

Michigan Ash Monitoring Plot System

Upper Peninsula Plot Atlas

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Background Information

The maps in this atlas were produced from data collected during 2004, 2005 and 2006. Sixty-seven monitoring plots were established in the Upper Peninsula of Michigan in 2004 and 2005. These plots are part of the Michigan Ash Monitoring Plot System. All plots established in 2004 and 2005 were remeasured in 2006.

The maps show tree level measurements for the three widely-distributed *Fraxinus* (ash) species found in Michigan: black ash (*Fraxinus nigra*), green ash (*Fraxinus pennsylvanica*), and white ash (*Fraxinus americana* L). Baseline measurements were averaged by species and by plot for mapping purposes, as were the remeasurement data.

Maps include all plots; plots with each of the three ash species present; and mean values for each plot (by species) depicting crown class, crown density, crown dieback, crown light exposure, diameter at breast height (DBH), foliage transparency, height, uncompacted live crown ratio, and tree vigor.

Crown class is a composite of light exposure and tree height that rates tree crowns in relation to the sunlight received and proximity to neighboring trees. The assessment is based on the position of the crown at the time of observation. Values range from 1 (open grown) to 5 (overtopped).

Crown density is the percent of total light that is blocked from shining through the crown by leaves, branches and fruit. It takes into account both live and dead parts of the crown and is affected by the tree's shape and growing conditions. Low crown density indicates a thin crown, missing sections of the crown, or poor foliage amounts. High crown density indicates that the tree has a large amount of leaf material available for photosynthesis and favorable growing conditions. Low values indicate stress.

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.

Crown light exposure estimates the number of sides on which the tree would receive direct sunlight if the sun were directly above the tree. Values range from 0 (overtopped) to 5 (open grown).

Foliage transparency is a measure of the amount of skylight that shines through the live portion of the tree's crown as a percent of the total amount of light that would be visible if it were not blocked. Transparency values differ among tree species and are affected by the tree's shape and growing conditions. High transparency values for a tree indicate that the tree has less leaf area to catch sunlight for photosynthesis and may result from insects feeding on foliage, diseases, or other stresses. A high transparency value indicates a stressed tree.

Tree height is the total height of a tree, in feet.

Uncompacted live crown ratio is a percentage calculated by dividing the live crown length by the total height of a tree. Trees with high live crown ratios are considered healthier and grow faster than trees with low crown ratios.

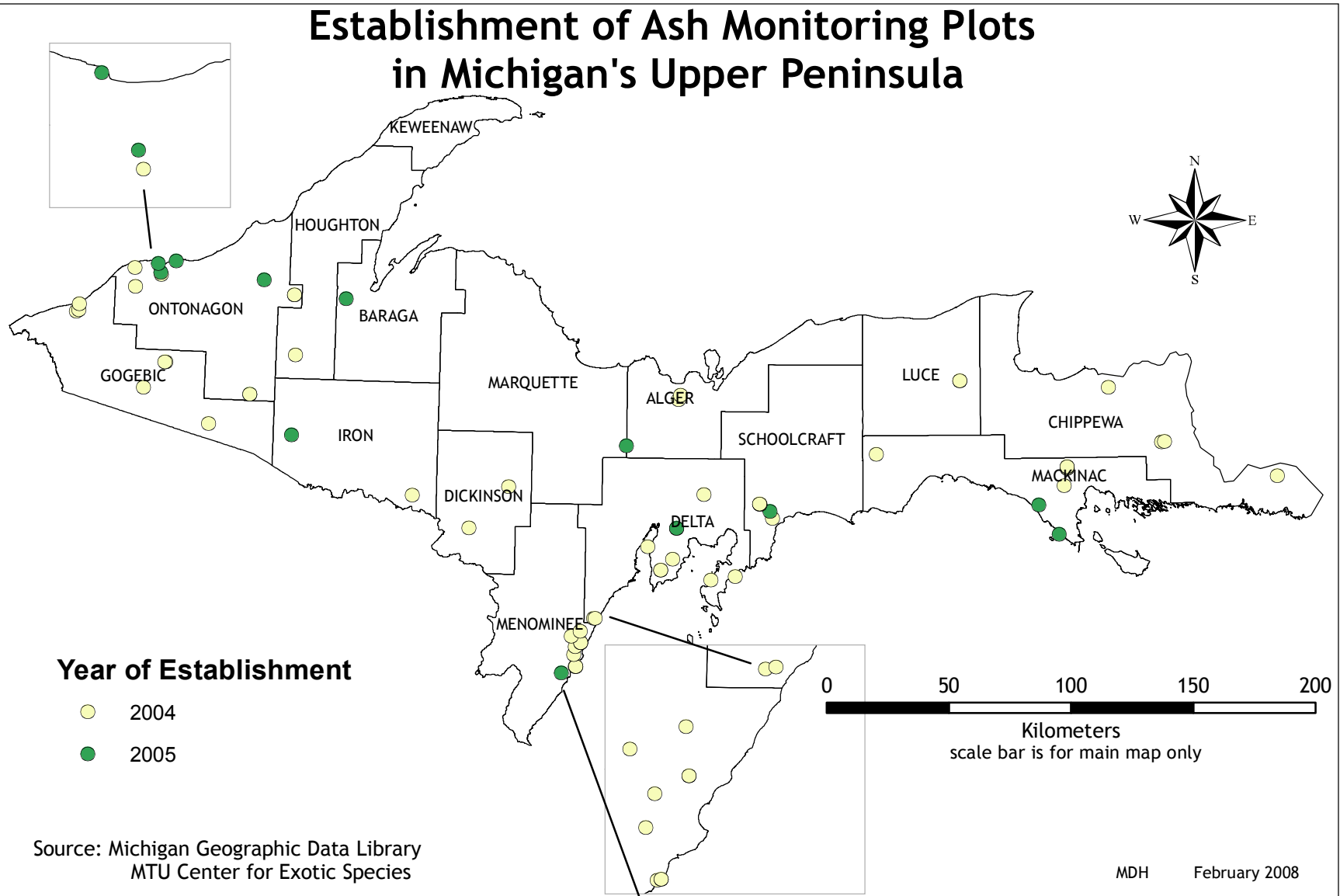
Tree vigor is a rating of the overall health of a tree. Values range from 1 to 8, depending on the amount of dead wood in the crown. A ranking of 1 would indicate a healthy, vigorous tree; a value of 5 indicates a crown more than half dead; and values of 6-8 indicate a dead tree in various stages of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

The **change maps** were created by comparing the remeasurement data, recorded in 2006, with plot establishment values from 2004 or 2005.

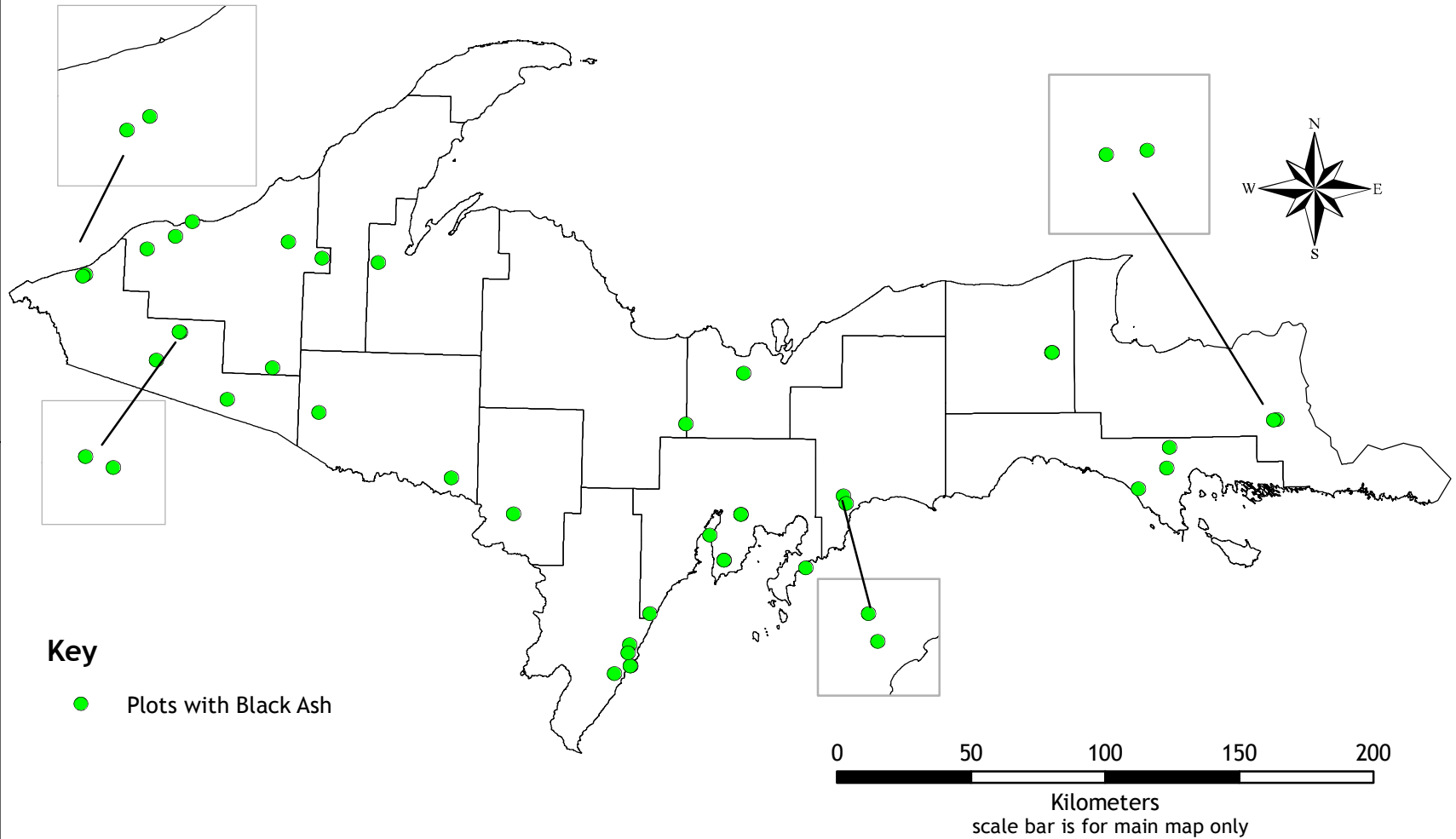
Additional information about the Michigan Ash Monitoring Plot System and measurements that were made at the tree and plot level may be found at <http://www.michiganash.org/publications/AshMonitoringProtocolHandbook.pdf>

