and cars from Warsaw to Vladivostok conformed to a striking wastefulness."[119] Some former Soviet states managed to reduce their energy intensity in the 1990s, but in Russia it actually increased. Chandler concluded that Russia could reduce energy intensity by one-quarter to one-half by implementing a number of efficiency measures.[120]

To reach energy self-sufficiency and reduce environmental costs associated with burning coal and diesel fuel, some RFE regions want to increase use of natural gas.[121] Chukotka wants to convert the Anadyr power plant from coal to gas—extracted from the nearby Zapadno Ozernoe gas field—but lacks investment to do so. For decades, Sakhalin's government has seen development of its offshore gas reserves as a means to make conversion possible. The Khabarovsk government would also like to increase its use of natural gas and has been lobbying ExxonMobil, operator of the Sakhalin I project, to build a gas pipeline through its territory for export to Northeast Asia. Khabarovsk has also secured federal funding to help renovate and extend the existing oil and gas pipeline running from Sakhalin to Komsomolsk-on-Amur (Khabarovsk). But ultimately the success of this effort depends on Sakhalin I's commitment to develop this pipeline route. And gas production from either Sakhalin I or II may not begin anytime soon, as the companies need to secure the long-term contracts to make gas extraction viable.

For companies developing the Sakhalin projects, the economic viability of supplying oil or gas to the domestic market is questionable. RFE consumers are unlikely to pay world gas prices (U.S.$90–$110 per metric ton) unless government subsidizes the cost. The Russian market is also comparatively small, and oil and gas infrastructure costs are high.[122]

Southern Kamchatka may be one of the few RFE regions to receive gas, thanks to a pipeline being built from onshore gas fields across the southern peninsula to the region's capital, Petropavlovsk-Kamchatsky, and nearby cities. But the gas will only meet Kamchatka's short-term needs, as the fields are projected to hold only a twelve- to sixteen-year supply. Fishing industry associations and the public oppose the project, as do environmentalists, who fear the pipeline is the first stage of a larger plan to open up greater oil and gas reserves offshore.

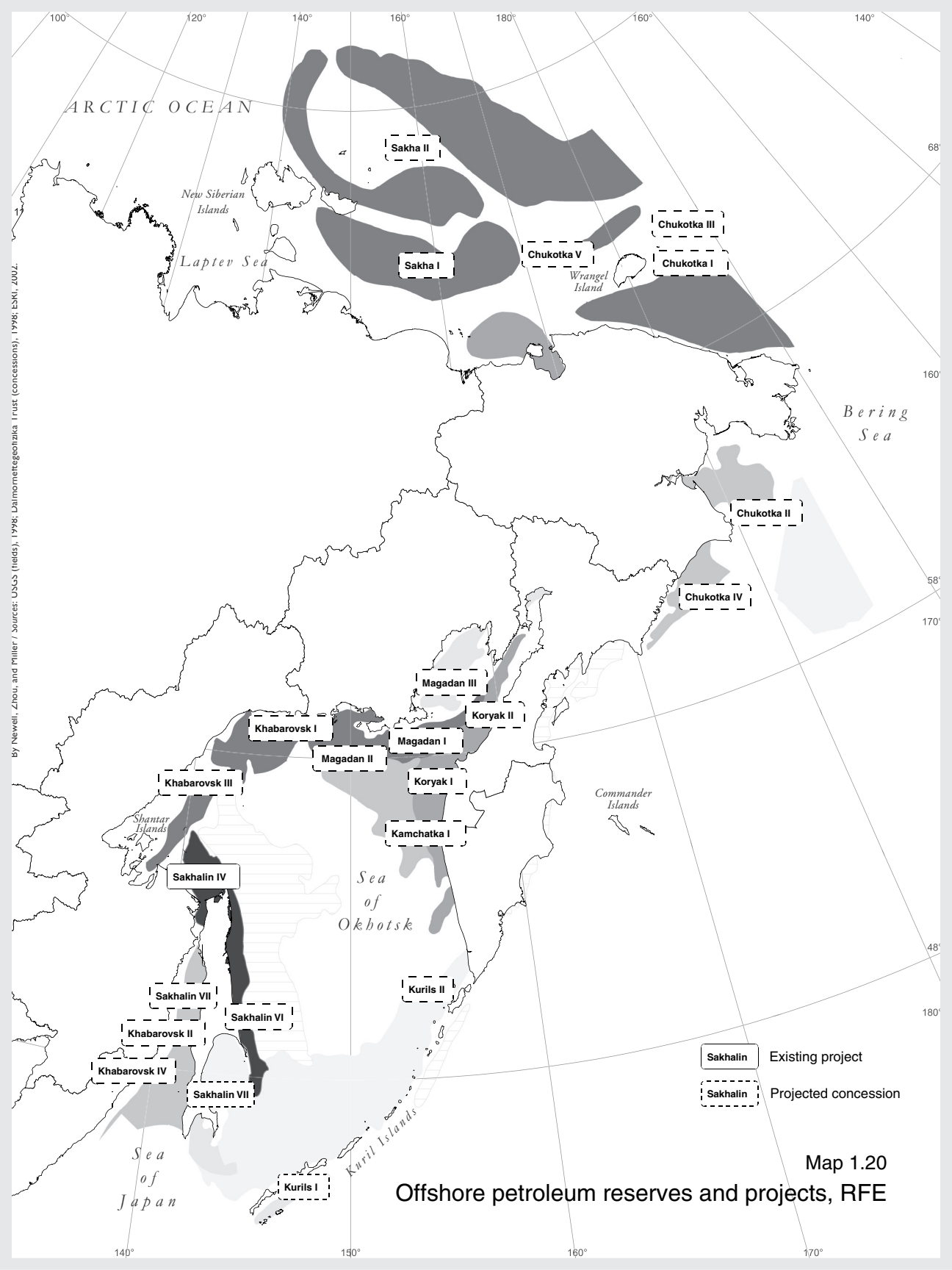
Given the remote location of many settlements, the lack of a unified grid system, and good potential for wind, solar, and other renewables, parts of the RFE are ideal for the aggressive development of renewable energy. Unfortunately, investment in this sector has been low, partly because the major international financial institutions active in the region—European Bank for Reconstruction and Development (EBRD), the U.S. Overseas Private Investment Corporation (OPIC), and the Japan Bank for International Cooperation (JBIC)—primarily finance oil and gas (see p. 87).

Oil. Onshore production is limited to northern Sakhalin (about 90 percent of RFE production) and central Sakha (10 percent of production). Oil is piped from both production areas to industrial centers: The Sakhalin pipeline goes under the Tatar Strait to a refinery in Komsomolsk-on-Amur, and the Sakha pipeline connects the Talakan oil field with the diamond-mining region near Mirny. After decades of speculation, surveying, and development, Sakhalin's offshore reserves finally produced oil in 1999 (1.7 million metric tons by Sakhalin II in 2000). Oil companies have ambitious plans to survey and tap more offshore oil and gas reserves near Sakhalin, Magadan, Kamchatka, Chukotka, and Khabarovsk (see map 1.20). The Far East and Zabaikalye Association estimates RFE oil reserves to be 8.9 billion metric tons, although this figure is rough because the exact size of the offshore reserves (which contain 60 to 75 percent of the estimated reserves) is not known.[123]

Oil refining is limited to two technologically outdated refineries in Khabarovsk Krai (Khabarovsk and Komsomolsk) and one small refinery on Sakhalin. Together, they produce less than half the oil consumed in the RFE; the rest is imported from other parts of Russia and from the United States.

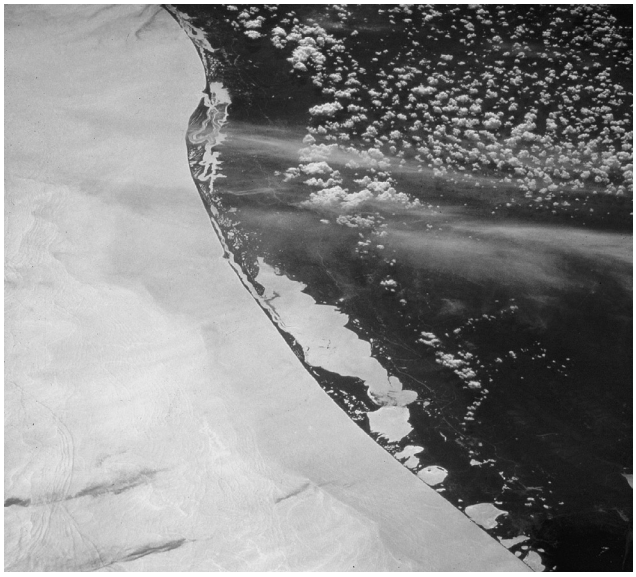
Emma Wilson

An oil flare at onshore oil operations near Nogliki, Sakhalin Island.



