



# Forest Sciences

## Prince Rupert Forest Region

*Extension Note # 07*

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### The Watershed Assessment Procedure

#### Research Issue Groups:

Forest Biology

Forest Growth

Soils

Wildlife Habitat

Silviculture

Ecosystem Inventory and Classification

Biodiversity

Ecosystem Management

Hydrology

Geomorphology

Extension

#### Background

The first watershed assessment procedure published for coastal B.C. was the Watershed Workbook (Wilford 1987). In anticipation of the Forest Practices Code (FPC), this document was updated based on new research results and published as the Coastal Watershed Assessment Procedure (CWAP). A similar document, The Interior Watershed Assessment Procedure (IWAP), will be available for interior watersheds as well.

The FPC specifies that a watershed assessment is required in community watersheds and in sensitive streams where resource agencies have a concern. There are three levels to the assessment. Level I requires the establishment of a Round Table involving all parties who have an interest in a watershed. They identify current issues and compile information on the watershed and use the data to answer questions outlined in the CWAP or IWAP.

In many cases, this information will provide adequate safeguards to

maintain watershed integrity. If the overview assessment indicates potential impacts, then a hydrologist must do a Level II assessment to determine the nature and extent of impacts to the stream channel. In most cases, this work will identify the nature and cause of the impacts and lead to specific management recommendations. If significant negative impacts are identified, a more detailed Level III analysis is undertaken to provide guidance regarding remedial works and management options.

#### What is the Watershed Assessment Procedure?

After concerns have been outlined at the Round Table meeting, the resource planner must gather together all topographic, planimetric, soils, terrain, fisheries, bedrock geology, legal survey, road development, forest cover, logging history and silviculture survey information, as well as the most recent aerial photograph coverage for the watershed.

From the information gathered, fifteen key impact indicators will be assessed. The assessment should

indicate potential and actual impacts to the overall watershed.

### **Why do a watershed assessment?**

It is in the Crown's interest to minimize the effects of harvesting on stream sediment levels, bedload movement, temperature, riparian cover, and the timing and magnitude of stream peak flows.

Running a watershed through the assessment procedure will help quantify or predict the impacts to the stream from previous or proposed harvest activities in a watershed.

Recommendations from the procedure will help guide harvest activities in a watershed over time. It will help define specific areas of concern and give an indication of how a watershed will react to proposed harvest activities. It will also outline any restrictions or concerns to be considered in the planning process. If a particular sub-basin or watershed has been severely impacted, no harvesting may be allowed until the area has recovered from past harvest-related disturbance. Recovery may include restoration prescriptions and remedial works. A re-assessment would then be done in five years' time to determine the level of recovery of the watershed.

### **What constraints may be imposed on the Five Year Plan?**

The information and interpretations provided by the assessment can be used to develop broad planning

constraints for the preparation of a Forest Development Plan.

Some examples of the type of recommendations that may result from a watershed assessment are:

- restricting clearcut harvesting in a particular sub-basin for a period of time;
- restricting high elevation logging for a period of time;
- restricting further road development in unstable areas;
- implementing a road restoration program prior to any further development in a sub-basin;
- justifying proposed harvesting or development within a watershed by planning for and minimizing potential impacts to the stream.

It is rare that all resource activity would be restricted everywhere in a watershed. However, it is possible that in extremely sensitive, damaged watersheds such restrictions would apply until recovery had occurred.

### **How does a watershed recover?**

Over time, the amount of sediment mobilized from exposed soils, extreme peak flows, or concentrated ditch water will be reduced due to:

- revegetation - exposed soil particles will be held in-place and protected by the roots and foliage of grass and shrub species. This directly affects the amount of sediment from the erosional effects of rainsplash and running water;
- hydrologic recovery - the equivalent clearcut area of a watershed declines as regrowth reaches a

tree height and crown closure sufficient to protect the snowpack from early or rapid snowmelt, directly affecting the timing and magnitude of peak flows in a watershed;

- erosion pavement - as running water erodes away particles small enough to be moved, the remaining larger particles fall together and serve to protect the finer textures under them, thereby limiting the available sediment to the stream or ditchflow.

Be aware, however, that even though some of the upslope processes may no longer be contributing to sediment levels or peak flows, the stream below may still be dealing with all of the bedload and debris mobilized by past harvesting activities. A Level II assessment may then be required.

### **What is in the WAP?**

**Peak flow** will require determining how much high, middle and low elevation area has been harvested within a watershed. When the area harvested in the zone of peak flow generation approaches 30% as in Figure 1, limitations to harvest and development activities will be imposed.

