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Interactions Between Marine Mammals and Turtles

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Interactions between marine mammals and turtles are not often reported in the literature. While conducting a marine mammal aerial survey during Summer 2004 off the Atlantic continental shelf of the USA, the second author observed bottlenose (*Tursiops truncatus*) and Atlantic spotted dolphins (*Stenella frontalis*) harassing loggerhead sea turtles (*Caretta caretta*). The National Marine Fisheries Service conducted this survey (Mid-Atlantic Tursiops Survey; MATS) to determine distribution and estimate the abundance of bottlenose dolphins from Fort Myers, Florida to Atlantic City, New Jersey during July through August 2004. On several occasions, dolphins chased turtles, tossed them out of the water, and used their beaks (rostra) to force them underwater. These observations led us to the question of how frequent and to what extent these types of interactions occur in the wild and in captivity. To address this question, we conducted a review of the interactions between marine mammals and turtles.

We attempted to compile all available records of marine mammal interactions with turtles. Sources included observations found in both peer-reviewed and gray literature, as well as unpublished sources. We also contacted people working with marine mammals in both captive and free-ranging situations, where interactions with turtles might take place. Additionally, we placed messages on various internet discussion groups pertaining to either marine mammals or sea turtles, requesting information on any observed interactions. Finally, we presented our preliminary findings at various conferences where attendees provided additional information. This information was not always complete or provided in a manner that allowed for traditional compilation or summarization. Several providers gave us personal observations which could have spanned decades, or were just single incidental reports. We have compiled all records in two ways: 1) a matrix of interactions where we attempted to assess direct interactions as investigation or predation; and 2) an online appendix table that lists each report (along with the location of the observation). We defined predation as the act of feeding on another animal, including stomach content analyses that support this behavioral event. Investigation was defined as exploratory behaviors, such as swimming around the animal, touching it, and seemingly unwanted advances, such as being physically tossed or submerged, because some type of behavioral or physiological change by the animal being assessed or touched was likely taking place.

We located reports of interactions between 22 marine mammal species and nine turtle species. There were 16 cetacean (one baleen whale and 15 toothed whale), four pinniped, and two sirenian species (Table 1; Appendix I, available online at <http://www.seaturtle.org/mtn/archives/mtn115/appendix1.pdf>). Reported free-ranging interactions came from many locations including Australia, New Zealand, Hawaii, Panama, Mexico, the Gulf of Mexico, the Caribbean, Brazil, and the Azores (online

Appendix).

Interactions involving cetaceans

Cetaceans and sea turtles co-occur in many of the same areas. During the MATS 2004 summer survey, for example, there were 67 sightings where dolphins and sea turtles were sighted within 100 m of one another. Unfortunately, we were unable to report the exact number of direct interactions between the two groups since behavioral notes associated with the raw survey data sheets which would confirm these data (e.g., dates, locations, and species involved) were not available when requested.

Observations of cetaceans interacting with sea turtles, while taking advantage of easily captured prey are documented. Bottlenose dolphins in Costa Rica and Atlantic spotted dolphins in the Azores apparently sometimes feed on fish aggregated under turtles that bask at the water's surface (A. Acevedo-Gutiérrez & Yin 2000; L. Steiner, personal communication, Whale Watch Azores 5, Old Parr Close, Banbury, OX16 5HY). There is also documentation of bottlenose dolphins (which are known to feed in association with shrimp trawlers) and turtles (UID species) both associated with the same trawler, including simultaneously within the same net and its turtle excluder device (Caldwell *et al.* 2003).

We were often informed of incidents of observing both a sea turtle and a cetacean(s) nearby or even passing by one another, with no obvious interest paid attention by either species. We did, however, locate a number of reports of dolphins and whales investigating turtles while they were at or near the water's surface (see online Appendix). Some incidents included a cetacean swimming on its side, under a turtle, appearing to examine it. We considered these to be exploratory behaviors since animals approaching and investigating new objects that appear in their environment. One intriguing report was of a sperm whale (*Physeter macrocephalus*) in the Sargasso Sea swimming on its side underneath a loggerhead sea turtle, apparently investigating the animal (S. Gero, pers.comm., Department of Biology, Dalhousie University, 1355 Oxford Street, Halifax, NS B3H 4J1, Canada).

