



Sakhalin Energy Investment Company Ltd. Controlled Document

Sakhalin Energy Assets								
Document Number:	Asset	Origin	Module	Discipline	Document Type	Sequential Number	Sheet Number	Language
	1000	S	90	04	P	0048	00	E
Title: <p style="text-align: center;">MARINE MAMMAL PROTECTION PLAN</p> <p style="text-align: center;">ПЛАН ЗАЩИТЫ МОРСКИХ МЛЕКОПИТАЮЩИХ</p>								
Custodian: Andrey Samatov, Head of Corporate Environmental Division (Sakhalin Energy)					Classification: Unclassified			
Revision	Issue Purpose	Signed by			Signatures	Date		
10	AFU - Approved For Use	Originator: Sergey Vinogradov, Environmental Specialist (Sakhalin Energy), Sergey Starodymov, Environmental Specialist (Sakhalin Energy)				19/05/2020		
		Checker: Andrey Samatov, Head of Corporate Environmental Division (Sakhalin Energy)				19.05.2020		
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		Technical Assurance (Sakhalin Energy): N/A						

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LIST OF ADDITIONAL APPROVALS*

Note: Delete this page if not used.

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** The role of each approving party shall be indicated, based on the roles from the title sheet: "originator", "checker", "approver", "technical assurance".

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DOCUMENT REVISIONS HISTORY

Rev.	Location of Change	Brief Description of Change
01	First issue of document	First formal issue of 2003 Western Gray Whale Protection Plan
02	Throughout document reflecting new companies approach	Update of 2003 Western Gray Whale Protection Plan. Title of document changed into Marine Mammal Protection Plan.
03	Throughout document reflecting MMO Audit recommendations + inclusion of Annex 3, noise management approach	Update of 2005 Marine Mammal Protection Plan to reflect MMO Audit recommended changes + addition of noise action criteria in Annex 3.
04	Edits and restructure throughout document. Update of Annex 2 and 3.	Changes made to reflect updates as per the 2006 construction season and adaptation in mitigation measures (vessel corridors and vessel speed limits).
05	Updates throughout document, specifically to Annex 1, 2 and 3.	Changes made with regard to the protection zones, vessel corridors, MMO program, noise impact assessment and WGW monitoring program to reflect updates as per the 2007 season.
06	Updates throughout document	Changes made with regard to speed limits, MMO program and GW monitoring program. Noise impact assessment and noise action criteria annexes were excluded
07	Updates throughout document	Changes made with regard to speed limits, MMO program and GW monitoring program.
08	Updates throughout document	Changes made with regard to structure of document, oil spill monitoring, minimum altitude to be used by aircraft, safety zone, and corridors.
09	Updates throughout document	Changes made with regard to structure of document and updated GW monitoring program. Updates in response to WGWAP and Lenders' representative review.
10	Updates throughout document	Changes made with regard to structure of document in accordance with the Lenders' Consultant comments.



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WHO SHOULD READ AND ACT ON THIS DOCUMENT?

If you or anyone responsible to you, including contractors, is planning to carry out any activity on, near or offshore of Sakhalin on behalf of the Sakhalin Energy Investment Company Ltd (Sakhalin Energy, the Company), then the information and guidance in this document applies. Any activity carrying the possibility of risk of harm or disturbance to a marine mammal must operate under this Marine Mammal Protection Plan (MMPP). The risks to the animals can be associated with noise, vessel/object speed and route, underwater activities such as buoy laying, dredging or rock placement, oil or other contaminant spill, beach/shore landing facilities and other construction activities. Please refer to the Method Statements associated with each activity in the appendix at the end of this document. Preparing to manage that risk by reading this document prior to the activity and acting upon its guidance will significantly lower any risk to the marine mammals in the area. Taking that approach will also sustain the hard-won, excellent reputation of the Company in the eyes of our stakeholders and regulators.



1 INTRODUCTION

1.1 BACKGROUND TO THE DEVELOPMENT OF THIS DOCUMENT

Sakhalin Energy Investment Company Ltd is a consortium comprising currently: Gazprom Sakhalin Holdings B.V., Shell Sakhalin Holdings B.V., Mitsui Sakhalin Holdings B.V. and Mitsubishi. It formed in 1991 to develop the Sakhalin 2 oil and gas project off the north-eastern coast of Sakhalin Island, Russia, in the north-western Pacific Ocean. In 1994, the Company signed a Partnership Sharing Agreement with the Russian Federation and the Sakhalin Oblast (Government) to operate at the Piltun-Astokhskoye (generally shortened to Piltun-Astokh or P-A) and the Lunskoye oil and gas fields. Subsequently, Sakhalin Energy has been producing and exporting oil since 1999 and liquefied natural gas since 2009. The Company has built a global reputation for gas and oil extraction in parallel with a highly responsible and constructive approach to nature conservation and environmental protection. It values greatly that reputation. This Marine Mammal Protection Plan provides information on carrying out the Company's activities without harming the marine mammals of Sakhalin Island.

1.2 THE WESTERN GRAY WHALE ADVISORY PANEL

The Company has operated successfully, over many years, with the guidance and recommendations from experts of the Western Gray Whale Advisory Panel (WGWAP) which provides independent scientific advice and recommendations to the Company on its marine activities off Sakhalin particularly in the context of gray whales (WGWAP 2019). The gray whales off Sakhalin are accorded special protection by the authorities. They use two crucial, feeding areas in the vicinity of the Company's zone of activity. In response to concerns of the Russian and international conservation community and the report of an IUCN-convened Independent Scientific Review Panel (ISRP 2005), the Lenders and the Company requested that IUCN (International Union for the Conservation of Nature) establish the WGWAP which IUCN has convened and managed since then. This unique relationship between the Industry and the scientific/conservation communities formed the basis for several innovative, multi-disciplinary scientific papers and reports including: '*Responsible practices for minimising and monitoring environmental impacts of marine seismic surveys with an emphasis on marine mammals*' (Nowacek *et al.* 2013 – co-authored *inter alia* by several Panel members), '*Effective planning strategies for managing environmental risk associated with geophysical and other imaging surveys: A resource guide for managers*' (Nowacek & Southall 2016) and '*WGWAP Stories of Influence*' (G. Martin-Mehers, 2016 – co-produced by IUCN, WWF and IFAW and based on interviews with more than 20 experts and stakeholders)¹.

1.3 MARINE MAMMALS

Twenty-three species of marine mammals have been recorded in the scientific literature as occurring along the shores and in the waters around Sakhalin. Not all of these species have been seen by Sakhalin Energy Marine Mammal Observers (MMOs) nor have they all been recorded specifically within the Sakhalin 2 operational area. Nevertheless, given their occurrence in the western North Pacific Ocean and what is known about their movements generally, there is potential for individuals from all 23 species to be encountered at least occasionally in the area (See Appendix 2).

Seventeen of the species are cetaceans (whales, dolphins and porpoises). One of these, the gray whale (*Eschrichtius robustus*), occurs in both the eastern and western North Pacific. The gray whales off Sakhalin are considered to belong to the western component, which is currently listed in the IUCN Red List as an Endangered subpopulation and in the Russian Federation Red Book as Category 1. Three other cetacean species that occur at least occasionally in the general vicinity of Sakhalin Island: bowhead whale (*Balaena mysticetes*), North Pacific right whale (*Eubalaena japonica*) and fin whale (*Balaenoptera physalus*) are listed in the IUCN Red List as Endangered and in the Russian Federation Red Book as Category 1 or 2. Six species of pinnipeds (seals, sea lions and walruses) are recorded in Sakhalin waters. One of these, an otariid or eared seal, is the Steller sea lion (*Eumetopias jubatus*), the western subspecies of which

¹ <https://portals.iucn.org/library/node/46182>



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(*E. j. jubatus*) is listed in the IUCN Red List as Endangered and in the Russian Federation Red Book as Category 2.

The Company has committed to mitigate the risks and protect all marine mammals and their habitats from the negative impacts associated with Company's activities. Equally, under National Law, the protection of Red Book species is afforded in terms of Federal Law number 52-FZ on Wildlife Protection; while the Russian Criminal Code prescribes the punishment that may be administered for destroying the habitats of Red Data Book species resulting in the death of protected organisms.

As a responsible operator with professional and public commitments to environmental protection, Sakhalin Energy developed this MMPP within its Health, Safety, Environment and Social Action Plan (HSESAP) to implement mitigation strategies, protection measures and continued monitoring programs, with the aim of reducing the possibility that its activities cause harm to the marine mammals.

The Company began development of its MMPP in 2001 and the document has been updated on a regular basis since then. The MMPP covers risks and mitigation measures and is based on the RF Laws, WGWAP recommendations, International Whaling Commission (IWC) guidance and Company commitments to International Finance Corporation (IFC) Performance Standards. This 2020 revised version is intended to ensure the following:

1. All employees and contractors carrying out activities on behalf of the Company where marine mammals could be encountered or put at risk, can manage that risk and avoid or mitigate it. In this document, they will learn how the Company expects them to proceed and act in those situations;
2. Sakhalin Energy evaluates the effectiveness of its mitigation and monitoring program and modifies plans and studies as necessary in response to new information as it becomes available, i.e., Sakhalin Energy employs an adaptive approach to assess and manage the impacts of its activities on all marine mammals, particularly the gray whales, and their habitats;
3. Sakhalin Energy has used the recommendations and other input from WGWAP to develop, implement and improve mitigation and protection measures in all of its shore, near-shore and offshore activities.

Sakhalin Energy argues that, because of the mitigation and monitoring efforts it has put in place, taking into account the guidance, advice and recommendations of the WGWAP, the environmental impacts of the Sakhalin 2 project on marine mammals in the waters around Sakhalin Island and in the Sea of Okhotsk have been very low. These efforts and their effectiveness have been assessed through a process of Environmental Impact Assessment (EIA) as reported in the Sakhalin 2 Phase 2 EIA (SEIC, 2003a) and associated EIA addenda (SEIC, 2005a). More recently, the international Environmental, Social and Health Impact Assessment (ESHIA) for the Company's 4D Seismic Survey in 2015 described measures to be taken to reduce the risks to gray whales and to other marine mammals during that activity (SEIC, 2015a). Scientific analyses of the behaviour and distribution of gray whales off Sakhalin Island have not yet revealed any impact of offshore oil and gas activities on the Sakhalin gray whales or their habitat. That does not mean there are no impacts, they may be very difficult to detect, only that none has been revealed by the years of monitoring and analyses. There is the possibility that more subtle impacts could be present in the longer term within the Sakhalin gray whales that have still to be identified. The Company recognises that view and proceeds cautiously with its activities in those contexts.



2 PURPOSE OF MMPP

This Marine Mammal Protection Plan raises awareness of the risks to marine mammals associated with Sakhalin Energy's marine activities and describes measures to be applied to prevent, reduce or mitigate those risks. This MMPP applies to all Sakhalin Energy staff and contractors involved in shore, near-shore and offshore activities.

2.1 SCOPE OF MMPP

This MMPP is about the prevention and management of potential impacts on all marine mammals likely to be encountered off Sakhalin while carrying out the Company's activities

The Plan addresses:

- The risks to marine mammals associated with the Company's marine activities and its onshore activities near the coast;
- Direction to detailed activity rules allowing staff and contractors to be aware of the risk associated with that activity and what steps to take to prevent or reduce that risk when marine mammals are in the vicinity;
- Marine mammal monitoring requirements;
- Marine mammal emergency response.

This MMPP covers the following activities associated with maritime operations:

- (1) Crew-change vessels: two catamaran ferry boats are used as crew-change vessels that run from Kaigan port to the three platforms - LUN-A, PA-A (Molikpaq) and PA-B;
- (2) Field-supply vessels shuttling by rotation between Kholmsk port and the Sakhalin Energy license areas, as required;
- (3) Oil spill response (OSR) vessels stationed near platforms as per oil spill response procedure;
- (4) Research and survey vessels: at present, the Company's supply and OSR vessels operate in Aniva, Lunskoye, and Piltun-Astokh areas to conduct (1) hydrological and benthic monitoring, (2) offshore pipeline monitoring and (3) all offshore components of the Joint gray whales monitoring programme (Joint Programme) - acoustic, distribution, and photo-ID studies;
- (5) Other types of offshore operations related to the performance of various types of work from vessels, to ensure the operation of the Company's offshore infrastructure (inspection of pipelines, maintenance of offshore assets, underwater infrastructure, etc.).

Activities not explicitly covered in this MMPP but with the potential to have a significant impact on marine mammals (for example: a seismic survey, pile driving, an activity with a high risk of striking or colliding with a marine mammal) may require the development and implementation of specific, additional and / or adapted mitigation measures and controls. The Company Hazards and Effects Management Process will be used to identify when an activity meets this criterion. In such cases, an activity-specific Monitoring and Mitigation Plan (MMP) will be developed in consultation with relevant specialists, including WGWAP where applicable.

Specific protection measures for endangered marine mammal species besides the gray whale are not included in this plan. However, it is expected that implementation of the mitigation measures for gray whales will also reduce the risks to other marine mammals.

Note: The following measures and issues are not addressed in this MMPP, but are addressed in separate documents:

- Activities such as Seismic Surveys have their own specific MMP and ESHIA for marine mammals and these are developed on a case-by-case basis;
- Wastewater discharges – refer to MARPOL 73/78 and Russian Federal laws;
- Detailed oil spill prevention and response – refer to Sakhalin Energy Oil Spill Prevention and Response Plan for Piltun-Astokh Offshore Operations (SEIC, 2017);



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- Biodiversity Action Plan (BAP) (SEIC, 2009b) and Environmental Impact Assessment (SEIC, 2003a) – refer to relevant Sakhalin Energy Standards;
- Health, Social and Safety issues linked to activities;
- Detailed descriptions of the offshore activities (refer to the specific project plans and schedules).

2.2 USER NOTES

The requirements described in this document are mandatory. Non-compliance must be authorized using the deviation procedure described in Chapter 10 of the Corporate Document Control Procedure (SEIC, 2004a). This document is linked closely to Appendix 6 of the Health, Safety, Environment and Social Action Plan (HSESAP): *Marine Environment Protection Standard*. A controlled copy of the HSESAP document is located in *Unica* and is available via the Sakhalin Energy website. Before using this document, it is the User's responsibility to ensure that any hard or electronic copy is current. The Corporate Health, Safety and Environment (C-HSE) Document Custodian should be contacted for any assistance and to provide any feedback.

The Document Custodians will review this MMPP. Triggers for full or partial review may include, but are not limited to:

- Emerging/growing HSE concerns in specific areas;
- Changes in shareholder requirements and concerns of staff, independent advisers, contractors, customers, Government agencies and the public;
- Changes in legislation and/or regulations;
- Results from monitoring data or incident investigations revealing shortcomings in the MMPP;
- Changing Company activities and locations;
- New hazards or activities not considered in the MMPP.

2.3 RESPONSIBILITIES

Marine mammal protection is centrally managed within Sakhalin Energy by the Department of General Manager HSE (Head of HSE Department). All activities are therefore subject to the same management framework, with clearly defined responsibilities that apply to all relevant Sakhalin Energy staff and contractors.

