

# **Michigan Recreation Site Ash Survey**

## **Southeastern Michigan Atlas**

**May 2009**

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Composite EAB Presence map

Composite Ash Dieback map

Composite Dead Ash map

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Poster; Witter, Stoyenoff and Storer

## Background Information

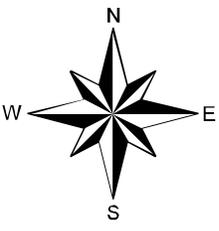
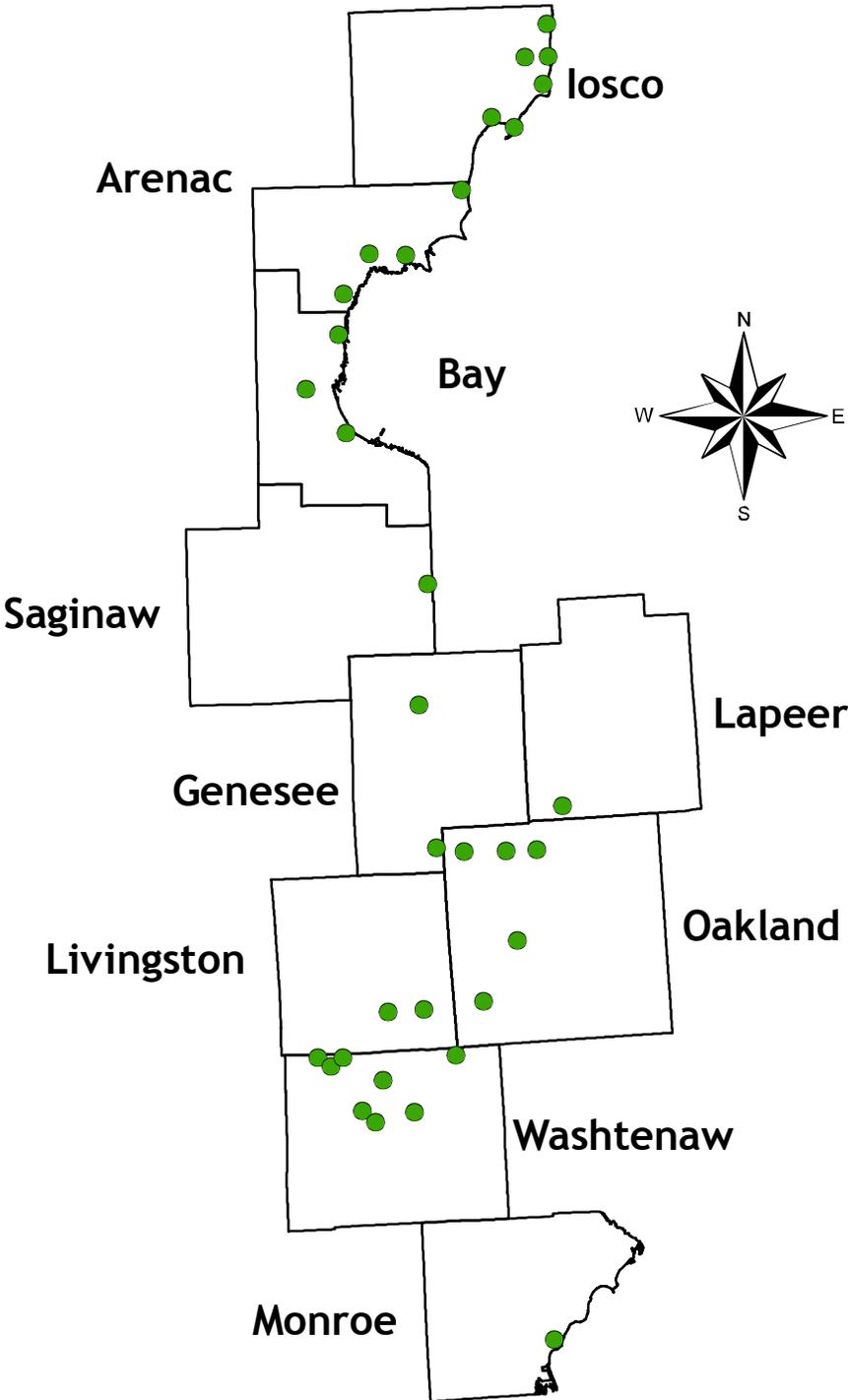
The maps in this atlas were produced from data collected during 2003 and 2005. A survey of thirty-three recreation sites in ten counties in Michigan's Lower Peninsula was performed to determine the extent and health of the ash resource. Sites were visited in 2003 to establish baseline information and revisited in 2005 to assess change that had occurred.

The maps show measurements for green ash (*Fraxinus pennsylvanica*), and white ash (*Fraxinus americana* L). Maps include recreation site locations; sites with EAB; and mean values for each plot (all ash species aggregated) showing percent crown dieback, percent of dead ash trees, and ash tree vigor. Change from 2003 to 2005 is shown for each metric.

**Crown dieback** is indicated by the percent of dead branch tips found in the upper portion and outer edges of the live crown. A large amount of dieback is an indication that the tree is under stress.

**Tree vigor** is a rating of the overall health of a tree. Values range from 1 to 8, depending on the amount of dead wood in the crown. A ranking of 1 would indicate a healthy, vigorous tree; a value of 5 indicates a crown more than half dead; and values of 6-8 indicate a dead tree in various stages of decay.

