

APPENDIX A Hawaii Range Complex Year 3 Monitoring Plan and Adaptive Management Discussion for the period 02 August 2010 to 01 August 2011

Draft 1 Octobert 2010

This Monitoring Plan is submitted to NMFS in support of the:

Taking and Importing Marine Mammals; U.S. Navy Training in the Hawaii Range Complex;
Letter of Authorization Renewal

AND

Biological Opinion on the U.S. Navy's Training in the Hawaii Range Complex

Prepared for
National Marine Fisheries Service
Office of Protected Resources

Prepared by
Department of the Navy
U.S. Pacific Fleet

Introduction

In the Hawaii Range Complex (HRC) monitoring plan (DoN 2008), as revised in the 2010 HRC Letter of Authorization (LOA) Renewal Application and Annual Monitoring Report (DoN 2009a and b), and authorized by National Marine Fisheries Service (NMFS) (NMFS 2010), the Navy proposed to continue implementing a diversity of field methods to gather field data from marine mammals and sea turtles in conjunction with training events. As in 2009, methods were specifically chosen to answer the following study questions:

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

Study 2 - If marine mammals and sea turtles are exposed to sonar, do they redistribute geographically as a result of continued exposure? If so, how long does the redistribution last?

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

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

Study 5 - Is Navy's suite of mitigation measures for sonar and explosives, and major exercise measures agreed to by Navy through permitting effective at avoiding TTS, injury, and mortality of marine mammals and sea turtles

Metrics (e.g. hours or events) were agreed to by Navy and NMFS and used as a goal for implementation.

FY10 Accomplishments

During study year 2 (02 August 2009 to 01 August 2010), U.S. Pacific Fleet implemented aerial and vessel surveys, embarked marine mammal observers on Navy platforms, tagged Hawaiian monk seals and deployed passive acoustic monitoring devices. This work builds upon U.S. Pacific Fleet - funded field work that has occurred in the Hawaiian Islands since the Rim of the Pacific (RIMPAC) exercise in 2006. There were also additional monitoring efforts within HRC that were funded by the Environmental Readiness Division of the Chief of Naval Operations (CNO N45) and the Office of Naval Research (ONR). Detailed information on accomplishment metrics can be found in Table 1 and in the FY10 Annual Hawaii and Southern California Monitoring Report (DoN2010)

Major Accomplishments from the US Pacific Fleet FY10 Compliance Monitoring in the HRC

- **Visual (Aerial) Survey**
 - Aerial surveys were conducted during two Submarine Commanders Courses (SCC) by a contracted aircraft in close-proximity (e.g. between 200 and 2,500 yards) to Navy surface vessels. Logistical challenges were overcome by close coordination with Pacific Missile Range Facility (PMRF) range and P-3 pilots to allow for survey aircraft to share airspace with P-3 and helicopters involved in several training scenarios. This success demonstrates that during certain training events, contracted aircraft may be used as a method for conducting behavioral monitoring of submerged and at-surface marine mammals.
 - Extended focal follows were obtained for several marine mammal species.
 - Aerial surveys were conducted in front of surface vessel with MMOs on board, providing an opportunity for coordination during sightings.
 - Coastline and pelagic surveys during and after training events in search of otherwise-undetected strandings.
- **Visual (Vessel) Survey**
 - A small vessel survey was conducted off Kauai and Niihau during the Rim of the Pacific (RIMPAC) Exercise. The survey was scheduled to gather data mid-exercise and in conjunction with scheduled “opposed-transit” events.
 - A small vessel survey was conducted off Kaula Islet pre-RIMPAC.
- **Passive Acoustic Monitoring**
 - Four PAM devices were deployed in areas of the HRC where underwater detonations and anti-submarine warfare exercises may occur nearby.
 - Recordings of PMRF underwater range hydrophones continued at twice per month. Efforts focused on manual verification for presence of beaked whales in the acoustic data. Manual verification is done to confirm that selected automated beaked whale click detections are indicative of the presence of beaked whales (a high percentage of automatically detected beaked whale clicks are false positives). The manual verification process matches observed characteristics with known beaked whale echolocation click details, and foraging dive vocal behavior. To date beaked whales have been confirmed via manual analysis. Analysis from data collected during SCC in February 2010 focused towards two marine mammal species for which automated classifiers are available, beaked whales and minke whales.
 - Analysis of marine mammal acoustic and behavioral data from several data sets and sources (SIO, PIFSC and Cascadia) was conducted.
- **Marine mammal observers (MMO)**
 - The Navy’s lookout effectiveness study commenced when four Marine Mammal Observers (MMOs) embarked during the February 2010 Submarine Commanders Course (SCC) in the HRC. This study was collaboratively developed by Navy, NMFS Science Centers and University of St. Andrews. This study was also implemented in AFAST and SOCAL ranges this year.
 - MMOs embarked on a Navy cruiser during the August 2009 SCC, gathering sighting and behavioral information.
 - MMOs monitored two Sinking Exercises (SINKEX) and four underwater detonations while embarked on Navy platforms.
- **Tagging**
 - Eleven Hawaiian monk seals were tagged with “cell phone tags” on Oahu, Molokai and Kauai by National Marine Fisheries Service, Pacific Islands Fisheries Science Center. Funds were provided to tag 15 animals and tagging efforts will continue into the next data year. At this writing, tracks from several animals have been finalized with several more still reporting after a couple of months.

