

NO DETECTABLE IMPROVEMENT IN COMPLIANCE TO REGULATIONS BY “SWIM-WITH-DOLPHIN” OPERATORS IN PORT PHILLIP BAY, VICTORIA, AUSTRALIA

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This article reports on operator compliance with regulations regarding humans swimming with free-ranging bottlenose dolphins (*Tursiops* sp.) in Port Phillip Bay, Victoria, Australia. The objective of this study was to compare if the level of compliance to three conditions (approach type, swim time, and time in proximity to dolphins) in the tour operators' permits changed after state government conducted a review on the existing operators. An additional fourth condition (number of swimmers participating in a dolphin-swim) was also studied. A total of 128 commercial dolphin-swim trips from September 1998–April 1999 and September 1999–April 2000 (prereview) and 16 commercial dolphin-swim trips from February–March 2002 and January 2003 (postreview) were studied. Data were collected using 1-minute scan samples and continuous observations from all three operating human–dolphin-swim tourist vessels. There was no detectable change in the level of compliance for rules regarding the way boats approached dolphins, their time in the proximity of dolphins, and the length of time people swam with dolphins. Operators always complied with regulations regarding the number of people participating in a dolphin-swim. Investigations of the extent to which tourism affects cetaceans have tended to ignore whether tourist vessels obey existing regulations. This study demonstrates that compliance cannot be assumed, and that operators appear to comply better with conditions that are easily quantified. Further, studies are needed to determine the statistical power required to detect changes in tour operator behavior to conditions in their permits. This will inform agencies whether the changes they have implemented to improve compliance levels are actually working.

Key words: Compliance; Swim-with-dolphin operations; *Tursiops* sp.

Introduction

People have long been fascinated by cetaceans (Lockyer, 1990). The historical preoccupation with cetaceans is evident in art forms of ancient Greece dating back to 1600 B.C. (Lockyer, 1990). Anecdotes of free-ranging dolphins initiating contact with people around the globe have occurred for thousands of years (Doak, 1988) and some of these interactions have been sustained for continuous periods at times (Orams, 1995).

In recent years, this interest has spawned into a million dollar tourist industry (Hoyt & Hvenegaard, 2002). This industry comes in several forms, such as land-based observation, whale-watching trips, "wild-dolphin" swimming programs, and dolphin-feeding programs (Amante-Helweg, 1996; Bejder, Dawson, & Harraway, 1999; Orams, 1995; Scarpaci, Nugegoda, & Corkeron, 2003a; Würsig, 1996). However, there can be a cost to the species that are targeted by cetacean tourism (Constantine, 2001; Corkeron, 1995; Scarpaci, Bigger, Corkeron, & Nugegoda, 2000). The effects of cetacean tourism include changes in behavioral responses (Constantine, 2001; Corkeron, 1995), respiration rates (Janik & Thompson, 1996), whistle production (Scarpaci et al., 2000), and interruption and termination of feeding behavior (Blane & Jaakson, 1995).

Southern Port Phillip Bay, Victoria (Australia) has become a venue for dolphin tourism in the form of dolphin-watching and swim-with-dolphin operations. A total of three swim-with-dolphin boats are currently active, taking tourists to swim with free-ranging dolphins. The targeted bottlenose dolphins (*Tursiops* sp.) are a small resident population (Scarpaci, Nugegoda, & Corkeron, 2003b) vulnerable to extirpation (local extinction) due to their population size (estimated at 80 dolphins), female natal philopatry (females remain within or close to their natal area), restricted home range, and human activity in their home range (Hale, 2002).

The authors in a previous study documented minimal compliance by the dolphin-swim tour operators to four conditions in their permit. These conditions were developed primarily to protect both the tourist (participating in a dolphin-swim activity) and the target animals (Scarpaci et al., 2003a). The four conditions previously investigated with

their corresponding level of compliance in brackets were:

- Condition 1: Approach type (64%)
- Condition 2: Swim time (39%)
- Condition 3: Time in proximity to dolphins (38.3%)
- Condition 4: Swims conducted in the absence of "fetal fold" calves (69.4%)

A fetal fold calve was defined as an individual that was closely associated with a fully grown dolphin and was either one third the size of its accompanying adult or had visible fetal folds (Scarpaci et al., 2003a).

