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Impacts of Ecotourism on Short-Beaked Common Dolphins (*Delphinus delphis*) in Mercury Bay, New Zealand

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Abstract

Short-beaked common dolphins (*Delphinus delphis*) often are found in large aggregations offshore from the eastern coast of New Zealand. They are the primary target of at least six marine mammal tourism operations from Whakatane to the Hauraki Gulf. This report details the first long-term investigation of interactions between tourists and common dolphins. During a 3-y study offshore from Whitianga on the Coromandel Peninsula, 105 focal group follows, totaling 118 h of observations were conducted from a 5.5-m, rigid-hull inflatable boat. Seventy-two of these observations were conducted in the absence of the tour boat (baseline), and 33 with the tour boat. Baseline data were compared with "tour boat" data to assess changes in dolphin behaviour resulting from the tour boat approaching and swimmers entering the water to snorkel with the dolphins.

Common dolphins responded with a relatively predictable pattern to approaching boats. Initial attraction (mean duration 8 min) typically was followed by neutral behaviour (mean duration 57 min) and eventually replaced by boat avoidance. Smaller dolphin groups showed boat avoidance sooner and more frequently than larger groups. When swimmers entered the water, dolphins only spent an average of 2 min in their vicinity. Throughout encounters, they maintained a distance of at least 3 m from the nearest swimmer. During half of the attempted swims, dolphins did not change their course or their activity in response to swimmers. Swimmers had a better chance of a sustained interaction when the group of dolphins was large (> 50 individuals) and/or the number of swimmers in the water was small (< 5). The results of this study suggested that common dolphins can be affected by tourism; however, adherence to New Zealand's *Marine Mammals Protection Regulations* and the current low level of tourism appear to minimise the impact on this species.

Key Words: short-beaked common dolphins, *Delphinus delphis*, ecotourism, dolphin-watching, swim-with-the-dolphins tours, behaviour, regulations, New Zealand

Introduction

The growing interest in observing and interacting with whales and dolphins in the wild (Orams, 1999; Hoyt, 2000) and the presence of a variety of species of dolphins in easily accessible nearshore environments have contributed to a rapid growth of wild dolphin-based tourism in New Zealand (Orams, 1997; Constantine, 1999a). Tours focus on all four species of dolphins that are frequently found in New Zealand's coastal waters. These species are Hector's dolphins (*Cephalorhynchus hectori*) (Bejder, 1997), bottlenose dolphins (*Tursiops truncatus*) (Constantine, 1995), dusky dolphins (*Lagenorhynchus obscurus*) (Barr, 1997), and common dolphins (*Delphinus delphis*) (Neumann, 2001).

In New Zealand, the conservation and management of marine mammals is the responsibility of the Department of Conservation (DoC). DoC administers the Marine Mammals Protection Act (New Zealand Government, 1978) and the *Marine Mammals Protection Regulations* (New Zealand Government, 1992). The purpose of these regulations is to . . .

> make provision for the protection, conservation, and management of marine mammals and in particular:
>
> (a) to regulate human contact or behaviour with marine mammals either by commercial operators or other persons, in order to prevent adverse effects of the interference with marine mammals; and
>
> (b) to prescribe appropriate behaviour by commercial operators and other persons seeking to come into contact with marine mammals.

These regulations also allow DoC to require permits and to set permit conditions for any commercial enterprise wishing to offer and promote interaction opportunities (e.g., observing, swimming, snorkelling, and so on) with marine mammals. In June 2001, there were 75 permits issued for cetacean-based tourism (including swimming); however, only 30 permits currently are being utilised by full-time, exclusively cetacean-based, tourism operations (Neumann, 2001). Of these, seven primarily focus on common dolphins (one for the Hauraki Gulf, one for Whitianga, one for Whangamata, two for Tauranga, and two for Whakatane).

