

# **Marine Species Monitoring Report**



**for the U.S. Navy's  
Southern California Range Complex**

**1 March 2014**



Cover photo credit: Blue whale (*Balaenoptera musculus*) fluking-out before a prolonged dive when photographed 26 July 2013 by B. Würsig under NMFS permit 14451.

**In Support Of  
Letter of Authorization and Incidental Take Statement  
Under The Marine Mammal Protection Act and Endangered Species Act  
For Incidental Harassment of Marine Mammals Resulting From  
U.S. Navy Training and Testing Activities in the Southern California Range Complex**

**Marine Species Monitoring  
Report  
For the U.S. Navy's  
Southern California Range Complex  
  
2013 Annual Report**

**Prepared in Accordance With  
50 C.F.R. §216.275(e)**

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## **EXECUTIVE SUMMARY**

This report presents the United States (U.S.) Department of the Navy's annual level of effort for regulatory compliance and monitoring accomplishments in the Southern California Range Complex (SOCAL) from the monitoring period of 2 August 2012 to 31 December 2013.

The evolution of process in the SOCAL Monitoring Program has been, and continues to be, concurrent with the evolution of the larger U.S. Navy Marine Species Monitoring Program. While systemic changes are in progress to be implemented in future monitoring, marine species monitoring in SOCAL included a shift from rigid effort based-metrics toward question-based monitoring and reporting. This process change increased transparency, facilitated the generation of statistically powerful results, and fostered collaboration. It has generated enhanced results in the report, through demonstration of specific progress in furthering our understanding of the monitoring questions. The questions were developed to fit within the existing metric-based requirements while, in the future, questions are planned to be developed through the U.S. Navy Strategic Planning Process.

A majority of the new science obtained during this period is contained and discussed in significantly more detail in contributed technical reports supporting this monitoring report. In addition, the SOCAL Comprehensive Exercise and Marine Species Monitoring Report For the U.S. Navy's Southern California Range Complex 2009-2012 provided to the National Marine Fisheries Service (NMFS) in June 2013 contains a more detailed discussion of cumulative observations and accomplishments of Navy funded monitoring within SOCAL Range Complex (Department of the Navy 2013a).

Visual survey efforts within SOCAL included 663 hours completed covering 13,443 nautical miles (nm) and resulting in 1,109 sightings of an estimated 48,865 marine mammals. For passive acoustic monitoring, over 18,192 hours of passive data were collected and analyzed for marine mammal vocalizations and anthropogenic sounds. Among the monitoring accomplishments this period include continued collection of marine mammal occurrence information specific to Navy at-sea training areas within Southern California, derivation of new marine mammal densities representing some of the most current data available for seasonal occurrence, documentation of baseline behavioral activities for multiple marine mammal species with a particular focus on blue whales, deployment of new passive acoustic device in an area of interest for blue whales (San Diego Arc), and new research on possible contributions to ambient underwater sound from regional earthquakes.

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**ACRONYMS AND ABBREVIATIONS**

|           |   |
|-----------|---|
| μPa       | micropascal(s)  |
| AMR       | Adaptive Management Review  |
| CalCOFI   | California Cooperative Oceanic<br>Fisheries Investigations                                |
| dB        | decibel(s)  |
| ESA       | Endangered Species Act  |
| FY        | Fiscal Year   |
| HARP      | High-Frequency Acoustic Recording<br>Package  |
| Hz        | hertz   |
| ICMP      | Integrated Comprehensive<br>Monitoring Program  |
| kHz       | kilohertz   |
| LOA       | Letter of Authorization   |
| LMR       | Living Marine Resources   |
| M3R       | Marine Mammal Monitoring on<br>Navy Ranges  |
| m         | meter(s)  |
| MFAS      | Mid-Frequency Active Sonar  |
| MMO       | Marine Mammal Observer  |
| MMPA      | Marine Mammal Protection Act  |
| MTE       | Major Training Event  |
| Navy      | United States Department of the Navy  |
| nm        | nautical mile(s)  |
| NMFS      | National Marine Fisheries Service   |
| OPNAV N45 | Office of the Chief of Naval<br>Operations Energy and Environmental<br>Readiness Division |
| PAM       | Passive Acoustic Monitoring   |
| re        | referenced to   |
| SOAR      | Southern California Anti-Submarine<br>Range   |
| SOCAL     | Southern California   |
| SSTC      | Silver Strand Training Complex  |
| U.S.      | United States   |

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## **1 INTRODUCTION**

### **1.1 BACKGROUND**

The United States (U.S.) Department of the Navy (Navy) developed Range Complex-specific Monitoring Plans under the Navy Monitoring Program to provide marine mammal and sea turtle monitoring as required under the Marine Mammal Protection Act (MMPA) of 1972 and the Endangered Species Act (ESA) of 1973. The U.S. Pacific and Atlantic Fleets' marine species monitoring programs are composed of a collection of "range-specific" monitoring plans, each developed as part of the MMPA/ESA authorization process. The Fleets individual plans establish specific monitoring requirements for each range complex based on a set of effort-based metrics.

This report describes Navy-funded monitoring within the Navy's Southern California (SOCAL) Range Complex conducted between 2 August 2012 and 31 December 2013.

### **1.2 INTEGRATED COMPREHENSIVE MONITORING PROGRAM**

The Integrated Comprehensive Monitoring Plan (ICMP) provides the overarching framework for coordination of the Navy Monitoring Program (Department of the Navy 2010). The ICMP has been developed in direct response to Navy Range permitting requirements established in the various MMPA Final Rules, ESA Consultations, Biological Opinions, and applicable regulations. As a framework document, the ICMP applies by regulation to those activities on ranges for which the Navy sought and received incidental take authorizations.

The ICMP is evaluated annually through the Adaptive Management Review (AMR) process to: (1) assess progress, (2) provide a matrix of goals for the following year, and (3) make recommendations for refinement and analysis of the monitoring and mitigation techniques. This process includes conducting an annual AMR meeting at which the Navy and National Marine Fisheries Service (NMFS) jointly consider the prior-year goals, monitoring results, and related scientific advances to determine if modifications are needed to more effectively address monitoring program goals. Modifications to the ICMP that result from AMR discussions are incorporated by an addendum or revision to the ICMP. As a planning tool, the ICMP is a "living document." It will be routinely updated as the program progresses with the most recent revision in 2013/2014 with the addition of the Strategic Planning Process.

### **1.3 REPORT OBJECTIVES**

The objectives of this report are to present reportable metrics of monitoring as requested by NMFS, data and results, and progress which furthers our understanding of monitoring questions. The Annual Report will focus mostly on summarizing collected data, while referring to the more technical discussions in various technical reports provided by the scientists who performed the monitoring work.

## 2 SOUTHERN CALIFORNIA RANGE COMPLEX MONITORING OVERVIEW

### 2.1 SOUTHERN CALIFORNIA RANGE COMPLEX MONITORING OBJECTIVES

The SOCAL Range Complex is situated off the coast of Southern California, generally between Dana Point and San Diego, California.

At the beginning of the SOCAL Range Complex monitoring program in 2009, it quickly became apparent that from a logistics perspective (distances from land, funding, amount of Navy training occurring, etc.) and scientific perspective (availability of previous data for comparison), not all parts of the SOCAL Range Complex could be effectively and safely studied within the time frame of this program (2009–2013). Therefore, the monitoring program focused on highly used key Navy training areas west, east, and south of San Clemente Island (Figure 2-1).