Results from the initial study (Scarpaci et al., 2003a) alerted all stakeholders that compliance to regulations could not be assumed. Recommendations made in the initial study were tour operator education, tourist education, enforcement of regulations, and limiting the number of licenses available for conducting commercial swims with dolphins. The recommendations adopted by wildlife managers were education (this included developing flyers to inform individuals of the Australian whale-watching regulations) and limiting the number of licenses through an open competitive process (e.g., tour operator behavior—compliance levels, number of fines issued) would be taken into account when dolphin-swim permits are considered for renewal and when competing with other operators seeking dolphin-swim licenses, discussions between all stakeholders, and conducting an independent review of this industry. The review consisted of an independent scientist reviewing the current literature on cetacean tourism in addition to reviewing the research conducted on dolphin-swim tours in Port Phillip Bay. The reviewer identified that proximity of vessels to dolphins must be restricted further in Port Phillip Bay and presented a number of recommendations to minimize the impact of vessels on dolphins (Hale, 2002). Currently, the state government is in the process of making amendments to the regulations that govern the dolphin-swim permit licenses.

In this study conditions 1–3 from the initial study were compared to determine if the level of compliance increased after a government review of the existing operators and the adoption of precaution-

ary measures to increase the level of compliance. The report also selected an alternative condition to study defined as condition 4: Four operators must ensure that no more than 10 persons, not including themselves and any of their employees, participate in a dolphin-swim. This condition was adopted against the previous fourth condition (swims in the presence of "fetal fold" calves) due to the difficulty required to judge the age class of calves. This condition has always been stipulated as a regulation in the dolphin-swim permit. The four conditions were selected against other regulations in the dolphin-swim license because 1) data could be easily collected without disrupting the tourists or the tour operator, 2) the data collection did not require the use of expensive equipment, 3) it did not require the researcher to evaluate the behavioral state (e.g., distress behavior) of the target animal and assume that the tour operator would classify behaviors in the same manner, and 4) Earthwatch volunteers could contribute to data collection after a training period.

Several authors have stipulated recommendations to minimize the impacts that wildlife tourism places on its target species. These recommendations include providing educational material (Amante-Helweg, 1996; Grossberg, Treeves, & Naughton-Treves, 2003), limiting number of tour operators (Scarpaci et al., 2003a), and protecting areas (e.g., marine sanctuaries) that are crucial to the target species (Lusseau, 2004). The objective of the study was to determine whether operations' levels of compliance changed after the review and once precautionary measures were adopted. The hypothesis tested in this study was:

H: There is no difference in compliance by dolphin-swim tour operations to conditions in their permit after state government implemented actions to improve them.

This study provides wildlife managers with an understanding as to whether these actions (education, capping number of licenses, review of licenses) were productive in improving tour operator compliance. Understanding ways in which to improve the behavior of nature-based tourism operations can improve management of wildlife tourism.

Methods

Observations were conducted onboard all of the active dolphin-swim vessels. It was possible to document compliance from all licensed dolphin-swim operations, as it was common to observe a group of dolphins with more than one operator present (Scarpaci et al., 2003a). An observer collected data on dolphin groups using 1-minute scan samples and continuous observations (Altmann, 1974). Data collected in scan samples included behavior, boat traffic, and number of swimmers. Data collected by continuous observation were the approach type, the time swimmers entered and exited the water, the time the mermaid lines entered and exited the water, the time the boat approached within 100 m of the focal group, and the time the boat departed from the focal group. An encounter was defined as the period during which a dolphin-swim vessel was engaged in interaction with dolphins as described in Scarpaci et al. (2003a). One individual was responsible for documenting approach type and time between approaches, and Earthwatch volunteers assisted the principal researcher in documenting the other variables under study.

