Forest Health NEWS

2016

Is the NWT forest resilient to climate change?

The Forest Management Division (FMD) has made answering this question a priority.

Studying and monitoring the effects of climate change in the NWT forest ecosystems is challenging. The forested area in question is enormous (80 million hectares), and climate change can manifest itself in several ways in the boreal forest.

Some of these changes occur on the landscape relatively quickly and are likely climate change related. For example, permafrost subsidence in peat plateaus causes uprooted black spruce trees to fall in all directions after losing stability.

Flooding observed just north of Fort Providence is one example of abiotic disturbances recorded during forest health surveys conducted annually by FMD.

80 million hectares of boreal forest in the NWT

85% of pest damage mapped in 2016 occurred in the Dehcho and South Slave regions

However, many if not most changes are subtle and require long-term monitoring to qualify them as climate related. The boreal forest is a disturbance driven ecosystem, meaning that disturbances like fire or insect outbreaks are necessary for its proper functioning and renewal. Therefore, understanding the disturbance regime (frequency, intensity, spatial and temporal patterns) of an ecosystem in question is essential for discerning between natural phenomena and any abnormal agent of change.

For several decades, forest health monitoring in the NWT has focused on tracking disturbances caused by insect pest and disease agents, most notably spruce budworm. While long-term, consistent information on activity of native pest agents is crucial to understanding natural dynamics of boreal forest, tracking abiotic (non-living) disturbances is becoming equally important. In response to this need, FMD has recently started to record this information during annual aerial and ground surveys.

Proper diagnostics and quantification of these events is a first step in learning more about impacts of climate on forest condition in the NWT. However, only long-term, consistent monitoring will provide a meaningful answer to the main question.

Drought effects observed in 2016. Despite much wetter conditions than during the summers of 2014 and 2015, water stress symptoms were still evident and can manifest for several years after the drought. Photo: Natural Resources Canada/Canadian Forest Service

Government of
Northwest Territories

Tent caterpillar outbreak continues

In 2015, an early spring with warm temperatures in May was one of the triggers for increased activity of Forest Tent Caterpillar (*Malacosoma disstria*) in the NWT, after an almost 20-year interval since the last recorded outbreak, which occurred in the Dehcho.

This time, the pest occurred in mass numbers in the South Slave region, defoliating over 100,000 hectares of aspen dominated forests. The outbreak continued into 2016, expanding to almost 136,000 ha. Areas along the Slave River were most affected; however, severe defoliation was also mapped along the Hay River.

A related species, Northern Tent Caterpillar (*Malacosoma californicum*) was also noted at outbreak levels in and around Yellowknife feeding on willow and small shrubs. It is worth noting that light defoliation has little effect on trees, while repeated severe defoliation can disrupt tree growth. The risk of mortality caused by this pest is reduced, as aspen is able to refoliate later in the same season and still has time to produce and store nutrient reserves for the following year.

Forest Tent Caterpillar defoliation observed in the Slave River area in 2016.

Aspen forests challenged by several pests in 2016

Damage caused by Forest Tent Caterpillar, Aspen Serpentine Leafminer, Aspen Blotch Leafminer and gall midges or mites observed on the same tree in Fort Smith. Photo: Natural Resources Canada/ Canadian Forest Service

For decades, aspen dominated forests in the NWT have been bothered by several pests whose populations fluctuated on an annual basis, depending on current climatic conditions. Recent drought, combined with warmer than usual springs, triggered an increased activity of pests, leading to a noticeable decline of many aspen stands across the territory.

In 2016, the aspen dominated forests were affected by several biotic (living) agents such as Forest Tent Caterpillar, Aspen Serpentine Leafminer, Aspen Sawfly, gall midges and mites, leaf blight and Aspen Blotch Leafminer. It was not uncommon to see several of these pests feeding on the same tree. Some of the observed aspen damage (stunted or gnarled leaves, thin crowns) was not associated with any particular pest. These changes were likely caused by environmental factors such as drought.

Dealing with tent caterpillars in your garden

Things to consider before you act:

- Tent caterpillars do not kill trees.
- Tent caterpillars are native to Canada and periodic outbreaks occur naturally.
- Natural predators (birds, insect parasites) control large parts of the caterpillar population.

When infestations are very severe:

- In summer and fall – destroy the eggs by carefully scraping off the shinny, dark brown or gray saddle- like cases that straddle the twigs of trees, collect in sealed bag and dispose of them.
- In spring – remove the web structures by clipping and destroying the tents and caterpillars. This is most effective early in the morning, late in the evening, or during cold and rainy days when caterpillars are resting in the tent.

