# Sakhalin Offshore Oil:
# Environmental Concern

**МОРЯ РОССИИ:**
сохранение биологического разнообразия,
устойчивое использование ресурсов и экологическая безопасность

**RUSSIAN SEAS:**
biodiversity conservation, sustainable use of resources
and environmental safety

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# CONTENT

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## ABBREVIATIONS

EIA – Environmental Impact Assessment, a widely accepted tool to ensure that all environmental and social concerns are addressed early in the planning process of industrial projects. An EIA is required by law in many countries, including Russia and is also required in projects supported by, for example, the World Bank.

GIS – Geographic Information System

IFAW – International Fund for Animal Welfare

IUCN – World Conservation Union

NGO – Non-governmental organisation

OCP – Onshore Complex for Preparation of Production

PSA – Production Share Agreement, a legal framework for the development of industrial projects, which require huge investment

SEA – Strategic Environmental Impact Assessment, or Strategic Environmental Assessment, a formal, systematic and comprehensive process of evaluating the environmental impacts of a policy, plan or programme, and using the findings in publicly accountable decision making.

SEW – Sakhalin Environment Watch

TAC – Total Allowable Catch, a scientifically based estimate of the amount of a particular commercial species, which may be harvested without damaging a stock

WWF – World Wide Fund for Nature

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# PREFACE

In 1997, an International Offshore Oil & Gas Experts meeting in Noordwijk, the Netherlands, recognised that:

*"Prior assessment is important and baseline assessments/studies valuable to predict impacts. Some parties do not consider environmental impact assessment(s) to be sufficient to determine impacts and believe that strategic environmental assessment is necessary to accommodate cumulative impacts."*

Strategic Environmental Assessment or SEA can be defined as a formal, systematic and comprehensive process of evaluating the environmental impacts of a policy, plan or programme, and using the findings in publicly accountable decision making. It is possible and desirable for SEA to incorporate both socio-economic and ecological / environmental assessment elements. SEA provides decision-makers with strategies and actual and projected information on effects on a large scale. SEA's wider frame enables policy-makers to anticipate effects on species, habitats and ecological processes that site-specific studies do not capture. Through consultation undertaken with communities and interested parties as part of the SEA process, it is possible to identify the issues, needs, concerns, values and ideas of those communities and sections of society that may be influenced by a particular policy, plan or programme.

A number of nations are undertaking SEA. The UK Government Department of Trade and Industry (DTI) is implementing SEA prior to future wide-scale licensing of the UK Continental Shelf (UKCS) for oil and gas exploration and production, while the Norwegian Government is actively considering SEA for the Norwegian Barents Sea.

The benefits of SEA can be summarised as follows, SEA:

- encourages consideration of environmental and social objectives at all levels, including those of policy development, plans/programmes and specific project objectives;
- allows effective analysis of cumulative effects and facilitates consideration of synergistic impacts, which are likely to be overlooked or outside of the scope of individual project EIAs.
- facilitates consultation between various government bodies and stakeholders and enhances public involvement in the evaluation of environmental and social aspects of policies, plans and projects; and
- encourages consideration of alternatives that are either not obvious or not practical at the project EIA stage.

This report is important. Considerable industrial development is anticipated in the biologically-rich Sea of Okhotsk and in particular the waters around Sakhalin Island, where gray whales migrate annually to feed and important seabirds and seal populations forage year round. Yet, the opportunity to implement SEA in a timely fashion, to ensure that the natural resources are efficiently and sustainably used with minimal impact on the environment, the wildlife and local stakeholders and communities, still exists, even though recently in 2002-2003 the "Sakhalin-1" and "Sakhalin-2" projects have been intensively developed with insufficient assessment of their environmental consequences.

Dr Sîan Pullen

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# SUMMARY

## Current absence of strategic ecological assessment in the offshore oil and gas development in the Sea of Okhotsk region (Sakhalin in particular)

The coastal areas and waters around Sakhalin Island (Sea of Okhotsk Ecoregion) have recently become the focus of offshore oil and gas development where several transnational corporations have been involved. The marine ecosystems around Sakhalin Island are among some of the most unique in the world. They provide home to such rare species as the Gray Whale, Sakhalin Sturgeon, Yambo (Sakhalin Taimen) and also to vast colonies of seabirds, shorebirds and fur seals. In 1999 East Sakhalin provided 45% of the total Pink salmon catch, 15% of the shrimp catch, and 38% of the seaweed harvest in the Russian Far East.

An analysis conducted by WWF Russia revealed a rather chaotic approach to the offshore industrial planning in this area. No Strategic Environmental Impact Assessment (SEA) has been conducted prior to the launching of particular projects, whose competition with each other is only magnifying the impact on biodiversity and the environment. In particular, two independent pipeline systems have been planned, rejecting instead the optimization of a single system looking both from a regional economy and also an ecological safety standpoint.

Officially recognized Environmental Impact Assessments for the Sakhalin offshore oil and gas activities are contained in the project documentation evaluated by the State Ecological Expert Reviewing. However, these mostly refer to small sub-projects providing little room for forecasting or the mitigation of cumulative impact on the marine and coastal environments.

The statements of the State Ecological Expert Panels on specific Sakhalin proposals contain a number of critical remarks, comments and recommendations for developers to take into account on further work. In spite of this, Panel Review statements usually do not mention the recommendations of previous panels, unless they made negative conclusions.

Even though the development of a general EIA for a project (done for the *Sakhalin* 1 first phase and the *Sakhalin* 2 second phase in late 2001 and early 2002) must be regarded as a positive step forward, the deficiencies in the current approach have become even more apparent. The two existing projects propose two different pipeline systems which totally ignore the magnification of ecological problems and impose actual expenses on the Russian Federation due to production share agreements, as opposed to trying to find a common integral approach. This very fact highlights the necessity to change the existing practice and to apply a Strategic Environmental Impact Assessment (or Strategic Environmental Assessment – SEA) prior to major project development. The main focus here is on opportunities for application, at least in part, of this approach in Russia.

The present circumstances offer little hope that the SEA initiative will be supported by federal authorities through the establishment of special regulations, even if they do recognize its necessity. Apparently, the introduction of special SEA regulation may be inspired by some external factors, e.g. the European Union, intergovernmental organizations, the Arctic Council or the international financial institutions such as World Bank, though this possibility is outside the scope of the present report. Current activity in developing a protocol for SEA in the framework of the European Economic Commission of the United Nations is a promising but not a rapidly going process (Grishin, 2002).

Looking from the inside, it seems the only effective way to promote SEA is through existing legal and regulatory mechanisms. Because of the long, drawn-out process of promoting any new regulation, potentially effective mechanisms, which in some respects may approach SEA, must instead be sought in the currently existing legislation.

## Towards strategic ecological assessment of the Sakhalin offshore oil and gas development

Sakhalin Island represents one of Russia's richest and most valuable areas in terms of natural resources and biodiversity, including marine biological resources, fossil fuels, timber and coal. Terrestrial natural resources on Sakhalin cannot sustain the demand of the growing island economy. Most of its terrestrial resources are overexploited or are inefficiently developed. However, the largest resource potential (oil, gas and marine biological) is found on Sakhalin's north-eastern shelf. The discovered oil and gas stock in this area has experienced rapid growth and carries great potential for economic growth, though the economic potential based on marine biological resources is lower.

Coastal fisheries and the investments in this industry, though also expanding, are growing at a much slower rate. Commercial fishing has finally overcome many of the difficulties it faced emerging from the decline of the Soviet era, however, the oil and gas industry appeared to be much better prepared and had many more advantages in the adjustment to the new economy.

It is clear in the foreseeable future that oil and gas exploitation, particularly on the northeastern shelf, will dominate the industrial development of Sakhalin, while coastal fisheries will primarily be developed on southern Sakhalin and on the Kuril Islands.

The marine ecosystem of north-eastern Sakhalin though very rich, is also very vulnerable and fragile. Besides fish and invertebrate fauna, this area hosts 25 whale and dolphin species, 11 of which are protected. Of special concern is the Okhotsk-Korean Gray Whale population– one of the most endangered large whale populations in the world. Waters of the northeastern Sakhalin coast, especially in the Piltun Bay area, are the only known seasonal feeding waters for these whales.

Numerous lagoons and bays off the northeast coast are on the international list of protected wetlands. This area is well known for the

nesting and migration of various protected bird species, included in the Red Book of Russia and the IUCN Red List.

Potential accidents and cumulative effects of the offshore oil and gas exploration and extraction pose a threat to the north-eastern Sakhalin coastal zone and its valuable living resources. Taking into account the seismicity of the area, the likelihood of catastrophic accidents is rather high, and issues of financial responsibility and compensation in the event of such an accident have yet to be made clear.

Experts fear that industrial activity on the northeastern Sakhalin shelf, tanker transportation and pipeline construction and operation may not only greatly decrease the rich biodiversity, but will also have serious detrimental effects on the ecosystem as a whole.

The data collected in the sociological study in four Sakhalin areas representatively portray elements of social and economic situation in Sakhalin and some attitudes of its population. They may be thus considered as the basis for strategic decision making.

These data indicate the presence of a generally active and potentially environmentally responsible population of Sakhalin, which is nevertheless impoverished and is living to greater extent using coastal aquatic resources. Most of this population will hardly find its niche in the future offshore oil and gas development in north-eastern Sakhalin nor these people will be demanded as suppliers of goods and services to well-paid employees of oil companies. This may further contribute to social split and impoverishment of the majority of the population. Since the area is largely not prepared for rapid development in other sectors and even the fish resources have not been properly assessed, the result will stimulate the growth of poaching, which is a problem difficult to tackle.

# RECOMMENDATIONS

**General issues**

1-1). The notion of Strategic Environmental Assessment should be developed in the legal sense and introduced in the legislation of the Russian Federation.

1-2). The provisions of the Law of the Russian Federation, "On Ecological Expert Review" should be applied to the offshore oil and gas development programs, a prototype for which is the "Concept for Exploration Exploitation of the Hydrocarbon Resources of the Far East and Northeast Russia." A programme in that case should contain EIA, which in many respects approaches to the SEA requirements. There are various ways for motivating authorities that can be applied, such as

- a direct decision of the President or the Government of the Russian Federation,
- applications to the Prosecutor General of the Russian Federation, or to various courts by NGOs and their coalitions.

1-3). Drafts of the production share agreements should contain a full-scale EIA, which is subject for reviewing by the State Ecological Expert Panel. Relevant guidelines should be developed and approved by the federal resources and environmental authorities. The EIA scheme also must include a section on the interaction with other existing and planned production share projects.

1-4). International financial institutions who credit production share projects, such as the World Bank or the European Bank for Reconstruction and Development are recommended to pay close attention to the presence of EIA in the relevant production share project documentation.

1-5). Even though the SEA methodology is far from being well developed, some prototypic approaches based on GIS techniques may already be applied.

1-6). Large academic and fisheries institutes remain the main organizations which are capable of conducting SEAs in Russia. The potential alternative to these large institutions is rather compact and only temporarily established project teams who efficiently organize their work and involve the best experts from different institutions. This is one example of how this work can be performed by some (though not all) environmental NGOs, who are already capacitated to fulfill this task.

**Sakhalin issues**

2-1). More information about the situation on Sakhalin must be provided in local and federal mass media. Alternative points of view should be given equal attention. Politics of keeping silence, adopted at present, should be reversed. In this context, environmental public relation campaigns with simple slogans, such as those suggested by the Sakhalin Environment Watch would be especially useful.

2-2). Oil companies operating on the Sakhalin shelf should be forced to use the Best Available Technologies, as opposed to cheap, ecologically unsound methods.

2-3). Routes for tanker traffic in the Sakhalin waters should be established. Only double hull tankers should be allowed in the Sakhalin waters. Radar and satellite control for tanker traffic in the Sea of Okhotsk should be organized.

2-4). The entire waters around Sakhalin including the waters off north-eastern Sakhalin, the Terpeniya Bay, the Aniva Bay and the Tatar Strait should receive a status of particularly sensitive sea areas through the MARPOL 73/78 Convention mechanisms.

2-4). Only the most environmentally safe routes for oil and gas transportation should be used, and long terrestrial and marine pipelines should be banned.

2-5). A Marine Protected Area with the highest possible status should be set up in the Piltun Bay area in order to protect the feeding waters of the Gray Whales.

2-6). Protected Areas should also be established to protect unique lagoons of the northeast coast, spawning grounds of salmon and bird nesting areas. It is necessary to accelerate the process of approval of the lagoons of north-eastern Sakhalin as internationally important wetlands in the list of the Ramsar Convention.

2-8). The ecology of the Sakhalin region would greatly benefit from the rational, efficient and sustainable use of renewable and non-renewable resources. An economic model outlining the development of hydrocarbon resources in the most safest way and sustainable use of renewable resources (fish, seafood and timber) should be drawn up and suggested to the regional administration.

# INTRODUCTION



Fig. 1. The north-western Pacific (political map), the location of Sakhalin Island and north-eastern Sakhalin (yellow rectangle).

The Sakhalin Island is the largest island in Russia. It lies in the northwest Pacific, between the Sea of Japan and the Sea of Okhotsk, and spans for more than 900 km along the continental border (Fig. 1).

The marine ecosystem around Sakhalin is one of the richest and most diverse boreal island ecosystems in the world. Its uniqueness is exemplified in a wide range of ecological conditions in the coastal zone, which are integrated with a high diversity of climatic and oceanographic factors. As a result, Sakhalin's marine ecosystem combines the features of various biogeographical provinces– from subtropical to subarctic. This diverse ecosystem provides habitat for a great diversity of algae, kelp, invertebrates, fish, and also vast colonies of seafowl and mammals. Among these organisms are various protected species such as the Gray Whale, Sakhalin Sturgeon, Sakhalin Taimen (Yambo), and Abaloni (*Haliotis*) species as well as others. The waters around Sakhalin were internationally recognized as belonging to the Sea of Okhotsk Ecoregion, which is one of the Global 200 Ecoregions.

Economically, the Sea of Okhotsk is a critical resource for Russia, supporting approximately 70% of the nation's marine products. Many of these products are then exported, including organisms such as crabs and sea urchins.

However, the marine biodiversity of Sakhalin is currently being very seriously threatened due to dramatic increase in human activity. Of particular concern are projects involving the offshore development of oil and gas on the Sakhalin northeastern shelf by major international oil companies such as Exxon, Shell, Sodeko, Mitsubishi etc. Commercial exploitation of hydrocarbon resources in this area began in 1999 with the project known as *Sakhalin 2*, and at least seven more

major projects are currently being organized, some of them already at the final stage of negotiations (for oil and gas resources of Sakhalin see Fig. 2).

Realizing the imperilment of the marine environment of Sakhalin, WWF Russia has initiated a project aimed to conserve the marine biodiversity in the area working in a close partnership with the local non-governmental organisation Sakhalin Environment Watch. First of all, it was questioned what kind of Environmental Impact Assessment (EIA) had ever been done with regard to the Sakhalin offshore oil projects, and what perspectives exist for the strategic ecological assessment from the regulatory, methodological and institutional standpoints.

Secondly, Sakhalin is considered the first area in Russia (besides the unique Caspian situation, which is complicated by numerous geo-political problems) where the offshore industry has begun to impact the marine biological diversity, biological resources and fisheries. The objective of this study was a comparative analysis of the two basic sectors of Sakhalin's economy, their perspectives, and potential conflicts of interest. This analysis is expected to be a starting point for the future Strategic EIA of the offshore oil and gas development on the Russian Far East shelf.


Fig. 2. The principal offshore oil and gas basins and the areas of the current offshore hydrocarbon development.

Daily life of the local population, which is dependent upon the sea and its resources, was never taken into account when plans for offshore oil and gas development were put on the agenda. A sociological study was undertaken in five areas of Sakhalin, which portrayed the average present quality of life, the role that marine biological resources and fisheries play in the lives of the people, and their expectations regarding the offshore development.

Chapter 1 of this report gives a summary of the current problems of the EIA for the offshore oil and gas projects, as well as perspectives for the Strategic EIA of the offshore hydrocarbon development. Chapter 2 deals with the problems of interaction between offshore hydrocarbon development and other resource use, especially for all coastal fisheries on Sakhalin. Chapter 3 reviews the material from the socio-ecological study of the role of coastal fisheries in the life of the peoples of Sakhalin.

# CHAPTER 1.
# PRACTICE OF EIA AND ECOLOGICAL EXPERT REVIEW FOR PROJECTS IN HYDROCARBON DEVELOPMENT ON THE SAKHALIN SHELF

## 1.1. Brief History of Environmental Impact Assessments of the Sakhalin Offshore Oil Projects

### 1.1.1. Regulatory framework

Regulations for modern EIA and the Ecological Expert Panel Review procedures were established at the adoption of the Law of the Russian Federation, "On the Protection of the Natural Environment." (See Box 1).

**Box 1. Legal and regulatory framework for the Environmental Impact Assessment in Russia**

A decree from the Ministry for Environment and Natural Resources of the Russian Federation, "On the Approval of Regulation for the Environmental Impact Assessment in the Russian Federation," was issued on 18 July 1994. The federal law, "On the State Ecological Expert Review," ("*Ob Ecologicheskoi Expertise*") was adopted on 23 November 1995, and on 17 June 1997, the State Committee for Environmental Protection approved the "Regulation for Conducting the State Ecological Review" (Decree # 280). The Regulation for the environmental impact assessment was updated approved by the decree of The State Committee for Environmental Protection on 16 May 2000 (Decree # 372, registered by the Ministry of Justice of the Russian Federation on 4 July 2000 with the registration 2302).

For a schematic view of the EIA procedure see Fig. 3.

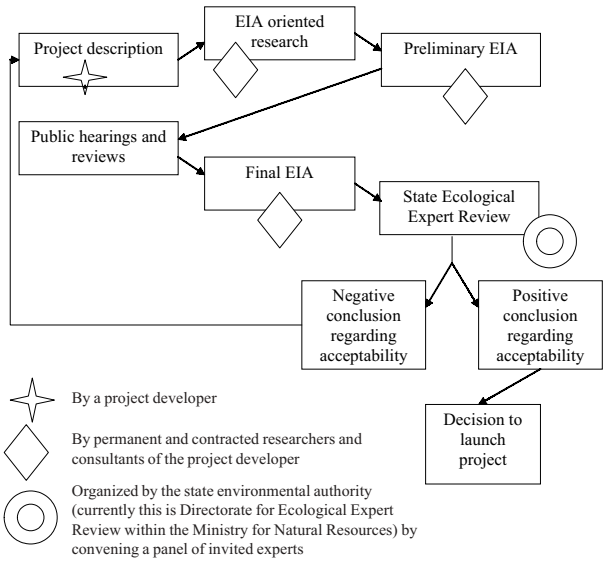


Fig. 3. A schematic view on the procedure of the project Environmental Impact Assessment and the Ecological Expert Review in Russia

According to the Federal Law "On the Ecological Expert Review" (Article 11) programmes of large-scale industrial development must be reviewed by the State Ecological Expert Review before its approval by the federal authorities (see Box 2).

Russia has had experience with Environmental Impact Assessments (EIA) and Expert Reviews of ecological consequences for various plans and programs at the pre-implementation stage (Grishin, 1999). However, the programmes for oil and gas development on the Far Eastern shelf have somehow been left outside these considerations. The production share agreements on the *Sakhalin 1* and *Sakhalin 2* projects were presented to the State Duma before the adoption of the Federal Law "On the State Ecological Expert Review," and approved without a statement from the State Ecological Expert Review.

**Box 2**

Article 11 of the Federal Law "On the Ecological Expert Review" states, that the following material intended for approval by federal authorities is subject to the State Ecological Expert Review:

- Drafts for inter-sectoral and targeted socio-economic federal programmes, research and development, and other federal programmes;

- Technical and economical rationales, work plans for economic activity which may impact the environment of transboundary states, or those which impact the interests of transboundary states covered by the provisions of the "Convention on Environmental Impact Assessment in the Transboundary Context;"

- Proposals for development in the mining and processing industry that would impact natural resources found under the jurisdiction of the Russian Federation,

- Production share agreement and concession agreement documents, and also agreements dealing with the use of natural resources that are under the jurisdiction of the Russian Federation

The "Concept for Exploration and Exploitation of Hydrocarbon Resources on the Shelf of the Seas in the Far East and Northeast Russia (the Sea of Japan, the Sea of Okhotsk, the Bering Sea, the Chuckchi and the East-Siberian Seas)," which was approved in 1996 after the adoption of the Federal Law "On the State Ecological Expert Review," was in fact a draft of a targeted federal socio-economic research and development programme. It contained elements of the Environmental Assessment (EA) and the EIA along with the tentative economic zoning of the shelf, which could be evaluated by the State Ecological

Expert Review. The Ministry for Fuel and Energy approved the first version of this document in 1996 without any review on the federal level. When preparing the updated version in 1999, the developers merely had the document approved with the then State Committee for Environmental Protection of the Russian Federation. The zoning contained in the Concept later became the basis for the plans for industrial development on the shelf which had been launched by several federal services, in particular the time schedules for exploratory drilling.

