Maine Spruce Budworm Task Force Update

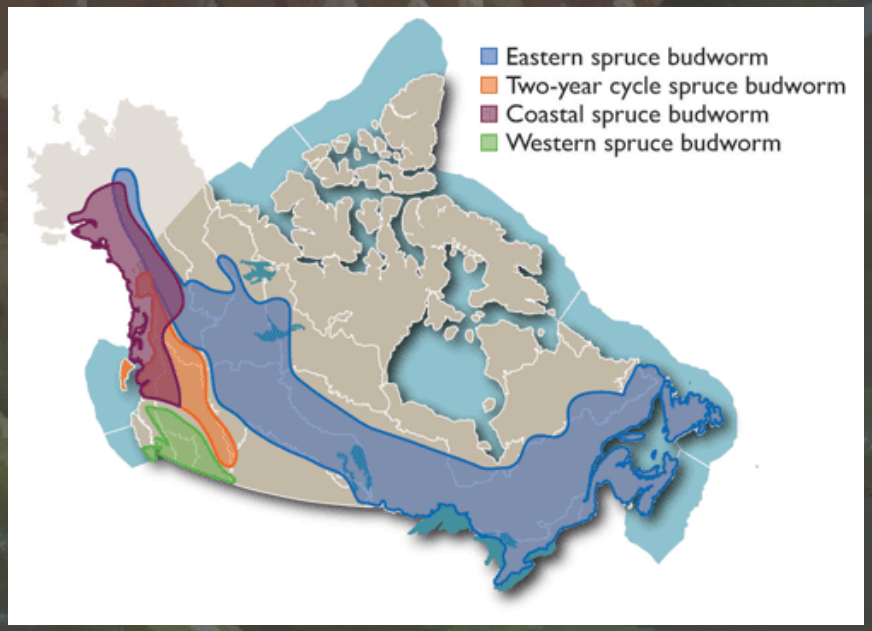
Robert G. Wagner

Nercofe 2016 Workshop
March 14-15, 2016
Wells Conference Center, University of Maine

The Eastern Spruce Budworm

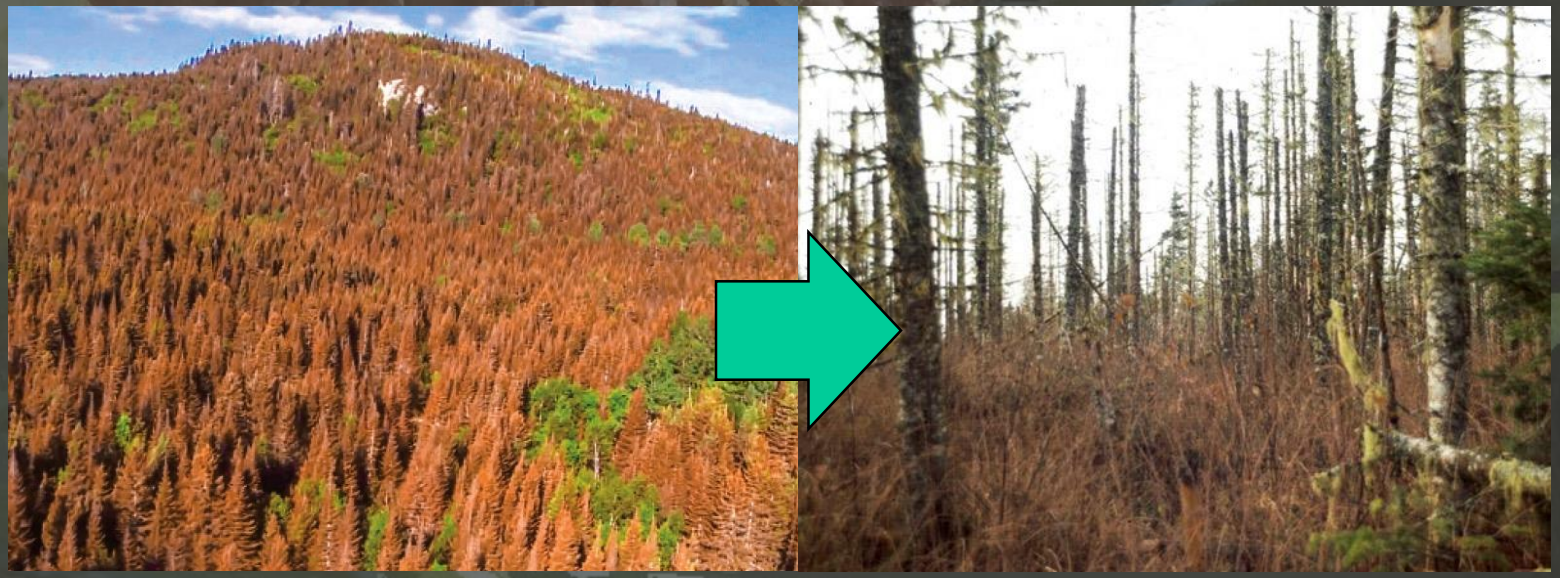
Eastern Spruce Budworm

- Natural part of spruce-fir forest for thousands of years
- Returns on 30-60 year cycle
- Affects spruce-fir forests from Alaska to Newfoundland



Eastern Spruce Budworm

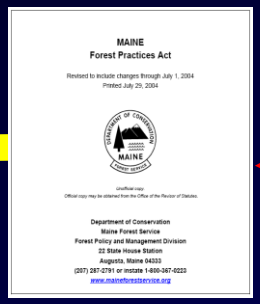
- Last outbreak during 1970s-80s damaged over 130 million acres
- Considered most damaging forest insect in North America



Spruce Budworm Kill From Top of Mt. Katahdin in 1980

Photo by: Dr. David Field

1970s-80s SBW Outbreak "Set the Stage" For Forest Management & Politics for Next 40 years


MAINE
Forest Practices Act

Revised to include changes through July 1, 2004
Printed July 29, 2004

Department of Conservation
Maine Forest Service
Forest Policy and Management Division
22 State House Station
Augusta, Maine 04333
(207) 287-2791 or instate 1-800-367-0223
www.maineforestservice.org

1989 Forest Practices Act

Maine SBW Task Force

Task Force Leaders:

- **University of Maine**
  - Bob Wagner, CFRU Director
- **Maine Forest Service**
  - Doug Denico, Director
- **Maine Forest Products Council**
  - Patrick Strauch, Executive Director

SBW Task Force Objectives

- Develop ***Risk Assessment***
- Develop ***Preparation & Response Recommendations*** for:
  - Those directly affected by coming outbreak:
    - Forest landowners/managers, forest products industry, rural communities
  - Those with legislative responsibility for forest health:
    - Government (Legislature, MFS, IF&W, USFWS)
- ***Raise public awareness*** about coming outbreak

Report Complete!

- Will be presented by Governor Paul LaPage on Wednesday, March 16

1865 THE UNIVERSITY OF MAINE

March 16, 2016

Coming Spruce Budworm Outbreak:

Initial Risk Assessment and Preparation & Response Recommendations for Maine's Forestry Community

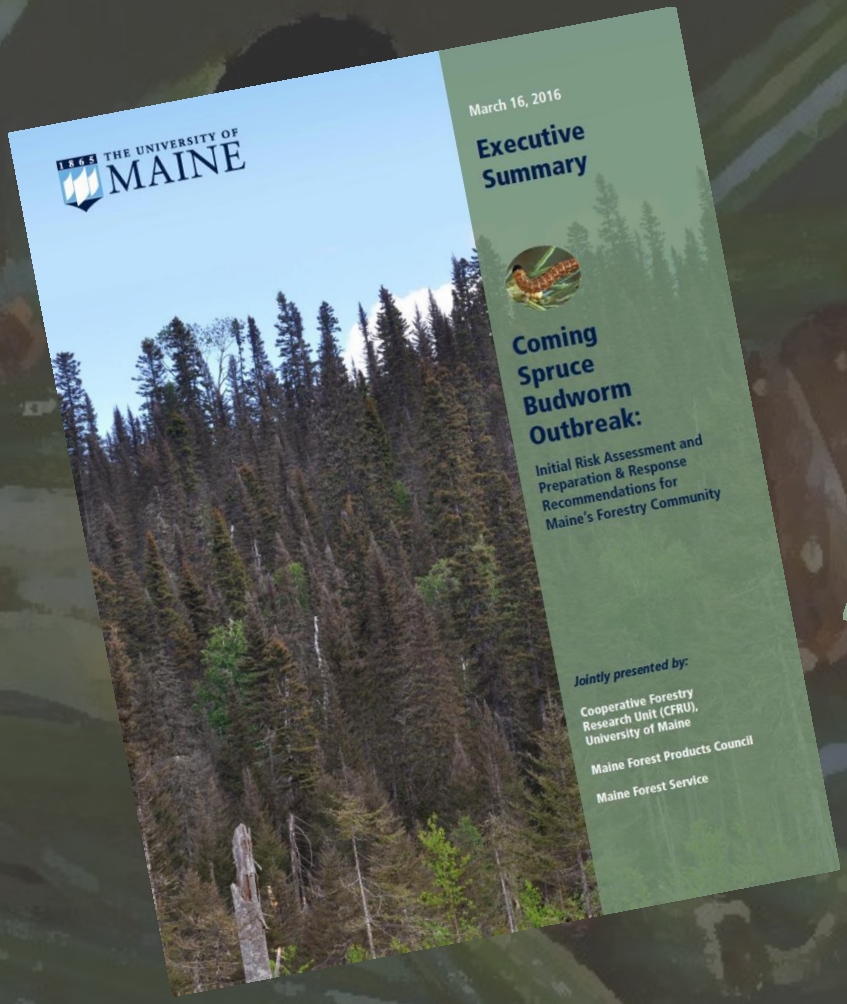
Jointly presented by:

