

Acoustic and Visual Survey of Cetaceans at Palmyra Atoll

Trip report 08/2006

Palmyra, July 18 – August 9, 2006

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Summary

1. HARP Recovery/Refurbishment

The high-frequency acoustic recording package (HARP) deployed last September off the north-western outer reef at 05 54' 6"N 162 7' 12"W in 500 m of water could not be recovered and therefore was not refurbished. The first attempt on Friday July 21, 2006 and two further attempts at recovery showed that the instrument's position is not where it was deployed and probably was moved both by current and more drastically by steep topography in the area of the deployment. The new position was determined to be approx. 05 54' 205"N 162 07' 488"W at a water depth of 700 m. The change of position is equivalent to a distance of 0.6636 nautical miles (0.7636 statute miles).

The acoustic release on the instrument package was successfully enabled and responded appropriately to both interrogation pings and release commands. However the instrument never lifted free from the seafloor even after numerous attempts and different iterations. At the end of each operation the acoustics were disabled to maintain battery life for possible efforts later. Reasons for the failure are currently being assessed and will be considered both in potential future attempts at recovery as well as in a new instrument design for this area.

2. Cetacean Survey and Acoustic Recording

During the three week cetacean survey at Palmyra Atoll we went out to sea about two days per week due to weather conditions and boat sharing time. Most survey effort had to be spent at the North side of the atoll since rough seas prevented good survey conditions at the south. The vessel used was 25 ft long, traveling at a speed of about 8-15 knots. When the hydrophone array was deployed survey speed was between 1 and 7 knots. The total traveling distance within 40 hours of survey was approximately 135 miles. For further details please see the chart "Survey Effort".

We had a total number of 22 encounters. There were 5 long encounters with melon-headed whales (*Peponocephala electra*), 11 encounters with bottlenose dolphins (*Tursiops truncatus*), 2 very brief sightings of spinner dolphins (*Stenella longirostris*), 1 possible beaked whale sighting and 3 sightings of unidentified dolphins.

The time spent with the melon-headed whales (*Peponocephala electra*) summed up to 280 minutes resulting in 190 minutes of recordings. The melon-headed whales were in large numbers of hundreds of whales mostly milling and socially interacting with each other. Only fewer animals were curious enough to approach our vessel to bowride and showed particular interest in the array towed behind us. We observed the rest of the group rather passive, occasionally with mother-calf interactions, spyhops, tailslaps, etc. (please see detailed notes at sighting table). The groups we observed were stretched over about a mile in loose aggregation. They formed clusters of two to eight individuals swimming very close to each other and interacting with each other.

In contrast during the 250 minutes spent with the bottlenose dolphins (*Tursiops truncatus*), giving 150 minutes of recordings, these animals were in smaller groups of a few animals up to bigger groups of 30 to 50 animals. In the last two sightings off the north shore and western terrace over deep waters the adult bottlenose dolphins were very much larger and robust than what we usually had seen on the western terrace, our main encounter area up to this point. This implies that it might have been a group of oceanic bottlenose dolphins passing through these waters. In general the dolphins were in loose aggregations with no obvious clusters and showed a strong interest in the research vessel. They approached it, were bowriding, wakeriding, leaping, jumping, etc. (see notes in sighting table) and the whole group was changing their traveling behavior according to the heading and speed of the boat.

There has possibly been a beaked whale observation (sighting 11) off the north shore. The very brief sighting of the dorsal fin, head, blow and fairly passive surfacing behavior indicates a beaked whale, suggesting the more common Cuvier's beaked whale.

We only had brief and distant encounters with spinner dolphins (*Stenella longirostris*). They never approached our vessel and we were not able to get recordings and more precise behavioral observations of this species.

