

SEE ME CONSULTATIONS, Ltd.

Sustainable Ecology and Evolution of Montane Ecosystems

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2 December 1995

GENERAL DISCUSSION ON HEMLOCK LOOPER ATTACK: UPPER FRASER RIVER

Hemlock Life Process and Physiology

Normally, a Hemlock tree evapotranspires water from the soil into the roots, up the trunk inside the wood, to the branches, twigs, and out the underside of the needles. Sugar, energy and growth is made by photosynthesis in the needles from the sun, water and nutrients brought with the water from the roots. The sugar, energy, nutrients, and water nourish the tree by passing down the twigs, branches, and trunk under the bark to the roots. This circulation system is also used for chemical and physical defense mechanisms that protect the tree from disease, injury and insects.

This circulatory system, evapotranspiration, photosynthesis, growth, and defense mechanisms are disabled whenever water is unavailable due to low rain, dry soil, or dry winds. Sugars and nutrients become concentrated at the base of each Hemlock needle where it is attached to the twig. At the same time, chemical and physical defenses of the tree are disabled and the tree is stressed, making it easier to attack. **Only this stressed condition allows the Hemlock Looper to attack as it can only get enough nourishment from the needles when the sugars and nutrients are concentrated at the base of the needles and the defenses of the tree are impaired.** The rest of the Hemlock needle is usually not used and drops to the ground wasted.

Wind and Rain Patterns

One way to determine what may cause a Looper outbreak is to study rain and wind patterns. Warm drying winds almost always come from the South moving down the Robson Valley towards the Northwest along the Fraser River and Highway 16. The winds are usually followed by rain except during dry periods when only the dry wind predominates and no rain follows. You can stand inside old-growth during these winds and discover that the wind stays in the tops of the trees and is much less prevalent at ground level. This keeps the ground level in the forest moist. You can stand inside an old forest and you will not feel wind on your face even though the tops of the trees are violently swaying from the wind. Stand inside a forest downwind of a road, clearcut, pasture, or other opening, however, and you will notice the wind on your face at ground level--sometimes 3000 m inside the forest. This dries out the ground level under a forest downwind from an opening compared with normal continuous forest.

Evidence of Patterns

Looper outbreak patterns should be seen in old forests downwind of openings, roads, pastures, clearcuts and on hills downwind of small valleys that are perpendicular to the direction of the drying winds. These forests dry out more than others due to dry wind.

All satellite photos of Robson Valley since 1991 support the above and clearly show the following:

- 1) Infestations begin in early years to the South and then spread North in the direction of the wind in subsequent years.
 - a) The first and only attack was in McBride in 1991.
 - b) The confluence of the Torpy/Walker was attacked in 1992 and outbreaks progressed downwind, up the Torpy River the next two years.
 - c) ICH passed Slim Creek/Torpy was only lightly attacked because the drying wind changes from paralleling the Fraser River and Highway 16 to paralleling the Torpy River near Dome/Slim Creeks.
 - d) Much of the ICH along Highway 16 was attacked.
- 2) The largest outbreaks in the region are all downwind of the largest concentrations of clearcuts in the region.
 - a) The largest clearcuts in the Robson TSA on Erg Mt. Road and Catfish Creek are directly upwind of the largest outbreak in the region. The wind exposed forest and the wind exposed hills around Ptarmigan Creek directly downwind of the openings is the largest Lopper infestation in the region.

- b) The second largest clearcut in the region on the Walker Creek Road and the large concentration of clearcuts in the POB Creek are directly upwind of the second largest outbreak in the region on the Torpy River and on Bearpaw Ridge, directly downwind.
 - c) The wind exposed hill along the North side of the Goat River is the last outbreak in the region. Highway 16 and the clearcuts at the break of the hill allowed wind to penetrate the forest at the break of the Goat river perpendicular to the wind.
- 3) **No other large openings or outbreaks exist in the region.**

Backcheck of Evidence of Patterns

Highway 16 first becomes a drying-wind-tunnel and then the sometimes ensuing rain soaks trees along the Highway at the very edge of the forest. The wet winds of 1994 that followed the dry winds of 1991-93 allowed trees at the extreme edge of some openings to recover from the drying stress and Looper attack.

Conclusions

Global warming, increased solar radiation from atmospheric thinning, slashburning, the removal of the old-growth carbon sink, the removal of forest cover that ameliorates climate, increased numbers of clearcuts, increased drying wind, lack of precipitation, the habitat loss of Looper predators due to forest removal, and other factors make Looper outbreaks worse.

It should be easily understood from the foregoing that clearcutting outbreak areas will create the exact conditions that will favor further outbreaks in the future. Wind reduction, retention of predator habitat in the form of large dead trees, and the reduction of clearings afforded by the retention of standing dead groups of trees of about 1 ha at 100m intervals will reduce the effects of further outbreaks in the future.

Sincerely,

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