Map 1.20
Offshore petroleum reserves and projects, RFE

by Newell, Zhou, and Miller / Sources: USGS (fields), 1998; Dalmorneftegeofizika Trust (concessions), 1998; ESRI, 2002.



NASA

Taken from a NASA space shuttle, this photograph captures the frozen wetlands and seas along the northeastern coast of Sakhalin.

Oil-producing areas in Sakha and Sakhalin are heavily polluted, and extraction methods are wasteful, as in other parts of Russia. Oil companies lose an estimated 3 to 7 percent (10–20 million metric tons) of Russia's annual crude oil to leakage.[124] The 1995 Neftegorsk earthquake fractured Sakhalin's oil pipelines, resulting in numerous small leaks that polluted wetlands and streams in northern Sakhalin.

Natural gas. With more than one-third of the world's natural gas reserves, Russia is the world's largest exporter. Western Siberia holds Russia's largest gas fields, but the RFE also has significant reserves, mostly in Sakha, Sakhalin, and other offshore areas. The Far East and Zabaikalye Association confirmed RFE gas reserves of 1.6 trillion cu. m, with 60 percent in Sakha and the remainder near Sakhalin. Reserves may be as high as 24 trillion cu. m.[125] Both regions produce about 3.5 million cu. m of gas yearly, but production is not commensurate with reserve size. A pipeline connects Yakutsk to gas fields near Vilyui. Another gas pipeline follows the same route as the Northern Sakhalin-Komsomolsk oil pipeline. Large-scale gas reserve development will likely occur first off Sakhalin, with the development of Sakha's fields dependent on securing foreign investment.

Coal. Coal, the most important energy source throughout the RFE with the exception of Kamchatka Oblast, accounts for about 90 percent of Primorsky Krai's and more than 80 percent of Sakha's total energy production.[126] In the early 1990s, RFE coal production declined more precipitously than that of other industries, but it has remained steady since 1998. The RFE produced 28.2 million metric tons of coal in 2001 (about 10 percent of Russian production) from mining in four regions: Sakha (9.7 million), Primorsky (9 million), Sakhalin (3.3 million), and Amur (2.7 million).[127] The government hopes to revitalize the industry by mining large untapped deposits, the most important being the Elginskoe deposit in Sakha, the Solntsevskoe deposit in Sakhalin, several deposits in Primorsky and Khabarovsk Krais, and a series of smaller open-pit mines throughout the RFE. The RFE has an estimated 19 billion metric tons of coal, with more than half in Sakha. About 55 percent of RFE coal is lignite; the remainder is bituminous coal.[128]

Coal is largely extracted with opencast mining, which is more destructive though less costly than shaft mining. Opencast mining transforms landscapes and pollutes rivers.

Nuclear. The RFE's only nuclear power plant is an aging reactor in Bilibino, Chukotka. The Ministry of Atomic Energy (Minatom) would like to build floating nuclear power plants in Pevek, Chukotka (see p. 304) and has tried to build stationary plants in other RFE regions. The most recent serious effort was in 1995 when Minatom proposed building a reactor near Lake Evoron in Khabarovsk. Widespread public opposition, concerns about seismicity, and environmental impact and building costs led to the plan's demise. Minatom has since resurrected a 1980s plan to build a 1,200 MW plant in Primorsky Krai, possibly in Dalnerenchensky Raion or Yakovlevsky Raion.[129]

Due to the 1986 Chernobyl accident, Russia's poor nuclear safety record is infamous worldwide. Nuclear accidents have occurred in the RFE as well. Between 1965 and 1994, the Vladivostok-based Pacific Fleet recorded 60 accidents on its nuclear-powered submarines, including 9 fires, 8 nuclear-power generation incidents, 20 collisions, and 4 groundings. In all, 107 people were killed and an estimated 1,300 suffered radiation exposure.[130] In 1993, the Japanese government, acutely aware that Russia was dumping nuclear waste in the Sea of Japan, provided about U.S.$29 million to build a floating filtration plant to store liquid radioactive wastes generated by the Zvezda Far Eastern Shipyard in Bolshoi Kamen. After numerous delays and complaints that contractors were dragging out the work to raise construction costs, the *Landysh* facility began operating in October 2000.[131]

Russian environmentalists are resisting government plans to import spent nuclear fuel. In July 2000, Putin signed a controversial law allowing such imports, which could bring a total of 20,000 metric tons into Russia, generating an estimated U.S.$21 billion in revenue over a 10-year period.[132] Russian environmental groups collected 2.5 million signatures to have a national referendum, but the Central Election Commission, saying that some of the signatures had been falsified, rejected the initiative (see p. 104).[133] The government has tentative plans to build processing facilities for spent nuclear fuel in the RFE, including one on Simushir, a small island in the Kuril Island chain. Use of existing facilities in Siberia is more likely, but this will require transporting nuclear fuel

from Asian countries through RFE ports, such as Vladivostok and Vanino. Transport raises concerns about the potential for accidents or theft along the route.

Hydroelectric. The rivers of the RFE can potentially generate 1008 billion kW-hours of electricity, 68 percent of which is commercially feasible and only 2.8 percent of which is currently exploited.[134] The largest hydroelectric station is the Zeysky plant in Amur Oblast. While hydroelectric power is often promoted as environmentally benign, scientists noted that construction of the Zeysky plant permanently altered ecosystems, replaced taiga landscapes, and obstructed migration patterns of roe deer and moose. The 2000 MW Bureinskaya Hydroelectric Power Station, also in the Amur region, is under construction (see p. 221), and there are plans to build the Gilyuisky Hydroelectric Power plant, which will flood part of a *zapovednik* when constructed (see pp. 209–210).

Geothermal. Geothermal reserves lie primarily in Kamchatka, where the Mutnovsky Geothermal Power Plant was built (see p. 362). The plant, built in part with a U.S.$99.9 million loan from the EBRD, began operating in December 2001.

Wind, solar, and other energy sources. With ongoing energy crises, some regional governments are showing growing interest in renewable energy including microhydroelectric power stations, wind-power stations, and solar energy devices. In Chukotka, a 250 kW capacity wind-power station was installed to take advantage of strong winds off the Bering and Chukchi Seas.[135] A Japanese philanthropist recently installed a wind-power turbine in Agzu, an indigenous village in Primorsky Krai.[136] These model projects, unfortunately, are rare.

Timber

J. NEWELL—Although the timber industry has traditionally accounted for between 5 and 10 percent of the RFE's total industrial production, its importance to the economic and social fabric of village life in some regions is far greater. In the timber-rich southern RFE, especially Khabarovsk and Primorsky Krais, log exports contribute a large portion of hard-currency revenue. For many other towns and villages, the closure of wood-processing enterprises, a trend that began after *perestroika*, has been devastating, causing a loss of jobs, tax revenue, and basic services such as a stable energy supply (the boilers used in timber mills often provide centralized heating for communities).

Official timber production figures for the RFE indicate a dramatic decline in harvest, with 2000 production registering just a third of 1985 levels. This would suggest that accessible forests have had some respite from decades of overlogging, including wasteful and destructive practices such as clear-cutting, where all trees in a given plot are logged. (Clear-cutting has contributed to the steady replacement of mature conifer forests with second-growth deciduous forests at a rate of about 0.8 percent a year [see p. 31].)

In fact, these practices may have become even more prevalent than during the Soviet era. Higher energy and transport costs have combined with a market shift from states of the former Soviet Union to China, Japan, and South Korea to increase overlogging in forests accessible to these markets. Biologically diverse forests in the southern region (Primorsky and southern Khabarovsk Krai) have been particularly hard hit. The collapse of processing, caused by decreased domestic demand, has meant that woodchips, branches, and smaller logs used to make sawnwood, plywood, and pulp and paper, are left at logging sites—increasing the already enormously wasteful operations and providing fuel for potential future fires (see "Forest Fires of 1998," p. 81).

These Asian markets are radically changing the type of species logged and the type of wood product produced (logs rather than sawnwood, plywood, etc.) as timber companies from the RFE and Eastern Siberia compete to meet demand. The increase in high-grade logging, whereby only large-diameter, commercially valuable trees are felled, is one result. Chinese and Japanese demand for ash logs, prized for housing construction, has led to another: logging along protected river basins (Group I forests) that are crucial for regulating water levels. And the continued high demand for harvest-restricted Korean pine logs has led to overharvest of that species, significantly reducing an important food source (pine nuts) for many animal species in the Ussuri Taiga.

