

## Annex G1

# Report of the Working Group on the In-Depth Assessment of Western North Pacific Common Minke Whales, With a Focus on J-Stock

**Members:** Kitakado (Chair), Allison, An, Baba, Baker, Bjørge, Borodin, Bøthun, Breiwick, Brownell, Burt, Butterworth, Cipriano, Cooke, Donovan, Double, Edwards, Fujise, Gallego, Galletti, Gedamke, Goodman, Goto, Gunnlaugsson, Hakamada, Hammond, Hatanaka, Hayashi, Hester, Hyugaji, Ilyashenko, Ipatova, Kasuya, Kato, Kawahara, Kell, Lawrence, Leaper, Leslie, Lyrholm, Magloire, Marcondes, Martien, Miller, Miller, Miyashita, Morishita, Nakamura, Newell, Nishiwaki, Northridge, Okamura, Palka, Park, Park, Pastene, Punnett, Punt, Rambally, Rea, Shimada, Simmonds, Skaug, Strbenac, Taylor, Tichotsky, Urban, Wade, Walløe, Waples, Yamada, Yamakage, Yasokawa, Yoshida, Young, Zelensky.

### 1. ELECTION OF CHAIR

Kitakado was elected Chair.

### 2. APPOINTMENT OF RAPPORTEURS

Hammond was appointed rapporteur.

### 3. ADOPTION OF AGENDA

The adopted agenda is given in Appendix 1.

### 4. DOCUMENTS AVAILABLE

Available documents relevant to the Working Group were SC/59/NPM1-4, 6 and Baker *et al.* (2007).

### 5. REPORT FROM INTERSESSIONAL WORKSHOP ON SIGHTINGS SURVEYS

The report of the Intersessional Workshop was not yet available. An gave a summary of the main points arising from the Workshop which is attached as Appendix 2.

### 6. STOCK STRUCTURE

#### 6.1 Genetic analyses

Last year, the Working Group received the results of cooperative research on stock structure between Korea and Japan. Following discussion, several additional analyses were proposed which the Working Group hoped would allow clarification among four stock structure hypotheses (IWC, 2007 p.186).

In response, Goto presented SC/59/NPM6, which reported the results of genetic population structure analyses of common minke whales from Japan (Sub-area 6 (SA6)) and Korea (SA5 and SA6) using mtDNA haplotypes and nine microsatellite loci. The samples were by-caught animals in set net fisheries along the Japanese coast in SA6 (mtDNA: n=202, microsatellite: n=202) from 2001 to 2004 and in coastal fishing gears along the Korean Peninsula (mtDNA: n=287, microsatellite: n=248) in SA6 and SA5 from 1999 to 2004. The microsatellite genotypes of the individuals were first standardised using reference samples in order to avoid scoring differences between the Japanese and Korean laboratories. In response to one of the proposals made last year (to analyse samples by month and season to investigate whether genetic heterogeneity could be due to seasonal or monthly difference in migration between two stocks), the statistical analysis of genetic data was conducted on samples divided into two temporal groups: 'early' = April-September, 'late' = October-March. This was done for samples taken in SA5 and SA6 in both Japan and Korea and for samples from both the countries combined. For both mtDNA and microsatellites no significant heterogeneity was found for the different temporal combination of samples. SC/59/NPM6 also examined genetic differences between Korea and Japan for the two temporal periods, and no statistically significant heterogeneity was observed. These results provide no support for the hypothesis of two stocks migrating in these sub-areas in different months or seasons. However, a statistically significant difference was detected in the comparison between the early (April-September) and late group (October-March) samples from 1999. It was therefore concluded that the heterogeneity detected in previous analyses was due to a few individuals taken in that period. These results are consistent with the single stock scenario in these sub-areas. Other proposals for future work made at last year's meeting, including conducting the microsatellite analysis in a single laboratory and analysis by sex could not be completed in time for this meeting. These tasks will be completed in the near future.

The Working Group discussed the temporal stratification of the data in SC/59/NPM6. It noted that the seasonal peaks in samples that had led to the stratification used in SC/59/NPM6 likely had some biological basis. Information on conception date was unavailable because most bycaught animals were immature and there were therefore few foetuses. Additional information on bycaught animals (sex, length, etc.) were collected by fishermen but may be incomplete or in error. Nevertheless, the Working Group agreed that all available information should be used to explore alternative temporal stratifications.

The Working Group agreed that a sensitivity analysis to examine how results changed with different temporal stratifications would be valuable. Following the request from the Working Group, Goto reported the results of additional heterogeneity tests for temporal variation on J-stock minke whales. Regarding Korean 1999 samples in sub-area 6, a difference was detected in samples between October-December and other months. October-December samples in 1999 were also significantly different from the same period in other years. The inference drawn was that the heterogeneity detected in previous analyses was not due to the 1999 sample in general but due to a few individuals taken in October-December. Goto also reported the results of heterogeneity tests conducted on samples divided into four temporal groups (January-March, April-June, July-September and October-December). No significant heterogeneity was found for different temporal combinations of samples taken in SA5 and SA6 in both Japan and Korea or for samples from both countries combined.

