

Michigan Ash Monitoring Plot System

Lower Peninsula Plot Atlas

May 2009

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Background Information

The maps in this atlas were produced from data collected during 2004 and 2005. One Hundred and seventy three monitoring plots were established in the Lower Peninsula of Michigan in 2004 and 2005. These plots are part of the Michigan Ash Monitoring Plot System. Remeasurement data was not collected for these plots.

The maps show tree level measurements for the three widely-distributed native *Fraxinus* (ash) species found in Michigan: black ash (*Fraxinus nigra*), green ash (*Fraxinus pennsylvanica*), and white ash (*Fraxinus americana* L), as well as two species with limited range in Michigan: blue ash (*Fraxinus quadrangulata*) and pumpkin ash (*Fraxinus profunda*). Baseline measurements were averaged by species and by plot for mapping purposes.

Maps include all plots; plots with each of the 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, uncompact live crown ratio, and tree vigor. Due to the low number of plots containing blue and pumpkin ash, these two species are presented on the same maps.

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).

Diameter at breast height (DBH) is the diameter of the tree in centimeters measured at 1.37 meters (4.5 feet) above the ground.

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. This 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.

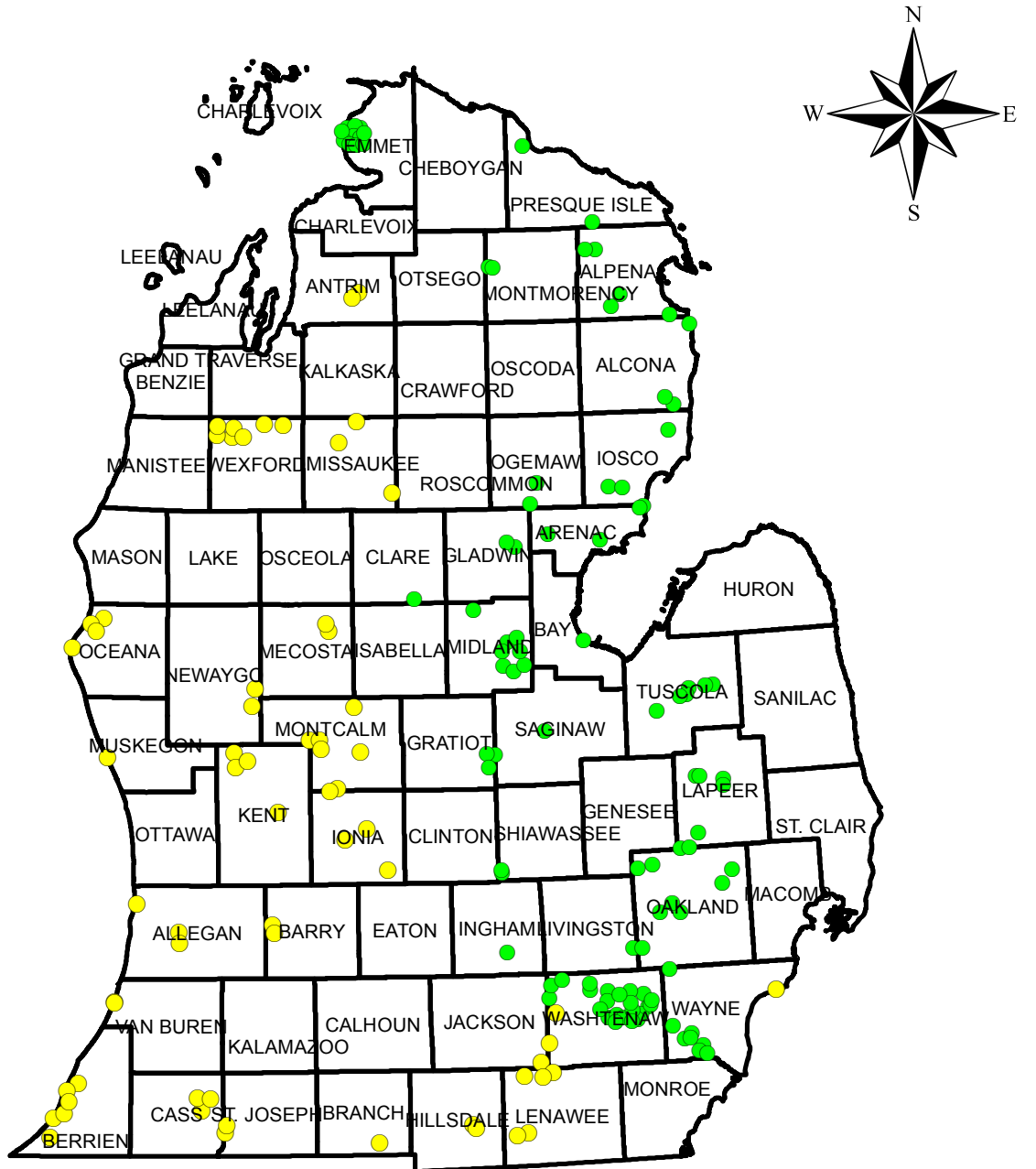
Uncompacted live crown ratio is a percentage calculated by dividing the live crown length by the total height of the tree. Trees with high live crown ratios are considered healthier and grow faster than trees with low crown ratios.

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 6-8 indicate a dead tree in various stages of decay.

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>

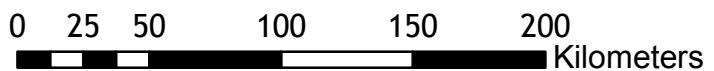
Baseline Maps

Establishment of Ash Monitoring Plots In Michigan's Lower Peninsula

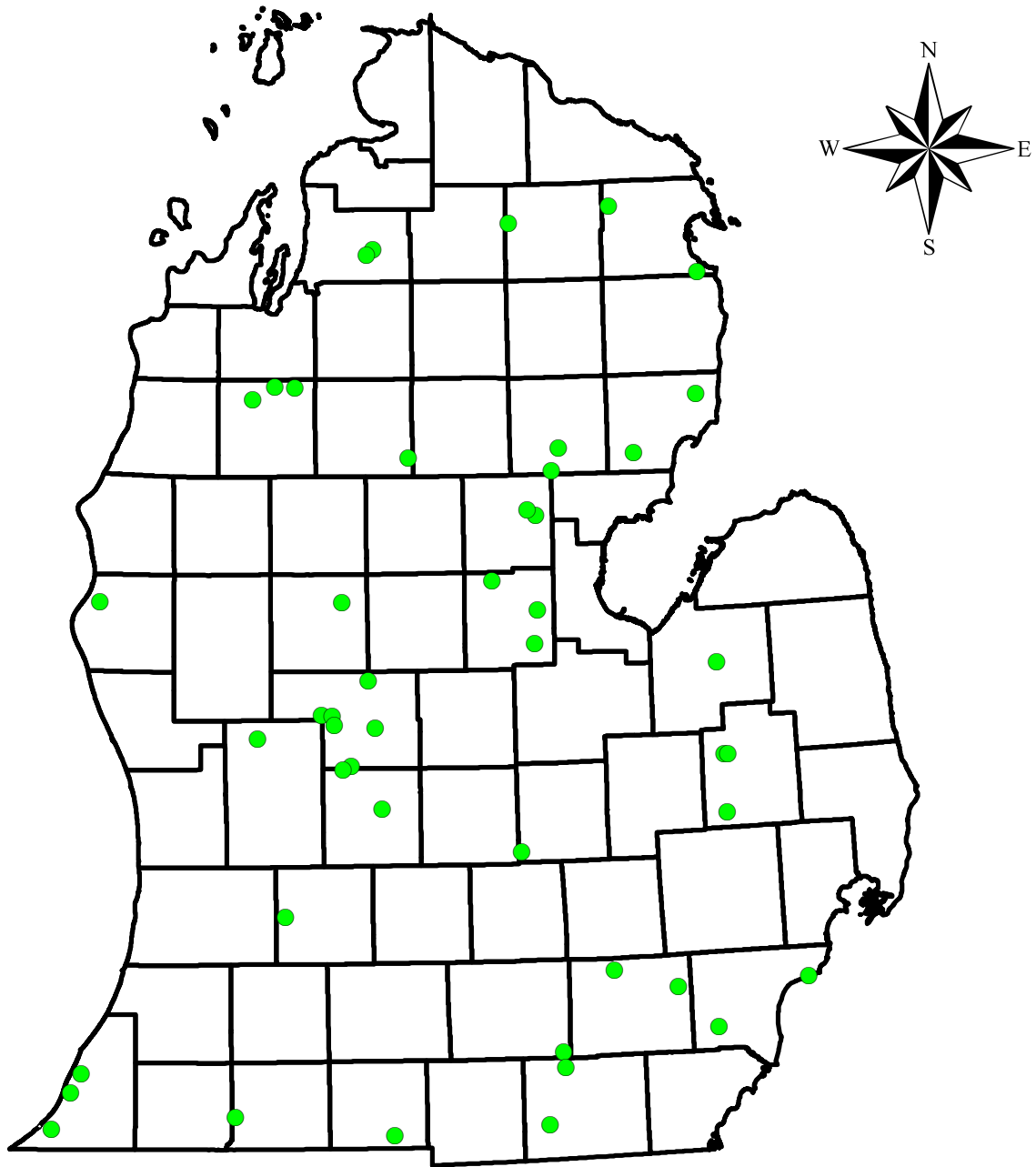


Year of Establishment

- 2004
- 2005



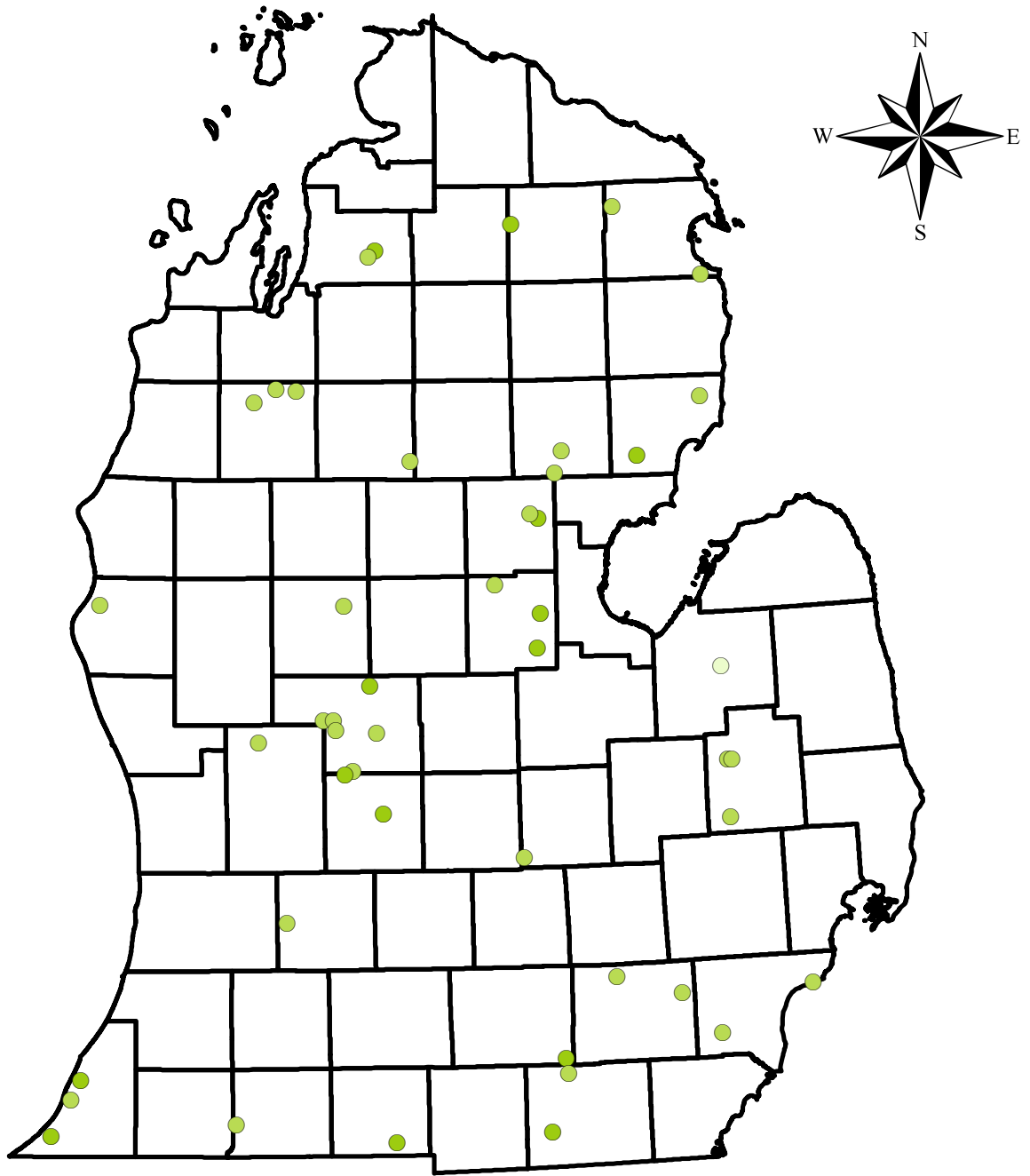
Black Ash Plots



Key

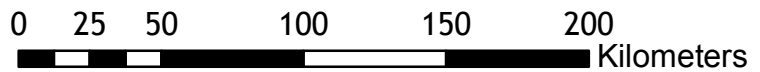
- Plots with Black Ash
- 0 25 50 100 150 200 Kilometers

