Acoustic and Visual Survey of Cetaceans at Palmyra Atoll

Trip report 06/2010

Palmyra, June 2 – June 23, 2010

Jason P Larese
Mark Deakos
Contact: sbaumann@ucsd.edu, jhildebrand@ucsd.edu

Scripps Institution of Oceanography
Marine Physical Laboratory

Summary (Trip Period: June 2 – June 23, 2010)

1. HARP Recovery / Deployment

The high-frequency acoustic recording package (HARP), which had been deployed off the northeast shore of the atoll, was recovered on June 3, 2010. This instrument started recording on October 3, 2009, located at position 05˚ 53.719' N 162˚ 02.229' W in 718 m of water. Data recording had ended at the time of recovery and preliminary analysis of the data showed good data quality.

By June 10, 2010 the instrument was refurbished and was redeployed at almost the same location. The new position is 05˚ 53.690' N 162˚ 02.224' W at a depth of 700 m. New circuit boards were installed that utilize data compression to allow for greater data recording. The instrument was again set to sample at a frequency of 200 kHz, but with recording being continuous instead of intermittent. The instrument is configured with 16 hard drives with a capacity of 120 GB each, or a total of 1.92 TB data storage. Recording was programmed to begin at 12 am GMT on 12 June 2010. Recording should continue for approximately 110 days, or almost 4 months, at which point there will be no available hard disk space or the battery capacity will drop below the required voltage. The HARP instrument – including hydrophone, datalogger, battery, and acoustic release components – was configured into a small mooring with glass spheres (i.e. flotation) and barbell weights (i.e. ballast weight), so that hand deployment from a small vessel such as *Zenobia* was feasible (Figure 1).

2. Cetacean Survey and Acoustic Recording

In addition to refurbishing the HARP, visual surveys were conducted to obtain species identification and numbers. Photographs, biopsy samples, and acoustic recordings were taken for certain species when conditions allowed. The focus of the survey effort was on the unidentified beaked whale (*Mesoplodon sp*.) known to frequent the nearshore waters.

The trip was originally scheduled to take place from 26 May – 9 June 2010, however, due to aircraft equipment problems the flight to Palmyra did not occur until 2 June. The return was pushed back from 9 June to the next scheduled flight on 23 June to allow enough time for survey effort.

During the three weeks on the atoll, a total of 87 hours of boat time was logged on the *R/V Zenobia* of which 74 hours were on effort (Figure 2). Most days were at least a Beaufort 3 or 4, although there was some time at level 2 on the scale. Due to the prevalent southerly swell direction, the best survey conditions occurred in the lee off of the north side of the atoll. Rain dominated conditions during this trip. Several days were lost to rain with totals of about 34" falling during the month and one 12 hour period recording 9" of precipitation. Tracklines often veered to avoid squalls.

A total of 88 cetacean sightings were made (Table 1). These included one beaked whale (*Mesoplodon sp*.,. Figure 3), 74 bottlenose dolphin (*Tursiops truncates*, Figure 4), six spinner dolphin (*Stenella longirostris,* Figure 5), and seven melon-headed whales (*Peponocephala electra*, Figure 6).

The beaked whale sighting took place north of Strawn Island (Figure 3) in the same general location where sightings occurred in the fall 2009 trip. For this reason and also because of favorable weather conditions, most survey effort focused in this area. The vessel remained on site after the initial sighting for an additional hour in an attempt to resight the whale. No photos were obtained. The low number of beaked whale sightings correlates with the low acoustic detection rate by the HARP during this time of year. The low sighting rate provides support that the animals may use different areas of the atoll during different times of the year or, more likely, may move away from the atoll entirely for parts of the year..

The group size for the 55 bottlenose dolphin encounters ranged from one to 50 animals and averaged six animals. These groups were sighted around the entire atoll (Figure 4). Thirty-seven biopsies were obtained as well as photos.

Spinner dolphins were encountered primarily over and next to the reefs at the east and west ends of the above water areas of the atoll (Figure 5). The group size for the six sightings ranged from 2 to 200 and averaged 80 dolphins. Because of the large swell usually present over the ends of the reefs, photos were difficult to obtain and only two biopsies were obtained.

