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PRELIMINARY REPORT ON A SMALL ESTUARINE POPULATION OF IRRAWADDY DOLPHINS *ORCAELLA BREVIROSTRIS* IN THE PHILIPPINES

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ABSTRACT. – During a survey in 1999 covering the coastal waters of the northwestern Sulu Sea and Malampaya Sound, Palawan, we sighted several groups of Irrawaddy dolphins (*Orcaella brevirostris*). Distribution was restricted to very shallow waters (≤ 15 m) of the inner part of Malampaya Sound. No Irrawaddy dolphin sightings were made in the Sulu Sea. No directed fisheries exist for the dolphin, but some incidental mortality occurs in fishing gear such as bottom-set gillnets, fish corrals, liftnets and crab traps. The habitat is endangered by encroaching fisheries, terrestrial development and increasing human population around the sound.

KEY WORDS. – Irrawaddy dolphin, marine mammal, *Orcaella brevirostris,* Malampaya Sound, Palawan, distribution, Philippines

INTRODUCTION

There has been no published information on Irrawaddy dolphins (*Orcaella brevirostris*) in Philippine waters. In the most recent review of the species by Stacey & Arnold (1999) this species was not recorded as present in the Philippines. Unpublished recent records include 79 sightings made by Kataoka et al. (1995) in Malampaya Sound during six survey flights of two hours and thirty minutes; a skull collected in a village on Malampaya Sound on the west coast of Palawan by one of us in 1996 (AASPY), sightings in 1998 during a dolphin-watching cruise in Malampaya Sound (by JMLT), and a stranded specimen from the Philippine Turtle Islands off the coast of the state of Sabah in Malaysian Borneo, originally reported as *Neophocaena phocaenoides* but now identified as *O. brevirostris* (by WFP). The species occurs widely in other parts of Asia, including Malaysia, Indonesia, Thailand, Cambodia, Vietnam, Brunei, Myanmar, India, Bangladesh, Australia, Papua New Guinea, Laos, and Singapore (Perrin et al., 1996; Beasley & Jefferson, 1997; Stacey & Leatherwood, 1997; Stacey & Arnold, 1999). The present report summarizes the 1998 sightings and results relating to *O. brevirostris* from a 1999 survey of cetaceans and fishery interactions in the northeastern Sulu Sea and Malampaya Sound (Dolar, 1999).

METHODS

Distribution and abundance. – The Irrawaddy dolphin study was part of a survey made in 1999 to document distribution of cetaceans in the northern part of the Sulu Sea and Malampaya Sound. The survey included two stages: 1) interviews with fishermen living in coastal villages to get some idea of the presence/absence of cetaceans and the location of unusual sightings, and 2) a vessel survey. In addition, local fishermen were asked if they knew of any cetacean remains (i.e., skulls, teeth, baleen, etc.) or photographs of stranded animals.

The survey was carried out from 18 June to 15 July 1999, from approximately 9.37°N to 12.69N ° and 118.64 ° E to

127.92°E, and covered a distance of 1,301 km in the Sulu Sea and 230 km in Malampaya Sound (Figs. 1, 2). The survey in Malampaya Sound was from 30 June to 3 July and July 12, total survey effort was 28.3 hours. Due to bad weather in the afternoon, all surveys were in the morning, from 0650 to 1337 hrs.

The survey boat used in Malampaya Sound was approximately 5 m long with a sighting platform about one meter above the water surface and a cruising speed of 15km/h. The number of observers varied from two to eight; only two consistently used binoculars (7X and 10X). Observations were carried out in sea states Beaufort 0-3. A GPS (Magellan NAV 5000DLX) was used to record location at the beginning and end of the effort day, every 20 minutes during effort, whenever course direction changed, and when a sighting was made.

The following were recorded for each sighting: location, species identification, group size estimates, presence of calves, and nearest distance from boat. Identifying features were noted. Photographs were taken with a Canon EOS-Elan camera with a 75-300 mm autofocus lens and motor drive.

