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MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

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**MARINE MAMMAL OBSERVER PROGRAMME 2019
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**MARINE MAMMAL OBSERVER PROGRAMME 2019
CLOSE-OUT REPORT**

TABLE OF CONTENT:

1	INTRODUCTION.....	5
1.1	GOALS AND OBJECTIVES	6
2	OVERVIEW OF RISKS AND MITIGATION MEASURES.....	7
2.1	POTENTIAL RISKS	7
2.2	COLLISION MITIGATION MEASURES	7
2.2.1	Control of Vessel Routes	9
2.2.2	Speed Limitation.....	9
2.2.3	Zonal Division of Eastern Sakhalin Coastal Waters.....	10
2.2.4	Marine Mammal Observers.....	14
2.2.5	Control of Vessel Movements	15
3	MARINE MAMMAL OBSERVERS.....	16
3.1	QUALIFICATION OF MARINE MAMMAL OBSERVERS	16
3.2	TRAINING PROGRAMME	16
3.3	ORGANISATION AND METHODS	16
4	OBSERVATION PROGRAMME	17
4.1	OFFSHORE OPERATIONS.....	17
4.2	VESSELS' ACTIVITY.....	17
4.3	MARINE MAMMALS OBSERVERS	17
5	COLLISION MITIGATION MEASURES.....	20
5.1	ADHERENCE TO VESSEL CORRIDORS	20
5.2	COMPLIANCE WITH THE SPEED LIMITS.....	23
5.3	OBSERVATION RESULTS AND MEASURES TAKEN.....	23
5.3.1	Gray Whales.....	23
5.3.2	Fin Whales and Northern right whale.....	26
5.3.3	Other Cetaceans	26
6	OBSERVATION PROGRAMME EFFICACY	29
6.1	GENERAL DESCRIPTION OF SIGHTING STATISTICS	29
6.2	NUMBER OF OBSERVATIONS BY MONTHS.....	29
6.3	WEATHER CONDITIONS.....	30
6.4	SIGHTING OF ANIMALS DEPENDING ON WEATHER CONDITIONS	33
7	CONCLUSION.....	34
8	REFERENCES.....	35



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

1 INTRODUCTION

Sakhalin Energy Investment Company Ltd. (Sakhalin Energy) was established in 1994 to develop the Piltun-Astokhskoye and Lunskoye oil and gas fields on the north-east shelf of Sakhalin Island, in the Sea of Okhotsk. 23 species of marine mammals, including 17 cetacean species (whales, dolphins and porpoises) and 6 pinniped species, can be observed in the coastal waters of the Sea of Okhotsk in the Sakhalin-2 project area. 7 of these species are listed in the Red Book of the Russian Federation: Okhotsk-Korean (western) gray whale (WGW), bowhead whale, pacific right whale, fin whale, Cuvier's beaked whale, harbour porpoise, and Steller's sea lion.

Sakhalin Energy has identified the protection of marine mammals as a high-priority task for the whole period of its oil and gas field development. In particular, the Company has focused on the conservation of western gray whales (*Eschrichtius robustus*) which feed near offshore production facilities of Sakhalin Energy during the ice-free season. This species is listed under Category 1 in the Red Book of the Russian Federation (2012). High conservation status was applied due to the small population size and low number of reproductive females. According to international expert estimates, over recent years the population has been steadily increasing by 2–5 % per year, due to which in 2018 IUCN changed the status of western gray whales in the Red List from “critically endangered” (CR) to “endangered” (EN).

Although industrial whaling was thought to have caused extinction of the WGW population (Bowen, 1974), a small number of feeding whales was identified in 1983 (Blokhin et al., 1985) in the coastal waters of Sakhalin. In 1995 studies of the WGW started under the *Agreement on Cooperation in the Field of Environmental Protection* between Russia and the USA. In 1997 Sakhalin Energy began funding the studies, which to date have produced extremely valuable information on the ecology of these whales. Since the discovery of WGW offshore the north-eastern coast of Sakhalin in 1983, the total number of known WGW has been consistently increasing from approximately 20 to over 200. As of 2019 a total number of 321 individuals have been included in the Sakhalin WGW catalogue of the National Scientific Center of Marine Biology, the Far Eastern Branch of the Russian Academy of Sciences (NSCMB FEB RAS).

In 2010–2012 a programme of whales' satellite tagging was successfully conducted using satellite telemetry performed by the A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences (IEE RAS) and the Oregon State University (OSU) Marine Mammal Institute in collaboration with the U.S. National Marine Fisheries Service, Kronotsky State Nature Biosphere Reserve, and the Kamchatka Branch of the Pacific Institute of Geography. The research was contracted through the International Whaling Commission (IWC) and International Union for Conservation of Nature (IUCN) with funding from Exxon Neftegas Ltd. (ENL) and Sakhalin Energy Investment Company Ltd.

During the study period, several whales were tagged. In 2010, one gray whale known as Flex (Belokhvost—"White Tail") was tagged near the north-east coast of Sakhalin. According to the satellite data, after the summer the whale migrated to the North American coast and reached the coast of central Oregon. In 2011 tags remained on two out of six tagged whales by the time of migration; these two whales followed the same route made by Flex a year before. The most representative example was the migration of Varvara. After tagging and wintering near the coast of California, this whale returned to Sakhalin for feeding in 2012. The data gathered to date indicates that the whales feeding near the north-eastern coast of Sakhalin and the individuals observed near the North-American coast may represent one common Pacific population of gray whales consisting of 20,000 individuals.

Sakhalin Energy adheres to the requirements of the **Marine Mammal Protection Plan (MMPP)**, first issued in 2003. The Plan was updated in 2018 in line with Russian and international requirements based on updated information on marine mammals and international best practices (Sakhalin Energy, 2018a). The Plan defines general measures for protection of gray whales and other species within the areas of the Company activities. In general, these measures include:

- identification of protected zones (Piltun and Offshore feeding areas, see below);
- establishment of vessel corridors (navigation, construction, etc.);
- regulation of the acceptable distance between mammals and vessels (minimum distance) depending on the types of activities and animals;
- limitation of the maximum vessel speed.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

A crucial condition for implementation of the above measures is the Marine Mammal Observers Programme which has been executed by Sakhalin Energy since 2003. Marine Mammal Observers (MMO) who stay on board of main vessels employed on offshore operations:

- record all marine mammals' sightings and where possible identify the species, their location, numbers, and behaviour;
- give advice on practical measures to avoid collisions with marine mammals; and
- record the cases of any injured or dead animals and where possible identify the reasons for injury or death.

This information is used to assess the adequacy of protection measures and their adjustment.

1.1 GOALS AND OBJECTIVES

In order to minimise the risk of marine mammal collision during offshore activities, regular observation is carried out from Sakhalin Energy vessels. The results of the analysis of observations in 2019 are presented in this report.

The objectives of the report include presentation and discussion of the following issues:

- overview of mitigation measures employed by Sakhalin Energy and used by MMOs to reduce the risk of collision between vessels and marine mammals (Section 2);
- qualification and preparation of MMOs (Section 3);
- the list of Sakhalin Energy offshore activities during the year which required MMO support (Section 4);
- the analysis of the applied mitigation measures efficacy (Section 5); and
- overview of observation data and factors affecting the detectability of marine mammals (Section 6).



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

2 OVERVIEW OF RISKS AND MITIGATION MEASURES

2.1 POTENTIAL RISKS

The main aspects of the Sakhalin-2 Project activities that can potentially impact marine mammals are: anthropogenic noise, accidental oil spills, and the risk of collisions with vessels. The document “Analysis of Risks for Western Gray Whales (*Eschrichtius robustus*) from Shipping Traffic Associated with the Sakhalin-2 Project” developed by Sakhalin Energy (Sakhalin Energy, 2006) builds the foundation for the Marine Mammal Protection Plan (MMPP) (Sakhalin Energy, 2018a). This describes the measures applied by Sakhalin Energy to mitigate the risk of collisions with whales and other marine mammals. A summary of these measures is presented below.

2.2 COLLISION MITIGATION MEASURES

Gray whale collision mitigation measures were developed according to the recent data on their migration, abundance and distribution in the coastal waters.

The number and distribution of gray whales in Sakhalin waters has been studied during the feeding, ice-free period, i.e. approximately from June until November, depending on the season. Two main feeding areas are known in the north-eastern coast of the island: a shallow coastal area adjacent to Piltun Bay (Piltun feeding area) and a deeper sea area adjacent to Chaivo Bay (Offshore feeding area), which are shown on the whale density map (Fig. 2.1). The Piltun feeding area is located in the immediate vicinity of the Sakhalin Energy license area, which places the whales close to industrial activities and vessel traffic.

Collision mitigation measures are described in Sakhalin Energy MMPP. In general, the risk of vessel-whale collisions can be effectively mitigated by:

- control of vessel routes;
- control of vessel speed;
- establishment of an exclusion zone for the vessels;
- setting the limitations for vessels operating in feeding areas;
- deployment of Marine Mammal Observers;
- development of the procedure for vessel response in case of the collision risk;
- briefing and training for vessel crews.

Although there is a low likelihood of a vessel-whale collision in the vicinity of the platforms, the pipeline routes, and along the designated vessel routes, a number of measures have been taken in accordance with the MMPP, continued to be employed in 2019 to further reduce this risk.



