Technical Reports of the Institute of Cetacean Research (2025) pp. 24–33

Technical Report (not peer reviewed)

Results of the dedicated sighting survey under the Japanese Abundance and Stock structure Surveys in the Antarctic (JASS-A) in Area IV-East in the 2024/2025 austral summer season

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ABSTRACT

The results of the sighting survey of the Japanese Abundance and Stock structure Surveys in the Antarctic (JASS-A) in the 2024/2025 austral summer season are reported. Two dedicated sighting vessels were engaged in the line transect method survey in a part of Antarctic Area IV East (100°E–130°E) for 39 days, from 2 January to 9 February 2025. For the survey, the research area was divided into northern and southern strata. The total searching distance in the research area was 2,491.5 n.miles (4,614.3 km). Five baleen whale species and at least three toothed whale species were sighted in the research area. Other research activities such as biopsy sampling, photo-ID, satellite tagging and oceanographic observations were also conducted. The data and samples collected are required for the main and secondary research objectives of JASS-A.

INTRODUCTION

Long-term systematic surveys on whales and the ecosystem in the Antarctic, such as the JARPA/JARPAII[1], NEWREP-A[2] and IWC IDCR/SOWER[3], obtained important data pertaining to the study of abundance and abundance trends of large whales and their biology as well as the role of whales in the Antarctic ecosystem. All these research programs have been terminated. The last NEWREP-A survey was carried out in the 2018/2019 austral summer season.

The Japanese Abundance and Stock structure Surveys in the Antarctic (JASS-A) commenced in the 2019/2020 austral summer season because it was considered important to continue with the whale and ecosystem surveys in the Indo-Pacific region of the Antarctic Ocean through dedicated sighting surveys and other non-lethal research techniques. JASS-A has two main research objectives (MO): i) the study of the abundance and abundance trends of large whale species (MO1), and ii) the study of the distribution, movement and stock structure of large whale species (MO2). JASS-A also has five secondary research objectives (SO) related to oceanography (SO1), marine debris (SO2), genetic data to estimate abundance (SO3), whale biology (SO4) and study on the utility of Unmanned Aerial Vehicle (UAV) (SO5). The JASS-A program was presented to the 2019 meeting of IWC SC[4] (GOJ, 2019a), the 2019 meeting of CCAMLR-EMM[5] (GOJ, 2019b) and the 2019 meeting of NAMMCO SC[6] (GOJ, 2019c).

The approach of JASS-A is systematic vessel-based sighting surveys utilizing the line transect method. Surveys are designed and conducted following the protocols included in the 'Requirements and Guidelines for Conducting Surveys and Analysing Data within the Revised Management Scheme' (IWC, 2012).

Sighting protocols are the same as those used in the former IDCR/SOWER surveys (Matsuoka *et al.*, 2003; IWC, 2008).

The JASS-A surveys are conducted alternatively in IWC Management Areas III, IV, V and VI by one or two specialized vessels, over a tentative period of eight austral sum-

[1] Japanese Whale Research Programs under Special Permit in the Antarctic, Phases I and II

[2] New Scientific Whale Research Program in the Antarctic Ocean

[3] International Decade for Cetacean Research/Southern Ocean Whale and Ecosystem Research

[4] International Whaling Commission-Scientific Committee

[5] Commission for the Conservation of Antarctic Marine Living Resources-Working Group on Ecosystem Monitoring and Management

[6] North Atlantic Marine Mammal Commission-Scientific Committee

mer seasons from 2019/20 to 2026/27. The first to fifth JASS-A surveys were carried out between 2019/20 and 2023/24 and covered the sector 000°–035°E of Antarctic Area III West, 145°W–120°W of Antarctic Area VI East, and 70°E–100°E of Antarctic Area IV West.

The sixth JASS-A survey was carried out in the 2024/2025 season and covered the sector 100°E–130°E (Antarctic Area IV East). This paper presents a summary of the 2024/2025 JASS-A survey results.

SURVEY DESIGN

Research period and area

The research area of JASS-A comprises IWC Management Areas III, IV, V and VI, south of 60°S (Figure 1). The research area in the 2024/2025 season was Area IV-East (100°E–130°E), south of 60°S (Figure 1). The area was divided into northern and southern strata. The boundary between these strata was defined by a line 45 n.miles north of the pack ice edge (Figure 2). The northern and southern strata were surveyed simultaneously to avoid a temporal gap.