Data were collected for conditions 1–3 exactly as in Scarpaci et al. (2003a). This method was ideal as data could be collected onboard the dolphin-swim vessels, eliminating the impact of an additional vessel in proximity to dolphins. It was cost-effective, observations could be made from the same perspective as the tour operator, particularly with respect to boat approaches, data could be collected relatively easily, and the methods did not require the use of expensive research equipment (the original wording from the dolphin-swim permit is shown in bold).

Condition 1: Boat Approach. A permit holder must ensure that he/she does not approach a dolphin or any other whale head on or is not in the path of a dolphin or any other whale (Wildlife (Whales) Regulations, 1998).

Condition 1 required the principal researcher to determine the approach type used by dolphin-swim tour operations when approaching dolphins. The three approach types were parallel (legal), direct (illegal), and J approach (illegal) according to Scarpaci et al. (2003a). During a parallel approach the tour

vessel would travel parallel to the dolphins, come to a stop, and place swimmers in the water. This was the only legal approach type allowed in Victoria as it provides the dolphins with a voluntary choice to interact with either boat or swimmers (Scarpaci et al., 2003a). During a direct approach a tour vessel would maneuver directly into the group of dolphins. When a J approach was made the vessel would begin by traveling parallel to the movement of the dolphins, generally pass the dolphins at a considerable distance, and then do a J or hook turn into the path of the dolphins. If dolphins approached a vessel on their own accord this was not considered as a boat approach. In addition, when dolphins voluntarily approached the vessel the tour operator was not considered to be breaching the minimum distance regulation.

Condition 2: Swim Time. A dolphin-swim permit holder must ensure that a mermaid line is placed in the water before any person enters the water from the tour vessel and a mermaid line is in the water for no more than 20 minutes at any one time (Wildlife (Whales) Regulations, 1998).

In Victoria it is illegal for tourists to swim freely with dolphins. Swimmers participating in a dolphin-swim must hang onto mermaid lines at all times during a dolphin-swim (Scarpaci et al., 2003a). Mermaid lines are ropes with floats that are streamed from the stern of the vessel and are approximately 15 m long. According to the dolphin-swim permit a mermaid line should not be in the water for more than 20 minutes at any one time [Wildlife (Whale) Regulations, 1998]. Condition 2 required the Earthwatch volunteers to record the time mermaid lines entered and exited the water during an encounter to determine the swim time.

Condition 3: Time in proximity to dolphins. According to the dolphin-sightseeing permit a tour operator must ensure that the tour vessel does not remain within 100 metres of a dolphin for more than 20 minutes at a time (Wildlife (Whale) Regulations, 1998).

Time in proximity to dolphins was measured as the time during an encounter when the vessel was

within 100 m (visual estimate by experienced observer) of a dolphin group according to Scarpaci et al. (2003a).

Condition 4: Number of persons that participate in a dolphin-swim. According to the dolphin-swim permit (except in an emergency in which human lives are threatened) must ensure that no more than 10 persons, not including himself or herself and any of his or her employees, participate in a dolphin swim.

Condition 4 in this study documented the number of persons that participated in the dolphin-swim. Once a sighting was made swimmers entered the water, on the instructions of an employee of the tour company. Once swimmers entered the water the number of persons that participated in a dolphin-swim was recorded every 1 minute until the conclusion of the swim. The number of persons could be documented by counting the number of swimmers holding onto the two mermaid lines at the stern of the vessel. The mean number of persons that engaged in each dolphin-swim was documented.

Time between approaches was also documented. In the presence of one tourist vessel the time that the first approach was made was documented; each approach that occurred after this was documented in the same manner. The time between each approach was determined by the time difference between approaches. For example, if approach one was made at 1 minute and 30 seconds into the encounter and approach two was made at 2 minutes and 45 seconds, the time between the approaches was 75 seconds. If more than one tourist vessel was present during an encounter, the time of each approach made per vessel was recorded. For example, if tourist vessel one approached the focal dolphin group at 1 minute and 30 seconds and vessel two approached at 2 minutes and 45 seconds, and vessel three approached at 3 minutes and 10 seconds, the time between successive approaches was 75 seconds and 25 seconds.