MARINE MAMMAL OBSERVER PROGRAMME 2019
CLOSE-OUT REPORT

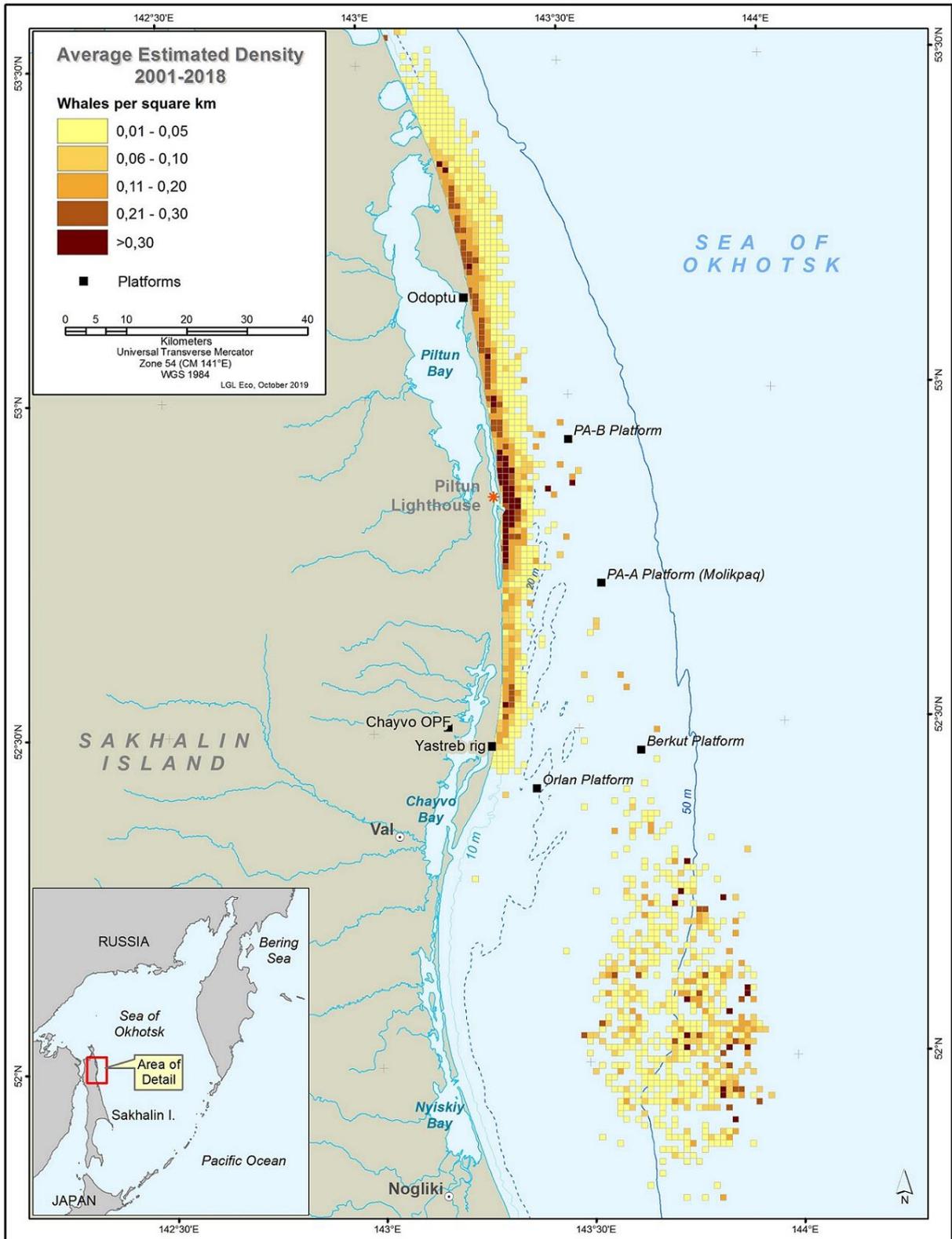


Fig. 2.1. Gray whale densities at the north-eastern coast of Sakhalin Island



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

2.2.1 Control of Vessel Routes

As in previous years, vessels were not allowed to enter the Piltun and Offshore feeding areas (Fig. 2.1) unless it was essential for safety, monitoring, or other purposes, subject to making a request and obtaining an authorisation.

Special vessel corridors have been established for all Sakhalin Energy vessel traffic along the eastern coast of Sakhalin Island. All Sakhalin Energy vessels were required to stay within the designated corridors, unless deviation from this course was essential for safety reasons or a special request and an authorisation were obtained.

The following corridors were determined:

- crew transfer corridors for crew change vessels travelling from the Kaigan Port to LUN-A, PA-A, or PA-B platforms (Fig. 2.2 and 2.3);
- navigation corridors for all vessels transiting from Kholmsk and Korsakov to Lunskoye and Piltun areas (Fig. 2.2 and 2.3); and
- pipeline inspection corridor for all vessels involved in offshore pipeline inspection and offshore environmental monitoring. For example, dynamic positioning vessels equipped with sonar systems and remotely operated vehicles (ROV) should follow the established navigation corridors while on transit and the pipeline inspection corridors during work execution. Other examples include research vessels that perform environmental monitoring (Fig. 2.3).

In addition to the above-mentioned corridors, a safety zone with a radius of 5 km has been established around all the three platforms. As a rule, supply and rescue vessels drift or are anchored in this area. Vessels without an affiliation with Sakhalin Energy are not allowed to enter this zone, which is guarded by emergency response and rescue vessels (Fig. 2.3).

2.2.2 Speed Limitation

The speed limitations established in 2019 are given in Table 2.1. Vessels are obliged to avoid sudden changes in speed and course (other than for safety reasons). In agreement with the Western Gray Whale Advisory Panel (GWAP), a test speed increase from the previous 21 knots up to 35 knots was established within the transport corridors when the visibility was ≥ 1 km during daylight hours from 2017 for catamaran-type crew change vessels shuttling from the Kaigan Port to PA-A, PA-B, and LUN-A platforms. The following additional measures were applied on each of these vessels:

- A CCTV system (Full HD outdoor cameras with recording feature) was installed to monitor the sea surface.
- Purpose-built equipment has been installed for recording GPS, speed, and acceleration of the vessels.
- Observations were conducted by two Marine Mammals Observers (MMOs) simultaneously in all voyages.

Where necessary, an analysis was made of video materials and GPS records received from the installed equipment.

After trial period, analysis and risk assessment (Sakhalin Energy, 2019a, Appendix 1), an increase in speed limits for catamaran vessels in transport corridors was agreed by the GWAP experts at its 20th meeting (November 6-8, 2019) on an ongoing basis (Report GWAP 20, 2020)



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

Table 2.1. Vessel speed limitation

Conditions	Crew transfer corridor	Within navigation corridors	Westward from corridors ¹ and within inspection and PA-A/PA-B approach corridors
Daylight conditions and visibility \geq 1 km	35 ² knots	17 knots	10 knots
Visibility < 1 km or at night	21 knots	17 knots	7 knots

2.2.3 Zonal Division of Eastern Sakhalin Coastal Waters

In order to compare different zones of marine mammal observations, Sakhalin Energy operational area was arbitrarily divided into four separate areas: Piltun, Lunskeye, Aniva Bay, and transit areas. Given the large size of the last area, it was divided into four observation areas: The North Transit area (between the Piltun and the Lunskeye areas), The Middle Transit area (from the Lunskeye area to the Terpeniya Bay), The South Transit area (from the Terpeniya Bay to the Aniva Bay) and the area south of Sakhalin (Fig. 2.4). In addition, observations in the coastal waters west of Sakhalin Island are grouped as belonging to a separate area west of Sakhalin.

Non-transiting³ vessels should maintain course and speed unless there is an imminent risk of collision. If a whale is observed near the vessel and there is a risk of collision, the vessel is required to stop (if safe to do so), until the risk of collision with the whale has passed.

¹ Speed limits westward from the corridors (towards areas where encounters with WGW are more likely) are to be adhered to in all cases, unless the emergencies or safety considerations require otherwise.

² Agreed by WGWAP experts at its 20th meeting (November 6-8, 2019) for use on an ongoing basis. This speed is based on technical performance criteria, without significantly increasing the risk of collisions with marine mammals, and balances the risk of collision with operational and passenger safety.

³ Transiting vessels move between ports, usually Kaigan or Kholmsk, and the Sakhalin Energy offshore areas. Non-transiting vessels move between platforms within the Sakhalin Energy offshore areas.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

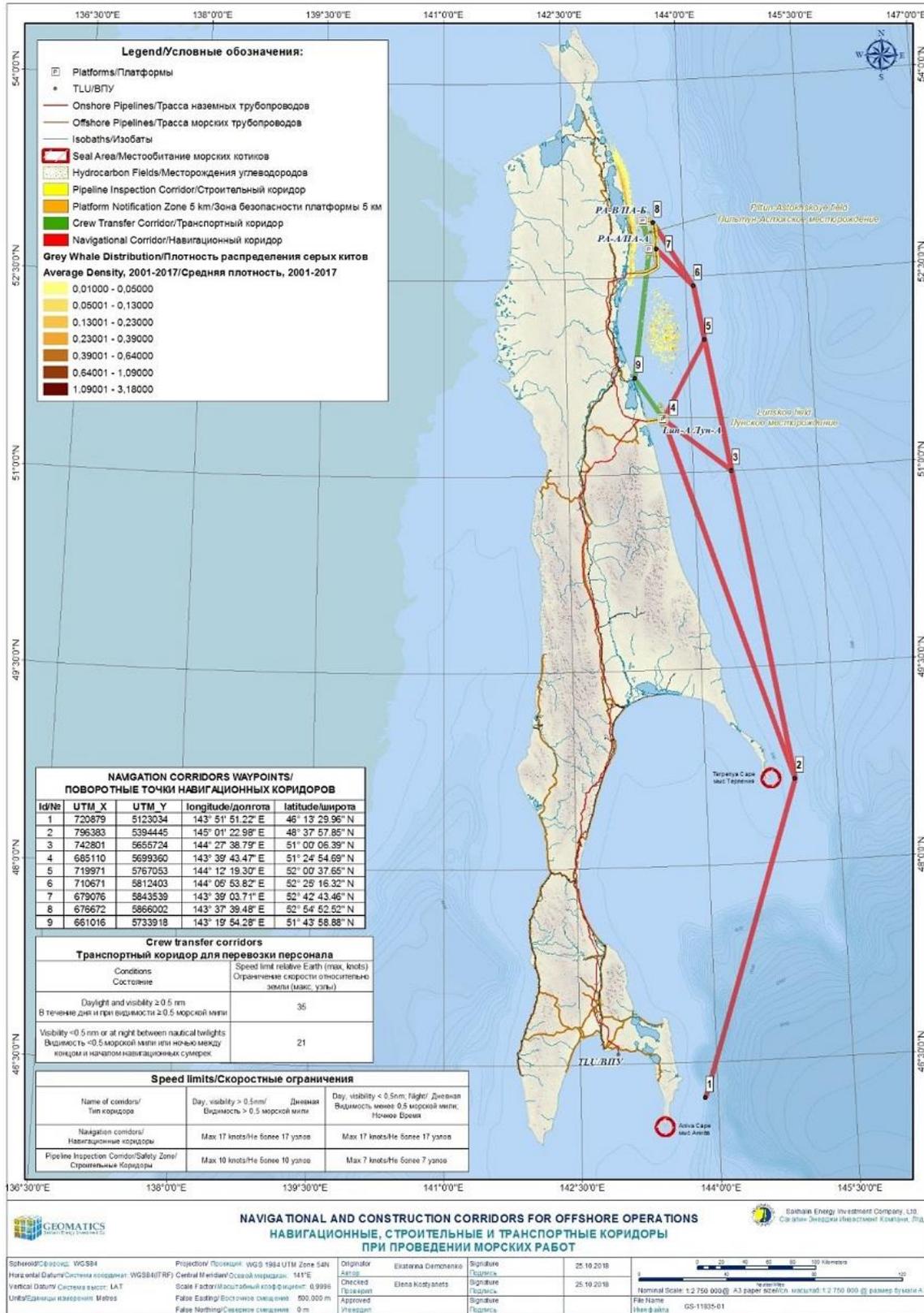


Fig. 2.2. Corridors for the vessels involved in offshore activities related to the Sakhalin-2 Project



