

Forest Insects: Look Who's Eating Now

Northern Ontario First Nations
Environmental Conference
Thunder Bay, Ontario
September 30, 2014

Taylor Scarr, Provincial Forest Entomologist
Ontario Ministry of Natural Resources and Forestry

Forest Health Work Areas in Ontario - 2013



Provincial Forest Health Technicians in Ontario - 2013



Mike Francis



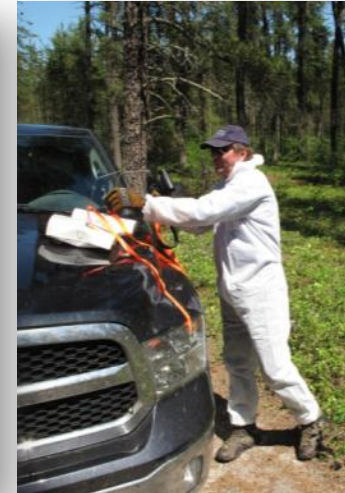
Lincoln Rowlinson



Susan McGowan



Vanessa Chaimbrone



Al Keizer



Kyle Webb



Bonnie Williams



Dan Rowlinson



Steve Young



Becky Lidster

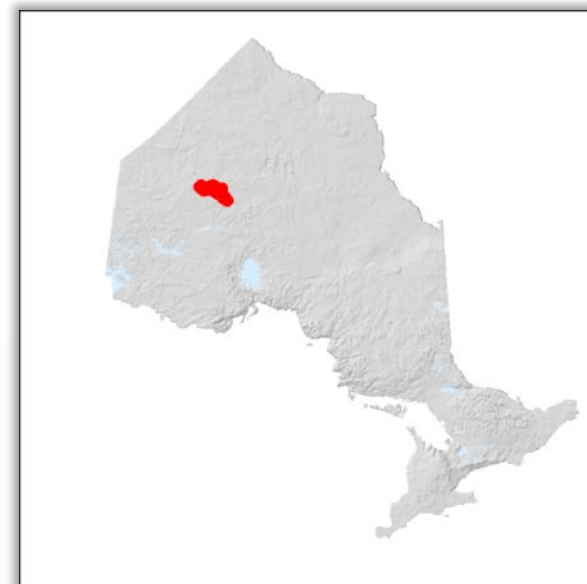


Pat Hodge

Jack pine budworm

Pest Information

Pest Origins:	Native to North America
Pest Type:	Defoliator
Host Species:	Jack pine, red pine, Scots pine, white pine
Infestation Area:	91,865 ha (2013)





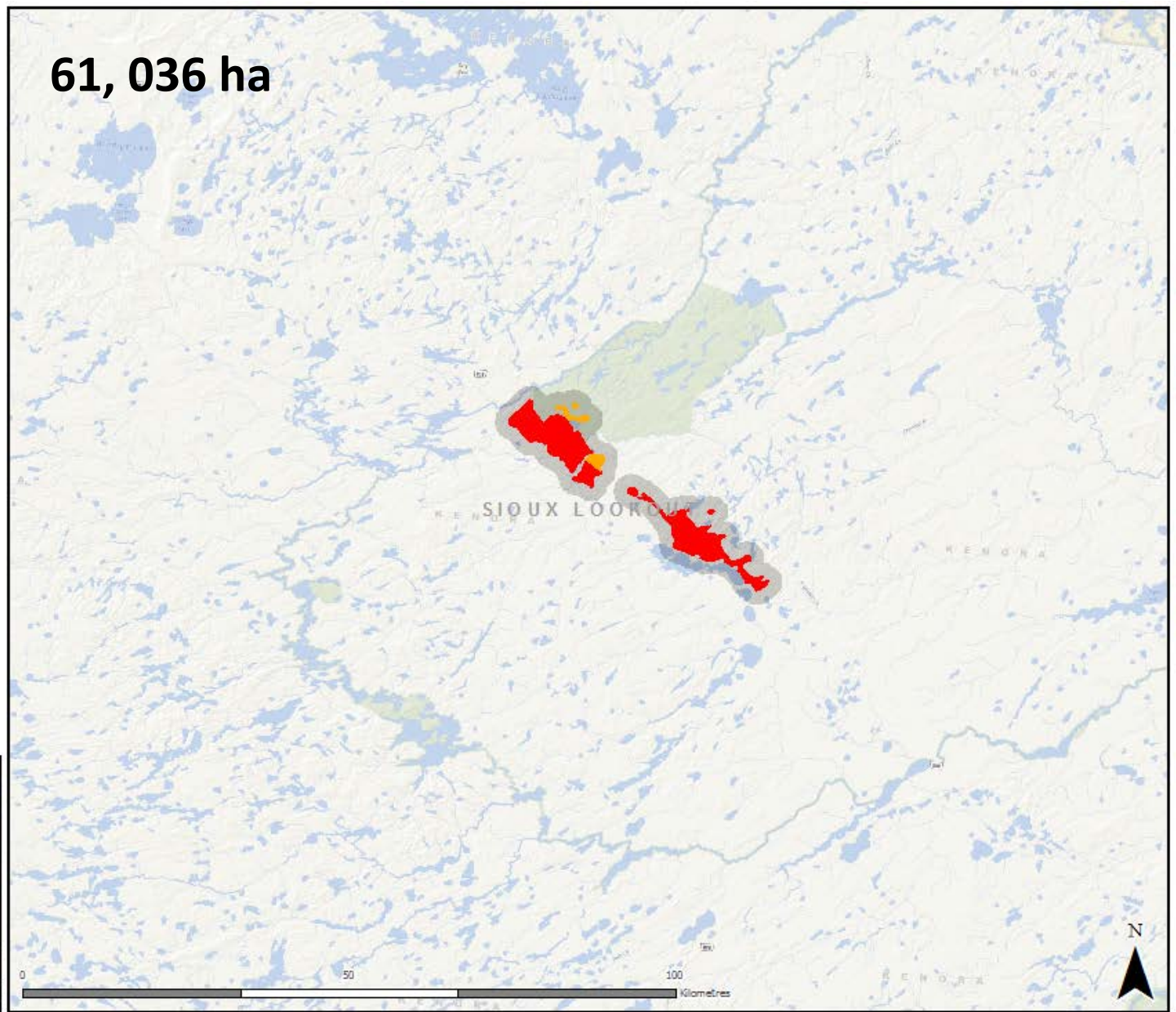
Jack pine budworm



Jack pine budworm 2012

Map 1
Northwest Region
Areas-within-which jack pine budworm caused defoliation.

-  Area of Light Defoliation
-  Area of Moderate-to-Severe Defoliation





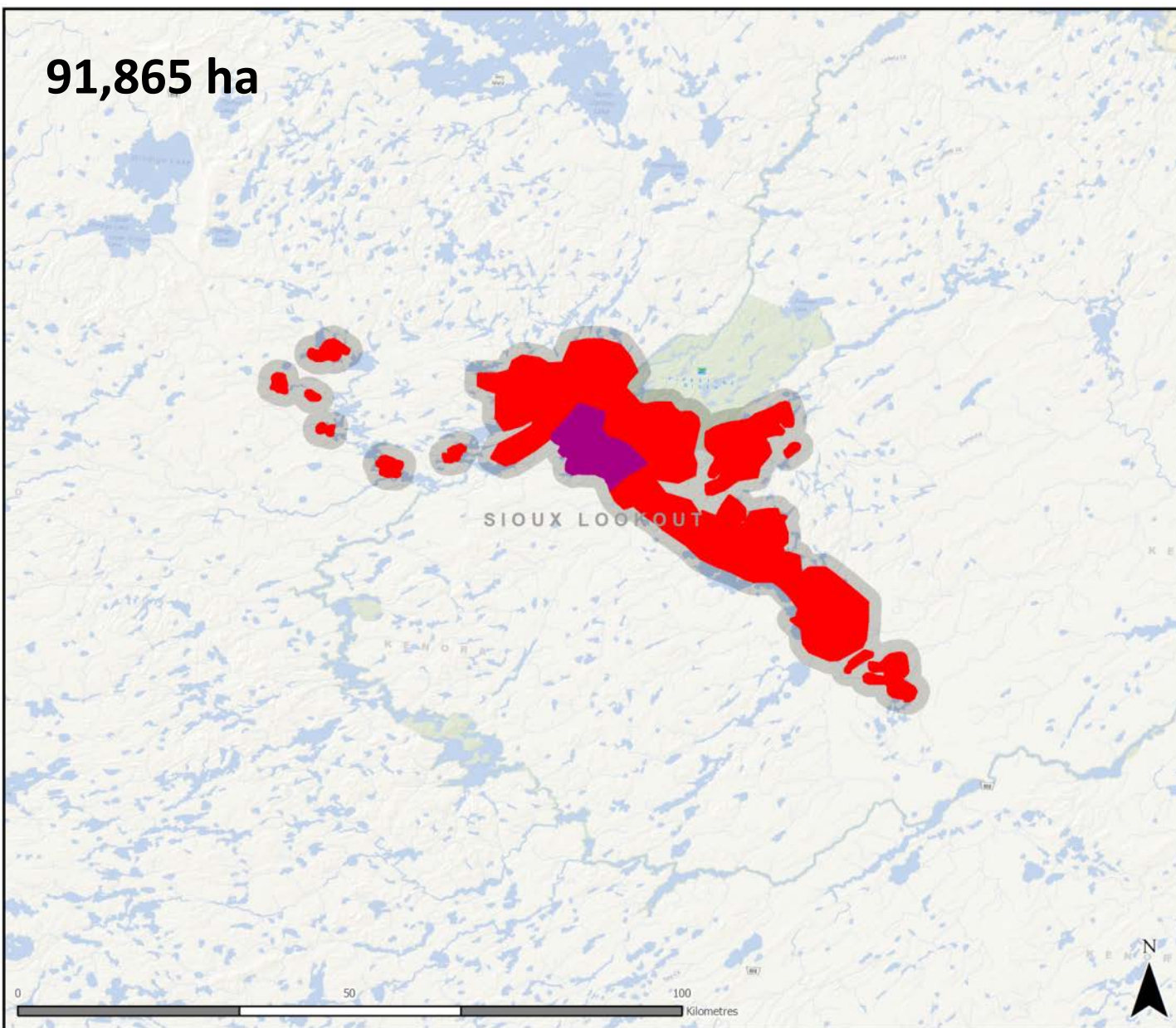
Jack pine budworm



Jack pine budworm 2013

Map 2
Northwest Region
Areas-within-which jack pine budworm caused defoliation.

-  Area of Moderate-to-Severe Defoliation
-  Mortality



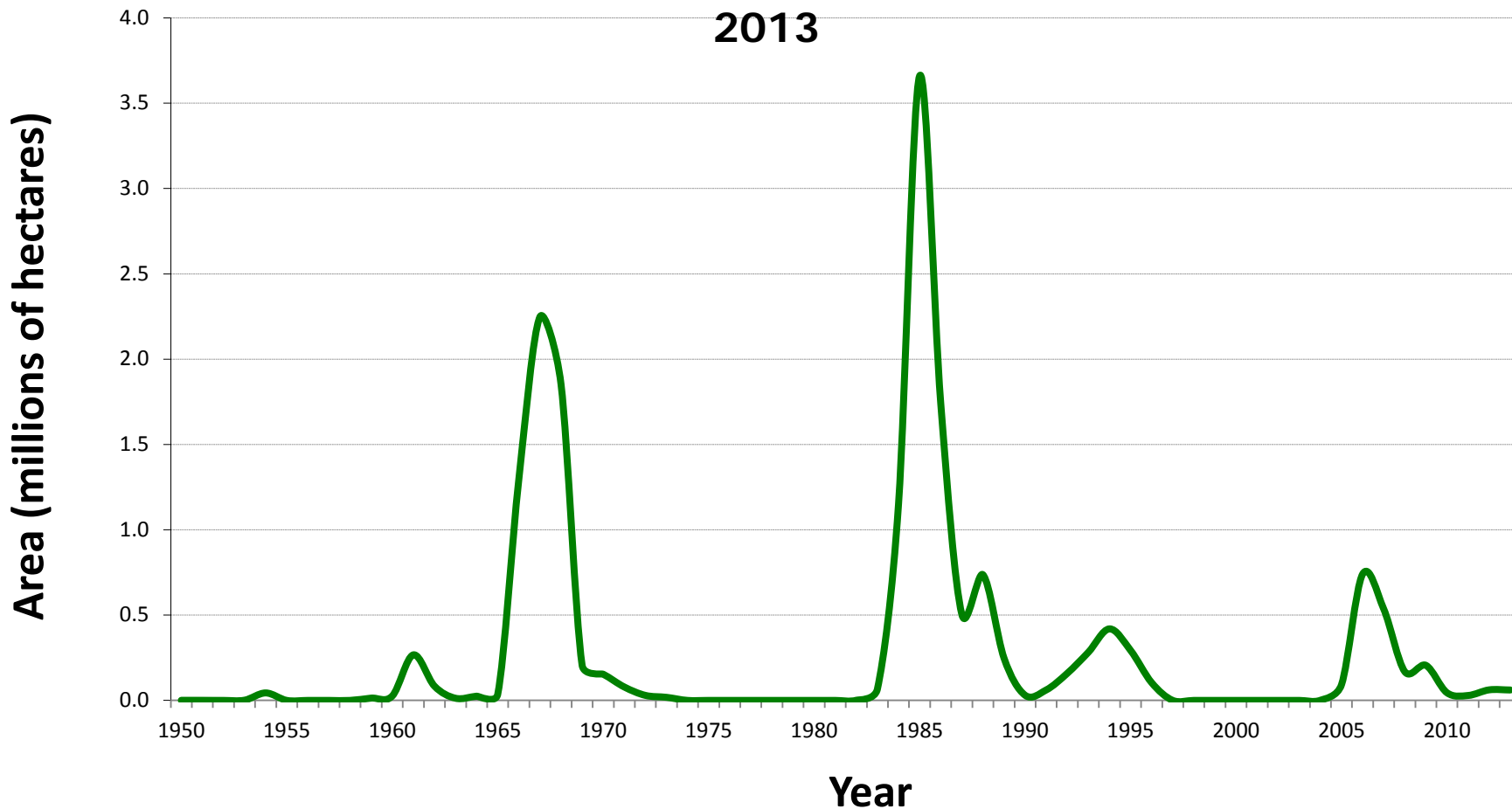
You are here



Jack Pine Budworm

Jack Pine Budworm

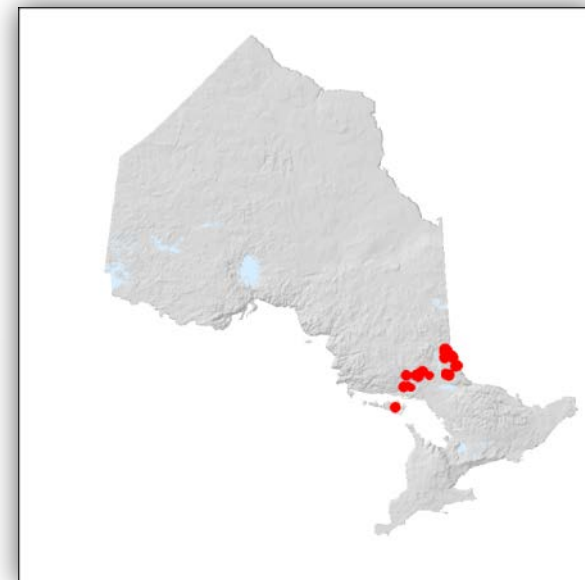
Moderate-to-Severe Defoliation Area in Ontario 1950-2013



