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ABSTRACT

The cetacean sighting survey was conducted in the northern part of the Sea of Okhotsk in 2021. The vessel is a stern trawl type research vessel with a barrel for observation. The objective of the survey is to obtain information on distribution and abundance of large whales using the normal closing mode. The period of survey was from August 8 to September 10 (34 days), the northern and the southern boundaries are 57°00N and 60°00N, respectively and the western and the eastern boundaries are 139°00E and 157°00E, respectively. During the research distance of 1299,26 n.miles by closing mode for large cetaceans in the research area and 963,41 n.miles by passing mode during transit.
Over the entire period of research, the following species of cetaceans were confirmed: common minke whale (18 schools – 21 animals), like minke whale (1-2), North Pacific right whale (2- 4), bowhead whale (1-1), humpback whale (1-1) fin whale (8-12), sperm whale (1-1), killer whale (6-32), white whale (1-6), Pacific white-sided dolphin (6-294), Dalli type Dall's porpoise (8-19), truei-type Dall's porpoise (2-3), unidentified type Dall's porpoise (112-351), unidentified large cetacean (4-5), unidentified small cetacean (2-7).
KEY WORD: SIGHTING SURVEY, SEA OF OKHOTSK, CETACEANS.

INTRODUCTION

Research objectives

The plan of 2021 survey was submitted at the 68 C session of the IWC/SC meeting (Gushcherov *et al.*, 2021). The survey was conducted in the northern part of the Sea of Okhotsk by Russian scientists of Pacific branch of «VNIRO» («TINRO») and Russian Research Institute of Fisheries and Oceanography «VNIRO».
The main objective of the survey was to record the information on distribution and abundance of cetaceans based on the IWC standard sighting survey method. Photo identification was tried if bowhead whale and killer whales were sighted. Distance and angle estimation training and experiment were conducted.

Research area and cruise track

The 2021 research area in the northern part of the Sea of Okhotsk in coordinates to 57°00N - 60°00N and 139°00E - 157°00E (Figure 1). The coordinates of way points for the pre-determined track line are given in Table 1 (WP1 – WP16). Track line was determined using Distance 7.3 Release 2 (Thomas *et al.* 2010). During the whole expedition there were no changes in the route.

SHORT INFORMATION ON THE CRUISE

Cruise itinerary

	Dates	Activity	Number of days
1	07-08.08.2021	Preparation for the survey, embarking the equipment	2 days
2	08.08.2021	Departing from Olga	1 day
3	08-10.08.2021	At anchor in Dzhigit Bay due to adverse weather conditions	3 days
4	11-15.08.2021	Transit to way points 1 of research area	5 days
5	16.08-02.09.2021	Sighting survey in research area	18 days
6	03.09-09.09.2021	Transit from the research area to the port of Vladivostok	7 days
7	10.09.2021	Arrival at the port of Vladivostok	

Research vessel

The FSBSE «VNIRO» research vessel *ВЛАДИМИР САФОНОВ* (*VLADIMIR SAFONOV*) was used during the survey as same as the past surveys since 2015. It is equipped with a barrel (15,0 m from the sea level) where two observers can conduct searching. On the upper bridge (12,0 m from the sea level), scientists can also observe and record sighting, effort and weather information. The crew consisted of 25 members. Specification and photo of the vessel are shown in Appendix 1 and table 9.

Six scientists from Russia (Pacific branch of «VNIRO» and Russian Research Institute of Fisheries and Oceanography «VNIRO») participated in the cruise. All scientists have significant experience in the marine mammal research survey. Names and responsibilities are as follows:

1. Pavel S. Gushcherov (Pacific branch of «VNIRO» («TINRO»)) Cruise leader/Chief Scientist - sighting, photo-ID;
2. Igor A. Naberezhnykh (Pacific branch of «VNIRO» («TINRO»)) – sighting, senior researcher; photo-ID;
3. Vladimir V. Obraztsov (Pacific branch of «VNIRO» («TINRO»)) – sighting;
4. Alexander N. Bashtovoy (Pacific branch of «VNIRO» («TINRO»)) – sighting;
5. Maksim D. Kenin (Pacific branch of «VNIRO» («TINRO»)) – sighting, meteo specialist;
6. Ivan F. Belokobylskiy (Russian Research Institute of Fisheries and Oceanography «VNIRO») – sighting.

Tomio Miyashita (T.M.) has acted as supervisor of IWC for oversight during the preparation and the survey by email communication.

Pre-cruise meeting

Due to the situation in the world caused by the COVID-19 infection, no pre-trip meeting was held this year. However, the readiness of the vessel, crew and scientific group was confirmed by T.M. via e-mail with the provision of photo and video materials.

Survey method

In the research area, the normal closing mode was primarily used for large cetaceans and killer whales, but the vessel passed for other small cetaceans. Two scientists conduct searching mainly by naked eye, sometimes using binoculars (15x50 with stabilizer or 7x50) as supplementary measures. Three observer teams with determined members operated in two hours shifts. The survey was conducted for a maximum of 14 hours per day (from 6 a.m. to 20 p.m.) when the weather conditions were suitable for observations: visibility better than 1.5 n.miles and the wind speed less than 15.5 knots (about 7.5 m/s) and Beaufort sea state less than 5. The vessel speed was about 9 knots with slight adjustment to avoid vibration of vessel, and about 10 knots while closing.

During the transit, the normal passing mode survey was conducted.

In general, research effort began from 6 a.m. and ended at 20 p.m. (maximum 14 hours), but considering the time of sunrise and sunset, the period was changed to keep enough brightness. Time-zone was kept the same as that of Vladivostok (GMT +10 hours) throughout the cruise.

When a sighting was made, the initial sighting information such as estimated distance and angle to the sightings, species and school size etc. was reported to a researcher on the upper bridge for record. The angle was estimated using the angle board in front of each researcher. The effort record was recorded by a researcher on the upper bridge. The hourly weather record was made by a scientist. Sea surface water temperature (SST) was measured from water drawn using a small bucket. Wind information was quoted from the sensor in the bridge.

When a sighted animal seemed to be large cetacean, one of the researchers on the barrel made instructions to the officer in the bridge about speed and/or course change using a transceiver. After the sighting was approached, the species, group size, estimated length, number of calves present and behavior were determined and recorded. All record sheets (sighting, effort and weather) were originally the same forms as those for IWC/POWER cruises.

Species identification

Guidelines of species identification were based on the IWC-POWER methods for classification of identification (Anon., 2014). Whale body, shape of blow, surfacing and other behavioral pattern were potential cues for species identification. Because of not closing to small cetaceans except for killer whales, it was difficult to identify color type of Dall's porpoises when it was observed at a long distance from the vessel and thus the proportion of unidentified type of the species became large.

Also, when identifying cetacean species, we used reference guides and methodological recommendations for registering marine mammals (Бурдин и др., 2009; Мельников, 2001; Гущеров и др., 2021).

School size estimation

Guidelines for school size estimation were also based on the IWC-POWER methods (Anon., 2014). For estimation of school size, a binocular was potentially used. School size was estimated after approaching within 1.0 n.miles for large cetaceans, but for small cetaceans it was estimated when the school was at the closest distance during passing. When it was difficult to determine the school size, especially for small cetaceans, the minimum, the maximum and the best estimate of school size were recorded.