Cooperative Forestry Research Unit (CFRU), University of Maine

Maine Forest Products Council

Maine Forest Service

Executive Summary & Brochure



sprucebudwormmaine.org

Spruce Budworm

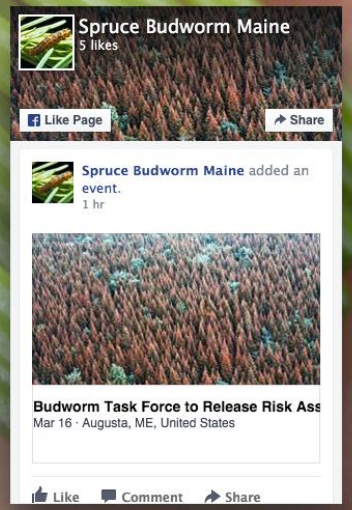
Maine Spruce Budworm Task Force

Coming Spruce Budworm Outbreak: Initial Risk Assessment and Preparation & Response Recommendations for Maine's Forest Community

- Full Report (web version) (pdf) 10.4mb
- Full Report (print version) (pdf) 33mb
- Executive Summary (pdf) 4.9mb
- Brochure (pdf) 4mb
- News Release: Gov. LePage, Budworm Task Force to release risk assessment and response plan (pdf) 81kb
- Current Outbreak in Canada: Healthy Forest Partnership

crsf@maine.edu • (207) 581-3794

Full site coming May 2016



SBW Task Team Leaders

Leader	Task Team
John Bryant *American Forest Management*	Forest Management
Barry Burgason *Huber Resources*	Wildlife Habitat
Mark Doty *Plum Creek*	Public Communications & Outreach
Brian Roth *University of Maine*	Research Needs
Patrick Strauch *Maine Forest Products Council*	Policy, Regulation, & Funding
Dave Struble *Maine Forest Service*	Monitoring & Protection
Robert Wagner *University of Maine*	Wood Supply & Economic Impacts

SBW Task Team Members

Task Team Contributors

The following field-specific experts were major contributors to the technical content presented in this report:

Task Team	Technical Contributors[1]
Wood Supply & Economic Impacts	Chris Hennigar (UNB), Erin Simons-Legaard (UMaine), Kasey Legaard (UMaine), Ken Laustsen (MFS), William McWilliams (FIA), Aaron Weiskittel (UMaine), Ernest Bowling (Sewall Co.), Peter Triandafillou (Huber Resources), Ian Prior (Seven Islands Land Co.), Todd Gabe (UMaine), Rob Lilieholm (UMaine), Lloyd Irland (The Irland Group)
Monitoring & Protection	Louis Morneau (MFFP QC), Blake Brunsdon (JD Irving), Brian Sturtevant (UMN), Mike Devine (MFS), Gary Fish (MBPC), Lebelle Hicks (MBPC), Gordon Mott (USFS, retired), Bud Brown (Consulting Entomologist), Charlene Donahue (MFS)
Forest Management	Kip Nichols (Seven Islands Land Co.), Tom Charles (BPL), Kenny Fergusson (Huber Resources), Gordon Mott (USFS, retired), Dave Wilson (Katahdin Forest Management)
Policy, Regulation, & Funding	Joel Swanton (FRA), Mark Doty (Plum Creek), Jim Contino (Verso), Doug Denico (MFS), Don Mansius (MFS), Peter Triandafillou (Huber Resources), Don Tardie (Consultant), Marcia McKeague (Katahdin Forest Management), Bill Ferdinand (Plum Creek), John Cashwell (Consultant), Michele MacLean (MFPC), Tom Doak (SWOAM), Blake Brunsdon (JD Irving), Chuck Gadzik (LandVest)
Wildlife Habitat	Ryan Robicheau (MDIFW), Walter Jakubas (MDIFW), Phillip deMaynadier (MDIFW), Joe Wiley (MDIFW), Erin Simons-Legaard (UMaine), Ray Ary (Plum Creek), John Gilbert (JD Irving), Henning Stabins (Plum Creek), Jennifer Vashon (MDIFW), Andrew Cutko (MNAP), Merry Gallagher (MDIFW), Andrew Whitman (Manomet)
Public Communications & Outreach	Roberta Scruggs (MFPC), Kevin Doran (MFS), Sherry Huber (Maine Tree), Pat Sirois (MFPC), Jason Killam (JD Irving), Joel Swanton (FRA), Robert Wagner (UMaine)
Research Needs	Bill Livingston (UMaine), Michel Huot (MFFP QC), Dave MacClean (UNB), Vince Nealis (CFS), Dave Struble (MFS), Andrew Willette (JD Irving), Lloyd Irland (Irland Group), Brian Sturtevant (USFS-NRS)

Public Review

- Draft report released for public review in November 2014
- Report presented to municipalities, environmental groups, the legislature, logging contractors and economic development consortiums
- *Keeping Maine's Forest* group review was very helpful

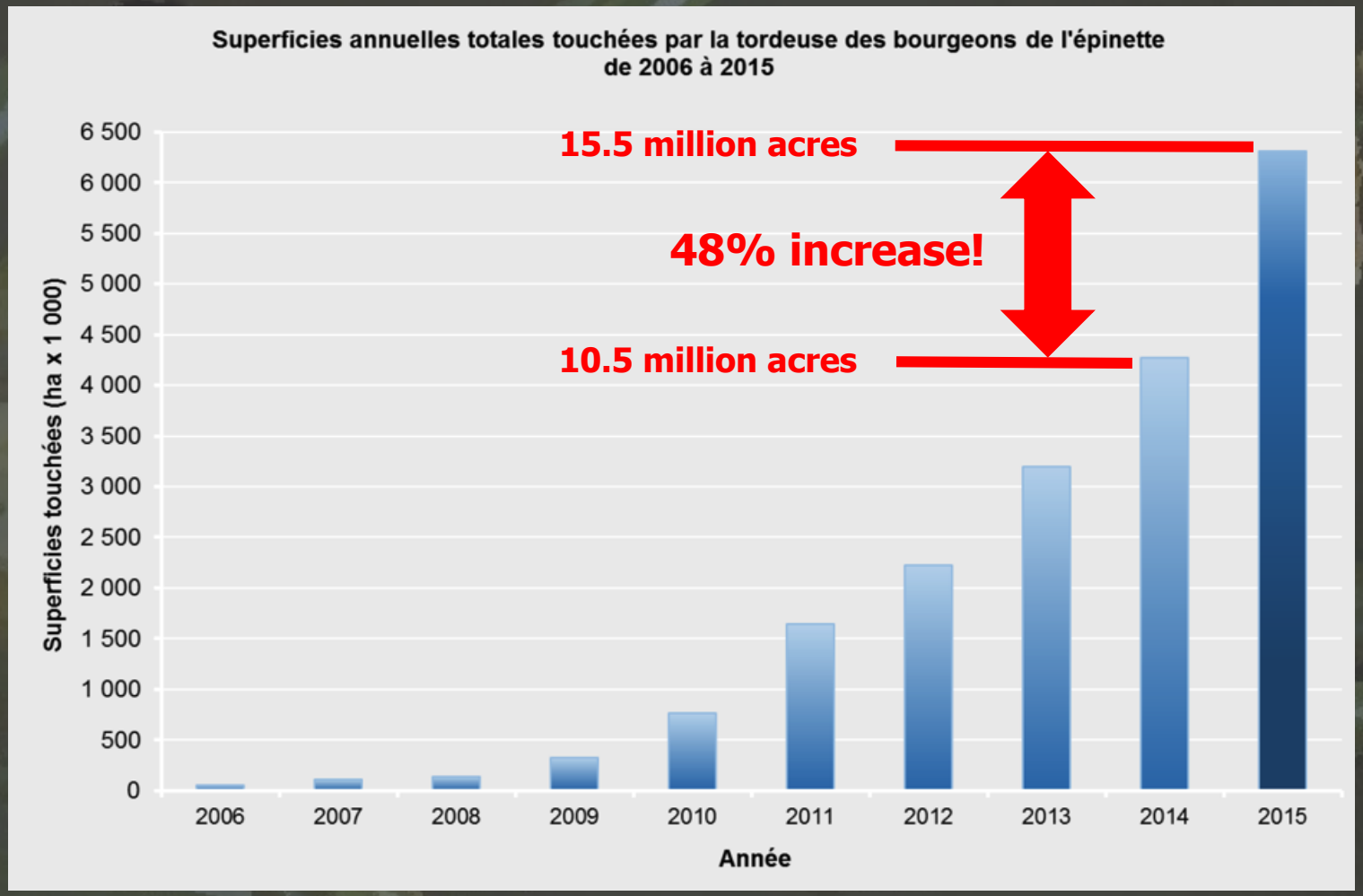
Report Addresses Key Topics

- Monitoring strategies
- Forest management strategies
- Protection options
- Policy, regulatory & funding
- Wildlife habitat
- Public communications & outreach
- Research priorities

