

The Harmful Effects of Inadvertently Conditioning a Wild Bottlenose Dolphin (*Tursiops truncatus*) to Interact with Fishing Vessels in the Indian River Lagoon, Florida, USA

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Abstract

Numerous accounts of social bottlenose dolphins (*Tursiops truncatus*) seeking human interactions have been documented. While there are several cases of dolphins seeking human interactions with no apparent benefit, dolphins may also be enticed to interact with humans through gradual habituation, usually involving a food source. Marine mammals frequently feed in association with commercial fisheries. Dolphins residing in the Indian River Lagoon (IRL), Florida, USA, may become conditioned to approaching commercial blue crab boats since the fishery regularly discards old bait fish at each trap. This routine may inadvertently acclimatize wild bottlenose dolphins to approach fishing vessels to feed on this supplemental food source. From 1998 to 2001, an adult bottlenose dolphin residing in the IRL estuary system regularly associated with commercial blue crab fishing boats. Focal observations revealed that the animal has become conditioned to approaching commercial crab boats ($n = 110$ min, $n = 6$ observations), spending all of its observed time feeding on discarded bait fish, following crab boats, or begging. The dolphin is readily resighted and well-known by fishers due to its tendency to closely approach and beg at fishing boats. The habituated dolphin is site-specific, with all observations and sightings (including fisher reports) occurring within a small 12.88 km area. This unintentional food provision and habituation of wild IRL dolphins to local fisheries may negatively impact the population. On 26 May 2001, this habituated dolphin approached a commercial vessel with a recreational fishing lure lodged in its mouth. Numerous reports from recreational fishers indicate that IRL dolphins also forage in association with recreational fisheries. Feeding and close interactions between wild dolphins and humans can lead to both animal and human injuries and fatalities. This paper documents the habituation of an IRL bottlenose dolphin to fishing vessels and reports the potentially harmful consequences of these interactions.

Key Words: bottlenose dolphin, *Tursiops truncatus*, fishery interactions, Indian River Lagoon

Introduction

Several accounts of wild bottlenose dolphins (*Tursiops truncatus*) interacting with humans have been reported (Webb, 1978; Conner & Smolker, 1985; Lockyer & Morris, 1986; Lockyer, 1990; Bloom, 1991; Dudzinski et al., 1995; Samuels & Bejder, 1998). Recent coastal population development, increased recreational activities, and human exploitation of marine food sources have increased the likelihood of dolphins coming in direct contact with human activities. While social dolphins have been reported to seek human contact with no obvious immediate reward or advantage (Lockyer, 1990), dolphins also can be conditioned to interact with humans through food provisioning (Dudzinski et al., 1995; Orams, 1995, 1997). Perhaps the best known example of food provisioned habituation involves bottlenose dolphins at Monkey Mia, Western Australia (Conner & Smolker, 1985). For more than 20 years, dolphins at Monkey Mia have been conditioned through food provisioning to regularly accept fish handouts and occasional physical contact from visitors (Conner & Smolker, 1985; Orams, 1997). Dolphins along Panama City Beach, Florida, USA, also have become habituated to human interactions. These animals approach within touching distance to humans in the water or on vessels; make close approaches with the head up, with or without mouth open; rapidly travel to keep up with a vessel moving at speed (excluding bowriding); and accept food handouts (Samuels & Bejder, 1998). Like the dolphins at Monkey Mia, many interactions between dolphins and humans in Panama City Beach were a result of food provisioning (Samuels & Bejder, 1998). Efforts to establish a dolphin feeding program in Tangalooma, Australia, revealed that dolphins were initially reluctant to accept fish handouts; however, after several months of approximation, dolphins eventually accepted fish handouts

(Orams, 1995). Likewise, dolphins that are regularly provisioned with fish discarded by commercial fisheries can lose their natural apprehension of humans and make close vessel approaches more readily (Noke & Odell, 2002). While the regular interactions between humans and wild dolphins can be established, the impacts of these activities on the health and welfare of both the dolphins and humans involved is potentially harmful (Lockyer, 1978; Lockyer & Morris, 1986; Corkeron et al., 1990; Orams, 1995; Orams et al., 1996).