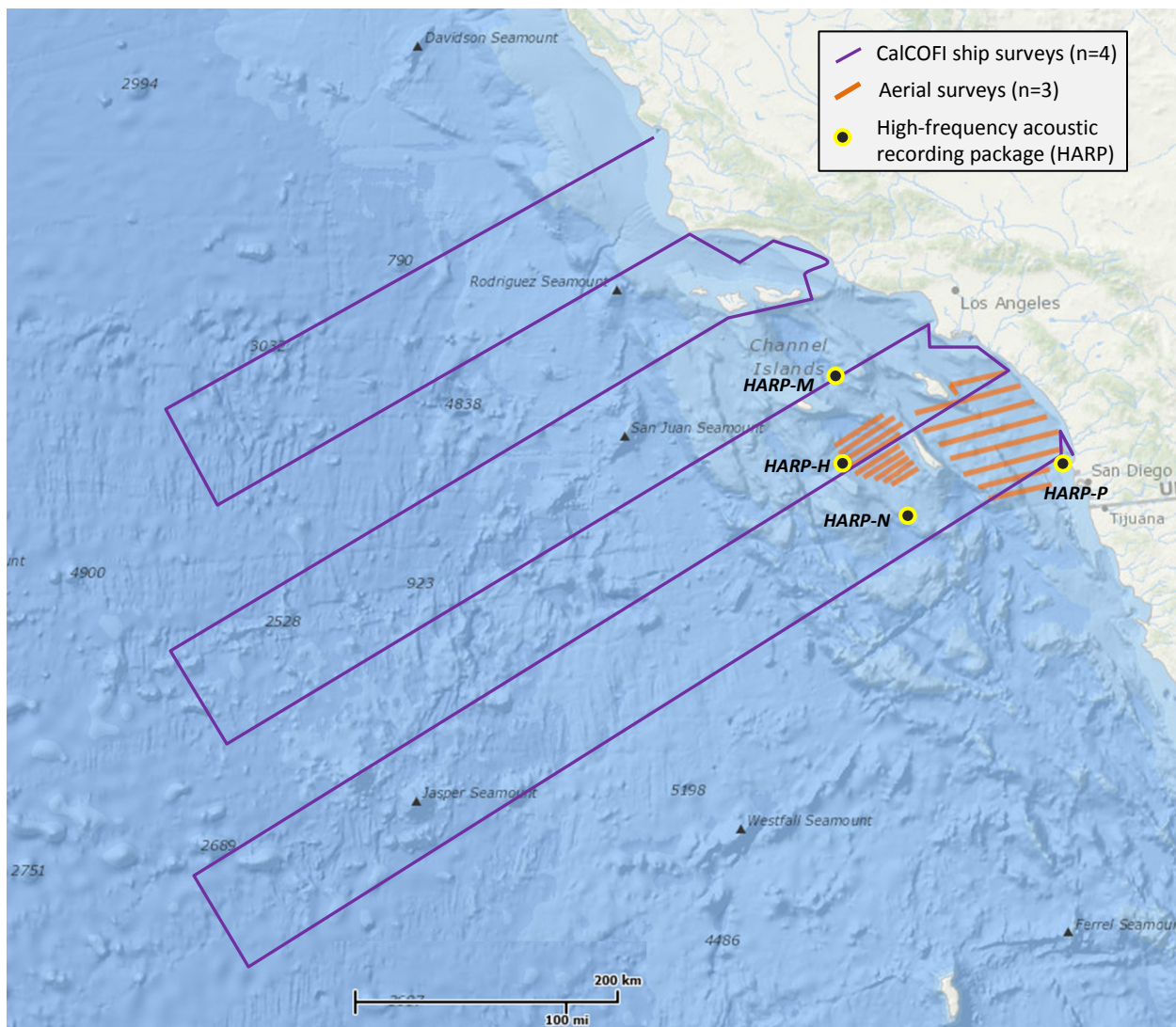


Figure2-1: Visual Marine Mammal Survey Monitoring Areas and Passive Acoustic Monitoring Locations within the Navy's Southern California Range Complex

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### **Current August 2012 to December 2013 Monitoring**

The 2012–2013 Navy-required monitoring requirements for the SOCAL Range Complex include (Department of the Navy 2012):

- Visual survey: completion of 100–150 hours of visual survey
- Passive Acoustic Monitoring (PAM): report results from minimum of two bottom deployed passive acoustic devices
- Marine Mammal Observer (MMO): completion of 50–100 hours of MMO deployment

In addition, Navy marine mammal sightings during SOCAL Range Complex Major Training Events (MTEs) are summarized annually. Finally, any contributions from researchers engaged in the Navy's research funded projects are presented, as available.

As of report deadline, no Navy research funded publications were available for inclusion with this Annual Monitoring Report. If research funded documents do become available in the future, the Navy will post these on its public monitoring web portal:

<http://www.navymarinespeciesmonitoring.us/>

The U.S. Pacific Fleet SOCAL Range Complex monitoring team is comprised of non-Navy civilian, academic, government, and contractor scientists along with participation by Navy marine species technical experts. Aerial visual surveys discussed were conducted by Smultea Environmental Services (which, over the course of the monitoring, became a sub-contractor to HDR, Inc.). Visual vessel surveys during California Cooperative Oceanic Fisheries Investigations (CalCOFI) cruises were conducted by Scripps Institution of Oceanography. Passive acoustic monitoring was performed by the Marine Physical Laboratory, Scripps Institution of Oceanography, University of California, San Diego, and Naval Postgraduate School, Monterey, CA.

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**2.2 SOUTHERN CALIFORNIA RANGE COMPLEX MAJOR TRAINING EXERCISE SUMMARY**

This chapter summarizes marine mammal sightings made from Navy platforms during designated MTEs within the SOCAL Range Complex.

**2.2.1 OVERVIEW OF MAJOR TRAINING EVENTS**

There were six (6) individual MTEs that took place in the SOCAL Range Complex during this reporting period (Table 2-1).

**Table 2-1: Southern California Range Complex Major Training Events from 2 August 2012 to 31 December 2013**

| SOCAL                               |                   |
|-------------------------------------|-------------------|
| MTE TYPE                            | DATE              |
| Composite Training Unit Exercise    | 17 Oct–5 Nov 2012 |
| Integrated Anti-submarine Course II | 29 Oct–5 Nov 2012 |
| Joint Task Force Exercise           | 6 Nov–11 Nov 2012 |
| Sustainment Exercise                | 2 Apr–18 Apr 2013 |
| Composite Training Unit Exercise    | 8 Jul–19 Jul 2013 |
| Sustainment Exercise                | 6-15 Nov 2013     |

**2.2.2 OVERVIEW OF SIGHTING DURING MAJOR TRAINING EVENTS**

There were 329 reported sightings of at least 3,502 marine mammals and sea turtles during MTEs in the SOCAL Range Complex from 2 August 2012 to 31 December 2013 (Table 2-2). The Navy's 2013 SOCAL unclassified annual Exercise Report contains tables listing all marine mammals sighted during this reporting year and the range of the sighting.

**Table 2-2: Southern California Range Complex Sightings of Marine Mammals and Sea Turtles from U.S. Navy Ships and Aircraft During Major Training Events**

| SPECIES TYPE | # OF SIGHTINGS | % OF TOTAL SIGHTINGS | # OF MARINE MAMMALS | % OF TOTAL NUMBER OF MARINE MAMMALS |
|--------------|----------------|----------------------|---------------------|-------------------------------------|
| Dolphins     | 144            | 44%                  | 3,091               | 88%                                 |
| Whales       | 149            | 45%                  | 314                 | 9%                                  |
| Pinnipeds    | 17             | 5%                   | 78                  | 3%                                  |
| Turtles      | 1              | < 1%                 | 1                   | < 1%                                |
| Not reported | 18             | 5%                   | 18                  | 1%                                  |
| <b>Total</b> | <b>329</b>     |                      | <b>3,502</b>        |                                     |

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**2.2.3 OVERVIEW OF SIGHTINGS LESS THAN 1,000 YARDS**

There were 41 total mitigation events by Navy mid-frequency sonar due to sighting of marine mammals within prescribed mitigation zones during MTEs from 2 August 2012 to 31 December 2013 (Table 2-3). Mitigation consisted of sonar either being powered down or shut off.

