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Cruise Report
Marine Mammal and Sea Turtle UNDET Monitoring
Hawaii Range Complex, 10-11 August, 2011

Prepared for:
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List of Acronyms and Abbreviations

ft	Feet
HRC	Hawaii Range Complex
HST	Hawaii standard time
kts	Knots (nautical miles per hour)
LMDE	Limpet Mine Disposal Equipment
MDSU	Mobile Diving Salvage Unit
MFAS	Mid-frequency active sonar
MSO	Marine species observer
NEW	Net explosive weight
nm	Nautical miles
NMFS	National Marine Fisheries Service
PMAP	Protective Measures Assessment Protocol
RHIB	Rigid-hulled inflatable boat
RIMPAC	Rim of the Pacific, major training exercise
UNDET	Under-water detonation
VHF	Very high frequency
yd(s)	Yard(s)

1. INTRODUCTION

1.1 MONITORING PLAN

In order to train with mid-frequency active sonar (MFAS) and underwater explosives, the Navy has obtained from the National Marine Fisheries Service (NMFS) a permit under the Marine Mammal Protection Act and a Biological Opinion under the Endangered Species Act. The Hawaii Range Complex (HRC) Monitoring Plan was developed with NMFS to comply with the requirements under the permit. The monitoring plan and reporting will provide science-based answers to questions regarding whether or not marine mammals are exposed and reacting to Navy MFAS. The objectives of the monitoring plan are to answer the following questions:

1. Are marine mammals and sea turtles exposed to MFAS at regulatory thresholds of harm or harassment? If so, at what levels and how frequently are they exposed?

2. If marine mammals and sea turtles are exposed to MFAS in the HRC, do they redistribute geographically in the HRC as a result of repeated exposure? If so, how long does the redistribution last?

3. If marine mammals and sea turtles are exposed to MFAS, what are their behavioral responses? Are they different at various levels?

4. What are the behavioral responses of marine mammals and sea turtles that are exposed to various levels and distances from explosives?

5. Are the Navy's suite of mitigation measures for MFAS and explosives (e.g., Protective Measures Assessment Protocol [PMAP], measures agreed to by the Navy through permitting and consultation) effective at avoiding harm or harassment of marine mammals and sea turtles?

The Marine species observer (MSO) effort is intended to address questions 4 and 5.

1.2 UNDERWATER DEMOLITION

Purpose—To provide training in the identification and destruction or neutralization of inert ground mines, floating/moored mines, harbor clearance, and excess ship hulks.

Description—Underwater demolition exercises include training in the detection and explosive attack of inert, underwater mines, as well as harbor clearance. Tactics against ground or bottom mines involve the diver placing a specific amount of explosives, which when detonated underwater at a specific distance from a mine results in neutralization of the mine. Floating, or moored, mines involve the diver placing a specific amount of explosives directly on the mine. Harbor clearance activities involve the diver placing a specific amount of explosives on underwater structures in order to clear these structures from their current position in the water column.

Location—The activities for this exercise took place offshore in the Pu‘uloa Underwater Range (Danger Zone 334.1370, also called Keahi Point in prior RIMPAC Environmental Assessments), Pearl Harbor.

Duration—Each demolition activity generally lasts 1 to 4 hours.

Standard Procedures—All demolition activities are conducted in accordance with Commander Naval Surface Forces Pacific (COMNAVSURFPAC) Instruction 3120.8D, Procedures for Disposal of Explosives at Sea/Firing of Depth Charges and Other Underwater Ordnance (Department of the Navy, 1993). Before any explosive is detonated, divers are transported a safe distance away from the explosive and a thorough search is made of the area to identify marine mammals or sea turtles. If any are seen, the exercise is delayed until the animals leave the area. Specifically, all mitigation measures as described in the MMPA permit and Hawaii Range Complex EIS are followed. Standard practices for tethered mines in Hawaiian waters require ground mine explosive charges to be suspended 3 meters (10 feet) below the surface of the water. For mines on the shallow water floor (less than 40 feet of water), only sandy areas that avoid/minimize potential impacts to coral would be used for explosive charges.