Research vessels

The dedicated sighting vessels *Yushin-Maru* No. 2 (*YS2*) and *Yushin-Maru* No. 3 (*YS3*) were engaged in the survey. The specifications for both vessels are the same and are shown in Figure 3. Four researchers participated in the survey, two in *YS2* and two in *YS3*. They had experience in conducting line transect surveys, biopsy sampling, photo-identification (photo-ID), satellite tagging and oceanographic survey through the previous NEWREP-A and previous JASS-A surveys.

Sighting procedures and experiments

The procedures for sighting and experiments were the same as in previous JASS-A surveys. See Katsumata *et al.* (2025) for details of the procedures used for sighting surveys and other research activities such as sighting distance and angle experiment, photo-ID, biopsy sampling, satellite tagging, oceanographic survey, marine debris observation.

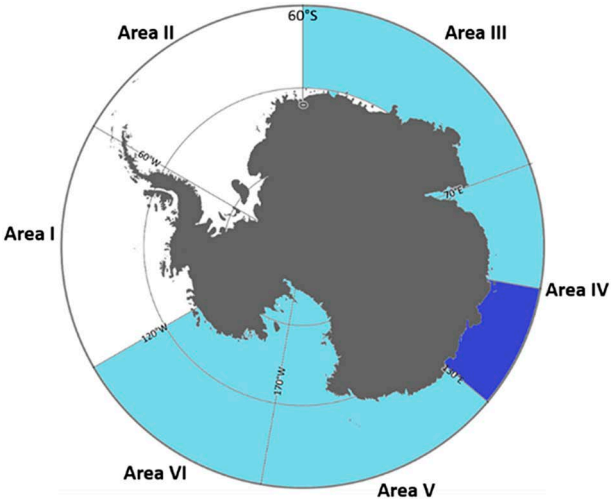

Figure 1. Research area of JASS-A. The blue colored area (100°E–130°E) indicates the surveyed area in the 2024/25 austral summer season.

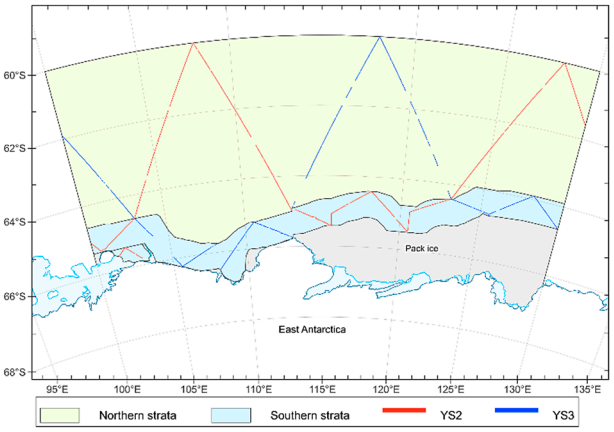

Figure 2. Research area (100°E–130°E) indicating northern, southern strata of the JASS-A survey in the 2024/25 austral summer season.

Figure 3. Research vessels participating in the JASS-A 2024/25 cruise.

RESULTS OF THE SURVEY

Narrative of the survey

Table 1 shows the itinerary of the survey. The duration of this cruise was 99 days for both *YS2* and *YS3*. The *YS2* and *YS3* departed Japan on 6 December 2024. They arrived at Benoa, Indonesia on 17 December. The *YS2* and *YS3* started the sighting survey in Antarctic Area IV East at 61°37'S; 130°00'E on 2 January, and at 64°39'S; 130°00'E on 3 January 2025, respectively. The *YS2* and *YS3* completed the survey on 9 February and left the research area at positions 60°00'S; 101°55'E and 60°00'S; 101°25'E respectively, on 10 February. The *YS2* and *YS3* arrived at Kota Kinabalu, Malaysia on 3 March and finally arrived at Japan on 14 March.

Research effort in the research area

Table 2 shows a summary of the searching effort spent during the survey. The *YS2* and *YS3* were engaged in the research for 39 days and 38 days, respectively. The total searching effort of both vessels was 2,491.5 n.miles (4,614.3 km); 1,230.8 n.miles in NSP mode and 1,260.8 n. miles in IO mode.

