

# Review of general methodology and survey procedures under the JARPAII

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## ABSTRACT

The Second Phase of the Japanese Whale Research Program under Special Permit in the Antarctic (JARPAII) was conducted every year from the 2005/06 to the 2010/11 seasons. After two seasons of feasibility research in 2005/06 and 2006/07, the full-scale research started in the 2007/08 season. The whole research area was divided into two sectors. The western sector comprised Area III, IV and a part of Area V (35°E-175°E). The eastern sector comprised Areas V and VIW (130°E-145°W). These western and eastern sectors were surveyed in alternate years. The research season was from the end of November to March. The minimum unit of longitudinal width was 10 degrees in principle. The number of units was set according to the longitudinal width of each stratum. Track lines were set for dedicated sighting vessels (SVs) and sighting and sampling vessels (SSVs), separately. The SVs and SSVs made sightings continuously in the north and south strata. The survey track line for the SVs consisted of two legs in the northern stratum in 5 longitudinal degree intervals and four legs in the southern stratum in 2-30 longitudinal degree intervals. Two SVs surveyed the northern and southern strata alternately. The survey track line for the SSVs consisted of a zigzag course changing direction at 2-30 or 1-40 longitudinal degree intervals. JARPAII is a comprehensive and interdisciplinary program, including lethal and non-lethal sampling. JARPAII maintained its unique sighting and sampling method during all surveys. In order to obtain biological samples representing the whole population in the research area, random sampling method under the line transect sighting survey was adopted. Sampling of 850 Antarctic minke whales (with 10% allowance) and ten fin whales was planned in the research area south of 62°S in the two feasibility studies. The sample sizes were 850 (with 10% allowance), 50 and 50 for Antarctic minke, fin and humpback whales, respectively, during the full research. Besides the sighting survey, JARPAII conducted a variety of other non-lethal surveys such as photo-identification, biopsy sampling, prey species survey, oceanographic survey, satellite tagging, vomiting observation, defecation observation and seabird sighting. The surveys contributed especially to the study of large baleen whales, prey species and oceanography. Throughout all of the research seasons JARPAII suffered from external interference by violent sabotage actions by an anti-whaling group. This resulted in un-surveyed areas and smaller number of samples obtained by both the lethal and non-lethal surveys.

**KEYWORDS:** SCIENTIFIC PERMITS; ANTARCTIC; ANTARCTIC MINKE WHALE, FIN WHALE

## BACKGROUND

The second phase of the Japanese Whale Research Program under Special Permit in the Antarctic (JARPAII) was conducted every year from the 2005/06 to the 2010/11 seasons. In compliance with Article VIII of the International Convention for the Regulation of Whaling (ICRW), JARPAII was authorized by the Government of Japan and conducted by the Institute of Cetacean Research (ICR). After two seasons of feasibility research in 2005/06 and 2006/07, the full-scale research started in the 2007/08 season.

JARPA elucidated that there were at least two stocks of Antarctic minke whales (*Balaenoptera bonaerensis*) in the research area but their geographical boundaries were different from those used for the IWC Areas (Pastene, 2006). JARPA found that pollutant concentration in whale's tissues, such as heavy metals and PCBs, was extremely low (Yasunaga *et al.*, 2006). Further, JARPA showed an annual decreasing trend in energy storage in the 18 year period of JARPA (Konishi *et al.*, 2008). JARPA has thus successfully accumulated data related to the initially proposed objectives (IWC, 2008).

Based on the result of JARPA research (Hatanaka *et al.*, 2006), the Government of Japan (2005) launched a new comprehensive study under the JARPAII, combining lethal and non-lethal methods. JARPAII is a long-term research program with the following objectives: 1) Monitoring of Antarctic ecosystem, 2) Modelling interaction among whale species and developing future management procedure for the Antarctic minke whale stocks. JARPAII focuses on Antarctic minke whale, humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*) and possibly other species in the Antarctic ecosystem that are major predators of Antarctic krill.

In order to achieve these objectives, it was necessary to obtain a wide variety of ecological, biological and oceanographic data in the research area. Therefore, JARPAII was comprehensive and interdisciplinary study, including

lethal and non-lethal samplings. This paper reviews the survey procedure of JARPAII with special reference to methodology of sighting and sampling.

## GENERAL METHODOLOGY

The first two seasons (2005/06 and 2006/07) were dedicated to feasibility studies. The practicability and appropriateness of sighting methods in the enlarged area and sampling procedures given the increased sample size and additional species were examined. Methods for catching, flensing and taking biological measurements of large body-sized whales were tested. The full-scale JARPAII started from the 2007/08 season.

### Research area and season

JARPA began with surveys in Areas IV (70-130E) and V (130E-170W). From the austral summer season 1995/96, the research area extended to include the eastern part of Area III (35-70E) and the western part of Area VI (170-145W). The stock structure of Antarctic minke whales was therefore investigated in an area spanning 180 degrees in longitude. With regard to the Antarctic minke whale, it was found that two independent stocks in the research area and a soft boundary at 165E (middle of Area V) was proposed for management purpose (Pastene *et al.*, 2005). To the west of this boundary line, but especially in Area IV, humpback whales have shown a rapid increase in recent years, and have surpassed the Antarctic minke whale in biomass. Fin whales have also shown a rapid increase with an abundance estimate of about 9,000 animals in Areas IV and IIIE.

The area to be covered by JARPAII is basically the same as JARPA. Fig. 1 shows research area of JARPAII (the eastern part of Area III, Areas IV and V, and the western part of Area VI (35E-145W).

The whole research area was divided two. The western part of the research area included Areas IIIE, IV and part of Area V (35E-175E). The eastern part of the research area included Areas V and VIE (130E-145W). The plan was to survey each of these areas every other year meaning that the entire research area would be covered in every 2 year period. The sighting survey was planned in the research area south of 60S. The sampling survey was planned in the research area south of 62S.

The research areas were further divided into two strata, a south stratum extending from the ice edge to a locus 45n.miles, and a north stratum extending from the northern boundary of the northern boundary (60S or 62S). Provision for exceptional cases included the northern boundary of the Prydz Bay which was fixed at 66s and the northern boundary of the Ross Sea which was fixed at 69S. The research period ranged from the end of November to March.

### Design of track lines

The minimum unit of longitudinal width is 10 degrees in principle. The disposition of track lines was set by random selection of each longitudinal 10 degrees width. The number of unites was allocated to correspond with the longitudinal width of each stratum. However, the width of units was changed based on the planed research days within stratum. Track lines were constructed for SVs and SSVs, separately (Fig. 2). Vessels made sightings alternately in the north and south strata. The survey track line for the SVs consisted of two legs in the northern stratum at 5 longitudinal degree intervals and four legs in the southern stratum for 2-30 degree longitudinal intervals. Two SVs alternately survey the northern and southern strata each crossing the track line at the veering point between two strata. The interval of legs and number of legs for the northern stratum could be changed by sub-area according to progress of the survey. Allocation of SSVs to track lines is shown in Fig. 3. Figs. 4 and 5 show the modification of track line by the ice edge line.

### Vessels

The following research vessels were used for JARPAII.

- 1) Research base vessel (RBV)  
*Nisshin-maru* (NM; 8,030.00tons to 8,044.00tons) 2005/06 season-2010-11 season
- 2) Sighting and sampling vessel(SSV)  
*Kyo-maru No.1* (K01; 812.08tons) 2005/06 season and 2006/07 season  
*Yushin-maru* (YS1; 720.00tons) 2005/06 season-2010-11 season  
*Yushin-maru No.2* (YS2; 747.00tons) 2005/06 season-2010-11 season  
*Yushin-maru No.3* (YS3; 742.00tons) 2007/08 season and 2009/10 season
- 3) Sighting vessel(SV)  
*Kyoshin-maru No.2* (KS2; 372.00tons) 2005/06 season -2008/09season  
*Kaikou-maru* (KK1; 860.25tons) 2005/06 season -2008/09 season  
*Shonan-maru No.2* (SM2; 712.00tons) 2009/10 season

### **Sighting method**

JARPAII also kept its unique sighting and sampling method during all surveys. In order to obtain biological samples representing the whole population in the research area, random sampling method under the line transect sighting survey was adopted. Sightings of whales were classified into primary and secondary sightings. The primary sightings were those seen in normal searching mode (two or three primary observers searched from the top barrel of the vessel on the pre-determined track-line). The secondary sightings were those seen in out of normal searching mode (e.g. during closing or chasing whales, no observer in the top barrel or vessel engages in other work) or off the research time. In principle, the sighting survey by SSVs was conducted under limited closing mode (NSC: when a sighting of Antarctic minke whale was made on the predetermined track line, the vessel approached it and species and school size were confirmed).

The sighting survey by the SV was conducted under limited closing mode (ASP; same manner as NSC without sampling of whales) and passing mode (NSP; even was made on the predetermined track line, the vessel did not approach the whale directly and searching from the top barrel was uninterrupted).

### **Sighting procedure**

Three or two SSVs advanced along parallel track lines 7n.miles apart, at a standard speed of 11.5knots. The SVs advanced at a standard speed of 10.5knots.

Basically, each of the SSVs changed the track line order among the three everyday to avoid possible sighting bias by fixed position. Starting position of the day was set at the position where one of SSVs ended the survey on the previous day in the most advanced position. Other SSVs moved to the starting position of next day after the end of the daily survey. When 'pre-determined distance per day' was set, the SSVs skipped the remaining distance, when they could not complete the distance per day. These daily arrangements of SSVs were determined by a cruise leader on the research base vessel.

In addition to sightings of Antarctic minke whales or whales suspected to be Antarctic minke whales, the SV approached blue, fin, southern right and humpback whales for conducting some experiments (e.g. photo ID and biopsy sampling). The SSVs also occasionally approached these whales for conducting some experiments.

All sightings of whales were recorded. The sighting record includes date and time of the sighting, position of the vessel, classification of survey mode and sighting (primary or secondary). Angle and distance from the vessel, species and school size, estimated body length, and other information was recorded.

### **Operation by survey condition**

Both SV and SSV survey were operated under the same optimal research conditions (when the wind speed was below 25knots in the southern strata and 20knots in the northern strata and visibility was more than 2.0n.miles). In addition to sightings of Antarctic minke whales and fin whales or whales suspected to be these species, the SV and SSV approached blue and southern right whales for conducting experiments. Humpback and other whales were also approached for conducting experiments.

#### *Sighting distance and angle experiment*

This experiment was conducted in order to evaluate the accuracy of the information on sighting distance and sighting angle given by observers of the SV and SSVs.

#### *Sampling method*

Sampling of 850 Antarctic minke whales (with 10% allowance) and ten fin whales was planned in the research area south of 62S for the feasibility surveys. The samples sizes were 850 (with 10% allowance), 50 and 50 for Antarctic minke, fin and humpback whales, respectively, during the full research. The original research plan of JARPA II specified those three target species for the lethal component of research (Government of Japan, 2005). No humpback whales sampled in the first period and this was due to political reasons. The Government of Japan decided to suspend their sampling in response to request from the Chair of IWC in order to contribute to the creation of a positive atmosphere for the negotiations to resolve the stalemate in the IWC (i. e. the 'Future of the IWC' process) that were initiated at the 2007 Annual Meeting of the Commission.

Two or three SSVs were engaged in sampling survey. One to two Antarctic minke whales were sampled randomly from each primary sighted school within 3n.miles of the track line. The dwarf form minke whales were not a target for sampling. Sampling of fin whales was restricted to those animals with an estimated body length less than 20m (this was revised downward to less than 19m during research period in 2006/07 season) due to the limitation of NM facility for

pulling up the animal onboard. One fin whale was sampled randomly from each primary sighted school within 3n.miles of the track line. If two or more animals smaller than 20m were found in the single school, then only one of them randomly selected.

### **Biological survey**

Non-lethal means are not satisfactory to address all of the objectives of JARPAII. For example, age of whale, nutrition condition of the whale, food consumption, and heavy metal load can't be obtained by the current non-lethal methods. As well as the former JARPA, JARPAII is conducted as a comprehensive research plan using lethal and non-lethal methods allocated properly for each research objective. Most of the research methods in JARPAII were established through a research period of 18 years in JARPA.

### **Non-lethal survey**

Besides, the sighting survey, JARPAII conducted a variety of non-lethal surveys. These surveys especially contributed to study on large baleen whales, prey species and oceanography.

#### *Photo-identification*

The following species were targeted for photographic record of natural markings by SVs and SSVs: blue, humpback and southern right whales.

#### *Biopsy sampling*

In addition to species targeted for the photo-identification experiment, pygmy right, fin, sei, sperm and southern bottlenose whales were targeted for biopsy skin sampling by the SVs and SSVs using a compound-crossbow. All samples collected were preserved at -30C.

#### *Prey species survey*

Two SVs conducted hydro-acoustic surveys using a passive acoustic system (EK 500 with operating frequencies at 38kHz, 120kHz, 200kHz, SIMRAD, Norway) to elucidate distribution and abundance of prey species of Antarctic baleen whales. *Kaikou-Maru* conducted net sampling for prey species of whales. The IKMT was used for sampling of krill and the NORPAC net was used for amphipods.

#### *Oceanographic survey*

The SVs conducted the following oceanographic survey;

- 1) Consecutive measuring of surface water temperature, conductivity, surface chlorophyll, dissolved oxygen and surface particle by Electric Particle Counting and Sizing System (EPCS).
- 2) XCTD and CTD survey
- 3) Marine debris recording in the research area. All marine debris found in the stomach of whales taken was also recorded and collected on the NM.

In addition to these surveys, the SVs deployed Argo profiling floats (profiling devices) to collect high quality oceanographic data of upper and middle layers of the world ocean almost simultaneously with high space-time resolution. This was a cooperative study with Japan Marine Science and Technology Center.

#### *Satellite tagging*

Two SSVs attempted satellite tag attachment on Antarctic minke and humpback whales

#### *Vomiting and defecation observation*

The SVs and SSVs were engaged in observations of vomits and defecations of sighted whales.

#### *Clasper and seabird sighting*

The SVs were engaged in sightings of clasper and seabirds on an opportunistic basis during the research period.

## **OUTLINE OF THE RESEARCH CRUISES**

Details of each cruise are described in cruise reports of JARPAII (Ishikawa *et al.*, 2008; 2011, Nishiwaki *et al.*, 2006; 2007; 2009; 2010). Table 1 and Fig. 6 summarizes outline of JARPAII. Followings are summary of research procedure and results in each cruise. Throughout all of research season, the un-surveyed area and a lack of the search effort occurred due to external interference by violent action by anti-whaling groups.

### **2005/06 season (Areas III, IV and parts of Area V, Figs. 7 - 10)**

The first surveys of the JARPA II were carried out between 3 December 2005 and 20 March 2006 (108 days) in Areas III, IV and part of V. The whale research unit (WRU) encountered a Greenpeace vessel during the research activity on

21 December 2005 and, a Sea Shepherd (SS) vessel together with GP on 25 December 2005. The WRU interrupted research activities from 25 December 2005 to 2 January 2006 to ensure safe refuelling. The attempted obstruction and violent activities of GP occurred from 21 December 2005 to 19 January 2006. The part of a strip (35E-55E) in figures 7-10 shows the un-surveyed area due to obstruction of anti-whaling groups. The total searching distance was 16,372.7n.miles and 8,836.2n.miles for the two SVs and 7,536.5n.miles for the three SSVs. The following species managed by the IWC were sighted: Antarctic minke, blue, fin, sei, humpback, southern right, sperm and southern bottlenose whales. The Antarctic minke and humpback whales were the dominant species. Out of 821 schools (1,959 individuals) in the primary sightings of Antarctic minke whales by SSVs, 779 schools (1,879 individuals) were targeted for sampling. A total of 853 individuals were sampled. Out of 37 schools (245 individuals) in the primary sightings of fin whales by SSVs, 11 schools (112 individuals) were targeted for sampling. A total of 10 animals were sampled. The maximum body length for the sampled fin whales was 20.22m (female, 61.52tons).