This study was conducted in Mercury Bay off the eastern coast of the Coromandel Peninsula (Figure 1). It is the first long-term study to assess the impacts of tourism activities on this species. Its primary objectives were

- To assess the impact of the approach of the commercial marine mammal tourism vessel on common dolphins in the area.
- To assess the impact of swimmers in the water on common dolphins in the area.

Materials and Methods

Observation Platform

Observations were conducted from a 5.5-m, centre-console, rigid-hull inflatable boat, powered by a 90-hp two-stroke outboard engine. Because observations were conducted from onboard a potential source of disturbance, it is important to consider how this may have influenced these data. The behaviour of dolphins and other cetaceans has been shown, to varying extents, to be affected by boat traffic (e.g., Acevedo, 1991;

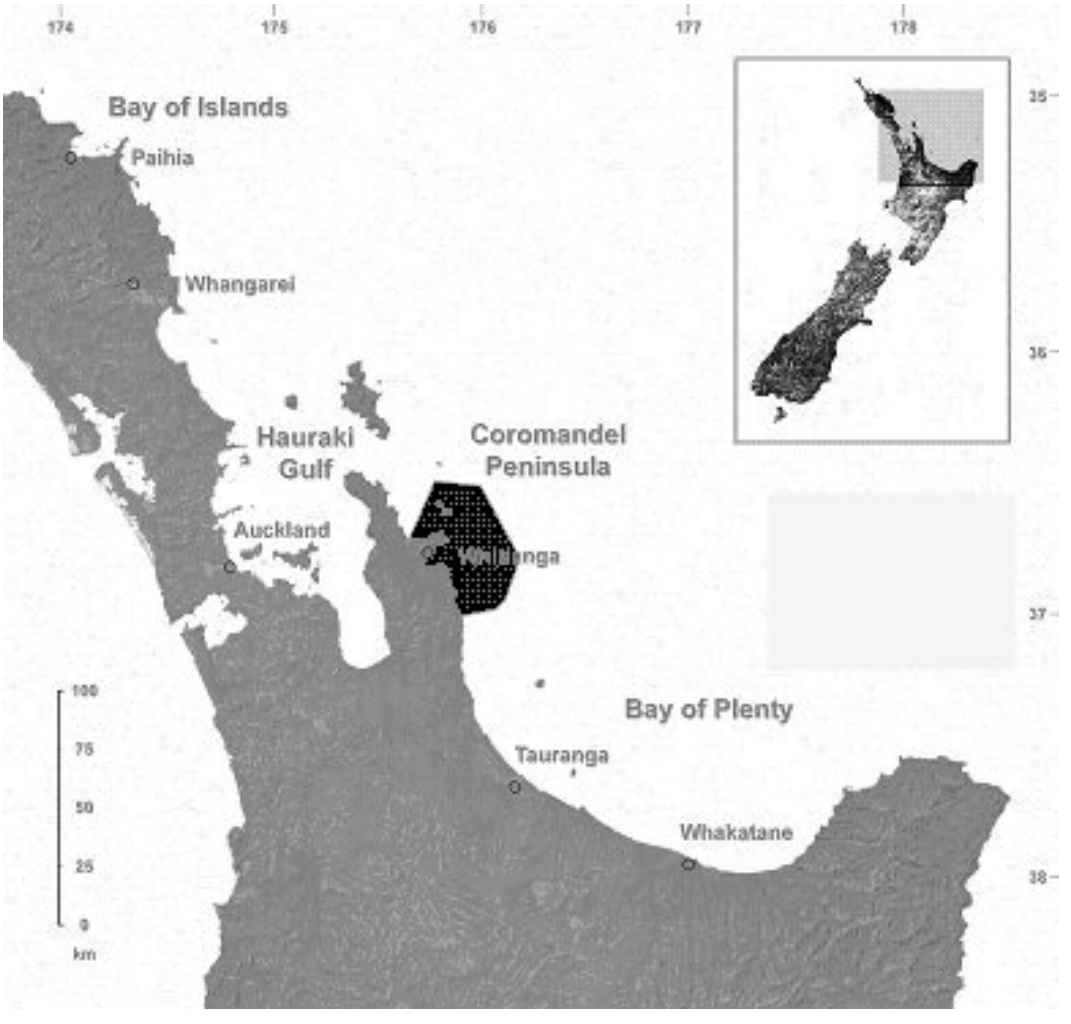

Figure 1. Map of northeastern New Zealand; the study area is shaded black.

