



CANADIAN FOREST SERVICE

Atlantic Forestry Centre – Making a Difference

Budworm Tracker: A citizen science project

Budworm Tracker is part of a large scientific initiative aimed at better understanding how spruce budworm (*Choristoneura fumiferana*) populations rise as an outbreak approaches. This research aims to identify areas of rising budworm populations early so that control measures can be initiated before a full blown outbreak occurs. Researchers require vast amounts of data, over large geographic areas. Land managers are conducting regular monitoring, and citizen scientists are filling a vital role in tracking budworm populations by helping conduct field research in their own communities.

What is citizen science?

Citizen science is research that is carried out by the general public, usually in collaboration with, or under the direction of, scientists. Citizen science projects have existed for several decades and have allowed scientists to conduct research that would otherwise not be possible.



Citizen scientist checking for budworm.

Budworm Tracker is a citizen science project that is part of the early intervention strategy for monitoring spruce budworm populations. The information collected will provide data needed to obtain a broader perspective of spruce budworm numbers throughout Atlantic Canada and beyond. The project also engages the public in the science and allows them to see first-hand what is happening on their own properties.

Early intervention strategy

The spruce budworm is the most serious pest affecting forests in eastern North America. Records indicate that spruce budworm outbreaks are cyclical, occurring every 30 to 40 years. The last extensive outbreak in eastern Canada reached its peak between 1974 and 1985, damaging more than 50 million hectares.

An outbreak is currently occurring in Quebec, and populations are on the rise in New Brunswick. Scientists are focusing their efforts on an early intervention approach to keep budworm populations below threshold levels. Intensive monitoring by provincial and federal departments and forestry companies is providing critical information on spruce budworm numbers. However, additional monitoring is needed to fill gaps and provide scientists with a clearer picture of how these populations are evolving.

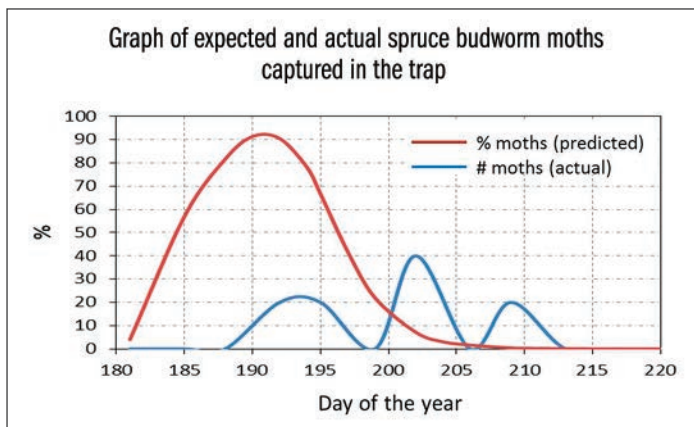


Migration of spruce budworm moths.

Budworm numbers have been rising slowly in New Brunswick and the rest of Atlantic Canada for several years. Scientists use two main sampling methods to determine budworm numbers: larval surveys and pheromone traps. The larval surveys monitor the number of overwintering spruce budworm larvae, while the pheromone traps capture adult male spruce budworm moths. Both methods give an indication of the size of budworm populations, but the pheromone traps can also indicate potential migration events that scientists believe play an important role in spruce budworm outbreaks.

How does it work?

Citizen scientists are supplied with a Budworm Tracker kit that includes all of the materials and instructions needed to successfully carry out their budworm monitoring research. The key item in the Budworm Tracker kit is a trap (green Unitrap) that is baited with a pheromone lure. Pheromones are naturally occurring, species-specific chemical compounds that pose no threat to humans or other animals, but play a critical role in the reproductive and mating behaviour of the spruce budworm. Male budworm moths are attracted to the pheromone lure and enter the trap where they are killed by an insecticide strip. The traps are placed in an easily accessible forested area with balsam fir and/or spruce trees and are checked regularly from June 15 to August 30 when budworm moths are active.



Scientists use climate data to predict when resident budworm moths are most likely to emerge. The red line on the graph represents the predicted probability of moth occurrence while the blue line shows the actual number of moths captured.

Budworm moths that are captured during the period when resident moths are emerging may be part of the resident population while moths that are captured outside the expected period are potential migrants from another area. The two blue peaks on the right side of the figure represent possible migrants from another area because they occurred later in the year than was expected in this area. This information enables researchers to gain a greater understanding of how spruce budworm populations evolve.

Ideally, the traps should be monitored every Monday, Wednesday and Friday. Each collection takes about five minutes. Citizen scientists check the trap, estimate the number of budworm moths, record this number, put the contents of the trap into a paper bag, label the bag, and freeze the bag and contents until the end of the season.

Trap captures can be recorded in several ways:

- pen and paper: record the date and the number of moths in the trap
- online at **budwormtracker.ca**, using a provided login and password
- SMART PHONE APP: scan the QR code on the trap and enter the data for that day

At the end of the season the samples will be collected and returned for processing.

To learn more about the Budworm Tracker project, visit the Healthy Forest Partnership (**budwormtracker.ca**) or contact:

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