

# 2016 MINNESOTA FOREST HEALTH HIGHLIGHTS

BOREAL FOREST HEALTH INFORMATION SESSION

OLD FORT WILLIAM, THUNDER BAY

MIKE PARISIO — REGIONAL FOREST HEALTH SPECIALIST

 **DEPARTMENT OF  
NATURAL RESOURCES**

# MNDNR FOREST HEALTH UNIT

MIKE PARISIO

NORTHWEST REGION FOREST HEALTH SPECIALIST

BEMIDJI, MN

218 308-2363

JESS HARTSHORN

NORTHEAST REGION FOREST HEALTH SPECIALIST

GRAND RAPIDS, MN

218 328-8897

BRIAN SCHWINGLE

CENTRAL REGION FOREST HEALTH SPECIALIST

ST. PAUL, MN

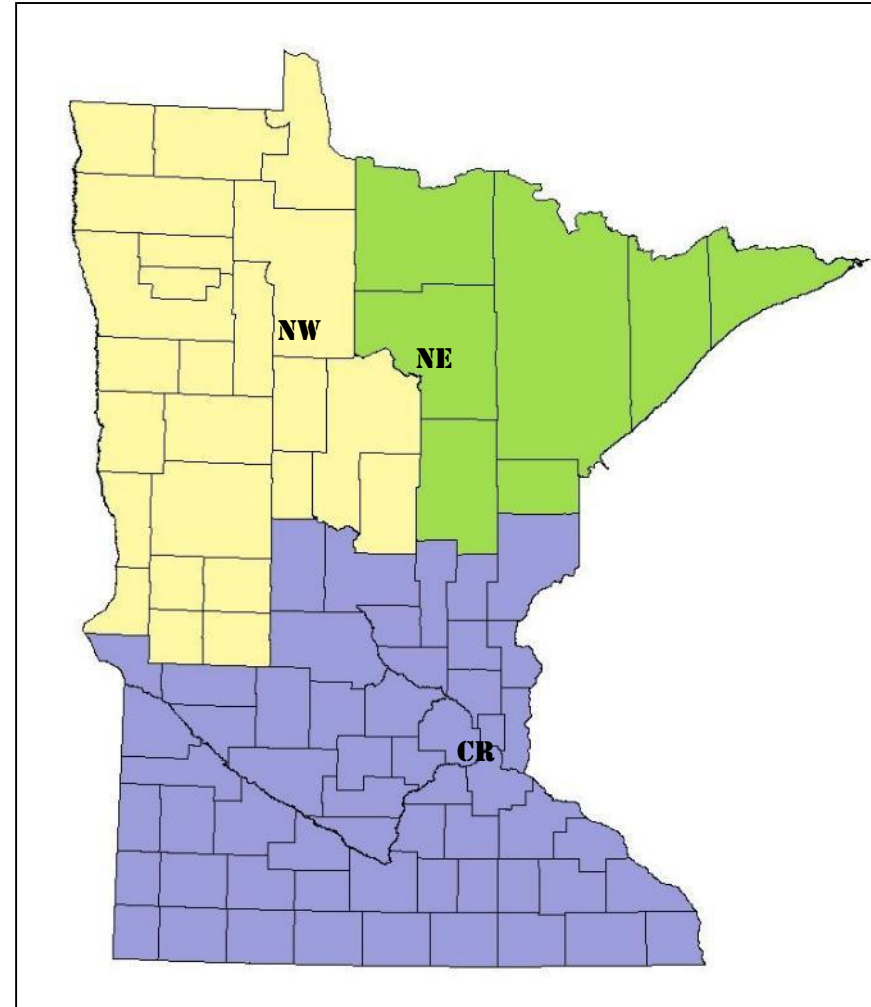
651-259-5821

VAL CERVENKA

FOREST HEALTH PROGRAM COORDINATOR

ST. PAUL, MN

651-259-5296



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- Forest health
  - Main page
  - Annual reports
  - Emerald ash borer
  - Firewood can move pests
  - Forest Insect & Disease Newsletter
  - Forest tent caterpillars
  - Gypsy moth
  - Invasive animals
  - Invasive plants
  - Oakwilt
  - Pine bark beetles
  - Spraying tree pests
  - Two-lined chestnut borers

## Forest Insect & Disease Newsletter

August 2016

### In this issue:

- [Oak wilt confirmed in far northern Pine County and found in Waseca County for the first time](#)
- [Bur oak blight back again](#)
- [Not always BOB - Botryosphaeria twig canker on bur oak](#)
- [Scattered sickly green ash in central and southern Minnesota](#)
- [Spruce needle rust](#)
- [Weird curled leaves on yard black ash in southern Minnesota](#)
- [A "Tinge"-idae of discoloration](#)
- [Yellownecked caterpillars](#)
- [Fall webworms appearing](#)
- [Yellow-headed spruce sawfly](#)



Canker wound on bur oak twig with visible fruiting bodies caused by Botryosphaeria



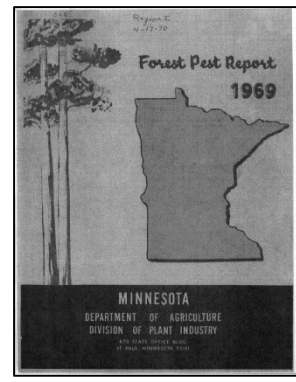
Underside of bur oak leaf showing oak lace bug nymphs, adults, and characteristic dark excrement spots.

[Archive for past issues](#)

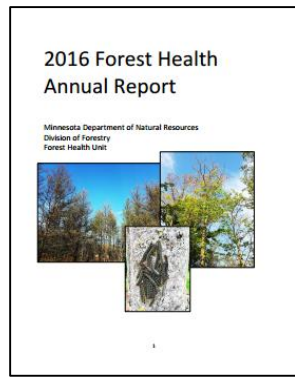
 **Email Updates**

Sign up to receive Forest Insect and Disease newsletter or access your subscriber preferences.

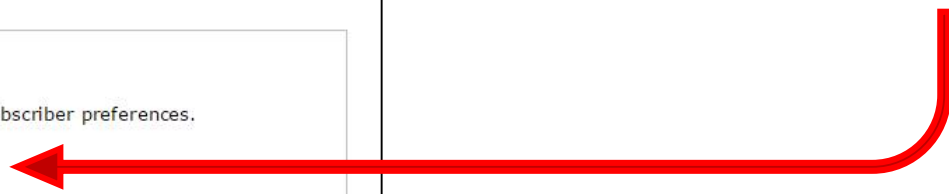
Email address



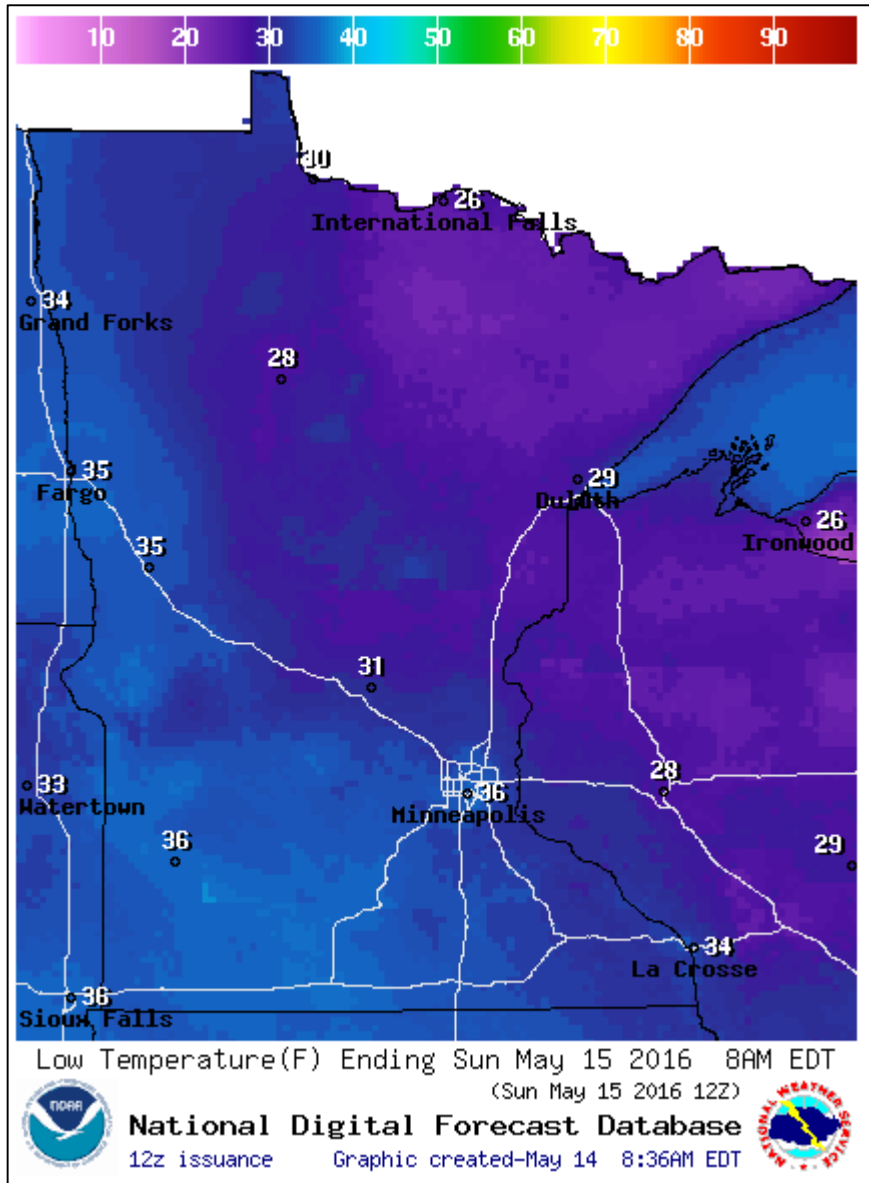
# ANNUAL REPORTS 1969-2016



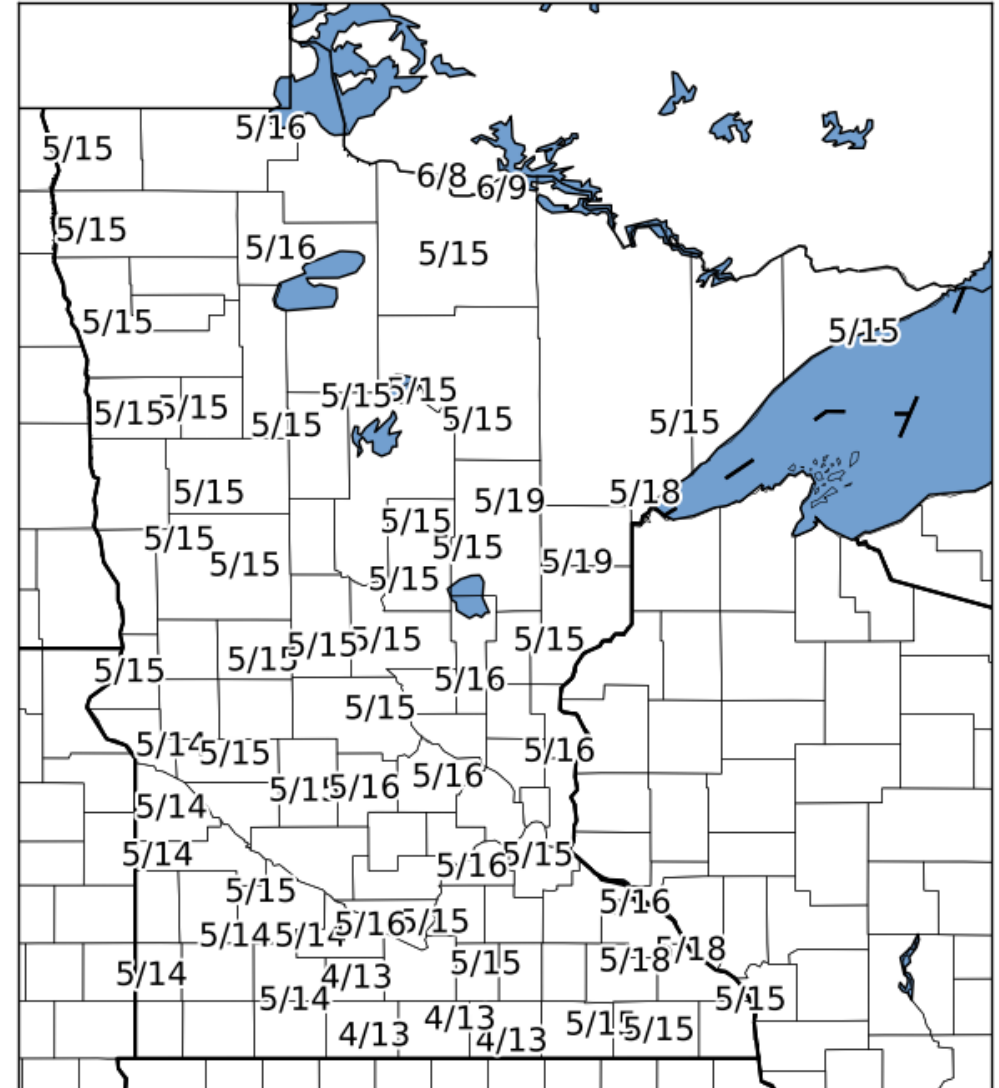
## STAY UP-TO-DATE ON MINNESOTA'S FOREST INSECT AND DISEASE ISSUES BY SIGNING UP FOR MNDNR'S