Investigatory behaviors are often linked with play (see Burghardt 2005). These were the kind of interactions most often reported by observers, likely due to more contact between the animals. Often, the actions were very physical, such as manipulations by whales and dolphins that included physically moving turtles across tanks in captivity; chasing and poking at turtles; attempting to flip sea turtles onto their backs; grabbing the turtle's flippers; pushing turtles underwater with their rostra; attempted 'mating'; tossing turtles high out of the water or onto sandy beaches; or flipping turtles out of holding tanks and subsequently injuring them (e.g., Brown 1960; Brown & Norris 1956; Caldwell 1956; Constantine 1995; Kritzler 1952; McBride & Hebb 1948; Megnet *et al.* 2006; Ritter 2002; online Appendix). We did receive an interesting account of one possible case of succorant behavior (a form of

	Species	Marine Turtles								Freshwater Turtles				
		ND	DC	LK	CC	CM	EI	LO	UNK	PS	MT	UNK		
Cetaceans	Humpback whale (<i>Megaptera novaeangliae</i>)				I							I		
	Bottlenose dolphin (<i>Tursiops truncatus</i>)		I	I	I	P ¹ /I	I	I	I				P	
	Indo-Pacific bottlenose dolphin (<i>Tursiops aduncus</i>)					I								
	Atlantic spotted dolphin (<i>Stenella frontalis</i>)				I		I							
	Pantropical spotted dolphin (<i>Stenella attenuata</i>)											I		
	Spinner dolphin (<i>Stenella longirostris</i>)												I	
	Striped dolphin (<i>Stenella coeruleoalba</i>)												I	
	Rough-toothed dolphin (<i>Steno bredanensis</i>)				I			I						
	Common dolphin (<i>Delphinus</i> spp.)				I									
	Long-beaked common dolphin (<i>Delphinus capensis</i>)												I	
	Short-beaked common dolphin (<i>Delphinus delphis</i>)						I	I	I					
	Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>)				I									
	Killer whale (<i>Orcinus orca</i>)		P/I				P		P	P				
	Sperm whale (<i>Physeter macrocephalus</i>)				I									
	Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)				I	I								
	Amazon river dolphin (<i>Inia geoffrensis</i>)												P	
	Pinnipeds	Hawaiian monk seal (<i>Monachus schauinslandi</i>)						I, P ¹						
		Mediterranean monk seal (<i>Monachus monachus</i>)				P								
		Southern elephant seal (<i>Mirounga leonina</i>)					*							
Australian sea lion (<i>Neophoca cinerea</i>)							I, P ¹							
Sirenians	Dugong (<i>Dugong dugon</i>)	I				I						I		
	West Indian manatee (<i>Trichechus manatus</i>)												P ²	

Table 1. Matrix of interactions between captive and free-ranging marine mammals and turtles. ND = *Natator depressus*, DC = *Dermochelys coriacea*, LK = *Lepidochelys kempii*, CC = *Caretta caretta*, CM = *Chelonia mydas*, EI = *Eretmochelys imbricata*, LO = *Lepidochelys olivacea*, PS = *Podocnemis sextuberculata*, MT = *Malaclemys terrapin*, UNK = Unidentified species. Behavior of marine mammals is defined as: investigatory (I) and predation (P). (I) includes behaviors of swimming around the turtle and touching the turtle, and could escalate to chasing, circling, flipping, and tossing. *mortality suspected to be due to seal rolling on top of turtle while on nesting beach; ¹suspected predation; actual evidence not available; ²turtles observed sitting sometimes on the backs of manatees.

Figure 1. Hawaiian monk seal with green turtle at French Frigate Shoals (George Balazs, NOAA Fisheries).



epimeletic or care-giving behavior as defined as Caldwell & Caldwell 1966) by a humpback whale (*Megaptera novaeangliae*) directed towards an unidentified species of sea turtle in Hervey Bay (Queensland, Australia). The whale appeared to attempt to use its long foreflippers to turn over an unidentified species of sea turtle that was apparently having buoyancy problems, causing it to be flipped (S.E. Scotto, pers. comm., C/ Valle de la Fuenfría 10, 8D, 28034-Madrid, Spain).