Project and Asset Managers

Project and Asset Managers must ensure that:

- All major activities with the potential to affect marine mammals should be assessed in line with the HSESAP² in order to determine whether an EIA to international Lenders' standards (ESHIA) should be undertaken;
- Activities not explicitly covered in this MMPP but with the potential to have a significant impact on marine mammals are assessed in conjunction with relevant Company specialists to determine whether the development and implementation of specific, additional and / or adapted mitigation controls are required. In such cases, an activity-specific MMP must be developed;
- They gain a detailed understanding of the Marine Mammal Protection Plan (and activity-specific MMP, if required) in relation to their project area. They shall ensure that effective and available

² The activity should be assessed in line with the Hazard and Effects Management Process (HEMP) defined in the Project Expansion HSE Procedure (1000-S-90-04-P-0029-00-E) and the Risk Assessment Matrix (RAM) set out in the Methodology for Classifying and Remediating Incidents and Breaches (86-0000-S-90-04-O-009-00-E).



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measures and means are used by contractors and their staff to ensure that impacts on any marine mammals are avoided or minimized.

General Manager HSE and Head of Corporate Environmental Division

The General Manager HSE and Head of Corporate Environmental Division (Corporate Environmental Manager) must ensure that:

- Marine mammal/gray whale monitoring is implemented as required and that the monitoring data are collated and analysed.
- The MMPP is updated when necessary, based on the criteria listed in section 2.2.
- Generic and specific marine mammal protection measures are developed in cooperation with project engineers for offshore installation and construction activities and for other operations (e.g. seismic surveys) that may affect gray whales and other marine mammals.
- Marine mammal/gray whale awareness training materials are developed and produced for all new and existing Sakhalin Energy staff and relevant contractors in relation to this protection plan.
- Routine audits of activities as part of the HSE Management System (HSE MS) auditing or as part of a themed audit are conducted.
- Audit findings are reported within the Company and to other stakeholders as appropriate.

Sakhalin Energy HSE Representatives

Sakhalin Energy HSE Representatives must ensure that:

- Captains on Company-chartered vessels understand the potential impacts on marine mammals associated with their area of responsibility and the measures required to minimise these impacts;
- Staff and contractors on Company-chartered vessels understand the marine mammal protection issues associated with their work, and the measures required to minimise impacts on marine mammals in accord with Sakhalin Energy Marine Operating Procedures and Guidelines;
- They liaise with other Company-chartered vessels to communicate on marine mammal-related issues and thereby maximise the effectiveness of specific measures;
- Incidents, such as injury, death or entanglement of marine mammals, are reported to the HSE department using the Marine Mammal Mortality-Injury Report (Appendix 5);
- Captains and staff on Company-chartered vessels comply with this protection plan;
- Marine Mammal Awareness Training is delivered to the crew if there is no requirement under the current MMPP to have MMOs onboard the vessel.

Staff and contractors

Staff and contractors must:

- Understand and implement measures for marine mammals' protection issues associated with their work/activities and the measures required to minimise impacts on marine mammals; their workplan must reflect this knowledge;
- Report incidents, such as injury, death or entanglement of marine mammals, to the supervisor using the Marine Mammal Mortality-Injury Report form (Appendix 5);
- Comply with this protection plan in the course of conducting their duties.



3 LEGAL FRAMEWORK

The legal basis of the Russian state policy in the sphere of environmental protection is defined in Federal Law 10.01.2002 N 7-FZ "On Environmental Protection". The gray whales (*Eschrichtius robustus*) occurring along the North East (NE) coast of Sakhalin Island, close to Sakhalin Energy's oil and gas developments, are classified as endangered Okhotsk-Korean population (Category 1) in the Red Data Book of the Russian Federation and are therefore protected under Russian Federation law. Sakhalin Energy is thus legally obliged to ensure that its activities do not harm them.

3.1 RUSSIAN LEGAL REQUIREMENTS:

- Federal Law from 10.01.2002 N 7-FZ "Environmental Protection";
- Federal Law from 24.04.1995 N 52-FZ "Wildlife";
- Governmental Regulation from 19.02.1996 N 158 "Red Data Book of the Russian Federation";
- Federal Law from 20.12.2004 N 166-FZ "Fishery and Water Biological Resources Protection".

According to the Federal Law on Wildlife, actions are not allowed that can bring about death, reduce the number, or disrupt habitats of wildlife included in the Red Data Books (National and Regional). Legal entities and citizens who conduct economic activities on shore and offshore where animals included in the Federal and regional Red Books dwell shall bear responsibility for the conservation and reproduction of this wildlife according to the legislation of the Russian Federation and the legislation of subjects of the Russian Federation.

3.2 INTERNATIONAL REQUIREMENTS:

- International Convention on the Regulation of Whaling (1946);
- Convention on Biological Diversity (1992).

Increasing attention is being given to the protection of the marine environment with developments in international maritime law and the growth of cooperation between states and international organizations in the joint protection of marine biota. The Russian Federation is directly responsible for protecting and restoring rare wildlife and habitat conditions within the waters under state sovereignty or national jurisdiction.

3.3 COMPANY COMMITMENTS

Under the Health, Safety, Environment and Social Action Plan, the Company has developed a Biodiversity Action Plan in accordance with the Lender requirements and IFC Performance Standards (2012). The BAP considers that all marine mammals are a biodiversity priority. Some of the marine mammals are accorded even higher priority and measures owing to their protected status or IUCN designation. The Sakhalin gray whales are an example of that higher prioritisation. The Company produces EIAs and international ESHIAs for major projects or activities. These are independently regulated and scrutinised.



4 RISKS AND CONTROL MEASURES

An overview of the potentially most important impacts on gray whales and other marine mammals related to Sakhalin Energy's offshore construction activities and operations more generally is given in Appendix 1. The main potential sources of impact are briefly outlined below. More detailed information concerning impacts on gray whales and other marine mammals can be found in the international ESHIA (SEIC, 2014), EIA's (SEIC, 2003a, 2003b), EIA addendum (2005a) and the Comparative Environmental Analysis (CEA, SEIC, 2004b).

4.1 IMPACTS OVERVIEW

The main sources of impact on gray whales can be divided into two categories:

- Those that are risk-based and acute, with mitigation measures in place to prevent impacts from occurring. These sources of impact include oil spills and vessel strikes. In case of such an event, the impact is potentially high and often directly visible. They can also lead to chronic effects;
- Those that are less obvious or chronic, but which carry risk, such as noise generated by offshore construction or exposure to hydrocarbons (directly or via the food web) following a spill or leak. Mitigation is needed to ensure that the cumulative and chronic impacts are sufficiently identified, understood and managed in a manner that they do not affect the whales' population-level health, the health of individual whales, cause their numbers to decline, affect their ability to reproduce or adversely affect their habitat/feeding ecology.

4.1.1 Vessel Strikes

Vessel strikes can be injurious or lethal to whales and crew. Vessels of any size may strike and injure or kill whales. Risk of strikes is related to the number and density of both whales and vessels as well as to vessel speed. Risk of severe injury or death to a whale if a strike occurs is linked to size of vessel and vessel speed. An IWC workshop (IWC, 2014) reviewed the then available information and provided the following general conclusions on ship strikes and mitigation measures:

- (1) Mitigation measures that separate whales from vessels (or at least minimise co-occurrence) in space and time to the extent possible are the most effective (e.g. routing schemes);
- (2) The most effective and only demonstrated general method to ameliorate lethal strikes risk available at present is reduced speed - in the USA, speed restrictions for vessels ≥ 65 feet (20m) have been effective in reducing mortality/serious injury for marine mammals (Laist *et al.* (2014);
- (3) For direct collision of a vessel with a marine mammal at a speed of 17 knots, the estimated probability of mortality or serious injury has been estimated to be around 90% (Vanderlaan and Taggart, 2007);
- (4) The efficacy of additional measures (e.g. alerting mariners that whales may be in the area), including having onboard observers or other technical solutions requires careful evaluation before such measures can be endorsed;
- (5) Apart from recommending that vessels proceed with great care, it is not possible to provide advice on simple avoidance strategies in the presence of whales.

Although Sakhalin Energy supply vessels and crew change vessels generally travel to the south and offshore of the Piltun feeding area, some whales moving along the coast and to the Offshore feeding area in summer and autumn are at risk of being struck by these vessels as well as by survey and environmental monitoring vessels working in the Piltun-Astokh license area.

The risk assessment for Sakhalin Energy vessels was performed using data from a representative sample of vessels. The expected number of vessel/whale encounters was estimated using a simple, two-dimensional model that incorporated vessel width, whale length, vessel distance travelled, monthly transects, whale vulnerability, whale population density, whale avoidance behaviour, observer success in



detecting whales and a proximity factor for whether whales and vessels co-occur in space and time. This study showed that the risk of a strike is very low, especially when MMOs are present on the vessel and it is travelling inside a designated corridor. The vessels with the highest risk of encountering gray whales were the two, mono-hull, crew change vessels operating within the corridors from Kaigan Port to the Piltun platforms (LGL, 2006). Since 2009, Company has been using catamaran-type crew change vessels. In terms of risk of striking whales, the performance of a mono-hull versus a shallow-draft, catamaran-style waterjet-propelled vessel is very different. Catamarans are highly manoeuvrable at operating speed and their waterjet propulsion allows them to quickly reduce their speed to a standstill, hence help to avoid collisions with marine mammals. A trial period of two field seasons in 2017 and 2018 was recommended by the WGWAP (Recommendation 16/008) regarding vessel planing speeds and managing the risk of striking a marine mammal. At the end of the trial period it was accepted by the WGWAP in 2019 that the new speed limit for crew change vessels in their corridors can be continued. Importantly, the development of the ship corridors and speed limits is based on probability and risk to whales balanced with the health, safety and technical operating requirements for the vessels, crews and passengers.

An additional risk assessment was carried out in 2015 for a new, South-North, vessel transit route directly from the turning point near Cape Terpenya to the LUN-A platform (Figure 5.1). The route presents no material additional risk to the gray whales' Piltun feeding area or the Offshore feeding area, which are both remote from the route. According to MMO records, cetaceans are rarely observed in or near to this new route (SEIC, 2015b). The Company's request for adoption of the new route was accepted and agreed by the WGWAP in 2016.

4.1.2 Anthropogenic noise

Marine mammals rely heavily on the use of underwater sound to communicate and to gain information about their environment. Experiments have shown that they hear, react to, and can have their hearing affected by anthropogenic sounds of many kinds (see: reviews by Southall et al. (2007; 2016), Ellison et al., 2012; Finneran (2015; 2016)). Underwater noise thus has the potential to interfere with the ability to communicate, find food and avoid harm (e.g. predation, vessel strike); noise can affect the animals' distribution, abundance, behaviour and general well-being. Potential impacts of noise exposure which have been most commonly considered from an environmental compliance perspective are:

- Temporary or permanent hearing threshold shifts, whereby the animal is impaired by losing hearing sensitivity following noise exposure or for a period of time during which it recovers or indefinitely. Permanent hearing loss constitutes direct physical injury;
- Behavioural modification, such as deflection from a migration path, disruption of mother-calf bonds, avoidance of an area, changes in orientation, changes in respiration rates and interrupted feeding.

Auditory effects

Noise at relatively lower received levels can interfere with (mask) the detection of important sounds (Erbe *et al* 2016). While explicit criteria have generally not been identified and are not proposed here, such interference may limit the ability of animals to detect important signals. Temporary Threshold Shift (TTS) is a form of hearing impairment that can be caused by exposure to relatively loud sounds or by prolonged exposure to lower-amplitude signals. While experiencing TTS, hearing sensitivity is decreased and the animal's functionality is compromised. Although it has only been measured directly in a few marine mammal species (and no whales), TTS can last from minutes or hours to days, the magnitude of which depends on the level and duration of sound exposure, among other considerations (see: Finneran, 2015). For sound exposures at or somewhat above the TTS onset threshold, hearing sensitivity recovers after exposure to the sound ends; the recovery time as well as the amount of sensitivity loss increase with increasing exposure level. Beyond a certain limit, Permanent Threshold Shift (PTS) can occur. This can be due to several different kinds of unrecoverable physical damage to structures within the ear. Physical damage to a marine mammal's hearing apparatus can occur from exposure to pulsed sound with high peak pressures, especially if the pulses have very short rise times and/or exposure is prolonged, or from extended or quite high levels of continuous, non-impulsive noise. Such damage can result in permanent decrease in functional sensitivity of the hearing system at some or all frequencies.



Noise exposure thresholds for physical injury from auditory effects typically consider permanent hearing loss. The thresholds for physical damage adopted in this MMPP are 190 dB re 1 μ Pa root mean square sound pressure level (SPL rms) for pinnipeds and 180 dB re 1 μ Pa for cetaceans, for both pulsed and continuous noise. For the specific case of exposure of gray whales to pulses from seismic surveys, however, this MMPP recognizes the exposure criteria developed by the Noise Task Force (NTF-13 report). They reviewed all available information on hearing, potential effects of noise on hearing, and proposed noise exposure criteria for estimating potential injury. While noting the presence of additional scientific data for some species and more recent proposed exposure criteria, the NTF noted the complete absence of direct data for whales and thus derived an adapted and slightly more precautionary interpretation of the recommendations of Southall et al. (2007). This resulted in an exposure criterion for physical damage of 195 dB re 1 μ Pa²-s cumulative sound exposure level (cSEL), calculated using the low-frequency cetacean M-weighting function defined by Southall et al. (2007) over a single survey line. The NTF also defined a measurement and/or modelling approach with which to determine a precautionary interpretation of the physical range over which this received level may occur for whales. The MMPs for the 2015 and 2018 Piltun-Astokh 4D seismic surveys were aligned with the recommendations of this scientific paper.

Behavioural Modifications within the Feeding Areas

Based on scientific information available about behavioural reactions of cetaceans to anthropogenic sound, 120 dB re 1 μ Pa SPL rms has been adopted in this MMPP as the level at which substantial behavioural disruption from continuous noise can occur. This strategy includes criteria referring to (1) estimated amount of potential feeding area avoided and (2) duration of sounds above the threshold level in the feeding area. Both the scientific information and the noise impact assessment approach are described in more detail in Chapter 4 of the Comparative Environmental Analysis (CEA, SEIC, 2004b). For pulsed noise Malme et al. (1983, 1984) documented avoidance reactions of migrating gray whales beginning at 160 dB re 1 μ Pa SPL rms, with 10%, 50%, and 90% probabilities of avoidance estimated at levels of 164, 170, and 180 dB re 1 μ Pa respectively. In this MMPP a threshold of 163 dB re 1 μ Pa SPL rms³ (156 dB per-pulse SEL) has been adopted for behavioural disruption from pulsed noise.

The area around the platforms was monitored for anthropogenic noise, especially sound entering the near-shore feeding zone with the capacity to harm whales and other marine mammals. Acoustic monitoring of the area around the platforms and supply vessels showed that the safe level is largely maintained but that peaks or periods of noise exceeding the adopted level are recorded occasionally though not related to routine operations. Noise level from routine marine operations entering the near-shore gray whale feeding area do not exceed safe levels. The replacement modern supply vessels entering service from autumn 2017 produce even less noise than their predecessors.

Assumed Noise Response Levels are summarised in Table 4.1. Levels risking physical injury or disturbance are compiled from the most recent scientific literature. Note: the development of action thresholds to mitigate impacts from specific activities should take into account those levels but be tailored for the actual sound source. Thresholds likely to cause hearing impairment are under review currently by the NTF of the WGWAP and will be updated accordingly.

³ The behavioural disruption threshold has now changed from 163 dB SPL rms to 156 dB per-pulse SEL. The latter is intended as an equivalent of the former expressed as a more stable metric (both to model and to measure).