Sightings

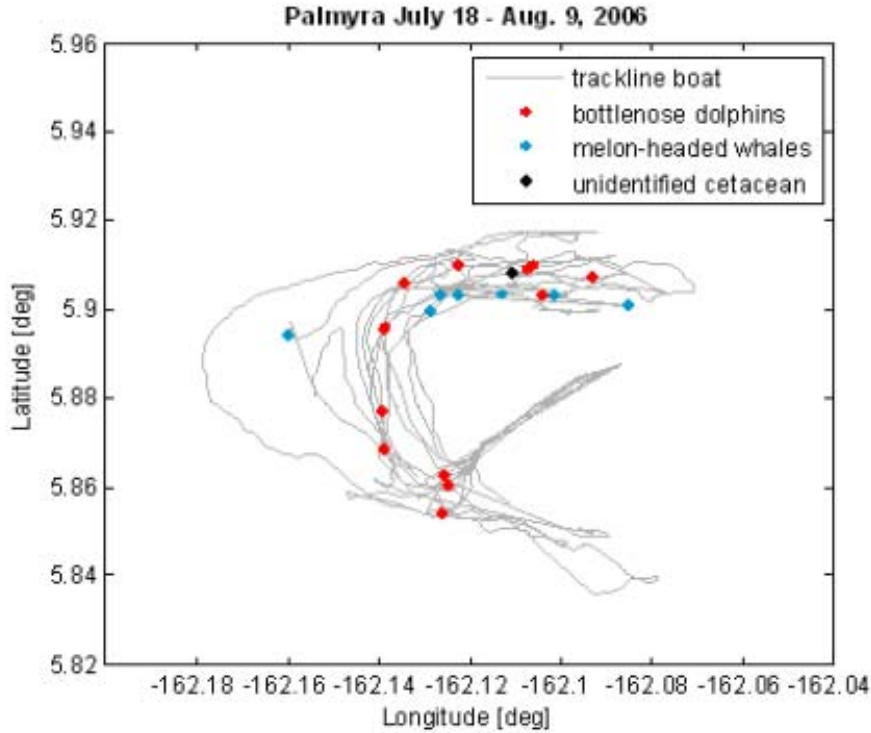


Figure 1: Total survey effort and sightings throughout July 18 to August 9, 2006 with approx. 135 miles of survey track.

of encounters:

melon-headed whales – 5

bottlenose dolphins – 11

unidentified cetacean, possibly beaked whale – 1

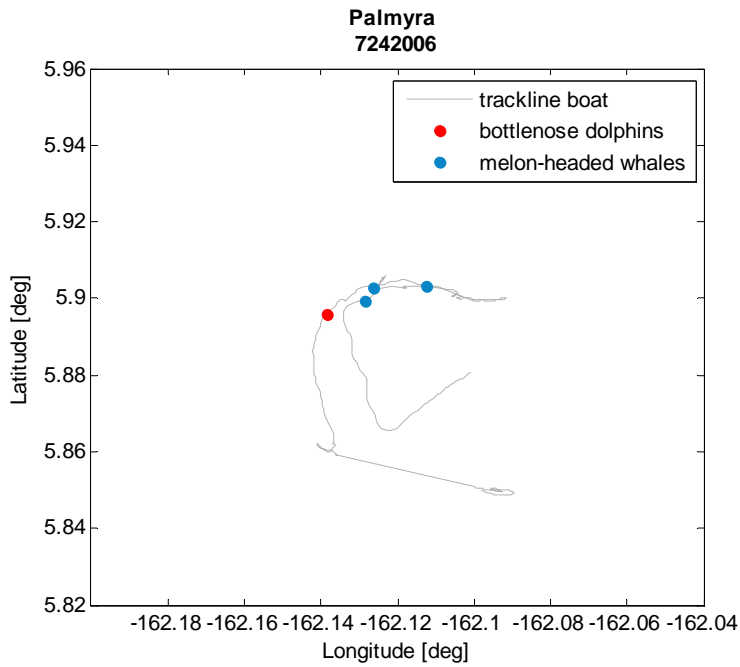


Figure 2: Survey track on July 24, 2006 with 1 encounter with bottlenose dolphins, 3 encounters with melon-headed whales.

