The 1996/97 Research Plan for the Japanese Whale Research
Program under Special Permit in the Antarctic

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CONTENTS

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 research in 1987/88 and 1988/89, full–scale research started in the 1989/90 season (Government of Japan, 1989).

JARPA is designed to repeat surveys in the Antarctic Areas IV and V in every alternate year during the sixteen year research period. "Estimation of biological parameters of minke whale stock" and "elucidation of the role of whales in the Antarctic ecosystem", which are the major objectives of JARPA, reasonably require a long–term continuous survey (Government of Japan, 1987). The statistical performance of the estimation will improve as research is continued.

Various research papers derived from JARPA have been annually reported to the IWC. In 1990 some of these contributed to the Comprehensive Assessment of the Southern Hemisphere Minke Whales carried out by the IWC Scientific Committee (IWC, 1991). In the recent Scientific Committee reports, it was noted that "several members commended on the high quality of certain aspect of the work" (IWC, 1995), and that "Several members commented on the high quality of much of the work that had been presented over the years of this proposal" (IWC, 1996) and also that "Other members believed that the proposal adequately fulfill the Committee's guidelines" (IWC, 1996).

Since the beginning of the research, a number of practical modifications have been made on the research in response to the comments made by the Scientific Committee. At the 1994

annual meeting of the Scientific Committee, a comment was made that "age distribution samples does not represent age composition of the group of whales "; suggesting the possibility that the research area does not cover the entire stock.

It was concluded that conducting feasibility study on the identification of minke whale stock adjacent to the existing research area is a good starting point to address this concern. In the 1995/96 season, the conventional survey area was expanded to the west (into the eastern half of Area III) and sampling of 100 (+-10%) minke whales was planned in the new feasibility area (Government of Japan, 1995). The existing research in the Area IV has kept unchanged with a sample size of 300 (+-10%) to maintain a long-term consistency of survey in this area.

In the 1996/97 season, a similar adjustment to the conventional survey area will be made to encompass the western half of Area VI for a limited period as a feasibility study. The research in Area V will be maintained in order to achieve consistent data accumulation in this conventional survey area.

II. OBJECTIVES OF JARPA

The research has the following four objectives:

(1)   Elucidation of the stock structure of the Southern Hemisphere minke whales to improve the stock management

(2)   Estimation of biological parameters of the Southern Hemisphere minke whales to improve the stock management

(3)   Elucidation of the role of whales in the Antarctic marine ecosystem through whale feeding ecology

(4)   Elucidation of the effect of environmental changes on cetaceans

The first three objectives are essentially as established by the Government of Japan when JARPA was initially planned (Government of Japan, 1987). The last objective was added from the 1995/96 season in response to the three resolutions below (IWC, 1995c, 1995d):

o   Resolution on research on the environment and whale stocks (IWC Resolution 1994-13)

o   Resolution on promotion of research related to conservation of large baleen whales in the Southern Oceans (IWC Resolution 1994-12)

o   Resolution on research on the environment and whale stocks (IWC Resolution 1995-10)

III. NUMBER, SEX, SIZE AND SAMPLING AREA OF MINKE WHALES TO BE TAKEN

In Area V (130E – 170W), three hundred (300) ordinary form minke whales with 10% allowances (+-10%) will be sampled. In order to obtain samples that can be comparable to the existing samples, the previous JARPA sampling method will be retained. The number of samples within Area V will be kept unchanged in order to maintain the precision of various

estimations. All samples will be collected randomly as in the previous research and no selection will be made in terms of sex and length.

In addition to this, and for only one or two research seasons at this stage, 100 animals (+−10%) of the ordinary−type minke whale will be sampled in the western part of Area VI (170W − 145W).

IV. RESEARCH NEEDS IN THE EXISTING AREA

Detailed discussions regarding the research needs in the conventional JARPA survey areas in Areas IV and V has presented in the original research proposal (Government of Japan, 1987). The following are some up−to−date supplements on this topic.

(1) Stock identification

Information on stock identification is of fundamental importance to the efficient application of the RMP. Comprehensive information on stock structure will make possible the accurate establishment of small areas for the purpose of the RMP application. JARPA can collect the comprehensive information on stock structure incorporating genetic morphology, morphometric, pollution accumulation and parasite infection for a multi factor analysis approach.

