



Water Resource Protection In a Forest Landscape Planning Context

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Land/water linkages



Photo: J McLaughlin





- Watershed level
- Landscape influences
 - Climate
 - Geomorphology
 - Geology – soils
 - Land cover/use
- Landscapes resistant
- Impacts localized
- Still important!
- Planning at landscape practice at site
- Feedback to landscape



What to protect...



- Shoreline (riparian) areas
 - Strongest land/water linkages
 - Critical productive habitat
 - Riparian reserves: not necessarily best approach
 - Unnatural landscape patterns
 - Riparian management strategies
- Water contributing areas
 - Hydrologically-connected uplands
 - Influence temperatures, nutrients, flow regimes
 - Detection/prediction methods are improving





- Landscape-level management; natural disturbance emulation
- Hydrological monitoring/modeling – detecting sensitive areas
- Small headwater streams – importance/protection
- Developing improved riparian management strategies: water protection & shoreline habitat & biodiversity
- Watershed studies – empirical / modeling

Outstanding issues...(1)



- Issues and impacts vary regionally – not necessarily predictable – regionally-relevant information
- Cumulative impacts & downstream recovery
- Improving riparian management strategies – re-visiting the buffer reserve approach (e.g., UBC, FORWARD, RIPNET, WRRHIP)
- Ecological implications of changes to hydrological & biogeochemical processes





- Improve cross-disciplinary collaboration: hydrology & ecology
- Advance partnerships/networks among academia, consultants, NGOs, First Nations, prov., state, federal gov's – RIPNET (U of Guelph, SFMN)
- Move research results to practice, regulation, policy: EM & AM - more complex regs & guides
- Can accommodate more complex regs with advanced positioning systems, sophisticated operational equipment



- White River Riparian Harvesting Impacts Project
- Boreal mixedwoods, whole-tree harvesting by feller/buncher and grapple skidders
- “BACI” design; 3-yr pre & 3-yr post logging
- 3 streams in logged watersheds; 3 in reference
- Uplands clearcut; riparian reserves partial harvest
- Prescription: “Up to 50% removal of merchantable trees, as evenly distributed as possible across species and size classes, in accessible portions of riparian reserves”

Partial harvest in riparian buffers



1. Increase riparian habitat complexity
2. Sustain ecological corridor functions by retaining 50% or more residual stand
3. Protect adjacent streams by retaining functional canopy cover
4. Emulate natural shoreline fire disturbance
5. Improve residual riparian stand structure/quality
6. Allow additional harvest to partially off-set declining wood supplies, or re-allocate across landscape





- All winter logging
- Logging completed by Spring 2005
- Post-harvest assessment underway

Riparian Logging



Riparian Logging



Riparian Logging



Riparian Logging



We are measuring...



- Operational productivity/feasibility
- Residual stand characteristics (upland, riparian)
- Ground disturbance
- Songbird communities
- Flying insects
- Carbon flux; terrestrial decomposition processes
- Upland, riparian, fen hydrology
- Soil and stream water chemistry



We are measuring...



- Stream invertebrate communities
- Leaf litter inputs and decomposition
- LWD inputs and dynamics
- Stream temperatures and cooling potential
- Fine sediment deposition
- Particulate organic matter deposition
- Periphyton biomass
- Aquatic microbial communities
- Hg and other trace metals in water and aquatic insects



What we've learned so far... (results very preliminary!!)



Hypotheses re-visited



- Operationally feasible – yes, when accessible
- Increase habitat complexity – yes, bird comm.
- Retain eco-corridor – yes, fall migrants
- Emulate fire – maybe – patches of early veg
- Improve riparian stand quality - ??
- Protect streams – yes (mostly)
 - Shade/canopy/litter inputs – sustained ~ 90%
 - Temps – short-term increase (~ 6 wk) at 1 site
 - Fine sediments – short-term increase (~ 3 mos) 1 site
 - Water quality – no measurable change yet
 - Other measures ongoing...



- Additional measurement endpoints; ongoing...
- Results are preliminary...
- This level riparian logging may be viable riparian management option in Boreal Shield forests
- Ecological benefits to creating some disturbance: Protect or enhance riparian ecological function, protect streams
- Provide some increased wood supplies and/or re-allocation options
- Continued post-logging assessment important...

So Who Cares??



- Provincial FMG & Regs revision - Ontario
- National riparian management issues (RIPNET)
- NFS Ecosystem-based forest management
- Landscape-level natural disturbance patterns



Photo: T. Sutton



Thank you!!



Domtar, OMNR, FERIC
Living Legacy Trust, Forestry Futures Trust, NSERC
U of Guelph, Trent U, U of Innsbruck, Environment Canada
Ken McIlwrick, Scott Capell, Kevin Good
Host of techs, interns, students