

APPENDIX F Kaula Island Ship-Based Marine Mammal Survey - Hawaii Range Complex

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Prepared for Commander, Pacific Fleet
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1. INTRODUCTION

1.1 MARINE MAMMAL AND SEA TURTLE MONITORING

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, and amended in 2010, 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 Kaula Island monitoring effort is intended to provide data towards answering questions 1, 2, and 5 above.

1.2 KAULA ISLAND BACKGROUND

1.2.1 Owner Information

Territorial Executive Order 173 of 13 December 1924 set aside Kaula Island for public purposes under the jurisdiction of the United States Lighthouse Service. In 1939, the U.S. Coast Guard (USCG) assumed control of Kaula (Elmer and Swedberg 1971; Balazs 1979). In 1952, the Department of the Navy obtained permission to use Kaula Island as a munitions target, and the Navy received control of the island from USCG in 1965 (Elmer and Swedberg 1971).

1.2.2 Property Description

Kaula is a small, uninhabited islet near the islands of Niihau and Kauai in the Hawaiian Archipelago (Fig. 1; latitude: 21°39'29" North, longitude: 160°32'39" West; Palmer 1936). It is located 20 nautical miles (37 kilometers [km]) west-southwest of Niihau and approximately 60 nautical

miles (111 km) southwest of the Pacific Missile Range Facility (PMRF), Kauai. Kaula has an area of approximately 136 acres (55 hectares), with a summit elevation of 540 feet (ft) (164.6 meters [m]) (Palmer 1936). The island is crescent-shaped, with a curving crest line approximately 5,500 ft (1,676 m) in length (Fig. 2). The terrain drops steeply from the crest at a mean slope of 36° (Palmer 1936), and steep V-shaped ravines have been cut by ephemeral streams on the windward slopes, such that the island has little level terrain (Elmer and Swedberg 1971). The northern horn of the island extends 2,500 ft (762 m) from the summit and ends at an approximate elevation of 280 ft (85 m), while the southern horn extends 3,000 ft (914 m) from the summit and ends at an approximate elevation of 100 ft (30 m) (Palmer 1936). The southeastern tip (1000 ft) of the island is currently used by the U.S. Navy as a range for inert ordnance and aircraft gunnery (Fig. 2). During a 1971 survey, a freshwater source was recorded approximately 1,000 ft (305 m) from the impact area with a flow rate of approximately 1 pint (0.47 liters) per hour (Elmer and Swedberg 1971).

1.2.3 Prior Use

Kaula Island is associated with Hawaiian culture and is assumed to have been visited in the past by Hawaiians for fishing and bird collection, but there is no evidence of regular human habitation (Elmer and Swedberg 1971). Three archeological sites were described by Bryan (1939): two sites were originally speculated to be heiaus and one site a shelter cave; however, the heiau sites have been noted to be of questionable origin (Bryan 1939, Elmer and Swedberg 1971, DON 1976a).

The U.S. Lighthouse Service established an automatic gas light near the summit of Kaula Island on August 18, 1932. Lighthouse Service personnel were able to land on the west side of the island during steady trade wind weather, and an ascent trail was built from a wave-cut bench near sea level to the lighthouse site near the summit (Palmer 1936). The gas light provided 480 candlepower and was visible for a distance of up to 27 miles in clear conditions. Two gas tanks on the west side of the island supplied fuel to the main and backup light via 1,500 ft-long pipes. The lighthouse on Kaula was operated until 1947.

Following World War II, USCG used Kaula Island as a radar navigation target. After receiving permission to use the island for munitions training, in 1952 the Navy designated the southeastern tip (1000 ft) of the island as a practice range for air-to-surface and surface-to-surface weapons delivery (Elmer and Swedberg 1971, DON 1976a). Both live and inert ordnance was used during training missions through 1980. From 1981 through 2009, munitions training by the Navy at Kaula Island has been restricted to inert ordnance delivery and aircraft gunnery (Walker 1983, 1984). In 1977, Kaula Island was designated as a Seabird Sanctuary by the State of Hawaii Department of Land and Natural Resources.