The Working Group thanked Goto for this additional presentation of results but **agreed** that a fuller examination of the data, in which the effects of combining quarters in different ways was explored, would be most valuable. It was also suggested that a jackknife analysis could identify any particular individual animals that were causing the heterogeneity. Goto undertook to report the results of further analyses at next year's meeting.

The question was raised that if there were two stocks rather than one, how big would the genetic differences have to be detectable? What would be the inference of such a difference for management; that is, what interchange/migration rates would this imply? The Working Group noted that this would depend on what the stock structure hypotheses were and on the size of putative populations.

## 6.2 Future work

The Working Group looked forward to the presentation of the results of revised collaborative analyses at next year's meeting, including completing items (2) and (5) carried forward from last year (IWC, 2007 p.186) and work described in item 6.1. It was confirmed that these analyses would include data from bycaught animals in Japan and Korea in 2005 and 2006.

Regarding item (6) from last year (IWC, 2007 p.186), the Working Group had thus far focussed on data from the Sea of Japan but its remit is to conduct an in-depth assessment with focus on J-stock, animals of which also occur east of Japan. The Working Group again discussed the question of expanding analyses to include samples collected from the east of Japan, which is necessary to complete the in-depth assessment and also to inform the *Implementation Review* of western North Pacific common minke whales. The Working Group expected to draw conclusions about stock structure in the Sea of Japan at next year's meeting and should then start to consider any information on J-stock from waters east of Japan. The Working Group noted that consideration of any J-stock animals east of Japan applied to catches as well as stock structure.

There is still a lack of information on stock structure in sub-areas 10 and 11; this is very important to the in-depth assessment. The Working Group **strongly recommended** that the Russian Federation be requested as a matter of priority to give permission for biopsy samples to be taken during surveys in its waters in these areas.

The Working Group recalled that there were differences in results from analyses of data from commercial catches in 1982 and analyses of recent data. This could possibly be a result of inshore/offshore structure (because commercial catches were taken offshore but bycatches are primarily inshore). Analysis of both mtDNA and microsatellites should be possible from 1982 samples but material was available from only from 27 animals. Nevertheless, the Working Group **recommended** that these analyses should be conducted.

Other non-genetic information on stock structure would also be valuable (for example, photographs to investigate presence/absence of scar of cookie cutter shark bites). Although it is difficult to collect such information from surveys, this will be attempted on forthcoming Japanese surveys. Fishermen are required to take photographs of Japanese bycaught animals but they are typically young so there may not be much information to be obtained; nevertheless, this will also be investigated.

The Working Group further noted that work on stock structure would be facilitated by the new information from the JARPN-II programme. Assignment of animals to J or O-stock could be enhanced by using as much information as possible as has been pursued for bowhead whales.

## 7. DISTRIBUTION AND ABUNDANCE

### 7.1 Report of recent surveys

Miyashita presented SC/59/NPM3, a report of the sightings survey in the northern Sea of Japan conducted in June 2006. From 18 May to 28 June 2006, an IO passing mode sighting survey using the research vessel *Kaiko-maru* was conducted in the northern Sea of Japan to obtain information on the distribution and abundance of common minke whales. Permission to enter the Russian 200 n.miles EEZ was granted by the Russian Federation and the survey was first conducted in the continental side of the Sea. During a total of 1,595.8 n.miles of searching effort, a total of 51 schools (55 animals) of common minke whales were sighted by the primary platform. There were sightings of 18 schools made from the IO platform (top barrel), of which 35% were also seen from the primary platform. Common minke whales were distributed widely in the Russian EEZ; a higher density was observed in the northern area between the continent and Sakhalin Island. This suggests that there is a high concentration of common minke whales in the continental side of the Sea. Fin whales and humpback whales were also observed in the research area.

It was confirmed that the platform height, vessel speed and IO data collection methods were the same as on the 2005 survey.

The Working Group welcomed the report of the successfully completed survey in an area in which it had previously identified as very important to obtain abundance estimates. It thanked Miyashita for successfully carrying out his oversight role on behalf of the Committee.

Park presented SC/59/NPM1, which described a survey conducted in April/May 2006 on the Korean side of sub-area 6 to estimate the abundance of minke whales. The survey covered 8.3% of sub-area 6. A total of 20 sightings of minke whale were sighted in this survey.

The Working Group welcomed this brief report and thanked An for his oversight on behalf of the Committee. Discussion on the results of this survey is recorded under item 7.2.

### 7.2 Abundance estimation

Miyashita presented SC/59/NPM4, the results of an analysis of the sightings survey in the northern Sea of Japan conducted in June 2006 to provide an estimate of abundance of minke whales in this area. Conventional line transect methods assuming  $g(0)=1$  and the hazard probability model allowing  $g(0)<1$  were applied to the sighting data and results were compared. Abundance in the Russian EEZ was estimated as 2,891 (CV=0.324, 95%CI 1,556 - 5,370) using conventional line transect methods, and 3,511 (CV=0.320, 95%CI 1,904 - 6,474) using the hazard probability method, respectively. In the Japanese EEZ, the estimates were 972 (CV=0.656, 95%CI 300 - 3,140) and 1,180 (CV=0.652, 95%CI 367 - 3,787), respectively.  $g(0)$  for all sighting platforms (top barrel, IO platform and upper bridge) was estimated as 0.8441 (CV=0.1762). The area covered by the 2006 survey is about 77% of the total area of sub-area 10; an unsurveyed area remains in the western part of sub-area 10.

