

Sakhalin Oblast

Location

Sakhalin Island lies east of mainland Khabarovsk Krai, separated by the Nevelsky Strait (7.4 km) and the Amur estuary. It lies 10,417 km east of Moscow, 1,000 km north of Vladivostok, and 40 km north of Hokkaido, Japan. Sakhalin is washed by the Tatar Strait to the west, the Sea of Okhotsk to the north and east, and the Sea of Japan to the southwest. The volcanic Kuril Island archipelago stretches in two ranges (the Greater and the Lesser Kuril Island chains) from Kamchatka Peninsula in the north to Hokkaido in the south, forming a breaker between the Sea of Okhotsk and the Pacific Ocean. Tiny Moneron Island lies in the Sea of Japan to the west of the southern tip of Sakhalin.

Size

Sakhalin Oblast (which includes Sakhalin Island and the Kuril Islands) has a total area of 87,100 sq. km. Sakhalin Island, Russia's largest, is 76,400 sq. km, 948 km long, 160 km at its widest point, and 26 km at its narrowest. The Kuril Island chain (15,600 sq. km) spans 1,200 km and includes over thirty islands as well as many small islets and rocks. The *oblast* has seventeen *raions*, three of which cover the Kuril Islands.

Climate

Sakhalin's maritime climate is milder and wetter than that of mainland Khabarovsk Krai. Average temperatures range from -30°C in January to 15°C in July. Spring arrives one month earlier in the south than in the north. Summer is cool except in August; June and July are particularly misty and foggy. Fall has typhoons with hurricane-force winds. Snow is heavy from November to March, reaching a maximum depth of 50 cm in the north, 70 cm in the south, and up to 100 cm in the east. The lowlands of the Tym and Poronai Rivers have the most extreme temperature shifts (from -40°C to 38°C). The Kuril Islands are less influenced by monsoons, but do experience swift weather changes. Winters are mild and summers cool. The Sea of Okhotsk is covered by ice for six months of the year, until June or later. The ice reaches a thickness of between 1.5 and 2 m, with pack ice and ice shears in the north. Because of the Sea's influence, the middle part of the Kuril Islands chain has a colder climate than the northern part. There are frequent typhoons, strong winds, constant fog in warmer seasons, and extremely strong currents. Earthquakes can reach 8 on the Richter scale and sometimes cause tsunamis.

Geography and ecology

Mountains cover three-quarters of Sakhalin Island. Two parallel ranges stretch from north to south. The highest peak of the eastern range is Lopatin Mountain (1,609 m); Onor

Mountain (1,330 m) is the highest in the west. A third mountain range, Susunaisky Ridge, lies in the south.

Forests cover about two-thirds of Sakhalin and differ greatly from north to south. Dahurian larch (*Larix gmelini*) forests cover the north. The widest stretches of Ayan spruce (*Picea ayanensis*) and Sakhalin fir (*Abies sakhalinensis*) forests are found in the central regions. The southern half of the island was clear-cut by the ruling Japanese in the first half of the century, and fires have seriously damaged the forests in the south. As a result, large areas are covered with small-leaved forest and stone birch (*Betula ermanii*) forest with bamboo (*Sasa kurilensis*). There are, however, old-growth fir forests along Susunaisky Ridge and some fragments remain on Krilon Peninsula in the southwest. Southern and northern vegetation types grow together in the south. High precipitation, low evaporation, and the mountainous relief have created more than sixteen thousand lakes and sixty-five thousand rivers, most of which are important spawning grounds less than 10 km long. The largest rivers, Tym and Poronai, flow between the two major mountain ranges. The Tym-Poronai lowlands make up central Sakhalin. Wetlands stretch along the northwestern and northeastern coasts, along the shores of Terpeniya Bay, and in the south, near Aniva Bay.

The Kuril Islands are a chain of volcanoes broken by straits; thirty-nine of the volcanoes are active. The highest are Tyatya Volcano (1,819 m) on Kunashir Island and Alaid Volcano (2,339 m) on Atlasova Island. Hydrothermal springs and frequent earthquakes are further testaments to seismic activity; typhoons and tidal waves also strike. Coniferous broadleaved forests cover 55 percent of the southern Kurils. Bamboo is also widespread in the south. Larch forests cover most of Iturup Island, while stone birch forests dominate Urup Island and parts of Shikotan Island. Japanese stone pine (*Pinus pumila*) grows at higher altitudes on all islands except Shikotan. Shrub alders (*Alnus*) are more common in the north, while the middle part of the island chain has mostly tundra and coastal meadows.

Flora and fauna

Sakhalin has unique mosaic vegetation due to its geographical position and length, and its proximity to the cold Sea of Okhotsk, the warm Sea of Japan, and the Pacific Ocean. Twenty-seven percent of the former Soviet Union's mammal species, 43 percent of the bird species, and 94 percent of the whale species live in or migrate to the *oblast*.

Key issues and projects

Offshore oil and gas

Exploration and production for multibillion-dollar offshore oil and gas projects has started on the Sakhalin shelf, with seven planned at a price tag of more than U.S.\$100 billion over the next forty years.¹ These projects are a litmus test for further oil and gas development all around the Sea of Okhotsk. Some observers believe that oil development has had some positive effect on the Sakhalin economy; others voice concern about the environmental impact, limited benefits to the local population, and threats to the fishing industry and traditional economic activities.

Wasteful fisheries practices

Sakhalin has lost 30 percent of its natural salmon-spawning grounds because of the logging and oil industries. Herring, pollock, flounder, and smelt populations have declined due to overfishing, illegal fishing (especially for crab), and to a lesser extent, pollution. Russians are concerned about Japanese driftnet fishing, which harms salmon runs in the Sea of Okhotsk.

The Kuril Islands

Kurilsky Zapovednik (65,365 ha) protects the northern and southern portions of Kunashir Island, one of the southern Kurils. Russia has applied to UNESCO to declare the *zapovednik* and a nearby *zakaznik* a World Heritage site. Problems facing the Kurils include gold mining in the buffer zone of the *zapovednik*, illegal driftnet fishing by the Japanese off the Kuril Islands, and plans for a nuclear waste dump on Simushir Island, one of the smaller Kurils.

There are 1,570 species of flora, including 45 endemic and many rare species. Sakhalin has 371 bird species. Whooper swans (*Cygnus cygnus*), scoters (*Melanitta*), mergansers (*Mergus*), sandpipers (*Calidris*), oystercatchers (*Haematopus*), and others migrate to Sakhalin's coastal wetlands. Rare birds include sea eagles (*Haliaeetus*), Nordmann's green-shank (*Tringa guttifer*), a recently discovered endemic subspecies of dunlin (*Calidris alpina actites*), Siberian grouse (*Falcapennis falcapennis*), and Blackiston's fish-owl (*Ketupa blakistoni*). The Kuril Islands have huge seabird colonies with the highest seabird diversity in Asia. Red-crowned cranes (*Grus japonensis*) and other rare species breed on Kunashir and the Lesser Kuril Islands. Kunashir also has more Blackiston's fish-owls than all of Japan.

Sakhalin has ninety-one mammal species, including brown bear (*Ursus arctos*), sable (*Martes zibellina*), river otter (*Lutra lutra*), muskrat (*Ondatra zibethica*), wild reindeer (*Rangifer tarandus*), an endangered subspecies of musk deer (*Moschus mosciferus sakhalinensis*), and eight rare species of cetaceans. It also has the RFE's only endemic reptile, the Sakhalin viper (*Vipera sakhalinensis*). The Kuril Islands have five species of reptiles and a great variety of insects. The waters around Sakhalin are home to hundreds of species of fish. Many marine invertebrates are endemic to the Kurils. Anadromous fish include four species of salmon, the globally endangered green sturgeon (*Acipenser medirostris*), Amur sturgeon (*A. schrenkii*), and kaluga sturgeon (*Huso dauricus*). Dolphins, Steller's sea lions (*Eumetopias jubatus*), seals, and the endangered Okhotsk-Korean population of gray whales (*Eschrichtus robustus*) also inhabit Sakhalin's waters.



Some forest types of Sakhalin are unique to the island.

Largest cities

More than 85 percent of Sakhalin's population lives in its nineteen towns. Yuzhno-Sakhalinsk (pop. 180,000) was the seat of the Japanese government on Sakhalin between 1905 and 1945. It is now the administrative center of Sakhalin and a base for food production, energy, construction, light industry, finance, science, and tourism. Kholmsk (pop. 51,000) is a major port town with a fishing fleet, fish-processing industry, shipbuilding and repair center, food industry enterprises, and two obsolete pulp and paper plants. Korsakov (pop. 45,000) is a port town, open to international shipping, and is Sakhalin's biggest fishing center; it is likely to increase in importance as the offshore oil projects expand. Dolinsk (pop. 15,900) and Poronaysk (pop. 26,000) are former centers of the declining coal and paper industries. Alexandrovsk-Sakhalinsky (pop. 19,400) is a port, with a shipyard and fish-processing industry.

Okha (pop. 37,000) is the main center for the onshore oil and gas industry and supporting industries (construction and food processing). Nogliki (pop. 14,000) is also a center for onshore oil and gas and will increase in importance as the offshore projects develop. Yuzhno-Kurilsk (pop. 6,500), on Kunashir Island, is a large port, a center for fishing and fish processing, and an emerging tourism center. Kurilsk (pop. 2,700), on Iturup Island, is a center for fishing, fish processing, and fish farming.

Population

As of January 2001, the population was just over 590,000, a decline of nearly 20 percent from 1999.² Approximately 20,000 people live on the Kuril Islands. The population of the *oblast* includes Russians (87.7 percent), Ukrainians (6.5 percent), Koreans (4.9 percent; many are now returning to South Korea), indigenous Nivkhi (0.3 percent), Uilta (Oroki, Orochon) (0.04 percent), and others.³

Political status

The southern half of Sakhalin was ruled by the Japanese between 1905 and 1945 and the northern part



A forest ecologist hand-measures a large tree on Sakhalin's Schmidt Peninsula.

occupied from 1920 to 1925. In 1947 Sakhalin Oblast became independent of Khabarovsk Krai. The Kuril Islands, ceded to Japan in 1875, were ostensibly liberated by Russia in 1945, but the peace treaty drawn up between Japan and Russia in 1951 remains unsigned and the Kuril Islands remain in dispute, though negotiations have recently resumed. In 1999, Igor Farkhutdinov was voted in as governor and Ivan Zhdakaev, a critic of the offshore oil and gas projects, was voted in as Sakhalin's deputy to the federal parliament (Duma).

Natural resources

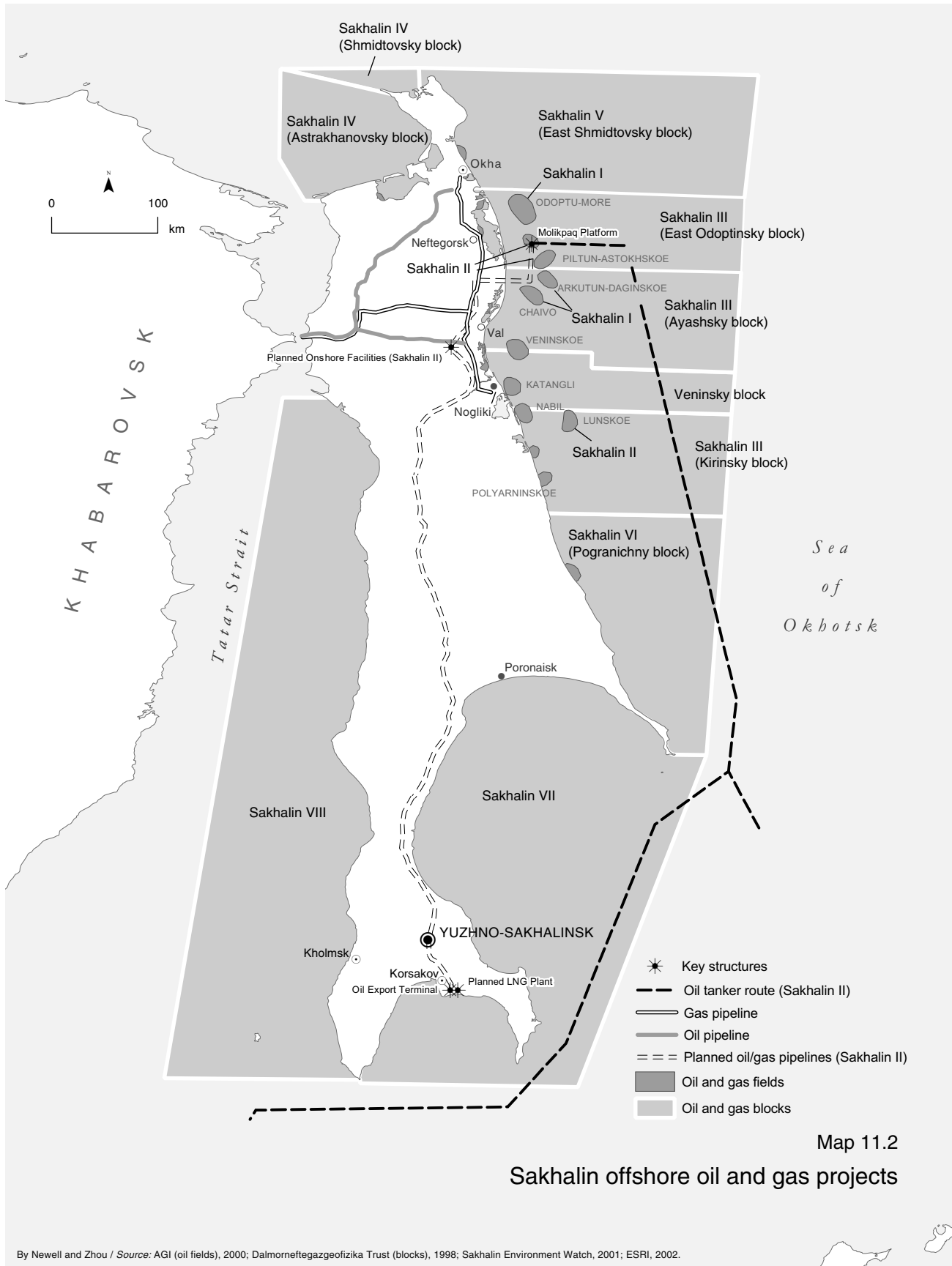
Sakhalin's resources include fish, timber, oil, gas, coal, and other minerals. The Kuril Basin and Sea of Okhotsk are some of the richest fisheries in the world. In 1999 the fishing industry had a total catch of 450,000 tons of fish and seafood, of which 330,000 tons were processed. The salmon catch in 1999 was the largest in the past ten years.⁴ Kuril Island rivers yield more than 25,000 tons of salmon every year. Offshore reserves of the Sea of Okhotsk shelf are estimated at 1,000 mmt of oil and 3,600 billion cu. m of gas.⁵ About 60–70 percent of the onshore oil and gas reserves are depleted.⁶ Timber reserves total 616.55 million cu. m, of which 207.47 million cu. m are suitable for commercial logging. There are more than sixty medium-quality coal deposits that can support production for many years, but costs of extraction are high. The Kuril Islands have considerable marine resources and mineral deposits including titanium, sulfur, copper, lead, zinc, and gold.

Main industries

Sakhalin's main industries are fishing and fish processing, oil and gas exploration and production, and forestry (logging, raw log export, small-scale timber processing). Sakhalin's fishing industry is still dominant in the region, providing about one-third of the *oblast's* industrial output. The oil and gas industry is now becoming increasingly important to the regional economy. Sakhalin has seventy-five onshore oil fields and twenty-five onshore gas fields. The focus is now shifting to the offshore projects currently being developed by some of the world's largest multinational companies. Sakhalin's timber industry is in crisis as a result of years of unsustainable forest exploitation, ineffective regeneration, and a shortage of local processing opportunities. The pulp and paper industry has collapsed, which means that pollution has declined but lower-quality timber is no longer processed. Today the timber industry relies on raw log export, mostly to Japan, and up to 70 percent of the cut timber is left on the logging sites. Despite the huge investment in extracting offshore oil and gas reserves for foreign export, coal is still Sakhalin's major energy source. Much of the coal comes from outside the region, mainly from the Republic of Sakha and Khabarovsk Krai. Industrial production of coal is declining on Sakhalin because of the high transportation costs, loss of federal subsidies, outdated machinery, and intensive resource exploitation. Sakhalin also produces building materials (cement, bricks, and concrete) and food and drink products (flour, confectionery, mineral water, soft drinks, beer, and spirits). Agricultural production (meat and dairy products) is increasing.

Infrastructure

Sakhalin depends heavily on air transportation. There are regular flights from Yuzhno-Sakhalinsk to Khabarovsk, Vladivostok, Moscow, Novosibirsk, and other Russian cities, though connections with Petropavlovsk-Kamchatsky remain problematic. Flights to the Kuril Islands can be unreliable due to the unpredictable weather. There are international



flights to Hakodate (Hokkaido) and Seoul. There are eight ports, the main ones being Kholmsk and Korsakov. The latter operates a summer ferry to Otaru (Hokkaido). Total port turnover for Sakhalin in 1999 was 3,104 metric tons.⁷ A rail ferry built in 1973 runs year-round between Kholmsk and mainland Vanino in Khabarovsk Krai. A Japanese-built railway network runs from Korsakov in the south to Nogliki in the northeast and between Shakhta and Ilinsky in the southwest. An oil pipeline links northern Sakhalin with refineries in Komsomolsk-on-Amur and Khabarovsk. Offshore production is transported by tanker. There are plans to build oil and gas pipelines from the offshore fields to the south for export, a liquified natural gas plant in the south in Prigorodnoe, and a gas pipeline from Sakhalin to Japan. There has also been talk of reviving plans to build a tunnel from Sakhalin to mainland Khabarovsk Krai (8 km) and from southern Sakhalin to Hokkaido, Japan (45 km).

Foreign trade

Sakhalin's foreign trade turnover in 1999 was almost U.S.\$700 million, in 2000 well over \$1 billion, and about \$930 million in 2001. Exports annually account for about 75 percent of this total, with fish and marine products accounting for 20 percent of all exports in 2001.⁸ Fuel and energy resources (oil, diesel fuel, and residual fuel oil) accounted for 64.9 percent of exports. The other major export was timber (3.5 percent). Export markets are Japan, South Korea, and Singapore.⁹ In 2000, Sakhalin exported about 3.2 million metric tons of oil (U.S.\$637.7 million), 133,800 tons of seafood (U.S.\$209.7 million), and 80 tons of coal (U.S.\$1.34 million).¹⁰ The *oblast* administration expects oil production to reach 13.3 million metric tons (est. U.S.\$2 billion) by 2005, much of it to be exported.

More than 70 percent of all goods consumed in the region are imported from other regions of Russia or abroad. Major imports include coal, food, fuels and oils, construction materials, and equipment for the fishing, timber, and oil and gas industries. In 2001, Sakhalin imported these products primarily from the United States (34.8 percent), Japan (28.7 percent), and South Korea (11.7 percent).

In 1999, Sakhalin was second only to Moscow in terms of foreign investment, a result of investment in the offshore oil and gas projects, which totaled U.S.\$1 billion in 1999, but dropped to U.S.\$251 million in 2000, and then in 2001 rose to about U.S.\$389 million. The governor, Igor Farkhutdinov, expected investment to rise again to U.S.\$2 billion in 2002.¹¹ Sakhalin's forestry sector attracted about U.S.\$17 million between 1997 and 1999.¹²

Economic importance in the RFE

- Main focus of foreign investment in the RFE.
- About 20 percent of the RFE's foreign trade turnover.
- 16 percent of the RFE's fishing and fish processing industries.

General outlook

Despite huge international investment, Sakhalin is likely to remain on the economic periphery of the Russian Federation if it continues to supply only raw resources. The region is located in a key position for export of timber and hydrocarbons to Pacific Rim markets. The offshore oil and gas will remain a priority for developers. The Sakhalin regional government believes the *oblast* will gain significant revenue from the offshore projects. Critics charge that the Production Sharing Agreements (PSAs) were negotiated

on extremely beneficial terms for the oil companies, without safeguards to guarantee local benefits. A report by the Russian Federation Auditing Chamber identified serious flaws in the Sakhalin PSAs. For the oil companies themselves, the regulatory conflicts between the PSAs and Russia's other normative acts are holding up speedy development of the projects. Local scientists recently issued an appeal to the government criticizing the economic soundness of the projects. Yuzhno-Sakhalinsk is likely to benefit more than the northern communities, whose traditional economies are threatened by the developments and who shoulder the major part of the ecological risk.