The "Concept for Exploration and Exploitation of Hydrocarbon Resources on the Shelf of the Seas in the Far East and Northeast Russia" could be excluded from the State Ecological Expert Review for formal reasons, for instance because it was named a "Concept" and not a "Programme." However, the "Programme of Geological and Geophysical Work in the Aquatories of the Far Eastern and Northeastern Seas of the Russian Federation" developed by the "Dalmorneftegeophysica" Trust in 1999, was subject to the Federal Ecological Panel Review since it had influenced the interests of several regions of the Russian Federation. However, the senior Deputy Chairman of the State Committee for Environmental Protection, A.F. Poryadin, approved this document in discordance with law on 7 July 1999, instead of being considered by the State Expert Panel Review. Only in 2000, after some years in operation did this programme pass through the State Ecological Expert Review. The statement of the panel was used to make a decision for the seismo-acoustic survey of the Odoptu Field (Project *Sakhalin 1*) between 2 August and 9 September 2001. Independent researchers regarded this survey as a large threat to Gray Whales, which had been strongly disturbed (see Appendix 3). It is noteworthy, however, that the panel that considered the programme failed to include any specialist familiar with the impact of seismic surveys on marine mammals.

The proponents of rapid oil and gas development succeeded not only at the federal but also at the regional level. Thus the governor of the Khabarovskiy Krai approved regional "Programmes of Geological and Geophysical Work" on 24 February 1998, and the governor of the Magadan Oblast on 18 May 1998. The legal validity of these documents is highly questionable because the regions do not have the right to independently develop mineral resources in the territorial sea, internal marine waters or in the Exclusive Economic Zone of the Russian Federation. Therefore, the first stage of hydrocarbon development on the shelf, including preparation of basic strategic and regulatory documents, exploration, discovery and the beginning of oil resource exploitation (Golubeva et al., 1999), passed without appropriate EIA or the Ecological Expert Review. The correlation of specific projects with the State Ecological Expert Reviews was formed as described below.

### 1.1.2. State Ecological Expert Review and the Sakhalin projects

By June 2000 before a long interruption caused by the abolishment of the State Committee for Environment Protection, eight State Ecological Panel Reviews of Sakhalin projects had been completed. The review of the Technical and Economical Rationale for the Project *Sakhalin 2* was the first of the panel reviews, which was conducted, and it considered the most large-scale activity. The statement of the expert panel contained 48 critical remarks, and the ecological rationale was particularly weak. Therefore it had been recommended to Sakhalin Energy Inc. to prepare further proposals in two steps: first, as a general draft project and the second as a technical draft project.

The company found another way around. By using "the Observers Board" established according to the Production Share Agreement, it advocated a "step-by-step" approach to project implementation with a main priority of producing the first commercial oil on the Molikpaq platform as soon as possible. All critical comments of the Panel were, in fact, ignored. Any concern as to the consequences suffered by the environment after a full-scale implementation of the project for oil, gas extraction and transportation was substituted by an assessment of ecological consequences of particular sub-projects, mostly for exploratory drilling. Thus, an ecological impact analysis for the large-scale project was reduced to the assessment of small-scale projects, which constituted only a minor portion of the entire programme.

However, the statements of the Ecological Expert Panels on particular proposals contain a number of critical remarks, comments and recommendations for developers to take into account for further work. The Panel Review statements did not mention the recommendations of previous panels, unless they made negative conclusions.

Technological issues were discussed in the material presented to panels in various degrees of detail, sometimes with details sufficient to evaluate their permissibility, but more often the details given were insufficient. The ecological soundness of the proposed technologies was only assessed on a comparative basis, and was declared in reference to the experience of similar approaches in other regions.

When comparing different options for proposed activities, the authors only vaguely described alternative ways to solve a particular technological problem. The assessment of ecological acceptability was nearly always replaced by biased arguments supporting the option accepted as the main one. Thus in the Piltun-Astokhskoe Field Project, the discharge of muds and cuttings was advocated as an alternative to their storage on the platform or on shore, but nothing was said regarding their transportation to the shelf break. The other argument against the alternatives is that there will be a sharp increase in the cost of the work planned, and a delay of all stages of project implementation.

Practically all statements of the State Ecological Expert Review regarding the Sakhalin shelf projects point to the requirement of the "Instruction for Ecological Rationale for Economic and Other Activities" approved by the Ministry for Natural Resources of Russian Federation on 29 December 1995 (registration number 539). The requirements regarding the assessment of ecological risks have been either totally ignored or substituted by the assessment of technological risks. In the latter case the documents presented to the panels

exclusively discuss accidents. The oil spills demonstrated hazardous pollution of the Sea of Okhotsk waters adjacent to Sakhalin, though further the documents declared that these scenarios are practically improbable, and that the oil spill response facilities had been developed in case of accidents. Contrary to this, the State Panel Review pointed out that the oil spill response plan for the only currently existing platform, Molikpaq, is merely a declaration (Statement of the State Ecological Expert Panel for the Piltun-Astokhskoe Field project, 1998). Moreover, ecological consequences of small oil spills and their possible impact on the marine ecosystem remained out of the scope of project developers. It is remarkable that the most probable environmental impacts under a normal working regime (without accidents) were not considered in regard to ecological risks at all. The risk assessment was reduced to the forecast of ecosystem component changes.

The content of the EIA section in the documents submitted to the State Ecological Expert Panels is rather strictly determined by existing regulation and decision-making practices. Characteristically, these sections are focused on the Maximum Permissible Concentrations (MPC) of contaminants in the environment and natural organisms. The regulation implies that the impact of industrial activity can be measured through a determination of contaminant concentration in certain control points in water and air. For the interpretation of measurements, environmental data is required.

As a consequence, EIA documents are voluminous and often contain sections, which raise doubts among reviewers. There seems to be an unofficial rule that states the more information included in the Environmental Assessment and EIA, the better. Some specialists participating in the panel reviews of the Sakhalin project mention the intentional unclear presentation of data on actual and forecasted environmental components. Nevertheless, the existing information is never sufficient enough to make clear conclusions, because the series of observations are limited for most Far Eastern seas, and, in particular on the Eastern Sakhalin shelf. It is also very clear that statistically reliable data could not have been collected in such a short pre-project period. The data on the most important components of environment assessment are largely missing. This refers first to the bottom landscape maps in the drilling rigs area, and the data on sediment dynamics and its influence on the processes occurring in the lagoons.

A closer look at biological sections also poses many questions and critical remarks as to the quality of data (Statement of the State Ecological Expert Panel Review of the Exploratory Drilling at the Chaivo-6 Oil Field, 1999). Moreover the benthic samples collected during the course of pre-project and assessment investigations are not stored in any reference collections and furthermore, the standards of their processing in retrospect are impossible to control. Therefore the conclusion of the State Ecological Expert Panel Review of the Piltun-Astokhskoe Field Project (*Sakhalin* 2) is rather characteristic: "The results of toxicological tests are presented without any regard to the assessment and forecast of possible biological consequences from the platform discharges. On the other hand, these results compared to and interpreted with the results of modeling of wastes distribution at sea could be the basis of the entire EIA methodology" (Statement of the State Ecological Expert Panel Review of the Piltun-Astokhskoe Field Project, 1998).

The impact of new oil and gas development on the Sakhalin shelf is being felt even in addition to the old pollution from land-based sources, which is a result of more than 70 years of oil exploitation on the island. This land-based pollution has been insufficiently studied, pollution sources have never even been mapped, and the EIA for offshore oil exploration and exploitation has been conducted practically ignoring the already existing pollution.

Summing up this section, it can be concluded that the organization, structure and content of the EIA formed in the last decade may, in fact, be adequate for exploratory activities that lead to intensive impacts that could persist for several months, as is characteristic for exploratory drilling. These appear to be temporary and reversible, and most traces of impact disappear after the first intense storm (though the time required for the re-colonization of disturbed sediments remains unknown).

The apparently "less dangerous" sub-projects are providing a basis for formal approval of large-scale programmes, though they do not address the combined impacts of the small projects for oil and gas development on the Sakhalin shelf. Refusing proposed activities has become more and more difficult, especially when the very idea of investment in offshore hydrocarbon development is strongly supported by the federal and regional authorities, and the investors go to great lengths to advertise the benefits of their activity. Individual projects tend to compete with one another, leading to a rather dangerous situation with an amplified environmental impact. The offshore oil development on Sakhalin was started without a clear understanding of how the oil can be transported in an economically optimal and environmentally safe way. As a result, two projects, each employing the pipeline transport of oil from more or less the same area, and each with a significant number of its own ecological problems, are allowed to coexist along side one another, thus amplifying environmental impact. However, it is apparent that environmental issues are secondary in decision-making processes, which are totally determined by economical and political motivations.

Methodology for the EIA of particular projects and subprojects is, unfortunately, not sufficient to cover mediated social effects of offshore oil development, thereby fulfilling the requirements of the Law "On the Protection of Environment" of the Russian Federation. This Law was put into place with regard to the prevention and mitigation of adverse social effects, as inflicted by the environmental impacts of industrial projects.

Recently, the companies changed the approach by presenting for the first time a general EIA for the so-called first phase of the projects *Sakhalin 1* and the second phase of the project *Sakhalin 2* for public hearings before coming to the State Ecological Expert Review. This became possible due to the new Regulation for the Environmental Im-

pact Assessment in the Russian Federation (see Box 1, Fig. 3), which determines the procedure of public involvement in the EIA process.

Although these EIAs were of a general nature, their main idea was, quite naturally, to justify the current practices and plans rather than to discuss alternatives. As an example, a review of the *Sakhalin 1* approach made by an independent group of experts and submitted in accordance with the procedure to the Exxon-Neftegaz Ltd. Office in Yuzhno-Sakhalinsk is presented in Appendix 1*. The notes from public hearings of the *Sakhalin 2* project are presented in Appendix 2.

Even though the development of a general EIA for a project must be regarded as a positive step forward, the deficiencies of the current approach have become even more evident. The two existing projects propose two different pipeline systems which totally ignore the magnification of ecological problems and impose actual expenses on the Russian Federation due to production share agreements, as opposed to trying to find a common integral approach. This very fact highlights the necessity to change the existing practice and to apply a Strategic Environmental Impact Assessment (or Strategic Environmental Assessment – SEA) prior to major project development. The basic principles of SEA are outlined in the report of the Stavanger Expert Meeting on Environmental Practices in Offshore Oil and Gas Development (Anonymous, 2000). This SEA approach is presented in detail in the Russian version of this report, as these ideas are still rather new in Russia. The main focus here is on opportunities for application, at least in part, of this approach in Russia.

## 1.2. Perspectives on Strategic EIAs for Offshore Oil and Gas Development in Russia

### 1.2.1. Legal Basis

In the recent history of the Soviet Union and post-Soviet Russia, there have been several examples of analyses, which could, in fact, be counted as SEAs preceding the implementation of large-scale industrial programmes (Grishin, 1999). At the same time, however, the present situation reveals numerous covert yet obvious conflicts between corporations, regions and federal power, as well as the stakeholders' intention to hide as much information as possible. The situation is further characterized by a lack of budget funding for scientific research, and poorly developed mechanisms for efficient research financing using non-budget funds. The present situation offers little hope that the SEA initiative will be supported by federal authorities through the establishment of special regulations, even if they do recognize its necessity. Apparently, the introduction of special SEA regulation may be inspired by some external factors, e.g. the European Union, intergovernmental organizations, the Arctic Council or the international financial institutions such as World Bank, though this possibility is outside the scope of the present report.

Looking from the inside, the only effective way to promote SEA is through existing legal and regulatory mechanisms. The "normal" way of doing this requires the working out of the very notion of the SEA in the legal sense, and its introduction into regulation and legislation. Though working through these goals is critical for any hope of success, it still does not ensure rapid development. Moreover, by stepping into the legal arena, the lobbies of important industrial groups may attempt to amend the Law "On Ecological Expert Review," which is the most important act that deals with these issues. This was already attempted after the abolishment of the State Committee for Environmental Protection and its Ecological Expert Review division (between May 2000 and the beginning of 2001). And in addition to this, the adoption of amendments to legislation is a long, drawn-out process, and the SEA is urgently needed before drilling platforms, terminals and pipelines are constructed offshore and onshore, and tanker shipping undergoes a serious increase. Because of this, potentially effective mechanisms must be sought in the currently existing legislation.

One possible way to develop the SEA framework is by applying the provisions of the Law of Russian Federation "On Ecological Expert Review" to the programmes of offshore oil and gas development, a prototype for which is the "Concept for Exploration and Exploitation of the Hydrocarbon Resources of the Far East and Northeast Russia." However, this concept seems already to be outdated, even from a purely economical standpoint. The Ministry for Natural Resources prepared the document, "The Basics of the Programme for Development of Mineral Resources of the Russian Federation for 2001–2005," for the Natural Resources of the Russian Federation in 2000. The legal status of this document remains unclear, though the Government can require its development into a full-scale programme that must also contain a section on the EIA, which is, in fact, an SEA. This programme may also be more specific, for example, by being focused on the mineral resources of the shelf. However, before this is done, a special working group consisting of the specialists of relevant agencies, scientists and environmental NGOs, must develop and present the basic principles of the EIA for these kinds of programmes. The draft of the programme must be published and passed through public hearings in one way or another, and then presented to the State Ecological Expert Panel Review. Similar procedures may be applied to the drafts of regional schemes for offshore oil and gas development in the Barents Sea and the Sea of Okhotsk.

By observing the current tendency to downplay the importance of environmental issues, the initiation of the above process by authorities on their own volition is highly unlikely, even though it is in full accordance with the current legislation. The authorities may also refer to some institutional problems, which have arisen after abolishing an independent environmental authority, the State Committee for Environmental Protection in May 2000, and subordinating the State Ecological Expert Reviewing to the Ministry for Natural Resources, which is the principal developer of the programmes for exploration and exploitation of mineral resources. In this case, the Ministry has

* Currently a review of the extended project description and EIA has been prepared. The English version will be available through the WWF Russia Office.

then only to present its own programme to itself for review. Using this bureaucratic loophole, the Ministry can easily escape from preparation of a SEA for their programme of mineral resource development and their respective ecological expert reviewing.

However, various ways of motivating authorities can be applied, including applications to the Prosecutor General of the Russian Federation, or to various courts by NGOs and their coalitions. There have been successful court trials when an NGO was successful in winning against the Government. In particular, in 1999 the Supreme Court of the Russian Federation cancelled the governmental decision, which permitted the discharge of drilling wastes during the exploratory drilling process and contradicted national legislation. One appropriate scheme would be to appeal to the court to prohibit any industrial activity on the shelf which would threaten the ecosystem, if it is based on a programme which has not been presented to State Ecological Expert Reviewing.

Another way to apply SEA principles is through the State Ecological Expert Review of the production share agreements (PSA) for particular projects. The currently employed production share agreements do not contain any section describing possible impacts of the project implementation, or measures for the prevention and mitigation of adverse consequences. There is nothing in the PSA for projects *Sakhalin 1* and *Sakhalin 2* besides the declaration to undertake necessary measures, and an ambiguous reference to the "norms and standards of the world oil industry." However, the standards in the oil industry obviously vary from one country to another. For example, all the data on discharges from an offshore oil platform in Norway are regularly published. However, receiving similar data from Sakhalin Energy Inc., though perhaps possible after long correspondence, in any case proves extremely difficult. For some countries, even the events related to the activity of Shell Nigeria, such as the murder of environmentalists, may be a norm.

Since the Law of the Russian Federation, " On Ecological Expert Review," requires drafts of the production share agreements through the federal Ecological Expert Review, the development and approval of guidelines for the EIA is recommended for the entire production share project. The EIA scheme must include a section on the interaction with other existing and planned production share projects. It could also be recommended to international financial institutions who credit production share projects, such as the World Bank or the European Bank for Reconstruction and Development, that they pay close attention to the presence of EIA in the relevant production share project documentation. This kind of EIA, along with the statement of the State Ecological Expert Panel Review may be, in particular, presented in the annexes to production share agreements. For further characteristics of the EIA for programmes of industrial development and the EIA for production share agreements see Box 3.

**Box 3. Kinds of Russia's national EIA potentially meeting some requirements of SEA**

EIA for both the national programmes of mineral resource exploration and development and the production share agreements may approach the requirements of SEA. However, the programmes of sectoral industrial development with a corresponding EIA unavoidably refer to the macro-scale, e.g. the shelf adjacent to several Regions of the Russian Federation. Such programmes operate within a longer time than a particular project, which is usually limited to the shelf adjacent to one administrative Region of the Russian Federation. The EIA of production share projects restricts the discussion of alternatives. However, well-developed protocols of both types of EIA can together complement one another, and by so doing will fit the SEA requirements.

Finally, there may one more way around using the programmes of development of fisheries and non-extractive use of marine and coastal biological diversity, e.g. tourism in the conditions of offshore oil and gas development. Recently a decision to develop a programme of that type (even though it was called a concept) was taken by the State Committee for Fisheries in November 2001. Such a programme must contain EIA for both the offshore oil and gas development and fisheries development which passes then the State Ecological Expert Review and becomes, when approved by the Government, an officially recognized basis for decision-making. Unfortunately, in the current situation the fisheries authorities show a tendency of backing the oil sector rather than providing a constructive criticism*.

### 1.2.2. Methodological Basis

When discussing the perspectives for the Strategic EIA, it is necessary to focus on the availability of research methodology to perform this work. The EIA of a single drilling does not comprise serious interdisciplinary problems, and most of the problems that do arise result from poorly developed standards used to calculate damage to the environment and natural resources (Kriksunov et al., 1999; Makarov et al., 1999).

SEA, on the other hand, requires a thorough understanding of a multitude of complex problems and an extensive analysis. This complexity only grows when adding social and economic problems to analyses on physical environment and ecosystem issues, which tends to cause ambiguity. Forecasting also becomes less and less precise when moving from strictly environmental issues to adding in social factors.

* This was reflected in the recent discussion on the designation of the rank ("category" in Russian official terminology) of importance for fisheries for the areas of recent offshore development under the projects *Sakhalin* 1 and *Sakhalin* 2 in 2001. The fisheries institutes both in Sakhalin and in Moscow did not accept the highest rank having based their conclusion solely on the report provided by the scientists from the Sakhalin Institute for Marine Fisheries and Oceanography known for a regular engagement in contracts with oil companies.

There is no single widely accepted or officially approved methodology for SEA. And the present report does not aim to develop it, but rather to briefly describe some existing tools and approaches, which may be used when developing this methodology.

Essentially, the SEA is a comparison of scenarios. Scenarios of industrial development include various proposals for developing production facilities, associated infrastructure, transportation facilities and social programmes. Furthermore, the scenarios of "business as usual", accident-free exploitation and various accident probabilities should be considered. The objective of the SEA is to forecast a synergic impact of all these processes on the physical environment, biota and ecological processes, regional economy, social processes and other (not directly affected by the proposed industrial development) resource use and management. The results are yet another set of scenarios, which must be tested for suitability for the society.

In the offshore projects a cumulative impact on the physical environment may be either qualitatively predicted using similar situations, or modeled. First, the impact of oil and gas extraction on the geological environment includes a prediction of changes in seismic activity. Then the impact of construction, discharges, shipping and associated activities must be assessed. This, in turn, depends on the understanding of certain environmental processes, such as wave activity, currents, sedimentation (including the role of organisms), sea bottom landscape formation and the horizontal transport of sediments. Wave activity may, in fact, be modeled, though for some reason in most of the EIAs done for the Sakhalin shelf project, this component is completely absent (E.V. Borisov, State Oceanographical Institute, pers. comm).

One of the most critical factors in accident-free development is the effect of discharged fine dispersed matter. Dispersed particles which absorb dissolved polymer compounds, e.g. protein and nucleic acid complexes, become a perfect substrate for bacteria which enhance metabolic processes in the water column and considerably change the mineralization regime which often leads to eutrophication (Sapozhnikov, 2000).

The physical and biological interaction in the water column, which is influenced by the offshore hydrocarbon exploration, extraction and transportation, are subject to modeling. Several models were developed to incorporate a "business as usual" scenario and the transformation of discharged compounds (Leonov & Sapozhnikov, 1997). They may be also modified to include the analysis of small spills and oil leaking. For "catastrophic" scenarios, additional modeling of oil spills is necessary (Monk & Cormack, 1992; Vepsa et al., 1993).

Dispersal, redistribution and accumulation of pollutants should also be assessed in terms of their impact on organisms and populations. Despite the availability of an immense amount of data on toxicity assessed in relation to specimens of particular species at various life history stages, cumulative effects of pollution on the entire ecosystem is difficult to predict in detail. Probably more promising seems the search for well-described analogous situations elsewhere, classifying them and fitting them to particular conditions in new offshore development.

A prospective integral approach is the analysis of sea bottom landscapes with a strong emphasis on the biotic component. Obtaining a map of sea bottom landscapes of the area prior to the development may help to predict possible changes to biota when the physical environment is altered (Preobrazhensky et al., 2000). This provides further insight on the areas of pollutant accumulation. On this basis, sea bottom and coastal landscapes must be ranked with regard to their sensitivity to various factors associated with the offshore oil and gas development, e.g. platform, terminal and pipeline construction, mud, cuttings, and produced water discharges, leaking, and shipping intensity.

Migrating fish and wandering invertebrates comprise a serious problem to the assessment due to their natural population dynamics and harvesting effects, which are nearly as difficult to predict as the impact of offshore industrial development. Modeling is most likely the only way to include in the SEA the impact on actively moving aquatic organisms, such as fish (Kriksunov et al., 1999).

The top components of the ecosystem, though, are not as hidden, and may be rather easily presented on maps. These include coastal colonies of birds, marine mammal rookeries, and spawning areas of salmon and other anadromous species. Along with this, the borders of nature reserves, and World Heritage and Ramsar sites must also be mapped. Direct impact assessments of the development on these sites may be performed through comparison of different variants of construction activities. The impact of proposed activity on the feeding organisms of birds and mammals should be derived from the assessment at the ecosystem level, e.g. water column, sea bottom landscapes and fish populations.

