Forests for the Future: Adapting Riparian Habitats in Northeast Ohio

Alicia Beattie, Associate Director

CHAGRIN RIVER WATERSHED PARTNERS

Chagrin River Watershed Partners

- Founded in 1996 by watershed communities and park districts
- 34 members
- Supported by member dues, grants, service agreements, and donations

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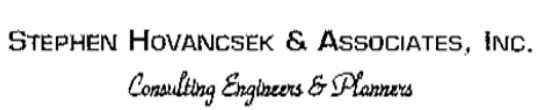
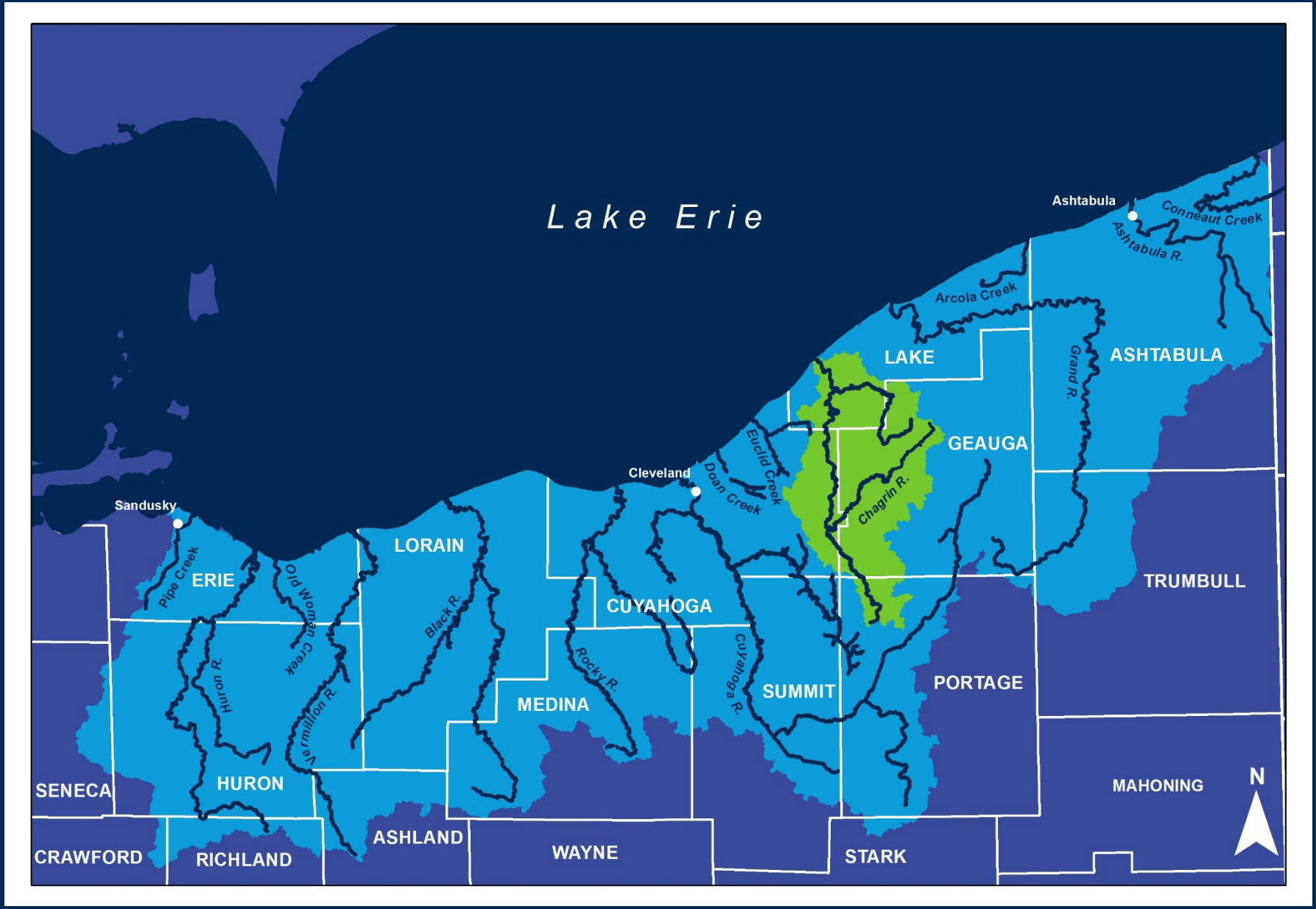
CRWP Sponsors



Central Lake Erie Basin Collaborative



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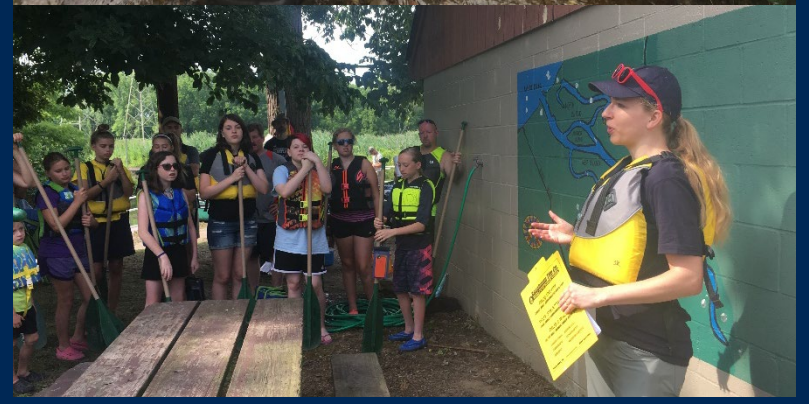
What does CRWP do?

- Watershed planning and project implementation
- Model regulations for natural resource protection
- Direct landowner assistance and public outreach



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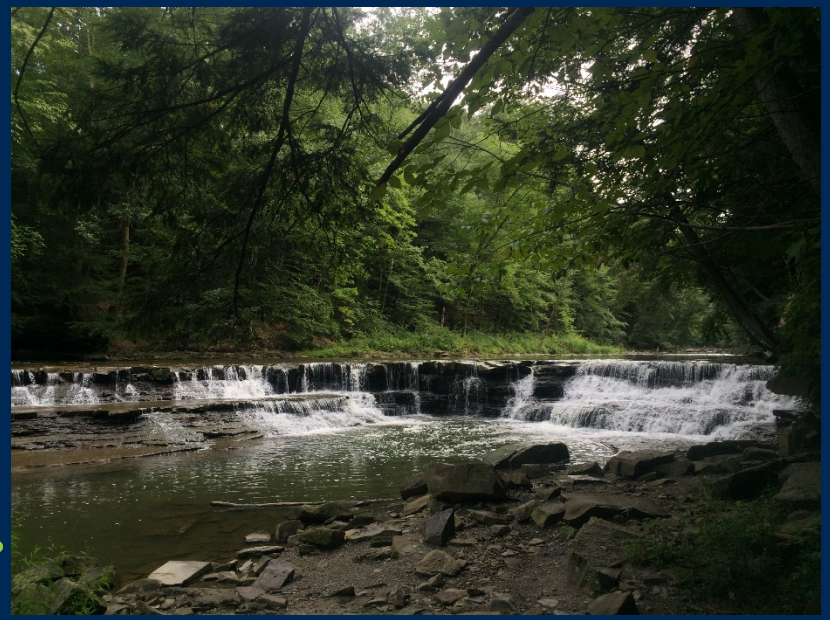
Chagrin River Watershed

- 71 miles designated as State Scenic
- Many high-quality coldwater streams
- State Threatened Ohio Brook Trout
- Forest cover > 50%

Salvelinus fontinalis



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Healthy Streamside Forests:

- Filter nutrients and sediment
- Reduce flooding
- Shade and cool streams
- Sequester carbon
- Provide wildlife habitat
- Enhance recreational opportunities

