Dynamics of mother-offspring common dolphins (*Delphinus* sp.) engaged in foraging activities in the Hauraki Gulf, New Zealand

A thesis presented in partial fulfilment of the requirements for the degree of
Master of Science in Ecology

Massey University
Auckland, New Zealand

Nicolas de la Brosse
2010

Acknowledgments

This project would not have been possible without the constant help and support of many people.

To start, I would like to thank my supervisor, Dr Karen Stockin and co-supervisors Assoc Prof Dianne Brunton and Prof David Raubenheimer. Thank you for giving me the opportunity to accomplish this research. Karen, thank you so much for your patience, your guidance and your support, I am very grateful.

Big thanks to the Coastal-Marine and Ecology and Conservation Research groups at Massey University, Albany. Apologises for not naming you all, but I want to give a special thanks to Frenchy Manue, Sarah Wells, Sarah Dwyer, Anneso, Marta, Brigitte, Gabriel, David, Jennifer, Dylan and Monika. It has been great working with you all, and thanks for the precious help. Also, I would like to acknowledge Mike Corbett (Corby), Carol Duffield, Aline Schaffar, Elizabeth Burgess and Prof Mark Orams.

I would like to express special thanks to the Blake family (Pippa, SJ, James, and the late Sir Peter). You have played a major role in my life, and I will forever be grateful for what you have done for me.

Big thanks to my close friends from France, Eneour, Pedro, Benoua, Ponpon, Troux, Vic, Gilou, Gogo, Elie, Ju, Blandine, you guys rock!

Another big thanks to all the supportive people I have had here in New Zealand, the Moore family, the Robertsons, my flexi bros (Crass, Tinmar, Thom, Dams), all the kitesurfing crew and the Frenchies.

To the crew of Dolphin Explorer, Andy, Rob (wingman), Jo, Keith, Cathy, thank you so much for everything. You guys are legends! I had a blast of a time working with you. A particular thanks for making me so proud of the French rugby team, and for reminding me what French sounds like! A big thanks to Explore NZ, Ray, Eric, Mike, Mel, Guzza, Abo, Will, Cam, and all the rest of the team, the dream team I should say! It has been fantastic sharing this experience with you all.

This research was supported by Dolphin Explorer, the New Zealand Department of Conservation and New Zealand Common Dolphin Project (NZCDP).

Finally, my biggest thanks go to my family. Without my parents, Isabelle and Axel, and my two brothers, Guillaume and Thibault, none of that would have been possible. You have always believed in me, and have always been there to support and push me to realise my dreams. I could not hope for a better life.

Abstract

This study investigated the dynamic of mother-offspring common dolphins (*Delphinus* sp.) engaged in foraging activities in the Hauraki Gulf, New Zealand. While previous studies have demonstrated the importance of Hauraki Gulf waters for feeding and nursing common dolphins, no previous study has systematically assessed the dynamics of mother-offspring pairs engaged in foraging activities. During 228 hr of survey time, a total of 49 independent focal groups were recorded between March and July 2009. All observations were conducted from the surface using the platform of opportunity, *Dolphin Explorer,* a 20 m tour boat. Variables examined included group size, composition, offspring presence, predominant behavioural state, foraging strategies employed, associated species, mother-offspring relationship, and location of offspring within groups. This study tested the hypothesis that foraging strategies employed by mother-offspring pairs would be influenced by environmental and anthropogenic parameters, group size, and associated species. It also examined the influence of associated species and foraging strategies on the mother-offspring dynamic within focal groups.

Sighting Per Unit Effort (SPUE) and Offspring Per Unit Effort (OPUE) varied by month, with SPUE and OPUE being highest in March and July, respectively. Mother-offspring pairs predominantly engaged in cooperative foraging strategies (97%), and were less likely to engage in individual strategies. Cooperative feeding groups likely provide better protection to young and vulnerable dolphins, as well as a more prolific food supply to lactating females and their offspring. Water depth, sea surface temperature and group size had no influence on foraging strategies employed by mother-offspring pairs. Groups comprising immature dolphins typically altered their behaviour more frequently in presence of vessels, with presumed mothers keeping their offspring away from boats in 80% of encounters. However, a limited sample size likely impeded the statistical significance of this observation. Behavioural changes and potential vessel avoidance during foraging activity may occur as a response of perceived threat. Cooperative foraging strategies employed by focal groups had no significant influence on the location of the young. Offspring were observed in echelon position during 93.6% of the time dolphins foraged, and were never separated from their assumed mother during individual foraging strategies. Echelon position may enhance better predatory protection, as well as learning during foraging activities.

Mother-offspring pairs were observed in association with Australasian gannets (*Morus serrator*) and Bryde's whales (*Balaenoptera brydei*) during 68.4% and 8.4% of encounters, respectively. Prevalence of dolphin cooperative feeding is likely to attract and benefit associated species. While neither species were found to affect the foraging strategies employed by mother-offspring pairs, diving gannets did affect the position of mother-offspring pairs within feeding groups, with offspring typically located on the peripheral edge of the focal group. Conversely, no such affect was detected for associated feeding involving Bryde's whales. Since mothers permit offspring in the centre of mono-specific feeding groups, it seems plausible that the use of peripheral regions maybe associated with the presence of mixed-species feeding aggregations. This apparent shift in mother-offspring position is unexplained, although may represent perceived risk by the assumed mother. Results presented here extend our knowledge of foraging behaviour and mother-offspring common dolphin dynamics in the Hauraki Gulf, New Zealand.

Table of Contents

List of Tables

List of Figures