# Recreational Areas in Southern Michigan

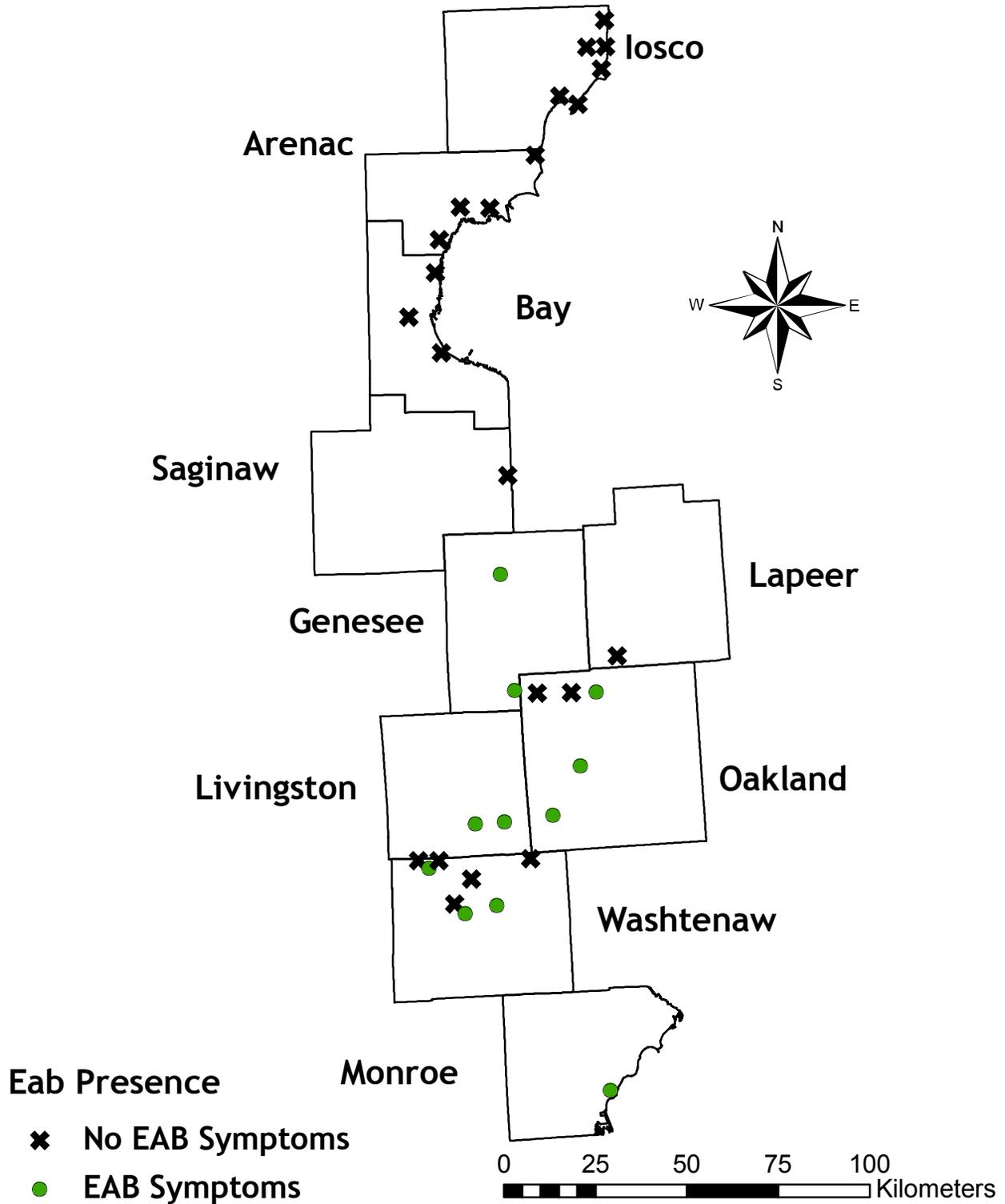


**Key**

● EAB Recreational Detection Plot



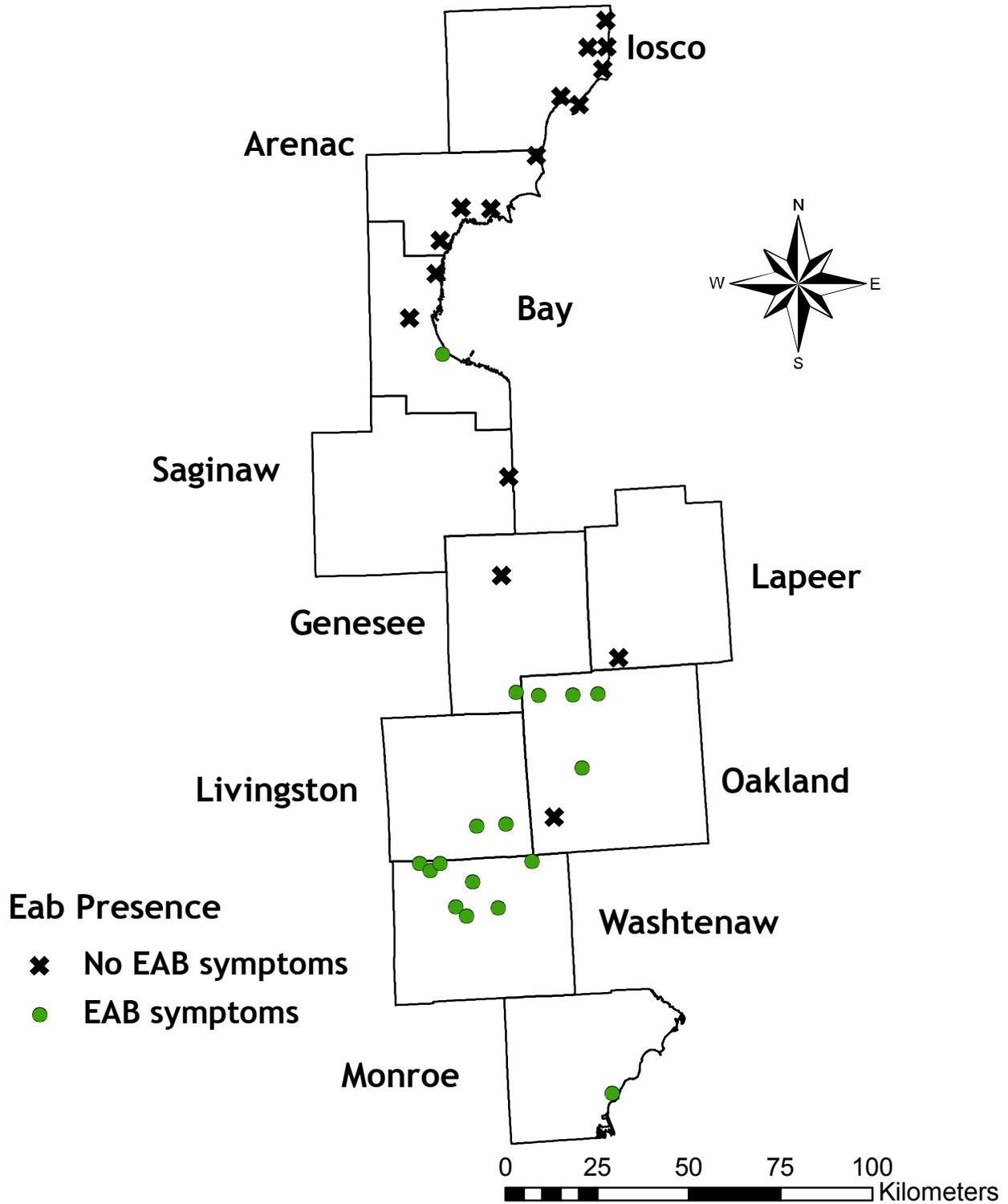
# 2003 Emerald Ash Borer Presence in Recreational Areas



Source: Michigan Geographic Library  
U of M School of Natural Resources and Environment

NDW May 2009

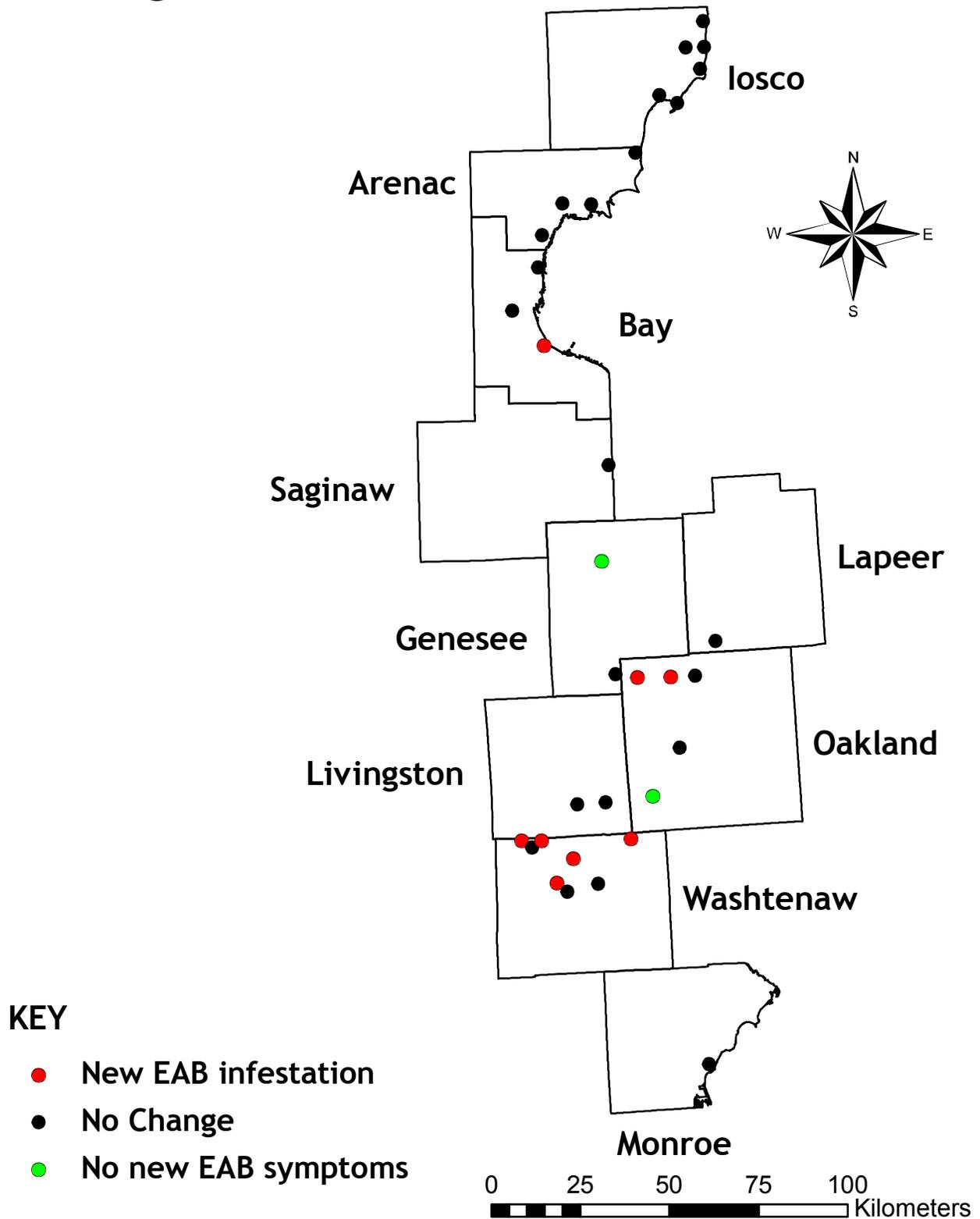
# 2005 Emerald Ash Borer Presence in Recreational Areas