The Working Group welcomed these new estimates. Further details of the analysis were given in discussion. Because permission was received for the first time to survey in Russian waters, the survey focussed first on this part of the survey area; this led to less effort in Japanese waters. As is common practice, angles were measured from an angle board to avoid rounding. Distance and angle experiments were also conducted. Mean surfacing rate was approximately 90 s, much higher than the 40-50 s typical for Antarctic minke whales. Covariates had not been included in the estimation of  $g(0)$  because of limited data; this could potentially result in an overestimate of  $g(0)$  because covariates can account for heterogeneity

in the data and this might explain why the estimates of  $g(0)$  were higher than those estimated in the Southern Hemisphere, where covariates were included. The Working Group agreed that it was important to incorporate covariates in estimation of  $g(0)$  in future analyses. The Working Group also requested that in future presentations of the results of  $g(0)$  estimation, histograms of the perpendicular distance distribution of duplicates and results of goodness-of-fit tests for duplicates should be presented.

The Working Group questioned whether all the animals included in the abundance estimate were from J stock. At the time when the survey was conducted it was most likely that animals in this area would be from J stock.

Park presented the results of analyses to estimate abundance from the survey conducted in April/May 2006 in Korean waters of sub-area 6. Various models (Half-normal, Hazard-rate, Uniform) were explored to fit the detection function; the Uniform model was chosen based on AIC. The value of  $g(0)$  was assumed to be 1. The effective search half-width (ESW) was estimated at 0.129 (CV=15.8%). Expected group size was estimated to be 1.24 (CV=6.24%) individuals based on regression of  $\log(\text{group size})$  on  $g(x)$ . The abundance of minke whales was estimated at 1,286 (CV=30.6%, 95% CI=707-2,340) individuals. The estimate from the hazard-rate model was 1,645 (CV=31.2%, 95% CI=593-4,561) and from the half-normal model 1,240 (CV=53.1%, 95% CI=673-2,283).

The Working Group noted that because a large part of the offshore block had not been surveyed, abundance had been estimated for the inshore block and only a small part of the offshore block. The Working Group requested that future presentations show the fitted detection function together with the histograms of perpendicular distribution. It noted that sample sizes were limited and suggested that pooling of data over past surveys to estimate the detection function be investigated.

More generally, the Working Group discussed how to move forward with regard to combining the abundance data from all the areas and years together to generate the best available abundance estimates for sub-areas 5, 6 and 10 and trends for some areas if possible.

Miyashita and An summarised the information on past sighting surveys for J-stock common minke whales to examine the possibility of obtaining integrated abundance estimates. Details are given in Appendix 3. The surveys began in 1994 and a total of 25 cruises had been conducted through 2006; the most valuable information for abundance estimation was from surveys in April-June since 1999. Taking the minimum number of primary sightings necessary for abundance estimation to be >15, a total of 17 cruises have generated useful data. The following areas have been surveyed several times: east of sub-area 5, west of sub-area 6, east of sub-areas 6 and 10. The following four areas remain un-surveyed: west of sub-area 5 (Chinese waters), north of sub-area 5 (Chinese and North Korean waters), northwest of sub-area 6 (North Korean waters) and west of sub-area 10 (North Korean waters).

This information was carried forward to the discussions reported under Item 7.4.

### 7.3 Plans for future surveys

Miyashita reported that Japan will conduct an IO passing mode sighting survey using R/V *Shonan-maru No.2* in the Okhotsk Sea and the Sea of Japan north of Hokkaido 18 May - 28 June 2007 (Fig. 1). The objective is to obtain information on the distribution and abundance of common minke whales as requested last year (IWC,2007 p.187). Distance and angle estimation experiments will be conducted as usual; photo-identification will also be conducted.

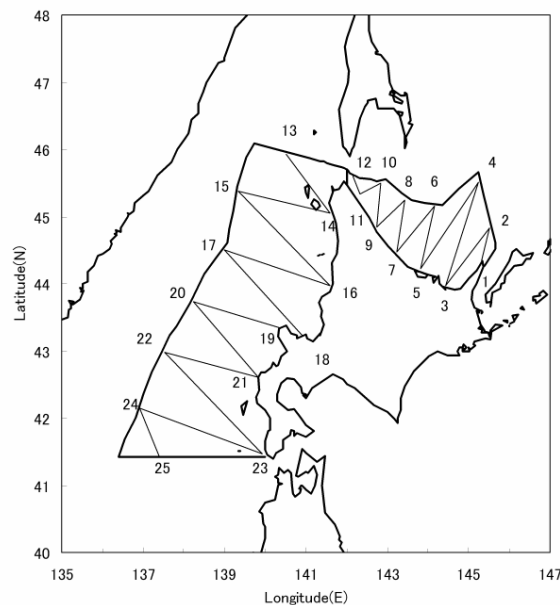


Fig. 1. Blocks and pre-determined track line for Japanese survey in March-June 20.07

The Working Group welcomed this plan and appointed Miyashita to provide oversight on behalf of the Committee.