(2) Biological parameters

Estimation of biological parameters is important even after the initial application of the Revised Management Procedure (RMP). The RMP has been designed to be robust over a range of possible values of the maximum sustainable yield rate (MSYR). Refinement of this range for the Southern Hemisphere minke whale would allow even sounder management of the population under such a management procedure.

Natural mortality rates and recruitment rates are useful parameters for the estimation of the maximum sustainable yield rate (MSYR) which defines MSY. If a good estimate of MSYR can be obtained, more rational utilization and management of stocks under the RMP will be made possible. The JARPA surveys collect age data of whales which are vitally important for this purpose. Also, in general, the high value of age data for fisheries assessment is widely recognized for fisheries assessment throughout the world.

In addition, clarification of possible trends in age at maturity contributes to deepening understanding of species interactions in the Antarctic. (Kato and Sakuramoto 1991).

(3) Antarctic ecosystem (feeding ecology)

Study on inter−species interactions with regard to habitat and prey species is an essential step for future multi−species management. The concept of multi−species management has drawn a worldwide attention at various recent meetings related to fisheries management. For example, the 95 States, meeting in December last year at the International Conference on the Sustainable Contribution of Fisheries to Food Security, adopted the Kyoto Declaration and

undertook to study the effectiveness of multi species management. In response to these new developments, JARPA will strengthen studies in this area.

Feeding ecology studies on minke whales by analyzing stomach contents and blubber volume obtained through JARPA is expected to elucidate the role of minke whales in the Antarctic marine ecosystem. Main food of minke whales is Antarctic krill (Euphausia superba) in the seasonal pack-ice zone, while E.crystallorophias and nototheniid fish Pleuragramma antarcticum are partly substituting E.superba in the high-Antarctic Zone in the Ross Sea and Pryze Bay. Changes in these prey availability and their possible effects on minke whales are expected to be detected by monitoring the feeding conditions and consequential fat storage of minke whales.

Recently, changes in the Antarctic food web have been increasingly documented on a regional scale such as a recent dramatic increase of Adelie penguin population in the Ross Sea of Area V (Blackburn et al., 1991). Continuous study of stomach contents and blubber volume is, therefore, expected to make contributions for the elucidation of the interaction of minke whales with other key factors (i.e. other top predators, prey species, and ocean environment) in the Antarctic food web.

(4) Antarctic environment

It is considered that, as a result of the establishment of the Southern Ocean Sanctuary (IWC, 1995c), needs for research on the ecosystem and the environment in this ocean region have increased further. Legal and scientific justifications are quite far from sufficient for the establishment of Southern Ocean Sanctuary and the Government of Japan has lodged the objection pursuant to the provision of the Convention. In this respect, too, JARPA will further amplify its importance as a continuous monitoring tool toward a review of the sanctuary.

At the Sanctuary Working Group in Norfolk Island in 1994, some delegations argued that "the RMP had not been fully evaluated with regard to environmental impacts". If this is the case, abiotic data on the environmental impacts along with biological data provided by JARPA can address the issue of environmental effects on the reproductive capability of whales and, thus, JARPA can make a major contribution toward the improved management and conservation of the whale resources.

Recent JARPA results show that an organochlorine compound "polychlorinated biphenyles (PCBs)" has been accumulated, although in small amount, in the Antarctic minke whale, and shows an increasing trend annually (Tanabe et al., 1995). This indicates that PCBs, released into the environment from countries in the Northern Hemisphere, have extended to the Antarctic via atmospheric movement, suggesting that environmental contamination is advancing on a global scale. It is necessary to take appropriate actions to ensure continuous monitoring through international cooperation.

As pollutants are accumulated in the whale body year by year, information not only on their accumulation level but also on the age of individual animals will become useful to understand the trend of the contamination. Effects of pollutants on the whale body will be mainly in the form of cancer and metabolic disorder, the data on which can be obtained only through lethal researches.

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(5) Research needs on toothed whales

Stomach contents of stranded animals (Sekiguchi et al., 1992) have shown that beaked whales are in a higher trophic level than baleen whales. The estimated abundance of the beaked whales, most of which are Southern bottlenose whales, is at least several hundred thousand animals (Ohsumi et al., 1994). This indicates beaked whales play an important role in the Antarctic ecosystem. To strengthen the ecological and environmental objectives of JARPA, the potential usefulness on analyzing beaked whales will be examined.

