

APPENDIX G Aerial Survey Monitoring for Marine Mammals and Sea Turtles in the Hawaii Range Complex in Conjunction with a Navy Training Event, SCC OPS August 16-30, 2009, Final Field Report.

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Section 1 Introduction

Aerial surveys to monitor for marine mammals and sea turtles (MM/ST) were conducted in conjunction with the August 2009 US Navy Submarine Commander's Course (SCC OPS) in the Hawaii Range Complex (HRC) on the Pacific Missile Range Facility (PMRF) instrumented range off Kauai and Niihau, Hawaii (

Figure 3). Surveys occurred on five consecutive days from 26-30 August 2009 before, during and after training activities involving intermittent use of mid-frequency active sonar (MFAS), typically ~100 km (50 nm) west or northwest of Kauai (Figure 2). The first day on August 26 a grid pattern was flown before SCC OPS began (Figure 2). The following three days on August 27-29 the observation aircraft flew elliptical orbits in advance of the *USS Lake Erie* during the SCC OPS (Figure 2). On the final survey day on August 30 after the SCC OPS had ended the grid pattern flown on the first day was replicated (Figure 2). The survey methodology and sampling design were submitted and approved in advance, per the Statement of Work (SOW), to the Navy Technical Representative (NTR) and followed previously established protocol implemented for monitoring of previous SCC OPS off Kauai in August 2008 (Smultea and Mobley 2009) and February 2009 (Smultea et al. 2009a) and a similar unit-level training event off Oahu in June 2009 (Mobley et al. 2009).

Prior to the event the co-Principal Investigator (JM) and pilot, along with Navy biologists, participated in a briefing to the *USS Lake Erie* Commanding Officer as well as the pre-planning conference at Pearl Harbor, Honolulu, Oahu, Hawaii, to coordinate survey efforts with the SCC OPS August 09 training event.

Per the SOW, the goal of the aerial survey was "to monitor and report the presence/absence, distribution/re-distribution, reaction/no reaction, injury, and/or mortality of MM/ST during exposure to SCC OPS Navy training event". This involved monitoring and reporting, in as detailed fashion as possible, the surface behavior of MM/ST. In particular, we were to monitor for any changes in the near-surface behavior, orientation, occurrence, and location of animals relative to the *USS Lake Erie's* activities using a systematic search and focal follow method. This included monitoring for any potentially dead, injured, or distressed animals and "any animals found to be exhibiting behaviors or associations deemed unusual" per the SOW.

As indicated in the SOW, it was recognized *a priori* that post-survey analyses were not expected to be completed under this task as sample size was expected to be limited in offshore survey waters based on previous regional survey data (e.g., Mobley et al. 2000, Barlow 2006, Mobley et al.

2009, Smultea and Mobley 2009, Smultea et al. 2009a,c; also see review in Smultea 2008). Rather, survey data collected during this monitoring effort will be compiled with previous (e.g., Mobley et al. 2009, Smultea and Mobley 2009, Smultea et al. 2009a,b,c,d) and subsequent data, and interpreted over time by the Navy to facilitate increased sample size and thus data validity and relevance.

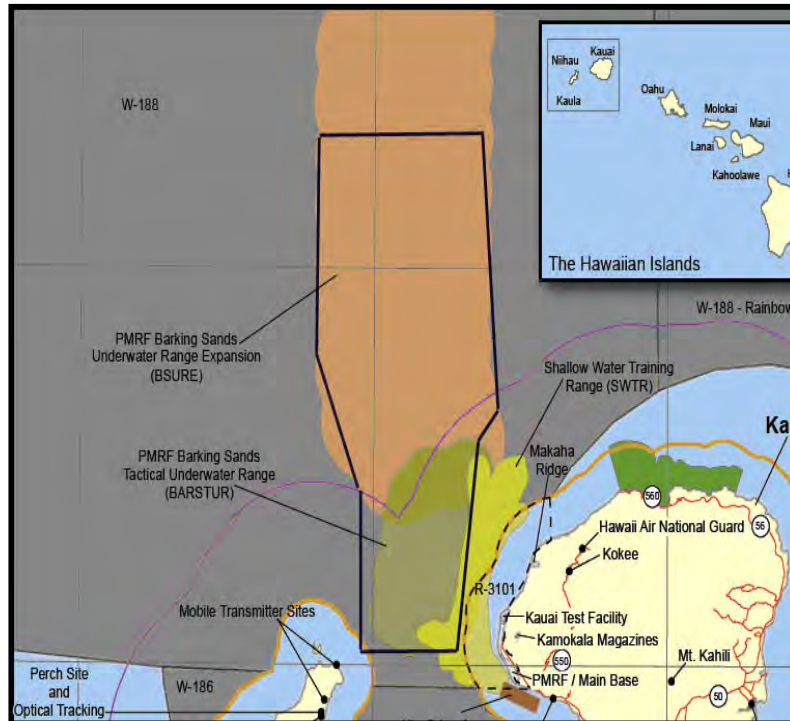


Figure 3. Location of the aerial survey monitoring area in and near the US Navy Pacific Missile Range Facility (PMRF) Range west and northwest of Kauai, Hawaii.

Section 2 Methods

Monitoring effort generally followed protocol first implemented in August 2008 for another SCC OPS off northern Kauai/Niihau (see Smultea and Mobley 2009 for details). This approach involves flying elliptical-shaped patterns in advance of the Navy vessel (i.e., the *USS Lake Erie* in the present case) that extends from the front of the ship (~200 yards [yd]) out to ~2500 yd) over a width of ~4 km (2 nm). However, unlike previous aerial monitoring of SCC OPS, a line-transect grid survey was flown one day before and one day after the SCC OPS in the general operation area. The line-transect grid consisted of 10 north-south oriented lines ~40 km long and spaced equidistantly ~10 km apart (Figure 2). This grid was flown on the first (Aug 26) and last days (Aug 30) of the survey period, before and after the SCC OPS, respectively. During the three intervening days (Aug 27-29), the aircraft flew the elliptical-shaped search patterns in front of the *USS Lake Erie* to search for MM/ST near this vessel during the SCC OPS activities.

Surveys were conducted from a small fixed-wing Twin Aero Commander flying at 100 knots (kt) groundspeed and an altitude of ~1000 ft (305 m), unless the pilot was directed to fly at alternate altitudes by flight controllers for safety reasons. Observations from the monitoring aircraft involved four personnel including a pilot, a co-pilot, and two professionally trained marine mammal biologists (both with >10 years of related experience). Both biologists sat in the two rear seats of the aircraft and functioned as observers. The observer on the right side of the plane also recorded data. The co-pilot in the front right seat was the photographer and back-up observer when the rear right observer was recording. Observers were not informed of the times and types of underwater transmissions during Navy activities, or the course of the *USS Lake Erie*. Observers maintained contact with Navy biologists who monitored MM/ST from aboard the *USS Lake Erie* using a handheld aviation VHF transceiver.