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

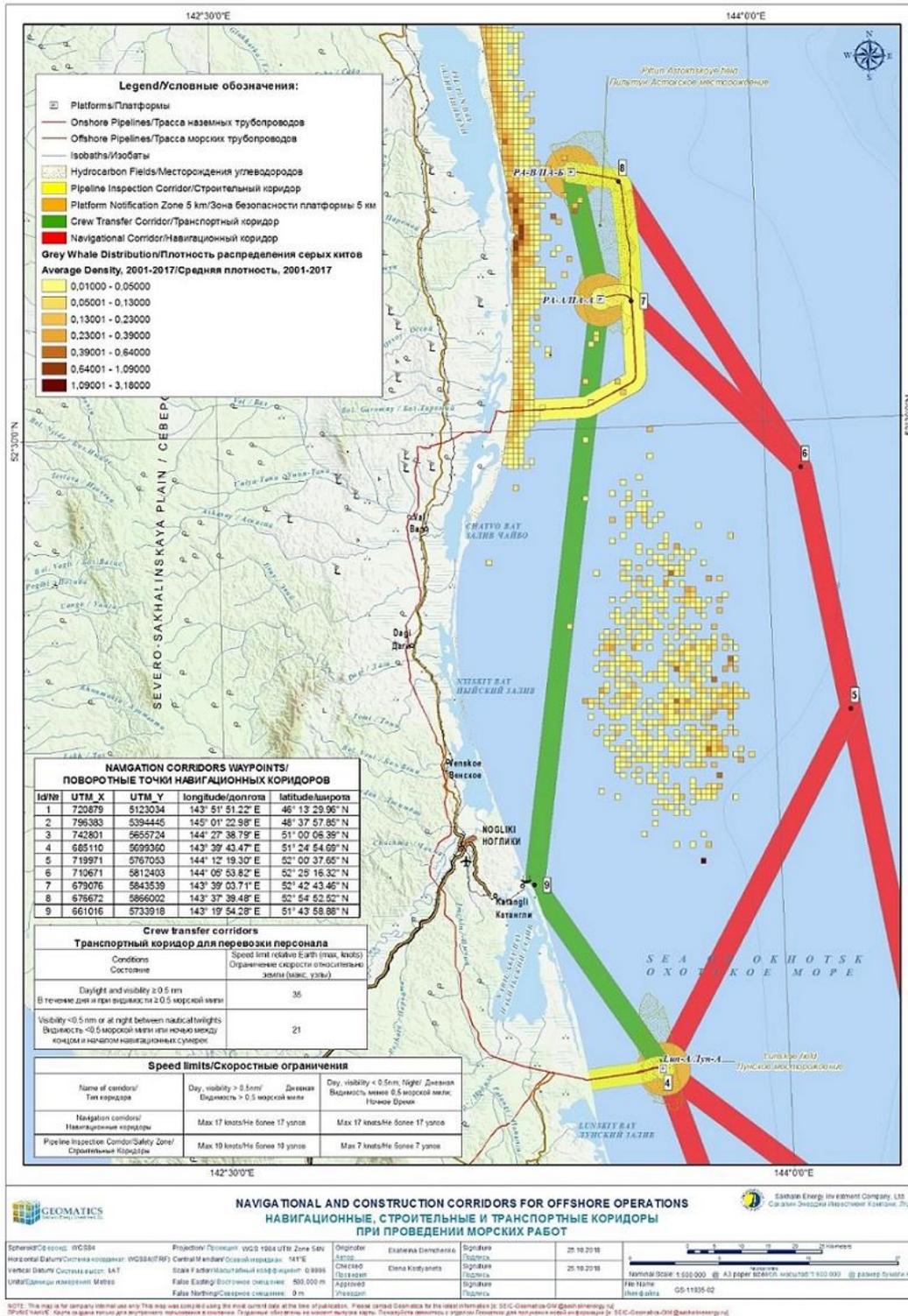


Fig. 2.3. Diagram of navigation, inspection, and crew transfer corridors in Piltun and Lunskeye areas

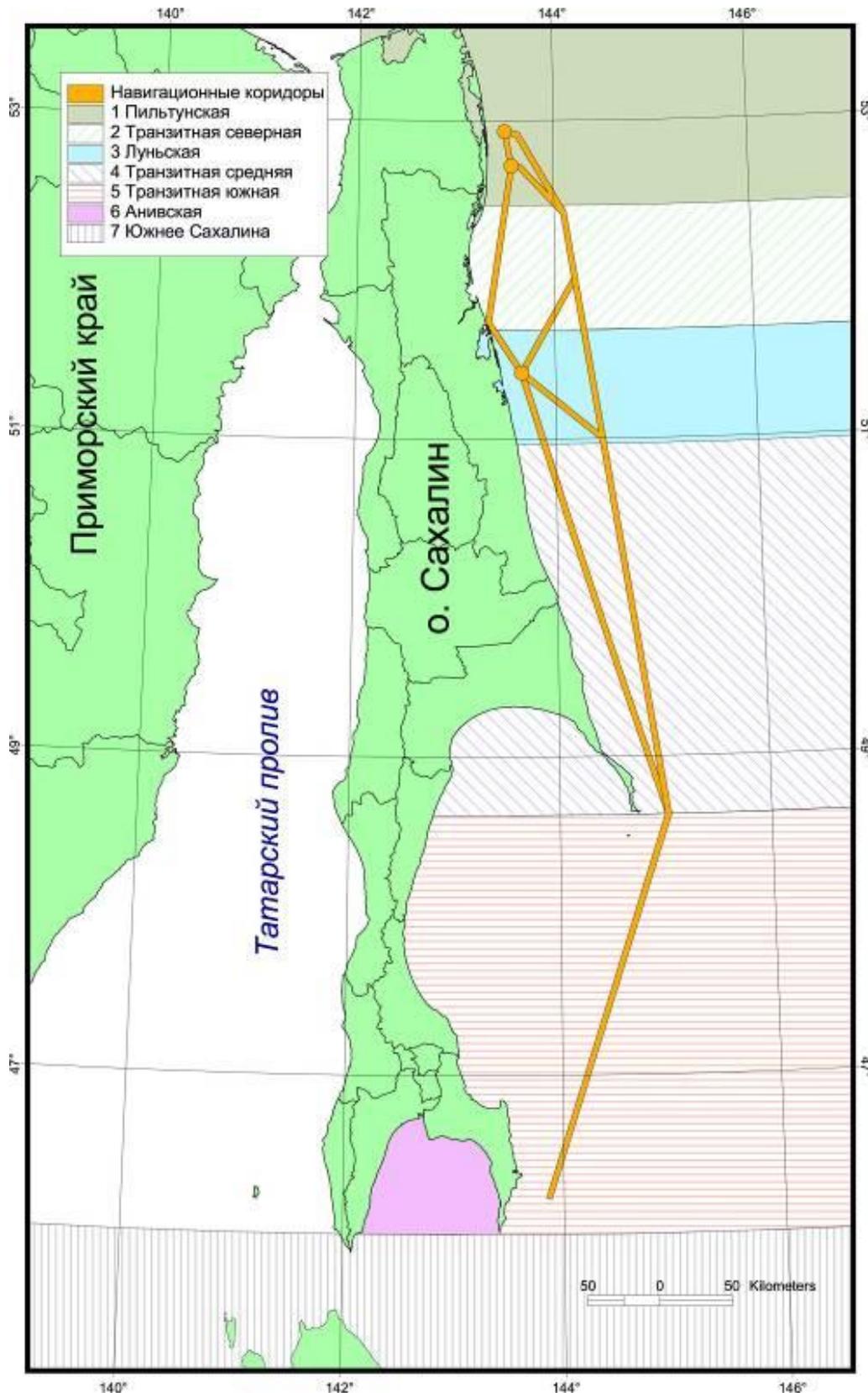


Fig. 2.4. Diagram of zonal division of eastern Sakhalin coastal waters



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

2.2.4 Marine Mammal Observers

Sakhalin Energy MMPP requires trained MMOs to be present on each of the main vessels⁴ involved in offshore activities along the eastern coast of Sakhalin Island and to constantly watch for gray whales and other marine mammals. The number of MMOs assigned to each vessel depends mainly on duration and area of operations, as well as the type of activities conducted by the vessel.

MMO duties and scope of responsibilities are outlined below.

- Maintain diligent and systematic watch for marine mammals during daylight hours for the whole period of operational activities.
- Advise the Vessel Master (Sakhalin Energy representative) about practical measures that may be taken to avoid possible collision with a marine mammal sighted within insufficient safety distance⁵. This might include change of course, reduction of speed, or full stop of the vessel, if this can be done safely.
- Record location and number of marine mammals sighted, as well as their behaviour, where possible. This data may be used to improve mitigation measures. Upon detecting marine mammals, records shall be made on the standard data recording form. In addition, the records shall be made every 30 minutes, whether or not a marine mammal was sighted.
- Record all actions taken to mitigate the risk of collision and note the respective timings.
- Observe the area in the vicinity of the vessel for 30 minutes prior to start of noisy operations.
- Immediately report collision between vessel and marine mammal to the Sakhalin Energy representative aboard and to the MMO Programme Coordinator, record the event in a Marine Mammal Mortality-Injury Report.
- Where necessary, remind the Vessel Master to adhere to navigation, inspection, and other established corridors, to comply with the speed limits, especially in night hours and under poor visibility conditions, and not to traverse known feeding areas of gray whales unless it is essential for safety reasons, subject to making a request and obtaining an authorisation.
- Before anchoring, the MMO shall conduct a visual search of the area to make sure that this operation will not endanger any marine mammal.

Protocols

MMOs perform continuous observation of gray whales and other marine mammals during daylight hours. The observation is conducted when the Beaufort Sea State is 5 or less⁶. Since continuous observation is an exhausting task under often adverse weather conditions, its duration is restricted to four hours, after which the MMO takes a break for a minimum of two hours.

If the MMO needs to leave the post, he/she warns the bridge staff about his/her absence. If marine mammals are detected during this time, the MMO is required to continue observation; the MMO can only leave if another MMO replaces him/her. If several marine mammals are present in the area, all MMOs aboard the vessel shall be called on for observation.

The MMO shall be stationed on the highest observation post available on the vessel. Observations of a 180° sector of the sea surface shall be made mostly by naked eye, alternated with binocular scans⁷ at regular intervals. When a marine mammal is detected, binoculars shall be used to confirm the sighting and to identify the species, its distance from the vessel, and direction of movement. Where whales are sighted in front of the vessel, the MMO immediately informs the bridge and advises on precautions to avoid collision.

⁴ "Main vessel" is defined as a vessel that has a high probability of a whale encounter or that provides the most appropriate base for marine mammal observations during the planned activity.

⁵ Safety distance of 1 km is used for endangered whale species (WGW, bowhead whale, North Pacific right whale, fin whale); safety distance of 0.5 km is set for other whales, dolphins, and porpoises; although safety distances are not specified for pinnipeds, vessels are required to proceed with caution.

⁶ The Beaufort scale defines force 5 as 17–21 knots wind speed, 1.8 to 2.8 m waves, many white caps, and some spray.

⁷ The binoculars in use are Fujinon 7X50 FMTRC-SX or similar types.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

The MMO records the observation results every 30 minutes regardless of whether marine mammals have been sighted. Records are made using data codes describing the vessel operations and speed, coordinates and course, time, sea state, visibility, species and number of marine mammals, their movements and activities, and if relevant, the distance between the vessel and the animals.

