Using DED- tolerant American Elm Trees in Mineland Reforestation

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USDA FOREST SERVICE

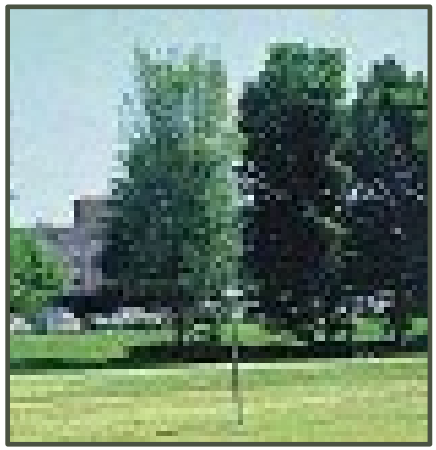
The story of American elm

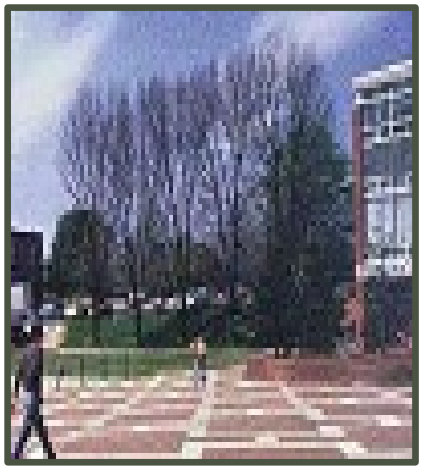
Part of several hardwood forest types

Bottomland forests and other forest types in Appalachia

The story of American Elm

Dutch elm disease was introduced into US in 1920s
A fungus, moved around by bark beetle
Nearly eliminated American elm throughout its range by 1970s





Screening Survivor American Elms

Sam Burr Elm, Vermont, USA

Lapeer Elm, Michigan, USA

Three Creeks Metro Park, Ohio, USA

Kathleen Knight at the park

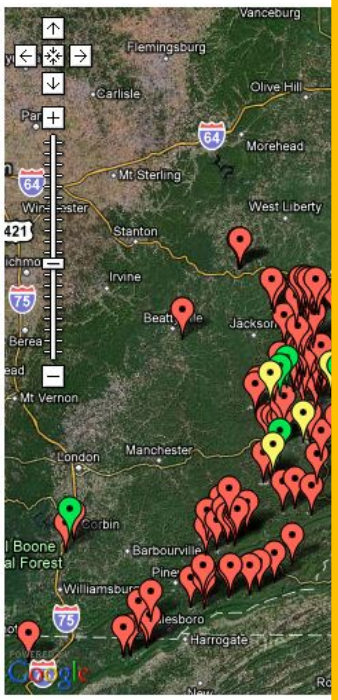
Lesser Selections in Field Plots, Delaware, Ohio, USA

American elm as a tool for restoration

Diversity of planting mix requires native hardwoods

American elm – wide natural range

Why elm for reforestation?



Why elm for restoration?

Emerald Ash borer –

- Gr[illegible] as[illegible]
- W[illegible]ite a[illegible]

Elm as a tool for restoration

FRA : Diversity of planting mix requires native hardwoods

The right tool for the job?

Although American elm is common on bottom-land soils, it is found on many of the great soil groups within its range:

- well-drained sands
- organic bogs
- undifferentiated silts
- poorly drained clays
- prairie loams
- many intermediate combinations.