Park presented SC/59/NPM2, the plans for a sightings survey in Korean waters of the Yellow Sea in spring 2008. The survey will use the partial-IO method in passing mode using the RV *Tamgu-3*. The objectives of the survey are to obtain information on the distribution and abundance of common minke whales to be used for the in-depth assessment and to collect general information on the distribution and abundance of other cetacean species in the area. The area will be divided into 6 blocks; 3 in inshore, 3 in offshore and the total of transect lines is 2,037 nautical miles (Fig. 2). Other non-lethal research activities will be conducted such as biopsy sampling for genetic studies, water temperature and salinity observations with a CTD for oceanographic studies and photography and video recording for photo identification.

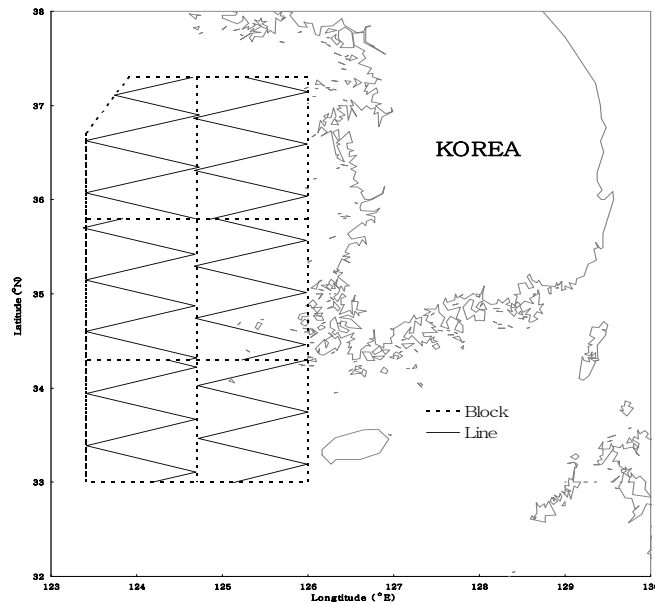


Fig. 2. Research area and track line for the proposed survey by *Tamgu-3* in spring 2008.

The Working Group welcomed this plan and appointed An to provide oversight on behalf of the Committee.

The Working Group noted the plans to employ a partial IO method on this survey and cautioned that analysis of IO data will be problematic with the sample sizes that have typically been obtained from surveys in Korean waters. Sample sizes could possibly be increased by searching with binoculars but any benefits of this would need to be balanced against the greater difficulty in identifying duplicates when using binoculars.

The Working Group looked forward to presentation of the results from these surveys at next year's meeting.

#### 7.4 Future work

Skaug reported on the deliberations of an *ad hoc* Working Group (additional members: An, Butterworth, Kitakado, Miyashita, Okamura, Park) established to examine methods for estimating abundance, including taking additional variance into account, when combining multiyear surveys for J-stock common minke whales. The migratory behaviour of minke whales in the Sea of Japan mean that abundance estimates for each sub-area must take season into account. The available abundance estimates with partial coverage of the survey area for the period 1994-2006 are summarised in Appendix 3. If abundance in each survey block is assumed to differ between spring (the period up to and including June) and summer, the multiyear model used for western NP Bryde's whales would also be appropriate for J-stock common minke whales:

$$\log[\text{Abundance est.}(b, s)] = \log[\text{True Abundance}(b, s)] + e_{b,s} + u_{b,s}$$

where  $b$  is an index for survey block,  $s = 1, 2$  is an index of season,  $e_{b,s}$  is survey error (with CV estimated from surveys) and  $u_{b,s}$  is the "process error", variance of which is the "additional variance" parameter. This situation for estimation of additional variance was considered to be very similar to that of western NP Bryde's whales.

The Working Group thanked the *ad hoc* Working Group and looked forward to receiving results of this work at next year's meeting.

Appendix 4 shows a summary of future survey and analysis work required for completion of the in-depth assessment. In discussion, while updating this summary, the Working Group paid particular attention to the possibility of surveys in Chinese waters. Regarding obtaining estimates of abundance in the western part of sub-area 5, the Working Group **recommended** that China be encouraged to collaborate with Korea to conduct sightings surveys in this area.

The Working Group briefly discussed how to decide whether to keep surveying in areas that had previously been surveyed in order to generate information on trends in abundance or to focus on areas as yet unsurveyed to obtain the most complete spatial coverage for abundance estimates as possible. For example, a power analysis might be useful to inform this. To facilitate this work, the Working Group established an Intersessional E-mail Correspondence Group with membership Miyashita (convenor), An, Butterworth, Kim, Kitakado, Okamura, and with terms of reference: to facilitate discussion on planning the allocation of sightings surveys to areas and their designs in the near future.

