



Watershed Management in Western Manitoba:

An Overview of LP's Forest Management Planning Process for Watersheds in Duck Mountain, MB



Donna Kopecky
LP District Biologist

May 7, 2009

Presentation

- to provide some background on LP current forest management planning process relative to watershed conservation;
- provide a brief overview of the development of LP watershed management strategies within the 20 Yr SFMP.
- Future direction and partnerships

10 Year Forest Management Plan and the EA License



- Forest Management License Agreement (FML #3) was issued in 1994;
- Completion of 10 Year FMP in 1995;
- Environment Act License awarded in 1996;
- Certified under SFI certification system in 2002;
- 20 Yr SFMP submitted June of 2006, government review ongoing - currently operating under EA license extension.

10 Year Forest Management Plan and the EA License

- During the CEC Hearings in 1994-5, DFO concerns were raised regarding changes in peak flow events and water yield resulting from forestry activities;
- EA license condition to consult with the DFO on identifying potential effects on water yield and peak flow events



10 Year Forest Management Plan and the EA License

- LP consulted with DFO, and agreed to a 30% maximum harvest limit within any given watershed.
- LP also conducted a literature review on various experimental watershed studies which examined the effects of forestry activities on water yield and water quality.



10 Year Forest Management Plan and the EA License

- current watershed analysis approach: tracking the % of the total harvested area out of % of total productive forest area (existing and proposed harvest areas) present within each watershed (this excludes lakes, wetlands etc)
- cutblocks are considered to be in a “harvested state” until stands reach FTG (fully stocked by government standards) (hardwood = 5 years, softwood = 15 years);
- does not refer to true “hydrologic recovery” of a harvested area.
- the intent of this analysis is to avoid potential negative effects to watersheds resulting from forestry activities.

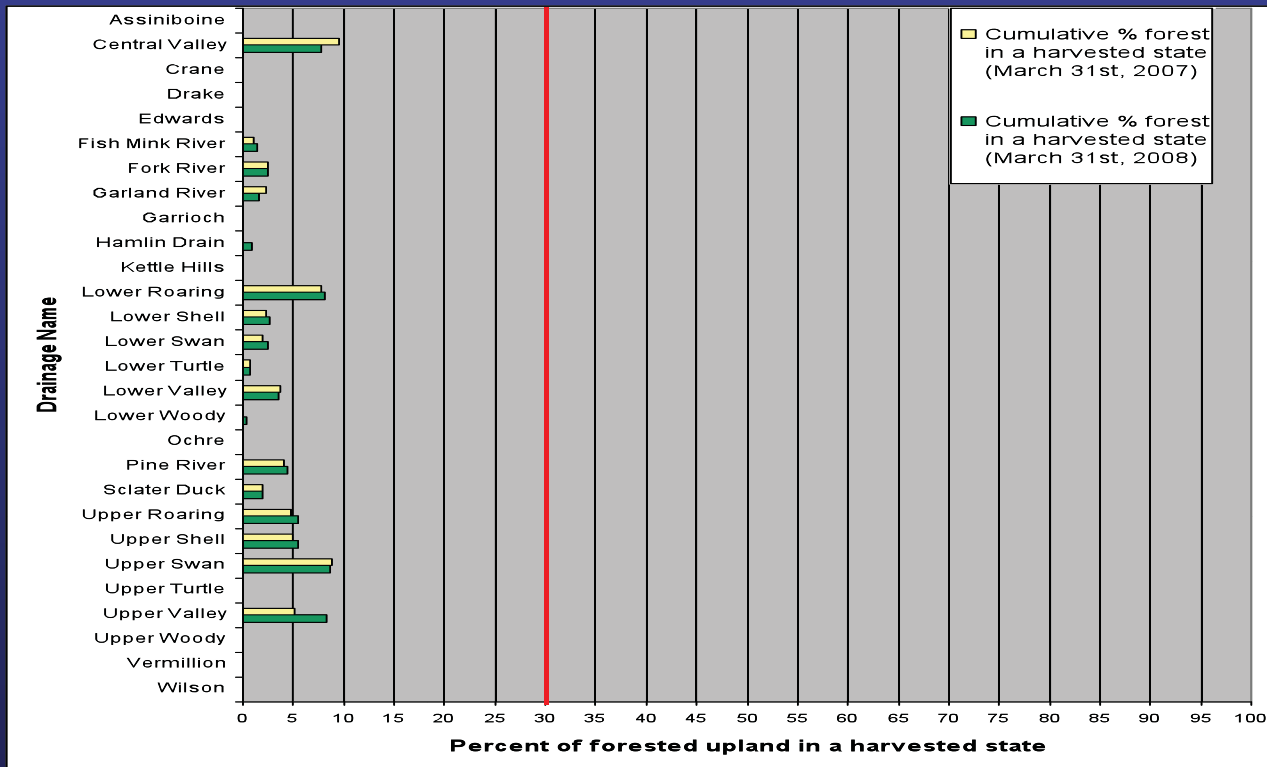
10 Year Forest Management Plan and the EA License

