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Cetacean Surveys in the Waters of the Southern Mariana Archipelago (February 2010 - April 2014)

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Introduction

The Mariana Archipelago is made up of 15 islands stretching approximately 880 km in a north-south arc from the northern-most island of Farallón de Pájaros (also known as Uracas, located at 20° 31'N, 144° 54'E) to Guam (the largest and southern-most island, located at 13° 28' N, 144° 47' E). The southern ("Main") Mariana Islands from Guam to Saipan (Figure 1) are the older (15 - 20 million years) and generally larger islands in the archipelago, with the primary human population residing on Guam, Saipan, Rota, and Tinian. The remote northern islands of the Mariana chain are generally uninhabited and made up of much younger islands (approximately less than 4000 years old) with several islands remaining volcanically active[1]. The region is most notably characterized by the Mariana Trench which parallels the Mariana Islands about 148 km to the east, arcing westward to within 120 km south of Guam. The Trench runs 2500 km long and is the deepest part of the world's oceans, reaching a maximum known depth of 11 km. Another significant oceanographic feature is the West Mariana Ridge which forms a series of seamounts paralleling 145 to 170 km west of the archipelago. The Mariana Islands are composed of two U.S. jurisdictions: the territory of Guam, and the Commonwealth of the Northern Mariana Islands (CNMI). The CNMI includes all islands within the Archipelago with the exception of Guam.

Due to U.S. territorial status, management of marine mammal stocks around Guam and the CNMI is the responsibility of the U.S. National Marine Fisheries Service. The U.S. Navy is mandated by permits and Biological Opinions issued under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) to monitor cetacean presence within the Mariana Island Range Complex (MIRC). The ocean surface and undersea area components of the MIRC encompass 1,299,851 km^2 of open ocean and coastal areas that extend from the international waters south of Guam to north of Pagan (CNMI), and from the Pacific Ocean east of the Mariana Islands and west to the middle of the Philippine Sea (U.S. Navy 2010). Within the MIRC, the Navy is authorized to conduct training and testing activities, which may include the use of active sonar, underwater detonations, and explosive ordnance use. Such activities have the potential to harass or harm cetaceans.

Prior to 2010, little information existed on cetaceans in the region. Most of what is known comes from stranding records (Kami and Lujan 1976, Kami and Hosmer 1982, Donaldson 1983, Trianni and Kessler 2002, Trianni and Tenorio 2012), whaling records (Townsend 1935, Camba 1965, Masaki 1972), and publications of previously undocumented strandings and anecdotal sighting reports (Eldredge 1991, Eldredge 2003, Wiles 2005, Jefferson *et al*. 2006). A handful of scientific surveys, primarily focused on large whale distribution, were conducted throughout the lower latitude areas of the western North Pacific in the 1990's (Darling and Mori 1993, Yamaguchi 1995, Yamaguchi 1996, Shimada and Miyashita 2001, Ohizumi *et al*.

[1] The island of Farallón de Medinilla (83 km northeast of Saipan) is geologically more similar to the southern main islands in terms of age and composition, but grouped here with the remote northern islands for convenience in distinguishing between the larger populated islands to the south and the harder to access, mostly uninhabited islands in the north.

2002). These met with low sighting rates in the vicinity of the Mariana Islands; however each of these projects only spent a small amount of time in Mariana waters[2].

In more recent years, prior to 2010, 2 scientific cetacean surveys dedicated to the Mariana region were conducted: a large-ship line-transect survey (the 2007 MISTCS cruise: U.S. Navy 2007, Fulling *et al*. 2011) and a 5-day aerial survey conducted in August 2007 (Mobley 2007). In 2010, a set of NOAA ship surveys were conducted (Oleson and Hill 2010, PIFSC 2010-a, -b, and -c). Two of these surveys were mammal-specific line-transect surveys conducted while in transit between Hawai'i and Guam (PIFSC 2010-a and -c), so little effort was actually spent surveying within Mariana waters. Mammal observations were also conducted opportunistically during an NOAA offshore oceanographic survey within the EEZs of the Marianas and Federated States of Micronesia (PIFSC 2010-b). In 2011 and 2012, two winter/spring small boat surveys were conducted by HDR (Navy contractor) around Guam and Saipan (HDR 2011, 2012).

In an effort to further develop a record of cetacean occurrence in the region, as well as, to gather photos and biopsy samples and deploy satellite tags for population studies, the Pacific Islands Fisheries Science Center's (PIFSC) Cetacean Research Program (CRP) conducted surveys for cetaceans in the waters surrounding Guam and the CNMI (Figure 1) during 2010-2014[3]. This research was carried out in partnership with the U.S. Navy and is expected to continue through 2015. Detailed reports for each survey year were submitted to the Navy (Oleson and Hill 2010, Ligon *et al*. 2011, Hill *et al*. 2012, Hill *et al*. 2013). The summary of the combined surveys is reported here.

Methods

Surveys and Field Methods

Five small boat survey efforts were conducted around the southernmost of the Mariana Islands (Guam, Saipan, Tinian, Aguijan, and Rota) during various times of year between February 2010 and April 2014, and for logistical reasons these efforts were divided into three separate locations (Table 1). Descriptions of all surveys are listed within Table 12 in the Appendix. During the first year of effort, surveys were conducted in February-March 2010 and included 10 survey days off Guam and 6 off Saipan and Tinian (Oleson and Hill 2010, Ligon *et al*. 2011). The second effort was conducted in August-September 2011 and included 9 surveys

[2] Darling and Mori (1993) spent just one week on Saipan in February 1990; Shimada and Miyashita (2001) conducted "no effort within 12 nm [of] territorial waters" and only just a few days in the region across three survey years; and Ohizumi *et al*. (2002) spent just one day conducting a survey "about 5km off the coast of Pagan and Agrihan Islands in the Northern Mariana Islands." Yamaguchi (1995) spent 10 days surveying nearshore Mariana waters in March-April, 1995, but reported only 5 sightings (of any species). Although no information was given regarding weather, such a low sighting rate implies that poor sea conditions were likely a factor (No sighting data was reported from Yamaguchi 1996.).

[3] The surveys in 2014 covered within this report are only those conducted in April and are considered winter/spring surveys.

(during 8 days)[4] off Guam, 6 survey days off Rota, and 15 in the waters surrounding Saipan, Tinian, and Aguijan (Hill *et al*. 2012). The third effort was conducted in May-July 2012 and included 11 survey days off Guam, 6 off Rota, and 14 in the waters surrounding Saipan, Tinian, and Aguijan (Hill *et al*. 2013). The fourth effort was conducted in June-July 2013 and included 10 survey days off Guam, 6 off Rota, and 14 in the waters surrounding Saipan, Tinian, and Aguijan. The fifth and most recent effort (covered within this report) was conducted in April 2014 and included 6 survey days off Guam and 9 in the waters surrounding Saipan, Tinian, and Aguijan.

Survey effort was designed to cover representative habitat within the study area and did not conform to systematic (e.g. line-transect) design. Vessel tracks were spread out from day to day to ensure broad survey coverage over a wide range of depths and were also dictated by weather and sea conditions. The survey vessels traveled at a speed of 15-26 kph, depending on the size of the vessel and sea conditions. A number of vessels were chartered for these surveys ranging from 5.8 to 12.2 m length, some of which had a flying bridge. The vessels were operated by locally experienced captains, with knowledge of cetacean sighting locations. In 2011-2014 during surveys off Saipan, Tinian, Aguijan, and Rota the captains allowed the research team to operate the vessel when approaching cetaceans for photo-identification and biopsy. Between four and six observers scanned for marine mammals with unaided eye or occasional use of 7x and 10x binoculars, collectively searching 360-degrees around the vessel.

All cetacean groups encountered were approached for species confirmation, group size estimates, photo-identification, biopsy sampling/sloughed skin collection (for assessment of genetic population structure), and acoustic recording when possible. In 2013, satellite tagging was implemented to investigate movements of individuals of some species. Digital SLR cameras with telephoto zoom lenses were used for taking photographs. Photographic efforts were focused on dorsal fin and fluke images (for individual identification purposes) and images of the body and head (for assessments of health and scarring). Additional data collected during each sighting included the location (GPS latitude/longitude), behavior, estimate of calf (neonates and young of the year) numbers (when possible), Beaufort sea state, and swell height. Environmental data (e.g., Beaufort sea state, swell height) and effort status were recorded regularly as conditions changed. Global Positioning System (GPS) readings of the vessel's track were automatically recorded once per minute.

Biopsy sampling was conducted using a Barnett RX-150 crossbow and Ceta-Dart bolts with sterilized, stainless steel biopsy tips (25 mm long x 8 mm diameter for small to medium odontocetes and 40 mm long x 8 mm diameter for large odontocetes). Tissue samples were preserved in a cooler on ice while on the boat. Samples were split in half longitudinally at the end of each field day (with each subsample stored in a different vial) and stored in a standard refrigerator freezer until the end of the project. Samples were kept frozen during transport on board a commercial airline to Honolulu, HI. One vial of each sample was stored in an -80°C

[4]On 5 September 2011, 2 surveys were conducted at the same time aboard 2 separate vessels in 2 different areas off Guam (see Table 12-Appendix).

freezer at the PIFSC and the other was submitted to the Southwest Fisheries Science Center (SWFSC) for tissue archiving and processing.

Satellite tagging was conducted using a Dan Inject air rifle and deployment arrows designed by Wildlife Computers. Location-only Wildlife Computers SPOT5 tags in the LIMPET configuration were deployed. The tags were attached to the dorsal fin with two sterilized, titanium darts with backward facing petals. Two dart lengths were used depending on the species (4.5 cm for small to medium odontocetes or 6.5 cm for large odontocetes). The programming of the tag configurations varied depending on the species and followed the specifications used by Cascadia Research Collective based on the average number of respirations per hour, speed of surfacing, and the likelihood that a tag would remain attached for longer than a month, which were determined in previous tagging studies by Cascadia (Baird *et al.* 2013).

The occurrences and locations of turtles were recorded during the 2012-2014 surveys but neither photos nor biological samples were collected.

Bathymetry Data

Bathymetric datasets used in displaying and analyzing the depth profiles of the survey effort, sightings, and satellite tag locations were obtained from two different sources. First, the Pacific Islands Benthic Habitat Mapping Center (PIBHMC)[5] has available high-resolution multibeam color-shaded bathymetry datasets for nearshore waters. For this project, 5 m grids were used for waters inside the 400 m isobath surrounding Guam, Rota, Saipan, Tinian, Aguijan and Marpi Reef - a shallow bank northwest of Saipan. Sixty meter resolution grids were used for portions of the waters out to the 3,500 m isobath surrounding Guam; the 2,700 m isobath surrounding Saipan, Tinian, and Aguijan; and the 1,900 m isobath surrounding Rota. In addition, a 114 m resolution synthesis grid of multibeam datasets of primarily offshore locations to depths of 10,650 m was used[6] (Weiss *et al.* 2007). The second source of bathymetric data was the SRTM30_plus ("Smith and Sandwell") dataset[7] (Smith and Sandwell 1997, Becker *et al.* 2009). The dataset uses satellite altimetry and ship depth soundings with global coverage. The dataset covers the entire CNMI Exclusive Economic Zone (EEZ) with a 560 m resolution grid and therefore was used to fill in the gaps that the other datasets did not cover.

All bathymetry datasets were processed using ArcCatalog 10.1 (ESRI, Redlands, CA). The ASCII files were first converted into raster grids, projected in the World Geodetic System (WGS) 1984 Universal Trans Mercator (UTM) Zone 55N coordinate system and imported into ArcMap 10.1.

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[5] School of Ocean and Earth Science and Technology (University of Hawaii at Manoa) http://www.soest.hawaii.edu/pibhmc/pibhmc_cnmi.htm

[6] Multibeam datasets from Hawaii MR-1 (COOK06MV & COOK07MV), HS-DS2 (EW0202 & EW0203), SEABEAM (NOAA Vents Program), and EM300 (NOAA OE Ring of Fire 2003 & 2004).

[7] David T. Sandwell, Walter H. F. Smith, and Joseph J. Becker. Copyright 2008. The Regents of the University of California. All Rights Reserved. http://topex.ucsd.edu/WWW_html/srtm30_plus.html

Data Analyses

Surveys and Encounters

Vessel GPS tracks and encounter locations were processed in ArcCatalog 10.1, projected in the WGS 1984 UTM Zone 55N coordinate system and then overlaid onto the bathymetric datasets within ArcMap 10.1. Depths of sighting locations were determined by using the Spatial Analyst Extraction tool within the ArcToolbox to extract the depth values from each relevant bathymetric raster dataset. On-effort trackline depths were extracted from the appropriate bathymetric raster datasets to analyze the amount of search effort within depth bins from 0 to 3,100 m in 100 m intervals. Distances from the closest shoreline for each encounter location were determined using the Near tool within the Spatial Analyst toolbox, which also listed the island to which the measurement was made.

Satellite Tagging

During the 2013 summer and April 2014 surveys, location-only Wildlife Computers (SPOT5) satellite tags were available for deployment on cetaceans. The ARGOS Doppler locations of satellite-tagged individuals were determined by the ARGOS CLS system using Kalman filtering. The ARGOS locations were uploaded to Movebank.[8] Movebank ran an algorithm to identify ARGOS "mirror" (Solution 2) locations that were the better of the two ARGOS location estimates, and in those cases stored the Solution 2 coordinates as the Movebank latitude and longitude attributes. According to Movebank, this typically occurs in 3% of locations. The algorithm chose between the Solution 1 and Solution 2 locations along an animal's track by determining the set of points that resulted in the shortest path through all combinations of both sets of locations, ignoring class Z locations. The algorithm then made a second pass to fill in either the primary or alternate class Z locations. Distances were calculated as great circle routes (orthodromes) using the WGS 1984 reference ellipsoid. Both sets of coordinates were stored in the dataset.

Next the Douglas filter (Douglas *et al.* 2012) was run on the Movebank filtered set of locations. The Douglas ARGOS filter includes a number of user defined variables: maximum redundant distance (consecutive points separated by less than a defined distance are kept by the filter because ARGOS location errors rarely occur in the same place, so very close temporally consecutive points are assumed to be self-confirming); location classes (LCs) that are automatically retained; maximum sustainable rate of movement; and the rate coefficient (Ratecoef) for assessing the angle created by three consecutive points. The rate coefficient algorithm takes into account that the farther an animal moves between locations, the less likely it is to return to or near to the original location without any intervening positions, creating an acute angle characteristic of typical ARGOS error. Locations were retained if they were separated from the next location by less than a maximum redundant distance of 3 km, as well as LC2 and LC3 locations (estimated error of <500 and <250 m, respectively; ARGOS User's Manual). LC1 locations (with estimated error of between 500 and 1500 m), as well as LC0, LCA, LCB, and LCZ locations (with no estimation of accuracy), were only retained if they passed the

[8] https://www.movebank.org

Douglas ARGOS Filter process. The maximum sustainable rate of movement used was 20 kph for false killer whales, bottlenose dolphins, and rough-toothed dolphins, and 15 kph for short-finned pilot whales and melon-headed whales. These were based on maximum travel speeds noted during observations of fast traveling individuals in Hawai'i (Baird *et al.* 2013). The default Ratecoef for marine mammals was used (Ratecoef = 25).

The Douglas ARGOS filtered tag locations were then processed in ArcCatalog 10.1 and added to ArcMap 10.1. Tag locations on land were removed. Depth and distance from shore measurements were extracted using the same method as the encounter locations.

Photo-Identification

Photo analysis began in June 2012 to create species-specific individual photo-identification catalogs for odontocetes[9]. Photos taken by PIFSC in 2010-2014[10], and HDR 2011-2012 (HDR 2011, 2012)[11] are included in the current photo analysis. Those taken by Geo-Marine (Navy contractor) in 2007 (U.S. Navy 2007, Fulling *et al.* 2011)[12] are available for analysis but are currently not included.

Initial matches of individuals were made within each sighting by one photo-identification analyst and were then checked by a second analyst. Individually identified fins were also compared with all others within the sighting to look for missed matches. Marks along the leading and trailing edges of the dorsal fins were used as the primary identifiers. Marks or scars on the body, dorsal fin surface, and peduncle; and coloration patterns on the body and dorsal fin were used as secondary identifiers. Each individual fin in each photo was rated for quality based numeric scores within 4 categories (focus/clarity, contrast/lighting, angle, extent visible) and was assigned an overall quality rating (Q-1 = high, Q-2 = moderate, Q-3 = poor). Distinctiveness ratings were assigned to each individual based on the number, size, and shape of the features located on the leading and trailing edges of the dorsal fin (D-1 = high, D-2 = moderate, D-3 = low, D-4 = clean fin and no marks on the peduncle within approximately 12 inches directly behind the dorsal fin). After the completion of matching and rating within sightings, identified individuals were compared between sightings by both analysts. Only those fins with a distinctiveness of D-1 or D-2 and a quality rating of Q-1 or Q-2 were initially entered into the catalog.

Tissue Sample Analysis

Tissue sample analysis was conducted by the SWFSC using mitochondrial DNA (mtDNA) sequences obtained from biopsy samples to investigate the genetic diversity and structure in short-finned pilot whales, bottlenose dolphins, spinner dolphins, and melon-headed whales

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[9] The photo analysis protocol is specific to dorsal fin photo-identification and excludes sperm whales for which flukes are used as primary identifiers.

[10] One April 2014 bottlenose dolphin encounter was used for the analysis presented here.

[11] HDR conducted small boat surveys in the waters surrounding Guam and Saipan during 17 February – 3 March, 2011 and 15-29 March, 2012. All photos were contributed to PIFSC for photo-identification analysis.

[12] Geo-Marine conducted shipboard surveys within the CNMI EEZ during 1 January – 14 April, 2007.

found near the Mariana Islands. Details of the methods and results are presented in Martien *et al.* (in review). The Martien *et al.* sample set included biopsies collected around the Mariana Islands during research surveys conducted by the PIFSC and HDR, as well as, samples from 4 bottlenose dolphins that stranded in Taiwan, 3 bottlenose dolphins by-caught in fisheries off of the Philippines, and 1 bottlenose dolphin sample from a Korean market for comparison with those samples collected from the Marianas.

Spinner dolphin and short-finned pilot whale data sets were stratified according to whether the samples were collected nearest to Guam, Rota, or Saipan/Tinian/Aguijan. Sample sizes for bottlenose dolphins and melon-headed whales were too small to allow stratification. Photographs taken at the time samples were collected were used to confirm that bottlenose dolphin samples collected around the Mariana Islands all came from unique individuals. Four pairs of short-finned pilot whales were identified as duplicate samples based on photographic data. One individual from each pair was excluded from the analyses. Though photos were also taken of the sampled spinner dolphins, not all individuals were sufficiently distinctive to be reliably matched. Therefore, it is possible there are duplicate samples within the spinner dolphin sample set. Microsatellite genotypes generated for another study were used to confirm that the two melon-headed whale samples, collected by HDR, came from different individuals (Martien *et al.* in review). Seventeen biopsy samples collected from melon-headed whales during the PIFSC April 2014 effort were not available at the time of the Martien *et al.* (in review) genetic analyses.

Results

Surveys and Encounters

The PIFSC Cetacean Research Program completed a total of 12,044 km of on-effort survey trackline over 816 hours during the 2010-April 2014 surveys of the southern Mariana Islands (Table 2). Less than half (39%, 4752 km) of the on-effort trackline was surveyed in Beaufort sea state conditions of 0-3, while a nearly equal amount was surveyed in Beaufort sea state conditions of 4 (39%, 4734 km)(Figure 2). Most (79%, 9567 km) of the on-effort trackline was surveyed in swells heights of 0-4 ft (Figure 3). Approximately one-quarter (26%, 215 hours) of the total time on-effort was surveyed inside of the 100 m depth contour (Figure 4). Effort was distributed fairly evenly over 101 – 800 m depth bins and was reduced gradually over depths of 801 – 3200 m (Figure 4).

The survey team encountered a total of 160 cetacean groups including 5 groups that were resighted on the same day in the same (or nearby) location (Tables 3, 13-Appendix, Figures 5-9). One hundred forty-nine of these groups were identified to species and included spinner dolphins (*Stenella longirostris*), bottlenose dolphins (*Tursiops truncatus*), melon-headed whales (*Peponocephala electra*), pantropical spotted dolphins (*Stenella attenuata*), rough-toothed dolphins (*Steno bredanensis*), short-finned pilot whales (*Globicephala macrorhynchus*), pygmy killer whales (*Feresa attenuata*), false killer whales (*Pseudorca crassidens*), sperm whales (*Physeter macrocephalus*), and a dwarf sperm whale (*Kogia sima*). The overall sighting rate for all cetacean groups (including those unidentified but excluding those groups that were resighted) was 1.3 sightings/100 km of effort (Table 4).

Spinner dolphins were the most frequently encountered species and made up 54% (0.70/100 km of effort, n = 84) of the total number of encounters (Table 4). All of the encounter locations were in depths less than 300 m (Tables 3, 13-Appendix, Figure 4). The vast majority (n = 77) of the locations were in depths less than 100 m. Spinner dolphins were encountered at offshore reefs (Marpi Reef and Rota Bank; 17-18 km from shore) on 11 occasions over the 4-year period (Tables 3, 13-Appendix, Figure 5). The median distance from shore for spinner dolphin encounters was 0.2 km (Table 3). A total of 95 biopsy samples were collected across all locations (Tables 3, 13-Appendix).

Pantropical spotted dolphins were the second most frequently encountered species (0.17/100 km of effort, n = 21) (Table 4). The groups were encountered in the widest range of depths, as well as the deepest depths (333 m to 3012 m) (Table 3, Figure 4). In addition, one sighting of spotted dolphins (offshore of Saipan near Malakis Reef a.k.a Ruby Seamount) was the farthest from shore (52.8 km) of all cetacean encounters (Tables 3, 13-Appendix, Figure 5). A total of 46 biopsy samples were collected across all locations (Tables 3, 13-Appendix).

Bottlenose dolphins ranked third highest in encounter rates (0.13/100 km of effort, n = 16) (Table 4). Eight of the 16 encounters occurred in 2013 (Tables 3, 13-Appendix). Four groups of bottlenose dolphins were observed during encounters with one or more other species (short-finned pilot whales, false killer whales, rough-toothed dolphins, and spinner dolphins) (Table 13-Appendix). Their locations ranged 18-734 m in depth and 0.3-18.7 km distance from shore (Table 3 and 13-Appendix, Figure 5). A total of 15 biopsy samples were collected across all locations (Tables 3, 13-Appendix). Two satellite tags were deployed on individuals off Aguijan and Saipan in 2013 (Tables 5, 13-Appendix).