Table 4.1. Estimated noise response levels

DESCRIPTION	LEVEL
Hearing impairment due to physical damage	190 dB SPL rms for pinnipeds
	180 dB SPL rms for cetaceans other than gray whales 195 dB SEL (M-weighted for low frequency cetaceans) for gray whales
Behavioural disruption	120 dB SPL rms for continuous noise
	163 dB SPL rms (156 dB per pulse SEL) for pulsed noise
Note: These levels are guidelines that can change in specific situations, based on regulations, international precedents or for other reasons.	

4.1.3 Oil spill

There are few reports or studies relating specifically to the interaction of gray whales and oil slicks, so it is unclear whether the whales can detect and avoid surface oil (Moore and Clarke, 2002). The published information on other cetaceans also leads to no firm conclusions. While some reports conclude that cetaceans do not avoid oil slicks, others suggest otherwise.

The oil produced by the Company is referred to as the Sakhalin Vityaz Export Blend (Sakhalin Vityaz), it is defined as a light, low-sulphur crude oil. The International Oil Pollution Compensation (IOPC) Fund classifies Sakhalin Vityaz as being non-persistent. Independent testing has shown that in regard to Sakhalin Vityaz, after any amount of weathering, all BTEX (*benzene, toluene, ethylbenzene and xylene*) compounds evaporated from the oil. Evaporative loss of BTEX compounds from weathered oils is therefore 100%. Within the context of an oil spill, the Company expects less relative impact from this type of crude when compared with the crude oils mentioned in the results of the studies below.

Studies on the effects of direct contact of petroleum products with cetacean skin have demonstrated that the marine mammals do not react to the type of prolonged exposure that would cause severe reaction in other mammalian species (Hansborough et al., 1985). Where histological changes were evident, they healed within a week of the exposure. Experiments appear to show that the cetacean epidermis is a near-complete barrier to hydrocarbons (Geraci and St. Aubin, 1990; Bratton et al., 1993).

Study of marine mammals after the Deepwater Horizon (DWH) oil spill found that bottlenose dolphins live-captured in a region with heavy and prolonged oiling had evidence of hypoadrenocorticism and were suffering from moderate to severe lung disease. They also had impaired reproduction and reduced survival, in contrast to bottlenose dolphins subject to health assessment studies in a location which did not experience oiling during the DWH accident (Lane et al., 2015; Schwacke et al., 2013).

The potential for baleen whales to have their baleen plates fouled by oil has also been a focus of concern. Because baleen whales rely on filtering their food from the water through their baleen plates, any fouling that diminishes feeding efficiency or increases the likelihood of ingesting oil, could have implications for individual survival. More detailed studies (Geraci and St. Aubin, 1982, 1985) demonstrated that oiling increased resistance to flow across the baleen, but also showed that over 70 percent of the oil was lost from the baleen within 30 minutes and that over 95 percent of the oil cleared after 24 hours. These data suggest that a baleen whale experiencing oiling of its baleen might have its feeding efficiency reduced for, at most, a few days. Baleen whales, such as the gray whales off Sakhalin which tend towards bottom feeding, are at less risk of ingesting oil when it is still on the surface.

However, while it is understood that it is a highly volatile oil, there is no information specific to Sakhalin Vityaz oil regarding direct physical or toxicological impacts on marine mammals or prey species e.g. no



LD50 information is available for Sakhalin Vityaz oil. Based on the above, the following assumptions can be made regarding the typical impact of oil on marine mammals. More background information and references are included in the project EIA's (SEIC, 2003a, 2003b) and the CEA (SEIC, 2004b):

- Cetaceans do not appear to consistently avoid oil slicks;
- At least some species are able to detect some oils (indicated by avoidance behaviour);
- Cetacean skin is largely impermeable to hydrocarbons, although surface layers may be damaged by crude oils and gasoline;
- Whales breathing in oil vapours can have their respiratory systems harmed;
- Baleen is temporarily affected by oiling;
- There is a risk of direct impact on the food organisms/benthos. This, in turn, can lead to a risk to gray whales from ingesting oil, particularly during benthic/bottom feeding in the aftermath of an oil spill.

Reduction of impacts of an oil spill on gray whales and other marine mammals is managed through the development of OSR plans (SEIC, 2017). The Company will not practice surf washing in the nearshore feeding area nor use dispersant in either the nearshore or offshore feeding areas.

4.1.4 Disruption of the Seafloor

Dredging activities required for the installation of the subsea pipelines, cables, and gravity-based structures, disrupt seafloor habitat and cause removal and burial of benthic fauna. Of the marine mammals present in the area, only endangered gray whales are particularly vulnerable to seafloor disturbance since they feed on benthic organisms. All of the dredging and pipelay activities in the Piltun area took place to south and about 8 to 9 km east of the more sensitive Piltun gray whales' feeding area. Other whale species are not known to form stable local aggregations in the Sakhalin area and are generally observed in these waters in small groups or as individuals. Plume cloud monitoring conducted during Piltun pipeline installation in 2006 showed that general sediment transport was to the south, based on net current direction. These results were similar to the Lunskoye study in 2005. Furthermore, sediment plumes did not extend further than 300-500 m on either side of the pipeline and turbidity was within background concentrations (SAIPEM, 2005, 2006). Disturbance of benthic communities due to sedimentation of dredging activities was therefore determined to be local and within limits of natural variation.

4.1.5 Cumulative Impacts

Cumulative impacts result from the combination of incremental impacts of individual activities when added to other past, present and foreseeable future activities. Individually minor, but collectively significant, activities that take place over time can lead to cumulative impacts that are insidious and significant for the affected species or population. Mention of cumulative impacts is appropriate because they, rather than isolated impacts associated with specific oil and gas activities, are ultimately more likely to affect gray whales and their environment.

In the offshore environment along the NE Sakhalin coast, gray whales could be affected during the summer and autumn feeding season by current and planned petroleum developments in the region and by activities that are deemed to be in the national, regional and local interests of the Russian Federation in maintaining various other commercial and domestic pursuits (e.g., fishing, shipping, industrial or infrastructure development). It is extremely difficult to distinguish the effects of offshore industrial activities conducted by Sakhalin Energy from those of other human activities occurring over the entire year-round range of the gray whales off Sakhalin. Nevertheless, in consideration that Sakhalin gray whales are deemed Endangered, Sakhalin Energy commits to do everything within its control to minimize any impact that the Company's construction and operation activities might have. Sakhalin Energy is sharing research and monitoring initiatives and mitigation measures with other operators in the area to obtain a consistent approach to gray whale protection in the short and long terms. Although no specific impacts of Sakhalin Energy's activities



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have been conclusively demonstrated by analyses of data on gray whale behaviour and distribution collected by the Joint Program, the whales are clearly at risk from the cumulative industrial activity on the Sakhalin shelf and knowledge should be shared. There are fishing activities close to the coast where the Company operates and where the gray whales feed. These fishing activities represent an entanglement risk to both adult gray whales and calves. As a responsible operator, the Company is working with the fishing industry and the Russian Authorities to remove derelict gear and contribute in other ways to mitigation efforts, reducing the entanglement risk to gray whales and other marine mammals.



5 MARINE MAMMAL PROTECTION

The mitigation measures outlined in this section apply to all offshore activities of Sakhalin Energy, in all zones and where relevant.

5.1 MITIGATION APPROACH

Sakhalin Energy is committed to minimising the impact of its offshore activities on the marine environment (particularly on gray whales) and to continually improving its environmental performance. This commitment is reflected in the Company's HSESAP.

The mitigation framework is based upon compliance with Russian law and the incorporation of good international practice in terms of marine mammal protection. The regulatory instruments, guidelines and industry standards that guide this Marine Mammal Protection Plan are:

- Terms and conditions of the agreement on development of the Piltun-Astokhskoye and Lunskoye oil and gas fields on the basis of the Production Sharing Agreement (PSA) between the Government of the Russian Federation, the Sakhalin Oblast Administration and Sakhalin Energy;
- Requirements of the environmental legislation of the Russian Federation and the Sakhalin Oblast;
- Relevant international laws and conventions;
- International performance standards by the World Bank/International Finance Corporation (IFC PS 2012) applied as a benchmark;
- Shareholder standards;
- WGWAP recommendations.

The best opportunity for avoidance and/or minimisation of impacts on marine mammals is during the project planning, design and site selection stage. During this stage, issues relating to facility construction and operations need to be considered so that potential problems and negative environmental impacts can be identified and addressed. Impact assessment criteria, methods and impact assessment documents have been developed and authored by leading experts. The results of this impact assessment process are reported in:

- Detailed EIAs for each of the project assets prepared for the Russian approval (TEOC) process. TEOC Environmental Protection Book, Volume 7 (2002);
- Summary EIA for the Russian approval (TEOC) process (2002);
- Comprehensive international-style EIA (SEIC, 2003a) and related addenda (SEIC, 2005a);
- EIA on the 2003 seismic survey in the Lunskoye area (SEIC, 2003c);
- Specialised WGW Technical EIA (SEIC, 2003b);
- Comparative Environmental Analysis of the Piltun Astokh Pipeline route options (SEIC, 2004b);
- EIA 3-D seismic programme in the Piltun-Astokh area (LGL Limited, 2010);
- EIA Sakhalin-2 Project South Piltun Site Survey (SEIC, 2012);
- International ESHIA for 4D Seismic Survey (SEIC, 2015c);
- ESHIA for OPF Compression Project (SEIC, 2016).

The implementation of appropriate mitigation, monitoring and management measures, as defined within this protection plan, will be carried out by the different Sakhalin Energy departments and overseen by the C-HSE department.



5.1.1 Protection Zones

Environmental impact assessments and the findings of extensive gray whales monitoring programmes have informed and continue to inform, mitigation plans. Areas where whales are likely to be encountered have been identified from the available data. Protection zones have been defined in relation to gray whales feeding grounds and migration / transit corridors (LGL, 2006). These Protection zones are characterized by high densities / frequencies of whales (Figure 5.1. and Figure 5.2.). Following guidance and recommendations from WGWAP, Sakhalin Energy applies mitigation measures to avoid collisions with marine mammals and to avoid interfering with their movements (through the management of vessels' routes, control of speed limits, employing MMOs). Deviation from these routes inside of protection zones is allowed only for safety/emergency purposes or by special permission.

5.1.2 Seasonal effects

Gray whales

The seasonal nature of the gray whale's migration into and out of Sakhalin waters is likely linked to the ice conditions prevalent in the Sea of Okhotsk. Although the spring arrival of a satellite-tagged whale has shown that heavy ice does not seem to impede island-ward movement in spring (Mate *et al.* 2010), the annual variability of the sea ice freezing and break up makes it difficult to accurately predict the exact timing of the annual appearance and departure of gray whales in the Sakhalin Energy offshore development areas. The general pattern, with annual fluctuations due to environmental conditions, is as follows: small numbers of whales begin to arrive in the area in May, increasing in numbers during the summer, with highest numbers of whales observed in August and September. Their numbers begin to decline in late September, then more rapidly so in October and November, as the whales initiate their winter migration.

Four distribution seasons can be distinguished, based on whale density analysis calculated in 1 km² grid cells in the Piltun area over the entire season using all available distribution data (2002 to 2005 aerial surveys, 2002-2016 vessel-based surveys, 2001 to 2010 shore-based behaviour scan surveys and the 2004-2016 shore-based vehicle scan surveys). The seasons are defined as follows⁴:

Off Season (1 December to 30 April) – gray whales are not present due to sea ice conditions. No monitoring is carried out.

Early Season (1 May to 31 July) – as ice breaks up, gray whales' presence is low, although numbers gradually increase over this period. Specific protection measures related to the physical presence of the whales need to be implemented. Because of the limited number of whales present in the feeding areas, offshore activities should be scheduled as much as possible in this season.

Peak Season (1 August to 30 September) – gray whales are present and numbers increase to annual maxima within this period. Specific protection measures related to the physical presence of the whales need to be implemented. Monitoring of whales is carried out.

Late Season (1 October to 30 November) – gray whales are still present but the numbers are gradually decreasing over this period. Specific protection measures related to the physical presence of the whales need to be implemented. Monitoring is completed or nearing completion. Because of the limited number of whales present in the feeding areas, offshore activities should be scheduled as much as possible in this season.

Other marine mammals

The time periods described for the gray whale are also important for other marine mammals. The presence or absence of most marine mammal species has a seasonal nature. Most species of cetaceans encountered in the waters off NE Sakhalin don't form large aggregations like, for example, the gray whales

⁴ The current definition of the peak season is preliminary and will be the subject of ongoing review based on historical data by Sakhalin Energy with input from the WGWAP to confirm the definition of peak season for future use within the MMPP and any future MMPs.



and are more likely to be encountered singly or in small groups.

Whale species (baleen and toothed whales) enter the Sea of Okhotsk to feed between spring and autumn when waters become ice free. With the onset of winter, they leave for the Pacific Ocean or the Sea of Japan. Bowhead whales (*Balaena mysticetus*) and beluga whales (*Delphinapterus leucas*) are the only cetaceans known to be regular year-round inhabitants of the Sea of Okhotsk.

List of species encountered in Sakhalin waters in summer and autumn period (more detailed list in Appendix 2):

Cetaceans

North Pacific right whale (*Eubalaena japonica*) in the summer-autumn period occurs in the east of Sakhalin. Two whales were registered travelling together in 2005 in the Lunskeye area.

Fin whale (*Balaenoptera physalus*) in the summer-autumn period inhabits the waters east of Sakhalin. Fin whales are mainly pelagic but are occasionally encountered in coastal waters.

Common minke whale (*Balaenoptera acutorostrata*) distributed along the entire east coast, is often found near the shore next to Gulf of Terpeniya and north-east of Sakhalin from June to October.

Killer whale (*Orcinus orca*) encountered along the eastern coast of Sakhalin Island from June to October. Regularly observed in the waters of the Gulf of Terpeniya and in waters from Lunskeye to Piltun-Astokh area; numbers observed and timing of observation are linked to the presence of prey. However, on a few separate occasions in recent years, killer whales were observed mounting an attack on a juvenile gray whale in shallow water close to shore.

Harbour porpoise (*Phocoena phocoena*) and Dall's porpoise (*Phocoenoides dalli*). Single individuals and small groups are common in Aniva Bay and along the entire eastern coast from June to September.

Baird's beaked whale (*Berardius bairdii*) is less likely to occur in the coastal zone as it tends to prefer deep waters.

Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) and common dolphin (*Delphinus delphis*) are encountered in the adjacent waters of the southern part of Sakhalin, mostly near Aniva Bay, during the summer period.

Seals/Otariids (Eared seals)

Northern fur seal (*Callorhinus ursinus*) and Steller sea lion (*Eumetopias jubatus*) arrive to Sakhalin waters around early May and reach highest abundance by late June-July. They winter in the Sea of Japan.

Other seal species occurring around Sakhalin Island are present the whole year round, for example: spotted seals (*Phoca largha*) occur often in groups of hundreds of individuals.

5.2 AVOIDANCE AND MITIGATION OF SHIP STRIKE RISKS

As mentioned earlier, the risk of ship strikes to whales can be avoided/mitigated by:

- Controlling vessel routes, vessel corridors;
- Establishing speed limits;
- Using Marine Mammal Observers;
- Training/raising awareness of crews on vessels;
- Avoiding regular movement of crew change and pipeline inspection vessels at night time where reasonably practicable.

