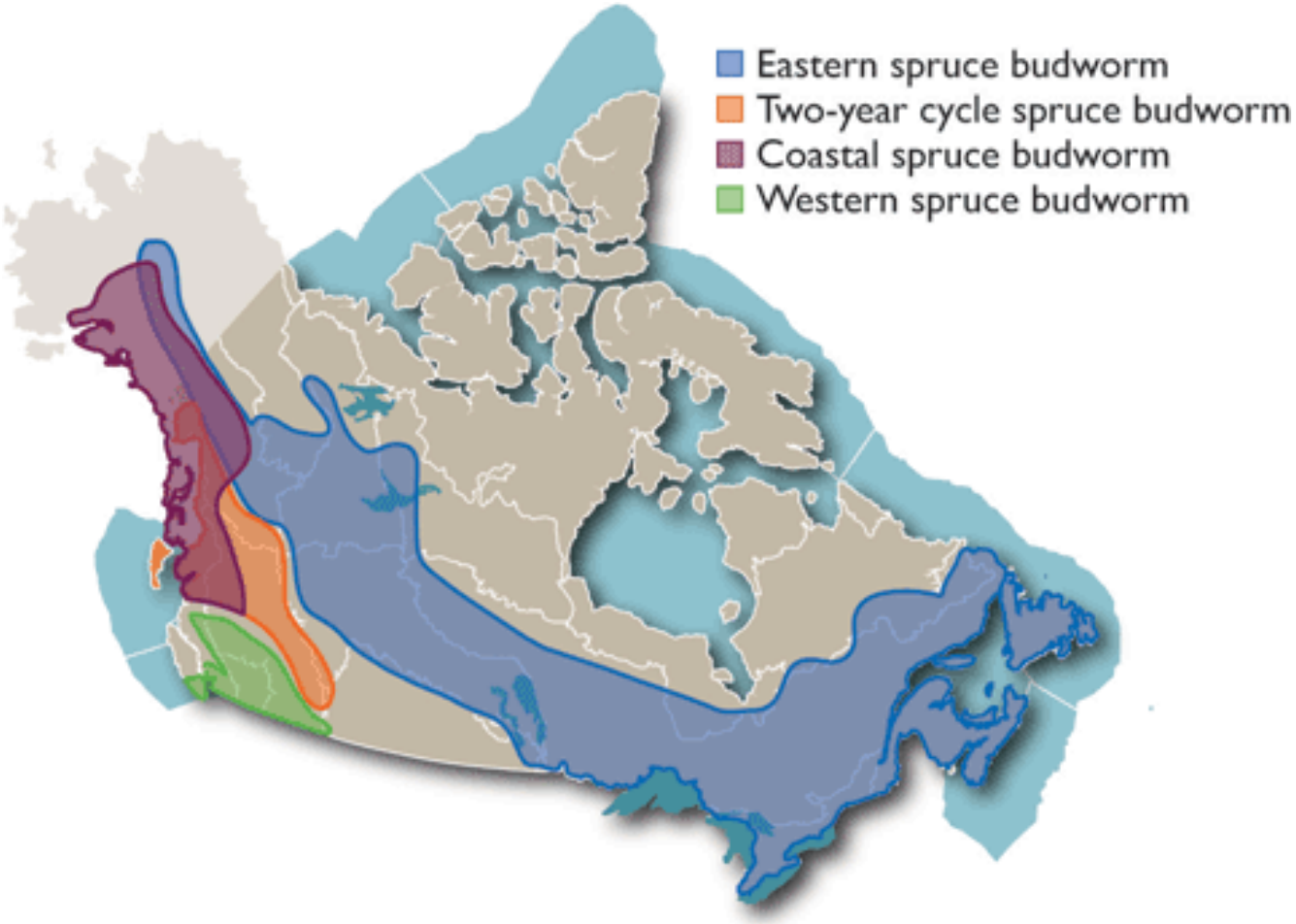
Early Intervention Strategy for spruce budworm: Translating theory into practice

Rob Johns

Atlantic Forestry Centre, Canadian Forest Service

Source: NB Woodlot owners webpage



NRCAN website

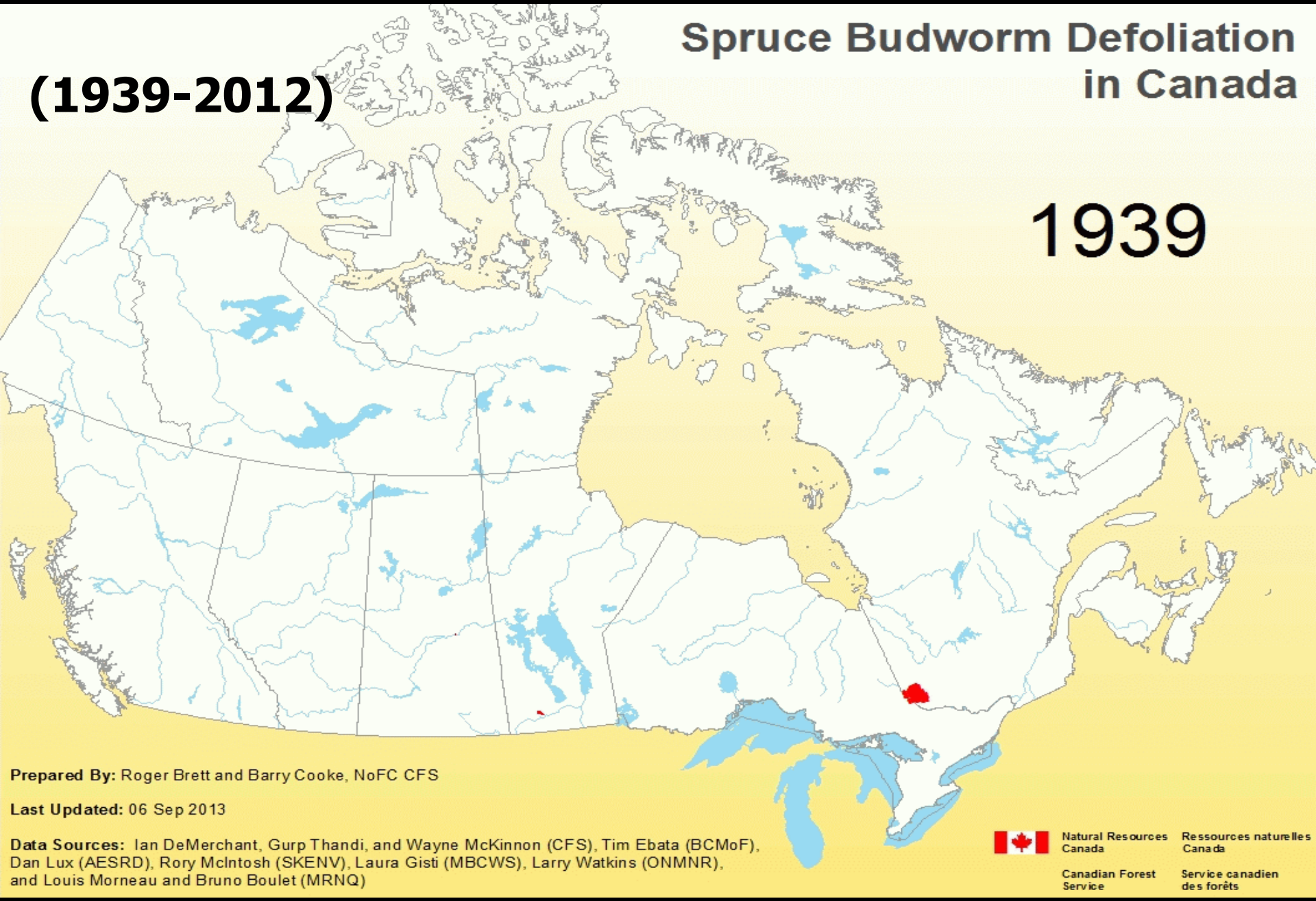
Spruce budworm, *Choristoneura fumiferana*

Cape Breton Highlands, 1977

Photo: Ed kettela

(1939-2012)

Spruce Budworm Defoliation in Canada



Prepared By: Roger Brett and Barry Cooke, NoFC CFS

Last Updated: 06 Sep 2013

Data Sources: Ian DeMerchant, Gurp Thandi, and Wayne McKinnon (CFS), Tim Ebata (BCMoF), Dan Lux (AESRD), Rory McIntosh (SKENV), Laura Gisti (MBCWS), Larry Watkins (ONMNR), and Louis Morneau and Bruno Boulet (MRNQ)

Natural Resources Canada | Ressources naturelles Canada

Canadian Forest Service | Service canadien des forêts

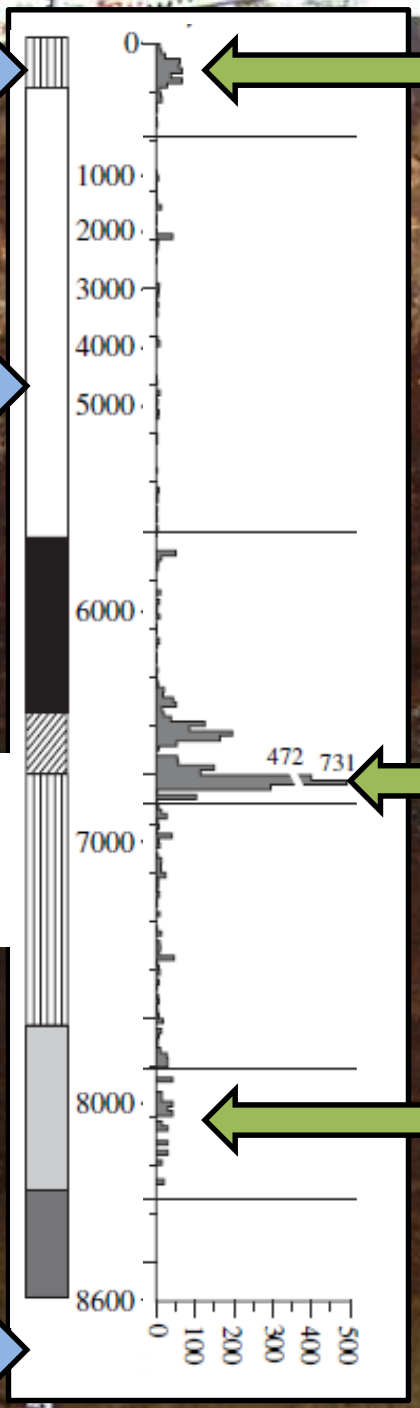
Are spruce budworm outbreaks natural…?

~70 years ago

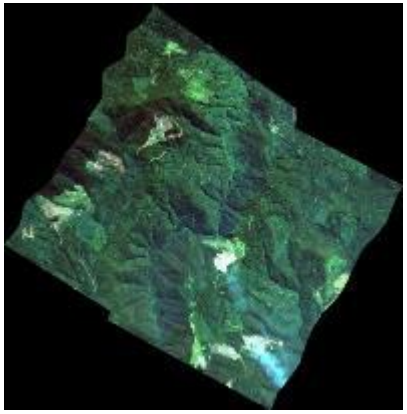
~4,700 years ago

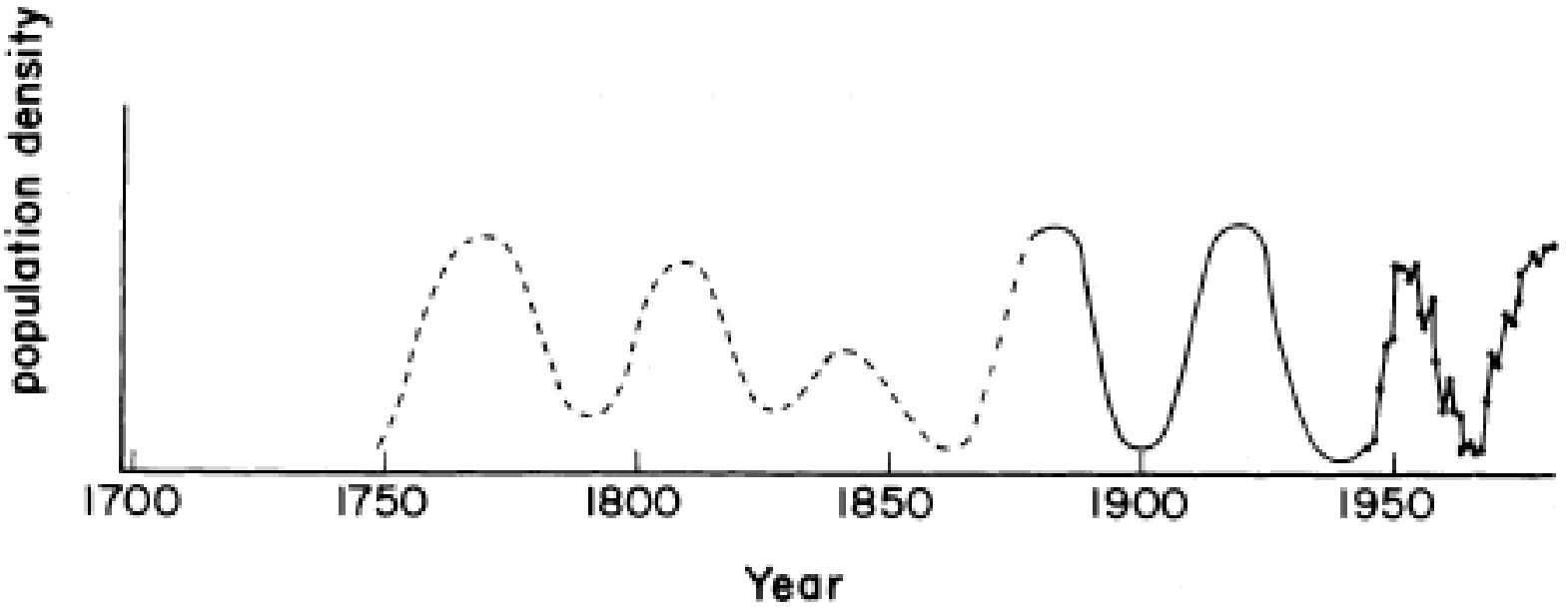
~10,000 years ago

Years before present



Simard et al. (2006)





