HUC 6 Watershed

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 20,449 7,895.5 684

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							al Change	in Habitat Suitability	Capability	to Cope o	Migration Potential			
Ash	2				Model			Scenario	Scenario		Scenario	Scenario		SHIFT	SHIFT
Hickory	6	Abu	ndance		Reliability	Adaptability		RCP45	RCP85		RCP45	RCP85		RCP45	RCP85
Maple	4	Abundant	3	High	18	28	Increase	33	38	Very Good	20	22	Likely	2	2
Oak	22	Common	33	Medium	38	57	No Change	20	19	Good	16	14	Infill	16	18
Pine	6	Rare	46	Low	39	12	Decrease	26	22	Fair	10	13	Migrate	2	2
Other	42	Absent	15	FIA	3		New	10	10	Poor	14	16	·	20	22
•	82		97		98	97	Unknown	9	9	Very Poor	19	14			
							-	98	98	FIA Only	2	2			
										Unknown	6	6			
Potentia	I Change	es in Climate Var	iahles							•	07	07			

Potential Changes in Climate Variables

Temperatu	ıre (°F)					Precipitation
	Scenario	2009	2039	2069	2099	
Annual	CCSM45	56.8	58.1	59.6	59.7	→ Annual
Average	CCSM85	56.8	58.3	60.2	62.2	→ Total
	GFDL45	56.8	58.8	60.3	60.8	→
	GFDL85	56.8	58.7	61.1	63.7	•
	HAD45	56.8	58.5	60.6	61.7	→
	HAD85	56.8	58.7	61.8	64.7	•
Growing	CCSM45	66.8	68.0	69.3	69.6	→ Growing
Season	CCSM85	66.8	68.0	70.1	72.5	Season
May—Sep	GFDL45	66.8	68.9	70.3	71.4	→ May—Sep
	GFDL85	66.8	68.7	71.3	74.3	→
	HAD45	66.8	69.3	71.2	72.4	+
	HAD85	66.8	69.3	73.7	76.4	•
Coldest	CCSM45	41.6	43.3	43.9	43.7	•
Month	CCSM85	41.6	43.3	44.3	45.2	NOTE: For t
Average	GFDL45	41.6	44.3	44.4	44.6	ending in 2
	GFDL85	41.6	43.0	43.9	44.2	obtained fr
	HAD45	41.6	41.6	42.9	43.4	show estim
	HAD85	41.6	42.5	43.5	44.8	and the em within the r
Warmest	CCSM45	69.8	71.1	71.6	71.7	→
Month	CCSM85	69.8	71.0	72.1	73.5	→ Cite as: Ive
Average	GFDL45	69.8	71.9	72.5	73.1	→ Climate Cha
	GFDL85	69.8	71.5	72.7	74.4	United Stat
	HAD45	69.8	73.1	74.4	74.9	+

Precipitati	on (in)				
	Scenario	2009	2039	2069	2099
Annual	CCSM45	42.1	43.3	47.2	46.2
Total	CCSM85	42.1	44.5	45.8	50.6
	GFDL45	42.1	47.0	49.9	51.3
	GFDL85	42.1	46.9	48.9	49.5
	HAD45	42.1	41.0	45.5	45.6
	HAD85	42.1	44.9	40.6	43.0
Growing	CCSM45	16.7	17.5	18.9	18.5
Season	CCSM85	16.7	16.8	17.5	19.1 ◆◆◆◆
May—Sep	GFDL45	16.7	20.3	22.2	21.6
	GFDL85	16.7	20.8	22.6	23.1
	HAD45	16.7	16.1	17.6	16.9 ◆◆◆◆
	HAD85	16.7	17.8	13.6	14.5

the six climate variables, four 30-year periods are used to indicate six potential future trajectories. The period 2009 is based on modeled observations from the PRISM Climate Group and the three future periods were rom the NASA NEX-DCP30 dataset. Future climate projections from three models under two emission scenarios nates of each climate variable within the region. The three models are CCSM4, GFDL CM3, and HadGEM2-ES mission scenarios are the 4.5 and 8.5 RCP. The average value for the region is reported, even though locations region may vary substantially based on latitude, elevation, land-use, or other factors.