In the northern stratum, the total searching effort was 1,566.8 n.miles and the searching effort coverage was 84%. In the southern stratum, the total searching effort was 924.7 n.miles and the searching effort coverage was 85%. Therefore, a good distribution of effort within all strata and survey mode was achieved. The total experimental time for photo-ID, biopsy sampling, tagging and distance and angle experiment was 64 hours 06 minutes.

Whale sightings in the research area

Five baleen whale species and at least three toothed whale species were sighted in the research area. The dominant whale species in the research area was the humpback whale (850 schools/1,514 individuals) followed by the Antarctic minke whale (148/332). Sightings of other species were as follows: fin (28/72), Antarctic blue (19/25), southern bottlenose (12/22), killer including Type A, Type B, Type C and undetermined type (9/234), southern right (3/3), and sperm (3/3) whales (Table 3).

Antarctic minke whales

Antarctic minke whales were mainly distributed in the southern part of the research area (Figure 4), with higher concentrations observed in the northern part of Vincennes Bay (110°E–115°E). As in previous surveys, no mother and calf pair of the Antarctic minke whale was observed. The mean school size of the primary sighting was 2.4, and the density index (DI) in the research area was 5.09. The DI decreased from 6.51 to 5.09 compared to the 2014/15 and 2015/16 surveys (Table 4). In the present survey, a polynya was formed further south of the pack ice near 120°E (Figure 5), however, the research vessel could not enter this area. In contrast, in the 2015/16 survey the research vessel entered into this type of polynya, where a high density of Antarctic minke whales was confirmed (Isoda *et al.*, 2016). These findings indicate that

Table 1
Itinerary of the JASS-A 2024/25 cruise.

Date (y/m/d)	Event
2024/11/20	Planning meeting was held at Tokyo, Japan
2024/12/5	Pre-cruise meeting was held at Shiogama, Japan
2024/12/6	*YS3* and *YS2* departed Shiogama, Japan
2024/12/8	*YS3* and *YS2* started transit survey at 29°–13'N; 139°–14'E, and at 29°–12'N; 139°–29'E, respectively
2024/12/17	*YS3* and *YS2* arrived in the homeport Benoa, Indonesia (8°–45'S, 115°–13'E)
2024/12/21	*YS3* and *YS2* resumed transit survey at 12°–10S; 113°–41'E, and at 12°–28'S, 113°–45'E, respectively
2025/1/2	*YS2* started survey in the research area at 61°–37'S; 130°–00'E
2025/1/3	*YS3* started survey in the research area at 64°–39'S; 130°–00'E
2025/2/9	*YS3* and *YS2* completed the survey in the research area and started the transit survey.
2025/2/21	*YS3* interrupted transit survey at 10°–11'S; 101°–27'E
2025/2/22	*YS2* interrupted transit survey at 08°–35'S; 102°–16'E
2025/2/28	*YS3* and *YS2* arrived in the homeport Kota Kinabalu, Malaysia
2025/3/9	*YS3* and *YS2* resumed transit survey at 23°–12'N; 127°–23'E, and at 22°–58'N; 127°–30'E, respectively
2025/3/12	*YS3* and *YS2* finished transit survey at 35°–01'N; 140°–30'E, and at 35°–02'N; 140°–31'E, respectively
2025/3/14	*YS3* and *YS2* arrived and post cruise meeting a Shiogama, Japan.

Table 2
Summary of searching effort and time spent by *YS3* and *YS2* during the 2024/25 JASS-A cruise.