Spruce Budworm

Pest Information

Pest Origins:	Native to North America
Pest Type:	Defoliator
Host Species:	Balsam fir, white spruce, black spruce
Infestation Area:	348 ha (2013)



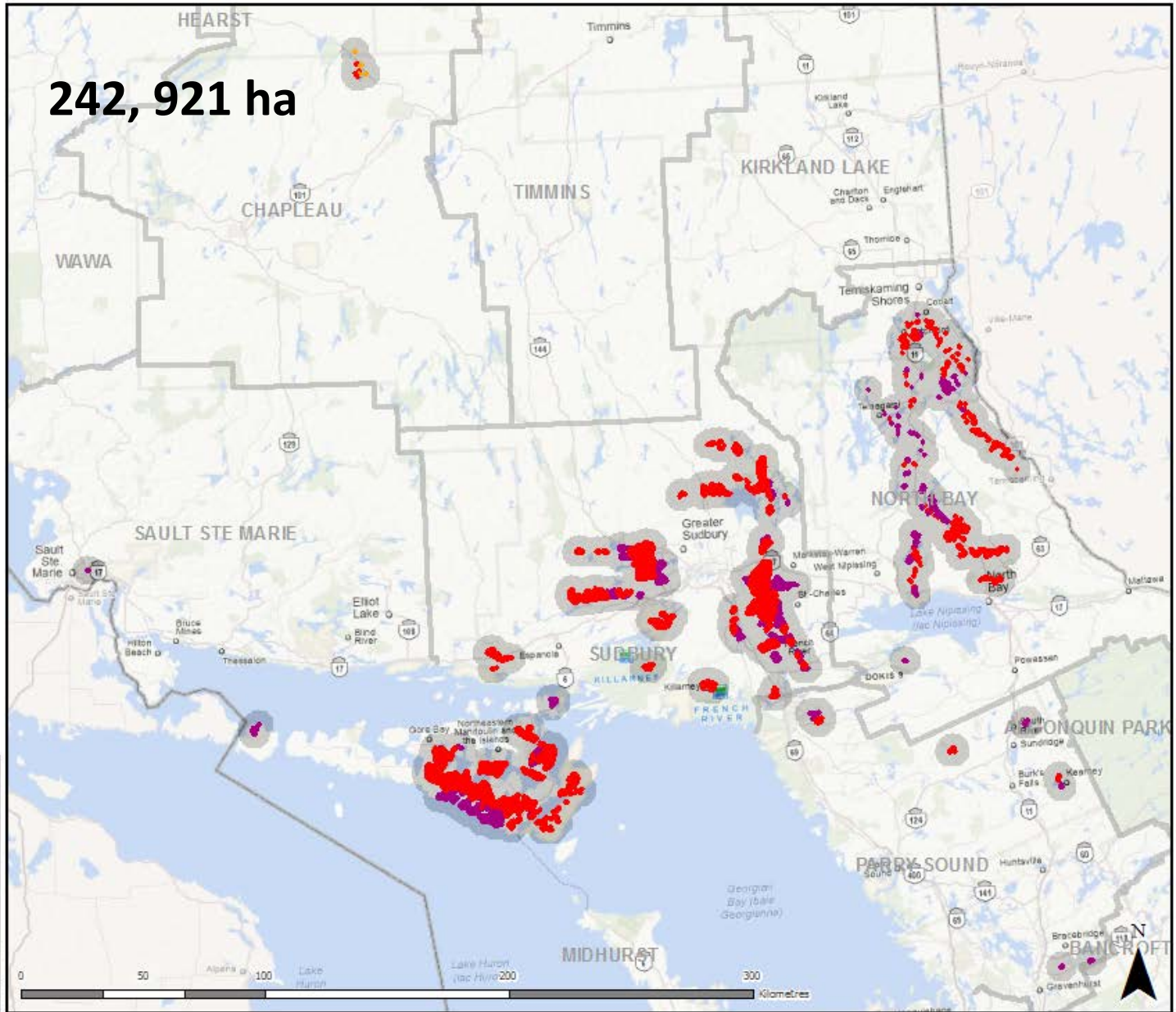
Spruce Budworm



Spruce Budworm 2012

Map 1
Northeast Region
Areas-within-which spruce
budworm caused
defoliation and mortality.

-  Area of Light Defoliation
-  Area of Moderate-to-Severe Defoliation
-  Mortality





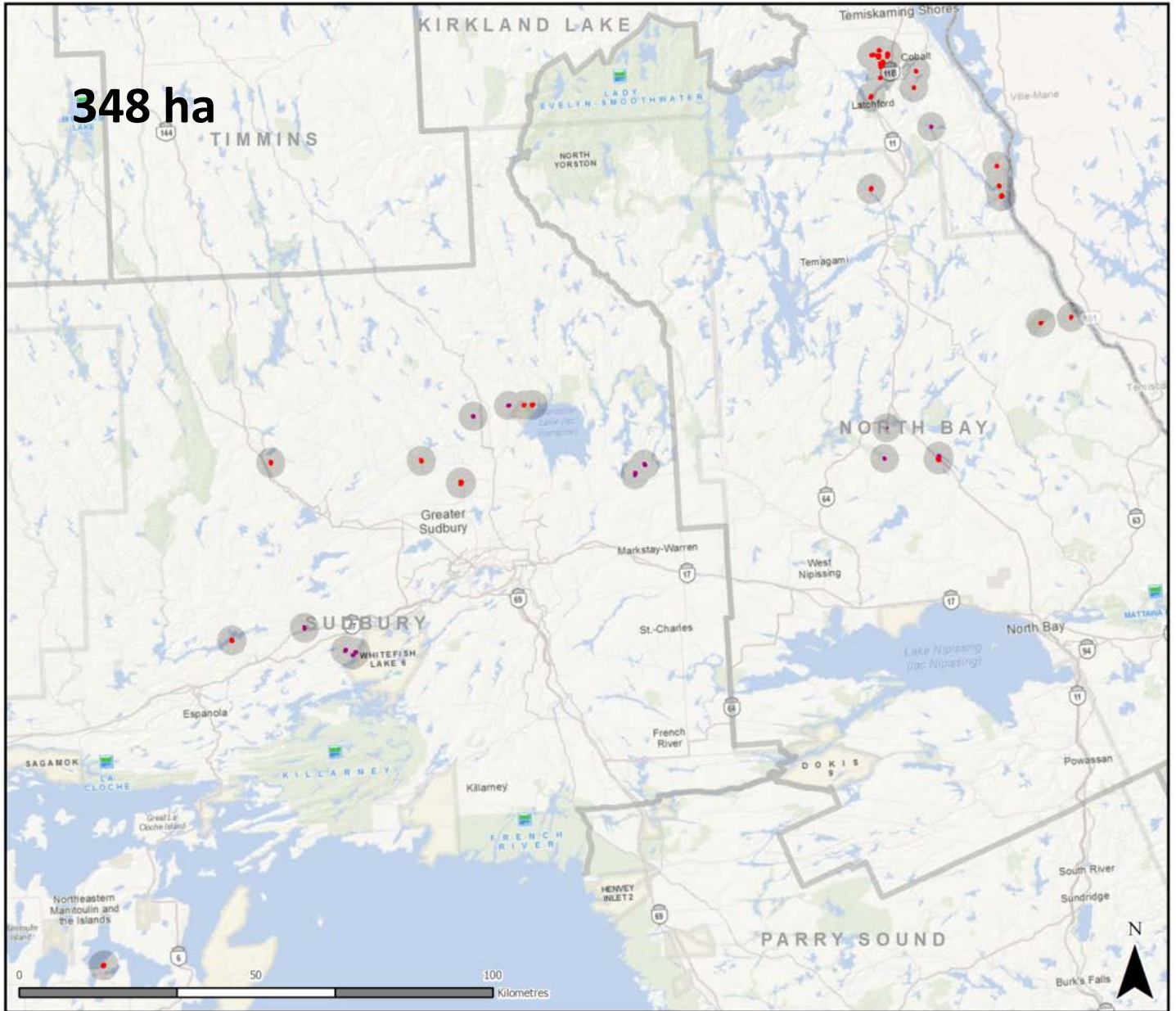
Spruce Budworm



Spruce Budworm 2013

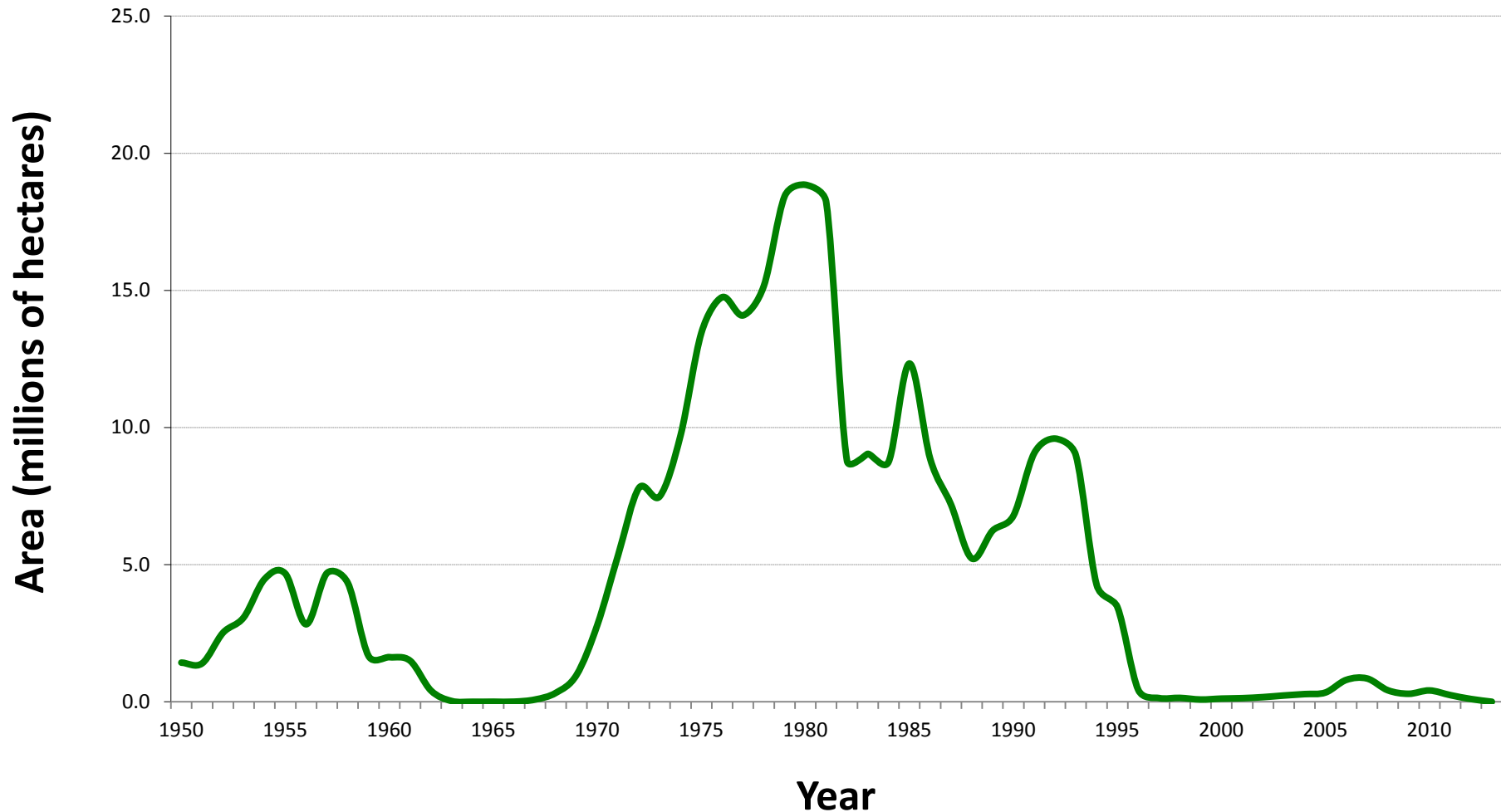
Map 2
Northeast Region
Areas-within-which spruce
budworm caused
defoliation and mortality.

