



Ministry of
Forests

Forest Health Bulletin

JANUARY 2025

Native defoliator management: Western Spruce Budworm

The western spruce budworm is a native defoliator that periodically erupts in severe landscape-level defoliation events, that can last several years. Since 1909, approximately 4 million hectares of forest in B.C. have been defoliated one or more times (Fig. 1). Budworm larvae primarily feed on coastal and interior Douglas-fir, but also feed on true firs, spruce, and western larch. It is an early season defoliator that totally or partially consumes buds and new foliage causing uneaten foliage, to dry and turn a characteristic reddish-brown colour that is easily detected from the air and ground. When viewed from a broad geographic scale, western spruce budworm exhibits expansive, sustained outbreaks; however, at a smaller geographic landscape scale, it may display quite fast-cycling, eruptive outbreaks. This defoliator can have devastating effects on Douglas-fir forests, causing decreased growth and yield, top-kill, and even mortality thereby limiting forest management options.

2023 saw a significant decline in budworm defoliation throughout the Cariboo Region, however there was an 11-fold increase in budworm defoliation in the Thompson Okanagan Region over 2022, notably in the Kamloops, Merritt, and Lillooet TSA's. Significant defoliation was also recorded in the Coast Region. Therefore, a 2024 aerial treatment with *B.t.k.* (*Bacillus thuringiensis* var. *kurstaki*)

was planned for high priority stands in the Cariboo and Thompson Okanagan Regions. Egg mass sampling conducted in the fall of 2023 indicated sustained and building budworm populations were expected in 2024. Using both mapped defoliation and egg mass sampling results, treatment areas were delineated, and local communities and First Nations were engaged.

In total 37,479 ha of budworm-infested forest was treated in 2024 with Foray 48B (*B.t.k.*) at 2.4 litres per ha. Western Aerial Applications Ltd. conducted the aerial applications using one 315B Lama helicopter, two Hiller UH12ET helicopters, and one Jet Ranger 206B, each equipped with four Beecomist 361A ultra low volume hydraulic sprayers. The spray operations were conducted from numerous staging sites close to treatment blocks, where the *B.t.k.*, mobile fuel trucks and loading crews were positioned. A total of 5 blocks were sprayed in the Cariboo near Chasm, 70 Mile House and 100 Mile House; and 13 blocks were sprayed in the Thompson Okanagan Region near Cache Creek, Ashcroft, Merritt and Kentucky Alleyne. Ground crews were positioned on spray blocks to monitor weather parameters before and during spray operations. Spray treatments were applied between June 25th and July 2nd, 2024.

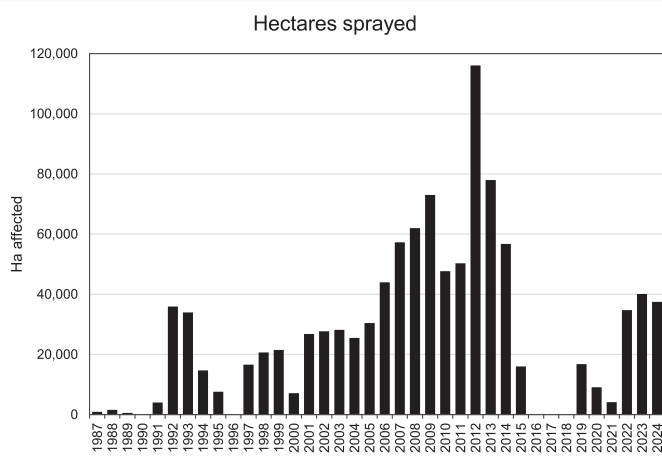
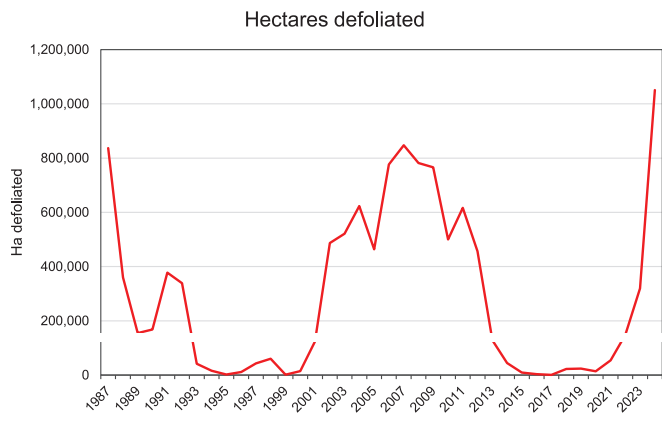


Figure 1. The upper graph shows hectares defoliated by western spruce budworm in B.C. (1987-2024) and the lower graph shows hectares treated with B.t.k.



Left. Partially eaten needles turning brown. Right. Landscape level defoliation in the Merritt TSA, Aug. 2024.

Warm weather in April-May prompted early budworm larvae emergence from overwintering sites. This was followed by cool weather in late May and June causing the larvae stay feeding within buds and webbed within expanding shoots, feeding extensively on the new growth prior to B.t.k. application. When the spray was conducted, weather conditions were optimal but considerable defoliation to new shoots had already occurred causing this foliage to dry and turn red. Mortality attributed to

B.t.k. was very high (>90% budworm mortality) despite larval density exceeding 350 larvae/m² on some sites. The spray greatly reduced the amount of 2024 defoliation but due to the pre-spray larval feeding defoliation was visible during subsequent aerial detection surveys. Reduced moth populations will lead to much lower larval density within sprayed areas in 2024. Preliminary aerial reconnaissance conducted later in July 2024 showed that the budworm has expanded exponentially throughout the Thompson Okanagan and Coast Regions.