At the end of each day of observation, the MMO enters the data from the paper data recording forms into a Microsoft Access database. A daily report is then sent to the Sakhalin Energy MMO Programme Coordinator. The daily report summarises the data on marine mammal species detected, their number and distance from the vessel, time of day, location, and the vessel speed. It also describes all collision mitigation measures that were applied. Weekly reports are also sent to the MMO Programme Coordinator.

In addition, the MMO records the GPS track of the vessel in one-minute intervals using a hand-held GPS navigator.

Upon the voyage completion, MMOs receive a de-briefing by the MMO Coordinator and submit all paper data forms, electronic databases, and a brief summary of observations during the voyage in a close-out report.

Further details on protocols are included in the MMO Manual (Sakhalin Energy, 2019b), in the MMPP (Sakhalin Energy, 2018), and in the Marine Operating Procedures and Methodical Recommendations (Sakhalin Energy, 2010).

2.2.5 Control of Vessel Movements

Transiting vessels are required to maintain, where possible, a minimum distance of 1,000 m from the detected whales belonging to endangered species (western gray whale, bowhead, Northern right whale, and fin whale); in addition, they should maintain a distance of 500 m from other non-endangered marine mammals. No minimum separation distance is established for pinnipeds, but vessels shall proceed with appropriate caution if pinnipeds are sighted close to the vessel.

If a whale surfaces in the vicinity of the vessel or moves towards it, the vessel is required to take all possible precautions to avoid collision until the collision risk has passed.

The MMPP forbids any vessel to pursue, intercept, encircle whales, or separate groups of whales.

Vessels are also required to avoid proceeding directly in front of moving or stationary whales, and when moving parallel to whales, vessels should maintain constant speed and course.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

3 MARINE MAMMAL OBSERVERS

3.1 QUALIFICATION OF MARINE MAMMAL OBSERVERS

In 2019, five Marine Mammal Observers (MMOs) were employed within routine activities on the vessels engaged in Sakhalin Energy offshore operations in the license areas and during transits to these areas. All MMOs had relevant experience, either gained on Sakhalin Energy vessels or doing other activities related to marine mammal observations in this region. All MMOs have a university degree in biology, and one MMO hold a Ph.D. degree in biology.

3.2 TRAINING PROGRAMME

The MMO's roles and responsibilities are described in the MMO Manual (Sakhalin Energy, 2019b). This manual is a working document and amended annually to reflect changes to the Sakhalin Energy MMPP and in response to comments and proposals put forward by MMOs and other stakeholders with regard to the implementation of the MMO Programme. The main objectives of the MMO Manual are to:

- serve as a training manual for the MMO Programme;
- provide guidance and reference information to the trained MMOs participating in Sakhalin Energy offshore activities;
- provide information to vessel operators and vessel crews with regard to the Marine Mammal Observer roles and responsibilities.

The following documents were provided to MMOs and used during the field season:

- Marine Mammal Observers Manual;
- Database Instruction Manual;
- brief guidance for identification of marine mammals in Sakhalin waters;
- data code table; and
- data recording forms.

3.3 ORGANISATION AND METHODS

This document provides no detailed description of the MMO work arrangement, monitoring protocols, communication or reporting structure. The detailed description is provided in the Marine Mammal Observers Manual (Sakhalin Energy, 2019b).



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

4 OBSERVATION PROGRAMME

4.1 OFFSHORE OPERATIONS

In 2019, Sakhalin Energy performed offshore activities in the Piltun-Astokhskoye and Lunskoye areas. Activities which required vessel support and could potentially pose a risk of marine mammals' collision are described below.

Piltun-Astokhskoye Area

The operations in the Piltun-Astokhskoye area included hydrocarbon production using platforms PA-B and PA-A. These activities were also supported by supply vessels shuttling between Kholmsk and the platforms, emergency response and rescue vessels (ERR) and oil spill response (OSR) standby vessels located between PA-A and PA-B platforms. (In accordance with the MMPP mandatory presence of marine mammal observers (MMOs) on these vessels during routine works is not required). Crew change vessels shuttled between the Kaigan Port and the platforms.

Lunskoye Area

As a part of the production programme, supply vessels, ERR and OSR vessels worked in the Lunskoye area. Environmental monitoring was conducted around the offshore pipeline and the platform. Crew change vessels shuttled between the Kaigan Port and the platform.

Environmental monitoring was carried out from the Gennady Nevelskoy vessel near the Sakhalin Energy platforms at the Lunskoye and Piltun-Astokhsky areas (in accordance with the criteria established by the MMPP, the presence of MMOs is not required for this type of work on the vessel).

Aniva Bay

Aniva Bay was used as a transit area on vessel routes to the Sakhalin Energy license areas on the north-eastern coast of Sakhalin. Activities in Aniva Bay included tanker traffic to and from TLU through La Perouse Strait, as well as traffic of tug and line boats, OSR vessel, and survey vessel. In accordance with the MMPP mandatory presence of marine mammal observers (MMOs) on these vessels is not required.

4.2 VESSELS' ACTIVITY

The SCF Endurance, SCF Endeavour, SCF Enterprise, and Gennady Nevelskoy supply vessels alternately made voyages between Kholmsk and the Sakhalin Energy license areas. The vessels were ordered to strictly follow the navigation corridors.

Fyodor Ushakov, Stepan Makarov and Evgeny Primakov standby vessels performing the OSR functions and providing support and accommodation to crews were permanently stationed between PA-A and PA-B platforms.

Polar Piltun and Polar Baikal platform crew change vessels made voyages between the Kaigan Port and PA-A, PA-B, and LUN-A platforms during ice-free navigation period.

4.3 MARINE MAMMALS OBSERVERS

In accordance with the MMPP, in the navigation period 2019, marine mammal observers (MMO) were present and conducted regular monitoring from two crew change vessels Polar Piltun and P. Baikal.

In total, the observation of marine mammals lasted 100 vessel days (48 to 52 days on different vessels). The number of working days per month is given in Table 4.1.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

Table 4.1. The total number of working days by MMOs in 2019

Vessel	May	June	July	August	September	October	November	Total
Polar Baikal		11	17	13	4	3		48
Polar Piltun		12	20	14	2	4		52
Total days:	0	23	37	27	6	7	0	100
Share, %:	0.00	23.00	37.00	27.00	6.00	7.00	0.00	100

In general, over the entire period of operations, the average number of working days per month on all vessels was 20 days. This value differed significantly from month to month: from 6 days in September to 37 days in July. The difference in number of working days was due to crew-change vessels schedule. The work duration of MMOs (in hours) on these vessels is given in Table 4.2.

Table 4.2. Total number of observation hours in 2019

Vessel	Time, hours		
	Sightings	Breaks in observations	
		Hours	Share, %
Polar Baikal	230:27	19:42	8.55
Polar Piltun	316:49	1:45	0.55
Total:	547:16	21:27	3.92

Within the reporting period, the observations have lasted 547 hours and 16 minutes. The total duration of breaks in the observations was 21 hours and 27 minutes (about 4 % of the total time). These were mainly due to adverse weather conditions and specific distribution and abundance survey of gray whales in the offshore feeding area (a component of the Joint Program scope of work), the results of which are presented in a separate report. Types of vessel activities and MMOs' schedules of work are given in Table 4.3.

Table 4.3. Vessel activities and the list of Marine Mammal Observers, 2019

Vessel	Area and type of activity	Names of MMOs	Date of commencement	Date of completion
Polar Baikal	Piltun/Lunskoye: crew change	V. Kavun, A. Ermoshin, A. Pogonyshev, Y. Korobeinokov, E. Lebedev	07.06.	17.10.
Polar Piltun	Piltun/Lunskoye: crew change		06.06.	16.10.

Five MMOs were engaged in the observations from the Polar Piltun and Polar Baikal 37 voyages from Kaigan Port to PA-A and back; and 30 voyages from Kaigan Port to PA-B and back (Table 4.4).

Table 4.4. Number of voyages for crew change vessels, 2019

Area	Number of voyages		
	Polar Baikal	Polar Piltun	Total
Kaigan–LUN-A–Kaigan	31	5	36
Kaigan–PA-A–Kaigan	16	21	37
Kaigan–PA-B–Kaigan	3	27	30
Total	50	53	103



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

For each area, the number of observation hours was counted depending on the weather conditions (no observations were conducted during storm) and the daylight hours (Table 4.5).

Table 4.5. Number of observation hours in 2019

Area of operations	Observations (hours)					
	June	July	August	September	October	Total
Area 1—Piltun	43.92	51.13	42.75	8.50	5.00	151.30
Area 2—North Transit	67.45	106.18	90.10	24.13	13.83	301.70
Area 3—Lunskoye	18.38	35.65	27.80	2.43	10.00	94.27
Total:	129.75	192.96	160.65	35.06	28.83	547.26

Most of the total observation time was in the North Transit area (55 %) / The other two zones, Piltun and Lunskoye, in two and three times less - 28% and 17%, respectively.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

5 COLLISION MITIGATION MEASURES

The responsibility for marine mammals' collision mitigation measures was assigned to the MMOs, the Sakhalin Energy representatives, the masters and the crew members of the vessels chartered by Sakhalin Energy. The Vessel Masters were obliged to follow the Sakhalin Energy Marine Operating Procedures and Methodical Recommendations (Sakhalin Energy, 2010) including the mitigation measures from the MMPP.

The main role of MMOs was to inform the Vessel Master on the presence of marine mammals and to advise on actions to be taken if marine mammals were sighted within insufficient safety distance. These mitigation measures can include speed reduction, course change, or full stop of the vessel. The effectiveness of these measures depends on the reliability, the coordination and the responsiveness of the MMOs and the team as well as their ability to identify the animals and determine their species.

5.1 ADHERENCE TO VESSEL CORRIDORS

In 2019, MMOs were on board of 2 vessels (Table 4.1). MMOs took the records of the vessel position every 30 minutes or whenever a marine mammal was sighted. In total, MMOs have recorded 1442 vessel coordinates, which were used to map the voyage tracks. Using these records, the MMO Programme Coordinator checked the compliance of vessel movement with the designated corridors. Routes and coordinates were mapped for a daily report to check the compliance with the designated routes within the corridors.

In addition, observers on each vessel were equipped with GPS navigators (Garmin GPSMAP 60CSx). GPS tracks were recorded with one-minute intervals. MMOs downloaded the recorded tracks from the GPS to a computer and sent them to the MMO Coordinator. This GPS data was used when more thorough analysis of possible deviations from corridors was required.

In case of deviations from the specified corridors, MMO in daily reporting, necessarily indicate the reasons for exit. When deviations are found, the reasons for which are not specified in the report, or such reasons were found to be unsatisfactory to the requirements of the MMPP, the MMO Programme Coordinator had to initiate investigations to determine the reason for these deviations.

In general, the compliance of movement within the corridors, unless the vessel mission required otherwise, is considered satisfactory. Most of the vessel tracks were inside the crew transfer corridors. (Fig. 5.1–5.2).