Although the likelihood of a ship striking a whale is considered low near the platforms and along the designated shipping routes, mitigation measures are employed to reduce the chances of such strikes. The following standard mitigation measures will be used to reduce the likelihood of ship strikes in all phases of



Sakhalin Energy operations during the early, peak and late seasons of gray whale presence near Sakhalin⁵.

5.2.1 Vessel corridors

Corridors have been established⁶ for Sakhalin Energy vessel traffic along the east coast of Sakhalin Island. Information of survey marine mammals was used for design of vessels traffic routes. All Company vessels are required to keep within the designated 4 km-wide corridors, unless deviation is essential for safety or else specifically required and authorised. These corridors are⁷:

- Navigational corridors for all vessels transiting from Kholmsk or Korsakov ports to Lunskeye and/or Piltun-Astokh (Figure 5.1. and Figure 5.2.) areas;
- Crew boat corridors⁸ for crew change vessels travelling between Kaigan port and LUN-A, Moliqpak (PA-A) and PA-B platforms (Figure 5.2.);
- Pipeline Inspection Corridor for all survey vessels involved in offshore pipeline inspection and offshore environmental monitoring. Examples are Dynamic Positioning vessels equipped with sonar and Remotely Operated Vehicle (ROV) – these vessels will follow the established navigational corridors while on transit and will follow the Pipeline Inspection Corridor during the survey. Other examples include research vessels for monitoring of marine sediments, benthos and seawater;
- In addition to the above-mentioned corridors, a platform safety zone with a radius of 5 km has been identified around all three platforms. Supply vessels and emergency response vessels typically drift or are anchored in this area. Vessels without an affiliation with Sakhalin Energy should avoid entering this zone, which is guarded by standby vessels.

To prevent vessel strikes of whales or disturbance of feeding whales, all Sakhalin Energy vessel traffic shall comply with these route definitions in Early, Peak and Late seasons. Deviation from these routes is allowed only for justifiable safety / emergency reasons, or if specifically authorized. Deviations from the corridors will be recorded as non-compliances and investigated in line with Sakhalin Energy procedures.

⁵ See paragraph 3 for definitions.

⁶ While defining the corridors and speed limits, several aspects were taken into consideration, such as:

Avoidance of gray whale feeding areas and limiting the risk of potential encounters of whales during spring and autumn migration. The routes are designed such that they avoid the areas with highest densities of feeding gray whales.

Establishment of the most direct routes for vessel traffic to keep the travel distance and time at sea as limited as possible. Reasons for this are:

- Concern on safety issues.
- The commitment from the Company to minimise CO₂ emissions. The longer the distance travelled the more fuel is used.

⁷ These corridors and associated speed limits also form an integral part of the Marine Operating Procedures and Guidelines (1000-S-90-90-P-0017-00), a document that is provided to all marine contractors and issued to all vessels coming into the Project.

⁸ The crew transfer corridor from Kaigan to Moliqpak (PA-A), PA-B and LUN-A has a higher potential for encountering whales than the navigational corridors as the route lies relatively close to shore and also runs between the Piltun and Offshore feeding areas. Sakhalin Energy selected this route as having the least risk, by avoiding direct transit through the feeding grounds, recognising that transiting whales are exposed to risk and notes that no strikes have been reported to date. Sakhalin Energy is using extra mitigation measures to control this risk during crew boat transfers.

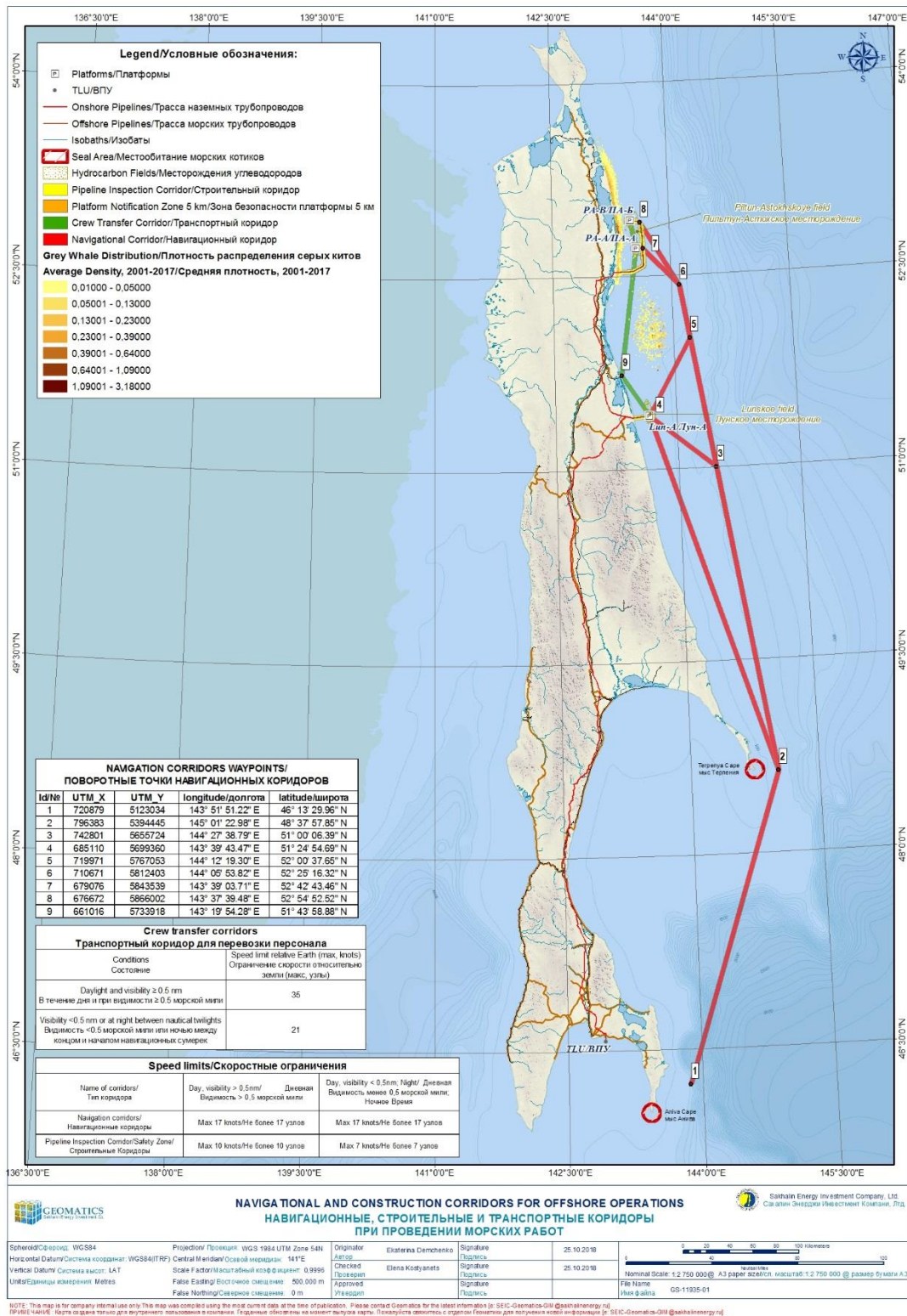


Figure 5.1. Vessel corridors for all vessel traffic involved in offshore activities related to the Sakhalin II project.

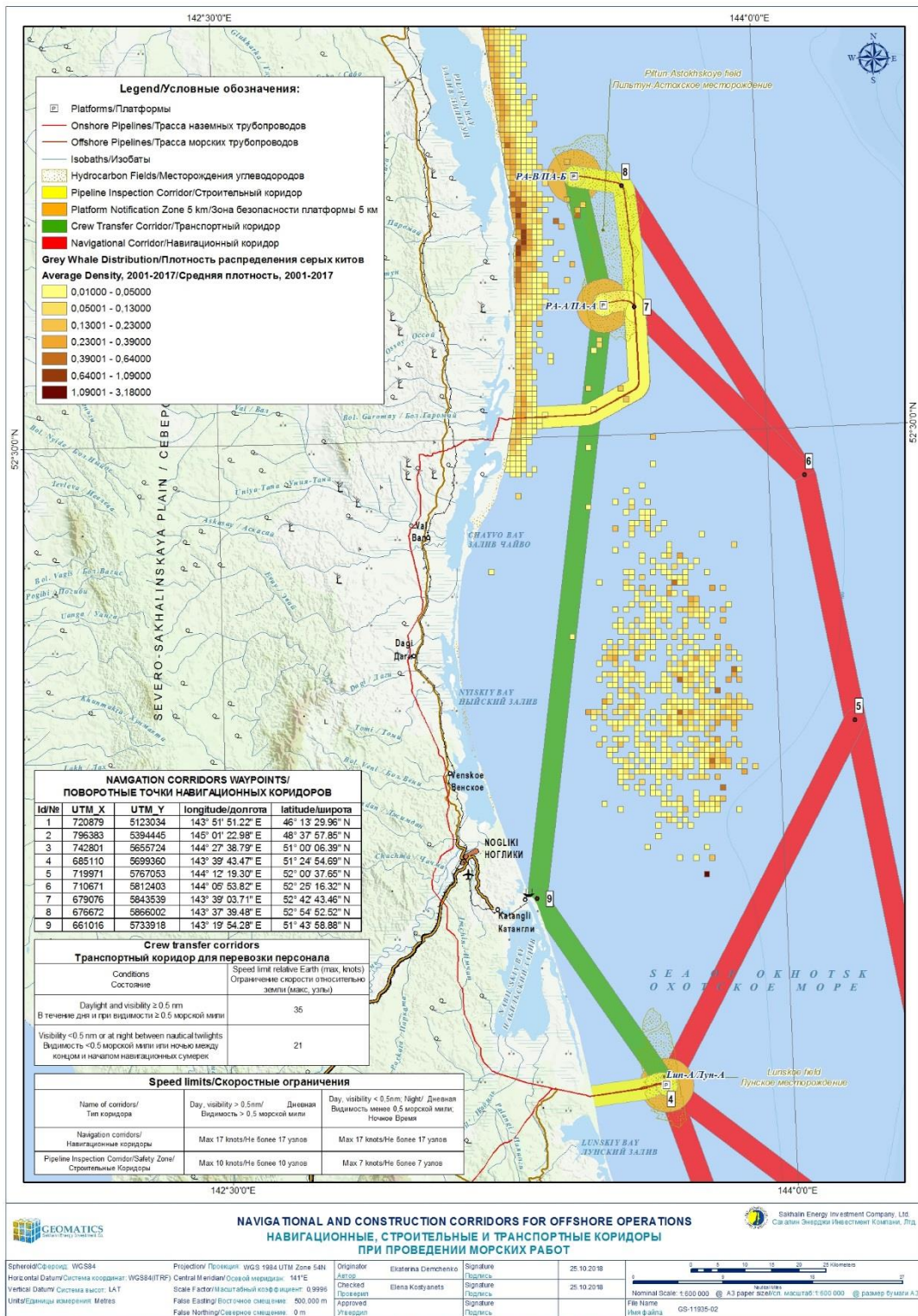


Figure 5.2. Detail of the navigational, Piltun-approach, and crew transfer corridors in the Piltun-Astokh area for vessel traffic related to the Sakhalin II project. Distribution of gray whales 2001-2017.



5.2.2 Speed limits and vessel control

Vessel speed limitation is an additional measure of control and mitigation adopted by Sakhalin Energy. The company uses various vessels with different technical characteristics to support its offshore activities. The established speed limits are mandatory for all vessels involved in the offshore activities of Sakhalin Energy, unless emergency or safety situations require otherwise. Vessel speed limits aimed at marine mammal protection are established in Table 5.1.

Table 5.1. Vessel speed limits

Speed limits (maximum in knots)	Crew transfer corridor ⁹	Within navigational corridors ¹⁰	Westward from corridors ¹¹ , within safety zones and in pipeline inspection corridor
Daylight conditions & visibility ≥ 0.5 n.m. (approx. 1 km.)	no limit applied*	17 knots	10 knots
Visibility < 0.5 n.m. (approx. 1 km.) or at night	21 knots	17 knots	7 knots

* In the crew transfer corridor Sakhalin Energy has determined that during good visibility the crew vessels can operate at a speed based on the technical performance criterion (35 knots) without significant increase in risk of marine mammal collisions. This speed balances collision risk with operational, passenger safety and passenger welfare considerations. The vessels have operated at this speed for 2 years with no marine mammal collisions.

- Sudden changes in speed and course should be avoided.
- Vessels are forbidden to pursue, intercept or encircle whales and shall not cause groups of whales to separate.
- Vessels will not cross directly in front of, or in the immediate vicinity of moving or stationary whales. When moving parallel to whales, vessels will maintain a constant speed and course.
- Non-transiting vessels moving with a speed of less than 5 knots shall maintain course and speed unless there is an imminent risk of collision.
- Transiting vessels will attempt to maintain a minimum of 1,000 m separation from observed endangered whale species (gray whale, bowhead whale, North Pacific right whale and fin whale) and a 500 m separation for other non-endangered marine mammals. No minimum separation distance is imposed for pinnipeds, but vessels are directed to proceed with appropriate caution if pinnipeds are observed close to the vessel.
- If a whale surfaces in the vicinity of, or is heading towards the vessel, appropriate precautionary measures shall be taken to avoid striking the whale, until it has been determined that the potential danger to the whale has passed. This might include slow change of course, reduction of speed or full stop of the vessel, if these can be done safely.

All speed exceedances will be considered as non-compliance with Sakhalin Energy's operating standards

⁹ See Appendix 1 for more details concerning the local situation with regard to crew transfer vessels and consequences for speed requirements.

¹⁰ The speed limit within the navigational corridors is the same under all visibility conditions under the assumption that the probability of encountering gray whales in these offshore routes is very low.

¹¹ Speed limits westward from the corridors (towards areas where encounters with gray whales are more likely).



and rules. Therefore, they will be documented by the MMO and investigated by Managers as such.

5.2.3 Marine Mammal Observers

- Trained marine mammal observers (MMOs) shall be present on all key vessels¹² involved in offshore activities along the East coast of Sakhalin Island.
- MMOs shall maintain continuous watch for gray whales and other marine mammals. All crew members shall be alert for marine mammals, regardless of whether or not the MMO is on watch.
- MMOs shall advise the vessel about practical measures that may be taken to avoid striking an observed marine mammal.
- MMOs shall observe the area in the vicinity of the vessel for 30 minutes prior to a commencement of noisy operations¹³.
- MMOs shall consult with the vessel's captain on issues regarding adherence to defined corridors, compliance with speed limitations and traversing known feeding areas of gray whales (unless essential for safety, specifically required or authorized).
- MMOs shall record all marine mammal sightings on specific data forms, as per the MMO Offshore Manual (SEIC, 2018). MMOs shall record the positions and numbers of marine mammals sighted, as well as particulars of their behaviour, which may be used to improve mitigation measures.
- MMOs shall also record all actions taken to mitigate the risk and respective time periods.

MMO provision on Sakhalin Energy vessels is provided in Table 5.2.

¹² Key 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.

¹³ Requirements for mitigation during seismic surveys may be specified separately.