The initial research will be feasibility studies to examine the practicality of obtaining samples of Southern bottlenose whales (as this has not been attempted) and very limited number of research sampling will be planned (though not immediately, i.e. not in 1996/97) in a manner which ensures that the catch are well spread over the entire research area.

These initial samples will allow analyses on morphology, sex, age (if possible), reproductive status, stomach contents, and pollutants. After examining the results of this feasibility study, further studies to elucidate Antarctic ecosystem and environment will be planned.

V. RESEARCH NEEDS IN THE EXPANDED AREA

(1) Objective

The main objective of the expansion is a feasibility study to further elucidate stock identity, structure, and distribution of minke whales.

Although IWC had used six areas for management of baleen whales (except Bryde's whale) in the Southern Hemisphere, it has been suggested that different stock migrates into these areas during the austral summer season (IWC, 1991). A large scale mtDNA survey that used minke whale samples taken by JARPA in Area IV and V, has demonstrated that the stock structure of minke whales in the Antarctic is more complex than was thought initially, and involves both spatial and temporal components. Based on the results of the mtDNA analysis, Pastene et. al.(1995) hypothesized that a large group ("core stock") migrate into Area V and eastern part of Area IV in most of the years, and that a different group ("western stock"), probably originating from Area III, is distributed in the western part of Area IV during the early period of the feeding season.

Also, analyses of pollutant using past commercial samples from Antarctic Areas IV, V, and VI suggested some level of variations of PCB and DDE concentration (ng/g wet wt.) in Southern Hemisphere minke whales at different localities (Tatekawa et. al., 1990).

In addition, the examination of age composition of minke whales in the Ross Sea has shown a lack of young individuals (Fujise and Kishino, 1994). A possibility is that the young component of the population is distributed in offshore area of the eastern part of Area V and/or in Area VI.

In the 1995/96 season, research catches were made in the eastern part of Area III in order to compare the mtDNA of these whales with those of the "western" and "core" stocks and to

corroborate results of mtDNA analysis using other approaches (morphometric, pollutants, etc).

In the 1996/97 season, the eastward expansion of the "core stock" will be examined. For this purpose, efforts will be made to sample animals from offshore areas of the eastern part of Area V (where past whale sample size still small) and from the western part of Area VI. A total of 100 animals (+/−10%) will be taken in the latter sector.

(2) Discussion on the proposed sample size

With regard the genetic approach, Pastene and Kishino (in prep.) estimated that a sample size of approaching 200 individuals is necessary to detect significant differences in mtDNA between putative stocks of Antarctic minke whale with a Type I error 5% and a Type II error 25%. The simulation study was based in the degree of difference between the hypothesized "western" and "core" stocks in Area IV and V, as determined using RFLP analysis.

The decision to sample 100 whales from the western part of Area VI is based on the presumption that this sample size should be sufficient to detect a difference between the "core stock" and a possible separate stock in the east. If the genetic difference between these two is somewhat larger than that between the two stocks found in the west, a sample size smaller than 200 would be sufficient. If, however, the 100 samples proves too small to detect a genetic difference, a larger overall sample size will be needed. In this case, a further scientific take from Area VI will be scheduled in a later year.

Pollution analysis, which is another subject of study for stock identity, reasonably requires 20−30 samples from each sex of a single population group for statistical evaluations such as analysis on pollutant accumulation by age. Since two age groups are to be analyzed by sex, 80−120 samples are necessary.

Also, sample size of 100 is expected to provide a reasonable amount of information on age distributions. Analysis of the past JARPA data suggests that migration patterns are related to age and, therefore, age data is useful to comprehend a stock distribution or age specific segregation.

(3) Applicability of non−lethal methods

Although samples for DNA analysis can be collected through biopsy, lethal means is necessary in this proposed survey. As was mentioned above, stock identification should be investigated using a multi−factor analysis approach, and most of these factors require lethal methods.

Comprehensive information for stock analysis using multi−factors cannot be obtained by non−lethal research methods such as biopsy sampling. A in depth study on stock identity requires combined results of DNA analysis, allozyme analysis, morphometric analysis, age dependent pollution analysis, parasite analysis, and sexual/age segregation analysis. Many of such analyses use internal organs which cannot be collected by any of the existing non−lethal methods.