Provision of gas to Sakhalin's residents was part of the original tender agreements for the offshore projects. Sakhalin residents are hoping that an increase in local gas-powered energy systems will make up for the failure of timely coal deliveries, which have been at the root of the island's energy crisis. Sakhalin's major gas power project in Nogliki has started its first phase of operation. It is hoped that the current use of gas in local energy systems will be increased from 20 percent to 40 percent when Nogliki is fully operational. Sakhalin has successfully attracted foreign investment for extraction and production, but has not yet been able to attract foreign support to convert its energy system to natural gas.

Governor Farkhutdinov opposes plans to route oil to Khabarovsk Krai, as Sakhalin's budget would be deprived of export revenues. It is likely that oil and gas pipelines will be built down the length of the island. These will be laid mostly along existing road routes, but will nonetheless damage reindeer pastures and spawning grounds. Further infrastructure construction and transportation will cause environmental disturbance in the north and northeast, both onshore and offshore. Plans for the liquid natural gas plant in Prigorodnoe, under the Sakhalin II project, are proceeding. The Japanese are also particularly interested in ensuring that a gas pipeline is constructed between Sakhalin and Japan, perhaps offshore from northern Sakhalin to Hokkaido. Meanwhile, residents of Sakhalin will suffer power outages in winter and severe pollution from coal-fired power plants.

International interest in the offshore oil and gas projects is high, and environmental organizations will continue to monitor the ecological safety of the projects. Local and international environmental organizations are concerned that Sakhalin is poorly prepared for a large-scale environmental disaster such as an oil tanker spill, and a major accident could result in a serious anti-American backlash. Chronic pollution from onshore and offshore oil projects, including the discharge



Greenpeace protesting at the Molikpaq oil platform.

Sakhalin Environment Watch

of drilling wastes, is likely to continue and, in affecting fisheries, lead to local opposition to the projects. The most recent ecological threat from the projects occurred in summer 2001, when ExxonMobil, operator of the Sakhalin I project, was ordered by the Ministry of Natural Resources to stop all seismic testing because of concerns that the drilling was harming a small population of the endangered Okhotsk-Korean gray whale. ExxonMobil, in response, maintained that it had already finished necessary testing when the order was issued. This order may affect future seismic tests, not only for Sakhalin I, but also for Sakhalin IV and VI.

There is considerable international interest in other sectors of the Sakhalin economy. Many projects are in the early stages of development, but are attracting the attention of international investors. These projects include the upgrading of Ulegorsk and Dolinsk pulp and paper mills, development of Solntsevsky coal pit, construction of the second Nogliki gas power station plant, exploitation of gas deposits in the south, and support for district timber enterprises.¹³

The timber industry is likely to continue exporting raw logs and, unless local timber processing is increased, the excessive wasting of resources. Measures to improve the industry include use of modern technology, including use of Scandinavian machinery with wheels instead of caterpillar treads, hauling timber by helicopter, and small-scale localized timber processing. The timber industry also needs to move toward certification by the Forest Stewardship Council (FSC) to help conserve the island's dwindling forests and participate in the market for FSC-certified wood in Japan. International efforts to conserve Sakhalin's forests, previously focused on creating and supporting the development of protected areas, should now also focus on promoting these changes in the Sakhalin timber industry and working with local communities in conservation and sustainable resource-use projects.

Communities once dependent on the timber, coal, and pulp and paper industries for jobs and social infrastructure remain in a state of crisis; wages have not been paid for months or, in some cases, years. Indigenous livelihoods are declining due to the withdrawal of state support and threats from industrial encroachment. Unemployed reindeer herders, hunters, and fishers cannot find jobs. It is unlikely that the prevalent poaching, drunkenness, theft, and depression will decrease until the deep-rooted socioeconomic problems are resolved in these settlements. Alternative livelihood options include setting up small-scale fishing enterprises, buying and selling food products, collecting and marketing nontimber forest products (NTFPs), or engaging in small-scale tourism.

— *Emma Wilson*

Ecology

A. K. Klitin

Sakhalin Island is located within two geobotanical zones: boreal and mixed forest.¹⁴ The Russian scientist A. I. Tolmachev also distinguishes three geobotanical subzones within the taiga zone: light conifer (with larch dominant); dark conifer (with spruce dominant); dark conifer (with fir dominant). Light-conifer forests grow in the north, with dominant Dahurian larch. Undergrowth often consists of Japanese stone pine and monarch birch (*Betula middendorffii*). Ayan spruce forest grows on mountain slopes (Schmidt Peninsula, Vagis Mountain).

The subzone of dark-conifer forest with dominant Ayan spruce lies in central Sakhalin (the Poyasok Isthmus). The dominant forest is spruce and Sakhalin fir with green moss on the forest floor. Larch forests grow along river valleys with giant poplar (*Populus maximovichi*), elm (*Ulmus*), alder (*Alnus*), willow (*Salix*), and tall grasses. In conifer forests you can also find arrowwood (*Viburnum*), cherry (*Prunus*), Japanese yew (*Taxus cuspidata*), Mongolian oak (*Quercus mongolicus*), wild kiwi (*Actinidia lindleyi*), and magnolia vine (*Schisandra chinensis*). Larch replaces spruce and fir after fires and on mountain slopes.

In the eastern Sakhalin mountain range, dark-conifer forest is replaced by stone birch (*Betula ermanii*) forest above 600 m. Trees are often covered with lichens in this belt. On mountain slopes in western Sakhalin, stone birch forests have dense thickets of bamboo in the undergrowth. Japanese stone

pine forms the timberline (above 800 m), while alpine tundra exists at 1,000–1,200 m. Up to 150 species of grasses and bushes have been recorded in this subzone. On coastal terraces with peat soils (Terpeniya Peninsula, around Nevskoe Lake, and northern Schmidt Peninsula), coastal tundra with crowberry (*Empetrum*), peat mosses (*Sphagnum*), and lichens are widespread.

The subzone of dark-conifer forests with dominant fir lies to the south of the Poyasok Isthmus and east of an imaginary line between the Aniva and Tomari Mountains. Spruce and fir forests grow here with bushes, grasses, and ferns. Maple (*Acer*), cherry, aralia (*Aralia*), Siberian ginseng (*Eleutherococcus*), wild kiwi, and magnolia vine are widespread. Elm and ash (*Fraxinus*) dominate in valley forests. There are several species of dwarf bamboo (*Susa*) that grow only in dark-conifer forests on Sakhalin, Hokkaido, and the southern Kurils. The tops of the highest mountains of the Susunaisky, Yuzhno-Kamyshovy, and Shrenka ridges are covered with Japanese stone pine from 800 m up. Mountain tundra is found only at the top of the Chekhov, Ostraya, and Maiorskaya Mountains (Susunaisky Ridge).

The subzone of dark-conifer and broadleaved forest covers southwest Sakhalin, including Krilon Peninsula and the western slopes of Yuzhno-Kamyshovy ridge south of Tomari Mountain. Southern Sakhalin forests have been badly damaged by logging and fires, especially on the slopes of Yuzhno-Kamyshovy, Mitsulsky, and Susunaisky Ridges. As a result, small-leaved forest and stone birch with bamboo thickets cover large areas. Liana vines interweave with the bamboo stems. Tall grasses, often reaching 4 m, are common,

especially along rivers and streams. There are 150 tall grass species, with the greatest diversity in the south. They include knotweed (*Polygonum*), angelica (*Angelica*), and various *Umbrelliferae*. Meadow flora is relatively young and represented mostly by forest species and alien plants.

The vegetation of Moneron Island used to be very similar to that of southwest Sakhalin: spruce and fir dominant with broadleaved forest. The original conifer vegetation was logged by the Japanese in the 1920s and 1930s or destroyed by forest fires at the end of the 1960s. Small patches of old spruce forest now cover only 3 to 4 percent of the island, while over half the island is covered with meadows.

The most diverse forests are found on the southern Kuril Islands (Kunashir, Iturup, Urup,



Hisao Aoki

Brown bear (*Ursus arctos*), Vostochny Zakaznik.

and the Lesser Kuril chain)—particularly southern Kunashir with its conifer-broadleaved forests. In the northern Kuril Islands (as far as Rasshua Island), Japanese stone pine and shrub alder (*Alnus kamtschatica*) dominate with mountain ash (*Sorbus*) and willow forming dense thickets. Large areas are covered with meadows and various grass species. The middle part of the Greater Kuril chain is mostly covered with tundra and coastal meadows. Beginning on Ketoi Island, dwarf bamboo, stone birch, Japanese yew, and Kuril cherry (*Cerasus kurilensis*) appear. Stone birch forests cover most of Urup. In the central part of Iturup are larch forests; they resemble the tundra woodlands of northeastern Siberia. Dark-conifer forests grow throughout much of southern Iturup and Kunashir, and include Sakhalin fir, spruces (*Picea microsperma*, *P. glehni*), and Japanese yew, with broadleaved species such as oak. In southern Kunashir, oak is found with magnolia vine, elm, mulberry (*Morus*), hydrangea (*Hydrangea*), and several species of birch. On Shikotan, spruce and Sakhalin fir now occupy less than 20 percent of the island. Bamboo does not grow very high and juniper (*Juniperus*) replaces Japanese stone pine. Other Lesser Kuril Islands and the southernmost tip of Kunashir are covered with meadows, important breeding grounds for red-crowned cranes.

Flora and fauna

The flora of Sakhalin comprises more than 1,570 species (1,173 of which grow on Sakhalin, 1,143 on Kuril Islands, and 448 on Moneron Island), 45 of them endemic.¹⁵ Many plant and animal species characteristic of mainland RFE are absent from Sakhalin and the Kuril Islands, but others are more common here.

Sakhalin and the Kuril Islands have about four hundred bird species. Among them are short-tailed albatross (*Diomedea albatrus*), Swinhoe's storm-petrel (*Oceanodroma monorhis*), mandarin duck (*Aix galericulata*), osprey (*Pandion haliaeetus*), white-tailed sea eagle (*Haliaeetus albicilla*), Aleutian tern (*Sterna kamchatica*), and Blackiston's fish-owl (*Ketupa blakistoni*).

There are ninety-one mammal species, eleven of which have become introduced to the islands over the past seventy years.¹⁶ Rare species include the Sakhalin musk deer, many marine mammals, and bats. On Sakhalin at least five mammal species have disappeared during the past millennium: walrus (*Odobenus rosmarus*), snow sheep (*Ovis nivicola*), moose (*Alces alces*), sika deer (*Cervus nippon*), and gray wolf (*Canis lupus*).¹⁷ There are eight reptile species, including two rare skinks (*Eumeces latiscutatus*, *E. japonica*), and a great variety of insects, including rare butterflies.

There are hundreds of species of fish in Sakhalin's waters, with the most diversity in the Tatar Strait. The marine fauna of Moneron Island is particularly distinctive, its waters being the most northern habitat for black-sea urchin (*Strongylocentrotus nudus*), trepang (*Apostyhopus japonicus*), sea star

(*Plazaster borealis*), sea urchin (*Glyptocidaris crenularis*), coastal crab (*Hemigrapsus sanguineus*), and rainbow abalone (*Haliotis iris*). Sakhalin has about sixty-five thousand rivers. Most of these are spawning rivers for valuable species of salmon (pink [*Oncorhynchus gorbuscha*], chum [*O. keta*], coho [*O. kizhuch*], and cherry [*O. simu*]) The total area of the spawning grounds is 22 million sq. m. Sakhalin has forty-one species of freshwater and brackish water fish, including four species of Pacific salmon and the globally endangered green sturgeon.

Protected area system

DIMA LISITSYN—The protected areas (PAs) of Sakhalin¹⁸ cover a total area of almost one million ha (167,035 ha of which have federal status), or about 11 percent of the territory (see table 11.1). But many of the wilderness areas, particularly forests, wetlands, and specific habitats of endangered species, are poorly protected. At present there are two *zapovedniks*, one federal *zakaznik*, one nature park, thirteen *oblast*-level hunting *zakazniks*, and forty-seven natural monuments.

Lacking funding and adequate equipment, the federal PAs are often unable to combat poaching by Russian and international fishermen. These poachers have been exploiting the marine resources in the waters of the Malye Kurily (Lesser Kurils) *Zakaznik* for many years. The director of Kurilsky *Zapovednik* (the reserve has administrative control over the *zakaznik*) has made great efforts to protect the *zakaznik*, but has been unable to be effective due to lack of federal funding to purchase patrol boats and equipment. Japanese fishermen have been granted permission to use driftnets to fish around the Lesser Kuril Island chain. Extensive fishing in this region would affect marine resources and lead to the death of thousands of marine birds and mammals and the disappearance of colonies of marine birds on the islands, as has already happened on neighbouring Hokkaido.

Even though the forest is habitat for many commercially valuable and rare species, the regulations for these *zakazniks*, as a rule, do not ban any form of logging. This encourages logging companies to exploit the forests. The forest service and the hunting service find it difficult to control logging inside the hunting *zakazniks*. Commercial timber companies have recently increased pressure on nature protection officials in an effort to obtain permission to log on slopes of more than 20 degrees. They intend to use one of the most destructive technologies, mountain-slope terracing, which at present is forbidden. To drag the timber out bulldozers are used to dig deep terraces across slopes, causing erosion, hindering forest regeneration, and damaging spawning rivers. It is essential to do research in *zakazniks* and prepare a scientific proposal to recommend changes to the *zakaznik* regulations, specifically regulations that ban commercial and salvage logging.

With the increased development of Sakhalin's onshore and offshore oil and gas fields, coastal ecosystems must be

Table 11.1
Protected areas in Sakhalin Oblast

Type and name	Size (ha)	Raion	Established
<i>Zapovedniks</i>			
Kurilsky	65,365	Yuzhno-Kurilsky	1984
Poronaysky	56,670	—	—
<i>Nature Park</i>			
Ostrov (Island) Moneron	4,200	—	1995
<i>Federal Zakazniks</i>			
Malye Kurily (Lesser Kurils)	45,000 (25,200 marine)	Yuzhno-Kurilsky	1982
<i>Regional Zakaznik</i>			
Severny (Northern)	135,000	Okhinsky	1978
Oleny (Deer)	80,000	Nogliksky	1989
Vostochny	67,646 (2,260 marine)	Smirnokhovskiy	1999
Nogliksky	65,800	Nogliksky	1998
Tundrovyy	60,000	Okhinsky	1987
Krilon	52,000	Anivskiy	1972
Makarovskiy	44,560	Makarovskiy	1992
Ostrovnoi	42,000	Kurilskiy	1988
Izyubrovyy	40,000	Dolinskyy	1988
Alexandrovskiy	24,600	Alexandrovsk-Sakhalinskyy	11980
Dobretskoe Ozero (Lake)	20,000	Korsakovskiy	1989
Krasnogorskiy	5,700	Tomarinskyy	1974
Poluostrov (Peninsula) Bukhta Kraternaya (Crater Cove)	200	Severo-Kurilskiy	1987

Source: Sakhalin Committee of Environmental Protection, 2000.

protected. The construction of coastal facilities (pipelines, extraction and processing complexes, electricity cables, roads, and pumping and compressing stations) will destroy these fragile ecosystems. There is no technology yet in the world for the satisfactory restoration of wetlands or for cleaning them up after an oil spill. The coastal areas adjacent to the oil extraction sites are habitat for rare species such as Steller's and white-tailed sea eagles, spotted greenshank, Sakhalin dunlin, and osprey. Those wetlands and bays of northeastern Sakhalin that satisfy international criteria should be designated as a Ramsar site. In 1997, these areas were included in a list of key ornithological territories of Russia. It is essential also to create new PAs to protect the remaining unlogged forests and the habitats of rare and endangered plants.

Zapovedniks. There are two *zapovedniks* (strict nature reserves) in the *oblast*.

Kurilsky. Kurilsky Zapovednik protects three territories—the northern and southern portions of Kunashir Island and Demina and Oskolkoy Islands in the Lesser Kuril Island chain. Between the northern and southern portions, some commercial activity is limited and there is a one-mile coastal buffer zone around each part. Some forms of tourism, sport fishing and hunting, and use of poisonous chemicals are prohibited in the buffer zone. There are also limits on logging, collecting nontimber forest products, and the use of fertilizers. The *zapovednik* has archaeological and ethnographic monuments (archeological sites and ancient Ainu villages). In total there are 825 species of higher flora, 38 species of fern, 144 species of mushroom, 222 species of lichen, and 218 species of algae. Kuril bamboo, Japanese stone pine, Sakhalin fir, Glehn's spruce (*Picea glehnii*), and stone birch characterize the landscape. Many plants rare elsewhere are common on the islands. About fifty species are endangered. Hundreds of species and many plant families are on the northern limit of their ranges here, such as silver magnolia (*Magnolia obovata*). The birdlife of the islands is rich, with more than 260 species, including sea eagles, osprey, albatross, red-crowned crane, Blackiston's fish-owl, and many species of Japanese birds at the northern limit of their ranges. The species diversity of land vertebrates is limited; the largest mammal is the brown bear. In the forests there are also red fox (*Vulpes vulpes*), sable, and several species of rodents and rare bats. The globally endangered European mink (*Mustela lutreola*) was introduced here in case of its extinction in its natural range. In the coastal waters there are seals, sea otters, and cetaceans. In the freshwater rivers and lakes there are twenty-two species of fish. The invertebrate fauna is rich, unique, and poorly studied. Four hundred and ten species of invertebrate, including 373 insect species, have been recorded, but this is far from a complete list. Scientific research expeditions routinely discover previously unrecorded invertebrate and even vertebrate species.

Notable natural features of the *zapovednik* include Golovina Caldera, a huge volcanic basin with clear Lake Goryachee and milky-white Lake Kipyashchee. Tyatya Volcano (1,891 m) is one of the most beautiful volcanoes in the world. Ptichy (Bird) River is the second largest river on Kunashir and has a series of cascading waterfalls, with water that changes in color from azure to transparent. Locals consider the island's largest waterfall, Ptichy Waterfall (12 m), where the river empties into the sea, the most beautiful natural feature on the island. There are also some unusual golden waterfalls, with water colored by golden algae. The Tyatina, Saratovka, and Nochka Rivers are the heart of salmon spawning on Kunashir and home to brown bears, which have a population density of one or two per sq. km. Broadleaved forests around Alyokhino Village have rare plants, insects, and birds. Virtually all of Kunashir's forest species can be seen in the mixed forests near

the Vodopadnaya and Svetlaya Rivers. This is the only place on Kunashir where the magnolia vine bears fruit. There are also hydrothermal vents and Kunashir's largest fumarole. Endangered mountain hawk-eagles (*Spizaetus nipalensis*) nest near the summit of Mendeleev Volcano. Stolbchaty Point is arguably the most spectacular area of columnar basalt in the world. Relict populations of Kunashir's reptiles inhabit nearby hot springs.

Poronaisky. This *zapovednik* protects landscapes characteristic of central Sakhalin, such as mountain taiga and coastline. The *zapovednik* consists of two unconnected portions, Nevsky and Vladimirovsky, that almost meet along the coast. A much larger reserve was originally planned but it was impossible to reach agreement with logging ventures based in Sobolinoe, a village situated between the sections of the reserve. Animals wander over to the unprotected zone and are hunted. The *zapovednik* protects the remaining intact conifer forests and important wetlands for migratory waterfowl. Protected species include white-tailed and Steller's sea eagles, osprey, Siberian grouse, and Sakhalin musk deer. The *zapovednik* has a buffer zone, where logging, fishing, hunting, use of poisonous chemicals and fertilizers, tourism, and building are all forbidden. This buffer zone includes part of Nevskoe Lake, but protection is inadequate. Efforts to change the reserve boundaries and to bring nearby Tyuleny (Seal) Island under the jurisdiction of the *zapovednik* have so far failed.

Nature parks. The one nature park on Sakhalin, Moneron, encompasses all of Moneron Island, which is about 7 km from north to south and about 4 km from east to west, and a two-mile marine zone around the island. Moneron has an unusual combination of mountain landscapes, alpine meadows, rocky gorges, and shingle beaches with agate and jasper. The clear waters around the island are high in biodiversity, the 30 to 40 m of visibility and warm current creating prime conditions for rare underwater fauna. The island is considered one of the best scuba diving sites in the RFE. Commercial species of invertebrates, such as sea urchin and trepang, need to be protected as their populations are threatened elsewhere due to overharvest. Many marine mammals breed on the island's coastal

reefs, and more visit during spring and autumn migrations. Marine birds nest on the coastal islets around Moneron. On Moneron itself there are colonies of tufted puffins (*Fratercula cirrhata*), rhinoceros auklets (*Cerorhincha monocerata*), black-tailed (*Larus crassirostris*) and slaty-backed gulls (*L. schistisagus*), common murre (*Uria aagle*), and Japanese cormorants (*Phalacrocorax conspicillatus*). Peregrine falcons and white-tailed sea eagles also nest here. Flora includes many rare plants, among them Japanese yew and goldenroot (*Rhodiola rosea*). A third of the island is covered by meadows, where tall grasses reach 3.5 m.