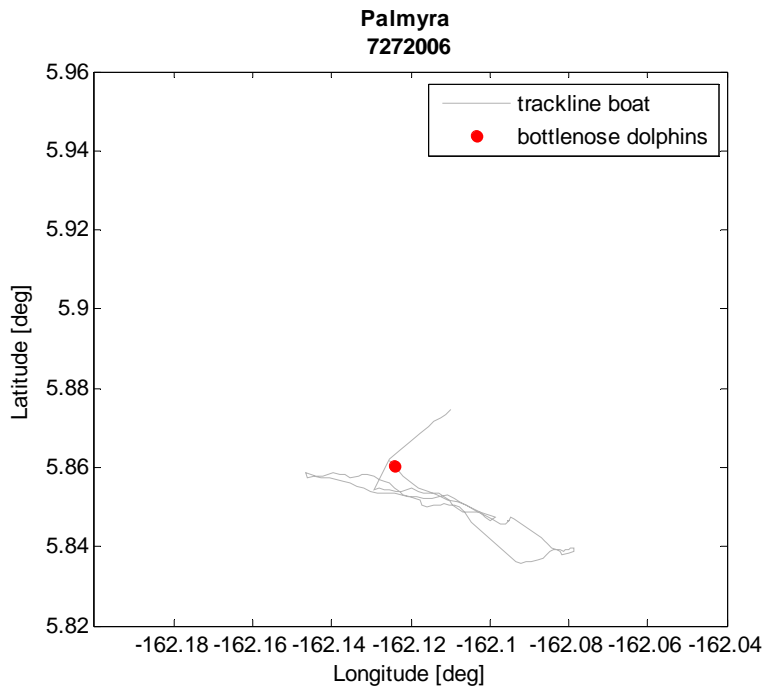


Figure 3: Survey track on July 27, 2006 with 1 encounter with bottlenose dolphins.

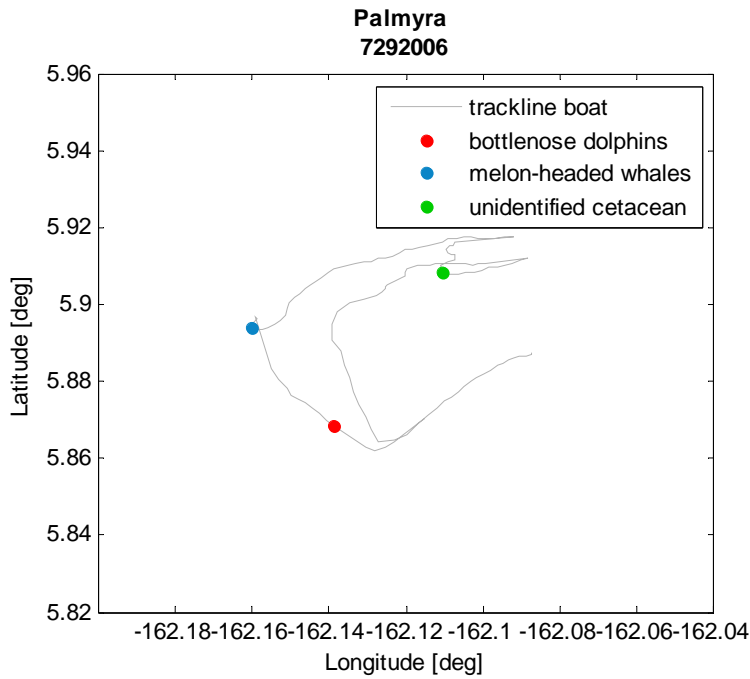


Figure 4: Survey track on July 29, 2006 with 1 encounter with bottlenose dolphins, 1 encounter with melon-headed whales and 1 encounter with an unidentified cetacean, possibly beaked whale.