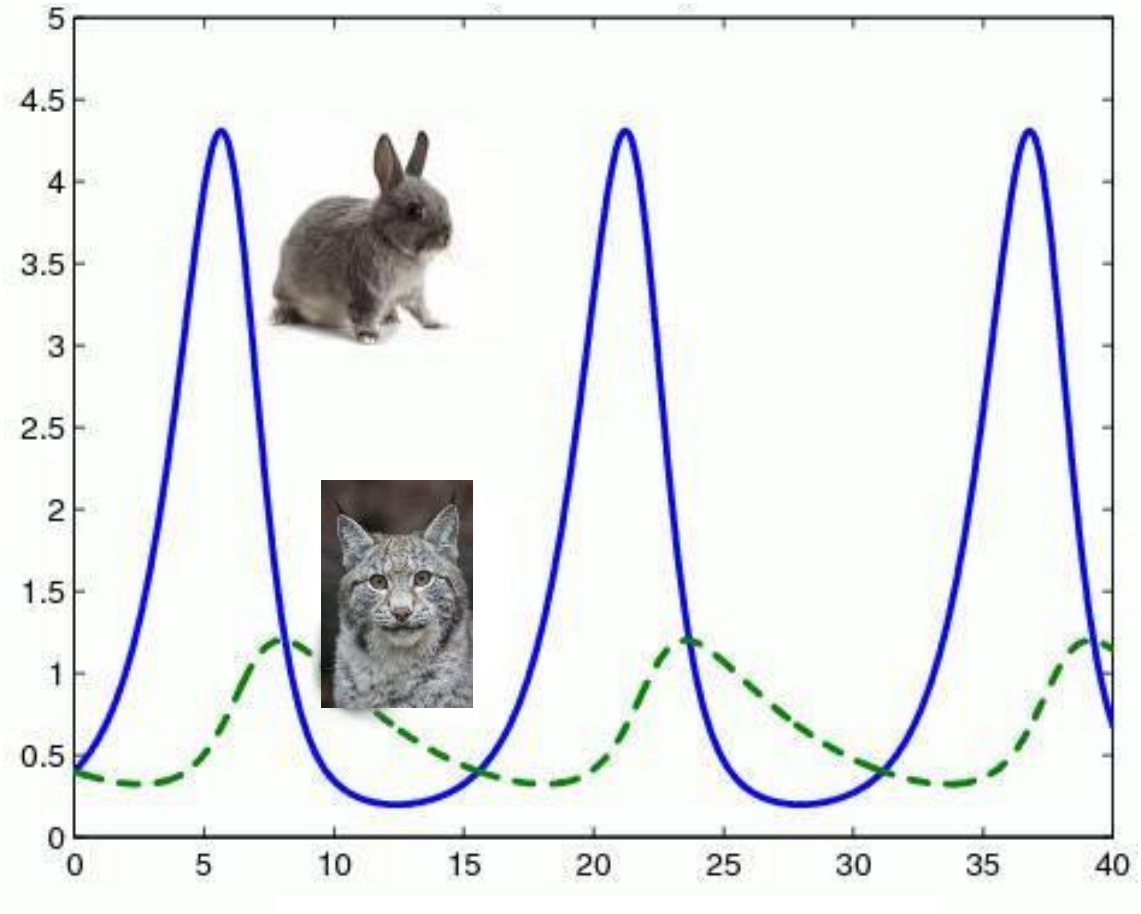
~35-40 year outbreak cycle

Oscillatory hypothesis

Predator-prey cycles drive budworm outbreaks

Oscillatory hypothesis

Predator-prey cycles drive budworm outbreaks

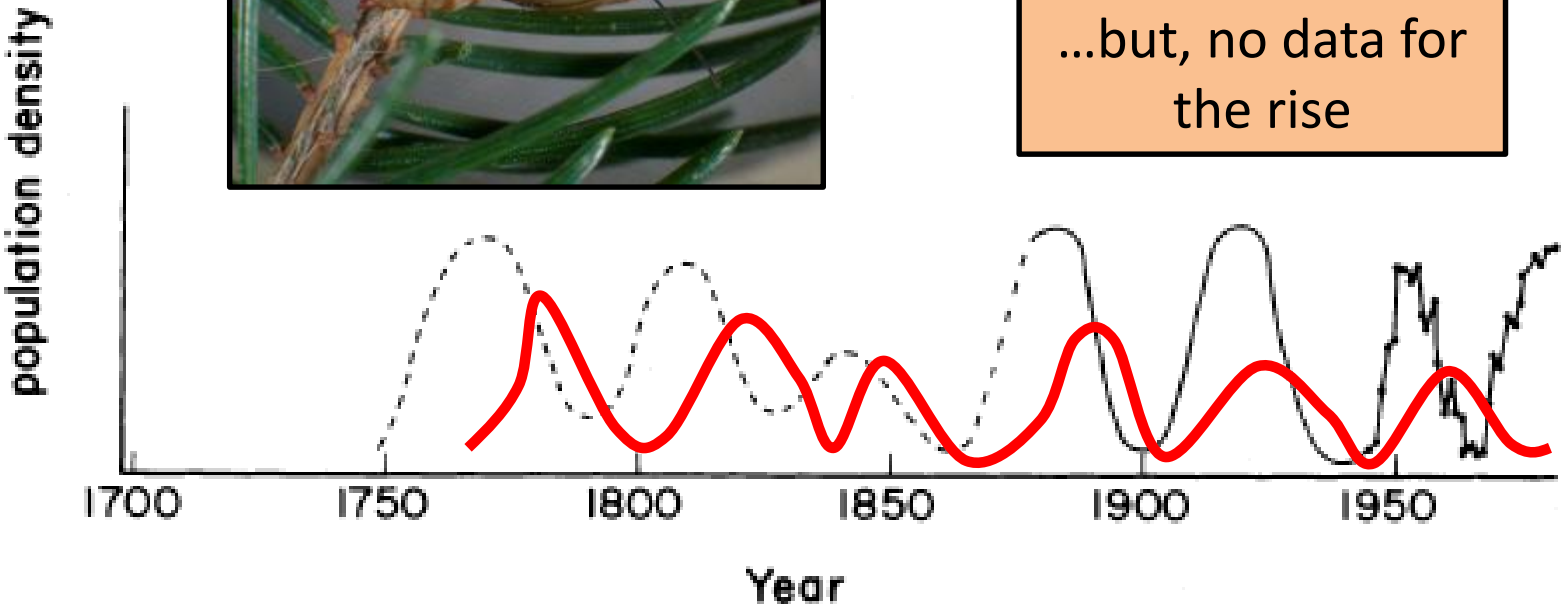


Oscillatory hypothesis

Predator-prey cycles drive budworm outbreaks

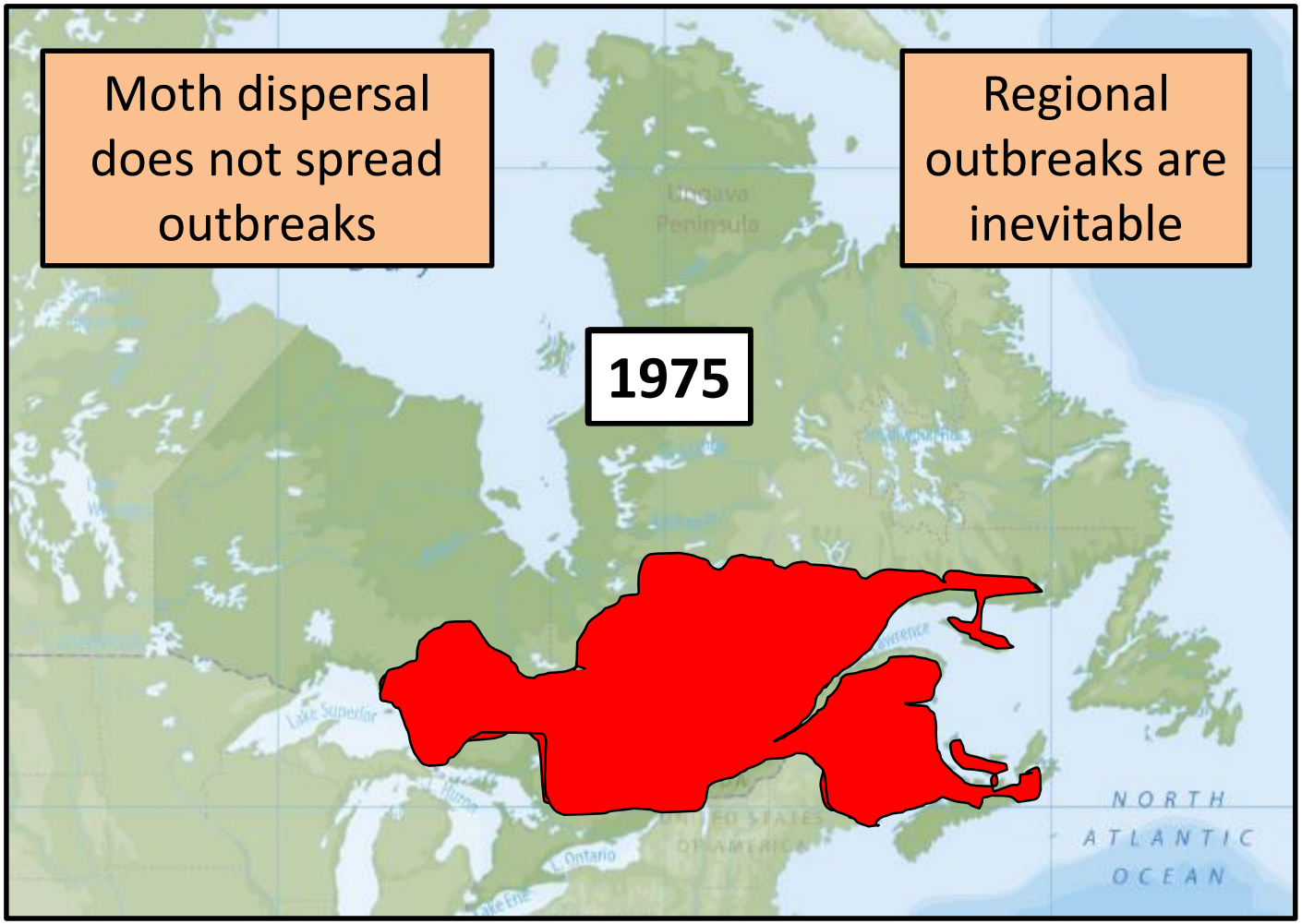
Only data for collapsing populations

…but, no data for the rise



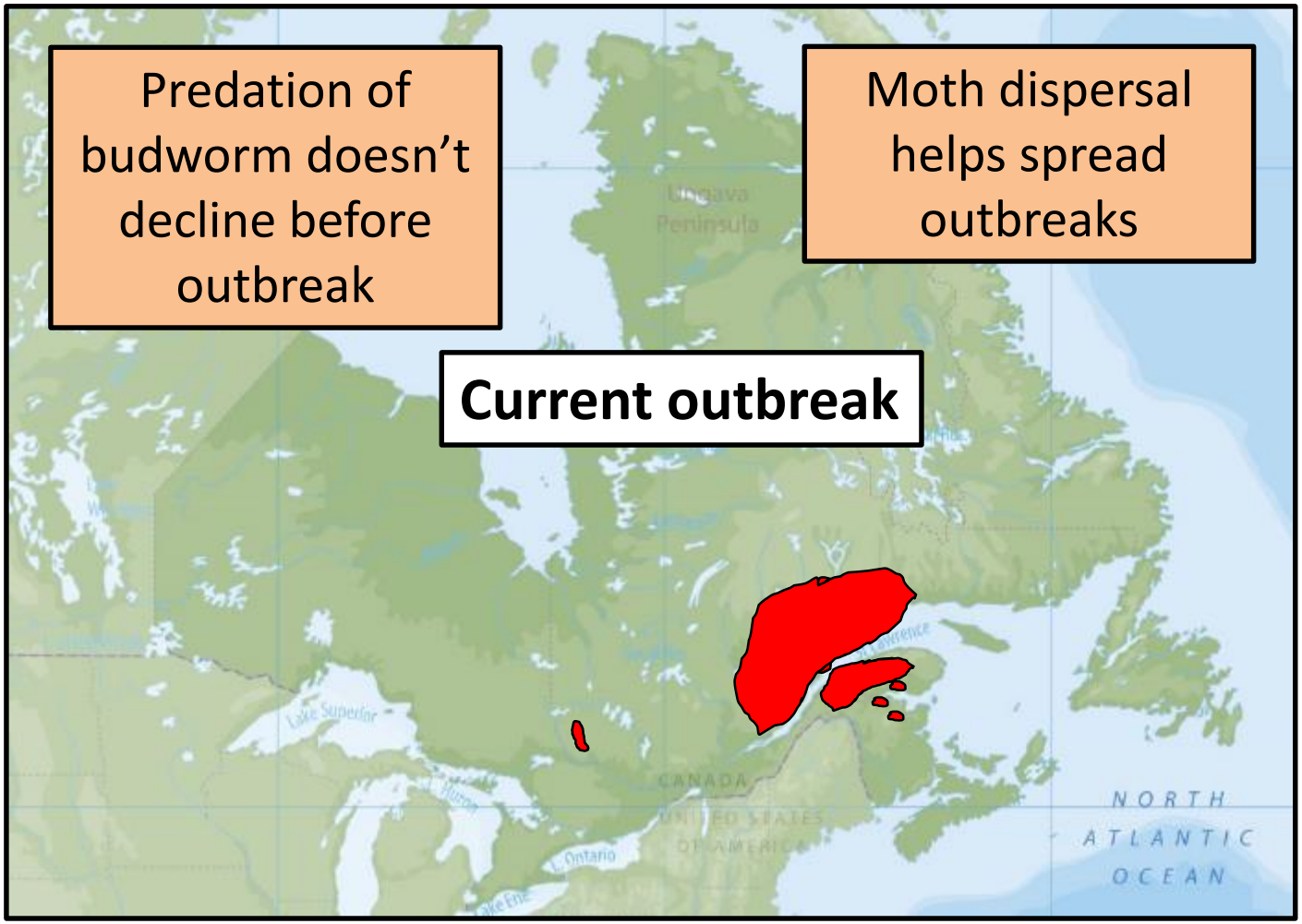
Oscillatory hypothesis

Outbreaks are synchronous across the landscape

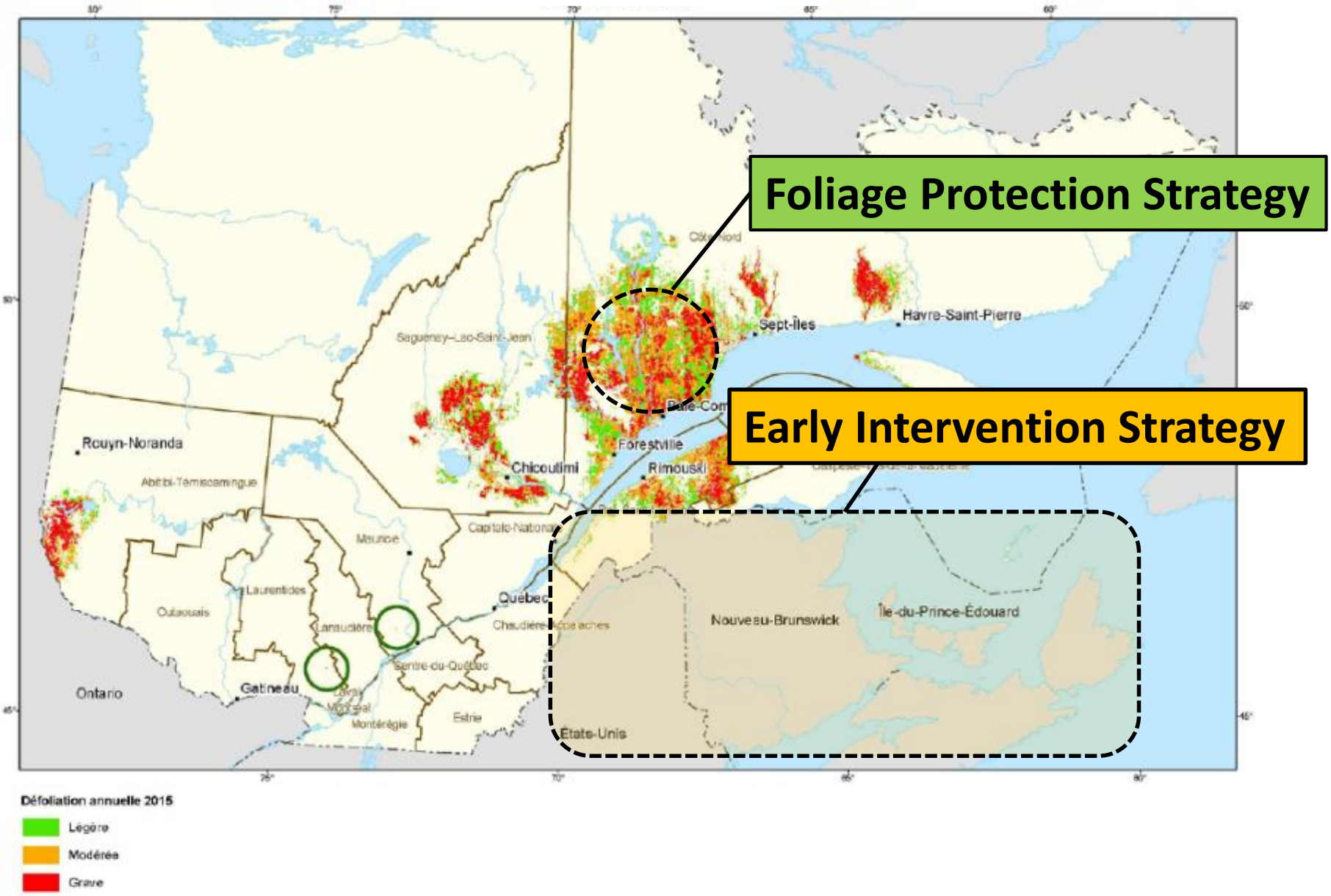


Epicentre Hypothesis

Outbreaks spread ‘contagiously’