**Table 2-3: Marine Mammal Sightings at Ranges Less than 1,000 Yards During Southern California Major Training Events between 2 August 2012 and 31 December 2013**

| <b>SOCAL</b>          |                           |   |   |
|-----------------------|---------------------------|---|---|
| <b>RANGES</b>         | <b>MARINE MAMMAL TYPE</b> | <b>SIGHTINGS WITHIN A GIVEN RANGE WITH MITIGATION (I.E., SONAR WAS ON PRIOR TO SIGHTING AND SONAR MITIGATION WAS APPLIED)</b> | <b>SIGHTINGS WITHIN A GIVEN RANGE WITH NO MITIGATION REQUIRED (I.E., SONAR WAS NOT ON SO SONAR MITIGATION WAS NOT NEEDED)</b> |
| <b>&lt; 200 yards</b> |                           |   |   |
|                       | Whales                    | 7 times for 25 whales *   | 5 sightings of 6 whales   |
|                       | Dolphins                  | 7 times for 93 dolphins   | 24 sightings of 362 dolphins  |
|                       | Pinnipeds                 | 1 time for 2 pinnipeds  | 1 sighting of 10 pinnipeds  |
|                       | Turtles                   | 0 times   | 1 sighting of 1 turtle  |
| <b>200–500 yards</b>  |                           |   |   |
|                       | Whales                    | 6 times for 12 whales   | 15 sightings of 18 whales   |
|                       | Dolphins                  | 4 times for 90 dolphins   | 33 sightings of 652 dolphins  |
|                       | Pinnipeds                 | 1 time for 10 pinnipeds   | 7 sightings of 32 pinnipeds   |
|                       | Turtles                   | 0 times   | 0 sightings   |
| <b>501–1000 yards</b> |                           |   |   |
|                       | Whales                    | 9 times for 19 whales   | 30 sightings of 72 whales   |
|                       | Dolphins                  | 3 times for 58 dolphins   | 34 sightings of 873 dolphins  |
|                       | Pinnipeds                 | 0 times   | 3 sightings of 12 pinnipeds   |
|                       | Turtles                   | 0 times   | 0 sightings   |

\*given report of "15 whales" from Nov 2013, suspect migrating gray whale

#### **2.2.4 EVALUATIONS OF MITIGATION EFFECTIVENESS**

During the six (6) MTEs in the SOCAL Range Complex from 2 August to 31 December (Table 2-1), mitigation procedures were effectively applied in cases of observation of marine mammals and sea turtles within the applicable zone (Table 2-2 and 2-3). The three categories of mitigation measures (Personnel Training, Lookout and Watchstander Responsibility, and Operating Procedures) outlined in the SOCAL Final Environmental Impact Statement (EIS)/Overseas EIS of December 2008 and approved by NMFS in subsequent Letters of Authorizations (LOA) were effective in appropriately mitigating exposure of marine mammals and sea turtles to sonar.

There were no reports of any unit not applying the appropriate mitigation, and two cases where sonar surface ship mitigation was applied outside of 1,000 yards (over mitigation; although it may have been that animals were seen between 1,000-1,500 yards, but deemed closing with the ship so mitigation in the form of sonar power down applied).

In support of the six (6) MTEs during the reporting period, the Navy conducted over 4,161 hours of Marine Species Awareness Training for 2,526 Navy personnel prior to the beginning of these exercises. While at sea, the Navy spent over 32,198 hours of surface and aerial visual observation toward the detection of marine mammals and sea turtles. Additionally, over 521 hours were spent documenting and reporting marine animal sightings and mitigation events.

In addition, during this reporting period within the SOCAL Range Complex: There were zero (0) instances of Navy ship strike to large whales, no reported Unusual Mortalities Events reported by NMFS coincidental with MTEs, or any other marine mammal strandings or reports of unusual behavior associated with Navy training this period.



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**2.3 SOUTHERN CALIFORNIA RANGE COMPLEX 2012–2013 MONITORING ACCOMPLISHMENTS**

This chapter provides a summary of U.S. Pacific Fleet-funded SOCAL Range Complex compliance monitoring with focus on the scientific contributions and major results from each research element. From August 2012 to December 2013, the U.S. Pacific Fleet maintained compliance with the annual metrics outlined in the SOCAL Range Complex monitoring plan and as amended in each annual Letter of Authorization (LOA) renewal from NMFS.

**2.3.1 SUMMARY OF METRICS**

As mentioned in Chapter 1, current SOCAL Range Complex Fleet-funded compliance monitoring consists of the research elements below which have been relatively consistent over the course of the monitoring period (January 2009–December 2013):

- Visual survey: 100–150 (mostly aerial)
- PAM: two bottom devices
- MMO: 50–100 hours of embarks and deployment
  - Exercise reporting from MTEs
  - Other Navy-funded research, as available

Table 2-3 highlights SOCAL Range Complex monitoring completed between August 2012 and August 2013 as compared to what the Navy committed.

**Table 2-3: Monitoring Plan Metrics Accomplished This Reporting Period**

| MONITORING YEAR                    |   |
|------------------------------------|---|
| STUDY TYPE                         | AUGUST 2012–DECEMBER 2013   |
| <b>VISUAL SURVEY</b>               | <p><u>Completed:</u><br/>79 total hours effort from aerial survey accomplished with results in Jefferson et al. 2013 and Smultea and Bacon 2013; another 584 hours effort from ship board visual survey accomplished with results to be presented Campbell et al. (2014); total therefore of 663 visual survey hours completed.</p> <p><u>Committed to in 2012 SOCAL Range Complex Annual Monitoring Report:</u><br/>Complete 100–120 hours from all platforms annually</p> |
| <b>MARINE MAMMAL OBSERVERS</b>     | <p><u>Completed:</u><br/>none *</p> <p><u>Committed to in 2012 SOCAL Range Complex Annual Monitoring Report:</u><br/>Complete 50–100 hours annually</p>   |
| <b>PASSIVE ACOUSTIC MONITORING</b> | <p><u>Completed:</u><br/>Five bottom-mounted passive acoustic devices deployed; results three devices reported in Kerosky et al. 2013 (18,192 hours of passive data analyzed for marine mammal vocalizations and anthropogenic sounds)</p> <p><u>Committed to in 2012 SOCAL Range Complex Annual Monitoring Report:</u><br/>Continue and present results from two passive acoustic monitoring devices</p>   |

\* Added to next year's committed amount (Dec 2013–Dec 2014)

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### 2.3.1.1 Metric Met or Exceeded

*Aerial and Vessel Surveys [26], [27], [31]*: a total of 663 hours of visual surveys were conducted which greatly exceeded planned amount (100–120 hours).

*Passive Acoustic Monitoring [24]*: Five high-frequency acoustic recording packages (HARPs) were deployed during the reporting period. This fulfills the commitment of the deployment, data recording, and analysis of at least two passive acoustic monitoring devices. Baumann-Pickering et al. 2013 and Kerosky et al. 2013 discuss available results from up to three of the four deployed devices dedicated for marine mammal vocalizations. Fifth device only analyzed for anthropogenic sounds with focus on commercial shipping sounds in relation to Automated Information System tracks of merchant ship passage.

