

## Can swimming with whales in Tonga be sustainable?

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### Abstract:

Humpback whales (*Megaptera novaeangliae*) using Tongan waters are part of the endangered Oceania population. Despite their slow recovery rate and small population size, this population supports a swim-with whale industry that generates approximately 15% of all foreign income in the Tongan economy. However, the sustainability of swimming with whales in Tonga has been questioned due to its potential disturbance of breeding mothers and calves. This study investigated whether whales responded differently when swimmers and boats were with whales compared to when boats were present without swimmers, and assessed the influence of different swimmer behaviour. Humpback whale behaviour was recorded from a commercial whale watching vessel and from dedicated research vessels. In the swim treatments, up to five swimmers approached whales in one of three ways: 1/ quietly slipping into the water and approaching at the surface making minimal noise; 2/ approaching the whales at the surface making loud, vigorous splashes; and 3/ approaching the whales with surface swimming and undertaking subsurface diving. In the no swimming control, whale behaviour was recorded when the boat approached the whales but no swimmers entered the water. Time until whales moved away was recorded. 51 trials were conducted, spread across treatments and boats. Preliminary results show that a quiet swim approach does not create a significantly different impact on the animals' behaviour compared to watching from a boat. A louder approach causes a significant change in behaviour. Operators' selection of how the swimmers approach the whales is crucial in ensuring the sustainability of the industry.

### Introduction:

Unlike many humpback whale (*Megaptera novaeangliae*) populations around the world, the Oceania subpopulation of humpback whales remain Endangered (Childerhouse *et al.*, 2008). Animals using the waters of the Kingdom of Tonga, are considered a substock of this population (E3) that may have been reduced to 25 - 50 mature females for three to six generations (Baker *et al.*, 1998). Recovery of the population, following a Royal Decree protecting humpback whales in 1978, has been slow and current population estimates suggest around 2,000 animals, of a total Oceania population of approximately 3,800, use Tongan waters (Baker *et al.*, 2006).

Despite the small population size, Tonga supports a large swim-with whale industry with 3,200 participants annually (O'Connor *et al.*, 2009) generating approximately 15% of all foreign income entering Tonga (Economists@Large, 2008). Its popularity relates to the fact that Tonga is one of only three places in the world that has a targeted swim-with humpback industry (Kessler and Harcourt, 2010). Concern about the sustainability of this industry has arisen due to the low whale population size and the fact that the industry primarily targets a vulnerable subset of the population, breeding mothers and new born calves (Kessler and Harcourt, 2012). Displacement from preferred breeding habitat (Glockner-Ferrari and Ferrari, 1990) and disruption of parental care, especially feeding (Kovacs and Innes, 1990) has the potential to prevent successful rearing of young, thereby endangering population recovery. On this basis it has been questioned whether swimming with the animals should be permitted.

The IWC Scientific Committee has previously noted that ‘the available evidence indicated that swim-with programmes in the wild could be considered highly invasive’ and that ‘the impact of swim-with programmes in the wild will vary among species, populations and locations and, therefore, that the impacts of such programmes should be assessed on a case by case basis’ (IWC, 2000). This study aimed to determine whether swimming with humpback whales in Tonga had a different effect on the animals compared to boat based whale watching and whether different types of swimming also had a different effect.

### Methods:

Research was undertaken in the Ha'apai island group in the Kingdom of Tonga. Humpback whale behaviour was recorded from a commercial whale watching vessel, Cat Knapp, between 15 August and 25 September 2009 and two dedicated research vessels between 10 and 28 September 2010. Continuous recordings were conducted for the length of the interaction. Observations included whale group composition, the behaviour sighted, and the distance and direction of the animal at the time of the behaviour. Swim groups consisted of a maximum of 5 swimmers. When swimmers entered the water information was collected on the number of individuals in the water, the length of time that swimmers spent in the water, and the distance and direction of the swim group from the boat.

