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One x One Degree
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	9,412.7	3,634.3	96

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	4
Hickory	4
Maple	5
Oak	9
Pine	4
Other	28
	54

Abundance	
Abundant	0
Common	14
Rare	40
Absent	12
	66

	Model Reliability	Adaptability
High	9	21
Medium	25	32
Low	27	11
FIA	6	
	67	**64**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	17	15
No Change	14	9
Decrease	17	24
New	10	10
Unknown	9	9
	67	**67**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	3	1
Good	14	14
Fair	6	5
Poor	13	12
Very Poor	10	12
FIA Only	3	3
Unknown	3	3
	52	**50**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	1	1
Infill	26	24
Migrate	2	6
	29	**31**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	50.7	52.4	54.8	55.0
	CCSM85	50.7	53.1	55.7	58.6
	GFDL45	50.7	56.4	56.2	57.1
	GFDL85	50.7	53.7	57.2	61.4
	HAD45	50.7	53.5	57.1	58.7
	HAD85	50.7	53.9	58.6	63.3
Growing Season May—Sep	CCSM45	68.1	69.8	71.9	72.6
	CCSM85	68.1	70.8	73.2	76.9
	GFDL45	68.1	75.2	74.7	76.2
	GFDL85	68.1	71.9	76.1	81.0
	HAD45	68.1	71.4	74.6	76.7
	HAD85	68.1	71.5	77.4	82.3
Coldest Month Average	CCSM45	23.0	24.6	26.4	26.7
	CCSM85	23.0	25.8	27.1	28.7
	GFDL45	23.0	26.8	27.4	28.0
	GFDL85	23.0	26.2	27.5	28.5
	HAD45	23.0	24.4	27.5	27.5
	HAD85	23.0	26.1	28.7	31.2
Warmest Month Average	CCSM45	73.8	75.5	76.9	77.6
	CCSM85	73.8	77.1	78.9	80.7
	GFDL45	73.8	76.7	78.6	79.6
	GFDL85	73.8	77.8	80.0	83.0
	HAD45	73.8	77.5	80.1	81.1
	HAD85	73.8	78.8	82.9	86.1

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	39.3	39.1	39.9	40.0
	CCSM85	39.3	40.3	40.1	41.6
	GFDL45	39.3	42.6	46.3	47.6
	GFDL85	39.3	41.8	47.1	49.2
	HAD45	39.3	40.8	42.6	42.3
	HAD85	39.3	41.8	39.5	42.7
Growing Season May—Sep	CCSM45	19.4	19.5	19.1	18.4
	CCSM85	19.4	18.4	18.4	18.0
	GFDL45	19.4	20.5	21.1	22.0
	GFDL85	19.4	20.3	21.4	21.3
	HAD45	19.4	19.9	18.1	19.2
	HAD85	19.4	19.2	16.3	16.5