#### **2006/07 season (Areas V and VIW, Figs. 11-14)**

The second feasibility survey of the JARPAII was carried out from 15 December 2006 to 28 February 2007 (76 days) in Areas VIW, VE and part of Area VW. The research activity was interrupted for three days due to external interference by the Sea Shepherd and for 10 days due to a fire accident on the research base *Nisshin-Maru*. The survey was subsequently discontinued. A part of strip (130E-170E) in figures 11-14 shows the un-surveyed area due to obstruction of the anti-whaling group and the fire accident. The total searching distance was 11,968.9n.miles and 6,091.7n.miles for the two SVs and 5,877.1n.miles for the three SSVs. The following species managed by the IWC were sighted: Antarctic minke, blue, fin, humpback, sperm and southern bottlenose whales. Antarctic minke whales were the most dominant species and were widely distributed in the whole research areas except the northern part of research area. Out of 443 schools (1,043 individuals) of the primary sightings of Antarctic minke whales by SSVs, 438 schools (1,027 individuals) were targeted for sampling. A total of 505 animals were sampled. Out of 19 schools (156 individuals) of the primary sightings of fin whales by SSVs 3 schools (9 individuals) were targeted for sampling. A total of 3 animals were sampled. The maximum body length of the collected fin whales was 21.15m with body weight 65.02 tons. Photo-id experiments were conducted on blue and humpback whales.

#### **2007/08 season (Areas IIIIE, IV and parts of Area V, Figs. 15-17)**

The first full-scale research survey of the JARPAII was conducted during the 2007/08 austral summer season. Two SVs, three SSVs and one research base ship were engaged in the research for 101 days from 15 December 2007 to 24 March 2008 in the Area IIIIE, IV, VW and a part of Area VE. The total searching distance was 14,575.4n.miles. The research activity was interrupted several times by violent action by anti-whaling groups. Both sighting and sampling surveys in the Area VE were cancelled and sampling surveys in the Area IVE and Area VE was not fully completed. The part of a strip (SSV: 130E-175E, SV: 165E-175E) in figures 15-17 shows the un-surveyed area due to obstruction of anti-whaling groups. For the following species managed by the IWC, eight species including six baleen whales (Antarctic minke, blue, fin, sei, humpback and southern right whale) and two toothed whales (sperm and southern bottlenose whale) were identified during research period. Humpback whale was most dominant species in the research areas followed by Antarctic minke whale. Out of 501 schools (979 individuals) in the primary sightings of Antarctic minke whales by three SSVs, 473 schools (912 individuals) were targeted and a total of 551 animals were sampled. Three SSVs made only nine primary sightings of fin whales. Sampling for these whales was not conducted due to inappropriate sea condition for safe transferring and flensing and /or practical reasons.

#### **2008/09 season (Areas V and VIW, Figs. 18-21)**

The second full-scale research survey of the JARPAII was conducted during the 2008/09 austral summer season. Two SVs, three SSVs and one research base ship were engaged in the research for 103 days from 10 December 2008 to 22 March 2009 in the Area V and western part of Area VI. The part of a strip (SSV: 130E-165E) in figures shows the un-surveyed area due to obstruction of the anti-whaling group Sea Shepherd. The total searching distance was 14,351.45n.miles. The research activities were interrupted several times by violent actions of the SS (an anti-whaling group) over 16 days. The part of a strip (SSV: 130E to 145W) in figures 18-21 shows the un-surveyed area due to obstruction of the anti-whaling group. For the following species managed by the IWC, eight species including six baleen whales (Antarctic minke, blue, fin, sei, humpback and southern right whale) and two toothed whales (sperm and southern bottlenose whale) were identified during research period. A total of 1,973 groups (4,883 individuals) of Antarctic minke whales were sighted and were the dominant species. A total of 679 Antarctic minke whales and one fin whale were sampled. The body length of this fin whale was 14.79m (Immature female).

#### **2009/10 season (Areas IIIIE, IV and parts of Area V, Figs. 22-25)**

The third full-scale research survey of the JARPAII was conducted during the 2009/10 austral summer season. Two SVs, two SSVs and one research base ship were engaged in research for 97 days from 14 December 2009 to 20 March

2010 in Areas III, IV and parts of Area V. The part of a strip (SSV: 35E-153E, SV: 35E-175E) in figures 22-25 shows the un-surveyed area due to obstruction of an anti-whaling group. The total searching distance was 8,232.0 n.miles. The research activities were interrupted several times by violent actions of the SS (an anti-whaling group) over 31 days. The strip of the figures 22-25 shows the un-surveyed area due to obstruction of anti-whaling group. For the following species managed by the IWC, eight species including six baleen whales (Antarctic minke, blue, fin, sei, humpback and southern right whale) and two toothed whales (sperm and southern bottlenose whale) were identified during research period. A total of 986 groups (2,242 individuals) of Antarctic minke whales were sighted. It was the dominant species in the research area followed by the humpback whale (603 groups, 1,187 individuals), fin whales (56 groups, 186 individuals). The number of sightings of the Antarctic minke whales was about 1.9 times higher than that of humpback whales and was considerably higher than those of other species. A total of 506 Antarctic minke whales and one fin whale were sampled.

#### **2010/11 season (Areas V and VIW, Figs. 26-28)**

The fourth full-scale research survey of the JARPAII was conducted during the 2010/11 austral summer season. One SV, two SSVs and one research base ship were engaged in research for 52 days from 29 December 2010 to 18 February 2011 in Areas VIW and V. The part of a strip (SSV: 130E-165E, SV: un-surveyed) in figures 26-28 shows the un-surveyed area due to obstruction of an anti-whaling group. The total searching distance was 1,877.2 n.miles. Although the research in the 2010/11 JARPAII was planned to continue by middle of March, it was shortened and the research activity was restricted because of the obstruction of the SS (violent anti-whaling group). The strip of figures 26-28 shows the un-surveyed area due to obstruction of anti-whaling group. SV and one of the SSVs were dedicated to search for and monitor the Sea Shepherd vessels for most of the research period. For the following species managed by the IWC, six species including four baleen whales (Antarctic minke, blue, fin, humpback and southern right whale) and two toothed whales (sperm and southern bottlenose whale) were identified during research period. A total of 530 groups (1,576 individuals) of Antarctic minke whales were sighted. It was the dominant species in the research area followed by the humpback whale (44 groups, 83 individuals), fin whales (34 groups, 120 individuals). A total of 170 Antarctic minke whales and two fin whales were sampled.

### **OUTLINE OF NON-LETHAL SURVEY**

#### **Photo-identification**

Table 3 summarizes the results of photo-ID. It was conducted throughout the entire research areas. A total of 360 targeted individuals were photographed (58 blue, 226 humpback and 76 southern right whales).

#### **Biopsy sampling**

Table 4 summarizes the results of biopsy sampling. It was conducted throughout the entire research area. A total of 196 skin biopsy samples were collected (11 blue, 17 fin, one sei, 128 humpback, 34 southern right, two sperm, one killer, one long finned pilot and one southern bottlenose whales).

#### **Oceanographic and prey species surveys**

Table 5 shows a summary of oceanographic and prey species surveys. CTD, XCTD and TDR castings conducted at 361, 347 and 18 locations. EPCS survey was for 482 days from the 2005/06 to 2008/09 seasons. SVs conducted a quantitative echo sounder survey which totalled 491 days in whole research areas from the 2005/06 to 2008/09 seasons. IKMT was conducted in sampling of prey species (Krill) at 120 locations in the whole research area from the 2006/07 to 2008/09 seasons. NORPAC was conducted in sampling of prey species (Amphipods) at 83 locations in the whale research area throughout the 2007/08 and 2008/09 seasons.

#### **Marine debris recording in the research area**

The marine debris recording was carried out concomitant with the sighting surveys of the SVs throughout the research area.

Table 6 shows a summary of observed marine debris during the 2005/06 to 2010/11 seasons.

#### **Satellite tagging**

The satellite tagging of whales was attempted in all research seasons. Table 7 shows results of satellite tag attachment on whales.

## Faecal and vomit observation

Recording observations of faeces was started in the 2006/07 season. Table 8 shows results of observations of whale faeces. Faeces were observed for 5 species (fin, sei, Antarctic minke, humpback and southern right whales). The recording of observations of vomit was started in the 2008/09 season. Vomit was not observed during 2008/09 to 2010/11 seasons (Table 9).

## Clasper and seabird sightings

The SVs were engaged in sightings of clasper and seabirds on an opportunistic basis during the 2005/06 to 2008/09 seasons. Table 10 shows a summary of observed claspers and seabirds, by season. Table 11 shows a summary of observed claspers and seabirds, by area.

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Table 1

## Outline of the JARPAII

| No. | Season  | Type of survey | Research area |    |   |      | Research period<br>(Research days)   | Research vessel |               |          | Sampled number of<br>Antarctic minke whale (Fin whale) |      |     |      |       |
|-----|---------|----------------|---------------|----|---|------|--------------------------------------|-----------------|---------------|----------|--|------|-----|------|-------|
|     |         |                | III E         | IV | V | VI W |                                      | RBV             | SSV           | SV       | III E  | IV   | V   | VI W | Total |
| 1   | 2005/06 | Feasibility    | ○             | ○  | ○ | -    | 03 Dec. 2005 – 20 Mar. 2006<br>(108) | NM              | YS1, YS2, K01 | KS2, KK1 | 130  | 573  | 150 | -    | 853   |
|     |         |                |               |    |   |      |                                      |                 |               |          | -  | (10) | -   | -    | (10)  |
| 2   | 2006/07 | Feasibility    | -             | -  | ○ | ○    | 15 Dec. 2006 – 27 Feb. 2007<br>(76)  | NM              | YS1, YS2, K01 | KS2, KK1 | -  | -    | 402 | 101  | 503   |
|     |         |                |               |    |   |      |                                      |                 |               |          | -  | -    | (3) | -    | (3)   |
| 3   | 2007/08 | Full scale     | ○             | ○  | ○ | -    | 15 Dec. 2007 – 24 Mar. 2008<br>(101) | NM              | YS1, YS2, YS3 | KS2, KK1 | 229  | 235  | 87  | -    | 551   |
|     |         |                |               |    |   |      |                                      |                 |               |          | -  | -    | -   | -    | -     |
| 4   | 2008/09 | Full scale     | -             | -  | ○ | ○    | 10 Dec. 2008 – 22 Mar. 2009<br>(103) | NM              | YS1, YS2, YS3 | KS2, KK1 | -  | -    | 384 | 295  | 679   |
|     |         |                |               |    |   |      |                                      |                 |               |          | -  | -    | (1) | -    | (1)   |
| 5   | 2009/10 | Full scale     | ○             | ○  | ○ | -    | 14 Dec. 2009 - 20 Mar. 2010<br>(97)  | NM              | YS1, YS2      | YS3, SM2 | 246  | 102  | 158 | -    | 506   |
|     |         |                |               |    |   |      |                                      |                 |               |          | (1)  | -    | -   | -    | (1)   |
| 6   | 2010/11 | Full scale     | -             | -  | ○ | ○    | 29 Dec. 2010 - 18 Feb. 2011<br>(52)  | NM              | YS1, YS2      | YS3      | -  | -    | 161 | 9    | 170   |
|     |         |                |               |    |   |      |                                      |                 |               |          | -  | -    | (2) | -    | (2)   |

RBV: Research base vessel  
 NM: Nisshin-Maru  
 K01:Kyo-Maru No.1  
 SSV: Sighting and sampling vessel  
 YS1: Yushin-Maru No.1  
 KS2: Kyoshin-Maru No.2  
 SV: Sighting vessel  
 YS2: Yushin-Maru No.2  
 KK1: Kaiko-Maru  
 YS3: Yushin-Maru No.3  
 SM2: Shonan-Maru No.2



Table 2-a

Data and samples of Antarctic minke whales collected by biological survey on the research base vessel in JARPAII

| Sample and data  | Number of Antarctic minke whales M: Male F: Female |     |       |         |     |       |         |     |       |         |     |       |         |     |       |         |     |       |       |       |        |
|--|--|-----|-------|---------|-----|-------|---------|-----|-------|---------|-----|-------|---------|-----|-------|---------|-----|-------|-------|-------|--------|
|  | 2005/06  |     |       | 2006/07 |     |       | 2007/08 |     |       | 2008/09 |     |       | 2009/10 |     |       | 2010/11 |     |       | Total |       |        |
|  | M  | F   | Total | M       | F   | Total | M       | F   | Total | M       | F   | Total | M       | F   | Total | M       | F   | Total | M     | F     | Total  |
| Photographic record of external character                                | 461  | 389 | 850   | 154     | 351 | 505   | 273     | 278 | 551   | 375     | 303 | 678   | 237     | 267 | 504   | 62      | 108 | 170   | 1,562 | 1,696 | 3,258  |
| Body length and sex identification                                       | 462  | 391 | 853   | 153     | 350 | 503   | 273     | 278 | 551   | 375     | 304 | 679   | 237     | 269 | 506   | 62      | 108 | 170   | 1,562 | 1,700 | 3,262  |
| Measurement of external body proportion                                  | 462  | 391 | 853   | 154     | 351 | 505   | 273     | 278 | 551   | 375     | 304 | 679   | 237     | 269 | 506   | 62      | 108 | 170   | 1,563 | 1,701 | 3,264  |
| Body weight  | 12   | 11  | 23    | 65      | 54  | 119   | 63      | 38  | 101   | 375     | 304 | 679   | 237     | 269 | 506   | 62      | 108 | 170   | 814   | 784   | 1,598  |
| Diatom film observation  | 462  | 391 | 853   | 154     | 348 | 502   | 273     | 278 | 551   | 375     | 304 | 679   | 237     | 269 | 506   | 62      | 108 | 170   | 1,563 | 1,698 | 3,261  |
| Body weight by total weight of parts                                     | 5  | 6   | 11    | 13      | 15  | 28    | 19      | 13  | 32    | 6       | 3   | 9     | 2       | 1   | 3     | -       | -   | -     | 45    | 38    | 83     |
| Standard measurement of blubber thickness (two points)                   | 462  | 391 | 853   | 154     | 351 | 505   | 273     | 278 | 551   | 375     | 304 | 679   | 237     | 269 | 506   | 62      | 108 | 170   | 1,563 | 1,701 | 3,264  |
| Lactation status   | -  | 391 | 391   | -       | 351 | 351   | -       | 278 | 278   | -       | 304 | 304   | -       | 269 | 269   | -       | 108 | 108   | -     | 1,701 | 1,701  |
| Measurement of mammary gland   | -  | 391 | 391   | -       | 350 | 350   | -       | 278 | 278   | -       | 304 | 304   | -       | 269 | 269   | -       | 108 | 108   | -     | 1,700 | 1,700  |
| Photographic record of fetus   | 126  | 93  | 227*  | 139     | 113 | 258*  | 82      | 85  | 170*  | 91      | 98  | 195*  | 83      | 91  | 186*  | 48      | 36  | 86*   | 569   | 516   | 1,122* |
| Fetal length and weight  | 126  | 93  | 227*  | 137     | 111 | 255*  | 82      | 85  | 170*  | 91      | 98  | 195*  | 83      | 91  | 186*  | 48      | 36  | 86*   | 567   | 514   | 1,119* |
| Testis weight  | 462  | -   | 462   | 154     | -   | 154   | 273     | -   | 273   | 375     | -   | 375   | 237     | -   | 237   | 62      | -   | 62    | 1,563 | 0     | 1,563  |
| Stomach content weight   | 440  | 378 | 818   | 142     | 327 | 469   | 273     | 278 | 551   | 362     | 288 | 650   | 237     | 269 | 506   | 62      | 108 | 170   | 1,516 | 1,648 | 3,164  |
| Measurement of skull (length and breadth)                                | 437  | 360 | 797   | 151     | 346 | 497   | 263     | 269 | 532   | 357     | 288 | 645   | 233     | 264 | 497   | 61      | 104 | 165   | 1,502 | 1,631 | 3,133  |
| Macro pathological observation (thyroid, lung, stomach, liver and gonad) | 462  | 391 | 853   | 154     | 351 | 505   | 273     | 278 | 551   | 375     | 304 | 679   | 237     | 269 | 506   | 62      | 108 | 170   | 1,563 | 1,701 | 3,264  |
| Record of external parasites**   | -  | -   | -     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -     | -     | -      |
| Record of internal parasites**   | -  | -   | -     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -     | -     | -      |
| Record of marine debris**  | -  | -   | -     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -     | -     | -      |

\*Including a fetus of sex unidentified. \*\*Described only in the field book.