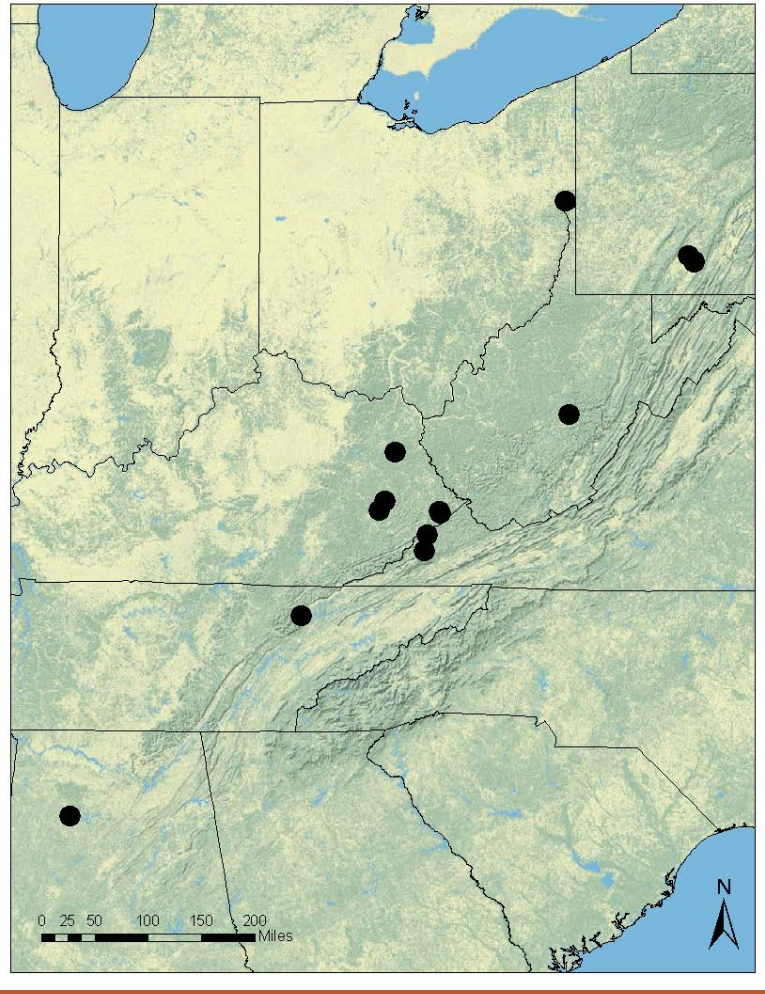
What we've done so far

DED tolerant elms planted at 14 sites in Appalachian coal fields

Elevations from 721-3000 ft

reclaimed mine sites

- FRA sites
- Old mines: 1992-2005
- AML and bond forfeiture land



Site	State	Elev (m)	date planted	Site history		
Pike Co. A	KY	510	3/7/2013	Legacy mine site, reclaimed ~1998	ripped to 36 inches	mine spoil
Pike Co. B	KY	500	3/13/2013	Legacy mine site, reclaimed ~ 2000	ripped to 36 inches	mine spoil
Breathitt Co.	KY	420	3/24/2013	AML site	ripped to 36 inches	1/3 soil, 2//3 mine spoil
Lawrence Co	KY	460	3/28/2013	Bond forfeiture mine land, reclaimed 2012	ripped to 36 inches	mine spoil
Wise Co.	VA	556	3/27/2013	Legacy mine site, reclaimed about 1995	ripped to 36 inches	mine spoil
Campbell Co	TN	915	4/4/2013	Legacy mine site; reclaimed about 1992	ripped to 36 inches	mine spoil
Walker Co	AL	220	2/16/2013	Legacy mine site, reclaimed ~1998	ripped to 12 inches (lightly)	sandy soil