Baseline Maps

Establishment of Ash Monitoring Plots in Michigan's Upper Peninsula



Black Ash Plots



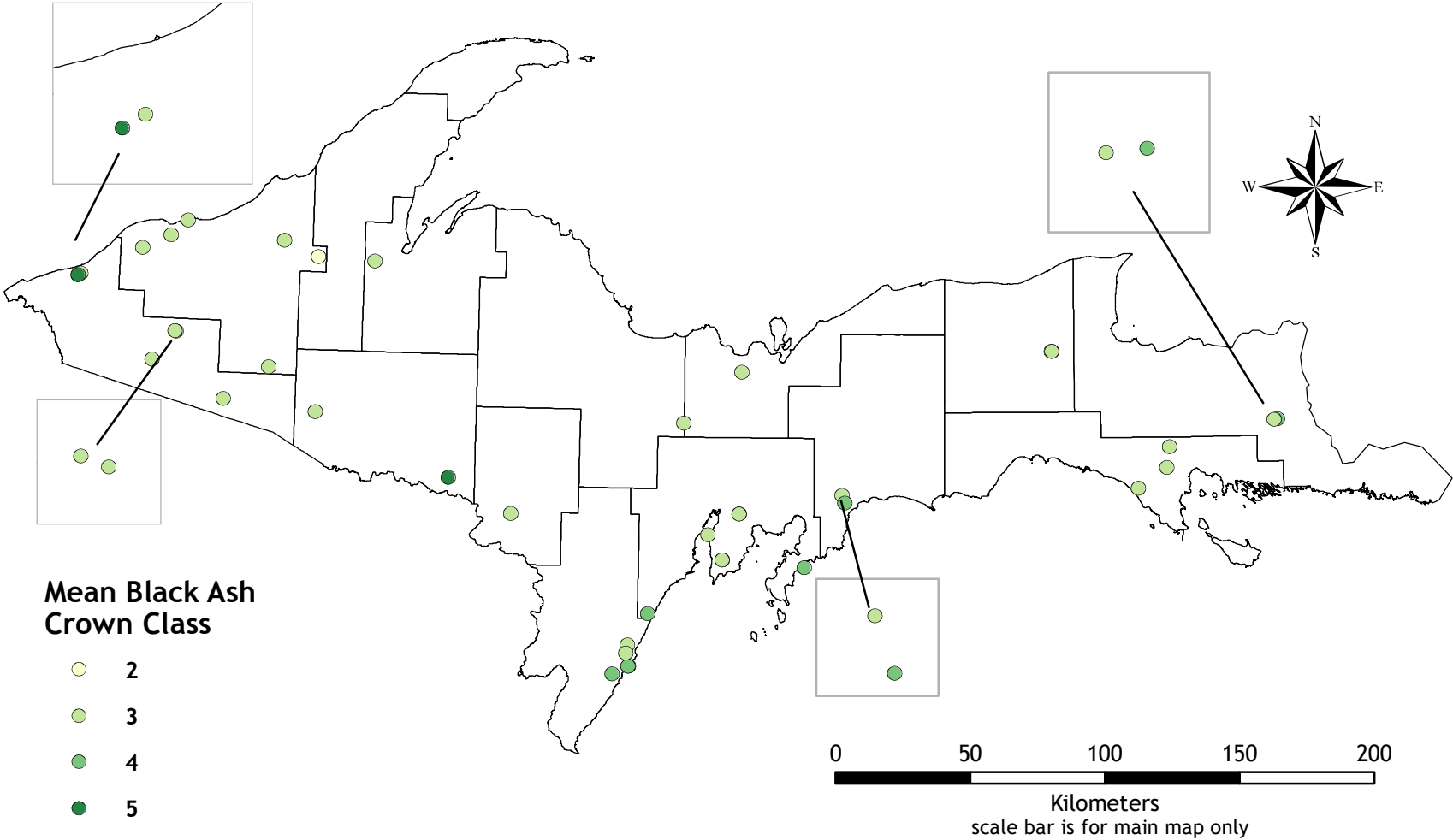
Key

● Plots with Black Ash

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

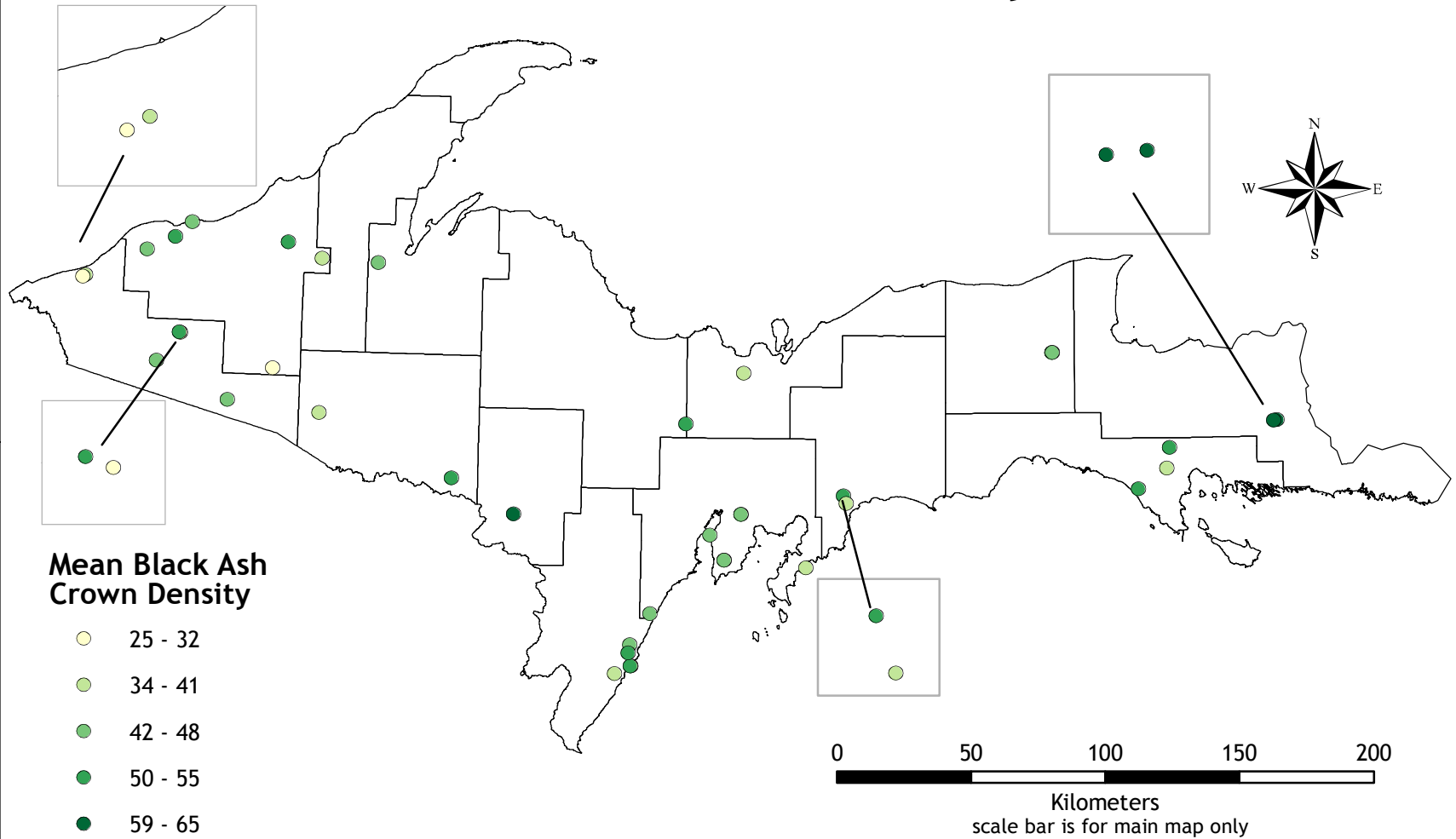
Black Ash Crown Class



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

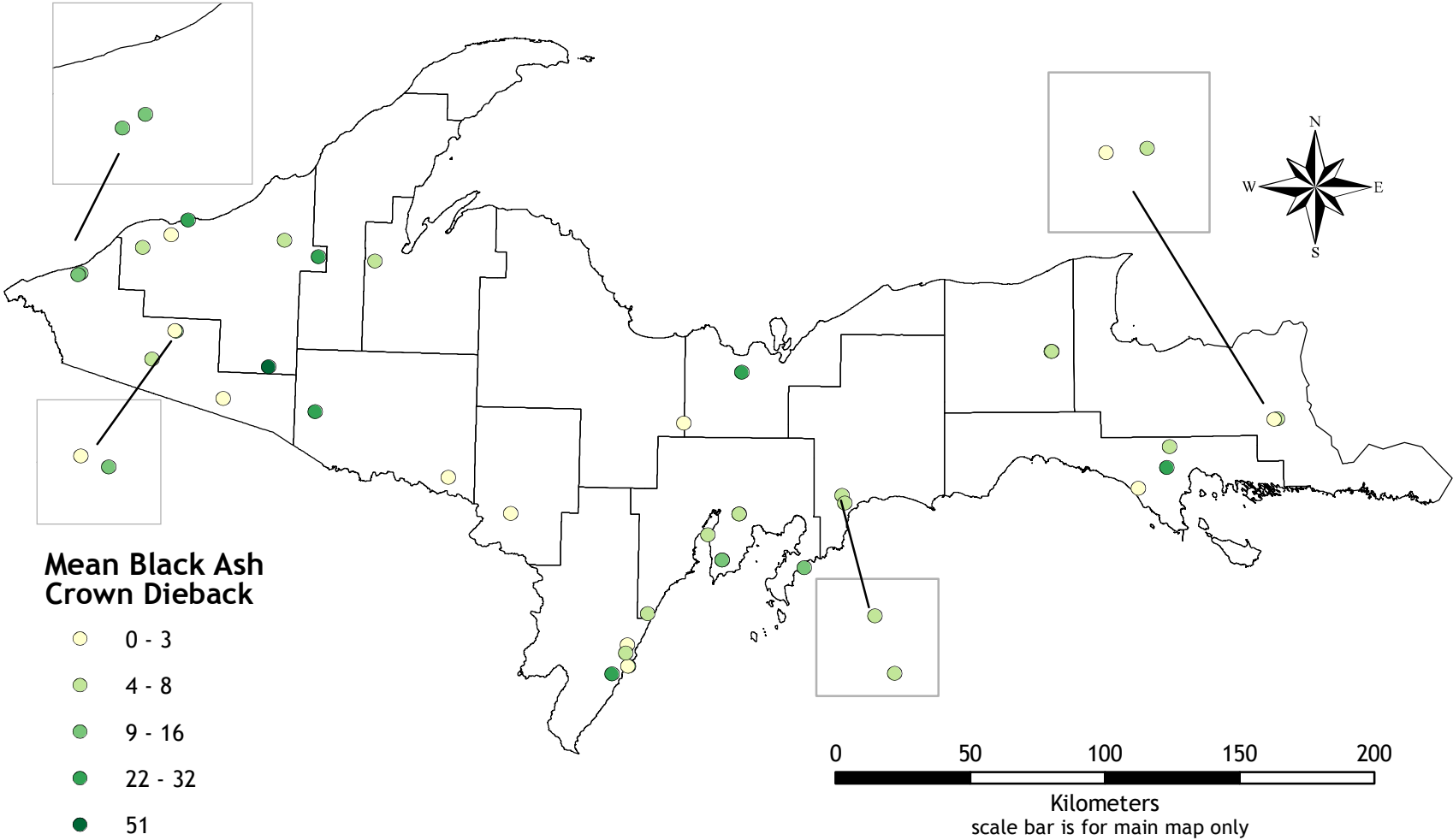
Black Ash Crown Density



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

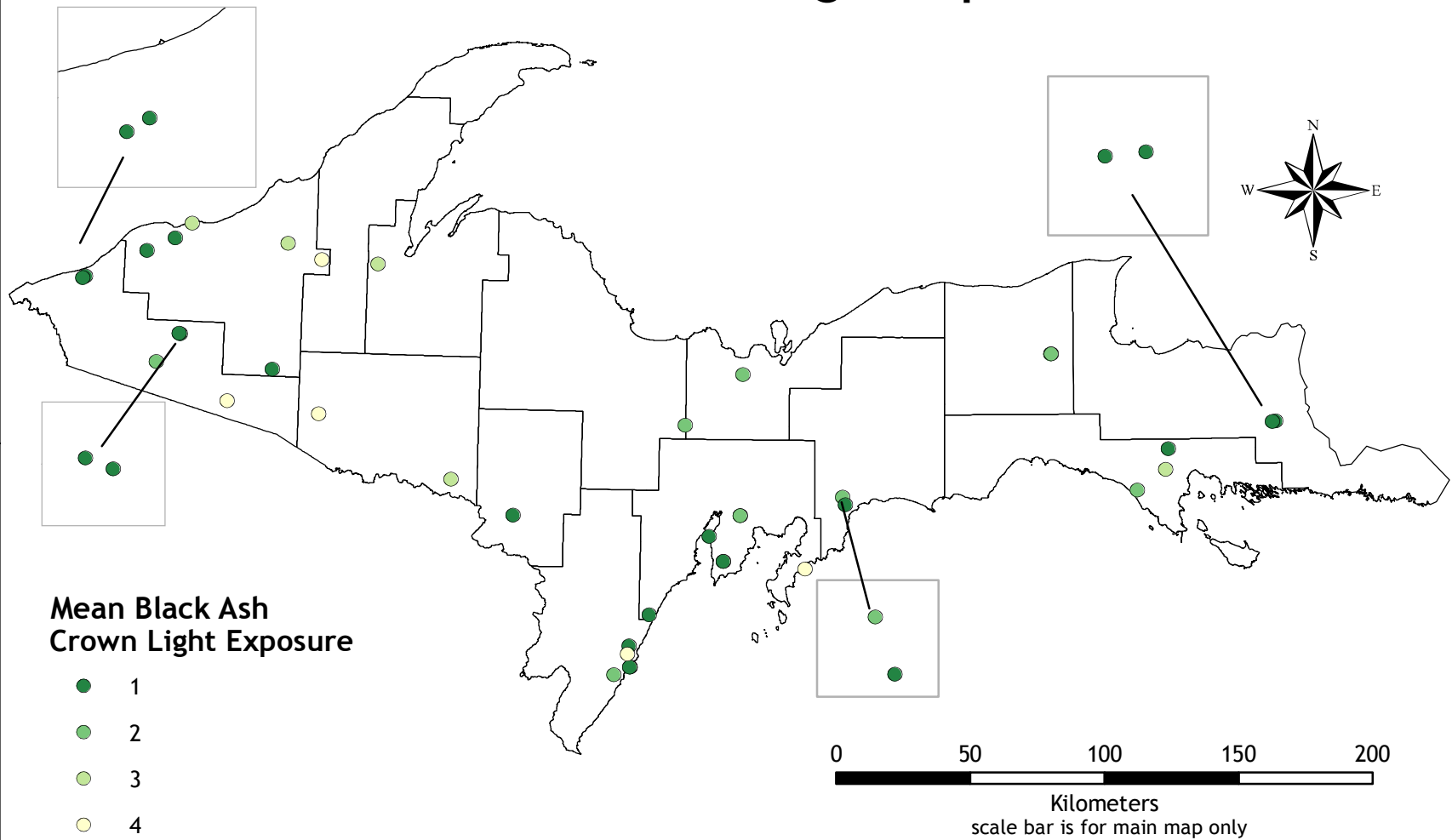
Black Ash Crown Dieback



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

Black Ash Crown Light Exposure



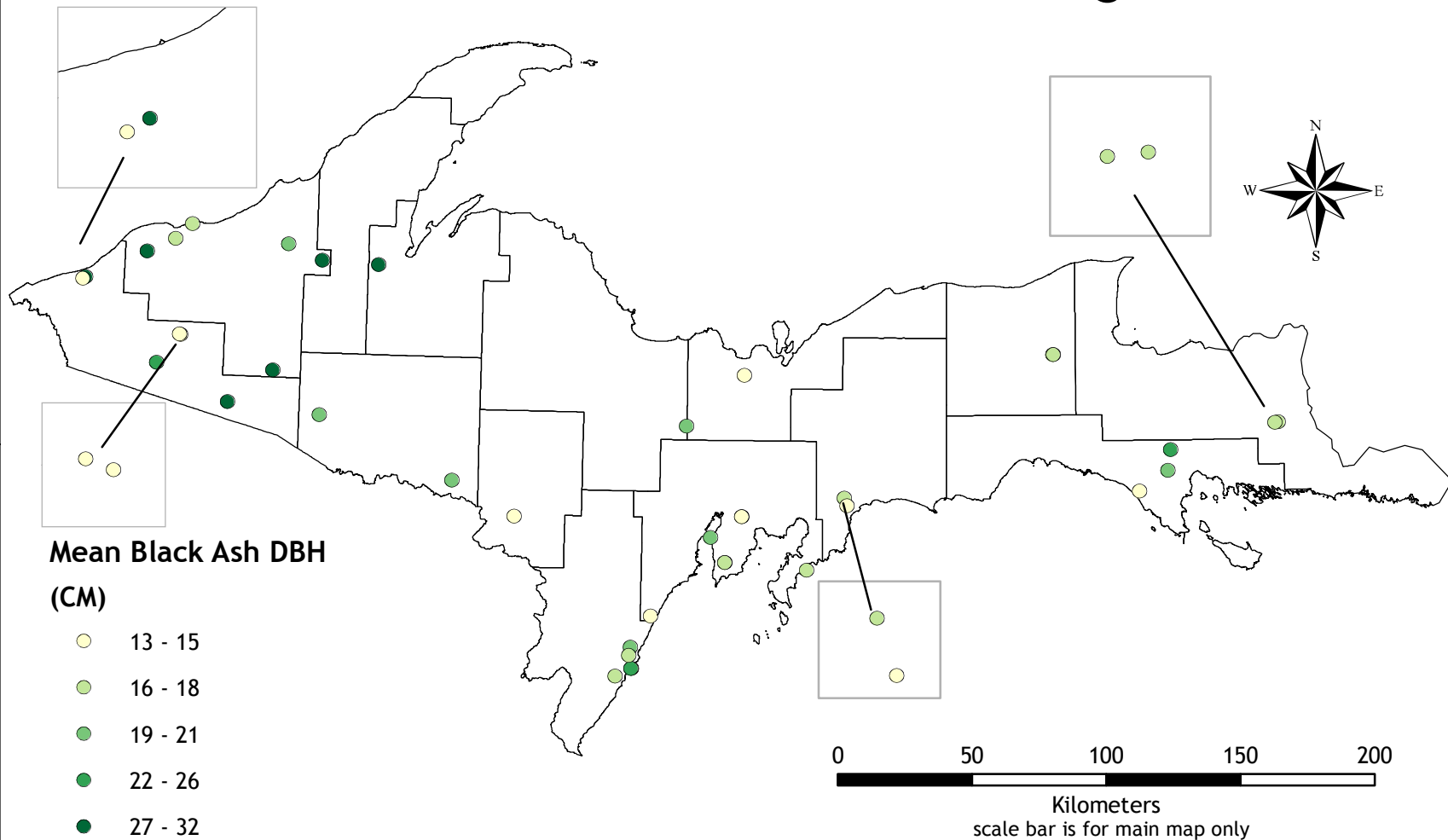
Mean Black Ash Crown Light Exposure

- 1
- 2
- 3
- 4

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

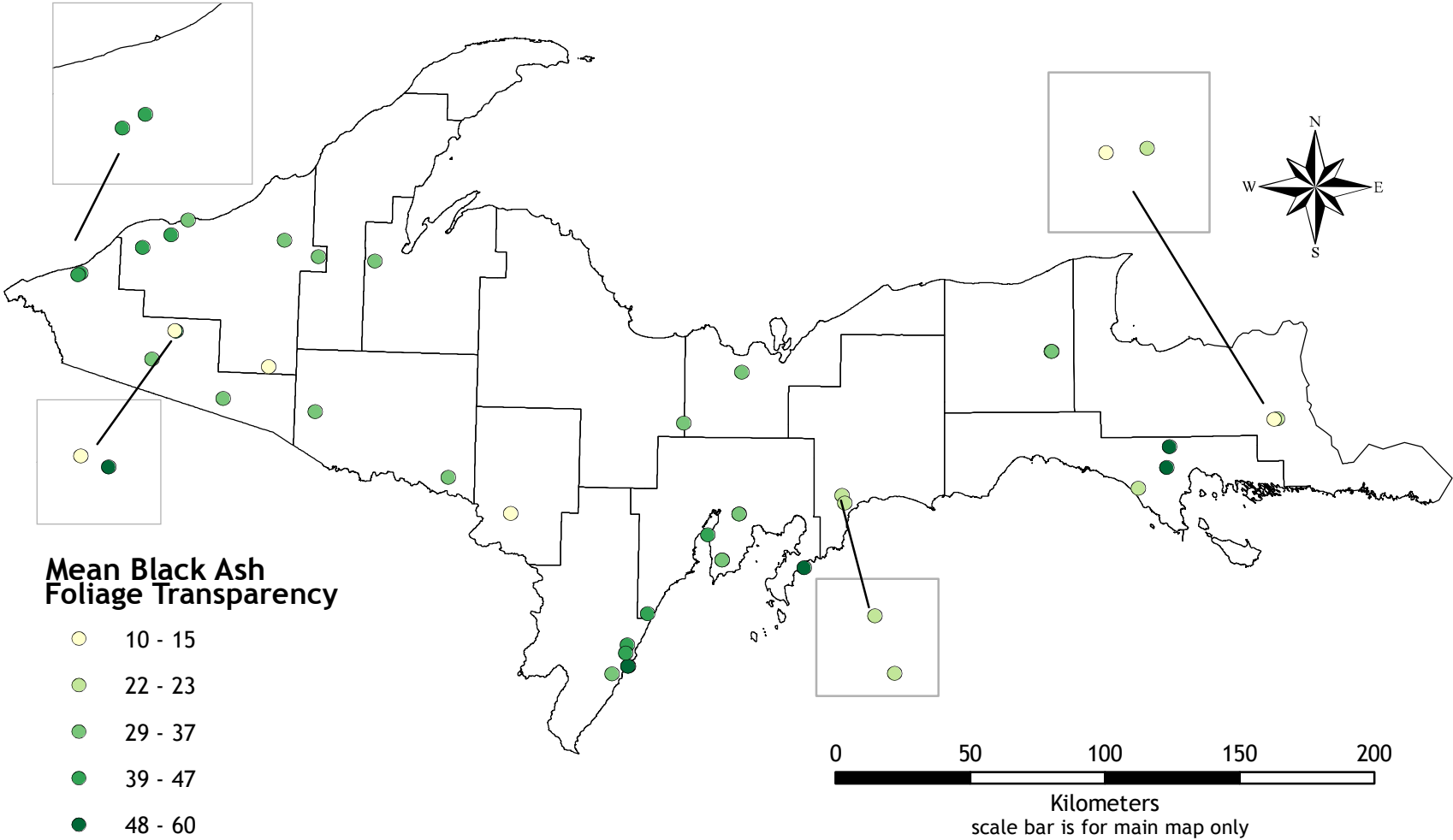
Black Ash Diameter at Breast Height



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

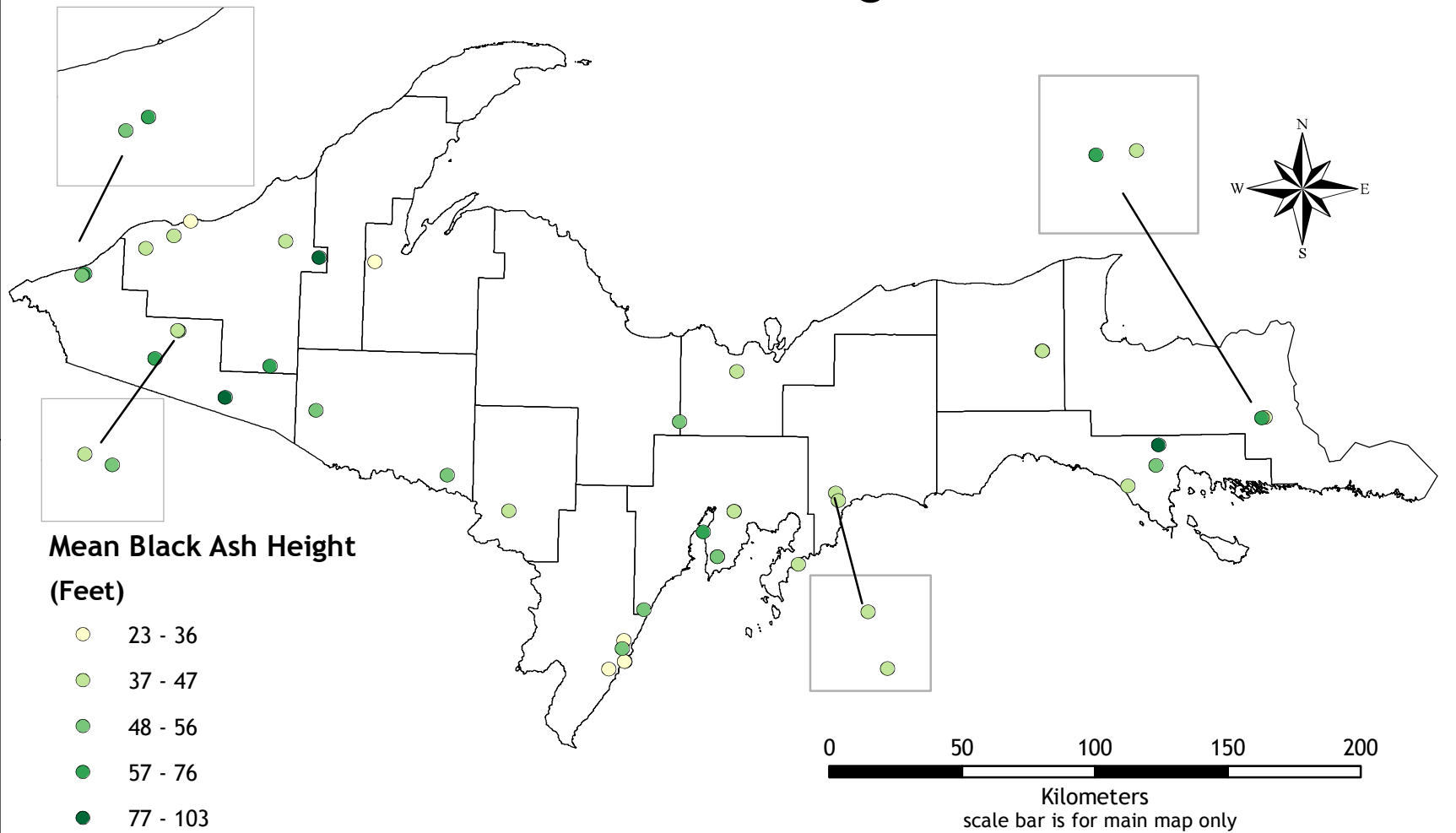
Black Ash Foliage Transparency



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

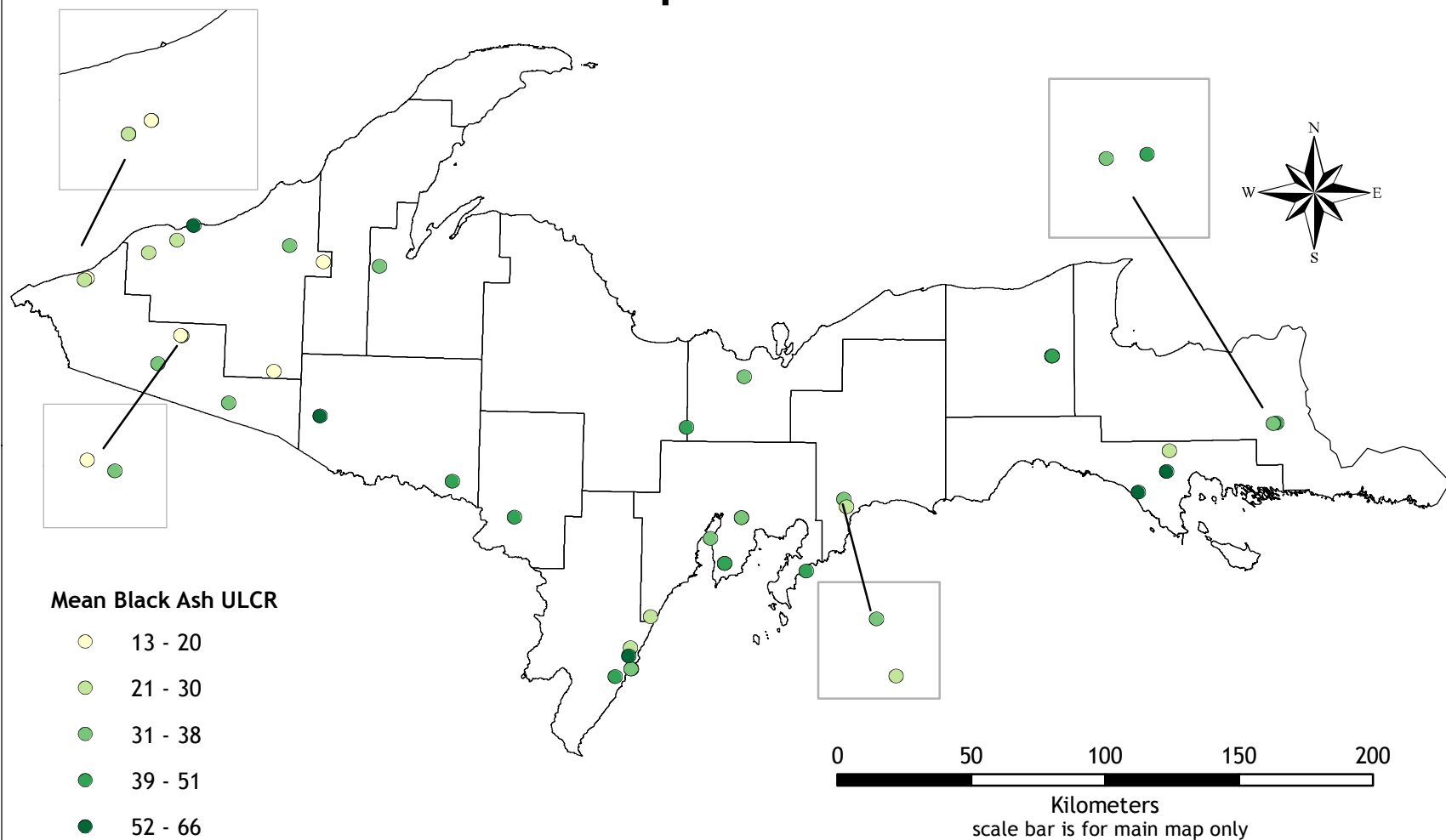
Black Ash Height



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

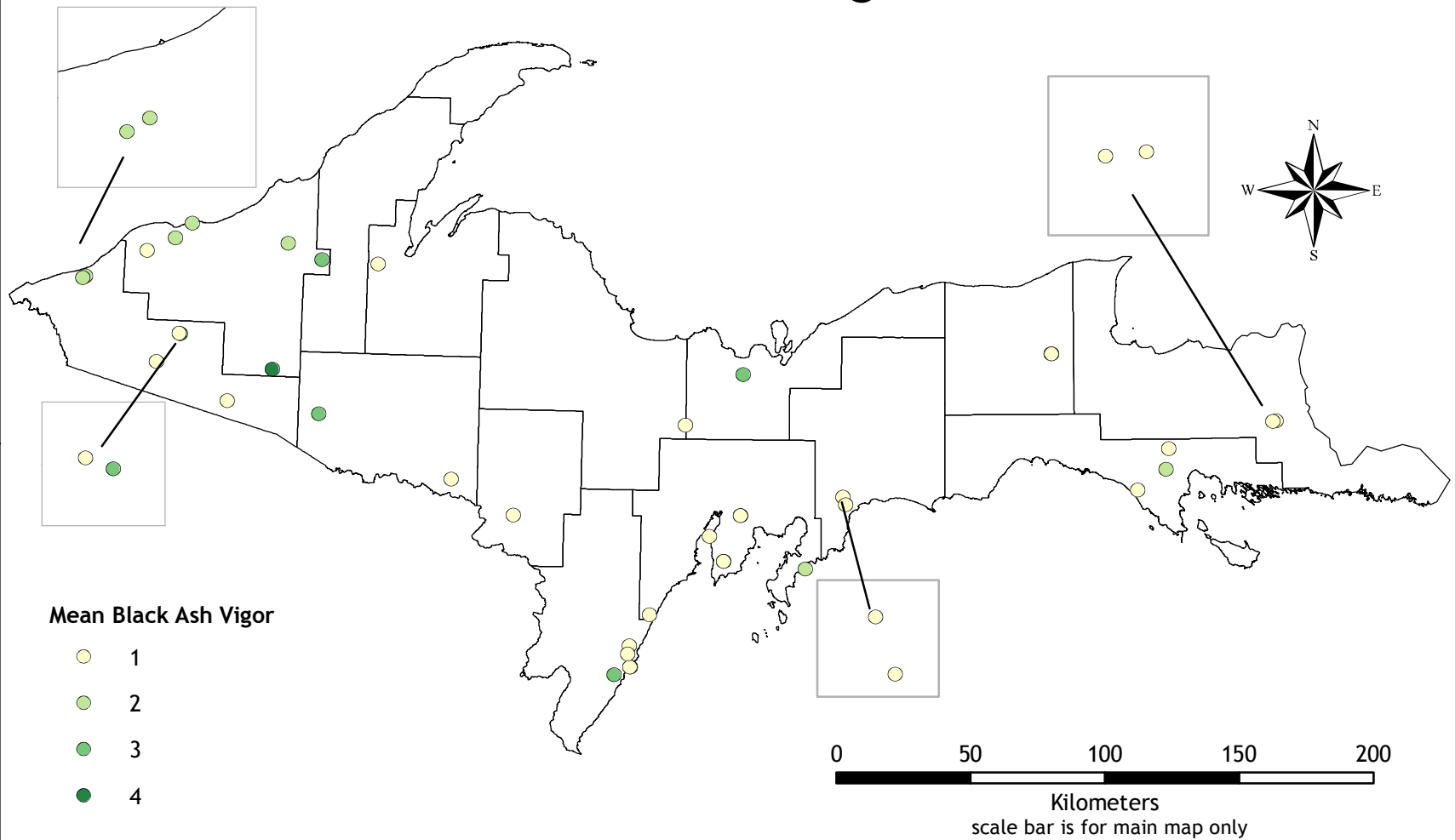
Black Ash Uncompacted Live Crown Ratio



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

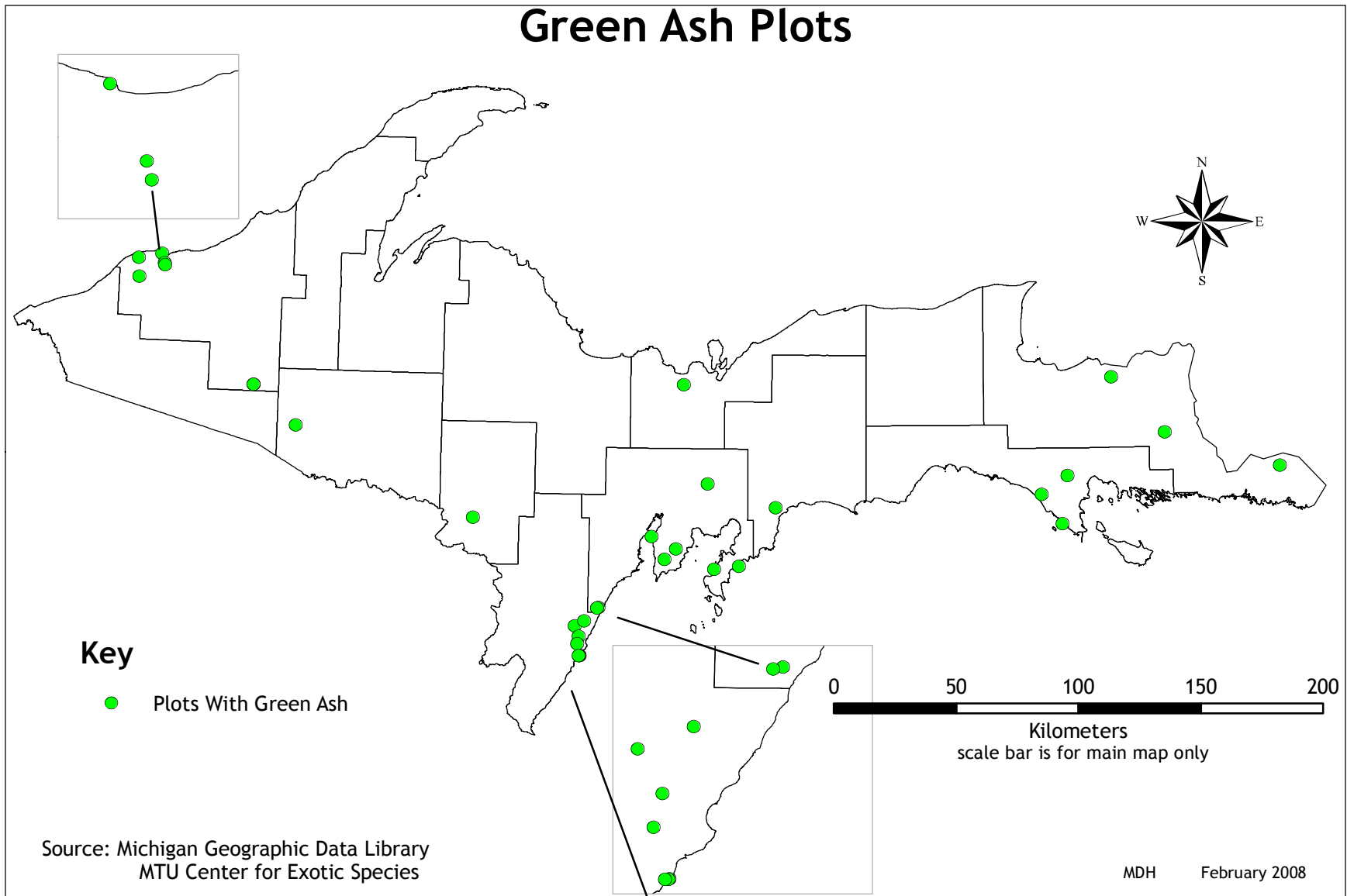
Black Ash Vigor



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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Green Ash Plots



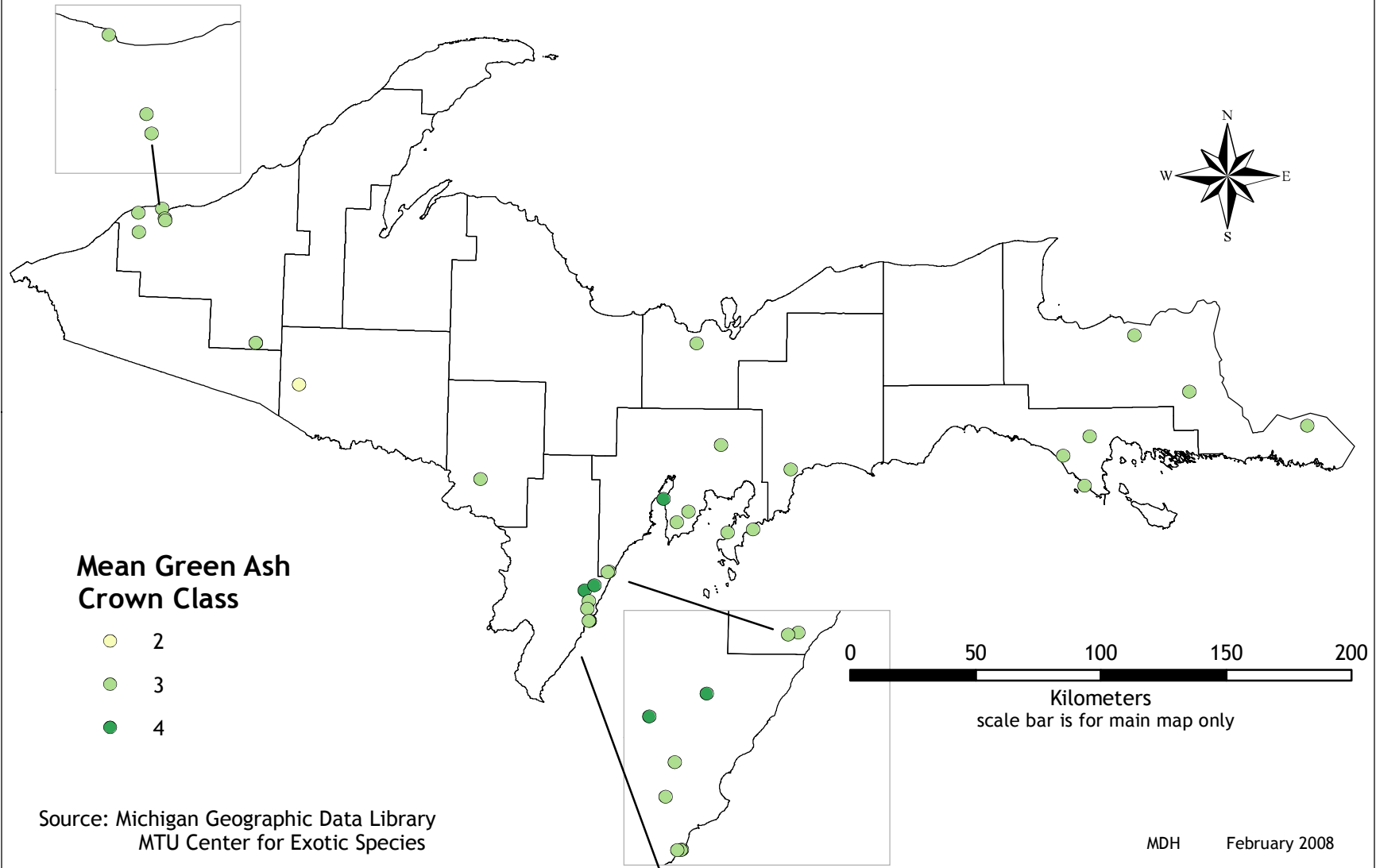
Key

● Plots With Green Ash

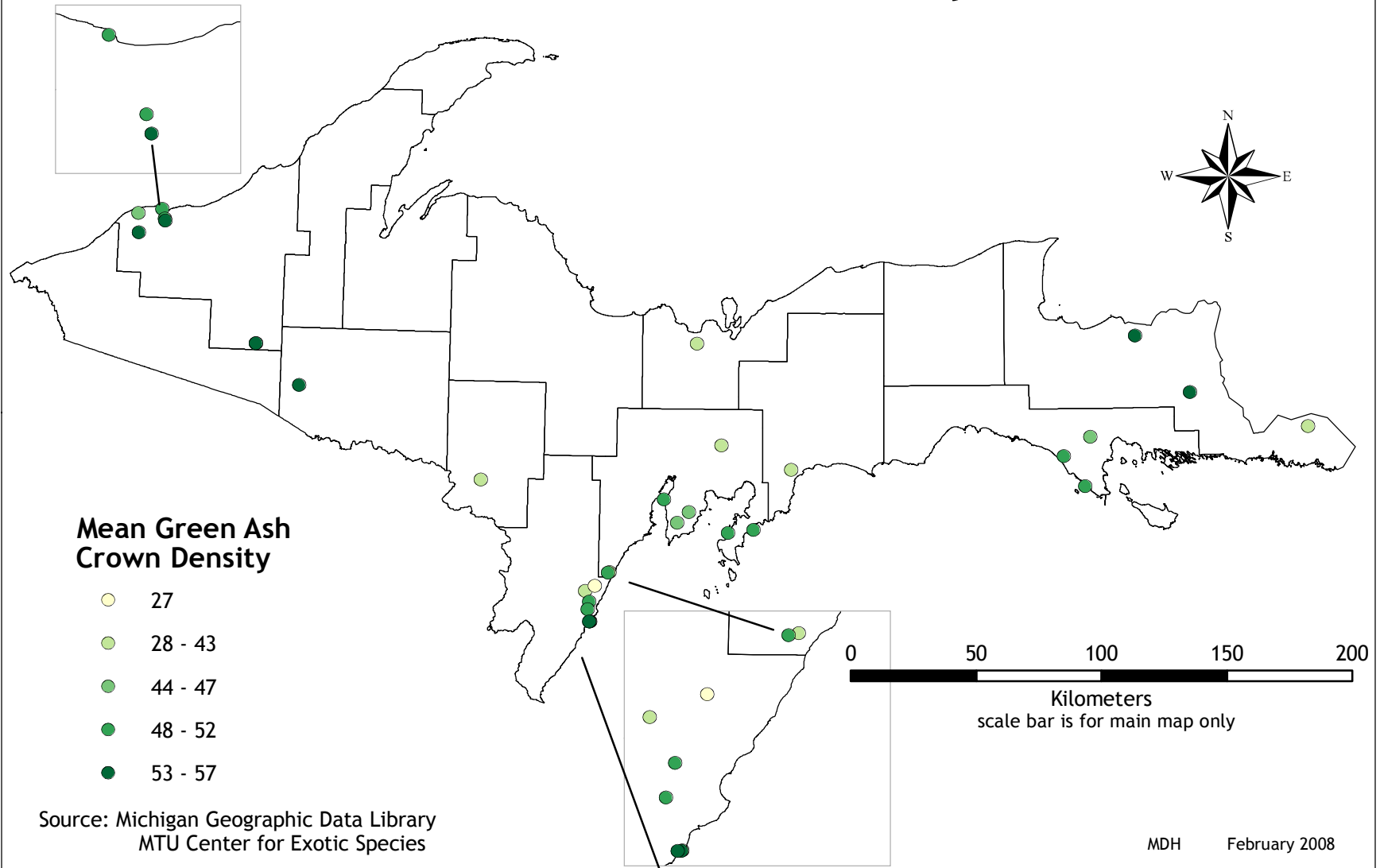
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MTU Center for Exotic Species