-  Area of Moderate-to-Severe Defoliation
-  Mortality



Spruce budworm

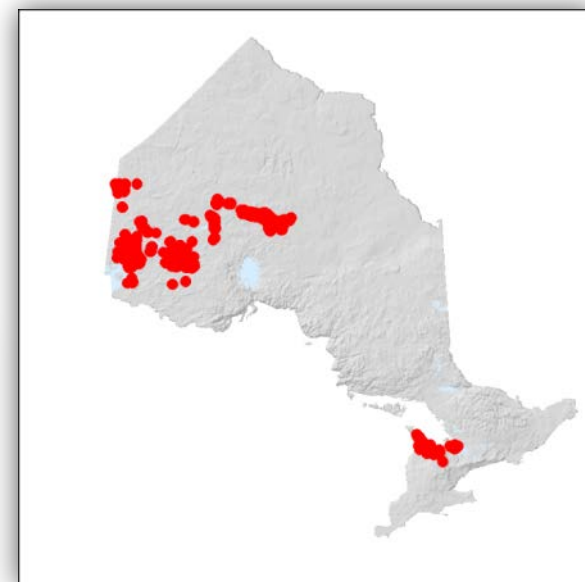
Spruce Budworm Moderate-to-Severe Defoliation Area in Ontario 1950-2013



Forest tent caterpillar

Pest Information

Pest Origins:	Native to North America
Pest Type:	Defoliator
Host Species:	Hardwoods
Infestation Area:	320,240 ha (2013)





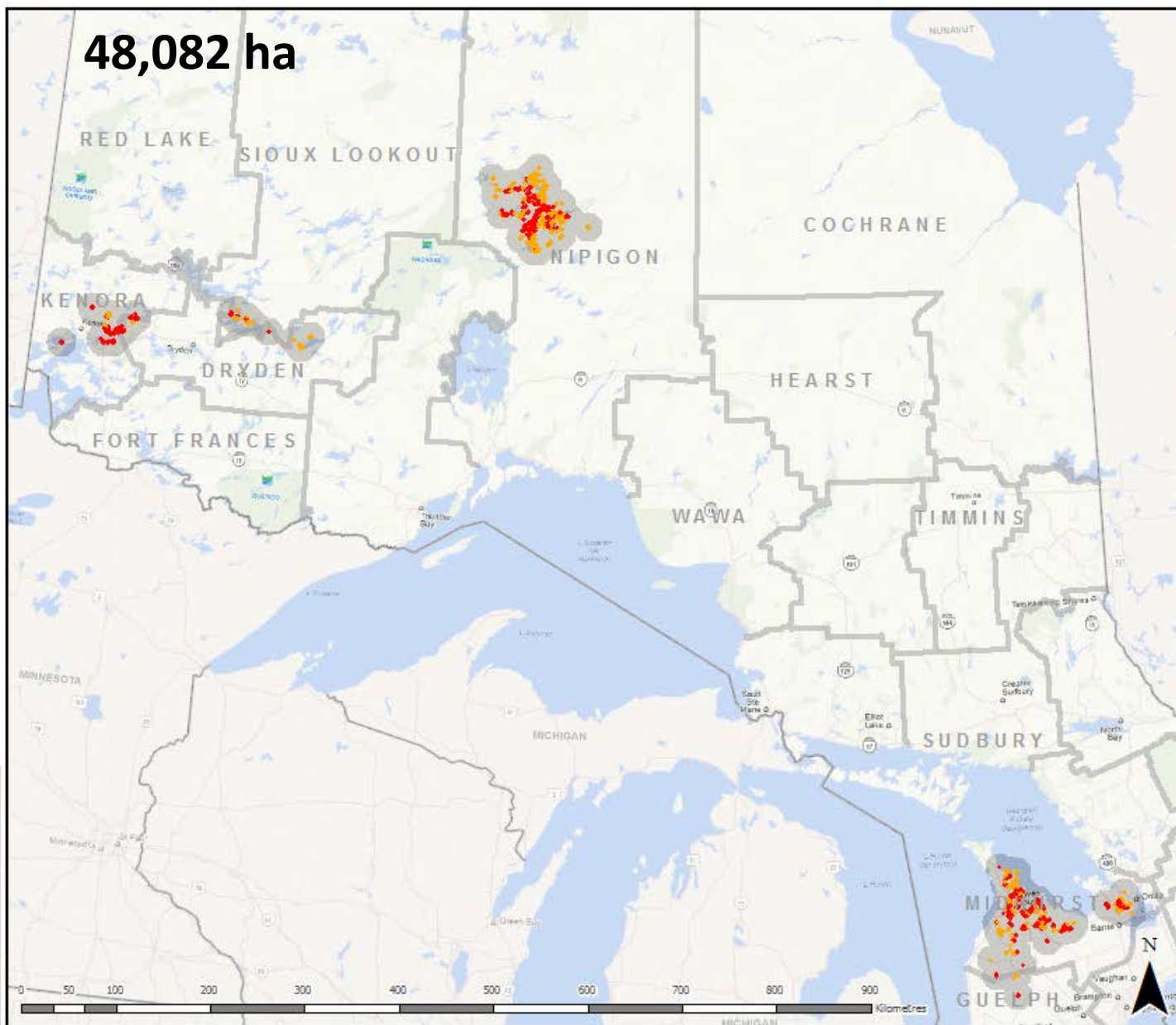
Forest tent caterpillar



Forest tent caterpillar 2012

Map 1
Overview
Areas within which forest tent caterpillar caused defoliation.

-  Area of Light Defoliation
-  Area of Moderate-to-Severe Defoliation





Forest tent caterpillar

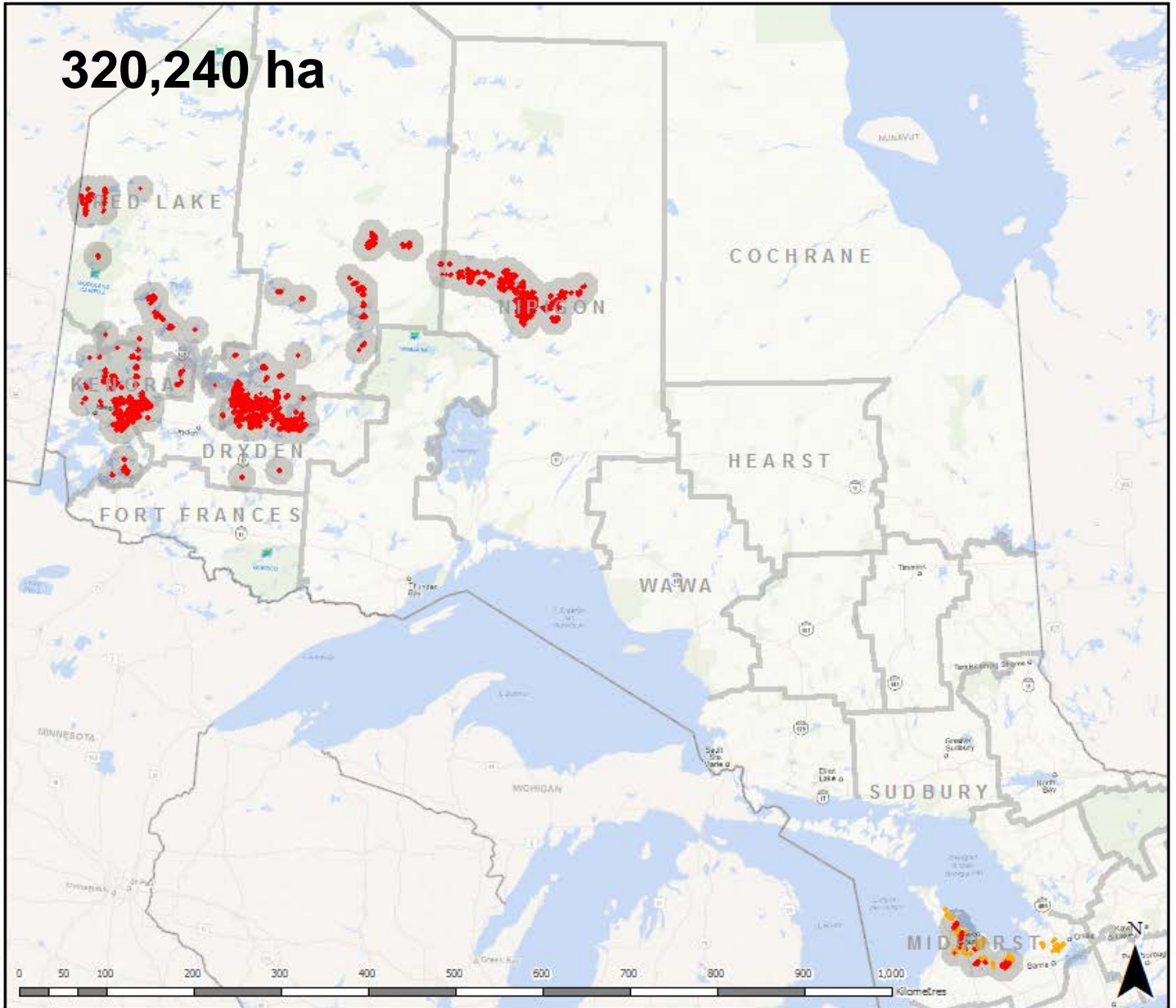


Forest tent caterpillar 2013

Map 2
Overview
Areas within which forest tent caterpillar caused defoliation.

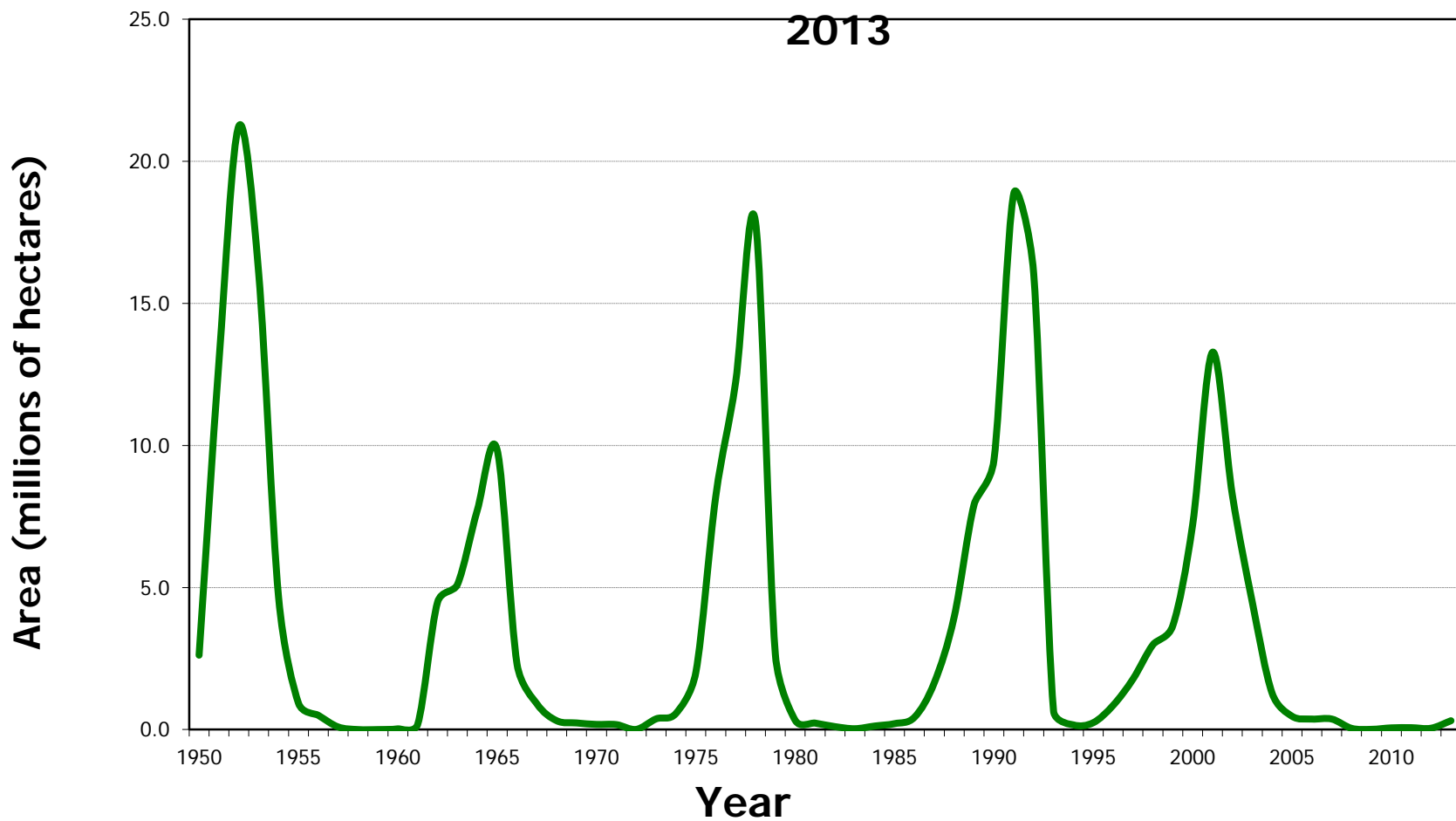
-  Area of Light Defoliation
-  Area of Moderate-to-Severe Defoliation

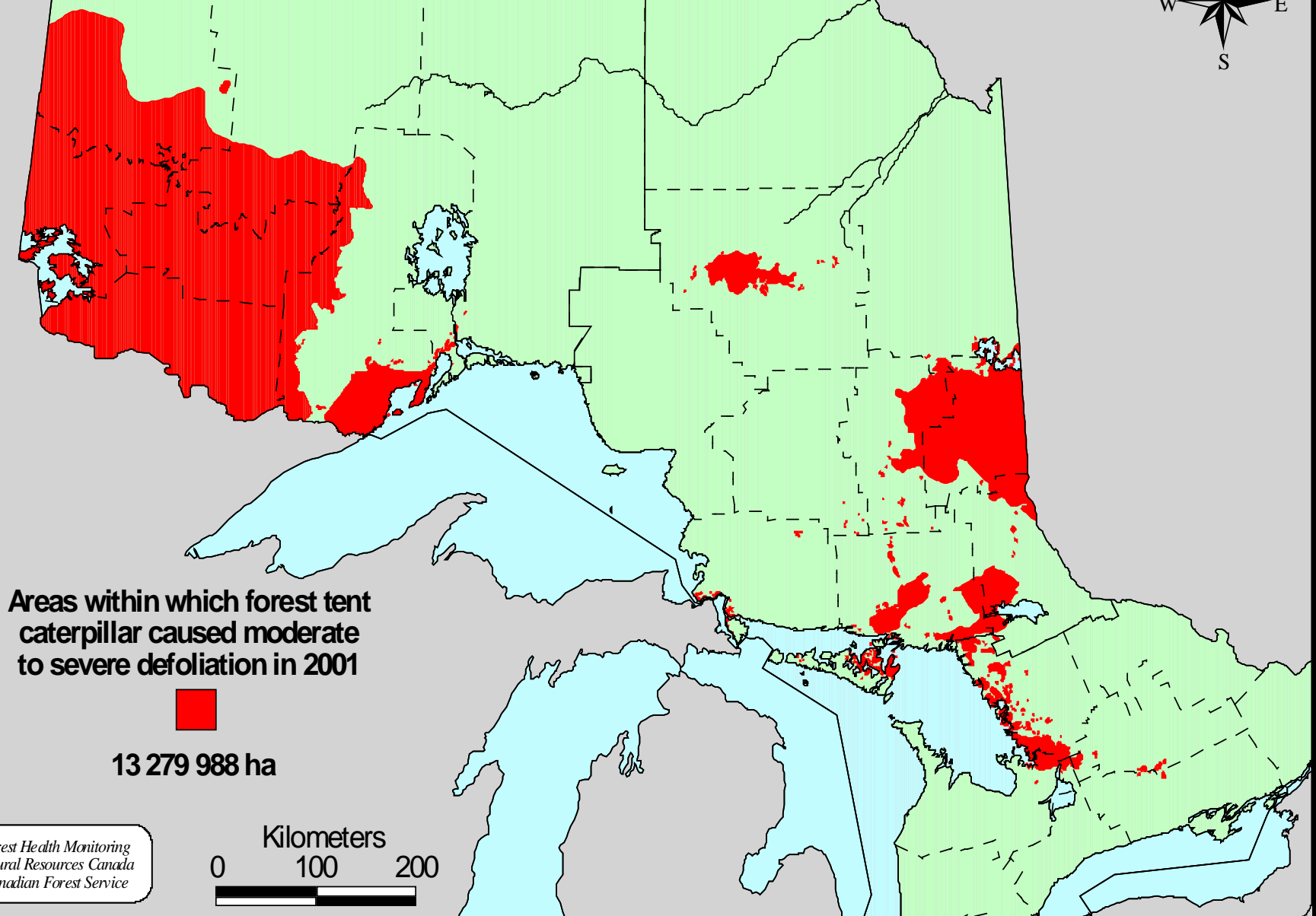
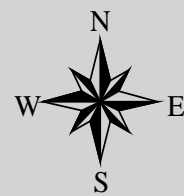
320,240 ha