The economic comparison for different scenarios of development has been recently demonstrated for the West Kamchatka Shelf. Shirkov et al. (2002) used calculation of natural resources rent for various kinds of resources and concluded that the absolute rent for marine biological resources is an order of magnitude higher than the rent for exploitation of all reliably assessed mineral resources. The next step of this analysis is searching for the way of effective capturing the natural rent of fisheries resources.

The social components of the assessment may include the collection of statistics from various administrative services, which include demography, health statistics, education and qualification data, employment and income information etc. However, even though these are absolutely necessary, these official statistics do not sufficiently portray the real situation. Therefore, a sociological survey of daily life, the importance of the local environment for the population, and their expectation and attitudes is of critical need. An example of such an approach is provided in the third part of this report, which considers the sociological survey of the role of aquatic resources and fisheries in the daily life of the Sakhalin people. Any

forecasts which do not take into account human attitudes and customs fail to predict the social effects of any industrial development. Several methodologies including the role games and project seminars (see Chapter 3) may be applied to develop the social component of SEA.

Recently, a rather well accepted instrument called Geographic Information System (GIS) was developed to study complex processes in the environment and society. Of course, GIS merely reproduces the behavior implied by the model used, either in a deterministic or stochastic way. The model, in turn, must be fit to the background data, whose obtainment is still a most difficult and costly process. GIS-based analysis in a simplified form may be used for SEA when the complicated modeling mentioned above is not feasible. An example of a general prototype system is the Atlas "Geo-ecological Conditions for the Development of Mineral Resources of Russian Federation," which was developed by the Institute for Economics of Mineral Resources (VIEMS) and the Information Centre of the Institute for Geosystems (VNIIGEOSYSTEM). The GIS is linked to an extensive database that permits the assessment of various options in developing mining industries on Russian territory. Certain procedures with GIS can determine:

- areas where the development of mineral resources is prohibited by law
- areas unfavorable for the development of mineral resources
- areas relatively favorable for the development of mineral resources
- areas especially favorable for the development of mineral resources

The analysis of this integral map along with a set of geo-ecological indexes (in which some socio-economic characteristics are included) allows for the recommendation of prototypic measures for nature conservation and mitigation with the adverse effects of development. Unfortunately, the Atlas is not updated for offshore data and cannot be used for the offshore SEA purposes at present. Some mapped information for north-eastern Sakhalin, which may be in a way similar to the above GIS is shown in Fig. 4.

Another type of GIS has been developed for smaller-scale tasks in environmental management and emergency response. One such system is available in the Technogenic Accidents Response Centre of the G.I. Nevelskoi Marine Academy in Vladivostok. These systems make possible analyses of oil spills and leaks, including the distribution and re-distribution of pollutants, their accumulation in particular areas, and the projection of other impacts in the model situation.

The combination of GIS analyses based on different scales may be used to discuss various options of development and to delimit areas where offshore oil and gas development is inappropriate. It is strongly recommended that a broad range of specialists, including independent experts, develop a GIS-atlas for geo-ecological conditions of the development of mineral resources on the shelf of the Russian Federation.

### 1.2.3. Institutional Basis

The project EIA is performed by a group of specialists from one or several institutes hired directly by a project operator or through a consulting company, which usually completes and edits a report. Usually there is a strong competition between potential consultants, however their selection is rarely based on their professional excellence, but rather on their personal relationship to managers of the operating or consulting company. In the case of SEA, such a task is hardly feasible for a group comprised of a limited number of specialists. A scientific institute can theoretically perform the entire EIA, but there are only a few of them which have the capacity to perform an SEA for offshore oil and gas development. For example, such institutes of the Russian Academy of Sciences including:

- the Institute for Marine Biology, Vladivostok
- Murmansk Marine Biological Institute
- P.P. Shirshov Institute for Oceanology, Moscow.

Several fisheries institutes also have enough qualified specialists and often even greater information resources to perform an SEA, for example:

- Russian Federal Institute for Marine Fisheries and Oceanography (VNIRO), Moscow
- Pacific Centre for Marine Fisheries and Oceanography (TINRO-Centre), Vladivostok
- Polar Institute for Marine Fisheries and Oceanography (PINRO), Murmansk
- Azov Institute for Fisheries, Rostov-on-Don.

Finally, some institutes of the State Committee for Hydrometeorology (ROSGIDROMET) may be also involved, such as:

- Arctic and Antarctic Research Institute (AANII), St. Petersburg
- Far Eastern Institute for Hydrometeorology (DVNIGMI), Vladivostok.

There do exist other institutes, but generally their number does not exceed twelve, and the expertise of most of them is restricted to particular areas. Moreover, the indirect costs for the work of large institutes are very high. When contracting them, it is difficult to summon only the involvement of the most necessary and efficient staff, and usually there is additional personnel loading which makes the project less manageable. A critical problem everywhere is a lack of qualified technicians, which are vital for rapid project development. Potential competitors of these large institutions may be more compact temporarily established project teams who efficiently organize their work and involve only the best experts from different institutions. This is one example of how this work can be performed by some (though not all) environmental NGOs, who are already capacitated to fulfill this task.

### 1.2.4. Information Availability

The following sections are dedicated to a review on the availability of information needed for the SEA of offshore oil and gas development with specific reference to the Sakhalin shelf.

General information regarding offshore oil projects is greatly influenced by several constraints, which may be difficult to understand without taking into account the history of the Soviet period.

**Environmental and Biodiversity Information**. Surveys of coastal waters have become rare since the early history of Soviet marine science in the 1960s-1980s, when the main research emphasis shifted to the deep sea. This shift accounts for such areas as the northwestern shelf of Sakhalin, and explains why they have not been sufficiently covered by multi-disciplinary bio-oceanographical research. Several surveys were conducted in the area during this period, however the material collected has remained unpublished, and accessibility is still difficult at present. Thus, background information describing the situation in the area prior to hydrocarbon exploration and exploitation is very limited. In the 1990s, field studies became scarcely affordable for government agencies. And so, with the onset of offshore hydrocarbon exploration, there were several surveys that were funded by investors themselves, so that results would remain in their possession. This information has been used in sub-project EIAs, and thus has become available to expert panel members, but in general their availability is still very limited. Because of this, the methodology of surveys is not open to critical discussion within the scientific community. Fortunately, many of the results were recently obtained during the research associated with the Sakhalin offshore hydrocarbon development and became available in a comprehensive monograph by Patin (2001). This monograph also contains an extensive references list.

Because of the statement of the Russian-US Commission on Scientific and Technological Cooperation (the Gore-Chernomyrdin Commission), and the subsequent adoption of the "Programme of Monitoring and Research of the Okhotsk-Korean Population of Gray Whales," Sakhalin Energy Inc. provided funds for annual observations of Gray Whales, though publication of any data had to be approved by the company. There still has been little data published, which reveals the principal biological characteristics of the area, and it remains unclear why the area is so attractive for the remnants of the Western Pacific population of Gray Whales. Recently there has been some development in the obtaining of independent environmental information due to the creation of a special fund by the administration of Sakhalin, but published or networked information still remains scarce.

**Information on the Programmes of Industrial Development**. Several legal problems in the industrial development of Russia's Exclusive Economic Zone (EEZ) remain unsolved, and the legal basis for offshore oil and gas development has never been comprehensively presented to either public authorities or to the general public.

Planning documents for offshore oil and gas development, such as the "Concept for Exploration and Development of Hydrocarbon Resources on the Continental Shelf of the Far East and Northeast Russia" (1996) were never broadly disseminated. The Concept itself claimed the absence of a legal basis for decision-making, in particular for the involvement of fisheries authorities in the process of exploration licensing. The adoption of the Concept, in fact, meant the start of programme implementation of offshore oil and gas development in the Russian Far East. However, such a programme is required by law to undergo a federal Ecological Panel Review, which has yet to be done. In spite of this, neither fisheries authorities nor environmental authorities commented on the Concept. Was the lack of information the reason why one sole document produced by the Ministry for Fuel and Energy, which was not even considered by other public authorities, spurred the launch of large scale industrial activities in Russia's Exclusive Economic Zone? Apparently, the developers of the programme were not especially interested in its broad discussion. However, there would likely be fewer problems encountered if more stakeholders commented on the draft.

Similarly, the final versions of the first production share agreements were never published, and never passed through the federal Ecological Panel Review. A sort of "information vacuum" around the process has enabled PSA lobbyists to provide rather favorable conditions for investors, even at the expense of meeting ecological requirements. In spite of these, the media regularly presents material containing complaints. The profile of the investors themselves remained largely unknown to regulators.

Due to the media's simplification of the situation, the investors in the Sakhalin offshore oil and gas projects have become identical to the giants of the petroleum industry in the public eye, while they are in fact only their "daughter" ventures. The general public is failing to recognize that the operators of the projects are merely small companies registered in the offshore economic zones, with limited capital and responsibility.

**Technical Information on Programmes, Projects and Safety Systems and Emergency Facilities**. Technical information on particular projects is presented in the project documentation along with the EIA. This documentation then becomes available to the members of the Ecological Expert Panel. Theoretically, project documentation is also available upon request in the offices of investing companies. Technical descriptions of the project have also been published in special and popular periodicals. As could be expected though, technical achievements, such as the strengthening of the platform, were stressed, while ecologically weak points were hidden. For instance, popular articles never even mentioned the problem of drilling wastes which Sakhalin Energy, Inc. is dumping and which Exxon Neftegaz Ltd. is trying to dump into the sea. In the technical papers, the ecological safety of discharging water-based drilling solution is reasoned based on the experiences of other projects, though details and comparisons to Sakhalin practices are rarely covered.

Information on the full-scale development of particular projects and their interference was until recently even scarcer. This is due, first of all, to an absence of coherent plans on the part of the investors for the development of processing and transportation systems. In particular, operators are insisting on their own proposals for pipeline construction, but details of these proposals are scarcely available for experts or the general public.

In autumn 2001, first ENG Ltd and then Sakhalin Energy announced a public hearing for the second phases of their projects. The hearings for the *Sakhalin 1* EIA were not, however, announced in the central newspapers as required by law.

The transportation of oil has proven to be one of the most risky operations in the entire technological process. Compared to the drilling platforms, little information on tanker operations (which are outside the responsibility of Sakhalin Energy, Inc.) is presented to the media. Liability for oil spills remains a question whose answer is totally unclear, not only to regulators but also to qualified international experts. The information situation with facilities for oil spill response is illustrated by the comparative analysis by Lawn, Steiner & Wills (1999). There is strong evidence to suggest that since this report was published, little change in information availability on oil spill response facilities took place.

**Environmental Performance Information.** Reporting of the monitoring surveys funded by the investors is also rather scarce. In principle, the companies will make the reports available upon request, but only after fighting through red tape. Permission to publish this data has not been given in any known case at this point. Local catastrophic events, such as the mass stranding of herring in front of the Molikpaq platform in the Piltun Bay in May 1999, are not properly reported. This ecological disaster, in which several thousand tons of herring were expected to die, could have remained totally unknown to the public (despite two short communications in the local newspaper of Okha, the district centre on northern Sakhalin) if there had not been field trips by the Sakhalin Environment Watch and Greenpeace. The publication of chemical analysis results, which indicated fish intoxication and coincided with various accidents at the platform, raised debates on Sakhalin. This story clearly demonstrated difficulties in the timely presentation of good quality information to the public, and at the same time, an urgent need for this type of information.

# CHAPTER 2.
# BACKGROUND FOR THE STRATEGIC ECOLOGICAL ASSESSMENT: OFFSHORE OIL AND GAS DEVELOPMENT, FISHERIES AND BIODIVERSITY

## 2.1. Methodology

During the course of the project, information, raw data and various opinions have been collected both from regional experts and experts in Moscow to assess the socioeconomic situation on Sakhalin; timber, hydrocarbon and mineral and biological resources; the state of coastal fisheries; and current and planned oil and gas developments in the area. The information collected includes:

- Review of known and prospective hydrocarbon resources on the Sakhalin shelf
- Review of the stock and level of exploitation of other mineral resources on Sakhalin
- Assessment of the current situation of timber resources and their exploitation
- Socio-economic infrastructure of north Sakhalin
- Pollution types, levels, and affected areas on northern Sakhalin and their specific threat to the marine ecosystem
- Modern methods of oil exploitation on the shelf
- Analysis of economic development in the northern Sakhalin areas
- Analysis of the legislative base of Sakhalin oil projects
- Status quo and perspectives of coastal fisheries on northern Sakhalin
- Inventory of marine biological resources around northern Sakhalin
- Analysis of hatcheries of marine biological resources on Sakhalin
- Current status of Marine Protected Areas on Sakhalin
- Current status of the at-risk Okhotsk-Korean population of the Gray Whale.

## 2.2. Sakhalin Resources

The Sakhalin Island and surrounding waters are rich in various natural resources. This is a result not only of the climate, geology and relief of the island, but also of its unique geographic location on the border of several physio-geographical zones. The most important resources that are traditionally harvested include fish, marine invertebrates and timber. Non-renewable harvested resources include fossil fuels, black and brown coal, sand and clay. Also exploited on the island are various metals, including both rare and noble forms.

### 2.2.1. Renewable Resources

The Sakhalin Island is home to one of the world's richest stocks of marine biological resources. Nutrients are particularly plentiful in the Sea of Okhotsk, which results in a high primary production in the area, thus sustaining such a rich and diverse ecosystem. Sakhalin is also famous for providing spawning grounds for Pacific salmon species. Here cod species, flat fish, herring and stone fish supply significant commercial stocks. An additional key part of the commercial stock is formed by marine invertebrates, including five crab species, six species of shrimp, as well as squid, gastropods, scallops, sea urchins and sea cucumbers. The number of algae species totals 150, two genera of which, *Laminaria* and *Ahnfeltia,* possess great commercial value. Various seal species also form vast colonies in this area.

Total Allowable Catch (TAC) for the Sea of Okhotsk for the year 2002 has been estimated at 300 000 t, including 200 000 t of fish, 38 000+ t of mollusks, 7 500 t of crustaceans and 34 000+ t of seaweed.

#### *2.2.1.1 Fisheries*

Given the unique stock of commercial fish and invertebrates, the Sakhalin region fisheries play a key role in the fishing industry not only in the Far East, but in the entirety of Russia as well. Fishery production on Sakhalin amounts to 22.7% of all fishery production in the Far East region, and 11% of the total production in Russia. Fisheries on Sakhalin yield up to 32% of the total industrial production in the region. At the same time, fishery production makes up 35% of the combined export from Sakhalin. The total catch in Sakhalin in 2000 amounted to 419 000 t.

Fisheries on Sakhalin at present are comprised of large, formerly state-owned enterprises that have since become stock companies, collective fishery farms, and many small enterprises claimed by various ownerships. The number of enterprises involved in commercial fishing totals more than 580, employing around 7% of the population of Sakhalin (compared to 1.5% of the population involved in the oil and gas sector). Historically, most of the fisheries industry on Sakhalin has been restricted to the southern part of the island. However, in the north-east of the islands rather plentiful resources of salmon, herring, navaga, plaice and other commercial species have been also discovered (Fig. 4).

**Salmon**. Salmon species are among the most valuable commercial fish resources. Salmon spawning grounds are found in nearly all riv-

ers on the island, though their distribution is uneven. Almost 80% of the Pink salmon and 42% of the Chum salmon spawning grounds are found on south Sakhalin (especially in the southeast). The most productive area for spawning is the shoreline between Lake Tunaicha and the Naiba River. Comprising only 8% of the total spawning grounds on Sakhalin, this region supports on the average 40% (and up to 70% in the most productive years) of the total salmon catch in Sakhalin. In order to safeguard these delicate salmon spawning grounds, anthropogenic impact in southeast Sakhalin must be strictly controlled.

The northeast Sakhalin rivers also play an important role in providing habitat for successful salmon reproduction. The area between the shoreline of the Elizaveta Cape and the 50°N latitudinal line holds more than 21% of the total spawning grounds on Sakhalin, including 57% of the Chum salmon spawning grounds. Most of the spawning grounds in this area lie in the Tym River basin, where Pink, Chum (the largest known stock), Coho and Cherry Salmons reproduce (Fig. 4). However, rivers north of the Tym' mouth have become heavily polluted particularly by land-based oil mining, and thus have lost a great deal of their commercial importance.

The Sakhalin region was the first in Russia to employ salmon hatcheries, though they have not yet been developed in the north. Twenty-two different enterprises have been involved in this endeavor, with a total production capacity of 170 million juveniles. Among the species most commonly hatched are Pink salmon (70% of total juveniles) and Chum salmon (30%). Hatcheries for other species have not yet been employed, however plans to do so are currently being developed.

Among the highest catches in the Sakhalin area are the Alaska pollock and the Navaga. Commercial stock of Alaska pollock is harvested in the Sakhalin northeast (during summer feeding migrations), the southeast, and also in the Aniva Bay, while Navaga is mainly fished in the Terpeniya Bay and along the northeast coast.

The population of the Pacific herring, though vast in former times, is currently experiencing a deep depression. Due to the pollution of spawning grounds along the coastline, the stock reduction has reached an irreversible low. The total catch has dropped dramatically from up to 900 000 t to around 2 000 t over the last several years, and the TAC for herring in 2002 is scheduled at a level of only 600 t.

**Crabs**. Five commercial species of crab are known on Sakhalin. Among the most valuable of these is the Kamchatka King crab, and its most important stocks occur in the bays of Aniva, Mordvinova and Terpeniya. Other commercial species harvested are the Snow crab (the largest stock found in the northeast at a depth of 200-350m), Hair Crab (found in Aniva Bay and southeast Sakhalin), and also the Blue king crab and Spiny king Crab.

**Shrimp**. Commercial species of shrimp include Northern (pink) shrimp and Greenland Shrimp.

Commercial whelks in Sakhalin are represented mainly by the Buccinid species. Other commercial invertebrates include sea urchins, squid and scallops.

*2.2.1.2. Timber*

Timber production on Sakhalin, though formerly a much more widely exploited natural resource, is presently at a low level. It now only constitutes around 3% of the total industrial output and involves little more than 1% of the Sakhalin population. The timber processing industry simply has not been developed. However, forests on Sakhalin cover 67% of the island's total land area and because of their great resource potential, they still play a key role in the natural resource industry of the whole Far East region. Total stock of Sakhalin forests amounts to 600 million $m^3$, while commercially available stock is around 472 million $m^3$.

### 2.2.2. Non-renewable Resources

Sakhalin is also rich in fuel resources, which are of great importance to the entire Far East region. The availability of these resources significantly exceeds both their current and prospective demand on the island. The Sakhalin region thus far represents the only developing region of oil and gas in the Far East, and exports these products to the Khabarovsky region, while also exporting coal to the Khabarovsk, Magadan and Kamchatka regions.

**Coal.** Coal deposits cover about 8% of the total island area. More than 60 prospective coal-yielding sites are known on the island. The total estimated coal resource (stock) is 20 billion t, 60% of which is black coal and 40% brown coal. On the average, around 2.5 million t of coal is mined annually on Sakhalin, 20% of which is exported. Despite the significantly large supply of coal, mining on Sakhalin has declined in recent years, because as mines grow older, their efficiency wanes and considerable investments are required to sustain production levels.

**Oil and gas.** The oil and gas industry on Sakhalin is concentrated in the northeast, where the fossil fuel supply is the most abundant. The exploitation of oil and gas on the island itself began 70 years ago. However, the availability of these resources is rapidly declining, as the fossil fuel supply on land is becoming exhausted. Experts project the diminishment of the onshore oil and gas development on the island of Sakhalin in the near future.

At the same time, fossil fuel resources on the Sakhalin shelf are an order of magnitude higher than on the land, and constitute roughly 4 billion t. Efficiency and productivity in industrial mining on the Sakhalin shelf is very high. For example, a 1 t (1000 $m^3$) increase in the hydrocarbon stock costs less than 1 USD, whereas the predicted outcome from the producing of 1 t is 3-14 USD, depending on the size of the deposit and the specific conditions of development.

Explorative drilling on Sakhalin began 25 years ago. Among the productive fields discovered are the Odoptu field, discovered in 1977, followed by Chaivo in 1979, Lunskoe in 1984, Piltun-Astohskoe in 1986 and Arkutun-Dagi in 1989.

Six oil fields on the Sakhalin shelf were registered as state-owned by 1 January 2000. Their total extractable oil stock of the category $C_1$ is

estimated at 150 million t, and of the category $C_2$ 142.8 million t. The total known oil stock represents about 5% of the potential predicted stock.

Three marine fields, Arkutun-Dagi, Chaivo and Odoptu, with a total stock of 62.4 million t of $C_1$ oil and 108.7 million t of $C_2$ oil, are managed by Exxon Neftegas Ltd. These fields lie 6-12 km off the northeast coast, in the depth range 18-32 m. Two other marine fields, Piltun-Astohskoe and Lunskoe (12-20 km off the eastern coast at the depth 28-32 m), are registered with the Sakhalin Energy Investment. Their combined stock is 84.7 million t of $C_1$ and 30.4 million t of $C_2$ oil. The Odoptu oil field (2.8 million t of $C_1$ and 3.7 million t of $C_2$) is registered with Rosneft-Sakhalinneftegas.

Also on the Sakhalin shelf are seven gas fields (by the 01/01/2000 status). The combined gas stock in categories $A+B+C_1$ is greater than 597 billion $m^3$ and in category $C_2$ 251.6 billion $m^3$.

Three gas fields, with a total stock of 194 billion $m^3$ of $C_1$ gas and 98.9 billion $m^3$ of $C_2$ gas, are registered with Exxon Oil and Gas Ltd. The Piltun-Astohskoe and Lunskoe fields (386.9 billion $m^3$ of $C_1$ gas and 92 billion $m^3$ of $C_2$), are registered with the Sakhalin Energy Investment.