MDH February 2008

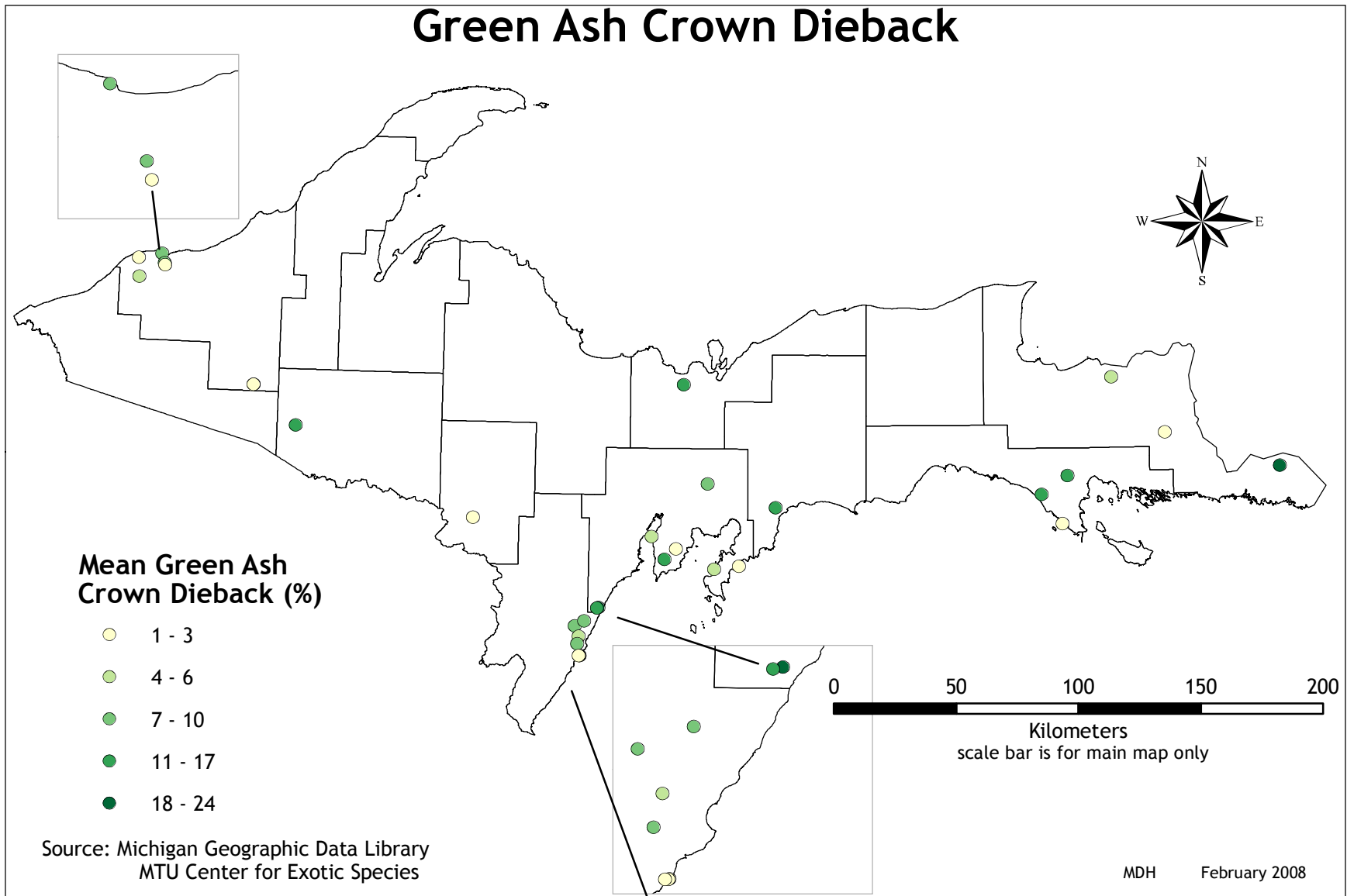
Green Ash Crown Class



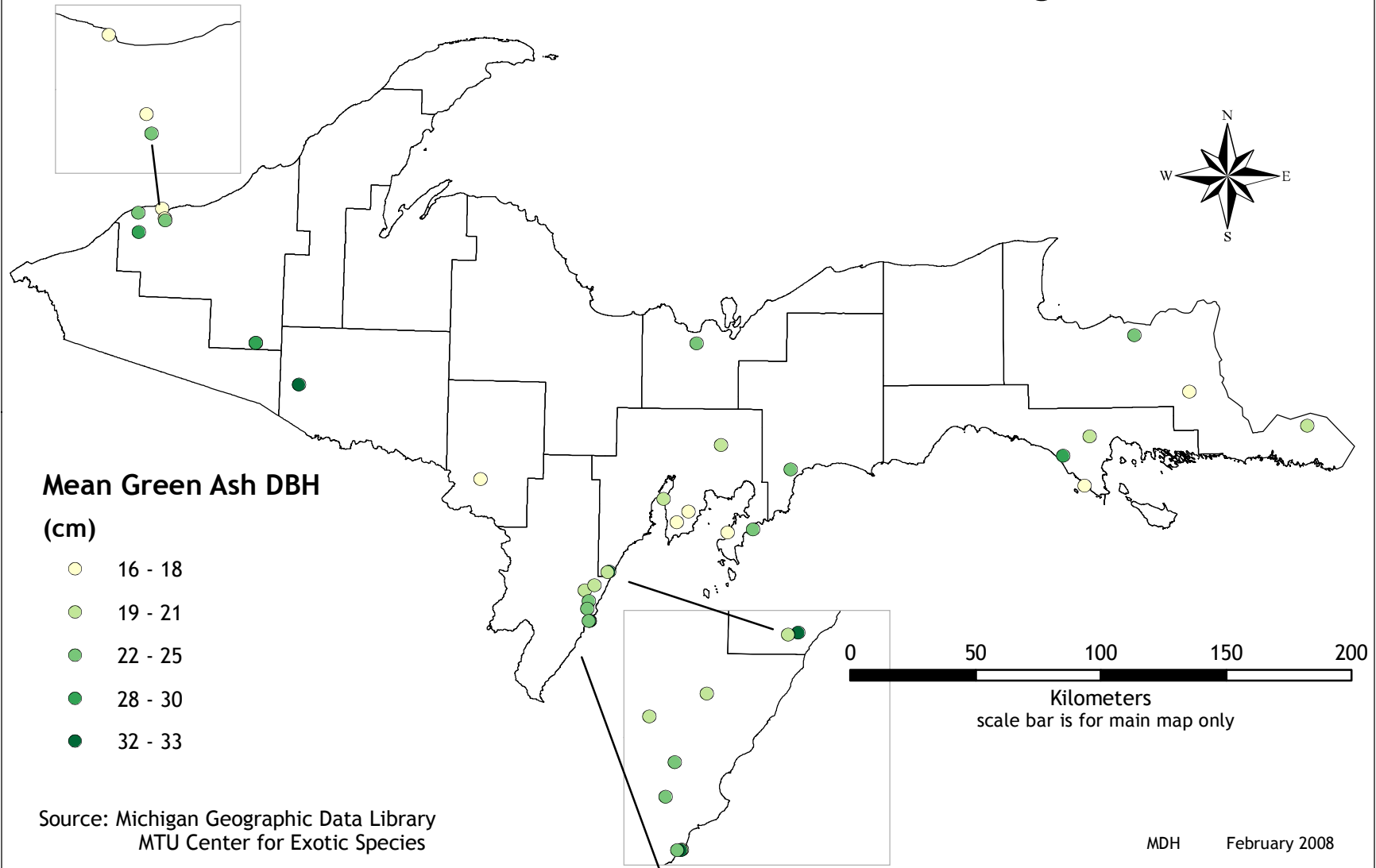
Green Ash Crown Density



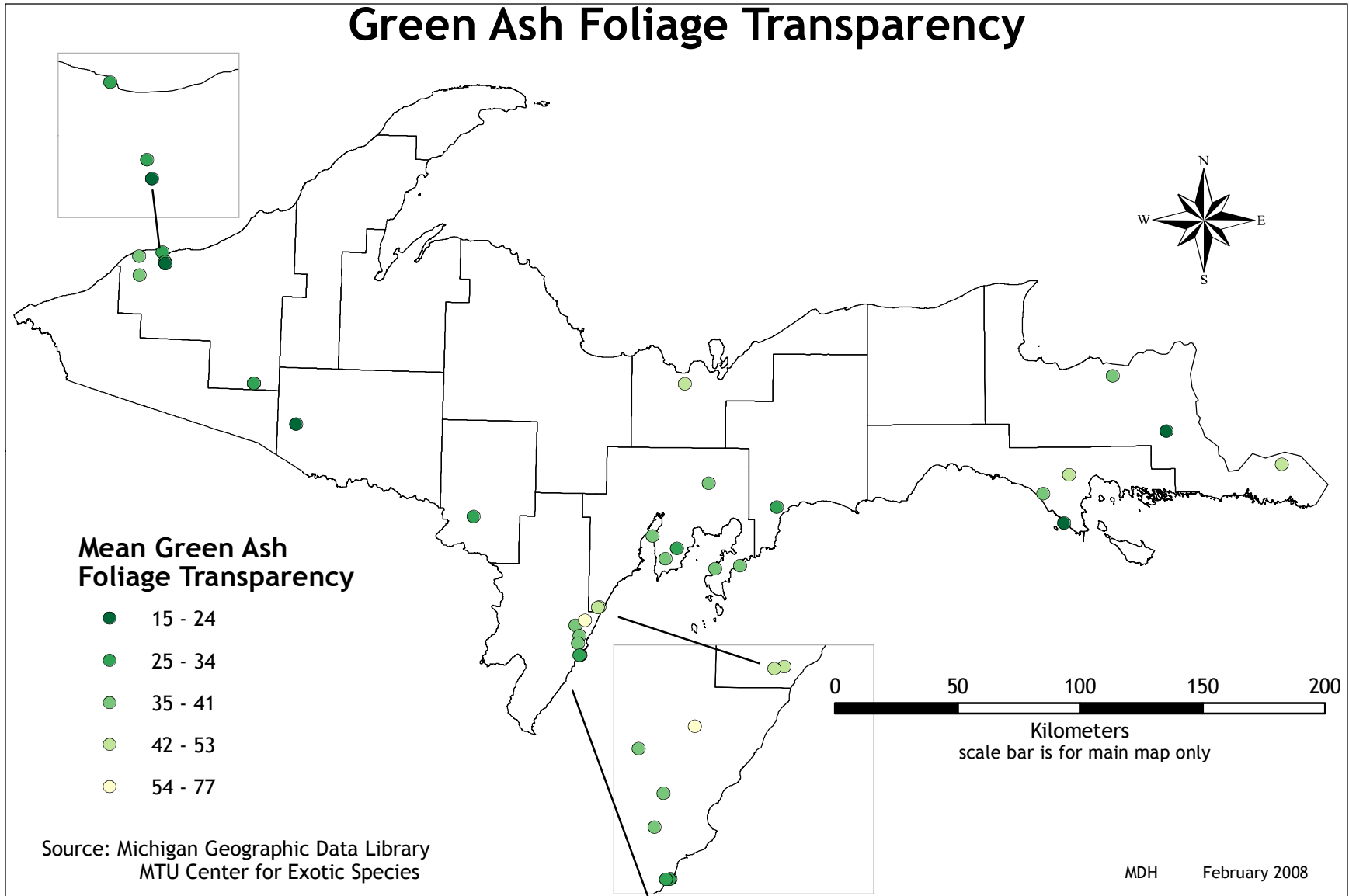
Green Ash Crown Dieback



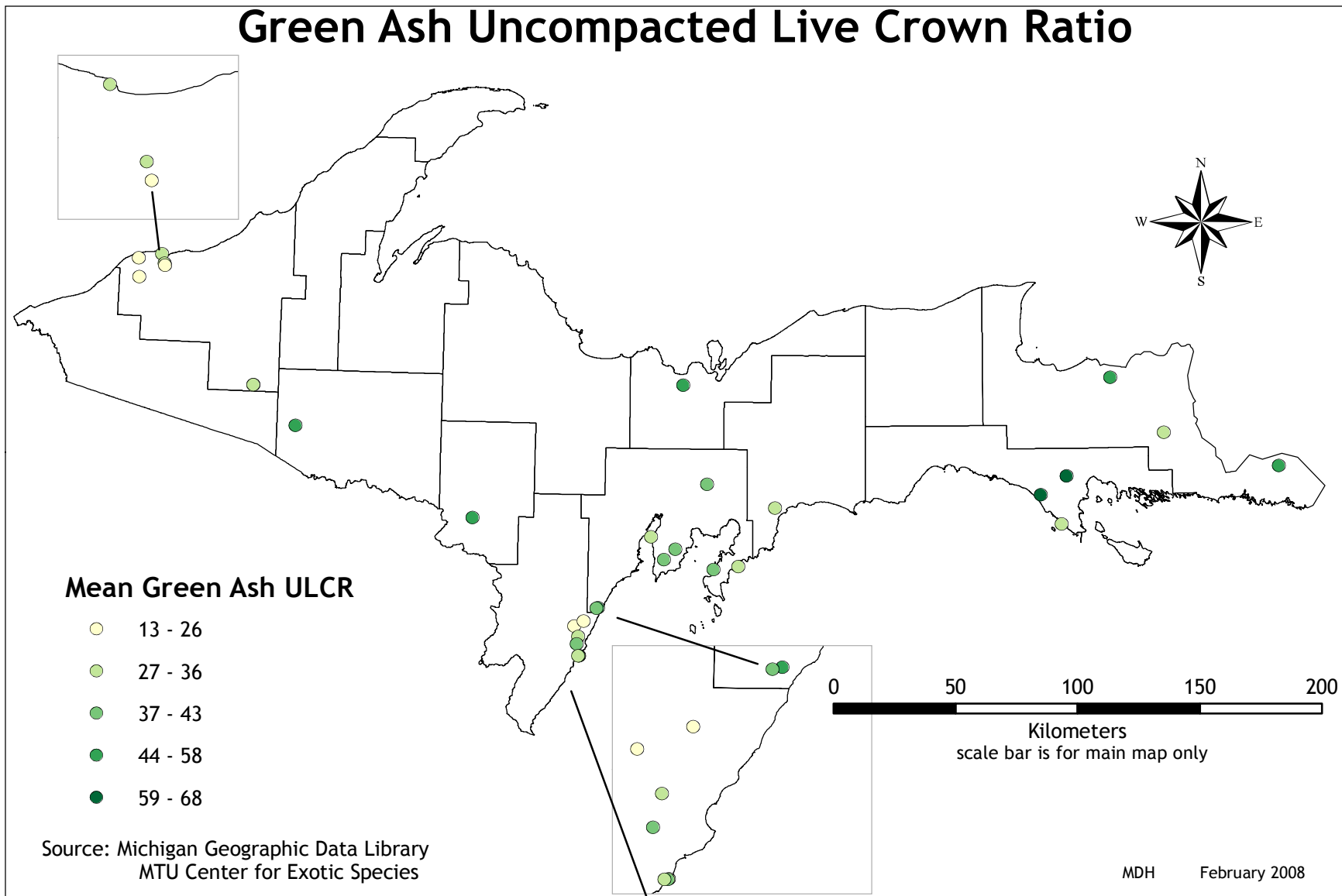
Green Ash Diameter at Breast Height



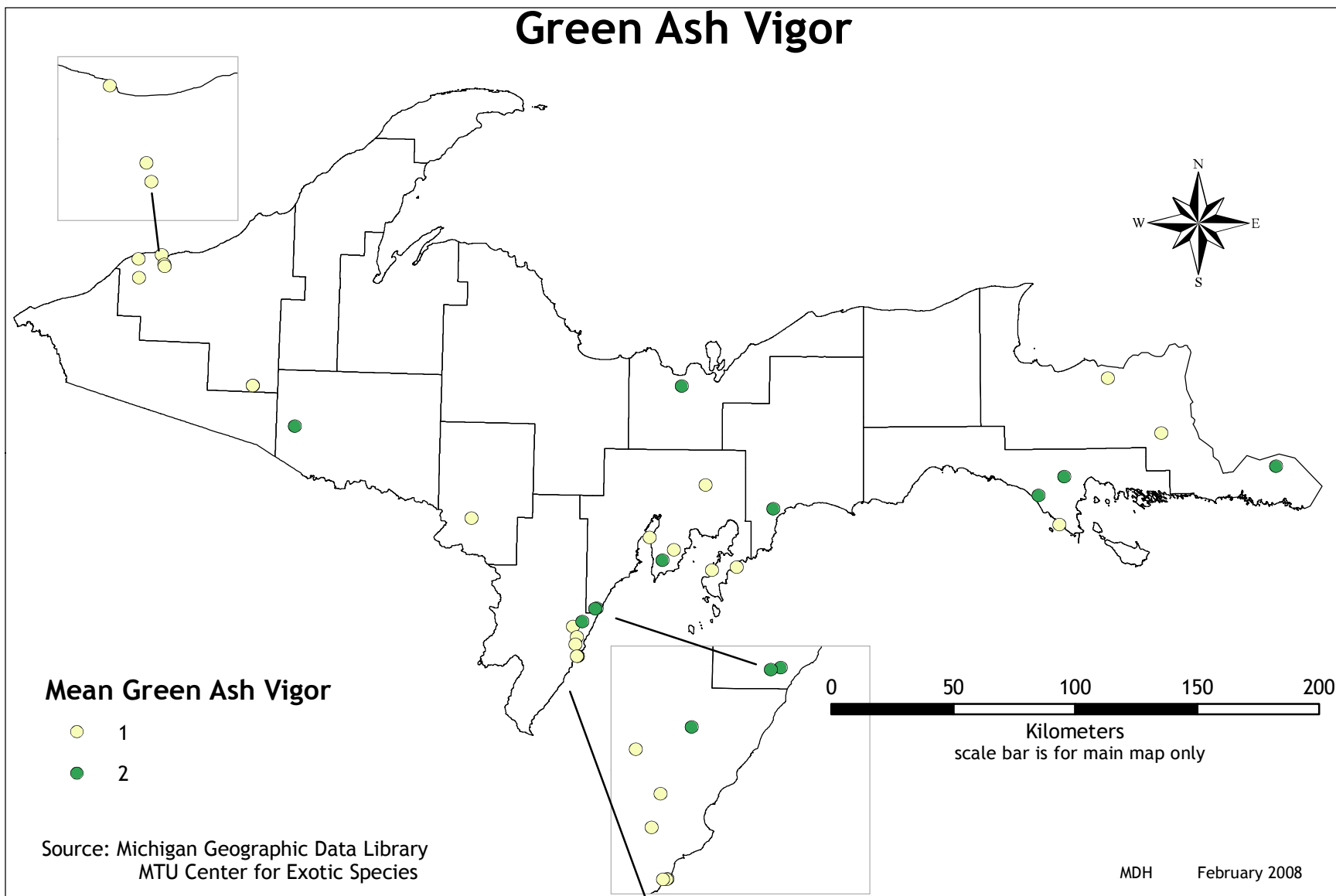
Green Ash Foliage Transparency



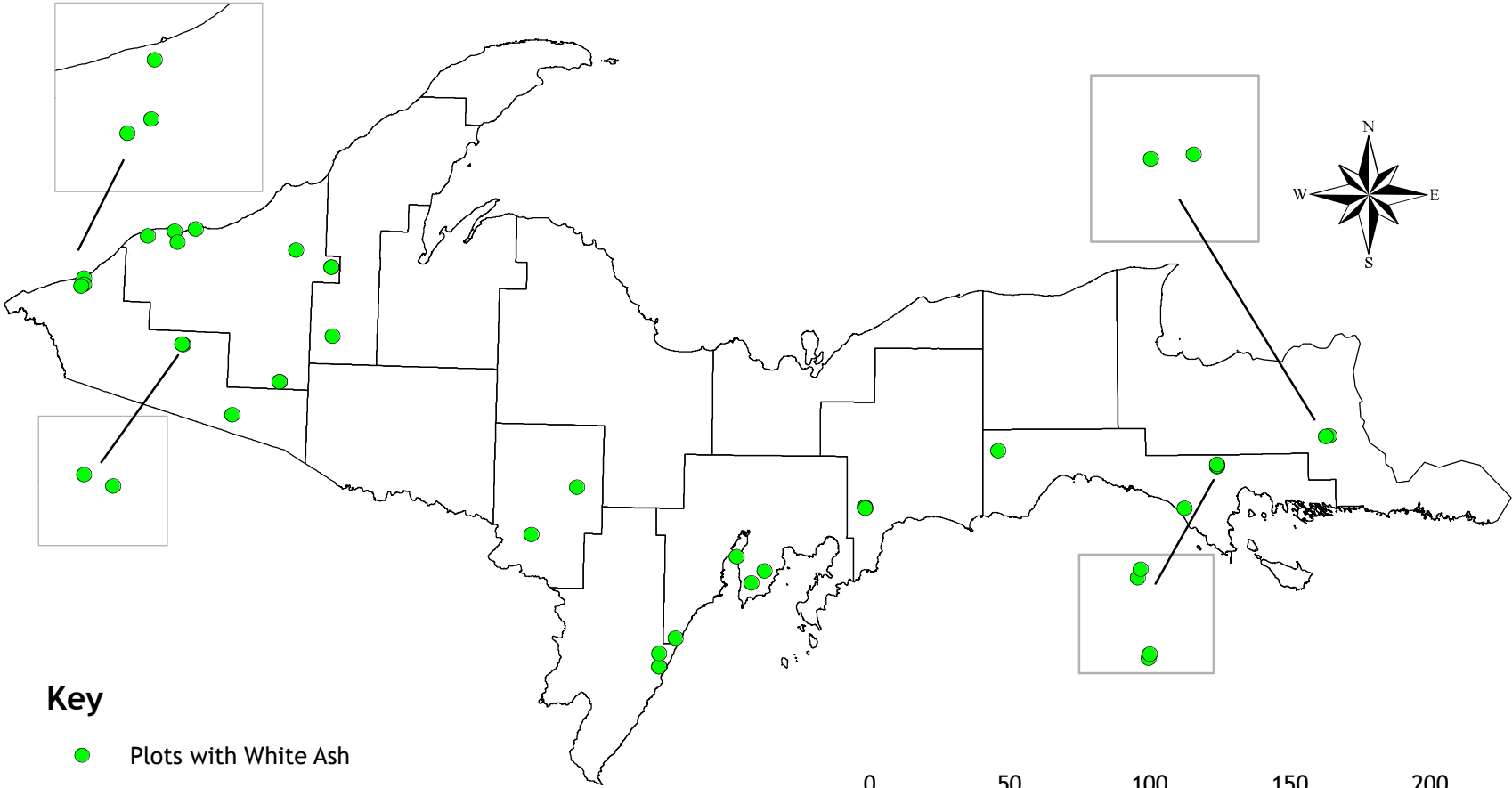
Green Ash Uncompacted Live Crown Ratio



Green Ash Vigor



White Ash Plots



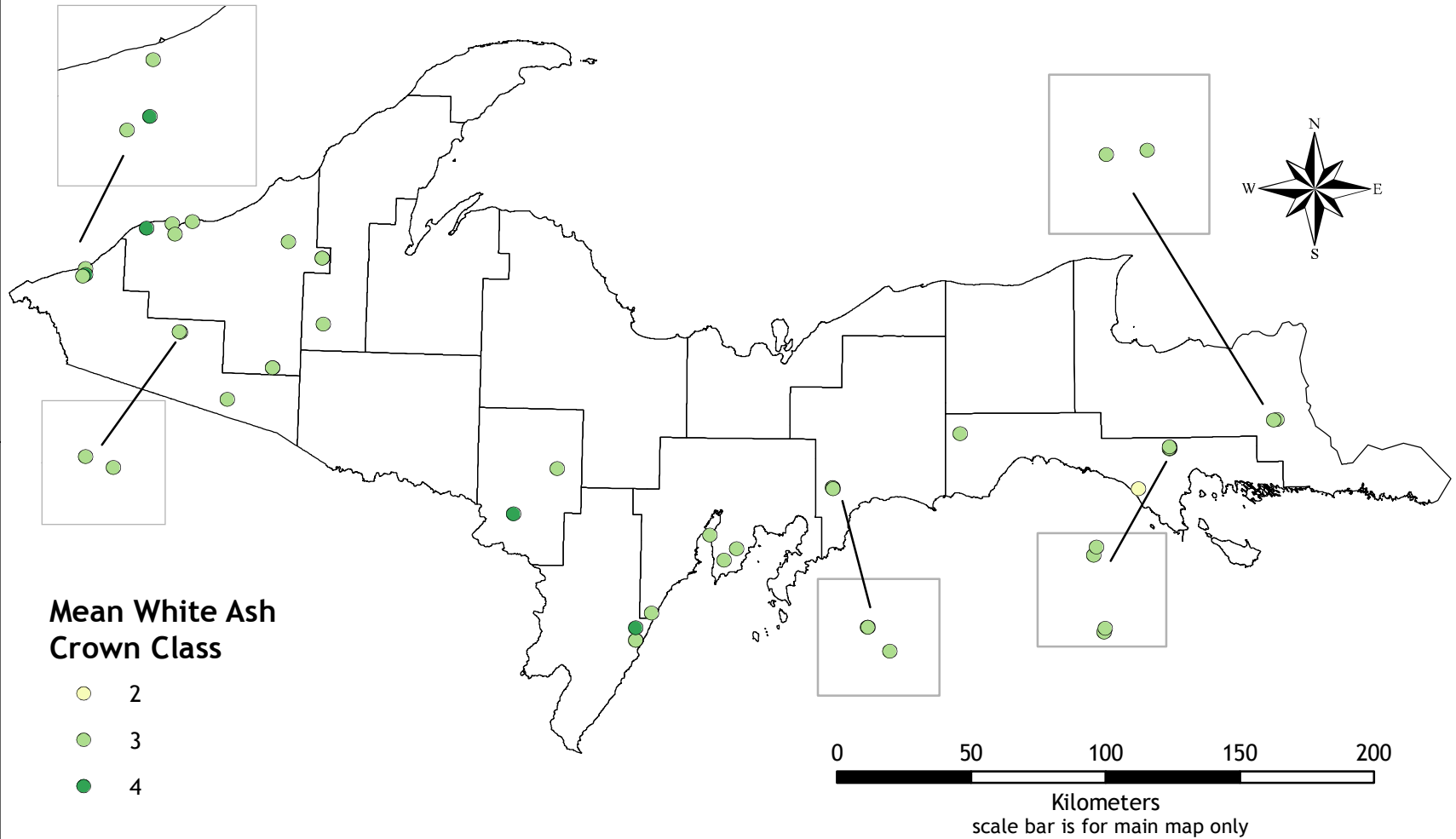
Key

● Plots with White Ash

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

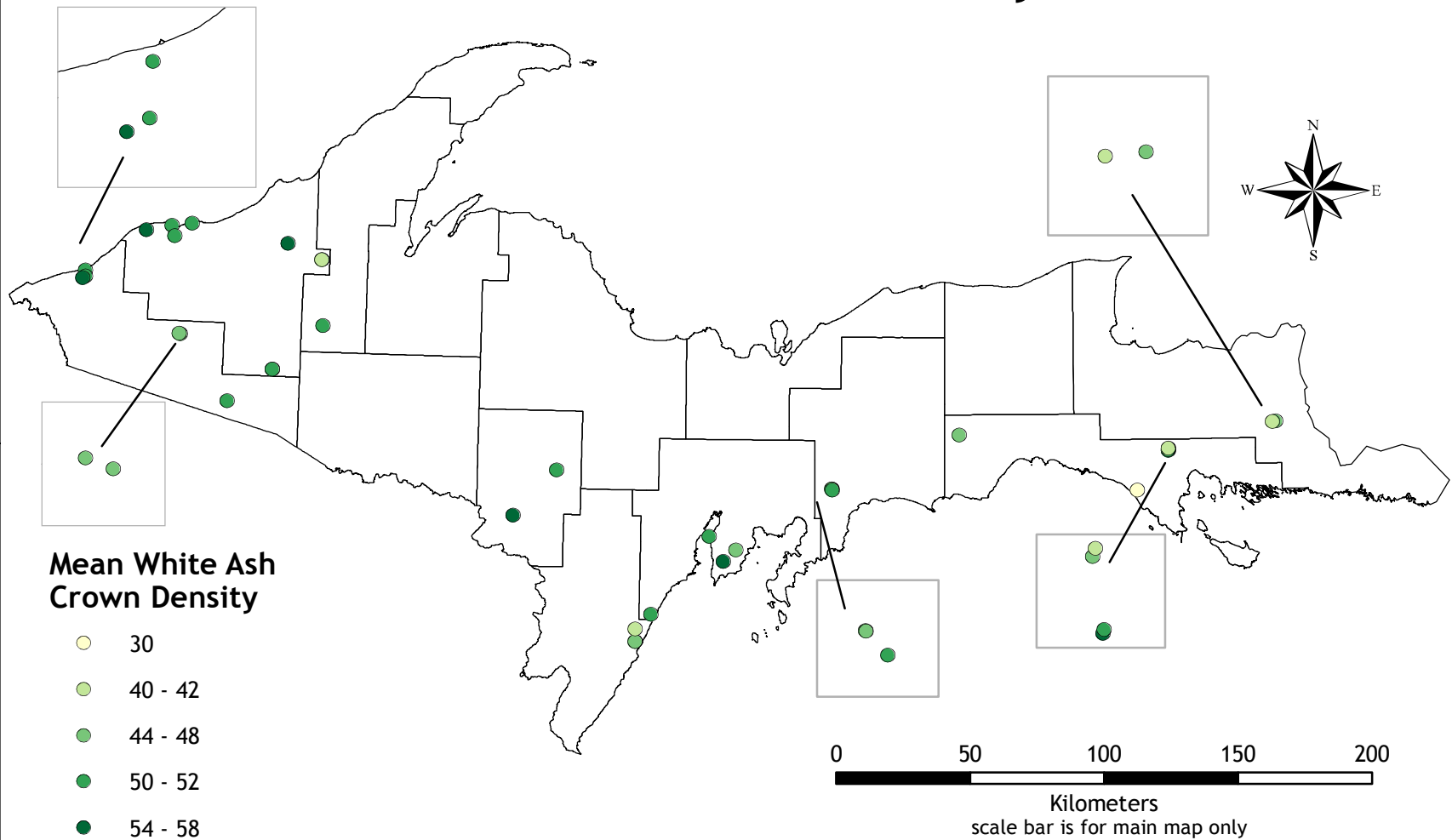
White Ash Crown Class



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

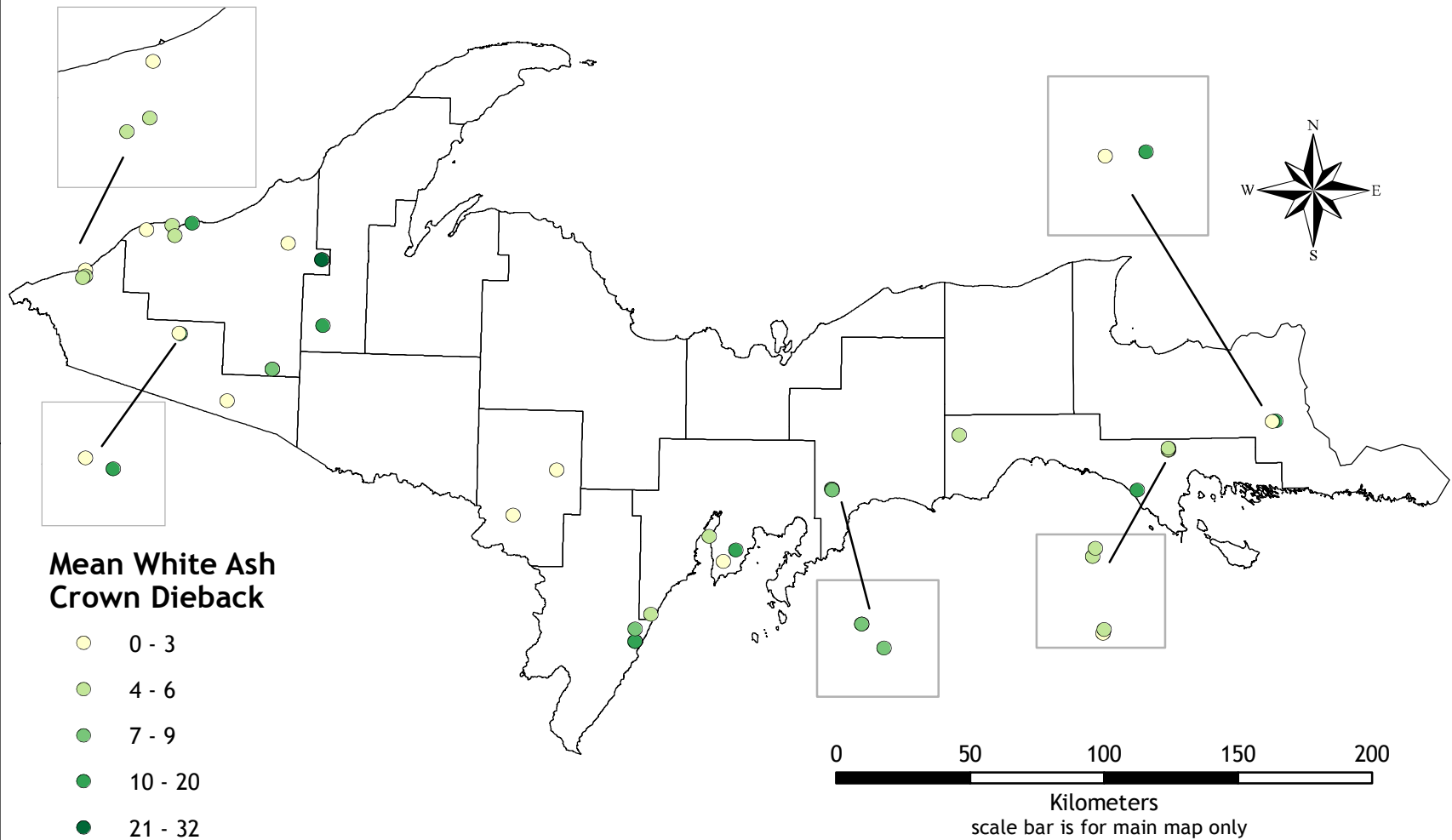
White Ash Crown Density



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

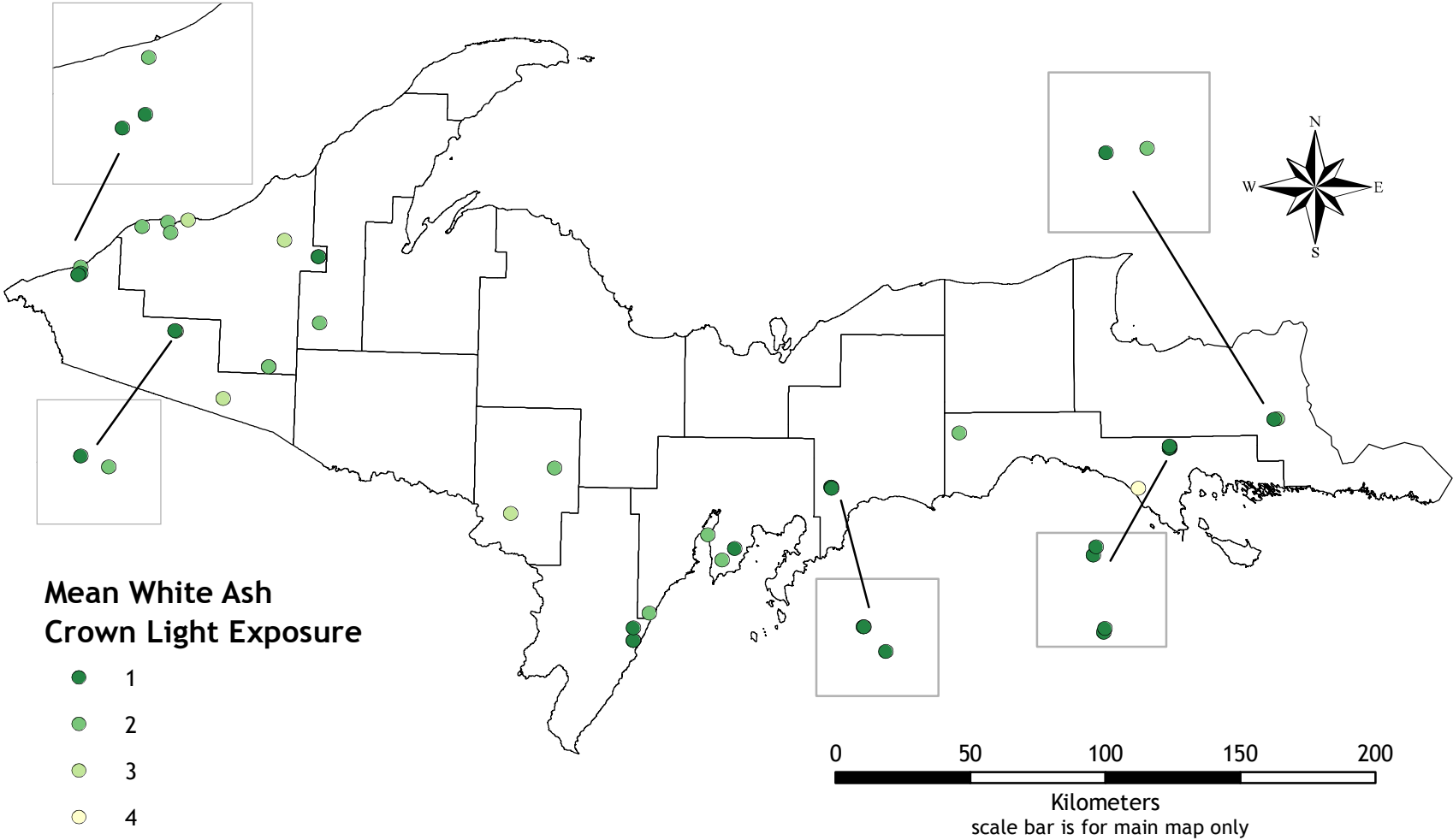
White Ash Crown Dieback



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

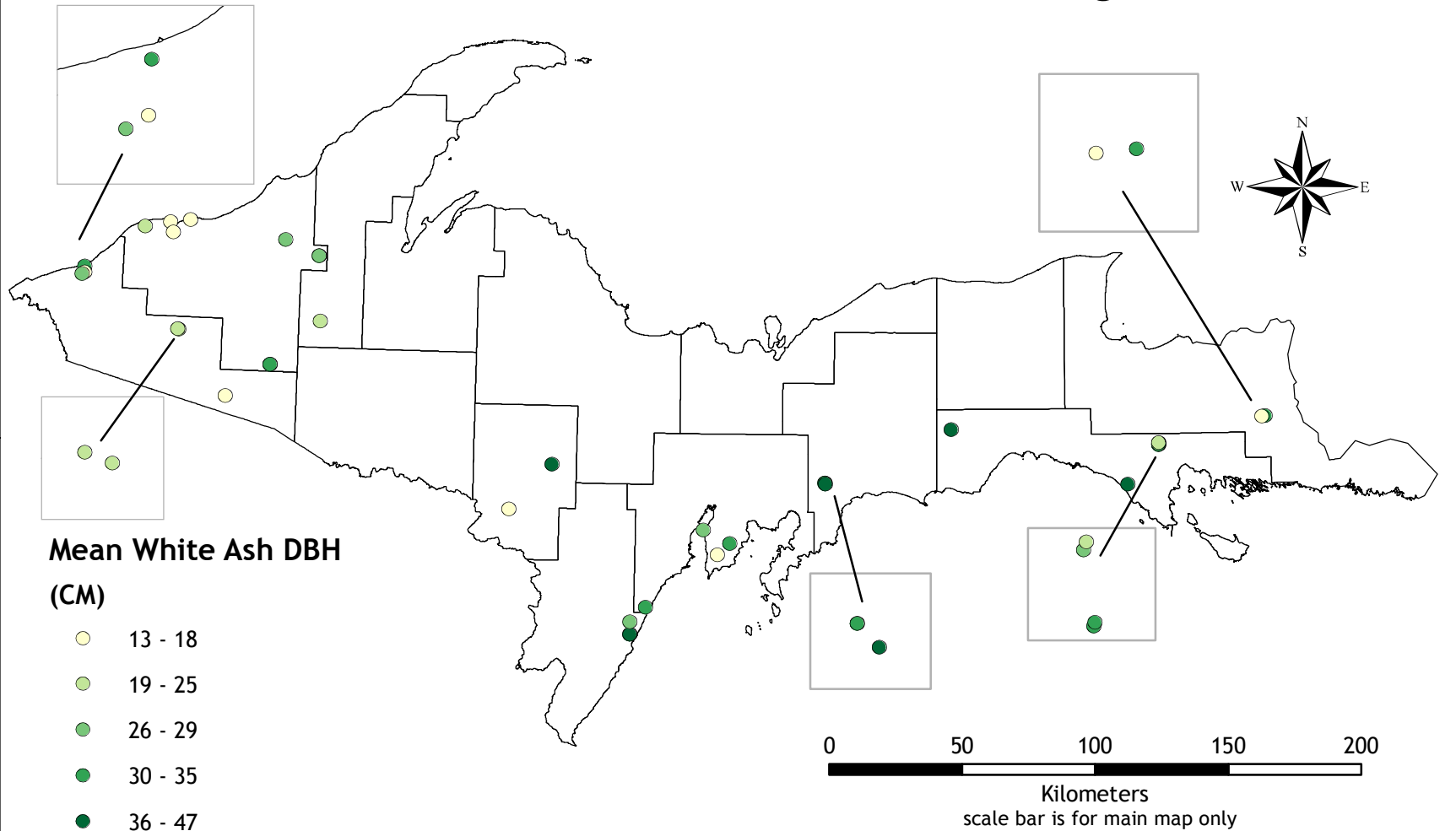
White Ash Crown Light Exposure



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

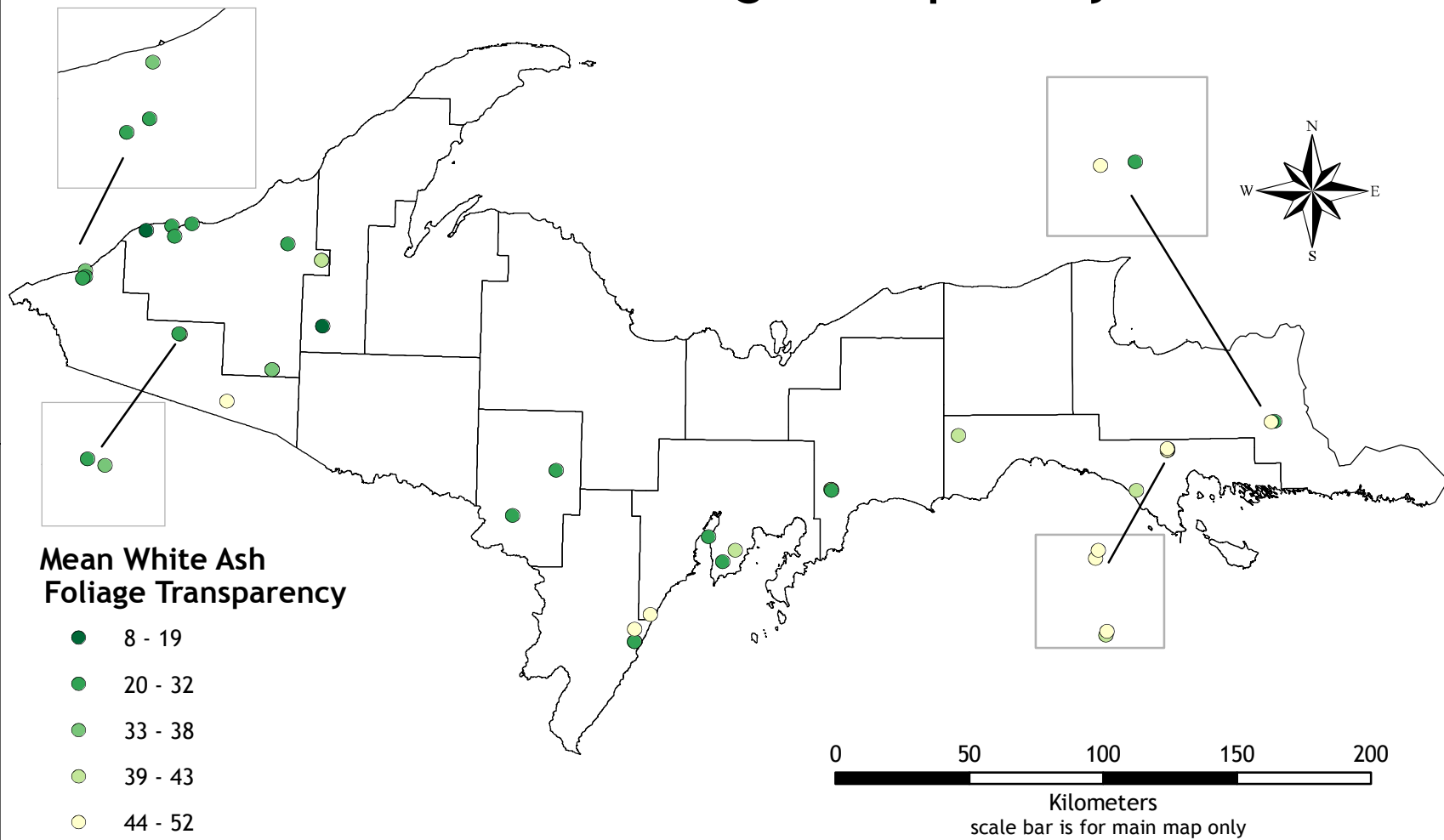