Black Ash Crown Class



Mean Black Ash Crown Class

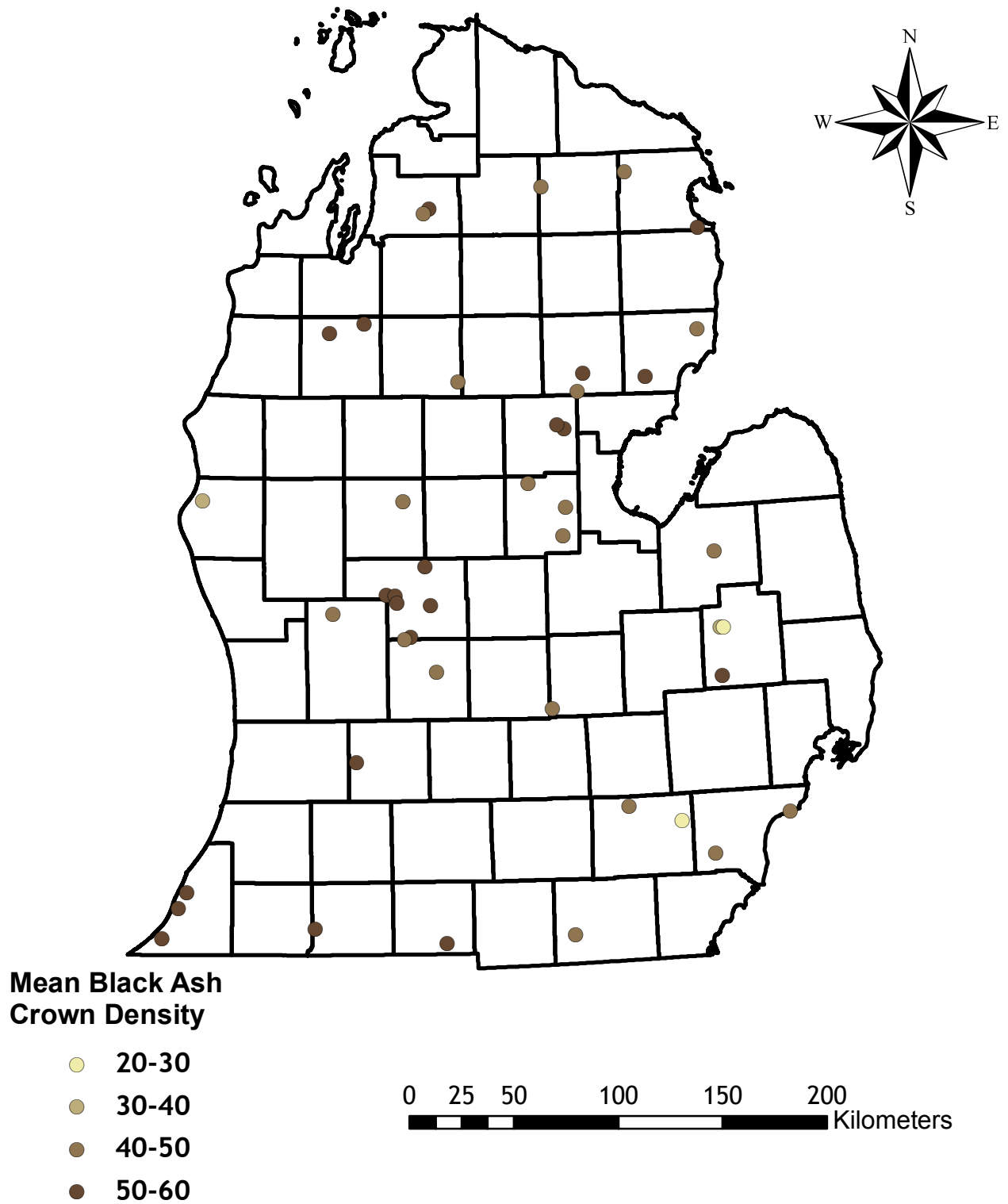
- 1
- 2
- 3
- 4



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

NDW April 2009

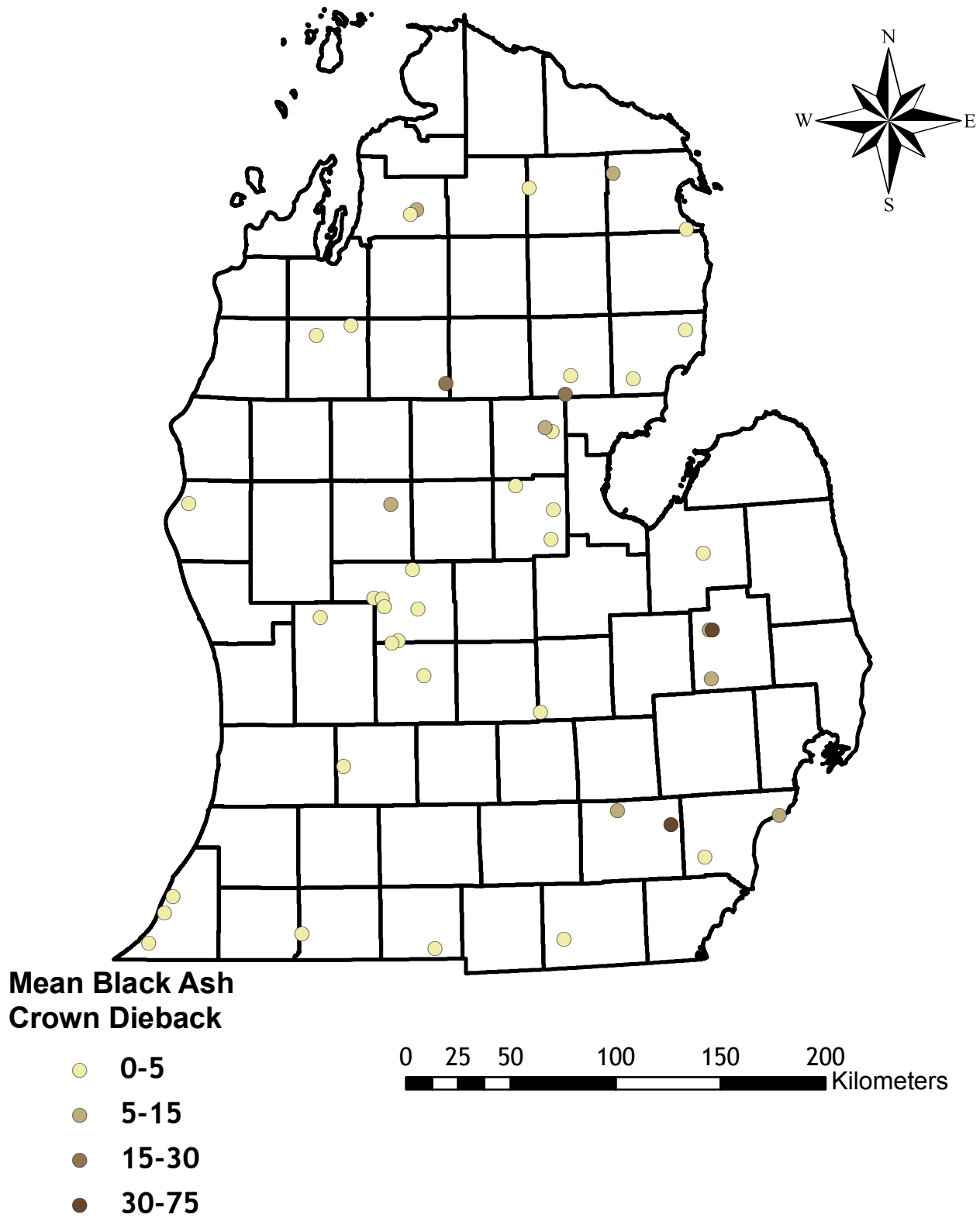
Black Ash Crown Density



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

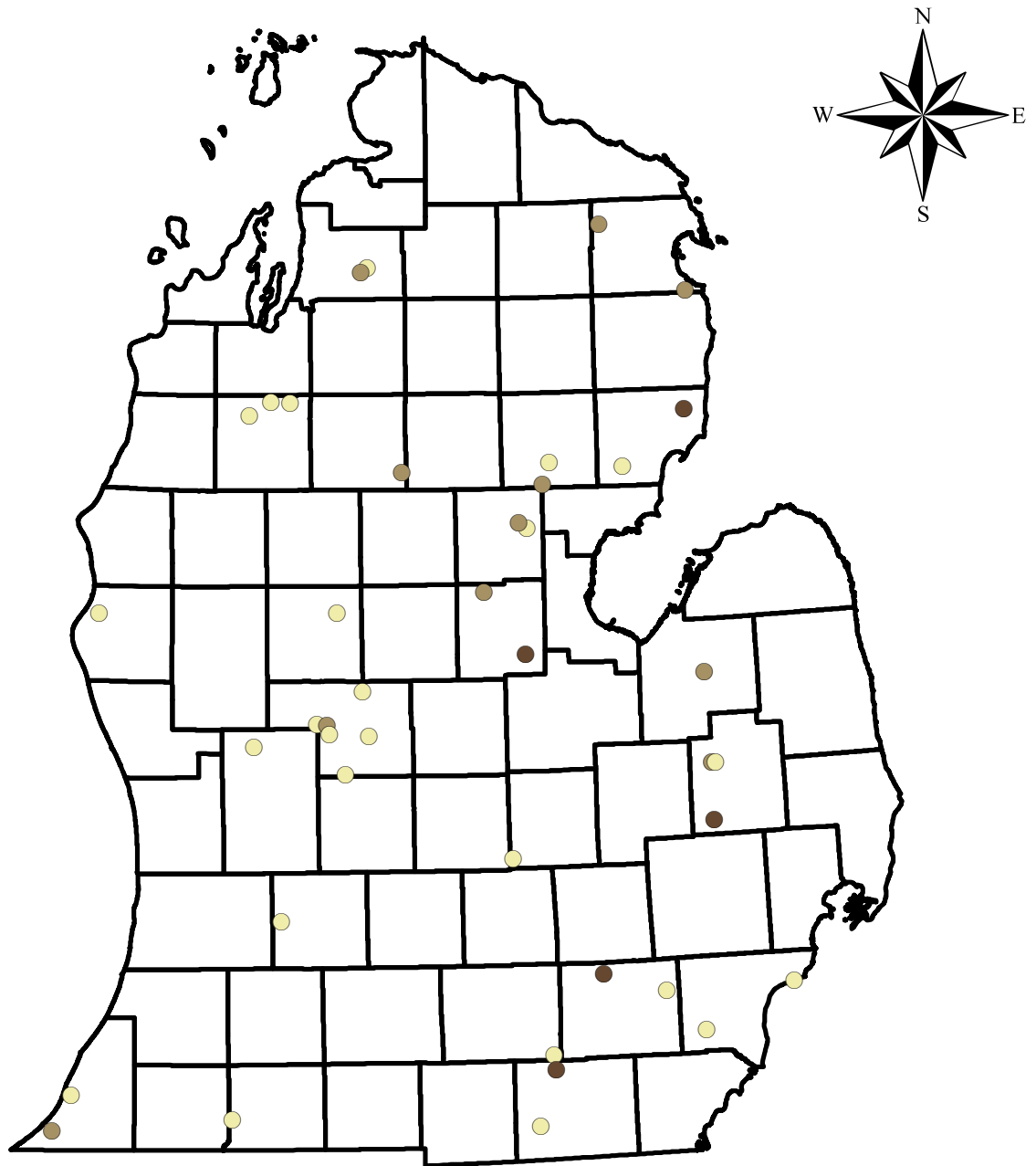
NDW April 2009

Black Ash Crown Dieback



Source: Michigan Geographic Data Library
U of M School of Natural Resources and Environment NDW April 2009

Black Ash Crown Light Exposure



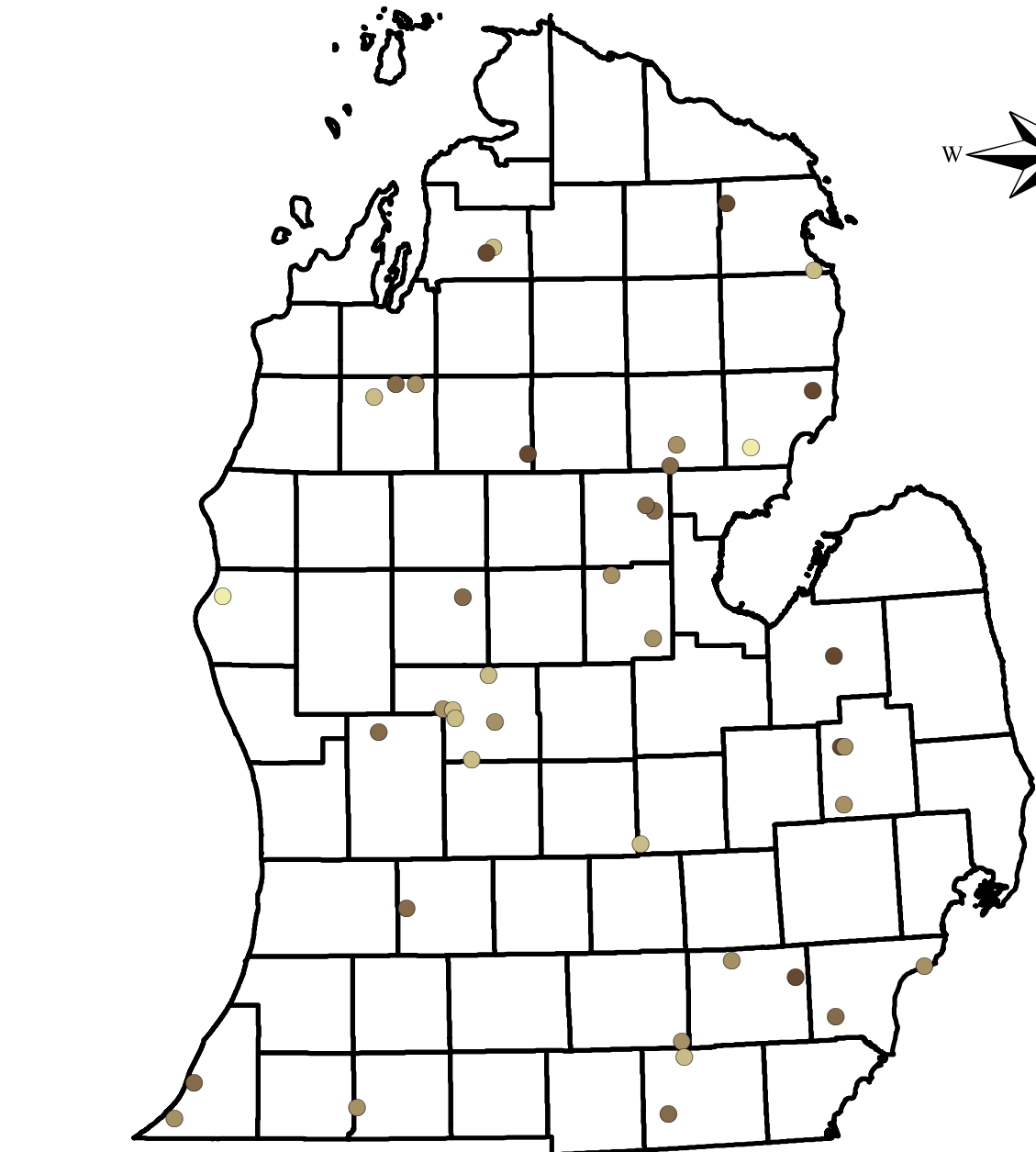
**Mean Black Ash
Crown Light Exposure**

- 1
- 2
- 3

0 25 50 100 150 200
Kilometers

Source: Michigan Geographic Data Library
U of M School of Natural Resources and Environment NDW April 2009

Black Ash Diameter at Breast Height



Mean Black Ash
DBH (cm)

- 5-8
- 8-12
- 12-14
- 14-16
- 16-28

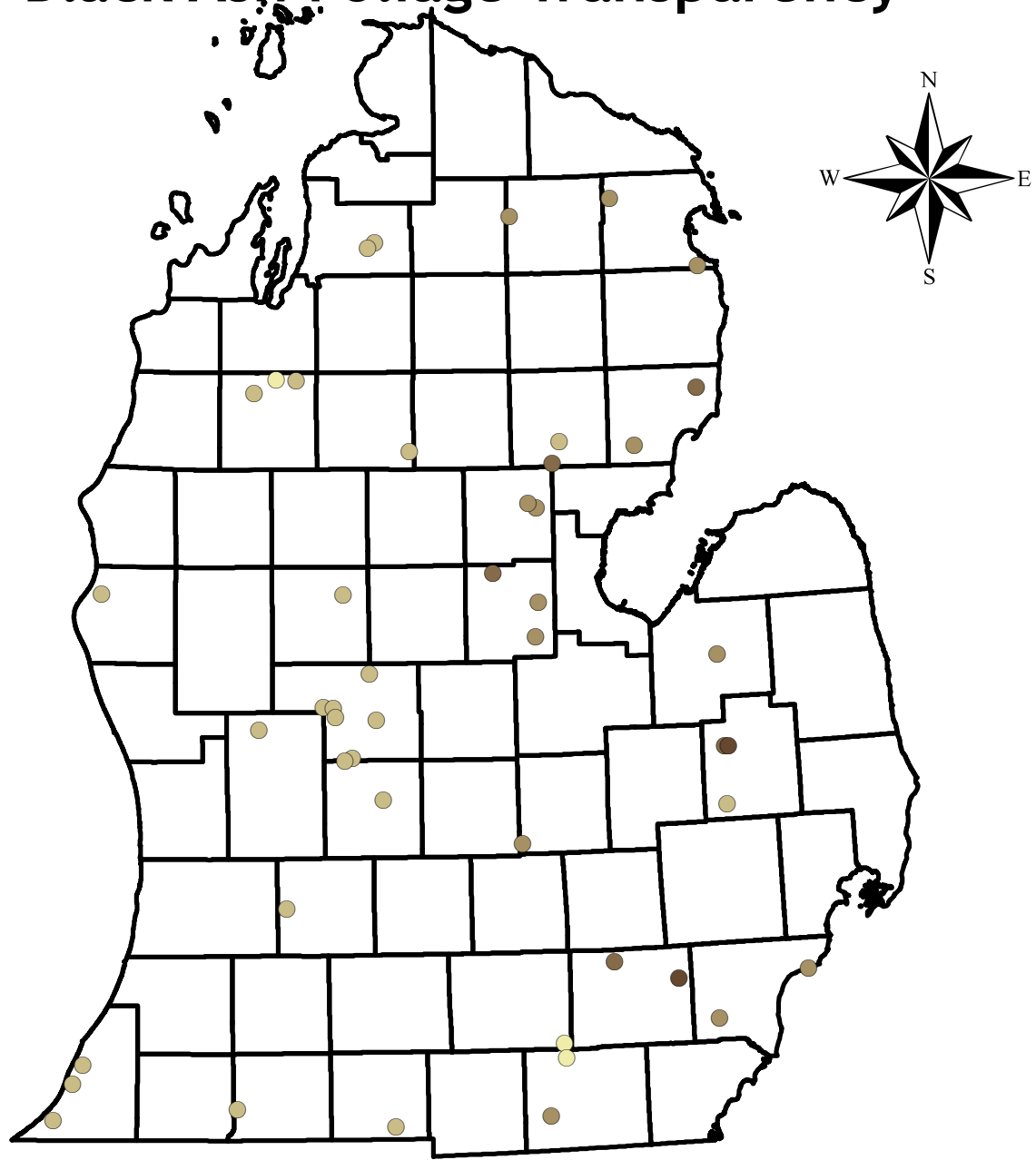
0 25 50 100 150 200 Kilometers

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

NDW

April 2009

Black Ash Foliage Transparency

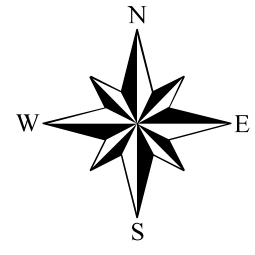
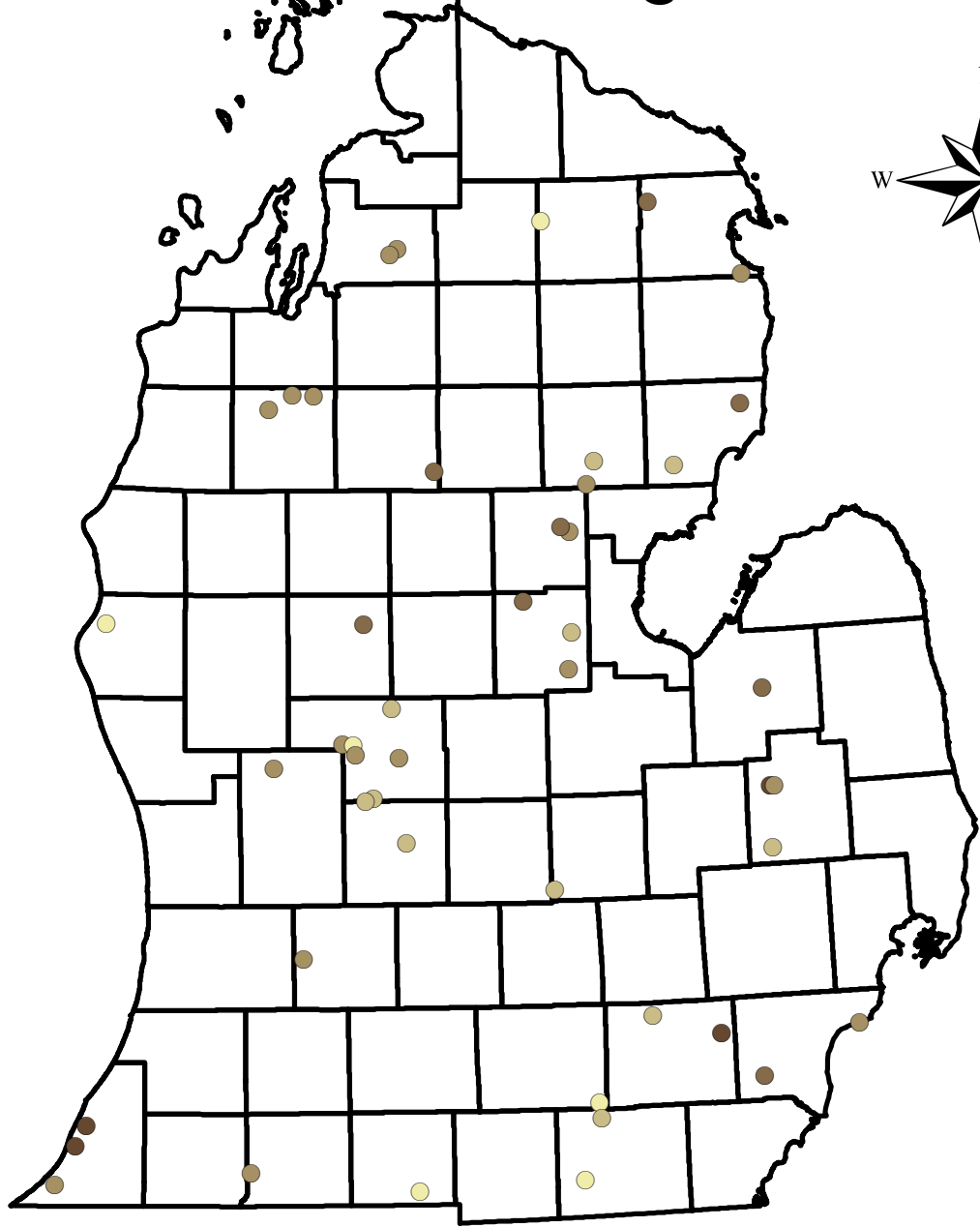