Managing regional outbreaks



“SLOW THE SPREAD” PROGRAM: GYPSY MOTH

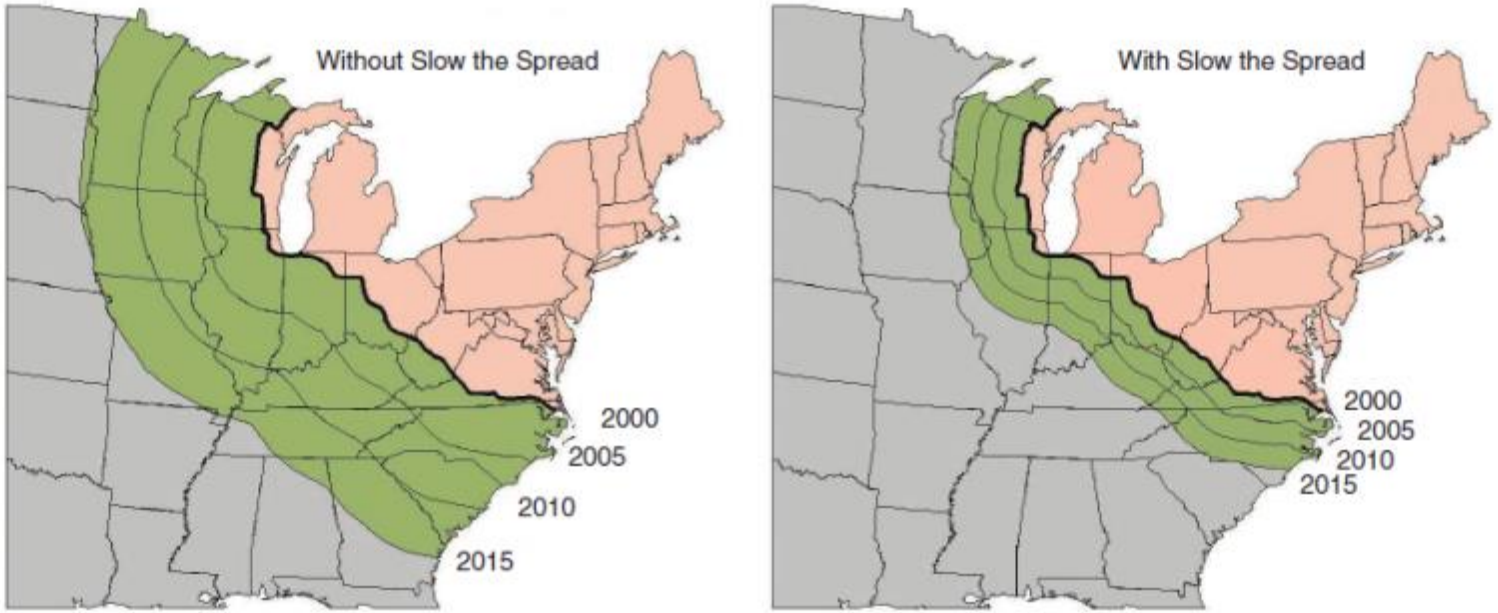


Figure 6. **Projected gypsy moth spread with and without the Slow the Spread project.**

USDA 2007 General Tech. Report (NRS-6)

Early Intervention Strategy

Criteria for feasibility:

1) Population dynamics

2) Monitoring: Detection at low densities

3) Efficacy and non-target effects

4) Social license – Communication

Early Intervention Strategy

Criteria for feasibility:

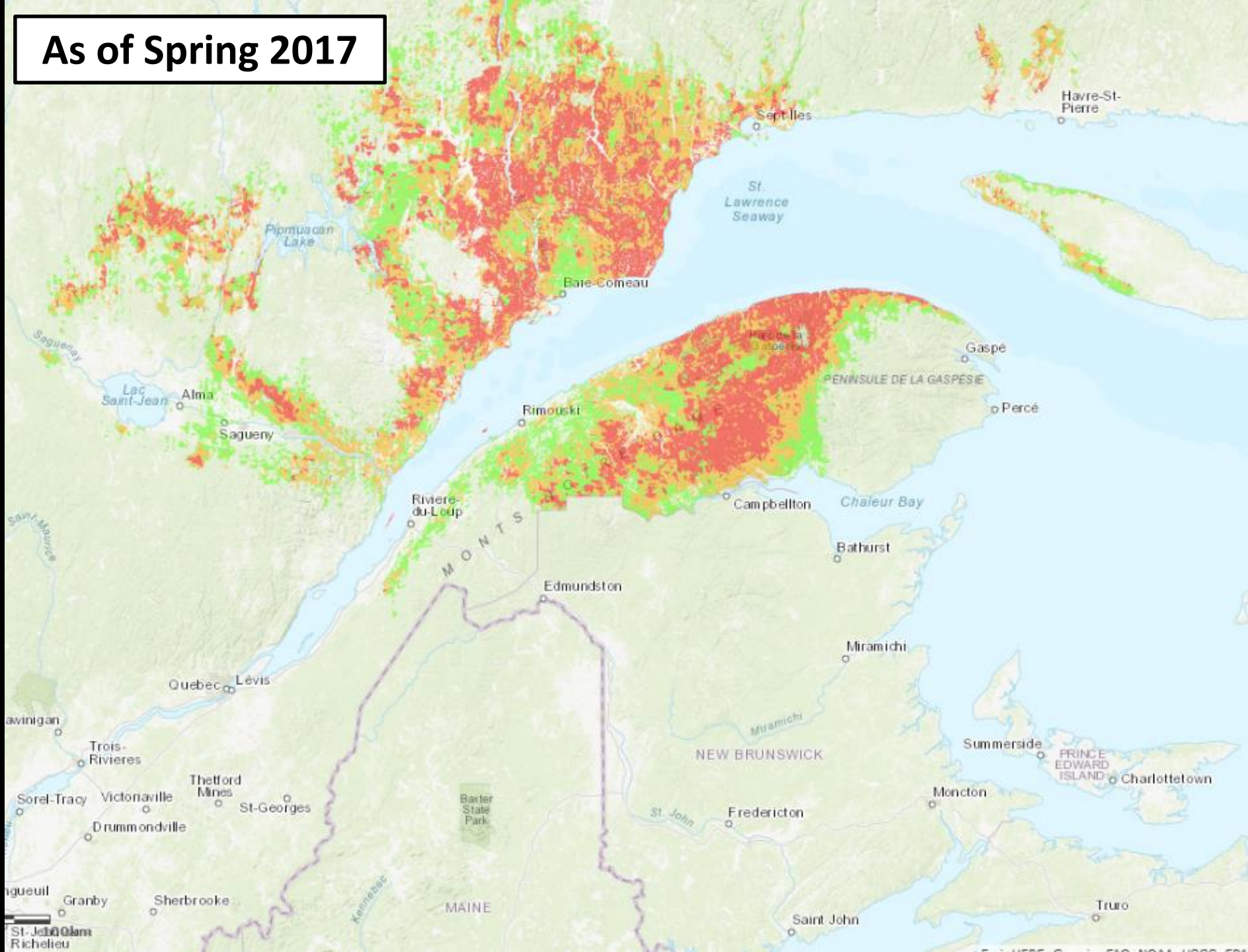
1) Population dynamics

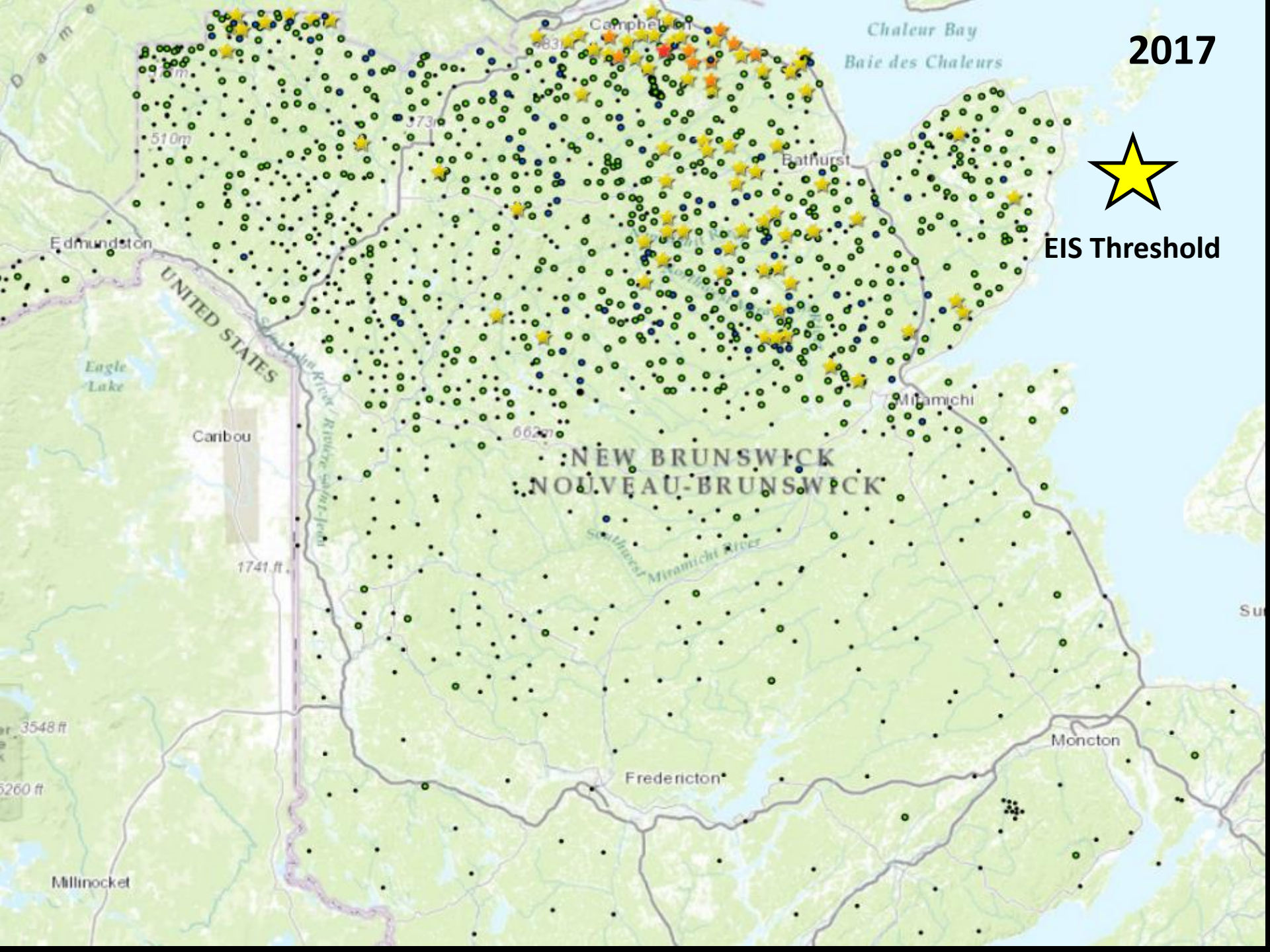
2) Monitoring: Detection at low densities

3) Efficacy and non-target effects

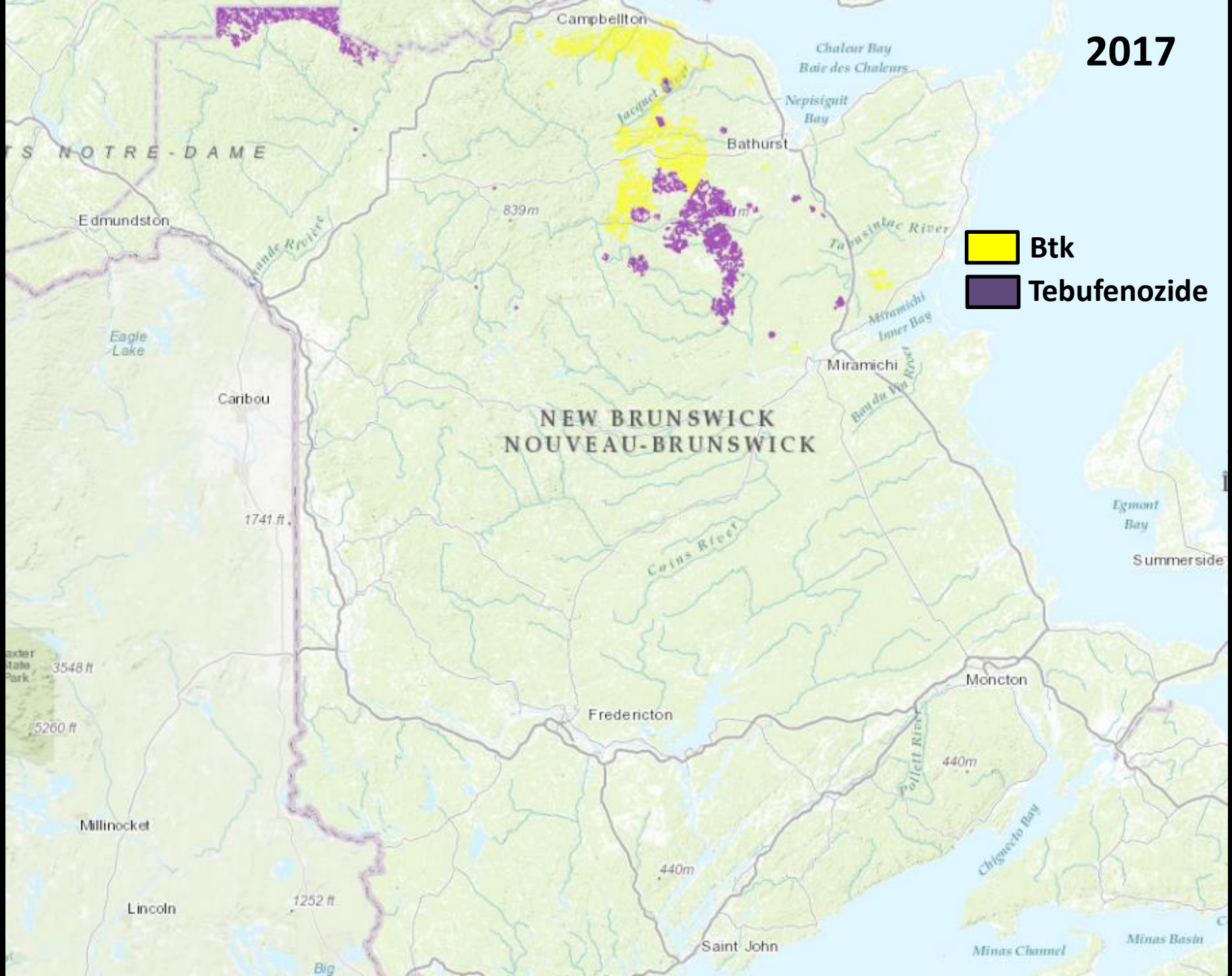
4) Social license – Communication

As of Spring 2017




2017
EIS Threshold
Chaleur Bay
Baie des Chaleurs
Campbellton
Bathurst
Edmundston
UNITED STATES
Eagle Lake
Caribou
Miramichi
NEW BRUNSWICK
NOUVEAU-BRUNSWICK
Southwest Miramichi River
Moncton
Fredericton
Millinocket
1741 ft
3548 ft
5260 ft


2017
EIS Threshold
Campbellton
Chaleur Bay
Baie des Chaleurs
Nepisiguit Bay
Jacquet River
Bathurst
839m
Edmundston
Grande Rivière
Eagle Lake
Caribou
1741 ft
NEW BRUNSWICK
NOUVEAU-BRUNSWICK
Miramichi
Miramichi Inner Bay
Bay du Vin River
Egmont Bay
Summerside
Cains River
3548 ft
5260 ft
Fredericton
Moncton
Pollett River
440m
Millinocket
Chignecto Bay
Lincoln
1252 ft


2017
Btk
Tebufenozide
Campbellton
Chaleur Bay
Baie des Chaleurs
Nepisiguit Bay
Bathurst
Edmundston
839m
Tabusintac River
Miramichi Inner Bay
Miramichi
Eagle Lake
Caribou
NEW BRUNSWICK
NOUVEAU-BRUNSWICK
1741 ft
Egmont Bay
Summerside
Coins River
3548 ft
5260 ft
Moncton
Fredericton
Pollett River
440m
Millinocket
Chignecto Bay
440m
Lincoln
1252 ft
Saint John
Minas Channel
Minas Basin

Early Intervention Strategy

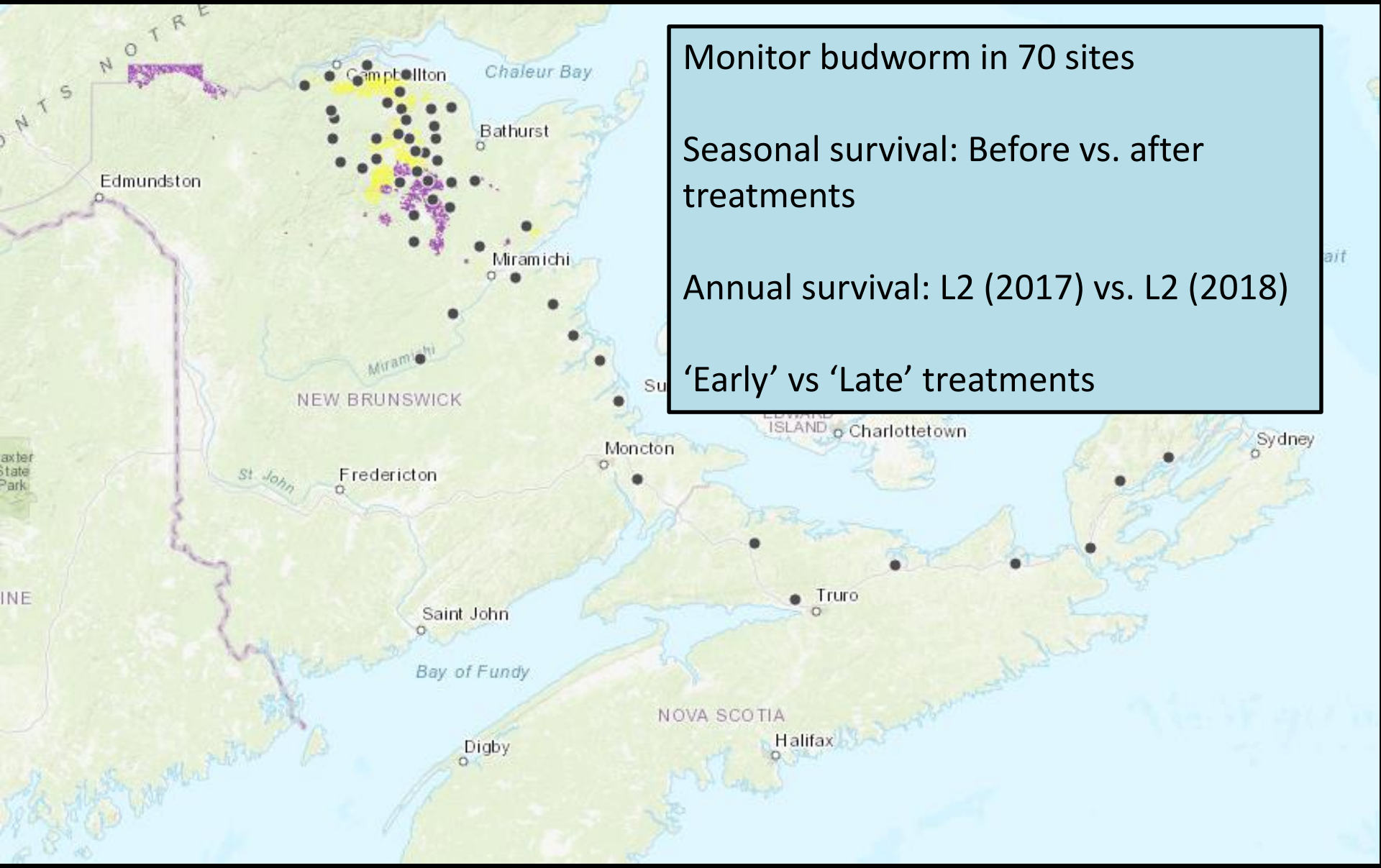
Criteria for feasibility:

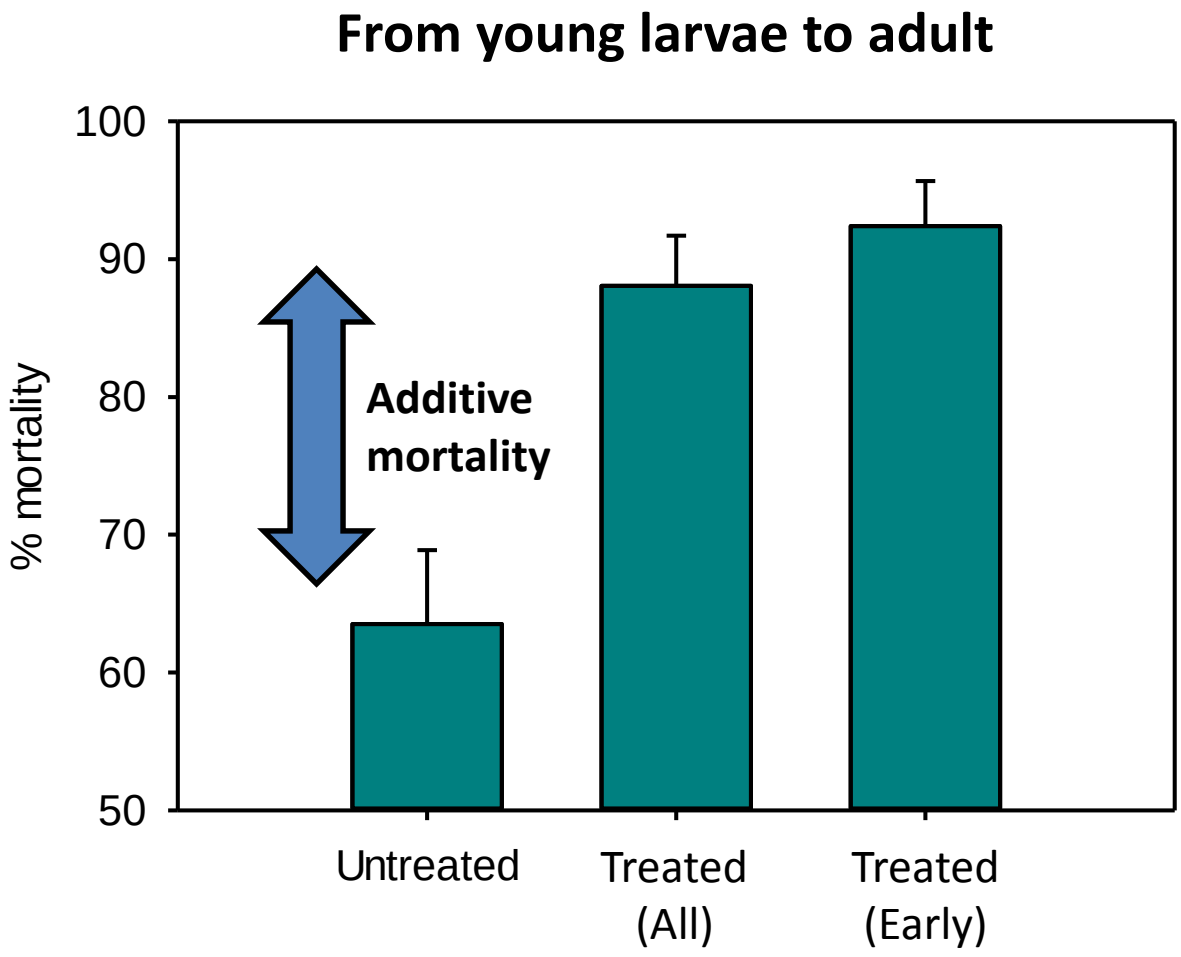
1) Population dynamics

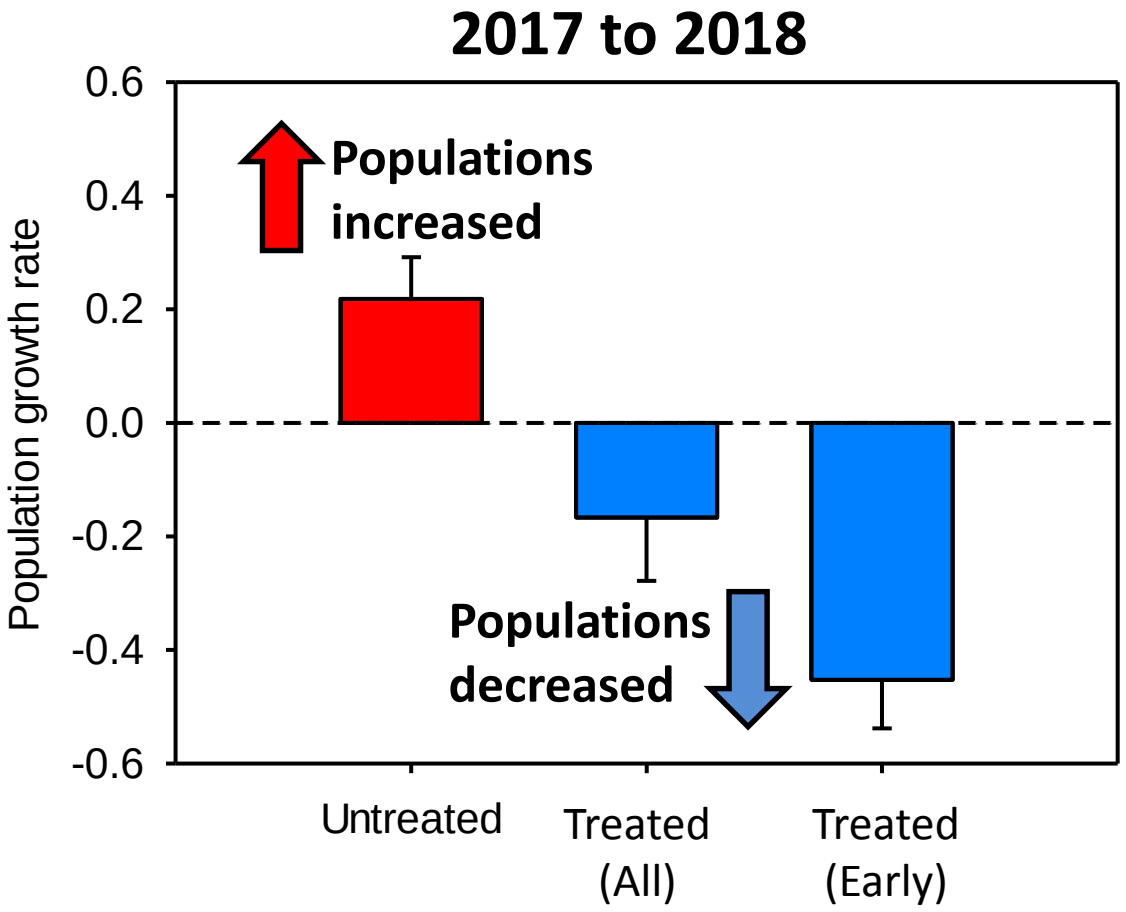
2) Monitoring: Detection at low densities

3) Efficacy and non-target effects

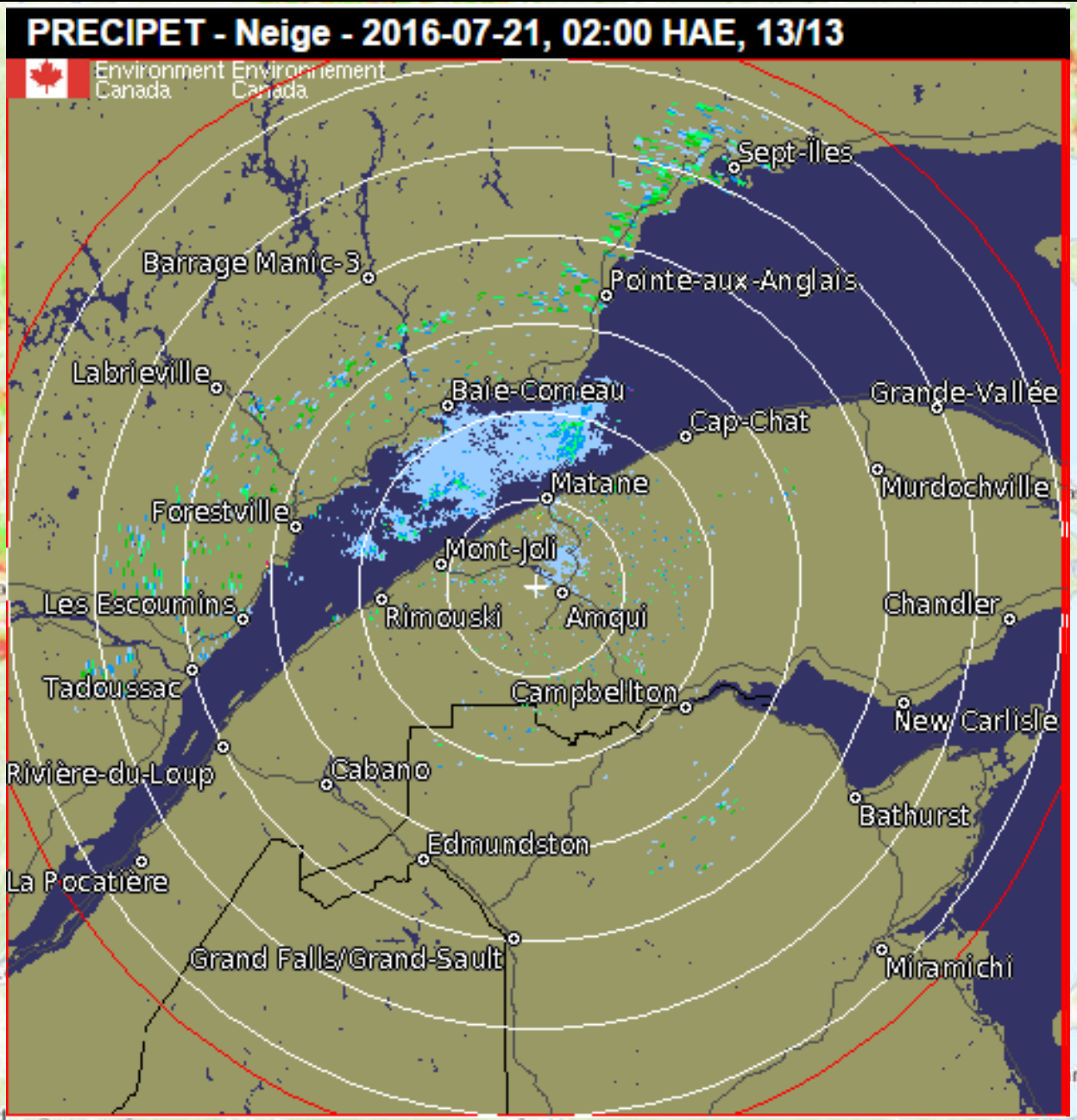
4) Social license – Communication


Monitor budworm in 70 sites
Seasonal survival: Before vs. after treatments
Annual survival: L2 (2017) vs. L2 (2018)
'Early' vs 'Late' treatments
Campbellton
Chaleur Bay
Bathurst
Edmundston
Miramichi
NEW BRUNSWICK
Moncton
Fredericton
St John
Charlottetown
Sydney
Truro
Saint John
Bay of Fundy
NOVA SCOTIA
Halifax
Digby


From young larvae to adult
100
90
80
70
60
50
% mortality
Additive mortality
Untreated
Treated (All)
Treated (Early)

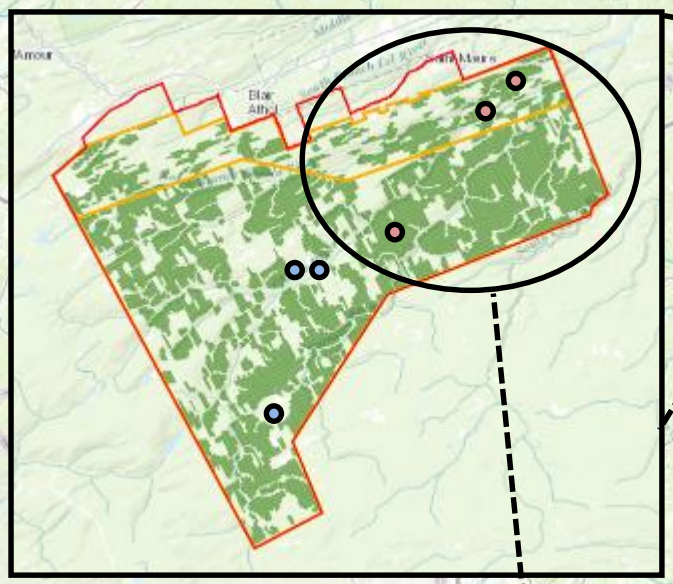

2017 to 2018
Population growth rate
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
Populations increased
Populations decreased
Untreated
Treated (All)
Treated (Early)

