

Acoustic and Visual Survey of Cetaceans at Palmyra Atoll

Trip report 06/2009

Palmyra, May 22 – June 08, 2009

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Summary (Trip Period: May 22 – June 08, 2009)

1. HARP Recovery / Deployment

On May 23, 2009, the high-frequency acoustic recording package (HARP) deployed off the western terrace of the atoll was recovered. The instrument was originally deployed on October 21, 2008 at position 05° 51.777' N 162° 09.385' W in 599m of water. Data recording ended on April 2, 2009, and preliminary analysis looks good.

The instrument was refurbished and redeployed on June 1, 2009 at a new location off the north shore. Position is 05° 54.252' N 162° 02.219' W in 1085 m of water (Figure 1). Weather delayed deployment, as this location is particularly exposed to both wind and swell. The recording was set to a sampling frequency of 200 kHz, with a recording duration of 5 minutes and a recording interval of 20 minutes. 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 began at 12 am GMT on June 2, 2009.

2. Cetacean Survey and Acoustic Recording

Over the period of 2.5 weeks on the atoll the *R/V Zenobia* was available 8 days to participate in the survey effort. On the days May 25 and 30 the weather was significantly bad and it was ruled an attempt to survey would be futile. The weather was generally poor the entire time. Most days were at least a Beaufort 3 or 4 and rarely were there days below 2 on the scale. There was usually thick cloud cover, if not worse and raining. Weather did not typically allow for circumnavigation of the atoll, although attempts were made, only some successful. A majority of the survey time was spent to the west and north of the atoll, with a total survey effort of approximately 48 hours.

IFAW Logger software was utilized to track boat's position, enter environmental values, as well as recording information on sightings and recordings. The software functions by creating a Microsoft Access database.

In order to make acoustic recordings during the survey, a combination of a towed array and boat based data acquisition and power setup were employed. The array contains multiple sensor elements on separate channels. Two specific channels were used in this experiment, one fabricated specifically for covering lower frequencies and other is more broad band, with the potential of receiving signals up to 96 kHz. For data acquisition a MOTU Traveler system was used, with a capability of sampling up to 192 kHz, with a laptop running acquisition software and recording to hard drive. The array was deployed 80 m from the vessel, but only after entering enough water depth. Tow speeds were typically 4-6 knots. Although the array was deployed during the entirety of the survey and being monitored, recording was only started after visual confirmation of species.

One of the main objectives of the survey was to hopefully have another encounter with the unidentified beaked whale (*Mesoplodon sp.*) that has been observed on two previous

trips to the atoll. Besides a photo identification as well as acoustic recording, a successful biopsy of the animal was also of interest. A biopsy was to be attained through the use of a cross bow and hollow tipped arrow. A sample of skin and blubber would be left inside the tip after penetrating the animal. This would allow for a species confirmation through DNA analysis. Despite considerable effort no encounter with the beaked whale occurred. The poor weather conditions, particularly white capping, made this already difficult task nearly impossible.

Besides the absence of any beaked whales, other cetaceans typically observed were also few in numbers. A total of 15 sightings were made over the course of the survey (Figure 1). There were 4 encounters with melon-headed whales (*Peponocephala electra*), 10 encounters with bottlenose dolphins (*Tursiops truncatus*), and a single encounter with spinner dolphins (*Stenella longirostris*). The term “re-sighting” was only used if a group of animals was seen again shortly after the initial sighting but not if maybe the same group of animals was seen later in the day or the next day, though most sightings were technically re-sightings of the same resident animals/groups on different days. As for population estimates, there were approximately 500-800 melon-headed whales, 20-30 bottlenose dolphins, and 500-800 spinner dolphins.