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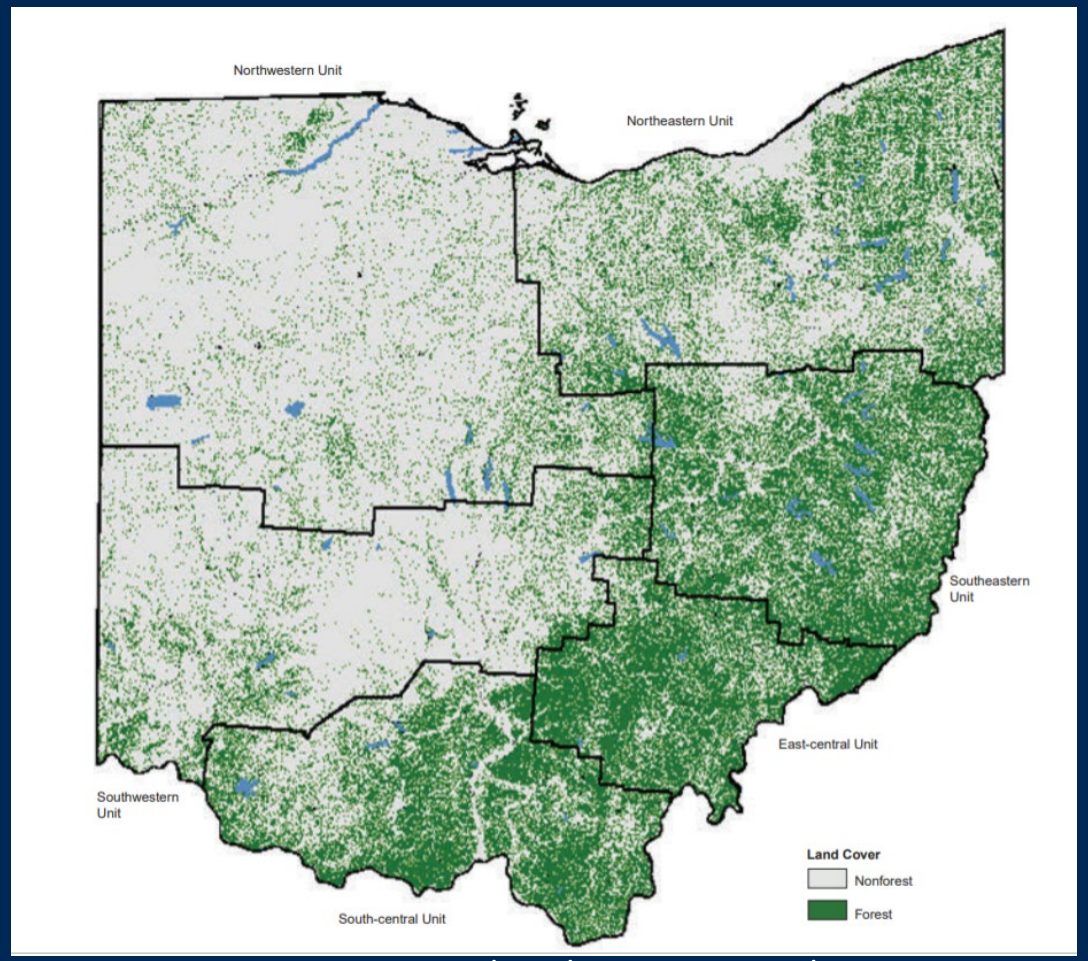
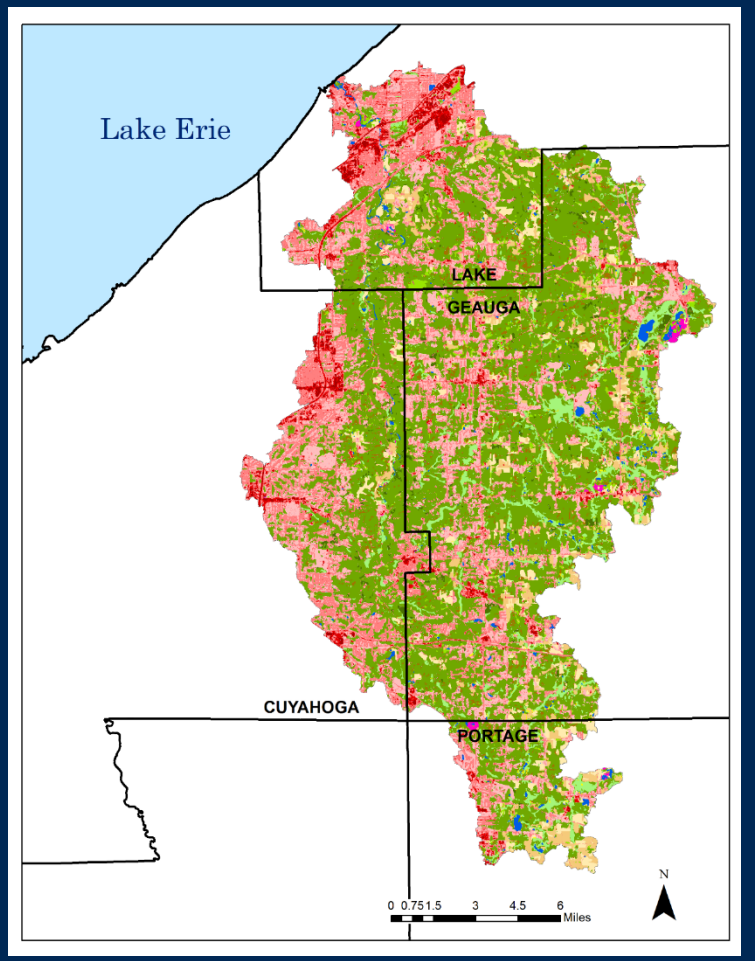
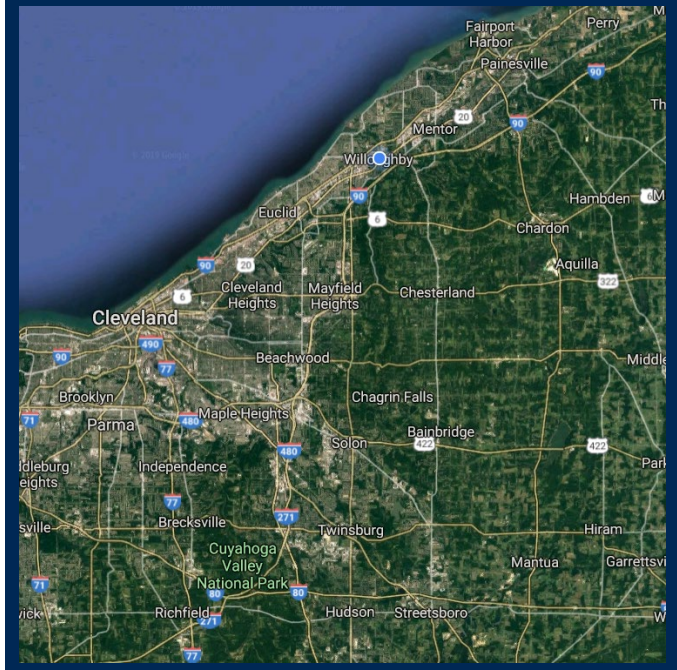
Forests Threats

Urbanization and fragmentation







Source: Forest Inventory and Analysis program, Ohio, 2011.