# WIDESPREAD FROST DAMAGE FROM MID-MAY 2016



2016 Last Spring Date Below 32 ° F  
based on NWS COOP and IEM Daily Estimates

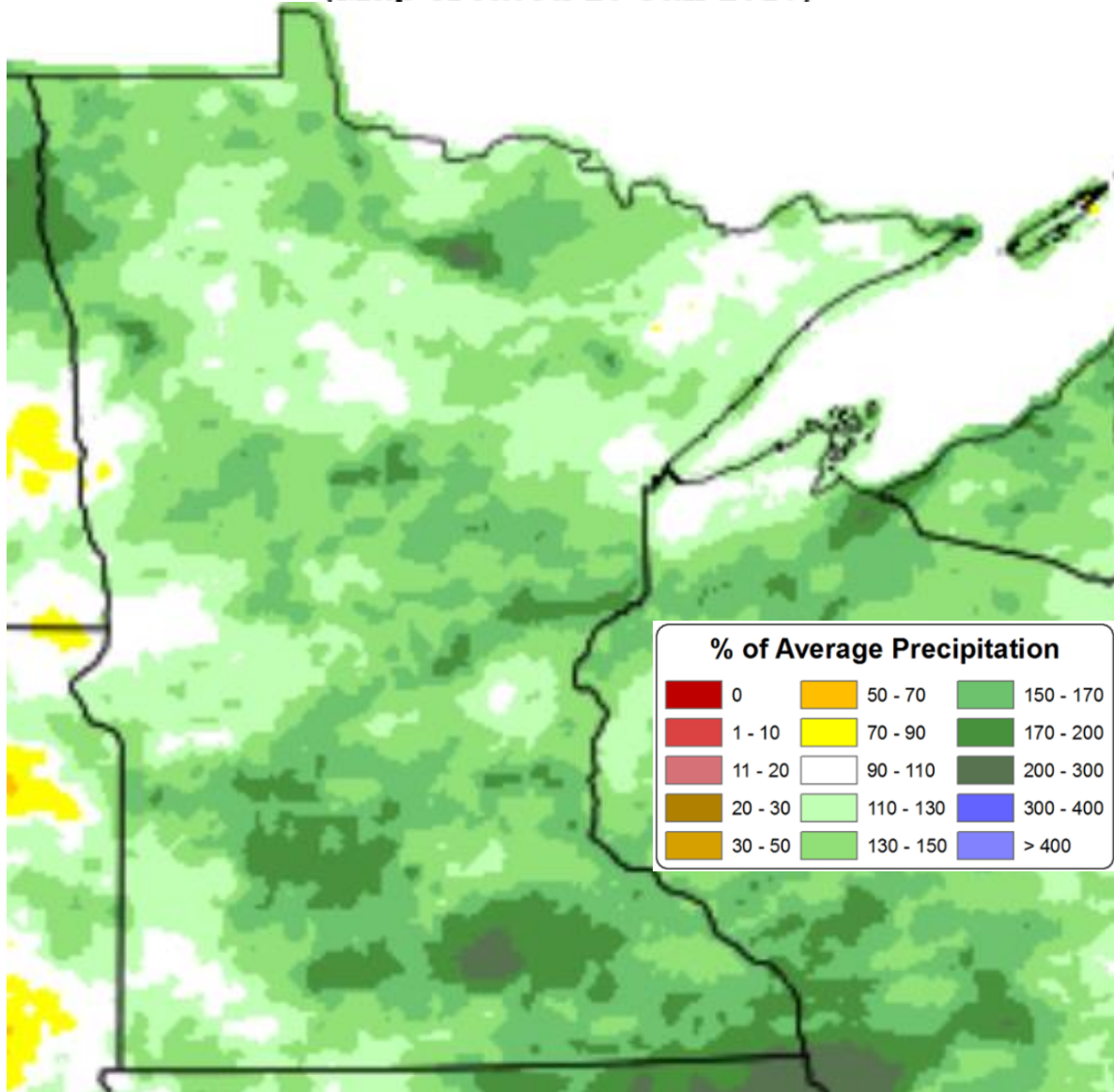


# Total Precipitation Anomaly: June 2016 - September 2016

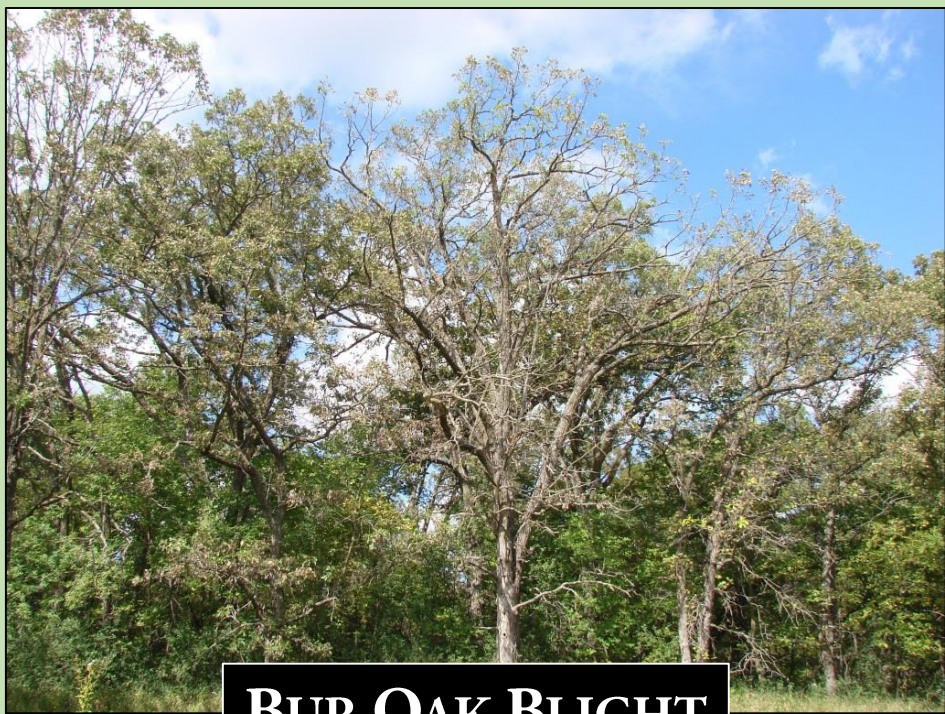
Period ending 7 AM EST 30 Sep 2016

Base period: 1981-2010

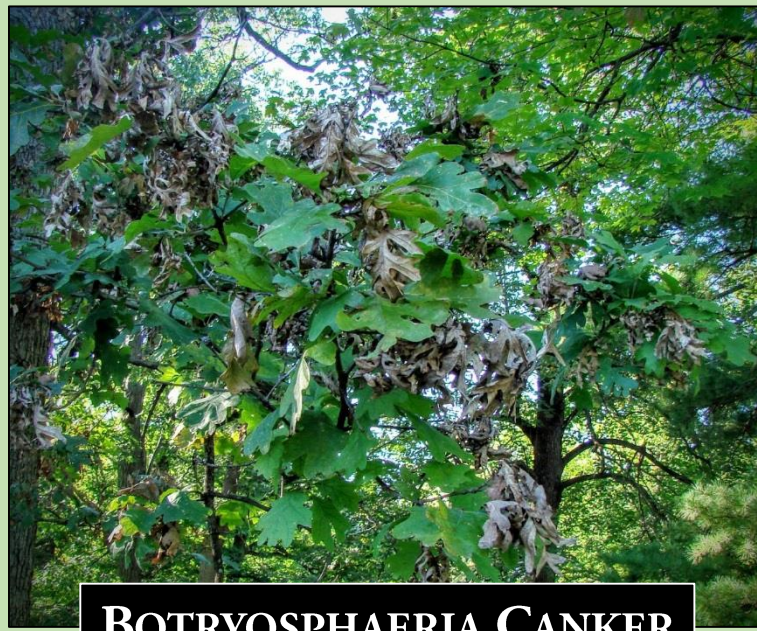
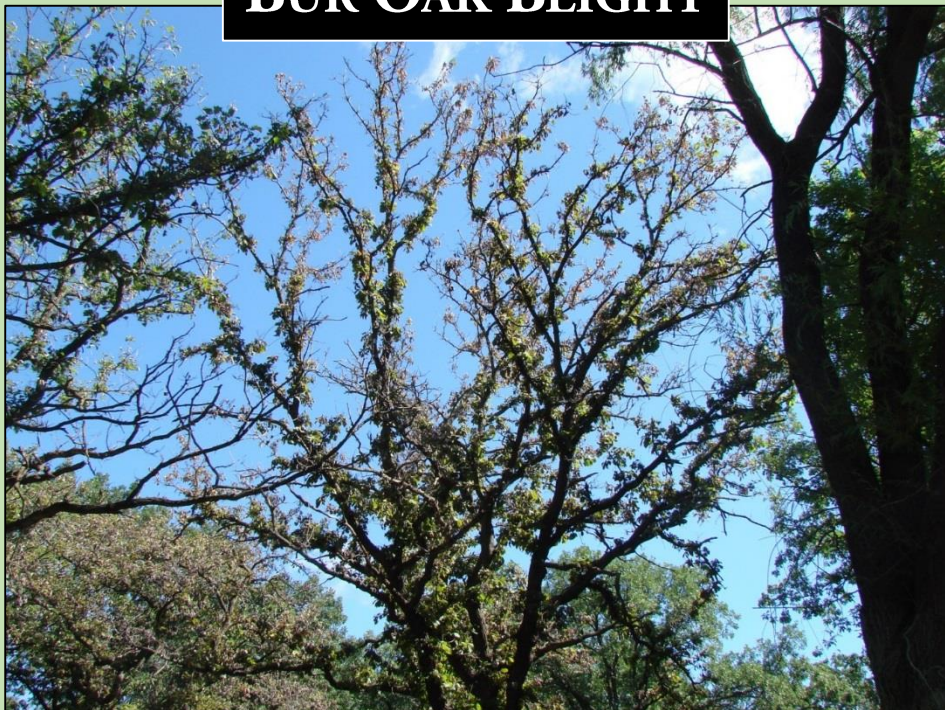
(Map created 20 Jan 2017)



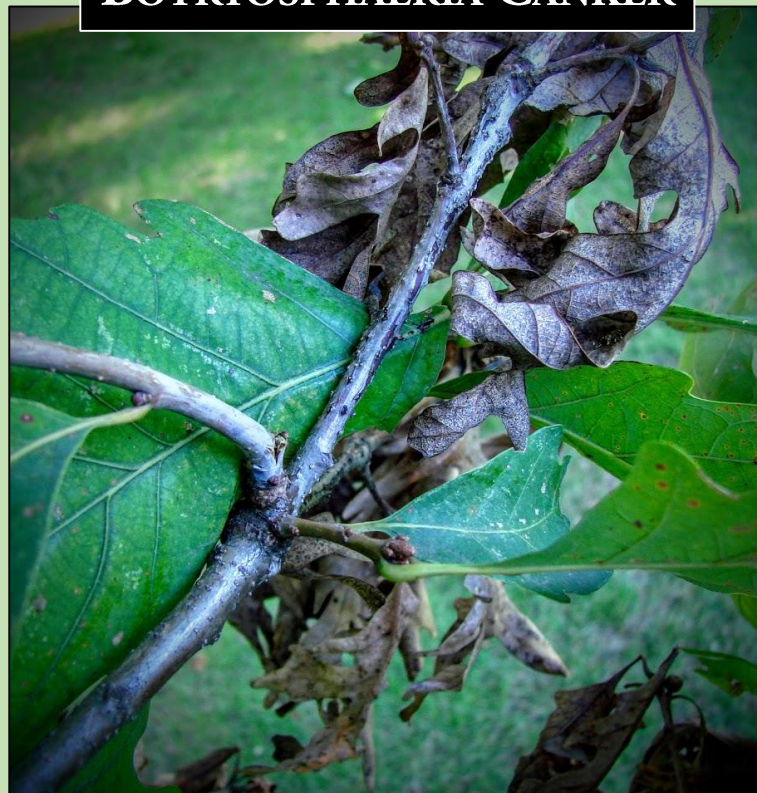
**ABOVE AVERAGE  
PRECIPITATION FROM  
JUNE –SEPTEMBER  
PROMOTED  
WIDESPREAD FOLIAR  
PATHOGEN ISSUES**



**BUR OAK BLIGHT**



**BOTRYOSPHERA CANKER**



**SPRUCE NEEDLE RUST**

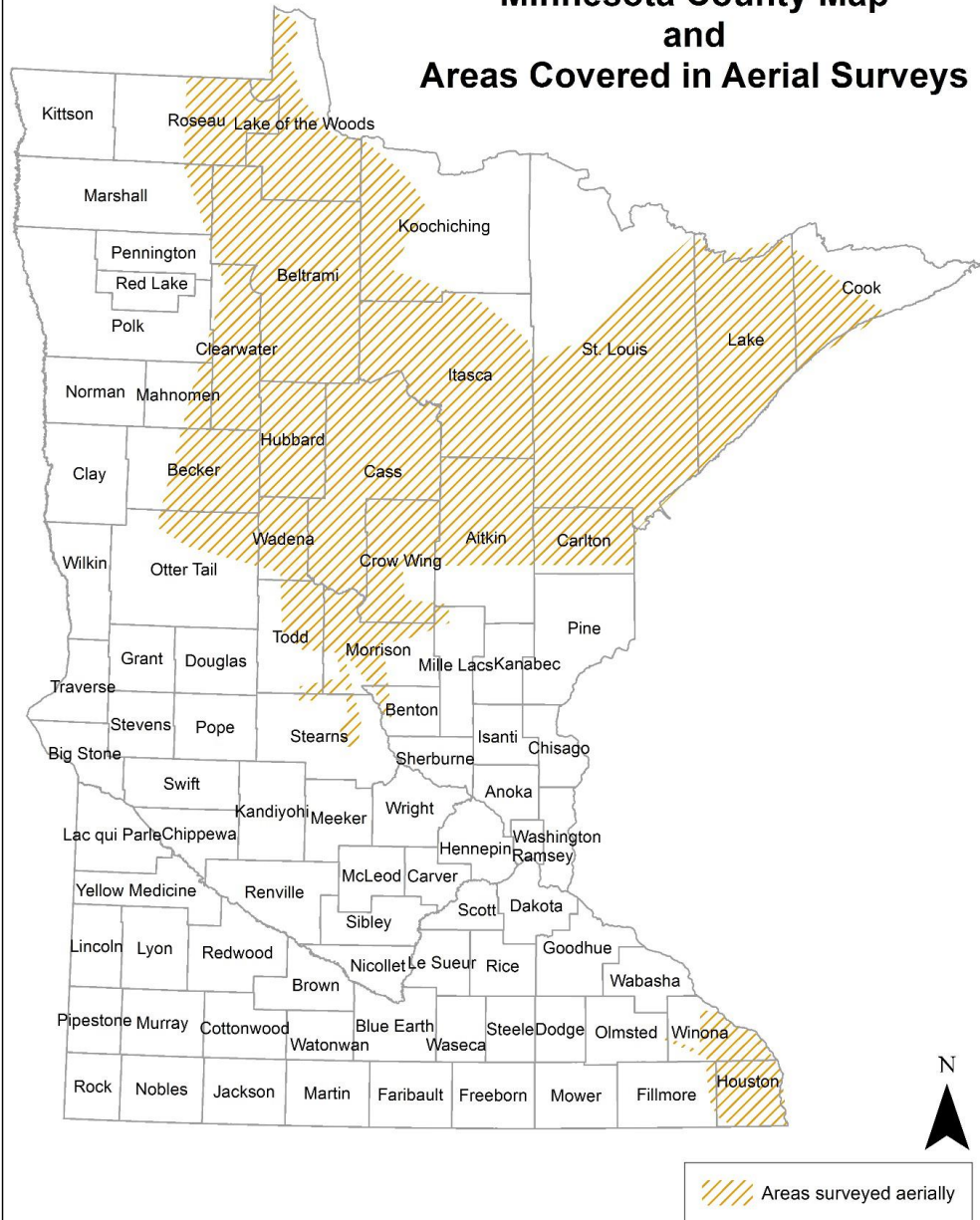


# ***DIPLODIA* SHOOT BLIGHT AND LATENT INFECTIONS PROBLEMATIC IN MINNESOTA AND WISCONSIN NURSERIES**



**3-0 CROPS DESTROYED IN BOTH STATES DUE TO HIGH RATES  
OF SHOOT BLIGHT AND LATENT INFECTION**

## Minnesota County Map and Areas Covered in Aerial Surveys



# 2016 MNDNR FOREST HEALTH AERIAL SURVEY

## CAVEATS...

- 22% LESS LAND SURVEYED IN 2016 THAN 2015
- FLIGHT TIMES DELAYED DUE TO WEATHER AND EQUIPMENT ISSUES
- SURVEYS MISSED SOME FTC & JPBW DEFOLIATION, FLOODING DAMAGE
- NOT ALL POLYGONS CAN BE GROUND-TRUTHED (3,567 POLYGONS)



