1988/89 Research Plan the Feasibility Study on "The Programme fo search on the Southern Hemisphere Minke Whale and for Preliminary Research on the Marine Ecosystem in the Antarctic"

The Government of Japan

August 1988

INTRODUCTION

Japan carried out a feasibility study to elucidate the current status of stock of the Antarctic minke whales in 1987/88. Implementation of such research is a sovereign right endowed to the Contracting Government to the International Convention for Regulation of Whaling, 1946, and the duty imposed on the nations that have utilized the whale resources.

A preliminary report of the above feasibility study was discussed at the annual meeting of the 40th Scientific Committee of International Whaling Commission (IWC) in San Diego, U.S.A. in May 1988. At the 40th annual meeting of the Commission held in Auckland, New Zealand in June 1988, the Commissioner for Japan, upon the adoption of the report of the Scientific Committee, expressed his appreciation for its consideration on the result from this research and has commented on some of the views based on misunderstandings; then referred to the points to be considered for the implementation of the research to be undertaken in 1988/89 (see Annex 1).

The research to be undertaken in 1988/89, in principle, as in the case of the previous season, is a study to examine the feasibility of random sampling proposed in the original programme. The previous research in 1987/88 was conducted in the eastern part of Area IV, from 105°E to 115°E and 55°S to the ice edge line, where the geographical and ice conditions are relatively simple. The research in 1988/89, however, will be undertaken in a part of Area V including the Ross Sea where geographical and oceanographical conditions are more complex. Since the population of the minke whale in this Area is regarded close to initial stock level (IWC/40/4 Annex D:13-14), it is expected that a great deal of useful biological information would be obtained from such a stock.

Furthermore, in order to improve sampling rate from small schools of less than four individuals, one additional sampling vessel will be introduced.

The sighting surveys for the minke whale in the middle and low latitudes will be continued.

It is reemphasized here that, as the history of the IWC/IDCR southern hemisphere minke whale sighting cruise have demonstrated, as are in many researches, the research should be planned and carried out on a long term base in order to monitor the stock status of whales.

OBJECTIVE

The study of the Antarctic minke whale stocks is planned to be undertaken along the flow of surveys and analyses described in Annex 2.

The Japanese research programme for 1988/89 aims at the following objectives:

1. The feasibility study on the method to obtain representative sample.

   i) Increase of the sampling rate from the schools of less than four individuals.
   ii) Improvement of sampling procedure in areas of high concentration of whales.
   iii) Development of research procedure where g(0) = 1 can be assumed.

2. The distribution within the research area and the estimation of the abundance of whale population together with their seasonal changes.

   i) Evaluation of spatial segregation in relation to the geographical characteristics of Area V.
   ii) Evaluation of the spatial distribution of schools or individuals.
   iii) Seasonal changes of the biological characteristics of whales taken in same locality.

3. A preliminary analysis of the stock identity, migration, reproduction and other biological information of whales in the middle and low latitudes.

4. Collection of information required for the Comprehensive Assessment of the minke whale stocks (see Annex 3).

METHODOLOGY

A. Antarctic Sampling Cruise.

1. Sample size, sex and age

In order to collect samples representing the population, no sample allocation by age and sex is predetermined in the samples to be collected.

Target sample size is 300 minke whales. However, +10% allowance will be assigned in light of the experience of the previous season, in order to obtain results applicable to more extensive analyses (see 6 - viii)).

2. Period of research

Approximately 90 days from December 1988 to March 1989.

3. Area, stock and tracklines for the research (Fig. 1)

The research area covers a part of Area V, south of 52°S; west of 180° and east of 168°E outside of the Ross Sea, and west of 180° to the ice edge inside of the Ross Sea, excluding the 200 mile zones of New Zealand and Australia.

The research area is stratified latitudinally to three strata; north, middle and south divided by latitudes 60°S and 69°S. The middle and south strata will be surveyed along the defined cruise trackline using the set angle reflection method as applied in the previous season (an example of such cruise trackline is given in the Fig. 1). The starting point and the initial course direction in each stratum will be determined at random. In the north stratum the trackline will be set along the longitudinal lines.