### 2.3.1.2 Metric Shortfalls

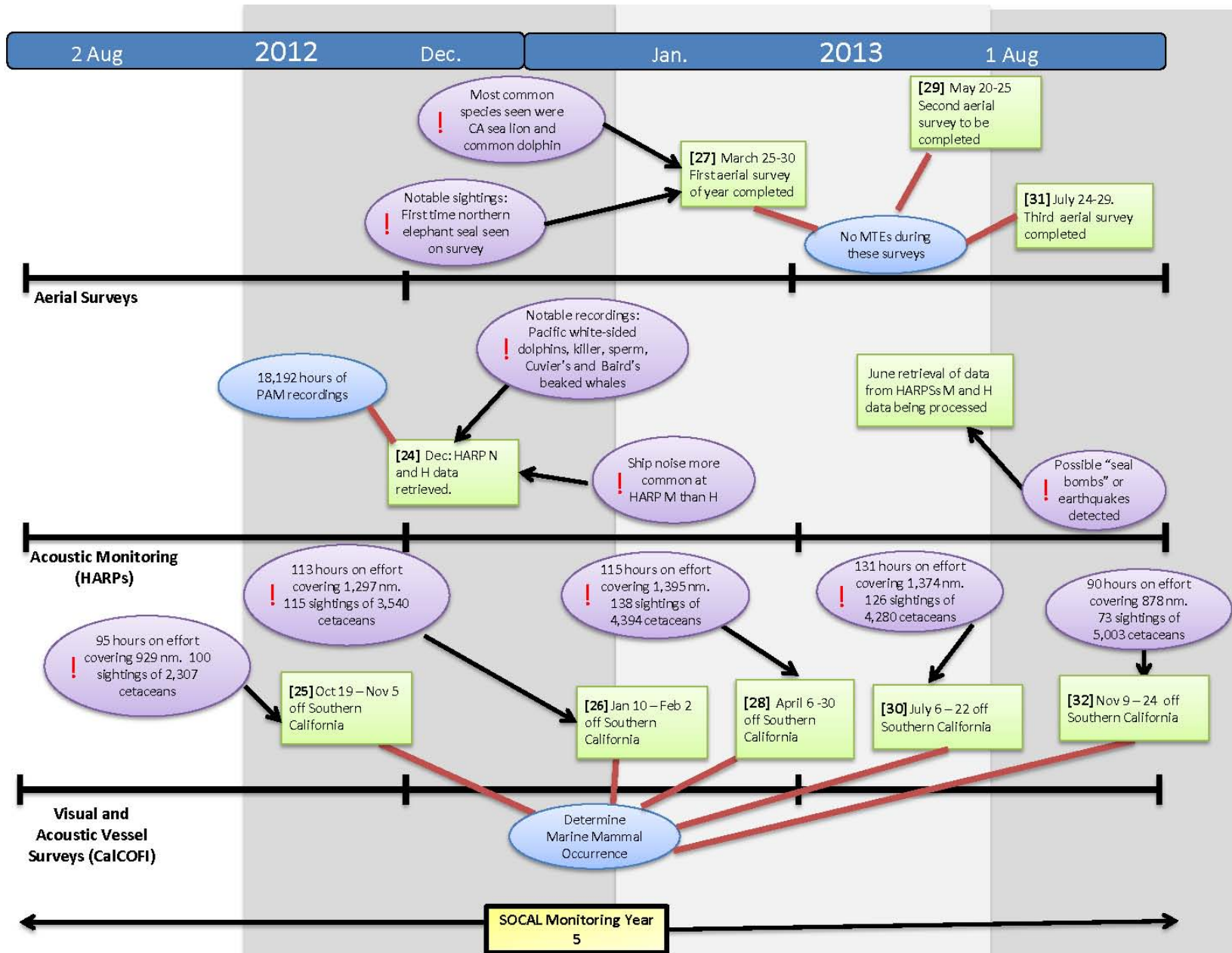
*Marine Mammal Observers*: Marine Mammal Observer deployment on San Diego based destroyers did not occur this period. A combination of factors contributed to this shortfall. One, government FY13 continuing resolution, sequestration, and budget shortfalls limited the number of non-deploying platforms at sea within the SOCAL Range Complex during 2013. Combined with out of area ship deployment schedules and maintenance periods, significantly fewer assets than normal were available for embarking marine mammal observers. In addition, concurrent underwater detonation marine mammal observer deployments within the Silver Strand Training Complex part of SOCAL Range Complex reduced the number and time for marine mammal observers to be available for SOCAL offshore ship embarks. There were nine Silver Strand Training Complex underwater detonation events with marine mammal observers in 2012-2013 (Department of the Navy 2013b).

The Navy concludes, however, the additional over the planned amount monitoring during this period under visual and passive acoustic accomplishments above contribute enough to offset MMO embarks.

### Chronological Timeline of Southern California Monitoring

The timing of projects was primarily based on Naval training event schedules and illustrates the timing in which the analysis efforts and surveys were conducted and, in some cases, the connectivity when monitoring techniques are applied in coordination with others. Each analysis effort and survey, as organized by monitoring technique, is included in a green box. On-going analysis efforts and important meetings are also depicted, in addition to the field efforts. Notable sightings are called out in purple ovals in Figure 2-2. Table 2-4 includes additional details about the monitoring effort, including notable sightings and outcomes. Note, the Navy is still waiting for a final report from visual marine mammal survey efforts associated during 2012-2013 CalCOFI cruises (Campbell et al. 2014).

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**Figure 2-2: Visual Timeline**

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**Table 2-4: Description of Monitoring Efforts and Key Events Related to Monitoring Row Numbers, Corresponding to Green Monitoring Boxes and Orange Event Boxes in Figure 2-3**

| <b>ROW #</b> | <b>DATES DATA FIELD COLLECTED</b> | <b>LOCATION</b>                         | <b>OBJECTIVES</b>   | <b>METHODS USED</b>   | <b>SPECIES DETECTED/OBSERVED</b>   | <b>NOTABLE OUTCOMES/EVENTS/CONCLUSIONS</b>   |
|--------------|-----------------------------------|---|---|---|--|--|
| <b>24</b>    | December 2012                     | HARP N and H Data Retrieved             | Determine the species present in SOCAL Range Complex acoustically by retrieving HARPs.  | HARP devices retrieved for acoustic detection and classification of marine mammals. | Species: blue, fin, Bryde's, gray, humpback, minke, Risso's, Pacific white-sided, killer, sperm, Cuvier's, Baird's beaked, common dolphins, bottlenose.  | These data only reflect March–December 2012: 18,192 hours of recorded data. Ship noise more common at HARP N. All HARPs had MFAS detections, along with explosive events, especially at H (possible Seal Control). |
| <b>25</b>    | October 19–November 5 2012        | Southern California                     | Determine marine mammal occurrence.   | CalCOFI ship visual and passive acoustic survey                                     | 100 sightings of 2,307 cetaceans   | 95 hours of effort covering 929 nm.  |
| <b>26</b>    | January 10–February 2 2013        | Southern California                     | Determine marine mammal occurrence.   | CalCOFI ship visual and passive acoustic survey.                                    | 115 sightings of 3,540 cetaceans.  | 113 hours of effort covering 1,297 nm.   |
| <b>27</b>    | March 25–30 2013                  | Santa Catalina Basin; San Nicolas Basin | Survey key Navy areas of interest, provide snapshot of marine mammal numbers, presence, distribution. Collect behavior data. Conduct focal follows and video documentation. Locate and identify dead floating or stranded marine mammals. | Aerial visual sampling using distance sampling methodology.                         | 180 sightings of 14,173 individuals. Species: both common dolphins, CA sea lion, gray, fin, minke, humpback, Bryde's whales, Risso's, bottlenose, northern right whale dolphin and northern elephant seal. | 25.4 hours covering 2,658 nm. Most abundant sightings were common dolphin and sea lions. First time northern elephant seal seen on aerial surveys.   |

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| <b>ROW #</b> | <b>DATES DATA FIELD COLLECTED</b> | <b>LOCATION</b>                         | <b>OBJECTIVES</b>   | <b>METHODS USED</b>   | <b>SPECIES DETECTED/OBSERVED</b>   | <b>NOTABLE OUTCOMES/EVENTS/ CONCLUSIONS</b>   |
|--------------|-----------------------------------|---|---|---|--|---|
| <b>28</b>    | April 6-30<br>2013                | Southern California                     | Determine marine mammal occurrence.   | CalCOFI ship visual and passive acoustic survey.            | 138 sightings of 4,394 cetaceans.  | 115 hours of effort covering 1,395 nm.  |
| <b>29</b>    | May 22-26<br>2013                 | Santa Catalina Basin; San Nicolas Basin | Survey key Navy areas of interest, provide snapshot of marine mammal numbers, presence, distribution. Collect behavior data. Conduct focal follows and video documentation. Locate and identify dead floating or stranded marine mammals. | Aerial visual sampling using distance sampling methodology. | 205 sightings of 7,693 individuals. 10 species: common dolphins, gray, sea lions and Risso's, Northern Right whale dolphins with short beaked common dolphins. | 30.1 hours covering 3,048 nm. First time gray whale seen in warm season. Pacific white sided seen with Risso's (hasn't been spotted since May 2010). Blue mother/calf pair. Possible Risso's mating.                                    |
| <b>30</b>    | July 6-22<br>2013                 | Southern California                     | Determine marine mammal occurrence.   | CalCOFI ship visual and passive acoustic survey.            | 126 sightings of 4,280 cetaceans.  | 131 hours of effort covering 1,374 nm.  |
| <b>31</b>    | July 24-29<br>2013                | Santa Catalina Basin; San Nicolas Basin | Survey key Navy areas of interest, provide snapshot of marine mammal numbers, presence, distribution. Collect behavior data. Conduct focal follows and video documentation. Locate and identify dead floating or stranded marine mammals. | Aerial visual sampling using distance sampling methodology. | 172 sightings of 7,575 individuals. 7 species – CA sea lions, common dolphins most frequent.   | 23.4 hours covering 2,441 nm. Unusual sightings include a lone blue whale, CA sea lions feeding on bait balls, documented social and sexual behavior of Risso's. July 29th had highest sightings ever, with total of 1,332 individuals. |
| <b>32</b>    | November 9-24<br>2013             | Southern California                     | Determine marine mammal occurrence.   | CalCOFI ship visual and passive acoustic survey.            | 73 sightings of 5,003 cetaceans.   | 90 hours of effort covering 878 nm.   |

