Food and Agriculture Organization of the United Nations (FAO)

Forest Sector Study in the Russian Far East
Roadmap for Value-added Investment in Forest Industry

Annex Report II
Assessment of forest resources, forest management, harvesting and forest certification in the Russian Far East

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Terminology

Please note that the Russian classification of tree species, vocabulary on logging, definitions of forest management, inventory and classification of forest types may differ from the international classification. It is also noted that the vocabulary is in a state of transition inside the Russian Federation, and that there are regional differences on its rate of adoption. A brief glossary is given below to facilitate reader and avoid misunderstandings.

Tree Species:

**Coniferous**
spruce, fir, larch, cedar, juniper, pine

**Hardwood**
Oak, beech, hornbeam, ash, maple, elm, linden, saksaul, Erman’s birch (*Betula ermanii*), etc.

**Deciduous Softwood**
birch, aspen, alder, lime, poplar, willow

Forest Classification:

**Forest Fund**
Forest Fund is a generic term used in Russian as applied to all forest lands, covered or not covered by forests, the within the limits defined by forest and land laws that are under Federal ownership and intended for forest and forestry purposes.

Forest fund falls under the administrative units: lesnichestva, forest enterprises, regions, territories and republics, and federal). It includes all forests except those on military and urban lands, trees and shrubs on agricultural lands, transport infrastructure, settlements, lands of the ‘water fund’. Water fund includes lands occupied by water reservoirs and lands for hydraulic engineering and other facilities required for the use of water reservoirs.

**Production (commercial or exploited forests)** are forests which are used for industrial logging and harvesting of other forest products.

**Reserved forests** are forests where logging is not allowed for the next twenty years.

**Protected forests** are forests that are allocated for maintaining the environmental, water protection, safety, hygiene, health and other functions of forests (ecosystem services). The use of these forests is allowed only if beneficial for the forest and compatible with forest protection. Currently, thinning and sanitary cutting are allowed in this type of forests.

**Annual Allowable Cut:**

**Allowable Cut (Prescribed Cut)** is an expressed specification of the average quantity of wood, usually in an approved management plan that may be harvested from a forest management unit, annually or periodically over a five- or ten-year period. When expressed on an annual basis, the Annual Allowable Cut (AAC) is established.

In its simplest form, the AAC can be derived by combining the maximum felling area which may be cut each year with the volume of wood in the felling area that has been determined from a pre-harvest inventory. The volume figure used can be revised as more volume information becomes available from later inventories. This method is expressed as follows:

\[
AAC = \frac{VA}{n}
\]

where: \(V\) = the average volume per ha of commercial species above a specified stem diameter that is estimated from the first forest inventory. \(A\) = the area of a whole forest, or of a felling series. \(N\) =
the length of the felling cycle, in years.

Internationally AAC is typically used to describe the maximal volume that can be sustainably cut in a given area per year.

In Russia, AAC determines the annual allowable volume of wood removals in commercial, and protected forests, which allows to maintain a multi-purpose sustainable use of forests (this definition is under question by many environmental NGOs).

Annual allowable cut is calculated per each lesnichestvo and park separately for commercial and protected forests (coniferous, hardwood, and softwood deciduous). Calculation of annual allowable cut is carried out separately for clearcuts, selective logging of mature and over mature forest stands for sanitary cutting, for cutting in forest areas designated for construction, reconstruction and operation of wood processing infrastructure, and facilities that are not related to forest infrastructure. These calculations are based on forest inventory data, the state forest registry or special surveys of forests.

Allowable cut is set for the period of validity of forest plans and are put into effect from the beginning of the calendar year. Changes of AAC should be reflected in the established forest plans and reglaments of forest management units or forest parks. Depending on structure of forests and type of cutting, different methods of calculations of AAC are used in Russia.

The Russian harvesting plans were based on calculated harvest levels (Raschetnaya lesoseka) but in English translations these were commonly aligned with Annual Allowable Cut (AAC), what can be misleading. In the Soviet era the calculated harvest level was mainly a plan for how much wood could be supplied from a given area during a certain period of time. Logging plans were typically made by dividing the available growing stock into a certain number of years, typically 20-40, corresponding to the estimated time needed to harvest all economically available old forest in a given area. Harvesting above the planned level was often encouraged. Pre-commercial and commercial thinnings were performed at a very low level.

Timber stocks:

In Russian-origin tables of this report three terms on timber stocks are used: liquid stock, timber and total. Usually, in Russian documents, they refer to liquid, unless it is stated differently.

**Raw roundwood stock** (Kornevoy zapas) refers to the total stock of wood including tops and stumps.

**Liquid stock** is usually 10-15% less than raw round wood stock. Liquid stock includes industrial roundwood without bark and firewood with bark.

**Timber** (Delovaia drevesina) refers to industrial roundwood: any part of wood without defects, longer than 2 m and with a diameter at the top which exceeds 6 cm or more. There are 3 classes of ‘Delovaia drevesina’: small (at the top under 13 cm); medium (under 24 cm), and large (25 cm and more).

There is also **accessible stock**, which in the RFE does not exceed 20 million m³ (based on different sources). It is mainly limited due to the present extent of working infrastructure and transport distances.

Logging:

**Uniformly selective cutting**: mature trees and trees in poor condition are removed in repeated cuts with 5-7 years intervals until a new preferable forest stand has been generated.

**Prolonged gradual cutting**: A pre-determined share of the growing stock is removed in a first cut and the rest in a second cut, which follows typically after 30-40 years.
Sanitary cutting aims to improve the health of the forest by removing (selectively or clear-cutting) sick, damaged and drying trees or entire stands which have lost productivity. Sanitary cutting is applied to trees affected by disease or infested by pests, as well as trees damaged by storms, etc. A 30% dead wood share is considered to threaten the stocks of the forest.

Maintenance cutting means cutting of unwanted plants and trees, carried out periodically during the forest rotation. It aims to provide favourable conditions for growth, and preserving high-quality trees and improving the value of forest. The main objectives are to improve species composition, increase productivity of forest (faster growth and higher yield), and environmental protection functions such as watershed protection.
Executive Summary

Forest resources are changing in the RFE

Production forests (217.5 mill. ha) are the main source of industrial roundwood for the industry in the Russian Far East. Forests available for commercial logging in the RFE are getting scarcer and more sparsely stocked with valuable industrial roundwood. Secondary deciduous trees gain ground with fast-growth naturally regenerated stocks of poor-value timber. The share of high-quality coniferous forests is getting smaller (cedar, pine, spruce) but larch-dominated remote forests continue to hold large untapped roundwood reserves.

Forest regeneration is predominantly natural

Forest regeneration in the Far East is predominantly natural and with a high rate of certainty over time. According to RFE expert estimates, more than 60% of the logging sites have sufficient undergrowth of valuable species (more than 2,000 young trees/ha) and on 80-90% there is a satisfactory undergrowth of valuable species, although in lower numbers per hectare.

Assisted natural regeneration with high-value species and timely tending and thinning of young forest stands are required to intensify the productivity of RFE forests.

Logging is moving further inland with improving logging technology

Traditionally, the main logging areas are located close to the Baikal-Amur Mainline (BAM), in middle and northern Sikhote-Alin (Khabarovsky and Primorsky Krai), Lower Amur River, and in the western part of the Republic of Sakha (Yakutia), where most forest resources are concentrated. These are areas where forest districts (lesnichectva) with an annual average harvesting level of more than 1 m³/ha are found. There are in total 126 lesnichectva in the Russian Far East.

A major share of roundwood is harvested in the leased forest plots (65% in the RFE). 19% of the forest fund area has been allocated to 20-49 year leases in the RFE. About 75% of logging volume came from mature and over-mature forests.

Intensity of logging varies hugely between sub-regions of RFE. In Primorsky 49% of AAC is leased, in Khabarovsky 42%. Intensive logging is carried out only in the areas adjacent to the ports of the central districts of Khabarovsky krai, but the leases are fully occupied by existing companies. Tendency is to consolidate leases into fewer and larger holdings. Other visible trends are:

- Operations will move to steeper terrains, but self-leveling harvesting machinery and modern cable systems are technically adept: a sufficient attention must be paid to proper planning of operations to avoid soil damage and loss of regenerative capacity of logging sites.

- Selective cutting is promoted by the leading RFE forest researchers and supported by the Federal Forest Agency: in reality selective logging is on the decline with the exception of some of the high-intensity forestry areas like in Primorsky, for example.
• Thinnings account for about one quarter of the annual harvest. A specific problem to RFE region is that thinnings are carried out on older stands for the purpose of extracting the most valuable hardwoods like oak.

Economically accessible forest areas are becoming more scarce and distant, and their timber stocks more sparsely stocked with valuable industrial roundwood in the Russian Far East. This requires a gradual change in the strategy of their sustainable use. It is necessary to increase the overall share of selective cutting in the RFE forests. Otherwise in 10-15 years all available commercial forests will have been passed over by clear-cutting.

Most necessary technical conditions for a gradual transition to a more balanced ratio between clear-cutting and selective cutting exist in RFE. There is experience on the application of modern logging technology in different site conditions, allowing for the preservation of forest environment and ensuring the development of undergrowth in stands where selective cutting is performed. But the economic conditions will be hard to achieve because cost of roundwood from selective logging is higher.

**Forest industry production has expanded with log export taxes**

Around 30% of harvested industrial roundwood volume is processed in the RFE, while 70% is exported as unprocessed logs. In the past five years, the volume of wood processing in the Russian Far East has grown by 66%, while in the Russian Federation this increase was only 17%. The average share of the RFE in the total volume of sawnwood production in the Russian Federation is 7-8%. Chinese and Russian investments have increased their sawmilling capacity in RFE, and this has been achieved with the help of Russian log export tax policy. This has been compounded with increasingly strict limits on logging in China, resulting in a score of Chinese-owned sawmills put up in Russia’s RFE and other bordering regions. These sawmills perform only the most simple processing to make logs qualify as sawnwood to circumvent the high duties.

Russia’s WTO membership may lead back to higher log exports, and to an additional challenge for RFE industries to compete with inflow of imported wood products in the region.

**Supply-demand balance by 2020 looks tight**

Annual Allowable Cut (AAC) in the RFE is on a declining trend. Annual Allowable Cut (AAC) in 2012 is around 90.5 mill. m3, and by 2015 it is projected to be 80.7 million m3, and in 2020 75.9 million m3.

According to these projections, in 2015 logging volumes in the RFE will be 9.4 million m3, and in 2020 7.5 million m3. Under existing plans to implement investment projects, the production of 1.9 million m3 of sawn timber, 570,000 m3 of veneer sheets, 450,000 m3 of MDF, 140,000 m3 of particle board, 1.5 million m3 of wood chips will require at least 8 million m3 of industrial roundwood, which is 11-13 million m3 of liquid timber.¹ These figures exclude demand for wood of the companies that do not participate in investment projects, as well as demand of local communities. As a result, an acute shortage of timber in the Russian Far East and possible disruption of the implementation of some investment projects due to limited wood supply are forecasted.

¹ In Russian terminology liquid timber includes industrial roundwood without bark and firewood with bark. Industrial roundwood is measured under bark.
**Forest certification will move on**

The total area of certified forests in the Russian Far East is **5.85 mill. hectares**, of which **5.70 mill. ha** are certified with FSC Forest Management (FM) certificates, and **153,700 ha** are under PEFC FM certificates. A total area of FSC FM certified forests of the RFE constitutes **16%** of the total FSC FM certified area in Russia (36.14 mill. ha).

