#### **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 8,500.0 3,281.9 263

#### **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								Potential Change in Habitat Suitability			Capability to Cope or Persist			
Ash	2				Model			Scenario	Scenario		Scenario	Scenario		SHIFT	SHIFT
Hickory	6	Abu	ndance		Reliability	Adaptability		RCP45	RCP85		RCP45	RCP85		RCP45	RCP85
Maple	5	Abundant	5	High	16	23	Increase	30	35	Very Good	11	14	Likely	2	2
Oak	17	Common	28	Medium	33	50	No Change	10	7	Good	16	18	Infill	6	13
Pine	3	Rare	37	Low	33	9	Decrease	28	26	Fair	14	10	Migrate	3	3
Other	37	Absent	12	FIA	2		New	11	11	Poor	14	14	•	11	18
•	70	_	82	-	84	82	Unknown	5	5	Very Poor	9	6			
							-	84	84	FIA Only	0	0			
										Unknown	3	3			
Potential Changes in Climate Variables									•	67	C.E.				

#### Potential Changes in Climate Variables

Temperature (°F)											
	Scenario	2009	2039	2069	2099						
Annual	CCSM45	60.6	62.3	64.4	64.7						
Average	CCSM85	60.6	62.7	65.3	68.1						
	GFDL45	60.6	63.4	65.3	66.2						
	GFDL85	60.6	63.3	66.4	69.8						
	HAD45	60.6	63.2	66.2	67.4						
	HAD85	60.6	63.5	68.0	71.7						
Growing		75.3	76.8	78.6	79.2						
Season	CCSM85	75.3	77.4	79.9	83.5						
May—Sep	GFDL45	75.3	78.6	80.6	82.2						
	GFDL85	75.3	78.4	82.0	86.1						
	HAD45	75.3	78.8	81.7	82.9						
	HAD85	75.3	79.0	85.6	88.9						
Coldest	CCSM45	38.2	40.4	41.7	41.8						
Month	CCSM85	38.2	41.2	42.3	43.9						
Average	GFDL45	38.2	41.9	42.0	42.2						
	GFDL85	38.2	40.0	41.2	41.7						
	HAD45	38.2	38.9	41.0	41.4						
	HAD85	38.2	40.0	41.7	43.3						
Warmest	CCSM45	80.4	81.6	82.5	82.7						
Month	CCSM85	80.4	82.4	83.6	85.3						
Average	GFDL45	80.4	84.5	85.1	86.0						
	GFDL85	80.4	83.7	85.6	87.9						
	HAD45	80.4	85.1	87.4	87.7						
	HAD85	80.4	85.9	90.3	91.5						

Precipitation (in)													
	Scenario	2009	2039	2069	2099								
Annual	CCSM45	56.5	58.3	63.9	61.7								
Total	CCSM85	56.5	59.8	61.7	65.3								
	GFDL45	56.5	63.6	67.8	68.9								
	GFDL85	56.5	64.0	67.7	71.2								
	HAD45	56.5	53.2	59.4	60.7								
	HAD85	56.5	57.4	51.4	56.8								
Growing	CCSM45	21.5	20.9	21.2	21.6								
Season	CCSM85	21.5	20.5	19.6	21.0								
May—Sep	GFDL45	21.5	24.5	26.0	26.6								
	GFDL85	21.5	26.1	27.4	28.4								
	HAD45	21.5	18.8	20.3	18.8 ◆◆◆◆								
	HAD85	21.5	20.7	15.3	16.1								

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.