**Surface erosion** will require determining the length of road on erodible soils within 100m of a stream, and the density of stream crossings in a watershed. If areas of highly erodible soils are exposed or if sediment has a direct opportunity to enter a watercourse, concern for surface erosion is high.

**Riparian buffers** will require determining the total length of stream that has been harvested. The more riparian area logged the greater the potential for impact on stream temperature, protective cover, food supply, and direct introduction of debris and sediment into the stream.

**Landslides** will require determining the number of road and harvesting related slope failures that have impacted on the stream and the area of potential future impact in steep gullies and unstable slopes. The more developed area in unstable terrain, the greater the potential for impact on the stream channel below.

**Other land uses** will require a review of other industrial, agricultural, domestic and recreational users in the

watershed. The more activity in and around the streams within the watershed, the greater the potential for impacts to the stream channel.

**Watershed characteristics**

The amount of private land in a watershed will directly affect the ability of the planner to determine the impacts of harvesting Crown land in a watershed. A high proportion of private land in the watershed affects the government’s ability to manage for potential impacts on peak flow and sediment production.

Other characteristics to consider within a watershed are:

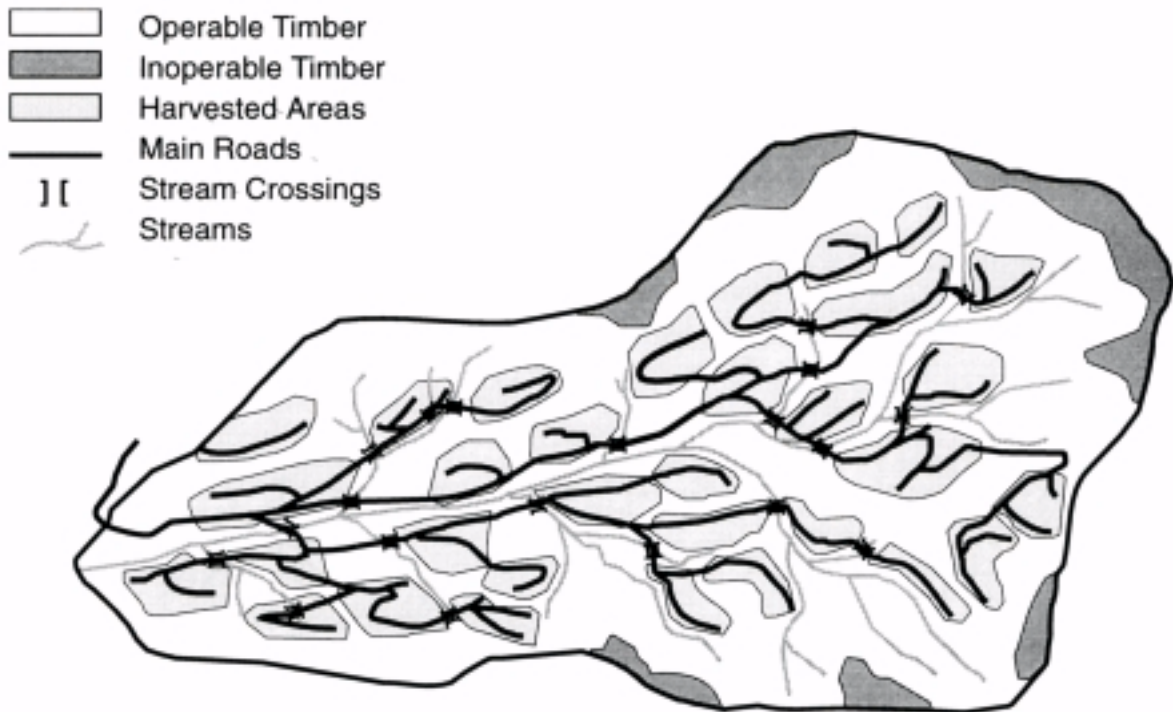
- extent of unstable slopes and erodible soils;
- area of lakes;
- presence of glaciers;
- dominant bedrock geology;

- hydrological zone; and,
- water temperature.

In summary, the Watershed Assessment Procedure is a tool to help the forestry planner determine the past and potential level of impact of harvesting activities in a watershed. Based on available information, it is used to objectively assess the health of the watershed with respect to fish and domestic water quality concerns.

**Contact:**

**Dave Wilford,**  
Research Hydrologist  
**Jim Schwab,**  
Research Geomorphologist



*Figure 1. A hypothetical watershed with concerns regarding peak flow and surface erosion, due to a relatively high harvested area and road density.*

### **References and Suggested Reading**

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