

# *Country report*

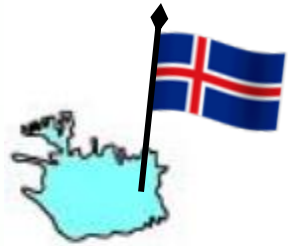
## *Estonian NFI*

*Veiko Adermann*

*Department of the National Forest Inventory  
Centre of Forest Protection and Silviculture*

*Estonian NFI*

*Estonia in Europe*



SNS – NFI meeting in Iceland, Egilsstaðir 2008-08-21



- **Total area 45 227 sq.km**
- **Population 1.4 million**
- **Density of population 30/sq.km**

Lake  
Peipsi

## LAND USE CLASSES (year 2007)

- **forest land 49%** (22 127 sq.km)
- **agricultural land 30%**
- **bogs and swamps 6%**
- **inland water 6%**
- **other 9%**

- More than 1/3 of forests are administered by the *Estonian State Forest Management Centre*
- About 8% of forests are covered by strict protection regime
- Ca 15% of forest land is still without owner due to the ongoing land reform

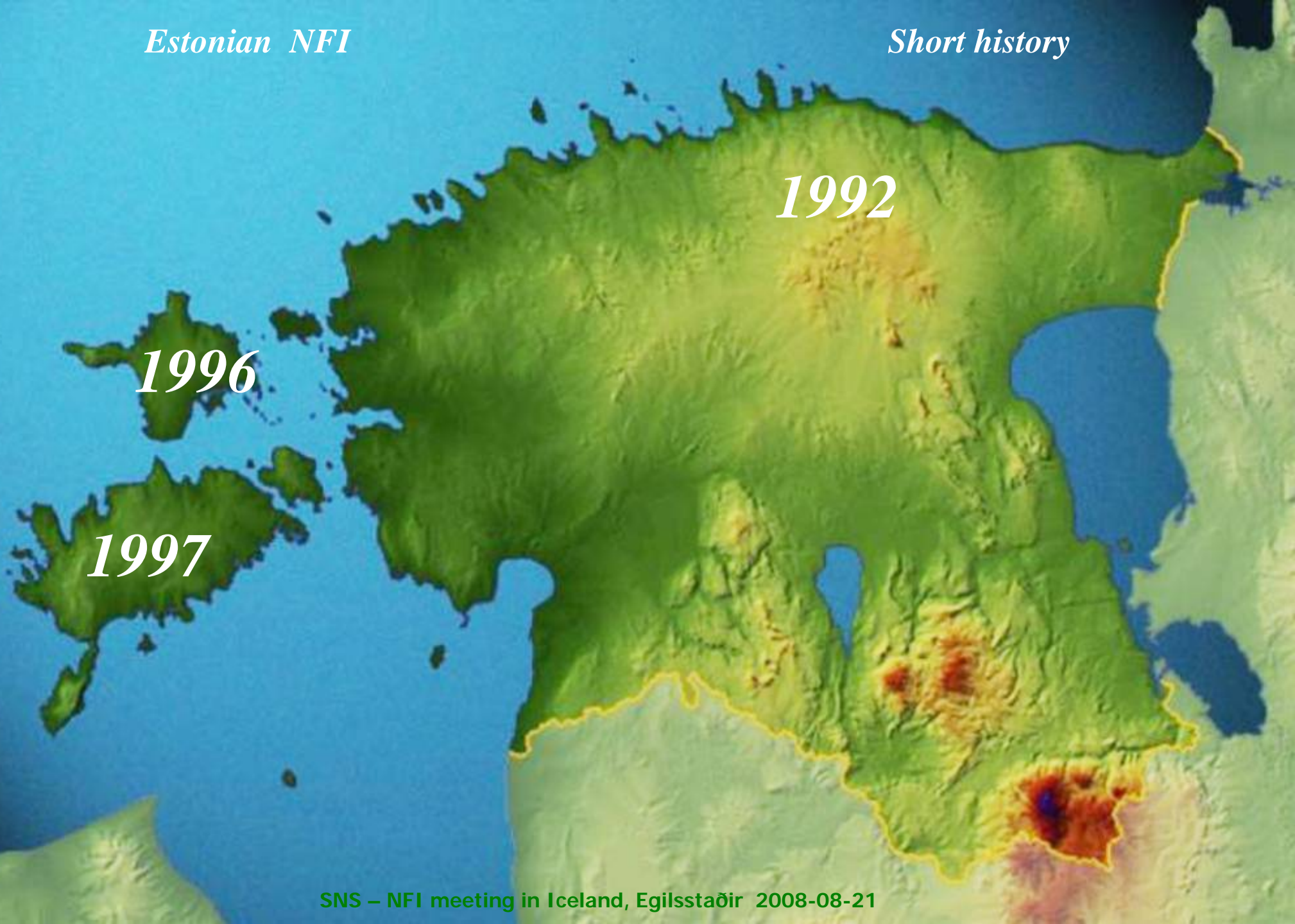
**FOREST AREA and GROWING STOCK**

Main tree species	Forest area		Volume	Increment
	1000 ha	%	m <sup>3</sup> /ha	m <sup>3</sup> /ha/year
<b>Pine</b>	<b>775,0</b>	<b>35,0</b>	<b>230</b>	<b>6,6</b>
<b>Spruce</b>	<b>371,2</b>	<b>16,8</b>	<b>211</b>	<b>10,2</b>
<b>Birch</b>	<b>669,1</b>	<b>30,2</b>	<b>170</b>	<b>5,1</b>
<b>Aspen</b>	<b>117,1</b>	<b>5,3</b>	<b>245</b>	<b>7,4</b>
<b>Black alder</b>	<b>65,4</b>	<b>3,0</b>	<b>236</b>	<b>5,5</b>
<b>Grey alder</b>	<b>177,4</b>	<b>8,0</b>	<b>173</b>	<b>6,3</b>
<b>Other</b>	<b>37,3</b>	<b>1,7</b>	<b>171</b>	<b>5,6</b>
<b>Total</b>	<b>2 212,7</b>	<b>100,0</b>	<b>204</b>	<b>6,7</b>

- The first forest survey and forest management plan – in 1794
- Until the 1990-es the national account of forest resources was based on stand-wise forest inventories
- Regularly, with period of ten years, inventory was made of most of the forest land
- After the re-independence was gained in Estonia in 1991, the land reform was started

- Changes were carried out in forest survey
- Planning economy was replaced by market economy
- Intensive cutting of forests
- Ongoing land reform
- Lack of the real information of the forests
- Intensified forest management together with the land reform created a need for new inventory methods





1992

1996

1997

- The first tentative attempts to conduct regional forest inventories were carried out in 1992, 1996 and 1997
- The first *National Forest Inventory* covering the whole country was commenced in 1999