MARINE MAMMAL OBSERVER PROGRAMME 2019
CLOSE-OUT REPORT

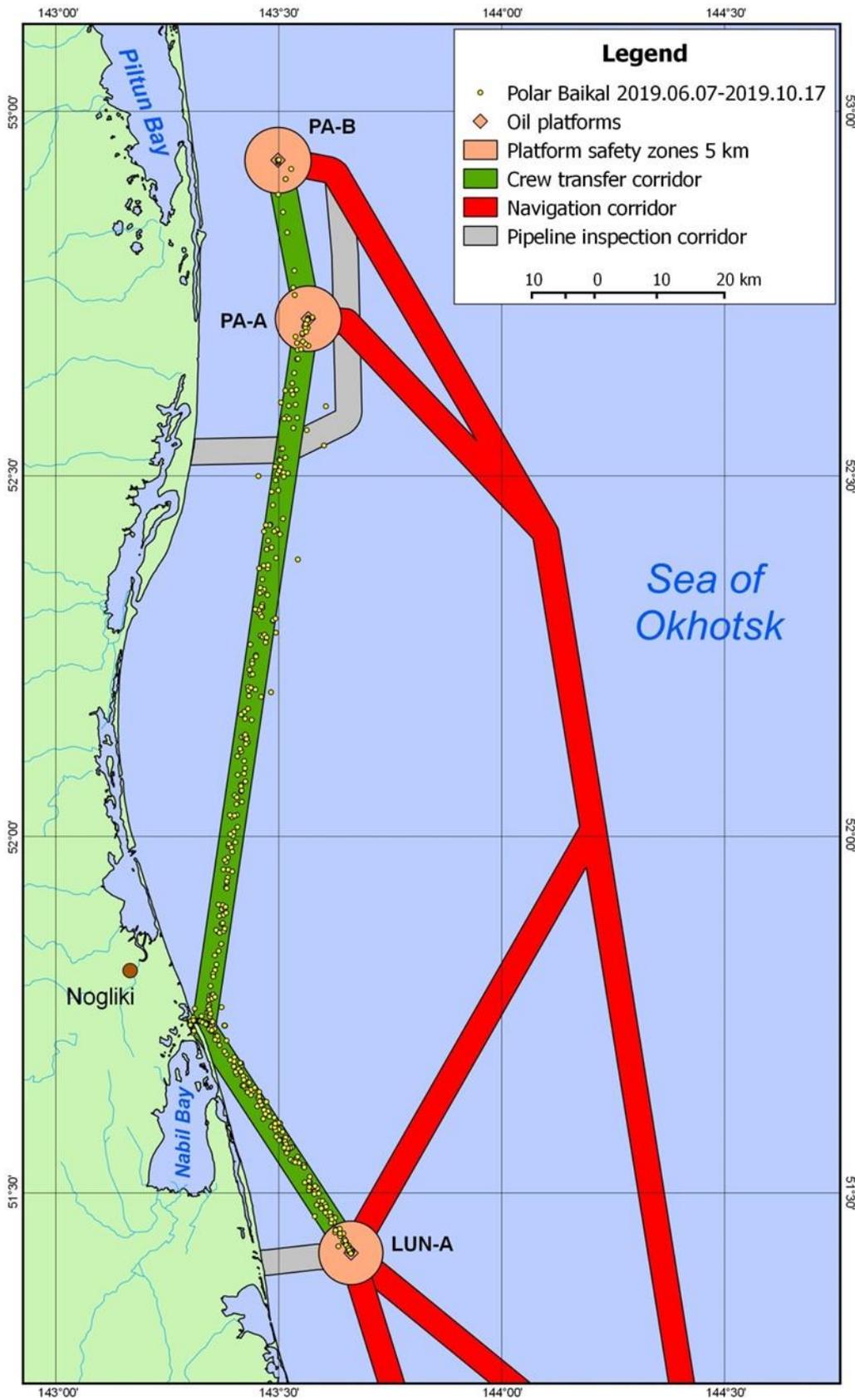


Fig. 5.1. Routes of Polar Baikal crew change vessel



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CLOSE-OUT REPORT**

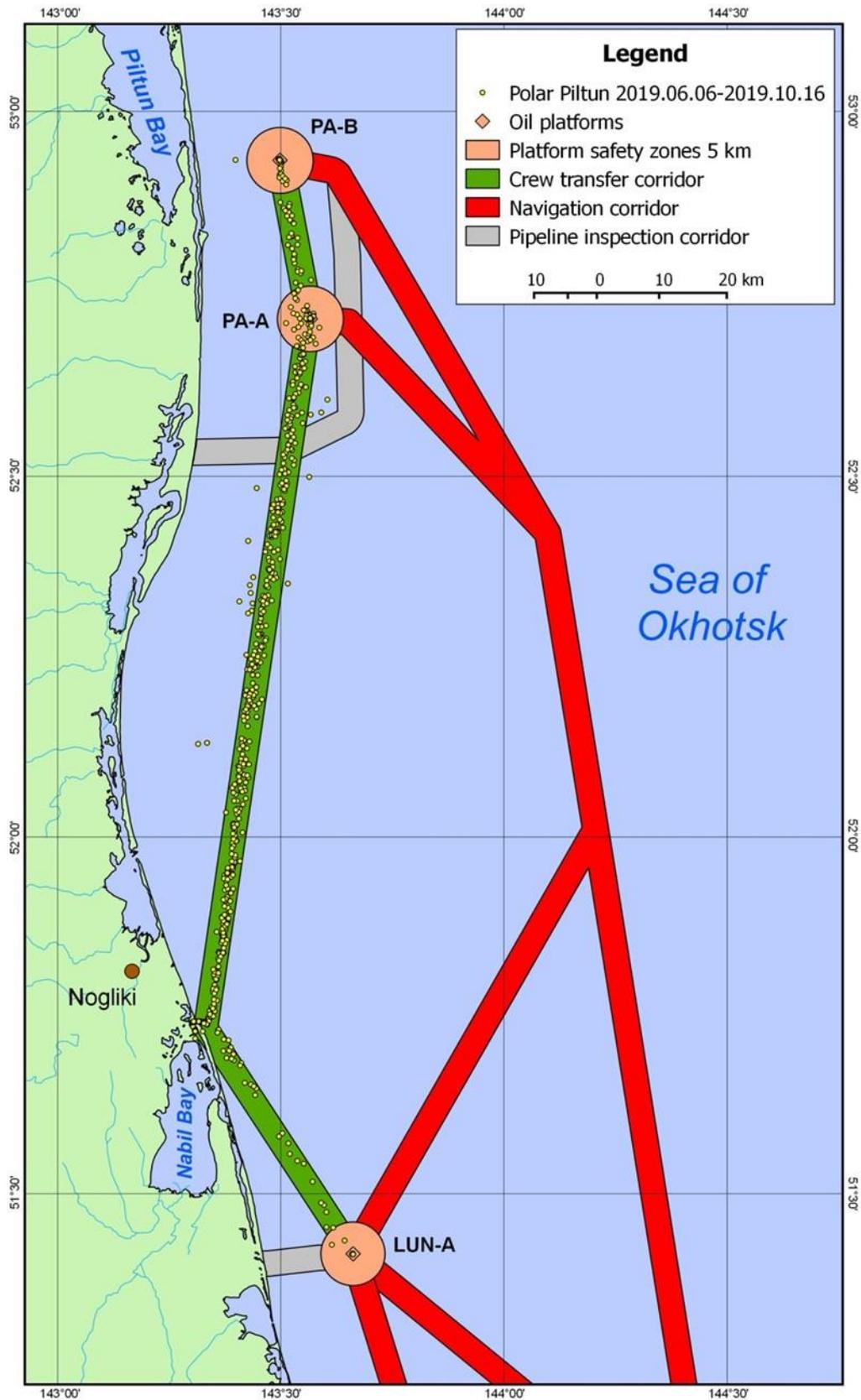


Fig. 5.2. Routes of Polar Piltun crew change vessel



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

Duration of vessels deviation from the designated corridors is given in Table 5.1.

Table 5.1. Duration of deviations from corridors in 2019

Vessel	Total time of observations	Duration of deviation from the corridor	Share of total time, %
Polar Baikal	230:27	19:10	8.32
Polar Piltun	316:49	7:59	2.52
Total:	547:16	27:9	4.96

The vessels stayed outside the corridors for 28 hours or 5% of the total observation period.

The total time of staying outside the corridors was less than 3 % for Polar Piltun and about 8 % for Polar Baikal. All deviations from the corridors were related to the navigation rules for avoiding a collision with third parties' vessels, special monitoring of gray whales whose aggregation areas are located outside the corridors (Offshore feeding area), as well as emergency response and personnel evacuation training (joint actions vessels with helicopters).

5.2 COMPLIANCE WITH THE SPEED LIMITS

No cases of exceeding speed limits were recorded during the entire observation period in 2019.

5.3 OBSERVATION RESULTS AND MEASURES TAKEN

5.3.1 Gray Whales

In 2019, during the Sakhalin Energy offshore operations, 18 gray whales sightings were recorded from the vessels with MMO's onboard, with a total of 19 individuals (Tables 5.2, 5.3, fig. 5.4).

Encounters with gray whales have been reported by MMOs onboard all two vessels. More than 50 % of gray whale sightings were registered in June (28 %) and August (28 %). The largest number of records (11, or 61 %) were made from Polar Piltun vessel from June through August (Table 5.2).

Table 5.2. Gray whales' sightings by months, 2019

Vessel	Sightings by months							
	May	June	July	August	September	October	November	Total
Polar Baikal		1		1	2	1		5
Polar Piltun		4	3	4		2		13
Total:	0	5	3	5	2	3	0	18

The distance of whales sighted by MMOs varied within 150–2000 m, with an average of 1136 m. There were 9 encounters or 50% at a distance, which is equal to or less than the safe distance. In 7 out of 9 cases, at the indicated distances, proactive measures were taken to reduce the impact - the vessel changed course. In two cases, no action was taken, since vessels moved a safe course., i.e. as the movement continued, the distance to the whale increased. During the entire ice-free navigation season there were no encounters with gray whales that posed a risk of collision. Thus, in 2019, presence of MMOs on the vessels allowed to take timely measures to minimise risk of collision or an adverse impact on gray whales.



