Report of the Workshop on Finless Porpoises in the Western North Pacific

Date : 17 March, 2005
Locale : National Fisheries Research & Development Institute, Busan, Korea

1. CONVENER'S OPENING REMARKS

Kim welcomed the participants (Appendix 1) as the overall chair of the Consultation and Review Meeting on Korea-Japan Cetacean Research Cooperation. He noted that this workshop formed a part of the meeting.

2. ELECTION OF CHAIR AND RAPPORTEURS

Kato was elected as the Chair. Miyashita agreed to act as the senior rapporteur in cooperation with Sohn, An and Yoshida.

3. ADOPTION OF AGENDA

The adopted Agenda is given as Appendix 2.

4. REVIEW OF THE AVAILABLE INFORMATION

There are a total of eight documents from Korea and Japan (Appendix 3).

Park reviewed the available information from Korea. As a part of research project of National Fisheries Research and Development Institute (NFRDI) for conservation and management of cetacean, population study of finless porpoises in Korean waters has started under contract with Bukyeong University since 2001. The project was initiated from 2 reasons. One was from the result of whale sightings survey conducted in the Yellow Sea in spring 2001, by which a good number of sightings of this species was made, and the other was that bycatch and stranded of this species had hardly been reported by the reporting system of the Ministry of Maritime and Fisheries because of fishermen's ignorance and no incentive other than disturbing in their fishing operation. Therefore the biological samples used in this study were purchased from fishermen at fishing ports of the western coast. The total number of specimen collected were 100 animals in 2001, 53 animals in 2002, 50 animals in 2003 and 24 animals in 2004, for which body length and weight were measured and stomach contents examined, and of which 79 specimens were aged.

Sighting surveys using research vessels were conducted to assess distribution, and estimates of abundance in the coastal Yellow Sea.

Yoshida reviewed the available Japanese data in the relevant sections.

5. STOCK STRUCTURE

Yoshida reported the stock structure study in Japan. Those are questionnaire survey to obtain information on distribution, and analyses of skull morphology and mitochondrial DNA (mtDNA) control region sequences to examine their geographic variation.

The questionnaire survey was carried out to the 2,053 oceanic fisheries cooperative associations in Japan. Question was 'Have you sighted finless porpoises or not ?' to the fishermen operated in the coastal waters in Japan. Although the 1,382 questionnaires were returned from all over Japan, locations of the fisheries cooperative associations reporting porpoises sighting concentrated in the five coastal waters: the Sendai Bay-Tokyo Bay, the Ise-Mikawa Bays, the Inland Sea-Hibiki Nada, the Omura Bay, and the Ariake Sound-Tachibana Bay. The results indicate that

finless porpoises are mainly distributed in the five waters and suggest that porpoises in each of the five waters belong to distinct stocks.

Geographic differences in skull morphology of finless porpoises were examined among the five waters, using 25 characters from 146 porpoise skulls. The analysis of covariance and the canonical discriminant analysis revealed morphological difference among the waters. Animals in Ise--Mikawa Bays appear to possess narrower skull than porpoises in the other waters.

Geographic differences in 345 base pairs of mtDNA control region sequences of porpoises were examined using tissue samples (muscle, skin, and blood) of 173 animals from the five waters. All the 10 unique haplotypes were found, of which only two types were shared by animals from more than one area, while the other eight types were each found only in one area. Frequency distribution of haplotypes differed among the five areas ($p < 0.05$). Finally, finless porpoises in each of the five waters were considered to belong to distinct stocks in Japan, from the sequence studies.

The question about the Sendai Bay--Tokyo Bay stock was posed because of the wide distribution range. Yoshida stated that the continuous distribution revealed from questionnaire survey and no distinct density hiatus observed in the sighting surveys supported the unique stock. While the results of mtDNA analysis showed that haplotype A is only observed in the Sendai Bay area but haplotypes B only in the Tokyo Bay area, Yoshida did not reach a conclusion of different stock from the analysis because of the small samples size i.e. seven samples in each area. The animal exchange between the Sendai Bay area and the Tokyo Bay can not be also examined up to now because of small sample size. Considering the existence of differences in haplotypes, it was concluded that the stock structure in the Sendai Bay - Tokyo Bay should be further examined incorporating additional samples.