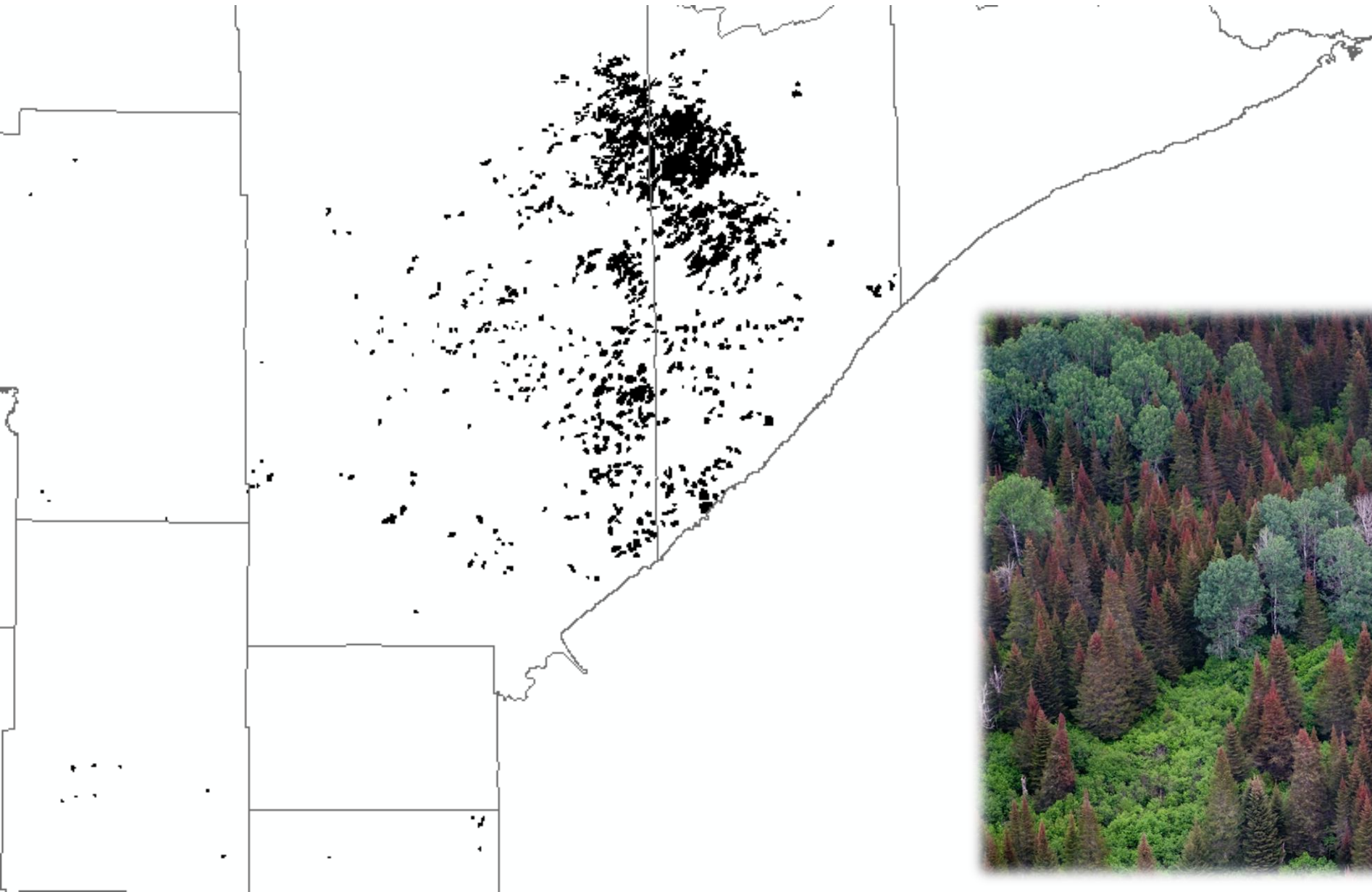
## TOP 5 DISTURBERS (AREA) IN 2016

- 1. SPRUCE BUDWORM:** **205 MI<sup>2</sup> – 131,200 ACRES**
- 2. EASTERN LARCH BEETLE:** **106 MI<sup>2</sup> – 67,840 ACRES**
- 3. WIND DAMAGE:** **29 MI<sup>2</sup> – 18,560 ACRES**
- 4. FOREST TENT CATERPILLAR:** **26 MI<sup>2</sup> – 16,640 ACRES**
- 5. LARCH CASEBEARER:** **26 MI<sup>2</sup> – 16,640 ACRES**

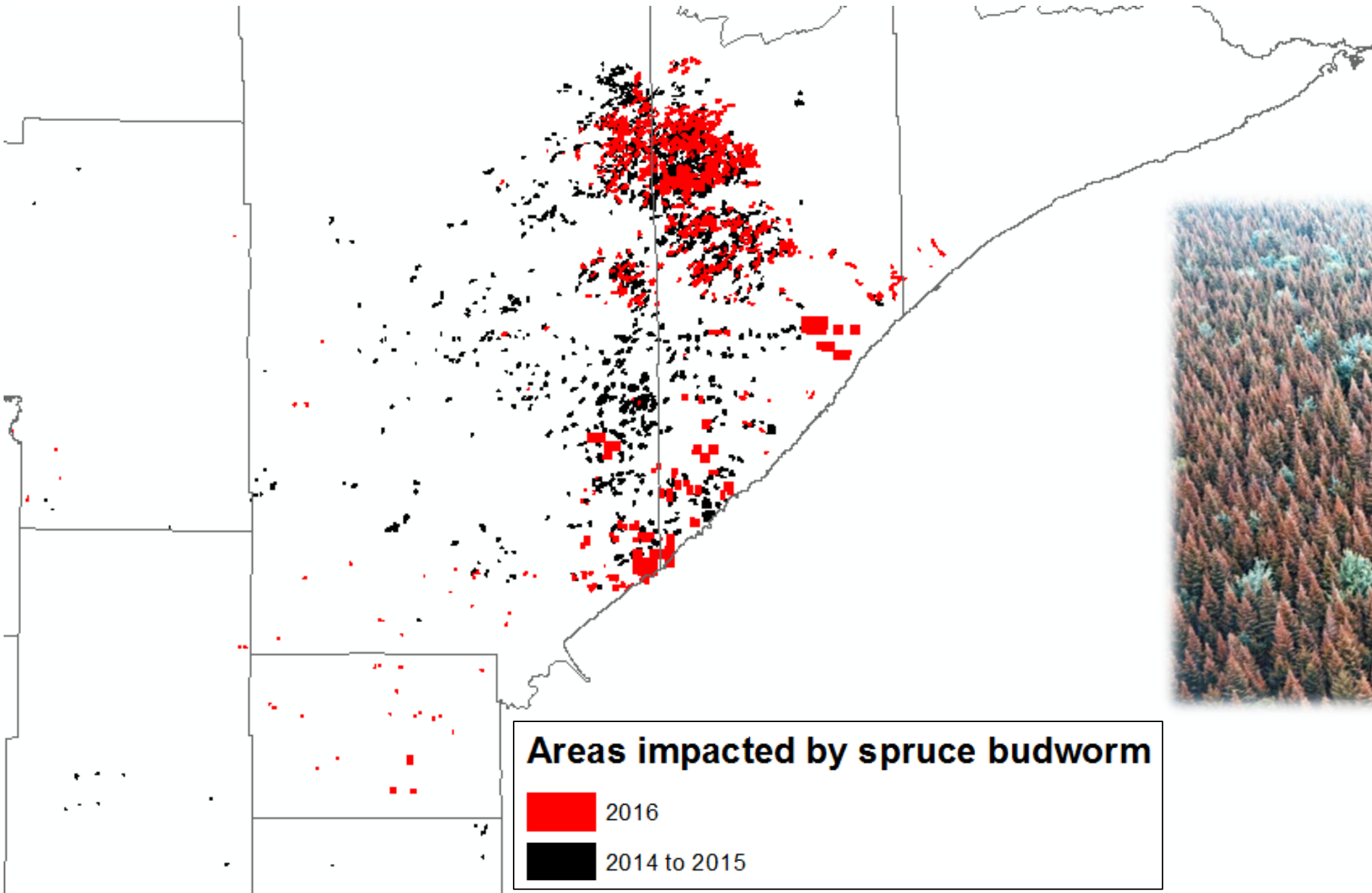
## TOP 5 DISTURBERS (AREA) IN 2016

- 1. SPRUCE BUDWORM:** 531 KM<sup>2</sup> – 53,095 HECTARES
- 2. EASTERN LARCH BEETLE:** 275 KM<sup>2</sup> – 27,454 HECTARES
- 3. WIND DAMAGE:** 75 KM<sup>2</sup> – 7,511 HECTARES
- 4. FOREST TENT CATERPILLAR:** 67 KM<sup>2</sup> – 6,734 HECTARES
- 5. LARCH CASEBEARER:** 67 KM<sup>2</sup> – 6,734 HECTARES

# AREAS AFFECTED BY SPRUCE BUDWORM: 2014 – 2015



# AREAS AFFECTED BY SPRUCE BUDWORM: 2014 – 2016



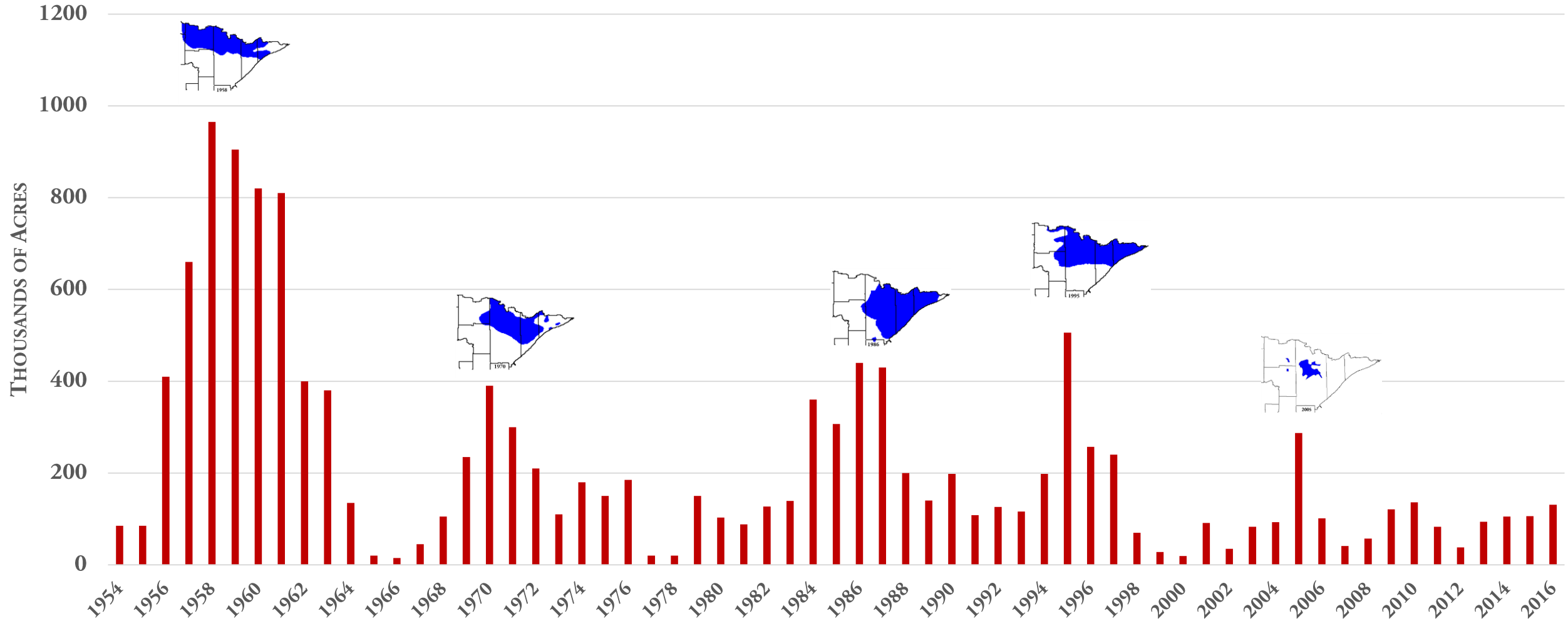
MAINE FOREST PRODUCTS COUNCIL

**Areas impacted by spruce budworm**

	2016
	2014 to 2015

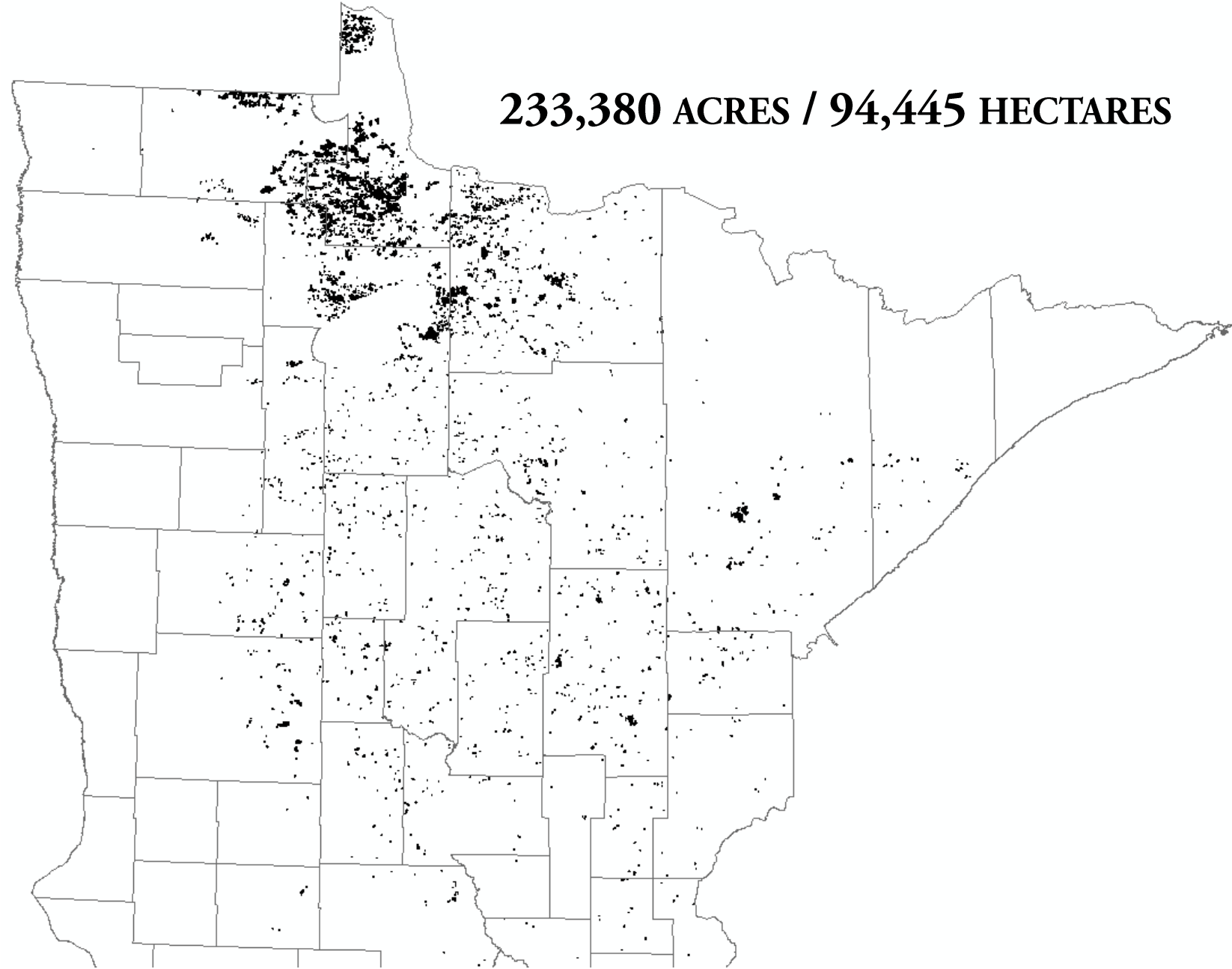
# ON-GOING SBW OUTBREAK IN NORTHEAST MINNESOTA

