

Australian Marine Mammal Centre

Final Report

(subclause 9 and Schedule Item 5 of the Funding Agreement)

- Project No. –0809/9
- Title - A Comparison of Group IV Humpback Whale Population Estimates from Two Key Locations Along the Western Australian Coast - Implications for Future Survey Location and Methodology
- Chief Investigator-Dr Chandra Salgado Kent and Mr. Curt Jenner
- Organisation – Curtin University

Activity Period – October 1st 2009-March 31st 2010

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1. Activity Summary

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The overall objective of this study was to assess the current status of the humpback whale population that migrates along the western Australian coastline each year. This project aimed to fill significant gaps in current knowledge by employing the latest statistical techniques to analyse seven years of survey data from North West Cape (NWC) to estimate sex ratio, population densities and size; and to compare results to those from Shark Bay, -400 km south of NWC. By addressing these needs the proposed project additionally aimed to elucidate on current survey design efficacy and practicality; which will have implications for future and ongoing locations and methodologies for monitoring humpback whales. The results from the study indicated that the best humpback whale population size estimates from surveys at NWC were around 7,276 (CI = 4,993-10,167) in 2000, 10,548 (CI = 6,502-48,622) in 2001, 18,692 (CI = 12,980-24,477) in 2006, 20,044 (CI = 13,815-31,646) in 2007, and 26,100 (CI = 20,152-33,272) in 2008. When combined with the best estimates for surveys conducted in 1999, 2005 and 2008 at Shark Bay (from Bannister and Hedley 2001, Paxton *et al.* 2005, Paxton *et al.*, in press, and Hedley *et al.*, 2009). When combined, the trend is of an over all increase rate of 10.3% per year, which is 1.5% lower than the most recent estimate of the maximum plausible increase rates for humpback whales (max 11.8%; Zerbini *et al.*, 2010). While the population size estimates seem reasonable, reducing uncertainty and increasing accuracy in future estimates is recommended by: 1) focusing surveys on the northern migration, 2) increasing survey effort, and 3) and conducting effective double platform surveys. Finally, previous estimates assume that all whales migrate north to the Kimberley region. If for example a cohort of females do not over-winter in Antarctica s previously suggested, then a 1 to 1 ratio of females to males is expected. The analysis of data on sex ratio of whales biopsied during boat surveys in 2002 and 2003 at NWC indicated if potential biases in boat-based biopsy sampling are not considered, there is indeed a 3 to 1 male to female ratio. However, by calibrating the boat-based data with aerial survey data (in particular expected group size and cue type), the male to female ratio is reduced to.... Hence, we suggest that majority of whales in the population are accounted for in these surveys.

2. The Outcomes/Objectives

The degree to which the activity achieved the objectives:

The specific objectives of the study were:

1. Identify the variability in density estimates resulting from data collected at various time intervals and migratory phases past North West Cape (-4 to 12 week time intervals over the northern and southern migratory phases).
2. Produce humpback whale density estimates at North West Cape using aerial survey data sets collected in 2000, 2001, 2006, 2007, and 2008.
3. Estimate the population increase rate for Group IV humpback whales based on density estimates at North West Cape.
4. Compare density estimates at North West Cape to those at Shark Bay for surveys
5. Compare estimates of population size increase rates at North West Cape (over 2000, 2001, 2006, 2007, 2008) to those made at Shark Bay (1999, 2005, 2008).
6. Determine sampling bias in sex ratio estimates made at North West Cape from biopsies collected during boat surveys in 2002 and 2003; and
 - a) Determine the implications for future study
 - b) Correct sex ratio for biases
 - c) Determine the implications of corrected sex ratio estimates to the estimated population size
7. Report the following to the 2009 International Whaling Commission (IWC): 1) population size estimates, 2) corrected sex ratio, and 3) implications of the results for optimal survey location and methodology for estimating the Group IV humpback whale population size.

All of the objectives listed above were met, except for the last which was to report the results to the 2009 IWC meeting. This will be done instead at the 2010 or 2011 meeting.

3. Appropriateness

The appropriateness of the approach used in the development and implementation of the Activity

The statistical modelling implemented for estimating the humpback whale population size estimates is on the forefront of current modelling developments. Furthermore, the work has highlighted some areas where future modelling could be further advanced.

4. Effectiveness

The degree to which the Activity has effectively met its stated objectives:

The program is considered to have been highly successful and significant to contributing to 1) information for management of western Australian humpback whales, 2) future modelling approaches, and 3) future survey methodology on the west coast of Australia. Similar work on long term data set already available for analysis is highly recommended for future activities.