Following an initial sighting, the aircraft typically broke from the transect search line and orbited the sighting to confirm species identification, obtain behavioral observations, and take photographs (see ,d et al. 2009a,b,c for detailed protocol). Species determination of cetaceans was often made possible via photographs taken with a Canon EOS 5D camera equipped with a 400-mm telephoto lens. Data-collection software (Handbase 4.0) was used on an iPhone to collect basic sighting and environmental data (this same data recorder was used during aerial monitoring surveys for the Navy off southern California in June-July 2009—see Smultea et al. 2009d). SpectatorGo, a behavioral data collection program developed by Bioobserve, was used to record interval-sampled behavioral data on the iPhone so that both GPS and altitude data could be incorporated with every data entry. An MMRC/SES team member (M. Deakos) worked closely with the developers to improve the software to match the project's needs. A wide area augmentation system (WAAS) enabled Garmin 296 GPS was used to collect latitude/longitude and altitude data. WAAS technology was developed by the Federal Aviation Administration to augment the Global Positioning System. The WAAS uses a separate satellite system with known positions that correct the GPS signal, resulting in far greater precision than ordinary GPS, particularly in the case of altitude measurements. The sighting and GPS data were merged post-field into an Excel database.

Section 3 Results and Discussion

As stated in the SOW, given the fact that MFAS transmission times were not known plus the small sample sizes of MM/ST observed, it is not possible herein to assess any effects of the August 2009 SCC OPS on MM/ST. Rather, the purpose of this monitoring effort was to gather data than can be compiled with previous and subsequent data to be “fully interpreted over time” by Navy personnel. As such, this section is limited to a summary of the chronology of events, effort, sightings, and behaviors observed as described below.

Two previous aerial monitoring surveys were conducted by Marine Mammal Research Consultants and Smultea Environmental Sciences in conjunction with SCC OPS in the Hawaiian Range Complex in August 2008 and February 2009 (Smultea and Mobley 2009, Smultea et al. 2009a). Over the course of these surveys, protocol has been refined and

standardized, including the development and customization of PDAs and associated software to improve the efficiency of data collection and reduce the data post-processing time. These three surveys have shown that search and behavioral observations of MM/ST from a civilian observer aircraft can be conducted safely and effectively (e.g., see Smultea and Mobley 2009 and Smultea et al. 2009a,b,c,d) with minimal interference with at-sea naval training involving multiple large vessels and aircraft.

Similar to the two previous SCC OPS aerial survey monitoring efforts north of Kauai and Niihau, survey conditions were predominantly hampered by high Beaufort (Bf) sea state and thus poor observation conditions due to the exceptionally strong trade winds (> 20 knots) that prevailed during all but the final day of surveys as described below. No MM/ST sightings were seen while accompanying the *USS Lake Erie* during the SCC OPS for three days when wind speeds were highest. However, sightings were made before and after the SCC OPS period as well as during transits to and from the *USS Lake Erie*. Unlike the previous two SCC OPS aerial monitoring efforts, the August 2009 SCC OPS aerial monitoring involved pre- (1 day), during (3 days) and post-ops (1 day) observation periods. In general, as indicated in previous reports and in the Navy's marine species monitoring plan for the HRC (DoN 2008), conducting observations before/during/after exposure to a potential stimulus is considered a logical experimental approach and is a goal of the Navy's aforementioned plan.

Chronology of Events

- On August 26, before SCC OPS began, the observation aircraft departed Oahu and conducted a line-transect survey in a grid pattern north of Niihau and west of Kauai (Table 1, Figure 2). After completing the survey grid, the aircraft circumnavigated Niihau then flew to the Lihue, Kauai, airport.
- The following three days (August 27-29) during SCC OPS, the aircraft departed each day from the Lihue airport and transited to the location of the *USS Lake Erie* located ~15-55 km NW of Kauai (Table 1, Figure 2). The observers then monitored for MM/ST in front of the *USS Lake Erie* for as long as possible given the fuel restrictions of the aircraft (see Methods). Two roundtrips were made on each of the three days to and from the Lihue airport from the *USS Lake Erie* to permit mid-day refueling.
- On the final survey day (August 30) after SCC OPS had ended, the aircraft departed Lihue airport and conducted a line-transect survey following the same grid pattern flown on August 26 (Table 1, Figure 2). This effort included circumnavigating Niihau after completing the systematic survey grid. The aircraft then returned to Oahu.

Effort

A total of 31.4 hr or 7048 km of flight effort (from aircraft wheels up to wheels down) was conducted from 26-30 August 2009 (Table 1). Most (44% or 13.7 hr) of the total 31.4 hr of flight time occurred while accompanying the *USS Lake Erie*, totaling 3019 km (Figure 3). This was followed by transiting to and from the offshore location of the *USS Lake Erie* or

the grid lines, and systematic line transects effort (Figure 3). In comparison, during similar MM/ST monitoring during the August 2008 SCC OPS off Kauai, the survey aircraft accompanied the Navy's *USS O'Kane* during 19.0 (67%) of the 28.5 hr of flight time (Smultea and Mobley 2009); during SCC OPS aerial survey monitoring in February 2009 off Kauai, the survey aircraft accompanied the Navy's *USS Russell* during 13.9 hr (51% of the 27.3 hr of flight time (Smultea et al. 2009a).

Effort with Respect to Beaufort Sea State

Similar to previous results (Smultea and Mobley 2009), observation conditions were predominantly poor in offshore Kauai waters where the *Lake Erie* was located and where most of the line-transect grid occurred (Bf 5 or 6 during 75% of 30.1 total hr over water) (Figure 4). In comparison, during SCC OPS Aug 08 aerial monitoring off Kauai, Bf was >4 during 80% of 19.0 hr of with-vessel effort; during SCC OPS Feb 09 aerial monitoring also off Kauai, Bf was >4 during 96% of 13.9 hr of with-vessel effort.

Sightings

A total of 19 sightings consisting of an estimated 238 individuals were recorded during the survey period, including one mixed cetacean species sighting (Tables 1 and 2). Locations of sightings are shown by date in Figures 5 – 9. None of the 19 sightings occurred while the survey aircraft accompanied the *USS Lake Erie*. Most sightings occurred while conducting line-transect surveys within the grid or while circumnavigating Niihau before SCC OPS had begun ($n = 8$ sightings) or after SCC OPS had ended ($n = 6$ sightings) (Appendix A). The remaining six sightings occurred primarily in shallow coastal waters near Kauai during transits to and from the airport on August 27-29 (Figures 6-8, Table 2, Appendix A).