4. Research vessels

One factory ship (research base) and three sampling vessels are to be used.

5. Research items

The main research items of the Japanese programme for 1988/89 are as follows:

i) Study on the time and space variation of schools and whales.
ii) Study on the time and space variation in body length, age, sex ratio and other reproductive parameters.
iii) Examination of biological properties (i.e. sex, length, age and reproductive status) in relation to school size.
iv) Estimation of biological parameters of the population.
v) Collection of information on effective search width by school size.
vi) Examination of accuracy in the estimation of sighting distance and angle.
vii) Collection of the data for morphological (i.e. photo-identification) and biochemical analyses (i.e. DNA studies) for stock identity.
viii) Collection of data on nutritional condition and feeding habit of minke whales.
ix) Oceanographical observation.

Annex 4 shows the general description of the research items from the minke whales under the

programme. Annex 4 also refers to lethal or non-lethal method. In addition, Annex 3 shows the relationship of research items under this programme with the major subject matters which have been discussed in the 40th annual meeting of Scientific Committee meeting in relation to the Comprehensive Assessment.

The programme also includes, as in the 1987/88, the collection of data relating to environmental conditions, research effort and sighting surveys.

6. Research methods

i) Trackline: As in the previous year, the sampling vessels will be allocated to two sub-tracklines 6 miles away from the randomly chosen main trackline, on its both sides (Fig. 1).

ii) Vessel assignment: Three sampling vessels will be grouped into two vessels and one vessel which are allocated to each sub-trackline. The arrangement of vessels and sub-tracklines will be rotated daily.

iii) Repetition of coverage: Two northern strata are to be covered twice. In each stratum, the interval between the two surveys must be set as long as possible within the research period.

iv) Rule of selection of target school for sampling: Every other school from the primary sightings, in the middle and south strata, will be systematically sampled as target school (other schools are neither closed with nor sampled). However, in the north stratum, all schools of the primary sightings will be targeted.

v) Sampling from the target school: As in the previous season, the maximum of 2 individuals randomly selected are to be sampled from each target school by the stochastic sampling procedure. Two vessels operating as a pair along the sub-trackline will collaborate in the sampling operations from the target school.

vi) Research in "the high density area": Observation will be made to identify the pattern of the density distribution; information on the school sizes is also recorded in the high density area. Selection rate of the target school may be adjusted downwards in such deucedly distributed area.

vii) Stop rule for chasing: As in the previous season, maximum of one hour chasing time will be adopted for each animal prior to

abandoning sampling.

viii) Reconsideration of sample size: In the case where the planned sample size has been already achieved prior to the commencement of the 2nd round research either in the north or in the middle stratum, sampling will be further continued until additional samples of 30 whales at the maximum are taken, in order to make more information available on seasonal changes in biological parameters.

B. Surveys in the Middle and Low Latitudes.

1. Sample size

No whales are to be sampled. However, basic feasibility experiment on biopsy will be conducted opportunistically.

2. Research vessels

Two sighting vessels are to be used.

3. Period of research, research area and cruise track

The period of the research is divided into the first and second halves. The first half is for the period of approximately 20 days from November to December 1988, and the second half for approximately 20 days from February to March 1989.

The first half survey will be undertaken in the research area A as shown in Fig. 2 using two research vessels. The second half survey will be made by one vessel in the research area B and by the other in the research area C (Fig. 2). The trackline in each area will be specified in the separate instruction note for the research.

4. Research items

i) The relationship between the whale distribution and the oceanographical conditions.

ii) Distribution of cow/calf pairs of the minke whales.

iii) Observation of behavior and body length composition of minke and other whales.

iv) Biopsy experiment.

v) Oceanographical observation.

5. Research methods

i) Sighting: All whale species sighted are to be recorded including identification of the

diminutive form minke whale.

ii) Collection of biopsy samples: Skin tissues of the minke whale using biopsy dart will be collected in favourable sea conditions.