Table 2-b

Data and samples of Antarctic minke whales collected by biological survey on the research base vessel in JARPAII

| Sample and data  | Number of Antarctic minke whales M: Male F: Female |     |       |         |     |       |         |     |       |         |     |       |         |     |       |         |     |       |       |       |        |
|--|--|-----|-------|---------|-----|-------|---------|-----|-------|---------|-----|-------|---------|-----|-------|---------|-----|-------|-------|-------|--------|
|  | 2005/06  |     |       | 2006/07 |     |       | 2007/08 |     |       | 2008/09 |     |       | 2009/10 |     |       | 2010/11 |     |       | Total |       |        |
|  | M  | F   | Total | M       | F   | Total | M       | F   | Total | M       | F   | Total | M       | F   | Total | M       | F   | Total | M     | F     | Total  |
| Blood plasma for physiological study                             | 459  | 389 | 848   | 151     | 349 | 500   | 272     | 278 | 550   | 375     | 300 | 675   | 215     | 239 | 454   | 52      | 93  | 145   | 1,524 | 1,648 | 3,172  |
| Earplug for age determination                                    | 462  | 391 | 853   | 154     | 351 | 505   | 273     | 278 | 551   | 373     | 303 | 676   | 236     | 269 | 505   | 61      | 106 | 167   | 1,559 | 1,698 | 3,257  |
| Ocular lens for age determination                                | 107  | 107 | 214   | 66      | 114 | 180   | 89      | 98  | 187   | 97      | 104 | 201   | 237     | 269 | 506   | 62      | 108 | 170   | 658   | 800   | 1,458  |
| Tympanic bone for chemical analysis                              | 48   | 27  | 75    | 18      | 28  | 46    | 33      | 22  | 55    | 41      | 30  | 71    | 30      | 18  | 48    | -       | -   | -     | 170   | 125   | 295    |
| Largest baleen plate for chemical analysis                       | 462  | 390 | 852   | 154     | 351 | 505   | 272     | 278 | 550   | 373     | 303 | 676   | 237     | 269 | 506   | 14      | 10  | 24    | 1,512 | 1,601 | 3,113  |
| Vertebral epiphyses sample                                       | 401  | 308 | 709   | 139     | 327 | 466   | 222     | 223 | 445   | 322     | 232 | 554   | 208     | 230 | 438   | 48      | 98  | 146   | 1,340 | 1,418 | 2,758  |
| Ovary  | -  | 391 | 391   | -       | 351 | 351   | -       | 278 | 278   | -       | 304 | 304   | -       | 269 | 269   | -       | 108 | 108   | -     | 1,701 | 1,701  |
| Histological sample of endometrium                               | -  | 15  | 15    | -       | 29  | 29    | -       | 14  | 14    | -       | 7   | 7     | -       | 17  | 17    | -       | -   | -     | -     | 82    | 82     |
| Histological sample of mammary gland                             | -  | 391 | 391   | -       | 351 | 351   | -       | 278 | 278   | -       | 304 | 304   | -       | 269 | 269   | -       | -   | -     | -     | 1,593 | 1,593  |
| Milk sample for chemical analysis                                | -  | 2   | 2     | -       | -   | -     | -       | 1   | 1     | -       | 2   | 2     | -       | -   | -     | -       | -   | -     | -     | 5     | 5      |
| Histological sample of testis                                    | 462  | -   | 462   | 154     | -   | 154   | 273     | -   | 273   | 375     | -   | 375   | 237     | -   | 237   | 62      | -   | 62    | 1,563 | -     | 1,563  |
| Tissues for genetic study (skin and liver)                       | 462  | 391 | 853   | 154     | 351 | 505   | 273     | 278 | 551   | 375     | 304 | 679   | 237     | 269 | 506   | 62      | 108 | 170   | 1,563 | 1,701 | 3,264  |
| Tissues for environmental monitoring (muscle, blubber and liver) | 462  | 391 | 853   | 154     | 351 | 505   | 273     | 278 | 551   | 375     | 304 | 679   | 237     | 269 | 506   | 62      | 108 | 170   | 1,563 | 1,701 | 3,264  |
| Tissue for air monitoring (Lung and liver)                       | 21   | 16  | 37    | 22      | 25  | 47    | 21      | 21  | 42    | 20      | 20  | 40    | 19      | 20  | 39    | 10      | -   | 10    | 113   | 102   | 215    |
| Tissues for histopathological study                              | 110  | 98  | 208   | 82      | 160 | 242   | 34      | 33  | 67    | 50      | 45  | 95    | 12      | 6   | 18    | 5       | 9   | 14    | 293   | 351   | 644    |
| Tissues for various analysis (muscle and blubber)                | -  | -   | -     | 3       | 3   | 6     | 3       | 3   | 6     | 3       | 3   | 6     | 3       | 3   | 6     | 3       | 5   | 8     | 15    | 17    | 32     |
| Tissues for nutritional component study                          | -  | -   | -     | -       | -   | -     | -       | 1   | 1     | -       | -   | -     | -       | -   | -     | -       | -   | -     | -     | 1     | 1      |
| Tissues for nutritional analysis (Muscle and blubber)            | -  | -   | -     | -       | -   | -     | -       | -   | -     | -       | 1   | 1     | -       | -   | -     | -       | -   | -     | -     | 1     | 1      |
| Stomach contents for food and feeding study                      | 38   | 24  | 62    | 24      | 66  | 90    | 24      | 22  | 46    | 43      | 30  | 73    | 25      | 31  | 56    | 11      | 11  | 22    | 165   | 184   | 349    |
| Stomach contents for environmental monitoring                    | 15   | 10  | 25    | 4       | 20  | 24    | 10      | 12  | 22    | 13      | 8   | 21    | 8       | 13  | 21    | 9       | 11  | 20    | 59    | 74    | 133    |
| External parasites   | 9  | 9   | 18    | -       | 1   | 1     | 3       | 3   | 6     | 3       | 3   | 6     | 4       | 6   | 10    | -       | -   | -     | 19    | 22    | 41     |
| Internal parasites   | 1  | 5   | 6     | 1       | 6   | 7     | 2       | -   | 2     | -       | -   | -     | 3       | 2   | 5     | -       | -   | -     | 7     | 13    | 20     |
| Fetus  | 0  | 0   | 8*    | 1       | 1   | 7*    | -       | -   | 3     | -       | -   | -     | -       | -   | -     | -       | -   | -     | 1     | 1     | 18*    |
| Fetal ocular lens for age determination                          | 16   | 11  | 27    | 64      | 45  | 109   | 28      | 27  | 55    | 27      | 41  | 68    | 9       | 8   | 17    | -       | -   | -     | 144   | 132   | 276    |
| Tissues for genetic study (fetal skin)                           | 126  | 93  | 227   | 137     | 108 | 252   | 82      | 85  | 170   | 90      | 98  | 193   | 83      | 91  | 182   | 48      | 36  | 86    | 566   | 511   | 1,110* |

\*Including a fetus of sex unidentified.

Table 2-c

Data and samples of Fin whales collected by biological survey on the research base vessel in JARPAII

| Sample and data  | Number of Fin whales M: Male F: Female |   |       |         |   |       |         |   |       |         |   |       |         |   |       |         |   |       |       |   |       |
|--|--|---|-------|---------|---|-------|---------|---|-------|---------|---|-------|---------|---|-------|---------|---|-------|-------|---|-------|
|  | 2005/06                                |   |       | 2006/07 |   |       | 2007/08 |   |       | 2008/09 |   |       | 2009/10 |   |       | 2010/11 |   |       | Total |   |       |
|  | M                                      | F | Total | M       | F | Total | M       | F | Total | M       | F | Total | M       | F | Total | M       | F | Total | M     | F | Total |
| Photographic record of external character                                | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Body length and sex identification                                       | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Measurement of external body proportion                                  | 4                                      | 6 | 10    | 1       | 2 | 3     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 9 | 17    |
| Body weight  | -                                      | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -     | - | -     |
| Diatom film observation  | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Body weight by total weight of parts                                     | 3                                      | 6 | 9     | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 1       | - | 1     | 6     | 8 | 14    |
| Standard measurement of blubber thickness (two points)                   | -                                      | - | -     | -       | - | -     | -       | - | -     | -       | 1 | 1     | -       | - | -     | -       | - | -     | -     | 1 | 1     |
| Detailed measurement of blubber thickness (fourteen points)              | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | - | -     | 1       | - | 1     | 2       | - | 2     | 8     | 7 | 15    |
| Lactation status   | -                                      | 6 | 6     | -       | 1 | 1     | -       | - | -     | -       | 1 | 1     | -       | - | -     | -       | - | -     | -     | 8 | 8     |
| Measurement of mammary gland   | -                                      | 6 | 6     | -       | 1 | 1     | -       | - | -     | -       | 1 | 1     | -       | - | -     | -       | - | -     | -     | 8 | 8     |
| Measurement of uterine horn breadth                                      | -                                      | 6 | 6     | -       | 1 | 1     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -     | 7 | 7     |
| Photographic record of fetus   | 1                                      | 1 | 2     | 1       | - | 1     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | 2     | 1 | 3     |
| Fetal length and weight  | 1                                      | 1 | 2     | 1       | - | 1     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | 2     | 1 | 3     |
| Measurements of external fetus   | 1                                      | 1 | 2     | 1       | - | 1     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | 2     | 1 | 3     |
| Testis weight  | 4                                      | - | 4     | 1       | - | 1     | -       | - | -     | -       | - | -     | 1       | - | 1     | 2       | - | 2     | 8     | - | 8     |
| Epididymis weight  | 4                                      | - | 4     | 1       | - | 1     | -       | - | -     | -       | - | -     | 1       | - | 1     | 2       | - | 2     | 8     | - | 8     |
| Stomach content weight   | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Measurement of skull (length and breadth)                                | 4                                      | 4 | 8     | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 6 | 14    |
| Number of ribs   | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | - | -     | 1       | - | 1     | 2       | - | 2     | 8     | 7 | 15    |
| Number of vertebra   | -                                      | - | -     | 1       | 1 | 2     | -       | - | -     | -       | - | -     | 1       | - | 1     | 2       | - | 2     | 4     | 1 | 5     |
| Number and length of baleen plates                                       | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Palate length  | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Macro pathological observation (thyroid, lung, stomach, liver and gonad) | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Record of external parasites**   | -                                      | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -     | - | -     |
| Record of internal parasites**   | -                                      | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -     | - | -     |
| Record of marine debris**  | -                                      | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -     | - | -     |

\*\*Described only in the field book.

Table 2-d

Data and samples of Fin whales collected by biological survey on the research base vessel in JARPAII

| Sample and data  | Number of Fin whales M: Male F: Female |   |       |         |   |       |         |   |       |         |   |       |         |   |       |         |   |       |       |   |       |
|--|--|---|-------|---------|---|-------|---------|---|-------|---------|---|-------|---------|---|-------|---------|---|-------|-------|---|-------|
|  | 2005/06                                |   |       | 2006/07 |   |       | 2007/08 |   |       | 2008/09 |   |       | 2009/10 |   |       | 2010/11 |   |       | Total |   |       |
|  | M                                      | F | Total | M       | F | Total | M       | F | Total | M       | F | Total | M       | F | Total | M       | F | Total | M     | F | Total |
| Diatom film sample   | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | - | -     | 1       | - | 1     | -       | - | -     | 6     | 7 | 13    |
| Blood plasma for physiological study                                   | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Earplug for age determination  | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Ocular lens for age determination                                      | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Tympanic bone for chemical analysis                                    | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Largest baleen plate for chemical analysis                             | 3                                      | 6 | 9     | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 7     | 8 | 15    |
| Vertebral epiphyses sample   | 4                                      | 6 | 10    | 1       | 2 | 3     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 9 | 17    |
| Ovary  | -                                      | 6 | 6     | -       | 1 | 1     | -       | - | -     | -       | 1 | 1     | -       | - | -     | -       | - | -     | -     | 8 | 8     |
| Histological sample of endometrium                                     | -                                      | 6 | 6     | -       | 1 | 1     | -       | - | -     | -       | 1 | 1     | -       | - | -     | -       | - | -     | -     | 8 | 8     |
| Histological sample of mammary gland                                   | -                                      | 6 | 6     | -       | 1 | 1     | -       | - | -     | -       | 1 | 1     | -       | - | -     | -       | - | -     | -     | 8 | 8     |
| Milk sample for chemical analysis                                      | -                                      | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -     | - | -     |
| Histological sample of testis  | 4                                      | - | 4     | 1       | - | 1     | -       | - | -     | -       | - | -     | 1       | - | 1     | 2       | - | 2     | 8     | - | 8     |
| Histological sample of epididymis                                      | 3                                      | - | 3     | 1       | - | 1     | -       | - | -     | -       | - | -     | 1       | - | 1     | 2       | - | 2     | 7     | - | 7     |
| Tissues for genetic study (skin and liver)                             | 4                                      | 6 | 10    | 1       | 2 | 3     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 9 | 17    |
| Tissues for environmental monitoring (muscle, blubber and liver)       | 4                                      | 6 | 10    | 1       | 2 | 3     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 9 | 17    |
| Tissue for air monitoring (Lung and liver)                             | 4                                      | 6 | 10    | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 8 | 16    |
| Tissues for histopathological study                                    | 4                                      | 3 | 7     | 1       | 1 | 2     | -       | - | -     | -       | - | -     | 1       | - | 1     | 2       | - | 2     | 8     | 4 | 12    |
| Tissues for various analysis (muscle and blubber)                      | -                                      | - | -     | -       | 1 | 1     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 3     | 2 | 5     |
| Tissues for lipid analysis (muscle, liver, kidney, lumbar and blubber) | 4                                      | 6 | 10    | 1       | 2 | 3     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | -       | - | -     | 6     | 9 | 15    |
| Tissues for nutritional component study                                | -                                      | - | -     | -       | - | -     | -       | - | -     | -       | 1 | 1     | -       | - | -     | -       | - | -     | -     | 1 | 1     |
| Tissues for chemical analysis (Muscle, liver and blubber)              | 4                                      | 6 | 10    | 1       | 2 | 3     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 9 | 17    |
| Tissues for nutritional analysis (Muscle and blubber)                  | 4                                      | 6 | 10    | 1       | 2 | 3     | -       | - | -     | -       | 1 | 1     | -       | - | -     | -       | - | -     | 5     | 9 | 14    |
| Stomach contents for food and feeding study                            | 4                                      | 5 | 9     | 1       | 1 | 2     | -       | - | -     | -       | 1 | 1     | 1       | - | 1     | 2       | - | 2     | 8     | 7 | 15    |
| Stomach contents for environmental monitoring                          | 2                                      | 3 | 5     | 1       | - | 1     | -       | - | -     | -       | - | -     | -       | - | 1     | -       | - | 1     | 4     | 3 | 7     |
| Stomach contents for lipid analysis                                    | 2                                      | 4 | 6     | 1       | - | 1     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | 3     | 4 | 7     |
| External parasites   | 3                                      | 2 | 5     | -       | - | -     | -       | - | -     | -       | - | -     | 1       | - | 1     | -       | - | -     | 4     | 2 | 6     |
| Internal parasites   | 1                                      | 0 | 1     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | 1     | - | 1     |
| Fetus  | -                                      | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | -     | - | -     |
| Fetal ocular lens for age determination                                | 1                                      | 1 | 2     | 1       | - | 1     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | 2     | 1 | 3     |
| Tissues for genetic study (fetal skin)                                 | 1                                      | 1 | 2     | 1       | - | 1     | -       | - | -     | -       | - | -     | -       | - | -     | -       | - | -     | 2     | 1 | 3     |

Table 3

Number of whales by photo-identification experiment

| Species              | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | Total |
|----------------------|---------|---------|---------|---------|---------|---------|-------|
| Blue Whale           | 13      | 2       | 23      | 11      | 9       | -       | 58    |
| Humpback Whale       | 34      | 25      | 16      | 39      | 112     | -       | 226   |
| Southern Right Whale | 38      | -       | 36      | -       | 2       | -       | 76    |
| Total                | 85      | 27      | 75      | 50      | 123     | -       | 360   |

individuals

Table 4

Number of samples by biopsy sampling experiment

| Species                   | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | Total |
|---------------------------|---------|---------|---------|---------|---------|---------|-------|
| Blue Whale                | 5       | 1       | 5       | -       | -       | -       | 11    |
| Fin Whale                 | 9       | 3       | 3       | 1       | 1       | -       | 17    |
| Sei Whale                 | 1       | -       | -       | -       | -       | -       | 1     |
| Humpback Whale            | 13      | 13      | 5       | 13      | 84      | -       | 128   |
| Southern Right Whale      | 15      | -       | 18      | -       | 1       | -       | 34    |
| Sperm Whale               | 1       | -       | 1       | -       | -       | -       | 2     |
| Killer Whale              | -       | -       | -       | -       | -       | 1       | 1     |
| Long Fin Pilot Whale      | 1       | -       | -       | -       | -       | -       | 1     |
| Southern Bottlenose Whale | 1       | -       | -       | -       | -       | -       | 1     |
| Total                     | 46      | 17      | 32      | 14      | 86      | 1       | 196   |

individuals

Table 5

Result of oceanographic and prey species survey

| Experiments       | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | Total |
|-------------------|---------|---------|---------|---------|---------|---------|-------|
| CTD(stations)     | 86      | 79      | 90      | 106     | -       | -       | 361   |
| XCTD(stations)    | 123     | 83      | 98      | 43      | -       | -       | 347   |
| XBT(stations)     | 18      | -       | -       | -       | -       | -       | 18    |
| TDR(stations)     | -       | -       | -       | -       | 57      | 8       | 65    |
| EPCS(days)        | 193     | 119     | 87      | 83      | -       | -       | 482   |
| Echosounder(days) | 94      | 62      | 171     | 164     | -       | -       | 491   |
| IKMT(stations)    | -       | 38      | 36      | 46      | -       | -       | 120   |
| NORPAC(stations)  | -       | -       | 37      | 46      | -       | -       | 83    |

