S45 E96

One x One Degree
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	8,686.5	3,353.9	14

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	1
Oak	2
Pine	2
Other	9
	16

Abundance	
Abundant	0
Common	2
Rare	14
Absent	4
	20

	Model Reliability	Adaptability
High	1	8
Medium	9	6
Low	8	4
FIA	2	
	20	**18**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	1	2
No Change	1	2
Decrease	12	10
New	3	3
Unknown	3	3
	20	**20**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	0	0
Good	1	2
Fair	1	1
Poor	5	5
Very Poor	5	4
FIA Only	0	0
Unknown	1	1
	13	**13**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	0	0
Infill	5	4
Migrate	1	1
	6	**5**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	43.5	45.3	48.2	48.8
	CCSM85	43.5	46.2	49.4	52.9
	GFDL45	43.5	50.0	48.5	50.0
	GFDL85	43.5	46.5	49.7	54.5
	HAD45	43.5	46.6	50.5	52.2
	HAD85	43.5	47.2	52.0	57.1
Growing Season May—Sep	CCSM45	64.9	67.0	69.5	70.1
	CCSM85	64.9	67.7	70.9	75.1
	GFDL45	64.9	72.8	70.9	72.8
	GFDL85	64.9	68.4	72.1	77.6
	HAD45	64.9	67.7	70.7	72.7
	HAD85	64.9	67.9	72.1	77.1
Coldest Month Average	CCSM45	9.4	11.3	13.7	14.2
	CCSM85	9.4	11.1	13.4	15.8
	GFDL45	9.4	13.3	14.4	14.9
	GFDL85	9.4	13.1	14.7	17.5
	HAD45	9.4	12.0	15.9	15.7
	HAD85	9.4	15.1	19.5	22.6
Warmest Month Average	CCSM45	71.5	74.2	75.7	76.4
	CCSM85	71.5	75.5	77.4	80.1
	GFDL45	71.5	75.0	76.5	77.8
	GFDL85	71.5	75.5	77.3	80.7
	HAD45	71.5	74.5	76.1	77.6
	HAD85	71.5	75.2	77.5	81.0

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	24.4	25.6	25.6	24.7
	CCSM85	24.4	24.9	24.0	24.9
	GFDL45	24.4	27.8	29.7	27.7
	GFDL85	24.4	27.9	30.5	29.7
	HAD45	24.4	26.9	25.5	26.7
	HAD85	24.4	26.4	26.2	28.3
Growing Season May—Sep	CCSM45	15.7	15.7	15.5	14.9
	CCSM85	15.7	15.1	14.1	13.8
	GFDL45	15.7	18.1	19.1	17.3
	GFDL85	15.7	18.0	18.8	17.6
	HAD45	15.7	16.0	15.1	14.8
	HAD85	15.7	15.8	14.2	13.6

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
green ash	Fraxinus pennsylvanica	WSH	Low	40.5	111.5	19.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	1
boxelder	Acer negundo	WSH	Low	28	93.5	25.9	Lg. dec.	Lg. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	2
bur oak	Quercus macrocarpa	NDH	Medium	10.9	44.3	13.1	Sm. inc.	Sm. inc.	High	Rare	Good	Good			2	3
American elm	Ulmus americana	WDH	Medium	23.5	37.8	9.2	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	4
American basswood	Tilia americana	WSL	Medium	11.1	31.0	16.7	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	5
black ash	Fraxinus nigra	WSH	Medium	5.1	29.5	42.8	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	6
northern red oak	Quercus rubra	WDH	Medium	1.2	26.5	24.6	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			2	7
Siberian elm	Ulmus pumila	NDH	FIA	10	26.3	25.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	8
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	4.8	20.2	15.6	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +		2	9
eastern cottonwood	Populus deltoides	NSH	Low	5.9	19.7	7.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	10
hackberry	Celtis occidentalis	WDH	Medium	10.5	16.5	12.3	Sm. dec.	Sm. inc.	High	Rare	Poor	Good	Infill +		2	11
red pine	Pinus resinosa	NSH	Medium	4.6	15.2	52.8	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	12
white spruce	Picea glauca	NSL	Medium	4.6	9.5	33.1	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	13
eastern white pine	Pinus strobus	WDH	High	4.6	4.0	14.0	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	14
black willow	Salix nigra	NSH	Low	5.4	2.5	3.6	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	15
white mulberry	Morus alba	NSL	FIA	3.6	1.1	3.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	16
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	17
silver maple	Acer saccharinum	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	18
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	19
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	20