# **Holly Springs**

### **National Forests and Grasslands**

Climate Change Atlas Tree Species

USDA Forest Service Northern Research Station Landscape Change Research Group Iverson, Peters, Prasad, Matthews

### Current and Potential Future Habitat, Capability, and Migration

Selection   Sele	Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
Sunther net daw   Quercus picted   Que	loblolly pine	Pinus taeda	WDH	High	81.2	1862.1	22.9 Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1 1
White	sweetgum	Liquidambar styraciflua	WDH	High	92.9	1220.0	13.1 Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1 2
September   Pinus echinata   WPH   High   62.4   51.6   8.0 Sm. Inc.   Medum   Mount   Medum   Mount   Medum   Mount   Medum   Mount   Medum	southern red oak	Quercus falcata	WDL	Medium	83.5	618.2	7.4 Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1 3
Marchange    Acer rubrum   WD    High   75.3   374.8   5.0 No change   No change   More   Migh   Common   Good   Good   1.7   7	white oak	Quercus alba	WDH	Medium	70.6	614.1	8.7 Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1 4
Wingselfem   Ulmus alstar   WDI   Medium   76.5 374.8 4.5 Sm. inc.   Medium   Common   Good   Good   Good   1.8 8   Restar redecated   Junipeans virginiana   WDI   High   74.1 35.2 4.4 Lg. inc.   Lg. inc.   High   Common   Very Good   Very Good   Common   Common   Very Good   Very Good   Very Good   Common   Common   Very Good   Very Good   Very Good   Common   Common   Very Good   Very Good   Very Good   Common   Very Good   Very G	shortleaf pine	Pinus echinata	WDH	High	62.4	551.6	8.9 Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1 5
Sestem redecided   Junipens virginisha   WPH   Medium   67.1   36.5   5.4 Sm. inc.   Sm. inc.   Medium   Common   Good   Good     1.8	red maple	Acer rubrum	WDH	High	75.3	374.8	5.0 No change	No change	High	Common	Good	Good			1 6
	winged elm	Ulmus alata	WDL	Medium	76.5	374.8	4.9 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 7
Pellow-poplar   Liriodendron tulipifera   WPH   High   61.2   269.7   4.4 No change   No	eastern redcedar	Juniperus virginiana	WDH	Medium	67.1	364.9	5.4 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 8
Biack oak   Quercus velutina   WDL   High   49, 91, 994   44. No change   Mortume Cammon   Fair	post oak	Quercus stellata	WDH	High	74.1	325.2	4.4 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 9
Indication   Carry alba   Well   Medium   Carry alba   Cherry bark coase, swamp red   Quercus pagoda   NS, Medium   A71, and 1, and 1	yellow-poplar	Liriodendron tulipifera	WDH	High	61.2	269.7	4.4 Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1 10
Cherry Mark and syswamp red Ouerrax pagoda   MSL   Medium   Medi	black oak	Quercus velutina	WDH	High	45.9	199.4	4.4 No change	No change	Medium	Common	Fair	Fair			1 11
Signate   Medium   Common   Popra	mockernut hickory	Carya alba	WDL	Medium	63.5	196.7	3.1 Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1 12
Second   Frazinus pennsylvanica   WSH   low   47.1   17.18   3.7 Sm. inc.   Sm. inc.   Medium   Good   Good   Good   Shack Cherry   Prunus serotina   WDL   Medium   63.5   16.38   2.6 Sm. inc.   Sm. inc.   Low   Common   Fair   Fair   1.16   1.1	cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	47.1	194.6	4.1 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 13
Pales Cherry   Purus sercioria   WDL   Medium   63.5   16.18   2.6 Sm. inc.   Low   Common   Fair   Fair   Fair   1.16   1.7	pignut hickory	Carya glabra	WDL	Medium	58.8	174.6	3.0 Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0 14
Bowering dogwood   Cornus Inonda   WDL   Medium   60   1443   24, 8 m. dec.   Sm. dec.   Medium   Common   Poor   Poor   Poor   1   18	green ash	Fraxinus pennsylvanica	WSH	Low	47.1	171.8	3.7 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 15
