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Resource Values Assessment: Hydrology

State of Knowledge:

- Forests play a key role in sustaining B.C.'s water supplies. Loss of forest cover allows more precipitation to reach the ground, reduces evaporative losses, increases soil moisture, and when forest cover loss is extensive results in more water leaving the watershed.
- Extensive forest cover loss in a watershed due to natural disturbance or land-use development can increase the magnitude, frequency, and rate of peak flows from snowmelt and rainstorms.
- The effect of climate change on weather and forest health is also predicted to increase the potential for extreme peak flows and drought.
- Roads can redirect or channel runoff increasing streamflow and delivery of sediment to streams.
- Higher peak flows and total runoff increase erosion potential, which may impair water quality; damage property, infrastructure and aquatic habitat; impact fish and fisheries; and increase public safety risks.
- Hydrologic change may be immediate after a wildfire due to canopy incineration but may take several years after mountain pine beetle due to a more gradual loss of forest canopy.
- Careful watershed planning and development may enable increased harvest levels but each watershed is unique. Climate and biophysical characteristics of the watershed, together with the type, location, and extent of disturbance, will influence the hydrologic response.
- Issues related to water quantity and quality will diminish as roads are deactivated and forests regenerate, and will be mitigated by secondary structure in disturbed stands and retained green stands. Good recovery may be possible after 20 to 25 years as forests regenerate and tree crowns expand, subject to natural disturbance.

Current condition:

- Many watersheds in B.C.'s Interior already have extensive areas of forest altered by mountain pine beetle, wildfire, and logging.
- Hydrologic assessments can be undertaken where drinking water, fish habitat, property, infrastructure and public safety are of concern, and where terrain is prone to erosion.
- Forest practices are monitored to determine their effectiveness in protecting water values.
- In the Cariboo-Chilcotin, Fisheries Sensitive Watershed designations support planning by identifying areas with significant fisheries values and sensitivity to forest or range practices.

Sustainability Risks

Past land-use, extensive mountain pine beetle infestation, and salvage harvesting in combination can:

- increase the frequency of flooding and erosion
- lead to potential earlier onset of low-flow periods that may extend for longer periods of time
- lead to potential deterioration of aquatic habitat and water quality
- increase risk to community safety, infrastructure and property, fish and fisheries.

Impacts:

- There are watersheds that may already be high risk because they have disturbance levels approaching or beyond the 30-50% due to past development activities and natural disturbance including fire and mountain pine beetle.

Supporting Documents (published after the Compendium which references most relevant literature published prior to 2010):

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- Winkler, Rita D. 2010. Changes in snow accumulation and ablation after a fire in south-central British Columbia. *Streamline Watershed management Bulletin* Vol.14(2):1-7. URL: <http://www.forrex.org/streamline/>
- Redding, Todd E., Moore, R. Dan, Winkler, Rita D., Pike, Robin G. and Wilford, David J. 2010. Long-term watershed research in British Columbia. *Streamline Watershed management Bulletin* Vol.14(1):129. URL: <http://www.forrex.org/streamline/>
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- Winkler, R., Boon, S., Zimonick, B. and Baleshta, K. 2010. Assessing the effects of post-pine beetle forest litter on snow albedo. *Hydrological Processes* 24: 803-812.