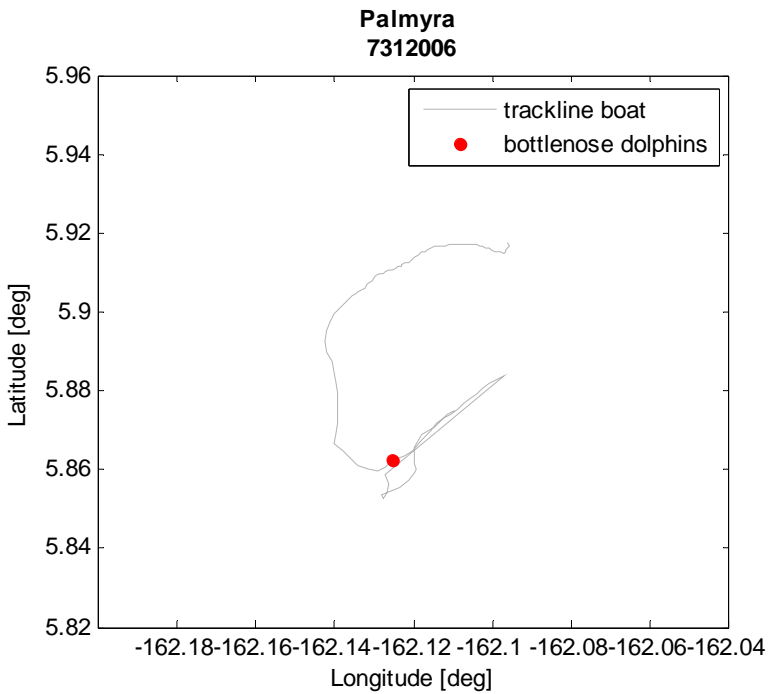


Figure 5: Survey track on July 31, 2006 with 1 encounter with bottlenose dolphins.

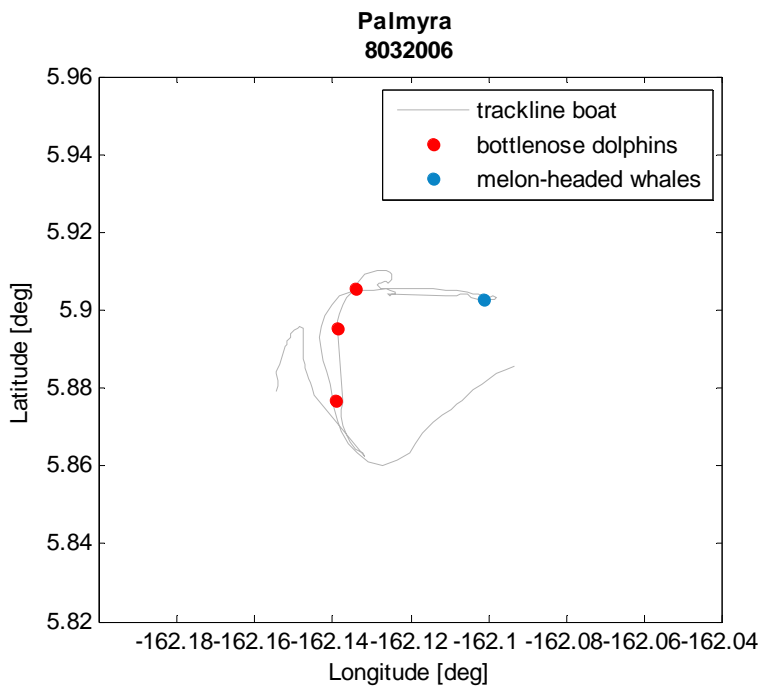


Figure 6: Survey track on August 3, 2006 with 3 encounters with bottlenose dolphins, 1 encounter with melon-headed whales.