## 8. ASSESSMENTS

### 8.1 Catch data

Cooke summarised the main points of Baker *et al.*, (2007), which describes the estimation of minke whale bycatch entering Korean markets in 1999-2003. This is one way of obtaining information on bycatch where it is not fully reported and could be used to construct alternative catch histories in

the future. The methods used in this paper were discussed in the Working Group on Estimation of Bycatch and other Human-Induced Mortality (Annex J). Simulations described in SC/59/BC4 show that the methods used tend to underestimate the amount of bycatch to an extent that depends on assumptions about the markets. It was noted that further work on markets was planned in a workshop proposed by the Working Group on Estimation of Bycatch (Annex J).

The Working Group reiterated its previous recommendation that bycatch be reported by O and J stock.

### 8.2 CPUE analyses

It was reported that it was feared that additional information related to Korean CPUE was lost. Nevertheless, efforts to locate information will continue. The Working Group appreciated and encouraged these efforts because of the importance of this information for the in-depth assessment.

### 8.3 Plans for future assessments

As last year, no information was available under this Item, which was kept open for next year's meeting.

## 9. OTHER

The Working Group noted that no progress had been made on investigating variation in the length and sex of bycaught animals or on the estimation of growth curves. It looked forward to receiving information on these topics next year.

## 10. WORK PLAN AND BUDGET REQUEST

The Working Group agreed that its work plan for the coming year should include the work on stock structure described under Item 6.2, and the work on distribution and abundance described under Item 7.4

## 11. ADOPTION OF REPORT

The report was adopted at 14:25 on 14 May 2007. The Chair thanked all participants for their hard work, and expressed his appreciation to the rapporteur for his assistance. The Working Group thanked the Chair for his efficient running of the meeting.

## REFERENCES

Baker, C.S., Cooke, J.G., Lavery, S., Dalebout, M.L., Ma, Y.U., Funahashi, N., Carraher, C. and Brownell, J., R.L. 2007. Estimating the number of whales entering trade using DNA profiling and capture-recapture analysis of market produce. *Mol. Ecol.* In press: 10pp.

International Whaling Commission. 2007. Report of the Science Committee. ANNEX G1. Report of the Working Group of Western North Pacific Common Minke Whales, with a Focus on J Stock. *J. Cetacean. Res. Manage. (Supple.)* 9: 179-187.

## Appendix 1

### AGENDA

1. Election of Chair
2. Appointment of rapporteurs
3. Adoption of agenda
4. Documents available
5. Report from intersessional workshop for sighting survey
6. Stock structure
  - 6.1 Genetic analyses
  - 6.2 Future work
7. Distribution and abundance
  - 7.1 Report of recent surveys
  - 7.2 Abundance estimation
  - 7.3 Plans for future surveys
  - 7.4 Future work
8. Assessments
  - 8.1 Catch data
  - 8.2 CPUE analyses
  - 8.3 Plans for future assessments
9. Other
10. Work plan and budget request
11. Adoption of report

## Appendix 2

## SUMMARY OF DISCUSSION CONDUCTED AT THE WORKSHOP ON SIGHTING SURVEY COLLABORATIONS FOR THE COMMON MINKE WHALES OFF THE KOREAN PENINSULA HELD IN ULSAN, KOREA, 16-17 NOVEMBER 2006

Yong-Rock An

The workshop on the sighting survey collaborations for the common minke whales off the Korean peninsula which was induced by Resolution 2005-2 was held in Ulsan, Korea 16-17 November, 2006 in order to improve abundance estimates of minke whales, the sighting survey methods, g(0) estimation and the spatio-temporal coverage over the un-surveyed area.

The workshop reviewed the discussion on North Pacific common minke whales in the 58<sup>th</sup> IWC SC. Stock structure for sub-areas 5 and 6 and the abundance estimation for sub-area 5, 6 and 10 including Russian EEZ were presented.

Also the workshop identified the knowledge gaps in seasonal distribution and abundance in the coastal areas of China and Russia. It was noted that the Russian EEZ in sub-area 10 was covered by the sighting survey by Japanese researchers in 2006, but other waters in the east of sub-area 10 still remain un-surveyed. Members **agreed** that the four areas; 1) North of sub-area 5 (China and North Korea), 2) West of sub-area 5 (China), 3) Northwest of sub-area 6 (North Korea), 4) Eastern continental side of sub-area 10 (North Korea) have high priority for the future sighting surveys. The southern East China Sea is also an important area to be surveyed to examine the migration of J-stock of common minke whales.

It was stated that Japanese sighting surveys will welcome foreign scientists. However the priority was **agreed** to be given in the following order, 1) one or two Russian scientist(s) when the Russian EEZ is surveyed, 2) Chinese scientist to prepare the Yellow Sea survey when the Russian EEZ is not surveyed, 3) Korea examines to dispatch scientist if the vessel space is available.

Biopsy sampling with Larsen gun, distance and angle estimation experiment and photo-identification for large whales such as humpback, fin, gray and killer whales were **recommended**.

