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Cruise Report
Marine Mammal Observer UNDET Monitoring
Hawaii Range Complex

Prepared for:
Commander, Pacific Fleet



Prepared by:
Mr. Anurag Kumar, Naval Facilities
Engineering Command, Atlantic



Ms. Julie Rivers, Commander, Pacific
Fleet



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List of Acronyms and Abbreviations

AM	amplitude modulated
CO	Commanding Officer
FM	frequency modulated
ft	feet
HRC	Hawaii Range Complex
HST	Hawaii Standard Time
kts	knots (nautical miles per hour)
MDSU	Mobile Diving Salvage Unit
MFAS	mid-frequency active sonar
MMO	Marine Mammal Observer
nm	nautical miles
NMFS	National Marine Fisheries Service
PMAP	Protective Measures Assessment Protocol
UNDET	Under Water Detonation
VHF	very high frequency
yd(s)	yards

SECTION 1: INTRODUCTION

In order to train with mid-frequency active sonar (MFAS), the Navy has obtained a permit from the National Marine Fisheries Service (NMFS) under the Marine Mammal Protection Act and Endangered Species Act. The Hawaii Range Complex (HRC) Monitoring Plan, finalized in December 2008 for implementation in January 2009, 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 Mammal Observers (MMOs) effort provided data towards question 5 above.

SECTION 2: METHODS

2.1. MARINE MAMMAL OBSERVERS

MMO monitoring was conducted from a shipboard platform. In one instance MMOs were allowed to observe from the explosives and blast cap boats providing a direct vantage point of what was involved in the UNDET training and the mitigation measure in place. Shipboard observations occurred from small boats (less than 30 ft) All MMOs had a pair of 7x50 binoculars, data entry sheets (Table 1), clipboard, watch, and access to VHF communications with the other boats. MMOs were on effort throughout the duration of the day, from the time they left the dock till the time they got back. MMOS recorded all sightings by MMOs or Navy lookouts and noted whether mitigation measures were in place.

2.2. AERIAL AND VESSEL MARINE MAMMAL MONITORING SURVEYS

Vessel and aerial monitoring surveys were also conducted during this effort. The vessel survey was conducted by NMFS using 7x50 binoculars. The aerial survey was conducted by Marine

Mammal Research Consultants (MMRC) from a helicopter with three observers on board. The helicopter was based out of Honolulu International Airport and conducted line-transect surveys at approximately 1000 feet above sea level, within the Puuloa Training area (Figure 1). Aerial and vessel survey reports are provided separately.

2.3. COMMUNICATIONS

Communication between MMOs, MDSU, and NMFS was accomplished via VHF radio or direct communication with navy personnel on the boat. Communications between the aerial survey team and the MMO we performed using cell phone text messaging.

SECTION 3: RESULTS

3.1. VESSEL AND AERIAL MARINE MAMMAL MONITORING UNDET I

UNDET I Monitoring Participants

MMOs

- Julie Rivers (CPF)
- Jennifer Steele (NAVFAC Pacific)
- Anurag Kumar (NAVFAC Atlantic)

Navy Vessels Involved in UNDET training

- Whaler 27 ft (4 Navy Ops personnel and 2 Navy Biologist MMOs on June 18 and 1 on June 19)
- RHIB 24 ft (3 Navy Ops personnel and 1 Navy Biologist MMO)

Contracted Research Vessel

- NOAA 23 ft (4 Civilian Biologists)

DESCRIPTION OF ACTIVITY

Marine Diving and Salvage Unit One (MDSU 1) performed three underwater detonation (UNDET) events each on 18-19 June 2009 for a total of six UNDET events just south of Ewa beach in the center of the Puuloa training area (Figure 1). For safety, two boats are required when setting UNDET. The first boat (whaler [Figure 2]) had the 20 lbs charges and the second boat (Ridged Hull Inflatable Boat [RHIB]) has the blast caps. We departed at 0945 out to the range. Seas started out at BF 3-4 with about 2-3' swell. There were four Navy divers on the RHIB. The first thing we did was set the buoy for the UNDET location. The 30 minute monitoring period commenced immediately. The RHIB then headed toward the perimeter of the 700 yard exclusion zone while the boat with the explosive moved in to set the charge. The RHIB continued in a circle around the exclusion zone. They had two guys standing on the port and starboard gunwale of the boat, keeping an eye out for marine mammals and sea turtles. The boat with the explosives saw a sea turtle eight minutes into the monitoring period near the UNDET site as they left. The monitoring period was reset to 30 minutes.