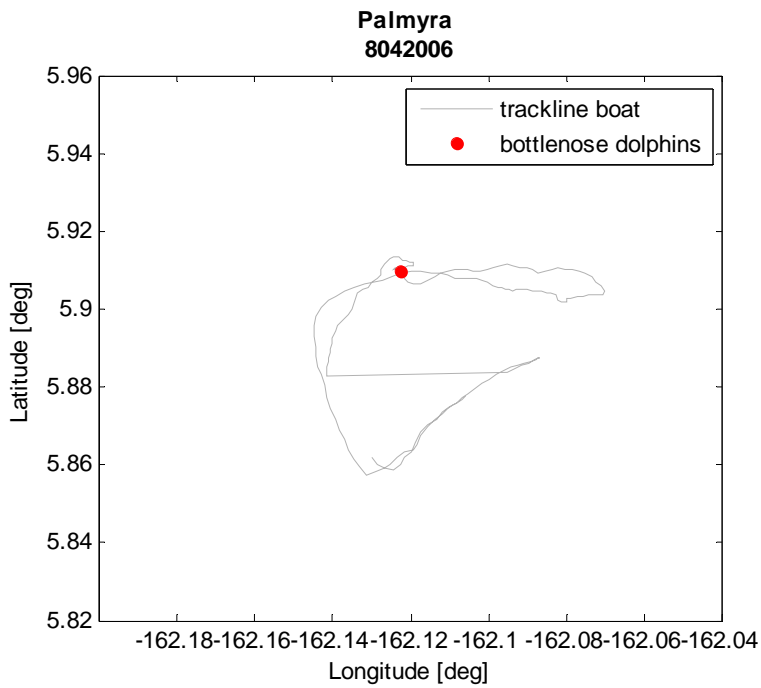


Figure 7: Survey track on August 4, 2006 with 1 encounter with bottlenose dolphins.

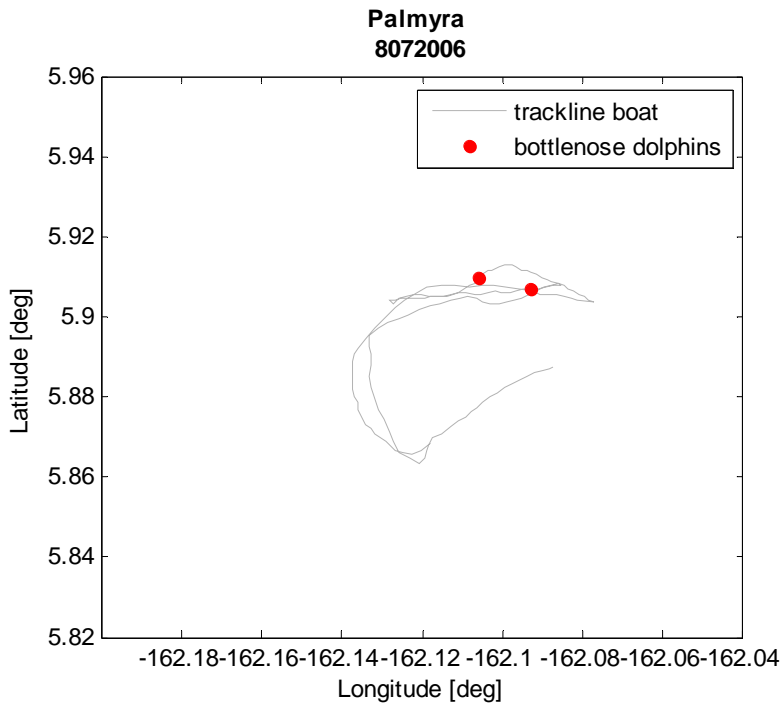


Figure 8: Survey track on August 7, 2006 with 2 encounters with bottlenose dolphins.