Unlike the previous trip in the fall of 2009 where no melon-headed whales were sighted, on this trip they were sighted seven times with a best estimate of group size about 70 individuals (Figure 6). Besides photos, 19 biopsies were obtained.

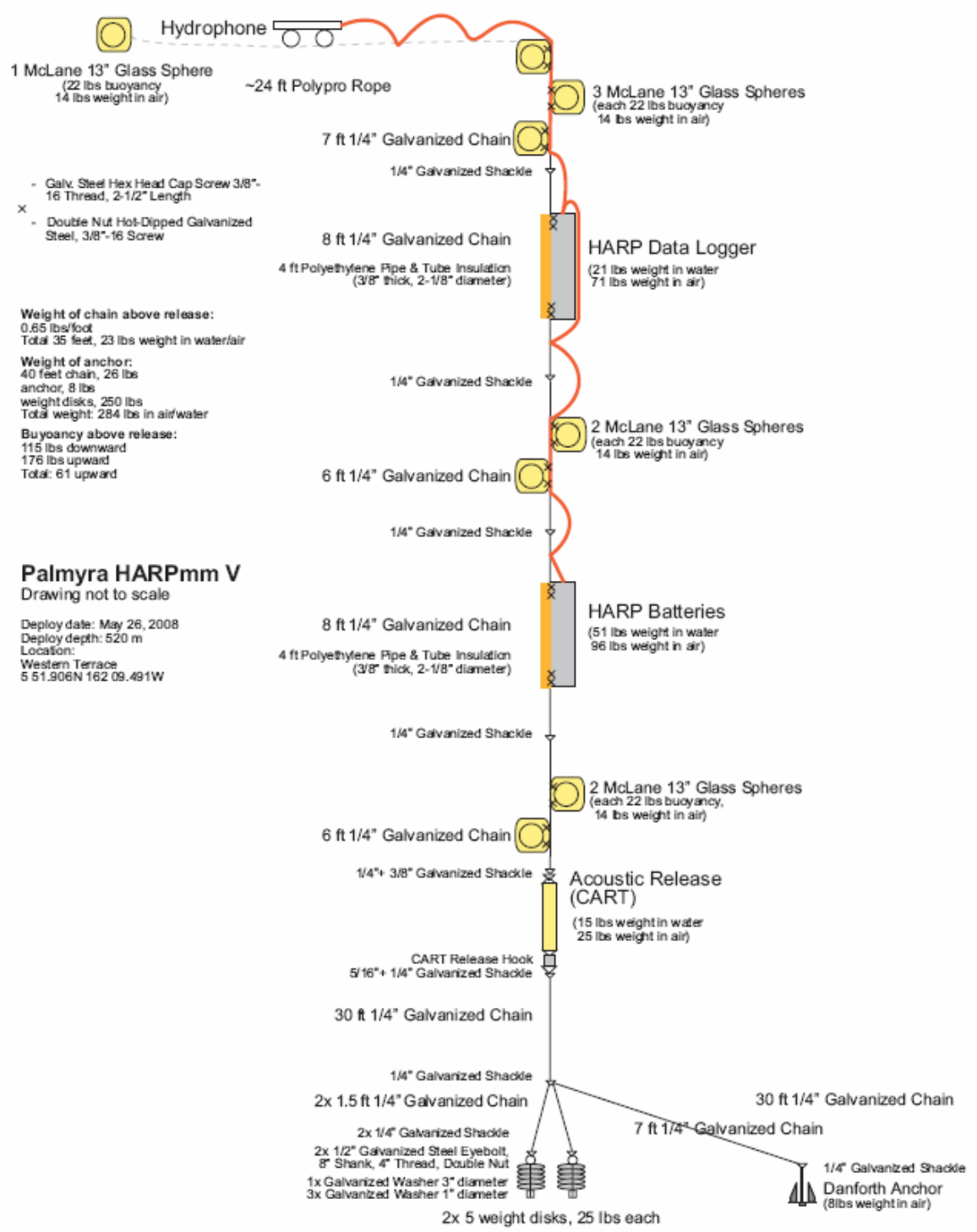

Figure 1. HARP mooring configuration.