Although the regulations are vague, activities that might harm the landscape, flora, fauna, and objects of cultural and historical interest are forbidden. Park managers organize tours to the island to secure revenue for the park. When the park was created, scientists determined the carrying capacity of the park and are now establishing zones within it to ensure that the tourism is ecologically sustainable.

Zakazniks. There are one federal-level and thirteen *oblast*-level *zakazniks* in the *oblast*.

Malye Kurily. The *zakaznik* was created to protect nesting, migrating, and wintering birds, marine mammals, including endangered whales and dolphins, and important spawning grounds for commercial fish species and marine invertebrates. It has outstanding floral diversity and beautiful coastal landscapes. It also supports a large population of Shikotan vole (*Clethrionomys sikotanensis*), which only lives here and on southwestern Sakhalin. Russia's sole breeding colony of intermediate egret (*Egretta intermedia*) was discovered here in 1989.



Fires in 1998 destroyed 100,000 ha of Sakhalin's forests.

Notable *oblast*-level *zakazniks* include Vostochny (Eastern) *Zakaznik*, which is the first PA to protect Sakhalin's dark-conifer taiga. It protects largely pristine spruce and fir forests in the basins of two large spawning rivers. In contrast with other *zakazniks* on Sakhalin, commercial logging is completely prohibited. Oleny (Deer) *Zakaznik*, established in 1989, stretches along the northeastern coastline and protects spring and summer reindeer pastures, valuable wetlands and spawning rivers. The Sakhalin Hunting Service and the Sakhalin Committee on Environmental Protection have attempted to renew its status, but it now appears that it will not be renewed. Oil companies are now likely to lay pipelines across the territory. Nogliksky *Zakaznik* was established in 1998 in north central Sakhalin (Nogliksky Raion), with assistance from the World Wildlife Fund; it protects reindeer pastures, the Siberian grouse, wild reindeer, and other species. The Dagi-Komsomolsk pipeline and a parallel road cross the northern part of the preserve. Domestic reindeer migrate along this route during winter and summer. The Poluostrov Krilon (Krilon Peninsula) *Zakaznik* was established in 1972 to protect the game populations of the eastern portion of the peninsula. However, fires and poaching have plagued this reserve. Severny (Northern) *Zakaznik* protects part of Schmidt Peninsula in the far north of Sakhalin and the region's large massifs of virgin forest, mostly spruce. Hunting and commercial logging are allowed in this *zakaznik*. Regional government officials continue to see this *zakaznik*'s considerable timber resources as suitable for future logging.

Natural monuments. The *oblast* has forty-eight natural monuments, including eight geological, twenty botanical, fourteen complex, three zoological, and three hydrological. In 1997, the Sakhalin Committee on Environmental Protection created the Lunsky Zaliv (Lunsky Bay) Natural Monument (22,110 ha) along the coastline closest to the offshore oil and gas projects to protect the nesting areas of rare and endangered birds—Steller's sea eagle, white-tailed sea eagle, osprey, Siberian grouse—and important stopover points for large numbers of migratory birds. The protection status allows native fishermen and indigenous family enterprises to fish here. Following protests from scientists and because of the legal protection provided by the natural monument, Sakhalin Energy had to reassess its plans to lay a pipeline here.

Vagis Mountain (29,500 ha) was established in 1998 to protect the dark-conifer forests in northwestern Sakhalin, one of the last significant stands of conifer forest on Sakhalin. Anna River, a part of southern Sakhalin that has been spared much anthropological disturbance, was designated a natural monument (3,000 ha) in 1983, but the area is threatened by increased access and logging (see pp. 390–91). Vaida Mountain Natural Monument was established in 1983, but this has not prevented logging and mining (see p. 393).

Several monuments exist only on paper. The fact that those responsible for protection have often been the forest service, schools, and *raion* councils, has not helped. The Society of Hunters and Fishers and other land users and organizations have been restructured or have not been in a position to patrol these protected areas. The Sakhalin Committee on Environmental Protection was doing an inventory of natural monuments to clarify their boundaries and increase protection but, with the abolishment of the Committee, the status of this project is now unclear.

Biodiversity hotspots

1. Pursh-Pursh and Vengeri River basins, Nabilsky Ridge (forest)

R. SABIROV, N. SABIROVA, G. VORONOV—The area encompassing Nabilsky Ridge and its adjacent river basins is one of the last large-scale, intact forest ecosystems on Sakhalin Island. Located in the center of the island, the forests are primarily dark conifer with dominant spruce. Nabilsky Ridge, with its steep, jagged mountains, includes some of Sakhalin's highest peaks, from 1,400 to 1,600 m. The peaks of nearby Tsentralny Ridge are somewhat smaller, between 700 m and 900 m. There are numerous rivers and streams. It is a scenic area popular with tourists.

The headwaters of the Pursh-Pursh and Vengeri Rivers lie on the eastern slope of Nabilsky Ridge and the rivers flow east into the Sea of Okhotsk. Pursh-Pursh River stretches for 30 km; Vengeri is 35 km long. Both rivers are important salmon-spawning grounds. The mountainous topography and the Northern Sakhalin Current in the Sea of Okhotsk influence the region's climate: Winter temperatures average -22°C , with between 70 cm and 80 cm of snowfall yearly. Snow covers the coastal areas for about six and a half months of the year and the mountaintops are snow covered for almost nine months. During August, the warmest month, the cool, misty, and rainy summers prevent average temperatures from exceeding 15°C .

The Pursh-Pursh and Vengeri River basins are well studied, thanks to financial support from Friends of the Earth–Japan, the Japanese Pro-Natura Foundation, and the Sakhalin Committee on Environmental Protection. Of particular value in this region are the large tracts of spruce, fir, and larch forests that have not been disturbed by commercial logging or fire. Stone birch and aspen forests are also found here, along with poplar and willow, white birch, alder, elm, oak, maple, and others. Many species are endemic, particularly among the high mountain flora.

The region's topography and climate, along with the rich mixture of vegetation communities, provide optimal conditions for species diversity. Although the Pursh-Pursh and Vengeri basins comprise only 1 percent of Sakhalin's land area, they are home to about a third of the island's flora species, nearly two-thirds of all terrestrial fauna species, and over half of all bird species. The two river basins are home to 374 vascular plant species, 30 of which are rare and endangered, including Redovsky's rhododendron (*Rhododendron redowskianum*).

The fauna of the region includes thirty terrestrial mammal species, five amphibian and reptile species, and 186 bird species. Fifty-eight species of fauna are rare and endemic, and twenty-eight are listed in the various *Red Data Books*. Mammals include the Sakhalin roe deer and wild reindeer. The area is particularly important for the latter during rutting and calving. Rare birds include the brant goose, swan goose, whooper swan, mandarin duck, osprey, golden eagle, Siberian grouse, eagle owl, white-tailed sea eagle, Steller's sea eagle, and others. Because of the rich fisheries, abundance of good nesting sites, and absence of humans, large populations of sea eagles nest in the region, and in autumn it is not uncommon to encounter eight or nine in a day. The pristine rivers are productive spawning grounds for pink salmon, chum salmon, cherry salmon, and coho salmon. The scenic landscape draws skiers to the steep slopes for summer skiing; there is a yearly ski camp at Chamginsky Pass.

Threats. Until 1995, with minimal recreational and hunting activity, the region was completely untouched, protected primarily by its inaccessibility—the steep Nabilsky Ridge serves as a formidable barrier. Then the timber company Smirnykhovsky Lespromkhoz (LPX) leased part of the territory and started to build logging infrastructure, with plans to log by helicopter as well.

Existing protection measures. Thanks to the efforts of activists and scientists, again with the support of Friends of the Earth–Japan, Vostochny (Eastern) Zakaznik was created in 1999.

Recommendations. The following actions should be taken:

- End commercial logging.
- Terminate Smirnykhovsky LPX's timber lease on the grounds of repeated violations of logging regulations.
- End road and bridge construction.
- Increase financing for Vostochny Zakaznik.

2. Coastal bays and wetlands of Northeastern Sakhalin (wetland and marine)

D. LISITSYN—The northeastern coast of Sakhalin and the island's shoreline and coastal waters should be regarded as a single ecosystem, essential for preserving the biodiversity

of the entire area. The coastline is an important migratory route for waterfowl traveling south to Japan, southeast Asia, and Australia. The coastal waters and the bays also serve as shelter during summer migrations. Population counts taken here between 1989 and 1991 tallied more than sixteen thousand swans, twelve thousand shorebirds, one hundred thousand ducks, and thirty thousand gulls.

The seashore and coastal rivers provide the primary stopover grounds for river ducks (mallards [*Anas platyrhynchos*], Northern pintails [*A. acuta*], Eurasian wigeons [*A. penelope*], Northern shovelers [*A. clypeata*], and common teal [*A. crecca*]). Tufted duck (*Aythya fuligula*) and greater scaup (*A. marila*) also nest here, as do mergansers (*Mergus*) and Common goldeneye (*Bucephala clangula*). Large, fish-eating birds of prey nest along the shoreline; these include the endangered Steller's sea eagle (*Haliaeetus pelagicus*), white-tailed sea eagle, and osprey. All the larger bays support mixed colonies of common (*Sterna hirundo*) and Aleutian terns, amounting to a few thousand pairs. Nesting shorebirds include sandpipers (*Calidris*), redshank (*Tringa totanus*), common greenshank (*T. nebularia*), and one of the rarest birds in the world, the Nordmann's greenshank.

These bays are also important fisheries; eight salmon species are found here, including pink salmon, chum salmon, cherry salmon, and coho salmon. Migrating smolts rest in these shallow waters before heading off to the open sea. The northeastern Sakhalin coast is a key feeding place for many populations of Pacific salmon. Young fish spend time in the coastal waters of the Sea of Okhotsk before migrating to the Pacific Ocean. The salmon then return along the same route to spawn. Massive migration begins in the last week of June (cherry and pink salmon) and continues until November (chum and coho). Thus, the rivers that flow into the Sea of Okhotsk on the northeastern Sakhalin coast support their own salmon runs. This fact makes the area crucial for the health of fisheries in the entire Sakhalin region, fisheries being the lifeblood of the Sakhalin economy.

Most nearby rivers also have Dolly Varden (*Salvelinus malma*), taimen (*Hucho taimen*), and whitefish (*Coregonus*). Smelt (*Osmerus*), Pacific cod (*Gadus macrocephalus*), and Pacific herring (*Clupea pallasii*) are abundant in the bays. The endangered gray whale also migrates to the coastal waters.

Threats. The offshore oil and gas projects pose great threats to the area, both on land and off shore.

Existing protection measures. In 1995, the Sakhalin Committee on Environmental Protection proposed to the federal government that the northeastern coastal wetlands be listed as a Wetland of International Importance (Ramsar site). For a variety of reasons, the Federal Committee on Environmental Protection, based in Moscow, continues to hinder this listing process.

Recommendations. The following actions should be taken:

- Declare the coastal bays and wetlands a Ramsar site; this would bring international attention to the importance of the region.
- Require that regional and federal authorities, nature protection agencies, and oil and gas companies comply fully with all existing Russian legislation and regulations during oil and gas development.
- Support the efforts of NGOs, indigenous groups and local citizens on Sakhalin to monitor oil and gas development.
- Permit only the most advanced and least damaging exploration, extraction, and processing methods, including adherence to technological practices such as zero discharge of drilling wastes and the use of double-hulled tankers.

3. Anna, Sima, and Bakhura River basins (forest)

R. SABIROV, N. SABIROVA, G. VORONOV—From their headwaters on the eastern slope of Susunaysky Ridge, the Anna, Sima, and Bakhura Rivers flow east into the Sea of Okhotsk. Dark coniferous forests of predominantly fir and spruce characterize the area. The topography is highlighted by five peaks: Shuya (612 m), Sokolskaya (839 m), Pervomaiskaya (749 m), Bykova (954 m), and Avgustinovicha (1,034 m). Between these peaks are numerous rock slides and steep, narrow valleys.

Sakhalin's southeast coast differs from other areas of the island in that winters are relatively mild. January temperatures average approximately -13°C , falling to -15°C on mountaintops. The warmest month is August, when temperatures average 16 to 17°C . Absolute high temperatures are much higher, however, often exceeding 30°C . Annual precipitation averages between 800 and 1,000 mm, with 130 frost-free days. The area is also one of Sakhalin's snowiest. Because of the heavy snow cover, mild temperatures, and fast currents, the rivers do not freeze over in the winter.

Fir and spruce forests cover 70 percent of the territory. Willow, alder, Japanese stone pine shrubs, and stone birch make up the rest of the forest cover in the Anna River basin. With forest fires rare and logging absent, old-growth forests remain where there are no roads.

Two hundred and seventy-two vascular plant species flourish in the Anna River basin (23 percent of all such species found on Sakhalin Island). Many of Sakhalin's species were first discovered in this area, and twenty are endangered. Numerous species of moss, lichen, and fungus are found here as well.

Fauna include 201 vertebrate species: 162 bird, 35 mammal, 2 amphibian, and 2 reptile, totaling about 40 percent of all Sakhalin's vertebrates. Endangered species include the Sakhalin musk deer, mandarin duck (*Aix galericulata*), whooper swan, eagle owl (*Bubo bubo*), gyrfalcon (*Falco rusticolus*), and peregrine falcon (*Falco peregrinus*).

The ecosystems of the other two basins (Bakhura and

Sima) are not as well studied, but they do differ significantly from the Anna River basin. The Sima River basin is characterized particularly by scenic cliffs and waterfalls, and groves of wild Ainu cherry (*Prunus ainensis*).

The watershed of the Bakhura River, totaling 37.7 sq. km, is much larger than those of the other two rivers. The river valley is dominated by large poplar and willow trees, frequently nested in by sea eagles. There are also magnificent stands of oak and other broadleaved species. These add a distinctive, east Asian accent to the otherwise boreal floral communities.

All three rivers are important spawning grounds and, thanks to the dense forest cover along their banks, are the most productive rivers on the southeast coast of Sakhalin. Dolly Varden, steelhead (*Oncorhynchus mykiss*), pink salmon, chum salmon, and cherry salmon are the most common species spawning in these rivers.

Threats. From 1940 to 1990, the territory was not significantly affected by human economic activity. The absence of roads and the alpine topography helped prevent the region from being settled. This has, however, begun to change with the onset of commercial timber harvesting and construction of logging roads nearby. Fishing, hunting, and wild herb gathering (both legal and illegal) have also started to take their toll. One company (Fenix-II), which has a permit to harvest salmon in Anna River, strings a large fishing net across the mouth of the river, with disastrous effects on salmon reproduction. Recreational use is also increasing.

Construction of a gravel road that cuts across all three rivers has destroyed many scenic cliffs and leveled the ground in many places. This road construction required the clearance of a 7 km-long, 20-m- to 50-m-wide strip along the upstream side of the road, and terraces have been built where the cliffs are steep. This road construction is likely to change the hydrological regimes of these rivers. It will certainly cause erosion, and, worse, provide access to previously remote regions, increasing the likelihood of forest fires and poaching.

Existing protection measures. This is one area of southern Sakhalin that has been largely spared the damage of human development. Pristine forests remain in the Anna River basin, 3,000 ha of which were designated a natural monument in 1983. There is also an initiative to create Susunaisky National Park, which would protect the headwaters and basins of all three rivers. This effort, which was supported by the Sakhalin Committee on Environmental Protection, is also included in a federal program for the creation of new protected areas by 2005.

Recommendations. The following actions should be taken:

- Improve protection of the Anna River Natural Monument and raise its status.
- Phase out leases for salmon harvesting in all three rivers.

- Enlarge the Anna River Natural Monument to 50,000 ha; the area is now too small to protect species that require extensive habitat, such as eagles, brown bear, river otter, sable, and American mink.
- Push for the creation of Susunaisky National Park.

4. Schmidt Peninsula (forest)

R. SABIROV, N. SABIROVA, G. VORONOV—Schmidt Peninsula lies at the extreme northern tip of Sakhalin Island. Two hilly ridges (623 m long) run northwest to southeast, and the Pil-Dianovskaya lowlands lie between them. There are picturesque cliffs and waterfalls. Prevailing winds moderate winter temperatures, making the climate somewhat warmer than the rest of central and northern Sakhalin. Winter months are generally 2 to 5 degrees warmer, and temperatures do not fall below -28°C .

The warmer temperatures and hilly topography have created much richer forests than those immediately to the south. Larch forests quickly give way to virgin Ayan spruce forests on Schmidt Peninsula, particularly in well-drained areas on hillsides protected from the winds. Stone birch grows on the windswept slopes, with larch dominating at lower elevations. Willow and alder forests thrive in floodplains. Japanese stone pine shrubs dot the coastline and mountain peaks. Many alpine species, such as *Erysimum pallasi*, grow only on Schmidt Peninsula.

Brown bear, red fox, sable, river otter, ermine (*Mustela erminea*), and reindeer live on the peninsula. Gallinaceous birds are abundant and include the hazel grouse (*Bonasa bonasia*), willow grouse (*Lagopus lagopus*), and Siberian grouse (*Falcapennis falcipennis*). Swan and geese also migrate through the area, and rare coastal birds, such as sea eagles, nest on the coasts. Pink salmon flourish in the clean rivers and the endangered Amur sturgeon (*Acipenser schrencki*) and kaluga sturgeon (*Huso dauricus*) migrate to the bays.

Threats. Because timber reserves are declining elsewhere on the island, the valuable Ayan spruce stands are now a temptation for Sakhalin's timber enterprises. New road construction and existing and planned mining activities compound the logging threat. Increasing unregulated tourism,

poaching, and continuing efforts to bury toxic chemicals (especially DDT) are also threats to the peninsula's forests and wildlife.

Existing protection measures. Severny (Northern) Zakaznik (a regional-level game preserve) inadequately protects the peninsula, as hunting and commercial logging are allowed within the *zakaznik* boundaries.

Recommendations. The following actions should be taken:

- Raise the protection status of Severny Zakaznik to that of a comprehensive nature *zakaznik* or *zapovednik*; prepare a scientific justification as a first step.
- Thoroughly research the flora and fauna.
- Halt construction of new roads and mines.

5. Krilon Peninsula (forest)

S. S. MAKEEV, A. A. TARAN—Sakhalin's southwestern tip, Krilon Peninsula, is the warmest part of the island, largely thanks to the warm Tsushima Current from the south. January temperatures average -10°C in the snowy winter; August temperatures in the warm, humid summers average 17°C . Autumn lasts until mid-November and there are 140 to 160 frost-free days each year.

The peninsula has low mountain ridges, none higher than 500 m, and is crisscrossed by numerous rivers and scenic cliffs. The fragments of uncut fir and coniferous broadleaved forests support some of the highest species diversity on the island. During the 1930s and 1940s, clear-cut logging and repeated fires devastated the southern half of the island.



Sakhalin Environment Watch staff campaigning for protection of Vostochny Zakaznik.

Sakhalin Environment Watch

Unfortunately, many of the forests have not grown back, having been replaced by unproductive birch forests and dwarf bamboo. Erosion on the steep, logged slopes has silted up many rivers and streams. These misguided land-use practices have caused microclimatic changes, degrading the unique flora communities of southern Sakhalin. Animal populations have plummeted. Forest cover has fallen by 40 percent and continued logging will lead to irreversible losses of vulnerable plants and animals.

Oak, maple, and the Sakhalin cork tree (*Phellodendron sachalinense*) dominate the coniferous broadleaved forests. Walnut trees (*Juglans*), cherry trees, magnolia vines, and climbing hydrangeas (*Hydrangea petiolaris*) are also present. Equally important are the southern taiga communities dominated by Sakhalin fir, intermingled with Japanese yew and holly (*Ilex*). Stone birch and Middendorf's honeysuckle (*Diervilla middendorffii*) grow at higher elevations.

According to Russian ecologists, the peninsula has global importance for biodiversity conservation because of its five hundred vascular plant species and even greater numbers of moss, lichen, and fungal species. Endangered species include Wright's hawk (*Viburnum wrightii*), spurred coral root (*Epipogon aphyllum*), Sakhalin catchfly (*Silene sachalinensis*), and many others.

