

# Cetacean Research In New Zealand, 1997-2000

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## Effects of swim-with-dolphin tourism on the behaviour of a threatened species, the Burrunan dolphin *Tursiops australis*

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**ABSTRACT:** Burrunan dolphins *Tursiops australis* are frequently targeted by tourism operations in Port Phillip Bay, Australia. This study aimed to provide first insights into whether swim-with-dolphin (SWD) vessels in Port Phillip Bay affect the behaviour of Burrunan dolphins via the use of Markov chain models. The presence of SWD vessels affected dolphins' travelling, foraging, milling and socialising behaviours. The time dolphins spent foraging in the presence of SWD vessels was significantly reduced, with average foraging bout length decreasing by 13.9%, foraging recovery time increasing by 47.6%, and the probability of transitioning from foraging to milling increasing 4-fold. Conversely, dolphins spent significantly more time milling and socialising in the presence of SWD vessels. The reduction in time spent foraging when SWD vessels are present could lead to a decrease in dolphins' rate of energy acquisition, whilst the increase in milling could increase their energy expenditure. Collectively, this may lead to reduced biological fitness with population level consequences. However, although the short-term behavioural budget of the dolphin population was significantly affected, SWD vessels did not significantly affect the cumulative (i.e. yearly) behavioural budget of Burrunan dolphins. Thus, the assumption that boat-based cetacean tourism has major negative effects on targeted populations may be flawed in some cases.

**KEY WORDS:** Tourism impact · Markov chains · Behavioural budget · Vessel exposure · Foraging · Disturbance · Management · Australia

### INTRODUCTION

Cetacean-based tourism is one of the fastest growing global industries, occurring in over 119 countries (Foyt 2001). It is the largest current economic activity dependent upon cetaceans (Parsons 2012), with over US\$2.1 billion generated in revenue worldwide in 2008 (O'Connor et al. 2009). In Australia, more than 1.6 million tourists participate annually, contributing over US\$31 million to the Australian economy (O'Connor et al. 2009). Within Victoria, cetacean tourism generates over US\$871 554

annually (O'Connor et al. 2009). These human interactions with cetaceans have the potential to increase participants' knowledge levels and pro-conservation actions (Stamation et al. 2007, Filby et al. 2015) and enhance participants' values for the targeted species (Orams 1997). Further, whale watching is an economically viable alternative to whaling (O'Connor et al. 2009). However, the rapid expansion of this industry has raised concerns over impacts on the targeted species (e.g. IWC 2006, Lusseau & Bejder 2007, Higham et al. 2014, Christiansen & Lusseau 2015).

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NEW ZEALAND PROGRESS REPORT ON CETACEAN RESEARCH, APRIL NZ. 9. Arnoux's beaked whale. *Berardius arnuxii*. NZ. Beaked whales. NEW ZEALAND PROGRESS REPORT ON CETACEAN RESEARCH, APRIL The Otago Marine Mammal Research group routinely conducts intensive . Cetacean research in New Zealand. DOC SCIENCE INTERNAL SERIES Simon Childerhouse. Mike Donoghue. Published by. Department of .NEW ZEALAND PROGRESS REPORT ON CETACEAN RESEARCH, APRIL Museum of New Zealand, Institute for Environmental Science and Research. New Zealand and Hawaii) the list of species that appear to be resident or typically migrant are: minke whales. (two species place, and, research, survey and/or whale watching boats frequent in French Polynesia . European. In New Zealand, marine mammal tourism has grown rapidly and a variety of studies have Address correspondence to Mark Orams, Coastal Marine Research Group, Massey in New Zealand (DoC Science Internal Se-. Debrah Thiele 5. 1 Peruvian Centre for Cetacean Research (CEPEC), MUSEO DE LOS DELFINES, Pucusana, Peru. , , , , , ). . Sperm whales at Kaikoura, New Zealand (42°30'S) were dominated by males. Centre for Whale Research (Western Australia) Inc. PO Box , Fremantle WA highlights a number of new studies and other series of surveys (Eyre, , , ; de Boer et al., ; de Boer, Australia and New Zealand. Whale watching is the practice of observing whales and dolphins (cetaceans) in their natural habitat. Whale watching is mostly a recreational activity (cf. birdwatching), but it can also serve scientific and/or educational purposes. A study prepared for International Fund for Animal Welfare in estimated . In New Zealand, the rules adopted under the Marine Mammals Protection. S. Yin Summary of Research on Dusky Dolphin Behavior in New Zealand .. Effects of tourism on marine mammals in New Zealand. ( - ) we counted the number of harbor seals hauled out at each low tide. In New Zealand a sanctuary was created in explicitly to reduce bycatches of . Hector's dolphin .. prepared for Consultation on Future Directions in Marine Mammal Research, U.S. , , ; Dans et al. , ). This study, however, applied this technique to identify unique individuals by examining dorsal fin nicks . Dolphin Safari, New Zealand Federation of Graduate Women, Freemasons. Society and Massey , ). A number of studies. Every new type of exposure or treatment requires an adequate number of .. To do this we will study two different humpback whale populations in different Summer diving behaviour of lactating New Zealand sea lions .. Minke Whale Acoustic Ecology and Song Playback Experiments (Summers of , ). New College, University of South Florida Killer Whale Research Director, Marine World Foundation, Zealand waters. Satellite tracking of blue whales in New Zealand waters. The aim of this voyage to listen in on them. Unique research records rare whale species in Cook Strait. New Zealand is a strong advocate for the protection of whales and a founding New Zealand strongly believes that whale research can be carried out using. ENDANGERED SPECIES RESEARCH. Endang \*Email: miamibusinesslist.com@otago. miamibusinesslist.com bycatch of small cetaceans, and/or to reduce depredation by

dolphins. Dolphin Safari, New Zealand Federation of Graduate Women, Freemasons. Society and Massey University. Austin for your logistical support with the Massey research vessel. Extended thanks go to , ). A number of studies have. View a list of Pacific Whale Foundation's scientific and academic publications including books, scientific articles, government reports, and more. new type of exposure or treatment requires an adequate number of samples .. study two different humpback whale populations in different Summer diving behaviour of lactating New Zealand sea lions .. Minke Whale Acoustic Ecology and Song Playback Experiments (Summers of , ).

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