Official production figures are considerably clouded because many logging companies, particularly smaller ones, operate illegally. Numerous small firms emerged as the industry was privatized, and the government has been unable to regulate them. According to a study by World Wildlife Fund–Russia (WWF–Russia), 50 percent of total timber harvest in Primorsky Krai in 1999 was illegal. In addition, *leskhoz*es, the regulatory bodies responsible for forest protection, abuse salvage logging policies and regulations to augment their budget shortfalls; unscrupulous *leskhoz* officials also sometimes seek to enrich themselves. This corruption has fostered widespread indifference among timber companies toward logging regulations, creating a "frontier mentality" in the RFE. It is now difficult if not impossible to enforce timber harvest regulations and collect stumpage and licensing fees. Honest timber companies struggle to compete with illegal loggers.

The greatest long-term threat to the region's forests, however, is rising wood consumption in Northeast Asia. Russia has emerged as the largest log supplier for China, Japan, and South Korea. Massive flooding in China in 1998—attributed to the widespread deforestation of upper river watersheds—forced the central government to strictly limit timber harvests to protect the few remaining natural forests and to prevent further soil erosion. This policy shift led to a tripling of Russian log imports to China in just four years (1999–2002). By 2025, China may face a deficit of 200 million cu. m of wood

per year, or 15 times the total reported yearly harvest in the RFE (see p. 74).

Regional governments have continually called for investment in wood processing, recognizing the advantages of providing such products to these booming markets: larger, more sustainable revenues, more jobs in local communities, and a slowing of timber harvest by increasing the use of secondary products (woodchips, branches). The latter advantage would in turn reduce pressure to continually open up "frontier forests" for exploitation. But such investment has not been forthcoming, primarily due to illegal logging, capital flight, and corruption.

The Russian government has taken measures to reform and better regulate the industry; President Putin himself branded the industry "uncivilized."[137] But efforts so far have been largely unsuccessful because the same government agencies responsible for forest protection are among the violators (see pp. 73–4).

The future health of the RFE forests depends upon effective Russian government regulation of the industry, substantial cuts in Chinese and Japanese timber imports, and the development of a competitive processing industry.

The collapse of wood processing. Since the late 1980s, the production of sawnwood, plywood, paper, and other processed products in the RFE has plummeted. Causes for the collapse are many, including outdated machinery, lack of reinvestment by Russian firms (capital flight), reduction of domestic demand, loss of government subsidies, and continued tariffs on processed wood products by primary consumer countries.[138] The region's timber industry now exports about 70 percent of all production, mostly in the form of logs, to three countries: China, Japan, and South Korea.

In 1989, the industry was more balanced. Almost half of all timber production was used regionally, while 25 percent was sent to other regions of the former Soviet Union, and 30 percent was exported abroad.[139] Processed timber (lumber and panel products) accounted for 20 percent of the region's total timber production, and the Sakhalin and Khabarovsk pulp and paper mills still operated. By 1998, processed timber accounted for just 5 percent of total production, producing only about 485,000 cu. m (see table 1.7).

The collapse of the wood-processing industry negatively affected the region's economy in numerous ways. Aside from quick profits and subsistence incomes for a select few, the export of raw materials provides few benefits. An investigation in February 1999 by two NGOs, Sakhalin Environment Watch and Pacific Environment, revealed the miserable working conditions of Russian loggers. During a visit to a logging site in southern Sakhalin Island, the organizations determined the logging brigade, composed of eight people, earned only about 75 cents per cu. m logged.[140] Thus, each brigade member received an average of less than 10 cents per cu. m logged. The truck driver transporting the logs 40 km to a port received about 25 cents per cu. m. The wood itself was then sold to Japan for ($70 to $100) per cu. m. Loggers work for such low wages because no other job opportunities exist. Unfortunately, many Russian entrepreneurs invest their final profits abroad—part of Russia's capital flight—rather than reinvesting in necessary items for the industry, such as wood-processing equipment.

Table 1.7
Output of the RFE forest sector, 1985–1998

Product	*1985*	*1990*	*1995*	*1998*
Timber (000,000 cu. m)	34.5	29.6	10.5	9.8
Lumber (000 cu. m)	6,179.0	5,414.0	973.0	476.0
Plywood (000 cu. m)	35.9	25.3	1.0	–
Particle board (000 cu. m)	117.1	189.4	22.1	5.1
Fiberboard (000,000 sq. m)	23.0	23.8	5.6	2.6
Cellulose (000 tons)	418.3	539.9	60.0	2.2
Paper (000 tons)	228.3	215.4	14.1	0.2
Cardboard (000 tons)	192.0	240.6	13.1	6.1

Note: Timber production includes total wood cutting, but not logging waste.

Source: Institute of Economic Research, 1999, and the regional chapters in this handbook.

Logging methods. The collapse of processing has exacerbated the wasteful use of forest resources that plagued the region throughout the Soviet industrial period, from 1940 to 1988. During this period, the timber industry wasted an estimated 40 to 60 percent of all cut timber during the production process, a figure four times higher than in Western timber-producing countries.[141] At the felling stage, loggers chose the best logs and left all others at the logging site. During the transportation stage, the amount of timber cut often exceeded transportation capabilities. Logs left lying for long periods of time often rotted or were infested by insects. Transportation of timber along rivers led to further loss as logs sank, destroying spawning grounds, and releasing resinous tar and other harmful substances into the water. Timber brigades would simply abandon an area after depleting it and move on to new stands of trees.

Russian foresters now report even higher levels of waste at logging sites than in Soviet times due to a lack of demand for woodchips, branches, and smaller diameter trees (which are harvested when a site is clear-cut). These secondary products are traditionally used in the processing industry. There are, of course, other reasons for this waste. Costs to transport and ship to the industry's primary markets—China, Japan, and

Table 1.8
Reported RFE timber production, 1995–2000 (cu. m)

Region	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*
RFE	10,508,000	9,500,000	10,930,300	9,854,600	10,615,400	12–15,000,000 (est.)
Khabarovsk	4,600,000	4,400,000	4,662,400	5,618,000	5,016,000	6,393,000
Primorsky	1,830,000	1,450,000	2,761,000	2,200,000	2,672,000	3,309,000
Amur	1,715,000	1,542,000	1,531,000	848,000	1,306,000	–
Sakhalin	1,440,000	1,448,000	1,070,000	461,100	869,400	–
Sakha	868,000	623,000	742,700	561,800	586,200	–
Kamchatka	–	–	136,300	149,200	135,800	–
JAO	55,000	37,000	26,900	16,500	30,000 (est.)	–

Sources: Data, compiled by Newell and the authors of the regional chapters in this book, are from Khabarovsk Forest Service, Sakhalin Forest Service, Amur Forest Service, Institute of Economic Research, and Russian Federal Customs.

South Korea—make it unfeasible to export smaller logs. And inefficient Soviet harvesting and transport equipment is still widely in use.

Perhaps most important, for a variety of reasons (illegal logging, weak regulation, Soviet-era managers still in control of many firms), sustainable forest management and logging techniques have failed to gain a foothold. Clear-cutting remains the preferred practice over much of the RFE's boreal and northern temperate regions. Clear-cuts cause soil erosion, clog river systems, and erode topsoil necessary for regrowth. Clear-cuts also dry out the soil, hinder seedling growth, and create canopy breaks in forests, making forests more susceptible to wind and fire damage. Large-scale clear-cutting also simplifies forest structure, reducing the forest's ability to support a wide range of plant and animal species. Many clear-cut forests never fully recover.

The diversity of species as well as the topography of Sikhote-Alin's forests makes them uneconomical to clear-cut, so selective high grading remains the area's most cost-efficient logging method. The practice of high grading, or taking only the best trees, slowly degrades the forest's genetic diversity and can affect water quality.

Logging shifts to the southern RFE. Timber harvest is gradually shifting from the north to the south. Both Primorsky Krai and Khabarovsk Krai have become growing timber centers, accounting for 72 percent of the RFE's total production in 1999 (see table 1.8), up from 55 percent in 1992. The relative importance of northern regions (Sakha and Kamchatka) to overall production in the RFE, meanwhile, has declined due to high energy costs and comparatively higher transport costs to export logs to Northeast Asian markets.

Given its location in the southern RFE, Amur Oblast's timber production might have been expected to remain stable during the 1990s, but production dropped from 20 percent in 1992 to 10 percent in 1999. This may be due to heavy overlogging of accessible timber stands during the 1970s and 1980s. In Chapter 5, Yuri Darman and Gennady Illarionov also point to the region's remoteness—although it borders China, exporting timber requires rail transport to Eastern Siberia or through Primorsky Krai. Darman and Illarionov also note the comparatively lower quality of most of the timber (see pp. 213–14). Sakhalin Oblast is a puzzle as well: timber production fluctuated greatly, ranging from 12 percent of the RFE's total production in 1992, to 16 percent in 1995, and down to 9 percent in 1999. The closure of most of the island's pulp and paper plants, which were large timber consumers, is likely a major reason (see pp. 402–04).