2. METHODS

2.1 MARINE SPECIES OBSERVERS

MSO monitoring was conducted by Navy biologists from a shipboard platform that accompanied the exercises on site at the Pu‘uloa Underwater Range (Danger Zone 334.1370). For the monitoring during 10-11 August 2011, a 27' Boston Whaler was provided and piloted by personnel of Mobile Diving Salvage Unit ONE (MDSU-1) and was dedicated to the marine species observers, who were observing the monitoring and mitigation effort conducted by the MDSU, in addition to logging marine species. There were two MSOs on board, each equipped with a pair of 7x50 binoculars and access to VHF communications with the other boats. One MSO was the data recorder as well as a secondary observer, and was equipped with a clipboard with data entry sheets and a handheld chart-plotting marine GPS unit. The MSOs were on effort throughout the duration of the day, from the time of the vessel leaving the dock until its return.

All sightings by MSOs and Navy lookouts were recorded, as well as whether mitigation measures were followed. Monitoring surveys from other platforms were not conducted for these UNDET monitoring efforts.

2.2 COMMUNICATIONS

Communication between MSOs and MDSU-1, and the other participating vessels (see “Results” below) were performed via VHF radio or direct communication with Navy personnel on the boat.

3. RESULTS

A total of three underwater detonation (UNDET) events were monitored: Two UNDETs on 10 August, 2011 and one UNDET on 11 Aug 2011 during the exercise by MDSU-1 in the Pu‘uloa Underwater Range.

3.1 PARTICIPANTS AND LOCATION

Navy marine species observers
Julie Rivers - Commander, Pacific Fleet (CPF) – 10 Aug 2011
Robert Uyeyama – Naval Facilities Engineering Command, Pacific (NAVFAC PAC) – 10-11 Aug 2011
Morgan Richie - Naval Facilities Engineering Command, Pacific (NAVFAC PAC) – 10 Aug 2011

Kate Winters – Naval Facilities Engineering Command, Pacific (NAVFAC PAC) – 11 Aug 2011

Naval Dive Team
US Navy - Mobile Diving Salvage Unit 1 (MDSU-1)

Vessels Involved in UNDET exercise
2 RHIBs ~24 ft
1 27 ft Boston Whaler - (Carrying three Navy MDSU-1 personnel and two Navy Biologist MSOs)

Location
Pu‘uloa Underwater Range (*Danger Zone 334.1370, also called Keahi Point in prior RIMPAC Environmental Assessments*)

3.2 DESCRIPTION OF ACTIVITY

MDSU-1 performed two underwater detonation (UNDET) events on 10 August and one event on 11 August 2011, for a total of three events, in the Pu‘uloa Underwater Range, approximately 1.7 nm from Keahi Point located west of the Pearl Harbor entrance channel. The intent of the exercises was to provide training for harbor clearance activities. The bottom depth of the training location was approximately 15 m.

The two UNDETs of 10 Aug contained a net explosive weight (NEW) of 19.99 lbs. each and were located at were located within 300 yards of 21º 17’ 20.8” N, 157º 59’ 36.4” W and 21º 17’ 33.1” N, 157º 59’ 34.4” W.

The UNDET of 11 Aug contained 19.99 lbs. NEW and was located within 300 yards of 21º 17’ 21.4” N, 157º 59’ 13.9” W.

Locations of the actual UNDETs are estimated from the GPS located on the monitoring vessel and were approximately 300 yards toward the center of the 700 yard mitigation zone.

On both days, a total of 3 boats participated: 2 RHIBs, as well as the Boston Whaler that was dedicated to the marine species monitoring effort and which carried the two Navy biologist observers (MSOs) in addition to three MDSU-1 personnel (Figure 1).

Figure 1. Navy marine species observer on the monitoring vessel, a Boston Whaler.

3.2.1 UNDETs of 10 August 2011

The intent of the exercises was to provide training for underwater demolition. The monitoring vessel was one of three vessels at the training location, the other two being ~24 ft RHIBs operated by MDSU-1. Two underwater explosive events were monitored on this day. Both UNDET locations on this day were within the Pu‘uloa Underwater Range (Figure 2).

One green sea turtle (*Chelonia mydas)* was seen at the training location during the course of this day’s monitoring effort.

