

# Forest Fertilisation within Metsähallitus Forestry Ltd

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*Jelgava*



# Metsähallitus manages:

**9 124 000**

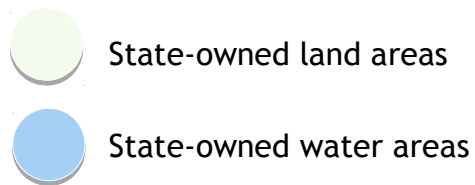
hectares of land.

**3 417 000**

hectares of waters.

**12 541 000**

hectares in total.



# Metsähallitus' land areas



- Forest land in multiple-use forests 3,482,000 hectares
- Low-productivity land in multiple-use forests 714,000 hectares
- Non-productive land in multiple-use forests 690,000 hectares
- Statutory protected areas 1,519,000 hectares
- Wilderness areas 1,377,000 hectares
- Areas reserved for conservation programmes 613,000 hectares
- Other areas of special value 729,000 hectares



# Aims of Fertilisation

- Increase of volume increment
- Acceleration of value increment
- Restoration of nutritional balance
- Shortening rotation
- Prevention of damage caused by nutritional imbalance
- Profitability
- Volume annually: 11000 ha mineral soil, 4000 ha peatland
- Constraint: avoidance of harm to watercourses,  
to aquatic life especially



# Requirements on the Stand

- Number of degree days must exceed 850
- Mesotrophic fertility
- Normal growing stock in good condition
- Coniferous, the share of broadleaves less than 30 %
- On mineral soil first thinning has been carried out
- No insect or fungi damage, or other disturbance in growth
- On peatland needle analysis is required
- Some flexibility is allowable in case of deficient or defective stands, which are located among fully suitable stands





# Nearly typical stand to be fertilised on mineral soil



# Nearly typical stand to be fertilised on peat



## Fertilising Mineral Soil

- Soil not fertilised: very stony, or very permeable soil like gravel or coarse sand, or nonpermeable clay
- At least nearly ten years to regeneration cutting
- In pine stands, either NP or just N; for spruce NP
- Fertiliser types are alternate, interval 7-9 years

Heat sum dd.	>950	850-950
Nitrogen, kg/ha	150	120
NP fertiliser, kg/ha	600	450
Urea, kg/ha	330	260





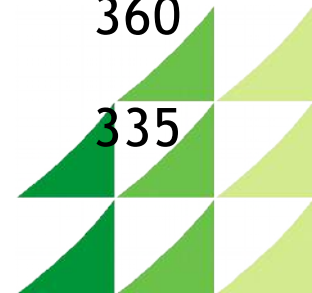
# Fertilising Peatland

- Stands with more than 50 cm of N-rich peat with a shortage of P and K are preferred
- Proper drainage either currently, or DNM is imminent
- No virgin peatland or groundwater areas
- Artificial PK, or wood ash
- PK: P 40-50 kg / ha, K 80-120 kg / ha, B 1-2 kg / ha
- Ash: 3000-5000 kg / ha
- May be repeated after: PK 15-20 years, ash 20-30 years
- Follow-up: K 80-100 kg / ha, B 1-2 kg / ha



## Area fertilised and respective unit cost ( all Finland)

Year	Nutritionally balanced sites	€/ha	Nutritionally imbalanced sites	€/ha
2015	13000	380	29000	325
2016	34000	325	13000	360
Average	24500	340	21000	335



# Spreading

- Private contractors do the job, sometimes even purchase the fertiliser
- Spreading from the air is much more common than spreading from the ground
- Spreading season: May - September, optimum May - July
- Urea September and October
- Ash also in the winter
- Buffer 30-50 m along watercourses, 5 m next to ditches
- No storage in groundwater area or < 50 m from a watercourse