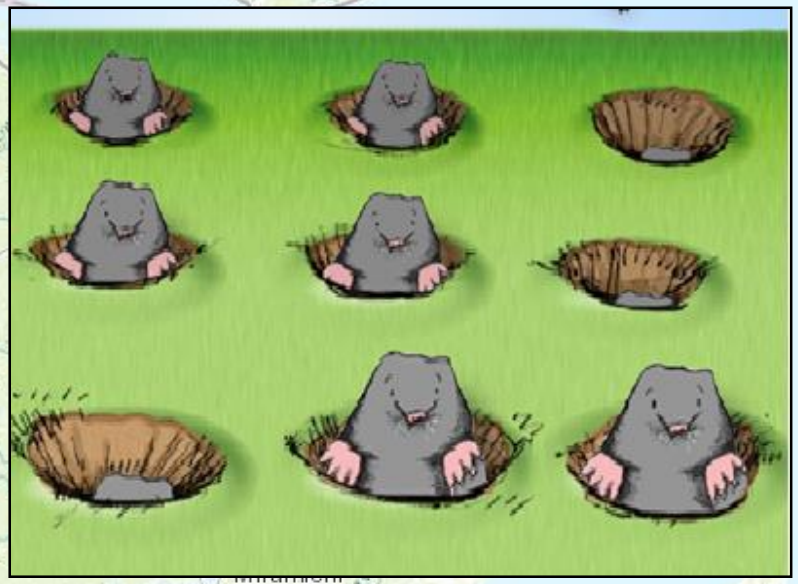
Weekend
July 20-22
2016

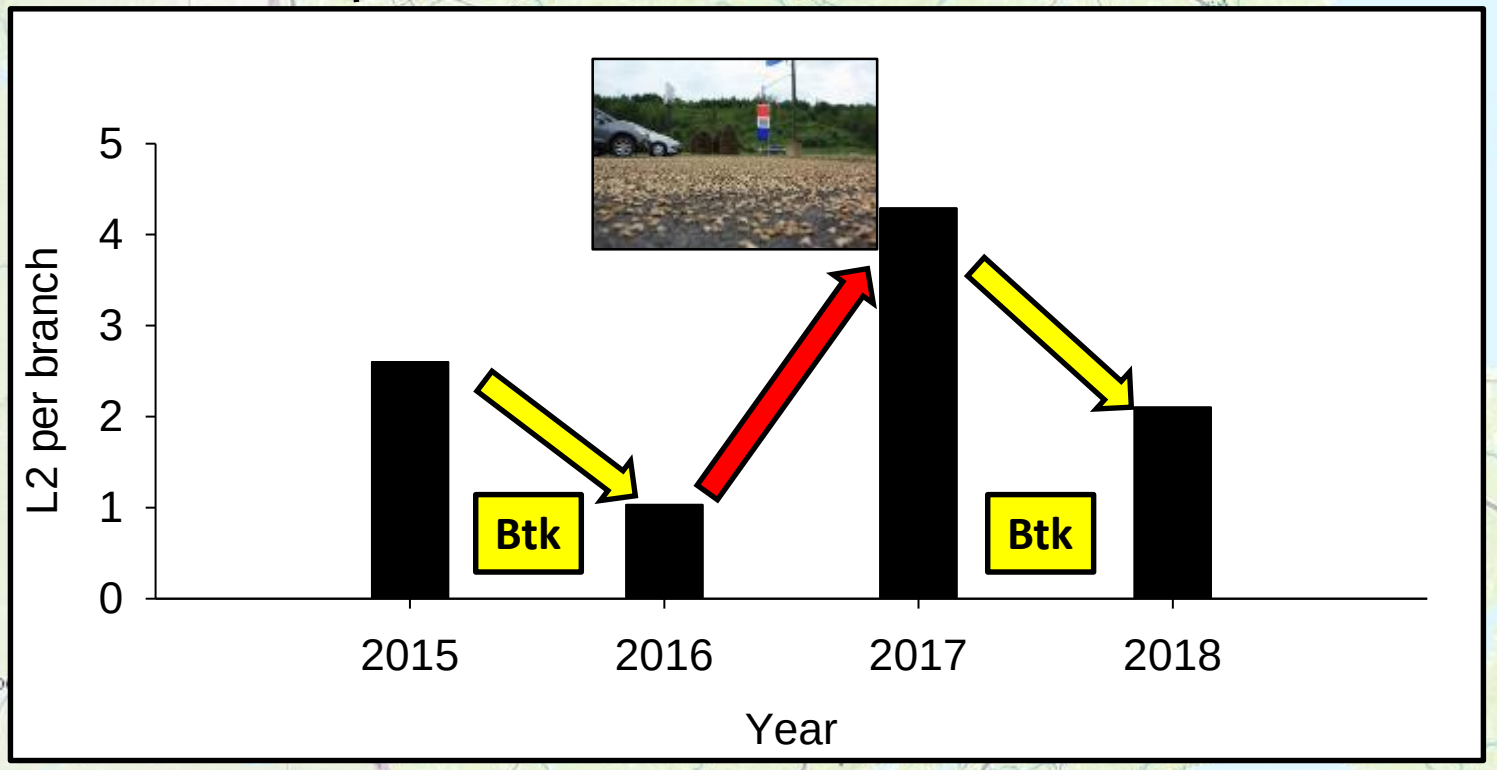



Self
Service
Libre
Service
ICE

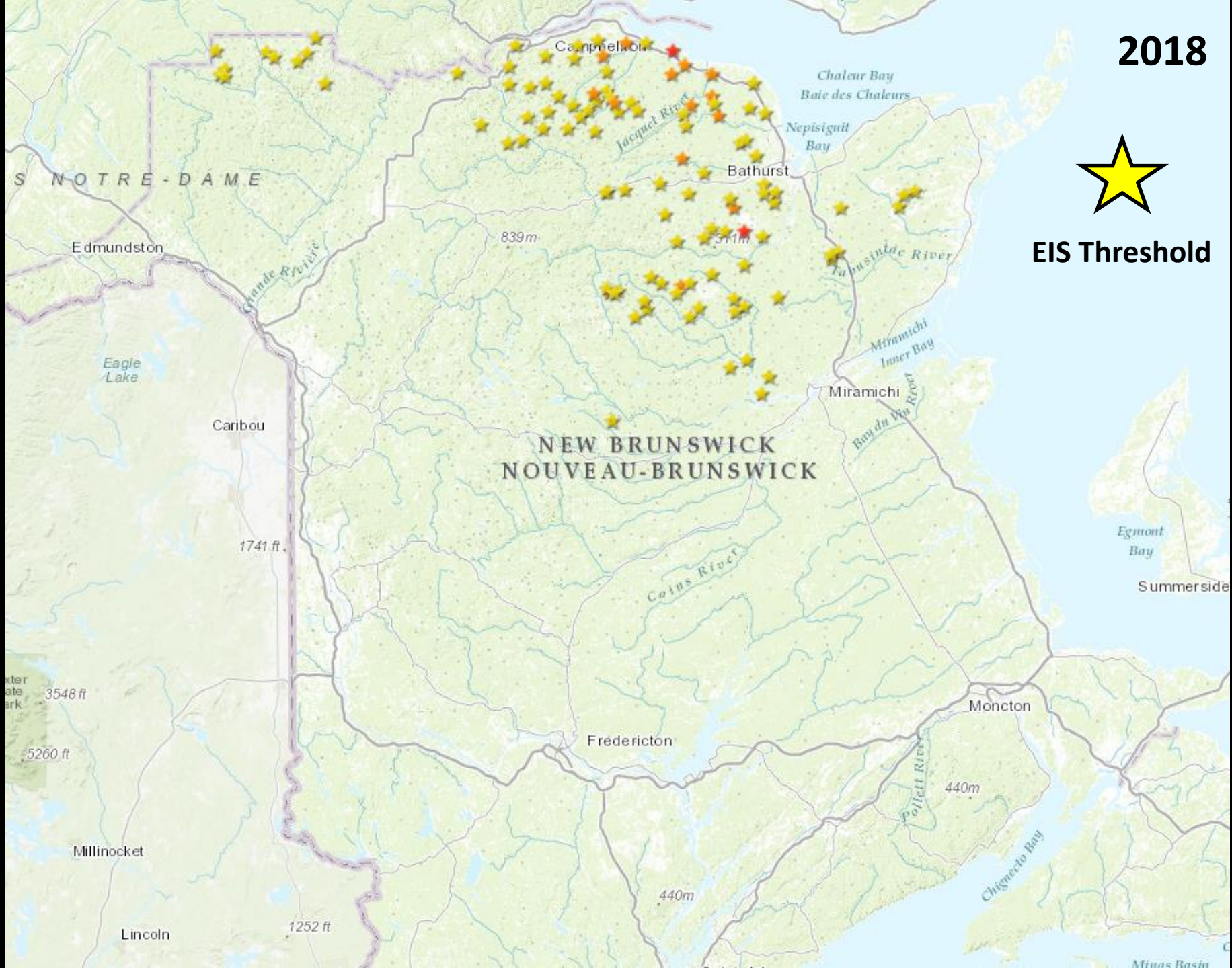

USED
CARS



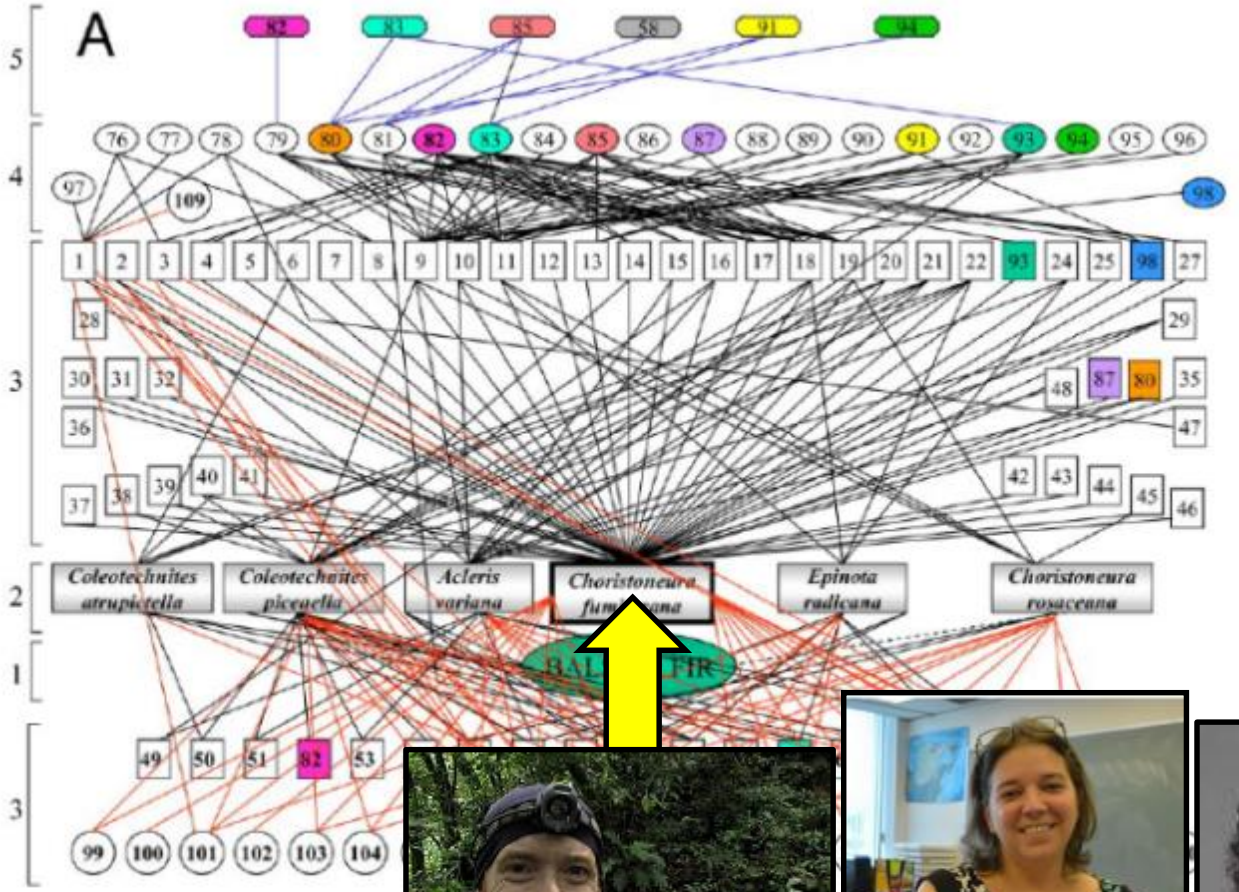



L2 per branch
5
4
3
2
1
0
2015
2016
2017
2018
Year
Btk
Btk


2017
EIS Threshold
Campbellton
Chaleur Bay
Baie des Chaleurs
Nepisiguit Bay
Jacquet River
Bathurst
839m
Edmundston
Grande Rivière
Eagle Lake
Caribou
1741 ft
NEW BRUNSWICK
NOUVEAU-BRUNSWICK
Miramichi
Miramichi Inner Bay
Bay du Vin River
Egmont Bay
Summerside
Cains River
3548 ft
5260 ft
Fredericton
Moncton
Pollett River
440m
Millinocket
Chignecto Bay
Lincoln
1252 ft


2018
EIS Threshold
Campbellton
Chaleur Bay
Baie des Chaleurs
Jacquet River
Nepisiguit Bay
Bathurst
S NOTRE-DAME
839m
Edmundston
Grande Rivière
Tabusintac River
Eagle Lake
Miramichi Inner Bay
Miramichi
Caribou
NEW BRUNSWICK
NOUVEAU-BRUNSWICK
Baie du Vin River
1741 ft
Egmont Bay
Cains River
Summerside
3548 ft
Moncton
Fredericton
5260 ft
Pollett River
440m
Millinocket
Chignecto Bay
440m
Lincoln
1252 ft

Non-target effects: Moth larvae and enemies



Eveleigh et al. (2007) PNAS

Non-target Impacts: Broader ecosystem

Early Intervention Strategy

Criteria for feasibility:

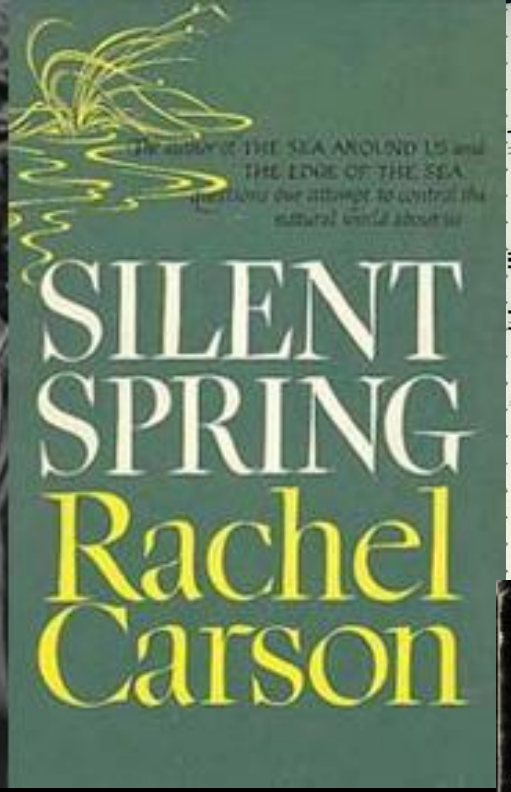
1) Population dynamics

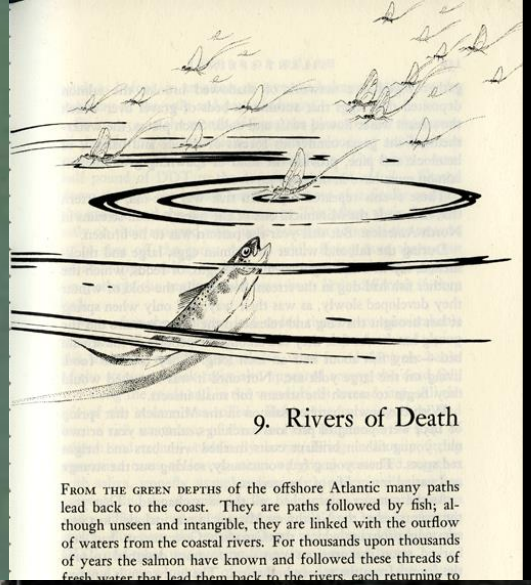
2) Monitoring: Detection at low densities

3) Efficacy and non-target effects

4) Social license – Communication

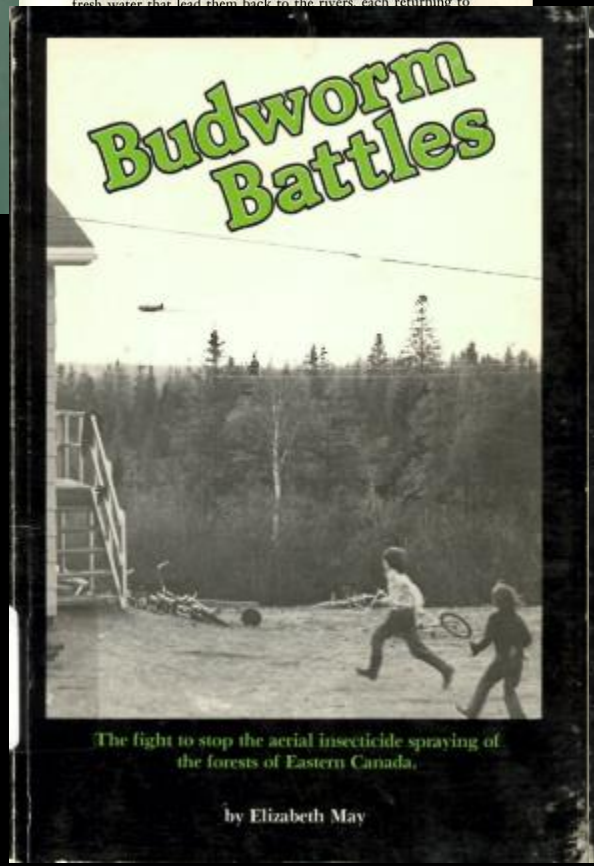
DDT - 1962





9. Rivers of Death

FROM THE GREEN DEPTHS of the offshore Atlantic many paths lead back to the coast. They are paths followed by fish; although unseen and intangible, they are linked with the outflow of waters from the coastal rivers. For thousands upon thousands of years the salmon have known and followed these threads of



Fenitrothion - 1982

The author lives in Margaree Harbour, Cape Breton where she is head cook at her family's restaurant on board an old fishing schooner, the *Marion Elizabeth*.

She is currently a student of the Faculty of Law of Dalhousie University and plans to practice environmental law.

While remaining involved in opposing the abuse of chemical sprays, she is also active in the movement against the development of uranium mining in Nova Scotia.

HealthyForest PARTNERSHIP

English Français

HOME | ABOUT US | WHAT'S SPRUCE BUDWORM? | RESEARCH IN ACTION | YOUR QUESTIONS | RESOURCES | CONTACT US

New Brunswick is a province that **shares a deep connection with its forests**. We interact with the forest in many ways – whether it's through residence, recreation or employment – our forests are at the heart of who we are and what we do. It is because of that important relationship that the Healthy Forest Partnership was created.

