



Working Report 2005-39

State of the Forests on Olkiluoto Island in 2004

Comparisons between Olkiluoto and the rest of Southwest Finland

**Jussi Saramäki
Kari T. Korhonen**

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STATE OF THE FORESTS ON OLKILUOTO ISLAND IN 2004

ABSTRACT

This report describes the permanent monitoring system, the basic tree and stand measurements, and the state of the forests on Olkiluoto Island in relation to corresponding areas in Southwest Finland. The area described represents 561 ha of forests. The trees on the permanent sample plot system were measured in accordance with the field manual of the National Forest Inventory. The forests in Olkiluoto are mainly intensively managed, commercial forests, apart from the Liiklanperä Nature Conservation Area which is not subjected to forest management. The soils are more fertile and the forests are younger than those on the average in Southwest Finland. The proportion of stands where the dominant tree species is Norway spruce is higher than that in Southwest Finland. Mixed stands are more common than in the comparison area. The stand volumes are similar, with the exception of the oldest age classes. The size class distributions are also similar to those in Southwest Finland. A higher proportion of the stands in Olkiluoto have been regenerated artificially compared to the situation in Southwest Finland in general. The silvicultural condition of the forests in Olkiluoto is better, and there are fewer cases of damage in the forests in Olkiluoto compared to Southwest Finland. The most common causes of damage were moose and storms. The frequency of silvicultural treatment in Olkiluoto has been markedly higher than that in Southwest Finland in general; 45% of the area had been treated during the last 10 years. The proportion of areas not treated during the last 30 years is higher than that in Southwest Finland. The proportion of regeneration areas that have been ploughed is also higher than elsewhere in Southwest Finland. About 10% of the total area of the island has been drained, and undrained mires cover 17 ha. The biodiversity situation in Olkiluoto is better than that in Southwest Finland in general due to the long shoreline and the presence of the nature conservation area.

Keywords: environmental monitoring, permanent sample plot, forest condition

METSIEN TILA OLKILUODOSSA VUONNA 2004

TIIVISTELMÄ

Raportissa esitetään Olkiluodon metsien seurantajärjestelmän pysyvä koealaverkko, perustamismittaukset ja kuvataan Olkiluodon metsien nykytila suhteessa vastaaviin metsiin Lounais-Suomen metsäkeskuksen alueella. Kuvattava alue kattaa 561 ha metsää. Pysyvän koealaverkon puut mitattiin samaan tapaan kuin koealat valtakunnan metsien inventoinnissa. Olkiluodon metsät ovat pääosin intensiivisesti hoidettuja talousmetsiä. Poikkeuksena on Liiklanperän Natura-suojelualue, joka sisältää paljon lahoppuuta ja nostaa saaren biodiversiteetin tilaa. Metsät ovat keskimäärin hieman Lounais-Suomen muita metsiä rehevämpiä ja nuorempia. Vallitsevana puulajina on kuusi useammin kuin muualla Lounais-Suomessa. Sekametsiä on myös vertailualueita runsaammin. Puustojen tilavuudet ovat vanhimpia ikäluokkia lukuun ottamatta samankaltaisia sekä Olkiluodossa että Lounais-Suomessa. Puiden kokojakauma Olkiluodossa on hyvin lähellä alueen keskimääräistä. Metsiä on uudistettu Olkiluodossa useammin viljelemällä kuin Lounais-Suomessa yleensä. Metsien metsänhoidollinen tila on myös parempi kuin Lounais-Suomen metsien keskimäärin. Tuhotilanne on Olkiluodossa parempi kuin Lounais-Suomessa keskimäärin. Pahimpia tuhonaiheuttajia olivat hirvi ja tuuli. Alueen pinta-alasta on käsitelty 45% viimeisen 10-vuotiskauden aikana, mikä on merkittävästi enemmän kuin Lounais-Suomessa keskimäärin. Toisaalta yli 30 vuotta hakkaamatta olleita alueita on Olkiluodossa selvästi enemmän kuin Lounais-Suomessa. Uudistusalueet on aurattu useammin kuin muualla Lounais-Suomessa. Saaren koko pinta-alasta noin 10% on ojitettu. Ojittamattomia soita on jäljellä 17 ha. Olkiluodon biodiversiteetin tila on parempi kuin Lounais-Suomessa keskimäärin, mikä johtuu pitkästä rantaviivasta ja alueella olevasta suojelualueesta.

Avainsanat: ympäristön seuranta, pysyvät koealat, metsien tila

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FOREWORD

The report covers part of the work carried out to fulfil the requirements set by the Finnish authorities to monitor the environment on Olkiluoto Island around the site of the final depository of spent fuel from the nuclear power plants. The Finnish Forest Research Institute (METLA) has been selected to carry out most of the environmental monitoring of the forest ecosystems. The monitoring is planned and executed jointly with POSIVA and METLA personnel. Several persons have participated in the planning and execution of the inventory work at different stages. The authors would like to acknowledge the contribution of Ari Rynnänen, Aimo Jokela, Ari Kokko, Hannu Latvajärvi and Taisto Jaakola for leading the field groups. Several field assistants made the collection of data possible. The time-consuming work of registering the collected field data, and consequent checking the data, supervised by Olli Seppälä and Anita Hiltunen, is also greatly acknowledged. The work was organised and supervised by the project co-ordinator Lasse Aro who also deserves thanks. The final check of the report was performed by Reija Haapanen from Haapanen Forest Consulting. Several other persons not mentioned in the above have also contributed to successfully completing this report, and we gratefully acknowledge their contribution.

1 INTRODUCTION

Monitoring the land environment on Olkiluoto Island is divided into three different levels, as described in the POSIVA monitoring programme (Raitio et al. 2005). Assessment of the vegetation types (Miettinen & Haapanen 2002) and forest resources on the island (Rautio et al. 2004) form the first level of monitoring. The second level consists of the establishment of the basic forest monitoring grid, based on the mapping of the vegetation and forest resources. The continuous forest inventory project was originally outlined by Saramäki, Raitio and Haapanen in 2001 in an unpublished report, and further modified during the initial phases by Raitio et al. (2005). The grid, called POSIVA FET (Forest Extensive Monitoring Plot; Figure 1), allows changes in the environment to be followed at regular (5 to 10 year) intervals. The third level of monitoring comprises intensive monitoring, whereby a number of intensively (daily, weekly) monitored sample plots have been established on representative sites on the island. The parameters measured include, for example, deposition, chemical composition of the plants and soil, plant community structure, and forest characteristics.

The basic forest monitoring allows continuous follow up of the environment and its comparison with corresponding areas located in other parts of Finland. Changes in the vegetation, soil, and forests will be of particular interest. In the initial stages the monitoring only describes the present situation but, following repeated measurements, changes in the environment can be detected and consequently modelled. Any deviations from the expected development will also be identified and their causes studied. Starting the monitoring before any construction or other operations have been carried out provides a reliable control period before the final use of the area begins.

A statistically reliable picture of the current state of the tree stands, vegetation and soil is required when monitoring the environment. A sample of the tree stands, vegetation, and soil is to be inventoried in order to provide a basis for monitoring the current state and future changes. The sampling will be carried out systematically because, according to a number of studies (e.g. Nyysönen et al. 1967, 1971), this is more effective than random sampling. Based on earlier studies (e.g. Nyysönen 1954, Tapion Taskukirja 1997), we can assume that, for an area the size of Olkiluoto Island, the current main characteristics of the tree stands can be described to a sufficient accuracy and growth can be monitored reliably by locating the sample plots at a distance of 100 meters. The selected sample plot density can be reduced with respect to the vegetation cover measurements and soil sampling due to the high costs of vegetation and soil sample collection and analysis. The variability of the vegetation and soil are known to be greater than that of forest characteristics. If the sample has to be divided into a large number of small strata, the reliability of the individual strata will be reduced. For example, the strata for individual deciduous species are relatively small and thus the accuracy will decrease. As will be explained later on in this report, the selected sample intensity was not large enough to reach the set targets in the case of the smaller strata especially.

The systematic observation plot inventory consists of the following stages: 1) tree stand measurements, 2) vegetation coverage analysis, and 3) plant and soil sampling for chemi-

cal and physical analyses. This report describes the first part – the tree stand measurements. It describes the area using the classification of Finnish National Forest Inventory (NFI) and compares the results with standard, regional NFI figures of the Southwest Finland Forestry Centre (later Southwest Finland; Korhonen et al. 2000; Figure 1). As the monitoring grid is to be a permanent grid, no destructive tree sampling (e.g. boring of trees for increment samples) was performed. As a result, no growth figures are presented because they would have to be based on growth models and thus not very accurate. Unlike in the compartment-wise inventory, completed in 2003, no recommendations concerning future forestry operations are given here as they would be of statistical interest only.

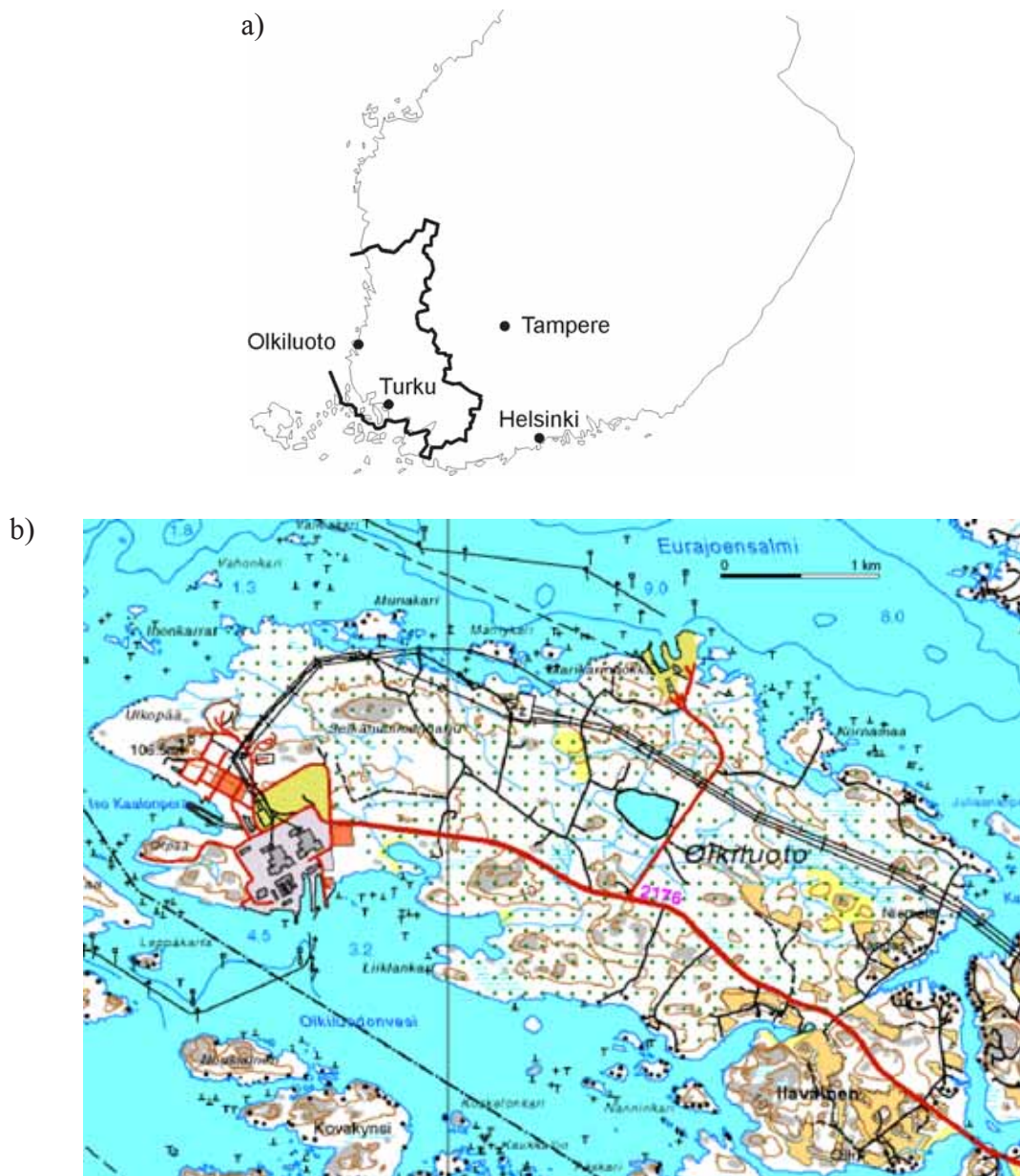


Figure 1. Location of Olkiluoto Island in the Southwest Finland Forestry Centre (a) and permanent monitoring grid of Olkiluoto (b).

2 FIELD MEASUREMENTS

The field measurements were carried out during summer 2004. Grid intersection points located within the depository construction area, as well as points located below power lines, were excluded from the assessments. Furthermore grid middle points on the treeless wetland areas near the sea were also omitted from the measurements.

Field measurement of the tree stand variables is based on the use of three concentric circular sample plots of fixed radius (Figure 2). The sample plot size depends on the breast height diameter of the trees. The plot sizes for trees of different diameter classes are presented in table 1.

If a compartment border runs through the sample plot then the border is temporarily marked on the ground and on the sample plot map. The location of the trees is mapped by determining the direction and distance from the centre point of the plot. The trees are marked with a paint spot at a height of 1.3 meters on the side of the tree facing the centre point.

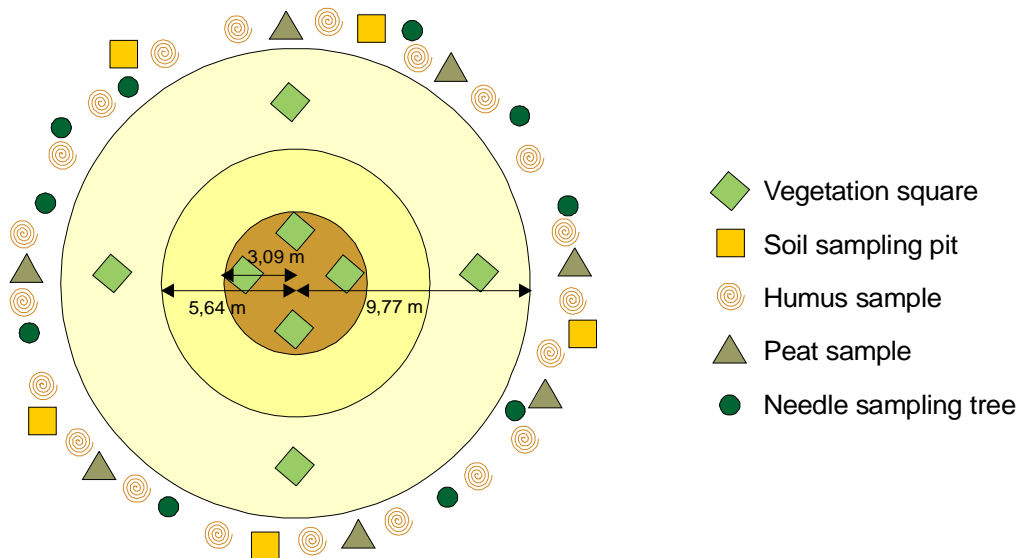


Figure 2. Schematic diagram of the sample plot and sampling points on the plot.

Table 1. Radius (m) and total area (m²) of the sample plot and the breast height diameter (DBH) of the measured trees (cm).

Radius, m	Total area, m ²	DBH, cm
9.77	300	> 4.5
5.64	100	2.5 – 4.5
3.09	30	< 2.5

The tree variables listed in table 2 are determined on the trees, depending on the state of the tree: living tally tree, dead standing tree or dead tree lying on the ground.

Every 7th tally tree with a diameter of over 4.5 cm and every 14th tree with a diameter of less than 4.5 cm are measured as a sample tree. Sample tree selection continues over consecutive sample plots. The sampling density of trees is determined on the basis of the results of the inventory by forest compartment. In addition to tally tree information, the sample tree variables (Table 2) are estimated or measured in accordance with the field manual of the National Forest Inventory.

Table 2. Variables measured on living tally trees, dead standing trees, dead trees lying on the ground (snag), and sample trees. The variables are estimated and measured in accordance with the manual of the National Forest Inventory (NFI9).

All trees	Dead standing trees	Dead trees lying on the ground	Sample trees
The number of the compartment in which the tree is located	Tree species	Tree species	Age ¹⁾
	Appearance of the tree	Appearance of the tree	Mode of regeneration
Direction and distance from the centre point of the sample plot	Coverage of bark	Coverage of bark	Upper diameter (6.0 m) of trees over 8 m in height
	Degree of decay	Snag class	Dead branch limit
Tree species Diameter at breast height	Diameter at breast height	Degree of decay	Lower limit of living crown
Tree class	Height	Diameter at stump height	Height
Crown layer		Crown diameter	Length of broken stem
		Length	Damage symptoms Time of damage occurrence Cause of damage Degree of damage

¹⁾ either from regeneration records, or by counting the number of branch whorls, or measured from increment cores taken outside the plot.

Table 3. Components of the measurement packages.

Measurement package 1	Measurement package 2
Form of use	Main site type
Land class	Mixed site type
Land sub-class	Site type
Soil type	Stoniness
Thickness of peat layer (on peatlands)	State of drainage
	Drainage carried out
State of drainage (on peatlands)	Time of drainage
	Ditch spacing
Site type	Condition of ditches
Forest or peatland site type	Number of tree storeys
Development class of stand	Position of storey
Quality of the stand	Development class
Special characteristics	Mode of regeneration
Tree species	Proportion of viable artificially regenerated seedling
Damage	Dominant tree species
Measures	Proportion of 1 st sub-tree species
Stand information:	Proportion of 2 nd sub-tree species
Tree species	Proportion of conifers 1
Tree storey	Proportion of conifers 2
Mode of regeneration	Stem number
Stem number	Total number of seedlings
Basal area	Age at breast height
	Damage symptom
Diameter	Time of occurrence of damage
Mean height	Cause of damage
Age	Beard lichens
Dead branch limit	Foliose lichens
	Crustose lichens
	Quality of tree stand
	Cause of decrease in quality
	Felling carried out
	Time of fellings
	Site preparation
	Time of site preparation
	Silvicultural measures carried out
	Time of silvicultural measuresd

3 CALCULATION OF THE RESULTS

The results are calculated using the methodology of the National Forest Inventory, which is described in detail in Tomppo et al. (1998). The results can be divided into area and volume estimates and their reliability. The area proportions are estimated on the basis of proportions of sample midpoints. For instance, the proportion of mineral soils out of the area of forest land is calculated by dividing the number of sample midpoints on mineral soils by the total number of sample midpoints on forest land. As every sample point represents one hectare, the estimate of total areas by sub classes equals the number of sample points per sub classes.

Volume estimates are calculated on the basis of the measured sample and tally trees. The volumes of timber assortments are estimated first for sample trees using the volume and stem curve models by Laasasenaho (1982). The volumes of the sample trees will then be generalised to tally trees such that k of the most similar sample trees are selected for every tally tree from the sample trees, based on the common tree and stand measurements (e.g. DBH, tree species). Then the necessary mean characteristics are calculated from the dimensions of these most similar sample trees.

The sampling errors were estimated using the grouping method originally developed by Matèrn (1960, see also Tomppo et al. 1998).

4 RESULTS

The main findings of the inventory are presented in the following chapters. The detailed inventory results are presented in the appendices.

4.1 Distribution of land

Forestry land is divided into forest land, scrub land and waste land according to its capacity to produce wood volume. On forest land the mean annual increment using a standard rotation period is $1.0 \text{ m}^3/\text{ha}/\text{year}$ or more, on scrub land between $0.1 - 0.99 \text{ m}^3/\text{ha}/\text{year}$, and on waste land under $0.1 \text{ m}^3/\text{ha}/\text{year}$. Forest roads and depots also belong to forestry land. The total inventoried area is 561 ha (Figure 3). The distribution of land areas in Olkiluoto and the Southwest Finland Forestry Centre are given in Appendix table A-1.

Most of the inventoried area in Olkiluoto is forestry land, with small proportions of other land uses. It should be noted that built-up areas on Olkiluoto Island were excluded from the inventory area. The scrub land and waste land proportions are close to the regional average (Figure 4).