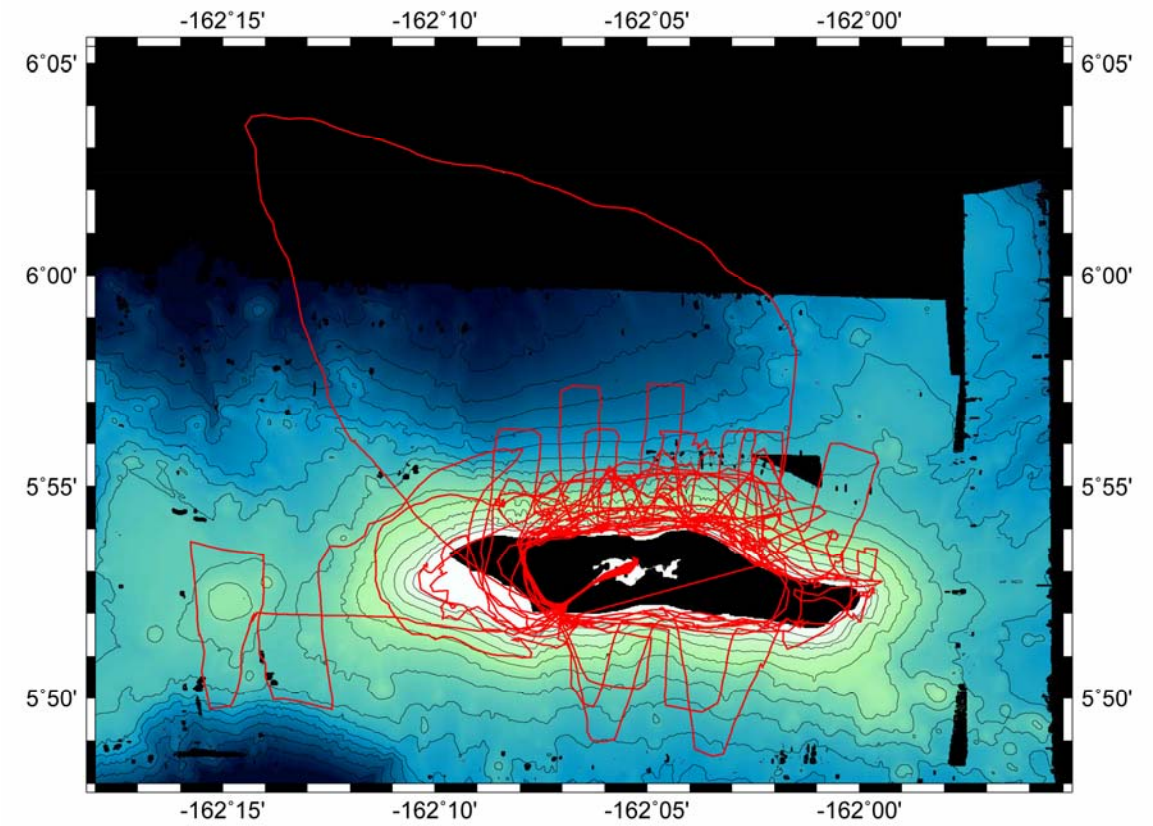

Figure 2. Surveyed tracklines (red) for all 74 hours of effort. Bathymetry lines every 200 m. Black indicates areas with no depth data.