**Mean Black Ash
Foliage Transparency**

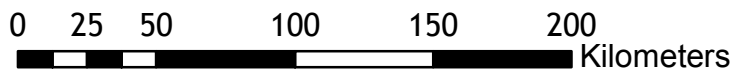
0 25 50 100 150 200
Kilometers

- 7-10
- 10-23
- 23-30
- 30-42
- 42-70

Black Ash Height

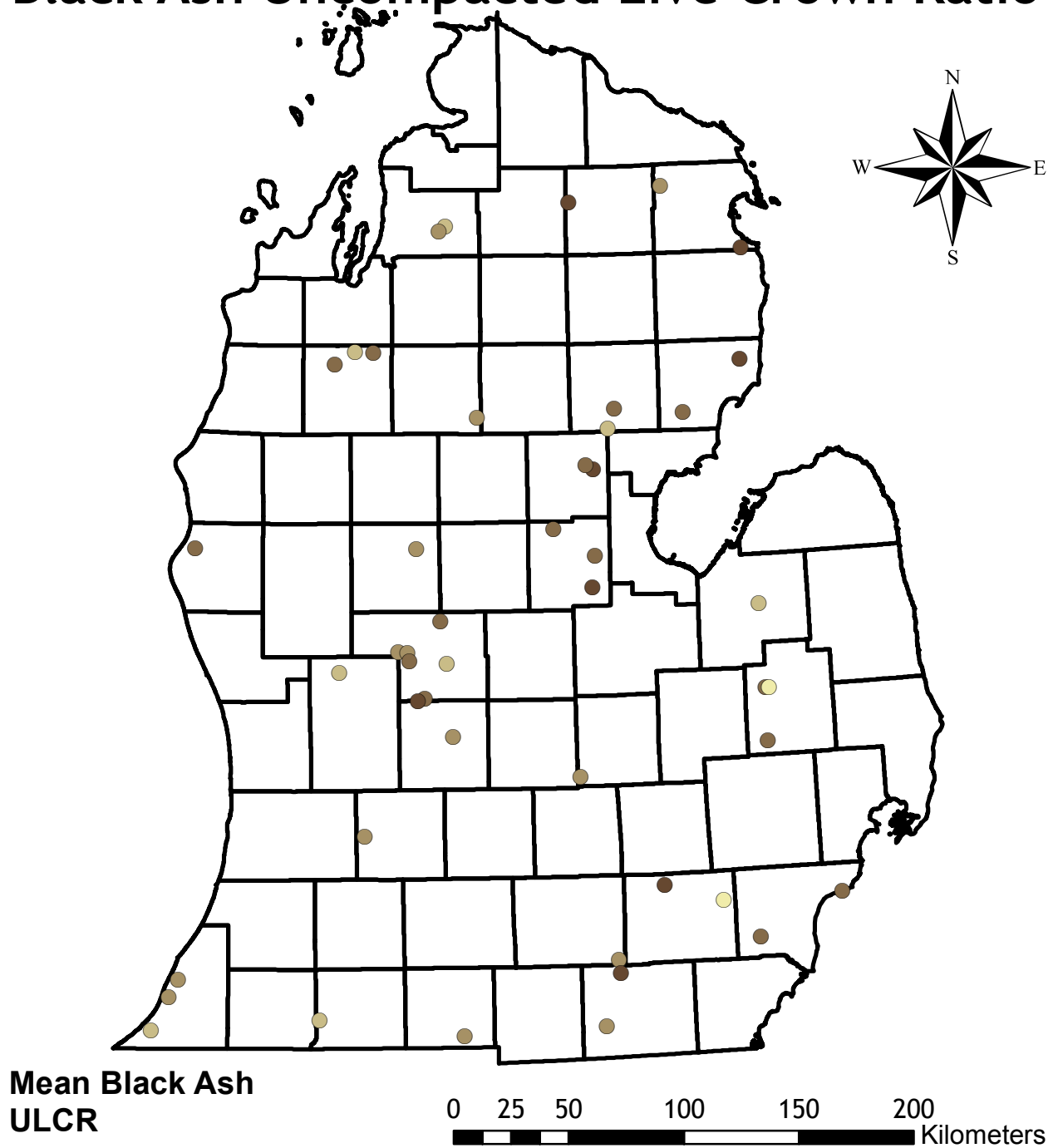


**Mean Black Ash
Height (feet)**



- 23-31
- 31-42
- 42-51
- 51-62
- 62-79

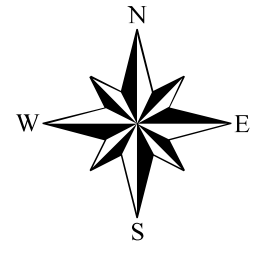
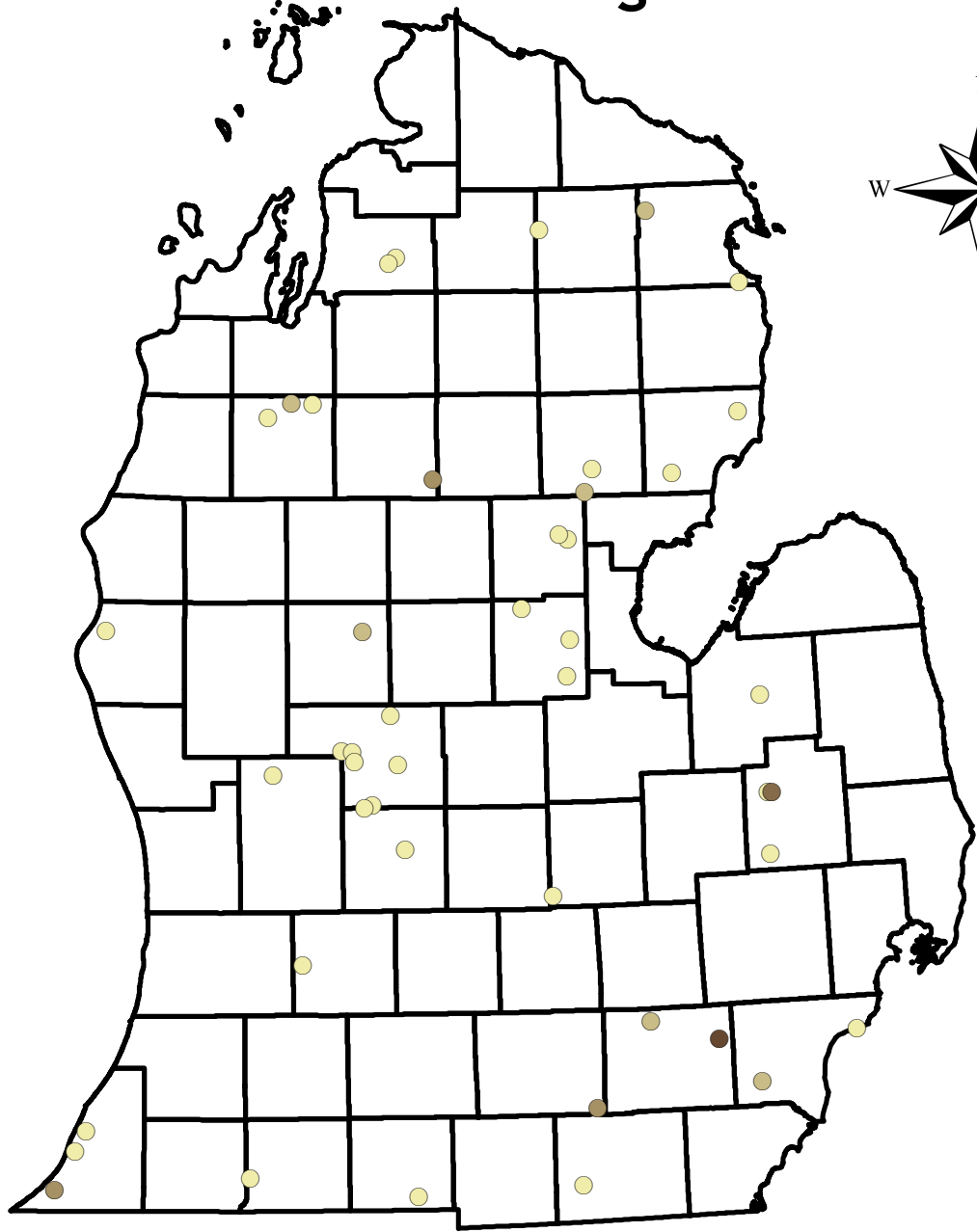
Black Ash Uncompacted Live Crown Ratio



Mean Black Ash
ULCR

- 10-15
- 15-39
- 39-47
- 47-55
- 55-71

Black Ash Vigor



Mean Black Ash Vigor

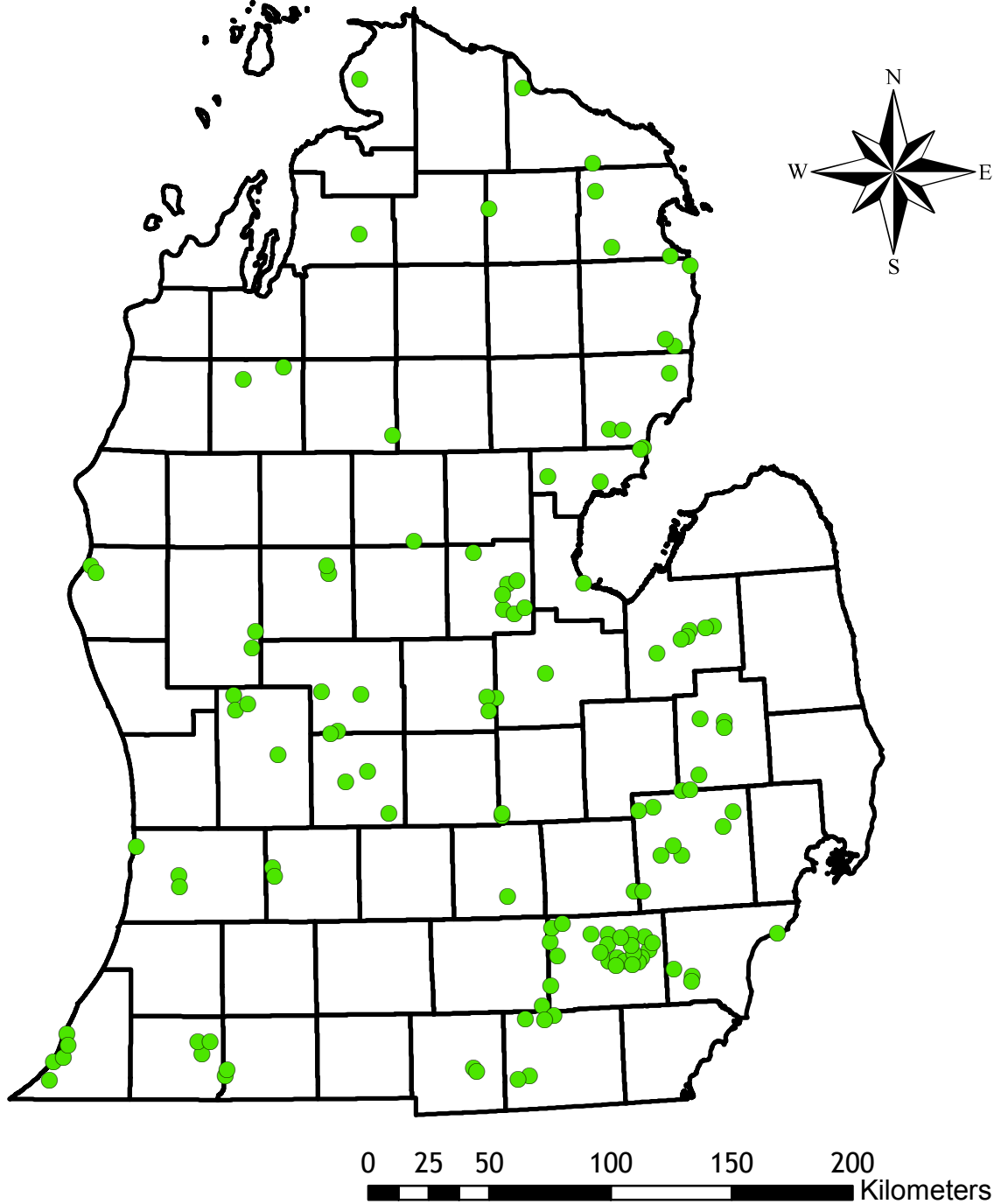
0 25 50 100 150 200 Kilometers

- 1
- 2
- 3
- 4
- 5

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

NDW April 2009

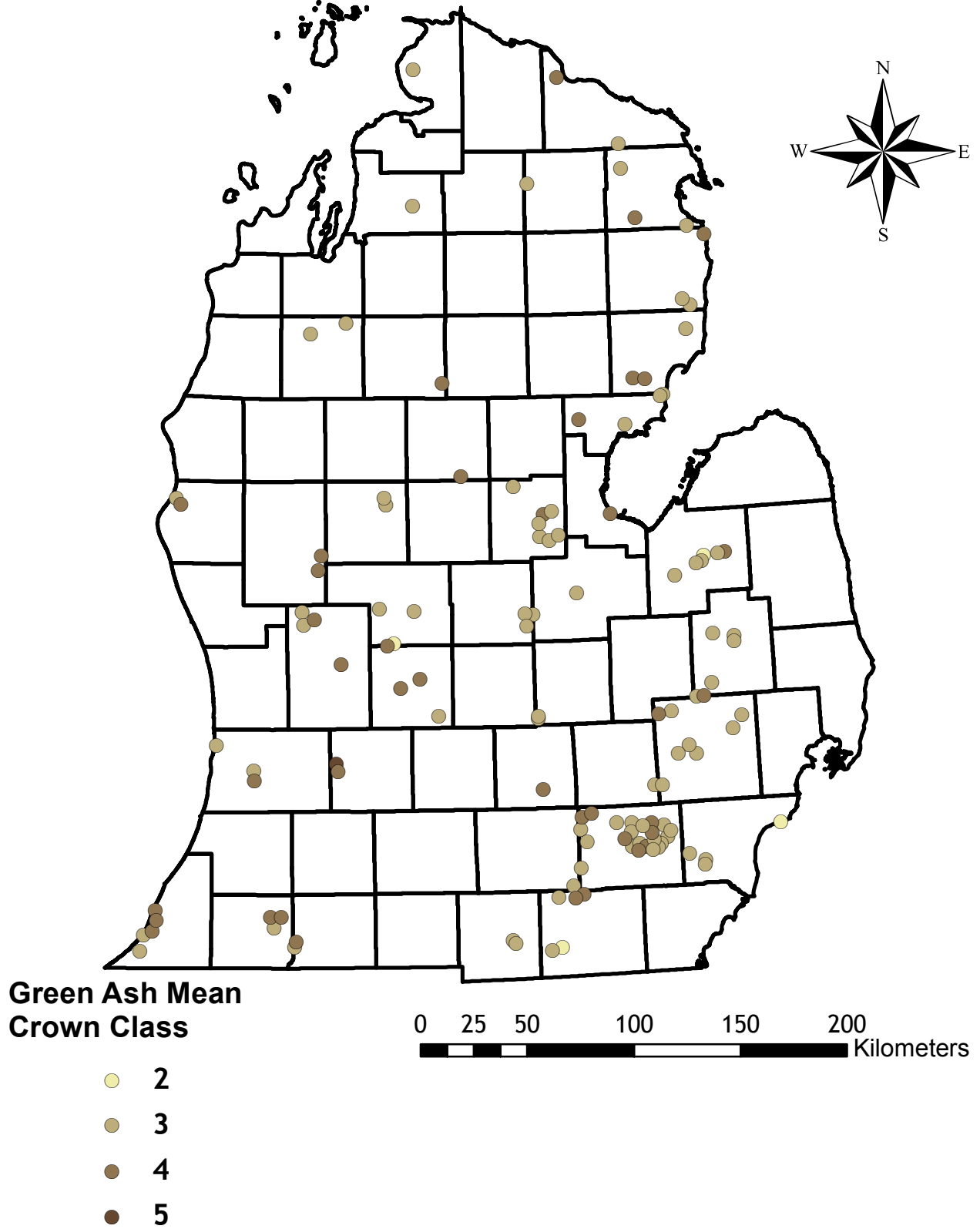
Green Ash Plots



Key

- Plots with Green Ash

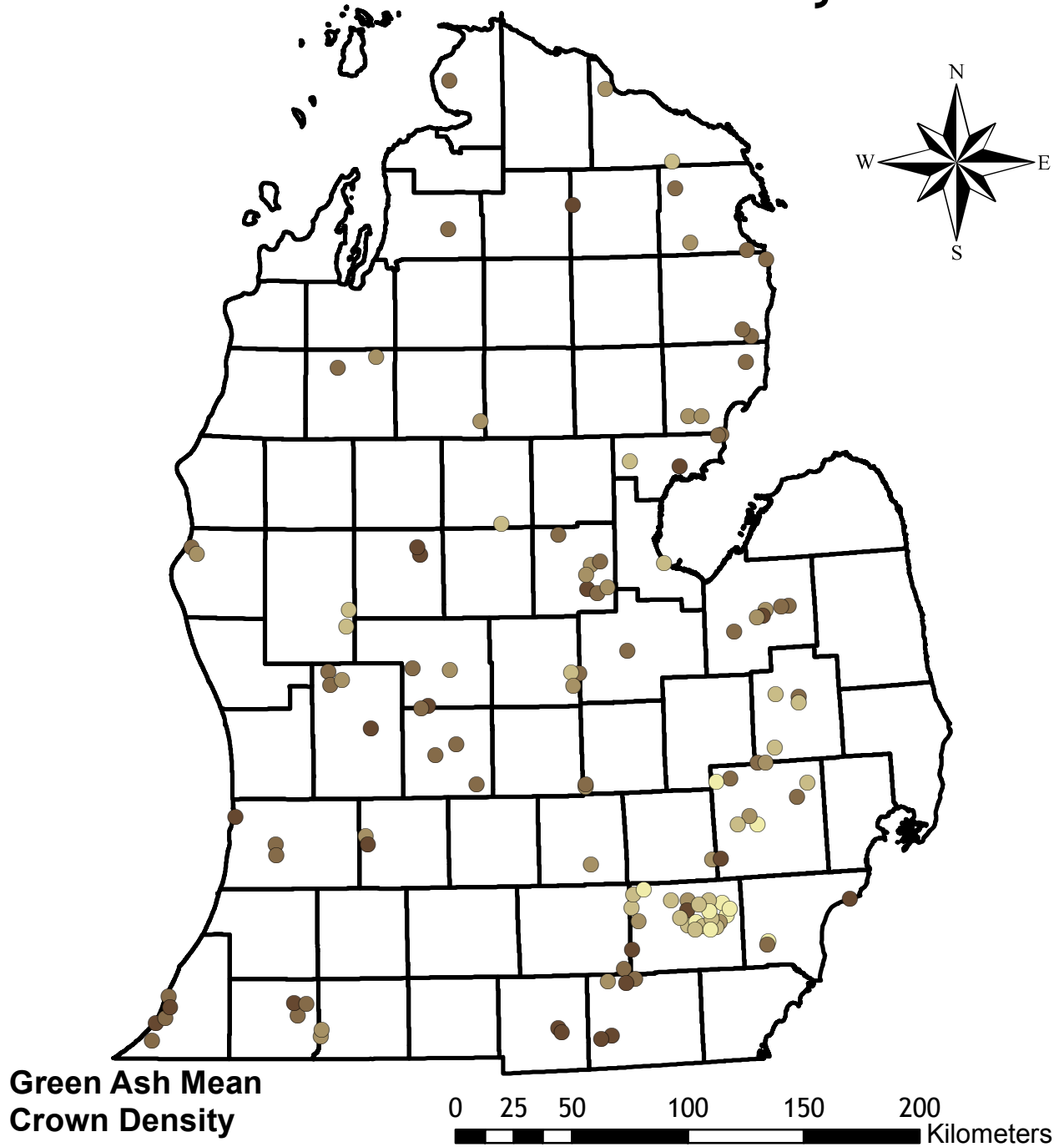
Green Ash Crown Class



Source: Michigan Geographic Data Library
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Green Ash Crown Density



**Green Ash Mean
Crown Density**

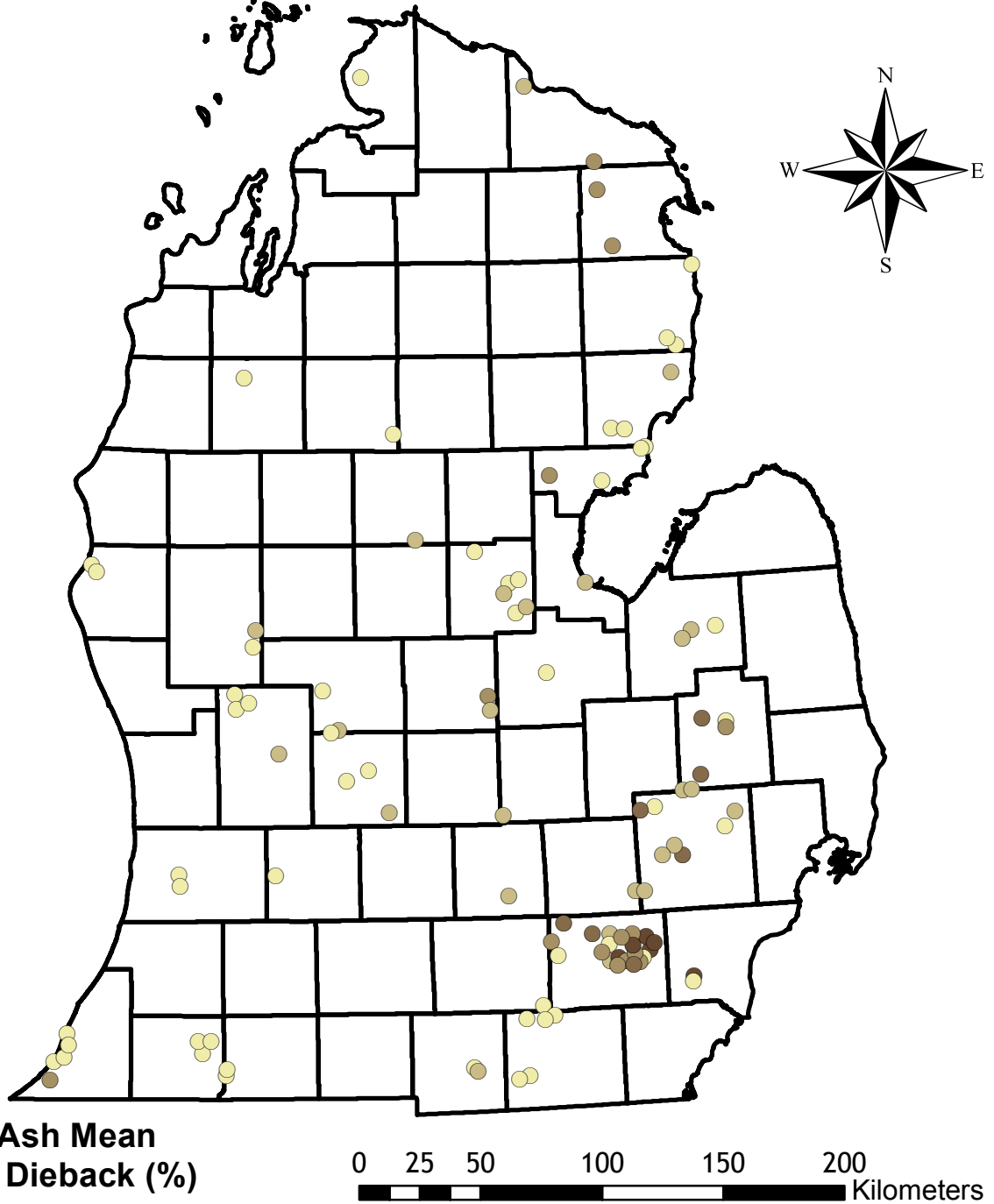
- 7-26
- 26-40
- 40-48
- 48-55
- 55-65

Source: Michigan Geographic Data Library

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Green Ash Crown Dieback



**Green Ash Mean
Crown Dieback (%)**

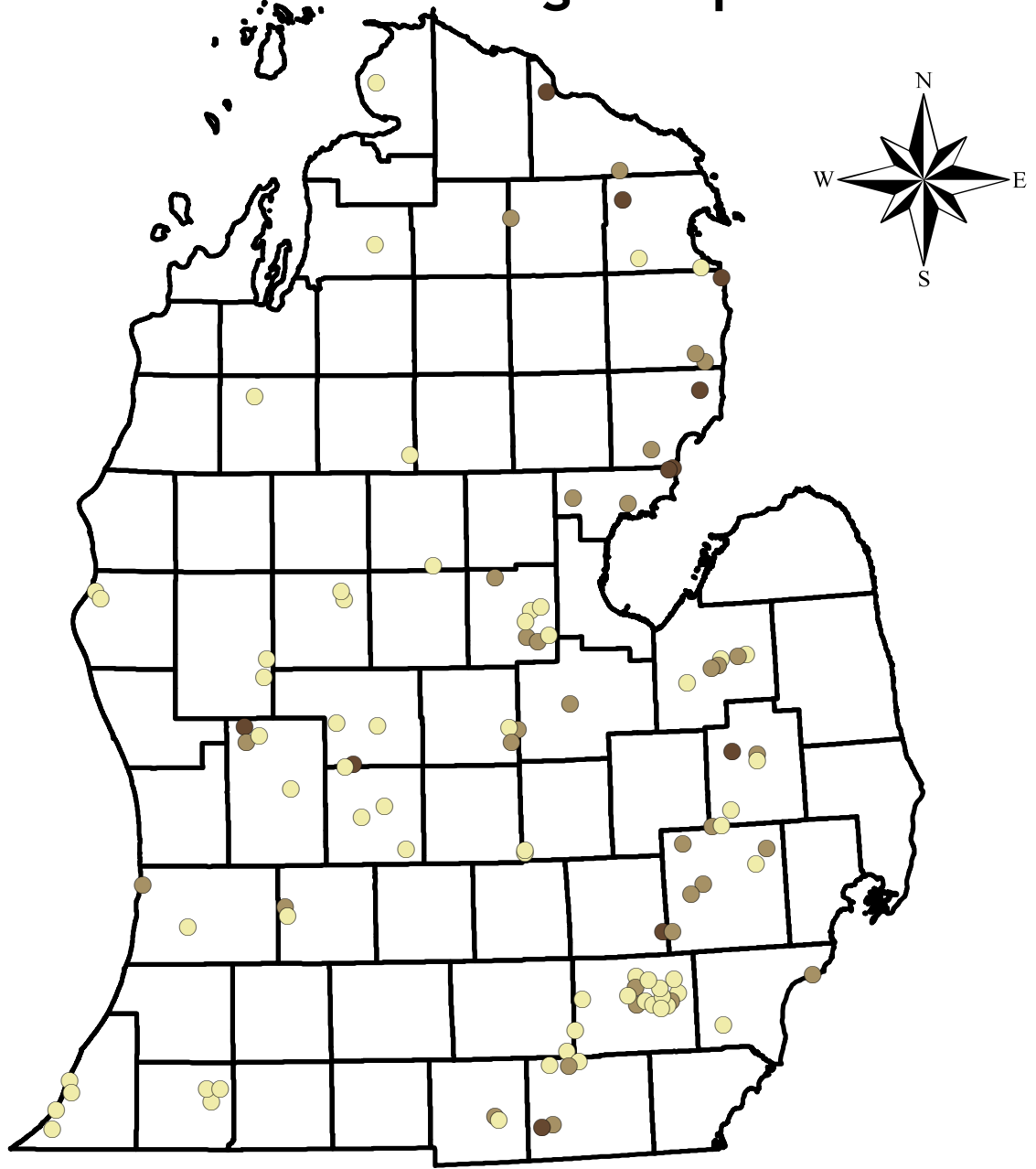
0 25 50 100 150 200
Kilometers

- 1-7
- 7-19
- 19-37
- 37-52
- 52-82

Source: Michigan Geographic Data Library

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Green Ash Crown Light Exposure