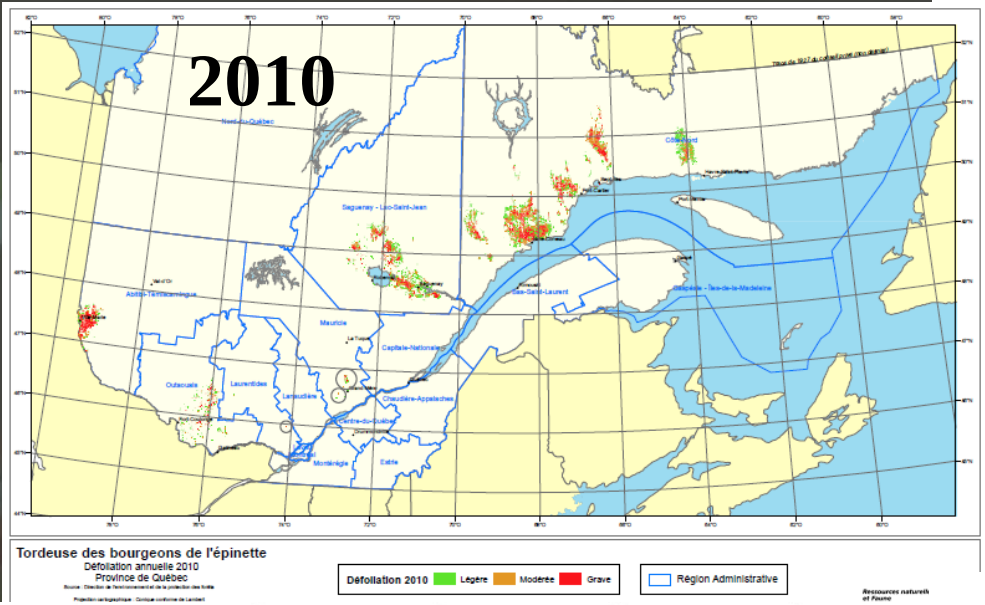
More than 70 recommendations

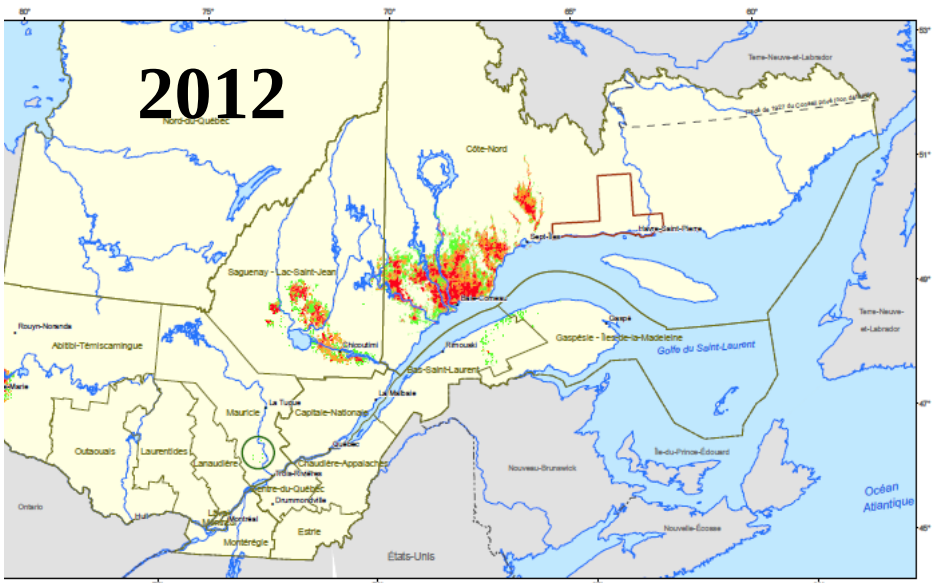

Outbreak
Update

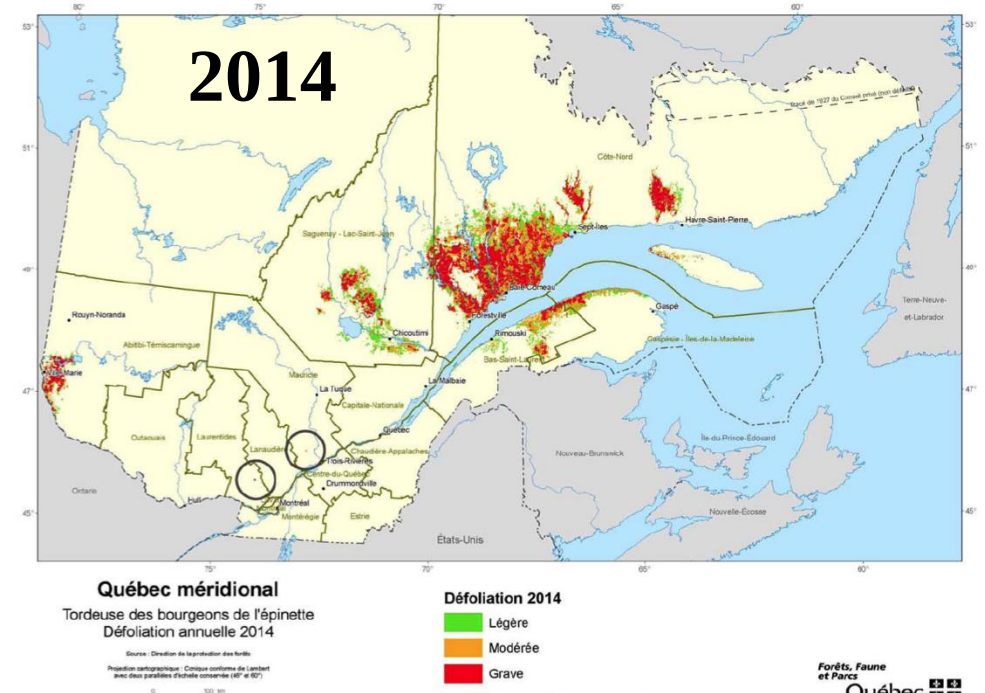
Quebec SBW Outbreak Update