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Table 5.2. MMO provision on Sakhalin Energy vessels¹⁴

Activity	Description	MMO provision
Crew transfer	Crew transfer from Nogliki to the offshore platforms in Piltun-Astokh and Lunskeye areas will take place by helicopter or by crew change vessels, as required. The crew vessel runs at mostly in daylight depending on the tide.	Captains and crew of the vessels have received awareness training and this training will be repeated in future. MMOs will be based in Nogliki camp and go onboard the crew vessels each time they sail.
Oil spill & emergency response vessels	A standby vessel is permanently positioned near the platforms to provide emergency response when required. Movement and offshore vessel operations may be carried out 24/7 if required to support emergency situations.	Captain and crew receive awareness training. They have been in the field during previous years and are well aware of the issues. They shall keep to the corridors and safety zones. As these vessels are usually permanently present near the platforms no MMOs are deployed on these vessels. If necessary, MMOs will be mobilized to the vessel from Nogliki crew change vessel team. Vessels can be used as a temporary base for photo-ID team and MMOs.
Supply vessels	The platforms are normally served by three supply vessels (additional vessels may occasionally be used in periods of peak activity such as a platform shutdown). Voyages from supply base (Kholmsk / Korsakov ports) to Piltun-Astokh and Lunskeye areas will be made along the navigational corridors. Movement and offshore vessel operations are carried out 24/7.	Captain and crew received awareness training. They have been in the field during previous years and are well aware of the issues. They shall keep to the navigational corridors (marked Red in Figure 5.1., 5.2.), which are deemed to be low risk for marine mammal collisions. No MMOs are deployed on these vessels. Vessels can be used for carrying out Joint Programme photo-ID component. MMOs together with photo-ID team members are employed onboard during operations on gray whale feeding areas.
Offshore monitoring vessels	A special research vessel can be involved in the implementation of Sakhalin Energy's gray whale monitoring program in the Piltun feeding area.	Two or more MMOs will be on vessels involved in gray whale monitoring program at all times. For additional survey vessels the need for MMOs will be determined on an individual basis depending on size, duration and type of activity.

¹⁴ In addition to vessels identified in this table, decisions to place MMOs on other vessels are made on a case-by-case basis taking into account:

- Area of activities and likelihood of gray whale encounters. Likelihood of encounters analysed in the Collision Risk Assessment Report.
- Activities of the vessels, e.g. mainly stationary or moving through the area.

MMO support for specific activities (e.g. seismic surveys) is addressed in comprehensive mitigation plans developed for those activities and are not specifically addressed here.



5.2.4 Training for the vessel crew

To reduce the impact of offshore operations on marine mammals, within the framework of Sakhalin-2 project on a regular basis for the crew involved in the company's offshore activities trainings shall be conducted that include:

- General briefing to provide information on gray whales and other species of marine mammals in the project area;
- Ship strike risk mitigation measures (control of vessel routes, control of vessel speeds, restriction to navigate through gray whales feeding areas, maintaining safe distances for marine mammals);
- Procedures to be followed after a vessel collision with a marine mammal.

5.2.5 Implementation

All mitigation measures outlined above shall be included in the document «Marine Operating Procedures and Guidelines» of Sakhalin Energy available from Marine Department.

Prior to mobilisation and depending on the schedule of the vessel, all relevant persons on the vessel shall receive from MMPP Coordinator a briefing with regard to Marine Mammal Protection Guidelines and mitigation measures that apply for its activity and area of operation.

MMOs are to report to MMPP Coordinator on a daily basis all marine mammals observed from the vessels.

The MMOs will report all cases of marine mammal near misses and ship strikes immediately to the relevant Sakhalin Energy HSE representative on board and in the office. This can be achieved face to face, by email, radio, satellite phone or mobile phone.

Certain vessel positions in relation to the corridors and protected areas (e.g. feeding areas) are continuously monitored and recorded via the online PurpleFinder tracking system, in addition to having an MMO onboard with a GPS. On other vessels, not using the PurpleFinder system, journey recording is achieved with transponders and with hand-held GPS operated by MMOs. All detected and reported deviations from the vessel corridors are recorded and analysed in the journey's MMO report. Any deviations are investigated, and action implemented by the Marine Department, if non-compliance is found. Sakhalin Energy C-HSE Department reports deviations to the WGWAP in MMO Close-Out Reports.

5.3 ANTHROPOGENIC NOISE

A specific noise mitigation approach has been developed for planning offshore activities having the potential to impact whales in or near their feeding grounds (SEIC, 2004b, WGWAP, 2008, Figure 5.3.). This approach involves predictions of the acoustic footprint using advanced acoustic models and an extensive source level measurement programme.

5.3.1 Mitigation

As mentioned earlier, due to the specific operational conditions and requirements of seismic surveys, comprehensive MMPs for such activities are developed on a project-by-project basis and are additional or complementary to the requirements set out herein.

The process for planning offshore activities that may generate elevated underwater noise is described in Figure 5.3., Step 1.

If feasible (schedule-, weather- and safety-related), offshore activities that may impact whales in or close to their feeding areas shall be scheduled to occur outside of the peak season (1 August to 30 September). In order of preference, this is:

- Off-season - from December 1 to April 30;
- Early season - from May 1 to July 31;



- Late season - from October 1 to November 30.

Possible mitigation measures are outlined in the document Noise Mitigation Strategy relevant to Sakhalin II Construction and Operations (SEIC, 2004c).

Contractors shall be requested to use equipment and procedures that minimise noise¹⁵. Possible engineering options to be assessed include use of special enclosures, mufflers, sound-isolation mounts, tuned propellers and drive shafts, and shrouds on propellers, along with minimal use of thrusters. Use of bubble curtains or other add-on noise shielding strategies have also been identified as potential mitigation tools (e.g. see SEIC 2004c) and are considered on a case per case basis from an effectiveness and feasibility standpoint when new operations are planned.

Verification of the predicted acoustic footprint should be undertaken wherever applicable and beneficial in consideration of the associated potential impact on the whales, as reflected by whale distribution and behaviour surveys. A specific procedure is established to define actual impacts and decide on actions to be taken (see Figure 5.3., Step 2).

5.3.2 Aircraft Noise

All types of aircraft will maintain an altitude that is as high as circumstances allow so as to minimize sound levels transferred into the water. Typically, helicopters used for crew changes fly at altitudes of 300-450 m, depending on visibility, cloud cover and other weather conditions. The optimal flying altitude for minimizing noise must be determined with foremost consideration of the safety of crew and passengers.

Aircraft (including drones below 10 m¹⁶) are prohibited from flying over or circling wildlife, including whales, for the purposes of casual viewing.

5.3.3 Monitoring

A general framework for acoustic monitoring was developed in conjunction with the WGWAP/NTF and was in place to monitor sound levels received in the Piltun feeding area from industrial sources during construction and operational phases until 2017¹⁷.

Acoustic monitoring of the area around the platforms and supply vessels showed that sound levels that would exceed the adopted disturbance criteria at the PML were rarely generated. Short peaks or periods of noise exceeding the adopted disturbance criteria were recorded occasionally, though it proved impossible to assign a definitive cause to these noise spikes, they did not appear to be related to Sakhalin Energy operations. According to the report "Assessment of Whale Distribution Linkages to Benthic Prey and Acoustic Sound Levels for the Okhotsk-Korean Gray Whale Population Monitoring Program off the North-East Coast of Sakhalin Island" prepared by M.V. Lomonosov, Moscow State University (SEIC, 2013; published as scientific paper – Kriksunov et al., 2016) no correlation was found between the intensity of the companies' activities, including noisy operations, and gray whales' abundance and distribution.

Monitoring programmes for activities with unique operational conditions and reporting requirements, such as seismic surveys, are addressed in relevant documents (including ESHIA and MMP) specific to those

¹⁵ To give an example of effective assessment and implementation of noise reduction practices, the Lunskeye acoustic monitoring program in 2004 yielded a catalogue of source level measurements of vessels involved in pipe laying activities, which were then used to identify suitable vessels and operational regimes to minimize sound emissions for work conducted subsequently in Piltun.

¹⁶ The current definition of minimum height of drone operation is preliminary and will be the subject of ongoing review based on research in the scientific literature and input from the WGWAP to confirm the definition for future use within the MMPP and any future MMPs.

¹⁷ Routine annual acoustic monitoring was dropped from the Joint Programme from 2018 onwards, with acoustic monitoring only planned during specific 'noisy' activities such as seismic surveys. However, the potential need to instate routine annual acoustic monitoring, in some form, is the subject of ongoing review and discussion between Sakhalin Energy and the WGWAP; the MMPP will be revised to reflect to outcome of these discussions.



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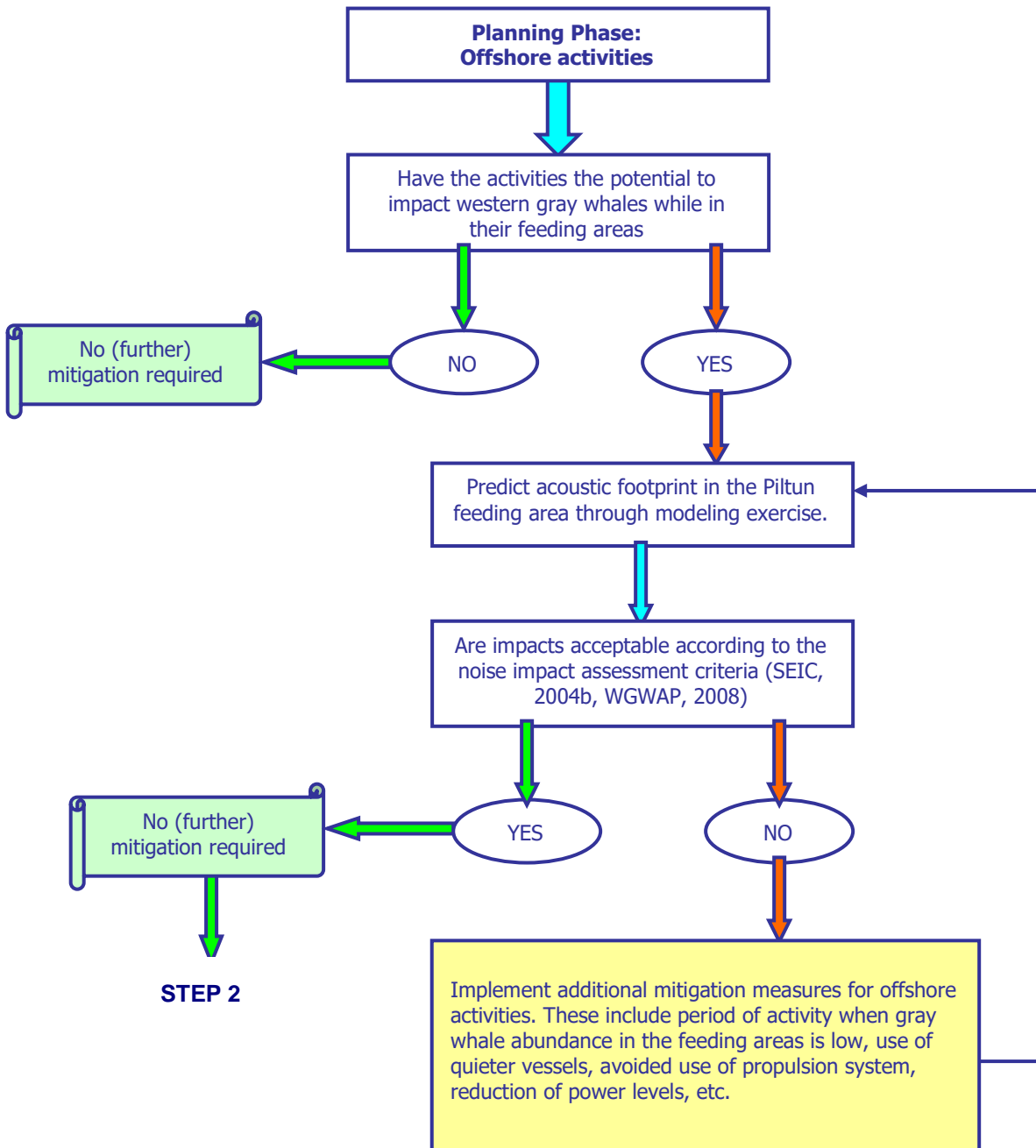
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activities. In accordance with Federal Service of Nature Usage Supervision (RPN, Rosprirodnadzor) Ministry of Natural Resources and Ecology (MNRE) recommendation (official letter № PH-10-03-32/23621 from 24.10.2017) acoustic monitoring should be included into the monitoring programme for such projects.

Summary of general mitigation measures is provided in Table 5.3.



STEP 1: Noise Mitigation Assessment Planning phase



STEP 2

(continued on next page)

STEP 2: Actual noise impact approach during offshore construction¹⁸

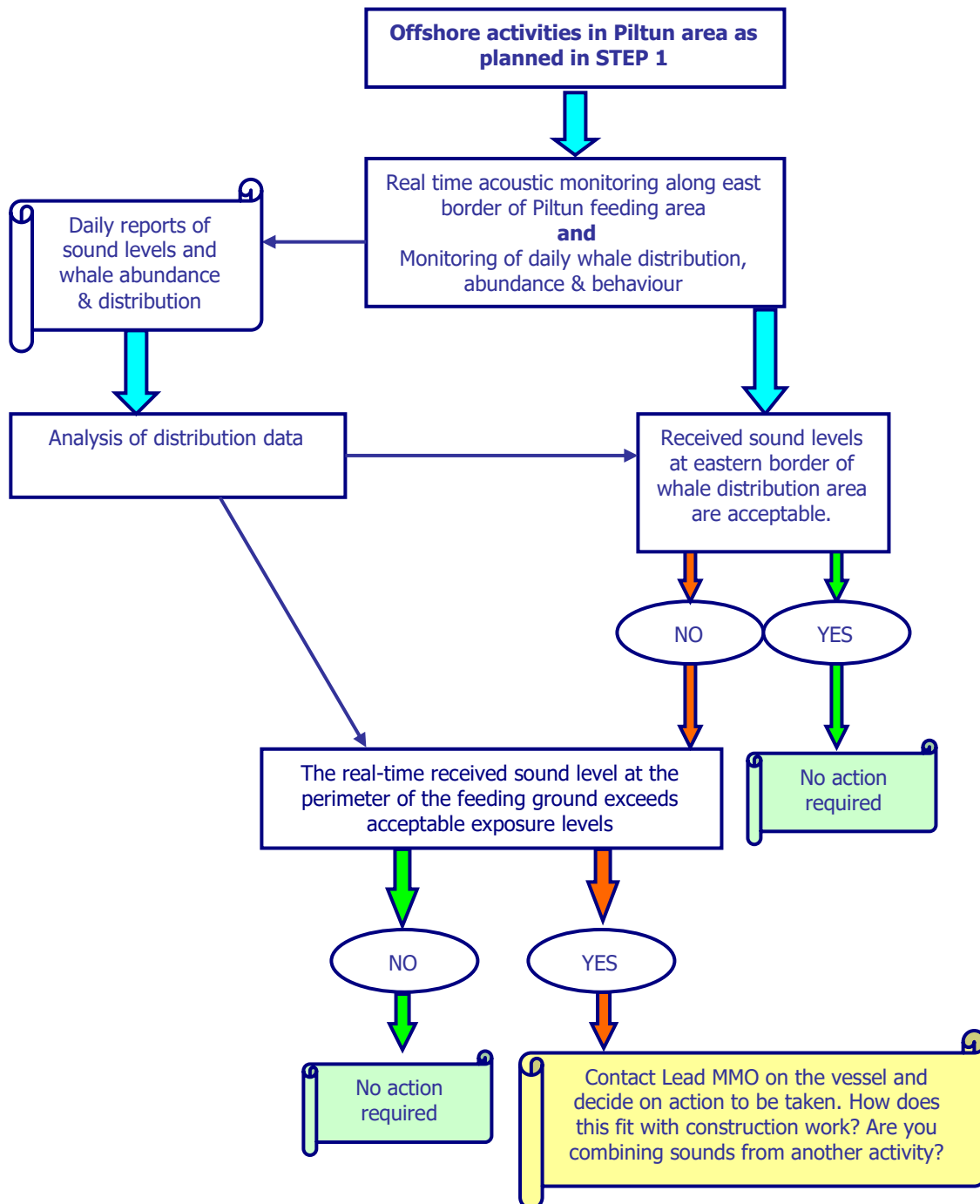


Figure 5.3. General Noise Mitigation Approach

¹⁸ Eastern Border means the line marking 95% probability distribution of gray whales in the Piltun feeding area on the eastern (sea) side.