**Green Ash Mean
Light Exposure**

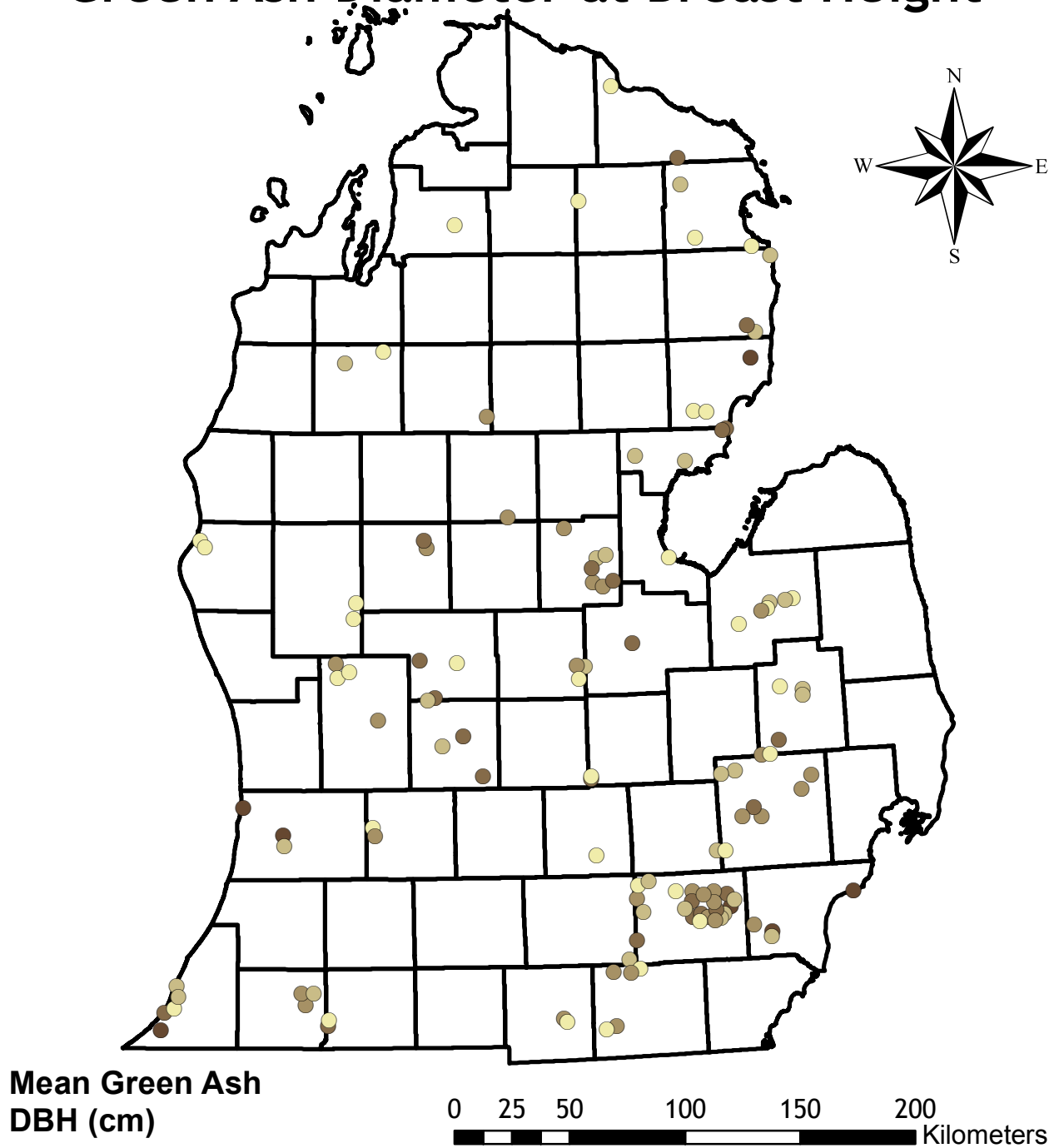
0 25 50 100 150 200
Kilometers

- 1
- 2
- 3

Source: Michigan Geographic Data Library
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Green Ash Diameter at Breast Height



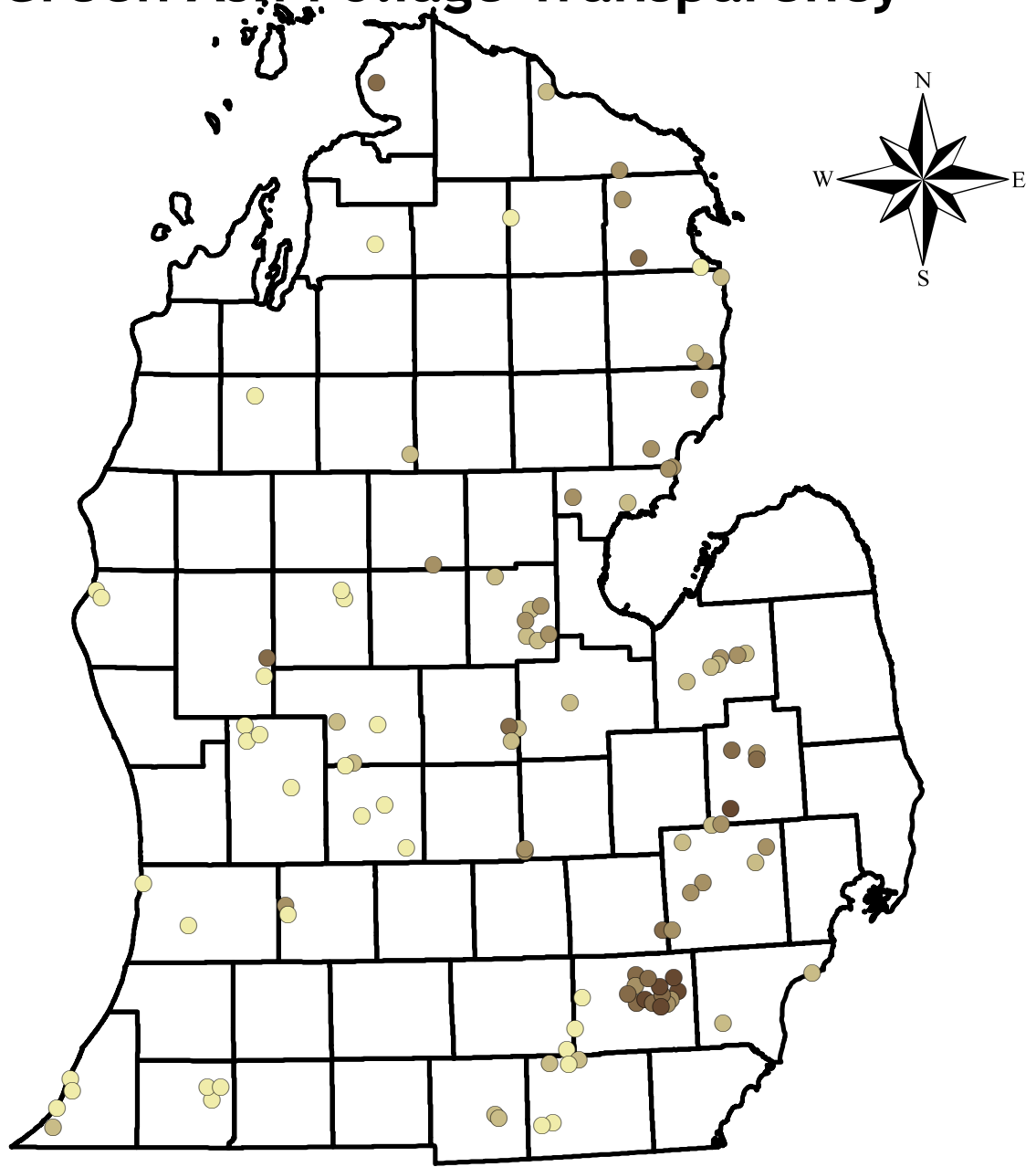
- 7-12
- 12-16
- 16-22
- 22-30
- 30-42

Source: Michigan Geographic Data Library

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Green Ash Foliage Transparency



**Mean Green Ash
Foliage Transparency**

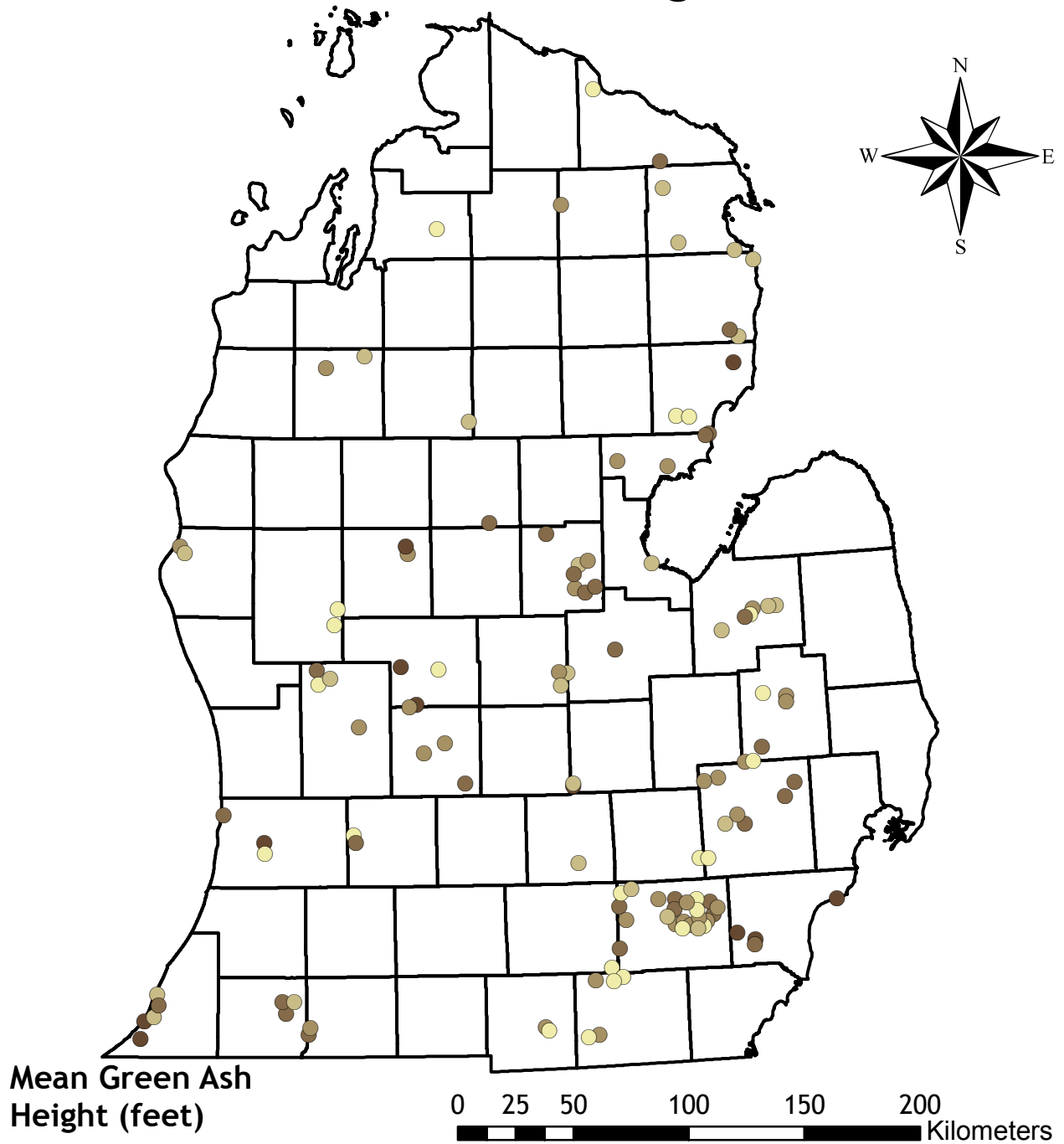
0 25 50 100 150 200
Kilometers

- 15-22
- 22-28
- 28-37
- 37-60
- 60-90

Source: Michigan Geographic Data Library

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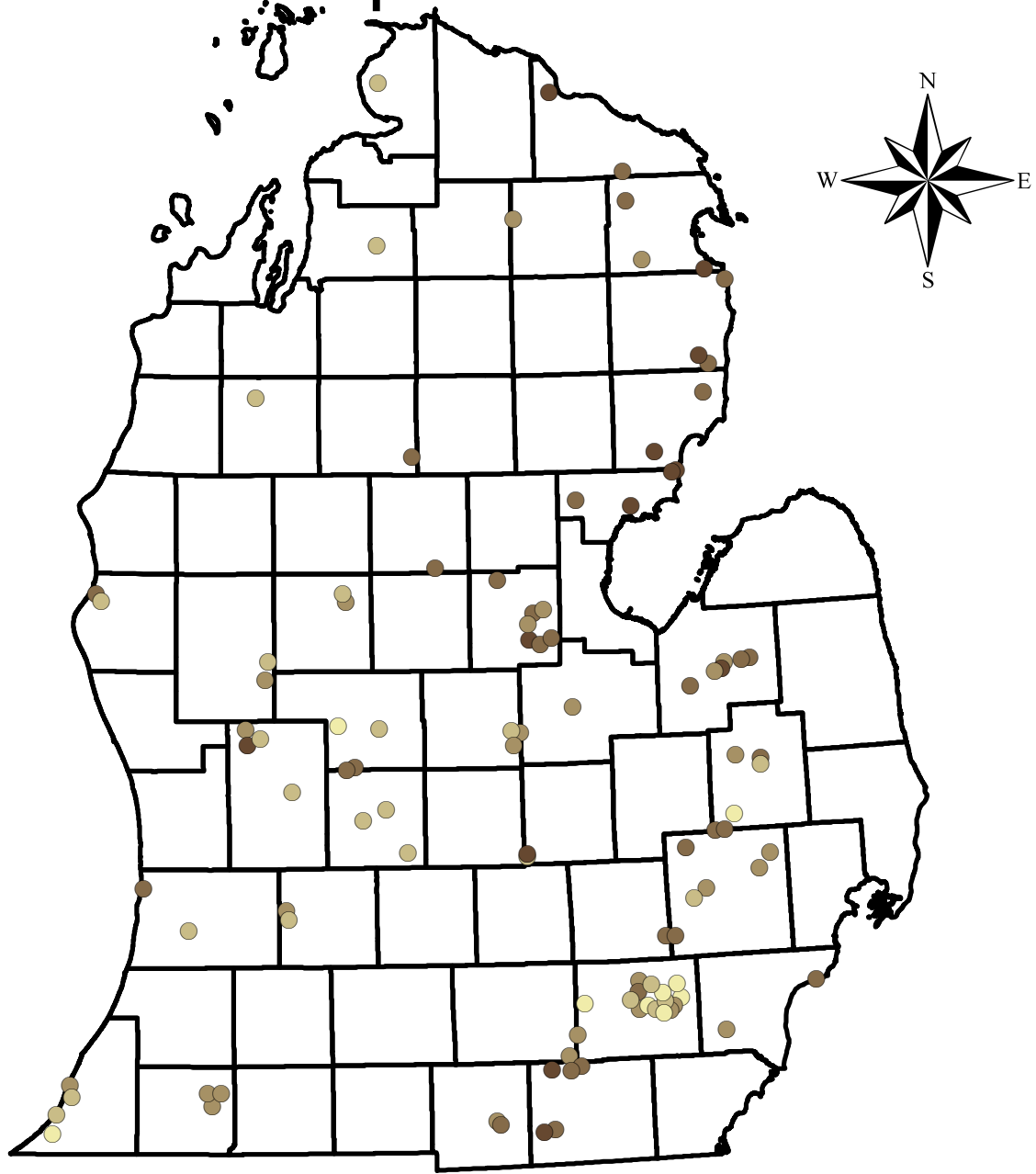
Green Ash Height



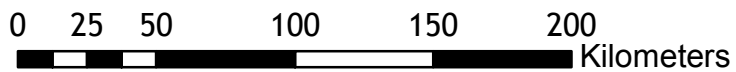
- 26-37
- 37-47
- 47-58
- 58-75
- 75-105

Source: Michigan Geographic Data Library
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Green Ash Uncompacted Live Crown Ratio