In addition to brown bear, red fox, and sable, one hundred bird species live on the peninsula, including osprey, white-tailed sea eagle, mandarin duck, peregrine falcon, eagle owl, and Japanese white-eye (*Zosterops japonica*). Ruddy-breasted crake (*Porzana fusca*), a very rare visitor to Russia, nests in the river valleys, as do red-crowned crane and Oriental white stork (*Ciconia boyciana*). The cliffs along the shores host black guillemot (*Cephus carbo*), ancient murrelet (*Synthliboramphus antiquus*), and tufted puffin (*Fratercula cirrhata*) colonies. Krilon's rivers still have large populations of cherry salmon, pink salmon, chum salmon, green sturgeon, and Sakhalin taimen.

Krilon Peninsula is considered a distinct geographical and botanical subzone, and its ecosystems serve as important baselines for research. Despite damage done to the region, the southernmost parts—particularly in the middle and upper reaches of rivers—have been spared from clear-cutting and retain their natural character. In addition, the low population density and absence of major transportation links, as well as the favorable climate and soil characteristics, facilitate natural regeneration in degraded ecosystems.

Threats. The settlements of Nevelsk, Gornozavodsk, and Shebunino, in the north of the peninsula, are the main areas of economic activity. Proposed plans to log the Uryum River basin would threaten salmon runs and populations of rare animal and plant species. The fishing industry pollutes rivers and streams and fishes irresponsibly. With the increasing number of visitors along the western shores, forest fires are a concern.

Existing protection measures. In 1972, Sakhalin established a 52,000-ha hunting *zakaznik* near Aniva Bay on the eastern portion of the peninsula to protect game populations. The *zakaznik* fails, however, to protect the region from poaching and fires.

Recommendations. The following actions should be taken:

- Reestablish the Yuzhno-Sakhalinsky (Southern Sakhalin) Zapovednik (which functioned until the late 1940s), with northern boundaries marked by the Uryum and Lugovka River basins, a buffer zone no less than 1 km wide, and a 1-km protected marine zone. Incorporate the existing *zakaznik* within the *zapovednik*. Set up a moratorium on logging and strict controls on hunting, fishing, nontimber forest products collecting, and tourism until the *zapovednik* is organized.
- Complete a full inventory of flora and fauna to provide the scientific justification for reestablishing the *zapovednik*.

6. Nevskoe Lake (wetland)

N. PIROGOV, V. V. FEDORCHUK—Located in central Sakhalin north of Terpeniya Bay, Nevskoe Lake is a large (178 sq km) but shallow brackish lagoon (2 km at its deepest point). Toward the east, the lake gives way to marshlands. Nevsky Spit, a long, narrow strip of land extending west to east, separates the lake from Terpeniya Bay. In many places, small lakes and thick peat deposits bisect the spit. Nevskoe Lake connects to the Bay through two main points, Promyslovka Outlet and Nevsky Strait.

Conifer and broadleaved forests (larch, spruce, birch, and willow) grow on the western shores of Nevsky Spit. These woods are largely inaccessible because the pine bush thickets are so dense. Along the shore at the water's edge are birch stands stunted by frigid, northerly winds and large snow banks. Forests on the eastern shore of Nevsky Spit were destroyed to build the narrow-gauge railroad that connects the city of Poronaisk with the village of Trudovoe.

Preliminary research demonstrates that the Nevskoe Lake area has a high level of biodiversity, in part because of the wealth of food resources (plant and animal). The shallow lake warms up quickly, which stimulates growth of phytoplankton and zooplankton. These plankton serve as the primary food source for fish, including salmon that travel up the Rukutama, Olenya, and Angurovka Rivers to spawn.

The fish support other fauna. A few dozen bird species nest near the lake and, during fall and spring migrations, tens of thousands of birds (ducks, shorebirds, gulls) stop over on the lake. The lake provides shelter from stormy weather, as birds escape Terpeniya Bay. Rare species include Steller's and white-tailed sea eagles, peregrine falcon, osprey, mandarin duck, and the migrating spoonbill sandpiper (*Calidris pygmaeus*). Whooper and Bewick's swans, oystercatchers, broad-billed sandpipers (*Calidris falcinellus*), and reed

bunting (*Emberhiza schoeniculus*), rare in the Far East, are also found. During the summer, the sandy bars and islands of the southern part of the lake provide nesting grounds for the globally endangered Aleutian tern. Red foxes, river otters, muskrats, raccoon, and brown bears feed near the shoreline of the lagoon. Muskrat, which was introduced here in the 1960s, has adapted particularly well to local conditions.

Threats. The lake plays an important role for many species, but except for the eastern part of the lake, the region is poorly protected, and the entire ecosystem is becoming degraded: swampland is spreading, the waters are becoming increasingly shallow, and fish are starving. The main culprit is the dike that provides railroad passage to the town of Trudovoe and has disrupted local groundwater supplies and the circulation of the lake's surface water. Timber cuts around the headwaters of the rivers on the lake's watershed decreased the amount of available water to the lake, and proportionally increased sedimentation of the lake. At present, large amounts of inorganic and organic compounds continue to flow into the lake, silting up the already shallow waters and accelerating bog formation on the lake's margins. This is especially visible along the eastern edge, which lies in the buffer zone of Poronaisky Zapovednik. Weak water circulation promotes the accumulation of organic matter and facilitates the rapid growth of green-blue algae, degrading the quality of water for the fish.

Another major factor is the year-round poaching. The lack of protective measures (except in the buffer zone of the *zapovednik*) and the ineffectiveness of environmental inspectors has resulted in the loss of natural lake fauna. The disturbance of birds during the nesting season is also serious. In 1996, a few colonies of common and Aleutian terns disappeared from an island and near the lakeshore after hay harvesting. A fire in 1997 destroyed an important Japanese stone pine grove near the town of Promyslovoe, which meant the loss of shelter for many species. According to some reports, the endangered Blakiston's fish-owl used to nest in the grove. Some other woods along the shore may still contain this rare species.

Existing protection measures. The only current measure to protect the region is the inclusion of the eastern part of Lake Nevskoe in the buffer zone of Poronaisky Zapovednik.

Recommendations. The following actions should be taken:

- Complete an ecological and archaeological survey of the territory.
- Determine the appropriate protection status (historical-natural park, national park, complex *zakaznik*, etc.).
- Breach the dike and create a suspension bridge to restore the natural water exchange between the lagoon and the sea.
- Establish zones in the territory to locate the most valuable areas requiring maximum protection, and forbid economic activity in such areas.

- Research potential Blakiston's fish-owl nesting sites and protect such sites as *zakazniks*.

7. Vaida Mountain (forest)

A. KLITIN—Vaida Mountain, once called Okadayama by the Japanese, is the largest ancient rift formation on Sakhalin Island. Located at the headwaters of the Vitintsy River, 12 km southeast of the town of Izvestkovy, the mountain's two peaks (835 m and 947 m) are among the highest points in the Rukutama River watershed, which includes the Vitintsy and Melkaya Rivers. Vaida is notable for its twenty-four karst cavities, which are of great interest to geomorphologists; its environs in general are of geological, archaeological, and zoological importance. The caves on Vaida Mountain, particularly Vaida Cave, Medvezhikh Tragedy ("Bear Tragedy") Cave, and Kaskadnaya Cave, with their distinctive formations, brilliant stalactites, stalagmites, petroglyphs, and variety of animal remains have attracted specialists for decades. The areas around the mountain that remain undisturbed by fire host fine examples of alpine flora, including two species of lady's slipper (*Cypripedium*) and a number of rare insects.

Two km to the south of Vaida is the remarkable Lake Perevalnoe. This 6-sq.-km kettle lake was formed by a landslide, and there are multiyear peat formations along its shores. A tiny population of East Sakhalin poppy (*Papaver sakhalinensis*), endemic to these mountains, grows in the watershed above the lake. Between 1986 and 1996, the number of these rare plants increased from about four to about forty.

Threats. Although declared a natural monument in 1983, Vaida Mountain has been hit with logging and mining; the local press has reported a number of these violations. All of these operations were approved by the local *raion* administration, despite the regulations protecting natural monuments. In addition, the construction of a new road in the late 1980s led to the extirpation of reindeer due to uncontrolled hunting. Future threats include possible limestone mining at Vaida once existing deposits elsewhere are depleted; the new road makes Vaida a convenient location for an open-pit quarry.

Existing protection measures. The existence of the road and the ease with which the regulations protecting the natural monument could be repealed at any moment (particularly if there is a demand for the mountain's limestone resources) leave the area highly vulnerable.

Recommendations. The following actions should be taken:

- Raise the status of the natural monument at Vaida Mountain to that of a nature park, strengthening its protection regime.
- Ensure that recreational visits to the mountain's caves are led by experienced guides.

Economy

Emma Wilson

Until the late nineteenth century the main natural resource users on Sakhalin were the indigenous Nivkhi, Ainu, Evenki, and Uilta (Orochon, Oroki). Russians had begun to explore Sakhalin's resource base by the 1850s. From the 1860s there were conflicts between Japan and Russia over fishing rights. Russia established sovereignty over Sakhalin in 1875, and the island became a notorious penal colony. In the 1890s, Russian business magnates, notably Grigory Zotov, set up commercial fishing *artels*. Zotov also discovered Sakhalin's first oil reserves in 1904, a discovery that attracted considerable interest and capital from England, America, Germany, and China.¹⁹ After the Russo-Japanese War of 1904–1905, Japan gained the southern half of Sakhalin, while Russia, abolishing the convict system, continued the industrial development of the north. The Japanese occupied northern Sakhalin between 1920 and 1925, after which they negotiated coal and oil concessions in the Soviet half of the island; these concessions were annulled in 1944. From 1925, to expand agriculture and exploit Sakhalin's resources, Soviet planners encouraged workers from the western USSR. Fishing and fish processing were further developed. The Russians overtook the Japanese in oil production, and the reserves became essential to the Soviet government, being the only known reserves in eastern Siberia.²⁰

The Soviet government imposed collectivization policies from the 1930s, attempting to settle the indigenous people by introducing agricultural activities and setting up reindeer farming and collective fishing enterprises. The politics of amalgamation followed from the 1950s and 1960s: hundreds of native villages were closed and the indigenous people gathered into larger and larger settlements. In the 1950s and 1960s the Soviet government encouraged more and more settlers from European Russia to Sakhalin to work in scientific, industrial, and administrative jobs, and geological prospecting. Settlements developed around a single state-run industry that also provided essential social infrastructure; local communities came to depend entirely on the state. This dependence was even more acute for the indigenous people whose children were placed in state boarding schools (*Internat*) and whose traditional economic activities were reoriented to suit Soviet agricultural policy. They depended on state subsidies for transportation and market access. In the settlements, the indigenous populations were gradually assimilated. The result today on Sakhalin is a mixed population with an overall indigenous representation of 0.3 percent, rising to only 7 percent in the north.

Sakhalin has retained its role as a natural resource colony. Since the collapse of the command economy, the loss of state subsidies and guaranteed markets has hit many sectors of

Sakhalin's economy hard, from the indigenous reindeer herding collectives to agriculture to paper production, and the dependent populations are now suffering the consequences. Fishing remains a vitally important economic activity, not only at the regional level, but also increasingly for subsistence users and small-scale entrepreneurs. The timber industry is surviving by focusing on raw log export to Asia. The oil industry is becoming more prominent, representing about one-quarter of total industrial production. The energy crisis on Sakhalin now is highlighting the conflict between satisfying local needs for Sakhalin's resources and political demands for foreign currency profits.

Fishing—lifeblood of Sakhalin

The Sakhalin fishing and fish processing industry constitutes 16 percent of the total RFE industry, making it the third-largest producer of fish and fish products after Primorsky Krai and Kamchatka Oblast. Fishing and fish processing are major sources of revenue and the largest employers in the *oblast*. Fisheries around Sakhalin Island have been heavily exploited for more than a hundred years. Overfishing has been the primary cause of decline, resulting, among other things, in significant fish population variations. In the past decade, illegal fishing around Sakhalin Island has flourished, affecting, especially, valuable marine resources such as crab.

Another significant concern is the Russian-Japanese agreements that allow Japanese boats to use driftnets for taking salmon near the Kuril Islands. This practice, particularly in key, narrow migration routes such as the Kuril Straits, can wipe out entire runs of salmon from a particular river basin.

Another significant issue occurred in June 1999 with the herring kill in Piltun Bay. Dead herring, piled half a meter high and between 1 and 6 m wide, covered a 12-km strip of shoreline in Piltun Bay. Investigators from the Sakhalin-based Institute of Fisheries and Oceanography (SakhNIRO) estimated that the dead fish amounted to between 1,000 and 11,000 tons. According to an investigation by two environmental groups, the kill may have occurred as a result of dumping from the Molikpaq oil-drilling platform, part of the Sakhalin II project. However, the groups claim that government environmental agencies refused to investigate the incident thoroughly, and the project's operator, Sakhalin Energy Investment Company, refused to provide the groups with data that could prove or disprove its responsibility.

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Agriculture

With its mountainous geography and dense network of creeks and rivers, only 2 percent of Sakhalin's territory is suitable for agriculture. The industry consists mainly of vegetable growing, production of animal feed, dairy and meat farming (including reindeer herding), and poultry farming. More than 85 percent of the agricultural land lies in the basins of six rivers, mainly the Tym and Poronai, in central Sakhalin, and in the south. In these areas between 40 percent and 60 percent of the land is cultivated. Present agricultural practices cause loss of topsoil, and agrochemicals poison the land. The hardest hit areas are the wetlands of the Tym River valley and around Aniva Bay, where migratory bird habitats are damaged and salmon now have no access to once-rich spawning rivers. Pastures are overgrazed to about four times their capacity. Agricultural production has declined, so the quantities of mineral fertilizers and poisonous chemicals used on the soil has decreased sharply, reducing the amount of pollution and improving the ecological condition of wide areas of valleys, especially in the basins of the Tym and Poronai Rivers.

Fishing

A. KLITIN—The Japanese were exploiting fishing grounds around Sakhalin long before the Russo-Japanese War. Until the end of the 1890s, Japanese fishing activities in Sakhalin waters were limitless as they controlled four hundred fishing areas.²¹ The payments for using these resources were negligible. After the Russo-Japanese War, when Sakhalin was split between Japan and Russia, Japanese fishing (including crab fishing) intensified. The Russian-Japanese Fishing Convention of 1907 did not improve the situation. In the northern (Russian) part of Sakhalin, there were only four Russian border guards to control the activities of Japanese fishermen.

Commercial fishing by Russian fishermen is done by means of seines or sweep nets. Japanese fishermen prefer to use driftnets for salmon fishing and have been doing so near the territorial waters of the RFE since 1927. At the end of the 1980s, an intergovernmental agreement was signed that allowed Japan to engage in driftnet fishing in the economic zone of the Russian Federation. In February 1992, under pressure from the United States, New Zealand, and Canada, Japan signed a convention to ban use of driftnets in open waters, because of the threat to birds, dolphins, and whales.²² But Japanese driftnet fishing continues today in the Russian economic zone. As a rule, approximately fifty Japanese vessels use driftnets all along the ocean side of the Kuril Islands. The same happens in the southern Sea of Okhotsk. Every vessel puts out and pulls in about eight 4-km-long nets daily.

Fishing operations in Sakhalin are carried out by Nevelsky Trawling Fleet, Korsakovsky Ocean Fishing Base, Severo-Kurilsky (North Kurils) Seiner Fleet, eleven fishing collectives (*kolkhozes*), Alexandrovsk-Sakhalinsky, Kurilsky, and Yuzhno-Sakhalinsky fishing factories, Ostrovnoi

and Yuzhno-Kurilsky industrial fishing complexes, Kholm'sky Marine Fishing Port, Pilenga-Godo and Sisafiko joint ventures, Svobodnoe TOO (limited liability company), Tunaicha AO (joint-stock company), Kuk ZAO (closed joint-stock company), Vostok Fishery company, Salmo company, Kanif International, and other private firms. At present, 351 commercial fishing areas (between 0.2 and 83 km long) are leased out along the Sakhalin coast. The allocation of quotas according to fishing areas works well with salmon fishing, but makes no sense with marine fish and invertebrates, which migrate widely.

Herring. At the end of the nineteenth century and the beginning of the twentieth century the major commercial fishing species near Sakhalin was Pacific herring (*Clupea pallasii*), found in the northern Sea of Japan. The average annual catch each year between 1900 and 1930 was 720,000 tons and in some years reached one million tons. At that time the quantity of herring in the Tatar Strait was very high, and it could be thrown onto the shore in great numbers. Thousands of tons of herring were used to make mineral fertilizer for rice fields in Japan. In the mid-1930s, the annual catch dropped to between 200,000 and 400,000 tons and remained at that level until the mid-1950s. For the past forty years, the Sakhalin-Hokkaido herring population has been in decline. In the 1970s the herring spawning areas were greatly reduced, due partly to the dumping of untreated waste from pulp and paper factories in the towns of Kholm'sk, Chekhov, Tomari, and Uglegorsk. Current Japanese fishing strategy focuses on fishing young herring, so there is nothing left of the populations by the age of maturity (six years).

Salmon. In the 1970s and 1980s, the salmon catch was large and stable (between 30,000 and 80,000 tons) around Sakhalin and the Kuril Islands. The highest catches of salmon (over 100,000 tons) were made in 1989 and 1991, thanks to the high natural reproduction capacity of salmon and the efficiency of salmon hatcheries in the region. At present, over twenty hatcheries are operating on Sakhalin (most of them in the south). The main reproduction areas for pink salmon are the rivers on the southeastern coast of Sakhalin and on Iturup Island. These two areas produce over 70 percent of all salmon. To date, 30 percent of the natural salmon-spawning grounds have been lost as a result of logging and oil industry activities, and 130 rivers have become unsuitable for natural salmon reproduction; other rivers, such as the Tym, Poronai, and Naiba, have been greatly damaged.

Pollock. Pollock fishing began near the eastern coast of Sakhalin in 1975, and the annual catch here has never exceeded 150,000 tons. Pollock migrates here from the northern Sea of Okhotsk and from the Kuril Islands in the south. A marked decrease in the pollock population in the northern Sea of Okhotsk between the 1980s and 1990s resulted in a

significant decrease in the catch near the northeastern coast of Sakhalin (from 140,000 tons in 1986 to 540 tons in 1998). Near the southern Kuril Islands, the pollock catch reached between 300,000 and 400,000 tons in 1976–1982 and 1986–1988. In subsequent years, the annual catch decreased to 200,000 tons. Pollock also migrates to the Tatar Strait from the northern Sea of Japan. In the mid-1980s, the catch in Sakhalin waters of the Tatar Strait fell to 1,000 tons but rose to 16,000 tons by 1992. Nevertheless, with intensive fishing, the pollock population in the northern Sea of Japan has been in decline for the past twenty years. Up to 60 percent of the population is caught annually near the coast of Japan, a practice that severely disrupts the population's reproductive capacity.

Flounder. The main areas of flounder fishing were in the northern Tatar Strait, in the Ilinsk shallows, and in Terpeniya Bay, where the maximum catch was between 11,600 and 16,200 tons in the 1940s and 1950s.²³ Subsequently, the flounder catch decreased due to overfishing and now, in the northern Tatar Strait, does not exceed 2,000 tons; in the Ilinsk shallows the annual catch is 600 tons.

Smelt. According to data from Aniva Marine Fishing Protection Service, in Mordvinova Bay, sports fishermen catch 500 tons of smelt (*Osmerus mordax dentex*) in winter, five times more than the recommended allowable catch for this species. Smelt fishing was banned in Terpeniya Bay between 1986 and 1997. The population decline was caused by untreated industrial effluents dumped from the Poronaysky pulp and paper factory into Poronai River, where the main smelt spawning grounds are.

Crab. As far back as 1909 the Japanese, using floating crab-canning factories, were engaged in crab fishing in Sakhalin waters, mostly for Kamchatka king crab (*Paralithodes camtschatica*). Southeastern Sakhalin was exploited the most, because of the relatively high numbers of crab and the year-round fishing opportunities. Between 1914 and 1944, 109,660 tons of king crab were caught (approximately 3,537 tons per year). The maximum catch in the area (12,350 tons) was in 1917. In that year 117,515 cans of Sakhalin crab were exported to England and the United States. At the end of the 1930s, the numbers of king crab fell because of this overfishing. In the 1950s, the annual king crab catch was estimated at 3,300 tons. In 1953–1956, significant overharvest led to long-term decline of the crab population. Until 1985, the crab catch in the area never exceeded 200 tons. The population began to recover only in the early 1980s when trawlers were replaced with trappers, making fishing more selective. As a result, the allowable catch in the area grew from 200 to 840 tons between 1986 and 1996.