EFFECT OF CATCHES ON THE STOCK

1. Present population size (IWC/40/4:23)

The Scientific Committee has two estimates of the minke whale population in Area V; e.g., total population of 133,382 (CV, 0.216) obtained from IDCR sighting survey in 1980/81 using closing mode, and 303,286 (CV, 0.172) estimated from passing mode surveys in 1985/86. Both of these estimates only include whales within the surveyed area and exclude animals inside pack-ice area and waters north of 60°S. Therefore, the total minke whale in Area V must be at least 133,382 individuals (CV, 0.216).

2. Possible effects of catches under special permit in 1988/89 (IWC/40/4 Annex D: 13-14)

The stock of Area V is considered to be very close to its initial level at present. Therefore, it is not reasonable to evaluate the potential effect of the catches to the stock on the basis of the replacement yield (RY). Since the RY values used in the past were estimates from the takable population by commercial whaling, these values cannot be used for evaluation of the effects of the take under special permit unless they are adjusted upwards to account for the over-all population size.

3. The effects of the catch of 300 animals to the stock (IWC/40/4: 59)

According to the agreed view of the Scientific Committee, it is reasonable to conclude that there is no adverse effect to the population of the minke whale in Area V by removing 300 animals.

RESEARCH CO-OPERATION

The principle of research co-operation and participation of foreign scientists described in Japanese research programme (SC/39/O4) and the research plan for the feasibility study 1987/88 (SC/D87/1) by the Government of Japan remains applicable in this research programme (see Annex 5).