Currently, **11 enterprises** are holding CoC certificates in the RFE. They are located in Primorsky, Khabarovsky and Amur region. In Primorsky, certificates belong to Terneyles group and Primorsky GOK; in Khabarovsky, the holders are RFP group, Arkaim, and Business Marketing group. In Amur, CoC certificates belong to Turanles group.

Without certification, a large part of environmentally sensitive markets in Japan, Korea, EU, North America, and partially China, will be gradually become restricted for RFE exporting companies (around **70%** of production in the RFE is for export).

**Large areas of the RFE are rich in biodiversity.** Harvesting in hardwood, cedar-broadleaved forests, pine nuts zones in Primorsky and Khabarovsky will lead to conflicts with environmental NGOs and indigenous groups. Using larch, low-quality wood, and wood of deciduous softwood species is less risky from the environmental point.

**Recommendations**

The following actions could facilitate a transition to sustainable forest management in the Russian Far East:

1. Clarify the current status and quality of forest resources by conducting a comprehensive forest inventory, and aligning deeper economic analysis behind the concept commercially accessible forests and valuation of timber stocks they hold.
2. Improve Russian strategic forestry planning with the introduction of appropriate assessment tools for supply and demand dynamics through capacity building in econometric modeling and the use foresight expert panels.
3. Lower gradually the rate of clear-cutting and switch towards selective cutting (establish a scientific balance based on forest inventory and monitoring of the evidence on sustainability).
4. Deploy thinnings only in young and middle-aged stands until they reach maturity (for coniferous forests up to 90 years and for deciduous forests up 40 years).
5. Implement stricter control over the harvesting and final use of low-quality wood at logging sites.
6. Ensure compliance of logging practices with the silvicultural and environmental principles of frequency, contiguity, intensity and uniformity of selection of the timber harvested from a forest compartment.
7. Discontinue the practice of under-canopy planting under valuable hardwoods, and enforce a halt to the widespread misuse of sanitary and maintenance logging rights for extracting valuable timber stocks which are not allowed for cutting otherwise.
8. Ensure greater observance of fire safety requirements in forest operations, including prevention, early detection, and better leadership and communication in fire suppression.
9. Regenerate forests by planting only if natural regeneration is unlikely or when a change to a more valuable, faster-growth or multi-purpose trees species is deemed necessary for economic, ecological or social reasons.

10. Intensify the establishment of planted forests on forest lands without a permanent forest cover, and on deforested and degraded forest lands, and integrate a carbon sequestration function appropriately for improving the financial and ecological viability of afforestation and reforestation of such lands.

11. Establish specialized forest harvesting companies for extracting both wood and non-wood forest products in a sustainable manner and in collaboration with local communities.

12. Investors are strongly advised to consult WWF regarding possible selection of sites for forest industries before final investment decisions to avoid conflicts on intact forests and High Conservation Value Forests (HCVF).

13. If PEFC certification process conflicts with WWF zoning of intact forests, investors should be aware that WWF may pressure companies to exclude intact forests from their logging operations.

14. Companies that are planning to participate in FSC certification process are advised to join a recently established regional commission on forest certification to exchange information with FSC and WWF in open dialogue.
1. Assessment of forest resources in the Russian Far East

1.1 Forest area and timber stocks

The Russian Far East (RFE) occupies an area of around six million square kilometres and includes the following regions (subjects): Amur, Primorsky Krai, Khabarovsky Krai, Kamchatksy Krai, Jewish Autonomous Oblast, Sakhalin, Magadan oblast, the Republic of Sakha (Yakutia), and Chukotka. RFE is considered to be one of the major forest regions of the Russian Federation (22.3% of the total forest stock of the Russian Federation). The major shares of forest stock of the RFE belong to Sakha (43%), Khabarovsky (25%) and Amur (10%). Total forest area is just below five million square kilometres (Figure 1.1).

![Figure 1.1 Total area of the RFE forests](image)

**Figure 1.1 Total area of the RFE forests**

Source: Rosleskhoz, 2012

The total stocks of wood in the RFE forests are estimated at 19.69 million m³, of which 43% is concentrated in Sakha, 25% in Khabarovsky, and 10% in Amur. More than 50% of mature and over-mature forests are located in Sakha, 27% in Khabarovsky and 8.8% in Amur.

According to the Russian classification of forest use, forests in Russia are divided into three categories: production (commercial or exploited), reserved and protected. Production forests (217.5 mill. ha) are the main source of industrial roundwood for the industry. Production forests in RFE occupy the largest share, 43% of the total forest area. The share of reserved forests is 38% and that of protected forests is 19%. (For full definitions, refer to ‘Terminology’).

1.2 Species composition

Forests of the RFE are predominantly coniferous (Annex 1.Forest resources: RFE region’s factsheet). Coniferous forests of Sakha, Khabarovsky, Amur, Sakhalin, Magadan and Chukotka are dominated by larch (85%). The remaining share is almost evenly split between spruce and pine. Pine forests mainly grow in Amur and Sakha, and spruce species are mainly spread in Primorsky, Khabarovsky, and Sakhalin regions. Cedar forests with Korean pine grow in Primorsky,
Khabarovsky and JAO. Cedar forests in Sakha are represented by Siberian pine. In total, cedar forests occupy 1.5% of the forest area in the RFE.

Hardwood forests occupy around 5% of forest area. They are found in Primorsky, the southern part of Khabarovsky, and JAO, and are mainly comprised of broadleaved species. The northern territories are dominated by Erman’s birch. Thus, in Kamchatka, 31% of forest area is occupied by Erman’s birch. Deciduous forests mainly grow in Amur, JAO, Khabarovsky and Primorsky where they replaced broadleaved - coniferous mixed forests as a result of fires and logging operations. Coniferous forests are dominated by mature and over-mature stands. Deciduous forests are mainly composed of middle-aged trees.

Forests that are potentially available for exploitation (commercial forests) occupy 217.5 million ha in RFE and are mainly coniferous. The predominant species is larch. It accounts for 56% of the area of commercial forests and 58% of the growing stock. Spruce forests cover 8% of the commercial forest area and hold 15% of the growing stock, and pine forests 5% and 6%, respectively. (Figure 1.3)

Commercial deciduous softwood forests cover 9% of the commercial forest area and hold 8% of their growing stock. The commercial soft deciduous forests are dominated by white birch, which accounts for 75% of timber stocks. Commercial hardwood forests occupy only 4% of the commercial forest area, and 5% of the total growing stock, including Erman's birch (Betula ermanii) and Yellow birch (Betula costeata) – together 2.4% of the area and 3% of the stock; ash - 0.2% of the area and 0.3% of the stock; and oak 1.5% of the area and 1.8% of the stock. The area of commercial oak forests in the Russian Far East constitutes 64.3% of the total area of commercial oak forests in the whole Russian Federation. Self-regenerated bush forests covers 16% of the commercial forest area.

Figure 1.3 Stock in RFE commercial forests by species

Source: DalNIILKh, 2013
1.3 Forest trends

Despite its huge area and correspondingly high timber stocks, the percentage of high-quality timber in the Far East is relatively low. For the past 20 years, the area of the most economically valuable forests has decreased because of an 8.5 million hectare expansion of the area of deciduous forests. Magnitude of this change is not very significant (4%) of the commercial forest area (217.5 mill. ha). The largest changes have been observed in spruce-fir forests: the area of spruce forests decreased by 20%. Although larch wood stocks remained unchanged, the share of mature and over-mature forests decreased by 22%. This is explained by the fact that while their share is falling fast in Primorsky and Khabarovsky, there is still an enormous potential of mature and over-mature larch forests in Sakha (mostly in areas which no company can economically access for harvesting).

The area of deciduous forests has increased by more than a quarter (but only 5% to 6% in total forest area). Mature and over-mature stands is under 20% of total deciduous forests. Reduction in the area of coniferous forests has led to a 15% drop in their growing stock (more than 2.0 billion m$^3$) over the last fifty years. The average stock per hectare of forest area is 100 m$^3$ for coniferous forests, 103 m$^3$ for hardwood forests, and 135 m$^3$ for deciduous softwood forests.

1.4 Productivity

Productivity (yield) class of forest is a unit of measurement of the productivity (quality) of forest stands. Class depends on the quality of forest conditions and is determined by the average height of the dominant species at a certain age. There are five productivity classes in Russia: I (the most productive), II, III, IV, V.

Forests of the RFE are dominated by low productivity classes. The share of high-yield forests does not exceed 20%. Classes IV and V dominate the RFE region. The most productive forests are located in Primorsky (yield class avg. 3.6) and JAO (yield class avg. 3.4). Average yield class in Amur is 4.0, in Khabarovsky 4.1, 4.4 in Sakhalin, and 5 in other regions.

This situation is directly linked to the methods of forest management in the Russian Far East. Under the current system, the best high-yielding forest stands are harvested first. Low-quality wood remains in the cutting area, or is used rarely as firewood. Clear-cutting, which is used in 70% of the total forest fund area under harvest, can leads to forest degradation and poor regeneration if improper logging technology is used, unfit for the terrain and soil characters of the logging site.

In 2007, the volume of wood from thinnings in the Primorsky region reached 30% of the total volume of wood harvested. Unjustified thinnings of middle-aged cedar-broadleaved mixed forests in Primorsky actually resulted in the final felling of some such forests. This discredited both the purpose of thinnings and also the sustainability of forest management in the region. Still today, some of the most valuable old-growth forests, which are protected from clear-felling, are being logged over for log exports in the disguise of thinnings, or sanitary and maintenance logging.

1.5 Forest fires

Forest fires play a very important role in the forest ecological processes in the RFE. Forests of the RFE are very vulnerable to fires due to natural factors. They are classified as the most prone to fires
in the Russian Federation. The share of areas prone to fire (class 1 very high risk, and 2 high risk) exceeds the share of the area in the European-Ural part of Russia by 1.6 times, in the Western Siberian region by 2.5 times, and in the Eastern-Siberian by 1/3.

Figure 1.3 shows that a large part of the Russian forest area affected by fires is located in the Russian Far East. In 2012, 33% of Russian forest area affected by fires was located in the Russian Far East. Average size of one fire in the RFE was 296 ha. In 2006 air surveillance was stopped due to lack of funding. Now some funds have been re-allocated for new equipment, but there is a shortage of trained fire fighters.

Figure 1.4 Russia’s forest area affected by fires: share of the RFE

![Russia's forest area affected by fires: share of the RFE](image)

Source: Rosleskhoz, 2012

1.6 Sustainability

Thinning, sanitary and maintenance cutting of forests are supposed to be applied for accelerating the forest growth and preventing the loss of valuable species. In RFE the ground reality is that more than 90% of the forest plots under thinning do not differ much from conventional logging sites. Volumes of roundwood from thinnings in Khabarovsky and Primorsky reach 1.5 million m³, and in Sakha more than 0.9 million m³. It should be noted that most of these volumes include the most valuable species such as ash, oak, spruce, fir and cedar (Korean pine and Siberian pine).