Notes: CalCOFI= California Cooperative Oceanic Fisheries Investigations, HARP = High-Frequency Acoustic Recording Package, nm = nautical mile(s)

## **2.3.2 PROJECT DESCRIPTIONS**

The following sections describe and summarize results by research element. The various technical reports associated with this Annual Report contain significantly more material (Baumann-Pickering et al. 2013, Campbell et al. 2014, Jefferson et al. 2013, Kerosky et al. 2013, and Smultea and Bacon 2013).

### **2.3.2.1 Visual Surveys**

**Aerial-** Three aerial surveys were conducted in subregions of Southern California to monitor and obtain baseline data on the occurrence, distribution, density, abundance, and behavior of marine mammals and sea turtles (see Figure 2-1).

Typical of previous surveys from 2008-2012, no sea turtles were seen during this survey period. Surveys were conducted from 25-30 March, 22-26 May and 24-29 July 2013. During these three surveys, there were 557 sightings of an estimated 29,341 individual marine mammals. Out of 224 sightings of vessels and boats, 84% of sighted vessels were civilian commercial ships, sailboats, pleasure craft, and fishing boats. Smultea and Bacon 2013 and Jefferson et al. 2013 provide detailed discussions and key observations from aerial survey results.

In May 2013, the first known behavioral focal follow of a blue whale mother and calf was conducted for 54 minutes including taking of digital video and photographs (Figure 2-3) (Smultea and Bacon 2013). The mother-calf pair was initially sighted 6.5 nm west of San Diego where water depth was 3,490 feet. During this encounter, quantified behaviors across four behavior metrics were collected to include (1) percentage of time in view, (2) dispersion distance (in BL) between the mother and the calf, (3) mean blow interval, and (4) position of the calf relative to the mother. These techniques were similar to research on other baleen whale species including South Atlantic right whales and bowhead whales. Smultea and Bacon (2013) also document what might be described as a startle from the calf due to an engine start and movement from a nearby civilian recreational boat.



**Figure 2-3. Blue whale mother/calf pair of San Diego followed for a focal session.**

(Photographed 24 May 2013 by D. Steckler under NMFS permit 144451)

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**Vessel-** The California Cooperative Oceanic Fisheries Investigations (CalCOFI) cruises, a joint agency field effort, have been ongoing within Southern California for over 61 years. More information on the overall history of the CalCOFI program is available at: <http://www.calcofi.net/>

Beginning in 2004, the Navy funded the collection of marine mammal visual and passive acoustic data during regularly scheduled CalCOFI cruises, which occur four times per year. U.S. Pacific Fleet specifically funded CalCOFI marine mammal data collection during 2013. The CalCOFI marine mammal efforts represent some of the few cool-water-period (i.e., winter, spring) vessel surveys within the region, with the exception of the U.S. Pacific Fleet's ongoing aerial surveys that have also sampled during cool-water periods. Each CalCOFI cruise consists of sampling the same survey track lines including coverage offshore (> 100 nm). Spatial and temporal distribution patterns, density, and abundance of cetaceans in the Southern California were assessed through visual and acoustic methodologies. Visual monitoring incorporated standard line-transect protocol during all daylight transits. The 2013 CalCOFI marine mammal sighting report is contained in Campbell et al. 2014.

For the period 2 Aug 2012 through 31 Dec 2013, 584 hours of sighting effort over 5,874 nm was completed resulting in sightings of 552 groups representing 19,524 individual cetaceans.

### **2.3.2.2 Passive Acoustic Monitoring**

The Marine Physical Laboratory of Scripps Institution of Oceanography, University of California, San Diego designs, fabricates, calibrates, deploys, and analyzes data from bottom deployed HARPs. In general, a HARP records marine mammal vocalizations, echolocation clicks, and anthropogenic sounds between 10 hertz (Hz) and 100 kilohertz (kHz). The length of deployment has improved over the years with improvements to battery design and currently a typical deployment can last for up to eight months on continuous duty cycle. A more detailed discussion of HARP technical specification is available at: [http://cet.uscd.edu/technologies\\_AutonomousRecorders.html](http://cet.uscd.edu/technologies_AutonomousRecorders.html).

As part of the U.S. Pacific Fleet-funded compliance monitoring, passive acoustic monitoring was conducted in the Navy's Southern California Range Complex during March 2012 through December 2012 to detect the presence of marine mammal and anthropogenic sounds, with continuous temporal coverage at a site near Santa Barbara Island (site M), a site west of San Clemente Island (site H), and a site southwest of San Clemente Island (site N).

Due to deployment and retrieval cycles, data analysis by Scripps does not always align with the exact periodicity of annual monitoring reporting. For the most current analysis, a total of 18,192 hours of data was recorded (Kerosky et al. 2013). In addition, a fourth HARP was deployed in 2013 several miles offshore of La Jolla, CA. Data from that device is currently under analysis.

There were six baleen whale species detected which included blue, fin, Bryde's, gray, humpback and minke whales. Fin whales were the most commonly detected and minke whales were the least commonly detected. In general, site H and N appeared to have more calling baleen whales than site M, with the exception of gray whales, which were only detected at site M.

At least ten species of odontocetes were recorded. There were six species with known acoustic signal characteristics which included Risso's dolphin, Pacific white-sided dolphin, killer whale, sperm whale, Cuvier's beaked whale, and Baird's beaked whale, along with both species of common dolphin and bottlenose dolphin (there acoustic signal cannot yet be differentiated to species). An additional beaked whale signal type that cannot be assigned to a species was also recorded.

Underwater ambient noise at sites M, H, and N had spectral shapes with higher levels at low frequencies, owing to the dominance of ship noise at frequencies below 100 Hz and local wind and waves above 100 Hz (Figure 2-4). Prominent peaks in noise were observed seasonally at 15–30 Hz and also at 46 Hz, related to the presence of fin and blue whale calls, respectively, at each site. Spectral plots reveal approximately 5–10 decibels (dB) lower ambient noise levels at site H relative to sites M and N, in the band below 100 Hz, coinciding with the distribution of broadband ship noise at these sites. Ship noise was a common anthropogenic sound due to the fact that major commercial shipping routes are located south of the Channel Islands and to/from the Ports of Los Angeles and Long Beach. Daily patterns of ship noise had two temporal peaks showing the preference in times for ship arrival and departure to port.