This geographic shift is significant economically because timber-dependent communities in areas distant from export markets will be less able to compete with their counterparts in more strategically located southern regions. Alternative economic strategies for communities in northern regions must be developed.

For Primorsky Krai and Khabarovsk Krai, by contrast, logging pressures will increase. The two regions contain Russia's most biodiverse forests (the Ussuri Taiga), raising concern that this geographic shift will lead to large-scale logging in these forests. Virtually all foreign logging operations, which account for a growing percentage of timber produced in the RFE, operate in the Ussuri Taiga and nearby coastal forests, particularly in southern Khabarovsk Krai. These ventures may dramatically increase the volume of timber logged in these forests because foreign firms have the capital to build roads and the technology to access timber on previously inaccessible steep slopes. In December 1997, Rimbunan Hijau, a Malaysian company, received a 48-year lease on 365,454 ha in the Sukpai watershed in Khabarovsk Krai. Logging these

Table 1.9
Top fifteen timber producers in the RFE

Firm (Region)	*Country*	*Annual production (cu. m)*
Terneiles (Primorsky)	Russia	393,000
Amurlesprom (Amur)	Russia	382,000
Forest Starma (Khabarovsk)	U.S.A.	370,000
Tyndales (Amur)	Russia	267,000
Rimbunan Hijau DV (Khabarovsk)	Malaysia	264,000
Everonsky LPX (Khabarovsk)	Russia	249,000
De-Kastriles (Khabarovsk)	Russia	223,000
Shelekhovsky LPX (Khabarovsk)	Russia	188,000
Gorinsky LPX (Khabarovsk)	Russia	161,000
Luchegorskles (Primorsky)	Russia	139,000
Roschinsky LPX (Primorsky)	Russia	129,000
JV Arkaim (Khabarovsk)	Japan	127,000
Vega (Khabarovsk)	Russia	126,000
Kavelerovsky LPX (Primorsky)	Russia	119,000
Amgu (Primorsky)	Russia	114,000

Source: Compiled by Josh Newell using data from regional chapters of this handbook. Data for Amur companies are for 1997, the rest are for 2000.

forests may lead to fragmentation of wilderness throughout the northern Sikhote-Alin Mountains because new logging roads will provide forest access outside the leased area (see pp. 175–75). On a positive note, enforcing regulations on large foreign operations is easier than on Russian ventures because historically the government, press, and NGOs have scrutinized international ventures more conscientiously. Rimbunan's logging operation is now one of the largest in the RFE (see table 1.9).

Illegal logging. As noted earlier, official statistics for the RFE indicate a sharp decline in timber harvest throughout the 1990s: Production was between 12 and 15 million cu. m in 2000, down from 29.6 million in 1990 and from 34.5 million in 1985, but up from a post-Soviet low of 9.1 million in 1996 (see tables 1.7 and 1.8). These figures, however, do not reflect actual harvest levels. According to numerous RFE timber sector studies, actual production may be twice as high as the official figures owing to underreporting to avoid taxation and, more importantly, to widespread illegal logging.[142]

The actual definition of "illegal logging" is open to debate: once defined, we can begin to determine actual harvest levels. Defining "illegal logging" would require extensive fieldwork and developing a sampling method to allow for averaging illegal logging levels across the huge region. Forestry economist Alexander Sheingauz argues, if all forestry regulations were taken into account, virtually every logging operation in the RFE would be illegal.[143] WWF–Russia adopted a more narrow definition, limiting illegal logging to harvesting more than permitted volumes, harvesting outside the permitted area, logging banned species or those not allowed for logging in a given area, commercial logging under the guise of sanitary or salvage logging, and logging without a license or with forged papers. They exclude basic logging violations, such as failing to clean up a site after logging or using inappropriate harvest methods, which Sheingauz undoubtedly includes.[144] Using this definition as a benchmark, WWF–Russia estimated that in 1999 about 1.5 million cu. m of timber (50 percent of total production) in Primorsky Krai alone were illegally logged; this represents about U.S.$450 million in unreported revenue.[145] The Russian government, eager to dispel claims of unbridled illegal logging, maintains only 24,000 cu. m were illegally logged in Primorsky for 1999. Greenpeace-Russia puts the figure at 600,000 cu. m.[146]

Rather than try to supply a monetary figure or to estimate illegal harvest levels in the RFE (since available figures are so variable), this study instead documents some of the more egregious forms of illegal activity. Logging methods and locations, not overall harvest levels, are the primary cause of forest degradation in the RFE. The following sections explore why illegality has flourished in the post-Soviet era, what forms it takes, and why it is so detrimental.

Multiple logging companies, exporters, and export points. Radical privatization led to the conversion of state-controlled *lespromkhoz*es to joint-stock companies. Today, Russian-owned medium and large joint-stock companies produce most of the RFE's reported timber product—from 75 to 85 percent. Privatization, however, forced many large, formerly state-owned logging and wood-processing companies to cut back on production and lay off workers, contributing to an economic crisis. Some unemployed workers started their own logging firms using equipment and materials appropriated from *lespromkhoz*es, leading to a proliferation in the number of firms. By 2000, over 450 logging firms were registered in Khabarovsk Krai alone.[147] Most of these smaller operations log illegally and accordingly their production goes unreported. They often operate for only a few years and then disappear before authorities catch them. Sometimes this is done to avoid taxation, a common practice in post-Soviet Russia. Penalties stipulated in both criminal and civil legal codes are too weak to be effective deterrents: fines for breaking environmental regulations are so low that companies can actually profit more by paying fines for logging and exporting illegally than by operating legally. Criminal timber dealers do worry about confiscation of their timber by the government, but bribes can usually resolve this problem. Larger firms also log illegally, but their less mobile operations are easier to inspect.

According to government documents and testimony from officials and industry representatives, Chinese timber brokers are aggressively moving into the RFE, many illegally. In a letter to then-Primorsky Krai Governor Nazdratenko, the Russian Federal Immigration Service wrote: "After inspection, we found that in the Lesozavodsky and Dalnerechensky Raions, seventy-one Chinese residents are dealing in timber wholesale and export to China. They come to Russia with the S-series business passport, arrange expert assessment of timber quality and value and accompany the timber back to China. All of this goes on, even though they have no rights to work in Russia."[148]

The strong reaction from Russian officials is partially attributed to phobias about Chinese residence and commercial activity on Russian soil, but also reflects the increasing involvement of Chinese firms in the RFE timber industry. Many Chinese operators control wholesale timber yards in the Primorsky cities of Luchegorsk, Dalnerechensk, Lesozavodsk, Ussuriisk, Nakhodka, and Dalnegorsk. Some Chinese export firms are listed under false names or aliases, which allow them to hide cash operations. Growing evidence also indicates Chinese money funds numerous small Russian timber firms and exporters, many of which operate illegally, according to Anatoly Lebedev, director of the Bureau for Regional Outreach Campaigns, a Vladivostok-based NGO.[149]

In spring 1999, the Department for Fighting Organized Crime (DFOC) of the Primorsky regional police uncovered a Chinese organized crime group in the forest-rich Krasnoarmeisky Raion, with a timber storage area and headquarters in nearby Dalnerechensk. Illegal ash and oak stockpiles, purchased from loggers and legalized with fake documents, were being exported to Japan. A police search revealed numerous blank transport certificates, a forest service document required for customs clearance.

In the mid-1990s, reforms dismantled the Soviet system strictly limiting the number of exporters and export points, resulting in an explosion of both. By 2001, Khabarovsk Krai alone had 294 exporters registered.[150] Export points today are so numerous they are virtually impossible for government authorities to regulate. The Primorsky government estimates there are more than ninety-seven export points in Primorsky Krai alone.[151] According to an estimate by Nakhodkales Director Nikolai Pozdnyakov, almost one hundred private piers and moorings that can be used for wood export exist in Nahkhoda port. Newspaper articles throughout the 1990s reported corruption and export of illegally harvested ash and Korean pine through Primorsky's smaller, more remote ports.[152] On Sakhalin, several companies take advantage of leased forest plots near the shore to helicopter wood from forest plots to ships offshore. Uncontrolled export points also exist upriver from Khabarovsk along the Amur River, where timber is delivered across the river into China. Timber flows are increasing across the Amur River to Tong Jiang (near Khabarovsk) and Hei He (across the river from Blagoveshchensk).