Bathymetric data for Malampaya Sound were obtained from a hydrographic map published by the U.S. Navy Hydrographic Office, Washington, D.C. (1951). From these data points, depth was interpolated using ArcView GIS. Dolphin sightings during this survey were then plotted against the various depth ranges.

Sighting rates for Irrawaddy dolphins in Malampaya Sound were calculated as the total sightings made in one day divided by the distance (km) covered on that day multiplied by 100.

Fishery interactions. – We visited 20 fishing villages along the northwestern rim of the Sulu Sea and three villages in Malampaya Sound (Figs. 1, 2). We interviewed three to seven fishermen in each village regarding cetacean-fishery interactions, including directed takes. Information collected included fishing methods, approximate number of fishermen and boats, species of fish caught, fishing season, approximate dimensions of nets, fishing effort, incidental and/or directed cetacean catches, and use of any catches. We also asked what the fishermen did with live cetaceans caught in their gear and whether they were aware of the legal protection of whales and dolphins under Philippine law.

RESULTS

Distribution. – Of 95 cetacean sightings during the vessel survey only 17 were of Irrawaddy dolphins. All 17 sightings were made in Malampaya Sound, with a sighting rate of 7.4 ± 2.9 S.E. dolphins/100 km. Group size ranged from one to 13 with a mean of 5.26 ± 1.06 S.E. (n=15) per group. The date, time, group size and location of sightings of Irrawaddy

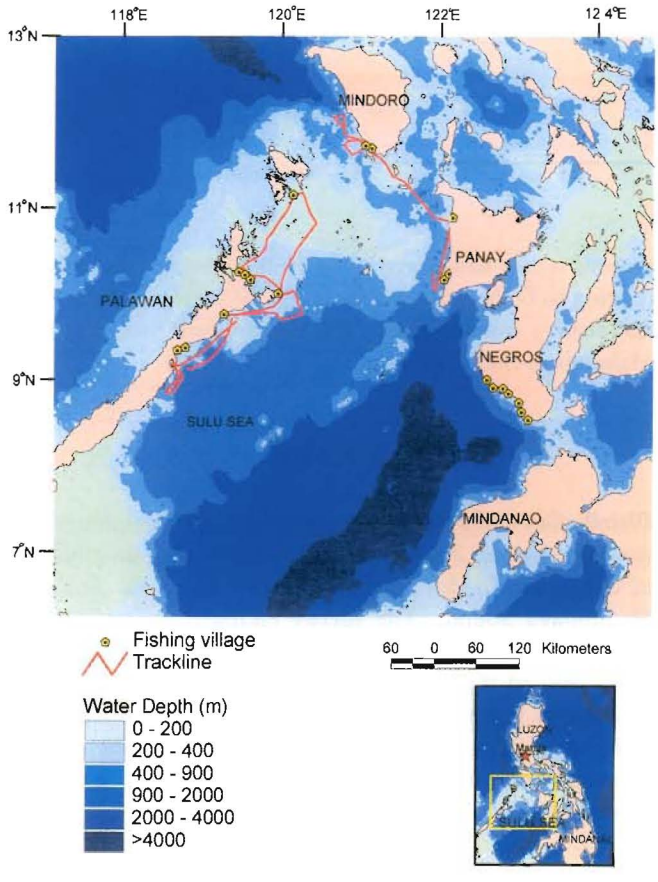

Fig. 1. Map of the Sulu Sea, showing the tracklines covered during the survey and the location of villages visited.