Table 6

Number of marine debris records

| Area  | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | Total |
|-------|---------|---------|---------|---------|---------|---------|-------|
| III E | -       | -       | 2       | -       | 1       | -       | 3     |
| IV    | 12      | -       | 16      | -       | -       | -       | 28    |
| V     | 3       | 6       | 13      | 24      | 6       | -       | 52    |
| VI W  | -       | 1       | -       | 1       | -       | 1       | 3     |
| Total | 15      | 7       | 31      | 25      | 7       | 1       | 86    |

records

Table 7-a

Number of satellite tagging experiment

This experiment was not operated in 2007/08, 2009/10, 2010/11 season

| Species               | 2005/06 | 2006/07 | 2008/09 | Total |
|-----------------------|---------|---------|---------|-------|
| Fin Whale             | 1       | -       | -       | 1     |
| Antarctic Minke Whale | 1       | 2       | -       | 3     |
| Humpback Whale        | -       | -       | 1       | 1     |
| Total                 | 2       | 2       | 1       | 5     |

records

Table 7-b

Number of attached satellite tag

This experiment was not operated in 2007/08, 2009/10, 2010/11 season

0 mean that it was tried to attach satellite tag, however not success

| Species               | 2005/06 | 2006/07 | 2008/09 | Total |
|-----------------------|---------|---------|---------|-------|
| Fin Whale             | 0       | -       | -       | 0     |
| Antarctic Minke Whale | 0       | 1       | -       | 1     |
| Humpback Whale        | -       | -       | 1       | 1     |
| Total                 | 0       | 1       | 1       | 2     |

individuals

Table 8

Number of faecal was observed. This experiment was started in 2006/07 season

0 mean that it was not confirmed faecal

| Species               | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | Total |
|-----------------------|---------|---------|---------|---------|---------|-------|
| Fin Whale             | 5       | 0       | 0       | 2       | 0       | 7     |
| Sei whale             | 0       | 0       | 1       | 0       | 0       | 1     |
| Antarctic Minke Whale | 2       | 0       | 1       | 2       | 0       | 5     |
| Humpback Whale        | 0       | 1       | 0       | 2       | 0       | 3     |
| Southern Right Whale  | 0       | 1       | 0       | 0       | 0       | 1     |
| Total                 | 7       | 2       | 2       | 6       | 0       | 17    |

individuals

Table 9

Number of vomits was observed

This experiment was started in 2008/09 season, however it has never been confirmed

| Species               | 2008/09 | 2009/10 | 2010/11 | Total |
|-----------------------|---------|---------|---------|-------|
| Fin Whale             | 0       | 0       | 0       | 0     |
| Antarctic Minke Whale | 0       | 0       | 0       | 0     |
| Humpback Whale        | 0       | 0       | 0       | 0     |
| Total                 | 0       | 0       | 0       | 0     |

individuals

Table 10

## Sighting of clasper and seabird by the research season

| Season                 | 2005/06 |      | 2006/07   |      | 2007/08 |      | 2008/09   |      | Total   |      |           |      |    |     |   |   |     |       |    |     |
|------------------------|---------|------|-----------|------|---------|------|-----------|------|---------|------|-----------|------|----|-----|---|---|-----|-------|----|-----|
|                        | Primary |      | Secondary |      | Primary |      | Secondary |      | Primary |      | Secondary |      |    |     |   |   |     |       |    |     |
| Type                   | Sch.    | Ind. | Sch.      | Ind. | Sch.    | Ind. | Sch.      | Ind. | Sch.    | Ind. | Sch.      | Ind. |    |     |   |   |     |       |    |     |
| Crabeater seal         | 14      | 21   | 1         | 3    | 29      | 33   | -         | -    | 8       | 13   | -         | -    | 9  | 18  | - | - | 60  | 85    | 1  | 3   |
| Ross seal              | -       | -    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | -  | -   | - | - | -   | -     | -  | -   |
| Leopard seal           | 3       | 3    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | 1  | 1   | - | - | 4   | 4     | -  | -   |
| Weddel seal            | 2       | 2    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | -  | -   | - | - | 2   | 2     | -  | -   |
| Southern elephant seal | -       | -    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | 5  | 6   | - | - | 5   | 6     | -  | -   |
| Unidentified seal      | 30      | 33   | 3         | 5    | 14      | 18   | -         | -    | -       | -    | -         | -    | 2  | 2   | - | - | 46  | 53    | 3  | 5   |
| Antarctic fur seal     | 6       | 13   | 7         | 7    | -       | -    | -         | -    | 1       | 1    | -         | -    | -  | -   | - | - | 7   | 14    | 7  | 7   |
| Unidentified otariidae | 1       | 1    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | -  | -   | - | - | 1   | 1     | -  | -   |
| Unidentified pinnipeds | 2       | 2    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | -  | -   | - | - | 2   | 2     | -  | -   |
| King penguin           | -       | -    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | -  | -   | - | - | -   | -     | -  | -   |
| Adelie penguin         | 224     | 713  | 5         | 62   | 35      | 149  | -         | -    | 45      | 156  | 8         | 46   | 16 | 191 | - | - | 320 | 1,209 | 13 | 108 |
| Chinstrap penguin      | -       | -    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | 2  | 8   | - | - | 2   | 8     | -  | -   |
| Emperor penguin        | 21      | 68   | -         | -    | 10      | 13   | -         | -    | 1       | 2    | -         | -    | 5  | 5   | - | - | 37  | 88    | -  | -   |
| Unidentified penguins  | 11      | 50   | -         | -    | 12      | 84   | -         | -    | 5       | 16   | -         | -    | 3  | 64  | - | - | 31  | 214   | -  | -   |

Table 11

## Sighting of clasper and seabird by the research area

| Area                   | IIIE    |      | IV        |      | V       |      | VIW       |      | Transit |      | Total     |      |   |    |   |   |   |   |   |   |     |       |    |     |
|------------------------|---------|------|-----------|------|---------|------|-----------|------|---------|------|-----------|------|---|----|---|---|---|---|---|---|-----|-------|----|-----|
|                        | Primary |      | Secondary |      | Primary |      | Secondary |      | Primary |      | Secondary |      |   |    |   |   |   |   |   |   |     |       |    |     |
| Type                   | Sch.    | Ind. | Sch.      | Ind. | Sch.    | Ind. | Sch.      | Ind. | Sch.    | Ind. | Sch.      | Ind. |   |    |   |   |   |   |   |   |     |       |    |     |
| Crabeater seal         | 6       | 11   | -         | -    | 15      | 22   | 1         | 3    | 30      | 39   | -         | -    | 9 | 13 | - | - | - | - | - | - | 60  | 85    | 1  | 3   |
| Ross seal              | -       | -    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | - | -  | - | - | - | - | - | - | -   | -     | -  |     |
| Leopard seal           | -       | -    | -         | -    | 3       | 3    | -         | -    | -       | -    | -         | -    | 1 | 1  | - | - | - | - | - | - | 4   | 4     | -  | -   |
| Weddel seal            | -       | -    | -         | -    | 2       | 2    | -         | -    | -       | -    | -         | -    | - | -  | - | - | - | - | - | - | 2   | 2     | -  | -   |
| Southern elephant seal | -       | -    | -         | -    | -       | -    | -         | -    | 4       | 5    | -         | -    | 1 | 1  | - | - | - | - | - | - | 5   | 6     | -  | -   |
| Unidentified seal      | -       | -    | -         | -    | 30      | 33   | 3         | 5    | 14      | 18   | -         | -    | 2 | 2  | - | - | - | - | - | - | 46  | 53    | 3  | 5   |
| Antarctic fur seal     | -       | -    | -         | -    | 7       | 14   | -         | -    | -       | -    | -         | -    | - | -  | - | - | - | 7 | 7 | 7 | 14  | 7     | 7  |     |
| Unidentified otariidae | -       | -    | -         | -    | 1       | 1    | -         | -    | -       | -    | -         | -    | - | -  | - | - | - | - | - | - | 1   | 1     | -  | -   |
| Unidentified pinnipeds | -       | -    | -         | -    | 2       | 2    | -         | -    | -       | -    | -         | -    | - | -  | - | - | - | - | - | - | 2   | 2     | -  | -   |
| King Penguin           | -       | -    | -         | -    | -       | -    | -         | -    | -       | -    | -         | -    | - | -  | - | - | - | - | - | - | -   | -     | -  |     |
| Adelie Penguin         | 28      | 166  | 1         | 6    | 228     | 664  | 5         | 62   | 64      | 379  | 7         | 40   | - | -  | - | - | - | - | - | - | 320 | 1,209 | 13 | 108 |
| Chinstrap Penguin      | -       | -    | -         | -    | -       | -    | -         | -    | 2       | 8    | -         | -    | - | -  | - | - | - | - | - | - | 2   | 8     | -  | -   |
| Emperor penguin        | -       | -    | -         | -    | 20      | 66   | -         | -    | 17      | 22   | -         | -    | - | -  | - | - | - | - | - | - | 37  | 88    | -  | -   |
| Unidentified penguins  | 3       | 5    | -         | -    | 11      | 50   | -         | -    | 17      | 159  | -         | -    | - | -  | - | - | - | - | - | - | 31  | 214   | -  | -   |



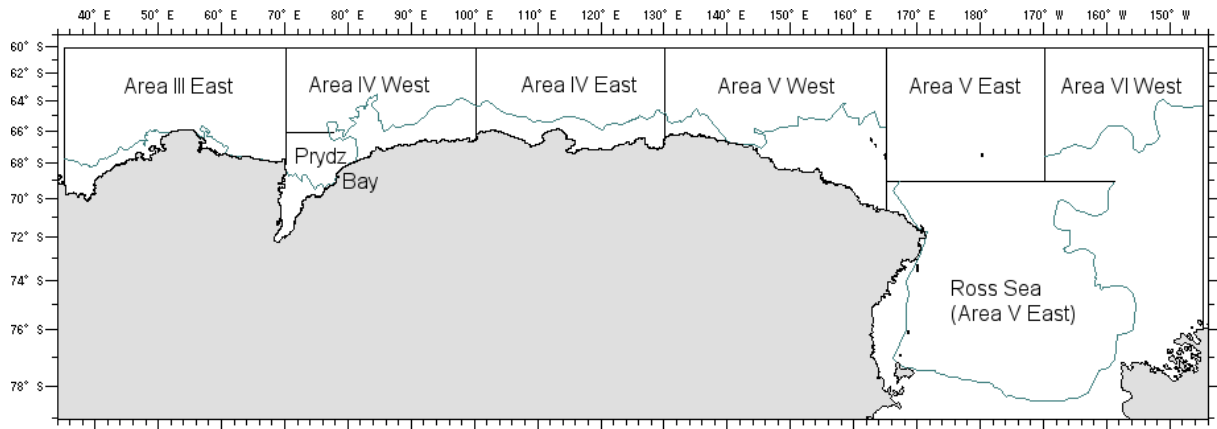


Fig.1. Research area of JARPAII (Area III, IV, V and VI) showing small strata.

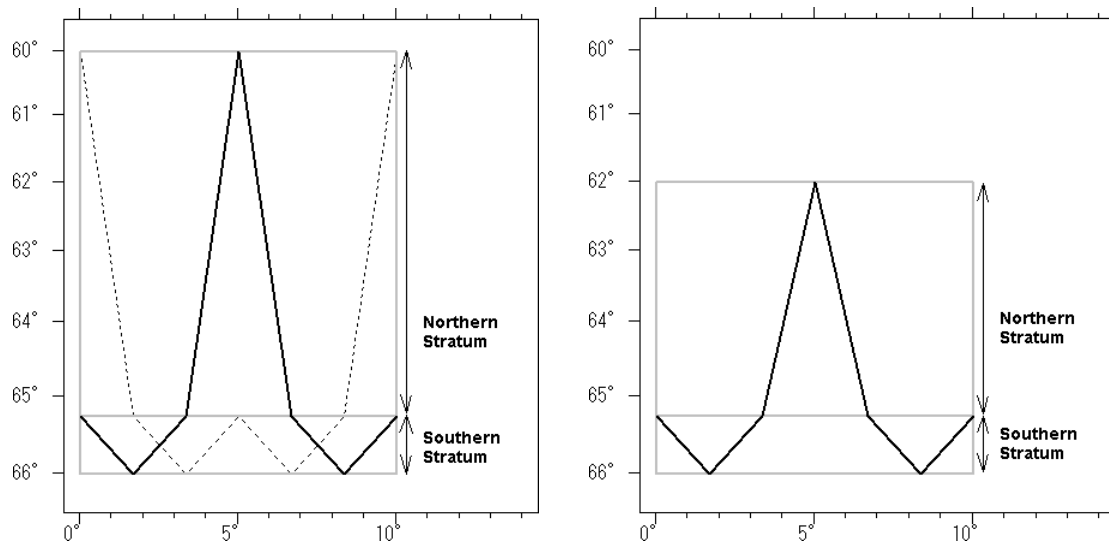


Fig. 2. Detail of the design of SV(left) and SSV(right) research track lines in JARPAII.

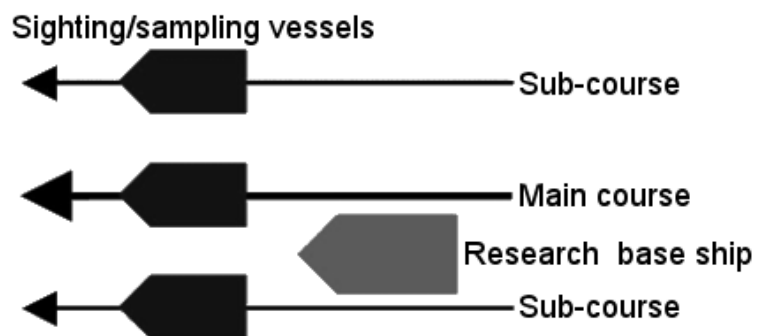


Fig. 3. Allocation of the three SSVs.

The research base vessel follows SSVs not to affect sighting and sampling survey.  
 The SVs track lines were constructed separately from SSVs.

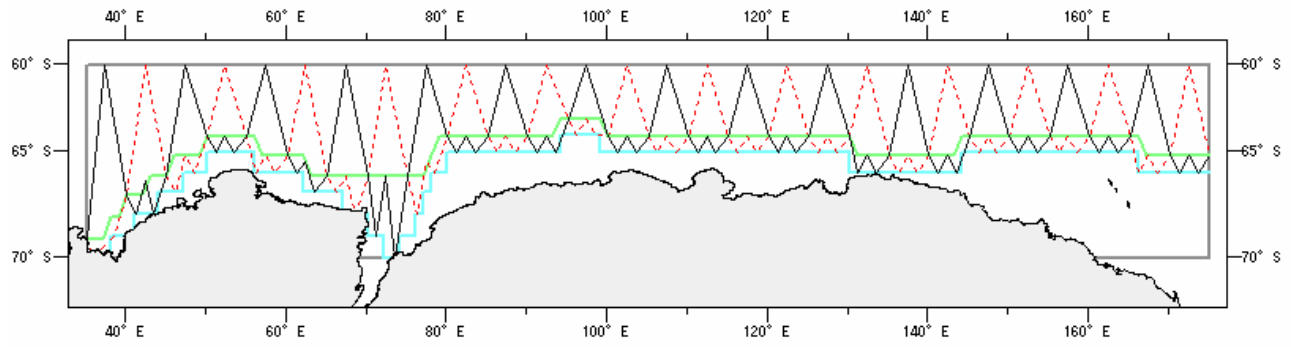


Fig. 4. Concept of the design of SV research track lines in JARPAII.