Park stated that stock structure study in the Korean waters is on progress based on the morphology of the by-caught animals. Kim suggested that the stock structure in the west coast and south coast of the Korean Peninsula seemed to be simple and might be single stock because of the simple distribution pattern and topographic condition, but further examination should be necessary using morphology and DNA analysis. It was pointed out that because the East China Sea and the Yellow Sea is shallow and some finless porpoises were observed in the central area (Miyashita et al, 1995), the comparison between the inshore and offshore waters should be necessary in the future. And about the morphological study, the difference of the figure of dorsal keel should be included.

6. ABUNDANCE ESTIMATE

Yoshida reported results of aerial line transect sighting surveys conducted in order to estimate finless porpoise abundance in each of the five stock locations. Surveys in the Sendai Bay-Tokyo Bay and in the whole area of the Inland Sea have not been completed. Survey areas were set in the waters shallower than 60m in depth based on the distributional information of porpoises. In the survey areas, some sets of transect lines were established spacing at intervals of 1 nautical mile (nm), but in the Omura Bay, 0.5 nm because of narrower area. Direction of the lines was east-west parallel to the latitude, except for the Suo Nada (western area of the Inland Sea), in which north-south lines were set. At each survey, one of sets of transect lines was selected at random to keep systematic sampling.

The 14 surveys were conducted in autumn and winter of 2002-04 and all the 596 porpoise schools (895 animals) were observed during the flight of 4,200.4 nm. Using the data from seven surveys conducted with good sea and weather conditions, porpoise abundance was estimated. In the analysis, sighting data collected under Beaufort wind scale of 3 or more were excluded from

estimation. Furthermore, sightings obtained at south side of transect lines during flight of east-west lines were also excluded, because of the decreased detection probability by glare in the south side. Resultant abundance estimates were 3,075 animals (CV=19.0% with 95% confidence interval 2,127-4,447, density = 4.45animals/nm^2) in the Ise-Mikawa Bays, 2,291 animals (CV=33.8% with 95%CI 1,202-4,371, density = 3.09 animals/nm^2) in the Suo Nada - Hibiki Nada, 2,277 animals (CV=21.2% with 95%CI 1,509-3,438, density=3.09animals/ nm^2) in the Ariake Sound - Tachibana Bay, and 391 animals (CV=42.4% with 95%CI 176- 867, density= 4.12 animals/ nm^2) in the Omura Bay. Abundance estimates obtained in this study are thought to have a downward bias, because of no correction of missed diving animals. Furthermore, comparison of the present estimates with other values from different season surveys should be conducted with caution, because abundance estimates vary with season where sighting surveys are carried out. Aerial sighting surveys in the Sendai Bay - the Tokyo Bay and in the whole area of Inland Sea will be conducted in the near future.

The workshop appreciated the works by Yoshida and his colleagues. A total abundance in the Japanese coastal waters was estimated at about 11 thousands animals at minimum. It was noted that the aerial survey for the species was advantageous because it can cover the very coastal waters where many fishing gears exist and vessel can not enter, no reaction of the animals to the observer platform which causes the bias in the estimation, and better value of g(0) is expected because the animals in the waters can be found when the water color is good.