Blackgum	black cherry	Prunus serotina	WDL	Medium	63.5	163.8	2.6 Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1 16
Bald cypress   Taxodium distichum   NSH   Medium   9.4   134.5   14.3 Sm. dec.   Sm. dec.   Medium   Common   Poor   Poor   Poor   1.70   1.	flowering dogwood	Cornus florida	WDL	Medium	67.1	161.2	2.4 Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0 17
American ellm   Ulmus americana   WDH   Medium   30.6   127.5   4.2 Sm. inc.   Lg. inc.   Medium   Common   Good   Very Good   1 20   20   20   20   20   20   20	blackgum	Nyssa sylvatica	WDL	Medium	60	144.9	2.4 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 18
Sycamore   Platanus occidentalis   NSL   Low   36.5   123.7   3.4 No change   Sm. inc.   Medium   Common   Fair   Good   Fair   1.21	bald cypress	Taxodium distichum	NSH	Medium	9.4	134.5	14.3 Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0 19
NSL   Low   1.5	American elm	Ulmus americana	WDH	Medium	30.6	127.5	4.2 Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1 20
water oak         Quercus nigra         WDH         High         35.3         105.6         3.0         Ig., inc.         Medium         Common         Very Good         Very Good         1         23           common persimmon         Diosyvos virginiana         NSL         Low         44.7         94.1         2.1         No change         Sm. inc.         High         Common         Good         Very Good         1         24           scarlet oak         Quercus cocicnea         WDL         Medium         20         83.8         Ns. lede.         Lg. dec.         Medium         Common         Poor         Poor         0         25         asssafras         Sals nigra         NSH         Low         21.2         79.8         3.8         No change         Sm. inc.         Medium         Common         Fair         Good         1         25         asspark nikkony         Carya ovata         WSL         Low         10.6         63.5         6.0         Lg. inc.         Lg. inc.         Medium         Common         Poor         Poor         0         28         will be dec.         Lg. inc.         High         Common         Very Good         Very Good         Very Good         Very Good         Very Good         Very Good	sycamore	Platanus occidentalis	NSL	Low	36.5	123.7	3.4 No change	Sm. inc.	Medium	Common	Fair	Good			1 21
Common persimmon   Diospyros virginiana   NSL   Low   44,7   94,1   2.1 No change   Sm. inc.   High   Common   Good   Very Good   1 24	river birch	Betula nigra	NSL	Low	16.5	116.9	7.1 Sm. dec.	No change	Medium	Common	Poor	Fair			1 22
Searlet to ak	water oak	Quercus nigra	WDH	High	35.3	105.6	3.0 Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 23
Sassafras   Sassafras albidum   SSL   Low   21.2   79.8   3.8 No change   Sm. inc.   Medium   Common   Fair   Good   1 26	common persimmon	Diospyros virginiana	NSL	Low	44.7	94.1		Sm. inc.	High	Common	Good	Very Good			1 24
Diack willow   Salix nigra   NSH   Low   24.7   75.5   3.1   Lg. inc.   Lg. inc.   Lg. inc.   Low   Common   Good   Good   1   27	scarlet oak	Quercus coccinea	WDL	Medium	20	85.3	4.3 Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0 25
shagbark hickory         Carya ovata         WSL         Medium         23.5         69.3         2.9 Lg. dec.         Lg. dec.         Medium         Common         Poor         Poor         0         28           willow oak         Quercus phellos         NSL         Low         10.6         63.5         60.1 Eg. linc.         Lg. inc.         Medium         Common         Very Good         Very Good         1.29           blackjack oak         Quercus marilandica         NSL         Medium         22.4         55.5         4.7 Lg. linc.         Lg. inc.         High         Common         Very Good         Very Good         1.31           eastern hophornbeam; ironw Ostrya virginiana         WSL         Low         31.8         52.5         1.7 Lg. inc.         Lg. inc.         High         Common         Very Good         Very Good         1.31           black locust         Robinian pseudoacacia         NDH         Low         24.7         50.2         2.0 Sm. inc.         Lg. inc.         Medium         Rare         Very Poor         Very Good	sassafras	Sassafras albidum	WSL	Low	21.2	79.8	3.8 No change	Sm. inc.	Medium	Common	Fair	Good			1 26