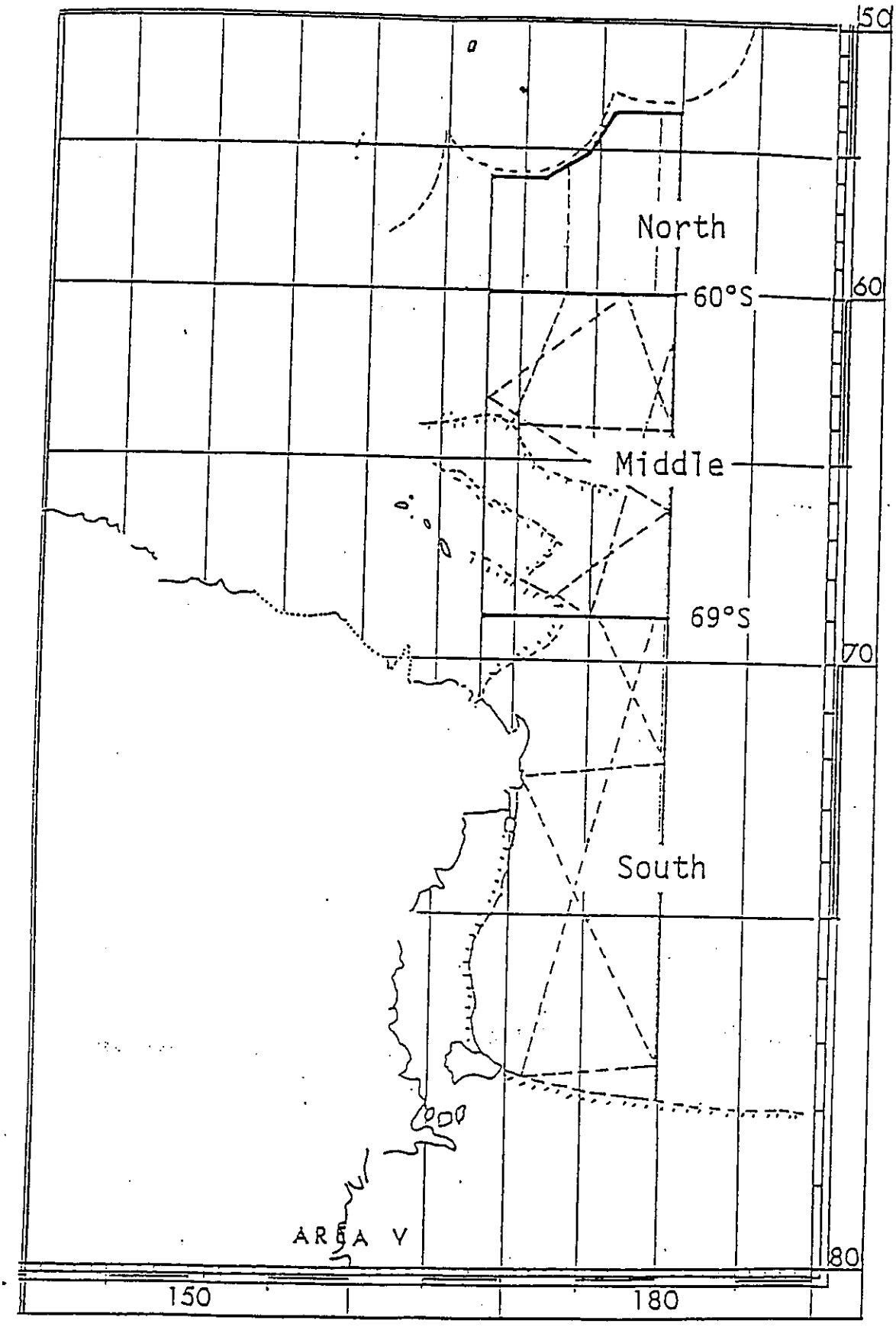
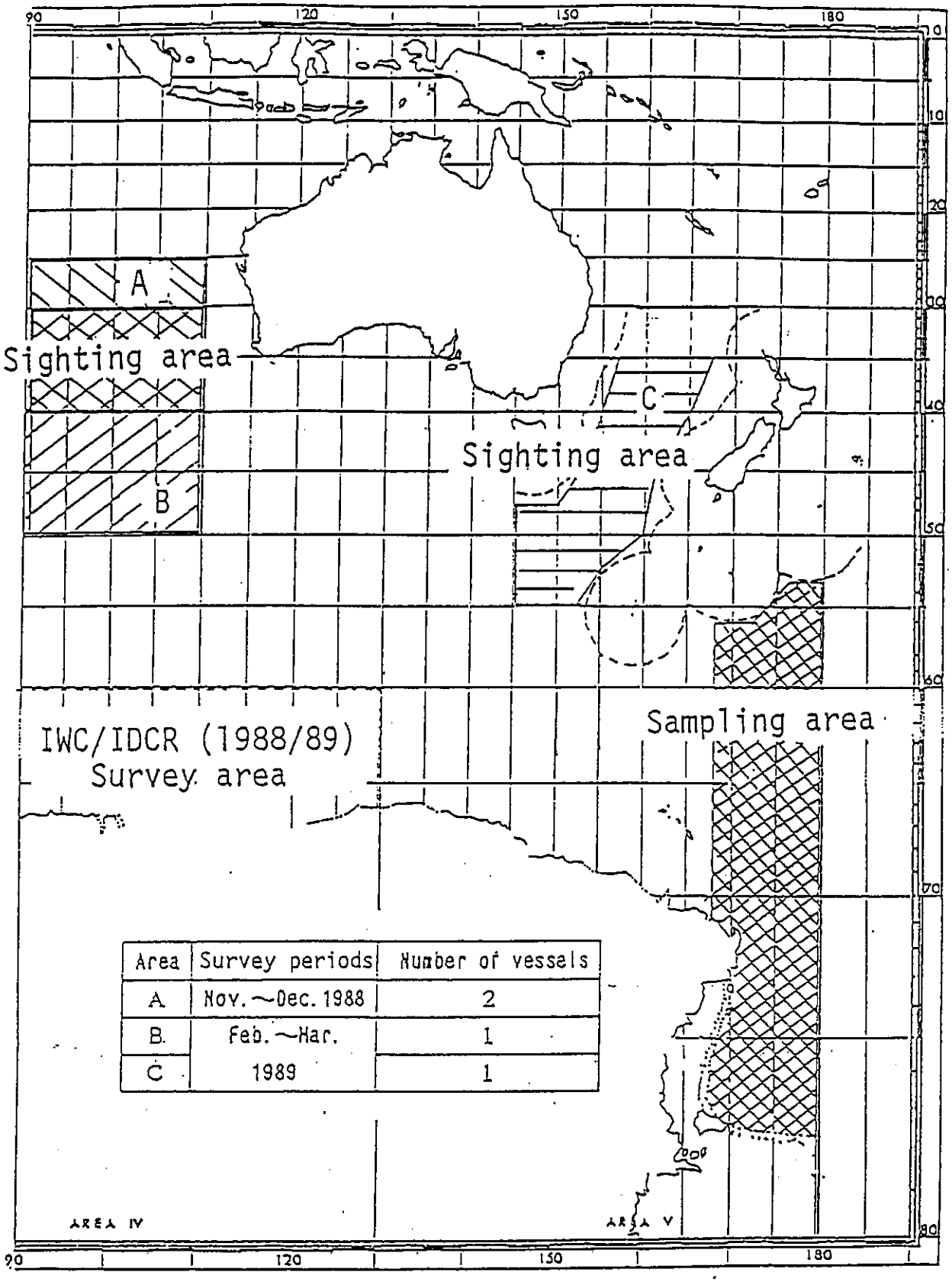


