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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	8,837.4	3,412.1	5

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	1
Hickory	0
Maple	1
Oak	1
Pine	1
Other	6
	10

Abundance	
Abundant	0
Common	1
Rare	9
Absent	7
	17

	Model Reliability	Adaptability
High	0	7
Medium	7	7
Low	9	2
FIA	1	
	17	**16**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	1	2
No Change	2	2
Decrease	6	5
New	6	6
Unknown	2	2
	17	**17**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	0	0
Good	1	2
Fair	1	1
Poor	3	3
Very Poor	2	1
FIA Only	0	0
Unknown	1	1
	8	**8**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	0	0
Infill	3	4
Migrate	3	3
	6	**7**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	43.9	45.9	48.6	49.2
	CCSM85	43.9	46.6	49.6	53.1
	GFDL45	43.9	50.3	48.9	50.3
	GFDL85	43.9	46.9	50.1	54.8
	HAD45	43.9	46.9	50.8	52.5
	HAD85	43.9	47.5	52.4	57.1
Growing Season May—Sep	CCSM45	64.8	66.9	69.5	70.2
	CCSM85	64.8	67.8	70.7	74.9
	GFDL45	64.8	72.7	70.9	72.7
	GFDL85	64.8	68.3	72.0	77.6
	HAD45	64.8	67.4	70.5	72.4
	HAD85	64.8	67.9	72.1	76.6
Coldest Month Average	CCSM45	11.1	13.5	15.6	16.3
	CCSM85	11.1	13.0	15.0	17.3
	GFDL45	11.1	14.7	15.7	16.2
	GFDL85	11.1	14.5	16.1	18.6
	HAD45	11.1	13.5	17.4	17.1
	HAD85	11.1	16.7	21.3	24.1
Warmest Month Average	CCSM45	71.4	74.2	75.8	76.6
	CCSM85	71.4	75.7	77.5	80.3
	GFDL45	71.4	74.9	76.5	77.8
	GFDL85	71.4	75.5	77.2	80.8
	HAD45	71.4	74.1	75.8	77.1
	HAD85	71.4	75.3	77.5	80.8

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	25.9	26.6	26.3	25.9
	CCSM85	25.9	26.0	25.6	26.3
	GFDL45	25.9	29.3	31.8	29.6
	GFDL85	25.9	29.6	32.4	31.5
	HAD45	25.9	29.0	27.5	28.1
	HAD85	25.9	27.2	28.4	30.7
Growing Season May—Sep	CCSM45	16.7	16.3	15.9	15.3
	CCSM85	16.7	15.6	14.9	14.7
	GFDL45	16.7	19.1	20.4	18.4
	GFDL85	16.7	19.3	20.0	18.7
	HAD45	16.7	17.3	16.1	15.9
	HAD85	16.7	16.2	15.6	14.8

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	20.5	104.9	46.6	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	1
red pine	Pinus resinosa	NSH	Medium	0.3	28.3	7.0	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	2
boxelder	Acer negundo	WSH	Low	19.5	21.7	12.9	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	3
American elm	Ulmus americana	WDH	Medium	10.4	13.7	12.9	No change	Lg. inc.	Medium	Rare	Poor	Good	Infill +		2	4
hackberry	Celtis occidentalis	WDH	Medium	5.9	9.0	15.6	No change	No change	High	Rare	Fair	Fair		Infill +	2	5
eastern cottonwood	Populus deltoides	NSH	Low	1.4	7.9	8.5	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	6
Siberian elm	Ulmus pumila	NDH	FIA	5.9	7.7	6.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	7
slippery elm	Ulmus rubra	WSL	Low	4.5	1.4	5.1	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	8
black willow	Salix nigra	NSH	Low	1.4	0.5	0.6	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	9
bur oak	Quercus macrocarpa	NDH	Medium	1.4	0.2	0.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	10
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	11
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	12
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	13
red mulberry	Morus rubra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	14
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +		3	15
northern red oak	Quercus rubra	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	16
American basswood	Tilia americana	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	17