The total known gas stock represents about 4% of the potential predicted stock.

## 2.3 Industrial Development

### 2.3.1 History and the Current Situation

Human impact on the coastal environment of the Sakhalin Island has increased dramatically since the latter half of the 19th century. With the widespread development of commercial fishing, fossil fuel drilling, mineral mining, and timber harvesting, delicate ecological balances have been disrupted. In the 20th century human industrial activity on the island took place in the following main stages:

- Japanese sovereignty on south Sakhalin (1905-1945)
- Second World War (1939-1945)
- The Post-War period (1945-1960)
- Growth of deep-sea fishing (1960-1990)
- Revival of the coastal fishing industry and large-scale development of hydrocarbon resources on the Sakhalin shelf (after 1990).

Each of these periods uniquely affected the Sakhalin coastal environment. The period of Japanese presence was particularly characterized by the development of coastal fisheries. A network of more than 200 small fisheries was created on the southern part of the island during that time. However, human influence on the coastal ecological balance at that time still remained low.

At the same time on north Sakhalin, which was controlled by the Soviet Union, special attention was given to the production of oil, gas and timber. Industrial activity became concentrated around several urban centres somewhat removed from the coast, such as Oha, Alexandrovsk-Sakhalinsky, Nogliki, and Moskalvo (Fig. 5). The development around these cities was quick to impact and disrupt the surrounding terrestrial ecosystem. Oil spills, the dumping of drilling cuts, the destruction of forests and land erosion were all major factors in the detriment suffered by Sakhalin's flora, fauna and abiotic environment. During World War II and the post-war period, however, the region saw an industrial decline which allowed the ecosystem to recover in part, though not for an extended period of time.

In the early 1960s, Sakhalin once again experienced an explosion of industrial activity, and the fisheries industry saw a trend away from coastal-based practices using small boats, towards deep-sea and long-range fishing, with fishing boats on a much larger scale. This change resulted in the rapid decline of shore-based fish processing factories. And subsequently the number of big fishing boats increased, correspondingly large ports were built, and centralized fish processing was organized. These transformations have in turn significantly affected the demographic situation in the region. Thus, as a result, the once evenly distributed small fisheries along the Sakhalin coasts have been displaced by several larger fisheries and fish processing factories, such as Nevelsk, Holmsk, Korsakov. Consequently, the harvesting of coastal commercial species has seen a dramatic decline.

Also during that period, northern Sakhalin underwent widespread fossil fuel extraction on its coastal shelf, which was rapidly intensified by the guidance of the state corporation, *Sakhalinmorneftegas*. However, the ecological soundness and environmental impact of these projects received very little consideration, and as a result, the fragile ecology of Sakhalin's coastal zone suffered deleterious effects. An additional negative impact was experienced by forest harvesting and timber production, concentrated mainly on the northern end of the island, which affected a large number of river basins, thus disturbing delicate salmon spawning areas.

By the time of the complete collapse of the Soviet economic system in 1990, Sakhalin had become split into two major economical regions: 1) oil extraction in the north and 2) fish processing in the south.

A new economic era began about the same time in the late 1980s and the early 1990s and stimulated a myriad of changes, including the following:

In the fishing industry:

- The establishment of market relations
- The opening of borders and beginning of free export of fish products
- The development of new fishing technologies and equipment
- A demand for new types of products

In the oil industry:

- Exceptional growth in the demand for oil
- The development of production share agreements

**Table 2-1.**
**Dynamics of major economical characteristics on Sakhalin in the period from 1995 to 2000.**

| **Parameter** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** |
|---|---|---|---|---|---|---|
| Total population | 673.1 | 647,8 | 633,5 | 619,6 | 607,9 | 598 |
| Population in the northern regions (north from Paranaisk), thousand | 132,2 | 125 | 120,7 | 116,2 | 113,3 | 110,1 |
| Oil extraction on land, thousand t | 1723,7 | 1662,3 | 1720,3 | 1695,9 | 1836 | 1855 |
| Gas production on land, million м$^3$ | 1636,5 | 1836,2 | 1843,7 | 1863,2 | 1762,5 | 1860 |
| Oil extraction from rigs, thousand t | - | - | - | - | 143,8 | 1510 |
| Oil production for Sakhalin needs, thousand t | 214,7 | 163,3 | 113,3 | 118,9 | 81 | 100 |
| Gas production for Sakhalin needs, million м$^3$ | 811,5 | 928,2 | 861,3 | 805,2 | 926,5 | 969 |
| Population involved in oil industry, thousands | 4,370 | 5,518 | 5,310 | 5,706 | 8,831 | |
| **Taxe revenues from oil and gas production, million rubles** | **-** | **-** | **633,3** | **475,1** | **836,9** | **1391,9** |
| Total catch by Sakhalin fisheries, thousand t | 393,2 | 373,1 | 462 | 507,1 | 451,7 | 419,5 |
| Catch by fisheries of North Sakhalin , thousand t | - | - | - | 28,1 | 37,6 | 23,8 |
| Population involved in fishery, thousands | 22,609 | 20,837 | 19,408 | 13,477 | 15,758 | 31,000 |
| Fish seedling , (Pink salmon), million | 176,7 | 137,9 | 221,1 | 224,4 | 209 | 169,9 |
| Fish seedling in the Sakhalin north | no enterprises | | | | | |
| Fish products consumption by Sakhalin, thousand t | 11 | 11 | 11 | 11,8 | 11,8 | 13 |
| **Taxes revenues from fishery, million rubles** | **-** | **-** | **116,5** | **115,4** | **358,8** | **481,7** |
| Coal production, thousand t | 2700 | 2825 | 2381 | 2286 | 2477 | 2761 |
| Population involved in coal industry, thousand | 12,745 | 11,689 | 8,807 | 6,149 | 4,451 | - |
| **Taxes from coal mining, million rubles** | | | | | **100,2** | **143,5** |
| Production of mineral resources : | | | | | | |
| Gold, kg | 217,5 | 233,9 | 225,8 | 227 | 224 | |
| Germanium , t | - | 1,7 | 7,7 | 10,7 | 5 | |
| Limestone, thousand t | 1,4 | 1 | 0,5 | | - | |
| Sand, thousand.м$^3$ | 115,6 | 70,6 | 58,6 | 88,9 | 95,8 | |
| Stone, thousand м$^3$ | 525,1 | 393,8 | 512,1 | 483,1 | 517,9 | |
| Population involved in mineral resources production, thousand | 54 | 57 | 24 | 25 | 42 | |
| **Tax revenues from mineral resources production** | - | - | - | - | - | |
| Timber production, thousand м$^3$ | 1448 | 1165,3 | 860,8 | 461,1 | 869,4 | 960 |
| Population involved in timber production, thousand | 13,4 | 11,3 | 9,6 | 6,6 | 6,8 | 6,9 |
| **Tax revenues from timber production, million rubles** | **-** | **-** | **48,7** | **28,1** | **131,5** | **140,7** |
| ***Discharge of industrial and home wastes, thousand t*** | ***-*** | ***464,6*** | ***441,4*** | ***183,2*** | ***202,9*** | |
| Including rivers, million м$^3$ | 26,4 | 15,1 | 7,9 | 6,7 | 12,5 | 18 |
| Discharge into the air, thousand t | 116,8 | 113,1 | 103,1 | 85,3 | 88,4 | |

- The establishment of better investment policies
- A growing interest among partners

A combination of the above factors significantly influenced the economic situation in the region. The coastal fishing industry in particular entered a period of rebirth, as interests shifted towards the more valuable species of the coastal zone, such as the Hairy Crab, sea urchins, sea cucumbers and stonefishes. Several of the old small fish processing factories on southern Sakhalin were rebuilt and several new ones appeared.

Industrial development in northern Sakhalin since the early 1990s has been determined by major oil drilling projects such as *Sakhalin 1* (operated by Exxon Neftegas Ltd) and *Sakhalin 2* (operated by Sakhalin Energy Investment).

*Sakhalin 1* has been working on the development of the Arktun-Dagi, Chaivo and Odoptu fields, and *Sakhalin 2* on the Piltun-Astokhskoe and Lunskoe fields. Several other major projects under the common title "Sakhalin," have also been introduced for the development of oil and gas on the Sakhalin shelf. Current economic situation on Sakhalin is shown in Table 2-1, which also presents the data on tax revenues in various sectors of economy.

### 2.3.2. The offshore oil and gas projects

The alliance *Sakhalin 1* was established in 1995. Its members include Rosneft -Sakhalin (17% of shares) (however Rosneft was recently replaced by the Indian ONGC), Sakhalinmorneftegaz (23%), Exxon Neftegas Ltd. (30%) and SODECO (30%). The first stage of the project considered the development of the Chaivo and Arkutun-Daginskoe fields. The total extraction forecast is 46 billion t of hydrocarbons in 34 years. After exploratory drilling the resources were re-assessed as 307 million t (2.3 billion barrels) of oil and 485 billion $m^3$ (17 trillion $ft^3$) of gas. Late in 2001, Exxon Nefteagaz Ltd. presented for public hearing a description and EIA for corrected plans for the production phase of the project (see Appendix 1). A total investment was originally estimated to be 15.2 billion USD. In a public appeal at the important TV channel NTV on 29 October 2001 G.O. Gref, Russia's Minister for Economic Development, said that Russia had never before received such an investment. He estimated the amount of investment in the *Sakhalin 1* project to be 12-15 billion USD in the next 7-8 years, while the total investment may be as high as 30 billion USD. At the peak of development, 24.1 million t of oil and 19.7 billion $m^3$ of gas are expected annually. The total expected income for Russia from this project was originally estimated as 53.4 billion USD, and of the consortium 48.9 billion USD. Gref said the federal and regional budgets of the Russian Federation will see about 30-40 billion USD of income.

It should be noted, however, that the figures given are based solely on calculated projections. In reality, the production share agreement, upon which the Sakhalin projects are based, has so many disadvantages for the Russian side that predicted benefits might never actually be reached (Schetnaya Palata Report, 2000). Nevertheless, local and federal administrations still strongly support and lobby for the Sakhalin projects. The benefits for Russia may even increase if the PSA and its legislative basis are improved for new projects in the *Sakhalin* series.

The construction of a pipeline has also been planned in order to transport oil to the De-Kastri terminal (Khabarovsky Krai), which would have the capacity to transport 12 million t per year. Oil tankers specially strengthened for travel in icy conditions would also be used for further transportation year round. Two different propositions are being considered for the project: 1) a land-based route toward southern Sakhalin, or 2) eastern underwater routes toward Japan. The construction of an 1100 km long pipeline from Sakhalin to Japan has also been considered. Drilling activity for the project would be restricted to the ice-fee period, i.e. from June to October.

The project *Sakhalin 2* is managed by the consortium Sakhalin Energy Investment, which was registered in Bermuda in 1994. Originally, shares were allocated as follows: Marathon Sakhalin Ltd. (USA) 37,5%, Shell Sakhalin Holding 25%, Mitsui Sakhalin Development (Japan) 25%, and Diamond Gas (daughter company of Mitsubishi, Japan) 12,5%. Currently Royal Dutch/ Shell holds 55% of shares, Mitsui remains with 21% and Diamond Gas possesses 20% of shares. The total expected income for Russia in this project is 26 billion USD, and of the consortium 25 billion USD.

A total investment is estimated to amount 10 billion USD. The two main oil fields that have been planned for exploitation are Piltun-Astohskoe and Lunskoe. An exploration stage of *Sakhalin 2* has now been completed and full-scale development is underway, as the first commercial oil was obtained in the summer of 1999. The project is scheduled to last for 25 years. The estimated combined stock of these two fields is 140 million t of oil and 408 billion $m^3$ of gas. The potential capacity of the Piltun-Astohskiy field alone is 11 500 t of oil per day. Yearly estimated production for the project is 7.9 million t of oil and 16.4 billion $m^3$ of gas.

The drilling complex "Vityaz" includes the Molikpaq platform, which is located 18.5 km off shore, the anchored tanker "Oha" and also the 2 km underwater pipeline.

The 15-year-old oil platform Molikpaq, refused by oil companies since the early 1990s after heavy use in the Canadian Arctic, has since been used by the alliance on Sakhalin. Designed for explorative drilling in water depths up to 12 m, the platform was installed on Sakhalin commercially at a water depth of about 30 m. Total production in 2001 exceeded 3 million t.

Current development on Sakhalin is experiencing some problems since, as it has been stated at the public hearings of the second phase of the project in December 2001, the extraction of oil alone on the Molikpaq platform is not making the project profitable. What could make the project profitable is the export of condensed gas to Japan, but this market is closed for at least the next 10 years by forward contracts.

Other Sakhalin projects under development are indicated in Tables 2-1 and 2-2 while their location is shown in Fig. 2.

### 2.3.3. Ways for Development

From the above discussion it becomes rather clear that terrestrial natural resources on Sakhalin cannot sustain the demand of the growing island economy. Most of its terrestrial resources, in particular oil and coal are overexploited or are inefficiently developed. However, the largest resource potential (oil, gas and marine biological) is found on Sakhalin's north-eastern shelf. The discovered oil and gas stock in this area has experienced rapid growth and carries great potential for economic growth, which is seemingly higher than the economic potential based on marine biological resources is lower (Table 2-1).

Coastal fisheries and the investments in this industry, though also expanding, are growing at a much slower rate. Commercial fishing has finally overcome many of the difficulties it faced emerging from the decline of the Soviet era, however, the oil and gas industry appeared to be much better prepared and had many more advantages in the adjustment to the new economy. However, this approach is too simplistic. A comprehensive analysis of various ways of economic development in West Kamchatka, the area in many respect similar to Sakhalin (Shirkov et al., 2002) indicates another set of criteria for sustainable development. From this standpoint, offshore oil and gas development has less advantages compared to the properly organised fisheries (Box 4).

**Box 4. Criteria for priorities in development of various kinds of resources in the West Kamchatka Shelf (Shirkov et al., 2002).**

- Rapid and effective capturing of the natural rent
- Minimum impact on the environment
- Substantial increase in the employment of local population and development of the regional infrastructure

Using these criteria, sustainable fisheries must be a priority while the offshore oil and gas development meets the above requirement to the minimum extent.

## Table 2-2.
## Projects with Production Share Agreement in preparation

| Projects, companies and shares | Year of tender | Predicted resources | | Finances | | | Job vacancies |
|---|---|---|---|---|---|---|---|
| | | Oil, million t | Gas, billion $m^3$ | Investments, million.$ USA | Bonuses paid to Sakhalin, million.$ USA | State income, billion.$USA | |
| Sakhalin - 3,block I, II Exxon 66,6% SMNG 16,6% RN -16,6% | 1993 | 114 | 513 | -8 | 169 | 13 | Up to 10000 |
| Sakhalin-3, block IV Mobil - 33,3% Texaco - 33,3% SMNG -16,6% RN-16,6% | 1993 | 687 | 873 | -20 | 150 | 46 | Up to 10000 |

## Table 2-3.
## Sites with the oil fields on the Sakhalin shelf with the mode of exploitation not finally set

| Site name | Location | Expected extractable resources of the $C_3$+ $D_{1-2}$ categories, million t in the oil equivalent | Area, $m^2$ |
|---|---|---|---|
| Sakhalin 3-3 | North-east | 350-400 | 5300 |
| Sakhalin-4-4 | Sakhalin Bay, north-west, Shmidt Peninsula | 660 | 22800 |
| Sakhalin -5 | North-east, Shmidt peninsula | 600 | 20650 |
| Sakhalin -6 | South-east | 500-600 | 13650 |
| Sakhalin -7 | Terpenia and Aniva Bays | 230 | 53000 |
| Sakhalin -8 | Tatar Strait, northern part | 80 | 21000 |
| Sakhalin 9 | Tatar Strait, south | 120 | 22900 |

It is clear, nonetheless, in the foreseeable future that oil and gas exploitation, particularly on the northeastern shelf, will dominate the industrial development of Sakhalin, while fisheries have a current tendency for development in the south of Sakhalin and on Kuril Islands. However, the development of oil and gas sector apparently coincides with the growth of discharges to the water (Table 2-1). Along with numerous shortcomings and deficiency of the current EIA for offshore oil and gas projects (Chapter 1) this poses serious questions regarding their ecological soundness and environmental safety.

## 2. 4. Ecological Soundness of Oil and Gas Development Projects

Oil drilling in areas of seasonal ice movement and where heavy storms are common around Sakhalin can be extremely risky as any type of accident may cause considerable damage to the ecosystem. Experts are especially concerned that the extraction of oil from the Sakhalin shelf would seriously affect important spawning grounds as well as migration routes and seasonal habitat of the Western Pacific Gray Whale population.

Several of the different processes involved in the various stages of oil extraction and oil transportation on the shelf present major threats to the environment. Oil spills and the dumping of toxic waste are of primary concern. Technology adopted in the *Sakhalin 2* project includes dumping of muds, produced waters and cuttings extracted during drilling. However, this practice has been forbidden by Russian law, as it has been well established that such dumping has a serious negative impact on surrounding biota.

Many of the larger international corporations such as Exxon have been lobbying to weaken Russia's environmental protection laws. They aim to roll back the strict, zero-waste discharge requirements of the Federal Water Code in order to lower their operational costs.

Possible risks of the *Sakhalin 2* project have been analyzed independently by the public organization Sakhalin Ecological Watch, and also by the Pacific Environment and Resources Center (PERC). In total 71 recommendations have been given by various experts. Among these was the use of Best Available Technologies (BAT), which would require the reinjection or other kinds of safe treatment of produced waters and mud cores extracted in the drilling process. Environmental specialists are also concerned about adequate oil spill response and plans and capabilities for mitigation in the event of a catastrophic spill. Sakhalin does not have enough resources or trained professionals prepared to respond to a disaster such as Alaska's Exxon Valdez spill in Prince William Sound in 1989 (Lawn, Steiner & Wills, 1999). On 25 March 2002 the head of the Emergencies Department of the Sakhalin Oblast, N. Smirnov, publicly recognized that Sakhalin lacks efficient facilities for oil spill response. With greatly increased tanker traffic between Sakhalin and Japan in difficult weather conditions, experts believe that the likelihood of a major spill is high. In addition, the currents in the Sea of Okhotsk have been inadequately studied and the data currently available would be insufficient to determine the behavior of spilled oil in order to conduct an effective cleanup.

Another complicating factor is the issue of compensation, in case of a large oil spill. Unfortunately, it is unlikely in the event of a disaster that oil companies or tankers owners would accept adequate financial responsibility in order to respond efficiently and responsibly. For example, Exxon was compelled to pay 7 billion USD as compensation for the damages caused in the Exxon Valdez spill. In comparison, the Sakhalin Energy Ltd. would only be obliged to compensate for a spill within the bounds of its initial capital, which only amounts to 100 million USD. The consortium has been able to evade full responsibility in case of an accident by being officially placed in Bermuda, where it lies under tax governmental regulation.

Yet another layer of complexity is added by numerous contradictions between Russian law and the production share agreement. For example, mud and water drilling extractions are not considered "waste" in the PSA for *Sakhalin 2*. According to the PSA, Russian environmental control agencies should stay with the PSA regulations and not with the Russian law, even if that means the latter is violated.

Oil companies working or planning to work on the Sakhalin shelf are of course interested in the highest and quickest profit. And one way in which to achieve that profit is to use the simplest of technologies and methods, regardless of whether or not they are out of date or environmentally unsound, and thus employ such practices as the dumping of waste or drill cuts directly into the sea. At present federal law prohibits such dumping and therefore investors have undertaken a severe attack on the Russian Duma (Parliament) by prodding them to adjust the legislation to fit the needs of oil companies. If successfully approved, these legal adjustments would leave no possible way to stop the ecological damage on the Russian shelf. Even the establishment of Marine Protected Areas would not remedy the situation, because of the great potential for pollution from dumping and accidents to extend far beyond the designated areas of oil and gas development.

Another set of problems that is of concern is related to the transportation of extracted oil and gas. Until 2004 it is planned that tankers will be responsible for oil transportation. However, tanker navigation in the stormy conditions of the Sea of Okhotsk can be extremely risky, as previously described, and the likelihood of major oil spills is high. Yet plans also exist for the construction of pipelines. The *Sakhalin 1* project intends to use the route Chaivo (northern Sakhalin)–De-Kastri (Khabarovskiy Krai), whereas the designers of *Sakhalin 2* suggest the route from the northern Sakhalin shelf to the village Prigorodnoe on southern Sakhalin. Gas transportation is planned using either a north-south land route, or a separate underwater pipeline to Japan.

Experts fear, though, that the construction of a land pipeline would either: 1) result in the loss of agricultural lands, 2) disrupt the migration routes of deer, or 3) negatively affect river basins and spawning grounds in consequence of forest destruction. The likelihood of accidents and spills is also not obliterated in such a scenario. It should be noted that rivers in the Sakhalin northeast hold more than 21% of spawning grounds, including 57% of the total Chum salmon spawning grounds.

An original estimate for the cost of a land pipeline in the *Sakhalin 2* project was ca 2 billion USD. This sum of money was intended for more than 600 km of construction crossing ca 460 salmon rivers in an active seismic area. Note for comparison, that the 1288 km long Alaska Pipeline required a 21 billion USD investment, most in order to fit ecological safety requirements. It seems quite unlikely now that fac-

ing the problems with marketing condensed gas, the Sakahlin Energy Inc. will be able to spend the much needed funds to secure the safety of the planned pipeline.

The critical risk factor in the future may be the increasing seismic activity caused by the progress of oil extraction, which undoubtedly has taken place in many areas of intensive and long-lasting hydrocarbon development.