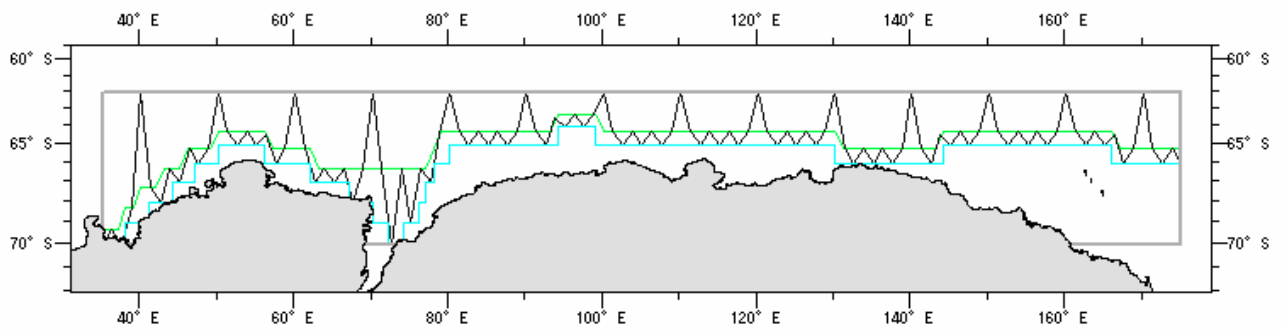


Fig. 5. Concept of the design of SSV research track lines in JARPAII.

Area III E

| Year    | Vessel    | December  | January                                    | February | March |
|---------|-----------|-----------|--|----------|-------|
| 2005/06 | SV        | KK1       | E 7, E 13                                  |          |       |
|         |           | KS2       | E 7, E 19                                  |          |       |
|         | SSV       |           | E 10, E 20                                 |          |       |
| 2006/07 | SV<br>SSV |           |  |          |       |
| 2007/08 | SV        | E 15, E 8 |  |          |       |
|         | SSV       | E 16, E 8 |  |          |       |
| 2008/09 | SV<br>SSV |           |  |          |       |
| 2009/10 | SV        | SM2       |  |          |       |
|         |           | YS3       | N 16, SE, N, SE, N, SE, N, SE, N, SE, N 16 |          |       |
|         | SSV       | YS2       | SE 14, SE 5, SE 25, SE 28                  |          |       |
|         |           | YS1       | SE 15, SE 5, SE 16, SE 25, SE 28           |          |       |
| 2010/11 | SV<br>SSV |           |  |          |       |

Fig. 6-a. Research period by the research season in area III E.

Area IV

| Year    | Vessel    | December    | January       | February                                    | March    |
|---------|-----------|-------------|---------------|---|----------|
| 2005/06 | SV        | KK1         | 3 W 6 14 W PB | W E 24                                      | 5 E 11   |
|         |           | KS2         | 3 W 6 20 PB   | W E 24                                      | 5 E 11   |
|         | SSV       | 3 W 7 21 PB | W P B         | W E 16                                      |          |
| 2006/07 | SV<br>SSV |             |               |   |          |
| 2007/08 | SV        |             | 8 W 13        | 25 W  | E 20     |
|         | SSV       |             | 9 W 11 31     | W E 1                                       |          |
| 2008/09 | SV<br>SSV |             |               |   |          |
| 2009/10 | SV        | SM2         | 24 SW         | 4   |          |
|         |           | YS3         | 10 SE NW 15   | 7 PB SW PB S P S V E V PB S S E N W N V V 5 |          |
|         | SSV       | YS2         | 9 SE S W 13   | 15 S V PB 24 1                              | PB SW 20 |
|         |           | YS1         | 9 SE SW 14    | 15 S V PB 24 1                              | PB SW 20 |
| 2010/11 | SV<br>SSV |             |               |   |          |

Fig. 6-b. Research period by the research season in area IV.

Area V

\* Dedicated sighting survey was conducted in the Ross Sea by two SSVs during the interruption of the sighting and sampling survey.

| Year    | Vessel | December |    |    |     | January |    |          |    | February |     |           |    | March |    |       |    |    |
|---------|--------|----------|----|----|-----|---------|----|----------|----|----------|-----|-----------|----|-------|----|-------|----|----|
| 2005/06 | SV     | KK1      | 3  | E  | W   | 24      |    |          |    |          |     |           |    |       | 12 | W     | W  | 20 |
|         |        | KS2      | 3  | E  | W   | 24      |    |          |    |          |     |           |    |       | 12 | W     | W  | 20 |
|         | SSV    | 3        | E  | W  | 24  |         |    |          |    |          |     |           |    |       |    |       | W  | 20 |
| 2006/07 | SV     | KK1      |    |    |     | 2       | NE | SE(Ross) | 26 |          | 10  | NE        | 15 |       |    |       |    |    |
|         |        | KS2      |    |    |     | 2       | NE | SE(Ross) |    |          | NE  | NE        | 15 |       |    |       |    |    |
|         | SSV    |          |    |    |     | 3       | NE | SE(Ross) |    |          | NE  | SE(R)     | 14 |       |    |       |    |    |
| 2007/08 | SV     |          |    |    |     |         |    | 26       |    |          | W   | 18        |    |       |    |       |    |    |
|         | SSV    |          |    |    |     |         |    |          |    |          |     |           |    | 11    |    | W     | 23 |    |
| 2008/09 | SV     | KK1      | 10 | NW | SW  | NW      | SW | 1        |    | 2        | NE  | N         | SE |       | NE | NSWNW | 15 |    |
|         |        | KS2      | 10 | SW | NW  | SW      | NW | 26       |    | 1        | NES |           | SE |       | NE | NES   | S  | 13 |
|         | SSV    | YS1      | 10 |    | SW  |         | 26 |          |    | 4        |     |           | SE |       |    | NES   | SW | 22 |
|         |        | YS2      | 10 |    | SW  |         | 19 |          |    | 4        |     |           | SE |       |    | NES   | SW | 22 |
|         |        | YS3      | 10 |    | SW  |         | 26 |          |    | 4        |     |           | SE |       |    | NES   | SW | 22 |
|         |        |          |    |    |     |         |    |          |    |          |     |           |    |       |    |       |    |    |
| 2009/10 | SV     | SM2      |    |    |     |         |    | 1        | SN | 2        |     |           |    |       |    |       |    |    |
|         |        | YS3      | 14 | NE | NES | SW      | N  | SW       | 28 | 5        | NW  | SW        | 9  |       |    |       |    |    |
|         | SSV    | YS2      | 13 | NE | NES | SW      | NW |          | SW |          | 8   |           |    |       |    |       |    |    |
|         |        | YS1      | 13 | NE | NES | SW      | NW |          | SW |          | 8   |           |    |       |    |       |    |    |
| 2010/11 | SV     |          |    |    |     |         |    |          |    |          |     |           |    |       |    |       |    |    |
|         | SSV    |          |    |    |     |         |    | 5        | NE | SE(Ross) |     | SE(Ross)* | 18 |       |    |       |    |    |

Fig. 6-c. Research period by the research season in area V

Area VIW

| Year    | Vessel    | December | January | February         | March |   |
|---------|-----------|----------|---------|------------------|-------|---|
| 2005/06 | SV<br>SSV |          |         |                  |       |   |
| 2006/07 | SV        | KK1      | 16 w 30 |                  |       |   |
|         |           | KS2      | 16 w 30 |                  |       |   |
|         | SSV       | 15 w 2   |         |                  |       |   |
| 2007/08 | SV<br>SSV |          |         |                  |       |   |
| 2008/09 | SV        | KK1      |         | 10 NW SW NW      | 1     |   |
|         |           | KS2      |         | 1 NW SW SW NW SW | 31    |   |
|         | SSV       | YS1      | 31 SW   | SW               |       | 1 |
|         |           | YS2      |         |                  |       |   |
|         |           | YS3      | 31 SW   | SW               |       | 1 |
| 2009/10 | SV<br>SSV |          |         |                  |       |   |
| 2010/11 | SV        |          |         |                  |       |   |
|         | SSV       |          | 29 w 4  |                  |       |   |

Fig. 6-d. Research period by the research season in area VI

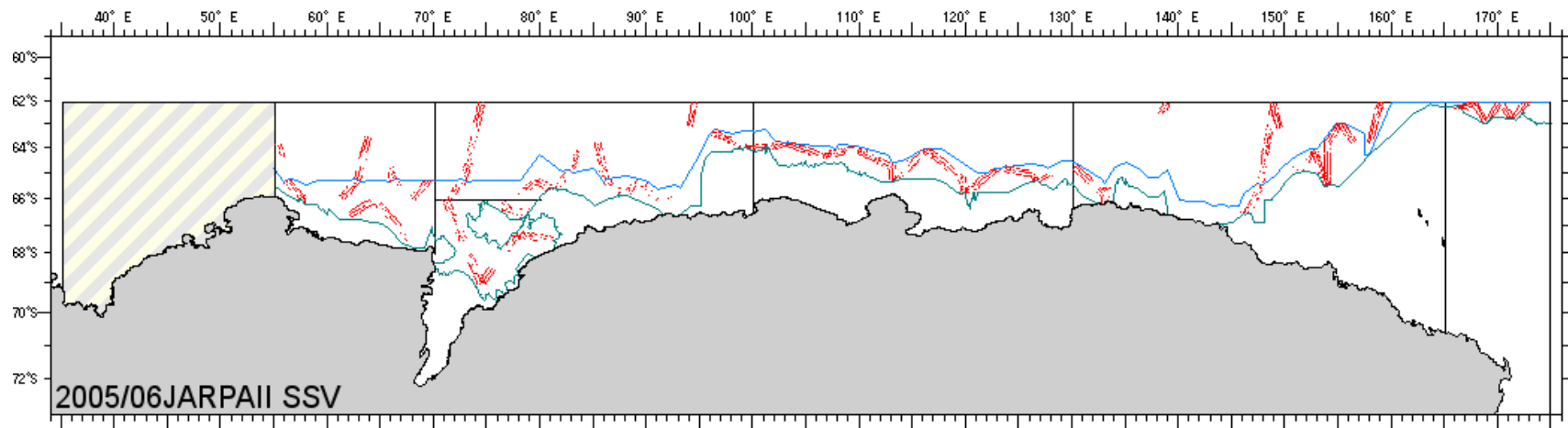


Fig. 7. SSV research track line in the 2005/06 feasibility research.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

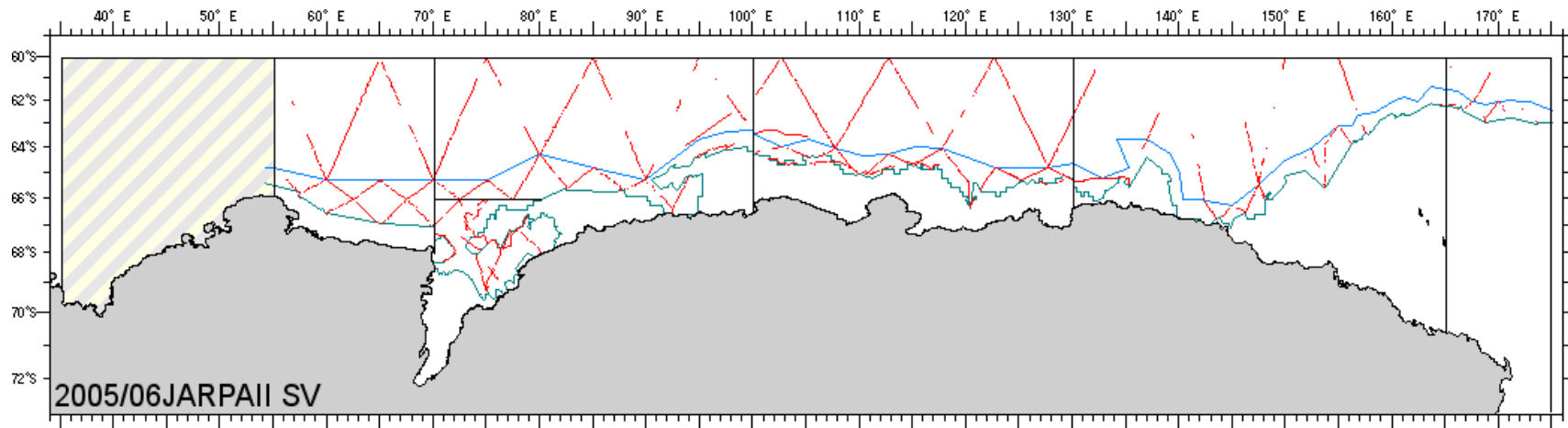


Fig. 8. SV research track line in the 2005/06 feasibility research.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

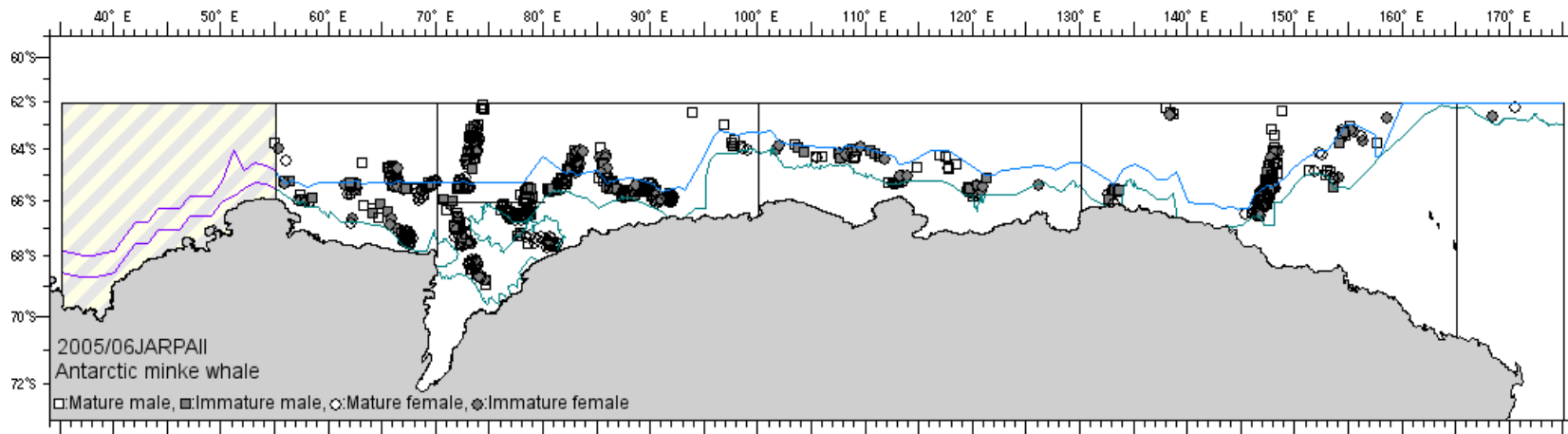


Fig. 9. Distributions of Antarctic minke whales in 2005/06 season.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

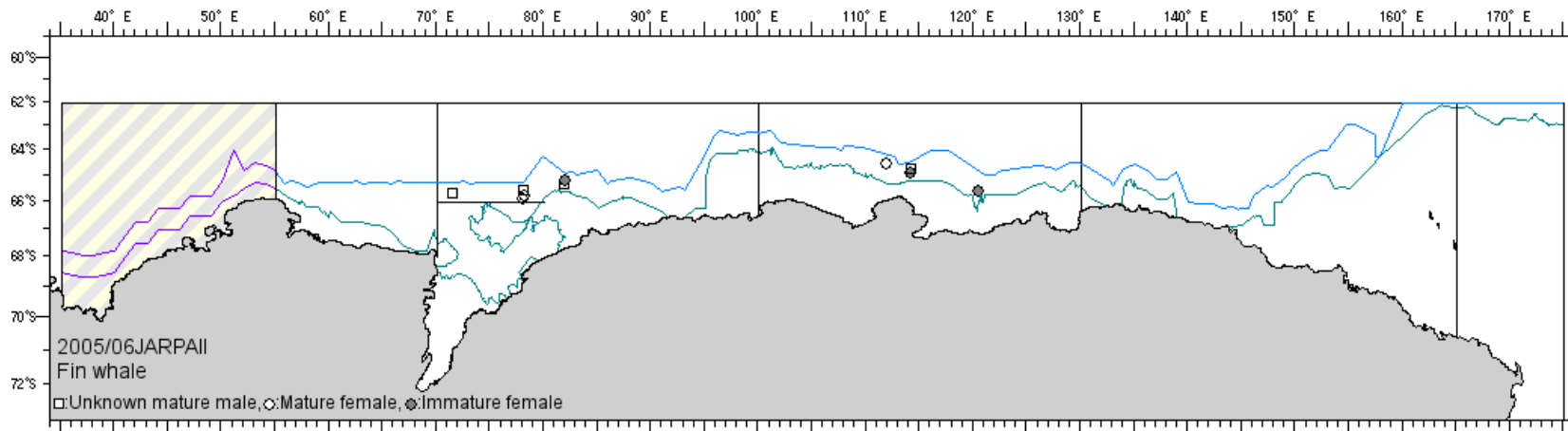


Fig. 10. Distributions of Fin whales in 2005/06 season.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.