After the monitoring period, the RHIB moved in towards the buoy. Two divers with just snorkel gear went in with the blasting cap to attach to the “dog bone” connection point at the surface. The blast cap was wrapped in bubble wrap for flotation and to attempt to keep it dry (Figure 3). Once everything is connected (Figure 4) the fuses are pulled and the divers swim immediately to the boat (Figure 5). The fuse has five minute timer before detonation. We move to a safe distance, roughly 200 yards and waited for the blast (Figure 6). They noticed an inbound private boat heading toward the UNDET site and immediately chased them away. After detonation the RHIB moves in immediately to recover expended materials from the blast cap (Figure 7). After that the RHIB continues to survey the area as the boat with the explosives moves back in towards the UNDET site to set another charge. By this time sea state was 4-5, with about a 4-5’ swell.

During the second UNDET, the whaler spotted another sea turtle within exclusion zone and the clock started again since they last saw the turtle. Almost after 30 minutes after second UNDET event the whaler spotted a group of about 10-20 spinner dolphins heading towards the site. Operations were halted till the dolphins cleared the range. The National Oceanic and Atmospheric Administration (NOAA) boat kept up with them as they moved out of the range (Figure 8 and 9). The RHIB kept the dolphins in sight and monitored their position. After they were confident that they were outside the exclusion zone they started the clock again and the RHIB continued to monitor the area as the whaler moved in to set the last charge. The next charge was delayed about an hour and forty-five minutes which included the 30 minute monitoring period. By this time the seas were 5-6, and swells were 5-6’. The UNDET training concluded at around 1500.

Only a few dead fish were noticed at the surface and at the bottom. The UNDET site was a sandy site away from any reefs. At the end of the day the divers mentioned that there was a 1-2 foot deep crater on the sea floor. On the second day, it was noticed that crater was mostly filled in.

On the second day, the training was delayed by an hour due to a submarine entering the harbor and did not head out till 1030. The seas were in general rougher (Beaufort 6 with ~ 6’ swell) than the day before. Visibility was very poor from any vessel in the training area. When we got on station they had to clear the range of private vessels. After the first charge was set, the whaler noticed a private vessel that was spear fishing moved within 300 yards of the UNDET site. The RHIB had to chase them away and ask them to recall their diver. They were in a restricted area and a Notice to Mariners (NOTMAR) was issued. They then continued to monitor for the rest of the 30 minute period. Aerial surveys were conducted via helicopter on this day starting at 8am. I was able to coordinate with the aerial survey via txt messaging and gave them a five minute warning before detonation. They were able to observe the first UNDET and then had to refuel. Refueling took longer than anticipated and they unfortunately missed the next two UNDETs and were back on station one minute after the last UNDET. For all three UNDETs, neither the whaler, RHIB, nor the NOAA vessel saw any marine mammals or sea turtles during the monitoring period. UNDETs concluded at 1330. The aerial survey saw only sea turtles out on the site and continued to monitor the site till 1600. They commented that the plumes from the UNDET could be visible for approximately an hour as it drifted with the current (Figure 10).