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



HAD85

69.8

73.3

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Common Namo	Scientific Name	Range	MD	%Coll	ElAcur	FIAir ChngCl4E	ChngCl85	Adan	J	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
loblolly pine	Pinus taeda	WDH	High	92.4	4579.9	FIAiv ChngCl45 35.9 No change	No change	Adap	Abund Abundant	Good	Good	3FIF145	3017183	1 1
, ,		WDH	_	93.1	1190.4		J	Medium	Abundant	Good	Good			1 2
sweetgum water oak	Liquidambar styraciflua Quercus nigra	WDH	High High	83.3	722.2		No change Lg. inc.	Medium		Very Good	Very Good			1 3
yellow-poplar	Liriodendron tulipifera	WDH	High	53.9	246.6	J	Sm. dec.	High	Common	Fair	Fair			1 4
red maple	Acer rubrum	WDH	High	65.6	244.2		Lg. inc.	High	Common	Very Good	Very Good			1 5
southern red oak	Quercus falcata	WDL	Medium	51	236.1		Lg. inc.	High		Very Good	Very Good Very Good			1 6
white oak	Quercus alba	WDH	Medium	47	220.3	3.3 Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good Very Good			1 7
shortleaf pine	Pinus echinata	WDH	High	43.1	208.6		Lg. inc.	Medium		Very Good	Very Good Very Good			1 8
longleaf pine	Pinus palustris	NSH	Medium	20	197.6	5.7 Lg. inc.	Lg. Inc. Lg. inc.	Medium		Very Good	Very Good Very Good			1 9
green ash	Fraxinus pennsylvanica	WSH	Low	38.6	189.0	4.1 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 10
eastern redcedar	Juniperus virginiana	WDH	Medium	33.9	174.4	4.6 Sm. inc.	Lg. inc.		Common	Good	Very Good			1 11
post oak	Quercus stellata	WDH	High	36.8	174.4	2.9 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 11
sugarberry	Celtis laevigata	NDH	Medium	29.7	170.9	5.5 Lg. inc.	Lg. inc.		Common	Very Good	Very Good Very Good			1 13
laurel oak	Quercus laurifolia	NDH	Medium	33.9	165.7	3.7 Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good Very Good			1 14
pignut hickory	Carya glabra	WDL	Medium	40.4	160.7	2.7 Sm. dec.	Sm. dec.		Common	Poor	Poor			0 15
blackgum	Nyssa sylvatica	WDL	Medium	54.4	156.2		Lg. inc.	High	Common	Very Good	Very Good			1 16
winged elm	Ulmus alata	WDL	Medium	54.4	150.2	2.1 Lg. inc.	Lg. inc.		Common	Very Good	Very Good Very Good			1 17
mockernut hickory	Carya alba	WDL	Medium	39.8	151.0	-	Sm. inc.	High	Common	Very Good	Very Good Very Good			1 17
sweetbay	Magnolia virginiana	NSL	Medium	24.3	123.3		Lg. inc.	Medium		Very Good	Very Good Very Good			1 19
flowering dogwood	Cornus florida	WDL	Medium	49.2	120.2	_	No change	Medium	Common	Fair	Fair			1 20
American hornbeam; muscle		WSL	Low	34.2	91.7		Lg. inc.	Medium	Common	Very Good	Very Good			1 21
black cherry	Prunus serotina	WDL	Medium	42.3	89.5	J	Lg. inc.	Low	Common	Good	Good			1 21
sourwood	Oxydendrum arboreum	NDL	High	34.5	87.6		Sm. dec.	High	Common	Fair	Fair			1 23
