Progress of the Outstanding Tasks Identified
at the JARPA Review Meeting

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INTRODUCTION

The IWC/SC carried out a comprehensive review of the data and results obtained from JARPA in May 1997 (IWC, 1997). Agreement was reached by the participants in this Working Group on several points as follows: with respect to estimation of biological parameters, no conclusive results have been obtained, because only half of the planned research period has been covered to date. However, it has been ascertained that JARPA has already made major contributions to the understanding of certain biological parameters (e.g., direct measures of age at sexual maturity) of the minke whale in Areas IV and V of the Antarctic Ocean. With respect to the Antarctic ecosystem, it has also been ascertained that this research is useful in testing various hypotheses related to the "krill surplus" model. Furthermore, the results of JARPA would be useful in the reduction of the current set of plausible scenarios considered in implementation simulation trials and the identification of new hypotheses. With respect to other biological parameters, on the other hand, more time is needed to obtain sufficient age composition and population abundance estimates. Further, some issues, such as representative nature of the sampling method and the stock structure of the minke whale, still remain unresolved. Also, some future tasks to be tackled have been identified, including the issue of survey on environmental change through the meso-scale approach.

In addition, at the 49th Annual Meeting of the IWC/SC, it was pointed out that further discussion is needed concerning such points as representative nature of samples and utilization of samples collected during the past commercial whaling operation. Regarding to this latter issue some progresses were made (see Yoshida *et al.* 1998 and Goto *et al.* 1998). Finally, the Committee agreed that none of the sampling and stock identity problems that had been identified in the JARPA review or subsequently, would in principle prevent JARPA from achieving its objectives in terms of estimation of biological parameters (IWC, 1998).

At that Meeting, the Committee also identified ten main areas to address these unresolved problems as follow (IWC, 1998):

Abundance estimates
1. Development of methods to correct bias of abundance estimate.

Stock structure
2. Stock definition.
3. Statistical analysis of mtDNA data considering the inclusion of school size as a covariate.
4. Pilot study on nuclear DNA analysis on JARPA minke samples.
5. Effort to obtain biological materials for genetic analysis from low latitude areas of the Southern Hemisphere.
6. External morphology/morphometry analysis.
7. Examination of possible stock boundaries (geographical and temporal) in Areas IV and V.

Biological parameters
8. Segregation study.
9. Recalculation of biological parameters by biological stocks.

Marine ecosystem and environmental change
10. Meso-scale survey plan.

This paper reports on the progress of outstanding tasks until now.

PROGRESS OF SOME ITEMS

At the 50th IWC/SC meeting progresses made in each of these tasks were presented (Government of Japan, 1998a). Since then further progresses have been achieved in some of the tasks, especially in Tasks 2, 3, 4, 5 and 7, which are related to the stock structure issue.

On Task 1 (abundance estimate), as described in the report of the 50th IWC/SC meeting, the simulation study to correct the abundance estimation from JARPA sighting data was already started in a co-oparative study with St. Andrews University. Plan and progress of this work have already been presented to the 49th IWC/SC meeting (SC/49/SH30) and to the last SC meeting (SC/50/CAWS33). Progress of the studies also will be presented to this meeting. Furthermore, an examination of the relationships between bias in whale density estimates and the speed of the vessel was made and it will be presented to this meeting (SC/51/CAWS12).

Apart from the above study, the Japanese scientists started a work to incorporate 'adjusted encounter rate' (Burt and Borchers; 1997: SC/M97/23) to their program in order to revise abundance estimates of minke whales stratified by school size and research sub-area. The aim of this study is to understand the nature of the bias of age-distribution and biological parameters caused by the difference of sampling rate by school size. However, these revision for abundance estimation are not been completed yet. The following two works are examining; One is calculation of a target distance and an unsurveyed distance of each survey vessel in each day as to 1991/92 and 1992/93 surveys. Another is to incorporate our estimation program to DISTANCE program on the

calculation methods. Results of this examination will be used for the revision of abundance estimate.