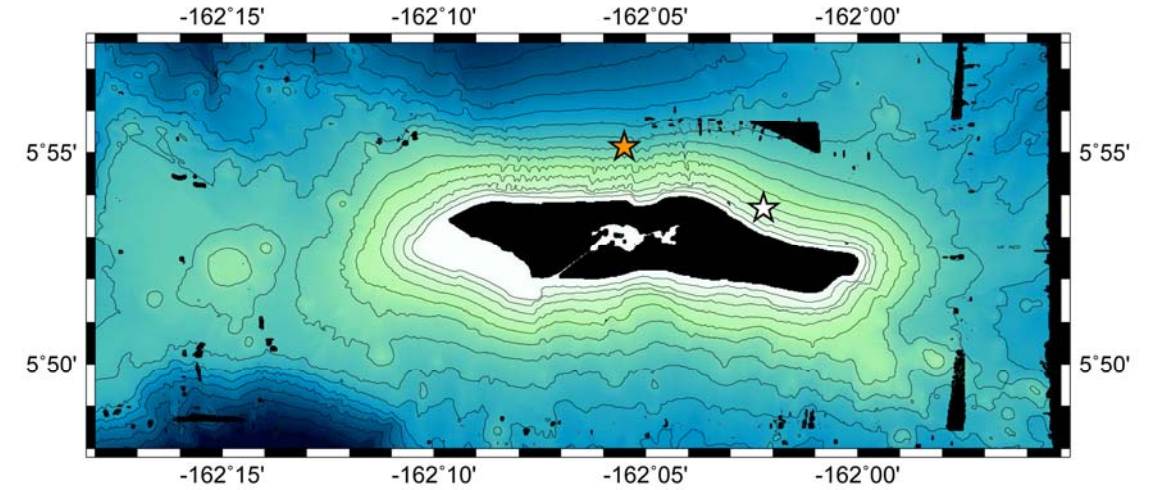

Figure 3. Sighting location of beaked whale (orange star) and HARP location (white star). Bathymetry lines every 200 m. Black indicates areas with no depth data.

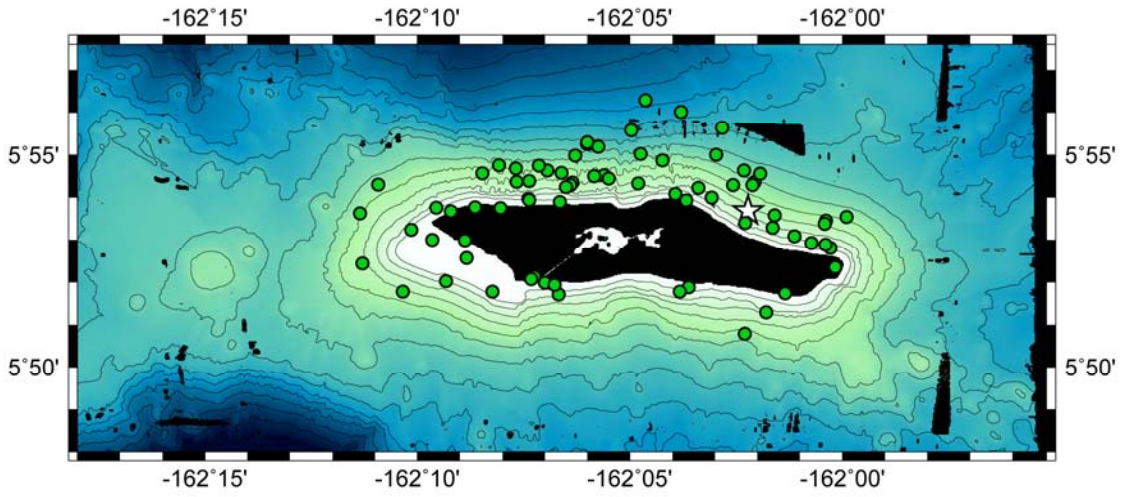

Figure 4. Sighting location of bottlenose dolphins (green dots) and HARP location (white star). Bathymetry lines every 200 m. Black indicates areas with no depth data.