In 2007, the volume of wood from thinnings in the Primorsky region reached 30% of the total volume of wood harvested. Unjustified thinnings of middle-aged cedar-broadleaved mixed forests in Primorsky actually resulted in the final felling of some such forests. This discredited both the purpose of thinnings and also the sustainability of forest management in the region. Still today, some of the most valuable old-growth forests, which are protected from clear-felling, are being logged over for log exports in the disguise of thinnings, or sanitary and maintenance logging.

High ground pressure and poor efficiency of old harvesting technology have negative impacts on soil, forest undergrowth and young trees. Modern logging machines are far more environmentally friendly in this regard. Extensive soil damage can cause soil mineralization at steep logging sites in particular. The latter may prolong rotation time and lead to a replacement of coniferous species by deciduous softwood species. More than 60% of the logging sites have sufficient undergrowth of
valuable species (more than 2,000 young trees/ha) and on 80-90% there is a satisfactory undergrowth of valuable species, although in lower numbers per hectare.

Another sustainability issue is systemic. It is associated with the calculation of the annual allowable cut (AAC). Existing AAC figures are inaccurate and not methodologically up-to-date. Annual allowable cut does not objectively reflect the productive condition of the forests, but only serves as a basis for charging lease fees. Russian AAC is a fairly ineffective tool for forest planning, and proposal to renew it in RFE are being prepared by DalNIILKh. The matter was discussed in the Expert Meeting and Investment Forum under this Project on 22-23 October in Vladivostok with stakeholder support.

The remaining forest resources available for exploitation require an immediate change in the strategy of their development and a transition to sustainable forest management. To avoid forest degradation, the rate of clear-cutting in the forests of the Far East should be lowered, and a proper balance between clear-cutting and selective cutting should be established. Otherwise, in 10-15 years all the accessible forests available for industrial development today will be subject to clear-cutting, if not lost to forest fires before that.

In order to improve the sustainability of forestry and forest industries in the RFE, it is essential to establish processing facilities for using both low-quality and high-quality wood, and residues. This approach seems especially important in Khabarovsky and Primorsky Krai, where stocks of high-quality wood are already limited.

2. Assessment of forest management in the Russian Far East

2.1 Clear-cutting versus selective logging

The choice of logging methods depends on the so-called taxation characteristics of forests (age, diameter and species structure) and intended use of roundwood. In even-aged forest stands with a predominance of larch, pine, birch, and aspen, clear-cutting is performed. Cutting ages for all Far Eastern tree species have been established by the order of Federal Forest Service (Rosleskhoz) N37 from 19.02.2008 (Annex 2.3. Cutting ages for main species in the RFE).

The ratio of selective cutting vs. clear-cutting in the regions of the Far Eastern Federal District depends on forest composition. In Primorsky Region, dominated by complex coniferous-broadleaved forest and uneven-aged spruce-fir forests, about 75% of cutting operations are selective. In the Jewish Autonomous Region where the relation between complex and uniformly aged stands is approximately 1 to 3, but where most of the leased forests consist of uniform larch forests, the ratio of selective vs. clear-cutting is 1 to 10. In Kamchatka region, where forests fulfill important protective functions in preservation of watersheds and spawning grounds for salmonids, selective cutting is mainly applied.

Clear-cutting prevails in the forests of Amur, Khabarovsky Region, and the Republic of Sakha (Yakutia), which are dominated by coniferous forests (Annex 2.1. Logging methods by RFE region in 2012). These significant variations in the ratio of selective vs. clear-cutting among regions are explained by the diversity of RFE forests on one hand, and compounded with the lack of absolute requirements on logging regimes in the current forest legislation.
2.2 Types of selective logging

In forests with complex age structure and dominated by hardwood or shade-tolerant coniferous species, different forms of selective logging are performed.

**Thinnings** are one form of selective logging. An analysis of thinnings performed in the southern forest management districts of the Far East show that most thinnings in middle-aged or older forests were removing above-planned volumes for the respective forest management district (*lesnichestvo*), or were made in forest management districts where no such measures had been planned.

The existing practice of thinning in middle-aged, mature and over-mature forests threatens watershed protection forests, forests in nut-collecting areas, cedar-broadleaved mixed forests and protected forest areas of the RFE. It is a form logging old high-value trees in disguise and should be discouraged and enforced.

At the current state of forestry in the region, thinnings in middle-aged and older forest should not be planned or carried out. In protected forests and cedar-broadleaved mixed forests volume of wood extracted by thinnings should be limited to the natural mortality rate in over-mature stands. Thinnings for sanitary reasons should not be allowed in forest districts where the annual allowable cut is not fully utilized. Forest stands of poor sanitary quality should be subject to sanitary logging only. In reality, leaseholders are not performing sanitary cutting of poor quality trees but cut the best trees.

In the preparation of long-term logging plans, thinning should be planned only where absolutely necessary and where it is technically feasible. Primarily, thinning should be made in young planted stands on time, including forests created under the canopy of older stands. Secondly, thinning should be planned for young mixed stands regenerated naturally with a certain proportion of valuable tree species.

A fundamental revision of the concept of thinning as a way to improve the quality and productivity of forests is recommended for the RFE region. It should include guidance on volumes extracted, in order to safeguard the future of sustainable forest management.

**Uniformly selective cutting** in the Russian context means that mature trees and trees in poor condition are removed in repeated cuts with 5-7 years intervals until a new preferable forest stand has been generated\(^2\).

**Prolonged gradual cutting** means that a pre-determined share of the growing stock is removed in a first cut and the rest in a second cut, which follows typically after 30-40 years\(^3\). Prolonged gradual cutting is most effective method in uneven-aged mixed spruce and larch-spruce forests (forest type: green moss larch). The crown cover after the first cut should be 0.3 or above, and the number of young trees at least 400 per hectare.


On steep slopes (21-30°) selective logging should be applied in the Far East, although this limitation is not explicitly written in the present Federal logging rules. Selective cutting is also the only allowed method in protected forests regardless of the stand’s age structure. For even-aged protected forests, **gradual cutting** is recommended (either by repeatedly cutting part of the volume uniformly over the stand, or by dividing the forests into belts not wider than tree-height and cutting every second to fourth belt at 3-5 year intervals).

In reality a considerable amount of industrial roundwood comes from thinnings and **sanitary fellings**. Sanitary fellings apply to selective cut or clear-cut in forests damaged by natural disasters, pests or diseases. A significant part of the harvested wood of high-value species such as ash, oak, linden, etc. comes from sanitary fellings, what proves that the regulation is misused. Up to 2010 also Korean pine/cedar was logged in sanitary felling for exports, until it was entered into the CITES list and its cutting prohibited.

In recent years, there has been a decline in the share of selective cutting. This is especially noticeable in Khabarovsky, where the percentage of selective cutting went down from 20% in 2007 to 10% in 2012. In the Jewish Autonomous Region the percentage of selective logging also fell, from 8% in 2009 to 4.5% in 2012. In Primorsky however, the volume of timber harvested by selective cutting in mature and over-mature stands has increased and reached 74% in 2012. This increase is primarily associated with a growing share of thinnings and of cutting in hardwood forests, where clear-cutting is not allowed.

### 2.3 Logging technologies

Application of modern technology in logging operations under different site conditions allows for the preservation of forest environment and ensures the development of undergrowth in stands where selective cutting is performed. Proactive preservation of undergrowth can be achieved if trees are directionally felled towards strip roads, logs/stems are hauled by the top end and strictly along the strip roads with minimal turnings. If harvesters and forwarders are used, they should also work strictly along strip roads, with a distance of not less than 12-15 meters on both sides.

According to the research of DalNIILKh, selective cutting on slopes steeper than 20° is feasible using cable systems with self-propelled carriages and modern harvester technology. Good results are also achieved by feller-bunchers. With this equipment all silvicultural and ecological requirements can be met with minimal disruption to the forest environment.

However, today some of the major local forest leaseolders harvest on steep slopes with their own special equipment like self-propelled winches or multi-operation forest tractors.

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On flat and gently rolling slopes below 20°, it is possible to carry out selective and prolonged gradual cutting using conventional logging equipment (skidders), forwarders, harvesters and cable skidders (tracked and wheeled). Technological discipline is necessary to preserve small trees and undergrowth.

**Text Box 2.1 Logging machinery evolution in RFE**

Research of the RFE research organization DalNIILKh shows that selective cutting on slopes steeper than 20° is feasible using cable systems with self propelled carriages and with horizontally leveling modern forest machines. Due to high costs and the significant time needed for setting up and dismantling (up to 80% of the total time), Russian cable systems such as ML-43 have not received a wide application in the RFE.

The introduction of the self-propelled winch system “OWREN” has markedly changed the logging scene. Time for moving and setting up the equipment has been shortened due to a significantly lighter construction. The machinery has been tested in selective logging, prolonged gradual cutting (where the old forest is removed in 2 cuttings with 30-40 years interval in order to promote undergrowth) as well as in strip-cutting. "OWREN” has demonstrated a capacity to meet silvicultural, ecological and economic demands. Good results are also achieved by feller-bunchers (e.g. Timberjack 2618), performing gradual cutting in the form of strip-cutting on slopes of 21-30°. Along with high productivity, the machines allow for preserving the forest environment and ensuring better forest regeneration.

**2.4 Forest regeneration in RFE**

Forest regeneration in the Far East is predominantly natural and with a high rate of certainty over time. Natural regeneration of coniferous and deciduous species follows on areas affected by logging, as well as after fires, draughts, and outbreaks of pests and diseases. According to RFE expert estimates, more than 60% of the logging sites have sufficient undergrowth of valuable species (more than 2,000 young trees/ha) and on 80-90% there is a satisfactory undergrowth of valuable species, although in lower numbers per hectare.

On logging sites without undergrowth, groups of seed trees (15 units/ha) or small groves (0.2-0.3 ha) can be retained. Leaving individual seed trees on clear-cuts is not recommended because spruce mother trees are susceptible to wind, and individual larch see trees spread too small amounts of seeds for the area. The size of clear-cutting areas should not exceed 25 hectares on mountain slopes and 50 hectares on flat lands. The width of clear-cutting sites should not exceed 250 m and 500 m, respectively. Adjacent stands should not be cut within a period equal to the average high seed year interval, which for spruce and larch is four years.

Among the most common measures supporting natural regeneration is soil preparation. This measure is mostly effective in regeneration of larch, pine and spruce in the taiga zone, on flat lands mostly. Soil preparation on rolling slopes has to be carefully planned, and on steep slopes it is not recommendable.

Annual forest regeneration area in the Far East is declining, and covered around 200,000 ha in 2011 (see Figure 2.1). This total area is in accordance with the planning figure of forest regeneration work of the lesnichestva (forest districts). Approximately 77% of this area, according to official statements, was reforested mainly through a variety of measures to assist natural regeneration. Artificial regeneration (by planting) accounts for only 8% (16,400 ha). These figures reveal that the
majority of regeneration is left for the nature with only limited organized inputs. Artificial regeneration by planting is used mainly when forests cannot regenerate naturally, or an undesirable species change would otherwise happen.

Figure 2.1  Annual area of forest regeneration in the RFE by region

Regrettably however, the little artificial regeneration works that are made are often on land not covered with forest, i.e. close to roads and settlements, and on easily accessible clear-cut plots, regardless of the condition of natural regeneration on them. It is suspected that part of the works also serve a vested interest for logging valuable hardwoods (see Text Box 2.2).

Artificial regeneration is of administrative importance (particularly recently) since it is used as an indicator of performed silvicultural obligations.

