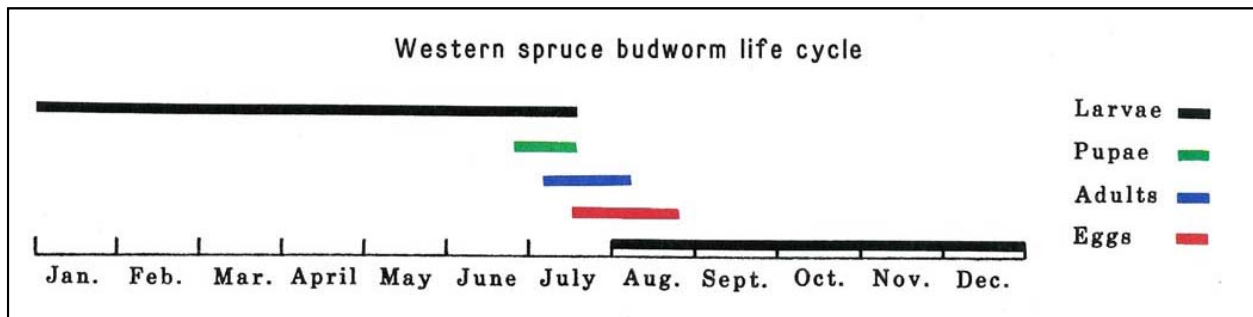


What is attacking our fir trees and should we be concerned about it.

By Roger Marshall, Clearwater Resource Council

Many of us have witnessed the increase in the number of Douglas-fir trees turning red at the needle tips this year. What we are most likely seeing is defoliation caused by western spruce budworm, one of the most destructive native insects found in all of the northwest's forests. This moth hatched in tremendous numbers in mid and late July around the Seeley Lake area. Known for widespread and severe outbreaks in the past, the spruce budworm can have a serious impact on trees of our area, particularly Douglas-fir and subalpine fir. Other hosts for this insect include grand fir, Engelmann spruce, ornamental spruces, as well as western larch.

To understand this insect and to control outbreaks, it is best to know something of its life cycle. Adult female moths lay eggs on host trees within one to two weeks after they hatch from their pupal case generally in late July or early August. They are capable of laying up to 150 eggs along the underside of the needles.



From Western Spruce Budworm Management, USDA/USFS, 2004

Within ten days after they are laid, the eggs hatch and the emerging larvae, very small with yellow green bodies and a brown head, seek shelter under bark or lichen along the limbs or trunk of the tree. They do not feed at this time but rather spin a case called a "hibernacula" where they will overwinter until the following spring. In early May to late June these larvae reemerge from their winter hibernation preferring to feed on the newest spring growth of the host tree. In addition to eating the emerging needles, the budworm larvae may eat the maturing seeds and cones. Evidence of this activity is the dying of young green needles and silken webs spun around needle tips that are being eaten and turning red. These larvae grow and mature in 30 to 40 days. The final stage is the pupal case where, after 10 days they emerge as adult moths and the cycle starts over again.



Adult and pupal stage of the western spruce budworm.



Late larvae stage of the western spruce budworm

The damage to host trees caused by budworm larvae results in reduced tree growth, top kill, new shoot kill, as well as cone reduction. Repeated and severe attacks can eventually result in the tree dying as the new needles continue to be eaten away and it cannot make enough of its own food to survive. Often young trees are killed in the first year or two after complete defoliation. Larger healthy trees have greater reserves of nutrients in their root system and can survive near complete defoliation but their growth is significantly reduced. Severe defoliation may also stress mature trees and subject them to attacks by Douglas-fir beetle.

Large epidemic outbreaks of western spruce budworm are held in check by natural control factors. Young larvae are preyed on by insects including spiders, ants, and beetles as well as small mammals including chipmunks and squirrels. Birds common to the area regularly will feed on the larvae including warblers, thrushes, sparrows, tanagers, pine siskins, grosbeaks, and waxwings. Additional natural control occurs because of internal parasites and diseases that happen in this insect's life cycle.

A significant natural control in our valleys is climate and weather. Strong winds will literally blow the larvae out of trees where they fall to the ground and cannot easily return to feeding on the tree. Cold temperatures, in the form of repeated and strong early and late season freezes, will kill the larvae. However, once established in the overwintering hibernacula, the spruce budworm larvae are largely protected from our winter cold. Overall however, natural predators and weather probably do more for control when budworm populations are low.

What can I do to protect my trees?

Healthy trees have the best chance to resist repeated defoliation. Keeping a tree well watered will offer it a greater chance to survive this insect's attack. Using pesticides for control is an option and has had good success in many places over the years. A microbial insecticide registered for use against the western spruce budworm is the bacterium *Bacillus thuringiensis*, a naturally occurring, host specific

pathogen that affects only the larvae. It is environmentally safe to use in sensitive areas such as campgrounds or along rivers or streams. When necessary, western spruce budworm populations can be substantially reduced with chemical insecticides. Large forested areas can be aerially sprayed for short-term protection, and individual trees can be sprayed using ground equipment. Users of pesticides should contact state or federal forest health specialists regarding formulations, dosages, and timing of treatment. Active forest management offers the best long-term solution and promotes resiliency against a broad array of insects and diseases. Thinning stands will not necessarily deter current defoliation but once the outbreak subsides, the trees will have more light, water, and nutrients resources to enable them to rebound. This strategy also is effective for a variety of tree species affected by insects; bark beetles, defoliators, and root diseases common to our area.

Where can I go for more information?

DNRC Forest Pest Management Program: <http://dnrc.mt.gov/forestry/assistance/pests/>
or contact our local Service Forester, Norm Fortunate at 244-2382 (MT-DNRC Clearwater Unit).