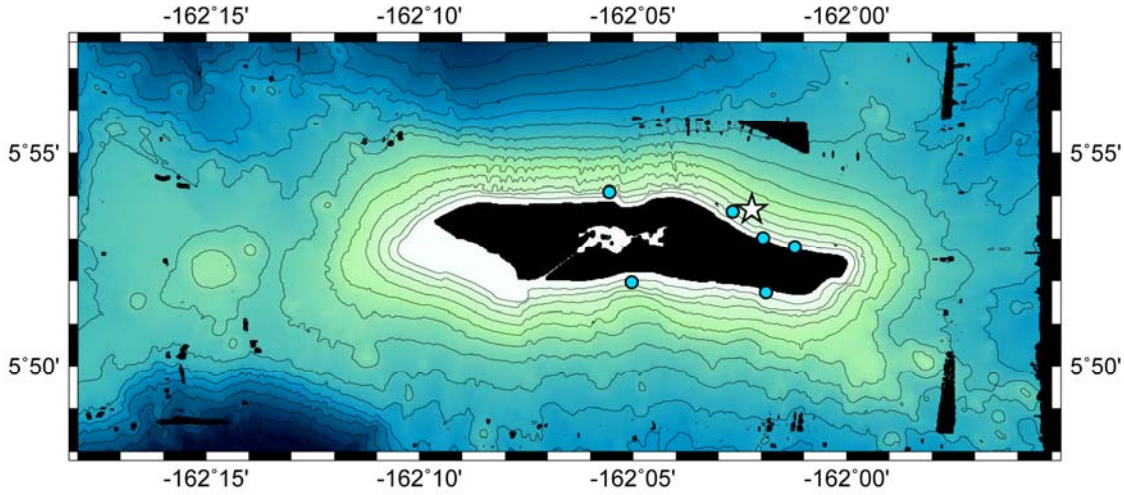

Figure 5. Sighting locations of spinner dolphins (blue dots) and HARP location (white star). Bathymetry lines every 200 m. Black indicates areas with no depth data.

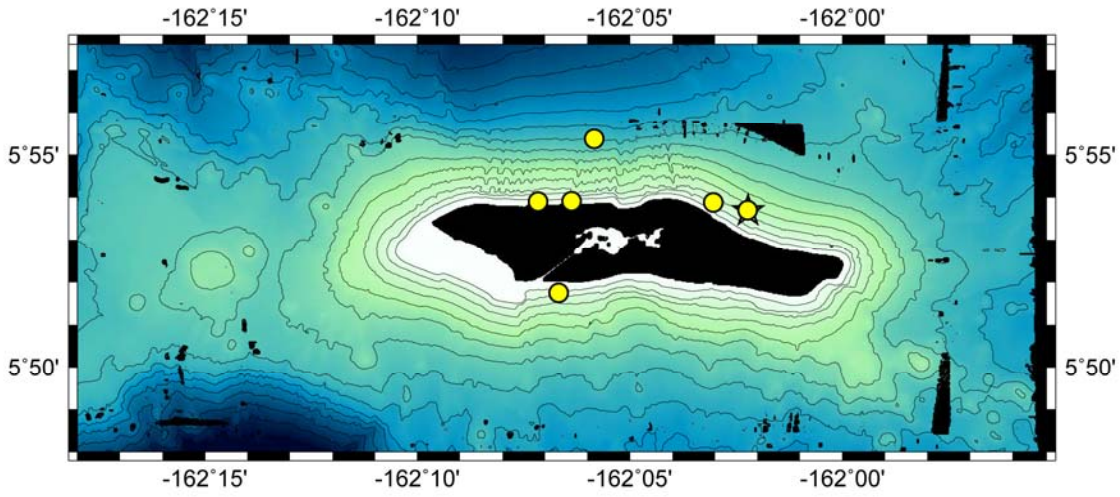

Figure 6. Sighting locations of melon-headed whales (yellow dots) and HARP location (white star). Bathymetry lines every 200 m. Black indicates areas with no depth data.

Table 1. Date, location, species, and group size estimates for all sightings.