Vessel	Survey Sections	Date and time		Searching effort (distance [n.miles] and time)				Experiments time	
		Start	End	NSP		IO		Photo-ID, Biopsy, Satellite tag experiment	Estimated angle and distance training/experiment
YS2	Transit survey (Japan–Entering Philippines EEZ)	2024/12/08 07:25	2024/12/11 16:50	65.6	04:51:54	—	—	00:00:00	0:00:00
	Transit survey (Leavening Indonesia EEZ–Research area)	2024/12/21 07:00	2025/1/2 07:42	499.3	43:35:03	—	—	00:56:56	0:00:00
	Research area (Area IVE 100°E–130°E)	2025/1/2 07:42	2025/2/9 15:40	693.8	64:37:10	733.3	67:07:21	30:50:20	5:00:44
	Transit survey (Research area - Entering Indonesia EEZ)	2025/2/9 15:40	2025/2/21 18:00	444.5	37:50:52	—	—	0:00:00	0:00:00
	Transit survey (Leaving Philippines EEZ–Japan)	2025/3/9 07:45	2025/3/12 16:40	124.1	10:14:04	—	—	0:00:00	0:00:00
	Total			1827.3	161:09:03	733.3	67:07:21	31:47:16	5:00:44
YS3	Transit survey (Japan - Entering Philippines EEZ)	2024/12/8 07:25	2024/12/11 16:50	64.4	04:52:21	—	—	00:00:00	0:00:00
	Transit survey (Leavening Indonesia EEZ–Research area)	2024/12/21 07:00	2025/1/2 18:00	502.1	44:50:02	—	—	00:09:49	0:00:00
	Research area (Area IVE 100°E–130°E)	2025/1/3 06:00	2025/2/9 12:32	537.0	49:38:48	527.5	48:23:49	32:09:50	6:02:21
	Transit survey (Research area–Entering Indonesia EEZ)	2025/2/9 12:32	2025/2/21 18:00	413.0	36:26:52	—	—	0:00:00	0:00:00
	Transit survey (Leaving Philippines EEZ–Japan)	2025/3/9 07:50	2025/3/12 16:40	146.6	12:11:45	—	—	00:00:00	0:00:00
	Total			1663.1	147:59:48	527.5	48:23:49	32:19:39	6:02:21

the number of sightings of Antarctic minke whales exhibit fluctuations on an annual basis, contingent on the melting of sea ice and accessibility to preferred feeding areas.

Fin whales

Fin whales were mainly sighted in the northern stratum (Figure 6). Mother and calf pairs were not observed. The mean school size was 2.00. The DI in this survey was 0.72. Comparison with previous surveys shows consistently low densities in Area IV East (Table 5). In contrast, the adjacent Area IV West showed a much higher DI of 5.92 in the 2023/24 survey (Isoda *et al.*, 2024), approximately 8 times higher than the present survey. These results potentially indicate that Area IV East is not a major distribution area for this species.

Humpback whales

Humpback whales were distributed south of 62°00'S, and high-density areas were encountered between 63°S and 65°S (Figure 7). 4 mother and calf pairs were observed. The mean school size for primary sighting was 1.77. The DI in the research area was 32.43. Compared to the DI obtained from past surveys conducted with a similar design, the present survey recorded the highest value (Table 5). Area IV East is used as a feeding ground by both Stock D and E, with both stocks recovering towards pre-whaling resource levels (IWC, 2015). Stock E was estimated to be 24,545 individuals in the breeding grounds in 2015 representing 94% of the carrying capacity (Noad *et al.*, 2019). The present survey results suggest that the population size of this species in Area IV East may have continued to increase since 2015. Future work should focus on detailed abundance estimation using distance sampling methods and conducting trend analysis for Stocks D and E separately. In the present survey, 52 biopsy samples were collected from this species, from which the estimation of mixing rates based on genetic data can be calculated.

Antarctic blue whales

Antarctic blue whales were sighted in the northern and southern strata (Figure 8). Mother and calf pairs were not observed. The mean school size was 1.50. The DI in the research area was 0.48. Comparison with previous surveys shows relatively stable density levels: 0.09 (2005/06), 0.05 (2007/08), 0.50 (2014/15+15/16), and 0.48 (2024/25) (Table 4), suggesting a steady but slow recovery pattern consistent with this species' long generation time and conservative reproductive strategy.

Table 3
Number of sightings made during the 2024/25 JASS-A survey in the research area, by stratum and species.