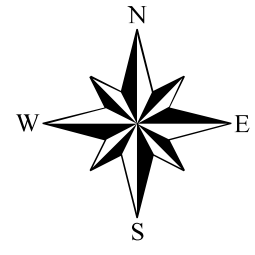
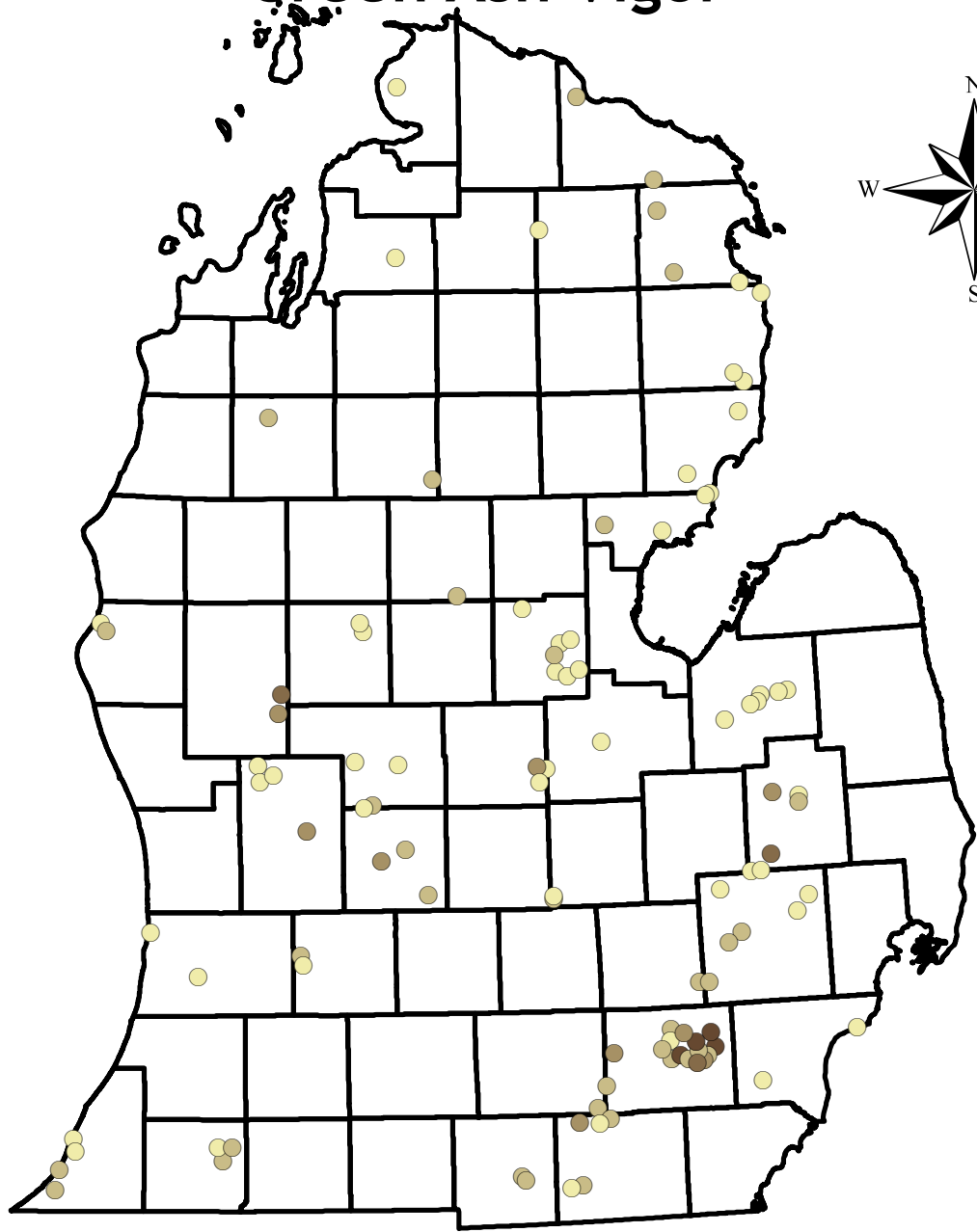
**Mean Green Ash
ULCR**



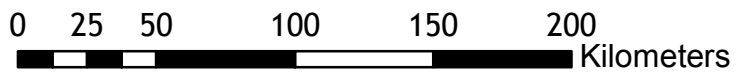
- 13-27
- 27-39
- 39-49
- 49-59
- 59-72

Source: Michigan Geographic Data Library
U of M School of Natural Resources and Environment NDW May 2009

Green Ash Vigor



Mean Green Ash Vigor



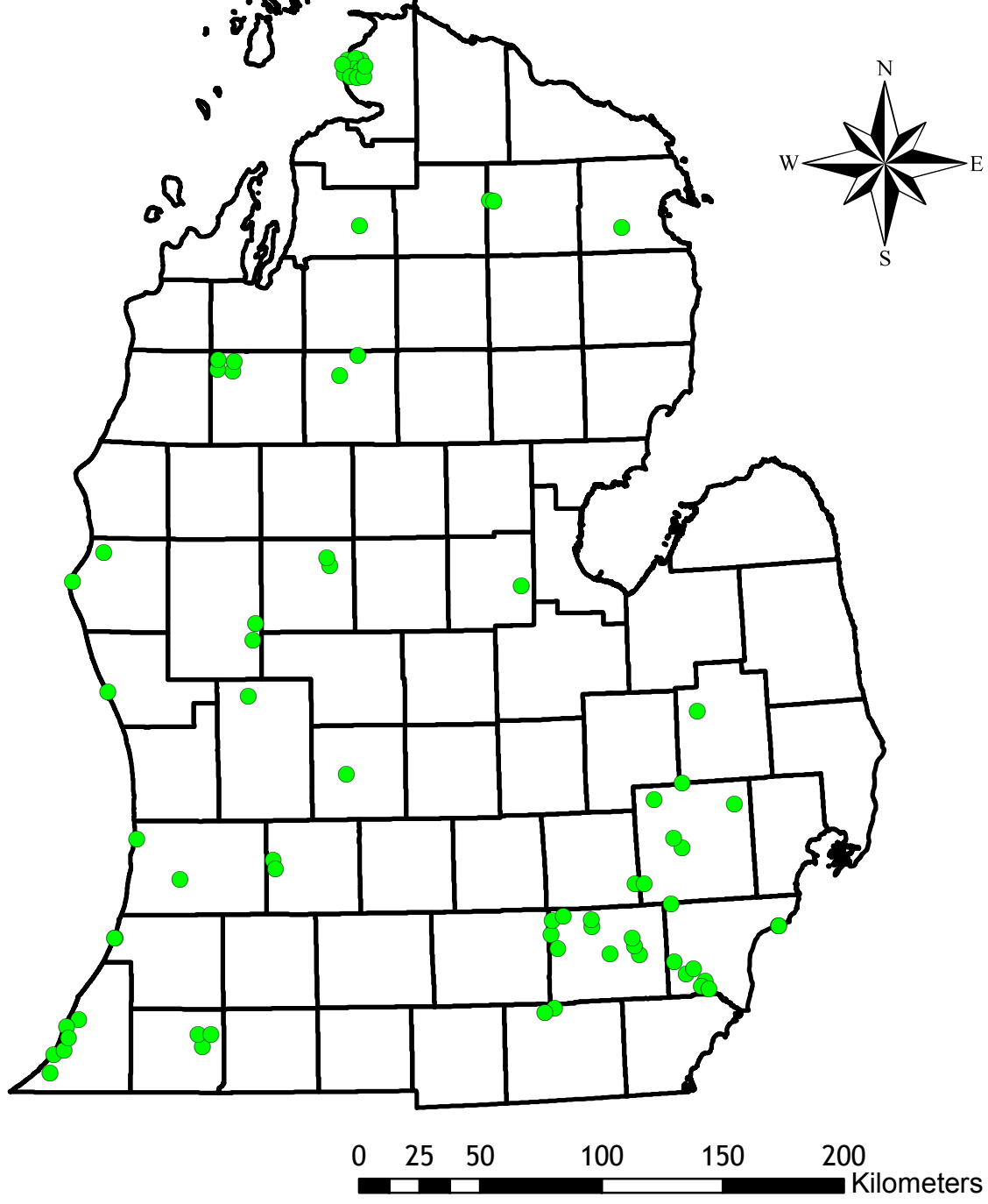
- 1
- 2
- 3
- 4
- 5-6

Source: Michigan Geographic Data Library

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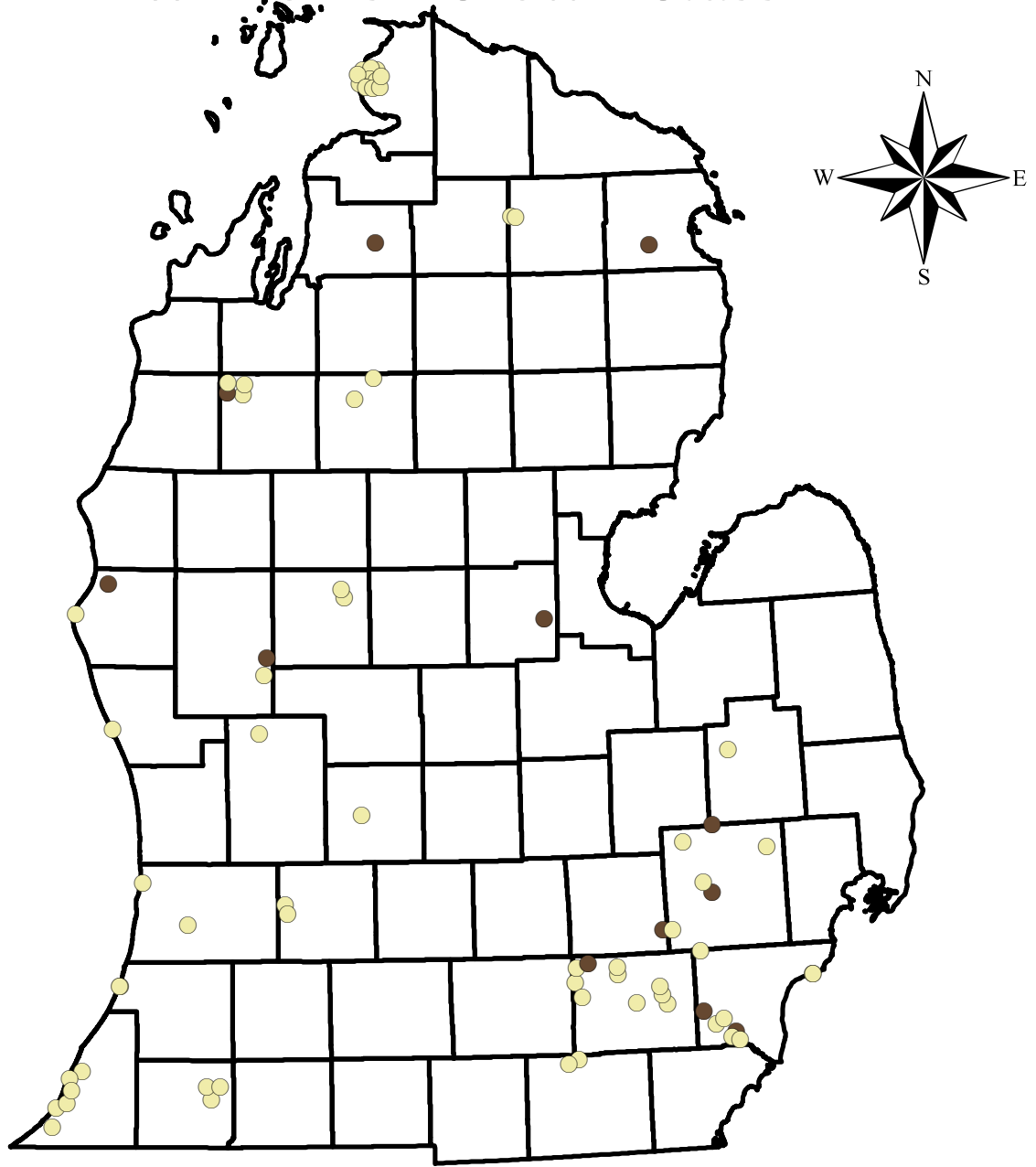
White Ash Plots



Key

● Plots with White Ash

White Ash Crown Class

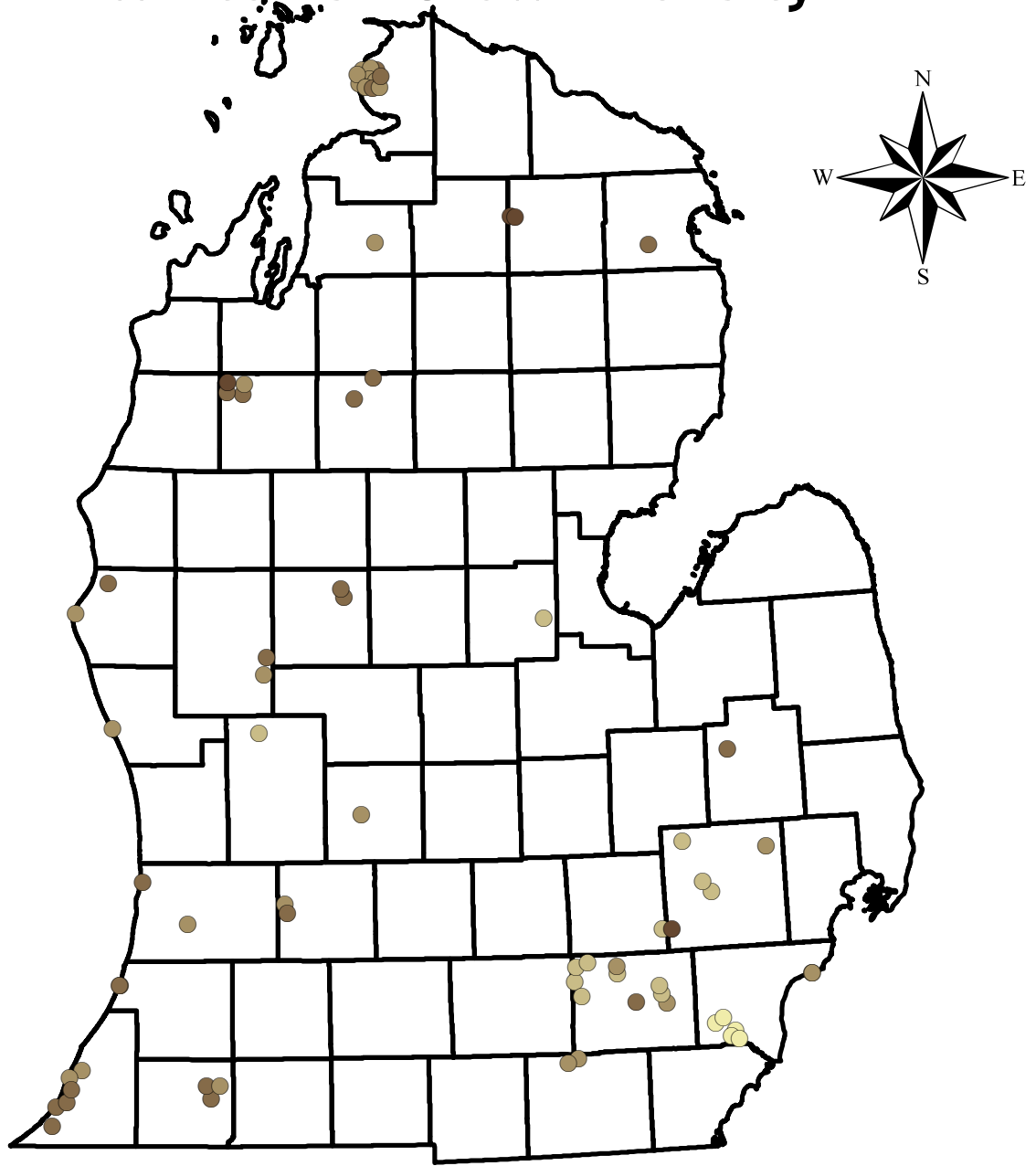


**Mean White Ash
Crown Class**

0 25 50 100 150 200
Kilometers

- 3
- 4

White Ash Crown Density



**Mean White Ash
Crown Density**

0 25 50 100 150 200
Kilometers

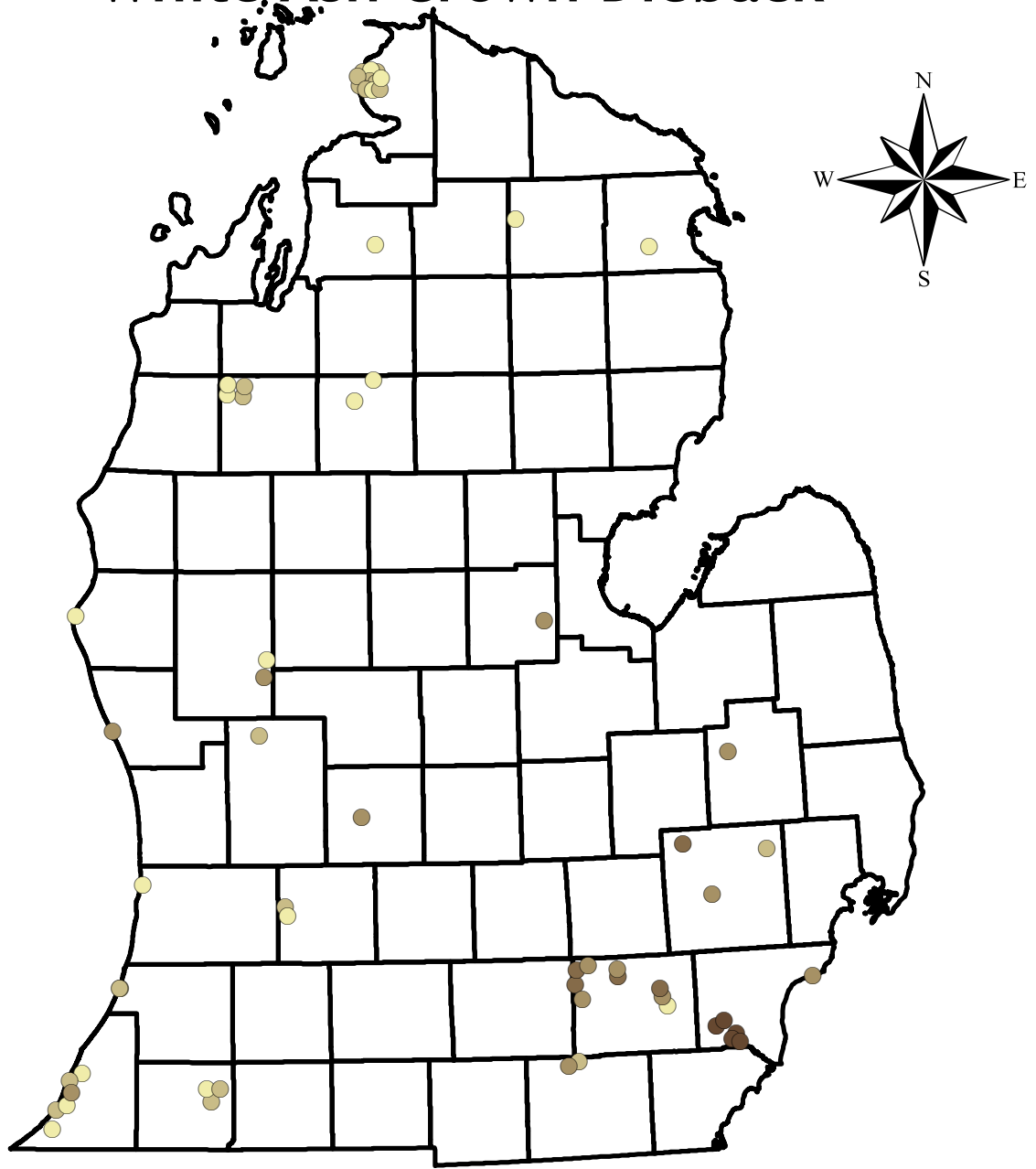
- 2-18
- 18-42
- 42-51
- 51-60
- 60-76

Source: Michigan Geographic Data Library

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White Ash Crown Dieback



**Mean White Ash
Crown Dieback**

0 25 50 100 150 200
Kilometers

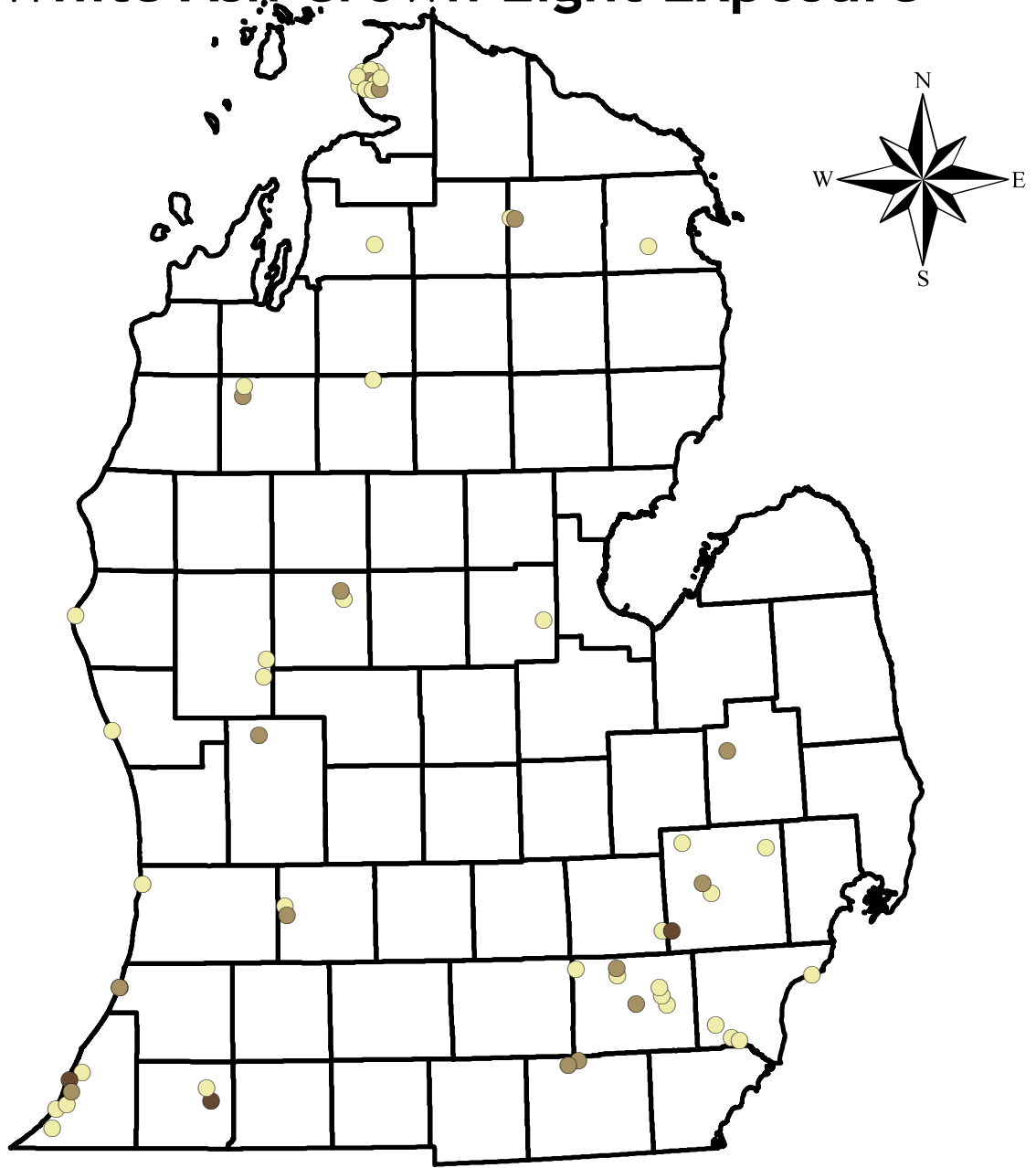
- 0-3
- 3-13
- 13-28
- 28-53
- 53-99

Source: Michigan Geographic Data Library

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White Ash Crown Light Exposure