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Forests Threats

Diseases

Deer browse

Invasive Plants

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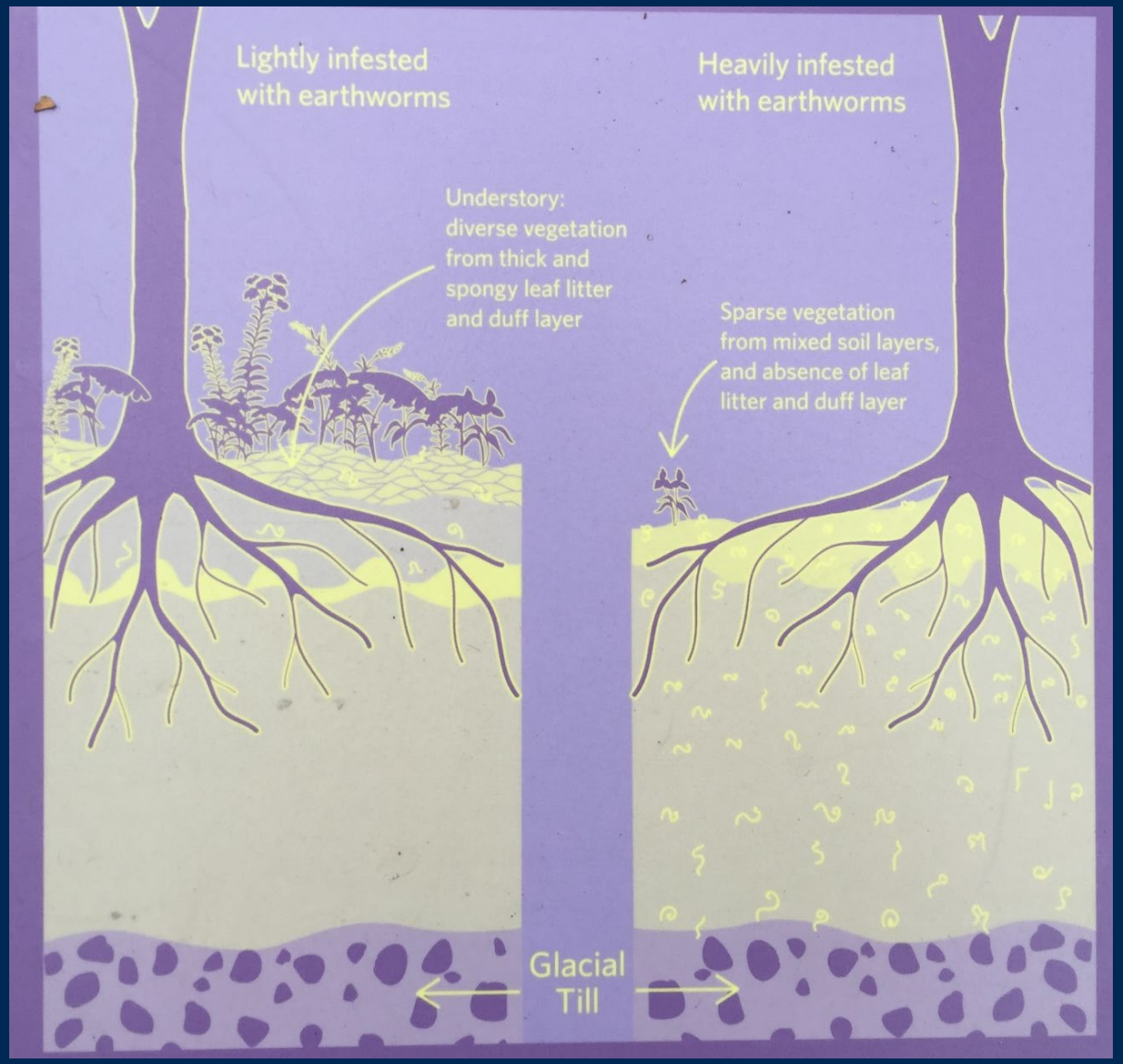
Invasive animals



Educational display at Cleveland Museum of Natural History

EAB

Gypsy moth

HWA

Ohio DNR photos of pests


American beech—striping on leaves
American beech—
severely affected leaves
PHOTOS BY JOHN POGACNIK
Current range of the disease
Year of First Disease Record
2012
2013
2014
2015
2016
2017
LAKEMETROPARKS.COM

Hemlock Wooly Adelgid Sign at Hocking Hills State Park

Trail at Penitentiary Glen, Lake Metroparks

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Impact of Climate Change on Regional Forests

Central Appalachians

Ecosystem Vulnerability Assessment and Synthesis

Soil moisture patterns will change, with drier soil conditions in summer and fall.

Early growth and advance regeneration will be vulnerable to changes in moisture.

Invasive plants, pests, and pathogens will increase or become more damaging.

Suitability for southern species will increase.

Suitability for northern species will decline.

USDA FOREST SERVICE DEPARTMENT OF AGRICULTURE

Northern Institute of Applied Carbon Science

Why focus on forests surrounding coldwater streams?

- Groundwater connections
- Species relying on clean, cold water at risk
- Steep ravines with cooler microclimates serving as critical refugia
- Gems of Northeast Ohio with high species diversity

Stebbins Gulch, Holden Arboretum

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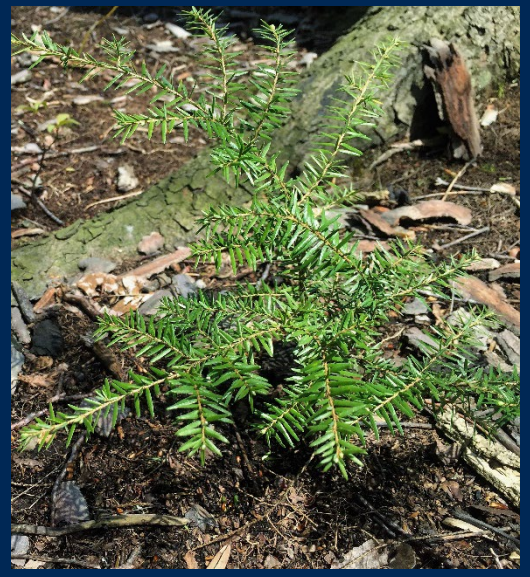
Targeted Riparian Forest Adaptation to Protect Coldwater Streams

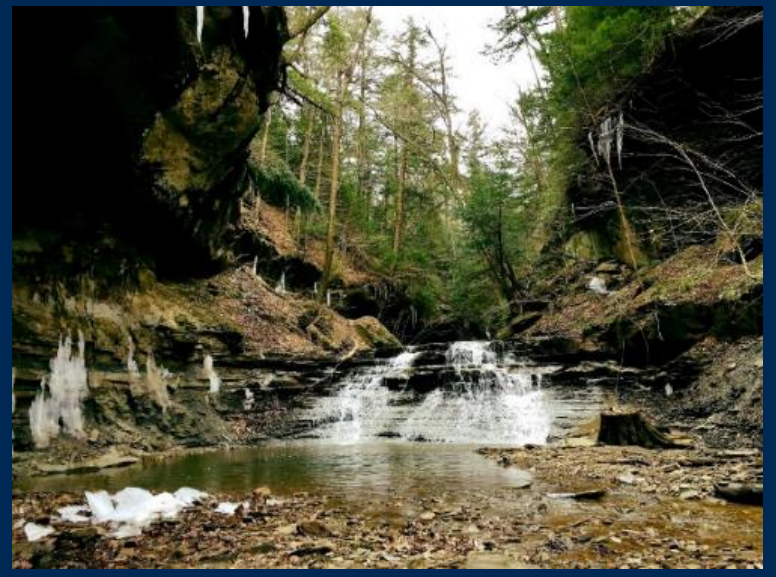
Wildlife Conservation Society

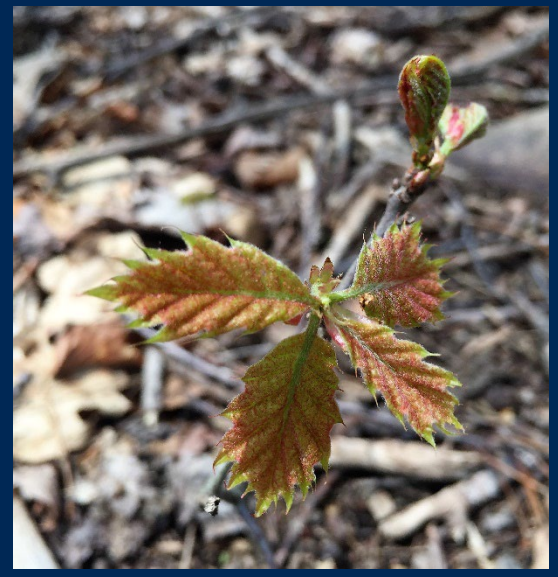
DORIS DUKE CHARITABLE FOUNDATION

Climate Adaptation Fund

- One of 12 projects funded nationwide in 2017
- $181,152 award matched with $184,123 cash and in-kind services
- Project Goal: increase health of 500 acres of forests surrounding coldwater streams in Chagrin and lower Grand river watersheds







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Project Partners

- Cleveland Metroparks
- Cleveland Museum of Natural History Trout Club
- Geauga Park District
- Holden Forests & Gardens
- Lake Erie Allegheny Partnership for Biodiversity
- Lake Metroparks
- Lake County Soil and Water Conservation District
- Lake County Stormwater Management Department
- Ohio Central Basin Steelheaders
- Old Woman Creek National Estuarine Research Reserve
- Think Media Studios
- Village of Gates Mills
- Village of Moreland Hills
- Western Reserve Land Conservancy Dominion watershed mini-grant program

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Project Overview

- Stream and forest assessments
- Consultations with forestry experts
- Management to enhance forest health
  - Complex structure and composition
  - Native species regeneration and invasive species control
  - Shading to protect coldwater streams
- Communications strategy with workshops, video and direct landowner assistance

