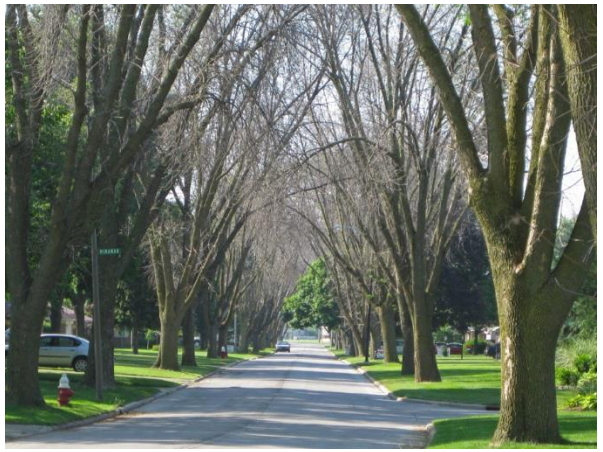
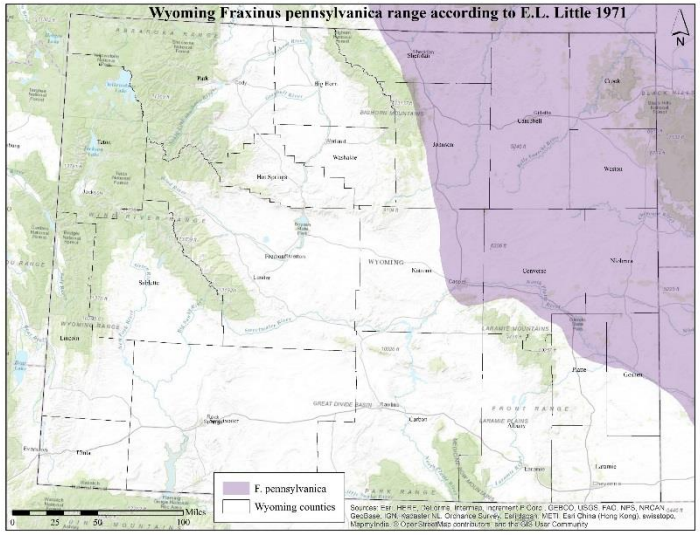
EMERALD ASH BORER IN WYOMING





Introduction to EAB

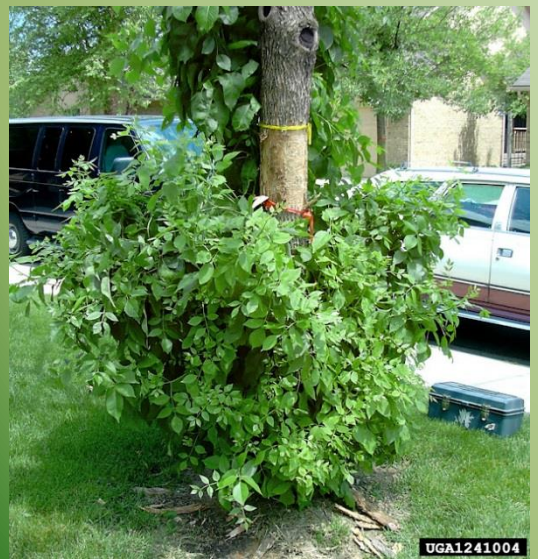
- Adult green, ½” long
- Larva flattened, legless, bell-shaped segments
- Larval galleries winding in phloem (between inner bark & outer sapwood; girdles trees, disrupting water & nutrient transport, eventually killing trees)
- Tunnels packed w/boring dust
- Adult exit holes 1/8” diameter, D-shaped