Short-finned pilot whales ranked fourth in frequency of encounters (0.10/100 km of effort, n = 11) (Table 4). They were encountered in depths that ranged from 215 m to 967 m (Tables 3, 13-Appendix). One encounter location was near Esmeralda Bank, approximately 36 km west of Tinian (Tables 3, 13-Appendix, Figure 5). Two groups of pilot whales, one encountered south of Aguijan and another encountered west of Guam, were associated with bottlenose dolphins (Table 13-Appendix). A total of 46 biopsy samples were collected across all locations (Tables 3, 13-Appendix). Three satellite tags were deployed on individuals from 3 different groups encountered off Guam in 2013 (Tables 5, 13-Appendix).

False killer whales, pygmy killer whales, rough-toothed dolphins and sperm whales were each encountered three times and have equal encounter rates of 0.03/100 km of effort (Table 4). All of the false killer whale encounters occurred in 2013 (Tables 3, 13-Appendix). The first encounter was off Guam while the other two were off Rota. The encounters off Rota were separated by 1 day and the groups were composed of different individuals on each day. The first group was accompanied by bottlenose dolphins. The 3 encounter locations were in depths that ranged from 88 m to 2107 m and distances from shore of 0.7-7.9 km (Tables 3, 13-Appendix, Figure 5). A total of 16 biopsy samples were collected from animals off Rota (Table 13-Appendix). Four satellite tags were deployed on individuals encountered off Rota; 3 from the first group and 1 from the second (Tables 5, 13-Appendix).

Pygmy killer whales were first encountered off Saipan, near Marpi Reef, in 2011 and were not approachable for biopsy sampling or photographing for individual identification (Table 13-Appendix, Figure 5). In 2013, a group of 8 individuals was encountered approximately 1 km from shore off the west side of Guam (Table 13-Appendix, Figure 5). Photographs of all individuals and biopsy samples from 3 individuals were collected. This same group of 8 individuals was encountered again off Guam, just west of Cocos Island, in April 2014 with an additional member that was calf-size (Table 13-Appendix, Figure 5). The encounter location depths ranged from 379 m to 575 m and the distances from shore were 1.1-10 km (Tables 3, 13-Appendix).

Rough-toothed dolphins were encountered for the first time in 2013 off the northeast side of Aguijan with bottlenose and spinner dolphins (Table 13-Appendix, Figure 5). There were 6 individuals in the group of rough-toothed dolphins (Table 13-Appendix). One biopsy sample was collected and 1 satellite tag was deployed on a different individual (Tables 3, 5). Four individuals from this group, including the tagged individual, were encountered 5 days later off Saipan. A biopsy sample was collected from the tagged individual at that time. In April 2014, a group of approximately 11 rough-toothed dolphins was encountered off the southwest side of Aguijan with a group of bottlenose dolphins (Table 13-Appendix, Figure 5). The four individuals encountered off Saipan in 2013 were present. The encounter location depths ranged from 260 m to 616 m and the distances from shore were 0.4-10.4 km (Tables 3, 13-Appendix).

Sperm whales were encountered three times (Figure 5); two occurrences were in 2010 and the third was in 2013 (Table 13-Appendix). The first sighting location was off of Guam (374 m depth and 1.1 km from shore). The second and third locations were off Saipan, approximately 3 km apart and separated by three years (1971 m and 1617 m depth; and 22.0 km and 19.5 km from shore respectively). A total of 6 biopsy samples were collected across both locations and 8 sloughed skin samples were collected off of Saipan in 2013 (Tables 3, 13-Appendix).

Melon-headed whales were encountered twice, with both encounters occurring in April 2014 (Table 13-Appendix, Figure 5). The first encounter was a group of 300-400 animals off Saipan and Tinian during which 3 satellite tags were deployed (Table 13-Appendix). The encounter location depth was 1014 m and the distance from shore was 15.1 km (Table 3). The second encounter occurred 5 days later (24 April) off Guam and was a group of approximately 100 animals (Table 13-Appendix, Figure 5). The encounter location depth was 1975 m and the distance from shore was 6.5 km (Tables 3, 13-Appendix). The satellite tag locations indicated that the group from the first encounter was north of Saipan on 24 April. In addition, a preliminary analysis of photos suggested that these were 2 separate groups. A total of 19 biopsy samples were collected from both locations (Tables 3, 13-Appendix).

Beaked whales were also encountered twice (Figure 5); both times in 2012 (Table 13-Appendix). The first encounter was off of Rota when 2-3 animals were seen approximately 5 km off the southwest tip of the island in waters of 1,032 m depth. Photographs were obtained but no biopsy sample could be collected due to high winds (Beaufort 5) and moderate swell (4-6 feet). The whales disappeared quickly and were not resighted. During the encounter the

observer team identified them as potential Blainville's beaked whales. Upon further analysis of the photos and consultation with other experts the species identification of this encounter could not be agreed upon and was therefore classified as unidentified Mesoplodont. The second encounter occurred off of Saipan when an unidentified beaked whale was spotted in the distance before it dove. The survey vessel went to the estimated location (~12 km off the north tip of Tinian; 1,352 m depth) and the observer team scanned the area for 1.5 hours, but the whale was not resighted.

The final identified species (dwarf sperm whale) was encountered only once at Marpi Reef in 2011 and no biopsy samples were collected (Tables 3, 13-Appendix, Figure 5). The encounter location depth was 673 m (Tables 3, 13-Appendix).

Turtles

During the 2012-April 2014 surveys there were 152 sightings of sea turtles (Table 14-Appendix, Figure 6). Sixty-one were identified to species; 59 were green (*Chelonia mydas*) while 2 were hawksbill (*Eretmochelys imbricata*). The vast majority of the sea turtle sightings were off Saipan (n=106) and most of those were either in or near the Smiling Cove Channel (Table 13-Appendix, Figure 6).

Satellite tagging

A total of 13 satellite tags were deployed on 5 species (short-finned pilot whale, false killer whale, rough-toothed dolphin, bottlenose dolphin, and melon-headed whale) during the 2013 and April 2014 surveys (Table 5, Figures 7-11). Tag durations varied by species and individual (Table 5). The longest duration recorded was from a tag that was deployed on a short-finned pilot whale (234.7 days; tag ID 128886).

Three satellite tags were deployed on short-finned pilot whales from three different groups off Guam in 2013. While one individual (128885) traveled over 400 km south of Guam, the median distance of the tag locations from the Mariana Islands for all three individuals was 15.8 km (Table 5, Figure 7). There were a total of 1232 Douglas ARGOS filtered satellite locations recorded from all three tags and 825 of those locations (67%) were closer to Guam than any of the other islands. The median depth for the tag locations from all individuals was 1086 m (Table 5).

Four satellite tags were deployed on false killer whales from 2 different encounters off Rota in 2013 (Table 5, Figure 8). During the first encounter 3 tags were deployed. Two of the individuals (128903 and 128904) appeared to travel together until 1 of the tags (128903) stopped transmitting after 4 days. The longest tag duration was 198.3 days (128908) (Table 5). There were 536 filtered tag locations from 128908; 220 (41%) were closer to Guam and 119 (22%) were closer to Rota than any of the other Islands (Figure 8). There were 198 filtered tag locations from 128904; 46 (23%) were closest to Saipan, 37 (19%) were closest to Anatahan, and 34 (17%) were closest to Farallón de Medinilla (Figure 8). The median distance from shore for all of the filtered tag locations was 74.1 km and the distances ranged from 0.1 km to 550 km (Table 5). The median depth of all tag locations was 3149 m (24-8585 m) (Table 5).

A single satellite tag was deployed on a rough-toothed dolphin off Aguijan in 2013 during a mixed species encounter that also included bottlenose dolphins and spinner dolphins (Table 5, Figure 9). The duration of the tag was 11.7 days. The individual remained in the vicinity of Saipan, Tinian, and Aguijan (Figure 14). The median distance from shore for the filtered tag locations was 4 km (0.4-13 km) (Table 5). Of the 80 filtered tag locations, 45 (56%) were closest to Tinian (Figure 9). The median depth of the filtered tag locations was 440 m (53-785 m) (Table 5).

Two satellite tags were deployed on bottlenose dolphins during 2013 (Table 5, Figure 10). The first was deployed on an individual off Aguijan (128897) during the mixed species encounter previously mentioned, and the second tag was deployed on an individual off Saipan (128898) 2 days later. The individual with tag 128897 did not continue to travel with the tagged rough-toothed dolphin, and the 2 tagged bottlenose dolphins did not appear to meet up or travel with one another for the duration of the tag attachments. Although further analyses are needed, it appeared that satellite tracks of the bottlenose dolphin with tag 128897 and the false killer whale with tag 128904 coincided on 18-20 July as they both traveled north past Farallón de Medinilla and Anatahan. There were 157 filtered tag locations for the bottlenose dolphin tag 128897; 48 (31%) were closest to Saipan, 39 (25%) were closest to Farallón de Medinilla, and 36 (23%) were closest to Tinian (Figure 10). Of the 77 filtered satellite locations for tag 128898, 34 (44%) were closest to Saipan and 29 (38%) were closest to Aguijan (Figure 10). The median distance from shore for the filtered tag locations from both bottlenose dolphins was 8.1 km (0.1-43.4 km) (Table 5). The median depth for the filtered tag locations was 612 m (28-2320 m).

Three satellite tags were deployed on melon-headed whales during an encounter off Saipan/Tinian in April 2014 (Table 5, Figure 11). The first tag (128915) communicated with the satellites for 2.6 days but did not transmit any location data. The other 2 tags (128916 and 128918) transmitted for 15.9 days and 3.1 days respectively. Satellite locations from tag 128916 indicate broad movements throughout the southernmost islands of the CNMI during the short-duration of the tag attachment (Figure 11). There were 245 filtered satellite locations for tag 128916; 75 (31%) were closest to Saipan, 60 (24%) were closest to Aguijan and 50 (20%) were closest to Tinian (Figure 16). There were 49 filtered satellite locations for tag 128918 and 41 (84%) were closest to Tinian (Figure 11). The median distance from shore for the filtered tag locations of both tags was 33.6 km (4.2-85.6 km) (Table 5). The median depth for the filtered tag locations was 1658 m (308-3726 m) (Table 5).

Photo-Identification

To date, through the work described below, photo-identification catalogs for 3 cetacean species (short-finned pilot whales, spinner dolphins, and bottlenose dolphins) have been created. These catalogs include photo data from the 2010-2013 PIFSC survey efforts, bottlenose dolphin data from PIFSC's April 2014 effort, and data collected off Guam and Saipan by HDR in 2011 and 2012 (HDR 2011, 2012). Except for bottlenose dolphins, PIFSC photo analysis from April 2014 has not yet been completed. Photo data collected by Geo-Marine

during their January-April, 2007 ship surveys in the Marianas are available for comparison but have not yet been included in the catalogs (U.S. Navy 2007, Fulling *et al.* 2011).

A total of 8,198 photos were analyzed from 13 encounters with short-finned pilot whales between 22 February 2011 and 1 July 2013, including photos contributed from 2 sightings made by HDR (Table 6). The catalog includes 146 individuals across all islands. A total of 56 individuals (38%) were photographed during more than 1 encounter. Matches within the catalog were made between Guam and either Saipan, Tinian, or Rota (Table 7, Figure 12). Twelve individuals (8%) were photographed during 3 separate encounters (Figure 12). Two of these individuals were seen off Tinian in September 2011 and subsequently off Guam in March 2012 and June 2013. The other 10 individuals were first seen off Rota in September 2011 then off Guam in May 2012 and June 2013.

A total of 4,610 photos were analyzed from 18 encounters with bottlenose dolphins between 22 February 2011 and 16 April 2014, including photos contributed from 2 sightings made by HDR (Table 8). There are a total of 47 cataloged individuals across all locations and years. Thirty individuals (64%) were photographed during more than 1 encounter. Seventeen individuals (36%) were photographed during 3 or more encounters. Resights occurred between all islands (Table 9).

A total of 24,762 photos from 77 encounters with spinner dolphins between 9 February 2010 and 27 July 2013 were analyzed (Table 10). A total of 307 individuals were cataloged across all locations and years. The catalog from the CNMI includes 166 individuals. Ninety-two individuals (55%) were photographed during more than 1 encounter. Resights of individuals have occurred between Saipan, Tinian, Aguijan, Rota, and Marpi Reef (Table 11). Three individuals from the Guam catalog were also photographed at Rota Bank, but no matches were found between Guam or Rota Bank and any of the CNMI locations. There were 122 individuals that were only photographed around Guam (excluding the Rota Bank individuals). Seventy-two (59%) of the Guam individuals were photographed during more than 1 encounter (Table 11). Fifty-one individuals (42%) were photographed during 3 or more encounters. Resights of individuals occurred at encounter locations around all sides of the island. One individual was photographed during 12 different encounters; 8 of the encounters were within Agat Bay.

Tissue Sample Analysis

Results of genetic analyses using mtDNA are discussed in detail within Martien *et al.* (in review), and are only summarized here. The sample set included 167 tissue samples from 4 different species. One hundred fifty-nine of these samples were biopsies collected around the Mariana Islands during research surveys conducted by the PIFSC and HDR, including spinner dolphins (*Stenella longirostris*, n=95), short-finned pilot whales (*Globicephala macrorhynchus*, n=47), melon-headed whales (*Peponocephala electra*; n=2), and bottlenose dolphins (*Tursiops truncatus*, n=15). Eight additional bottlenose dolphin samples came from stranded or by-caught individuals, or market samples from the western Pacific and were used for comparison with the Marianas samples.

Martien *et al.* (in review) found evidence of genetic differentiation between islands for short-finned pilot whales, but not for spinner dolphins. Sample sizes were too small to investigate differentiation within bottlenose dolphins and melon-headed whales. Short-finned pilot whales around the Marianas possess haplotypes which are common in the South Pacific, North Atlantic, Indian Ocean, and off of southern Japan. Of the 45 individuals genetically sexed, 25 were females and 20 were males. In 2 cases, 2 females in the same group had different haplotypes suggesting social structure is not entirely matrilineal. Significant genetic differentiation was found between the 3 strata (Guam, Rota, and Saipan/Tinian/Aguijan) and pairwise comparison of Guam to the Saipan/Tinian/Aguijan was also statistically significant. The strong genetic differentiation detected between the Saipan/Tinian/Aguijan and Rota and Guam suggest that there may be limited gene flow between these areas. Martien *et al.* (in review) suggested that the data from nuclear loci should be used to assess the possibility of male-mediated gene flow between the strata. An analysis of the nuclear DNA is ongoing (Martien *et al.* in review).

Martien *et al.* (in review) found that spinner dolphins in the Marianas possess haplotypes common throughout the Pacific, exhibiting high haplotypic diversity similar to that observed around Samoa and in the Society Islands of French Polynesia, but higher than near Hawaiʻi, suggesting they are not as genetically isolated as Hawaiian spinner dolphins. No genetic structure was found using the mtDNA sample set, however, this may be due to the small sample size relative to the high haplotypic diversity (Martien *et al.* in review).

Martien *et al.* (in review) found 9 of the bottlenose dolphin samples from the Mariana Islands and all of the other western Pacific samples had haplotypes consistent with *T. truncatus.* Bottlenose dolphin samples from 2 of the by-caught individuals from the Philippines shared 2 different haplotypes with *T. truncatus* individuals from the Marianas. No *T. aduncus* haplotypes were found. The remaining one-third (n=5) of the samples from the Marianas shared a single haplotype that is most similar to that found in Fraser's dolphin (*Lagenodelphis hosei*) sampled near the Philippines. Photo-identification data confirm that the 5 samples with Fraser's dolphin haplotypes come from 5 different individuals, all of which appear morphologically to be bottlenose dolphins. The small sample size and occurrence of 5 samples with very different haplotypes precluded assessment of population structure for bottlenose dolphins in the Marianas (Martien *et al*. in review).

At the time of analysis, samples were available from only 2 melon-headed whales. Although each sample had a different mtDNA haplotype, both have been previously observed in the central Pacific. The very small sample set precludes assessment of the connectivity of Marianas animals relative to others in the Pacific (Martien *et al.* in review).

Discussion

The PIFSC CRP completed 122 surveys over a 4-year period (2010-April 2014). These surveys were some of the first small boat surveys conducted for cetaceans within the Marianas. The surveys represent 4 years of collaborative effort between the PIFSC's CRP and the U.S. Navy

towards a better understanding of the occurrence and distribution of cetaceans in waters off of Guam and the southernmost islands of CNMI (Saipan, Tinian, Aguijan, and Rota). The NMFS (PIFSC) is responsible for the assessment of marine mammal stocks in the Exclusive Economic Zone (EEZ) waters of Guam and CNMI. The U.S. Navy is mandated by permits and Biological Opinions issued under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) to monitor cetacean presence within the Mariana Island Range Complex (MIRC).

For PIFSC, a long-term goal of this research is the evaluation of the population status of each species. This includes genetic analysis of tissue samples, telemetry and photo-ID datasets for evaluating population structure, as well as producing population abundance estimates using mark-recapture techniques from the photo data. Preliminary results of the specific questions presented within the U.S. Navy's monitoring plan are discussed below.

1. What species of beaked whales and other odontocetes occur around Guam and Saipan?

Beaked whales are a species of particular interest for both the Navy and NMFS, given the potential detrimental effects of mid-frequency sonar on the whales. From studies in the main Hawaiian Islands, the two most commonly sighted beaked whale species are Blainville's (*Mesoplodon densirostris*) and Cuvier's beaked whales (*Ziphius cavirostris*), though encounter rates are low (Baird *et al*. 2003, 2006; McSweeney *et al*. 2007). Baird *et al*. (2006) found that, in Hawaii, Blainville's beaked whales sightings occur in a median water depth of 922 m while Cuvier's beaked whales occur in deeper waters with a median depth of 2079 m. Baird *et al*. (2006) encountered two groups of unidentified beaked whales in water depths of 3373 m and 4224 m. During the 2007 MISTCS surveys within the Marianas waters there were 3 sightings of beaked whales in depths that ranged 2122-3984 m (Fulling *et al.* 2007). Two of the sightings were identified to the genus *Mesoplodon* while the other was listed as an unidentified beaked whale (Fulling *et al.* 2007). During aerial surveys of the southeastern portion of the Guam/CNMI EEZ, Mobley (2007) saw a single Cuvier's beaked whale directly south of Guam over the edge of the Mariana Trench. During the 2010-April 2014 Marianas surveys, 28% of the effort was spent in water depths of 800-2200 m and we encountered beaked whales on 2 occasions. We were not able to determine the species during either encounter, but identified the group off Rota in 2013 as Mesoplodont beaked whales.

Ten other species of odontocetes have been documented during our surveys in the MIRC (Table 4). These species, in order of encounter frequency from high to low, are spinner dolphin, pantropical spotted dolphin, bottlenose dolphin, short-finned pilot whale, false killer whale, pygmy killer whale, rough-toothed dolphin, sperm whale, melon-headed whale, and dwarf sperm whale. Figure 13 displays our species discovery curve by trackline distance surveyed. It is likely that most other tropical delphinids also occur in this region, though potentially in waters further from shore than we are able to frequently survey or along the remote islands north of Saipan. Fulling *et al.* (2011) lists 29 cetacean species that have been observed or have the potential to occur within Marianas waters, however, 9 of the species are listed as rare or extralimital (Fulling *et al.* 2011).

2. Are there locations of greater relative cetacean abundance around Guam and Saipan?

Although our surveys are confined to relatively nearshore waters, we do attempt to survey offshore as far as possible given weather and sea conditions. Comparison of sighting locations and water depths among species does reveal some preferences. Spinner dolphins are clearly associated with shallow near-island and bank waters, with most sightings occurring within 1 km of shore, offshore at Marpi Reef or Rota Bank, and in water depths less than 300 m (Table 13-Appendix, Figure 4).

Bottlenose dolphins exhibit a similar pattern of shallow water preference, although our sample size is more limited. Telemetry data and photo-identification analyses indicate bottlenose dolphins move between islands and there does seem to be a preference for shallower banks and nearshore areas; however Fulling *et al.* (2011) encountered bottlenose dolphins at 4 offshore locations where depths ranged 3295-5011 m. Interestingly, 1 of these sightings was a mixed species encounter with rough-toothed dolphins off the northeast side of Saipan (Fulling *et al.* 2011). Two of our mixed species bottlenose dolphin encounters were with rough-toothed dolphins (Table 13-Appendix, Figure 5).

Short-finned pilot whales also show a preference for nearshore waters based on our encounter locations and telemetry data. All locations were between 400 m and 1000 m (Figure 4), and telemetry data points have a median depth of just over 1000 m (Table 5). Telemetry datasets do indicate occasional distant offshore movements, up to 400 km from shore, though the median distance from shore (15 km) indicates preference for near-island waters (Figure 7). The data from 3 telemetry deployments, 1 extending for over 230 days, suggest some preference for waters around Guam, and no movements north of Marpi Reef (Figure 7). During the 2007 MISTCS surveys there were 3 sightings of short-finned pilot whales along the northern portion of the West Mariana Ridge; west of Guguan and Alamagan (Fulling *et al.* 2011). Additional satellite tag deployments on short-finned pilot whales seen near Rota, Saipan, and in waters further to the north, as well as analysis of the MISTCS 2007 photo data may yield more insight into whether different social groups prefer different areas, and whether the home range of the current cataloged individuals may be largely restricted to the southern islands.

Our encounters with pantropical spotted dolphins had a wider distribution in distances from shore than most other species, and a depth range from 300 m to over 3000 m (Table 5), similar to the depth distribution of pantropical spotted dolphins near the Hawaiian Islands (Baird *et al.* 2013). Fulling *et al.* (2011) encountered pantropical spotted dolphins in depths of 114-5672 m and 16 of 17 encounters were at offshore locations.

Although there have been only 3 encounters with false killer whales during our surveys, these occurred over a broad range of depths, from less than 100 m to over 2000 m (Figure 4), and telemetry records clearly indicate very broad long-distance offshore movements, including use of offshore banks and seamounts (Figure 8) up to 500 km from the Mariana Islands (Table 5). Fulling *et al.* (2011) encountered false killer whales on 10 occasions; all of which were

offshore. The depths of these 2007 encounter locations ranged 3059-8058 m (Fulling *et al.* 2011).