Confirmed or suspected predation on turtles was also reported. One unconfirmed account involved possible predation on a hatchling green turtle (*Chelonia mydas*). This individual may have been eaten by a bottlenose dolphin as the group chased flying fish near a ship at night (Awbrey *et al.* 1984). There are confirmed cases of killer whales (*Orcinus orca*) preying on sea turtles, though at an unknown frequency (e.g., Caldwell & Caldwell 1969; Brongersma 1972; Esquivel *et al.* 1993; Sarti M. *et al.* 1994; Pitman & Dutton 2004). As noted by Celini *et al.* (2002), since killer whales are known to play with objects, encounters between killer whales and sea turtles cannot always be confirmed to be predatory attempts. The few observations of how leatherbacks (*Dermochelys coriacea*) might attempt to protect themselves are consistent. In these cases, the turtle extended its front flippers ahead and with its rear margins up (apparently attempting to protect its head), strongly moved the flippers to strike at a whale(s) touching its body (e.g., Celini *et al.* 2002; K.D. Mullin, pers. comm., NOAA/NMFS Pascagoula Laboratory 3209 Frederic St. Pascagoula, MS 39567, USA).

What we found particularly interesting was the co-housing of sea turtles with dolphins in captivity, particularly where the turtles served as behavioral enrichment for dolphins during rehabilitation efforts after stranding, such as in the Philippines. It was noted that having sea turtles in the same pens with dolphins stimulated feeding and swimming more quickly, perhaps with the dolphins watching the turtles and mimicking them (J. Archer & C. Torno, pers. comm., Ocean Adventure, Subic Bay, Philippines). Green, olive ridley (*Lepidochelys olivacea*), and hawksbill turtles (*Eretmochelys imbricata*) are all used, with the latter two species being less likely to bite the dolphins (J. Archer & C. Torno, pers. comm.). As noted earlier, various levels of interactions between cetaceans and turtles in other captive situations have been noted.

While compiling information on cetacean interactions with

sea turtles, we also became aware of interactions with freshwater turtles. There was an instance of predation on a six-tubercled river turtle (*Podocnemis sextuberculata*) by an Amazon River dolphin (*Inia geoffrensis*) (da Silva & Best 1982), which was determined by examination of stomach contents. Additionally, a bottlenose dolphin was observed to intentionally strand itself to capture a diamondback terrapin (*Malaclemys terrapin*) sitting on a mudbank in North Inlet Estuary, South Carolina (D. Allen, pers. comm., University of South Carolina, Baruch Marine Field Laboratory, PO Box 1630, Georgetown, SC 29442).

Interactions involving pinnipeds

Interactions between pinnipeds and sea turtles take place both in the water and on land. As with cetaceans, there are undoubtedly many instances of the two taxonomic groupings co-occurring with one another. For example, at French Frigate Shoals (Northwestern Hawaiian Islands), both Hawaiian monk seals (*Monachus schauinslandi*) and green turtles are found next to one another, lying on the same beaches, often in close proximity, without resulting in obvious behavioral changes or disturbances (Figure 1). Researchers working in the French Frigate Shoals reported that it is not uncommon for turtles to crawl ashore and “disturb” sleeping seals and sometimes even a mother with pup (G. Balazs, pers. comm., National Marine Fisheries Service, Pacific Islands Fisheries Science Center, 2570 Dole Street, Honolulu, HI 96822-2396). Usually this happens when the turtle excavates a nest and throws sand/coral rubble onto the seal(s) which appear disturbed by this. Sometimes the seal(s) move, other times they just stay put and endure the rain of sand and rock, bellowing at the turtle periodically.

There is some hazard for a sea turtle sharing the same beach with some pinniped species, however. For example, there is a record of a southern elephant seal (*Mirounga leonina*) reputedly having killed an adult-sized green turtle on a nesting beach near NW Cape in Western Australia. The mishap may have involved a nesting turtle bumping into a resting elephant seal and being rolled on and perhaps suffocated or suffering crush injury (B. Prince, pers. comm., Western Australian Marine Turtle Project, Wildlife Research Centre, Dept CALM, PO Box 51, Wanneroo, Western

Australia 6946).