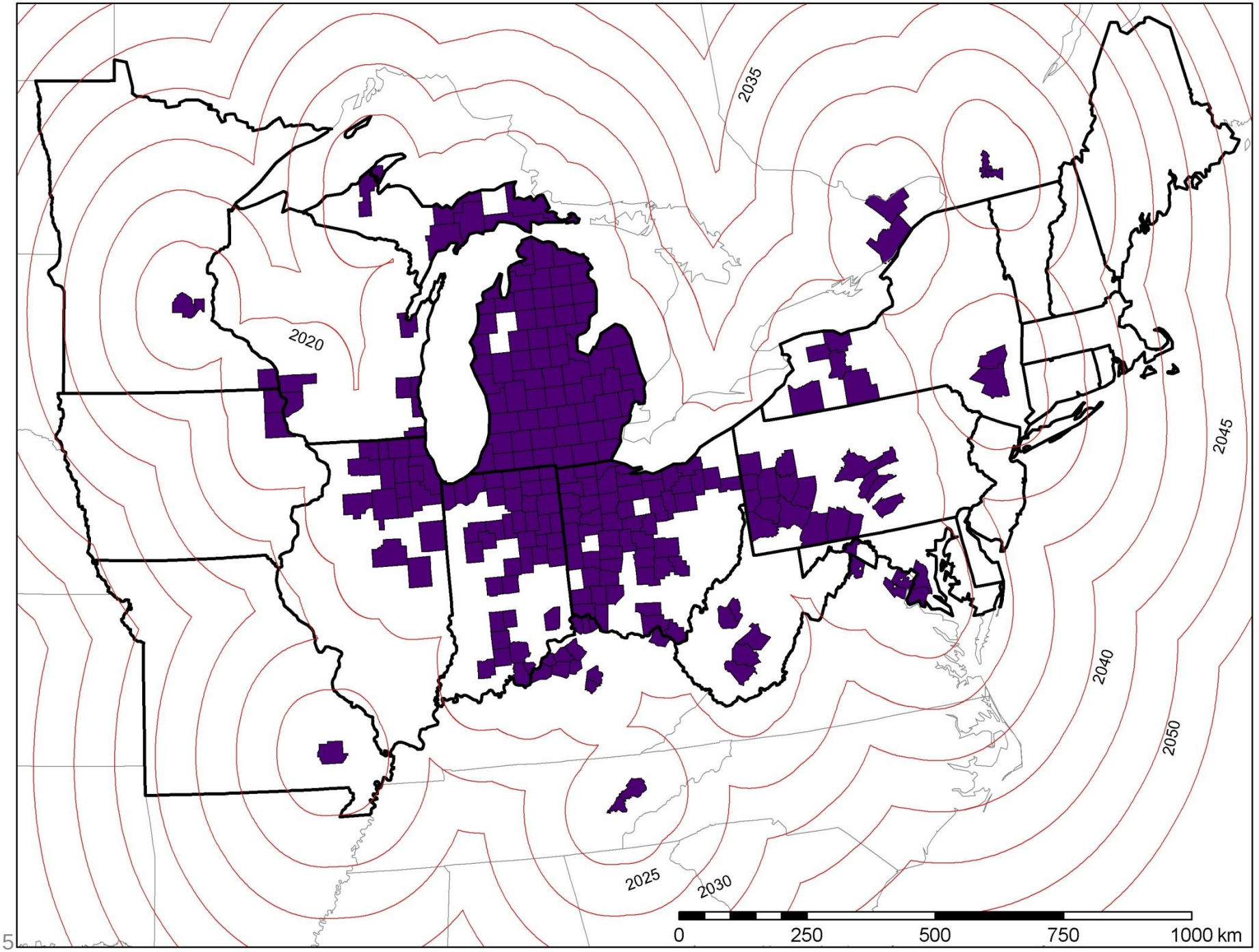
Introduction to EAB

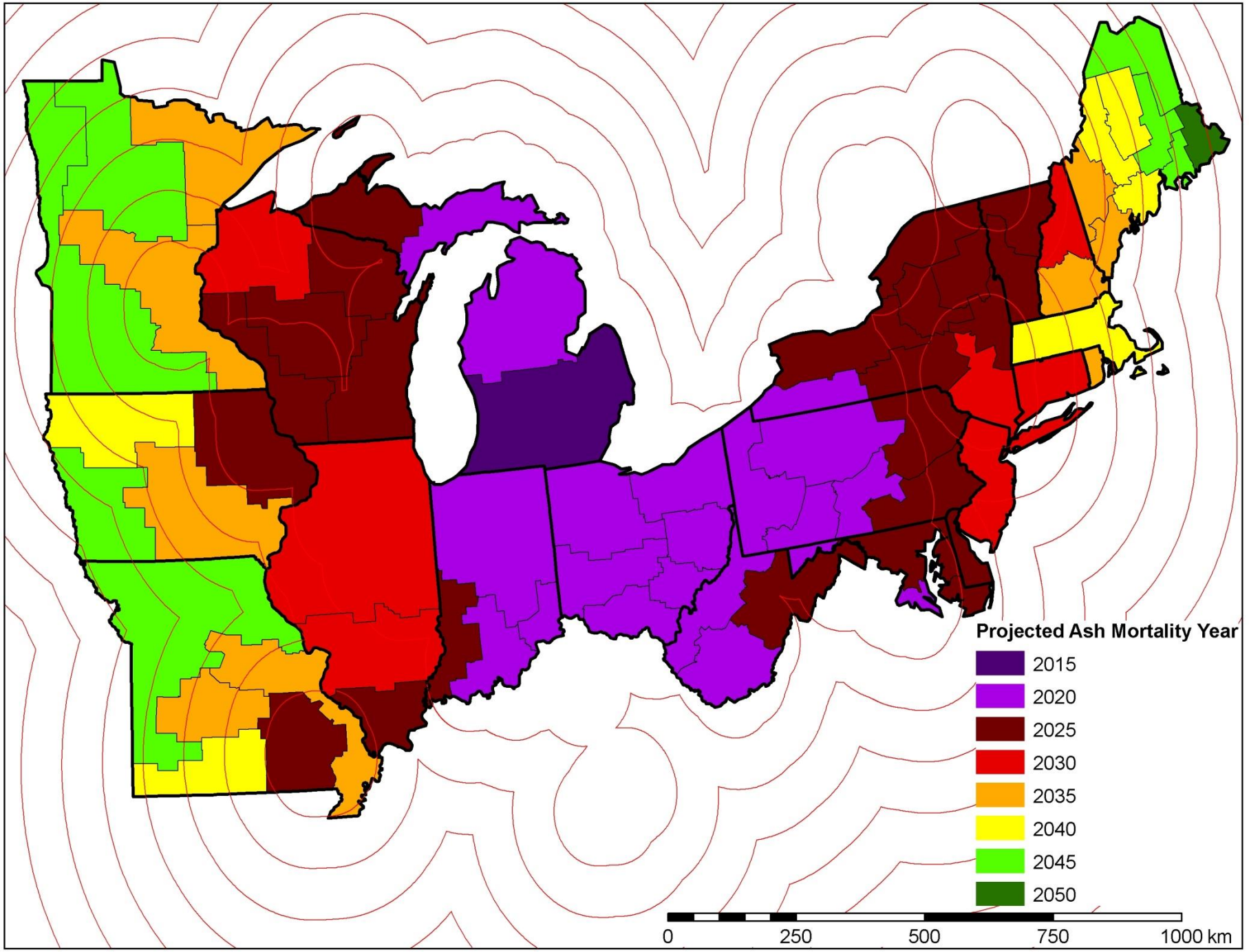
- NNIB native to eastern Asia (Family Buprestidae)
- Detected in North America in 2002 (southeastern MI, established since early-mid 1990s; first CO detection 2013)
- Larvae feed on ash xylem & phloem (girdles trees, disrupts water & nutrient transport, causes tree mortality)
- Estimated economic value of US ash timber loss due to EAB in next decade: $ hundreds of millions (ash timber important in Midwest & northeast U.S.; value of urban ash also $ hundreds of millions)

