HUC 040203 Lake Superior

HUC 6 Watershed
Climate Change Atlas Tree Species
Current and Potential Future Habitat, Capability, and Migration

USDA Forest Service
Northern Research Station
Landscape Change Research Group
Iverson, Peters, Prasad, Matthews

	sq. km	sq. mi	FIA Plots
Area of Region	84,708	32,706	40

Species Information

The columns below provide breif summaries of the species associated with the region and described in the table on the next pages. Definitions are provided in the Excel file for this region.

Genus	Species
Ash	2
Hickory	0
Maple	4
Oak	1
Pine	3
Other	19
	29

Abundance	
Abundant	0
Common	0
Rare	29
Absent	29
	58

	Model Reliability	Adaptability
High	19	17
Medium	22	30
Low	17	12
FIA	1	
	59	**59**

Potential Change in Habitat Suitability

	Scenario RCP45	Scenario RCP85
Increase	14	14
No Change	6	6
Decrease	8	8
New	29	29
Unknown	2	2
	59	**59**

Capability to Cope or Persist

	Scenario RCP45	Scenario RCP85
Very Good	0	0
Good	6	7
Fair	10	8
Poor	3	4
Very Poor	8	8
FIA Only	1	1
Unknown	1	1
	29	**29**

Migration Potential

	SHIFT RCP45	SHIFT RCP85
Likely	6	6
Infill	11	11
Migrate	5	9
	22	**26**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	32.3	32.4	32.6	32.6
	CCSM85	32.3	32.5	32.6	32.8
	GFDL45	32.3	32.5	32.6	32.7
	GFDL85	32.3	32.5	32.7	33.0
	HAD45	32.3	32.5	32.7	32.8
	HAD85	32.3	32.5	32.7	33.0
Growing Season May—Sep	CCSM45	33.2	33.2	33.3	33.3
	CCSM85	33.2	33.3	33.4	33.6
	GFDL45	33.2	33.4	33.6	33.7
	GFDL85	33.2	33.4	33.6	33.9
	HAD45	33.2	33.3	33.4	33.5
	HAD85	33.2	33.3	33.5	33.7
Coldest Month Average	CCSM45	31.0	31.1	31.2	31.2
	CCSM85	31.0	31.1	31.2	31.3
	GFDL45	31.0	31.2	31.3	31.3
	GFDL85	31.0	31.2	31.3	31.5
	HAD45	31.0	31.2	31.4	31.4
	HAD85	31.0	31.3	31.4	31.7
Warmest Month Average	CCSM45	33.5	33.6	33.6	33.6
	CCSM85	33.5	33.6	33.7	33.8
	GFDL45	33.5	33.7	33.8	33.9
	GFDL85	33.5	33.7	33.9	34.0
	HAD45	33.5	33.6	33.7	33.8
	HAD85	33.5	33.6	33.7	33.9

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	1.3	1.4	1.4	1.3
	CCSM85	1.3	1.3	1.4	1.4
	GFDL45	1.3	1.4	1.5	1.5
	GFDL85	1.3	1.4	1.6	1.6
	HAD45	1.3	1.4	1.4	1.4
	HAD85	1.3	1.4	1.5	1.5
Growing Season May—Sep	CCSM45	.6	.7	.6	.6
	CCSM85	.6	.6	.6	.6
	GFDL45	.6	.7	.7	.7
	GFDL85	.6	.7	.8	.7
	HAD45	.6	.6	.6	.6
	HAD85	.6	.6	.6	.6

NOTE: For the six climate variables, four 30-year periods are used to indicate six potential future trajectories. The period ending in 2009 is based on modeled observations from the PRISM Climate Group and the three future periods were obtained from the NASA NEX-DCP30 dataset. Future climate projections from three models under two emission scenarios show estimates of each climate variable within the region. The three models are CCSM4, GFDL CM3, and HadGEM2-ES and the emission scenarios are the 4.5 and 8.5 RCP. The average value for the region is reported, even though locations within the region may vary substantially based on latitude, elevation, land-use, or other factors.

Cite as: Iverson, L.R.; Prasad, A.M.; Peters, M.P.; Matthews, S.N. 2019. Facilitating Adaptive Forest Management under Climate Change: A Spatially Specific Synthesis of 125 Species for Habitat Changes and Assisted Migration over the Eastern United States. Forests. 10(11): 989. https://doi.org/10.3390/f10110989.