In a number of subjects of the Russian Far East, such as Magadan region, Chukotka Autonomous Area, and the Republic of Sakha, as well as in a number of forest management districts in the northern Kamchatka, Khabarovsky and Amur regions, forests are not regenerated by planting due to harsh natural conditions.

Forest regeneration problems occur mostly on land that has been without trees for a longer period, such as wasteland and clearings, for instance areas repeatedly hit by fires. Such lands make up 10% of the area of forest under regeneration and should be the primary object of artificial regeneration.

The average level of forest planting survival in the RFE region is 45%. Forest fires and untimely tending of young planted forests are factors causing the loss. When forest cultures or naturally generated young forests have reached certain indicators, they are re-registered into the category of economically valuable forest stands. In the last decade there has been a steady decline in such transition into the category of economically valuable forest stands.
Regenerating young forests artificially in the Russian Far East is so far mainly of theoretical importance. But the accumulated experience from methods of soil preparation, mixed-species stands, introduction of foreign species, tending of plantings, and on the acceleration of growth in artificially regenerated stands, is important for the future development of planted forests for carbon sequestration and for industrial roundwood production for multiple purposes in the Russian Far East.

Most forest plantations have been established in the forest area protected to various degrees. Forest plantations close to cities and settlements meet recreational needs and are also important for collection of non-timber forest products for local communities. Production of wood is not the main goal in all forest plantations since the minimal felling age of the planted species is above 100 years and since a considerable share of protection forests are created with tree species prohibited from felling (e.g. Korean pine/cedar and Manchurian walnut).

Cutting ages for all Far Eastern tree species have been established by the order of Federal Forest Service (Rosleskhoz) N37 from 19.02.2008 (Annex 2.3). They are based on research from the 1960-1980s and objectively represent the rotation age of trees for yielding the right assortments of industrial roundwood.

In the last decade there has been a steady decline in such transition into the category of economically valuable forest stands (Figure 2.2). According to expert estimates, this decrease is directly proportional to the decrease in pre-commercial thinning. The area of pre-commercial thinning fell by 62% from year 2000 to 2010, resulting in a decrease by 30-55% of the annual area meeting the requirements for being defined as economically valuable stands.

**Figure 2.2 Transition of young stands into economically valuable forests in the RFE**

Source: DalNIILKh 2013
Creating planted forests in RFE

A large share of the young forests in Primorsky and Khabarovsky regions have been created by reconstruction work in low-value deciduous stands. In Primorsky where most forest management districts (lesnichestva) have no open lands in need of artificial forest regeneration, young forest stands were created mostly by planting Korean pine seedlings (90% of cases) under the canopy of deciduous stands, often dominated by oak, and rarely by aspen or birch. This sometimes involved soil preparation, but in many forest management districts, the soil for such under-canopy plantations was not treated.

In total 182,000 hectares of under-canopy planted forests have been created in Primorsky, but this area is not reflected in the official statistics of the Federal Forest Agency. Under-canopy planted forests were also established in the Jewish Autonomous Region, in Sakhalin, Kamchatka and Khabarovsky Krai (with the total area of 203,000 ha in 2007). To transfer these forests into the category of young forests, it is necessary to carry out thinning or reconstruction felling, where the deciduous canopy is fully removed.

This could serve as a false pretense to allow logging of the valuable oak trees for exports. The lowest rate of survival of forest planting is in Primorsky, and it is largely attributable to the under-canopy method.

An important issue for the RFE is the general evaluation of the effectiveness of, and the need for, artificial regeneration. Forest plantations account for only 0.2% of the forested area in the Russian Far East. They play a significant role only on Sakhalin, where their share is 4%. Foresters of the Sakhalin region have achieved a high level of survival in their artificial regeneration by planting. They have learned methods of growing seedlings of various species, including spruce and fir, and to create artificial regeneration in variable site conditions, e.g. in more than 20° slopes, in bamboo thickets, and on eroded soils.
3. Logging volumes, forest industry production and supply-demand balance (2020) in the Russian Far East

3.1 Logging volumes

Traditionally, the main logging areas are located close to the Baikal-Amur Mainline (BAM), in middle and northern Sikhote-Alin (Khabarovsk and Primorsky Krai), Lower Amur River, the western part of the Republic of Sakha (Yakutia), where most forest resources are concentrated (Figure 3.1 and Annex 3.1. Logging volumes in the RFE). Table 3.1 indicates that 75% of logging volume came from mature and over-mature forests, and 25% from thinning and selective logging.

The most intensive logging is carried out only in the areas adjacent to the ports of the central districts of Khabarovsky krai. The leases are in the hands of existing forest industries and in a process of consolidation into larger holdings. (Annex 3.3. Maps of annual allowable cut and logging distribution in the RFE, and Annex 3.4. Annual allowable cut in the RFE).

Figure 3.1 Logging volumes in the RFE by region 2003-2012

![Logging in the Russian Far East by region, 1000 m3](image)

Source: DalNIILKh, 2013
The major share of wood is harvested in the leased forest plots (65% in the RFE). 19% of the forest fund area has been allocated to leases in the RFE. In Primorsky, 49% of AAC is leased, in Khabarovsky - 42%. Lease period ranges between 20 and 49 years (Annex 3.5. Map 3.5 Leased and protected forest areas in Primorsky and Khabarovsky).

Table 3.1  Logging volumes in mature and over-mature forests in RFE

<table>
<thead>
<tr>
<th>Logging volumes in mature and over-mature stands, mill. m³</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logging volume in mature and over-mature stands, mill. m³</td>
<td>12.1</td>
<td>13.0</td>
<td>13.6</td>
<td>13.8</td>
<td>14.1</td>
<td>13.4</td>
<td>15.4</td>
<td>15.5</td>
<td>13.4</td>
<td>11.2</td>
<td>12.0</td>
<td>11.9</td>
</tr>
<tr>
<td>Including coniferous, mill.m³</td>
<td>11.1</td>
<td>11.8</td>
<td>12.4</td>
<td>12.1</td>
<td>12.2</td>
<td>11.6</td>
<td>13.3</td>
<td>13.3</td>
<td>11.4</td>
<td>9.7</td>
<td>10.3</td>
<td>10.3</td>
</tr>
<tr>
<td>Logging volume harvested during thinning and stand tending, mill.m³</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>3.0</td>
<td>3.6</td>
<td>3.6</td>
<td>3.0</td>
<td>4.3</td>
<td>3.0</td>
<td>2.5</td>
<td>3.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Total</td>
<td>12.1</td>
<td>13.0</td>
<td>13.6</td>
<td>16.8</td>
<td>17.7</td>
<td>17.0</td>
<td>18.4</td>
<td>19.8</td>
<td>16.4</td>
<td>13.7</td>
<td>15.3</td>
<td>15.8</td>
</tr>
</tbody>
</table>

Source: DalNIILKh

3.2 Forest industry production in RFE

Thirty percent of harvested roundwood volume is processed in the RFE. The rest of it is exported. For the past five years, the volume of wood processing in the Russian Far East has grown by 17%, while in the Russian Federation this increase was only 3-5%. The average share of the RFE in the total volume of sawnwood production in the Russian Federation, is 7-8%. The total value of shipped wood-based products in 2010 in the RFE was 31.7 billion rubles, in 2011 - 33.3 billion rubles, in the first 9 months of 2012 - 25.3 billion rubles. RFE does not have its own production of pulp, paper. Cardboard is made by recycling waste paper; pulp products are imported from other regions (Annex 3.2. Forestry industry production in the RFE).

3.3 Supply demand balance by 2020

In the past 50 years, the annual allowable cut (AAC) and logging volumes in the RFE have fallen noticeably, and a correlation between the two indicators has been established (Figure 3.3). The most recent figure is 84.7 million m³ in commercial forests, added with 5.8 million m³ in protected forests (90.5 mill. m³). At the current rate of decline, by 2015 AAC will be reduced to 80.7 million m³, and will drop to 75.9 million m³ in 2020, in commercial forests (Figure 3.2).

According to DalNIILKH projections, in 2015 logging volumes in the RFE’s commercial forests will be 9.4 million m³, and in 2020 7.5 million m³ (Figure 3.2). Under existing plans to implement investment projects, the production of 1.9 million m³ of sawn timber, 570,000 m³ of veneer sheets, 450,000 m³ of MDF, 140,000 m³ of particle board, 1.5 million m³ of wood chips will require at least 8 million m³ of industrial roundwood, which is 11-13 million m³ of liquid timber. These figures exclude demand for wood of the companies that do not participate in investment projects, as well as demand of local communities. As a result, an acute shortage of timber in the Russian Far East and possible disruption of the implementation of some investment projects due to limited

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7 In Russian terminology liquid timber includes industrial roundwood without bark and firewood with bark. Industrial roundwood is recorded under bark.
wood supply are forecasted by DalNIILKH. Local investment difficulties among the RFE forest industries seems to lend support to these projections.

Figure 3.2  Logging volumes and AAC in the Russian Far East 1965 - 2020

Figure 3.3  Correlation between logging volumes and AAC

Source: DalNIILKh, 2013
4. Forest certification in the Russian Far East

4.1 Status of forest certification in RFE

In March 2013, FAO conducted an independent assessment of the situation of forest certification in the RFE. This assessment was based on interviews with key stakeholders involved in certification processes in the region. FSC and PEFC head offices in Moscow, auditors, companies, WWF, trade associations, academia, and government representatives were interviewed. Objective was to highlight potential investment risks and facilitate decision making on potential forest industry projects selection.

The assessment revealed a conflict among the stakeholders centered around the following perceptions regarding FSC certification process:

- Companies perceived the requirement for additional allocation of HCVF-2 (intact forests) to the existing protected areas as a barrier to their economic growth and financial stability due to a growing shortage of accessible forest resources (mainly in Primorsky and Khabarovsky). See annex 4.3. Intact forests within the boundaries of FSC certified forests.

- Contradiction of FSC requirements against the Russian legislation is due to lack of definition of intact forests and different approach to forest management.

- New FSC standard (v. 6.01) fails to recognize regional specifics of the RFE and sets unrealistic requirements of additional allocation of significant share of leased forest area to high conservation value forest (HCVF) category.

- There is a contradiction between federal policies under ‘Tiger protection initiative’, international conventions and local land tenure and decision making; as a result, a few priority projects in the region were unable to meet their demand for raw materials and faced financial problems leading to suspension of operations.

- WWF experts have monopolized the ‘expertise’ on intact forests zoning, and disregard opinions of other regional experts.

- There is no constructive dialogue between FSC representatives and other stakeholders.

However, since March 2013 there has been a visible progress in reaching consensus among WWF and some companies, through a certification dialogue and a commission comprising private sector forest companies (see Text Box 4.1).

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8 Summary of interviews are included into confidential part of the report
Text Box 4.1 Terneyles group and forest certification

Total forest lease area of Terneyles group is around three million hectares. After a long period of negotiations, on 14 August, 2013 the Terneyles group, WWF Amur branch of WWF Russia, Greenpeace Russia and Transparent World signed an agreement on the protection of high conservation value forests (HCVF) and biodiversity.