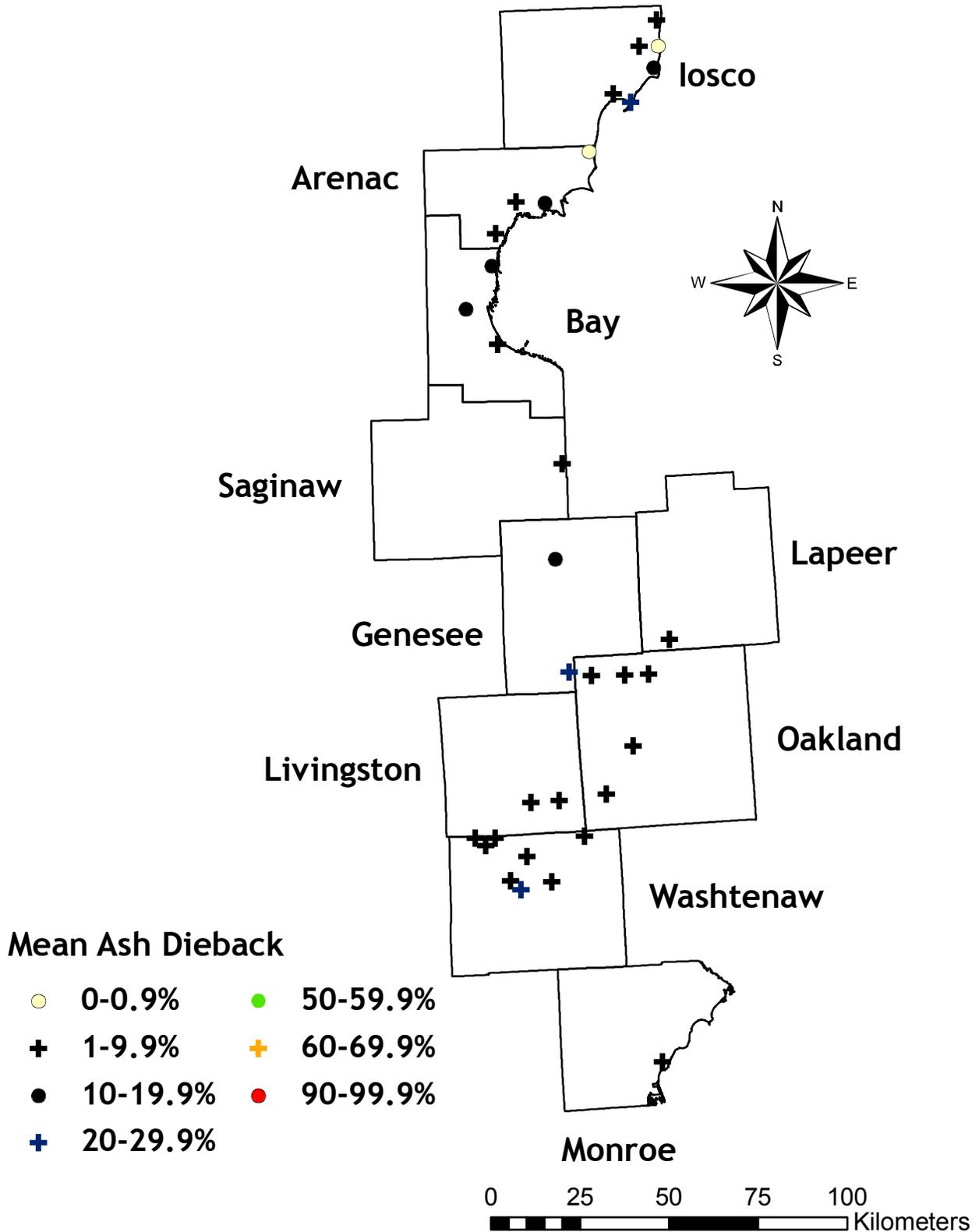
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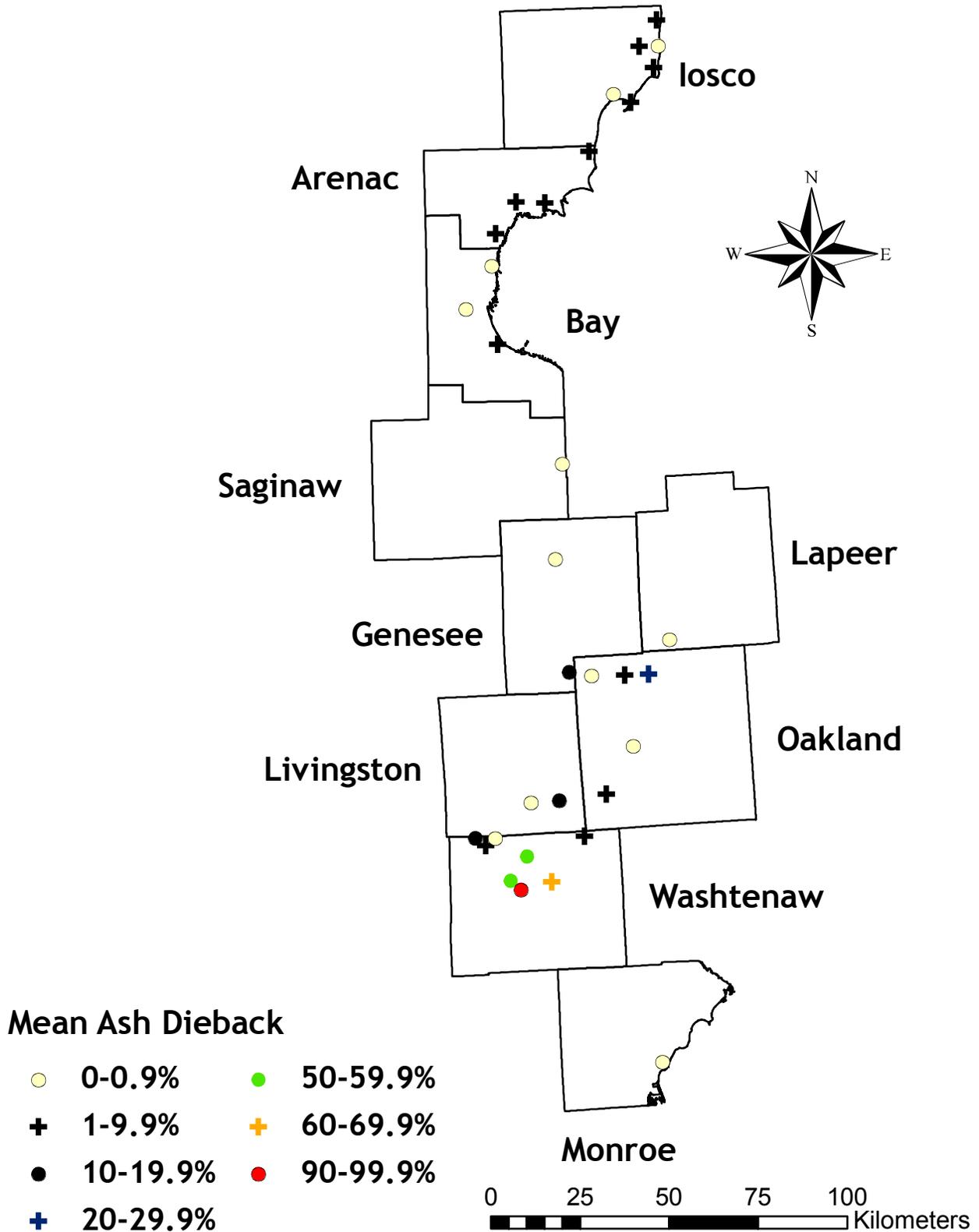
# Change in Emerald Ash Borer Presence



# Ash Dieback in Recreational Areas 2003



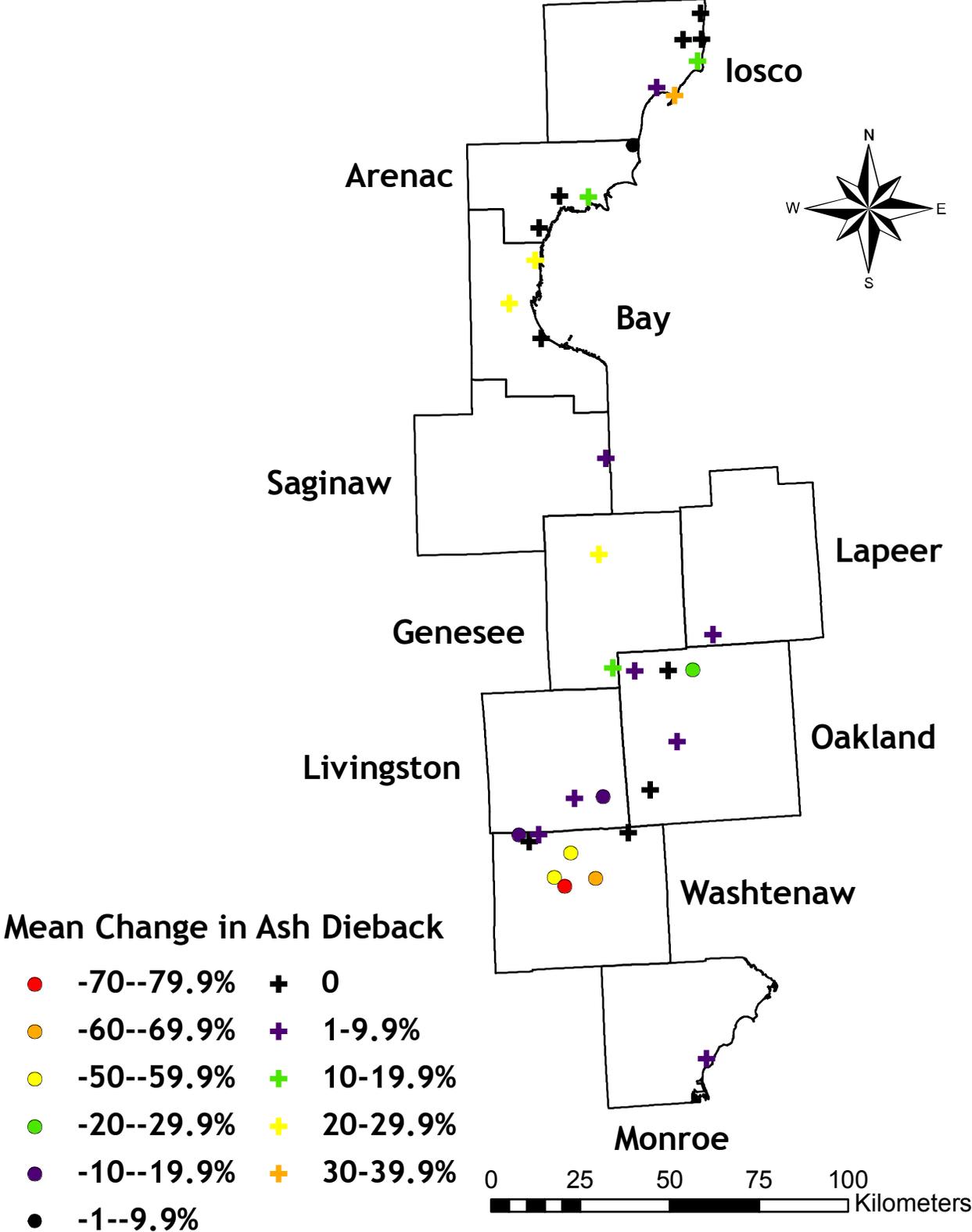
# Ash Dieback in Recreational Areas 2005