In this study power is referred to as the probability of rejecting the null hypothesis when in fact it is false and should be rejected (Zar, 1996). Generally, the power of a statistical test increases as the sample size increases (Zar, 1996). The statistical technique employed to determine the number of pairs of data

required to provide a 95% probability of rejecting the null hypothesis was the McNemar's test according to Zar (1996).

Results

The researcher was present on 128 commercial dolphin-swim trips (mean time per trip = 234 minutes, SD = 28.9) from September 1998–April 1999 and September 1999–April 2000, and 16 commercial dolphin-swim trips from February–March 2002 and January 2003 (mean time per trip = 225 minutes, SD = 27.7). Compliance was documented from all licensed dolphin-swim operations as described in Scarpaci et al. (2003a). The mean time between approaches was found to be 4.15 minutes (SD = 4, $N = 138$).

Condition 1: Approach Type

A total of 149 boat approaches were studied from February–March 2002 and January 2003. The most common approach type was the parallel approach (53%; $N = 79$) followed by the J approach (28%; $N = 42$) and direct approach (19%; $N = 28$). The percentage of illegal approaches increased from 36% (1998–2000) to 47% (2002–2003) (Fig. 1). There was no significant difference, $\chi^2(1) = 1.2$, $p > 0.05$, in the proportion of legal approaches made from 1998–2000 and 2002–2003. Therefore, compliance of approach type did not change perceptibly. Results indicate that for condition 1 to show significance at least 251 pairs of data should be used.

Condition 2: Swim Time

The mean licensed swim time decreased from 31.9 minutes (results from 1998–2000: SD = 20.1 minutes, range = 3–105 minutes, $N = 77$) to 26.6 minutes (results from 2002–2003: SD = 11.07, range = 10–50 minutes, $N = 19$) (Fig. 2). The percentage of swims that fell within permit conditions increased from 39% (1998–2000) to 42% (2002–2003); however, no significant difference, $\chi^2(1) = 1.8$, $p > 0.05$, was found. Power for condition 2 was > 0.45 and a minimum of 236 pairs of data should be used to detect significance.

Condition 3: Time in the Proximity of Dolphins

The mean time in proximity to dolphins increased from 34.78 min (results from 1998–2000: SD = 28.7 minutes; range 3–151 minutes, $N = 107$) to 41.3 minutes (results from 2002–2003: SD = 24.4 min, range = 15–95 minutes, $N = 17$) (Fig. 3). The percentage of proximity times that fell within permit conditions decreased by 9.3% in this study. There was no significant difference, $\chi^2(1) = 0.48$, $p > 0.05$, in the proportion of time tourist vessels interacted with free-ranging dolphins in the two data sets. Results also indicated that for condition 3 a minimum of 309 pairs of data should be used and the power value was greater than 0.24.

Condition 4: Number of Persons Participating in a Dolphin-Swim

The number of persons that participated in a dolphin-swim was documented for 25 swims. The mean

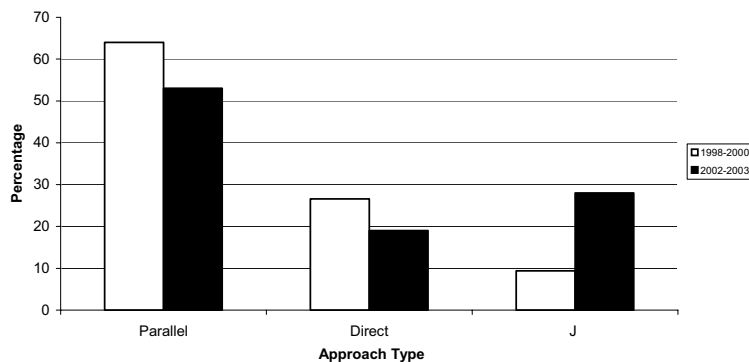


Figure 1. Approach types used by swim-with-dolphin operations in Port Phillip Bay from 1998–2000 ($N = 564$) and 2002–2003 ($N = 149$).