Kruse, 1991; Corkeron, 1995; Nowacek, 1999). To get an accurate understanding of how dolphins behave without boats present, some studies have been successful in conducting land-based observations (e.g., Janik & Thompson, 1996; Bejder et al., 1999). Unfortunately, due to the offshore distribution of common dolphins, this was not possible for this study; however, boat-based studies can still provide valid information on dolphin behaviour by adhering to established approach and follow protocols, which are intended to minimise disturbance (Bearzi et al., 1999; Mann, 2000). Following recommendations by Mann (2000) and Regulation 18 of the *Marine Mammals Protection Regulations* (New Zealand Government, 1992), we avoided sudden changes in speed or direction, head-on or fast approaches, and maneuvers that would cut off the path of dolphin groups. Data collected were catagorised as "baseline"—recorded in the presence of the research vessel only; "tour boat"—recorded when the research boat and the commercial marine mammal tour boat were present; and "swim"—collected when the research and tour boats were present and when the tour boat had placed swimmers in the water in an attempt to "swim with the dolphins."

Study Area

Over three summer seasons (December to April), from 1998 to 2001, observations were conducted in the greater Mercury Bay area, based from Whitianga (36° 50' S, 175° 42' E), on the east coast of Coromandel Peninsula, North Island, New Zealand (Figure 1).

Data Collection

Surveys were only conducted in sea conditions of Beaufort ≤ 2. Upon sighting a group of dolphins, their location was recorded using a handheld Garmin 35 GPS. The number of animals in the group was counted or estimated, and the predominant group activity at the first contact was recorded. This was done at whichever distance the dolphins were first spotted (typically ranging between 200 to 500 m) before approaching closer (to approximately 100 m) for "group follow" (see below) and photo-identification purposes. All information was logged by hand onto a standardised data sheet.

One of the preferred options in behaviour sampling is to follow a focal individual because this tends to provide the most accurate information, and data are based on the "natural unit for analysis" (Mann, 1999, p. 117). Focal animal sampling is best suited to small and stable groups, and it is dependent on the presence of readily identifiable group members. This was not possible for the subjects of this study because groups of common dolphins were usually large (> 50 individuals), and individuals were rarely recognisable from natural markings. As a result, a focal group follow protocol was chosen for data collection. To minimise potential bias, it strictly followed Mann's (1999) recommendations:

> [When conducting a focal group follow] an estimate of predominant group activity can be achieved by explicitly scan sampling over 50 percent of the individuals, rather than by "watching" the group. (p. 110)

This was accomplished by instantaneous scan-sampling at 3-min intervals. Thus, the activity of the dolphins was defined as the behavioural state, which more than 50% of the animals were involved in at each time. The following five categories of activity state were derived from definitions used by Shane (1990), Hanson & Defran (1993), and Waples (1995):

1. *Resting*—The dolphins stayed close to the surface and close to each other. They surfaced at regular intervals in a coordinated fashion, either not propelling themselves at all or moving forward very slowly.
2. *Milling*—Dolphins were swimming, but frequent changes in direction prevented them from making noticeable headway in any one direction, and, as a consequence, they remained in the same general area. Often, different individuals in the group were swimming in different directions at a given time, but their frequent directional changes kept them together.
3. *Traveling*—The dolphins propelled themselves along at a sustained speed, all heading in the same direction and making noticeable headway along a certain compass heading.
4. *Feeding*—The dolphins were seen either capturing or pursuing fish. The herding of fish was also included in this category, as it was invariably followed by at least some fish captures.
5. *Socialising*—This covered any physical interactions that took place among members of a group, including chasing each other, body contact, and copulation. Socialising was often accompanied by aerial behaviour.