EVENT ONE (NEW 19.99 lb): The monitoring vessel departed the dock two times on this day within Pearl Harbor; once at 10:05:51 and again at 11:48:15, and arrived at the training location at 12:08:11. The sea state remained at Beaufort 4 throughout the day’s effort, with a swell height up to 3-4 ft. Cloud cover was 30-60% and visibility was excellent throughout the exercise. Three unidentified turtles and two green sea turtles (*C. mydas*) were seen in transit. Because the vessels were traveling at a high speed it was not possible to obtain photographs. One *C. mydas* was seen at the exercise site, however the sighting was brief and no photograph was taken.

At 12:08:11, the marine species monitoring vessel arrived at the exercise site and began the pre-exercise survey in concert with the MDSU RHIB. The pre-exercise survey conducted by the MDSU RHIB was a roughly circular track with a radius of approximately 250-600 yds (~225 - 550 m) from the UNDET site. The marine species monitoring vessel monitored the MDSU RHIB in addition to logging marine species in the same circular radius at a position on opposite ends such that the UNDET location was roughly at the midpoint between the two vessels. (Figure 3). At 12:28:48 one *C. mydas* was sighted at approximately N 21 º 17’33.1”, W 157 º 59’ 37.8”. The monitoring period was reset at this time and the circular track of the visual survey was continued. No additional sightings were made for the duration of the pre-exercise survey.

During this time, the exercise participants located an exercise buoy that had previously been deployed to mark the location of the simulated target. At this time, the crew of the other MDSU RHIB proceeded to set the explosive charges at this location. The RHIBs then switched positions: the first RHIB took over conducting the visual survey along the circular path, while the second RHIB moved to the UNDET location to place the blasting caps then connect and arm the radio-controlled detonation device. All communication radios were secured and the UNDET shot was triggered by the radio frequency device at 13:36:29 (Figure 4). The pre-exercise mitigation survey for event one, starting at 12:28:48, had therefore been conducted for 1 hour 7 minutes and 41 seconds. The post-exercise mitigation survey began immediately after the first UNDET at 13:36:29, again utilizing the same circular radius with one RHIB and the monitoring vessel on opposite sides of the circle, and was conducted for 45 minutes and 34 seconds, ending at 14:22:03.

EVENT TWO (NEW 19.99 lb): The post-exercise survey for event one (beginning at 13:36:29) also served as the pre-exercise survey for event two. Again, one RHIB set a charge while the other RHIB monitored, then the two vessels switched places to complete setting the blasting caps and arming the radio detonation device while the first vessel conducted monitoring. The UNDET shot was triggered by radio frequency device at 14:22:03. The pre-exercise mitigation survey for event two therefore had been conducted for 45 minutes and 34 seconds. MDSU divers reported a crater approximately a few feet wide by one foot deep caused by the UNDET.

No dead fish were seen after either event but both events caused a plume of sediment and gases (Figure 5). At 14:45:53, two small blasting caps (not considered an UNDET event) were expended at the surface which emitted a short pulse of smoke at the location of the two previous UNDETs. The monitoring vessel left the range at 14:53:19, for a total post-exercise survey duration of 30 minutes and 45 seconds. One *C. mydas* was seen at 14:59:19 on the transit back to port. At 15:01:51, the monitoring vessel returned to port. Total on-water time was 4 hours 4 minutes and 40 seconds.

Figure 2. Locations of sightings during UNDET monitoring of 10 August 2011. The boundaries of the Pu‘uloa Underwater Range are marked by the pink square. Marine species monitoring vessel track shown in black. The entrance to Pearl Harbor is at the top right.

Figure 3. MDSU-1 divers preparing for the UNDET. Divers from the crew of the RHIB place charges at the obstruction marked by the orange buoy. The far RHIB is conducting the pre-exercise survey around the UNDET site, opposite the marine species monitoring vessel from which the photograph was taken.

Figure 4. Event one of 10 August 2011: 19.99 lb. NEW

Figure 5. Plume of sediment and gas after 10 August 2011 UNDET number two.

