

## Impacts of forest harvesting on stream nutrient processing mediated by organic carbon-nitrate

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### Project Team:

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### Abstract

Keeping nitrate concentrations below levels that cause ecological and health risks is a vital ecosystem service provided by the stream and riparian environment. Watershed disturbance, particularly forest harvesting, tends to enhance stream nitrate concentrations following leaching from soil, while producing variable effects on dissolved organic carbon (DOC) input to streams. With DOC-nitrate ratio known to be negatively related to microbially-controlled nitrate production, it has not been well established as to how logging influences ecological processes controlling this ratio, and hence stream nitrate levels.

This research investigates logging-associated changes in selected stream and riparian biogeochemical processes that can control stream nitrification rates. Using a replicated Before-After-Control-Impact (BACI) approach, it examines how such outcomes vary across watersheds with contrasting nutrient retention potentials, which are within two distinct forest types (deciduous and coniferous) in Canada. Watersheds with higher deciduous cover is expected to leach more nitrates, and would be partly contributed by increased in-stream nitrification, given a reduced streamwater DOC-nitrate ratio.

Results will help identify suitable ecological indicators which can mechanistically predict the extent of stream nutrient enrichment after forest harvests. Established indicators have the potential to be applied to inform pre-logging planning of harvesting practice and post-logging implementation of water monitoring regime.

**Keywords:** Nitrates; forest harvesting; riparian; biogeochemistry; DOC; nitrification

### Geographic Location:

- Malcolm Knapp Research Forest, Maple Ridge, British Columbia, Canada (E10-1; R20-4; G-4; East Creek; Mike Creek; Spring Creek)

- Turkey Lakes Watershed, Ontario, Canada (TLW34; TLW96; TLW97; AY1-1; AY3-1; AY4-1; AY13)

**How does your project link to Canadian aquatic ecosystem services?**

If deciduous-dominated watersheds tend to be more susceptible to nutrient loads increases after forest harvesting, logging practices may need to be carefully planned to reduce risks of degradation and water quality degradation. This would minimize possible increases in costs associated with the treatment and purification of water bodies downstream of these logging sites.