According to Terneyles group, logging on almost 50% of the leased area will be either significantly limited or prohibited. According to WWF, the HCVF areas of Terneyles group provide habitats for Amur tiger and include intact old-growth forests which are rich in biodiversity. The agreement also set up mechanisms for resolution of issues related to key habitat areas and illegal logging. According to WWF, the most important HCVF in the agreement coincide with existing protected area that has already been established by the Russian legislation. The largest areas of excluded commercial forests will be in the Samarga Basin and comprise a comparatively modest portion of that huge wood supply.

Another recent development is the establishment of a commission on FSC certification issues in the Russian Far East, as a venue for mitigating conflicts in forest certification. Commission includes representatives of FSC, WWF, RFP and Terneyles group. The commission intends to invite independent experts to discuss issues openly. The next discussion will be focused on the scientific justification for the approaches to allocation of HCVF-2 for the zoning of intact forests.

Since the conflict surrounding FSC certification was escalated to the top of the Federal government, the Ministry of Natural Resources and Rosleskhoz got involved into solving the problem. A team of dedicated specialists in Rosleskhoz and the Ministry of Natural Resources is currently working towards harmonization of the Russian legislation and requirements of the FSC standard regarding definitions of intact forests and forest management.

The situation with forest certification has also caught the eye of the President of the Russian Federation. During the meeting of the State Committee on Forest Industry which took place in April 2013, the President instructed the Government to prepare a set of measures in order to encourage forest industries to adopt forest certification in accordance with national and international standards of forest management (Annex 5.5. Barriers to certification in Russia and measures to stimulate development of certification in Russia). Rosleskhoz counseling on the issues related to certification will be continued with stakeholder meetings.

4.2 Forest Management and Chain of Custody certification

The total area of certified forests in the Russian Far East is 5.85 mill. hectares, of which 5.70 mill. ha are certified with FSC Forest Management (FM) certificates (Annex 4.1. FSC certified forests in RFE), and 153,700 ha are under PEFC FM certificates. FSC has been in Russia since 2000 and in the RFE region since 2004. The first PEFC FM certificate was issued in the region only in 2012. A total area of FSC FM certified forests of the RFE constitutes 16% of the total FSC FM certified area in Russia (36.14 mill. ha).

Although the largest area of FSC FM certified forests is located in Khabarovsky (3.01 mill. ha), its share in a total forest area of the region is only 6%. The largest share of FSC certified forests in the RFE are in Primorsky region (2.69 mill. ha or 23% of the forest area). In Amur, the area of FSC FM...
certified forests is 119,771 ha only and the area under PEFC FM is 153,687 ha, which make up around 2% of the total forest area in Amur. Forests of the rest of RFE regions are not certified by either scheme so far.

Currently, 11 enterprises are holding CoC certificates in the RFE. They are located in Primorsky, Khabarovsky and Amur region. In Primorsky, certificates belong to Terneyles group and Primorsky GOK; in Khabarovsky, the holders are RFP group, Arkaim, and Business Marketing group. In Amur, CoC certificates belong to Turanles group (Annex 4.2. Forest Management and Chain-of-Custody certificates in RFE).

**Text Box 4.2  WWF position on forest certification in RFE**

Large areas of the RFE are rich in biodiversity; especially in Primorsky, Khabarovsky, Amur, Kamchatka, and Sakhalin. Amur-Heilong River Basin eco-region is classified as ‘biodiversity hotspot’ (ref. WWF online maps of protected areas). Harvesting in high-value hardwood, cedar-broadleaved forests, and in pine nuts forests in Primorsky and Khabarovsky will lead to conflicts with environmental NGOs and indigenous groups (Annex 4.4. List of indigenous peoples areas).

WWF holds a position that large areas of intact forests of the RFE should be excluded or restricted from harvesting in to order to preserve their high ecological value. These areas provide habitat to rich biodiversity, serve as corridors to critically endangered Amur tigers and other species, and often are located within the boundaries of the settlements of indigenous tribes. Investors are strongly advised to consult with WWF regarding possible selection of sites for forest industries, as well as volumes of harvesting and species composition of potential resource base. WWF underlines that only FSC certification process allows for successful zoning of intact forests. To avoid reputation risks, investors are advised to take into consideration ecological value of forests prior to allocation them for timber harvesting operations.

Due to problems arising during FSC FM certification process, some companies are starting to get certified with PEFC. Although PEFC FM certification standard does not have a requirement to exclude intact areas, the process also encourages prior consultation with key stakeholders. If PEFC certification process conflicts with WWF zoning of intact forests, investors should be aware that WWF will most probably prepare an adequate response to address the issue of intact forests. This response may involve public campaigns, lobbying and coalition building with other NGOs in order to pressure companies to exclude intact forests from their logging operations. WWF has a successful track record in planning and implementing such activities internationally and in Russia.
Annex 1  Forest resources: RFE region’s factsheet

1.1  Primorsky Krai

**Forest area**
The total forest fund area is 11,955,300 hectares. The area under protected forests is 4,610,200 ha (34.5%), under commercial forests, 8,760,200 ha (65.5%). The forest fund contains 99% of commercial forests and 71.2% of protected forests. The total area of forest cover is 11,484,200 hectares.

Total growing stock in Primorsky was 1,752.8 million m³ in 2012. Coniferous forests (dominated by spruce and fir) occupied 2,938,700 hectares with a total stock of 526,630,000 m³. Cedar-deciduous forests occupied 2,156,200 hectares with a total stock of 417,800,000 m³. Oak forests occupied 2,093,400 hectares and their stock was 227,490,000 m³. They are followed by larch (1,092,500 ha), Erman’s birch (681,800 ha), ash (315,500 ha), and aspen (236,700 ha).

**Growing stock**

**Species composition**

The ratio of tree species in a lesnichestvo, or forest management unit, depends on site conditions and influenced by economic activities and forest fires. Spruce and fir have a significant share in the Kavalerovsky (65.8%), Sergeevsky (64.3%), Roshchinsky (54.3%), Chuguyivsky (53.0%), Verkhne-Perevalninsky (41.0%) forest management units. Cedar’s share in the Roshchinsky lesnichestvo is 43.2% of the total, in Dalnerechensky 72.6%, Spassky 71.6%, Ussuriysky 47.8%, and in Chuguyivsky 46.9%. Larch in the Verkhne-Perevalninsky lesnichestvo is 26%, and in Terneisky 53.1%. The percentage of oak is high in the southern and central parts of the region: Arsenyevsky, Vladivostoksky, Dalnerechensky, and the Kavalerovsky lesnichestva.

Annex Figure.1.1  Species composition in Primorsky krai by stock

![Bar chart showing species composition in Primorsky krai by stock](chart)

Source: Forest plan of Primorsky, 2009-2018
Commercial forests had a total growing stock of 1,288.04 million m$^3$. The greatest share of timber resources is located in the northern and central parts of the region: Ternesky, Roshchinsky, V.-Perevalninsky, Kavalerovsky, Chuguyivsky lesnichestva.

Species composition is dominated by coniferous trees, at 60 % by area and 69 % by stock. The percentage of hardwood is 24 % by area and 19 % by stock, while deciduous is 16% by area and 12 % by stock. Coniferous trees represent an especially high percentage in the northern forests of the region: in the Verkhne-Perevalninsky, Roschinsky, and Ternesky lesnichestva, whereas hardwood is mainly concentrated in the southern part of the Far East.

The forests of Primorsky region are the most productive ones in the Far East. The average timber stock in mature and over-mature coniferous forests is 195 m$^3$/ ha, and in hardwood and deciduous forests is around 175 m$^3$/ha.

The annual allowable cut in Primorsky was 7,183,000 m$^3$ in 2012.

**Annex Figure 1.2 AAC in Primorsky per lesnichestvo**

![Graph showing AAC in Primorsky per lesnichestvo](image)

Source: Forest plan of Primorsky, 2009-2018

Actual harvested volume of wood in 2012 was 3,774,854 m$^3$, which is 51 % of the AAC. There are 11 lesnichestva in Primorsky. The total area of leased plots is 9,859,200 ha.
1.2 Khabarovsky Krai

**Forest area**

Khabarovsky krai belongs to the group of densely forested regions of the Russian Federation. Forests cover 67% of the region. The total area of the forest fund is 73.7 million hectares, of which 51 million hectares, or 70% of the total forest fund area, are covered by forest. Commercial forests in Khabarovsky krai amount to around 40.5% of the total, protected forests 14.5%, and reserved forests 45%. The area of coniferous forests is 73.2 %, of hardwood 2.9%, and of deciduous 23.9%. The forest fund of the Khabarovsky region is not homogeneous in its composition, structure, productivity, or distribution. Forests also differ from a socio-economic standpoint.

The total growing stock is about 5 billion m$^3$, of which about 3 billion m$^3$ is coniferous.

More than 300 species of trees and shrubs grow in the Khabarovsky region. The main tree species are larch and Ayan spruce. The largest area, 63% of all forest lands, is occupied by larch forests. The region also holds more than half of all Far Eastern spruce and valuable species such as the Amur cork tree, yew, Manchurian walnut, Chinese magnolia, Actinidia, and many others. While the northern, central and eastern parts of the region are dominated by coniferous forests, the southern part of the region is dominated by deciduous forests.

**Growing stock**

**Species composition**

Annex Figure 1.3 Species composition in Khabarovsky

![Species composition in Khabarovsky krai by stock](image)

Source: Forest plan of Khabarovsky 2009-2018
In commercial forests, the total stock of coniferous timber is 2,019.98 million m$^3$, that of deciduous timber is 243.78 m$^3$, and of hardwood 107.83 million m$^3$. Commercial forests are primarily located in the central and southern parts of Khabarovsky krai. The average stock of spruce in mature and over-mature forests is 186 m$^3$/ha, of larch 157 m$^3$/ha, of oak 111 m$^3$/ha, of Erman’s birch 156 m$^3$/ha.

**Annex Figure 1.4 AAC in Khabarovsky krai per lesnichество**

For the past five years, annual actual volume of harvested wood ranged between seven and nine million m$^3$. In 2012, AAC was 25,078,000 m$^3$. Actual volume of harvested wood was 6,939,600 m$^3$, or 27% of the AAC. There are 40 forest management units (*lesnichestva*) in the region.

Source: Forest plan of Khabarovsky 2009-2018
1.3 Amur region

Forest area

The forest fund area in Amur region is 30,515,300 hectares of which 22,845,000 hectares are covered by forests. Commercial forests occupy 19,092,600 ha which is 88.6% of the total forest area, protected forests - 8%, and reserved forests -3.4% of the total forest area.

Growing stock

The total stock of wood is 2,012.55 million m³, of which 1,589.12 million m³ (78.9%) is coniferous, 35.89 million m³ is hardwood, and 387.5 million m³ is deciduous. The stock of mature and over-mature wood is 1,032.25 million m³.

Species composition

The percentage of larch is 60%, pine 2.8%, birch 22%, spruce 2%, and other species 11%.

Annex Figure 1.5 Species composition in Amur by area

Fir forests have the greatest stock of wood among coniferous mature stands, 193 m³ per hectare, while pine forests have the lowest, at 19 m³/ha. Among deciduous species, poplar forests have the greatest stock, 208 m³/ha, and oak has the lowest, 65 m³/ha.

The total stock of mature and over-mature stands in commercial forests is 748,120,000
m3, which is 81.4% of the total stock of mature and over-mature wood. Coniferous makes up 85.8% of the total stock of commercial wood, hardwood 0.3%, and deciduous 13.9%.