chestnut oak	Quercus prinus	NDH	High	9.5	87.5	5.0 No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2 24
Virginia pine	Pinus virginiana	NDH	High	10.5	76.3	3.4 Sm. dec.	Sm. dec.	Medium		Poor	Poor	Infill +	Infill +	0 25
slash pine	Pinus elliottii	NDH	High	6	76.1	8.4 Lg. inc.	Lg. inc.		Common	Very Good	Very Good	Infill ++	Infill ++	2 26
swamp tupelo	Nyssa biflora	NDH	Medium	11.3	75.0	_	Lg. inc.	Low	Common	Good	Good		111111111111	1 27
willow oak	Quercus phellos	NSL	Low	18.1	74.0	J	Lg. inc.		Common	Very Good	Very Good			1 28
American beech	Fagus grandifolia	WDH	High	24.5	69.0	2.5 Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good Very Good	Infill ++	Infill ++	1 29
cherrybark oak; swamp red o		NSL	Medium	23.7	68.7	2.5 Lg. inc.	Lg. inc.	Medium		Very Good	Very Good Very Good			1 30
American elm	Ulmus americana	WDH	Medium	29.6	67.7	1.7 Lg. inc.	Lg. inc.		Common	Very Good	Very Good Very Good			1 31
eastern hophornbeam; ironv		WSL	Low	22.9	62.0	1.7 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good Very Good			1 32
spruce pine	Pinus glabra	NSL	Low	16.9	59.9	2.8 Lg. dec.	Lg. dec.	Medium		Poor	Poor			0 33
Osage-orange	Maclura pomifera	NDH	Medium	7.5	55.4	9.0 No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1 34
boxelder	Acer negundo	WSH	Low	11.5	54.8	3.7 Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1 35
common persimmon	Diospyros virginiana	NSL	Low	40.6	53.4	1.0 No change	Sm. inc.	High	Common	Good	Very Good			1 36
river birch	Betula nigra	NSL	Low	6.2	46.0	5.3 No change	No change	Medium	Rare	Poor	Poor			1 37
sycamore	Platanus occidentalis	NSL	Low	12	45.6	2.9 Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1 38
American holly	Ilex opaca	NSL	Medium	21.2	45.0	1.5 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1 39
black oak	Quercus velutina	WDH	High	14	43.4	2.1 Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 40
shagbark hickory	Carya ovata	WSL	Medium	12.9	38.0	2.3 Lg. dec.	Lg. dec.	Medium		Very Poor	Very Poor			0 41
water tupelo	Nyssa aquatica	NSH	Medium	4.2	37.4	5.1 No change	No change	Low	Rare	Very Poor	Very Poor			2 42
northern red oak	Quercus rubra	WDH	Medium	10.9	36.1	2.1 Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1 43
bald cypress	Taxodium distichum	NSH	Medium	6	34.5	4.5 No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2 44
southern magnolia	Magnolia grandiflora	NSL	Low	9.3	33.5		Sm. inc.	Medium		Fair	Fair	Infill +	Infill +	1 45
pecan	Carya illinoinensis	NSH	Low	8.9	32.7	2.8 No change	Sm. inc.	Low	Rare	Very Poor	Poor	1/11111	Infill +	1 46
florida maple	Acer barbatum	NSL	Low	15.7	32.7	J	No change	High	Rare	Poor	Fair		1111111 7	1 47
Horiua Iliapie	Acei baibatuiii	INSL	LOW	15.7	32.3	1.3 3III. UEC.	No change	iligii	Mare	1 001	ı alı			1 4/