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Table 5.3. Summary of general mitigation measures

Source of impact	Mitigation measures ¹⁹				Area ²⁰	Control/ Monitoring / Documentation
Strikes	Special vessel corridors have been established for all vessel traffic along the east coast of Sakhalin Island. All Sakhalin Energy vessels are required to keep within the designated corridors, unless deviation is essential for safety or specifically required and authorised (See Figures 5.1. and 5.2. for corridor details).				All	Position tracking via www.purplefinder
	Speed limits (maximum in knots)	Within Crew Transfer corridor	Within navigational corridors	Westward of all corridors + within inspection and Piltun approach corridors	All	MMO, Crew
	Visibility ≥ 0.5 n.m. (approx. 1 km.)	No speed limit mitigation measure applied. 35 knots upper speed limit for crew change vessels based on technical performance criterion	17 knots	10 knots		
	Visibility <0.5 n.m. (approx. 1 km.) and at night	21 knots	17 knots	7 knots		
	Sudden changes in speed and course should be avoided				All	MMO, Crew
	Non-transiting vessels moving with a speed of less than 5 knots will maintain course and speed unless there is an imminent risk of striking a whale. In case of such a risk, they should stop if it is safe to do so until it has been determined that the potential danger to the whale has passed				All	MMO, Crew
	Transiting vessels will attempt to maintain a minimum of 1,000 m separation from observed gray whales and other endangered whales (bowhead whale, North Pacific right whale and fin whale) and 500 m from all other marine mammals (excluding pinnipeds). If a whale surfaces in the vicinity of or is heading towards the vessel, all measures possible (slow down and change vessel's course) need to be taken to avoid a strike until it has been determined that the potential danger to the whale has passed.				All	MMO, Crew
	Vessels will not pursue, intercept, encircle, or cause groups of whales to separate.				All	MMO, Crew
	Vessels will not cross directly in front of or in the immediate vicinity of moving or stationary whales. When moving parallel to whales, vessels will maintain a constant speed and course				All	MMO, Crew
Strikes	MMO shall be present on key vessels (this includes crew change vessels that travel from Kaigan to PA-A, PA-B, and LUN-A) and shall maintain a continuous watch for gray whales and other marine mammals. All marine mammal sightings shall be recorded on specific data sheets.				Piltun, Lunskeye	Daily MMO reports

¹⁹ All mitigation measures apply in Early, Peak and Late season.

²⁰ All means all areas where Sakhalin Energy is constructing or operating: Piltun-Astokh, Lunskeye areas and Aniva Bay.



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	All crewmembers shall be alert for marine mammals, regardless of whether or not the MMO is on watch.	All	
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Table 5.3. (Continued) Summary of general mitigation measures related to noise disturbance

Source of impact	Mitigation measures	Area	Control/ Monitoring / Documentation
Noise disturbance (general)	If feasible (schedule, weather and safety related), offshore activities that have the potential to impact whales on their feeding grounds are to be scheduled outside the peak season (i.e. August-September)	Piltun	Project schedules
	Contractors are requested to use equipment and procedures that minimise noise. Possible options include use of special enclosures, mufflers, sound-isolation mounts, tuned propellers and drive shafts, and shrouds on propellers, along with minimal use of thrusters.	Piltun	Noise Mitigation Strategy (SEIC, 2004c)
	Acoustic footprint of offshore activities close to the whale feeding area will be predicted with acoustic models prior to offshore activities that have the potential to impact whales on their feeding grounds and tested against noise impact criteria.	Piltun	Real time acoustic & whale monitoring
	MMOs will observe the area in the vicinity of the operating vessel for 30 minutes prior to commencement of operations that have the potential to evoke PTS or TTS; start-up of the operations may be delayed if gray whales are observed within exclusion zone of the vessel.	Piltun	Real time acoustic & whale monitoring
	EIA's and specific monitoring and mitigation plans will be developed to mitigate the impact of seismic surveys.	All	Real time acoustic & whale monitoring
Noise Disturbance (aircraft including drones)	All types of aircraft will maintain a minimum altitude as high as circumstances allow for over the gray whale feeding area. The minimum altitude is 100 m (10 m for drones).	Piltun	Flight Operations Manual
	All aircraft will be prohibited from flying over or circling wildlife, including whales, for the purposes of casual viewing.	All	Flight Operations Manual
Noise Disturbance (Platform operations)	Mitigation strategies have been identified in case monitoring and modelling results predict higher sound levels from platform operations than those that are considered to be acceptable in relation to potential impacts to gray whales.	Piltun	Noise Mitigation Strategy (SEIC, 2004c)
	Acoustic footprint of offshore activities close to the whale feeding area, other than normal operational activities, will be predicted with acoustic measurements and modelling prior to these activities and tested against noise impact criteria.	Piltun	Noise modelling strategy (SEIC, 2004d) Acoustic monitoring



5.4 OIL SPILL

Specific requirements with respect to oil spill response close to the Piltun feeding area have been identified and are documented in the Oil Spill Prevention and Response Plan for Piltun-Astokh Offshore Operations (SEIC, 2017). Please refer to that document for a more detailed description.

In general, in the event of an oil spill near an area where whales may occur, the following actions shall be implemented:

- MMOs from the crew change vessels' team will be placed onboard of oil spill response vessels for monitoring marine mammals during a response;
- Vessel masters shall immediately report to the Offshore Installation Manager any whale sightings;
- Masters shall navigate their vessels at speeds stipulated while in the vicinity of whale feeding areas (visibility ≥ 0.5 n.m. (approx. 1 km.) - 10 knots, visibility < 0.5 n.m. (approx. 1 km.) – 7 knots), unless emergency or safety considerations require otherwise;
- Observers and trained MMOs assigned to aerial support shall monitor marine mammal sightings and inform the emergency coordination team;
- If sea conditions permit, booms will be deployed to prevent oil spreading to areas where whales have been sighted. Special consideration shall be given to exclusion booming to prevent oil spreading to gray whale feeding areas;
- Dispersants should not be used in the vicinity of gray whales or in the vicinity of gray whale feeding areas;
- Oil spill response and preparedness procedures shall be implemented, including procedures for clean-up of oil spill in ice where required to minimize risk to gray whales arriving in the area after the spring thaw.



6 MONITORING REQUIREMENTS

6.1 GRAY WHALES RESEARCH AND MONITORING

Detailed information can be found in the annual gray whale monitoring program, which is approved by RF authorities. Appendix 3 presents a brief overview of the distribution, abundance and feeding ecology of gray whales offshore Sakhalin Island.

These components form part of a long-term monitoring programme that allows Sakhalin Energy to build upon the knowledge collected to date and to evaluate potential changes in the status or distribution of the whales on a longer term. These studies have thus provided, and continue to provide, crucial data for informed decisions by Sakhalin Energy management to reduce potential risks to gray whales. Research and monitoring are necessary to verify the effectiveness of implemented controls in achieving objectives, and for informing future mitigation plans. As stated in the Introduction, gray whales off Sakhalin are protected under Russian law and Sakhalin Energy is obliged and committed to ensure that the Company's activities do not negatively impact these whales.

6.2 GRAY WHALE MONITORING IN EVENT OF AN OIL SPILL

In the following paragraphs, the additional gray whale monitoring requirements are outlined that will be executed in the event of an oil spill. As all oil spills are unique in terms of location and volume, as well as of prevailing climatic conditions, these plans are to be used as guidelines only. In case of a spill it will be decided if specific plans will need to be designed and implemented.

6.2.1 Organisation

Marine Mammal Oil Spill Response forms part of the overall Sakhalin Energy Crisis and Emergency Response Management System. The oil spill monitoring organisation diagram is outlined in Figure 6.1. This organisational chart does not include clean-up and emergency activities as this is considered part of the oil spill emergency procedures.

6.2.2 Roles and responsibilities

HSE representative on duty:

- In case of a spill the environmental coordinator on duty (or Emergency Coordinator) will contact the Head of Corporate Environmental Division and/or the Head of Environmental Monitoring and Biodiversity Subdivision.

Head of Corporate Environmental Division and/or the Head of Environmental Monitoring and Biodiversity Subdivision, Marine mammal specialist

Provides advice to the emergency coordination team (ECT):

- On distribution and abundance of gray whales and other marine mammals;
- Advises on locations where dispersants should not be used²¹;
- Initiates onshore distribution and behaviour monitoring surveys to determine presence of gray whales and oil-related changes in abundance, distribution and behaviour;
- Determines if vessel-based surveys can be executed without interfering with emergency and clean-up operations;
- Initiates aerial surveys to determine location and impact of oil spill on gray whales;

²¹ The use of dispersants is prohibited in or near the gray whale feeding areas.



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- Refines survey transects for vessel-based distribution surveys and aerial surveys;
- Coordinates the development of suitable transects for vessel-based and aerial surveys with Contractors;
- Interacts with Exxon Neftegas Limited (ENL) in those situations where joint program resources are required for oil spill related monitoring;
- Interacts with the field-based survey teams and coordinates the implementation of medium and long-term behaviour and distribution surveys, focussed on areas impacted by oil spills.

Scientific teams:

- Monitor changes in whale distribution and behaviour following an oil spill using standard marine mammal monitoring protocols. Protocols will be based on those applied in the Joint Programme at the current time but reviewed and amended as necessary depending on specific scenarios;
- Document presence and movement of oil slicks and positions of whales in relation to oil;
- If possible, benthic samples are to be procured in a non-affected area. This will allow for the comparison with samples from the impacted area and support attempts to determine the likely impact on the gray whales' feeding habits;
- Participate in aerial oil spill and whale monitoring.

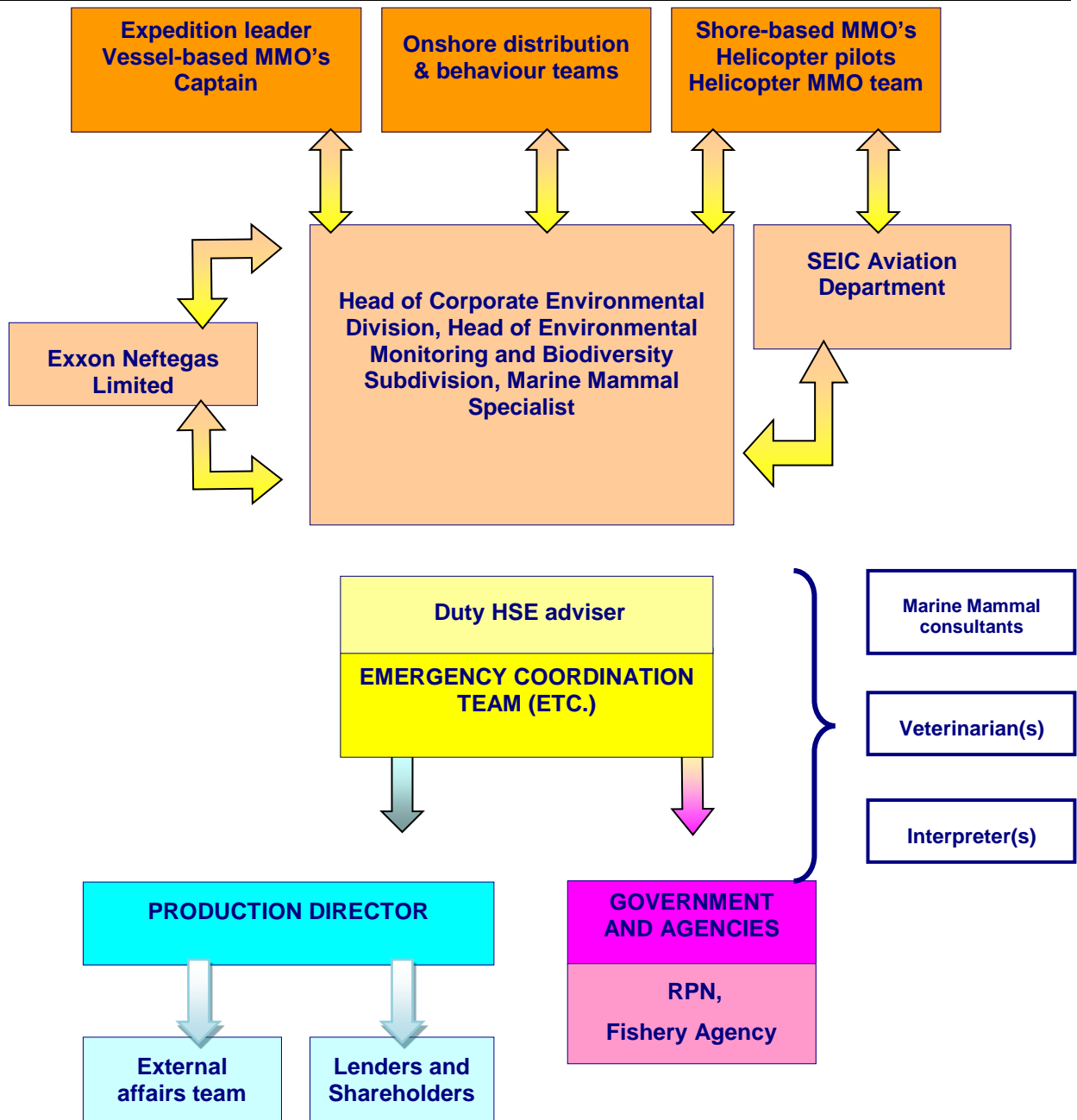


Figure 6.1. Sakhalin Energy Marine Mammal Oil Spill Monitoring Organisation ²²

²² Does not include OSR and clean-up operations.



6.2.3 Medium term monitoring

Medium-term monitoring, occurring in the days and weeks following a spill event, should include:

Surveys to document

Short-term patterns of post-spill distribution of whales should be compared with the following: (a) existing data on whale distribution under non-spill (pre-spill) conditions; (b) observed movement of spilled oil; (c) information on various types of acoustic disturbance associated with response effort; and (d) information on the location and extent of incorporation of spilled oil into the benthos in feeding areas.

Whale distribution

Gray whale distribution survey teams (Sakhalin State University, SSU) are typically stationed in the Piltun feeding area in the period from beginning of August to end of September. As this overlaps with a large part of the whale feeding season, these teams will be involved in post-spill monitoring of whale distribution. If a spill was to occur before mobilization or after demobilization, emergency mobilization of the teams will be initiated.

Based on location, size and impact of the oil spill on the Piltun feeding ground, it might be decided that specific focus should be given to the most affected areas.

Scanning protocols will be identical to those used during normal distribution surveys to enable comparison between pre- and post-spill whale distribution. More details on the distribution protocols can be found in relevant sections of the report: "2011 Program For Gray Whale Monitoring Offshore Northeast Sakhalin Island (Vladimirov et al., 2012)".