Fig. 1. Antarctic sampling area in 1988/1989 reasearch plan, with breakdown of strata and an example of trackline in each stratum.



Area	Survey periods	Number of vessels
A	Nov.~Dec. 1988	2
B	Feb.~Mar.	1
C	1989	1

Fig. 2. Research areas in 1988/1989 season.

ANNEX 1. Statement by Mr. K. Shima, the commissioner for Japan at the 40th annual meeting of the International Whaling Commission upon adoption of the report of the Scientific Committee.

I appreciate the fair presentation by the Chairman of the Scientific Committee of the Report which accurately reflects the deliberations taken place at the Committee on the Japanese research. I also like to take note of the various useful comments given by the members of the Committee regarding the result of the feasibility study conducted by Japan. However, I have to point out on this occasion that some scientists have erroneous concept of the Japanese research and concluded that, both in its original and preliminary forms, the Japanese research programme would not contribute to the rational utilization of the whale stocks or to the Comprehensive Assessment.

The following are our views on the criticisms expressed on the Japanese research:

i) One of the major objectives of the Japanese research is to estimate the natural mortality coefficient. The possibility of this estimation has been proved by the Bayesian Cohort Analysis Method developed by Drs Tanaka, Sakuramoto and Nakamura. A further simulation study is expected to be conducted in time for the next annual meeting of the Committee. This very fact shows that the Scientific Committee has, in fact, recognized the justification of the Japanese original programme, hence the criticism I referred to earlier would be considered arbitrary.

ii) As noted in the Report of the Scientific Committee, one of the most important objectives of the 1987/88 research programme that is the collection of the samples representative of the population has been successfully achieved by the research conducted in 1987/88. Furthermore, it has been demonstrated by the research that the random sampling can be easily implemented. Therefore, the information obtained by the research is clearly useful for clarification of the degree of bias inherent to the data collected by commercial whaling. In this sense, the research undoubtedly contributes to the rational utilization and the Comprehensive Assessment.