Palmyra date and time	Latitude	Longitude	Species Short List	Min Count	Max Count	Best Count
06/03/2010 10:40:00	5.5368	-162.0231	Melon-Headed Whales	60	100	80
06/05/2010 11:15:00	5.8882	-162.0273	Bottlenose Dolphin	9	12	10
06/05/2010 11:55:00	5.9038	-162.0565	Bottlenose Dolphin	5	5	5
06/05/2010 12:31:00	5.9059	-162.1059	Bottlenose Dolphin	5	5	5
06/05/2010 12:50:00	5.8996	-162.1232	Bottlenose Dolphin	6	12	8
06/06/2010 10:07:17	5.8873	-162.1691	Bottlenose Dolphin	2	3	5
06/06/2010 10:34:37	5.9065	-162.1228	Bottlenose Dolphin	2	2	2
06/06/2010 12:56:43	5.9095	-162.1412	Bottlenose Dolphin	1	1	1
06/06/2010 13:50:37	5.9015	-162.0655	Bottlenose Dolphin	30	50	40
06/06/2010 15:07:30	5.8801	-162.0202	Spinner Dolphin	2	2	2
06/06/2010 16:17:37	5.9017	-162.0926	Spinner Dolphin	80	100	90
06/07/2010 09:48:13	5.8670	-162.1554	Bottlenose Dolphin	6	6	6
06/07/2010 10:45:39	5.8834	-162.1609	Bottlenose Dolphin	6	8	7
06/07/2010 11:07:42	5.8961	-162.1593	Bottlenose Dolphin	4	4	4
06/07/2010 11:21:59	5.8762	-162.1473	Bottlenose Dolphin	5	5	5
06/07/2010 11:40:51	5.8618	-162.1112	Bottlenose Dolphin	3	3	3
06/10/2010 14:45:55	5.8802	-162.0047	Bottlenose Dolphin	8	12	9
06/10/2010 15:18:32	5.8925	-161.9984	Bottlenose Dolphin	2	2	2
06/10/2010 15:39:33	5.8910	-162.0064	Bottlenose Dolphin	3	3	3
06/10/2010 15:53:54	5.8822	-162.0121	Bottlenose Dolphin	1	1	1
06/10/2010 16:33:43	5.8931	-162.0266	Bottlenose Dolphin	2	2	2
06/10/2010 17:56:12	5.9098	-162.1101	Bottlenose Dolphin	5	8	7
06/10/2010 18:16:58	5.8688	-162.1208	Bottlenose Dolphin	5	5	5
06/11/2010 09:36:48	5.8832	-162.1480	Bottlenose Dolphin	2	2	2
06/11/2010 09:40:50	5.8962	-162.1440	Bottlenose Dolphin	1	1	1
06/11/2010 10:02:47	5.8987	-162.1062	Melon-Headed Whales	60	120	70
06/11/2010 11:38:59	5.8991	-162.1228	Bottlenose Dolphin	1	1	1
06/11/2010 11:53:46	5.9087	-162.0936	Bottlenose Dolphin	1	1	1
06/11/2010 12:35:00	5.8898	-162.0069	Bottlenose Dolphin	1	1	1
06/11/2010 13:26:22	5.9060	-162.0345	Bottlenose Dolphin	12	17	13
06/11/2010 14:28:16	5.8849	-162.0188	Bottlenose Dolphin	1	1	1
06/11/2010 14:33:07	5.8815	-162.0066	Bottlenose Dolphin	1	1	1
06/11/2010 14:52:33	5.8548	-162.0299	Bottlenose Dolphin	2	2	2
06/12/2010 11:02:54	5.8984	-162.1194	Melon-Headed Whales	65	85	75
06/12/2010 11:37:31	5.8983	-162.1108	Bottlenose Dolphin	8	10	8
06/12/2010 12:35:29	5.9050	-162.1067	Bottlenose Dolphin	2	2	2
06/12/2010 12:45:20	5.9075	-162.0917	Bottlenose Dolphin	8	8	8
06/12/2010 12:54:34	5.9056	-162.0800	Bottlenose Dolphin	1	1	1
06/12/2010 13:21:46	5.9049	-162.0428	Bottlenose Dolphin	18	25	20
06/12/2010 14:20:29	5.9266	-162.0828	Bottlenose Dolphin	5	5	5
06/12/2010 14:32:13	5.9212	-162.0995	Bottlenose Dolphin	1	1	1
06/12/2010 14:52:34	5.9127	-162.1347	Bottlenose Dolphin	5	5	5
06/12/2010 15:23:45	5.9052	-162.1820	Bottlenose Dolphin	2	2	2
06/12/2010 15:31:55	5.8939	-162.1892	Bottlenose Dolphin	4	4	4
06/12/2010 15:42:04	5.8741	-162.1882	Bottlenose Dolphin	1	1	1

Table 2 continued. Date, location, species, and group size estimates for all sightings.