1.2.4 Marine Mammal Survey History and Species Observations

Two National Oceanic and Atmospheric Administration (NOAA) marine mammal surveys not associated with the on-island plant and seabird surveys at Kaula Island have included the waters surrounding the island (Mobley et al. 2000, Baird et al. 2003). Both surveys recorded spinner dolphins (*Stenella longirostris*) and bottlenose dolphins (*Tursiops truncatus*) near Kaula (Mobley et al. 2000; Baird et al., 2003).

Due to increasing concerns by the Navy regarding the potential for injury to personnel visiting Kaula by unexploded ordnance, bird aircraft strikes, and steep, unstable terrain, access to the island for land-based surveys has not been granted since 1998. In January 2009, the Navy contracted a private company to obtain aerial imagery of Kaula Island via small airplane in order to conduct seabird surveys using high resolution digital images. The resolution of the imagery obtained during those flights, however, was not high enough to accurately assess seabird species abundance or presence on the island. In order to conduct additional seabird surveys on Kaula Island in the absence of direct access to land, on 21-22 July 2009 avian surveys were conducted via vessel platform, with surveys for marine mammals conducted concurrently (Pepi et al. 2009). Five biologists, including four seabird observers and one marine mammal observer, carried out the surveys. Observations of seabirds and marine mammals were conducted from the platform above the bridge, approximately 24 ft (7 m) above the water. Four species of marine mammals were observed near Kaula Island, including three species of odontocetes and one species of pinniped. Bottlenose dolphins (*Tursiops truncatus*) and spinner dolphins (*Stenella longirostris*) were all sighted off of the northwest coast of the island within 820 ft (250 m) of the coastline. The spotted dolphins (*Stenella attenuata*) were sighted during transit to the survey area off of the southeast coast of Kaula within 4.9 miles (8 km) of the coastline. Hawaiian monk seals (*Monachus schauinslandi*) were observed hauled out on two separate ledges on the leeward (western) side of the island.

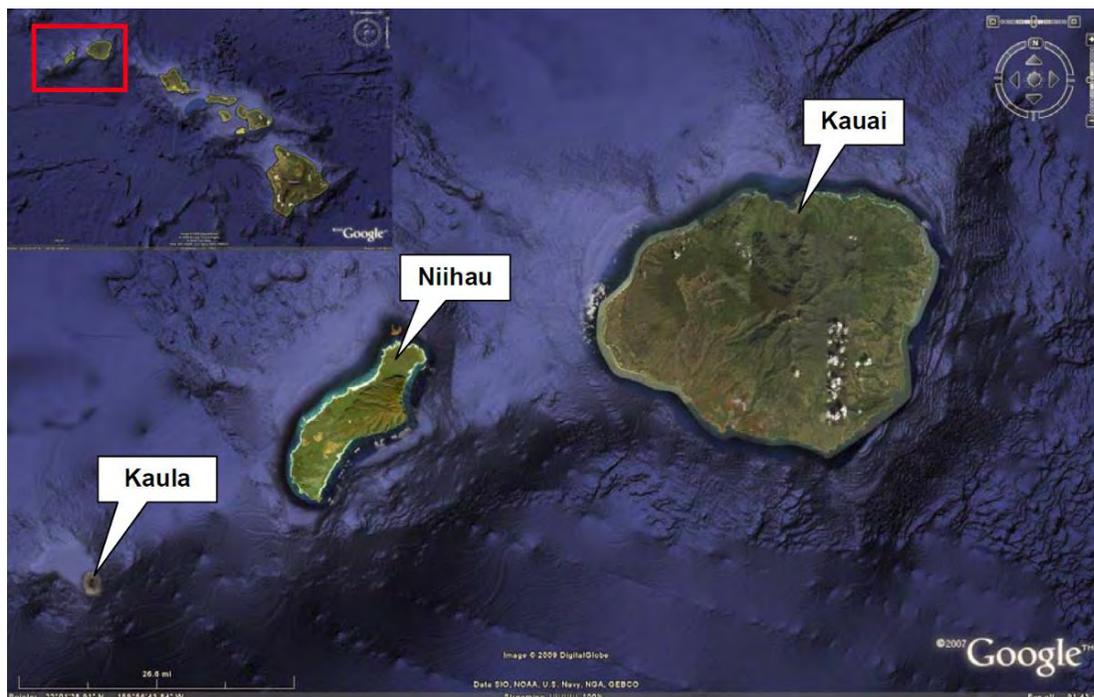


Figure 1. Location of Kaula Island relative to the main Hawaiian Islands (inset) and Kauai and Niihau (imagery from Google Earth).