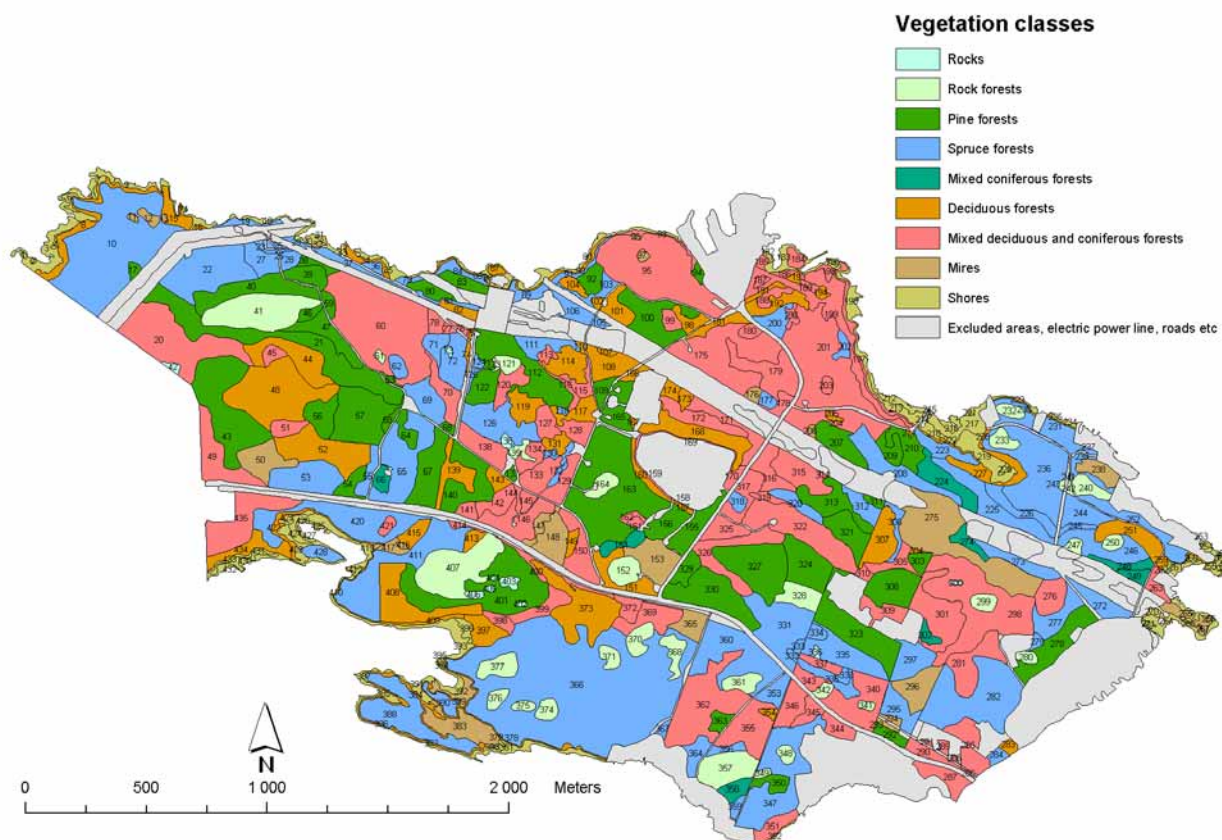


Figure 3. Vegetation classes of Olkiluoto (Miettinen & Haapanen 2002).

The vegetation classes in Olkiluoto are, on the average, slightly more fertile than in Southwest Finland (Figure 5). However, the differences are not very marked. Grove-like and fresh mineral soil sites are more frequent in Olkiluoto than in Southwest Finland.

The relative area of mires in Olkiluoto is less than that in Southwest Finland on the average. As the area has been under active management, the proportion of undrained mires is lower than in Southwest Finland (Figure 6). However, the ditches are relatively recent and the drainage situation of the mires is still changing.

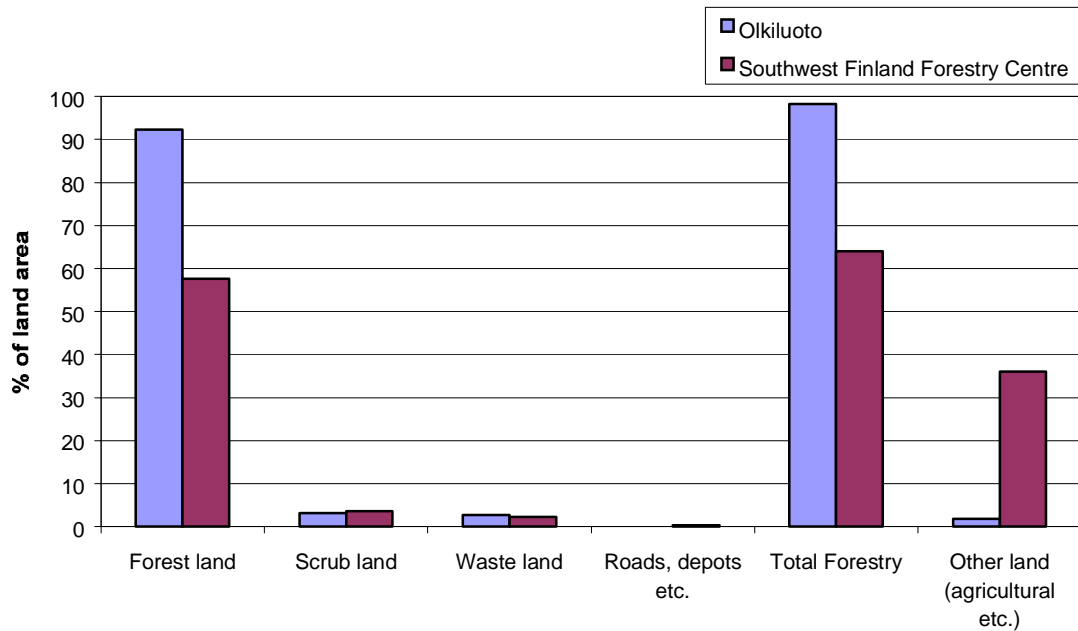


Figure 4. Distribution of land area in Olkiluoto and in the Southwest Finland Forestry Centre.

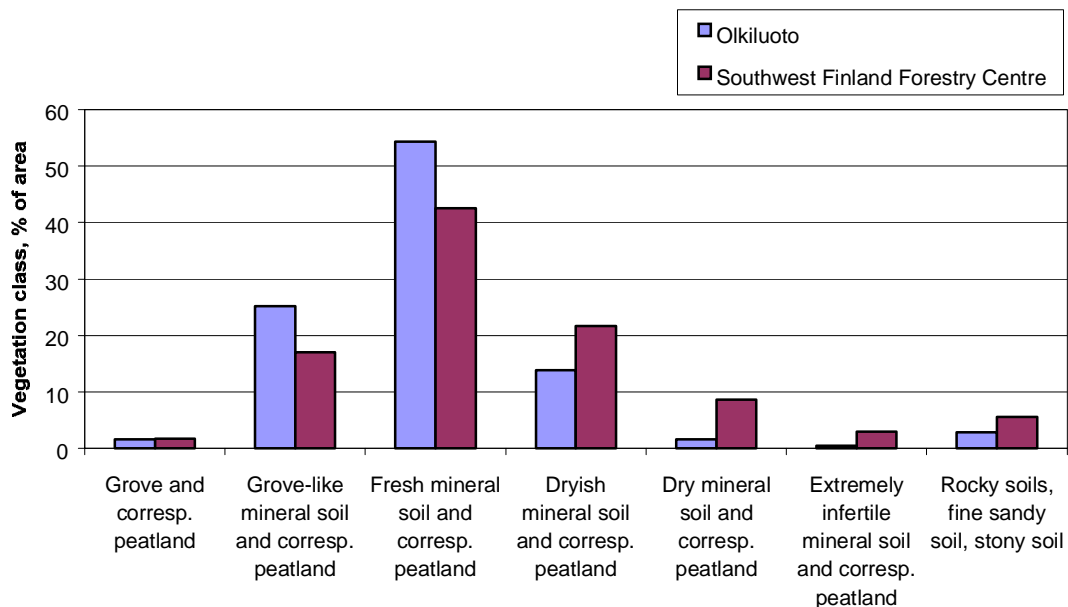


Figure 5. Distribution of forest land, scrub land and waste land into vegetation classes.

4.2 Tree species dominance

The tree species distribution differs from that of Southwest Finland mainly in the greater dominance of spruce and deciduous species. The coastal black alder forest stands are characteristic of the area (Figure 7). The proportion of pine-dominated forests is clearly lower than in Southwest Finland. The reason for this shift is mainly the higher fertility of the soils in Olkiluoto. More demanding spruce and deciduous tree species dominate on more fertile soils.

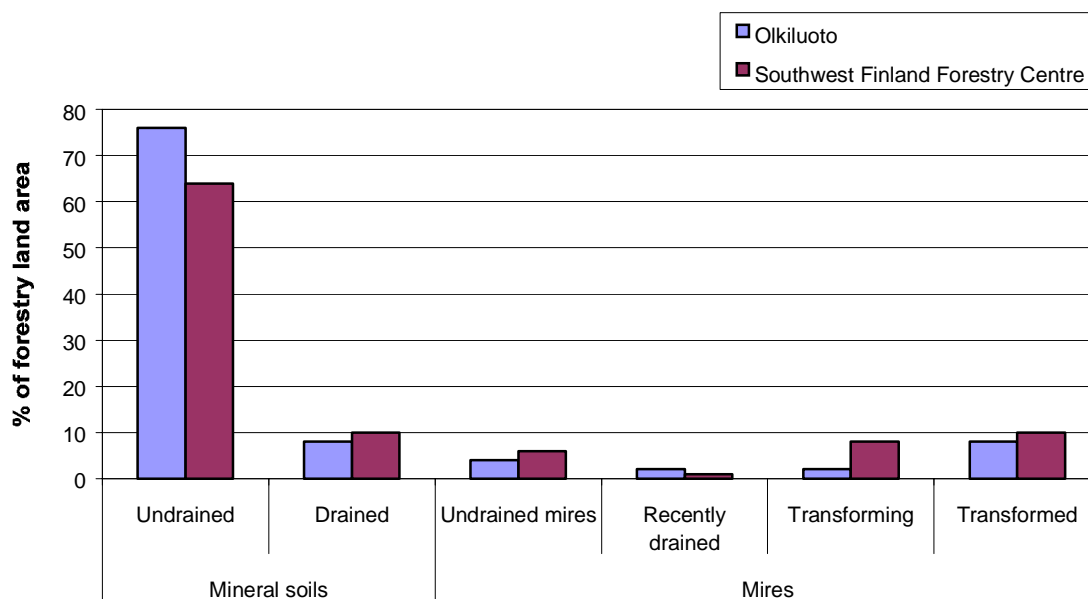


Figure 6. Drainage situation in Olkiluoto and the Southwest Finland Forestry Centre.

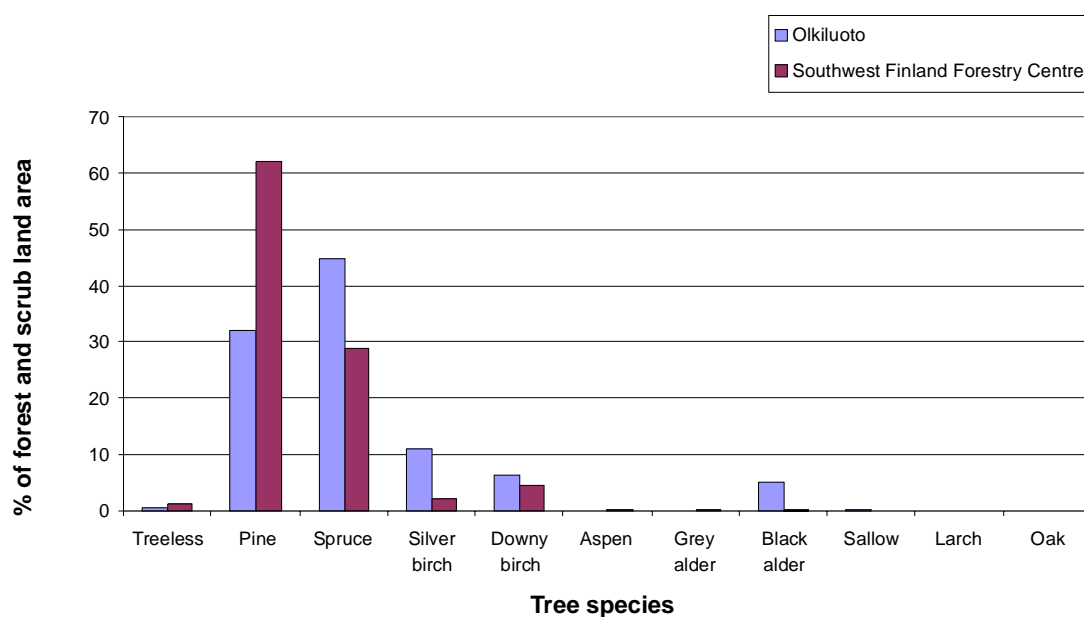


Figure 7. Dominance of tree species on forest and scrub land in Olkiluoto and the Southwest Finland Forestry Centre.

There are less pure single species stands in Olkiluoto than in Southwest Finland generally (Figure 8). The proportion of mixed forests is correspondingly higher. This phenomenon is also a consequence of the more fertile soils and relatively high proportion of the coast line where primary forests still dominate.

4.3 Age and development classes

The forests of Olkiluoto are generally younger and belong to earlier development stages than the forests in Southwest Finland. While in Southwest Finland one third of the forests are less than 40 years old, the corresponding figure for Olkiluoto is close to two thirds. Forests of over 120 years of age are almost completely absent from Olkiluoto, whereas their proportion in Southwest Finland is measurable (Figure 9). The same phenomenon can be seen in figure 10, where young thinning stands constitute about 40% of the total forest area.

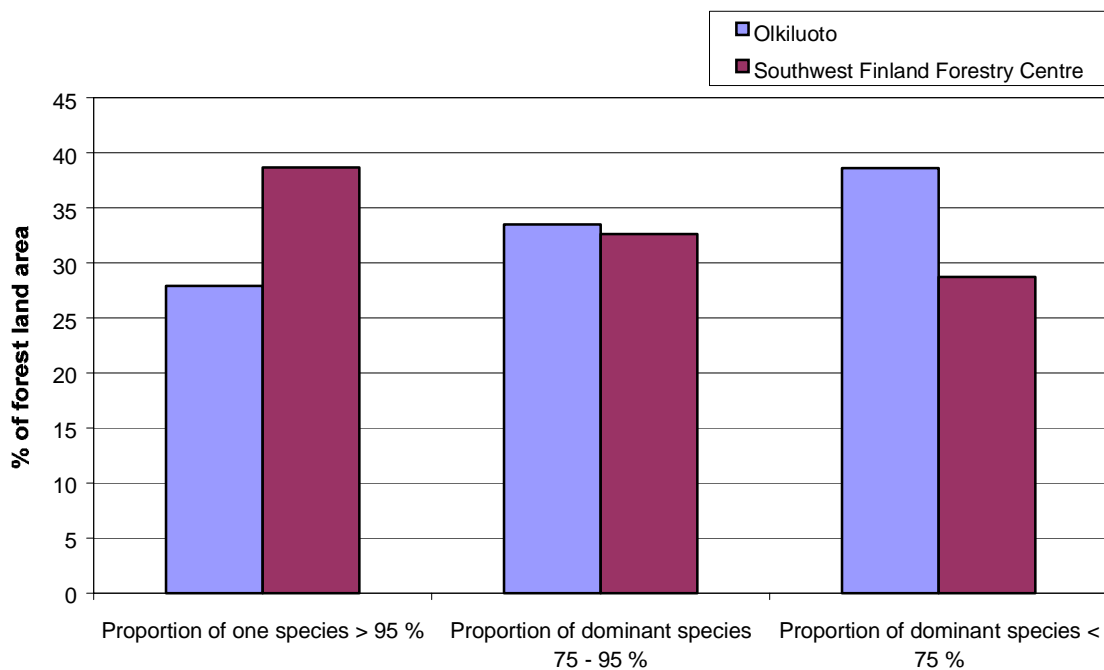


Figure 8. The proportion of pure single species stands and mixed stands on forest land in Olkiluoto and in the Southwest Finland Forestry Centre.

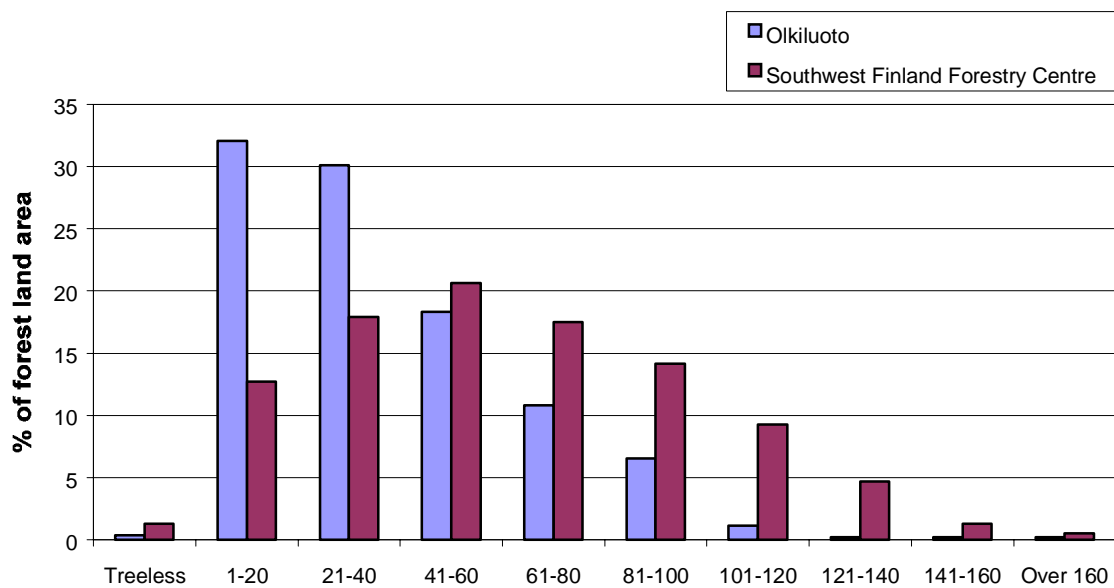


Figure 9. Distribution of forests into age classes in Olkiluoto and the Southwest Finland Forestry Centre.

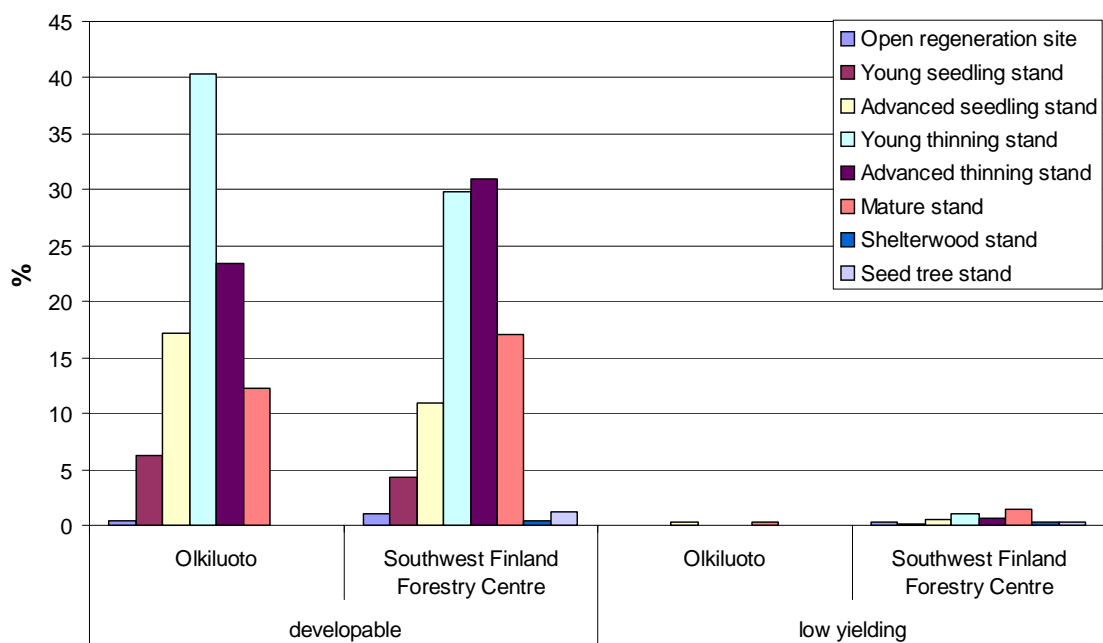


Figure 10. Distribution of forests into different development classes in Olkiluoto and the Southwest Finland Forestry Centre.

4.4 Stand structure and volume

The mean volumes of different age classes are rather similar in Olkiluoto and in Southwest Finland (Figure 11), apart from the oldest age classes that are poorly represented in Olkiluoto and are restricted to the old forests in the nature conservation area. The clustering of the oldest age classes into a separate unmanaged region creates a peak in the mean volumes of these classes.

The distribution of volume between tree species follows the distribution of area by dominant tree species and in Olkiluoto includes more spruce, silver birch and other broadleaved trees than is generally the case in Southwest Finland (Figure 12).

Stem size distribution in Olkiluoto does not differ very much from the average for Southwest Finland (Figure 13). Most of the stems are in the smallest diameter classes. The average number of stems on forest and scrub land in Olkiluoto is 3 288 stems/ha and in Southwest Finland 3 332 stems/ha. Downy birch is the most frequent species both in Olkiluoto and Southwest Finland. In both areas about half of the stems are also less than 2 cm in diameter at breast height. Within conifers there was a clear difference between the areas. In Olkiluoto, the number of pines per hectare was about one third of the number in Southwest Finland, while the number of spruces was slightly more than in Southwest Finland. The number of silver birches was also much higher in Olkiluoto than in Southwest Finland on the average.