Species	Area IVE (100°E–130°E)								Sub-total				Total	
	Southern stratum Area code 42				Northern stratum Area code 44									
	Prim.		Second.		Prim.		Second.		Prim.		Second.			
	sch.	Ind.	sch.	Ind.	sch.	Ind.	sch.	Ind.	sch.	Ind.	sch.	Ind.	sch.	Ind.
Antarctic blue whale	6	10	5	5	6	8	2	2	12	18	7	7	19	25
Fin whale	7	19	0	0	11	17	10	36	18	36	10	36	28	72
Antarctic minke whale	100	265	14	24	27	36	7	7	127	301	21	31	148	332
Dwarf minke whale	0	0	0	0	1	1	4	4	1	1	4	4	5	5
Like minke	8	10	0	0	5	5	0	0	13	15	0	0	13	15
Humpback whale	409	710	10	20	399	725	32	59	808	1435	42	79	850	1514
Southern right whale	0	0	1	1	2	2	0	0	2	2	1	1	3	3
Baleen whale	5	6	0	0	0	0	0	0	5	6	0	0	5	6
Sperm whale	1	1	0	0	2	2	0	0	3	3	0	0	3	3
Southern bottlenose whale	4	7	0	0	8	15	0	0	12	22	0	0	12	22
Killer whale (Undetermined)	3	55	0	0	0	0	0	0	3	55	0	0	3	55
Killer whale (Type A)	0	0	1	17	0	0	0	0	0	0	1	17	1	17
Killer whale (Type B)	1	5	1	11	0	0	1	40	1	5	2	51	3	56
Killer whale (Type C)	2	106	0	0	0	0	0	0	2	106	0	0	2	106
Hourglass dolphin	0	0	0	0	2	17	0	0	2	17	0	0	2	17
Long-finned pilot whale	2	41	0	0	2	65	0	0	4	106	0	0	4	106
Ziphiidae	2	3	0	0	10	19	0	0	12	22	0	0	12	22
Spectacled porpoise	0	0	0	0	1	1	0	0	1	1	0	0	1	1
Unidentified whale	7	7	0	0	6	6	1	2	13	13	1	2	14	15

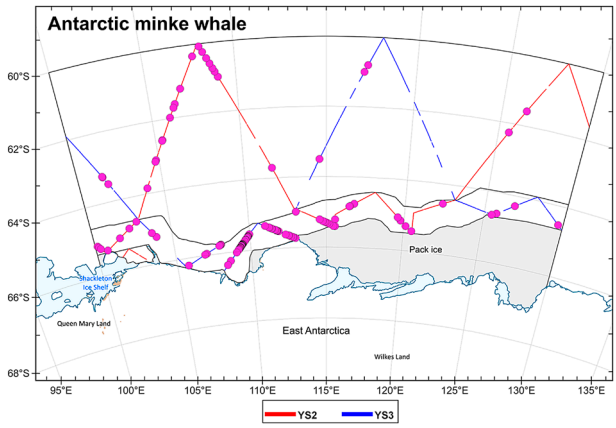

Figure 4. Geographical distribution of primary sightings of Antarctic minke whales during the 2024/25 JASS-A survey.

Southern right whales

Southern right whales (SRW) were sighted in the western part of the northern stratum (Figure 9). Mother and calf pairs were not observed. The mean school size was 1.00. The DI in the research area was 0.08 and decreased remarkably compared to the previous survey (Table 4). SRWs migrating Area IV East belong to the Southwest Australian population (Bannister, 2001), and this population migrate to feeding areas in mid-latitude areas without reaching Antarctic waters (Mackay *et al.*, 2020). Although southern right whales show slowed growth rates (O'Shannessy *et al.*, 2025; Grundlehner *et al.*, 2025), it is unlikely that the population has declined. Instead, these figures could reflect different numbers of whales from this population migrating into the Antarctic.

Rare species observations

Rare species sightings included a dwarf minke whale and a spectacled porpoise (Figure 10). The dwarf minke whale (Figure 11) was sighted as primary sighting at 60°30'S, 128°40'E in the northern stratum. This sighting location coincides with one of the high-density regions of this species identified by Kato *et al.* (2021). The spectacled porpoise (Figure 12) was observed in the northern stratum, representing a valuable record of this poorly known small cetacean species in Antarctic waters.

Other research activities

Table 5 shows a summary of results of different experi-

Table 4

Comparison of density indices (DI, number of schools per 100 n.miles) and mean school size (MSS) of baleen whales from primary sightings in Area IVE (100°E–130°E) between the present survey and previous surveys.

Species	Antarctic blue		Fin		Antarctic minke		Humpback		Southern right		Reference
Survey year	DI	MSS	DI	MSS	DI	MSS	DI	MSS	DI	MSS	
2005/06	0.09	1.50	3.60	2.51	5.20	2.08	28.21	1.82	1.08	1.32	Nishiwaki *et al.*, 2006
2007/08	0.05	3.00	0.04	1.00	0.78	2.41	7.57	1.87	2.09	1.33	Ishikawa *et al.*, 2008
2014/15+15/16	0.50	1.77	0.68	2.66	6.51	2.75	26.53	2.23	0.84	1.68	Matsuoka *et al.*, 2015
											Isoda *et al.*, 2016
2024/25	**0.48**	**1.50**	**0.72**	**2.00**	**5.09**	**2.37**	**32.43**	**1.77**	**0.08**	**1.00**	**The present survey**