The distinction between resting, traveling, feeding/foraging, and socialising is widely accepted and forms the basis of most field research on free-ranging (non-captive) cetaceans (Mann, 2000). Shane (1990) and Waples (1995) also included "milling," and this was found to be useful to classify some of the observed common dolphin behaviour in this study. In addition to the instantaneous scan-sampling of behavioural states, continuous focal group sampling was carried out for

unusual behavioural events such as tail-slapping, breaching, leaps, chuffing, bow-riding, and avoidance. Avoidance was defined as when the entire group suddenly changed direction away from the tour vessel and/or dived for a prolonged period of time, and then exhibited this behaviour consistently during renewed approaches by the boat.

Thus, comparisons between each data set—"baseline," "tour boat," and "swimmers"—were made using the "activity budget" (the amount of time spent in particular behavioural states) and "behavioural events." These comparisons were the basis of an assessment of the tourism activities' influence.

Results

One hundred and sixty-six surveys were conducted, and these resulted in 105 focal group follows. Six hundred and forty-one h were spent on the water, and 118.2 h of these were spent following common dolphins. The mean duration of focal group follows was 67.5 min (SD = 39.5, range = 15 to 195 min). Seventy-two focal follows were considered baseline data with only the research vessel present, while 33 focal follows were conducted with the tour boat present for all or part of the follow. Of these 33, only 15 trips by the tour operator included "swim attempts."

Activity Budget – Baseline

During baseline focal group follows, common dolphins spent most of their time traveling and the least amount of time resting. This was consistent throughout the three study seasons. The differences in time devoted to each behaviour were highly significant ($F = 66.08$, $DF = 4$, $p < 0.001$), while there was no significant difference between the activity budgets for different years ($F = 0.05$, $DF = 2$, $p > 0.95$). Overall, common dolphins spent 55.6% of their time traveling, 20.4% milling, 16.2% feeding, 7.1% socialising, and 0.7% resting (Figure 2).

Impact of the Tour Boat

Dolphins changed their activity in 21.2% of cases when the tour boat approached—most frequently by dolphins approaching the tour boat to "bow-ride"; however, activity did not change more often than expected during boat approaches compared with the frequency of activity changes during baseline focal group follows. The exponential distribution of bout duration was calculated to account for the probability that some of these behavioural changes would have occurred at that time, regardless of an approaching boat (Haccou & Meelis, 1992). A chi-square goodness-of-fit test showed no significant effect of boat approaches on dolphin behaviour overall (chi-square = 1.4, DF = 1, $p > 0.1$); however, the activity change from feeding to traveling occurred significantly more often during boat approaches than during other times (chi-square = 5.42, DF = 1, $p < 0.02$).

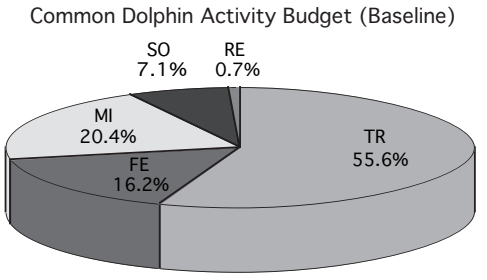

Figure 2. Proportion of time spent by common dolphins in various activity states, with the tour boat absent; TR = traveling, FE = feeding, MI = milling, SO = socialising, and RE = resting.

Dolphins spent a higher proportion of their time traveling and socialising, at the expense of the remaining three behavioural states, when the tour boat was present (Figure 3). Even so, an ANOVA comparing baseline and tour boat data sets failed to show a statistically significant difference between the respective activity budgets ($F = 0.78$, $DF = 1$, $p > 0.4$).

