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Behavioural responses of Risso's dolphin, *Grampus griseus*, to remote biopsy sampling



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INTRODUCTION

A long term research project by the Nova Atlantis Foundation started in 2000, focusing on Photo ID of Risso's dolphins (*Grampus griseus*) in order to study social structure. Hartman et al. (2008) (1) found that stable clusters are forming the basic units of Risso's dolphin society. With the aim to study kinships between strongly associated individuals, biopsy samples were collected from pre-selected and long term sighted individuals. Biopsy sampling from free-ranging cetaceans is a widespread method used in various biological studies. Since this is an intrusive technique, it is important to determine its impact. We examined the short-term behavioural reactions of Risso's dolphins (2.6 – 4 m in length) off Pico Island (Azores) to remote biopsy sampling.

STUDY AREA

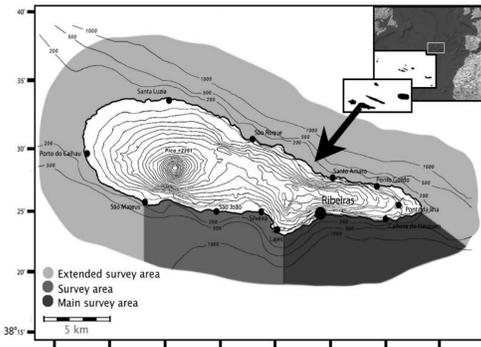


Figure 1: Location and detailed map of Pico Island, showing the survey areas. Out of all surveys; 83% were carried out in the main survey area, 16% in the survey areas and less than 1% in the extended survey area.



Figure 2: Example of a successful biopsy (Photo by Steve Geelhoed)

METHODS

Sampling Protocol

- * Sea state ds_2 (Douglas Scale)
- * Main behaviour: Travelling
- * Max 2-4 shots per sampling group
- * Females with nursing calves were not sampled

Behavioural responses were analysed by visual observation using two scales of behavioural reactions:

- the reaction of the targeted individual
- the reaction of the focal group to which the targeted individual belonged (2)

We defined five categories of behavioural response:

none, low, medium, high and **very high**

and of display response:

quick dive, QD; diving & leaving, D&L; jumping, J; tail slapping, TS; and speeding away at surface, SS.

RESULTS

A total of 189 shots were made (115 hits, 74 miss) during 61 survey days. Tissue was obtained in 83% of the hits. No significant differences were found between hits and misses in behavioural responses and display types (Table 1, Fig. 3) for individuals. Most reactions (48%) were of low intensity; in 10% of the cases there was no visible reaction at all (Fig. 4). The frequencies of the display responses differed significantly from each other ($\chi^2 = 121.30$, $df = 4$, p -value < 0.001, Fig. 3). The types QD and D&L constituted 79% of the responses (Fig. 3). Group reaction was observed during 20% with D&L (52%) forming the main behaviour.

Table 1: Statistical results of Kruskal Wallis test

Test	KW	Df	p-value
Miss vs Hit (Strength)	0.2761	1	0.5993
Strength	7.8681	4	0.0965
Miss vs Hit (Display)	0.5345	1	0.4647
Display	8.2909	4	0.0815

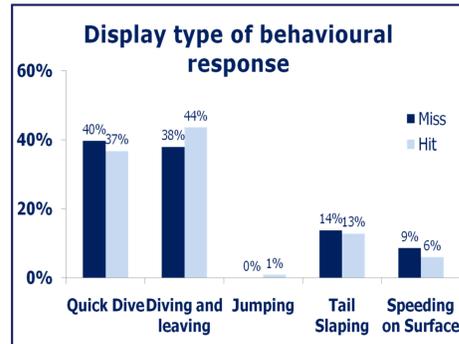


Figure 3: Frequency distribution of display type of behavioural response of individual Risso's dolphins to remote biopsy sampling

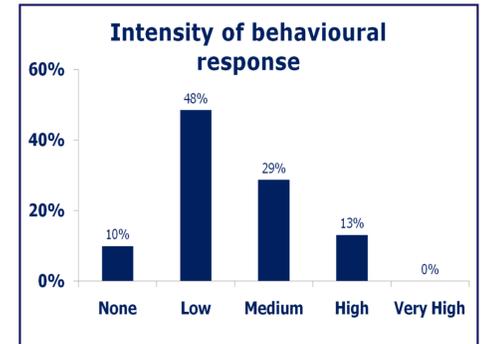


Figure 4: Frequency distribution of intensity of behavioural response of individual Risso's dolphins to remote biopsy sampling

CONCLUSION

* **High hit rate resulted in tissue sampling 83% of the time**

* **No difference in intensity or type of behavioural response between miss and hit shots**

* **Unequal display response, mainly QD and D&L**

* **Group reaction observed only in 20% of the shots**

Although biopsy sampling is an invasive method, our results indicate that if basic precaution rules are followed low intensity behavioural responses can be expected for half of the time.

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