Figure 2. Aerial imagery of Kaula Island (Walker and Associates).

2. METHODS

2.1 SHIP-BASED SEA BIRD AND MARINE MAMMAL SURVEY

Ship-based surveys were again conducted for seabirds and marine mammals offshore of Kaula Island and in the waters between Niihau and Kauai on 26-28 June 2010. These dates were prior to the RIMPAC major training exercise, and therefore were intended to provide a baseline survey of marine species presence. The waters of the survey area included the PMRF areas W-186, W-187, and W-188 (Fig. 3). Seven biologists, including five from the U.S. Navy, one from the U.S. Fish and Wildlife Service, and one from Hawaii DLNR, carried out the surveys (Table 1). Surveys were conducted from the Motor Vessel Searcher, a 96 ft (29.3 m) ship capable of sleeping a scientific crew of 8. The M/V Searcher has an observation deck above the bridge, placing observers approximately 20 ft (6 m) above the surface of the water (Fig. 4).

2.2 SURVEY TIMELINE

Three biologists from the U.S. Navy boarded the M/V Searcher at Nawiliwili Harbor, Kauai, on the morning of 26 June, and conducted one day of marine mammal surveys in the waters roughly between Kauai and Niihau, eventually rounding the northern end of Niihau. In the evening the vessel anchored off the west coast of Niihau.

On the morning of 27 June, the vessel resumed a marine mammal survey beginning by rounding the southern end of Niihau, and surveying waters between Niihau and Kauai on the way to eventually reach Port Allen, Kauai in the late afternoon, where the four remaining biologists boarded. The marine mammal survey was continued until daylight allowed along a direct transit to again anchor off the west coast of Niihau.

On the morning of 28 June, a marine mammal survey was conducted on a transit to Kaula Island. Upon reaching Kaula Island, as with the 2009 ship-based survey, a bird survey of the island was conducted as the vessel circumnavigated the island twice at a distance of approximately 750 ft (228 m) from the coastline. Marine mammal sightings were also recorded. After the bird survey, the dedicated marine mammal survey was again resumed as the vessel made its final transit to Port Allen, where all biologists disembarked.