The encounter rate with sperm whales was low during our surveys (0.025/100 km; n=3) (Table 4), but they were the most frequently sighted species during the MISTCS 2007 surveys (Fulling *et al.* 2011). Most of their 23 sightings were far offshore and in depths that ranged 809-9874 m (Fulling *et al.* 2011). Our sperm whale encounter locations were between 1.1 and 22 km from shore and in depths of 375-1971 m (Table 5, Figure 5).

For other species there are inadequate sighting, photo-identification, or telemetry data to infer greater use in nearshore versus offshore waters or preference for waters off the northern or southern islands of the Mariana Archipelago.

3. What is the baseline abundance and population structure of odontocetes which may be exposed to sonar and/or explosives in the nearshore areas of Guam, Saipan, Tinian, and Rota?

Using the results of photo-identification, biopsy sampling, and satellite tagging studies, we are beginning to learn more about the distribution and movements of spinner dolphins, short-finned pilot whales, and bottlenose dolphins encountered near Guam and the southern Mariana Islands; and so far, the story is not straight-forward for any of these species. Analysis of sighting histories for individual spinner dolphins indicates that some individuals move between Marpi Reef and Rota, as well as among each of the islands in between. There are no individuals that have been documented moving between the southern islands of the CNMI and Guam or Rota Bank, suggesting there may be little or no exchange of individuals between these regions. In contrast, the genetic analysis suggests there is no structure within the southern portion of the archipelago based on mtDNA. Martien *et al.*(in review) found that spinner dolphins in the Marianas exhibit high haplotypic diversity, similar to that in French Polynesia (Oremus *et al.* 2007), such that structure was only discernable using a combination of mtDNA and nuclear DNA. Martien *et al.* (in review) suggest that the genetic transfer may be facilitated by offshore individuals that make temporary visits or by males within the insular populations and therefore a larger sample size, sampling of the islands north of Saipan, or analysis of nuclear microsatellites may reveal finer population structure.

Short-finned pilot whales show the opposite pattern. The photo-identification data that we have collected to date have demonstrated movements between the islands over the survey years. Some individuals have been photographed multiple times suggesting some association with the southern islands. We have also encountered groups that have only been photographed on a single occasion, suggesting some segment of the populations may prefer offshore waters or those near the northern islands, and occur near the southernmost islands intermittently. This is similar to short-finned pilot whale movements documented near Hawaiʻi, where some groups are known to be long-term residents of Hawaiʻi Island and are consistently seen there, while others are seen intermittently or infrequently, and are more prevalent at islands further to the north (Mahaffy 2012). All resightings near Saipan, Tinian, and Rota have been of individuals photographed off Guam, with no resightings among the islands of CNMI,

perhaps suggesting sampling islands further to the north will be required to better elucidate the finer-scale, and potentially complex population structure within Marianas short-finned pilot whales. All three satellite-tagged individuals were tagged off Guam. With the exception of the individual (128885) that traveled south toward the Federated States of Micronesia, the 3 individuals remained near the southernmost islands and primarily closer to Guam than the other islands. Satellite locations from the 3 tags were recorded from all sides of Guam and at Galvez Bank to the southwest of Guam. Satellite locations from 129885 and 128886 were recorded at Santa Rosa Reef, south of Galvez. Analysis of the mtDNA of biopsy samples collected from short-finned pilot whales revealed significant genetic differentiation between samples collected from individuals off Saipan, Tinian, and Aguijan (3-Islands) and those collected from individuals off Guam and Rota suggesting limited gene flow (Martien *et al.,* in Review). The resights of individuals between these locations suggest that the genetic differences detected may be a reflection of social structure, that there is male-mediated gene flow, or that the 3-islands region is an area of overlap between the two populations (Martien *et al.* in review). Additional photo-identification and biopsy sampling in the islands north of Saipan and the analysis of the MISTCS 2007 photos may provide more insight.

The species with the most interesting story is the bottlenose dolphin. This gregarious species has been seen during our surveys to be closely associated with short-finned pilot whales, false killer whales, rough-toothed dolphins, and spinner dolphins on multiple occasions. The satellite tag data for 128887 (and false killer whale 128904) indicate that associations of bottlenose dolphins with other species are not fleeting but continue for multiple days. The current photo-identification catalog of bottlenose dolphins is made up of 47 individuals from 15 encounters across 4 survey years, with resightings among all surveyed islands. The genetic analysis of biopsy samples revealed Fraser's dolphin haplotypes within one third of the bottlenose dolphin samples. The photo-identification data have demonstrated that those individuals with the Fraser's dolphin haplotypes have the morphological appearance of bottlenose dolphins. This along with high occurrence of the Lh haplotype within the sampled population lead Martien *et al.* (in review) to conclude that there has been extensive introgressive hybridization of Fraser's dolphin mtDNA into the Mariana Islands bottlenose dolphin gene pool. This potential hybridization and its origin are being further investigated through more detailed analysis of the bottlenose dolphin and Fraser's dolphin samples from the Marianas, as well as, those elsewhere in the western Pacific and near Hawai'i. Because of sample size population structure among the islands could not be assessed, however, photo-identification and telemetry data suggest that a population is distributed among the southern islands and as far north as Sarigan in the Northern Mariana Islands (Martien *et al.* in review). Additional satellite tag deployments, as well as, surveys in the northern islands should help to reveal the full distribution and population structure of bottlenose dolphins in the archipelago.

Although we have produced photo-identification catalogs for spinner dolphins, bottlenose dolphins, and short-finned pilot whales, the encounter rate and number of distinctive individuals within each catalog is still too small to conduct robust abundance analyses. It is not yet possible to determine how many animals may be impacted by explosive or sonar exercises in the region annually. While some of the areas of underwater detonations

and explosive ordnance use off Guam are known and we can begin to assess what species may be exposed, the specific areas of sonar exercises are unknown to us and we are unable to make any evaluation of exposure to cetacean species.

Off Guam, there are 3 known Navy training areas where underwater detonations and explosive ordnance use occur. These include the Piti Mine Neutralization Area, the Agat Bay UNDET Area, and the Outer Apra Harbor UNDET Area (Figure 14). The locations of cetacean encounters during our surveys and the telemetry data from satellite tags deployed on 3 short-finned pilot whales, suggest that exposure to explosive events may occur at Piti and Agat Bay sites (Figure 14). To date, we have not encountered any cetacean groups within Apra Harbor where the Outer Apra Harbor UNDET Area is located (Figure 14).

Locations from all 3 satellite tags deployed on short-finned pilot whales were located within 3000 m of underwater explosive detonation sites off Guam (Figure 14). One of the satellite transmission locations of tag 128886 was within 500 m of the Piti site and 1 was located within the exclusion zone of Agat Bay site (Figure 14). In addition, our 30 June 2013 encounter with short-finned pilot whales was 340 m from the Piti Floating Mine Neutralization Area and our 1 July 2013 encounter with short-finned pilot whales was 2911 m from the Agat Bay UNDET Area (Figure 14). In 2013, we encountered a group of bottlenose dolphins approximately 1200 m from the Piti Floating Mine Neutralization Area (Figure 14). Spotted dolphins and pygmy killer whales were also encountered in the vicinity of the Piti Floating Mine Neutralization Area; 1029 m and 2550 m away, respectively (Figure 14). All of the spinner dolphin encounters off Guam were more than 4 km from any of the underwater detonation sites suggesting a lower probability of exposure (Figure 14). The photo-identification data demonstrates that individuals move between northern and southern locations along the west side of Guam. We do not know the routes used by the spinner dolphins when traveling between these locations. Exposure to Navy activities at the Piti site could occur if the dolphins pass through the area while transiting between northern and southern locations. In addition, movements of spinner dolphins between coastal locations and offshore feeding areas that pass through the Piti or Agat Bay areas could expose them to Navy activities. Based on the depths of the locations of cetacean encounters during our surveys, it is possible that other species may be exposed to underwater detonations and at the Piti Floating Mine Neutralization Area (~750 m) and the Agat Bay UNDET Area (~1750 m). For the Piti site the species include sperm whales and false killer whales (Table 4). For the Agat Bay site the species include melon-headed whales, sperm whales, false killer whales, and beaked whales (Table 4).

4. What is the seasonal occurrence of baleen whales around Guam, Saipan, Tinian, and Rota?

To date, we have not had any encounters with baleen whales during our surveys. The primary intent of our April 2014 effort was to locate humpback whales (*Megaptera novaeangliae*) that are known to occur in the Marianas seasonally, during winter months, though we did not encounter any during that survey. There have been recent anecdotal accounts of humpback whale encounters, as well as a collision report and photographic

evidence from a boat-strike that occurred off Saipan in February 2014 (CNMI DFW 2014). During the 2007 (January-April) MISTCS survey, Fulling *et al.* (2011) encountered humpback whales 15 km northeast of Saipan in February. All of their other baleen whale encounters were much further offshore, with Bryde's (*Balaenoptera edeni*) and sei whales (*Balaenoptera borealis*) being their second and third most frequently encountered species, respectively. Mobley (2007) encountered a single Bryde's whale over a southern portion of the Mariana Trench during an August 2007 aerial survey. No other baleen whales were observed (Mobley 2007). PIFSC is in the process of evaluating long term acoustic data from the region that may shed more light on this question.

Ongoing and Future Work

Additional surveys in the summer of 2014 were completed on 20 June. There were 37 encounters with 7 species (Blainville's beaked whale, bottlenose dolphin, Cuvier's beaked whale, false killer whale, pantropical spotted dolphin, short-finned pilot whale, and spinner dolphin) during which more than 22,000 photos were collected, 13 satellite tags were deployed on 3 species (short-finned pilot whale, false killer whale, and bottlenose dolphin), and 36 biopsy samples were collected from the same 3 species. In addition, there were encounters with unidentified beaked whales and an unidentified Mesoplodont whale. These data will be detailed in future reports after they have been processed. The processing of short-finned pilot whale and false killer whale photos from these surveys has already begun.

The short-finned pilot whale photos will be integrated into the existing catalog. An analysis on the individual movements using the photo and satellite tag data will be combined with results from the tissue sample analysis by *Martien et al.* (in review) for a publication on the synopsis of our current knowledge of short-finned pilot whales in the Marianas.

The analysis of photos and the creation of new photo-identification catalogs will be on-going. Work has begun on the creation of catalogs for false killer whales and rough-toothed dolphins.

The results from current survey efforts also inform strategies for PIFSC program goals for the Mariana Islands region. Surveys in the Northern Mariana Islands (north of Saipan) would provide a more complete assessment of population structure for any species. It is clear from the limited existing satellite telemetry datasets that bottlenose dolphins and false killer whales move into the northern islands, and the short-finned pilot whale tracks suggest that their full population range will not be described through survey of the southern islands alone. Genetic results from short-finned pilot whales and spinner dolphins suggest sampling in the northern islands may facilitate resolving discrepancies between mtDNA patterns, and those apparent in the photo-identification dataset.

As summarized in the introduction, existing knowledge on marine mammals in the Mariana Islands is based on only a handful of relatively recent surveys. A more complete description of baleen whale occurrence and any seasonal odontocete movement patterns would gradually be developed through additional surveys during the winter and spring. Weather presents a difficult obstacle for winter surveys in this region, but a combination of

shore-based spotters with a boat-based rapid deployment crew may yield sampling opportunities that small boat-only surveys may not. This type of work would need to be targeted to regions where sea conditions are satisfactory for working on most days, even when weather offshore is not conducive to productive survey. One example is the area immediately offshore of the lagoon off the west side of Saipan, which may be a particularly productive area for such a winter-time survey design.

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Tables

Table 1: Dates and locations of the PIFSC cetacean surveys in southern Mariana waters.

Location	2010	2011	2012	2013	2014
Guam	9-18 February	26 August - 5 September	25-28 May, 26 June -3 July	22 June - 1 July	22-27 April
Saipan-Tinian-Aguijan	22 February - 3 March	7-12, 20-29 September	7 - 24 June	12 July - 27 July	11-19 April
Rota	----	14-19 September	28 May - 4 June	4 July - 10 July	----

Table 2: On-effort survey distance and duration by location and year.

	2010			2011			2012			2013			2014			Location Total		
Location	**No. Survey**	**Dist. (km)**	**Time (hr)**	**No. Survey**	**Dist. (km)**	**Time (hr)**	**No. Survey**	**Dist. (km)**	**Time (hr)**	**No. Survey**	**Dist. (km)**	**Time (hr)**	**No. Survey**	**Dist. (km)**	**Time (hr)**	**No. Survey**	**Dist. (km)**	**Time (hr)**
Guam	10	693	58.0	9	968	66.2	11	1323	90.8	10	1087	68.4	6	387	28.9	46	4458	312.3
Saipan-Tinian-Aguijan*	6	571	39.1	15	1460	96.0	14	1580	102.6	14	1526	102.6	9	806	57.1	58	5944	397.3
Rota	0	0	0.0	6	623	38.0	6	510	29.5	6	508	40.4	0	0	0.0	18	1641	108.0
Year Total	16	1265	96.1	30	3051	200.2	31	3413	223.2	30	3121	211.4	15	1194	85.9	**122**	**12044**	**816.8**

*The on-effort totals reported here differ slightly from the previous reports (Oleson and Hill 2010, Ligon *et al*. 2011, Hill *et al*. 2012, Hill *et al*. 2013). On-effort minutes and trackline points were eliminated within the lagoon channel off of Saipan between the Smiling Cove Marina seawall and an outside channel marker ("green can no. 3"). This was done to reduce additional shallow water bias introduced from daily transiting through the channel.

Table 3: Summary of sightings by species and location across all years (2010-April 2014) excluding resights of the same group on the same day. Some of the locations listed are submerged reefs located offshore of the main Islands. See the Appendix (Table 13) for details of each sighting.

Species and Location	Sightings by Year					Total No. Sightings	No. Sightings for Photo-ID	No. Biopsy Samples	No. Satellite Tags	Median Group Size (Range)	Median Depth (Range) - m	Median Shore Distance (Range) - km
	2010	2011	2012	2013	2014							
Bottlenose dolphin	**0**	**3**	**4**	**8**	**1**	**16**	**15**	**15**	**2**	**8 (2-16)**	**88 (18-734)**	**0.9 (0.3-18.7)**
Saipan	0	1	0	3	0	4	4	1	1			
Tinian	0	1	0	0	0	1	1	2	0			
Aguijan	0	0	1	1	1	3	3	3	1			
Rota	0	0	1	3	0	4	3	1	0			
Rota Bank	0	1	1	0	0	2	2	7	0			
Guam	0	0	1	1	0	2	2	1	0			
Dwarf sperm whale	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1 (1)**	**673 (673)**	**18.7 (16.7)**
Marpi Reef	0	1	0	0	0	1	0	0	0			
False killer whale	**0**	**0**	**0**	**3**	**0**	**3**	**3**	**16**	**4**	**16 (4-17)**	**1494 (88-2107)**	**5.8 (0.7-7.9)**
Rota	0	0	0	2	0	2	2	16	4			
Guam	0	0	0	1	0	1	1	0	0			
Melon-headed whale	**0**	**0**	**0**	**0**	**2**	**2**	**2**	**19**	**3**	**205 (85-325)**	**1190 (1014-1975)**	**10.8 (6.5-15.1)**
Saipan/Tinian	0	0	0	0	1	1	1	10	3			
Guam	0	0	0	0	1	1	1	9	0			
Pantropical spotted dolphin	**1**	**3**	**9**	**7**	**1**	**21**	**19**	**46**	**0**	**24 (4-70)**	**784 (333-3012)**	**6.4 (2.5-52.8)**
Saipan Offshore-Malakis Reef†	0	0	1	0	0	1	1	0	0			
Saipan	0	1	0	0	0	1	1	6	0			
Tinian	0	0	0	1	0	1	1	0	0			

Species and Location	Sightings by Year					Total No. Sightings	No. Sightings for Photo-ID	No. Biopsy Samples	No. Satellite Tags	Median Group Size (Range)	Median Depth (Range) - m	Median Shore Distance (Range) - km
	2010	2011	2012	2013	2014							
Rota	0	0	3	4	0	7	7	15	0			
Guam	1	2	5	2	1	11	9	25	0			
Pygmy killer whale	**0**	**1**	**0**	**1**	**1**	**3**	**2**	**4**	**0**	**8 (6-9)**	**563 (379-575)**	**5.1 (1.1-10.0)**
Saipan near Marpi Reef	0	1	0	0	0	1	0	0	0			
Guam	0	0	0	1	1	2	2	4	0			
Rough-toothed dolphin	**0**	**0**	**0**	**2**	**1**	**3**	**2**	**2**	**1**	**6 (4-11)**	**438 (260-616)**	**0.5 (0.4-10.4)**
Saipan	0	0	0	1	0	1	1	1	0			
Aguijan	0	0	0	1	1	2	1	1	1			
Short-finned pilot whale	**0**	**4**	**4**	**3**	**0**	**11**	**11**	**46**	**3**	**23 (4-38)**	**720 (215-967)**	**7.0 (0.5-36.3)**
Saipan	0	1	0	0	0	1	1	7	0			
Tinian	0	1	0	0	0	1	1	6	0			
Esmeralda Bank	0	0	1	0	0	1	1	2	0			
Aguijan	0	0	2	0	0	2	2	3	0			
Rota	0	1	0	0	0	1	1	9	0			
Guam	0	1	1	3	0	5	5	19	3			
Sperm whale	**2**	**0**	**0**	**1**	**0**	**3**	**2**	**6**	**0**	**8 (6-9)**	**1617 (375-1971)**	**19.5 (1.1-22.0)**
Saipan	1	0	0	1	0	2	1	3	0			
Guam	1	0	0	0	0	1	1	3	0			
Spinner dolphin	**13**	**22**	**19**	**22**	**8**	**84**	**73**	**95**	**0**	**28 (2-90)**	**47 (8-260)**	**0.5 (0.2-18.5)**
Marpi Reef	2	2	2	2	1	9	7	8	0			
Saipan	4	4	6	9	2	25	21	35	0			

Species and Location	Sightings by Year					Total No. Sightings	No. Sightings for Photo-ID	No. Biopsy Samples	No. Satellite Tags	Median Group Size (Range)	Median Depth (Range) - m	Median Shore Distance (Range) - km
	2010	2011	2012	2013	2014							
Tinian	0	3	0	1	1	5	4	6	0			
Aguijan	0	1	2	3	1	7	5	8	0			
Rota	0	8	1	2	0	11	9	11	0			
Rota Bank	0	1	1	0	0	2	2	6	0			
Guam	7	3	7	5	3	25	25	21	0			
Unid. medium delphinid	**1**	**2**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**1 (1-5)**	**631 (464-702)**	**6.2 (2.8-12.6)**
Saipan	0	1	0	0	0	1	0	0	0			
Rota	0	1	0	0	0	1	0	0	0			
Guam	1	0	0	0	0	1	0	0	0			
Unid. Mesoplodon whale	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**2 (2)**	**1032 (1032)**	**5.1 (5.1)**
Rota	0	0	1	0	0	1	0	0	0			
Unid. small delphinid	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**1.5 (1-2)**	**770 (26-1515)**	**13.2 (2.6-23.7)**
Saipan	0	2	0	0	0	2	0	0	0			
Unid. small whale*	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**1 (1)**	**343 (343)**	**18.6 (18.6)**
Rota Bank	0	0	1	0	0	1	0	0	0			
Unid. Ziphiid whale	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**2 (2)**	**1352 (1352)**	**11.8 (11.8)**
Saipan	0		1	0	0	1	0	0	0			
Grand Total	**17**	**38**	**39**	**47**	**14**	**155**	**129**	**249**	**13**			

†Known as Ruby Seamount within the Mariana Trench Marine National Monument

*The position of the unidentified small whale was estimated. It was seen in the distance during an encounter with bottlenose dolphins.

Table 4: Sighting rate by species (excluding resights) 2010-April 2014.

Species	No. Sightings	No. Sightings/100km
Spinner dolphin	84	0.697
Pantropical spotted dolphin	21	0.174
Bottlenose dolphin	16	0.133
Short-finned pilot whale	11	0.091
False killer whale	3	0.025
Pygmy killer whale	3	0.025
Rough-toothed dolphin	3	0.025
Sperm whale	3	0.025
Unid. medium delphinid	3	0.025
Melon-headed whale	2	0.017
Unid. small delphinid	2	0.017
Dwarf sperm whale	1	0.008
Unid. Mesoplodont whale	1	0.008
Unid. small whale	1	0.008
Unid. Ziphiid whale	1	0.008
Grand Total	**155**	**1.287**

Table 5: Satellite tag deployment information and summary of depth and distance to shore for the Douglas ARGOS filtered tag locations by species and tag ID.

Species and Tag IDs	Deployment Location	Deployment Date-Time (GMT +10)	Duration (Days)	No. Tag Locations	Median Depth (Range) - m	Median Shore Distance (Range) -km
Short-finned pilot whales				1232*	1086 (24-9660)	15.8 (0.1-416.6)
128884	Guam	06/30/2013 7:08	17.9	138	1437 (38-3267)	18.3 (0.2-50.8)
128885	Guam	06/30/2013 8:46	64.0	449	1322 (33-9660)	26.7 (0.2-416.6)
128886	Guam	07/01/2013 13:20	234.7	645*	910 (24-8646)	10.7 (0.1-15.7)
False killer whales				1145	3149 (24-8585)	74.1 (0.1-550)
128903	Rota	07/06/2013 9:06	4.0	19	1418 (295-4192)	31.7 (1.6-204)
128904	Rota	07/06/2013 9:26	22.3	198	1158 (65-4307)	25.5 (0.2-273)
128906	Rota	07/06/2013 11:06	98.9	392	1852 (24-8160)	33.9 (0.1-303)
128908	Rota	07/07/2013 11:42	198.3	536	3686 (902-8585)	146.1 (7.9-550)
Rough-toothed dolphin				80	440 (53-785)	4.0 (0.4-13.0)
128896	Aguijan	07/15/2013 10:33	11.7	80	440 (53-785)	4.0 (0.4-13.0)
Bottlenose dolphins				234	612 (28-2320)	8.1 (0.1-43.4)
128897	Aguijan	07/15/2013 10:52	20.5	157	611 (28-2320)	9.9 (0.1-43.4)
128898	Saipan	07/17/2013 14:06	8.8	77	615 (29-1522)	6.5 (0.1-20.8)

Species and Tag IDs	Deployment Location	Deployment Date-Time (GMT +10)	Duration (Days)	No. Tag Locations	Median Depth (Range) - m	Median Shore Distance (Range) -km
Melon-headed whales				294	1658 (308-3726)	33.6 (4.2-85.6)
128915	Saipan/Tinian	04/18/2014 21:13	2.6	0	-	-
128916	Saipan/Tinian	04/18/2014 21:58	15.9	245	1537 (308-3726)	30.1 (4.2-85.6)
128918	Saipan/Tinian	04/18/2014 23:20	3.1	49	2926 (873-3653)	33.6 (9.5-79.2)

*For the calculation of the median depth, 2 records were removed because no value was obtained from the bathymetry datasets.