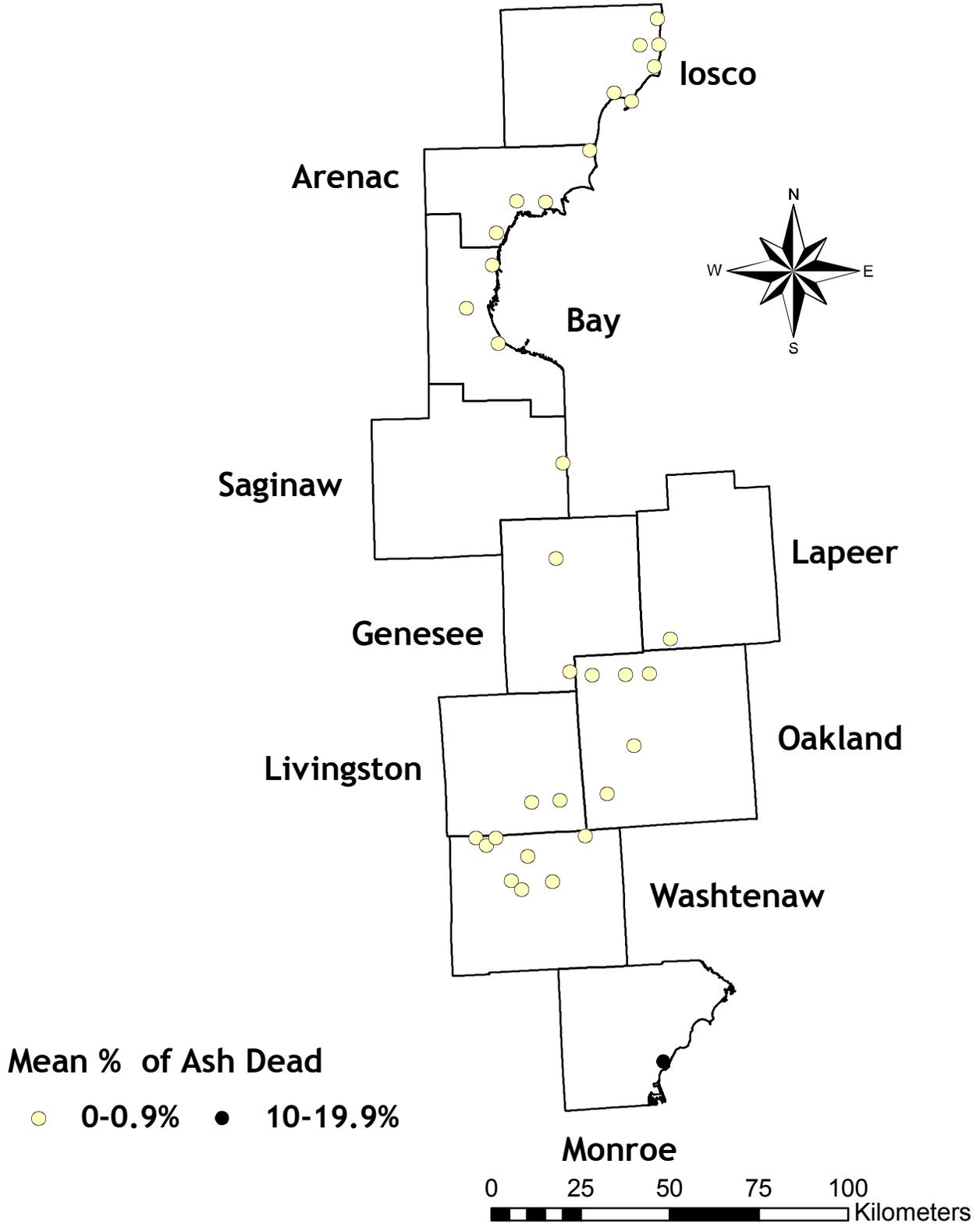
Source: Michigan Geographic Library  
 U of M School of Natural Resources and Environment

NDW May 2009

# Change of Ash Crown Dieback



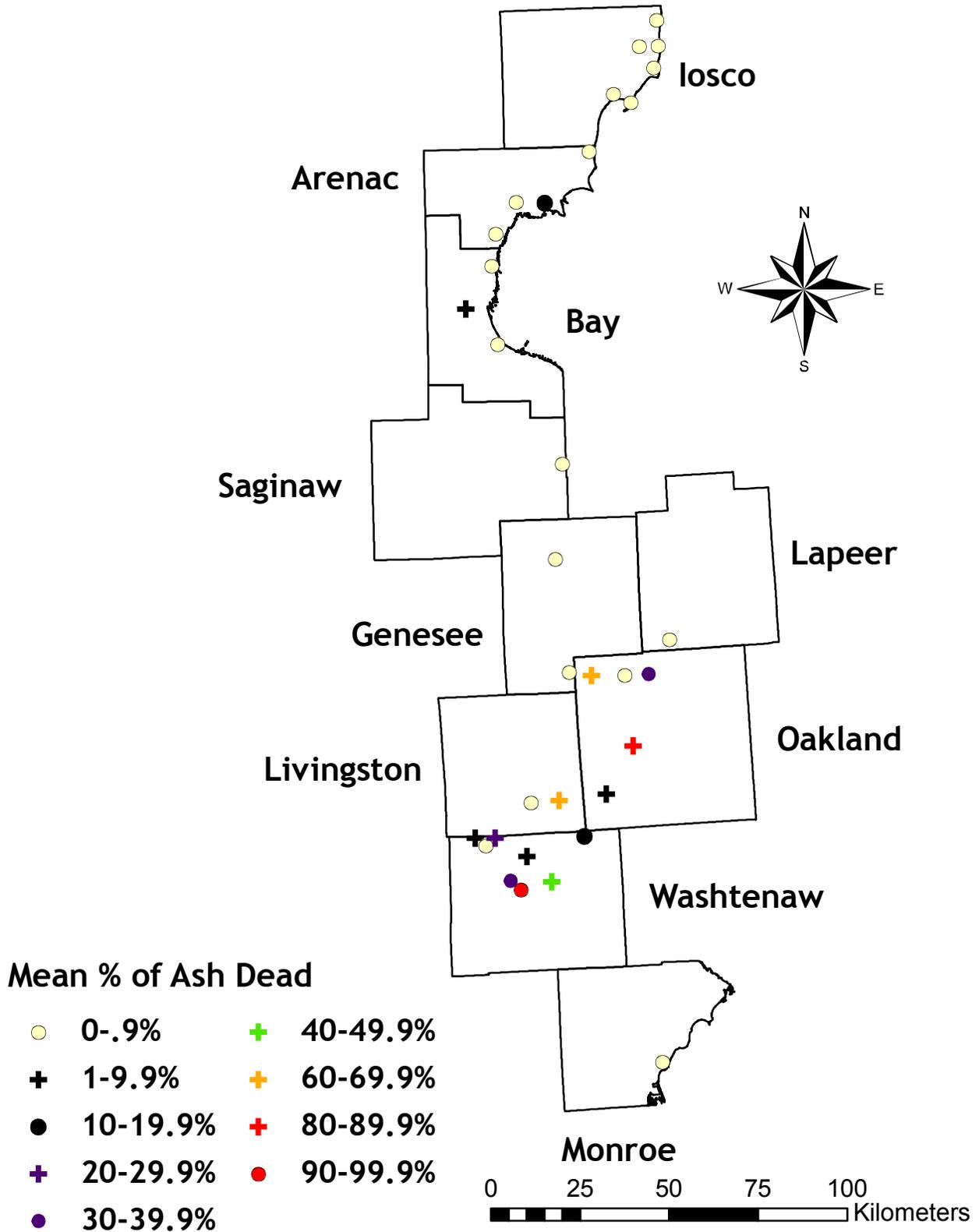
# Percent of Ash Dead in Recreational Areas 2003



Source: Michigan Geographic Library  
U of M School of Natural Resources and Environment

NDW May 2009

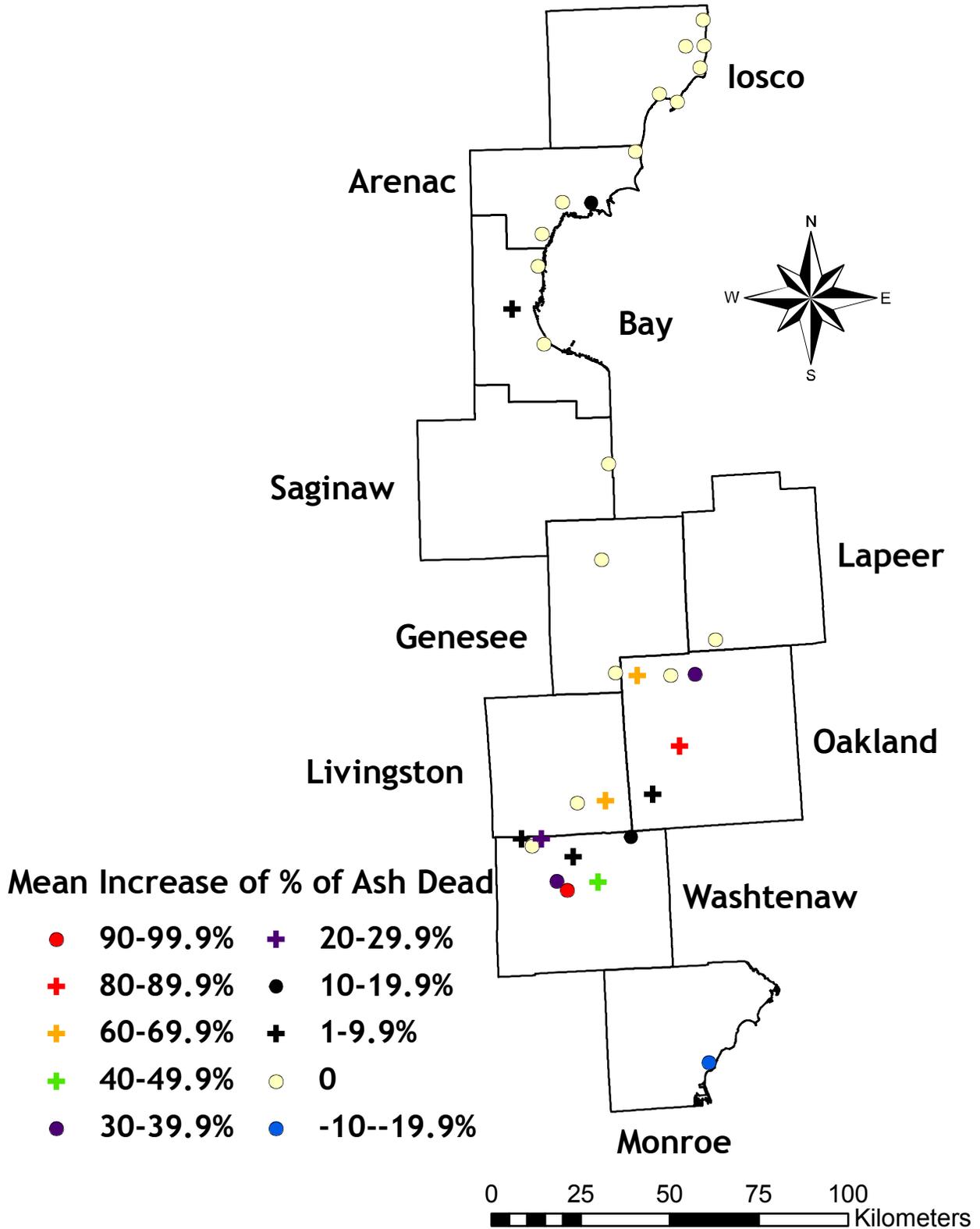
# Percent of Ash Dead in Recreational Areas 2005



