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In accordance with the Letter of Authorization  
under the MMPA and ITS authorization under  
the ESA

7 February 2011

# **Annual Range Complex Exercise Report**

## **2 August 2010 to 1 August 2011**

**For The U.S. Navy's  
Southern California (SOCAL) Range Complex  
and  
Hawaii Range Complex (HRC)**

**1 October 2011**

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# SOUTHERN CALIFORNIA RANGE COMPLEX

## INTRODUCTION

The U.S. Navy prepared this Annual Range Complex Exercise Report covering the period from 2 August 2010 to 1 August 2011 in compliance with the National Marine Fisheries Service (NMFS) Final Rule under the Marine Mammal Protection Act (MMPA) for the Southern California (SOCAL) Range Complex.

In the SOCAL Range Complex Letter of Authorization "Requirements for monitoring and reporting", the following report subsections were specified and are present within this report for the SOCAL Range Complex:

- (1) Mid-Frequency Active Sonar (MFAS)/High-Frequency Active Sonar (HFAS) Major Training Exercises (MTE).
  - (i) Exercise information (for each MTE).
  - (ii) Individual marine mammal sighting information (for each MTE).
  - (iii) Evaluation (based on data gathered during all MTEs) of effectiveness of mitigation measures designed to avoid exposing marine mammals to MFAS. This evaluation shall identify the specific observations that support any conclusion the Navy reaches about the effectiveness of the mitigation.
- (2) Anti-Submarine Warfare (ASW) Summary
  - (i) Total annual hours of each type of sonar source
  - (ii) Cumulative Impact Report
- (3) Sinking Exercises (SINKEX)
  - (i) Exercise information (for each SINKEX)
  - (ii) Individual marine mammal observation information (for each mammal sighting)
- (4) Improved Extended Echo Ranging (IEER) Summary
  - (i) Total number of IEER events conducted in the SOCAL Range Complex
  - (ii) Total expended/detonated rounds (buoys)
  - (iii) Total number of self-scuttled IEER rounds
- (5) Explosives Summary
  - (i) Total annual number of each type of explosive exercises
  - (ii) Total annual expended/detonated rounds for each explosive type

This Annual Report covers the period from 2 August 2010 to 1 August 2011, and the information represents the best practical data collection for this period. The data collection and reporting timeline differs from the actual LOA dates. In order to provide a better representation of annual exercise data for the SOCAL Range Complex, the Navy has combined all exercise data from 2 August 2010 to 1 August 2011 and compared it to the annual allocations provided in the 7 February 2011 SOCAL Letter of Authorization. This representation of annual exercise data shall be repeated in future Annual Reports. To provide accounting for the entire five year period of the authorization, the Navy will also submit a final report at the end of the five years to provide comprehensive totals of authorized usage.

Finally, on review of accumulated reporting metrics, the Navy has determined that certain portions become classified by their summary. Information designated as classified in this report will be submitted to NMFS in a separate classified version of this report.

## **(1) SOCAL – MFAS/HFAS Major Training Exercises**

This section summarizes authorized sonar use and marine mammal observations from the MTEs conducted within the SOCAL Range Complex between 2 August 2010 and 1 August 2011.

For SOCAL, MTEs include Ship Anti-Submarine Warfare Readiness and Evaluation Measuring (SHAREM), Sustainment Exercises (SUSTEX), Integrated Anti-Submarine Warfare Course Phase II (IAC II), Composite Training Unit Exercises (C2X), and Joint Task Forces Exercises (JTFEX).

There were a total of eleven MTEs within the SOCAL Range Complex between 2 August 2010 and 1 August 2011. Exercise specific details as described in the SOCAL Final Rule §216.275(f)(1)i-iii and LOA include:

- (i) Exercise Information (for each MTE)
- (ii) Individual Marine Mammal Sighting Information (for each MTE)
- (iii) Evaluation (based on data gathered during all MTEs) of the effectiveness of mitigation measures designed to avoid exposing marine mammals to MFAS. This evaluation shall identify the specific observations that support any conclusions the Navy reaches about the effectiveness of the mitigation.

**(i) Exercise information**

**Table S1-i-1. MTEs conducted in the SOCAL Range Complex.**

| (A) Exercise | (B) Date        | (C) Location | (D) # and types of active sources used |        |        |           |                         |                  |              | (E) # and types of passive sources used |        |        |        |            |                         |                  | (F) # and types of vessels and aircraft participating |     |     |                      |                         |            |           | (G) Total hours of observation by watchstanders (hrs) | (H) Total hours of all active sonar | (I) Total hours ea. active source |        |        |        |            |                         |                  | (J) Wave height (high, low, and average) (ft) |              |
|--------------|-----------------|--------------|--|--------|--------|-----------|-------------------------|------------------|--------------|---|--------|--------|--------|------------|-------------------------|------------------|---|-----|-----|----------------------|-------------------------|------------|-----------|---|-------------------------------------|-----------------------------------|--------|--------|--------|------------|-------------------------|------------------|---|--------------|
|              |                 |              | SQS-53                                 | SQS-56 | BQQ-10 | BQS-15*** | AQS-22 (or AQS-13F)**** | SSQ-62 Sonobuoys | SLQ-25 Nixie | SQS-53                                  | SQS-56 | SQR-19 | BQQ-10 | BQS-15**** | AQS-22 (or AQS-13F)**** | SSQ-53 Sonobuoys | CG  | DDG | FFG | H-60F/R dipping helo | SH-60B non-dipping helo | Submarines | P-3C MPRA |   |                                     | Non-ASW surface ships             | SQS-53 | SQS-56 | BQQ-10 | BQS-15**** | AQS-22 (or AQS-13F)**** | SSQ-62 Sonobuoys |   | SLQ-25 Nixie |
| C2X**        | 23 JUL – 12 AUG | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 4         | 10,560  | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 6,1,3        |
| SUSTEX       | 5 AUG – 20 AUG  | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 1         | 4,380   | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 8,1,4        |
| IAC II       | 31 AUG – 2 SEP  | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 2         | 3,067   | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 6,1,3        |
| IAC II       | 20 OCT – 22 OCT | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 2         | 1,172   | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 14,2,4       |
| C2X          | 25 OCT – 15 NOV | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 2         | 14,644  | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 14,2,4       |
| C2X          | 4 NOV – 19 NOV  | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 3         | 6,212   | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 6,1,2        |
| C2X          | 30 NOV – 20 DEC | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 2         | 15,145  | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 15,1,3       |
| JTFEX        | 4 FEB – 9 FEB   | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 2         | 6,084   | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 5,1,3        |
| IAC II       | 18 FEB – 20 FEB | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 1         | 3,566   | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 9,2,4        |
| C2X          | 6 MAY – 27 MAY  | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 1         | 13,290  | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 8,4,6        |
| JTFEX        | 3 JUN – 8 JUN   | S            | *                                      | *      | *      | *         | *                       | *                | *            | *                                       | *      | *      | *      | *          | *                       | *                | *   | *   | *   | *                    | *                       | *          | 1         | 3,626   | *                                   | *                                 | *      | *      | *      | *          | *                       | *                | *   | 8,4,6        |

C2X=Composite Training Exercise; IAC II=Integrated ASW Course (Phase II); JTFEX=Joint Task Force Exercise; SUSTEX=Sustainment Exercise  
 S=SOCAL Range Complex

\* Information is contained in the classified version of this report.

\*\* Data collected from 2 August – 12 August 2010 is presented in this report. Data from 23 July – 1 August 2010 was included in the 2010 Annual Exercise Report.

\*\*\* Submarine mid-frequency navigational sonar (BQS-15) incorrectly designated BQQ-15 in Final Rule and LOA.

\*\*\*\* AQS-22 used as surrogate for AQS-13F; AQS-22 source level is higher than AQS-13F.

**(ii) Individual marine mammal sighting information by exercise**

**Table S1-ii-1. SOCAL MTE – Individual Marine Mammal Sighting Information: C2X 23 Jul – 12 Aug 2010.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|-----------------------|
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 2                                 | 4                    | 10                  | na                            | 1000-2000       | Maneuvered away            | na  | Closing, surfacing    |
| SOCAL        | dolphin     | 25                   | N                         | VIS                          | DDG                         | 3                                 | 1                    | 10                  | Y                             | <200            | na                         | dolphins bearing 180, ship course 170, paralleling ship   | Paralleling ship      |
| SOCAL        | dolphin     | 12                   | N                         | VIS                          | CG                          | 1                                 | nr                   | 9                   | N                             | <200            | na                         | na  | nr                    |
| SOCAL        | pinniped    | 1                    | N                         | VIS                          | DDG                         | 3                                 | 1                    | 10                  | N                             | <200            | na                         | na  | nr                    |
| SOCAL        | dolphin     | 4                    | N                         | VIS                          | DDG                         | 1                                 | 1                    | 10                  | N                             | <200            | na                         | na  | nr                    |
| SOCAL        | dolphin     | 2                    | N                         | VIS                          | DDG                         | 2                                 | 2                    | 10                  | N                             | <200            | na                         | na  | nr                    |
| SOCAL        | dolphin     | 3                    | N                         | VIS                          | DDG                         | 5                                 | 2                    | 10                  | N                             | <200            | na                         | na  | nr                    |
| SOCAL        | dolphin     | 10                   | N                         | VIS                          | CG                          | 3                                 | nr                   | 10                  | N                             | <200            | na                         | na  | nr                    |
| SOCAL        | whale       | 1                    | N                         | VIS                          | DDG                         | nr                                | 1                    | 10                  | N                             | >2000           | na                         | na  | nr                    |
| SOCAL        | whale       | 10                   | N                         | VIS                          | CG                          | 20                                | 2                    | 9                   | N                             | >2000           | na                         | na  | nr                    |
| SOCAL        | whale       | 13                   | N                         | VIS                          | CG                          | 30                                | 1                    | 10                  | N                             | >2000           | na                         | na  | nr                    |
| SOCAL        | whale       | 1                    | N                         | VIS                          | DDG                         | nr                                | 2                    | 10                  | N                             | >2000           | na                         | na  | nr                    |
| SOCAL        | dolphin     | 40                   | N                         | VIS                          | CG                          | 4                                 | 1                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                    |
| SOCAL        | dolphin     | 30                   | N                         | VIS                          | CG                          | 5                                 | 1                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                    |
| SOCAL        | dolphin     | 40                   | Y                         | VIS                          | CG                          | 5                                 | 1                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                    |
| SOCAL        | dolphin     | 15                   | N                         | VIS                          | CG                          | 10                                | 1                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                    |

|       |         |     |   |     |              |    |    |    |    |           |                 |    |                    |
|-------|---------|-----|---|-----|--------------|----|----|----|----|-----------|-----------------|----|--------------------|
| SOCAL | whale   | 1   | N | VIS | DDG          | nr | 1  | 10 | N  | 1000-2000 | na              | na | nr                 |
| SOCAL | dolphin | 80  | Y | VIS | DDG          | 6  | 2  | 10 | N  | 1000-2000 | na              | na | nr                 |
| SOCAL | dolphin | 2   | N | VIS | DDG          | nr | 2  | 10 | N  | 1000-2000 | na              | na | nr                 |
| SOCAL | whale   | 2   | N | VIS | CG           | 2  | 3  | 10 | N  | 1000-2000 | na              | na | nr                 |
| SOCAL | whale   | 2   | N | VIS | DDG          | 3  | 3  | 10 | N  | 1000-2000 | na              | na | nr                 |
| SOCAL | dolphin | 20  | N | VIS | CG           | 15 | 3  | 10 | N  | 200-500   | na              | na | nr                 |
| SOCAL | dolphin | 10  | N | VIS | CG           | 5  | nr | 10 | N  | 200-500   | na              | na | nr                 |
| SOCAL | whale   | 2   | N | VIS | CG           | 1  | nr | 5  | N  | 500-1000  | na              | na | nr                 |
| SOCAL | dolphin | 20  | N | VIS | DDG          | nr | 1  | 10 | N  | 500-1000  | na              | na | nr                 |
| SOCAL | dolphin | 2   | N | VIS | DDG          | 2  | 2  | 10 | N  | 500-1000  | na              | na | nr                 |
| SOCAL | dolphin | 35  | Y | VIS | DDG          | 3  | 2  | 10 | N  | 500-1000  | na              | na | nr                 |
| SOCAL | dolphin | nr  | N | VIS | DDG          | nr | 2  | 10 | N  | 500-1000  | na              | na | nr                 |
| SOCAL | dolphin | 10  | N | VIS | DDG          | 1  | 4  | 10 | N  | 500-1000  | na              | na | nr                 |
| SOCAL | dolphin | 50  | N | VIS | CG           | 15 | 1  | 10 | N  | nr        | na              | na | nr                 |
| SOCAL | dolphin | 200 | N | VIS | CG           | 25 | 1  | 10 | N  | nr        | na              | na | nr                 |
| SOCAL | dolphin | nr  | N | ACO | DDG          | nr | 1  | 10 | N  | nr        | na              | na | nr                 |
| SOCAL | dolphin | nr  | N | ACO | DDG          | 3  | 2  | 10 | N  | nr        | na              | na | nr                 |
| SOCAL | dolphin | nr  | N | ACO | DDG          | nr | 2  | 10 | N  | nr        | na              | na | nr                 |
| SOCAL | whale   | 1   | N | VIS | non-ASW ship | 3  | 2  | 10 | na | >2000     | na              | na | Blowing            |
| SOCAL | whale   | 1   | N | VIS | non-ASW ship | 2  | 1  | 10 | na | 1000-2000 | na              | na | Blowing            |
| SOCAL | whale   | 1   | N | VIS | non-ASW ship | 2  | 2  | 10 | na | 1000-2000 | na              | na | Blowing            |
| SOCAL | whale   | 1   | N | VIS | non-ASW ship | 2  | 4  | 10 | na | 1000-2000 | Maneuvered away | na | Closing, surfacing |
| SOCAL | whale   | 2   | N | VIS | non-ASW ship | 2  | 2  | 10 | na | 1000-2000 | na              | na | Surfacing          |
| SOCAL | dolphin | 5   | N | VIS | non-ASW ship | 2  | 1  | 10 | na | 200-500   | na              | na | Paralleling ship   |
| SOCAL | whale   | 1   | N | VIS | non-ASW ship | 1  | 2  | 10 | na | 200-500   | na              | na | Surfacing          |
| SOCAL | whale   | 2   | N | VIS | non-ASW ship | 4  | 2  | 10 | na | 500-1000  | na              | na | Blowing            |

|       |          |     |   |     |              |    |    |    |    |           |                    |   |                  |
|-------|----------|-----|---|-----|--------------|----|----|----|----|-----------|--------------------|---|------------------|
| SOCAL | whale    | 2   | N | VIS | non-ASW ship | 5  | 2  | 10 | na | 500-1000  | na                 | na  | Blowing          |
| SOCAL | dolphin  | 16  | N | VIS | non-ASW ship | 3  | 2  | 10 | na | 500-1000  | na                 | na  | Bowriding        |
| SOCAL | dolphin  | 30  | N | VIS | non-ASW ship | 2  | 3  | 10 | na | 500-1000  | na                 | na  | Bowriding        |
| SOCAL | dolphin  | 10  | N | VIS | DDG          | nr | 2  | 10 | Y  | <200      | Sonar<br>powerdown | dolphins bearing 005,<br>ship course 351, nr                  | nr               |
| SOCAL | pinniped | 1   | N | VIS | DDG          | 5  | 1  | 10 | Y  | <200      | Sonar<br>shutdown  | pinniped bearing 015,<br>ship course 349, nr                  | nr               |
| SOCAL | dolphin  | 1   | N | VIS | DDG          | 1  | 2  | 10 | Y  | <200      | Sonar<br>shutdown  | dolphin bearing 005,<br>ship course 256, nr                   | nr               |
| SOCAL | dolphin  | 20  | N | VIS | DDG          | 5  | 2  | 10 | Y  | <200      | Sonar<br>shutdown  | dolphins bearing 315,<br>ship course 314, nr                  | nr               |
| SOCAL | whale    | 1   | N | VIS | DDG          | nr | 2  | 10 | Y  | <200      | Sonar<br>shutdown  | whale bearing 248,<br>ship course 133, nr                     | nr               |
| SOCAL | whale    | 1   | N | VIS | DDG          | nr | 2  | 10 | Y  | <200      | Sonar<br>shutdown  | whale bearing 030,<br>ship course 284, nr                     | nr               |
| SOCAL | dolphin  | 4   | N | VIS | DDG          | 3  | nr | nr | Y  | <200      | Sonar<br>shutdown  | nr, nr, nr  | nr               |
| SOCAL | whale    | 3   | N | VIS | DDG          | 5  | 4  | 10 | Y  | >2000     | na                 | whales bearing 030,<br>ship course 297,<br>paralleling ship   | Blowing          |
| SOCAL | dolphin  | 100 | N | VIS | DDG          | 5  | 3  | 10 | Y  | >2000     | na                 | dolphins bearing 000,<br>ship course 335,<br>paralleling ship | Paralleling ship |
| SOCAL | whale    | 1   | N | VIS | DDG          | 2  | 2  | 10 | Y  | >2000     | na                 | whale bearing 180,<br>ship course 201, nr                     | nr               |
| SOCAL | whale    | 3   | N | VIS | DDG          | nr | 2  | 10 | Y  | >2000     | na                 | whales bearing 296,<br>ship course 310, nr                    | nr               |
| SOCAL | whale    | 1   | N | VIS | DDG          | 5  | 4  | 10 | Y  | >2000     | na                 | whale bearing 030,<br>ship course 249, nr                     | nr               |
| SOCAL | whale    | 1   | N | VIS | DDG          | nr | 1  | 10 | Y  | >2000     | na                 | whale bearing 235,<br>ship course 319, nr                     | nr               |
| SOCAL | pinniped | 1   | N | VIS | DDG          | 5  | 2  | 10 | Y  | >2000     | Sonar<br>powerdown | pinniped bearing 268,<br>ship course 168, nr                  | nr               |
| SOCAL | dolphin  | 20  | N | VIS | DDG          | 5  | 1  | 10 | Y  | 1000-2000 | na                 | dolphins bearing 010,<br>ship course 000,<br>paralleling ship | Paralleling ship |
| SOCAL | dolphin  | 150 | N | VIS | DDG          | 3  | 3  | 10 | Y  | 1000-2000 | na                 | dolphins bearing 090,<br>ship course 006,<br>paralleling ship | Paralleling ship |
| SOCAL | whale    | 1   | N | VIS | DDG          | nr | 2  | 10 | Y  | 1000-2000 | na                 | whale bearing 112,<br>ship course 259, nr                     | nr               |
| SOCAL | pinniped | 1   | N | VIS | DDG          | 2  | 2  | 7  | Y  | 1000-2000 | Sonar<br>powerdown | pinniped bearing 300,<br>ship course 175, nr                  | nr               |
| SOCAL | whale    | 1   | N | VIS | DDG          | 5  | 2  | 8  | Y  | 1000-2000 | Sonar<br>powerdown | whale bearing 270,<br>ship course 168, nr                     | nr               |
| SOCAL | whale    | 1   | N | VIS | DDG          | 5  | 2  | 8  | Y  | 1000-2000 | Sonar<br>powerdown | whale bearing 300,<br>ship course 310, nr                     | nr               |



