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Review on the Objectives of Japanese Whale Research Program
under Special Permit in the North-western
North Pacific (JARPN)

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ABSTRACT

The JARPN survey started in 1994 with an original objectives of "the elucidation of stock structure of minke whale in the north-western North Pacific" to contribute to the implementation simulation trial of RMP for this stock by the IWC/SC. Three sub-objectives are there in the original objectives, and they are 1) clarify whether W Stock exist, 2) clarify the mixing rate of W Stock, and 3) clarify the validity of O Sub-stock scenario. The third sub-objectives has become to be not important since 1997, because the SC agreed that the sub-stock structure had been dropped in 1996. The second objectives of "the feasibility study on the feeding ecology of minke whales in the research ground" added in 1996, recognizing its importance for the JARPN project. In the second sub-objectives of the first objectives, "2) clarify the mixing rate of J Stock" was added from 1999 survey.

INTRODUCTION

Japan started the Scientific Research Program in the north-west North Pacific (JARPN) in 1994 under a special permit issued by the Government based on the Article VIII of the International Convention for the Regulation of Whaling (ICRW). This survey project has been continuing since then.

Research plan in each year has been submitted to the Scientific Committee (SC) of the International Whaling Commission (IWC) after the thorough examination by a scientific team and approval by the Government of Japan (GOJ) (*e.g.* Government of Japan, 1994). It has been re-examined since then based on the comments by members of the SC, and the GOJ issued the permit under the final research plan to the Institute

of Cetacean Research (ICR) to conduct the survey every year. After the end of JARPN survey in each season, the data and materials were analyzed and the results have been submitted as several documents including survey report to the annual meeting of the SC in the next year (see bibliography of papers relevant to the JARPN program).

The JARPN project has now two main objectives and two sub-objectives, and they will be reviewed in this paper for an understanding of this research project.

BACKGROUND OF THE JARPN PROJECT

Minke whales were caught by in Japanese coastal waters from 1930s to 1987 by Japanese small-type whaling. The stock identification work of the minke whale around Japan started in 1950s (*e.g.* Omura and Sakiura, 1956; Ohsumi, 1983). The IWC identified stocks (Sea of Japan-Yellow Sea-East China Sea Stock, Okhotsk Sea-West Pacific Stock and remainder), and established stock boundaries for the management of the North Pacific minke whale stocks in 1982 by the recommendation of the SC (IWC, 1983).

The comprehensive assessment work was carried out on the North Pacific minke whale in 1991 annual meeting of the SC (IWC, 1992). At that time, the sub-committee agreed that the existing stock definition and boundary by the IWC did not provide an adequate basis for assessment and agreed upon four options to provide input to the HITTER/FITTER program (IWC, 1992). However, it was noted that the range of depletion rate of the Sea of Japan-Yellow Sea-East China Sea stock was from 0.30 to 0.47, and it was classified as the PS. On the other hand, the depletion rate of the Okhotsk Sea-West Pacific stock was estimated from 0.61 to 0.88 and SMS would be the most likely classification for this stock.

In addition, the RMP was adopted by the IWC at the annual meeting in 1992 (IWC, 1993).

Following above two results, the SC established a working group meeting to start implementation simulation trial for the application of the RMP to the North Pacific minke whales prior to the annual meeting of the SC in 1993 (IWC, 1994). The Working Group felt that the information was conspicuously lacking on the stock structures, differentiation and mixing patterns for the trials. Then, the Working Group made a complicated scenario hypothesized with three stocks, 7 sub-stocks and mixing patterns of them, and then the Working Group established 13 sub-areas for this purpose as shown in Fig. 1.

According to this scenario there are three stocks such as the Sea of Japan-Yellow Sea-East China Sea Stock (J Stock), the Okhotsk Sea-West Pacific Stock (O Stock) and

the Western Pacific Stock (W Stock) in the west North Pacific. Then, this scenario further hypothesizes that the J Stock includes three sub-stocks, and the O Stock includes four sub-stocks. In addition,

This hypothetical scenario was felt to be unrealistic by Japanese scientists who have much experience about biological studies of minke whales in the north-western North Pacific, and at the same time the SC noted on the desirability of obtaining improved data on the stock identity and migration pattern (IWC, 1994). Then, they examined the stock and sub-stock scenario thoroughly, and prepared to undertake a research program under the Article VIII of the ICRW to solve the questions raised by the Working Group.

THE ORIGINAL OBJECTIVES

Thus, the GOJ made a research plan of the Japanese Whale Research Program under Special Permit in the North Pacific (JARPN) and submitted the plan to the IWC/SC in 1994 (GOJ, 1994: SC/46/NP1).

