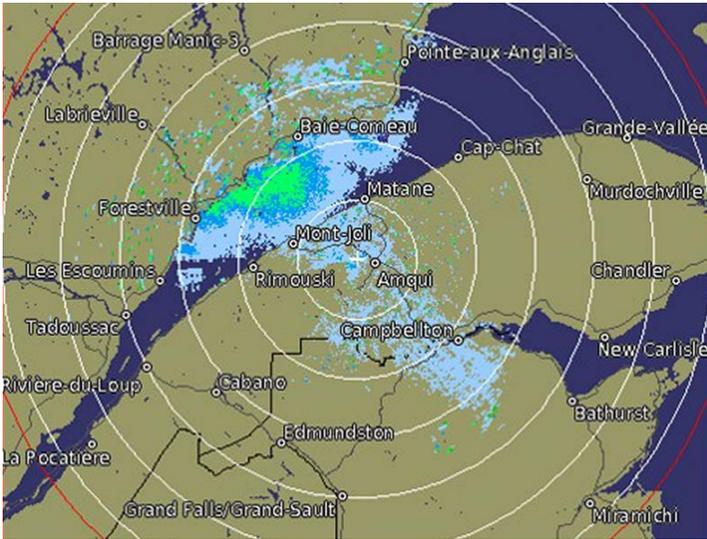




## Spruce budworm dispersal

### Snow in July

On several cloudless nights from July 20 through 25, 2016, Environment Canada’s weather radar detected what appeared to be bands of snow moving from the north shore of the Gulf of St. Lawrence into New Brunswick. Citizens of the City of Campbellton and nearby communities in northern New Brunswick soon discovered that this “July snow” was in fact massive swarms of spruce budworm moths from an outbreak in Quebec.



Snow in July 2016.

The spruce budworm is a native forest insect that inhabits the spruce-fir forests of northeastern North America. Outbreaks of this insect generally occur every 30 to 40 years. In 2006, an outbreak started in Quebec and, as of 2016, covered over 7 million hectares – an area equal to the province of New Brunswick. The outbreak has reached the northern border of New Brunswick and is threatening the province’s forest.

### Early intervention strategy

In 2014, an early intervention strategy research project was undertaken to explore new ways of managing a spruce budworm outbreak. Researchers are studying many aspects of the insect’s ecology and management. The early intervention approach requires

intensive monitoring of budworm populations and targeting areas where budworm numbers are high (hot spots) before they reach outbreak levels. Dr. Rob Johns, a forest insect ecologist with the Canadian Forest Service at the Atlantic Forestry Centre in Fredericton, New Brunswick, is studying the role that these mass dispersal events have on expanding spruce budworm outbreaks.

### Dispersal events

Mass dispersal events occur from time-to-time during budworm outbreaks. At night, the moths rise on warm air currents and can be transported great distances before returning to the ground. The moths are attracted to light sources. That explains the incredible numbers that sometimes accumulate in well-lit areas.

Mass dispersal of spruce budworm is not new to the Campbellton area (see the 1957 photo). The 2016 dispersal is estimated to be in the trillions. Although the number is spectacular, scientists are uncertain what impact these moths will have on spreading the budworm outbreak into New Brunswick. Will these events overwhelm the efforts to contain the outbreak in the north? This question has dominated much of Dr. Johns’ research activities during the latter part of 2016.



1957



2016

Spruce budworm moths in Campbellton in 1957 and 2016.

## Budworm Trackers play an important role

Budworm Trackers is a citizen science project started in 2015 to provide valuable information to researchers. The information will help show how spruce budworm populations evolve during the early stages of an outbreak. Citizen scientists are given a green trap baited with a pheromone lure. Pheromones are naturally occurring chemical compounds that trigger a powerful social response in members of the same species. The pheromone used by citizen scientists is emitted by the female budworm moth and is highly attractive to male budworm moths.



Citizen scientist checking pheromone trap.

Scientists use climate data to predict when resident moths are most likely to emerge. Budworm moths that are captured during the period when resident moths are emerging may be part of the resident population. However, moths that are captured outside the expected period are potential immigrants from another area. This is especially likely when high numbers are captured in areas that did not show any previous activity. Citizen scientists check their traps weekly and will capture resident moths as well as immigrant moths from a dispersal event. With the help of these citizen scientists, it was determined that the 2016 budworm dispersal events were likely quite extensive, perhaps reaching as far as Cape Breton, Nova Scotia, and deep into Maine in the United States.

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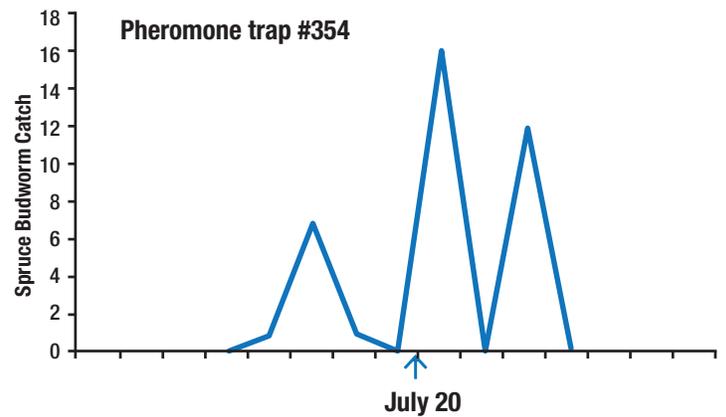
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Probable spruce budworm immigrant moths captured in a trap.

## What impact will this event have on local budworm populations?

The reproductive capacity of budworms is high – each female can produce up to 200 eggs. However, many natural controls such as parasites, diseases and predators help keep spruce budworm populations low. Furthermore, the health and vigour of immigrating moths may be lower than resident moths, which may affect the viability of eggs that are laid. This may be because of increased competition for food where populations are higher and a higher susceptibility to diseases as a result of increased stress. Moths coming from areas of high budworm populations may also carry additional diseases and parasites. These are all issues that researchers will continue to study.

The intensive sampling of overwintering larvae and the dedicated work of citizen scientists and researchers determined that most of the eggs were laid within 30 to 50 km of Campbellton. This finding suggests that any impact of this dispersal event will likely be limited to northern New Brunswick. The early intervention approach of identifying and targeting hot spots is expected to manage the slight increase in budworm numbers that will likely result from the moth dispersal event in 2016.

To date, results from treatments under the early intervention strategy are encouraging, and researchers are optimistic that the spread of the outbreak will continue to be slowed.

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