

Australian Marine Mammal Centre (AMMC)

Final Report No. 10/30

- Title - Modelling the abundance and habitat preferences of coastal dolphins in the Gold Coast region
- Chief Investigator- Dr. Lyndon Brooks
- Organisation – Southern Cross University

Activity Period- December 2010- January 2012

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1. Project progress and objectives achieved

List of the Project Objectives
<ol style="list-style-type: none">1) Develop a statistical model to predict fine-scale habitat usage by humpback dolphins in the southern Moreton Bay and Gold Coast region in terms of functions of time of day and season, environmental variables and the co-presence of sympatric delphinid species and human activities.2) Identify areas of critical habitat of humpback dolphins in the region and use the resource selection model to provide an account of the factors that contribute to their importance.3) Estimate the abundance and structure of populations of humpback and bottlenose dolphins in the region and quantify any interactions between these species.4) Determine the type and intensity of relevant human activities in the region and assess the level of threat and potential impacts posed by these activities on coastal dolphin habitat.5) Develop a regional management report for coastal dolphins with detailed recommendations for implementation by government agencies to aid in the protection and conservation of coastal dolphin species and their habitats.
The degree to which the Activity has achieved each of the objectives
<p>The surveys for the first of two field seasons (summer 2010/11 and winter/spring 2011) have been completed. The first season's activities were severely hampered by poor weather conditions with frequent heavy rainfall, rough seas and an extreme flood event. This resulted in fewer than the planned number of surveys (38 of 66), disruption of the planned survey structure and the expenditure of more than the planned time on the Gold Coast waiting for suitable weather conditions. Conditions in the second season were more favourable with 59 of 66 of the planned surveys completed.</p> <p>Initial modelling of the summer capture-recapture data found that large numbers of dolphins had apparently moved into and out of the survey area during the season- possibly in response to the extreme weather events- resulting in highly variable recapture and apparent survival probabilities. An</p>

analysis of social structure indicates a fragmented population with specific individuals using estuarine areas and others remaining off the coast.

A habitat selection model will be fitted when all data have been collated December. This model will be used in conjunction with GIS mapping to identify areas of critical habitat in the region and to provide an account of the factors that contribute to their importance. In turn, this information will contribute to the development of a regional management report for coastal dolphins with detailed recommendations for implementation by government agencies to aid in the protection and conservation of coastal dolphin species and their habitats.

Identification of human-dolphin encounters and threatening activities have been summarised. These observations have brought to light high levels of human interference for some social groups of dolphins, specifically through boating activities, boat strikes, fishing interactions and entanglements and exposure to poor water quality in some locations. These observations have been made directly during surveys, from photographic analysis of scars and injuries of the dolphins and recordings of water quality measurements. Aspects of these disturbances and dolphin usage patterns will be addressed in the management plan and study recommendations.

A clear summary of the work undertaken in the period to which the Report relates including achievement against each of the objectives and an analysis of the effectiveness of this work

The summer 2010/11 (December 2010-March 2011) and winter/spring 2011 (July-October 2011) field seasons have been completed. While only 45 (211hrs) of the 66 planned summer season survey days were possible due to unfavourable weather conditions, 69 groups of dolphins were observed. These included 62 groups of *Tursiops aduncus*, one of *Sousa chinensis* (6 individuals), two mixed groups of *T. aduncus* and *S. chinensis* (both containing one individual *S. chinensis*), three groups of *Delphinus de/phis* and one mixed group of *D. de/phis* and *T. aduncus*. A total of 296 individuals of all species were identified as 'marked' and catalogued into an Access photo-id database. Of these, 271 were *T. aduncus*, seven were *S. chinensis* and 18 *D. de/phis*. To date, 37 groups have been observed during the winter season surveys. This includes 34 *T. aduncus* groups, one mixed group of *T. aduncus* (6 individuals) and *S. chinensis* (10 individuals), two groups of *D. de/phis*.

During winter/spring 2011, 59 surveys of the planned 66 were made and 54 groups of dolphins were observed. These included 49 groups of *T. aduncus*, four of *D. de/phis* and one group of *S. chinensis*. Photo-identification analysis of individuals is still being completed.

Dolphins identified during the current study will be compared with photo-id catalogues from previous studies (conducted by G. Parra, I. Ansmann and others) conducted in the northern sections of Moreton Bay to investigate intermixing and movement patterns of communities. From these data, it is evident that some sympatry between species is occurring and this will be investigated further during the final analysis of data.

The apparent movement of dolphins into and out of the survey area, and the somewhat irregular timing of the surveys due to unsuitable weather conditions, have posed difficulties in capture-recapture modelling and obtaining reliable estimates of abundance for the first summer field season. Improved weather conditions in the winter/spring 2011 season have allowed the planned number and spatio-temporal structure of surveys to be followed which will facilitate modelling the resulting capture-recapture data. Capture-recapture models will be applied again when the photo-identification data from the winter/spring 2011 season have been compiled.

The events contributing to difficulties arising in the initial attempts to fit capture-recapture models for abundance should not pose substantial problems for fitting the habitat usage model although habitat selection is likely to have responded to the weather and flood conditions. A substantial number of sightings have allowed the development of a suitably sized and growing database for the purposes of this model which will be fitted when all data from both seasons are available. The locations of groups observed during summer 2010/11 and winter 2011 seasons were clustered in locations adjacent to estuarine areas and river mouths. ~~Between seasons, there was a decline in the overall numbers of~~

dolphins observed. The lower numbers of dolphins per hour observed in the inshore (estuarine) waters was significantly different between seasons ($P = 0.003$; $df = 1, 35$), however, there was no significant difference in the numbers of dolphins observed in coastal waters between seasons ($P = 0.235$; $df = 1, 16$). Further analysis of environmental parameters influencing habitat selection and application of a habitat model will be applied to data.

The results from the analysis of all data will form the basis for development of a regional management report for coastal dolphins.

2. Milestones and timeframes met

Identification of the Milestones and timeframes (and any performance indicators) met during the period to which the Report relates

Currently the following milestones have been achieved:

- Completion of summer field survey season December 2010- March 2011
- Preliminary analysis of mark-recapture data from summer season field surveys
- Ongoing development of sightings and environmental data file for analysis of habitat usage
- Submission of Masters degree research full draft report (Amanda Peterson)
- Completion of winter/spring field season (July-October 2011)
- Commencement of Masters degree research (Paul Harrison)
- Presentation at the NSW Coastal Conference (November 2011)

3. Delays affecting project

A statement as to whether the timeframes for the Activity are being met and an explanation of any delays that have occurred, including the reasons for those delays and the action the Organisation proposes to take to address the delay and the expected effects (if any) the delay will have on the Activity (including subsequent Milestones and the overall completion of the Activity)

While the summer season's field work was disrupted by weather conditions, the timeframe was not affected. The start of the winter/spring 2011 season's fieldwork was delayed by a month due the availability of vessels, equipment and personnel. While complete analysis and publication of results will take some time, the data will have been collected, organised and summarised in time for the final report.