- existing and proposed harvest areas are tracked by “Basin” (LP Term used to classify largest hydrologic unit used for management purposes) approximately > 4000 ha;
- the analysis is provided in the Annual Operating Plan and in the Annual Report



10 Year Forest Management Plan and the EA License

- To date, the percent of productive forest in a harvested state or proposed state is significantly less than the 30% maximum in all basins.



10 Year Forest Management Plan and the EA License

- the watershed analysis is the best information LP has to date
- a relatively coarse approach
- provides direction in terms of how much harvest is currently available by basin area (considering both existing and proposed harvest areas)
- the intent to minimize disturbance to aquatic areas.

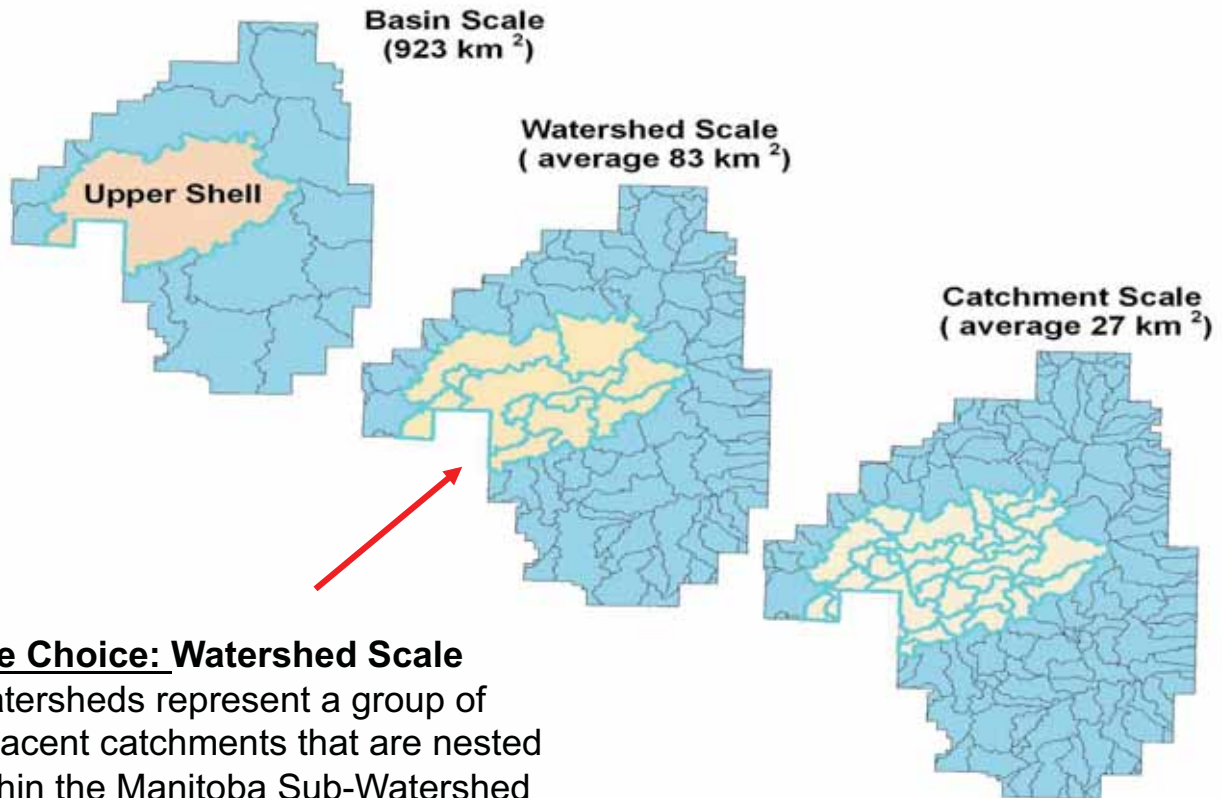


Other Considerations for a Watershed-Based Approach....