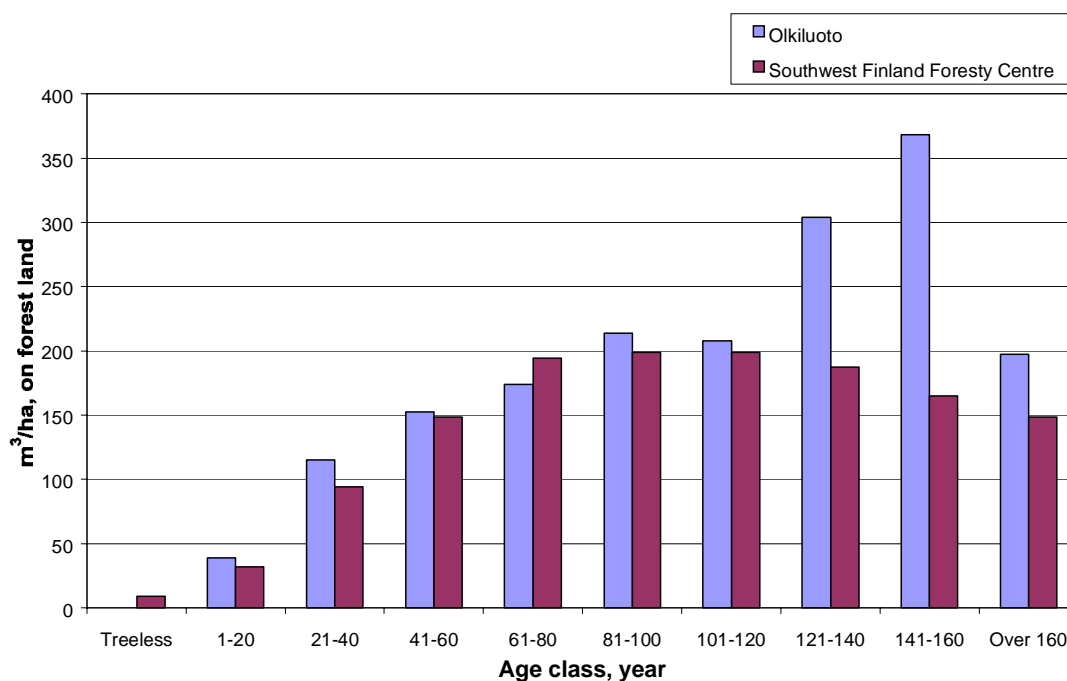


Figure 11. Mean volumes by age classes in Olkiluoto and the Southwest Finland Forestry Centre.

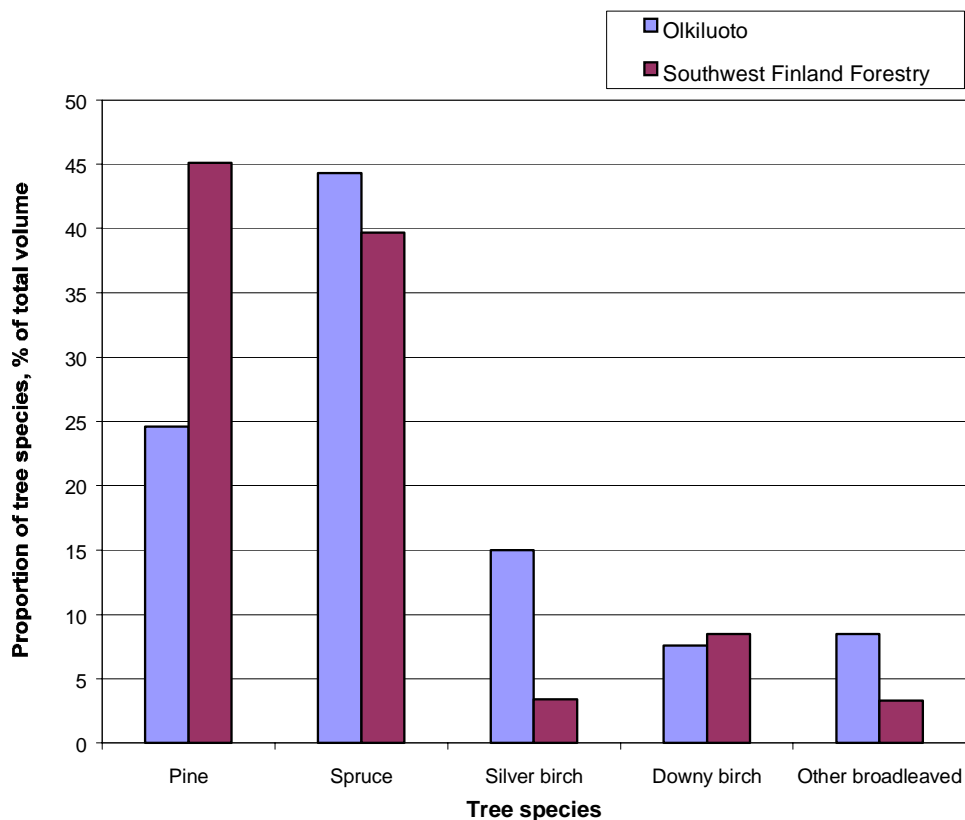


Figure 12. Distribution of total volume by species on forest and scrub land in Olkiluoto and the Southwest Finland Forestry Centre.

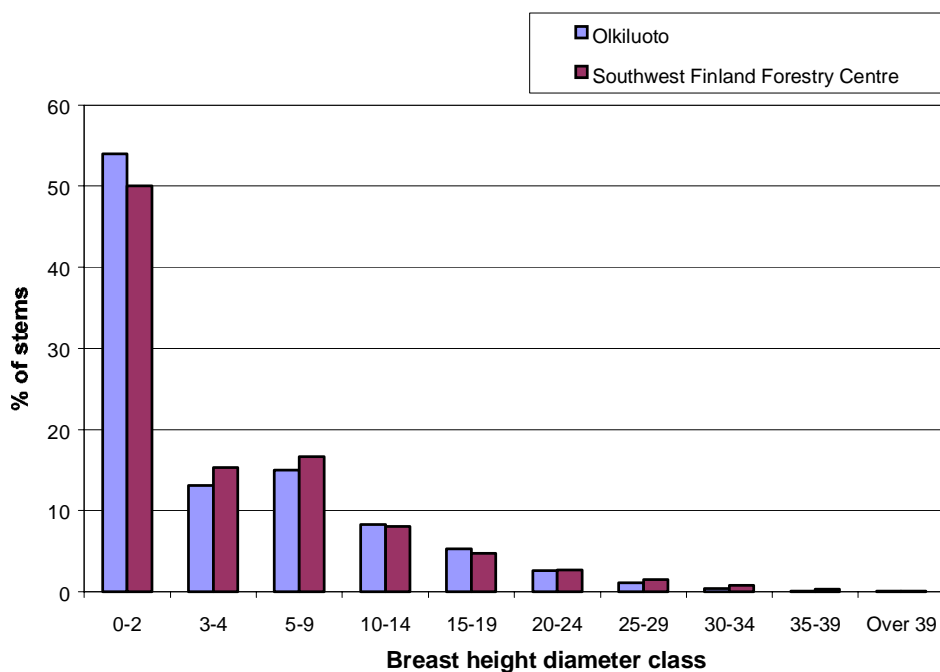


Figure 13. Stem size distribution on forest and scrub land in Olkiluoto and in the Southwest Finland Forestry Centre.

4.5 Silviculture and regeneration

The silvicultural condition of the forests in Olkiluoto is better than that in Southwest Finland on the average (Figure 14). There is a very small proportion of low yielding stands in Olkiluoto. As the area is under intensive management the proportion of artificially regenerated young stands in Olkiluoto (48%) is greater than the corresponding figure in Southwest Finland (32%). However, the percentage of failed artificial regeneration is higher in Olkiluoto than in Southwest Finland. The number of viable seedlings in all the seedling stands was greater in Olkiluoto compared to the case in Southwest Finland.

A lack of silvicultural management and poor technical quality of the growing stock are the most common reasons for decreased quality in Olkiluoto, whereas unevenness of forest stand and damage are the main factors decreasing quality in Southwest Finland (Figure 15). Overall, most of the forests in Olkiluoto have been subjected to good management and can be regarded as being in a good condition. There are no known threats to the forests, because damage caused by moose also seems to be at low level despite the fact that the moose population on the island is high.

4.6 Damage

In Olkiluoto the area of undamaged forest stands (76.4%) was higher than in Southwest Finland (63.2%) (Table 4.). The difference is mainly due to the fact that the amount of mild damage in Southwest Finland is about 17 percentage points greater than in Olkiluoto. Also the proportion of undamaged deciduous trees in Olkiluoto is significantly higher than in Southwest Finland. The main cause of damage in Olkiluoto is moose, followed by wind (Table 5). In Southwest Finland the greatest cause are fungi followed by human activities.

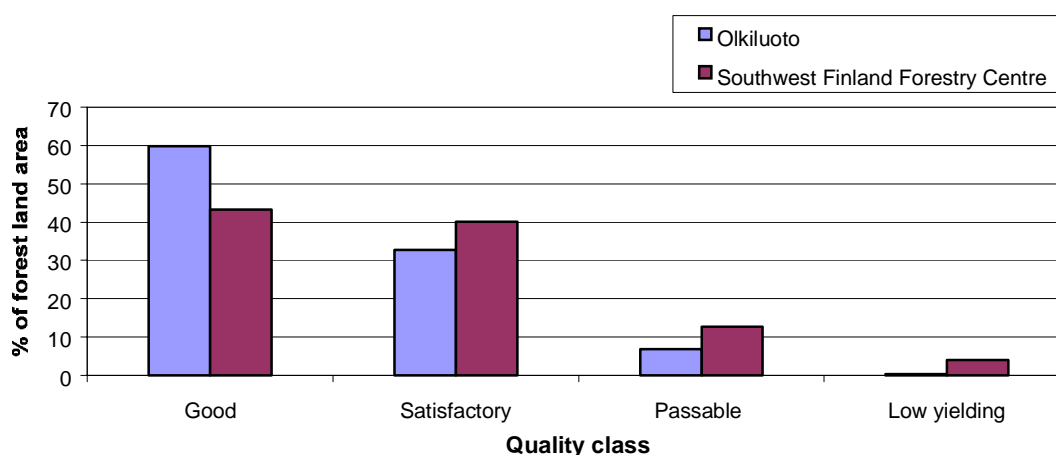


Figure 14. The quality of forest stands on forest land in Olkiluoto and the Southwest Finland Forestry Centre.

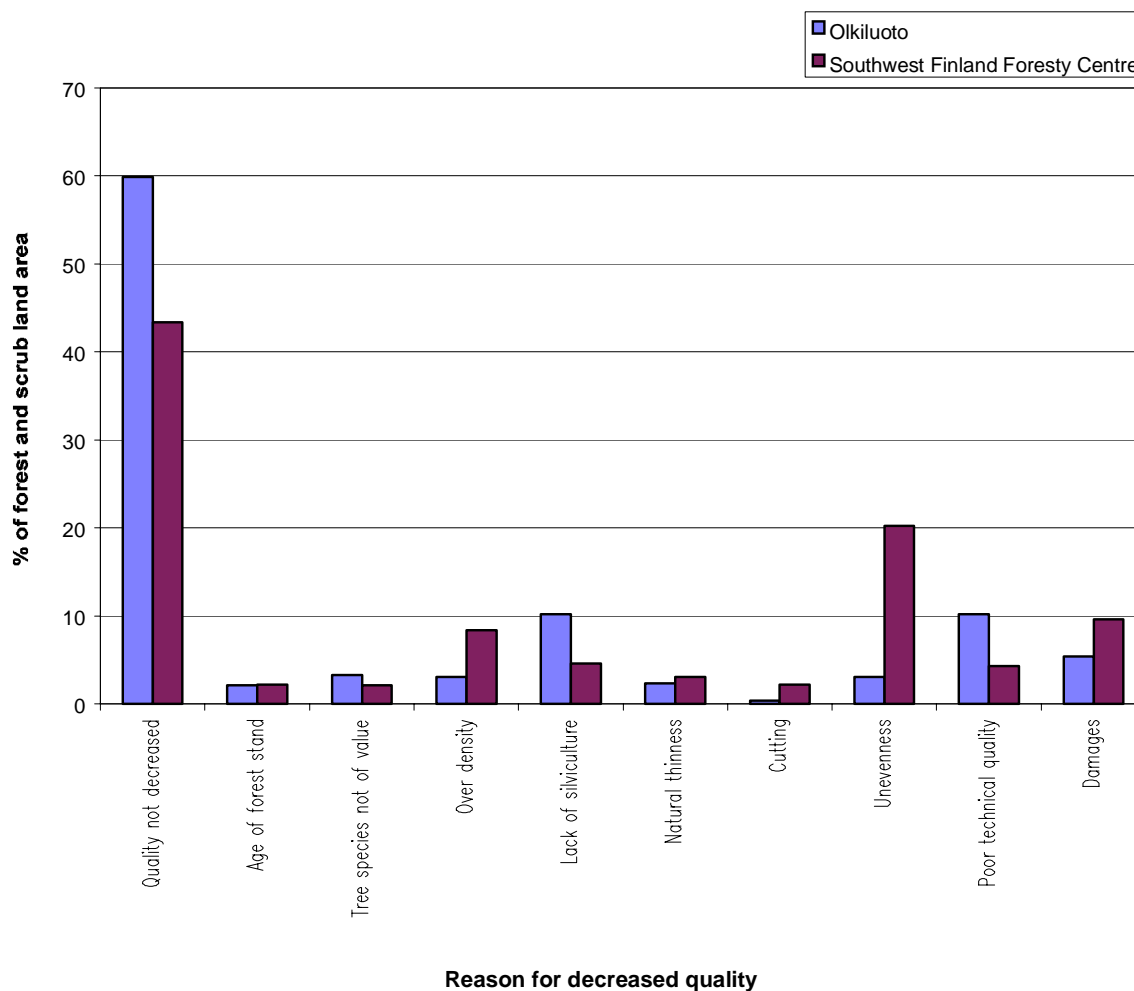


Figure 15. The reasons for a decrease in quality in Olkiluoto and the Southwest Finland Forestry Centre.

Table 4. Degree of damage by dominant tree species on forest land in Olkiluoto.

Degree of damage	Dominant tree species									
	Treeless		Pine		Spruce		Deciduous		Forest land total	
	ha	%	ha	%	ha	%	ha	%	ha	%
Mild	0	0	5	3.2	17	7.1	6	5	28	5.4
Noticeable	0	0	17	10.8	30	12.6	17	14.2	64	12.4
Serious	0	0	7	4.4	5	2.1	13	10.8	25	4.8
Complete	0	0	0	0	2	0.8	3	2.5	5	1
No damage	2	100	129	81.6	184	77.3	81	67.5	396	76.4
Total	2	100	158	100	238	100	120	100	518	100

Table 5. Causes of damage by the degree of damage on forest land in Olkiluoto.

Cause of damage		Mild		Noticeable		Serious		Complete		Total	
		ha	%	ha	%	ha	%	ha	%	ha	%
Abiotic damage	Total	8	28.6	19	29.7	3	12.0	1	20.0	31	6.0
	Wind	8	28.6	15	23.4	1	4.0	0	0.0	24	4.6
	Snow	0	0.0	1	1.6	0	0.0	0	0.0	1	0.2
	Other weather conditions	0	0.0	2	3.1	1	4.0	0	0.0	3	0.6
	Soil condition	0	0.0	1	1.6	1	4.0	1	20.0	3	0.6
Human activity	Total	1	3.6	0	0.0	0	0.0	0	0.0	1	0.2
	Other human activity	1	3.6	0	0.0	0	0.0	0	0.0	1	0.2
Animals	Total	5	17.9	13	20.3	22	88.0	3	60.0	43	8.3
	Moose	5	17.9	13	20.3	22	88.0	3	60.0	43	8.3
Fungi	Total	5	17.9	7	10.9	0	0.0	0	0.0	12	2.3
	Unrecognised fungus	3	10.7	2	3.1	0	0.0	0	0.0	5	1.0
	Annosum root rot	1	3.6	5	7.8	0	0.0	0	0.0	6	1.2
	Pine needle-cast fungus	1	3.6	0	0.0	0	0.0	0	0.0	1	0.2
Competition		5	17.9	8	12.5	0	0.0	1	20.0	14	2.7
No damage		-	-	-	-	-	-	-	-	396	76.4
Unknown		4	14.3	17	26.6	0	0.0	0	0.0	21	4.1
Total		28	100.0	64	100.0	25	100.0	5	100.0	518	100.0

Table 6. The appearance of damage by the degree of damage on forest land in Olkiluoto.

	Degree of damage									
	Mild		Noticeable		Serious		Complete		Phenotype total	
	ha	%	ha	%	ha	%	ha	%	ha	%
Dead standing	2	14.3	10	71.4	2	14.3	0	0	14	2.7
Fallen	8	29.6	17	63	2	7.4	0	0	27	5.2
Rot	1	33.3	2	66.7	0	0	0	0	3	0.6
Stem damage	2	50	1	25	1	25	0	0	4	0.8
Resin flow	0	0	1	100	0	0	0	0	1	0.2
Tops broken	1	10	2	20	3	30	4	40	10	1.9
Top damage	1	4.3	9	39.1	13	56.5	0	0	23	4.4
Form defects	1	8.3	11	91.7	0	0	0	0	12	2.3
Branch damage	2	50	1	25	1	25	0	0	4	0.8
Defoliation	6	33.3	9	50	3	16.7	0	0	18	3.5
Discoloration	4	80	1	20	0	0	0	0	5	1
Multiple damage	0	0	0	0	0	0	1	100	1	0.2
No damage	0	0	0	0	0	0	0	0	396	76.4
Total	28	5.4	64	12.4	25	4.8	5	1	518	100

The appearance of damage in Olkiluoto has most often been dead standing or fallen trees (Table 6). Also top damage and defoliation are significant. In Southwest Finland form defects are the most common appearance of damage, followed by dead standing and fallen trees, and top damage. However, the damage situation in Olkiluoto is generally not alarming and it is better than the situation in the rest of Southwest Finland.

4.7 Past management actions

During the past ten-year period, there have been cuttings on 45% of the forests in Olkiluoto (Figure 16). The cuttings include cleaning and precommercial thinnings of seedling stands. The management intensity in general has been high because the proportion of precommercial thinnings and cleaning of seedling stands is about 40% of the whole cutting area (Figure 17). The total area treated during the last 10 years is also higher than the average for Southwest Finland. More of the regeneration cuttings have been for artificial regeneration than for natural regeneration, which also highlights the high management intensity in Olkiluoto.

The activities in Olkiluoto have been concentrated in recent years compared to Southwest Finland, where the treatments have been distributed more evenly (Figure 18). In Olkiluoto, the area that has not been treated within 30 years is high due, in part, to the nature conservation area. In Southwest Finland 22% of the forest land has not been treated during the last 30 years, while in Olkiluoto the corresponding figure is 52%. In addition, the whole of the scrub land area in Olkiluoto has remained untouched for the past 30 years.

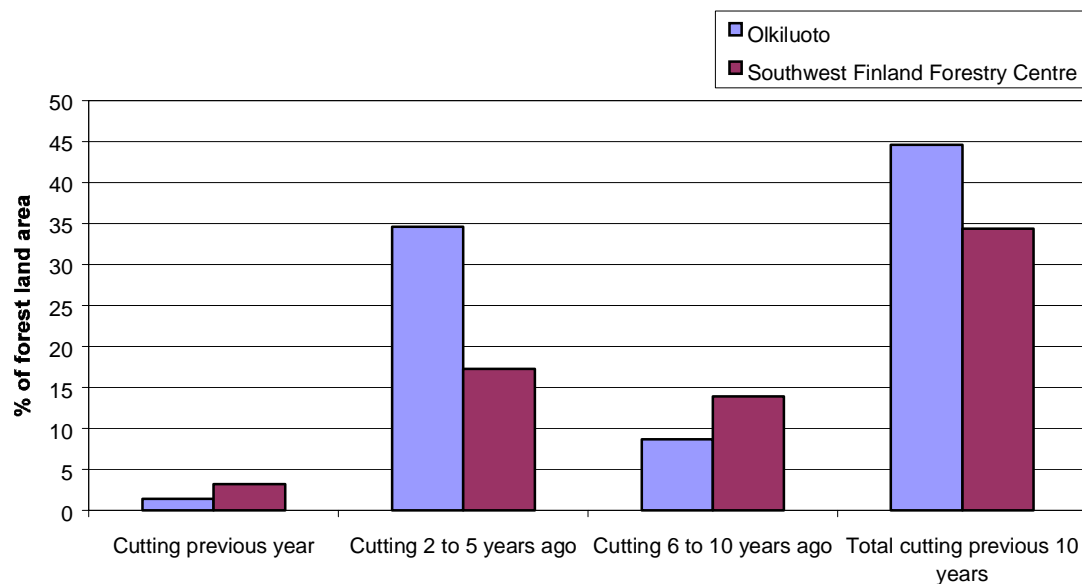


Figure 16. Area and timing of recent cuttings in Olkiluoto and in the Southwest Finland Forestry Centre.