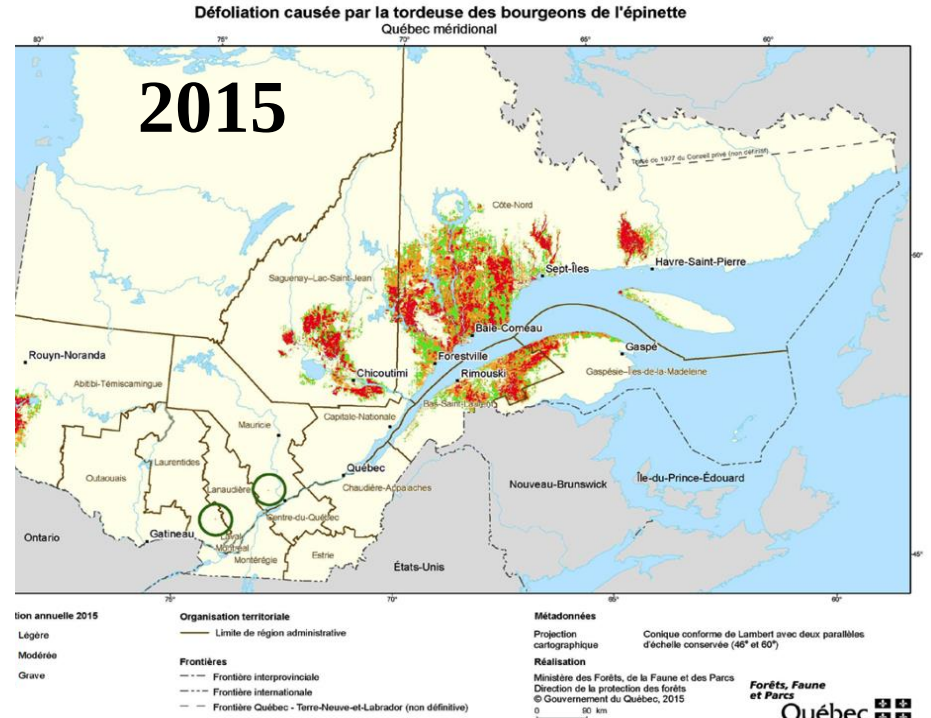


Spruce Budworm Defoliation 2010 to 2015

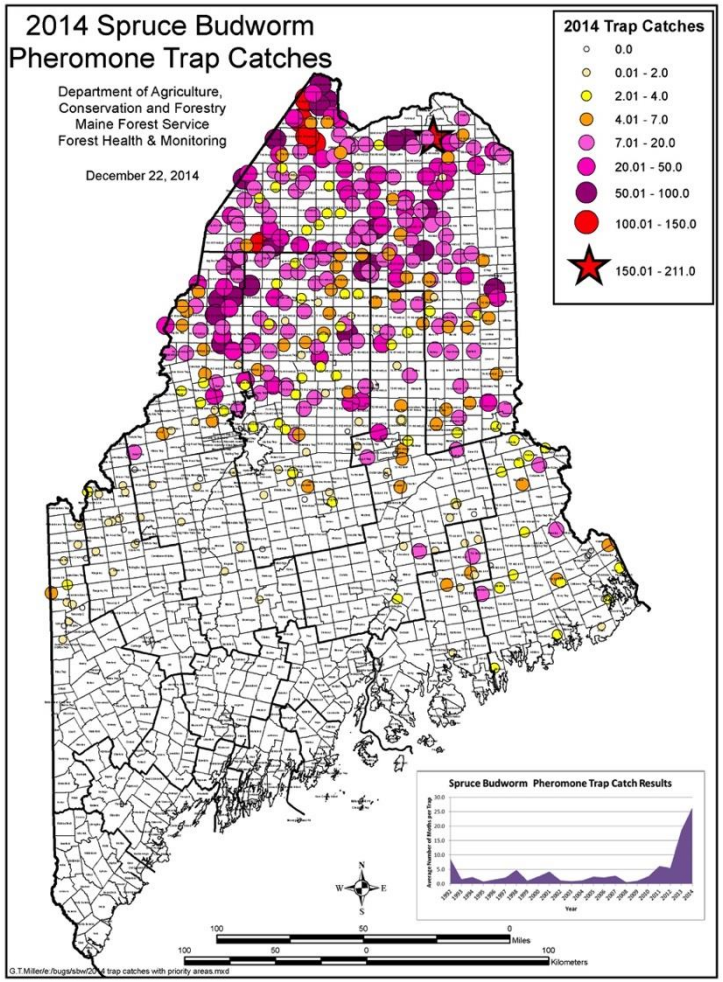


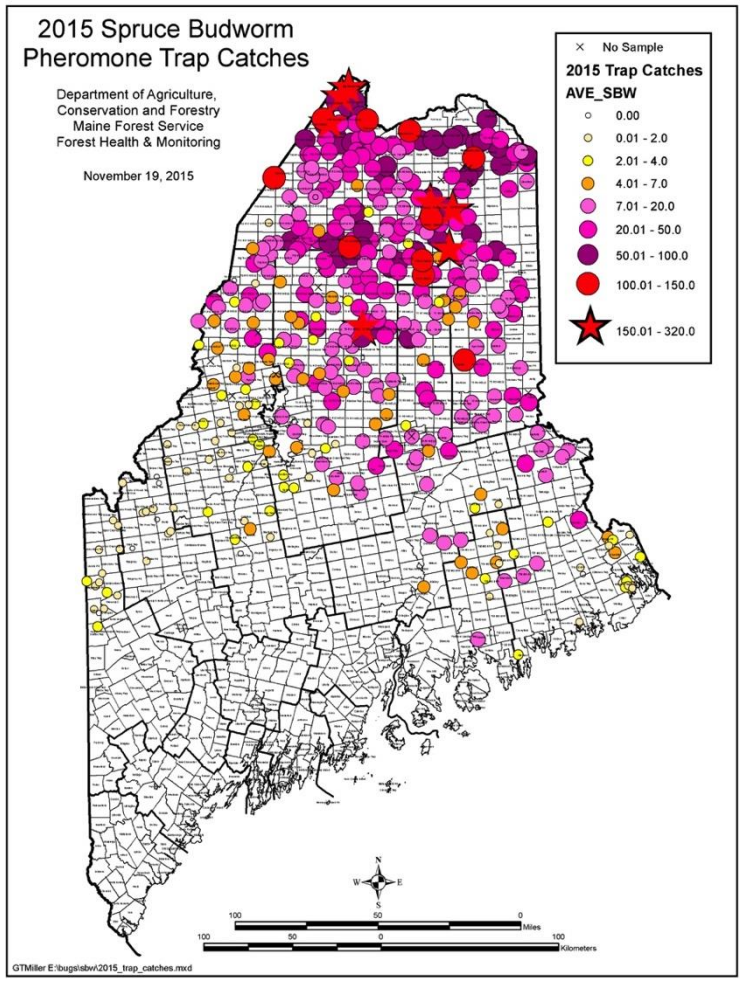




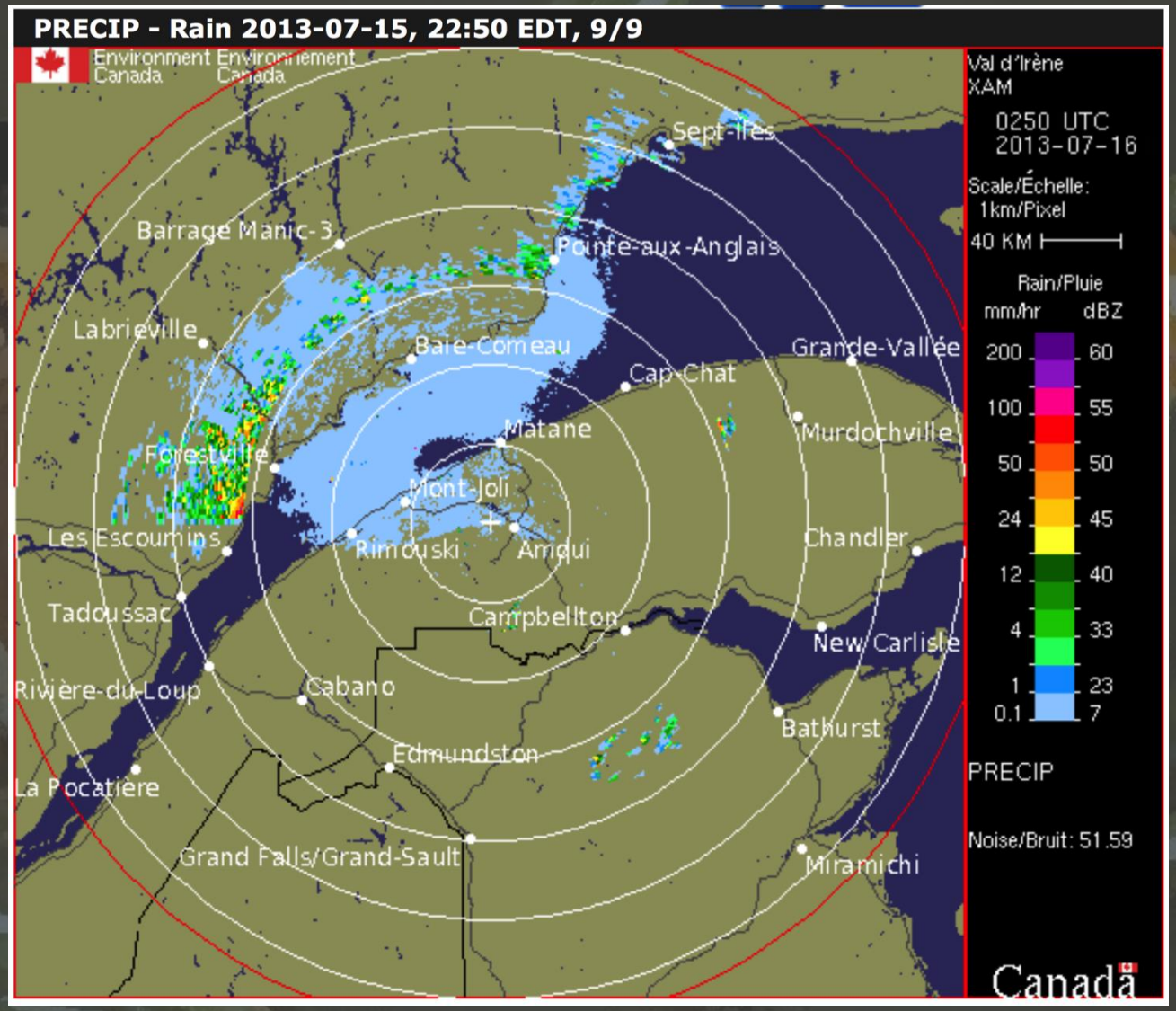