Table 6: Number of short-finned pilot whale encounters and cataloged individuals by location and year, including between-year resights.

	Esmeralda Bank		Saipan		Tinian		Aguijan		Rota		Guam	
Year	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals
2010	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	1	19	1	30	0	0	1	32	2*	23
2012	1	9	0	0	0	0	2	25	0	0	2*	39
2013	0	0	0	0	0	0	0	0	0	0	3	39

*One encounter during this year was made by HDR.

Table 7: Number of cataloged short-finned pilot whale individuals matched between locations across all years (2011-2013). The numbers on the diagonal represent the number of cataloged individuals seen more than once at that location and in parentheses (the number of cataloged individuals encountered only once at that location).

	Esmeralda Bank	Saipan	Tinian	Aguijan	Rota	Guam
Esmeralda Bank	0 (9)	0	0	0	0	0
Saipan		0 (10)	0	0	0	9
Tinian			0 (8)	0	0	22
Aguijan				0 (25)	0	0
Rota					0 (13)	19
Guam						12 (27)

Table 8: Number of bottlenose dolphin encounters and cataloged individuals by location and year, including between-year resights but excluding within-year resights.

	Saipan		**Tinian**		**Aguijan**		**Rota**		**Rota Bank**		**Guam**	
Year	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals
2010	0	0	0	0	0	0	0	0	0	0	0	0
2011	1	7	1	6	0	0	0	0	1	9	1*	3
2012	1*	1	0	0	1	4	1	12	1	6	1	5
2013	3	14	0	0	1	5	3	23	0	0	1	3
2014	0	0	0	0	1	9	0	0	0	0	0	0

*HDR encounters

Table 9: Number of cataloged bottlenose dolphin individuals matched between locations across all years (2011-April 2014). The numbers on the diagonal represent the number of cataloged individuals seen more than once at that location and in parentheses (the number of cataloged individuals encountered only once at that location).

	Saipan	Tinian	Aguijan	Rota	Rota Bank	Guam
Saipan	5(1)	7	5	9	0	5
Tinian		0(0)	3	6	0	2
Aguijan			0(8)	3	2	1
Rota				4(1)	1	4
Rota Bank					4(3)	0
Guam						1(2)

Table 10: Number of spinner dolphin encounters and cataloged individuals by location and year, including between-year resights but excluding within-year resights. TBD = To Be Determined

	Marpi Reef		**Saipan**		**Tinian**		**Aguijan**		**Rota**		**Rota Bank**		**Guam**	
Year	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals	No. Encounters	No. Cataloged Individuals
2010	1	7	3	11	0	0	0	0	0	0	0	0	8	47
2011	2	17	4	18	2	4	1	22	7	23	1	15	9*	68
2012	2	22	6	23	0	0	1	1	1	2	1	12	6	66
2013	1	18	9	48	1	18	2	18	2	10	0	0	5	48
2014	1	TBD	3	TBD	1	TBD	1	TBD	0	0	0	0	3	TBD

*Six of the encounters were by HDR

Table 11: Number of cataloged spinner dolphin individuals matched between locations across all years (2010-2013). The numbers on the diagonal represent the number of cataloged individuals seen more than once at that location and in parentheses (the number of cataloged individuals encountered only once at that location).

	Marpi Reef	Saipan	Tinian	Aguijan	Rota	Rota Bank	Guam
Marpi Reef	16(11)	13	0	9	1	0	0
Saipan		28(27)	5	5	0	0	0
Tinian			3(11)	2	0	0	0
Aguijan				9(14)	1	0	0
Rota					19(10)	0	0
Rota Bank						8(9)	3
Guam							72(50)

Figures

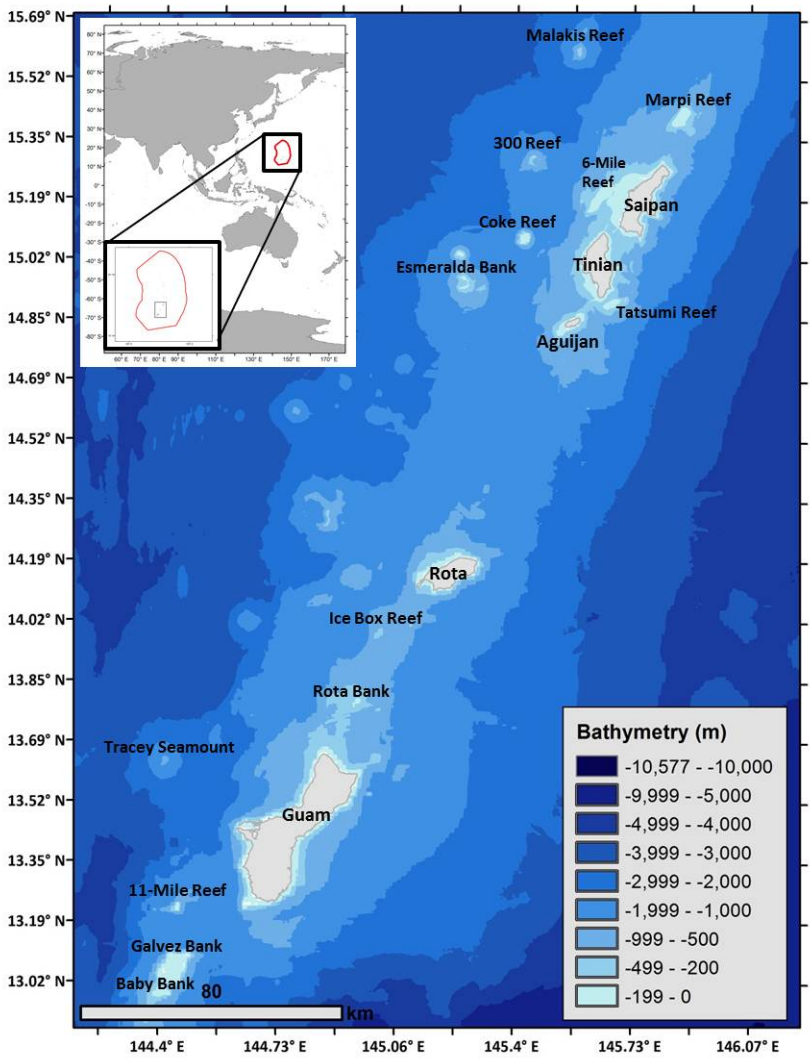

Figure 1: Survey locations of southern Marianas displaying bathymetry from all datasets combined in depth bins between 0 and 10,500 m. The inset shows the location of the Commonwealth of the Northern Mariana Islands (CNMI) Exclusive Economic Zone (EEZ) and the location of the study area within the CNMI EEZ.

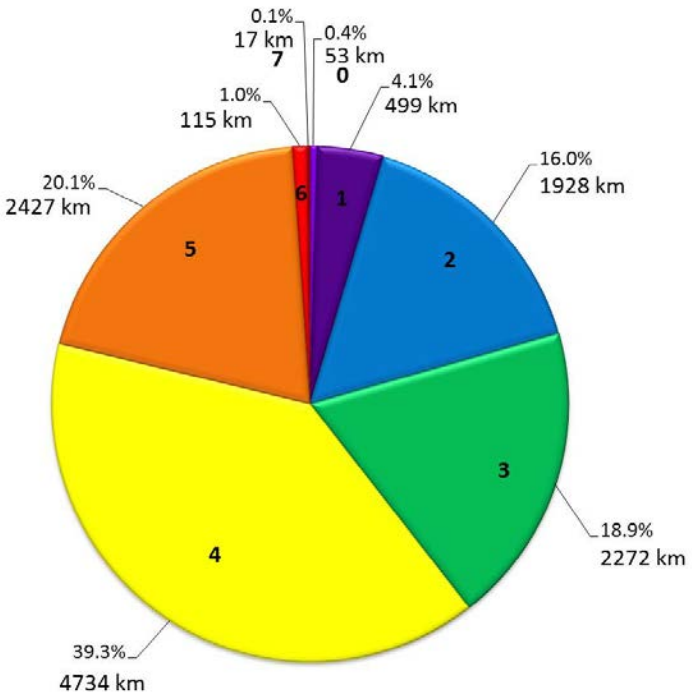

Figure 2: Beaufort sea state as a percentage of the total on-effort trackline distance (12,044 km) during the 2010-April 2014 surveys of the southern Mariana Islands.

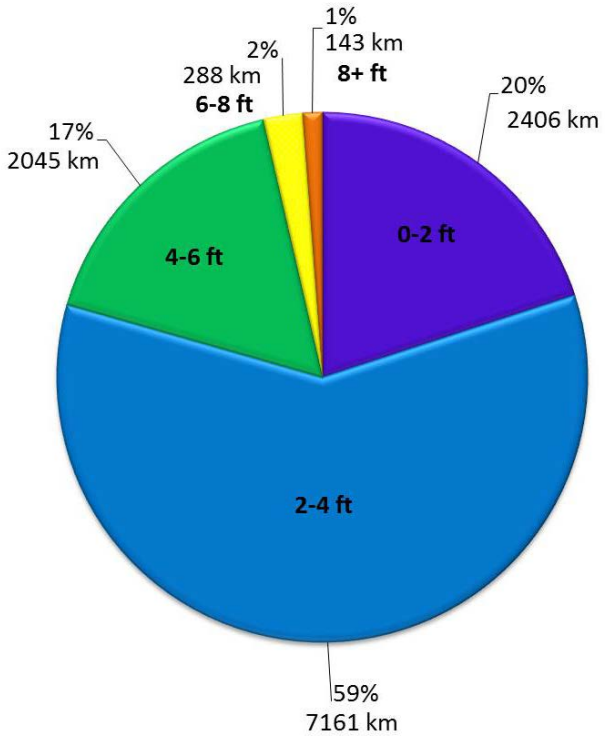

Figure 3: Swell height (ft) as a percentage of the total on-effort trackline distance (12,044 km) during the 2010-April 2014 surveys of the southern Mariana Islands.

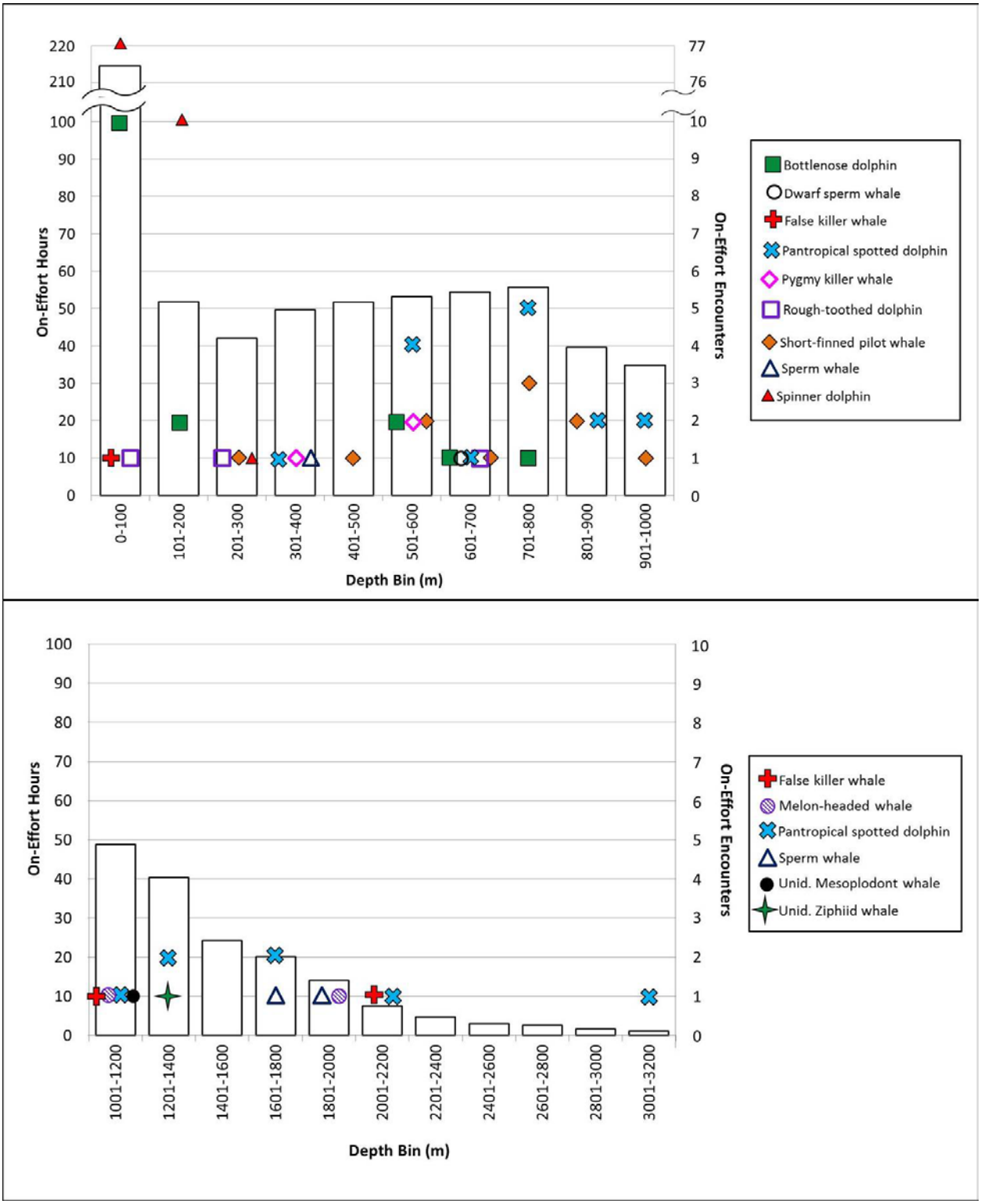

Figure 4: Distribution of cetacean encounters and search effort across depth profiles (including resights). The top panel displays depths 0-1000 m divided into 100 m interval depth bins for all locations combined. The bottom panel displays depths 1001-3200 m divided into 200 m interval depth bins for all locations combined. Total on-effort hours = 816.8.

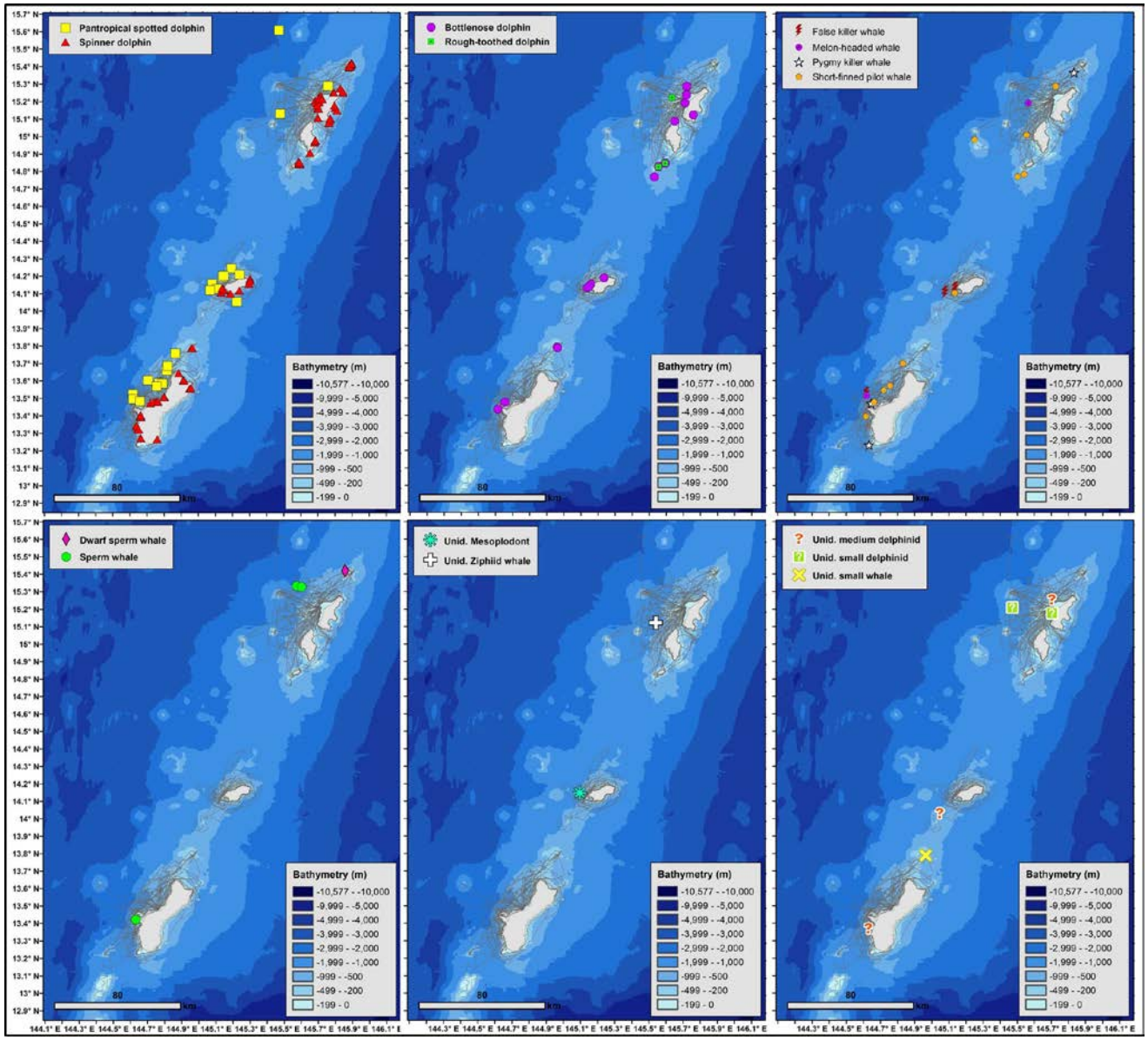

Figure 5: All cetacean encounter locations and survey tracklines 2010-April 2014.

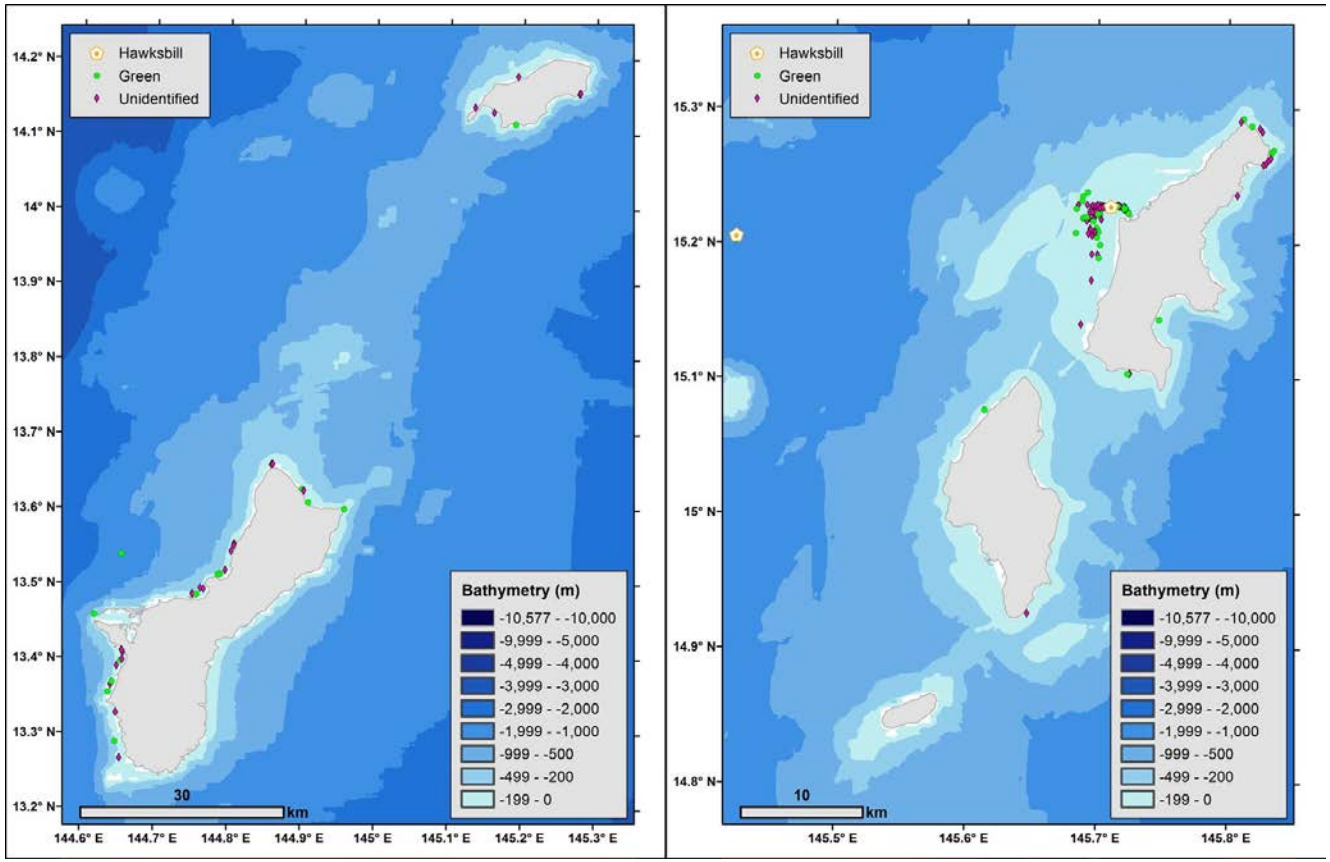

Figure 6: Sea turtle sightings 2012-April 2014.