|       |          |    |   |     |     |    |    |    |   |           |                 |   |    |
|-------|----------|----|---|-----|-----|----|----|----|---|-----------|-----------------|---|----|
| SOCAL | whale    | 2  | Y | VIS | DDG | 8  | 3  | 10 | Y | 1000-2000 | Sonar powerdown | whales bearing 312, ship course 321, nr   | nr |
| SOCAL | whale    | 1  | N | VIS | DDG | 5  | 2  | 10 | Y | 200-500   | Sonar powerdown | whale bearing 355, ship course 151, nr    | nr |
| SOCAL | dolphin  | 4  | N | VIS | DDG | 5  | 2  | 7  | Y | 200-500   | Sonar shutdown  | dolphins bearing 210, ship course 275, nr | nr |
| SOCAL | pinniped | 1  | N | VIS | DDG | 1  | 3  | 7  | Y | 200-500   | Sonar shutdown  | pinniped bearing 089, ship course 140, nr | nr |
| SOCAL | whale    | 1  | N | VIS | DDG | 1  | 2  | 8  | Y | 200-500   | Sonar shutdown  | whale bearing 260, ship course 275, nr    | nr |
| SOCAL | dolphin  | 1  | N | VIS | DDG | 1  | 2  | 10 | Y | 200-500   | Sonar shutdown  | dolphin bearing 315, ship course 352, nr  | nr |
| SOCAL | whale    | 2  | N | VIS | DDG | 3  | 2  | 10 | Y | 200-500   | Sonar shutdown  | whales bearing 180, ship course 356, nr   | nr |
| SOCAL | dolphin  | 4  | N | VIS | DDG | nr | 2  | 7  | Y | 500-1000  | Sonar powerdown | dolphins bearing 300, ship course 310, nr | nr |
| SOCAL | whale    | 1  | N | VIS | DDG | nr | 2  | 10 | Y | 500-1000  | Sonar powerdown | whale bearing 095, ship course 060, nr    | nr |
| SOCAL | whale    | 1  | N | VIS | CG  | 30 | nr | nr | Y | 500-1000  | Sonar powerdown | nr, ship course 240, nr                   | nr |
| SOCAL | whale    | 2  | N | VIS | DDG | nr | 1  | 10 | Y | 500-1000  | Sonar shutdown  | whales bearing 117, ship course 106, nr   | nr |
| SOCAL | nr       | nr | N | VIS | DDG | nr | nr | nr | Y | nr        | Sonar powerdown | nr, ship course 113, nr                   | nr |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**Table S1-ii-2. SOCAL MTE – Individual Marine Mammal Sighting Information: SUSTEX 5 – 20 Aug 2010.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|-----------------------|
| SOCAL        | dolphin     | 25                   | N                         | VIS                          | DDG                         | 3                                 | 1                    | 10                  | Y                             | <200            | na                         | dolphins bearing 180, ship course 170, paralleling ship   | Paralleling ship      |
| SOCAL        | whale       | 2                    | Y                         | VIS                          | CG                          | 3                                 | 1                    | 10                  | N                             | >2000           | na                         | na  | Blowing               |
| SOCAL        | dolphin     | 70                   | N                         | VIS                          | DDG                         | 5                                 | 3                    | 10                  | N                             | >2000           | na                         | na  | Paralleling ship      |
| SOCAL        | whale       | 4                    | N                         | VIS                          | CG                          | 7                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Blowing               |
| SOCAL        | dolphin     | 15                   | N                         | VIS                          | MPRA                        | 2                                 | 5                    | 7                   | N                             | 1000-2000       | Sonar shutdown             | na  | Swimming              |
| SOCAL        | whale       | 1                    | N                         | VIS                          | CG                          | 5                                 | 3                    | 10                  | N                             | 500-1000        | na                         | na  | Blowing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 1                                 | 1                    | 10                  | na                            | >2000           | na                         | na  | Blowing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 1                                 | 2                    | 10                  | na                            | >2000           | na                         | na  | Blowing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 3                                 | 2                    | 10                  | na                            | >2000           | na                         | na  | Blowing               |
| SOCAL        | whale       | 2                    | N                         | VIS                          | non-ASW ship                | 1                                 | 3                    | 10                  | na                            | >2000           | na                         | na  | Blowing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 1                                 | 1                    | 10                  | na                            | 1000-2000       | na                         | na  | Blowing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 4                                 | 1                    | 10                  | na                            | 1000-2000       | na                         | na  | Blowing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 1                                 | 1                    | 10                  | na                            | 1000-2000       | na                         | na  | Blowing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 1                                 | 1                    | 10                  | na                            | 1000-2000       | na                         | na  | Blowing               |
| SOCAL        | whale       | 2                    | N                         | VIS                          | non-ASW ship                | 1                                 | 1                    | 10                  | na                            | 1000-2000       | na                         | na  | Blowing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 2                                 | 1                    | 10                  | na                            | 1000-2000       | na                         | na  | Blowing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 2                                 | 2                    | 10                  | na                            | 1000-2000       | na                         | na  | Blowing               |

|       |          |     |   |     |              |   |   |    |    |           |                 |   |                  |
|-------|----------|-----|---|-----|--------------|---|---|----|----|-----------|-----------------|---|------------------|
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 2 | 2 | 10 | na | 1000-2000 | na              | na  | Blowing          |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 2 | 2 | 10 | na | 1000-2000 | na              | na  | Blowing          |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 5 | 2 | 10 | na | 1000-2000 | na              | na  | Blowing          |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 3 | 10 | na | 1000-2000 | na              | na  | Blowing          |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 2 | 6 | 10 | na | 1000-2000 | na              | na  | Blowing          |
| SOCAL | whale    | 2   | N | VIS | non-ASW ship | 2 | 2 | 10 | na | 1000-2000 | na              | na  | Surfacing        |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 3 | 10 | na | 1000-2000 | na              | na  | Surfacing        |
| SOCAL | dolphin  | 5   | N | VIS | non-ASW ship | 2 | 1 | 10 | na | 200-500   | na              | na  | Paralleling ship |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 2 | 10 | na | 200-500   | na              | na  | Surfacing        |
| SOCAL | whale    | 2   | N | VIS | non-ASW ship | 4 | 2 | 10 | na | 500-1000  | na              | na  | Blowing          |
| SOCAL | whale    | 2   | N | VIS | non-ASW ship | 5 | 2 | 10 | na | 500-1000  | na              | na  | Blowing          |
| SOCAL | dolphin  | 16  | N | VIS | non-ASW ship | 3 | 2 | 10 | na | 500-1000  | na              | na  | Bowriding        |
| SOCAL | dolphin  | 30  | N | VIS | non-ASW ship | 2 | 3 | 10 | na | 500-1000  | na              | na  | Bowriding        |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 1 | 10 | na | 500-1000  | na              | na  | Surfacing        |
| SOCAL | pinniped | 1   | N | VIS | DDG          | 3 | 4 | 10 | Y  | <200      | Sonar shutdown  | pinniped bearing 060, ship course 193, opening ship     | Floating         |
| SOCAL | whale    | 3   | N | VIS | DDG          | 5 | 4 | 10 | Y  | >2000     | na              | whales bearing 030, ship course 297, paralleling ship   | Blowing          |
| SOCAL | dolphin  | 20  | N | VIS | DDG          | 5 | 4 | 10 | Y  | >2000     | na              | dolphins bearing 230, ship course 210, closing ship     | Closing          |
| SOCAL | dolphin  | 100 | N | VIS | DDG          | 5 | 3 | 10 | Y  | >2000     | na              | dolphins bearing 000, ship course 335, paralleling ship | Paralleling ship |
| SOCAL | dolphin  | 30  | N | VIS | DDG          | 5 | 3 | 10 | Y  | >2000     | na              | dolphins bearing 145, ship course 339, paralleling ship | Paralleling ship |
| SOCAL | dolphin  | 20  | N | VIS | DDG          | 5 | 1 | 10 | Y  | 1000-2000 | na              | dolphins bearing 010, ship course 000, paralleling ship | Paralleling ship |
| SOCAL | dolphin  | 150 | N | VIS | DDG          | 3 | 3 | 10 | Y  | 1000-2000 | na              | dolphins bearing 090, ship course 006, paralleling ship | Paralleling ship |
| SOCAL | pinniped | 3   | N | VIS | DDG          | 5 | 4 | 10 | Y  | 500-1000  | Sonar powerdown | pinnipeds bearing 230, ship course 190,                 | Floating         |

|       |          |    |   |     |     |   |   |    |   |          |                    |  |          |
|-------|----------|----|---|-----|-----|---|---|----|---|----------|--------------------|--|----------|
|       |          |    |   |     |     |   |   |    |   |          |                    | paralleling ship   |          |
| SOCAL | pinniped | 20 | N | VIS | DDG | 5 | 4 | 10 | Y | 500-1000 | Sonar<br>powerdown | pinnipeds bearing 295,<br>ship course 210,<br>paralleling ship | Floating |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**Table S1-ii-3. SOCAL MTE – Individual Marine Mammal Sighting Information: IAC II 31 Aug – 2 Sep 2010.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior               |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|-------------------------------------|
| SOCAL        | dolphin     | 25                   | N                         | VIS                          | DDG                         | 2                                 | 3                    | 5                   | Y                             | 500-1000        | na                         | dolphins bearing 030, ship course 010, nr   | Pod of dolphins bowriding           |
| SOCAL        | dolphin     | 10                   | N                         | VIS                          | CG                          | 3                                 | 2                    | 10                  | N                             | <200            | na                         | na  | nr                                  |
| SOCAL        | dolphin     | 2                    | N                         | VIS                          | CG                          | 7                                 | 2                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                                  |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | FFG                         | 5                                 | 1                    | nr                  | N                             | 1000-2000       | na                         | na  | nr                                  |
| SOCAL        | dolphin     | 30                   | N                         | VIS                          | CG                          | 4                                 | 2                    | 10                  | N                             | 200-500         | na                         | na  | nr                                  |
| SOCAL        | dolphin     | 10                   | N                         | VIS                          | CG                          | 4                                 | 1                    | 10                  | N                             | 500-1000        | na                         | na  | nr                                  |
| SOCAL        | nr          | nr                   | N                         | ACO                          | CG                          | 3                                 | 1                    | 10                  | N                             | nr              | na                         | na  | nr                                  |
| SOCAL        | dolphin     | nr                   | N                         | VIS                          | FFG                         | nr                                | nr                   | nr                  | nr                            | 1000-2000       | nr                         | na  | nr                                  |
| SOCAL        | dolphin     | nr                   | N                         | VIS                          | FFG                         | nr                                | nr                   | nr                  | nr                            | nr              | nr                         | na  | nr                                  |
| SOCAL        | dolphin     | nr                   | N                         | VIS                          | FFG                         | nr                                | nr                   | nr                  | nr                            | nr              | nr                         | na  | nr                                  |
| SOCAL        | pinniped    | 1                    | N                         | VIS                          | DDG                         | 5                                 | 2                    | 10                  | Y                             | <200            | Sonar shutdown             | pinniped bearing 270, ship course 270, nr   | Dead seal                           |
| SOCAL        | nr          | nr                   | N                         | ACO                          | CG                          | nr                                | 2                    | 10                  | Y                             | 1000-2000       | Sonar powerdown            | Acoustic detection only   | Heard over UWT                      |
| SOCAL        | whale       | 2                    | N                         | VIS                          | CG                          | 8                                 | 2                    | 10                  | Y                             | 1000-2000       | Sonar shutdown             | whales bearing 280, ship course 170, closing ship   | Adult fin whales swimming, spouting |
| SOCAL        | dolphin     | 25                   | N                         | VIS                          | CG                          | 3                                 | 2                    | 10                  | Y                             | 1000-2000       | na                         | dolphins bearing 250, ship course 270, nr   | nr                                  |
| SOCAL        | whale       | nr                   | N                         | ACO                          | CG                          | 10                                | 2                    | 10                  | Y                             | nr              | Sonar powerdown            | Acoustic detection only   | Heard over UWT                      |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**Table S1-ii-4. SOCAL MTE – Individual Marine Mammal Sighting Information: IAC II 20 – 22 Oct 2010.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior                              |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|--|
| SOCAL        | dolphin     | 15                   | N                         | VIS                          | FFG                         | 1                                 | 2                    | 10                  | Y                             | 500-1000        | na                         | dolphins bearing 340, ship course 120, paralleling ship   | Breaching  |
| SOCAL        | dolphin     | 10                   | N                         | VIS                          | FFG                         | 1                                 | 3                    | 10                  | Y                             | 500-1000        | na                         | dolphins bearing 030, ship course 025, closing ship   | Breaching  |
| SOCAL        | dolphin     | 15                   | N                         | VIS                          | CG                          | 3                                 | 2                    | 10                  | Y                             | 500-1000        | na                         | dolphins bearing 035, nr, nr  | Dolphins seen off the bow                          |
| SOCAL        | dolphin     | 100                  | N                         | VIS                          | CG                          | 10                                | 5                    | 9                   | N                             | <200            | na                         | na  | Bowriding  |
| SOCAL        | dolphin     | 150                  | N                         | VIS                          | FFG                         | 2                                 | 4                    | 10                  | N                             | <200            | na                         | na  | Breaching  |
| SOCAL        | pinniped    | 20                   | N                         | VIS                          | CG                          | 5                                 | 2                    | 10                  | N                             | <200            | na                         | na  | nr   |
| SOCAL        | dolphin     | 100                  | N                         | VIS                          | CG                          | 10                                | 5                    | 10                  | N                             | <200            | na                         | na  | Sighted off the bow, crossed bow port to starboard |
| SOCAL        | dolphin     | 1                    | N                         | VIS                          | DDG                         | 1                                 | 2                    | 10                  | N                             | <200            | na                         | na  | nr   |
| SOCAL        | dolphin     | 50                   | N                         | VIS                          | DDG                         | 10                                | 2                    | 10                  | N                             | <200            | na                         | na  | nr   |
| SOCAL        | whale       | 1                    | N                         | VIS                          | CG                          | 2                                 | 2                    | 10                  | N                             | >2000           | na                         | na  | Breaching, blowing                                 |
| SOCAL        | whale       | 1                    | N                         | VIS                          | FFG                         | 1                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Blowing  |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | CG                          | 10                                | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Dolphins seen jumping                              |
| SOCAL        | dolphin     | 30                   | N                         | VIS                          | FFG                         | 5                                 | 2                    | 10                  | N                             | 200-500         | na                         | na  | Breaching  |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | FFG                         | 3                                 | 2                    | 10                  | N                             | 200-500         | na                         | na  | Feeding  |
| SOCAL        | dolphin     | 4                    | N                         | VIS                          | FFG                         | 2                                 | 3                    | 10                  | N                             | 500-1000        | na                         | na  | Opening  |
| SOCAL        | dolphin     | 250                  | N                         | VIS                          | HELO                        | 5                                 | 5                    | 10                  | N                             | nr              | Sonar shutdown             | na  | nr   |

|       |         |     |   |     |              |    |   |    |    |           |                 |  |                       |
|-------|---------|-----|---|-----|--------------|----|---|----|----|-----------|-----------------|--|-----------------------|
| SOCAL | whale   | 1   | N | VIS | non-ASW ship | 2  | 2 | 10 | na | >2000     | na              | na   | Blowing               |
| SOCAL | whale   | 2   | N | VIS | non-ASW ship | 1  | 2 | 5  | na | 1000-2000 | na              | na   | Blowing               |
| SOCAL | whale   | 3   | N | VIS | non-ASW ship | 5  | 2 | 10 | na | 1000-2000 | na              | na   | Blowing               |
| SOCAL | whale   | 2   | Y | VIS | non-ASW ship | 10 | 2 | 10 | na | 1000-2000 | na              | na   | Paralleling ship      |
| SOCAL | dolphin | 15  | N | VIS | non-ASW ship | 3  | 2 | 6  | na | 1000-2000 | na              | na   | Swimming in a group   |
| SOCAL | dolphin | 20  | N | VIS | non-ASW ship | 6  | 2 | 6  | na | 1000-2000 | na              | na   | Swimming in a group   |
| SOCAL | whale   | 5   | N | VIS | non-ASW ship | 7  | 2 | 10 | na | 500-1000  | na              | na   | Blowing               |
| SOCAL | dolphin | 35  | N | VIS | FFG          | 2  | 2 | 10 | Y  | <200      | Sonar shutdown  | dolphins bearing 280, ship course 290, closing ship    | Feeding               |
| SOCAL | whale   | 1   | N | VIS | DDG          | 9  | 3 | 10 | Y  | <200      | Sonar shutdown  | whale bearing 150, ship course 180, closing ship       | nr                    |
| SOCAL | dolphin | 200 | N | VIS | FFG          | 3  | 3 | 10 | Y  | <200      | Sonar shutdown  | dolphins bearing 050, nr, nr                           | nr                    |
| SOCAL | dolphin | 100 | N | VIS | CG           | 10 | 2 | 10 | Y  | 200-500   | Sonar powerdown | dolphins bearing 270, nr, opening ship                 | Dolphins seen jumping |
| SOCAL | dolphin | 1   | N | VIS | FFG          | 1  | 2 | 10 | Y  | 500-1000  | Sonar shutdown  | dolphin bearing 140, ship course 050, paralleling ship | Breaching             |
| SOCAL | dolphin | 10  | N | VIS | DDG          | 3  | 2 | 10 | Y  | 500-1000  | Sonar shutdown  | dolphins bearing 030, ship course 035, closing ship    | nr                    |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**Table S1-ii-5. SOCAL MTE – Individual Marine Mammal Sighting Information: C2X 25 Oct – 15 Nov 2010.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior      |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|----------------------------|
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | DDG                         | 5                                 | 1                    | 10                  | Y                             | 500-1000        | na                         | dolphins bearing 150, nr, nr  | nr                         |
| SOCAL        | dolphin     | 5                    | N                         | VIS                          | DDG                         | 5                                 | 2                    | nr                  | N                             | <200            | na                         | na  | Bowriding parallel to ship |
| SOCAL        | dolphin     | 5                    | N                         | VIS                          | FFG                         | 1                                 | 5                    | 10                  | N                             | <200            | na                         | na  | Breaching                  |
| SOCAL        | pinniped    | 2                    | N                         | VIS                          | FFG                         | 3                                 | 5                    | 10                  | N                             | <200            | na                         | na  | Breaching                  |
| SOCAL        | dolphin     | 150                  | N                         | VIS                          | FFG                         | 5                                 | 5                    | 10                  | N                             | <200            | na                         | na  | Breaching                  |
| SOCAL        | whale       | 1                    | N                         | VIS                          | FFG                         | 3                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Blowing                    |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | DDG                         | 3                                 | 2                    | 10                  | N                             | 1000-2000       | na                         | na  | Bowriding                  |
| SOCAL        | dolphin     | 12                   | N                         | VIS                          | FFG                         | 5                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Breaching                  |
| SOCAL        | dolphin     | 15                   | N                         | VIS                          | CG                          | 6                                 | 2                    | 10                  | N                             | 1000-2000       | na                         | na  | Jumping                    |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | DDG                         | 5                                 | 2                    | nr                  | N                             | 1000-2000       | na                         | na  | nr                         |
| SOCAL        | dolphin     | 100                  | N                         | VIS                          | DDG                         | nr                                | 2                    | 9                   | N                             | 1000-2000       | na                         | na  | Paralleling ship           |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | DDG                         | 5                                 | 4                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                         |
| SOCAL        | whale       | 1                    | N                         | VIS                          | FFG                         | 1                                 | 1                    | 10                  | N                             | 200-500         | na                         | na  | Blowing                    |
| SOCAL        | dolphin     | 50                   | N                         | VIS                          | FFG                         | 2                                 | 1                    | 10                  | N                             | 200-500         | na                         | na  | Breaching                  |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | FFG                         | 2                                 | 3                    | 10                  | N                             | 200-500         | na                         | na  | Breaching                  |
| SOCAL        | dolphin     | 50                   | N                         | VIS                          | FFG                         | 2                                 | 3                    | 10                  | N                             | 200-500         | na                         | na  | Breaching                  |
| SOCAL        | dolphin     | 6                    | N                         | VIS                          | FFG                         | 5                                 | 4                    | 10                  | N                             | 200-500         | na                         | na  | Breaching                  |
| SOCAL        | dolphin     | 60                   | N                         | VIS                          | FFG                         | 1                                 | 6                    | 10                  | N                             | 200-500         | na                         | na  | Breaching                  |