Fourteen (74%) of the 19 sightings were identified to species, 5 (26%) of which were confirmed via digital photographs (Appendix B). No video was taken during the surveys. A total of six different marine mammal species were confirmed: the monk seal, pygmy killer whale, false killer whale, and rough-toothed, spinner and spotted dolphins (Table 2, Appendix A and B). One unidentified sea turtle was observed during the survey on the north coast of Kauai on August 27 (Figure 6). Most (57%) of the 14 sightings identified to species were monk seals ($n = 8$), all of which were seen hauled on western beach of Niihau on August 26 and 30 (this Niihau beach was not overflowed during the remaining three survey days—see Figure 2).

In general, the predominant Bf 5-6 in the survey grid and near the *USS Lake Erie* compromised the detection of MM/ST with a few exceptions as summarized below (see Figure 4).

- No sightings were seen in the survey grid on August 26 before SCC OPS began when Bf was primarily 5-6 (Figure 2 and 5).

- While accompanying the *USS Lake Erie* on August 27-29 in offshore north Kauai waters, no sightings were made when Bf was a constant 5 or 6 (Figure 2 and 6-8).
- On the last survey day on August 30 after SCC OPS had ended, four sightings were made in the same survey grid when Bf was largely 2-4 with considerably less Bf 5-6 (Figure 2 and 9).

Behavior

Protocol to collect data on the behavior of MM/ST was the same as previous surveys and followed that outlined in the SOW. This approach consisted of two phases, when possible. The first phase involved recording the initial behavior state, minimum and maximum inter-individual spacing between individuals (estimated in body lengths), direction of travel, species, any conspicuous or unusual behaviors, and any observed changes in behavior. Thus, taking photographs was a high priority to identify and/or confirm species. The second phase was to conduct extended focal follows using the video to supplement detailed behavioral observations when possible. However, as documented during previous aerial monitoring surveys conducted in conjunction with Navy training activities (e.g., Smultea and Mobley 2009, Smultea et al. 2009a,b,c,d), Bf conditions must be sufficiently calm (typically $<Bf\ 4$) to allow reliable and accurate collection of behavioral data. For example, in poor Bf conditions (e.g., Bf 5 and 6), it is very difficult to keep track of the sightings and many behaviors are missed, including entire surfacing sequences. Given the predominantly poor Bf conditions during this survey, no focal follows were conducted and no video was taken. However, initially observed behavioral data were recorded as summarized below and in detail in Appendices A and B. All eight monk seal sightings consisted of single animals hauled out and resting on the western coast of Niihau. Among the 11 small odontocete/delphinid sightings, most groups (55% or 6 groups) were first observed traveling, followed by milling ($n = 3$ groups), surface-active milling ($n = 1$ group), and surface-active traveling ($n = 1$). On two occasions, delphinids were observed feeding: (1) a group of 5 rough-toothed dolphins including 1 calf on August 28 that was milling and feeding, and (2) a single false killer whale observed feeding while traveling on August 30. A photograph showing a possible fish in the false killer whale's mouth was taken through the water surface. A change in the initially observed behavior was noted for 2 of the 19 sightings (Appendix B). On August 28, a group of ~50 spinner dolphins initially surface-active milling near the western shore of Kauai changed behavior state to surface-active travel to the southeast (Appendix B). Also on August 28 a mixed species group of 19 rough-toothed dolphins and 5 pygmy killer whales (including 1 calf) traveling to the northwest appeared to change behavior by staying below the water surface for longer periods while the aircraft circled overhead to take photographs (Appendix B). The latter sighting occurred ~10 km off the southwest coast of Kauai (Figure 7). The one sea turtle observed during the survey was seen resting at the water surface on August 27 along the northern shoreline of Kauai (Appendix B, Figure 6).

Table 8. Summary of survey times by date and periods when the observer aircraft was accompanying and not accompanying the *USS Lake Erie*.

Date 2009	Flight Period (Wheels Up)	Flight Period (Wheels Down)	Total Flight Hours	Period not with <i>USS Lake Erie</i>	Total Hours not with <i>USS Lake Erie</i>	Period with <i>USS Lake Erie</i>	Total Hours with <i>USS Lake Erie</i>	No. Sightings With <i>USS Lake Erie</i> (# indiv)	No. Sightings Away from <i>USS Lake Erie</i> (# indiv)
08/26/2009	09:53:39	15:02:21	5:08	9:54 - 15:02	5:08	n/a	0	0	6 (16)
08/27/2009	09:13:53	12:57:00	3:43	9:13 - 9:37 12:32 - 12:57	0:48	09:37 - 12:32	2:55	0	0
08/27/2009	13:47:51	16:50:01	3:02	13:47 - 14:07 16:24 - 16:50	0:46	14:07 - 16:24	2:16	0	1 (1)
08/28/2009	07:42:58	12:10:23	4:27	07:42 - 08:23 11:35 - 12:10	1:15	08:23 - 11:35	3:11	0	2 (50)
08/28/2009	13:00:27	15:49:24	2:48	13:00 - 13:35 14:56 - 15:49	1:27	13:35 - 14:56	1:21	0	2 (24)
08/29/2009	06:44:56	11:27:49	4:42	06:44 - 07:30 10:29 - 11:27	1:43	07:30 - 10:29	2:59	0	2 (20)
08/29/2009	12:14:38	14:19:52	2:05	12:14 - 12:47 13:46:14:19	1:06	12:47 - 13:46	0:59	0	0
08/30/2009 TOTAL	06:51:33	12:16:53	5:25 31:20	12:16 - 05:25	5:25 17:38	n/a	0 13:41	0	6 (127) 19 (238)

Table 9. Summary of sightings by species and periods with and without the *USS Lake Erie* during the August 2009 SCC OPS aerial survey monitoring.

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Species	With USS Lake Erie		Away from USS Lake Erie		Total	
	No. Grps	No. Individ.	No. Grps	No. Individ.	No. Grps	No. Individ.
Monk Seal (<i>Monachus schauinslandi</i>)	0	0	8	9	8	9
False Killer Whale (<i>Pseudorca crassidens</i>)	0	0	1	1	1	1
Pygmy Killer Whale (<i>Feresa attenuata</i>)	0	0	1	5 (1 calf)	1	5
Rough Toothed Dolphin (<i>Steno bredanensis</i>)	0	0	2	24 (1 calf)	2	24
Spinner Dolphin (<i>Stenella longirostris</i>)	0	0	1	50	1	50
Spotted Dolphin (<i>Stenella attenuata</i>)	0	0	1	110	1	110
Unidentified Dolphin (<i>Delphinidae</i>)	0	0	5	38 (1 calf)	5	38
Unidentified Sea Turtle	0	0	1	1	1	1
Total	0	0	20^{1/}	238	20	238

¹ This total counts one mixed group of rough-toothed dolphins and pygmy killer whales as two separate sightings.

