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Commentary

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Importance of Japan-Russia Cooperation in Cetacean Research in the Sea of Okhotsk

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It is known that many cetaceans migrate to feeding grounds in the Sea of Okhotsk during the boreal summer season, and surveys in this area can provide highly accurate abundance estimates as well as useful ecological information. Among the cetacean migrating into the Sea of Okhotsk, the common minke whale has been the subject of sighting surveys and related ecological research in this area since the late 1980s, in the context of a research cooperation between Japan and the Russian Federation. Results of this research collaboration contributed to the comprehensive assessment and in-depth assessment of this species by the International Whaling Commission Scientific Committee (IWC SC). These surveys have also contributed to the domestic management of Dall's porpoises, which was once one of the most important species in the Japanese dolphin fishery. After Japan's withdrawal from the IWC in 2019, further strengthening of the whale research collaboration between Japan and the Russian Federation in the Sea of Okhotsk is expected as updated abundance estimates of common minke whale in this area is important for the calculation of catch quotas of this species for Japan's sustainable commercial whaling in its Exclusive Economic Zone and Territorial Sea in line with the IWC's Revised Management Procedure.

History of cooperation

The first sighting survey conducted by Japan with permission to enter Russia's Exclusive Economic Zone (EEZ) in the Sea of Okhotsk was in 1989 during the former Soviet Union era. The main purpose of this first survey was to get information on the distribution of common minke whales. Although this year's survey was a preliminary feasibility study, it was very significant because it was the first time that a systematic sighting survey was conducted in the northernmost part of the Sea of Okhotsk. Following this, in 1990, two vessels conducted a full-scale sighting survey in the Sea of Okhotsk and off the eastern coast of the Kuril Islands on the Pacific side. Based on sighting data collected during this survey, the International Whaling Commission Scientific Committee (IWC SC) conducted a common minke whale abundance estimation (Buckland *et al.*, 1993). Later, in the late 1990s, sighting surveys in the Sea of Okhotsk were resumed in preparation for the IWC's common minke whale Revised Management Procedure (RMP) implementation trials, as the revision of the abundance of this species again became an important goal. However, it was noted that the sighting survey method was changed from the original approach to the Independent Observer (IO) method. The IO method is a less biased method for estimating abundance by considering the probability of missing whales on the track line. After a preliminary feasibility study, an IO mode sighting survey in the Sea of Okhotsk was conducted in 2003 using two research vessels, and based on the results of this survey, a revision of the abundance estimation was conducted (Okamura *et al.*, 2010).

In the process of RMP implementation of common minke whale, it was found that two stocks of this species, the Okhotsk Sea–West Pacific stock (O-stock) and the Sea of Japan–Yellow Sea–East China Sea stock (J-stock),

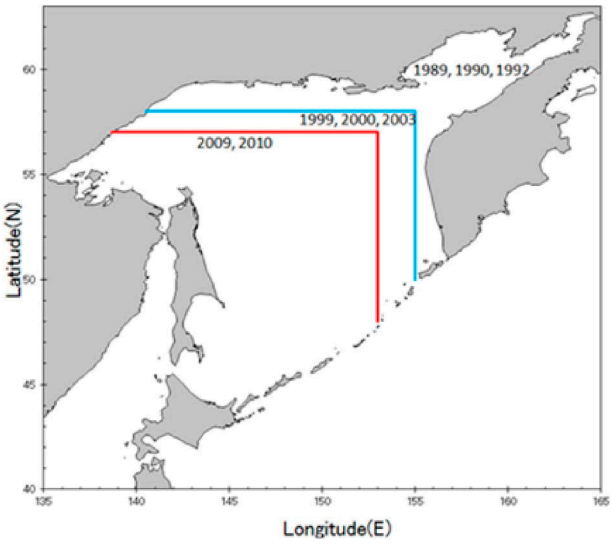

Figure 1. Expansion of Russian restricted area for sighting surveys.

mix from spring to fall in the Sea of Okhotsk, and the estimation of the mixing rate became an important issue. Therefore, at the end of the 2000's, epidermal samples were collected by biopsy sampling and DNA analysis was conducted to estimate the stock mixing rate of this species in the Sea of Okhotsk. However, since the Russian export permit under Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was not granted, the DNA analysis had to be conducted at the field using a simple approach. However, the initial objective was achieved (both stocks are mixed in the southwestern part of Okhotsk, while the O-stock occupies most of the northeastern part) (Yoshida *et al.*, 2011). However, due to the small number of samples, continued collection of DNA samples has been required.

On the other hand, the extent of the research area for sighting and biopsy sampling in the Sea of Okhotsk was gradually decreasing until the 2000's for security reasons as shown in Figure 1. The restricted coastal areas, which are known to have a relatively high density of common minke whales, increased gradually. The importance of surveying this area was recognized. However, the existence of a restricted area by Russia prevented surveys by Japanese vessels in the coastal areas for a long time. Considering this situation, sighting surveys by Russian vessels was planned (instead of Japanese vessels) since the mid 2010's and has been continued until recent days as a joint survey by Japan and Russia.