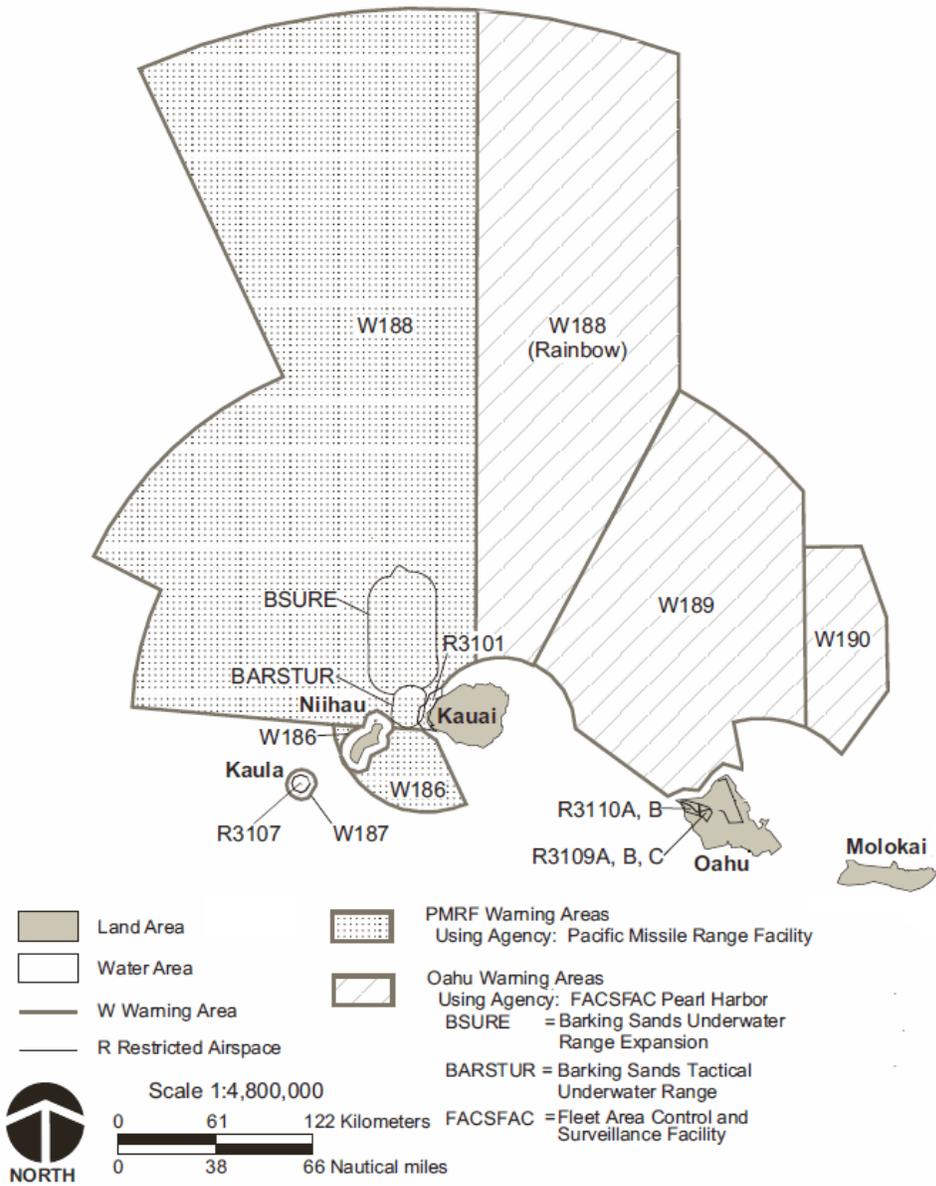


Figure 3. Depiction of PMRF Warning Areas W-186 and W-187 in relation to the Hawaiian Islands



Figure 4. M/V Searcher. A view from the stern shows several decks, including the covered flying bridge at top.

2.3 SHIP-BASED MARINE MAMMAL SURVEY METHODOLOGY

Data collection protocols and forms generally followed those used during previous vessel-based marine mammal and sea turtle monitoring programs conducted in conjunction with other naval exercises in the HRC (Smultea et al. 2007, 2008a, 2008b). The primary goals of this project were to locate and identify marine mammals and sea turtles observed before a training exercise. The marine mammal survey portion of the cruise was conducted by three Navy biologists. One biologist was being trained through a Navy internship program, and the other two biologists were experienced with line-transect survey methodology and had experience in field identification of subtropical Pacific marine mammal and sea turtle species, were knowledgeable of marine mammal biology and behavior, and had previous experience conducting marine mammal observations from vessels. Observations were made from the flying bridge of the M/V Searcher, where the approximate observe eye-level height was 7.97 m above sea level (Fig. 5). Distance to the horizon from this height was ~8 nm. A canopy structure covered the flying bridge to minimize exposure of observers and equipment to sun and rain. Each observer rotated through three stations at 30-minute intervals: port observer, data recorder, and starboard observer. The data recorder also was able to make opportunistic observations. The observers scanned continuously from abeam to the bow. The left and right observers were each equipped with a pair of “Big Eyes” 25 x 50 binoculars, securely mounted on pedestals located on the port and starboard forward corners of the flying bridge. All three biologists were also equipped with 7x hand-held reticled binoculars. The two observers were also equipped with digital voice recorders and digital cameras, one with a 200 mm zoom lens, and the other with a 400 mm zoom lens. The survey was conducted in “passing mode,” i.e., the vessel was not diverted from the track line in the case of sightings. Once a sighting occurred, all three observers on duty were assigned the task of

projecting independent estimates of group composition using a minimum, maximum, and best estimate approach. The average of the “best” estimates from the three observer team was then recorded for group size.