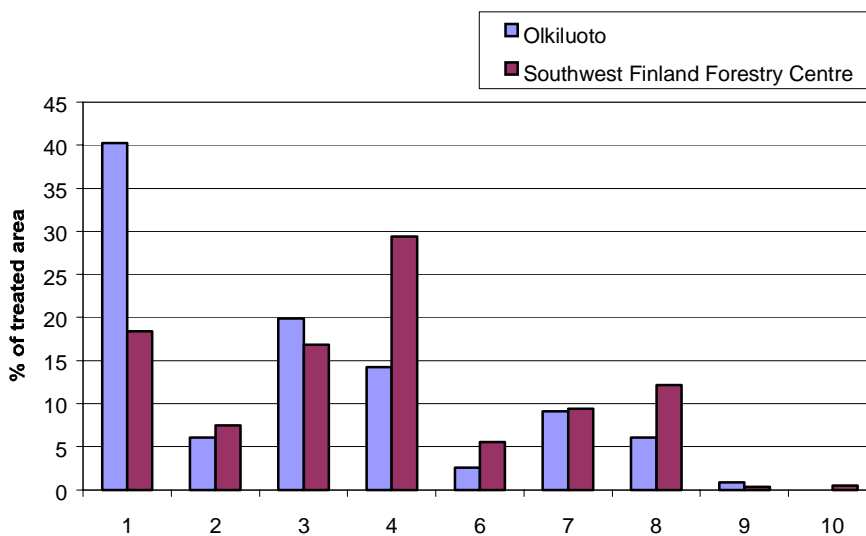


Figure 17. Distribution of cuttings by harvesting type.

Type of cutting

0 = no cutting in 10 years

1 = cleaning or precommercial thinning of seedling stand

2 = Removal of overstorey trees

3 = First thinning

4 = Other thinning

5 = -

6 = Special cutting e.g. removal of trees from road or drainage lines

7 = Regeneration cutting for artificial regeneration

8 = Regeneration cutting for natural regeneration

9 = Shade tree cutting

10 = Selection cutting

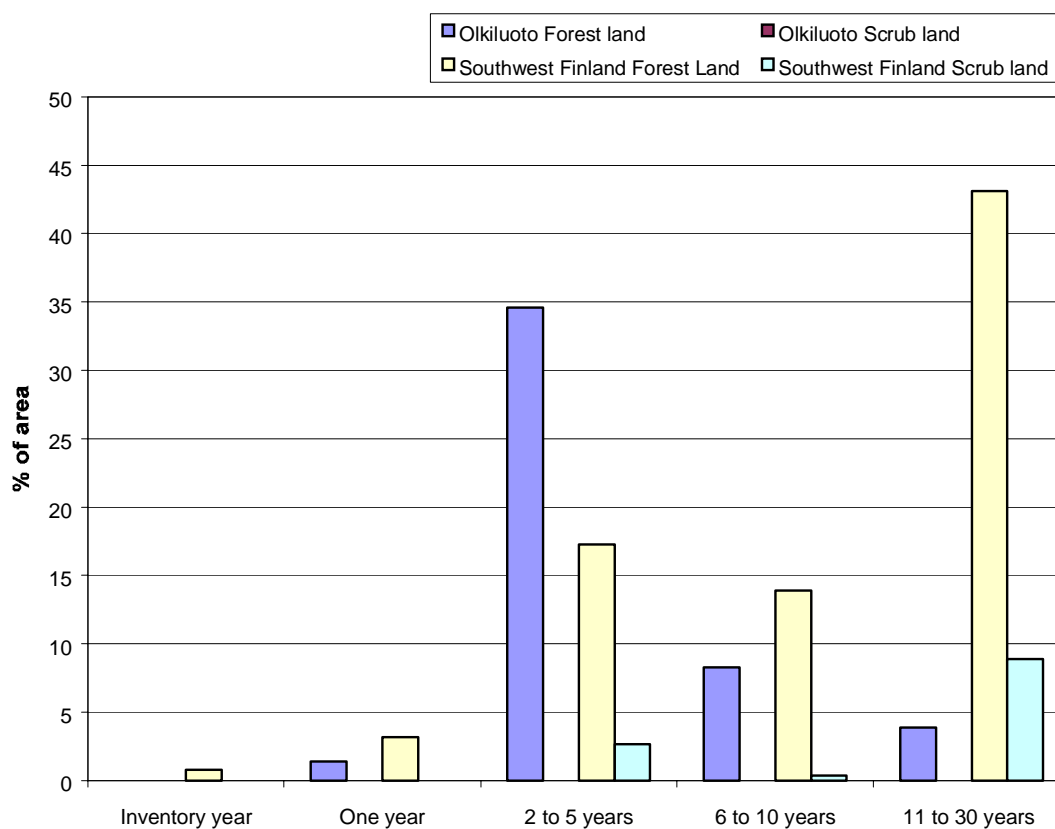


Figure 18. Time since last cutting in Olkiluoto and in the Southwest Finland Forestry Centre.

In concordance with the timing of the treatment, regeneration has also been concentrated in the last 2- to 5-year period (Figure 19). In Southwest Finland there has been some supplementary planting, but none in Olkiluoto. Neither has there been any pruning. Most of the site preparation has been light tilling throughout Southwest Finland, but, due to the high proportion of state ownership in Olkiluoto, there has been more ploughing and less hummocking in Olkiluoto than in Southwest Finland (Table 7). In Olkiluoto half of the site preparation has taken place more than 10 years ago. In Southwest Finland the tilling activity has been spread more evenly over time.

In Olkiluoto the total drainage area is 57 ha (Table 8), representing slightly more than 10% of the total inventory area. There are still 17 ha of undrained mires. As normal the case nowadays, most of the recent drainage has been the cleaning of old ditches.

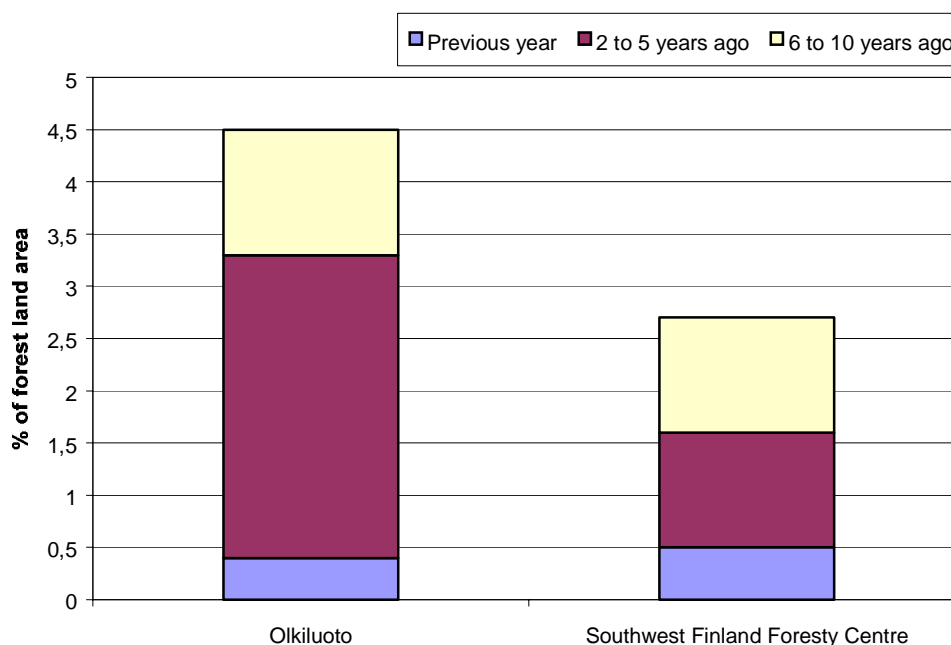


Figure 19. The area of artificial regeneration during recent years on forest land in Olkiluoto and in the Southwest Finland Forestry Centre.

Table 7. Distribution of relative site preparation area by tilling method.

	Light tilling	Ploughing	Hummocking	Prescribed burning	Total*
Olkiluoto	79.8	17.0	3.2	0.0	100
Southwest Finland	81.1	0.2	12.4	1.8	100

* total site preparation + burned area

Table 8. Drainage activities during the last 10 years and drainage 11 to 30 years ago.

	Mineral soils		Mires		Total	
	Forest land	Forest land	Scrub land	Waste land	Total	
Olkiluoto						
Forest drainage during 10 year period	ha	ha	ha	ha	ha	ha
New drainage	8	6	0	0	6	14
Cleaning of old ditches	15	28	0	0	28	43
Forest drainage total	23	34	0	0	34	57
Other operations during 10 year period						
Ditching not related to forestry	5	0	0	0	0	5
11 to 30 year old drainage	12	17	1	0	18	30
Southwest Finland						
Forest drainage during 10 year period	100 ha	100 ha	100 ha	100 ha	100 ha	100 ha
New drainage	152	55	8	6	69	221
Cleaning of old ditches	50	240	11	0	251	301
Complementary drainage	33	135	0	3	138	171
Forest drainage total	235	431	19	8	458	693
Other operations during 10 year period						
Ditching not related to forestry	3	3	0	0	3	6
Restoration of mires	0	8	0	0	8	8
11 to 30 year old drainage	477	922	72	0	1005	1482

4.8 Biodiversity

Forest biodiversity in the Olkiluoto area was assessed by measuring the amount and quality of dead wood and counting the number of key tree species (Table 9). Part of Olkiluoto (Liiklanperä area) also belongs to protected Natura areas (Rauman saaristo, FI0200073), which demonstrates its relatively high biodiversity value. The Liiklanperä area was first protected as old growth forest (act 1115/93) and later joined to the Natura network. The distribution of dead wood in Olkiluoto is patchy and most of it is concentrated in the Liiklanperä area. As the nature conservation area is dominated by spruce, the proportion of spruce out of total dead wood is also higher than the average for Southwest Finland (Figure 20). Consequently, the proportion of dead pine wood is small. Deciduous trees are well represented in dead wood in Olkiluoto. The fact that part of the area has remained untreated for such a long period has increased the total amount of dead wood, especially the amount of fallen dead wood compared to the situation in Southwest Finland (Figure 21). The total amount of dead wood in Olkiluoto is 3 345 m³. The mean volume is 6.24 m³/ha. The comparable figure in Southwest Finland is 1.82 m³/ha, which is about 30% of the Olkiluoto figure (Table 10).

Table 9. The incidence of key tree species on forest and scrub land in Olkiluoto and Southwest Finland

Tree species and minimum DBH	Key tree species Southwest Finland			Olkiluoto		
	stems/ha	1000 stems	%	stems/ha	1000 stems	%
Aspen >30 cm	0.48	516	7.1	0.1	0	0.2
Grey alder >20 cm	0.19	205	2.8	0	0	0.0
Black alder >10 cm	3.51	3735	51.1	43.8	23.5	90.5
Rowan >10 cm	0.69	736	10.1	1.1	0.6	2.3
Sallow >10 cm	1.15	1219	16.7	3.4	1.8	7.0
Mountain elm >5 cm	0.02	17	0.2	0	0	0.0
Linden	0.04	40	0.5	0	0	0.0
Oak > 5 cm	0.72	768	10.5	0	0	0.0
Maple >5 cm	0.07	73	1.0	0	0	0.0
Total	6.87	7309	100.0	48.4	25.9	100.0

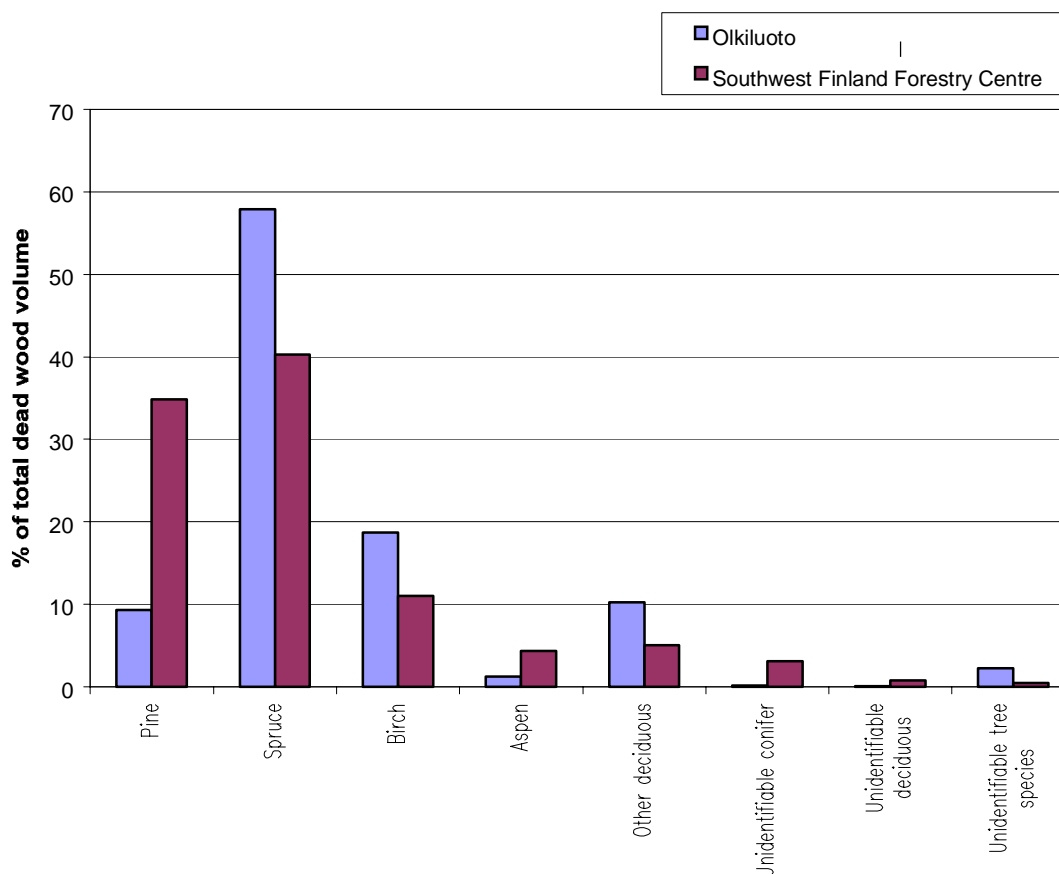


Figure 20. The distribution of dead wood volume by species on forest and scrub land in Olkiluoto and the Southwest Finland Forestry Centre.

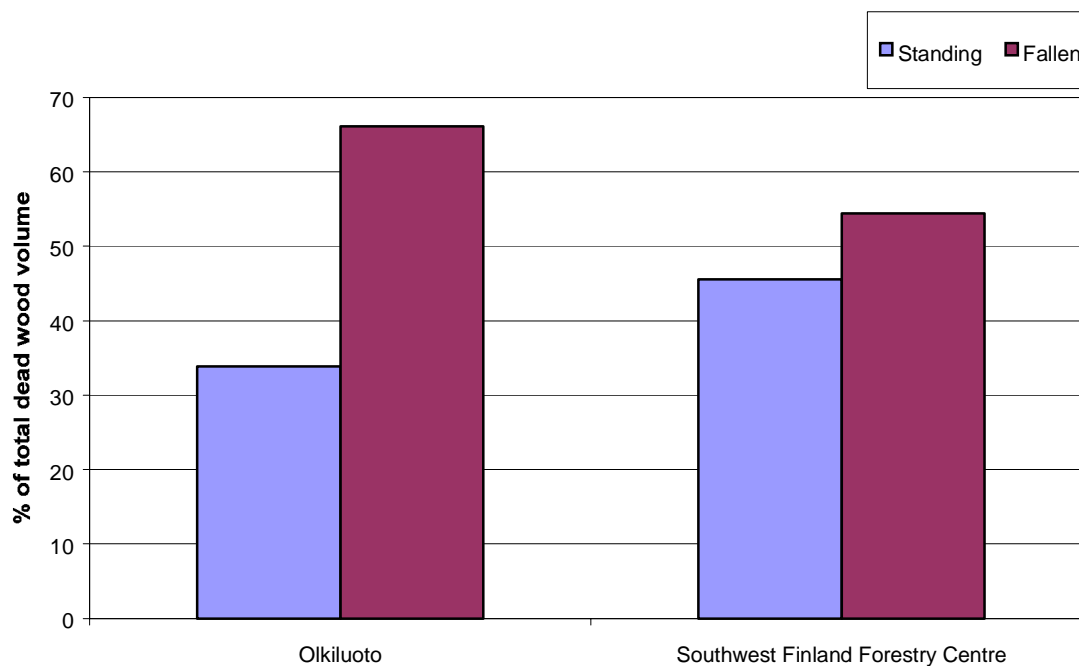


Figure 21. Distribution of dead wood between standing and fallen trees on forest and scrub land in Olkiluoto and in Southwest Finland.

Table 10. Mean volume (m^3/ha) of the dead wood by DBH classes on forest and scrub land in Olkiluoto.

Tree species	Standing	Standing	Fallen	Fallen	Total	Total
	<30 cm	>30 cm	<30 cm	>30 cm	<30 cm	>30 cm
Pine	0.07	0	0.5	0.01	0.57	0.01
Spruce	0.88	0.24	1.94	0.55	2.82	0.79
Birch	0.47	0	0.65	0.04	1.12	0.04
Aspen	0.07	0	0	0	0.07	0
Other deciduous	0.35	0.02	0.25	0.02	0.61	0.04
Unidentifiable conifer	.	.	0.01	0	0.01	0
Unidentifiable deciduous	.	.	0.01	0	0.01	0
Unidentifiable tree species	.	.	0.14	0	0.14	0
Total	1.85	0.27	3.5	0.62	5.35	0.89

The number of black alder is high in Olkiluoto due to its role as a pioneer tree species, and the young age of the soil and consequent low competition pressure from other tree species (Table 9). The long shoreline also increases the number of black alder. On the other hand, there are few large aspens in Olkiluoto and elm, linden, oak and maple are completely missing.

4.9 Accuracy of the results

The target mean error of about 1% could not be reached with the used sampling intensity for any of the assessed variables (see appendices for detailed figures). The areas of most common vegetation classes were estimated with a mean error of between three and ten percent. About the same accuracy was reached when estimating the areas of different dominant tree species or age classes. The mean error for volume was about 2.7%. As regards the volume at the tree species level, the mean error for the main species was about 5%.

5 CONCLUSIONS

The forests on the island of Olkiluoto are growing on slightly more fertile soils than the average for Southwest Finland. The forests are under intensive management apart from the area protected under the old-growth forest and Natura acts. The area will continue to be managed as normal commercial forest, and the changes in the structure of the forests will develop according to the normal aging of the forests and management activities. The biodiversity value of Olkiluoto is higher than average because the number of key tree species, as well as the amount of dead wood, are clearly higher than in Southwest Finland.

If the original accuracy target would have had to be reached, then the sampling intensity should have been increased considerably. However, this would have made the work extremely expensive. Despite this, the present inventory comprehensively describes the forests of Olkiluoto and provides a sound basis for future monitoring. The possibility to compare reliably the situation in Olkiluoto with that in Southwest Finland increases the usability of the material. The permanent grid allows future comparisons to be made without sampling bias, thus making the conclusions more reliable.

6 SUMMARY

This report describes the permanent environmental monitoring system, basic tree and stand measurements, and the forests in Olkiluoto Island in relation to corresponding areas in Southwest Finland. The described area consists of 561 ha of forest. The systematic permanent sample plot system was established with three concentric sample plots at 100-meter intervals. In order to ensure comparability, the assessments were made using the same procedures as those used in the national forest inventory. The calculations also followed the methodology employed by the national forest inventory.

The forests in Olkiluoto are mainly intensively managed commercial forests. Only the Liiklanperä Nature Conservation Area is not managed. The soils are more fertile than the soils on the average in Southwest Finland. The forests in Olkiluoto are younger than the forests in Southwest Finland. The dominant tree species is more often Norway spruce than in other parts of the region. Mixed stands are more common in Olkiluoto than in the comparison area.

The volumes are very similar in both areas with the exception of the oldest age classes where Olkiluoto figures are much higher than the average volumes in Southwest Finland. The size class distributions are also similar to those in Southwest Finland. A higher proportion of the forests in Olkiluoto are regenerated artificially than in Southwest Finland. The silvicultural condition of the forests in Olkiluoto is better than the average in the area. There is less damage in the forests in Olkiluoto compared to Southwest Finland. The most common causes of damage in Olkiluoto were moose and storm damage, whereas in Southwest Finland fungi and human activities were the most common causes of damage.

The frequency of silvicultural treatment in Olkiluoto has been considerably higher than that in Southwest Finland; 45% of the area had been treated during the last 10 years. On the other hand, the proportion of areas not treated during the last 30 years is higher than that in Southwest Finland. A higher proportion of the regeneration areas have been ploughed than elsewhere in Southwest Finland. About 10% of the total area of the island has been drained, and mires in a natural condition cover 17 ha. The biodiversity situation in Olkiluoto is better than that in Southwest Finland in general due to the long shoreline and the existing nature conservation area.