Because the survey in the Yellow Sea is very important, the workshop will request some budget to the IWC/SC through the activity of the NPM Working Group in the SC. Chinese members hope to invite Korean and/or Japanese scientists to Chinese surveys because of their limited experience of sighting surveys.

The workshop **encouraged** that a collaboration on genetic studies among Russian scientists, Chinese scientists and the Japan-Korea genetic cooperative group should be organised and existing samples should be exchanged among the countries for analyses as soon as possible. Members also **encouraged** that tissues for genetic analyses should be collected from stranded and by-caught animals in the Yellow Sea and East and South Chinese Sea.

It is evident from the above that to obtain estimates of abundance for these un-surveyed areas requires cooperation from range states in the area of Korea, Japan, China and Russia. Therefore the workshop **recommended** the states of Korea, Japan, China and Russia to 1) exchange information on common minke whales, 2) exchange scientists, 3) arrange international collaborative surveys and 4) continue discussion on how to improve collaboration through an e-mail correspondence group.

The adopted agenda and the list of participants are given as Adjuncts 1 and 2.

## Adjunct 1

## AGENDA FOR THE SIGHTING SURVEY COLLABORATION WORKSHOP

16-17 November, 2006, Ulsan, Republic of Korea

1. Introductory items
  - 1.1 Convener's opening remarks
  - 1.2 Election of chair
  - 1.3 Appointment of rapporteurs
  - 1.4 Adoption of agenda
  - 1.5 Review of available documents
2. Review of discussion on North Pacific common minke whales in the 58th IWC Scientific Committee
3. Review of known distribution and abundance information on common minke whales found in waters off the Korean Peninsula
  - 3.1 Short review of stock identity issues
  - 3.2 Seasonal distribution
    - 3.2.1 From catch data
    - 3.2.2 From systematic sightings surveys
    - 3.2.3 From opportunistic surveys
  - 3.3 Abundance
    - 3.3.1 Methods used
    - 3.3.2 Areas covered
4. Identification of knowledge gaps
  - 4.1 Seasonal distribution
  - 4.2 Abundance
5. Development of co-operative research recommendation
  - 5.1 Abundance estimation cruises in 2007
    - 5.1.1 Vessels, participants
    - 5.1.2 Methods (e.g. single platform, double platform, use of big-eye etc)
    - 5.1.3 Area, coverage, cruise track design

- 5.1.4 Additional experimental work (e.g. Biopsy sampling, photo-identification etc)
- 5.1.5 Logistics including permission to work within national waters
- 5.2 Future cruises
  - 5.2.1 Vessels, participants (e.g. single platform, double platform, use of big-eye etc)
  - 5.2.2 Methods
  - 5.2.3 Area, coverage, cruise track design
  - 5.2.4 Additional experimental work (e.g. Biopsy sampling, photo-identification etc)
  - 5.2.5 Logistics including permission to work within national waters
- 6. Adoption of report

**Adjunct 2**

**LIST OF PARTICIPANTS**

**China**

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WANG, Yamin

**Japan**

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Institute of Cetacean Research

GOTO, Mutsuo

Tokyo University of Marine Science and Technology

KATO, Hidehiro

KITAKATO, Toshihide

**Republic of Korea**

Cetacean Research Institute, National Fisheries Research & Development

AN, Yong-Rock

CHOI, Seok Gwan

KIM, Hyun Woo

KIM, Zang Geun

PARK, Kyum Joon

SONG, Kyung Jun

**Russia**

Pacific Research Fisheries Center (TINRO)

BLOKHIN, Sergey A.

## Appendix 3

## SUMMARY OF AVAILABLE SIGHTING INFORMATION FOR THE J-STOCK COMMON MINKE WHALE

Tomio Miyashita and Yong-Rock An

We summarise the past sighting information related to the J-stock common minke whale to examine the possibility of using a GLM analysis to obtain an integrated abundance estimate.

For clarity, sub-areas 1, 5, 6 and 10 were subdivided taking into account past survey areas (Fig. 1).

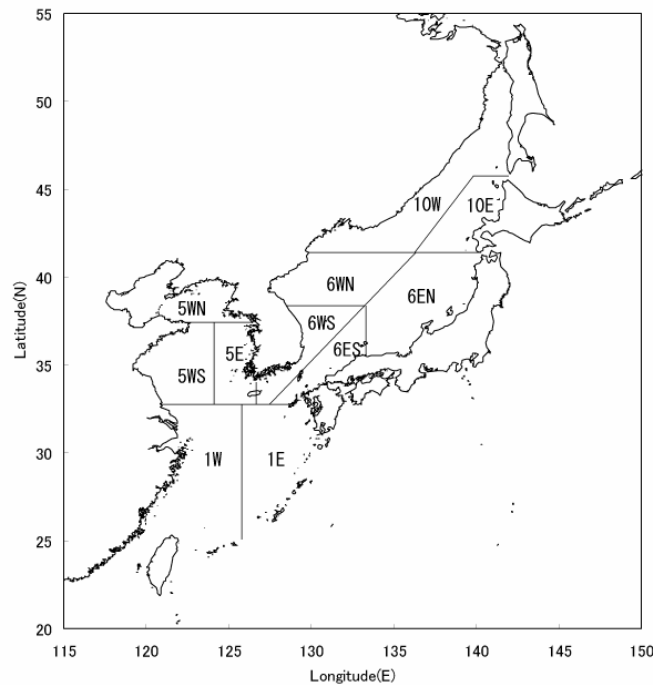


Fig. 1. Definition of areas surveyed.