02/16/2013

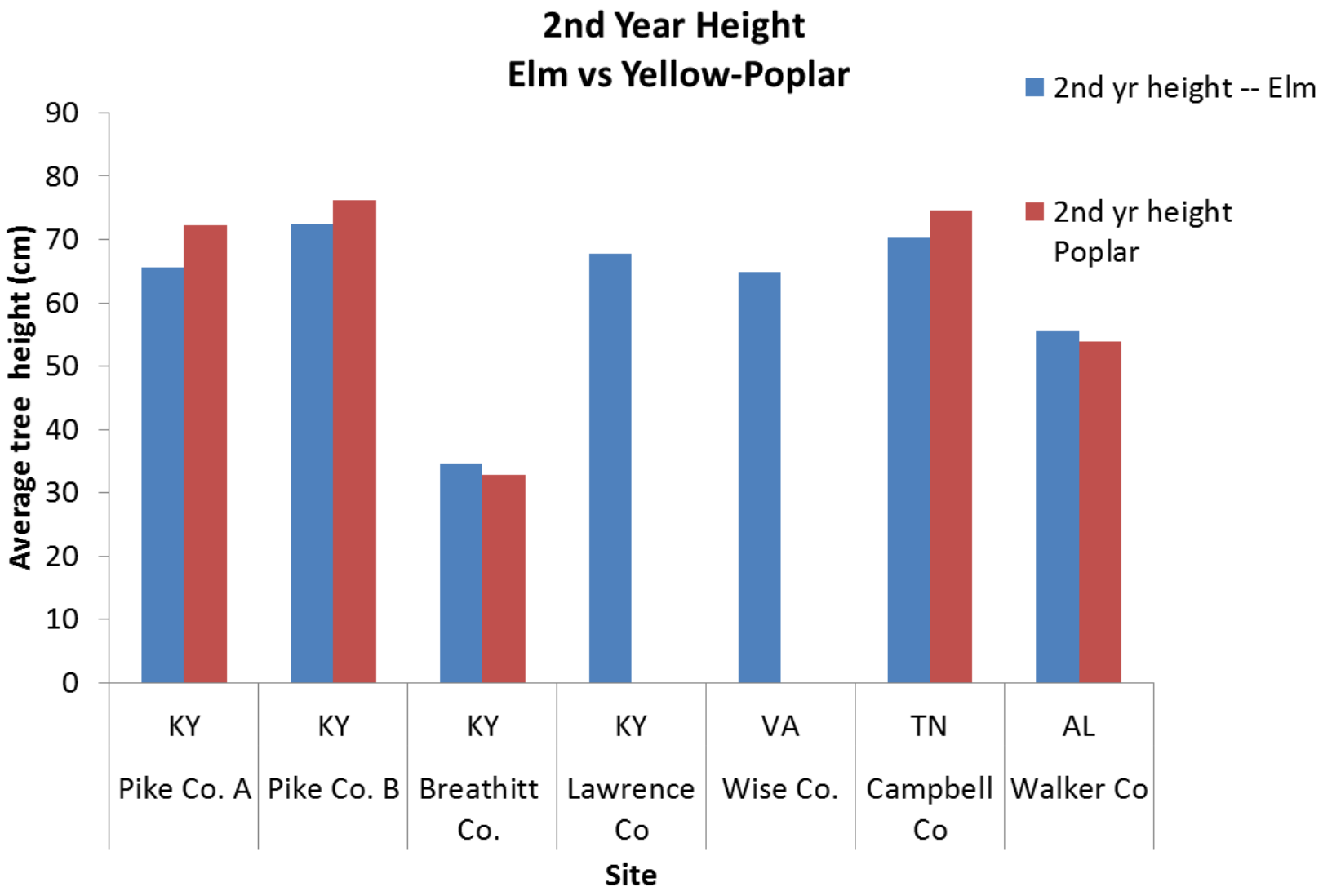

03/02/2013


04/13/2013


04/13/2013

Planted American Elm performance after 2 growing seasons on Mine sites

SITE LOCATION	STATE	PERCENT SURVIVAL	AVERAGE HEIGHT (cm)	AVERAGE VIGOR CLASS (0-4)	AVERAGE BROWSE (0-4)
PIKE CO. A	KY	78	65.5	3.7	0.3
PIKE CO. B	KY	82	72.5	3.0	0.5
BREATHITT CO.	KY	65	34.6	3.0	2.2
LAWRENCE CO.	KY	75	67.8	3.9	1.3
WISE CO.	VA	80	64.9	3.6	0.2
CAMPBELL CO.	TN	80	70.3	3.9	0.2
WALKER CO.	AL	78	55.5	3.7	1.0
Average of all site locations		77	61.6	3.5	0.8


2nd Year Height
Elm vs Yellow-Poplar
2nd yr height -- Elm
2nd yr height Poplar
Average tree height (cm)
90
80
70
60
50
40
30
20
10
0
KY
Pike Co. A
KY
Pike Co. B
KY
Breathitt Co.
KY
Lawrence Co
VA
Wise Co.
TN
Campbell Co
AL
Walker Co
Site

What next?