**Mean White Ash
Crown Light Exposure**

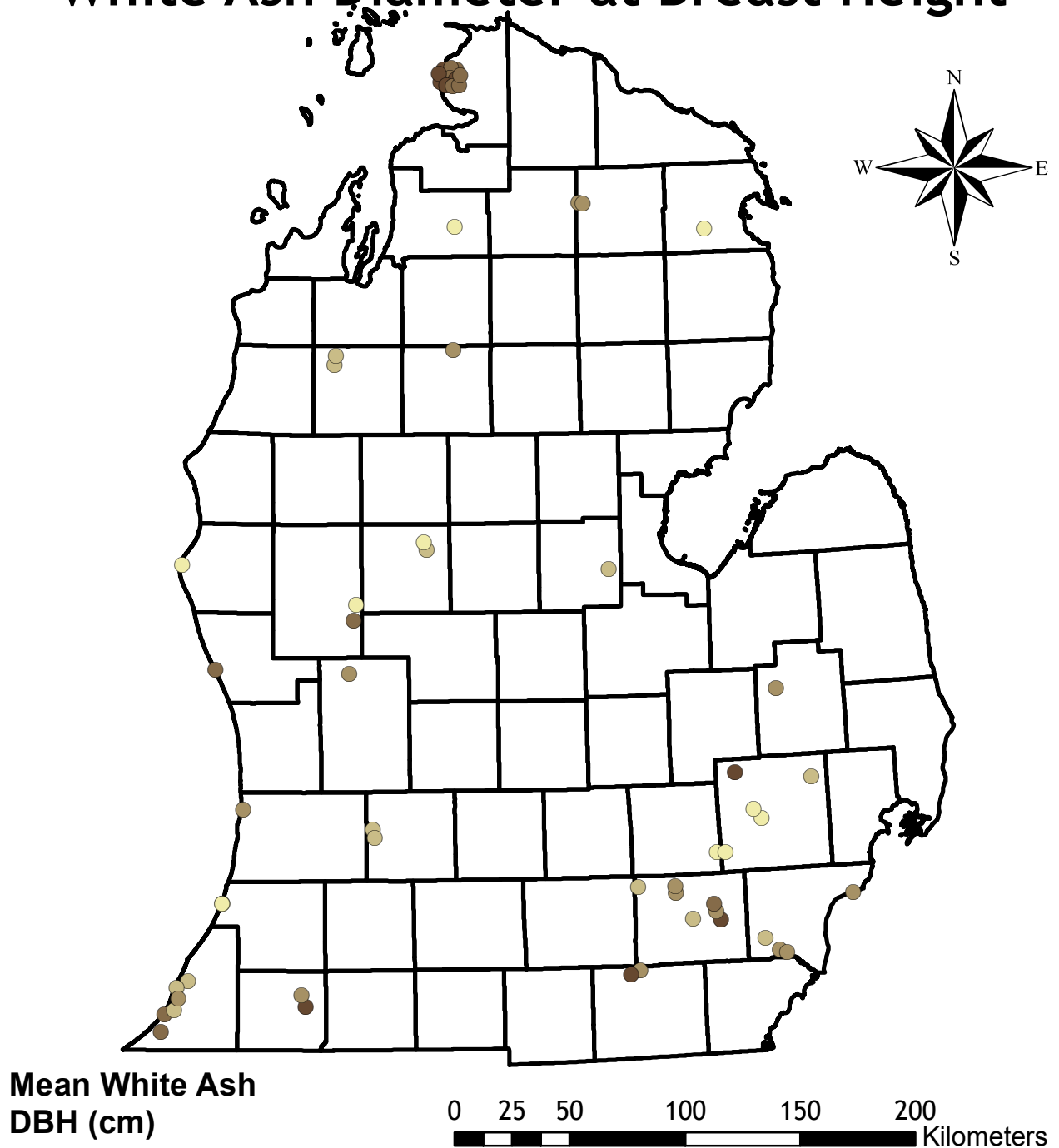
0 25 50 100 150 200
Kilometers

- 1
- 2
- 3

Source: Michigan Geographic Data Library
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White Ash Diameter at Breast Height



Mean White Ash
DBH (cm)

0 25 50 100 150 200
Kilometers

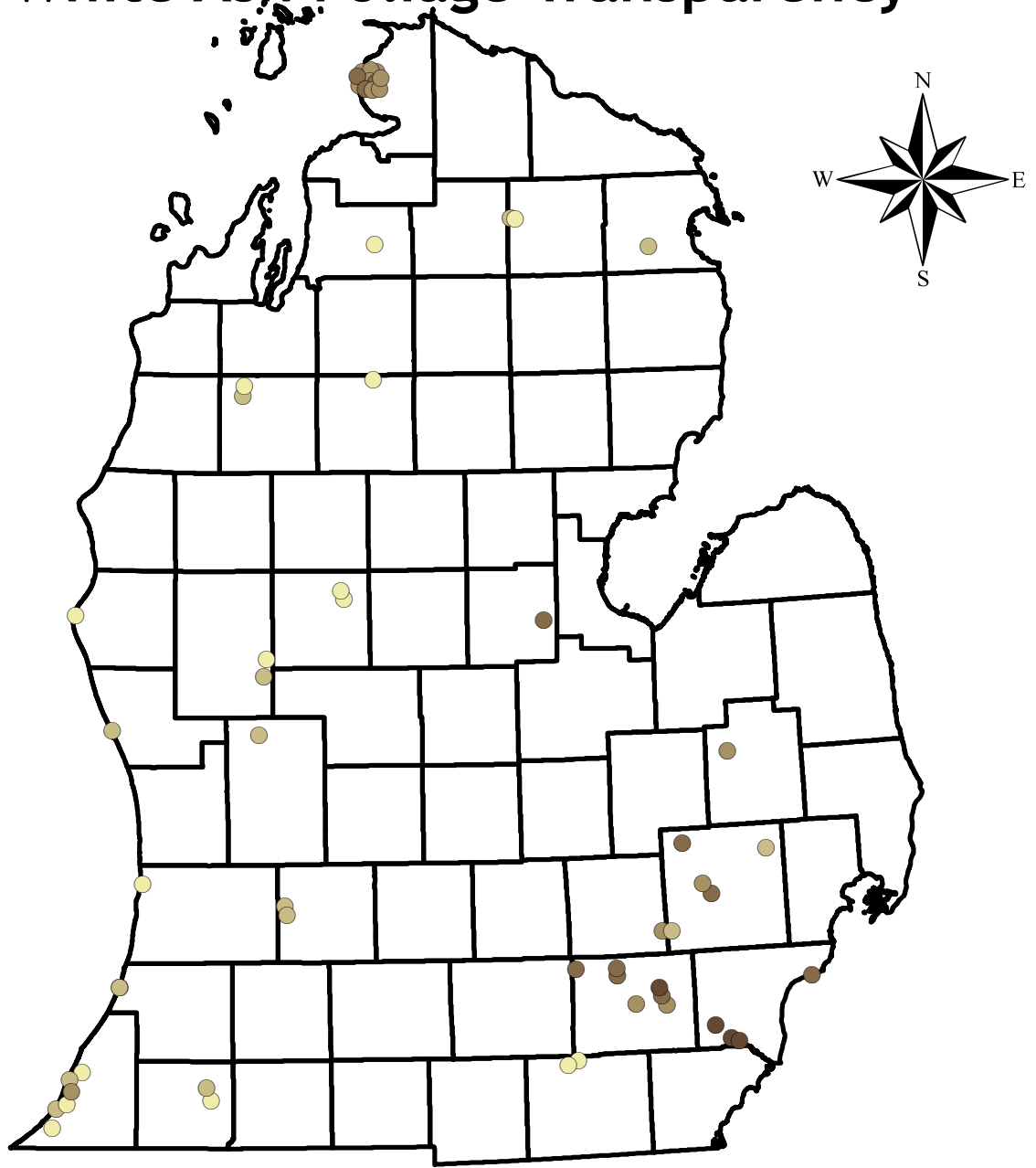
- 8-15
- 15-22
- 22-29
- 29-38
- 38-51

Source: Michigan Geographic Data Library

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White Ash Foliage Transparency



**Mean White Ash
Foliage Transparency**

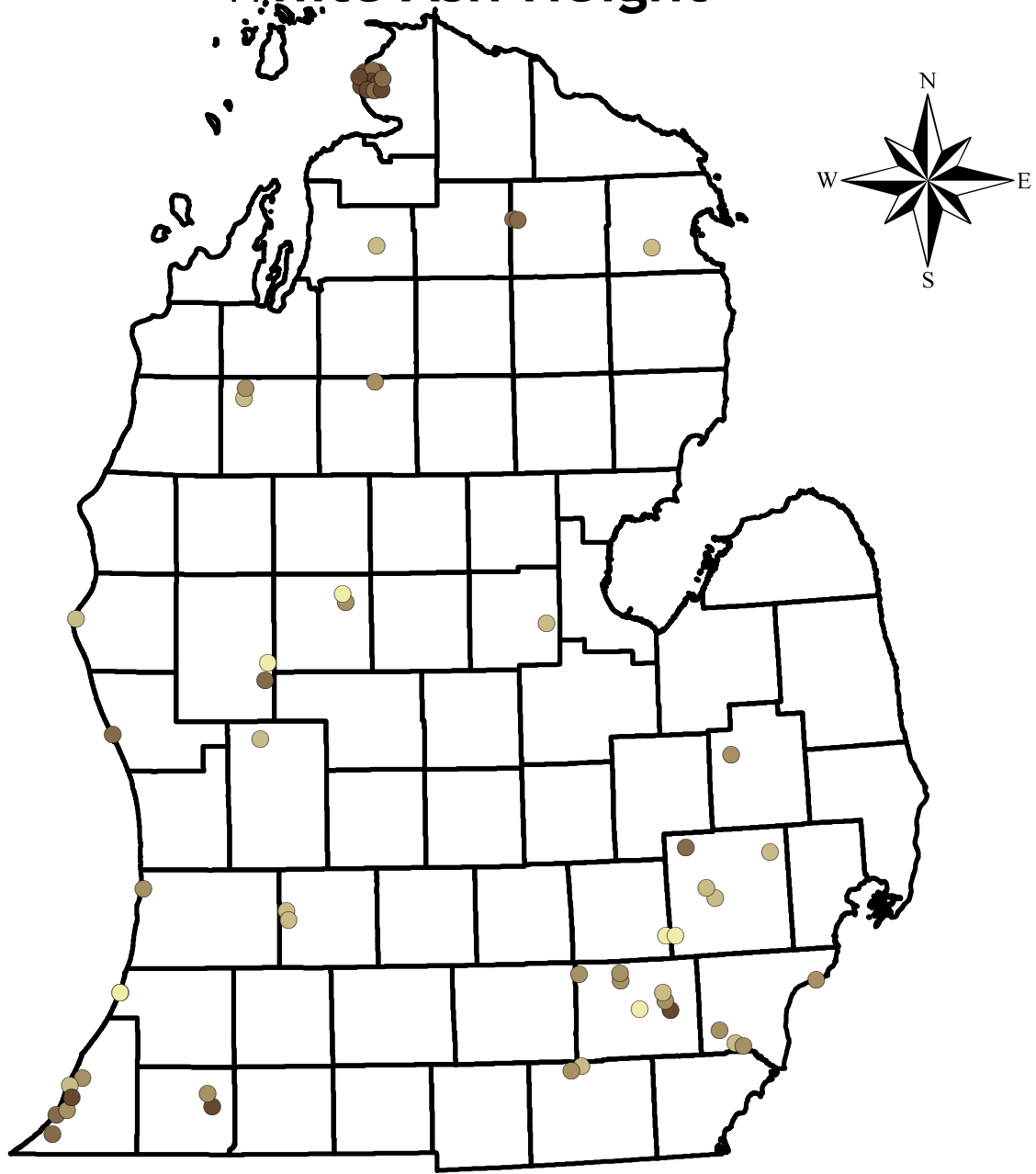
0 25 50 100 150 200
Kilometers

- 15-20
- 20-28
- 28-38
- 38-55
- 55-97

Source: Michigan Geographic Data Library

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White Ash Height



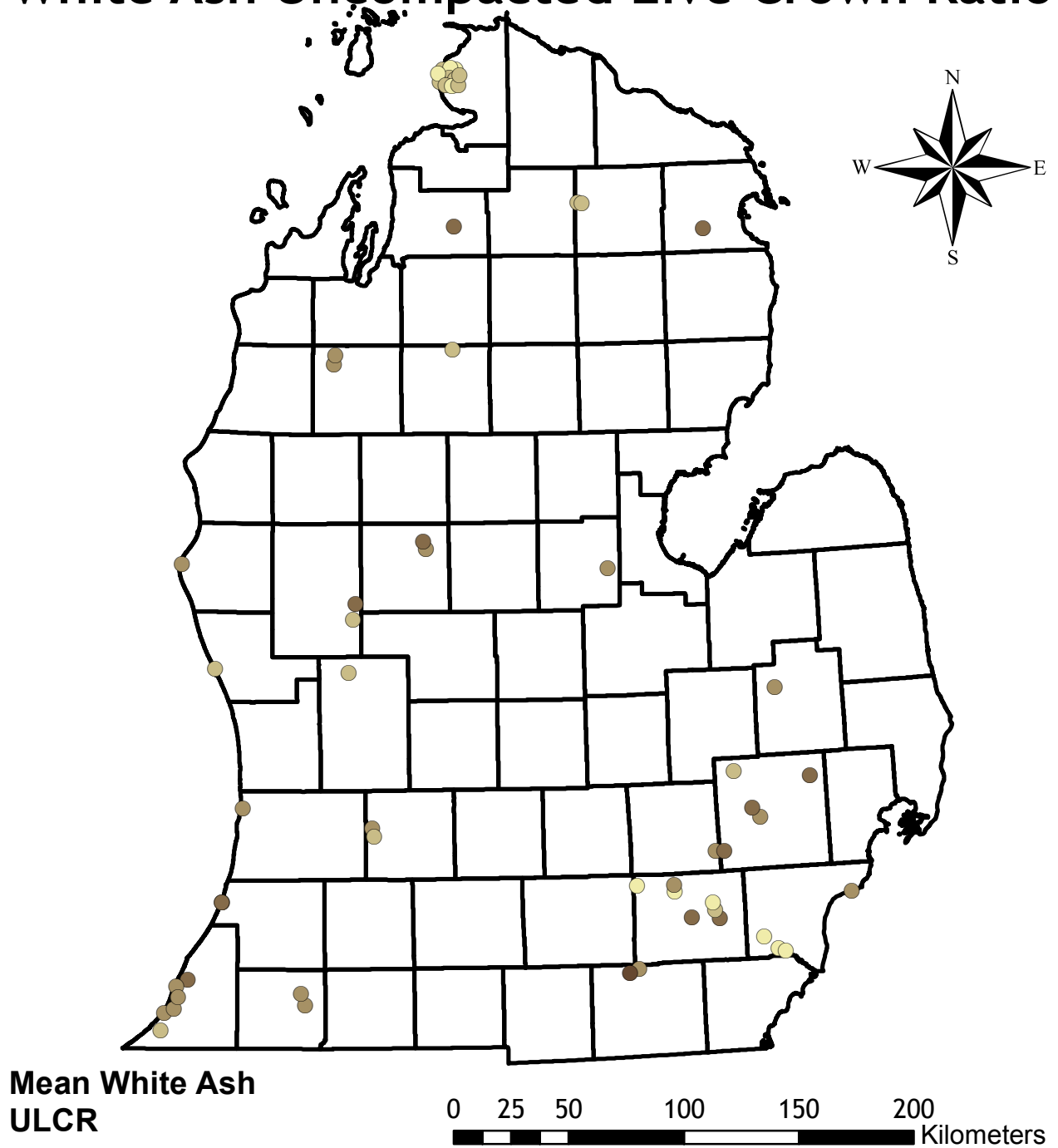
**Mean White Ash
Height (feet)**

0 25 50 100 150 200
Kilometers

- 29-40
- 40-57
- 57-75
- 75-94
- 94-109

Source: Michigan Geographic Data Library
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White Ash Uncompacted Live Crown Ratio



