

**Strictly confidential until the opening plenary at IWC/55**

**THE 2003/2004 PLAN OF THE JAPANESE WHALE RESEARCH PROGRAM  
UNDER SPECIAL PERMIT IN THE ANTARCTIC (JARPA)**

*Government of Japan  
March 2003*

**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).

In the surveys in Areas IV and V, a sample size of 300 ( $\pm 10\%$ ) has been maintained to achieve a long-term consistency of surveys in these areas. From the 1995/96 season, the survey area was expanded longitudinally to cover the eastern part of Area III ( $35^{\circ}\text{E}-70^{\circ}\text{E}$ ) and western part of Area VI ( $145^{\circ}\text{W}-170^{\circ}\text{W}$ ). The objective of this expansion was to investigate the distribution of stock (s) occurring in Areas IV and V and an additional sample of 100 ( $\pm 10\%$ ) minke whales have been taken every year in the extended Areas (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 has reviewed these reports. In addition, the IWC/SC carried out a comprehensive review of the data and results obtained by the JARPA in May, 1997 (IWC, 1998a). The review report agreed on the high value of the data accumulated so far and that the JARPA had already made important contributions toward the objectives of the program. It was also agreed that the JARPA has the potential to improve the management of minke whales in the southern hemisphere. Specifically it was agreed that:

- Results from JARPA will be useful in reducing the current set of plausible scenarios for the RMP, and will contribute to increasing the allowed catch without increasing the depletion risk.
- JARPA has the potential to provide answers to various questions concerning the trend of stock fluctuation of minke whales in Areas IV and V and already has made important contribution to elucidating the biological parameters for Areas IV and V.
- JARPA is useful for elucidating the role of whales in the Antarctic ecosystem and the collected data should be useful to verify hypotheses such as the 'krill surplus model'.

The SC agreed that none of the sampling and stock identity problems that had been identified in the JARPA review, would in principle prevent JARPA from achieving its objectives in terms of estimation of biological parameters (IWC, 1998b). At that meeting, the Committee also identified ten main areas of research to address these unresolved problems. Studies addressing these ten areas as well as other JARPA-related studies, have been conducted and reported to

past IWC/SC meetings (Abe *et al.*, 1999; Clarke *et al.*, 1999; Fujise *et al.*, 1999; Fujise and Ohsumi, 1999; ICR, 1999; Matsuoka *et al.*, 1999; Pastene and Goto, 1999; Polacheck *et al.*, 1999; Butterworth *et al.*, 1999). Other studies related to the JARPA tasks e.g. GAM based abundance estimation, were presented to the 52<sup>nd</sup> IWC/SC meeting (Clarke *et al.*, 2000).

In this document the JARPA plan for the austral season 2003/2004 in Areas IV and III is presented.

## II. OBJECTIVES OF JARPA

The objectives of the JARPA are: (i) estimation of biological parameters to improve the stock management of the Southern Hemisphere minke whale, (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; 1995; 1996; IWC, 1998a).

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

In 2003/2004 three hundred (300) Antarctic minke whales with 10% allowances ( $\pm 10\%$ ) will be sampled in Area IV. In addition to this, 100 animals ( $\pm 10\%$ ) of the Antarctic minke whale will be sampled in the eastern part of Area III (35°E - 70°E) as specified in the previous research plans for the 1995/96, 1997/98, 1999/2000 and 2001/2002 surveys. The continuation of the survey in Area III is necessary for the objective of stock structure as explained in the previous plans and reiterated below.

In Areas IV sampling design remain 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. All samples will be randomly sampled, using the same methodology as employed in the past.

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

### Research needs in Areas IV

No change from the previous research plan (see Government of Japan, 1987; 1989; 1995).

### Research needs in the eastern part of Area III

Estimation of biological parameters, which is the main objective of the JARPA, 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 derived from mtDNA and morphometric analyses (Pastene *et al.* 1996a; Fujise, 1995). As explained in previous plan the analysis of genetic data suggested a lot of movement of minke whale across the IWC-boundary between Areas IV and V at 130°E. Genetic and morphometric results are consistent with the hypothesis that a core stock distributes in Areas IV and V and that a different stock could occur sporadically in the western part of Area IV and possibly in Area III. Then the additional survey in Areas III and VI are focused to investigate the geographical and temporal distribution of the core stock. An update of the mtDNA analyses conducted in Areas IV and III was presented in Pastene *et al.* (2001).

The analyses based on mtDNA and microsatellites in Area IV and IIIE have confirmed some degree of geographical and temporal genetic heterogeneity in these Areas, which support the hypothesis that a different stock could occur in Area III and western part of Area IV with a temporal component to its distribution. An alternative hypothesis is that part of Areas III and IVW represent an area of mixing of two stocks, with geographical as well temporal components involved. Apart from the genetic results, other results based on independent markers support the existence of a different stock in these Areas. Mark-recapture analyses (Wada, 1984) and more recently pollutant analysis (Kunihito *et al.*, 2001) suggests the occurrence of different stocks separated at longitude 80°E.