Forest tent caterpillar

Forest Tent Caterpillar Moderate-to-Severe Defoliation Area in Ontario 1950- 2013





Areas within which forest tent caterpillar caused moderate to severe defoliation in 2001



13 279 988 ha

*Forest Health Monitoring
Natural Resources Canada
Canadian Forest Service*





Forest Tent Caterpillar



Forest tent caterpillars crawling on house



Forest tent caterpillars on birch trees

**FTC defoliation
in urban and
wooded areas**





Forest tent caterpillar cocoon



Forest tent caterpillar moth



Forest tent caterpillar egg
band on twig



Forest tent caterpillar
With white key hole
pattern

Eastern tent caterpillar
With white line along back



Eastern tent caterpillar:

- Forms tents in branch crotches
- Does not go into large outbreaks
- Sometimes the forest tent caterpillars will take over the tents of eastern tent caterpillars





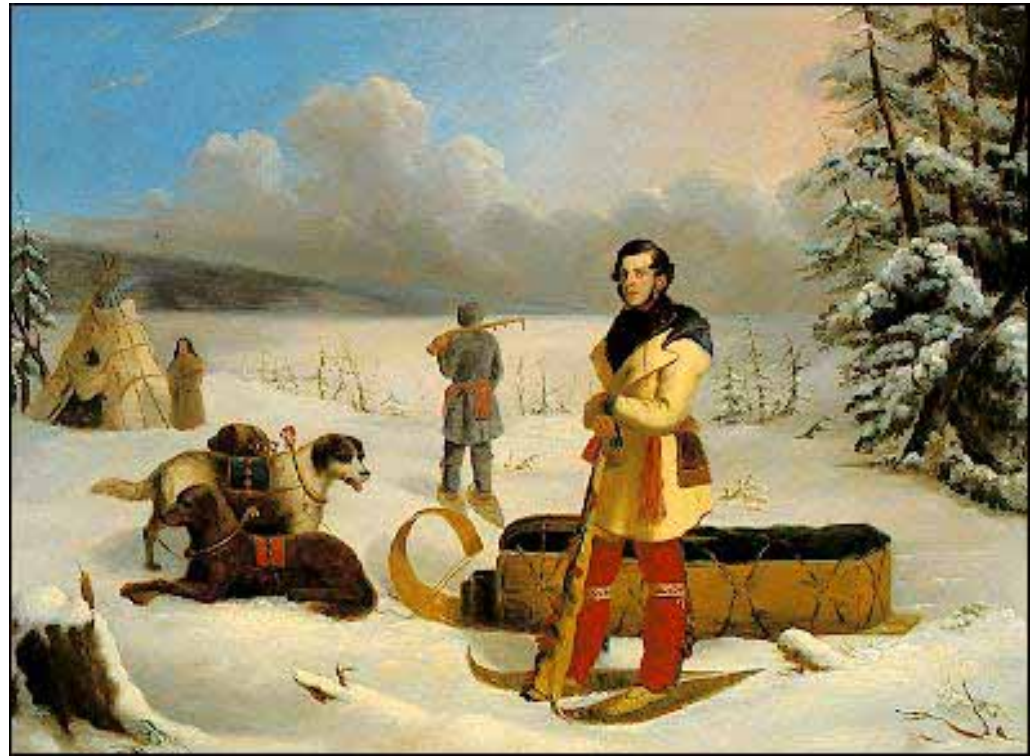
Friendly flies, parasites of tent caterpillars



Paul Kane, 1850

Irish-born artist, travelled from Toronto to western Canada to record native life and natural scenery. 1845-1848.

First written record of a forest tent caterpillar outbreak.



**Kee-a-kee-ka-sa-coo-way,
Cree Chief**

Man Who Gives the War Whoop

Artist: Paul Kane, Fort Pitt, SK
Year: 1848



**Maydocgamekinungee
Ojibway Chief**

Artist: Paul Kane, Fort William, ON
Year: 1848

“June 6th - It was a remarkable fact that the trees on each side of the river, and part of the Lake of the Woods, for a full 150 miles of our route, were literally stripped of foliage by myriads of green caterpillars, which had left nothing but the bare branches: and I was informed that the scourge extended to more than twice the distance I have named, the whole country wearing the dreary aspect of winter at the commencement of summer.”

“As it was impossible to take our breakfast on land, unless we made up our minds to eat them dropping incessantly as they did from the trees among our food, and the ground everywhere covered with them *en masse*, we were compelled to take it in our canoes. We met some Indians, from whom we purchased seven fine sturgeons, each weighing perhaps forty or fifty pounds.”

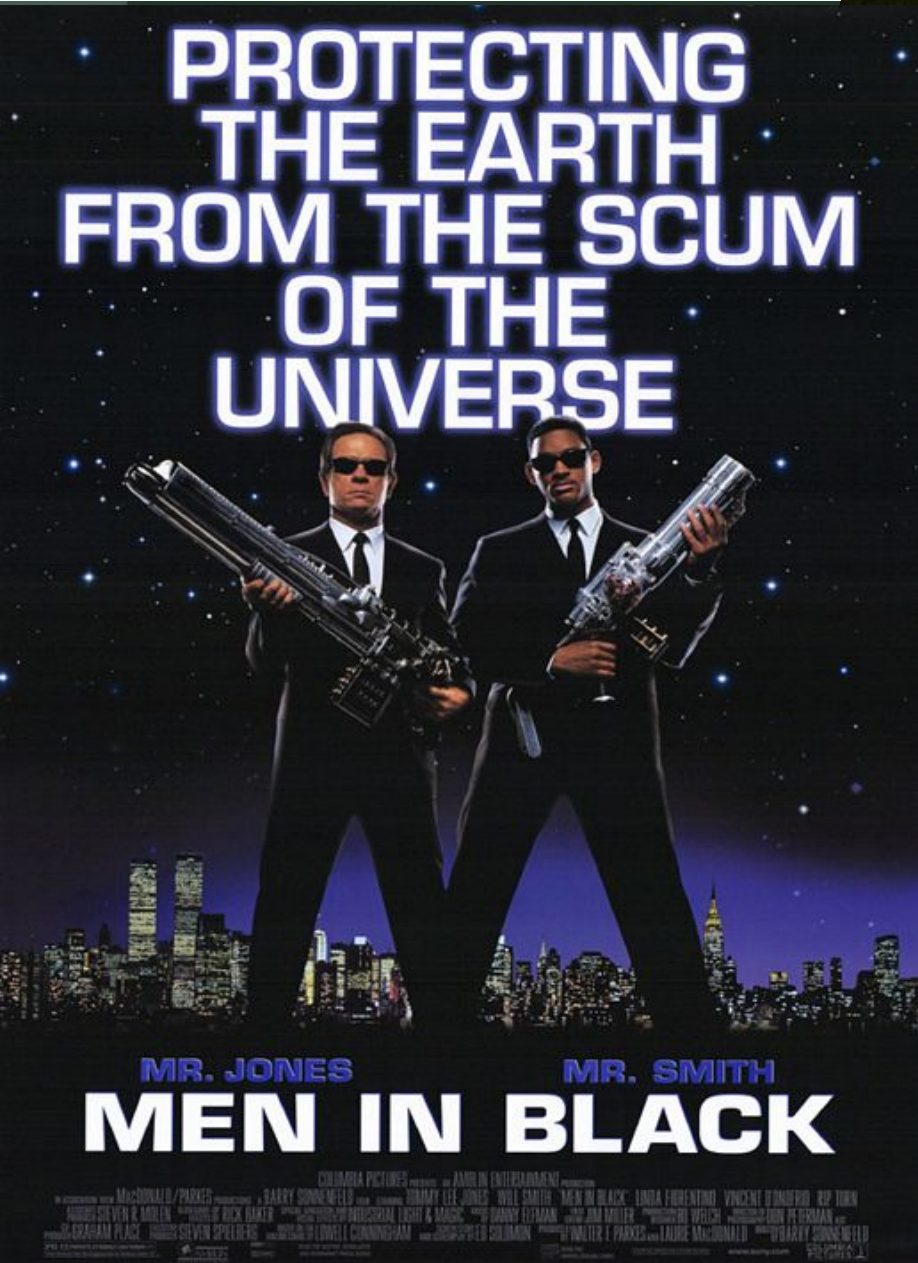
“We next entered the Lake of the Woods, and camped on a beautiful rocky island, having made fifty-three miles in one day.”

The field notes for June 6, 1846 read as follows:
“6th. the trees on each side of the river are
eaten up with caterpillars not a leaf remaining on
the trees looks like winter could not find a place
to breakfast for them the shore covered with
them for 150 m. about Sturgeon at an encampment
of Indians entered Lake of the Woods”

The 1858 book- “June 8- We camped for the night a few miles below this station (White Dog), and still found the caterpillars before alluded to extremely annoying, covering as they did completely our blankets and clothing.”

The field notes - June 8th and 9th-“past through sum beautiful rappeds took a cetch of rapid de gock and flays quantuy miskitas and black flies verrey bad did not sleep all night for them had to get on a rook they caterpillar's was so numeras

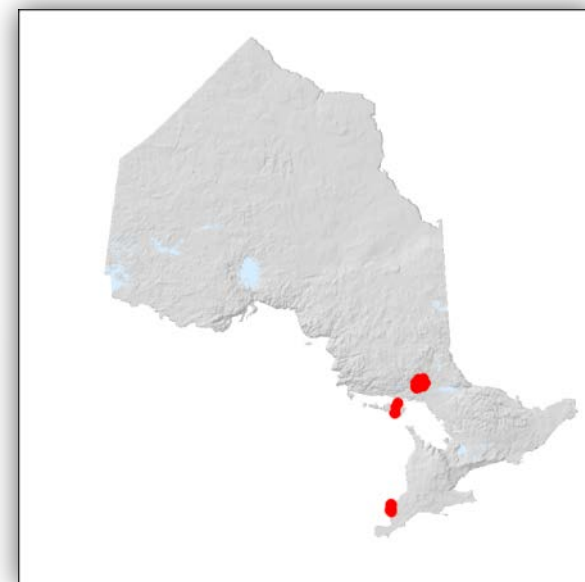
Invasive Alien Species



Gypsy moth

Pest Information

Pest Origins: **Invasive** - Native to Europe
Pest Type: Defoliator
Host Species: Oak, birch, aspen and various hardwoods
Infestation Area: **9,188 ha (2013)**




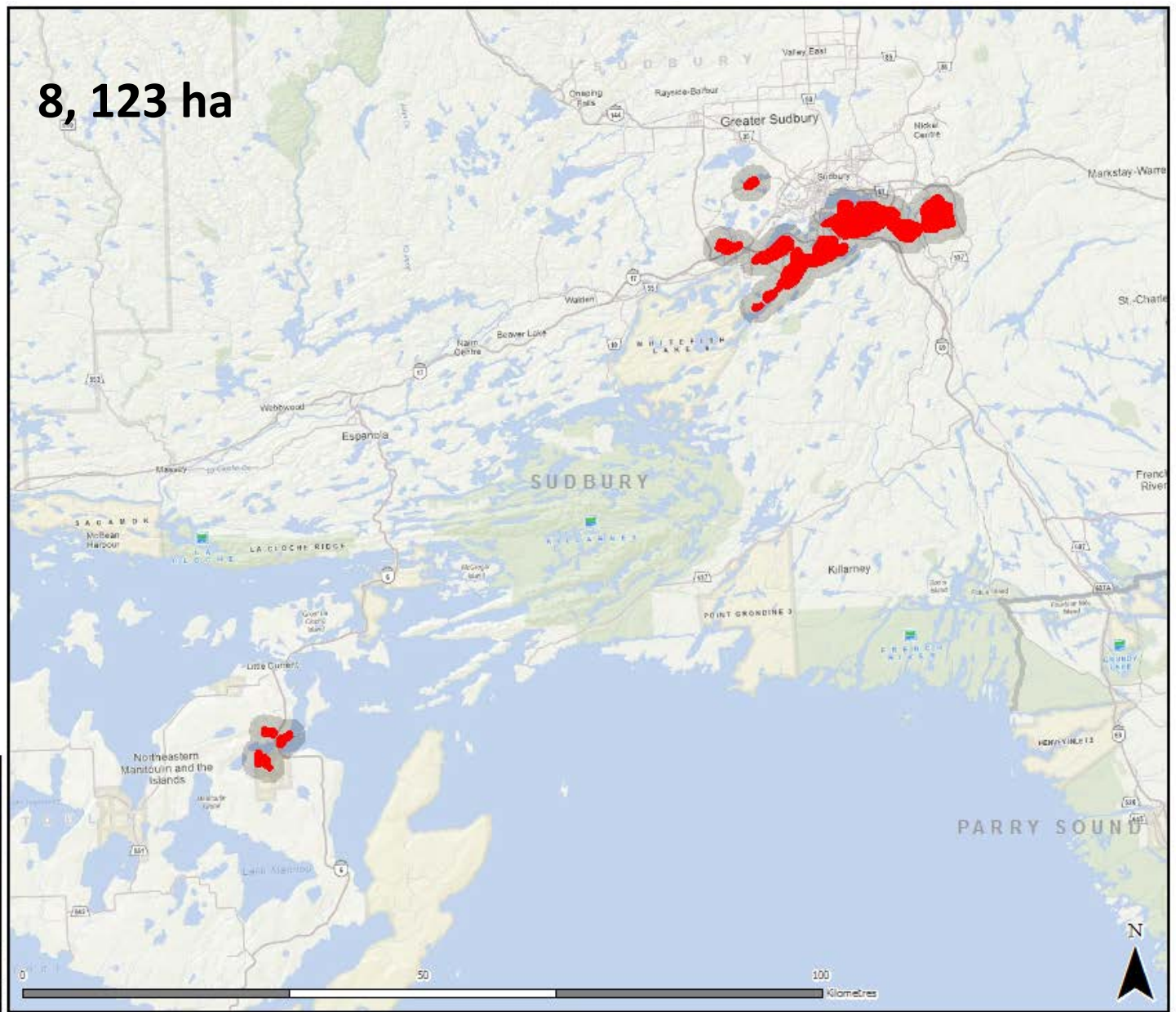
Gypsy moth



Gypsy moth 2012

Map 2
Northeastern Region
Areas-within-which gypsy
moth caused defoliation.