Need to consider the following:

- determine the appropriate level or scale of watershed
- identify thresholds or acceptable levels of disturbance
- determine hydrologic recovery period for watersheds ie. when is a regenerated block not 'in a harvested state' - 7 yrs, 15 yrs, 20 yrs ??
- consider watershed attributes, such as lakes and wetlands as part of the overall land-base that may moderate effects.
- hydrologic response resulting from natural disturbance vs timber harvest
- continued development of watershed assessment models

LP 20 YR Sustainable Forest Management Plan



The Choice: Watershed Scale

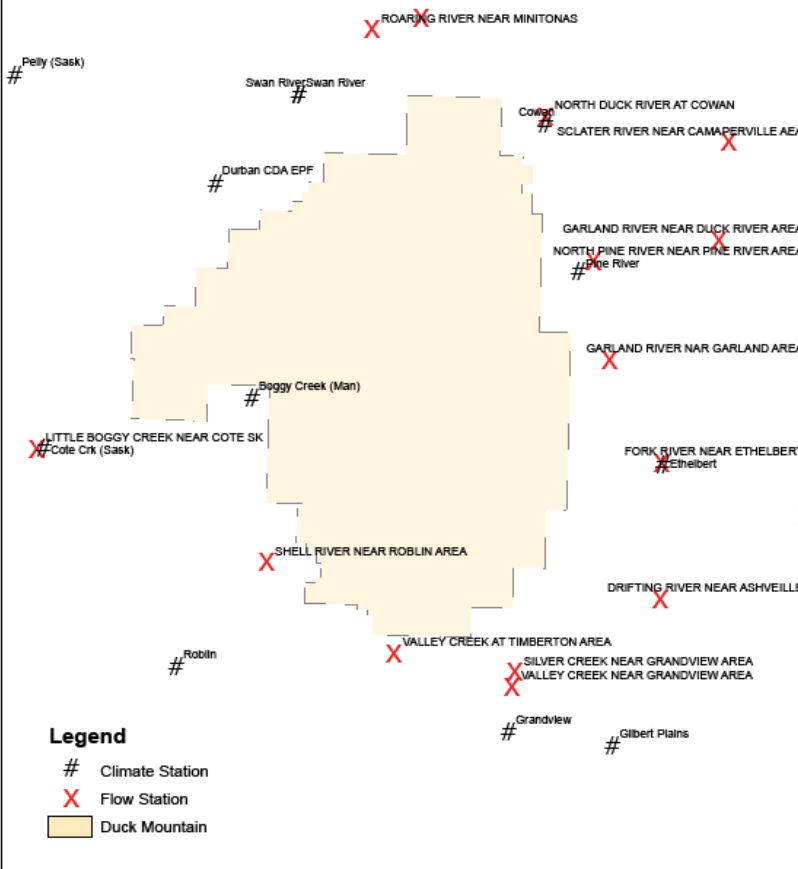
Watersheds represent a group of adjacent catchments that are nested within the Manitoba Sub-Watershed boundaries.

Watershed Assessment Model Selection

- Explored options (RHESsYs, BASINS_SWAT, WRENss)
- limited access to hydrologic & other data to drive models
- Ability to run model within planning context
 - WRENSS model
 - Estimates changes in annual water yield over time for the various management scenarios
 - Estimates changes in peak flow for 2,10,20,50 and 100 yr recurrence periods (return period)
 - Currently being used elsewhere in planning & compatible with overall modeling framework
 - Data requirements modest & were available
 - **A starting point....**