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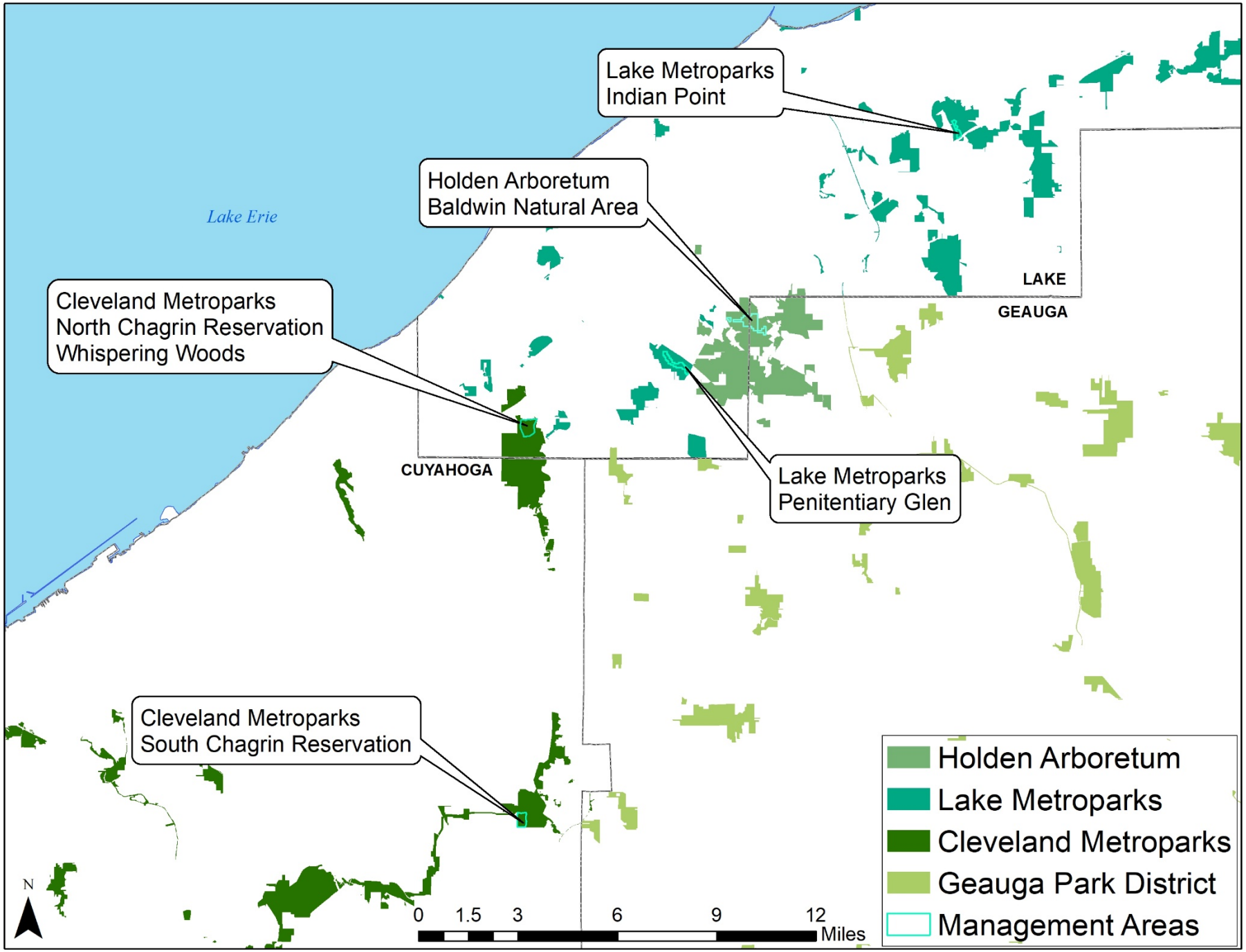

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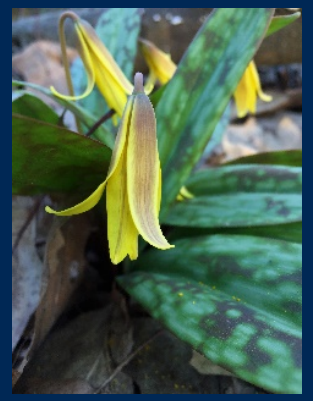
Field Assessments

- Vegetative Index of Biological Integrity (VIBI)
- Spring ephemeral rapid assessment (SERA)
- Rapid Upland Forest Assessment (RUFA)
- Headwater Habitat Evaluation Index (HHEI)
- Surveys for Hemlock Wooly Adelgid and Elongate Hemlock Scale



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Field Days with Advisory Committee April 2018

- Staff from TNC, ODNR Forestry, USFS, The Ohio State University, The Wilderness Center, project partners
- Collaborative dialogue to discuss issues and adaptation strategies across sites

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Cleveland Metroparks Sites

South Chagrin Reservation

North Chagrin Reservation

Photo credit: Dr. Constance Hausman

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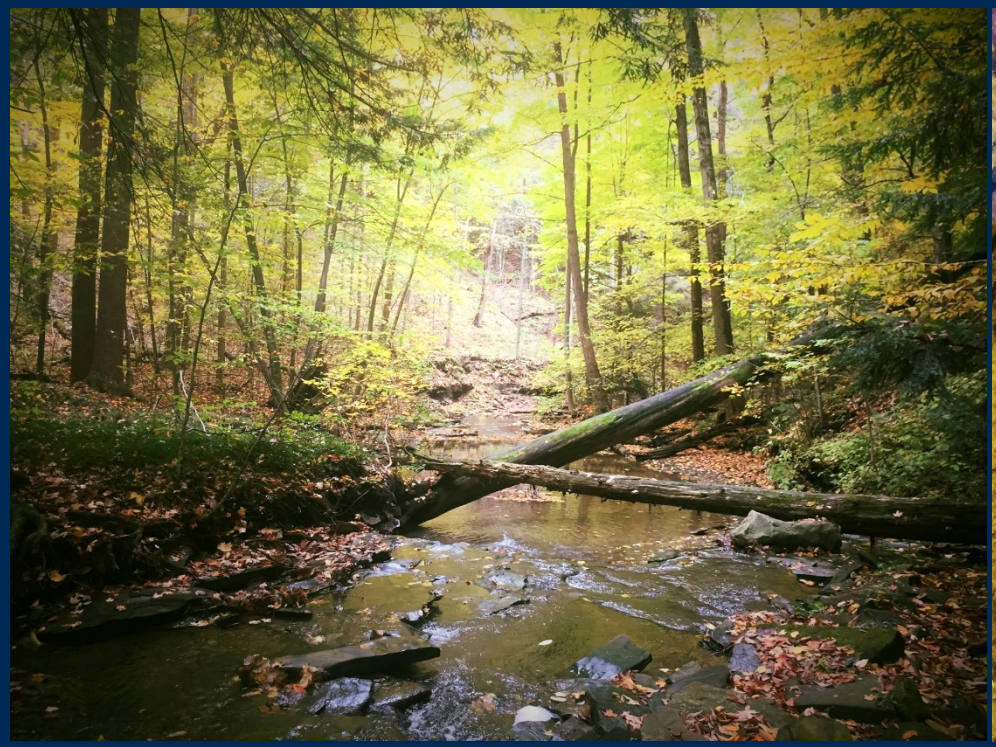
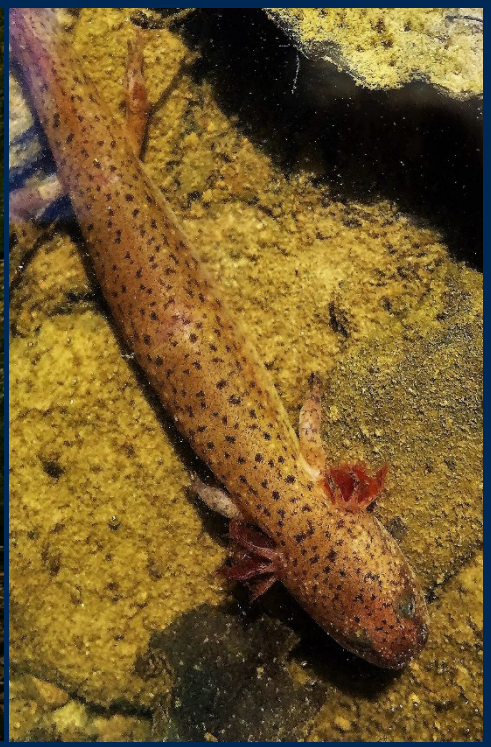
Lake Metroparks Sites