|       |          |     |   |     |              |   |   |    |    |           |                    |    |   |
|-------|----------|-----|---|-----|--------------|---|---|----|----|-----------|--------------------|----|---|
| SOCAL | dolphin  | 15  | N | VIS | DDG          | 1 | 2 | nr | N  | 500-1000  | Sonar<br>powerdown | na | Bowriding                                 |
| SOCAL | whale    | 10  | N | VIS | CG           | 5 | 1 | 10 | N  | 500-1000  | na                 | na | Breaching                                 |
| SOCAL | dolphin  | 5   | N | VIS | FFG          | 5 | 5 | 10 | N  | 500-1000  | na                 | na | Breaching                                 |
| SOCAL | dolphin  | 20  | N | VIS | CG           | 5 | 1 | 10 | N  | 500-1000  | na                 | na | Jumping                                   |
| SOCAL | dolphin  | 6   | N | VIS | CG           | 3 | 2 | 8  | N  | 500-1000  | na                 | na | Paralleling ship                          |
| SOCAL | whale    | 1   | N | VIS | DDG          | 5 | 2 | 9  | N  | 500-1000  | na                 | na | Paralleling ship                          |
| SOCAL | dolphin  | 100 | Y | VIS | non-ASW ship | 2 | 5 | 10 | na | <200      | na                 | na | Swimming off<br>port and starboard<br>bow |
| SOCAL | dolphin  | 20  | N | VIS | non-ASW ship | 2 | 2 | 8  | na | <200      | na                 | na | Bowriding                                 |
| SOCAL | dolphin  | 5   | N | VIS | non-ASW ship | 5 | 1 | 5  | na | <200      | na                 | na | Swimming                                  |
| SOCAL | whale    | 2   | Y | VIS | non-ASW ship | 1 | 2 | 7  | na | >2000     | na                 | na | Blowing                                   |
| SOCAL | whale    | 4   | N | VIS | non-ASW ship | 2 | 2 | 7  | na | >2000     | na                 | na | Blowing                                   |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 2 | 10 | na | >2000     | na                 | na | Blowing                                   |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 3 | 8 | 10 | na | >2000     | na                 | na | Blowing                                   |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 1 | 10 | na | >2000     | na                 | na | Blowing                                   |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 1 | 10 | na | >2000     | na                 | na | Blowing                                   |
| SOCAL | whale    | 2   | Y | VIS | non-ASW ship | 1 | 1 | 10 | na | >2000     | na                 | na | Blowing                                   |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 4 | 10 | na | >2000     | na                 | na | Blowing                                   |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 5 | 10 | na | >2000     | na                 | na | Blowing                                   |
| SOCAL | whale    | 2   | N | VIS | non-ASW ship | 1 | 2 | 10 | na | >2000     | na                 | na | Surfaced                                  |
| SOCAL | whale    | 10  | N | VIS | non-ASW ship | 2 | 2 | 10 | na | >2000     | na                 | na | Swimming aft                              |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 1 | 10 | na | 1000-2000 | na                 | na | Blowing                                   |
| SOCAL | whale    | 2   | N | VIS | non-ASW ship | 4 | 4 | 10 | na | 1000-2000 | na                 | na | Blowing                                   |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1 | 5 | 10 | na | 1000-2000 | na                 | na | Crossed bow port<br>to starboard          |
| SOCAL | pinniped | 50  | Y | VIS | non-ASW ship | 1 | 5 | 10 | na | 1000-2000 | na                 | na | Paralleling ship                          |
| SOCAL | whale    | 2   | N | VIS | non-ASW ship | 1 | 2 | 10 | na | 1000-2000 | na                 | na | Surfacing                                 |

|       |          |    |   |     |              |    |    |    |    |           |                 |   |                            |
|-------|----------|----|---|-----|--------------|----|----|----|----|-----------|-----------------|---|----------------------------|
| SOCAL | whale    | 2  | N | VIS | non-ASW ship | 2  | 2  | 10 | na | 1000-2000 | na              | na  | Surfacing                  |
| SOCAL | pinniped | 15 | N | VIS | non-ASW ship | 5  | 4  | 10 | na | 1000-2000 | na              | na  | Swimming port to starboard |
| SOCAL | dolphin  | 5  | Y | VIS | non-ASW ship | 2  | 2  | 10 | na | 1000-2000 | na              | na  | Swimming                   |
| SOCAL | dolphin  | 20 | Y | VIS | non-ASW ship | 2  | 4  | 10 | na | 1000-2000 | na              | na  | Swimming                   |
| SOCAL | dolphin  | 10 | Y | VIS | non-ASW ship | 1  | 6  | 10 | na | 1000-2000 | na              | na  | Swimming                   |
| SOCAL | dolphin  | 25 | Y | VIS | non-ASW ship | 1  | 2  | 10 | na | 1000-2000 | na              | na  | Swimming                   |
| SOCAL | whale    | 2  | N | VIS | non-ASW ship | 5  | 4  | 10 | na | 1000-2000 | na              | na  | Swimming aft               |
| SOCAL | dolphin  | 15 | Y | VIS | non-ASW ship | 2  | 3  | 10 | na | 1000-2000 | na              | na  | Swimming and jumping       |
| SOCAL | dolphin  | 10 | N | VIS | non-ASW ship | 5  | 1  | 10 | na | 200-500   | na              | na  | Closing stern              |
| SOCAL | whale    | 1  | N | VIS | non-ASW ship | 2  | 2  | 10 | na | 200-500   | na              | na  | Surfacing                  |
| SOCAL | dolphin  | 21 | Y | VIS | non-ASW ship | 2  | 2  | 10 | na | 500-1000  | na              | na  | Swimming                   |
| SOCAL | whale    | 2  | N | VIS | non-ASW ship | 1  | 3  | 10 | na | 500-1000  | na              | na  | Blowing                    |
| SOCAL | whale    | 1  | N | VIS | non-ASW ship | 1  | 4  | 10 | na | 500-1000  | na              | na  | Blowing                    |
| SOCAL | whale    | 5  | N | VIS | non-ASW ship | 3  | 1  | 10 | na | 500-1000  | na              | na  | Blowing                    |
| SOCAL | whale    | 35 | Y | VIS | non-ASW ship | 2  | 2  | 10 | na | 500-1000  | na              | na  | Surfacing                  |
| SOCAL | pinniped | 7  | N | VIS | non-ASW ship | 1  | 6  | 10 | na | 500-1000  | na              | na  | Swimming port to starboard |
| SOCAL | dolphin  | 30 | Y | VIS | non-ASW ship | 2  | 4  | 5  | na | 500-1000  | na              | na  | Swimming                   |
| SOCAL | whale    | 1  | N | VIS | MPRA         | nr | nr | nr | nr | nr        | na              | na  | Floating carcass           |
| SOCAL | dolphin  | 30 | N | VIS | DDG          | 15 | 2  | 10 | Y  | <200      | Sonar shutdown  | dolphins bearing 000, nr, nr                        | nr                         |
| SOCAL | dolphin  | 20 | N | VIS | DDG          | 2  | 2  | nr | Y  | >2000     | na              | dolphins bearing 220, ship course 235, opening ship | nr                         |
| SOCAL | dolphin  | 15 | N | VIS | DDG          | 10 | 2  | nr | Y  | >2000     | na              | dolphins bearing 120, ship course 090, opening ship | nr                         |
| SOCAL | dolphin  | 10 | N | VIS | DDG          | 5  | 2  | nr | Y  | 500-1000  | Sonar powerdown | dolphins bearing 115, ship course 150, closing ship | Bowriding                  |
| SOCAL | dolphin  | 5  | N | VIS | DDG          | 5  | 6  | 10 | Y  | 500-1000  | Sonar powerdown | dolphins bearing 340, nr, nr                        | nr                         |
| SOCAL | dolphin  | 10 | N | VIS | DDG          | 1  | 2  | 9  | Y  | 500-1000  | Sonar shutdown  | dolphins bearing 310, nr, opening ship              | nr                         |

|       |       |   |   |     |      |    |   |    |   |    |                |    |    |
|-------|-------|---|---|-----|------|----|---|----|---|----|----------------|----|----|
| SOCAL | whale | 3 | N | VIS | MPRA | nr | 2 | 10 | Y | nr | Sonar shutdown | na | nr |
|-------|-------|---|---|-----|------|----|---|----|---|----|----------------|----|----|

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**Table S1-ii-6. SOCAL MTE – Individual Marine Mammal Sighting Information: C2X 4 – 19 Nov 2010.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|-----------------------|
| SOCAL        | dolphin     | 30                   | N                         | VIS                          | MPRA                        | 10                                | 3                    | 10                  | N                             | >2000           | na                         | na  | nr                    |
| SOCAL        | dolphin     | 80                   | N                         | VIS                          | MPRA                        | 10                                | 3                    | 10                  | N                             | >2000           | na                         | na  | nr                    |
| SOCAL        | dolphin     | 150                  | N                         | VIS                          | MPRA                        | nr                                | 1                    | 10                  | N                             | nr              | na                         | na  | nr                    |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**Table S1-ii-7. SOCAL MTE – Individual Marine Mammal Sighting Information: C2X 30 Nov – 20 Dec 2010.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|-----------------------|
| SOCAL        | dolphin     | 5                    | N                         | VIS                          | DDG                         | 3                                 | 2                    | 10                  | Y                             | 200-500         | na                         | dolphins bearing 141, ship course 141, nr   | nr                    |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | DDG                         | 2                                 | 7                    | 10                  | N                             | <200            | na                         | na  | Bowriding             |
| SOCAL        | whale       | 2                    | N                         | VIS                          | DDG                         | 1                                 | 6                    | 8                   | N                             | >2000           | na                         | na  | nr                    |
| SOCAL        | dolphin     | 2                    | N                         | VIS                          | MPRA                        | 5                                 | 3                    | 10                  | N                             | >2000           | na                         | na  | nr                    |
| SOCAL        | whale       | 1                    | N                         | VIS                          | DDG                         | 1                                 | 1                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                    |
| SOCAL        | whale       | 1                    | N                         | VIS                          | DDG                         | 1                                 | 2                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                    |
| SOCAL        | whale       | 12                   | Y                         | VIS                          | DDG                         | 10                                | 1                    | 10                  | N                             | 500-1000        | na                         | na  | Minke whales          |
| SOCAL        | dolphin     | 10                   | N                         | VIS                          | CG                          | 5                                 | 5                    | 10                  | N                             | nr              | na                         | na  | Bowriding             |
| SOCAL        | dolphin     | 10                   | N                         | VIS                          | CG                          | 5                                 | 5                    | 10                  | N                             | nr              | na                         | na  | Bowriding             |
| SOCAL        | dolphin     | 5                    | N                         | VIS                          | CG                          | nr                                | 5                    | 10                  | N                             | nr              | na                         | na  | Bowriding             |
| SOCAL        | dolphin     | 5                    | N                         | VIS                          | CG                          | nr                                | 5                    | 10                  | N                             | nr              | na                         | na  | Bowriding             |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | CG                          | nr                                | 5                    | 10                  | N                             | nr              | na                         | na  | Bowriding             |
| SOCAL        | whale       | 1                    | N                         | VIS                          | CG                          | nr                                | 5                    | 10                  | N                             | nr              | na                         | na  | Floating              |
| SOCAL        | whale       | 1                    | N                         | VIS                          | CG                          | 5                                 | 5                    | 10                  | N                             | nr              | na                         | na  | Orca, floating        |
| SOCAL        | whale       | 6                    | N                         | VIS                          | CG                          | 5                                 | 5                    | 10                  | N                             | nr              | na                         | na  | Pilot whale, floating |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | FFG                         | 10                                | 2                    | 10                  | N                             | 1000-2000       | na                         | na  | Tail observed         |
| SOCAL        | dolphin     | 20                   | Y                         | VIS                          | non-ASW ship                | 10                                | 2                    | 10                  | na                            | >2000           | na                         | na  | Bowriding             |
| SOCAL        | nr          | 1                    | N                         | VIS                          | non-ASW ship                | 1                                 | 4                    | 7                   | na                            | >2000           | na                         | na  | Floating              |

|       |         |    |   |     |              |     |    |    |    |           |                |   |                       |
|-------|---------|----|---|-----|--------------|-----|----|----|----|-----------|----------------|---|-----------------------|
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 1   | 1  | 10 | na | >2000     | na             | na  | Floating              |
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 1   | 1  | 10 | na | >2000     | na             | na  | Floating              |
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 2   | 1  | 10 | na | >2000     | na             | na  | Floating              |
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 1   | 3  | 10 | na | >2000     | na             | na  | Floating              |
| SOCAL | whale   | 3  | N | VIS | non-ASW ship | 3   | 3  | 10 | na | >2000     | na             | na  | Floating              |
| SOCAL | whale   | 2  | N | VIS | non-ASW ship | 1   | 1  | 10 | na | >2000     | na             | na  | Paralleling ship      |
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 1   | 2  | 10 | na | >2000     | na             | na  | Paralleling ship      |
| SOCAL | dolphin | 1  | N | VIS | non-ASW ship | nr  | 4  | 10 | na | >2000     | na             | na  | nr                    |
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 2   | 1  | 10 | na | 1000-2000 | na             | na  | Floating              |
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 1   | 1  | 10 | na | 1000-2000 | na             | na  | Floating              |
| SOCAL | whale   | 2  | N | VIS | non-ASW ship | 3   | 2  | 10 | na | 1000-2000 | na             | na  | Floating              |
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 5   | 3  | 10 | na | 1000-2000 | na             | na  | Floating              |
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 1   | 1  | 10 | na | 1000-2000 | na             | na  | Paralleling ship      |
| SOCAL | whale   | 5  | N | VIS | non-ASW ship | 1   | 1  | 10 | na | 1000-2000 | na             | na  | Paralleling ship      |
| SOCAL | dolphin | 15 | Y | VIS | non-ASW ship | 4   | 1  | 10 | na | 200-500   | na             | na  | Bowriding             |
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 1   | 1  | 9  | na | 500-1000  | na             | na  | Floating              |
| SOCAL | whale   | 2  | N | VIS | non-ASW ship | 15  | 1  | 10 | na | 500-1000  | na             | na  | Floating              |
| SOCAL | dolphin | 20 | N | VIS | CG           | 3   | 4  | 9  | Y  | <200      | Sonar shutdown | dolphins bearing 010, ship course 335, opening ship     | Bowriding             |
| SOCAL | dolphin | 5  | N | VIS | DDG          | 110 | nr | nr | Y  | <200      | Sonar shutdown | dolphins bearing 165, ship course 329, paralleling ship | Bowriding             |
| SOCAL | whale   | 2  | N | VIS | DDG          | 2   | 5  | 10 | Y  | <200      | Sonar shutdown | whales bearing 355, ship course 349, opening ship       | nr                    |
| SOCAL | whale   | 4  | N | VIS | CG           | 49  | 3  | 10 | Y  | <200      | Sonar shutdown | whales bearing 020, ship course 225, nr                 | nr                    |
| SOCAL | dolphin | 1  | N | VIS | DDG          | 4   | nr | nr | Y  | <200      | Sonar shutdown | nr, ship course 290, opening ship                       | Dolphin heading south |
| SOCAL | dolphin | 50 | Y | VIS | DDG          | 10  | 1  | 8  | Y  | >2000     | Sonar shutdown | dolphins bearing 214, ship course 329, closing ship     | Bowriding             |
| SOCAL | whale   | 2  | N | VIS | DDG          | 1   | 1  | 10 | Y  | >2000     | na             | whales bearing 128, ship course 359, nr                 | nr                    |