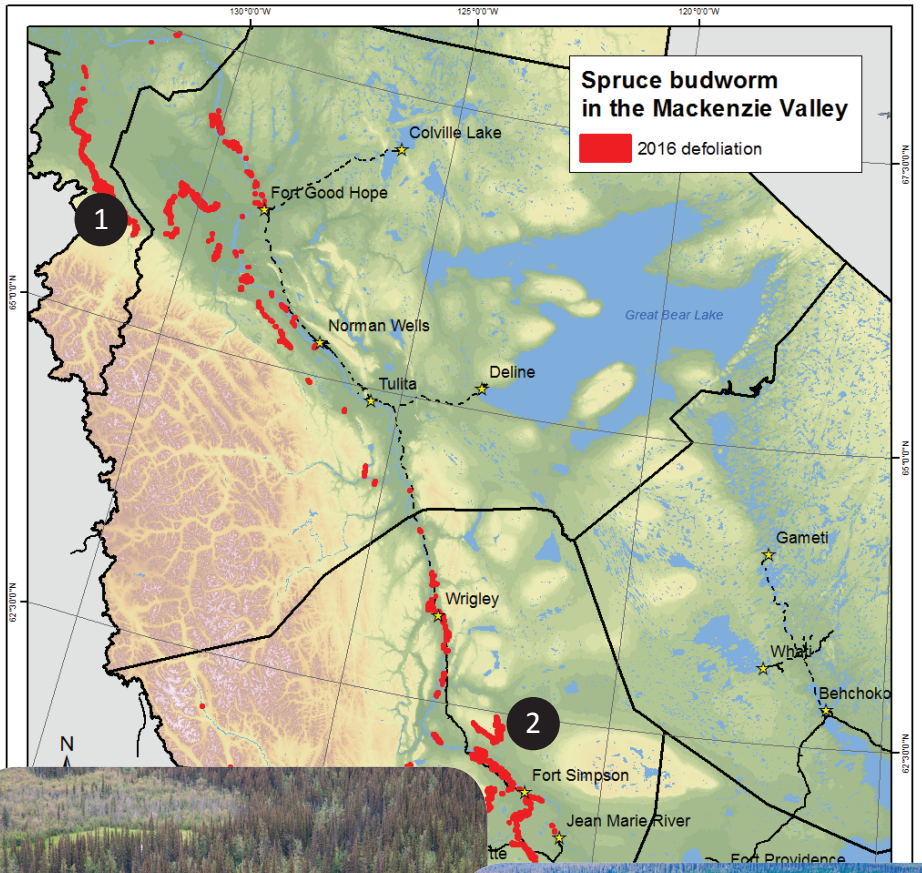
Spruce budworm on the rise

Spruce budworm is the most serious insect pest in the NWT. Developing larvae feed on the needles of conifers, causing defoliation extending from the top of a tree downwards. In the NWT, white spruce is a preferred host. Infestations occur mainly in mature stands, found along main rivers and waterways. Tree mortality starts to occur after five to seven years of severe consecutive defoliation in a given area.

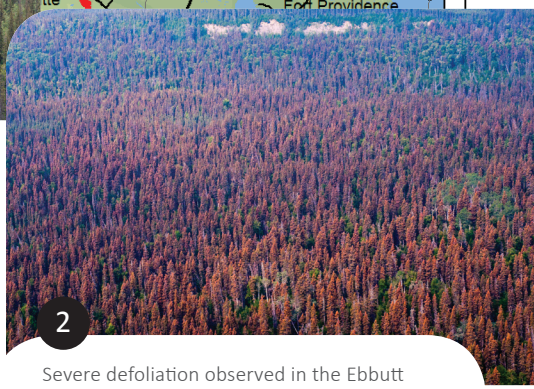
Spruce budworm has been the longest tracked insect pest in the NWT. FMD has a continuous record of budworm activity since the 1950s, which provides a good baseline. Over the last few decades, opulations of budworm have fluctuated, with significant outbreaks in 2002-2003 in the southern portions of the Mackenzie Valley and along the Slave River. Since 2004, spruce budworm populations stabilized in the south; however, outbreaks have been consistently spreading northwards, culminating in the Mackenzie Delta in 2015 with over 100,000 hectares affected by severe defoliation.

FMD surveyed the Delta again in 2016 and, surprisingly, found a trace of budworm damage only in southern areas. Clearly, the dynamics of this pest in the extreme northern environment require more study and continuous monitoring, coupled with consistent tracking of weather events. FMD has been collaborating with the Inuvik region forestry staff and the Canadian Forest Service (CFS) to address uncertainty around spruce budworm dynamics in this sensitive region.

In the summer of 2016, a team of forestry staff collected samples from trees infested in 2015 to be analyzed by CFS researchers. Samples will provide information on duration of the recent outbreak and will help identify any similar disturbances that might have occurred in the past. FMD, in collaboration with the Inuvik region and CFS staff, will continue to monitor this sensitive ecosystem in the future. In addition to usual aerial surveys, the pheromone trapping program will be reactivated in the Mackenzie Valley in 2017.



