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Cetacean Strandings on the Southwestern Coast of the Gulf of Mexico

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A total of 21 reports of cetacean strandings on the coast of Veracruz, Mexico were obtained from interviews and monitoring efforts carried out through surveys conducted by walking along the beach between July 1993 and June 1994. Skeletal remains and recently documented stranding events in scientific and private collections were also collected. Identified species belong to four families: Balaenopteridae, Physeteridae, Kogiidae, and Delphinidae. Nineteen animals were identified to species level. Additionally, a single baleen whale photo was identified only as a Balaenopteridae whale and a single vertebra was recorded as a Delphinidae vertebra because of lack of more conclusive evidence. Six categories were recorded (number of stranding events in parentheses): *Physeter macrocephalus* (2), *Kogia breviceps* (2), *Tursiops truncatus* (14), *Stenella frontalis* (1), *Balaenoptera* sp. (1), and unidentified Delphinidae (1). The spatial distribution of the carcasses and skeletal remains indicates that cetaceans strand along most of the coast of Veracruz. Two types of interaction between the bottlenose dolphin and the artisanal coastal fishery were identified through anecdotal information. The first interaction relates to competition for food, because dolphins eat fish caught in gill nets. A second interaction was the direct use of dolphin meat as shark bait. This is the first systematic study involving the collection of cetacean stranding data along the entire coastline of Veracruz.

INTRODUCTION

Mexico has a rich marine mammal fauna (Aurioles-Gamboa, 1995; Torres et al., 1995). Marine mammal diversity in Mexican territorial waters includes 46 living species (Aurioles-Gamboa, 1995; Torres et al., 1995) of which the largest group is the cetaceans (whales and dolphins) with 40 species represented. The pinnipeds (seals and sea lions) follow with four species, and there is one species each of fissiped (sea otter, *Enhydra lutris*) and sirenian (Antillean manatee, *Trichechus manatus manatus*). However, marine mammal research in Mexico has focused in the Pacific Ocean, principally on Baja California's west coast and the Gulf of California. Marine mammal studies in the southern Gulf of Mexico (GOM) are less common due the lack of research groups and facilities. Relatively little has been done for the GOM and the Mexican waters of the Caribbean Sea (Aurioles-Gamboa et al., 1993). The conservation of marine mammals in the southern GOM is promoted by the legal decree of protection for large cetaceans within the Mexican economic exclusive zone (SEMARNAT, 2002).

There are 28 species of cetaceans known from the GOM (Mullin and Hansen, 1999; Würsig et al., 2000), which account for 60.8% of the total number of cetacean species recorded for Mexico. Most of the information from the GOM has been obtained from studies in the territorial waters of the United States (e.g., Mullin and Hansen, 1999; Würsig et al., 2000; Mullin and Fulling, 2004). Limited information on the Mexican coastal region has been obtained from strandings and opportunistic sightings during oceanographic cruises (Villa-Ramírez, 1969; Hugentobler and Gallo, 1986; Gallo and Pimienta, 1989; Jefferson and Lynn, 1994; Solís-Ramírez, 1995; Delgado-Estrella et al., 1998a). Other records were obtained from the evaluation of interactions between cetaceans and tuna and shrimp fisheries in oceanic waters (Delgado-Estrella, 1997; Ulloa et al., 1997). Finally, studies were conducted on the coast of Veracruz, Campeche, and Yucatán to assess the abundance and movements of coastal populations of the bottlenose dolphin (*Tursiops truncatus*) (Delgado-Estrella, 1991; Heckel, 1992; Schramm, 1993). Recent reviews by Ortega-Ortiz (2002) and Ortega-Ortiz et al. (2004) summarize historic and current cetacean records, published and unpublished, from the southern region of the GOM.

The Veracruz Marine Mammal Stranding Network (VMMSN) was founded in 1993 by a team of scientists, volunteers, and government representatives to contribute to marine mammal knowledge for the GOM. The objective of this paper is to report VMMSN records of cetacean strandings in Veracruz and the most

