

State of the Forests and Management Trends in the Forests of Northwest Russia

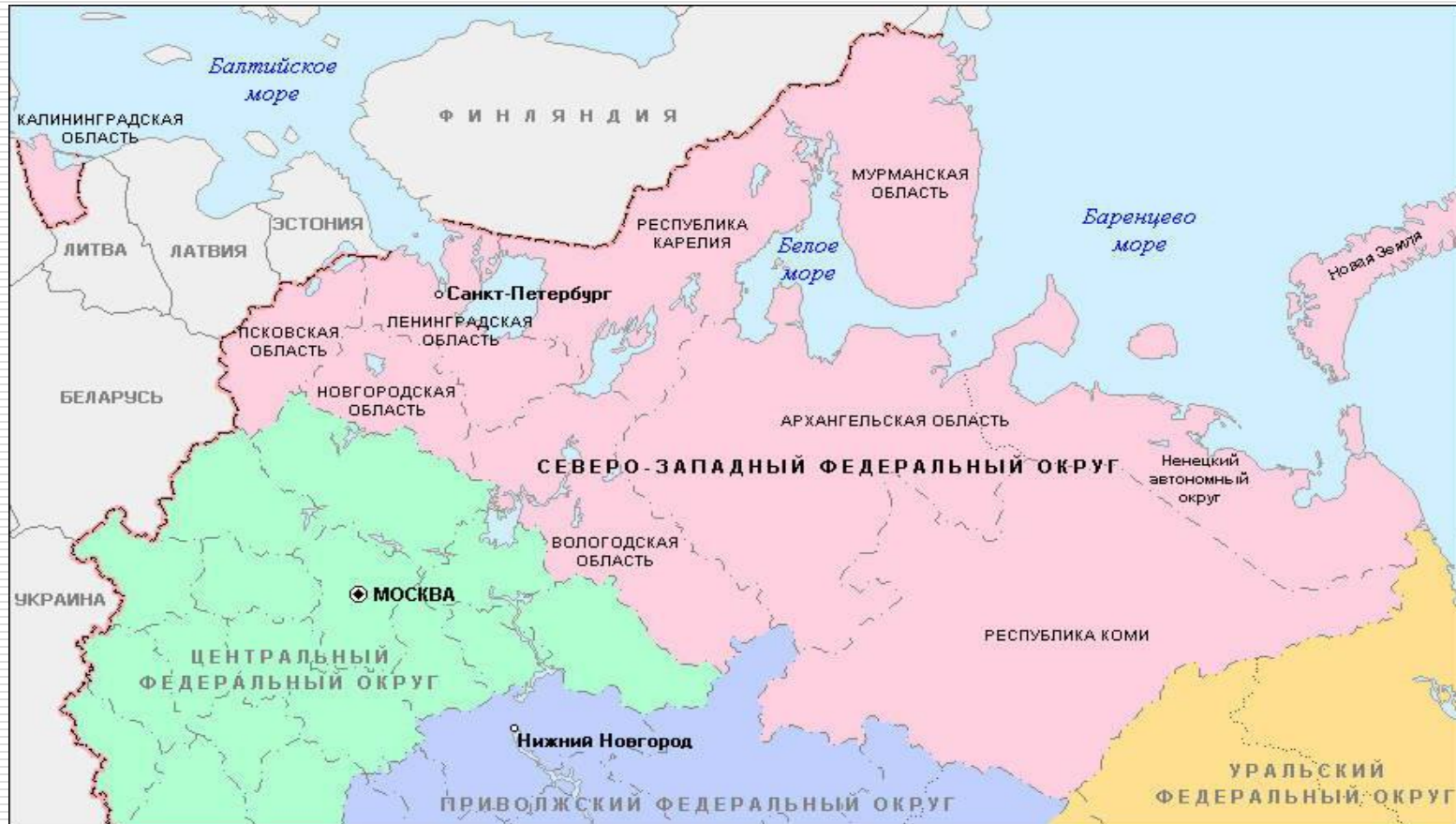
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Composition of North-West Federal District of Russian Federation

- Total number of regions - subjects of Russian Federation – 11
 - 1. City of Saint-Petersburg
 - 2. Kaliningrad
 - 3. Leningrad
 - 4. Pskov
 - 5. Novgorod
 - 6. Republic of Karelia
 - 7. Murmansk
 - 8. Vologda
 - 9. Komi Republic
 - 10. Archangelsk
 - 11. Nenez autonomy