From 1991 to 2002, the Tatar Strait served as a main source for crab exports to Japan, with over sixty vessels fish-

ing near the southwestern coast of Sakhalin. Exporting crab outside of Russian territorial waters (but still in the Russian 200-mile Exclusive Economic Zone) is much easier, so three to four times more crab were caught from 1994 to 1998 than was officially reported. This smuggling scheme is quite simple and safe for the crews. If inspectors from either Sakhalinrybvod (the Sakhalin branch of Glavrybvod) or the Special Marine Inspection Service pay an unexpected visit, the quantity of crab is immediately recorded in the fishing logbook prior to the inspection. The whole operation of legalising the crab catch takes no more than 30 seconds. But nine times out of ten, crab cargoes leave the EEZ without any obstacles. Where crab populations are significantly depleted and catches do not exceed between 100 and 200 kg, fishermen apply a different strategy. It is much more profitable there to “make an agreement” and collect crab from vessels that do not export it to Japan and, as a rule, have no quota allocation for crab fishing. Another popular illegal fishing method is to catch king crab but register it as blue crab.

Due to overharvest, both populations and allowable catch decreased abruptly. But reduced crab quotas failed to improve conditions as crabbers switched to the intensive harvest of female king crabs, severely affecting reproduction patterns. The Japanese, completely aware of the illegal nature of such catches, willingly purchase female crabs at dumping prices.

The long lifespan and other biological and population-related characteristics of the crab predetermined its slow recovery after overharvest. In the South Kuril Strait, for example, in the mid-1930s, the Japanese were catching up to 10,800 tons of king crab; in the mid-1960s, up to 5,700; today a 20-ton catch is difficult to achieve. Populations of other crab species have also declined as a result of intensive fishing, the predominance of Japanese interests in fishing and consumption, and illegal fishing practices.

In 1998 coastal crab fishing was carried out by fourteen enterprises of Sakhalinrybprom (Nevelsky Trawling Fleet, Sakhmoproduct AO, Korsakovsky fish-canning factory, Diana joint venture, Tunaicha AO, and others), Korsakov Ocean Fisheries Base, six fishing *kolkhozes*, twenty-four enterprises of the Fishing Industry Association of Sakhalin, and six enterprises of the coastal fishing industry complex (Kompas, Taranai, Aborigen Sakhalina, and others). Deep-water crab fishing is carried out by Kurilsky Universal Complex, Binom, and fishing *kolkhozes* of Sakhalin.

Shrimp. Two species of shrimp are caught in the Tatar Strait: northern shrimp (*Pandalus borealis*) and crested shrimp (*P. hypsinotus*). Shrimp fishing is done by Nevelsky Trawling Fleet Base, fishing *kolkhozes*, Kurilsky Universal Complex, Komandor Company, Preobrazhenie Trawling Fleet Base (Vladivostok), Sako & Co., Baial Company, and others. Between 1979 and 1984, mostly Japanese vessels were engaged in shrimp fishing. In 1984, trapper fishing was started by using vessels of the Nevelsky Trawling Fleet Base. In 1990, the

number of ships increased to thirty-five. By 1995, there were sixty-two shrimp fishing vessels. Prices for small raw northern shrimp in Japanese ports were low, so fishermen began to target only the bigger crested shrimp. This was exacerbated by the indiscriminate system of permits for harvesting any shrimp species. As a result, the quantities of crested shrimp in catches in the early 1990s would reach from 96 to 99 percent. Thus, despite the estimated catch of 680 tons, the actual catch of crested shrimp in 1992 was 2,513 tons. The system was in place until 1996 and led to a drastic decrease in the population size in 1994–1995. Now the catch size of crested shrimp near the western coast of Sakhalin has been reduced to 50 tons. Since 1997, northern shrimp fishing in Tatar Strait has been done with shrimp trawlers, and one vessel may catch up to 20 tons of shrimp per month. In 1997–1998, the use of such trawlers in Aniva Bay resulted in decreasing population numbers of crested shrimp.

Fur seals. In the nineteenth century, fur seals (*Callorhinus ursinus*) numbered up to fifty thousand on nine of the Kuril Islands. Native Ainu people routinely used the noise from large rookeries to help them navigate in foggy weather. They seldom hunted the seals, preferring to use bird skins to make clothes. From 1881 to 1896 fishermen caught twenty-four thousand and five hundred fur seals and in the process destroyed this population.²⁴ Not until 1955 were small groups of fur seals (totaling about three thousand) discovered on the Dolgaya and Khitraya rocks (Kuril Islands) by the Russian scientist S. K. Klimov. The fur seal populations did not recover to their former size (fifty thousand) until the 1980s.²⁵ Fur seals also live on tiny Tyuleny (Seal) Island, about 18 km from Terpeniya Cape on Sakhalin Island. By 1896, American and English poachers there helped to reduce the population of two hundred thousand fur seals to only two thousand.²⁶ According to V. P. Shuntov's estimates, between fifty thousand and sixty thousand fur seals were killed annually at that time on the Kuril Islands and Tyuleny Island.²⁷ In 1911, a convention was signed between the United States of America, Russia, Japan, and Great Britain restricting fur seal hunting, and populations on Tyuleny Island recovered. However, in 1941, the Japanese resumed hunting, catching up to tens of thousands of fur seals annually and reducing the population to between thirty thousand and thirty-five thousand in five years.²⁸

It took forty years for the fur seal population on Tyuleny Island to recover, but by the end of the 1980s it had reached between seventy thousand and eighty thousand. In the 1980s, single male fur seals and four-month-old baby seals were killed periodically by order of the Ministry of Fisheries (Minrybkhoz), to "perfect techniques."²⁹ The International Convention on the Preservation of Fur Seals in the Northern Pacific Ocean was signed by the Soviet Union, the United States of America, Canada, and Japan in 1957 to the cost of

the Tyuleny Island rookery. Currently, the island is subject to intense sea erosion. Because of the decrease in demand for seal fur, the brigade from the Yuzhno-Sakhalinsk fishing factory left the island in 1994 after thirty years of fur seal hunting. At present, with no guards in place on the island, there have been cases of poaching. Animals also come to the island caught up with remnants of fishing nets, plastic bags, and steel rings.³⁰

Seaweed. Fishing for seaweed (*Anfelia tobuchiensis*) in Izmeny Bay (Kunashir Island) has been carried out since 1937 and most actively between 1964 and 1974, when the harvest reached 14.3 tons.³¹ Unsustainable fishing of this fragile seaweed species resulted in reduction of its biomass, the most damage done in Busse Lagoon. By 1970, the seaweed resources in Busse Lagoon were 7.2 percent of the 1916 level, and the harvest was stopped in 1971. Twenty-nine years later the biomass has recovered somewhat, to 20 percent of the 1916 level.

In the 1980s the coastal waters around the Lesser Kuril Islands were famous for their abundance of brown seaweed, especially *Laminaria japonica*, *L. angustata*, and *L. cichrioides*. After 1987, dredging tools were introduced and severely damaged the resource, reducing the laminaria near Zelyony Island, for example, from 320,000 tons to only 5,000 tons in 1990. The laminaria has now been replaced by less valuable species.

Other marine resources. Commercial fishing for Primorsky sea cucumber (*Patinopecten yessoensis*) in Aniva Bay began in 1961 on a bank near Kirillovo Village. By the following year, the harvest was already at 1,800 tons, which exceeded the recommended catch by 1.5 times. By 1966, the harvest had fallen to 30 tons, and in 1967 sea cucumber harvesting was banned. In 1976, the ban was removed and harvesting resumed until 1984. In 1985 the ban was reintroduced and remains in place. A ban on Primorsky sea cucumber fishing was twice introduced in Terpeniya Bay and near the southern Kuril Islands. It took fifteen years for the sea cucumber population to recover partly. Coastal fishing for gray sea urchin (*Strongylocentrotus intermedius*) began quite recently, without benefit of any scientific research to determine what was sustainable. In 1992 the catch was 600 tons. In 1997, the catch decreased to 70 tons—a sign that the resource has been damaged by overharvesting.

The trepang is harvested in Busse Lagoon, which is adjacent to Aniva Bay. Between 1978 and 1988 the catch reached 155 tons, exceeding the recommended harvest by 20–25 percent. In 1988 harvesting was banned. Currently, the population recovery is hindered by illegal harvesting, estimated at between 10 and 20 tons). Yet more damage was caused by fishing for red *Anphelitsiya* seaweed in Busse Lagoon as immature trepang were caught along with the seaweed.

Mining

Coal is still Sakhalin's major energy source—much of it coming from outside the region, mainly from the Republic of Sakha. Coal production is declining due to high transportation costs, loss of federal subsidies, outdated machinery, and intensive resource exploitation. From January to August 2000, Sakhalin's coal mines produced 1.75 million tons of coal. Coal producers are shifting from shaft to open-cast mining (80 percent of total mining) for the lowered costs and increased export competitiveness. Dolinsk and Poronaisk are the main coal centers, and there is also a large coal factory in Ulegorsk, where 42 percent of the *oblast's* coal is extracted.³² There are eleven underground coal mines, built in the 1930s and 1940s, and three open-cast mines: Solntsevsky, in Ulegorsky Raion (221 ha), Novikovskiy, in Korsakovskiy Raion (221 ha), and Lermontovskiy, in Poronayskiy Raion (2,796 ha). According to experts of the Vostokgeologiya

Conversion to natural gas?

Coal-fired power stations in Yuzhno-Sakhalinsk and other southern towns such as Vokhrushev are a big environmental concern for citizens. During winter, when black coal dust covers the snow and cloaks the towns, the air is difficult to breathe. Oil companies have advertised that the offshore projects will provide an environmental benefit by allowing the region to convert from coal to gas. But, because Sakhalin has not attracted the necessary investment for conversion to gas, it is unlikely that this will occur. Energy and fuel infrastructure problems result in frequent power cuts. The local authorities claim that a reorganization of coal pits can produce enough coal for power plants but they lack the working capital because the energy producers are not paying the coal mines. Coal deliveries are also hampered by the weather, lack of vehicles to transport the fuel, and payment for spare parts or winter tires.

Sakhalin residents hope that expanding local gas-powered energy systems will offset erratic coal supplies. The Nogliki gas-fired power station is now operating, with four turbines producing 40 MW. Despite the volume of local gas supplies, gas is used much less in local energy systems than on average in Russia (20 percent compared with 63 percent). Local gas is three times cheaper than locally produced coal, and increasing use of gas will save about 400 tons of coal daily. With the second phase of the Nogliki gas-turbine station in operation, gas usage within the power system could increase to between 40 and 45 percent.³³

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(Eastern Geological) Association, the estimated 650 million tons of reserves remain largely undeveloped due to financial difficulties.

Most existing mines are still unprofitable, and maintaining them is a heavy burden on the budget. While old, inefficient mines are being shut down (about seven in ten on Sakhalin), outsiders are coming to Sakhalin to develop new open-cast mines. These owner-operators have proven to be commercially effective, and in 1997 produced 25 percent of Sakhalin's coal output.

Energy

v. GOROKHOV—On January 20, 1925, a convention on cooperation between the USSR and Japan was signed in Peking (Beijing), returning northern Sakhalin to the Soviet Union and marking a new era in natural resource exploitation. The economic priority was to ensure constant growth in production and export of fuel and other resources. Development priorities remain much the same today.

Sakhalin's oil industry was established in 1928 when the Sakhalin-neft Trust was set up and oil production began in the north. After only five years, annual output rose to 500,000 tons, peaking in the 1980s at 2.5 million tons. In seventy years, 104.2 million tons of oil have been extracted on northern Sakhalin, yet not one ton has been processed on Sakhalin. All of it was transported to the oil refinery in Komsomolsk-on-Amur or exported abroad.

Onshore oil production increased in the late 1990s to around 1.7 million tons annually, though this is much less than the 2.6 million produced in the 1980s. Rosneft-Sakhalin-mornefegaz (SMNG) accounts for about 85 percent of onshore output and is a partner in several of the Sakhalin offshore projects. Most of Sakhalin's oil production is transported by pipeline to refineries in Khabarovsk and Komsomolsk-on-Amur. The small Petrosakh refinery on Sakhalin provides about one-third of Sakhalin's fuel needs. Onshore extraction has declined since the 1980s as known reserves have been depleted. Hopes for future development of the industry rest on the new offshore projects.

Offshore oil and gas. Mineral resources are nonrenewable and mineral development is unsustainable on Sakhalin and never will be sustainable; biological resources, if properly managed, can be developed sustainably. The Sea of Okhotsk has tremendous marine resources and proper development of these resources should take priority over oil and gas development. During the seventy years of oil extraction on Sakhalin, enormous damage has been done to its wildlife, rivers, and biological resources. Even greater damage can be caused by the offshore projects. These resources are now threatened.

The Sakhalin offshore projects commenced on January 28, 1975, when a General Agreement was signed between the Japanese company, Sodeco, and its Russian partner,

Sakhalinmorneftegaz (SMNG). SMNG received credit to conduct seismic surveys and exploratory drilling, and by 1990 had discovered five oil and gas deposits: Chaivo, Lunscoe, Arkutun-Daginskoe, Piltun-Astokhscoe, and Odoptu-More (see map 11.2, p. 380). The USSR, like the Russian Federation today, lacked both funds and technical expertise to develop the deposits alone, so in 1991 the government requested international bids to develop the Lunscoe gas deposit and the Piltun-Astokhscoe oil field. The main requirements of the Russians were:

- RFE demands for gas should be satisfied first.
- A portion of the gas should be processed on Sakhalin.
- The winner of the tender should use its own finances instead of financial loans.
- Environmental protection should take priority.

On January 27, 1992, a federal commission headed by V. I. Danilov-Danilyan, then head of the Federal Committee on Environmental Protection, analyzed the results of the tender. There were only three Sakhalin representatives in the seventeen-member commission: V. P. Fyodorov (then Governor of Sakhalin Oblast), A. V. Cherny (then Director General of Sakhalinmorneftegaz), and N. V. Solovyov (the indigenous representative). The tender was won by MMM, a consortium of western companies—Marathon, McDermott (both U.S. companies) and Mitsui (Japan). Governor Fyodorov refused to sign the commission's decision, as he and other experts did not trust MMM's promises.

Later, commenting for the newspaper *Sovetskaya Rossiya*, A. V. Cherny wrote:

The Production Sharing Agreement (PSA) allows most environmental issues to be left [in the waters of] foreign countries. It allows for profit making at all stages of the project. Banks provide credits and receive their benefits covered by the investor's portion of production. For the most part new jobs are created at home, but not in the country of operation. The PSA allows companies to establish control over natural resources and expand their influence over world market prices... Given this terrible situation, it is unbearable to hear Americans ... trying to convince people on Sakhalin that the Sakhalin II project will raise the living standards of the local population.³⁴

By the end of 1992, MMM consortium had become Sakhalin Energy Investment Company Ltd. (SEIC), registered in Ber-



Eastern Sakhalin coast. The island's shores are a mecca for gray whales, walruses, sea lions, seals, and endangered migratory birds.

Vladimir Zykov

muda with assets of just U.S. \$100 million dollars. Perhaps for financial reasons, SEIC deviated drastically from the original requirements stipulated by the Russian side and agreed upon by MMM. Gas production was postponed until 2005–2010. Funds are secured as loans from Western banks, with repayment based on revenue from oil and gas sales. Oil production, which began in July 1999, is now a priority.

Oil is being transported in the most environmentally dangerous way, by 90,000-ton tankers at ten- to twelve-day intervals. A similar system was used in Alaska, where in March 1989 the disastrous *Exxon Valdez* accident occurred. As a result of that tragedy, 40,000 tons of oil spilled into the sea, and Exxon had to pay around U.S. \$3 billion to deal with the consequences. SEIC has no such funds. Therefore, in its Oil Spill Contingency Plan (January 1999), it claims responsibility only for oil spills in the range of 500 m around the Molikpaq platform. SEIC is not liable for oil transportation or tanker spills.

The results of six environmental expert reviews (*experti-tiza*) conducted since February 1993 for the Sakhalin I and II projects suggest that oil and gas development in the Sea of Okhotsk may lead to disastrous and irreversible environmental consequences. Comments made in 1993 by experts on the federal environmental expert review committee for Sakhalin II include the following:

- Lack of worldwide experience in design, construction, and operation of offshore extraction facilities in such harsh climatic conditions.
- Threat of irreversible environmental consequences for the fishing industry—Sakhalin's key industry.
- Impossibility of cleaning up spills when the sea is covered with thick ice (at least six months of the year).

- Project documents show lack of consideration of spawning rivers during pipeline construction and lack of concern for ensuring water purity.
- No plan for provision of funds in the event of an accident.

SEIC continues to neglect Sakhalin's natural environment. In 1997, the company submitted a plan of the pipeline route for approval. The pipelines were supposed to be built from Okhinsky Raion in the north to Korsakovsky Raion in the south, and all the pipelines would be placed underground. Sakhalinrybvod states in response to the plan that "the pipeline routes will cross 463 water streams including the 65 largest spawning rivers, which produce 73 percent of all red salmon caught on Sakhalin.... If this construction plan proceeds, it will lead to water pollution, disruption of spawning grounds, and damage to the fishing industry.... [D]uring pipeline operation, leaks of oil and gas condensate are unavoidable and will dam-

age not only the natural reproduction capacity of salmon but also salmon hatcheries."

The pipeline route also cuts across Group I forests. Permission to use these lands can be given only by the Russian government, after receiving a favorable federal environmental expert review (*expertiza*). The pipeline route would also be crossing lands where indigenous people live. In accordance with the Russian Land Code, the lands can be used only after the issue has been discussed with the local communities and, if required, after a referendum has been held. Such referendums have so far not been conducted in any *raion* of Sakhalin.

The federal expert review for the Sakhalin I project was not favorable. Nevertheless, work continued on the project thanks to the patronage of V. I. Danilov-Danilyan, former head of the Federal Committee on Environmental Protection, and N. I. Onischenko, former head of the Sakhalin

NGOs claim Sakhalin II threatens fish populations and gray whales

Sakhalin Energy (SEIC) has again applied to the European Bank for Reconstruction and Development (EBRD), the Overseas Private Investment Corporation (OPIC), and the Japan Bank of International Cooperation (JBIC), this time for funding the second phase of the Sakhalin II project. However, a consortium of international and Russian NGOs believe both the company and lending institutions have failed to fulfill a number of environmental, social, and economic commitments made during the project's first phase. In a sharply worded letter to EBRD president Jean Lemierre, dated December 10, 2001, NGOs cited a host of problems left unaddressed after the first phase: failure to provide the public with adequate and timely information; failure to reinject 100 percent of drilling waste during operations; almost no revision of an already weak oil spill response plan; unacceptably low levels of economic benefit to the Sakhalin region; and failure to renegotiate the Production Sharing Agreement (PSA) so that it complies with Russian environmental laws.³⁵

While these claims are not new, NGOs did raise two new significant concerns: The Sakhalin II project is negatively affecting populations of two fish species (herring and saffron cod) and a globally endangered species, the Okhotsk-Korean gray whale. Local government fisheries inspectors and local fisherman working throughout Northeastern Sakhalin, where the oil company works, found a sharp decrease in saffron cod spawns. However, there has been no analogous decrease in commercial saffron cod harvest in other areas of Sakhalin. In June 1999, there was a herring die-off in Piltun Bay, also where the company operates. Sakhalin Environment Watch

(SEW) sent herring samples to a lab for analysis and found the same petroleum products and substances found in the drilling muds from the Sakhalin II Molikpaq platform. Sakhalin Energy, however, refused to provide SEW with an oil sample to confirm the analysis.³⁶ In 2000, fishermen were only able to catch 40 tons of herring, almost five times lower than both the annual quota and the amount of herring usually caught.

Fewer than one hundred individuals of the Okhotsk-Korean gray whale population remain. They feed primarily offshore of Northeastern Sakhalin, just 20 km from the Molikpaq platform. In 1999 and 2000, scientists noticed that the whales were displaced to the north of their feeding grounds, likely as a result of the oil drilling. Russian scientist and chair of the Ichthyological Commission of the Ministry of Natural Resources M. E. Vinogradov has concluded that, "Without designing special measures for gray whale conservation, the continuation of the Sakhalin-II project can lead to extinction of this unique population."³⁷ In 1997, Sakhalin Energy agreed to develop a Gray Whale Conservation Plan as part of its obligation to its lenders. However, it was not until early 2002 that the company finalized the Conservation Plan, which incidentally only deals with Phase I of the project, not subsequent phases.

SEW filed a formal complaint against the Ministry of Natural Resources demanding that all drilling activity, construction, and seismic testing cease until the Ministry can provide data that the environmental expert review (*expertiza*) for both the Sakhalin I and II projects has been completed. This effort was unsuccessful.