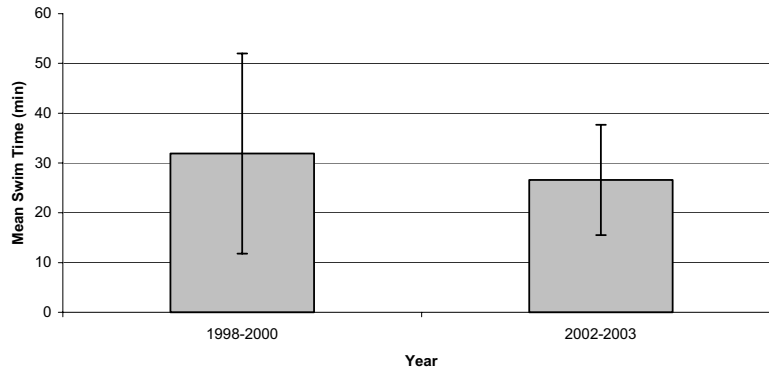


Figure 2. Mean swim time before and after review (condition 2).

number of humans swimming with dolphins per swim was 6.3 (SD = 2.1, range 1–9, $N = 25$). Results indicate 100% compliance based on Section 78(1)(g) of the Wildlife Act 1975.

Discussion

To increase compliance by swim-with-dolphin tourist operations in Port Phillip Bay, the Victorian state government conducted a review on vessel interactions in 2001. This review was conducted simultaneously with the study reported here. The methods employed in this study show no evidence to suggest that commercial operations licensed to offer “swim-with-dolphin” tours in Port Phillip Bay

have improved their level of compliance to the three conditions studied (approach type, swim time, and time in proximity to dolphins). Results however, indicate total compliance to condition 4 (number of swimmers participating in a dolphin-swim). Attempts to increase compliance have included placing a temporary cap on the number of tourist vessels allowed to participate in the industry, opportunities for tour operators to provide suggestions to the review, and outreach material (Hale, 2002).

The results demonstrate that the minimum number of observations needed to evaluate changes in operator compliance ranged from 236 to 309 pairs of data. It is evident that studies must evaluate the

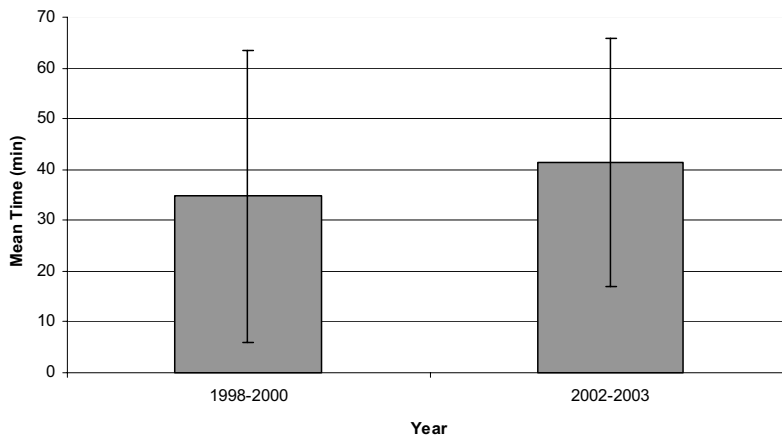


Figure 3. Mean proximity time with dolphins before and after review (condition 3).

statistical power that is required to detect changes in operators' level of compliance, and this clearly demonstrates that a large number of observations is required to detect changes. What are probably needed are more sophisticated field studies, more sophisticated (e.g., Bayesian) analyses, more field-work, or a combination of all of these. The benefit of determining the statistical power required is to inform agencies whether management approaches (e.g., providing educational resources or enforcing regulations) are working.