Pheromone Trap Catches of Spruce Budworm Moths in 2014 and 2015



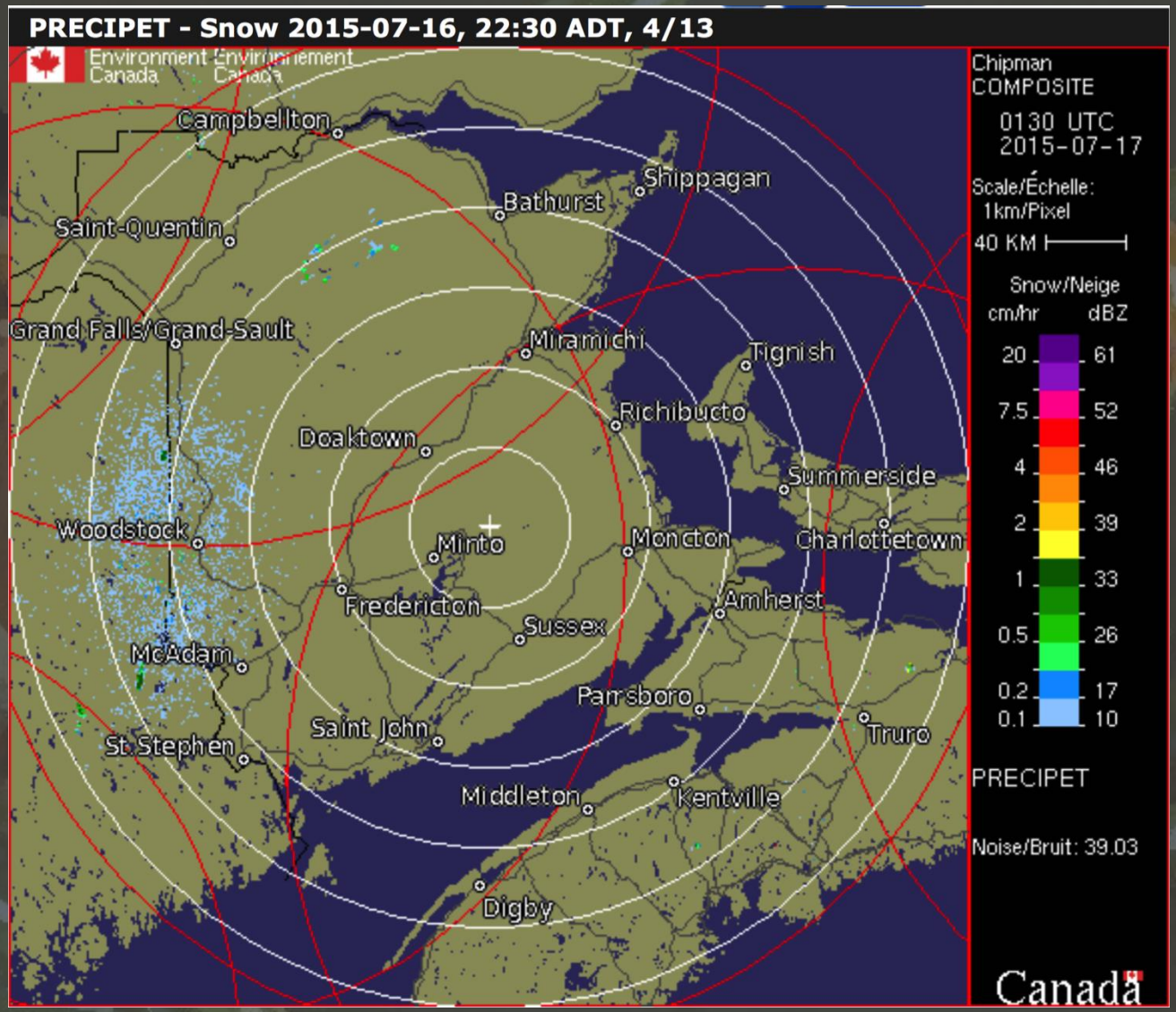


Spruce Budworm Mass Flight



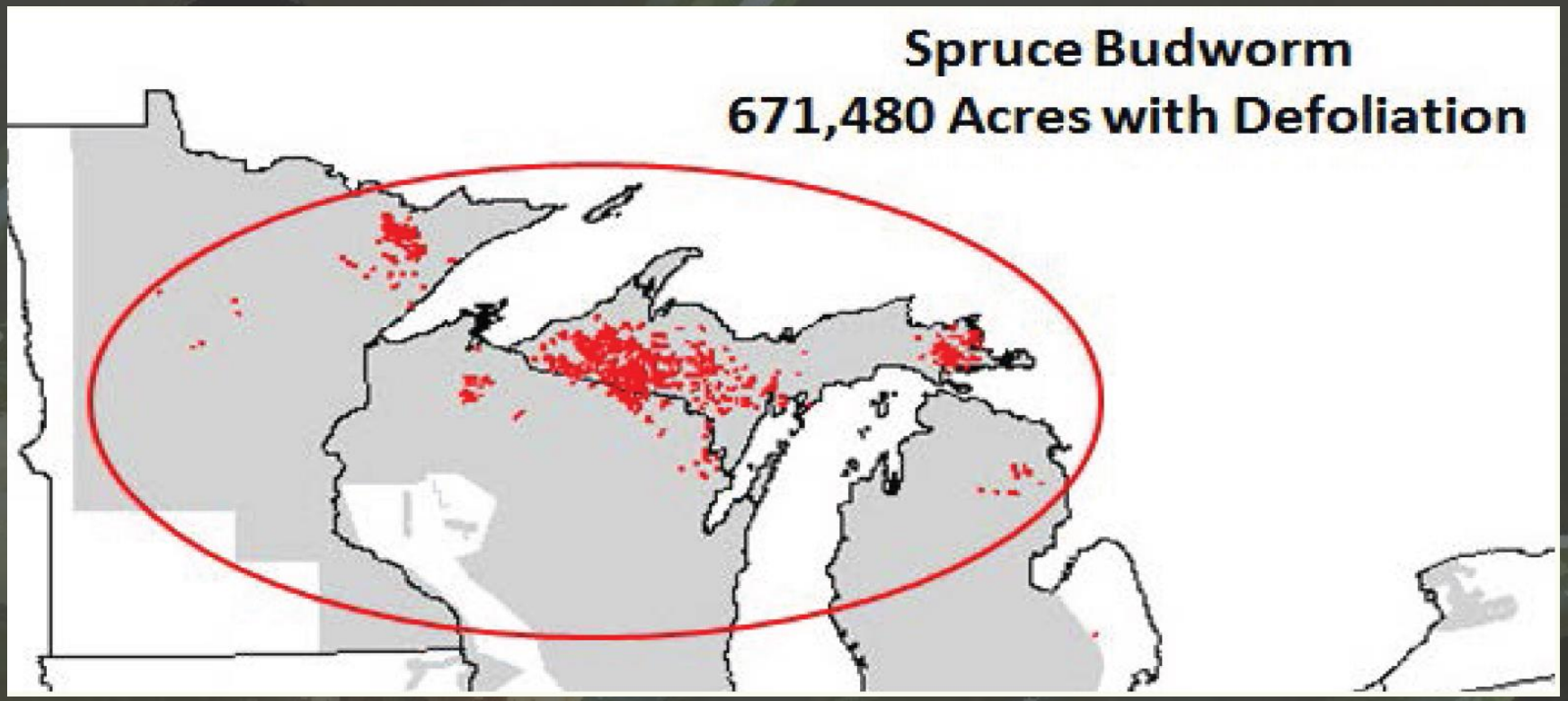
Ongoing research by Yan Boulanger, Canadian Forest Service