Mid-Frequency Active Sonar (MFAS) was also detected by the HARPs (Figure 2-5). October and November had the largest number of hours of sonar pings detected, which coincided with the MTEs that were conducted during this time period. Fewer sonar pings and lower received levels were detected at site M than at sites H and N. A total of 321 MFAS pings were detected in the frequency range 2.44.5 kHz over periods of 120 days analyzed, with a maximum 139 dB re 1 $\mu$ Pa received level. At site H, a total of 18,919 MFAS pings were detected over a period of 132 days with some ping received levels above the



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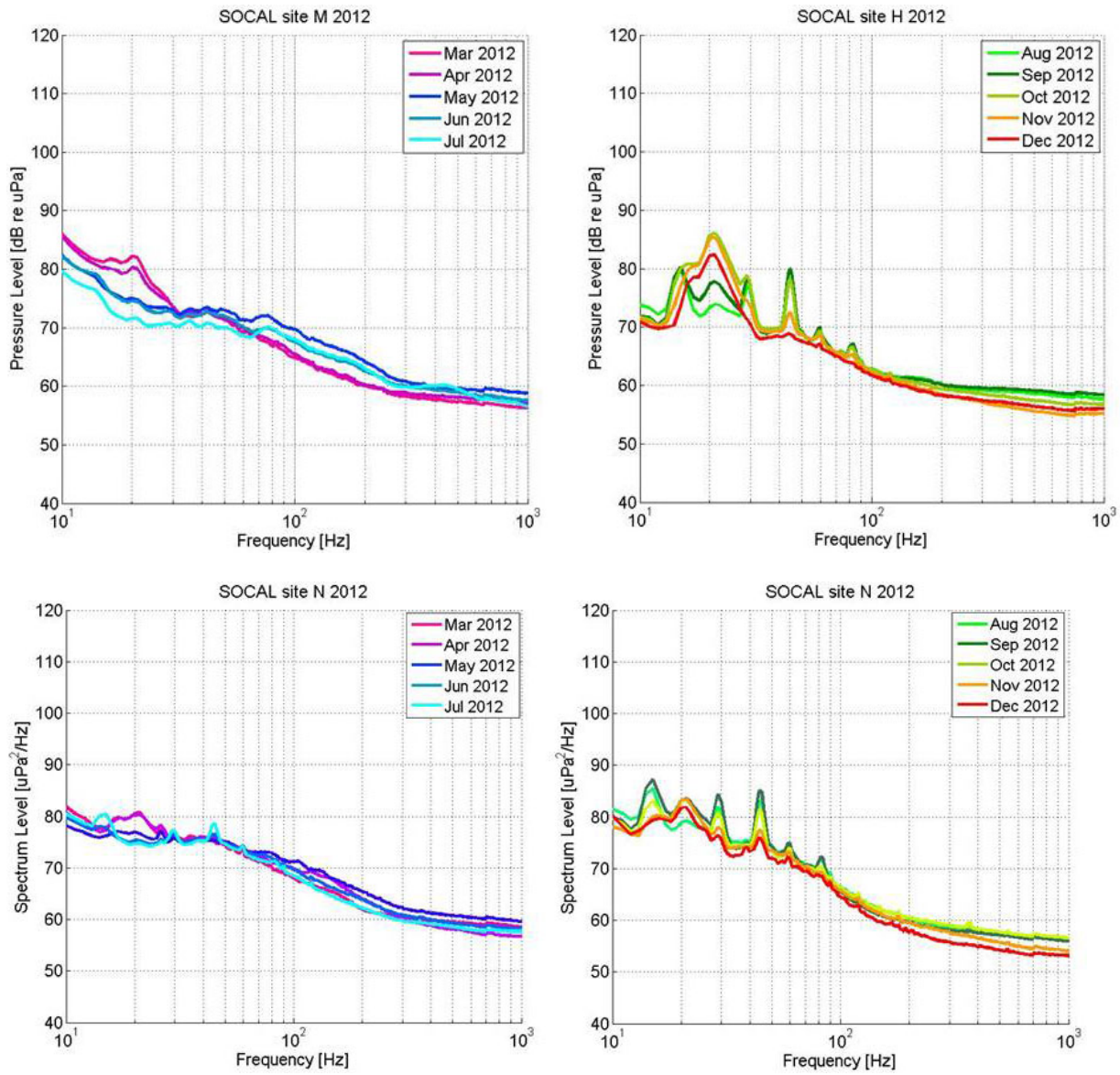
instrument's maximum of 177 dB pp re 1 $\mu$ Pa. A total of 57,851 MFAS pings were detected at site N over a period of 256 days with some pings received levels above the instrument's maximum of 176 dB re 1 $\mu$ Pa.

Baumann-Pickering et al. (2013) discuss an interesting observation in the reporting of in water explosions detected in and near the SOCAL Range Complex: *"In the years 2010-2012, counts of explosions per week regularly reached several thousand (max. 8,500). The maximum number of detected explosions per hour was 500. These large numbers of explosions, as well as their persistence over many months, were unexpected."*

The majority of explosions reported over a three year period at night (Figure 2-6). Coupled with the relatively little at-sea explosive use in the SOCAL Range Complex Navy has been reporting annually to NMFS since 2009, with the general principle that for safety the Navy does not normally conduct nighttime explosive use, suggests a non-Navy source for these explosions.

Baumann-Pickering et al. (2013) hypothesize and present preliminary results that these explosions might be related to commercial fishing activity. Further analysis is ongoing.

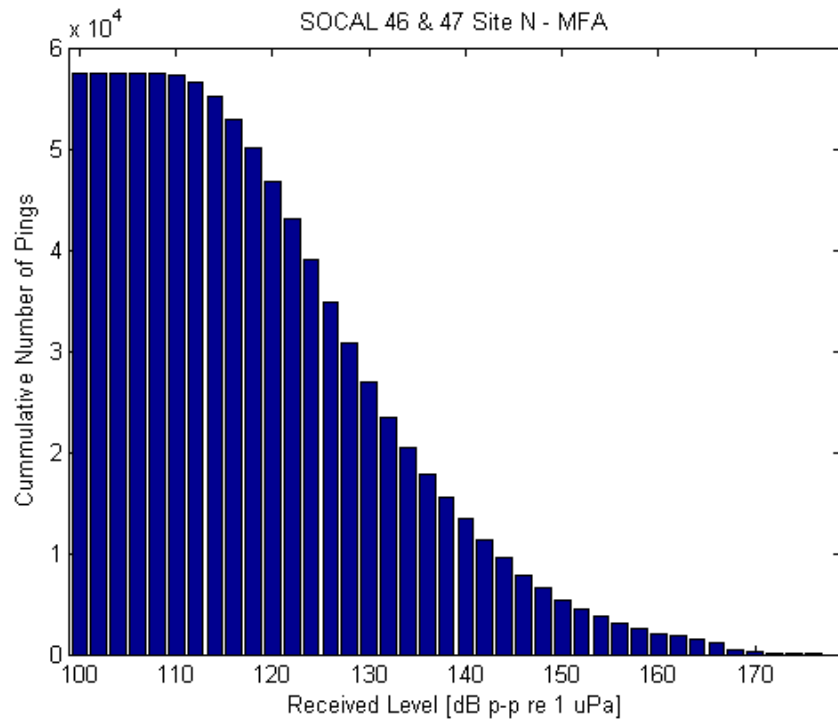
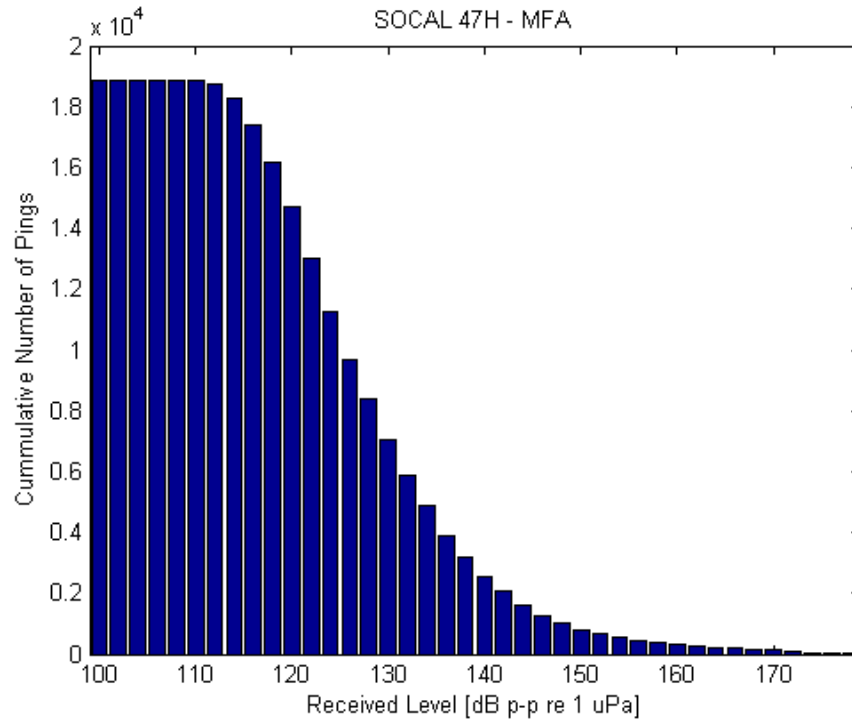
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**Figure 2-4: Monthly Averaged Ambient Noise at Three Sites in Southern California**