## SPRUCE BUDWORM DEFOLIATION



# AREAS AFFECTED BY EASTERN LARCH BEETLE: 2001 – 2015

233,380 ACRES / 94,445 HECTARES

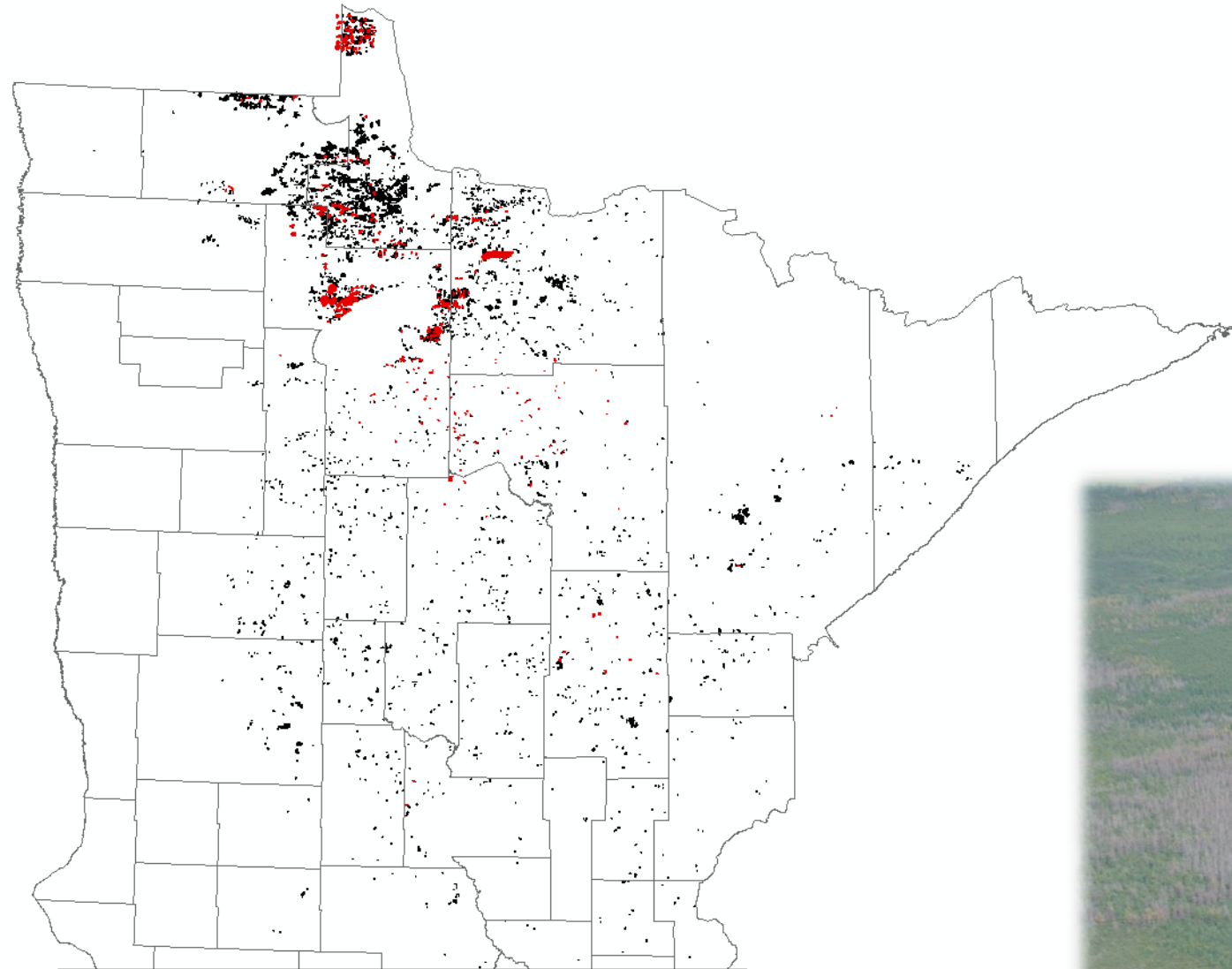


5478373



MARC ROBERTS - USFS

# AREAS AFFECTED BY EASTERN LARCH BEETLE: 2001 – 2016



Areas impacted by eastern larch beetle



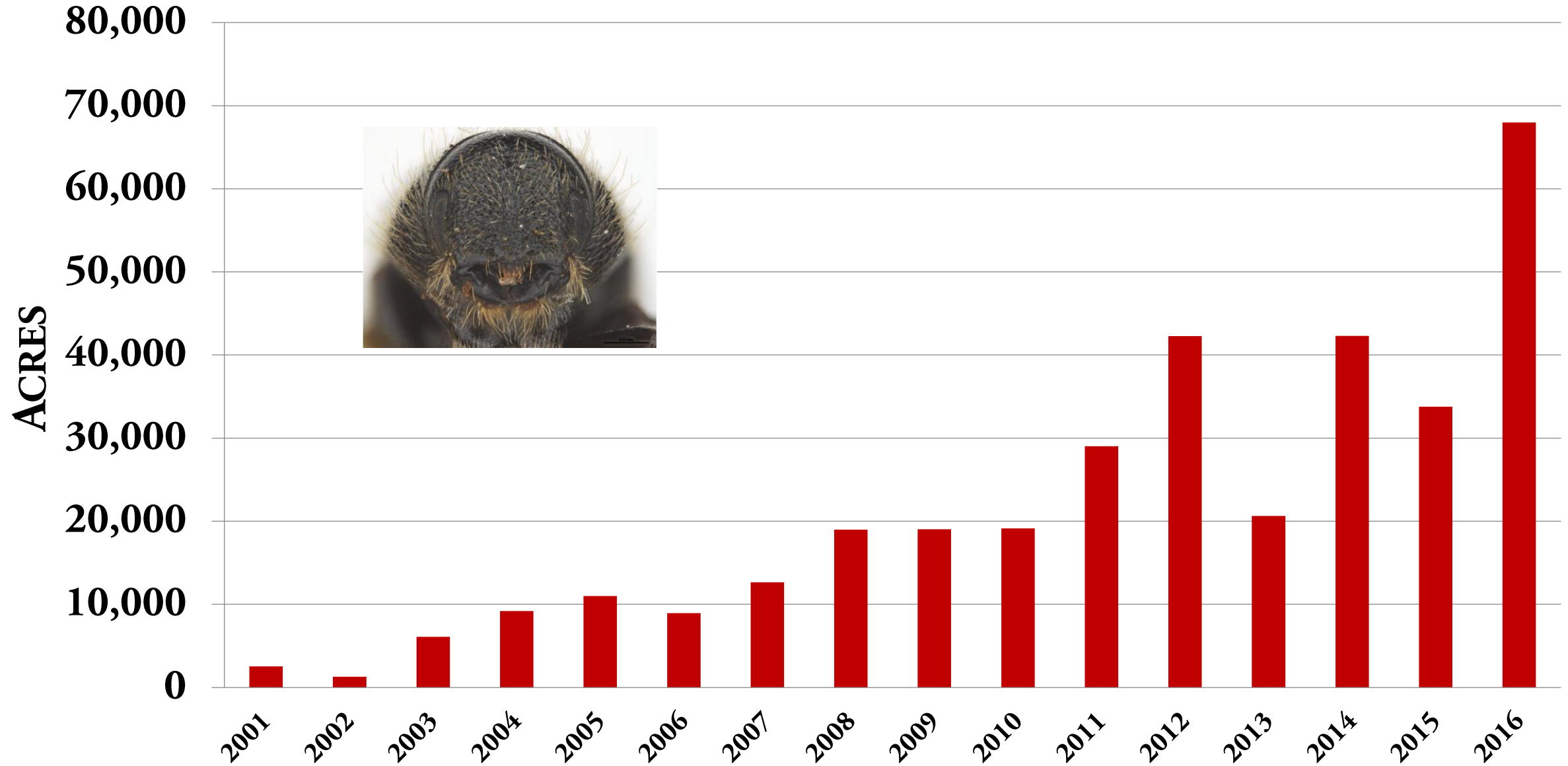
2016



2001 to 2015

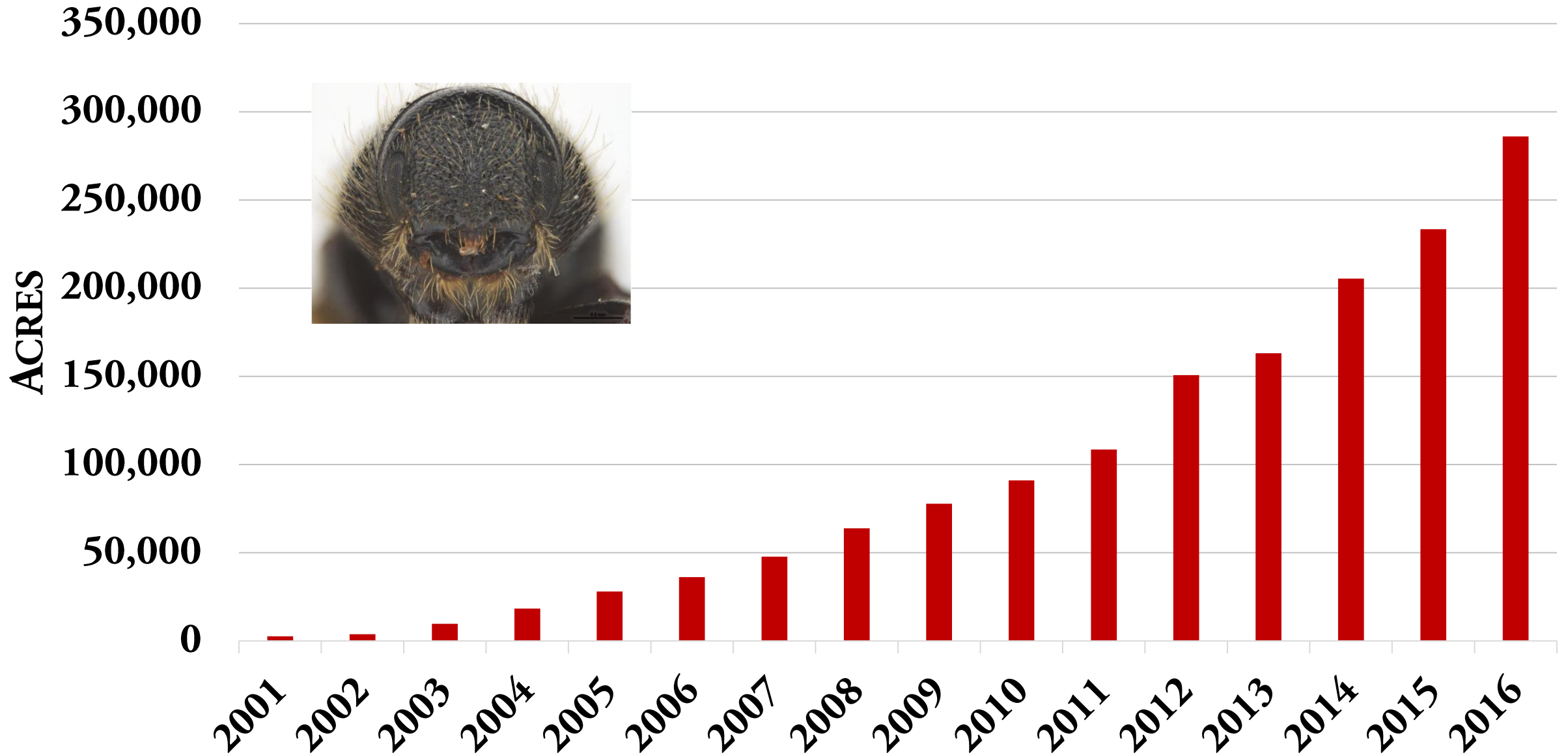


# ACREAGE WITH EASTERN LARCH BEETLE MORTALITY

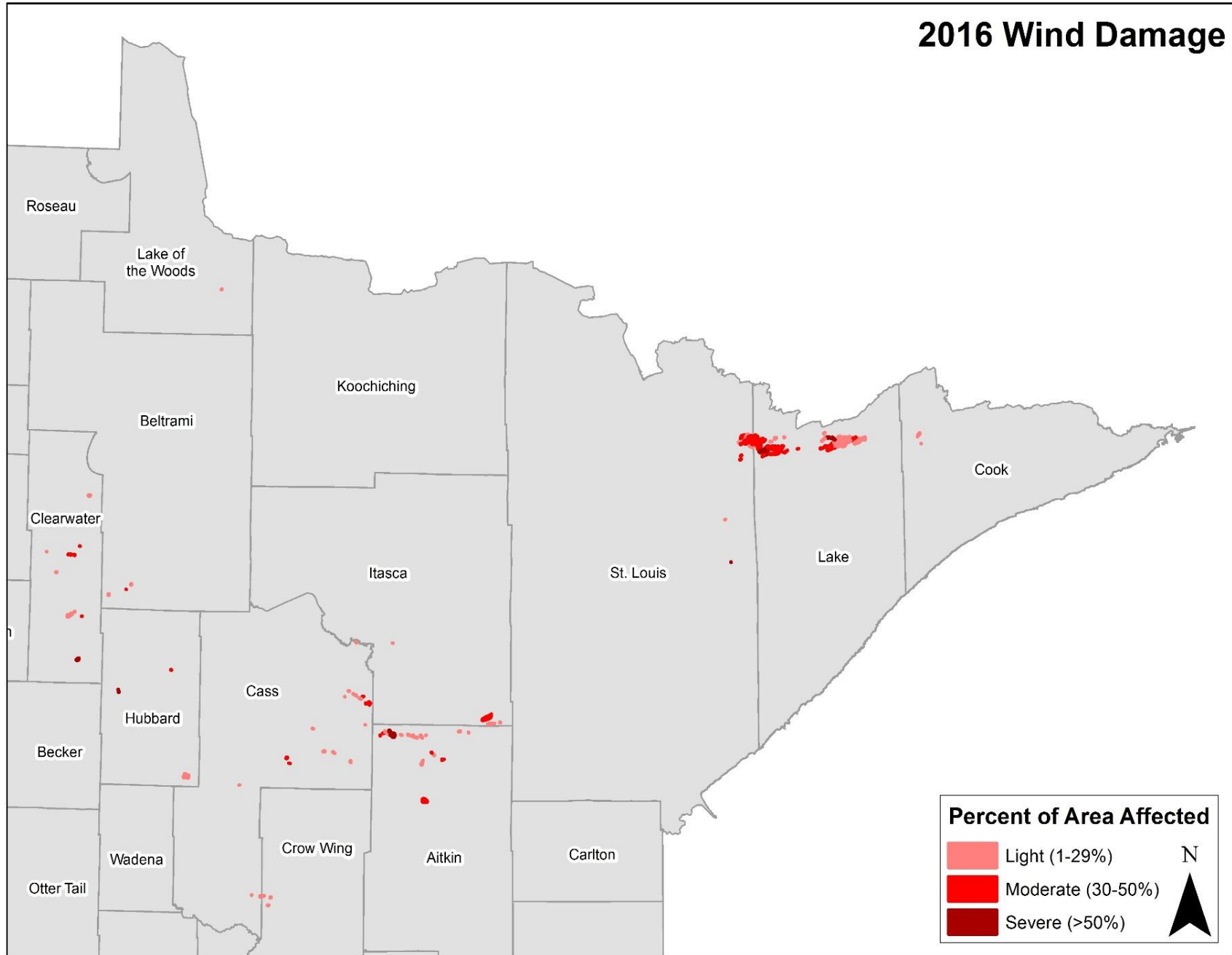




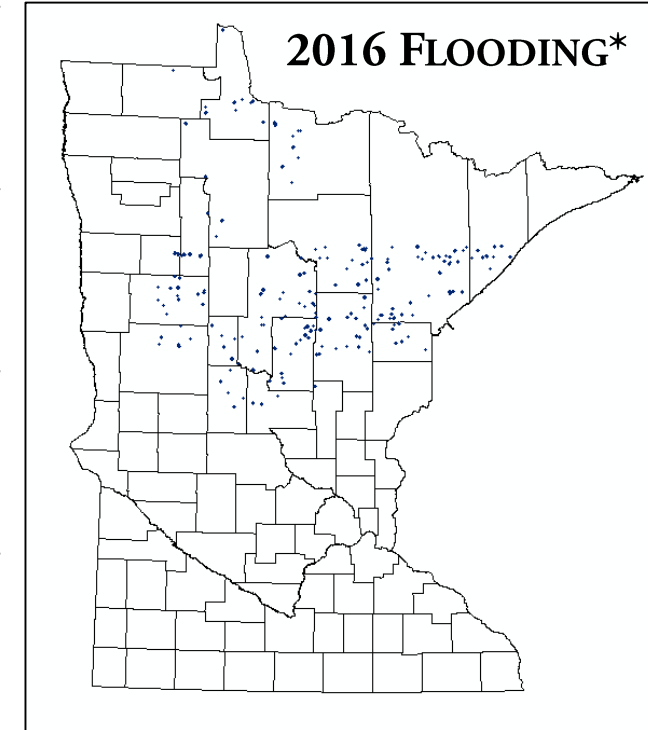
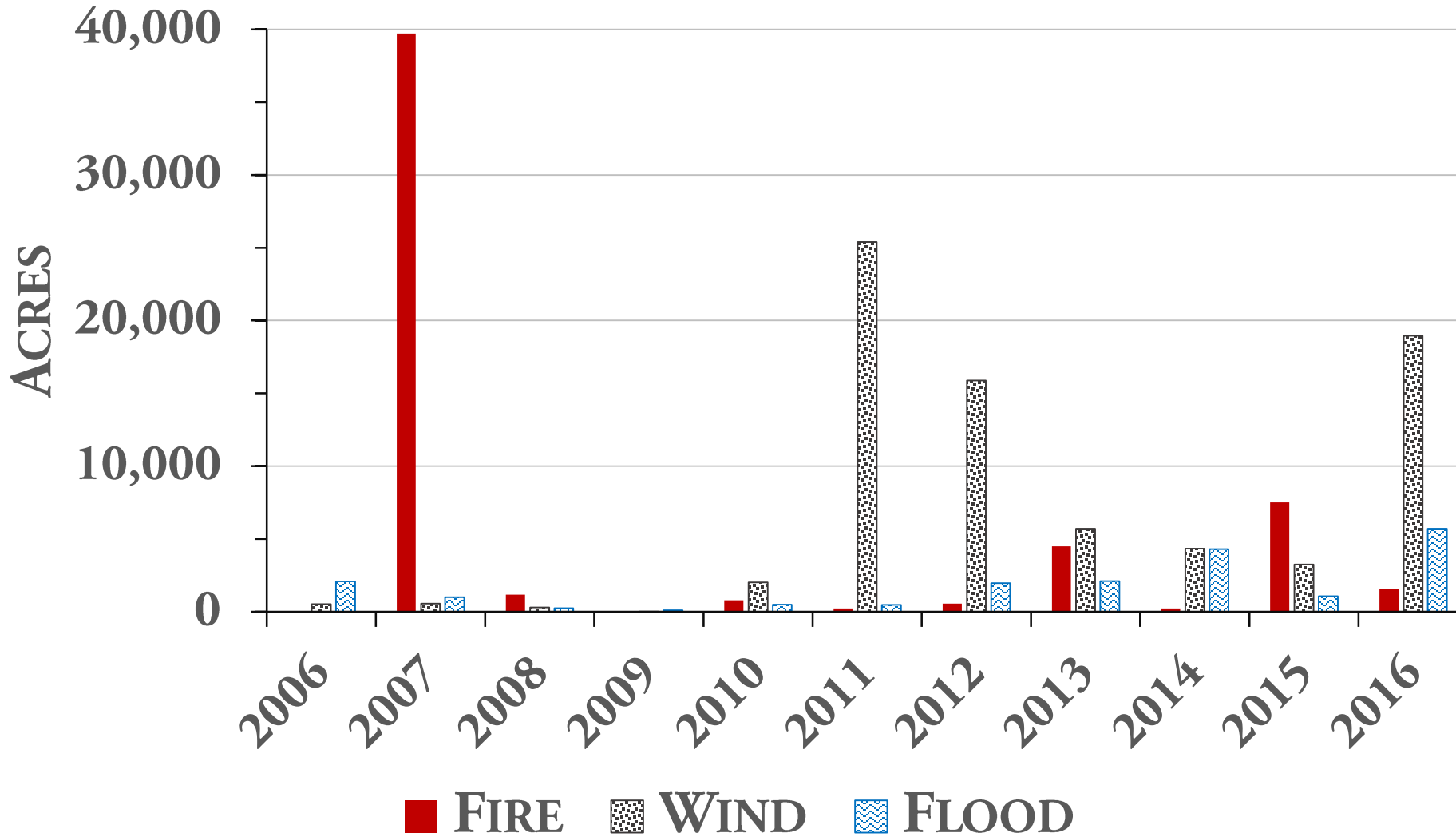
# *ACCUMULATED* ACREAGE AFFECTED BY EASTERN LARCH BEETLE