Attraction and Avoidance

In 45.7% of encounters, some of the observed dolphins were attracted to the boat and started bow-riding. Members of a group frequently took turns bow-riding, with some dolphins engaging in it repeatedly while others did not join in at all. When bow-riding occurred, it lasted 11.31 min on average (SD = 10.5, range = 3 to 48 min). After this period of

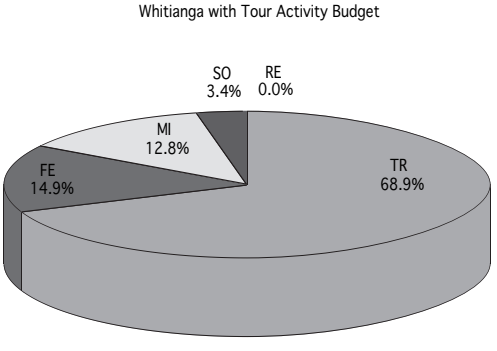

Figure 3. Proportion of time spent by common dolphins in various activity states, in the presence of the tour boat; TR = traveling, FE = feeding, MI = milling, SO = socialising, and RE = resting.

initial attraction, in most cases, the dolphins behaved "neutrally" for the remainder of the observation (i.e., they showed no further apparent response to the boat). In some cases, however, the dolphins exhibited boat avoidance behaviour. They abruptly changed their heading away from the path of the boat, and they continued to do so if the boat adjusted its heading to follow the dolphins. Sometimes, the dolphins combined this with long coordinated dives, putting a large distance between themselves and the boat while traveling below the surface. When exhibited, boat avoidance occurred, on average, 48.6 min (SD = 22.6, range = 12 to 110 min) into a focal group follow. Boat avoidance eventually was observed in 24.2% of cases when the tour boat was present.

Groups containing fewer than the average 57.3 individuals (range = 3 to 400) were significantly more likely to exhibit boat avoidance than larger groups (chi-square = 3.67, DF = 1, $p < 0.1$) (Figure 4). Groups that showed boat avoidance contained an average of 44.1 individuals (range = 3 to 250), whereas groups that showed no boat avoidance were made up of 63.3 individuals on average (range = 5 to 400).

Calves and newborns were present in similar numbers in both the groups that showed avoidance and the groups that showed none. Their presence or absence did not appear to influence whether or not boat avoidance occurred (chi-square = 0.56, df = 1, $p > 0.1$). Boat avoidance did not occur more frequently than expected in correlation to any particular activity state (chi-square = 2.58, DF = 4, $p > 0.1$); therefore, group size seems to be the chief factor contributing to boat avoidance, with larger groups being more boat-tolerant.

Impact of Swimming with the Dolphins

On 15 of the 33 tour boat trips, swimming with the dolphins was attempted. Of these, 46.6% ($n = 7$) resulted in an "interaction" with the dolphins (i.e., some of the dolphins approached and investigated the swimmers and were clearly visible to them underwater). Thirty-nine separate swim attempts were undertaken during those 15 trips, resulting in an average of 2.6 swim attempts per trip (SD = 1.4, range = 1 to 5). Dolphins were interactive during eight swim attempts (20.5%), and the mean duration of these interactions was 3 min (SD = 1.6, range = 1 to 10 min).

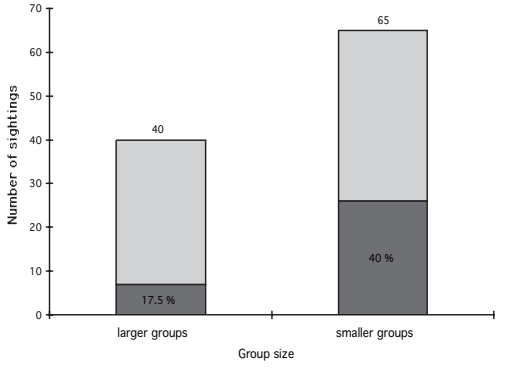

Figure 4. The relationship between group size and boat avoidance; number of sightings of groups > 57 individuals (left) and groups < 57 individuals (right), with incidence of boat avoidance for each group size in solid grey.