Effort coverage and weather conditions

The overall length of accounting tracks passed in the survey area in normal closing mode with the observations was 1299,26 nautical miles (Table 2). In addition, 963,41 nautical miles were surveyed during passing mode.
Meteorological observations were made every hour. In total, 477 meteorological observations were carried out during 33 voyage days.
Some statistics on meteorological conditions during the period from August 8 to September 9, 2021 are shown in tables 3 - 6.
The air temperature ranged from 6,0° C to 35,0° C, and the surface water temperature ranged from 2,3° C to 24,0 ° C (Table 3), on average, the air temperature was 16,5°C, and the temperature of the surface water layer was 14,7°C. Unsuitable conditions for observation at strong waves (4-7 points) were 17% (Table 4).
In the period from August 8 to September 9, of the total number of observations made, good weather conditions (clear, slightly cloudy, cloudy, mainly cloudy) made up 70,5%, and bad (rain, fog) – 29,5% (Table 5).
During the voyage, the South-West (37,9%) and North-East (21,8%) winds were predominant (Table 6).

RESULTS OF SIGHTINGS

Sighting summary

Table 7 shows the summary of sightings recorded in the research area and during transit. The following species of baleen cetaceans were found: North pacific right whale, common minke whale, like minke whale, fin whale, humpback whale, bowhead whale. The species of toothed cetaceans found: killer whale, white whale, sperm whale, Pacific white-sided dolphin, Dall's porpoises, harbour porpoise. Due to short observation time of some whales, it was not possible to determine the species affiliation for 12 whales. Sighting positions of species identified were plotted in Figures 3a-x.

Detailed sightings of each species

Common minke whale

During the observations on board the R/V Vladimir Safonov, this whale was encountered everywhere (Figure 7) – in research area (6 schools - 8 animals, Figure 3 a) and during transit (12 schools-13 animals, Figure 3 b). A total of 21 animals on the cruise.

It should also be mentioned that on August 28, 2021, the R/V Vladimir Safonov was drifting in the evening. The scientific team found two minke whales near the ship's side (Figure 3 c), which circled the ship until the morning (confirmed by the crew on duty). At the time of the whales' discovery, the accumulation of juvenile herring was visually observed. On the morning of August 29, 2021, the vessel starting survey on the tack. For some time, the minke whales continued to be near the vessel, continuing to accompany it (Figure 3 d).

Like minke whale

In the current season, we also observed animals like minke whale. This code was used to mark whales when, for various reasons, it was impossible to determine with 100% certainty the species as common minke whale.

We noted such animals only during transit (Figure 3 e), in the amount of 2 whales.

Fin whale

During the entire expedition, 12 fin whales were noted, 7 – in the research area (Figure 3 f), and 5 on the transit (Figure 3 g).

Humpback whale

In the current year, the humpback whale met only once at the transit crossing (Figure 3 h). The fountain was noticeable bushy, dorsal fin on a small hump, when diving, the characteristic tail lobe of a humpback whale was visible. Given that the animal is marked in transit mode, there is no photo.

North Pacific right whale

In the current season, 4 animals were recorded – 2 animals in the in the research area (Figure 3 i) and 2 animals - at the transit (Figure 3 j). When identifying this species, we used the following characteristic features: the absence of a dorsal fin, a wide forked fountain and a tail fin inherent in the North Pacific right whale - these parameters were observed through binoculars. It was not possible to take photographs, because it was not possible to get close to the animals - apparently they were under water for a long time.

Bowhead whale

In 2021, 1 animals bowhead whale was recorded in the research area (Figure 3 k). Managed to take some pictures of the bowhead whale (Figure 3 l).

Sperm whale

We met the sperm whale only once during the transit (Figure 3 m). The sperm whale was identified by a high triangular dorsal crest, an asymmetric fountain directed forward and to the left, and triangular lobes of the caudal fin. Given the deep and long dives of the sperm whale, as well as the normal passing mode, there is no photo.

Killer whale

During the current cruise, killer whales were encountered in several groups (6 schools). 4 animals killer whales (Figure 3 n) were recorded in the research area. 28 animals killer whales were counted during the transit (Figure 3 o). Of all the animals, it was possible to determine by gender: 6 females, 12 males, 3 young. One group of 9 animals killer whales was represented only by males (Figure 3 p). Also was noted 1 jumping killer whale (Figure 3 q).

Dall's porpoises

As before, as in previous years, Dall's porpoises are the most widely encountered species. In the research area, Dall's porpoises were recorded on accounting lines by subspecies in the following numbers: unidentified type of Dall's porpoise - 158 (Figure 3 r), dalli-type of Dall's porpoise - 9 (Figure 3 s), truei-type of Dall's porpoise - 1 (Figure 3 t). At transit: unidentified type of Dall's porpoise - 193 (Figure 3 u), dalli-type of Dall's porpoise - 10 (Figure 3 v), truei-type of Dall's porpoise - 2 (Figure 3 w).

The truei-type of Dall's porpoise was identified in a mixed group of an indeterminate subspecies of the unidentified type of Dall's porpoise.

Pacific white-sided dolphin

In 2021, the Pacific white-sided dolphin was observed in large concentrations during the transit in the Laperuza Strait (Figure 3 x). 6 schools - 294 animals was registered.

White whale

During the transit to the research area, 6 white whales were recorded in the in the Amur Estuary at the entrance to Sakhalin Bay (Figure 3 y).

PHOTO-IDENTIFICATION

During the current expedition, a number of whale photographs suitable for photo-identification were obtained (Table 8): killer whale and bowhead whale. A total of 367 images were obtained, provisionally 9 different animals were identified.

Estimated angle and distance training

Distance and angle estimation training was carried out on August 16th prior to sighting in the research area. Time elapsed – 2 hour 24 min (Appendix 2, Figure 5).

Estimated angle and distance experiment

Experiment was carried out on September 2th. Time elapsed – 3 hours 34 min. The time spent on the training and experiment is given in the table 2.

DISCUSSION

Preliminary analysis based on the past sighting results was summarized as followings (Гущеров и др., 2022).

Joint Russian-Japanese visual surveys of cetaceans have been carried out annually since 2015 and have already covered most of the Sea of Okhotsk (so far, surveys have not been conducted in the southern part of the sea, including along the Kuril Islands).

In the northern, northwestern, western, eastern and central parts of the Sea of Okhotsk in 2015-2021 on accounting transects and transit crossings, the following were counted: fin whale (sch/ani) - 98/199, minke whale - 123/147, North Pacific right whale - 26/38, humpback whale - 17/35, bowhead whale - 3/3, killer whale - 51/203, white whale - 39/406, sperm whale - 6/7, Pacific white-sided dolphin - 7/301, Baird's beaked whale - 4/30, harbour porpoise - 14/34, dalli-type of Dall's porpoise - 182/610 , truei-type of Dall's porpoise - 28/89, unidentified type of Dall's porpoise - 1138/2428 (Myasnikov et. all., 2015; Gushcherov et. all., 2016, 2017, 2018, 2019, 2020, 2021; Гущеров и др., 2022).