Spruce Budworm Mass Flight



Ongoing research by Yan Boulanger, Canadian Forest Service

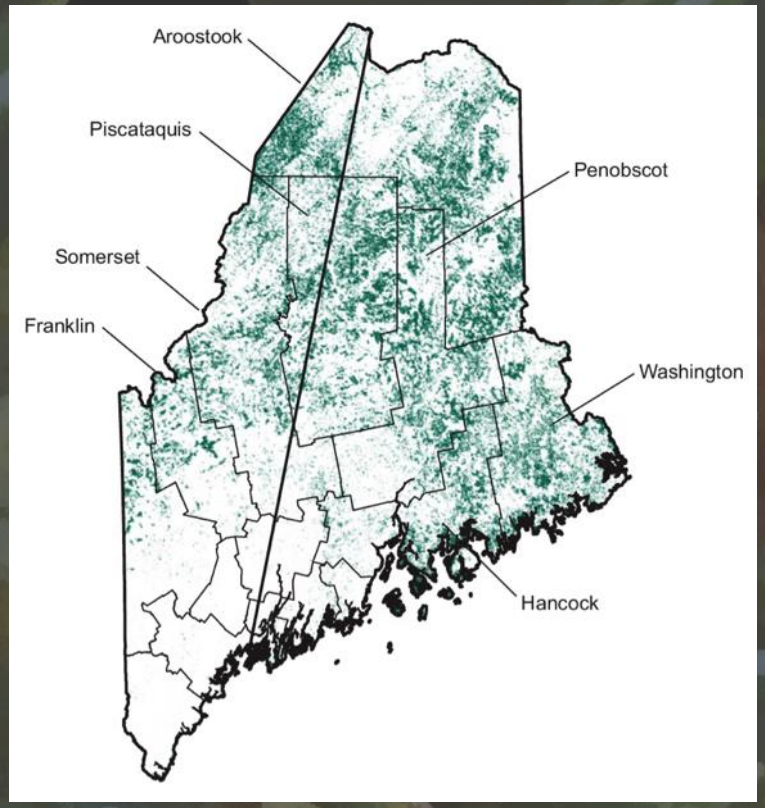
Lake States SBW Outbreak



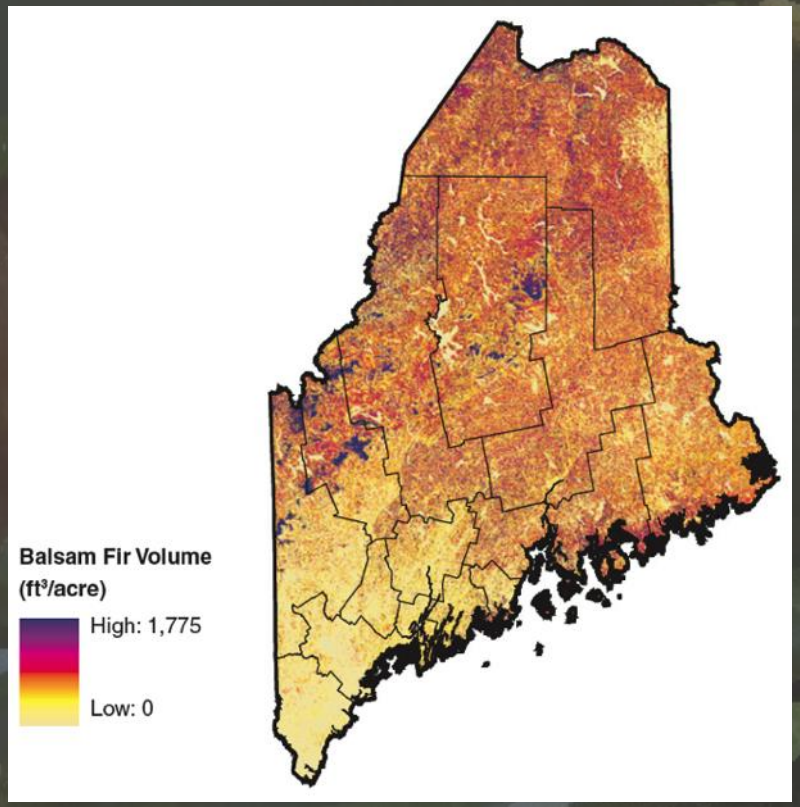

Risk
Assessment

Risk Assessment

5.8 million acres of spruce-fir stands at risk of some level of defoliation, leading to reduced tree growth and mortality over wide areas.

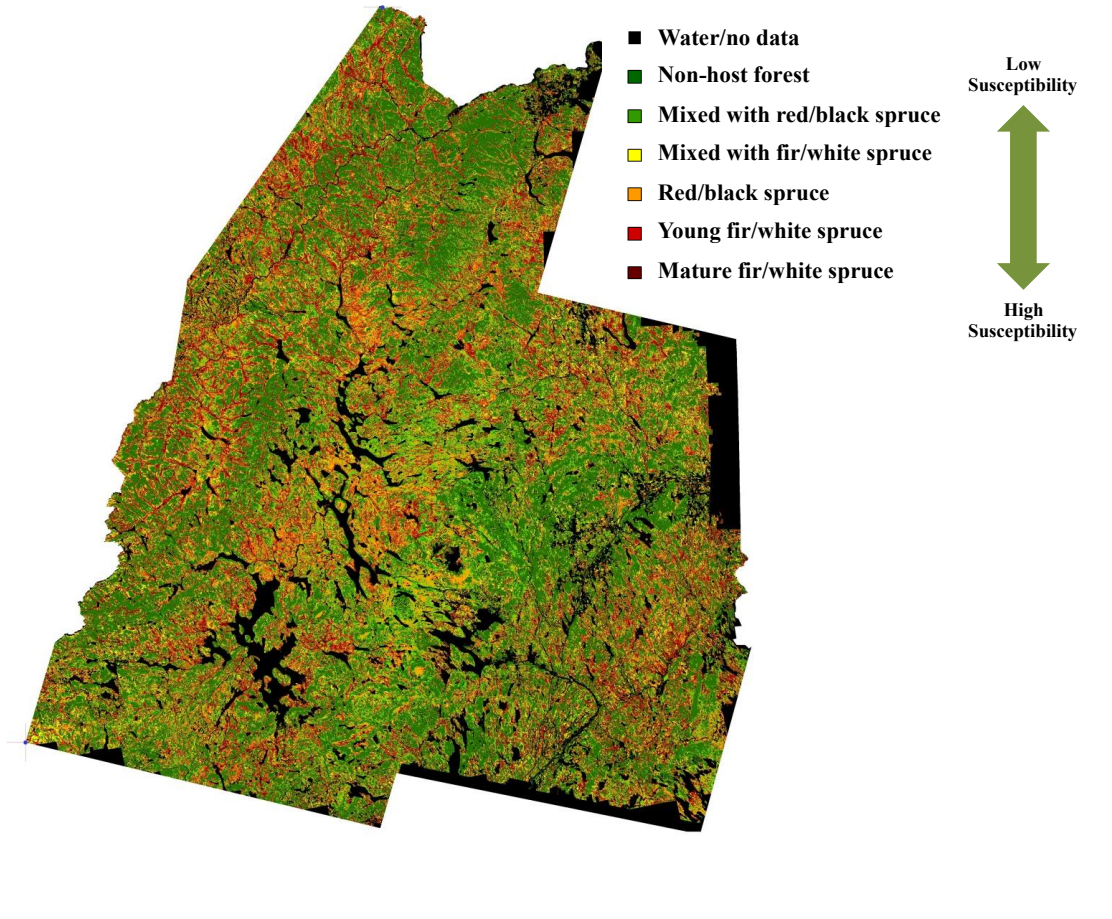


Distribution of Spruce-Fir Forest Type in Maine counties, 2008 (Source: McCaskill et al. 2011).



Balsam fir concentrations (as depicted on map) by average volume (ft^3/acre) by county in Maine, 2008. (Source: McCaskill et al. 2011)

Risk Assessment



Map of approximately 10 million acres of northern Maine showing areas of forestland classified based on susceptibility to defoliation by SBW. (Source: Legaard et al. 2013)

Potential Spruce-fir Yield Reductions

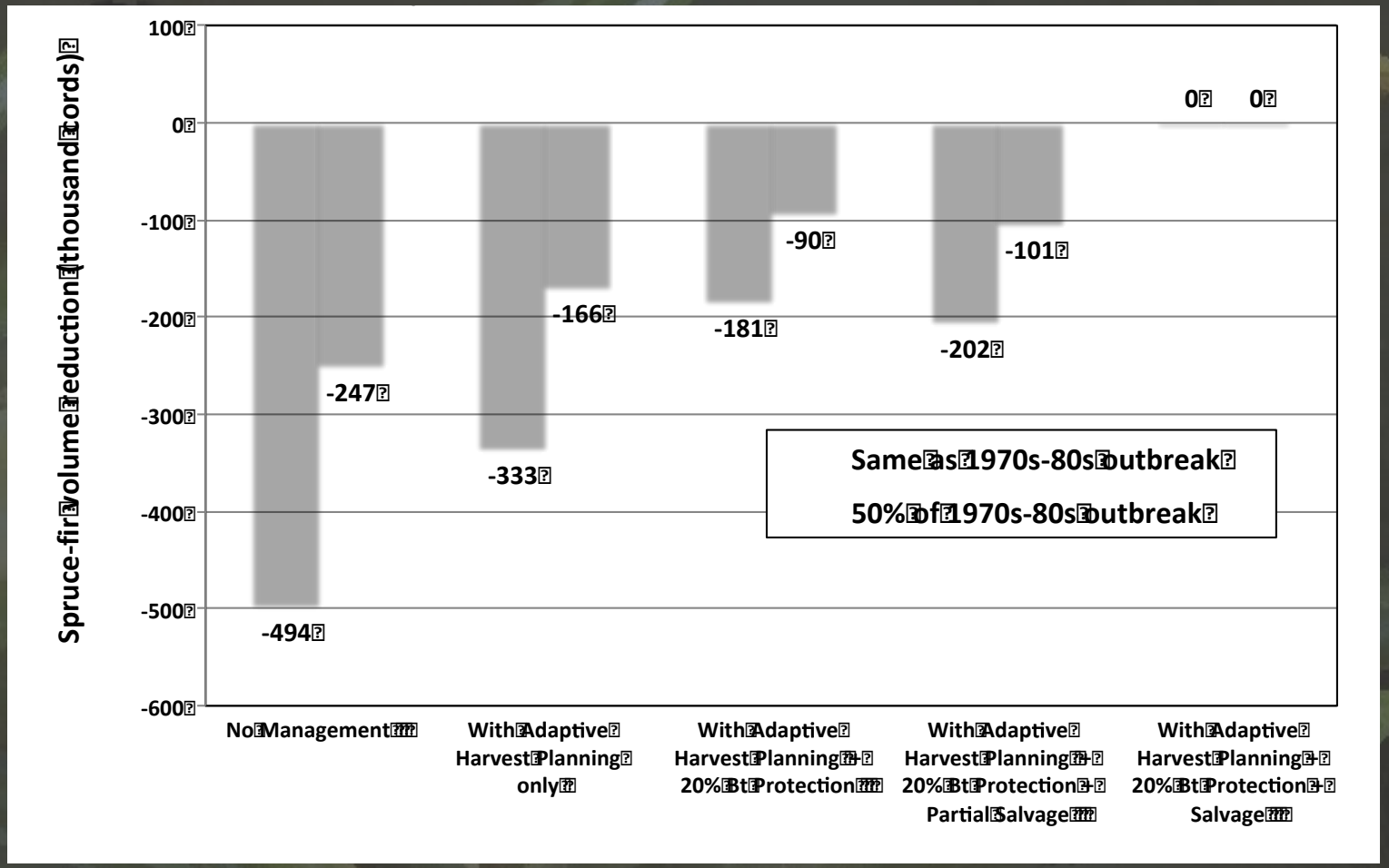
- **Two studies completed:**
  - Hennigar et al. 2013 – CFRU
  - Legaard et al. 2013 – NSRC
- **Both studies concluded:**
  - 15% to 30% maximum annual reduction in spruce-fir harvestable volume or standing biomass for moderate to severe SBW outbreak
  - Slow (40-year) recovery of spruce-fir following peak impact of outbreak
  - Impact similar (both severity and rate of recovery) regardless of when outbreak occurs over next few decades