Park reported the results of the line-transect sighting surveys for finless porpoises using vessels off the west coast of Korea. In the coastal waters (35°17′ - 37°17′N, 126°00′ - 126°25′E), the surveys were conducted along zigzag transect lines in 2003 and 2004 using the R/V *Tamgu-18*. There were 24 primary sightings and 48 in 2003 and 2004, respectively. Sighting rate were 0.111 animals/nm and 0.222 in 2003 and 2004, respectively. From the best fitted model for the perpendicular distance distribution truncated at the largest 5% distance, the effective half width was estimated. Estimated densities were 1.0133 animals/nm^2 and 2.5956 for 2003 and 2004, respectively. Abundance was estimated as 1,571 animals (CV= 30.2% with 95%CI 881-2,800) in 2003 and 5,464 animals (CV=19.9%, 95% CI = 3,714-8,038).

In the offshore waters (33°00′ to 37°30′N, 122°00′ to 126°00′E), two sighting surveys were conducted using the R/V *Tamgu-3* in 2001 and 2004. From same kind of analysis in the coastal waters, the density was estimated as 2.5487 animals/nm^2 in 2001 and 0.63192 animals/nm^2 in 2004, respectively. The abundance was estimated as 58,650 animals (CV=26.9%, 95%CI = 34,961-98,389) in 2001 and 21,532 (CV=39.3%, 95%CI = 10,243-45,263) in 2004.

The members appreciated the works for abundance estimate by Park and his colleagues. It was pointed out that the shipboard survey of finless porpoise is fluctuated by sea and weather conditions, distribution pattern by year, and those causes a process error. However it is recognized the order of the current abundance in the Korean waters is much larger than that of the Japanese waters, and scientifically there is a downward bias caused by the ship avoidance, g(0) and presence of animals outside the research area suggested by a number of sightings occurred close to the northern boundary. Therefore it is agreed that the current abundance estimates are apparent values. The aerial survey in Korea is necessary to be considered, but it is reported that a small aircraft is prohibited to fly to survey in Korea.

7. Stock status

Yoshida reviewed the stock status in the Japanese waters. Abundance estimates from different surveys conducted on past years and on 2002-04 surveys were compared. Comparison of abundance

estimates in each of Ariake Sound-Tachibana Bay and Omura Bay by season revealed that finless porpoises inhabit throughout the year in the two locations. The comparison also indicated that abundance estimates vary with season and the highest estimate was obtained from the spring survey. In the Ariake Sound - the Tachibana Bay, estimates were similar between the 93/94 (Yoshida et al. 1997) and 02-04 surveys, which suggests no conspicuous trend. In the Ise-Mikawa Bays and the Omura Bay, estimates from 2003/04 surveys were higher than values from the past surveys (91-95 surveys in the Ise-Mikawa Bays by Miyashita et al. 2003 and 93/94 surveys in the Omura Bay by Yoshida et al. 1998), although it should be noted that, in the Ise-Mikawa Bays, abundance estimates from different platforms were compared, i.e., shipboard in 91-95 surveys and airplane in 02-04 surveys. In the other two locations, the Sendai Bay-Tokyo Bay and the Inland Sea- Hibiki Nada, trend could not be examined here, because of no available estimates. Total of abundance estimates in each of the 5 locations was around 11000 animals, from 02-04 surveys and surveys in Sendai Bay--Tokyo Bay by Amano et al. (2003). It was thought that more animals inhabit in the Japanese coastal waters, because of no available estimates in the whole of Inland Sea and of no correction of missed diving animals (g(0)). To obtain more information on status of finless porpoise stocks, further aerial sighting surveys are required in each of the locations, especially in the Sendai Bay-Tokyo Bay and in the whole area of the Inland Sea.

It is pointed out the direct comparison in the abundance estimates in the Ise-Mikawa Bays should be cautious because the survey method was different, the previous surveys were shipboard census with presumed downward bias caused by the ship avoidance and un-surveyed area in the very coastal waters.

Park reported the stock status in the Korean waters based on the abundance estimate. 2 shipboard surveys for finless porpoise were made in each offshore and inshore of the west coast of Korea. The first surveys in offshore and inshore were carried out in each 2001 and 2003 estimated an abundance of 58,650 animals in offshore and 1,571 porpoises in inshore. In 2004, it was estimated that current abundance was 21,532 animals in offshore and 5,464 porpoises in inshore.

