



LUND UNIVERSITY

Initial effects of stump harvesting on greenhouse gas fluxes and nitrogen leaching

Vestin, Patrik; Mölder, Meelis; Hellström, Margareta; Karlsson, Tomas; Sundqvist, Elin; Klemedtsson, Leif; Lindroth, Anders

Published in:

[Publication information missing]

2011

[Link to publication](#)

Citation for published version (APA):

Vestin, P., Mölder, M., Hellström, M., Karlsson, T., Sundqvist, E., Klemedtsson, L., & Lindroth, A. (2011). Initial effects of stump harvesting on greenhouse gas fluxes and nitrogen leaching. *[Publication information missing]*. http://www.slu.se/Global/externwebben/centrumbildningar-projekt/treestumpsymposium2011/S%205_LCA_all%20presentations.pdf

Total number of authors:

7

General rights

Unless other specific re-use rights are stated the following general rights apply:

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

INITIAL EFFECTS OF STUMP HARVESTING ON GREENHOUSE GAS FLUXES AND NITROGEN LEACHING

Patrik Vestin¹, Anders Lindroth¹, Meelis Mölder¹, Tomas Karlsson¹,
Margareta Hellström¹, Elin Sundqvist¹, Leif Klemedtsson²

1 Department of Earth and Ecosystem Sciences, Lund University, Sweden

2 Department of Plant and Environmental Sciences, Gothenburg University, Sweden

Key words: *stump harvest, flux measurements, CO₂, CH₄, N₂O, N leaching*

Clear-cutting and subsequent stump harvesting and site preparation lead to substantial disturbances of the forest ecosystem, including the soil. Increased substrate availability for decomposers following harvest may result in higher carbon dioxide (CO₂) emissions from soils and in increased nitrogen (N) mineralization rates. This may be further enhanced by increased soil temperatures after stump harvest/site preparation. This has the potential to result in significant nitrous oxide (N₂O) emissions and N leaching to the ground water. In addition, removal of trees causes reduced evapotranspiration and subsequently, a raised ground water table. Boreal forest soils are normally sinks of atmospheric methane (CH₄) but changes in ground water level, soil temperature etc. might cause a reduced uptake or even turn the ecosystem into a CH₄ source. The net effects of stump harvest on greenhouse gas fluxes and N leaching were studied at a clear-cut in Norunda, central Sweden. The forest was clear-cut in early 2009 and stump harvested in May 2010. Micrometeorological measurements (i.e. gradient measurements and eddy covariance) during the period 20 May through 30 November 2010 allowed for quantification of CO₂, CH₄ and H₂O fluxes at two stump harvested plots and two control plots. Automatic chamber measurements (CO₂, CH₄) were carried out in the adjacent forest stand during the main growing season and at the clear-cut during October–November 2010. In addition, CO₂, CH₄ and N₂O fluxes were measured with a manual chamber from September through November 2010. Ground water was sampled from 16 ground water pipes and analyzed for [NH₄⁺], [NO₂⁻] and [NO₃⁻]. Preliminary results indicate increased mean soil temperatures at disturbed microsites. The clear-cut became waterlogged after harvest and a comparison of preliminary flux-gradient and chamber results indicate a switch from a weak CH₄ sink to a significant source at all plots. Daily average CH₄ fluxes ranged between -6.4 – 204.2 μmol m⁻² hr⁻¹ with mean values of 10.7 – 42.0 μmol m⁻² hr⁻¹. Daily average CO₂ fluxes were in the order of -0.4 – 9.7 μmol m⁻² s⁻¹. There are no clear differences between stump harvested plots and control plots. All data (including 2011) will be further analyzed and presented at the conference.