5 year measurements – survival, growth

Are these trees sufficiently DED-resistant/tolerant ?

How do they compete with other tree species?

How soon do they reproduce ?

Restoring American Elm

James M. Slavicek, Mary Beth Adams, Steven Eshita, Charlie Flower, Kathleen S. Knight, Christian Marks & TNC personnel, Rakesh Minocha, Tim Noon & FLNF personnel, Leila Pinchot, Paul Schaberg, Gary Swanson & CNF personnel , Keith Woeste

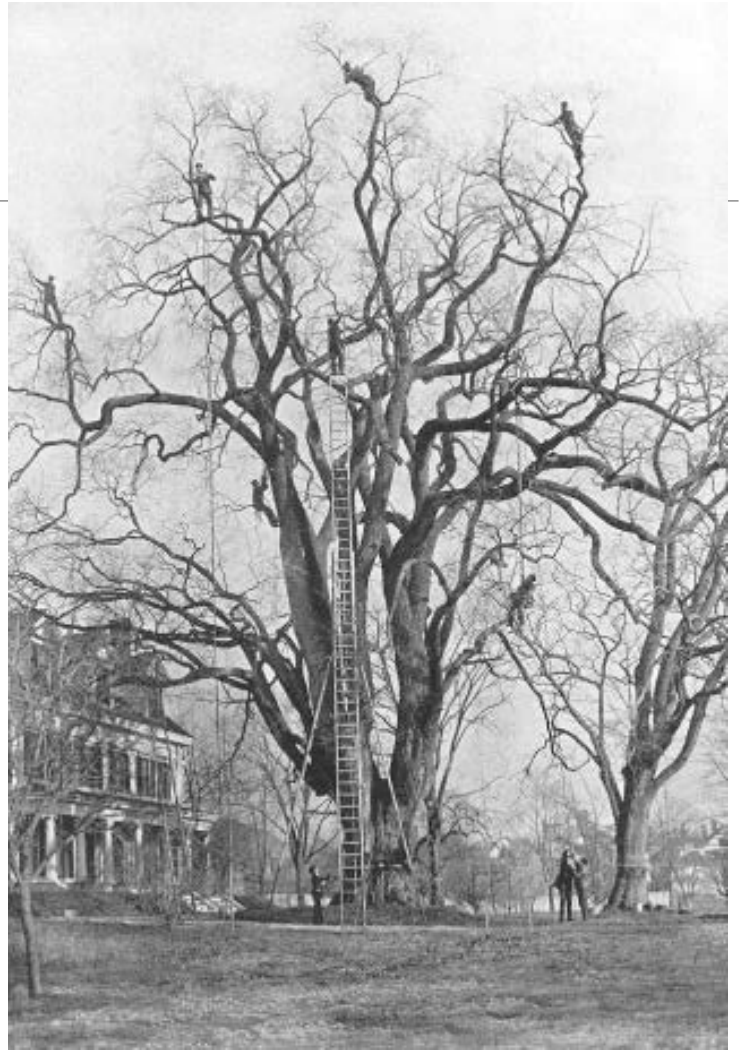
US Forest Service, Northern Research Station, Delaware, OH

American Elm R & D Goal

The goal of our R&D efforts is to restore the American elm as a species across the urban to forest gradient.