Penitentiary Glen





Indian Point

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Hemlock Treatments at Penitentiary Glen

Measuring basal area

Dinotefuran treatment

Treated hemlocks

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Holden Arboretum Sites

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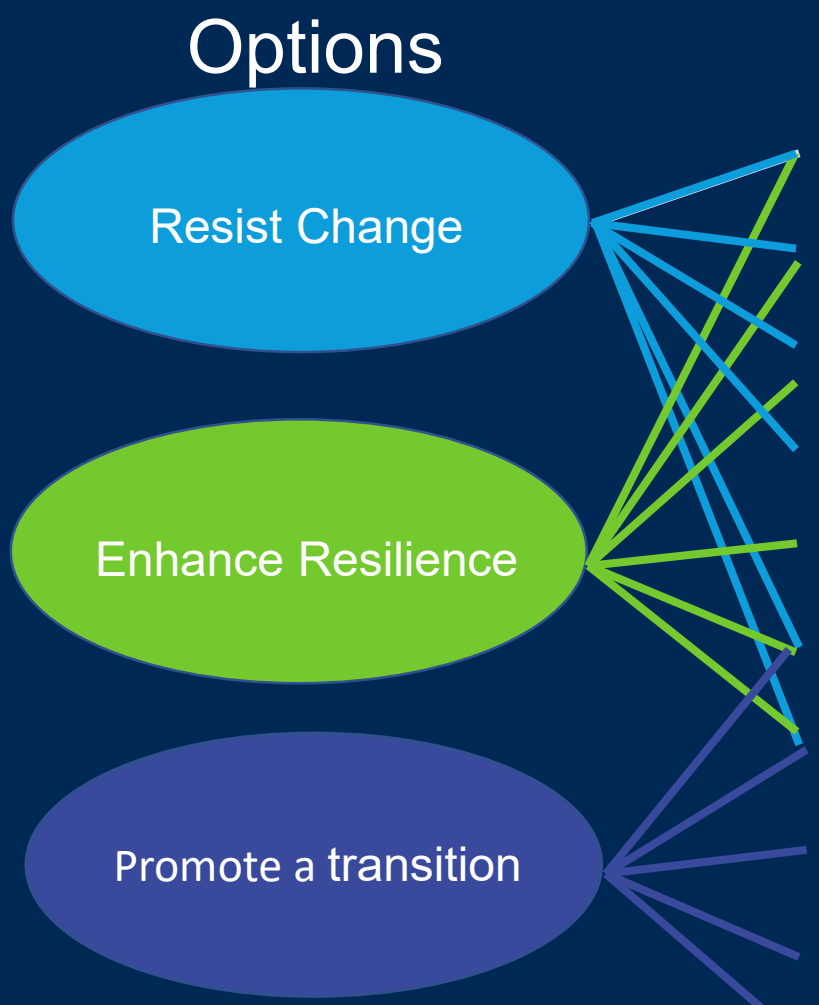
Adaptation Strategies and Approaches



Strategies

1: Sustain fundamental ecological functions.
2: Reduce existing biological stressors.
3: Reduce impacts of severe disturbances.
4: Maintain or create refugia.
5: Enhance species and structural diversity.
6: Promote ecosystem redundancy.
7: Increase landscape connectivity.
8: Enhance genetic diversity.
9: Facilitate species transitions.
10: Realign after disturbance.

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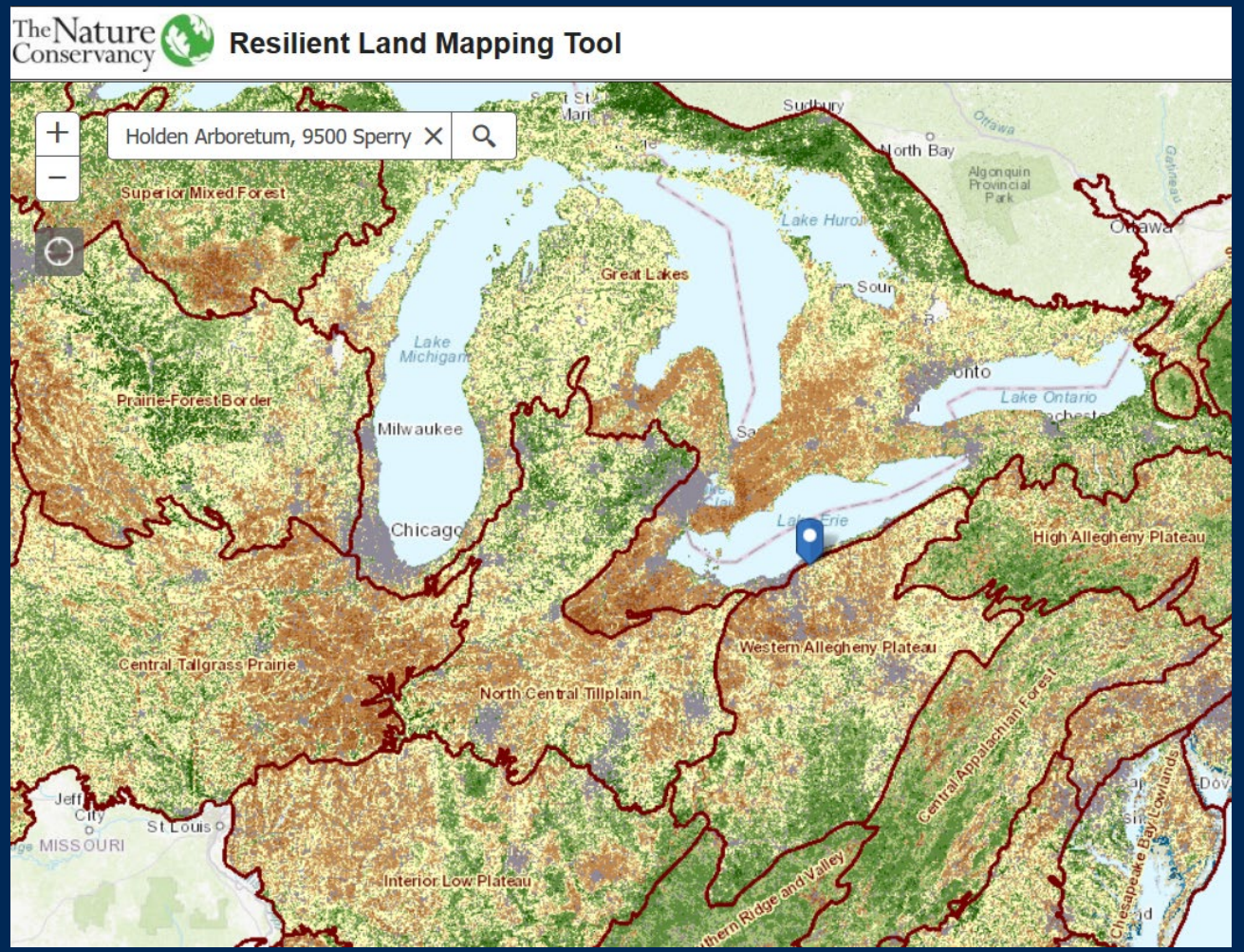
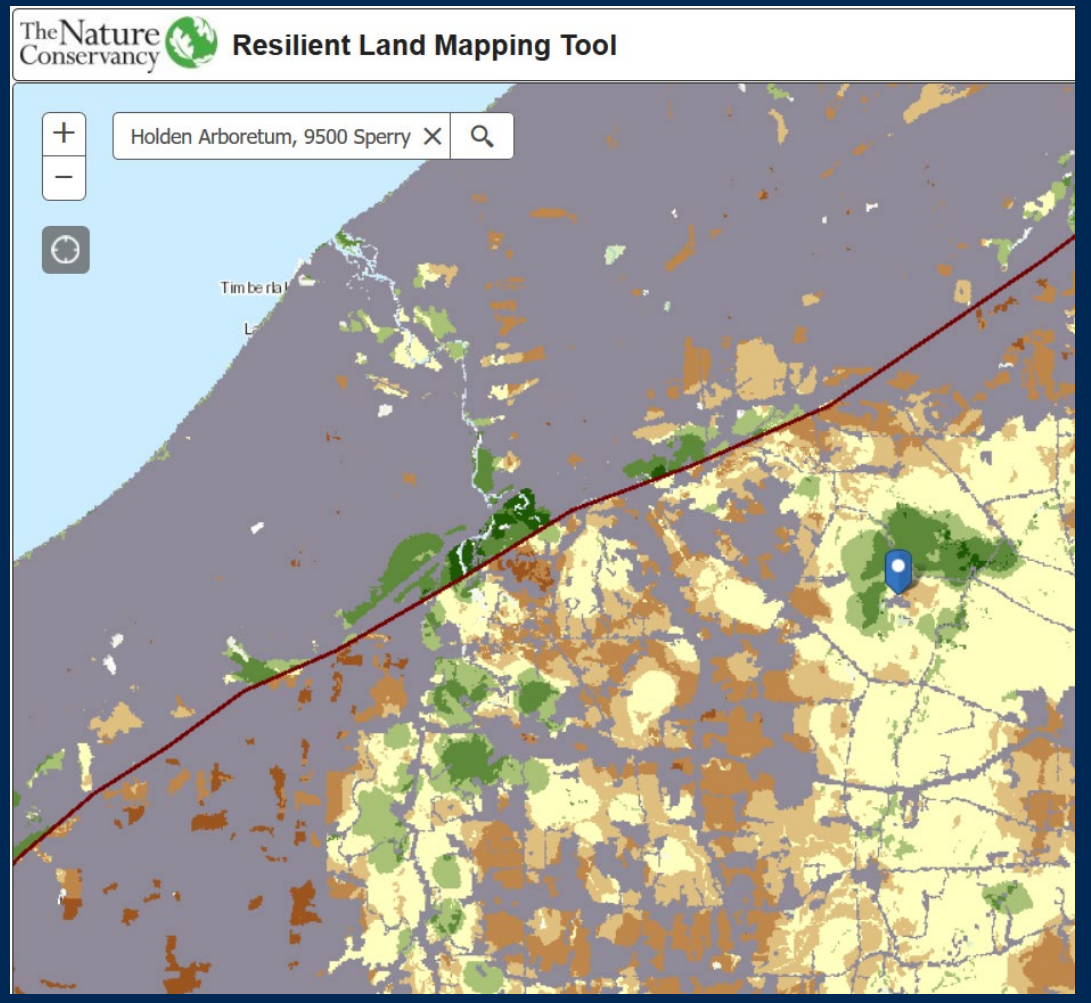
Source: Patricia Leopold. www.adaptationworkbook.org/niacs-strategies