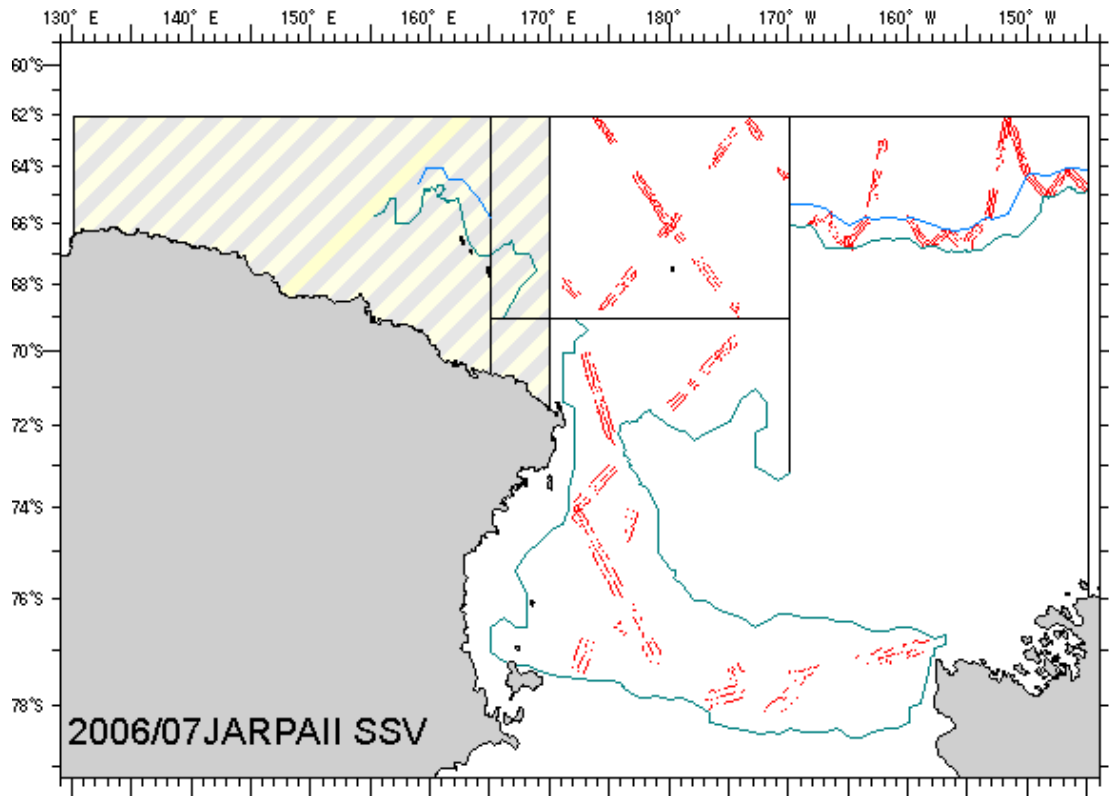


Fig. 11. SSV research track line in the 2006/07 feasibility research.

Stripe shows the unsurveyed area due to obstruction of anti-whaling group and fire accident.

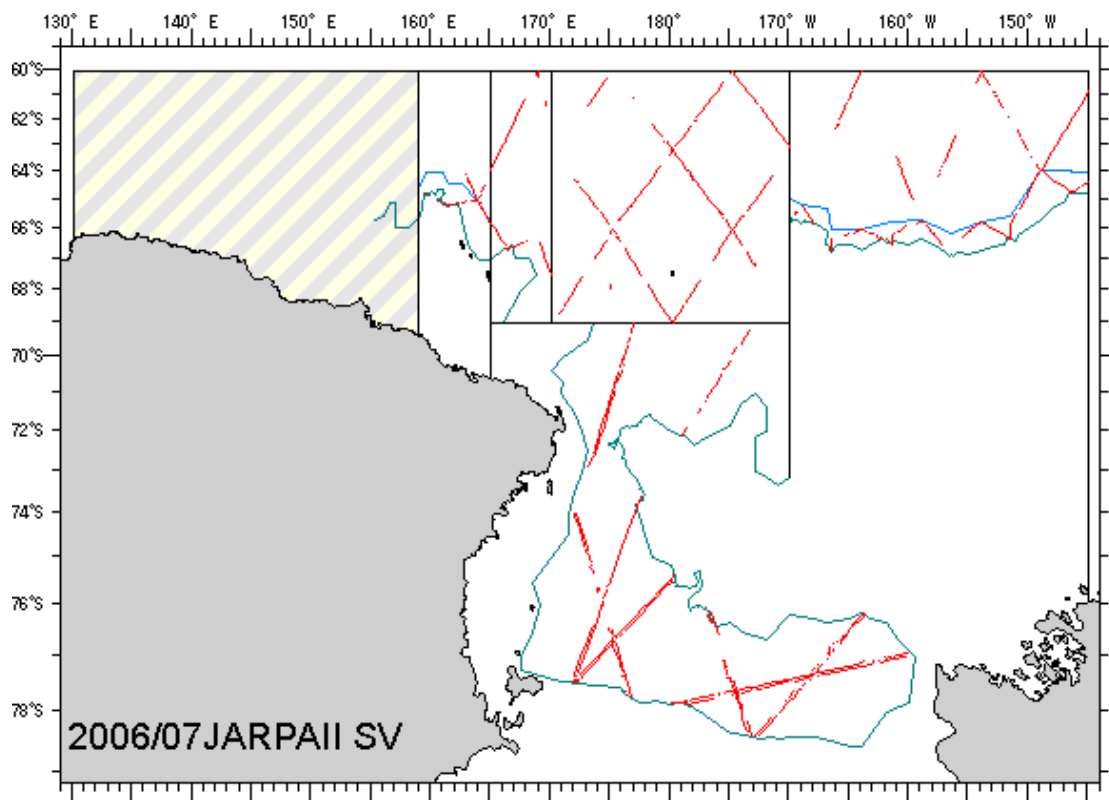


Fig. 12. SV research track line in the 2006/07 feasibility research.

Stripe shows the unsurveyed area due to obstruction of anti-whaling group and fire accident.

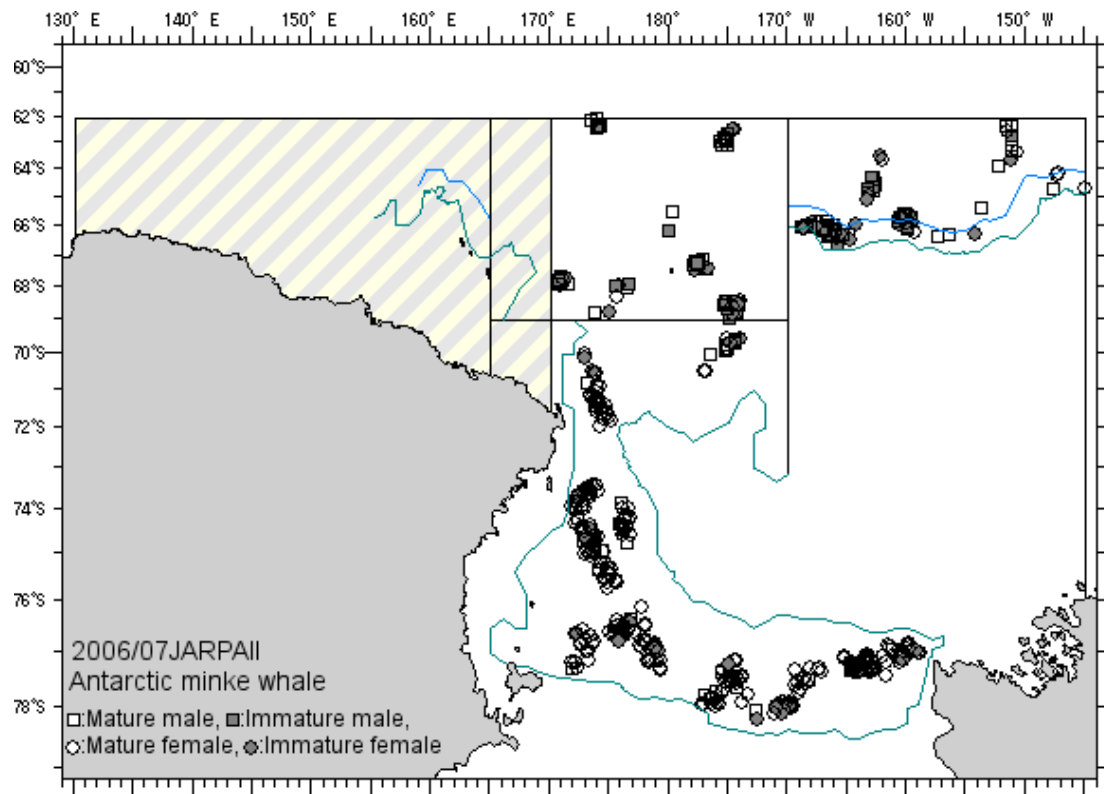


Fig. 13. Distributions of Antarctic minke whales in 2006/07 season.

Stripe shows the unsurveyed area due to obstruction of anti-whaling group and fire accident.

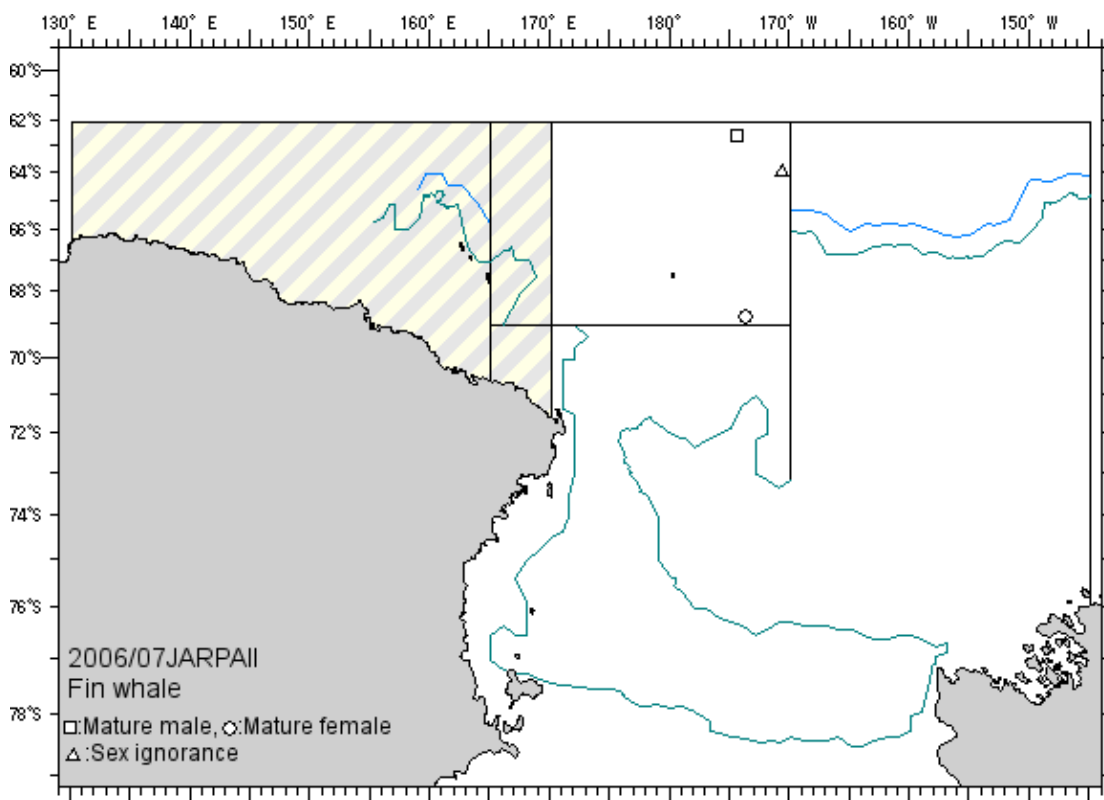


Fig. 14. Distributions of Fin whales in 2006/07 season.

Stripe shows the unsurveyed area due to obstruction of anti-whaling group and fire accident.

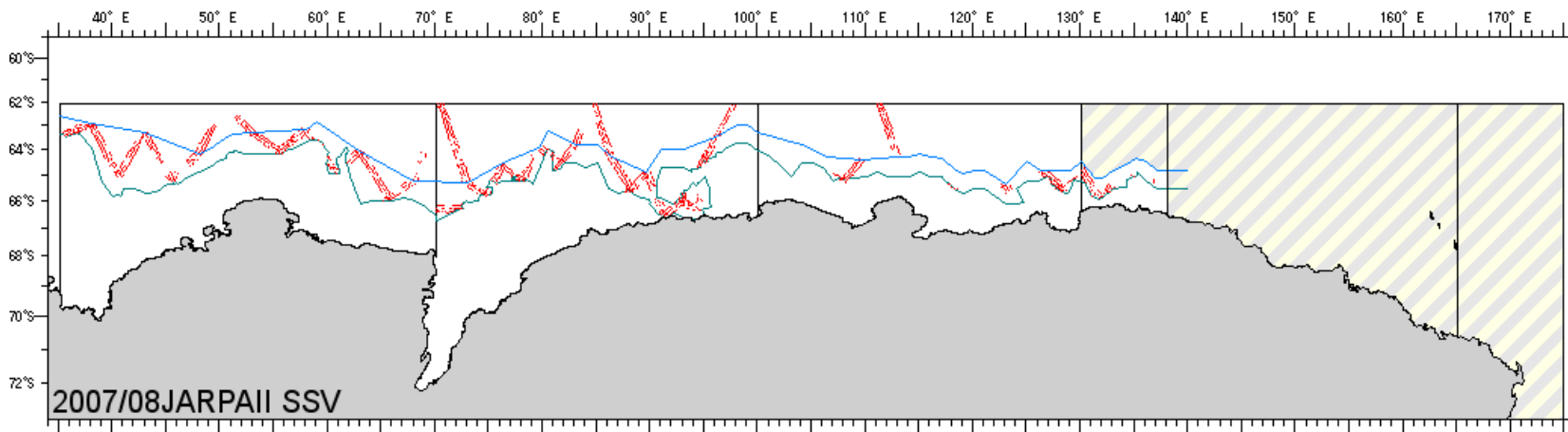


Fig. 15. SSV research track line in the 2007/08 research.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

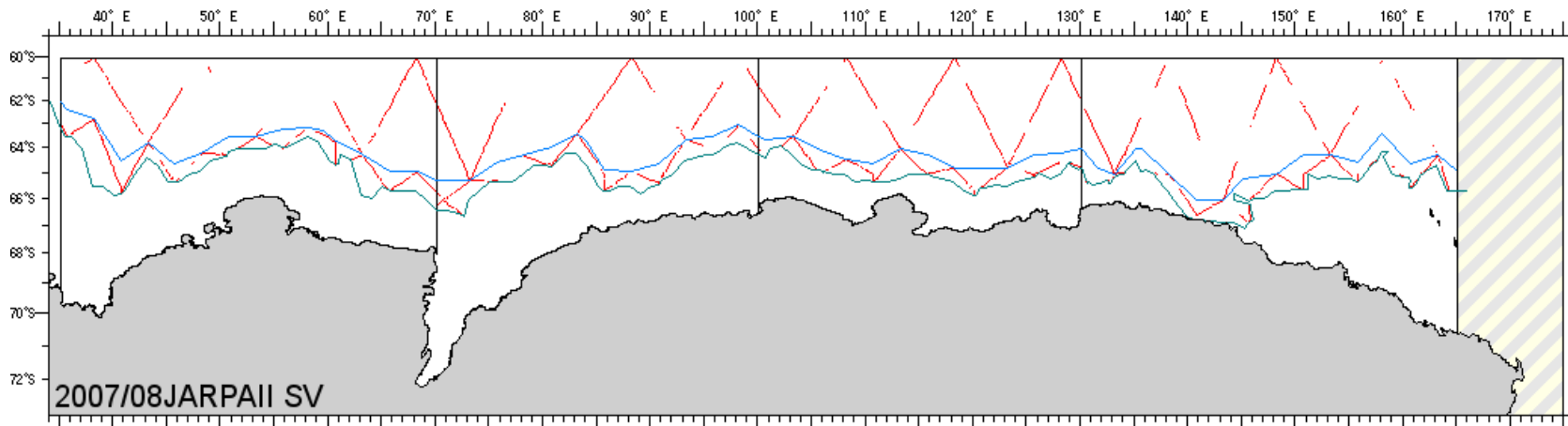


Fig. 16. SV research track line in the 2007/08 research.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