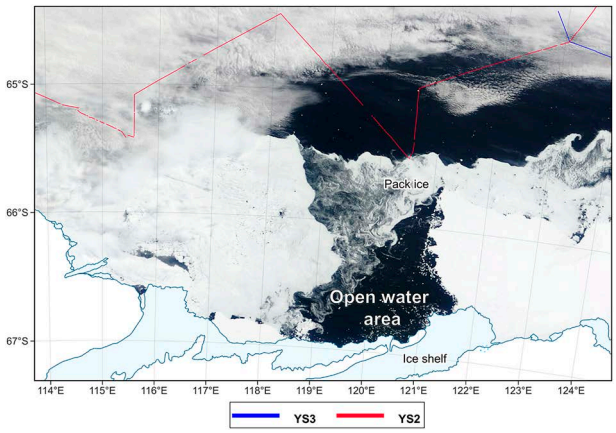

Figure 5. Satellite image of a polynya (open water area) formed near 120°E in the research area on January 13, 2025. The image shows thick pack ice (labeled) to the north of the open water area. The red line indicates survey tracks where research vessels (*YS2*) attempted to access the polynya but were unable to proceed due to sea ice conditions. This image was obtained from NASA Global Imagery Browse Services for EOSDIS WMS.

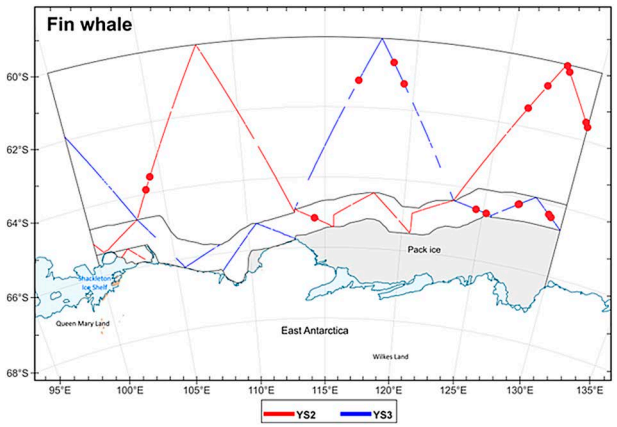

Figure 6. Geographical distribution of primary sightings of fin whales during the 2024/25 JASS-A survey.

ments.

Sighting distance and angle experiment

The sighting distance and angle experiment was conducted to evaluate the accuracy of sighting distance and angle provided by primary observers. The results of this experiment will be used for the calibration of abundance estimates. The actual experiments were successfully completed on 26 January for 3 hours 17 minutes (128 trials) in *YS2*, and on 27 and 31 January for a total of 6 hours 2 minutes (136 trials) in *YS3*.

Photo-ID

Photo-ID data are used for individual matching exercises to investigate distribution and movement of large whales. A total of 24 Antarctic blue, 36 humpback, 3 southern right and 15 killer whales were successfully photo-identified during the entire survey. These data will be registered into the Institute of Cetacean Research (ICR) database (see Matsuoka and Pastene, 2014).

Biopsy sampling

Biopsy samples are used for genetic studies on stock structure of large whales and for other feasibility studies related to the specific objectives of the JASS-A. For the entire survey, a total of 128 biopsy samples were collected from 12 Antarctic blue, 18 fin, 35 Antarctic minke, 52 humpback, 3 southern right, 5 killer, one long-finned pilot whale, and one spectacled porpoise, using the Larsen system (Larsen, 1998). Biopsy samples were stored at −20°C.

Satellite tagging

Satellite tagging is used for the study of movement, distribution and stock structure of whales. The satellite-monitored tags (SPOT and SPLASH-types, Wildlife Computers, Redmond, Washington, USA) were deployed with the Air Rocket Transmitter System (ARTS) (LK-ARTS, Skutvik, Norway). The details of deployment system, protocols and research results to date were described in Konishi *et al.* (2020). During the whole survey, 10 fin, 25 Antarctic minke, and 2 humpback whales were tagged.

Table 5
Summary of the results of experiments conducted during the 2024/25 JASS-A survey.