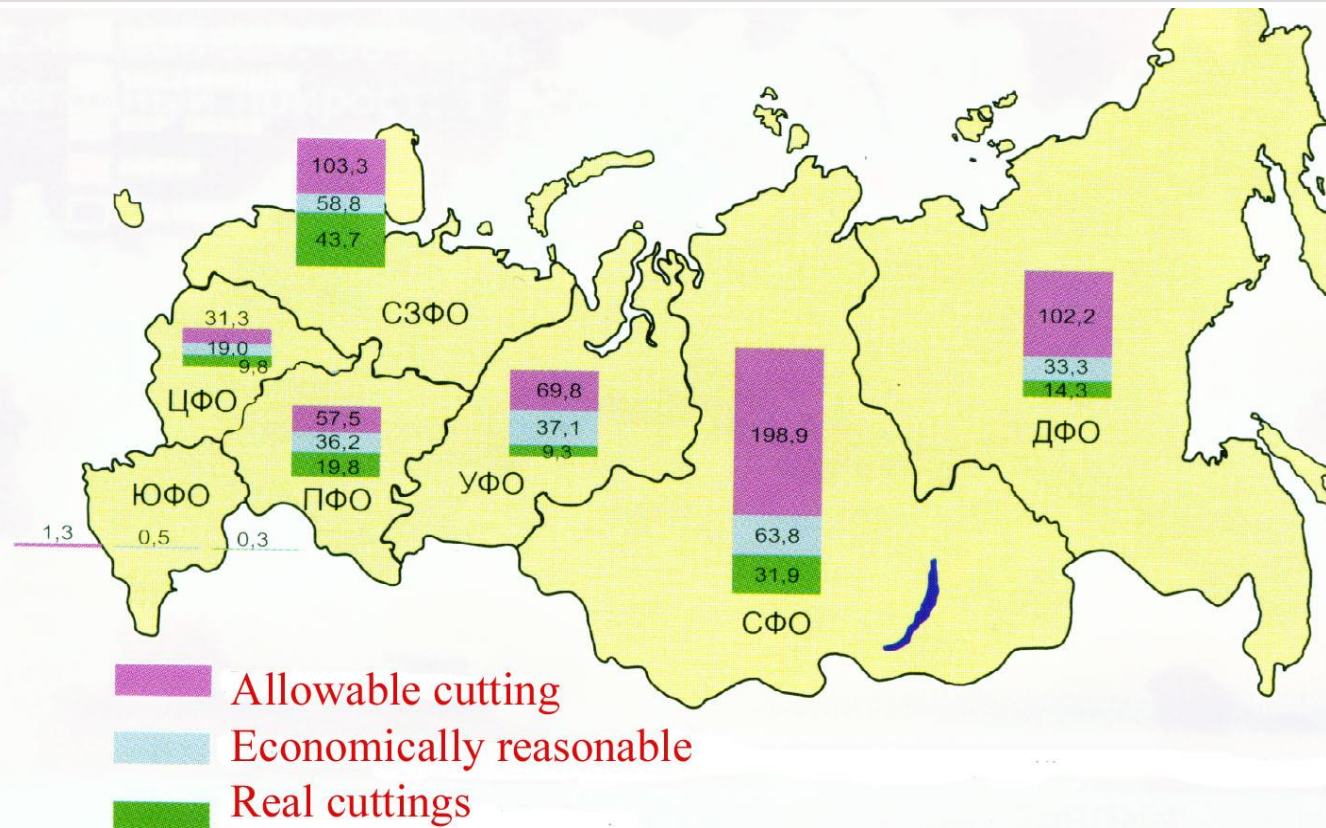
Map of North-West Federal District



Distribution of growing stock over Federal Districts of Russian Federation (Total $83,6 \cdot 10^9 \text{ m}^3$, including conifers $61,9 \cdot 10^9 \text{ m}^3$, annual gain $1 \cdot 10^9 \text{ m}^3$), %



Allowable, reasonable and real cuttings in Russian forests



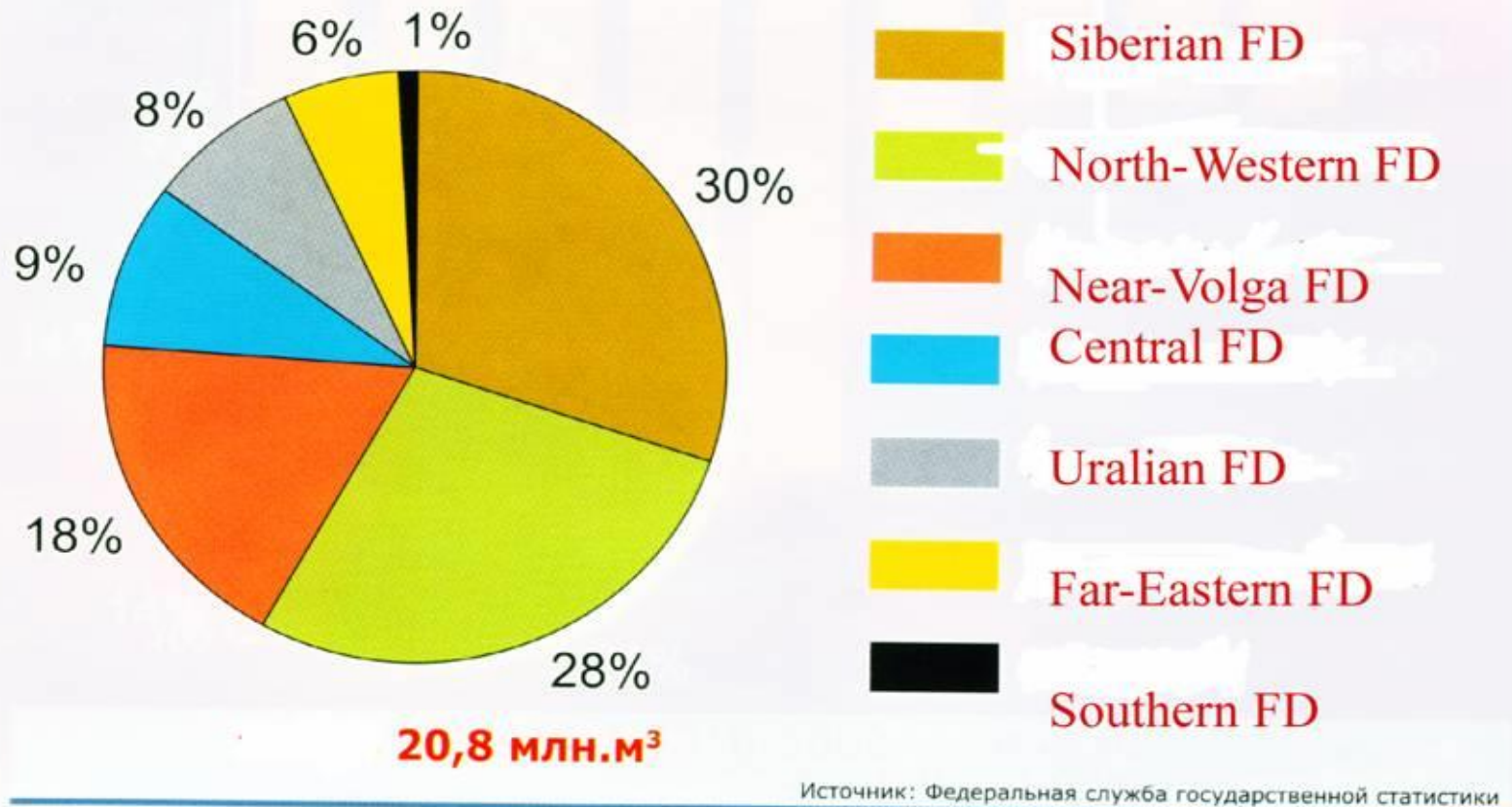
Allowable, reasonable and real cuttings in Russian forests in numbers (10⁶ ha / % of total)