White Ash Diameter at Breast Height



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

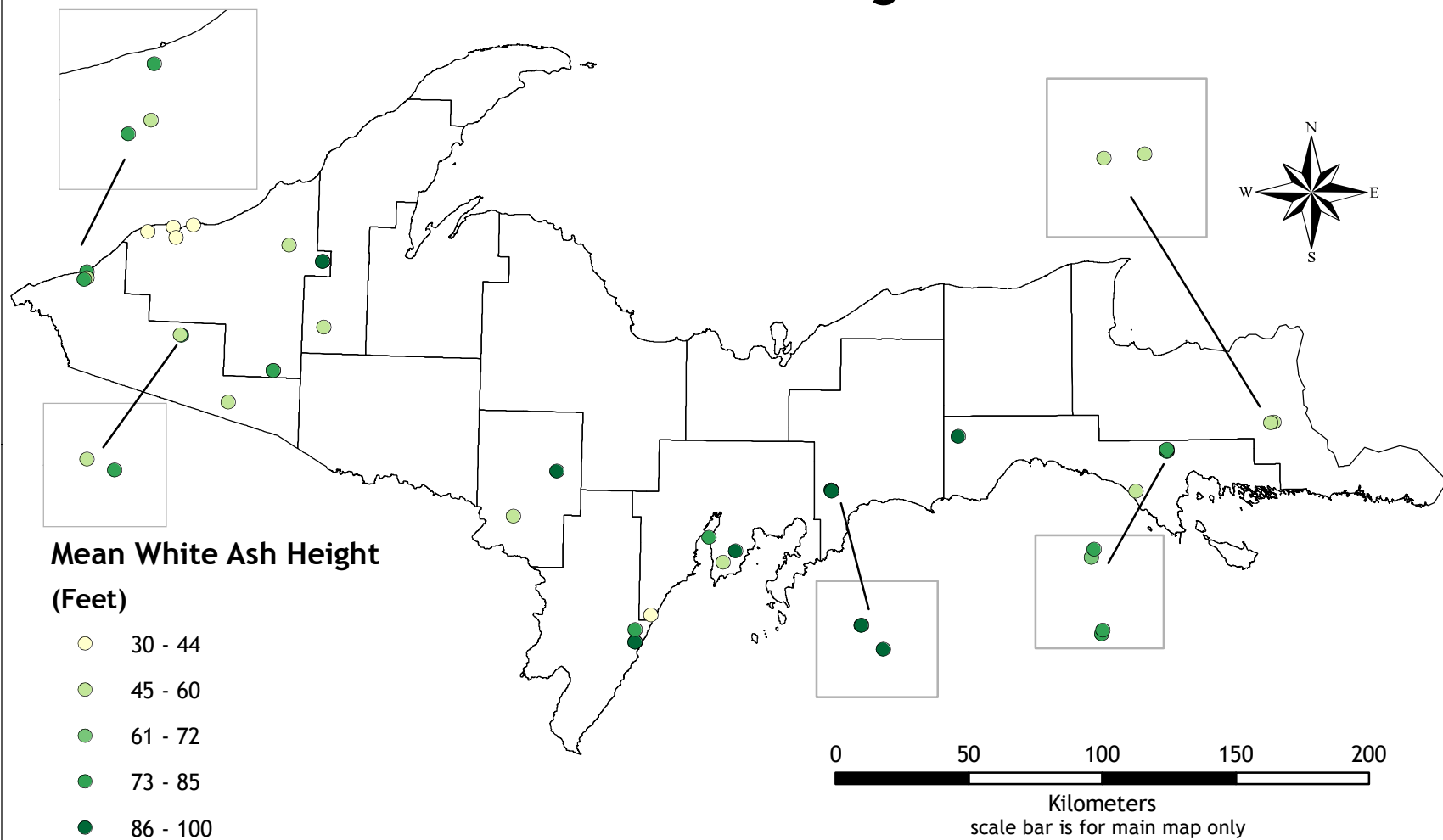
White Ash Foliage Transparency



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

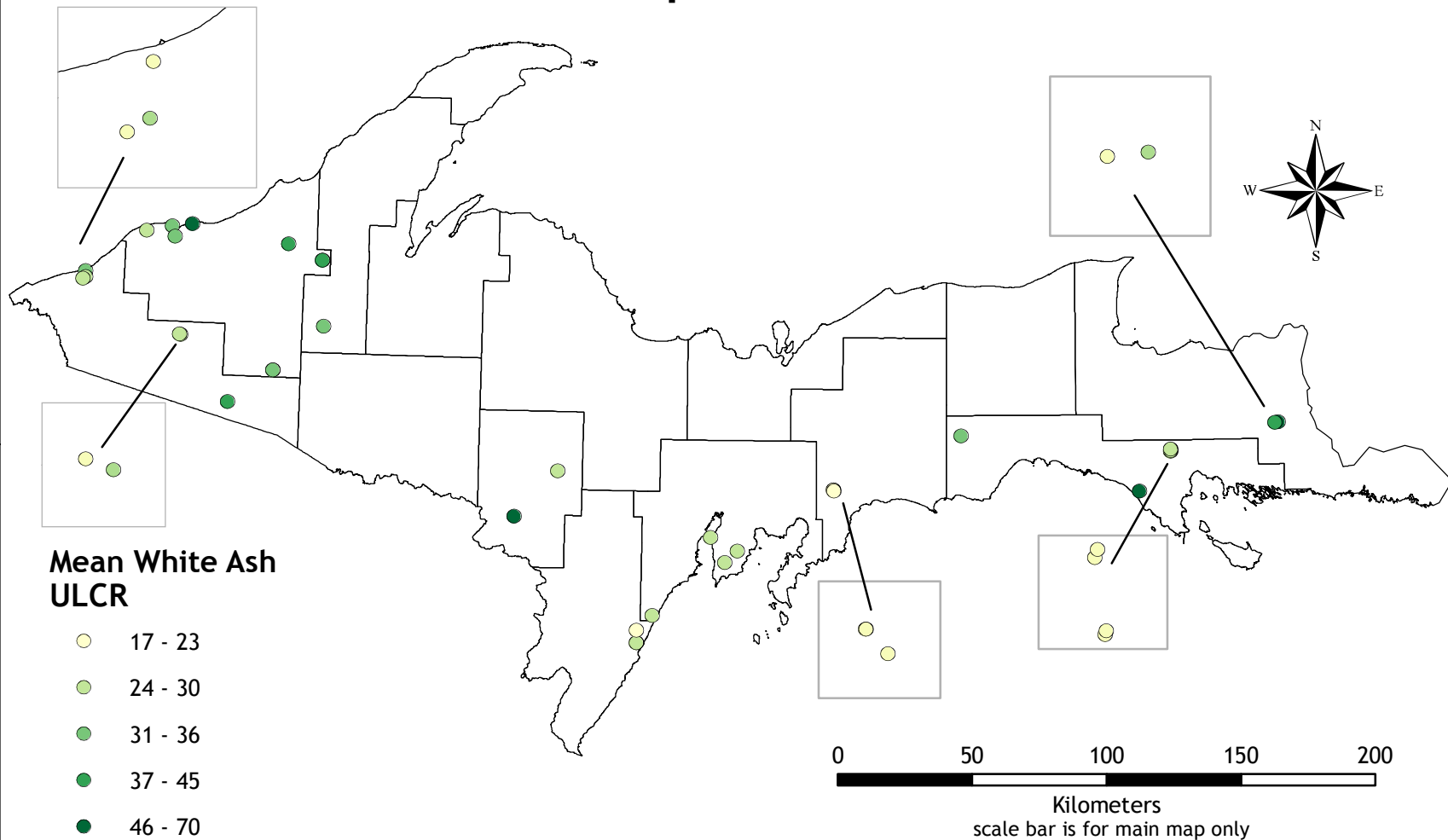
White Ash Height



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

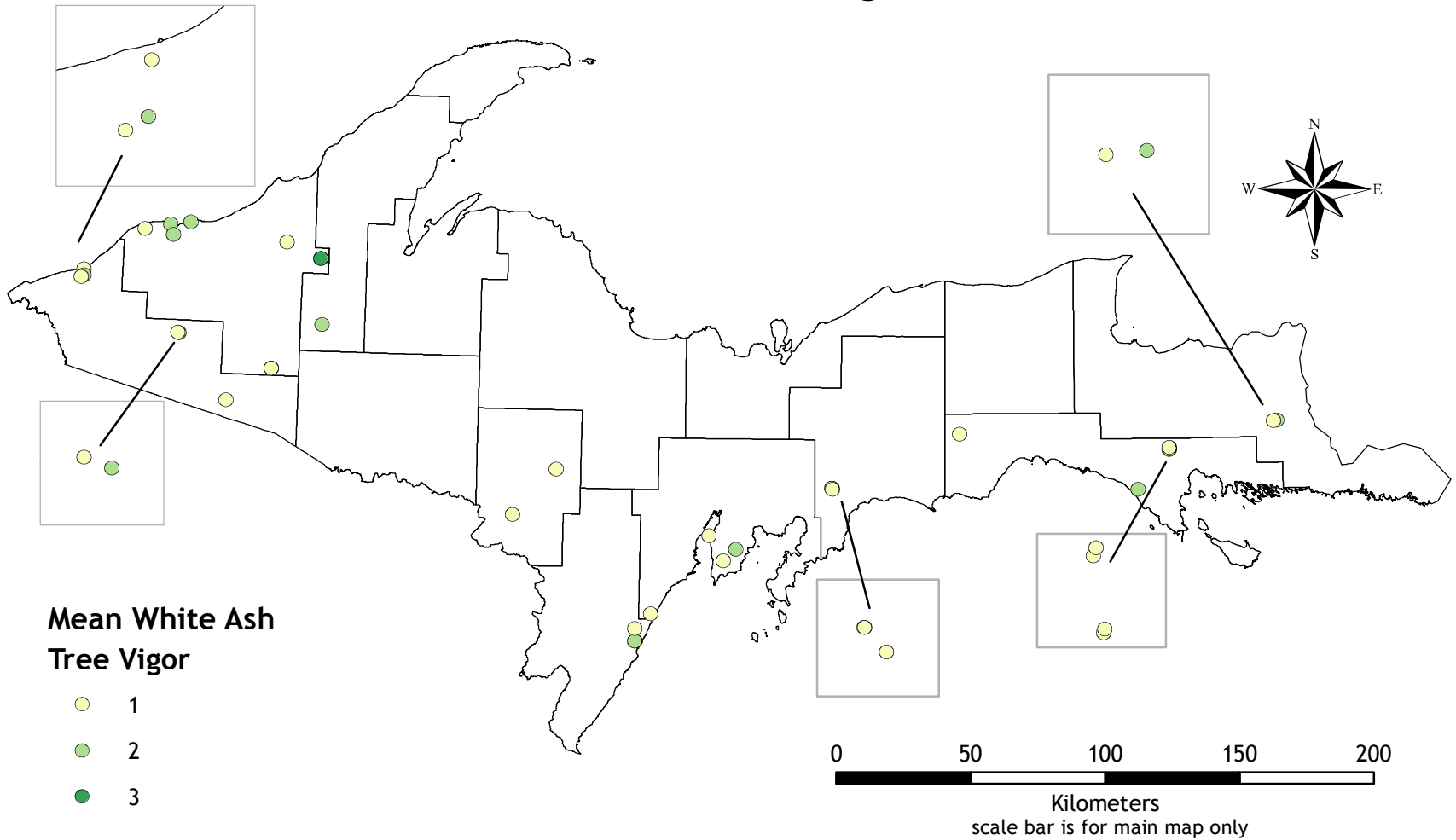
White Ash Uncompacted Live Crown Ratio



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

White Ash Vigor

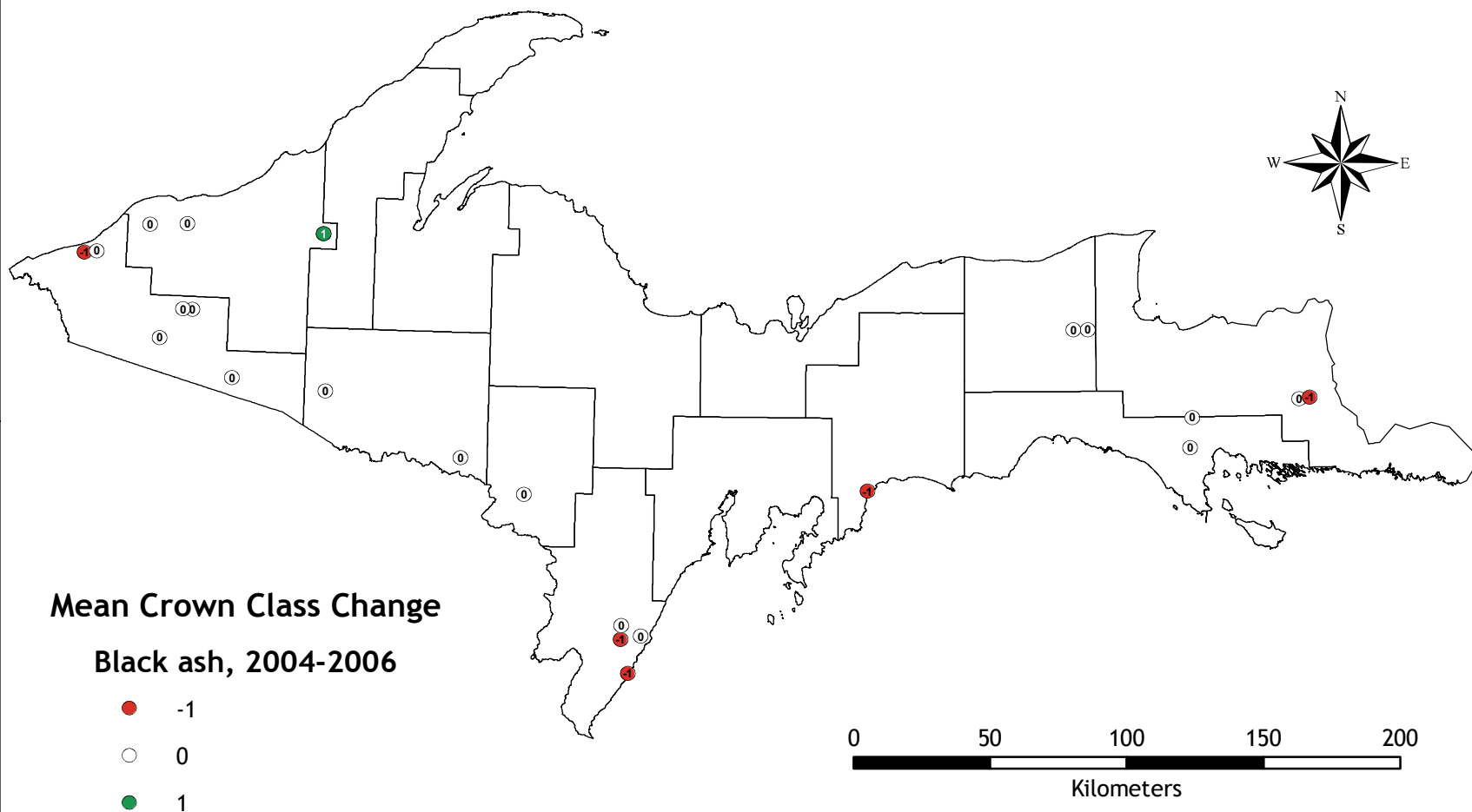


Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH February 2008

Change Maps - Black Ash

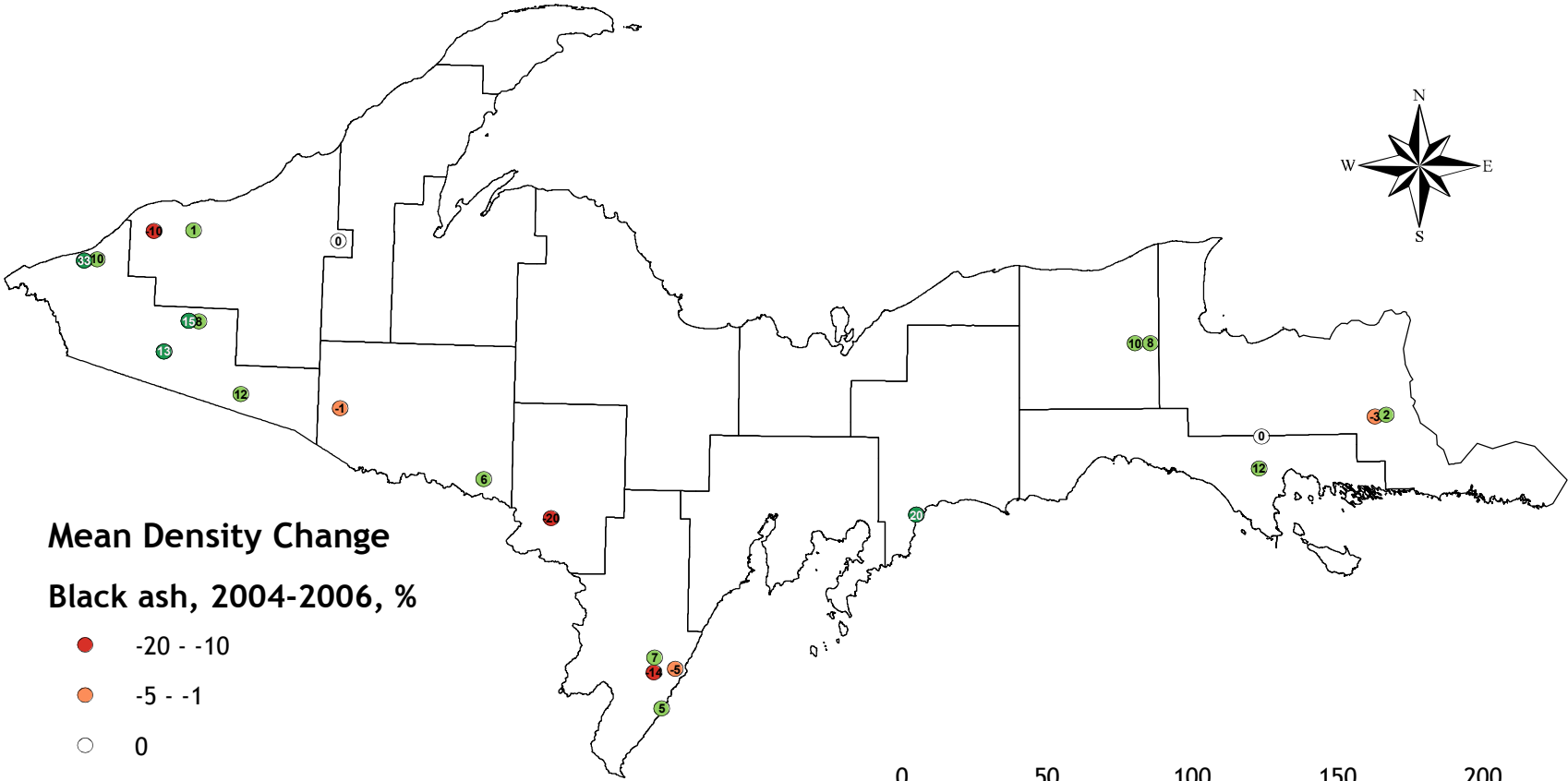
Black Ash Crown Class Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

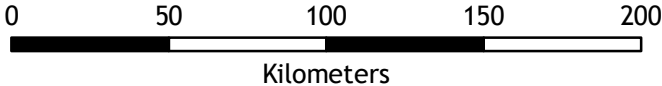
Black Ash Crown Density Change



Mean Density Change

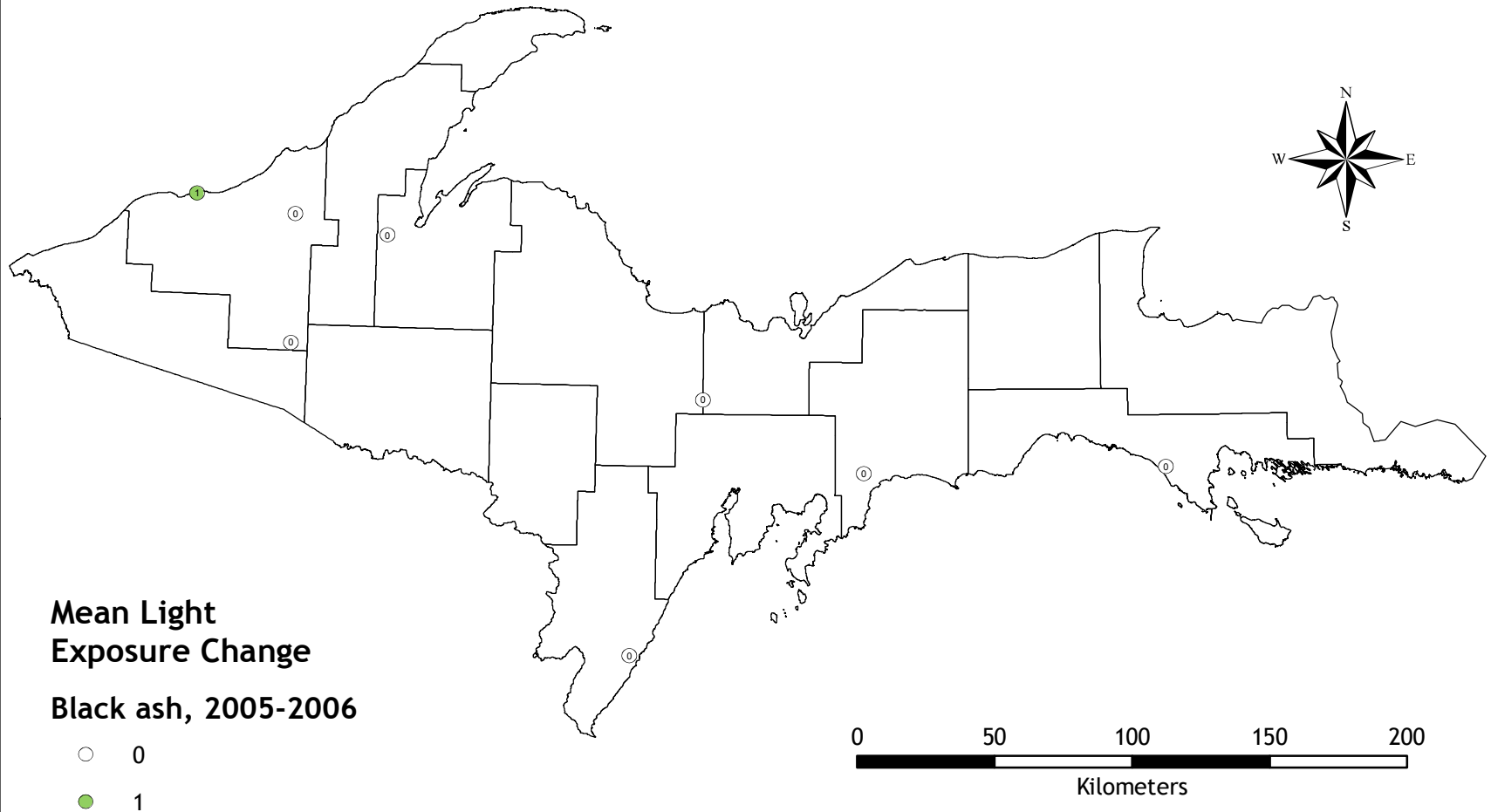
Black ash, 2004-2006, %

- -20 - -10
- -5 - -1
- 0
- 1 - 12
- 13 - 33



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

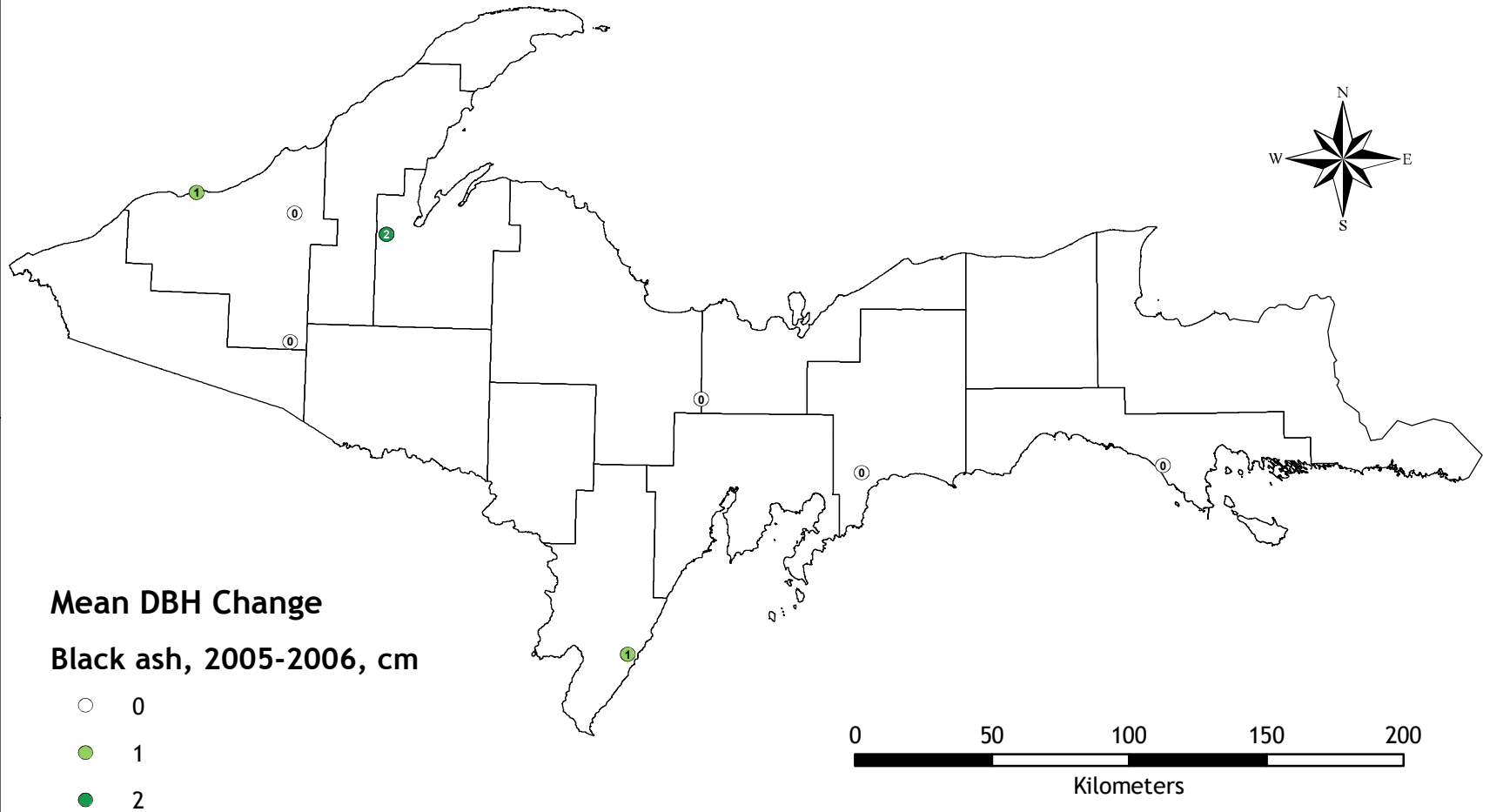
Black Ash Crown Light Exposure Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