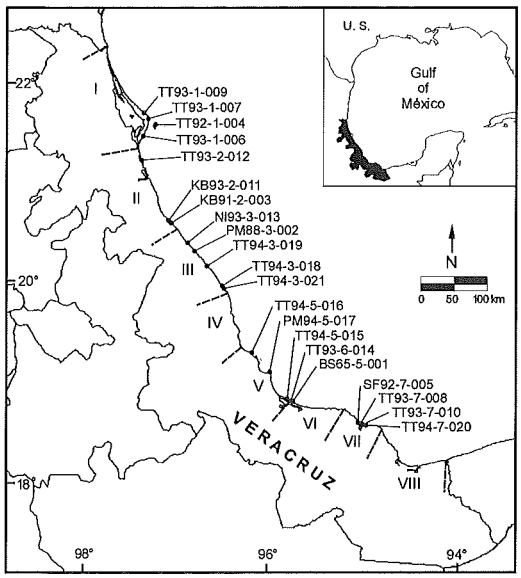

Fig. 1. Location of cetacean strandings on the coast of Veracruz, Mexico. The field numbers shown in the map indicate the same order of recording found in Table 1.

common types of interaction between cetaceans and coastal fisheries.

Study Area and Methods

The study area comprises 745 km of the coast of Veracruz, from the Panuco River (22°15′N 97°47′W) to the Tonala River (18°13′N 94°10′W) (Fig. 1). Most of this coast is characterized by wide, sandy beaches, with the exception of a 55-km portion in the southern part of the state, where small, rocky cliffs of volcanic origin are located. For this research, the coast of Veracruz was divided into eight zones that were surveyed during four seasonal periods, from July 1993 through June 1994 (3–10 July 1993; 17 Oct.–20 Nov. 1993; 20 Feb.–11 Mar. 1994, and 5–18 June 1994) (Fig. 1). Each zone was surveyed once in each seasonal period. Walking beach surveys were made by VMMSN volunteers to collect skeletal remains and record recent strandings. We also reviewed fishermen's private collections in Tecolutla and Alvarado, which included bone remains and photographic material. All specimens, bone remains, and photographs were examined and identified to the lowest taxonomic level possible in accordance with their morphometrics, skin-color patterns, tooth counts, and number and position of ventral pleats. Species identification followed Leatherwood and Reeves (1983), Jefferson et al. (1993), Ridgway and Harrison (1994), and Reeves et al. (2002). Osteological material was deposited at the University of Veracruz's Mammalogy Collection (Table 1). We also visited 119 coastal communities where we interviewed fishermen and government representatives in natural resources and fisheries. This allowed us to obtain information regarding successive strandings during the course of the year and maintain a permanent monitoring of the Veracruz coast. Direct observations and interviews also allowed us to understand interactions between cetaceans and artisanal coastal fisheries. Causes of animal death were only determined when there was gross evidence of human-induced injuries.

Results

In total, 21 cetacean strandings were recorded: one mysticete and 20 odontocetes (Table 1). Records were obtained in the following way: 15 records were from field work; three previously unpublished records were documented at the Department of Biology, University of Veracruz (DBUV); and three previous records belong to two private collections (two records from Tecolutla and a single record from Alvarado). Nineteen animals were identified at species level and correspond to the families Physeteridae, Kogiidae, and Delphinidae. A photographed baleen whale was recorded only as a Balaenopteridae specimen (see Fig. 2 for explanation) and a single dorsal vertebra was recorded as a Delphinidae specimen because insufficient evidence was available for identification to the species level. The bottlenose dolphin was the species most commonly recorded (14 cases), followed in order of frequency by the sperm whale, *Physeter macrocephalus* (2), pygmy sperm whale, *Kogia breviceps* (2), Atlantic spotted dolphin, *Stenella frontalis* (1), a balaenopterid whale (1), and an unidentified Delphinidae (1).

All of the strandings were of single animals. In 10 cases where we found the carcasses of complete and recently stranded animals, local residents stated that they were already dead when they came ashore. Two pygmy sperm whales (field numbers KB91-2-003 and KB93-2-011) and a bottlenose dolphin (TT94-3-018) died as a result of entanglement in gill nets used in Tecolutla and Lechuguillas (Fig. 1, Table 1). In the remaining cases, we were not able to identify cause of death because of incomplete information and the advanced state of decomposition in which the animals were found.

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TABLE 1. Cetacean stranding records from the coast of Veracruz State, México.