Table 1. U.S. Navy funded marine mammal monitoring accomplishments within the Hawaii Range Complex from 01 August 2009 to 01 August 2010.

Study Type	U.S. Navy EIS/LOA monitoring	Associated event type	U.S. Navy R&D funded monitoring	Associated event type	MMPA/ESA requirement	Total accomplished
Visual surveys (Studies 1,2,3,4,5)	1) 31.3 hours - 26-30 Aug 2009 (aerial) 2) 33 hours - 15-19 Feb 2010 (aerial) 3) 21.5 hours 26-28 June 2010 (vessel) 4) 78 hours 17-25 July 2010 (vessel)	1) SCC (ASW) 2) SCC (ASW) 3) Pre-RIMPAC (ASW and explosives) 4) RIMPAC (ASW)	n/a	n/a	120-160 hours before, during and after ASW and/or explosive events	163.8 hours of aerial and vessel surveys
Marine Mammal Observers (Studies 1,2,3,4,5)	1) 42.5 hrs (21.25 hrs x 2 MMOs) - 26-30 Aug 2009 2) 197 hrs [49.2 hrs x 4 MMOs] - 15-19 Feb 2010	1) SCC (ASW) 2) SCC (ASW)	n/a	n/a	80 hours aboard Navy vessels during ASW and/or explosive events	239.3 hours
Tagging (Studies 1,2,3)	11 Hawaiian monk seals tagged off Kauai, Oahu and Molokai	Coverage overlaps ULT, SCC, RIMPAC	Navy funding supports Cascadia Research Collective cetacean tagging off Hawaii and Oahu	n/a	Tag 15 marine mammals	11 monk seals tagged
Passive Acoustic Monitoring (Studies 1,2,3)	1) Two Ecological Acoustic Recording (EAR) devices deployed on Pu`uloa 8 July 2010 2) Two EARS deployed off Ni`ihau 17 July 2010	RIMPAC	1) ONR-funded PAM acoustic methods and tracking (UH/SOEST); 2) ONR-funded Acoustic Ecology of Minke Whales (BioWaves) ; 3) ONR-funded hearing and echolocation of odontocetes (HIMB)	n/a	Deploy 4 devices and collaborate with data collection from other Navy-funded devices. Analyze PIFSC data collected in 2009.	4 EARs deployed, two off Oahu and two off Niihau Acoustic data collected and analyzed from PMRF instrumented range. Acoustic data from HRC analyzed by CPF funded post-doc Groundwork laid for early FY11 contract award to collaborate with HIMB data analysis.
Mitigation Effectiveness (Study 5)	1) 42 hours from 26-30 Aug 2009 2) 197 hours from 15-19 Feb 2010 3) 2 explosive events - 10 July and 17 July 4) 4 explosive events, 15 July	1) SCC (ASW) 2) SCC (ASW) 3) RIMPAC Sinking Exercise 4) RIMPAC Underwater Detonations	n/a		Lookout effectiveness study by MMOs during 3 ASW events and 6 explosive events	Lookout effectiveness during 2 ASW events and 6 explosive events

Metrics exceeded:

Visual surveys: visual surveys (four total) were conducted before, during and after all the multi-unit ASW events in the HRC, totaling significantly more than the targeted number of hours.