The rising number of export sites has made it increasingly difficult for the Forest Service and Customs to track the origin of timber and assure its legality. Nonetheless, some regional governments do attempt to control the situation. The Khabarovsk government, for example, now mandates that a new state firm, KhabGlavLes, export 20 percent of the region's timber. But this may be an attempt by the government to increase profits rather than to regulate illegal export. In Primorsky, the governor signed a decree in 1997 to ban ash log export and reduce the number of possible export points. Many exporters have ignored the decree, however, and continue to sell timber to other wholesalers and exporters, such as Primorsklesprom or Chinese private companies. In addition, illegally harvested timber is extremely difficult to track through Customs due to the widespread use of forged documents.

"Purchasing" documents. To market illegal timber, companies must provide documentation. They use fraudulent shipment declarations, which list inaccurate prices, grades, species, and timber volumes. Similarly, transport regularly involves forged logging and export licenses, fake transport certificates, and double contracts (one official and one secret).

Josh Newell

Anatoly Lebedev films Russian militia officers inspecting a logging truck at a checkpoint in Krasnoarmeisky Raion (Primorsky Krai).

Such licenses and certificates are widely available on the black market in Primorsky and Khabarovsk Krais. In Roshchino village in Primorsky Krai, field research revealed that logging and transport certificates, complete with the embossed seal of the Forest Service, could be bought for U.S.$300.[153] These documents include dates for logging, logging site data, tree species, allowable logging volume, truck license numbers, drivers' names, and a logging license number. With such certificates, militia and customs checkpoints are easily manipulated.

"We have a steady but mediocre salary," reported Yuri, a truck driver for an undisclosed logging company in Primorsky. "Our officials give me blank certificates to fill in information about the timber that I take on my truck from a logging site. So I write in whatever I want to sell officially; the difference that I hide for a private cash sale is up to me. We negotiate the extra logs' price, and I simply give them to the port manager for cash. Everything is always negotiable, both documents and timber to be exported."[154]

There are other loopholes: Logging without a license also occurs; militia are then bribed at the checkpoint, and the timber is sold to a wholesaler who then forges customs documents. According to Alexander Kichigin, director of the firm Belogorka in Roshchino, "Any consignment can get through the militia point for two to three hundred dollars."[155] The timber is then taken to a wholesale timber yard for sale and export. Pavel Soldatov, former chairman of the Committee on Environmental Protection in Krasnoarmeisky Raion (Primorsky Krai), agrees: "Depending on the quality of fake documents, the amount of ash timber, and the number of people involved, two to five hundred dollars will get you through the militia point. One typical procedure for dealing with the militia is to send a scout ahead of the log trucks to bribe the militia officer, and then the truck can proceed."[156] This is a common strategy in the city of Dalnerechensk: illegally logged timber passes the militia checkpoint and is transferred to a large timber holding area, now a wholesale point controlled by Chinese exporters.[157]

Mislabeling species and quality. Russian exporters and Japanese importers label high-quality timber as pulp logs to reduce the official contract price. This illegal export strategy hides company profit on the Russian side, thereby reducing taxes paid to the government. RFE customs officials and border guards either look the other way or fail to catch this because they are poorly trained in species identification. Japanese importers, after sorting and sizing logs, sell it as commercial-quality timber. In the first six months of 1997, Japan reported 120,000 cu. m of softwood pulp log imports from Russia, North America, and Australia. Russian statistics for the same period show that Russia alone exported 163,000 cu. m of softwood pulp logs to Japan. This practice appears more prevalent in the export of more valuable hardwood ash and oak logs. Japanese customs statistics for 1997 show that Russian hardwood log imports totaled 363,000 cu. m. Of this total, high-quality logs made up 150,000 cu. m, while the remaining 213,000 cu. m (an unlikely figure) were reported as pulp logs.[158]

Logging of rare and protected species. Large amounts of high-quality Korean pine logs can be seen in the port of Plastun, ready for export to Japan, even though Russian regulations forbid commercial logging of the species. The species may be logged, however, under certain circumstances, to build roads, for example, or during salvage logging. This timber may then be exported legally. Melnichny Timber Company reported exporting 1,200 cu. m of Korean pine from the port of Plastun to Japan in 1998, as well as exporting about 25,000 cu. m of "coniferous" raw logs. A review of the company's logging sites, however, revealed the company's permits pertained primarily to Korean pine forests.[159] The Forest Service participates by issuing bogus logging licenses, granting permission to build roads through Korean pine stands, and agreeing to expand the size of leased plots to include Korean pine areas—all of which facilitate the commercial logging of the species.

Demand for large, high-quality ash logs is increasing in both Japan and China, where the housing industry covets this hardwood. Thus, intense logging targets riparian areas in southern Khabarovsk and Primorsky Krais, where the largest ash trees grow and where they are vital for regulating water levels and controlling erosion. These riparian areas are protected Group 1 forests and hence closed to commercial logging but open to salvage logging. Local customs data show that 640,000 cu. m of hardwood timber (ash and oak) from Primorsky Krai and 150,000 cu. m from Khabarovsk Krai was exported to China in 1998—a total of 790,000 cu. m. In contrast, federal customs data report only about 520,000 cu. m of hardwood timber was exported to China from Russia in 1998. Assuming the reliability of local statistics, federal statistics underestimated the volume of trade by at least 35 percent, not considering hardwood exports to China from regions outside Primorsky and Khabarovsk.

According to Vsyacheslav Balandin, former head of Primorsky's logging industry department, estimated overlogging of hardwoods increased four- to fivefold between 1995 and 1999. The Primorsky and Khabarovsk governments have repeatedly tried to restrict hardwood exports, especially ash, but with little success. On May 25, 1999, Vladimir Stegni, former Director of Foreign Economic Relations for Primorsky Krai, asked the Russian Ministry of Economy in Moscow to include strict quantity limitations on export licenses. He wrote: "Timber hardwood export volumes from Primorsky region to Japan and China are constantly increasing and are much greater than the legal allowable cut volume.... Providing export licenses without quantity limitations yields no results. From February 15 through May 20, 1999, licenses were issued for hardwood logs exported at a volume of 930,900

cu. m (both Primorsky and Khabarovsk Krais), while the legal quota in Primorsky region for these species for [all of] 1999 is 260,000 cu. m."

Other forms of illegality. Illegality in the industry does not stop here. Myriad other complex schemes and frauds thrive. Many of these involve, ironically, the active cooperation or tacit agreement of the Russian Federal Forest Service, the primary government agency responsible for regulating forest use. *Leskhoz*es regularly harvest export-quality timber themselves under the guise of salvage or sanitary logging.

The Forest Service: oversight agency or logging company? Prior to 2001, the Federal Forest Service and the State Committee on Environmental Protection managed and controlled the forests. The Forest Service managed eighty-one regional departments, each of which managed a respective region (*krai, oblast*) or republic. Under the jurisdiction of these departments, forest service districts (*leskhoz*es*)* oversaw forest use, management, and protection of a particular administrative district. Although Putin's decrees abolished the Forest Service, *leskhoz*es still function and are administered by the Ministry of Natural Resources. There are 1,740 *leskhoz*es in Russia, with over 40 in Khabarovsk Krai alone.

Years of declining federal funding left many forest service departments and *leskhoz*es without sufficient funds to manage and protect forests. The 1997 forest service budget in Primorsky Krai, containing Russia's most ecologically diverse forests, was 67 million rubles (U.S.$2.7 million), which paid 2,500 staff salaries for 123 forest service stations scattered among 31 *leskhoz*es. Only 18 million rubles came from the federal budget; additional funding sources were varied. The regional government provided 3 million rubles for reforestation, generated by leasing payments and stumpage fees; penalties and fines provided 2.5 million rubles. The U.S. Forest Service donated 1 million rubles to fight the gypsy moth. The remaining 42.5 million rubles, or 64 percent of the total budget, were generated from salvage logging conducted by the Forest Service and small firms.

By Russian definition, "salvage," "sanitary," or "maintenance" logging is intended to remove old and ill trees and trees posing fire threats. This kind of logging, allowed within protected territories, is exempt from lease payments and stumpage fees. *Leskhoz*es and local companies illegally exploit salvage logging rules to raid high-grade forests for commercially valuable species, such as Korean pine and ash.