It has been suggested that at the present stage, serious NGO initiatives for preserving the marine environment on Sakhalin should be focused on legislation. Every possible effort should be made in order to prevent changes and adjustments to the law legalizing the use of ecologically detrimental technologies on the Russian shelf. These efforts will require the combined and coordinated actions of environmental lawyers, politicians, various non-governmental organizations and the general public.

Probably, the most effective way to control tanker transportation would be designation of the Sakhalin waters as particularly sensitive sea area in the sense of the MARPOL 73/78 Convention.

## 2.5 Natural Protected Areas

Sakhalin also provides habitat to very unique terrestrial and marine biota. More than 90 mammal species can be found on or around the island, including both seals and whales. The Tyuleniy Island hosts one of the largest colonies of Fur Seal in the world. And in the waters of northeastern Sakhalin reside 25 species of whales and dolphins, 11 of which are threatened or endangered. Of special concern is the Okhotsk-Korean Gray Whale population (see Appendix 3). Also common on Sakhalin are vast seafowl colonies, especially on the Terpeniya Cape, and on the Tyuleniy and Moneron Islands. The endangered Steller Sea Eagle is also a known inhabitant of this region, and fish and invertebrate fauna of the Sakhalin waters are very diverse.

Unfortunately, sustainable use of natural resources has never been among top priorities on Sakhalin. The only federal zapovednik (protected area with restricted admission and totally prohibited industrial activity) organized on Sakhalin is Poronaiskiy, which covers part of the Poronai river basin and spreads 500 m off shore into the Terpeniya Bay. The total area of this protected zone is 16 600 hectares.

Also on Sakhalin are seven areas protected with the Zakaznik or nature reserve status, which is lower than the Zapovednik status. Some of these include a 500m - 2 km zone off shore. Moneron Island has a natural park status which also spreads a protection regime to a 2-mile zone around the island. Sakhalin also has eight places that carry a natural monument status.

Whale and marine scientists along with environmental organizations (Sakhalin Environment Watch, WWF, International Foundation for Animal Welfare, Greenpeace) are currently developing plans to give a protected area status to several other places on Sakhalin, including the lagoons and bays on the northeast corner of the island. Special attention has been given to the Piltun Bay, around which is found the feeding area of the Gray Whales (see Appendix 3). Most of the areas of remarkable coastal and offshore biodiversity are shown in Fig. 4. The development of the offshore oil and gas project should be planned in the way to avoid a direct impact on these areas (Box 5).

**Box 5. Important biodiversity areas, which should be avoided when developing Sakhalin offshore oil and gas projects (Fig. 4)**

Gray whale area off Piltun Bay

Piltun Bay as a nominated area for the Ramsar Convention List

Wrangel Island Natural Monument

Oleniy Reserve

Lyarvo Island Natural Monument

Lunsky Bay Natural Monument

Severniy Reserve

Tundroviy Reserve

Alexandrovskiy Reserve

# CHAPTER 3.
# SOCIAL SITUATION AND ATTITUDES TOWARDS NATURE EXPLOITATION AND FUTURE DEVELOPMENT ON SAKHALIN

## 3.1 Background of the analysis

This section describes what has largely been ignored by nearly all impact assessments for the industrial development on Sakhalin: subsistence of the Sakhalin people based on aquatic biological resources, and their attitudes towards current and potential methods of development.

The principal aim of the study conducted in June 2000 was the analysis of marine resource use in various areas of Sakhalin: the north-east section of the island, where commercial fishery is poorly developed; the south and south-west sections of the island with developed commercial fishery; the north-west section of the island, which employs both fishing and mining areas that have clearly devastated the landscape, and finally the city of Yuzhno-Sakhalinsk, in the centre of the region.

The strategy of the study was focused on the following points:

- level of consumption of aquatic living resources
- specificity of fish and seafood consumed
- changes in nutrition composition and causal factors
- personal assessments of environmental quality and environmental impacts; how people
- are informed as to the condition of the environment
- attitudes towards coastal fisheries development
- attitudes towards offshore hydrocarbon development (simply known as “shelf” in Sakhalin)
- employment in the use of natural resources of Sakhalin
- attitudes towards various kinds of nature utilization
- attitudes towards the development of tourism
- attitudes towards prospective Sakhalin development

A special questionnaire was developed during a consultation process with the Sakhalin administration, fisheries specialists and environmental NGOs. The field work was performed by specially trained staff, and coordinated by E. Shlykova of the Institute for Sociology. In each area typical towns and villages were chosen, and random sampling was organized using the municipal lists used for elections. In each small town or village 60 people were polled, while in Yuzhno-Sakhalinsk the sample amounted to 140 individuals.

The poll was thus conducted in the following settlements (Fig. 6):

- North-eastern area: Nogliki, town of 11 000 inhabitants, and Kolendo, settlement with 1300 inhabitants;

Fig. 6. Areas where a sociological survey in summer 2000 was conducted.

- Southern and south-western area: Nevelsk, a town of 21 000 inhabitants, and Solovievka, a village with 1546 inhabitants;
- North-western area: Aleksandrovsk, a town with 16 000 inhabitants, and Tomari, a settlement with 6900 inhabitants;
- Yuzhno-Sakhalinsk, a regional centre with 180 000 inhabitants.

Principal results are presented below. For more details the reader is advised to refer to the Russian version of the report to be published in the Proceedings of the WWF Russia Conservation Department.

## 3.2 Sample Characteristics and Social Situation

Generally about half of the interviewed individuals were born in their current place of residence (on average 56%). This fraction is especially high (72%) in Nevelsk, one of the fisheries centres on South-west Sakhalin.

The composition of the sample with regard to sex and age is presented in Tables 3-1 and 3-2. More than half of those polled have families. The sample portrays a demographic situation in the Sakhalin families where about half of the adult population has 2 or 3 children (40-60% depending on the area). Most of the interviewed persons consider themselves ethnic Russians, and the fraction of Nivkh population is substantial in Nogliki (North-east Sakhalin), while ethnic Koreans covered by the study live mostly in Tomari. The educational level of the population studied is at a rather medium level: from 55 to 80% of the interviewed individuals (depending on the area) graduated from normal school or mid-range professional schools, while from 10 to 32% have not even finished normal school.

A characteristic pattern of employment does not show great differences between areas. About half of the interviewed persons are employed, and those who do not work are mostly elderly people living in retirement. Official unemployment has reached a rather high rate in Kolendo, the settlement in north-east Sakhalin which is based on the onshore oil industry. Generally more than half of the individuals polled are employees in the public sector, and a relatively high fraction of the employees of stock companies and private enterprises was observed in Kolendo and Nevelsk.

From 21 to 40% of the interviewed families (depending on the area) may be considered extremely poor (Table. 3-3). From 15 to 42 % can afford to buy normal food and clothing, but are not able to invest in expensive long-use commodities, e.g. cars, property etc. A rather high number of relatively wealthy people live in Nevelsk, known for its fisheries, which have been relatively successful, while in Aleksandrovsk, whose fisheries are in a depressed state, the fraction of such families is much lower (Table 3-3). In Nogliki and Kolendo, where many employees of the onshore oil industry are living, the self-estimate of the own state of wealth is not essentially different from other areas, in particular in Yuzhno-Sakhalinsk (Table 3-3). Real incomes communicated by the polled individuals are presented in Fig. 7. As many as 78% of the total sample are concerned that in the near future their families will not be able to sustain their daily needs.

**Table 3-1.**
**Distribution of polled individuals with regard to sex (in per cent of the total sample in a particular area)**

| Sex | Area | | | | | | |
|---|---|---|---|---|---|---|---|
| | Nogliki | Kolendo | Nevelsk | Solovievka | Aleksandrovsk | Tomari | Yuzhno-Sakhalinsk |
| Male | 40 | 55 | 50 | 35 | 50 | 42 | 35 |
| Female | 60 | 45 | 50 | 65 | 50 | 58 | 65 |

## 3.3 The Role of Aquatic Living Resources in the Daily Life of the Sakhalin People

One of the basic pretenses of the present study was the strong dependence of the subsistence of the Sakhalin people on aquatic living resources by employment in fisheries, fish processing and trade, sustaining fisheries and even poaching.

Professional involvement in fisheries and fish processing was indeed rather high in all studied areas (Table 3-4). It is comparable with the employment in the onshore oil industry in such traditional "oil areas" such as Nogliki and Kolendo. The importance of sustaining fisheries is much greater (Table 3-5). In the traditional "oil areas" this involves up to 80-83% of the individuals polled, while in Yuzhno-Sakhalinsk, which is located in ca. 40 km from the shore, nearly half (47%) of the interviewed persons use sustaining fishery in their household. An estimated yearly consumption is presented in Table 3-6. Several of those polled reported on the excess of fish and seafood from sustaining fisheries: from 15% of families in Nogliki up to 48% in Kolendo. Respectively, from 22 to 62% of the subjects supplied their relatives and friends with excessive fish and seafood. Relatively few persons used to sell it (2-17%). Generally, more than half of the interviewed persons estimated that fish and seafood from coastal waters (irrespective to the origin, whether caught by themselves or acquired by another way) supply up to 1/3 of their yearly food consumption (Fig. 8).

There are several fish species which make up a significant portion of the food supply on Sakhalin, namely Pink salmon (part of the diet in 79% of the polled individuals), Plaice (40%), Smelt (30%), Navaga (Safron cod) (28%), Chum salmon (22%), Saury (14%) and Herring (9%). These species were consumed in all studied areas. Of these species, only Saury is not a common target for sustaining fishery. It is worth noting that while, in general, less than half of the inhabitants of south Sakhalin report a consumption decrease of most fish and seafood species, people from north-east Sakhalin reveal an opposite tendency. It is here that a decrease of consumption appears to be negligible only for Pink and Chum salmon.

There are different perceptions for the future of coastal fisheries on Sakhalin (Table 3-7). The highest fraction of polled individuals who believe that fisheries are on the road to collapse live in north Sakhalin, i.e. in Nogliki, Kolendo and Aleksandrovsk, while the people on

**Table 3-2.**
**Distribution of polled individuals with regard to age (in per cent of the total sample in a particular area)**

| Age (years) | Area | | | | | | |
|---|---|---|---|---|---|---|---|
| | Nogliki | Kolendo | Nevelsk | Solovievka | Aleksandrovsk | Tomari | Yuzhno-Sakhalinsk |
| 18 – 21 | 8 | 20 | 8 | 8 | – | 2 | 7 |
| 22 – 30 | 22 | 24 | 28 | 7 | 8 | 15 | 9 |
| 31 – 40 | 10 | 13 | 30 | 15 | 10 | 18 | 21 |
| 41 – 50 | 34 | 18 | 18 | 35 | 34 | 17 | 23 |
| 51 – 60 | 13 | 15 | 3 | 22 | 25 | 24 | 14 |
| 61 – 70 | 10 | 7 | 8 | 13 | 15 | 17 | 14 |
| 71 and older | 3 | 3 | 5 | – | 8 | 7 | 12 |

**Table 3-3.**
**Self-estimates of the personal state of wealth (in per cent of the total sample in a particular area)**

| Verbal estimate | Area | | | | | | |
|---|---|---|---|---|---|---|---|
| | Nogliki | Kolendo | Nevelsk | Solovievka | Aleksandrovsk | Tomari | Yuzhno-Sakhalinsk |
| We can hardly sustain ourselves | 7 | 5 | 9 | 17 | 12 | 7 | 10 |
| Our incomes allow us to buy simple food but buying clothing becomes already a problem | 23 | 18 | 12 | 22 | 28 | 28 | 21 |
| We can afford food and cheap clothing, buying such commodities as a TV set or a frige is problematic | 37 | 43 | 19 | 41 | 50 | 36 | 40 |
| We are feeding well and can buy clothing, which is relatively expensive. When saving money, we can buy something of long-use commodities. We cannot afford really expensive things, e.g. cars, property | 28 | 26 | 42 | 15 | 8 | 27 | 23 |
| We buy long-lasting commodities without problems. When saving money, we can afford a not-expensive car or a simple summer house. | 5 | 8 | 15 | 5 | 2 | 2 | 6 |
| We do not have financial problems and can buy property, a rather good car, or an expensive vacation tour | – | – | 3 | – | – | – | – |

**Table 3-4.**
**Employment of the interviewed individuals, their family members and relatives in various sectors of economy (in per cent of total number of individuals polled in each area)**

| Sectors | Area | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nogliki | | | Kolendo | | | Nevelsk | | | Solovievka | | | Aleksandrovsk | | | Tomari | | | Yuzhno-Sakhalinsk | | |
| | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C |
| Fisheries and fish processing | 5 | 10 | 13 | 30 | 12 | 13 | 12 | 37 | 37 | 8 | 23 | 10 | 15 | 18 | 20 | 18 | 15 | 13 | 5 | 12 | 16 |
| Oil industry | 8 | 10 | 5 | 27 | 23 | 20 | – | 2 | – | 2 | 2 | – | – | 3 | 3 | 2 | – | – | – | 1 | 4 |
| Logging and timber processing | 2 | 2 | 3 | 2 | 2 | 10 | 2 | 3 | 10 | – | 2 | – | 2 | 5 | 10 | 5 | 5 | 3 | 1 | 2 | 4 |
| Hunting | 2 | 2 | 3 | 13 | 10 | 10 | 5 | 3 | 2 | – | – | 2 | 8 | 2 | 8 | 5 | 3 | 5 | 2 | 1 | 3 |

**Table 3-5.**
**Using various activities for sustaining families (in per cent of total number of individuals polled in each area)**

| Activities | Area | | | | | | |
|---|---|---|---|---|---|---|---|
| | Nogliki | Kolendo | Nevelsk | Solovievka | Aleksandrovsk | Tomari | Yuzhno-Sakhalinsk |
| Fishing | 80 | 83 | 67 | 68 | 73 | 68 | 47 |
| Collecting seaweeds | 10 | 5 | 55 | 73 | 63 | 67 | 33 |
| Catching crabs and shrimps | 2 | 3 | 37 | 37 | 20 | 15 | 22 |
| Collecting clams and other sessile animals | – | 2 | 37 | 40 | 17 | 12 | 21 |
| Hunting | 17 | 47 | 10 | 10 | 10 | 13 | 7 |
| Collecting berries other wild plants products, and mushroom | 100 | 100 | 88 | 92 | 90 | 87 | 74 |

the south end of the island show greater optimism. Besides all variation, both the commercial and sustaining coastal fisheries are a vital component of life on Sakhalin. This is illustrated by Table 3-8), which shows that from 32 to 52% of the Sakhalin people are sustained by the fishing industry, while for about the same fraction of the population fishing is an important recreational pastime, i.e. a cultural and a social need (Table 3-8).

From 9 (Yuzhno-Sakhalinsk) to 35% (Aleksandrovsk) of the interviewed persons feel sure that fish and seafood depletion as a consequence of natural or technogenic catastrophe would result in death from hunger. For another fraction of the population (from 17% in Nogliki to 42% of Nevelsk people), such occurrences would be a disaster for the way of life of the people, while about half of the population consider such scenarios to be very hard but think that they could survive without fish. Regardless, coastal fisheries appear to be an irreplaceable asset for the Sakhalin people.

## 3.4 Attitudes Toward Nature Utilization

In general, the interviewed Sakhalin people are rather unsatisfied with the environmental situation. 48% of the surveyed population in Nogliki, 23% in Kolendo, 53% in Nevelsk, 35% in Solovievka, 43% in Aleksandrovsk, 30% in Tomari and 55% in Yuzhno-Sakhalinsk rate the environmental situation relatively low (from 0 to 3 on a scale of 1 to 10, with 10 being the highest). The majority (from 82% in Kolendo to 100% in Nogliki) agree that environmental issues need immediate attention. Inhabitants of Nogliki and Kolendo, along with those of Yuzhno-Sakhalinsk, consider themselves most exposed to harmful impacts from pollution. The former population targets in particular the onshore oil industry, while the latter population points a finger at the electric power plant. The Sakhalin people base conclusions regarding the environmental impact of industries largely on personal experience, only in Yuzhno-Sakhalinsk did they also receive information from media, e.g. newspapers (Table 3-9).

More than half of the interviewed individuals emphasize that they perceive an unfavorable impact on their physical state as a result of environmental factors. The proportions of the polled with such a perception are as follows: 70% in Nogliki, 60% in Kolendo and Nevelsk, 82% in Aleksandrovsk, 72% in Solovievka, 58% in Tomari and 84% in Yuzhno-Sakhalinsk. 31% of the Yuzhno-Sakhalinsk inhabitants feel absolutely certain that their health is negatively influenced by environmental pollution, though in the north-east, north-west and south-west sections of the island, the fraction of polled individuals who feel that same certainty is not so large, respectively 21%, 19% and 24% (differences are statistically significant).

The interviewed populations also have noticed changes in the condition and quality of fish which is harvested, traded and consumed. The most remarkable decrease in fish condition is evident in north-east Sakhalin (differences are statistically significant) (Table 3-10). About half (or even greater fraction) of the interviewed individuals in Nogliki, Kolendo, Nevelsk and Yuzhno-Sakhalinsk are aware of cases of mass mortality and stranding of aquatic organisms, e.g. crabs, herring, Navaga, Pink salmon, chars, ducks and seals. Areas in which such cases took place include northern Sakhalin including the Kolendo inlet, Chaivo Bay, and the Dagi and Omba Rivers. The most commonly mentioned case is the stranding of herring in Piltun Bay in 1999. Even though the people polled were not asked about the causes of these events, they usually referred to one cause or another. In north Sakhalin, 69% of the interviewed persons believed that most mass mortality cases took place due to oil industry pollution. The inhabitants of north-west Sakhalin are of a similar opinion, though they mention several cases which are not related to oil industry pollution, in particular the mortality case of Kaluga Sturgeon due to phenol intoxication in the Beloshinka River. Even in Yuzhno-Sakhalinsk, 44% of the polled population relate the catastrophic events in the animal world in connection with the oil industry.

In general, many Sakhalin people believe that the old onshore sources of oil pollution, e.g. rigs, and muds and cuttings storage are the

**Table 3-6.**
**Yearly consumption of fish and seafood: estimates made by the respondents for their and average families (in per cent of total number of individuals polled in each area)**

| Consumption Kg per family per year | Area | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nogliki | | Kolendo | | Nevelsk | | Soloviev-ka | | Aleksan-drovsk | | Tomari | | Yuzhno-Sa-khalinsk | |
| | A | B | A | B | A | B | A | B | A | B | A | B | A | B |
| **Fish N=** | **51** | **55** | **56** | **54** | **50** | **60** | **44** | **41** | **40** | **26** | **45** | **49** | **98** | **98** |
| 0 | 6 | – | 2 | – | 10 | – | 7 | – | 2 | – | 4 | – | 30 | – |
| 1 – 10 | 6 | – | – | – | 40 | 18 | 14 | – | 13 | 8 | 13 | 8 | 20 | 9 |
| 11 – 30 | 10 | 5 | 7 | 4 | 12 | 37 | 16 | 7 | 22 | 23 | 18 | 27 | 16 | 23 |
| 31 – 51 | 23 | 16 | 9 | 5 | 10 | 25 | 20 | 27 | 22 | 19 | 29 | 20 | 16 | 19 |
| 51 – 100 | 12 | 31 | 31 | 22 | 14 | 17 | 16 | 44 | 28 | 15 | 20 | 31 | 12 | 25 |
| 101 – 300 | 21 | 15 | 21 | 30 | 12 | 3 | 20 | 15 | 5 | 23 | 12 | 10 | 5 | 11 |
| Over 300 | 22 | 33 | 30 | 39 | 2 | – | 7 | 7 | 8 | 12 | 4 | 4 | 1 | 13 |
| **Seaweeds N=** | **13** | **18** | **10** | **10** | **51** | **60** | **44** | **37** | **34** | **21** | **44** | **44** | **87** | **95** |
| 0 | 61 | 17 | 80 | 50 | 16 | – | 4 | – | 12 | 5 | – | – | 44 | – |
| 1 – 10 | 8 | 6 | 10 | 30 | 45 | 47 | 46 | 24 | 44 | 24 | 57 | 43 | 35 | 61 |
| 11 – 30 | 23 | 22 | 10 | 20 | 25 | 32 | 25 | 41 | 29 | 24 | 23 | 39 | 16 | 28 |
| 31 – 51 | – | 33 | – | – | 10 | 15 | 11 | 16 | 9 | 19 | 14 | 9 | 5 | 7 |
| 51 – 100 | – | 6 | – | – | 4 | 6 | 7 | 11 | 6 | 28 | 2 | 7 | – | 3 |
| 101 – 300 | 8 | 16 | – | – | – | – | 7 | 3 | – | – | 2 | – | – | 1 |
| Over 300 | – | – | – | – | – | – | – | 5 | – | – | 2 | 2 | – | – |
| **Invertebrates N=** | **10** | **8** | **8** | **8** | **50** | **60** | **31** | **34** | **17** | **14** | **34** | **37** | **80** | **90** |
| 0 | 90 | 100 | 87 | 75 | 24 | 75 | 16 | 2 | 35 | 3 | 50 | 30 | 51 | – |
| 1 – 10 | 10 | – | – | 13 | 42 | 13 | 42 | 63 | 41 | 23 | 44 | 51 | 35 | 80 |
| 11 – 30 | – | – | 13 | – | 20 | – | 22 | 23 | 12 | 38 | 3 | 19 | 13 | 18 |
| 31 – 51 | – | – | – | – | 8 | – | 7 | 2 | – | 18 | – | – | 1 | 2 |
| 51 – 100 | – | – | – | 12 | – | 12 | 13 | 8 | 12 | 15 | – | – | – | – |
| 101 – 300 | – | – | – | – | 6 | – | – | – | – | – | – | – | – | – |
| Over 300 | – | – | – | – | – | – | – | 2 | – | 3 | 3 | – | – | – |

*Note:* A – respondent's family; B – average family

principal source of hydrocarbon pollution on Sakhalin. The percentage of such interviewed individuals is rather high in north Sakhalin, and unusually high in Yuzhno-Sakhalinsk.

