

Incidence and strandings of the Spinner Dolphin, *Stenella longirostris*, in Saipan Lagoon

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Abstract—The spinner dolphin, *Stenella longirostris*, has been observed throughout the Commonwealth of the Northern Mariana Islands and most notably in Saipan Lagoon, where there was a series of strandings in 1995. Recent documented reports of these occurrences were examined. Identified dolphins were primarily females associated with sub-adults or juveniles. A single dead male was found to have its stomach engorged with seagrass. Reliable observations in the Mariana Islands spanning 1995 – 2001 and strandings during 1995 in Saipan Lagoon are presented.

Introduction

The causes of cetacean strandings have been a topic of increasing interest in recent years (Geraci & Lounsbury 1993). Klinowska (1985) hypothesized alterations in the geomagnetic topography near landmasses in the United Kingdom caused confusion in the cetacean magnetic sense, resulting in disorientation and subsequent stranding. Brabyn & Frew (1994) surmised that geomagnetic alterations were not the cause of strandings in New Zealand, while Hui (1992) found no relationship between free-ranging dolphins and magnetic patterns. Other theories include ill health (Odell et al. 1989) potentially triggered by excessive hydrocarbon exposure (Marsili and Focardi 1997), neuropathy caused by parasitic infection (Ridgeway & Dailey 1972), currents or coastal topography (Brabyn & McLean 1992), and stranding due to falling tides and topographical obstacles (Geraci & Lounsbury 1993). Dolphin stranding has also been observed due to Killer Whale (*Orcinus orca*) predation (Wapstra 1991).

The spinner dolphin is found throughout the Pacific region, primarily as the pantropical form, *Stenella longirostris longirostris*, which is replaced in the eastern Pacific off Central America by the eastern spinner, *S. l. orientalis*, and the Central American spinner, *S. l. centroamericana* (Perrin et al. 1981, 1991, Gilpatrick et al. 1987). A fourth subspecies, *S. l. roseiventris* is distributed in shallow inner waters of Southeast Asia, including the Gulf of Thailand, Timor and Arafura Seas, and similar waters off Indonesia, Malaysia and Northern Australia. It is replaced in offshore waters by the pantropical form (Perrin et al. 1999). Whether the species that occupies the Mariana Islands is the pantropical form or another subspecies has not been determined.

Strandings of spinner dolphins have been documented from Hawai'i (Migaki et al. 1990), Florida (Mead et al. 1980, Anderson & Rawson 1997) and Yemen (Robineau & Rose 1983). Published reports of strandings from Micronesia have been limited to Guam (Kami & Lujan 1976, Kami & Hosmer 1982), which may be due to the small size and the comparative isolation of the other islands and atolls, resulting in infrequent observations or erratic communications. While there are no previously published records of strandings of the spinner from Micronesia, two strandings have been documented in Saipan Lagoon, along with three verified sightings/rescues and numerous unconfirmed sightings.

The island of Saipan (15°13'N, 145°44'E) harbors the largest lagoon in the Mariana Archipelago. Saipan Lagoon is a typical high-island barrier reef lagoon covering approximately 35 km² (Amesbury et al. 1979), with three passes at Tanapag Harbor, Chalan Kanoa, and a narrow boat channel south of Garapan (Fig. 1). The lagoon ranges in width to nearly 100 m. The depth of the lagoon reaches a maximum of 14 m in the Tanapag Harbor channel, although the average is less than 3 m deep.

Dolphin sightings are reported in Saipan Lagoon nearly every year. Typically these sightings are from the northern part of the lagoon, referred to as Tanapag Lagoon (Fig. 1), and are believed to involve the spinner dolphin. On occasion these dolphins, presumably, are unable to leave the lagoon, become stranded, and perish. No published information exists pertaining to the residency or breeding status of the spinner around Saipan, or throughout the CNMI.

This paper documents strandings and rescues confirmed by Commonwealth of the Northern Mariana Islands (CNMI) Division of Fish and Wildlife (DFW) staff from 1995 to 1997 of the spinner dolphin in Saipan Lagoon. Documented observations along the Northern Mariana Islands of the CNMI through September 2001 are also listed.