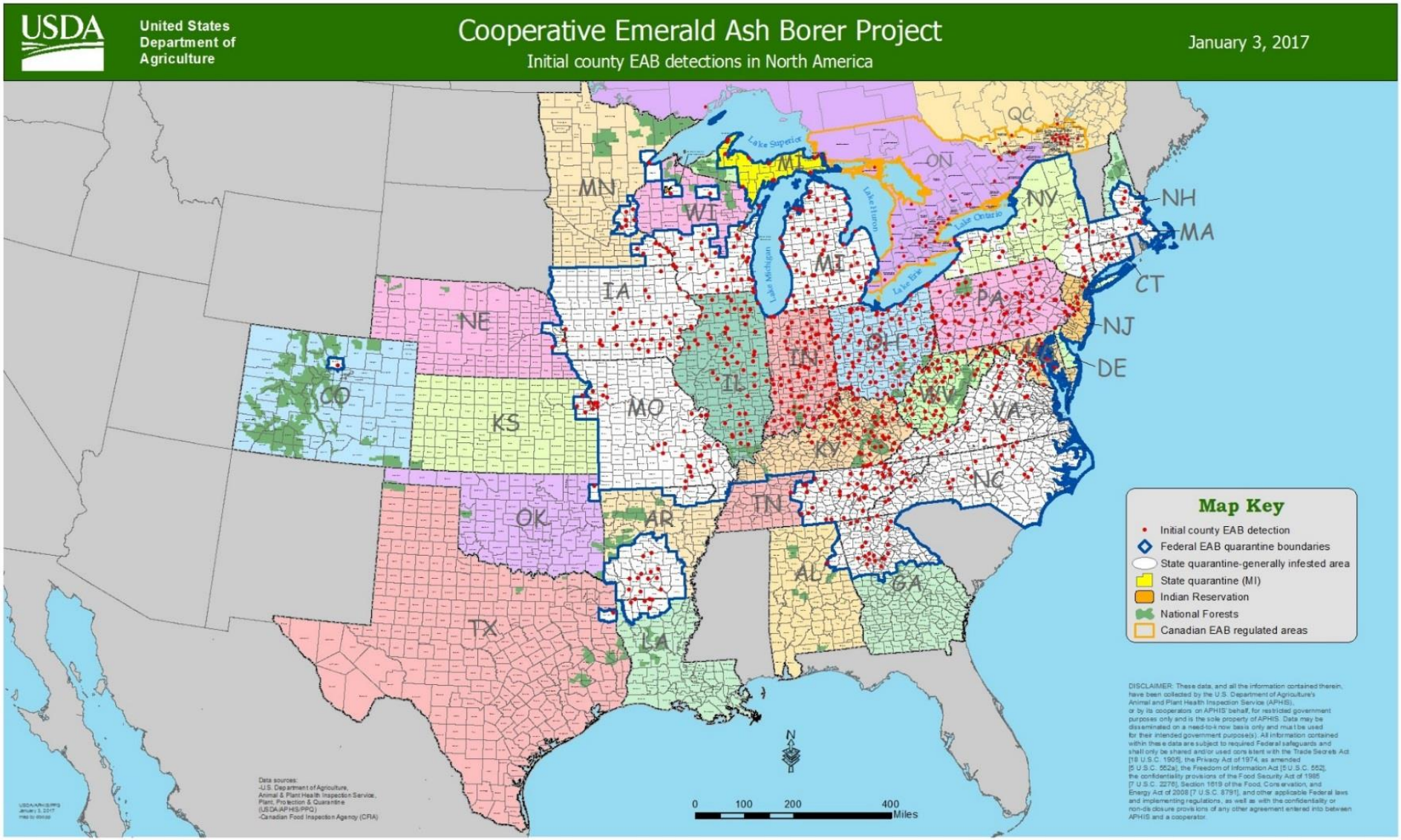
Introduction to EAB

- Killing >99% of Midwest & northeast ash >1” dbh
  (all size classes; blue ash not as susceptible but green, white, and black ash highly susceptible and comprise >99% of all ash; Asian ash species not infested & killed)
- EAB on ash different than DED on elm (mature trees AND sprouts infested)
- Spreading at 12 mi/yr (as of 2012, average short range dispersal from core infested area in southeastern MI; excludes additional spread from inadvertent human-assisted transport)