# SAMPLING DESIGN

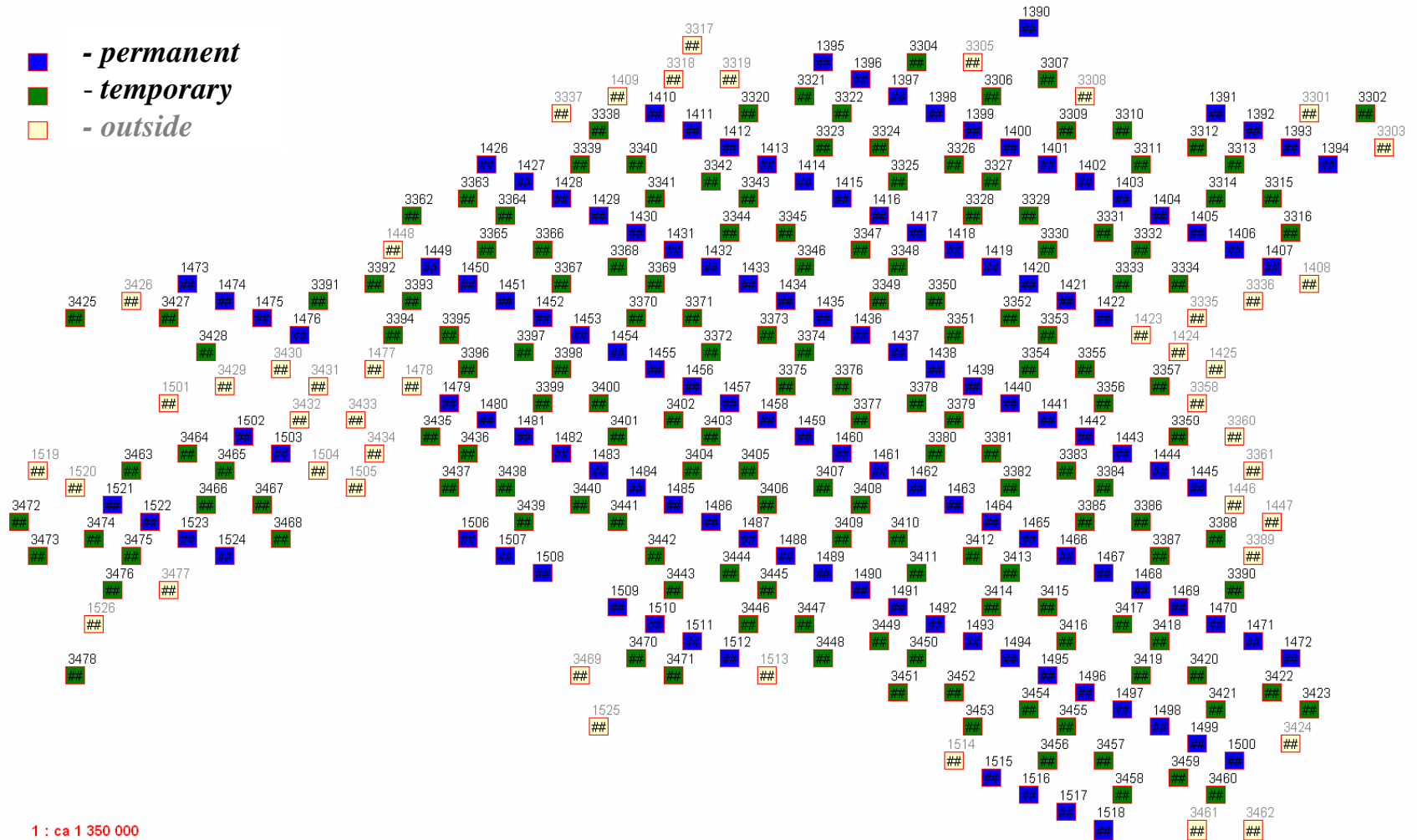
- annual research
- systematic sampling
- without pre-stratification
- no remote sensing is applied
- the network of sample plots covers the whole country
- the network is planned for five years

- sample plots are organised into clusters
- 1/5 of the clusters are measured per year
- the sample (cluster) distribution is based on a national 5 x 5 km quadrangle grid
- sampling density is the same throughout the whole country
- the method of cluster sampling with partial replacement is used