Methods

Files containing historical documentation of cetacean strandings stored at the CNMI DFW were reviewed. Stranded dolphins were identified by the authors and verified using the guidebook by Leatherwood et al. (1982) and the stranding field guide by Geraci & Lounsbury (1993). Field observations were augmented by

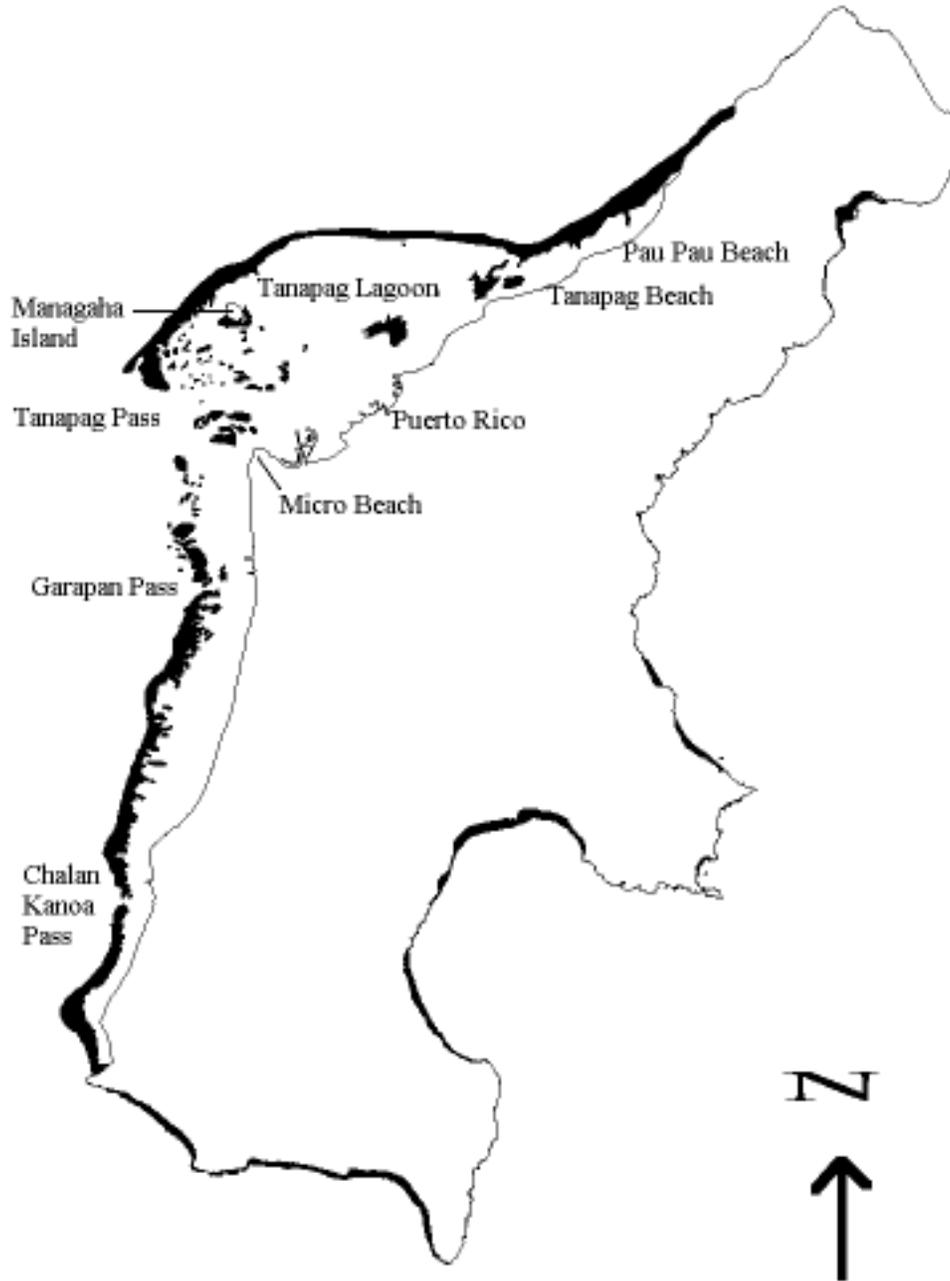


Figure 1. The island of Saipan showing Saipan Lagoon entry points and stranding locations.

electronically scanned standard photographs that were stored in computer files at a resolution of 600 dpi. This provided magnification of identifying characteristics, observed trauma, and documentation of rescue procedures.