2020
2025
2030
2035
2040
2045
2050
0
250
500
750
1000 km

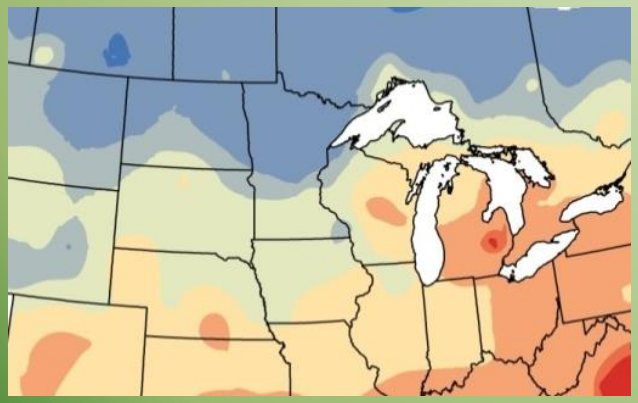

Projected Ash Mortality Year
2015
2020
2025
2030
2035
2040
2045
2050
0
250
500
750
1000 km

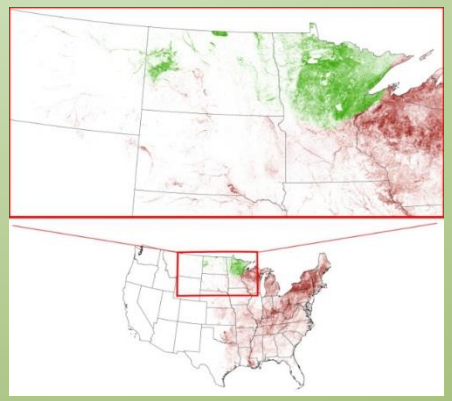

USDA
United States Department of Agriculture
Cooperative Emerald Ash Borer Project
Initial county EAB detections in North America
January 3, 2017
MN
WI
MI
IA
NE
CO
KS
MO
IL
IN
OH
KY
WV
VA
NC
TN
AR
OK
TX
LA
MS
AL
GA
PA
NY
ON
QC
NH
MA
CT
NJ
DE
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Map Key
Initial county EAB detection
Federal EAB quarantine boundaries
State quarantine-generally infested area
State quarantine (MI)
Indian Reservation
National Forests
Canadian EAB regulated areas
N
0 100 200 400
Miles
Data sources:
-U.S. Department of Agriculture, Animal & Plant Health Inspection Service, Plant Protection & Quarantine (USDA/APHIS/PPQ)
-Canadian Food Inspection Agency (CFIA)
DISCLAIMER: These data, and all the information contained therein, have been collected by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), or by its cooperators on APHIS' behalf, for restricted government purposes only and is the sole property of APHIS. Data may be disseminated on a need-to-know basis only and must be used for their intended government purpose(s). All information contained within these data are subject to required Federal safeguards and shall only be shared and/or used consistent with the Trade Secrets Act [18 U.S.C. 1905], the Privacy Act of 1974 as amended [5 U.S.C. 552a], the Freedom of Information Act [5 U.S.C. 552], the confidentiality provisions of the Food Security Act of 1985 [7 U.S.C. 2276], Section 1619 of the Food, Conservation, and Energy Act of 2008 [7 U.S.C. 8791], and other applicable Federal laws and implementing regulations, as well as with the confidentiality or non-disclosure provisions of any other agreement entered into between APHIS and a cooperator.

Introduction to EAB

- EAB overwintering:

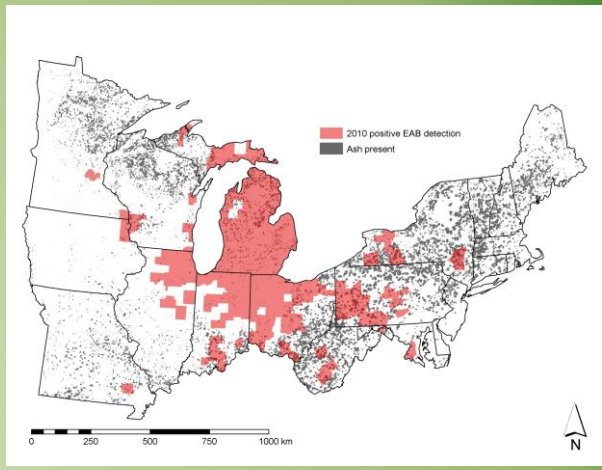
  - Larvae or prepupae
  - ½” beneath bark surface, *anywhere* on tree, including at base of tree bole near ground level
  - Lowest recorded EAB supercooling point = -31.54°F
  - At least half of the EAB population may not survive -22°F