Encounters of minke whales can be characterized as ubiquitous - in the open and coastal parts of the Sea of Okhotsk. The same applies to the fin whale, and in larger numbers these whales were recorded in the central and northern parts of the Sea of Okhotsk in 2015. Such large whales as the North Pacific right whale, humpback whale, sperm whale, bowhead whale were encountered in smaller numbers and were not observed annually. The killer whale was also a ubiquitous species; it was noted annually in various group and sex ratios. Dall's porpoise is the leader in sightings among all species of cetaceans, and its maximum number was recorded in the area of western Kamchatka in 2017. White whale and Pacific white-sided dolphin were found only in the Amur Estuary and Sakhalin Bay, as well as in the Laperuza Strait, respectively. Also, occasional sightings of the harbor porpoise and the Baird's beaked whale were noted.

In addition to animal counts, in accordance with the SC IWC methodology, the reaction of whales to the vessel, the dynamics and compactness of groups and the general characteristics of behavior were also recorded. Analysis of the data showed that the reaction of animals to the vessel was absent in most cases (73%), the frequency of other reactions was: indeterminate (11%), active avoidance of the vessel at a distance of less than 0.5 miles (4.5%), active avoidance of the vessel over 0.5 mile (4%), active attraction when under 0.5 mile (3%), active attraction over 0.5 mile (2%), sea surface activity (1.5%). In 79% of cases no change during entire observation period, in 3.5% and 1.5% of cases, the groups disperses or merged, respectively, the exchange of individuals between schools in 1.5% of cases, in 12% of cases, the dynamics of the composition of the group was not determined (Myasnikov et. all., 2015; Gushcherov et. all., 2016, 2017, 2018, 2019, 2020, 2021; Гущеров и др., 2022).

According to the method, the compactness of the group was judged on the basis of the distance expressed in body length between individuals in the group. Whales mostly kept compact at a distance of less than 5 body lengths (51.5% of cases), all animals within 5 BL of another - 11.5%, most animals within 5 BL of another - 8%, Most animals within 5 BL - 3%, animals are dispersed - 7%, and undetermined compactness was 17.5% of cases. The general behavior was as follows: fast travel (53%), slow travel (17.5%), undetermined (14.5%), milling (7.5%), resting (3%), feeding (2.5%) (Myasnikov et. all., 2015; Gushcherov et. all., 2016, 2017, 2018, 2019, 2020, 2021; Гущеров и др., 2022).

Analysis of photos 2015-2021 allowed preliminary identification of 4 species of cetaceans: killer whale - 26 individuals, North Pacific right whale - 12, humpback whale - 8, bowhead whale - 1

Summarizing the above, we believe that the expeditions carried out in 2015 - 2021 have once again made a significant contribution to the activity of the Scientific Committee of the International Whaling Commission.

CONCLUSIONS

This 2021 season was the seventh year when the systematic joint Russian-Japanese sighting survey was carried out on R/V «Vladimir Safonov» in the Sea of Okhotsk. Throughout the expedition we noted the following species of cetaceans - common minke whale, North Pacific right whale, bowhead whale, humpback whale, fin whale, sperm whale, killer whale, white whale, Pacific white-sided dolphin, Dall's porpoises. Marine mammals lab specialists have gained necessary experience to carry out similar surveys based on the method authorized by the IWC/SC.

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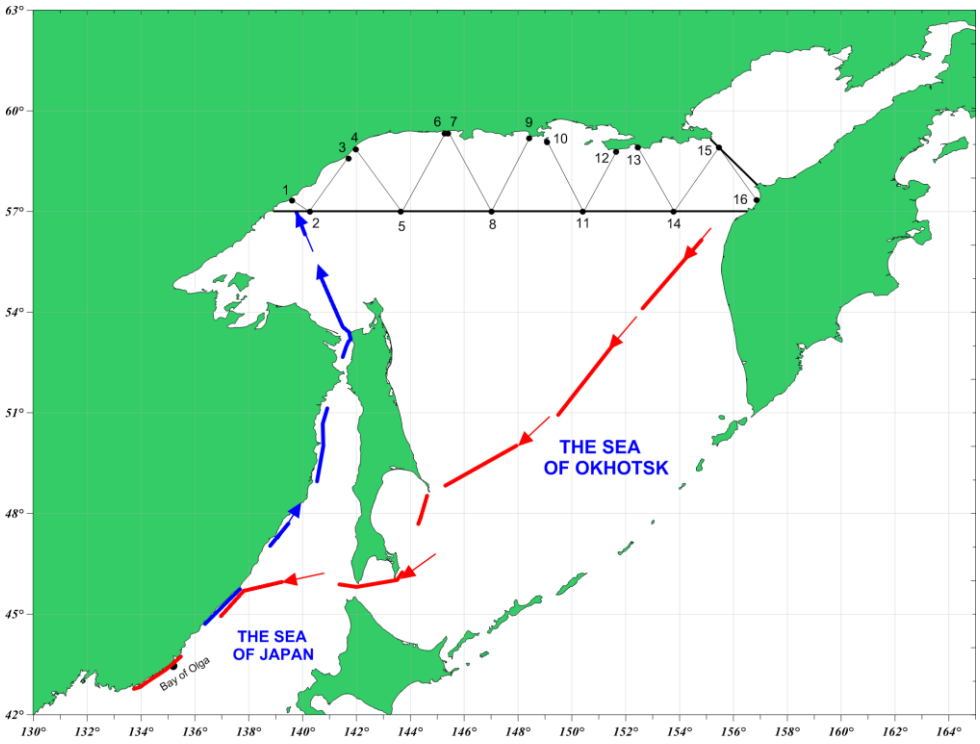

Figure 1. Research area and transit route for *ВЛАДИМИР САФОНОВ* (*VLADIMIR SAFONOV*) in the 2021 Okhotsk cetacean sighting survey. The blue line indicates the ship's route to the research area, the red line – indicates

Table 1. Coordinates of the way points in research area of Okhotsk Sea in 2021 cruise by «Vladimir Safonov».

№ way point	Coordinates	
	Longitude	latitude
1	57°20,98'	139°37,25'
2	57°00,00'	140°16,51'
3	58°35,98'	141°42,08'
4	58°51,95'	141°59,40'
5	57°00,00'	143°39,21'
6	59°20,51'	145°16,40'
7	59°20,75'	145°24,54'
8	57°00,00'	147°01,90'
9	59°11,91'	148°25,86'
10	59°04,76'	149°05,20'
11	57°00,00'	150°24,60'
12	58°47,70'	151°38,84'
13	58°55,73'	152°27,52'
14	57°00,00'	153°47,29'
15	58°55,65'	155°28,64'
16	57°21,44'	156°51,20'

Table 2 - Summary of search effort of in 2021 cruise by «Vladimir Safonov»

Area	Start	End	Normal Closing mode		Normal Passing mode		Estimated angle and distance estimation training/ experiment
	Data/ Time	Data/ Time	Time	Distance (nmi)	Time	Distance (nmi)	
Vladivostok to research area	8-Aug. 00:10	16-Aug. 08:00	-	-	40:30	368,39	-
Research area	16-Aug. 10:56	02-Sep. 17:45	147:60	1299,26	-	-	Training 2:24
Research area to Vladivostok	02-Aug. 18:00	09-Sep. 19:00	-	-	74:30	595,02	Experiment 3:34
Total	-	-	147:60	1299,26	115:00	963,41	5:58