|       |         |     |   |     |     |    |    |    |   |           |                    |   |           |
|-------|---------|-----|---|-----|-----|----|----|----|---|-----------|--------------------|---|-----------|
| SOCAL | whale   | 1   | N | VIS | DDG | 3  | 5  | 10 | Y | >2000     | na                 | whale bearing 345,<br>ship course 000, nr                     | nr        |
| SOCAL | whale   | 2   | N | VIS | DDG | nr | nr | nr | Y | >2000     | na                 | whales bearing 220,<br>ship course 339, nr                    | nr        |
| SOCAL | whale   | 1   | N | VIS | DDG | 1  | 3  | 9  | Y | 1000-2000 | Sonar<br>powerdown | whale bearing 020, nr,<br>paralleling ship                    | One spout |
| SOCAL | whale   | 2   | N | VIS | DDG | 1  | 1  | 9  | Y | 1000-2000 | Sonar<br>powerdown | whales bearing 270,<br>ship course 210,<br>paralleling ship   | nr        |
| SOCAL | whale   | 1   | N | VIS | DDG | 1  | 1  | 9  | Y | 1000-2000 | Sonar<br>powerdown | whale bearing 160,<br>ship course 233,<br>opening ship        | nr        |
| SOCAL | dolphin | 20  | N | VIS | DDG | 12 | 2  | 1  | Y | 1000-2000 | Sonar<br>shutdown  | dolphins bearing 045,<br>ship course 155,<br>opening ship     | nr        |
| SOCAL | whale   | 1   | N | VIS | DDG | nr | nr | nr | Y | 1000-2000 | Sonar<br>powerdown | whale bearing 208,<br>ship course 208,<br>closing ship        | nr        |
| SOCAL | dolphin | 100 | N | VIS | DDG | 20 | 6  | 8  | Y | 1000-2000 | Sonar<br>shutdown  | nr, ship course 328, nr                                       | nr        |
| SOCAL | whale   | 1   | N | VIS | DDG | 7  | 1  | 9  | Y | 1000-2000 | Sonar<br>powerdown | whale bearing 160,<br>ship course 233, nr                     | nr        |
| SOCAL | whale   | 1   | N | VIS | DDG | 5  | 1  | 10 | Y | 200-500   | Sonar<br>powerdown | whale bearing 010,<br>ship course 005,<br>paralleling ship    | One spout |
| SOCAL | dolphin | 20  | N | VIS | CG  | 10 | 2  | 10 | Y | 200-500   | Sonar<br>shutdown  | dolphins bearing 270,<br>ship course 008,<br>paralleling ship | Bowriding |
| SOCAL | whale   | 1   | N | VIS | DDG | 1  | 3  | 10 | Y | 200-500   | Sonar<br>shutdown  | whale bearing 319,<br>ship course 329,<br>opening ship        | nr        |
| SOCAL | whale   | 1   | N | VIS | DDG | 2  | 2  | 10 | Y | 200-500   | Sonar<br>shutdown  | whales bearing 100,<br>ship course 240,<br>opening ship       | nr        |
| SOCAL | whale   | 2   | N | VIS | DDG | 2  | 5  | 10 | Y | 200-500   | Sonar<br>shutdown  | whales bearing 000,<br>ship course 349,<br>opening ship       | nr        |
| SOCAL | dolphin | 15  | N | VIS | DDG | 30 | nr | nr | Y | 200-500   | Sonar<br>powerdown | dolphins bearing 165,<br>ship course 151, nr                  | nr        |
| SOCAL | whale   | 1   | N | VIS | DDG | 23 | nr | nr | Y | 200-500   | Sonar<br>shutdown  | whale bearing 165,<br>ship course 329,<br>opening ship        | nr        |
| SOCAL | whale   | 3   | N | VIS | DDG | 10 | 1  | 10 | Y | 500-1000  | Sonar<br>powerdown | whales bearing 180,<br>ship course 239,<br>paralleling ship   | One spout |
| SOCAL | whale   | 1   | N | VIS | CG  | 2  | 3  | 8  | Y | 500-1000  | Sonar<br>shutdown  | whale bearing 080,<br>ship course 340,<br>opening ship        | Floating  |

|       |         |    |   |     |     |    |    |    |   |          |                 |   |          |
|-------|---------|----|---|-----|-----|----|----|----|---|----------|-----------------|---|----------|
| SOCAL | whale   | 1  | N | VIS | CG  | 5  | 3  | 10 | Y | 500-1000 | Sonar shutdown  | whale bearing 010, ship course 165, opening ship        | Floating |
| SOCAL | dolphin | 30 | N | VIS | DDG | 2  | 2  | 1  | Y | 500-1000 | Sonar powerdown | dolphins bearing 180, ship course 155, opening ship     | nr       |
| SOCAL | dolphin | 2  | N | VIS | DDG | 5  | 3  | 8  | Y | 500-1000 | Sonar powerdown | dolphins bearing 256, ship course 003, paralleling ship | nr       |
| SOCAL | whale   | 1  | N | VIS | DDG | 3  | nr | nr | Y | 500-1000 | Sonar powerdown | whale bearing 048, ship course 343, nr                  | nr       |
| SOCAL | dolphin | 10 | N | VIS | DDG | 30 | nr | nr | Y | 500-1000 | Sonar powerdown | nr, ship course 309, nr                                 | nr       |
| SOCAL | whale   | 1  | N | VIS | DDG | nr | nr | nr | Y | 500-1000 | Sonar powerdown | whale bearing 064, ship course 094, closing ship        | nr       |
| SOCAL | whale   | 1  | N | VIS | DDG | nr | 6  | 8  | Y | 500-1000 | Sonar shutdown  | whale bearing 345, ship course 344, nr                  | nr       |
| SOCAL | dolphin | 1  | N | VIS | DDG | 26 | 2  | 8  | Y | nr       | Sonar powerdown | nr, ship course 336, nr                                 | nr       |
| SOCAL | nr      | 1  | N | VIS | FFG | nr | nr | nr | Y | nr       | Sonar powerdown | nr, ship course 328, nr                                 | nr       |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**Table S1-ii-8. SOCAL MTE – Individual Marine Mammal Sighting Information: JTFEX 4 – 9 Feb 2011.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|-----------------------|
| SOCAL        | dolphin     | 50                   | N                         | VIS                          | MPRA                        | 10                                | 1                    | 5                   | N                             | >2000           | na                         | na  | nr                    |
| SOCAL        | dolphin     | 15                   | N                         | VIS                          | FFG                         | 5                                 | 2                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                    |
| SOCAL        | whale       | 1                    | N                         | VIS                          | CG                          | 2                                 | 6                    | 10                  | N                             | 1000-2000       | na                         | na  | Passing               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | CG                          | 5                                 | 2                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                    |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | CG                          | 5                                 | 1                    | 10                  | N                             | 200-500         | na                         | na  | nr                    |
| SOCAL        | dolphin     | 5                    | N                         | VIS                          | CG                          | 5                                 | 2                    | 10                  | N                             | 200-500         | na                         | na  | nr                    |
| SOCAL        | dolphin     | 100                  | N                         | VIS                          | FFG                         | 5                                 | 3                    | 10                  | N                             | 500-1000        | na                         | na  | nr                    |
| SOCAL        | dolphin     | 3                    | N                         | VIS                          | CG                          | 2                                 | 3                    | 10                  | N                             | nr              | na                         | na  | nr                    |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable



**Table S1-ii-9. SOCAL MTE – Individual Marine Mammal Sighting Information: IAC II 18 – 20 Feb 2011.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior  |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|--|
| SOCAL        | dolphin     | nr                   | N                         | VIS                          | DDG                         | nr                                | nr                   | 5                   | Y                             | <200            | na                         | dolphins bearing 270, nr, paralleling ship  | Pod of dolphins bowriding  |
| SOCAL        | dolphin     | 30                   | Y                         | VIS                          | DDG                         | 30                                | 6                    | 10                  | N                             | <200            | Maneuvered away            | na  | Dolphins were displaying bowriding behavior  |
| SOCAL        | dolphin     | 150                  | N                         | VIS                          | DDG                         | 30                                | 4                    | 10                  | N                             | 500-1000        | na                         | na  | 150 dolphins observed proceeding inbound at 700 yds bearing 230T. Continued to play just off bow and down port side of the ship displaying bow riding behavior |
| SOCAL        | dolphin     | nr                   | N                         | ACO                          | DDG                         | 220                               | nr                   | nr                  | N                             | nr              | na                         | na  | Dolphins heard over UWT and passive sonar audio  |
| SOCAL        | dolphin     | 8                    | N                         | VIS                          | CG                          | 5                                 | 4                    | 10                  | Y                             | <200            | Sonar shutdown             | dolphins bearing 170, ship course 267, closing ship   | Sighted dolphins on the port beam closing the ship   |
| SOCAL        | whale       | 1                    | N                         | VIS                          | CG                          | 5                                 | 2                    | 10                  | Y                             | 1000-2000       | Sonar powerdown            | whale bearing 030, ship course 107, paralleling ship  | 1 whale sighted at 030T 1kyds spouting parallel to ship  |
| SOCAL        | whale       | 2                    | N                         | VIS                          | CG                          | 5                                 | 5                    | 10                  | Y                             | 1000-2000       | Sonar powerdown            | whales bearing 265, ship course 325, paralleling ship   | 2 whales sighted at 265T 1kyds spouting parallel to ship   |
| SOCAL        | whale       | 1                    | N                         | VIS                          | DDG                         | 24                                | nr                   | nr                  | Y                             | 200-500         | Sonar shutdown             | whale bearing 150, ship course 180, nr  | nr   |

|       |         |    |   |     |     |    |    |    |   |          |                |   |  |
|-------|---------|----|---|-----|-----|----|----|----|---|----------|----------------|---|--|
| SOCAL | dolphin | 15 | N | VIS | DDG | 5  | 3  | 10 | Y | 500-1000 | Sonar shutdown | dolphins bearing 045, ship course 060, closing ship | 15 dolphins continued to close and ride bow wake |
| SOCAL | dolphin | nr | N | ACO | DDG | nr | nr | nr | Y | nr       | na             | Acoustic detection only                             | Dolphins heard over UWT                          |
| SOCAL | dolphin | nr | N | ACO | DDG | nr | nr | nr | Y | nr       | na             | Acoustic detection only                             | Pod of dolphins heard over UWT                   |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**Table S1-ii-10. SOCAL MTE – Individual Marine Mammal Sighting Information: C2X 6 – 27 May 2011.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior               |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|-------------------------------------|
| SOCAL        | dolphin     | 1                    | N                         | VIS                          | FFG                         | 2                                 | 2                    | 10                  | N                             | <200            | na                         | na  | Bowriding                           |
| SOCAL        | dolphin     | 100                  | N                         | VIS                          | DDG                         | 1                                 | 6                    | 10                  | N                             | <200            | na                         | na  | Breaching                           |
| SOCAL        | dolphin     | 2                    | N                         | VIS                          | FFG                         | 2                                 | 1                    | 10                  | N                             | <200            | na                         | na  | Closing to bowride                  |
| SOCAL        | whale       | 1                    | N                         | VIS                          | FFG                         | 1                                 | 2                    | 10                  | N                             | <200            | Maneuvered away            | na  | Floating, blowing                   |
| SOCAL        | dolphin     | 2                    | N                         | VIS                          | FFG                         | 1                                 | 5                    | 10                  | N                             | <200            | na                         | na  | Paralleling ship                    |
| SOCAL        | pinniped    | 3                    | N                         | VIS                          | FFG                         | 5                                 | 1                    | 10                  | N                             | <200            | na                         | na  | Sea lion diving in and out of water |
| SOCAL        | pinniped    | 5                    | N                         | VIS                          | FFG                         | 3                                 | 1                    | 10                  | N                             | <200            | na                         | na  | Seal diving in and out of water     |
| SOCAL        | pinniped    | 1                    | N                         | VIS                          | FFG                         | 1                                 | 1                    | 8                   | N                             | <200            | na                         | na  | Seal passed by starboard side       |
| SOCAL        | whale       | 6                    | N                         | VIS                          | DDG                         | 10                                | 5                    | 10                  | N                             | >2000           | Sonar powerdown            | na  | Blowing                             |
| SOCAL        | whale       | 3                    | N                         | VIS                          | FFG                         | 20                                | 3                    | 10                  | N                             | >2000           | Maneuvered away            | na  | Crossing in front of ship, blowing  |
| SOCAL        | whale       | 1                    | N                         | VIS                          | DDG                         | 3                                 | 5                    | 8                   | N                             | 1000-2000       | na                         | na  | Blowing                             |
| SOCAL        | whale       | 1                    | N                         | VIS                          | FFG                         | 2                                 | 1                    | 10                  | N                             | 1000-2000       | na                         | na  | Blowing                             |
| SOCAL        | whale       | 1                    | N                         | VIS                          | DDG                         | 5                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Blowing                             |
| SOCAL        | whale       | 2                    | N                         | VIS                          | DDG                         | 1                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Floating on surface                 |
| SOCAL        | whale       | 1                    | N                         | VIS                          | FFG                         | 2                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | nr                                  |
| SOCAL        | nr          | 2                    | N                         | VIS                          | DDG                         | nr                                | nr                   | nr                  | N                             | 1000-2000       | na                         | na  | nr                                  |
| SOCAL        | whale       | 1                    | N                         | VIS                          | DDG                         | 14                                | 5                    | 10                  | N                             | 200-500         | na                         | na  | Blowing                             |

|       |          |     |   |     |              |    |    |    |    |           |                 |    |                                 |
|-------|----------|-----|---|-----|--------------|----|----|----|----|-----------|-----------------|----|---------------------------------|
| SOCAL | dolphin  | 4   | N | VIS | FFG          | 2  | 2  | 10 | N  | 200-500   | na              | na | Closing to bowride              |
| SOCAL | whale    | 1   | N | VIS | FFG          | 1  | 3  | 8  | N  | 200-500   | na              | na | Floating                        |
| SOCAL | whale    | 1   | N | VIS | DDG          | 1  | 3  | 10 | N  | 200-500   | na              | na | Floating on surface             |
| SOCAL | dolphin  | 2   | N | VIS | DDG          | 1  | 3  | 10 | N  | 200-500   | na              | na | Jumping                         |
| SOCAL | whale    | 1   | N | VIS | DDG          | 1  | 2  | 10 | N  | 200-500   | na              | na | nr                              |
| SOCAL | pinniped | 1   | N | VIS | DDG          | 3  | 1  | 10 | N  | 200-500   | na              | na | Seal                            |
| SOCAL | pinniped | 1   | N | VIS | FFG          | 3  | 1  | 10 | N  | 200-500   | na              | na | Seal diving in and out of water |
| SOCAL | whale    | 1   | N | VIS | FFG          | 8  | 2  | 10 | N  | 200-500   | na              | na | Whale closed in on ship         |
| SOCAL | whale    | 1   | N | VIS | FFG          | nr | nr | nr | N  | 200-500   | na              | na | nr                              |
| SOCAL | whale    | 1   | N | VIS | DDG          | 2  | 6  | 10 | N  | 500-1000  | Maneuvered away | na | Blowing                         |
| SOCAL | whale    | 2   | N | VIS | DDG          | 5  | 4  | 10 | N  | 500-1000  | Maneuvered away | na | Blowing                         |
| SOCAL | whale    | 1   | N | VIS | DDG          | 2  | 2  | 10 | N  | 500-1000  | na              | na | Blowing                         |
| SOCAL | whale    | 2   | N | VIS | DDG          | 6  | 3  | 10 | N  | 500-1000  | na              | na | Crossed the bow                 |
| SOCAL | dolphin  | 200 | Y | VIS | DDG          | 20 | 4  | 10 | N  | 500-1000  | Maneuvered away | na | Bowriding                       |
| SOCAL | whale    | 1   | N | VIS | DDG          | 2  | 2  | 10 | N  | 500-1000  | na              | na | Spouting                        |
| SOCAL | whale    | 3   | N | VIS | FFG          | 5  | 3  | 10 | N  | 500-1000  | na              | na | nr                              |
| SOCAL | whale    | 1   | N | VIS | FFG          | 2  | 2  | 10 | N  | nr        | na              | na | Closing along port side         |
| SOCAL | whale    | 1   | N | ACO | FFG          | nr | nr | nr | N  | nr        | na              | na | nr                              |
| SOCAL | whale    | 1   | N | ACO | FFG          | nr | nr | nr | N  | nr        | na              | na | nr                              |
| SOCAL | dolphin  | 2   | N | VIS | non-ASW ship | 3  | 10 | 7  | na | <200      | na              | na | Bowriding                       |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 2  | 6  | 7  | na | >2000     | na              | na | Blowing                         |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 4  | 6  | 7  | na | >2000     | na              | na | Swimming                        |
| SOCAL | whale    | 2   | N | VIS | non-ASW ship | 3  | 6  | 7  | na | >2000     | na              | na | nr                              |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | 1  | 3  | 7  | na | 1000-2000 | na              | na | Normal behavior                 |
| SOCAL | whale    | 1   | N | VIS | non-ASW ship | nr | 5  | 7  | na | 1000-2000 | na              | na | nr                              |
| SOCAL | whale    | 3   | Y | VIS | non-ASW ship | 3  | 2  | 5  | na | 500-1000  | na              | na | Flukes, blowing                 |

|       |       |   |   |     |              |    |    |    |    |           |                 |   |                         |
|-------|-------|---|---|-----|--------------|----|----|----|----|-----------|-----------------|---|-------------------------|
| SOCAL | whale | 1 | N | VIS | non-ASW ship | 2  | 2  | 5  | na | 200-500   | Maneuvered away | na  | Passed in front of ship |
| SOCAL | whale | 1 | N | VIS | non-ASW ship | nr | nr | 7  | na | nr        | na              | na  | nr                      |
| SOCAL | nr    | 2 | N | VIS | DDG          | nr | nr | nr | nr | 1000-2000 | na              | na  | nr                      |
| SOCAL | nr    | 2 | N | VIS | DDG          | nr | nr | nr | nr | 1000-2000 | na              | na  | nr                      |
| SOCAL | whale | 1 | N | VIS | DDG          | nr | nr | nr | nr | nr        | nr              | na  | nr                      |
| SOCAL | whale | 1 | N | VIS | FFG          | 10 | 3  | 8  | Y  | <200      | Sonar shutdown  | whale bearing 010, ship course 045, paralleling ship  | Paralleling ship        |
| SOCAL | whale | 1 | N | VIS | DDG          | 5  | 4  | 8  | Y  | >2000     | na              | whale bearing 160, ship course 125, paralleling ship  | Blowing                 |
| SOCAL | whale | 2 | N | VIS | DDG          | 1  | 6  | 10 | Y  | >2000     | na              | whales bearing 356, ship course 346, opening ship     | Blowing                 |
| SOCAL | whale | 3 | N | VIS | DDG          | 10 | 3  | 10 | Y  | >2000     | na              | whales bearing 065, ship course 080, opening ship     | Blowing                 |
| SOCAL | whale | 1 | N | VIS | DDG          | 2  | 5  | 10 | Y  | >2000     | na              | whale bearing 350, ship course 000, closing ship      | Blowing                 |
| SOCAL | whale | 1 | N | VIS | FFG          | 5  | 6  | 10 | Y  | >2000     | Sonar shutdown  | whale bearing 220, ship course 250, paralleling ship  | Blowing                 |
| SOCAL | whale | 2 | N | VIS | DDG          | 10 | 3  | 10 | Y  | 1000-2000 | na              | whales bearing 310, ship course 270, opening ship     | Blowing                 |
| SOCAL | whale | 2 | N | VIS | FFG          | 5  | 4  | 10 | Y  | 1000-2000 | na              | whales bearing 340, ship course 320, paralleling ship | Blowing                 |
| SOCAL | whale | 2 | N | VIS | DDG          | 5  | 8  | 10 | Y  | 1000-2000 | Sonar powerdown | whales bearing 190, ship course 267, opening ship     | Blowing                 |
| SOCAL | whale | 1 | N | VIS | FFG          | 4  | 4  | 10 | Y  | 1000-2000 | Maneuvered away | whale bearing 355, ship course 290, closing ship      | Blowing, not moving     |
| SOCAL | nr    | 2 | N | VIS | DDG          | nr | nr | nr | Y  | 1000-2000 | Sonar powerdown | nr, ship course 338, nr                               | nr                      |
| SOCAL | whale | 1 | N | VIS | DDG          | 20 | 5  | 10 | Y  | 200-500   | Sonar shutdown  | whale bearing 335, ship course 321, closing ship      | nr                      |
| SOCAL | whale | 1 | N | VIS | FFG          | 2  | 7  | 10 | Y  | 200-500   | Sonar shutdown  | whale bearing 340, ship course 014, paralleling ship  | Paralleling ship        |
| SOCAL | nr    | 2 | N | VIS | DDG          | nr | nr | nr | Y  | 500-1000  | Sonar powerdown | nr, ship course 320, nr                               | nr                      |