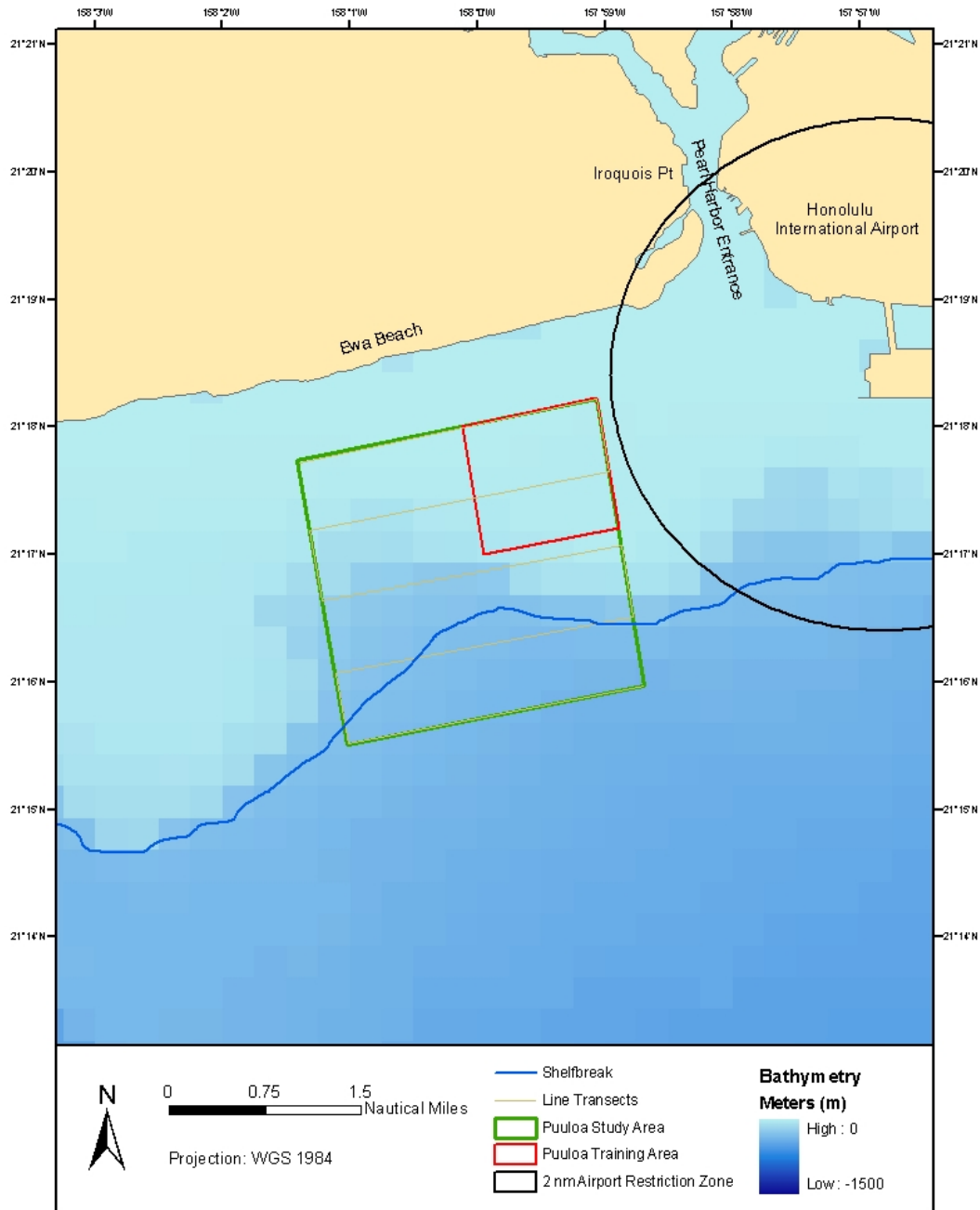


Figure 1. UNDET location in the center of the Puuloa training area.



Figure 2. Whaler with 20 lbs charges.



Figure 3. Blasting cap from RHIB.



Figure 4. Divers in water connecting blasting cap.



Figure 5. Five minute fuse lit, diver swimming immediately to RHIB.



Figure 6. 20 lbs UNDET.



Figure 7. Collection of expended materials floating at the surface.



Figure 8. NOAA survey vessel.



Figure 9. Spinner dolphins spotted within the exclusion zone prior to UNDET. UNDET delayed until dolphins were outside 700 yard exclusion zone.



Figure 10. Example of the plume immediately post UNDET.