Palmyra date and time	Latitude	Longitude	Species Short List	Min Count	Max Count	Best Count
06/14/2010 12:54:09	5.8960	-162.1341	Bottlenose Dolphin	2	2	2
06/14/2010 13:01:49	5.9115	-162.1281	Bottlenose Dolphin	3	3	3
06/14/2010 13:14:04	5.9107	-162.1157	Bottlenose Dolphin	3	3	3
06/14/2010 13:27:48	5.9211	-162.1002	Bottlenose Dolphin	7	9	8
06/14/2010 14:27:45	5.9106	-162.0386	Bottlenose Dolphin	10	14	12
06/14/2010 14:36:05	5.8951	-162.0372	Melon-Headed Whales	45	65	50
06/14/2010 16:21:43	5.9049	-162.0352	Bottlenose Dolphin	7	7	7
06/14/2010 16:33:25	5.8982	-162.0507	Melon-Headed Whales	75	150	100
06/14/2010 17:44:26	5.9084	-162.0973	Bottlenose Dolphin	25	30	20
06/15/2010 10:33:06	5.9126	-162.1191	Bottlenose Dolphin	2	2	2
06/15/2010 12:18:45	5.9146	-162.0706	Bottlenose Dolphin	12	18	15
06/15/2010 15:14:24	5.8662	-162.0839	Spinner Dolphin	120	200	180
06/15/2010 16:23:52	5.8665	-162.1166	Bottlenose Dolphin	2	2	2
06/16/2010 09:19:28	5.8629	-162.1724	Bottlenose Dolphin	9	9	9
06/16/2010 13:05:19	5.8947	-162.1535	Bottlenose Dolphin	1	1	1
06/16/2010 13:57:38	5.8647	-162.0603	Bottlenose Dolphin	2	2	2
06/16/2010 14:41:38	5.8622	-162.0314	Spinner Dolphin	10	10	10
06/16/2010 15:00:46	5.8464	-162.0382	Bottlenose Dolphin	1	1	1
06/17/2010 15:08:43	5.8679	-162.1221	Bottlenose Dolphin	2	2	2
06/17/2010 15:26:52	5.9042	-162.1084	Bottlenose Dolphin	5	8	6
06/17/2010 16:28:49	5.8990	-162.0613	Bottlenose Dolphin	3	3	3
06/17/2010 16:48:11	5.8836	-162.0325	Spinner Dolphin	19	32	28
06/18/2010 17:12:38	5.9231	-162.0974	Melon-Headed Whales	75	150	80
06/19/2010 09:11:22	5.8656	-162.1128	Bottlenose Dolphin	1	1	1
06/19/2010 09:38:42	5.8629	-162.0637	Bottlenose Dolphin	2	2	2
06/19/2010 10:00:39	5.8623	-162.0225	Bottlenose Dolphin	4	4	4
06/19/2010 10:25:10	5.8727	-162.0028	Bottlenose Dolphin	20	28	24
06/19/2010 11:58:33	5.8901	-162.0381	Bottlenose Dolphin	5	7	6
06/19/2010 14:11:07	5.9189	-162.0918	Beaked Whale	2	2	2
06/19/2010 15:04:26	5.9217	-162.1001	Bottlenose Dolphin	2	2	2
06/19/2010 15:45:51	5.9166	-162.1047	Bottlenose Dolphin	1	1	1
06/20/2010 09:14:37	5.8630	-162.1372	Bottlenose Dolphin	3	4	3
06/20/2010 10:20:27	5.9063	-162.1277	Bottlenose Dolphin	7	7	7
06/20/2010 11:37:54	5.9201	-162.0957	Bottlenose Dolphin	3	3	3
06/20/2010 12:03:23	5.9172	-162.0791	Bottlenose Dolphin	5	5	5
06/20/2010 12:23:07	5.9383	-162.0773	Bottlenose Dolphin	3	4	3
06/20/2010 12:36:13	5.9337	-162.0633	Bottlenose Dolphin	12	18	14
06/20/2010 13:35:18	5.9274	-162.0471	Bottlenose Dolphin	1	1	1
06/20/2010 13:59:31	5.9094	-162.0322	Bottlenose Dolphin	3	3	3
06/20/2010 14:23:43	5.9168	-162.0495	Bottlenose Dolphin	17	19	17
06/20/2010 15:10:04	5.8941	-162.0444	Spinner Dolphin	150	200	175
06/20/2010 15:30:54	5.9000	-162.0512	Bottlenose Dolphin	5	5	5
06/20/2010 16:44:31	5.8625	-162.1112	Melon-Headed Whales	50	10	70