Federal districts	Cuttings		
	Allowable	Reasonable	Real
North-Western	103,3 / 18,3	58,8 / 23,6	43,7 / 33,8
Central	31,3 / 5,5	19,0 / 7,6	9,8 / 7,6
Near-Volga	57,5 / 10,2	36,2 / 14,6	19,8 / 15,3
Ural	69,8 / 12,4	37,1 / 14,9	9,3 / 7,2
Southern	1,3 / 0,2	0,5 / 0,2	0,3 / 0,2
Siberian	198,9 / 35,2	63,8 / 25,7	31,9 / 24,7
Far Eastern	102,2 / 18,1	33,3 / 13,4	14,3 / 11,1

Main directions of industrial wood consumption

	Direction of use	Industrial wood consumption	
		Millions m3	%
1	Sawmilling	38.0	34.8
2	Pulp and paper production	31.6	29.0
3	Wood-based panels production	10.8	9.9
4	Plywood production	7.0	6.4
5	Export	21.7	19.9
6	Total	109.1	100.0

Saw wood production in Russia



Two clusters of saw wood production in Russia



Share of NW Russia in production of main forest products (other than saw wood)

- Wood-based panels – 30,4%
- Cellulose – 62,6
- Paper and cardboard – 57,2%

North-Western Federal District is a leader in forest sector of economy development

Lands with the forests of North-west federal district

Land category	Lands with the forests, 1000 ha							
	Total	According main goal of use			Forest lands	Covered by forest		
		Protective	Exploitable	Reserved		Total	Coniferous	Hardwood
Total	118219.3	45197.0	73022.3	0	90198.2	88466.9	64120.3	54.4
Forest fund lands	112836.1	40434.5	72401.6	0	86722.8	85063.9	61523.7	50.7
Defence and security lands	926.2	378.9	547.3	0	681.9	651.0	344.6	3.6
Cities and settlements lands	82.3	73	9.3	0	60.6	57.1	20.8	0
Nature protection lands	4283.5	4283.5	0	0	2644.0	2608.9	2186.7	0.1
Other lands categories	91.2	27.1	64.1	0	88.9	86.0	44.5	0

Coverage of the area by forest – 52.5%

Total annual wood increment – 132.41 millions of cubic meters

Main species, areas and growing stock

N	Species	Area, 1000 ha	%	Growing stock, 1000 m3	%
1	Scots pine	26232,5	31,0	2913,51	29,3
2	Norway spruce	34929,5	41,2	4143,63	41,7
3	Larch	202,5	0,2	28,88	0,3
4	Siberian pine	32,2	0,0	4,06	0,0
5	Fir	127	0,1	15,64	0,2
6	Oak, seeds	39,4	0,0	8,07	0,1
7	Oak, shoots	0,3	0,0	0,03	0,0
8	Beech	0,2	0,0	0,04	0,0
9	Maple	0,2	0,0	0,01	0,0
10	Ash	7,2	0,0	1,31	0,0
11	Birch stony	0	0,0	0	0,0
12	Linden	8,1	0,0	2,31	0,0
13	Birch	19360,2	22,9	2142,78	21,6
14	Aspen	2774,3	3,3	530,71	5,3
15	Alder	991,7	1,2	137,42	1,4
	Total	84705,3	100,0	9928,4	100,0