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
white ash	Fraxinus americana	WDL	Medium	83.6	281.7	10.6	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	1
black walnut	Juglans nigra	WDH	Low	82.4	209.8	10.4	No change	Sm. dec.	Medium	Common	Fair	Poor	Infill +	Infill +	1	2
sugar maple	Acer saccharum	WDH	High	73.2	179.1	7.2	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	1	3
American elm	Ulmus americana	WDH	Medium	78.6	150.2	6.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	4
black cherry	Prunus serotina	WDL	Medium	69.8	129.0	5.3	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	5
green ash	Fraxinus pennsylvanica	WSH	Low	61.5	107.0	6.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	6
shagbark hickory	Carya ovata	WSL	Medium	45	93.7	8.7	Sm. inc.	Sm. dec.	Medium	Common	Good	Poor	Infill ++	Infill +	2	7
hackberry	Celtis occidentalis	WDH	Medium	66.7	87.2	4.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	8
American basswood	Tilia americana	WSL	Medium	30.5	75.6	5.2	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	9
bitternut hickory	Carya cordiformis	WSL	Low	51.6	72.6	3.4	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	10
honeylocust	Gleditsia triacanthos	NSH	Low	40	69.1	8.0	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	11
northern red oak	Quercus rubra	WDH	Medium	44.6	57.7	4.8	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	2	12
white oak	Quercus alba	WDH	Medium	23.1	55.7	6.6	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	2	13
eastern white pine	Pinus strobus	WDH	High	9.5	53.9	22.7	Lg. dec.	Very Lg. dec.	Low	Common	Very Poor	Lost			0	14
red maple	Acer rubrum	WDH	High	24.5	49.8	6.0	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	15
slippery elm	Ulmus rubra	WSL	Low	56.4	46.5	2.9	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	16
boxelder	Acer negundo	WSH	Low	40.6	44.7	2.7	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	17
silver maple	Acer saccharinum	NSH	Low	15	34.5	7.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	18
pignut hickory	Carya glabra	WDL	Medium	21	30.4	4.2	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	19
sycamore	Platanus occidentalis	NSL	Low	7.9	30.0	5.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	20
American beech	Fagus grandifolia	WDH	High	13.7	27.4	3.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	21
eastern cottonwood	Populus deltoides	NSH	Low	10.8	26.4	4.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	22
yellow-poplar	Liriodendron tulipifera	WDH	High	4	25.8	5.9	No change	Sm. dec.	High	Rare	Fair	Poor	Infill +	Infill +	2	23
red pine	Pinus resinosa	NSH	Medium	1.1	24.4	23.0	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	24
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	19.7	24.1	1.8	No change	Sm. dec.	High	Rare	Fair	Poor	Infill +	Infill +	2	25
swamp white oak	Quercus bicolor	NSL	Low	19	18.7	5.0	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		2	26
Ohio buckeye	Aesculus glabra	NSL	Low	32.4	18.0	2.3	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	27
black locust	Robinia pseudoacacia	NDH	Low	6.4	17.4	9.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	28
black willow	Salix nigra	NSH	Low	9.3	9.4	5.4	Lg. dec.	No change	Low	Rare	Very Poor	Very Poor			2	29
black oak	Quercus velutina	WDH	High	3	8.8	2.7	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	30
eastern redbud	Cercis canadensis	NSL	Low	5.9	7.7	2.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	31
red mulberry	Morus rubra	NSL	Low	16.6	7.3	1.6	No change	Sm. dec.	Medium	Rare	Poor	Very Poor			0	32
Scots pine	Pinus sylvestris	NSH	FIA	4.2	6.7	25.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	33
bur oak	Quercus macrocarpa	NDH	Medium	21.8	6.6	1.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	34
northern catalpa	Catalpa speciosa	NSHX	FIA	1.4	5.9	7.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	35
chinkapin oak	Quercus muehlenbergii	NSL	Medium	22.3	5.9	2.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	36
Siberian elm	Ulmus pumila	NDH	FIA	6.7	5.2	2.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	37
rock elm	Ulmus thomasii	NSLX	FIA	1.5	5.1	1.7	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	38
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	5.3	4.9	6.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	39
black ash	Fraxinus nigra	WSH	Medium	10.9	4.3	2.0	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	40
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	14.3	4.3	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	41
blue ash	Fraxinus quadrangulata	NSL	Low	7.8	4.1	2.4	No change	No change	Low	Rare	Very Poor	Very Poor			2	42
pawpaw	Asimina triloba	NSL	Low	6.3	4.0	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	43
Osage-orange	Maclura pomifera	NDH	Medium	10.1	3.1	2.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	44
black maple	Acer nigrum	NSH	Low	2.1	2.9	1.4	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0	45
pin oak	Quercus palustris	NSH	Low	14	2.7	2.1	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	46
bigtooth aspen	Populus grandidentata	NSL	Medium	1.1	2.0	1.9	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	47

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
flowering dogwood	Cornus florida	WDL	Medium	9.7	1.9	0.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	48
northern pin oak	Quercus ellipsoidalis	NSH	Medium	12.2	1.2	1.5	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	49
sassafras	Sassafras albidum	WSL	Low	1.6	0.5	0.7	Sm. inc.	Sm. dec.	Medium	Rare	Fair	Very Poor	Infill +		2	50
white mulberry	Morus alba	NSL	FIA	1.8	0.5	0.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	51
mockernut hickory	Carya alba	WDL	Medium	4.2	0.4	1.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	52
shingle oak	Quercus imbricaria	NDH	Medium	4.2	0.3	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	53
jack pine	Pinus banksiana	NSH	Medium	4.2	0.2	0.6	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	54
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	55
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	56
pecan	Carya illinoinensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++	3	57
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	58
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	59
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	60
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	61
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	Unknown	Unknown	Low	Modeled	Unknown	Unknown			0	62
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	63
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	64
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	65
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	66
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	67