The present investigation also aimed to reveal the attitudes of the Sakhalin population towards the environmental impact of offshore oil and gas development. The persons polled were asked the question:

"Do you think it is possible to develop oil and gas offshore while simultaneously meeting the requirement of biological diversity protection?" The distribution of different kinds of answers is shown in Table 3-11. It is remarkable that the highest proportion of interviewed individuals who had a positive outlook on this cooperation live in Nogliki, a town which is most closely located to the area of offshore oil development. Whereas the greatest proportion of polled individuals who doubt the compatibility of offshore oil development and biodiversity protection are from Nevelsk, a town which is located far away from hydrocarbon development, but which has been a place of dynamic fisheries development.

Most of the Sakhalin people suppose that the development of offshore oil and gas projects will improve the quality of life on Sakhalin in general. However, at the same time, their expectations for their local areas are much less optimistic. Paradoxically, in Nogliki we ob-

**Table 3-7.**
**Perceptions for the future of coastal fisheries in Sakhalin**

| View at the future of coastal fisheries | Area | | | | | | |
|---|---|---|---|---|---|---|---|
| | Nogliki | Kolendo | Nevelsk | Solovievka | Aleksandrovsk | Tomari | Yuzhno-Sakhalinsk |
| It will collapse | 62 | 43 | 42 | 20 | 43 | 22 | 22 |
| There will be no change | 23 | 23 | 10 | 18 | 15 | 8 | 23 |
| Probably it will be developing | 12 | 20 | 35 | 37 | 25 | 45 | 35 |
| Certainly, it will be developing | 3 | 14 | 13 | 25 | 17 | 25 | 20 |

**Table 3-8.**
**What means fishing and fish processing for polled individuals (in per cent of the total number of polled individuals in each area)**

| Attitude | Area | | | | | | |
|---|---|---|---|---|---|---|---|
| | Nogliki | Kolendo | Nevelsk | Solovievka | Aleksandrovsk | Tomari | Yuzhno-Sakhalinsk |
| Hobby, entertainment | 45 | 47 | 55 | 38 | 35 | 37 | 65 |
| Possibility to subsist | 52 | 42 | 33 | 43 | 47 | 35 | 32 |
| Mode of life | 5 | 7 | 12 | 7 | 13 | 15 | 8 |

**Table 3-9.**
**Sources of information on harmful effects of industries (in per cent to the total number of polled individuals in a particular area)**

| Information sources | Region | |
|---|---|---|
| | North-east Sakhalin n =63 | Yuzhno-Sakhalinsk n =77 |
| Newspapers, TV, radio | 11 | 40 |
| Public lectures of specialist | – | 6 |
| Conversation with neighbors, friends, relatives | 30 | 34 |
| PR releases of industries | 3 | 8 |
| Professional experience | 16 | 1 |
| Personal observations | 46 | 58 |

**Table 3-10.**
**Perceived changes in the condition of fish and seafood (in per cent of the total number of polled individuals in each area)**

| Quality change of fishes and seafood | Area | | | | | | |
|---|---|---|---|---|---|---|---|
| | Nogliki | Kolendo | Nevelsk | Solovievka | Aleksandrovsk | Tomari | Yuzhno-Sakhalinsk |
| Changes in general appearance, malformation | 88 | 57 | 75 | 65 | 73 | 63 | 61 |
| Unusual smell or taste | 75 | 62 | 70 | 78 | 60 | 43 | 68 |

**Table 3-11.**
**Answers given to the question: "Do you think it is possible to develop oil and gas offshore while simultaneously meeting the requirement of biological diversity protection?" (in per cent of the total number of polled individuals in each area)**

| Answer | Area | | | | | | |
|---|---|---|---|---|---|---|---|
| | Nogliki | Kolendo | Nevelsk | Solovievka | Aleksandrovsk | Tomari | Yuzhno-Sakhalinsk |
| Possible | 80 | 58 | 30 | 45 | 55 | 53 | 51 |
| Doubtful | 17 | 25 | 43 | 38 | 32 | 33 | 31 |
| Impossible | 3 | 17 | 27 | 17 | 13 | 13 | 18 |

**Table 3-12.**
**Frequency of using particular sources of information regarding the environment. (in per cent of the total number of polled individuals in each area)**

| Source of information | Frequency of using | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Often | | | | | | | Sometimes | | | | | | | Never | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Central TV | 43 | 38 | 35 | 40 | 52 | 23 | 41 | 43 | 52 | 53 | 48 | 33 | 40 | 43 | 13 | 10 | 12 | 12 | 15 | 37 | 16 |
| Local TV | 8 | 15 | 2 | 40 | 30 | 12 | 61 | 10 | 45 | 10 | 57 | 32 | 18 | 35 | 82 | 40 | 88 | 3 | 38 | 70 | 4 |
| Local radio | 7 | – | 5 | 10 | 27 | 3 | 36 | 5 | 8 | 7 | 22 | 35 | 12 | 30 | 88 | 92 | 88 | 68 | 38 | 85 | 34 |
| Central newspapers | 8 | 12 | 25 | 12 | 15 | 5 | 23 | 68 | 33 | 43 | 35 | 38 | 30 | 40 | 23 | 55 | 32 | 53 | 47 | 65 | 37 |
| Local newspapers | 52 | 27 | 23 | 25 | 23 | 15 | 54 | 35 | 42 | 45 | 48 | 42 | 58 | 38 | 13 | 32 | 32 | 27 | 35 | 27 | 8 |
| Specialists public lectures | 5 | – | 7 | 2 | 2 | – | 1 | 3 | 5 | – | 3 | 5 | 8 | 7 | 92 | 95 | 93 | 95 | 93 | 92 | 91 |
| Environmental NGOs bulletins | 5 | – | 3 | – | 2 | – | 3 | 7 | 15 | – | – | 2 | 7 | 8 | 88 | 85 | 97 | 100 | 97 | 93 | 89 |
| Information from relatives and neighbours | 17 | 42 | 27 | 3 | 20 | 18 | 14 | 60 | 38 | 53 | 47 | 45 | 33 | 48 | 23 | 20 | 20 | 50 | 35 | 48 | 38 |

**Areas: 1** – Nogliki; **2** – Kolendo; **3** – Nevelsk; **4** – Solovievka; **5** – Aleksandrovsk; **6** – Tomari; **7** – Yuzhno-Sakhalinsk

serve the highest proportion of polled people who believe such development will result in a decrease in the quality of living.

From 78 to 95% of the polled population lacks adequate information on the environmental situation of Sakhalin. The people from small towns and settlements express a need mostly for reliable information on local situations, while the inhabitants of Yuzhno-Sakhalinsk are mostly interested in data regarding the environmental characteristics of Sakhalin as a whole. Table 3-12 gives an idea of sources for environmental information, where the role of federal TV is highlighted. The role of local TV is surprisingly low. From 75 to 88% of the interviewed persons believe that the biological diversity of Sakhalin is unique due to Gray Whales, waterfowl and salmon, and are basically ready to contribute to its conservation.

## 3.5 Perception of Prospective Development on Sakhalin

It should firstly be mentioned that about half of the polled population demonstrates not only worry, but a complete dissatisfaction with perspectives about their future. About one third show a moderate satisfaction, while those who believe to have good perspectives are most numerous in Nevelsk, while the smallest proportion is in Aleksandrovsk (Fig. 9). Most polled individuals believe that improvement of the situation is dependent upon the President of the Russian Federation and on regional authorities. Few people think that political parties or non-governmental organizations play any role.

In answer to the question, "which sectors of the economy must be developed on Sakhalin?" the polled individuals give the highest rating to fishing, irrespective of the polling area. Twice lesser number of the interviewed persons is convinced of the necessity of oil and gas development. Agriculture and livestock farming and forest industry are also considered important (Fig. 10).

Tourism was never considered a promising field for development on Sakhalin, since the relevant infrastructure is lacking, while its formation requires a huge investment. However, it appears that tourism (most likely self-organized) is quite common on Sakhalin, and the inhabitants of even rather remote areas like Kolendo (50% of the

sample) have some experience with tourists. In north-west Sakhalin the proportion of the population which has had contacts with tourists is the lowest on Sakhalin (23% in Aleksandrovsk and 24% in Tomari). It is worth noting that the inhabitants of these areas themselves are also less likely to travel than people from other parts of the island. Between 80 and 85% of the interviewed persons in each area believe that the development of tourism will bring benefits to the local community and to the entire island as well. The interviewed persons consider fishing tourism on Sakhalin as particularly interesting. It is remarkable that over half of the polled population in each area expressed their personal interest in the development of fishing tourism in their areas.

The data collected in the present study provide several indications representative of both the social and economic situation on Sakhalin as well as attitudes of its population. These, then, may provide a good basis for decision making. Sociology provides not only a means for monitoring society, but also a way to model future development. In this respect, the methodology of innovative project seminars (developed by A.I. Prigozhin' s group) appears to be very promising and may be included in the process of the Strategic Ecological Assessment.

# FINAL EDITORIAL COMMENT

The present sociological study indicates the presence of a generally active and potentially environmentally responsible population of Sakhalin, which is nevertheless impoverished and is living to a greater extent on its coastal aquatic resources. Most of this population will likely not find its niche in the future offshore oil and gas development in north-eastern Sakhalin, nor will these people be demanded as suppliers of goods and services to the well-paid employees of oil companies. It is remarkable that the interviewed persons, though believing that the offshore oil and gas projects will improve the quality of life on Sakhalin in general, do not expect improvement in their local areas. A striking image of devastation is brought by the study for north-western Sakhalin. The offshore oil and gas projects will unlikely have any significant positive effect on the economical and social situation in this area unless the dividends of Sakhalin from these projects will be partly used for the wise stimulation of local fisheries and fish processing. Even in north-eastern Sakhalin, which is traditionally dominated by the oil industry, only a small part of the population may be employed in the offshore oil and gas project, and most of them only temporarily.

According to the EIA of the first phase of the *Sakhalin 1* project, at the peak of the project's development, 300 jobs will be provided. Since the majority of the vacancies require certain qualifications which may not necessarily be found within the local people, people from outside the region will be invited, which is bound to cause tension and stress on the region. On the other hand, the employees of the present onshore oil extraction enterprises may lose their jobs due to the depletion of the fields, which have been under development for many years. This will likely further contribute to a social split and impoverishment of the majority of the population. Since the area is largely not prepared for rapid development in other sectors, and even the fish resources have not been properly assessed*, the result will stimulate the growth of poaching, which is a problem difficult to tackle.

These problems are only coupled with the possibility of a large-scale accident which would affect fisheries across the entire Sakhalin island, thus such an oil spill would call for a comprehensive programme of regional development. This must be a programme where environmental safety and the benefits shared from oil development would be cross-linked to ensure the sustainability of the fisheries sector while meeting the needs of the entire society.

* Several specialists from fisheries institutes who were engaged in contracts with the oil and gas companies tried to show that the waters off north-eastern Sakhalin are poor in living resources, rather than trying to make a thorough assessment of fish stocks. As a result, a total mass of herring stranded onshore in the Piltun Bay in 1999 apparently exceeded stock estimates given by the Sakhalin Institute for Marine Fisheries and Oceanography. Recently, when local fisheries in north-eastern Sakhalin were seriously affected by the depletion of the Navaga stock, fishery scientists were largely not prepared to deal with this crisis, which is of a local nature, yet crucial for the entire subregion.

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# APPENDIX 1

## New Development of the *Sakhalin* 1 Project and Comments on the Environmental Impact Assessment

*An account of the Phase 2 of the* Sakhalin 1 *Project. Exxon Neftegas Ltd., Yuzhno-Sakhalinsk, Russia, September 2001*

Prepared by "Sakhalin Environment Watch" based on a document by Exxon Neftegaz Ltd, provided for public review, and additions based on the results of public hearings in Yuzhno-Sakhalink on 25 October 2001.
Translation: David Gordon, Pacific Environment and Resource Council

### Project Description

**Chaivo.** The Chaivo deposit is located 6-12 kilometers from shore. Its development is planned to be carried out from the shore and from the offshore platform Orlan (previously an exploration platform in the Beaufort Sea), which will be placed at a depth of 15 meters, 11 kilometers from shore. 20 production wells will be drilled from the platform – 8 oil production wells, 7 wells for injection of gas, 1 well for injection of drilling wastes, and 4 additional wells whose purpose will later be determined.

From the drilling area, located on the shore of the Sea of Okhotsk, on the Chaivinsky spit, 10 production wells will be drilled, 1 for injection of drilling wastes, and several for the supply of fresh water. A camp for 120 people will be built in the drilling area.

8 kilometers from the drilling area, near to Ngayan Cape and 1 kilometer west of the Chaivo Bay, an Onshore Complex for Preparation of Production (OCP) will be built, at which oil extracted from the Chaivo and Odoptu deposits will be processed. The Orlan Platform and the OCP will be connected by two pipelines 19 kilometers in length, of which 11 kilometers are at sea. Infrastructure in the form of a bridge is also planned across Chaivo Bay.

**Odoptu.** The Odoptu deposit, which is located 7-24 kilometers from shore, will be developed from two onshore areas – the northern (#2) and the southern (#1), with a distance between the two of 9 kilometers. The drilling areas are located on the Piltun spit: #2 is to the south of Lebedinyi Cape, and #1 is to the south of Ostrovnoi Cape.

At area #1, over 7-8 years: 9 production wells will be drilled, 3 for injection of gas, 5 for injection of water, 1 for injection of drilling wastes, 3 for gathering of water (21 wells in total).

At area #2, over 5 years: 9 production wells will be drilled, 4 for injection of water, 1 for injection of drilling wastes, and 3 for gathering of water (17 in total).

Next to area #1, an OCP will be built. The drilling areas and the OCP will be connected by a network of pipelines.

Production from both deposits will be:

- oil: 12 million t per year (40 000 t per day)
- gas: 31.2 million $m^3$ per day. 1.1 million $m^3$ per day of dry processed gas will be used as fuel for the OCP and up to 2.8 million $m^3$ per day will go for sale on the local market.

Piers will be constructed at the drilling areas of Odoptu and Chaivo for unloading construction materials that will be imported by barges.

**Pipeline.** An on-shore pipeline with a length of 67 kilometers will be laid from the OCP Odoptu to the OCP Chaivo. A pipeline will go from OCP Chaivo to a terminal at De-Kastri, first going across Nevelsky Strait from Uangi Cape to Kamennyi Cape.

The length of the oil pipeline to De-Kastri is 221 kilometers, with a diameter of 610 mm. The oil pipeline will cross 24 roads, 129 water barriers with an overall length for their crossing of 492 meters. The length of the crossing of Nevelsky Strait is 20 kilometers. Turnoff valves in the oil pipeline will be put into place on both shores of Nevelsky Strait, in areas crossing large water barriers, and seismically active faults. The pipeline will be buried underground at a depth of 0.5-1 meter. Crossings over rivers will be carried out primarily via digging trenches across the streambed. However, the project developers claim that there will be an individual approach to each river and that it is possible that the pipeline will cross under some rivers by drilling a horizontal well under the streambed. Work on crossings over rivers will be occur outside of the spawning period in the winter, but shallow streams will be crossed in the summer as well. The final route of the pipeline will be determined by the end of 2001.

**Terminal.** Oil will be transported from the De-Kastri terminal year-round by tankers through the Tatar Strait to Japan and Pacific Rim countries. Tankers will be with a double hull and the water displacement of up to 110 thousand tons. Oil will be transported every 2-3 days onto 6 tankers for transporting 40 000 t per day (as stated in the Exxon document). Tugboats will be used at the terminal for maneuvering and for the approach of tankers. Four ice-breakers will be used to provide for tanker approaches in the Tatar Strait and the approaches to the terminal during 3-4 severe winter months in order to provide for year-round offloading.

A portion of the construction materials will be transported by barge, and the rest by trucks to the construction locations.

Dates for the most important stages of project realization:

Construction of the OCP and the drilling area at Chaivo – 3rd quarter of 2002

Drilling at Chaivo – 4th quarter of 2002;

production – 4th quarter of 2005

Construction at Odoptu – 1st quarter of 2004;

extraction – 4th quarter of 2007

De-Kastri: Construction and dredging work – 4th quarter of 2002

Offshore platform Orlan: setting in place – 2nd quarter of 2004

Onshore pipeline: construction – 3rd quarter of 2002

Offshore pipeline – 3rd quarter of 2004

Launch of exploitation of the Orlan Platform, OCP Chaivo, and the De-Kastri

Terminal: End of 2005

OCP Odoptu: 2007

Exploitation of these complexes will require a workforce of 500 people.

**Impact of the project.** The impact of the project on the environment, according to the opinion of the project developers, is weak and modest. A weak impact is classified as: short-term, scale from local to regional, consequences are reversible, and impacts can be noticed on the level of subpopulations of biota, ecosystems, and the human population. "Measured" (modest) is classified as: medium-term, the scale is local or regional, the consequences are reversible, and are noticeable on the level of populations and ecosystems. "Short-term" impacts are: 1-10 days for the physical environment, 1 day-1 month for the biological environment, and 1 day-1 season for the social environment. "Medium-term" impacts are: from 10 days to a season for the physical environment, from one month to a season for the biological environment, and from one season to years for the social environment.

**Consultations with the public and minimization of impact.** Exxon Neftegas Limited will carry out consultations with native peoples to identify sites for constructing objects and dates of construction, in order to bring the impacts on migration of reindeer to a minimum.

Offshore infrastructure, pipelines, and safety zones around them will be put onto navigational maps. Exxon Neftegaz Ltd will carry out meetings regularly with fish harvesting organizations and native peoples to resolve concerns that arise.

Construction activity for crossings of waterways will be carried out when possible outside of spawning periods.

Some toxic wastes, drilling muds and cuttings (with the exception of those that will be created in the first 100 meters of drilling the offshore well, i.e. prior to the dropping of the removed core, produced water and other technical waste water) will be pumped into appropriate underground formation cavities. Low-toxicity oil-based drilling muds will also be used during the process of drilling.

The injection process could bring on a hydraulic fault of the formation, but the consequences of this will only appear just within the limits of the drilling plot due to the flexibility of inter-layer clays. Under contract with Exxon, the Institute of Marine Geology and Geophysics of the Far Eastern Branch of the Russian Academy of Sciences carried out research on the dependence between the injection of drilling wastes and seismic activity. The results of the work showed an extremely low probability of initiating catastrophic earthquakes with the injection of fluids at recommended distances from active faults.

"The company Exxon Neftegaz Ltd will provide information, carry out lectures in schools, for nature conservation public organizations, for the local administration, for representatives of business, and for the broad public. Public consultations during the period of construction and exploitation of project objects is seen as a key factor of supporting the relations that have been built between the company Exxon Neftegaz Ltdand the primary interested parties....The company Exxon Neftegaz Ltd will organize the given consultations during the entire period of the realization of the project."

**Characteristics of the region of work for the project.** The area of the *Sakhalin*-1 project is located in a region characterized by having strong marine currents, intensive wave activity, changes in sea level, complex ice conditions, the creation of *torosy* and stomukha (ice shears), as well as by high seismic activity leading to the arising of tsunamis. In 1964 there was an 8.0 earthquake in Nogliki District, and in 1995 in Neftegorsk, there was a 7.2 earthquake with the epicentre 15-25 kilometers from the shoreline. Earthquakes, landslides, avalances, *seli*, erosion, and swamping are all possible in the area of construction of the objects. The Odoptu-Chaivo-De-Kastri oil pipeline crosses large rivers and creeks 43 times and smaller waterways 140 times.

In Chaivo and Piltun pays, 355 bird species, of which 10 species are listed in the Russian Red Book (rare and endangerd species list), either nest or stop during migration. The Wrangel Island Natural Monument is located 2.5 kilometers from the northern drilling area. Aquatic areas that are near to Piltun Bay are the feeding area for the Okhotsk-Korean population of Gray Whales, which are listed in the Red Book of the Russian Federation and IUCN as a species under the threat of extinction. Construction of the piers in this region and intensive ship traffic will create significant disruption to the Gray Whales, since this is an irreplaceable area for their feeding.

Six fish hatcheries are located within the zone of project impact: the Tymovsky and Pilenga fish hatcheries on the Tym' River; the Pobedinskii and Buyuklovskii fish hatcheries on the Poronai River; the Pugachevskii fish hatchery on the Pugachevka River; and the Urozhaynyi fish hatchery on the Chernaya River.

The loss of forest resources from placement of the pipeline comes to 120 hectares, including 17 hectares of first group forests and 14000 cubic meters of construction materials. The damage to wildlife is evaluated at 29 million rubles, and the loss of marine biological resources at 102 tons.

**An analysis of alternative variants carried out by project developers:**

1. Offshore drilling instead of drilling from the shore. Drilling from the shore will only obtain 75% of the oil volumes. However, offshore drilling is too expensive. Therefore, drilling partially from shore, and partially offshore, was chosen.

2. The route of the export oil pipeline to the marine terminal. Since the expenses for an oil pipeline to the south of Sakhalin to Prigorodnoye and construction of a terminal there are much higher than the pipeline to De-Kastri, a terminal there, and leasing four icebreakers, the latter variant was chosen. Despite the fact that the oil pipeline route to De-Kastri crosses an area of high seismic activity with three isolated faults.