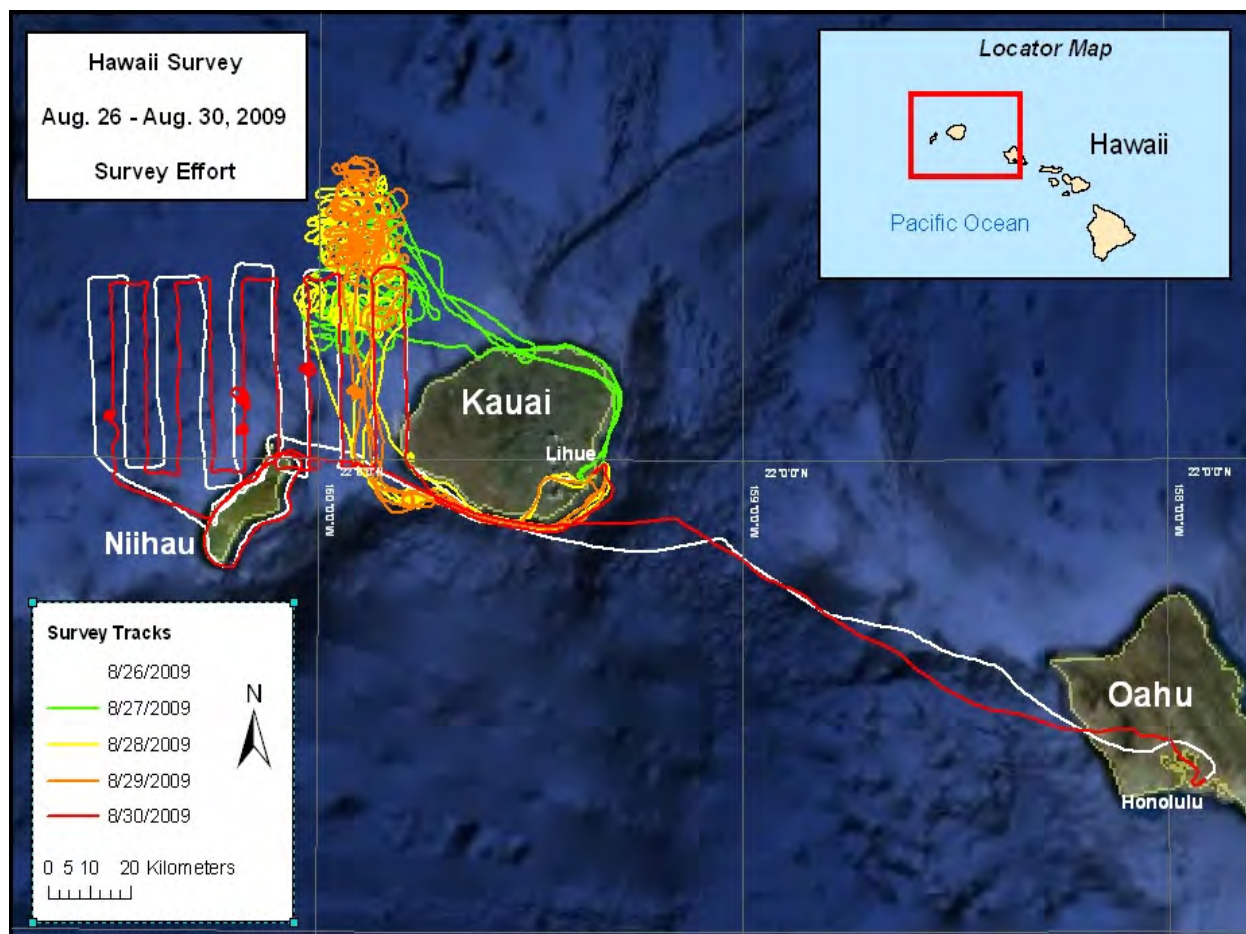


Figure 4. Aerial survey tracks by date during visual observations before (August 26), during (August 27-29), and after (August 30) SCC OPS off Kauai, Hawaii. Parallel lines indicate the line-transect survey grid. Corkscrew-shaped tracks indicate when the aircraft was accompanying the *USS Lake Erie*. Random effort consists of the short lines connecting the longer line-transect grid lines. Remaining lines consist of transit effort while traveling to and from the airport and the *USS Lake Erie* or the survey grid.