The level of current abundance of finless porpoise was about 37% of that in offshore in 2001 and it was about 348% of that in inshore in 2003. Those big differences in trend of abundance estimate might be caused by several reasons (see abundance estimate section), it was agreed that it is premature to decide stock status in this waters.

8. Research in animals in captivity

Furuta introduced the scientific permit catch in Japan in 2004. To improve the technology for the keeping in captivity (including capture, transportation and early stage of keeping in captivity) and the propagation technology, the capture of finless porpoises was carried out under science-based permission. The technology and knowledge obtained from this will provide application towards by-catch and weakened wildlife animals when they are temporarily accommodated to assist in their recovery.

Possible removal number of the finless porpoises which would have no adverse effects on the stocks was calculated scientifically based on the abundance estimates, and the Ise Bay was selected as the capture area. The timing of the operation was from the beginning of October to the beginning of November in 2004 to avoid the breeding season, and because of better sea condition. The purse seine and a minute mesh net were used for capture. Six purse seine ships operated with four outboard motor boats to haul the animals on deck. A total of 15 fishermen and 27 aquarium staff engaged in the work. Two staff members and a veterinarian accompanied each animal on its

transport by ship to the aquarium. As a result, nine animals (five males and four females) were captured without loss from death. But after two weeks from capture, one male was died due to MRSA by the micrococcus. We got valuable knowledge for keeping in early stage captivity from the scientific permit catch. The study for the propagation technology using the remaining eight animals will be continued.

Other studies in captivity in Japan were introduced in the presentation by Ishibashi under item 9.

9. Conservation, management and human relationship

Kim explained that direct take of all cetacean species including this species is prohibited. He reviewed referring to the book of whaling history off Korean peninsula (Park, 1987) that the stories of finless porpoises appeared frequently from prehistoric era to Chosun dynasty. The name of the species in Korean was handed down from 19 century which was created by a practical scientist, Jeong (1814). Some other scientists described the feature, behavior and interaction between fisheries such as chasing fish schools in its migration. Its meat was consumed and oil was used for light and oriental medicine. In modern era, fishermen regarded this animal as a symbol of bad luck, because bad weather came when they encountered this animal at the sea.

Suzuki reviewed the management scheme of Japan. Japan ensures conservation and management of finless porpoise by implementing the Living Aquatic Resources Protection Law which prohibits from catching and trading this species except for a scientific permit issued by the Minister of Agriculture, Forestry and Fisheries.

In addition to the above measure, the Japanese government requires reports of stranding and by-catch of finless porpoises, and also issues a permit to use carcasses only for scientific research.

According to the reports complied between 2000 and 2002, approximately 80 finless porpoises per year were stranded or by-caught in Japan.

The Minister has issued a scientific permit to catch nine finless porpoises in the Ise Bay in 2004 for the first time because this scientific research would contribute to development of conservation of finless porpoise and the catch of nine finless porpoises would never affect the status of stocks based on the assessments by National Research Institute of Far Seas Fisheries (NRIFSF).

Park reported the current management by Korea. The moratorium banned commercial catch for whale, prohibited intentional catch of cetacean. There is no direct takes of finless porpoise in Korea. Incidental catches of finless porpoise, however, are occurred in large stow net in the west coast of Korea. Local fishery officials and the office of the Maritime Police have a role for collecting information about by-catch and strand of finless porpoise in Korea. There were regular monitoring and questionnaire surveys with high frequency for the by-catch of finless porpoise at ports, such as, Daechun, Shinjindo and Seochun in 2003 and 2004.