— DG, JN



A salmon makes its way up one of Sakhalin's estimated sixty-five thousand rivers.

Committee on Environmental Protection. In 1997 and 1998, Exxon conducted exploratory drilling, then dumped the waste into the sea. The Sakhalin Special Marine Inspection Service filed a lawsuit, but Danilov-Danilyan responded by disbanding the inspectorate and subordinating it to the Sakhalin Committee on Environmental Protection, under Onischenko, a person more amenable to Western companies. According to the Special Marine Inspection Service, the dumping of drilling waste caused 6 million rubles of damage. Onischenko reduced this figure by thirty-six times. In 1999, the federal *expertiza* committee finally acknowledged how much harm is caused by dumping drilling waste, and did not allow Sakhalin I to drill the Chaivo-6 bore hole (see p. 411).

On January 21, 1999, the state-owned company Dal'morneftegeofizika submitted the Proposed Program of Geological and Geophysical Operations in the Far Eastern and Northeastern Seas of the Russian Federation to the Ministry of Natural Resources. The program was not submitted for a federal environmental expert review nor are the indigenous people of the RFE aware of it.

The Russian government is considering a number of other offshore oil development projects for Sakhalin. If they go ahead, 30 to 40 million tons of oil will be produced annually in the Sea of Okhotsk for the next thirty years. About 0.03 percent of oil is always lost at sea during extraction and transportation, and this figure does not depend on the quality of technology used or qualifications of the personnel. Thus, around 10,000 tons of oil will be spilled into the Sea of Okhotsk annually. Project developers do not analyze or account for this data. The Sea of Okhotsk and Sakhalin could become one great big environmental disaster area. Unless the Russian public, together with indigenous people's groups and local and international environmental and legal organizations get actively involved in monitoring the Sakhalin projects, the situation will not change for the better.

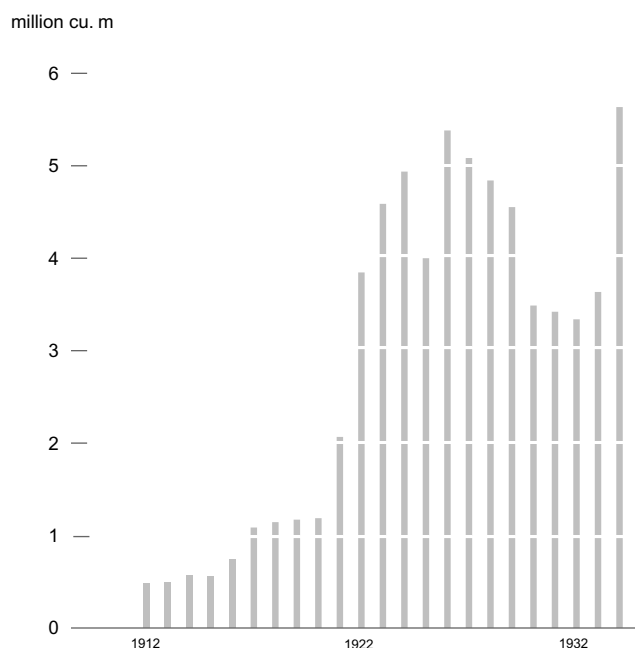
Timber

D. LISITSYN—Sakhalin's forest resources are crucial to the island's industrial development, and their exploitation has received considerable attention—in the tsarist period, during the Japanese occupation of southern Sakhalin, in the Soviet period, and in the era of democratic reform.

Small-scale logging began in the second half of the nineteenth century and was linked to the establishment of the penal colony and the construction of settlements. Later the timber was used to build the coal mines. The only large timber extraction project during the penal colony period was to supply timber for sleepers for the Chinese Eastern Railway in 1896. All other timber export projects initiated by the island's prison administration failed due to stiff competition from nearby Primorsky Krai, Hokkaido (Japan), and Korea. Up to the beginning of the Japanese occupation of southern Sakhalin in 1905, logging was limited, primarily for local use and for the nascent coal industry.

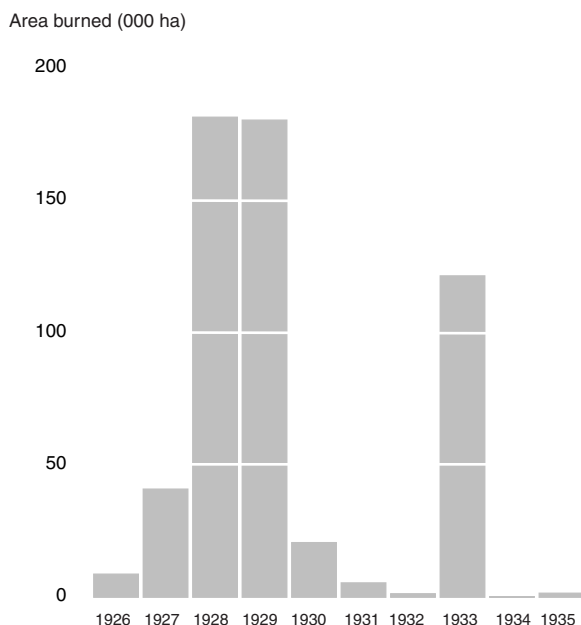
After the occupation, the Japanese government immediately prioritized the extraction and processing of timber in its development plans for Karafuto (the official Japanese name for southern Sakhalin). Timber harvests began to increase rapidly (see fig. 11.1). Timber extraction peaked in 1940 at 7.69 million cu. m. Some was sent to Japan as raw logs, but

Figure 11.1
Japanese timber harvest in Southern Sakhalin, 1912–1935



Source: Sakhalin Forest Service, 2000.

Figure 11.2
Forest fires on Karafuto, 1926–1935



Source: Sakhalin Forest Service, 2000.

most was processed on Karafuto at the pulp and paper factories and then exported to Japan. The pulp and paper industry played a key role in the destruction of Sakhalin's dark-conifer (spruce-fir) forests. Between 1914 and 1926 the Japanese erected eight factories in southern Sakhalin to produce cellulose, paper, cardboard, and artificial silk from the island's timber. The ninth mill was built in Sikuka (Poronaisk) in 1935. This was a more northerly location than the others, as logging was shifting to the north with the depletion of timber resources in the south. Between the establishment of the paper industry in 1914 and the arrival of Soviet forces in 1945, Karafuto produced between 50 and 70 percent of Japan's total paper and cellulose. The industry developed rapidly because paper and cellulose were no longer available from Europe at the beginning of World War I, and Sakhalin had vast supplies of spruce and fir, the most suitable timber for the technology that existed then. Only one factory, in what is now Dolinsk, was able to process larch.

The production capacity of all these factories was considerably greater than the natural productivity of Sakhalin's forests. According to the first Japanese forest survey in 1908, there were 32,448 sq. km of forest in southern Sakhalin. By 1935 this had been reduced to 16,202 sq. km. In just thirty years of logging, the forests had been reduced virtually by half. Valleys and forests close to settlements and convenient transportation routes (railways and large rivers) were logged first. The effects of logging were compounded by giant fires, the invasion of pests (the Siberian silkworm in 1919–1923 and

the Japanese bark beetle in 1929), and powerful winds that struck the weakened timber stands during typhoons. Fires caused substantial destruction to the forests (see fig. 11.2).

Before the 1920s, forests were mainly clear-cut. Fires on cluttered logging sites left behind barren wastelands. Natural consequences included powerful flash floods, silting up of agricultural land, erosion of the productive soil layer of flood plains, avalanches and snow drifts along transportation routes, and the loss of water supplies to settlements. This forced the Japanese administration to alter the system of timber exploitation. Forest scientists established that selective logging, with the removal of about 30 percent of the trees, was the best way to preserve the ecology and permit regeneration. The subsequent use of selective logging meant that the area of forest used for logging had to be greatly increased to allow for growth in the volume of timber logged.

Silviculture was practiced from 1920, and about 160,000 ha of plantations were established before 1944. Most of these were damaged by forest fires between the 1930s and 1950s. Attempts to reproduce forests from seed were completely unsuccessful. The main silviculture species were Ayan spruce and Sakhalin fir. Mining and construction companies planted fast-growing larch for their own use. Municipalities and timber-processing enterprises planted birch for charcoal and plywood blocks.

Logging began in northern Sakhalin after Soviet power was established in 1925. The state forestry monopoly was Sakhalinles. The major trade was in raw logs exported to Japan and to the Russian mainland. Timber was also provided to satisfy the growing demands of the coal, oil, and fishing industries, and for construction. Timber extraction peaked at 450,000 cu. m in 1932. Then production declined and by 1939 had dropped to 138,000 cu. m. Selective cutting was employed everywhere, and only the lower part of the trunk (6–8 m) of the highest quality trees was used.

From the end of the 1940s, after southern Sakhalin was incorporated into the Soviet Union, more and more pristine forests were logged. For a long time volume and productivity levels were low. But with large-scale capital investment in the 1950s and the shift to powerful petrol-driven saws, diesel-powered hauling tractors, and log trucks, timber production almost doubled from 1,453,000 cu. m in 1947 to 3,546,000 cu. m in 1964.

Up to the beginning of the 1990s, eight of the nine Japanese-built pulp and paper mills continued production, and dark-conifer timber provided virtually all of the raw material. For many decades this determined the focus for logging. Spruce and fir stands were logged first, and the best quality timber was traditionally exported to Japan as raw logs. Lower quality timber and pulpwood was sent to the mills. This allowed for a relatively effective use of most of the extractable timber resources. A small percentage of dark-conifer timber was processed into lumber, but poor technology meant this lumber was unsuitable for export, and so it was used locally.

Larch was generally used only for railway sleepers and for pit props in the coal mines.

At the start of the 1960s, changes in timber extraction and transportation technology had a great influence on forest exploitation. Powerful, heavy bulldozers with the capacity to cut deep terraces for hauling logs in steep areas considerably expanded logging on steep slopes, where most of the remaining forests were concentrated. Another important change was the halting of timber transport by river in 1961 (apart from the river Agnevo, where it continued until July 1978). This regulation was enacted because water levels in many rivers had dropped considerably because the forests in the river basins were depleted and because of a growing awareness of the damage caused by log transportation to salmon-spawning grounds. The shift necessitated intensive road construction. In several cases, in outlying timber-rich districts such as Pervomaisk, rail links were specially built. Huge forest areas could now be exploited, both in the already exploited south (on the steep slopes of mountain ridges, in the upper reaches of small rivers) and in the previously distant wilderness areas of central and northern Sakhalin. Production expanded and in 1975 reached its peak with 3,906,000 cu. m, as illustrated in figure 11.3.

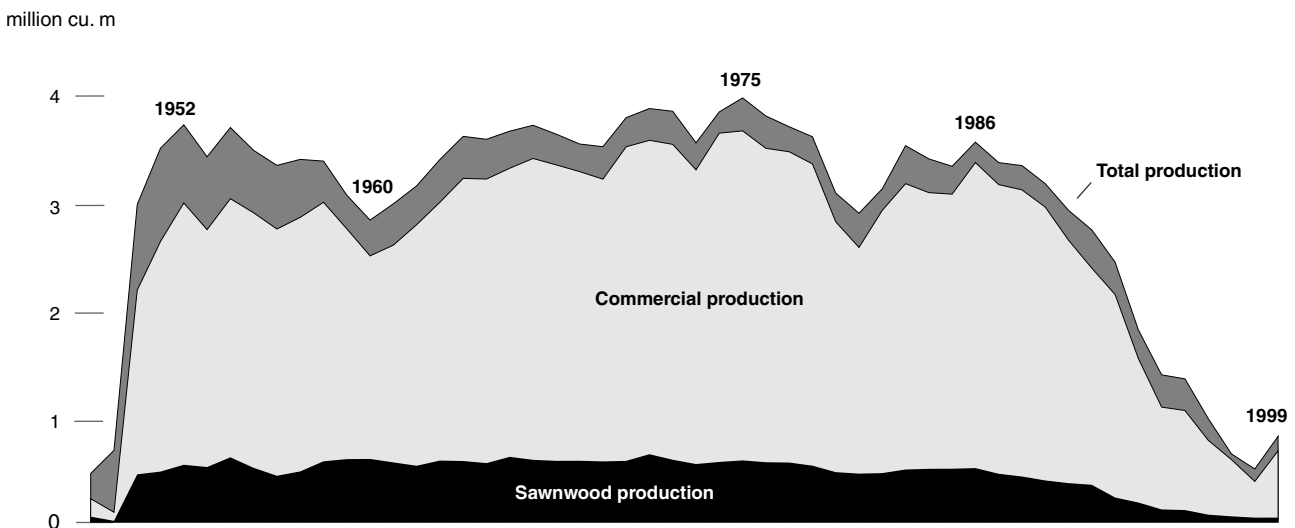
Soon after, logging began to drop steadily as the accessible spruce and fir stands were depleted. Forest fires also contributed to deforestation. Huge fires between 1949 and 1954 burned an estimated 1 million cu. m and similar catastrophes occurred in central and northern Sakhalin in 1989 and 1998.

In the early 1980s a logging road was built eastward across Nabilsky Ridge toward the last large valley area of dense spruce stands. To replace entire brigades of loggers, advanced

machinery was introduced for cutting and hauling, but even this could not halt the timber decline. The Russian economic crisis in the 1990s has had the most destructive effect on Sakhalin's timber sector. When the planned economy collapsed, there was a sharp decrease in timber production, and the pulp and paper industry collapsed in turn. Since the factories had been constructed by the Japanese and never repaired, they were hopelessly outdated, decaying, and no longer competitive. After privatization and without state support, all the Sakhalin paper mills were closed by 1997, and most will probably never work again. Production has recommenced at Ulegorsk Mill, which is now producing paper for the domestic market and materials for the Korsakov corrugated packaging factory. But the supplies of timber are irregular and production is frequently halted.

The decline in domestic demand for forest products has led to a sharp drop in timber production. The frequent redistribution of property and unsound external economic politics have compounded the collapse. Thousands of people have not received their salaries; some are owed several years of back wages. The pulp and paper mills supported the social infrastructure, and their collapse has left entire towns in disarray. Unlike the coal industry, the timber industry did not have a restructuring program to create alternative jobs or to resettle people. This has led to shock and apathy; many people have lost faith in the possibility of better times. In recent years, due to the stabilization of ownership and distribution of forest resources and because new timber enterprises do not have to provide for social infrastructure, there has been a small but noticeable increase in production. However, locals still remember the unpaid wages and therefore are not

Figure 11.3
Timber production in Sakhalin Oblast, 1940–1999

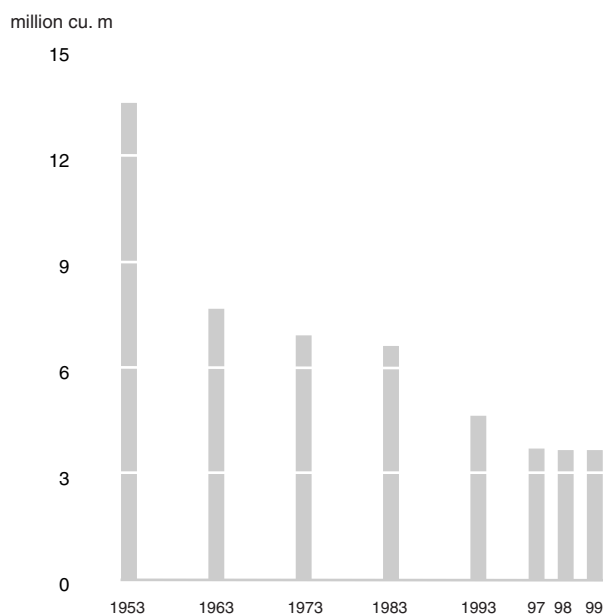


Source: Sakhalin Forest Service, 2000.

too enthusiastic about being employed by these new bosses. Exporting high-quality raw logs is the only economically viable activity in the industry today and leads to an extreme waste of the resource—up to 70 percent of the cut timber remains in the forest. This waste is also exacerbated by high rail transportation tariffs, as it is economical to transfer only the highest quality logs.

Aside from their obvious economic value, the forests on Sakhalin have great ecological significance. The dark-conifer forests here developed as a result of a combination of important factors: the cold moist climate, strong winds, abundant snow, the specific characteristics of the soils, and the infrequency of fires. These forests are extremely vulnerable to both logging and fire. In contrast to most mainland second-growth forests, dark-conifer forests that have been logged or hit by fire are not naturally regenerated. Under good conditions, the territory becomes overgrown with larch, otherwise with small birch trees, or it simply turns into wasteland or marsh. Large areas of mountainous forest in southern Sakhalin have become wasteland, sparse forest, or more frequently, overgrown with dwarf bamboo. In a natural state, the bamboo grows rather minimally in the undergrowth but it grows back quickly after logging or fires and rapidly colonizes the forestland, becoming a thick, impenetrable carpet. This hinders the rejuvenation of other species, particularly spruce and fir. Huge areas of dark-conifer forest have been transformed into bamboo thickets in Anivsky, Nevelsky, Kholmsky, Dolinsky, and Tomarinsky Raions.

Figure 11.4
Change in the Annual Allowable Cut for Sakhalin Oblast, 1953–1999



Source: Sakhalin Forest Service, 2000.

The present overall supply of timber in Sakhalin's forests is 616.55 million cu. m, including 352.5 million cu. m of dark conifer. Of this, 207.47 million cu. m is mature forest (suitable for commercial logging). Commercially valuable forest comprises about one-third of total forest. In 1972, this supply was 503.84 million cu. m. Thus, mature forests have been reduced by half in just twenty-six years.

Environmental impact. The dynamics of the Annual Allowable Cut (AAC), which is the official indicator of the volume of mature forest that can be cut each year without threatening regeneration, clearly reflect the unsustainability of forest use on Sakhalin and the defects of the AAC, as it is presently calculated. Official statistics state that the AAC was never fully used, but the considerable steady decline in the AAC over time is clearly illustrated in fig. 11.4. Despite reports by the forest service about the underuse of forests throughout the island, in some places, particularly in the south, they were being rapaciously overexploited in Soviet times as now. Forest inventories to determine the AAC, conducted by local forest services (*leskhoz*es), called for sharp reductions. This reveals that the AAC was too high.

The AAC is still far too high: In 1999, the AAC was 3,651,300 cu. m. Most of the valuable remaining forests are scattered as small fragments across a large territory, primarily in the mountains and essentially inaccessible. Many of the accessible, high-quality, mature timber stands are also scattered in small patches and uneconomic to log. All are still included when the AAC is determined.

Logging on Sakhalin has always been accompanied by replanting programs, but on far too small a scale to compensate for the amount of forest logged. Ayan spruce, the most valuable species, grows very slowly when young and needs stable moisture and temperature levels, plenty of shade, and abundant snow cover. Plantations on large clear-cut areas cannot provide such conditions; many seedlings die in the first few years, usually because the soil is too hot or too cold. Attempts to grow pine on barren and burned land are often unsuccessful: The trees go yellow and bushy or break under the weight of snow, or voles eat the roots. It is unlikely that a pine plantation could ever produce commercially valuable timber. In addition, fires destroy a significant number of planted trees.

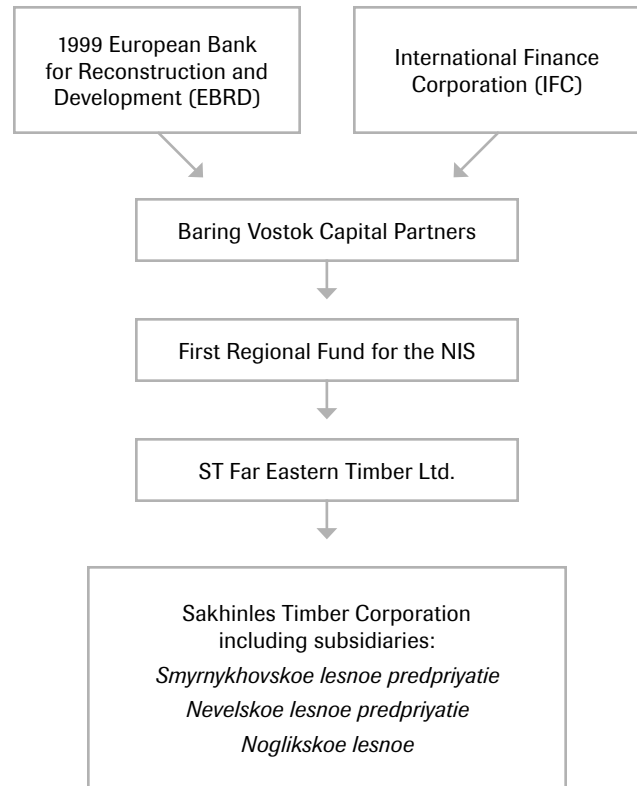
Until recently, protected areas (PAs), including relatively large forested areas, were created on Sakhalin to protect various species of animal, especially valuable commercial species, but logging was allowed, particularly in the *zakaznik*s. Before Poronaysky Zapovednik was established, so much forest on the proposed territory had already been logged that there is not much point in protecting it today. Kurilsky Zapovednik includes large forested areas, but they are very different from Sakhalin Island forests. The first PA established to protect the representative forests of the Sakhalin subzone of dark-conifer taiga was the *oblast*-level Vostochny Zakaznik.