The research period, research distance and number of sightings for each survey are shown in Table 1.

In 1994, the survey using three Japanese vessels was conducted from July to September in the sub-areas 3, 5 and the western part of 6, but the target species was Bryde's whales at that time. Also, the timing was late for common minke whales, which is consistent with the low number of minke whale sightings.

Since 1999, both Japan and Korea have conducted sighting surveys mainly in April-June because of the expected higher density in this period suggested by past commercial whaling catch data. At last year's meeting, it was **agreed** that April-June should be the season to conduct sighting surveys for J-stock common minke whales.

The Russian EEZ in sub-area 10W was surveyed for the first time in 2006, but the EEZs of other countries remain un-surveyed in April - June (Fig. 2). These are as follows:

1. 5WN: North of sub-area 5 (China and North Korea);
2. 5WS: West of sub-area 5 (China);
3. 6WN: Northwest of sub-area 6 (North Korea);
4. Western part of 10W: North Korean waters in sub-area 10.

Abundance estimation by cruise is desirable but for some cruises the number of primary sightings was less than 15, especially in the case of Japanese surveys before 2001 and abundance estimation by cruise is not realistic in those seasons.

Table 1. Sightings data in relation to J-stock common minke whales.

No.	Season	Period	Vessel	Searching distance (n.miles)	No. sighting (schools - animals)		Sub-area
					Primary	Secondary	
Japanese vessels							
1	1994	6 July - 18 Aug.	<i>Shunyo-maru</i>	2,132.2	3-3	-	5E, 6WS
2		26 July - 23 Sep.	<i>Shinhoyo-maru</i>	3,514.6	6-8	1-1	1E, 6ES,
3		20 July - 26 Sep.	<i>Khoshin-maru No.2</i>	1,700.0	1-2	-	1W, 5W
4	1999	10 June - 17 July	<i>Kurosaki</i>	559.9	-	-	6ES
5	2000	4 May - 12 June	<i>Kurosaki</i>	1,495.2	1-1	3-3	6ES
6	2001	12 April - 21 May	<i>Kurosaki</i>	1,607.1	3-3	-	6ES
7	2002	10 April - 9 May	<i>Kurosaki</i>	441.9	5-7	2-2	6ES
8		13 May - 1 July	<i>Shonan-maru No.2</i>	2,175.0	33-34	2-2	6EN, 10E
9	2003	11 April - 10 May	<i>Kurosaki</i>	708.0	3-3	-	6ES
10		12 May - 30 June	<i>Shonan-maru No.2</i>	1,847.5	27-31	5-5	6EN, 10E
11	2004	11 May - 29 June	<i>Shonan-maru No.2</i>	1,804.4	19-19	11-13	6EN, 10E
12	2005	12 May - 30 June	<i>Shonan-maru No.2</i>	1,520.1	11 -12	6 - 6	10E
13	2006	18 May - 28 June	<i>Kaiko-maru</i>	1,852.2	51 - 55	6 - 6	10W, 10E
Korean vessel							
14	1999	18 June - 12 July	<i>Tamgu 3</i>	655.4	17-17	3-3	6WS
15	2000	9 May - 2 June	<i>Tamgu 3</i>	771.6	23-26	1-1	6WS
16		18 Sep - 9 Oct	<i>Tamgu 3</i>	826.0	10-10	1-1	6WS
17	2001	18 April - 17 May	<i>Tamgu 3</i>	810.5	28-29	-	5E
18		6 Sep - 26 Sep	<i>Tamgu 3</i>	622.2	9-9	-	5E
19	2002	16 May - 9 June	<i>Tamgu 3</i>	1162.2	30-31	2-3	6WS
20		16 Aug - 18 Sep	<i>Tamgu 3</i>	800.0	9-11	-	5E
21	2003	21 April - 19 May	<i>Tamgu 3</i>	1082.1	13-13	4-5	6WS
22		16 Sep - 5 Oct	<i>Tamgu 3</i>	555.8	1-1	-	6WS
23	2004	21 April - 2 June	<i>Tamgu 3</i>	1805.8	18-18	2-2	5E
24	2005	21 April - 25 May	<i>Tamgu 3</i>	1040.6	31-32	1-1	6WS
25	2006	24 April - 20 May	<i>Tamgu 3</i>	1069.8	20-23	1-1	6WS