1 Budworm defoliation persists in spruce stands along the Arctic Red River.



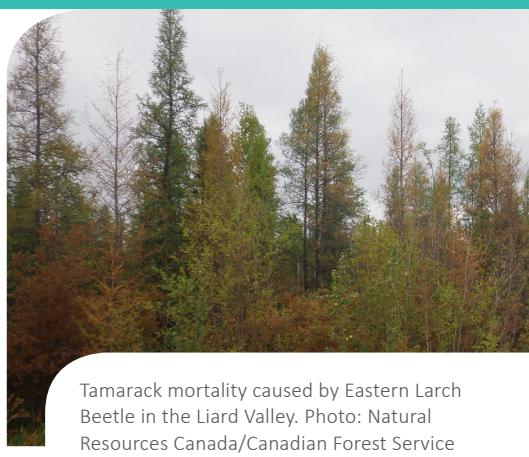
2 Severe defoliation observed in the Ebbutt Hills in 2016.

The Mackenzie Delta defended itself from the spruce budworm attack in 2016; however, the pest still persists at outbreak levels beyond the Arctic Circle in stands along the Arctic Red, Ramparts and Hume rivers. Significant expansion of budworm activity was also noted in the Ebbutt Hills (severe defoliation) and in the entire Mackenzie Valley. Early signs of increased activity were observed in the Liard Valley in 2016, suggesting that a milder than usual winter could trigger an outbreak in this area in 2017.

Secondary pests gain significance

One of the indirect effects of the ongoing drought in the NWT has been an increased activity and change in behaviour of secondary insect pests. Water stress reduces the capacity of trees to defend against insect and disease. Under normal conditions, secondary pests cause no significant damage to host plants, but they can become a serious threat when conditions like drought enable them to thrive. Over the last two years, FMD noted an increased activity of several insect pests considered secondary in the NWT, including:

- White-spotted Sawyer Beetle, which normally feeds on dead wood, was observed attacking living mature pine trees showing symptoms of water stress. Over 2,000 ha were affected in 2016.
- An unprecedented outbreak of Gray Willow Leaf Beetle in the southern Dehcho affected over 9,000 ha in 2015 and over 4,000 ha of willow dominated riparian zones in 2016.
- Striped Alder Sawfly damage was reported in the Dehcho and along the Ingraham Trail.
- Tamarack mortality caused by Eastern Larch Beetle was observed along the Liard Highway.
- Yellow-Headed Spruce Sawfly damage was observed along the Ingraham Trail.
- During extended periods of drought, it is also common to notice an increased activity of invasive insect pests. For example, Amber-marked Birch Leafminer population levels have been increasing rapidly, with over 650 ha mapped in the Dehcho and over 300 ha mapped in the North Slave.



Tamarack mortality caused by Eastern Larch Beetle in the Liard Valley. Photo: Natural Resources Canada/Canadian Forest Service

Yellow-headed Spruce Sawfly damage observed along Ingraham Trail. Photo: Natural Resources Canada/Canadian Forest Service

Mountain Pine Beetle not found in NWT

Mountain Pine Beetle bait attached to a mature pine tree. Bait is only effective within a few hundred meters and will not attract new beetles to the area, only the ones already present.

Mountain Pine Beetle is the most damaging insect pest of pine trees in North America. It is native to interior British Columbia and has been spreading far beyond its endemic range since the early 2000s. In 2006, it crossed the Rocky Mountains and, despite significant control efforts from Alberta Agriculture and Forestry (AAF), the outbreak continues to spread eastward. FMD has been monitoring for Mountain Pine Beetle since 2009 using pheromone trapping and aerial surveys. In 2012, the beetle was found in one pine stand just north of the NWT-Alberta border. The affected trees were cut and burned, which is the only effective method for controlling the pest. Since then, there has been no recorded presence of this beetle in the NWT.

In 2016, FMD staff joined AAF for the aerial survey flight along the southern territorial border. This collaborative effort was a great opportunity to exchange information on the local forest health situation and share essential data. It is worth noting that, according to the AAF analysis, the Mountain Pine Beetle populations are in a declining trend in the northern portions of their current range. The pheromone trapping program was also continued in the southern NWT, with three trapping locations along Highway 1 and two locations along Highway 5. No evidence of Mountain Pine Beetle was recorded in any trapping location. However, as the old adage goes, "The absence of evidence is not evidence of absence." Therefore, FMD will remain alert and continue to monitor.

FOR MORE INFORMATION ON THE FOREST HEALTH PROGRAM IN THE NWT, PLEASE CONTACT:

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