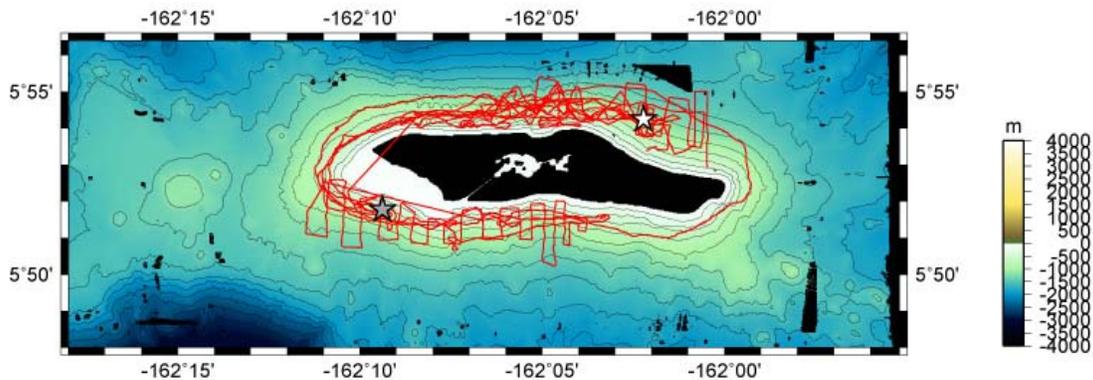


Figure 1: Bathymetric map of Palmyra Atoll (200 m contour lines) with trackline of cetacean survey (red) showing survey effort and positions of HARPs indicated with stars (grey: old HARP recovered, white: new HARP deployed).

The group sizes of melon-headed whales were consistent with past surveys, where hundreds of whales are typically observed milling and socially interacting with each other. The animals were used to the presence of *Zenobia*; part of the group showed no interest in the vessel there and pursued their normal course of action, while others approached the vessel curiously even during drift, and many would bow ride as well. The animals were nearly always seen in a large loosely aggregated group over deeper water (Figure 2).

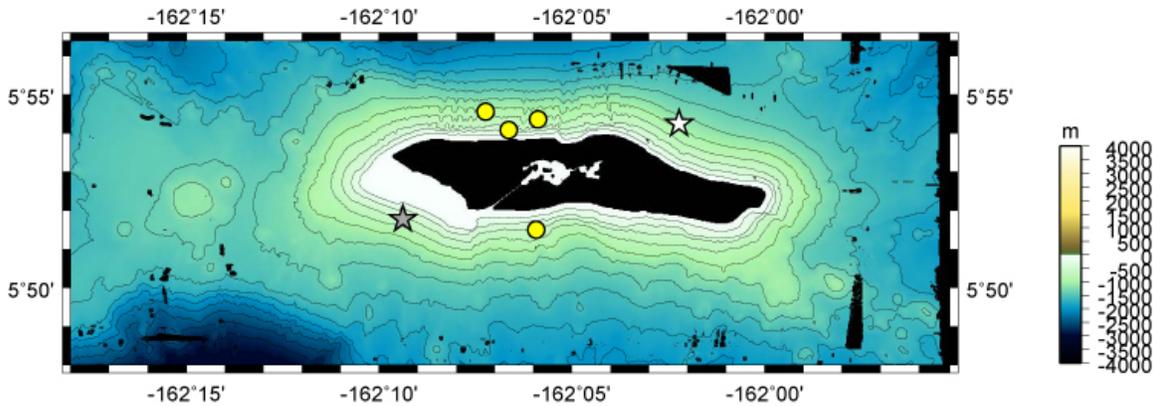


Figure 2: Bathymetric map of Palmyra Atoll (200 m contour lines), showing sightings of melon-headed whales (*Peponocephala electra*) and positions of HARPs indicated with stars (grey: old HARP recovered, white: new HARP deployed).

Regarding bottlenose dolphins, these animals were encountered most frequently, ranging from smaller groups of a few individuals to larger groups of 15-20, on one occasion up to 30 animals. These small and medium groups were stretched out all around the atoll (Figure 3). Many individuals were fairly large and would usually approach the vessel to bow ride.