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**Figure 2-5: Cumulative Distribution of the Number of Mid-Frequency Active Sonar Pings Detected at Two High-Frequency Acoustic Recording Package Sites**

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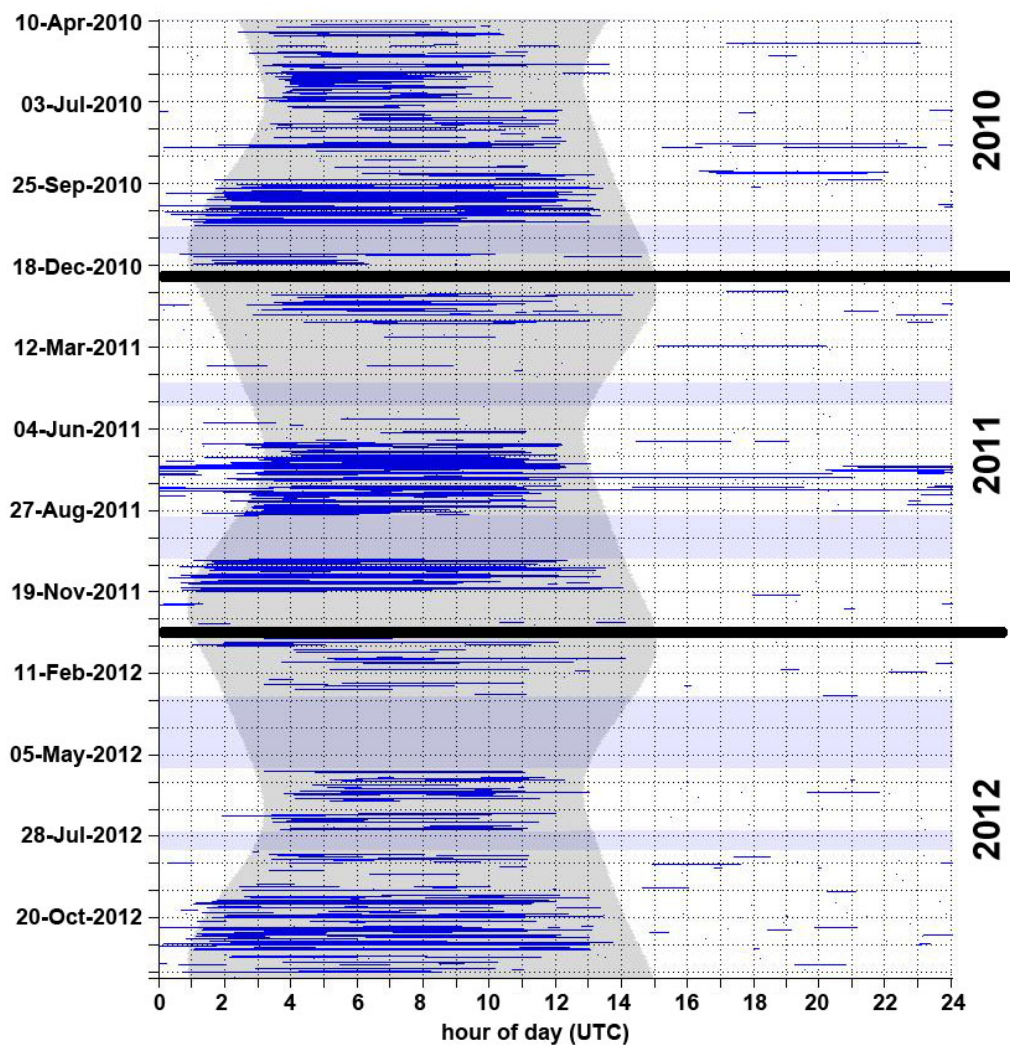


Figure 2-6. Occurrence Of Explosions (blue) Over Three Years At Site East of Tanner Bank Was Predominantly At Night (grey shaded area).

(Purple shaded areas indicate time periods with no data; From Baumann-Pickering et al 2013)

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A fifth HARP owned and operated by the Navy's Naval Postgraduate School was deployed from 2012-2013 approximately 30 nm west of San Diego near the north-south shipping lane between Los Angeles/Long Beach/San Diego and Mexico/Panama Canal/South America. Goal from this deployment was to record and analyzed anthropogenic sounds with a focus on sound contributions to background noise from commercial shipping traffic.

This project is planned for two years with data collection continuing through spring 2015. In addition, specific ship tracks determined from information obtained from Automated Identification Systems will be matched to acoustic detections from the HARP.

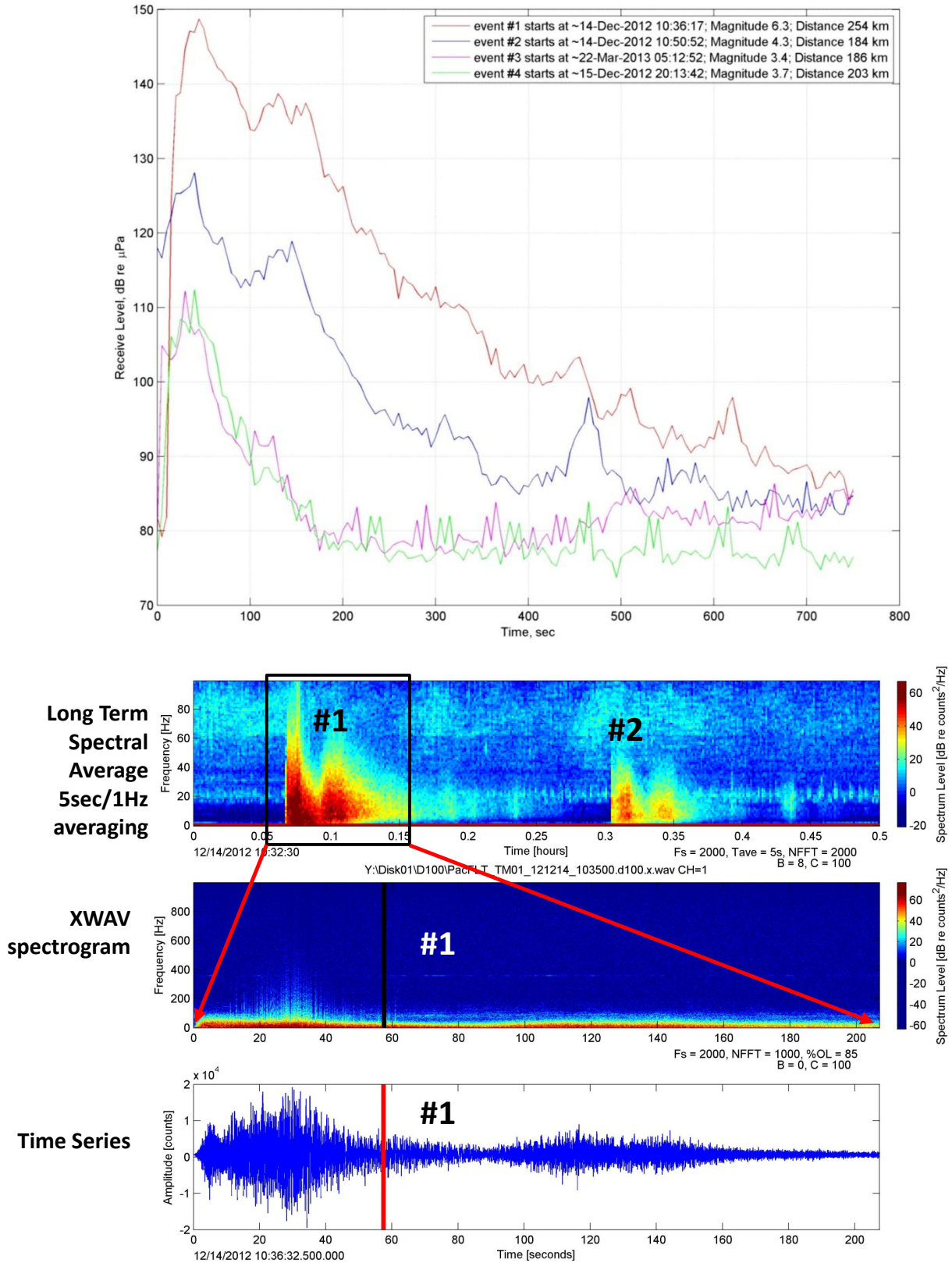
Naval Postgraduate School screened data obtained from their HARPs after the first year deployment (2013-2014), and reported some interesting results on natural sounds possibly resulting from near and distant Southern California earthquakes. These underwater quake-sounds typically last from tens of seconds to a couple of minutes with a signal that builds quickly then fades away more gradually (Figure 2-7). Received energy appears to be in the 1-20 Hz band which stands out on their HARP in the <10 Hz band because their hydrophone sensitivity rolls off below 10 Hz. Some less frequent, nearby events can contain energy all the way up into the 80 Hz band, but are generally more the exception with most events lower in frequency and further away.