The largest number of commercial forests is concentrated in remote north-western, northern, and north-eastern lesnichestva that lack transport and forest infrastructure. The Amur region occupies third place in the RFE by forest area, growing stock and annual allowed cut (AAC). Although most forests are coniferous, those of the Zavitinsky, Magdagachinsky, and Svobodnensky lesnichestva are dominated by deciduous species. This is caused mainly by fires and over-logging of coniferous timber.

Annex Figure 1.6 AAC in Amur per lesnichestvo

<table>
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Source: Forest plan of Amur region 2009-2018

In 2012 the annual allowable cut in Amur was 17,491,200 m3. Actual harvested volume of wood in 2012 was 1,804,080 m3, which is 10% of the AAC. There are 18 lesnichestva in Amur. The total area of leased plots is 3,482,500 ha.
1.4 Republic of Sakha

**Forest area**
The total area of the forest fund in Sakha is 254,752,200 ha. The total area of forest cover is 156,459,600 ha, or 61% of the total forest fund area. The forests consist mainly in the major species (135,485,700 ha, or 85.7%) and shrubs (22,574,400 ha, or 14.3%). The forest cover of Sakha is 22.8% of the total forest cover of the Russian Federation, and 4.1% of the global forest cover. Forest cover ranges from 11.5% of the Eveno-Bytantaisky district up to 91.7% of the Neriunginsky district. Protected forests occupy 11.3% of the total area, commercial forests 42.2%, and reserved forests 46.5%.

**Growing stock**
The total stock of timber in Sakha is 8,649.7 million m³. Coniferous species make up 99% of the total, and range from 94% in Lenskoie lesnichestvo up to 100% in Zhiganskoie. The average stock of timber is 65.5 m³ per hectare; 65.8 m³/ha for coniferous species and 46.5 m³/ha for deciduous.

**Species composition**

Annex Figure 1.7 Species composition in Sakha

- Larch 83%
- Pine 15%
- Spruce 1%
- Fir, cedar, birch, aspen, others 1%

Source: Forest plan of Sakha region for 2009-2018

It should be noted that there remain no freely accessible undeveloped plots. Forests are spread sparsely over the region and located in remote areas. Development of remote forests requires significant investment in construction of roads, housing, and other socially important infrastructure. However, the southern group of lesnichestva may be potentially attractive to forest industries because of their proximity to the Berkakit-
Yakutsk railroad currently under construction. The largest stocks of commerical forests, 2,070.9 million m³, are concentrated in the permafrost taiga zone. Timber stock in mature and over-mature stands of the main forest-forming species of the southern forest areas (Aldan, Ust-May, Olekminskoie, and Lenkoie) is 1,126.33 million m³, or 53% of the stock of all commercial forests. Coniferous species makes up 99.5 % of commercial forests.

**AAC**

Sakha occupies first place in the RFE by forest area, growing stock, and allowable cut. The annual allowable cut in 2012 was 34,742,600 m³.

**Actual volume of harvesting**

Actual harvested volume of wood in 2012 was 1,651,190 m³, which is 4.75 % of the AAC.

**Annex Figure 1.8 AAC in Sakha per lesnichestvo**

![Graph showing AAC in Sakha per lesnichestvo as liquid stock, thousand m3](chart)

Source: Forest plan of Sakha region for 2009-2018

There are 19 lesnichestva in Sakha. The total area of leased plots is 450,300 ha. In many lesnichestva the utilization of the AAC does not exceed 1%. The logging industry exists mainly in the southern part of the region, where 56% of the total stock of commercial forests is concentrated. Southern lesnichestva harvest around 39% of all Sakha timber.

Undeveloped transport infrastructure, and the remoteness of foreign and domestic markets for forest products has determined the absence of large forest industries in the region. Another impediment to the development of forest industries is the poor quality of forest inventories data. Most such information is over twenty years old, and often dates from the mid 1950's.
1.5 Sakhalin region

**Forest area**

The total area of the forest fund in Sakhalin is 6,950,500 hectares, of which 1,310,100 ha are allocated to protected forests and 5,642,000 ha to commercial forests. There are no reserved forests in Sakhalin. Protected forests in the Sakhalin region are not distributed unevenly. The Kurilsky Islands have a high percentage of protected forests (31%). The percentage of protected forests is also high in the following *lesnichestva*: 34% in Korsakovskoie, 37% in Nevelskoe, 38% in Anivsky, 39% in Kholmsky, and 95% in Yuzhno-Sakhalinsk.

**Growing stock**

The total growing stock of wood in Sakhalin is 625.1 million m³ (2012). The portion of coniferous forests in the region is 70% (3.9 million ha). The greatest number of coniferous stands are located in the northern and central parts of the island. Hardwood forests are mainly located in Smirnykovsky (158,700 hectares) and Kurilsky (165,500 ha) *lesnichestva*.

**Species composition**

Annex Figure 1.9 Species composition in Sakhalin by stock

![Species composition in Sakhalin by stock](image)

Source: Forest plan of Sakhalin region for 2009-2018

Average stock of timber in mature and over-mature forests is 181 m³ per hectare for coniferous forests, 96 m³/ha for hardwood, and 105 m³/ha for deciduous. Mature and over-mature stands make up one third of the total growing stock. Total stock of timber in the area is 625.1 million m³.
Commercial forests are dominated by coniferous species (spruce and fir), which occupy a total area of 3,243,100 ha and have a stock of mature and over-mature timber of 239.3 million m³. Deciduous forests are dominated by white birch, and oak (in Kurilsky). The total area of these forests is 856,100 ha.

**Actual volume of harvesting**

The annual allowable cut in 2012 was 2,100,800 m³. Actual use of the AAC is 13%. The use of AAC is mainly in the coniferous category. Actual harvested volume of wood in 2012 was 369,800 m³, which is 17% of the AAC. There are 17 lesnichestva in Sakhalin. The total area of leased plots is 2,091,200 ha.

Because of its remote geographical location and the lack of road connection to other parts of the Russian Federation, Sakhalin’s forest industry is mainly focused on export markets (Japan, Korea and China). Besides its geographical location, the other main hindrances to the development of value-added forest industries in the region include the high cost of production (mainly due to high transport and energy tariffs), and a shortage of skilled workers.

**Annex Figure 1.10  AAC in Sakhalin per lesnichestvo**

![Graph showing AAC in Sakhalin per lesnichestvo as liquid stock, thous. M3](image-url)

Source: Forest plan of Sakhalin region for 2009-2018
1.6 Kamchatka

Forest area

The total area of the forest fund in Kamchatka is 44,218,800 hectares. Protected forests occupy 12,967,600 ha (in the Koriaksky district 9,405,000 ha), commercial forests occupy 22,086,900 ha (in the Koriaksky district 19,713,900 ha), and reserved forests occupy 9,164,300 ha.

Growing stock

The average stock for coniferous forests is 44 m$^3$/ha, for hardwood forests it is 58 m$^3$/ha (mainly Erman birch), and for deciduous forests 65 m$^3$/ha. The average stock in the taiga zone of Kamchatka is higher than that of both the pre-tundra and sparse taiga zones. Thus the average stock of coniferous timber in the taiga is 147 m$^3$/ha, of hardwood 87 m$^3$/ha, and of deciduous 80 m$^3$/ha. Mature and over-mature stands dominate both by area and stock in all lesnichestva.

Species composition

The pre-tundra forests and sparse taiga (Koriaksky district) are dominated by larch. Their total area is 420,100 ha. The average stock of mature and over-mature stands of pine is 52 m$^3$/ha. The total stock of coniferous timber is 26,240,000 m$^3$. The total area of hardwood forest is 312,000 ha, and is dominated by Erman’s birch. The average stock of mature and over-mature stands is 82 m$^3$/ha. The total stock of hardwood in the district is 18,230,000 m$^3$.

Deciduous forests are represented by white birch, poplar, willow and other species. The total area of deciduous forests is 260,500 ha. The average stock of mature and over-mature stands is 100 m$^3$/ha. The total stock of deciduous in the district is 15,980,000 m$^3$.

Taiga zone

Atlasovskoie lesnichestvo is dominated by larch and spruce. Their total area is 301,200 ha. The average stock of mature and over-mature stands of pine is 163 m$^3$/ha. The total stock of coniferous timber is 45.30 million m$^3$.

The total area of hardwood forests is 145,400 ha. It is dominated by Erman’s birch. The average stock of mature and over-mature stands is 109 m$^3$/ha. The total stock of hardwood in the district is 14.21 million m$^3$. Deciduous forests are represented by white birch, poplar, willow and other species. The total area of deciduous forests is 131,400 ha. The average stock of mature and over-mature stands is 116 m$^3$/ha. The total stock of deciduous in the district is 10.2 million m$^3$.

Bystrinskoie lesnichestvo is dominated by larch and spruce, which account for a total area of 51,800 ha. The average stock of mature and over-mature stands of pine is 163 m$^3$/ha. The total stock of coniferous wood is 7.26 million m$^3$.

The total area of hardwood forests is 19,900 ha. It is dominated by Erman’s birch.
The average stock of mature and over-mature stands is 114 m$^3$/ha. The total stock of hardwood in the district is 2.26 million m$^3$.

Deciduous forests are represented by white birch, poplar, willow and other species. The total area of deciduous forests is 9,300 ha. The average stock of mature and over-mature stands is 118 m$^3$/ha. The total stock of deciduous timber in the district is 0.9 million m$^3$.

**Elizovskoie lesnichestvo** is dominated by young plantations. The total area of hardwood forests is 225,500 ha, and is dominated by Erman’s birch. The average stock of mature and over-mature stands is 87 m$^3$/ha. The total stock of hardwood in the district is 19.81 million m$^3$. Deciduous forests are represented by white birch, poplar, willow and other species. The total area of deciduous forests is 7,400 ha. The average stock of mature and over-mature stands is 72 m$^3$/ha. The total stock of deciduous timber in the district is 0.34 million m$^3$.

**Kliuchesvkoie lesnichestvo**
The total area of hardwood forests is 456,000 ha. It is dominated by Erman’s birch. The average stock of mature and over-mature stands is 124 m$^3$/ha. The total stock of hardwood in the district is 48.83 million m$^3$. Deciduous forests are represented by white birch, poplar, willow and other species. The total area of deciduous forests is 169,400 ha. The average stock of mature and over-mature stands is 120 m$^3$/ha. The total stock of deciduous in the district is 13.75 million m$^3$.

Coniferous forests are dominated by larch and spruce. Their total area is 165,000 ha. The average stock of mature and over-mature stands of pine is 165 m$^3$/ha. The total stock of coniferous wood is 22.74 million m$^3$.

**Koriakskoie lesnichestvo**
The total area of hardwood forests is 1,093,200 ha. It is dominated by Erman’s birch. The average stock of mature and over-mature stands is 83 m$^3$/ha. The total stock of hardwood in the district is 116.54 million m$^3$. Deciduous forests are represented by white birch, poplar, willow and other species. The total area of deciduous forests is 130,400 ha. The average stock of mature and over-mature stands is 80 m$^3$/ha. The total stock of deciduous in the district is 9.81 million m$^3$.