Mean White Ash
ULCR

0 25 50 100 150 200
Kilometers

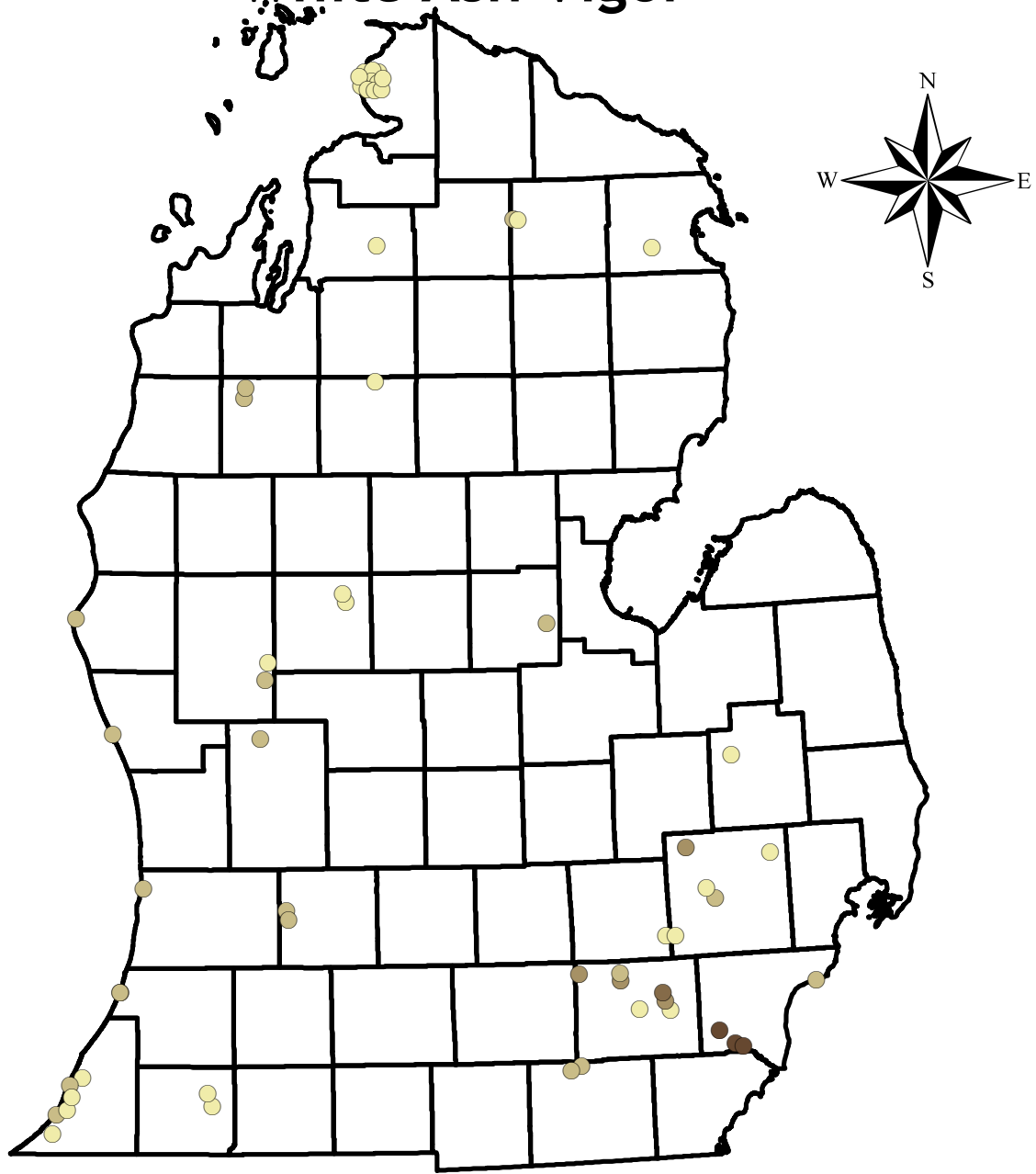
- 1-21
- 21-34
- 34-45
- 45-60
- 60-80

Source: Michigan Geographic Data Library

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White Ash Vigor



Mean White Ash Vigor

0 25 50 100 150 200 Kilometers

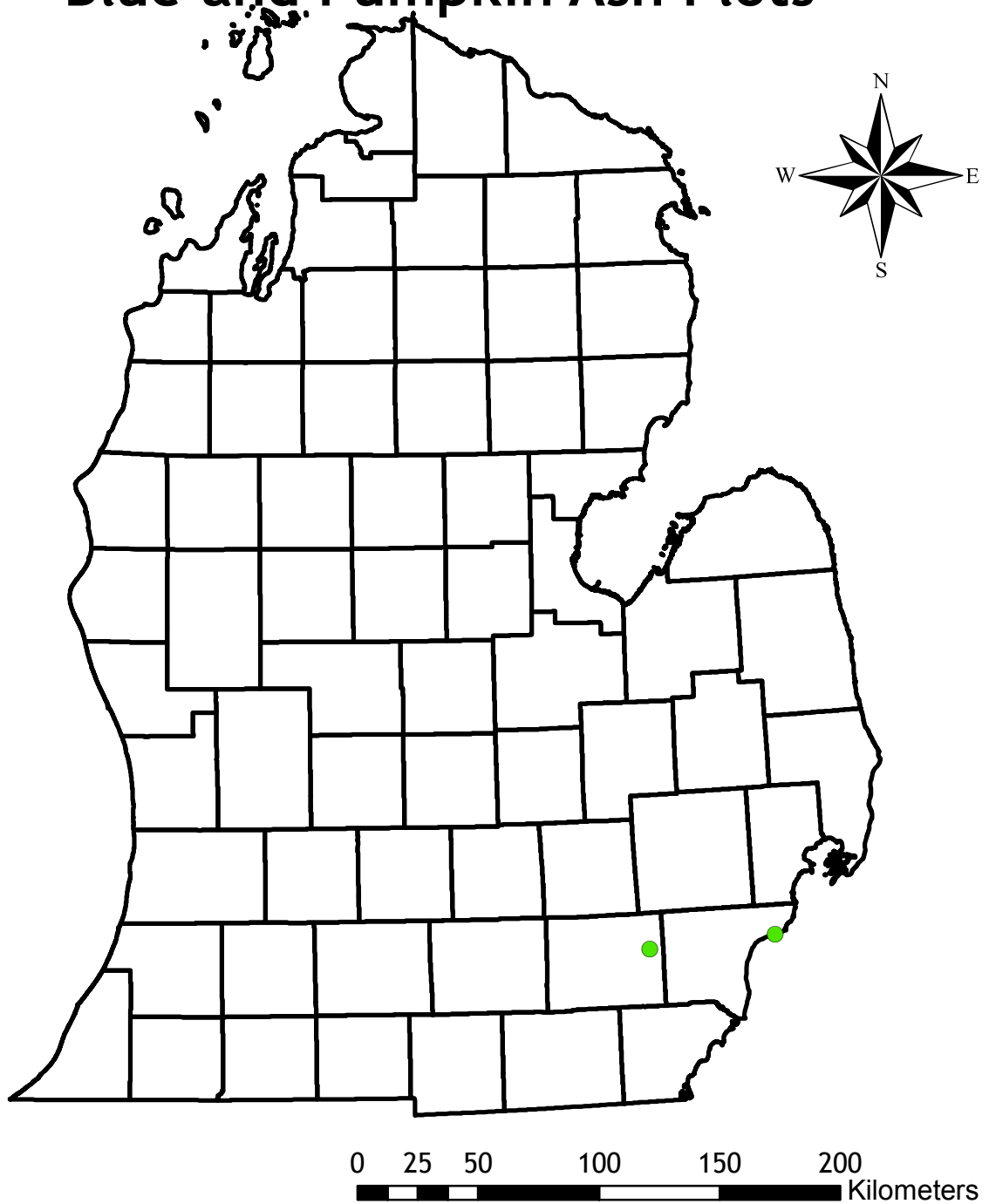
- 1
- 2
- 3
- 4
- 5-7

Source: Michigan Geographic Data Library

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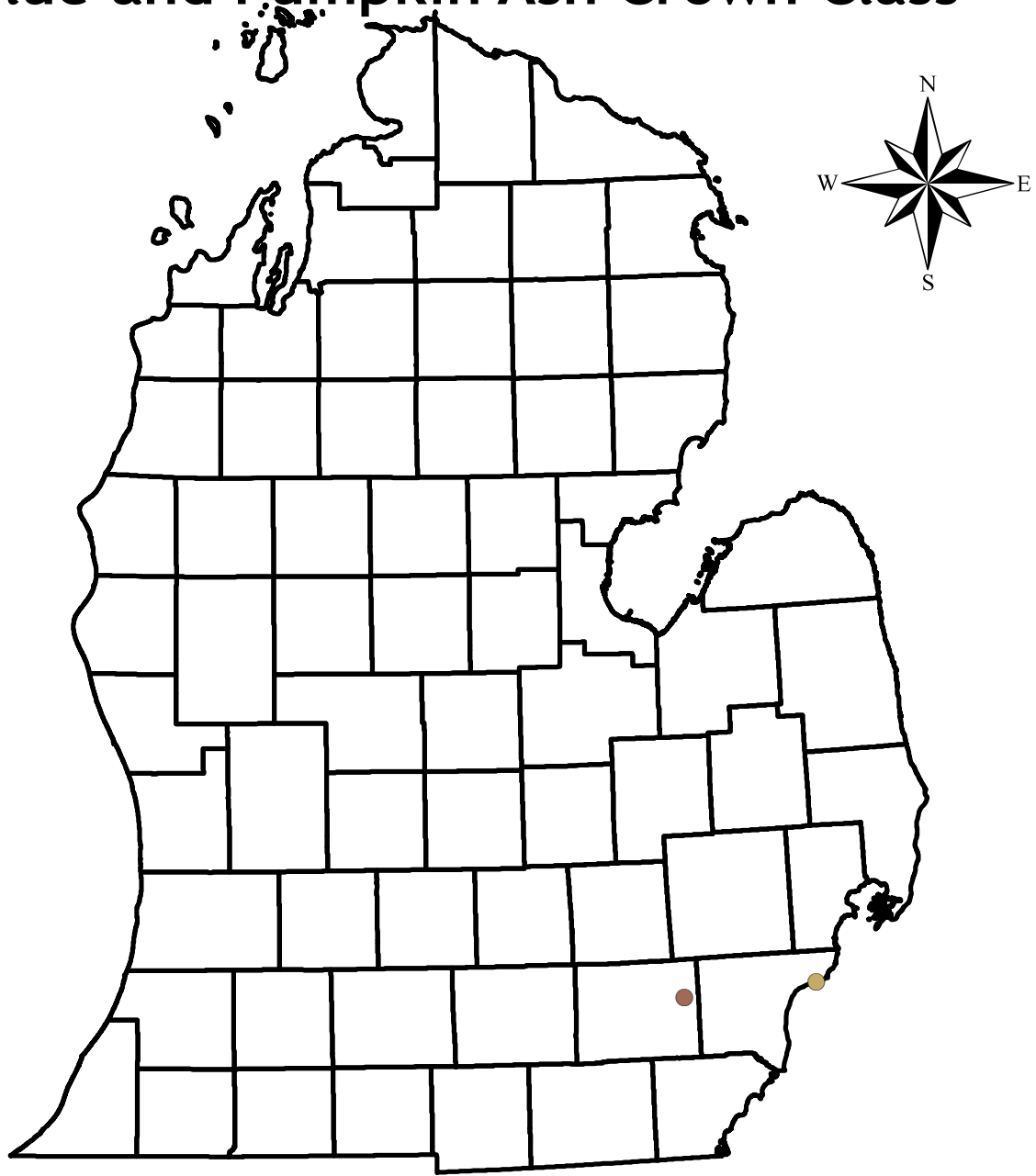
Blue and Pumpkin Ash Plots