Naval Postgraduate School postulates these sounds are earthquake related based on review of United States Geological Survey archives of Southern California and regional earthquakes that were greater than magnitude 1.5 or greater and within 540 nm. Given it would take more distant earthquake sounds up to a few minutes to propagate to the HARP location, when allowing for a 10 minute window in HARP data analysis there appears to be a correlation between the archive data for reported earthquake epicenters and HARP acoustic detections in the 1-10 Hz band. Since receive level at the HARP is a function of both source magnitude and distance, Naval Postgraduate School developed some scaling factors to derive a fairly simple empirical relationship that seems to agree with the HARP data rather well.

What was surprising to Naval Postgraduate School was the close match for distant, weak earthquakes which increases confidence that these events are the actual source of energy being detected by the HARP. Naval Postgraduate School also cautioned that not all earthquakes in the seismic detection archives were detected in the HARP data during their preliminary screening. They are continuing to review the HARP data to see if these other events were missed in their first analysis, might have been masked by other broad band detections (commercial ship noise, fish choruses, etc.), or if there might be an acoustic shadow between the seismic event and the HARP location.

Further analysis is ongoing and will be detailed in future reporting.

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**Figure 2-7. Receive Levels Of Suspected Underwater Sound Energy Originating From Southern California Earthquakes (top); Detailed Views Of Event #1 (bottom).**

(Graphics courtesy of T. Margolina and J. Joseph, Naval Postgraduate School)

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### 2.4 OTHER NAVY FUNDED RESEARCH IN THE SOUTHERN CALIFORNIA RANGE COMPLEX (NAVY BASIC AND APPLIED RESEARCH SUMMARY)

Marine mammal research projects at various locations around the United States are funded by the Office of Naval Research (ONR) under its Marine Mammals & Biological Oceanography Program (basic research) and the Navy's Living Marine Resource (LMR) Program (applied research).<sup>1</sup> A number of these projects utilized the SOCAL Range Complex due to the high density of marine mammals in Southern California, and availability of academic, government, and contractor scientists.

Two major multi-year LMR research-funded projects have been ongoing within and adjacent to the SOCAL Range Complex during the period of this report (Aug 2012-Dec 2013).

Previous results from these projects have been summarized in the Navy's annual monitoring reports, when information was available from the various individual researchers (Department of the Navy 2009, 2010 2011, 2012). As future results and publications become available from these projects, Navy will post them on its public monitoring web portal: <http://www.navy-marinespeciesmonitoring.us/>

Specific 2012-2013 research funded projects include:

**Marine Mammal Monitoring on Navy Ranges (M3R)-** The Marine Mammal Monitoring on Navy Ranges (M3R) utilizes the existing bottom-mounted hydrophones west of San Clemente named Southern California Anti-Submarine Range (SOAR) . As of January 2013, SOAR consists of 177 bottom-mounted hydrophones (either 50 Hz-40 kHz or 8-40 kHz) forming an array covering 695 square miles (1,800 square kilometers) of ocean bottom at depths up to 6,070 feet. M3R is set up to record marine mammal vocalizations from these hydrophones, and apply detection algorithms for species identification. Field validation continues with in lab monitoring with supporting on-water visual confirmation. The most significant progress with M3R has been improved classifications of Cuvier's beaked whale echolocation clicks.

**Distribution and Demographics of Marine Mammals in SOCAL through Photo-Identification, Genetics, and Satellite Telemetry-** A series of small boat surveys are conducted within the SOCAL Range Complex with the purpose of defining marine mammal occurrence in relation to the M3R system detections. In addition, satellite tracking tags are attached to a variety of species, photographs taken for use in PhotoID, and biopsies taken where possible. This project is in the fourth of a planned five field seasons. Falcone and Schorr (2014) summarizes the field season from July 2012 through June 2013.

**Southern California Behavioral Response Study (SOCAL-BRS)-** The SOCAL Behavioral Response Study (SOCAL-BRS) is a multi-year effort (2010–2015) designed to better understand marine mammal behavior and reactions to sound. SOCAL-BRS is an interdisciplinary research collaboration, building on previous efforts in the Bahamas and Mediterranean Sea. The overall objective is to provide a better scientific basis for estimating risk and minimizing effects of active sonar for the Navy and regulatory agencies. SOCAL-BRS is also part of a larger international collaboration to measure the impacts of noise marine mammals using opportunistic and experimental approaches (including controlled exposure experiments). In particular, SOCAL-BRS is a dedicated effort to study a variety of marine mammal species in areas around the Southern California coast and the Channel Islands from Morro Bay to San Diego. Currently (2014), the SOCAL-BRS is in the fourth of a planned five field seasons.

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<sup>1</sup> In 2012, the OPNAV N45 program underwent a formal revision to become the Living Marine Resources Program with administration of the program passing from OPNAV N45 to Naval Facilities Engineering and Expeditionary Warfare Center in Port Hueneme, CA.

## **2.5 NAVY ADAPTIVE MANAGEMENT AND MONITORING**

### **2.5.1 ADAPTIVE MANAGEMENT AND STRATEGIC PLANNING PROCESS**

Adaptive management review (AMR) is an iterative process of optimal decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. AMR has taken place annually with NMFS, and also engaged the Marine Mammal Commission and non-governmental organizations.

Revisions to the Compliance Monitoring Structure as a result of AMR which have been dynamic include the further development of the Strategic Planning Process which is a planning tool for selection of monitoring projects and its incorporation into the ICMP for future monitoring. Phase 2 monitoring will address the ICMP top-level goals through a collection of specific regional and ocean basin studies based on scientific objectives. Quantitative metrics of monitoring effort (e.g., 20 days of aerial survey) will not be a specific requirement, but instead the requirement on the monitoring program would be to pose and make progress toward answering scientific monitoring questions.

The AMR process and reporting requirements will serve as the basis for evaluating performance and compliance. In light of no longer evaluating the Navy's monitoring program via metrics of effort, the adaptive management process will make evaluations by considering the quality of the work and results produced, as manifested in the annual monitoring reports, as well as peer review and publications, and public dissemination of information, reports, and data. Such a process is fundamentally an extension of the goal of the original SOCAL Range Complex monitoring plan (Department of the Navy 2008) of using the annual monitoring reports to inform adaptive management.

The Strategic Planning process will be used to set intermediate scientific objectives, identify potential species of interest at a regional scale, and evaluate and select specific monitoring projects to fund or continue supporting for a given fiscal year.

Future continued monitoring starting in 2013-2014 within the SOCAL Range Complex portion of the Hawaii-Southern California Training and Testing area is currently listed on the Navy's public monitoring web site:

<http://www.navy.marinespeciesmonitoring.us/regions/pacific/current-projects/>



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