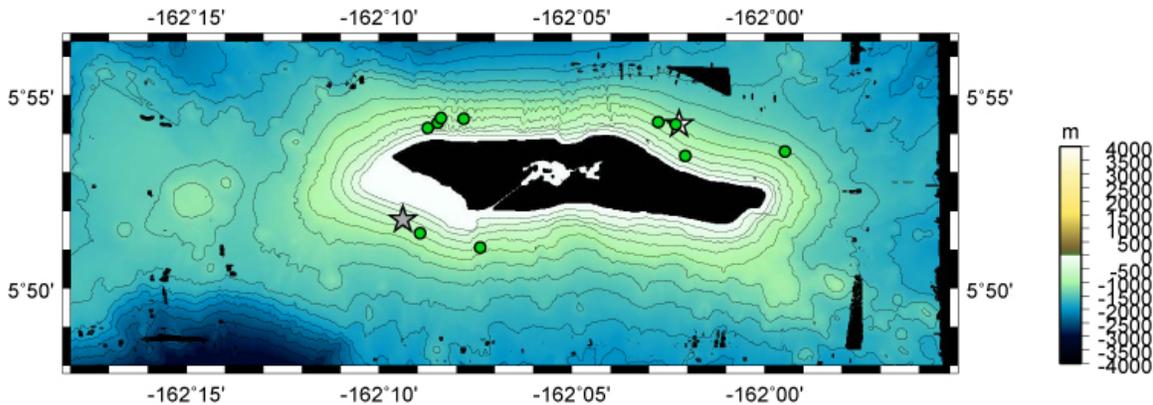


Figure 3: Bathymetric map of Palmyra Atoll (200 m contour lines), showing sightings of bottlenose dolphins (*Tursiops truncatus*) and positions of HARPs indicated with stars (grey: old HARP recovered, white: new HARP deployed).

The one encounter with the spinner dolphins was a very large loosely aggregated group mixed with adults, calves and juveniles (Figure 4). The pod had between 500-800 individuals and occurred on the north side of the atoll. They took immediate interest in the *Zenobia* and many approached to bow ride.

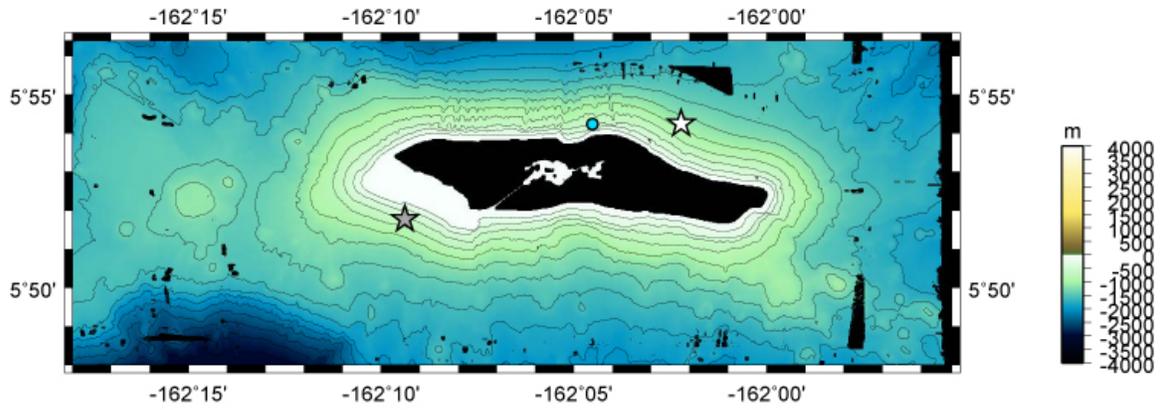


Figure 4: Bathymetric map of Palmyra Atoll (200 m contour lines), showing sightings of spinner dolphins (*Stenella longirostris*) and positions of HARPs indicated with stars (grey: old HARP recovered, white: new HARP deployed).