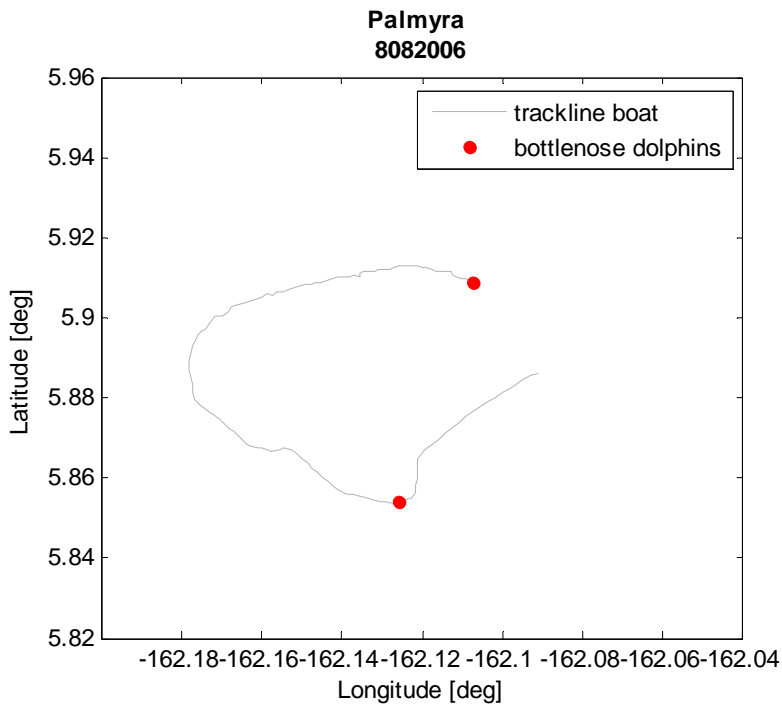


Figure 9: Survey track on August 8, 2006 with 2 encounters with bottlenose dolphins.

