

Strictly confidential until after the discussion in the Scientific Committee of the 51th IWC Annual Meeting

**The 1999/2000 Research Plan for the Japanese Whale Research Program  
under Special Permit in the Antarctic (JARPA)**

Government of Japan  
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**I. INTRODUCTION**

The Japanese Whale Research Program under Special Permit in the Antarctic (JARPA) has been conducted every year since the 1987/88 season in compliance with Article VIII of the International Convention for the Regulation of Whaling. After two seasons of feasibility study in 1987/88 and 1988/89, the full-scale research started in the 1989/90 season (Government of Japan, 1989).

Objectives of the JARPA research are: (i) estimation of biological parameters of minke whale stock, (ii) elucidation of the role of whales in the Antarctic ecosystem, (iii) elucidation of the effect of environmental changes on cetaceans, and (iv) elucidation of the stock structure of the Southern Hemisphere minke whales to improve stock management (Government of Japan, 1987; Government of Japan, 1996).

In the survey Areas IV and V, a sample size of 300 (+-10%) has been maintained to achieve a long-term consistency of survey in these areas. From the 1995/96 season, the survey area was expanded for a stock structure study using sample of 100 (+-10%) minke whales (Government of Japan, 1995).

Annual research plan and scientific papers derived from JARPA have been annually submitted to the Scientific Committee of the International Whaling Commission (IWC/SC) and the Committee reviewed these reports every year.

In addition, the IWC/SC carried out a comprehensive review of the data and results obtained from JARPA in May, 1997 (Anon., 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 meso-scale approach.

At the 49th Annual Meeting of the IWC/SC, it was also 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. These areas, together with a report on progress to date in addressing them, are detailed in document SC/51/xx

## II. OBJECTIVES OF JARPA

No change from the previous research plan (see Government of Japan, 1995;1996;1997).

## III. NUMBER, SEX, SAMPLING SIZE AND AREA

In Area IV, three hundred (300) ordinary form minke whales with 10% allowances (+-10%) will be sampled. Sampling design within the Area IV remains unchanged to obtain data compatible to the past JARPA surveys, and the sample size is also retained to ensure maintenance of present levels of precision. This reason was not only for the stock structure study, but also for the analysis of catch-at-age data. All samples will be randomly sampled, using the same methodology as employed in the past.

In addition to this, 100 animals (+-10%) of the ordinary form minke whale will be sampled in the eastern half of Area III (35° - 70°E) as in the previous survey in the 1997/98 season, except that efforts will be made to take these whales further to the north than in that previous season. It is clear that the continuation of this study is necessary for the study on stock structure, for reasons indicated below.

## IV. RESEARCH NEEDS AND APPLICABILITY OF NON-LETHAL METHODS

### *Research needs*

The analyses on stock structure under JARPA had suggested that at least two stocks occur in Areas IV and V. The basis for such hypothesis was an extensive mtDNA analysis in Areas IV and V (Pastene *et al.* 1996) and a preliminary morphometric analysis in Area IV (Fujise, 1995). These studies suggested that a different stock ('Western' or W Stock) could occur in the western part of Area IV early in the season, with a 'Core' or C Stock distributed in Area V, Area IV Eastern and Area IV Western Late.

Estimation of biological parameters should ideally be carried out on the basis of genetically-identified stock units. Then for this objective of the JARPA, it is very important to corroborate the new hypothesis on stock identity and to identify the geographical and temporal boundaries for the W and C Stocks in Areas IV and V and adjacent Areas. The original objective of the expansion to Area III Eastern was a feasibility study on stock identity to examine the hypothesis of the occurrence of more than one stock in Areas IV and V (Government of Japan, 1995) and to attempt to determine the distribution pattern of hypothesized C Stock.

The analyses using the 1995/96 JARPA samples showed that C Stock occurred in the eastern part of Area III and western part of Area IV early in the season (Pastene and Goto, 1997). A similar result was found in the analysis of mtDNA using the 1997/98 JARPA samples (Pastene and Goto, in prep.).

On the other hand, the study by Pastene *et al.* (1996) and other recent analyses suggested certain degree of yearly variation in the pattern of mtDNA variation in some longitudinal/temporal groups e.g. western part of Area IV late in the season.

These results show that not only is there a temporal component to the presence of the W and C stocks in Areas III and IV, but further that this pattern can vary extremely from one season to the next. It is noted that the temporal component of W and C stocks presence in the Antarctic waters needs to be taken into account when RMP implementation trials for the Southern Hemisphere minke whales are next reviewed. The inter-year variability in this component will also need to be incorporated in these revised trials, so that more samples from the Area III Eastern and Area IV regions are needed to better determine the nature of this variability.