What is Spruce Budworm?

A spruce budworm is a small, brown caterpillar with the latin name *Choristoneura fumiferana*, found throughout the range of spruce and fir in Canada and the United States. Spruce budworm is native to North America and has evolved together with the spruce and fir trees it feeds on over thousands of years.

Learn More

Ask the Experts

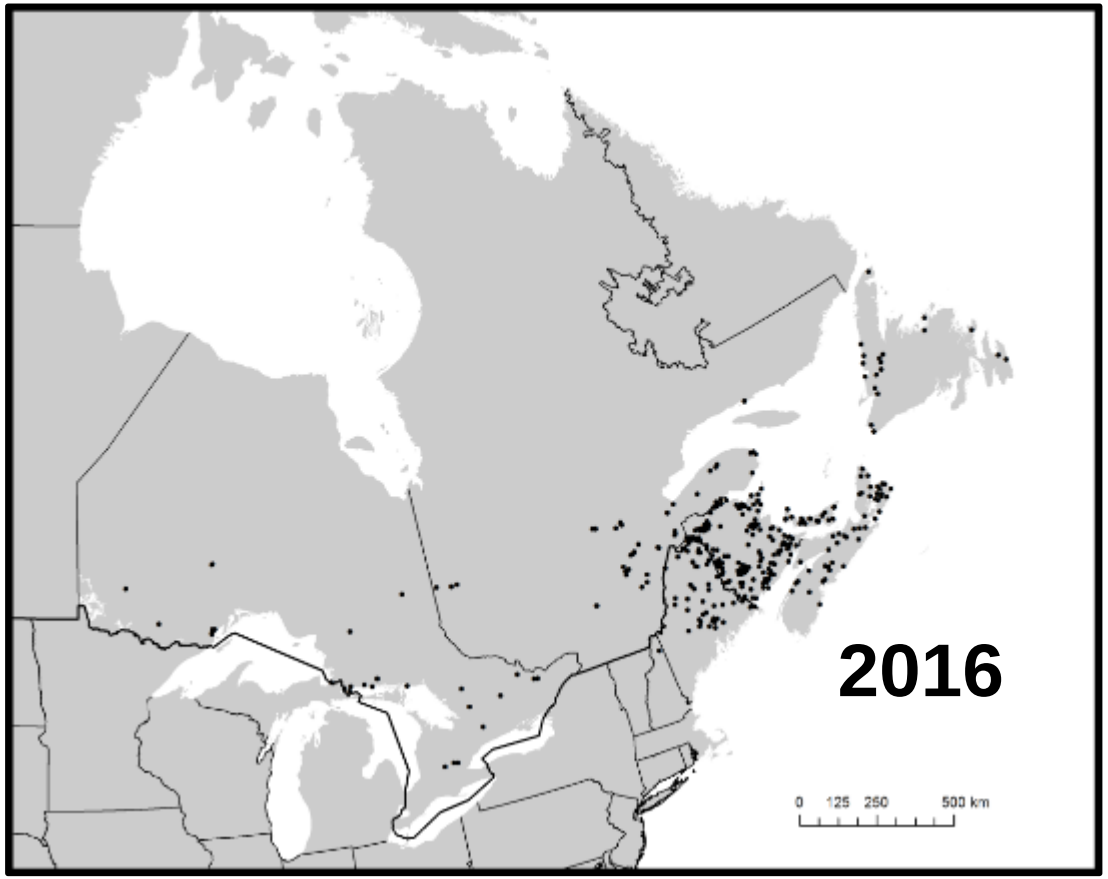
Recent Questions

- » What happens to Mimic once it is sprayed?
- » Do all of the spruce trees die during...
- » If you are successful what can we expect...
- » If a spruce budworm infestation occurs how long...
- » What would be the economic impacts if we...
- » How many jobs could be lost if treatments...

ASK YOUR QUESTION »

Reaching out with Citizen Science?

BUDWORM TRACKER
PISTEURS de TORDEUSES



Rechercher

17 novembre 2014
Québec
2°C
Prévisions météo complètes

L'APPEL

Choisissez le journal de votre ville ou région

Actualités | Faits divers | Sports | Culture | Opinion | Communauté | Vidéos | Déc

Politique | Société | Économie

Aimez-vous sur Facebook!

Suivez-nous sur Twitter

Faits divers à Québec

Journal L'Appel, membre du groupe Québec Hebdo > Actualités

L'arbre, une ressource précieuse à conserver

Véronique Demers
Publié le 09 octobre 2014

Partager | Tweet 0 | g+1 0 | Commenter | Envoyer à un ami | Imprimer

Publié le 09 octobre 2014

«Avec la tordeuse de l'épinette noire, on connaît des cycles d'épidémie de 30 à 40 ans. Depuis 2006, on remarque que des foyers d'infestation commencent à grandir», observe la chercheure et scientifique Véronique Martel. (Photo TC Media – Véronique Demers)

Official site of Canadian Forest Industries and Wood Products magazines

Wood BUSINESS

ABOUT | CONTACT | SITEMAP | ENEWS

search...

V8TV Sponsored Search

HOME | HARVESTING | SAWMILLING | INDUSTRY NEWS | WOOD PANELS | REMANUFACTURING | SUBSCRIBE

ENEWS SIGN UP FREE

The pending storm

Eastern Canadian foresters brace for spruce budworm.

by Rob Johns & Deepa Pureswaran | Oct 2013

MOST POPULAR STORIES

- L-M Equipment introduces I-CUT
  Read more
- Aspen Planers blows dust away
  Read more
- Japan chooses Canadian wood
  Read more
- Pembroke MDF back in operation
  Read more
- Montreal Wood keynote announced
  Read more

DIGITAL EDITION View edition

HewSaw

Tweets Follow

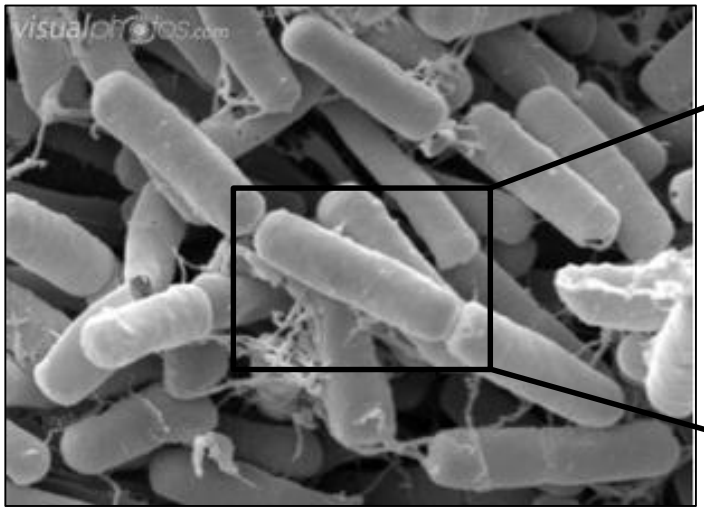
CFIMag 1h

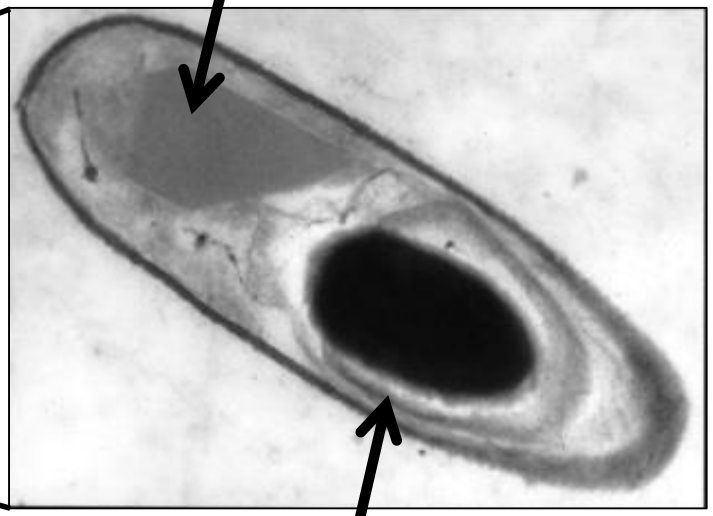
Breakaway - CBC Radio One

Canadian Forest Service researchers Veronique Martel, Deepa Pureswaran and Louis de Grandpré pose with a giant Budworm model.

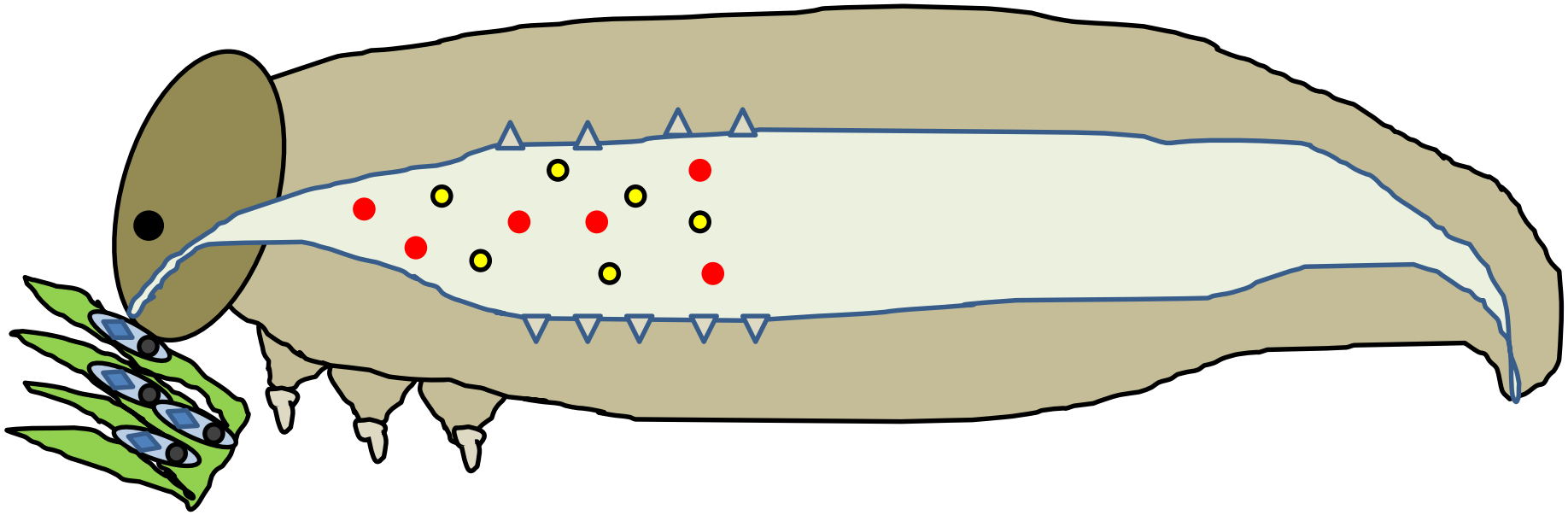
Elizabeth Cecile she ps.

What is Btk?

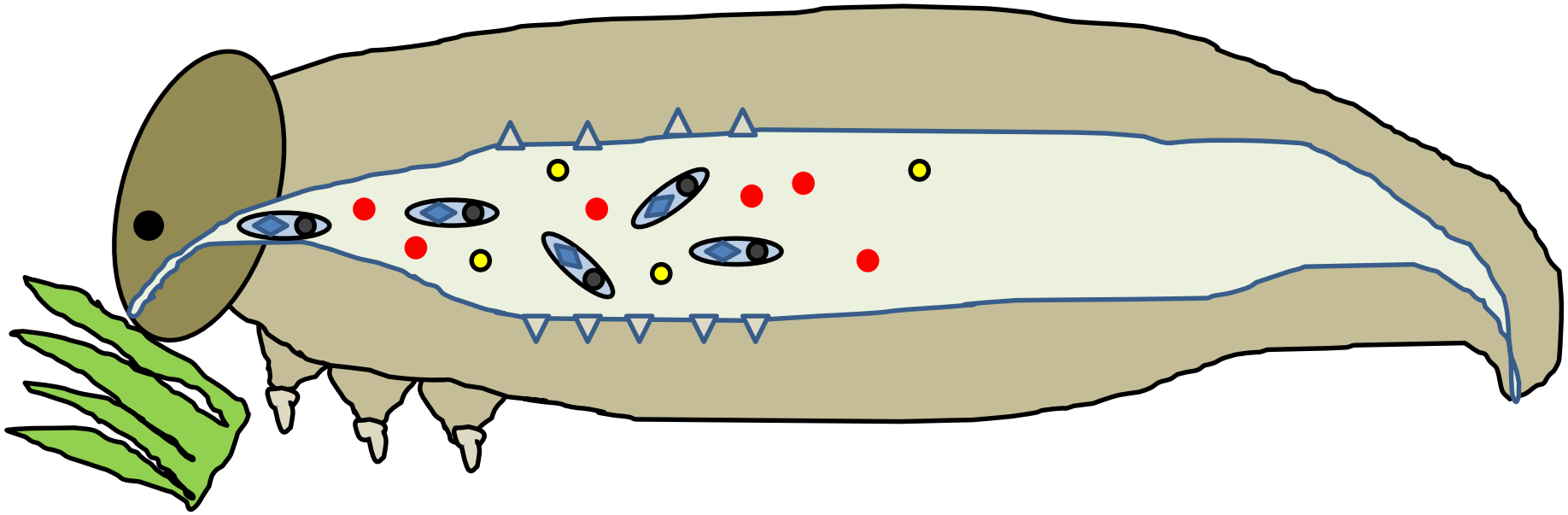




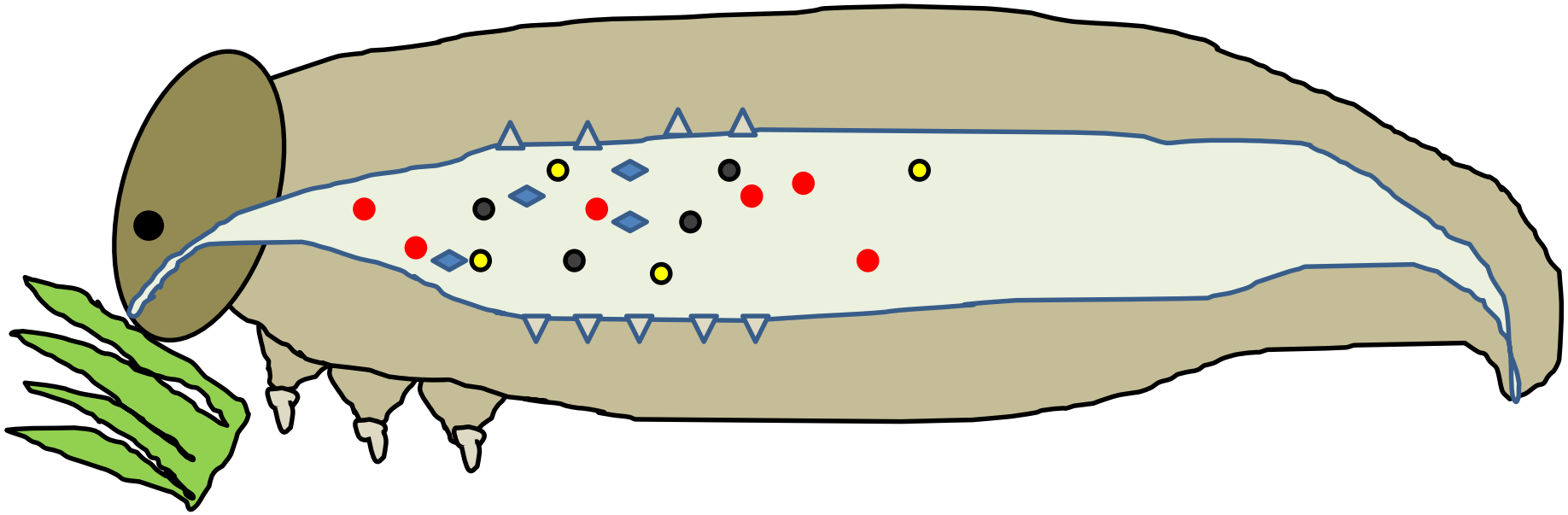
How does Btk work?