Table 1: Sightings

Sighting No	GMT Time	End Time (GMT)	Sighting Duration [min]	Recording	Palmyra Date	Palmyra Time	Latitude	Longitude
Friday July 21, 2006								
1	7/21/2006 7:15:00 PM	7:18:00 PM	3	no	7/21/2006	9:15:00 AM	5.902777	-162.1219
2	7/21/2006 9:37:00 PM	10:10:00 PM	33	no	7/21/2006	11:37:00 AM	5.902777	-162.1222
Resighting 2	7/22/2006 12:20:00 AM	2:00:00 AM	100	yes	7/21/2006	2:20:00 PM	5.900556	-162.0847
3	7/22/2006 2:02:00 AM	2:20:00 AM	18	no	7/21/2006	4:02:00 PM	5.903055	-162.1036
Monday July 24, 2006								
4	7/24/2006 7:13:47 PM	7:15:58 PM	2	no	7/24/2006	9:13:57 AM	5.867366	-162.119
5	7/24/2006 7:25:48 PM	7:27:16 PM	2	no	7/24/2006	9:25:57 AM	5.899483	-162.1285
6	7/24/2006 8:09:17 PM	8:38:34 PM	29	yes	missing exact GPS 7/24/2006	10:23:15 AM	5.902916	-162.1263
Resighting 6	7/24/2006 9:09:12 PM	9:58:29 PM	49	yes	7/24/2006	11:09:12 AM	5.9032	-162.1125
7	7/24/2006 10:21:34 PM	10:25:22 PM	4	yes	7/24/2006	12:21:34 PM	5.895867	-162.1384
Thursday July 27, 2006								
8	7/27/2006 11:32:59 PM	11:43:43 PM	11	no	7/27/2006	1:32:59 PM	5.860433	-162.1243
9	7/27/2006 11:43:50 PM	11:44:27 PM	1	yes	7/27/2006	1:44:20 PM	5.847684	-162.1014
10	7/28/2006 12:18:45 AM	12:43:03 AM	25	no	7/27/2006	2:18:33 PM	5.839333	-162.0841
Saturday July 29, 2006								
11	7/29/2006 8:30:25 PM	9:32:52 PM	62	yes	7/29/2006	10:30:01 AM	5.908117	-162.1107
12	7/29/2006 10:13:06 PM	10:31:54 PM	18	yes	7/29/2006	12:13:22 PM	5.8938	-162.1599
13	7/29/2006 10:33:12 PM	10:34:24 PM	1	no	7/29/2006	12:32:43 PM	5.880517	-162.1531
14	7/29/2006 10:43:45 PM	10:44:21 PM	1	no	7/29/2006	12:40:43 PM	5.868384	-162.1386
Monday July 31, 2006								
15	7/31/2006 11:21:51 PM	11:23:44 PM	2	yes	7/31/2006	1:21:32 PM	5.862317	-162.1253
Thursday August 3, 2006								
16	8/3/2006 11:14:53 PM	12:05:23 AM	50	yes	8/3/2006	1:14:46 PM	5.90295	-162.1012
17	8/4/2006 12:29:02 AM	12:30:08 AM	1	no	8/3/2006	2:29:30 PM	5.905667	-162.1343
18	8/4/2006 12:43:03 AM	12:43:36 AM	1	yes	8/3/2006	2:34:30 PM	5.895333	-162.1387
Resighting 18	8/4/2006 1:10:04 AM	1:49:32 AM	39	yes	8/3/2006	3:10:04 PM	5.8769	-162.1392
Friday August 4, 2006								
19	8/4/2006 9:04:18 PM	9:17:09 PM	13	yes	8/4/2006	11:04:07 AM	5.9095	-162.1225
Monday August 7, 2006								
20	8/7/2006 11:32:51 PM	11:39:03 PM	6	no	8/7/2006	1:32:51 PM	5.907067	-162.093
21	8/8/2006 12:08:52 AM	1:02:42 AM	54	yes	8/7/2006	2:08:52 PM	5.9095	-162.106
Tuesday August 8, 2006								
22	8/8/2006 11:28:56 PM	12:30:53 PM	62	yes	8/8/2006	1:28:56 PM	5.853867	-162.1257
Resighting 22	8/9/2006 1:54:16 AM	2:31:00 AM	37	yes	8/8/2006	3:54:16 PM	5.9088	-162.1072