Before it was abolished, the inspection division of the Khabarovsk Committee on Environmental Protection addressed the abuse of salvage logging. Concerned about forest health, particularly the survival of ash forests, the inspection division and local police reviewed 380 logging sites licensed by the Khorsky, Oborsky, Mukhensky, and Sukpaisky *leskhoz*es during 1996–1999 and published the findings in the report "Status of Group I forests in riparian protection zones of the rivers and creeks in Lazo Raion, Khabarovsk Krai."[160] According to the report, *leskhoz*es routinely: (1) logged in violation of the Forest Service's mission to log ill trees and reduce fire threats, not to generate profits; (2) undergraded the value of logged timber; (3) removed under- and oversized trees; and(4) logged in prohibited areas, such as steep slopes, river banks, and key watershed areas. "Based on many inspection trips," the study's authors wrote, "*leskhoz*es have been logging rich, commercially valuable timber of key species (ash, Korean pine, and spruce) in sensitive riparian protection zones and along spawning rivers under the guise of 'salvage logging'; this is absolutely prohibited." The study then listed the species violations by *leskhoz*es operating in the area. For example:

> On forest plot #192 (Sukpaisky department of Sukpaisky Leskhoz), license #38 dated July 27, 1996 delivered rights for so-called "Renewal logging" in the riparian protection zone of the highest category spawning region of the Khor River. Using this license, 698 cu. m of high quality timber were logged, including 560 cu. m of top-grade export timber. Eighty-two percent of this timber was A-1 quality ash. This area, upon inspection, did not need "maintenance" or "renewal."
>
> On forest plot #85 (Gorny department of Sukpaisky Leskhoz), license #17 of February 14, 1996, delivered rights for so-called "passage logging"; 516 cu. m of

It is no secret that we ourselves, *leskhoz*es in RFE administrative districts, are some of the most serious violators of forestry rules and regulations. Even though logging may be our only means to survive as we receive almost no financing from the local administration and from the government, we have no right, I suppose, to log commercially under the label of "salvage logging."

– *Viktor Kozachko, Director of Melnichny Leskhoz, Krasnoarmeisky Raion, Primorsky Krai*

Our main worry in forest protection is that salvage logging, conducted by *leskhoz*es in forests where no maintenance is actually necessary, leads to a large amount of healthy timber cut for export. We [need] … to introduce a regional law to ban logging by *leskhoz*es completely, even so-called "salvage" logging.

– *Sergei Krylov, Head of Administration, Olginsky Raion, Primorsky Krai*

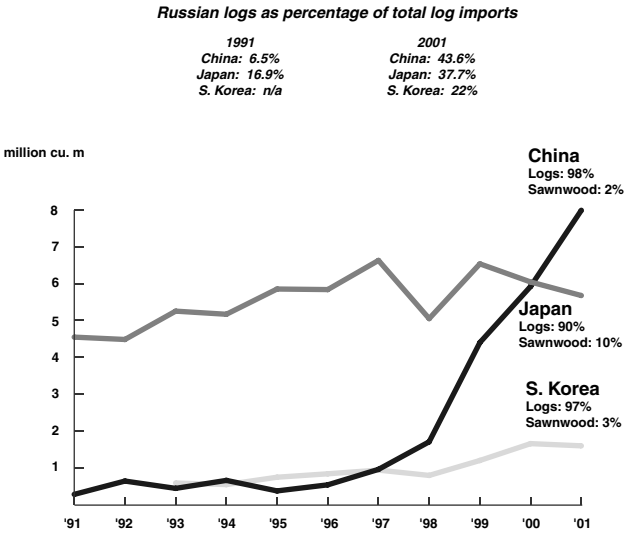
high-quality timber were logged, including 447 cu. m of commercial quality ash—this site did not need maintenance.

On the set of forest plots administered by the Katensky Leskhoz on the riparian protection zone of the first fisheries category of the Katen River, there were a series of so-called "rejuvenation logging" operations in 1996–1997. These operations delivered more than 2,000 cu. m of first quality ash to the market, although licenses provided for logging of primarily old yellow birch trees.

The report also documented increased water levels of 100 to 115 cm due to selective logging along the Khor River watershed.[161] The report concluded 82 percent of the logs harvested under salvage logging licenses were in fact commercial-grade timber, and sales of this timber generated revenue for the Khabarovsk Forest Service and *leskhoz*es.

According to Greenpeace-Russia, by 1998 the Forest Service had become Russia's biggest timber producer, providing 10 million cu. m of commercial timber. During that year, Primorsky Krai's Forestry Service alone allowed 377,000 cu. m to be cut under salvage logging loopholes.[162] The Forest Service's violations of Russian salvage logging regulations prove they are unable, unwilling, or cannot be trusted to regulate the industry.

Figure 1.6
Russian timber exports to Northeast Asia, 1991–2001



Note: 2001 figures for China are estimated based on first three quarters. Log and sawnwood statistics are for 1999 (China) and 2001 (Japan, South Korea).

Sources: Japan Lumber Importers Association; Japan Ministry of Finance, 2002.

Timber exports to Northeast Asia. With weak regulation, antiquated processing equipment, and illegal logging and export, the RFE is poorly prepared to face what is the greatest long-term threat to the region's forests: growing wood consumption in Northeast Asia. Russia has already emerged as the primary source of logs for China, Japan, and South Korea, a major shift in just ten years (see fig. 1.6). In 2001, about 15 million cu. m of timber from the southern RFE (Khabarovsk, Primorsky, Sakhalin, and Amur) and Eastern Siberia (Irkutsk, Buryatia) flowed through Siberian and RFE land and seaports to these countries (see appendixes I and J for detailed statistics). Logs comprised about 90 percent of this total.

China. Chinese consumption of timber is growing rapidly; by 1995, China was already the second largest consumer of wood in the world after the United States.[163] As early as 1986, Richardson predicted that under a middle-growth scenario, China's annual consumption could reach 1.163 billion cu. m by 2040, almost 10 times the 1995 level.[164] The Chinese government has developed programs to increase self-sufficiency in timber production through massive plantation efforts and by increasing harvesting efficiency. Despite these efforts, the future is clear: China will become the world's largest importer of timber in the near future, overtaking Japan. Richardson estimates China will face an annual deficit of 225 million cu. m by 2025. The Center for International Trade in Forest Products (CINTRAFOR), an influential U.S.-based think tank, predicts a similar figure (200 million cu. m) by 2025 under a low-growth scenario. The Finnish consulting firm Jaako Poyry predicts a deficit of 110 million cu. m, including a log deficit of 30 million cu. m, by 2010.

Two specialists in Russia's forest economy, Thomas Waggener and Charles Backman, point out that outside of Eastern Siberia and the RFE, few other regions in the world can supply such massive amounts of timber.[165] Russia has already emerged as China's primary source of logs. In 2000, Russian logs accounted for almost 44 percent (5.9 million cu. m) of China's total log imports, a rise from just 11 percent (.39 million cu. m) in 1993. This trend shows no signs of shifting. Chinese imports of Russian logs for the first nine months of 2002 was 11.32 million cu. m—roughly double 2000 figures and double Japan's average annual import level (see fig. 1.6).

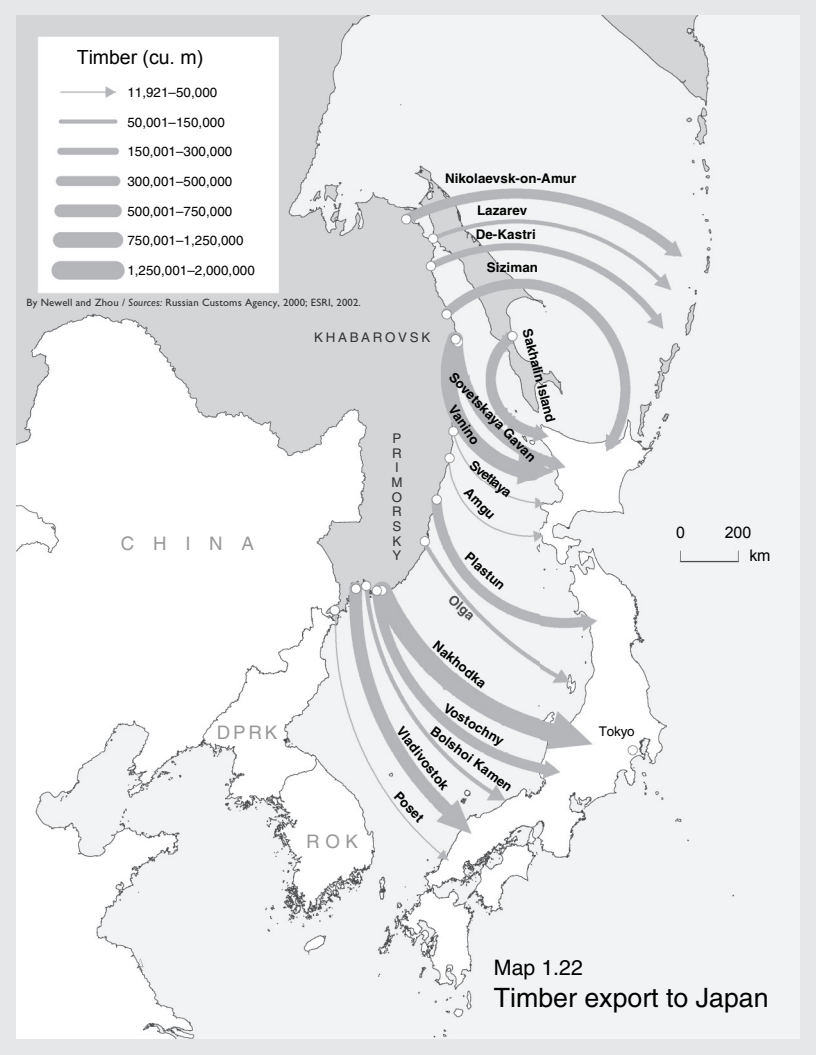
Virtually all Russian logs exported to China come from either Eastern Siberia (about two-thirds) or the RFE (one-third). China imports Siberian pine (*Pinus sibirica*) and larch logs from Eastern Siberia, and ash, larch, fir, Korean pine, and spruce from the southern RFE. Some logs travel by the Russian-built Chinese Eastern Railroad, which cuts through Manchuria from the Eastern Siberian border of Zabaikalsk, runs southeast of Lake Baikal to Manzhouli in China and then on to Harbin, a Russian-built city and the current capital of China's Heilongjiang Province (see map 1.21). Others travel by railroad from Naushki, just south of Lake Baikal in the Republic of Buryatia, to the Mongolian town of Erlianhot, on to Ulaanbaatar, and finally to Beijing. Illegally logged