Frequent interactions between dolphins and humans can cause these animals to become less wary of humans, which can result in increased aggressive behaviors that can lead to human injuries or even death (Dudzinski et al., 1995; Orams, 1995; Orams et al., 1996; Santos, 1997). Dolphin-human interactions can also be detrimental to the dolphins involved. The regular feeding of wild dolphins alters natural behavior patterns and places dolphins at risk (Bryant, 1994). For example, close interactions with humans may place the animals at risk for propeller cuts, fishing gear entanglement, or other human activities that are potentially harmful (Corkeron et al., 1990; Bloom, 1991; Bryant, 1994; Orams, 1995). Close human contact can also result in the ingestion of contaminated or inappropriate food or intentional harm by people who may regard dolphins as nuisance animals (Lockyer, 1978; Bryant, 1994). Dolphins residing in the Indian River Lagoon (IRL) have been documented to feed in association with the commercial blue crab fishery (Noke & Odell, 2002). While it is not unusual for marine mammals to feed in association with fisheries in pursuit of similar prey items, dolphins residing in the IRL are not feeding on blue crabs (Barros, 1993), nor have these animals become acclimatized to feeding on by-catch. Rather, these dolphins have become accustomed to closely approaching fishing vessels in order to feed on discarded bait fish, a supplemental food source. Routinely discarding old bait fish and unintentionally provisioning IRL dolphins may condition dolphins to approach fishing vessels. This study documents an IRL bottlenose dolphin conditioned to fishing vessels and reports the inherent hazards of this association.

Materials and Methods

The Indian River Lagoon is a shallow estuary system located along the east coast of central Florida (Figure 1). The estuary consists of three interconnected bodies of water—(1) the Indian River, (2) the Banana River, and (3) the Mosquito Lagoon—that extend over a distance of approximately 220 km (Mulligan & Snelson, 1983; Barros, 1993). While most of the area is

shallow (less than 1 m at high tide), the majority of it is a suitable habitat for the bottlenose dolphins that are frequently seen in the shallow areas (Odell & Asper, 1990). Bottlenose dolphins inhabiting the IRL are presumed resident to the estuary, and while population data are scarce, the estimated population size is 300 animals (Scott et al., 1990).

As part of a larger study, 125 surveys were conducted with eight commercial crab boats from January 1998 to August 1999 to assess the interactions between the IRL blue crab fishery and the bottlenose dolphin. Dolphins were found to interact with the fishery in several ways, including begging at commercial crab boats, feeding on old discarded bait fish, foraging bait fish from crab pot bait wells, and dying from crab pot float line entanglement (Noke & Odell, 2002). This study presents opportunistic focal-animal observations of a typically solitary individual dolphin that is conditioned to approach commercial crab fishing boats. During these observations, standardized behaviors (Wells, 1996; Samuels & Bejder, 1998; Noke & Odell, 2002) were recorded using instantaneous scan sampling at 5-min intervals while the animal remained with the fishing boat (Altmann, 1974; Mann, 1999) (Table 1). Additionally, detailed *ad libitum* field notes were recorded to supplement the description of these events (Altmann, 1974). A handheld global positioning system receiver (Magellan GPS 300™) was used to record latitude and longitude for dolphin sightings. In addition, during the course of the study, 12 commercial crab fishers were interviewed to determine if they were familiar with this habituated dolphin and what types of interactions they had with this animal. One fisher provided photographs and sighting locations from 1998 to 2000. While there were numerous anecdotal reports, only the confirmed sightings with photographs and accurate locations were included in this study.

Results

From 1998 to 2001, an adult bottlenose dolphin (based on a total length of > 249 cm) (Wells et al., 1987) was documented interacting with the commercial blue crab fishery in the IRL. The dolphin was estimated to be at least 255 cm in total length and, based on this size, the animal was presumed to be a male (Wells et al., 1987; Stolen et al., 2002). Several broken and missing teeth were present in the lower right jaw; there were a few broken teeth in the lower left jaw; and several teeth were missing in the anterior portion of the upper jaw (Figure 2). The remaining teeth were extremely worn, especially in the upper jaw. The animal's rostrum is pitted, scarred, and reddish in