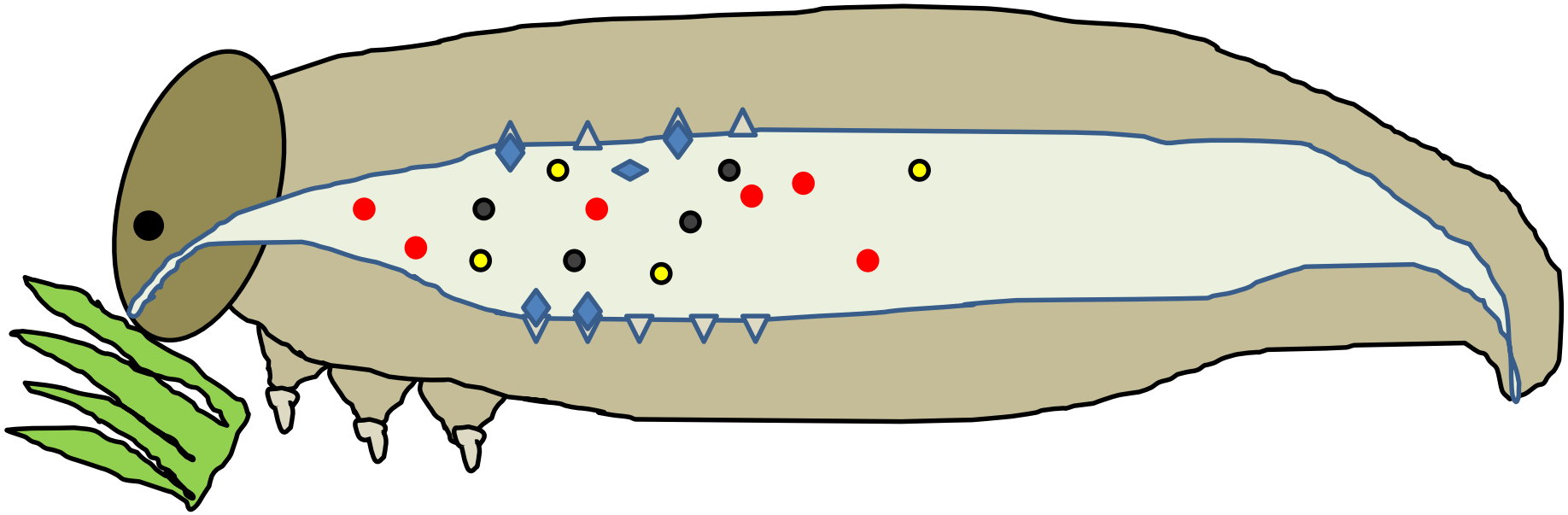
How does Btk work?



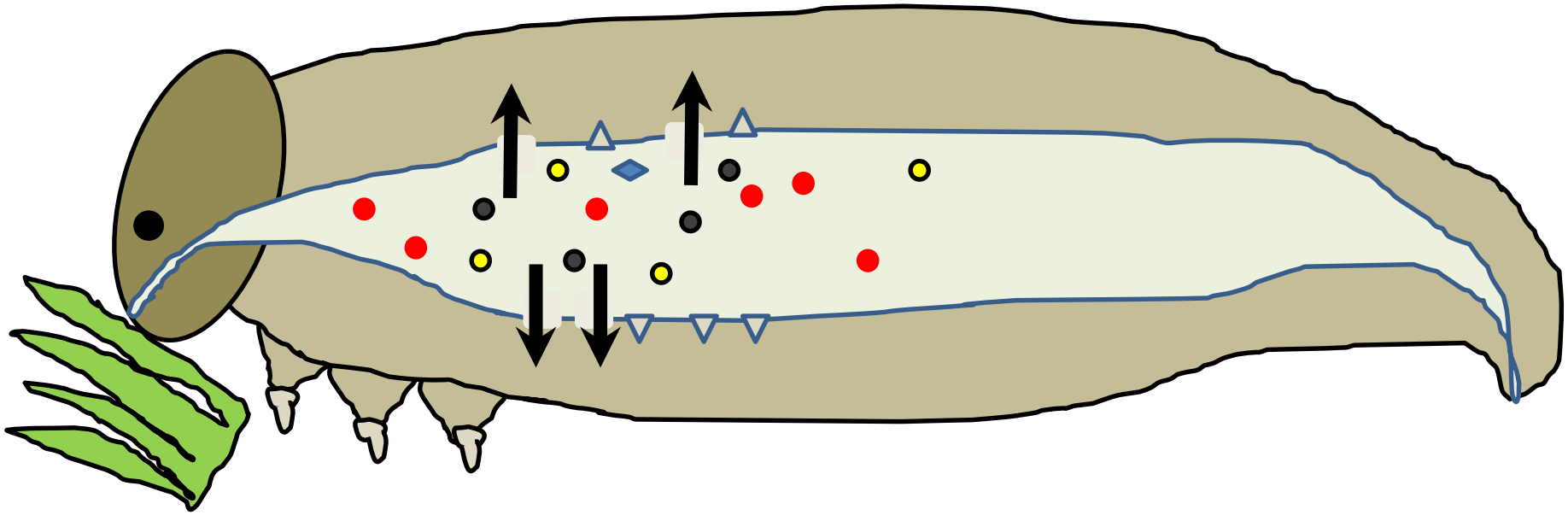
How does Btk work?



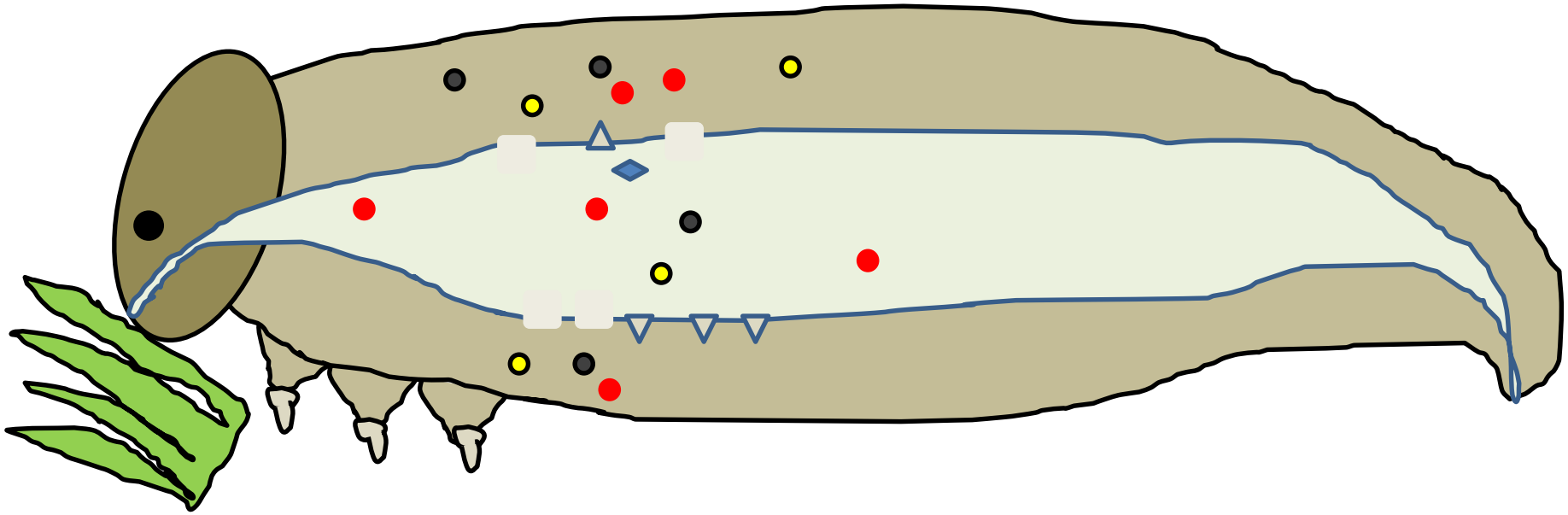
How does Btk work?



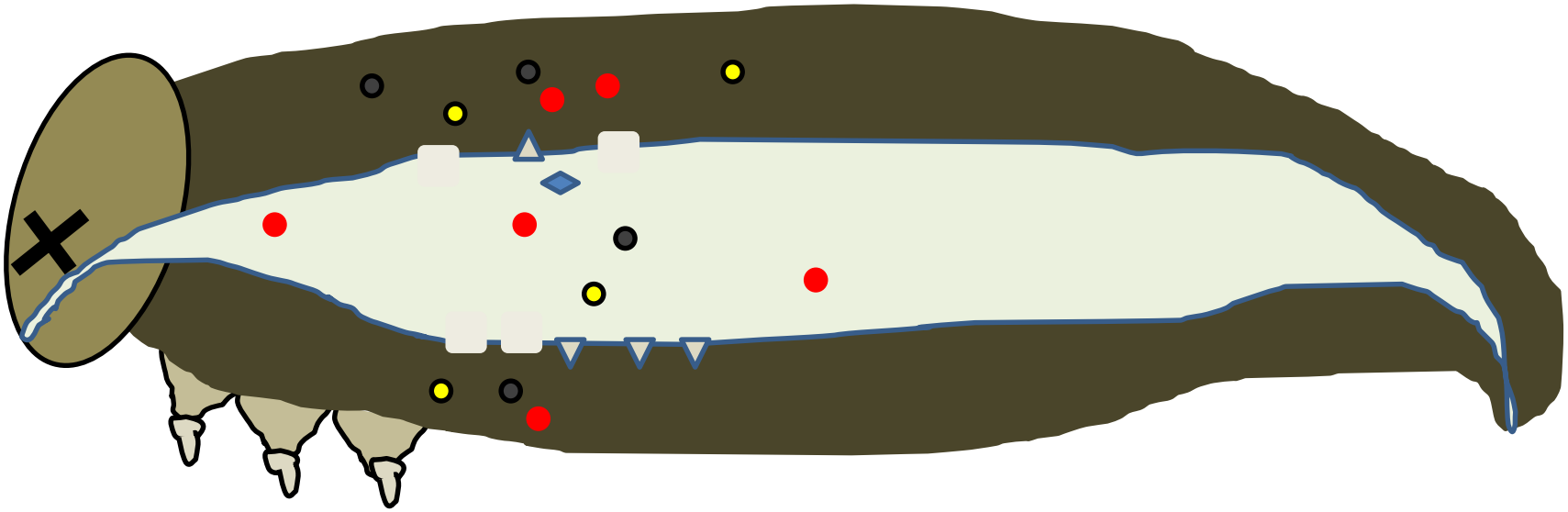
How does Btk work?



How does Btk work?

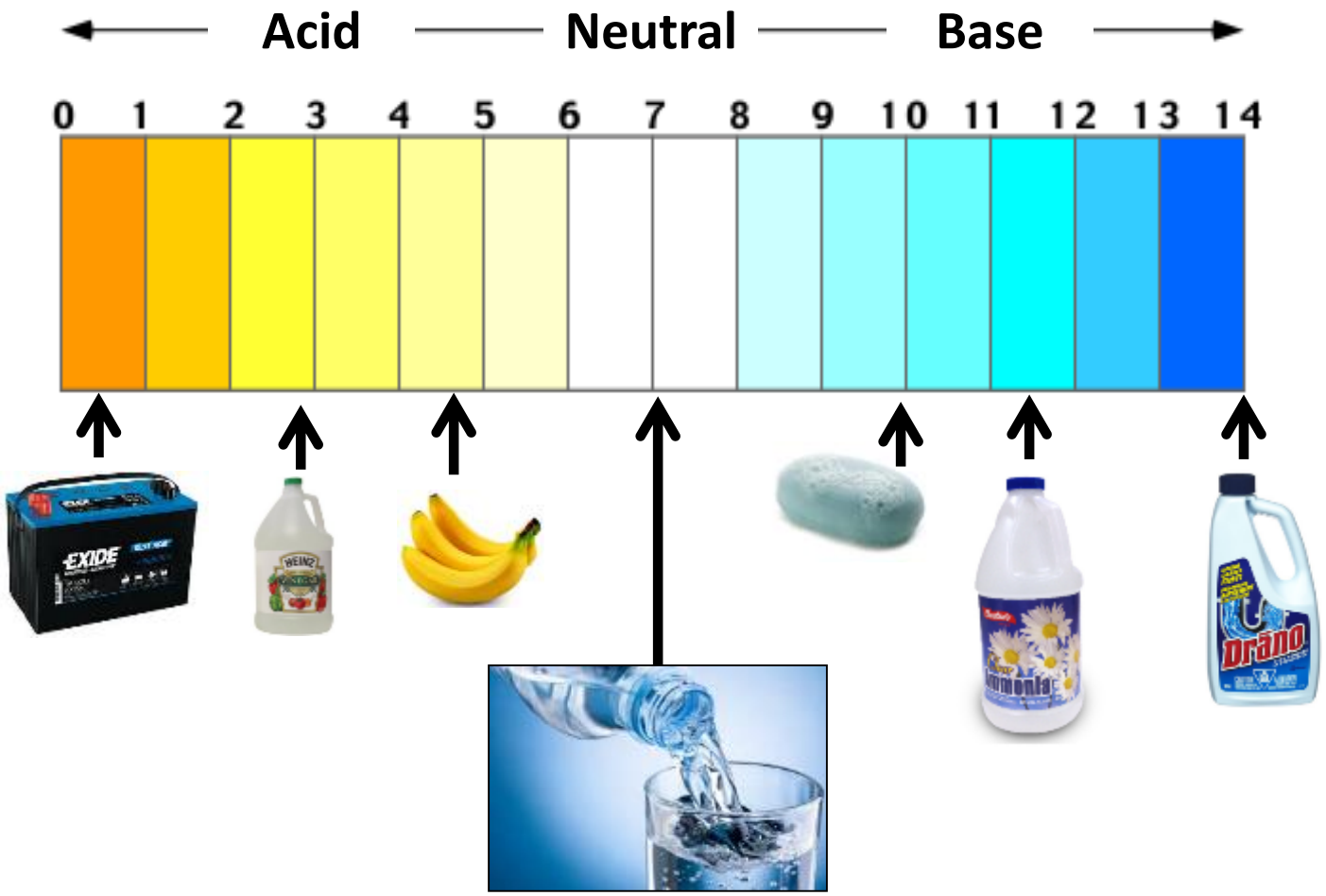


How does Btk work?

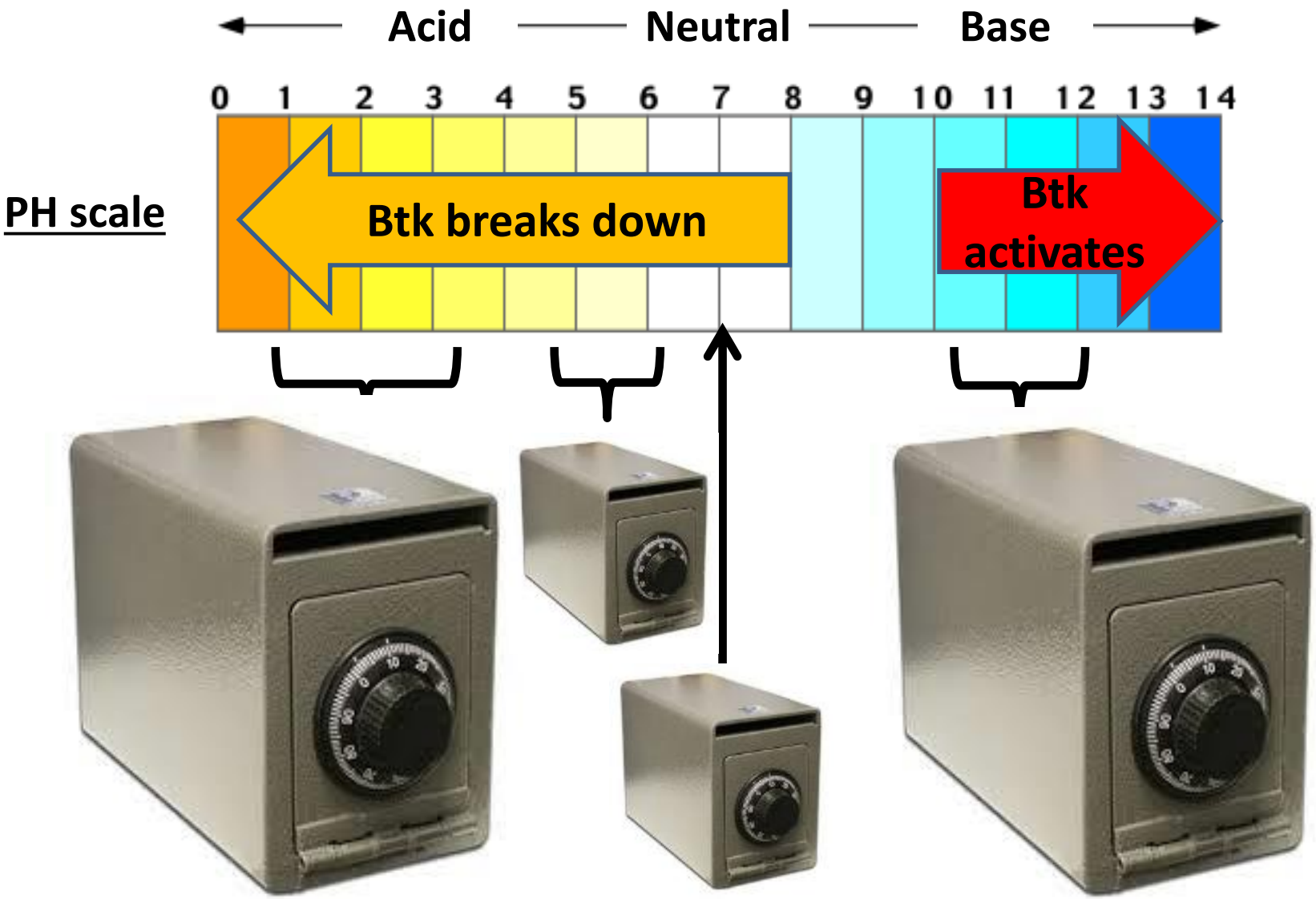


How does Btk work?