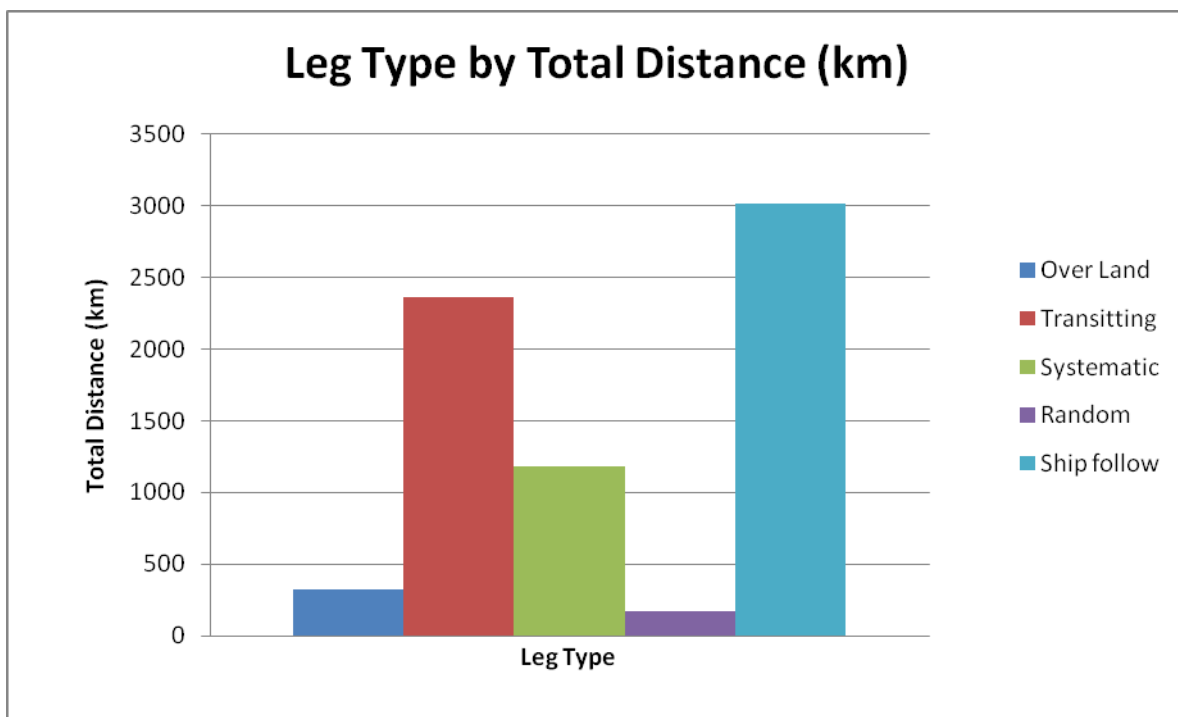
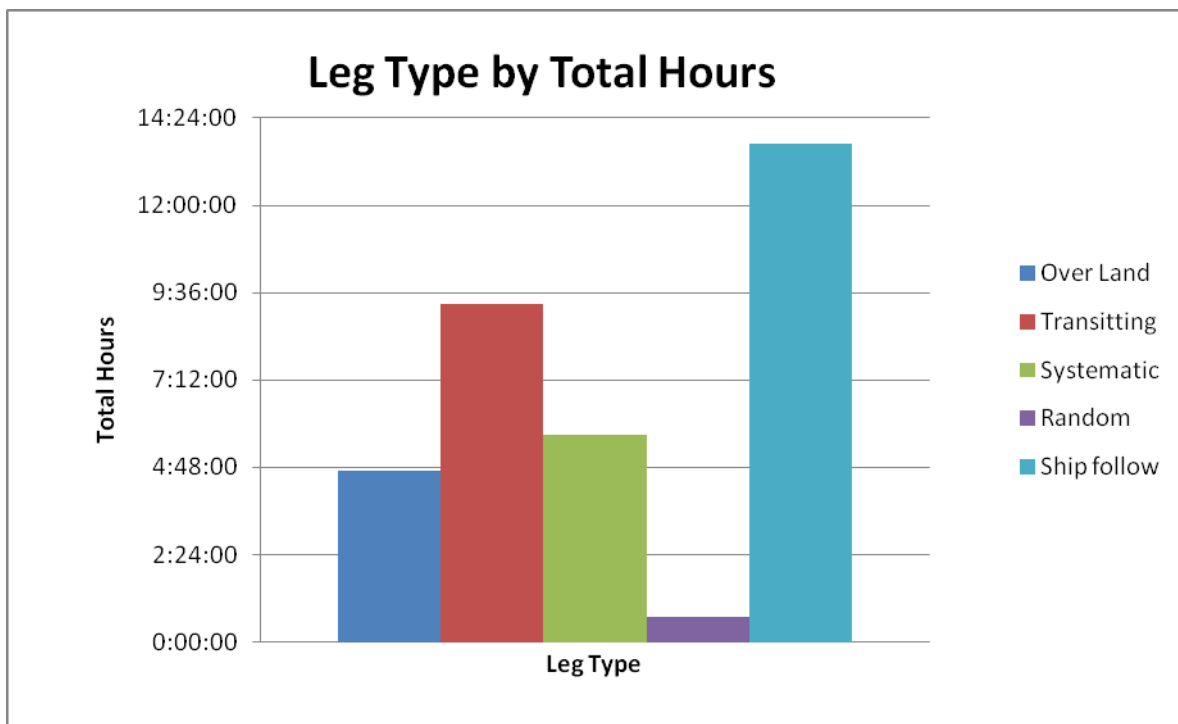


Figure 5. Effort types conducted during the Aug 2009 SCC OPS aerial survey monitoring off Kauai, Hawaii, expressed in hours (upper panel) and km flown (bottom panel).

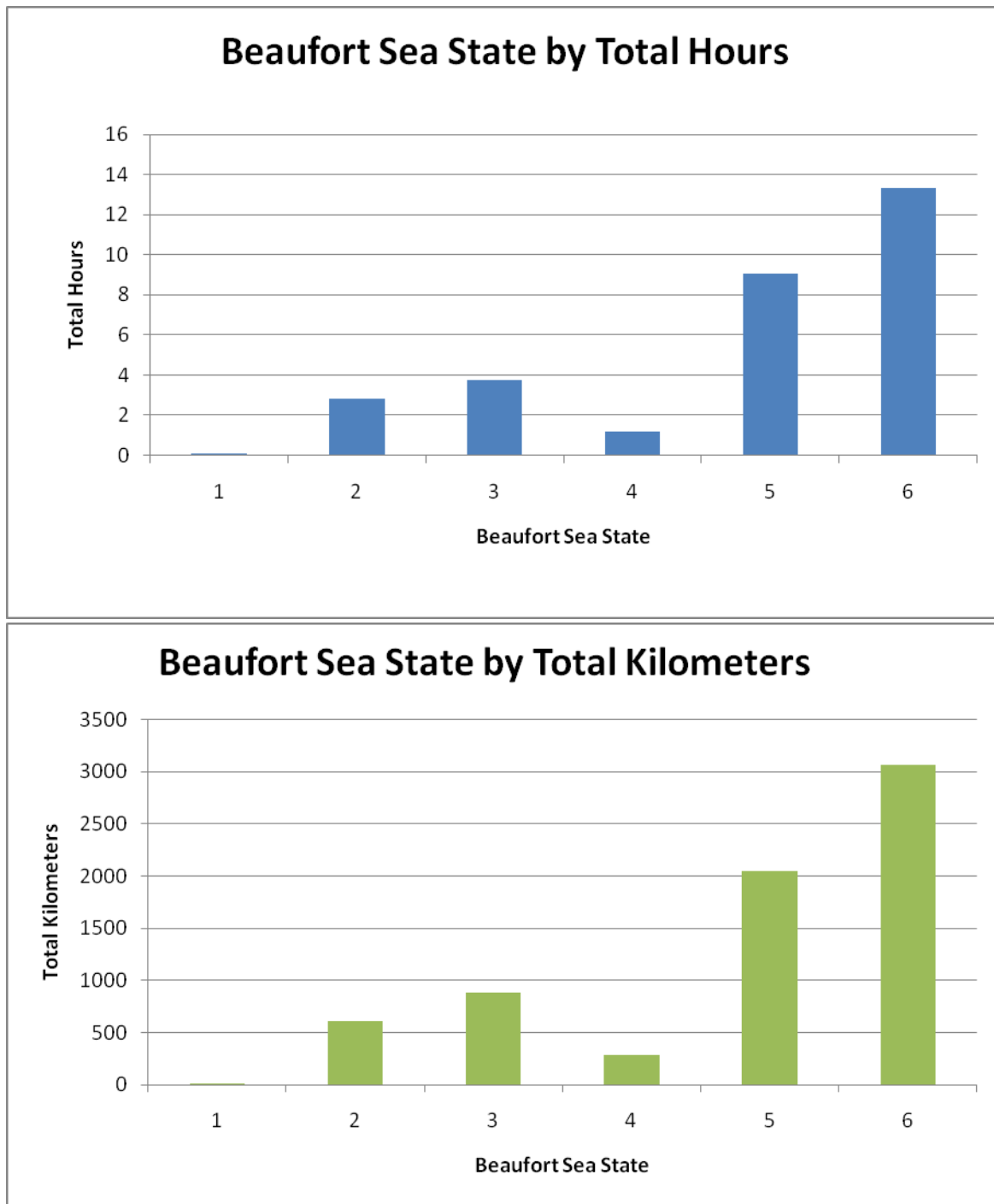


Figure 4. Effort in hours (upper panel) and kilometers (bottom panel) by Beaufort Sea State during the Aug 2009 SCC OPS aerial survey monitoring off Kauai, Hawaii.