On Task 2, during the 1997 meeting the IWC/SC agreed that the lack of the working definition of stocks and sub-stocks is a general problem, not for JARPA alone, and therefore, needs to be addressed by the Committee. Consequently the Japanese side took the initiative and during the 1998 meeting presented a working paper (RMP/WP7) proposing the establishment of a SC Working Group on stock definition and a review of the use of the term stock and of case studies. As a response to this proposal, the SC established an ad hoc Working Group to develop terms of reference for such a review and to outline the tasks that it may be useful to address overall in such a review, including identifying specific steps that can be taken intersessionally in preparation for a more comprehensive discussion during the next meeting. The ad hoc Working Group identified five main tasks, which were specified in Annex D, Appendix 4 of the 1998 SC meeting report. The first three tasks would be covered intersessionally before the 1999 SC meeting with the other two tasks being covered during a intersessional workshop after the 1999 SC meeting. After the 1998 SC meeting some initial e-mail discussions began. Several works of the SG are being made through a corresponding e-mail group.

On Task 3, some analyses considering the inclusion of school sizes as a covariate in the mtDNA survey have been carried out. Results of these analyses will be presented during the 1999 SC meeting.

On Task 4, a pilot study to investigate the utility of nuclear DNA markers (microsatellites) for studies on stock identity has already started. Results of this pilot study will be presented to the 1999 SC meeting (SC/51/CAWS 9).

On Task 5, a preliminary working paper was presented at the 48th meeting of the IWC/SC with the results of a survey of biological material among researchers and institutions of the Southern Hemisphere. According to those results, apart the Brazil region, no other comprehensive material of the ordinary form minke whale was available from other low latitude regions. Of interest for the JARPA is the material from low latitude areas of the eastern and western side of the Indian Ocean and the western side of the South Pacific Ocean. After further searching, we learnt of a collection of samples of the minke whales taken in Durban, South African (western part of the Indian Ocean). It was confirmed to us the occurrence of about 200 samples of baleen plates, which have been stored in formaline for several years. We are still discussing on the best ways to examine such material.

On Tasks 7: Whether this task will be possible will depend of the analysis and results of Tasks 2, 3, 4, 5 and 6.

The JARPA tasks related to biological parameters are dependent in part on the results of the tasks concerning the stock structure issue. A segregation study (Task 8) is being examined in the context of the distribution pattern of minke whales in relation to pack ice edge. Results will be reported to the 1999 SC meeting (SC/51/CAWS 18).

On the ecological study (Task 10), feasibility studies were planned to apply equipment on oceanographical and ecological surveys in the cruise of the 1998/99 JARPA. These equipments were XCTD and CTD (or XBT) for recording for vertical thermal and salinity distributions, Echo sounding system for examining of the distribution of prey species (such as krill), and EPCS (Electric Particle Counting and Sizing System) for examining the distribution of chlorophyll. However, some part of these experiments was cancelled due to fire accident of *Nisshin-Maru*. Preliminary results will be presented during the 1999 SC meeting.

On other additional tasks on sampling bias and representativeness of samples, the following studies are continuing.

The issue of sample bias will be examined during the VPA analyses being conducted by several SC members. In the last SC meeting, some SC members suggested a possibility of effect of pack ice distance on distribution of minke whales in Antarctic. Japanese scientists prepared data on distance from ice edge to sampling location of whale. Such data was distributed to the related scientists. Apart from Japanese scientists, some SC members are examining this problem using these pack ice information as well as other GIS data such as depth. Results of these analyses will be presented during the 1999 SC meeting.

Regarding the sampling scheme, Dr. Schweder proposed a modification of the scheme at the 49th IWC/SC meeting (Schweder, 1998). Although a feasibility study on the sampling scheme was planed to conduct during the 1998/99 cruise (Government of Japan, 1998b), the study was not conducted due to the *Nisshin Maru*'s fire accident. The next 1999/2000 cruise will attempt to conduct a limited scale of feasibility study on whether the modified method suggested by Dr. Schweder is workable or not (Government of Japan, 1999).

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