



# 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



- 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!!



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