|       |         |   |   |     |     |    |    |    |   |          |                    |   |                |
|-------|---------|---|---|-----|-----|----|----|----|---|----------|--------------------|---|----------------|
| SOCAL | whale   | 1 | N | VIS | DDG | 5  | 6  | 10 | Y | 500-1000 | Sonar<br>powerdown | whale bearing 240,<br>ship course 230,<br>opening ship    | Blowing        |
| SOCAL | whale   | 1 | N | VIS | DDG | 2  | 3  | 9  | Y | 500-1000 | Sonar<br>powerdown | whale bearing 000,<br>ship course 270,<br>closing ship    | Blowing        |
| SOCAL | whale   | 1 | N | VIS | DDG | 5  | 5  | 10 | Y | 500-1000 | Sonar<br>powerdown | whale bearing 010,<br>ship course 030,<br>closing ship    | Blowing        |
| SOCAL | whale   | 2 | N | VIS | DDG | 5  | 5  | 10 | Y | 500-1000 | Sonar<br>powerdown | whales bearing 330,<br>ship course 300,<br>closing ship   | Blowing        |
| SOCAL | dolphin | 3 | N | VIS | DDG | 6  | 2  | 10 | Y | 500-1000 | Sonar<br>shutdown  | dolphins bearing 060,<br>ship course 150,<br>closing ship | Played off bow |
| SOCAL | whale   | 1 | N | VIS | DDG | nr | nr | nr | Y | nr       | Sonar<br>powerdown | nr, ship course 160, nr                                   | nr             |
| SOCAL | whale   | 3 | N | VIS | DDG | nr | nr | nr | Y | nr       | Sonar<br>shutdown  | nr, ship course 300, nr                                   | nr             |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**Table S1-ii-11. SOCAL MTE – Individual Marine Mammal Sighting Information: JTFEX 3 – 8 Jun 2011.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior         |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|-------------------------------|
| SOCAL        | dolphin     | 3                    | N                         | VIS                          | FFG                         | 8                                 | 6                    | 10                  | N                             | <200            | na                         | na  | Paralleling ship on surface   |
| SOCAL        | dolphin     | 30                   | N                         | VIS                          | SSN                         | 5                                 | 3                    | 5                   | N                             | 1000-2000       | na                         | na  | Bowriding                     |
| SOCAL        | dolphin     | 3                    | N                         | VIS                          | FFG                         | 3                                 | 10                   | 10                  | N                             | 1000-2000       | na                         | na  | Closing to bowride            |
| SOCAL        | whale       | 1                    | N                         | VIS                          | FFG                         | 3                                 | 10                   | 10                  | N                             | 1000-2000       | na                         | na  | Paralleling ship on surface   |
| SOCAL        | whale       | 1                    | N                         | VIS                          | FFG                         | 3                                 | 10                   | 10                  | N                             | 1000-2000       | na                         | na  | Paralleling ship on surface   |
| SOCAL        | dolphin     | 20                   | N                         | VIS                          | DDG                         | 2                                 | 1                    | 10                  | N                             | 1000-2000       | na                         | na  | Reciprocal course             |
| SOCAL        | whale       | 3                    | N                         | VIS                          | FFG                         | 1                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Surfacing for air             |
| SOCAL        | whale       | 3                    | N                         | VIS                          | HELO                        | 1                                 | nr                   | 10                  | N                             | 200-500         | na                         | na  | Paralleling ship              |
| SOCAL        | pinniped    | 1                    | N                         | VIS                          | FFG                         | 2                                 | 6                    | 10                  | N                             | 200-500         | na                         | na  | Sea otter floating on surface |
| SOCAL        | whale       | 2                    | N                         | VIS                          | FFG                         | 5                                 | 2                    | 10                  | N                             | 200-500         | Maneuvered away            | na  | Swimming close to surface     |
| SOCAL        | dolphin     | 100                  | Y                         | VIS                          | DDG                         | 20                                | 6                    | 10                  | N                             | 500-1000        | na                         | na  | Bowriding                     |
| SOCAL        | whale       | 2                    | N                         | VIS                          | non-ASW ship                | 5                                 | 4                    | 7                   | na                            | >2000           | na                         | na  | Logging                       |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 1                                 | 3                    | 7                   | na                            | 1000-2000       | na                         | na  | Blowing                       |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 15                                | 3                    | 7                   | na                            | 1000-2000       | na                         | na  | Blowing                       |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 1                                 | 5                    | 7                   | na                            | 1000-2000       | na                         | na  | Normal behavior               |
| SOCAL        | whale       | 8                    | N                         | VIS                          | non-ASW ship                | 2                                 | 5                    | 7                   | na                            | 1000-2000       | na                         | na  | Normal behavior               |
| SOCAL        | whale       | 1                    | N                         | VIS                          | non-ASW ship                | 1                                 | 3                    | 7                   | na                            | 200-500         | na                         | na  | Diving                        |

|       |         |    |   |     |              |    |    |    |    |           |                 |   |                 |
|-------|---------|----|---|-----|--------------|----|----|----|----|-----------|-----------------|---|-----------------|
| SOCAL | whale   | 1  | N | VIS | non-ASW ship | 1  | 3  | 7  | na | 500-1000  | na              | na  | Diving          |
| SOCAL | whale   | 2  | N | VIS | non-ASW ship | 1  | 3  | 7  | na | 500-1000  | na              | na  | Diving          |
| SOCAL | whale   | 3  | N | VIS | non-ASW ship | 1  | nr | nr | na | 500-1000  | na              | na  | Normal behavior |
| SOCAL | whale   | 1  | N | VIS | DDG          | 1  | 4  | 10 | Y  | <200      | Sonar shutdown  | whale bearing 180, ship course 090, paralleling ship  | Blowing         |
| SOCAL | dolphin | 5  | N | VIS | DDG          | 2  | 5  | 10 | Y  | <200      | Sonar shutdown  | dolphins bearing 180, ship course 270, opening ship   | Bowriding       |
| SOCAL | dolphin | 30 | Y | VIS | DDG          | 8  | 5  | 7  | Y  | <200      | Sonar shutdown  | dolphins bearing 325, ship course 270, nr             | nr              |
| SOCAL | whale   | 1  | N | VIS | DDG          | 1  | 4  | 10 | Y  | >2000     | na              | whale bearing 000, ship course 270, opening ship      | Blowing         |
| SOCAL | whale   | 1  | N | VIS | DDG          | 2  | 3  | 10 | Y  | 1000-2000 | Maneuvered away | whale bearing 180, ship course 090, paralleling ship  | Blowing         |
| SOCAL | whale   | 2  | N | VIS | DDG          | 3  | 1  | 10 | Y  | 1000-2000 | na              | whales bearing 010, ship course 090, opening ship     | Blowing         |
| SOCAL | whale   | 1  | N | VIS | DDG          | 5  | 4  | 10 | Y  | 1000-2000 | Sonar shutdown  | whale bearing 140, ship course 130, closing ship      | Blowing         |
| SOCAL | whale   | 3  | N | VIS | DDG          | 5  | 1  | 10 | Y  | 1000-2000 | na              | whales bearing 345, ship course 122, paralleling ship | Transiting      |
| SOCAL | whale   | 4  | N | VIS | DDG          | 13 | 3  | 10 | Y  | 1000-2000 | Sonar powerdown | nr, ship course 285, paralleling ship                 | Transiting      |
| SOCAL | whale   | 1  | N | VIS | DDG          | 1  | 1  | 10 | Y  | 1000-2000 | Sonar powerdown | whale bearing 075, ship course 122, nr                | nr              |
| SOCAL | whale   | 1  | N | VIS | DDG          | 5  | 1  | 10 | Y  | 1000-2000 | Sonar powerdown | whale bearing 250, ship course 132, nr                | nr              |
| SOCAL | whale   | 1  | N | VIS | CG           | 3  | nr | nr | Y  | 1000-2000 | Sonar powerdown | whale bearing 040, ship course 129, nr                | nr              |
| SOCAL | nr      | 3  | N | VIS | DDG          | nr | nr | nr | Y  | 200-500   | Sonar shutdown  | nr, ship course 337, nr                               | nr              |
| SOCAL | nr      | 3  | N | VIS | DDG          | nr | nr | nr | Y  | 200-500   | Sonar shutdown  | nr, ship course 181, nr                               | nr              |
| SOCAL | whale   | 3  | N | VIS | DDG          | 3  | 4  | 10 | Y  | 500-1000  | Sonar shutdown  | whales bearing 200, ship course 190, paralleling ship | Blowing         |
| SOCAL | whale   | 3  | N | VIS | DDG          | 8  | 3  | 10 | Y  | 500-1000  | Sonar powerdown | nr, ship course 300, paralleling ship                 | Transiting      |
| SOCAL | whale   | 2  | N | VIS | DDG          | 1  | 1  | 10 | Y  | 500-1000  | Sonar powerdown | whales bearing 250, ship course 132, nr               | nr              |
| SOCAL | whale   | 1  | N | VIS | CG           | 3  | nr | nr | Y  | 500-1000  | Sonar shutdown  | whale bearing 180, ship course 039, nr                | nr              |



|       |    |   |   |     |     |    |    |    |   |    |                |                         |    |
|-------|----|---|---|-----|-----|----|----|----|---|----|----------------|-------------------------|----|
| SOCAL | nr | 1 | N | VIS | DDG | nr | nr | nr | Y | nr | Sonar shutdown | nr, ship course 230, nr | nr |
|-------|----|---|---|-----|-----|----|----|----|---|----|----------------|-------------------------|----|

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**(iii) Evaluation of effectiveness (based on data gathered during all MTEs)**

For the eleven major training exercises conducted in the Southern California Range Complex this reporting period (2 Aug 2010 to 1 Aug 2011), the Navy conducted over 9,755 hours of Marine Species Awareness Training for 7,537 Navy personnel prior to beginning the training events. In addition, over the 134 non-consecutive major training event days in this same period (**Table S1-iii-1**), the Navy performed over 86,871 hours of visual observation (when counting the number of individual watchstanders engaged in lookout or navigation duties times the number of ships involved times the number of days at sea).

**Table S1-iii-1. SOCAL Range Complex major training exercises from 2 August 2010 to 1 August 2011.**

| <b>MTE Type</b> | <b>Dates</b>           | <b># of Days</b> | <b># of Ships Involved</b> | <b># of Marine Mammal Sightings</b> | <b># of Marine Mammals</b> |
|-----------------|------------------------|------------------|----------------------------|-------------------------------------|----------------------------|
| C2X             | 23 JUL - 12 AUG 2010 * | 11               | 10                         | 77                                  | 1,049                      |
| SUSTEX          | 5 AUG - 20 AUG 2010    | 16               | 5                          | 40                                  | 541                        |
| IAC II          | 31 AUG - 2 SEP 2010    | 3                | 7                          | 15                                  | 131                        |
| IAC II          | 20 OCT - 22 OCT 2010   | 3                | 5                          | 29                                  | 1,184                      |
| C2X             | 25 OCT - 15 NOV 2010   | 22               | 5                          | 68                                  | 1,121                      |
| C2X             | 4 NOV - 19 NOV 2010    | 21               | 4                          | 3                                   | 261                        |
| C2X             | 30 NOV - 20 DEC 2010   | 21               | 7                          | 69                                  | 488                        |
| JTFEX           | 4 FEB - 9 FEB 2011     | 6                | 8                          | 8                                   | 195                        |
| IAC II          | 18 FEB - 20 FEB 2011   | 3                | 7                          | 11                                  | 211                        |
| C2X             | 6 MAY - 27 MAY 2011    | 22               | 11                         | 69                                  | 413                        |
| JTFEX           | 3 JUN - 8 JUN 2011     | 6                | 8                          | 39                                  | 254                        |
| <b>Total</b>    |                        | <b>134</b>       | <b>77</b>                  | <b>428</b>                          | <b>5,848</b>               |

Note: \* This exercise was conducted over two reporting periods (2010 Annual Exercise Report and 2011 Annual Exercise Report). The data shown in this table reflects only the numbers from this reporting period (2011).

Key: C2X= Composite Training Unit Exercise; IAC II= Integrated Anti-Submarine Warfare Course; JTFEX= Joint Task Force Exercise; SUSTEX= Sustainment Exercise

**SOCAL Range Complex Major Training Exercise Marine Mammal Observations**

There were approximately 428 sightings of an estimated 5,848 marine mammals over the course of the eleven major training exercises in the Southern California Range Complex. A breakdown of sightings by species type is shown in **Table S1-iii-2** and **Figure S1-iii-1**.

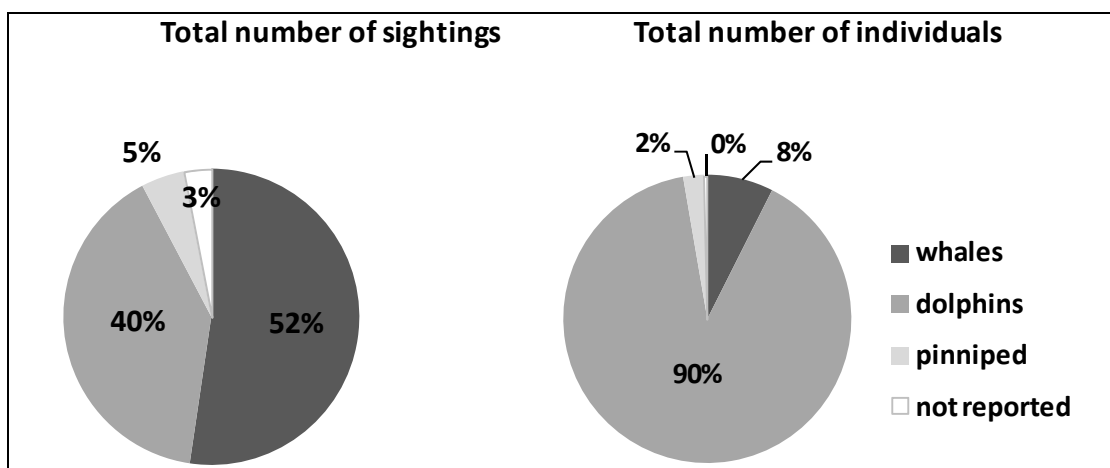
Dolphin species in Southern California typically occur in larger pods than whales, hence the higher number of dolphins and larger percentage of total numbers seen in these counts.

**Table S1-iii-2. Total number of marine mammal sightings observed from Navy platforms during SOCAL Range Complex major training exercises from 2 August 2010 to 1 August 2011.**

| Species Type   | # of Sightings | % of Total Sightings | # of Marine Mammals | % of Total Number of Marine Mammals |
|----------------|----------------|----------------------|---------------------|-------------------------------------|
| Dolphins       | 172            | 40%                  | 5,255               | 90%                                 |
| Whales         | 223            | 52%                  | 435                 | 8%                                  |
| Pinnipeds      | 20             | 5%                   | 136                 | 2%                                  |
| Not recorded   | 13             | 3%                   | 22                  | <1%                                 |
| <b>Totals:</b> | <b>428</b>     |                      | <b>5,844</b>        |                                     |

Note: Totals represent sum of observations during both MFAS/explosives events and during non-MFAS/explosives training periods.

**Figure S1-iii-1. Chart of marine mammal sightings (left) and number of individuals by species categories (right) during SOCAL Range Complex major training exercises from 2 August 2010 to 1 August 2011.**



### SOCAL Range Complex Major Training Event Mitigations

From **Table S1-iii-2**, of the 428 Navy marine mammal sightings during major training exercises this reporting period, there were 110 sightings within 1,000 yards that qualified as mitigation events. In other words, mid-frequency active sonar units had their sonar on, and followed the appropriate mitigation (secure or power down) depending on the range to the marine mammal. There were 59 sonar shutdowns at ranges <200 yards (**Table S1-iii-3**), and 51 sonar powerdowns at ranges between 200-1,000 yards.

There were also 12 instances of Navy ships actively maneuvering to avoid marine mammals. Of these 12 maneuvers, 10 were to avoid whales (n=14 whales), and 2 were to avoid pods of dolphins (one pod of 30 and another of 200).

**Table S1-iii-3. Number of marine mammal sightings at ranges less than 200 yards observed from Navy platforms during major training exercises concurrent with sonar shutdown mitigation from 2 August 2010 to 1 August 2011.**

| Shutdown Mitigation Range | Total # of Sightings | Total # of Marine Mammals | Breakdown by species type |                           |                         |                           |
|---------------------------|----------------------|---------------------------|---------------------------|---------------------------|-------------------------|---------------------------|
|                           |                      |                           | # of Whales               | # of Dolphins             | # of Pinnipeds          | # of Not Reported         |
| < 200 yards               | 59                   | 890                       | 28 times for 41 whales    | 24 times for 838 dolphins | 4 times for 4 pinnipeds | 3 times for 7 individuals |

### **SUMMARY: Mitigation Effectiveness and Navy Safety Zone Adherence**

During this year's major training exercises in the Southern California Range Complex, proscribed NMFS safety zones were effectively applied greater than 99% of the time in cases of observation of marine mammals within the applicable safety zone. There was only one instance of a ship powering down vice turning sonar off when a group of 10 dolphins were sighted at a range of 200 yards. There were 9 instances this reporting period of bowriding dolphins. In accordance with the bowriding exception, there is no sonar powerdown or shutdown requirement in the case of dolphins deliberately closing to ride a vessel's bow wave.

