Roundheaded Woodborer

Yukon Forest Health — Forest insect and disease

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Yukon
Energy, Mines and Resources
Forest Management Branch

Introduction

Roundheaded woodborers, (*Monochamus spp*), otherwise known as sawyer beetles or longhorn beetles, are prevalent throughout the forested regions of Yukon. The most common species in Yukon is the white spotted sawyer beetle (*Monochamus scutellatus*). The larvae mine the sapwood and heartwood of recently dead conifers. They will attack trees almost immediately following a successful bark beetle attack, blowdown, log jams along rivers, or fire kill, but dead trees remain susceptible to attack for up to two years. In some instances, dead portions of otherwise healthy trees can be infested as well. Mill yards filled with large amounts of timber inventory also provide habitat for roundheaded woodborers. Since the beginning of forest health surveys in 1994, woodborers have been abundant in trees killed by spruce beetles in southwest Yukon. Forest health surveys in 2007 revealed minor incidences of woodborer activity in areas south of Dawson City.

Monochamus spp. are probably the most commonly seen wood infesting beetles and are often misidentified as the spruce beetle. It is common for these beetles to land on any surface, including people, during their flight period. Their approach is accompanied by a loud buzzing, and that, coupled with their large size, can be disturbing to some.

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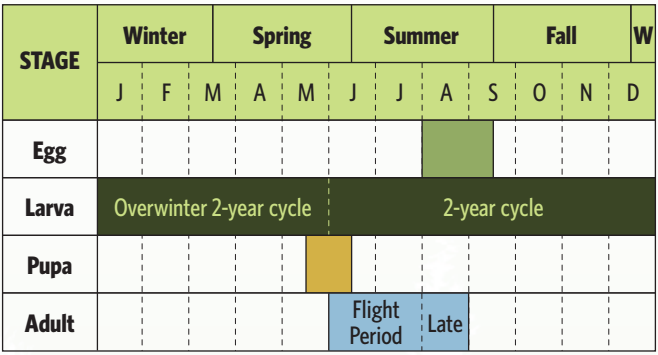
Life Cycle



The length of the *Monochamus* life cycle varies between species, taking one to three years for completion. In the colder climate of Yukon, the woodborer life cycle is normally two years. Adults emerge from galleries excavated in the heartwood of a host tree in late spring or early summer. Over the next month adults will feed on the foliage and bark until mating occurs. The females will lay eggs in mined holes in the trees bark. Eggs hatch two weeks later and larvae start to mine the sapwood. Through the summer as the larvae mature and their mandibles strengthen, they individually mine towards the centre of the tree. Larvae continue mining deeper into the trunk of the tree until late fall, where they overwinter in galleries deep within the heartwood. During the larval mining period they can often be heard within the tree. The sound, a ragged squeaking, is caused by the action of their mandibles hewing the wood. This is a particularly common sound a year after a stand has been killed by wildfire.

The following spring, larvae start to mine back towards the surface of the tree, creating a distinctive U-shaped gallery pattern. Before reaching the sapwood surface in late spring pupation occurs at the end of the larval mine, and after two weeks adults emerge from the pupal cells. The newly emergent adults excavate a gallery to the exterior of the tree from which they emerge in early summer to continue their life cycle.

Host Species Attacked and Damage

Tree species attacked in Yukon: Recently dead white spruce (*Picea glauca*) and lodgepole pine (*Pinus contorta*) are highly susceptible but subalpine fir (*Abies lasiocarpa*) and occasionally, eastern larch (*Larix laricina*) are also attacked. Among these species, dead trees of all ages and all diameter classes are susceptible.

Visible external stand and tree-level symptoms manifest as defoliation by adult beetles of new shoots and foliage when live trees are the host **(photo 1 and photo 2)**. Because the adult stage is short-lived, crown symptoms are difficult to discern and consequently the damage to healthy trees is negligible.

Larval damage attributed solely to the woodborer can only be seen through destructive sampling of the host. Galleries of early larval instars are visible in the cambium of the bark and sapwood **(photo 3)**. Unique to *Monochamus*, is the continuation of these galleries into the heartwood. No other species of forest insect in Yukon mines this part of the tree.

Adult pine sawyers have been identified as economically important in Europe and Asia because they are vectors of the damaging nematode *Bursaphelenchus xylophilus* that causes pine wilt **(photo 4)**. However *B. xylophilus* is native to North America and most native North American pines are resistant to damage from the wilt disease unless under severe stress. *B. xylophilus* may be present in Yukon but most healthy native pines are likely to be resistant to transmission of this pathogen to healthy plant tissues.