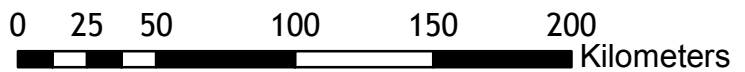
Key

- Plots with Blue or Pumpkin Ash

Blue and Pumpkin Ash Crown Class

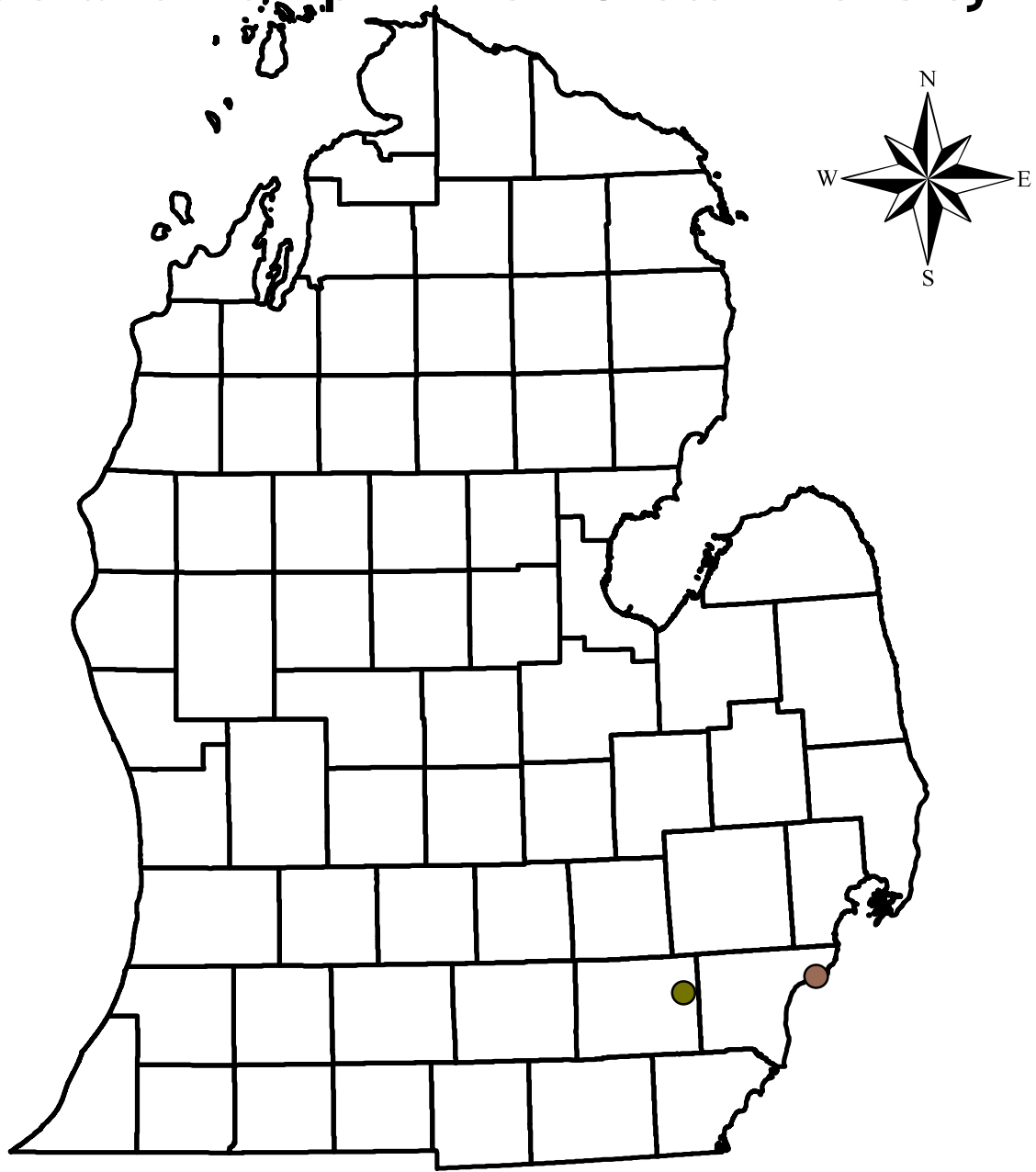


**Blue and Pumpkin Ash
Crown Class**

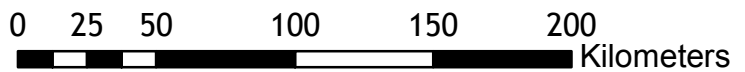


- 3
- 4

Blue and Pumpkin Ash Crown Density

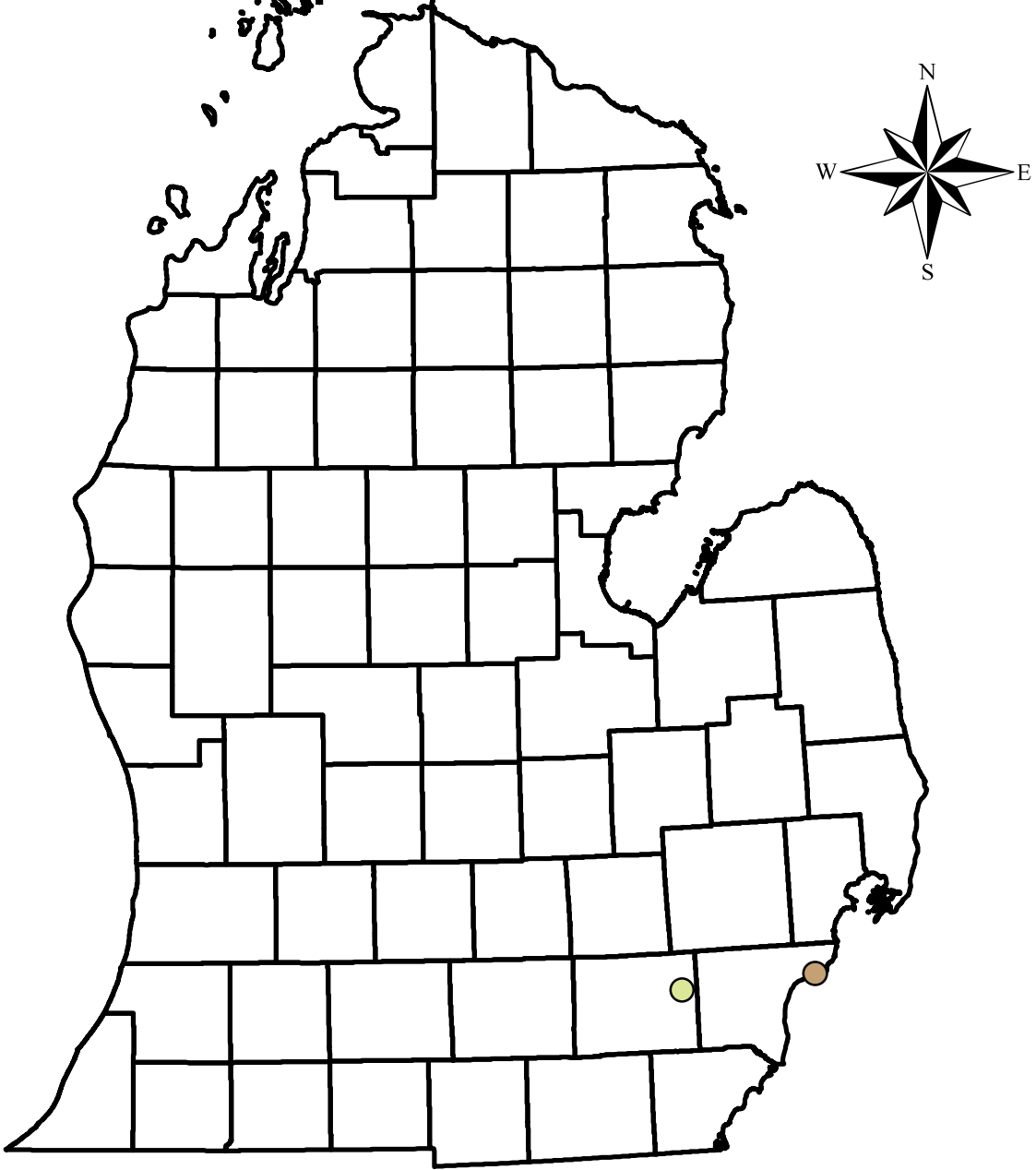


**Blue and Pumpkin Ash
Crown Density**

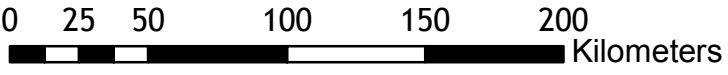


- 39
- 80

Blue and Pumpkin Ash Crown Dieback

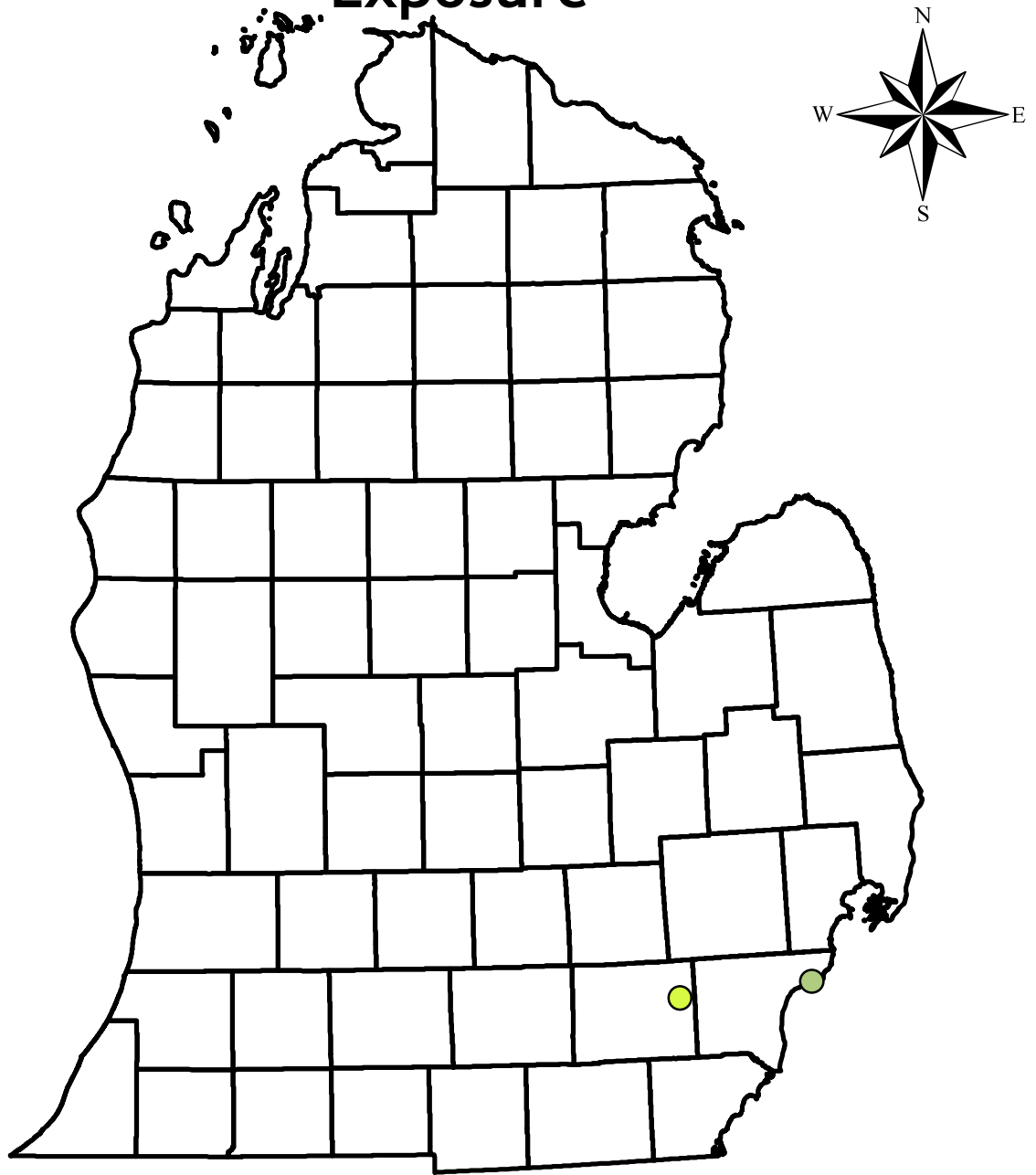


**Blue and Pumpkin Ash
Crown Dieback**



- 0.5
- 8

Blue and Pumpkin Ash Crown Light Exposure



**Blue and Pumpkin Ash
Crown Light Exposure**

0 25 50 100 150 200
Kilometers

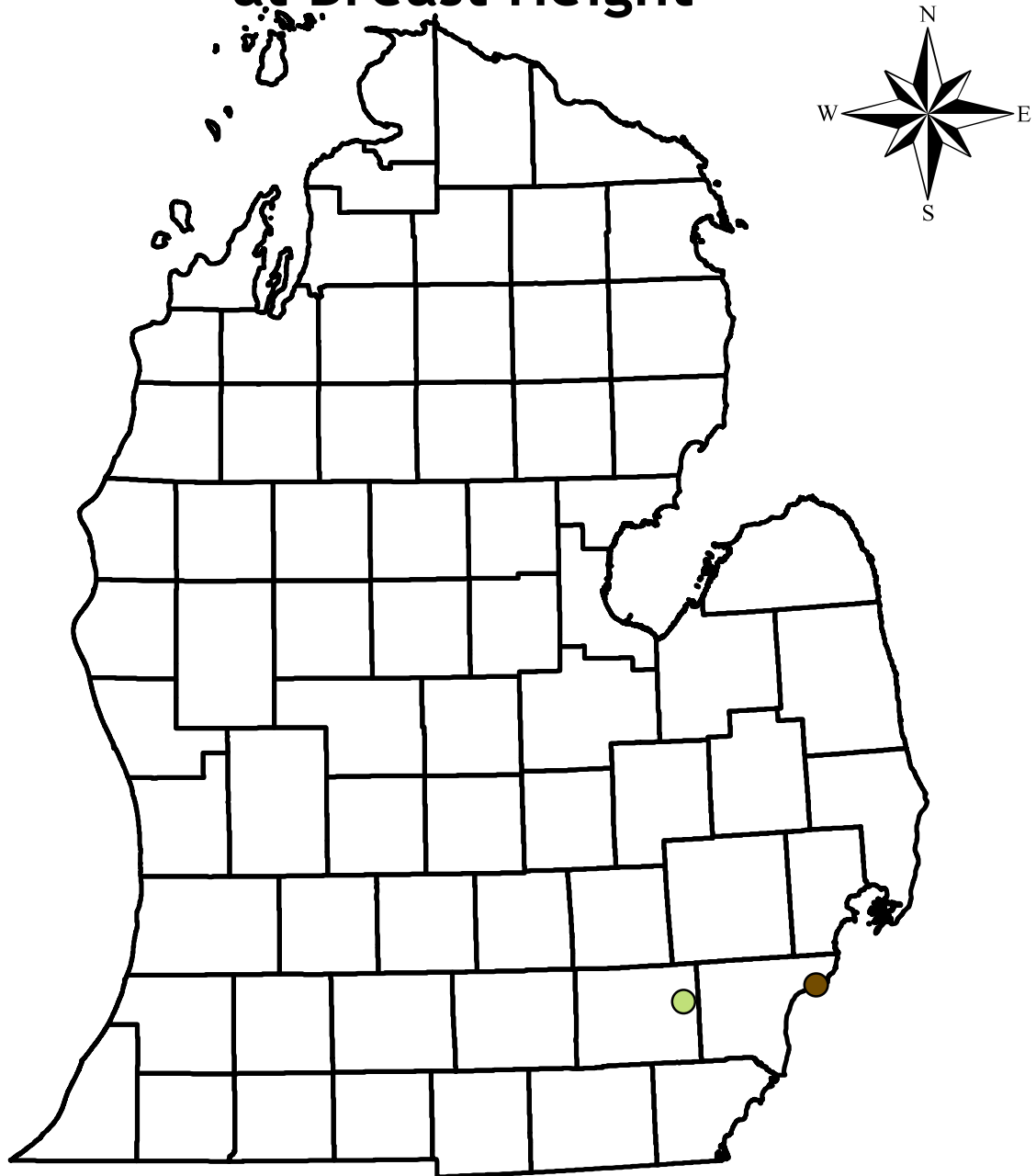
● 0.5

● 2.5

Source: Michigan Geographic Data Library
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Blue and Pumpkin Ash Diameter at Breast Height



Mean Blue and Pumpkin Ash DBH (cm) 0 25 50 100 150 200 Kilometers

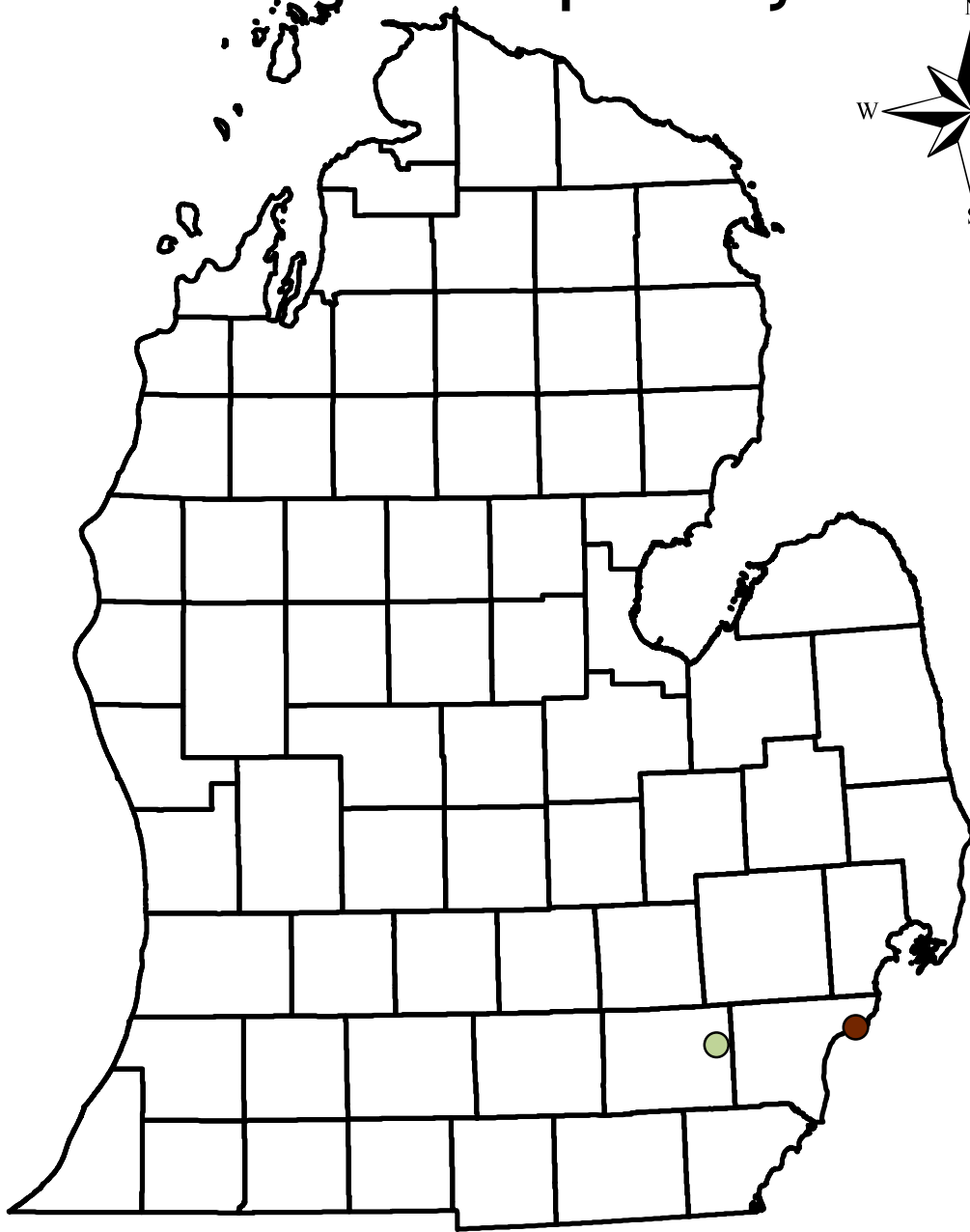
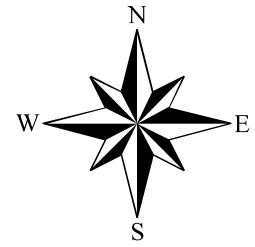
● 16

● 60

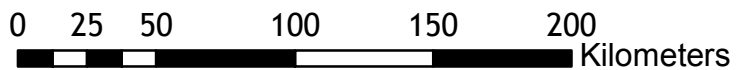
Source: Michigan Geographic Data Library
U of M School of Natural Resources and Environment NDW

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Blue and Pumpkin Ash Foliage Transparency



Mean Blue and Pumpkin Ash
Foliage Transparency



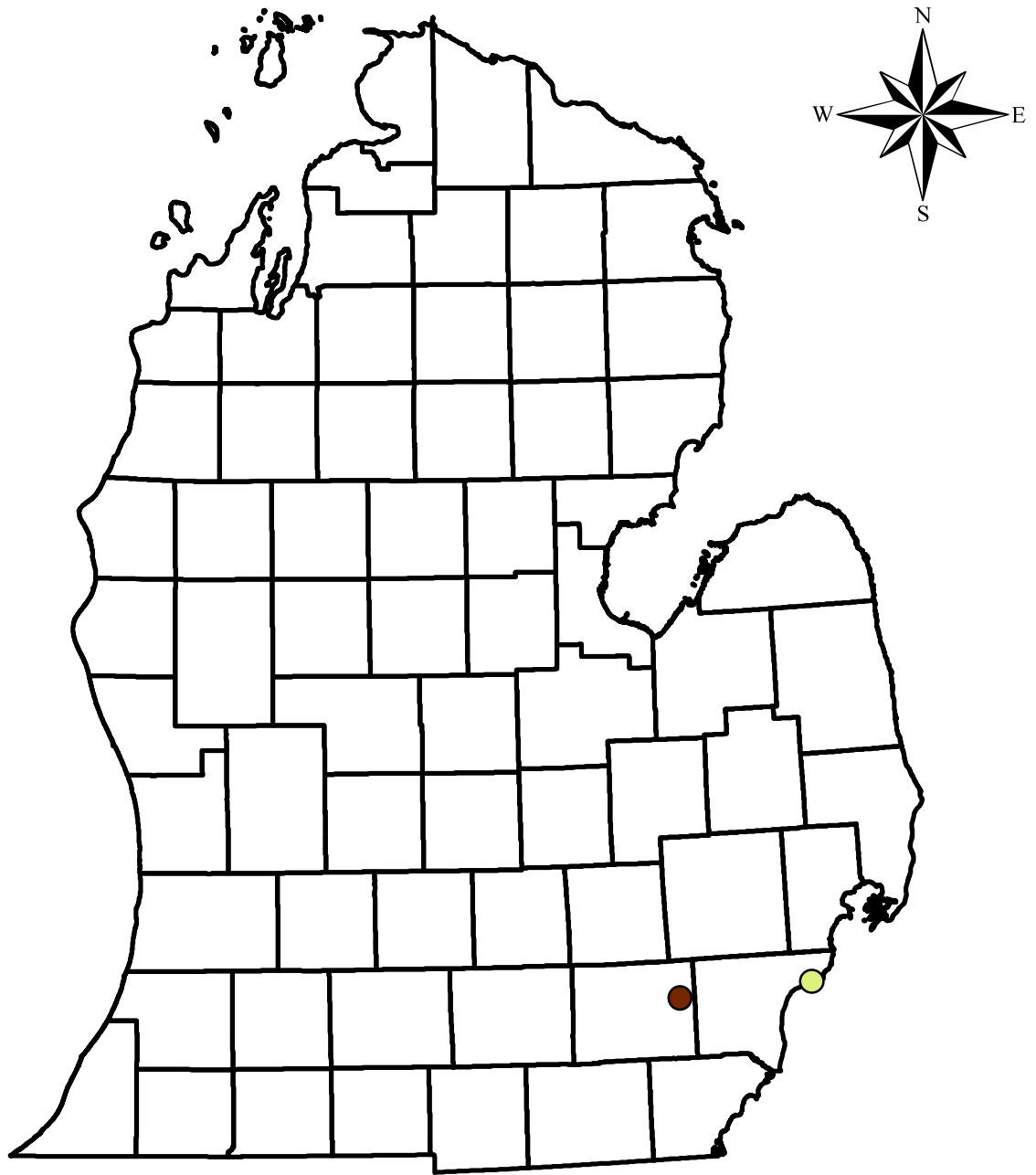
● 33

● 40

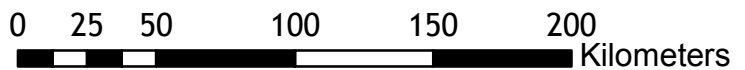
Source: Michigan Geographic Data Library
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Blue and Pumpkin Ash Height



Mean Blue and Pumpkin Ash Height (feet)

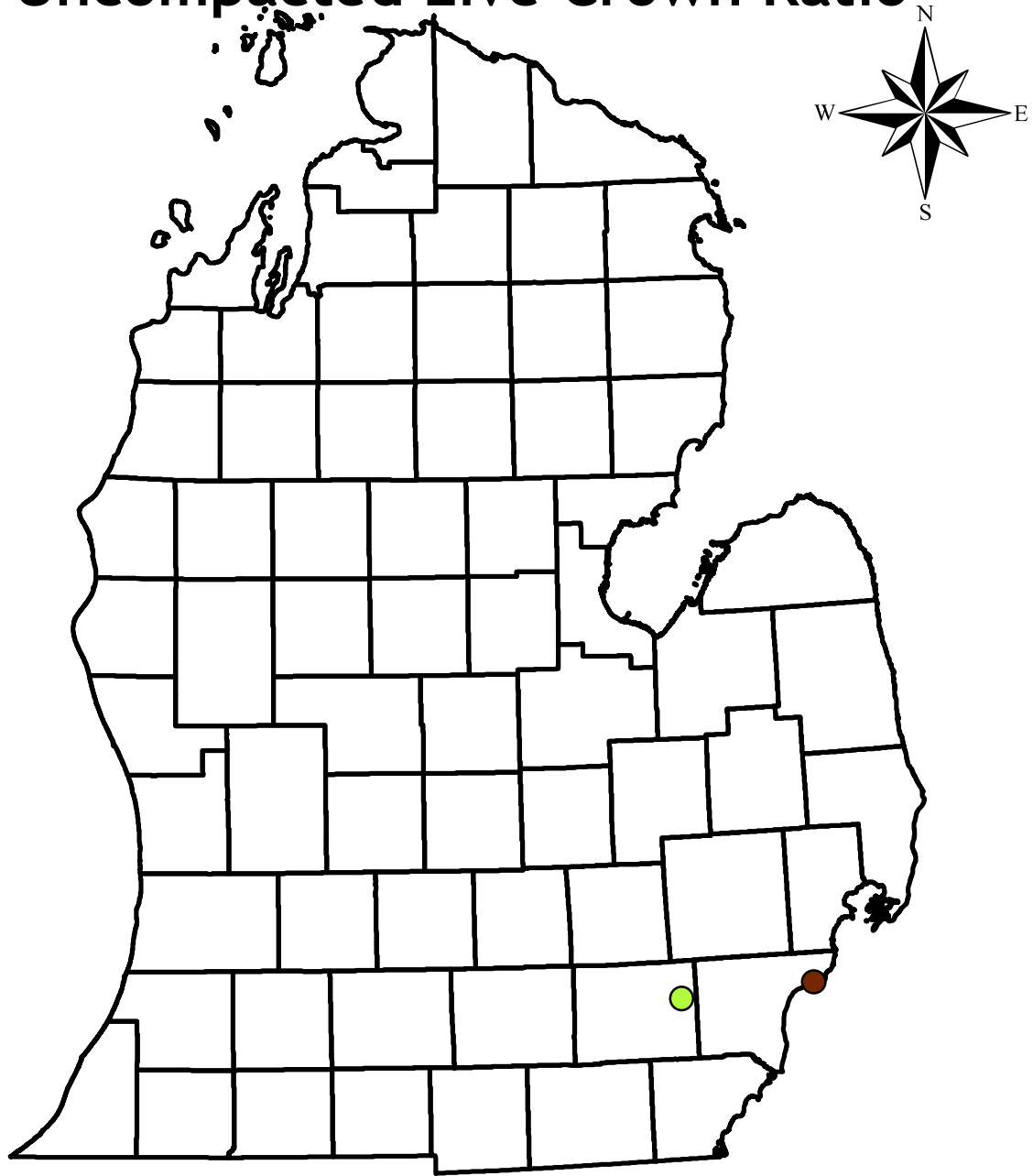


- 52
- 83.5

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

May 2009

Blue and Pumpkin Ash Uncompacted Live Crown Ratio



Mean Blue and Pumpkin Ash ULCR 0 25 50 100 150 200 Kilometers

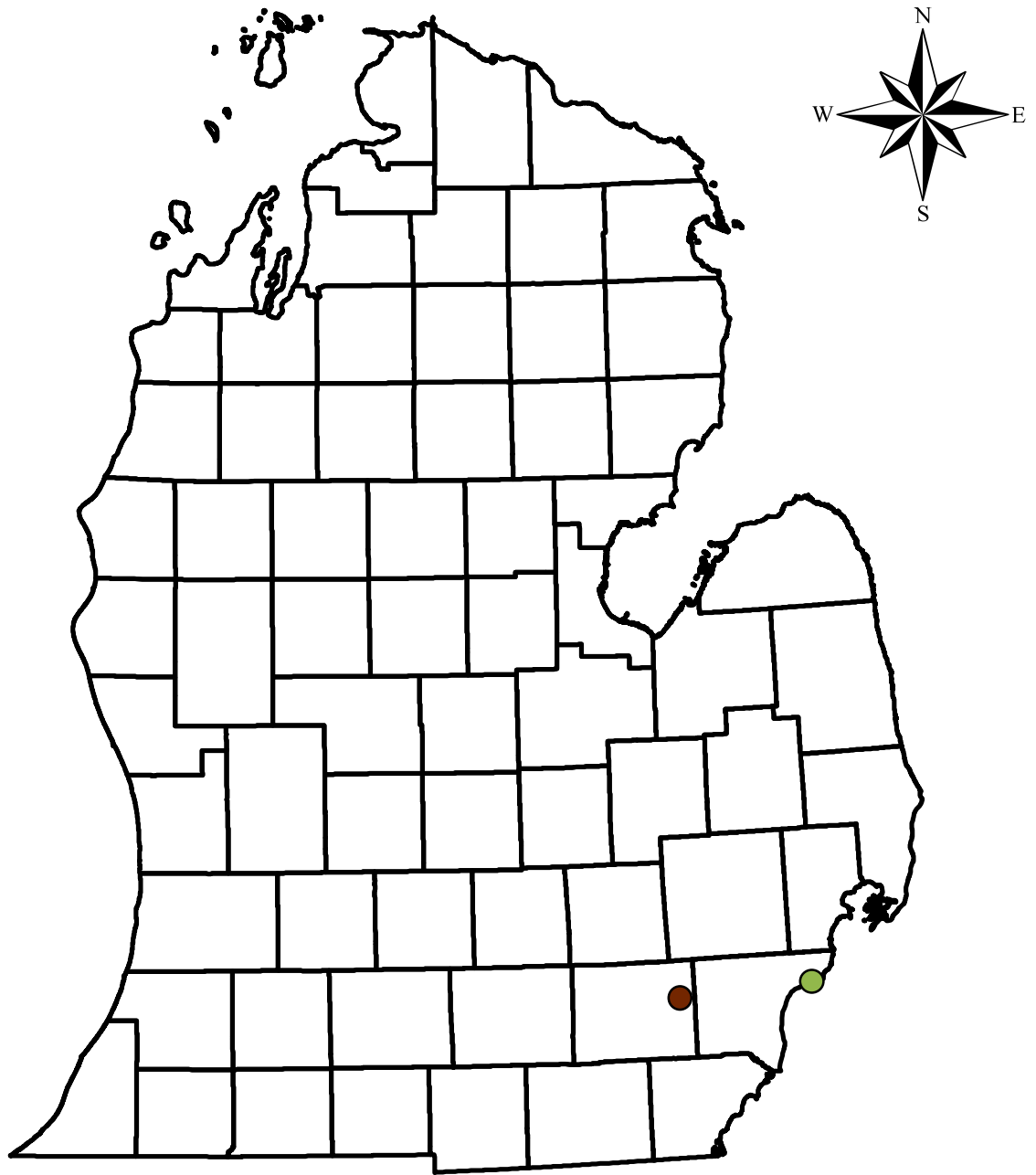
● 42.33

● 62.5

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

May 2009

Blue and Pumpkin Ash Vigor



Mean Blue and Pumpkin Ash Vigor

0 25 50 100 150 200 Kilometers

- 1
- 1.4

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

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