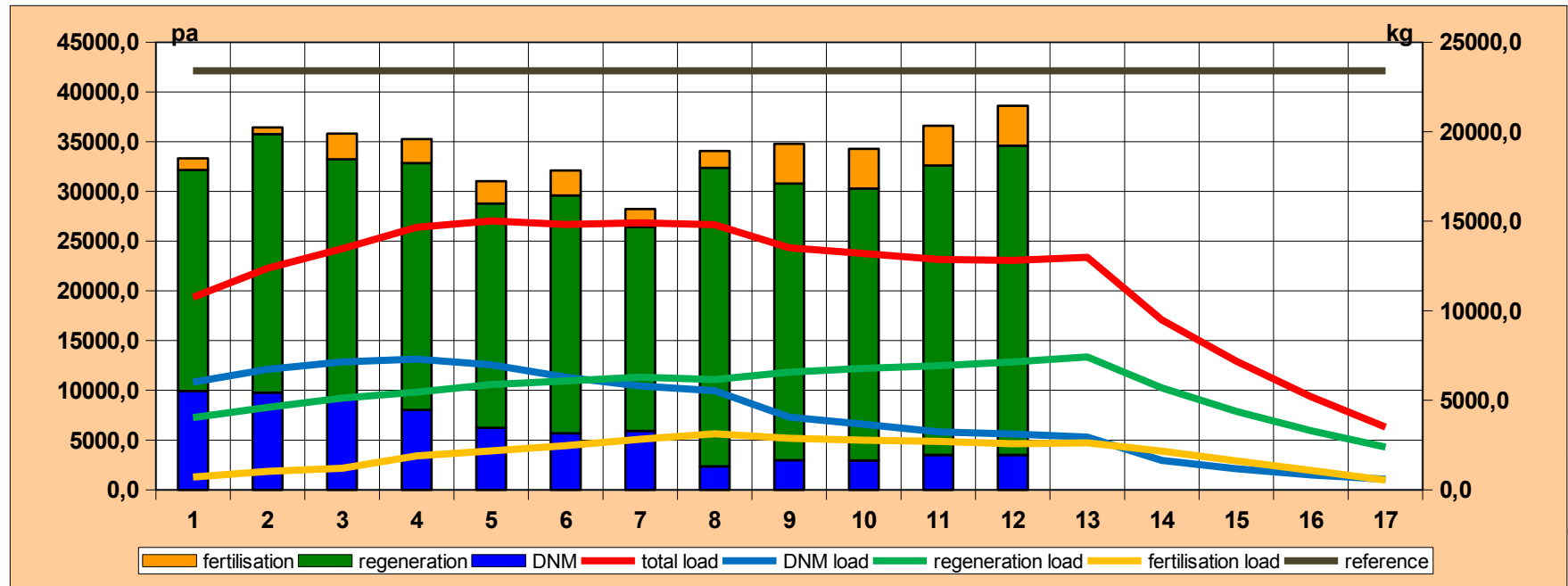
# Spreading Ash





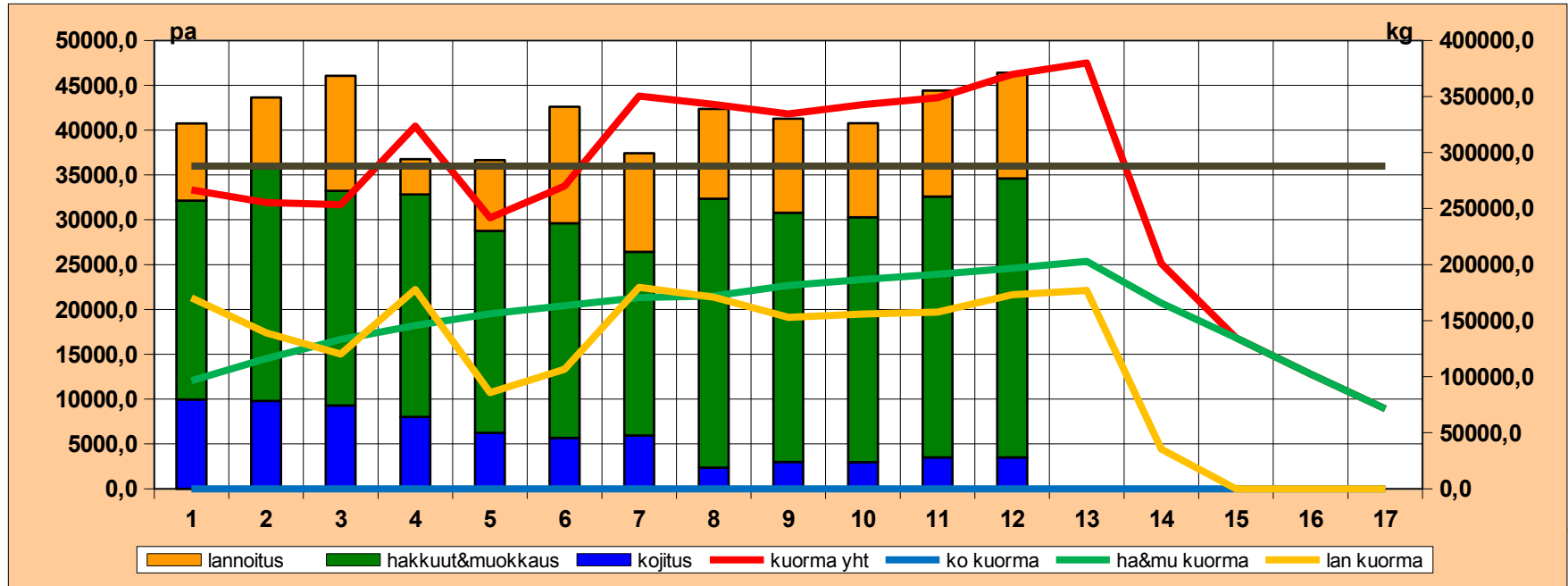
# Phosphorus load to watercourses from Metsähallitus Forestry Ltd: estimate of the near past, and the scenario 2017-2021