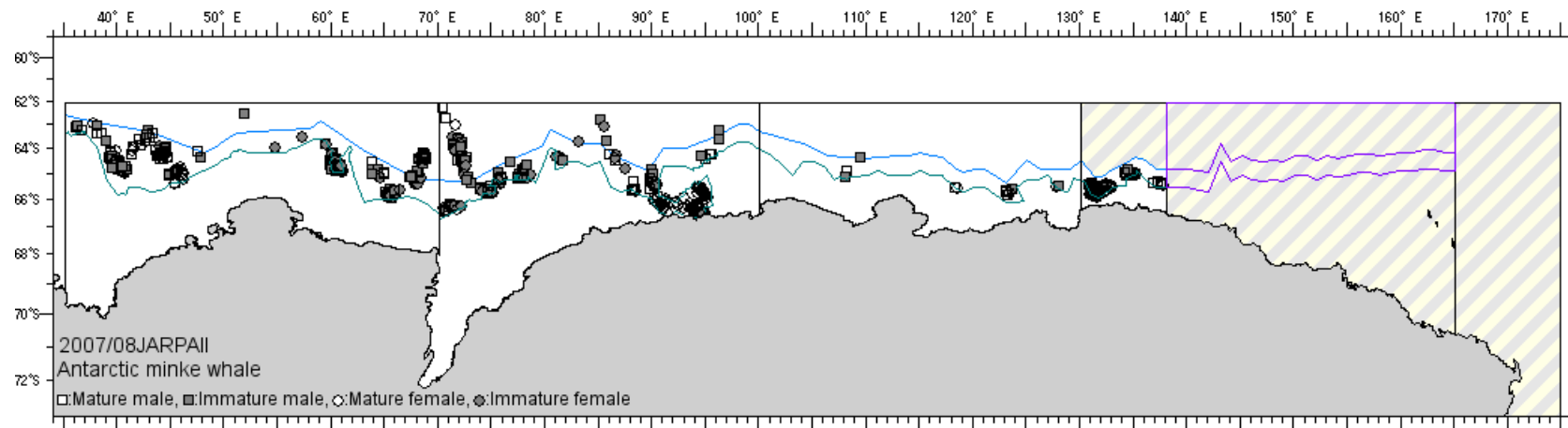


Fig. 17. Distributions of Antarctic minke whales in 2007/08 season.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.  
 Fin whale was not collected in this season.

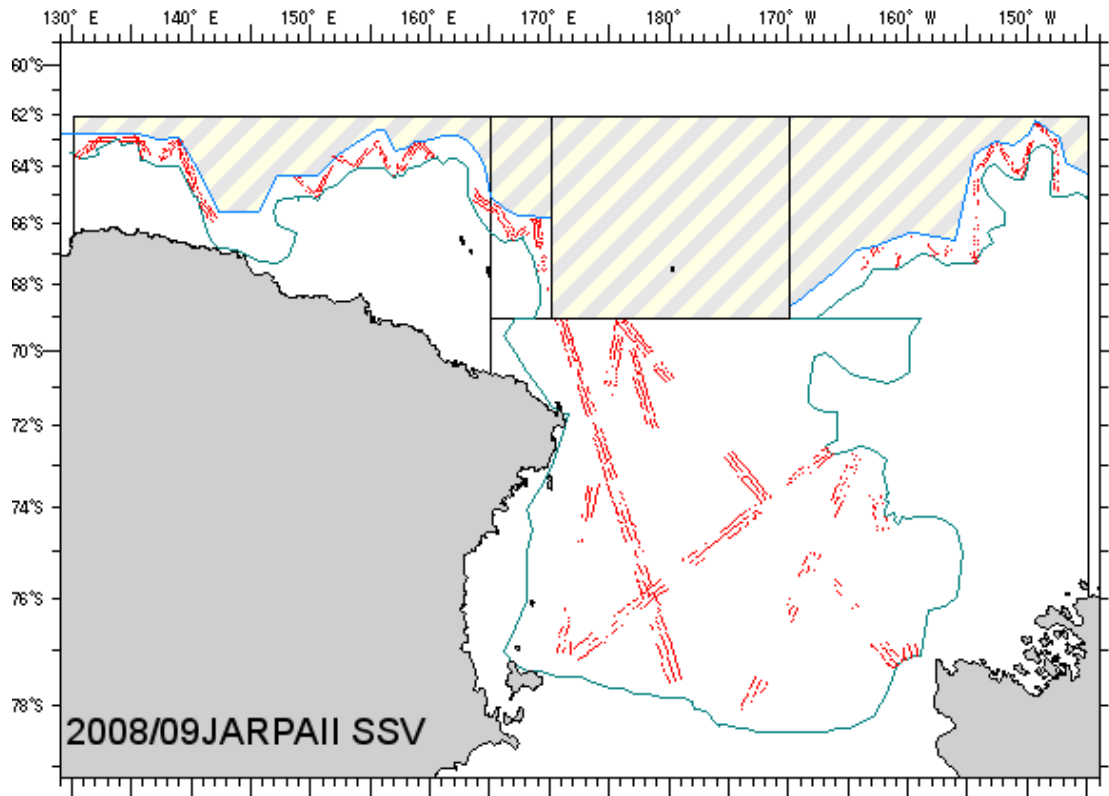


Fig. 18. SSV research track line in the 2008/09 research.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

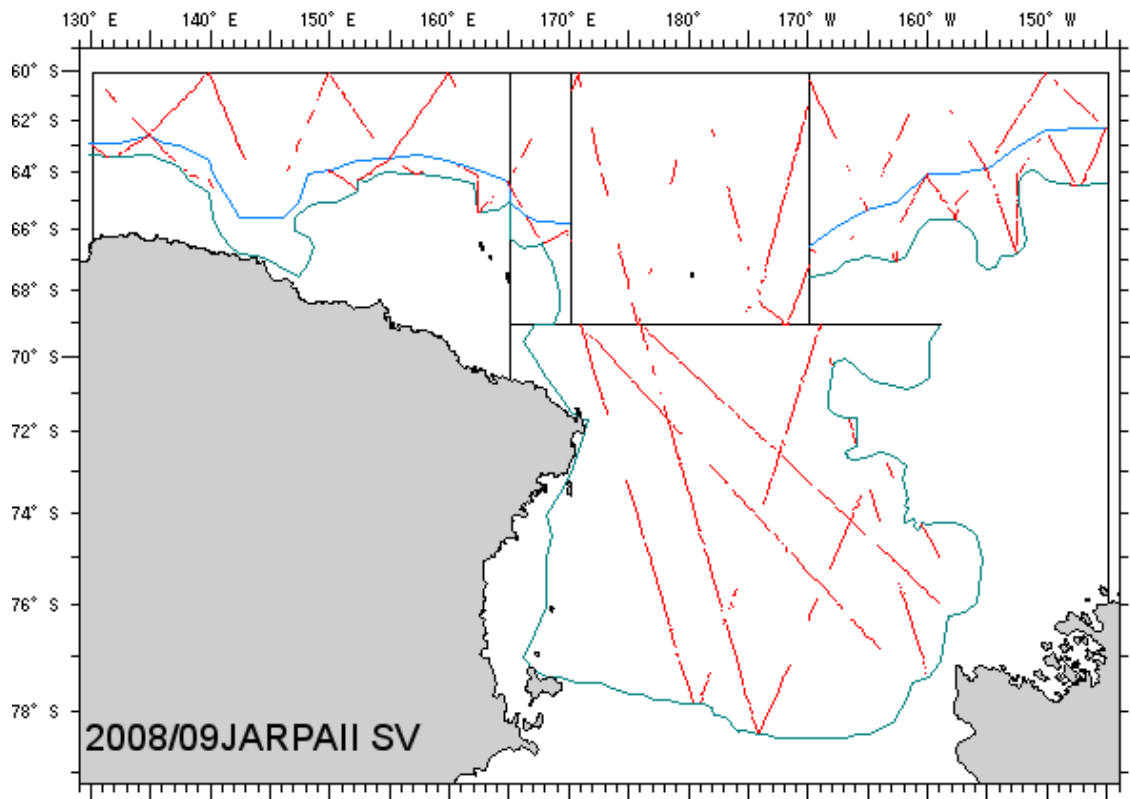


Fig. 19. SV research track line in the 2008/09 research.

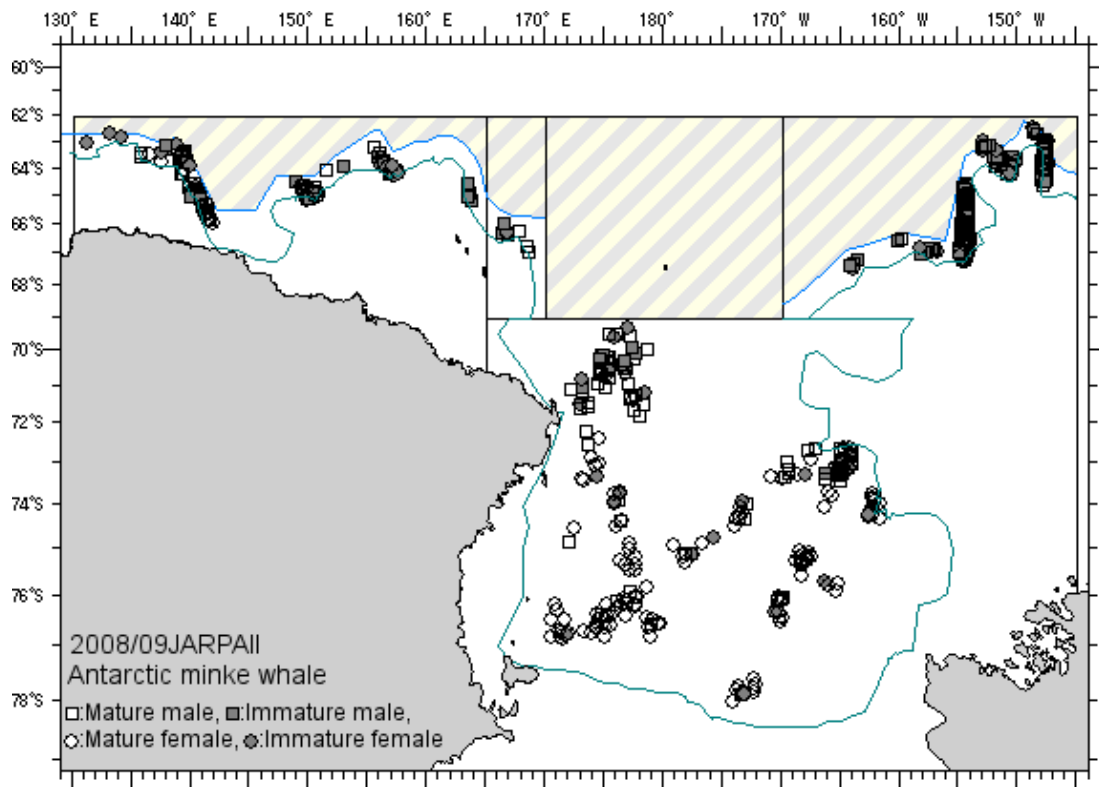


Fig. 20. Distributions of Antarctic minke whales in 2008/09 season.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

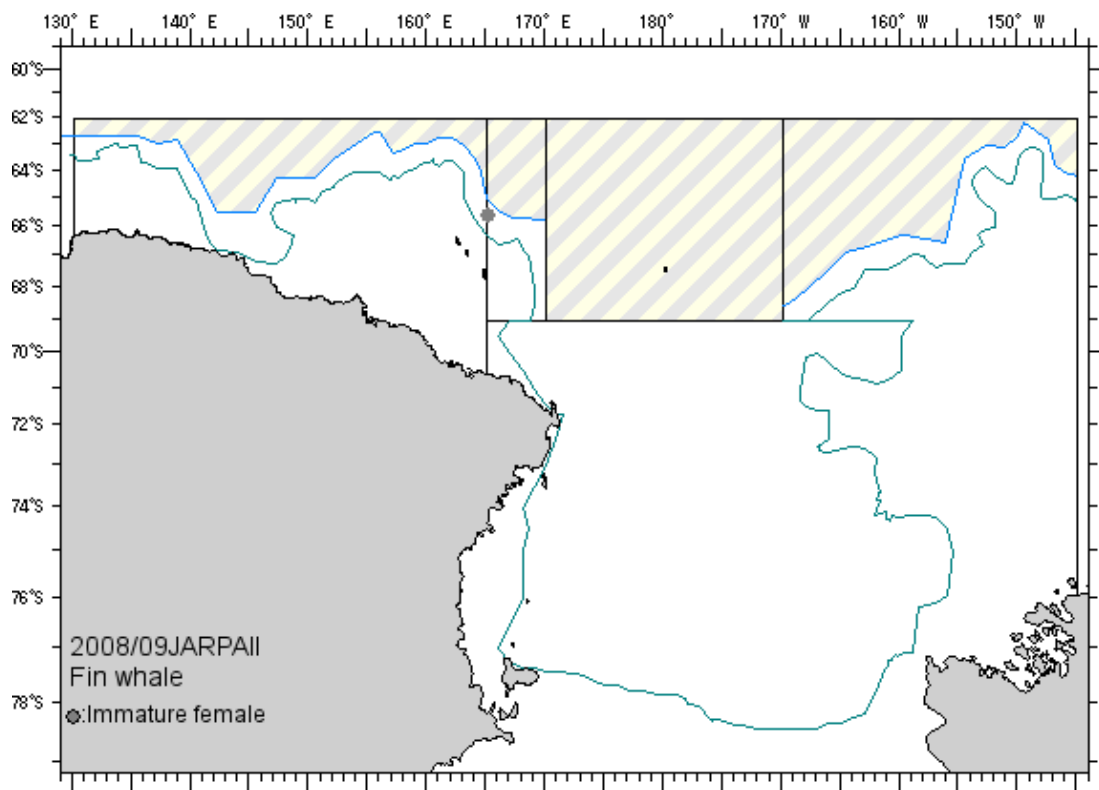


Fig. 21. Distributions of Fin whales in 2008/09 season.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

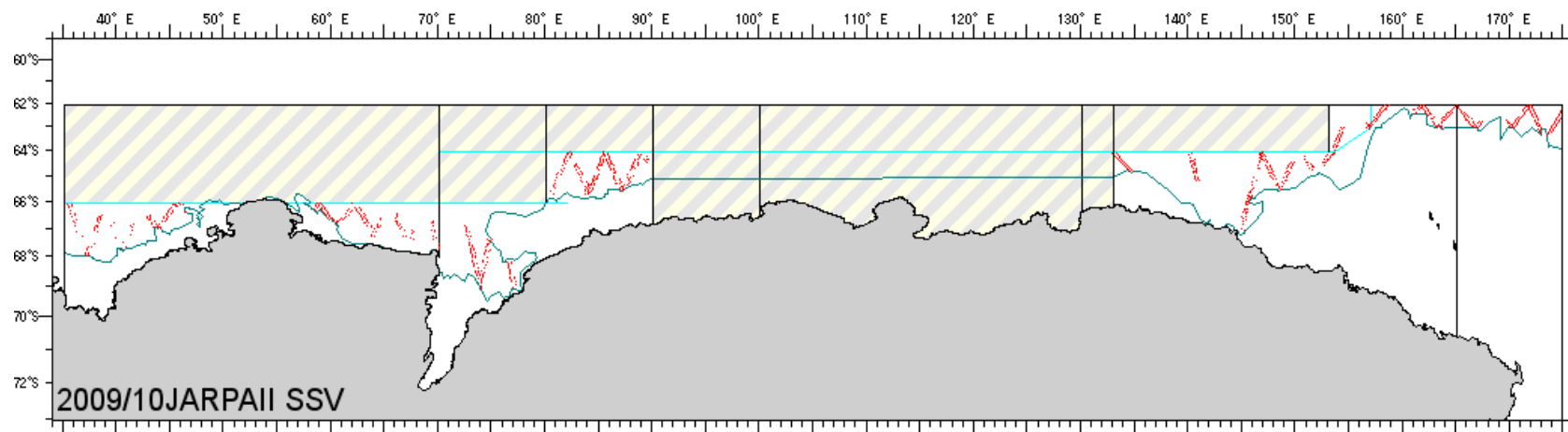


Fig. 22. SSV research track line in the 2009/10 research.

Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

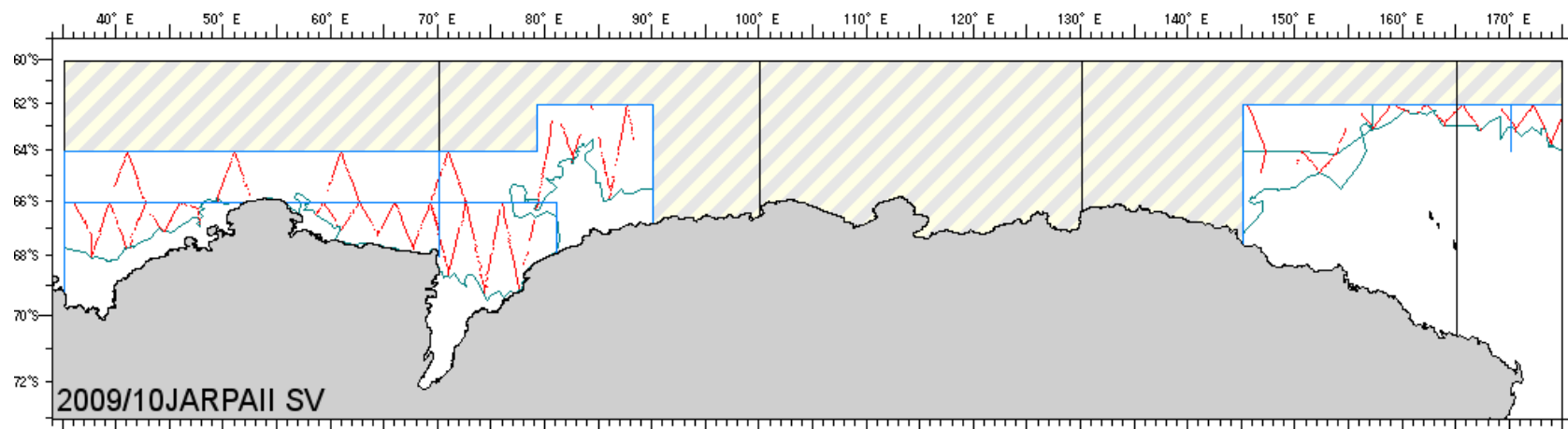


Fig. 23. SV research track line in the 2009/10 research.

Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

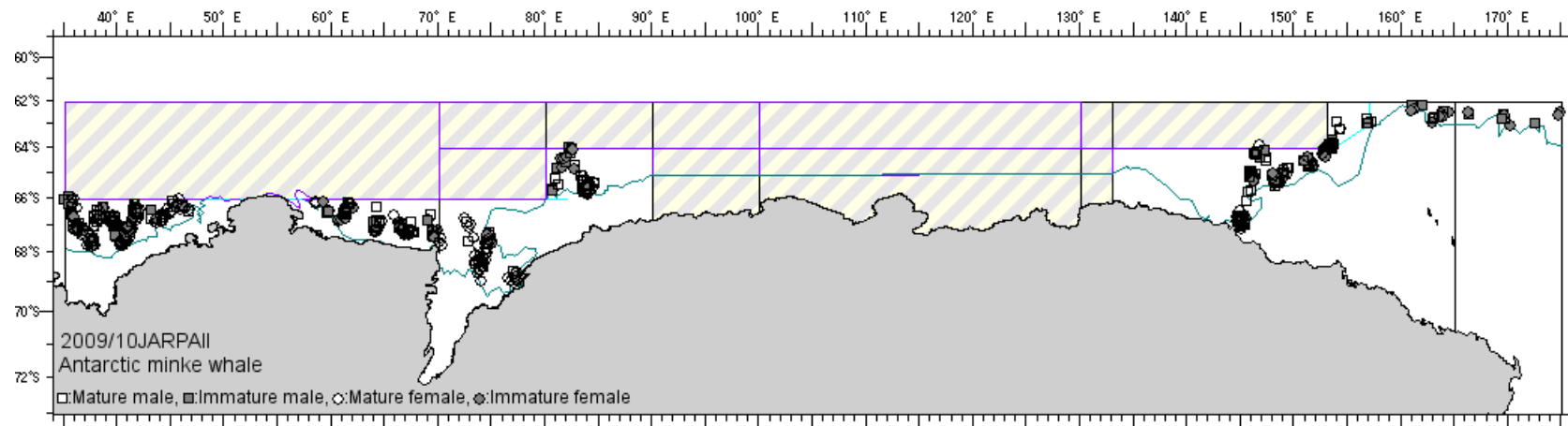


Fig. 24. Distributions of Antarctic minke whales in 2009/10 season.  
Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

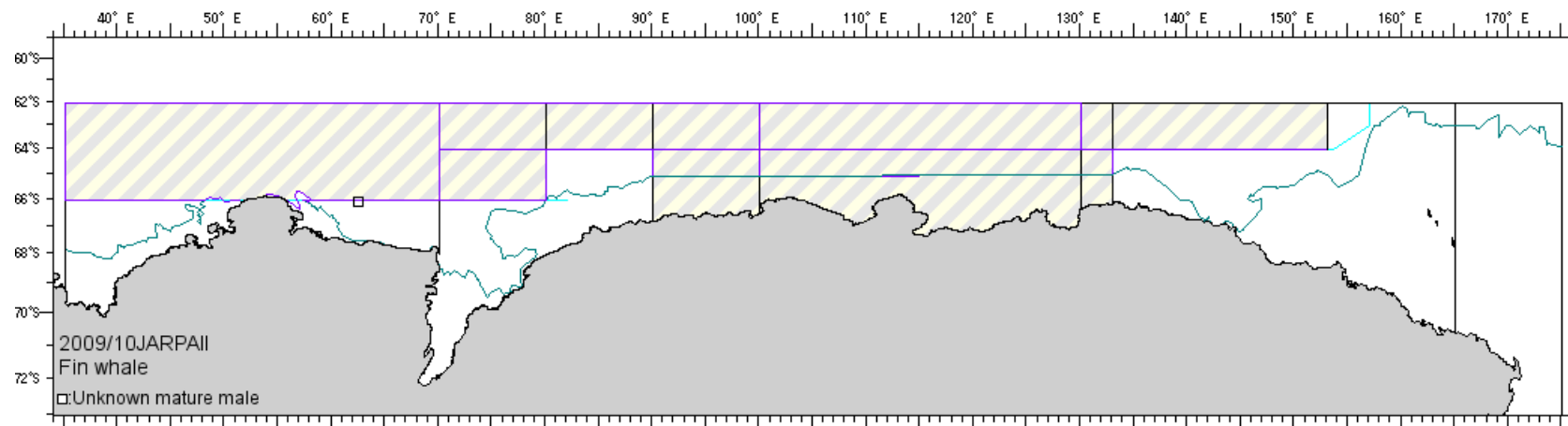


Fig. 25. Distributions of Fin whale in 2009/10 season.  
Stripe shows the unsurveyed area due to obstruction of anti-whaling group.



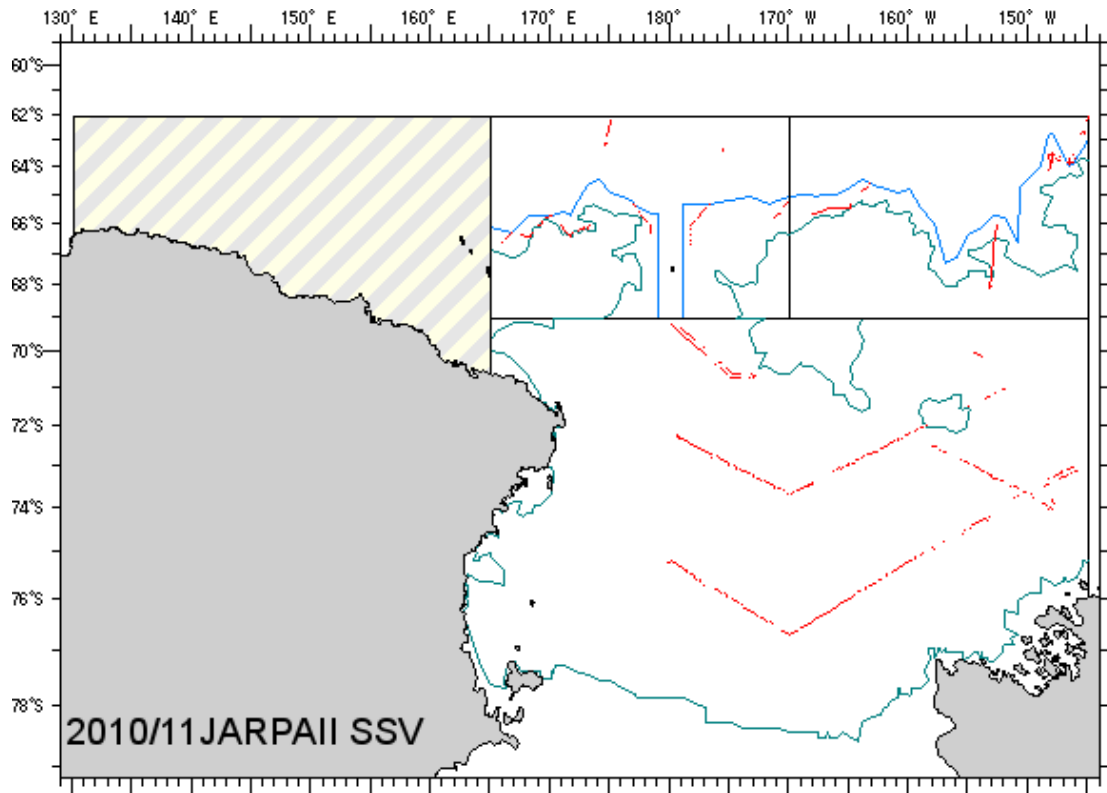


Fig. 26. SSV research track line in the 2010/11 research.  
 Stripe shows the unsurveyed area due to obstruction of anti-whaling group.  
 Dedicated sighting survey was conducted in the Ross Sea by two SSVs during the interruption of the sighting and sampling survey.

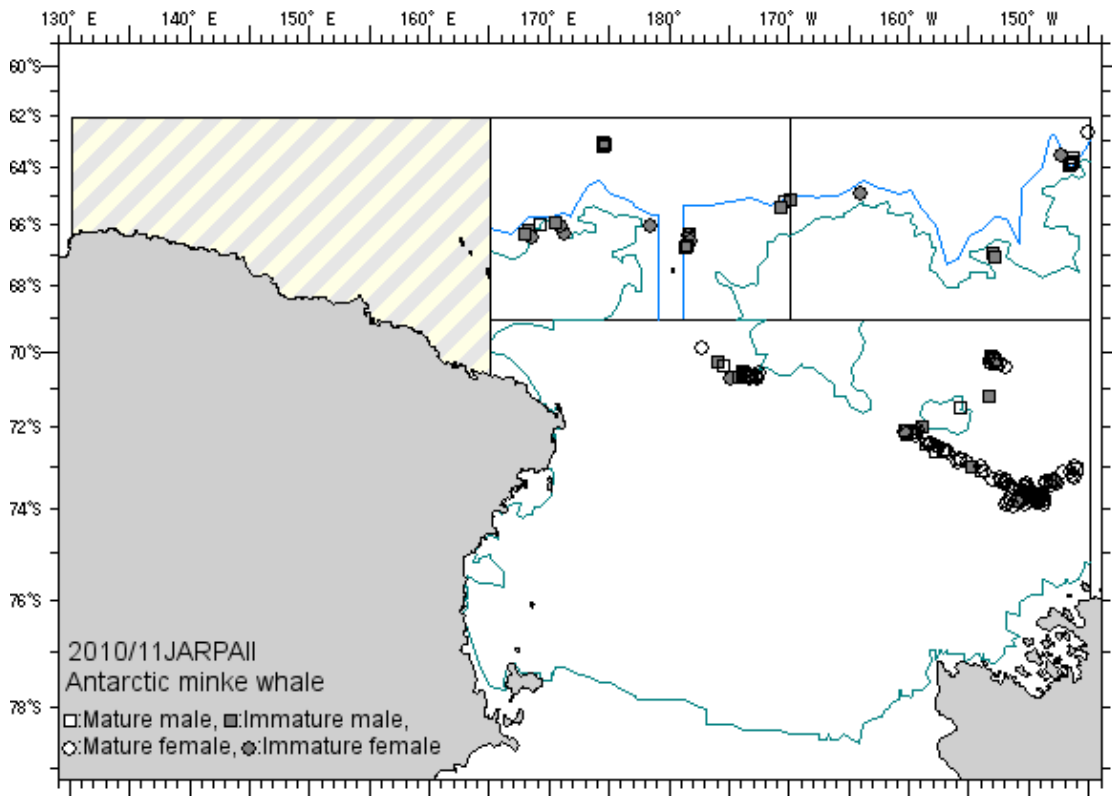


Fig. 27. Distributions of Antarctic minke whales in 2010/11 season.  
Stripe shows the unsurveyed area due to obstruction of anti-whaling group.

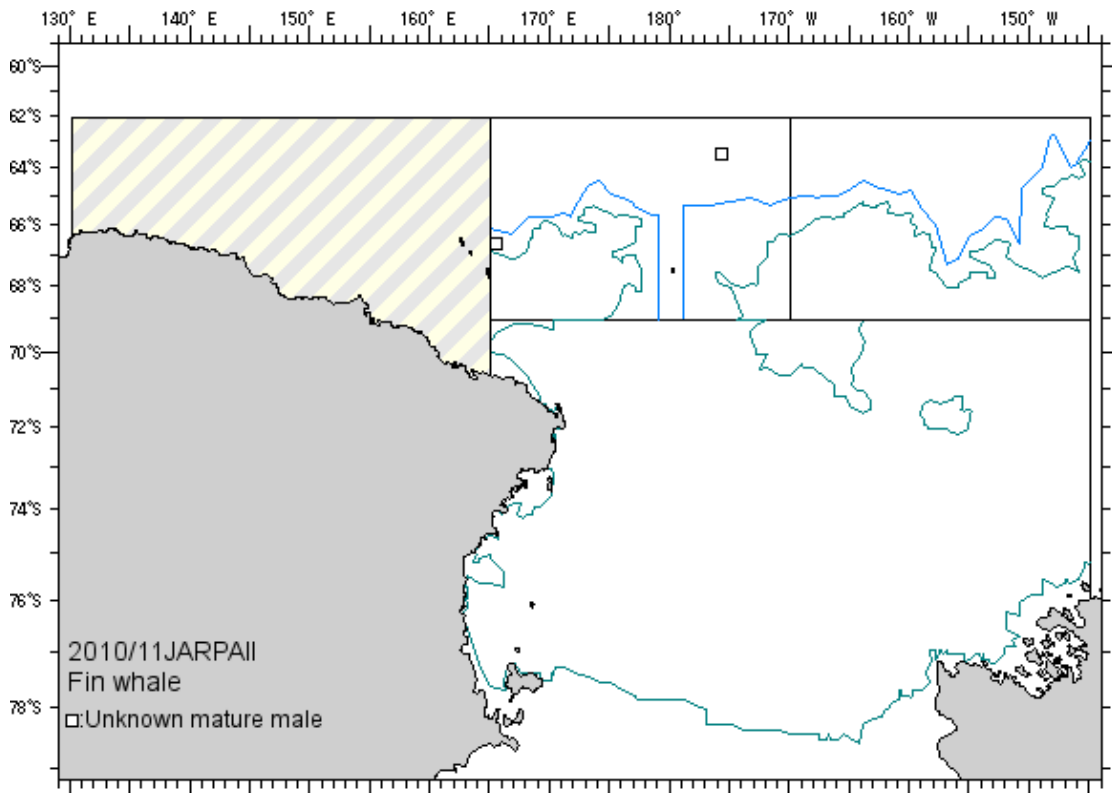


Fig. 28. Distributions of Fin whales in 2010/11 season.  
Stripe shows the unsurveyed area due to obstruction of anti-whaling group.