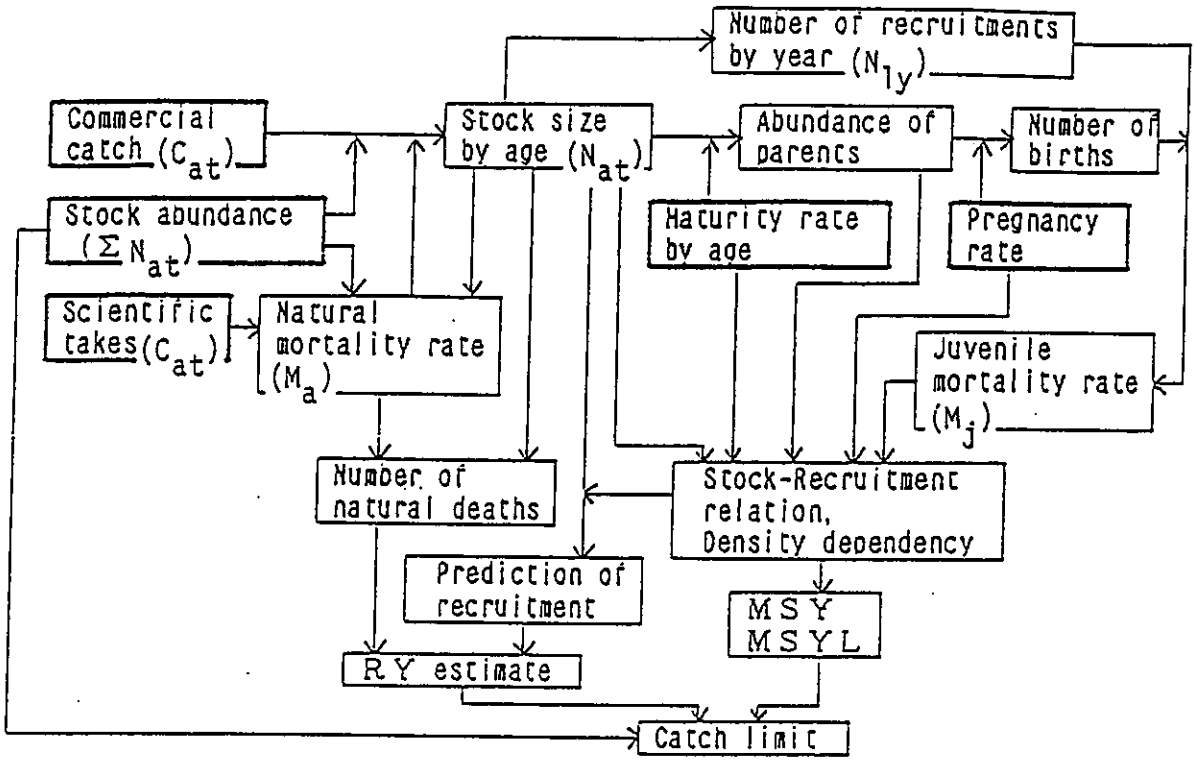
iii) Such important tasks as recognized by the Scientific Committee this year which are sighting surveys, collection of material for biochemical genetics, offering of the materials for photo-identification, continuation of the contribution of information to the Feeding Ecology Workshop, and the collection of data contributive to the

improvement of the estimates of pregnancy rate, and age at the sexual maturity, etc., have been implemented by the feasibility study. In addition, the collection of the ear plugs of the younger age animals which contributes new information to the age reading essential for the stock assessment has been successfully achieved.

It is truly unfortunate not only for the sake of Japan but also for the sake of science and the progress of the tasks of IWC that the Scientific Committee had to list these adverse criticisms by some of its members who without conscientious examination of the practical achievement of the research implementated by Japan denied the effectiveness and the progress shown in the Japanese research programme.

Japan intends to continue its research programme based on the understanding that it is indispensable for the sake of science. Japan is confident that our research does bear a great role in contribution to the scientific advancement of the whale stocks. I also like to add that any scientist with conscience would recognize the seriousness and diligence that Japanese scientists and the Japanese government have put into the planning and conduct of the research if you read the details of what we have done. Therefore, we expect your cooperation in the support in our programme and expect to have serious examination of our result from the research. We would welcome any foreign scientists who are interested in this aspect and in this research. Japan will carefully consider the comments and views expressed in the constructive direction at the Scientific Committee on the result of our feasibility study conducted last season. These will be carefully accounted for in planning of the forthcoming scientific programme to be conducted in this autumn to next year.

ANNEX 2. Flow chart of data and information originated from the surveys and analyses on the Antarctic minke whale stock.



NOTE: The items boxed with bold-type lines are materials and estimates directly obtainable from the sampling and sighting survey. The items boxed with fine lines are the information obtained by the analyses of the foregoing estimates and materials.