Four JARPA surveys have been conducted in Area IIIE, in 1995/96, 1997/98, 1999/00 and 2001/2002. The number of samples examined for mtDNA in these surveys is 105, 99, 107 and 106, respectively. Samples taken in 2001/2002 still being under genetic analysis. The survey in 2003/2004 will be conducted again in the eastern part of Area III (as in the previous surveys). The rationale behind this is that analysis of genetic and non-genetic data in that sector and western sector of Area IV has proved to be informative of possible additional stock structure. This finding should be further investigated through the analysis of additional samples from Area IIIE. The total number of samples examined for mtDNA in Area IIIE is relatively large (n=417). However the genetic analysis is conducted by taking into consideration several factors such as temporal (early and late in the JARPA season) and geographical (near the ice-edge and offshore). When the analysis is conducted in this way, a sample size of 160-200 is required for each stratum for finding significant differences at the mtDNA RFLP level (Pastene *et al.* 1996b).

#### **Acoustic and other surveys**

The extent of the temporal variation (within and between years) of stock distribution patterns will be examined using other available sources. Analyses will be made on the ice edge conditions, prey species availability, and nutritional condition of sampled whales. Recently, surveys have been conducted with echo sounding system 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, and the *Kyoshin Maru No.2*, the dedicated sighting vessel, are equipped with the Electric Particle Counting and Sizing System (EPCS). This system allows for quantification of chlorophyll in surface water. Also, useful information can be expected 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. In this way the dynamic of stocks can be studied in the context of the oceanographic conditions and dynamic of the prey species in the research area (e.g. Murase *et al.*, 2002).

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

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

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

This matter was already described in the previous research plan (see Government of Japan, 1995; 1996).

## VI. OPPORTUNITY FOR PARTICIPATION BY FOREIGN SCIENTISTS

No change from the previous research plan. Opportunity for participation in the research under JARPA will be given to any foreign scientist to the extent allowed by accommodation and other logistic conditions, provided that such participation does not cause inconveniences in the implementation of the program. The selection of the participants are to be determined by the Whale Research Coordinating Committee, Japan, which will consider the various conditions such as accommodation and others for a final determination. Conditions for participation are indicated in previous research plans (see Government of Japan, 1987; 1994).

## VII. OUTLINE OF 2003/2004 RESEARCH IN AREAS IV AND IIIE

- (1) Number of research vessels: One research base (*Nisshin Maru*), three sighting/sampling vessels (*Yushin Maru*, *Yushin Maru No. 2* and *Kyo Maru No. 1*) and one dedicated sighting vessel (*Kyoshin Maru No. 2*).
- (2) Research period: From November 2003 to April 2004.
- (3) Research area: 35°E-130°E (eastern part of Area III and entire Area IV).
- (4) Sighting method: Sighting surveys will be conducted as in the past (see Government of Japan, 1995; 2001). Three vessels will be engaged in sighting and sampling activities; one vessel will be dedicated to sighting activities only.
- (5) Sampling method: No change from the previous research plan (see Government of Japan, 1995; 2001). When the sighting/sampling vessels find a school of Antarctic minke whale, one animal is sampled from that school in a random manner.

## VIII. REFERENCES

- Abe, H., Goto M., Katsumata, Y., Mizutani, M. and Pastene L.A. 1999. Preliminary microsatellite DNA analysis to investigate stock structure in the Antarctic minke whales (*Balaenoptera acutorostrata*). Paper SC/51/CAWS9 presented to the IWC Scientific Committee, May 1999 (unpublished). 12pp.
- Butterworth, D.S., Punt, A.E., Fujise, Y. and Kato, H. 1999. Do the JARPA age-structure data for Southern Hemisphere minke whales provide indication that commercial selectivity could have been age-specific for higher ages? Paper SC/51/CAWS21 presented to the IWC Scientific Committee, May 1999 (unpublished). 10pp.
- Clarke, E.D., Burt, M.L. and Borchers, D.L. 1999. Simulations of JARPA surveys to test abundance estimation methods. Paper SC/51/RMP16 presented to the IWC Scientific Committee, May 1999 (unpublished). 17pp+appendices.
- Clarke, E.D., Burt, M.L. and Borchers, D.L. 2000. Investigation of bias in GAM-based abundance estimation methods and their suitability for JARPA survey data. Paper SC/52/LA19 presented to the IWC Scientific Committee, June 2000 (unpublished). 15pp.

Fujise, Y. 1995. A preliminary morphometric study in minke whales from Antarctic Area IV using data from the 1989/90 JARPA survey. Paper SC/47/SH7 presented to the IWC Scientific Committee, May 1995 (unpublished). 15pp.

Fujise, Y. and Ohsumi, S. 1999. Progress of the outstanding tasks identified at the JARPA review meeting. Paper SC/51/CAWS13 presented to the IWC Scientific Committee, May 1999 (unpublished). 5pp.

