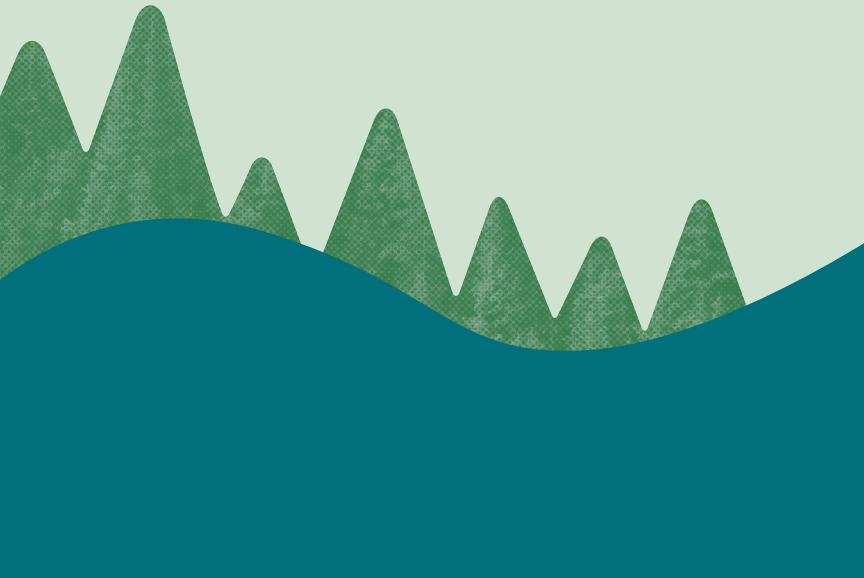


Water

The Forest Steward Handbook



Forests and Water

Water takes many different paths as it travels through Alberta's forests; its journey is not just limited to streams, creeks and rivers. Vegetation and soil play an important role in the capture, storage and transportation of water. When trees are removed, these pathways are significantly affected. Hydrological processes are affected by logging practices in the following ways:

SNOW

Forest cover mitigates the effects of both wind and solar radiation on snow. However, when the tree canopy is removed, the resulting combination of increased wind speeds, exposure, and higher rates of incident solar radiation makes for increased snow ablation (melting or sublimation).

Overall, in snow-dominated forests (like the ones in southern Alberta), the impacts of forest harvest can result in faster rates of snowmelt, causing runoff to be more concentrated over a shorter period of time, and changes the timing of Spring runoff.

ROADS

The construction of forestry roads, heavy vehicle traffic, and the process of log skidding all compact soil and decrease its ability to absorb water. These activities also cause changes to rate, number and pathways of surface flow, the impacts of which can take a significant amount of time to recover.

STREAM FLOW AND FLOOD RISK

Forest harvest has the potential to affect downstream flooding and streamflow changes through increased peak flows.

Studies show that clearcut logging increased summer stream flows by approximately 160% for eight years, which was then followed by a 25% decrease in low-flows, which after 18 years had still not returned to pre-harvest levels. Additionally, it has been found that even moderate levels of harvest have the potential to influence the frequency, magnitude, and duration of streamflow.

Water yield increases following harvest, due to: more precipitation reaching the ground, less water lost through evaporation and transpiration after vegetation removal, increased soil moisture and groundwater levels, and increased overland flow.

Streams on or beside cutblocks typically see an immediate increase in stream flow due to the lack of canopy cover and evaporation. This is later followed by a decrease in stream flows.



REMOVAL OF CANOPY

The canopy is the first point of contact for precipitation. The leaves and branches of the canopy, as well as the cover of the forest floor, help catch and store precipitation which helps to reduce the impact of heavy rainfall on forest soil. The interception of rain and snow is especially important in coniferous forests, which cover a significant amount of ground and have a consistent leaf area index year round. However, when the canopy cover is removed, as is the case in clearcut forest harvesting, this precipitation interception is significantly reduced at the site. In turn, the site sees an increase in precipitation reaching the ground.

Canopy removal drastically reduces the amount of precipitation taken up by trees and transpired. This reduction in evapotranspiration causes subsequent increases in soil moisture and higher water tables, with important implications on streamflow. This reduced interception storage can increase the frequency and severity of floods.



For sources and more information visit:
cpaws-southernalberta.org/forest-stewards/