The accuracy of the results is not as good as expected because the variation in the forests was high. However, due to the large range of quality variables to be monitored the results provide a sound basis for future monitoring.

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Appendix A: Detailed inventory results*Table A - 1. Land use classes.*

Olkiluoto	<i>Forestry land</i>					<i>Other land (agricultural etc.)</i>	<i>Total</i>
	<i>Forest land</i>	<i>Scrub land</i>	<i>Waste land</i>	<i>Roads, depots etc.</i>	<i>Total Forestry</i>		
<i>Area, ha</i>	518	18	15	0	551	10	561
<i>Mean error of area, ha</i>	6	4	4	.	3	3	.
<i>Proportion of land use class out of land area, %</i>	92.3	3.2	2.7	0.0	98.2	1.8	100.0
Southwest Finland Forestry Centre	<i>Forestry land</i>					<i>Other land (agricultural etc.)</i>	<i>Total</i>
	<i>Forest land</i>	<i>Scrub land</i>	<i>Waste land</i>	<i>Roads, depots etc.</i>	<i>Total Forestry</i>		
<i>Area, ha</i>	.	618	392	77	11 111	6 254	17 365
<i>Mean error of area, ha</i>	174	51	49	15	187	187	0
<i>Proportion of land use class out of land area, %</i>	57.7	3.6	2.3	0.4	64	36	100

Table A - 2. Main groups and vegetation classes on forestry land (cont'd).

Land use classes	Main group	Vegetation class ¹⁾										Total						
		1	2	3	4	5	6	7	Area	Proportion	Mean error		Proportion					
Forest land	Mineral soil	119	1.5	1515	19.6	3886	50.2	1695	21.9	295	3.8	22	0.3	210	2.7	7741	156	100.0
	Spruce mires	52	4.8	315	28.9	676	62.2	44	4.1	0	0.0	0	0.0	0	0.0	1087	60	100.0
	Pine mires	0	0.0	6	0.5	99	8.3	621	52.0	450	37.6	19	1.6	0	0.0	1195	79	100.0
	Total	171	1.7	1835	18.3	4661	46.5	2360	23.5	745	7.4	41	0.4	210	2.1	10024	174	100.0
Scrub land	Mineral soil	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	350	35	100.0
	Spruce mires	6	33.3	8	50.0	0	0.0	3	16.7	0	0.0	0	0.0	0	0.0	17	7	.
	Pine mires	0	0.0	0	0.0	3	1.1	8	3.3	108	42.9	132	52.7	0	0.0	251	36	100.0
	Total	6	0.9	8	1.3	3	0.4	11	1.8	108	17.4	132	21.4	350	56.7	618	51	100.0
Waste land	Mineral soil	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	52	13	100.0
	Spruce mires	0	0.0	0	0.0	3	100.0	0	0.0	0	0.0	0	0.0	0	0.0	3	3	100.0
	Pine mires	0	0.0	0	0.0	0	0.0	3	2.9	17	17.1	77	80.0	0	0.0	97	20	100.0
	Treeless mires	6	2.3	28	11.5	25	10.3	17	6.9	83	34.5	83	34.5	0	0.0	240	36	100.0
Total	6	1.4	28	7.0	28	7.0	19	4.9	99	25.4	160	40.8	52	13.4	392	49	100.0	
Total forestry land	Mineral soil	119	1.5	1515	18.6	3886	47.7	1695	20.8	295	3.6	22	0.3	613	7.5	8144	164	100.0
	Spruce mires	58	5.2	323	29.2	679	61.3	47	4.2	0	0.0	0	0.0	0	0.0	1107	61	100.0
	Pine mires	0	0.0	6	0.4	102	6.6	632	41.0	574	37.2	229	14.8	0	0.0	1543	101	100.0
	Treeless mires	6	2.3	28	11.5	25	10.3	17	6.9	83	34.5	83	34.5	0	0.0	240	36	100.0
Total	182	1.7	1871	17.0	4692	42.5	2390	21.7	952	8.6	334	3.0	613	5.6	11034	185	100.0	

1) 1. Grove and corresp. peatland.

2. Grove-like mineral soil and corresp. peatland.

3. Fresh mineral soil and corresp. peatland.

4. Dryish mineral soil and corresp. peatland.

5. Dry mineral soil and corresp. peatland.

6. Extremely infertile mineral soil and corresp. peatland.

7. Rocky soil, fine sandy soil, stony soil.

Table A - 3. Drainage situation on forestry land.

Olkiluoto	Forest land				Scrub land				Waste land				Total			
	Area	Mean error	Percent of the area of main group	Percent of the area of forest land	Area	Mean error	Percent of the area of main group	Percent of the area of scrub land	Area	Mean error	Percent of the area of main group	Percent of the area of waste land	Area	Mean error	Percent of the area of main group	Percent of the area of forestry land
	ha	ha	%	%	ha	ha	%	%	ha	ha	%	%	ha	ha	%	%
<i>Drainage situation</i>																
<i>Mineral soils</i>																
Undrained	392	10	90	76	16	3	100	89	12	3	100	80	420	10	90	76
Drained	45	6	10	9	0	.	0	0	0	.	0	0	45	6	10	8
Mineral soils total	437	10	100	84	16	3	100	89	12	3	100	80	465	9	100	84
<i>Mires</i>																
Undrained mires	17	4	21	3	1	1	50	6	3	2	100	20	21	4	24	4
Drained mires	64	7	79	12	1	1	50	6	0	.	0	0	65	7	76	12
Recently drained	8	3	10	2	1	1	50	6	0	.	0	0	9	3	10	2
Transforming	12	3	15	2	0	.	0	0	0	.	0	0	12	3	14	2
Transformed	44	6	54	8	0	.	0	0	0	.	0	0	44	6	51	8
Mires total	81	8	100	16	2	1	100	11	3	2	100	20	86	8	100	16
<i>Mineral soils and mires total</i>	518	6		100	18	4		100	15	4		100	551	3		100

Table A - 3. Drainage situation on forestry land (cont'd).

Southwest Finland Forestry Centre	Forest land				Scrub land				Waste land				Total				
	Area	Mean error	Percent of the area of main group	Percent of the area of forest land	Area	Mean error	Percent of the area of main group	Percent of the area of scrub land	Area	Mean error	Percent of the area of main group	Percent of the area of waste land	Area	Mean error	Percent of the area of main group	Percent of the area of forestry land	
	km ²	km ²	%	%	km ²	km ²	%	%	km ²	km ²	%	%	km ²	km ²	%	%	
<i>Drainage situation</i>																	
<i>Mineral soils</i>																	
<i>Undrained</i>	6690	144	86	67	350	35	100	57	50	13	95	13	7090	152	87	64	
<i>Drained</i>	1051	59	14	10	0	.	0	0	3	3	5	1	1054	59	13	10	
<i>Mineral soils total</i>	7741	156	100	77	350	35	100	57	52	13	100	13	8144	164	100	74	
<i>Mires</i>																	
<i>Undrained mires</i>	262	28	11	3	141	25	53	23	312	44	92	80	715	67	25	6	
<i>Drained mires</i>	2020	94	89	20	127	24	47	21	28	9	8	7	2175	102	75	20	
<i>Recently drained</i>	66	13	3	1	36	11	13	6	22	7	7	6	124	21	4	1	
<i>Transforming</i>	842	57	37	8	88	18	33	14	6	4	2	1	936	61	32	8	
<i>Transformed</i>	1112	66	49	11	3	3	1	0	0	.	0	0	1115	66	39	10	
<i>Mires total</i>	2282	100	100	23	268	37	100	43	339	47	100	87	2889	127	100	26	
<i>Mineral soils and mires total</i>	10024	174		100	618	51		100	392	49		100	11034	185		100	

Table A - 4. Dominance of tree species on forest and scrub land.

Olkiluoto	<i>Forest land</i>			<i>Scrub land</i>			<i>Total</i>		
	<i>Area</i>	<i>Mean error</i>	<i>Percent of the area of forest land</i>	<i>Area</i>	<i>Mean error</i>	<i>Percent of the area of scrub land</i>	<i>Area</i>	<i>Mean error</i>	<i>Percent of the area of forestry land</i>
	<i>ha</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>ha</i>	<i>%</i>
<i>Dominant tree species</i>									
<i>Treeless</i>	2	1	0.4	1	1	5.6	3	2	0.6
<i>Pine</i>	158	9	30.5	14	3	77.8	172	9	32.1
<i>Spruce</i>	238	9	45.9	1	1	5.6	239	9	44.6
<i>Silver birch</i>	59	6	11.4	0	.	0	59	6	11
<i>Downy birch</i>	33	5	6.4	1	1	5.6	34	6	6.3
<i>Black alder</i>	27	5	5.2	1	1	5.6	28	5	5.2
<i>Sallow</i>	1	1	0.2	0	.	0	1	1	0.2
<i>Total</i>	518	6	100	18	4	100	536	5	100
Southwest Finland Forestry Centre									
	<i>Forest land</i>			<i>Scrub land</i>			<i>Total</i>		
	<i>Area</i>	<i>Mean error</i>	<i>Percent of the area of forest land</i>	<i>Area</i>	<i>Mean error</i>	<i>Percent of the area of scrub land</i>	<i>Area</i>	<i>Mean error</i>	<i>Percent of the area of forestry land</i>
<i>Dominant tree species</i>	<i>km²</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>km²</i>	<i>%</i>
<i>Treeless</i>	130	20	1.3	3	3	0.4	132	20	1.2
<i>Pine</i>	6038	148	60.2	582	49	94.2	6621	161	62.2
<i>Spruce</i>	3074	106	30.7	0	.	0	3074	106	28.9
<i>Silver birch</i>	226	27	2.3	0	.	0	226	27	2.1
<i>Downy birch</i>	469	39	4.7	19	8	3.1	488	41	4.6
<i>Aspen</i>	30	9	0.3	0	.	0	30	9	0.3
<i>Grey alder</i>	14	6	0.1	3	3	0.4	17	7	0.2
<i>Black alder</i>	25	7	0.2	11	6	1.8	36	9	0.3
<i>Sallow</i>	3	3	0	0	.	0	3	3	0
<i>Contorta pine</i>	3	3	0	0	.	0	3	3	0
<i>Larch</i>	6	4	0.1	0	.	0	6	4	0.1
<i>Oak</i>	6	6	0.1	0	.	0	6	6	0.1
<i>Total</i>	10024	174	100	618	51	100	10642	182	100

Table A - 5a. Area distribution of the share of dominant tree species volume within the dominant tree layer.

Olkiluoto	Volume share of dominant tree species						Total	
	Pure single species stands over 95 %		Some species admix 75 - 95 %		Mixed stands less than 75 %			
	ha	%	ha	%	ha	%	ha	%
<i>Dominant tree species</i>								
<i>Pine</i>	46	29.1	52	32.9	60	38.0	158	100.0
<i>Spruce</i>	70	29.4	89	37.4	79	33.2	238	100.0
<i>Birch</i> ¹⁾	16	17.4	24	26.1	52	56.5	92	100.0
<i>Other broadleaved</i> ¹⁾	12	42.9	8	28.6	8	28.6	28	100.0
<i>Total</i>	144	27.9	173	33.5	199	38.6	516	100.0

Southwest Finland Forestry Centre	Volume share of dominant tree species						Total	
	Pure single species stands over 95 %		Some species admix 75 - 95%		Mixed stands less than 75 %			
	km ²	%	km ²	%	km ²	%	km ²	%
<i>Dominant tree species</i>								
<i>Pine</i>	2843	47.0	1901	31.4	1303	21.5	6047	100.0
<i>Spruce</i>	864	28.1	1115	36.3	1096	35.6	3074	100.0
<i>Birch</i> ¹⁾	102	14.7	199	28.6	395	56.7	695	100.0
<i>Other broadleaved</i> ¹⁾	22	28.6	11	14.3	44	57.1	77	100.0
<i>Total</i>	3831	38.7	3226	32.6	2837	28.7	9894	100.0

1) Deciduous species have been separated as dominant species as in table A -4.

Table A - 5b. Area distribution of the share of conifer / broadleaved volume within the dominant tree layer.

Olkiluoto	Conifer / broadleaved proportion of volume within dominant tree species						Total	
	over 95 %		75 - 95 %		less than 75 %			
	ha	%	ha	%	ha	%	ha	%
<i>Dominant tree species</i>								
<i>Pine</i> ¹⁾	68	43.0	45	28.5	45	28.5	158	100.0
<i>Spruce</i> ¹⁾	66	27.7	81	34.0	91	38.2	238	100.0
<i>Birch</i> ²⁾	26	28.3	27	29.3	39	42.4	92	100.0
<i>Other broadleaved</i> ²⁾	13	46.4	7	25.0	8	28.6	28	100.0
<i>Total</i>	173	33.5	160	31.0	183	35.5	516	100.0

Southwest Finland Forestry Centre	Conifer / broadleaved proportion of volume within dominant trees						Total	
	over 95 %		75-95%		less than 75 %			
	km ²	%	km ²	%	km ²	%	km ²	%
<i>Dominant tree species</i>								
<i>Pine</i> ¹⁾	4195	69.4	1490	24.6	362	6.0	6047	100.0
<i>Spruce</i> ¹⁾	1703	55.4	999	32.5	373	12.1	3074	100.0
<i>Birch</i> ²⁾	171	24.6	248	35.7	276	39.7	695	100.0
<i>Other broadleaved</i> ²⁾	41	53.6	22	28.6	14	17.9	77	100.0
<i>Total</i>	6110	61.8	2760	27.9	1024	10.3	9894	100.0

1) Proportion of conifers.

2) Proportion of broadleaved.

Table A - 7. Basal area according to age and dominant tree species on forest land.

Dominant tree species	Age class, years											Total
	Treeless	1-20	21-40	41-60	61-80	81-100	101-120	121-140	141-160	Over 160	Total	
		Basal area, m ² /ha										
Olkiluoto												
Treeless
Pine	.	7.4	19.1	23.2	28.8	34.7	14.4	.	.	.	.	15.1
Spruce	.	7.5	17.0	22.1	21.0	25.7	29.2	37.4	31.4	33.5	19.0	19.0
Birch	.	7.2	14.7	17.1	22.8	30.7	.	.	.	.	.	11.5
Other broadleaved	.	10.3	26.8	25.5	68.3	.	.	.	.	.	.	24.2
Forest land total	.	7.4	18.4	22.0	22.6	26.4	26.7	37.4	47.9	33.5	16.7	16.7
Southwest Finland Forestry Centre												
Treeless
Pine	.	6.1	16.7	19.7	22.5	21.9	21.6	21.6	21.0	19.0	18.2	18.2
Spruce	.	6.3	15.6	23.1	27.1	27.8	27.9	27.3	24.7	27.3	23.5	23.5
Birch	.	6.2	17.9	23.0	20.5	21.8	18.0	.	.	.	.	17.3
Other broadleaved	.	2.1	27.8	25.5	43.5	25.5	.	.	.	.	.	25.7
Forest land total	1.4	6.2	16.8	21.4	24.4	24.2	23.8	22.9	21.4	20.7	19.6	19.6

Table A - 8. Mean volume according to age and dominant tree species on forest land.

Olkiluoto Dominant tree species	Treeless	Age class, years										Total			
		1-20	21-40	41-60	61-80	81-100	101-120	121-140	141-160	Over 160					
Treeless	0.0	.	.	.	.	.	.	.	.	.	.	.	.	.	0.0
mean error, m ³ /ha
Pine	.	35.8	120.9	160.0	212.3	238.9	92.6	.	.	.	.	.	.	.	92.8
mean error, m ³ /ha	.	3.0	5.8	25.1	35.7	116.1	21.5	.	.	.	.	.	.	.	4.3
Spruce	.	46.1	106.5	154.6	161.6	211.2	231.1	304.0	251.2	197.2	137.0	.	.	.	137.0
mean error, m ³ /ha	.	7.8	8.0	9.8	10.4	23.4	32.2	.	.	176.8	5.3	.	.	.	5.3
Birch	.	35.8	85.0	118.3	178.5	244.0	.	.	.	.	69.9	.	.	.	69.9
mean error, m ³ /ha	.	4.4	10.8	23.6	38.8	113.9	.	.	.	.	6.9	.	.	.	6.9
Other	.	51.4	168.8	169.2	521.0	.	.	.	.	.	156.3	.	.	.	156.3
broadleaved	.	20.3	30.1	26.8	170.7	.	.	.	.	.	19.3	.	.	.	19.3
mean error, m ³ /ha	.	39.0	115.3	152.5	174.1	213.8	208.0	304.0	368.3	197.2	112.1	.	.	.	112.1
Forest land	0.0	39.0	115.3	152.5	174.1	213.8	208.0	304.0	368.3	197.2	112.1	.	.	.	112.1
total	.	2.9	4.4	7.7	11.3	21.2	32.5	.	153.7	176.8	3.0	.	.	.	3.0

Table A - 8. Mean volume according to age and dominant tree species on forest land (cont'd).

Southwest Finland Forestry Centre		Age class, years											Total
Dominant tree species		Treeless	1-20	21-40	41-60	61-80	81-100	101-120	121-140	141-160	Over 160		
Treeless	m ³ /ha	9.2	.	.	.	.	.	.	.	.	.	9.2
	mean error, m ³ /ha	3.2	.	.	.	.	.	.	.	.	.	3.2
Pine	m ³ /ha	.	29.7	92.5	130.0	167.9	167.3	169.7	169.8	158.9	130.9	125.5	
	mean error, m ³ /ha	.	2.2	2.8	4.7	5.7	5.8	6.6	8.2	14.9	21.8	2.3	
Spruce	m ³ /ha	.	40.5	90.1	171.0	230.4	248.3	251.1	244.1	215.5	219.5	192.2	
	mean error, m ³ /ha	.	4.6	5.7	5.3	6.0	6.8	9.9	15.3	54.3	18.5	3.4	
Birch	m ³ /ha	.	21.3	107.7	154.2	152.7	163.0	166.5	.	.	.	113.4	
	mean error, m ³ /ha	.	5.8	9.3	9.3	12.8	43.7	57.9	.	.	.	5.7	
Other	m ³ /ha	.	17.5	172.6	180.6	352.3	193.9	.	.	.	.	181.1
broadleaved	mean error, m ³ /ha	.	12.4	45.5	26.6	79.6	36.2	.	.	.	.	20.4
Forest land	m ³ /ha	9.2	32.1	94.2	148.7	194.5	198.7	198.8	187.6	164.9	148.6	144.1	
total	mean error, m ³ /ha	3.2	1.9	2.6	3.2	4.3	4.8	6.1	7.9	14.8	19.3	2.1	

Table A - 9. Mean diameter according to age and dominant tree species on forest land.

Dominant tree species	Age class, years										Total	
	Treeless	1-20	21-40	41-60	61-80	81-100	101-120	121-140	141-160	Over 160		
	Mean diameter, cm											
Olkiluoto												
<i>Dominant tree species</i>												
<i>Treeless</i>	.	.	.	.	.	.	.	.	.	.	.	.
<i>Pine</i>	.	11.8	17.7	20.1	21.2	20.4	17.5	.	20.0	.	.	17.0
<i>Spruce</i>	.	16.3	16.5	18.9	23.3	24.8	24.0	25.2	20.5	36.9	.	20.5
<i>Birch</i>	.	10.6	13.4	19.2	21.7	26.2	.	.	.	.	.	15.2
<i>Other broadleaved</i>	.	12.9	20.9	18.8	25.2	.	.	.	.	.	.	19.8
<i>Forest land total</i>	.	12.6	17.3	19.0	23.0	24.5	23.4	25.2	20.3	36.9	.	18.9
Southwest Finland Forestry Centre												
<i>Dominant tree species</i>												
<i>Treeless</i>	18.3	.	.	.	.	.	.	.	.	.	.	18.3
<i>Pine</i>	.	12.4	13.9	17.3	21.2	23.6	25.5	26.1	24.5	24.3	.	19.9
<i>Spruce</i>	.	17.2	13.1	18.2	23.2	25.7	26.4	27.5	26.5	23.7	.	22.4
<i>Birch</i>	.	11.7	12.5	17.0	19.1	19.8	25.3	.	.	.	.	16.0
<i>Other broadleaved</i>	.	35.8	16.1	19.8	26.8	23.0	.	.	.	.	.	20.2
<i>Forest land total</i>	18.3	13.3	13.7	17.6	22.1	24.4	25.9	26.5	24.8	24.2	.	20.6

Table A - 11. Understorey and predominant tree stories on forest land.

Dominant tree species of the tree storey	Understorey				Predominant like					
	Acceptable for growing	Changing	Not acceptable	Total	Per cent of forest land	Predominant trees	Reserve trees	Protective trees	Total	Per cent of forest land
<i>Pine</i>	0	0	1	1	0.2	6	5	0	11	2.1
<i>Spruce</i>	20	2	20	42	8.1	5	8	0	13	2.5
<i>Broadleaved</i>	6	0	10	16	3.1	10	25	19	54	10.4
<i>Forest land total</i>	26	2	31	59	11.4	21	38	19	78	15.1
Southwest Finland Forestry Centre										
Dominant tree species of the tree storey	Acceptable for growing	Changing	Not acceptable	Total	Per cent of forest land	Predominant trees	Reserve trees	Protective trees	Total	Per cent of forest land
<i>Pine</i>	99	47	36	182	1.8	251	86	0	337	3.4
<i>Spruce</i>	141	113	342	596	5.9	39	8	0	47	0.5
<i>Broadleaved</i>	8	3	237	248	2.5	77	22	33	132	1.3
<i>Forest land total</i>	248	163	615	1027	10.2	367	116	33	516	5.1

Table A - 12. Stand mean and total volume of forest and scrub land on mineral soils and mires.