The three categories of mitigation measures (Personnel Training, Lookout and Watchstander Responsibility, and Operating Procedures) outlined in the SOCAL Final Environmental Impact Statement/Overseas Environmental Impact Statement of December 2008 and approved by NMFS in subsequent Letters of Authorization in 2009, 2010 and 2011 were effective in appropriately mitigating exposure of marine mammals to mid-frequency sonar. During this year's major training exercises, the proscribed NMFS safety zones were adhered to, and vessels and aircraft applied mitigation measures when marine mammals were visually observed within the requisite zone. Fleet commanders, aircrews and ship watch teams continue to improve individual awareness and enhance reporting practices. This improvement can be attributed to the various pre-event conferences, mandatory Marine Species Awareness Training, adherence to required MFAS mitigation zones, and application of lessons learned in marine mammal sighting and reporting

**Table S1-iii-4. SOCAL MTEs where sonar was on during detection of marine mammals at ranges less than 1,000 yards, and mitigation conducted.**

| 1) Range   SOCAL (S) | 2) MTE | 3) Month | 4) Species sighted | 5) # of marine mammals sighted | 6) Platform | 7) Length of time observed (min) | 8) Range at which marine mammal sighted | 9) Mitigation [secure (SD); power down (PD); maneuver ship (MAN) <sup>1</sup> ] | 10) Estimate MAX exposure PRIOR to mitigation (dB re 1µPa) <sup>2</sup> | 11) Number of minutes sonar mitigation applied | 12) Estimate exposure AFTER mitigation (dB re 1µPa) <sup>2</sup> | 13) DISTANCE ship would have moved given length of mitigation and nominal 10-knot ship speed (yds) | (M) If sourced in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | 15) Observed behavior |
|----------------------|--------|----------|--------------------|--------------------------------|-------------|----------------------------------|---|---|---|--|--|--|--|-----------------------|
| S                    | C2X    | AUG      | whale              | 1                              | CG          | 30                               | 500-1000                                | PD  | <175-181  | 30   | <169-175   | 10,000   | nr, ship course 240, nr  | nr                    |
| S                    | C2X    | AUG      | dolphin            | 25                             | DDG         | 3                                | <200                                    | na  | <189  | na   | <189   | na   | dolphins bearing 180, ship course 170, paralleling ship  | Paralleling ship      |
| S                    | C2X    | AUG      | dolphin            | 10                             | DDG         | nr                               | <200                                    | PD  | <189  | 2  | <179   | 667  | dolphins bearing 005, ship course 351, nr  | nr                    |
| S                    | C2X    | AUG      | pinniped           | 1                              | DDG         | 5                                | <200                                    | SD  | <189  | 5  | none   | 1,667  | pinniped bearing 015, ship course 349, nr  | nr                    |
| S                    | C2X    | AUG      | dolphin            | 1                              | DDG         | 1                                | <200                                    | SD  | <189  | 33   | none   | 11,000   | dolphin bearing 005, ship course 256, nr   | nr                    |
| S                    | C2X    | AUG      | dolphin            | 20                             | DDG         | 5                                | <200                                    | SD  | <189  | 5  | none   | 1,667  | dolphins bearing 315, ship course 314, nr  | nr                    |
| S                    | C2X    | AUG      | whale              | 1                              | DDG         | nr                               | <200                                    | SD  | <189  | 18   | none   | 6,000  | whale bearing 248, ship course 133, nr   | nr                    |
| S                    | C2X    | AUG      | whale              | 1                              | DDG         | nr                               | <200                                    | SD  | <189  | 27   | none   | 9,000  | whale bearing 030, ship course 284, nr   | nr                    |
| S                    | C2X    | AUG      | whale              | 1                              | DDG         | 5                                | 200-500                                 | PD  | <181-189  | 37   | <171-179   | 12,333   | whale bearing 355, ship course 151, nr   | nr                    |
| S                    | C2X    | AUG      | dolphin            | 4                              | DDG         | 5                                | 200-500                                 | SD  | <181-189  | 2  | none   | 667  | dolphins bearing 210, ship course 275, nr  | nr                    |
| S                    | C2X    | AUG      | pinniped           | 1                              | DDG         | 1                                | 200-500                                 | SD  | <181-189  | 6  | none   | 2,000  | pinniped bearing 089, ship course 140, nr  | nr                    |
| S                    | C2X    | AUG      | whale              | 1                              | DDG         | 1                                | 200-500                                 | SD  | <181-189  | 2  | none   | 667  | whale bearing 260, ship course 275, nr   | nr                    |
| S                    | C2X    | AUG      | dolphin            | 1                              | DDG         | 1                                | 200-500                                 | SD  | <181-189  | 30   | none   | 10,000   | dolphin bearing 315, ship course 352, nr   | nr                    |

|   |     |     |         |    |     |     |          |    |          |     |          |        |   |                       |
|---|-----|-----|---------|----|-----|-----|----------|----|----------|-----|----------|--------|---|-----------------------|
| S | C2X | AUG | dolphin | 4  | DDG | 3   | <200     | SD | <189     | 3   | none     | 1,000  | nr, nr, nr  | nr                    |
| S | C2X | AUG | whale   | 2  | DDG | 3   | 200-500  | SD | <181-189 | 4   | none     | 1,333  | whales bearing 180, ship course 356, nr                 | nr                    |
| S | C2X | AUG | dolphin | 4  | DDG | nr  | 500-1000 | PD | <175-181 | 5   | <169-175 | 1,667  | dolphins bearing 300, ship course 310, nr               | nr                    |
| S | C2X | AUG | whale   | 1  | DDG | nr  | 500-1000 | PD | <175-181 | 30  | <169-175 | 10,000 | whale bearing 095, ship course 060, nr                  | nr                    |
| S | C2X | AUG | whale   | 2  | DDG | nr  | 500-1000 | na | <175-181 | 5   | none     | 1,667  | whales bearing 117, ship course 106, nr                 | nr                    |
| S | C2X | NOV | dolphin | 30 | DDG | 15  | <200     | SD | <189     | 15  | none     | 5,000  | dolphins bearing 000, nr, nr                            | nr                    |
| S | C2X | NOV | dolphin | 20 | DDG | 5   | 500-1000 | na | <175-181 | na  | <175-181 | na     | dolphins bearing 150, nr, nr                            | nr                    |
| S | C2X | NOV | dolphin | 10 | DDG | 5   | 500-1000 | PD | <175-181 | 5   | <169-175 | 1,667  | dolphins bearing 115, ship course 150, closing ship     | Bowriding             |
| S | C2X | NOV | dolphin | 5  | DDG | 5   | 500-1000 | PD | <175-181 | 27  | <169-175 | 9,000  | dolphins bearing 340, nr, nr                            | nr                    |
| S | C2X | NOV | dolphin | 10 | DDG | 1   | 500-1000 | SD | <175-181 | 1   | none     | 333    | dolphins bearing 310, nr, opening ship                  | nr                    |
| S | C2X | DEC | dolphin | 20 | CG  | 3   | <200     | SD | <189     | 30  | none     | 10,000 | dolphins bearing 010, ship course 335, opening ship     | Bowriding             |
| S | C2X | DEC | whale   | 4  | CG  | 49  | <200     | SD | <189     | 49  | none     | 16,333 | whales bearing 020, ship course 225, nr                 | nr                    |
| S | C2X | DEC | dolphin | 20 | CG  | 10  | 200-500  | SD | <181-189 | 30  | none     | 10,000 | dolphins bearing 270, ship course 008, paralleling ship | Bowriding             |
| S | C2X | DEC | whale   | 1  | CG  | 2   | 500-1000 | SD | <175-181 | 30  | none     | 10,000 | whale bearing 080, ship course 340, opening ship        | Floating              |
| S | C2X | DEC | whale   | 1  | CG  | 5   | 500-1000 | SD | <175-181 | 30  | none     | 10,000 | whale bearing 010, ship course 165, opening ship        | Floating              |
| S | C2X | DEC | dolphin | 5  | DDG | 110 | <200     | SD | <189     | 117 | none     | 39,000 | dolphins bearing 165, ship course 329, paralleling ship | Bowriding             |
| S | C2X | DEC | whale   | 2  | DDG | 2   | <200     | SD | <189     | 2   | none     | 667    | whales bearing 355, ship course 349, opening ship       | nr                    |
| S | C2X | DEC | dolphin | 1  | DDG | 4   | <200     | SD | <189     | 8   | none     | 2,667  | nr, ship course 290, opening ship                       | Dolphin heading south |
| S | C2X | DEC | dolphin | 5  | DDG | 3   | 200-500  | na | <181-189 | na  | <181-189 | na     | dolphins bearing 141, ship course 141, nr               | nr                    |
| S | C2X | DEC | whale   | 1  | DDG | 5   | 200-500  | PD | <181-189 | 5   | <171-179 | 1,667  | whale bearing 020, nr, paralleling ship                 | One spout             |

|   |     |     |         |    |     |    |          |    |          |    |          |        |   |                  |
|---|-----|-----|---------|----|-----|----|----------|----|----------|----|----------|--------|---|------------------|
| S | C2X | DEC | whale   | 1  | DDG | 1  | 200-500  | SD | <181-189 | 90 | none     | 30,000 | whale bearing 319, ship course 329, opening ship        | nr               |
| S | C2X | DEC | whale   | 1  | DDG | 2  | 200-500  | SD | <181-189 | 10 | none     | 3,333  | whales bearing 100, ship course 240, opening ship       | nr               |
| S | C2X | DEC | whale   | 2  | DDG | 2  | 200-500  | SD | <181-189 | 2  | none     | 667    | whales bearing 000, ship course 349, opening ship       | nr               |
| S | C2X | DEC | dolphin | 15 | DDG | 30 | 200-500  | PD | <181-189 | 30 | <171-179 | 10,000 | dolphins bearing 165, ship course 151, nr               | nr               |
| S | C2X | DEC | whale   | 1  | DDG | 23 | 200-500  | SD | <181-189 | 32 | none     | 10,667 | whale bearing 165, ship course 329, opening ship        | nr               |
| S | C2X | DEC | whale   | 3  | DDG | 10 | 500-1000 | PD | <175-181 | 23 | <169-175 | 7,667  | whales bearing 180, ship course 239, paralleling ship   | One spout        |
| S | C2X | DEC | dolphin | 30 | DDG | 2  | 500-1000 | PD | <175-181 | 5  | <169-175 | 1,667  | dolphins bearing 180, ship course 155, opening ship     | nr               |
| S | C2X | DEC | dolphin | 2  | DDG | 5  | 500-1000 | PD | <175-181 | 15 | <169-175 | 5,000  | dolphins bearing 256, ship course 003, paralleling ship | nr               |
| S | C2X | DEC | whale   | 1  | DDG | 3  | 500-1000 | PD | <175-181 | 30 | <169-175 | 10,000 | whale bearing 048, ship course 343, nr                  | nr               |
| S | C2X | DEC | dolphin | 10 | DDG | 30 | 500-1000 | PD | <175-181 | 52 | <169-175 | 17,333 | nr, ship course 309, nr                                 | nr               |
| S | C2X | DEC | whale   | 1  | DDG | nr | 500-1000 | PD | <175-181 | 30 | <169-175 | 10,000 | whale bearing 064, ship course 094, closing ship        | nr               |
| S | C2X | DEC | whale   | 1  | DDG | nr | 500-1000 | SD | <175-181 | 30 | none     | 10,000 | whale bearing 345, ship course 344, nr                  | nr               |
| S | C2X | MAY | whale   | 1  | DDG | 20 | 200-500  | SD | <181-189 | 20 | none     | 6,667  | whale bearing 335, ship course 321, closing ship        | nr               |
| S | C2X | MAY | whale   | 1  | DDG | 5  | 500-1000 | PD | <175-181 | 10 | <169-175 | 3,333  | whale bearing 240, ship course 230, opening ship        | Blowing          |
| S | C2X | MAY | whale   | 1  | DDG | 2  | 500-1000 | PD | <175-181 | 5  | <169-175 | 1,667  | whale bearing 000, ship course 270, closing ship        | Blowing          |
| S | C2X | MAY | whale   | 1  | DDG | 5  | 500-1000 | PD | <175-181 | 10 | <169-175 | 3,333  | whale bearing 010, ship course 030, closing ship        | Blowing          |
| S | C2X | MAY | whale   | 2  | DDG | 5  | 500-1000 | PD | <175-181 | 5  | <169-175 | 1,667  | whales bearing 330, ship course 300, closing ship       | Blowing          |
| S | C2X | MAY | dolphin | 3  | DDG | 6  | 500-1000 | SD | <175-181 | 24 | none     | 8,000  | dolphins bearing 060, ship course 150, closing ship     | Played off bow   |
| S | C2X | MAY | nr      | 2  | DDG | nr | 500-1000 | PD | <175-181 | 30 | <169-175 | 10,000 | nr, ship course 320, nr                                 | nr               |
| S | C2X | MAY | whale   | 1  | FFG | 10 | <200     | SD | <179     | 20 | none     | 6,667  | whale bearing 010, ship course 045, paralleling ship    | Paralleling ship |

|   |        |     |          |     |     |    |          |    |          |    |          |       |   |  |
|---|--------|-----|----------|-----|-----|----|----------|----|----------|----|----------|-------|---|--|
| S | C2X    | MAY | whale    | 1   | FFG | 2  | 200-500  | SD | <171-179 | 20 | none     | 6,667 | whales bearing 340, ship course 320, paralleling ship   | Paralleling ship                                   |
| S | IAC II | OCT | dolphin  | 100 | CG  | 10 | 200-500  | PD | <181-189 | 6  | <171-179 | 2,000 | dolphins bearing 270, nr, opening ship                  | Dolphins seen jumping                              |
| S | IAC II | OCT | dolphin  | 15  | CG  | 3  | 500-1000 | na | <175-181 | na | <175-181 | na    | dolphins bearing 035, nr, nr                            | Dolphins seen off the bow                          |
| S | IAC II | OCT | whale    | 1   | DDG | 9  | <200     | SD | <189     | 9  | none     | 3,000 | whale bearing 150, ship course 180, closing ship        | nr   |
| S | IAC II | OCT | dolphin  | 10  | DDG | 3  | 500-1000 | SD | <175-181 | 10 | none     | 3,333 | dolphins bearing 030, ship course 035, closing ship     | nr   |
| S | IAC II | OCT | dolphin  | 35  | FFG | 2  | <200     | SD | <179     | 15 | none     | 5,000 | dolphins bearing 280, ship course 290, closing ship     | Feeding  |
| S | IAC II | OCT | dolphin  | 200 | FFG | 3  | <200     | SD | <179     | 6  | none     | 2,000 | dolphins bearing 050, nr, nr                            | nr   |
| S | IAC II | OCT | dolphin  | 15  | FFG | 1  | 500-1000 | na | <165-171 | na | <165-171 | na    | dolphins bearing 340, ship course 120, paralleling ship | Breaching  |
| S | IAC II | OCT | dolphin  | 10  | FFG | 1  | 500-1000 | na | <165-171 | na | <165-171 | na    | dolphins bearing 030, ship course 025, closing ship     | Breaching  |
| S | IAC II | OCT | dolphin  | 1   | FFG | 1  | 500-1000 | SD | <165-171 | 3  | none     | 1,000 | dolphin bearing 140, ship course 050, paralleling ship  | Breaching  |
| S | IAC II | AUG | pinniped | 1   | DDG | 5  | <200     | SD | <189     | 10 | none     | 3,333 | pinniped bearing 270, ship course 270, nr               | Dead seal  |
| S | IAC II | SEP | dolphin  | 25  | DDG | 2  | 500-1000 | na | <175-181 | na | <175-181 | na    | dolphins bearing 030, ship course 010, nr               | Pod of dolphins bowriding                          |
| S | IAC II | FEB | dolphin  | 8   | CG  | 5  | <200     | SD | <189     | 12 | none     | 4,000 | dolphins bearing 170, ship course 267, closing ship     | Sighted dolphins on the port beam closing the ship |
| S | IAC II | FEB | dolphin  | nr  | DDG | nr | <200     | na | <189     | na | <189     | na    | dolphins bearing 270, nr, paralleling ship              | Pod of dolphins bowriding                          |
| S | IAC II | FEB | whale    | 1   | DDG | 24 | 200-500  | SD | <181-189 | 25 | none     | 8,333 | whale bearing 150, ship course 180, nr                  | nr   |
| S | IAC II | FEB | dolphin  | 15  | DDG | 5  | 500-1000 | SD | <175-181 | 5  | none     | 1,667 | dolphins bearing 045, ship course 060, closing ship     | 15 dolphins continued to close and ride bow wake   |



|   |        |     |          |    |     |    |          |    |          |    |          |        |  |                  |
|---|--------|-----|----------|----|-----|----|----------|----|----------|----|----------|--------|--|------------------|
| S | JTFEX  | JUN | whale    | 1  | CG  | 3  | 500-1000 | SD | <175-181 | 30 | none     | 10,000 | whale bearing 180, ship course 039, nr                   | nr               |
| S | JTFEX  | JUN | whale    | 1  | DDG | 1  | <200     | SD | <189     | 10 | none     | 3,333  | whale bearing 180, ship course 090, paralleling ship     | Blowing          |
| S | JTFEX  | JUN | dolphin  | 5  | DDG | 2  | <200     | SD | <189     | 10 | none     | 3,333  | dolphins bearing 180, ship course 270, opening ship      | Bowriding        |
| S | JTFEX  | JUN | dolphin  | 30 | DDG | 8  | <200     | SD | <189     | 27 | none     | 9,000  | dolphins bearing 325, ship course 270, nr                | nr               |
| S | JTFEX  | JUN | nr       | 3  | DDG | nr | 200-500  | SD | <181-189 | 17 | none     | 5,667  | nr, ship course 337, nr                                  | nr               |
| S | JTFEX  | JUN | nr       | 3  | DDG | nr | 200-500  | SD | <181-189 | 27 | none     | 9,000  | nr, ship course 181, nr                                  | nr               |
| S | JTFEX  | JUN | whale    | 3  | DDG | 3  | 500-1000 | SD | <175-181 | 3  | none     | 1,000  | whales bearing 200, ship course 190, paralleling ship    | Blowing          |
| S | JTFEX  | JUN | whale    | 3  | DDG | 8  | 500-1000 | PD | <175-181 | nr | <169-175 | na     | nr, ship course 300, paralleling ship                    | Transiting       |
| S | JTFEX  | JUN | whale    | 2  | DDG | 1  | 500-1000 | PD | <175-181 | 1  | <169-175 | 333    | whales bearing 250, ship course 132, nr                  | nr               |
| S | SUSTEX | AUG | dolphin  | 25 | DDG | 3  | <200     | na | <189     | na | <189     | na     | dolphins bearing 180, ship course 170, paralleling ship  | Paralleling ship |
| S | SUSTEX | AUG | pinniped | 1  | DDG | 3  | <200     | SD | <189     | 25 | none     | 8,333  | pinniped bearing 060, ship course 193, opening ship      | Floating         |
| S | SUSTEX | AUG | pinniped | 3  | DDG | 5  | 500-1000 | PD | <175-181 | 9  | <169-175 | 3,000  | pinnipeds bearing 230, ship course 190, paralleling ship | Floating         |
| S | SUSTEX | AUG | pinniped | 20 | DDG | 5  | 500-1000 | PD | <175-181 | 19 | <169-175 | 6,333  | pinnipeds bearing 295, ship course 210, paralleling ship | Floating         |

Notes:

<sup>1</sup> nr=not reported; na=not applicable; mitigation not applicable if dolphins were determined to be bowriding.