Table 3 - Air and SST temperatures during to 2021/8/8 – 9/9

Item	Air temperature	SST
Maximum	35	24
Minimum	6	2,3
Average	16,5	14,7

Table 4 - Observation of the sea state during to 2021/8/8 – 9/9

Sea state	0	1	2	3	4	5	6	7	Total
Observation	3	157	114	122	56	18	5	2	477
%	0,7	32,9	23,9	25,6	11,7	3,8	1	0,4	100

Table 5 - Observation of weather condition during to 2021/8/8 – 9/9

Weather	Clear	Slightly cloudy	Cloudy	Mainly cloudy	Rain	Fog	Total
Observation	24	47	82	183	7	134	477
%	5	9,9	17,2	38,4	1,5	28,1	100

Table 6 - Observation of wind speed and direction during to 2021/8/8 – 9/9

Wind speed (knots)	**Wind direction**										
	breeze	N	NE	E	SE	S	SW	W	NW	Total	%
breeze	3	0	0	0	0	0	0	0	0	3	0,6
1-3	0		23	2	37	24	54	3	15	158	33,1
4-6	0	5	17	3	26	29	24	1	10	115	24,1
7-10	0		17	1	1	7	80	3	12	121	25,4
11-16	0		23			5	23	4		56	11,7
17-21	0		17	1						18	3,8
22-27	0		5							5	1
28-33	0		2							2	0,4
Total	3	5	104	7	64	65	181	11	37	477	
Total, %	0,6	1	21,8	1,5	13,4	13,6	37,9	2,3	7,8		100,0

Table 7 - Number of sightings during the Okhotsk Sea sighting survey in 2021

Species	Research area				Transit				Total			
	Primary		Secondary		Primary		Secondary		Primary		Secondary	
	Sch.	Ani.	Sch.	Ani.	Sch.	Ani.	Sch.	Ani.	Sch.	Ani.	Sch.	Ani.
Dall's porpoise (dalli-type)	3	6	2	3	3	10			6	16	2	3
Dall's porpoise (truei-type)	1*	1			1*	2			2*	3		
Dall's porpoise (unidentified type)	50	152	3	6	59	193			109	345	3	6
Pacific white-sided dolphin					5	286	1	8	5	286	1	8
Killer whale	1	4			5	28			6	32	0	0
White whale					1	6			1	6	0	0
Common minke whale	3	3	3	5	12	13			15	16	3	5
Like minke whale					1	2			1	2	0	0
North pacific right whale	1	2			1	2			2	4	0	0
Humpback whale							1	1	0	0	1	1
Sperm whale					1	1			1	1	0	0
Fin whale	3	7			5	5			8	12	0	0
Bowhead whale	1	1							1	1	0	0
Unidentified large cetacean	1	2			2	2	1	1	3	4	1	1
Unidentified small cetacean	1	1			1	6			2	7	0	0

*: with unidentified type Dall's porpoises.

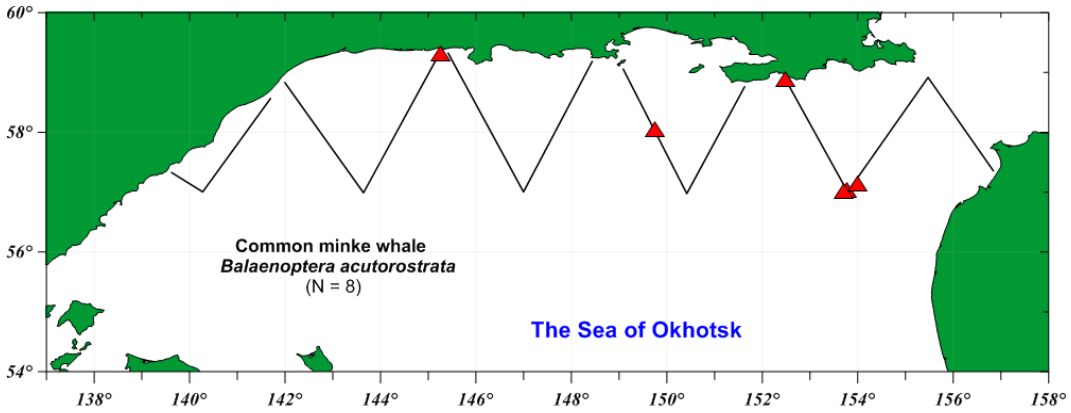

Figure 3 a. Sighting positions of common minke whale schools in research area. Red triangles show the sighting position

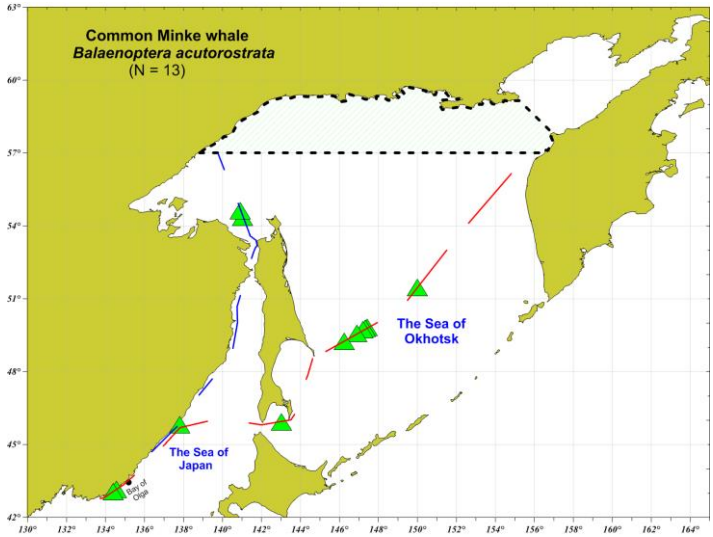

Figure 3 b. Sighting positions of common minke whale schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

Figure 3 c. Minke whale in the dark at the side of the vessel

Figure 3 d. Minke whale during daylight hours at the side of the vessel

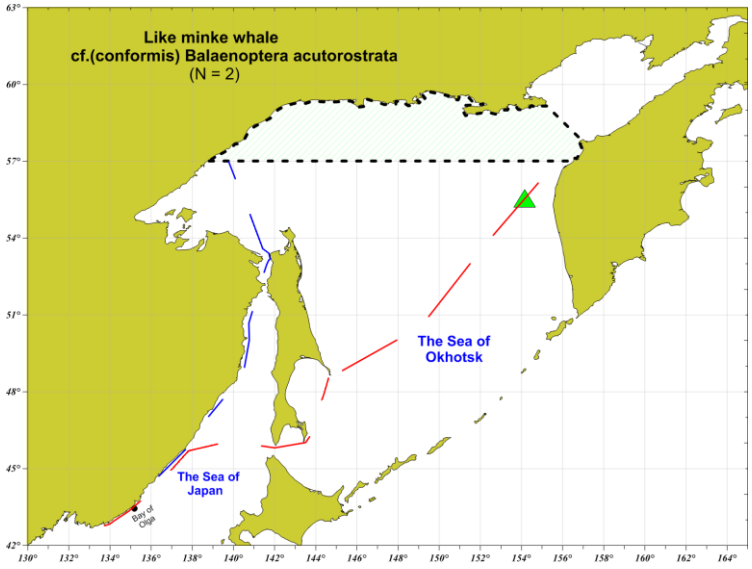

Figure 3 e. Sighting positions of Like minke whale schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