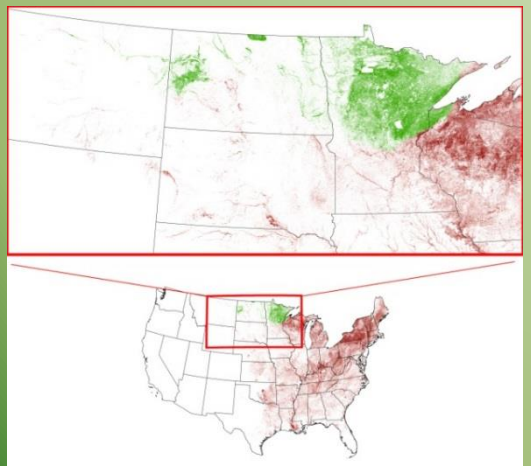


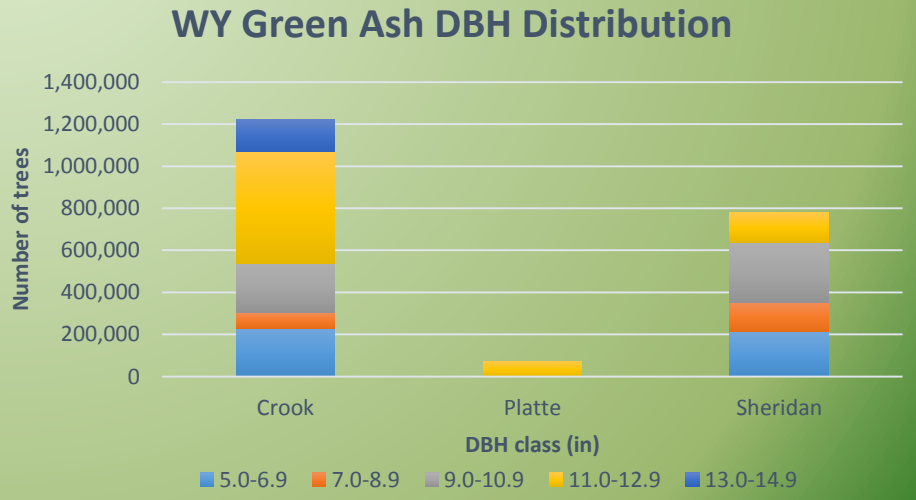


Current Ash Resource

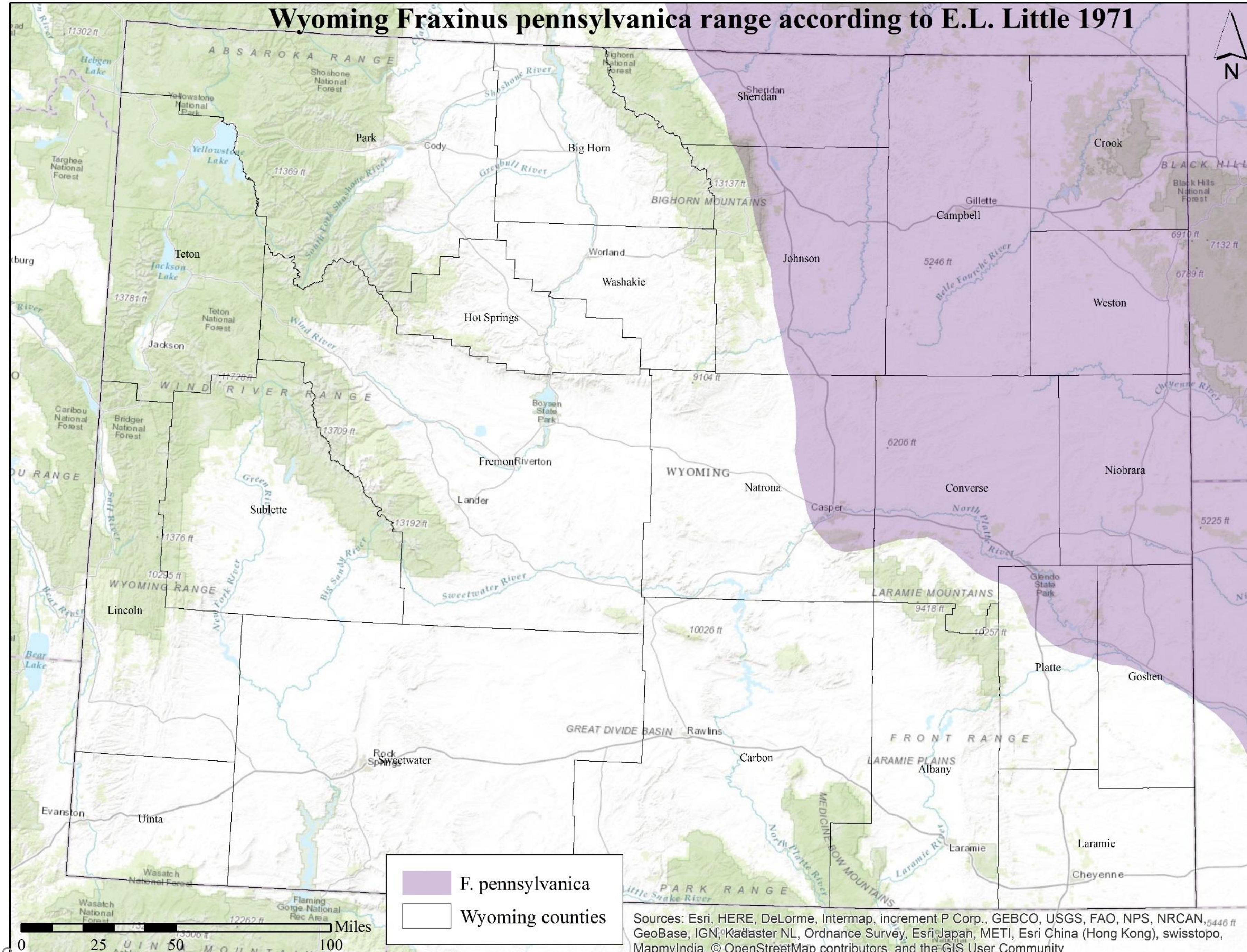
- Ash in WY:
  - Rural?
    - Native = mostly riparian green ash in NE WY
    - FIA: 2,075,272 trees, all on private land
  - Urban?
    - Ash % tree canopy varies from low % (Laramie) to High % (Powell)
  - Native: green ash