The original objective of the JARPN is "the elucidation of stock structure of minke whale in the north-western North Pacific". Specifically, emphasis is given to the following three points:

1. Clarify whether W Stock exists.

Clarify whether there exists a hypothesized W Stock, which migrates from the central North Pacific (Sub-areas 8 and 9) into the Okhotsk Sea (Sub-areas 11 and 12) and the offshore area on the side of Pacific east coast of Japan (Sub-area 8). It does not approach to the Japanese coast regardless of whether there is O Stock in the other Sub-areas adjacent, or where the eastern boundary for O Stock lies.

2. Clarify the mixing rate of W Stock

Clarify the extent to which W Stock (if it exists) mixes with O Stock in Sub-areas 8, 9, 11 and 12.

3. Clarify the validity of O Sub-stock scenario

With respect to the O Stock, clarify whether there is evidence for site-specific Sub-stocks in Sub-areas 7, 11 and 12, or rather there is a homogeneous O Stock which has segregation by sex and growth stage and repeats latitudinal and onshore-offshore migration making northward shift in search of feeding grounds.

DEVELOPMENT OF RESEARCH OBJECTIVES

Establishment of the second objective

During the conducting of feasibility researches in 1994 and 1995 it was found that the Pacific saurys which are one of main commercial fishes of Japan were frequently found from the stomach of minke whales sampled, and salmons were also found in the minke whale stomachs (Fujise *et al.*, 1996). On the other hand, the sardine, which was the main stomach contents of the minke whale in the waters adjacent waters of Japan in 1980s (Kasamatsu and Tanaka, 1992), was not found from the stomach of minke whales sampled by the JARPN.

A "top down control" concept has been suggested by salmon scientists in those days (Nagasawa *et al.*, 1995). And, the North Pacific Marine Science Organization (PICES) established the Working Group on Consumption of Marine Resources by Birds and Mammals at its 1995 annual meeting. Furthermore, it has been revealed by the Norwegian scientific permit research that minke whales contributed to reduce the abundance of food species such as capelin and herring in the North Atlantic (Haug *et al.*, 1996). The information on feeding ecology is also essential for interpretation of results on pollutants, parasites and stable isotopes, because they are primarily originated from food of whales.

Examining above background knowledge and research results of the JARPN, we recognized the need of feeding study of the minke whale in the research area, where is the main fisheries ground of Japan. Then, the second objective was added for the JARPN project from 1996 onward. It is "the feasibility study on feeding ecology of minke whales in the research ground".

Termination of the third sub-objectives of the first objectives

At the beginning of the JARPN project, "Clarify the validity of O Sub-stock scenario" was established as a part of the original objectives of the elucidation of stock structure in the north-western North Pacific.

The Working Group on North Pacific minke whale trials which was held in 1996 agreed that the sub-stock structure had been dropped (IWC, 1997). Thus, the third sub-objectives of "Clarify the validity of O Sub-stock scenario" in the original objective has not become important in the JARPN project since 1997.

Addition of a sub-objectives in the first objectives

The importance on the knowledge on the mixing rate of J and O Stocks was realized in the SC from 1995. Then, the JARPN survey was conducted in sub-area 11 in 1996 to

investigate this matter as well as study on the sub-stock problem. During discussion at the Sub-Committee meeting on the RMP in 1998, the need to clarify the J/O mixing was suggested as one of the objectives for the 1999 survey, in response to concerns raised (IWC, 1999). Accepting this suggestion, 2) "Clarify the mixing rate of J Stock" was added in the second sub-objectives of the first objectives of the JARPN project from 1999.

DISCUSSION

The JARPN project started to clarify the reality of the stock and sub-stock structure scenario which was hypothesized by the SC in 1993 for the implementation simulation trial of the RMP (IST) to the northwestern North Pacific minke whale. Therefore, the results obtained under the original objectives of this project will contribute largely for the work of IST and thus for the rational management of minke whale stocks in the region. The second objectives of the JARPN project will also contribute to the rational utilization and overall management of marine living resources by the real understanding on the role of minke whales in the ecosystem.

Based on the results of feasibility studies in 1994 and 1995, the full-scale researches have been continuing, and outline of the research activity is described concisely by Fujise (2000). In the feasibility study period, the research was conducted under the original objectives, and the full-scale study has been carried out under the two kinds of objectives, which were described above.

Although these two objectives are independent each other, they can be achieved by use of the same lethal method. It is needed to analyze comprehensively from several approaches such as genetics, morphology, ecology, parasitology, pollution, etc. for the stock identification (Pastene *et. al.*, 2000). The lethal methods are needed to collect these data. In the case of feeding ecology surveys of stomach contents including food species, weight of stomach contents, freshness of food, body weight and other data are essential. These data can only obtained through lethal methods.