The need for vessel-based distribution surveys in the Piltun and Offshore feeding grounds will be assessed. If this is required, and dedicated vessel-based distribution surveys do not interfere with clean-up efforts, specific transects will be designed to optimise the survey effort.

Both shore-based and vessel-based scans will also look for dead, sick or injured whales.

Observed movement of spilled oil

Movements of spilled oil will be monitored in the field by the MMOs who have special OSR training. Information gathered by MMOs will pass to Emergency Coordination Team (ECT) through pilots and Asset Logistic Group (ALG) on a real-time basis. Also ECT can request more detailed information (records or data for preparation maps) from observers through Duty HSE adviser (Head of Environmental Offshore Monitoring Team or Environmental Engineer). In that case after each flight, observers make reports or prepare data and report it to Duty HSE adviser directly.

Information on the location and extent of incorporation of spilled oil into the benthos in feeding areas.

Benthic sampling was carried out as a component of the Joint Programme, from 2002 to 2016. The monitoring has resulted in a comprehensive dataset, as well as providing an understanding of the spatial and temporal variation of benthic ecological processes. Where possible, benthic samples will be taken immediately after an oil spill at permanent sampling stations and at control stations out with the impacted area to allow for detecting impacts with time. An analysis will be made to assess if current sampling stations adequately cover the impacted area. If required, benthic sampling will be conducted at additional sampling stations.

Focal follows to evaluate whale behaviour: observations should be recorded on the following:

(a) behaviour of whales in the presence of floating oil, including assessments of the ability and inclination of whales to avoid contact with oil; (b) general behavioural patterns of whales (for comparison with data collected during non-spill conditions); (c) changes in whale behaviour associated with spill response activities such as operations of oil recovery vessels and deployment of containment booms; (d) patterns of whale behaviour in the vicinity of areas with known contamination of benthic prey by spilled oil.

If the nearshore Piltun feeding area is contaminated with oil, standard protocols will be carried out. In addition to this, the location of oil and the position of whales in relation of the oil will be documented to determine the movements of the gray whales in relation to the oil slicks.



Surveys for dead whales:

Searches for dead whales should be carried out both on shore and on the water. Any dead whales located must be evaluated, at a minimum, as follows: (a) characterization of freshness of carcass; (b) description of pattern of oil coverage on the exterior surfaces of the carcass, in the eyes, in the mouth and in the baleen; (c) (see note below) sampling of skin for genetic analysis; (d) photography of the animal for matching it to identified individuals in the existing photo-ID catalogues and for illustrating the extent of contact with oil.

Note: In the case of a whale stranding, Sakhalin Energy will inform the relevant authorities as soon as possible and will not take any action with carcass until approval is given. In addition, Sakhalin Energy will provide technical and logistical assistance to the authorities in an inspection and necropsy²³.

6.2.4 Long term monitoring

As with medium-term studies, the primary aims for long-term work should be distribution, behaviour and carcass assessment. To contribute to understanding of long-term effects of oil spill events, existing protocols for whale monitoring should, in the event of a spill, be amended to incorporate the following: (a) Increased effort to study whale distribution and behaviour in areas known to have been subject to significant oiling; (b) Increased effort to study whale distribution and behaviour in areas known to have been subject to significant spill response activity (e.g. vessels, boom deployment and related activities); (c) Increased effort to study whale distribution and behaviour plus benthos response in areas where benthic communities are known to have been subject to significant oil exposure.

²³ Sakhalin Energy is currently investigating logistics and feasibility for having suitable veterinary/necropsy expertise on-call (Nov 2017)



7 GRAY WHALE EMERGENCY RESPONSE – INJURY & STRANDING

Marine Mammal Emergency Response forms part of the overall Sakhalin Energy Crisis and Emergency Response Management System. The response organisation diagram in Figure 7.1. is based on the existing Emergency Coordination Procedures (SEIC, 2005a) and Crisis Management Procedures (SEIC, 2005b). Readers are referred to those documents for further details (Figure 6.1.)

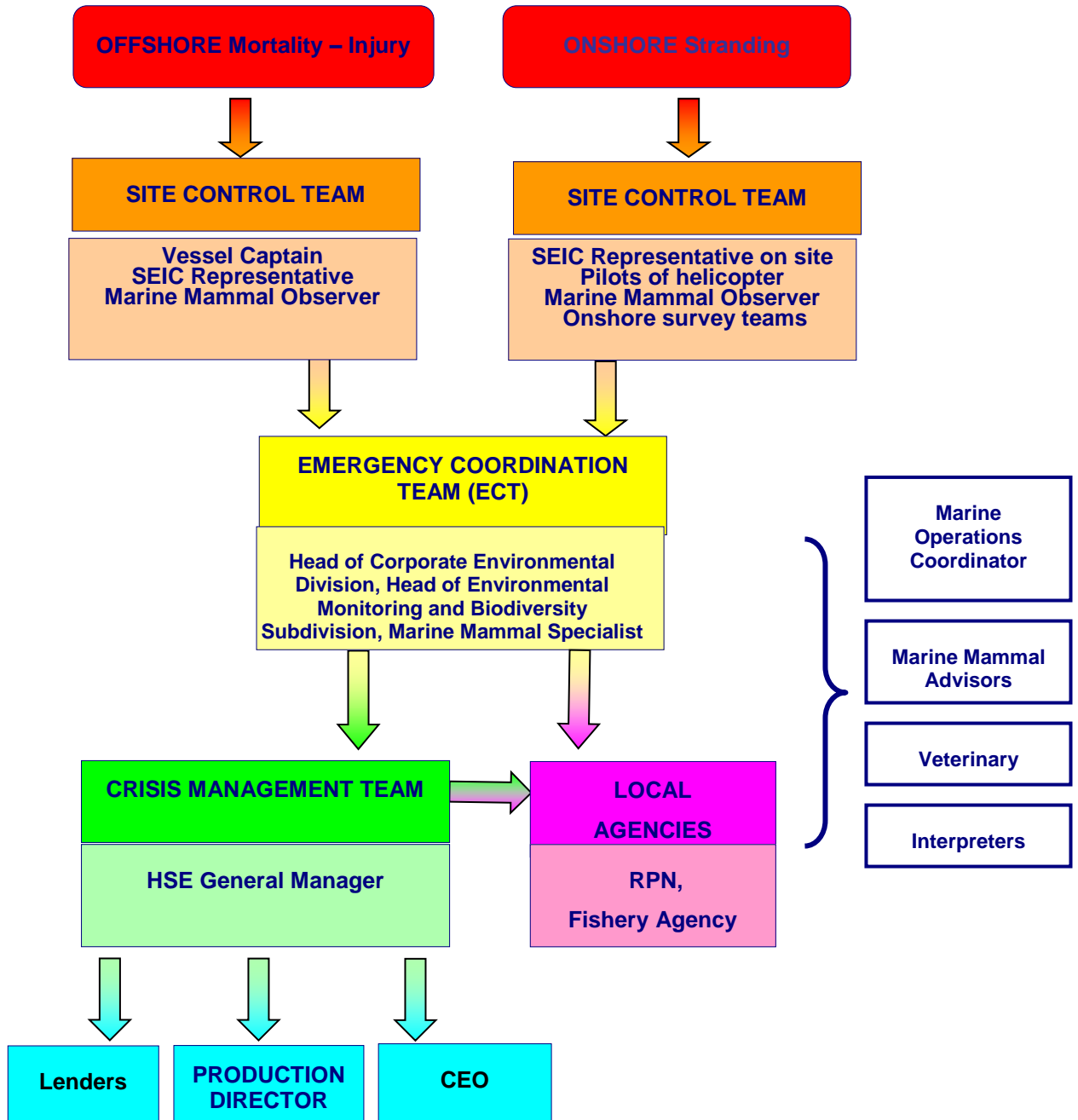


Figure 7.1. Sakhalin Energy Marine Mammal Emergency Response Organisation



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Although Sakhalin Energy will assist where practical, the ultimate responsibility and authority for protection of Red Book species (such as gray whales) lies with the Federal Services for Nature Use Oversight (Rosprirodnadzor, RPN) Ministry for Natural Resources and Ecology (MNRE) of the Russian Federation. All wildlife response, including response to marine mammal-related incidents, will be conducted with the guidance and pre-authorization of the Far East Interregional Department of RPN (based in Vladivostok).

The responsibility and authority for protection of marine biological resources lies with the Fishery Agency, Sakhalin-Kuril Territorial Administration. For marine mammals, this includes all species that are not listed in the Russian Red Book.

Sakhalin Energy recognises that it may not legally conduct necropsy of red book species without the authorisation and guidance of RPN and Federal Service for Veterinary and Phytosanitary Surveillance (Rosselkhozadzor). At the time of writing, spring 2020, there is no capacity for necropsy of large whales amongst veterinarians on Sakhalin Island.

In the event of an incident, Sakhalin Energy will contact all local authorized Russian authorities. The agencies will be requested to provide a representative to coordinate with Company representatives. Upon request Sakhalin Energy will provide logistical and technical assistance to the agency representatives. Contact details of relevant agencies are provided in Appendix 6.

Sakhalin Energy will take photographs and external measurements of dead or injured marine mammals but must not touch the carcass until approval is received. An example of the marine mammal mortality and injury form is provided in Appendix 5.

Examination and Reporting of dead whales

In case a dead or injured marine mammal is observed offshore, the Marine Mammal Observer or gray whale survey team members closest to the animal will be involved in a quick assessment of the situation. If possible, photographs will be taken to confirm the identification of the species and, in the case of gray whales, whether the individual can be identified from the photo-ID record by experts soon after. It is important to document the incident and any evidence of entanglement (pieces of gear associated with the event, photos, etc.) or ship strike (e.g. blunt trauma as reflected by broken bones, massive haemorrhaging, etc.) should be recorded in detail and retained for later examination by experts. If will be obtained permission from the authorities' consideration should be given to securing the carcass preventing it from floating out to sea. The Marine Mammal Mortality - Injury Report (Appendix 5) will be completed insofar as possible considering the situation at sea and status of the animal. Reporting will occur through the normal communication protocol or according to the emergency response procedures depending on the situation. The relevant authorities will be notified.

For practical and health and safety reasons, Sakhalin Energy will not take part in towing carcasses or perform autopsies on carcasses. However, where possible and with official approval, the Company will support and coordinate the collection of small tissue samples from a dead gray whale for genetic (DNA) analysis for subsequent identification and comparison with Sakhalin Energy/ENL Joint Program monitoring data. All other actions to be taken are to be discussed with the responsible government agencies (refer to Appendix 6). Company has made two necropsy kits and manuals²⁴, readily and freely available to government agencies and other local organizations. Necropsy kits stored and available at Yuzhno and Nogliki; contact C-HSE office in Yuzhno-Sakhalinsk.

²⁴ Woods Hole Oceanographic Institution, *Marine Mammal Necropsy: An introductory guide for stranding responders and field biologists*, WHOI-2007-06, September 2007



APPENDIX 1: OVERVIEW OF SAKHALIN ENERGY OFFSHORE ACTIVITIES

Table 1. Summary of Sakhalin Energy offshore commissioning and production activities²⁵ and their potential impact on marine mammals in general and the gray whale in particular.

Area of activity	Offshore activities	Period of activity	Importance of project area for Marine mammals	Source of impact	Description of impact	Assessment of impact on gray whales	Impact assessment other Marine mammals ²⁶
ANIVA BAY	Tanker traffic, to and from TLU, supply vessel traffic through La Perouse Strait	Throughout year.	Gray whales migrate from wintering grounds to summer feeding grounds. Possible migration routes include La Perouse straight and / or along the east coast of Japan. Gray whale sightings and fatalities have been recorded along both routes. Migration to Sakhalin occurs at the beginning of summer, around May-June; migration from Sakhalin occurs at the end of summer, around October. Gray whales need to complete migration to Sakhalin successfully to feed and need to complete migration from Sakhalin to breed.	Ship strikes	Injury or death due to strikes by vessels.	Risk difficult to estimate. Although details about vessel activity are known, sufficient detail about gray whales migration routes and movement is unknown so that risk assessments have not been possible. Risk considered to be similar to other vessel traffic along routes	Risk to individual animals low, impacts at population level assumed to be negligible.
				Oil spill	Damage to skin, respiratory system, toxicity due to oil spills.	Risk low due to vessel control and very low density of whales along routes.	Low risk due to vessel control measures, impacts at population level assumed to be negligible.
				Sound	Possible disturbance during migration caused by anthropogenic sound.	No hearing loss expected from vessel-related sounds.	No hearing loss expected from vessel-related sounds.
LUNSKOYE	Production and well drilling from LUN-A platform. Support vessel traffic, one support vessel will be on standby next to the platform. Crew change vessel will shuttle between Kaigan port and LUN-A platform.	Throughout year. Crew change vessel will shuttle during the ice-free season (usually early June – early-November).	Gray whales can migrate near shore Lunskeye area and very low numbers observed feeding. One possible observation of two individuals off Vostochniy Reserve. Sightings of other endangered marine mammals rare. Regular sightings of porpoises, seals, Killer whales and to a lesser extent Minke whales and dolphins. Lunskeye project area is not a specific feeding or breeding area for marine mammals.	Ship strikes	Injury or death due to strikes by vessels.	Risk low, due to very low probability of encounters and establishment of vessel corridors.	Risk to individual animals low, impacts at population level assumed to be negligible.
				Oil spill	Damage to skin, respiratory system, toxicity due to oil spills	Risk low: very low density of whales in area, and LUN-A produces condensate and gas but no oil.	Low risk due to pipeline and platform design, impacts at population level assumed to be negligible.
				Sound	Hearing damage leading to decreased orientation, compromised foraging ability, behaviour and communication due to high sound levels (≥ 180 dB re 1 uPa)	No hearing loss expected from vessel-related sounds and drilling.	No impact on hearing loss expected from vessel related sounds and drilling.
PILTUN-ASTOKH	Production and well drilling from PA-A and PA-B platforms. Support vessel traffic, one support vessel will be on standby next to the platforms. Crew change vessel will shuttle between Kaigan and PA-A and PA-B platforms.	Throughout year. Crew change vessel will shuttle during the ice-free season (usually early June – early-November).	Gray whale feeding areas along Piltun and Chaivo lagoons coast. Regular sightings of other marine mammals visiting the area include Killer whales, Minke whales, Harbour porpoises, seals. Sightings of other endangered marine mammals rare. All offshore activities occur outside of gray whale feeding area. Noise disturbance can extend into areas where whales have been observed feeding. Piltun feeding area is most critical due to mother/calf presence and high site fidelity. Lower return rate (Return rate is % of annual return of gray whales) in Offshore feeding area, but high abundance of food and hence probability of gray whale sightings high.	Collisions	Injury or death due to collisions with vessels	Potential Risk high, mainly from crew change vessels and special research vessel. Measures to reduce are establishments of vessel corridors, speed limits, MMO on board.	Risk to individual animal, negligible impacts on population level
				Oil spill	Damage to skin, respiratory system, toxicity from ingested oil?	Risk low due to pipeline and platform design, potential impact can be high depending on circumstances	Low risk due to pipeline and platform design, negligible impact on population level
					Direct loss of food sources due to pollution of benthos (oil spill)	Impact minor, modelling of largest modelled spill scenarios (well-blow out) show a potential impact on benthos in 0.1%-0.3% of feeding area.	Not applicable
				Sound	Hearing damage leading to decreased orientation, communication, food allocation, due to high sound levels (≥ 180 dB re 1 uPa)	No impact on hearing loss expected from vessel related sounds.	No hearing loss expected from vessel related sound
Avoidance of the feeding area and/or disturbance during feeding caused by increased continuous sound levels (≥ 120 dB re 1 uPa)	Potential impact high, though analysis of whale behaviour during the 2005 construction season showed no apparent reactions to construction-related noise.	Not applicable					

²⁵ These activities are intended to reflect steady state. Any specific activities not addressed here may require separate risk assessment.