3. The location of the Chaivo OCP. Several years ago, a forest fire occurred on the chosen site and this situation lowers the volume of logged timber during construction.

4. The route of the pipeline from OCP Odoptu to OCP Chaivo. An onshore route was chosen, since the marine route is longer by 20 kilometers and its construction would cause a stronger impact on fisheries resources and marine mammals.

5. The "no action" alternative. In this situation, the environmental condition in the region will not change. Implementing the project can provide pure profit (employment, revenues for the Russian Federation counted in the billions of dollars, construction of infrastructure). The "no action" alternative can lead to the loss of a profitable opportunity for Russia and the regions.

Specialists from Russia and Sakhalin will be invited to work on the project. During the implementation of the project, payment of taxes and providing a share of "profitable oil" to both the administration of Sakhalin Region as well as to the federal government, will be carried out.

During winter of 2002, the company Exxon-Neftegaz Ltd will begin testing of tanker transportation to De-Kastri with escort by two icebreakers to determine the safest routes for incoming and outgoing tankers.

**Comments on "Preliminary Environmental Impact Assessment of the Project *Sakhalin* 1**

By Gorokhov V.K.(PhD Chemistry, Institute Ecojuris, Moscow), Kasianova N.A. (Dr. Sci, Geology, Moscow State University), Lesnikov B.M. (PhD, Physics, Institute for Applied Ecology, Moscow), Mischenko V.L. (PhD, Law, Institute Ecojuris, Moscow), Spiridonov V.A. (PhD, Biology, WWF)

The document presented by Exxon Neftegaz Ltd. according to the Preliminary Environmental Impact Assessment of the project *Sakhalin 1* (further on EIA) is of a general and in many ways declarative character. The description of the project itself occupies the major part of it, while a smaller part is devoted to the EIA. Therefore the document cannot serve as a basis for a serious analysis. An alternative EIA could provide such an analysis, but it is definitely unreal to expect such an alternative EIA from the reviewers. Thus below are stated several remarks which are of both a general and specific character.

1) There are serious grounds to suppose that in the course of public discussion the procedure of informing the public required by the Russian legislation was violated.

2) Assessment of the state of the environment was made formally. It is obvious that only a few and the most general literary sources were used for the assessment.

Such an important factor as waves, which influence sediment dynamics, is touched upon very shortly. The following is stated regarding another most important process defining the possible behavior of pollutants:

"It is supposed that sediment changes under the influence of tidal current is complicated and thus difficult to determine." At the same time tidal processes can be modeled, while tidal currents and sediment transport can be measured instrumentally. These measurements could be conducted at the bay entrance, which does not require expensive ship works. It is difficult to imagine that during the whole period starting from the preparatory phase of the project, which promises high profits according to the document, the company-operator failed to find the sum of about 100 000 USD, which would be enough to conduct research in the mentioned field.

Nothing is said about the significance of rivers in the region for salmon fishing. The ecology of Piltun and Chaivo Bays, which play the most important role not only as the most significant wetlands, herring spawning sites and feeding places of some other kinds of fish but probably also as suppliers of organic matter into surrounding parts of the sea, is extremely weakly illustrated.

Not a word is said about oceanographic conditions of the bays, water exchange, or particulate organic matter transport between the bay and the sea. The legal status of the bays is falsely described.

3) In this connection the plans to lay the pipeline across Piltun Bay (10 km of the pipeline Odoptu-Chaivo for pumping oil under high pressure) seem to be extremely weakly grounded ecologically. Not a word is mentioned about how the replacement of a huge mass of sediments, which is inevitable during the pipeline construction, can affect the hydrochemical regime of the bay, its productivity and biological diversity. When the alternative variants are considered, in particular, an offshore one, it is only said that it will cause an unfavorable impact on whales. It is clear that the impact of the pipeline construction on the Gray Whale population will be distinctly negative. However the part of the pipeline in the feeding area of whales theoretically could be built in the season when there are no whales or when they are just beginning to arrive (April-May). Again nothing is said about this in the presented document.

4) Assessment of the pipeline in general totally ignores the impact on biocenosis of the bays and coastal areas of the sea connected with

hydrotechnical construction. How is it possible without this assessment to say that the impact of the project on industrial fishing as well as on whales and other sea mammals will be "insignificant" (Table 6-1-4 EIA)?

5) The Environmental Impact Assessment should contain qualitative information about such impact. For example, how many kilometers of the pipeline will be laid in the seismic zones and what security measures will be undertaken in these areas, what hunting and fishing grounds of the local Sakhalin people will be touched by the construction site, what will be the extent of damage and how it is planned to compensate for the damage, etc.

Thus it is well known that during the famous Neftegorsk earthquake (1995) more than a thousand breaks occurred on all types of pipelines belonging to the company Sakhalinmorneftegaz. It is impossible to understand from the EIA how the Exxon Oil Gas Ltd. company will deal with the consequences of possible accidents, while this is a question of utmost priority.

6) Technical solutions for protecting the sea area of the pipeline in the Sea of Okhotsk are not given in the document. When crossing the Nevelsk Bay only two shutters are planned to be installed on the shores. Thus in case the pipeline breaks in the middle of the bay, a considerable amount of oil will leak into the sea. Its amount, security measures and methods how to deal with the consequences of such a break are not analyzed in the EIA.

7) Shipment of crude oil from the sea terminal De-Kastri is planned by tankers of 110 000 t displacement. Every 2-3 days oil will be shipped by six tankers. In total, it is planned to transport 12 million t of crude oil per year.

The document contains the following statement:

"The research accomplished by Russian and international specialists within the three-year period made it possible to come to the conclusion that all year-round exploitation of tankers from De Castri to the south across the Tatarsk Strait is *safe*" (emphasis added). First of all we would like to ask what kind of research the authors of the EIA appeal to? Other authors, in particular the Far East analysts are not so ambiguous in their conclusions.

First of all, in spite of all the measures undertaken within the convention MARPOL-73/78, MCO-69, SOLAS and the decisions of the International Maritime Organization, the number of large accidents of tankers and oil spills in the 1990s reached up to 10 per year. It can be said with confidence that middle and large accidents are more likely in the regions where the routes of tankers are close to dangers, to the regions with complicated hydrometeorogical conditions and intensive ship traffic (Moninets A.Yu. Analysis of the accidents causing oil spill into sea." In: "Problems of perfection the system of fighting against oil spill in the Far East", The Admiral G.I. Nevelskoi Marine Academy, Vladivostok, 1999, pp. 3-10). The northern part of the Tatar Strait is exactly such a region where besides this there is intensive shipping of fishing vessels doing various operations with nets, traps and other gear. In the text of the EIA, nothing is said about how, by whom and when will the oil spill response plan be elaborated in advance. At the same time, the elaboration of such a plan is not an easy task. It should have serious material security and many organizations should be involved.

8) Information on regulations which will be used by operators for defining the impact of noise on whales, listed in the Red Books of IUCN and Russia is absent.

10) The most serious critical remarks are addressed to the social and economic part of the document.

Many social and economic characteristics of the region of works are given according to the data of 1996, though it ends in 2001. The question arises: couldn't the company hire the executives who would be able to acquire more updated data?

The authors of the EIA correctly note that the local population could fail to cope with the most difficult tasks which will arise during the construction. At the peak of the project's development, 300 jobs will be provided. Since the majority of the vacancies require certain qualifications which may not necessarily be found within the local people, people from outside the region will be invited, which is bound to cause tension in the region. This tension could, in part, be relieved by the improvement of living conditions of the local population. However, from the materials presented, it is not clear how this will be achieved. There is a high probability that development of the project will cause even further social split and impoverishment of the majority of the population, and as a result will stimulate the growth of poaching, which is a problem difficult to tackle.

In conclusion, it is recommended that the presented preliminary EIA be seriously reworked. In the available form it cannot be considered as the foundation for investments for further development of the *Sakhalin 1* Project. Such a negative evaluation of the document could likely be avoided if the whole procedure of preparation of the Terms of Reference (TORs) for the EIA, planning of research work and choice of the executives were more transparent and could make possible the avoidance of work by insufficiently qualified specialists. This is especially important when taking into account that the funds spent by the investor for accomplishing such works are reimbursed in the course of fulfillment of production share agreements, and thus ultimately are funds spent by the Russian Federation.

# APPENDIX 2

## NOTES FROM PUBLIC HEARINGS ON THE SAKHALIN-2 PROJECT MARCH 1, 2002

**David Gordon, Pacific Environment**

At the behest of urban and regional leaders and members of the public, Sakhalin Environment Watch (SEW) organized alternative public hearings regarding Shell's/Sakhalin Energy's "*Sakhalin*-2" project.

Sakhalin Environment Watch (SEW), along with interested regional leaders and members of the public, believe that these additional hearings were necessary because the public did not have an opportunity to ask all of its questions or discuss the projects in detail at public hearings that were organized by Sakhalin Energy in December, 2001. The earlier public hearings consisted of a 90-minute presentation by the company and only 30 minutes for questions and answers from the public.

More than 100 people attended SEW's hearings, which attested to the need for these additional hearings. Apparently only 40 people attended the hearings organized by Sakhalin Energy in December. A number of people traveled from Korsakov, on the southern coast of Sakhalin and near to the proposed sight of the Liquified Natural Gas (LNG) plant, SEW's hearings lasted five hours, from 2-7 p.m., included a range of presentations from a variety of points of view, and provided a full opportunity for questions to each speaker and discussion.

Unfortunately, Sakhalin Energy itself refused to attend the public hearings organized by SEW. Sakhalin Energy claimed that there was no mandatory legal requirement for it to appear at these public hearings and that it had satisfied legal requirements with the public hearing in December. Sakhalin Energy's claim may be accurate according to the letter of the law, but its presence was noted and missed by participants at the SEW hearings. Sakhalin Energy's failure to appear at this public discussion of the Sakhalin-2 project attests to a deepening mistrust between the public of Sakhalin Island and the oil companies that are operating there.

In a letter of refusal, Sakhalin Energy wrote that it was "surprised" and "puzzled" that SEW chose to hold the hearings. Sakhalin Energy goes on in its letter to flout public organizations' attempts to raise environmental and economic concerns on the project and cites the lack of a legal requirement that would mandate the company's attendance. According to the letter, "We have taken legal opinion on the validity of your calling this meeting under your quoted Article 12 of the Federal Law on Environmental Protection. Following this advice, it would appear that there is no legal basis in law for Sakhalin Energy to attend."

An assistant to Sakhalin's Duma representative Zhdakaev opened the hearings. He said that the hearings are a very important step for civil society and that these public hearings can help shed light on the oil development. He also claimed that many mistakes have been made since oil development on Sakhalin Island began, and that royalties expected from the oil projects are not coming in. He also claimed that it was a mistake by the Sakhalin Duma to free the oil projects from taxes. He suggested that the press on Sakhalin Island is not able to freely report on the projects due to payments from the oil companies to the press. And he argued that contracts supposedly going to Russian companies are actually going to foreign companies that are registered as Russian. He concluded by arguing for the need to look objectively at these issues and these public hearings would help.

Further presentations and discussions highlighted the following issues:

- Economically, the project has a problem with exaggerated expenses;
- Money for the projects have gone not to Sakhalin but to foreign companies;
- Shell is only interested in Liquified Natural Gas (LNG) because it builds LNG plants; it is not willing to look at alternative fuels;
- The Production Sharing Agreement should be dissolved, at least for the Lunskoye Deposit;
- Lack of demand for LNG;
- Unfair prices for gas are being proposed for use by Sakhalin Island;
- Sakhalin Energy did not tell the truth at its public hearings, particularly about the impacts of drilling muds (Sakhalin Energy apparently suggested that drilling muds are no more harmful than lipstick);
- The need to develop alternative fuels like Dimethyl Ether (DME), and the opportunities for Sakhalin gas to be used for DME rather than for LNG due to growth in the market and a smaller amount of energy required to create DME;
- Concern about seismic effects from oil development and impacts on pipelines;
- Problems of exceeding allowable pollution norms through discharges of drilling muds and cuttings;
- Concerns about the deleterious effects of drilling muds and cuttings on marine biological resources;
- Concerns about the impacts from the LNG plant on fisheries in Aniva Bay, including on salmon spawning streams in Prigorodnoye;
- Concerns about the 1999 oil spill at Molikpaq and the lack of consensus about the amount of oil that was spilled;
- Concerns about other accidents on the Molikpaq that perhaps have not been reported;

- Concerns about the limited habitat for benthic organisms that are key to survival of the Western Pacific Gray Whale;
- Problems with illegal gas flaring from the Molikpaq platform;
- Concerns about the independence of scientific institutes that are working under contract to the oil companies;
- Concerns with the lack of regular and attentive monitoring by government agencies;
- Concerns about the lack of baseline data on fisheries in Aniva Bay;
- Concern about the herring kill in Piltun Bay in 1999 as well as other fisheries decreases, including decreases in saffron cod;
- Concerns about the pipeline to be constructed on Sakhalin Island and especially its impacts on salmon spawning areas;
- Concerns by residents of Korsakov about the impact of LNG plant on fisheries, air pollution, and public health;
- Lack of time for citizens to ask questions at Sakhalin Energy's public hearings in Korsakov;
- Concerns about the conditions of the Production Sharing Agreements and recommendations that the conditions be changed;
- Recommendations for citizens to go to court against Sakhalin Energy for damages to the Russian Federation;
- Concern about the lack of economic benefits in relation to the high environmental costs of the project.

SEW promised to write up a full transcript of the public hearings, which will then be provided to Sakhalin Energy, the regional administration, federal government agencies, and other interested parties. SEW remained hopeful that Sakhalin Energy will provide answers to the questions asked by citizens at these alternative public hearings. Many participants also signed an appeal to Sakhalin Energy with concerns about its lack of attendance at the public hearings and the lack of respect that this showed to the people of Sakhalin Island.

# APPENDIX 3

## WESTERN PACIFIC GRAY WHALE

(full version initially prepared for the WWF leaflet)

Gray Whales are currently found only in the Pacific Ocean, but in the past they have had a wider distribution. Historical documents and archaeological excavations clearly indicate an abundant Gray Whale population in the Atlantic Ocean during the Middle Ages, though it had become extinct due to whaling by the 18th century.

By the mid-1870s, commercial whaling from both ships and shore stations had reduced the Eastern Pacific population of Gray Whales along the coast of North America to about 4,000 individuals. However, with protection from further exploitation solidified by the Whaling Convention of 1946 and the U.S. Marine Mammal Protection Act of 1972, this population was able to quickly rebound. Approximately 21,000 Gray Whales now live in the eastern Pacific Ocean, quite possibly as many as existed before the heyday of commercial whaling.

The Western Pacific Gray whale population was probably never as substantial as the Eastern Pacific population. In the 1740s Stepan Krasheninnikov, Kamchatka's natural history pioneer, described numerous herds of whales presumably belonging to this species along the western and southern coasts of Kamchatka. Though indigenous whaling by the Koryaks was limited, the onset of commercial whaling in the Sea of Okhotsk in the early 20th century soon brought the population of Gray Whales nearly to extinction. Coastal whaling stations in the area left little if any catch statistics so population estimates for the Western Pacific Gray Whale in the past are scarcely reliable. By the early 1970s whale specialists were seriously doubting the northeastern population's survival, when suddenly a group of summering Gray Whales was discovered off the coast of Sakhalin Island in 1977 by scientists from the Pacific Institute for Marine Fisheries and Oceanography in Vladivostok.

This population of Gray Whales that migrates to the spring/summer feeding waters off of northeastern Sakhalin has been subject to regular studies since 1995. These studies indicate that its number does not exceed 100 specimens and that most whales which are seen outside the feeding area actually belong to this group. In the 2001 season the joint Russian-U.S. research team identified 71 whales, including six new whales born around the start of the year in calving waters known to be somewhere along the coast of China. Two of the six females with calves gave birth to their first calf during this year, while the other four mothers had also given birth in 1998. It is important to note that no calves recorded in the past years showed up in Sakhalin after their first summer.

Since 1999 some whales have shown indications of starvation and have been described by observers as "skinny whales." Their number grew from 10 to 27 in the year 2000 (28.7 % of the estimated population) while in the year 2001, 12 whales, including four females with calves, have been tentatively identified as "skinny whales." Using a special biochemical methodology, scientists have examined small pieces of whale skin and concluded that skinny whales are under physiological stress. Considering both the dwindling numbers of this whale population, and the possibility that fewer than 50 reproductive individuals exist, The World Conservation Union (IUCN) has listed this population as *critically endangered*. This resolution was adopted at the 53rd meeting of the International Whaling Commission, noting that it is a matter of absolute urgency that every effort be made to reduce anthropogenic disturbances to the lowest possible level while the critically endangered Gray Whales are in their feeding waters off the coast of northeastern Sakhalin.

### Offshore Oil Development and Whales

The only known feeding waters for this whale population is an area off of northeastern Sakhalin in the Piltun Lagoon region, and is approximately 60 km long (north to south) and 5 km wide (east to west). Thus this region serves as an important and irreplaceable habitat for the Western Pacific Gray Whales.

Since the mid 1990s, whale summering grounds off Sakhalin Island have had to coexist with high intensity seismic exploration, placement of temporary drilling rigs, increased ship and helicopter traffic, and the installation of a major drilling and production platform– all within 10-20 km of their primary feeding area. Concerns about this development include threats to the whales and their benthic food by an oil spill, and underwater noise disturbance of the whales caused by seismic surveys, drilling and production rigs, and associated support vessels and helicopters operating in the areas around the Sakhalin I and Sakhalin II projects.

The projects of offshore oil development in Sakhalin were begun even before an efficient accidental oil spill response system was put into place. The Federal Ecological Expert Panel Review in Russia repeatedly pointed out numerous project details, which caused considerable doubt as to environmental soundness. The history of both the Sakhalin I and II projects proved that the strategy adopted by the investors was not one of adjusting their technological schemes to the recommendations of expert panels, but rather insisting upon adopted practices.

Even though all causes for further deterioration of the Sakhalin Gray Whale population are still not completely clear, there still remains substantial evidence that disturbance from offshore oil activities contributes to the degeneration of the population's condition.

In 1997 the Russian-U.S. research team documented apparent behavioral shifts of Gray Whales in relation to seismic surveys being

conducted 30 km away. With the onset of commercial oil extraction on the Moliqpack platform in 1999, whales apparently shifted to the northern portion of the feeding area. A seismic survey conducted in August/September 2001 caused a clear disturbance for the whales, as evidenced by a shortened feeding time. These disturbances and shortening of feeding time may likely result in malnutrition and a lesser chance (particularly for calves) to survive through migration and wintering. Further development of the Sakhalin offshore oil and gas projects also poses various new threats, such as the construction of a pier inside whale feeding waters, and the construction of an underwater pipeline, which are among the most serious threats aside from oil spills.

## Other Threats

Since neither the migration patterns nor exact location of wintering areas of the Western Pacific Gray Whales are known, it is rather difficult to conclude which other factors threaten them. Recently, illegally traded Gray Whale meat was discovered on the Japanese market. Illegal hunting is presumed possible in the wintering areas off East Asia, but most likely the meat traded in Japan is of Eastern Pacific origin. Also, ship strikes and entanglement of fishing nets and gear are other factors which have to be taken into account when considering international conservation measures, but information regarding them is only now becoming available.

## General Information on the Gray Whale

Gray Whales may be the most "primitive" living baleen whales, as they have remained nearly the same morphologically over millions of years. Evidence for this is given not only by their anatomy, but also their slow swimming speeds, preference for coastal waters and their dependence (in the East Pacific) on sheltered lagoons for calving. This behavior stands in contrast with the swifter open-ocean and breeders like Fin Whales and Blue Whales. Gray Whales are migratory marine mammals which possibly undergo some of the longest migrations in the world. Eastern Pacific Gray Whales calve in winter in the lagoons of the Pacific coast of Mexico. By the end of winter they depart for their long journey (more than 10 000 km) along the entire coast of North America to the Bering Strait and the Chuckchi Sea. Although this area also has lagoons in abundance, whales are usually found foraging outside of them searching for sandy seafloors with an abundant benthic population. By studying the contents from the stomachs of Gray Whales captured by indigenous people in the Bering Strait area, scientists have learned that small crustaceans called amphipods make up the meal most commonly enjoyed by the whales.

Early observers of Gray Whales called them "mussel diggers," and thought that these whales behaved much like an underwater power shovel, scooping up great mouthfuls of sand and silt in its massive lower jaw. They later abandoned this idea after learning that amphipods and other animals consumed by the whales were found in a layer of sediment less than an inch deep. Now it appears that Gray Whales draw in their prey using suction. While feeding, a whale will swim along the sea bottom, slowly turning its body and bringing the side of its mouth within a few inches from the bottom. Because most Gray Whales bear fewer barnacles and more skin abrasions on the right sides of their heads, they can be considered "right-handed," while others appear to favor their left side.

The Sea of Okhotsk is in many respects similar to the Arctic Ocean, although the ice-free period in most of its areas is clearly longer. The east coast of Sakhalin is known for its plentiful lagoon environment, and thus its landscape is reminiscent of the shoreline of the Bering Strait. The Piltun lagoon in particular, in front of which whales are commonly concentrated is a highly productive area. They likely gather in this location by more than mere accident: organic matter produced in the lagoon ecosystem is exported with tidal currents and supports rich populations of benthic crustaceans. Unfortunately, in contrast with their Eastern Pacific counterparts, the feeding of Gray Whales off the island of Sakhalin has not been well studied. However, what has been discovered is that not only amphipods, but other crustaceans termed isopods are also an important component of their diet. Whales forage in the Sakhalin area from May to October, while later in autumn they begin their migration to the south. It has long been thought that their migration ends somewhere in the Korean waters where females give birth to young, though this has not yet been proven. The wintering area of the Western Pacific Gray Whales may be located further south in the South China Sea.

