Stump harvest – Environmental impact

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Stump harvest in Finland (UPM Kymmene)

Started in 2002

- Double amount of biomass/ha (200MWh) compared to logging residues LR
- UPM kymmene uses 2 TWh woodfuels
- Stumps 700 GWh (80% of total stumplifting in Finland)
- Stumps are removed from 4% of all final fellings (LR 17%) in all Finland (15% in middle part)

Source: Christer Backland UPM-kymmene



Stump harvest in Sweden

- Swedish Forest Agency is positive to stump removal if it is not substansially affecting long term productivity and biodiversity
- Should be applied for/reported to SFA
- Waiting for an update of environmental impact that will provide basis for recomendations from SFA – ready 2009
- Until then restricted to 2000 hectares

Hur much more biomass can we harvest if we also include stumps?



- 4-6% Extenstion of the stenm
- 8% Whole core of biomass (cf Jonsson, 1978)
- 13-18% All stumpwood (cf Jonsson, 1978)
 - 23-25% Roots larger than > 5cm (FFRI)
 - <40% Finnish experience 170 MWh/ha (UPM-Kymmene)



Major concerns

- the loss of coarse woody debris and it's impact on biodiversity
- soil disturbance and it's impact on
- erosion and thereby siltation of surface waters
- physical soil properties
- nutrient losses and potential acidification of surface waters
- carbon balance
- cultural heritage hidden in the forest soil
- mobility of toxic substances organic mercury in particular

Silvicultural benefits

- Reduction of root rot in the next forest generation
- Improved seedling establishment
- Unchanged or increased tree growth and stand productivity



Effect on stand productivity

- No effect on seedling survival
- No decrease of growth
- Promotion of natural generation especially birch
- No increase in soil damage if stump harvester is used for site preparation – wet soils should be avoided
- If logging residues also are removed planting could be done 1-2 years earlier than common practise, with a better result and at a lower cost

Effects on biodiversity

- Dead wood is important for many xylofagous organism
- The amount of dead wood is lower in managed forest than in unmanaged
- Stumps is 80% of dead wood and a potential substrate is removed
- Stumps is a man made substrate
- All stumps are not harvested
- Lack of basic knowledge

Effects on soil and water

- Care with stump harvest on susceptible soils and close to surface waters
- If harvest only includes course root nutrient export with harvest will be limited
- More studies are needed

Effects on insect and rot



- High potential of reducing infection of the coming generation of rot (*Hetrobasidion, Armillaria, Phellinus*) – confirmed by a number of studies
- Reduced risk of pine weevils (*Hyolobius abietus*) and black bark beetles (*Hylastes sp*.)
- If stump harvest becomes widespread and common practise – potential to reduce infection on a landscape level



Root rot (*Heterobasidion annosum*) is gaining a hold in Swedish forests

≻15% of the Swedens's Norway-spruce population is already afflicted, costing forestry an estimated US\$200.000 a day

➢ This invasive fungus degrades the timber, reduces growth and increases the risk to trees of further damage, eg, windthrow.

Source: Skogforsk

Stump harvest site is often a negative experience from the public

This experience changes to the opposite when field vegetation and regeneration is back. A decade after stump removal visitors prefer stump harvested sites.

On a landscape level it is recommended to refrain from stump-harvest or to be restrained:

- In areas with frequent occurring known ancient remains
- In watersheds with high ambitions and goals for management
- In areas with high ambitions and goals for management concerning
- biodiversity
- water quality

On a stand level stump harvest should be avoided:

- In stand with high risk of deep tracks, soil damage and soil erosion – wet and fine soils
- At thinning to avoid damage on the remaining stand
- In urban stands that are important for recreation
- In stands close to protected areas

Within a stand where stumps are harvested it is important to:

- Avoid stump harvest closer than 15 m to lakes and watercourses
- Avoid stump harvest in earlier left respects to nature
- Avoid to harvest all stumps
- Harvest in such way that the majority of fine-roots remain in the ground

Knowledge gap

- New knowledge is needed to be able to assess the impact of stump harvest on the environment
- Research and development ongoing in a number of areas

Perspective

 To be able to make meaningful judgement on how increased stump removal can effect biological diversity we have to relate it to:



1. All other silvicultural mesurues during a rotation period

2. What is going on in the neighboring forest landscape

3. Ecological requirements



- Ecological requirements for rare and important species for nature conservation
- Some species are favoured and some species are disfavoured

4. Environmental impact of the energy system it is replacing



Fossil fuel systems

- O Not sustainble
- Emission of greenhouse gases
- Dependence of import
 from unrelible sources

All energy systems have negative environmental impact

Contradicting environmental goals

Living forests high in biodiversity



Reduced emissions of greenhouse gases

Potential for increased use of biofuels in Latvia



- Today big export of woodchips and pellets
- Great potential for increased forest chips production
- Most cost effective bioenergy systems for the future;
- ✓ local productaion,
- ✓ local upgrading
- ✓ local use.

Thank you for your attention !

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