The analyses of samples from this expanded research area also include comparison with

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existing samples from Areas IV and V by JARPA. In depth comparison can be achieved when the same level of information is collected in the new research area. Apart from the mtDNA analysis other methods are being used to examine material already collected from Area IV and V.

Also, research can be undertaken more efficiently in many lethal methods than non-lethal methods. Collecting 100 samples from biopsy alone in one season would be almost impossible. Past JARPA cruises attempted to collect biopsy samples, and proved that biopsy attempts in the rough sea condition in the Antarctic have markedly low success rate (Fujise et. al., 1995).

(4) Availability of existing samples in Area VI

Past samples, which were collected through commercial whaling in the Area VI, do exist. However, these samples are limited to whales from the pack ice edge, and so do not represent population components which do not migrate so far south.

The accumulation level of pollutants, such as heavy metals and PCBs which are a valuable indicator for stock identification, changes year by years. Materials in the same or near-by years are most appropriate to assure reliable comparisons.

In addition, the age data from the commercial samples are biased due to the selective nature of the operation and, therefore, are not suitable for in depth analysis of stock structure such as segregation by age.

It is concluded that these past samples are not sufficient to establish stock distribution and its structure due to the limited geographical range of the past commercial sampling sites.

VI. POSSIBLE EFFECT ON THE STOCK

In the comprehensive assessment of the Southern Hemisphere minke whales at the 42nd meeting of the IWC Scientific Committee, the minke whale abundance was estimated at 294,610 for Area V and 106,901 for Area VI (IWC, 1991:p.59). The precision estimates for these Areas yield lower 5% confidence limits of 236,560 for Area V and 68,349 for Area VI.

If the standard "Hitter-Fitter" population model is applied to Area V, the current mature female population is estimated to be over 90% of its size before commercial harvesting started, even under the extremely conservative assumptions of MSYR=1% for the mature component of the stock and abundance equal to the lower 5% confidence limit obtained from the sighting survey. The mature females in Area VI are also found to be over 90% of their initial size under these assumptions.

The scientific program of research plans a catch of 300 whales every second year in Area V, and calculations have also allowed for catches of 100 whales from Area VI in both 1996/97 and 1998/99. Results from Hitter-Fitter show that for both Areas, under the catches planned the mature female component of the stock will be larger at the end of the research program in 2003 than at present (Butterworth, 1996). It is concluded therefore that such catches will

have no adverse effect on the stocks concerned.

VII. OPPORTUNITY FOR PARTICIPATION BY FOREIGN SCIENTISTS

This is the same as in the previous research programs (participation is welcomed under the conditions prepared by the Government of Japan).

VIII. OUTLINE OF 1996/97 RESEARCH

(1) Number of research vessels
    One research factory ship, 3 sighting/sampling vessels, and 1 dedicated sighting vessel

(2) Research period
    From November 1996 to April 1997

(3) Research area
    The area from 130 degree East and 145 degree West (entire Area V and western part of Area VI of the Antarctic), the area south of 60 degree South.

(4) Sighting method
    The method of sighting survey is the same as in the past years. As last year, one dedicated sighting vessel and three sighting–sampling vessels will be used.

(5) Sampling method
    As in the sampling method employed to date, one whale is selected randomly from a group of ordinary minke whale which sighting–sampling vessel finds and the representativeness of samples is ensured.