Results

On August 8, 1995 at about 1300, a hotel manager notified DFW personnel that dolphins were trapped by the falling tide off Pau Pau beach in Tanapag Lagoon (Fig. 1). This was during the extreme low tide for the year. Upon arrival DFW staff observed three dolphins trapped in about 1.2 m of water in a pool approximately 45 by 45 m, about 35 m off the beach. Numerous people were in the water with the dolphins, swimming with them, and attempting to touch them. This was having an obvious stressful effect on the animals. Once DFW staff halted this activity it was decided to monitor the dolphins as the tide rose. At about 1530 the tide had risen sufficiently to allow escape but the dolphins remained in the same area. It was then decided to herd the dolphins to the main channel, about 5 km to the south. This was accomplished by using two jet-skis and swimmers formed in a 'U', jet-skis on the ends. Occasionally the dolphins would try to breakout in another direction, but the jet-ski's would quickly head them off and return them to the formation. The dolphins, whether out of exhaustion or something else, swam at a pace that could be followed by a swimmer equipped with fins. At 1630 the herding process ceased when the dolphins reached the deep water of the channel and swam away at a fast pace. The maneuverability and noise of the jet-skis proved successful in moving the dolphins into deeper water. C. Kessler, from within 1 m distance, observed the morphological characteristics and distinct color pattern identifying the dolphins as spinners. Judging from relative size of the three individuals, the group was estimated to consist of two adults and one sub-adult.

Another verified sighting occurred on August 14, 1995 when DFW personnel were notified that four dolphins were sighted near shore in Tanapag Lagoon (Fig. 1). Upon arrival at Tanapag Beach, M. Trianni identified four spinner dolphins that appeared restricted to a small pool, approximately 8 by 14 m in surface area, with a maximum depth of about 2 m. The dolphins were swimming calmly in a close group until DFW staff entered the pool, at which time they began evasive maneuvers. As the tide was receding and it appeared the dolphins would not be able to leave the pool, it was decided that a rescue be attempted. The dolphins were encircled by 3–5 swimmers and subsequently captured by restraining them by holding their caudal section. The dolphins were determined to be two adult females and two juveniles. They were placed in separate nets two at a time, one adult and one juvenile, and transported to the barrier reef where they were released. The release appeared successful as all the dolphins swam away in a normal fashion. Adult female dolphins were identified by the placement of their genital slit relative to their anus. The sex of the juveniles was not determined.

After the August 14 rescue four spinner dolphins were observed daily, by DFW staff, within the lagoon off Tanapag beach in the channel leading to the primary boat launch. It was anticipated that they would be able to leave the lagoon via the boat channel so DFW conducted only sporadic monitoring. On August 25, a dead dolphin was found on Tanapag beach with contusions that could have resulted from a boat collision. This raised concerns for the remaining three dolphins and a rescue attempt was deemed necessary. On August 28, DFW personnel began the rescue operation using a jet-ski and 4-7 swimmers. The jet-ski was maneuvered to keep the dolphins in shallow water, where the swimmers eventually hand captured them (Fig. 2). During the capture and subsequent restraining the animals remained calm and did little to resist. The dolphins were transferred to a 7.6 m boat and released past Managaha Island about 2.5 km outside the barrier reef (Fig. 3 & 4). All three dolphins were observed swimming away in what appeared to be a normal fashion and in a tight group. The entire rescue operation lasted from 1031 until 1125. M. Trianni identified the three dolphins as females by the placement of their genital slit relative to their anus. Recorded lengths were 1.80 m, 1.75 m, and 1.43 m, corresponding to two adults and one sub-adult.



Figure 2. Curt Kessler with captured juvenile spinner during rescue off Tanapag Beach on August 28, 1995.



Figure 3. Spinners in holding tank en route to release beyond the barrier reef outside of Managaha Island on August 28, 1995.