Whale biologists recognize individual Gray Whales by the patterns of barnacle clusters and white spots on their skin– in this no two animals are alike. By preparing photo identification cards, the scientists from the Russian–US team have managed to count nearly all whales around Sakhalin and keep track of them throughout time.

## What WWF is Doing

Promoting the highest environmental standards for offshore oil and gas exploration and extraction on Sakhalin; establishing a whale reserve in the Gray Whale summering waters; and founding well coordinated conservation monitoring and conservation activities throughout the entire Western Pacific Gray Whale range have been identified as ways to reduce or eliminate the threats to this highly endangered population.

- WWF is striving to reduce all threats to the whales by lobbying the International Whaling Commission – the primary organization for whale conservation and management. Joint efforts of WWF, IFAW and Greenpeace all contributed to the adoption of the resolution of the 53rd session of the International Whaling Commission on Western Pacific Gray Whales.

- The CEOs of WWF Russia, IFAW Russian office and Greenpeace Russia forwarded the conclusions of Russian marine mammal experts regarding the situation with Western Pacific Gray Whales to the

Prime Minister of Russia. This apparently resulted in a raising of awareness of the problem among Russian authorities.

- During the EXXON seismic survey in August–September, WWF Russia sent five official letters to the Ministry for Natural Resources of the Russian Federation which reviewed the current situation and warned of the threats of seismic surveys to whales. This activity, along with the campaign undertaken by The Sakhalin Environmental Watch, Greenpeace, IFAW and other organizations, helped to prevent the further escalation of seismic work in whale feeding waters in 2001.
- WWF Russia organized a series of meetings with whale specialists to agree upon the draft of the whale reserve proposal, which has been sent to the government of Russia.
- WWF is trying to use all existing analysis and communication tools to influence environmental standards in the Sakhalin offshore oil projects.

## Proposed Whale Reserve (*see map* – Fig. 11)

The approximate dimensions of the zakaznik should be ca. 100 miles long (roughly between the town of Okha and Chaivo Bay) and 12 miles from the coastline. Of particular importance to protecting Gray Whales and their habitat is the limitation of underwater noise, oil and chemical contamination, and any other potential threats to the feeding habitat and benthic food communities these whales depend on. The more extensive buffer zone (from 12 to 24 miles offshore) would also prohibit any seismic surveying or other geophysical sub-bottom profiling operations during whale habitation periods. The reserve should also include the Piltun lagoon, since it is very likely that the condition of the lagoon ecosystem largely determines the productivity of the whale feeding waters that it supports.

## What Needs to be Done

WWF recommends that the following actions be urgently implemented in order to help the recovery of the Western Pacific Gray Whale population.

- An international research and conservation action plan should be adopted by the International Whaling Commission and agreed upon by all affected countries, e.g. Russia, Japan, Peoples Democratic Republic of Korea, Republic of Korea, China and Vietnam, and also by the countries which host companies involved in offshore oil and gas development in the area.
- A communication campaign should be established, focused on attaining commitments from Sakhalin offshore oil operators to avoid direct impacts on whale feeding areas, e.g. any construction within the 12 mile offshore zone, seismic surveys and other geophysical work during the whales' summering period from June to November within 25 mile offshore.
- Whale protection measures and details for their material support must be included in the oil spill response plan for Sakhalin.
- A whale reserve off north-eastern Sakhalin should be established.
- A programme of whale monitoring should be established based on the previous work of Russian and U.S. specialists and on the basis of the proposed reserve.

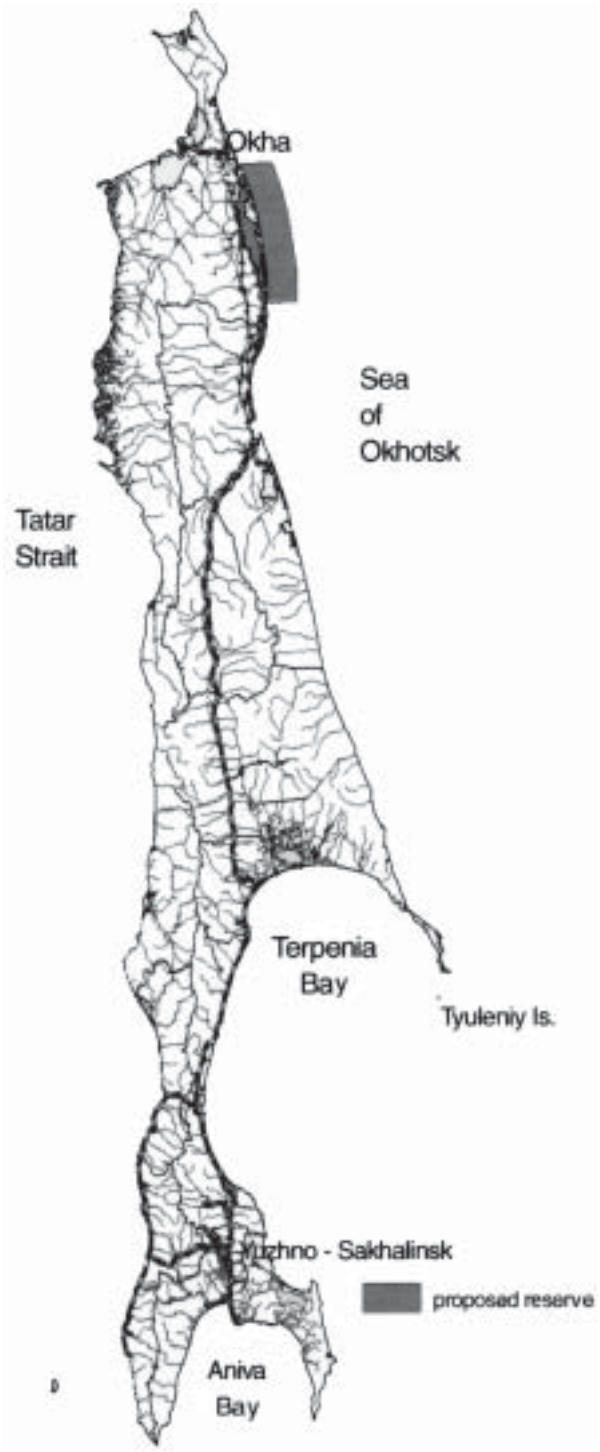


Fig. 11. Proposed whale reserve

## APPENDIX 4
## LATIN NAMES OF WILDLIFE SPECIES MENTIONED IN THE REPORT

Abaloni – *Haliotis* sp.

Alaska Pollock *Therarga chalcogramma*

Blue king crab *Paralithodes platypus*

Cherry salmon *Oncorhynchus masu*

Chum salmon *Onchorhynchus keta*

Coho salmon *Oncorhynchus kisutch*

Fur seal *Callorhinus ursinus*

Gray whale *Eschrichtius gibbosus*

Greenland shrimp *Lebbeus grenlandicus*

Hairy crab *Erimacrus isenbeckii*

Kamchatka crab *Paralithodes kamtschatica*

Navaga *Eleginus gracilis*

Northern (Pink) shrimp *Pandalus borealis eous*

Pacific herring *Clupea pallasii pallasii*

Pink salmon *Oncorhynchus gorbuscha*

Plaice *Lepidopsetta bilineata, Limanda* spp.

Sakhalin sturgeon *Acipenser medirostris*

Sakhalin taimen, Yambo *Hucho perryi*

Smelt *Osmerus eperlanus dentex, Hypomesus olidus*

Snow crab *Chionocoetes opilio* and *Chionocoetes bairdi*

Steller Sea Eagle *Haliaetus pelagicus*

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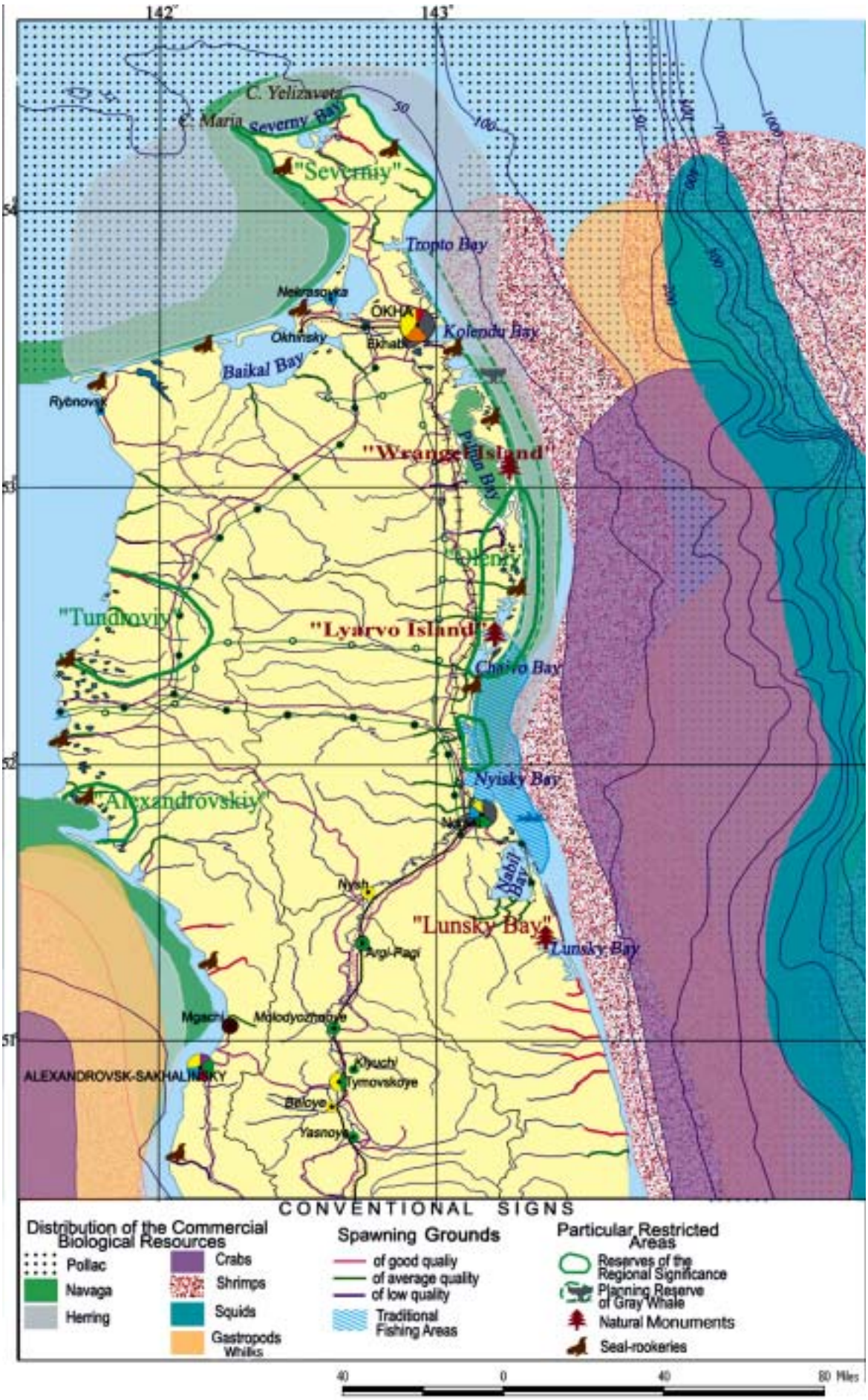


Fig. 4. Biological resources and remarkable biodiversity areas in north-eastern Sakhalin.

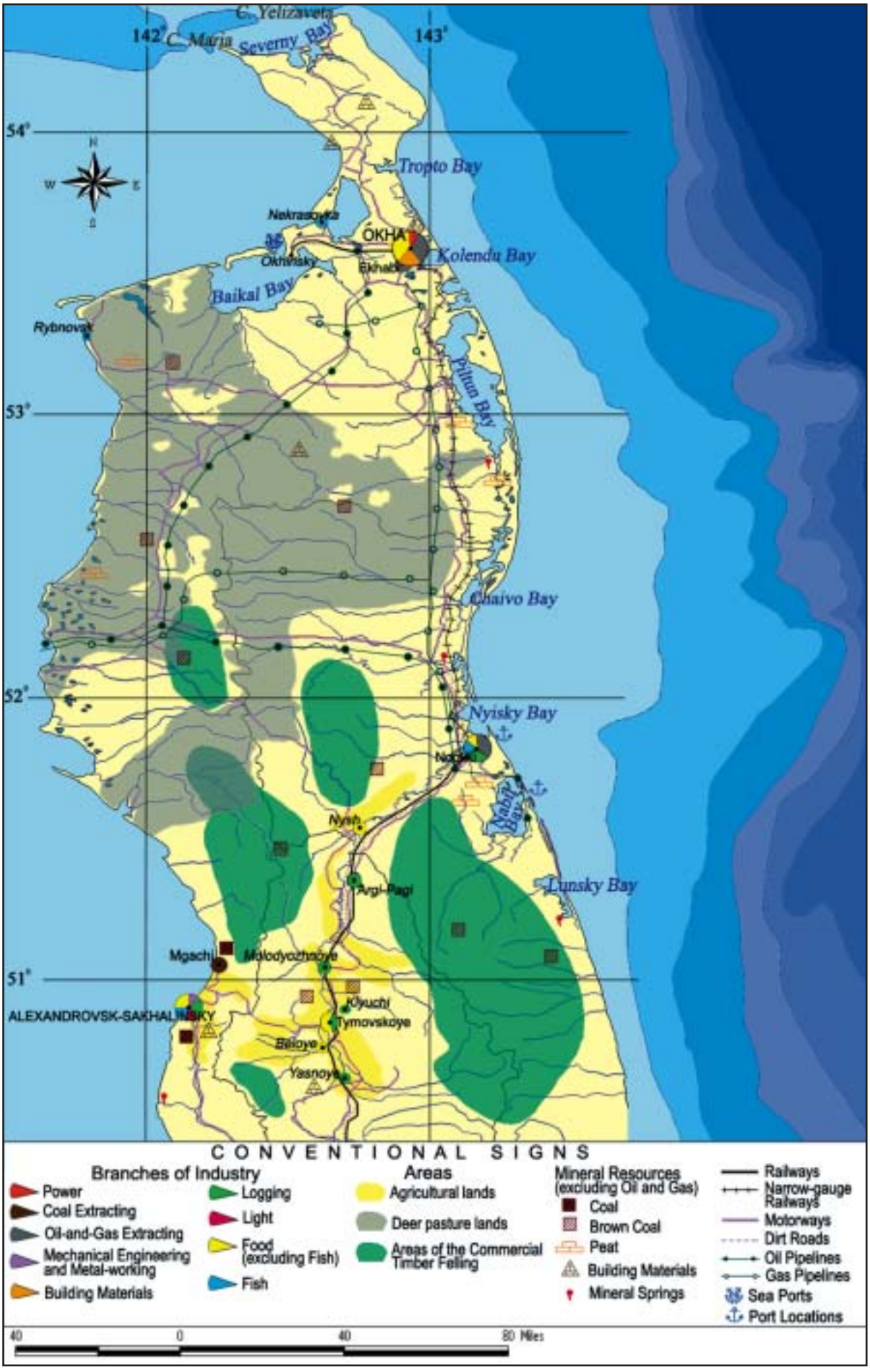


Fig. 5. Industrial development in north-eastern Sakhalin.

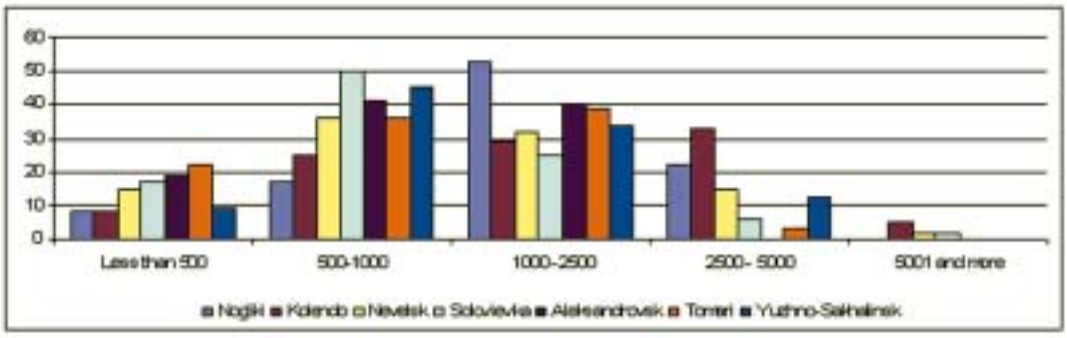


Fig. 7. Distribution of the interviewed individuals in relation to monthly incomes (roubles per a family member) - in per cent of the total number of individuals polled in a particular area.

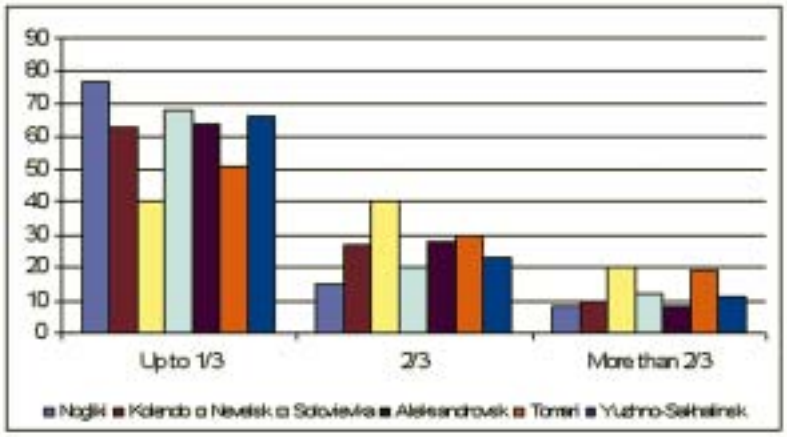


Fig. 8. Approximate estimates of the share which fish and seafood constitute in yearly food supply of the families of polled individuals (in per cent of the total number of polled individuals in each area).

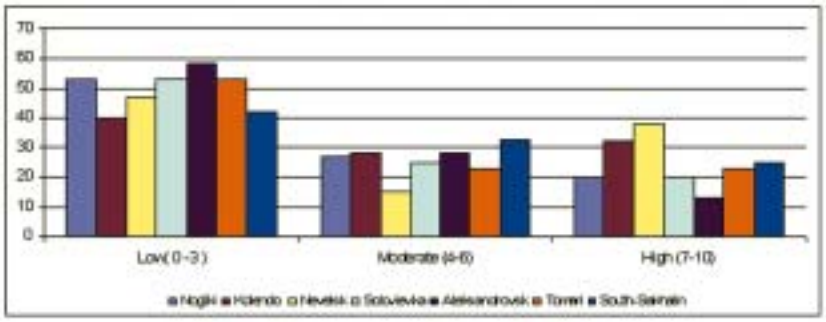


Fig. 9. The level of satisfaction of Sakhalin people with perspectives about their future (in per cent of the total number of polled individuals in each area).

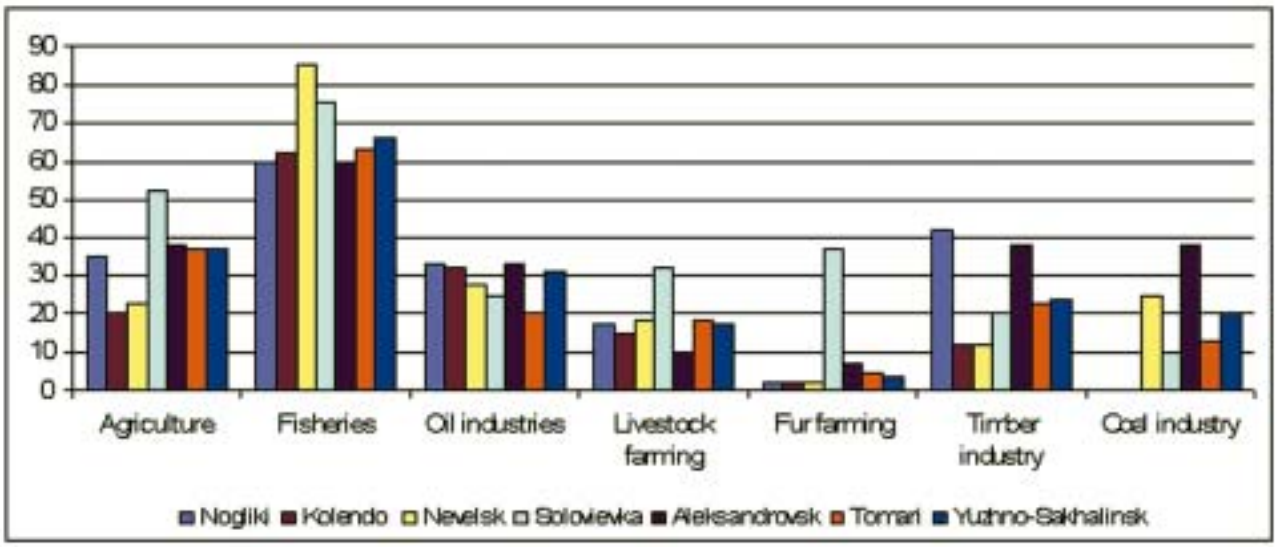


Fig. 10. Rating of preferences for development of particular sectors of economy in Sakhalin given by polled individuals (in per cent of the total number of polled individuals in each area).