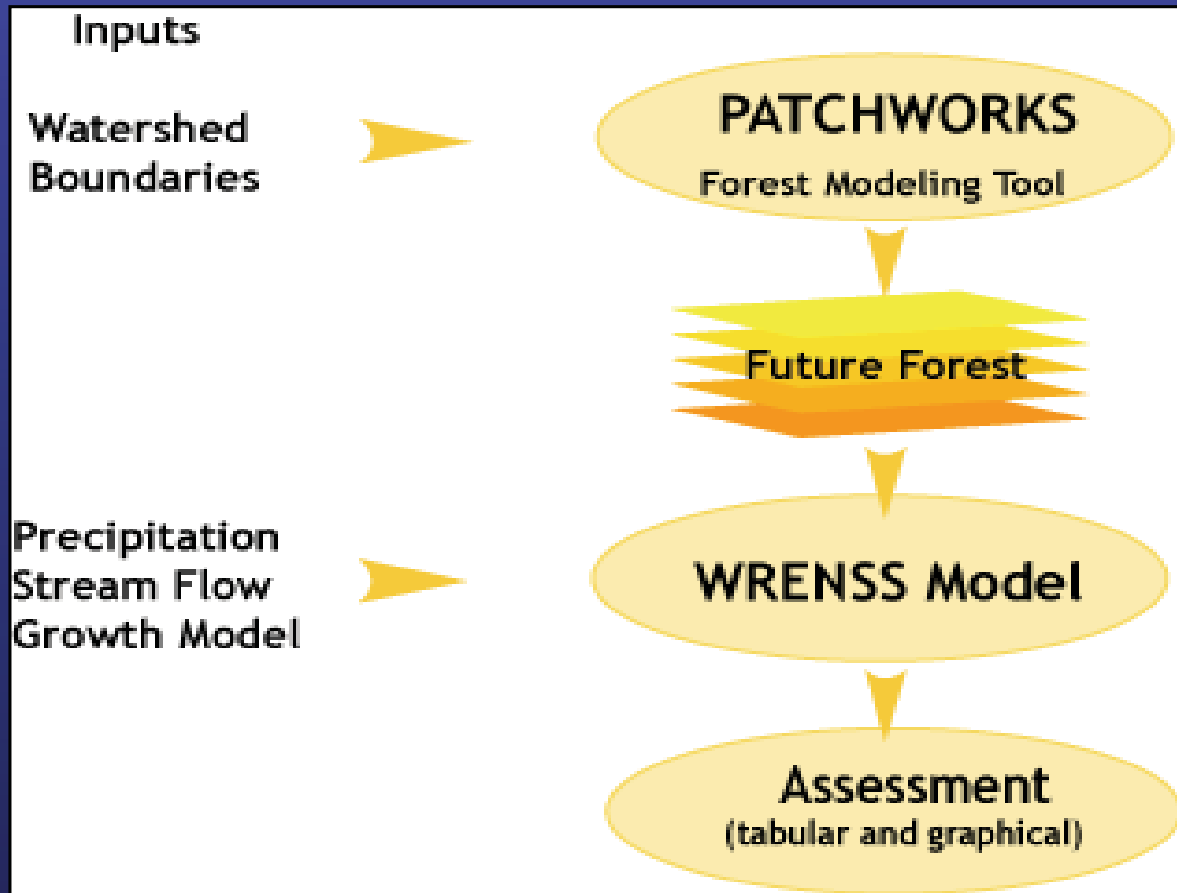
Hydrometric and Precipitation Data Records

Climate and Flow Stations



- data from fifteen hydrometric stations were used
- data from 13 met stations were used
- all stations monitored by Water Surveys and Atmospheric Environment Services EC
- all data stations located outside of the DMPF

Water Yield Evaluation Process



Assessing Changes in Annual Yield between Scenarios

Catchments

24.7 km²

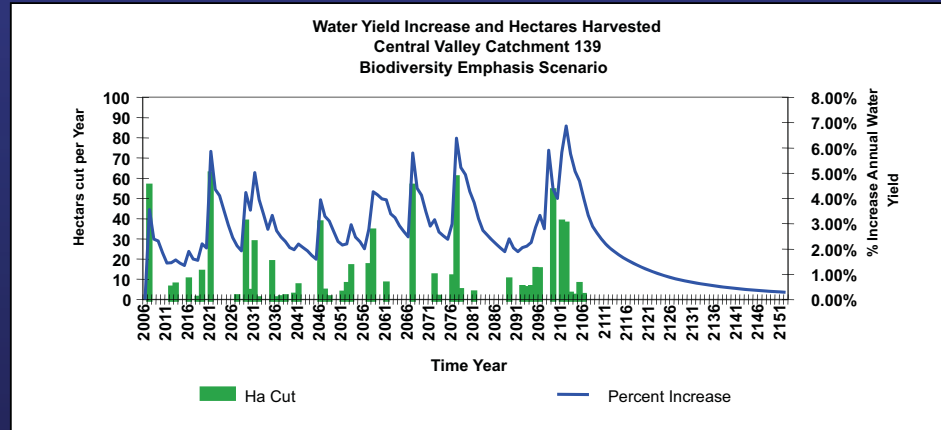
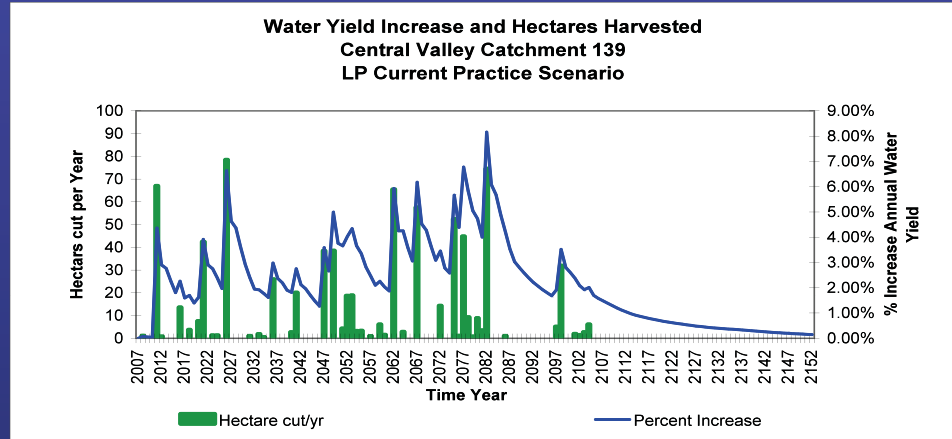
519 ha harvested