Western spruce budworm feeding in shoot.



Western spruce budworm moth.

Lorraine Maclauchlan, PhD, RPBio, RPF, is the Forest/Research Entomologist, Thompson Okanagan Region. In 2024, Lorraine was honored by the Western Forest Insect Working Group and awarded the 2024 Founder's Award for her contributions to forest entomology in western North America. Over the past 30 years Lorraine has been a pioneering, woman forest entomologist, and built and led the Ministry's native defoliator management program.

Invasive species management: Keeping B.C. Spongy Moth-Free

The European spongy moth (formerly referred to as gypsy moth) was introduced from Europe into the northeastern US in the late 1860's, established and slowly spread across the Eastern U.S. Spongy moth (SM) is now established in southern Ontario, Quebec, Nova Scotia, PEI and New Brunswick. The SM females have wings but do not fly, can lay up to 1,000 eggs and the caterpillars feed on more than 300 non-conifer hosts.

Spongy moth is a non-native, invasive species that can cause significant ecological, health and economic impacts once it establishes (i.e., SM populations compete with native species, including pollinators; during outbreaks they can kill valuable urban trees through defoliation; and cause allergic reactions to sensitive individuals when they encounter hairs on the caterpillars and moths). SM also poses a threat to valuable agricultural crops such as blueberries and fruit trees. If SM becomes established, B.C.'s major trading partners may set quarantines and trade restrictions to limit the introductions into the western U.S., which is SM free. In 1999, the U.S. refused shipments from B.C. nurseries without additional inspection certificates due to a failed treatment program in 1998.

In 1978, B.C. first detected the North American SM strain. Since 1979, B.C. has been actively detecting (using pheromone baited traps that attract the male moths) and eradicating SM. The Canadian Food Inspection Agency (CFIA) led the detection and eradication of SM up until 1998. Following a failed pesticide use permit application in 1998, CFIA opted to deregulate SM in western Canada and the Ministry of Forests (FOR) stepped in to continue the eradication program and maintain B.C.'s SM-free status. CFIA has continued to lead detecting SM introductions by annually deploying pheromone baited traps across the province.

In 2023, CFIA deployed close to 9,000 traps and caught over 400 male moths across 51 locations. The moths are moved from eastern Canada into B.C. on vehicles (cars and RVs) or when people move and bring outdoor furniture or other outdoor items that may have SM egg masses on them (the egg masses are very hardy!). In 2024,

FOR implemented one of the largest and most complex eradication programs in B.C., aerially spraying 12 areas across the province. The successful 2024 eradication program and a cold snap in February 2024 contributed to a significant decrease in positive detections with only 39 male moths intercepted in 27 of the 8,657 deployed traps.

Between 1999 and 2024, FOR has successfully planned and delivered over 60 ground and aerial eradication programs. After 25 years, FOR will no longer lead B.C.'s SM eradication program and will focus its efforts and resources on managing native forest health factors on public lands. The success of this invasive species eradication program is attributed to the efforts of our trusted aerial contractor, ground support contractors and the former Forest Health Officer, Tim Ebata's efforts.



Babita and team during a spray in Kamloops

Babita Bains, MSc, RPF, is the Forest Health Officer. Babita joined the Forest Health team in 2017 as the Provincial Forest Entomologist and had focused her efforts on planning and implementing the spongy moth eradication program. She will remain the Chair of the B.C. Plant Protection Advisory Council's Spongy Moth Technical Advisory Committee until a new delivery model and program lead is established.

FOREST HEALTH TEAM UPDATE:



Mike Fowler has moved into the Forest Health Data Scientist position from his base position as a Spatial Data Specialist with Forest Analysis and Inventory Branch. Mike has been working in the Ministry for over 11 years and his experience includes working as a GIS Analyst with BCTS and working with the Pricing Branch as a Cruising Systems Analyst. Prior to joining government, Mike worked for industry and as a consultant. Mike has a Resources Technology Diploma from Malaspina University-College (now Vancouver Island University) and after tweaking his knee in a heli-block doing engineering layout, Mike enrolled at BCIT and obtained his Bachelor of Technology in Geomatics. Mike is based out of Campbell River and in his spare time he enjoys spending time with his family, taking adventure motorcycle trips around the BC interior (specifically Lillooet!) as well as camp, hike and fish (or any other outdoor activity).



Kate Mitchell joined the Forest Health Team in May as the new Provincial Forest Entomologist. She graduated from the University of St Andrews, Scotland in 2018 with a Bachelors in Earth and Environmental Sciences. She moved to Vancouver to pursue her PhD in Forestry at UBC, Vancouver in 2018, and plans to defend her thesis in early 2025. Her thesis focused on predicting the patterns of Douglas-fir beetle and woodborer outbreaks following wildfires in the dry interior forests of B.C., and how competition and predation between insect species can affect tree mortality and post-fire management outcomes. Kate is thrilled to be joining the team and is especially excited to work on the AOS program and continuing her research interests in disturbance interactions and insect population dynamics. She lives in the Lower Mainland with her husband Liam and their fur baby Twiggy.



Calvin Jensen, MF, RPF, has joined Branch to fill the Provincial Forest Pathologist temporary assignment (Jewel Yurkewich is on parental leave until spring 2026). Calvin has been the Regional Forest Pathologist in the Thompson-Okanagan Region since 2021. He graduated from the University of Alberta with a MF and his previous work experience includes forest health and tree improvement, silviculture, and wetland and caribou conservation. Calvin is an avid, albeit clumsy, cross-country skier, plant collector, and reading on the beach enthusiast.