Marine mammal observers: hours were exceeded four-fold for marine mammal observer hours. This was in part, due to the lookout effectiveness study design which recommends four marine mammal observers participate in each embark.

Passive Acoustic Monitoring: continuation of acoustic recording and analysis from the PMRF instrumented range was not committed to in prior monitoring plans, however, it has been ongoing with ONR and CPF funding for many years.

Metric shortfalls:

Tagging: the Navy's goal was to tag 15 marine mammals however, only eleven were successfully tagged by the 1 August 2010 data cutoff. NMFS is still striving to complete the necessary number of deployments and tagging will continue to complete all 15 deployments. Falling short of our goal is primarily a result of the unpredictability of field work. During multiple field trips, NMFS was presented with an unprecedented lack of seals on the beaches, particularly on Kauai. In three, week-long trips to Kauai, only 4 instruments were deployed. Of the seals that were encountered on those trips, most were pregnant females, young of the year, or animals that were not suitable candidates for instrumentation due to some sort of injury or molt status. During the first field trip to Kauai in February 2010 three cell phone tags were deployed. All of these tags fell off within a few weeks of deployment. This malfunction was due to a bad batch of epoxy that was used to secure the tags to a neoprene base. New epoxy was used on all subsequent deployments to successfully prevent similar issues.

Mitigation effectiveness: The HRC had fewer ASW events in 2010 than is typical. These fewer events translated to fewer opportunities to monitor. So, although the hours for MMOs well-exceeded the goal of hours, MMOs embarked during two ASW events instead of three.

ADAPTIVE MANAGEMENT AND FY11 MONITORING COMMITMENTS

Adaptive management is an iterative process of optimal decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. Within the natural resource management community, adaptive management involves ongoing, real-time learning and knowledge creation, both in a substantive sense and in terms of the adaptive process itself. Adaptive management focuses on learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable ecosystems. Adaptive management helps science managers maintain flexibility in their decisions, knowing that uncertainties exist and provides managers the latitude to change direction will improve understanding of ecological systems to achieve management objectives; and is about taking action to improve progress towards desired outcomes.

The Navy and NMFS convened meetings in 2009 (Raleigh Durham, NC) and July 2010 (Washington DC) in the interest of soliciting input on monitoring objectives and methods. Additionally, the Fleets will convene a monitoring plan review meeting in October 2010 prior to

the 2011 Adaptive Management meeting. Results of these meetings as well as success and challenges in the field continue to feed Adaptive Management.

Significant progress was made during range complex compliance monitoring within the Hawaii Range Complex this year. This year's focus was expansion beyond monitoring techniques that are proven in the HRC, while targeting required metrics. We continued to successfully schedule monitoring using civilian aircraft and ships operating concurrently with multiple Navy aircraft and ships in the same area, which required extensive pre-survey coordination between multiple Navy commands. The U.S. Pacific Fleet operational community provided critical interface and coordination which was instrumental in using novel field methods to allow for researchers to conduct monitoring in close-proximity to Navy assets. They also provided berthing and vessels for MMOs on two types of surface vessels.

Cancellations or major date shifts in Navy training events based on logistics, fiscal, or operational needs were challenging to overcome. These kind of changes are difficult to predict and more importantly, more difficult to reschedule from a monitoring prospective when contracts have been awarded, survey equipment has been purchased, rented or relocated; personnel availability and transport arranged; and fixed date contracts put into place. Several planned Navy training events scheduled for monitoring had to be re-scheduled to cover the change in monitoring design.