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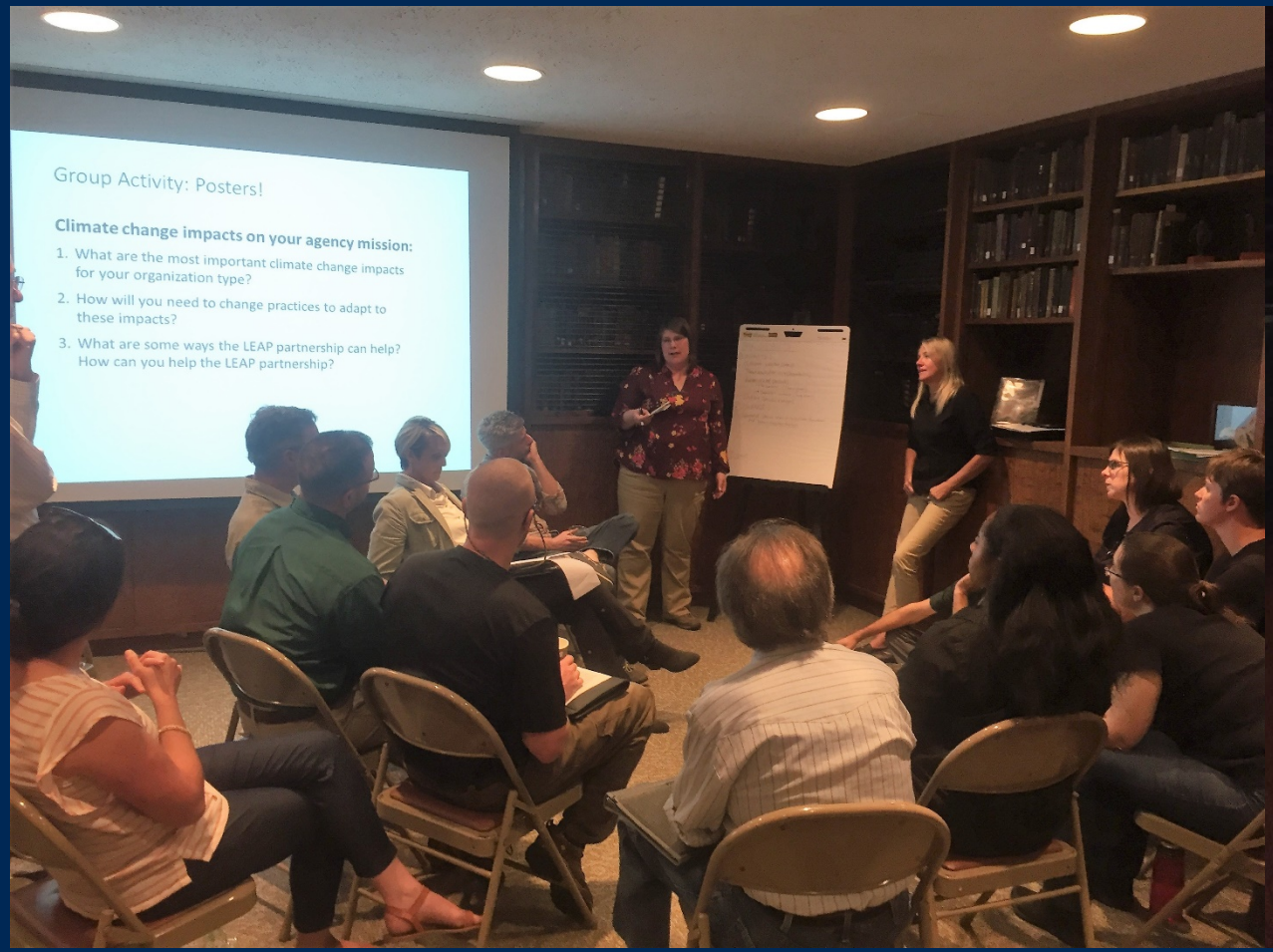
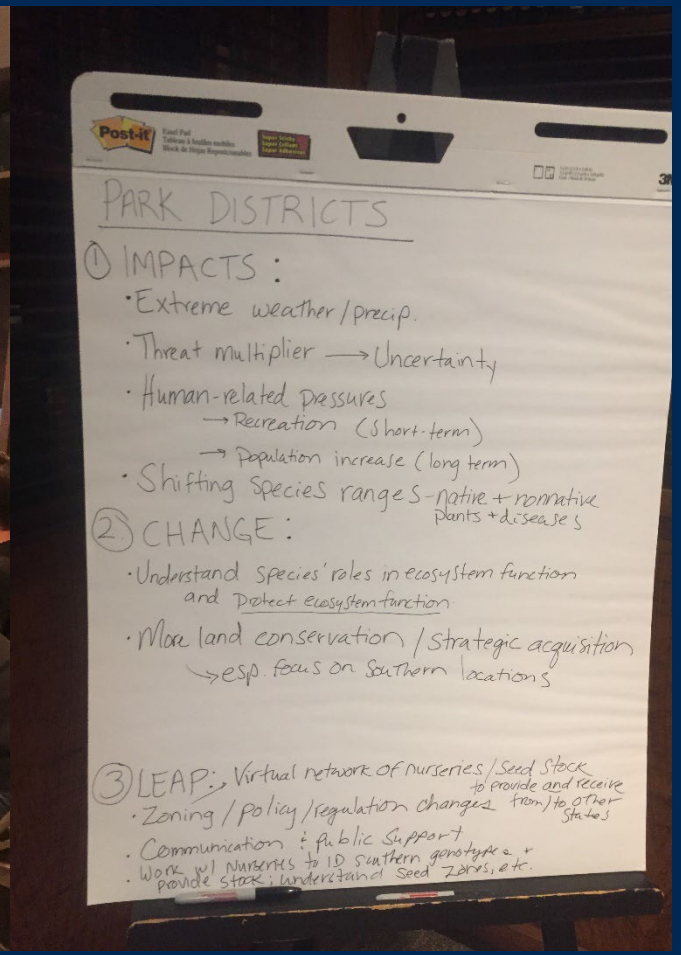
LEAP Biodiversity Vision