The results presented in this article are interesting, as total compliance is only achieved in condition 4. This suggests that operators adhere better to simple conditions with a single numerical value as in condition 2 (slight increase in compliance documented) and 4 (100% compliant). In contrast, condition 1 is nonnumerical and there is no detectable change in a relatively high level of noncompliance. Condition 3 includes both a time and distance factor and is categorized under dolphin-sightseeing tours.

The results of this study suggest that regulations designed by managers to protect wildlife subject to nature-based tourism should be written in a manner that can be comprehended easily by the tourist operations, are realistic in the field (considering all the elements of the environment and expertise of the operators), and are easily enforceable. For instance, condition 2 could be reworded as: a mermaid line is not in the water for more than 20 minutes with dolphins per trip, and condition 3 be reworded as: a tour operator must ensure that the tour vessel does not remain with dolphins for more than 20 minutes per trip. This will provide operators with a numerical value for proximity times with dolphins. It is also a condition that can be enforced as it simply requires noting the time mermaid lines are released and brought back to the vessel, or the start and end time of an encounter. In addition, it does not require that the tour operator estimate the distance from their vessel to the group of dolphins being observed, which can be a challenge in the field.

During this study, one of the authors observed the presence of enforcement officers on several occasions during the peak season both in 1998–2000 and 2002–2003. The proposed amendments to conditions 2 and 3, if adopted, could make these regulations

easier for officers to enforce, and for tour operators to interpret and use.

Alternatively, total compliance to condition 4 may be attributed to management of tourists during dolphin swims. Results from this study indicate that the mean time between approaches was 4.15 minutes, and a mean swim time of 3.0 minutes for individual swims was documented (Scarpaci et al., 2003a). Due to the rapid pace in releasing tourists for a dolphin swim and the short duration between approaches, more than 10 individuals may be unpractical and difficult to manage. Therefore, complete compliance may be influenced by management protocols within the tourism industry. The minimal level of compliance documented for conditions 1–3 (approach type, swim time, and time in proximity) to dolphins may also be a result of tour operators' breaching these conditions to enhance tourist enjoyment (e.g., the assumption is that prolonged periods of interaction with dolphins may equal greater customer satisfaction). A study by Orams (2000) demonstrated that proximity to whales was not fundamental to whale watcher enjoyment and other factors such as whale behavior, cruise duration, and seasickness influence customer satisfaction. It may be appropriate that these dolphin-swim tour operators incorporate other activities in their tour (e.g., reef snorkel) to redirect the focus of the tour away from the dolphins.

Currently, research on cetacean tourism has tended to center on impacts on the target species (Orams, 2000; Scarpaci et al., 2003a). Management practices rely on tour operators abiding conditions in their permit. Yet, there is a dearth of work conducted on compliance by cetacean tourist operations to the regulations under which they should operate (e.g., Scarpaci et al., 2003a). Some recent work (Lusseau, 2003) demonstrated that if vessels abide by regulations (in one instance) they may not adversely affect dolphins. Therefore, if wildlife tour operators abide by conditions in their permit they may be less likely to alter the behavior of the target species. To minimize the impacts that wildlife tourist operations place on their target species it is proposed that regulations are written in a clear, concise manner that can be simply interpreted by operators and enforced by managers. This factor may be fundamental in achieving an acceptable level of compliance in Port Phillip Bay, and perhaps at other sites.

Conclusion

The methodology employed in this study was unable to detect evidence to suggest that dolphin-swim tour operators have improved their level of compliance to three conditions in their permit after the state government implemented actions. However, operators complied perfectly to the condition regarding the number of swimmers allowed in the water with dolphins. This may suggest that operators adhere better to simple conditions with a single numerical value or, alternatively, this condition is practical for managing tourists conducting dolphin-swims. Regulations designed by managers to protect a resource or wildlife should be written in a manner that can be comprehended by the tour operations, are realistic in the field (considering all the elements of the environment and expertise of the operators), and are easily enforceable. This management tool may be beneficial in increasing the level of compliance in the wildlife tourism industry.

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