SOnce STream (headwater) PROtection from forest practices: what are the costs and benefits, and how best to do it?  SOSTPRO

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Water JPI
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Protection of streams from FORESTRY (and other land uses) tends to leave buffers around larger streams. Often we have little or no real protection around source areas. Once sediments and nutrients enter the source streams, the water is heated by solar radiation in summer, and organic matter sources are altered, is there any point to leaving protection around larger streams? Could we do better at protecting source areas, and what would be the relative costs?

Richardson JS & Danehy RJ. 2007. A synthesis of the ecology of headwater streams and their riparian zones in temperate forests. Forest Science 53:131-147
Streams receive and integrate all the influences from the landscape.

Northern Sweden
Different ways of protecting fishless source streams in Washington State, USA

Current Forest Practices Rules
Absolute values of effect sizes

Overall effect size (± 95% conf. int.)

Overall effect size (± 95% conf. int.)

OBJECTIVES (WPs)

1. Develop process-based models to compare outcomes (local and catchment scale) of different scenarios for streamside protection. This will be integrated with an economic analysis of costs of the different scenarios.

2. Augment data available for models by a sampling program carefully structured to expand the range of ecosystem variants sampled and to account for underlying environmental gradients, which can modify specific responses to forestry.

3. Develop a white paper for the options for riparian management around small streams.
CONSORTIUM DESCRIPTION

University of British Columbia, CANADA
Richardson

University of Oulu, FINLAND
Muotka

Swedish Agricultural University, SWEDEN
Kuglerová

Swedish Forest Agency
British Columbia Ministry of Forests, Lands and Natural Resource Operations
Metsahallitus Parks and Wildlife Finland
The Swedish Agency for Marine and Water Management
SCA Skog AB (Sweden)
Ontario Ministry of Natural Resources and Forestry
Svesaskog (Sweden)
Forest Practices Board, British Columbia
Bothnian Sea Water District Authority
Metsäkeskus, Finnish Forest Centre
1. Develop process-based models to compare outcomes (local and catchment scale) of different scenarios for streamside protection.

   Different buffer widths on source streams

   Different arrangements – specific reaches

   Variable widths

   Different environmental background (e.g. latitude, stream slope, etc.)

These model outcomes will be integrated with an economic analysis of costs of the different scenarios.

Costs of operations differ by protection measures and landscapes.


Spatially explicit catchment processes

- Run-off generation
- Groundwater inputs
- Dissolved organic carbon
- Pathogen sources
- Light Radiation input
- Nutrient fluxes
- Sediment flux
- Particulate organic carbon inputs

EcoPath, SWAT models, empirical models
Account for landscape features, e.g. latitude, elevation, slopes, potential evapotranspiration, etc.

Augment data available for models by a sampling program

Structured to expand the range of ecosystem traits sampled

Environmental gradients, such as

- Latitude
- Altitude
- Stream size
- Slopes (stream slope, hill slope)
- Potential evapotranspiration

others?
3. Develop a white paper for the options for riparian management around small streams

Riparian management guidelines have often been adopted from other jurisdictions …

- Not accounting for underlying environmental differences
- Not tested in new places
- Need to account for different ecosystem values

3. Develop a white paper for the options for riparian management around small streams

Provide guidance for riparian management

Outline designs for how one might test effectiveness and efficiency of management around source stream protection
Expected Impact of the Project

Better understanding of how different practices might lead to outcomes to protect downstream values

Guidance for how to tailor management guidelines to recognise landscape differences

Explicit evaluation of the trade-offs between resource values – considering industry values and social values

Meeting the aims of the call

Project includes biology, hydrology, biogeochemistry and geomorphology

Project includes economic analysis

We will be working directly with government agencies and forest industry partners, and aim to develop lasting, productive relationships

Post-graduate students, post-doctoral fellows will spend time in the different countries participating

Meetings with partners annually moving between the 3 primary countries