Mitigation Strategies

Hennigar et al. (2013) concluded that nearly all spruce-fir volume losses can be prevented by:

- **Adaptive harvesting**
  - Reducing area of high-risk stands (i.e., those with high balsam fir and white spruce composition) ahead of outbreak
- **Foliage protection**
  - Insecticide application to high risk and valuable stands
  - Only 20% of area of affected area needs to be treated
- **Salvage logging**
  - Dead and dying trees

Projected Maximum Annual Spruce-fir Volume Reduction Under Various Mitigation Scenarios



From Hennigar et al. 2013

Economic Impact - Projected Maximum Annual Spruce-fir Loss

SBW Outbreak Scenario on Current Forest	Forest Management Response Scenario	Estimated Total Direct Economic Impact to Forest Products Industry	Estimated Total Indirect Economic Impact to Maine	Estimated TOTAL Economic Impact to Maine
Same as 1970s-80s	No Management	-$505 million	-$290 million	-$795 million
50% of 1970s-80s	No Management	-$252 million	-$145 million	-$397 million

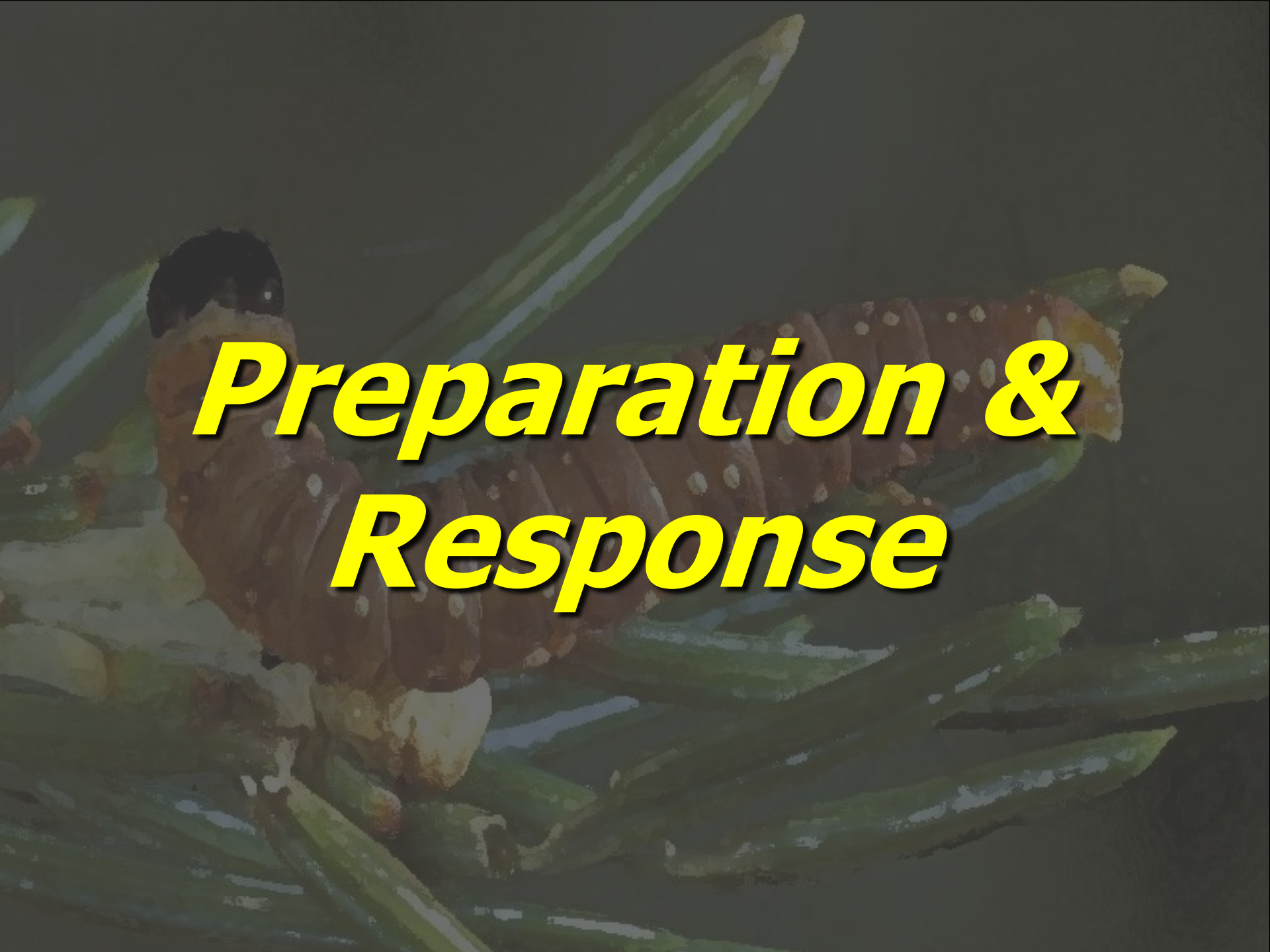
ASSUMPTIONS:

- No substitutions made for lost spruce-fir volume during outbreak
- No change in market price of spruce-fir wood with increased supply during outbreak
- No real price change in spruce-fir stumpage over time

Many Factors Different Today Than During 1970s Outbreak

- Less spruce-fir forest
- Younger spruce-fir forest
- TIMO & REIT ownership
- Better road system
- Better forest management technology
- More diverse forest products
- Higher mill capacity
- More diverse markets
- Less dependence on spruce-fir
- Better logging technology
- Better protection technology
- More policy & regulations
- Lower funding levels in government & industry
- More sensitive political environment
- Less entomology expertise

Challenges during coming outbreak will be very different than in 1970s-80s


Preparation &
Response

What Can Forest Managers Do Now?

- Participate in pheromone trap monitoring efforts
- Map location, condition and concentration of high-risk stands
- Adapt harvest activities before or as early as possible into the outbreak to reduce area available in stands
- Track annual progress of infestation by monitoring SBW population levels and distribution

What Can Forest Managers Do Now?

- Stop thinning within 3 years of outbreak in stands where balsam fir and white spruce are >50% of composition
- Seek and encourage markets for low-value trees from pre-salvage and salvage operations
- Apply insecticide to protect foliage in high-risk and high-value stands not ready for harvest
- Prepare action plans to salvage trees that would likely be lost through spruce budworm mortality

Insecticides Likely to Be Used

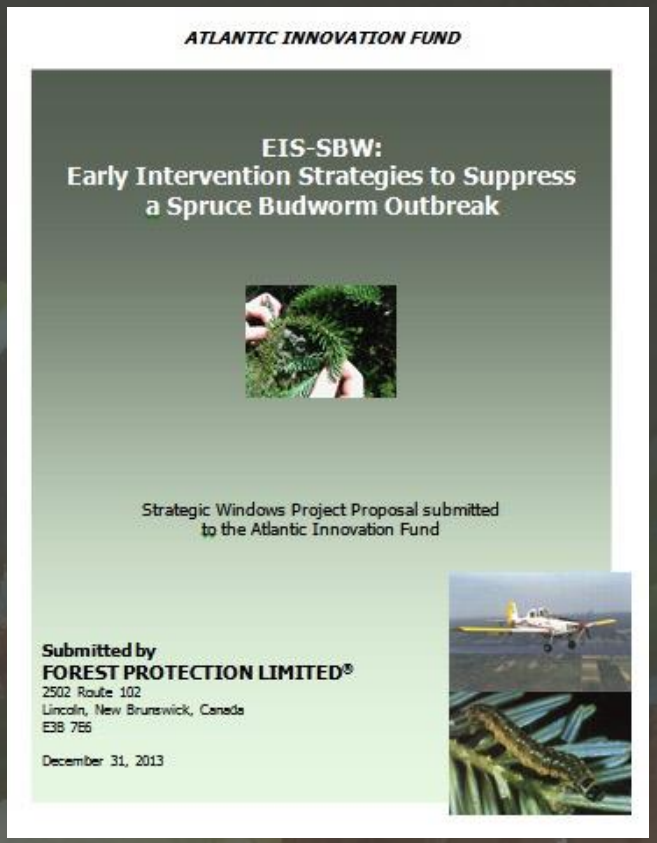
Btk (*Bacillus thuringiensis* var. *kurstaki*) (Foray, Dipel, or Biobit) –

- Naturally occurring bacterium found in soil, foliage, wildlife, water, and air across most of the world.
- Used as an insecticide on organic farms for over 50 years.
- Contains naturally occurring protein crystals and dormant spores of bacterium that are insecticidal when eaten by susceptible species of insects, Lepidoptera (SBW, other moths, and butterflies).
- Potential adverse effects to non-target Lepidoptera (Karner blue butterfly, some swallowtail butterflies, and promethea moths).
- Minimal risk of adverse effects to aquatic invertebrates in studies.
- Low risk of adverse effects to non-Lepidoptera invertebrates.
- Non-toxic to vertebrates (mammals, birds, fish, etc.).