Groups of age classes of coniferous, hardwood and broadleaves

Coniferous

	Area, 1000 ha	%	Growing stock, 1000 m3	%
Young	11659,3	19,0	423,17	6,0
Middle age	10761,7	17,5	1285,48	18,1
Premature	4353,2	7,1	796,06	11,2
Mature and over mature	34749,5	56,5	4601,01	64,8
Total	61523,7	100,0	7105,72	100,0

Hardwood

	Area, 1000 ha	%	Growing stock, 1000 m3	%
Young	6	11,8	0,47	4,7
Middle age	32,9	64,9	6,78	67,1
Premature	6,7	13,2	1,6	15,8
Mature and over mature	5,1	10,1	1,25	12,4
Total	50,7	100,0	10,1	100,0

Broadleaves

	Area, 1000 ha	%	Growing stock, 1000 m3	%
Young	3604,8	15,5	63,24	2,2
Middle age	8161,3	35,1	692,81	24,6
Premature	2504,6	10,8	382,92	13,6
Mature and over mature	8958	38,6	1678,44	59,6
Total	23228,7	100,0	2817,41	100,0

Allowable and Real cuttings in NW Russia

Region	Real cuttings, 1000 m3	%	Allowable cuttings, 1000 m3	%	Real/Allowable, %
Karelia	5622	13,3	11513,2	9,4	48,8
Komi	6409,4	15,2	33810,94	27,7	19,0
Archangelsk	9460,6	22,4	23844,8	19,5	39,7
Vologda	10335	24,4	29041,36	23,8	35,6
Kaliningrad	181,9	0,4	470,1	0,4	38,7
Leningrad	6734,1	15,9	10182,48	8,3	66,1
Murmansk	38,4	0,1	560,7	0,5	6,8
Novgorod	2359,4	5,6	7197,4	5,9	32,8
Pskov	1158	2,7	5387,42	4,4	21,5
Nenez autonomy	0	0,0	31	0,0	0,0
Saint-Petersburg	0	0,0	0	0,0	0,0
Total	42298,8	100,0	122039,4	100,0	34,7

Forest regeneration in the year 2014

Federal District	Forest regeneration , 1000 ha		Forest cultures classified as covered by forest lands, 1000 ha	Young tree stands classified as valuable, 1000 ha	Dead forest cultures, 1000 ha	
	Total	Including planting			Total	Including by natural reasons
North-Western	195,9	34,7	41,4	211,1	0,9	0,3
Central	71,0	43,5	27,9	58,8	2,4	0,6
Near Volga	100,4	40,1	28,8	115,7	3,6	3,0
Southern	4,7	3,3	1,4	2,5	2,4	1,5
North-Caucasus	1,6	1,0	1,1	1,4	0,4	0,4
Ural	57,3	16,2	10,4	71,1	2,3	0,4
Siberian	265,7	34,9	31,1	320,7	7,1	2,9
Far Eastern	167,1	13,3	9,1	293,3	2,3	2,2
Total	863,7	187,0	151,2	1 074,6	21,4	11,3

Tending of Forests

Federal District	Area, prescribed for tending cuttings, 1000 ha	Real tending cuttings, 1000 ha					Commercial wood harvested, 1000 м³
		Total	Including types				
			Cleanings	Thinnings	Selective loggings	Other types	
North-Western	106,00	111,70	83,80	4,30	23,60	-	1 239,82
Central	84,10	99,10	69,00	10,30	19,80	-	1 120,14
Near Volga	108,30	155,90	70,20	27,50	56,40	1,80	3 282,66
Southern	11,10	6,10	2,90	1,30	1,60	0,30	74,02
North-Caucasus	3,50	3,00	1,40	0,50	1,00	0,10	33,02
Ural	44,70	51,90	20,80	12,70	18,30	0,10	1 326,48
Siberian	88,30	107,00	33,50	25,80	39,40	8,30	2 672,25
Far Eastern	29,00	52,80	11,60	1,80	37,00	2,40	1 115,92
Total	475,00	587,50	293,20	84,20	197,10	13,00	10 864,31

Control of the area by forest authorities

Federal District	Area need to be controlled, 1000 ha	Number of forest inspectors	Area per 1 inspector, 1000 ha
Central	22 652,3	4 364	5,2
North-Western	112 386,1	3 211	35,0
Near Volga	2 792,8	869	3,2
Southern	1 857,9	972	1,9
North-Caucasus	39 281,1	3473	11,3
Ural	112 110,3	1 316	85,2
Siberian	358 268,1	2 902	123,4
Far Eastern	495 795,3	1 721	288,0
Total	1 145 143,9	18 828	60,8

Forest Inventory in the year 2015

Federal District	Total Area, 1000 ha	Categories and Methods of Measurements, 1000 ha				
		1 Category		2 Category		Interpretive
		Visual-Measuring	Visual	Visual-Measuring	Visual	
Central	1158,3	978,8	45	0	0	134,5
North-Western	2893,2	63,3	901,9	536,7	436,8	954,6
Southern	65,4	65,4	0	0	0	0
North-Caucasus	107,6	107,6	0	0	0	0
Near Volga	2878,7	876,3	175,1	454,3	380,2	992,8
Ural	3137,1	314,5	185,6		289,8	2347,2
Siberian	2015,6	289,5	296,8	178,7	285,3	965,4
Far Eastern	1449,3	0	0	270,4	296,2	882,7
Total, 1000 ha	13705,2	2695,4	1604,3	1440,0	1688,3	6277,1
%	100	19,7	11,7	10,5	12,3	45,8