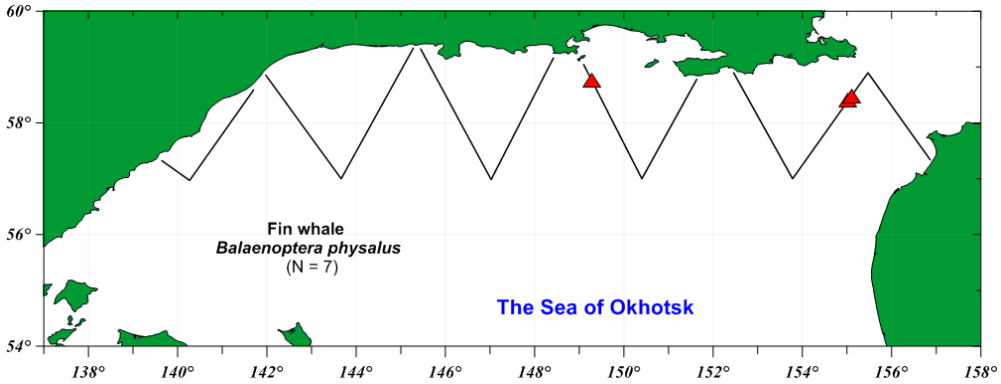

Figure 3 f. Sighting positions of fin whale schools in research area. Red triangles show the sighting position

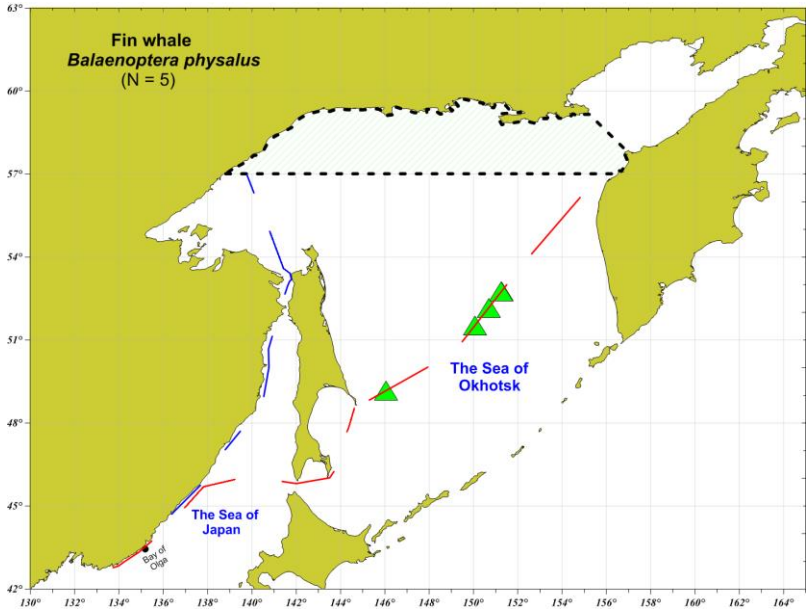

Figure 3 g. Sighting positions of fin whale schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

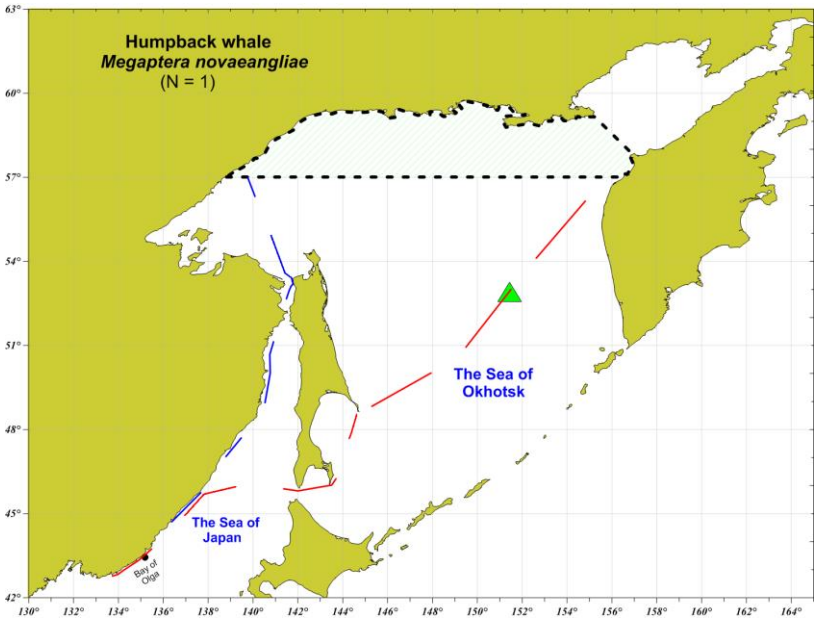

Figure 3 h. Sighting positions of humpback whale schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

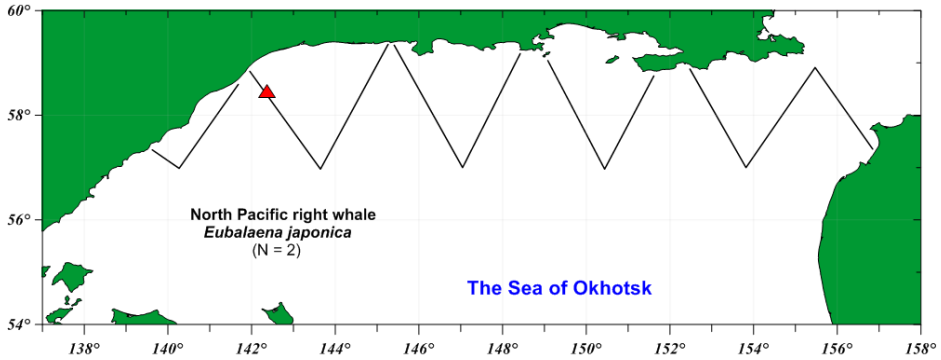

Figure 3 i. Sighting positions of North Pacific right whale schools in research area. Red triangles show the sighting position

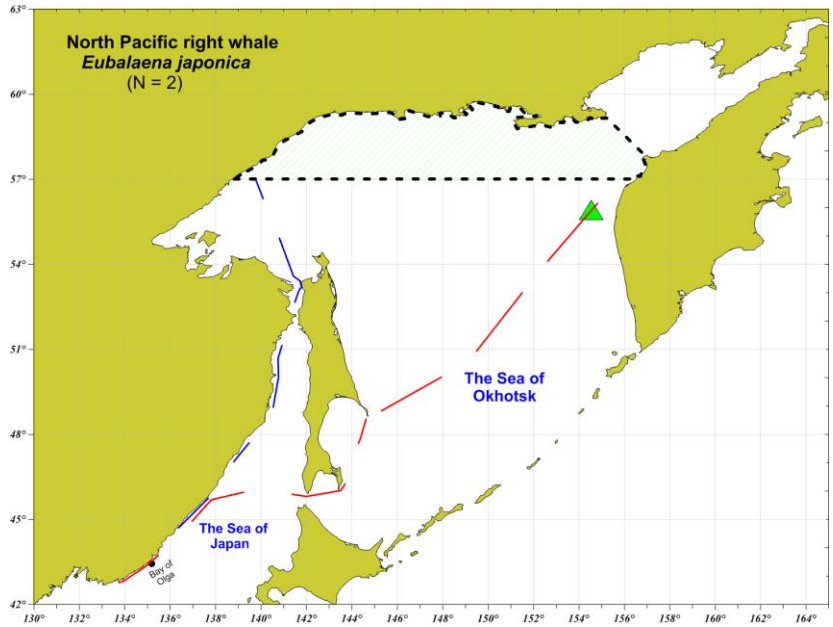

Figure 3 j. Sighting positions of North Pacific right whale schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

