Superior

National Forests and Grasslands
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	16,415	6,337.8	1,000

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	3
Oak	3
Pine	3
Other	21
	32

Abundance	
Abundant	5
Common	12
Rare	15
Absent	22
	54

	Model Reliability	Adaptability
High	15	13
Medium	20	32
Low	19	11
FIA	2	
	56	**56**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	17	17
No Change	3	3
Decrease	10	10
New	17	20
Unknown	9	6
	56	**56**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	4	4
Good	10	10
Fair	10	10
Poor	2	2
Very Poor	4	2
FIA Only	2	2
Unknown	7	4
	39	**34**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	1	1
Infill	6	6
Migrate	5	14
	12	**21**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	37.6	39.0	41.9	42.2
	CCSM85	37.6	39.9	43.2	46.8
	GFDL45	37.6	40.9	43.8	45.6
	GFDL85	37.6	41.1	45.2	50.8
	HAD45	37.6	40.9	44.2	46.4
	HAD85	37.6	41.3	45.4	51.5
Growing Season May—Sep	CCSM45	58.5	60.0	62.6	62.8
	CCSM85	58.5	61.0	63.7	67.8
	GFDL45	58.5	62.5	66.3	68.5
	GFDL85	58.5	63.0	67.5	73.8
	HAD45	58.5	61.6	64.1	66.5
	HAD85	58.5	61.5	65.3	71.2
Coldest Month Average	CCSM45	4.0	5.2	7.8	7.7
	CCSM85	4.0	4.9	7.4	9.8
	GFDL45	4.0	7.5	9.6	10.4
	GFDL85	4.0	8.6	10.5	14.1
	HAD45	4.0	6.5	10.6	10.5
	HAD85	4.0	9.7	12.7	17.0
Warmest Month Average	CCSM45	65.2	66.9	68.5	68.9
	CCSM85	65.2	68.3	70.2	72.6
	GFDL45	65.2	69.8	71.4	73.0
	GFDL85	65.2	70.2	72.7	75.7
	HAD45	65.2	68.4	69.4	71.4
	HAD85	65.2	68.6	70.5	74.5

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	29.0	29.9	30.2	29.2
	CCSM85	29.0	28.5	30.2	29.7
	GFDL45	29.0	31.1	32.5	31.2
	GFDL85	29.0	32.0	33.9	33.9
	HAD45	29.0	30.5	29.1	29.6
	HAD85	29.0	30.2	30.6	32.0
Growing Season May—Sep	CCSM45	18.2	18.5	17.8	17.4
	CCSM85	18.2	17.3	17.7	16.6
	GFDL45	18.2	19.6	19.6	19.1
	GFDL85	18.2	20.3	20.8	19.5
	HAD45	18.2	18.3	16.4	16.5
	HAD85	18.2	18.0	16.3	15.9

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
quaking aspen	Populus tremuloides	WDH	High	94.6	1877.7	18.4	No change	Sm. dec.	Medium	Abundant	Good	Fair			1	1
black spruce	Picea mariana	NSH	High	90.4	1516.8	16.4	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	2
balsam fir	Abies balsamea	NDH	High	96.7	1501.3	14.3	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	3
paper birch	Betula papyrifera	WDH	High	96.8	1303.4	12.3	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	4
jack pine	Pinus banksiana	NSH	Medium	61.2	682.1	10.8	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	5
northern white-cedar	Thuja occidentalis	WSH	High	47.6	445.0	9.0	No change	No change	Medium	Common	Fair	Fair			1	6
red maple	Acer rubrum	WDH	High	73.1	431.3	5.5	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	7
tamarack (native)	Larix laricina	NSH	High	49.9	379.7	7.6	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	8
black ash	Fraxinus nigra	WSH	Medium	47	361.9	7.0	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	9
white spruce	Picea glauca	NSL	Medium	83.2	325.9	3.7	No change	No change	Medium	Common	Fair	Fair			1	10
red pine	Pinus resinosa	NSH	Medium	46.8	318.8	6.8	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	11
eastern white pine	Pinus strobus	WDH	High	44.1	277.7	6.0	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	12
sugar maple	Acer saccharum	WDH	High	17	204.1	9.5	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	13
balsam poplar	Populus balsamifera	NSH	Medium	32.3	90.5	2.8	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	14
mountain maple	Acer spicatum	NSL	Low	52.4	86.0	1.5	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	15
bigtooth aspen	Populus grandidentata	NSL	Medium	25.1	55.4	2.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	16
yellow birch	Betula alleghaniensis	NDL	High	20.6	50.6	2.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
green ash	Fraxinus pennsylvanica	WSH	Low	4.3	18.0	4.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	18
northern red oak	Quercus rubra	WDH	Medium	13.3	15.5	1.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	19
American basswood	Tilia americana	WSL	Medium	5.5	14.9	2.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	20
pin cherry	Prunus pensylvanica	NSL	Low	20.8	13.1	0.6	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	21
chokecherry	Prunus virginiana	NSLX	FIA	18	11.5	0.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	22
American mountain-ash	Sorbus americana	NSL	Low	14.9	11.5	0.6	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	23
peachleaf willow	Salix amygdaloides	NSLX	FIA	10	10.3	0.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	24
serviceberry	Amelanchier spp.	NSL	Low	19.5	9.9	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	25
black willow	Salix nigra	NSH	Low	6.7	6.6	1.0	Lg. dec.	No change	Low	Rare	Very Poor	Very Poor			2	26
American elm	Ulmus americana	WDH	Medium	5.3	5.7	0.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	27
bur oak	Quercus macrocarpa	NDH	Medium	2.4	5.5	2.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	28
northern pin oak	Quercus ellipsoidalis	NSH	Medium	4.5	4.8	1.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	29
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	0.5	4.0	5.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	30
slippery elm	Ulmus rubra	WSL	Low	0.5	1.8	2.2	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			2	31
black cherry	Prunus serotina	WDL	Medium	3.7	1.2	0.3	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	32
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	33
eastern hemlock	Tsuga canadensis	NSH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	34
boxelder	Acer negundo	WSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	35
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	36
sweet birch	Betula lenta	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	37
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	38
bitternut hickory	Carya cordiformis	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	39
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	40
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	41
hackberry	Celtis occidentalis	WDH	Medium	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +	3	42
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			0	43
American beech	Fagus grandifolia	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	44
white ash	Fraxinus americana	WDL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	45
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	46
black walnut	Juglans nigra	WDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	47

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cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	48
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			0	49
eastern cottonwood	Populus deltoides	NSH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	50
white oak	Quercus alba	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	51
swamp white oak	Quercus bicolor	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	52
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	53
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	54
black oak	Quercus velutina	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	55
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	56