The dead dolphin found on August 25, was necropsied by M. Trianni and C. Kessler with the following observations recorded. The specimen was a female, as determined by the presence of female organs, with a 1.77 m snout to fluke notch length. The left side of the forehead had a healing longitudinal scar. The tip of the maxilla was fractured (Fig. 5). A large contusion was found below the eye stripe, just forward of the pectoral fin. There was longitudinal scarring around the vent that was probably caused by scraping coral rock and rubble in shallow water. The left fluke was broken and hanging as it was cut near the base. The stomach appeared empty and shriveled. Death appeared to be from head injuries and/or starvation.

On December 18, 1995 about seven whitebelly spinner dolphins were sighted in Tanapag Lagoon. The school was monitored on a daily basis by DFW staff, until it was determined that they had departed Saipan Lagoon on January 10, 1996. During this period, on December 26, 1995, DFW staff was called to Micro Beach (Fig. 1) to investigate a dolphin stranding. Upon arrival a dead whitebelly



Figure 4. Spinners being released from transport vessel on August 28, 1995.



Figure 5. Anterior view of necropsied spinner showing fractured maxilla.

spinner dolphin was observed on the beach. The specimen appeared to have been dead for a minimum of 24 hours. The following notes were taken during a necropsy conducted by M. Trianni and C. Kessler.

The dolphin was identified as a young adult male, with a snout to fluke notch length of 1.69 m. The skin was peeling off; there was no evidence of prior body scarring, and no obvious scars that may have been attributed to trauma. A dorso-lateral incision below dorsal fin indicated a thin fat layer of approximately 2 mm. The left eye was missing, with the skin around the eye peeled off. Examination of the mouth revealed that the front maxilla teeth were missing, with blood evident on the gum. There were numerous scrapes on the rostrum. The heart, liver, kidneys appeared normal. Viscera were intact, with no sign of bleeding or trauma. The ventral surface of lungs was covered with a whitish, uneven surface. The trachea and esophagus were clear, and appeared normal. The testes appeared bluish-gray, and no sperm was observed upon cross section. The stomach was filled entirely with seagrass.

The presence of the spinner in Saipan Lagoon appears to be a regular occurrence over the long term, though quite variable on a yearly basis. An unidentified school of dolphins reported to DFW in Tanapag Lagoon on October 27, 1998 were probably spinners. A school of 11-13 were identified on April 13, 2000, and

Table 1. Verified sightings of spinner dolphins in the CNMI by Division of Fish and Wildlife staff (1996 – 2000). All island sightings within 3 km of shore.

Date	Location	No.# of animals in school
July 19, 1996	Marpi Reef	100
August 22, 1997	Marpi Reef	30
February 1, 1998	Sarigan	8-10
June 11, 1998	Marpi Reef	5
August 5, 1998	Farallon de Medinilla	10-15
July 12, 1999	Farallon de Medinilla	10-12
July 14, 1999		
August 26, 1999	Pagan	30
August 28, 1999		
April 13, 2000	Tanapag Harbor, Saipan	11-13
July 4, 2000	Sarigan	15-20
July 25, 2000	Tanapag Harbor, Saipan	1
September 25, 2000	Farallon de Medinilla	5
September 24, 2001	Farallon de Medinilla	120

a single individual on July 25, 2000 (Table 1). Numerous anecdotal sightings of dolphins in Saipan Lagoon that were not tied to a specific date were most likely spinners. Other recently verified sightings of the spinner dolphins along the CNMI chain are listed in Table 1.

