Black Kettle

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	8,196.2	3,164.6	28

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	0
Oak	1
Pine	0
Other	16
	18

Abundance	
Abundant	0
Common	2
Rare	16
Absent	9
	27

	Model Reliability	Adaptability
High	5	7
Medium	8	16
Low	11	2
FIA	5	
	29	**25**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	2	2
No Change	2	2
Decrease	9	9
New	8	8
Unknown	8	8
	29	**29**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	0	0
Good	1	1
Fair	2	2
Poor	5	5
Very Poor	3	3
FIA Only	1	1
Unknown	3	3
	15	**15**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	2	2
Infill	2	2
Migrate	4	4
	8	**8**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	58.7	60.5	62.2	62.8
	CCSM85	58.7	61.1	62.9	65.9
	GFDL45	58.7	65.0	63.5	65.0
	GFDL85	58.7	61.7	64.8	69.0
	HAD45	58.7	61.0	63.8	64.8
	HAD85	58.7	61.3	65.8	68.7
Growing Season May—Sep	CCSM45	75.1	77.1	79.1	79.7
	CCSM85	75.1	77.8	79.7	83.4
	GFDL45	75.1	83.7	81.2	83.7
	GFDL85	75.1	79.2	83.0	88.3
	HAD45	75.1	77.1	79.5	80.2
	HAD85	75.1	77.8	82.5	84.9
Coldest Month Average	CCSM45	34.9	37.1	37.9	38.8
	CCSM85	34.9	37.4	37.8	39.6
	GFDL45	34.9	38.5	38.6	38.8
	GFDL85	34.9	36.0	37.3	38.1
	HAD45	34.9	35.9	38.1	38.1
	HAD85	34.9	38.0	40.0	41.7
Warmest Month Average	CCSM45	81.6	83.7	85.3	85.7
	CCSM85	81.6	84.6	85.5	87.8
	GFDL45	81.6	86.7	87.5	89.7
	GFDL85	81.6	86.8	88.8	93.5
	HAD45	81.6	83.4	84.8	85.0
	HAD85	81.6	84.8	86.9	88.0

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	26.4	26.8	26.7	25.8
	CCSM85	26.4	26.4	28.1	27.1
	GFDL45	26.4	27.1	30.7	27.8
	GFDL85	26.4	27.4	29.3	27.7
	HAD45	26.4	29.3	27.4	28.5
	HAD85	26.4	27.0	23.9	28.4
Growing Season May—Sep	CCSM45	15.2	14.2	14.2	13.9
	CCSM85	15.2	15.0	15.3	14.5
	GFDL45	15.2	15.4	17.9	15.9
	GFDL85	15.2	16.6	17.6	16.2
	HAD45	15.2	16.8	16.3	16.6
	HAD85	15.2	14.5	12.8	15.4

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.

Cite as: Iverson, L.R.; Prasad, A.M.; Peters, M.P.; Matthews, S.N. 2019. Facilitating Adaptive Forest Management under Climate Change: A Spatially Specific Synthesis of 125 Species for Habitat Changes and Assisted Migration over the Eastern United States. Forests. 10(11): 989. https://doi.org/10.3390/f10110989.

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
eastern redcedar	Juniperus virginiana	WDH	Medium	29.3	148.6	81.2	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	1
black locust	Robinia pseudoacacia	NDH	Low	27.8	65.9	35.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	2
black walnut	Juglans nigra	WDH	Low	24.4	46.1	30.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	3
black willow	Salix nigra	NSH	Low	14.6	24.7	26.9	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	4
Osage-orange	Maclura pomifera	NDH	Medium	18.1	22.0	17.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			1	5
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	19.5	21.9	17.9	Sm. inc.	Sm. inc.	High	Rare	Good	Good			1	6
American elm	Ulmus americana	WDH	Medium	29.3	21.1	11.5	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	7
Siberian elm	Ulmus pumila	NDH	FIA	18.1	18.8	14.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	8
eastern cottonwood	Populus deltoides	NSH	Low	8.3	14.0	19.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	9
bur oak	Quercus macrocarpa	NDH	Medium	4.9	10.2	33.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	10
slippery elm	Ulmus rubra	WSL	Low	9.8	8.3	13.6	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	11
common persimmon	Diospyros virginiana	NSL	Low	4.9	7.1	23.2	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	12
paulownia	Paulownia tomentosa	NSL	FIA	4.9	6.5	21.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	13
hackberry	Celtis occidentalis	WDH	Medium	9.8	6.1	10.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	14
white mulberry	Morus alba	NSL	FIA	4.9	4.2	13.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	15
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	4.9	1.5	4.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	16
ailanthus	Ailanthus altissima	NSL	FIA	4.9	0.7	2.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	17
green ash	Fraxinus pennsylvanica	WSH	Low	4.9	0.3	0.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	18
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	19
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	20
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	21
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	22
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	23
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	24
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	25
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	26
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	27
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	28
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	29