Species	# animals best	# animals high	# animals low	Reticle	Bearing	Ship Heading [deg]	Distance [m]	Juveniles	Calves Newborn	Calves Older	Behaviour1	Behaviour2
<i>Stenella longirostris</i> - Spinner Dolphins	15	20	10			90	300	no	no	no	FT	
<i>Peponocephala electra</i> - Melon-headed Whales	300	500	150			90	200	yes	no	yes	MI	SH
<i>Peponocephala electra</i> - Melon-headed Whales	300	500	150			90	-	yes	no	yes	MI	TS
<i>Tursiops truncatus</i> - Bottlenose Dolphins	16	20	12			270	100	yes	no	no	ST	
<i>Stenella longirostris</i> - Spinner Dolphins	5	10	5	0.3	150	331.1	500	no	no	no	FT	LE
<i>Peponocephala electra</i> - Melon-headed Whales	15	20	10		60	30	20	yes	yes	yes	ST	LE
<i>Peponocephala electra</i> - Melon-headed Whales	20	50	15	1	290	200.5	20	yes	yes	yes	ST	SH
<i>Peponocephala electra</i> - Melon-headed Whales	20	50	15			270	-	yes	yes	yes	SL	SH
<i>Tursiops truncatus</i> - Bottlenose Dolphins	20	30	15	1		197.2	-	no	no	no	BR	LE
<i>Tursiops truncatus</i> - Bottlenose Dolphins	4	6	2	1		109.8	10	no	no	no	BR	
Unidentified Dolphins	5	30	10	0.2	170	128		no	no	no	FT	
Unidentified Dolphins	1			0.2	250	256.4		no	no	no		
Unidentified Cetacean - possibly Beaked Whales	1	2	1	2	310	270.4	500	no	no	no		
<i>Peponocephala electra</i> - Melon-headed Whales	100	120	60	2	200	149.5		yes	yes	yes	GA	LE
Unidentified Dolphins	4	5	3		145	118.7	50	no	no	no		
<i>Tursiops truncatus</i> - Bottlenose Dolphins	30	50	15			125.8	1	yes	yes	no	BR	
<i>Tursiops truncatus</i> - Bottlenose Dolphins	1					302.8	20	no	no	no	BR	LE
<i>Peponocephala electra</i> - Melon-headed Whales	300	400	200			116.7	10	yes	no	yes	BR	SH
<i>Tursiops truncatus</i> - Bottlenose Dolphins	1			2.5	30	217.6		no	no	no		
<i>Tursiops truncatus</i> - Bottlenose Dolphins	50	70	40	2.5		174.5	20	yes	no	yes	BR	TS
<i>Tursiops truncatus</i> - Bottlenose Dolphins	50	70	40	-	-	146.6	-	yes	no	yes	LS	TS
<i>Tursiops truncatus</i> - Bottlenose Dolphins	2	2	2	2.5	250	277.7	20	yes	no	no	BR	
<i>Tursiops truncatus</i> - Bottlenose Dolphins	4	4	4	2.5		254.4	20	yes	no	no	BR	
<i>Tursiops truncatus</i> - Bottlenose Dolphins	30	50	10		60	271.4	100	yes	no	no	BR	
<i>Tursiops truncatus</i> - Bottlenose Dolphins	15	30	7			104.1	20	yes	no	no	BR	LE
<i>Tursiops truncatus</i> - Bottlenose Dolphins	15	30	7			119.8	50	yes	no	yes	BR	LE

Behaviour3	Behaviour4	Further (Behavioural) Notes
AV	AT	Quiet, spyhopping, swimming under surface of boat (during HARP recovery)
AV	AL	Groups of 2 up to 6 ind., calves and juveniles present, white lips, bow riding, body with scars
AV	AL	
AV	AL	Fast swimming with the boat, bowriding, wake riding, uniformly spread
AV	AL	Spyhopping, leaping, lots of animals logging at surface, mother calf interactions, jumping, tail splashing
AV	AL	Spyhopping, leaping, lots of logging, jumps, tail slapping, splashing, mother-calf interaction, clusters
AV	CC	interacting, rubbing, curios near the boat
SC	CC	tail slapping, social, but kind of quiet for the first 40 min.
AV		Fast travel, birds around
		Very far only saw 1 dorsal fin
SC	CC	Maybe beaked whales (Cuvier's???)
		First time we see a big group with different age classes bowriding
AV	CC	Adult males with scars on dorsal fins, very curious and playful, more than in previous sightings
AV		Second encounter with big group, different age classes, social-friendly-playful, mother-calf interactions,
AV	CC	surfing, logging at surface
AV		
AV		fast travel, big school approached after aprox. 15 min., some close to boat, others kept fast traveling;
AV		exceptionally large animals - maybe an ocean group passing through???
AV	AL	feeding by birds and echolocation clicks when passing through that area indicating hunting
AV		

Index of Behaviours

Behaviour1: School Behaviour

- FT= Fast Traveling
- ST= Slow Traveling
- MI= Milling
- BR= Bow Riding
- GA= Group Affiliation
- SL= Stationary/Logging

Behaviour2: Individual Behaviour

- LE= Leaping
- SH= Spyhopping
- TS= Tail Slapping

Behaviour3: Reaction to Vessel

- AV= Approach to Vessel
- SC= School coalescing

Behaviour4: School aggregation

- AT= Aggregation tight
- AL= Aggregation loose
- CC= Clumping - clumped