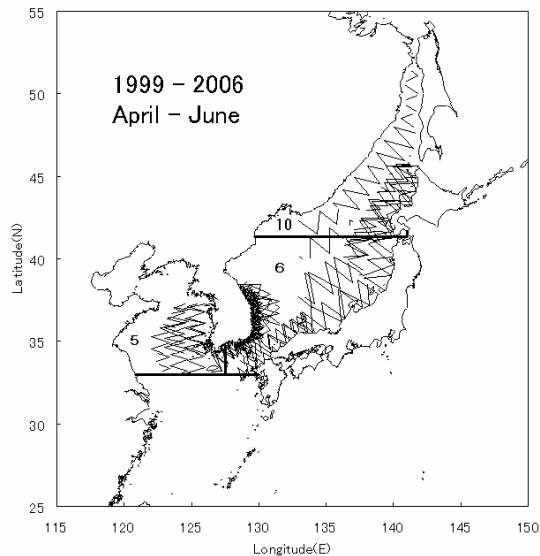


Fig. 2. Pre-determined track lines of sighting surveys from April to June since 1999. Thin lines: pre-determined track lines; thick lines: borders of sub-areas.

The seasonal coverage by area and season is shown in Table 2. The period when the abundance estimate is possible is defined as when the number of primary sightings was larger than 15. Under this definition, a total of 17 cruises in six areas can produce abundance estimates.

Table 2. Seasonal coverage of sighting surveys related to the J-stock common minke whale.

Area	Season	Cruise	April			May			June			July			August			September			October		
			E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
1W	1994	3																					
1E	1994	2																					
5WS	1994	3																					
5WN	No available data																						
	1994	1																					
	2001	17			Abundance																		
5E	2001	18																					
	2002	20																					
	2004	23			Abundance																		
	1994	1																					
	1999	14						Abundance															
	2000	15			Abundance																		
	2000	16																					
6WS	2002	19			Abundance																		
	2003	21																					
	2003	22																					
	2005	24			Abundance																		
	2006	25			Abundance																		
6WN	No available data																						
	1994	2																					
	1999	4																					
6ES	2000	5																					
	2001	6																					
	2002	7			Abundance																		
	2003	9			Abundance																		
	2002	8									Abundance												
6EN	2003	10									Abundance												
	2004	11									Abundance												
	2002	8									Abundance												
	2003	10									Abundance												
10E	2004	11									Abundance												
	2005	12																					
	2006	13																					
10W	2006	13									Abundance												

Abundance : Abundance estimation is possible because number of primary sighting is larger than 15, if April to June is migration season.

## Appendix 4.

## FUTURE WORK ON SIGHTING SURVEYS IN SPRING (APRIL-JUNE) FOR J-STOCK COMMON MINKE WHALES.

Item	By whom, when, method	Matters of concern
<b>(1) Surveys in unsurveyed areas</b>		
(a) Northern part of sub-area 5	Korea? 2009?	Feasibility of surveys in North Korean waters is uncertain. Korea will continue to try to contact North Korea but this area may remain unsurveyed.
(b) Western part of sub-area 5	Country? When?	Foreign vessels cannot enter and survey in the Chinese EEZ (see Appendix 2).
(c) North western part of sub-area 6	Korea? 2008?	Feasibility of surveys in North Korean waters is uncertain. Korea will continue to try to contact North Korea but this area may remain unsurveyed.
(d) Western continental side of sub-area 10	Korea? 2008?	Feasibility of surveys in North Korean waters is uncertain. Korea will continue to try to contact North Korea but this area may remain unsurveyed.
(e) Sea of Okhotsk (sub-area 11)	Japan, May-June 2007	Some animals might migrate into the Sea of Okhotsk at this time.
(f) East China Sea (sub-area 1)	Korea/Japan, 1 when?	Some animals might remain in sub-area 1 at this time.
<b>(2) Repeat sighting surveys</b>		
(a) Korean coast of sub-area 6	Korea, when?	More surveys are necessary for data accumulation and monitoring.
(b) Russian EEZ in sub-area 10	Japan, when?	Survey conducted in 2006 and abundance estimation presented in 2007.
(c) Korean side of sub-area 5	Korea, spring 2008	More surveys are necessary for data accumulation and monitoring.
(d) Japanese side of sub-area 10	Japan, when?	Survey conducted in 2006 and abundance estimation presented in 2007.
(e) Japanese side of sub-area 6	Japan, when?	More surveys are necessary for data accumulation and monitoring.
<b>(3) <math>g(0)</math> estimation</b>		
(a) IO passing mode survey	Japan (IO), Korea (partial-IO)	Standard method for the species in this area and to be used for the future sighting surveys.
<b>(4) Possibility of synoptic sighting survey using several vessels as in NASS</b>		
	When?	Low possibility because of budgetary and logistical problems.
<b>(5) Satellite tracking</b>		
	Korea, 2007?	Difficulty of attachment.
<b>(6) Dive time data collection</b>		
	Direct observation, VHF, data logger	
<b>(7) Analysis of sighting data</b>		
(i) Timing and survey direction		
(a) Timing of survey	April-June	
(b) Analysis by month and area	GLM framework	Intersessional work by Japan and Korea.
(ii) Accumulation of IO data and analysis		
(a) Hazard rate model framework	Japan, 2007	
	JCRM (suppl.) 9: 186-7.	
(b) Extrapolation to unsurveyed areas	Spatial modelling framework	