Wyoming Fraxinus pennsylvanica range according to E.L. Little 1971

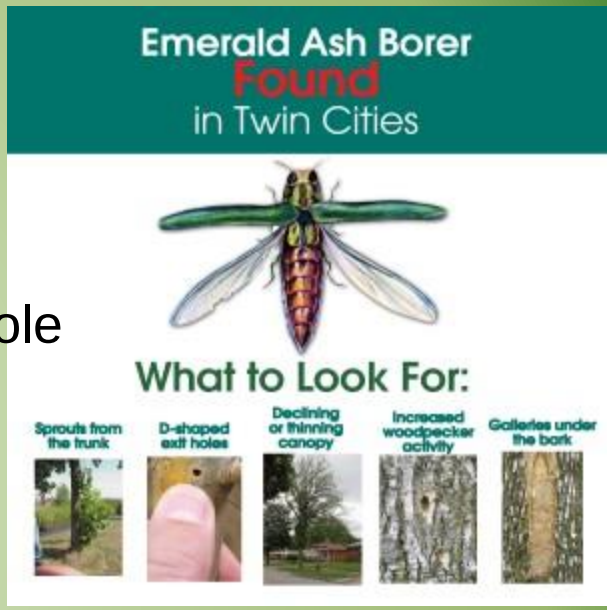


Infestation Symptoms of EAB on Ash

- Symptoms in Midwest/northeast:
  - Dieback (many other causes not EAB-related… ash yellows, drought, soil compaction & root injury, ash/lilac borer, other ash borers & bark beetles)
  - Suckering & epicormic branching (could be caused by some of the above, e.g. ash yellows)
  - Bark splits (could be caused by fungi e.g. Cytospora)
  - Woodpecker damage (could be searching for other insects)
  - D-shaped exit holes (could be mistaken for other insects)

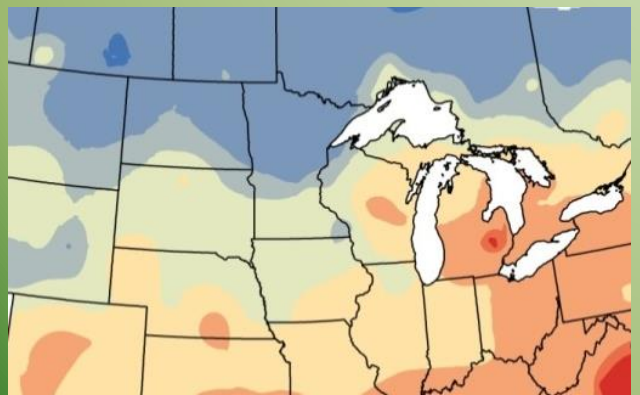
Infestation Symptoms of EAB on Ash

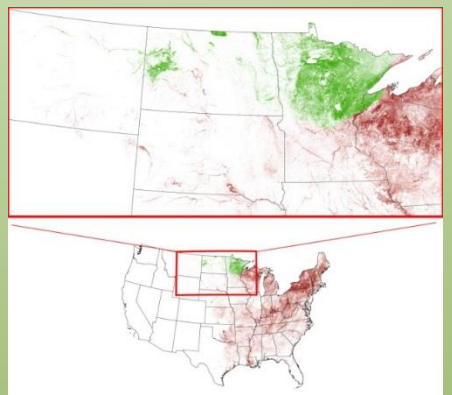
- Symptoms in Colorado… so far:
  - Usually no suckering
  - Little epicormic branching, especially lower on bole
  - Ash health/growth rates (<CO vs >Midwest)
    - Lilac/ash borer, banded ash borer, redheaded ash borer
    - Ash bark beetles
    - Cytospora canker
    - Drought
    - Spring freezes
    - Dry summers
  - Increased ash mortality/decline not EAB-related
    - Cold-killed cambium & drought, trees dying & falling down
    - Ash limbs breaking clean, not tearing (drought-related?)



EAB Physiology/Population Characteristics

- No evidence that North American climate can 100% limit EAB survival
- Evidence for climatic constraints to EAB infestation: e.g. north-central US, south-central Canada
- EAB at low populations that do not infest trees may not cause ash mortality (Ash may persist in ND, MT but not farther S)





EAB Physiology/Population Characteristics

- In northern ranges of ash, EAB may not kill much ash and EAB spread may take some time:
  - Resource limitations on EAB spread
  - Climatic constraints to EAB spread
- In WY, not much chance for climatic constraints to EAB spread; possibility for resource limitations on EAB spread?
  - Gypsy moth:
    - Found in Lovell 2015, no spread
    - Found in Casper 2016, no spread
- <u>Biggest threat is transporting firewood!</u>


Troy Kimoto, Canadian Food Inspection Agency, Bugwood.org

Ash tree management

- Small-scale: private landowners can protect individual trees with a variety of chemicals (imidacloprid, dinotefuran, azadirachtin, emamectin benzoate, permethrin, bifenthrin, cyfluthrin, carbaryl)

- Forest products industry reliant on ash has been shifting to other species (private landowners, municipalities affected most)

- Wildlife generally not dependent on ash but benefits from a variety of species in EAC

QUESTIONS?

http://emeraldashborer.info/