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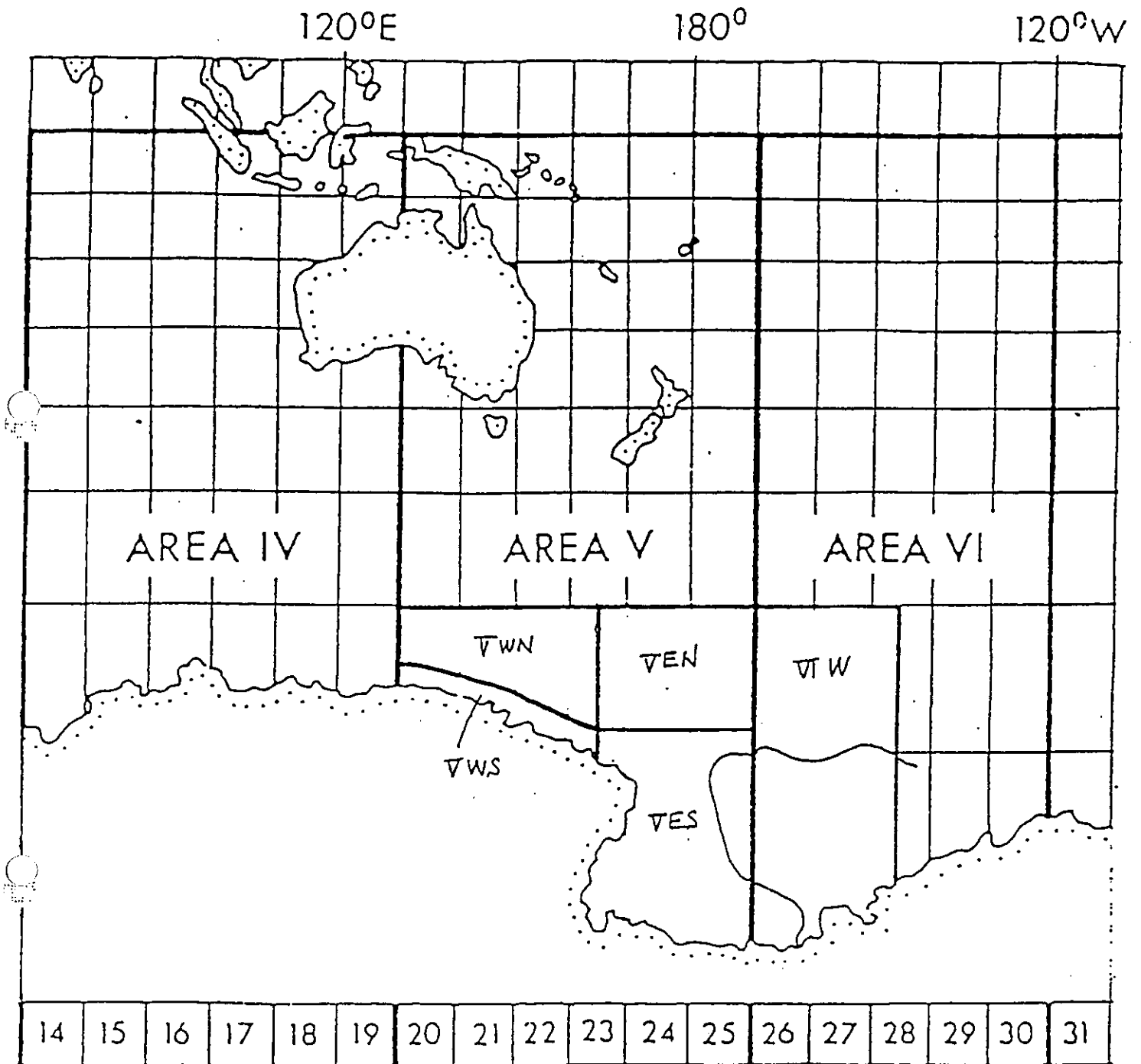
Fig. 1. Research areas of JARPA in 1996/97.

COMMENTS ON THE ILLEGALITY OF THE IWC RESOLUTION 1995-9

This is an annex to the SC/48/SH3 "The 1996/97
Research Plan for the Japanese Whale Research
Program under Special Permit in the Antarctic"

Fisheries Agency, Government of Japan

INTRODUCTION

The IWC in 1995 adopted the Resolution on Whaling under Special Permit (IWC Resolution 1995-9). Although the IWC Resolutions are not recognized as a legally binding instruments, special considerations were given on the legal characteristics of the Resolution in preparing the two Japanese special permit research programs (The 1996/97 Research Plan for the Japanese Whale Research Program under Special Permit in the Antarctic and the 1996 and 1997 Research Plan for the Japanese Whale Research Program to Elucidate the Stock Structure of the Minke Whale ion the Northwestern Part of the North Pacific).