 Area of Moderate-to-Severe Defoliation





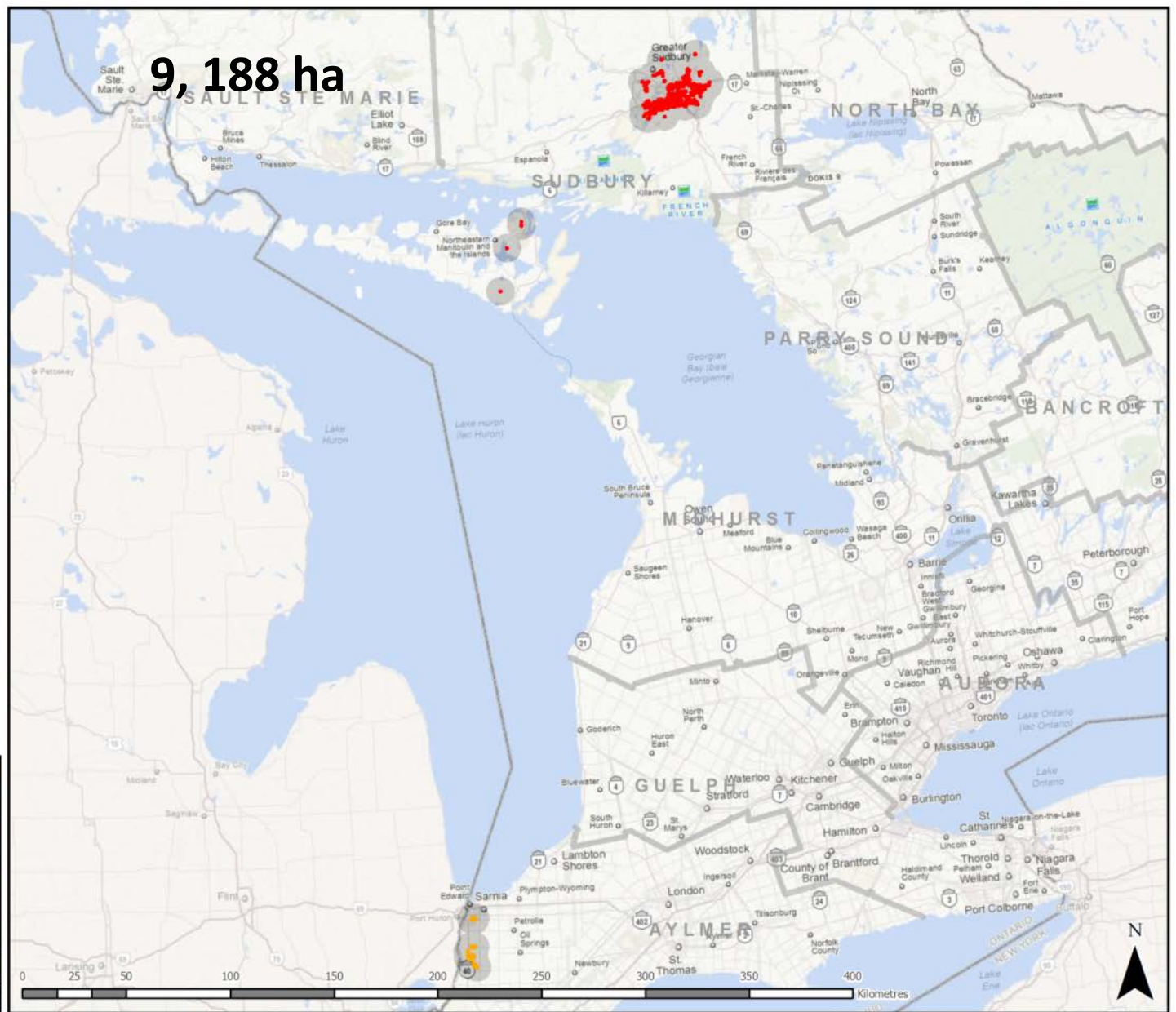
Gypsy moth



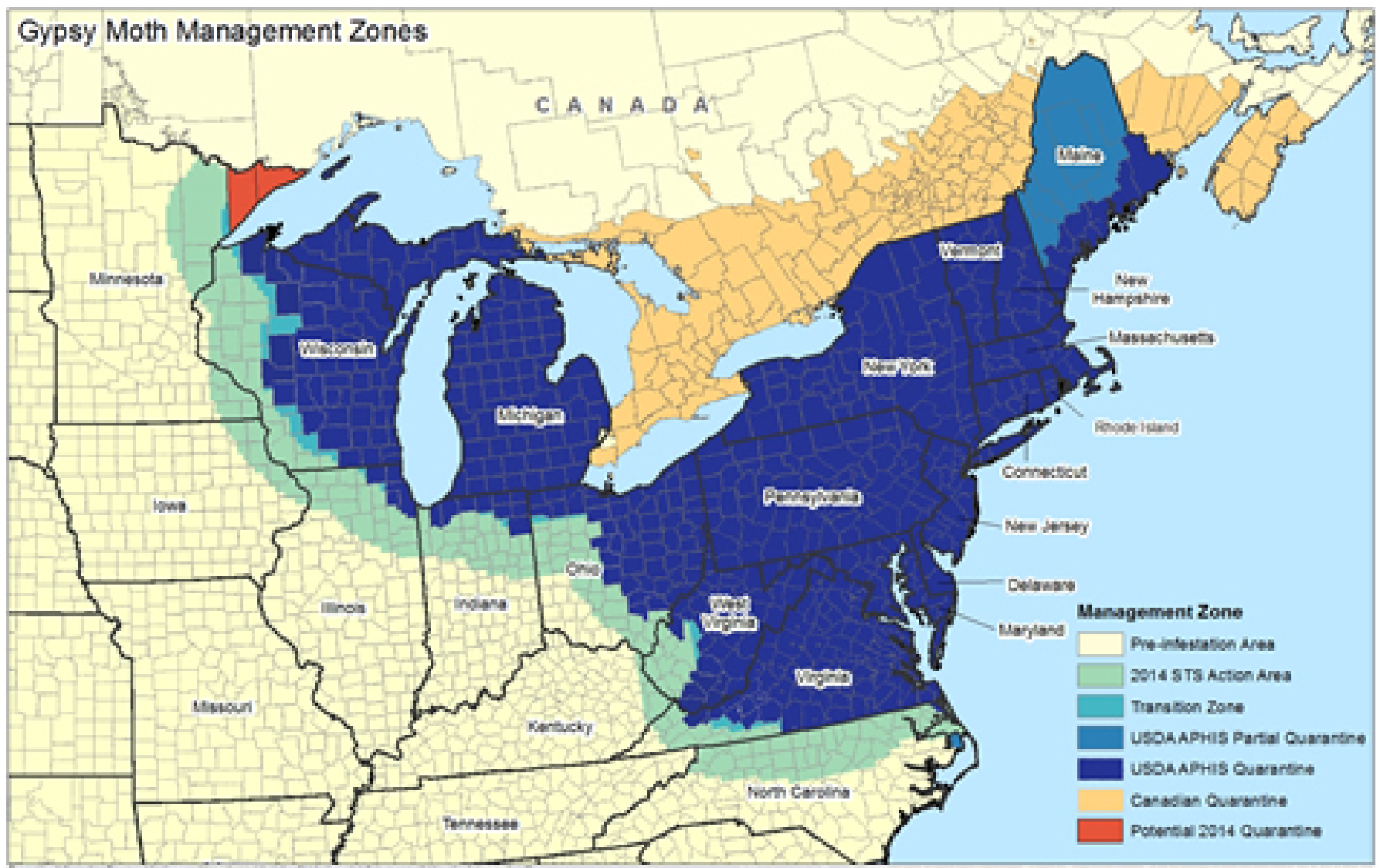
Gypsy moth 2013

Map 1
Overview
Areas-within-which gypsy moth caused defoliation.

-  Area of Light Defoliation
-  Area of Moderate-to-Severe Defoliation



Gypsy Moth Management Zones

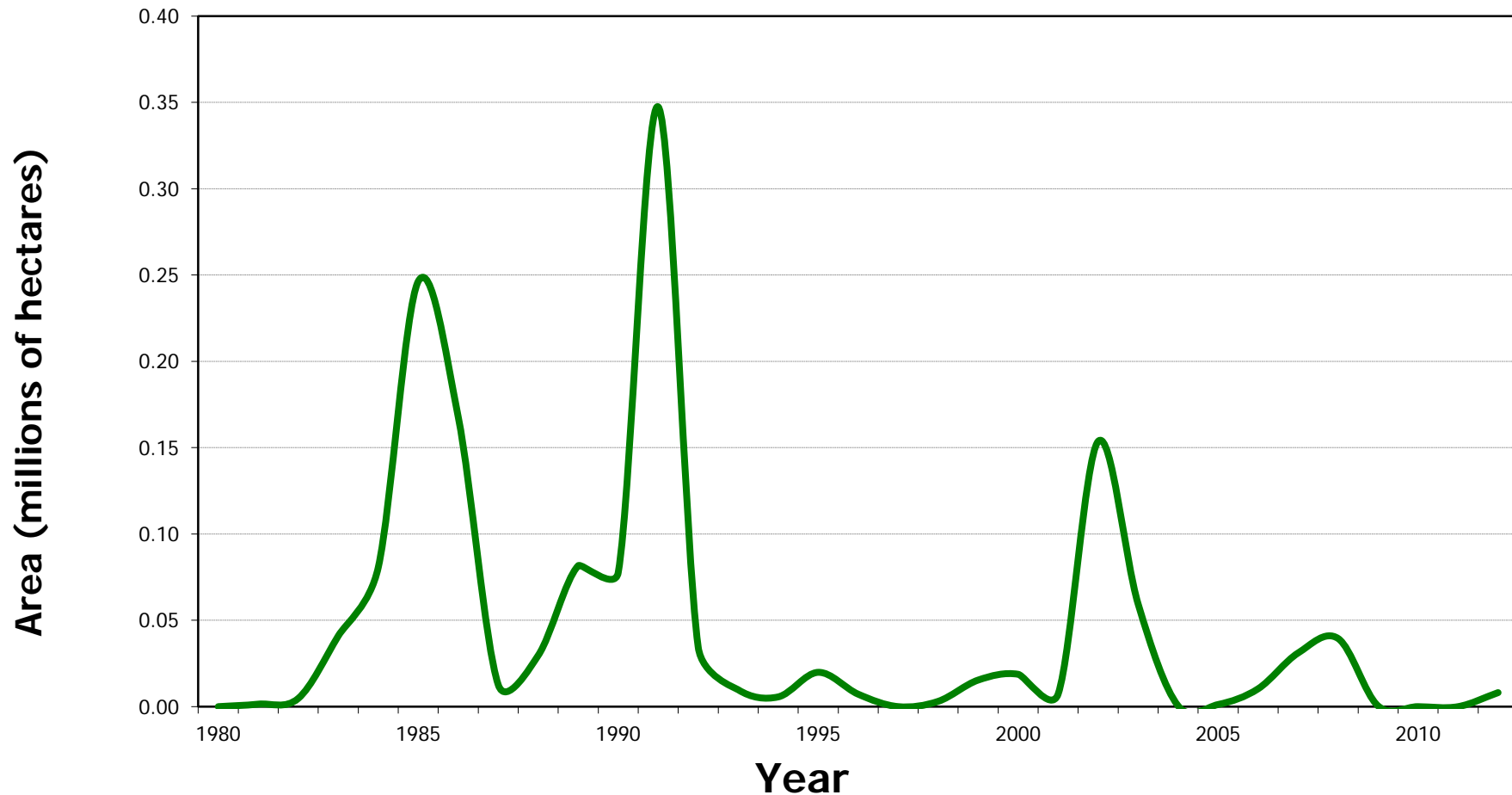


Minnesota Department of Agriculture - Plant Protection Division (updated: 12/20/2013)

Gypsy moth could invade northwestern Ontario from Minnesota
Impact on forest should be minimal

Gypsy moth

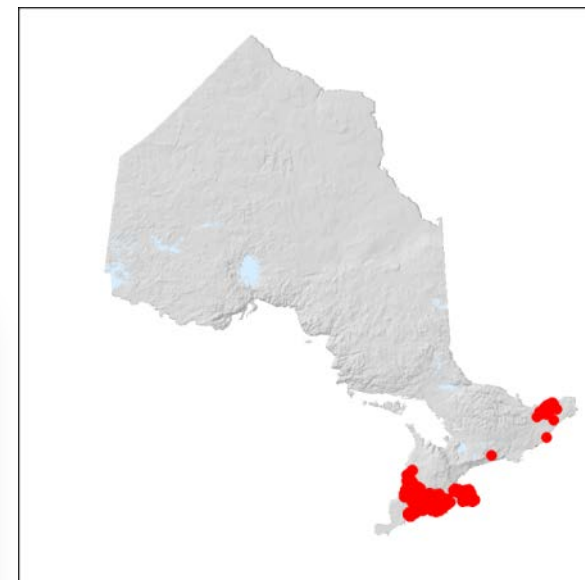
Gypsy Moth Moderate-to-Severe Defoliation Area in Ontario 1950-2013



Emerald ash borer

Pest Information

Pest Origins: **Invasive** – Native to Asia
Pest Type: Wood Borer
Host Species: Ash spp.
Infestation Area: **126,000 ha (2013) cumulative**