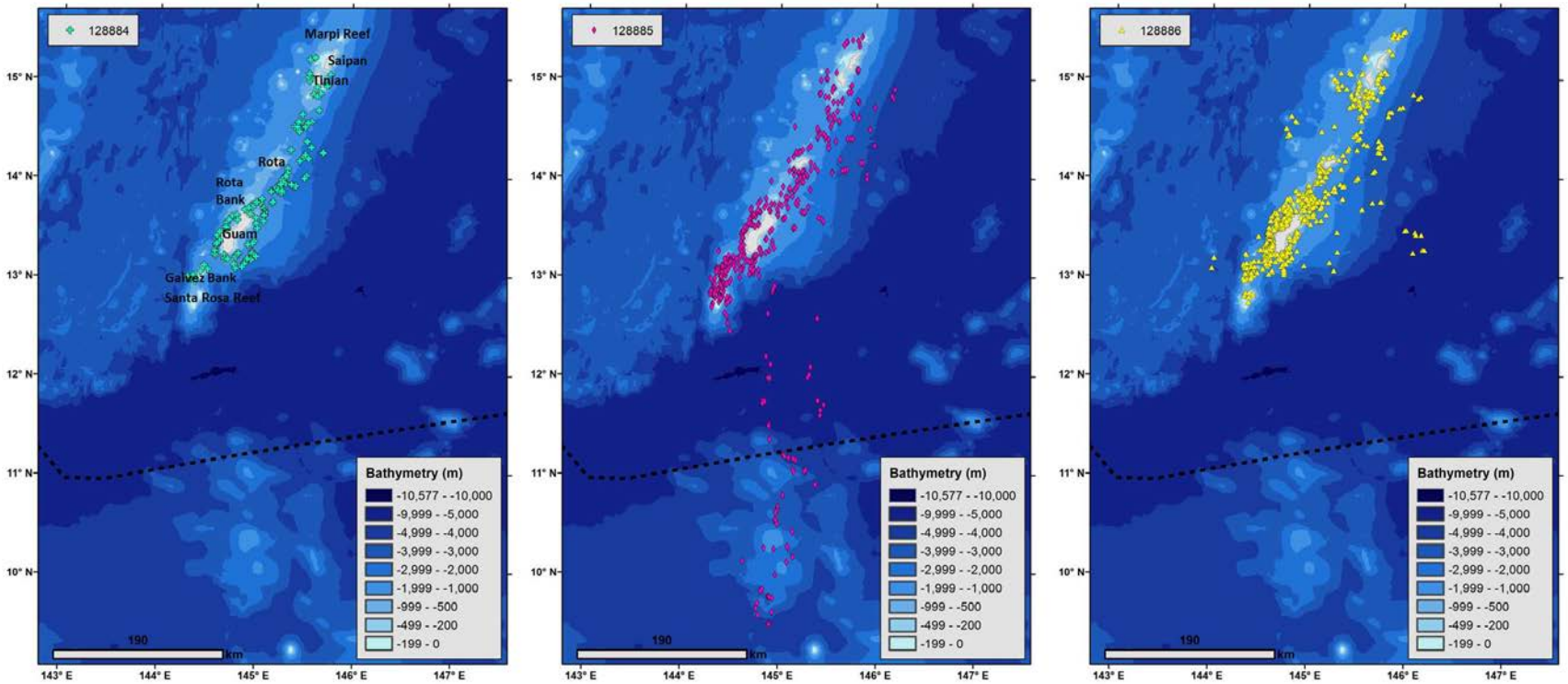

Figure 7: Satellite locations for tags 128884, 128885, and 128886 deployed on short-finned pilot whales off Guam in 2013. Deployment durations were 17.9 d, 64.0 d, and 234.7 d respectively. The dashed line is the EEZ boundary south of Guam. Islands and offshore reefs and banks are labelled on the first panel for reference.

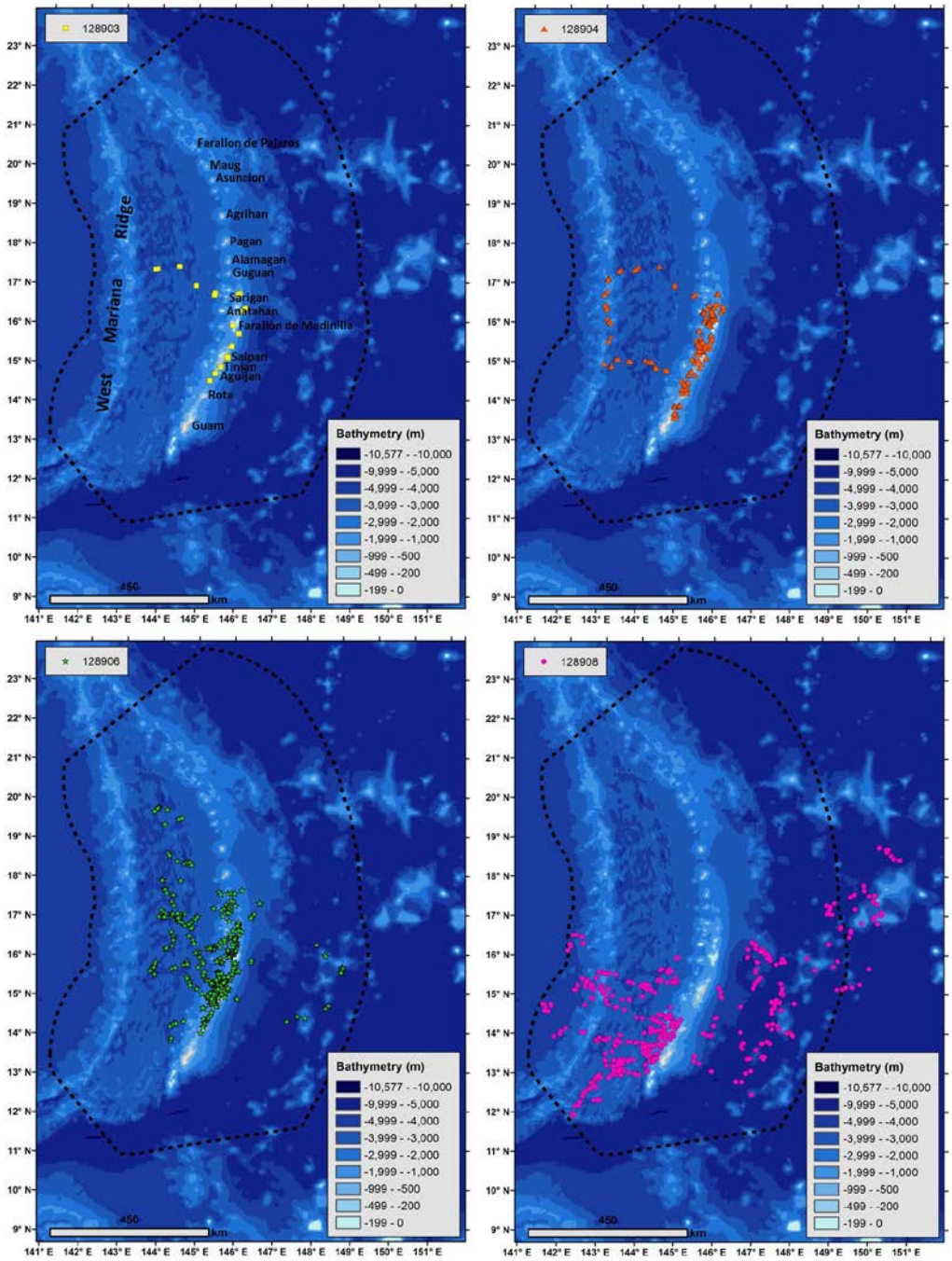

Figure 8: Satellite locations for tags 128903, 128904, 128906, and 128908 deployed on false killer whales off Rota in 2013. Deployment durations were 4.0 d, 22.3 d, 98.9 d, and 198.3 d respectively. The dashed line is the EEZ boundary surrounding Guam and CNMI. Islands and offshore reefs and banks are labelled on the first panel for reference.

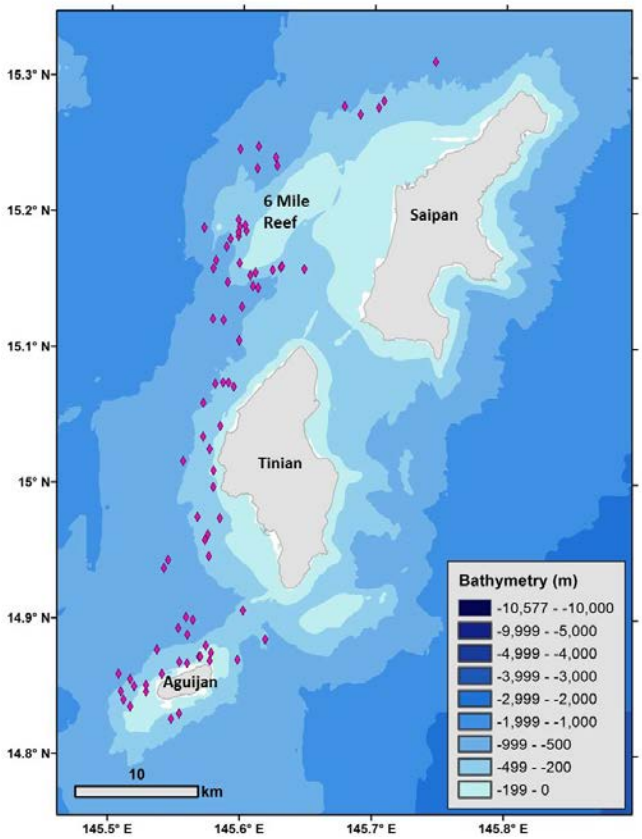

Figure 9: Satellite locations for tag 128896 deployed on a rough-toothed dolphin off Aguijan in 2013. The deployment duration was 11.7 d.

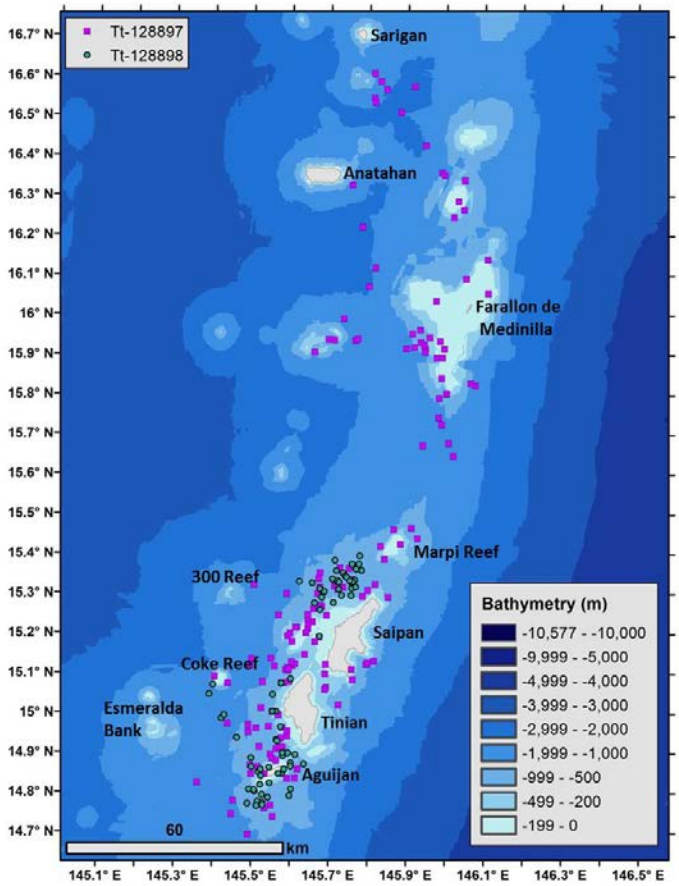

Figure 10: Satellite locations for tags 128897 and 128898 deployed on bottlenose dolphins off Aguijan and Saipan, respectively in 2013. Deployment durations were 20.5 d and 8.8 d respectively.

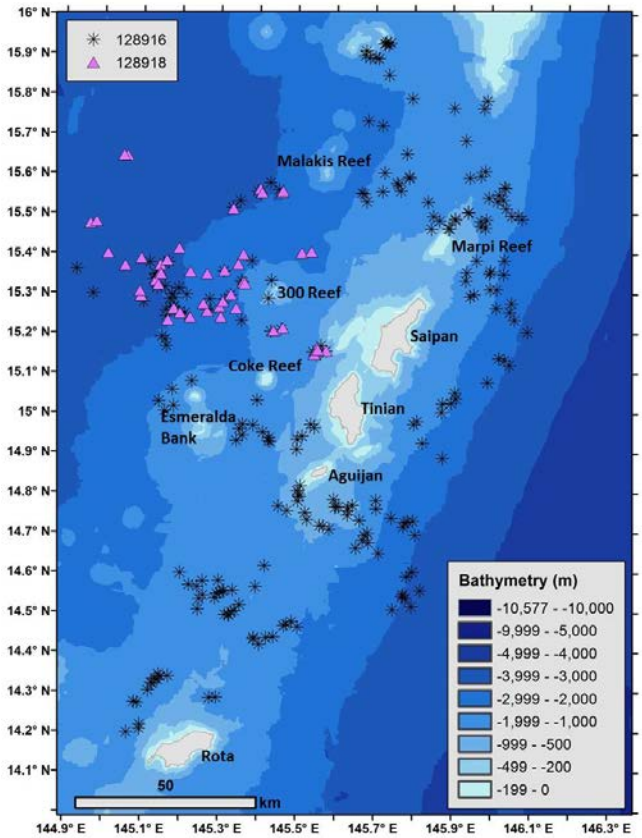

Figure 11: Satellite locations for tags 128916 and 128918 deployed on melon-headed whales off Saipan/Tinian in 2014. Deployment durations were 15.9 d and 3.1 d respectively.

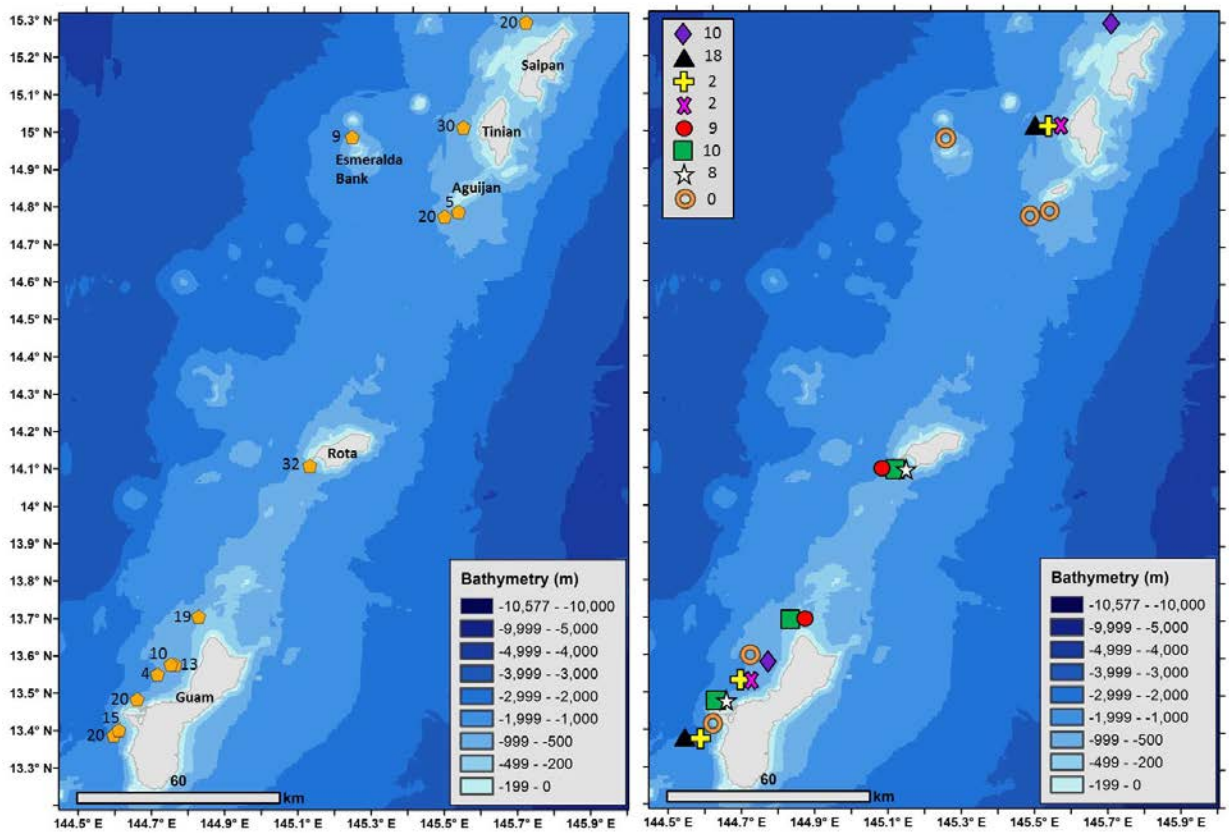

Figure 12: Short-finned pilot whale encounters and resights of individuals. The left panel displays the locations of encounters 2011-2013 (including those of HDR) and the number of cataloged individuals associated with each encounter. The right panel displays the resights of cataloged individuals. Each symbol represents a different group of individuals matched between locations. The numbers of individuals in each matched group are displayed in the legend.

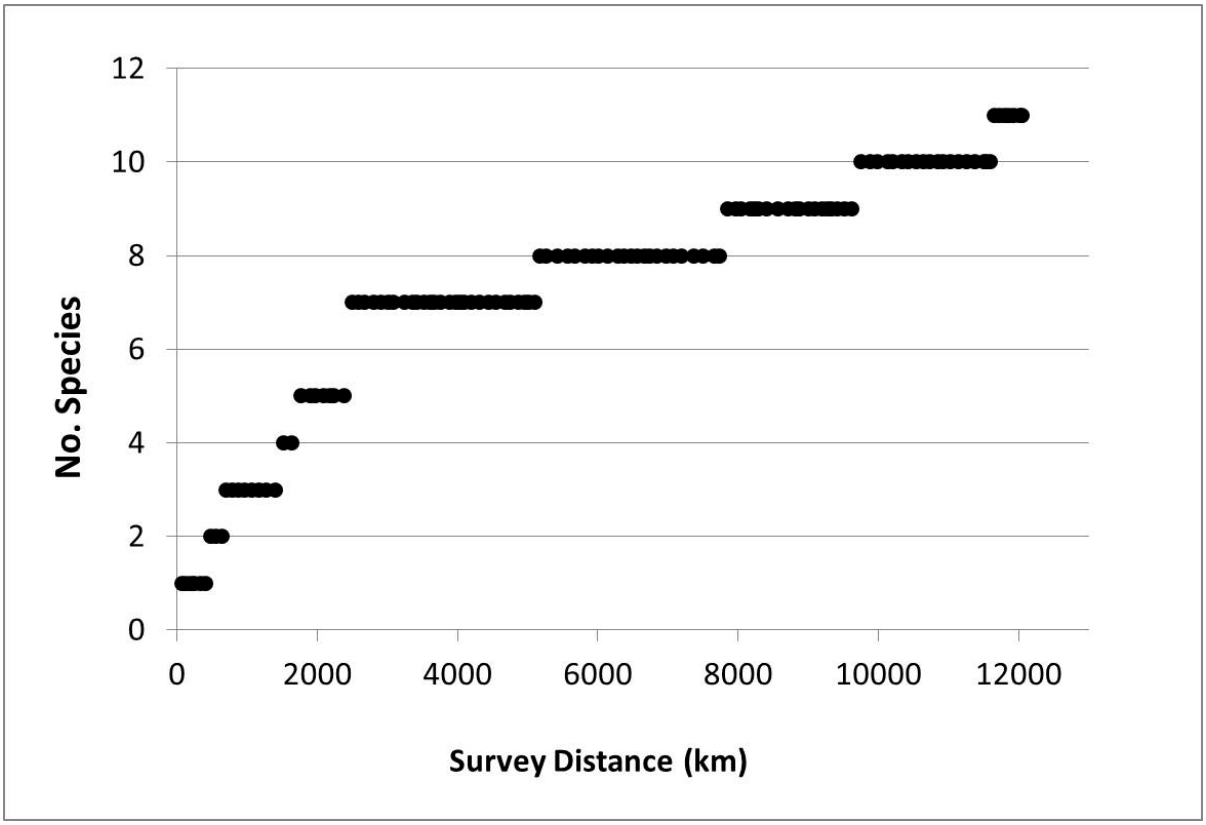

Figure 13: Species discovery by distance of trackline surveyed.

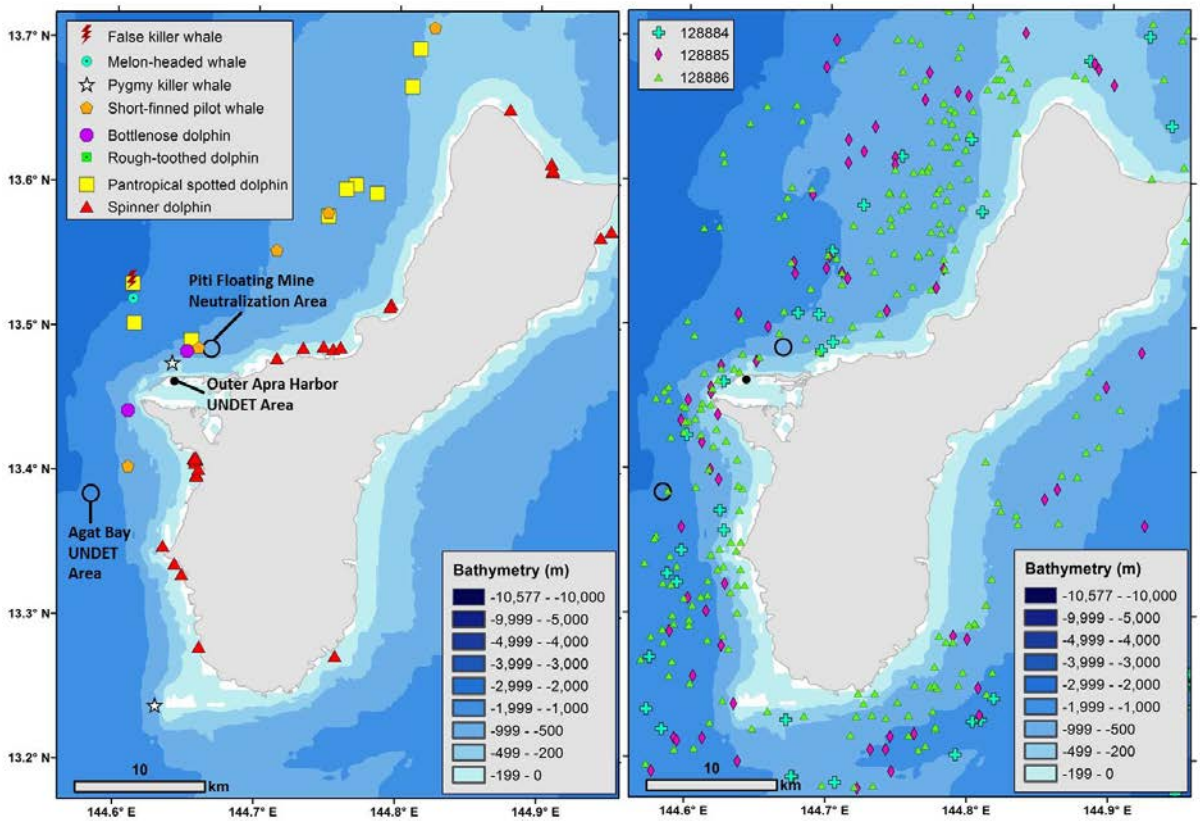

Figure 14: Navy underwater detonation and explosive ordnance areas, cetacean encounter locations and short-finned pilot whale satellite tag locations. The circles at the Piti Floating Mine Neutralization Area and the Agat Bay UNDET Area represent the 640 m exclusion zone around the detonation site.