willow oak         Quercus phellos         NSL         Low         10.6         63.5         6.0 Lg. inc.         Lg. inc.         Medium         Common         Very Good         Very Good         1         29           boxelder         Acer negundo         WSH         Low         11.8         55.5         4.7 Lg. dec.         Sm. dec.         High         Common         Fair         Fair         1         30           black jack oak         Quercus marilandica         NSL         Medium         22.4         54.1         2.4 Lg. inc.         Lg. inc.         High         Common         Very Good         Very Good         1         31           eastern hophornbeam; ironw Ostrya virginiana         WSL         Low         24.7         50.2         2.0 Sm. inc.         Lg. inc.         High         Common         Very Good         Very Good         1         31           slippery elm         Ulmus rubra         WSL         Low         24.7         50.2         2.0 Sm. inc.         Lg. inc.         Medium         Common         Very Good         Very Good         1         36           American bench         Fagus grandifolia         WDH         High         22.4         40.7         18.1 Lg. inc.         Lg. inc.         Medium </td <td>black willow</td> <td>Salix nigra</td> <td>NSH</td> <td>Low</td> <td>24.7</td> <td>75.5</td> <td>3.1 Lg. inc.</td> <td>Lg. inc.</td> <td>Low</td> <td>Common</td> <td>Good</td> <td>Good</td> <td></td> <td></td> <td>1 27</td>	black willow	Salix nigra	NSH	Low	24.7	75.5	3.1 Lg. inc.	Lg. inc.	Low	Common	Good	Good			1 27
willow oak         Quercus phellos         NSL         Low         10.6         63.5         6.0         Lg. inc.         Lg. inc.         Medium         Common         Very Good         Very Good         1         29           boxelder         Acer negundo         WSH         Low         11.8         55.5         4.7         Lg. dec.         Sm. dec.         High         Common         Pair         Fair         1         30           black jack oak         Quercus marilandica         NSL         Medium         22.4         54.1         2.4         Lg. inc.         Lg. inc.         High         Common         Very Good         Very Good         1         31           slippery elm         Ulmus rubra         WSL         Low         24.7         50.2         2.0         Sm. inc.         Lg. inc.         Medium         Common         Very Good         Very Good         1         33           black locust         Robinia pseudoacacia         NDH         Low         10.6         46.3         4.4         Lg. dec.         Medium         Rare         Good         Good         4         1         33           black locust         Robinia pseudoacacia         NDH         High         22.4         40.7	shagbark hickory	Carya ovata	WSL	Medium	23.5	69.3	2.9 Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0 28