Workshop on Climate Change Vulnerability and Adaptation held Sept 19, 2018





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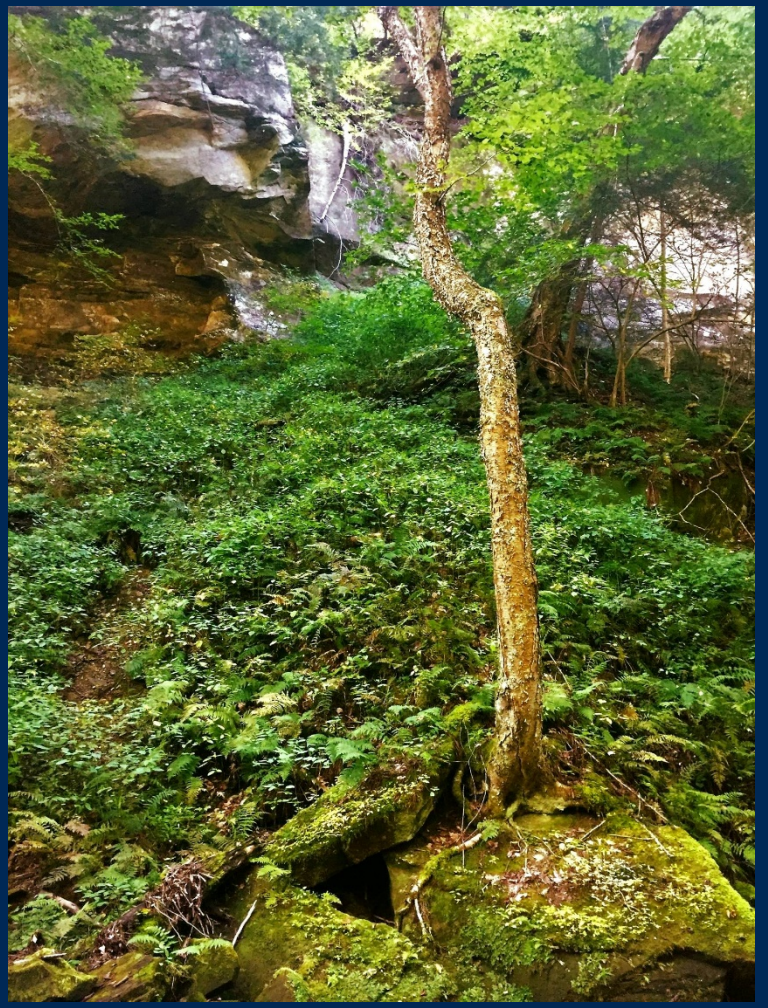
Changing Climate, Changing Trees

Forest is the dominant native habitat of the LEAP region, and our forests will be altered significantly by climate change in the coming decades. More than a third of the region's tree species will be less able to survive here by the end of the century, according to a study of the LEAP region by scientists at the U.S. Forest Service Landscape Change Research Group.



Tree Habitat Suitability Modeling for LEAP Region completed in 2018 by USFS Northern Research Station and Northern Institute of Applied Climate Science

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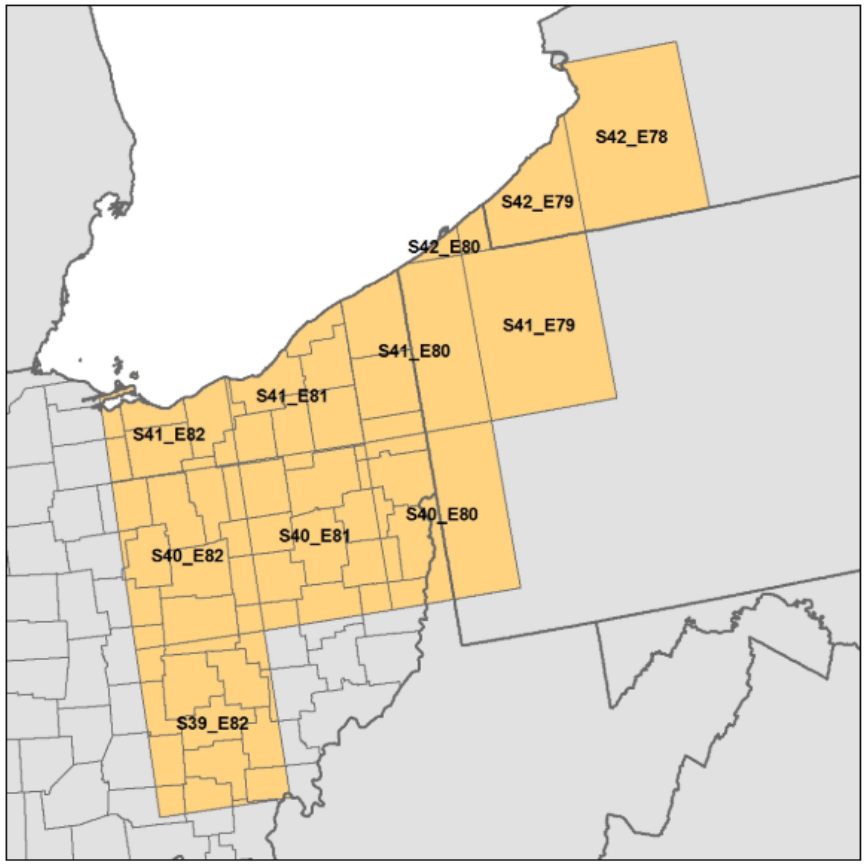
Tree species tables for 1x1 degree grids



1x1 degree grids of the LEAP region

S41_E81_GJJM_Distrib2

One Degree Grid
Distrib2 Output for Species
Current and Potential Future Habitat and Capability

Landscape Change Research Group
Iverson, Peters, Prasad, Matthews
USFS Northern Research Station
Delaware, OH