Species	Field number	Date	Locality	Coordinates	Specimen examined	Comments[1]
Family Balaenopteridae						
Unidentified balaenopterid	BS65-5-001	1965	Alvarado	19°00′N 96°45′W	Photograph	(13.5e)u
Family Physeteridae						
Physeter macrocephalus	PM88-3-002	1988	Casitas	20°15′N 96°48′W	Complete carcass	(13e)u
	PM94-5-017	10 May 1994	Antón Lizardo	19°03′N 96°51′W	Skull, vertebrae, and ribs	(12e)u
Famly Kogiidae						
Kogia breviceps	KB91-2-003	19 Jan. 1991	Tecolutla	20°30′N 97°01′W	Complete carcass	(3.5)u
	KB93-2-011	3 Aug. 1993	Tecolutla	20°30′N 97°01′W	Complete carcass	(3)m
Family Delphinidae						
Tursiops truncatus	TT92-1-004	19 May 1992	Lobos Island	21°27′N 97°13′W	Complete skeleton	u
	TT93-1-006	19 March 1993	Tamiahua	21°16′N 97°25′W	Complete carcass	(3e)u
	TT93-1-007	24 June 1993	Cabo Rojo	21°34′N 97°20′W	Skull	u
	TT93-7-008	4 July 1993	Sontecomapan	18°33′N 95°20′W	Skull	u
	TT93-1-009	4 July 1993	Cabo Rojo	21°19′N 97°25′W	Skull and ribs	u
	TT93-7-010	4 July 1993	Sontecomapan	18°34′N 94°58′W	Skull and ribs	u
	TT93-2-012	19 Oct. 1993	Barra Galindo	21°07′N 97°23′W	Skull and ribs	u
	TT93-6-014	Oct. 1993	Alvarado	19°00′N 96°45′W	Partial skull	u
	TT94-5-015	5 March 1994	Alvarado	19°00′N 96°45′W	Complete carcass	(2.8e)u
	TT94-5-016	March 1994	Veracruz City	19°13′N 96°09′W	Complete skeleton	u
	TT94-3-018	6 June 1994	Lechuguillas	20°05′N 96°35′W	Complete carcass	(2.2)u
	TT94-3-019	7 Jun 1994	El Raudal	20°12′N 96°45′W	Complete carcass	(2.2)u
	TT94-7-020	18 Jun 1994	Sontecomapan	18°33′N 95°05′W	Skull and ribs	u
	TT94-3-021	2 Oct 1994	Emilio Carranza	19°58′N 96°34′W	Complete carcass	(2.5)m
Stenella frontalis	SF92-7-005	3 Jun 1992	Sontecomapan	18°33′N 95°00′W	Complete carcass	(2.1)u
Unidentified Delphinidae	NI93-3-013	19 Oct. 1993	El Palmar	20°21′N 96°57′W	One dorsal vertebra	u

[1] Comments: Total body length (m) shown if known; when the body length was indirectly estimated then the measure is followed by 'e'; Sex: f = female, m = male, u = unknown.

Fig. 2. This photograph is the only evidence of the baleen whale stranded in Alvarado, Veracruz (19°00′N 96°45′W) in 1965. In the absence of the appropriate morphometrics we estimated the total body length of the whale to be 13.5 m, using the height of the people in the photograph as a reference. The baleen whale was identified as a member of the family Balaenopteridae based on the sleek body form, estimated body length, flipper length and shape, and the presence of ventral pleats (Reeves et al., 2002). The photographed specimen does not have the smaller and streamlined body shape of a minke whale (*B. acutorostrata*), or the large flippers characterizing a humpback whale (*Megaptera novaeangliae*). The whale shows in the photograph 36 ventral pleats; however, some pleats are not visible in the photo. It is also difficult to distinguish if the pleats end just at or behind the flippers. Sei whale (*B. borealis*) and minke whale are the only two whales where the ventral pleats end well before the umbilicus (Horwood, 2002). In blue whale (*B. musculus*), fin whale (*B. physalus*), and Bryde's whale (*B. edeni*) the ventral pleats end at, or posterior to, the umbilicus. The characteristics observed in the photo are shared by many species, but are most consistent with both sei whale and Bryde's whale. Both species can overlap in low latitudes such as the waters of the Gulf of Mexico, but Bryde's whale is the most common species observed in this region (Würsig et al., 2000). The evidence available is not conclusive for species-level identification.

The strandings were distributed across six of the eight surveyed zones, with the exceptions of zones IV and VIII (Fig. 1). Zone III had the highest stranding incidence, with five records. On a 32-km portion of the coast between Tecolutla and Casitas (between zones II and III), there was one sperm whale stranding and two pygmy sperm whale strandings within a 5-yr period. All strandings occurred on sandy beaches, with one exception on Lobos Island, where the shore is rocky. Of 17 records that include an accurate stranding date, we observed that nine events occurred during the dry season (March–June 1994), when seven bottlenose dolphins, one Atlantic spotted dolphin, and one sperm whale were stranded.