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 U of M School of Natural Resources and Environment

NDW May 2009

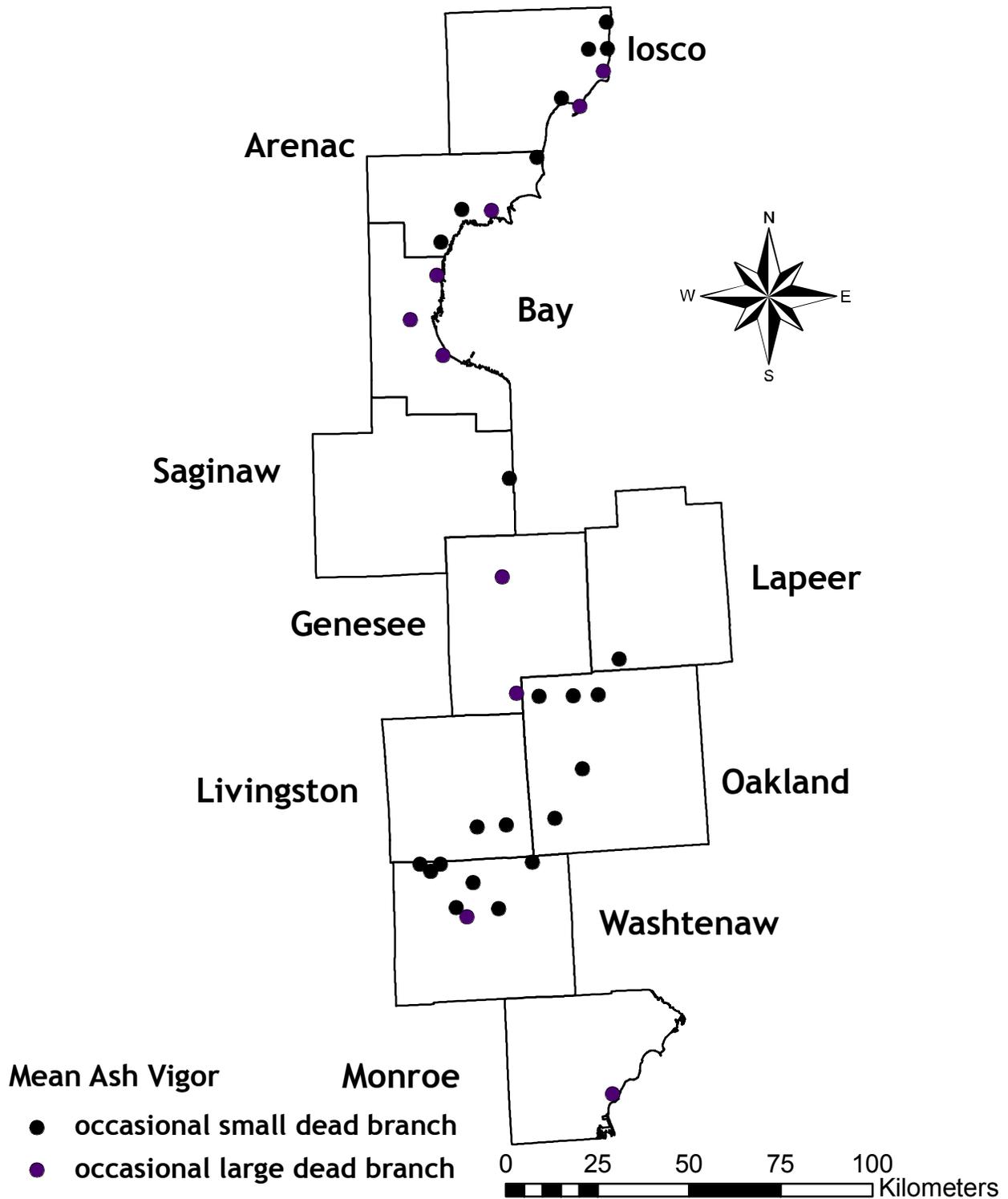
# Change of Percent of Ash Dead in Recreational Areas



Source: Michigan Geographic Library  
U of M School of Natural Resources and Environment

NDW May 2009

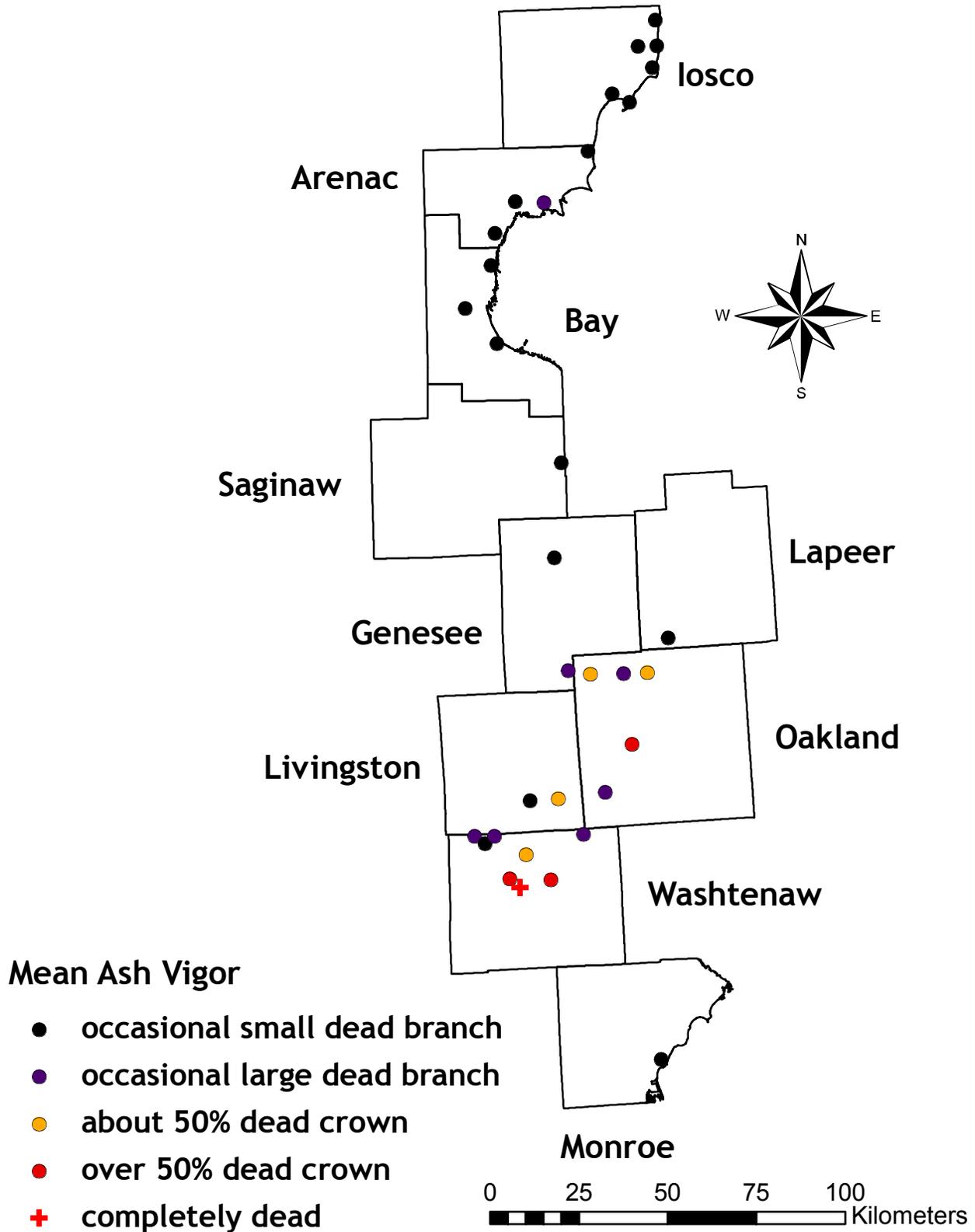
# Ash Vigor in Recreational Areas 2003



Source: Michigan Geographic Library  
 U of M School of Natural Resources and Environment