LEGAL ANALYSES AND INTERPRETATIONS

1. Conflicts with the Article VIII of the Convention

Many parts of this Resolution is in conflict with the Convention. The preamble of the resolution reads:
> WHEREAS Contracting Governments, in exercising their rights under Article VIII, should NEVERTHELESS respect fully the Commission's arrangements to conserve whales and ensure that killing, taking and treating of whales for scientific research is only undertaken in a manner consistent with the provisions and principles of the Convention. (emphasis added)

The Resolution admits, by stating "NEVERTHELESS" in its text, that the stated arrangements have direct conflicts with the Article VIII. Judging from this, special consideration should be given on the treatment of this particular resolution in order to avoid a potential infringement against other legally binding provisions of the Convention and its Schedule.

2. Conflict with the Report of the Scientific Committee

Also, it can be argued that the resolution was not properly reflect the debate at the Scientific Committee. Another preamble paragraph reads:
> WHEREAS with the development of modern scientific techniques it is not necessary to kill whales to obtain the information that is needed for initial implementation of the Revised Management Procedure for a particular whale stock;

This description directly contradicts with the Report of the Scientific Committee (IWC/47/4) which states "The Committee recognized that there are a number of ways to estimate mixing rates (e.g. from marking data; from telemetry data; from data on biological markers)." Thus

the Scientific Committee recognizes that lethal sampling provides important information on values of mixing rate, which are key information needed for the simulation trials for the initial implementation of the RMP.

The possibility cannot be excluded that this incorrect preamble paragraph might have misled the Commissioners' debate before the voting. Therefore, special attention should be also required in applying some of the requests contained in this Resolution.

3. Conflict with the Schedule of the Convention

One operative paragraph of the Resolution 1995-9 states:
> RECOMMENDS that scientific research intended to assist the comprehensive assessment of whale stocks and the implementation of the Revised Management Procedure shall be undertaken by non-lethal means;

And another operative paragraph of the Resolution states:
> AGREES that this Resolution replaces the Resolutions adopted in 1986 and 1987 on Special Permit whaling (Report of IWC, 37;38).

The Resolution in 1987 stipulates that "the research address a question or questions that should be answered in order to conduct the comprehensive assessment or to meet other critically important research need" (Rep.int.Whal.Commn 38:27-8).

In 1995, without any explicit scientific arguments, this criterion was suddenly altered. It is extremely difficult to find a good faith interpretation on this alteration. It can be argued that Contracting Governments and/or the Scientific Committee, if acting as recommended in 1995, may face a danger that the action might violate the condition stipulated in the Paragraph 10 (e) of the Schedule of the Convention, which is legally binding and reads "this provision will be kept under review, based on the best scientific advise", because any intentional exclusion of the potential of particular researches from the scientific discussions cannot lead to the best scientific advice.

Similar problems arise from the following recommendation:
> RECOMMENDS that, if whales are killed under the provisions of Article VIII of the Convention, this should be done in a manner consistent with the provisions of Section III of the Schedule;

The provisions of the Section III of the Schedule refer to commercial whaling operation and, therefore, this recommendation is in direct contradiction with Article VIII of the Convention, which stipulates that taking whales in accordance with Article VIII "shall be exempt from the operation of this Convention".

It should be interpreted, in a good faith, that this paragraph of the Recommendation should be only applied to a situation where no compelling scientific reasons exit against it. The same argument applies to the IWC Resolution on Whaling under Special Permit in Sanctuaries (Resolution 1995-8).

4. Other Requests by the Resolution

Other provisions, as long as no immediate conflict was observed with other legally binding requirements in the Convention/Schedule, were well taken into account in the Japanese special permit research programs. For example, an operative paragraph of the Resolution reads:

> REQUEST each Contracting Government ensures that all scientific information and data available to it with respect to whales and whaling, including results of research conducted pursuant to Articles IV and VIII of the Convention, are submitted promptly to the Scientific Committee for review, analysis and consideration.

Materials that are able to be submitted (i.e. those recorded in the form of paper and floppy discs) have been submitted accordingly in the past and this practice will be continued, as the information transmission is primarily requested in Article VIII of the Convention as well as Paragraph 30 of the Schedule.

Another operative paragraph reads:

> RECOMMENDS that scientific research involving the killing of cetaceans should only be permitted in exceptional circumstances where the questions address critically important issues which cannot be answered by the analysis of existing data and/or use of non-lethal research techniques.

The Japanese special permit research programs have fully taken into account of this point. The programs have demonstrated the necessity of collecting new materials and data through scientific catches.