Table 1. Shipboard MMO Data Category Descriptions

Data Category	Description
Sightings Information	
Effort (on/off)	On effort means actively searching for marine mammals; time spent off effort could result from vacating the bridge wing for operational reasons.
Date	Format in mm/dd/yy.
Time	Time provided in Hawaii Standard Time (HST).
Location	This is the location of the MMO at the time of the sighting, provided by monitors on the bridge.
Detection Sensor	Either visual or aural (if detected passively by the sonar technician) and which MMO observed the animal.
Species/Group	Determined by the MMO.
Group Size	Estimated by the MMO.
# Calves	Estimated by the MMO.
Bearing (true)	Estimated by the MMO.
Distance (yds)	Estimated by the MMO; reticled binoculars or other measurement devices not available.
Length of contact	Estimated by the MMO.
Environmental Information	
Wave height (ft)	Estimated by the MMO.
Visibility	Estimated by the MMO.
BSS	Estimated by the MMO.
Swell direction (true)	Estimated by the MMO.
Wind direction (true)	Estimated by the MMO.
Wind speed (kts)	Provided by monitors on the bridge.
% glare	Estimated by the MMO.
% cloud cover	Estimated by the MMO.
Operational Information	
Direction of ship travel	Provided by monitors on the bridge.
Animal motion	Estimated by the MMO.
Behavior	<u>Individual behaviors</u> : breach, porpoise, spin, bowride, feeding, head slap, social, tail slap, pectoral fin slap, other <u>Whale behaviors</u> : blow, no blow rise, fluke up, peduncle arch, unidentified large splash <u>Group behaviors</u> : rest, mill, travel, surface active travel, surface active mill
Mitigation implemented	Measures implemented.
Comments	Other comments as necessary.

3.2. VESSEL MARINE MAMMAL MONITORING UNDET II

UNDET II Monitoring Participants

Navy Vessels Involved in UNDET training on July 9th, 2009

- Whaler 27' (4 Navy Ops personnel)
- RHIB 24' (3 Navy Ops personnel)
- RHIB 24' (1 Navy Ops personnel and 3 Navy Biologists)

MMOs

- Anurag Kumar (NAVFAC Atlantic)
- Steven Jameson (NAVFAC Pacific)
- CDR Jeffrey Juhala (Former veterinarian, visiting MDSU 5)

Contracted Research Vessel

- NOAA 23 ft (4 Civilian Biologists)

Contracted Small Aircraft

- Helicopter (3 Civilian Biologists and 1 pilot on June 19)

DESCRIPTION OF ACTIVITY

- 10:15 On station. Blast cap boat attempted to clear fish farm, no one was on deck to notify.
- 10:27 MMO saw green sea turtle about 100 ft from observation boat and 200 yards from UNDET site. Blast cap and charge boats were unable to see same turtle.
- 10:45 UNDET marker buoy went in the water. Blast cap boat started 30-minute sweep. Cleared fish farm
- 11:15 MMO saw green sea turtle about 100 ft from observation boat and greater than 700 yards from UNDET site.
- 11:22 MMO saw bottlenose dolphins near UNDET buoy moving towards Waikiki and away from the blast cap boat. Blast cap boat was unable to see them and also was busy setting up the blasting caps. Navy personnel on MMO boat were notified, however Navy personnel did not communicate to blast cap boat. If the bottlenose dolphins remained in the exclusion zone before divers went in the water, MMOs would have asked to intervene. MMOs followed their moment away from the UNDET site and noted that they were well outside the 700 yard exclusion zone before the divers went in the water. Therefore for the blast cap boat was not notified till after the UNDET.
- 11:37 UNDET event number one detonated. Blast cap boat went in to recover expended materials and commenced 30-minute monitoring period. Blast cap, charge, and MMO boat did not see any marine mammals or sea turtles
- 12:16 UNDET event number two. Blast cap boat went in to recover expended materials and commenced 30-minute monitoring period. Blast cap, charge, and MMO boat did not see any marine mammals or sea turtles
- 13:00 UNDET event number three attempted, but misfired. MDSU SOP is to wait 30-minutes before sending divers to investigate cause of misfire. During this time, they announced that they were monitoring for marine mammals and sea turtles at the time. Cause of misfire was poor connection at blast cap. Blast cap, charge, and MMO boat did not see any marine mammals or sea turtles
- 13:50 UNDET event number three reattempted and was successful.