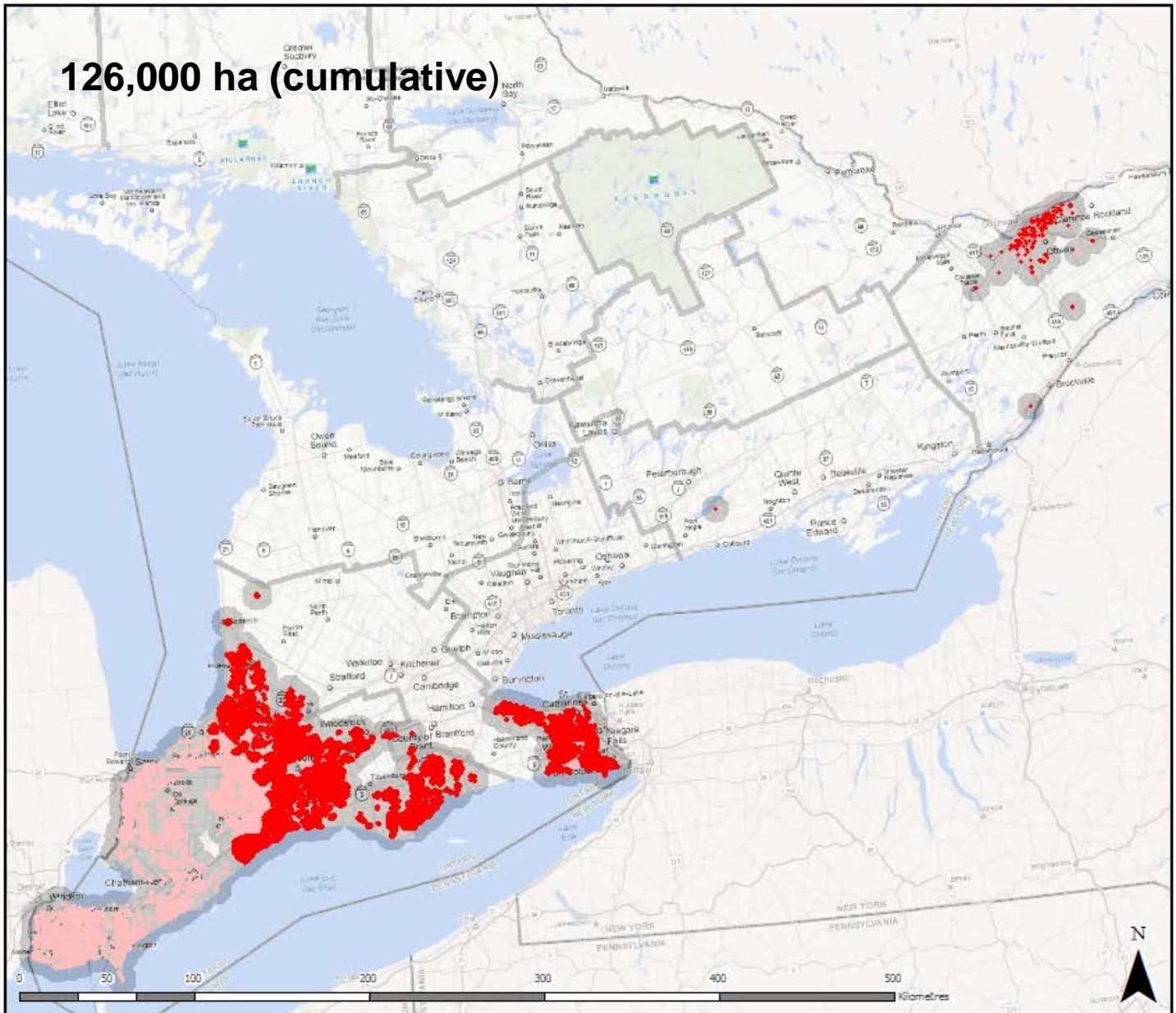
Emerald Ash Borer



Emerald Ash Borer 2004-2013

Map 1
Southern Region
Areas-within-which
emerald ash borer caused
moderate-to- severe
decline to ash species.

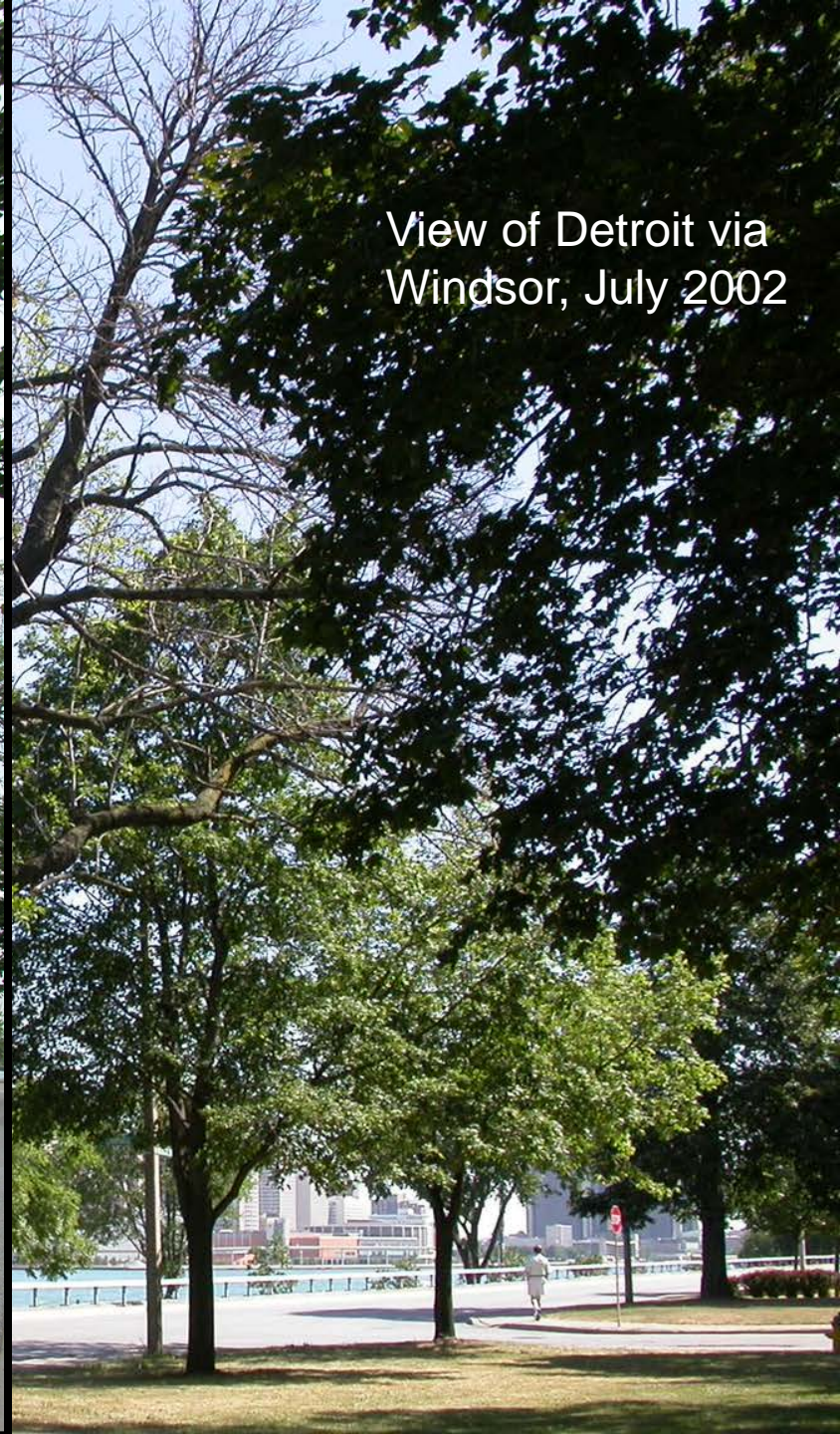
-  2013 - Area of Moderate-to- Severe Decline and Mortality
-  2004 – 2012 Area of Moderate-to- Severe Decline and Mortality
*no 2008 data



Discovered July 2002

- Detroit: Michigan State University
- Windsor: MNR & CFS forest health staff





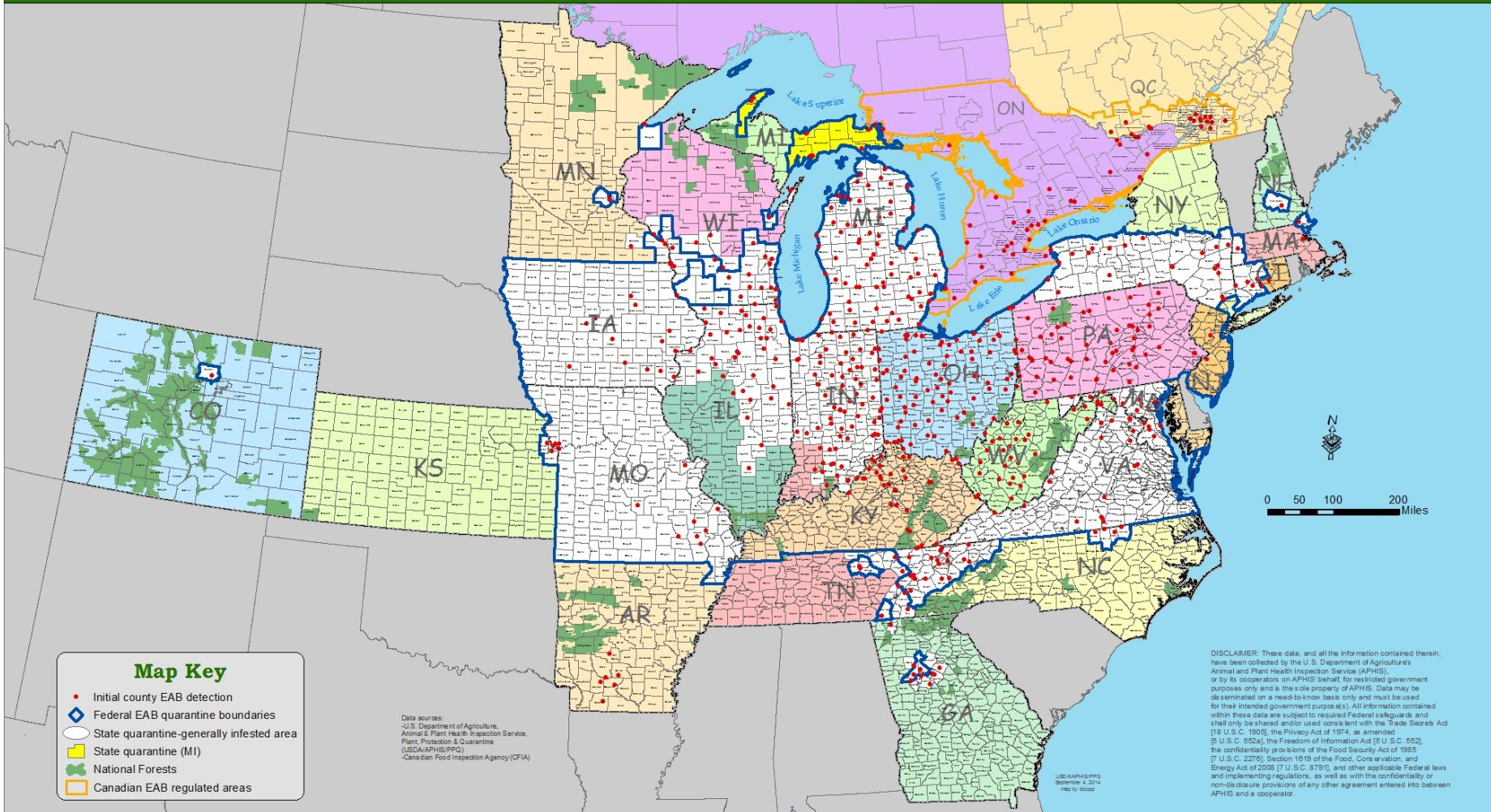
View of Detroit via
Windsor, July 2002



Cooperative Emerald Ash Borer Project

Initial county EAB detections in North America

September 4, 2014



Emerald ash borer now in 23 states and 2 provinces

Adult

8.5-13.5mm



Larva

26-32 mm



HOSTS:

- All ash species (*Fraxinus*)
- Green (red), black, white, European, blue
- Significant impact on black ash First Nations cultural uses (baskets, masks)
- Blue ash shows resistance
- NOT mountain ash






**Crown dieback
epicormic shoots**





Emerald ash borer in the summer





Emerald ash borer kills 99% of the ash trees as it invades an area









Significant impacts in riparian zones – streams & shorelines



Cities face costs of >\$340 million over next 10 years for tree removal and replacement





The greatest risk to northern Ontario is from people moving firewood



Before EAB

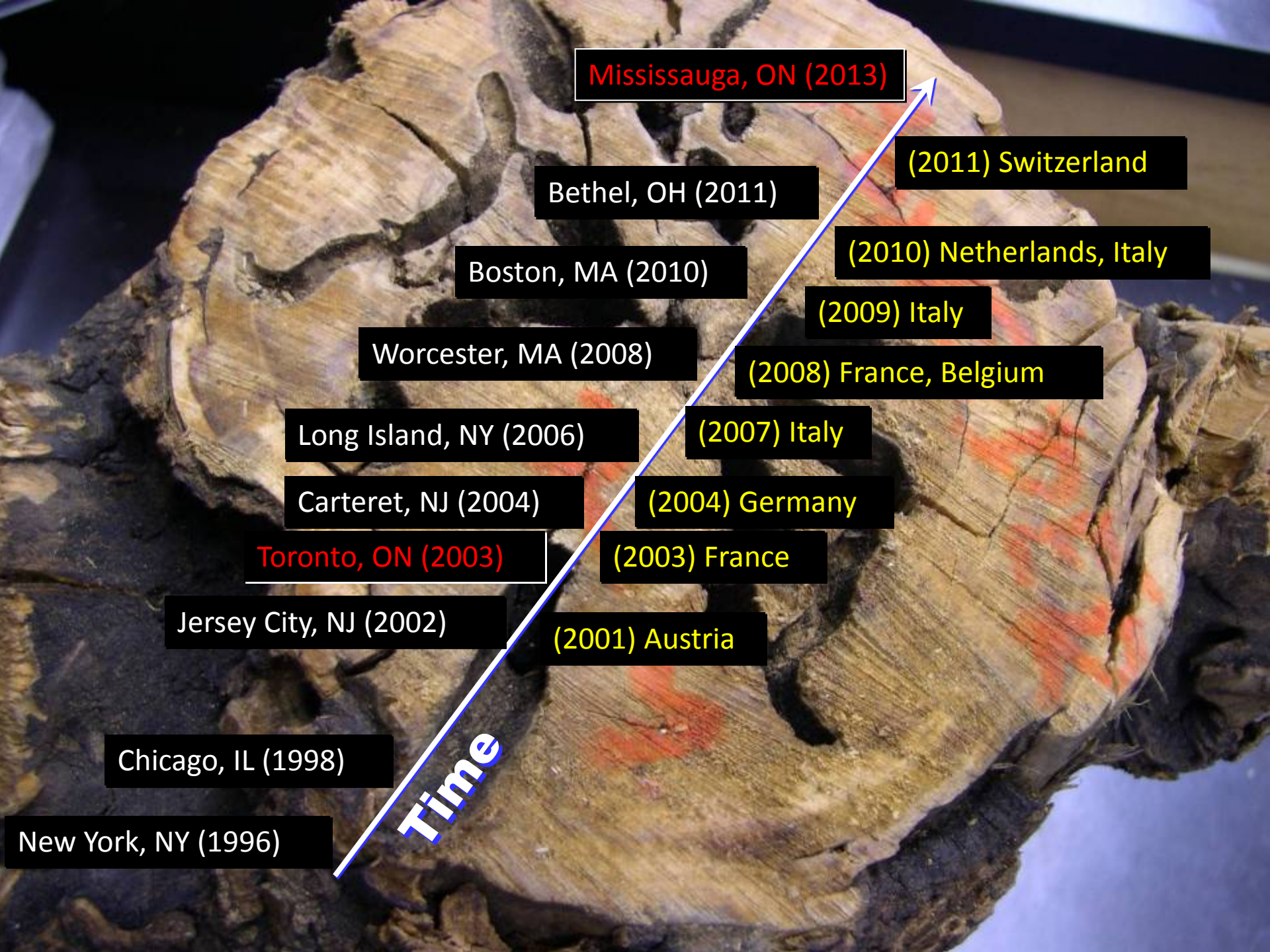
Dave Kreuzweiser, CFS

After EAB



Asian long-horned beetle





Mississauga, ON (2013)