<sup>2</sup> Estimated exposure based on 20Log[R] spherical spreading propagation loss for ranges less than 1000 yards and where nominal MFAS Source Level (SL) assumed to be 235 dB for DDGs and 225 for FFGs. Actual operating parameters and oceanographic conditions likely result in lower exposures. This calculation assumes exposure prior to mitigation. Once animal was spotted at the range indicated, applied mitigation would have resulted in much lower to no exposures.

**Exposure assessment**

Estimated exposures within 2000 yards can be determined based on standard formulas of how sound propagates in water. Spherical spreading is generally valid within 1000 yards from the sound source, and can be expressed as spreading loss (in dB from a source) equals 20logR (with "R" being range from the source in yards). Spherical spreading loss in the first 1000 yards equates to 60 dB of loss. At ranges between 1000 and 2000 yards the sound waves can become trapped by the sea surface and bottom (depending on water depth and other sound propagation factors) and not expand vertically. The spreading wave then forms an expanding cylinder. Cylindrical spreading loss in dB between two points can be calculated by using the formula  $(10\log R_2/R_1)$ . Cylindrical spreading loss between 1000 and 2000 yards equates to an additional 3 dB of loss. By the time the sound wave has propagated to 2000 yards, the sonar signal strength has decreased by a total of at least 63 dB. Using the AN/SQS-53 sonar as an example transmitting at 235 dB subtracting the 63 dB of spreading loss equates to an estimated sonar Receive Level (RL) of 172 dB at 2000 yards. The spreading

loss formulas are used to make very conservative assumptions about potential exposure. The formula is an estimation of spreading losses only and does not take into account other factors that could increase the total propagation losses such as oceanographic conditions, attenuation losses, scattering losses, and Navy-unique MFAS operating parameters which would result in slightly lower sonar transmit levels. Use of this approach to estimate potential RL at any given animal assumes the horizontal range from a visual sighting accounts for an animal across all depths at which an animal travels to predict the maximum, worst case potential exposure. In other words, this estimated worst case exposure is presented independent of the animal's actual depth level, since a) time and depth of current and previous dives cannot be deduced from a limited surface sighting, and b) oceanographic and tactical conditions influence actual sound propagation at different depths. Given relative motion of ships and animals at sea, the time spent with any given exposure from surface ships is likely to be limited.

## (2) SOCAL – ASW Summary

This section summarizes information from MTEs and non-major training exercises such as unit level training.

### (i) Total annual hours of each type of sonar source

Total annual hours of each type of sonar source used within the SOCAL Range Complex between 2 August 2010 and 1 August 2011 are presented in the classified version of this report. With the exception of SQS-53 and SLQ-25, system usage was less and sometimes significantly less than the amount authorized.

**Table S2-i-1. Sonar allocation within the SOCAL Range Complex by source.**

| Authorized MFAS sources §216.270 (c)(1) of NMFS SOCAL Final Rule and LOA | Annually Authorized |
|--|---------------------|
| (i) AN/SQS-53 surface ship hull-mounted active sonar (hours)             | 1,977               |
| (ii) AN/SQS-56 surface ship hull-mounted active sonar (hours)            | 494                 |
| (iii) AN/BQQ-10 submarine active sonar (hours)                           | 815                 |
| (iv) AN/BQS-15 submarine navigational sonar (hours)                      | 122                 |
| (v) AN/AQS-22 helicopter active dipping sonar (# of dips)                | 2,719               |
| (vi) AN/SSQ-62 DICASS acoustic sonobuoy (# of buoys)                     | 4,256               |
| (vii) SSQ-125 AEER sonobuoy (# of buoys)                                 | 1,150               |
| (viii) Mk-48 heavyweight torpedoes (# of torpedoes)                      | 87                  |
| (ix) Mk-46 lightweight torpedoes (# of torpedoes)                        | 84                  |
| (x) AN/SLQ-25 NIXIE acoustic countermeasure (hours)                      | 1,600               |

### (ii) Cumulative impact report

From NMFS Final Rule: *“To the extent practicable, the Navy, in coordination with NMFS, shall develop and implement a method of annually reporting non-major (i.e., other than MTEs) training exercises utilizing hull-mounted sonar. The report shall present an annual (and seasonal, where practicable) depiction of non-major training exercises geographically across the SOCAL Range Complex. The Navy shall include (in the SOCAL Range Complex annual report) a brief annual progress update on the status of the development of an effective and unclassified method to report this information until an agreed-upon (with NMFS) method has been developed and implemented.”*

The precise locations and frequency of ASW training is classified and is presented in the classified version of this report. There is currently no method to declassify the sensitivity of this data in order to publish this type of information in an unclassified report. For this reason the only available method for this information to be disseminated for the foreseeable future is in the classified version of this Annual Exercise Report.

## (3) SOCAL – SINKEXs

No SINKEXs were conducted in the SOCAL Range Complex during the reporting period.

## (4) SOCAL – IEER Summary

The annual summary of use within the SOCAL Range Complex for Improved Extended Echo-Ranging System (IEER) sonobuoys is deemed classified. Data requested from the Navy is presented in the classified version of this report. Reporting elements include (i) Total number of IEER events; (ii) Total expended/detonated rounds (buoys); and (iii) Total number of self-scuttled IEER rounds.

**(5) SOCAL – Explosives Summary**

The Navy is in the process of improving the methods used to track explosives use within each range complex. Therefore, NMFS requested that the Navy report to the maximum extent practicable as defined in the SOCAL Range Complex Final Rule. The summary for maritime explosives use within the SOCAL Range Complex is presented below.

**Table S5-1. Explosives usage in the SOCAL Range Complex.**

| <b>(i) Total annual number of each type of explosive exercise</b>          |                     |                                   |   |
|--|---------------------|-----------------------------------|---|
| <b>Authorized Exercise</b>   | <b>Total Annual</b> | <b>Amount Annually Authorized</b> | <b>% Total Used To Total Authorized</b> |
| (A) Surface-to-Surface Gunnery Exercise (S-S GUNNEX)                       | 0                   | 402                               | 0%                                      |
| (B) Air-to-Surface Missile Exercise (A-S MISSILEX)                         | 0                   | 50                                | 0%                                      |
| (C) Bombing Exercise (BOMBEX)  | 0                   | 40                                | 0%                                      |
| (D) Sinking Exercise (SINKEX)  | 0                   | 2                                 | 0%                                      |
| (E) EER/IEER/AEER Exercise   | 12                  | 30                                | 40%                                     |
| <b>(ii) Total annual expended/detonated rounds for each explosive type</b> |                     |                                   |   |
| <b>Category</b>  |                     | <b>Quantity</b>                   |   |
| (A) 5” naval gunfire rounds  |                     | 0                                 |   |
| (B) 76 mm naval gunfire rounds   |                     | 0                                 |   |
| (C) Maverick missiles  |                     | 0                                 |   |
| (D) Harpoon missiles   |                     | 0                                 |   |
| (E) Mk-82 aerial bombs   |                     | 0                                 |   |
| (F) Mk-83 aerial bombs   |                     | 0                                 |   |
| (G) Mk-84 aerial bombs   |                     | 0                                 |   |
| (H) Mk-48 torpedoes (detonations)  |                     | 0                                 |   |
| (I) Demolition charges   |                     | 69                                |   |
| (J) EER/IEER explosive sonobuoys   |                     | 180                               |   |

These explosive numbers were collected manually from several different databases that are maintained by separate entities. The implementation of an automated database that was estimated to be operational for this year’s explosive data collection has been delayed due to unanticipated technical and administrative issues. The Navy will continue the development of an automated system to track explosives use within the range complexes. This system will eventually reduce the manpower needed to collect this data and improve reporting accuracy within the SOCAL Range Complex.

# HAWAII RANGE COMPLEX

## INTRODUCTION

The U.S. Navy prepared this Annual Range Complex Exercise Report covering the period from 2 August 2010 to 1 August 2011 in compliance with the National Marine Fisheries Service (NMFS) Final Rule under the Marine Mammal Protection Act (MMPA) for the Hawaii Range Complex (HRC).

In the Hawaii Range Complex Letter of Authorization "Requirements for monitoring and reporting", the following report subsections were specified and are present within this report for the HRC:

- (1) Mid-Frequency Active Sonar (MFAS)/High-Frequency Active Sonar (HFAS) Major Training Exercises (MTE).
  - (i) Exercise Information (for each MTE).
  - (ii) Individual Marine Mammal Sighting Information (for each MTE).
  - (iii) Evaluation (based on data gathered during all MTEs) of effectiveness of mitigation measures designed to avoid exposing marine mammals to MFAS. This evaluation shall identify the specific observations that support any conclusion the Navy reaches about the effectiveness of the mitigation.
- (2) Anti-Submarine Warfare (ASW) Summary
  - (i) Total annual hours of each type of sonar source
  - (ii) Total sonar hours (dense humpback areas)
  - (iii) Total sonar hours (humpback whale cautionary area)
  - (iv) Cumulative Impact Report
- (3) Sinking Exercises (SINKEX)
  - (i) Exercise information
  - (ii) Individual marine mammal observation information
- (4) Improved Extended Echo Ranging (IEER)/Advanced Extended Echo Ranging (AEER) Summary
  - (i) Total number of IEER/AEER events conducted in the HRC
  - (ii) Total expended/detonated rounds (buoys)
  - (iii) Total number of self-scuttled IEER rounds
- (5) Explosives Summary
  - (i) Total annual number of each type of explosive exercises
  - (ii) Total annual expended/detonated rounds for each explosive type

This Annual Report covers the period from 2 August 2010 to 1 August 2011, and the information represents the best practical data collection for this period. The data collection and reporting timeline differs from the actual LOA dates. In order to provide a better representation of annual exercise data for the HRC, the Navy has combined all exercise data from 2 August 2010 to 1 August 2011 and compared it to the annual allocations provided in the 7 February 2011 HRC Letter of Authorization. This representation of annual exercise data shall be repeated in future Annual Reports. To provide accounting for the entire five year period of the authorization, the Navy will also submit a final report at the end of the five years to provide comprehensive totals of authorized usage.

Finally, on review of accumulated reporting metrics, the Navy has determined that certain portions become classified by their summary. Information designated as classified in this report will be submitted to NMFS in a separate classified version of this report.

## **(1) HRC – MFAS/HFAS Major Training Exercises**

This section summarizes authorized sonar use and marine mammal observations from MTEs conducted within the HRC between 2 August 2010 and 1 August 2011. For the HRC, MTEs include Rim of the Pacific exercises (RIMPAC), Undersea Warfare Exercises (USWEX), and Multi Strike Group Exercises.

Between 2 August 2010 and 1 August 2011, there were two MTEs conducted within the HRC.

Exercise specific details as described in the HRC Final Rule §216.175(f)(1)i to iii and LOA include:

- (i) Exercise Information (for each MTE)
- (ii) Individual Marine Mammal Sighting Information (for each MTE)
- (iii) Evaluation (based on data gathered during all MTEs) of the effectiveness of mitigation measures designed to avoid exposing marine mammals to MFAS. This evaluation shall identify the specific observations that support any conclusions the Navy reaches about the effectiveness of the mitigation.

**(i) Exercise information**

**Table H1-i-1. MTEs conducted in the HRC.**

| (A) Exercise | (B) Date        | (C) Location | (D) # and types of active sources used |        |          |              |                  | (E) # and types of passive sources used |        |        |          |              | (F) # and types of vessels and aircraft participating |    |     |     |                            |                         | (G) Total hours of observation by watchstanders (hrs) | (H) Total hours of all active sonar | (I) Total hours ea. active source |           |                       |        |        | (J) Wave height (high, low, and average) (ft) |          |
|--------------|-----------------|--------------|--|--------|----------|--------------|------------------|---|--------|--------|----------|--------------|---|----|-----|-----|----------------------------|-------------------------|---|-------------------------------------|-----------------------------------|-----------|-----------------------|--------|--------|---|----------|
|              |                 |              | SQS-53                                 | SQS-56 | BQQ-5/10 | AQS-22 or 13 | SSQ-62 Sonobuoys | SQS-53                                  | SQS-56 | SQR-19 | BQQ-5/10 | AQS-22 or 13 | SSQ-53 Sonobuoys                                      | CG | DDG | FFG | SH-60F\SH-60R dipping helo | SH-60B non-dipping helo |   |                                     | Submarines                        | P-3C MPRA | Non-ASW surface ships | SQS-53 | SQS-56 |   | BQQ-5/10 |
| USWEX        | 19 FEB – 23 FEB | H            | *                                      | *      | *        | *            | *                | *                                       | *      | *      | *        | *            | *   | *  | *   | *   | *                          | *                       | *   | 0                                   | 3,600                             | *         | *                     | *      | *      | *   | 7,2,4    |
| USWEX**      | 30 MAR – 5 APR  | H            | *                                      | *      | *        | *            | *                | *                                       | *      | *      | *        | *            | *   | *  | *   | *   | *                          | *                       | *   | 0                                   | 2,088                             | *         | *                     | *      | *      | *   | 6,2,4    |

USWEX=Undersea Warfare Exercise

H=Hawaii Range Complex

\* Information is presented in the classified version of this report

\*\*Koa Kai Exercise

**(ii) Individual marine mammal sighting information by exercise**

**Table H1-ii-1. HRC MTE – Individual Marine Mammal Sighting Information: USWEX 19 – 23 Feb 2011.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior                           |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|---|
| HRC          | dolphin     | 20                   | N                         | VIS                          | CG                          | 5                                 | 1                    | 10                  | Y                             | 500-1000        | na                         | dolphins bearing 160, ship course 046, paralleling ship   | Bowriding                                       |
| HRC          | dolphin     | 2                    | N                         | VIS                          | DDG                         | 1                                 | 2                    | 9                   | N                             | 1000-2000       | Maneuvered away            | na  | Paralleling ship                                |
| HRC          | nr          | 1                    | N                         | VIS                          | MPRA                        | nr                                | nr                   | nr                  | N                             | nr              | na                         | na  | nr  |
| HRC          | nr          | 1                    | N                         | VIS                          | MPRA                        | nr                                | nr                   | nr                  | N                             | nr              | na                         | na  | nr  |
| HRC          | nr          | 1                    | N                         | VIS                          | MPRA                        | nr                                | nr                   | nr                  | N                             | nr              | na                         | na  | nr  |
| HRC          | nr          | 1                    | N                         | VIS                          | MPRA                        | nr                                | nr                   | nr                  | N                             | nr              | na                         | na  | nr  |
| HRC          | whale       | 1                    | N                         | VIS                          | CG                          | 3                                 | 2                    | 10                  | Y                             | >2000           | na                         | whale bearing 065, ship course 247, opening ship  | nr  |
| HRC          | whale       | 2                    | Y                         | VIS                          | DDG                         | 5                                 | 3                    | 10                  | Y                             | >2000           | na                         | whales bearing 217, ship course 113, nr   | nr  |
| HRC          | whale       | 1                    | N                         | VIS                          | DDG                         | 1                                 | 1                    | 10                  | Y                             | 200-500         | Sonar shutdown             | whale bearing 300, ship course 297, closing ship  | Whale on reciprocal course of ship              |
| HRC          | dolphin     | 10                   | N                         | VIS                          | DDG                         | 4                                 | 3                    | 10                  | Y                             | 500-1000        | Sonar powerdown            | dolphins bearing 055, ship course 045, paralleling ship   | nr  |
| HRC          | nr          | 1                    | N                         | ACO                          | MPRA                        | nr                                | nr                   | nr                  | Y                             | nr              | Sonar shutdown             | na  | Possible marine mammal heard over passive sonar |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable



**Table H1-ii-2. HRC MTE – Individual Marine Mammal Sighting Information: USWEX (Koa Kai Exercise) 30 Mar – 5 Apr 2011.**

| (A) Location | (B) Species | (C) # of individuals | (D) Calves observed (y/n) | (E) Initial detection sensor | (F) Platform detection from | (G) Length of time observed (min) | (H) Wave height (ft) | (I) Visibility (nm) | (J) Sonar source in use (y/n) | (K) Range (yds) | (L) Mitigation implemented | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | (N) Observed behavior        |
|--------------|-------------|----------------------|---------------------------|------------------------------|-----------------------------|-----------------------------------|----------------------|---------------------|-------------------------------|-----------------|----------------------------|---|------------------------------|
| HRC          | whale       | 2                    | N                         | VIS                          | DDG                         | 5                                 | 3                    | 10                  | N                             | >2000           | na                         | na  | Blowing                      |
| HRC          | whale       | 2                    | N                         | VIS                          | DDG                         | 5                                 | 3                    | 10                  | N                             | >2000           | na                         | na  | Blowing                      |
| HRC          | whale       | 4                    | N                         | VIS                          | CG                          | 5                                 | 1                    | 10                  | N                             | >2000           | na                         | na  | Blowing                      |
| HRC          | whale       | nr                   | N                         | VIS                          | DDG                         | nr                                | 3                    | 10                  | N                             | >2000           | na                         | na  | nr                           |
| HRC          | whale       | 1                    | N                         | VIS                          | DDG                         | 2                                 | 2                    | 10                  | N                             | >2000           | na                         | na  | Diving                       |
| HRC          | whale       | 2                    | N                         | VIS                          | CG                          | 10                                | 4                    | 10                  | N                             | >2000           | na                         | na  | Jumping, showing flukes      |
| HRC          | whale       | 1                    | N                         | VIS                          | CG                          | 5                                 | 2                    | 10                  | N                             | >2000           | na                         | na  | Surfaced, transiting away    |
| HRC          | whale       | nr                   | N                         | ACO                          | CG                          | 10                                | 2                    | 10                  | N                             | >2000           | na                         | na  | Surfaced, transiting away    |
| HRC          | whale       | 1                    | N                         | VIS                          | CG                          | 3                                 | 2                    | 10                  | N                             | 200-500         | na                         | na  | Blowing                      |
| HRC          | whale       | 1                    | N                         | VIS                          | DDG                         | 1                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Blowing                      |
| HRC          | whale       | 2                    | N                         | VIS                          | CG                          | 3                                 | 2                    | 10                  | N                             | 1000-2000       | na                         | na  | Showing flukes               |
| HRC          | whale       | 3                    | N                         | VIS                          | DDG                         | 4                                 | 3                    | 10                  | N                             | 1000-2000       | na                         | na  | Slapping, blowing, breaching |
| HRC          | whale       | 3                    | N                         | VIS                          | CG                          | 10                                | 2                    | 10                  | N                             | 1000-2000       | Maneuvered away            | na  | Tail slapping                |
| HRC          | whale       | 3                    | N                         | VIS                          | CG                          | 10                                | 1                    | 10                  | N                             | 1000-2000       | na                         | na  | Tail slapping                |
| HRC          | whale       | 10                   | N                         | VIS                          | CG                          | 5                                 | 1                    | 10                  | N                             | 1000-2000       | na                         | na  | Tail slapping                |
| HRC          | whale       | 1                    | N                         | VIS                          | CG                          | 4                                 | 2                    | 10                  | N                             | 500-1000        | na                         | na  | Blowing                      |
| HRC          | dolphin     | 4                    | N                         | VIS                          | CG                          | 1                                 | 2                    | 10                  | N                             | 500-1000        | na                         | na  | Jumping                      |

|     |       |    |   |     |     |    |   |    |   |          |                |   |                     |
|-----|-------|----|---|-----|-----|----|---|----|---|----------|----------------|---|---------------------|
| HRC | whale | nr | N | ACO | DDG | 45 | 9 | 10 | N | nr       | na             | na  | nr                  |
| HRC | whale | 1  | N | VIS | DDG | 5  | 2 | 10 | Y | >2000    | Sonar shutdown | whale bearing 227, ship course 180, opening ship  | Transiting          |
| HRC | whale | 2  | N | VIS | DDG | 15 | 2 | 10 | Y | 500-1000 | Sonar shutdown | whales bearing 250, ship course 060, opening ship | Floating on surface |

nr=not reported; VIS=visual; ACO=acoustic; Y=yes; N=no; na=not applicable

**(iii) Evaluation of effectiveness (based on data gathered during all MTEs)**

For the two major training exercises conducted in the Hawaii Range Complex this reporting period (2 Aug 2010 to 1 Aug 2011), the Navy conducted over 2,583 hours of Marine Species Awareness Training for 1,032 Navy personnel prior to beginning the training events. In addition, over the 12 non-consecutive major training event days in this same period (**Table H1-iii-1**), the Navy performed over 5,688 hours of visual observation (when counting the number of individual watchstanders engaged in lookout or navigation duties times the number of ships involved times the number of days at sea).