21% harvested

24.7 km²

460 ha harvested

18.6% harvested



Developing a Planning Indicator - Equivalent Clearcut Area (ECA)

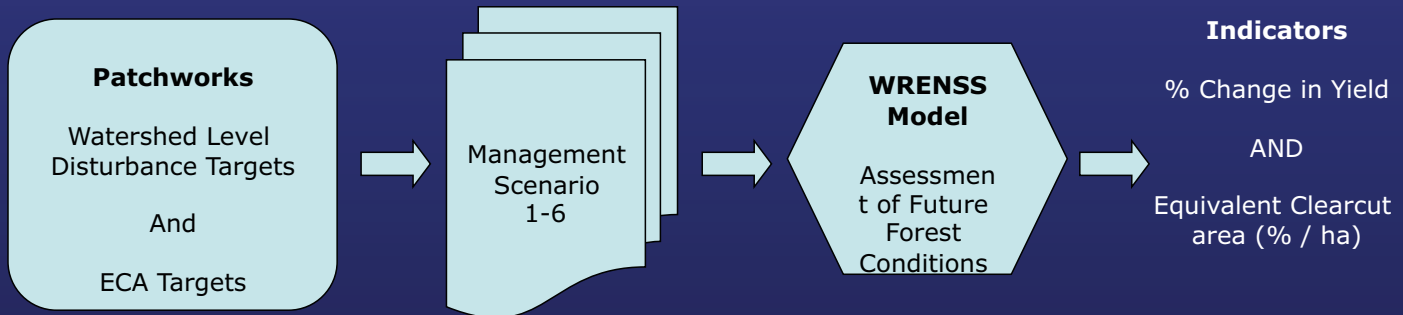
- ECA indicator facilitates the estimate of the total area of a watershed that is contributing to the increased water yield associated with forest removal and renewal.
- It is described as the recovering disturbance (total area of regenerating forest), in terms of hydrologic effects, expressed as an equivalent area of new disturbance
- Rule that regenerating stand currently utilizes 75% of water a mature stand would use.
- Therefore a 100 ha harvest in 1970 will generate a water yield that is equivalent to a 25 ha harvest in 2003

Setting ECA Targets for Watersheds

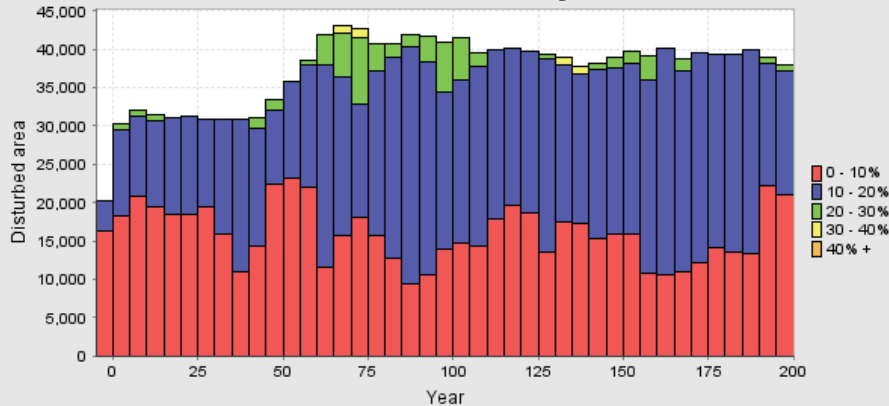
- Wanted to develop a way to integrate watershed attributes into modeling & set ECA targets for individual watersheds based on risk factors - ie. All watersheds not the same
- Developed a watershed risk ranking system to influence harvest scheduling, rate and area of harvesting (WRF=watershed risk factor)
- Watershed risk factors were developed on the basis of watershed attributes that are suggested to influence hydrologic processes.
- WRF based on the following attributes:
 - % area of softwood
 - Slope position
 - Slope steepness (%)
 - Eco-series (soil factors)
 - Aspect