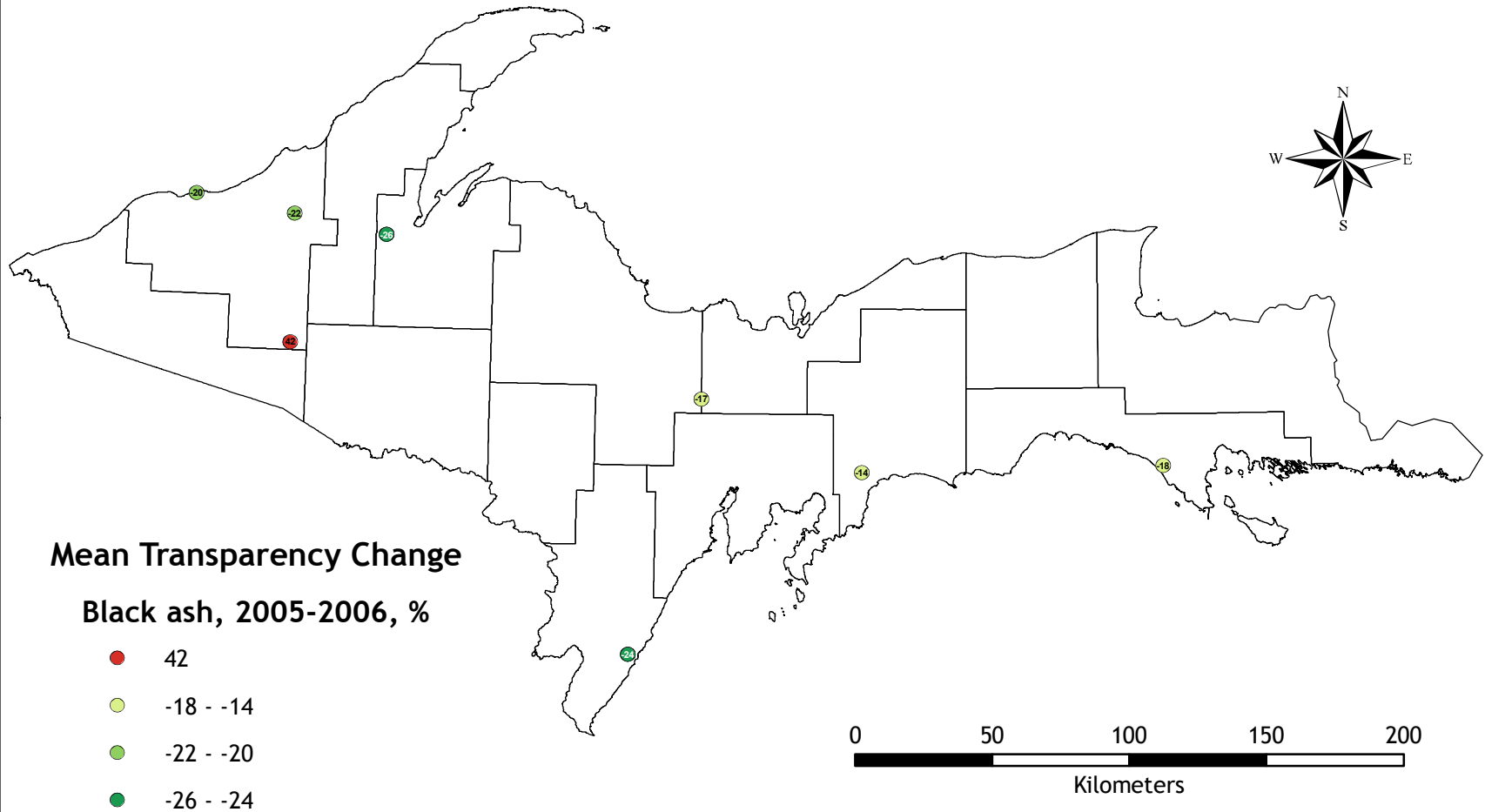
Black Ash Diameter at Breast Height Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

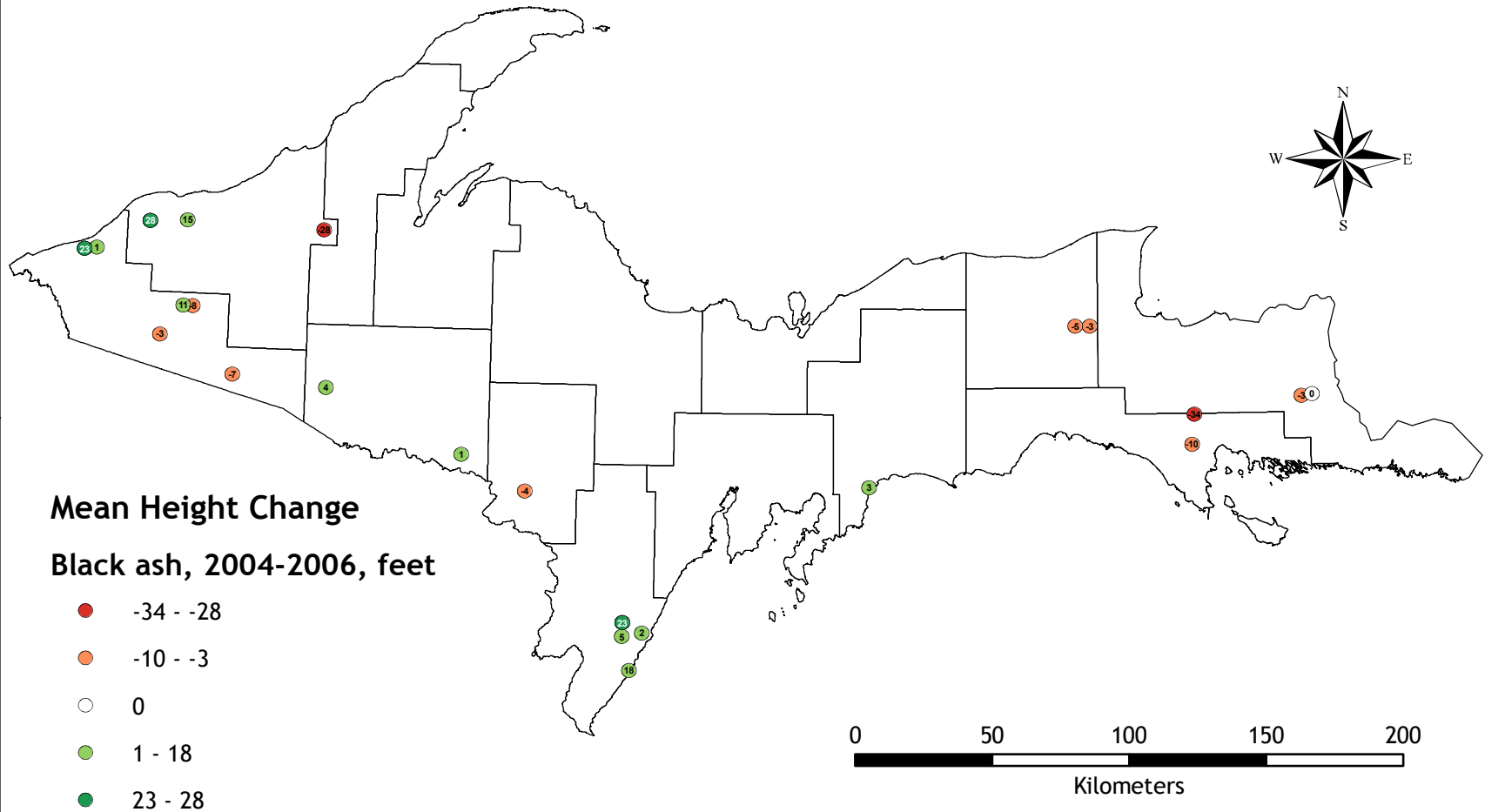
Black Ash Foliage Transparency Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

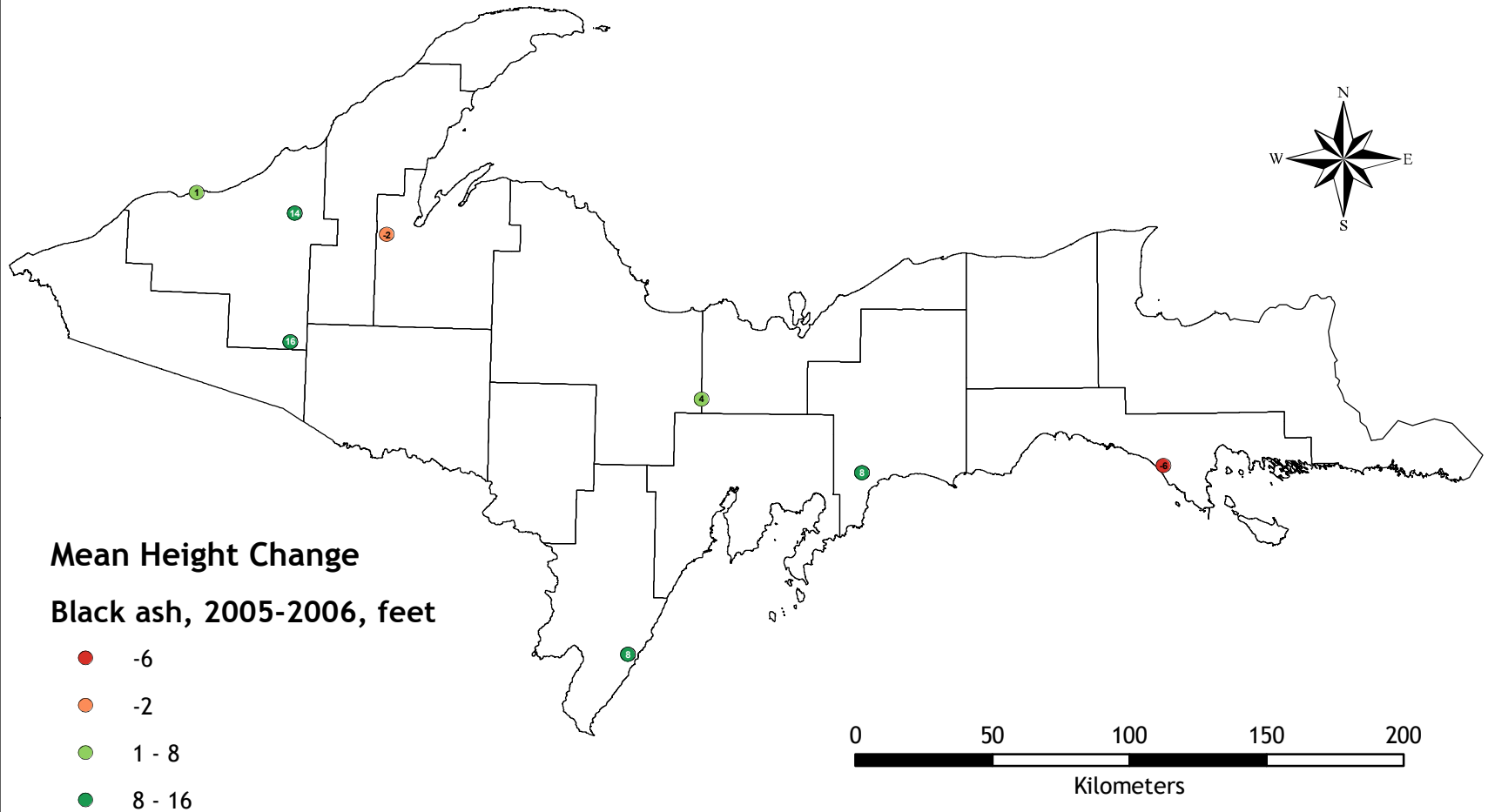
Black Ash Height Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

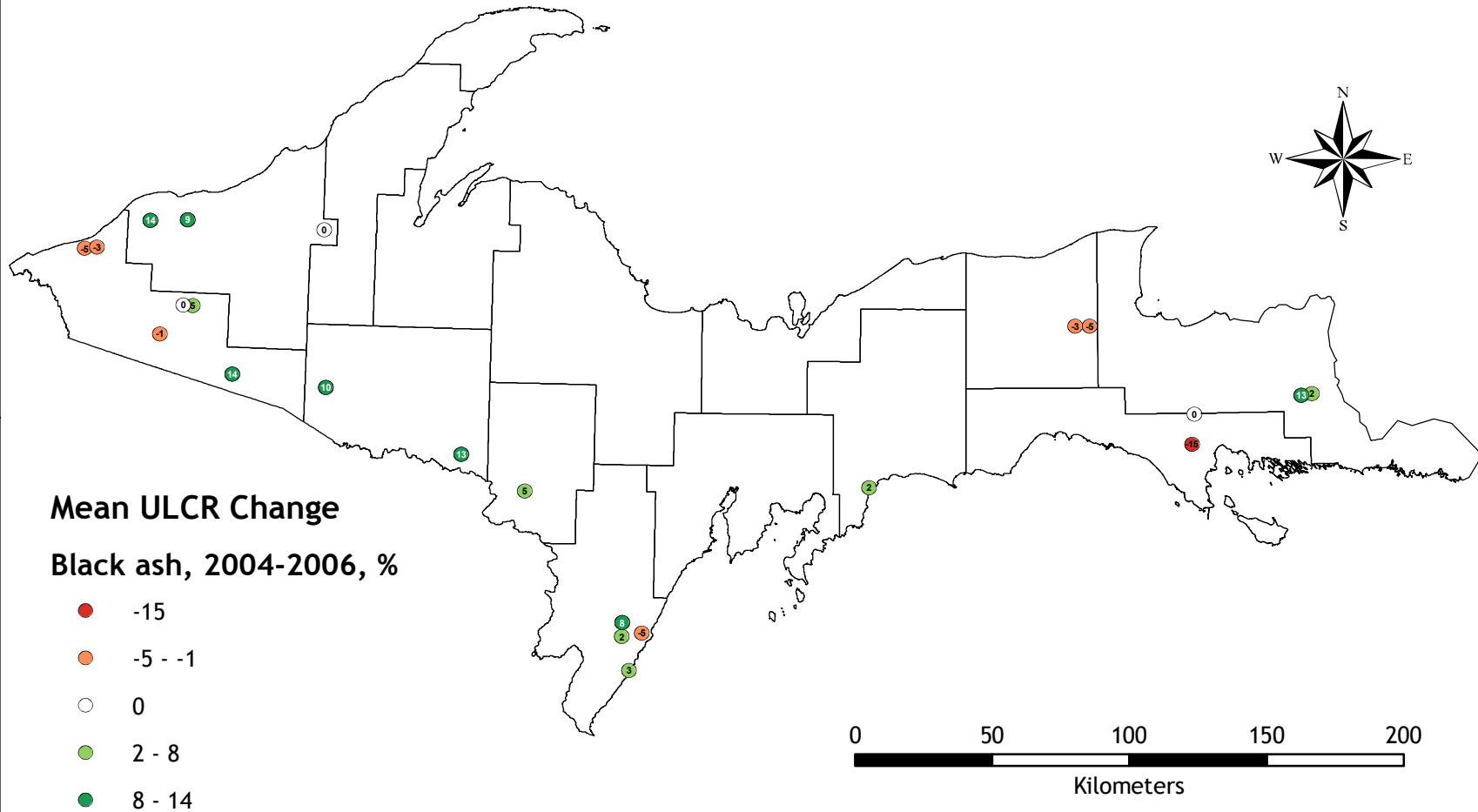
Black Ash Height Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

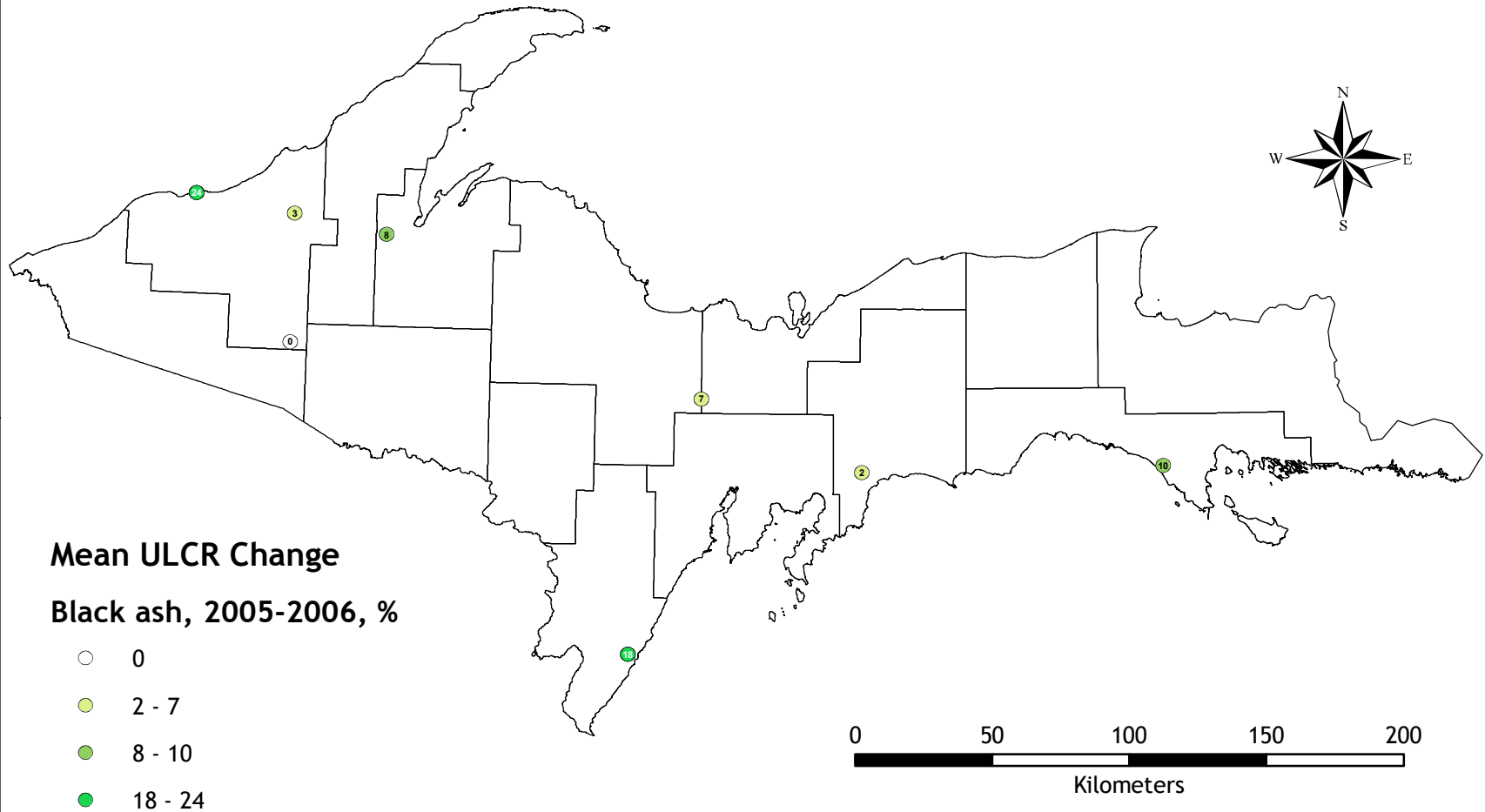
Black Ash Uncompacted Live Crown Ratio Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

Black Ash Uncompacted Live Crown Ratio Change



Mean ULCR Change

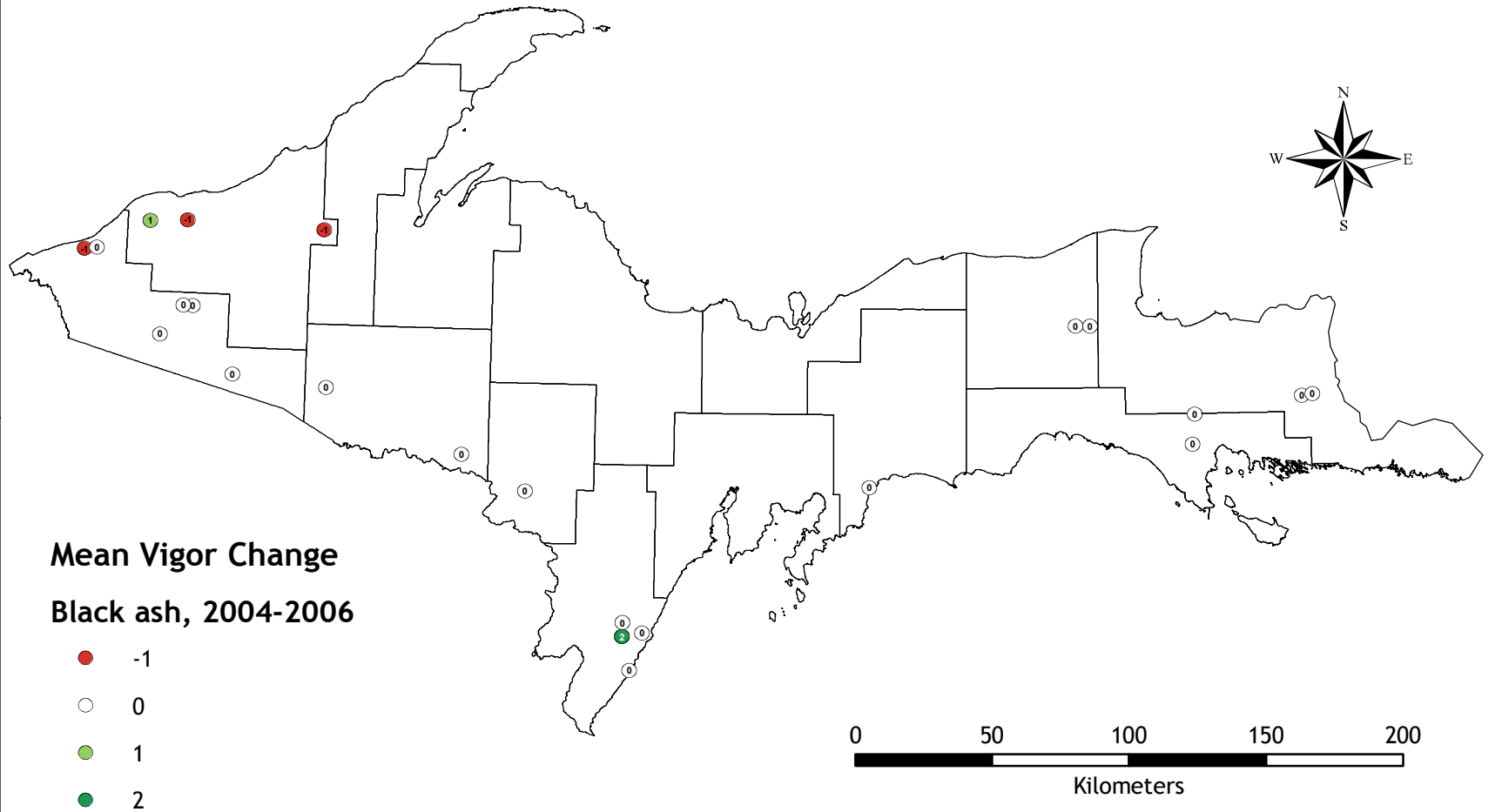
Black ash, 2005-2006, %

- 0
- 2 - 7
- 8 - 10
- 18 - 24

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

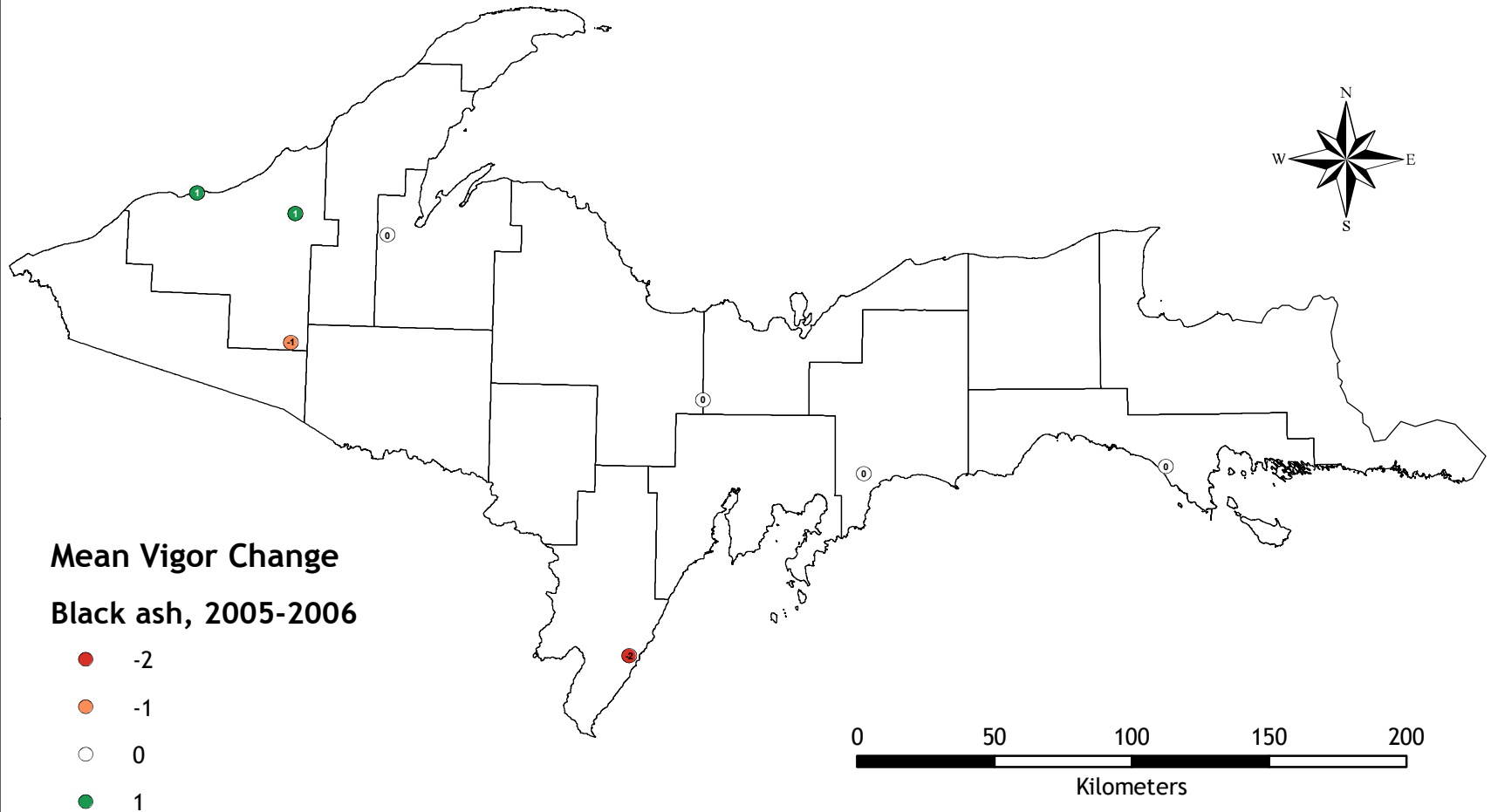
Black Ash Vigor Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