Many of the interactions between pinnipeds and sea turtles are likely exploratory (investigatory) in nature. For example, one juvenile Hawaiian monk seal pup was observed swimming towards a green turtle hatchling (early morning emergence) and “mouthed” it; this response was determined to be investigatory, because pups of this age mouth many items in their environment (G. Balazs, pers. comm.). Kobayashi *et al.* (1995) reported sighting Hawaiian monk seals occasionally chasing turtles near longline fishing vessels. Play-type behavior by seals towards sea turtles also has been observed (B. Prince, pers. comm.).

Aggressive and predatory interactions were documented. Margaritoulis *et al.* (1996) reported that in a year of extreme food shortage at the island of Zakynthos (Greece), Mediterranean monk seals (*Monachus monachus*) fed on adult loggerhead turtles. No such observations have been reported since that year (D. Margaritoulis, pers. comm., ARCHELON, P.O. Box 51154, KIFISSIA, Attiki GR-14510, Greece). It is not known if this is because fish stocks recovered, or if only one seal was engaged in this behavior and that was the individual that was found dead some months later (D. Margaritoulis, pers. comm.). In Western Australia, Australian sea lions (*Neophoca cinera*) are suspected of killing some juvenile green turtles in areas where the two species overlap in occurrence (B. Prince, pers. comm.).

Interactions involving sirenians

Very few encounters between free-ranging sirenians and sea turtles were reported (see online Appendix). Both sirenians and green turtles feed on sea grasses and there is likely some level of competition between the two in the wild. André *et al.* (2005) provided some evidence that the presence of dugongs (*Dugong dugon*) limits the feeding opportunities for green turtles. I. Lawler (pers. comm., School of Tropical Environment Studies and Geography, James Cook University, Townsville Qld 4811, Australia) mentioned that while researching dugongs in Hervey Bay he and his colleagues see many green turtles and dugongs over the same



Figure 2. Dugong “Serena” with green turtle “Kamekichi” at the Toba Aquarium, Toba, Japan (courtesy of Mr. Masami Furuta, Director, Toba Aquarium).

types of seagrasses, but they are rarely seen in the same place. For example, in Burrum Heads (Hervey Bay), there are usually about 30 to 60 dugongs in the area and very few turtles, and about 30 km south, in the Great Sandy Straits (Hervey Bay), they see many turtles and just the occasional dugong. This may be an example of small-scale habitat segregation between two species that share a similar ecological niche.

The most noteworthy observations between sirenians and sea turtles come from a dugong housed together with a green sea turtle at the Toba Aquarium in Japan (Figure 2); both of these individuals apparently co-exist without conflict. There are many instances of apparent stimulation-seeking behavior (the turtle rubbing the edge of its carapace against the dugong and vice-versa) and even play observed, including the dugong playing with the turtle and bumping it around the tank. The green turtle seems to be the instigator of many of the encounters, for example, appearing to purposefully swim into the dugong (C.D. Marshall, pers. comm., Texas A&M University at Galveston, 5007 Avenue U, Galveston, TX 77551-5923, USA). This dugong has, however, been in the tank with two other individual turtles – another green and a flatback (*Natator depressus*). None of these forced associations were favorable, however, with each turtle and the dugong attacking one another.

As a side note, we received a report that occasionally, freshwater turtles (unidentified species) bask in the sun on the backs of West Indian manatees (*Trichechus manatus*) resting at the water’s surface in Florida (C. Beck, pers. comm., U.S. Geological Survey, Sirenia Project, 412 NE 16th Avenue, Gainesville, FL 32601, USA).

Marine mammals and sea turtles co-occur in many parts of the world. Encounters between the two are diverse and can range from no apparent interest between the two to harassment and mortality (both intentional and likely accidental). Opportunistic observations are anecdotal in nature and interpretations are often speculative. Most reported encounters are from coastal locations, where there are more researchers and boaters.

We hope that this review will encourage the reporting of observations and promote their publication in the scientific literature. We feel that these should be further studied to examine how rehabilitation efforts and general holding of marine mammals in captive situations might be enhanced by incorporating sea turtles. Rigorous behavioral sampling to examine the interactions of sea turtles and marine mammals housed together in captivity is suggested. By doing so, we will better understand the significance and importance of interspecific interactions between marine mammals and turtles and their behavioral and ecological implications.

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