NDW May 2009

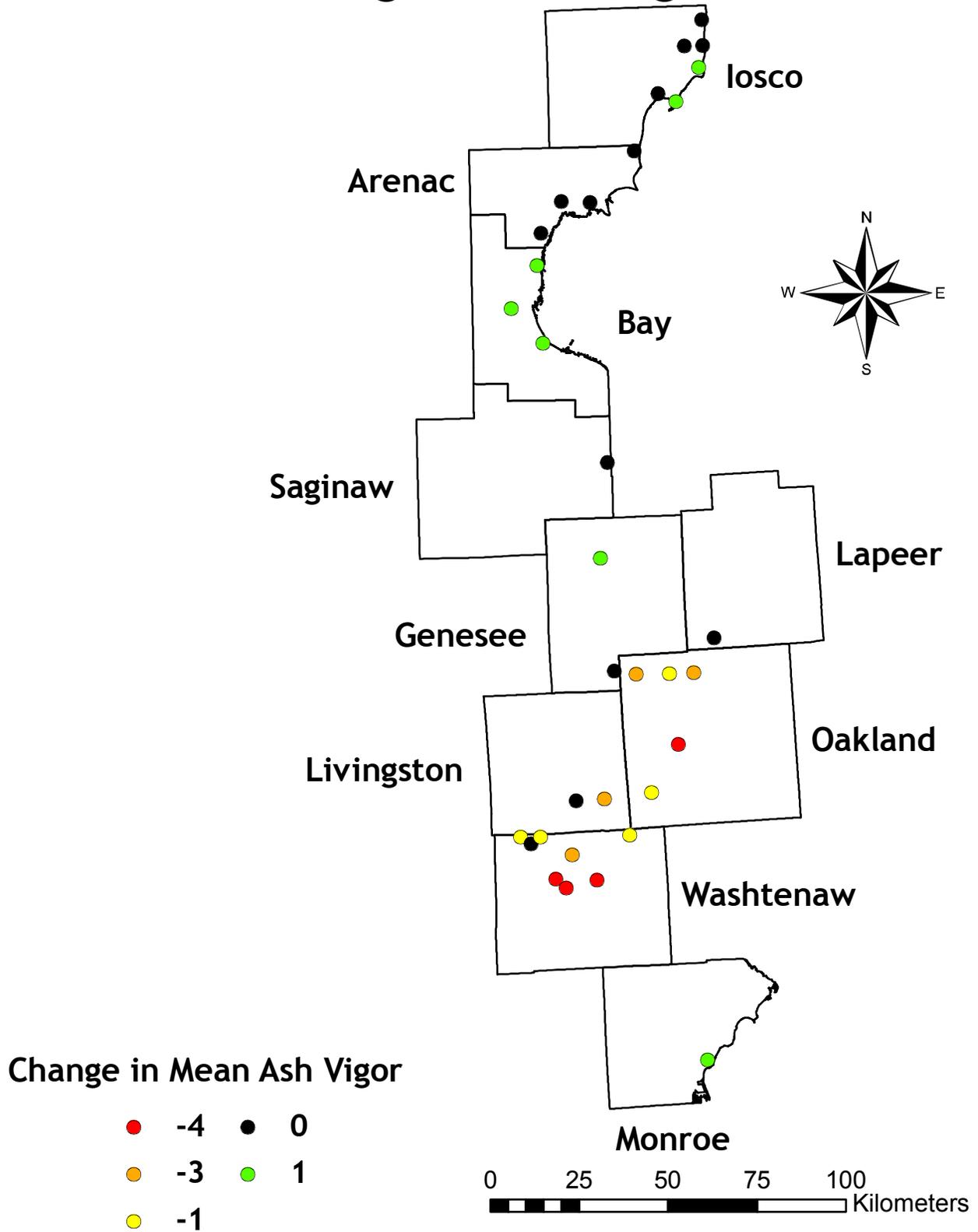
# Ash Vigor in Recreational Areas 2005



Source: Michigan Geographic Library  
 U of M School of Natural Resources and Environment

NDW May 2009

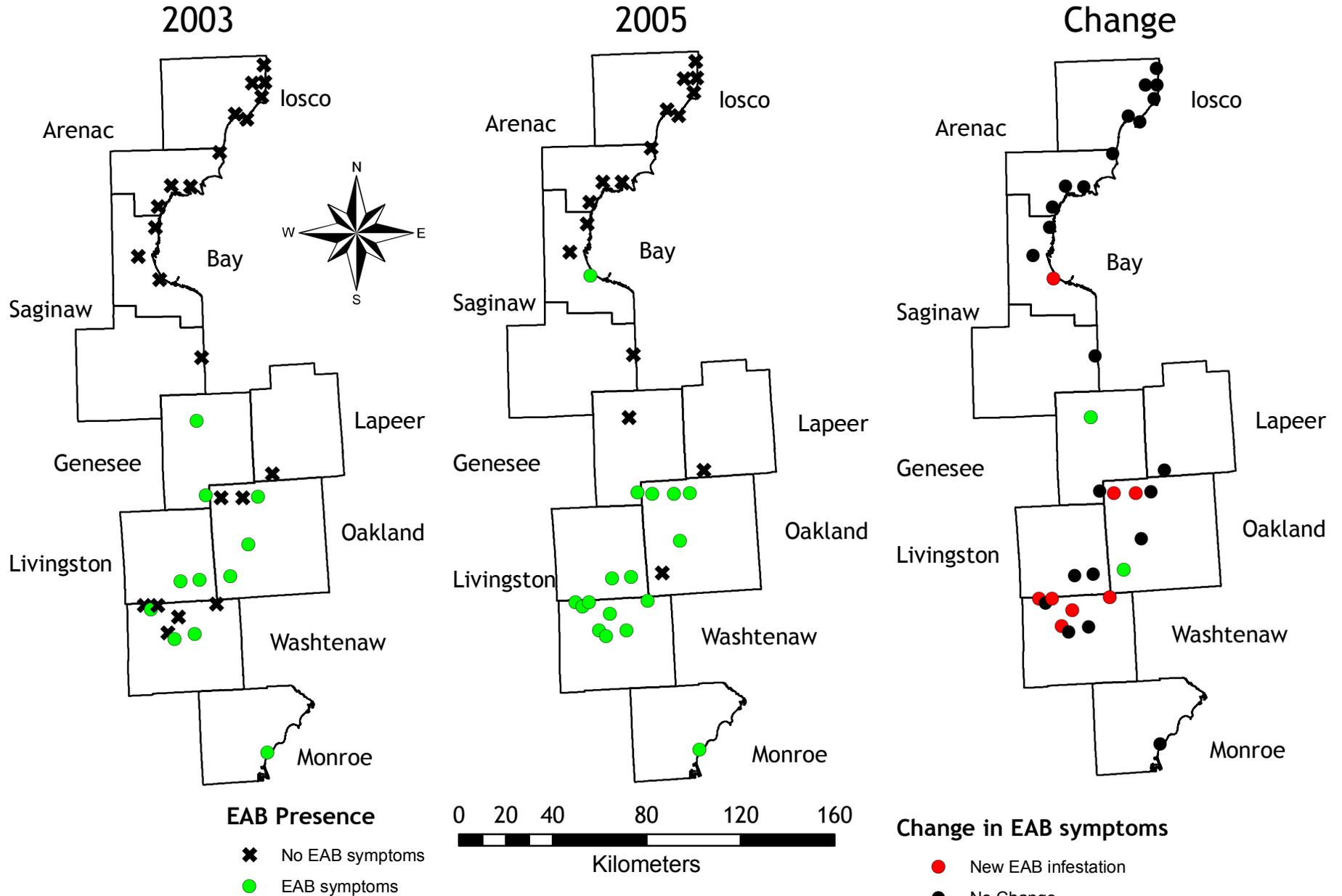
# Change in Ash Vigor



Source: Michigan Geographic Library  
 U of M School of Natural Resources and Environment