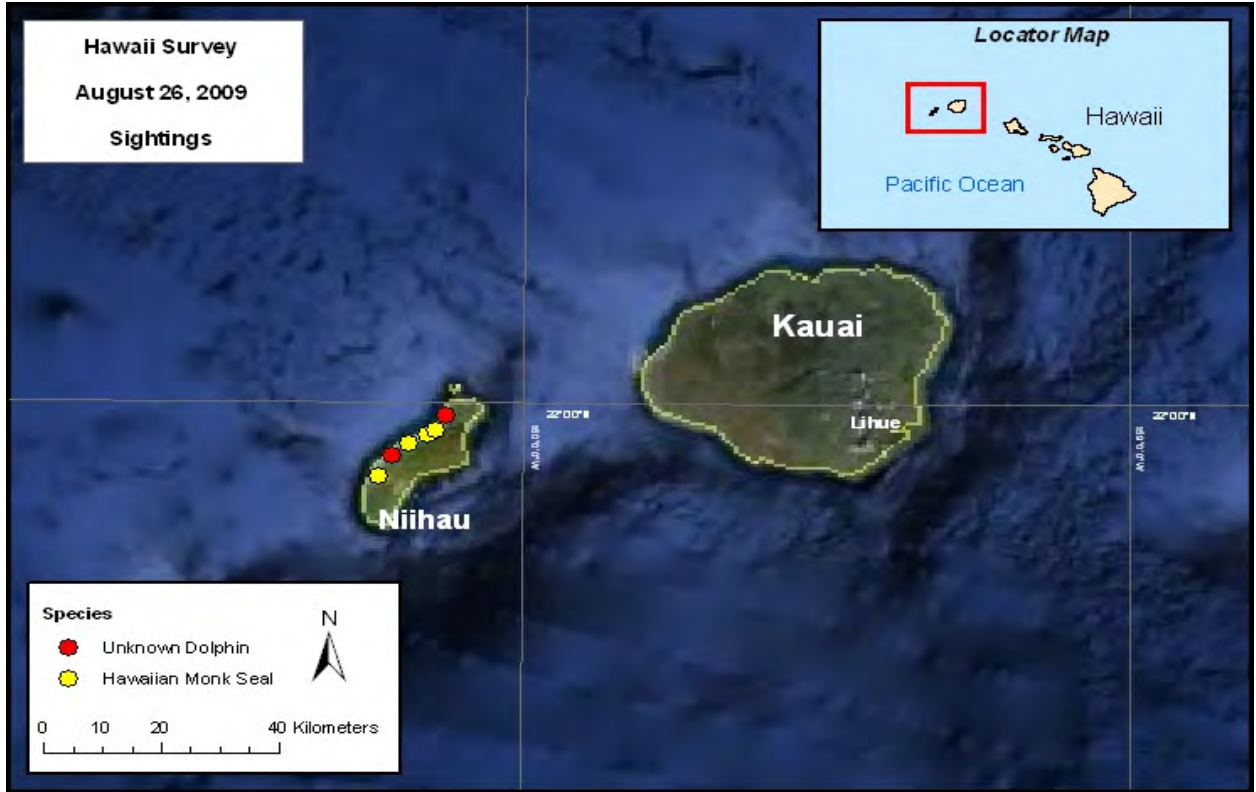


Figure 5. Sightings made on 26 August 2009 off Kauai, Hawaii, before SCC OPS began, while conducting line-transect surveys.



Figure 6. Sightings made on 27 August 2009 during the SCC OPS period off Kauai, Hawaii. Sighting made during transit to/from the *USS Lake Erie*.



Figure 7. Sightings made on 28 August 2009 during the SCC OPS period off Kauai, Hawaii. All sightings were made during transit to/from the *USS Lake Erie*.

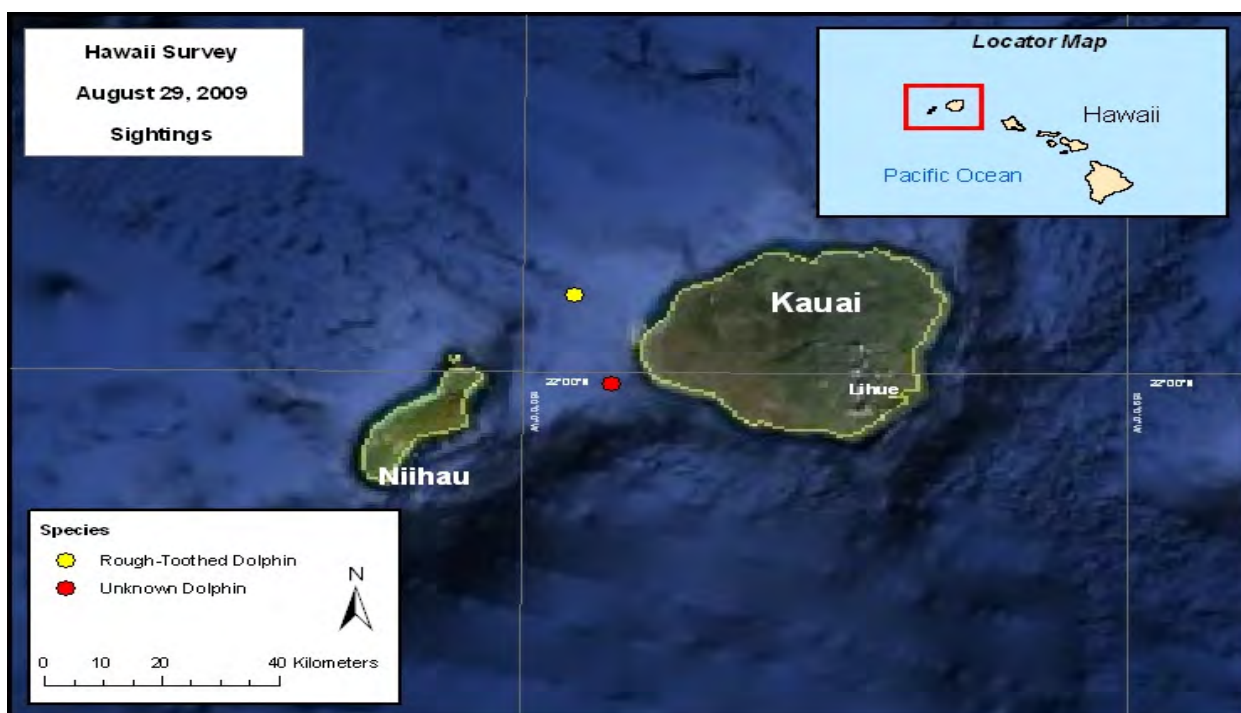


Figure 8. Sightings made on 29 August 2009 during the SCC OPS period off Kauai, Hawaii. All sightings were made during transit to/from the *USS Lake Erie*.