Experiments	Results and descriptions
Sighting distance and angle experiment	264 trials completed (*YS2*: 128 trials, *YS3*: 136 trials)
Photo-ID	Obtained from 24 Antarctic blue, 36 humpback, 3 southern right and 15 killer whales
Biopsy sampling	Collected from 12 Antarctic blue, 18 fin, 35 Antarctic minke, 52 humpback, 3 southern right, 5 killer, 1 long-finned pilot whale, and 1 spectacled porpoise
Satellite tagging	Deployed on 10 fin, 25 Antarctic minke, and 2 humpback whales
Oceanographic survey	164 XCTD casts
Marine debris observation	1 plastic bottle was observed in the research area

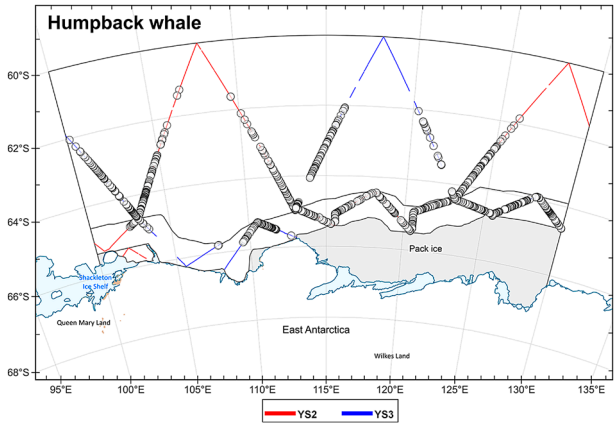

Figure 7. Geographical distribution of primary sightings of humpback whales during the 2024/25 JASS-A survey.

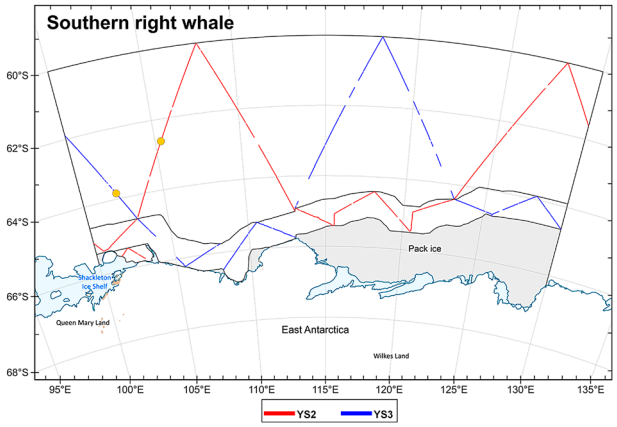

Figure 9. Geographical distribution of primary sightings of southern right whales during the 2024/25 JASS-A survey.

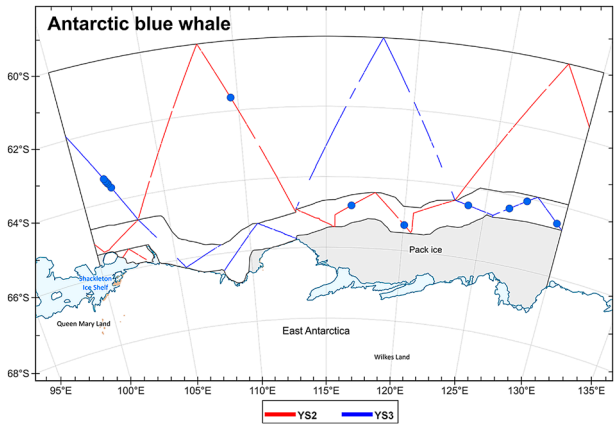

Figure 8. Geographical distribution of primary sightings of Antarctic blue whales during the 2024/25 JASS-A survey.

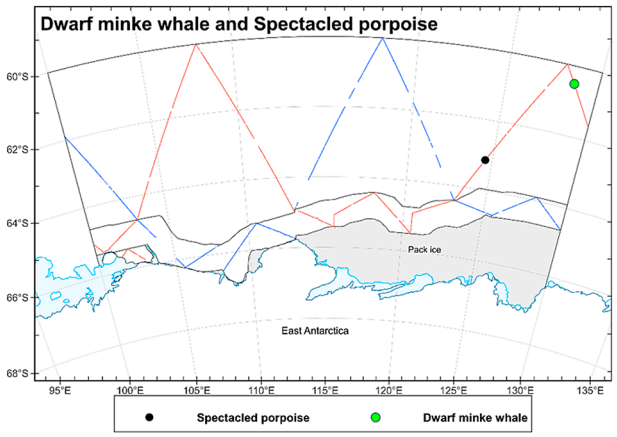

Figure 10. Geographical distribution of primary sightings of dwarf minke whale and spectacled porpoise during the 2024/25 JASS-A survey.