NDW May 2009

# Change in Emerald Ash Borer Presence Over Time



**EAB Presence**

- ✕ No EAB symptoms
- EAB symptoms

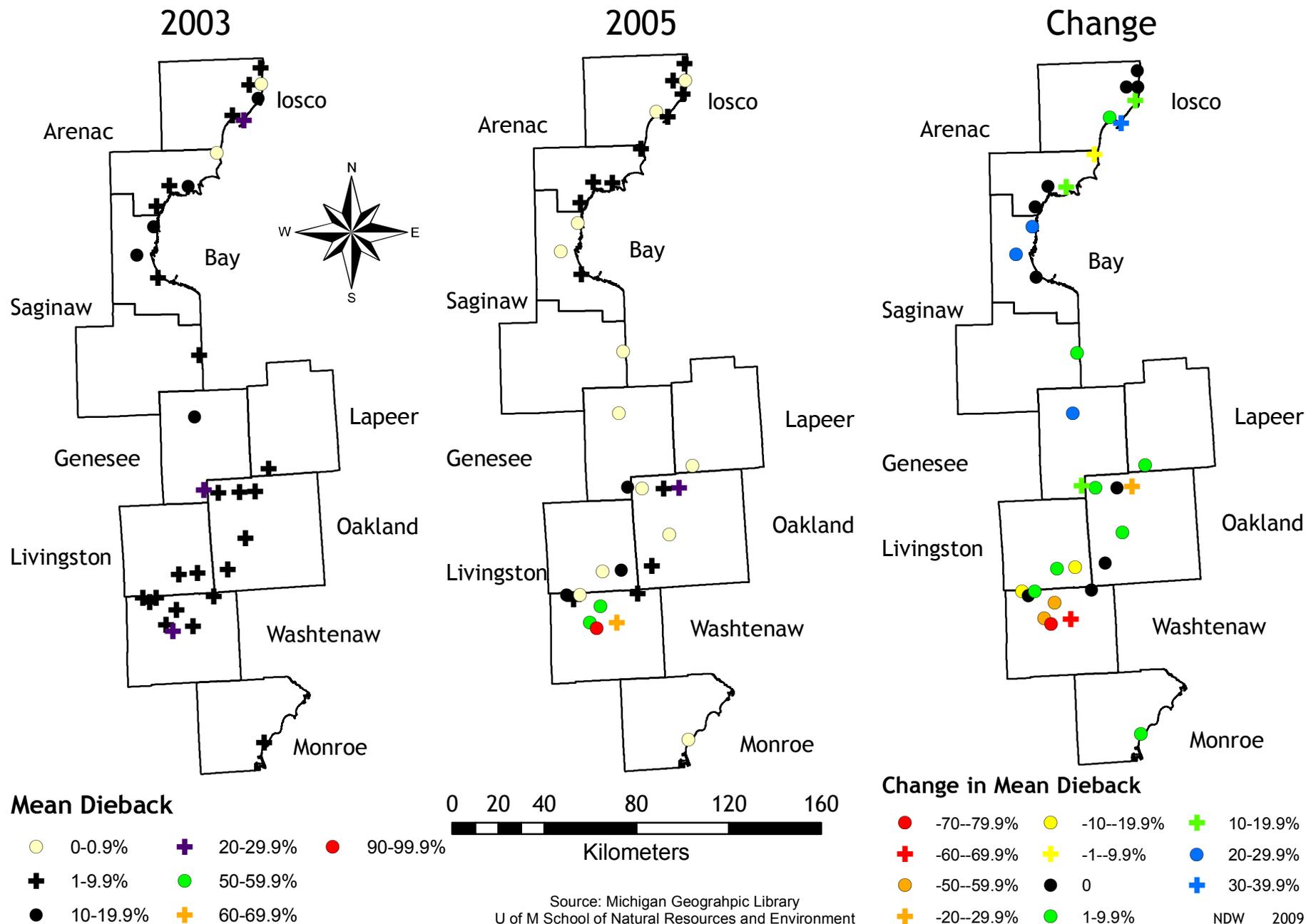
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Kilometers

**Change in EAB symptoms**

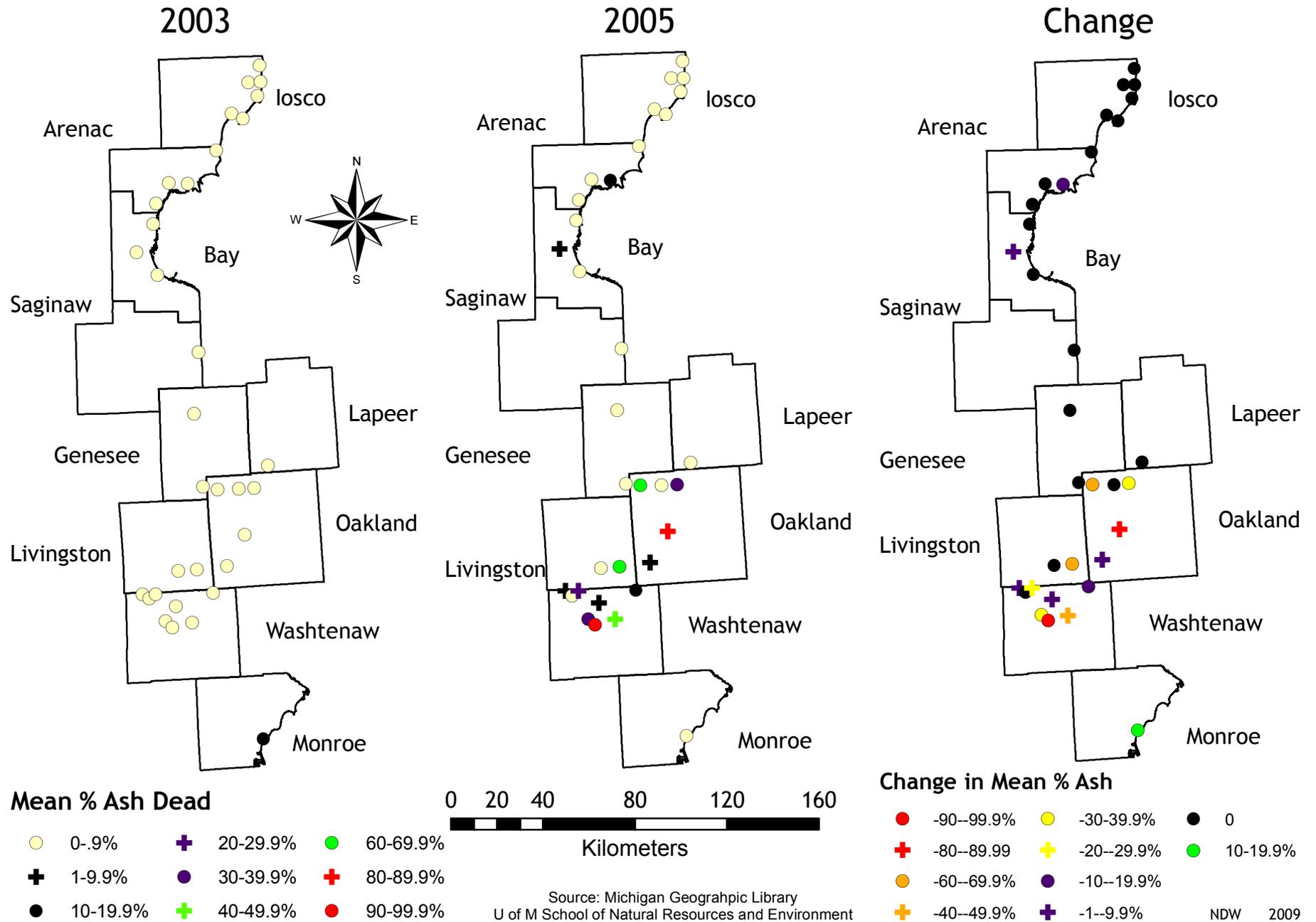
- New EAB infestation
- No Change
- No new EAB symptoms

Source: Michigan Geographic Library  
U of M School of Natural Resources and Environment

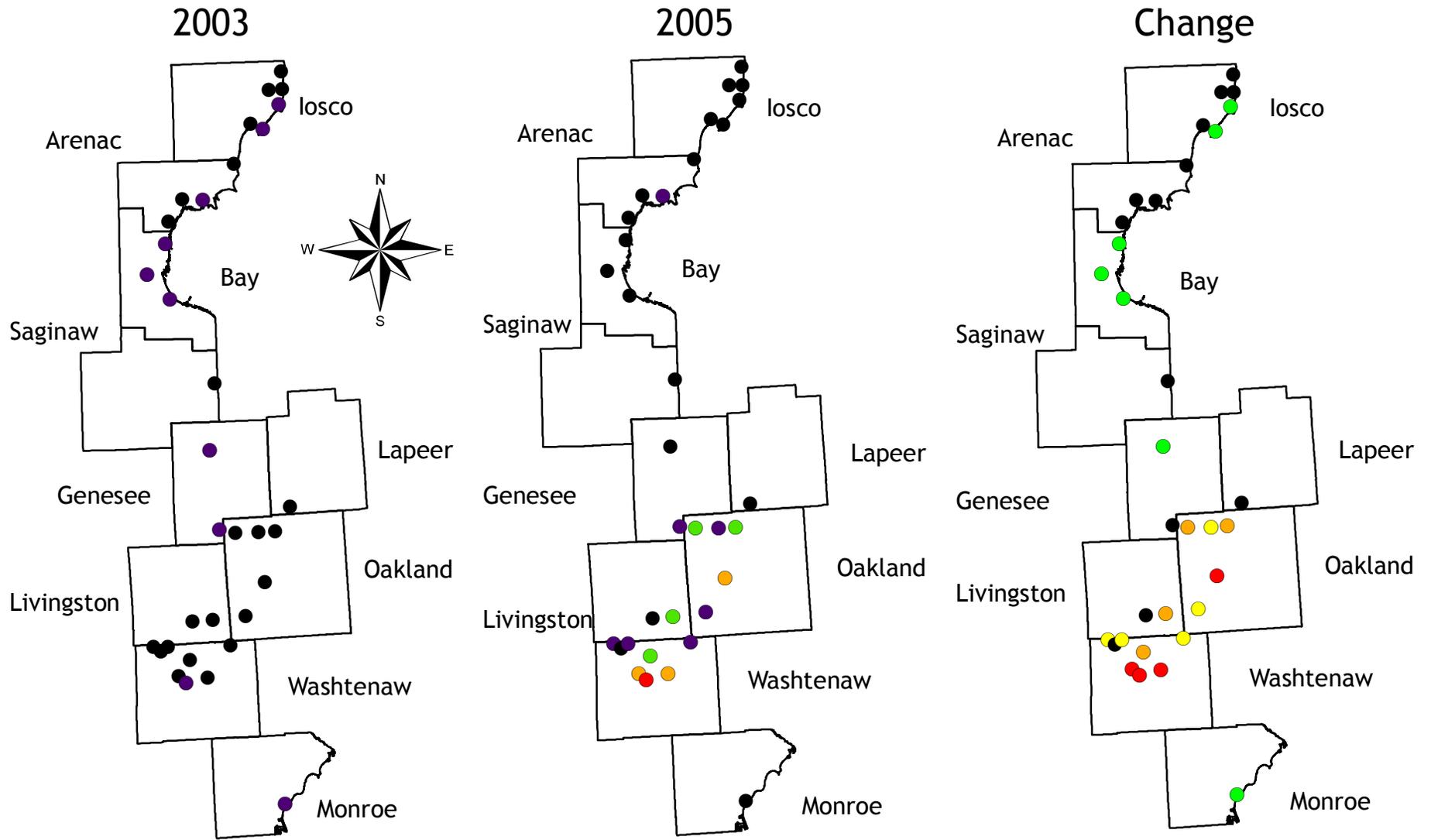
# Change in Ash Dieback Over Time



# Change in Percent Ash Dead Over Time



# Change in Ash Vigor Over Time



## Mean Ash Vigor

- Few small dead branches
- few large dead branches
- About 50% dead
- Over 50% dead
- Completely dead