In Severny Zakaznik commercial logging is threatening the ancient forests (see p. 388). Relatively undamaged forests have been protected in northwestern Sakhalin. These are mostly northern larch forests, which have been damaged to some extent by logging, but much more so by oil industry infrastructure (pipelines, roads, drilling work, and so on). Vagis Mountain in the northwest has significant dark-conifer forests.

The density of rivers and streams on Sakhalin makes the effects of logging unavoidable. Three-quarters of Sakhalin is mountainous, and logging on steep slopes compacts the soil and creates erosion; soil flows into the rivers and clogs salmon-spawning grounds. Logging on steep slopes in northern larch forests causes the fragile, somewhat sandy topsoil to wash away, leaving deep, barren gullies. Loggers transport timber across rivers, often constructing temporary roads along streams. In mountainous areas, timber is hauled along small creeks, which are the sources of larger rivers. Terracing technology is particularly harmful as huge amounts of soil are displaced, often resulting in landslides. Deforestation of the river basins lowers water levels in the rivers and damages the hydrological regime. Logged forests cannot hold the same volume of snow, and in spring the snow melts much more quickly than it would under thick forest cover. As a result, the dry forest undergrowth is more likely to burn and is particularly susceptible to crown fires. During spring thaws, the water flows too quickly into the rivers, often washing away spawning mounds. During the drier months the water level decreases too sharply, as the forest can no longer properly regulate water outflow. The logging of valley forests can cause lowland areas to become marshy, as the water stagnates and forests do not grow back in these areas.

Structural changes in the industry. In the early 1990s, the federal government privatized the region's timber monopoly, Sakhalinlesprom, after a drawn-out battle between various financial-industrial groupings over how its property and resource base would be redistributed. In 1998, Sakhalinlesprom and all its subsidiaries, the *lespromkhoz*es (former state timber companies), went bankrupt, which changed the structure of the shareholding. In early 1998, the main shareholder, previously the Moscow-based Mezkhombank became the foreign holding company ST Far Eastern Timber Limited, which created a new holding company, Sakhinles OAO (open joint-stock company), from the ruins of Sakhalinlesprom and is largely controlled by foreign investors (see fig. 11.5). The First Regional Fund for the Newly Independent States (FRF NIS) is registered in Luxembourg and managed by Baring Vostok Capital Partners, whose largest shareholders are the EBRD and the International Finance Corporation (IFC), an arm of the World Bank Group. The FRF NIS has the controlling share in ST Far Eastern Timber Ltd., which owns 100 percent of OAO Sakhinles.

Figure 11.5
Foreign investment in the timber industry, Sakhalin Oblast



Source: Sakhalin Environment Watch, 2000.

Sakhinles obtained the production assets of its predecessor and created a series of subsidiaries that leased the forest areas given up by the bankrupt *lespromkhoz*es and began logging anew. However, Sakhinles found itself in a much more advantageous situation, since the huge debts such as unpaid wages and social infrastructure costs for the forest industry settlements remained with Sakhalinlesprom and the *lespromkhoz*es, which formally remain active and retain their legal status. Thousands of workers of the bankrupt *lespromkhoz*es still have not been paid back wages. Instead, they have been offered jobs with the new enterprises, which even occupy the same buildings; some are controlled by directors of the old *lespromkhoz*es. Knowing this, people are reluctant to work at all and the situation has led to apathy, mistrust, and a general degeneration of the social fabric, with an increase in alcoholism, poaching on spawning rivers, and criminal activity.

In recent years, local branches (*leskhoz*es) of the Federal Forest Service have also become timber producers, as they are legally entitled to sell timber from maintenance and sanitary



Industrial forestry on Sakhalin.

logging. But the *leskhoz*es use this type of logging to obtain commercially valuable timber. Much of the timber is then exported as high-quality raw logs. Major *leskhoz*es involved include the Alexandrovsky, Anivsky, Makarovsky, Gastelovskiy, Krasnogorsky, Kholmnsky, and Onorsky Leskhozes.

The main export species is spruce, then fir and larch. Recently there has been an increase in demand for stone birch. High quality fir and spruce (first- and second-class quality) is exported to Japan; lower-quality larch and fir (third class) goes to South Korea. Timber is periodically exported to China, Taiwan, and Indonesia. In 1999, approximately 583,400 cu. m was exported to the two major markets—Japan and South Korea. For export figures and a list of major exporters, see table 11.2.

The timber industry plays a decreasing role in the economy of Sakhalin, particularly with the paralysis of the pulp and paper industry, now accounting for a small percentage of the total industrial production. The introduction of advanced timber-processing equipment would increase the economic competitiveness of the industry, but there is hardly enough forest left to set up large-scale enterprises. The entire industry must be radically reformed.

Table 11.2
Timber exports and major exporters
in Sakhalin Oblast, 1999

	<i>Quantity (cu. m)</i>
Annual Export	
Logs (1st and 2nd grade)	336,800
Logs (3rd grade)	246,500
Pulpwood	39,800
Sawnwood	10,600
Total	633,700
To Japan	
Logs (1st and 2nd grade)	336,800
Logs (3rd grade)	37,600
Pulpwood	3,900
Sawnwood	8,300
To Korea	
Logs (3rd grade)	208,900
Pulpwood	35,900
Sawnwood	2,300
Major Sakhalin Timber Exporters	
Tymovskaya	69,900
Smirnohovskaya	46,100
Hoinsky LPK	43,900
Interpreneur Ivanov	39,800
Agnevo	37,000
Golubye Eli (Blue Spruces)	33,700
Safonov	32,000
Zaab Les (Moscow)	21,900
Interpreneur Boichuk	20,800

Source: Sakhalin Goskomstat, 2000

The Uglegorsk pulp and paper mill is now the only serious timber-processing enterprise and may be able to satisfy demand on the Sakhalin market. But this factory stops production repeatedly due to lack of raw materials and has outdated technology, consumes too much energy, and generates too much waste to be economically efficient. Every mid- to long-term investment program in large-scale timber processing faces the same problem. One viable exception is a small sawmill set up several years ago in Yuzhno-Sakhalinsk by the Japanese company Mitinoku.

As the only market is for raw logs, most timber remains at the logging sites from which only the most valuable logs are taken. The closure of pulp and paper factories has meant

that the lower-quality timber they used now has no market. Workers in lumberyards, sawmills, and pulpmills have lost their jobs. Towns that relied on the pulpmills for the local infrastructure are stranded and thousands of residents unemployed. Most people survive as best they can by poaching salmon, growing vegetables, collecting nontimber forest products, and taking short-term, periodic jobs. For others, coastal fishing and fish processing has become crucial. It is considered more sustainable than logging as the resource base is larger. Some far-sighted timber industrialists realize this and are organizing coastal fishing brigades and small processing plants. The problem of job creation and support for the timber sector could be partially resolved by creating small, highly technical operations to produce lumber. To reduce transportation costs these enterprises should be located in small settlements near remaining timber resources. Some enterprises do transport timber from the logging site to loading area by helicopter, which reduces the impact on rivers, but encourages “high grading” or the selection of only export-quality logs and thus changes the structure of the forest. Helicopter logging is unprofitable if all logging rules are followed. Recently, the timber industry has been aggressively promoting the introduction of foreign harvesters and forwarders. These are light and mobile enough to enable logging on steep slopes, and their wheels reduce the impact on the soil. This technology could definitely reduce the damage to rivers, but will not resolve the problem of watershed deforestation. Also, this type of equipment is so expensive that huge volumes of timber will be necessary to repay the initial investment. As the new machinery replaces between fifteen and twenty loggers, the technology can benefit employment only if the timber is processed locally.

Nontimber forest use (the collection and processing of ferns, mushrooms, berries, wild onion, coltsfoot, the *chaga* fungus, birch sap, medicinal plants) and ecological tourism could improve the economy, but the switch from logging would not be easy.

Toward sustainable development

Emma Wilson

Sakhalin has abundant renewable resources that could provide long-term economic benefit to local communities with minimal impact on the natural environment, but decision-makers are focusing on the offshore oil and gas developments for the development of the economy.³⁸ The European Bank for Reconstruction and Development (EBRD), which sponsors the Sakhalin II project, has in its founding agreement a

pledge to promote “environmentally sound and sustainable development.”³⁹ Oil development generally results in unsustainable “boom and bust” development with high ecological risk. In Russia, the equitable distribution of profits and resources has always been a major problem. The Sakhalin projects are unlikely to guarantee adequate benefits to local communities and threaten local livelihood activities such as subsistence fishing, as well as reindeer herding, which is already under threat of extinction as economic activity and cultural tradition.

Economists argue that the only way for a resource outpost such as Sakhalin to develop is by exporting its raw resources, and point to the proximity to lucrative Pacific Rim markets. However, the profits from these exports need to be invested wisely in development funds, social infrastructure, and processing capacity. Profits in Sakhalin have tended to be directed toward private companies, to Moscow, or to Yuzhno-Sakhalinsk.

Soviet development based on state subsidies, guaranteed markets, and single-industry settlements was unsustainable, as is visible in Sakhalin’s declining villages that were formerly dependent on the timber or coal industry. In northern Sakhalin, villages depend on the tax income from the onshore oil and gas industry, but have seen little investment in reindeer herding, forestry, or fishing. If the oil industry were to pull out they would have nothing to fall back on. With depletion of the onshore fields and a shift to offshore production (in federal waters), this could soon be the case. SMNG has already moved its headquarters from Okha in the north to Yuzhno-Sakhalinsk. Fishing and fish processing have traditionally been the dominant industry on Sakhalin, despite the huge annual revenue drain of illegal fishing. There is considerable potential for sustainable development of the fishing industry, but the effects of oil drilling on this industry and on local subsistence fishing could be devastating, not only for Sakhalin, but also for the larger Sea of Okhotsk region.

In a market economy, the state cannot subsidize entire regions as it did in Soviet times. Some state subsidies are, however, important, particularly for some sectors of the economy such as agriculture (as in any western country). Sakhalin’s agriculture sector has collapsed. Taxation of and special funds from high-profit, high-disturbance industries should support social infrastructure and traditional resource use, especially if local populations are threatened or disturbed by such industries. Local populations also need federal socioeconomic and cultural programs, foreign grants, and microcredit lending programs. The federal government programs and grants have had some effect on Sakhalin, and microcredit programs are just being introduced.

“Sustainable development” implies equitable access to resources. Russian citizens, and indigenous people in particular, have a growing base of legislation clarifying their rights to natural resources, land, a clean environment, and an equitable distribution of profits from resource use. But there

is often no money in the regional or local budgets to implement the laws, and people at the grassroots level lack the experience to use them.

Sustainable development requires involving all stakeholders in the planning processes, ensuring transparency and public accountability. Public participation in Russia is increasing and may include consultations to accompany environmental impact assessments (EIAs), independent public expert reviews, referendums, village meetings, two- or three-sided agreements between interest groups and the state or industry, representative commissions to assess project development, public monitoring, and litigation. Access to information increases the participation, as do interest groups and NGOs that collect and disseminate information, formulate and promote local interests, and catalyze action. Sakhalin's local groups can rely on considerable international support, though they may be hindered by lack of access to the Internet and an inability to speak English, essential elements in communications between local and international organizations.

The case of Noglikovsky Raion in northeastern Sakhalin is instructive. This *raion*, situated alongside the offshore oil and gas fields of the Sakhalin I, II, and III projects and taking on the bulk of the ecological risk of the projects, is unlikely to reap significant long-term economic benefits. The projects threaten the livelihoods of local residents who depend directly on the natural resources of the area.

The *raion's* budget relies heavily on the onshore oil industry, which has already destroyed large areas of surrounding forest, reindeer pastures, and wetlands by careless exploitation and lack of land regeneration. But onshore production is declining and, with the collapse of the timber industry and withdrawal of federal subsidies for other industries, there are no sectors of the economy able to replace the oil industry.

Initially locals hoped the Sakhalin offshore projects would add to the budget coffers and create jobs. The oil and gas reserves are, however, located in federal waters so Noglikovsky Raion has no claim to any payments for the use of resources, although an oil spill would devastate the local fishing economy. The Production Sharing Agreement system, developed in Third World countries and used by the Sakhalin offshore oil and gas projects, has proved incapable of providing local communities with an equitable share of benefits (see pp. 411–12 for a full discussion of the PSAs). Under the PSA, there is a system of bonus payments as the project develops. So far, the only bonus payments Noglikovsky Raion has received are earmarked solely for the controversial gas-fired power station close to Nogliki, built mainly to provide energy for southern Sakhalin. Locals have protested this station, because of its proximity to local *dachas* and the political significance of the project. The old gas pipeline that feeds the power station recently exploded under the extra pressure necessary to transport the additional volumes of gas.

Incoming workers could bring added revenue to local communities by using local services, shops, restaurants, and

so on. However, ExxonMobil and SEIC have, for security reasons, built their own self-sufficient compound outside Nogliki. Access to this compound is strictly limited. As the oil companies are registered in Yuzhno-Sakhalinsk, Noglikovsky Raion receives no tax revenue from the camp. Local experts feel that the Sakhalin projects have been developed without the interests of the local districts in mind, although the original tender agreements promised significant local benefits (such as gasification of the island, local processing, local jobs, etc.). Local regulatory agencies are not even allowed on board the Molikpaq platform. In November 1997 the mayor of Noglikovsky Raion and the head of the *raion* assembly wrote a letter to Governor Farkhutdinov expressing concern that profits from Sakhalin I and II will go primarily to Moscow and Yuzhno-Sakhalinsk, international investors, and multinational corporations. Unfortunately, these local leaders have been unable to negotiate a better deal for their constituencies.

Indigenous peoples

V. D. Fedorchuk

The more than 3,400 indigenous people in Sakhalin, including Nivkhi (pop. 2,400), Oroki (pop. 340, including Uilta and Orochi), Evenki (pop. 240), and Nanai (pop. 180) live primarily in northern Sakhalin in six *raions*: Alexandrovsk-Sakhalinsky (205 indigenous people), Okhinsky (1,237), Noglikovsky (1,018), Smirnykhovsky (45), Tymovsky (226), and Poronaisky (476).⁴⁰ Over 220 indigenous people live in Yuzhno-Sakhalinsk.

The Nivkhi and the Ainu (who were still living on Sakhalin and the Kuril Islands fifty years ago) are the region's ancient aboriginals, rooted in the neolithic cultures of the hunters and fishers of the Sea of Okhotsk coast; there are references to both in Chinese geographical tracts dating back two thousand years.⁴¹

The Sakhalin Nivkhi, always relatively sedentary, now live mostly in northern Sakhalin. Traditional activities rarely practiced today include marine mammal hunting, dog breeding, and making sleds, boats, skis, hunting and fishing equipment, and domestic tools and utensils. Today, their main activities are fishing and gathering of nontimber forest products for personal use. The nomadic reindeer-herding Oroki (Uilta, Orochi) and Evenki came much later to Sakhalin from the mainland. The first references to Oroki can be found in Japanese chronicles from the beginning of the eighteenth century, but they were recorded as an ethnic group much earlier.⁴² The Evenki, who moved to northern Sakhalin in the 1860s after a smallpox epidemic on the mainland,⁴³ still engage in reindeer herding, fishing, hunting, and gathering. The Nanai, who originally came from the lower

Amur, were forced to move to Sakhalin in 1947 after World War II to work in the fishing collective (*kolkhoz*) in Poronaisky Raion. Their main occupation remains fishing.

Fifty to sixty years ago, demographic movement depended on government politics, be it Russian or Japanese. A striking example is the fate of the Sakhalin and Kuril Island Ainu. The Kuril Island Ainu were forced to resettle by the Japanese at the end of the nineteenth century. Most had to move to Shikotan, where all of them died within a few years from malnutrition and disease. The few remaining Ainu were assimilated in the first half of the twentieth century and no longer exist

as an ethnic group. The Sakhalin Ainu, as citizens of Japan, migrated from Sakhalin after the end of World War II. Today descendants of the Sakhalin Ainu live on Hokkaido (Japan).

If the Ainu were victims of capitalism, the Nivkhi, Oroki, Evenki, and Nanai of northern Sakhalin were the victims of collectivization. The Soviets forced these peoples into collective (*kolkhozes*) and state (*sovkhoses*) farms. One of the villages where the Nivkhi were moved to became a collective vegetable farm in the 1930s and was named Chir Unvd (New Life).⁴⁴ Today many Nivkhi settlements in northern Sakhalin exist only on the map. The villagers of Nyvrovo, Muzma Viski, Tamlavo, Kaigan, Liugi, Chingai, Teng, Tyk, Nyivo, Veni, Komrvo, Chamgu, Piltun, Khanduza, and many others were gradually resettled into larger and larger settlements, such as Nogliki, Nekrasovka, Rybnoe, etc.⁴⁵ Today the same fate awaits the settlements of the Rybnovsk shoreline in northwestern Sakhalin, where now there are no shops, schools, social infrastructure, energy provision, or transport links.

Cultural revival began in the 1970s and the early 1980s. In 1979 the modern Nivkhi alphabet was updated, and from 1981 the study of the Nivkhi language was introduced in schools.⁴⁶ By the end of the 1980s new forms of economic activity were introduced—collective native enterprises and so-called clan enterprises (*rodovye khozyaistva*). Today, there is an emphasis on “clan community” (*rodovaya obshchina*), in line with a state program for indigenous revival. The clan community is a voluntary society of people who carry out traditional economic activities on native lands. The aims are



Fires in 1998 destroyed huge areas of land used by the Nivkhi peoples.

to support native subsistence practices, revive and develop native economies, culture, and language, and provide social protection to members of the community. Most of the enterprises are joined in the commercial-agrarian firm Aborigen Sakhalina (The Sakhalin Aboriginal). As of 1997, Aborigen Sakhalina included fifty-three clan enterprises, the clan community Tyi in Poronaisky Raion, the souvenir workshop Tevi in Nogliki, the former state farm Reindeer Herder in Alexandrovsk-Sakhalinsky Raion, and the reindeer-herding enterprise Val in Nogliksky Raion.⁴⁷ Although native enterprises are engaged in a range of activities, from hunting and herding to tourism and the creation of traditional craftware using fish skin and animal furs and pelts, the accent today is mostly on fishing, which brings in the bulk of the revenue.

Fishing

For Sakhalin’s indigenous people, quotas and fishing ground allocations are particularly controversial. Native enterprises apply to the *raion* administration for allocations. A recommendation is submitted to the *oblast* fisheries department, where it is approved, subject to quotas allocated by the federal government. In 1997, 26 km of commercial fishing grounds were allocated for native enterprises in Poronaisky Raion, 64 km in Okhinsky Raion, 4 km in Alexandrovsk-Sakhalinsky Raion, and in Nogliksky Raion five fishing grounds were allocated on the Chaivo, Nyivo, Piltun, Lunsy, and Nyisky Bays.⁴⁸ Many of those grounds are fairly unproductive, and the native enterprises are not a priority for *raion* administrations.

The limit for personal use is 100 kg per year per person of pink and chum salmon. Limits for chum salmon depend on scientific predictions of fish spawning. Usually it is between 40 and 60 kg, or about ten to twelve fish. This is clearly not enough food and certainly not enough to store for winter. Native families naturally use all sorts of ways to get the necessary quantities of fish, which means that they are forced to fish illegally. The size of the fish catch depends not only on the quotas and fishing grounds, but also on the runs of spawning salmon. In recent years, in Alexandrovsk-Sakhalinsky Raion, the clan enterprises have fished only in winter because the summer fishing—pink and chum salmon—has diminished. In Noglikovsky and Okhinsky Raions, catches of saffron cod (*Eleginus gracilis*) and smelt have declined, and chum salmon may be fished only for the personal use of indigenous residents.