Black Ash Vigor Change

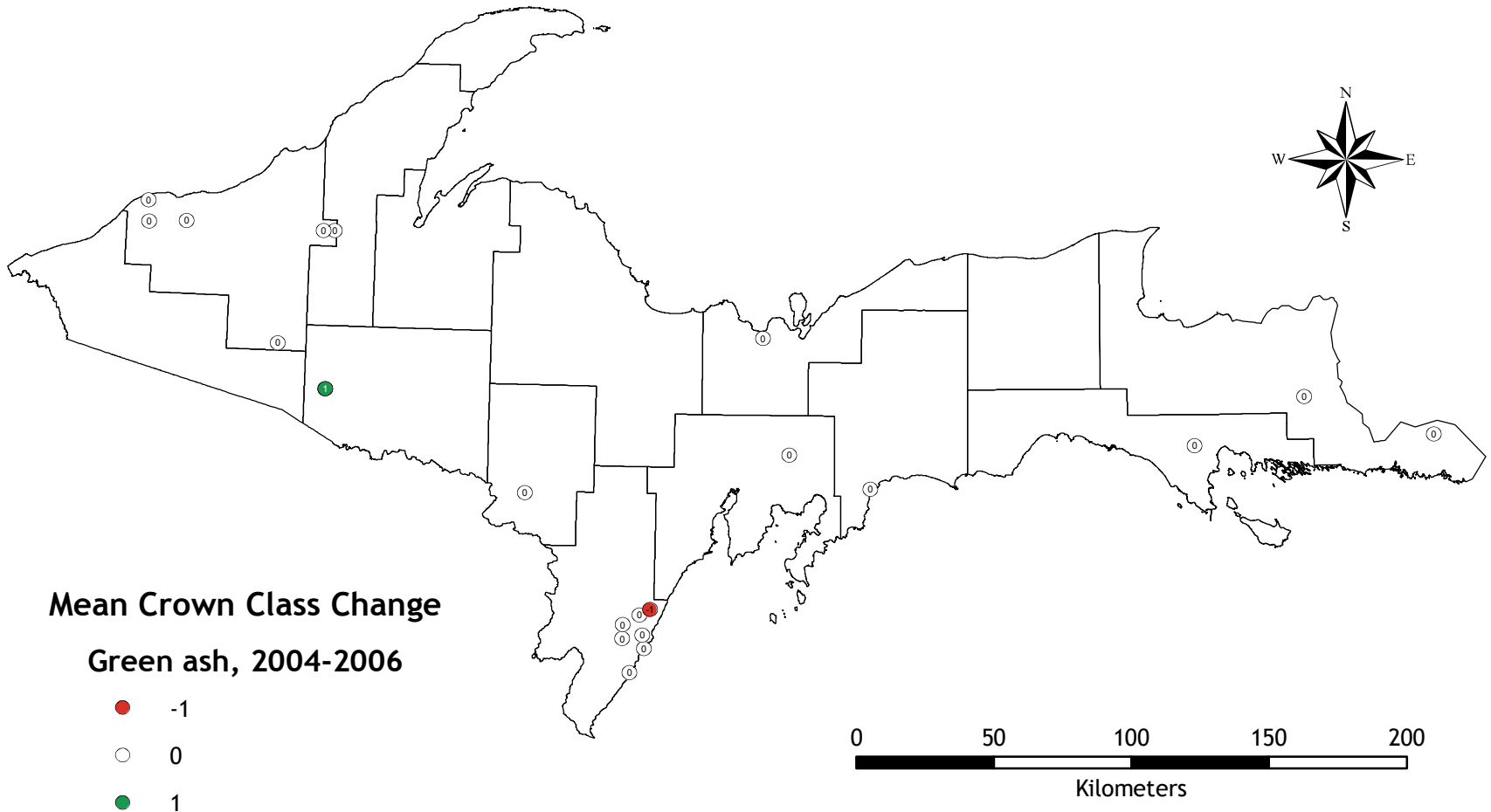


Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

Change Maps - Green Ash

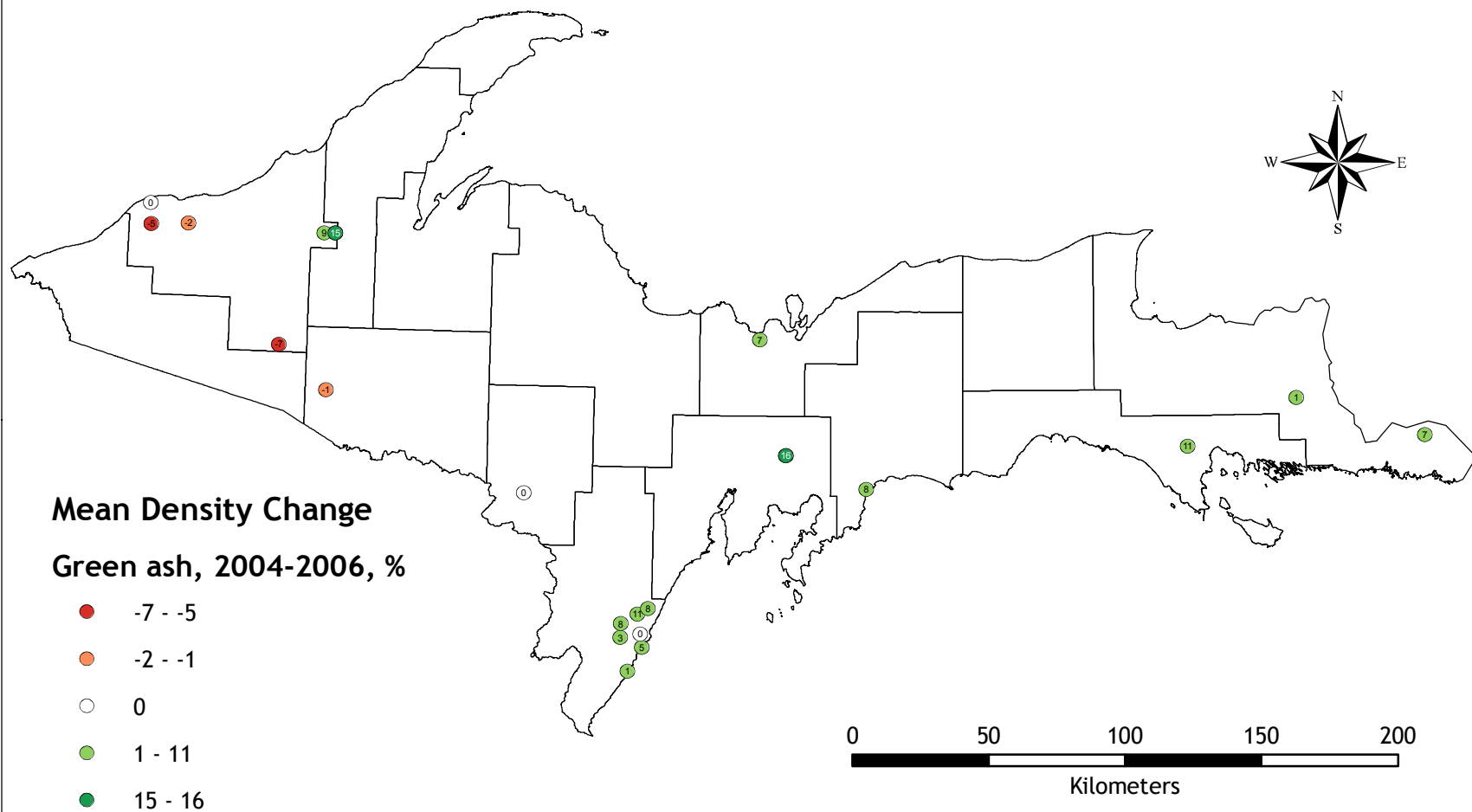
Green Ash Crown Class Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

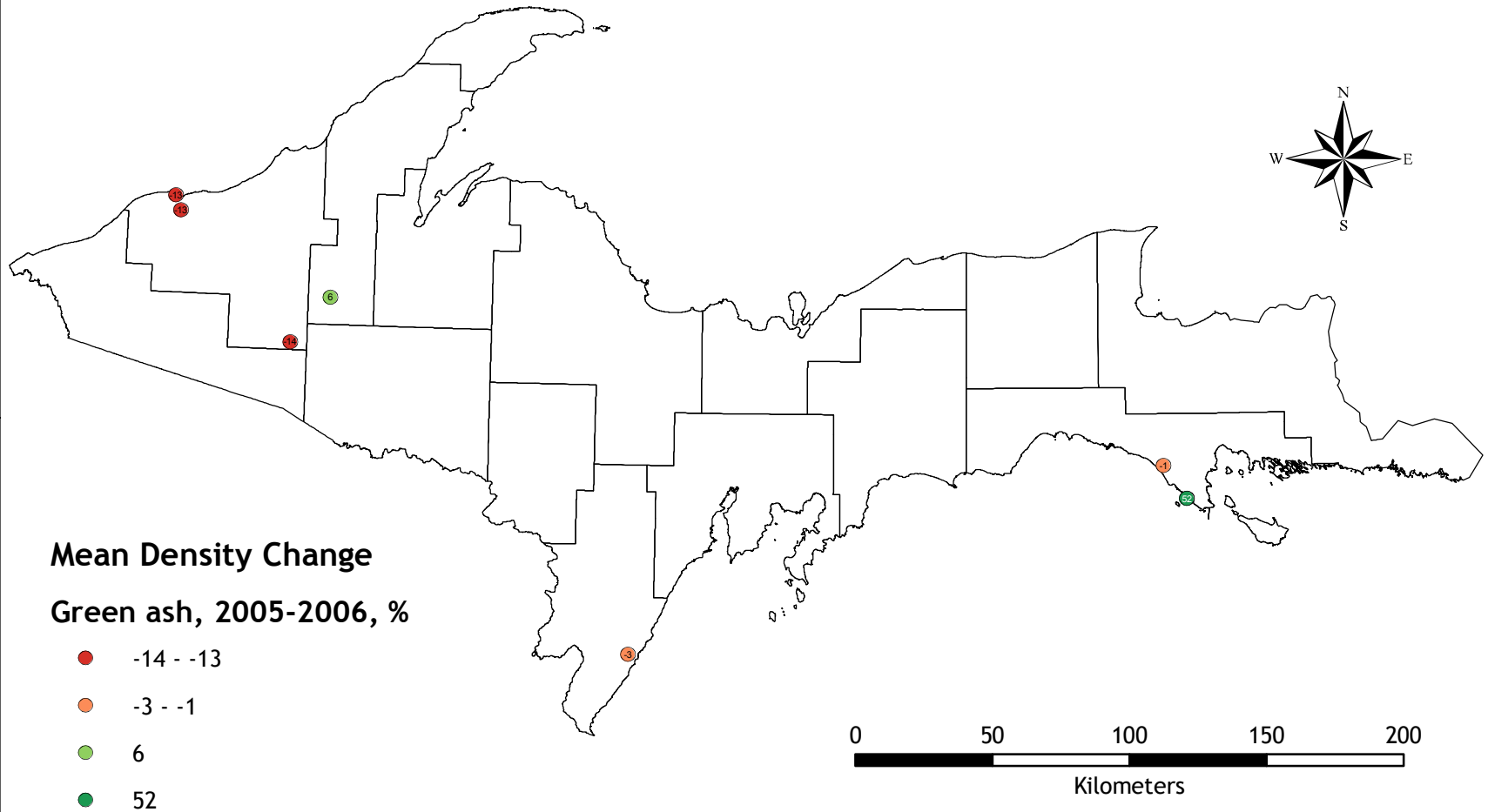
Green Ash Crown Density Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

Green Ash Crown Density Change



Mean Density Change

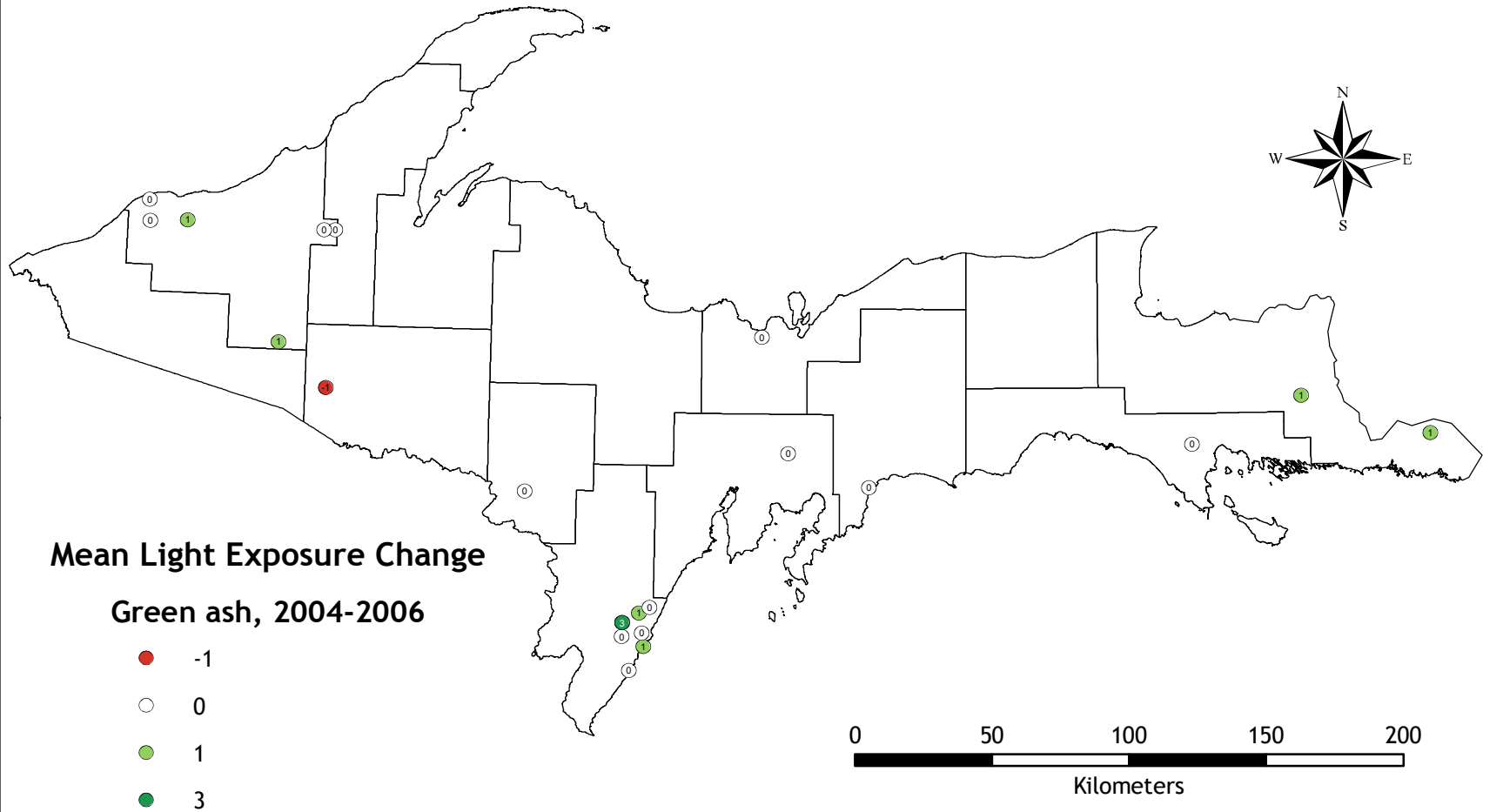
Green ash, 2005-2006, %

- -14 - -13
- -3 - -1
- 6
- 52

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

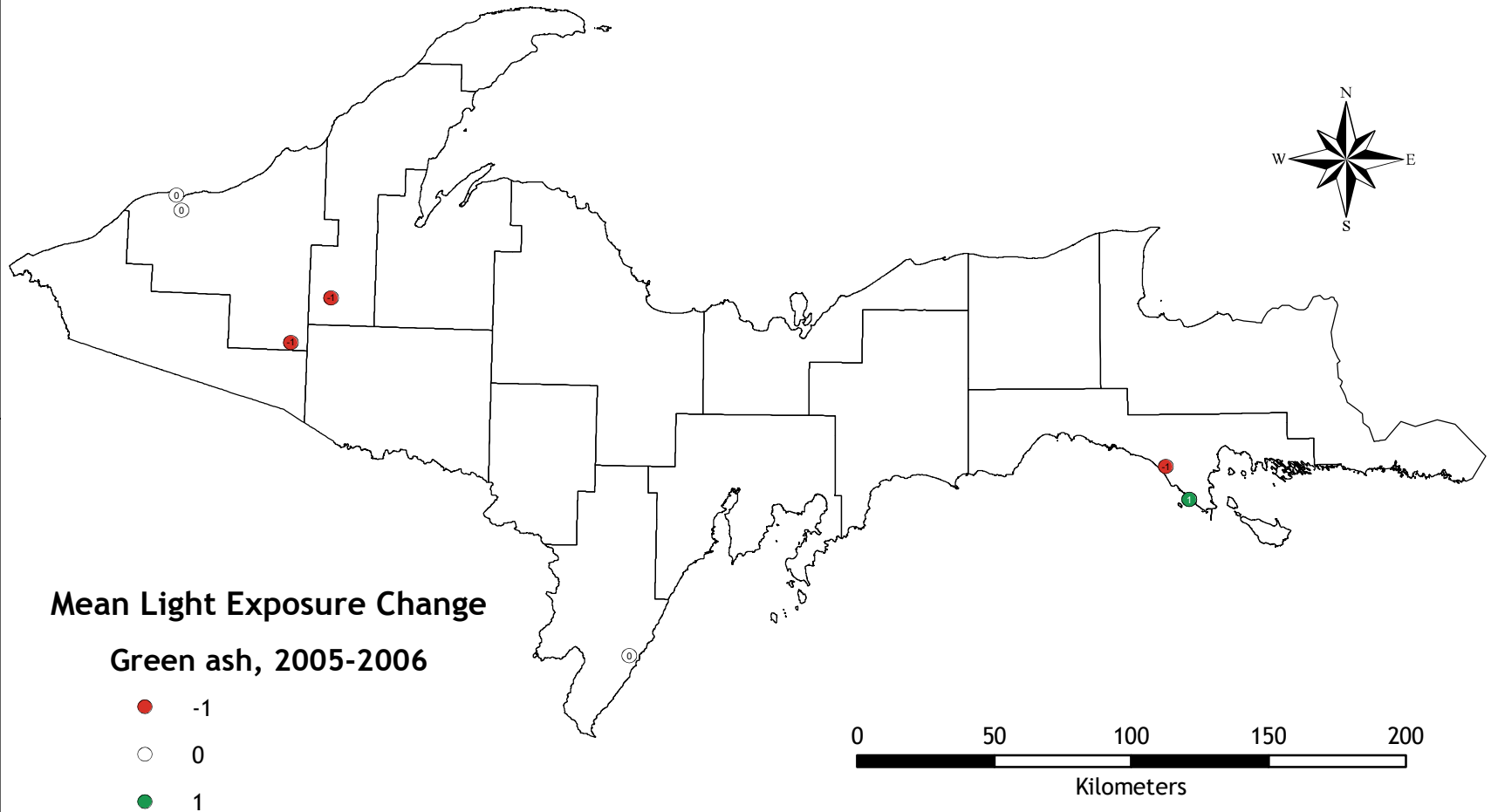
Green Ash Crown Light Exposure Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

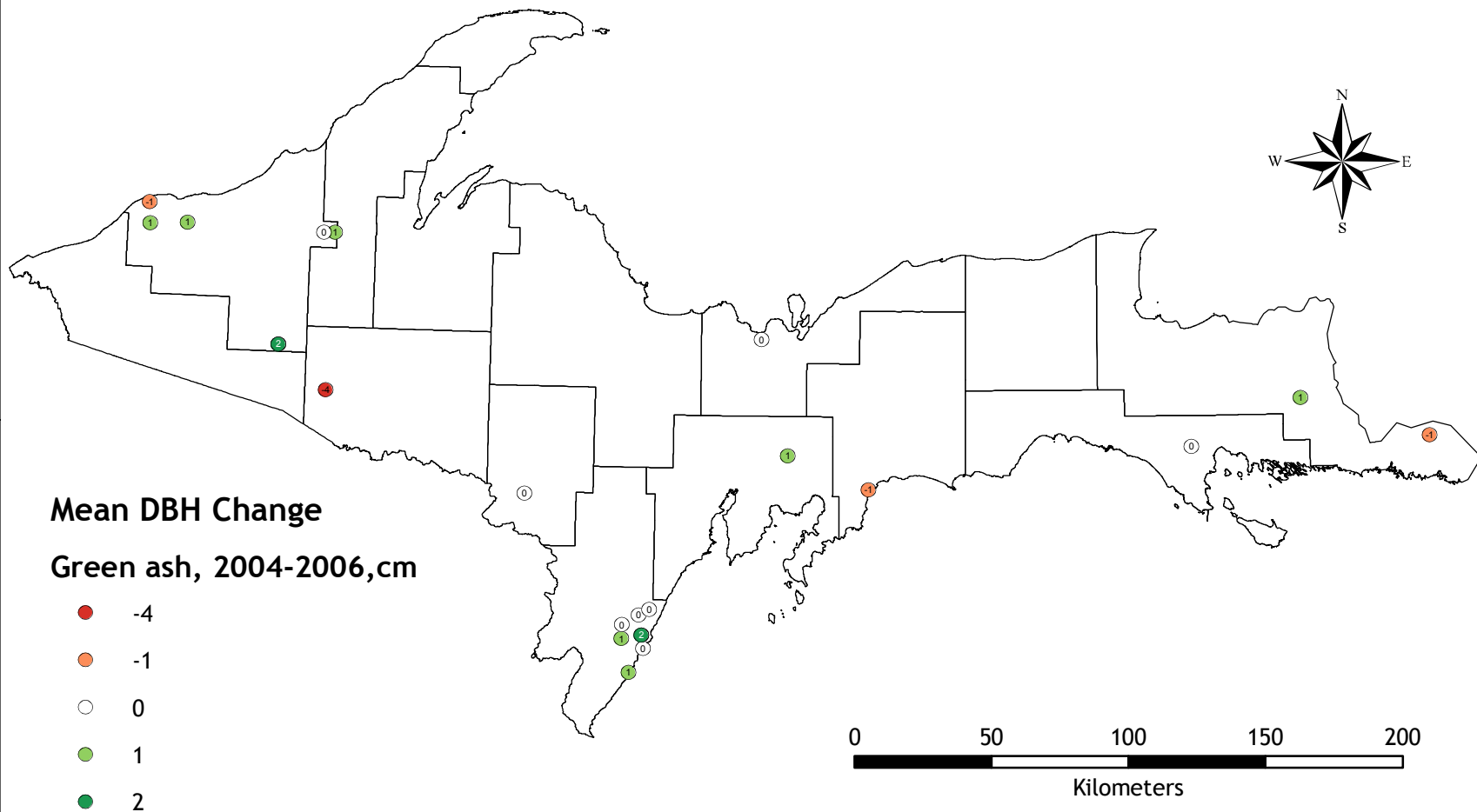
Green Ash Crown Light Exposure Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

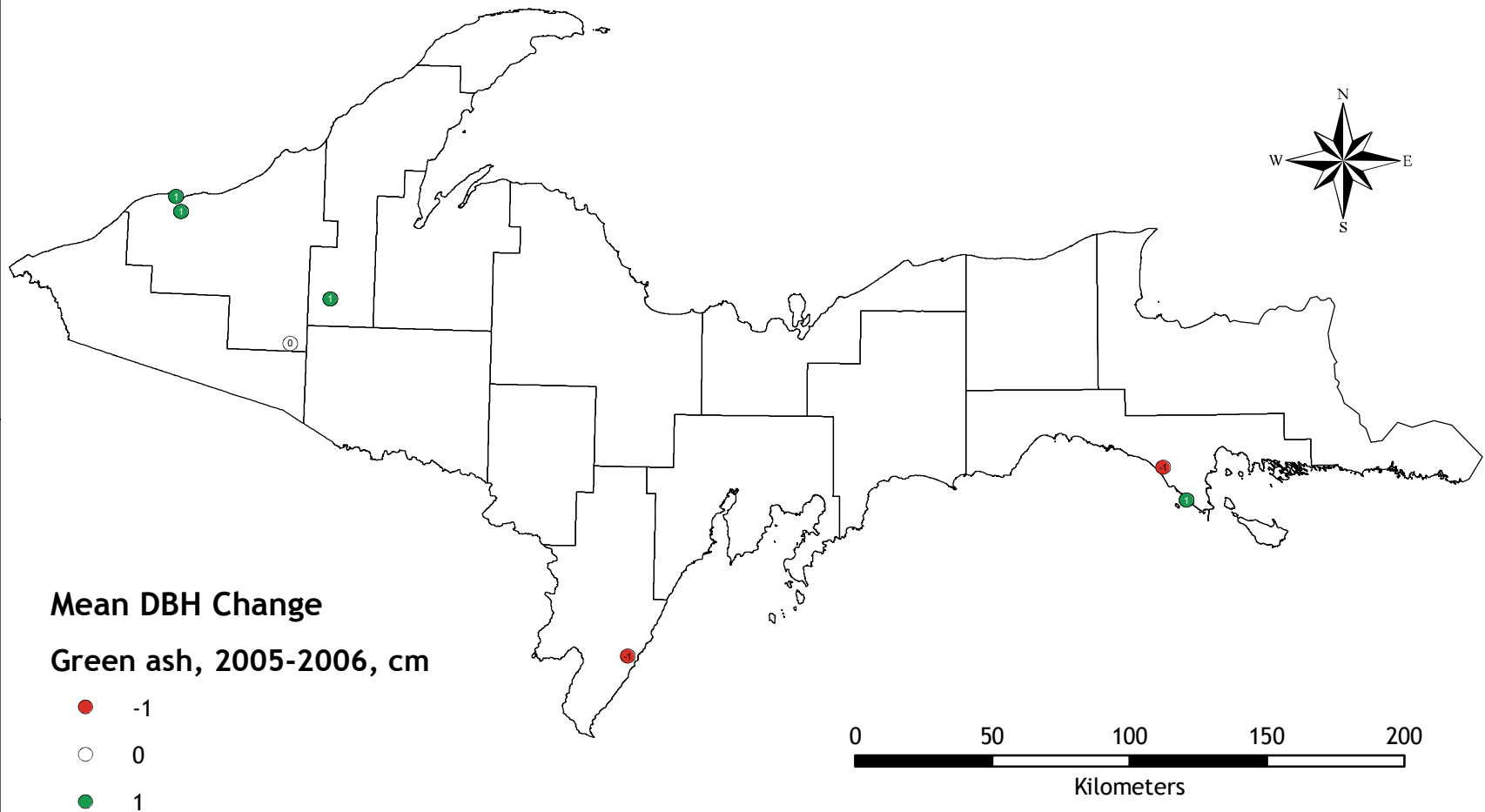
Green Ash Diameter at Breast Height Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

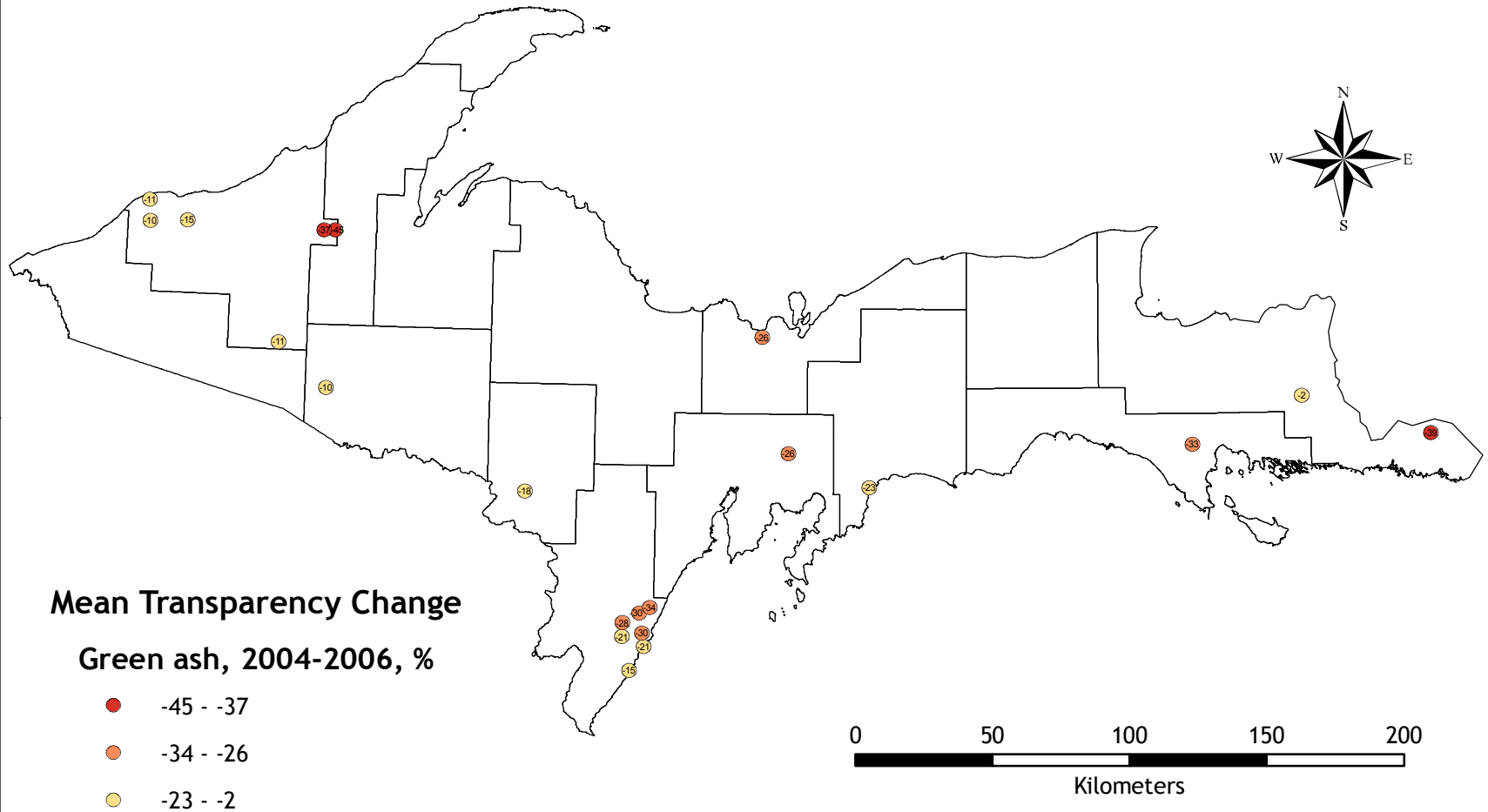
Green Ash Diameter at Breast Height Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

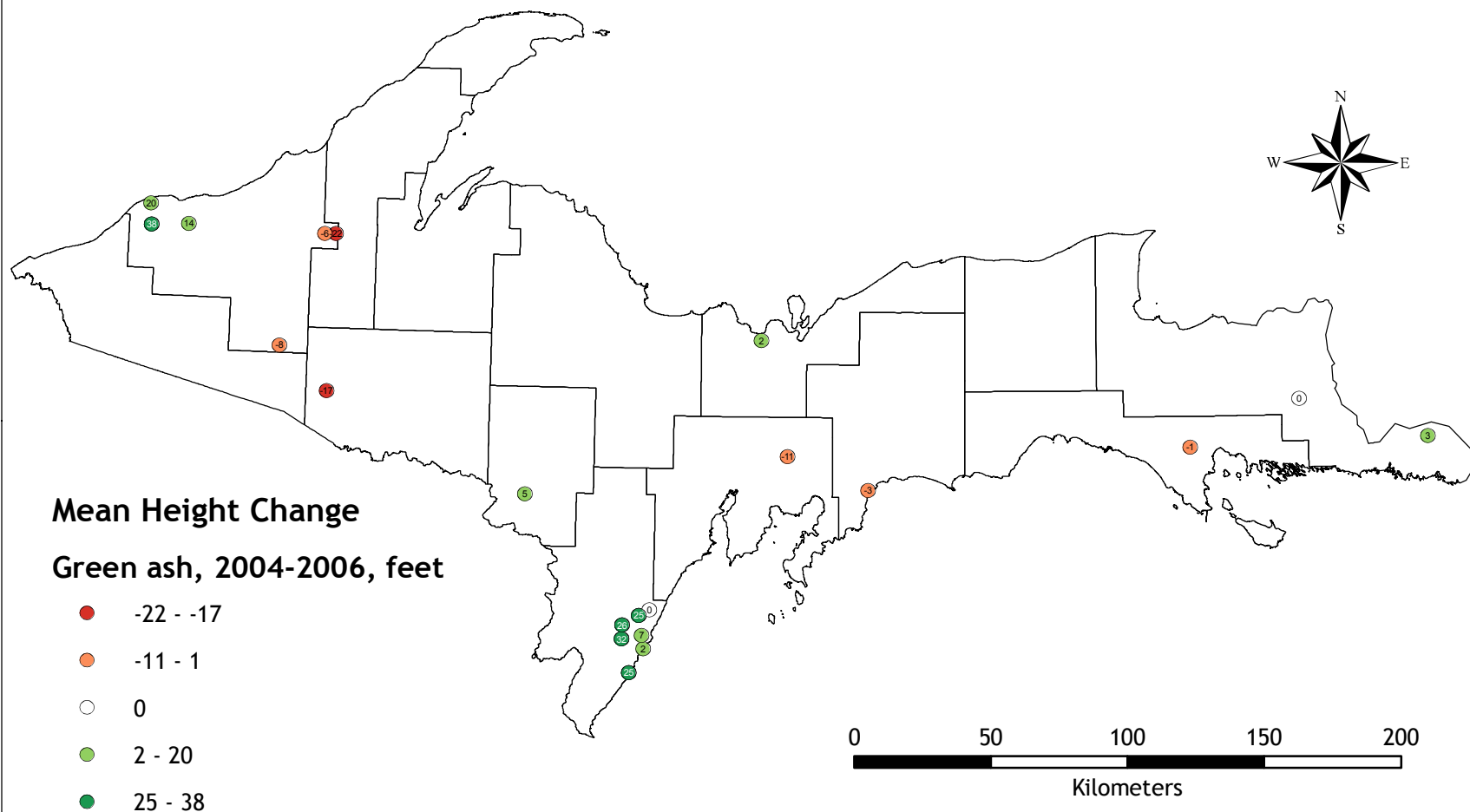
Green Ash Foliage Transparency Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