Appendix:

Table 12: Details of the PIFSC small boat cetacean surveys of the southern Marianas (2010-April 2014).

Date	Vessel	Region	Harbor	Survey Location Description	On Effort Time	On Effort Distance (km)
2/9/2010	*Melakai*	Guam	Agat Marina	Guam SW nearshore loop (Orote Pt. to Cocos Is.)	5:09	66.8
2/10/2010	*Melakai*	Guam	Agat Marina	Guam-west nearshore loop-Tumon to Cocos Is.	5:43	61.9
2/11/2010	*Melakai*	Guam	Agat Marina	Guam SW nearshore loop (Orote Pt. to Cocos Is.)	5:25	67.0
2/12/2010	*Melakai*	Guam	Agat Marina	Guam SW nearshore loop (Agat Bay to Merizo)	4:37	51.5
2/13/2010	*Melakai*	Guam	Agat Marina	Guam-west nearshore loop-Agat Bay to Tumon Bay	7:27	86.4
2/14/2010	*Melakai*	Guam	Agat Marina	Guam SW offshore loop (Orote Pt. to Cocos Is.)	6:02	73.9
2/15/2010	*Melakai*	Guam	Hagåtña Boat Basin	Guam-NW nearshore to offshore loop	5:54	75.7
2/16/2010	*Lucky Strike*	Guam	Hagåtña Boat Basin	Guam-NW offshore loop	5:25	68.3
2/17/2010	*Ten-III*	Guam	Hagåtña Boat Basin	Guam-NW offshore loop (north of Ritidian)	5:58	90.7
2/18/2010	*Melakai*	Guam	Agat Marina	Guam-SW nearshore loop Agat Bay just north of Ritidian Pt.	5:18	51.1
2/22/2010	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan- NW offshore loop to Marpi Reef	6:29	91.2
2/23/2010	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan circumnavigation nearshore	6:32	84.7
2/24/2010	*Sea Hunter*	CNMI	Smiling Cove Marina	Tinian circumnavigation neashore	6:02	97.6
2/25/2010	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-west to 300 Reef	6:45	94.6
3/2/2010	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan/Tinian-west loop to Coke Reef	6:38	101.6
3/3/2010	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-NW offshore loop to Marpi Reef	6:41	101.6
08/26/2011	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagatna north and east to Katalina Pt.	8:35	135.4
08/27/2011	*Lucky Strike*	Guam	Hagåtña Boat Basin	Guam-west	8:25	112.9
08/28/2011	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagatna north and east to Hawaii Rock Quarry	8:56	123.5
08/29/2011	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagatna north to Rota Bank	9:07	123.9
08/30/2011	*Lucky Strike*	Guam	Hagåtña Boat Basin	counter clockwise circumnavigation	9:13	140.0
08/31/2011	*Lucky Strike*	Guam	Hagåtña Boat Basin	Guam-west	4:54	72.8
09/01/2011	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagatna around north to northeast	8:11	116.3
09/05/2011	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagatna south to Facpi Pt.	5:22	88.2
09/05/2011	*Anna Marie*	Guam	Agat Marina	Agat south to Cocos	3:26	55.3
09/07/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-Tinian-Aguijan circumnavigation	9:01	154.1
09/08/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-west & north to Marpi Reef	9:23	112.2
09/09/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan circumnavigation	6:11	84.9
09/10/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Tinian circumnavigation	6:30	94.1
09/12/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-Tinian_west-Coke Reef & 300 reef	7:23	125.5

Date	Vessel	Region	Harbor	Survey Location Description	On Effort Time	On Effort Distance (km)
09/14/2011	*Sr. Dung*	CNMI	Rota West	Rota circumnavigation	6:46	108.1
09/15/2011	*Sr. Dung*	CNMI	Rota West	Rota circumnavigation	7:40	97.8
09/16/2011	*Sr. Dung*	CNMI	Rota West	Rota west side	3:21	79.9
09/17/2011	*Sr. Dung*	CNMI	Rota West	"Ice Box" Reef & Rota circumnavigation	8:18	153.3
09/18/2011	*Sr. Dung*	CNMI	Rota West	Rota circumnavigation	7:49	122.6
09/19/2011	*Sr. Dung*	CNMI	Rota West	Rota circumnavigation	4:04	61.0
09/20/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-Tinian west side	5:39	98.1
09/21/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west side	5:11	87.7
09/22/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan north-west	3:52	54.6
09/23/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-Tinian west side	5:13	90.2
09/24/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Marpi Reef & Saipan west side	8:45	137.2
09/25/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan circumnavigation - nearshore	5:50	79.5
09/26/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-Tinian west side	3:41	60.1
09/27/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west side	3:18	53.4
09/28/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan north-west	6:38	112.1
09/29/2011	*Sea Hunter*	CNMI	Smiling Cove Marina	Tinian circumnavigation	9:24	116.4
5/25/2012	*Ten II*	Guam	Hagåtña Boat Basin	Hagåtña to NW & around north side	9:12	121.7
5/26/2012	*Ten II*	Guam	Hagåtña Boat Basin	Hagåtña to Rota Bank	9:10	114.2
5/27/2012	*Ten II*	Guam	Hagåtña Boat Basin	Hagåtña to 11 mile reef	7:59	121.3
5/28/2012	*Ten III*	Guam	Agat Marina	Agat to south of Cocos Is.	4:02	83.0
5/29/2012	*Sr. Dung*	CNMI	Rota West	Rota counterclockwise circumnavigation at 2-4km; then clockwise along north shore to ENE pt. & back at 2.5km	7:16	119.4
5/30/2012	*Sr. Dung*	CNMI	Rota West	Rota west & northwest out to 7km	5:00	73.7
6/1/2012	*Sr. Dung*	CNMI	Rota West	Rota west-southwest 13.5km out	3:10	64.5
6/2/2012	*Sr. Dung*	CNMI	Rota West	Rota clockwise circumnavigation- north offshore out to 13km to south nearshore	4:30	83.2
6/3/2012	*Sr. Dung*	CNMI	Rota West	Rota counterclockwise circumnavigation- close to north shore out to 3-6km off south shore	4:41	81.5
6/4/2012	*Sr. Dung*	CNMI	Rota West	Rota counterclockwise circumnavigation- close around entire shore then out to 5km off northwest shore	5:06	87.9
6/7/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west out to Malakis and 300 Reefs	9:07	156.9
6/8/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west -Tinian/Aguijan east - south of Naftan Rock	11:52	152.5
6/9/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west up to Marpi Reef	6:04	92.5
6/10/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Tinian west-toward Esmeralda Bank	11:18	153.3
6/11/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan circumnavigation clockwise-close on west side; out to 6km on east	6:47	102.9

Date	Vessel	Region	Harbor	Survey Location Description	On Effort Time	On Effort Distance (km)
6/13/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan and Tinian west to fads (II,HH & GG) and Coke Reef	5:23	89.3
6/14/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Tinian and Aguijan west along shore & offshore 6km	7:20	125.5
6/15/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west out to 300 Reef	8:21	142.2
6/16/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan clockwise circumnavigation along shore	7:08	95.9
6/17/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	HARP locations (NE Tinian to W Saipan- 300 Reef)	6:10	101.1
6/19/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west to 300 Reef south to west of Tinian north tip	4:57	79.5
6/20/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	off Tinian west side out to Coke Reef	6:24	105.0
6/22/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-Tinian east to HARP to Tinian-Saipan west	5:12	83.9
6/24/2012	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan northwest to Marpi Reef	6:29	99.9
6/26/2012	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña to Rota Bank	9:42	121.0
6/27/2012	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña to Tracey Seamount	7:48	106.3
6/29/2012	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña to Guam west	9:13	124.4
6/30/2012	*Ten III*	Guam	Agat Marina	Agat Bay to Guam east	10:04	167.2
7/1/2012	*Ten III*	Guam	Agat Marina	Agat to Galvez and Baby Banks	8:32	139.3
7/2/2012	*Proline 25*	Guam	Agat Marina	Guam west-Agat S to Cocos- N to double reef	9:51	157.8
7/3/2012	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña - NW Guam - Ledge Buoy	5:10	66.4
6/22/2013	*Proline 25*	Guam	Cabras Harbor	Apra Harbor north along shore then zig-zag south	5:49	122.8
6/23/2013	*Proline 25*	Guam	Cabras Harbor	Apra Harbor south zig zag to Cocos then north along shore	6:15	111.7
6/24/2013	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña north along 300 ftm line to wave buoy then south past Ledge Buoy and in near Buoy 1	5:04	74.3
6/25/2013	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña south to 11 Mile Reef	9:51	129.3
6/26/2013	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña north along 200 ftm contour to Ritidian Pt. out to ledge and back in to FAD Buoy 1	5:01	71.0
6/27/2013	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña west ~10nmi south to Apra Harbor	3:08	45.2
6/28/2013	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña to Rota Bank	8:51	122.3
6/29/2013	*Proline 25*	Guam	Cabras Harbor	Apra Harbor south around Cocos to Inarajan Bay out and back to SWside	7:10	162.6
6/30/2013	*Proline 25*	Guam	Cabras Harbor	Apra Harbor north around Ritidian Pt. to Spinner Bay	10:26	142.6
7/1/2013	*Proline 25*	Guam	Cabras Harbor	Apra Harbor north offshore then in to Double Reef - south tight along shore to Agat	6:44	105.3
7/4/2013	*Nacrina*	CNMI	Rota West	Rota West Harbor (Song Song Harbor) to out and around to Sasanhaya Bay then NE along west shore and back	2:55	63.1
7/5/2013	*Sr. Dung*	CNMI	Rota West	Rota circumnavigation counterclockwise at 3nmi distance	8:42	121.3
7/6/2013	*Sr. Dung*	CNMI	Rota West	Rota N following false killer whales 12nmi offshore	9:29	87.8

Date	Vessel	Region	Harbor	Survey Location Description	On Effort Time	On Effort Distance (km)
7/7/2013	*Nacrina*	CNMI	Rota West	Rota counterclockwise circumnavigation along shore then out to west	8:48	106.1
7/9/2013	*Sr. Dung*	CNMI	Rota West	Rota NW side - circuit ~1nmi from shore then out to 5nmi	7:02	75.1
7/10/2013	*Nacrina*	CNMI	Rota West	Rota west then inshore along NW coast	3:27	55.1
7/12/2013	*Regulator*	CNMI	Smiling Cove Marina	Saipan clockwise circumnavigation along shore	7:17	87.4
7/13/2013	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan and Tinian west sides out to Coke Reef and FADs (GG, FF, HH)	6:02	101.6
7/14/2013	*Sea Hunter*	CNMI	Smiling Cove Marina	Tinian NW to Saipan NW	7:10	113.1
7/15/2013	*Regulator*	CNMI	Smiling Cove Marina	West side off islands approximately 4-5 nmi around Aguijan then nearshore along Tinian west side	8:19	125.7
7/17/2013	*Regulator*	CNMI	Smiling Cove Marina	Zig-Zags off Saipan west side	9:10	137.8
7/18/2013	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west to Marpi Reef	7:17	100.6
7/19/2013	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-Tinian west out to Esmeralda Bank	9:04	143.6
7/20/2013	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west out to 300 Reef	5:24	77.6
7/21/2013	*Sea Hunter*	CNMI	Smiling Cove Marina	Tinian counterclockwise circumnavigation 3-6nmi offshore	7:47	118.8
7/23/2013	*Regulator*	CNMI	Smiling Cove Marina	Saipan NW circuit offshore	8:12	94.1
7/24/2013	*Regulator*	CNMI	Smiling Cove Marina	Tinian clockwise circumnavigation- alongshore on east side and SW side to offshore on NW	8:24	118.9
7/25/2013	*Regulator*	CNMI	Smiling Cove Marina	Saipan-Tinian west circuit offshore	5:33	100.8
7/26/2013	*Regulator*	CNMI	Smiling Cove Marina	Tinian west side	4:36	82.2
7/27/2013	*Regulator*	CNMI	Smiling Cove Marina	Saipan-Tinian west side to Aguijan north side	8:13	124.3
4/11/2014	*Regulator*	CNMI	Smiling Cove Marina	Saipan west side figure 8	4:55	69.5
4/12/2014	*Regulator*	CNMI	Smiling Cove Marina	Tinian east along shore to Tinian west out to FADs FF (missing) and GG	6:35	108.0
4/13/2014	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-Tinian west-300 & Coke reefs	7:05	120.8
4/14/2014	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan-Tinian west loop	7:15	110.9
4/15/2014	*Sea Hunter*	CNMI	Smiling Cove Marina	Saipan west -Marpi Reef-Saipan east	7:55	121.7
4/16/2014	*Regulator*	CNMI	Smiling Cove Marina	Saipan-Tinian west to Aguijan circumnavigation	9:28	121.7
4/17/2014	*Regulator*	CNMI	Smiling Cove Marina	Saipan west nearshore loop	2:06	30.9
4/18/2014	*Regulator*	CNMI	Smiling Cove Marina	Saipan west out to FADs II & HH	4:08	61.7
4/19/2014	*Regulator*	CNMI	Smiling Cove Marina	Saipan-Tinian loop	7:34	61.3
4/22/2014	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña - NW loop FAD3 to ledge buoy to Orote Pt.	5:07	75.3
4/23/2014	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña - west figure eight	4:42	64.8
4/24/2014	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña - west triangle	6:02	55.4
4/25/2014	*Lucky Strike*	Guam	Hagåtña Boat Basin	Hagåtña - southwest	5:39	81.1
4/26/2014	*Proline 25*	Guam	Cabras Harbor	Cabras - SW loop down to Cocos	5:30	81.8
4/27/2014	*Proline 25*	Guam	Cabras Harbor	Cabras - north along shore to Tumon Bay	1:50	28.7

Table 13: Details of sightings within the southern Marianas (2010- April 2014). The number of calves includes the best estimate of the young of the year and neonates combined.