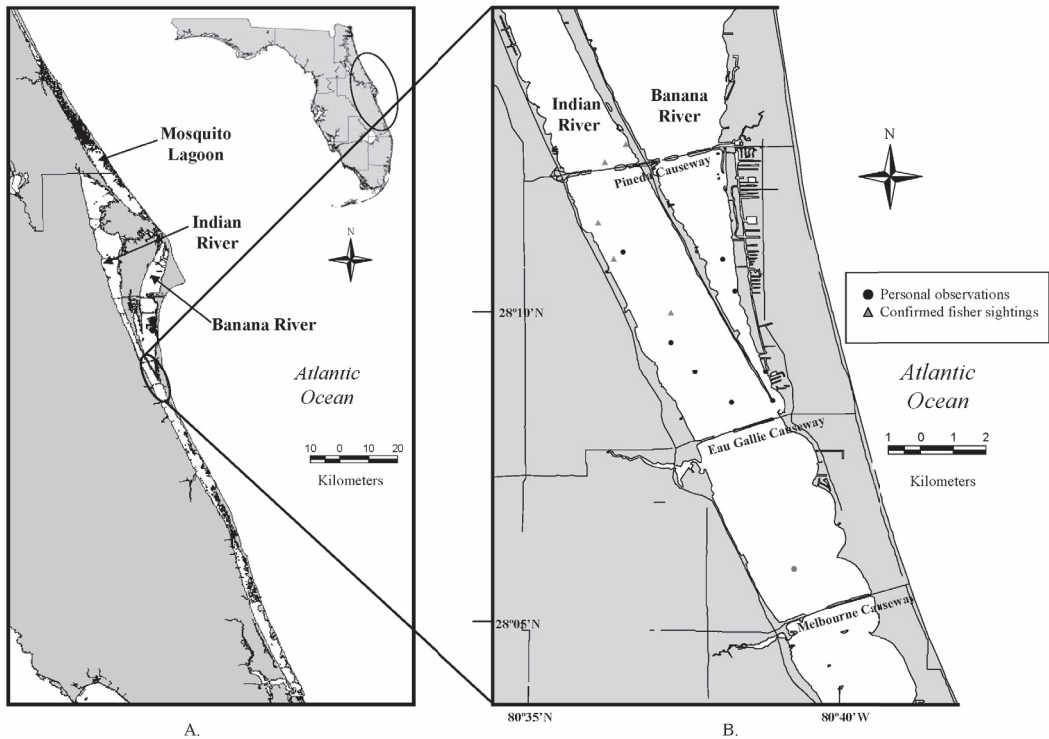


Figure 1. (A) A map of the Indian River Lagoon estuary system and the localized area (within the oval) where the dolphin was sighted; (B) sightings (personal observations) and confirmed fisher sightings are illustrated on the enlarged study site map.

Table 1. Standardized behaviors that were used during focal observations

Behavior	Description	Reference
Mill	Nondirectional movement; often occurs in conjunction with other activities	Wells, 1996
Probable feed	Indications of feeding, but the feeding cannot be confirmed (e.g., active milling by a dolphin with marine birds diving in area)	Wells, 1996
Travel	Directed movement, including zig-zag movement	Wells, 1996
Leap, tail slap, chuff	Aerial or acrobatic behaviors	Wells, 1996
With boat	Includes all cases where the dolphins are interacting with a boat, including bowriding, stern wake-riding, making figure-eights ahead of the boat, etc.	Wells, 1996
Feeding on discarded bait fish	Dolphins observed following crab fishing boats, approaching the side of the boat, and consuming bait fish	Noke & Odell, 2002
Close approaching	Dolphins changing direction to approach the crab boat within 2 m of the operational side of the boat, where crab pots were harvested, old bait fish discarded, and traps re-baited and deployed	Noke & Odell, 2002
Begging	Approaching the boat with head out of water and mouth open	Samuels & Bejder, 1998

color. Based on the individual's size, dentition, and weathered rostrum, the animal was speculated to be an older adult. The dolphin is distinctly marked with whitish skin lesions covering large areas posterior to the blowhole, laterally, and along the tip of the dorsal fin (Figure 2). While these

lesions resemble lobomycosis, a superficial fungal infection of the skin caused by the fungus *Lacazia loboi* (syn. *Loboa loboi*), fungal disease could not be confirmed since this can only be accomplished through light microscopy (Cowan, 1993; Simões-Lopes et al., 1993). Photographic comparisons of