As mentioned above, the genetic and morphometric analyses grouped the samples considering longitudinal and temporal factors. Genetic analysis of available and future samples from Areas III and IV will consider an additional factor to examine heterogeneity in these areas: the latitudinal factor e.g. distance from the ice-edge. Results of this new analysis could help to elucidate the nature of the variability observed in these areas.

In addition to the continuation of the expanded research, it is planned to examine the extent of the yearly variation of stock distribution patterns using other available sources. Hence analyses will be made on the ice edge conditions, prey species availability, and nutritional condition of sampled whales.

Further, as far as biological parameters are concerned, it is necessary to stratify the area, season, sex and body size. In this respect, the existing number of samples from the eastern part of Area III is not sufficient to achieve this goal.

In the next season, surveys will be conducted with echo sounding system newly equipped on the dedicated sighting vessel. The distribution and abundance of the food species including Antarctic krill, a major food species for the minke whale, will be identified throughout the entire research area. Furthermore, the Yushin Maru, one of the sighting and sampling vessels, will be equipped with the Electric Particle Counting and Sizing System (EPCS). This system allows for quantifications of chlorophyll in surface water. Also, useful information can be expected to be obtained with regard to the survey of the Antarctic ecosystem, which is one of the important objectives of the research, as well as clarification of the possible impact of environmental changes on whale stocks.

Regarding the sampling scheme it will be attempted to conduct a limited scale of feasibility study on whether the modified method suggested in Annex U2 of the Report of 49<sup>th</sup> Scientific Committee (IWC, 1998) is workable or not.

#### *Availability and usefulness of existing samples from Area III*

The availability of tissue samples from past commercial operations in Area III was examined by Yoshida *et al.* (1998). Samples from the commercial operation of the 1978/79 Antarctic season in that Area have been already examined for mtDNA.

Although a number of samples still being available for Area III Eastern (III-E) in the early period, the important issue here is to determine whether commercial samples are useful to study stock structure. All the commercial samples were taken around the ice edge in contrast with JARPA samples, which are taken randomly between 60°S and the ice-edge. Goto *et al.* (1998) examined JARPA samples in Area IV for two summer seasons, 1989/90 and 1991/92. They grouped the samples considering three factors: longitude, period within a summer season and distance from the ice-edge. These authors showed that the only samples useful for identifying the W stock were those taken in Area IV Western in the early period in offshore waters (from 60nm from the ice-edge), and no useful information was obtained using only the samples taken near the ice edge (within the 60nm from the ice-edge).

Under this context, the fact that no mtDNA heterogeneity was found in Areas III and IV in the early periods of the JARPA surveys 1995/96 and 1997/98, could be due to the limited spatial (distance from the ice edge) covering in these surveys. In these surveys whales were sampled mainly around the ice-edge. Thus it is important that the new survey in Area III-E attempt to cover offshore (north areas) in a more intensive way.

It should be noted here that the effect of the distance from the ice edge in the pattern of variability of minke whales in Areas III-E and VI for the period 1989/90-1997/98 is being further investigated in an ongoing study.

It is also important to examine historical samples from low latitudes of the Southern Hemisphere (Task 5). Their analyses could provide useful information on genetic variability in suspected breeding areas and such information could be compared with the pattern of variability observed in the Antarctic. Effort is being made to examine a collection of samples from Brazil taken in a commercial operation in 1981. Also we are considering to conduct a feasibility study to examine the usefulness of biological materials of minke whales collected off Durban in the mid-70's for genetic analysis.

#### *Applicability of non-lethal methods*

No change from the previous research plan (see Government of Japan, 1998).

## **V. POSSIBLE EFFECT ON THE STOCK**

This matter was already described in the previous research plan (see Government of Japan, 1995).

## VI. OPPORTUNITY FOR PARTICIPATION BY FOREIGN SCIENTISTS

No change from the previous research plan (see Government of Japan, 1995;1997).

## VII. OUTLINE OF 1999/2000 RESEARCH

- (1) Number of research vessels: No change from the previous research plan (see Government of Japan 1995;1997). However, a new research vessel (*Yushin-Maru*) will engaged as one of the sighting and sampling vessels (replacing the old *Toshimaru No.18*).
- (2) Research period: No change from the previous research plan (see Government of Japan, 1995;1997).
- (3) Research area: No change from the previous research plan (see Government of Japan, 1995;1997).
- (4) Sighting method: No change from the previous research plan (see Government of Japan, 1995;1997).
- (5) Sampling method: No change from the previous research plan (see Government of Japan, 1995;1997).

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