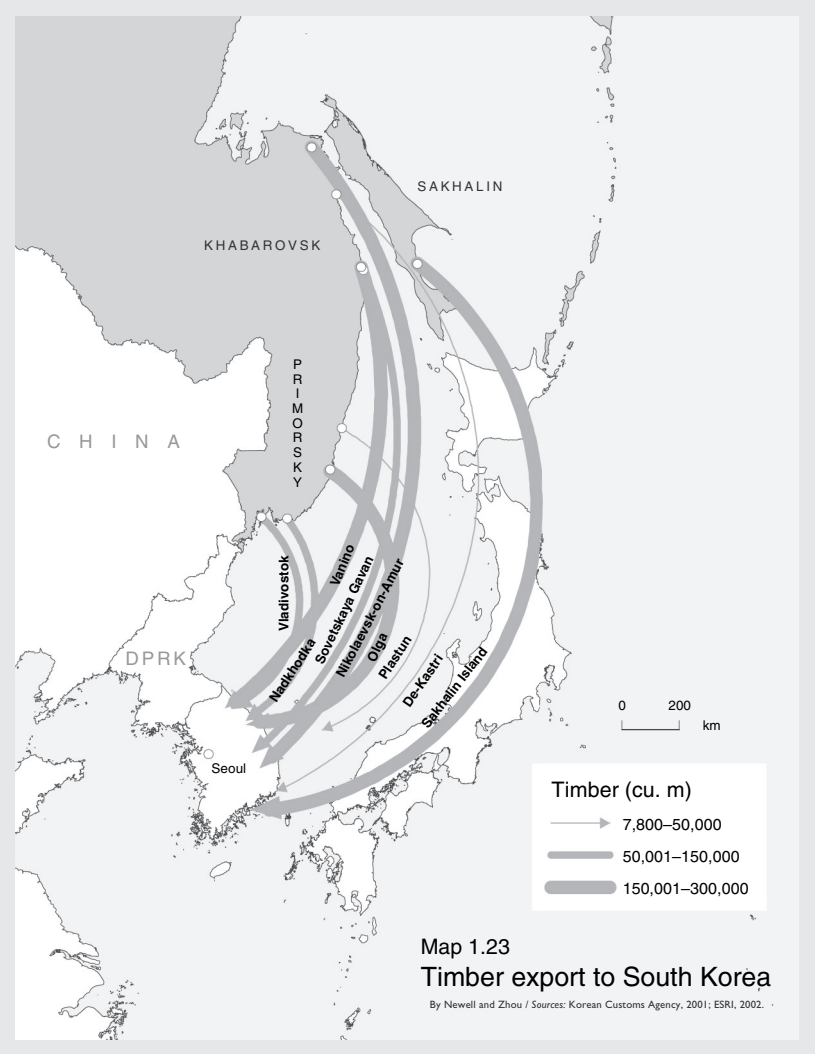
pine from Northern Mongolia is mixed with Russian timber shipments bound for China on the Russian-Mongolian rail route, according to one Chinese forestry expert.[166]

The southern RFE supplies the rest of the timber via the third major route, from Primorsky Krai's Gorodekova (Pogranichnoe) to the Chinese city of Suifenhe, located just 100 km from Russia's Ussuriisk, a city of 250,000 and a center for the expanding Russian-Chinese trade.[167] These three routes (Zabaikalsk-Manzhouli, Gorodekova-Suifenhe, and Naushki-Erlianhot) account for about 95 percent of all timber exported to China (see fig. 1.6), providing hope that illegal export can be combated with more stringent regulation of the routes. In 2000, about 2 million cu. m was exported via both Manzhouli and Suifenhe, and about 1.5 million via Erlianhot. All three routes have transported increased amounts of timber exports in the past five years (see appendix J).

Timber is also shipped across a number of points on the Amur River, the largest of which is Blagoveschensk in Amur Oblast. Other methods for transporting timber include trucking across numerous small roads and river crossings along the 2,000 -km Russian-Chinese border; many of these small export points are beyond the control of customs officials. Previously, a significant percentage of timber exported to China was shipped by sea (almost 40 percent in some years), but it has dropped to about 2 percent with increased Russian-Chinese railroad trade.

Japan. Despite a decade of decline in housing starts (the number of residential construction projects begun in a given year), figure 1.6 shows that log exports to Japan steadily increased from 1991 (4.3 million cu. m) to 1997 (6.1 million cu. m). Although log exports fell in 1998 (4.7 million) as a result of the Asian financial crises and the ruble devaluation, they rose again to the 5 to 6 million cu. m range in 1999, 2000, and 2001. Eastern Siberian timber accounts for roughly one-third of total annual export (2 million cu. m) to Japan, with timber from the RFE making up the remaining two-thirds (4 million cu. m). These wood sources are replacing more





Map 1.23
Timber export to South Korea
By Newell and Zhou / *Sources:* Korean Customs Agency, 2001; ESRI, 2002.

traditional log sources, such as Southeast Asia and North America. As with China, Russia has emerged as Japan's largest supplier of logs. Barring significant environmental restrictions or a Japanese housing market collapse, Russian log imports will remain steady at about 5 to 7 million cu. m per year.

Exporters ship wood to Japan from numerous locations in the southern RFE, including large ports such as Nakhodka, Vanino, Sovetskaya Gavan, Vladivostok, and Vostochny (see map 1.22). Nakhodka alone handles about one-third of the trade, exporting 1.5 to 2.5 million cu. m annually. Most timber exported through Nakhodka is Siberian pine from the Irkutsk region near Lake Baikal in Eastern Siberia, and to a lesser degree from Amur Oblast. The remainder comes from throughout the southern RFE. The ports of Vladivostok and Vostochny (in southern Primorsky) annually export from 600,000 to 700,000 cu. m and from 400,000 to 500,000 cu. m, respectively. Half of this timber comes from Eastern Siberia and half from the southern RFE. Timber exported from Vanino (700,000 to 1,000,000 cu. m) comes mainly from Khabarovsk Krai and Amur Oblast.

In addition to these larger ports, there are a number of smaller coastal ports in the Khabarovsk, Sakhalin, and Primorsky regions, which almost exclusively export timber logged from nearby forests. Among the largest in Khabarovsk are Nikolaevsk-on-Amur (300,000 to 400,000 cu. m annually) and De-Kastri (250,000 to 300,000 cu. m) and in Primorsky are Plastun (400,000 to 500,000 cu. m) and Olga (100,000 cu. m). Sakhalin ports, including Korsakov, Poronaisk, and Kholmsk, export a total of 400,000 to 500,000 cu. m per year.

South Korea and North Korea (DPRK). South Korea, whose forests were devastated during the Japanese Occupation, World War II, and the Korean War, imports about 90 percent of its timber products, including about 8 to 9 million cu. m of logs each year. New Zealand remains South Korea's largest log supplier, but Russia has become a major source, ranking third after New Zealand and Chile. In 2001, South Korea imported about 1.55 million cu. m of Russian logs, thereby tripling its 1994 imports (see appendix I). Russia ships logs from ports in the RFE to the South Korean ports of Pusan and Inchon. South Korean imports will likely increase, since Russian old-growth timber is higher quality than New Zealand or Chilean plantation timber but costs about the same. Unlike their Japanese counterparts, Korean timber importers place a premium on price rather than quality. Demand for medium- and pulp-grade logs, therefore, is high; Korean manufacturers often convert larch pulp logs into sawn timber, for example.