Only groups of whales that were stationary were approached for trials. Impact was therefore defined as the whales moving away from the boat or swimmers. A control was created in situations in which a group of whales was identified as behaving appropriately to swim with, but swimmers delayed entering the water for 15 minutes. Control situations were conducted in 2009 and were randomly allocated. For each swim, swimmers were randomly allocated to one of the following groups. To ensure equivalency, only the first 15 minutes of the swim treatments were included in the analysis:

- Quiet approach (2009 and 2010) – swimmers stayed at the surface of the water and approached the whales with minimal splashing.
- Splash approach (2010 only) – swimmers stayed at the surface but were encouraged to make a vigorous amount of splashing as they approached the whales as may be expected of inexperienced swimmers.
- Dive approach (2010 only) – swimmers approached the whales with a quiet approach and started diving under the water as soon as the whales were in visual range.

The latency to departure was analysed using proportional hazards (Cox) regression. The software SPSS Statistics v19 was used.

### Results:

Fifty-one trials were completed from 124 encounters (Table 1). Time that swimmers spent in the water ranged from 2 to 30 minutes with an average swim length of 8.3min. Median departure times for the whales ranged from 1.6 to 15min.

Table 1: Time to whale group departure under different swim treatments.

Swim Type	Year	Number of trials	Median Time to Departure (min)	Minimum time to departure (min)	Maximum time to departure (min)
Control	2009	10	15.0	3.9	15.0
Quiet approach	2009	11	9.5	0.6	15.0
Quiet approach	2010	9	4.1	1.7	15.0
Splash approach	2010	10	1.6	0.1	3.2
Dive approach	2010	11	2.8	0.5	15.0

Time to departure was compared amongst the control and all swim types and boat (which also represented the year trials were undertaken) was identified as a confounding factor. As a result, the following swim combinations were compared:

- Control and quiet approach (2009);
- Quiet approach (2009) and quiet approach (2010); and
- Quiet approach (2010), splash approach and dive approach.

There was no significant difference between control and quiet approach (2009) ( $p=0.248$ , Beta = -0.726, SE = 0.629) and no significant difference between quiet approach (2009) and quiet approach (2010) ( $p=0.232$ , Beta = -0.624, SE = 0.522). Of trials conducted in 2010, there was no significant difference between quiet approach (2010) and dive approach ( $p=0.241$ , Beta = -0.561, SE = 0.478) but there was a significant decrease in the time to departure for groups of whales approached under a splash approach compared to a quiet approach ( $p=0.013$ , Beta = 1.404, SE = 0.562). Presence of a calf or the closest approach distance had no significant impact on the results in any comparison.

### **Discussion:**

These preliminary results suggest that a louder, splashing swim approach to the whales increases the likelihood that the whales will be disturbed by swimmers and move away, when compared to a quiet approach. The sample sizes used in this analysis were small and the median times to departure suggest an additional (statistically non-significant) trend for shorter departure times for quiet approaches and dive approaches compared to controls that requires further investigation. However, these results suggest it is possible to conduct a swim-with humpback program that does not have a greater impact on the whales than boat based whale watching. To minimise impact, operators would be required to slowly approach whales, confirm that the whales are stationary, then allow swimmers to enter the water quietly and approach the whales slowly and quietly.

These results do not suggest that there is no impact on whale behaviour as a result of whale watching. Schaffer *et al.* (2009) have shown that the New Caledonia (E2) component of the Oceania whale population will increase dive times and decrease the linearity of swim path in the presence of boats. In this study 38 of 51 groups of whales moved away within 15min of the boat approaching or swimmers entering the water.

These findings create significant management challenges for the Tongan whale watching industry. Walker and Moscardo (2011) identified that local industry participants tend to disregard the existing whale watching regulations when the owner of the business is not present. Given that these results suggest that the way to minimise impact on the whales is to encourage particular guide and swimmer behaviour, both guides and tourists need to be made aware that the sustainability of the industry may depend on their actions around the whales. This means patience will be an important part of the swim-with whale experience and that it will not always be possible to swim with every group of whales and that the guide role in explaining the situation and ensuring tourist satisfaction is critical (Andersen and Miller, 2006).

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