Plans of Forest Inventory for the year 2016

Federal District	Area planned to be inventoried,	
	1000 ha	%
Central	1 151	8,1
North-Western	2 919,3	20,4
Southern	76,2	0,5
North-Caucasus	93,4	0,7
Near Volga	1 967,9	13,8
Ural	4 620,6	32,3
Siberian	2 518,7	17,6
Far Eastern	942,9	6,6
Total	14 290,0	100,0

Age of Inventory Data

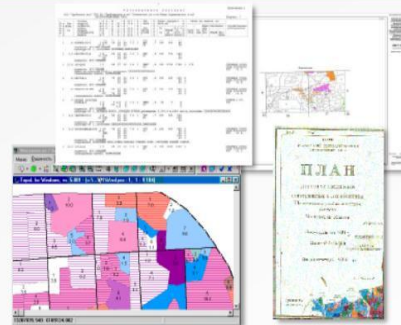
Federal District	FORESTED AREA, 1000 HA	LESS THAN 10 YEARS		11-15 YEARS		16-20 YEARS		MORE THAN 20 YEARS	
		AREA, 1000 HA	%	AREA, 1000 HA	%	AREA, 1000 HA	%	AREA, 1000 HA	%
Central	22631,09	8 279,69	36,6	7 697,50	34,0	5 454,94	24,1	1 174,21	5,2
North-Western	112 842,45	29 222,56	25,9	24 118,89	21,4	24 005,70	21,3	35 495,31	31,5
Southern	2 753,17	124,55	4,5	417,50	15,2	1 724,05	62,6	486,62	17,7
North-Caucasus	1 721,30	621,47	36,1	175,80	10,2	606,91	35,3	317,13	18,4
Near Volga	39 043,01	12 959,71	33,2	9 295,56	23,8	8 764,37	22,4	8 012,05	20,5
Ural	112 116,35	53 951,27	48,1	17 286,75	15,4	37 077,03	33,1	3 781,02	3,37
Siberian	358 451,57	29 253,68	8,2	66 492,29	18,5	32 122,25	9,0	230 291,88	64,2
Far Eastern	496 592,77	68 210,29	13,7	43 671,56	8,8	166 696,11	33,6	218 014,74	43,9
Total 04.05.2016	1 146 151,71	202 623,22	17,7	169 155,84	14,8	276 451,36	24,1	497 572,96	43,4

Main trends in forest management in NW Russia

1. Development of state (national) forest inventory
2. Development of forest management planning based on remote sensing data
3. Development of advanced centers for seedlings production
4. Change in the strategy (model) of forest resources use – from extensive to intensive

Basic data for SFI

- ✓ Documents of forest management
(updated forest management boards,
plans of forest stands,
thematic forest maps).



- ✓ Topographic maps.

- ✓ Data of State forest register.

- ✓ Cartographic documents of
state database,
from land management.



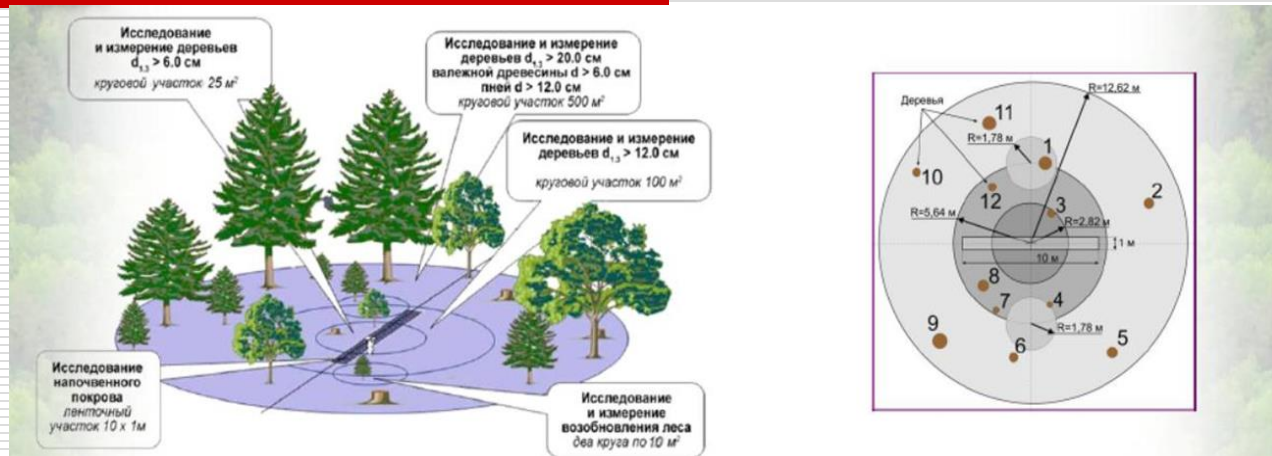
- ✓ ERS data (digital satellite images of optical
range with spatial resolution better than 5 m).

- ✓ Standard reporting about use,
protection, security and
renovation of forest.