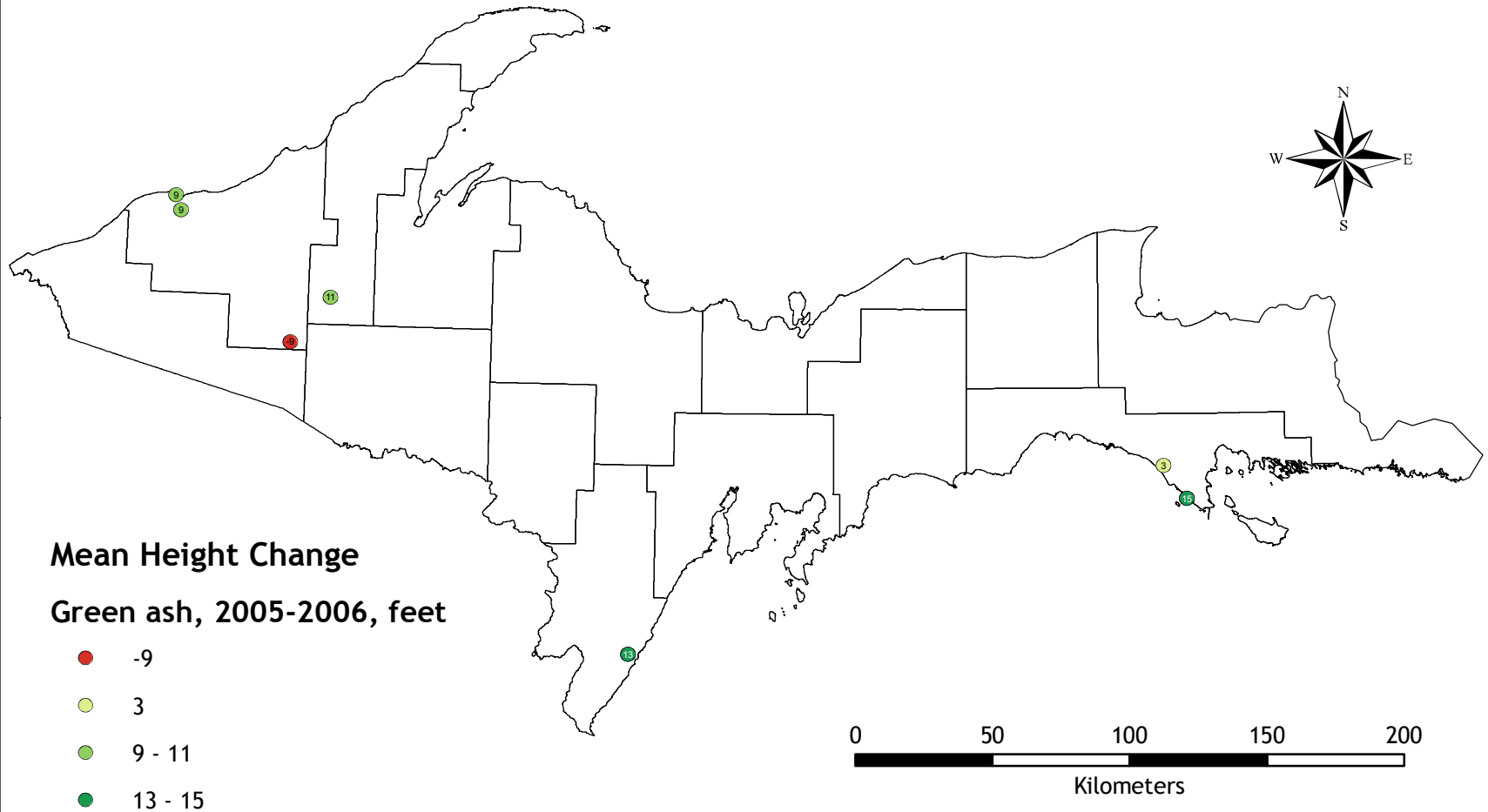
Green Ash Height Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

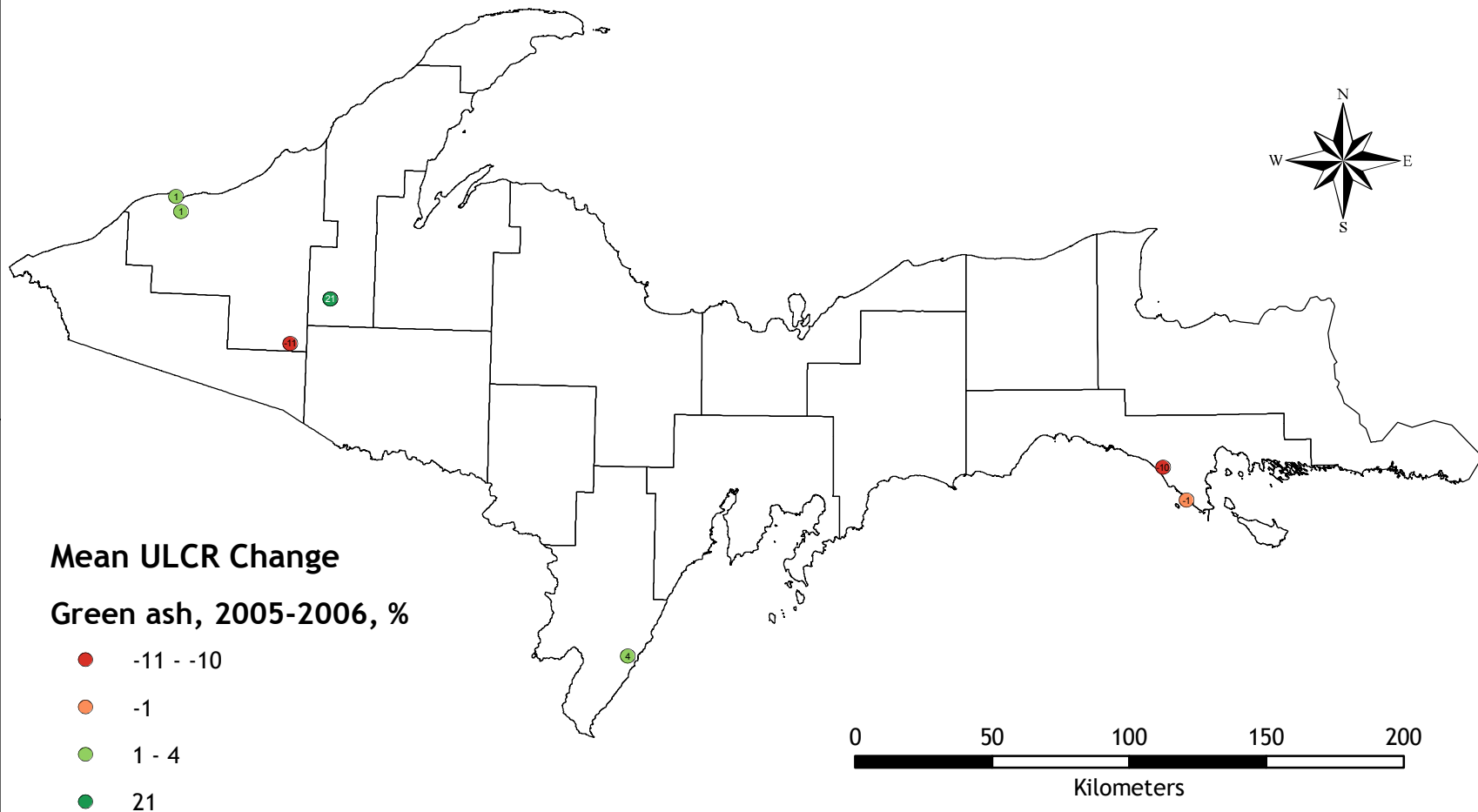
Green Ash Height Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

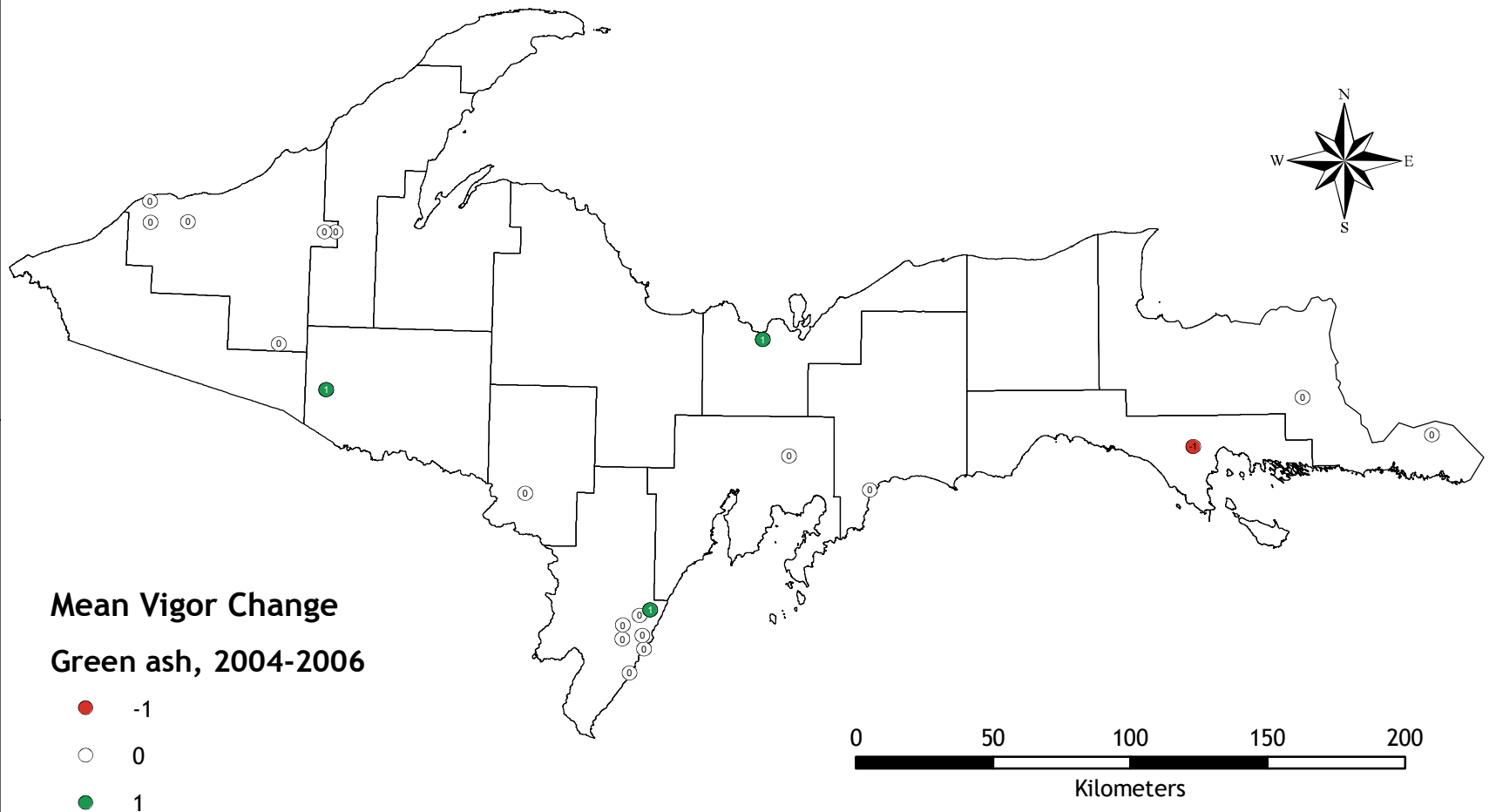
Green Ash Uncompacted Live Crown Ratio Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

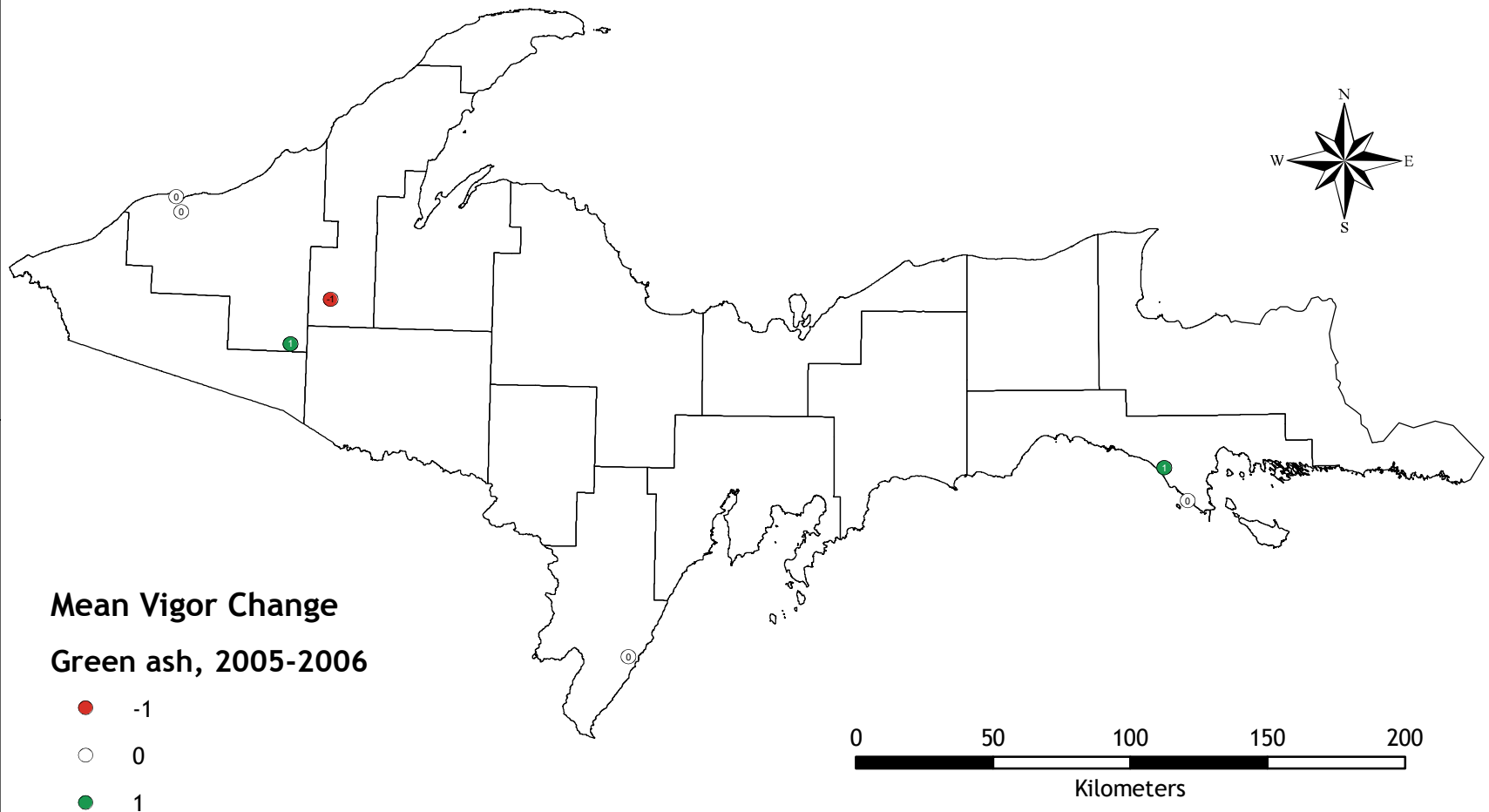
Green Ash Vigor Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

Green Ash Vigor Change

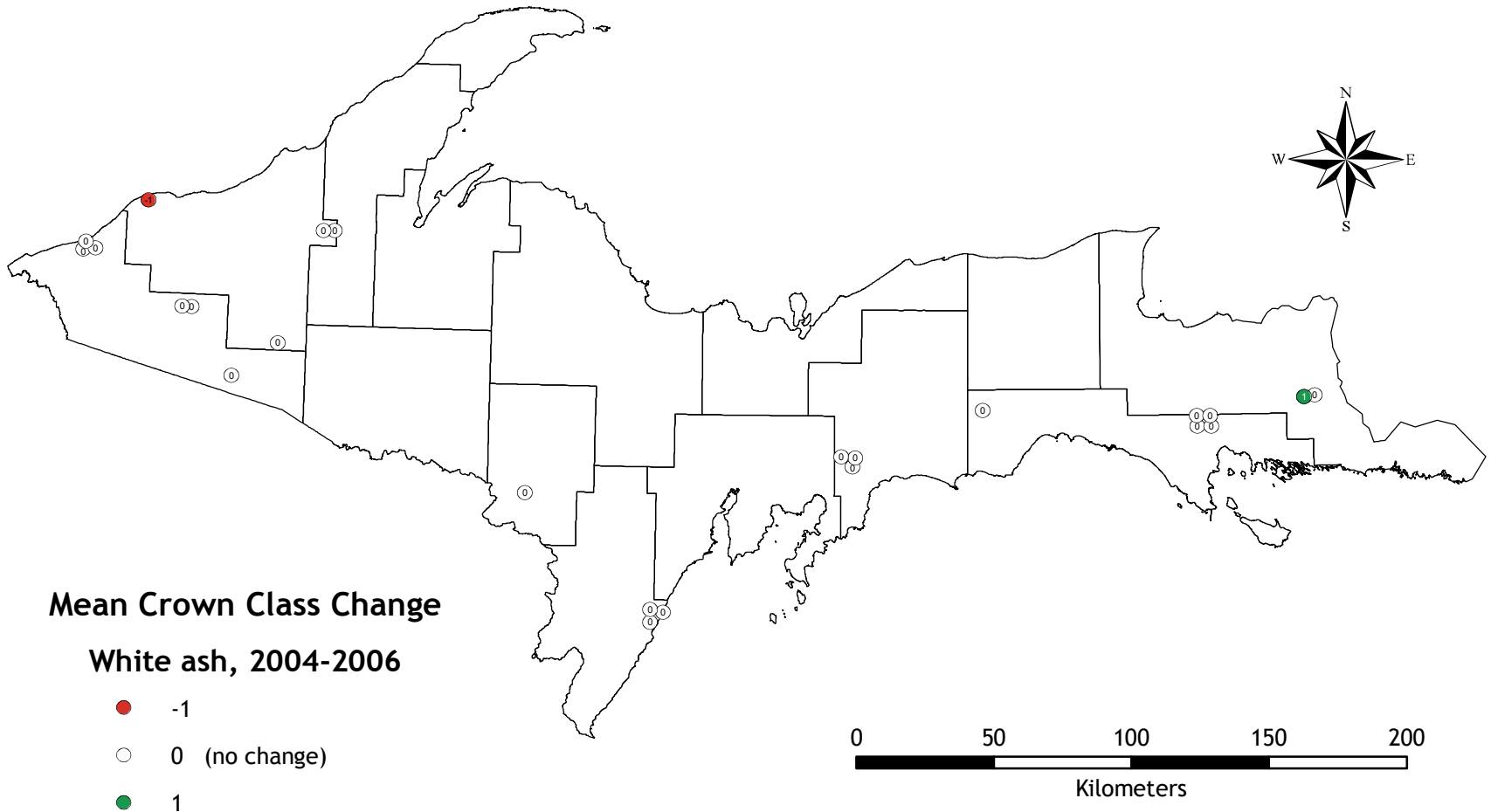


Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008

Change Maps - White Ash

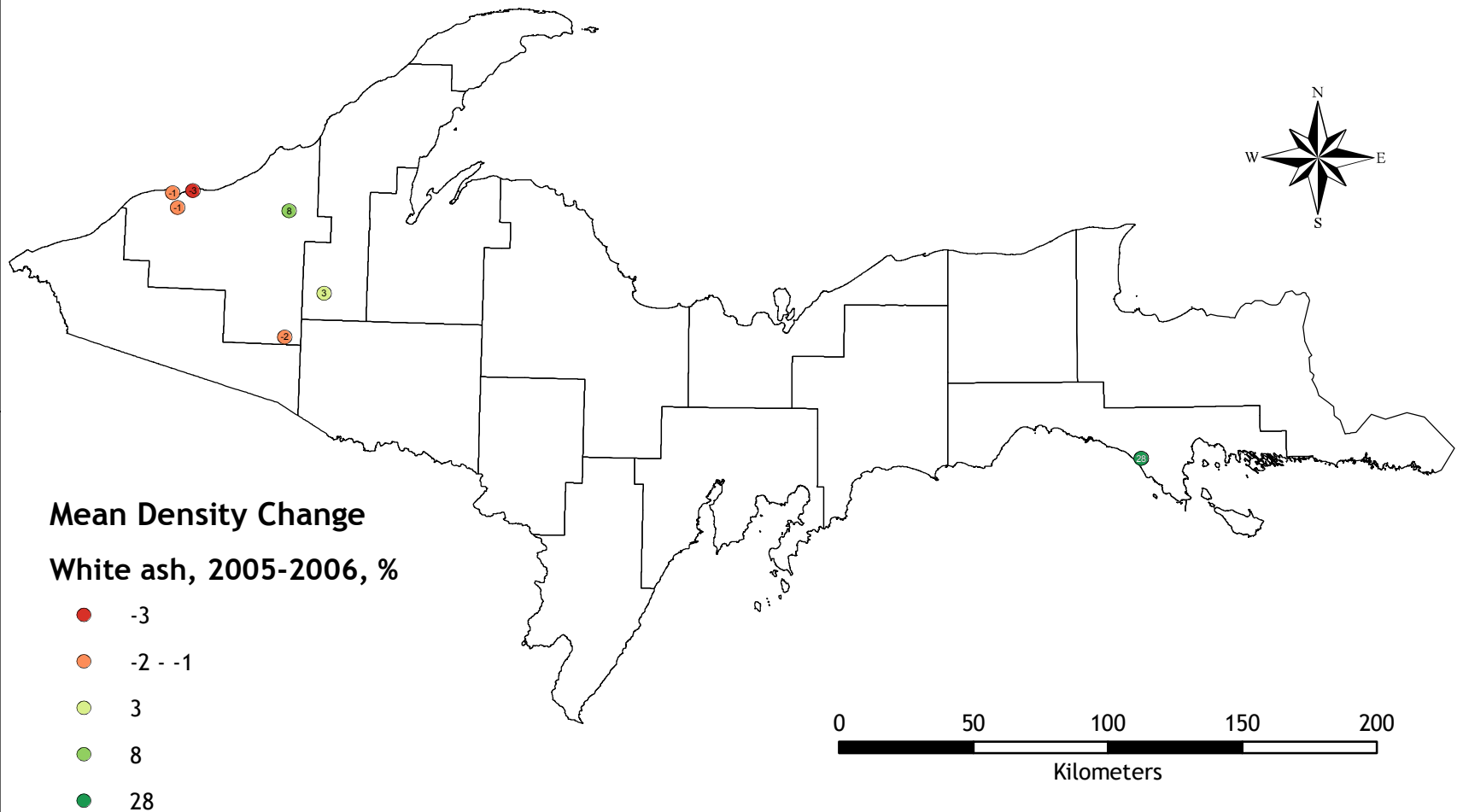
White Ash Crown Class Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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White Ash Crown Density Change



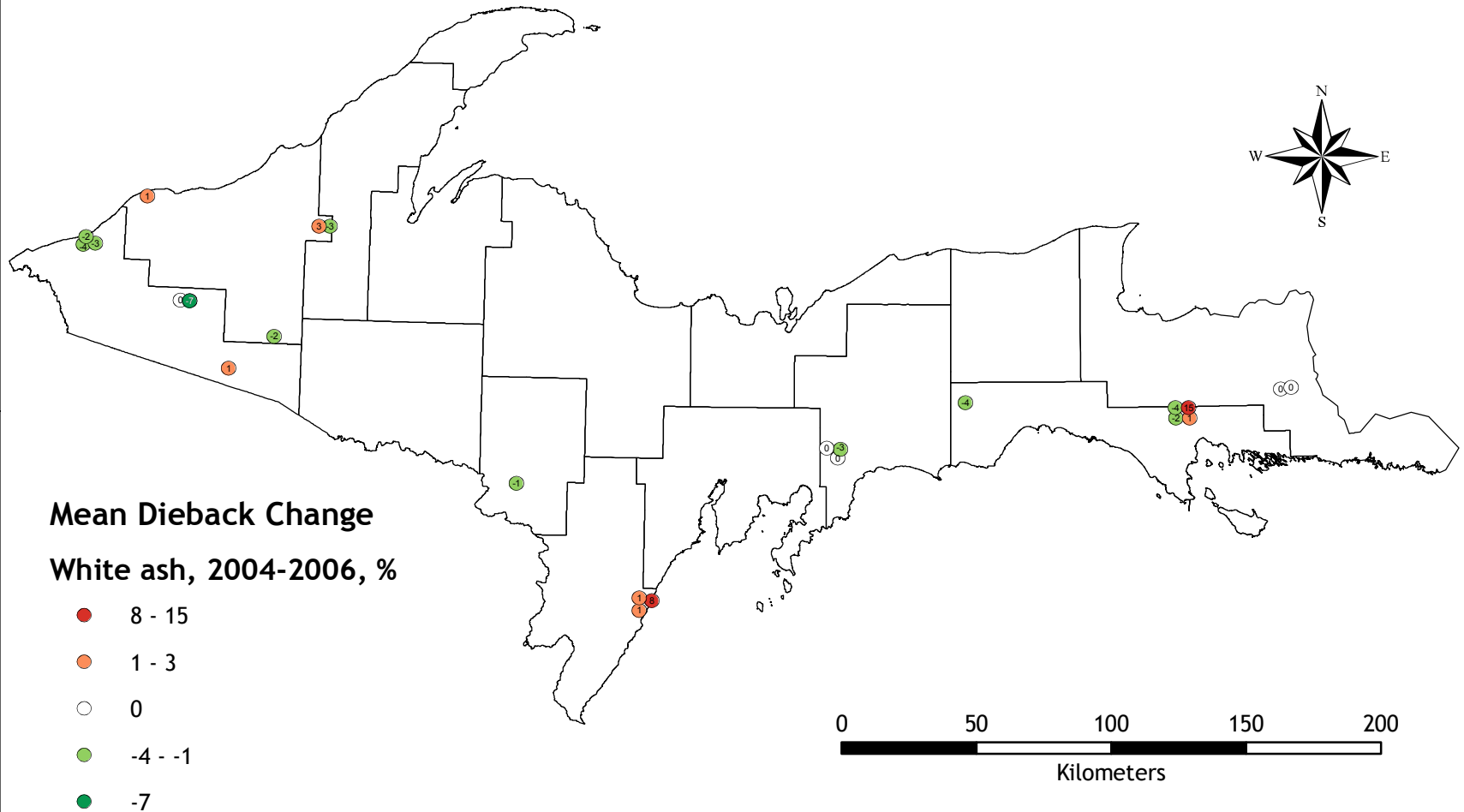
Mean Density Change
White ash, 2005-2006, %

- -3
- -2 -- -1
- 3
- 8
- 28

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

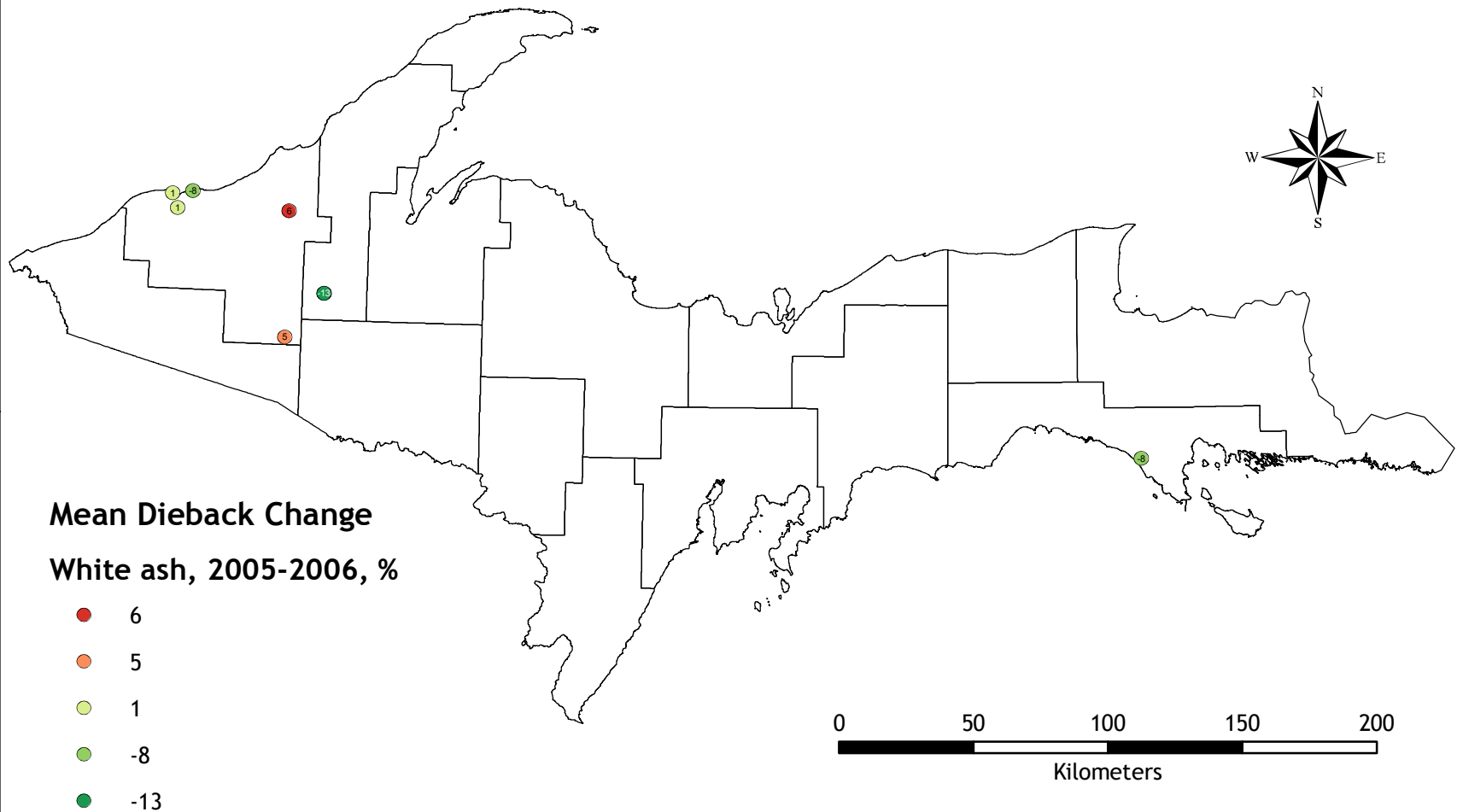
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White Ash Dieback Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

