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Final Report for Nature Foundation SA, Scholarship Grant 2014-2015

Project Title: Social Dynamics and Genetic Structure of the Newly Described, Endemic Burrunan Dolphin (*Tursiops australis*) in Eyre Peninsula, South Australia.

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Introduction and aims:

Delphinids are known to possess complex patterns of social grouping, but how ecological and intrinsic factors have shaped the evolution of their social systems remains a challenging question. This project is examining the social dynamics and genetic relatedness of Burrunan dolphins (*Tursiops australis*), a newly described and potentially southern Australian endemic dolphin, inhabiting Coffin Bay, South Australia. Specifically, we are analysing the social organisation and its dynamics at different spatial, temporal and behavioural scales using photo-identification data and quantitative analyses of social networks. Furthermore, we are examining how the resulting patterns correlate with gender, age and relatedness of the individuals.

Methodology:

Boat surveys follow pre-determined zigzag line transects designed to optimize coverage of all areas and habitat types within Coffin Bay (Fig. 1). Once a group of dolphins is sighted we leave the transect and approach the animals at a distance of 10m to record the position (GPS), water depth, group size and behaviour, and age composition. Additionally, we collect fin photographs and biopsy samples of the dolphins. Fieldwork was already conducted during spring 2013, summer-autumn 2014, winter-spring 2014 and summer 2014-2015. Further fieldwork seasons will be carried out during 2015 (during autumn and winter-spring). This report presents details of the activities performed and preliminary analysis of the data gathered so far.

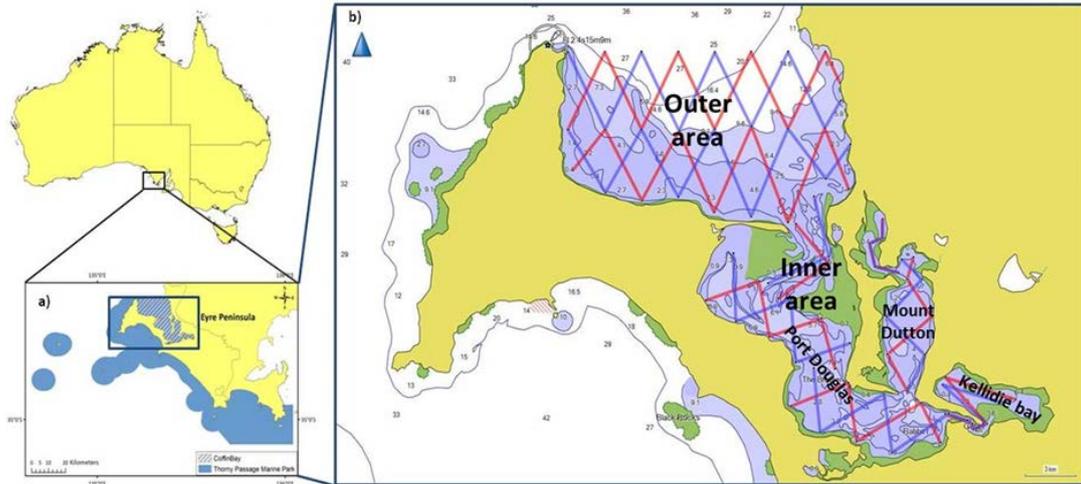


Figure 1. Map of study site showing the location of inner and outer area of Coffin Bay. Within inner area three distinctive bays are shown: Port Douglas, Mount Dutton and Kellidie bay. The two alternative zig-zag transects are shown with different colours (red and blue).

Preliminary results and discussion:

As of March 2015 we have carried out 97 boat-based surveys photo-identifying 495 groups of Burrunan dolphins and cataloguing 248 individual animals (considering adults and juveniles only). Mean individual re-sighting rate for this period was 7.1 (range= 1-23). We used the Half-Weight Index to evaluate the strength of the relationships between pairs of individuals observed on more than three occasions and excluding re-sightings of the same animal within the same day (the last two months of surveys are not included in the analyses presented below). In total 375 groups were analysed including 184 individual dolphins.

The likelihood estimator of social differentiation for this population was $S = 0.9$ ($SE = 0.025$), which indicated a well differentiated society. The correlation between true and estimated association indices was $r = 0.67$ ($SE = 0.043$) indicating that the power of the analyses is good. Observed association indices were significantly different from those expected by chance ($p < 0.005$, calculated over CV) suggesting the presence of preferred/avoided companionships within the population. Modelling of lagged association rates (LARs) suggested that an individual Burrunan dolphin has three types of associates: preferred companionships (stable associations over long periods of time), casual acquaintances (irregular associations that last some time), and rapid disassociations (associations that last only a short time). Analysis of local social structure using a modularity coefficient suggested the presence of at least four dolphin communities within Coffin Bay, which preferentially inhabit the four main bays (i.e., Kellidie Bay, Mt Dutton, Port Douglas, and Point Longnose-Outer area). Moreover, Mantel tests considering association indices and analyses of LARs comparing these communities suggested that they differ in the strength and stability of their relationships.



Preliminary results showed a remarkable fine-scale social segregation of dolphins to different areas of Coffin Bay. These results will provide the first comprehensive assessment of the social structure of this new species and aid in the conservation management of Burrunan dolphins within Coffin Bay and South Australia.

Biopsy sampling: To date we have obtained 106 *T. australis* biopsy samples, of these 84 are from known individuals. These samples will be used for subsequent genetic analyses for estimating genetic relatedness and structuring.

Acknowledgment:

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