Past results

Japanese research vessels during the Japan-Russia joint sighting surveys in the Sea of Okhotsk that started in 1989 discovered six species of baleen whales: common minke, fin, sei, humpback, North Pacific right and gray

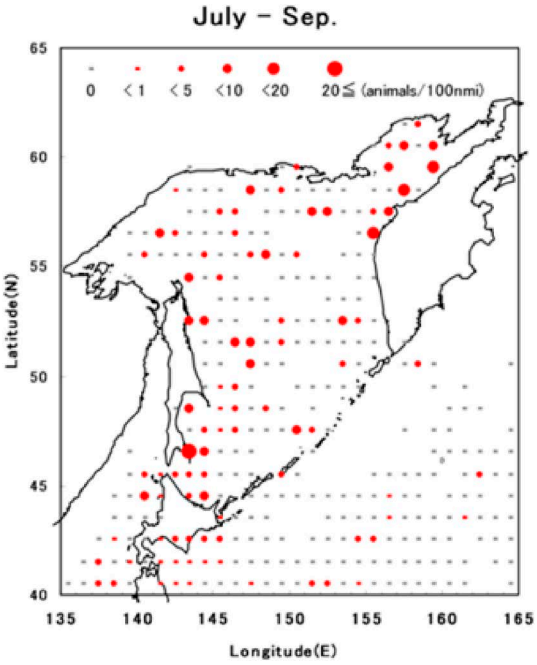

Figure 2. Density index of common minke whales (No. animals/100 n.miles) based on sighting surveys in the Okhotsk Sea and adjacent waters.

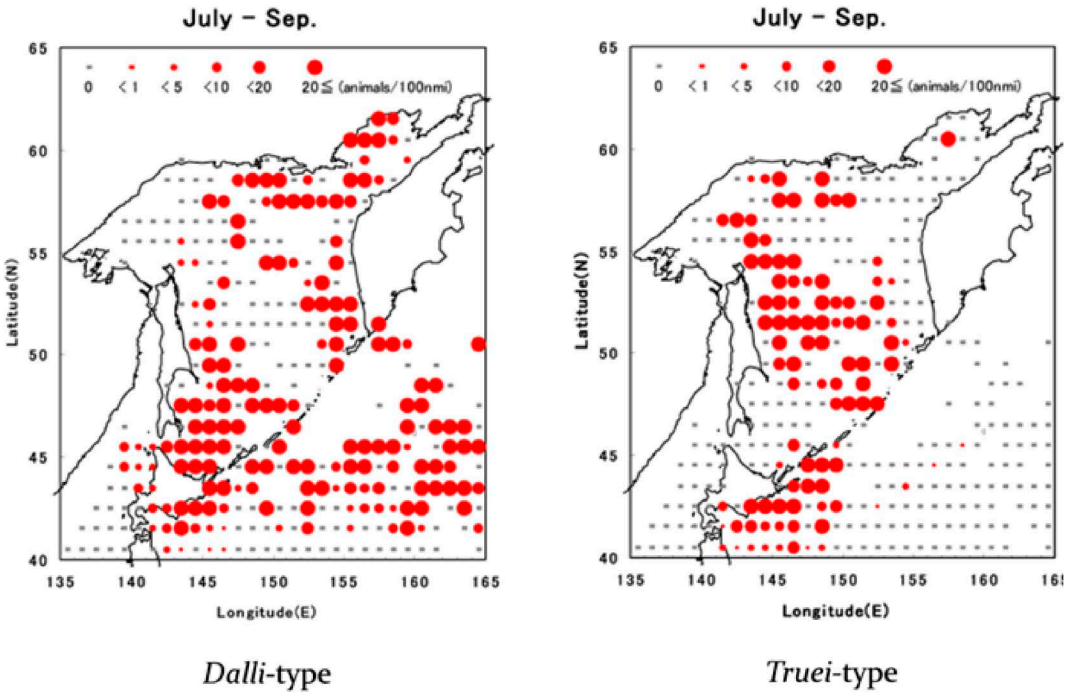

Figure 3. Density index of Dall's porpoises (No. animals/100 n.miles) based on sighting surveys in the Okhotsk Sea and adjacent waters.

whales, and six species of toothed whales: sperm, Baird's beaked, killer, Pacific white-sided dolphin, Dall' porpoise and harbor porpoise. Since bowhead and beluga whales are mainly distributed in the northern coastal waters (IWC, 1993; Rugh *et al.*, 2003), sightings of these species were made only when coastal areas were surveyed by a Russian research vessel, in the late 2010s.

Information on the distribution of common minke whales and Dall's porpoises, which have been the most important species since the beginning of the joint project, was presented in terms of the number of animals found per survey distance (per one degree of latitude and longitude) (Miyashita and Zharikov, 2013). The sighting data used were obtained from July to September from 1989 to 2003. Common minke whales were widely distributed throughout the Sea of Okhotsk but the species is clearly more abundant closer to the coast (Figure 2). This species is known to congregate in small bays and near shore areas, and current sighting surveys, which do not adequately survey very nearshore areas, may underestimate abundance estimates.

Two body color types, *Dalli*-type and *Truei*-type, are known, with the former distributed mainly in the southwestern and northeastern regions and the latter mainly in the central region (Figure 3). Based on the distribution of mother and calf pairs, which suggested the reproduction area, three stocks were distributed in the Sea of Okhotsk: two *Dalli*-type stocks in the southwestern and northeastern areas, and one *Truei*-type stock in the central area.

Need for future research cooperation

There are several considerations regarding future research cooperation in the Sea of Okhotsk. First, since important cetacean species migrate to the Sea of Okhotsk during the boreal summer season, continued cooperative sighting surveys for monitoring purposes is essential. Second, since sighting surveys of the entire Sea of Okhotsk are desirable, surveys by Russian vessels, which are capable of surveying coastal areas, are important. However, it is not easy to cover the entire Sea of Okhotsk in a limited period, so ideally surveys could be divided between Japanese vessels covering the central area and Russian vessels covering the coastal area. Third, the collection of biopsy samples of common minke whale is very important. This requires equipment and expertise (for the operations in Russian vessels) and CITES import permits (for the operations of Japanese vessels). These aspects should be addressed to expedite the process. Fourth, photo-id work for individual identification and matching should be promoted for some relevant species as such exercise will contribute to understanding movement and migration. This work is in progress for North Pacific right, humpback and killer whales.

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