Ishibashi summarized the relationship between human and finless porpoises in Japan. Japan has a long history and culture of using small cetaceans for human consumption, however, there has never been a culture of catching finless porpoise for this purpose. Finless porpoises inhabit shallow coastal waters in certain areas of Japan and are familiar coastal inhabitants for many people. In modern Japanese society, people can see finless porpoise in aquariums in Japan. These aquariums conduct studies to keep finless porpoises and a number of animals have lived longer than the natural longevity for the species in the wild. Furthermore, three generations of finless porpoises have been bred in captivity in Japan. In addition to these studies, some aquariums are working in concert with universities and organizations such as National Research Institute of Far Seas Fisheries. Finless porpoises kept

in aquariums have successfully rehabilitated live porpoises stranded or by-caught in a fishing gear, which have remained at those aquariums for study. Recently, porpoise watching activities are held in several places in Japan, resulting in a greater awareness and appreciation for the marine environment. The finless porpoise has become a familiar character and symbol of the marine environment in Japan.

10. Recommendations

(1) Both countries should continue research cooperation in the relation to finless porpoises.

(2) To develop the abundance estimate, much wider coverage is necessary and systematic survey should be conducted further especially in the Sendai Bay - Tokyo Bay in Japan.

(3) In the Korean waters, because the coverage by shipboard survey was not enough in the very coastal waters where the species inhabit, it needs to evaluate the survey methodology for fine scaled survey to get more information.

(4) Cooperative studies on finless porpoises in captivity should be conducted between the aquariums of both countries in the future.

(5) Group encourages further collaboration in the stock structure study for the species in both countries.

11. Adoption of report

The report was adopted through correspondence after the meeting.

Acknowledgements

Group appreciated the hard work of the chair of the workshop and also the overall chair of consultation and review meeting.

Appendix 1. List of Participants

Korea

Kim, Zang-Geun / Director, Cetacean Research Center, Nation Fisheries Research & Development Institute (NFRDI)
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Park, Gyum-Jun / Graduate School Student, Pukyung National University
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Japan

Hidehiro Kato / Head, Cetacean Population Biology Unit, National Research Institute of Far Seas Fisheries (NRIFS)
Tomio Miyashita / Head, Cetacean Resources Management Unit, NRIFS
Hideyoshi Yoshida / Senior Scientist, Cetacean Population Biology Unit, NRIFS
Shinichi Suzuki / Section Chief, Ecosystem Conservation Office, Fisheries Agency, MAFF
Masashi Ikeda / International Resources Section, Fisheries Agency, MAFF
Masami Furuta / Vice director, Toba Aquarium
Toshiaki Ishibashi / Director, Shimonoseki Marine Science Museum
Takayuki Shimizu / Vice consul, Consulate-General of Japan at Busan

Interpreter

Kim, Ki-yeong

Appendix 2.

Adopted Agenda

1. Opening remarks
2. Election of Chair and Rapporteurs
3. Review of Available Information
4. Stock structure
5. Abundance estimate
6. Stock status
7. Research on animals in captivity
8. Conservation, management and human relationship
9. Recommendation
10. Adoption of report

Appendix 3.

List of available documents

1. Park, G.J. and Kim, Z.G., Available information.
2. Park, G.J. and Kim, Z.G., Abundance estimation.
3. Park, G.J. and Kim, Z.G., Stock assessment.
4. Park, G.J. and Kim, Z.G., Conservation and Management.
5. Yoshida, H., Stock structure of finless porpoises in Japanese coastal waters.
6. Yoshida, H., Abundance estimates of finless porpoises in Japanese coastal waters from aerial sighting surveys.
7. Yoshida, H. and Kato, H., Status of finless porpoise stocks in Japanese coastal waters.
8. Furuta, M., Scientific capture program of finless porpoise by the aquarims.

For Information

1. Sohn H, Z.G. Kim, T. Miyashita and K. J. Park. 2001. Cruise report of the Korean whale sightings survey in the Yellow Sea, April-May 2001. SC/53/RMP22.

2. Kim, Z.G., Sohn, H. and An, Y.R., 2004. Cruise report of the Korean sighting survey in the Yellow Sea, April-May 2004. Document SC/56/NPM2 submitted to the 56th International Whaling Commission. 6pp.