Insecticides Likely to Be Used

Tebufenozide (Mimic) –

- Widely used insect growth regulator to control Lepidoptera pests in fruit, vegetable and other agricultural crops around the world.
- Mimics action of the molting hormone (ecdysone) , resulting in unsuccessful molting of Lepidoptera larvae within few hours of exposure.
- Active against wide range of arthropods (not just Lepidoptera).
- Similar toxicological profile to Btk.
- Very low risk to vertebrates, non-Lepidopteran insects, and other wildlife species under normal use, even at highest application rates.

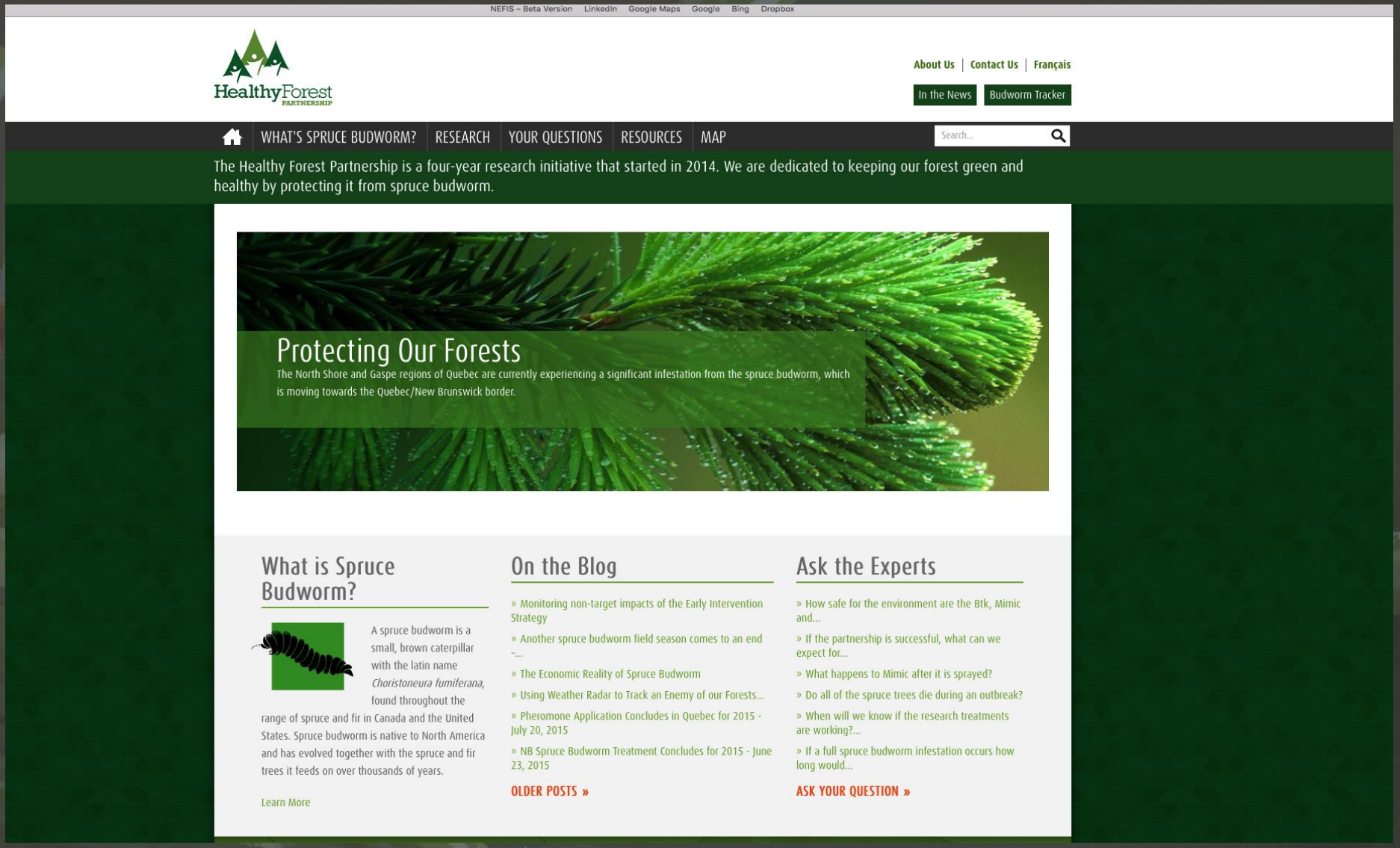


Experimental Canadian Early Intervention Strategy (EIS)

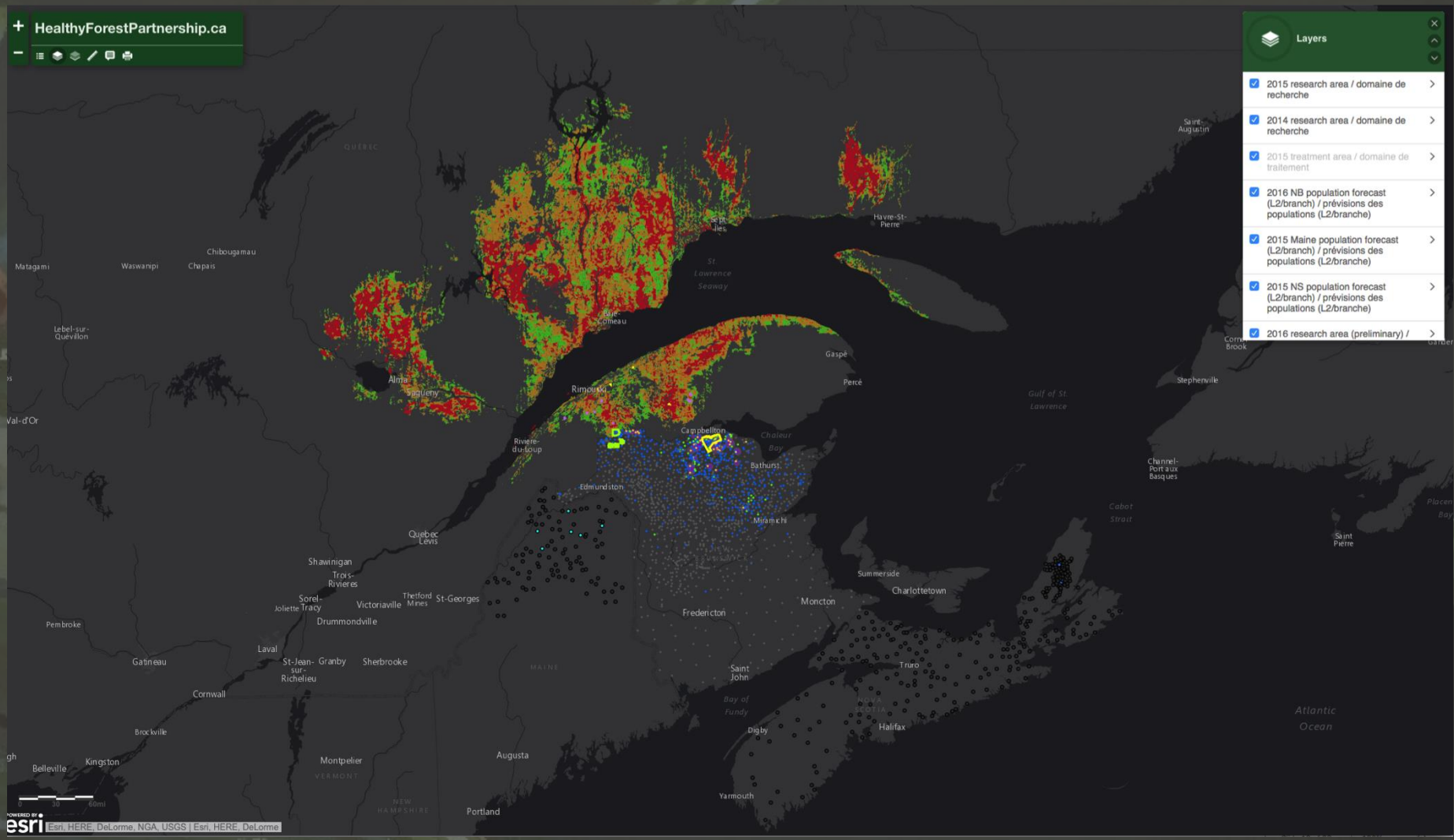
- Cost-shared by federal & provincial governments & industry
- $18 million CDN, 4 years
- ~30 scientists & collaborators
- Projects in NB and Quebec

1. Intensive monitoring & study of SBW population responses
2. Use Bt, Mimic, &/or pheromone to treat rising populations **before** defoliation in attempt to prevent outbreaks
3. Scenario and economic analyses using SBW DSS with remote sensing of current & cumulative defoliation

Canadian Healthy Forest Partnership



Canadian Healthy Forest Partnership



CFRU Research on SBW

- Identifying high-risk stands using latest remote sensing technology
- Using remote sensing for early damage detection
- Forest growth & wood supply impacts
- Economic impacts
- Wildlife impacts


Questions?