Notation for the suffix

a;age	t;year
J;age at juvenile	y;year class

ANNEX 3. The relationship between
Japanese research programme and Comprehensive Assessment

Summary of discussion at the 40th IWC/SC on C. A.	Japanese Research Programme
1. Biochemical Genetics: i) Allocation of fund proposed for contract studies on DNA for stock identity and school structure. ii) Recommendation of coding of existing tissue samples by the Secretariat. iii) Facilitation of the exchange of cetacean tissues between scientific institutions. iv) Recommendation of IWC Workshop on the genetic and biochemical analysis of tissue samples collected by biopsy sampling and other means.	1. Samples from 273 individuals (154 males, 119 females) have been collected from 1987/88 research. It is expected that the sampling of the similar level will be conducted in 1988/89. Simultaneously, the analyses of the collected samples will commence.
2. Analysis of Southern Hemisphere minke whale marking data: i) Analysis of the effects on heterogeneity in the probabilities between the marking and re-capture on mark-recapture estimates. ii) Recommendation of implementation of the study on the mark shedding mortality of short term based on firing experiments and natural mark recoveries on board the Japanese factory ship in the past. iii) Completion of the data registration by the Secretariat.	2. Filling of data on the newly recaptured whales.

(cont.)

ANNEX 3 (continued)

Summary of discussion at the 40th IWC/SC on C.A.	Japanese Research Programme
3. Analyses of the Southern Hemisphere non-minke sighting data:	3. 138 individuals, 71 schools of humpback, fin, right, sei and sperm whales were sighted by 1987/88 research. The similar research is scheduled in 1988/89.
4. Photo-identification:	4.
i) Endorsement of the conclusion by the Working Group.	
ii) Proposal for funding of the computerization of the natural marking records of the whale species.	
iii) Proposal for funding of the analyses of the whale photographs taken during the IDCR Sighting Cruise in the Southern Hemisphere.	iii) Material collected in 1987/88 research will be offered.
5. Feeding Ecology: In relation to the proposed joint-workshop with CCAMLR, and the review and preparation of the paper for the workshop, the following items have been raised:	5. The relevant information regarding the waters between 105°E and 115°E will be provided.
a) Estimates of abundance for minke whale and other species from IDCR cruises by the most detailed geographical breakdown possible.	
b) Review of available information on the southern baleen whales including prey species and size composition by month and year and locality, stomach fullness and nutritive value of prey where possible.	b) Providing the information on minke whales. Basic information will be made available.

(cont.)

Summary of discussion at the 40th IWC/SC on C.A.	Japanese Research Programme
c) Analysis of new information on diet and the feeding rate of minke whales.	c) Same as above.
d) Review of morphological feeding adaptations in baleen whales.	
e) Review of feeding strategies in baleen whales particularly energetic implications of food-gathering.	
f) Review of available knowledge on summer krill distribution in the Antarctic, including diurnal movements and swarming behavior.	
g) Review of distribution of commercial krill fishing activities and catches within the Antarctic.	
h) Analysis of body condition (blubber thickness, girth, carcass lipid content) of baleen whales in relation to food availability.	h) Information on minke whales will be provided.
i) Review of annual trends in growth and reproductive rates of Antarctic baleen whales.	i) The recent information on minke whales will be made available.
j) Analysis of variations in oil yields from commercial whaling operations in the Antarctic.	
k) Analysis of IDCR data on school size, diving/ feeding behavior of minke whales in relation to abiotic factors (e.g. prosimity of ice edge, sea surface temperature, whale abundance, etc.).	k) It is possible to obtain more detailed information than the one obtained by IDCR. This can be made available.

(cont.)

Summary of discussion at the 40th IWC/SC on C.A.	Japanese Research Programme
6. Catch Curves: A small group was formed to make estimates of the net recruitment rate and natural mortality. The group has met to agree on the protocol for these studies and the analyses of the result will be conducted in the next annual Scientific Committee meeting.	6. This subject is one of the most important objectives of the Japanese original research programme.
7. Management Procedures: i) Recommendation for consideration how to proceed with the further evaluation of management procedures. ii) Recommendation for funding of the participating scientists to the workshop meeting.	
8. Biological Parameters: The Scientific Committee has noted its importance and recognized the need of further consideration at next year's Annual Meeting.	8. This subject is one of the most important objectives of the Japanese original research programme. The Japanese preliminary research generates useful information also.
9. Sighting Survey: i) Repeating of recommendation up to the previous year regarding the continuation of monitoring studies including Antarctic IDCR cruise and NASS, etc. ii) Recommendation for the continuation of the aerial survey of the right whale off South African coasts.	9. Providing the information of the quality about the same level as that provided by the IDCR.