**Milkovskoie lesnichestvo**
The total area of hardwood forests is 108,200 ha. It is dominated by Erman’s birch. The average stock of mature and over-mature stands is 122 m$^3$/ha. The total stock of hardwood in the district is 13.93 million m$^3$. Deciduous forests are represented by white birch, poplar, willow and other species. The total area of deciduous forests is
98,200 ha. The average stock of mature and over-mature stands is 109 m³/ha. The total stock of deciduous in the district is 9.9 million m³. Coniferous forests are dominated by larch and spruce. Their total area is 33,700 ha. The average stock of mature and over-mature stands of pine is 178 m³/ha. The total stock of coniferous wood is 5.33 million m³.

Ust-Bolshretskoie
The total area of hardwood forests is 404,000 ha. It is dominated by Erman’s birch. The average stock of mature and over-mature stands is 86 m³/ha. The total stock of hardwood in the district is 38.59 million m³. Deciduous forests are represented by white birch, poplar, willow and other species. The total area of deciduous forests is 15,500 ha. The average stock of mature and over-mature stands is 67 m³/ha. The total stock of deciduous in the district is 0.71 million m³.

The major part of forest resources is located in the central part of the river basin of Kamchatka in Atlasovskoye, Klyuchevskoie Milkovskoe lesnichestva. Currently, the accessible coniferous forests on the left bank of the Kamchatka River are depleted. The main reasons hindering the development of value-added industries are the high costs of production in the Kamchatka region caused by high transport and energy tariffs, lack of infrastructure and lack of a skilled labor force.

Annex Figure 1.11  AAC in Kamchatka per lesnichestvo

In 2012, the annual allowable cut in Kamchatka was 2,679,500 m³. Actual harvested volume of wood in 2012 was 175,590 m³, which is 7% of the AAC. There are a total of seven lesnichestva in Kamchatka. The total area of leased plots is 1,329,400 ha.
## Annex Table 2.1 Logging methods in the RFE by region

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<th>Region</th>
<th>Selective</th>
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Source: DalNIILKh, 2013
Annex Figure 2.1 Logging methods in the RFE

Source: DalNIILKh, 2013
Annex Figure 2.2  Logging methods in RFE regions

Logging methods in Sakha
- Selective cuts: 3%
- Clearcutting: 6%
- Sanitary thinning: 9%
- Maintenance cutting: 82%

Logging methods in Khabarovsky
- Selective cuts: 13%
- Clearcutting: 8%
- Sanitary thinning: 12%
- Maintenance cutting: 79%

Logging methods in Primorsky
- Selective cuts: 29%
- Clearcutting: 18%
- Sanitary thinning: 1%
- Maintenance cutting: 52%

Logging methods in Amur
- Selective cuts: 5%
- Clearcutting: 1%
- Sanitary thinning: 5%
- Maintenance cutting: 93%

Source: DalNIILKh, 2013
Annex Figure 2.2  Logging methods in RFE regions (continued)

Logging methods in Khamchatka

Source: DalNIILKh, 2013
Annex 2.2 Harvesting equipment for selective cutting

Annex Figure 2.3 Harvesting conducted by cable systems

Forest plot, passed by gradual long-term cutting (60% intensity) in 2005 with a use of cable systems with self propelled carriages OWREN-400, slope 30°. Average annual growth 6.5 m3/ha.
Annex Figure 2.4 Harvesting by feller bunchers

Forest plot after last step of gradual cutting by Timberjack-2618, and Timberjack-933. First cutting was done in 1998, last one on 2008. Young spruce growth was formed as a result.
Annex Figure 2.5  Logging by harvesters, forwarders, and tracked skidders

Forest plot, passed by selective cutting (45% intensity) in 2000 with a use of Timberjack-1270 and Timberjack-1010. Average annual growth is 3.3 m3/ha.
## Annex 2.3  Cutting ages for main species in the RFE

### Annex Table 2.2 Cutting ages for main species

<table>
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<th>Type of forest biome</th>
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<td></td>
<td></td>
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<td>141-160 VIII</td>
<td>121-140 VII</td>
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<td>101-120 VI</td>
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<td>61-70 VII</td>
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<td>121-140 VII</td>
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<td>141-160 VIII</td>
<td>121-140 VII</td>
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<td>121-140 VII</td>
<td>101-120 VI</td>
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<td>101-120 VI</td>
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<td>71-80 VIII</td>
<td>61-70 VII</td>
</tr>
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<td>all</td>
<td>61-70 VII</td>
<td>51-60 VII</td>
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<td>41-50 V</td>
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<td>141-160 VIII</td>
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<td>Cedar</td>
<td>all</td>
<td>241-280 VII</td>
<td>201-240 VI</td>
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<td>Spruce, fur</td>
<td>all</td>
<td>121-140 VII</td>
<td>101-120 VI</td>
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\(^{10}\) Productivity (yield) class of forest - a unit of measurement of the productivity (quality) of forest stands; class depends on the quality of forest conditions and is determined by the average height of the dominant species at a certain age. There are five productivity classes: I (the most productive), II, III, IV, V.
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<th>Type of forest biome</th>
<th>Dominating species</th>
<th>Productivity (Yield) class</th>
<th>Cutting ages (numerator - age, years/ denominator - age class)</th>
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<td>101-120 VI</td>
</tr>
<tr>
<td>Honey Linden</td>
<td>all</td>
<td>141-160 VIII</td>
<td>141-160 VIII</td>
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<td>White Birch Grey Alder</td>
<td>all</td>
<td>71-80 VIII</td>
<td>61-70 VII</td>
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<tr>
<td>Honey Linden</td>
<td>all</td>
<td>61-70 VII</td>
<td>51-60 VI</td>
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<tr>
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<td>III and above</td>
<td>121-140 VII</td>
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<td></td>
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<td>All</td>
<td>201-240 VI</td>
<td>161-200 V</td>
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<tr>
<td>Spruce, Fur</td>
<td>All</td>
<td>121-140 VII</td>
<td>101-120 VI</td>
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<td>121-140 VII</td>
<td>101-120 VI</td>
</tr>
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<td>Elm, Maple, Linden</td>
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<td>101-120 VI</td>
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<td>141-160 VIII</td>
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<td>All</td>
<td>71-80 VIII</td>
<td>61-70 VII</td>
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<td>Aspen</td>
<td>All</td>
<td>61-70 VII</td>
<td>51-60 VI</td>
</tr>
</tbody>
</table>
Annex 3.1  Logging volumes in the RFE

Annex Figure 3.1  Logging volumes in the RFE

Loggin in the Russian Far East by region, million m3

Source: DalNIILKh, 2013
Annex 3.2 Forest industry production in the RFE

Annex Table 3.1 Production of forest industry products in the RFE 1990 - 2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Industrial roundwood 1000 m³</th>
<th>Sawnwood, 1000 M³</th>
<th>Plywood, 1000 m³</th>
<th>Particle board, 1000 M³</th>
<th>Fiber board, mill. M²</th>
<th>Pulp, 1000 t</th>
<th>Paper, 1000 t</th>
<th>Cardboard, 1000 t</th>
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</thead>
<tbody>
<tr>
<td>1990</td>
<td>23456.0</td>
<td>5414.1</td>
<td>25.3</td>
<td>-</td>
<td>-</td>
<td>539.9</td>
<td>215.5</td>
<td>240.6</td>
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<tr>
<td>1995</td>
<td>7370.3</td>
<td>972.7</td>
<td>1.0</td>
<td>22.1</td>
<td>5.6</td>
<td>60.0</td>
<td>14.2</td>
<td>13.1</td>
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<tr>
<td>1997</td>
<td>6138.1</td>
<td>550.9</td>
<td>0</td>
<td>8.9</td>
<td>3.0</td>
<td>1.6</td>
<td>0.7</td>
<td>5.1</td>
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<tr>
<td>1998</td>
<td>4914.3</td>
<td>483.7</td>
<td>0</td>
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<td>2.6</td>
<td>2.2</td>
<td>0.2</td>
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<tr>
<td>1999</td>
<td>7544.2</td>
<td>581.0</td>
<td>0</td>
<td>6.2</td>
<td>4.5</td>
<td>12.6</td>
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<td>8450.5</td>
<td>673.3</td>
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<td>4.6</td>
<td>4.6</td>
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<tr>
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<td>1297.9</td>
<td>0.1</td>
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<td>0</td>
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<tr>
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<td>38.0</td>
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</table>

Note 1: In 2011: 216,000 m³ of veneer sheets, 6,000 m³ of MDF and 70,000 m³ of wood chips, and 20,000 t of toilet paper were also produced.

In 2012 (E): 233,200 m³ of veneer sheets, 11,900 m³ of MDF and 64,700 m³ of wood chips were also produced.

Note 2: estimates for 2012 are based on 9 months actual production statistics.
Annex 3.3  Maps of annual allowable cut and logging distribution in the RFE

Map 3.1  Distribution of AAC in the RFE, 1000 m3
Map 3.2  Distribution of logging in the RFE, 1000 m3

Заготовка древесины, тыс. куб. м

- 0
- 1 - 15
- 16 - 50
- 51 - 100
- 101 - 150
- 151 - 200
- 201 - 300
- 301 - 400
- 401 - 500
- 501 - 600
- 601 - 800

400 0 400 километры
Map 3.3  Annual allowable cut utilization rate in the RFE, %
Map 3.4  Logging volume from 1 ha in the RFE, m3/ha

Фактический объем заготовки древесины с 1 га, куб. м/га

- 0
- 0.001 - 0.03
- 0.03 - 0.05
- 0.05 - 0.1
- 0.1 - 0.15
- 0.15 - 0.2
- 0.2 - 0.25
- 0.25 - 0.35
- 0.35 - 0.5
- 0.5 - 0.85

400 0 400 километры
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<thead>
<tr>
<th>Region</th>
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<th>Commercial</th>
<th>Total</th>
</tr>
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<tr>
<td>Total</td>
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<td></td>
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</tr>
<tr>
<td>Total</td>
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</table>

<table>
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<tr>
<th>Region</th>
<th>Total</th>
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<th>Hardwood</th>
<th>Deciduous softwood</th>
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<td>3599.7</td>
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Annex Figure 3.2 Annual allowable cut by RFE region (2012)

Source: DalNIILKh, 2013
Annex Figure 3.3  Annual allowable cut in commercial forests in RFE (2012)

Source: DalNIILKh, 2013
Annex 3.5 Leased and protected forest areas in Primorsky and Khabarovsky
Map 3.5 Map of leased and protected forest areas in Primorsky and Khabarovsky
Annex 4.1. FSC certified forests in RFE

Map 4.1 FSC certified forests in RFE

Source: FSC website, October 2013
### Annex 4.2 Forest management and chain-of-custody certificates in the RFE