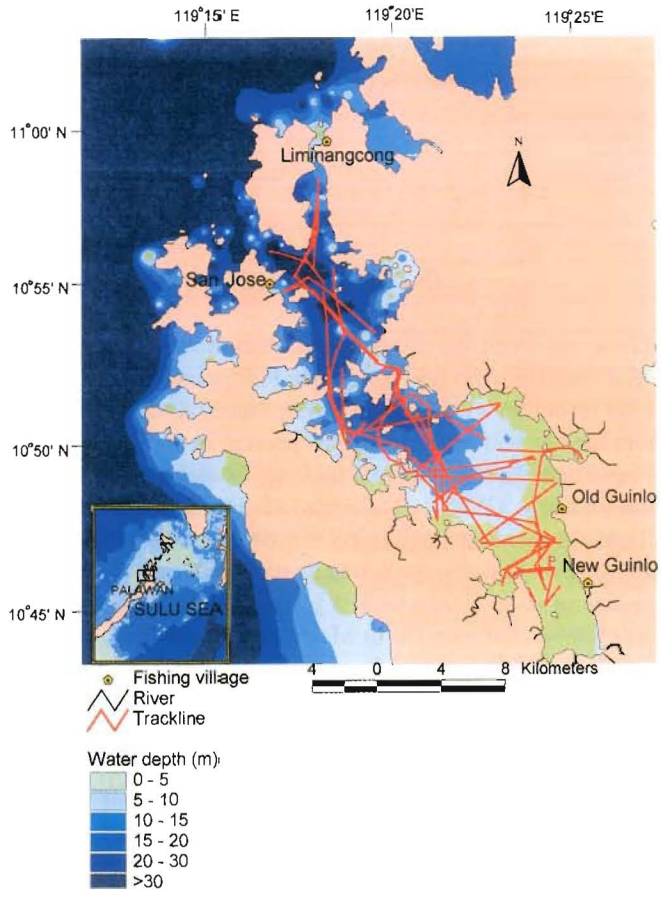

Fig. 2. Map of Malampaya Sound. Tracklines of the survey and the fishing villages are shown.

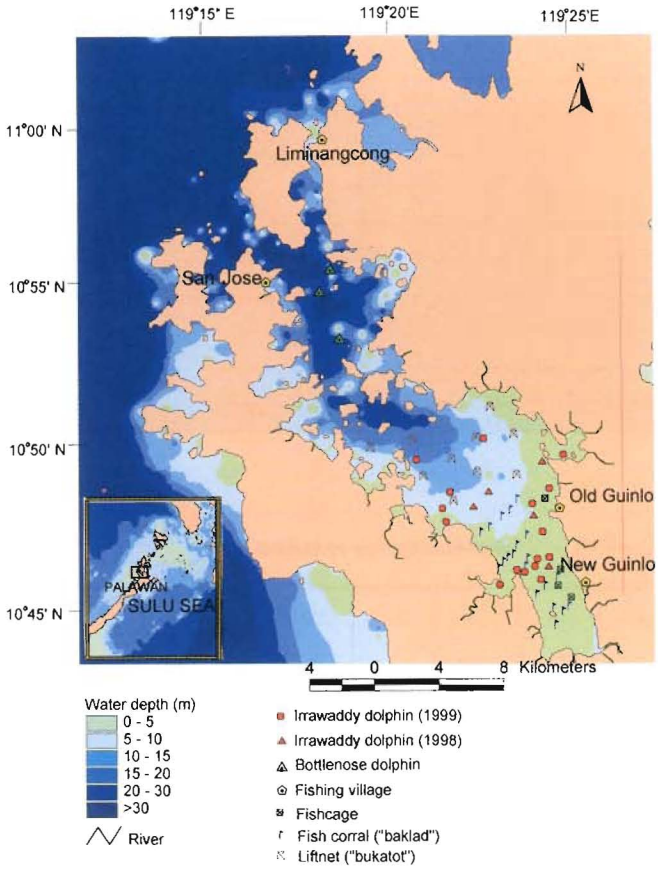

Fig. 3. Cetacean sightings in Malampaya Sound. Sightings made by Tan in 1998 and the fishing structures in the Sound are also shown. Locations of fish cages, fish corrals and liftnets are approximations.