Common_Name	PC	Scientific_Name	ModRel	%CellFIA	FIAiv	FIAsum	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	%OccCol	%2Col	%AnyCol	HQCL45	HQCL85	N
white oak	1	Quercus alba	Medium	18.8	9	53.8	Sm. inc.	No change	6.1	Common	Very Good	Good	56.2	68	68	2.75	2.63	1
yellow-poplar	1	Liriodendron tulipifera	High	63.3	13.5	194.4	No change	No change	5.3	Abundant	Very Good	Very Good	79.5	53.2	53.2	3.34	2.99	2
bitternut hickory	1	Carya cordiformis	Low	46.2	5.9	83	No change	No change	5.6	Abundant	Very Good	Very Good	78.6	51	51	2.97	2.98	3
northern red oak	1	Quercus rubra	Medium	85.3	8	161.5	No change	Sm. dec.	5.4	Abundant	Very Good	Good	79.8	36.7	36.7	3	3	4
sugar maple	1	Acer saccharum	High	96.2	14.3	343.1	No change	Sm. dec.	5.8	Abundant	Very Good	Good	79.6	30.1	30.1	4.68	3.51	5
boxelder	1	Acer negundo	Low	4.9	3	11.6	No change	No change	7.4	Common	Good	Good	46.8	72.7	72.7	2.52	2.53	6
black walnut	1	Juglans nigra	Low	22.7	3.7	18.8	Sm. inc.	Sm. inc.	4	Common	Good	Good	62.7	66.5	66.5	2.75	2.75	7
eastern hophornbeam; i	1	Ostrya virginiana	Low	10	1.7	13	No change	Sm. dec.	6.4	Common	Good	Fair	70.9	65.3	65.3	2.86	2.91	8
shagbark hickory	1	Carya ovata	Medium	60.9	5.3	88.6	No change	No change	4.4	Abundant	Good	Good	79.1	44.5	44.5	2.99	2.99	9
green ash	1	Fraxinus pennsylvanica	Low	71.6	10.2	199.1	No change	No change	4	Abundant	Good	Good	79.8	35.9	35.9	3	3.82	10
bur oak	1	Quercus macrocarpa	Medium	3.3	6.6	10.8	No change	No change	6.4	Common	Good	Good	5.2	31.8	50.9	0	1	11
American elm	1	Ulmus americana	Medium	99.6	7.2	200.5	No change	Sm. inc.	4	Abundant	Good	Very Good	79.8	25.1	25.1	3.94	5.86	12
sweetgum	1	Liquidambar styraciflua	High	1.3	0.5	0.7	Lg. inc.	Lg. inc.	4.1	Rare	Good	Good	4.2	16.2	35	1	1.03	13
red maple	1	Acer rubrum	High	100	18.6	620.8	Sm. dec.	Lg. dec.	8.5	Abundant	Good	Good	79.8	11.8	11.8	5.32	3	14
black oak	1	Quercus velutina	High	8	17.3	14.5	No change	No change	4.9	Common	Fair	Fair	16.5	77.4	78.1	1.77	1.88	15
slippery elm	1	Ulmus rubra	Low	8.5	3.8	15.3	No change	No change	4.8	Common	Fair	Fair	61.4	72.4	72.4	2.74	2.74	16
black locust	1	Robinia pseudoacacia	Low	21.2	7.8	27.9	No change	No change	3.8	Common	Fair	Fair	79.3	71.5	71.5	2.99	2.99	17
Osage-orange	1	Maclura pomifera	Medium	2.8	13.9	19.7	Sm. dec.	Sm. dec.	6.3	Common	Fair	Fair	24	66.4	73.3	1	2.09	18
pin oak	1	Quercus palustris	Low	47.1	11	80.8	Sm. dec.	Sm. dec.	2.8	Abundant	Fair	Fair	77.7	57.6	57.6	2.93	2.96	19
silver maple	1	Acer saccharinum	Low	31.1	5.9	59.5	Sm. dec.	No change	5.6	Common	Fair	Good	79.4	55.4	55.4	3	3	20
blackgum	1	Nyssa sylvatica	Medium	25.8	3.5	33.6	Lg. dec.	Sm. dec.	5.9	Common	Fair	Fair	79.5	53.8	53.8	2.99	2.99	21
American beech	1	Fagus grandifolia	High	65.8	8	152.4	Sm. dec.	Lg. dec.	3.6	Abundant	Fair	Fair	77.9	42.3	42.3	2.97	3	22
white ash	1	Fraxinus americana	Medium	99.6	11.7	202.4	No change	No change	2.7	Abundant	Fair	Fair	79.8	32.4	32.4	4.75	3.36	23
black cherry	1	Prunus serotina	Medium	100	13.9	299.1	Sm. dec.	Sm. dec.	3	Abundant	Fair	Fair	79.8	24.5	24.5	4.28	3	24
flowering dogwood	2	Cornus florida	Medium	2	1	1.5	No change	No change	5	Rare	Poor	Poor	18.3	76.7	76.7	1.62	1.21	25
serviceberry	0	Amelanchier spp.	Low	2.6	2	3.4	No change	Lg. dec.	4.8	Rare	Poor	Very Poor	40.4	76.6	76.7	0	0	26
pignut hickory	2	Carya glabra	Medium	2.6	3.4	4.3	No change	Sm. dec.	4.7	Rare	Poor	Very Poor	12.3	76.4	77.1	1.87	1.63	27
black willow	0	Salix nigra	Low	11.6	4.2	10.8	No change	No change	2.8	Common	Poor	Poor	35.8	75	75	2.99	2.31	28
sycamore	0	Platanus occidentalis	Low	7.9	16.6	51.2	Sm. dec.	Sm. dec.	4.8	Common	Poor	Poor	56.9	73.7	73.9	2.65	2.62	29
quaking aspen	0	Populus tremuloides	High	6.6	3.2	6.2	Sm. dec.	Sm. dec.	4.7	Common	Poor	Poor	33.2	72.2	74.4	0	0	30
cucumbertree	0	Magnolia acuminata	Low	8.4	2.2	10.7	Sm. dec.	Sm. dec.	3.6	Common	Poor	Poor	46.2	70.8	70.8	0	0	31
yellow birch	0	Betula alleghaniensis	High	5	3.4	8.4	Sm. dec.	Sm. dec.	3.4	Common	Poor	Poor	36.8	69.6	73.2	0	0	32
American hornbeam; m	0	Carpinus caroliniana	Low	5.9	1.5	8.5	Sm. dec.	Sm. dec.	5.1	Common	Poor	Poor	69.8	69.3	69.3	0	0	33
swamp white oak	0	Quercus bicolor	Low	16.1	6.4	24.9	Lg. dec.	Lg. dec.	4.9	Common	Poor	Poor	50.4	68.6	68.6	2.89	0	34
sassafras	0	Sassafras albidum	Low	21.6	3.4	26.7	Sm. dec.	Lg. dec.	4.2	Common	Poor	Poor	78.2	65.9	65.9	2.97	3	35
eastern cottonwood	0	Populus deltoides	Low	31	10.6	59.6	Sm. dec.	Sm. dec.	3.9	Common	Poor	Poor	72.5	62.8	62.8	2.95	2.94	36
bigtooth aspen	0	Populus grandidentata	Medium	19.3	3.4	25.4	Lg. dec.	Lg. dec.	5.1	Common	Poor	Poor	69.4	60.4	60.4	0	0	37
scarlet oak	2	Quercus coccinea	Medium	0	0.4	0.1	No change	Lg. dec.	4.6	Rare	Poor	Very Poor	3.2	57.4	71.3	1	0	38
American basswood	0	Tilia americana	Medium	52.2	6.2	71.8	Lg. dec.	Lg. dec.	4.6	Common	Poor	Poor	79.8	49.5	49.5	3	3	39
black maple	0	Acer nigrum	Low	1.1	2.6	1.4	Lg. dec.	Very Lg. dec.	5.2	Rare	Poor	Lost	3.8	22.8	46.8	0	0	40
chinkapin oak	2	Quercus muehlenbergii	Medium	1.1	3	1.5	No change	No change	4.8	Rare	Poor	Poor	4	19.1	40.3	1.01	1.17	41
swamp chestnut oak	0	Quercus michauxii	Low	1.1	1.6	0.8	No change	Sm. dec.	4.6	Rare	Poor	Very Poor	3.8	13.2	24.9	0	0	42
eastern white pine	0	Pinus strobus	High	24.1	8	55.1	Lg. dec.	Very Lg. dec.	3.3	Common	Very Poor	Lost	51.1	66.1	66.1	2.42	0	43
eastern hemlock	0	Tsuga canadensis	High	2.7	3.1	4.3	Lg. dec.	Very Lg. dec.	2.7	Rare	Very Poor	Lost	8.9	65.6	73.6	0	0	44
black ash	0	Fraxinus nigra	Medium	0	0.9	1.2	Very Lg. dec.	Very Lg. dec.	1.7	Rare	Lost	Lost	11.8	60.3	70.8	0	0	45
pin cherry	0	Prunus pensylvanica	Low	2.1	0	0	Unknown	Unknown	4.2	Modeled	Unknown	Unknown	0	74	78.6	0	0	46
sweet birch	0	Betula lenta	High	6	0	0	Unknown	Unknown	3.2	Modeled	Unknown	Unknown	0	62.1	75	0	0	47
Virginia pine	0	Pinus virginiana	High	12	0	0	Unknown	Unknown	3.8	Modeled	Unknown	Unknown	0	30.5	57.3	0	0	48
American mountain-ash	0	Sorbus americana	Low	0	0	0	Unknown	Unknown	3.1	Absent	Unknown	Unknown	0	0.1	5.2	NA	NA	49
slash pine	0	Pinus elliottii	High	0	0	0	Unknown	New Habitat	4.3	Absent	Unknown	New Habitat	0	0	0	0	0	50
bluejack oak	0	Quercus incana	Low	0	0	0	Unknown	Unknown	4.8	Absent	Unknown	Unknown	0	0	0	0	0	51
mockernut hickory	3	Carya alba	Medium	0	0	0	New Habitat	New Habitat	5.4	Absent	New Habitat	New Habitat	5.5	77.7	79.4	1.49	1.47	52
eastern redbud	3	Cercis canadensis	Low	0	0	0	New Habitat	New Habitat	4.9	Absent	New Habitat	New Habitat	0	55.2	72	1	1	53

www.fs.fed.us/nrs/atlas

Study credits

- U.S. Forest Service Northern Research Station, Landscape Change Research Group: Louis Iverson, Anantha Prasad, Matt Peters, Steve Matthews
- Northern Institute of Applied Climate Science: Patricia Leopold

Resilient Forested Landscapes for the Future

- Requires regional communication and partnerships
- Tough questions about the best way to focus management efforts
- Range of strategies and approaches available for sustainable management, conservation, and restoration of forests

CHAGRIN RIVER WATERSHED PARTNERS

Thank you! Questions?

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