Figure 2. Habituated bottlenose dolphin that follows a commercial crab boat; apparent skin lesions make this animal easily recognizable.

the skin lesions (1998 to 2000) did not reveal an increase in coverage or a change in appearance. The combination of the unusual behaviors this animal exhibited, in addition to the distinguishing markings along the body, made the individual easily recognized and resighted.

Anecdotal reports from blue crab fishers suggest that this individual associated with the fishery since 1994. Interviews with local commercial crab fishers revealed that all fishers were familiar with this animal, and various encounters with this known animal were reported ($n = 12$ fishers). All fishers reported the animal begging and feeding on discarded bait fish. Additionally, some fishers reported hand feeding ($n = 7$ fishers) and petting and swimming ($n = 2$ fishers) with this habituated animal.

Focal observations of this dolphin revealed that it had become highly conditioned to approaching commercial crab boats (total observation time = 110 min, $n = 6$ observations, mean observation time [\pm SE] = 18.3 ± 6.38 min) (Table 2). The dolphin was observed following crab boats from trap to trap for up to 50 min at a time, lunging at vessels, and vocalizing. Focal scan samples ($n = 6$ encounters) from crab fishing boats (1998 to 1999) revealed that the dolphin spent all of its observed time feeding on discarded bait fish, following crab boats, and/or begging. Since all sightings made from commercial crab boats involved the

Table 2. A summary of behavioral observations made from 1998 to 2001

Date	Time	Solitary	Observer	Observations
16 June 98	10:07-10:20	Yes	Durden	Dolphin closely approached, begging at boat, fishing on discarded bait fish. Fisher stopped to kull harvest; no bait discarded. Dolphin begged and vocalized.
16 June 98	11:20-11:30	Yes	Durden	Begging at crab boat, close approach, and feeding on discarded bait fish
9 June 99	7:45-7:55	Yes	Durden	Dolphin lunged at and close approached the crab boat as soon as crab harvesting began, begged, fluke slapped, and left the boat when no bait was discarded.
21 July 99	9:20-9:32	Yes	Durden	Feeding on discards, begging, and following crab boat, with close approach
21 July 99	10:30-11:20	Yes	Durden	Feeding on discards, begging, and following crab boat, with close approach
13 August 99	10:35-11:45	Yes	Durden	Feeding on discards, begging, and following crab boat, with close approach
14 April 01		No	Durden	Sighted from recreational watercraft, milling with three other dolphins.
26 May 01		No	Durden	Observations from rescue vessel: Approached crab boat with fishing lure in mouth. Remained at the boat for over an hour until the rescue team arrived. Two other dolphins milled nearby.
27 May 01		No	Durden	Sighted from recreational watercraft. Probable feeding in the shallows with two other dolphins.
19 May 98		No	Fisher	Fisher provided photos of dolphin begging with another large adult.
5 June 98		Yes	Fisher	Fisher provided photos of dolphin begging.
13 August 99		Yes	Fisher	Fisher approached observation crab boat; dolphin left and followed his boat, begging and feeding on discarded bait for an hour.
15 August 00		Yes	Fisher	Fisher provided photos of dolphin begging and feeding on discarded bait fish.
1 November 00		Yes	Fisher	Fisher provided photos of dolphin begging.



Figure 3. The known bottlenose dolphin approaches a commercial crab boat with a fishing lure lodged in its mouth. The animal's worn dentition is apparent.

dolphin feeding on discarded bait fish, there was a concern that the dolphin's natural foraging skills could have been altered; however, sightings of the dolphin from watercraft other than fishing boats documented the dolphin naturally foraging (probable feed) and traveling with two other dolphins ($n = 3$ sightings; pers. ob., 2001).