A. Objective A: Develop a genetically diverse DED-tolerant American elm population for outplanting.

B. Objective B: Develop methods for reintroducing American elm across the urban to rural gradient.



An American elm being cleared of *Lymantria dispar* egg masses

Establishment and Monitoring of Experimental American Elm Restoration Sites

Goal: **To restore the American elm to forested landscapes.**

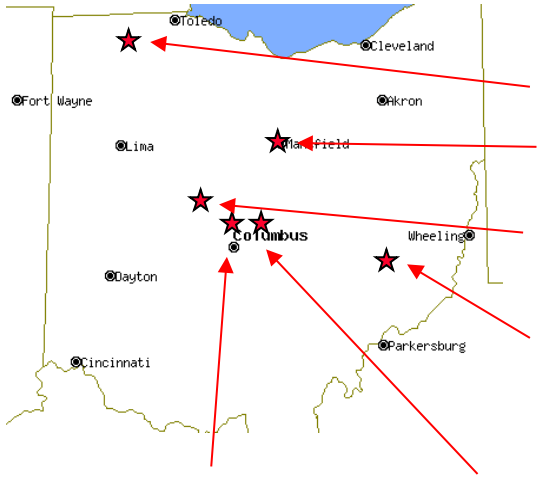
Approach: **American elm tree strains with high levels of tolerance to Dutch elm disease were established in areas where the trees can naturally regenerate and spread. These are sentinel sites to assess threats beyond DED to successful restoration.**

The American elm Restoration Project is in collaboration with:

ODNR, Division of Forestry	**Dan Balser**
Franklin County Metro Parks	**Andrew Boose**
The Wilds	**Nicole Cavender**
USFS State & Private Forestry	**Linda Haugen**
Army Corps of Engineers	**Randy Urich & John Sobiech**
Carpenter St. Croix Valley Nature Ctr	**John McPherson**
Luther College	**Rich Tenneson**
U.S. Fish & Wildlife Service	**Tim Yager**
The City of Worthington, OH	**Scott Brown**
The Nature Conservancy	**Christian Marks**