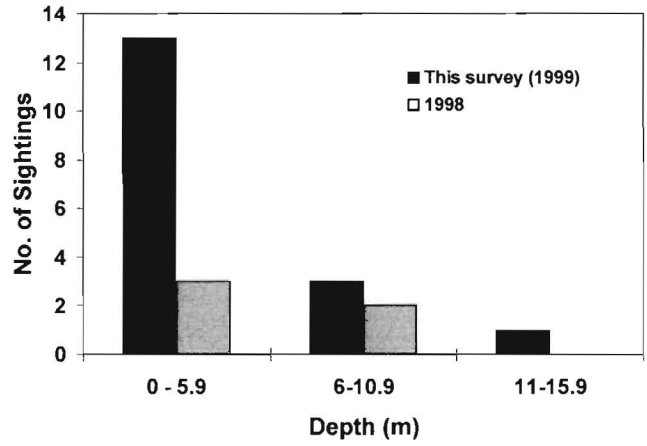

Fig. 4. Number of Irrawaddy dolphin sightings at various water depths in Malampaya Sound.

dolphins are shown in Table 1. All 17 sightings during the survey, as well as the 1998 sightings, were made in the inner part of the sound in waters of 15 m or less. Thirteen sightings or 76% were made in waters less than 6 m deep (Figs. 3 & 4). Another species sighted in the sound was the bottlenose dolphin, *Tursiops truncatus*; all sightings were made in the outer sound in waters at least 20 m deep (Fig. 3).

Fishery interactions - No directed catches were reported for Irrawaddy dolphins in Malampaya Sound. However, incidental takes were reported in bottom-set gillnets (*palubog*), fish corrals (*baklad*), liftnets (*bukatot*) and crab traps. Based on the interviews, incidental catches appear to be low, estimated at about one to two dolphins per year. There are three different kinds of fish corrals in Malampaya Sound: one for shrimp and two (shallow-water and deep-water) for fish. Bolen (1999) counted approximately 169

Table 1. Details of date, time sighting location and group sizes of Irrawaddy dolphin groups sighted in Malampaya Sound.

Sighting No.	Date	Time	Latitude (N)	Longitude (E)	Group size
1	30 June 99	729	10.809	119.424	2
2	30 June 99	800	10.779	119.426	8
3	30 June 99	830	10.768	119.429	4
4	30 June 99	850	10.775	119.425	6
5	30 June 99	955	10.794	119.430	13
6	30 June 99	1226	10.846	119.397	4
7	1 July 99	636	10.837	119.441	2
8	1 July 99	816	10.807	119.374	2
9	1 July 99	951	10.807	119.374	2
10	1 July 99	956	10.816	119.379	1
11	1 July 99	1056	10.765	119.406	12
12	1 July 99	1126	10.773	119.415	2
13	1 July 99	1136	10.772	119.410	4
14	1 July 99	1145	10.780	119.433	no estimate
15	1 July 99	1220	10.818	119.433	no estimate
16	3 July 99	1121	10.800	119.376	12
17	12 July 99	1142	10.834	119.360	5

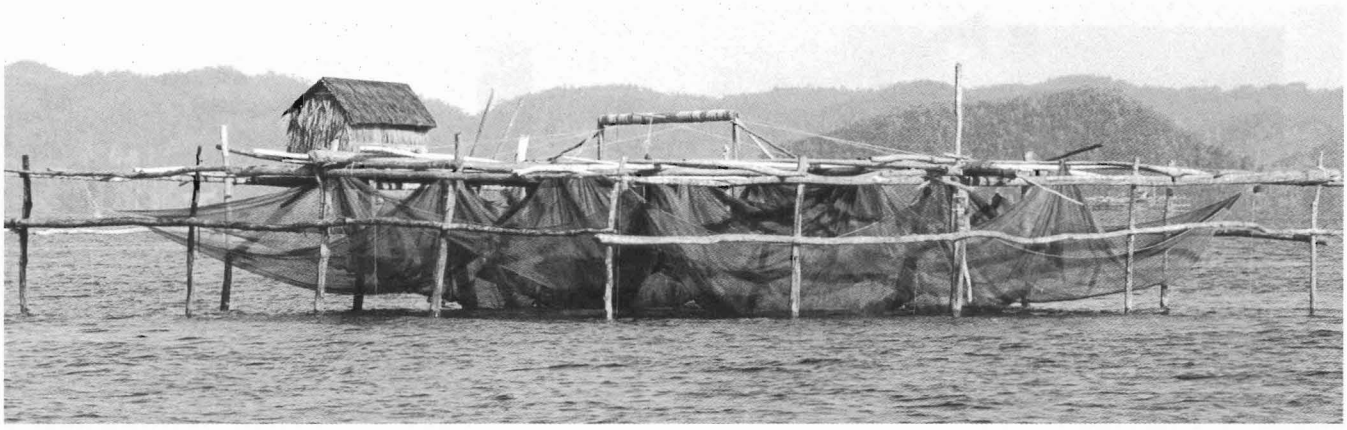

Fig. 5. Liftnet ('bukatot") in Malampaya Sound.