Promoting the rights of indigenous peoples

- Create an effective normative and legal base protecting and regulating the socioeconomic development of the indigenous people of Sakhalin.
- Negotiate equitable benefits from the oil, fishing, and logging industries for the indigenous populations. These arrangements should be based on the territories of indigenous peoples, and a legal framework should be established to guarantee this.
- Conduct an ecological expert review of the state of hunting territories, pasturelands, spawning rivers, and coastal waters to determine the damage already done and the potential threat to the environment from industrial activities in areas traditionally inhabited by indigenous people.
- Consider the opinions of the indigenous peoples when exploiting natural resources on the territories where they live.
- Determine the borders of territories of traditional natural resource use; carry out an integrated assessment of the lands with the aim of allocating them to indigenous peoples.
- Ensure proper educational opportunities for indigenous children and adults. This will help develop a body of indigenous specialists – economists, hunting experts, ecologists, and fishing industry specialists.
- Resolve conflicts over fishing limits and fishing grounds. Allocate priority rights to indigenous peoples.
- Encourage indigenous people to take a more active part in defending their own rights.

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The worsening ecological situation has affected fisheries in northern Sakhalin. The onshore oil industry in particular has harmed the fish runs, as will offshore projects. In February 1997, the Okha municipal committee for nature protection and land, with help of SMNG, chose a dumping site for offshore drilling waste, a deserted sand quarry near the source of Chyornaya River and several small streams that flow into Baikal Bay, which has already seen declines in fish runs.⁴⁹ Residents of the nearby villages of Nekrasovka and Moskalvo have demanded a review of the issue. The problem of storing drilling waste on the shores of Baikal Bay is not resolved.

Reindeer herding and pasturelands

Wild reindeer populations have decreased considerably over the past few years, and domestic reindeer now number only in the dozens, a result of poaching and intensive hunting, industrial encroachment by the oil and logging industries, and forest fires. In 1998, half of the 1,190,678 ha of reindeer pastures allocated to native enterprises were destroyed by forest fires that damaged or destroyed 50 percent of all hunting and herding territories in Noglikovsky Raion, 30 percent in Okhinsky Raion, and 100 percent in Tymovsky Raion. The decline is exacerbated by poor policies of regulating reindeer herding, which should include herd censuses, pasture rotation, and quality control. Now, however, all they do is simply shoot the reindeer.

The regional and district administrations and nature protection organs do not have enough money to preserve and restore the natural environment of Sakhalin's indigenous peoples. There have, however, been some signs of improvement, such as the creation of Noglikovsky Zakaznik (see p. 388.)

Legal concerns

The legal status of the indigenous peoples of the north was codified on April 30, 1999 (On the Guarantees of the Rights of Indigenous Peoples of the Russian Federation). Most of the other laws are still passing through parliament, which has been dragging out the issue for years. Russian Federation laws in place today contain only general regulations relating to indigenous peoples. Article 12 of the Sakhalin Oblast statutes refers to the protection of ethnic minority rights, their traditional lands, and way of life. Articles 20 and 49 confirm the post of an indigenous peoples representative in the Sakhalin regional assembly (Duma) and the right to initiate legislation. Article 76 is about territories of traditional natural resource use and access to natural resources. Normative acts tend to provide incomplete regulation and be temporary in character. Apart from Okhinsky Raion, where a special amendment has been inserted, at the *raion* level none of the statutes has anything determining the legal status of local indigenous peoples.

Legal issues

Emma Wilson

The use of legislation as a tool to resolve environmental conflict on Sakhalin is increasing, notably in response to development of the offshore oil and gas projects. Local and national NGOs have taken the lead in using legislation to regulate resource developers; such experience has been publicized in the local media and across the Internet. Local populations themselves are, however, more reluctant to use legal tools to assert their rights, despite increasing awareness about the strengthening legislative framework. Russian environmental legislation is noted for its strictness and comprehensiveness. It is the implementation of laws, not the laws themselves, that is less than satisfactory.

Environmental Expert Review (*Expertiza*)

According to the federal law On Environmental Protection (December 19, 1991) any project likely to cause harm to the environment must receive approval in an *expertiza*. This law has been used by Russian regulators as well as by Russian and international environmental organizations. In 1997, international NGOs sent a letter to the EBRD and succeeded in halting financing for the Sakhalin II project until it had passed the federal *expertiza* process. NGOs are also entitled by law to do a public *expertiza*, and there is guidance on how to do this. But this avenue is open only to the few: You need time, money, and access to experts who can carry out the review. Local environmentalists are concerned that Sakhalin Energy is now securing land allocations for its pipeline, but the project has yet to pass the required *expertiza*.

Discharge of drilling waste

When multinationals face legal obstacles in a host country, their initial reaction is to lobby for change to the legislation rather than adapt their own practices, which would often entail a considerable financial cost. An example of this, and probably the most controversial legal issue related to the offshore oil and gas projects, is the disposal of drilling waste at sea. Western oil companies argue that the discharge of drilling waste is permitted in other national waters and so should be legal in Russian waters. Environmentalists counter that zero discharge (reinjecting drilling muds and cuttings) has become a standard for the oil industry worldwide.⁵⁰

According to the Law on the Continental Shelf (October 25, 1995, amended February 10, 1999), the discharge of waste and other materials into continental shelf waters requires a special permit obtained from the Federal Committee on Environmental Protection and given in terms of existing Russian legislation. The two most important pieces of legislation are the state standard, Indicators of the Condition of

Fisheries, which categorizes all fisheries into higher, first, and second categories, and the Rules for the Protection of Coastal Waters from Pollution, enacted in 1984, which forbids the discharge of any waste into waters of the highest fisheries category.

In 1999 the Committee on Environmental Protection denied ExxonMobil the environmental permit needed to drill an exploratory well at its Chaivo-6 field (Sakhalin I) after the project failed its *expertiza* because of the plans to discharge drilling waste into the sea. Exxon's threats to withdraw from the project led the then-Prime Minister Sergei Stepashin to pass a decree in 1999 allowing the discharge of drilling waste into the Sea of Okhotsk. A coalition of citizens' organizations, led by Ecojuris, protested the decree in Russia's Supreme Court, which ruled in the citizens' favor and invalidated Stepashin's decree. In 2000, ExxonMobil again threatened to pull out of the Sakhalin I project. The company was eventually granted a license to drill an appraisal well on the Chaivo-6 field after agreeing to reinject the drilling waste back into the well, increasing the cost of the project by U.S. \$3 million. This decision signified a triumph for environmental regulation and public pressure.

The controversy over the discharge of drilling waste continues. As Fedorchuk notes earlier in this chapter (p. 410), there are problems with disposing of drilling waste onshore, which SMNG continues to do. SEIC (Sakhalin II project) is still discharging its waste into the sea, even though this violates Russian law, but is apparently planning to change to zero discharge for future drilling.⁵¹ What is more, oil companies are now lobbying to have the fisheries category for the drilling areas in the Sea of Okhotsk reduced from the "highest" category, to the "first" category, which would de facto allow discharge.⁵² The State Fisheries Committee apparently ordered SakhNIRO to complete a report providing a justification for such a reduction for waters deeper than 20 meters.⁵³ Fishing enterprises and environmental groups have united in opposition to this change and are awaiting the decision of the State Fisheries Committee with some apprehension.

Production sharing agreements

The Law on Production Sharing, passed on December 30, 1995, regulates the relationship between the government and investors during the exploration and production of mineral resources in the Russian Federation. The law requires amendments to be made in existing legislation and regulations (amendments were passed in 1998 and 2000) or the adoption of new legislation or regulations, particularly in environmental protection, taxation, accounting, and customs regulations. All agreements between project participants and the Russian Federation made prior to December 30, 1995 (Sakhalin I and II projects) are considered to lie outside the normal Russian legal framework. New Production Sharing Agreements (PSAs) can be made only for reserves included in a special list that is

ratified by the Russian federal Duma, the federal council, and the federal government.

Critics, who include environmentalists, economists, even the Sakhalin representative in the federal Duma, Ivan Zhdekaev, consider the PSA system inadequate in terms of providing benefits to local communities. The PSA for the Sakhalin II project was signed on June 22, 1994, between SEIC and the Russian government and Sakhalin regional administration. According to this agreement, all the production goes first to SEIC until the company has covered its investment costs. Only after the project has started to make a 175-percent profit will the Russian side receive its own share of the profits, which will be about 60 percent (split between the federation and Sakhalin region).

The PSAs also free the Sakhalin projects from their federal tax obligations, apart from royalties (only 6 percent) and profit taxes (32 percent, once profit is made). The projects are also exempt from regional and local district taxes. According to the Sakhalin Regional Tax Inspectorate, the estimated loss to the region as a whole will be U.S.\$4.16 million for Sakhalin I and U.S.\$954 million for Sakhalin II. In theory, the lack of direct benefits is compensated by the bonus payments at strategic points in the project development (total U.S.\$45 million) and payments to the Sakhalin Development Fund (total U.S.\$100 million). The regional administration and the assembly (Duma) decide how to distribute payment. When the Sakhalin II project celebrated the first oil from Molikpaq in July 1999, Sakhalin received the third payment to the Sakhalin Development Fund (U.S.\$20 million) and royalty payments began. In October 1999, SEIC paid the first installment of compensation totaling approximately U.S.\$160 million for previous geological exploration work (50 percent to the federal, 50 percent to the regional budget). At the same time the company claimed back U.S.\$23 million of value-added tax (VAT) that had been paid previously in contradiction to the PSA. This will be paid back out of the federal and regional royalty payments.⁵⁴

Observers note the bitter irony that in northern *raions* of Sakhalin, tax holidays have been granted to multinationals such as Shell (SEIC) and ExxonMobil rather than to struggling reindeer herding and fishing enterprises and small farms. Local concerns about the PSAs have been further verified and bolstered by a report by the Russian Federation's Auditing Chamber. This three-hundred-page report details the ways in which the PSAs are not profitable for the Russian government. This report led to a group of Sakhalin scientists criticizing the offshore projects for not providing much-needed benefits to Sakhalin citizens.

Compensation

Compensation for damage to fisheries from the Sakhalin II project was estimated in the project plans at U.S.\$1.68 million by the Vladivostok-based Pacific Institute of Fisheries and Oceanography (TINRO), which initially estimated it as U.S.\$3 million. SEIC, however, forced this number to be reduced to U.S.\$200,000, which will be invested in two fish hatcheries on the Tym River. That river flows out to the southern zone of offshore exploitation; the hatcheries will not be in Nogliksky Raion at all. Environmental groups do not believe that SEIC is paying adequate compensation nor that two hatcheries—with their associated environmental problems—will make up for the damage to fisheries caused by the offshore projects. Compensation paid to local administrations by SMNG for many years of previous damage to reindeer pastures was supposed to regenerate the pastures. The money was, apparently, swallowed by local budgets.

Public consultations

According to Russian legislation, public consultations are an essential part of the Environmental Impact Assessment (EIA) process (*Otsenka vozdeistviya na okruzhayushchuyu sredu, OVOS*) that is mandatory for a project likely to impact the natural environment. SEIC has held two sets of public hearings as part of the EIA for its project (in spring and autumn of 1997). Public consultations for the pipeline are going ahead in 2002 only after the pipeline route has already been agreed upon with regulators and government authorities. ExxonMobil has so far not held any public consultations. Residents of villages in northwestern Sakhalin close to the proposed site of Sakhalin IV are concerned that they were not able to take part in project consultation, which was carried out in private meetings. The results of a public village meeting (expressing categorical opposition) and a collection of over a thousand signatures were ignored. According to Article 28 of the Land Code (1991), the construction of industrial objects (such as a pipeline) on lands inhabited by indigenous peoples has to be discussed in advance with the local residents, even to the point of holding a referendum. No referendums have been held on Sakhalin relating to oil and gas development.

Perspective

Emma Wilson

Sakhalin I oil and gas project

- Project partners: Exxon Neftegas Ltd. (ExxonMobil) (30 percent), Sodeco (Japan) (30 percent), Oil and Natural Gas Corporation Ltd. (India) (30 percent), Rosneft-Sakhalin (11.5 percent), and Sakhalinmorneftegaz-Shelf (Rosneft subsidiary) (8.5 percent).
- Area: Three fields: Arkutun-Dagi, Chaivo, Odoptu.
- Estimated reserves: 325 million tons of oil and condensate; 425 billion cu. m of gas.
- Expected project cost: U.S.\$12 billion.

The consortium was formed in June 1995 and signed a Production Sharing Agreement (PSA) in 1996. ExxonMobil is the operator of this project. ExxonMobil missed the 1999 drilling season for Sakhalin I when its plans to dispose of drilling waste at sea failed to receive approval from the state environmental expert review committee. After protracted battles with environmental regulators, ExxonMobil finally agreed to reinject the drilling waste, at an extra cost of U.S.\$3 million. ExxonMobil continues to lobby for permission to discharge drilling waste at sea, a move opposed by environmental groups and fishing companies. The appraisal well at Chaivo-6 revealed an oil rim around the gas deposit with an estimated flow rate of 6,000 barrels a day.

In 2002, ExxonMobil was scheduled to begin a \$3.5 to 4.5 billion Phase I development (2001–2006), involving early oil extraction from Chaivo using directional drilling from onshore, followed by the erection of an arctic drilling rig, or CIDS (Concrete Island Development System). Drilling at Chaivo, however, depends on obtaining the necessary federal permits. Construction of a U.S.\$400-million onshore pipeline is planned to transport oil across the Tatar Strait to De-Kastri Port in Khabarovsk Krai, from where crude would be exported to China, Japan, and South Korea. ExxonMobil has also teamed up with Japanese firms to create Japan Sakhalin Pipeline FC Co. Ltd., which has prepared a feasibility study for an underwater pipeline route to Japan.⁵⁵

Governor Farkhutdinov and the Ministry of Energy strongly oppose these plans, and would prefer Sakhalin I and II to collaborate on joint infrastructure construction. The governor has threatened to suspend the Sakhalin I project. Transporting oil to Khabarovsk Krai would mean that the Sakhalin Oblast budget would get no export revenues from it. The Sakhalin II project north-south pipeline and export terminal will create more jobs for Sakhalin although construction will be more expensive. It is also said that the governor wants to promote Sakhalin Oil Company, which is owned by the *oblast* administration and produces oil and gas

from small fields in the south. The company could use the export pipeline near these fields. The governor is against the construction of two pipelines (north-south and east-west), as according to the terms of the PSA, the government is required to reimburse the cost of both pipelines to investors.⁵⁶

In February 2001, the EBRD gave initial approval to a U.S.\$90 million loan to Sakhalinmorneftegaz to upgrade oil collectors, reconstruct oil pipelines to Komsomolsk-on-Amur and Okha, and to drill seven new slant wells at the Odoptu site.⁵⁷

In summer 2001, ExxonMobil again raised the ire of the environmental community when it conducted seismic testing as grey whales were feeding off the northeastern coast of the island. The Ministry of Natural Resources banned the surveys, but Exxon reportedly had already finished the seismic work by that time.⁵⁸

Sakhalin II oil and gas project

- Project partners: Sakhalin Energy Investment Company Ltd. (SEIC) consortium consisting of Royal Dutch Shell (operator) (55 percent), Mitsui Sakhalin Holdings B.V. (25 percent), Diamond Gas Sakhalin B.V. (Mitsubishi) (20 percent).
- Area: Two fields—Piltun-Astokhskoe and Lunscoe.
- Estimated reserves: 140 million tons oil, 494 billion cu. m (18 trillion cu. ft.) of gas (the largest of the proven gas reserves).
- Expected project cost: U.S.\$10 billion.

SEIC was established in 1994 and signed its PSA in the same year. Sakhalin II produced the first oil of all the offshore projects in July 1999, with production levels at 20,000 barrels per day. In 2001, Sakhalin II completed its third season of oil production, increasing production to about 2.1 million metric tons for the year. In December 2000, Shell acquired Marathon's 37.5 percent share of SEIC in exchange for other assets, and Mitsubishi bought an additional 7.5 percent share from Shell.

In September 1999, during off-loading from the Molikpaq platform in high winds, about half a ton of crude oil was spilled, and attracted widespread attention, raising international and local concerns about the environmental safety of the offshore projects. Sakhalin II has had several more technical problems since the erection of Molikpaq.

Shell is planning to invest U.S.\$5 billion from 2002 to 2006 to develop a 600-km gas-oil pipeline from offshore platforms to a 9.6 million-tons-per-year liquified natural gas (LNG) plant and oil export terminal in the south (Prigorodnoe).⁵⁹ So far no ecological expert review has been completed for this pipeline, and agreement on the pipeline route was apparently already reached with land survey officials before the present public consultation process began. In the summer of 2002, the focus was on securing a long-term LNG sales

contract, most likely with a group of companies from Japan. Major construction is expected to begin in fall 2002.

The first phase of development involves ecologically risky tanker transportation from the Molikpaq, which was put in place in 1999. SEIC built a U.S.\$60-million housing complex for its expatriate staff and a six-story office building in Yuzhno-Sakhalinsk. In June 2000, SEIC moved its main offices from Moscow to the island.⁶⁰ In September 2000, SEIC announced that a U.S.-Russian-Japanese consortium had won the U.S.\$10 million tender to develop technical specifications for a feasibility study for the Prigorodnoe LNG plant. In December 2000, approximately U.S.\$100 million in major contracts were awarded to, among other companies, the Russian-French joint venture Starstoy for pipeline and terminal design, AMEC Services Ltd. (U.K.) for offshore platform design, and Parsons Engineering (U.S.) for design of onshore infrastructure. Starstoy got the contracts after Russians drew attention to the fact that there were low levels of Russian content in the Sakhalin II project (70 percent is required by the PSA over the lifetime of the project).

Sakhalin III oil and gas project

- Project partners: ExxonMobil (operator), Texaco, Rosneft, Sakhalinmorneftegaz (SMNG) (partners formed the company Pegastar).
- Area: Kirinsky, Ayashsky, and Eastern Odoptinsky blocks.
- Estimated reserves: Kirinsky—687 million tons of oil and condensate and 873 billion cu. m of gas, according to preliminary assessments. Ayashsky and Eastern Odoptinsky—114 million tons of oil and condensate and 513 billion cu. m of gas.

Kirinsky: In 1993 Mobil and Texaco won the tender for the right to explore and develop this block. An agreement was signed between the U.S. and Russian project partners in 1998. The Sakhalin III project has not yet signed a PSA. Delays with the production sharing negotiations mean that exploratory drilling is unlikely before 2003. About U.S.\$150 million has been planned to survey the deposit.

Ayashsky and Eastern Odoptinsky: In 1993 ExxonNeftegas Ltd. won the tender for exploration and development rights to these fields. In January 1999, then-Exxon agreed to include Rosneft and SMNG in the consortium to develop the two blocks, to get on the list of projects eligible for a PSA. The PSA has been signed by the consortium together with the Sakhalin and federal governments, and is waiting to be ratified by the Duma. ExxonMobil has committed an estimated \$300 million to survey the deposits.

Sakhalin IV oil and gas project

- Project partners: Rosneft, SMNG.
- Area: Astrakhanovsky block, Schmidtovsky block.
- Estimated reserves: 123 million tons of oil and condensate and 540 billion cu. m of gas.

A letter of intent was signed between Rosneft-Sakhalinmorneftegaz and Atlantic Richfield Co. (ARCO) in 1997, and a cooperation agreement signed in 1998, but ARCO withdrew from the project in February 2000. This was apparently due to concern about the lack of a Production Sharing Agreement (PSA), requirements that it would have to reinject drilling waste, and concerns voiced by indigenous peoples about the environmental threats to the northwest region of the island posed by the project. In the summer drilling season SMNG, which has the exploration license and PSA rights to the Astrakhanovsky block, began exploratory drilling independently. The Astrakhanovskoe Sea is estimated to contain 100 billion cu. m of gas deposits. Extracting the gas is estimated to cost U.S.\$2.6 billion with expected profits of U.S.\$4 billion. SMNG reportedly has started to negotiate with BP about acquiring a share in the project.⁶¹

Sakhalin V oil and gas project

- Project partners: British Petroleum (BP), Rosneft, SMNG.
- Estimated reserves: 154 million tons of oil and condensate and 450 billion cu. m of gas.

ARCO merged with BP Amoco in January 2000 and the company is now known simply as BP. The local BP office in Yuzhno-Sakhalinsk is being reregistered as BP Exploration Operating Company Sakhalin Inc. BP and Rosneft-SMNG now have an alliance agreement to explore opportunities for developing the Sakhalin V block. Sakhalin V has not yet come up for tender, but it is likely that BP and Rosneft-SMNG will make a joint bid. The block is not yet included in the federal list of fields that can be developed under a PSA.

Sakhalin VI oil and gas project

The Russian firm Petrosakh, owned primarily by Alfa-Eco Group, spent U.S.\$13 million on seismic studies in the project area in summer 2000. When completed, there are plans to drill a first well to estimate reserves, which may initially yield 600,000 metric tons of oil each year. In March 2002, Petrosakh and Rosneft formed a joint-venture to develop the reserves.