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Current and Potential Future Habitat, Capability, and Migration

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Common Name	Scientific Name	Range				FIAiv ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
water hickory	Carya aquatica	NSL	Medium	4.2		3.2 No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2 48
blackjack oak	Quercus marilandica	NSL	Medium	11.1		1.2 Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1 49
honeylocust	Gleditsia triacanthos	NSH	Low	5.6		3.5 No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1 50
overcup oak	Quercus lyrata	NSL	Medium	7		2.9 No change	No change	Low	Rare	Very Poor	Very Poor			0 51
eastern cottonwood	Populus deltoides	NSH	Low	3.3		4.4 Sm. dec.	Sm. dec.	Medium		Very Poor	Very Poor			2 52
black willow	Salix nigra	NSH	Low	9.6		1.6 No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	1 53
scarlet oak	Quercus coccinea	WDL	Medium	5.8		3.0 Sm. dec.	Sm. dec.	Medium		Very Poor	Very Poor			0 54
slippery elm	Ulmus rubra	WSL	Low	12.6		1.2 No change	Sm. inc.	Medium	Rare	Poor	Fair			1 55
sassafras	Sassafras albidum	WSL	Low	17.8		0.8 Lg. inc.	Lg. inc.	Medium		Good	Good			1 56
red mulberry	Morus rubra	NSL	Low	14.1	18.7	1.1 Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair			1 57
swamp chestnut oak	Quercus michauxii	NSL	Low	10.3	16.9	1.6 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1 58
bigleaf magnolia	Magnolia macrophylla	NSL	Low	7.5	15.2	1.3 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 59
eastern redbud	Cercis canadensis	NSL	Low	12	14.4	1.0 Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 60
black walnut	Juglans nigra	WDH	Low	6.4	14.0	2.2 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 61
turkey oak	Quercus laevis	NSH	Medium	4.8	13.7	2.8 No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2 62
durand oak	Quercus sinuata var. sinuata	NSL	FIA	6.4	13.4	2.1 Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0 63
Nuttall oak	Quercus texana	NSH	Medium	1.1	13.2	5.9 No change	No change	High	Rare	Fair	Fair			0 64
white ash	Fraxinus americana	WDL	Medium	7.3	13.2	1.4 No change	No change	Low	Rare	Very Poor	Very Poor			0 65
Shumard oak	Quercus shumardii	NSL	Low	3.5	8.1	1.8 Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0 66
hackberry	Celtis occidentalis	WDH	Medium	2.9	6.5	1.0 No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2 67
chinkapin oak	Quercus muehlenbergii	NSL	Medium	2.4	5.2	2.1 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 68
American basswood	Tilia americana	WSL	Medium	3.4	5.2	1.3 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 69
cucumbertree	Magnolia acuminata	NSL	Low	2.9	4.8	1.2 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2 70
wild plum	Prunus americana	NSLX	FIA	6.9	4.6	0.8 Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0 71
bitternut hickory	Carya cordiformis	WSL	Low	3.4	3.4	1.0 Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0 72
black locust	Robinia pseudoacacia	NDH	Low	1	2.8	2.8 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 73
redbay	Persea borbonia	NSL	Low	3.1	2.1	0.6 Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2 74
serviceberry	Amelanchier spp.	NSL	Low	2	1.3	0.7 Sm. dec.	No change	Medium	Rare	Very Poor	Poor			0 75
white mulberry	Morus alba	NSL	FIA	0.2	1.2	0.8 Unknown	Unknown	NA	Rare	NNIS	NNIS			0 76
silver maple	Acer saccharinum	NSH	Low	0.6	0.6	0.3 Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0 77
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0.5	0.4	0.9 Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +		2 78
live oak	Quercus virginiana	NDH	High	0.5	0.3	0.6 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2 79
bluejack oak	Quercus incana	NSL	Low	0.5		0.5 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2 80
pin cherry	Prunus pensylvanica	NSL	Low	0.4	0.2	0.3 No change	No change	Medium	Rare	Poor	Poor			0 81
bur oak	Quercus macrocarpa	NDH	Medium	0.5		0.3 Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0 82
ashe juniper	Juniperus ashei	NDH	High	0		0 New Habitat	New Habitat	Medium		New Habitat	New Habitat			0 83
Table Mountain pine	Pinus pungens	NSL	Low	0	0	0 Unknown	Unknown	High	Absent	Unknown	Unknown			0 84
pond cypress	Taxodium ascendens	NSH	Medium	0	0	0 New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3 85
striped maple	Acer pensylvanicum	NSL	Medium	0		0 New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	0	0	3 86
sugar maple	Acer saccharum	WDH	High	0	0	0 Unknown	Unknown	High	Absent	Unknown	Unknown			0 87
yellow buckeye	Aesculus flava	NSL	Low	0		0 Unknown	Unknown	Low	Absent	Unknown	Unknown			0 88
pawpaw	Asimina triloba	NSL	Low	0		0 New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3 89
sweet birch	Betula lenta	NDH	High	0		0 Unknown	Unknown	Low	Absent	Unknown	Unknown			0 90
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp		Low	0		0 New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3 91
shellbark hickory	Carya laciniosa	NSL	Low	0		0 Unknown	Unknown	Medium	Absent	Unknown	Unknown			0 92
black hickory	Carya texana	NDL	High	0		0 New Habitat			Absent		New Habitat	Likely +	Likely +	3 93
black ash	Fraxinus nigra	WSH	Medium	0	•	0 New Habitat			Absent		New Habitat	LIKELY T	LIKELY T	0 94
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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	/ ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
loblolly-bay	Gordonia lasianthus	NSH	Medium	C)	0 (0 Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0 95
silverbell	Halesia spp.	NSL	Low	C)	0 (0 New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3 96
water elm	Planera aquatica	NSL	Low	C)	0 (0 New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3 97
cedar elm	Ulmus crassifolia	NDH	Medium	C)	0 (0 New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	. 3 98