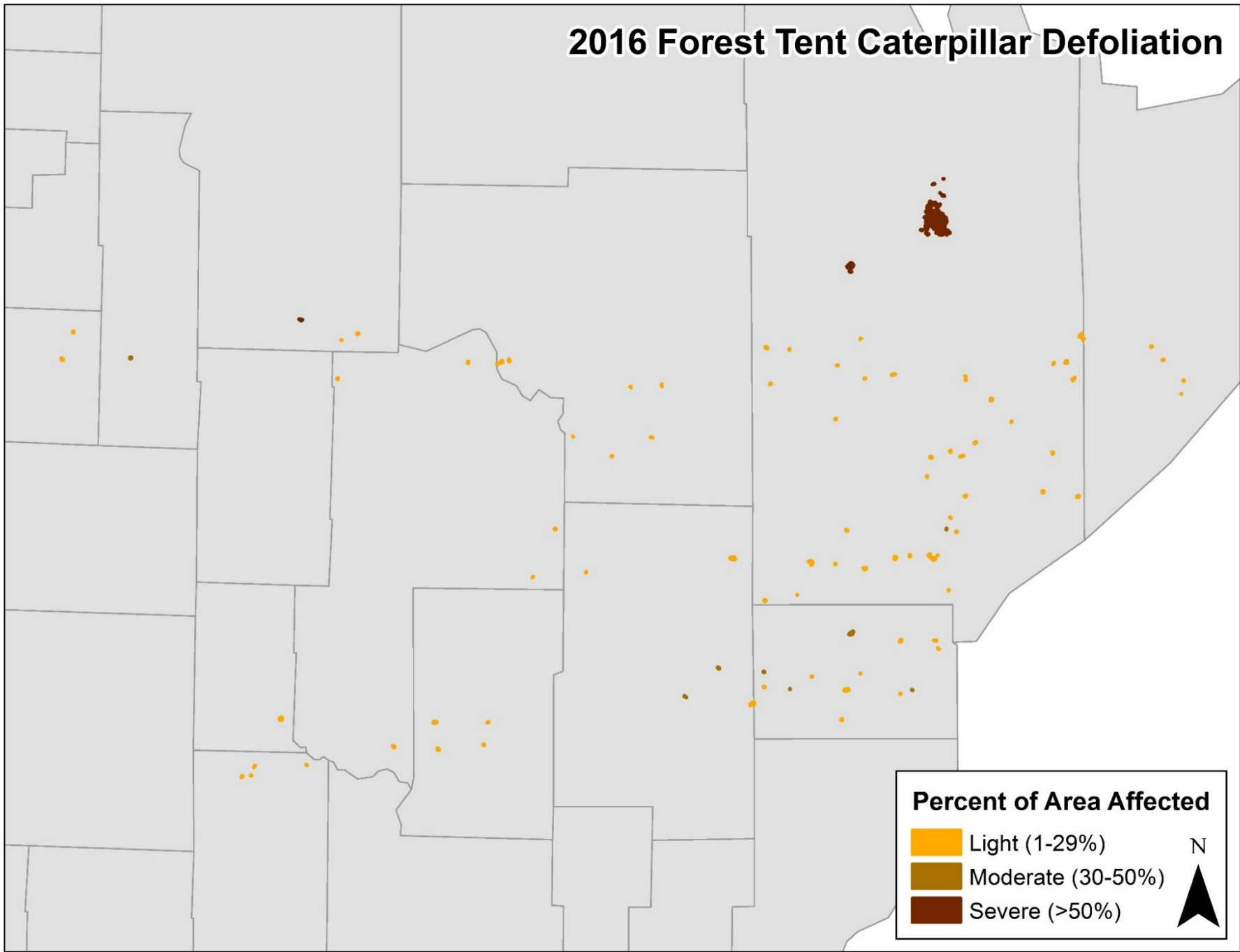
# 2016 Wind Damage



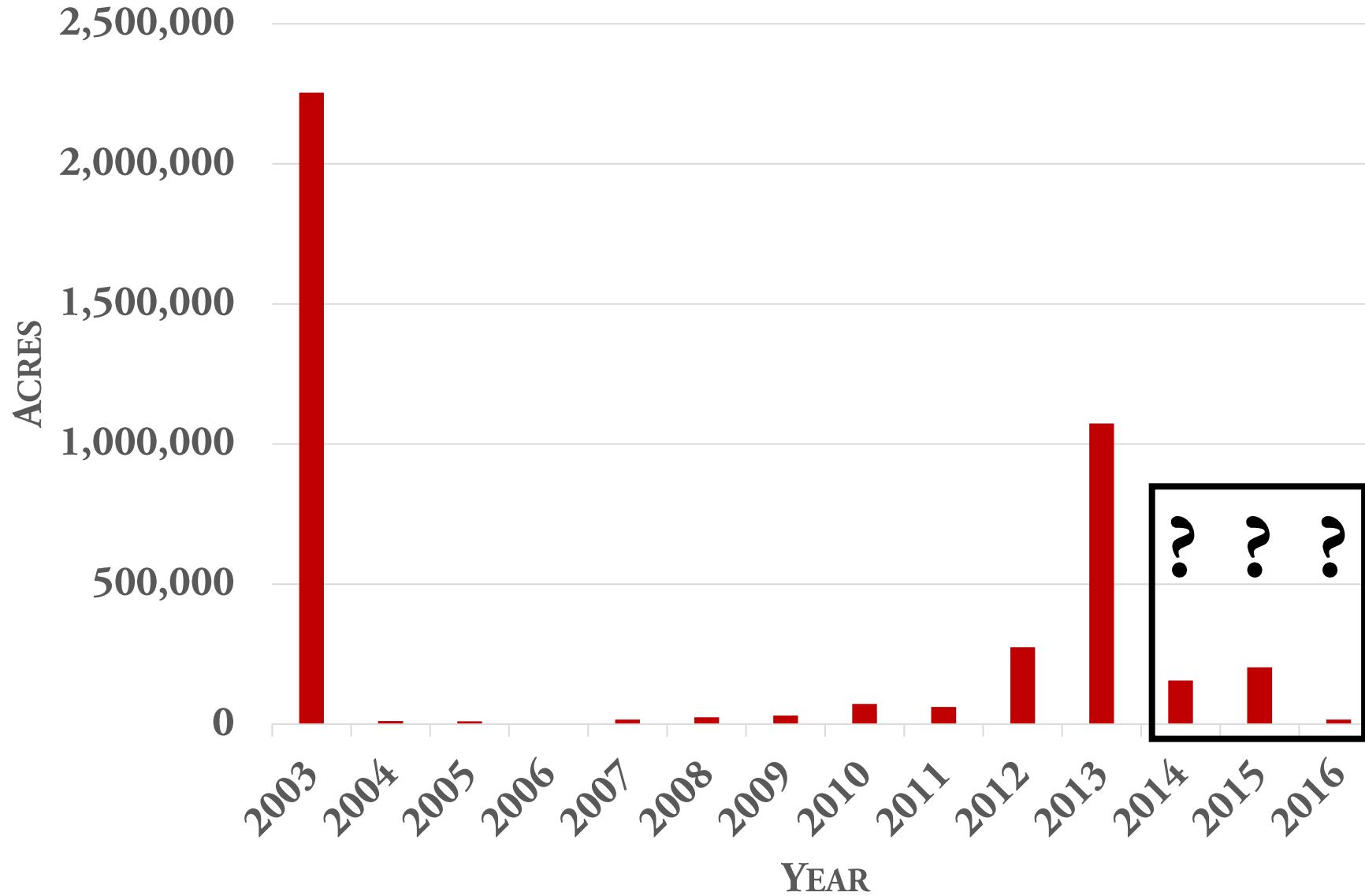
# ABIOTIC DAMAGE AGENTS



# 2016 Forest Tent Caterpillar Defoliation

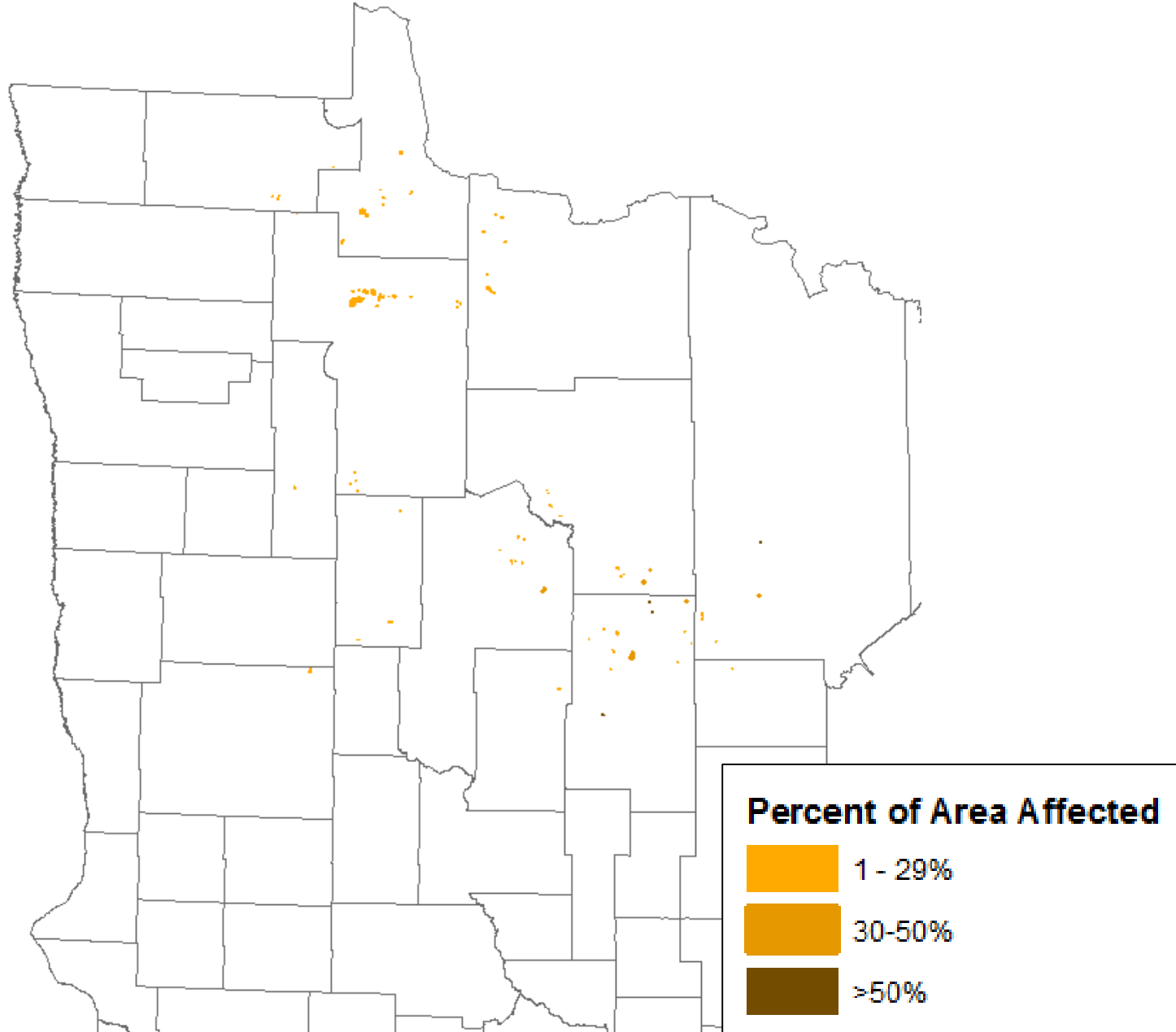


# FOREST TENT CATERPILLAR DEFOLIATION

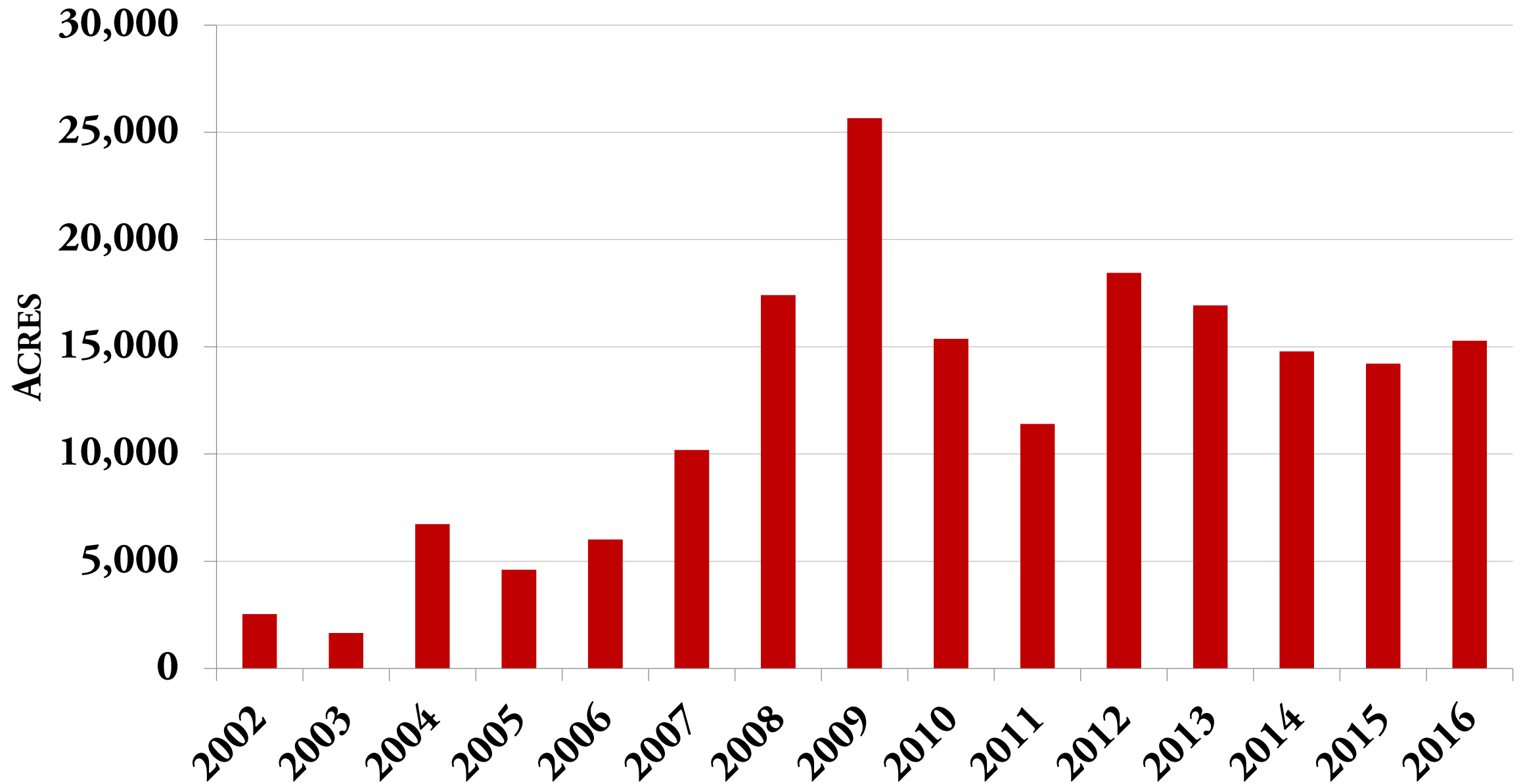


**~10 YEAR OUTBREAK  
CYCLE IN MINNESOTA**