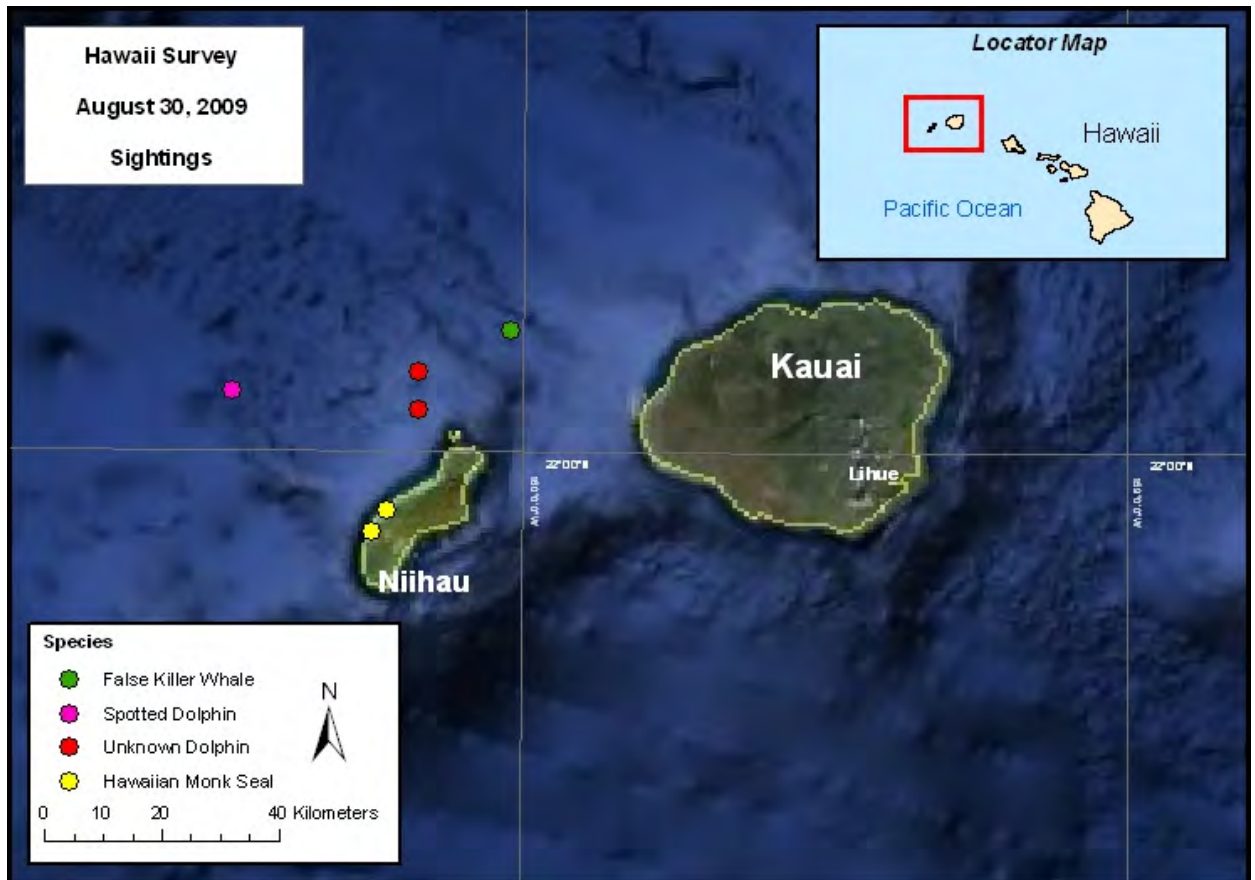


Figure 9. Sightings made on 30 August 2009 off Kauai, Hawaii, after the SCC OPS period, while conducting line-transect surveys.

Section 4 Recommendations

Following are recommendations for future similar MM/ST aerial monitoring efforts during training events. See Smultea and Mobley (2009) for further details and recommendations specifically for SCC OPS monitoring in the HRC. Also see Smultea et al. (2009a,b,c,d) for additional relevant recommendations based on results of aerial monitoring during Major Training Events (MTE) in the SOCAL based on aerial surveys conducted there in fall 2008 and summer 2009.

- In general, the predominant environmental conditions and estimated MM/ST densities in the exposed offshore waters of the area are not conducive to effective monitoring for these species due to high prevailing winds.
- It is highly recommended that this SCC OPS protocol approach be implemented in the Navy SOCAL operating area during a training event. Sighting rates and density of marine mammals are significantly higher throughout the year and the environmental conditions are significantly better for collecting pertinent data in the SOCAL vs. HRC. For example, the sighting rate was ~5-6 sightings per hour of aerial effort in the primary SOCAL range vs. <1 sighting per hour in the offshore waters of the primary HRC SCC OPS area used in

2008-2009. Furthermore, the Bf was >4 for $>75\%$ of the SCC OPS aerial monitoring during Aug 2008 and Feb 2009 vs. Bf <4 for $>50\%$ of the SOCAL fall 2008 and summer 2009 MTE aerial survey (see Smultea and Mobley 2009; Smultea et al. 2009a,b,c).

- Focal follows should be conducted at altitudes of at least ~1200-1500 ft and radial distances of at least ~1 km (0.5 nm) to avoid and minimize the potential for focal animals to react to the aircraft. This is based on results of the limited available studies of a few cetacean species (mostly whales) as well as preliminary observations during this study and also the recent related results of aerial survey monitoring for the Navy in SOCAL (Smultea et al. 2009b,d). We recommend that the latter protocol be followed unless it can be statistically demonstrated that particular species do not exhibit detectable reactions to the aircraft at closer distances.
- Data collected during this study should be added to previous aerial survey data to permit assessment of any responses on the part of MM/ST to MFAS. These analyses will be important in developing and implementing effective marine mammal monitoring for future planned Navy activities identified for the HRC in the Navy's associated monitoring plans (DoN 2008).

Section 5 Acknowledgements

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Appendix A. Locations of Marine Mammal and Sea Turtle Sightings Made off Kauai and Niihau during the February 2009 SCC OPS during Aerial Monitoring Surveys.