Fujise, Y., Tamura, T., Ichihashi, H. and Kishino, H. 1999. Further examinations of the segregation pattern of minke whales in the Antarctic Area IV using a logistic regression model, with considerations on the pack ice distribution. Paper SC/51/CAWS18 presented to the IWC Scientific Committee, May 1999 (unpublished). 18pp.

Government of Japan. 1987. The programme for research on the Southern Hemisphere minke whale and for preliminary research on the marine ecosystem in the Antarctic. Paper SC/39/O4 presented to the IWC Scientific Committee, June 1987 (unpublished). 60pp.

Government of Japan. 1989. The research plan in 1989/90 in conjunction with note for "The programme for research on the Southern Hemisphere minke whale and for preliminary research on the marine ecosystem in the Antarctic (SC/39/O4)". Paper SC/41/SHMi13 presented to the IWC Scientific Committee, May 1989 (unpublished). 21pp.

Government of Japan. 1994. The 1994/95 Research Plan of Japanese Whale Research Programme under Special Permit in the Antarctic. Paper SC/46/SH16 presented to the IWC Scientific Committee, May 1994 (unpublished). 7pp.

Government of Japan. 1995. The 1995/96 Research Plan for the Japanese Whale Research Program under Special Permit in the Antarctic. Paper SC/47/SH3 presented to the IWC Scientific Committee, May 1995 (unpublished). 9pp.

Government of Japan. 1996. The 1996/97 Research Plan for the Japanese Whale Research Program under Special Permit in the Antarctic. Paper SC/48/SH3 presented to the IWC Scientific Committee, April 1996 (unpublished). 10pp.

Government of Japan. 2001. The 2001/2002 Research Plan for the Japanese Whale Research Program under Special Permit in the Antarctic (JARPA). Paper SC/53/O1 presented to the IWC Scientific Committee, July 2001 (unpublished). 5pp.

Institute of Cetacean Research. 1999. Research activities of the Institute of Cetacean Research (RAICR) May 1998-April 1999. Paper SC/51/O6 presented to the IWC Scientific Committee, May 1999 (unpublished). 29pp.

International Whaling Commission. 1998a. Report of the Intersessional Working Group to review data and results from special permit research on minke whales in the Antarctic, Tokyo, 12-16 May 1997. *Rep. int. Whal. Commn* 48: 377-412.

International Whaling Commission. 1998b. Report of the Scientific Committee. *Rep. int. Whal. Commn* 48:55-302.

Kunito, T., Watanabe, I., Yasunaga, G., Fujise, Y. and Tanabe, S. 2001. Using trace elements in skin to discriminate the populations of minke whales in southern hemisphere. *Marine Environmental Research* 53: 175-197.

Matsuoka, K., Watanabe, A., Ichii, T., Shimada, H. and Nishiwaki, S. 1999. Application of the XCTD oceanographic survey in the Antarctic Areas III and IV (35°E-130°E) during 1997/98 JARPA cruise. Paper SC/51/E5. presented to the IWC Scientific Committee, May 1999 (unpublished). 11pp.

Murase, H., Matsuoka, K., Ichii, T. and Nishiwaki, S. 2002. Relationship between the distribution of euphausiids and baleen whales in the Antarctic (35°E-145°W). *Polar Biol.* 25:135-145.

Pastene, L.A., Goto, M., Itoh, S. and Numachi, K. 1996a. Spatial and temporal patterns of mitochondrial DNA variation in minke whales from Antarctic Area IV and V. *Rep. int. Whal. Commn.* 46:305-314.

Pastene, L.A., Kishino, H. and Goto, M. 1996b. Preliminary RFLP analysis of mitochondrial DNA in the Antarctic minke whale from Areas III and VI. Paper SC/48/SH13 presented to the IWC Scientific Committee, May 1996 (unpublished). 19pp.

Pastene, L.A. and Goto M. 1999. Further spatial and temporal analysis of mitochondrial DNA variation in minke whales from Areas III and IV with considerations on the pack-ice distribution. Paper SC/51/CAWS11 presented to the IWC Scientific Committee, May 1999 (unpublished). 11pp.

Pastene, L.A., Goto, M. and Kanda, N. 2001. An update of the mitochondrial DNA RFLP analysis in the Antarctic minke whales from Areas III and IV. Paper SC/53/LA17 presented to the IWC Scientific Committee, July 2001 (unpublished). 16pp.

Polacheck, T., Dobbie, M., Fujise, Y. and Kato, H. 1999. Spatial and temporal distribution of ages of Southern Hemisphere minke whales in commercial and JARPA catches in areas IV and V. Paper SC/51/CAWS31 presented to the IWC Scientific Committee, May 1999 (unpublished). 32pp.

Wada, 1984. Movements of marked minke whales in the Antarctic. *Rep. int. Whal. Commn* 34: 349-355.