shrimp corrals, 14 shallow fish corrals, and five deep fish corrals in a fishery census made in 1999. Most of these were in the inner sound. One of the crewmen of the boat we used for the survey told us that there were occasions when dolphins trapped in the corrals were speared by the fishermen. However, on most occasions they were released alive.

There were approximately 82 liftnets, most in the inner sound. This type of net is suspended from a permanent wooden structure and is lowered at night; a light is used to attract fish. Once the fish have gathered in the net, it is raised with a line passed through an overhead block (see Fig. 5). The net is sometimes fished during the day. The fishermen's reports to us varied; some said dolphins were never caught, but others said they do occasionally get trapped.

Crab traps have also been reported to catch dolphins. Up to 200 crab traps are attached to a 600-700-m line suspended near the surface (Fig. 6). When dolphins swim past, their flukes sometimes become snagged in the lines and they die. Bolen (1999) reported 81 sets of traps operating in the sound. Approximately 30 bottom-set gillnets are deployed in the sound. These nets are reported to occasionally catch dolphins.

Results of the survey in the Sulu Sea are detailed in Dolar (1999). No Irrawaddy dolphins were seen there in 1,301 km of survey effort.

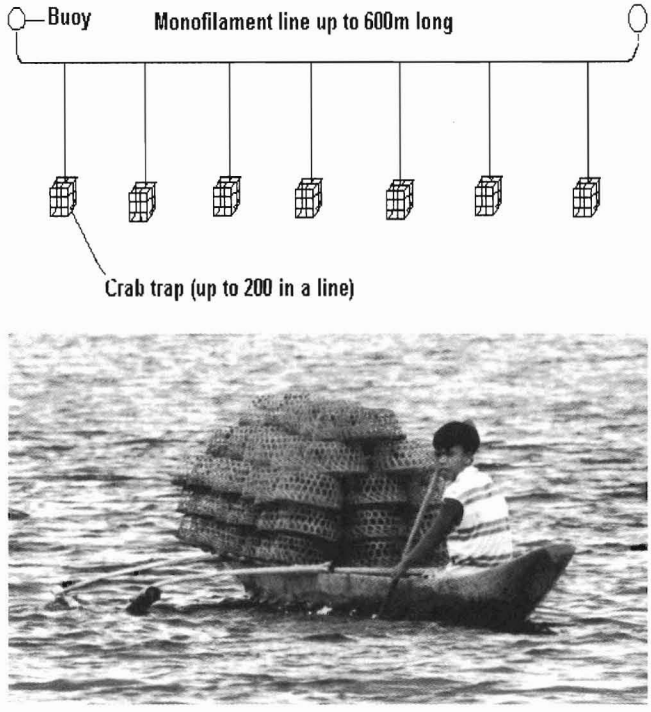

Fig. 6. Illustration of crab traps set in Malampaya Sound, which occasionally catch Irrawaddy dolphins.

DISCUSSION

The occurrence of *O. brevirostris* on the west coast of Palawan is not surprising. Palawan is faunistically more closely related to Malaysia, Indonesia and mainland Southeast Asia than to the other islands of the Philippines to the east, probably because it was once part of the Pleistocene Asian mainland and the other islands were not (Heaney & Rickart, 1990). The Irrawaddy dolphin is closely tied to very shallow estuarine and riverine waters and is thus unlikely to colonize distant offshore islands beyond deep waters. Stacey & Leatherwood (1997) observed that records of this species were "connected by a continuous band of water less than 200m deep".