Date	Time	Count	# Calves	Species Common	Species Latin	Lat °N	Long °W
8/26/09	14:14:13	1	0	Monk Seal	<i>Monachus schauinslandi</i>	21.94605	160.15157
8/26/09	14:14:31	1	0	Monk Seal	<i>Monachus schauinslandi</i>	21.94423	160.15746
8/26/09	14:15:32	1	0	Monk Seal	<i>Monachus schauinslandi</i>	21.92728	160.1893
8/26/09	14:18:33	2	0	Monk Seal	<i>Monachus schauinslandi</i>	21.87084	160.23619
8/26/09	14:19:56	7	0	Unidentified Dolphin, possible Spinner Dolphin	<i>Delphinidae</i> , possible <i>Stenella longirostris</i>	21.90682	160.21501
8/26/09	14:27:42	1	0	Monk Seal	<i>Monachus schauinslandi</i>	21.94411	160.15627
8/26/09	14:28:17	1	0	Monk Seal	<i>Monachus schauinslandi</i>	21.95229	160.14273
8/26/09	14:29:20	2	0	Unidentified Dolphin, possible Bottlenose Dolphin	<i>Delphinidae</i> , possible <i>Tursiops truncatus</i>	21.97758	160.12608
8/27/09	16:37:07	1	n/a	Unidentified Turtle	Unidentified sea turtle	22.2355	159.46454
8/28/09	08:00:35	50	unk.	Spinner Dolphin	<i>Stenella longirostris</i>	22.0031	159.7892
8/28/09	15:14:18	19 mixed	0	Rough-Toothed Dolphin (mixed with Pygmy Killer Whales below)	<i>Steno bredanensis</i>	21.90011	159.75417
		5 mixed	1	Pygmy Killer Whale (mixed with Rough-Toothed Dolphins above)	<i>Feresa attenuata</i>	21.90011	159.75417
8/29/09	10:40:08	5	1	Rough-Toothed Dolphin	<i>Steno bredanensis</i>	22 09.027	159 54.893
8/29/09	11:08:27	15	unk.	Unidentified Dolphin	<i>Delphinidae</i>	21 58.639	159 51.127
8/30/09	08:06:54	1	0	False Killer Whale	<i>Pseudorca crassidens</i>	22 11.466	160 01.201
8/30/09	08:56:37	2	0	Unidentified Dolphin	<i>Delphinidae</i>	22 07.549	160 10.449
8/30/09	09:11:59	12	1	Unidentified Dolphin, possible False Killer Whale	<i>Delphinidae</i> , possible <i>Pseudorca crassidens</i>	22 03.880	160 10.426
8/30/09	10:27:02	110	unk.	Spotted Dolphin	<i>Stenella attenuata</i>	22 05.666	160 28.860
8/30/09	10:48:48	1	0	Monk Seal	<i>Monachus schauinslandi</i>	21 54.408	160 13.437
8/30/09	11:11:15	1	0	Monk Seal	<i>Monachus schauinslandi</i>	21 52.437	160 14.940

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Appendix B. Summary of Behavioral Observations of All Marine Mammal and Sea Turtle Sightings made during the February 2009 SCC OPS aerial monitoring survey off Kauai, Hawaii. (Grp=group, ID=identification, Behav.=behavior, Hdg=heading, mg=magnetic, Min=minimum, Max=maximum, Disp.= dispersal distance between next closest individual in group or subgroup, BL=body lengths, Trav=travel, SAC=surface-active, Unid=unidentified, Bf=Beaufort sea state, Mixed = mixed species group.)

2009 Date	Time	Grp. ID #	Focal Follow?	Grp. Size	# Calif	Species	Reaction/Change in Behavior?	Initial Behavior. State	Other Behavior. States	Anim Hdg (mg)	Min. Disp. (BL)	Max. Disp. (BL)	Photos?	Video?	Comments
26-Aug	14:14:13	1	N	1	0	Monk Seal	No	Hauled Out	Rest	n/a	n/a	n/a	No	No	
26-Aug	14:14:31	2	N	1	0	Monk Seal	No	Hauled Out	Rest	n/a	n/a	n/a	No	No	
26-Aug	14:15:32	3	N	1	0	Monk Seal	No	Hauled Out	Rest	n/a	n/a	n/a	No	No	
26-Aug	14:18:33	4	N	2	0	Monk Seal	No	Hauled Out	Rest	n/a	1	1	No	No	
26-Aug	14:19:56	5	N	7	0	Unid, Dolphin	No	Mill		n/a	1	15	No	No	Possible spinner dolphin
26-Aug	14:27:42	6	N	1	0	Monk Seal	No	Hauled Out		n/a	n/a	n/a	No	No	
26-Aug	14:28:17	7	N	1	0	Monk Seal	No	Hauled Out		n/a	n/a	n/a	No	No	
26-Aug	14:29:20	8	N	2	0	Unid, Dolphin	No	Travel		200	1	1	No	No	Possible bottlenose dolphin
27-Aug	16:37:07	9	N	1	n/a	Unid, Turtle	No	Resting		n/a	n/a	n/a	No	n/a	
28-Aug	08:00:35	10	N	50	n/a	Spinner Dolphin	Yes/Change in Behavior or State	SAC Mill	SAC Travel	120	1	3	No	No	Changed to SAC travel
28-Aug	15:14:18	11	N	19 Mixed	0	Rough-Toothed Dolphin	Yes/Change in Behavior or State	Travel		300	1	1	Yes	No	Behavioral change was animals staying down more. Mixed group with pygmy killer whales seen at same time.
29-Aug	10:40:08	12	N	5	1	Rough-Toothed Dolphin	No	Mill		n/a	1	20	Yes	No	Feeding observed.
29-Aug	11:08:27	13	N	15	n/a	Unid, Dolphin	No	Mill		n/a	1	6	No	n/a	Unable to circle due to airspace restriction.
30-Aug	08:06:54	14	N	1	0	False Killer Whale	No	Travel		350	n/a	n/a	Yes	No	One photo showing possible fish in mouth underwater.

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30-Aug	08:56:37	15	N	2	0	Unid, Dolphin	No	Travel		180	1	1	No	No	
30-Aug	09:11:59	16	N	12	1	Unid, Dolphin	No	Travel		90	1	5	Yes	No	Bird associated, possibly false killer whales, photos seem to show blunt nose, dorsal suggest false killer, pygmy killer, or melon headed but body size and group size would indicate false killer most likely.
30-Aug	10:27:02	17	N	110	n/a	Spotted Dolphin	No	SAC Travel		180	1	4	Yes	No	
30-Aug	10:48:48	18	N	1	0	Monk Seal	No	Hauled Out	Rest	n/a	n/a	n/a	No	n/a	Observed on beach
30-Aug	11:11:15	19	N	1	0	Monk Seal	No	Hauled Out	Rest	n/a	n/a	n/a	No	No	Observed on beach