**MARINE MAMMAL OBSERVER PROGRAMME 2019
CLOSE-OUT REPORT**

Table 5.3. Gray whale encounters from the vessels during Sakhalin Energy offshore operations in 2019

Number of ind.	Date	Time	Vessel*	Angle	Distance (m)	Behaviour	Coordinates						Were any measures taken?
							Latitude			Longitude			
1	28.06	17:06	PB	300	1500	FD	143	20	64	51	45	87	No
1	23.08	11:30	PB	90	1500	FD	143	21	39	51	50	3	No
1	17.09	17:00	PB	90	1000	FD	143	22	84	51	54	10	Course change
2	28.09	09:00	PB	300	1000	FD	143	22	92	51	53	60	Course change
1	17.10	18:00	PB	30	1500	FD	143	21	41	51	46	53	No
1	28.06	10:05	PP	270	1200	FE	143	21	9	51	47	51	No
1	28.06	16:30	PP	60	2000	FE	143	21	67	51	50	33	No
1	28.06	16:40	PP	300	800	FE	143	20	69	51	45	74	No
1	29.06	06:18	PP	270	1000	FD	143	28	92	52	22	49	Course change
1	11.07	11:58	PP	270	500	FD	143	22	30	51	52	97	No
1	12.07	11:17	PP	270	150	FD	143	22	20	51	51	67	Course change
1	29.07	10:41	PP	0	2000	FD	143	22	26	51	51	99	No, whale moved in opposite direction
1	08.08	06:27	PP	30	600	FD	143	22	97	51	53	19	Course change
1	09.08	11:38	PP	300	1200	FD	143	34	2	52	35	9	No
1	23.08	11:36	PP	30	1500	FD	143	21	69	51	49	65	No
1	30.08	11:00	PP	300	1500	FD	143	22	84	51	56	46	No
1	02.10	08:22	PP	270	1000	FD	143	21	31	51	47	20	Course change
1	13.10	13:18	PP	330	500	FD	143	23	38	51	41	39	Course change

*Vessels; PB - Polar Baikal, PP - Polar Piltun



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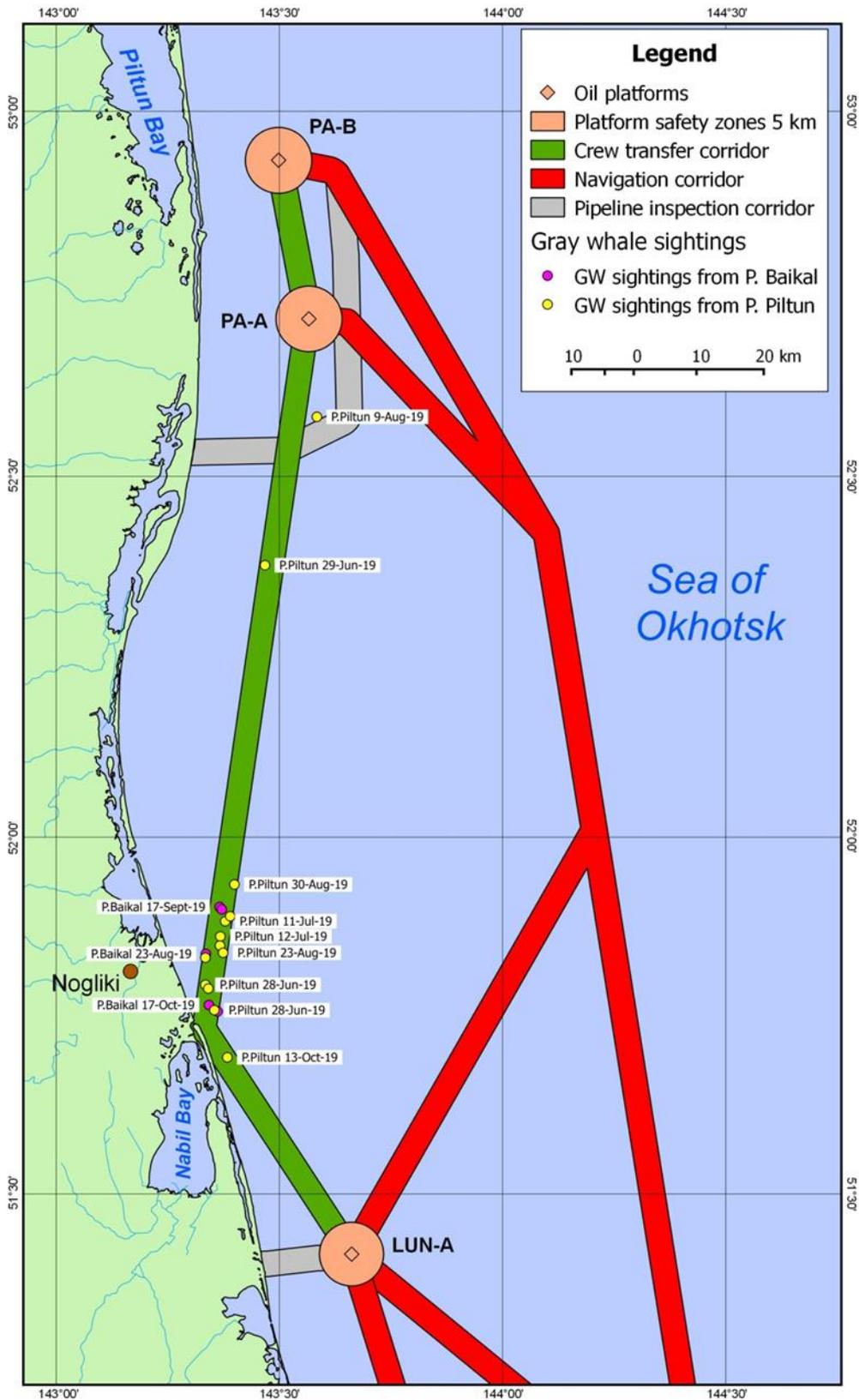


Fig. 5.4. Locations of gray whales sightings recorded by MMOs



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

5.3.2 Fin Whales and Northern right whale

Over the entire period of observation in 2019 there were no encounters with fin whales and Northern right whale.

5.3.3 Other Cetaceans

In 2019, four other species of cetaceans were recorded:

- Minke whale;
- Killer whale;
- Dall's porpoise;
- Harbour porpoise.

A total of 57 sightings were registered, of which in 47% of cases (27 out of 57), these cetacean species were observed at a distance of 500 m or less i.e. equal to or less than the established safety distance. With this, a significant range of these values for different species was noticed. While the average encounter distance for all these four species was about 620 m, the average distance to the killer whales was about 1,200 m., while 63 % of porpoise encounters (harbour and Dall's) (20 out of 32) occurred at a distance of ≤ 500 m. This is quite typical for dolphins due to their high speed and lack of obvious avoidance of vessels, as well as their small sizes (it is more difficult to detect these animals at a large distance).

Table 5.4 presents information of movement observations for these four cetacean species. When considering the direction of movement of these species in relation to the vessel, two types of their movement were observed most often—away from the vessel (54%) and parallel to its course (42%). These types of movements are identified as the main ones and occurred in a total of 96 % of all the sightings in 2019.

Table 5.4. Cetaceans sightings from the vessels during Sakhalin Energy offshore operations in 2019

Species	Number of sightings	Number of sightings in a distance of ≤ 500 m	Visibility ≤ 500 m	Movement	Away from the vessel	Parallel to the vessel	Toward the vessel	Thrash	No movement	Unknown
Minke whale	18	6	1		10	7	1	0	0	0
Killer whale	7	1	0		1	5	1	0	0	0
Harbour porpoise	30	19	0		19	11	0	0	0	0
Dall's porpoise	2	1	0		1	1	0	0	0	0



MARINE MAMMAL OBSERVER PROGRAMME 2019
CLOSE-OUT REPORT

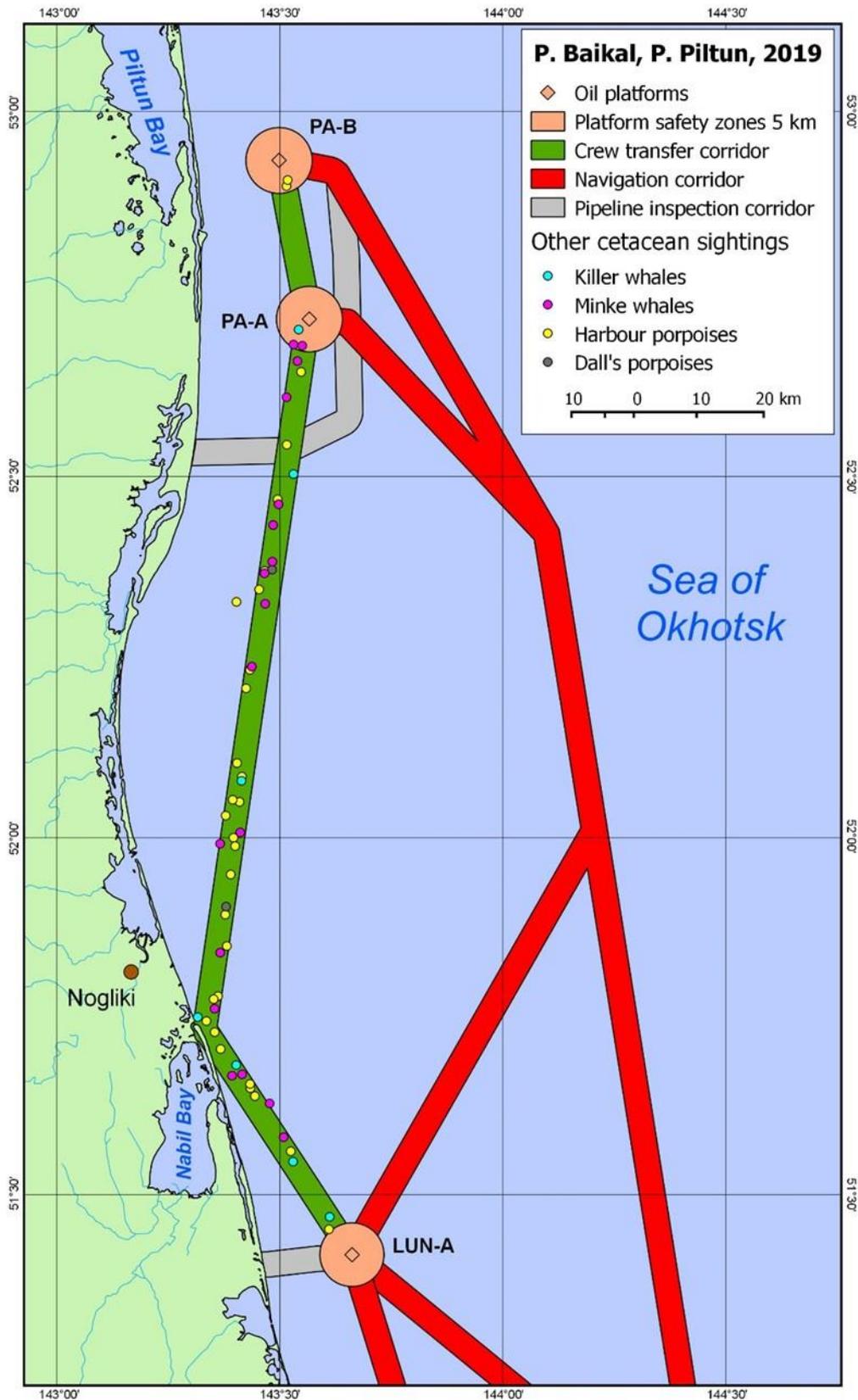


Fig. 5.5. Location of recorded cetaceans' sightings



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

Below is a description, arranged by types of measures taken on all marine mammals observed in 2019 (Table 5.5). MMOs have reported a total of 192 encounters (sightings) with marine mammals, including gray whales. 75 observations out of them were of cetaceans. In some cases, when animals meet closer than a safe distance no measures were required to avoid the collision as the animals were moving parallel to the vessel course or away from the vessel. Although no cases of near collision with marine mammals were recorded, in 17 %cases (33 from 192) for minimize the potential collisions with whales and dolphins various preventive measures have been taken.