Accuracy of wood stock assessments in forest regions (red -1%, yellow-2%, green – 3%, grey – 4%, blue -5%)

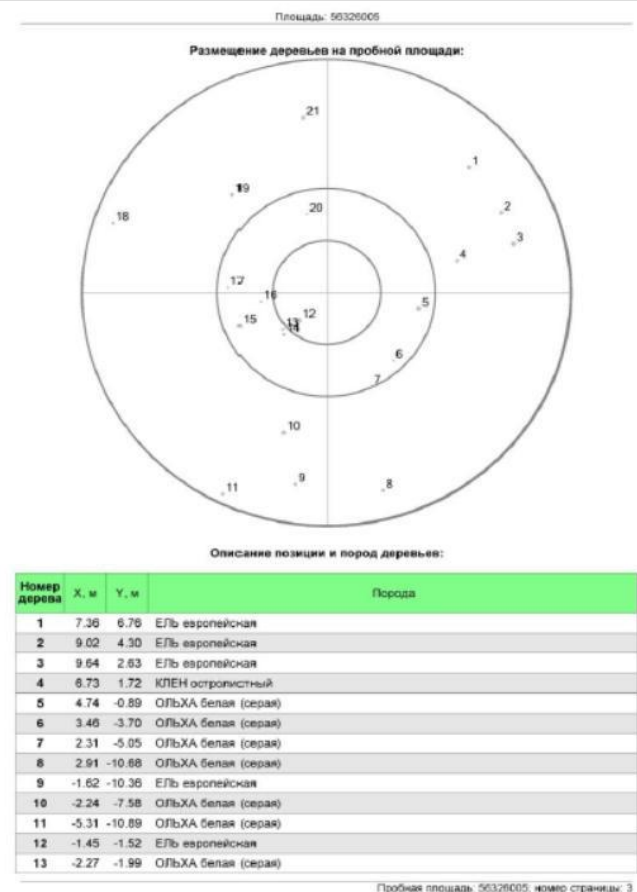
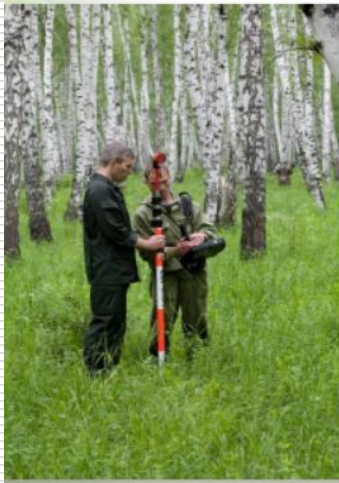


Sample plot of SFI



Circle diameter, m	Area, m ²	Measured objects
12,62	500	Trees with DBH >20cm, dead wood with diameter > 6 cm, stamps with diameter > 12 cm
5,64	100	Trees with DBH>12 cm
2,82	25	Trees with DBH>6 cm
1,78 (two)	20	Natural and artificial regeneration with H>0,2 m and DBH<5,9 cm, undergrowth,
Belt (10*1 m)	10	Ground vegetation

Sample plot establishment - example



Measurements on sample plots



Measurements on sample plots - 1

- Total number of parameters 117 grouped in 8 blocks:
 1. Landscape, soils, tree stand description
 2. Tree data including dead trees
 3. Ground vegetation
 4. Unger growth and under canopy vegetation
 5. Stamps and dead wood
 6. Regeneration
 7. Biodiversity
 8. Model trees parameters

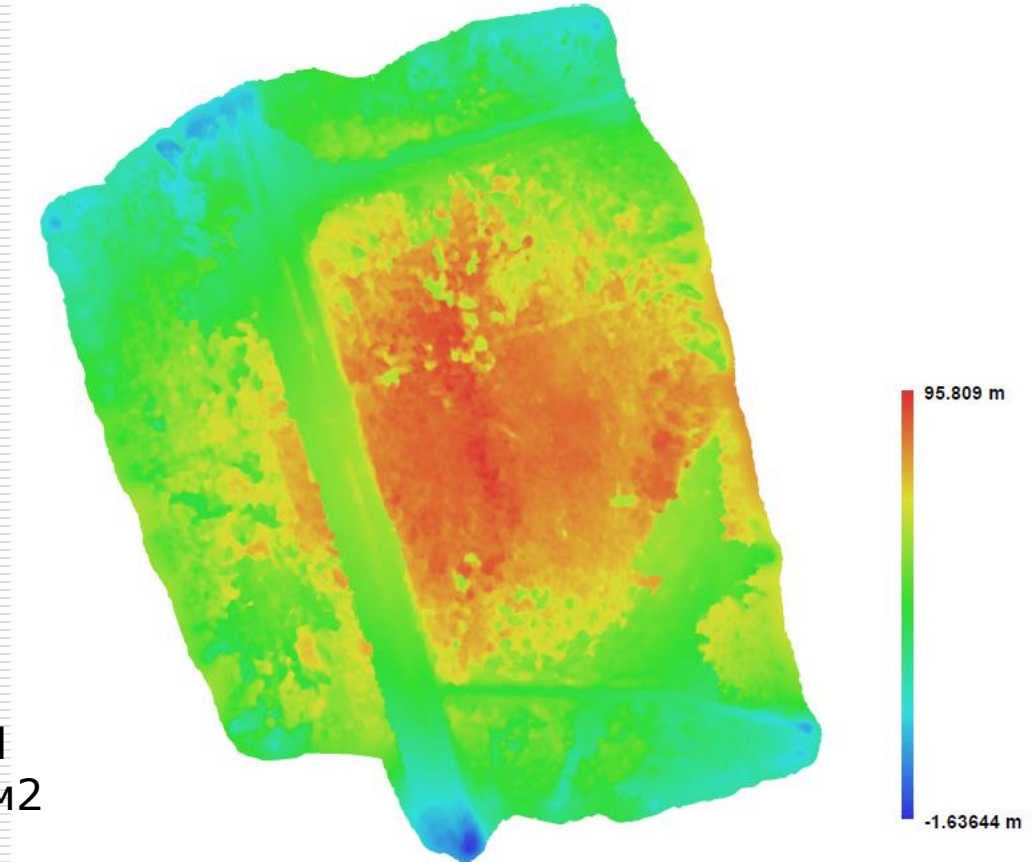
4-rotor platform for high resolution forest photography