Additionally, we recorded two types of interaction between bottlenose dolphins and artisanal coastal fisheries. The first consisted of competition for food, because the bottlenose dolphins feed opportunistically on fish caught in gill nets. Dolphin feeding sometimes causes net damage. This occurs mainly during the king mackerel (*Scomberomorus cavalla*) fishing season, which runs from Nov. to Feb. Fishermen shoot dolphins with firearms and wound them with harpoons in an attempt to reduce damage to nets. We were informed that this happens occasionally in Cabo Rojo, Tamiahua, Alvarado, and Sontecomapan (zones I, V and VII) (Fig. 1). Another type of interaction involves the use of dolphin meat as shark bait; however, this practice is not widespread. For this type of fishing, people take advantage of dolphins that incidentally get entangled in gill nets. They cut dolphins into small pieces and set them in hooks distributed across a longline (5–10 km in length). Fishermen informed us

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that they made occasional use of the bottlenose dolphin as bait in the coastal communities of Villa Lobos, Cabo Rojo, Casitas, Alvarado, Sontecomapan, Jicacal, and Las Barrillas (zones I, III, V, VII and VIII) (Fig. 1). In none of the communities visited were we informed of the use of cetaceans as meat for human consumption.

Discussion

Systematic work performed throughout the 1-yr study permitted us to obtain an initial estimate of the magnitude of cetacean strandings along the Veracruz State coast, which might serve as reference for similar studies in other regions of the GOM. We recorded 21 single strandings involving one balaenopterid species and four odontocete species. The bottlenose dolphin accounts for the highest frequency of strandings. Because of its coastal habits, this species has a high probability of interaction with coastal fisheries. Baleen whale strandings are, in contrast, very rare events. The balaenopterid whale stranded in Alvarado, Veracruz constitutes the fourth case of a baleen whale reported in Mexican waters from the GOM. Prior to this stranding another two sei whales were captured in the state of Campeche before 1915 (Miller, 1928) and a minke whale was lately stranded in Yucatan in 1998 (Delgado-Estrella et al., 1998b). There is another report of a sei whale stranded in Veracruz in 1969 (Villa-Ramírez, 1969), but the article photographs show a sperm whale which was identified erroneously. Schmidly (1981) considered this record as a sperm whale stranding.

Cetacean strandings in the southwestern GOM appear to be less frequent than those observed in the Mexican Pacific and the Gulf of California. Neither natural nor human-caused mass strandings have been reported for the southwestern GOM. In the Mexican waters of the Pacific Ocean more species interact with fishery activities because of higher cetacean diversity and abundance. The species that have been reported to interact with fisheries in the Mexican water of the Pacific Ocean are the bottlenose dolphin, vaquita (*Phocoena sinus*), common dolphin (*Delphinus delphis*), pantropical spotted dolphin (*Stenella attenuata*), short-finned pilot whale (*Globicephala macrorynchus*), Pacific white-sided dolphin (*Lagenorynchus obliquidens*), and gray whale (*Eschrichtius robustus*) (Vidal et al., 1994; Zavala-González et al., 1994; Torres et al., 1995).

In the GOM, bottlenose and the Atlantic spotted dolphins are common on the continental shelf (Mullin et al., 1994; Mullin and Hansen, 1999). Significant numbers of deaths of both species have been recorded in incidental gill-net trapping associated with the shrimp fishery in Términos Lagoon, the Campeche Sound and Dzilam de Bravo, Yucatán (Zavala-González et al., 1994; Delgado-Estrella, 1997).

In the long term, the monitoring of strandings will permit us to determine whether a relationship exists between incidental dolphin mortality and a well-defined fishing season, as is the case of the mackerel fishery. This information would allow us to propose regional management strategies for the species involved, such as the bottlenose dolphin. It is important to develop an educational program for coastal fishermen in order to inform them that the capture of marine mammals and the use of dolphin meat as bait are banned by Mexican law.

Gill net and longline use along the coast of Veracruz is extensive. They are the two most common pieces of artisanal fishing gear used in the region. In 1992, there were 11,370 boats registered to Veracruz fisheries; 97.8% were small in size and used for inshore fishing (Montfort-Guillén, 1995). This indicates the magnitude of fishing-gear use and the potentially negative impact it may have on coastal cetacean populations. In order to avoid an increase in dolphin mortality, fishery gear use must be monitored by pertinent governmental authorities.

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