(2011) Switzerland

Bethel, OH (2011)

(2010) Netherlands, Italy

Boston, MA (2010)

(2009) Italy

Worcester, MA (2008)

(2008) France, Belgium

Long Island, NY (2006)

(2007) Italy

Carteret, NJ (2004)

(2004) Germany

Toronto, ON (2003)

(2003) France

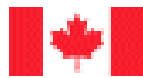
Jersey City, NJ (2002)

(2001) Austria

Chicago, IL (1998)

New York, NY (1996)

Time



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments



Natural Resources
Canada

Ressources naturelles
Canada

 **TORONTO**



Ontario




The City Above Toronto



 Agricultural
Research
Service



 **United States Department of Agriculture**



Asian long-horned beetle (Canada)

Discovered: Toronto-Vaughan 2003

Eradication and surveys 2003 to 2013

27,700 trees cut, 662 infested trees

Last infested trees and beetles found 2007

Declared eradicated April 5, 2013 (5 yrs negative surveys)



2013 Asian long-horned beetle

Mississauga August 2013

Delimitation survey to Dec 2013

25 infested trees found (1 Toronto)



**Science panel recommendations
to CFIA Dec 2013**

**Infestation quite small, localized, probably a remnant of
2003 infestation**

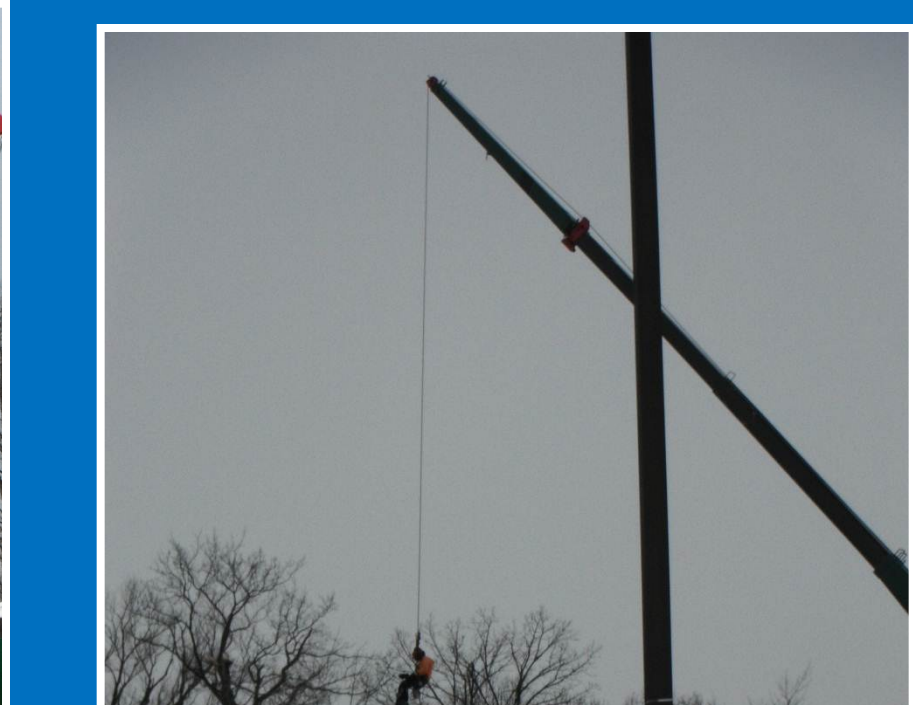
Eradication February-March 2014

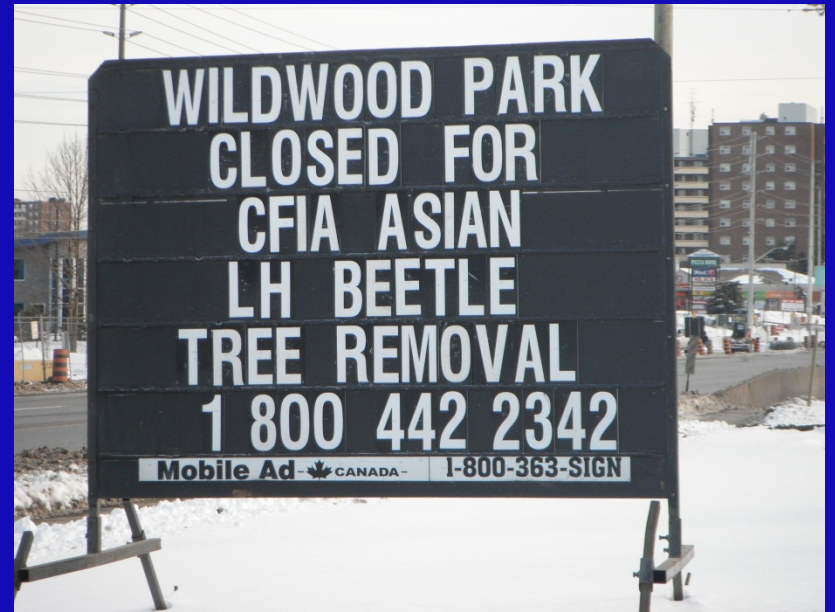
2013 Asian long-horned beetle

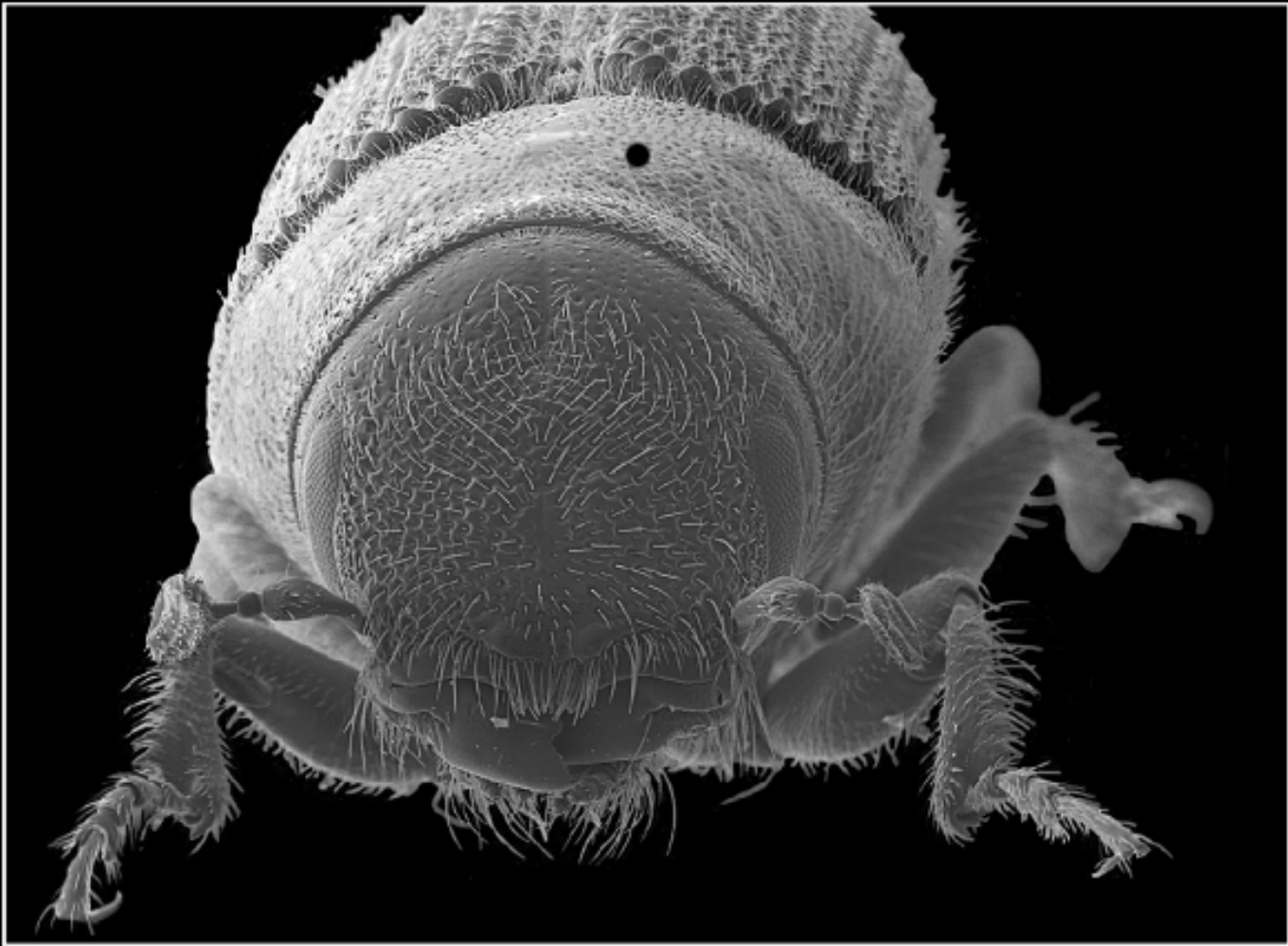


MILL 908
HT
MILL 908
HT
MILL 908
HT
MILL 908





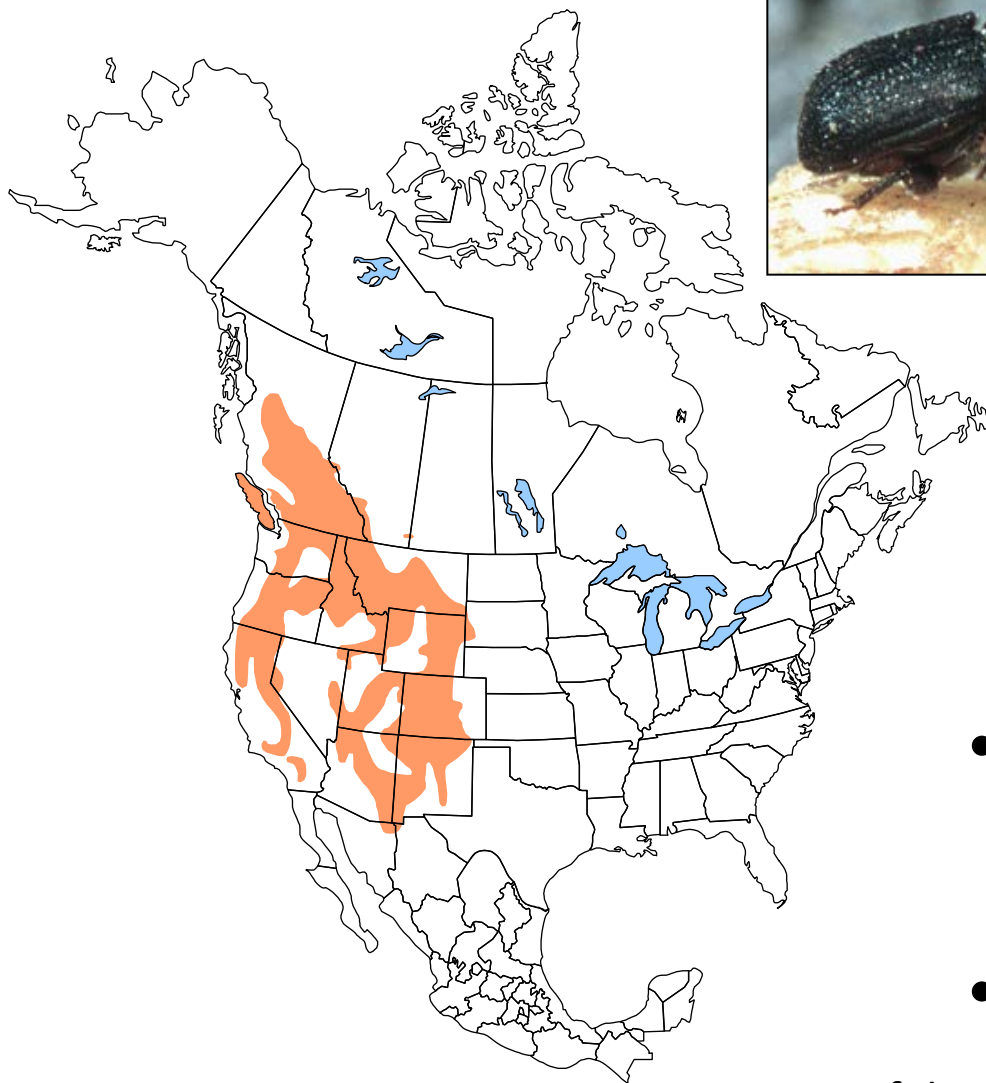




got pine?