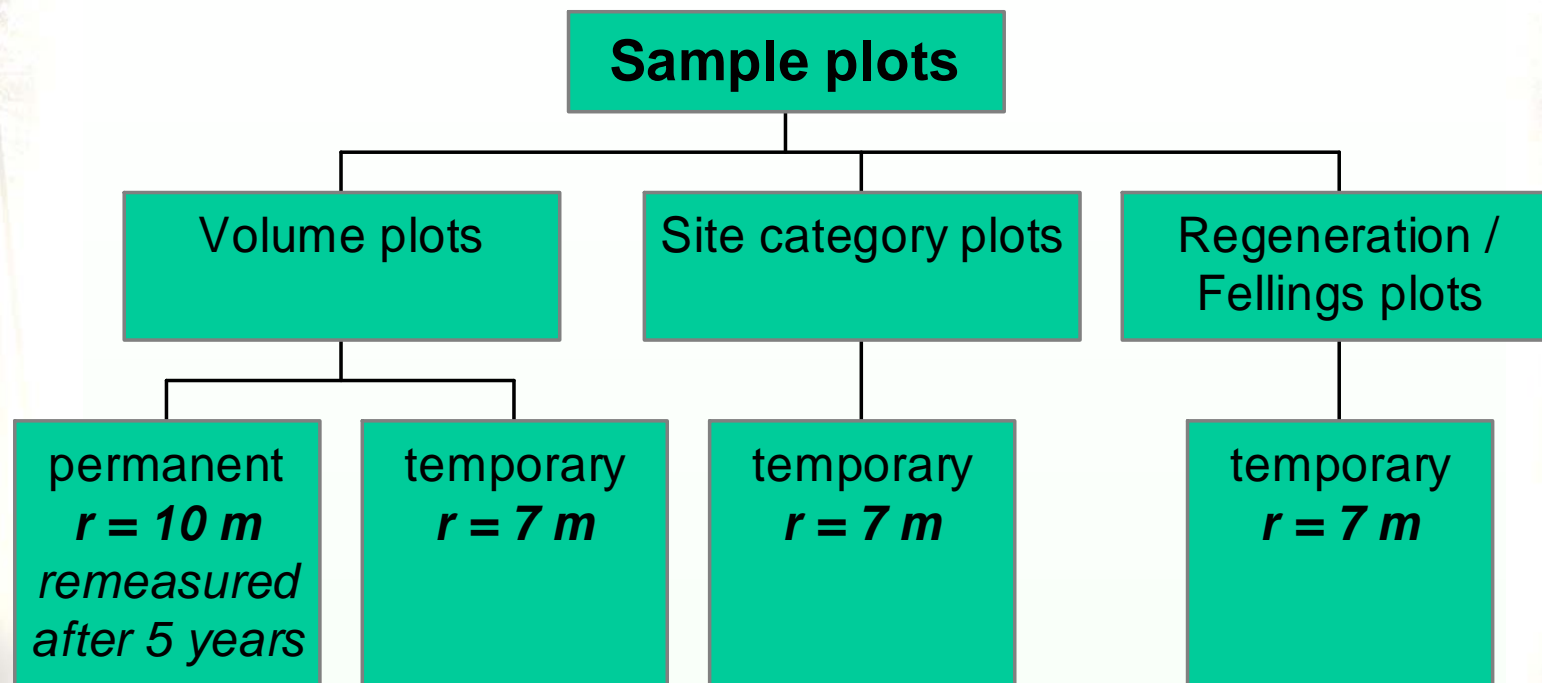
# Cluster network

year 2007

- - permanent
- - temporary
- ## - outside



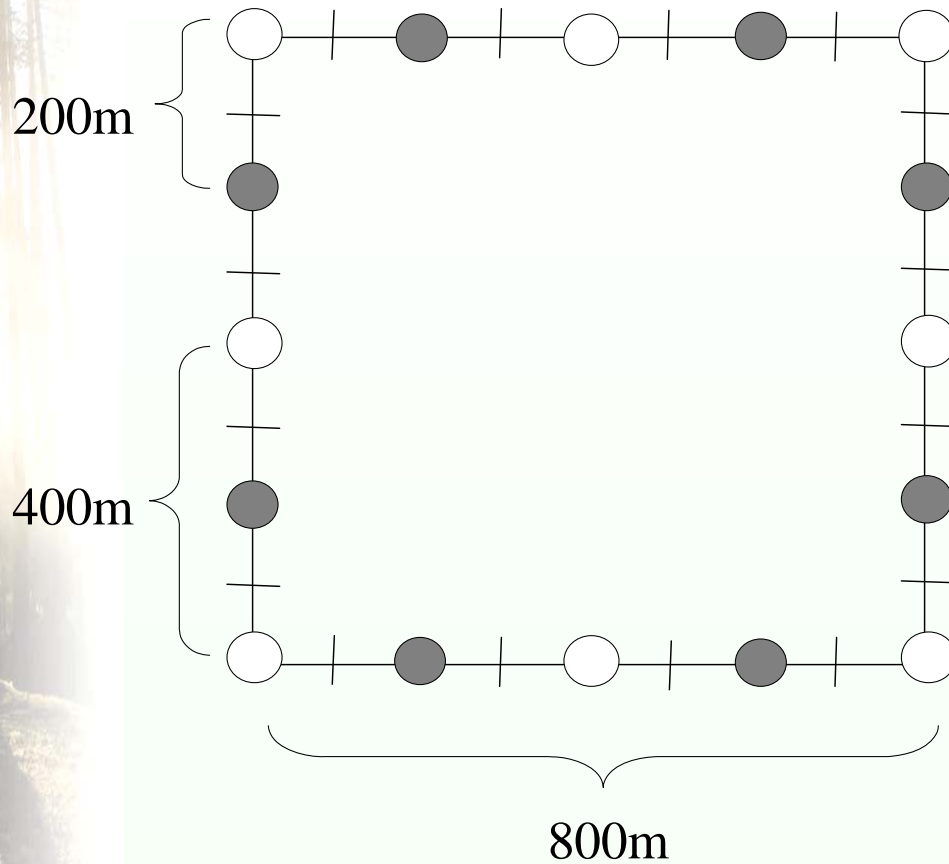
- Mean distance of clusters in 5-year network – 5.7 km
- Mean distance between clusters per year – 12.7 km
- Three types of circular fixed-radius sample plots are used:
  - volume sample plots
  - site category sample plots
  - regeneration & fellings sample plots



*\* about 1000 permanent plot per year,  
1/2 of them on forest land*

# Cluster and location of sample plots

**800 x 800 m**



- - volume plots
- - site category plots
- - regeneration and felling sample plots



- Plots that contain different land categories or stands of distinctly different parameters are divided into sections
- Sample radius depends on the assessed variables, as well as its value
- In addition to the main radius (10 m, 7 m), where land-use class is determined, other radiuses are in use

## The forest inventories in Estonia

<b>Inventory</b>	<b>Years</b>	<b>Number of clusters and plots per year</b>
<b>1<sup>st</sup> NFI</b>	<b>1999-2003</b>	Ca 240 clusters, ca 4400 plots, whence ca 2250 plots on forest land
<b>2<sup>nd</sup> NFI</b>	<b>2004-2008</b>	Ca 275 clusters, ca 4500 plots, whence ca 2300 plots on forest land
<b>3<sup>rd</sup> NFI (planned)</b>	<b>2009-2013</b>	

- *Estonian Forest Survey Centre* conducted NFI in 1999 – 2002
- 2003 – ... *Estonian Centre of Forest Protection and Silviculture*, the department of NFI
- Number of field staff is approximately 8 persons, incl. 3 team leaders
- On temporary tracts working group of two is employed and on permanent ones there is a working group of three

- The area of forest land is calculated as follows: the ratio of the plots on forest land to the total number of plots is multiplied with the known land area area of the corresponding administrative unit
- Volume is calculated over bark, from the ‘stump height’, excluding branches
- Individual tree volumes are calculated as a function of the tree species, DBH and height. Data models (non-linear regression) for the calculation of height of callipered trees are based on the measurement data of sample trees (‘model trees’), stand and site variables

- To prevent errors, inventory results of the last five years are combined during data processing
- The possibility of alterations in time is taken into consideration. The importance of earlier estimates smaller compared to the current data (i.e. the weight attributed to the data is reduced per each passing year)
- Some estimates are based only on the data of the last year. Assessments, where changes in time can be considered meaningless (for example forest site types, drainage etc) are based on five-year average

- The results of the Estonian NFI are provided for the whole country
  - for forests administrated by the Estonian State Forest Management Centre
  - for other owners' forests
- Some estimates by counties (– 15 in Estonia) are also provided
- The inventory results are available in the annual report “*Estonian Forests. Statistics of forest resources and conditions by National Forest Inventory*”
- also available on the Internet <http://www.metsad.ee>

The NFI  
will provide a baseline  
of where our forest resources are  
and how they are changing over time

*Thank you  
for attention !*