Except for the portion of the cruise devoted to the bird count at Kaula Island (Fig. 6), the observations occurred during all daylight hours during “acceptable” survey conditions (i.e., Bf <7) with no rain or other environmental conditions impeding the ability to sight marine mammals near the vessel. Survey lines on the first day of 26 June concentrated the west coast of Kauai in a modified sawtooth pattern, and the survey effort continued afterwards on the transit to the west coast of Niihau to anchor for the night (Fig. 7). Survey lines on 27 June consisted of perpendicular transits across undersea slopes to deeper waters southwest of Niihau and southeast of Kauai, as the vessel made its way to Port Allen for the boarding of the biologists for the bird survey; the vessel again anchored off the west coast of Niihau for the evening (Fig. 8). Survey lines on 28 July were opportunistic, consisting of the transits to Kaula Island, as well as from Kaula Island on the return to Port Allen for disembarkation. (Fig. 9).



Figure 5. Flying bridge and port big-eye binocular. The starboard big eye is to beyond the camera view to the right.



Figure 6. Kaula Island bird survey.



Figure 7. Survey track of 26 June. Nawilili Harbor to west coast of Niihau



Figure 8. Survey track of 27 June. West coast of Niihau, survey to Port Allen, then transit back to west coast of Niihau.



Figure 9. Survey track of 28 June. West coast of Niihau, two circumnavigations of Kaula Island (lower left), and return rvey to Port Allen.

3. RESULTS

A total of seven marine mammal groups (all cetaceans) were sighted during the three days of observations (Table 1). One of these was a bow-riding group of unidentified dolphins sighted only by the crew of the vessel during an off-effort period due to rain; the remaining six were sighted on-effort by the biologist observers. Five of the cetacean sightings were confirmed to species and consisted of two groups of bottlenosed dolphins (*Tursiops truncatus*), one group of rough-toothed dolphins (*Steno bredanensis*) (Fig. 10), one group of spinner dolphins (*Stenella longirostris*), and one group of false killer whales (*Pseudorca crassidens*) (Fig. 11). The sighting by the crew was an unidentified dolphin species. No sea turtles were sighted. A calf was sighted within the group of false killer whales, and the spinner dolphin group were bow-riding and several animals were sighted with unidentified white material trailing from the flukes, pectoral fins, or visible on the melon.

All sightings and their locations with reference to survey tracks are depicted in Figure 12.

Table 1. Summary of marine mammal sightings

Species	Group size (Min/Max/Best)	Date	Time
<i>Steno bredanensis</i>	3/3/3	26 June	10:09
<i>Unidentified cetacean</i>	1/-/-	26 June	10:29
<i>Unidentified dolphin</i>	(15)	26 June	15:53
<i>Tursiops truncatus</i>	2/2/2	27 June	06:40
<i>Tursiops truncatus</i>	1/2/2	27 June	07:40
<i>Stenella longirostris</i>	7/13/8	28 June	08:33
<i>Pseudorca crassidens</i>	3/3/3	28 June	11:46



Figure 10. Sighting of *Pseudorca crassidens* 28 June. Calf sighted within group.



Figure 11. Sighting of *Stenella longirostris* at Kaula Island.