White Ash Dieback Change

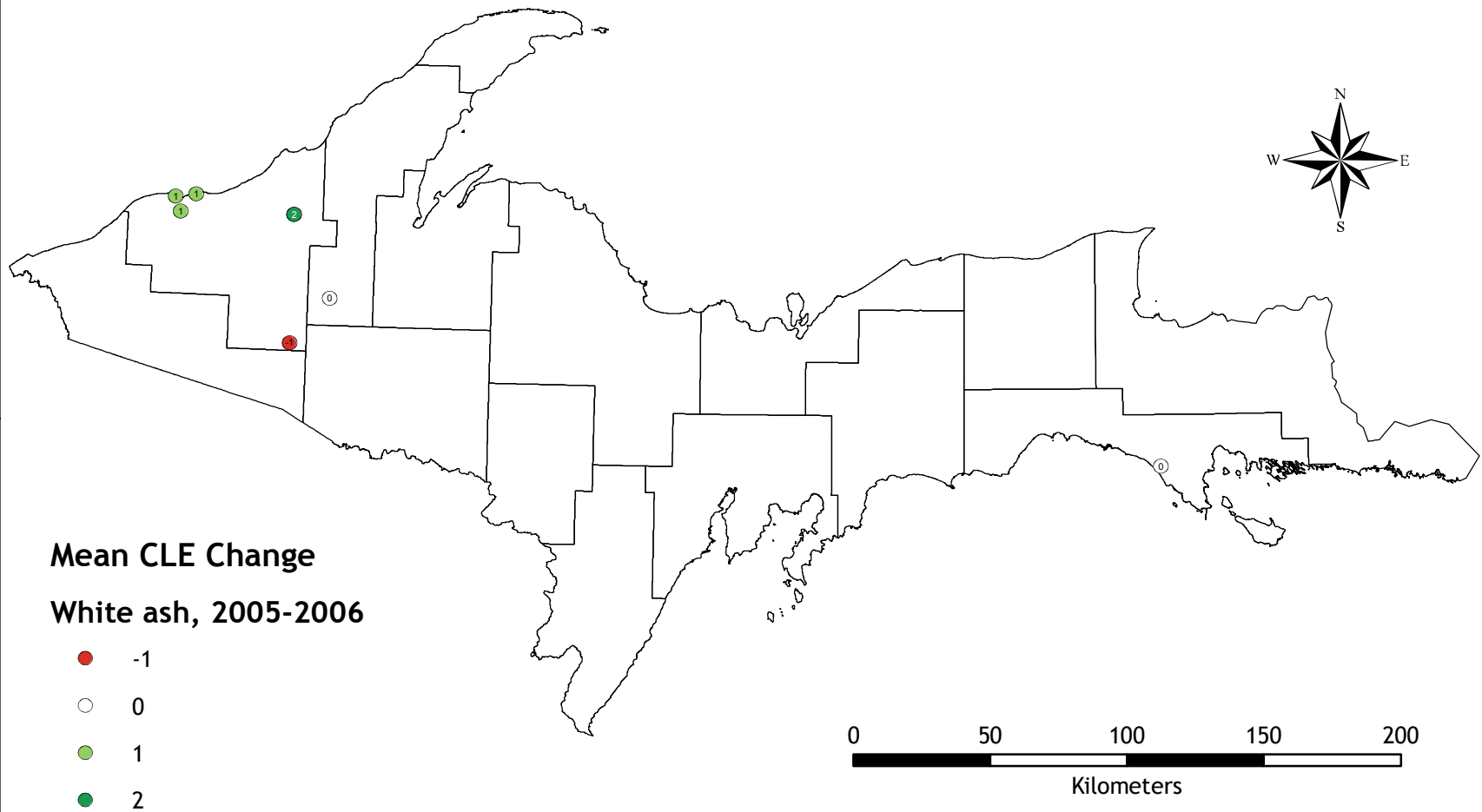


Mean Dieback Change
White ash, 2005-2006, %

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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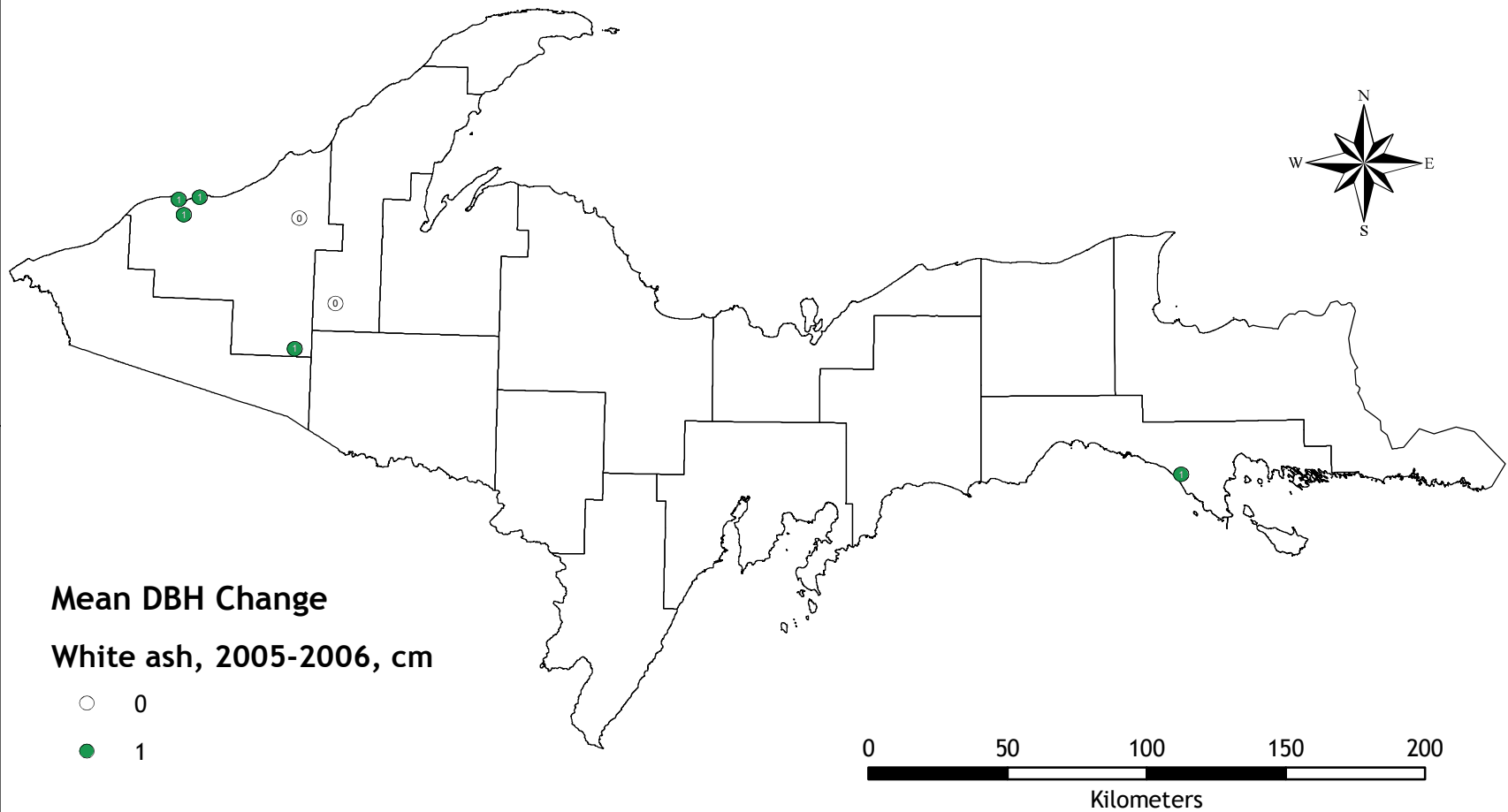
White Ash Crown Light Exposure Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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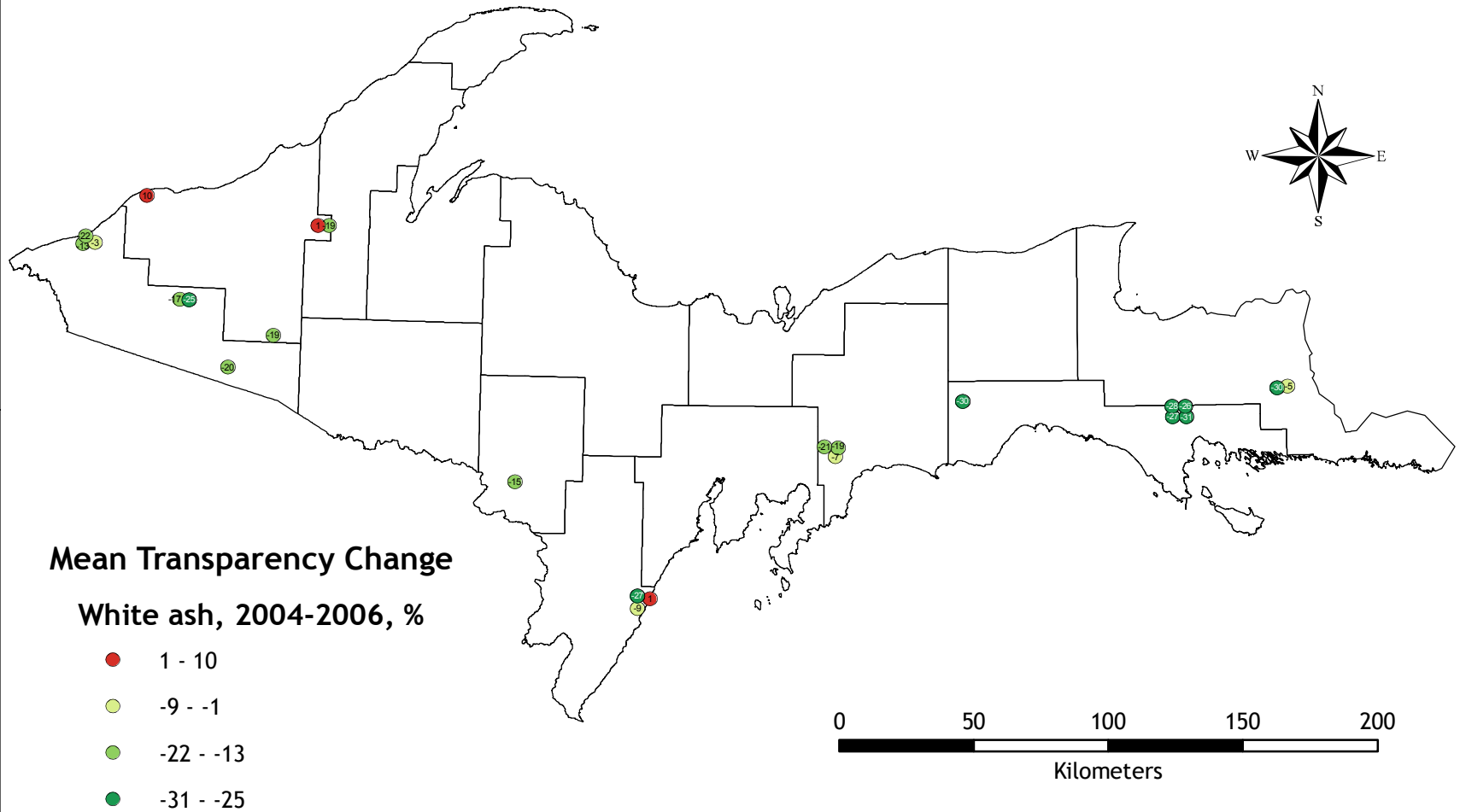
White Ash Diameter at Breast Height Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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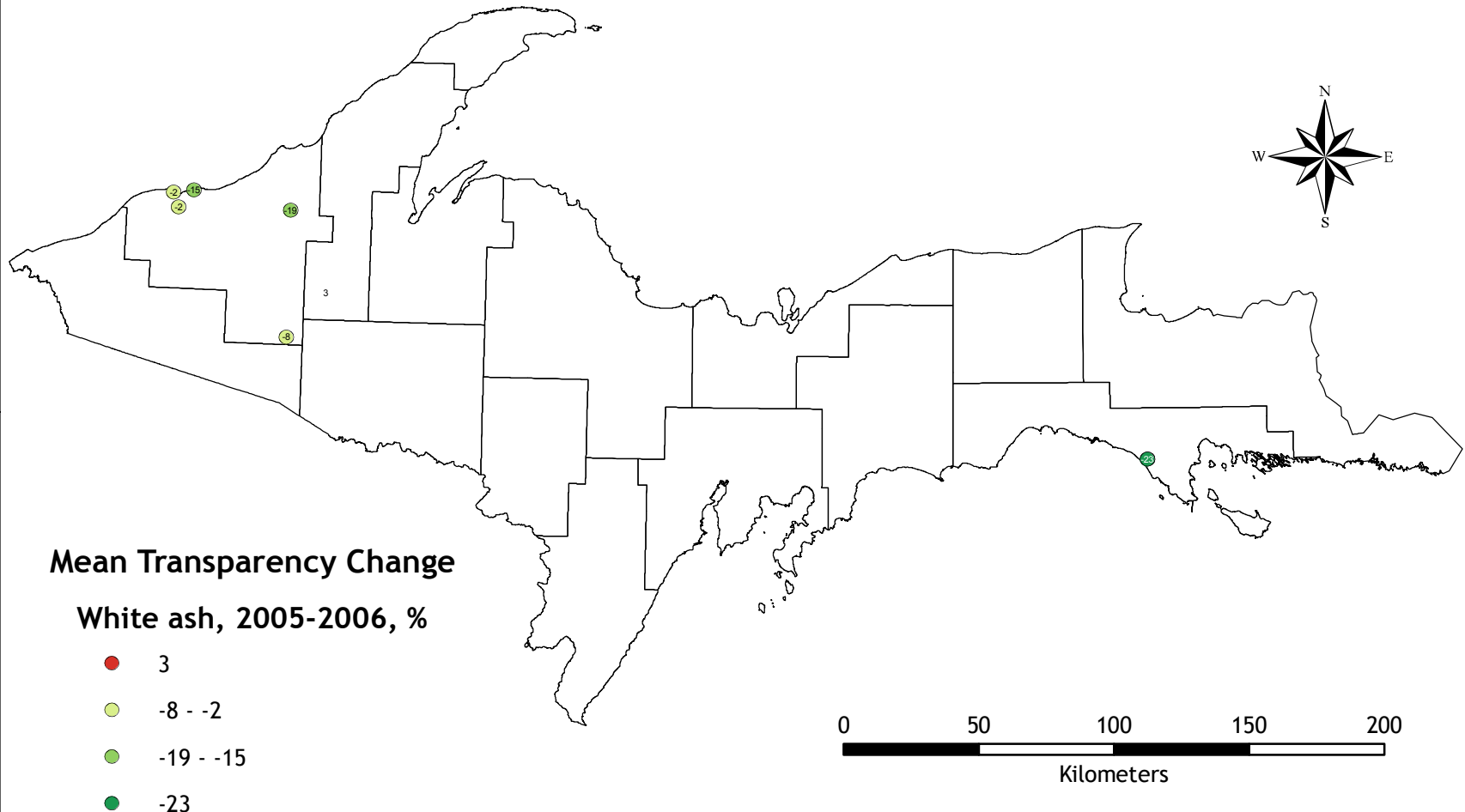
White Ash Foliage Transparency Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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White Ash Foliage Transparency Change



Mean Transparency Change

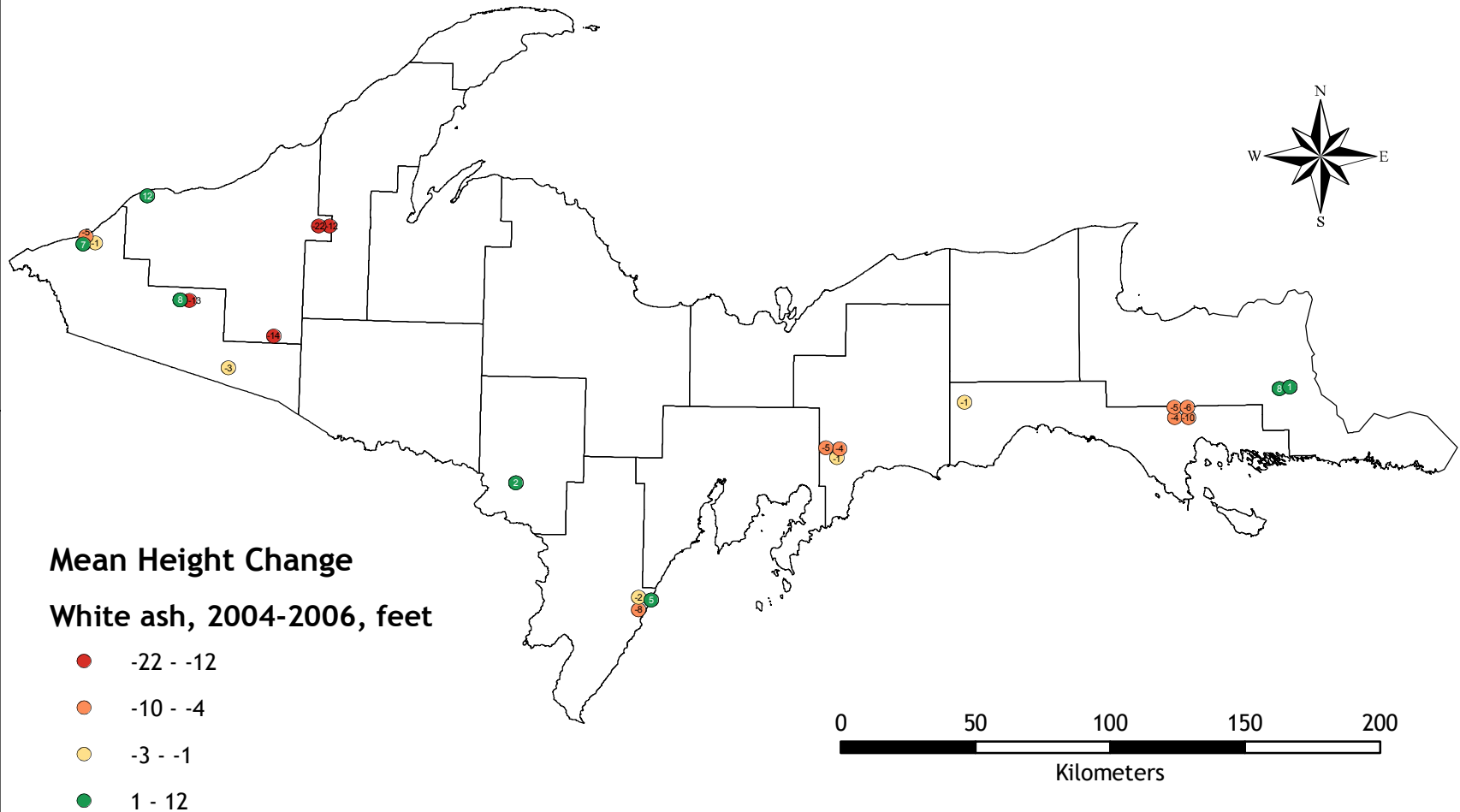
White ash, 2005-2006, %

- 3
- 8 - -2
- 19 - -15
- 23

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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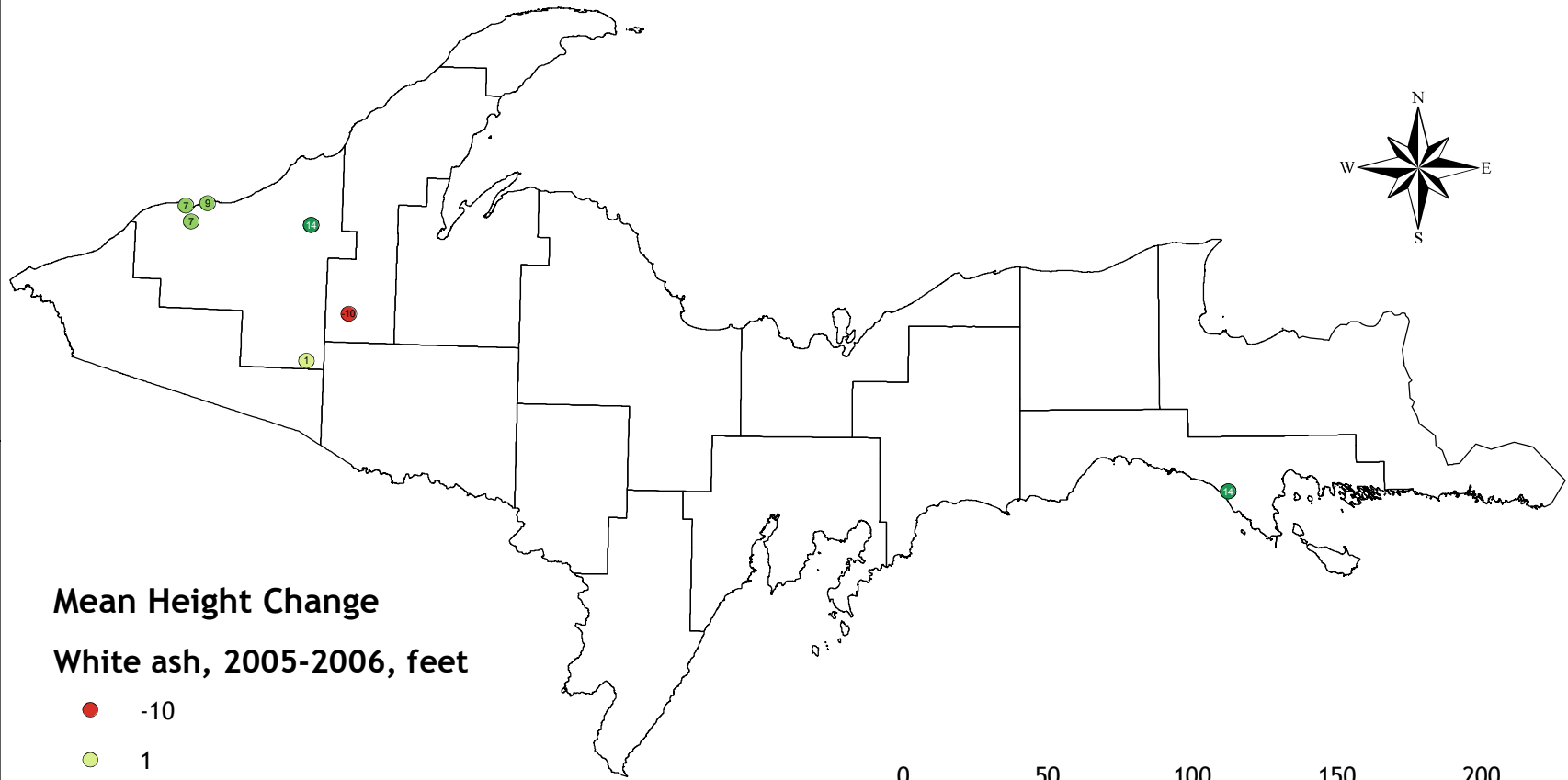
White Ash Height Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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White Ash Height Change



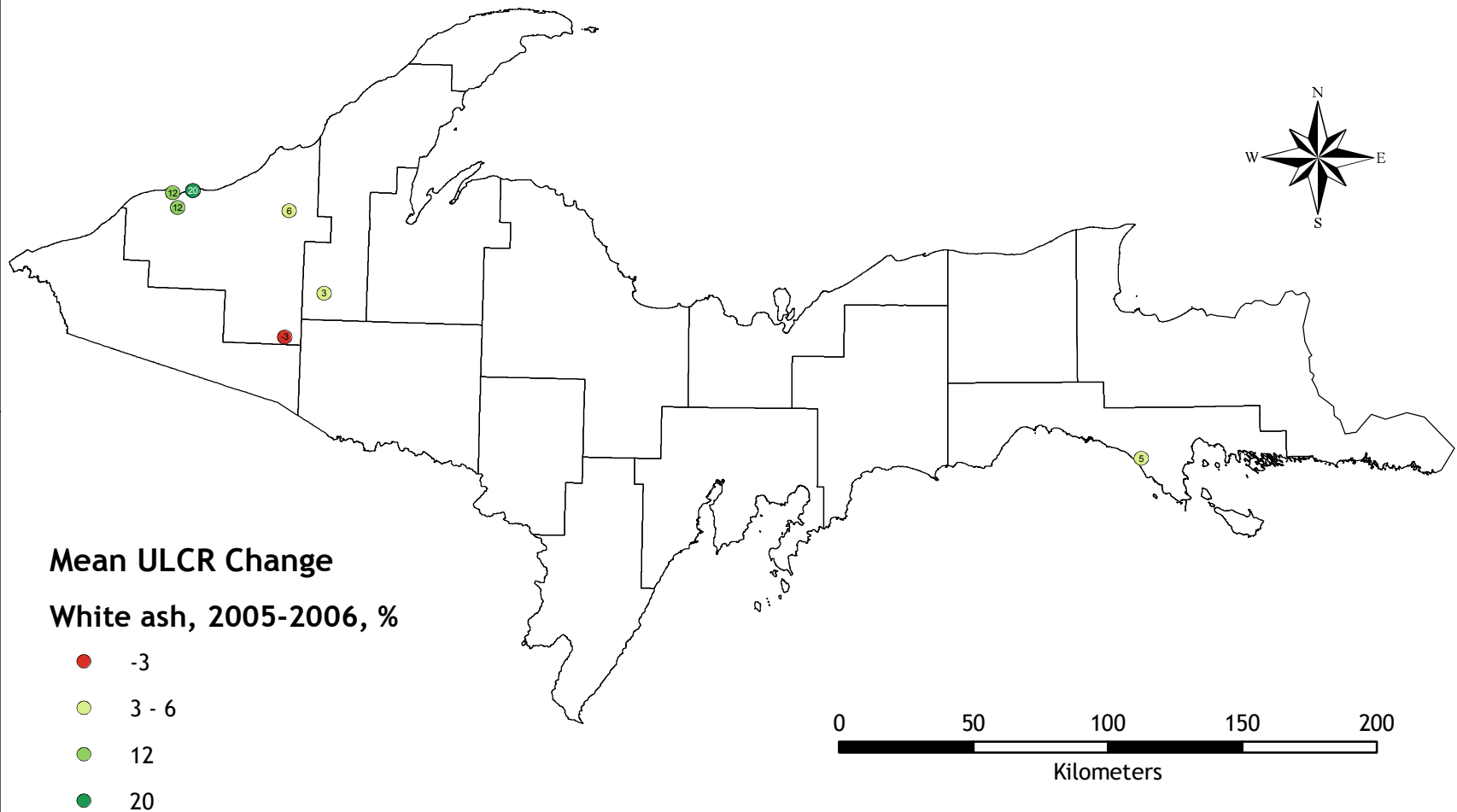
Mean Height Change

White ash, 2005-2006, feet

- -10
- 1
- 7 - 9
- 14

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

White Ash Uncompacted Live Crown Ratio Change



Mean ULCR Change

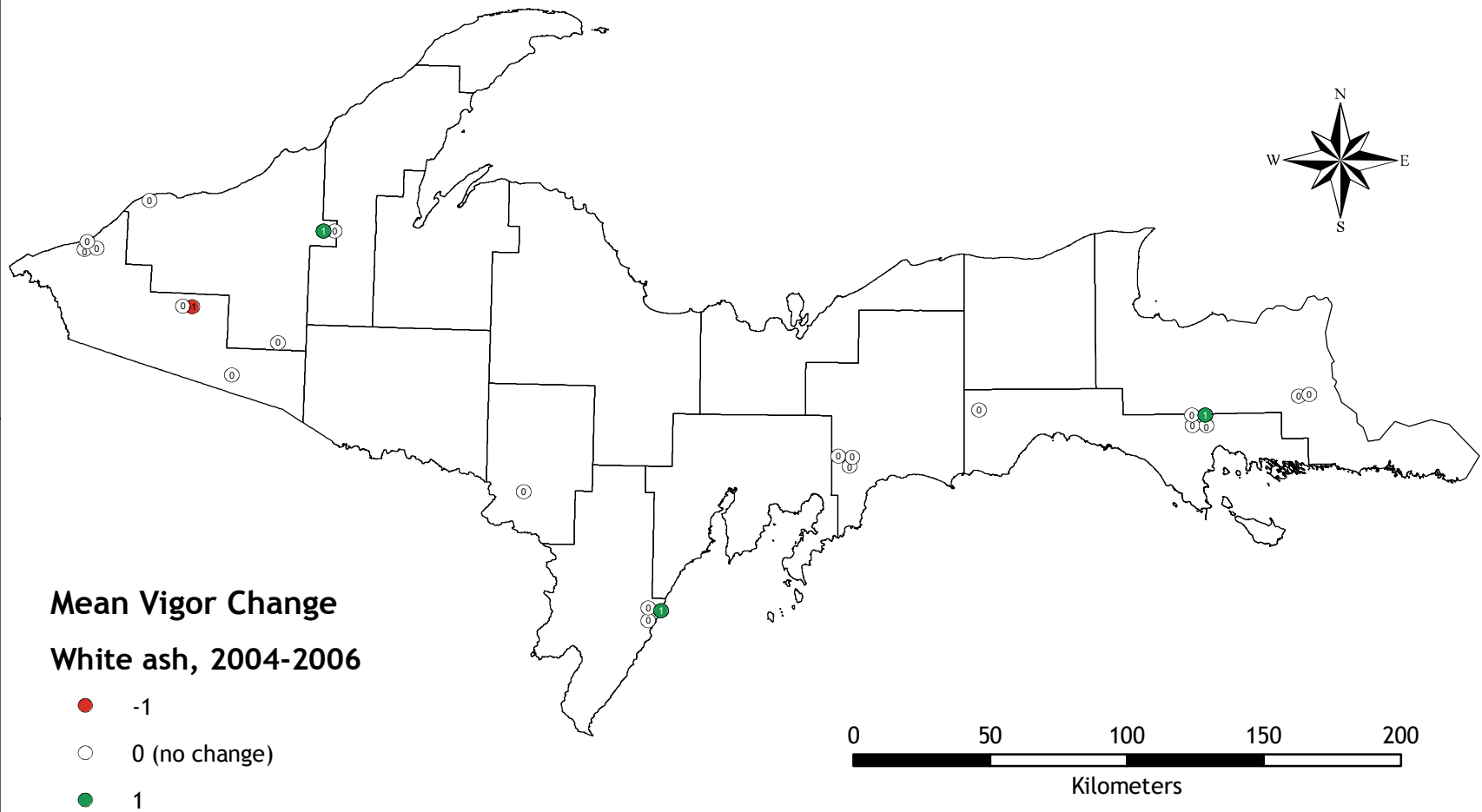
White ash, 2005-2006, %

- -3
- 3 - 6
- 12
- 20

Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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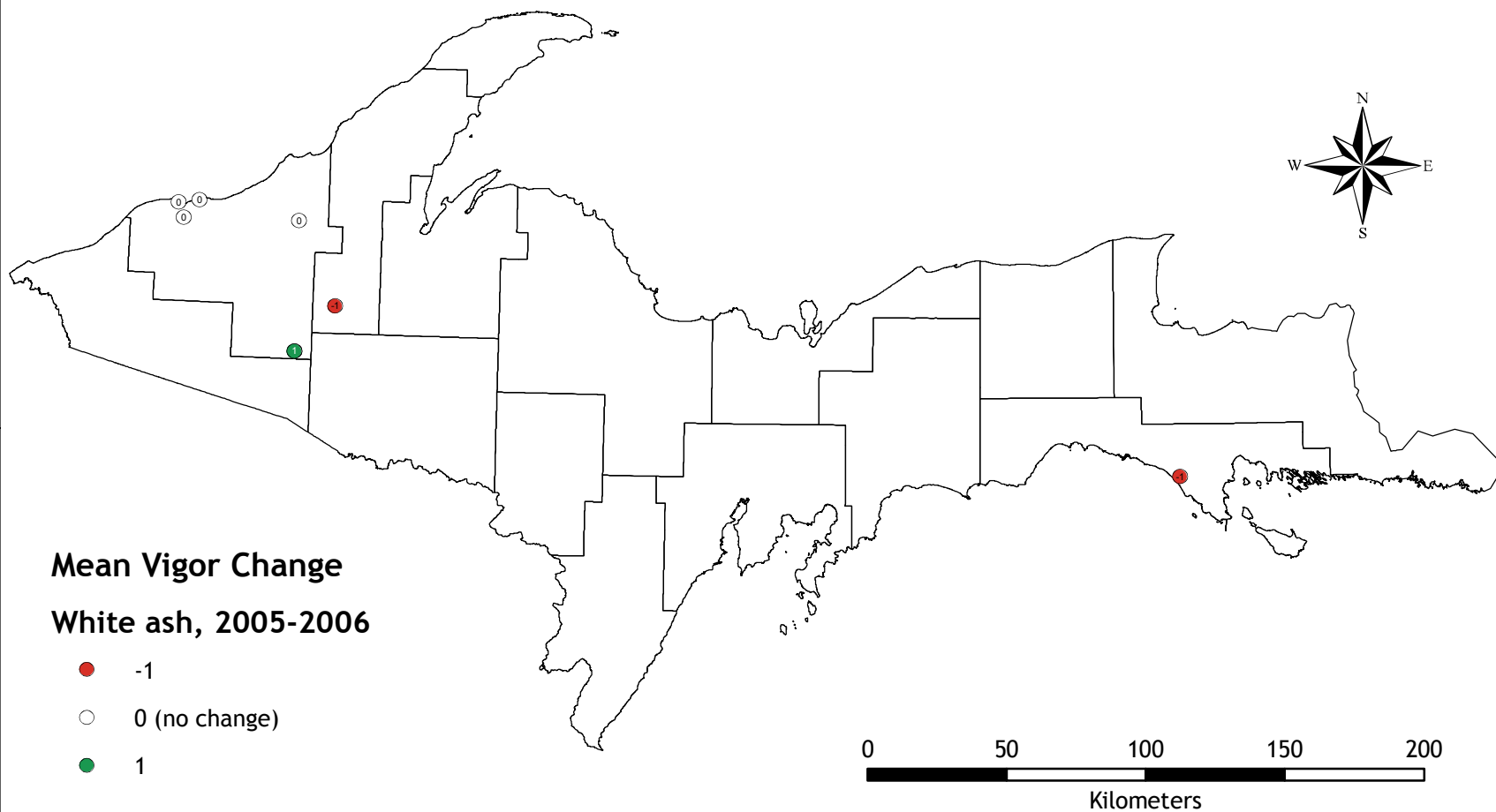
White Ash Vigor Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

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White Ash Vigor Change



Source: Michigan Geographic Data Library
MTU Center for Exotic Species

MDH December 2008