0 20 40 80 120 160

Kilometers

## Change in Mean Ash Vigor

- -4
- -3
- -1
- 0
- 1

Source: Michigan Geographic Library  
U of M School of Natural Resources and Environment

# CONDITIONS OF ASH TREES IN RECREATIONAL SITES OF LOWER MICHIGAN WITH AND WITHOUT EMERALD ASH BORER

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White ash trunk. (Photo from www.hubbardbrook.org)

## DISCUSSION

The number of our study plots containing at least 1 tree with EAB symptoms increased from 11 in 2003 to 17 plots in 2005. While this indicates that EAB is spreading to new sites over time, its local-area spread within infested plots was more dramatic. For those plots infested at the time of the 2003 sample, the average proportion of study trees with EAB in a plot was  $30 \pm 5\%$ . For these same plots in 2005, proportion of trees infested was  $64 \pm 13\%$ .

Across all plots, trees with EAB symptoms were on average very similar to trees without EAB symptoms in terms of descriptive measures such as tree diameter at breast height and proportion of tree height made up of live crown. Trees with EAB did have slightly less light exposure on average ( $3.0 \pm 0.2$ , which represents the tree top and 2 sides exposed to sunlight) as compared to trees with no EAB symptoms ( $3.7 \pm 0.1$ , the tree top and just over 2.5 sides exposed to sunlight); however, this difference may not be biologically meaningful. On the other hand, trees with EAB were markedly worse in terms of mean vigor and mean dieback than trees without EAB symptoms.

Generally, green ash has responded somewhat more poorly after infestation and has declined more in health measures over the past 2 yr than has white ash. For instance, green ash with EAB had higher levels of dieback in 2005 than did white ash with EAB in that year. Similarly, mean vigor ratings of green ash with EAB indicated much poorer health in 2005 than did average ratings for infested white ash. The % of sample trees that were dead in 2005 for green ash is double the figure for white ash. However, the % of trees showing EAB symptoms increased much more markedly over the past 2 yr for white ash than for green ash. Because of this recent increase in infestation level for white ash trees in the study, it is possible that future trends in white ash health may show declines similar to those currently seen for green ash.

Mean tree health measures such as vigor, dieback, and % of ash dead have worsened markedly over the past 2 yr in many plots close to the infestation epicenter while these measures have shown little change in areas that are more distant.

## EMERALD ASH BORER (EAB)

- Exotic wood boring insect discovered in SE Michigan during 2002 but likely in the state for at least 5-10 yr prior to that time.
- Now in many Michigan counties, as well as other areas such as Ohio, Indiana, and Ontario.
- Poses serious risk because it attacks both stressed and healthy trees of white ash, green ash, and black ash.
- Found on trees in the open, along forest edges, and in forest interiors.

## OUR STUDY

- We are studying EAB presence and ash tree health in recreational sites throughout Michigan. This poster reports on a subset from the study.
- Objectives are to detect presence of EAB and monitor changes in tree health at sites with and without EAB.
- Recreational sites often include planted ash trees, growing conditions are frequently stressful, many people interact with these sites, and firewood brought to these sites commonly acts as a means of transport for insects.

## METHODS

- This poster reports on 33 Lower Michigan sites in or near recreational areas (parks, picnic areas, rest areas, boat landings, camp sites, etc.). Sites included both naturally occurring and planted ash trees.
- Sites were visited in 2003 and 2005. Common descriptive data and tree crown measurements were collected following methods of the USDA's Forest Inventory and Analysis—Forest Health Monitoring program. In 2003, 10 trees were sampled per site; in 2005, 15 trees were sampled per site.

- Means and standard errors are presented, along with other descriptive measures. Statistical comparison procedures for means have not yet been completed.

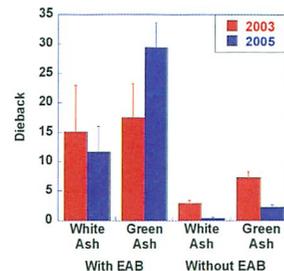
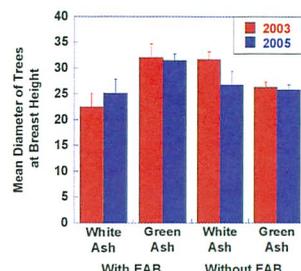
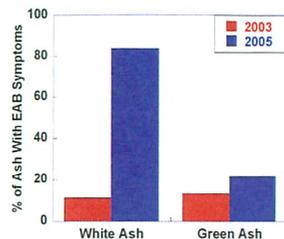


EAB adult. (Photo by D. Cappaert)

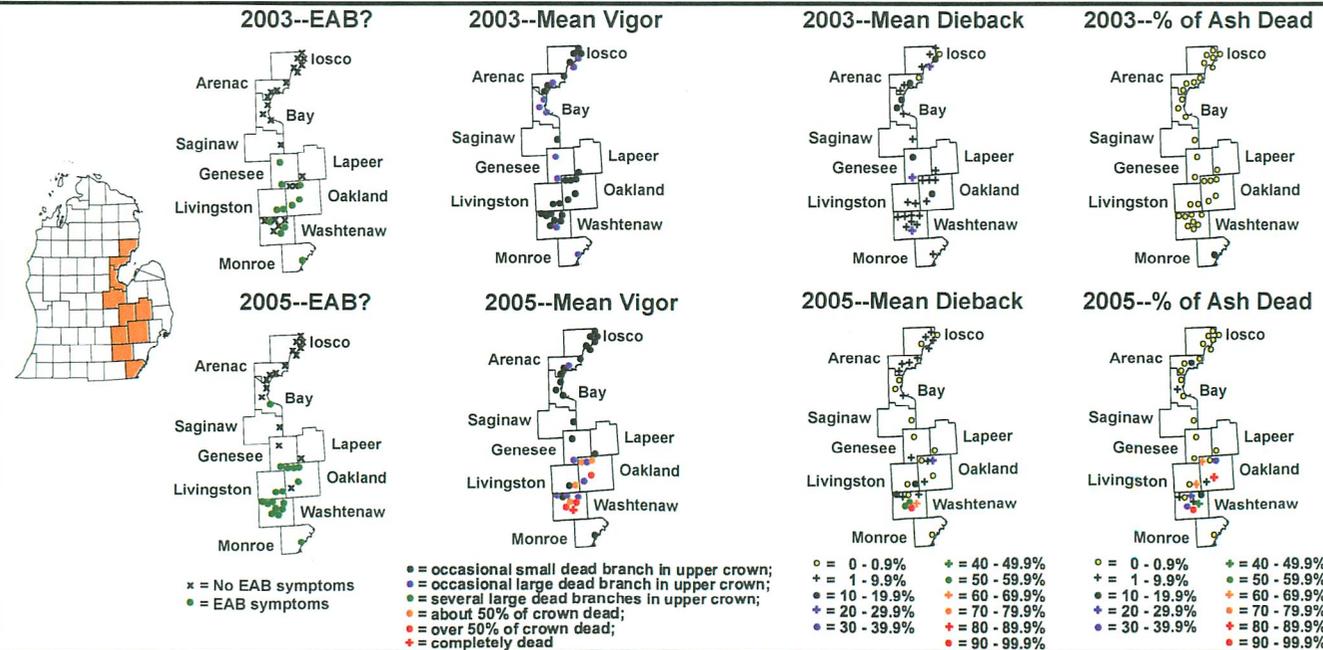
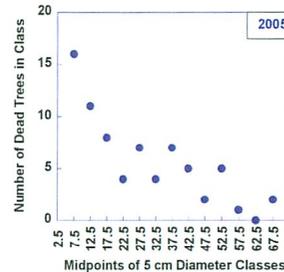
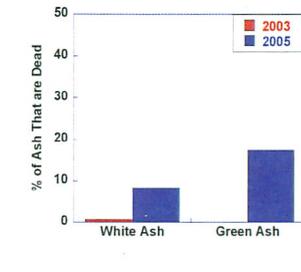
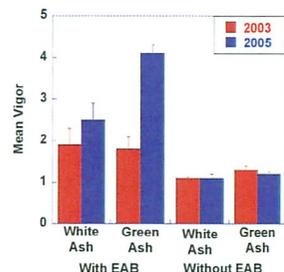
## RESULTS

EAB symptoms searched for include exit holes, larval galleries, and epicormic branching.

For vigor, 1 = occasional small dead branch in upper crown; 2 = occasional large dead branch in upper crown; 3 = several large dead branches in upper crown; 4 = about 50% of crown dead; 5 = over 50% of crown dead; 6 = tree dead



Dieback is measured as % of branch tips that are dead in the upper and outer portions of the crown. Dieback is measured only on trees that are still alive. It is affected by weather and disease as well as insect pests.



Ash species are important members of natural ecosystems, both in upland forests and bottomland wet areas. Additionally, ash trees are commonly planted in urban, suburban, and recreational sites. Understanding patterns of ash tree health will allow us to better manage the trees in both our planted and natural ecosystems.

Thanks for support:  
USDA Forest Service  
Michigan Dept. of Natural Resources