Full stop wasn't used for mitigating the impact on marine mammals in 2019. The deceleration measure was taken once: in one case with parbour porpoise encounters. In all other cases, the vessels changed their course to mitigate the impact on marine mammals.

Table 5.5. Measures taken in 2019 to mitigate the impact on marine mammals

Species	Number of measures taken				No mitigation measures were taken.
	Deceleration	Full stop of the vessel	Course change	Course change and deceleration	
GW			7		11
MW			6		12
KW			1		6
HP	1		17		12
DP			1		1
SL					10
NF					14
SS					85
RS					8
ИТОГО	1	0	32	0	159

Note. Species: GW—gray whale, MW—Minke whale, KW—killer whale, DP—Dall's porpoise, HP—Harbour porpoise, SL—Steller 's sea lion, NF—northern fur seal, RS—ringed seal, SS—spotted seal.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

6 OBSERVATION PROGRAMME EFFICACY

The number of observations depends on various factors, the most significant being the number of animals present in coastal waters, observation effort determined by the number of vessels and MMOs (i.e. the total number of observation hours and the number of observations per time unit), and weather conditions.

6.1 GENERAL DESCRIPTION OF SIGHTING STATISTICS

During the field season from 6 June to 17 October 2019, a total of 192 marine mammal sightings were recorded by MMOs (total 1,042 animals), including 75 encounters with cetaceans and 117 encounters with pinnipeds. Table 6.1 provides a summary of the recorded marine mammals. Five species of cetaceans and four species of pinnipeds were recorded. The Minke whale, the gray whale and the harbour porpoise were the most frequently observed cetaceans; as regards to pinnipeds, the most frequently observed species were the spotted seal and the northern fur seal.

Table 6.1. Total number of marine mammal sightings and total number of marine mammals in 2019

English name	Latin name	Code	Number of sightings	Number of animals
Gray whale	<i>Eschrichtius robustus</i>	GW	18	19
Minke whale	<i>Balaenoptera acutorostrata</i>	MW	18	18
Killer whale	<i>Orcinus orca</i>	KW	7	13
Dall's porpoise	<i>Phocoenoides dalli</i>	DP	2	4
Harbour porpoise	<i>Phocoena phocoena</i>	HP	30	45
Steller's sea lion	<i>Eumetopias jubatus</i>	SL	10	16
Northern fur seal	<i>Callorhinus ursinus</i>	NF	14	15
Spotted seal	<i>Phoca largha</i>	SS	85	903
Ringed seal	<i>Phoca hispida</i>	RS	8	9
Total			192	1042

Among the cetaceans recorded in 2019, two species are listed in the Red Book of the Russian Federation. Gray whale (*Eschrichtius robustus*) is listed under Category 1 (endangered species) and harbour porpoise (*Phocoena phocoena*) is listed under Category 4 (species with uncertain status)⁸.

Among the pinnipeds recorded in 2019, the Steller's sea lion (*Eumetopias jubatus*) is listed under Category 2 in the Red Book of the Russian Federation. In total, 10 encounters with Steller's sea lions (16 individuals) were recorded (see Table 6.1). In the reporting period, the Steller's sea lion, as usual, was recorded in this region by observers less often than the spotted seals (82 encounters and 903 individuals), which was often reported in accumulation of 10-30 species or more mostly at the mouth of Nabil Bay, at exit of crew change vessels from the port of Kaigan.

6.2 NUMBER OF OBSERVATIONS BY MONTHS

Since the number of vessels with observers aboard and the duration of their activities varied per area and per month, the numbers of observed animals were compared by month and area (Table 6.2).

In 2019, spotted seal (0.155 encounter/hour), harbour porpoise (0.055 encounter/hour), gray whale (0.033 encounter/hour) and Minke whale (0.033 encounter/hour) were observed most frequently.

⁸ See <http://www.sevin.ru/redbook>.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

Table 6.2. Number of marine mammal sightings in relation to the observation period (number of sightings/total monthly hours of observation) in 2019

Species *	Area**	Total		May	June	July	August	September	October	November	Total
		sighting	hours								
DP	2	2	301.70	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.007
DP	Total:	2	547.267	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.004
HP	3	5	94.27	0.000	0.000	0.056	0.000	0.000	0.300	0.000	0.053
HP	2	20	301.70	0.000	0.044	0.075	0.067	0.083	0.072	0.000	0.066
HP	1	5	151.30	0.000	0.000	0.098	0.000	0.000	0.000	0.000	0.033
HP	Total:	30	547.267	0.000	0.023	0.078	0.037	0.057	0.139	0.139	0.055
NF	1	4	151.30	0.000	0.091	0.000	0.000	0.000	0.000	0.000	0.026
NF	2	9	301.70	0.000	0.030	0.019	0.055	0.000	0.000	0.000	0.030
NF	3	1	94.27	0.000	0.000	0.028	0.000	0.000	0.000	0.000	0.011
NF	Total:	14	547.267	0.000	0.046	0.016	0.031	0.000	0.000	0.000	0.026
SS	1	1	151.30	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.007
SS	2	84	301.70	0.000	0.252	0.301	0.289	0.207	0.289	0.000	0.278
SS	Total:	85	547.267	0.000	0.139	0.166	0.162	0.143	0.139	0.139	0.155
MW	1	4	151.30	0.000	0.000	0.078	0.000	0.000	0.000	0.000	0.026
MW	2	10	301.70	0.000	0.030	0.028	0.055	0.000	0.000	0.000	0.033
MW	3	4	94.27	0.000	0.000	0.056	0.036	0.000	0.100	0.000	0.042
MW	Total:	18	547.267	0.000	0.015	0.047	0.037	0.000	0.035	0.035	0.033
GW	2	17	301.70	0.000	0.074	0.028	0.044	0.083	0.217	0.000	0.056
GW	1	1	151.30	0.000	0.000	0.000	0.023	0.000	0.000	0.000	0.007
GW	Total:	18	547.267	0.000	0.039	0.016	0.031	0.057	0.104	0.104	0.033
KW	3	3	94.27	0.000	0.000	0.056	0.036	0.000	0.000	0.000	0.032
KW	1	2	151.30	0.000	0.000	0.000	0.023	0.118	0.000	0.000	0.013
KW	2	2	301.70	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.007
KW	Total:	7	547.267	0.000	0.015	0.010	0.012	0.029	0.000	0.000	0.013
SL	1	5	151.30	0.000	0.068	0.039	0.000	0.000	0.000	0.000	0.033
SL	3	4	94.27	0.000	0.054	0.084	0.000	0.000	0.000	0.000	0.042
SL	2	1	301.70	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.003
SL	Total:	10	547.267	0.000	0.039	0.026	0.000	0.000	0.000	0.000	0.018
RS	2	7	301.70	0.000	0.015	0.000	0.033	0.041	0.145	0.000	0.023
RS	1	1	151.30	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.007
RS	Total:	8	547.267	0.000	0.015	0.000	0.019	0.029	0.069	0.069	0.015

* Table 6.1 shows the correspondence of the codes with marine mammal species names.

**Areas: Area 1—Piltun, Area 2—North Transit, Area 3—Lunskoye.

6.3 WEATHER CONDITIONS

Weather conditions play an important role in sighting marine mammals. Data were therefore grouped according to favourable and unfavourable weather conditions. Favourable weather conditions were defined as those where (a) visibility was ≥ 1 km, and (b) sea state was ≤ 3 on the Beaufort scale. Weather conditions that did not meet any of these criteria or their combination during the observation period were considered unfavourable.

During the reporting year, the observations were mostly performed in favourable visibility conditions (92%). The observations in unfavourable weather conditions about 8% of the total duration of observations (Table 6.3).



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

Table 6.3. Visibility conditions during observation in 2019, by areas of operations

Area of operations	Hours		Share, %	
	< 1 km	≥ 1 km	< 1 km	≥ 1 km
Area 1—Piltun	14.55	136.75	9.62	90.38
Area 2—North Transit	17.00	284.70	5.63	94.37
Area 3—Lunskoye	11.88	82.38	12.61	87.39
Total:	43.43	503.83	7.94	92.06

The sea swell did not significantly affect the course of observation in 2019; the duration of observations during the sea swell considered favourable for observation (3 or less on the Beaufort scale) constituted 100 % (see Table 6.4).

The prevalence of favourable weather conditions during the monitoring period (visibility and sea state) is mainly because a decision to use Polar Baikal and Polar Piltun vessels for personnel transportation was only made in case of forecast favourable weather conditions, due to safety.

Table 6.4. Sea swell during observation in 2019, by areas of operations

Area of operations	Hours		Share, %	
	≤ 3	> 3	≤ 3	> 3
Area 1—Piltun	150.30	1.00	99.34	0.66
Area 2—North Transit	299.70	2.00	99.34	0.66
Area 3—Lunskoye	93.27	1.00	98.94	1.06
Total:	543.27	4.00	99.27	0.73

The ratio of records made in favourable and unfavourable weather conditions did not differ significantly in 2019 on the area and the month (Fig. 6.1–6.4).

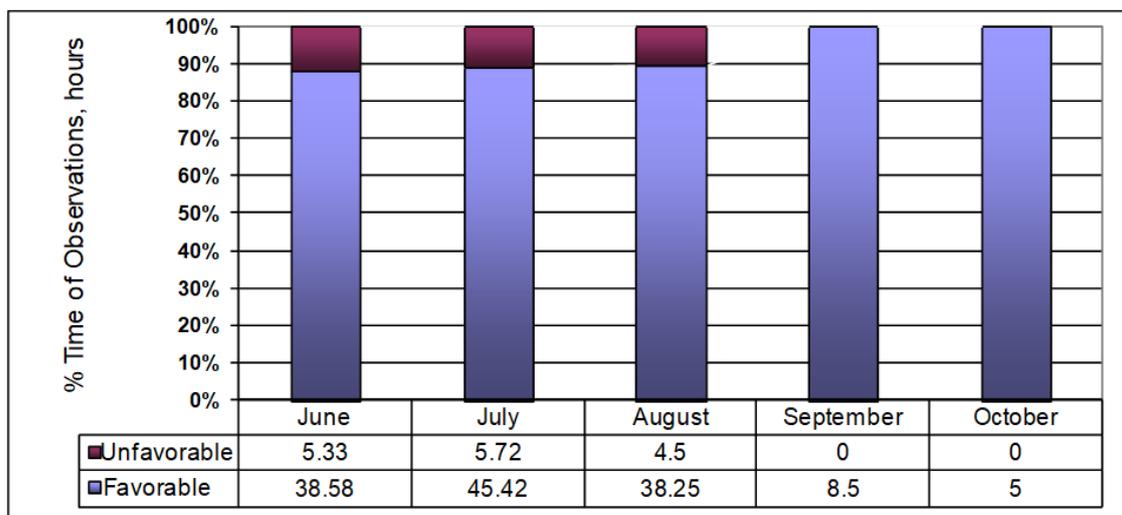


Fig. 6.1. Ratio of favourable and unfavourable weather conditions in area 1—the Piltun Area