In 2000, about 830,000 cu. m of timber was exported to South Korea via Vanino, Sovetskaya Gavan, Nikolaevsk-on-Amur, and De-Kastri (see map 1.23). Much of this timber was logged in Khabarovsk Krai. About 10 to 15 percent of Russia's annual exports to South Korea was shipped from Sakhalin ports, perhaps reflecting the close business relationship between South Korean companies and the large local Korean community in Sakhalin.

North Korea imports RFE timber from North Korean–managed timber concessions in Chegdomyn (Khabarovsk Krai) and Tynda (Amur Oblast). The Soviet and North Korean federal governments first signed the Chegdomyn and Tynda logging agreements decades ago, and regional officials seeking timber revenues have since extended them. North Korean loggers have badly damaged the forests in these concession areas.

One major export route to North Korea runs via the Tumen River railroad crossing near Khasan. Timber is also shipped from Vladivostok and Poset to the commercial ports of Rajin and Chajin. Statistics show that Russia exported 26,000 cu. m to North Korea in 1999, yet local observers claim the volume of timber logged in North Korean concession areas that year was far greater. North Korea may also be exporting some of its portion of the concession timber to China. In 1999, North Korea exported an estimated 163,406 cu. m in logs to China, a high figure considering the country's depleted forests.[168]

Conclusions and next steps. Interconnected, simultaneous events—the privatization of the Russian timber industry, the opening of Asian markets, the collapse of processing, and the disintegration and corruption of the Federal Forest Service's regulatory functions—triggered a flurry of illegal logging and export operations throughout the RFE. This has included logging of protected forests and species, such as Group 1 forests and Korean pine. The shift toward Asian markets continues to dictate where and what type of timber is cut. In the long term, rising wood consumption in Northeast Asia, particularly in China, poses the greatest threat to the region's forests.

Obstacles to reducing illegality. The Russian government has a vested interest in eliminating illegality. Illegal logging floods the market with cheap timber, which drives down prices, and the government loses stumpage fees and other tax revenues generated by legitimate logging operations. Still, success has been limited for a litany of reasons, including:

- Inadequate funding for inspecting agencies, resulting in understaffed departments with poorly trained, poorly equipped, and poorly paid staff.
- Dependence of inspecting agencies on fines and payments from timber companies.
- Poor collaboration between federal bodies (Customs, the Forest Service, the Ministry of Foreign Trade) and regional administrations.
- Lack of power among agencies controlling the timber sector and consequent overruling by more powerful government agencies.
- Poor inspections of log export shipments and poor enforcement of regulations by customs officials.
- High costs associated with tracking the chain of custody from logging to export.
- Poor government policies for reinvesting revenues in the forestry sector to ensure responsible forest management and trade controls.
- Lack of incentives to promote processed wood exports.
- Lack of checks and balances for government agencies responsible for the forest sector, and consequent corruption.
- Failure to release information on trade and export contract prices in the timber industry to the public.
- Incomplete export contracts that fail to specify where the timber is cut.
- Too many timber export points.
- Byzantine tax system, prompting companies to work illegally to avoid taxation.
- Negligible fines and punishments for logging and trade violations.
- Cutting and export bans passed without commensurate increases in enforcement resources.
- Failure of importing countries to accurately check species and grade of timber.

A basic problem underlying many of these obstacles is the prevailing disregard for laws and regulations. Poverty and high unemployment fuel this disregard, pushing people to break the law to make a living, including loggers, traders, police, forestry service officials, customs officials, even government officials in Moscow. This fundamental socioeconomic reality, manifest in government corruption, is the biggest obstacle to industry reform.

Federal and regional governments have developed concrete policies to combat illegal logging, only to find them compromised by internal corruption. Although forest service personnel and police confiscate illegally logged or exported timber, officials in both camps have been caught reselling the timber to the same firms they confiscated it from. Primorsky Krai instituted a system of transport certificates to track the chain of custody for timber, making it theoretically possible to check the timber source and ensure that it was legally logged.[169] Primorsky regional agencies maintain roadblocks at strategic points to check these certificates; these can succeed because there are just a few major roads along which timber is transported. Unfortunately, the local police who run the roadblocks are susceptible to bribes and forged documents. Officials from Krasnoameisky Raion (Primorsky) were actually able to establish a relatively corruption-free roadblock, mainly due to vigilant staff from the Committee on Environmental Protection (Goskomekologia). Timber interests, however, managed to pressure government officials to reduce the year-round inspections to seasonal ones, diminishing their effectiveness.

Still, if roadblocks could be successfully maintained and if the documents required could be difficult to forge or purchase, illegal logging and export could be curtailed. Georgi Markov, a deputy in the logging department of the Khabarovsk administration, suggests a ten-day holding period for timber export, allowing time for the government to research the consignment's chain of custody. Industry has criticized the measure, however, citing the already considerable delays from transport bottlenecks and inadequate staffing at customs export points.

The main regulatory agencies (divisions with the Ministry of Natural Resources, the Forest Service, and the Hunting Administration) also need the right to arrest loggers

Josh Newell

The railroad town Gorodekova is one of three major timber export points into China.

tomo Corporation, is the largest of the ventures and produces about 30,000 to 50,000 cu. m of lumber for export to Japan.

But recent developments in China are likely to hinder Russian efforts to modernize its processing industry. Chinese limits on domestic logging forced the timber industry in Manchuria, China's main timber-producing region, to search for new log sources. At least 300 sawmills operate in Manchuria and process about 4 million cu. m of timber annually.[170] These mills already use Russian timber and may be exporting sawnwood made from Russian logs to Japan, Taiwan, and elsewhere. Since 1996, Chinese sawnwood exports to Japan have grown dramatically.

If China is indeed modernizing and expanding this industry to capitalize on growing demand for processed timber, firms in the RFE would have to compete with Chinese suppliers for the Japanese and South Korean markets. Chinese suppliers and Japanese investors, however, are more likely to invest in Chinese processing mills due to cheaper labor and greater economic and political stability. In Manchuria, many small sawmills have been established with Taiwanese investment, some as joint ventures and others as Taiwan-owned companies. Despite declining harvests in China, there are new timber-processing enterprises springing up in Heilongjiang Province. The Chinese timber companies Nacha Wood, Lancian Wood, Mudanjiang Forest Wood, San Gan Ling, and Xin Yang Wood together have the capacity to process more than 600,000 cu. m annually; this indicates an already sizeable processing industry is in place.

The Russian government is aware of this threat: stipulations regarding processing are prominent in recent Russian-Chinese timber harvest agreements. In March 2002, for example, the Hebei Forestry Bureau, a division of the Forest Industry Bureau in China's Heilongjiang Province, agreed with the Russian government to log 200,000 cu. m and produce 50,000 cu. m of sawnwood in the Jewish Autonomous Oblast. Plans to develop similar logging and processing ventures in Primorsky and Khabarovsk Krais and Amur Oblast exist, but may not reach fruition because they require large-scale investment and acceptance of political and economic risks.

Khabarovsk Governor Viktor Ishaev has issued an ambitious decree calling for raw logs exports to cease by the end of

and carry firearms. The Ministry of Internal Affairs, whose officials have this right, has established special task forces targeting illegal logging and trade; these task forces, however, so far have struggled to work effectively with other regulatory agencies.

NGOs have formed brigades with regulatory agencies to patrol forests. The Tiger Task Force, established within the Primorsky Committee on Environmental Protection but essentially run with NGO funding and aided by NGO staff, slowed poaching of Siberian tigers in the early and mid-1990s. This government-NGO model is now being applied to timber task forces, also in Primorsky Krai. The scale of these activities cannot match the scale of the problem, however. Tens of millions of dollars would be needed each year to create and maintain the necessary number of task forces to reform the industry in the RFE—a level of financing NGOs do not have.

Rejuvenating processing. A number of regional governments recognize the benefits of reviving processing, an industry that collapsed in the 1990s. The Khabarovsk government has issued directives requiring at least 20 percent of the *krai*'s timber harvest be processed locally, although enforcement of this regulation has proved virtually impossible; for example, some foreign companies promise to process timber simply to access forest resources. The Malaysian logging firm Rimbunan Hijau, which logs the Sukpai River watershed in southern Khabarovsk, agreed to process 20 percent of its cut timber but hasn't done so and continues to export Sukpai logs to Japan and China. Some processing ventures, however, have established themselves in the RFE. Several Japanese-Russian joint ventures process timber. STS Technowood, a joint venture between the Russian firm Terneiles and Sumi-