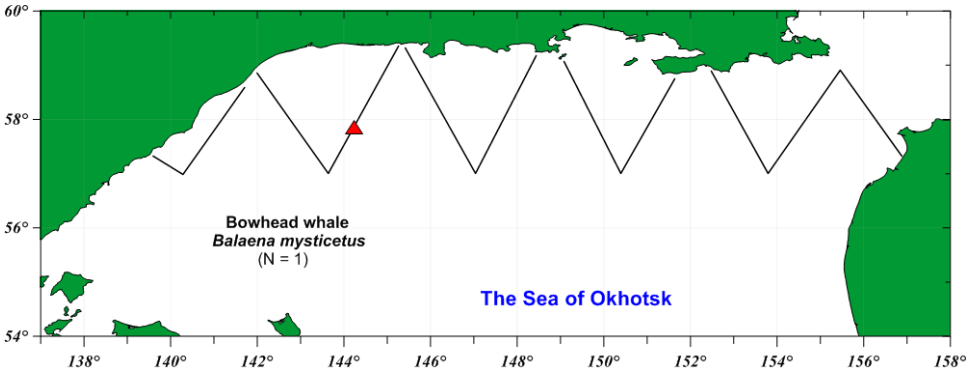

Figure 3 k. Sighting positions of Bowhead whale schools in research area. Red triangles show the sighting position

Figure 3 l. White coloration of the chin of the bowhead whale

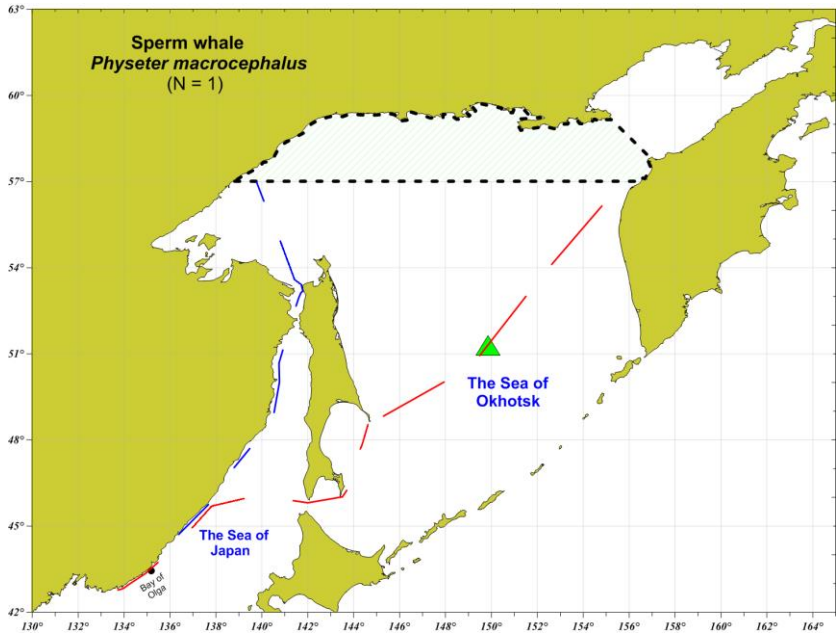

Figure 3 m. Sighting positions of Sperm whale schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

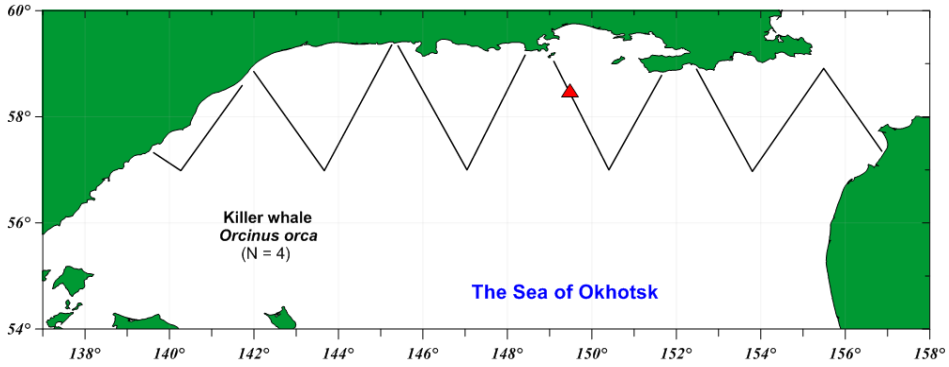

Figure 3 n. Sighting positions of Killer whale schools in research area. Red triangles show the sighting position

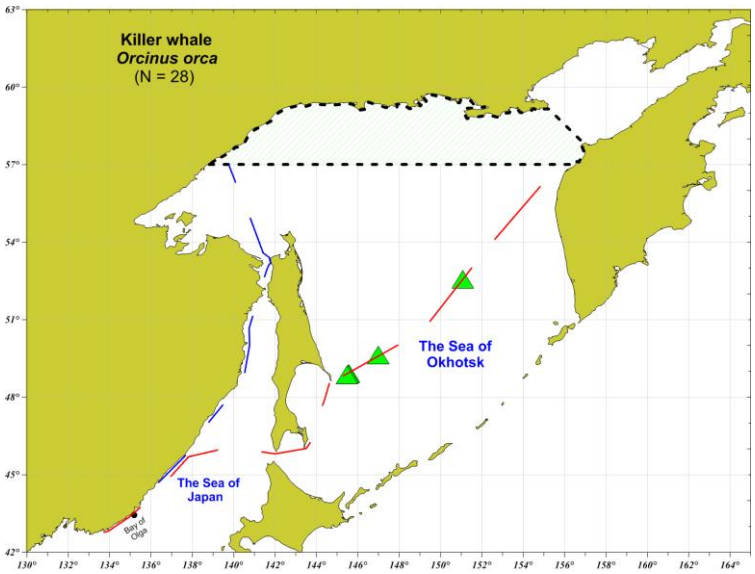

Figure 3 o. Sighting positions of Killer whale schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

Figure 3 p. Male killer whale group

Figure 3 q. Jumping of killer whale

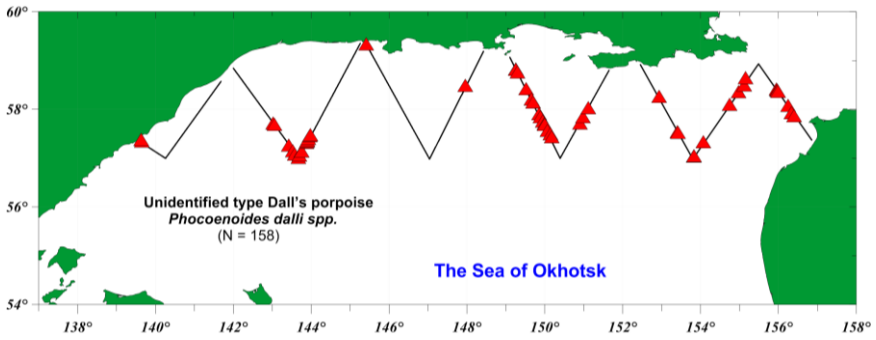

Figure 3 r. Sighting positions of unidentified type Dall's porpoise schools in research area. Red triangles show the sighting position

