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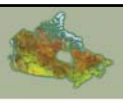

A Bio-indicator of Forest Stream Health for Effectiveness Monitoring of Forest Management Guidelines

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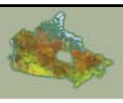
FMGs & Water



- FMGs & Ps being revised under END paradigm
- Changes to directives for aquatic habitat (e.g., SSG and shoreline harvesting)
- Implementation:
  - Produce ND patterns on landscape
  - Sustain or enhance ecological integrity of forest ecosystems
- Tools for measuring FMG effectiveness and sustainability

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Forest watersheds

- Include aquatic ecosystem integrity
- Project evaluates a potential bioindicator of stream ecological integrity
- Community structure (biodiversity): aquatic invertebrates & microbial communities
- Ecological function: organic matter breakdown (critical ecosystem process - primary energy source in forest water bodies)

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Standardized leaf pack

- Leaf litter decomposition and associated invertebrate and microbial communities
- Used in other ecosystems to detect impairment, rarely to assess forest stream health

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Previous projects






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Previous projects

- Significantly lower decomposition rates in logged watersheds (with riparian buffers)
- Linked to lower abundance of some key leaf-shredder invertebrate taxa
- Impetus: new project – find this again?
- What conveys upland disturbance to instream conditions and reduced leaf litter decomposition?
- How does this compare to natural disturbance (fire)? Relevance for the END

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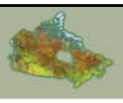
Co-op project



- Compare logged (8-18yrs); burned (12yrs); not recently disturbed (reference) watersheds
- How do they look after period of recovery? (emphasis on riparian forests)
- Effects on stream habitat condition, biodiversity, function
- Linked to landscape features (disturbance, RCA)
- Similarities, differences in processes, features, effects & recovery

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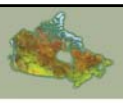
Because…



- Test ecologically-relevant bioindicator
- Improve understanding of risks from current and evolving FMPs
- Implications of END (targets & benchmarks)
- Laurentian U: Role of forests in the recovery of stressed aquatic ecosystems

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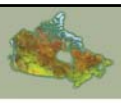
Partners & sites



- Team: CFS, OMNR (Rob Mackereth et al.), Laurentian U (John Gunn et al.), Forest Co-op
- Trent U, York U, Laurier U, RRU, Vale
- PhD student (Elisa Muto) & assistants
- Post-Doc for a term (NSERC)
- MSc student Royal Roads U (Tanya Sharko)
- 28 sites:
  - 10 undisturbed
  - 12 logged
  - 6 burned

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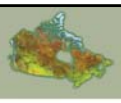
Project status



- Field work completed:
  - 3 yrs water temperature, level monitoring
  - 2 yrs leaf pack analyses
  - 2 yrs water quality grab samples
  - 1 yr sediment deposition
  - 1 yr stream habitat surveys
  - 1 yr riparian & upland forest surveys
- Early GIS watershed characterization following methods of Rob & Darren
- All samples processed, data analysis underway…

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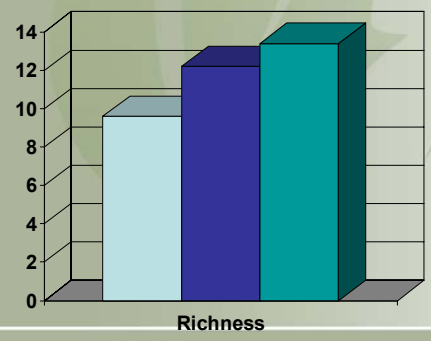
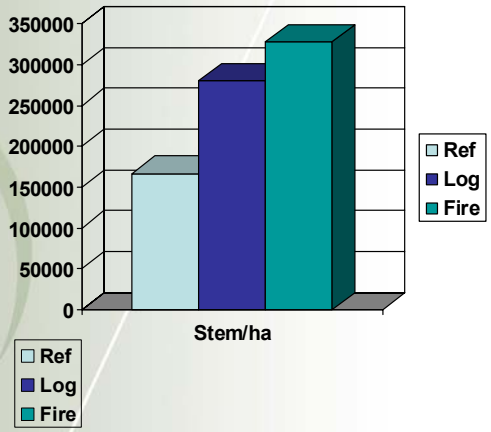
Sneak preview…

- Watershed features:
  - Riparian, upland woody vegetation





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Habitat conditions

- Water chemistry…
  - several parameters F >> L > R; other nsd
  - total N F << L&R
- Fine sediment deposition F&L > R (nsd)
- Fine sediment cover F > L > R
- % fine organics R > F >= L (nsd)
- Canopy cover over streams F < L&R
- Therefore….
- ~10-15 yr after, still detect watershed, riparian and in-stream habitat differences

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Ecological implications

- Invertebrate biodiversity & leaf litter breakdown
- Reminder…..
- Previously, significantly lower breakdown, significantly lower abundance in logged
- Subsequently demonstrated in BC interior
- Here in WR (more sites, longer recovery, including fire)….

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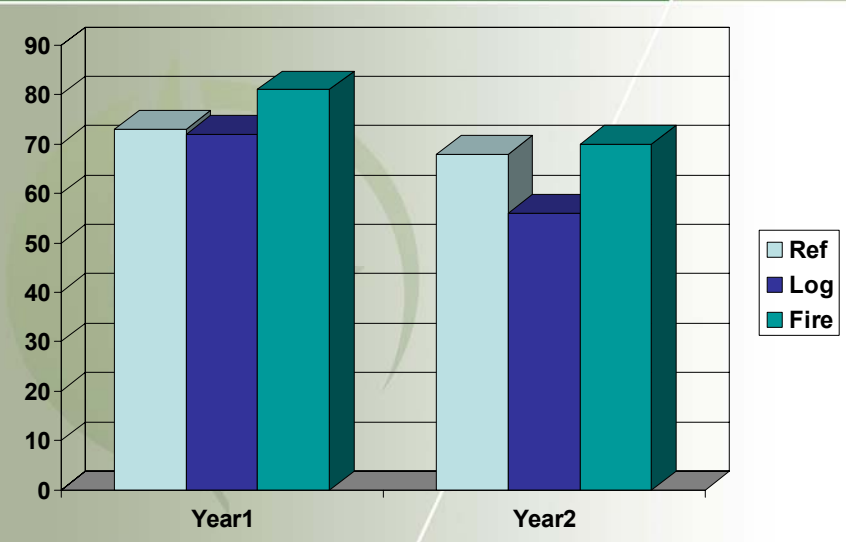
Litter breakdown



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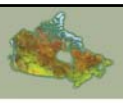
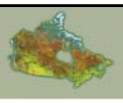
Invert communities



- Still working on those data!
- Link breakdown and invertebrates to watershed characteristics to determine “drivers”

Early indications…



- By ~10-15 years after…
- Watersheds/streams differ; ecological indicators
- Logged watersheds not significantly different from reference
- Most significant differences are between fire and reference
- Most response variables from logged tend to be intermediate between fire and reference
- Under END (intentional near-water harvesting) likely to shift toward fire & we can measure that

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Thanks!

Forest Co-op, NSERC, Vale Inc.
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Scott Capell, Kevin Good, Jesse Harnden, Tom Shorney