Manistee

National Forests and Grasslands
Climate Change Atlas Tree Species
Current and Potential Future Habitat, Capability, and Migration

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Iverson, Peters, Prasad, Matthews

	sq. km	sq. mi	FIA Plots
Area of Region	8,565.8	3,307.3	407

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	3
Hickory	1
Maple	5
Oak	6
Pine	4
Other	28
	47

Abundance	
Abundant	7
Common	15
Rare	25
Absent	19
	66

	Model Reliability	Adaptability
High	21	18
Medium	23	34
Low	19	12
FIA	3	
	66	**64**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	13	11
No Change	6	9
Decrease	25	24
New	16	16
Unknown	6	6
	66	**66**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	4	3
Good	10	9
Fair	8	10
Poor	9	9
Very Poor	9	10
FIA Only	1	1
Unknown	3	3
	44	**45**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	3	3
Infill	2	2
Migrate	3	5
	8	**10**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	45.6	47.5	50.5	50.4
	CCSM85	45.6	48.2	51.2	54.5
	GFDL45	45.6	48.5	51.4	52.6
	GFDL85	45.6	48.9	52.5	57.1
	HAD45	45.6	49.0	52.2	54.1
	HAD85	45.6	49.2	53.6	59.2
Growing Season May—Sep	CCSM45	63.0	64.7	67.1	67.4
	CCSM85	63.0	65.3	67.9	71.8
	GFDL45	63.0	66.7	70.4	72.3
	GFDL85	63.0	67.4	71.8	77.1
	HAD45	63.0	66.8	69.0	71.6
	HAD85	63.0	66.3	71.1	77.0
Coldest Month Average	CCSM45	19.7	21.6	24.6	24.1
	CCSM85	19.7	22.7	25.0	27.2
	GFDL45	19.7	21.8	23.5	23.8
	GFDL85	19.7	22.7	24.1	26.3
	HAD45	19.7	21.3	25.0	25.2
	HAD85	19.7	23.5	26.2	30.2
Warmest Month Average	CCSM45	69.1	71.1	72.5	72.9
	CCSM85	69.1	72.1	73.8	75.8
	GFDL45	69.1	72.7	74.5	75.7
	GFDL85	69.1	73.5	75.7	78.5
	HAD45	69.1	73.3	74.5	76.3
	HAD85	69.1	73.6	76.4	80.6

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	35.2	34.8	34.0	35.2
	CCSM85	35.2	35.9	35.4	36.2
	GFDL45	35.2	37.5	40.7	40.3
	GFDL85	35.2	38.9	42.2	43.2
	HAD45	35.2	36.3	37.9	37.7
	HAD85	35.2	38.1	36.9	39.9
Growing Season May—Sep	CCSM45	17.1	17.5	16.6	17.2
	CCSM85	17.1	17.7	17.2	16.5
	GFDL45	17.1	17.6	19.7	19.5
	GFDL85	17.1	19.3	19.3	19.9
	HAD45	17.1	16.7	15.9	16.5
	HAD85	17.1	17.5	14.5	15.6

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.