**Annex Table 4.1 FSC forest management certificates in the Russian Far East**

<table>
<thead>
<tr>
<th>Region</th>
<th>Certificate Nr</th>
<th>License Nr</th>
<th>Company</th>
<th>Dates of validity</th>
<th>Area, ha</th>
<th>Total area certified</th>
<th>Total forest area</th>
<th>Share of certified area in total forest area, %</th>
</tr>
</thead>
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<td>SGS-FM/COC-001925</td>
<td>FSC-C009842</td>
<td>JSC “Terneyles”</td>
<td>8 Mar 2010 - 7 Mar 2015</td>
<td>1,800,454</td>
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<td>SGS-FM/COC-007557</td>
<td>FSC-C084504</td>
<td>JSC “Amgu” (Terneyles)</td>
<td>21 Apr 2010 - 20 Apr 2015</td>
<td>365,587</td>
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<td></td>
<td></td>
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<tr>
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<td>SGS-FM/COC-007724</td>
<td>FSC-C089488</td>
<td>JSC “Roschino KLPKH” (Terneyles)</td>
<td>4 Jun 2010 - 3 Jun 2015</td>
<td>473,251</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khabarovsky</td>
<td>SGS-FM/COC-009683</td>
<td>FSC-C113940</td>
<td>JSC «Komsomolsky KKL PKH» (RFP)</td>
<td>12 Dec 2012 - 11 Dec 2017</td>
<td>102,992</td>
<td>3,011,218</td>
<td>51,085,500</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>SGS-FM/COC-009577</td>
<td>FSC-C112777</td>
<td>JSC «Flora» (RFP)</td>
<td>17 Sep 2012 - 16 Sep 2017</td>
<td>366,146</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SGS-FM/COC-009606</td>
<td>FSC-C11302</td>
<td>OJSC «Dallesprom» (RFP)</td>
<td>5 Oct 2012 - 4 Oct 2017</td>
<td>1,336,939</td>
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</tr>
<tr>
<td></td>
<td>SW-FM/COC-004340</td>
<td>FSC-C006805</td>
<td>Arkaim SP OOO</td>
<td>16 Sep 2009 - 15 Sep 2014</td>
<td>1,094,594</td>
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<tr>
<td></td>
<td>SGS-FM/COC-009682</td>
<td>FSC-C113933</td>
<td>CJSC «Lesnoy komplex» (RFP)</td>
<td>12 Dec 2012 - 11 Dec 2017</td>
<td>110,547</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Amur</td>
<td>CU-FM/COC-827776</td>
<td>FSC-C116901</td>
<td>Turanles CJSC</td>
<td>13 June 2013 - 12 June 2018</td>
<td>119,771</td>
<td>119,771</td>
<td>22,845,000</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Source: FSC, August 2013
### Annex Table 4.2  FSC chain-of-custody certificates in the Russian Far East

<table>
<thead>
<tr>
<th>Region</th>
<th>Certificate N</th>
<th>License</th>
<th>Company</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primorsky</td>
<td>SW-COC-003764</td>
<td>FSC-C003369</td>
<td>GRK AIR OAO (Primorsky GOK)</td>
<td>8 Jan 2009-7 Jan 2014</td>
</tr>
<tr>
<td></td>
<td>SGS-COC-008839</td>
<td>FSC-C106396</td>
<td>CJSC “STS Technowood” (Terneyles)</td>
<td>6 Jun 2011-5 Jun 2016</td>
</tr>
<tr>
<td></td>
<td>SGS-COC-008838</td>
<td>FSC-C113842</td>
<td>PTS Hardwood” CJSC (Terneyles)</td>
<td>6 Jun 2011-5 Jun 2016</td>
</tr>
<tr>
<td>Khabarovsky</td>
<td>SGS-COC-009678</td>
<td>FSC-C113842</td>
<td>RFP Trading House, LLC</td>
<td>5 Dec 2012-4 Dec 2017</td>
</tr>
<tr>
<td></td>
<td>SW-COC-004330</td>
<td>FSC-C017067</td>
<td>Arkaim SP OOO</td>
<td>11 Sep 2009-10 Sep 2014</td>
</tr>
<tr>
<td></td>
<td>SGS-COC-0097444</td>
<td>FSC-C114725</td>
<td>Amurskaya Lesopromyshlennaya Company (Business Marketing)</td>
<td>4 Feb 2013-3 Feb 2018</td>
</tr>
<tr>
<td>Amur</td>
<td>CU-COC-827776</td>
<td>FSC-C116786</td>
<td>Turanles CJSC</td>
<td>6 June 2013-5 June 2018</td>
</tr>
<tr>
<td></td>
<td>CU-COC-827777</td>
<td>FSC-C116786</td>
<td>Turanles Isa Sawmill</td>
<td>6 June 2013-5 June 2018</td>
</tr>
<tr>
<td></td>
<td>CU-COC-827776</td>
<td>FSC-C116786</td>
<td>Turanles Vostochny Sawmill</td>
<td>6 June 2013-5 June 2018</td>
</tr>
</tbody>
</table>

Source: FSC, August 2013
### Annex Table 4.3  PEFC certificates in the Russian Far East

<table>
<thead>
<tr>
<th>Region</th>
<th>Certificate N</th>
<th>Type</th>
<th>Company</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khabarovsky</td>
<td>SGS-PEFC-FSR 0001</td>
<td>FM area:</td>
<td>Business Marketing</td>
<td>27 Dec 2012 - 2 Dec 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td>153,687.0 ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SGS-PEFC/CoC-1608</td>
<td>CoC</td>
<td>Amur Forest (BM)</td>
<td>6 Mar 2013 - 5 Mar 2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SGS-PEFC/CoC-1624</td>
<td>CoC</td>
<td>Azia Export (BM)</td>
<td>18 Mar 2013 - 17 Mar 2018</td>
</tr>
</tbody>
</table>

Source: PEFC website, August 2013
Annex 4.3  Intact forests within the boundaries of FSC certified forests
Map 4.2  Intact forests within the boundaries of FSC certified forests

Source: FSC website, October 2013
Annex 4.4 List of indigenous peoples areas

Executive Order of the Government of the Russian Federation, from 08/05/2008 N 631-R

In accordance with paragraph 2 of Article 5 of the Federal Law "On guarantees of the rights of the indigenous peoples of the Russian Federation," the attached list of settlements of traditional residence and economic activities of indigenous peoples of the Russian Federation and a list of traditional economic activities of indigenous peoples of the Russian Federation was approved.

Prime Minister
the Russian Federation

List of settlements of traditional residence and traditional economic activities of
OF INDIGENOUS PEOPLES THE RUSSIAN FEDERATION

Republic of Sakha

Abyisky municipal district (ulus): p. Kebergene Mayyarskogo national rural settlements

Aldan municipal district (ulus): Hatystyr villages and rural settlements Ugayan Belletskogo (naslega), p. Kutan Anaminskogo rural settlement (naslega)


Mirnyi municipal district (ulus): p. Syuldyukyar Sadynskogo national rural settlements (naslega)


Neryungirinsky municipal district (ulus): p. Iengra lenglinskogo rural settlement (naslega)


SredneKolymsk municipal district (ulus): Berezovka Urodan Berezovsky and the national (nomadic) rural settlement (naslega)

Tomponsky municipal district (ulus): p. Poplar Tomponsky rural settlement (naslega)


Verkhoyanskiy municipal district (ulus): p. Ulakhan-Kuyol Tabalahskogo rural settlement (naslega)

Tungiro-Olekminsky municipal district: p. Deadlock rural settlement Tupikskoe, p. Zarechnoe Zarechenskaya rural settlements, villages Moklakan, Central Olekma, Gul inter-settlement municipal district


Kamchatsky krai

Vilyuchinsky municipal district
Village Palana
Petropavlovsk-Kamchatsky municipal district
Aleutian municipal district
Bystrinsky municipal district
Yelizovsky municipal district
Karaginsky municipal district
Milkovsky municipal district
Olyutorskij municipal district
Penzhinsky municipal district
Tigilsky municipal district
Sobolevskij municipal district
Ust-Bolsheretsky municipal district
Ust-Kamchatsky municipal district

**Primorsky Krai**

Krasnoarmeysky municipal district
Lazo municipal district
Olginsky municipal district
Pozharsky municipal district
Terneisky municipal district

**Khabarovsky Krai**

Municipal district of Khabarovsk
Municipal district of Komsomolsk-on-Amur
Amur municipal district
Bikin municipal district
Ayano-Maisky municipal district
Vaninskiy municipal district
Verkhnebureinskiy municipal district
Vyazemskij municipal district
Komsomolsk municipal district
The municipal area Lazo
Nanai municipal district
Nicholaesvky municipal district
Okhotsk municipal district
The municipal area of Polina Osipenko
Sovetskaya Gavan municipal district
Solnechny municipal district
Tuguro-Chumikansky municipal district
Ulehsky municipal district
Khabarovsk municipal District

**Amur Region**

Zeisky municipal district (rural settlement Bomnasksky)
Mazanovsky municipal district (rural settlement Maisky)
Selendzhinsky municipal district (rural village Ivanovo)
Tyndinskiy municipal district (rural settlements Nyukzhinsky, Pervomaisky and Ust-Nyukzhinsky)

**Magadan region**

Olsky municipal district
Omsukchan municipal district (urban settlement of the village. Omsukchan, p. Merengue inter-settlement municipal district)
Severo-Evensky municipal district
Srednekansky municipal district (urban settlement of the village Seimchan, rural settlement with. Kolyma)
Tenkinskiy municipal district (p. Orotuk inter-settlement municipal district)
Khasynsky municipal district (urban settlement of the village Palatka)

**Sakhalin Region**

Municipal district of Aleksandrovsk-Sakhalin
Nogliksky municipal district
Okhynsky municipal district
Poronajsky municipal district
Smirnykhovsky municipal district (p. Buyukly)
Tymovsky raion municipal district
Yuzhno-Sakhalinsk municipal district

Chukotka Autonomous Okrug

Municipality of Anadyr
Central municipal district
Bilibinsky municipal district
Vostochny municipal district
Providensky municipal district
Chaunsky municipal district
Chukotka municipal district

List of traditional economic activities of indigenous MINORITIES OF THE RUSSIAN FEDERATION

1. Herding, including nomadic (reindeer, horse, yak, sheep).
2. Processing of animal products, including the collection and processing of leather, wool, hair, horns, hooves, antlers, bones, endocrine glands, meat subproducts).
3. Dog breeding (breeding of dogs for herding, hunting and sled dogs).
4. Breeding of animals, processing and sale.
5. Apiculture, bee-keeping.
6. Fishing (including marine mammals) and sale of biological water resources.
7. Commercial hunting, processing and sale of hunting products.
8. Agriculture (horticulture), including medicinal plants.
9. Harvesting of wood and non-wood forest resources for their own needs.
10. Gathering (harvesting, processing and marketing of food forest resources, collection of medicinal plants).
11. Extraction and processing of common minerals for their own needs.
12. Art trades and crafts (blacksmithing and iron-craft, making utensils, equipment, boats, sleds, and other traditional vehicles, musical instruments, bark products, stuffed game animals and birds, souvenirs made of fur deer and game animals and birds, weaving of grasses and other plants, knitting of nets, bone carving, wood carving, sewing clothes and other national activities and crafts related to the processing of fur, skin, bone and other materials).
13. Construction of national traditional dwellings and other structures necessary for the implementation of traditional economic activities.
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Forest plan of Sakha for 2009-2018
Forest plan of Sakhalin region for 2009-2018
Forest plan of Kamchatka for 2009-2018
Executive order of the Government of the Russian Federation N631 R, 08/05/2008
Interviews with major stakeholders in the Russian Far East, March 2013
Rosleskhoz statistics of 2013
Moderns state of the forests of the Russian Far East and perspectives of their future use, under edition of A.P. Kovalev, Khabarovskiy, Dalniilh, 2009
WWF online interactive maps
Interactive maps of protected areas:
  for Primorsky http://hcvf-prim.kosmosnimki.ru/
  for Khabarovsk http://hcvf-khab.kosmosnimki.ru/
  for Amur http://hcvf-amur.kosmosnimki.ru/