Definitions:

Instar: *the stages in the growth of a larva before it pupates.*

Cambium: *the actively dividing layer of cells which produces the conducting tissues in a tree, therefore increasing the girth of a tree.*

Key features for identification:

- Adults are a moderate to large (13–27 mm), very conspicuous beetle. They are shiny, black and elongated with large antennae – up to double the length of the body **(photo 5)**.
- Pupae (10–11 mm) are brown to reddish and have many of the adult beetle features (elytra, legs and wing covers).
- Larvae are large (10–40 mm) and flattened. Their heads are diamond shaped and much larger than the body **(photo 6)**.
- Eggs are small (2–4 mm) and deposited under the surface of the bark.
- Can often be identified from the excelsior-like shavings at the mouth of holes bored into the sapwood **(photo 7 and photo 8)**.

Photo number:

1. **Adult feeding damage.** Citation: Ronald S. Kelley, Vermont Department of Forests, Parks and Recreation, Bugwood.org
2. **Adult feeding wounds.** Citation: Thérèse Arcand, Natural Resources Canada, Canadian Forest Service.
3. **Larval feeding damage.** Citation: Thérèse Arcand, Natural Resources Canada, Canadian Forest Service.
4. **Adult with nematodes.** Citation: Thérèse Arcand, Natural Resources Canada, Canadian Forest Service.
5. **Adult *Monochamus scutellatus*.** Citation: Kenneth R. Law, USDA APHIS PPQ, Bugwood.org
6. **Larva.** Citation: Thérèse Arcand, Natural Resources Canada, Canadian Forest Service.
7. **Oval shaped larval entrance holes.** Citation: Thérèse Arcand, Natural Resources Canada, Canadian Forest Service.
8. **Round shaped adult exit holes.** Citation: Thérèse Arcand, Natural Resources Canada, Canadian Forest Service.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Similar damage

Larval galleries may be confused with other bark beetles such as *Ips*, *Dendroctonus* or *Xylosandrus spp.* The galleries of the woodborer are unique because they are wider and they continue from the sapwood into the heartwood. Ambrosia beetles (*Xylosandrus spp.*) bore into the sapwood as well but the bore holes are round and small (about 3mm), and the white boring dust is fine textured. Buprestid beetles can be distinguished by a D-shaped exit hole.

Risk Assessment

The occurrence of woodborers is dependent on factors including the availability of dead host material, the frequency of large biotic and abiotic disturbances (e.g., windthrow, beetle, or wildfire) and climatic factors. Given that roundheaded woodborers do not cause mortality or damage in healthy living trees and that the *B. xylophilus* nematode is not a commercially important damage agent in North America, the risk is negligible.

Implications of Climate Change

General Circulation Model (GCM) results in the 2007 Intergovernmental Panel on Climate Change (IPCC) report indicate that warming in northern Canada is likely to be greatest in winter (up to 10°C) and warmer by 3–5°C in summer. Mean annual precipitation is also predicted to increase (particularly in fall and winter). More rainfall is expected on windward slopes of the mountains in the west, therefore the rain shadow effect of the St. Elias Mountains may mean that southern Yukon will not experience increased rainfall. Higher temperatures will increase levels of evaporation and transpiration, and ultimately lower soil moisture levels. Therefore, even if summer rainfall is maintained at current average levels, higher temperatures would result in limited soil water availability and cause moisture stress in trees. Temperature and precipitation are likely to be the dominant drivers of change in insect populations, pathogen abundance and tree responses as it influences insect/pathogen development, dispersal, survival, distribution and abundance. It is possible the incidence of widespread bark beetle outbreaks, drought and wildfire may increase under a warmer/drier climate scenario. An increase in landscape level disturbance events would likely benefit roundheaded woodborer populations by increasing the available habitat.

Management Options

Monitoring

Woodborer activity can only be viewed from ground surveys because they do not cause tree mortality. The best time of year for monitoring is mid- to late summer, prior to pupation, when the larval mining has reached a maximum. Surveys should be isolated to freshly killed conifer stands.

Direct Control

Direct control is not necessary.

References

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Mota, M. and Vieira, P. 2004. *The pinewood nematode,* Bursaphelenchus xylophilis. Proceedings of an International Workshop, University of Évora, Portugal, August 20-22, 2001.

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