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
red pine	Pinus resinosa	NSH	Medium	65.5	1416.7	21.2	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	1
red maple	Acer rubrum	WDH	High	90.8	1232.0	13.0	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
white oak	Quercus alba	WDH	Medium	73.7	914.7	12.2	No change	Sm. dec.	High	Abundant	Very Good	Good			1	3
eastern white pine	Pinus strobus	WDH	High	74.5	770.5	9.9	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	4
black oak	Quercus velutina	WDH	High	52.4	540.4	10.2	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	5
bigtooth aspen	Populus grandidentata	NSL	Medium	63	539.3	8.1	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	6
quaking aspen	Populus tremuloides	WDH	High	56.6	531.9	9.2	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	7
northern red oak	Quercus rubra	WDH	Medium	66.5	444.3	6.4	No change	No change	High	Common	Good	Good			1	8
sugar maple	Acer saccharum	WDH	High	44.4	431.8	9.7	No change	No change	High	Common	Good	Good			1	9
jack pine	Pinus banksiana	NSH	Medium	46.7	367.7	7.9	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	10
northern pin oak	Quercus ellipsoidalis	NSH	Medium	56.2	357.0	6.2	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	11
black cherry	Prunus serotina	WDL	Medium	69.8	313.7	4.4	Lg. inc.	Sm. inc.	Low	Common	Good	Fair			1	12
green ash	Fraxinus pennsylvanica	WSH	Low	40.6	248.6	5.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	13
northern white-cedar	Thuja occidentalis	WSH	High	35.9	236.4	6.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	14
Scots pine	Pinus sylvestris	NSH	FIA	11.7	223.0	19.1	Unknown	Unknown	NA	Common	NNIS	NNIS			0	15
silver maple	Acer saccharinum	NSH	Low	21	204.6	9.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	16
American beech	Fagus grandifolia	WDH	High	50.8	181.1	3.5	Sm. inc.	No change	Medium	Common	Good	Fair			1	17
American basswood	Tilia americana	WSL	Medium	29.2	152.9	5.2	Sm. inc.	No change	Medium	Common	Good	Fair			1	18
eastern hemlock	Tsuga canadensis	NSH	High	36.4	135.1	3.5	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor			0	19
black ash	Fraxinus nigra	WSH	Medium	36.2	95.0	2.6	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	20
American elm	Ulmus americana	WDH	Medium	36.2	85.3	2.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	21
white ash	Fraxinus americana	WDL	Medium	25.7	70.8	2.8	Sm. inc.	Lg. inc.	Low	Common	Fair	Good			1	22
paper birch	Betula papyrifera	WDH	High	35.3	46.1	1.2	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	23
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	23.3	44.6	1.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	24
sassafras	Sassafras albidum	WSL	Low	22.8	35.8	1.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	25
yellow birch	Betula alleghaniensis	NDL	High	18.1	24.2	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	26
serviceberry	Amelanchier spp.	NSL	Low	19	24.1	1.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	27
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	22.2	23.9	1.1	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			1	28
bur oak	Quercus macrocarpa	NDH	Medium	9.3	20.1	2.2	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor			0	29
balsam fir	Abies balsamea	NDH	High	8.2	18.7	2.3	Very Lg. dec.	Lg. dec.	Low	Rare	Lost	Very Poor			0	30
mountain maple	Acer spicatum	NSL	Low	1	17.8	12.4	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	31
Norway spruce	Picea abies	NSH	FIA	1.2	17.2	14.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	32
swamp white oak	Quercus bicolor	NSL	Low	7	16.1	2.3	No change	No change	Medium	Rare	Poor	Poor	Infill +		2	33
eastern cottonwood	Populus deltoides	NSH	Low	2.3	10.2	4.4	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	34
tamarack (native)	Larix laricina	NSH	High	3.5	9.9	2.8	No change	No change	Low	Rare	Very Poor	Very Poor			2	35
bitternut hickory	Carya cordiformis	WSL	Low	2.3	8.9	3.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	36
boxelder	Acer negundo	WSH	Low	1.2	8.6	7.4	No change	No change	High	Rare	Fair	Fair			0	37
white spruce	Picea glauca	NSL	Medium	1.2	6.4	5.5	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	38
black spruce	Picea mariana	NSH	High	2.3	5.1	2.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	39
black willow	Salix nigra	NSH	Low	1.2	4.9	4.2	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	40
chokecherry	Prunus virginiana	NSLX	FIA	3.5	3.7	1.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	41
flowering dogwood	Cornus florida	WDL	Medium	2.3	3.6	1.5	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	42
balsam poplar	Populus balsamifera	NSH	Medium	4.7	2.7	0.6	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	43
pin cherry	Prunus pensylvanica	NSL	Low	4.7	2.0	0.4	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	44
eastern redcedar	Juniperus virginiana	WDH	Medium	1.2	1.8	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	45
slippery elm	Ulmus rubra	WSL	Low	1.2	1.8	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	46
blackgum	Nyssa sylvatica	WDL	Medium	1.2	0.5	0.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	47

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shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	48
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	49
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	50
sweet birch	Betula lenta	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	51
pignut hickory	Carya glabra	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	52
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	53
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	54
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	55
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	56
black walnut	Juglans nigra	WDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	57
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	58
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	59
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	60
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	61
pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	62
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	63
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	64
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	65
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	66