# AREAS AFFECTED BY LARCH CASEBEARER - 2016

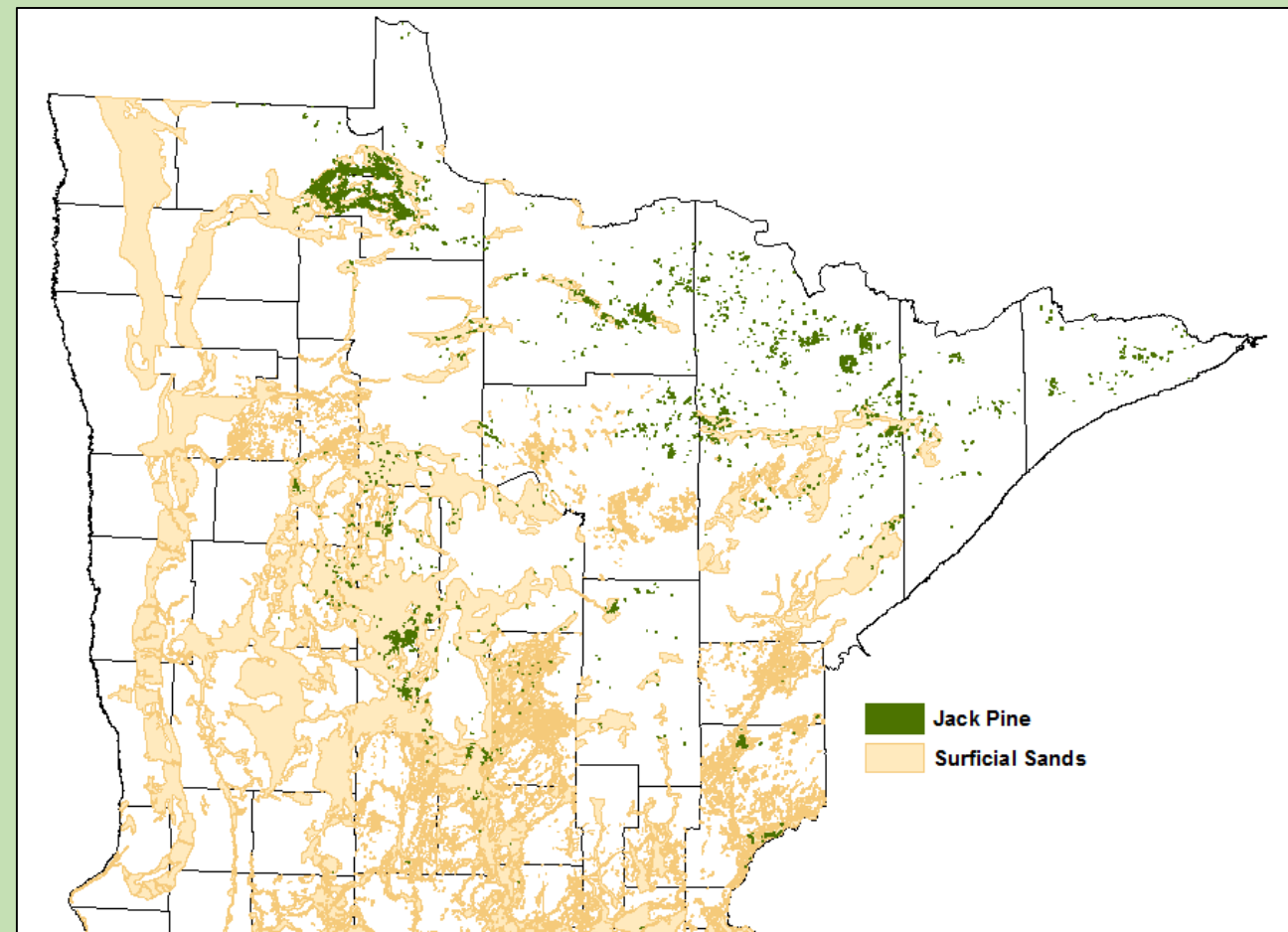
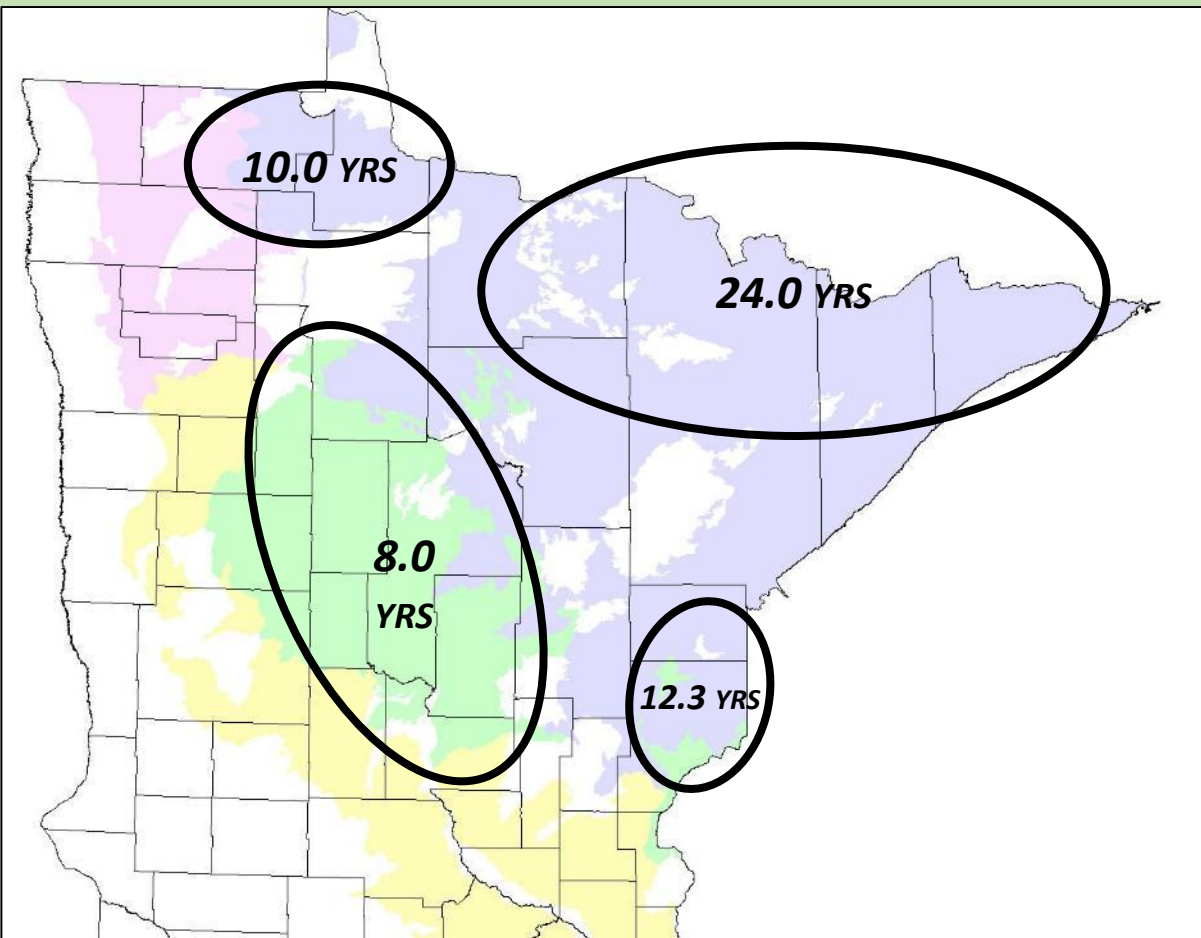


# LARCH CASEBEARER DEFOLIATION TREND



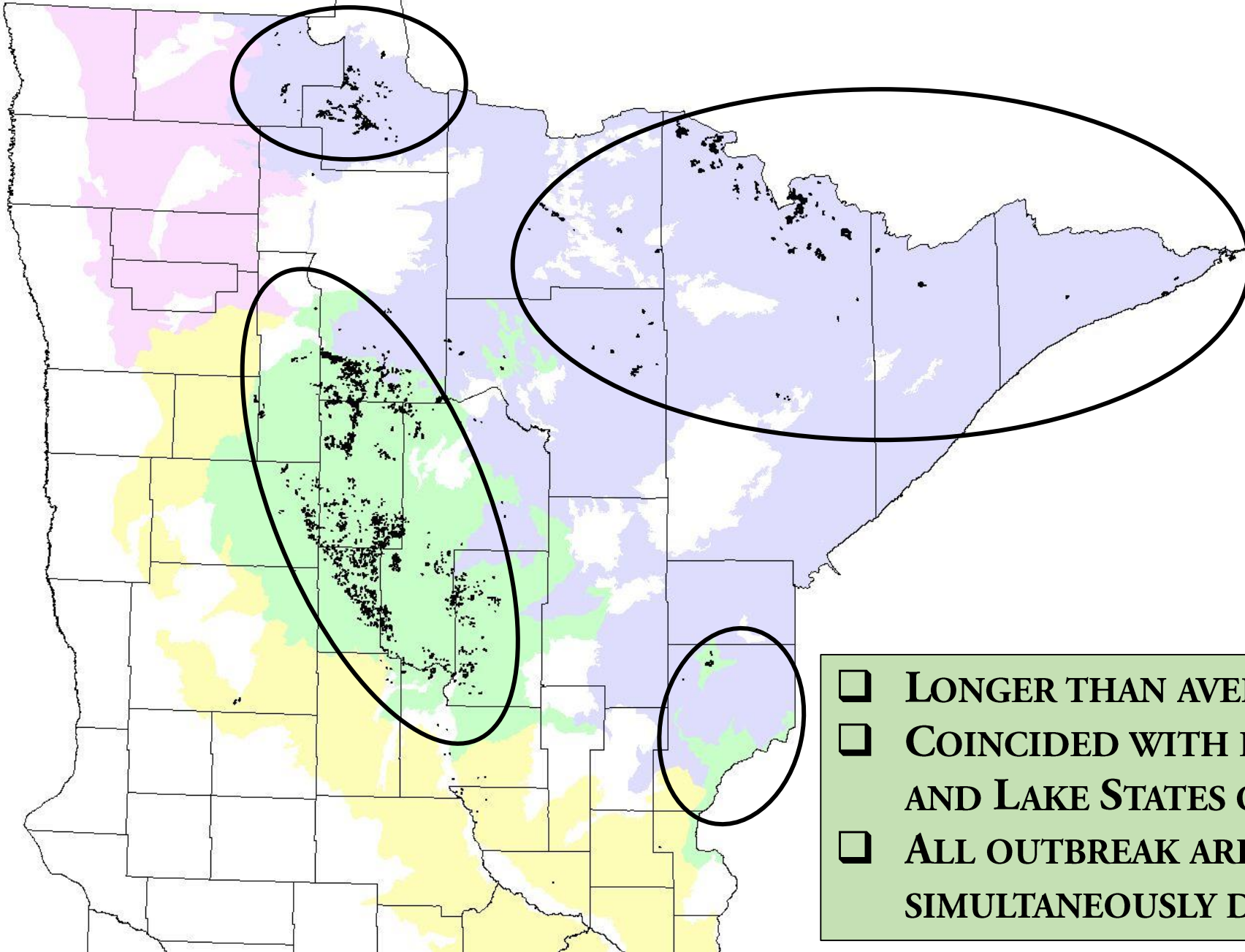
# EXPECTED REGIONAL JPBW RETURN INTERVALS

- JPBW OUTBREAKS TYPICALLY OCCUR EVERY 6 – 12 YEARS IN MN
- SHORTEST RETURN INTERVALS AND HIGHEST DENSITIES OCCUR ON DRIEST SITES WITH SANDIEST SOILS