Oceanographic survey

Oceanographic observations are important to understand the relationship between whales and the physical environment. The vertical distribution of water temperature and salinity were recorded from sea surface to 1,850 m water depth using XCTD system (eXpendable Conductivity, Temperature and Depth profiler, Tsurumi-Seiki Co., Ltd., Yokohama, Japan; probe type: XCTD-4N) with Digital Converter MK-150P (*YS2*) and MK-150N (*YS3*) at 164 stations (Figure 13).

The mean temperature from the surface to 200 m depth (MTEM200) was calculated using XCTD data

Figure 11. Dwarf minke whale sighted at 60°30'S, 128°40'E on 2 January 2025. The white blaze can be confirmed to spread from the pectoral fin to the shoulder area. Photographed by Minato Kawasaki of *YS2*.

Figure 12. Spectacled porpoise sighted at 63°09'S, 124°35'E on 7 January 2025. Photographed by Minato Kawasaki of *YS2*.

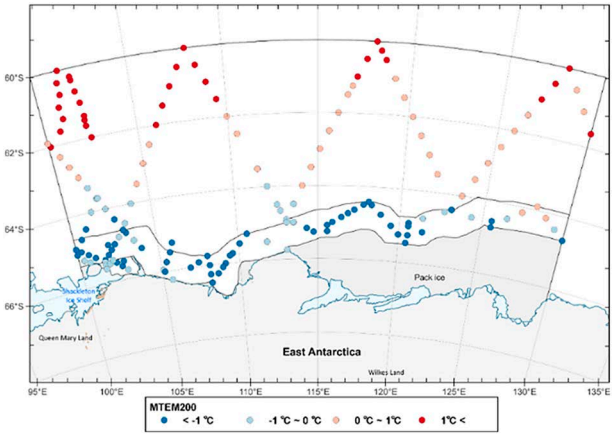

Figure 13. Oceanographic observation stations (XCTD casting points) in the 2024/2025 JASS-A survey. The mean temperature from the surface to 200 m depth (MTEM200) was calculated using XCTD data collected at these stations.

(Figure 13). The MTEM200 provides a useful overview of water mass structure, and temperatures ranging from 0°C to 1°C indicate the distribution around the SBACC (Southern Boundary of the Antarctic Circumpolar Current) zone (Naganobu *et al.*, 2010). Oceanographic data will be analysed to study the oceanographic structure of the research area and the relationship with whale distribution.

Marine debris observation

Studies on marine debris in the Antarctic are very scarce. It is therefore important to continue with this kind of survey to monitor future trends in the occurrence of marine debris. One plastic bottle was observed in the research area. These data will be registered into the ICR database and reported in the future (e.g. Isoda *et al.*, 2021).

HIGHLIGHTS OF THE SURVEY

The 2024/2025 JASS-A survey covered Area IV East (100°E–130°E) and succeeded in collecting sighting data following the same protocol as the past survey, necessary for the abundance estimation of cetaceans in this area. Several other data necessary for understanding stock structure, movement and the environment of whales were collected during the survey. The data collected through JASS-A will be analysed in conjunction with the data collected by the previous JARPA/JARPAII, NEWREP-A and IDCR/SOWER surveys in the same region so that the analyses can be based on a long and consistent data set.

ACKNOWLEDGEMENTS

We thank the captains, crew members and researchers who participated in the 2024/2025 JASS-A survey for their effort in the collection of data and samples. We also thank the Fisheries Agency of Japan for the funding and logistic support for the JASS-A program. We appreciate Yoshihiro Fujise, Koji Matsuoka, Tsutomu Tamura, Takashi Hakamada, Mioko Taguchi (ICR), Hiroto Murase (Tokyo University of Marine Science and Technology), and the steering group of JASS-A for their guidance in the design and implementation of the research. Kyodo Senpaku Co., Ltd. is acknowledged for their arrangements and logistic support for this cruise. We are grateful to Luis A. Pastene (ICR) for his assistance in preparing this report and to the Editorial Team of TEREP-ICR for editorial work.

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