Olkiluoto	Forest land				Scrub land				Forest and scrub land total				
	Mean volume m ³ /ha	Total volume 1 000 m ³	Proportion of tree species %	Mean volume m ³ /ha	Total volume 1 000 m ³	Proportion of tree species %	Mean volume m ³ /ha	Total volume 1 000 m ³	Proportion of tree species %	Mean volume m ³ /ha	Total volume 1 000 m ³	Proportion of tree species %	
Mineral soil	Pine	13	24.9	39.1	1	81.2	29.2	13	25.8				
	Spruce	23	45.0	8.0	0	16.6	50.4	23	44.5				
	Silver birch	8	15.6	0.5	0	0.9	17.4	8	15.4				
	Downy birch	3	6.3	0.2	0	0.4	7.1	3	6.2				
	Other broadleaved	4	8.2	0.4	0	0.9	9.1	4	8.1				
	Total all species	50	100.0	48.2	1	100.0	113.1	51	100.0				
	Mires	Undrained mires											
		Pine	1	30.3	.	.	.	30.2	1	30.3			
		Spruce	1	31.4	.	.	.	31.3	1	31.4			
		Silver birch	0	4.2	.	.	.	4.1	0	4.2			
Downy birch		0	16.2	.	.	.	16.1	0	16.2				
Other broadleaved		0	18.1	.	.	.	18.0	0	18.1				
Total all species		2	100.0	.	.	.	99.7	2	100.0				
Drained mires													
Pine		1	12.1	21.3	0	92.4	11.5	1	12.7				
Spruce		3	46.4	0.2	0	0.9	41.6	3	46.0				
Silver birch	1	14.6	.	.	.	13.1	1	14.5					
Downy birch	1	17.2	1.5	0	6.7	15.4	1	17.1					
Other broadleaved	1	9.7	.	.	.	8.7	1	9.7					
Total all species	6	100.0	23.0	0	100.0	90.4	6	100.0					
Mires total	Pine	1	16.2	21.3	0	92.4	15.3	1	16.6				
	Spruce	3	43.0	0.2	0	0.9	39.5	3	42.8				
	Silver birch	1	12.3	.	.	.	11.2	1	12.2				
	Downy birch	1	16.9	1.5	0	6.7	15.6	1	16.9				
	Other broadleaved	1	11.6	.	.	.	10.6	1	11.5				
	Total all species	8	100.0	23.0	0	100.0	92.3	8	100.0				

Table A - 12. Stand mean and total volume of forest and scrub land on mineral soils and mires (cont'd).

Southwest Finland Forestry Centre		Forest land			Scrub land			Forest and scrub land total			
		Mean volume m ³ /ha	Total volume 1000 m ³	Proportion of tree species %	Mean volume m ³ /ha	Total volume 1000 m ³	Proportion of tree species %	Mean volume m ³ /ha	Total volume 1000 m ³	Proportion of tree species %	
Mineral soil	Pine	66.4	51436	45.1	26.5	929	80.4	64.7	52364	45.5	
	Spruce	61.5	47578	41.7	2.7	96	8.3	58.9	47674	41.4	
	Silver birch	5.7	4444	3.9	1.3	46	4.0	5.5	4490	3.9	
	Downy birch	8.1	6301	5.5	0.3	12	1.0	7.8	6313	5.5	
	Other broadleaved	5.5	4240	3.7	2.1	73	6.3	5.3	4313	3.7	
	Total all species	147.3	113999	100.0	33.0	1155	100.0	142.3	115154	100.0	
Mires	Undrained mires										
	Pine	60.0	1572	42.3	19.1	268.0	69.1	45.7	1841	44.9	
	Spruce	47.9	1257	33.9	3.2	45.0	11.7	32.3	1302	31.7	
	Silver birch	1.9	49	1.3	0.0	0.0	0.0	1.2	49	1.2	
	Downy birch	25.1	657	17.7	1.8	25.0	6.4	16.9	682	16.6	
	Other broadleaved	6.8	177	4.8	3.6	50.0	12.9	5.6	227	5.5	
	Total all species	141.6	3713	100.0	27.6	389.0	100.0	101.8	4102	100.0	
Drained mires											
Pine	57.1	11531	43.2	13.8	175	91.8	54.5	11705	43.5		
Spruce	44.6	9016	33.8	0.2	2	1.3	42.0	9019	33.5		
Silver birch	2.1	420	1.6	0.0	0.0	0.0	2.0	420	1.6		
Downy birch	27.1	5475	20.5	1.0	13	6.9	25.6	5488	20.4		
Other broadleaved	1.3	269	1.0	.	.	.	1.3	269	1.0		
Total all species	132.2	26710	100.0	15.0	190	100.0	125.3	26900	100.0		
Mires total	Pine	57.4	13103	43.1	16.6	443	76.5	53.1	13546	43.7	
	Spruce	45.0	10273	33.8	1.8	48	8.3	40.5	10321	33.3	
	Silver birch	2.1	469	1.5	0.0	0.0	0.0	1.8	469	1.5	
	Downy birch	26.9	6132	20.2	1.4	38	6.6	24.2	6170	19.9	
	Other broadleaved	2.0	446	1.5	1.9	50.0	8.7	1.9	496	1.6	
Total all species	133.3	30423	100.0	21.6	579	100.0	121.6	31002	100.0		

Table A - 13. Stand mean and total volume on forest and scrub land.

Olkiluoto	Forest land				Scrub land				Forest and scrub land total			
	Mean volume m ³ /ha	Total volume 1000 m ³	Proportion of tree species %	Mean volume m ³ /ha	Total volume 1000 m ³	Proportion of tree species %	Mean volume m ³ /ha	Total volume 1000 m ³	Proportion of tree species %	Mean volume m ³ /ha	Total volume 1000 m ³	Proportion of tree species %
<i>Tree species</i>												
<i>Pine</i>	26.7	14	23.8	37.1	1	81.8	27.0	14	24.6			
<i>Spruce</i>	50.1	26	44.7	7.1	0	15.7	48.7	26	44.3			
<i>Silver birch</i>	17.0	9	15.2	0.4	0	0.9	16.4	9	15.0			
<i>Downy birch</i>	8.7	4	7.7	0.4	0	0.8	8.4	4	7.6			
<i>Other broadleaved</i>	9.7	5	8.6	0.4	0	0.8	9.4	5	8.5			
<i>Total all species</i>	112.1	58	100.0	45.4	1	100.0	109.9	59	100.0			
Southwest Finland Forestry Centre												
<i>Tree species</i>												
<i>Pine</i>	64.4	64539.0	44.7	22.2	1372.0	79.1	61.9	65911.0	45.1			
<i>Spruce</i>	57.7	57851.0	40.1	2.3	144	8.3	54.5	57995	39.7			
<i>Silver birch</i>	4.9	4912.0	3.4	0.7	46.0	2.7	4.7	4959.0	3.4			
<i>Downy birch</i>	12.4	12434.0	8.6	0.8	49	2.9	11.7	12483	8.5			
<i>Other broadleaved</i>	4.7	4685.0	3.2	2.0	123.0	7.1	4.5	4809.0	3.3			
<i>Total all species</i>	144.1	144422.0	100.0	28.1	1734	100	137.3	146156	100			

Table A - 14. Number of stems and volume per hectare by tree species on forest and scrub land.

Tree species	Forest land										Forest and scrub land									
	Number of stems			Volume			Proportion of small (0 – 2 cm) trees				Number of stems			Volume			Proportion of small (0 – 2 cm) trees			
	trees/ha	%		m ³ /ha	%		of stem number	%	of volume	%	trees/ha	%		m ³ /ha	%		of stem number	%	of volume	%
<i>Pine</i>	242	7.2		26.6	23.8		13.3	0.1			253	7.7		27.0	24.6		13.5	0.1		
<i>Spruce</i>	1017	30.3		50.1	44.7		33.4	0.4		993	30.2		48.7	44.3		33.4	0.4			
<i>Silver birch</i>	607	18.1		17.0	15.2		66.7	0.9		591	18.0		16.4	15.0		66.7	0.9			
<i>Downy birch</i>	1259	37.5		8.7	7.7		74.4	3.7		1225	37.3		8.4	7.6		74.3	3.7			
<i>Aspen</i>	8	0.2		0.4	0.3		76.9	0.3		8	0.2		0.4	0.3		76.9	0.3			
<i>Black alder</i>	162	4.8		8.5	7.6		38.5	0.4		157	4.8		8.2	7.5		38.4	0.4			
<i>Rowan</i>	20	0.6		0.2	0.2		66.0	2.5		20	0.6		0.2	0.2		66.0	2.5			
<i>Sallow</i>	20	0.6		0.5	0.4		44.2	0.9		20	0.6		0.5	0.4		44.2	0.9			
<i>Thuja</i>	1	0.0		0.0	0.0		0.0	0.0		1	0.0		0.0	0.0		0.0	0.0			
<i>Juniper</i>	6	0.2		0.0	0.0		69.3	17.9		6	0.2		0.0	0.0		69.3	17.9			
<i>Other broadleaved</i>	3	0.1		0.0	0.0		90.9	51.6		3	0.1		0.0	0.0		90.9	51.6			
<i>Bird cherry</i>	12	0.3		0.0	0.0		78.2	6.9		11	0.3		0.0	0.0		78.2	6.9			
<i>Total</i>	3359	100.0		112.1	100.0		54.2	0.7		3288	100.0		109.9	100.0		54.0	0.7			

Table A - 14. Number of stems and volume per hectare by tree species on forest and scrub land (cont'd).

Tree species	Forest land						Forest and scrub land									
	Number of stems			Volume			Proportion of small (0 – 2 cm) trees			Proportion of small (0 – 2 cm) trees						
	trees/ha	%	m ³ /ha	%	trees/ha	%	m ³ /ha	%	trees/ha	%	m ³ /ha	%	trees/ha	%	m ³ /ha	%
<i>Pine</i>	765	22.0	64.3	44.6	27.9	0.2	61.9	45.0	768	23.0	26.8	0.2	768	23.0	26.8	0.2
<i>Spruce</i>	740	21.3	57.7	40.1	22.7	0.2	54.5	39.7	698	20.9	22.7	0.2	698	20.9	22.7	0.2
<i>Silver birch</i>	105	3.0	4.9	3.4	39.7	0.3	4.7	3.4	100	3.0	39.4	0.3	100	3.0	39.4	0.3
<i>Dowry birch</i>	1341	38.5	12.4	8.6	70.9	2.6	11.7	8.5	1265	38.0	70.8	2.6	1265	38.0	70.8	2.6
<i>Aspen</i>	125	3.6	2.6	1.8	65.8	1.0	2.5	1.8	119	3.6	65.5	1.0	119	3.6	65.5	1.0
<i>Grey alder</i>	42	1.2	0.6	0.4	49.4	1.6	0.5	0.4	40.0	1.2	49.4	1.6	40.0	1.2	49.4	1.6
<i>Black alder</i>	17	0.5	0.6	0.4	23.3	0.5	0.6	0.5	19	0.6	19.0	0.4	19	0.6	19.0	0.4
<i>Rowan</i>	267	7.7	0.3	0.2	90.6	24.3	0.3	0.2	252	7.6	90.6	24.3	252	7.6	90.6	24.3
<i>Sallow</i>	48	1.4	0.4	0.3	51.3	4.3	0.4	0.3	45	1.4	51.3	4.3	45	1.4	51.3	4.3
<i>Contorta pine</i>	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2	0.0	0.0	0.0	2	0.0	0.0	0.0
<i>Juniper</i>	13	0.4	0.0	0.0	60.9	17.1	0.0	0.0	12	0.4	60.9	17.1	12	0.4	60.9	17.1
<i>Oak</i>	1	0.0	0.2	0.2	0.0	0.0	0.2	0.2	1	0.0	0.0	0.0	1	0.0	0.0	0.0
<i>Bird cherry</i>	13	0.4	0.0	0.0	52.1	12.3	0.0	0.0	12	0.4	52.1	12.3	12	0.4	52.1	12.3
<i>Total</i>	3479	100.0	144.1	100.0	50.6	0.5	137.3	100.0	3332	100.0	50.0	0.5	3332	100.0	50.0	0.5

Table A - 15. Stem size distributions by tree species.

Olkiluoto	Breast height diameter class, cm												Total								
	0-2	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	Over 39	%	stems/ha									
Forest land	stems/ha	%	stems/ha	%	stems/ha	%	stems/ha	%	stems/ha	%	stems/ha	%	stems/ha	%	stems/ha	%	stems/ha				
Pine	36.7	14.7	19.5	7.8	31.5	12.6	57.7	23.1	61.7	24.7	30.4	12.2	8.9	3.6	2.4	1.0	0.9	0.4	0.2	0.1	249.9
Spruce	339.8	33.4	177.2	17.4	247.8	24.4	125.9	12.4	66.9	6.6	31.0	3.0	16.5	1.6	7.7	0.8	2.3	0.2	1.9	0.2	1016.9
Silver birch	404.8	66.7	60.4	10.0	61.8	10.2	36.3	6.0	21.0	3.5	12.5	2.1	6.4	1.0	2.6	0.4	0.8	0.1	0.5	0.1	607.1
Downy birch	936.3	74.4	155.2	12.3	120.3	9.6	30.5	2.4	9.8	0.8	5.0	0.4	1.5	0.1	0.5	0.0	0.1	0.0	0.0	0.0	1259.2
Aspen	6.4	76.9	0.6	6.9	0.3	3.1	0.2	2.3	0.1	1.5	0.3	3.8	0.3	3.8	0.1	1.5	0.0	0.0	0.0	0.0	8.4
Other broadleaved	96.5	44.4	27.4	12.6	38.9	17.9	24.3	11.2	16.5	7.6	8.5	3.9	3.9	1.8	1.2	0.6	0.2	0.1	0.1	0.0	217.4
Total all species	1820.5	54.2	440.3	13.1	500.6	14.9	274.8	8.2	176.0	5.2	87.7	2.6	37.5	1.1	14.7	0.4	4.2	0.1	2.6	0.1	3358.9
	Breast height diameter class, cm																				
Forest and scrub land	0-2	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	Over 39	Total										
Pine	38.6	14.8	19.8	7.6	35.2	13.5	60.3	23.2	62.7	24.1	31.3	12.0	9.1	3.5	2.5	1.0	0.9	0.3	0.2	0.1	260.6
Spruce	331.5	33.4	173.1	17.4	242.3	24.4	123.3	12.4	65.0	6.6	30.3	3.0	16.0	1.6	7.5	0.8	2.2	0.2	1.8	0.2	993
Silver birch	394.3	66.7	59.3	10.0	60.0	10.1	35.3	6.0	20.3	3.4	12.1	2.1	6.2	1.0	2.5	0.4	0.7	0.1	0.4	0.1	591.1
Downy birch	910.4	74.3	151.5	12.4	117.2	9.6	29.5	2.4	9.6	0.8	4.8	0.4	1.4	0.1	0.5	0.0	0.1	0.0	0.0	0.0	1224.9
Aspen	6.2	76.9	0.6	6.9	0.2	3.1	0.2	2.3	0.1	1.5	0.3	3.8	0.3	3.8	0.1	1.5	0.0	0.0	0.0	0.0	8.1
Other broadleaved	93.3	44.3	26.5	12.6	37.7	17.9	23.6	11.2	16.0	7.6	8.2	3.9	3.7	1.8	1.2	0.6	0.2	0.1	0.1	0.0	210.5
Total all species	1774.3	54.0	430.8	13.1	492.6	15.0	272.1	8.3	173.8	5.3	87.1	2.6	36.8	1.1	14.3	0.4	4.1	0.1	2.5	0.1	3288.2

Table A - 15. Stem size distributions by tree species (cont'd).

Southwest Finland Forestry Centre	Breast height diameter class, cm														Total stems/ ha							
	0-2		3-4		5-9		10-14		15-19		20-24		25-29			30-34		35-39		Over 39		
	stems/ ha	%	stems/ ha	%	stems/ ha	%	stems/ ha	%	stems/ ha	%	stems/ ha	%	stems/ ha	%		stems/ ha	%	stems/ ha	%	stems/ ha	%	
Forest land	221.4	28.4	117.2	15.0	160.0	20.5	112.2	14.4	74.8	9.6	45.2	5.8	27.3	3.5	14.6	1.9	5.6	0.7	1.8	0.2	780	
Pine	167.9	22.7	146.2	19.8	200.7	27.1	94.5	12.8	57.9	7.8	35.2	4.8	21.1	2.9	10.6	1.4	3.9	0.5	1.6	0.2	740	
Spruce	41.7	39.7	19.4	18.5	21.8	20.8	10.4	9.9	6.0	5.7	3.0	2.9	1.4	1.3	0.8	0.7	0.3	0.3	0.2	0.2	105	
Silver birch	950.6	70.9	172.4	12.9	143.7	10.7	47.2	3.5	19.0	1.4	6.0	0.4	1.7	0.1	0.4	0.0	0.1	0.0	0.0	0.0	1341	
Downy birch	82.5	65.8	18.2	14.5	13.5	10.8	5.4	4.3	3.0	2.4	1.4	1.1	0.7	0.6	0.3	0.3	0.2	0.1	0.1	0.1	125	
Aspen	298.1	76.8	51.8	13.4	26.8	6.9	6.9	1.8	2.4	0.6	1.2	0.3	0.4	0.1	0.2	0.1	0.1	0.0	0.0	0.0	388	
Other broadleaved	1762.2	50.6	525.3	15.1	566.5	16.3	276.6	8.0	163.1	4.7	92.1	2.6	52.7	1.5	26.9	0.8	10.1	0.3	3.8	0.1	3479	
Total all species																						
Forest and scrub land	Breast height diameter class, cm														Total stems/ ha							
	0-2		3-4		5-9		10-14		15-19		20-24		25-29			30-34		35-39		Over 39		
	stems/ ha	%	stems/ ha	%	stems/ ha	%	stems/ ha	%	stems/ ha	%	stems/ ha	%	stems/ ha	%		stems/ ha	%	stems/ ha	%	stems/ ha	%	
Pine	213.2	27.3	123.2	15.8	167.8	21.5	112.8	14.4	73.4	9.4	44.0	5.6	26.3	3.4	13.9	1.8	5.3	0.7	1.7	0.2	782	
Spruce	158.2	22.7	137.7	19.7	189.4	27.1	89.4	12.8	54.8	7.8	33.3	4.8	19.9	2.9	10.0	1.4	3.7	0.5	1.5	0.2	698	
Silver birch	39.3	39.4	18.3	18.3	21.2	21.2	9.9	9.9	5.8	5.8	2.9	2.9	1.3	1.3	0.7	0.7	0.3	0.3	0.2	0.2	100	
Downy birch	895.4	70.8	162.4	12.8	136.4	10.8	44.7	3.5	18.0	1.4	5.7	0.4	1.6	0.1	0.4	0.0	0.1	0.0	0.0	0.0	1265	
Aspen	77.7	65.5	17.6	14.8	12.9	10.9	5.1	4.3	2.8	2.4	1.4	1.1	0.7	0.6	0.3	0.3	0.1	0.1	0.1	0.1	119	
Other broadleaved	280.8	76.1	49.4	13.4	27.2	7.4	7.2	1.9	2.5	0.7	1.3	0.3	0.4	0.1	0.2	0.1	0.1	0.0	0.0	0.0	369	
Total all species	1664.6	50.0	508.7	15.3	554.8	16.7	269.0	8.1	157.2	4.7	88.5	2.7	50.2	1.5	25.6	0.8	9.6	0.3	3.6	0.1	3332	

Table A - 16. Total volume by breast height diameter classes and tree species.