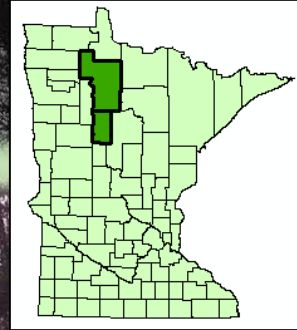


# ALL DEFOLIATION 2002 TO 2008

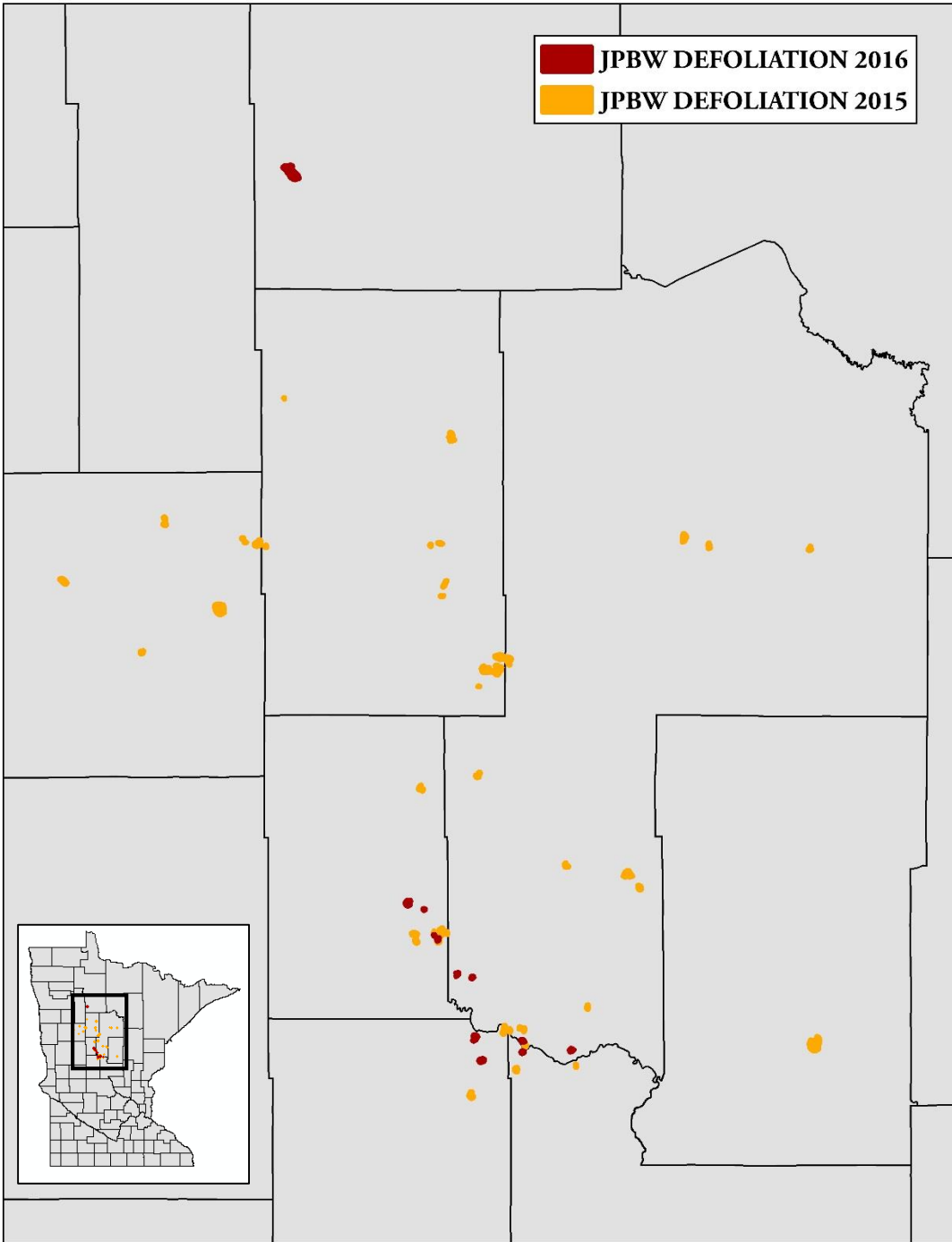


- LONGER THAN AVERAGE OUTBREAK
- COINCIDED WITH LARGER REGIONAL CANADIAN AND LAKE STATES OUTBREAK
- ALL OUTBREAK AREAS IN MN WERE SIMULTANEOUSLY DEFOLIATED TO SOME DEGREE

# JACK PINE BUDWORM DEFOLIATION



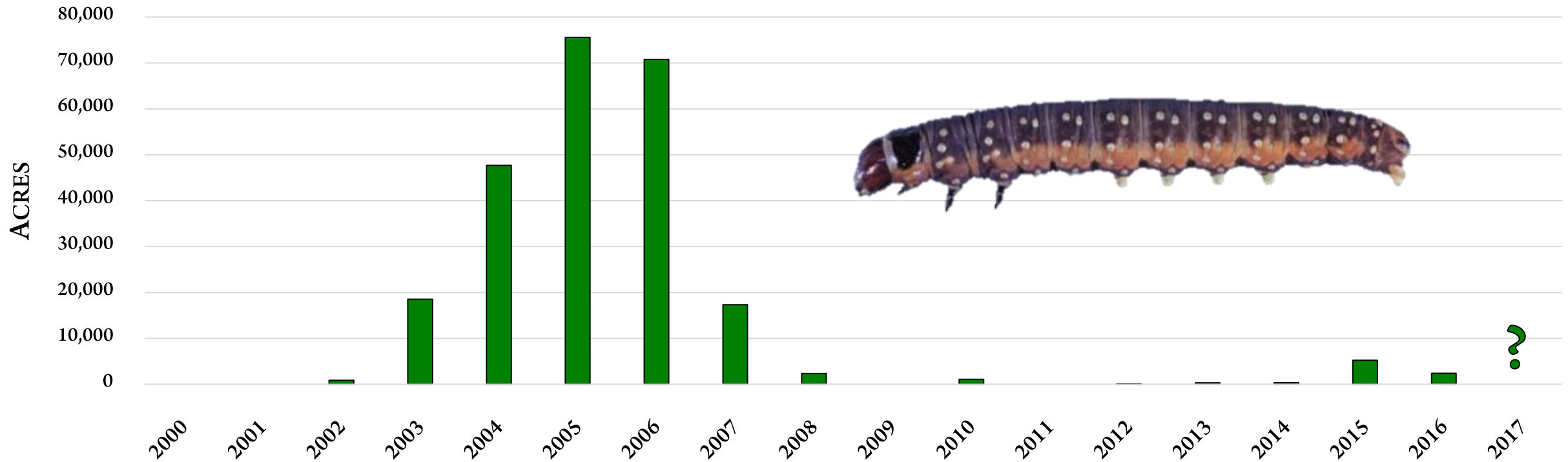
# JPBW DEFOLIATION & MORTALITY 2015-2016



# 2017 JPBW CONSIDERATIONS

- 2016 AERIAL SURVEY DATA IS LIKELY AN UNDERESTIMATE DUE TO WEATHER
- IS THE OUTBREAK TRULY SUBSIDING?
- WILL SEVERE DEFOLIATION OCCUR NEXT YEAR?
- MONITOR CURRENT OUTBREAK AREAS AND BEWARE OF BUILDING POPULATIONS IN NORTHWEST

ACRES OF JACK PINE BUDWORM DEFOLIATION

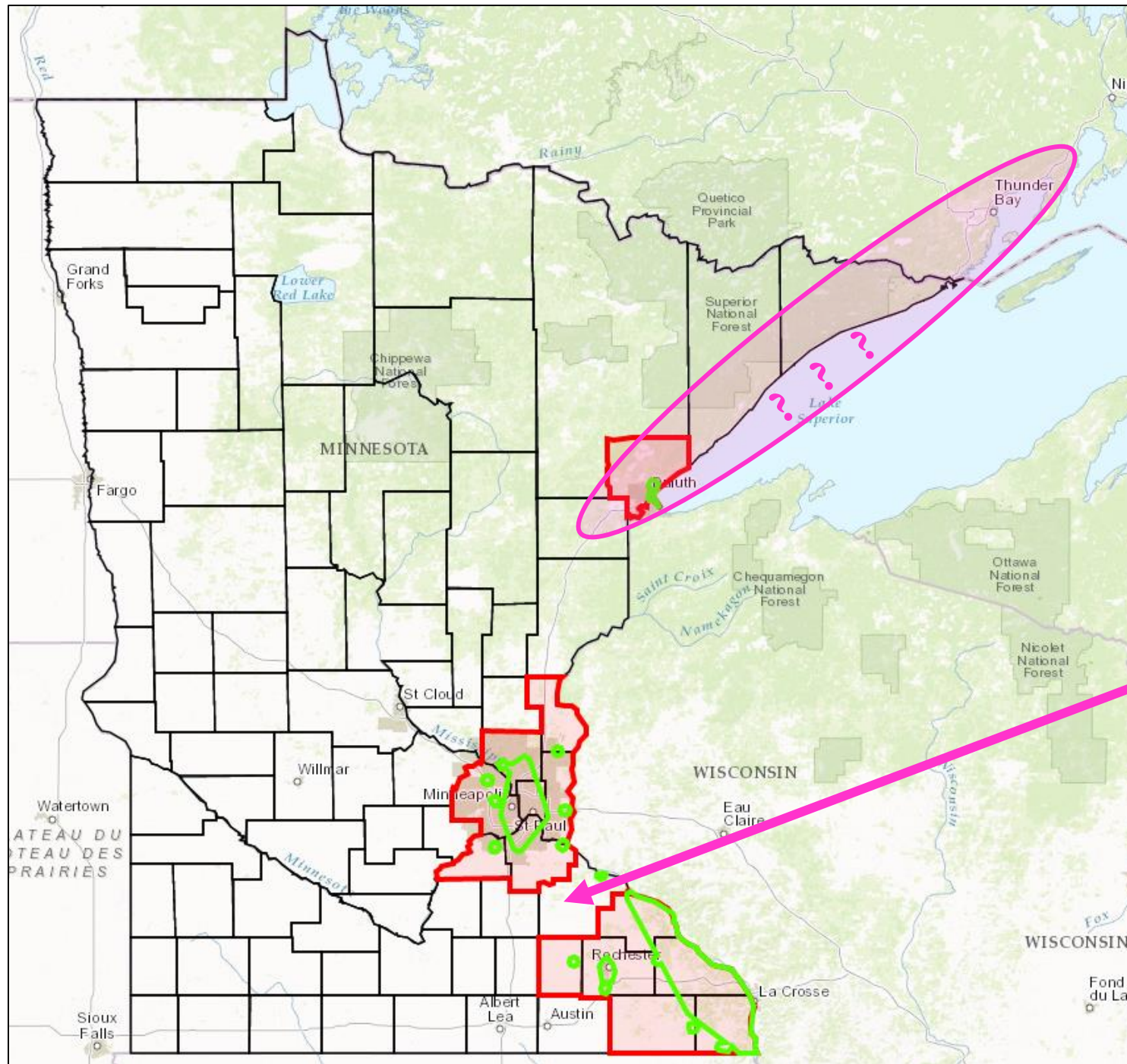


# EAB

EAB Generally Infested Areas

EAB County Quarantines

EAB Quarantine Outer Boundary



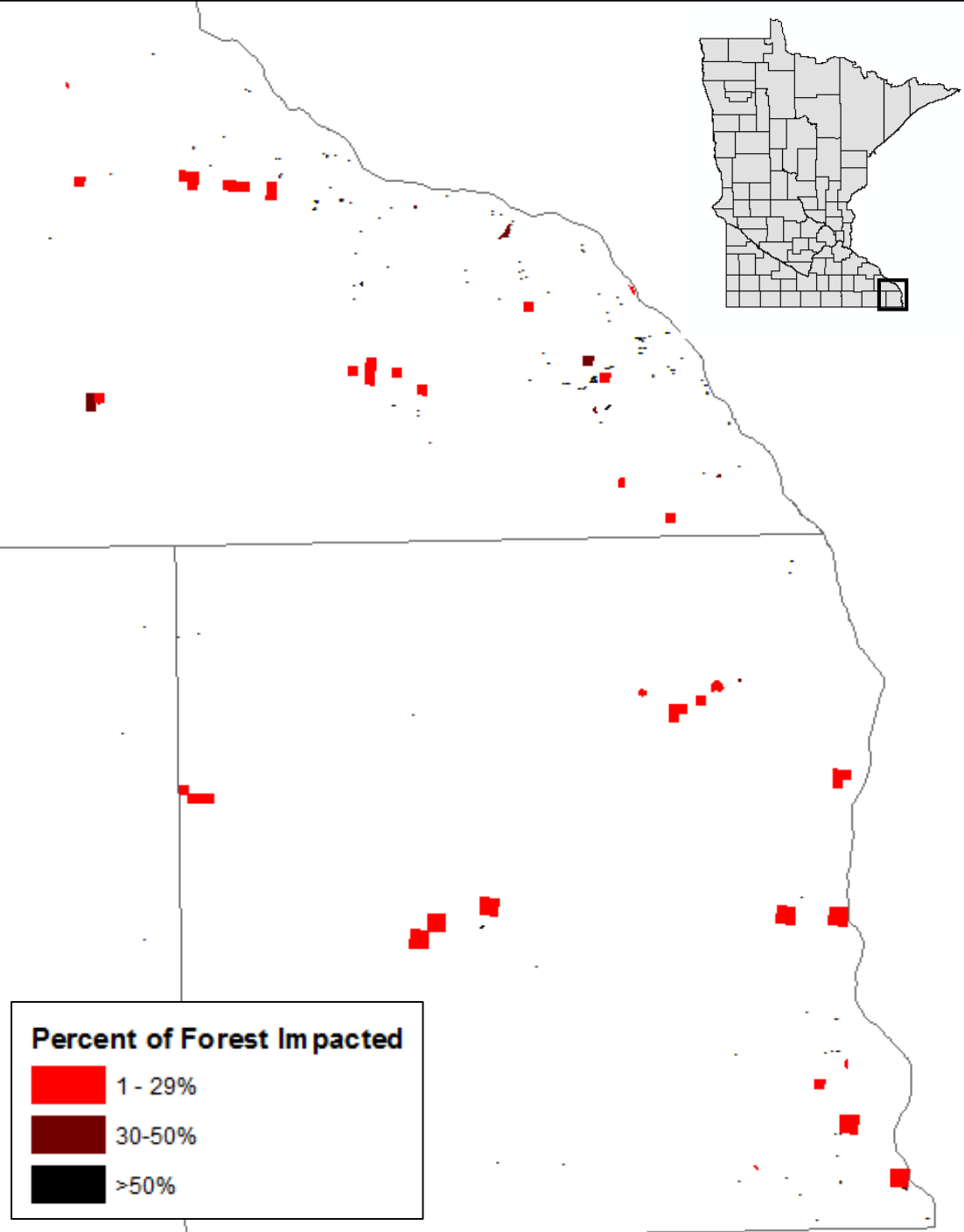
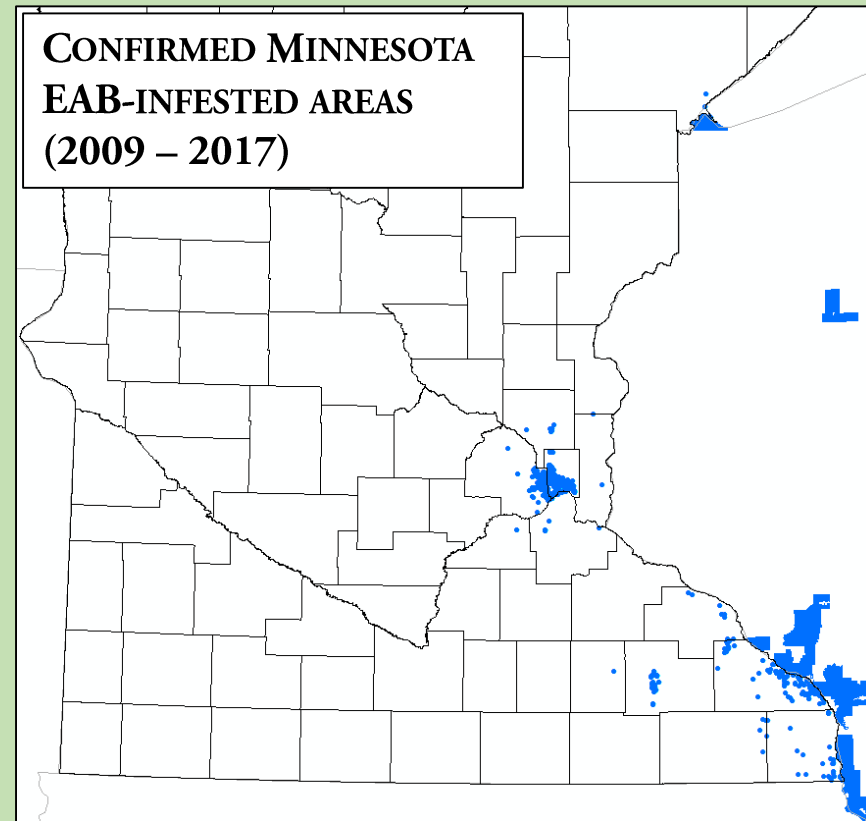
**NEW**  
**GOODHUE CO.**  
**CONFIRMED**  
**MAR 02 - 2017**