The dolphins' activity influenced the success of swim attempts. Dolphins were most interactive when the predominant group activity was "social," and least interactive when it was "travel" or "mill" (Table 1). Swim attempts were more successful when dolphin groups were larger (Table 2). Calves or newborns were not present during swim attempts as it is a violation of existing regulations to swim with them, and the tour operator adhered to this requirement on all occasions observed in this study. Unsuccessful swim attempts were always the result of the dolphins maintaining their initial activity, "ignoring" the swimmers, and moving out of their field of vision. On no occasion did dolphins show apparent avoidance by changing direction to head away from the swimmers, nor did they change their behavioural state when swimmers entered the water.

Dolphin behaviour did not show a consistent response during each trip (i.e., even though dolphins may not have showed any interest in the swimmers during the first or second swim attempt, they sometimes interacted with them during a later attempt).

The behaviour of swimmers in the water appeared to influence the outcome of a swim attempt. No interactions took place when swimmers

Table 1. Dolphin activity and success rate of swim attempts

Dolphin activity	Interactive swims	Swim attempts	Success rate
SO	1	2	50.0%
FE	2	7	28.6%
MI	2	12	16.7%
TR	3	18	16.7%

Table 2. Relationship between the number of dolphins in a group and the success of swim attempts

Group size	Attempts	Interactions	Success rate
< 15	3	0	0.0%
15-30	7	1	14.3%
31-50	15	3	20.0%
51-100	8	2	25.0%
> 100	6	2	33.3%

splashed noisily on the surface, while the success rate improved considerably when swimmers did repeated "duck-dives" (Table 3).

Table 3. Behaviour of swimmers and outcome of swim attempts

Behaviour of swimmers	Attempts	Interactions	Success rate
Splashing	7	0	0.0%
Quiet snorkel	26	5	19.2%
Duck-diving	6	3	50.0%

During a typical interaction, some of the dolphins in the focal group (up to 50%) approached the swimmers to within 3 m, but never closer. They then appeared to visually inspect swimmers, with some individuals making up to five close passes beside swimmers. When swimmers tried to approach the dolphins by swimming towards them, the dolphins adjusted their distance to maintain the initial "safety distance," typically about 3 to 5 m. Fast approaches by swimmers often had the opposite of the desired effect and resulted in an increase of that "safety distance." The only aerial behaviours observed during swim interactions were tail-slapping ($n = 4$) and "chuffing" ($n = 3$). Neither of these was significantly correlated to swim interactions (chi-square = 0.65, DF = 2, $p > 0.1$).

Discussion

Impact of the Tour Boat

The high frequency of changes in behaviour from feeding to traveling in response to an approaching vessel is potentially serious because it suggests that—on certain occasions—boat traffic can interfere with the dolphins' feeding behaviour. Feeding, of course, is one of the most basic requirements any animal has to perform, and disruption of this activity could have a negative effect. Constantine (1995) reported that common dolphins off the Bay of Islands changed their behaviour during 52% of boat approaches, while only 32% of bottlenose dolphin groups changed their activity. Thus, disruption of feeding by approaching boats also occurs in other locations in New Zealand.

In a number of situations, "attraction" to the tour boat (usually for "bow-riding") was observed; however, even if dolphins show a "positive" response and approach boats, this still could have negative long-term effects, for example, by keeping the dolphins from feeding or resting (Janik & Thompson, 1996). If dolphins become stressed due to boat traffic, it could have a negative impact on their physical fitness (Bejder et al., 1999). Because of the implications for cetacean conservation, more and more studies are now addressing this problem (e.g., Nowacek, 1999). Observed reactions reported in the literature range from an initial attraction to boats for Hector's dolphins (*Cephalorhynchus hectori*) (Bejder et al., 1999) to changing direction and avoiding boats as far as six miles away for spinner (*Stenella longirostris*) and spotted dolphins (*S. attenuata*) (Au & Perryman, 1982). Killer whales (*Orcinus orca*) increased their travel speed when boats were present, but they maintained their heading (Kruse, 1991). Bottlenose dolphins in a busy shipping channel showed changes in their behaviour when boats started to follow rather than pass them (Acevedo, 1991). In Sarasota Bay, bottlenose dolphins dived longer as boats passed near to them (Nowacek, 1999). Bottlenose dolphins in the Moray Firth appeared to take longer dives and/or move away from approaching boats (Janik & Thompson, 1996).