Olkihoto	Breast height diameter class, cm																							
	0-2	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	Over 39	Total	0-2	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	Over 39	Total		
Forest land	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%
Pine	0.0	0.1	0.0	0.2	0.3	2.0	1.7	12.7	4.4	32.1	4.2	30.1	1.9	14.0	0.7	5.4	0.4	2.7	0.1	0.9	13.8			
Spruce	0.1	0.4	0.2	0.9	1.7	6.7	4.1	15.6	5.4	20.6	4.8	18.7	4.3	16.5	2.9	11.1	1.1	4.2	1.3	5.2	26.0			
Silver birch	0.1	0.9	0.1	0.9	0.6	6.8	1.2	13.7	1.9	21.3	2.0	22.8	1.5	17.5	0.8	9.6	0.3	3.8	0.2	2.8	8.8			
Downy birch	0.2	3.7	0.2	5.2	1.0	22.2	0.9	21.2	0.9	19.0	0.8	17.4	0.3	7.2	0.2	3.4	0.0	0.7	0.0	0.0	4.5			
Aspen	0.0	0.3	0.0	3.9	0.0	2.1	0.0	2.9	0.0	4.3	0.0	23.0	0.1	39.6	0.0	23.9	0.0	0.0	0.0	0.0	0.2			
Other broadleaved	0.0	0.5	0.1	1.1	0.3	5.9	0.7	14.0	1.2	25.5	1.1	22.7	0.9	18.5	0.4	9.2	0.1	1.8	0.0	0.9	4.8			
Total all species	0.4	0.7	0.6	1.1	3.9	6.7	8.6	14.9	13.7	23.7	12.9	22.2	9.0	15.6	5.1	8.8	1.9	3.3	1.8	3.0	58.1			
Forest and scrub land	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%	1000 m ³	%
Pine	0.0	0.1	0.0	0.2	0.3	2.2	1.9	13.0	4.6	31.9	4.3	30.0	2.0	13.9	0.8	5.3	0.4	2.5	0.1	0.8	14.5			
Spruce	0.1	0.4	0.2	0.9	1.8	6.7	4.1	15.7	5.4	20.6	4.9	18.7	4.3	16.5	2.9	11.0	1.1	4.2	1.3	5.1	26.1			
Silver birch	0.1	0.9	0.1	0.9	0.6	6.8	1.2	13.7	1.9	21.3	2.0	22.7	1.5	17.5	0.8	9.6	0.3	3.8	0.2	2.8	8.8			
Downy birch	0.2	3.7	0.2	5.2	1.0	22.2	0.9	21.1	0.9	19.0	0.8	17.4	0.3	7.2	0.2	3.4	0.0	0.7	0.0	0.0	4.5			
Aspen	0.0	0.3	0.0	3.9	0.0	2.1	0.0	2.9	0.0	4.3	0.0	23.0	0.1	39.6	0.0	23.9	0.0	0.0	0.0	0.0	0.2			
Other broadleaved	0.0	0.5	0.1	1.1	0.3	5.9	0.7	14.1	1.2	25.5	1.1	22.6	0.9	18.5	0.4	9.1	0.1	1.8	0.0	0.9	4.8			
Total all species	0.4	0.7	0.6	1.1	4.0	6.7	8.8	15.0	14.0	23.7	13.1	22.3	9.1	15.5	5.1	8.7	1.9	3.3	1.8	3.0	58.9			

Table A - 17. Size class distribution of saw logs on forest land by tree species.

Olkiluoto	Number of stems													
	Stems/ha					Total stem number								
	Breast height diameter class, cm					Breast height diameter class, cm								
Tree species	17-19	20-24	25-29	30-34	35-39	Over 39	Total	17-19	20-24	25-29	30-34	35-39	Over 39	Total
<i>Pine</i>	1.7	12.0	5.3	1.7	0.5	0.1	21.3	0.9	6.2	2.7	0.9	0.3	0.1	11.0
<i>Spruce</i>	2.4	20.1	15.5	7.5	2.2	1.7	49.5	1.3	10.4	8.0	3.9	1.1	0.9	25.6
<i>Silver birch</i>	0.2	4.3	4.4	2.4	0.6	0.3	12.3	0.1	2.2	2.3	1.2	0.3	0.2	6.4
<i>Downy birch</i>	0.1	1.2	1.0	0.4	0.1	0.0	2.8	0.1	0.6	0.5	0.2	0.0	0.0	1.4
<i>Aspen</i>	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.1
<i>Other broadleaved</i>	0.0	2.3	1.8	0.9	0.1	0.1	5.1	0.0	1.2	0.9	0.5	0.1	0.0	2.7
Total all species	4.4	39.8	28.2	13.0	3.5	2.3	91.2	2.3	20.6	14.6	6.7	1.8	1.2	47.2

Olkiluoto	Volume														
	Proportion of the diameter class of volume					Total volume									
	Breast height diameter class, cm					Breast height diameter class, cm									
Tree species	17-19	20-24	25-29	30-34	35-39	Over 39	Total	Mean volume m ³ /ha	17-19	20-24	25-29	30-34	35-39	Over 39	Total
<i>Pine</i>	4.2	44.4	29.6	13.9	5.6	2.3	100.0	7.6	0	2	1	1	0	0	4
<i>Spruce</i>	2.0	26.3	31.7	22.0	8.1	9.9	100.0	24.7	0	3	4	3	1	1	13
<i>Silver birch</i>	0.8	24.1	35.5	24.6	8.9	6.1	100.0	6.0	0	1	1	1	0	0	3
<i>Downy birch</i>	2.8	33.7	39.0	19.3	5.3	0.0	100.0	1.2	0	0	0	0	0	0	1
<i>Aspen</i>	0.0	0.0	53.5	46.5	0.0	0.0	100.0	0.1	0	0	0	0	0	0	0
<i>Other broadleaved</i>	0.0	22.5	38.7	29.6	5.6	3.7	100.0	2.2	0	0	0	0	0	0	1
Total all species	2.2	29.2	32.5	21.3	7.6	7.6	100.0	41.8	0	6	7	5	2	2	22

Table A - 17. Size class distribution of saw logs on forestland by tree species (cont'd).

Southwest Finland Forestry Centre	Number of stems										Total stem number			
	Stems/ha					Breast height diameter class, cm					Breast height diameter class, cm			
	17-19	20-24	25-29	30-34	35-39	Over 39	Total	17-19	20-24	25-29	30-34	35-39	Over 39	Total
<i>Tree species</i>														
<i>Pine</i>	3.7	26.9	22.2	13.1	5.1	1.5	72.6	3744.0	26920.0	22294.0	13084.0	5157.0	1551.0	72752.0
<i>Spruce</i>	4.8	25.9	19.6	9.9	3.8	1.6	65.5	4767.0	25931.0	19601.0	9937.0	3832.0	1573.0	65642.0
<i>Silver birch</i>	0.2	4.0	2.4	0.9	0.3	0.2	7.9	156.0	3978.0	2387.0	944.0	320.0	167.0	7952.0
<i>Other broadleaved</i>	0.0	1.1	0.6	0.4	0.1	0.1	2.3	0.0	1150.0	557.0	419.0	139.0	57.0	2321.0
<i>Total all species</i>	8.6	57.8	44.7	24.3	9.4	3.3	148.3	8667.0	57979.0	44839.0	24384.0	9449.0	3348.0	148666.0
	<i>Volume</i>													
	Proportion of the diameter class of volume					Breast height diameter class, cm					Total volume			
	%					Mean volume					Breast height diameter class, cm			
	17-19	20-24	25-29	30-34	35-39	Over 39	Total	17-19	20-24	25-29	30-34	35-39	Over 39	Total
<i>Tree species</i>														
<i>Pine</i>	2.3	23.0	29.8	25.7	13.5	5.6	100.0	834	84449	10928	9425	4962	2064	36662
<i>Spruce</i>	3.3	25.1	30.3	22.5	11.6	7.2	100.0	1169	8939	10777	7988	4133	2556	35560
<i>Silver birch</i>	1.0	35.6	31.9	16.9	8.5	6.1	100.0	40	1360	1220	645	326	233	3824
<i>Other broadleaved</i>	0.0	33.2	23.5	24.1	12.0	7.2	100.0	0	419	297	304	151	91	1260
<i>Total all species</i>	2.6	24.8	30.0	23.8	12.4	6.4	100.0	2042	19067	23220	18363	9571	4943	77305

Table A - 18b. The quality of forest compartments on managed forest land.

Olkiluoto	Reason for decreased quality										Total	
	Quality not decreased	Age of forest stand	Tree species not of value	Over density	Lack of silviculture	Natural thinness	Cutting	Unevenness	Poor technical quality	Damage		ha
<i>Quality</i>					ha						ha	%
Good	257	.	.	.	.	.	.	.	.	.	257	56.4
Satisfactory	.	4	14	13	47	9	1	15	50	8	161	35.3
Passable	.	0	2	3	6	3	1	1	2	18	36	7.9
Low yielding	.	1	1	0	0	0	0	0	0	0	2	0.4
<i>Forest land total</i>	257	5	17	16	53	12	2	16	52	26	456	100.0
Southwest Finland Forestry Centre	<i>Reason for decreased quality</i>											
<i>Quality</i>					km ²						ha	%
Good	4344	.	.	.	.	.	.	.	0	.	4344	43.3
Satisfactory	.	66	69	673	229	155	124	1584	273	776	3949	39.4
Passable	.	25	88	160	146	113	75	408	135	141	1292	12.9
Low yielding	.	124	55	6	83	44	22	33	25	47	439	4.4
<i>Forest land total</i>	4344	215	213	839	458	312	221	2026	433	963	10024	100.0

Table A - 19. Quality of the forest stands by development classes on forest land.

Olkiluoto	Development class ¹⁾						Total
	1	2	3	4	5	6	
<i>Quality</i>	<i>km²</i>						
<i>Good</i>	2	22	36	114	91	45	310
<i>Satisfactory</i>	0	6	33	87	28	16	170
<i>Passable</i>	0	4	20	8	2	2	36
<i>Low yielding</i>	0	0	1	0	0	1	2
<i>Forest land total</i>	2	32	90	209	121	64	518
Southwest Finland Forestry Centre	Development class ¹⁾						
	1	2	3	4	5	6	Total
<i>Quality</i>	<i>km²</i>						
<i>Good</i>	80	257	422	1093	1465	922	310
<i>Satisfactory</i>	0	121	461	1405	1325	618	170
<i>Passable</i>	22	52	210	494	315	160	36
<i>Low yielding</i>	28	11	52	99	61	144	2
<i>Forest land total</i>	130	442	1145	3091	3165	1844	518

- ¹⁾
- | | | | |
|---|-------------------------|---|-------------------------|
| 1 | Open regeneration site | 5 | Advanced thinning stand |
| 2 | Young seedling stand | 6 | Mature stand |
| 3 | Advanced seedling stand | 7 | Shelterwood stand |
| 4 | Young thinning stand | 8 | Seed tree stand |

Table A - 20. Regeneration method in seedling stands and young thinning stands on forest land.

Olkiluoto	Seedling and young thinning stands									
	Natural regeneration				Artificial regeneration				Total	
	Succeeded		Not succeeded		Succeeded		Not succeeded			
	ha	%	ha	%	ha	%	ha	%	ha	%
<i>Forest land</i>	172	52.0	136	41.5	23	6.9	331	100.0		
Southwest Finland Forestry Centre	Seedling and young thinning stands									
	Natural regeneration				Artificial regeneration				Total	
	Succeeded		Not succeeded		Succeeded		Not succeeded			
	km ³	%	km ³	%	km ³	%	km ³	%	km ³	%
Forest land	3102	68.7	1366	30.3	44	1.0	4512	100.0		
Forest land converted from other land use class	66	40.0	86	51.7	14	8.3	166	100.0		
Forest land total	3168	67.7	1452	31.0	58	1.2	4678	100.0		

Table A - 2Ib. Area proportions by the total number of seedlings and dominant tree species on forest land.

Olkiluoto	Dominant tree species	Total number of seedlings/ha										Total
		1-500	501-1500	1501-3500	3501-5500	5501-10500	10501-20500	20501-50500	Over 50500	% of area		
Young seedling stands	Pine	0.0	0.0	18.2	0.0	18.2	36.4	27.3	0.0	100.0		
	Spruce	0.0	0.0	16.7	25.0	16.7	16.7	25.0	0.0	100.0		
	Broadleaved	11.1	0.0	11.1	0.0	11.1	33.3	22.2	11.1	100.0		
	Pine	9.1	0.0	18.2	18.2	0.0	54.5	0.0	0.0	100.0		
	Spruce	2.3	7.0	23.3	9.3	25.6	18.6	11.6	2.3	100.0		
	Broadleaved	8.3	0.0	16.7	13.9	19.4	13.9	19.4	8.3	100.0		
Southwest Finland Forestry Centre												
Young seedling stands	Pine	0.0	0.0	14.0	11.0	40.0	25.0	9.0	1.0	100.0		
	Spruce	0.0	0.0	17.8	8.9	44.4	17.8	6.7	4.4	100.0		
	Broadleaved	0.0	13.3	13.3	13.3	20.0	20.0	20.0	0.0	100.0		
	Pine	.	0.4	23.5	23.5	31.3	17.3	3.3	0.7	100.0		
	Spruce	.	1.1	22.0	18.7	34.1	18.7	5.5	0.0	100.0		
	Broadleaved	0.0	7.7	11.5	19.2	26.9	19.2	13.5	1.9	100.0		
Advanced seedling stands	Pine	0.0	0.0	14.0	11.0	40.0	25.0	9.0	1.0	100.0		
	Spruce	0.0	0.0	17.8	8.9	44.4	17.8	6.7	4.4	100.0		
	Broadleaved	0.0	13.3	13.3	13.3	20.0	20.0	20.0	0.0	100.0		
	Pine	.	0.4	23.5	23.5	31.3	17.3	3.3	0.7	100.0		
	Spruce	.	1.1	22.0	18.7	34.1	18.7	5.5	0.0	100.0		
	Broadleaved	0.0	7.7	11.5	19.2	26.9	19.2	13.5	1.9	100.0		

Table A - 22. Cutting areas on forest land during previous 10-year period.

Olkiluoto	Type of cutting ¹⁾										Total	
	0	1	2	3	4	5	6	7	8	9	ha	%
<i>Time of cutting</i>											ha	%
<i>Cutting previous year</i>	0	1	0	2	3	1	0	0	0	0	7	1.4
<i>Cutting 2 to 5 years ago</i>	0	83	13	36	25	3	12	5	2	0	179	34.6
<i>Cutting 6 to 10 years ago</i>	2	9	1	8	5	2	9	9	0	0	45	8.7
<i>Total cutting previous 10 years</i>	2	93	14	46	33	6	21	14	2	0	231	44.6
Southwest Finland Forestry Centre	Type of cutting ¹⁾										Total	
	0	1	2	3	4	5	6	7	8	9	ha	%
<i>Time of cutting</i>											ha	%
<i>Cutting previous year</i>	.	44	28	86	80	19	30	36	0	0	323	3.2
<i>Cutting 2 to 5 years ago</i>	.	254	138	312	480	105	182	248	3	11	1733	17.3
<i>Cutting 6 to 10 years ago</i>	.	337	91	185	453	66	110	135	8	6	1391	13.9
<i>Total cutting previous 10 years</i>	.	635	257	582	1013	190	323	419	11	17	3447	34.4

- ¹⁾ 0= No cutting in 10 years
1= Cleaning or precommercial thinning of seedling stand
2= Removal of overstorey trees
3= First thinning
4= Other thinning
5= -
6= Special cutting e.g. removal of trees from road or drainage lines
7= Regeneration cutting for artificial regeneration
8= Regeneration cutting for natural regeneration
9= Shade tree cutting
10= Selection cutting

Table A - 23. Time since last cutting on forest and scrub land.

Olkiluoto	Forest land		Scrub land	
	ha	%	ha	%
<i>Time since last cutting</i>				
<i>Inventory year</i>	0	0	0	0
<i>One year</i>	7	1.4	0	0
<i>2 to 5 years</i>	179	34.6	0	0
<i>6 to 10 years</i>	43	8.3	0	0
<i>11 to 30 years</i>	20	3.9	0	0
<i>More than 30 years</i>	269	51.9	18	100
<i>Total</i>	518	100	18	100
Southwest Finland Forestry Centre	Forest land		Scrub land	
	km ²	%	km ²	%
<i>Time since last cutting</i>				
<i>Inventory year</i>	80	0.8	0	0.0
<i>One year</i>	323	3.2	0	0.0
<i>2 to 5 years</i>	1733	17.3	17	2.7
<i>6 to 10 years</i>	1391	13.9	3	0.4
<i>11 to 30 years</i>	4325	43.1	55	8.9
<i>More than 30 years</i>	2172	21.7	544	87.9
<i>Total</i>	10024	100.0	618	100.0

Table A - 24. Artificial regeneration on forest land during previous 10 years.

Olkiluoto		<i>Regeneration</i>	
<i>Time of artificial regeneration</i>	<i>ha</i>	<i>% of forest land area</i>	
<i>Previous year</i>	2	0.4	
<i>2 to 5 years ago</i>	15	2.9	
<i>6 to 10 years ago</i>	6	1.2	
<i>10 year period total</i>	23	4.4	
Southwest Finland Forestry Centre		<i>Regeneration</i>	
<i>Time of artificial regeneration</i>	<i>km²</i>	<i>% of forest land area</i>	
<i>Previous year</i>	50	0.5	
<i>2 to 5 years ago</i>	113	1.1	
<i>6 to 10 years ago</i>	113	1.1	
<i>10 year period total</i>	276	2.8	

Table A - 25. Site preparation on forest land during the previous 30-year period.

Olkiluoto	<i>Light tilling</i>		<i>Ploughing</i>		<i>Hummocking</i>		<i>Prescribed burning</i>		<i>Total</i>	
	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>
<i>2 to 5 years ago</i>	13	2.5	0	0	1	0.2	0	0	14	2.7
<i>6 to 10 years ago</i>	8	1.5	0	0	0	0	0	0	8	1.5
<i>10 year period total</i>	21	4.1	0	0	1	0.2	0	0	22	4.2
<i>11 to 30 years ago</i>	33	6.4	16	3.1	1	0.2	0	0	50	9.7
Southwest Finland Forestry Centre	<i>Light tilling</i>		<i>Ploughing</i>		<i>Hummocking</i>		<i>Prescribed burning</i>		<i>Total</i>	
<i>Time of treatment</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>
<i>Previous year</i>	61	0.6	0	0.0	8	0.1	0	0.0	69	0.7
<i>2 to 5 years ago</i>	177	1.8	0	0.0	28	0.3	6	0.0	210	2.1
<i>6 to 10 years ago</i>	127	1.3	0	0.0	36	0.4	6	0.0	168	1.7
<i>10 year period total</i>	364	3.6	0	0.0	72	0.7	11	0.0	447	4.5
<i>11 to 30 years ago</i>	527	5.3	3	0.0	47	0.5	3	0.0	580	5.8

Table A - 26. Operations related to water resources management during previous 10 years and drainage 11 to 30 years before.

Olkiluoto	Mineral soils		Mires			Total
	Forest land	Forest land	Scrub land	Waste land	Total	
	ha	ha	ha	ha	ha	ha
<i>Forest drainage during 10 year period</i>						
<i>New drainage</i>	8	6	0	0	6	14
<i>Cleaning of old drainage</i>	15	28	0	0	28	43
<i>Forest drainage total</i>	23	34	0	0	34	57
<i>Other operations during 10 year period</i>						
<i>Other than forest drainage</i>	5	0	0	0	0	5
<i>11 to 30 year old drainages</i>	12	17	1	0	18	30
Southwest Finland Forestry Centre						
	Mineral soils		Mires			Total
	Forest land	Forest land	Scrub land	Waste land	Total	
	km ²	km ²	km ²	km ²	km ²	km ²
<i>Forest drainage during 10 year period</i>						
<i>New drainage</i>	152	55	8	6	69	221
<i>Cleaning of old drainage</i>	50	240	11	0	251	301
<i>Complementary drainage</i>	33	135	0	3	138	171
<i>Forest drainage total</i>	235	431	19	8	458	693
<i>Other operations during 10 year period</i>						
<i>Other than forest drainage</i>	3	3	0	0	3	6
<i>Restoration of the mire</i>	0	8	0	0	8	8
<i>11 to 30 year old drainages</i>	477	922	72	0	1005	1482

Table A - 27. Causes of damage by the degree of damage on forest land.

Olkiluoto	Cause of damage	Mild		Noticeable		Serious		Complete		Total	
		ha	%	ha	%	ha	%	ha	%	ha	%
		<i>Abiotic damage</i>	<i>Total</i>	8	28.6	19	29.7	3	12.0	1	20.0
	<i>Wind</i>	8	28.6	15	23.4	1	4.0	0	0.0	24	4.6
	<i>Snow</i>	0	0.0	1	1.6	0	0.0	0	0.0	1	0.2
	<i>Other weather conditions</i>	0	0.0	2	3.1	1	4.0	0	0.0	3	0.6
	<i>Soil condition</i>	0	0.0	1	1.6	1	4.0	1	20.0	3	0.6
<i>Human actions</i>	<i>Total</i>	1	3.6	0	0.0	0	0.0	0	0.0	1	0.2
	<i>Other human activity</i>	1	3.6	0	0.0	0	0.0	0	0.0	1	0.2
<i>Animals</i>	<i>Total</i>	5	17.9	13	20.3	22	88.0	3	60.0	43	8.3
	<i>Moose</i>	5	17.9	13	20.3	22	88.0	3	60.0	43	8.3
<i>Fungi</i>	<i>Total</i>	5	17.9	7	10.9	0	0.0	0	0.0	12	2.3
	<i>Unrecognised fungus</i>	3	10.7	2	3.1	0	0.0	0	0.0	5	1.0
	<i>Annosus root rot</i>	1	3.6	5	7.8	0	0.0	0	0.0	6	1.2
	<i>Needle cast fungi</i>	1	3.6	0	0.0	0	0.0	0	0.0	1	0.2
<i>Competition</i>		5	17.9	8	12.5	0	0.0	1	20.0	14	2.7
<i>No damage</i>		0	0.0	0	0.0	0	0.0	0	0.0	396	76.4
<i>Unknown</i>		4	14.3	17	26.6	0	0.0	0	0.0	21	4.1
<i>Total</i>		28	100.0	64	100.0	25	100.0	5	100.0	518	100.0

Table A - 27. Causes of damage by the degree of damage on forest land (cont'd).