# LANDSCAPE IMPACT FROM EAB IN WINONA & HOUSTON COUNTIES - 2016

~3700 ACRES DETECTABLE  
EAB DAMAGE DURING  
2016 AERIAL SURVEY



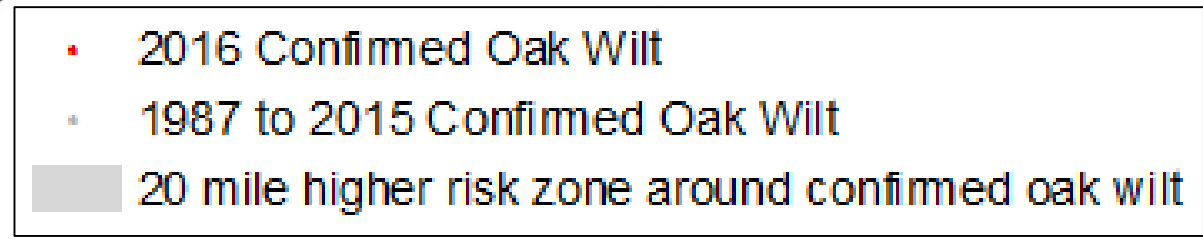
CONFIRMED MINNESOTA  
EAB-INFESTED AREAS  
(2009 - 2017)



**Percent of Forest Impacted**

Red square	1 - 29%
Dark red square	30-50%
Black square	>50%

# OAK WILT CONTINUES TO MOVE NORTHWARD

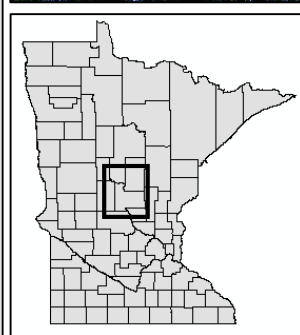
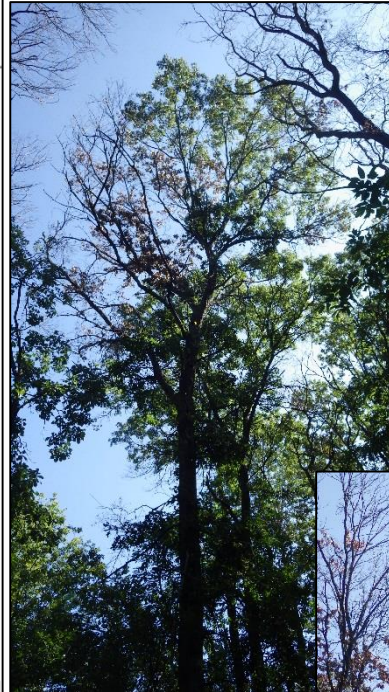
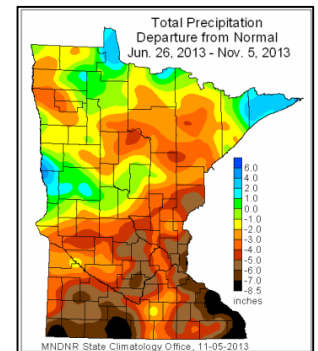
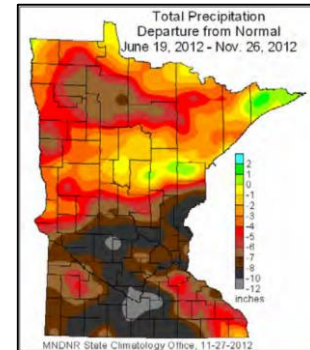
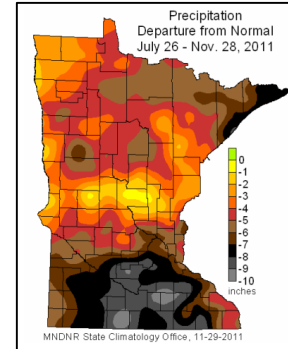


**TREATMENT COST-SHARE  
PROGRAM IN DEVELOPMENT**

# TWO-LINED CHESTNUT BORER 2013-2016

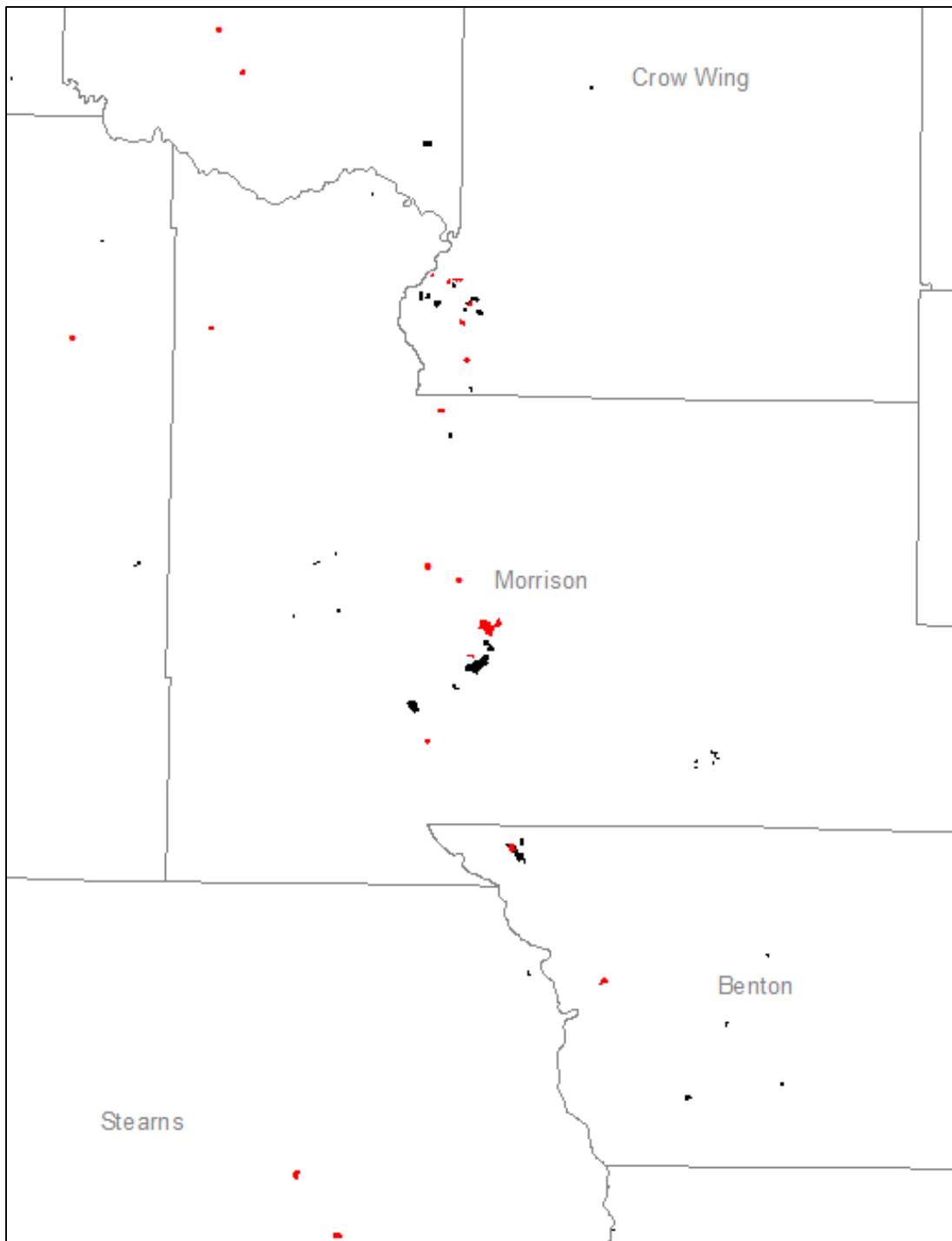


2011-  
2013

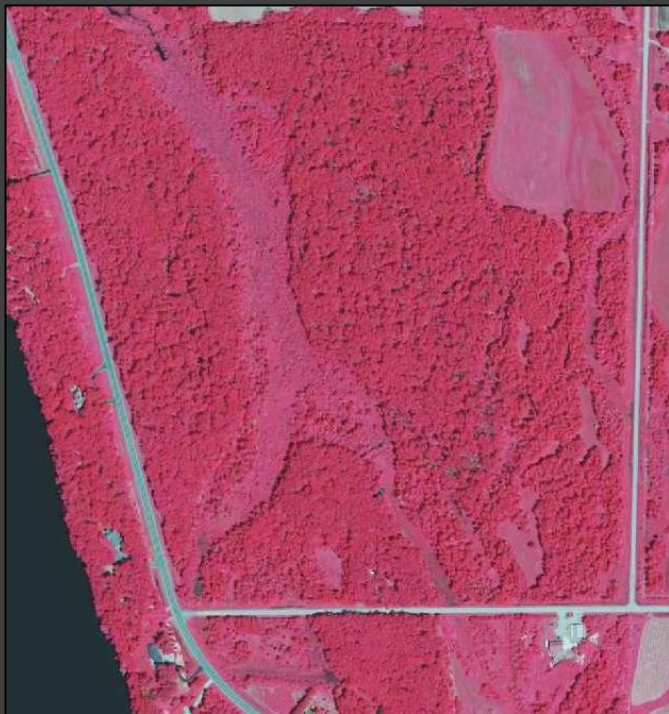


## Areas Affected

- 2016 Mortality
- 2013 to 2015 Mortality



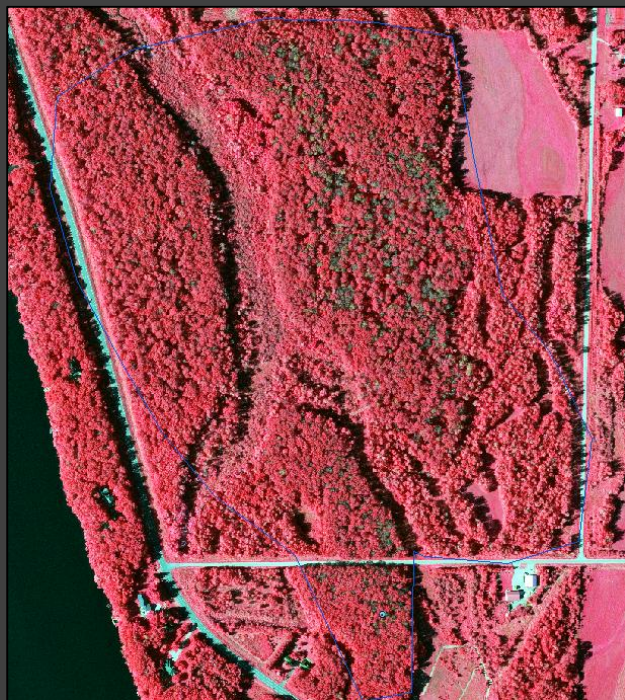




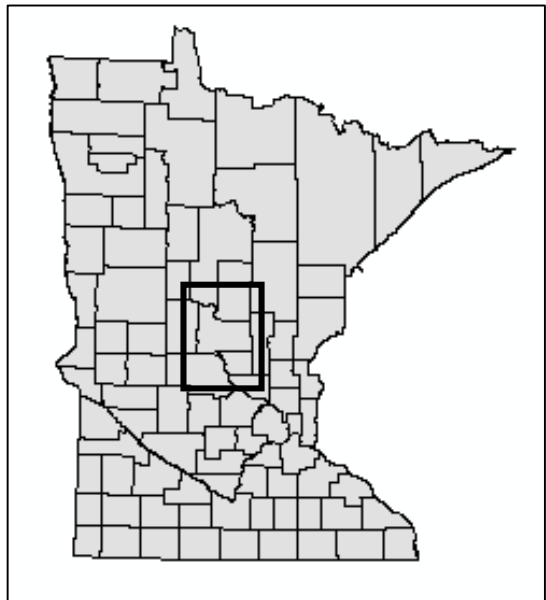
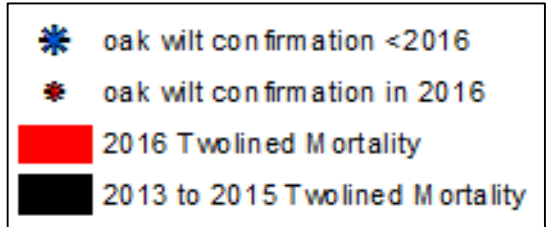
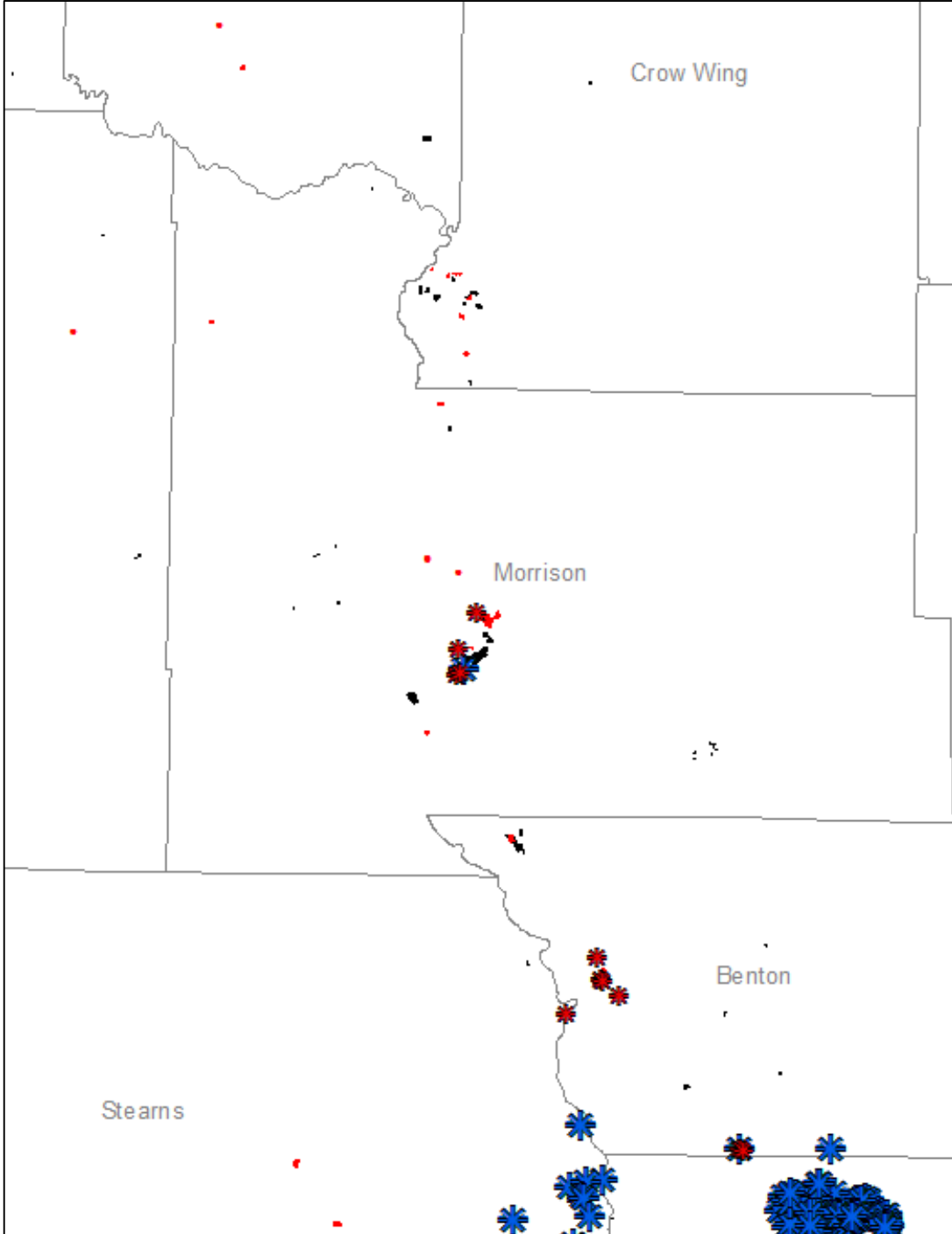
2013



2015



# TWO-LINED CHESTNUT BORER & OAK WILT IN CENTRAL MN



**OVERLAPPING SYMPTOMS  
AND OVERLAPPING AREAS  
MIGHT MAKE OAK WILT  
DETECTION PROBLEMATIC  
IN THE FUTURE**



**THANK YOU,  
QUESTIONS?**



**DEPARTMENT OF  
NATURAL RESOURCES**