

Annex P

Work Plan for Completion of the MSYR Review

Steering group: Butterworth (Chair), Allison, Best, Brandon, Calambokidis, Cooke, George, Gunnlaugsson, Kitakado, Koski, Kraus, Punt, Robbins, Sears, Straley, Wade, Walløe, Waples.

Background

The RMP sub-committee agreed that that it was necessary to take account of the potential impact of environmental variation in conducting and interpreting a meta-analysis of increase rates in baleen whale populations in order to determine a plausible range for MSYR for use in RMP trials. The sub-committee further agreed that the issues raised in Appendix 5 of Annex D needed to be addressed before proposals for revising the range of MSYR values could be considered.

The sub-committee agreed that an important part of this process was to examine available datasets with a view to obtaining information on the plausible range of values of parameters that reflect the magnitude and nature of environmental variation in increase rates. The sub-committee identified the following potential case studies and contact persons:

- SE Atlantic right (Best);
- SW Atlantic right whales (Cooke);
- North Atlantic right (Kraus);
- Eastern North Pacific gray whales (Brandon);
- BCB bowhead (Koski, George*);
- California humpbacks and blues (Calambokidis);
- Gulf of Maine humpbacks (Robbins);
- SE Alaska humpbacks (Straley and Gabriele);
- Gulf of St Lawrence blue, fin and humpbacks (Sears)*

Provided that sufficient input from those listed above is secured, the sub-committee recommended that a 4-day intersessional workshop be held with the following terms of reference:

- (1) use the information from the stocks identified above to estimate the parameters which determine the extent of environmental variation;
- (2) use information from genetic considerations to refine these parameters;
- (3) revise and finalize the meta-analysis which will be used to calculate the distribution for the rate of increase at low stock size.

Progress to date

The above persons have been contacted by email. Five positive responses have been received, one probable, and two are still to reply. The provisional steering group considers the response sufficient to proceed with the analyses listed below and with the workshop, budget permitting.

Work to be completed before the workshop

1. *Specification of the revised meta-analysis*

The group considers the proposal in Annex D, Appendix 5 for extending the methodology of the meta-analysis to be appropriate in principle, but noted that detailed issues are likely to arise when implementing the proposal. Allison, Cooke and Punt are requested to develop a computational implementation and to circulate to the Steering Group a more detailed specification of the proposal, including proposals for handling any problems or choices that arise.

2. *Estimation of variability from datasets*

The data available for the populations listed above include information on calving intervals, mortality rates (of calves and/or non-calves), population trends, and strandings (of calves and/or non-calves), although not all items are available for each population. The group considered that, if possible, a common model template for characterising and estimating variability should be applied to all data sets. However, this depends to some extent on the nature of the data, and no one member of the group was familiar with all the datasets. The group requested that Cooke circulate an initial proposal based on southern right whale time series; the group would then develop it to accommodate the kinds of information available from the other populations.

3. *Use of information from other taxa*

Noting that the direct information on variability in population size and vital rates in baleen whales is still rather limited, the group considered that a review of relevant information from other taxa, especially large mammals, would be useful. The group recommended that a budgetary allocation be made for such a review. The group drew attention to the review by Inchausti and Halley (2001) and the literature cited therein.

4. *Use of genetic information*

Fluctuations in population size have important genetic consequences because genetic diversity and haplotype richness tend to be proportional to the harmonic mean of N_e (effective population size) over time, rather than the arithmetic mean. Thus, fluctuating populations will exhibit lower genetic diversity than constant populations with the same mean level. Genetic data may enable bounds to be placed on the degree of fluctuation. In general, genetic diversity depends on: (a) mutation rate; (b) effective population size (harmonic mean); (c) interchange with other populations;

* Added by subgroup after RMP sub-committee report had been finalised.

and (d) generation time. The group identified the following work to be done:

- (i) use the environmental variability model implemented by Allison to determine the ratio of the long-term harmonic mean of population size to mean K for the standard set of scenarios (Table 2 in SC/61/Rep6);
- (ii) compile available information on standard measures of genetic diversity in: (a) the populations identified above as case studies; (b) other baleen whale populations of interest in the MSYR context. This compilation may require a small budgetary allocation.

Because migration rates of genetic significance can be well below the level at which they would be demographically significant, genetic diversity tends to reflect the size of the meta-population (which may be worldwide) rather than the local population, in which case genetic data from several major populations of the species in question may be required.

Generation time is available from the review by Taylor *et al.* (2007).

5. *Relation between variability and length of time series*

As noted in the sub-committee report, estimates of environmental variance from time-series data tend to increase with the length of the series. Therefore, estimates of environmental variance from shorter time-series will tend to under-estimate environmental variance (Inchausti and Halley, 2001). The group identified the following work:

- (i) compilation of information on this issue in the course of the review of information from other taxa (see task 3 above);
- (ii) Allison to conduct a simulation study, using the environmental variability model already implemented, to determine the predicted relationship between length of series and estimated level of variability for the standard scenarios.
- (iii) develop a means to include of data series length as a factor in the meta-analysis (this can be subsumed into task 1 above).

Not all details of the above tasks could be worked out in the time available at the meeting. The Steering Group may need to amend or augment the above list of tasks should any unforeseen issues arise.

REFERENCES

Inchausti, P. and Halley, J. 2001. Investigating long-term ecological variability using the Global Population Dynamics Database. *Science*, 293: 655–657.

Taylor B.L., Chivers S.J., Larese J. and Perrin W.F. 2007. Generation length and percent mature estimates for IUCN assessments of cetaceans. Administrative Report LJ-07-01. National Marine Fisheries Service, Southwest Fisheries Center. La Jolla, CA, USA.