Ortophotoplan

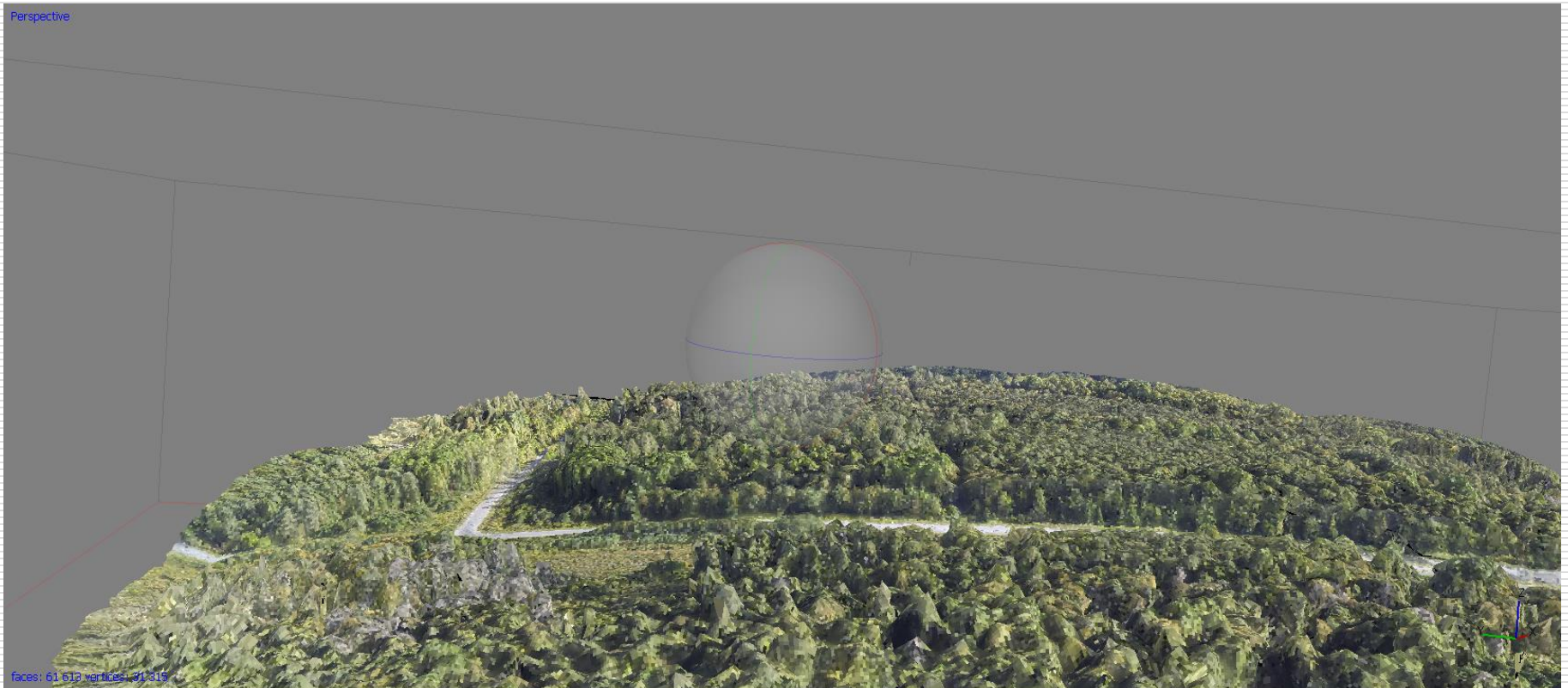


Digital terrain model



Resolution: 0.547599 m/pixel
Dots density: 3.33484 dots/m²

3D model



Forest compartments mensuration based on high quality aerial photos

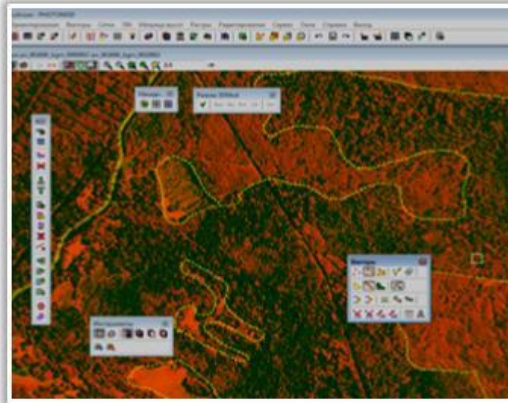
Main stages of technology

1. Aerial survey



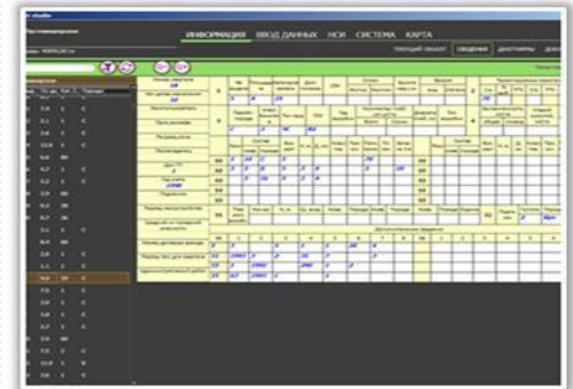
- Digital aerial survey (Vision Map A3, Israel)
- Making orthophoto plan and set of stereo pairs

2. Forest mensuration (interpretation method)



- Mensuration of tree height using stereo effect