Locations of Experimental American Elm Restoration Sites

Experimental Sites in Ohio



Maumee State Forest, ODNR

Mohican Memorial State Forest

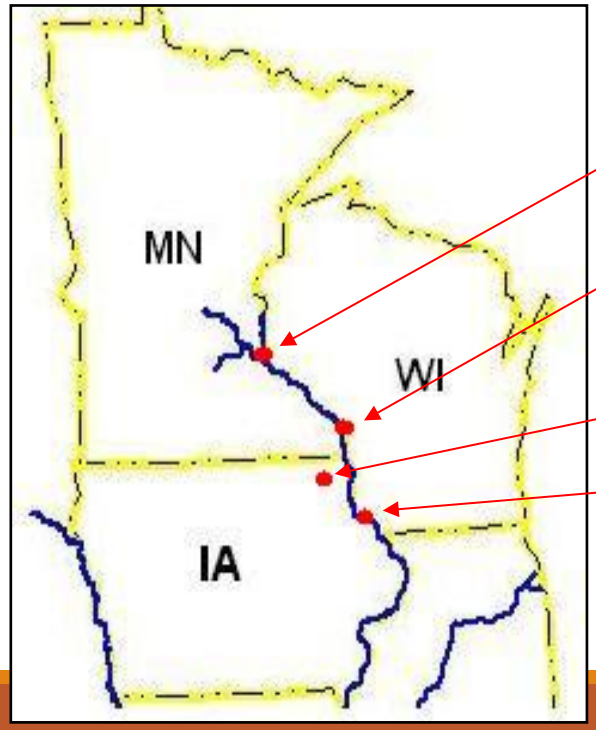
Glacier Ridge Metro Park

The Wilds

Highbanks Metro Park

Worthington City Park

Experimental Sites in the Upper Mississippi Watershed



Carpenter St. Croix Valley Nature Center, Hastings, MN

U.S. Army Corps of Engineers, Eagle Island, Stoddard Islands, WI

Roslein Woodlands, Luther College, Decorah, IA

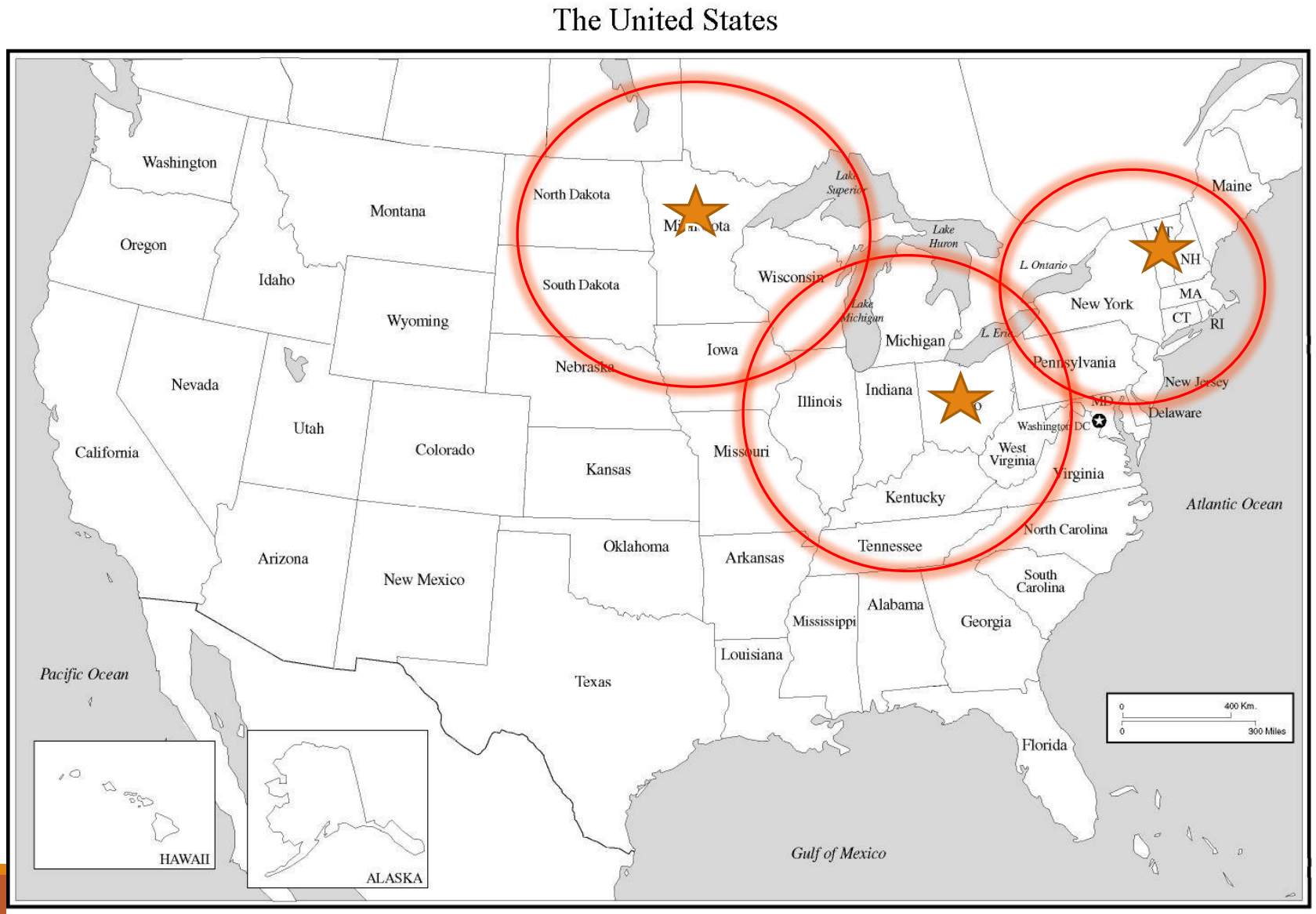
Dago Slough, US F&WS, Cassville, WI

Restoration of EAB-Impacted Floodplain Forests (Kathleen Knight)

A planted elm tree in flood waters beside a large ash tree likely to die from EAB at Clinton Conservation Area (right).

A Toledo Metroparks employee plants American elm and sycamore trees at Oak Openings Metropark.

Locations of American Elm Seed Orchards and Potential Geographic Range of Seed Usage



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