Discussion

The data presented here documents verified observations of spinners in Saipan Lagoon during August 1995, December 1995-early January 1996, October 1998, and July 2000. The use of Saipan Lagoon by spinner dolphins is poorly understood. Most of the dolphins identified were females with sub-adults or juveniles, although the one necropsied male indicates that at least some of the groups that do enter are comprised of mixed sexes. The presence of spinners in Saipan Lagoon during which no strandings occurred suggested that most of the time the dolphins did not experience circumstances that led to mortality, and may in fact feed in certain parts of the lagoon. However, both of the necropsied specimens had no signs of recent feeding on fish, while the male's stomach was filled with seagrass. This suggests that at least for these two animals something else was happening. If the female had been struck by a boat and incurred a broken jaw, then the absence of food in the stomach is understandable. Whatever the case, the fact that she died shows she was sick in some way and most likely unable to feed. The male, though, with a belly full of grass, presents a different and more interesting case. Unfortunately the species of grass was not identified, but it is likely that it was one of the two dominant seagrass species found in Saipan Lagoon. These are *Enhalus acoroides* and *Halodule uninervis* (Tsuda et al. 1977). Amesbury et al. (1979) estimated the coverage of *Enhalus acoroides* and *Halodule uninervis* in Saipan Lagoon to be approximately 2.2 km² and 1.8 km², respectively. The distributions of these two seagrasses within Saipan Lagoon overlap, although *E. acoroides* appears dominant from the Micro Beach area north, while *H. uninervis* appears dominant south of Micro Beach (Amesbury et al. 1979). Although no literature has previously documented a dolphin feeding directly on seagrass, the interaction of dolphins with seagrass meadows has been reported from Florida, where the Bottlenose Dolphin, *Tursiops truncatus*, has been documented utilizing prey resources inhabiting seagrass meadows (Barros & Wells 1998). Why this individual had chose to feed on grass will probably never be known. But it seems reasonable to assume that it was starving and could not pursue fish for some reason either due to being stranded in shallow water or to an illness reducing its agility.

No verifiable historical information was found pertaining to spinner dolphin use of Saipan Lagoon before those mentioned here. Observations from the past six years will serve as a starting point for compilation of sighting/stranding data. Kami & Lujan (1976) related an incident from a 1905 document of a purposeful stranding of 80 'sperm whales', interpreted as dolphins by the authors, in a shallow lagoon on Saipan. These animals were subsequently consumed, and if dolphins, could have been spinners.

The cause of the high number of spinner strandings during 1995 is unknown. The only significant event that occurred during that time period was the commencement in 1994 of dredging the main channel entrance to Saipan Lagoon and of the basin at the commercial port at Puerto Rico. This activity concluded in 1998.

One speculation on the entrapment of dolphins is that the start of dredging activity in the morning in the main channel served to cut off the dolphins' retreat and scared them to the north into the maze of coral heads. Once inside this northern section (possibly swimming into the current which comes from the north), they could not find their way out due to a combination of falling tide and acoustical shadowing effect. The 'dog-leg' nature of the channel through coral habitat to the north might not allow the dolphins' sonar to function properly. Their sonar would possibly keep them trapped by providing a false image of an enclosure with no outlet. Whatever the cause it is interesting to note that no dolphins have been in need of rescue in later years.

It is unknown if sightings are resident pods or groups of non-resident pods that travel amongst the islands and banks of the CNMI. No specific and continual surveys have been initiated. Routine flights (once a month since January 2000) to Farallon de Medinilla (FDM), following bombing exercises, have only observed dolphins on two occasions (T. Sutterfield, per. comm.) (Table 1). M. Trianni is a participant in the annual five-day marine survey supported by the US Navy at FDM that identified a small pod of spinners during the July 1999 survey (Table 1). The CNMI DFW conducted seven fish survey cruises to FDM from May 1998 to September 2000 and observed one pod of spinners, on August 5, 1998 (Table 1). These data along with anecdotal and DFW survey data from other islands and reefs indicate that spinners do travel amongst the CNMI island chain, and although resident populations have not been identified due to a lack of consistent observation, they may exist. In Guam a long time series of observations collected by Guam Division of Aquatic and Wildlife Resources (GDAWR) during low altitude surveys around the island captured incidental observations of resident dolphin populations including spinner, spotted (*Stenella attenuata*) and bottlenose dolphins (*Tursiops truncatus*). It is believed that migrant or roving pods of these species frequent the coastal waters and interact with the resident populations. Dolphin tours have become a popular tourist activity on Guam and these tours utilize two distinct resident populations of spinner dolphins (G. Davis, per. comm.).

Spinner dolphins and cetacean populations in general throughout the Mariana's require much more observation and the establishment of routine scientific surveys. A proper protocol and venue need to be established to report and substantiate sightings, and all reports should be sent either to CNMI DFW or GDAWR. Only through increased surveillance can information be gathered to allow a better understanding of the marine mammals throughout the Mariana Islands.

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