# The effects of whale watching vessels on humpback whale (*Megaptera novaeangliae*) behaviour and welfare

*This paper investigates the effects of the presence of whale watching vessels on humpback whale (Megaptera novaeangliae) behaviour and discusses the welfare implications on the species.*

Tianna Grant

Word count 1,000

## Introduction

The whale watching industry is of high economic value worldwide and is completely reliant on cetaceans (Parsons, 2012). Due to their range and breathtaking surface behaviours, humpback whales (*Megaptera novaeangliae*) are highly sought after and are the focus of whale watching tours every year. Many environmentalists have supported the whale watching industry as it has helped shift views from the consumption of whale meat towards entertainment and appreciation of nature (Parsons, 2012). However, the effects of whale watching vessels (WWV) on humpback whale behaviours raises concern as the regulations limiting whale tourism are inconsistent and often ignored. This paper discusses the key findings of three studies on humpback whale behavioural changes in the presence of WWV.

## Discussion

Clemente et al (2018) conducted a land-based observational study in Alaska, recording the behaviour of humpback whales in the presence of WWV. From June to August 2015, observations were taken near the NOAA Ted Stevens Marine Research Institute. The area of interaction between the boats and whales was defined as 500 metres around each whale and sightings were classified as an individual or group performing at least one behavioural event. The following data were recorded: behavioural events, number of vessels, heading, group size, group type (singleton, mother-calf pair or mixed), and bubble netters (feeding). Behavioural events were further classified into four categories: feeding, resting, surface active behaviours (SAB) and travelling. A total of 172 sightings were recorded and 7125 behavioural events observed. The study found that the presence of WWV significantly impacted the transition between behavioural states ($p<0.001$). For example, travelling whales started performing SAB and vice versa. Additionally, resting whales were more likely to begin travelling near WWV, revealing potential energy expenditure complications if ample resting time is not observed. Markov chains and model simulations revealed that the presence of WWV did not decrease feeding behaviour, but increased SAB and decreased travelling overall. The lack of responses to WWV during feeding may suggest that the reactions of the whales are context specific (dependent on previous experience with the vessels, foraging behaviour etc.) and raises the issue of short-term tolerance and habituation to WWV. This study also recommended establishing a prolonged monitoring program to assess less overt behavioural responses of the whales over time, as minor disruptions may yield subtler long-term

negative effects.

In Peru, Garcia-Cegarra et al (2019) conducted a similar land-based observational study. From August to October 2016, observations were recorded on the interactions of humpback whales and WWV within 100−400 metres and whale behaviours were recorded before, during and after the encounters. Groups were classified by the number of whales, presence of calves, surface behaviour and the presence of vessels. Researchers then analysed five behaviour response variables: breathing frequency, surface time, directness index (path linearity), swim speed and long dive duration. They tracked 180 humpback groups over 167 hours. The study concluded that significant changes in directness index occurred after vessels approached mother-calf groups. Mother-calf groups also swam more slowly, performed shorter long dives, spent a shorter time on the surface, and breathed less frequently than non-calf groups when vessels were near. Non-calf groups spent more time on the surface in the presence of boats, again raising the concern for possible habituation and tolerance to the vessels, as seen in Clemente et al (2018). Garcia-Cegarra et al (2019) also revealed the need for strict regulations limiting the negative effects on the whales, especially mother-calf pairs.

Both studies by Clemente et al (2018) and Garcia-Cegarra et al (2019) revealed critical short-term effects on humpback whale behaviour and displayed the importance of further research on the long-term effects on *Megaptera novaeangliae*. With biologically important behaviours being affected like resting and breathing patterns, complications could arise such as increased energy expenditure and reduced reproduction rates (Parsons 2012).

Fiori et al (2019) then conducted a water-based observational study assessing humpback whale behavioural responses to vessel and swimmer presence in Tonga. Between 2016 and 2017, 56 surveys were used to gather data on dive time, number of reorientation events, and respiration rates in the presence of boats and swimmers. Additionally, factors such as vessel approach style, swimmer placement, and whale avoidance responses were documented. Results showed that average dive time and the proportion of time spent diving significantly increased in mother-calf pairs ($P<0.001$ and $P=0.009$ respectively). Additionally, 33.5% of vessel approaches resulted in avoidance behaviours. Vessel approach style had a significant effect on this, as 67.6% of J type approaches (parallel followed by overtaking the whales) yielded avoidance ($P<0.001$). Researchers also noted low compliance to Tongan whale regulations, revealing the importance of effective tourism management, especially in Tongan breeding grounds with susceptible mother-calf pairs.

All three studies supported the need for further investigation, a standardised ethogram and effective management regulations, however, each study contributed a unique finding. Clemente et al (2018) revealed the importance of context specific scenarios, as the whales chose to ignore the boats when feeding, but altered normal behaviour when resting, travelling, and performing SAB. This study also provided the groundwork for the Garcia-Cegarra et al (2019) and the Fiori et al (2019) studies, both of which discovered differences in behaviour in mother-calf groups, which spent less time at the surface and appeared more protective near WWV. Fiori et al (2019) then added another complexity by

investigating avoidance behaviours, revealing the importance of vessel approach style. These results are key to improving humpback welfare, by altering how, when and which groups of whales are approached. Additionally, as whale watching increases, so does the probability of injury from boat strikes. This has significant welfare implications and potential long-term effects like decreases in population size and genetic diversity (Parsons, 2012).

## Conclusion

From Alaska to Peru to Tonga, the presence of WWV on humpback whale behaviour has short-term and potentially long-term effects. The above studies affirm the need for extensive research before any management decisions can be made responsibly. The benefits of whale tourism must be weighed against potential negative effects, which may be irreversible if behaviour patterns continue to be disturbed (Parsons, 2012). Until sufficient research is conducted, conservative management should be observed.

## References


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