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
2/9/2010	1	Spinner dolphin	7:44	Guam	13.4080	144.6580	29	S&S	0-100	0.29	2	0 to 2	40	0	rest	274	0	0	No
2/9/2010	2	Spinner dolphin	11:42	Guam	13.4070	144.6580	29	S&S	0-100	0.33	4	0 to 2	40	0	rest	167	0	0	No
2/10/2010	1	Spinner dolphin	7:28	Guam	13.3970	144.6580	38	S&S	0-100	0.42	2	0 to 2	35	1	rest	250	0	0	No
2/10/2010	2	Spinner dolphin	11:43	Guam	13.3350	144.6430	40	Contour-PIBHMC Guam 60m	0-100	0.22	3	0 to 2	22	3	rest	353	0	0	No
2/11/2010	1	Spinner dolphin	7:30	Guam	13.4050	144.6570	29	S&S	0-100	0.39	2	0 to 2	75	2	rest	491	0	0	No
2/11/2010	2	Unid. medium delphinid	10:24	Guam	13.3750	144.6240	702	PIBHMC Guam 60m	701-800	2.83	5	0 to 2	1	0	slow travel	8	0	0	No
2/12/2010	1	Spinner dolphin	7:41	Guam	13.3960	144.6580	38	S&S	0-100	0.39	2	0 to 2	85	3	rest	505	0	0	No
2/13/2010	1	Spinner dolphin	7:02	Guam	13.4080	144.6560	29	S&S	0-100	0.46	2	0 to 2	55	2	rest	240	2	0	No
2/14/2010	1	Spinner dolphin	7:05	Guam	13.4070	144.6570	29	S&S	0-100	0.44	1	0 to 2	60	2	rest	78	3	0	No
2/15/2010	1	Pantropical spotted dolphin	10:15	Guam	13.5290	144.6120	2079	PIBHMC Synthesis	2001-2100	7.65	5	2 to 4	17	0	travel	15	0	0	No
2/18/2010	1	Sperm whale	9:13	Guam	13.4260	144.6270	374	PIBHMC Guam 5m	301-400	1.10	2	0 to 2	9	0	log	418	3	0	No
2/22/2010	1	Spinner dolphin	7:04	Saipan	15.2487	145.7023	42	PIBHMC Saipan 5m	0-100	3.58	2	0 to 2	6	0	slow travel	72	0	0	No
2/22/2010	2	Spinner dolphin	9:40	Marpi Reef	15.4392	145.8839	74	PIBHMC Marpi 5m	0-100	18.24	3	2 to 4	36	3	mill	189	1	0	No
2/23/2010	1	Spinner dolphin	8:38	Saipan	15.2655	145.8346	80	PIBHMC Saipan 5m	0-100	0.53	4	0 to 2	10	0	bow ride	37	3	0	No
2/23/2010	2	Spinner dolphin	9:51	Saipan	15.1791	145.7890	33	PIBHMC Saipan 5m	0-100	0.48	3	2 to 4	32	3	mill	235	1	0	No
2/23/2010	3	Spinner dolphin	11:33	Saipan	15.1063	145.7575	81	PIBHMC Saipan 5m	0-100	0.36	4	2 to 4	35	1	mill	190	0	0	No
2/25/2010	1	Sperm whale	8:20	Saipan	15.3460	145.5590	1971	PIBHMC Synthesis	1901-2000	21.98	2	2 to 4	6	0	mill	281	2	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
3/3/2010	1	Spinner dolphin	9:02	Marpi Reef	15.4244	145.8822	71	PIBHMC Marpi 5m	0-100	16.69	5	4 to 6	12	1	mill	38	0	0	No
08/27/2011	1	Pantropical spotted dolphin	7:14	Guam	13.5986	144.7695	741	PIBHMC Guam 60m	701-800	6.50	3	4 to 6	4	0	leap/spin ; boat approach	0	0	0	No
08/27/2011	2	Short-finned pilot whale	7:51	Guam	13.5791	144.7501	825	PIBHMC Guam 60m	801-900	7.13	3	4 to 6	14	0	slow travel	389	7	0	No
08/28/2011	1	Spinner dolphin	14:56	Guam	13.5159	144.7951	37	PIBHMC Guam 5m	0-100	0.90	4	4 to 6	30	1	social; leap/spin	266	2	0	No
08/29/2011	1	Spinner dolphin	10:10	Rota Bank	13.7955	144.9532	126	S&S	101-200	18.29	3	6 to 8	45	3	mill	428	3	0	No
08/29/2011	2	Bottlenose dolphin	11:18	Rota Bank	13.7996	144.9539	100	S&S	0-100	18.71	3	6 to 8	14	2	mill	158	1	0	No
08/30/2011	1	Spinner dolphin	9:30	Guam	13.2720	144.7571	30	S&S	0-100	0.45	3	0 to 2	40	2	rest	320	3	0	No
08/31/2011	1	Pantropical spotted dolphin	8:38	Guam	13.6099	144.7002	905	S&S	901-1000	13.46	3	6 to 8	21	2	feed; fast travel	185	1	0	No
09/01/2011	1	Spinner dolphin	10:42	Guam	13.5630	144.9430	22	PIBHMC Guam 5m	0-100	0.40	3	0 to 2	55	2	mill	439	4	0	No
09/07/2011	2	Spinner dolphin	11:05	Aguijan	14.8557	145.5823	260	Contour-S&S	201-300	0.46	2	2 to 4	55	4	mill	619	6	0	No
09/08/2011	1	Unid. Medium delphinid	6:25	Saipan	15.2682	145.6886	464	PIBHMC SMAR 60m	401-500	6.17	2	2 to 4	1	0	slow travel	0	0	0	No
09/08/2011	2	Short-finned pilot whale	7:07	Saipan	15.3039	145.7113	570	PIBHMC SMAR 60m	501-600	8.17	1	2 to 4	34	5	slow travel	437	7	0	No
09/08/2011	3	Pygmy killer whale	10:58	Saipan-Marpi Reef	15.3799	145.8184	563	PIBHMC SMAR 60m	501-600	9.97	1	2 to 4	6	1	slow travel	256	0	0	No
09/08/2011	4	Spinner dolphin	11:55	Marpi Reef	15.4110	145.8704	62	PIBHMC Marpi 5m	0-100	14.80	0	2 to 4	42	3	mill	349	2	0	No
09/08/2011	5	Dwarf sperm whale	13:23	Marpi Reef	15.4373	145.8432	673	PIBHMC SMAR 60m	601-700	16.65	0	2 to 4	1	0	log	63	0	0	No
09/09/2011	1	Spinner dolphin	6:59	Saipan	15.2680	145.7790	65	PIBHMC Saipan 5m	0-100	0.75	3	0 to 2	65	2	fast travel	704	7	0	No
09/09/2011	2	Bottlenose dolphin	10:05	Saipan	15.1351	145.7456	36	PIBHMC Saipan 5m	0-100	0.36	2	2 to 4	10	0	mill	294	2	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
09/10/2011	1	Spinner dolphin	8:02	Tinian	14.9790	145.6681	30	PIBHMC Tinian 5m	0-100	0.20	4	0 to 2	40	5	leap/spin ; boat approach	483	2	0	No
09/10/2011	2	Spinner dolphin	9:10	Tinian	14.9202	145.6415	45	PIBHMC Tinian 5m	0-100	0.35	5	2 to 4	30	1	boat approach ; bow ride	31	0	0	No
09/10/2011	3	Bottlenose dolphin	11:14	Tinian	15.0990	145.6365	62	PIBHMC Tinian 5m	0-100	0.39	5	2 to 4	10	0	boat approach ; bow ride	222	1	0	No
09/12/2011	1	Unid. small delphinid	10:35	Saipan	15.2218	145.4556	1515	PIBHMC Synthesis	1501-1600	27.24	4	2 to 4	2	n/a	wag tail leap	0	0	0	No
09/14/2011	1	Spinner dolphin	6:57	Rota	14.1401	145.1307	34	PIBHMC Rota 5m	0-100	0.40	2	0 to 2	8	n/a	n/a	0	0	0	No
09/14/2011	2	Spinner dolphin	9:51	Rota	14.1095	145.1775	-	Contour-PIBHMC Rota 5m	0-100	0.25	3	0 to 2	18	0	slow travel	320	1	0	No
09/15/2011	1	Short-finned pilot whale	10:36	Rota	14.1136	145.1259	215	PIBHMC Rota 5m	201-300	0.53	4	2 to 4	38	1	slow travel	996	9	0	No
09/15/2011	2	Spinner dolphin	13:31	Rota	14.1156	145.1243	98	PIBHMC Rota 5m	0-100	0.25	4	2 to 4	13	0	mill	145	3	0	No
09/17/2011	1	Unid. medium delphinid	7:24	Rota	14.0397	145.0372	631	S&S	601-700	12.57	3	0 to 2	5	n/a	evasive	20	0	0	No
09/17/2011	2	Spinner dolphin	12:29	Rota	14.1953	145.2935	93	PIBHMC Rota 5m	0-100	0.64	4	0 to 2	18	n/a	mill	470	0	0	No
09/18/2011	1	Spinner dolphin	11:34	Rota	14.1839	145.2938	133	S&S	101-200	0.48	5	2 to 4	24	n/a	mill	343	1	0	No
09/18/2011	2	Spinner dolphin	13:46	Rota	14.1279	145.2310	90	PIBHMC Rota 5m	0-100	0.29	4	2 to 4	18	n/a	slow travel	214	2	0	No
09/19/2011	1	Spinner dolphin	7:34	Rota	14.1306	145.1409	72	PIBHMC Rota 5m	0-100	0.53	2	0 to 2	28	n/a	rest	263	0	0	No
09/19/2011	2	Spinner dolphin	9:35	Rota	14.1832	145.2947	133	S&S	101-200	0.61	4	2 to 4	40	n/a	mill	207	1	0	No
09/22/2011	1	Pantropical spotted dolphin	13:58	Saipan	15.3052	145.7457	562	PIBHMC SMAR 60m	501-600	6.07	4	2 to 4	40	n/a	slow travel	306	6	0	No
09/24/2011	1	Spinner dolphin	9:48	Marpi Reef	15.4328	145.8862	73	PIBHMC Marpi 5m	0-100	17.71	4	2 to 4	55	n/a	mill	393	3	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
09/25/2011	1	Spinner dolphin	9:06	Saipan	15.1926	145.7849	63	PIBHMC Saipan 5m	0-100	0.66	3	2 to 4	55	n/a	slow travel	377	6	0	No
09/25/2011	2-resight of 1	Spinner dolphin	11:29	Saipan	15.0922	145.7532	90	PIBHMC Saipan 5m	0-100	0.32	5	2 to 4	28	n/a	mill	72	3	0	No
09/25/2011	3	Spinner dolphin	12:18	Saipan	15.1200	145.6864	66	PIBHMC Saipan 5m	0-100	0.34	4	0 to 2	18	n/a	slow travel	28	0	0	No
09/29/2011	1	Unid. small delphinid	7:25	Saipan	15.1909	145.6911	26	PIBHMC Saipan 5m	0-100	2.57	2	0 to 2	1	n/a	n/a	0	0	0	No
09/29/2011	2	Spinner dolphin	9:22	Tinian	14.9878	145.6725	56	PIBHMC Tinian 5m	0-100	0.32	5	2 to 4	6	n/a	moderate travel	193	0	0	No
09/29/2011	3	Short-finned pilot whale	11:51	Tinian	15.0219	145.5413	724	PIBHMC SMAR 60m	701-800	4.43	4	2 to 4	33	n/a	moderate travel	792	6	0	No
5/25/2012	1	Spinner dolphin	12:55	Guam	13.6085	144.9086	31	S&S	0-100	0.33	1	0 to 2	18	1	mill, rest, leap/spin, boat approach, bow ride, evasive	374	2	0	No
5/26/2012	2	Pantropical spotted dolphin	7:45	Guam	13.6667	144.8088	505	PIBHMC Guam 60m	501-600	5.05	3	2 to 4	35	0	mill, feed, boat approach, bow ride, leap/spin	148	3	0	No
5/26/2012	3	Short-finned pilot whale	8:19	Guam	13.7076	144.8246	469	PIBHMC Guam 60m	401-500	6.98	3	2 to 4	30	1	slow travel, boat approach, spy hop, dive, evasive, log	676	3	0	Yes
5/26/2012	4	Pantropical spotted dolphin	11:07	Guam	13.7654	144.8582	523	S&S	501-600	12.29	3	2 to 4	22	0	boat approach, bow ride, leap/spin, mod trav	113	4	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
5/29/2012	5	Bottlenose dolphin	10:23	Rota	14.1621	145.1491	43	PIBHMC Rota 5m	0-100	0.52	3	2 to 4	12	0	slow travel, boat approach, bow ride, mill, evasive	340	2	0	No
5/30/2012	6	Pantropical spotted dolphin	8:56	Rota	14.1655	145.0710	1195	PIBHMC Rota 60m	1101-1200	7.05	5	4 to 6	70	1	fast travel, boat approach, bow ride, leap/spin, feed, mill	604	4	0	No
6/2/2012	7	Pantropical spotted dolphin	6:54	Rota	14.2545	145.1845	870	PIBHMC Rota 60m	801-900	8.11	4	2 to 4	12	0	boat approach, bow ride, mod trav	127	1	0	No
6/3/2012	8	Unid. Mesoplodon whale	10:49	Rota	14.1563	145.0866	1032	PIBHMC Rota 60m	1001-1100	5.09	5	4 to 6	2	0	slow travel, dive	37	0	0	No
6/4/2012	9	Spinner dolphin	7:08	Rota	14.1831	145.2920	133	S&S	101-200	0.35	5	4 to 6	33	0	boat approach, bow ride, mill	30	0	0	No
6/4/2012	10	Pantropical spotted dolphin	9:27	Rota	14.1383	145.0999	773	PIBHMC Rota 60m	701-800	2.79	4	2 to 4	11	0	boat approach, mod trav, bow ride, spy hop	83	2	0	No
6/7/2012	11	Pantropical spotted dolphin	9:53	Saipan Offshore-Malakis Reef	15.6227	145.4533	3012	PIBHMC Synthesis	3001-3100	52.81	4	2 to 4	45	0	evasive, low swim	213	0	0	No
6/8/2012	12	Spinner dolphin	6:35	Saipan	15.1765	145.6872	35	PIBHMC Saipan 5m	0-100	2.53	1	0 to 2	29	1	slow travel, boat approach, bow ride, evasive	401	1	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
6/8/2012	13	Spinner dolphin	10:23	Aguijan	14.8525	145.5788	79	S&S	0-100	0.28	2	2 to 4	12	0	boat approach, bow ride, evasive, dive, low swim	122	1	0	No
6/8/2012	14a	Short-finned pilot whale	12:09	Aguijan	14.7827	145.4912	676	PIBHMC SMAR 60m	601-700	8.33	2	2 to 4	22	1	slow travel, dive, evasive, spy hop	534	3	0	Yes
6/8/2012	14b	Bottlenose dolphin	13:08	Aguijan	14.7785	145.5184	734	PIBHMC SMAR 60m	701-800	7.34	1	2 to 4	5	0	mod trav, boat approach, bow ride	116	1	0	No
6/8/2012	14c	Short-finned pilot whale	14:59	Aguijan	14.7960	145.5292	553	PIBHMC SMAR 60m	501-600	5.13	2	2 to 4	19	1	slow travel, evasive, dive	200	0	0	No
6/9/2012	15	Spinner dolphin	10:48	Marpi Reef	15.4218	145.8792	68	PIBHMC Marpi 5m	0-100	16.28	2	4 to 6	90	0	spin, boat approach, leap, bow ride, social, tail slap, mill	710	2	0	No
6/10/2012	16	Unid. Ziphiid whale	7:31	Saipan	15.1349	145.5257	1352	PIBHMC Synthesis	1301-1400	11.80	3	4 to 6	2	0	log, dive	0	0	0	No
6/10/2012	17	Short-finned pilot whale	11:52	Esmeralda Bank	14.9935	145.2356	720	PIBHMC Synthesis	701-800	36.28	1	4 to 6	23	1	slow travel, dive, spy hop, mill, evasive	373	2	0	No
6/11/2012	18	Spinner dolphin	6:18	Saipan	15.2292	145.6915	8	PIBHMC Saipan 5m	0-100	2.91	1	2 to 4	8	0	slow travel, mill, rest	330	1	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
6/11/2012	19	Spinner dolphin	7:58	Saipan	15.2896	145.8181	105	PIBHMC Saipan 5m	101-200	0.34	3	4 to 6	24	0	boat approach, bow ride, spin, leap	180	3	0	No
6/14/2012	20	Spinner dolphin	10:12	Aguijan	14.8687	145.5752	103	S&S	101-200	0.31	4	2 to 4	12	0	leap, boat approach	4	0	0	No
6/16/2012	21	Spinner dolphin	9:35	Saipan	15.2730	145.8341	39	PIBHMC Saipan 5m	0-100	0.40	4	4 to 6	60	1	leap, mill, spin, boat approach, bow ride	676	2	0	No
6/16/2012	22	Spinner dolphin	12:02	Saipan	15.1631	145.7994	76	PIBHMC Saipan 5m	0-100	0.42	5	4 to 6	15	0	surf, boat approach, bow ride, leap	24	0	0	No
6/16/2012	23	Spinner dolphin	13:11	Saipan	15.1179	145.7599	75	PIBHMC Saipan 5m	0-100	0.34	5	2 to 4	23	0	boat approach, bow ride	47	0	0	No
6/24/2012	24	Spinner dolphin	9:33	Marpi Reef	15.4210	145.8763	64	PIBHMC Marpi 5m	0-100	16.07	5	4 to 6	20	1	leap, boat approach, bow ride, evasive, low swim	104	0	0	No
6/26/2012	25	Pantropical spotted dolphin	7:03	Guam	13.5955	144.7627	784	PIBHMC Guam 60m	701-800	6.90	2	2 to 4	55	0	leap, boat approach, bow ride, mill	599	4	0	Yes

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
6/26/2012	26	Pantropical spotted dolphin	9:25	Guam	13.6928	144.8144	517	PIBHMC Guam 60m	501-600	6.35	3	2 to 4	24	0	leap, boat approach, bow ride, mod trav, evasive	130	4	0	No
6/26/2012	27	Bottlenose dolphin	11:34	Rota Bank	13.7958	144.9563	126	S&S	101-200	18.49	2	2 to 4	5	0	mill, rest, evasive	141	0	0	No
6/26/2012	29	Unid. small whale	11:37	Rota Bank	13.7976	144.9562	343	S&S	301-400	21.31	2	2 to 4	1	0	slow travel	0	0	0	No
6/26/2012	28	Spinner dolphin	12:33	Rota Bank	13.7950	144.9584	126	S&S	101-200	18.53	2	2 to 4	45	0	rest, boat approach, bow ride	189	3	0	No
6/29/2012	30	Bottlenose dolphin	9:36	Guam	13.4410	144.6093	559	PIBHMC Guam 60m	501-600	1.10	4	2 to 4	7	0	bow ride, boat approach, slow travel	285	2	0	No
6/29/2012	31	Spinner dolphin	14:41	Guam	13.5140	144.7942	28	PIBHMC Guam 5m	0-100	0.88	3	2 to 4	43	0	rest	215	0	0	No
6/30/2012	32	Spinner dolphin	15:38	Guam	13.3473	144.6346	50	S&S	0-100	0.62	1	0 to 2	8	0	rest, social, tail slap, leap, boat approach	346	0	0	No
7/2/2012	33	Spinner dolphin	7:28	Guam	13.3277	144.6481	14	S&S	0-100	0.20	1	0 to 2	14	0	rest, boat approach, bow ride, leap, social, evasive	440	1	0	Yes

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
7/2/2012	34	Spinner dolphin	9:04	Guam	13.2775	144.6607	17	S&S	0-100	0.28	2	0 to 2	65	1	rest, leap, spin, boat approach, bow ride, social, evasive	987	0	0	No
7/2/2012	35	Spinner dolphin	12:25	Guam	13.4779	144.7144	33	PIBHMC Guam 5m	0-100	0.46	3	0 to 2	18	0	rest	360	0	0	No
7/2/2012	36	Pantropical spotted dolphin	15:07	Guam	13.5927	144.7845	652	PIBHMC Guam 60m	601-700	4.77	3	0 to 2	35	1	mod trav, leap, boat approach, bow ride, porpoise	465	5	0	No
7/3/2012	37	Spinner dolphin	6:10	Guam	13.4862	144.7475	52	PIBHMC Guam 5m	0-100	0.51	1	0 to 2	22	1	Nose out, rest	796	0	0	No
06/22/2013	1	False killer whale	11:52	Guam	13.5310	144.6114	2107	PIBHMC Synthesis	2101-2200	7.88	5	2 to 4	4	1	slow travel, boat approach, bow ride, breach	28	0	0	No
06/23/2013	2	Spinner dolphin	10:56	Guam	13.4007	144.6595	-	Contour-PIBHMC Guam 5m	0-100	0.34	4	0 to 2	25	0	rest	520	0	0	No
06/25/2013	3	Pantropical spotted dolphin	7:12	Guam	13.5018	144.6131	1658	PIBHMC Guam 60m	1601-1700	4.87	4	2 to 4	19	0	boat approach, bow ride, porpoise	155	3	0	No
06/25/2013	4	Pygmy killer whale	14:11	Guam	13.4744	144.6402	379	PIBHMC Guam 60m	301-400	1.07	4	2 to 4	8	0	low swim, slow travel, log	578	4	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
06/28/2013	5	Spinner dolphin	6:05	Guam	13.4845	144.7543	37	PIBHMC Guam 5m	0-100	0.31	1	0 to 2	20	0	rest, social, boat approach, bow ride	381	0	0	No
06/30/2013	6a	Bottlenose dolphin	6:13	Guam	13.4823	144.6507	671	PIBHMC Guam 60m	601-700	1.94	2	0 to 2	8	0	boat approach, bow ride, mod trav	67	0	0	No
06/30/2013	6b	Short-finned pilot whale	6:20	Guam	13.4847	144.6589	809	PIBHMC Guam 60m	801-900	2.12	2	0 to 2	29	1	boat approach, bow ride, slow travel, dive	1004	2	1	No
06/30/2013	6c	Short-finned pilot whale	8:19	Guam	13.5526	144.7137	967	PIBHMC Guam 60m	901-1000	8.08	2	0 to 2	4	0	slow travel, fluke-up, dive	379	2	1	No
06/30/2013	7	Spinner dolphin	10:52	Guam	13.6514	144.8784	29	S&S	0-100	0.52	4	2 to 4	4	0	boat approach, bow ride	95	1	0	No
06/30/2013	8	Spinner dolphin	11:27	Guam	13.6140	144.9079	22	PIBHMC Guam 5m	0-100	0.42	4	2 to 4	34	0	rest, boat approach, bow ride, porpoise	109	0	0	No
06/30/2013	9	Spinner dolphin	12:53	Guam	13.5673	144.9506	49	PIBHMC Guam 5m	0-100	0.69	4	2 to 4	55	1	boat approach, bow ride, mill, spin, leap	432	3	0	No
06/30/2013	8-resight	Spinner dolphin	14:31	Guam	13.6097	144.9090	22	PIBHMC Guam 5m	0-100	0.44	4	2 to 4	34	0	boat approach, bow ride, porpoise	312	0	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
06/30/2013	10	Pantropical spotted dolphin	16:02	Guam	13.4899	144.6537	994	PIBHMC Guam 60m	901-1000	2.78	4	2 to 4	11	0	leap, boat approach, bow ride	157	1	0	No
07/01/2013	11	Short-finned pilot whale	12:54	Guam	13.4023	144.6097	781	PIBHMC Guam 60m	701-800	3.87	4	0 to 2	17	0	slow travel, mill, boat approach, bow ride, spy hop	1179	5	1	No
07/05/2013	12	Pantropical spotted dolphin	6:35	Rota	14.2057	145.1323	756	PIBHMC Rota 60m	701-800	5.10	5	2 to 4	4	0	boat approach, bow ride, feed	48	1	0	No
07/05/2013	12-resight	Pantropical spotted dolphin	7:50	Rota	14.1293	145.0591	1261	PIBHMC Rota 60m	1201-1300	6.76	5	4 to 6	10	0	boat approach, bow ride	128	6	0	No
07/05/2013	13	Pantropical spotted dolphin	10:19	Rota	14.0657	145.2172	1334	PIBHMC Rota 60m	1301-1400	5.51	4	4 to 6	6	0	boat approach, bow ride, tail slap	60	3	0	No
07/06/2013	14a	False killer whale	6:03	Rota	14.1405	145.1260	88	PIBHMC Rota 5m	0-100	0.72	2	0 to 2	17	0	slow travel, boat approach, bow ride, breach, porpoise, feed	2161	9	3	No
07/06/2013	14b	Bottlenose dolphin	6:05	Rota	14.1405	145.1260	88	PIBHMC Rota 5m	0-100	0.72	2	2 to 4	2	0	boat approach bow ride	3	0	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
07/06/2013	15	Pantropical spotted dolphin	14:25	Rota	14.2132	145.1377	779	PIBHMC Rota 60m	701-800	5.52	4	2 to 4	35	1	leap, boat approach, bow ride, porpoise, tail slap	322	4	0	No
07/07/2013	16	Spinner dolphin	8:18	Rota	14.1673	145.2878	-	Contour-PIBHMC Rota 5m	0-100	0.35	3	2 to 4	60	0	spin, leap, boat approach, bow ride, rest	392	3	0	No
07/07/2013	17	False killer whale	11:22	Rota	14.1143	145.0680	1190	PIBHMC Rota 60m	1101-1200	5.78	2	2 to 4	15	0	slow travel, boat approach, bow ride, porpoise, feed, spy hop, social	1162	7	1	No
07/09/2013	18	Spinner dolphin	6:10	Rota	14.1389	145.1287	36	PIBHMC Rota 5m	0-100	0.40	2	2 to 4	14	0	slow travel, mill	34	0	0	No
07/09/2013	19	Bottlenose dolphin	6:28	Rota	14.1470	145.1375	26	PIBHMC Rota 5m	0-100	0.55	4	2 to 4	12	0	slow travel, boat approach bow ride, porpoise, tail slap, spy hop, fish chase (flying fish)	805	1	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
07/09/2013	20	Pantropical spotted dolphin	8:57	Rota	14.2205	145.2305	333	PIBHMC Rota 5m	301-400	2.47	4	2 to 4	50	1	leap, boat approach, bow ride, porpoise, mod trav	621	0	0	No
07/10/2013	21	Bottlenose dolphin	10:47	Rota	14.1976	145.2267	34	S&S	0-100	0.37	4	2 to 4	8	0	boat approach, bow ride, porpoise, breach	337	0	0	No
07/12/2013	22	Spinner dolphin	6:52	Saipan	15.2661	145.7792	33	PIBHMC Saipan 5m	0-100	0.61	2	2 to 4	25	0	rest, boat approach, bow ride, leap, spin, tail slap	538	2	0	No
07/12/2013	23	Spinner dolphin	8:25	Saipan	15.2725	145.8340	37	PIBHMC Saipan 5m	0-100	0.39	5	2 to 4	40	0	boat approach, bow ride, spin, leap, porpoise	406	3	0	No
07/12/2013	24	Spinner dolphin	11:08	Saipan	15.1164	145.7585	58	PIBHMC Saipan 5m	0-100	0.24	5	4 to 6	25	0	boat approach, bow ride, spin	313	1	0	No
07/13/2013	25	Pantropical spotted dolphin	10:00	Tinian	15.1438	145.4633	1761	PIBHMC Synthesis	1701-1800	17.47	5	2 to 4	30	0	boat approach, bow ride, porpoise	58	0	0	No
07/13/2013	26*	Spinner dolphin	12:13	Saipan	15.2283	145.7057	12	PIBHMC Saipan 5m	0-100	1.54	4	0 to 2	25	0	boat approach, bow ride, slow travel	565	0	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
07/14/2013	27	Spinner dolphin	6:13	Saipan	15.2054	145.6808	33	PIBHMC Saipan 5m	0-100	3.68	4	2 to 4	14	0	boat approach, porpoise	45	0	0	No
07/15/2013	28	Spinner dolphin	9:40	Aguijan	14.8625	145.5803	-	Contour-S&S	0-100	0.19	4	4 to 6	25	1	spin, leap, boat approach, bow ride	463	0	0	No
07/15/2013	29a	Bottlenose dolphin	10:21	Aguijan	14.8576	145.5831	122	S&S	101-200	0.53	4	4 to 6	11	0	boat approach, bow ride, porpoise, mod trav, social, sex, play	123	0	1	No
07/15/2013	29b	Rough-toothed dolphin	10:22	Aguijan	14.8567	145.5820	260	S&S	201-300	0.41	4	4 to 6	6	0	slow travel, boat approach, bow ride, social	297	1	1	No
07/15/2013	29c	Spinner dolphin	10:35	Aguijan	14.8606	145.5827	122	S&S	101-200	0.40	4	4 to 6	2	0	boat approach, bow ride	9	0	0	No
07/17/2013	30	Bottlenose dolphin	12:29	Saipan	15.2505	145.7060	37	PIBHMC Saipan 5m	0-100	3.61	2	0 to 2	3	0	slow travel, boat approach, bow ride	132	1	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
07/17/2013	31	Bottlenose dolphin	13:49	Saipan	15.2041	145.6968	18	PIBHMC Saipan 5m	0-100	1.96	2	0 to 2	6	0	social, boat approach, bow ride, porpoise, mod trav, evasive	447	3	1	No
07/18/2013	32	Spinner dolphin	8:42	Marpi Reef	15.4197	145.8687	67	PIBHMC Marpi 5m	0-100	15.60	3	2 to 4	8	1	spin, boat approach	15	0	0	No
07/18/2013	33	Spinner dolphin	9:20	Marpi Reef	15.4135	145.8752	75	PIBHMC Marpi 5m	0-100	15.28	2	2 to 4	65	2	spin, boat approach, bow ride, porpoise, tail slap, rest	279	0	0	No
07/18/2013	33-resight	Spinner dolphin	10:53	Marpi Reef	15.4315	145.8867	82	PIBHMC Marpi 5m	0-100	17.61	4	2 to 4	55	1	spin, leap, social, porpoise, rest	337	0	0	No
07/19/2013	34	Spinner dolphin	6:31	Saipan	15.2179	145.6702	182	PIBHMC Saipan 5m	101-200	4.87	2	0 to 2	7	0	slow travel, boat approach, bow ride	239	1	0	No
07/20/2013	35	Rough-toothed dolphin	17:17	Saipan	15.2340	145.6200	616	PIBHMC SMAR 60m	601-700	10.44	1	0 to 2	4	0	slow travel, boat approach, bow ride	299	1	0	No
07/21/2013	36	Spinner dolphin	7:09	Saipan	15.2104	145.6957	20	PIBHMC Saipan 5m	0-100	2.16	1	0 to 2	17	0	mill, tail slap, social, rest chuffing, boat approach	511	0	0	No
07/21/2013	37	Spinner dolphin	14:17	Saipan	15.1734	145.6914	32	PIBHMC Saipan 5m	0-100	1.97	1	0 to 2	17	0	rest	44	0	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
07/23/2013	38	Sperm whale	6:54	Saipan	15.3423	145.5861	1617	PIBHMC Synthesis	1601-1700	19.53	4	2 to 4	8	0	blow, mill, evasive, breach, fluke-up, dive	213	1	0	No
07/23/2013	39	Bottlenose dolphin	12:32	Saipan	15.2989	145.7068	528	PIBHMC SMAR 60m	501-600	8.01	4	2 to 4	5	0	boat approach, bow ride, tail slap	200	1	0	No
07/24/2013	40	Spinner dolphin	6:30	Saipan	15.1923	145.6830	28	PIBHMC Saipan 5m	0-100	3.45	1	0 to 2	30	0	rest, boat approach, bow ride, tail slap, evasive	404	1	0	No
07/24/2013	41	Spinner dolphin	8:35	Tinian	14.9912	145.6727	58	PIBHMC Tinian 5m	0-100	0.28	4	2 to 4	45	0	boat approach, bow ride, porpoise, spin	664	4	0	No
07/27/2013	42	Spinner dolphin	8:58	Aguijan	14.8593	145.5817	122	S&S	101-200	0.31	4	2 to 4	40	1	spin, boat approach, bow ride, porpoise, rest	449	1	0	No
04/11/2014	1	Spinner dolphin	8:02	Saipan	15.2347	145.6905	24	PIBHMC Saipan 5m	0-100	3.3	4	2 to 4	28	0	slow travel, rest, boat approach	118	0	0	No
04/12/2014	2	Spinner dolphin	7:41	Tinian	14.9912	145.6733	65	PIBHMC Tinian 5m	0-100	0.4	5	4 to 6	40	2	boat approach, bow ride leap, spin	357	0	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
04/14/2014	3	Spinner dolphin	7:00	Saipan	15.2279	145.6929	12	PIBHMC Saipan 5m	0-100	2.7	2	2 to 4	32	1	slow travel, synch dive/surface, tail slap, boat approach, bow ride	303	0	0	No
04/14/2014	4-resight of 3	Spinner dolphin	13:46	Saipan	15.2282	145.7126	12	PIBHMC Saipan 5m	0-100	1.1	4	0 to 2	30	0	mill, synch dive/surface, bow ride	388	0	0	No
04/15/2014	5	Spinner dolphin	9:03	Marpi Reef	15.4321	145.8854	71	PIBHMC Marpi 5m	0-100	17.6	3	4 to 6	81	0	mill, synch dive/surface, boat approach, bow ride, social, leap, spin, tail slap	746	0	0	No
04/16/2014	6	Spinner dolphin	8:55	Aguijan	14.8640	145.5801	-	Contour-S&S	0-100	0.2	4	2 to 4	41	1	boat approach, bow ride, mill, synch dive/surface, leap, spin, wave riding	405	0	0	No
04/16/2014	7a	Bottlenose dolphin	10:15	Aguijan	14.8378	145.5424	-	Contour-S&S	0-100	0.3	4	2 to 4	16	0	slow travel, mill, boat approach, bow ride, social, leap	703	0	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
04/16/2014	7b	Rough-toothed dolphin	10:20	Aguijan	14.8359	145.5420	-	Contour-S&S	0-100	0.5	4	2 to 4	11	0	slow travel, boat approach, bow ride, social	703	0	0	No
04/19/2014	8	Melon-headed whale	6:58	Saipan	15.2027	145.5497	1014	S&S	1001-1100	15.1	3	4 to 6	325	8	slow travel, bow ride, boat approach, social, tail slap, spy hop, chasing, head slap	3496	10	3	No
04/23/2014	9	Pantropical spotted dolphin	6:45	Guam	13.5765	144.7502	821	PIBHMC Guam 60m	801-900	7.0	4	2 to 4	50	0	boat approach, bow ride, leap	308	0	0	No
04/24/2014	10	Melon-headed whale	7:10	Guam	13.5184	144.6123	1975	PIBHMC Synthesis	1901-2000	6.5	4	2 to 4	85	3	slow travel, boat approach, bow ride, leap, spy hop, social	1809	9	0	No
04/25/2014	11	Spinner dolphin	10:55	Guam	13.4851	144.7331	32	PIBHMC Guam 5m	0-100	0.6	5	2 to 4	22	1	bow ride, mill, synch dive/surface, boat approach	188	0	0	No
04/26/2014	12	Pygmy killer whale	8:15	Guam	13.2370	144.6299	575	PIBHMC Guam 60m	501-600	5.1	3	2 to 4	9	1	slow travel, log, fluke-up	212	0	0	No