The objectives are the strategy of the JARPN survey, and research plan in each year is the tactics. Thus, the survey plan in each year has been made examining the results of the JARPN surveys in previous years for the achievement of the objectives. As an example, survey season was advanced from June-July in 1994-96 to May in 1997 and May-June in 1998 by the suggestion of the Working Group of the SC in 1996 (IWC, 1997). These surveys were carried out by the change in tactics of the same strategy

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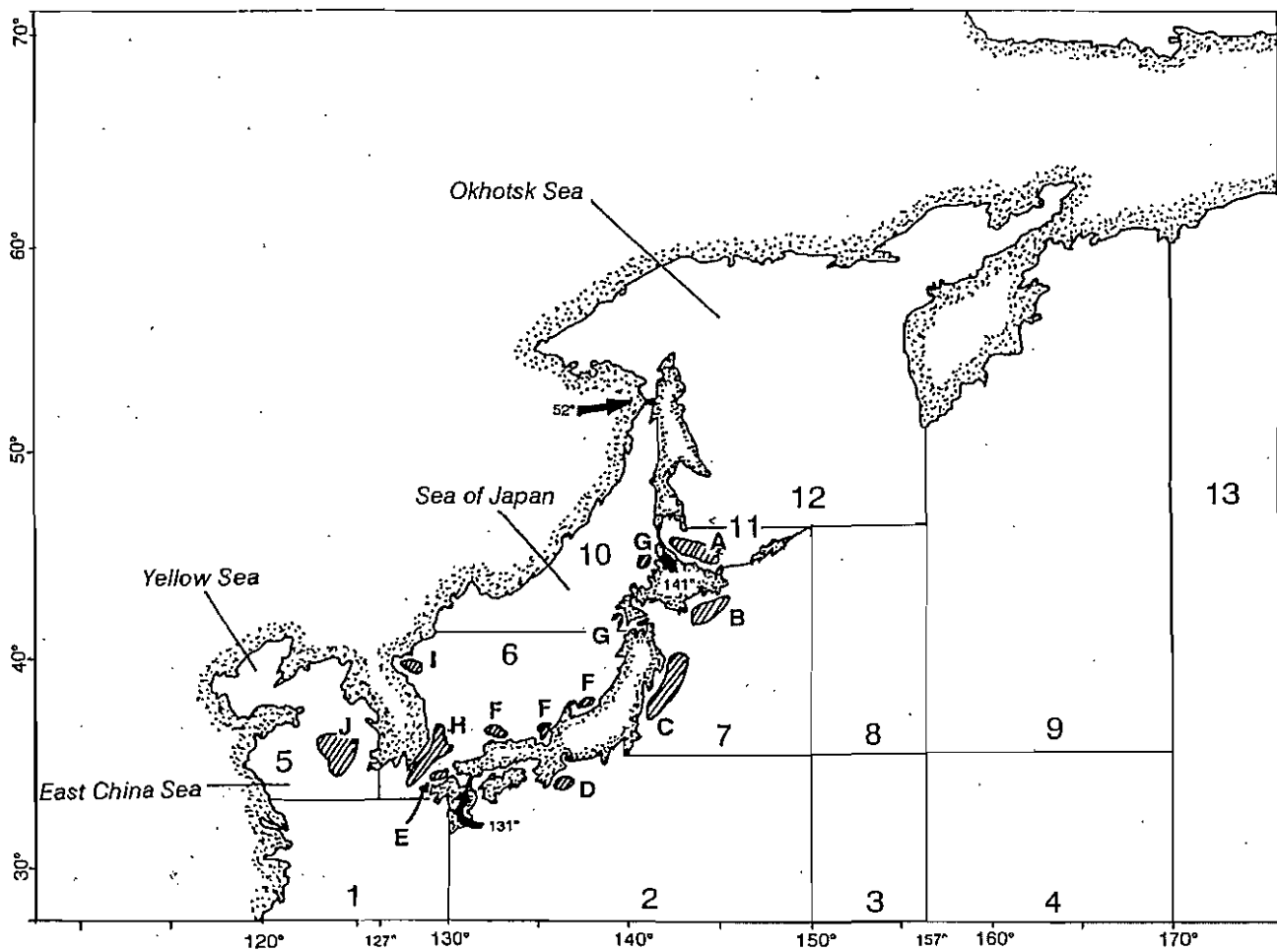


Fig. 1. Map showing location of past Japanese whaling ground and the 13 sub-areas chosen for the implementation trials. (after IWC, 1994)