The reactions by common dolphins observed in this study appear to correspond closely to those found by Bejder et al. (1999) for Hector's dolphins. Hector's dolphins showed an initial attraction to boats for "bow-riding," lasting up to 50 min; however, after 70 min, the dolphins were either avoiding the boat or equivocal to it. The period of initial attraction was much shorter for the common dolphins observed in this study—boat avoidance appeared earlier; however, the overall pattern of an attraction-neutral-avoidance sequence is the same as reported by Bejder and colleagues.

Group size was significantly correlated with boat avoidance. Boat avoidance dropped from 40% for smaller than average groups to 17.5% for larger groups. Large groups form partly to provide better protection from predation. This is achieved by increasing group vigilance and also by decreasing the likelihood of any one individual being taken (dilution effect). If this holds true, then dolphins traveling in large groups should have less cause to be disturbed by an unfamiliar entity or potential threat (e.g., a boat) than dolphins traveling in smaller groups. This prediction was confirmed by the results of this study.

With the exception of the behavioural changes reported above, the behaviour of dolphins did not appear to be affected significantly by the presence of the tour boat. This could occur for the following reasons:

- The skipper's experienced and responsible handling of the vessel and his adherence to the *Marine Mammals Protection Regulations* (New Zealand Government, 1992)—This would indicate that these regulations are indeed effective, if adhered to.

- The frequency of dolphin-watching trips may be too low to have an effect in this area—Typically, around 20 trips were conducted over the entire summer. Furthermore, related research indicated that any one common dolphin group does not spend extended periods of time in Mercury Bay (Neumann, 2001). Therefore, it is unlikely that individual dolphins experience multiple tourist trips during one season. This decreases the likelihood of either sensitisation or habituation to these trips.
- Any behavioural changes caused by boat traffic were already exhibited in reaction to the research vessel—They were not compounded by the presence of a second vessel (i.e., the tour boat).

While the tourism impact in Mercury Bay is diluted by being spread over various groups during consecutive sightings, this "dilution" might be counteracted by the cumulative effects of tourism exposure in different places. Movements by individual dolphins from Mercury Bay to the Hauraki Gulf, and from Mercury Bay to Whakatane were documented (Neumann, 2001). Both locations feature a greater level of dolphin tourism than Mercury Bay. This could mean that while individual dolphins may be exposed to tourism only briefly in one location, they could then be subject to tourism again in another location. Thus far, there is no indication that common dolphin behaviour differed in either the Hauraki Gulf (Leitenberger, 2001) or off Whakatane (Neumann, 2001) from the baseline behaviour observed in Mercury Bay.

Impact of Swimmers

Constantine & Baker (1997) reported a slightly higher rate of sustained interactions per swim attempt for common dolphins in the Bay of Islands (24% vs 20.5%, this study); however, this difference was not statistically significant ($z = 1.48$, $p > 0.05$). The average duration of these interactions was noticeably longer in the Bay of Islands (5.3 min vs 3 min, this study); however, this difference also was not statistically significant ($z = 1.84$, $p > 0.05$).

No active avoidance of swimmers was observed in this study. This is probably a direct result of the differing approach strategies immediately preceding a swim. Constantine & Baker (1997) observed an 86% avoidance rate when swimmers were placed in the path of the dolphins' travel, rather than when swimmers entered the water when dolphins were milling around the boat. Leitenberger (2001) found that no "in-path" placements in the Hauraki Gulf resulted in an interaction. Dolphins either ignored or avoided swimmers. This swimmer placement strategy was employed much less frequently in the Hauraki Gulf than in the Bay of Islands, and it was never observed in Mercury Bay, which could explain the low rate or absence of swimmer avoidance in the latter two locations.