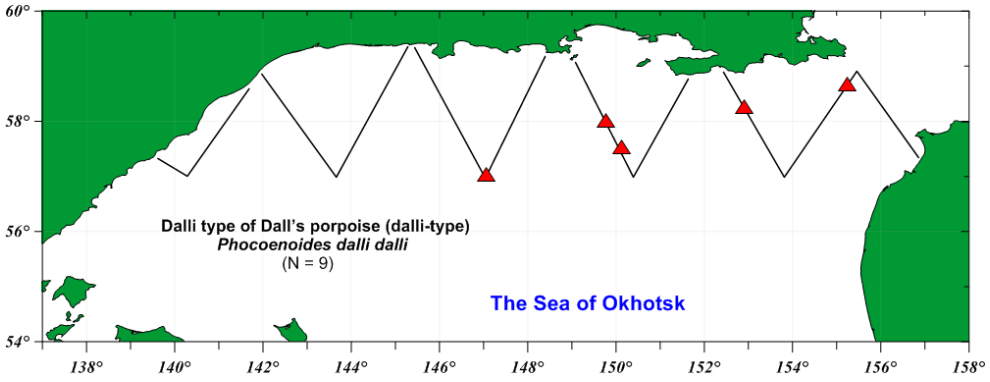

Figure 3 s. Sighting positions dalli-type of Dall's porpoise schools in research area. Red triangles show the sighting position

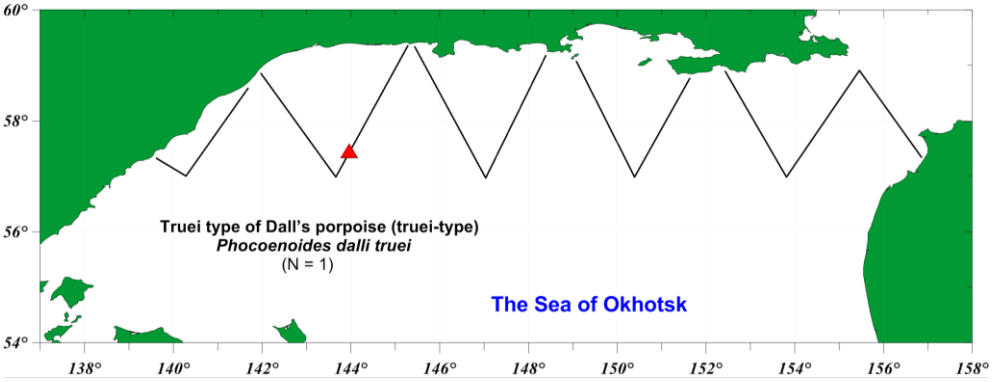

Figure 3 t. Sighting positions truei-type of Dall's porpoise schools in research area. Red triangles show the sighting position

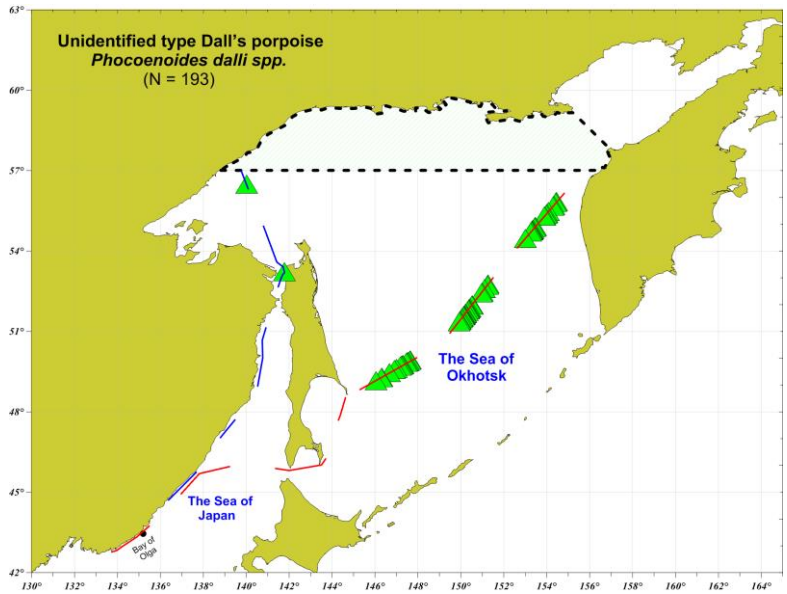

Figure 3 u. Sighting positions of unidentified type Dall's porpoise schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

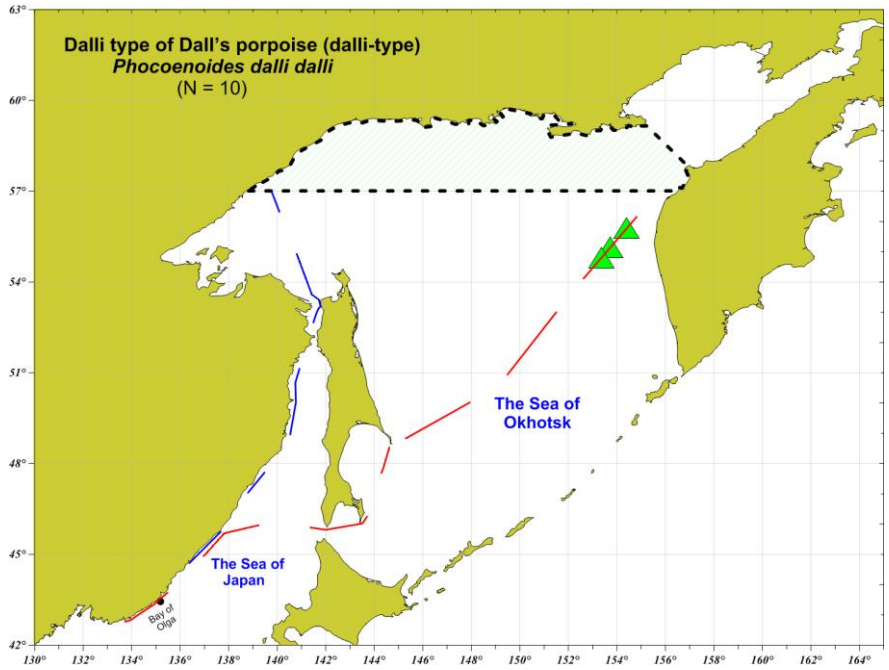

Figure 3 v. Sighting positions of dalli-type of Dall's porpoise schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