**Table H1-iii-1. HRC MTEs from 2 August 2010 to 1 August 2011.**

| MTE Type       | Month        | # of Exercise Days | # of Ships Involved (MFAS and non-MFAS) | # of Marine Mammal Sightings | # of Marine Mammals |
|----------------|--------------|--------------------|---|------------------------------|---------------------|
| USWEX          | FEB 2011     | 5                  | 9                                       | 11                           | 41                  |
| USWEX*         | MAR-APR 2011 | 7                  | 8                                       | 20                           | 43                  |
| <b>Totals:</b> |              | <b>12</b>          | <b>17</b>                               | <b>31</b>                    | <b>84</b>           |

\*Koa Kai Exercise

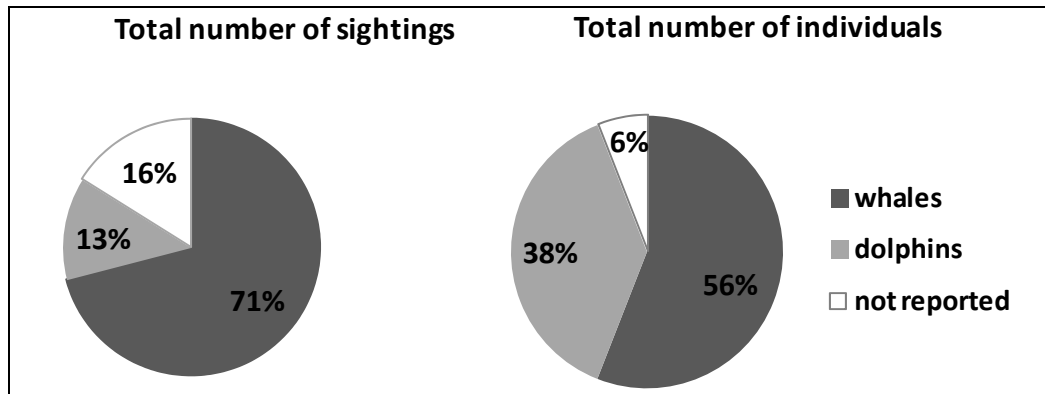
**Hawaii Range Complex Major Training Exercise Marine Mammal Observations**

There were approximately 31 sightings of an estimated 84 marine mammals over the course of the two major training exercises in the Hawaii Range Complex. A breakdown of sightings by species type are shown in **Table H1-iii-2** and **Figure H1-iii-1**:

**Table H1-iii-2. Total number of marine mammal sightings observed from Navy platforms during Hawaii Range Complex major training exercises from 2 August 2010 to 1 August 2011.**

| Species Type   | # of Sightings | % of Total Sightings | # of Marine Mammals | % of Total Number of Marine Mammals |
|----------------|----------------|----------------------|---------------------|-------------------------------------|
| Dolphins       | 4              | 13%                  | 32                  | 38%                                 |
| Whales         | 22             | 71%                  | 47                  | 56%                                 |
| Pinnipeds      | 0              | 0%                   | 0                   | 0%                                  |
| Not reported   | 5              | 16%                  | 5                   | 6%                                  |
| <b>Totals:</b> | <b>31</b>      |                      | <b>84</b>           |                                     |

**Figure H1-iii-1. Chart of marine mammal sightings (left) and number of individuals by species categories (right) during Hawaii Range Complex major training exercises from 2 August 2010 to 1 August 2011.**



### Hawaii Range Complex Major Training Event Mitigations

From **Table H1-iii-2**, of the 31 Navy marine mammal sightings during major training exercises this reporting period, there were 4 sightings within 200 yards that qualified as mitigation events. In other words, mid-frequency active sonar units had their sonar on, and followed the appropriate mitigation (power down) depending on the range to the marine mammal (**Table H1-iii-3**).

There were also 2 instances of Navy ships actively maneuvering to avoid marine mammals. Of these 2 maneuvers, 1 was to avoid 3 whales and the other was to avoid 2 dolphins.

**Table H1-iii-3. Number of marine mammal sightings at ranges less than 200 yards observed from Navy platforms during major training exercises concurrent with sonar shutdown mitigation 2 August 2010 to 1 August 2011.**

| Shutdown Mitigation Range | Total # of Sightings | Total # of Marine Mammals | Breakdown by species type |               |                |                          |
|---------------------------|----------------------|---------------------------|---------------------------|---------------|----------------|--------------------------|
|                           |                      |                           | # of Whales               | # of Dolphins | # of Pinnipeds | # of Not Reported        |
| < 200 yards               | 4                    | 5                         | 3 times for 4 whales      | 0             | 0              | 1 time for 1 individuals |

### SUMMARY: Mitigation Effectiveness and Navy Safety Zone Adherence

During this year’s major training exercises in the Hawaii California Range Complex, proscribed NMFS safety zones were effectively applied 100% of the time in cases of observation of marine mammals within the applicable safety zone.

The three categories of mitigation measures (Personnel Training, Lookout and Watchstander Responsibility, and Operating Procedures) outlined in the Hawaii Final Environmental Impact Statement/Overseas Environmental Impact Statement of December 2008 and approved by NMFS in subsequent Letters of Authorization in 2009, 2010 and 2011 were effective in appropriately mitigating exposure of marine mammals to mid-frequency sonar. During this year’s major training exercises, the proscribed NMFS safety zones were adhered to, and vessels and aircraft applied mitigation measures when marine mammals were visually observed within the requisite zone. Fleet commanders, aircrews and ship watch teams continue to improve individual awareness and enhance reporting practices. This improvement can be attributed to the various pre-event conferences, mandatory Marine Species Awareness Training, adherence to required MFAS mitigation zones, and application of lessons learned in marine mammal sighting and reporting.

**Table H1-iii-4. HRC MTEs where sonar was on during detection of marine mammals at ranges less than 1,000 yards and mitigation conducted.**

| 1) Range [ HRC (H)] | 2) MTE | 3) Month | 4) Species sighted | 5) # of marine mammals sighted | 6) Platform | 7) Length of time observed (min) | 8) Range at which marine mammal sighted | 9) Mitigation [secure (SD); power down (PD); maneuver ship (MAN)] <sup>1</sup> | 10) Estimate MAX exposure PRIOR to mitigation (dB re 1µPa) <sup>2</sup> | 11) Number of minutes sonar mitigation applied | 12) Estimate exposure AFTER mitigation (dB re 1µPa) <sup>2</sup> | 13) DISTANCE ship would have moved given length of mitigation and nominal 10-knot ship speed (yds) | (M) If source in use (J) is hull-mounted, true bearing of animal from ship, true direction of ship's travel, and estimation of animal's motion relative to ship | 15) Observed behavior              |
|---------------------|--------|----------|--------------------|--------------------------------|-------------|----------------------------------|---|--|---|--|--|--|---|------------------------------------|
| H                   | USWEX  | FEB      | whale              | 1                              | DDG         | 1                                | 200-500                                 | SD   | <181-189  | 18   | none   | 6,000  | whale bearing 300, ship course 297, closing ship  | Whale on reciprocal course of ship |
| H                   | USWEX  | FEB      | dolphin            | 10                             | DDG         | 4                                | 500-1000                                | PD   | <175-181  | 5  | <169-175   | 1,667  | dolphins bearing 055, ship course 045, paralleling ship   | nr                                 |
| H                   | USWEX  | FEB      | dolphin            | 20                             | CG          | 5                                | 500-1000                                | na   | <175-181  | na   | <175-181   | na   | dolphins bearing 160, ship course 046, paralleling ship   | Bowriding                          |
| H                   | USWEX  | APR      | whale              | 2                              | DDG         | 15                               | 500-1000                                | SD   | <175-181  | 15   | none   | 5,000  | whales bearing 250, ship course 060, opening ship   | Floating on surface                |

Notes:  
<sup>1</sup> nr=not reported; na=not applicable; mitigation not applicable if dolphins were determined to be bowriding.  
<sup>2</sup> Estimated exposure based on 20Log[R] spherical spreading propagation loss for ranges less than 1000 yards and where nominal MFAS Source Level (SL) assumed to be 235 dB for DDGs and 225 for FFGs. Actual operating parameters and oceanographic conditions likely result in lower exposures. This calculation assumes exposure prior to mitigation. Once animal was spotted at the range indicated, applied mitigation would have resulted in much lower to no exposures.

**Exposure assessment**

Estimated exposures within 2000 yards can be determined based on standard formulas of how sound propagates in water. Spherical spreading is generally valid within 1000 yards from the sound source, and can be expressed as spreading loss (in dB from a source) equals 20logR (with “R” being range from the source in yards). Spherical spreading loss in the first 1000 yards equates to 60 dB of loss. At ranges between 1000 and 2000 yards the sound waves can become trapped by the sea surface and bottom (depending on water depth and other sound propagation factors) and not expand vertically. The spreading wave then forms an expanding cylinder. Cylindrical spreading loss in dB between two points can be calculated by using the formula (10logR<sub>2</sub>/R<sub>1</sub>). Cylindrical spreading loss between 1000 and 2000 yards equates to an additional 3 dB of loss. By the time the sound wave has propagated to 2000 yards, the sonar signal strength has decreased by a total of at least 63 dB. Using the AN/SQS-53 sonar as an example transmitting at 235 dB subtracting the 63 dB of spreading loss equates to an estimated sonar Receive Level (RL) of 172 dB at 2000 yards. The spreading loss formulas are used to make very conservative assumptions about potential exposure. The formula is an estimation of spreading losses only and does not take into account other factors that could increase the total propagation losses such as oceanographic conditions, attenuation losses, scattering losses, and Navy-unique MFAS operating parameters which would result in slightly lower sonar transmit levels. Use of this approach to estimate potential RL at any given animal assumes the horizontal range from a visual sighting accounts for an animal across all depths at which an animal travels to predict the maximum, worst case potential exposure. In other words, this estimated worst case exposure is presented independent of the animal’s actual depth level, since a) time and depth of current and previous dives cannot be deduced from a limited surface sighting, and b) oceanographic and tactical conditions influence actual sound propagation at different depths. Given relative motion of ships and animals at sea, the time spent with any given exposure from surface ships is likely to be limited.

**(2) HRC – ASW Summary**

This section summarizes information from MTEs and non-major training exercises such as unit level training.

**(i) Total annual hours of each type of sonar source**

Total annual hours of each type of sonar source used within the HRC between 2 August 2010 and 1 August 2011 are presented in the classified version of this report. All reporting metrics within the HRC were below the NMFS authorized amount.

**Table H2-i-1. Sonar authorization within the HRC by source.**

| Authorized MFAS sources §216.170 (e)(1) of NMFS HRC Final Rule and LOA | Annually Authorized |
|--|---------------------|
| (i) AN/SQS-53 surface ship hull-mounted active sonar (hours)           | 1,284               |
| (ii) AN/SQS-56 surface ship hull-mounted active sonar (hours)          | 383                 |
| (iii) AN/AQS-22 or 13 helicopter active dipping sonar (# of dips)      | 1,010               |
| (iv) AN/SSQ-62 DICASS acoustic sonobuoy (# of buoys)                   | 2,423               |
| (v) Mk-48/Mk-46/Mk-54 torpedoes (# of torpedoes)                       | 313                 |
| (vi) AN/BQQ-5/10 submarine active sonar (hours)                        | 200                 |

**(ii) Total Sonar Hours (dense humpback areas)**

Hull-mounted active sonar use was not reported within the dense humpback areas plus a 5 km buffer between 15 December 2010 and 15 April 2011. The precise boundaries of these “dense humpback areas” have yet to be formalized by the U.S. Navy and NMFS.

**(iii) Total Sonar Hours (Humpback Whale Cautionary Area)**

Hull-mounted active sonar use was not reported within the Humpback Whale Cautionary Area between 15 December 2010 and 15 April 2011.

**(iv) Cumulative Impact Report**

From NMFS Final Rule: *“To the extent practicable, the Navy, in coordination with NMFS, shall develop and implement a method of annually reporting non-major (i.e. other than RIMPAC, USWEX, or Multi-Strike Group Exercises) training exercises utilizing hull-mounted sonar. The report shall present an annual (and seasonal, where practicable), depiction of non-major training exercises geographically across the HRC. The Navy shall include (in the HRC annual report) a brief annual progress update on the status of the development of an effective and unclassified method to report this information until an agreed-upon (with NMFS) method has been developed and implemented.”*

Specific to the HRC only, seasonality refers to reporting of total hull-mounted use within Hawaii’s “dense humpback areas” and Humpback Whale Cautionary Area between 15 December and 15 April.

Hull-mounted sonar was not used within the boundaries of the “dense humpback areas” or the “Humpback Whale Cautionary Area” between 15 December 2010 and 15 April 2011.

The precise locations and frequency of ASW training is classified and is presented in the classified version of this report. There is currently no method to declassify the sensitivity of this data in order to publish this type of information in an unclassified report. For this reason the only available method for this information to be disseminated for the foreseeable future is in the classified version of this Annual Exercise Report.

**(3) HRC – SINKEX**

No SINKEXs were conducted in the HRC during the reporting period.

**(4) HRC – IEER/AEER Summary**

The annual summary of use within the HRC for Improved Extended Echo Ranging (IEER) and Advanced Extended Echo Ranging (AEER) sonobuoys is deemed classified. Data requested from the Navy is presented in the classified version of this report. Reporting elements include (i) Total number of IEER/AEER events; (ii) Total expended/detonated rounds (buoys); and (iii) Total number of self-scuttled IEER rounds (buoys).

**(5) HRC – Explosives Summary**

The Navy is in the process of improving the methods used to track explosives use within each range complex. Therefore, NMFS requested that the Navy report to the maximum extent practicable as defined in the Hawaii Range Complex Final. These explosive numbers were collected manually from several different databases that are maintained by the separate entities. The implementation of an automated database that was estimated to be operational for this year’s explosive data collection has been delayed due to unanticipated technical and administrative issues. The Navy will continue the development of an automated system to track explosives use within the range complexes. This system will eventually reduce the manpower needed to collect this data and improve reporting accuracy within the Hawaiian Range Complex.

**(i) Total annual number of each type of explosives exercises (of those identified as part of the “specified activity” under HRC LOA)**

**Table H5-i-1. Explosives exercises conducted in the HRC.**

| Authorized Exercise §216.170(c)(2)(ii)                 | Total Annual | Amount Annually Authorized | % Total Used To Total Authorized |
|--|--------------|----------------------------|----------------------------------|
| (A) Mine Neutralization                                | 3            | 68                         | 4%                               |
| (B) Air-to-Surface Missile Exercise (A-S MISSILEX)     | 5            | 50                         | 10%                              |
| (C) Surface-to-Surface Missile Exercise (S-S MISSILEX) | 5            | 12                         | 42%                              |
| (D) Bombing Exercise (BOMBEX)                          | 1            | 38                         | 3%                               |
| (E) Sinking Exercise (SINKEX)                          | 0            | 6                          | 0%                               |
| (F) Surface-to-Surface Gunnery Exercise (S-S GUNEX)    | 34           | 91                         | 37%                              |
| (G) Naval Surface Fire Support (NSFS)                  | 4            | 28                         | 14%                              |
| (H) EER/IEER explosive sonobuoys                       | 4            | 4                          | 100%                             |

**(ii) Total annual expended/detonated rounds for each explosive type**

**Table H5-ii-1. Explosives usage in the HRC.**

| Underwater Explosives §216.170 (c)(2)(i) | Number |
|--|--------|
| (A) 5” naval gunfire rounds              | 202    |
| (B) 76 mm naval gunfire rounds           | 26     |
| (C) Maverick missiles                    | 0      |
| (D) Harpoon missiles                     | 2      |
| (E) Mk-82 aerial bombs                   | 0      |
| (F) Mk-83 aerial bombs                   | 0      |
| (G) Mk-84 aerial bombs                   | 0      |
| (H) Mk-48 torpedoes (detonations)        | 1      |
| (I) Demolition charges                   | 14     |
| (J) EER/IEER sonobuoys                   | 106    |