Reference level: average of all productive commercial forest in Finland



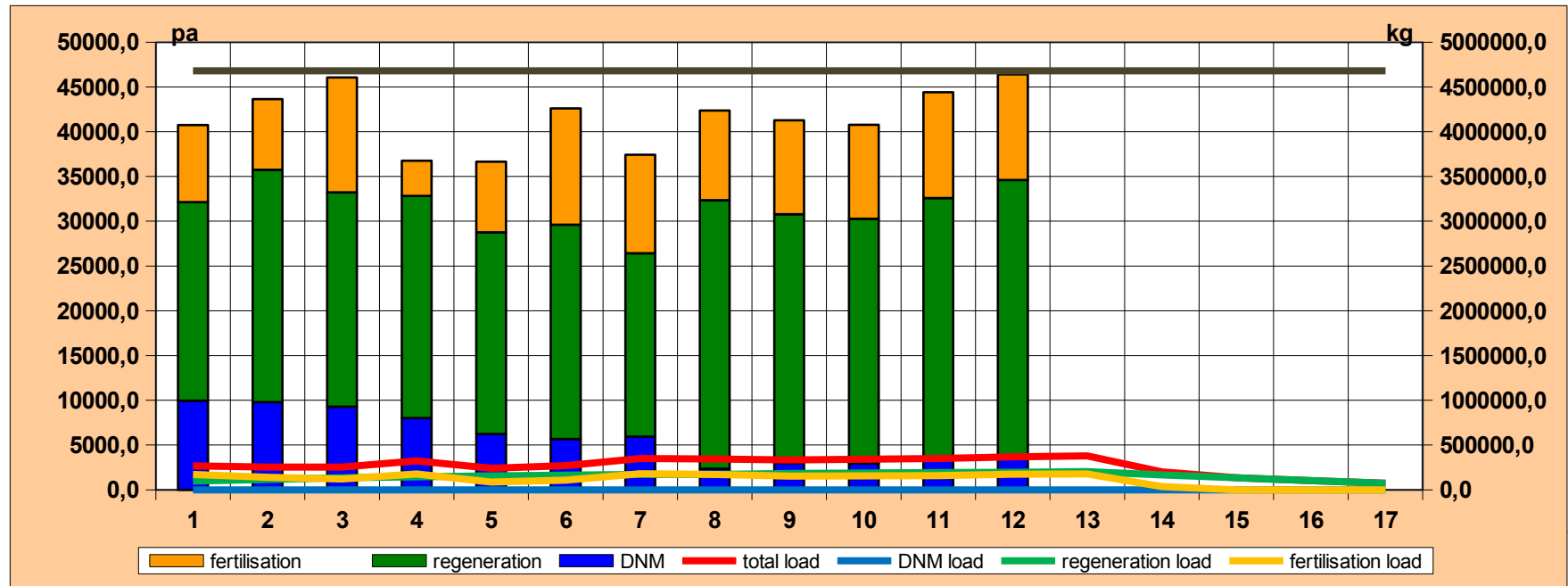
# Nitrogen load to watercourses from Metsähallitus Forestry Ltd: estimate of the near past, and the scenario 2017-2021

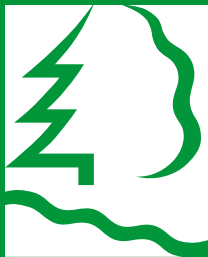
Reference level: average of all productive commercial forest in Finland



# Nitrogen load to watercourses from Metsähallitus Forestry Ltd: estimate of the near past, and the scenario 2017-2021

Reference level: background load (natural eluviation + fallout)





METSÄHALLITUS

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The End



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