PH scale



How does Btk work?



Why we say "*Btk is not toxic*"

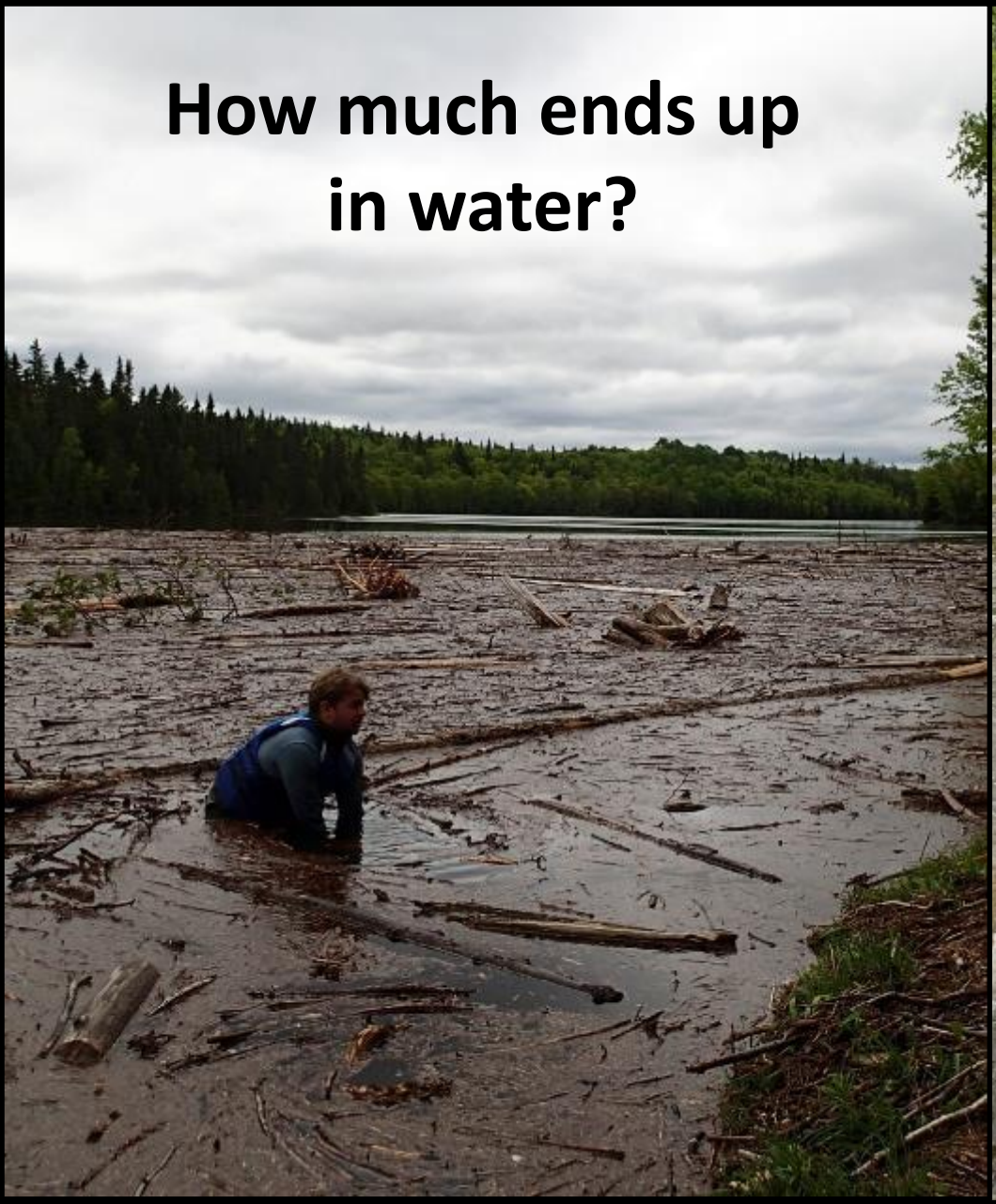
- ***Environmental Protection Agency, US Department of Agriculture, World Health Organization:***

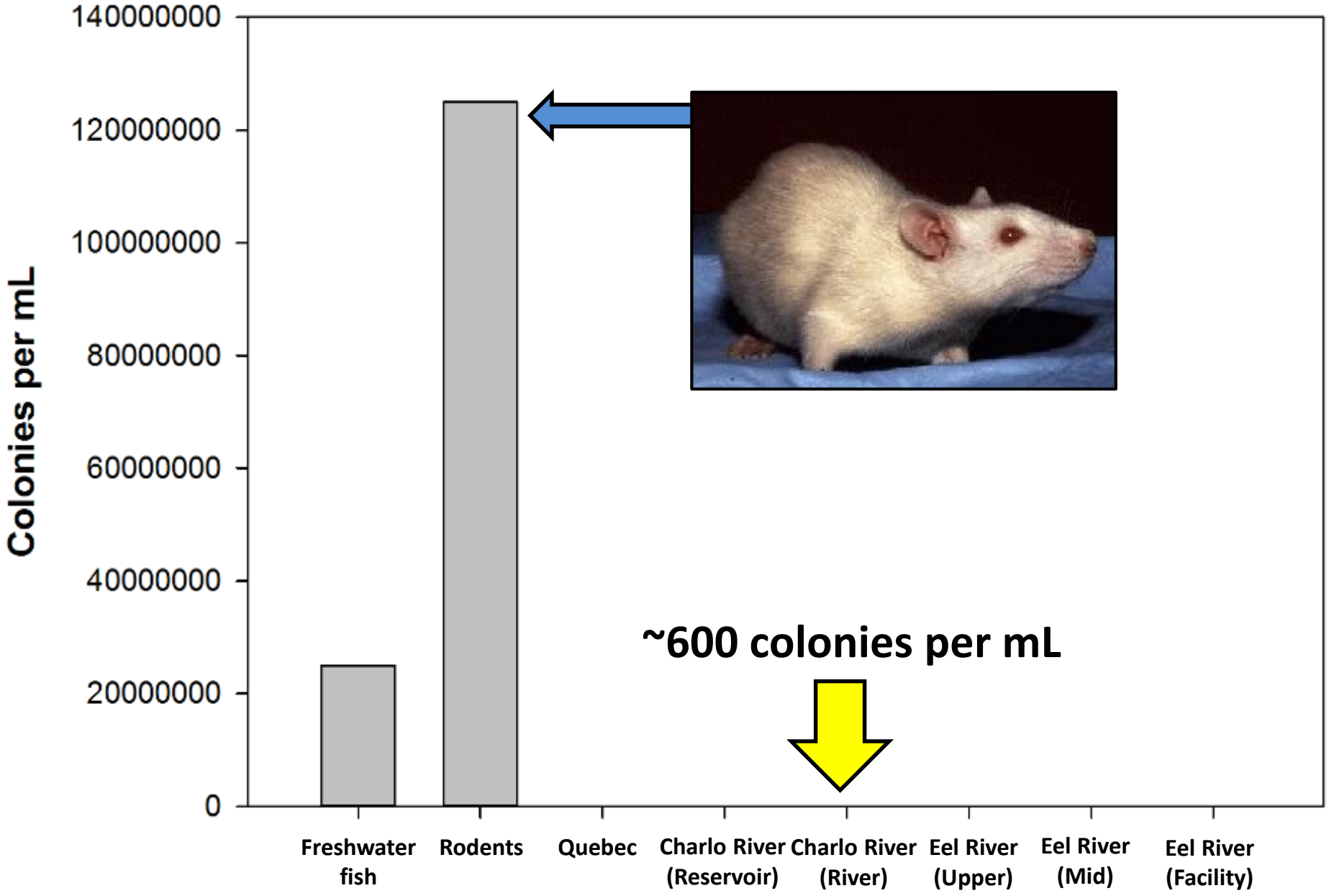
  "Owing to their specific mode of action, Bt products are unlikely to pose any hazard to humans or other vertebrates or to the great majority of non-target invertebrates."

- Registered (and widely used) in Organic farms to suppress caterpillar pests.

- Used in downtown Winnipeg for tent caterpillar (2015).

How much ends up in water?




140000000
120000000
100000000
80000000
60000000
40000000
20000000
0
Colonies per mL
~600 colonies per mL
Freshwater fish
Rodents
Quebec
Charlo River (Reservoir)
Charlo River (River)
Eel River (Upper)
Eel River (Mid)
Eel River (Facility)


1 CENT
2005
CANADA

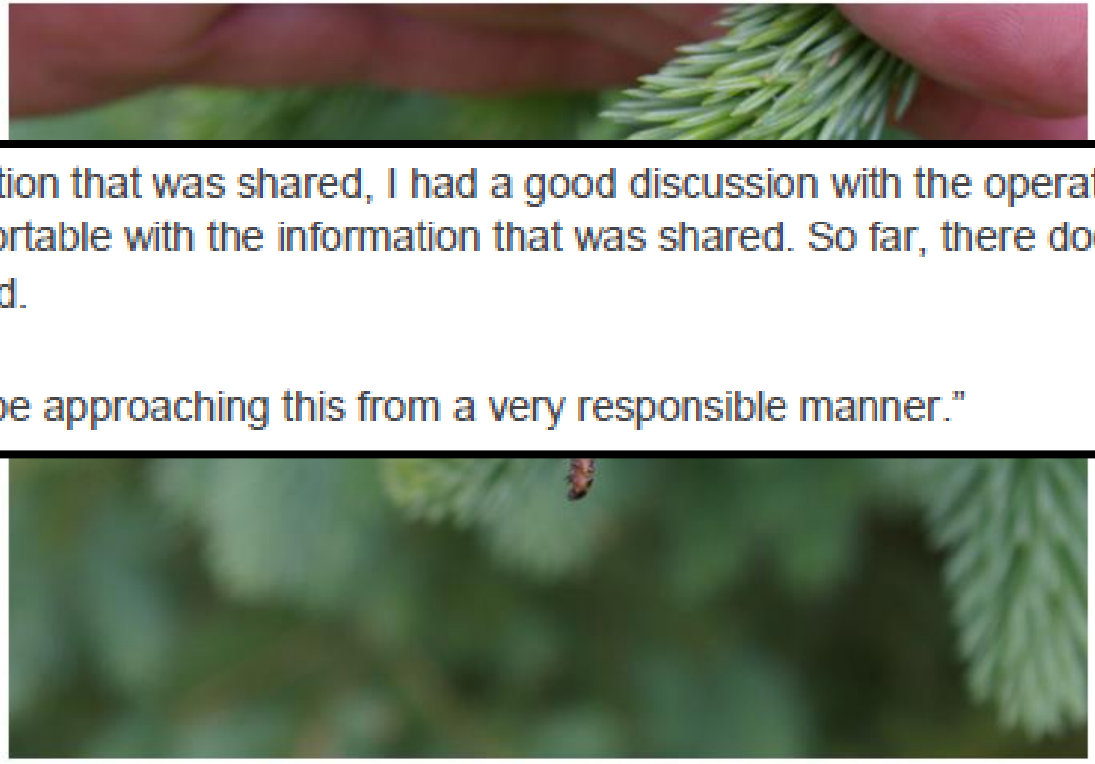

ONE CENT
ONE CENT

Bacterium used to fight budworm no threat to humans, says ecologist

TIM JAQUES Campbellton Tribune

December 10, 2015

Share this article Facebook Twitter Email



"With the information that was shared, I had a good discussion with the operators afterwards, and we are comfortable with the information that was shared. So far, there doesn't seem to be a concern," she said.

"They appear to be approaching this from a very responsible manner."

A spruce budworm. Rob Johns,a forest insect ecologist at Canadian Forest Service in Fredericton, says that the bacterium used to fight the spread of the destructive pest in Restigouche has no effect on humans even if it gets into the drinking water.
Photo: Natural Resources Canada

Early Intervention Strategy

Criteria for feasibility:

1) Population dynamics

2) Monitoring: Detection at low densities

3) Efficacy and non-target effects

4) Social license – Communication

Thanks to Brian, Jenna, and Allison!

(and the audience!)

Source: NB Woodlot owners webpage

Natural Resources Canada | Ressources naturelles Canada

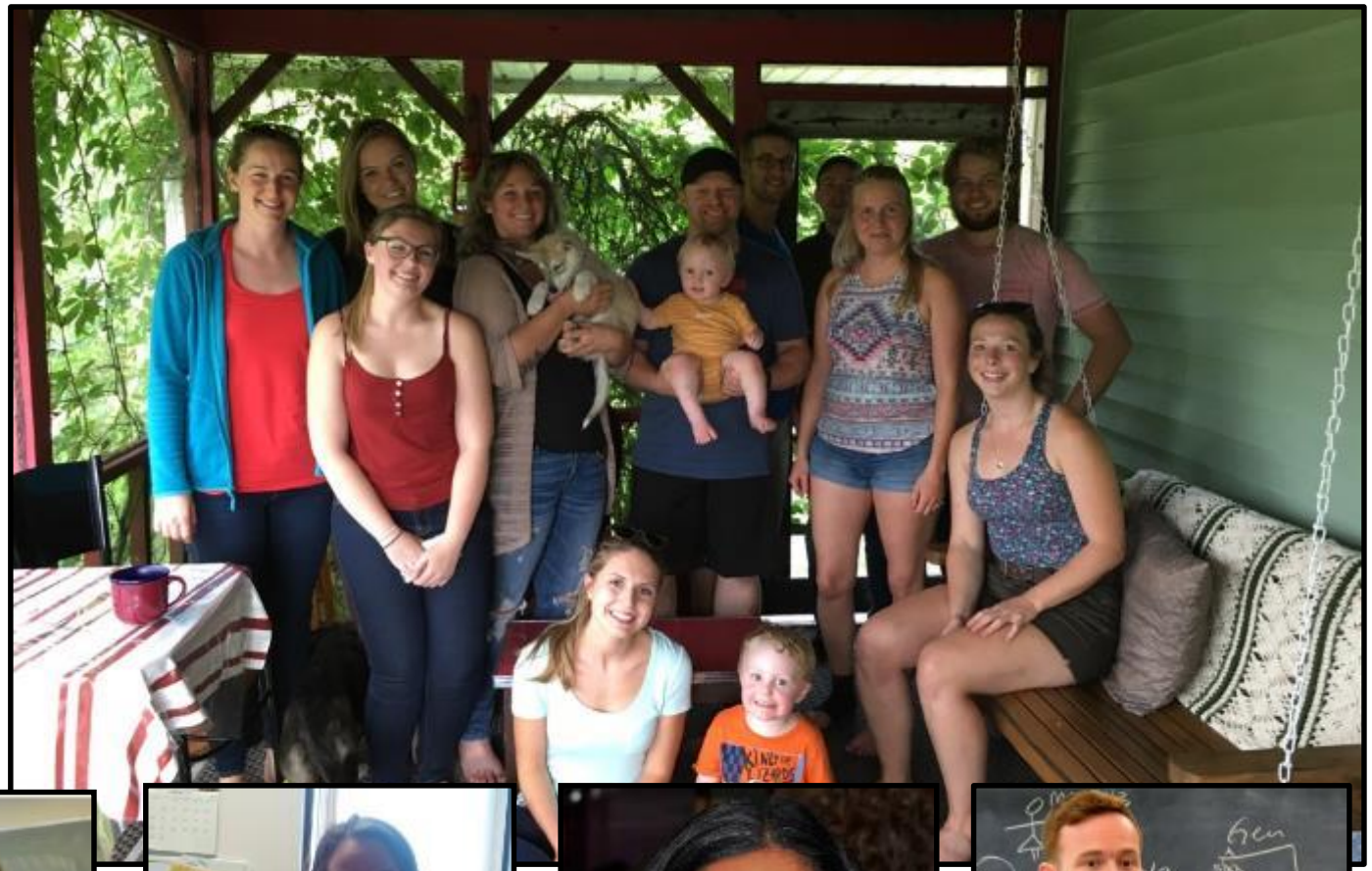
Canada

FPL FOREST PROTECTION LIMITED
ISO 14001:2004 certified

UNIVERSITY OF NEW BRUNSWICK

UNB

DERD New Brunswick, Newfoundland, Nova Scotia, Maine Forest Service



Contact: rob.johns@canada.ca or emily.owens@canada.ca

Website: www.healthyforestpartnership.ca