HUC 040203 Lake Superior

HUC 6 Watershed

Climate Change Atlas Tree Species

Current and Potential Future Habitat, Capability, and Migration

USDA Forest Service
Northern Research Station
Landscape Change Research Group
Iverson, Peters, Prasad, Matthews

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
northern white-cedar	Thuja occidentalis	WSH	High	58.8	26.6	9.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	1
paper birch	Betula papyrifera	WDH	High	59.9	24.8	8.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	2
sugar maple	Acer saccharum	WDH	High	36.6	19.4	3.3	No change	No change	High	Rare	Fair	Fair			1	3
red maple	Acer rubrum	WDH	High	19.1	15.6	1.5	Sm. inc.	Sm. inc.	High	Rare	Good	Good			1	4
white spruce	Picea glauca	NSL	Medium	63.9	14.9	4.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	5
yellow birch	Betula alleghaniensis	NDL	High	36.4	14.8	7.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	6
quaking aspen	Populus tremuloides	WDH	High	33.5	11.1	6.1	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	7
balsam fir	Abies balsamea	NDH	High	43.7	10.6	2.1	No change	No change	Low	Rare	Very Poor	Very Poor			0	8
black spruce	Picea mariana	NSH	High	49.4	9.0	3.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	9
eastern white pine	Pinus strobus	WDH	High	13.6	2.3	1.4	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair			1	10
American beech	Fagus grandifolia	WDH	High	2.5	1.9	3.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	11
eastern hemlock	Tsuga canadensis	NSH	High	4.4	1.4	0.4	Sm. inc.	Sm. inc.	Low	Rare	Poor	Poor	Infill +	Infill +	2	12
jack pine	Pinus banksiana	NSH	Medium	6.6	1.3	1.8	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	13
bigtooth aspen	Populus grandidentata	NSL	Medium	0.6	1.2	0.5	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	14
black ash	Fraxinus nigra	WSH	Medium	21.6	0.9	0.9	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair			1	15
red pine	Pinus resinosa	NSH	Medium	0.6	0.4	0.2	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	16
American basswood	Tilia americana	WSL	Medium	3.2	0.4	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	17
pin cherry	Prunus pensylvanica	NSL	Low	13.7	0.2	0.4	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	18
striped maple	Acer pensylvanicum	NSL	Medium	1.4	0.2	0.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	19
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	2.5	0.2	0.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	20
balsam poplar	Populus balsamifera	NSH	Medium	8.8	0.1	0.3	Sm. inc.	No change	Medium	Rare	Fair	Poor	Infill +		1	21
mountain maple	Acer spicatum	NSL	Low	2.2	0.0	0.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	22
American mountain-ash	Sorbus americana	NSL	Low	8	0.0	0.2	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	23
serviceberry	Amelanchier spp.	NSL	Low	0.8	0.0	0.0	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	24
green ash	Fraxinus pennsylvanica	WSH	Low	0.8	0.0	0.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	25
chokecherry	Prunus virginiana	NSLX	FIA	0.7	0.0	0.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	26
black cherry	Prunus serotina	WDL	Medium	0.8	0.0	0	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	27
northern red oak	Quercus rubra	WDH	Medium	0.7	0.0	0.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	28
American elm	Ulmus americana	WDH	Medium	0.7	0.0	0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	29
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	30
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	31
tamarack (native)	Larix laricina	NSH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	32
boxelder	Acer negundo	WSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	33
silver maple	Acer saccharinum	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	34
sweet birch	Betula lenta	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	35
bitternut hickory	Carya cordiformis	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	36
pignut hickory	Carya glabra	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	37
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	38
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	39
white ash	Fraxinus americana	WDL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	40
black walnut	Juglans nigra	WDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	41
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	42
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	43
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	44
eastern cottonwood	Populus deltoides	NSH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	45
white oak	Quercus alba	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	46
swamp white oak	Quercus bicolor	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	47

HUC 040203 Lake Superior

HUC 6 Watershed

Climate Change Atlas Tree Species

Current and Potential Future Habitat, Capability, and Migration

USDA Forest Service
Northern Research Station
Landscape Change Research Group
Iverson, Peters, Prasad, Matthews

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	48
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	49
bur oak	Quercus macrocarpa	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	50
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	51
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	52
black oak	Quercus velutina	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	53
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	54
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	55
black willow	Salix nigra	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	56
sassafras	Sassafras albidum	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	57
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	58
slippery elm	Ulmus rubra	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	59