(cont.)

Summary of discussion at the 40th IWC/SC on C.A.	Japanese Research Programme
10. Telemetry and remote sensing working group:	
i) Recommendation of mounting of a dual bean interferometer on the satelite in future.	
ii) Recommendation for more adequate funding to allow the development and use of telemetry to progress rapidly by the member nations.	
iii) Recommendation for continuous funding for several years for the special requirement of this work.	
11. Follow up to CPUE Workshop:	
12. Estimating MSY rate:	12. This subject is one of the most important potential of the Japanese original research programme.
i) The Scientific Committee agreed on the importance of this work and recommended that papers dealing with this should be prepared for the next Annual Meeting.	
ii) Examination and re-analysis of the existing data, consideration for design for collecting adequate data and procedures for analyzing them, and justification for inter-stock comparisons were agreed.	
13. Data Inventries:	13. Japan is prepared to provide the list of the data for data inventry.
14. Priority Groups/Stocks:	14. Judging from the foregoing items, it is obvious that the Japanese research programme has a great deal of contribution to the Comprehensive Assessment.
Priority was given to the Southern Hemisphere minke whale as substantial work on this stock is underway.	

ANNEX 4. The generation of data in the Japanese research Programme

Subject for study	Materials	Methods in the plan	General applicability of non-lethal method
Stock Size	Sighting	non-lethal	yes
Population size at age (*)	Sighting + Age	non-lethal + lethal	no
Basic studies for the sighting survey	Sighting	non-lethal	yes
Probability of sighting and effective search width by school size	Sighting	non-lethal	yes
Age and growth (*)	Body length	lethal (exact)/ non-lethal (approximately)	yes (inaccurate)
	Body weight Foetal length and weight Corpus luteum Earplug Tympanic Bulla Baleen plate	lethal	no
Reproductive Status (*)	Sex, Lactation Age, Mammary gland Milk Ovarian corpora Uterine horn	lethal/non-lethal	yes
	Endometrium Uterine fluid Testis, Epididymis Gonadal hormone Foetus (sex,number,length)	lethal	no

(cont.)

ANNEX 4 (continued)

Subject for study	Materials	Methods in the plan	General applicability of non-lethal method
Stock Identity			
Possibility of Individual recognition	Photographs	lethal	almost impossible
Morphological analysis	Allometory (including Foetus)	lethal	no
Bio-chemical analysis	Skin	lethal/non-lethal	yes
	Muscle,Liver,Heart,etc.	lethal	no
Nutrition	Blubber thickness Stomach contents Lipids	lethal	no
Migration	Diatom film	lethal	yes
Environment			
Oceanography			yes
Pollution	Tissue, Blood	lethal	no
	Foetus	lethal	no
Random sampling			
Biological Characteristics by School Size		lethal	no
Enhancement of sampling efficiency from small schools		lethal	no
Analysis of Segregation		lethal	no
Others			
Skeleton		lethal	no

(*) : Including the study of catching selectivity by commercial whaling.

ANNEX 5. Extract from SC/39/04, the programme for research on the southern hemisphere minke whale and preliminary research on the marine ecosystem in the Antarctic.

(5) Opportunities for Participation by Foreign Scientists

Opportunities for participation in the research cruises under this program will be given to any scientist to the extent allowed by accomodation and other logistic consideration, provided that such participation does not cause inconveniences in the implementation of the program. The selection of the participants, however, will be finalized by the Whale Research Coordinating Commitee who will consider the various conditions such as accommodation and others for determination.

(6) Conditions for Participation

i) Costs:

Costs for participation, travel expenses to and from the port of boarding the research vessel, meals on board the research vessel, and any special instruments required by the participant will be borne by the participant.

ii) Indemnification and insurance for casualty or personal injury on board the research vessels:

The Whale Research Institute and the crew of the research vessel or research team will not be held responsible for any casualty or personal injury to the participants resulting from the participant's negligence or force majore.

iii) Cancellation of participation:

Any participants who are found to have intentionally sabotaged in the course of implementation of the researches and thereby impaired the execution of such researches shall be cancelled of his/her participation in this program.