Figure 12. Unidentified white material on *Stenella longirostris*

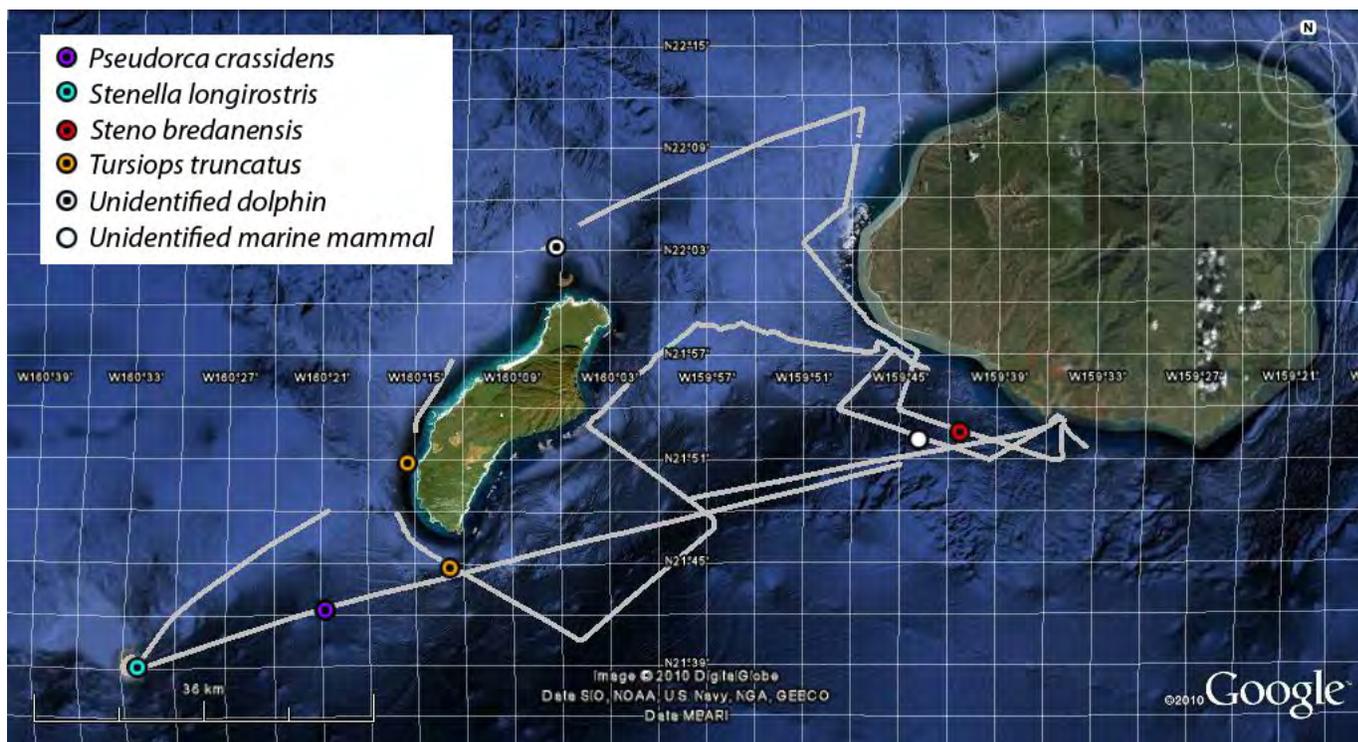


Figure 13. Marine mammal sightings. Sighting locations are superimposed upon survey tracks.

4. CONCLUSIONS

4.1 NIIHAU-KAUAI-KAULA PROJECT AREA

Few data are available from intensive marine mammal surveys specific to the waters surrounding the Niihau-Kauai project area, and only two that extend to Kaula Island (Mobley et al. 2000, Baird et al. 2003; Pepi et al., 2009). Therefore comparison to past studies with the results of this survey are difficult to interpret. However, this survey is the second of a series of surveys planned to be conducted in conjunction with Kaula Island sea bird surveys, following Pepi et al. (2009). Therefore data resulting from this survey may be considered to be the early portion of an anticipated continuation of a long-term effort in progress to characterize the marine mammal and sea turtle populations in the Kaula Island, as well as Niihau-Kauai area.

4.2 RECOMMENDATIONS

The cooperative combination of marine mammal and sea turtle survey effort with long-term vessel-based sea bird surveys of Kaula Island have proven to be a fruitful, cost-effective, and productive research tool. The continued collection of data in these waters are therefore anticipated to be a relatively long-term effort that can provide baseline information regarding marine mammal and sea turtle populations in the Navy exercise areas.

For future marine mammal cruises to this project area, we also recommend the addition of other efforts that are able to help answer the questions of the MMPA permit monitoring requirements. For example, the ability to perform focal follows (as in Pepi et al., 2009) would provide additional

behavioral data, especially for rarer species such as the Hawaiian *Pseudorca crassidens*. For example, it is unknown whether the *Pseudorca* sighted were members of the Insular Hawaiian population, which is currently a candidate for ESA listing. Because the survey was conducted in “passing mode,” the individually-identifying dorsal photographs that were obtained were not the best that could be obtained by following the animals, either in the primary vessel, or a deployed smaller vessel. Additionally, other qualified researchers could be placed upon the marine mammal-sea turtle-sea bird cruises to enable the application of tags (e.g., satellite tags) for population and range information, or the collection of biopsies for population structure data.

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