²⁶ No, negligible and low impacts belong to the category “no biological impact”, mitigation is not required. High impacts belong to the category “Potential biological impact”, mitigation is required. See adjacent section for more details on mitigation approach.

**APPENDIX 2: LIST OF MARINE MAMMALS RECORDED IN THE SEA OFF SAKHALIN ISLAND**

	Russian name	Latin name	English name
1	Гренландский кит	<i>Balaena mysticetus</i>	Bowhead whale
2	Серый кит	<i>Eschrichtius robustus</i>	Gray whale
3	Японский гладкий кит	<i>Eubalaena japonica</i>	North Pacific right whale
4	Финвал	<i>Balaenoptera physalus</i>	Fin whale
5	Кит Минке	<i>Balaenoptera acutorostrata</i>	Minke whale
6	Кашалот	<i>Physeter macrocephalus</i>	Sperm whale
7	Северный плавун	<i>Berardius bairdii</i>	Baird's beaked whale
8	Косатка	<i>Orcinus orca</i>	Killer whale
9	Клюворыл	<i>Ziphius cavirostris</i>	Cuvier's beaked whale
10	Короткоплавниковая гринда	<i>Globicephala macrorhynchus</i>	Short-finned pilot whale
11	Белуха	<i>Delphinapterus leucas</i>	Beluga or White whale
12	Северный китовидный дельфин	<i>Lissodelphis borealis</i>	Northern right whale dolphin
13	Обыкновенная морская свинья	<i>Phocoena phocoena</i>	Harbour porpoise
14	Белокрылая морская свинья	<i>Phocoenoides dalli</i>	Dall's porpoise
15	Тихоокеанский белобокий дельфин	<i>Lagenorhynchus obliquidens</i>	Pacific white-sided dolphin
16	Дельфин-белобочка	<i>Delphinus delphis</i>	Common dolphin
17	Афалина	<i>Tursiops truncatus</i>	Bottlenose dolphin
18	сивуч (северный морской лев)	<i>Eumetopias jubatus</i>	Steller's sea lion
19	Северный морской котик	<i>Callorhinus ursinus</i>	Northern fur seal
20	Ларга	<i>Phoca largha</i>	Spotted seal
21	Кольчатая нерпа	<i>Pusa hispida</i>	Ringed seal
22	Полосатый тюлень	<i>Histiophoca fasciata</i>	Ribbon seal
23	Морской заяц	<i>Erignathus barbatus</i>	Bearded seal



APPENDIX 3: SPECIAL NOTE ON GRAY WHALE DISTRIBUTION, ABUNDANCE AND FEEDING ECOLOGY IN THE WATERS OF THE NE SAKHALIN

This section presents a brief overview of the distribution, abundance and feeding ecology of gray whales offshore Sakhalin Island. More detailed information is provided in separate reports from the Sakhalin Energy/ENL Joint Gray Whale Monitoring Programme (available on www.sakhalinenergy.com) and in scientific publications. The literature references are included at the end of this document. Extensive research programmes have studied the benthic invertebrates and distribution of the gray whales offshore north-eastern Sakhalin Island. Distribution data has been collected since 2002 from aerial, vessel and onshore-based surveys have been combined to calculate seasonal densities of whales per square kilometre in the Piltun and Offshore Feeding areas. The Piltun feeding area, placed adjacent to Piltun Bay, extends along the coast from 52°20' to 53°20' N, with an area of slightly less than 1000 km². Gray whales within the Piltun feeding area are sighted along a 110 km stretch of shoreline and prefer depths of less than 20 m, at a distance of no more than 4-5 km from the shore. The majority of gray whales (about 75%), are concentrated within 2 km from the coast and prefer depths of less than 10 meters. The Offshore feeding area, located about 40-50 kilometers south-southeast of the Piltun feeding area and eastward of Chayvo and Nyisky Bays, extends from ~25 to 50 kilometers from shore at approximate latitudes of 51°50' to 52°30' and covers an area of ~1400 km². Figure Appendix 1 describes two areas where gray whales have been recorded at relatively high density during distribution surveys, and where they have also been observed feeding. (Blokhin et al., 2002; Maminov, 2003, 2004; Gailey et al., 2005 - 2008; Votrogov and Bogoslovskaya, 1986; Vladimirov et al., 2006 - 2016). The distribution and abundance of gray whales varies in these two feeding areas within the season and among the seasons.

To date, the majority of mother/calf pairs in the Piltun Feeding Area have been observed within 1 km from shore, and other whales mainly within 2 km from shore. No mother/calf pairs have been observed in the Offshore Feeding Area in any of the years from 2001 to 2015 (Yakovlev and Tyurneva, 2003 - 2016).

Results from the photo-identification studies have shown frequent movements of gray whales between the two feeding areas (Yakovlev and Tyurneva, 2016). Seasonal shifts in whale distribution may occur as whales reduce and deplete their own prey habitat base locally (i.e. top-down effects) or as the biomass and quality of prey fluctuates for other reasons throughout the open-water season. The number of gray whales feeding offshore north-east Sakhalin varies from year to year. During field season 2019, a total of 193 individual whales were photo-identified in the feeding areas off the coast of Sakhalin. This value was higher than in all previous years. To date Sakhalin photo-identification catalogue contains 321 identified individuals.

Besides the observations of whales in the Piltun and Offshore feeding areas, small groups of whales were also observed in 2005 more to the north in the shallow nearshore waters to the north off the coast of Okha (four whales) and in the waters off Elizabeth Cape (two whales). Two of these whales were identified as determined to be 'new' individuals that were had not been observed in the Piltun or Offshore feeding areas in previous years (Yakovlev and Tyurneva, 2006). In 2006 and 2007, a small number of whales were also observed feeding in the shallow nearshore waters off the coast of Chaivo Bay (Vladimirov et al. 2007; Yakovlev and Tyurneva, 2008). Three gray whales were identified in the northern Sea of Okhotsk in 2006 (Yakovlev and Tyurneva, 2008). In 2015, two 'new' whales were photographed near the wildlife reserve "Vostochnyi" (east coast of Sakhalin). Finally, the Kamchatka gray whales' catalogue contains photos of encountered whales that have been observed in the three areas off Kamchatka (Khalaktyrsky beach, Vestnik Bay and Olga Bay) when researchers were searching there – in 2004, and from 2006 to 2012 and from 2018 to 2019. To date, this Kamchatka photo-identification catalogue contains 184 identified individuals, of which 101 individuals have also been photographed on the shelf at Sakhalin in different areas and in different years of research at some time, and perhaps most of them belong to one feeding congregation of gray whales (Yakovlev, *et al.* 2016). The whales may apparently travel between north-eastern Sakhalin and south-eastern Kamchatka both within and between feeding seasons.

Sakhalin gray whales are thought to feed predominantly on organisms living in or on the sea bottom (benthic organisms), although mid-water invertebrates may also be important dietary item. They consume these organisms by ploughing into the sediment and extracting their food by filtration against baleen plates as they expel associated sediment and water. Since gray whales have a relatively short feeding season,



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it is critical for gray whales to build the bulk of their energetic reserve during the main feeding season. Failing to acquire enough surplus energy makes females less likely to carry a foetus to term or suckle it to weaning. Benthic studies of gray whale prey conducted from 2002 to 2016 demonstrated high but patchy prey abundance off Sakhalin. Results of an integrated analysis of whale distribution in relation to benthic prey off the North-East Coast of Sakhalin Island prepared by Moscow State University (2014) showed a strong and pronounced link between higher benthic prey biomass ($> 60 \text{ g/m}^2$) and the number of gray whale sightings within those water areas. A comparison of the estimated sizes of whale sighting areas in zones with various levels of abundance of forage benthos (less than 40; 40-60, and more than 60 g/m^2) showed that the largest sectors occupied by whales coincided with the zones with the highest density of forage species (Kriksunov, 2014). Whales can be expected to move between areas in search of food and this needs to be taken into account in the development and implementation of mitigation measures.

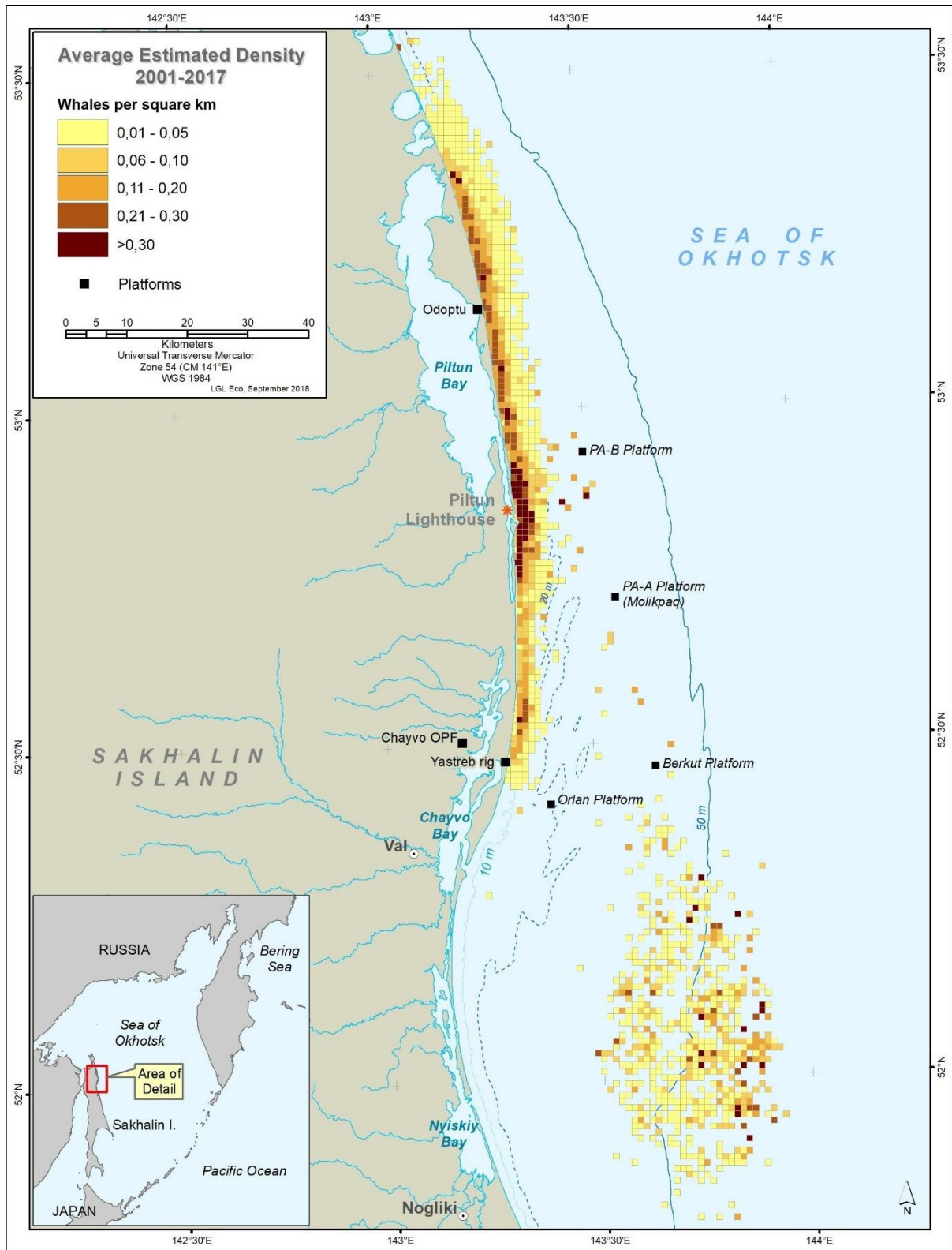


Figure Appendix 3: Gray whale distribution along the Sakhalin coast, 2001-2017.



APPENDIX 4: BASIC RULES WHEN OPERATING IN PROXIMITY TO MARINE MAMMALS

All staff and contractors:

- Have to follow all MMPP guidance and recommendations;
- Must possess special approval for work within gray whales feeding areas;
- Have to obey speed limits;
- Have to keep a safe distance of 1000 m from endangered species of cetaceans and 500m from non-endangered species of cetaceans. For all species of pinnipeds the safe distance is not defined, but activities changing the behaviour or causing the animals to leave should be avoided;
- Are prohibited to cross directly in front of the whales or pass in close proximity to whales;
- Are prohibited to change the speed of the vessel suddenly in the presence of whales, apart from for evasive procedures to avoid collision;
- Are prohibited from pursuing, intercepting, encircling whales or breaking up groups.



APPENDIX 5: MARINE MAMMAL MORTALITY AND INJURY FORM

EXAMINER

Name: _____
Affiliation: _____
Address: _____
Phone: _____

SPECIES AND LOCATION DETAILS

Common Name: _____

Genus: _____ **Species:** _____

Site Description: _____

GPS Coordinates:

Geographical: _____

UTM: _____

Coordinate system: _____

Vessel (if applicable): _____

Sighting conditions: _____

Vessel speed: _____

Vessel activity: _____

Distance to Marine Mammal at first sighting: _____

Floating? YES NO

Stranded? YES NO

DATE OF INITIAL OBSERVATION

Year: _____ **Month:** _____ **Day:** _____

CONDITION:

- 1. Alive/Healthy
- 2. Alive/Injured
- 3. Alive/Sick
- 4. Fresh Dead

- 6. Advanced Decomposition
- 7. Mummified/Skeletal
- 8. Decomposition Unknown

5. Moderate Decomposition



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CARCASS DISPOSITION

Check One or More:

- 1. Left at site
- 2. Buried
- 3. Towed ashore
- 4. Other _____
- 5. Unknown

NECROPSIED? YES NO Date: _____

NECROPSIED BY: _____

TAG DATA

Tag #	Color	Type	Placement
_____	_____	_____	_____
_____	_____	_____	_____

MORPHOLOGICAL DATA

SEX: 1. Male
2. Female
3. Unknown

Straight Length: _____ cm (in approx)

Weight: _____ kg/lb (estimate)

PHOTOS TAKEN? YES NO
Disposition: _____

VIDEO TAKEN? YES NO
Disposition: _____

Comments: _____



APPENDIX 6: CONTACT DETAILS OF RELEVANT AGENCIES

Upon discovery of a whale stranding the following agencies will be informed:

Rosprirodnadzor

123995 Moscow, 4/6 Building 242 Bolshaya Gruzinskaya st, GSP-5

+7(495)254-50-72

Far East Interregional Department of Rosprirodnadzor

693000, Vladivostok, 29 Okeanskiy prospekt

Phones of the duty officer (for reporting information on emergencies in the field of activity of the Office):

8 (902) 557 -75 -78 (Primorskiy kray)

8 (902) 573-67-17 (Sakhalinskaya obl)

Sakhalin branch of Rosprirodnadzor

693000, Yuzhno-Sakhalinsk, 49 Kommunistichesky prospekt, office 27

+7(4242)23-00-36

Sakhalin branch of Rosselkhozadzor

693000, Yuzhno-Sakhalinsk, 50b Gorkogo st,

+7(4242)73-59-17



APPENDIX 7: REFERENCES AND LITERATURE

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