Variations in the influence of approach styles on dolphin-human interactions could not be assessed in this study because swimmers always were placed in the water using the "around boat" strategy. This approach is consistent with that required under the *Marine Mammals Protection Regulations* (New Zealand Government, 1992) and recommended from other locations such as in the Bay of Islands (Constantine, 1995).

As in this study, Leitenberger (2001) also observed very poor success rates for swim attempts when swimmers were noisy and splashing, while success increased with diving and active swimming. This resulted in large groups of swimmers having a significantly lower chance of interacting with the dolphins because they were consistently noisier than small groups of swimmers. Avoidance of swimmers also has been shown in situations where swimmers were not boat-based. For example, Hector's dolphins changed their heading away from swimmers who entered the water from a beach within 200 m of the dolphins in 12.5% of swim attempts (Bejder, 1997).

Bottlenose dolphins in the Bay of Islands appear to have become more sensitive to swim attempts over the past 6 y of increasing tourism exposure. Swimmer avoidance increased significantly over consecutive years. These bottlenose dolphins are members of a relatively closed population, showing a high degree of site fidelity (Constantine, 1999b). Therefore, they are subject to repeated swim attempts time and again. Such a sensitisation is less likely to occur in the much more transient common dolphins, unless the cumulative effects of tourism in different locations are significant. Leitenberger (2001) also found a significant increase in boat and swimmer avoidance over the 6-mo period of her study; however, the increased avoidance rates observed towards the end of Leitenberger's November 2000 to April 2001 study coincide with a decrease in average group size. As in this study, Leitenberger also found larger groups of common dolphins to be much more tolerant towards both boats and swimmers than smaller groups. Therefore, she argued that the increase in avoidance rate is a function of the smaller group sizes she observed in her autumn sample. This supports the notion that common dolphins tend to find "safety in numbers."

Overall, common dolphins appear to be much less "receptive" to contact with human swimmers than the other species targeted by swim-with-the-dolphin tourism in New Zealand. This is shown

in the brevity of interactions, the large distance common dolphins maintain to swimmers, and the low proportion of swim attempts resulting in a sustained interaction. The success rates for swim attempts with common dolphins were only 20.5% in Mercury Bay, which are much lower than those reported for Hector's, dusky, and bottlenose dolphins, all of which ranged above the 50% mark (Constantine, 1995; Barr, 1997; Bejder, 1997).

Compared to the Bay of Islands, dolphin tourism along the Coromandel Peninsula coast and in the Hauraki Gulf is still in its infancy; however, human use of these areas is bound to increase, with continued growth in the New Zealand tourism industry (Tourism Strategy Group, 2001) and multimillion dollar residential developments such as the "Waterways" in Whitianga (Auckland City Council, 2001). Therefore, long-term monitoring of common dolphin populations should be undertaken to determine if this species becomes either habituated or sensitised to human contact.

Conclusions

While this investigation of dolphin-human interactions has been of a preliminary nature, it has produced some valuable insights. For example, common dolphins generally showed few changes in their behaviour in response to tour boat traffic as long as boats were driven in a careful manner, consistent with the provisions of the *Marine Mammals Protection Regulations* (New Zealand Government, 1992); however, prolonged boat traffic (exceeding 45 min) caused apparent boat avoidance behaviour in 40% of groups containing less than 57 (= mean group size) individuals, while only 17.5% of larger groups showed any indication of boat avoidance.

Common dolphins showed no avoidance responses toward swimmers in the water, but they were generally less inclined to interact with humans than the other three dolphin species (bottlenose, dusky, and Hector's) that are targets of Swim-with-the-Dolphin tourism in New Zealand.

While common dolphins are abundant off the east coast of the North Island of New Zealand, they are a species that is sensitive to disturbance. It appears that adhering to the *New Zealand Marine Mammals Protection Regulations* is an effective means for trying to minimise disturbance; however, the long-term cumulative impacts of tourism on this species are unknown. Experience from other species that are targeted for tourism elsewhere shows that negative impacts are difficult to detect and may not become apparent for many years.

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