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CLOSE-OUT REPORT**

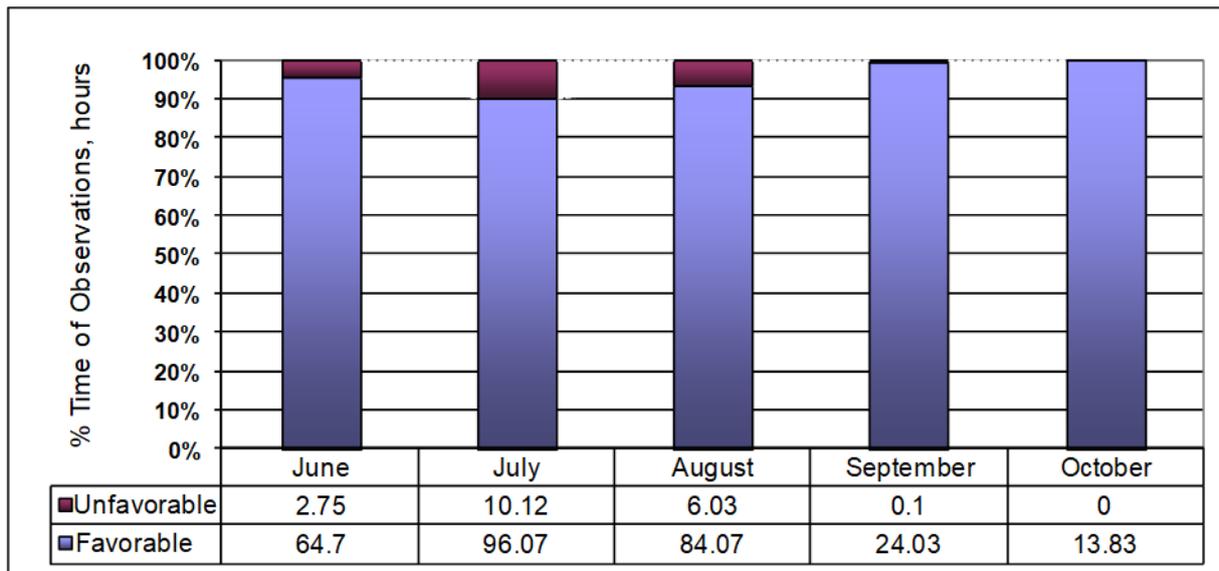


Fig. 6.2. Ratio of favourable and unfavourable weather conditions in area 2—the North Transit Area

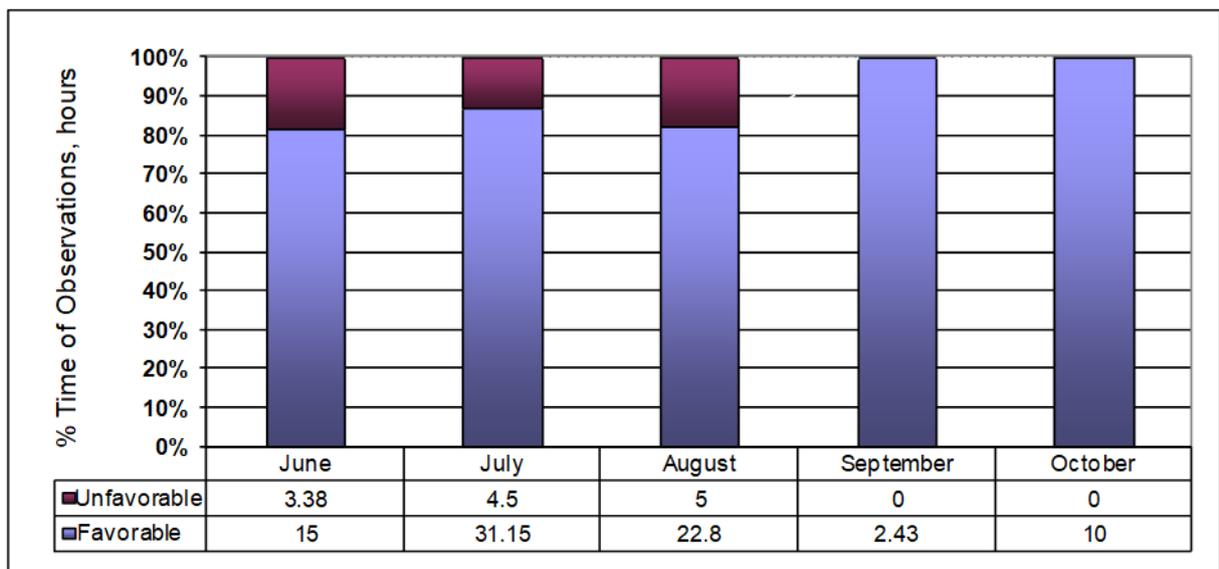


Fig. 6.3. Ratio of favourable and unfavourable weather conditions in area 3—the Lunskeye Area

In general, favourable weather conditions significantly prevailed over unfavourable (91% and 9%, respectively) during the entire observation period. June-August of 2019 were the least favourable months for observations; the most favourable conditions for observations were in September through October (see Fig. 6.4).



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

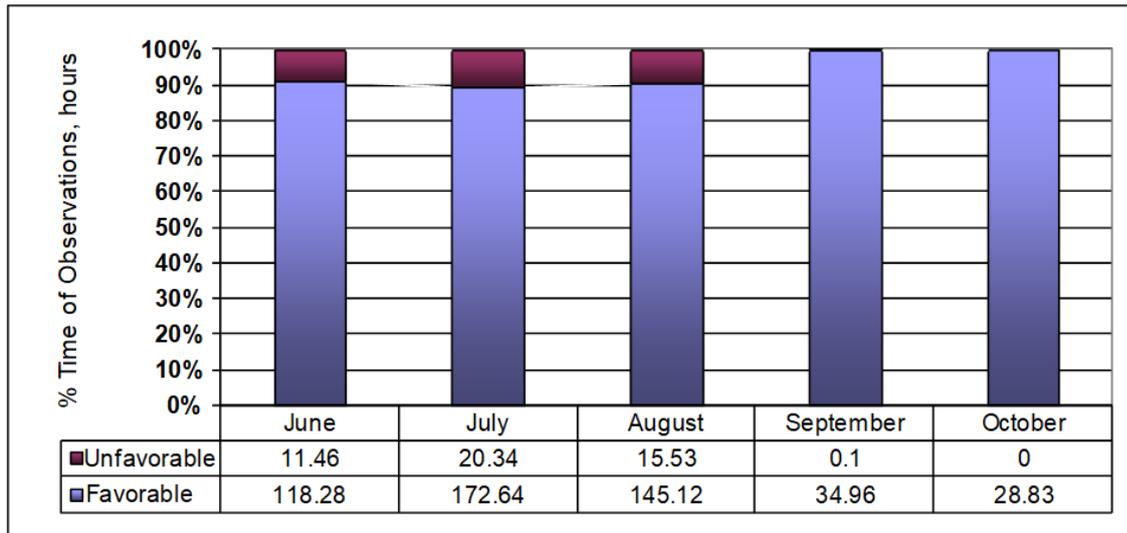


Fig. 6.4. Ratio of favourable and unfavourable weather conditions over the entire observation period

6.4 SIGHTING OF ANIMALS DEPENDING ON WEATHER CONDITIONS

Marine mammals sighting varies under changing weather conditions, differing between species according to their size and distance from the vessel. Behaviour of animals also matters; for example, some mammal species leave an area as a storm approach.

During field season in 2019, 95 % of marine mammal encounters were recorded under favourable weather conditions (Table 6.5). The unfavourable observation conditions (visibility less than 1 km and/or sea state over 3) reduced the number of marine mammal encounters by 18 times on average.

Table 6.5. Number and frequencies of marine mammals sighted in favourable and unfavourable weather conditions in 2019

Species	Favourable conditions, 499,83 h.		Unfavourable conditions, 47,43 h		Total 547.26	
	Sightings	Sightings/hour	Sightings	Sightings/hour	Sightings	Sightings/hour
GW	18	0.0360			18	0.0329
MW	17	0.0340	1	0.0211	18	0.0329
KW	7	0.0140			7	0.0128
DP	2	0.0040			2	0.0037
HP	30	0.0600			30	0.0548
SL	10	0.0200			10	0.0183
NF	14	0.0280			14	0.0256
SS	76	0.1521	9	0.1898	85	0.1553
RS	8	0.0160			8	0.0146
Total:	182	0.3641	10	0.2108	192	0.3508

Note. Species: GW—gray whale, MW—Minke whale, KW—killer whale, DP—Dall's porpoise, HP—Harbour porpoise, SL—Steller 's sea lion, NF—northern fur seal, RS—ringed seal, SS—spotted seal.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

7 CONCLUSION

In 2019 five Marine Mammal Observers were employed on two vessels engaged in Sakhalin Energy offshore activities in Lunskeye and Piltun areas. Observations began on 6 June and continued until 17 October. In 2019 the observations lasted a total of 547 hours during 100 vessel days. During the season, 5 species of cetaceans and 4 species of pinnipeds were encountered.

Gray whales were observed 18 times (19 animals in total). The average distance to them from all encounters was 1.136 km. There were 9 encounters at a distance equal to or less than the safe distance. In 7 out of 9 cases at the indicated distances, preventive measures were taken to reduce the impact - the vessel changed course. In two cases, no action was taken when a gray whale was spotted, as the vessels were movement a safe course. During the entire ice-free navigation season there were no encounters with gray whales that posed a risk of collision. Thus, in 2019, presence of MMOs on the vessels allowed the vessels' crew to take timely measures to minimise risk of collision or an adverse impact on gray whales.

Over the entire period of marine mammal observation in 2019 there were no encounters with fin whales or pacific right whales.

In 2019 MMOs reported a total of 192 encounters with marine mammals. In addition to the encounters with gray whales, there were 57 encounters with cetaceans. In 27 cases cetaceans were encountered at a distance equal to or less than the established safety distance (500 m). In some cases, no measures were required to avoid a collision as the animals were moving parallel to the vessel course or away from the vessel. Although no cases of near collision with marine mammals were recorded, in 33 cases preventive measures were taken in order to avoid possible collision with whales and dolphins.

Measures taken to protect gray whales and other marine mammals during 2019 can be considered successful; no cases of (near) collision with gray whales or other marine mammals were recorded.

The programme implemented conforms with environmental requirements and the Company commitments towards stakeholders; it adheres to WGWAP recommendations.

From the beginning of the Company's operations in coastal waters of the north-eastern Sakhalin, no collisions of vessels with marine mammals were recorded. Thanks to the risk mitigation measures, the possibility of vessel collision with marine mammals is estimated as low.



MARINE MAMMAL OBSERVER PROGRAMME 2019 CLOSE-OUT REPORT

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