In view of lessons learned during implementation of the 2010 HRC Monitoring Plan and as part of the Navy's adaptive management review for the Hawaii Range Complex, slight modification of the 2010 Plan is recommended and shown in Tables 2 and 3.

The rationale for restructuring the monitoring commitments shown in Table 2 is to:

- simplify the presentation of goals, and
- align the technique with the best promise of more accurately addressing the Monitoring Plan objectives

Specific revisions for elements of 2010 monitoring include:

Visual Surveys: Minor change in order to allow maximum flexibility of platform choice.

Marine Mammal Observers (MMOs): There are two changes to this section. Firstly, since the MMOs are the method being used for study 5, it was erroneous in the 2010 plan to separate out Mitigation Effectiveness in the table. Therefore, it has been combined for FY11. Secondly, there is a change from the metric of *hours* to a metric of *events*. This is to account for the variable time duration of ASW and explosive events as experienced in FY10. MMOs will continue to be used for gathering species and behavioral data as well as implementation of the Lookout Effectiveness developed in 2010 by Navy, University of St. Andrews and NMFS Science Centers.

Tagging: No change.

PAM: Other than editorial changes, the addition here is to include the hydrophones of the Pacific Missile Range Facility instrumented range as a tool for acoustic data gathering and analysis. This was not included in prior monitoring plans although the data collection has been funded since 2002. Adding this method of passive acoustic monitoring will expand our capabilities.

Table 2. Adaptive management review showing updates to FY10 monitoring plan (strike through are deletions and red font are additions).

Monitoring Technique	Implementation	Adaptive Management Review (AMR) for FY11
Visual Surveys (aerial or vessel) STUDIES 1,2,3,4,5	120-160 hours before, during and after ASW and/or explosives training events including major training exercises (MTE), SCC, Unit Level Training (ULT) and/or explosive events. "During" will be targeted by aerial surveys when feasible.	
Marine Mammal Observers (MMO) STUDIES 1,2,3,4,5	80 hours aboard Navy vessels during MTE, ULT, and/or explosive events MMO team aboard Navy surface platforms during 2 ASW and 6 explosive events.	
Tagging STUDIES 1,2,3	Tag a goal of 15 individual marine mammals.	
Passive Acoustic Monitoring (PAM) STUDIES 1,2,3	Install four HARRPs PAM devices deployed throughout the year. ; collaborate with Continue collaboration of data collection and analysis from other additional N45/ONR R&D funded autonomous PAM devices (goal of 10 devices total). Analyze PIFSC acoustic data collected in 2009. - Continue use of the Pacific Missile Range Facility instrumented range hydrophones to gather and analyze marine mammal acoustic data.	
Mitigation Effectiveness STUDY 5	Lookout effectiveness study by MMOs on Navy surface vessels during 3 ASW events and 6 explosive events	

Legend:

- Study 1 - Are marine mammals and sea turtles exposed to mid-frequency active sonar (MFAS), especially at levels associated with adverse effects (i.e., based on NMFS' criteria for behavioral harassment, TTS, or PTS)? If so, at what levels are they exposed?
- Study 2 - If marine mammals and sea turtles are exposed to sonar, do they redistribute geographically as a result of continued exposure? If so, how long does the redistribution last?
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Table 3. Final 2011 monitoring commitments resulting from changes red-lined in Table 2

Monitoring Technique	Implementation	Adaptive Management Review (AMR) for FY11
Visual Surveys (aerial or vessel) STUDIES 1,2,3,4, 5	120-160 hours before, during and after ASW and/or explosives training events	
Marine Mammal Observers (MMO) STUDIES 1,2,3, 4, 5	MMO team aboard Navy surface platforms during 2 ASW and 6 explosive events	
Tagging STUDIES 1,2, 3	Tag a goal of 15 individual marine mammals	
Passive Acoustic Monitoring (PAM) STUDIES 1,2, 3	- 4 PAM devices deployed through the year. Begin data analysis. Continue collaboration of data collection and analysis from additional N45/ONR-funded autonomous PAM devices. - Continue use of the Pacific Missile Range Facility instrumented range hydrophones to gather and analyze marine mammal acoustic data.	

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