3.2.2 UNDET of 11 August 2011

As during the previous day, the intent of the exercises was to provide training for underwater demolition. As before, the monitoring vessel was one of three vessels at the training location, the other two being ~24 ft RHIBs operated by MDSU-1. Two underwater explosive events were monitored on this day. Both UNDET locations on this day were within the Pu‘uloa Underwater Range (Figure 6).

EVENT ONE (NEW 19.99 lb.): The sea state remained at a Beaufort 4 throughout the day’s effort, with a swell height up to 3 ft . Visibility was excellent throughout the exercise, with approximately 60% cloud cover. The monitoring vessel departed the dock within Pearl Harbor at 11:10:48, and arrived at the boundary of the range at 11:25:33. One *C. mydas* was sighted at 11:22:06 during the transit to the range, approximately midpoint be Buoy 1 and the range, at N 21º 17’ 36.8”, W157º 58’ 18.5”. Because the vessels were transiting at a high speed, it was not possible to get a photograph.

Upon arrival, the crews of the two RHIBs alternated between preparing for the detonation at the UNDET site, and conducting a perimeter visual survey at a radius of between approximately 200 to 350 yds (~180 – 320 m), while the marine species monitoring vessel monitored the MDSU RHIBs, in addition to logging species, at the perimeter approximately the opposite side of the UNDET location. The detonation method was the same radio-controlled method of the previous day’s exercises. The detonation for event one occurred at 12:17:38. The pre-exercise survey began at 11:25:33 and was 52 minutes and 5 seconds. The post exercise survey began immediately after event one at 12:17:38. At 38 minutes and 12 seconds later, the remaining detonation cord (not considered an UNDET event) was expended at the surface of the water (NEW 1 lb.) at 12:55:50. No turtles or marine mammals were sighted during this time. At this time, preparations began to leave the exercise site. The monitoring vessel departed the previously-surveyed perimeter soon thereafter, for a total post-exercise monitoring survey of

approximately 40 minutes. During the return transit, at 12:59:29, a pod of approximately 4-7 (best estimate: 5) spinner dolphins (*Stenella longirostris*) was sighted inshore of the boat at a relative bearing of 270º and 100 meters from 21º 17' 36.8" N and 157º 58' 58.9" W. The dolphins were observed to be actively travelling from east to west toward the exercise range. Therefore this group was likely to have been farther away from the range at some distance to the east at the time of the detonation thirty minutes earlier, and continuing to travel west toward the training range until encountered by the monitoring vessel as it departed the range. Because the exercise monitoring was completed and the sighting made during the non-monitoring transit back to port, the monitoring vessel was not directed to break its return transit in order to be redirected to observe the animals. Because the transit journey was made at a higher speed than suitable for surveying, the estimated group size for this sighting is likely to be an underestimation. The monitoring vessel returned to port at 13:11:43 for a total on-water time of 1 hour 47 minutes.

Figure 6. Locations of sightings during UNDET monitoring of 11 August 2011. The boundaries of the Pu‘uloa Underwater range are marked by the pink square. Marine species monitoring vessel track shown in black. The entrance to Pearl Harbor is at top right.

Figure 7. Event one of 11 August 2011: 19.99 lb NEW

Figure 8. Detonation cord expenditure at the surface on 11August 2011: 1.0 lb NEW

4. CONCLUSIONS

4.1 MARINE SPECIES MONITORING

MDSU-1 was cooperative and instrumental with the coordination of placing MSOs on board for monitoring the UNDET events. In general, the UNDET training requires Navy divers to be vigilant with a number of safety considerations, not only for the environment, but for the personnel on board and civilians in the vicinity. Overall they knew the mitigation requirements well and followed them as described in the MMPA permit and Hawaii Range Complex EIS. The MSO time spent with the Navy divers helps foster the understanding of why these mitigation measures are in place and how important these measures are to protecting marine life and also to Navy training. Protocols for the coordination of future UNDET monitoring efforts were also clarified.

5. ACKNOWLEDGEMENTS

We thank the officers and crew of MDSU-1, including but not limited to CWO3 Chris Lehner, CWO3 Jason Kypros, and NDCS Richard Stafford for their outstanding support and hospitality during this cruise.