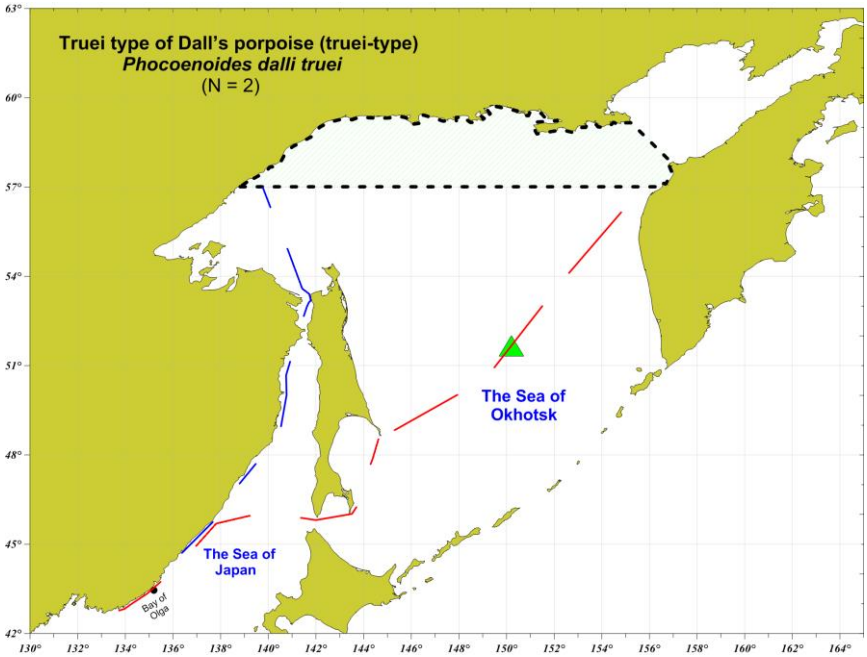

Figure 3 w. Sighting positions of truei-type of Dall's porpoise schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

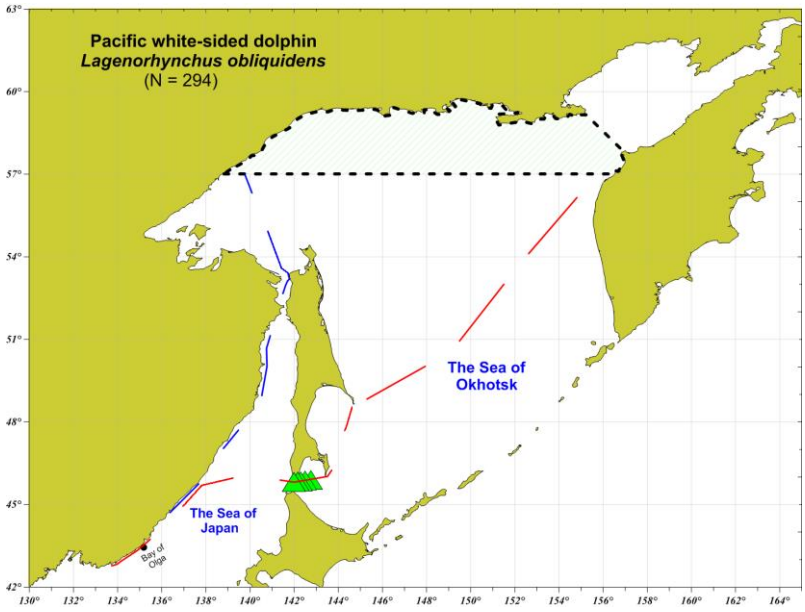

Figure 3 x. Sighting positions of Pacific white-sided dolphin schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

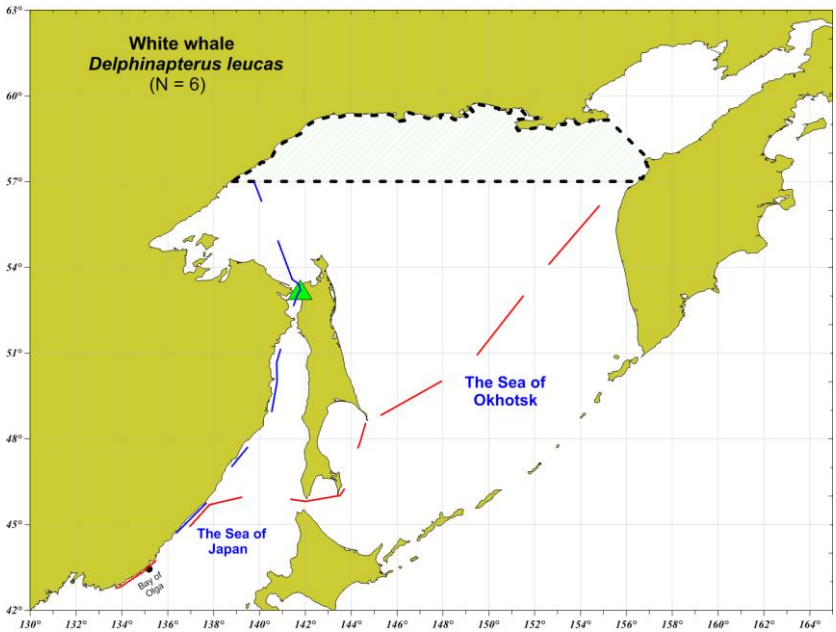

Figure 3 y. Sighting positions of white whale schools in transit. Green triangles show the sighting position. The blue line indicates the ship's route to the research area, the red line – indicates the ship's route from the research area

Table 8 – Provisional number of photo-identified animals during the 2021 survey

Date	Species	Number of photos	Number of identified individuals
20.08.2021	Bowhead whale	7	1
25.08.2021	Killer whale	39	4
04.09.2021	Killer whale	31	3
05.09.2021	Killer whale	6	1 (poor quality)

Appendix 1

R/V ВЛАДИМИР САФОНОВ (VLADIMIR SAFONOV)

Table 9. Specification of the research vessel *ВЛАДИМИР САФОНОВ* (*VLADIMIR SAFONOV*)

Length overall [m] 48.12
Molded breadth [m] 10.50
Gross tonnage (GT) 462.0
Barrel height [m] 15.0
Upper bridge height [m] 12.0
Engine power [kW] 970

Appendix 2

Figure 5. Radar reflecting buoy for estimated angle and distance training and experiment

Oversight report for the cetacean sighting survey in the Sea of Okhotsk in 2022

Tomio Miyashita
Fisheries Resources Institute

This year's project was also heavily influenced by COVID-19, and many difficulties were encountered in its implementation. Like the last season, I have ordered the photos and the videos of the vessel before departure, and I have checked. Then a request was made to move a fish-collecting lamp that may be obstructing forward visibility, and the work was done as requested.

I also requested like the last season that species identification should be conducted by experienced scientists (cruise leader or senior scientists) and the angle board should be rigorously used. As the results, it seems that these requests were faithfully carried out.

During the cruise, detailed information of the research activities such as the positions (at noon, start and finish), the distance (with survey effort, without effort), the sighting information (number of schools and animals sighted by species, by primary/secondary), the weather information at noon and other description of activity if necessary has been informed everyday via e-mail. If necessary, I e-mailed for confirmation and received a response from the cruise leader.

This year, during the transit to the research area, the typhoon was closed this area, but the weather in the research was generally good, and the vessel could covered 100% of the pre-determined track line. And large number of sightings have been obtained successfully. The fact that so much has been accomplished under the COVID-19 epidemic is a tribute to the tireless efforts of the cruise leader, researchers and crew. Finally, I am confident that this survey was carried out in accordance with the guidelines of the Scientific Committee.