Date	Sight No.	Species-Common	Time (+10 GMT)	Location	Latitude	Longitude	Depth (m)	Bathymetry Source	Depth Bin	Distance to Shore (km)	Beaufort	Swell Height (ft)	Group Size Best	No. Calves	Behavior	No. Photos	No. Biopsy Sample	No. Tags	Acoustic Record
04/26/2014	13	Spinner dolphin	11:09	Guam	13.4082	144.6571	29	S&S	0-100	0.3	4	2 to 4	24	0	mill, synch dive/surface, boat approach, social, tail slap, head slap, spy hop	318	0	0	No
04/27/2014	14	Spinner dolphin	7:14	Guam	13.4859	144.7595	37	S&S	0-100	0.8	2	2 to 4	55	0	mill, synch dive/surface, rest	188	0	0	No

Table 14: Sea turtle sightings 2012- April 2014.

Date	Time (+10 GMT)	Island	Latitude	Longitude	Description
5/25/2012	12:44	Guam	13.6242	144.9028	Turtle-med (1.5-2.5 ft)
5/25/2012	15:33	Guam	13.5528	144.8083	Turtle-med (1.5-2.5 ft)
5/25/2012	15:34	Guam	13.5502	144.8078	Turtle-small (<1.5 ft)
5/25/2012	15:38	Guam	13.5425	144.8044	Turtle-med (1.5-2.5 ft)
5/27/2012	13:34	Guam	13.5378	144.6550	Green Turtle-small (<1.5 ft)
5/28/2012	6:31	Guam	13.3974	144.6570	Turtle-med (1.5-2.5 ft)
7/2/2012	6:41	Guam	13.4099	144.6560	Turtle-small (<1.5 ft)
7/2/2012	6:49	Guam	13.4093	144.6563	Turtle-small (<1.5 ft)
7/2/2012	8:40	Guam	13.3266	144.6486	Turtle-small (<1.5 ft)
7/2/2012	10:14	Guam	13.2659	144.6540	Turtle-med (1.5-2.5 ft)
7/2/2012	13:46	Guam	13.4847	144.7572	Green Turtle-med (1.5-2.5 ft)
7/2/2012	17:12	Guam	13.3673	144.6432	Green Turtle-med (1.5-2.5 ft)
6/22/2013	8:26	Guam	13.5172	144.7966	Turtle-large (>2.5 ft)
6/23/2013	10:36	Guam	13.3537	144.6375	Green Turtle-med (1.5-2.5 ft)
6/23/2013	10:49	Guam	13.3887	144.6495	Turtle-med (1.5-2.5 ft)
6/23/2013	10:52	Guam	13.3958	144.6547	Green Turtle-med (1.5-2.5 ft)
6/23/2013	12:16	Guam	13.4062	144.6576	Turtle-med (1.5-2.5 ft)
6/24/2013	11:19	Guam	13.4852	144.7518	Turtle-med (1.5-2.5 ft)
6/28/2013	6:33	Guam	13.4929	144.7625	Turtle-med (1.5-2.5 ft)
6/29/2013	10:39	Guam	13.2879	144.6476	Green Turtle-large (>2.5 ft)
6/30/2013	10:44	Guam	13.6585	144.8586	Turtle-med (1.5-2.5 ft)
6/30/2013	10:45	Guam	13.6590	144.8602	Turtle-med (1.5-2.5 ft)
6/30/2013	11:22	Guam	13.6261	144.9002	Green Turtle-small (<1.5 ft)
6/30/2013	12:34	Guam	13.5996	144.9578	Green Turtle-med (1.5-2.5 ft)
6/30/2013	14:27	Guam	13.6082	144.9087	Green Turtle-small (<1.5 ft)
7/1/2013	8:53	Guam	13.4573	144.6183	Green Turtle-med (1.5-2.5 ft)
4/23/2014	10:17	Guam	13.5126	144.7895	Green Turtle-med (1.5-2.5 ft)
4/23/2014	10:19	Guam	13.5113	144.7863	Green Turtle-med (1.5-2.5 ft)
4/26/2014	10:52	Guam	13.3636	144.6410	Turtle-med (1.5-2.5 ft)
4/26/2014	10:54	Guam	13.3668	144.6426	Turtle-small (<1.5 ft)
4/27/2014	7:57	Guam	13.4921	144.7669	Turtle-med (1.5-2.5 ft)
5/30/2012	6:59	Rota	14.1138	145.1885	3x Green Turtle-large (>2.5 ft); 2 mating
6/1/2012	8:48	Rota	14.1293	145.1590	Turtle-med (1.5-2.5 ft)
7/7/2013	8:12	Rota	14.1547	145.2754	Turtle-med (1.5-2.5 ft)
7/7/2013	8:13	Rota	14.1555	145.2771	Turtle-med (1.5-2.5 ft)
7/7/2013	10:32	Rota	14.1776	145.1919	Turtle-med (1.5-2.5 ft)
7/10/2013	12:52	Rota	14.1363	145.1332	Turtle-med (1.5-2.5 ft)
6/7/2012	15:29	Saipan	15.2284	145.7018	Turtle-med (1.5-2.5 ft)
6/8/2012	18:38	Saipan	15.2272	145.7052	2x Turtle-med (1.5-2.5 ft)
6/8/2012	18:42	Saipan	15.2279	145.7160	Turtle-small (<1.5 ft)
6/9/2012	8:51	Saipan	15.2277	145.6960	Turtle-small (<1.5 ft)
6/10/2012	17:40	Saipan	15.2277	145.7100	Hawksbill-small <1.5 ft
6/11/2012	7:01	Saipan	15.2379	145.6920	Turtle-med (1.5-2.5 ft)
6/11/2012	12:01	Saipan	15.1037	145.7247	Turtle-large (>2.5 ft)
6/11/2012	12:02	Saipan	15.1034	145.7229	Green Turtle-med (1.5-2.5 ft)
6/11/2012	12:27	Saipan	15.1400	145.6873	Turtle-small (<1.5 ft)
6/11/2012	12:47	Saipan	15.1894	145.7005	Green Turtle-small (<1.5 ft)
6/11/2012	12:58	Saipan	15.2086	145.6979	Turtle-small (<1.5 ft); Turtle-large (>2.5 ft)

Date	Time (+10 GMT)	Island	Latitude	Longitude	Description
6/11/2012	13:12	Saipan	15.2258	145.7212	Turtle-small (<1.5 ft)
6/13/2012	8:10	Saipan	15.2275	145.7146	Green Turtle-small (<1.5 ft)
6/14/2012	6:25	Saipan	15.2259	145.7012	Turtle-small (<1.5 ft)
6/14/2012	7:17	Saipan	15.2219	145.6999	Green Turtle-small (<1.5 ft)
6/14/2012	14:30	Saipan	15.2075	145.6927	Turtle-med (1.5-2.5 ft)
6/16/2012	8:09	Saipan	15.2279	145.7143	Turtle-small (<1.5 ft)
6/16/2012	9:26	Saipan	15.2856	145.8235	2x Turtle-med (1.5-2.5 ft)
6/16/2012	9:28	Saipan	15.2830	145.8254	Turtle-med (1.5-2.5 ft)
6/16/2012	11:04	Saipan	15.2636	145.8319	Turtle-med (1.5-2.5 ft)
6/16/2012	12:57	Saipan	15.1434	145.7468	Green Turtle-med (1.5-2.5 ft)
6/16/2012	15:23	Saipan	15.2241	145.6994	Turtle-small (<1.5 ft)
6/16/2012	15:32	Saipan	15.2257	145.7200	Green Turtle-med (1.5-2.5 ft)
6/17/2012	16:24	Saipan	15.2261	145.7202	Green Turtle-small (<1.5 ft)
6/19/2012	8:45	Saipan	15.2275	145.7169	Turtle-small (<1.5 ft)
6/19/2012	8:52	Saipan	15.2288	145.6997	Turtle-small (<1.5 ft)
6/19/2012	14:04	Saipan	15.2258	145.6836	Green Turtle-med (1.5-2.5 ft)
6/19/2012	14:10	Saipan	15.2273	145.6980	Turtle-small (<1.5 ft)
6/19/2012	14:12	Saipan	15.2278	145.7036	Turtle-small (<1.5 ft)
6/20/2012	6:15	Saipan	15.2238	145.6981	Turtle-med (1.5-2.5 ft)
6/20/2012	12:33	Saipan	15.2103	145.6945	Turtle-small (<1.5 ft)
6/22/2012	13:27	Saipan	15.2233	145.6956	Turtle-small (<1.5 ft)
6/22/2012	13:30	Saipan	15.2263	145.7014	Turtle-med (1.5-2.5 ft)
6/22/2012	13:31	Saipan	15.2268	145.7037	Turtle-med (1.5-2.5 ft)
6/24/2012	12:49	Saipan	15.2314	145.6879	Green Turtle-small (<1.5 ft)
6/24/2012	12:57	Saipan	15.2281	145.7078	Green Turtle-med (1.5-2.5 ft)
7/12/2013	8:09	Saipan	15.2906	145.8090	Turtle-small (<1.5 ft)
7/12/2013	8:13	Saipan	15.2874	145.8174	Green Turtle-med (1.5-2.5 ft)
7/12/2013	8:55	Saipan	15.2694	145.8340	Green Turtle-med (1.5-2.5 ft)
7/12/2013	9:20	Saipan	15.2675	145.8324	Green Turtle-large (>2.5 ft)
7/12/2013	9:25	Saipan	15.2616	145.8298	Turtle-med (1.5-2.5 ft)
7/12/2013	9:27	Saipan	15.2592	145.8282	Turtle-med (1.5-2.5 ft)
7/12/2013	9:27	Saipan	15.2585	145.8261	Turtle-med (1.5-2.5 ft)
7/12/2013	9:42	Saipan	15.2358	145.8065	Turtle-med (1.5-2.5 ft)
7/12/2013	13:22	Saipan	15.2052	145.6986	Turtle-med (1.5-2.5 ft)
7/13/2013	12:05	Saipan	15.2187	145.6884	Green Turtle-med (1.5-2.5 ft)
7/13/2013	12:05	Saipan	15.2194	145.6893	Green Turtle-med (1.5-2.5 ft)
7/13/2013	12:15	Saipan	15.2280	145.7046	Green Turtle-med (1.5-2.5 ft)
7/13/2013	12:53	Saipan	15.2169	145.6914	Turtle-med (1.5-2.5 ft)
7/13/2013	13:07	Saipan	15.2265	145.7194	Green Turtle-small (<1.5 ft)
7/14/2013	14:09	Saipan	15.2270	145.6983	2x Green Turtle-med (1.5-2.5 ft)
7/15/2013	5:58	Saipan	15.2273	145.7181	Green Turtle-med (1.5-2.5 ft)
7/15/2013	14:21	Saipan	15.2257	145.7019	Green Turtle-med (1.5-2.5 ft)
7/15/2013	14:32	Saipan	15.2238	145.7227	Green Turtle-med (1.5-2.5 ft)
7/17/2013	13:36	Saipan	15.2077	145.6831	Green Turtle-med (1.5-2.5 ft)
7/17/2013	15:19	Saipan	15.2044	145.6991	Green Turtle-med (1.5-2.5 ft)
7/17/2013	15:20	Saipan	15.2088	145.7002	Green Turtle-med (1.5-2.5 ft)
7/18/2013	14:08	Saipan	15.2273	145.7200	Green Turtle-med (1.5-2.5 ft)
7/19/2013	15:20	Saipan	15.2258	145.6988	Green Turtle-med (1.5-2.5 ft)
7/19/2013	15:22	Saipan	15.2269	145.7033	Green Turtle-med (1.5-2.5 ft)
7/19/2013	15:29	Saipan	15.2261	145.7206	Turtle-med (1.5-2.5 ft)
7/20/2013	12:51	Saipan	15.2274	145.6953	Turtle-small (<1.5 ft)
7/20/2013	18:20	Saipan	15.2274	145.6976	Green Turtle-med (1.5-2.5 ft)
7/21/2013	7:03	Saipan	15.2275	145.7041	2x Turtle-med (1.5-2.5 ft)
7/21/2013	7:04	Saipan	15.2260	145.7008	Turtle-small (<1.5 ft)
7/21/2013	7:05	Saipan	15.2249	145.6999	Turtle-small (<1.5 ft)

Date	Time (+10 GMT)	Island	Latitude	Longitude	Description
7/21/2013	7:06	Saipan	15.2215	145.6982	Turtle-med (1.5-2.5 ft)
7/21/2013	7:40	Saipan	15.2059	145.6954	Turtle-med (1.5-2.5 ft)
7/21/2013	14:50	Saipan	15.1919	145.6954	Turtle-small (<1.5 ft)
7/23/2013	13:58	Saipan	15.2285	145.6849	Turtle-med (1.5-2.5 ft)
7/24/2013	6:11	Saipan	15.2223	145.7232	Green Turtle-large (>2.5 ft)
7/24/2013	6:19	Saipan	15.2184	145.6969	Turtle-med (1.5-2.5 ft)
7/24/2013	6:20	Saipan	15.2164	145.6962	Green Turtle-large (>2.5 ft)
7/24/2013	6:22	Saipan	15.2109	145.6939	Turtle-med (1.5-2.5 ft)
7/24/2013	14:34	Saipan	15.2196	145.6913	Green Turtle-large (>2.5 ft)
7/25/2013	11:35	Saipan	15.2225	145.6960	Turtle-small (<1.5 ft)
7/25/2013	11:45	Saipan	15.2255	145.7204	Green Turtle-med (1.5-2.5 ft)
7/26/2013	10:50	Saipan	15.2234	145.6936	Turtle-med (1.5-2.5 ft)
7/26/2013	10:51	Saipan	15.2254	145.6964	Green Turtle-med (1.5-2.5 ft)
7/26/2013	10:52	Saipan	15.2260	145.6983	Turtle-med (1.5-2.5 ft)
7/26/2013	10:54	Saipan	15.2273	145.7035	Green Turtle-med (1.5-2.5 ft)
7/26/2013	10:56	Saipan	15.2277	145.7080	Turtle-med (1.5-2.5 ft)
7/26/2013	10:59	Saipan	15.2276	145.7163	Green Turtle-med (1.5-2.5 ft)
7/27/2013	6:00	Saipan	15.2262	145.7209	Green Turtle-med (1.5-2.5 ft)
4/11/2014	8:10	Saipan	15.2351	145.6885	Green Turtle-large (>2.5 ft)
4/11/2014	9:54	Saipan	15.2924	145.8111	Green Turtle-large (>2.5 ft)
4/13/2014	9:28	Saipan	15.2052	145.4238	Hawksbill-small <1.5 ft
4/14/2014	14:15	Saipan	15.2281	145.7154	Turtle-small (<1.5 ft)
4/14/2014	14:17	Saipan	15.2273	145.7199	Turtle-small (<1.5 ft)
4/15/2014	6:20	Saipan	15.2287	145.6917	Turtle-med (1.5-2.5 ft)
4/15/2014	13:50	Saipan	15.1727	145.6950	Turtle-med (1.5-2.5 ft)
4/15/2014	13:58	Saipan	15.1918	145.6997	Turtle-small (<1.5 ft)
4/15/2014	14:05	Saipan	15.2105	145.6982	Turtle-med (1.5-2.5 ft)
4/15/2014	14:05	Saipan	15.2105	145.6982	Turtle-small (<1.5 ft)
4/16/2014	15:35	Saipan	15.2208	145.7004	Green Turtle-small (<1.5 ft)
4/16/2014	15:36	Saipan	15.2218	145.7014	Green Turtle-small (<1.5 ft)
4/17/2014	8:07	Saipan	15.1989	145.7016	Green Turtle-med (1.5-2.5 ft)
4/17/2014	8:16	Saipan	15.2178	145.7025	Turtle-med (1.5-2.5 ft)
4/18/2014	10:14	Saipan	15.2179	145.6913	Turtle-med (1.5-2.5 ft)
4/18/2014	10:15	Saipan	15.2182	145.6919	Turtle-med (1.5-2.5 ft)
4/18/2014	10:15	Saipan	15.2189	145.6932	Turtle-med (1.5-2.5 ft)
4/18/2014	10:29	Saipan	15.2248	145.7199	Green Turtle-med (1.5-2.5 ft)
4/18/2014	10:30	Saipan	15.2238	145.7218	Turtle-small (<1.5 ft)
4/19/2014	13:39	Saipan	15.2115	145.6988	Green Turtle-med (1.5-2.5 ft)
4/19/2014	13:47	Saipan	15.2278	145.7156	Green Turtle-small (<1.5 ft)
4/19/2014	13:47	Saipan	15.2272	145.7183	Green Turtle-small (<1.5 ft)
6/14/2012	8:23	Tinian	15.0766	145.6140	Green Turtle-med (1.5-2.5 ft)
4/12/2014	9:11	Tinian	14.9257	145.6471	Turtle-med (1.5-2.5 ft)