The distribution in Malampaya Sound appeared to be limited to the inner sound, in shallow waters close to shore. The highest concentration was found in depths of 6 m or less, the area which also receives the highest freshwater input from rivers. The sightings by Tan in 1998 were in the same general part of the sound (see Fig. 3). Though some fishermen reported that they had seen Irrawaddy dolphins in the outer sound, we did not see any there. All of the surveys were done in the morning and during high tide and it is possible that the dolphins move in and out of the sound during the different times of the day, especially between low and high tides. Daily movements of Irrawaddy dolphins have been reported in Indonesia and in the Lao PDR (Stacey & Leatherwood, 1997). However, there is also the possibility that the dolphins near the outer sound that the fishermen reported were bottlenose dolphins; we learned that fishermen who live near the outer part of the sound give bottlenose dolphins the same local name (*lampasut*) as the Irrawaddy dolphins. In other areas of Southeast Asia, Irrawaddy

dolphins have been found to live in brackish to fresh water (Jefferson et al., 1993; Stacey & Leatherwood, 1997; Dolar et al., 1997; Stacey & Arnold, 1999).

The average group size of 5.26 observed in Malampaya Sound was well within the range of mean group sizes observed in other areas (Stacey & Leatherwood, 1997).

The area of high dolphin occurrence was also the most heavily used portion of the sound and had the highest amount of boat traffic. Some dolphins seen during the survey had scars on their backs, probably from injuries caused by boat propellers (Fig. 7). Fishing structures such as corrals, grouper cages, oyster stakes and liftnets abound, and fishing operations using crab traps, multiple hooks and gillnets occur in the area. The high productivity and general accessibility (for permanent fishery structures) are the most likely factors that drew fishing developments to this area. These fisheries are the major sources of income for many families living around the sound and they can be lucrative. For example, the harvest of groupers (high-value fishes) from within the sound in the period 21 Dec. 1997-20 Jan. 1998 was approximately 2.6 metric tonnes and in Jan. 1999 alone was about 538 kg; grouper cages in the inner sound yielded approximately 700 kg and 900 kg, respectively, during the two periods (BFAR, 1999).

The conservation status of the Irrawaddy dolphin in Malampaya Sound, and by extension, in Philippine waters, is uncertain but possibly threatened. The animals in Malampaya Sound could be the last Irrawaddy dolphins remaining in the Philippines and are at risk because of the high vulnerability of their obligate estuarine habitat and increasing pressures from human development. Anecdotal evidence gathered from a 70-year-old fisherman suggested that the distribution of Irrawaddy dolphins 30 years ago was more extensive than now. He estimated that the population began to decline suddenly in the late 1970s and early 1980s, when an influx of fishermen began construction of many fish traps and corrals. Approximately 75% of the fishermen we interviewed said they knew what Irrawaddy dolphin meat tastes like. All of them, however, said they were aware of the recent legal protection of dolphins and released those they caught alive. Though the incidental catch appears to be low (one or two a year) this may be significant to the apparently very small population inhabiting the sound. Increasing human population density around the sound may also pose a danger to the dolphins, through increased fishing pressure, increased organic wastes, and increased run-off from deforested land leading to eutrophication and algal blooms. Habitat destruction is considered to be the greatest threat to Irrawaddy dolphin populations throughout Asia (Stacey & Leatherwood, 1997).

Fig. 7. Irrawaddy dolphin with a large scar on the dorsal fin and back, probably an injury caused by a boat propeller.

Malampaya Sound has been proposed for protection under the Philippine National Integrated Protected Areas Programme (NIPAP) (P. Velasco, personal communication). The plan is to include the watershed area surrounding the sound and a buffer zone. The sound would be divided into various utilization zones. It is hoped that the results of the present study will be considered in the zoning of the sound. Recommendations are that: 1) further surveys of distribution, abundance and movements within the sound and in adjacent estuarine areas be carried out, including seasonal coverage (fish corrals pose a difficulty in carrying out a line transect survey, so population size may be estimated based on mark-recapture analysis of photo-identified animals), and 2) a community-based cooperative action plan be developed to reduce conflicts between fishing gear and dolphins.

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