Slide: Chris MacQuarrie, CFS

Mountain Pine Beetle

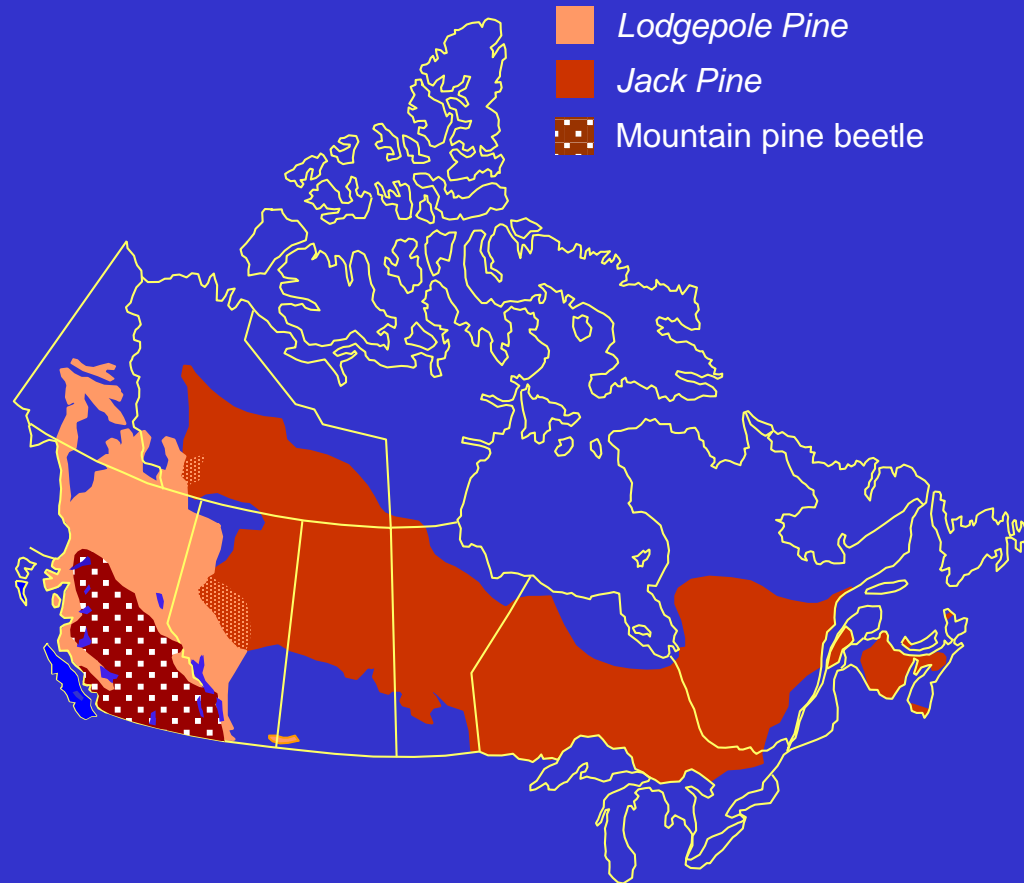


- Historic range: western North America
- Phloem feeder

➔ Successful reproduction \equiv tree death

Mountain Pine Beetle

Susceptible Pine Across Canada

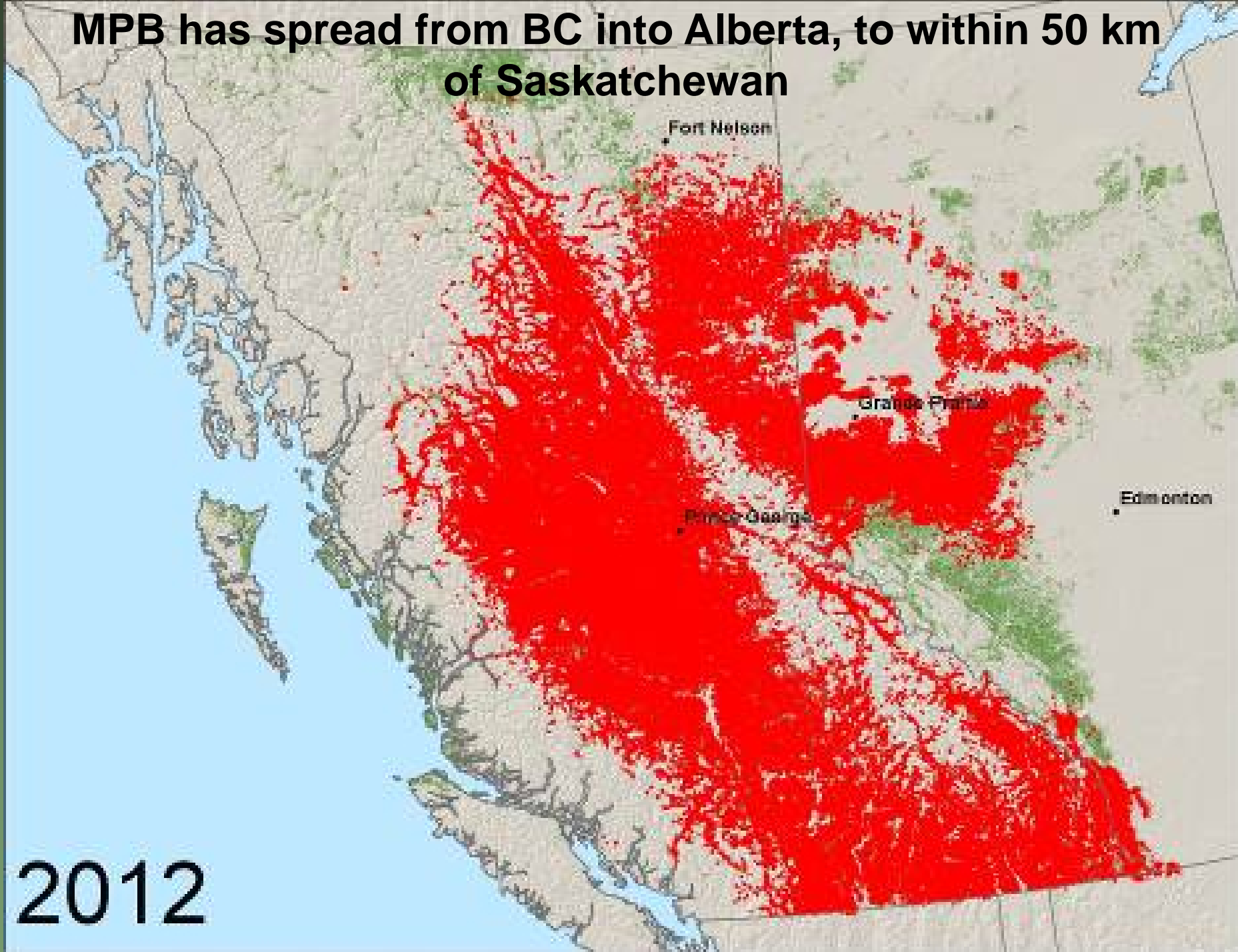


No climate or biological barriers to MPB

Source: NRCan/CFS/PFC

Lodgepole and jack pine abundance in Canada

MPB has spread from BC into Alberta, to within 50 km of Saskatchewan



2012

An aerial photograph showing a vast, undulating landscape covered in dense forest. The forest has a reddish-brown hue, suggesting it might be composed of coniferous trees. Scattered throughout the terrain are numerous small, irregularly shaped lakes and ponds, some of which are interconnected by narrow channels. The background shows rolling hills and a larger body of water in the distance under a clear sky.

Over 18 million hectares of mature timber killed by mountain pine beetle in BC and Alberta

BC: mature trees dead.
MPB attacking young stands



Mountain Pine Beetle



Firemaster kiln dries its firewood



MPB could be moved to Ontario in firewood or logs



ONTARIO Actions: Research Support

CFS projects supported by MNR:

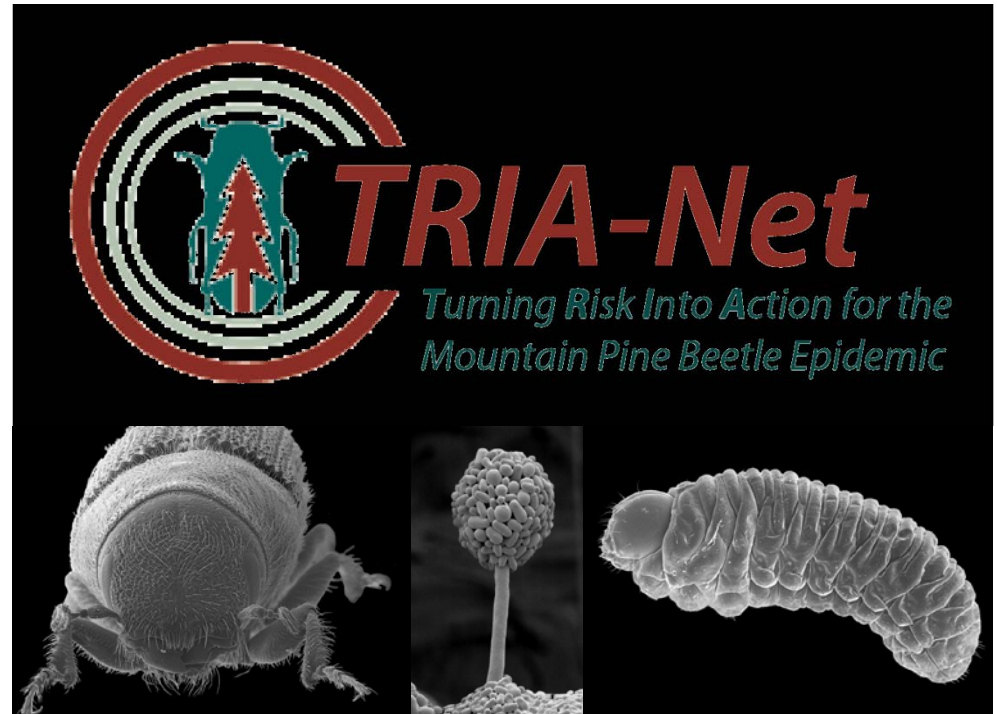
- suitability of jack & white pine as MPB hosts (Invasive Species Centre funds)
- modeling future Ontario climate suitability and eastward expansion (AB, SK, MB)
- assessing current Ontario climate (ISC \$)
- changes in MPB ecology in jack pine hosts
- search for fungal control agents



ONTARIO Actions: Research Support

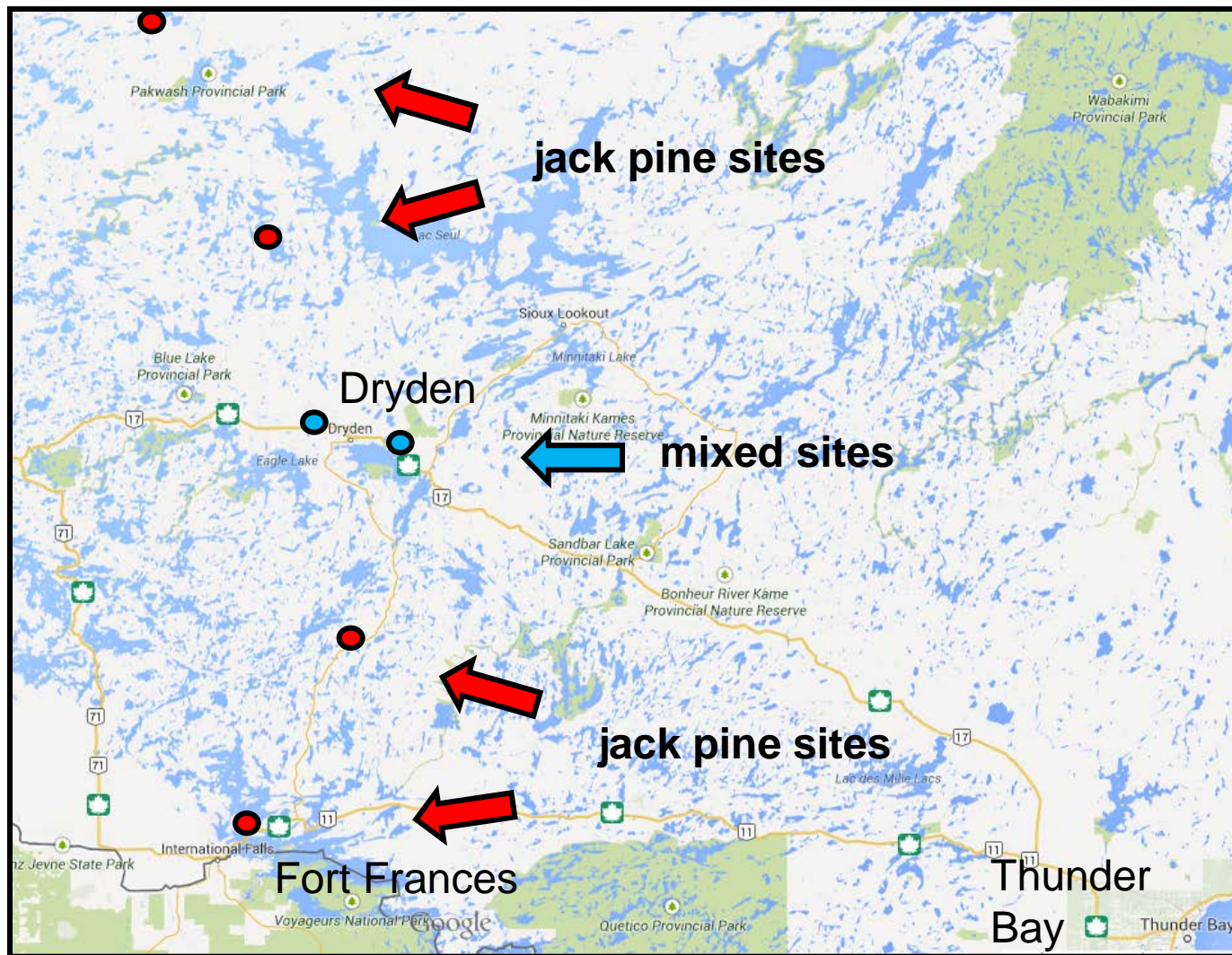
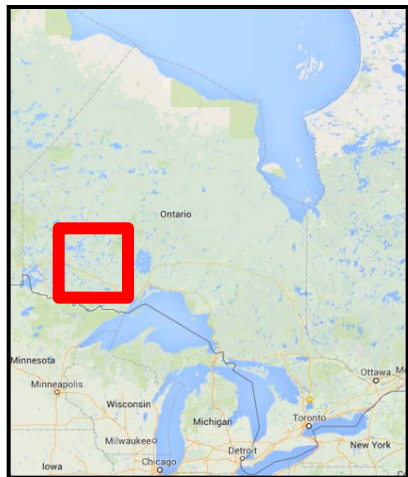
University of Alberta et al.

- \$3.5 million MPB TRIA-
Network genetics + population
ecology + management
- Interactions between pine
chemistry and MPB
pheromone
- Sprayable pheromone sex
attractant





Monitoring under-bark temperatures in Ontario pine species







Questions?