Southwest Finland Forestry Centre Cause of damage		Mild		Noticeable		Serious		Complete		Total	
		km ²	%	km ²	%	km ²	%	km ²	%	km ²	%
<i>Abiotic damage</i>	<i>Total</i>	348	15.7	201	15.1	22	16.7	0	0.0	571	5.7
	<i>Wind</i>	66	3.0	19	1.4	0	0.0	0	0.0	86	0.9
	<i>Snow</i>	141	6.6	25	1.9	3	2.1	0	0.0	168	1.7
	<i>Cold</i>	3	0.1	3	0.2	3	2.1	0	0.0	8	0.1
	<i>Other weather conditions</i>	19	0.9	11	0.8	0	0.0	0	0.0	30	0.3
	<i>Soil condition</i>	119	5.3	144	10.8	17	12.5	0	0.0	279	2.8
<i>Human actions</i>	<i>Total</i>	224	10.1	130	9.7	14	10.4	3	50.0	370	3.7
	<i>Harvesting</i>	69	3.1	11	0.8	0	0.0	0	0.0	80	0.8
	<i>Other human activity</i>	155	7.0	119	8.9	14	10.4	3	50.0	290	2.9
<i>Animals</i>	<i>Total</i>	108	4.8	80	6.0	14	10.4	3	50.0	204	2.0
	<i>Mole</i>	0	0.0	6	0.4	3	2.1	0	0.0	8	0.1
	<i>Moose</i>	80	3.6	58	4.3	11	8.3	3	50.0	152	1.5
	<i>Other vertebrate</i>	3	0.1	0	0.0	0	0.0	0	0.0	3	0.0
	<i>Pith borers</i>	17	0.7	6	0.4	0	0.0	0	0.0	22	0.2
	<i>Pine sawfly</i>	6	0.2	0	0.0	0	0.0	0	0.0	6	0.1
	<i>Other needle pest</i>	3	0.1	0	0.0	0	0.0	0	0.0	3	0.0
	<i>Unidentified insect</i>	0	0.0	11	0.8	0	0.0	0	0.0	11	0.1
<i>Fungi</i>	<i>Total</i>	676	30.4	403	30.2	61	45.8	0	0.0	1140	11.4
	<i>Annosus root rot</i>	127	5.7	179	13.5	33	25.0	0	0.0	339	3.4
	<i>Other decay fungi</i>	61	2.7	50	3.7	11	8.3	0	0.0	121	1.2
	<i>Scleroderris canker</i>	262	11.8	77	5.8	11	8.3	0	0.0	350	3.5
	<i>Pine twisting rust</i>	39	1.7	17	1.2	3	2.1	0	0.0	58	0.6
	<i>Resin-top disease</i>	146	6.6	72	5.4	3	2.1	0	0.0	221	2.2
	<i>Other rust fungi</i>	6	0.2	0	0.0	0	0.0	0	0.0	6	0.1
	<i>Needle cast fungi</i>	25	1.1	0	0.0	0	0.0	0	0.0	25	0.2
	<i>Unidentified fungus</i>	11	0.5	8	0.6	0	0.0	0	0.0	19	0.2
<i>Competition</i>		130	5.8	69	5.2	3	2.1	0	0.0	201	2.0
<i>No damage</i>		0	0.0	0	0.0	0	0.0	0	0.0	6331	63.2
<i>Unknown</i>		737	33.2	450	33.7	19	14.6	0	0.0	1206	12.0
<i>Total</i>		2222	100.0	1333	100.0	132	100.0	6	100.0	10024	100.0

Table A - 28. Appearance of the damage by the degree of damage on forest land.

Olkiluoto	<i>The degree of damage</i>									
	<i>Mild</i>		<i>Noticeable</i>		<i>Serious</i>		<i>Complete</i>		<i>Phenotype total</i>	
	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>
<i>Appearance of the damage</i>										
<i>Dead standing</i>	2	14.3	10	71.4	2	14.3	0	0	14	2.7
<i>Fallen</i>	8	29.6	17	63	2	7.4	0	0	27	5.2
<i>Rot</i>	1	33.3	2	66.7	0	0	0	0	3	0.6
<i>Stem damages</i>	2	50	1	25	1	25	0	0	4	0.8
<i>Resin flows</i>	0	0	1	100	0	0	0	0	1	0.2
<i>Tops broken</i>	1	10	2	20	3	30	4	40	10	1.9
<i>Top damages</i>	1	4.3	9	39.1	13	56.5	0	0	23	4.4
<i>Form defects</i>	1	8.3	11	91.7	0	0	0	0	12	2.3
<i>Branch damages</i>	2	50	1	25	1	25	0	0	4	0.8
<i>Defoliation</i>	6	33.3	9	50	3	16.7	0	0	18	3.5
<i>Discoloration</i>	4	80	1	20	0	0	0	0	5	1
<i>Multiple damages</i>	0	0	0	0	0	0	1	100	1	0.2
<i>No damage</i>	0	0	0	0	0	0	0	0	396	76.4
<i>Total</i>	28	5.4	64	12.4	25	4.8	5	1	518	100
Southwest Finland Forestry Centre	<i>The degree of damage</i>									
	<i>Mild</i>		<i>Noticeable</i>		<i>Serious</i>		<i>Complete</i>		<i>Phenotype total</i>	
<i>Appearance of the damage</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>
<i>Dead standing</i>	243	59.1	144	34.9	25	6	0	0	411	4.1
<i>Fallen</i>	243	69.3	97	27.6	11	3.1	0	0	350	3.5
<i>Rot</i>	185	44.7	196	47.3	33	8	0	0	414	4.1
<i>Stem damages</i>	196	76.3	58	22.6	3	1.1	0	0	257	2.6
<i>Resin flows</i>	6	66.7	3	33.3	0	0	0	0	8	0.1
<i>Tops broken</i>	110	70.2	39	24.6	6	3.5	3	1.8	157	1.6
<i>Top damages</i>	293	53.8	221	40.6	30	5.6	0	0	544	5.4
<i>Form defects</i>	494	52.2	433	45.8	17	1.7	3	0.3	947	9.4
<i>Branch damages</i>	22	80	6	20	0	0	0	0	28	0.3
<i>Down part of crown dead</i>	215	83.9	41	16.1	0	0	0	0	257	2.6
<i>Defoliation</i>	157	65.5	75	31	8	3.4	0	0	240	2.4
<i>Discoloration</i>	58	72.4	22	27.6	0	0	0	0	80	0.8
<i>No damage</i>	0	0	0	0	0	0	0	0	6331	63.2
<i>Total</i>	2222	22.2	1333	13.3	132	1.3	6	0.1	10024	100

Table A - 29. Degree of damage by dominant tree species on forest land.

Olkiluoto	<i>Dominant tree species</i>									
	<i>Treeless</i>		<i>Pine</i>		<i>Spruce</i>		<i>Deciduous</i>		<i>Forest land total</i>	
	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>	<i>ha</i>	<i>%</i>
<i>Mild</i>	0	0	5	3.2	17	7.1	6	5	28	5.4
<i>Noticeable</i>	0	0	17	10.8	30	13	17	14	64	12.4
<i>Serious</i>	0	0	7	4.4	5	2.1	13	11	25	4.8
<i>Complete</i>	0	0	0	0	2	0.8	3	2.5	5	1
<i>No damage</i>	2	100	129	81.6	184	77	81	68	396	76.4
<i>Total</i>	2	100	158	100	238	100	120	100	518	100
Southwest Finland Forestry Centre	<i>Dominant tree species</i>									
<i>Degree of damage</i>	<i>Treeless</i>		<i>Pine</i>		<i>Spruce</i>		<i>Deciduous</i>		<i>Forest land total</i>	
	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>	<i>km²</i>	<i>%</i>
<i>Mild</i>	0	0	1518	25.1	544	18	160	21	2222	22.2
<i>Noticeable</i>	0	0	770	12.7	367	12	196	25	1333	13.3
<i>Serious</i>	0	0	55	0.9	41	1.3	36	4.6	132	1.3
<i>Complete</i>	0	0	3	0	0	0	3	0.4	6	0.1
<i>No damage</i>	130	100	3701	61.2	2122	69	378	49	6331	63.2
<i>Total</i>	130	100	6047	100	3074	100	773	100	10024	100

Table A - 30. Mean (m^3/ha) and total (m^3) volume of dead wood on forest and scrub land.

Oikiluoto	Standing tree				Fallen tree				Dead trees total						
	Mean vol. m^3/ha	Std. error m^3/ha	Total vol. 1 000 m^3	Std. error 1 000 m^3	Proportion of the species %	Mean vol. m^3/ha	Std. error m^3/ha	Total vol. 1 000 m^3	Std. error 1 000 m^3	Proportion of the species %	Mean vol. m^3/ha	Std. error m^3/ha	Total vol. 1 000 m^3	Std. error 1 000 m^3	Proportion of the species m^3/ha
<i>Pine</i>	0.07	0.03	37	15	3.3	0.51	0.11	275	57	12.4	0.58	0.11	312	60	9.3
<i>Spruce</i>	1.12	0.35	601	187	53	2.49	0.45	1334	240	60.3	3.61	0.69	1935	372	57.8
<i>Birch</i>	0.48	0.1	256	52	22.6	0.69	0.13	370	71	16.8	1.17	0.2	626	106	18.7
<i>Aspen</i>	0.08	0.06	41	34	3.6	0	0	1	1	0.1	0.08	0.06	42	35	1.2
<i>Other deciduous</i>	0.37	0.11	200	56	17.6	0.27	0.07	144	38	6.5	0.64	0.15	344	82	10.3
<i>Other conifer</i>	0	.	0	.	0	0	.	0	.	0	0	.	0	.	0
<i>Unidentifiable conifer</i>	0	.	0	.	0	0.01	0.01	5	3	0.2	0.01	0.01	5	3	0.1
<i>Unidentifiable deciduous</i>	0	.	0	.	0	0.01	0.01	4	4	0.2	0.01	0.01	4	4	0.1
<i>Unidentifiable tree species</i>	0	.	0	.	0	0.14	0.06	77	32	3.5	0.14	0.06	77	32	2.3
<i>Total</i>	2.12	0.39	1134	208	100	4.12	0.5	2211	268	100	6.24	0.78	3345	417	100

Table A - 30. Mean (m^3/ha) and total (m^3) volume of dead wood on forest and scrub land (cont'd).

Southwest Finland Forestry Centre	Standing tree					Fallen tree					Dead trees total				
	Mean vol. m^3/ha	Std. error m^3/ha	Total vol. 1000 m^3	Std. error 1000 m^3	Proportion of the species %	Mean vol. m^3/ha	Std. error m^3/ha	Total vol. 1000 m^3	Std. error 1000 m^3	Proportion of the species %	Mean vol. m^3/ha	Std. error m^3/ha	Total vol. 1000 m^3	Std. error $1000 m^3$	Proportion of the species m^3/ha
<i>Pine</i>	0.33	0.04	347	47	39.3	0.31	0.03	328	34	31.1	0.63	0.05	675	59	34.9
<i>Spruce</i>	0.30	0.07	323	70	36.6	0.43	0.05	457	56	43.3	0.73	0.09	780	99	40.3
<i>Birch</i>	0.09	0.03	101	27	11.4	0.11	0.02	113	18	10.8	0.2	0.03	214	33	11.1
<i>Aspen</i>	0.03	0.02	34	26	3.9	0.05	0.02	50	18	4.7	0.08	0.04	84	40	4.3
<i>Other deciduous</i>	0.06	0.02	65	18	7.4	0.03	0.01	32	9	3.1	0.09	0.02	98	21	5.0
<i>Other conifer</i>	0	.	0	.	0.0	0	.	0	.	0.0	0	.	0	.	0.0
<i>Unidentifiable conifer</i>	0	.	1	1	0.1	0.06	0.01	59	13	5.6	0.06	0.01	60	13	3.1
<i>Unidentifiable deciduous</i>	0.01	0.01	12	12	1.3	0	0	4	2	0.4	0.01	0.01	16	12	0.8
<i>Unidentifiable tree species</i>	0	.	0	.	0.0	0.01	0	10	4	1.0	0.01	0	10	4	0.5
<i>Total</i>	0.83	0.09	883	93	100.0	0.99	0.07	1054	80	100.0	1.82	0.12	1937	135	100.0

Table A - 31. Mean volume (m^3/ha) of the dead wood by DBH classes on forest and scrub land.

Olkiluoto <i>Tree species</i>	<i>Standing</i>	<i>Standing</i>	<i>Fallen</i>	<i>Fallen</i>	<i>Total</i>	<i>Total</i>
	<30 cm	>30 cm	<30 cm	>30 cm	<30 cm	>30 cm
<i>Pine</i>	0.07	0	0.5	0.01	0.57	0.01
<i>Spruce</i>	0.88	0.24	1.94	0.55	2.82	0.79
<i>Birch</i>	0.47	0	0.65	0.04	1.12	0.04
<i>Aspen</i>	0.07	0	0	0	0.07	0
<i>Other deciduous</i>	0.35	0.02	0.25	0.02	0.61	0.04
<i>Unidentifiable conifer</i>	.	.	0.01	0	0.01	0
<i>Unidentifiable deciduous</i>	.	.	0.01	0	0.01	0
<i>Unidentifiable tree species</i>	.	.	0.14	0	0.14	0
<i>Total</i>	1.85	0.27	3.5	0.62	5.35	0.89
Southwest Finland Forestry Centre <i>Tree species</i>	<i>Standing</i>	<i>Standing</i>	<i>Fallen</i>	<i>Fallen</i>	<i>Total</i>	<i>Total</i>
	<30 cm	>30 cm	<30 cm	>30 cm	<30 cm	>30 cm
<i>Pine</i>	0.31	0.02	0.29	0.01	0.60	0.03
<i>Spruce</i>	0.23	0.07	0.37	0.06	0.60	0.13
<i>Birch</i>	0.09	0.01	0.10	0.01	0.18	0.02
<i>Aspen</i>	0.02	0.01	0.04	0.01	0.06	0.02
<i>Other deciduous</i>	0.06	0.00	0.03	0.00	0.09	0.00
<i>Unidentifiable conifer</i>	0.00	0.00	0.05	0.00	0.05	0.00
<i>Unidentifiable deciduous</i>	0.01	0.00	0.00	0.00	0.01	0.00
<i>Unidentifiable tree species</i>	0.00	0.00	0.01	0.00	0.01	0.00
<i>Total</i>	0.71	0.11	0.89	0.10	1.61	0.20

Table A - 32. Total volume of dead wood by tree's appearance on forest and scrub land.

Appearance of tree	Olkiluoto										Total
	Pine	Spruce	Birch	Aspen	Other deciduous	Unidentifiable conifer m ³	Unidentifiable deciduous	Unidentifiable species	Total		
Standing trees	Dead while standing	34	514	173	38	136	0	0	0	895	
	Dead and rotting	3	87	83	3	64	0	0	0	240	
Fallen trees	Total	37	601	256	41	200	0	0	0	1134	
	Badly rotten	0	13	11	0	3	0	0	60	86	
	Dead and rotting	2	0	0	0	0	0	0	0	2	
	Fallen with roots	142	815	144	0	28	0	0	3	1132	
	Broken tree	44	242	127	1	74	3	0	7	497	
	Stump or artificially made rotting tree	18	68	1	0	0	0	0	0	87	
	Left log	67	178	81	0	39	2	1	7	376	
Logging residue	Logging residue	2	17	6	0	1	0	3	1	30	
	Total	275	1334	370	1	144	5	4	77	2211	
Total	312	1935	626	42	344	5	4	77	3345		
Appearance of tree	Southwest Finland Forestry Centre										Total
	Pine	Spruce	Birch	Aspen	Other deciduous	Unidentifiable conifer 1000 m ³	Unidentifiable deciduous	Unidentifiable species	Total		
Standing trees	Dead while standing	318	297	70	7	45	0	12	0	748	
	Dead and rotting	21	25	27	28	20	1	0	0	121	
Fallen trees	Broken tree	9	1	0	0	0	0	0	0	9	
	Stump or artificially made rotting tree	0	0	5	0	0	0	0	0	5	
	Total	347	323	101	34	65	1	12	0	883	
	Badly rotten	20	7	6	1	0	8	0	9	51	
	Fallen with roots	120	183	22	0	3	13	0	0	342	
Logging residue	Broken tree	72	146	50	17	14	14	3	1	317	
	Left log	77	97	24	24	11	20	1	0	255	
	Total	39	23	11	7	4	4	1	0	89	
Total	Logging residue	328	457	113	50	32	59	4	10	1054	
	Total	675	780	214	84	98	60	16	10	1937	

Table A - 33. Total volume of dead wood by degree of rotten wood on forest and scrub land.

Olkiluoto Tree species	The degree of decay ¹⁾																	
	I		2		3		4		5		Total		Total					
	Stand- ing	Fallen	Standing	Fallen	Stand- ing	Fallen	Stand- ing	Fallen	Stand- ing	Fallen	Stand- ing	Fallen	Stand- ing	Fallen				
	36	104	140	1	115	116	0	51	51	0	2	2	0	2	2	37	275	312
Pine	549	645	1194	23	241	264	13	173	185	16	157	173	0	119	119	601	1334	1935
Spruce	85	42	127	81	55	136	41	93	134	48	105	153	1	76	76	256	370	626
Birch	34	0	34	6	1	8	0	0	0	0	0	0	0	0	0	41	1	42
Aspen	69	3	72	86	73	159	43	42	85	2	23	25	0	3	3	200	144	344
Other deciduous Unidentifiable	0	3	3	0	0	0	0	0	0	0	2	2	0	0	0	0	5	5
conifer Unidentifiable	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	4	4
deciduous Unidentifiable tree species	0	10	10	0	35	35	0	5	5	0	0	0	0	28	28	0	77	77
Total	773	807	1580	198	521	718	97	363	460	66	292	359	1	228	228	1134	2211	3345

1) 1 Hard ... 5 soft, in decay.

Table A - 33. Total volume of dead wood by degree of rotten wood on forest and scrub land (cont'd).

Southwest Finland Forestry Centre Tree species	The degree of decay ¹⁾																	
	1		2		3		4		5		Total							
	Stand- ing	Fallen	Stand- ing	Fallen	Stand- ing	Fallen	Stand- ing	Fallen	Stand- ing	Fallen	Stand- ing	Fallen	Total					
<i>Pine</i>	272	88	360	69	72	141	6	85	91	1	64	64	0	19	19	347	328	675
<i>Spruce</i>	304	129	433	9	105	114	9	70	79	1	119	120	0	34	34	323	457	780
<i>Birch</i>	44	31	76	31	23	54	22	16	39	4	31	35	0	12	12	101	113	214
<i>Aspen</i>	32	11	43	0	10	10	2	20	22	0	8	8	0	1	1	34	50	84
<i>Other</i>	42	15	57	15	9	24	3	4	7	5	3	8	0	1	1	65	32	98
<i>deciduous</i>																		
<i>Unidentifiable</i>	1	2	2	0	2	2	0	13	13	0	15	15	0	27	27	1	59	60
<i>conifer</i>																		
<i>Unidentifiable</i>	12	0	12	0	0	0	0	1	1	0	2	2	0	1	1	12	4	16
<i>deciduous</i>																		
<i>Unidentifiable</i>	0	0	0	0	1	1	0	2	2	0	1	1	0	7	7	0	10	10
<i>tree species</i>	707	276	983	124	222	346	42	212	255	10	242	252	0	101	101	883	1054	1937
<i>Total</i>																		

1) 1 Hard ... 5 soft, in decay.

Table A - 34. Key tree species.

<i>Tree species and minimum DBH</i>	Southwest Finland Forestry Centre			Olkiluoto		
	<i>stems/ha</i>	<i>1 000 stems</i>	<i>%</i>	<i>stems/ha</i>	<i>1 000 stems</i>	<i>%</i>
<i>Aspen >30 cm</i>	0.48	516	7.1	0.1	0	0.2
<i>Grey alder >20 cm</i>	0.19	205	2.8	0	0	0.0
<i>Black alder >10 cm</i>	3.51	3735	51.1	43.8	23.5	90.5
<i>Rowan >10 cm</i>	0.69	736	10.1	1.1	0.6	2.3
<i>Sallow >10 cm</i>	1.15	1219	16.7	3.4	1.8	7.0
<i>Mountain elm >5 cm</i>	0.02	17	0.2	0	0	0.0
<i>Linden</i>	0.04	40	0.5	0	0	0.0
<i>Oak > 5 cm</i>	0.72	768	10.5	0	0	0.0
<i>Maple >5 cm</i>	0.07	73	1.0	0	0	0.0
<i>Total</i>	6.87	7309	100.0	48.4	25.9	100.0