Table 2. Marine Species Sightings Data – UNDET I

Data Category	Sighting 1	Sighting 2	Sighting 3
Effort (on/off)	on	on	on
Date	06/08/09	06/08/09	06/08/09
Time	10:26	10:50	13:09
Location	Inside Exclusion Zone	Inside Exclusion Zone	Inside Exclusion Zone
Detection Sensor	Navy Lookout	Navy Lookout	Navy Lookout
Species/Group	Green sea turtle	Green sea turtle	Spinner dolphins
Group Size	1	1	15
# Calves	0	0	undetermined
Bearing (true)	n/a	n/a	n/a
Distance (yds)	>10 from UNDET site	100 SW from UNDET site	150 from UNDET site
Length of contact	5 min	1 min	4 min
Wave height (ft)	4	4	4
Visibility	unrestricted	unrestricted	unrestricted
BSS	4	4	6
Swell direction (true)	SE	SE	SE
Wind direction (true)	SE	SE	SE
Wind speed (kts)	15 - 20	15 - 20	20-25
% glare	0	0	0
% cloud cover	20	20	20
Fish present	Yes	Yes	Yes
Animal motion	unknown	unknown	unknown
Behavior	Body	Body	Splashing, spinning
Mitigation implemented	Yes	Yes	1.5 hour wait period as R/V tracked pod till outside exclusion zone

Table 3. Marine Species Sightings Data – UNDET II

Data Category	Sighting 1	Sighting 2	Sighting 3
Effort (on/off)	on	on	on
Date	02/19/09	02/19/09	02/19/09
Time	10:27	11:15	11:22
Location			
Detection Sensor			
Species/Group	Green sea turtle	Green sea turtle	Bottlenose dolphins
Group Size	1	1	8
# Calves	0	0	undetermined
Bearing (true)	undetermined	undetermined	East
Distance (yds)	200 from UNDET site	>700 from UNDET site	<10 from UNDET site
Length of contact	30 seconds	30 seconds	4 minutes
Wave height (ft)	4-5	4-5	4-5
Visibility	unrestricted	10+	unrestricted
BSS	4-5	4-5	4-5
Swell direction (true)	SE	SE	SE
Wind direction (true)	SE	SE	SE
Wind speed (kts)	15-20	15-20	15-20
% glare	0	0	0
% cloud cover	10	5	10
Direction of ship travel	n/a	n/a	n/a
Animal motion	unknown	unknown	unknown
Behavior	Body	Body	Splashing/jumping
Mitigation implemented	Yes, though not possible for Navy Lookout to see from their location	Yes, though not possible for Navy Lookout to see from their location	Yes, though not possible for Navy Lookout to see from their location

SECTION 4: CONCLUSION

4.1. MARINE MAMMAL MONITORING

The monitoring effort was successfully completed for 2009 with 40 hours of MMO time logged observing UNDET training within the HRC. MDSU 1 was very cooperative and helpful with the coordination of having MMOs aboard. NMFS was contracted to provide independent observers conducting vessel surveys in the vicinity of the UNDET location, and as a result, had the opportunity to conduct a focal follow of dolphins observed in the area.

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 MMO time spent with the Navy divers help foster the understanding of why these mitigation measures are in place and how important these measures are to protecting marine life and Navy training.

4.2. RECOMMENDATIONS

Having the opportunity to have MMOs onboard one of the UNDET boats provided an opportunity to directly observe that the mitigation measures were implemented. In addition, having the MMOs on the same boats at the Navy lookouts gave both the opportunity to sight the same animal. After the first day of monitoring, MDSU deemed it to be unsafe to have MMOs on the same boats with explosives or blasting caps, and provided a third observation platform. Having the MMOs on a different platform than the Navy lookouts made it difficult to evaluate mitigation effectiveness, though it did provide an opportunity to have observers at an independent monitoring location within the exclusion zone. Quite often during UNDET II, MMOs would site an animal within the exclusion zone, that given the average sea state conditions, would be impossible for the Navy lookouts to see from their vantage point on the other side of the exclusion zone. Typically sea turtle would only be seen by MMOs with 40 yards, and small odontocetes within 200 yards of the platform. Dolphins were observed moving fast through the area on both days (spinners and bottlenose); in both cases the animals were first observed between the second and third detonations and were traveling steadily. The bottlenose dolphins were outside of the exclusion zone within five minutes.

Therefore, given an effective range of detection of 200 yards, it is very possible for Navy lookouts monitoring near the perimeter of the exclusion (700 yds) zone to miss animals moving into the area. Our recommendation is that Navy lookouts should focus more of their time monitoring for marine species nearer to the UNDET site.

SECTION 5: ACKNOWLEDGEMENTS

We thank the officers and crew of MDSU 1 for their outstanding support and hospitality during this cruise and CDR Jared East (CPF) and Ms. Mandy Shoemaker (NAVFAC Atlantic) for pre-cruise planning.