 - Contour, analytical and measuring interpretation
 - Digitizing of forest compartment borders
- Used software - Photomod Stereo Measure, Russia

3. Making GIS – data base



- Inputting of forest inventory cards
- Making GIS – data base

Used software - «ESAUL», Russia; ArcGIS, USA

Seedlings production complex in Luga, Leningrad region

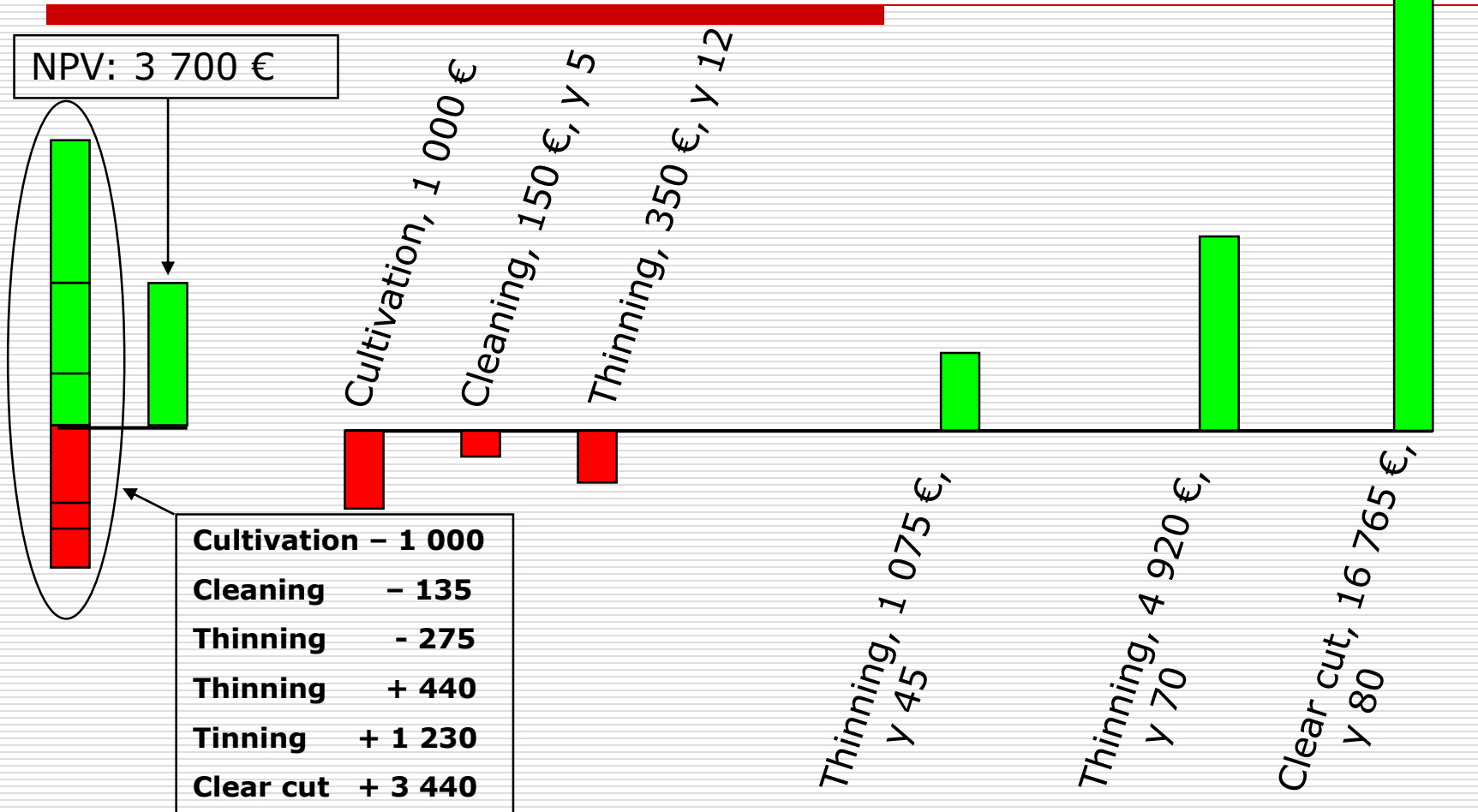


Seedlings packaging line in Luga complex, Leningrad region



Intensive forest management - cash flow and discounting

(spruce, rich site, thinning 35 %, interest 2 %)



Thank you for your kind
attention!