While this dolphin typically was solitary when approaching crab boats, it has been photographed by a fisher begging at a crab fishing boat with another adult dolphin (based on Wells et al., 1987; total length > 249 cm) (Table 2). Sightings of this animal, including anecdotal reports from fishers, confirmed fisher sightings, and personal observations, have all been within a small localized area (12.88 km) surrounding the Eau Gallie Causeway, Melbourne, Florida (Figure 1). The majority of reports and observations of this dolphin interacting with the fishery occurred during the late spring and summer months (May to August), with the exception of one encounter reported by a fisher in November 2000.

Behavioral observations revealed that this animal could become agitated when it does not receive bait fish upon approaching commercial crab boats. On one occasion, this animal was observed fluke-slapping and leaping out of the water after following a crab boat for several traps where no bait fish was discarded. Fluke-slapping often is associated with aggressive behavior and could be used as a warning sign to other dolphins (Brown & Norris, 1956; Würsig & Würsig, 1977). Similar to other habituated animals, this animal also may become predictably more aggressive as its wariness of humans is lost (Bryant, 1994). Likewise, the animal's loss of prudence in the presence of human activities may increase susceptibility to human-related injuries.

On 26 May 2001, this habituated dolphin approached a commercial crab boat that it regularly frequented and proceeded to beg. When the

animal approached the boat, the fisher noticed a dual-hook (11.6 cm) fishing lure lodged inside of the dolphin's mouth (Figure 3). The fisher reported the injured dolphin to the proper authorities, and a rescue team was dispatched to dislodge the recreational fishing lure. The dolphin remained at the fisher's boat for over an hour until the rescue team arrived and was able to remove the fishing lure.

Discussion

As the human population along coastal areas continues to increase, there is a growing concern that marine mammals will be impacted by human activities. Urban and agricultural pollution, recreational boating, noise pollution, and marine debris entanglement or ingestion may pose a serious threat to marine mammals (Rawson et al., 1993; Mann et al., 1995; Richardson et al., 1995; Wells & Scott, 1997; Gorzelany, 1998; Wells et al., 1998; Laist et al., 1999; O'Shea, 1999; Van Parijs & Corkeron, 2001). Likewise, the feeding of wild dolphins was determined to be harmful to the health and welfare of these animals and was prohibited in waters within United States jurisdiction by the federal Marine Mammal Protection Act regulations in 1991 (Bryant, 1994). Dolphins feeding opportunistically in association with a commercial fishery, however, fall exempt from this regulation.

While there are several accounts of marine mammals feeding opportunistically in association with fisheries (Corkeron et al., 1990; Couperus, 1994; Fertl & Leatherwood, 1997; Secchi & Vaske, 1998), animals in these studies consumed live or "trash fish" that had been recently caught and/or released. These cases involved an opportunistic foraging opportunity with little close human interaction (Corkeron et al., 1990). IRL dolphins associated with commercial blue crab fishery, however, fed on old, discarded, often highly decomposed bait fish of various species that are used as bait to capture blue crabs. These animals fed on a supplemental food source that was obtained by closely approaching fishing vessels. Since blue crab fishers typically discard old bait fish from each crab pot while harvesting crabs, it is likely that this animal has been conditioned to approach fishing boats through bait fish reinforcement obtained at each trap.

The conditioning of bottlenose dolphins in the IRL through food provisioning could habituate dolphins to human interactions, increasing close vessel approaches and making dolphins more susceptible to fishery gear entanglement, boat propeller injuries, or intentional harm by fishing operations that view the animal as a nuisance. While close interactions between IRL dolphins and the

commercial blue crab fishery have been documented (Noke & Odell, 2002), numerous anecdotal reports indicate that dolphins also feed in association with recreational fishers in the IRL (Stolen & Noke Durden, unpublished data). In fact, fishers have reported dolphins chasing their hooked fish, begging at their boats, closely approaching their boats, and even removing hooked fish from their lines (Stolen & Noke Durden, unpublished data). Close interactions with fishing operations may result in injuries to these animals. The vulnerability of this habituated dolphin to injuries from human interactions became evident when a recreational fishing lure was found lodged in its mouth. This paper documents the first case of a habituated bottlenose dolphin known to associate with a commercial fishery along the east coast of Florida. Observations of this animal provide one example of the harmful effects of close human interaction.

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