Applying Equivalent Clearcut Area in Planning

- As planning tool - use ECA as target in Patchworks to approximate changes in % yield prior to a WRENSS assessment
- Enables development of landscape design concept based on watershed risk factors & potential for changes in yield



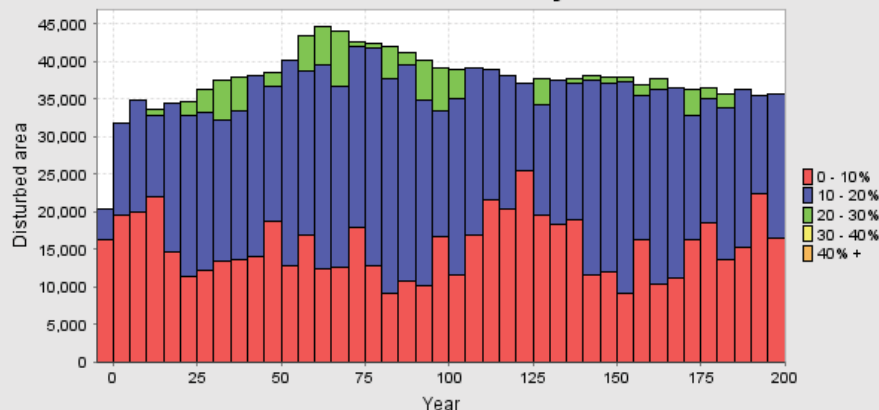
Amount of disturbed area in basins by disturbance class



Preferred Scenario

- more area within the 0-10% disturbance class as compared to the scenario below

Amount of disturbed area in basins by disturbance class



Unconstrained Harvest Scenario

- more area within the 20-30% disturbance class as compared to the above scenario

Results of Watershed Assessment...

- The use of ECA was discontinued in Round 3 of scenario evaluation. The results of the ECA assessment were ultimately counter-intuitive to the predictions made by the forest hydrologists.
- The problems with the modeling system could not be accurately identified and corrected in time for the completion of the SFMP.
- In the meantime, LP has continued to implement the 30% of watershed in a “disturbed state” threshold . Harvesting activities are currently tracked both at a basin scale and at the watershed scale and reported on in the Annual Operating Plan and Annual Report.

So, where are we now....

- Continue to investigate opportunities for collaborative projects and sponsor research to refine strategies in support of a watershed based approach for application in the forestry effects monitoring program.
- Continue to work with research and conservation organizations to develop projects and integrate science into forestry planning and operational practices.
- Continue with the development of watershed management program within the context of LP's Forestry Effects Monitoring Program and through extended partnerships, such as the group we are working to establish here today...

- Need to address some key knowledge gaps to better understand the dynamic nature of local watersheds in order to effectively manage land use activities that occur within these areas....

Knowledge Gaps and Research Needs:

1. Does the Environment Act License condition indicating a 30% max allowed harvest level for watersheds in FMU 13 minimize the potential for changes in water yield and peak flow events following harvest? Have alternative methods or indicators been developed to look at these effects? (% of a WATERSHED HARVESTED)
2. What is the appropriate scale of a watershed to use for analysis of harvest related effects? Is there a threshold limit on disturbance levels that minimizes the potential for harvest related effects? (WATERSHED SIZE)

3. Will silviculture and regeneration activities successfully produce a pre-disturbance forested condition within the time frame specified in the forecasts (7 years for a hardwood stand, 12 years for a softwood stand)? (HYDROLOGIC RECOVERY)

4. What is the role of wetland type, size and position in mitigating or receiving post-harvest effects? Can we further develop a watershed risk ranking system that integrates wetland attributes with other bio-physical features currently considered in watershed management?

5. Can we develop a decision support tool for use in forest management that incorporates hydrologic models into a dynamic planning process for predicting the potential of harvest related effects in a scenario planning context? What are the data requirements for these models and how do we address data or knowledge gaps?

QUESTIONS