blackjack oak Quercus marilandica NSL Medium 22.4 54.1 2.4 Lg. Inc. Lg. Inc. High Common Very Good Very Good 1 31 action Decision Ostrya virginiana WSL Low 31.8 52.5 1.7 Lg. Inc. Lg. Inc. High Common Very Good Very Good 1 32 slippery elm Ulmus rubra WSL Low 24.7 50.2 2.0 Sm. Inc. Lg. Inc. Medium Common Good Very Good Very Good 1 33 black locust Robinia pseudoacacia NDH Low 10.6 46.3 4.4 Lg. dec. Lg. dec. Medium Rare Very Poor Very Poor 0 34 American beech Fagus grandifolia WDH High 22.4 40.7 1.8 Lg. Inc. Lg. Inc. Medium Rare Good Good 5 1 35 American hornbeam; muscle Carpinus caroliniana WSL Low 17.6 39.1 2.2 Lg. Inc. Lg. Inc. Medium Rare Good Good 5 1 36 sugarberry Celtis laevigata NDH Medium 5.9 35.4 6.0 Sm. inc. Lg. Inc. Medium Rare Fair Good Infill + Infill ++ 1 37 northern red oak Quercus rubra WDH Medium 20 33.3 1.7 Lg. dec. Lg. dec. High Rare Poor Poor 1 38 sliver maple Acer saccharinum NSH Low 4.7 30.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor 9 0 9 0 39 chestnut oak Quercus prinus NDH High 3.5 21.9 6.2 Sm. dec. Lg. dec. High Rare Poor Poor 9 0 0 40 white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Fair Fair 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Good Good Infill + Infill ++ 1 43 NUT	willow oak	Quercus phellos	NSL	Low	10.6	63.5	6.0 Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 29
eastern hophornbeam; ironw Ostrya virginiana WSL Low 31.8 52.5 1.7 Lg. inc. Lg. inc. High Common Very Good Very Good 1 32 slippery elm Ulmus rubra WSL Low 24.7 50.2 2.0 Sm. inc. Lg. inc. Medium Common Good Very Good 1 33 black locust Robinia pseudoacacia NDH Low 10.6 46.3 4.4 Lg. dec. Lg. dec. Medium Rare Good Good Good 1 35 American beech Fagus grandifolia WDH High 22.4 40.7 1.8 Lg. inc. Lg. inc. Medium Rare Good Good Good 1 35 American hornbeam; muscle Carpinus caroliniana WSL Low 17.6 39.1 2.2 Lg. inc. Lg. inc. Medium Rare Good Good Infill + Infill ++ 1 37 northern red oak Quercus rubra WDH Medium 20 33.3 1.7 Lg. dec. Lg. dec. High Rare Poor Poor Poor 1 38 silver maple Acer saccharinum NSH Low 4.7 30.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor Poor 0 40 white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Fair Good Infill + Infill ++ 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Wedlum Rare Good Good Infill + Infill ++ 1 43 Nuttall oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. Lg. inc. Lg. inc. Low Rare Fair Fair Fair 1 41 Nuttall oak Quercus texana NSH Medium 3.5 17.8 15.0 Sm. dec. Sm. dec. High Rare Poor Poor Poor 1 4 Swamp tupelo Nyssa biflora NDH Medium 1.2 15.7 13.3 No change No change No change Medium Rare Very Poor Very	boxelder	Acer negundo	WSH	Low	11.8	55.5	4.7 Lg. dec.	Sm. dec.	High	Common	Fair	Fair			1 30
slippery elm Ulmus rubra WSL Low 24.7 50.2 2.0 Sm. inc. Lg. inc. Medium Common Good Very Good 1 33 black locust Robinia pseudoacacia NDH Low 10.6 46.3 4.4 Lg. dec. Lg. dec. Medium Rare Very Poor Very Poor 0 34 American beech Fagus grandifolia WDH High 22.4 40.7 1.8 Lg. inc. Lg. inc. Medium Rare Good Good 1 35 American hornbeam; musclev Carpinus caroliniana WSL Low 17.6 39.1 2.2 Lg. inc. Lg. inc. Medium Rare Good Good 1 35 American hornbeam; musclev Carpinus caroliniana WSL Low 17.6 39.1 2.2 Lg. inc. Lg. inc. Medium Rare Good Good Infill + Infill + 1 37 northern red oak Quercus rubra WDH Medium 20 33.3 1.7 Lg. dec. Lg. dec. High Rare Poor Poor Poor 1 38 silver maple Acer saccharinum NSH Low 4.7 30.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor Poor 0 40 white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Fair 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Wedium Rare Good Good Infill + Infill + 1 43 Nuttall Oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. High Rare Poor Poor Poor 0 40 Avesumptupelo Nyssa biflora NDH Medium 1.2 15.7 13.3 No change No change Medium Rare Very Poor V	blackjack oak	Quercus marilandica	NSL	Medium	22.4	54.1	2.4 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 31
black locust Robinia pseudoacacia NDH Low 10.6 46.3 4.4 Lg. dec. Lg. dec. Medium Rare Very Poor Very Poor 0 34  American beech Fagus grandifolia WDH High 22.4 40.7 1.8 Lg. inc. Lg. inc. Medium Rare Good Good 1 35  American hornbeam; muscle\ Carpinus caroliniana WSL Low 17.6 39.1 2.2 Lg. inc. Lg. inc. Medium Rare Good Good 1 36  sugarberry Celtis laevigata NDH Medium 5.9 35.4 6.0 Sm. inc. Lg. inc. Medium Rare Good Good Infill + Infill ++ 1 37  northern red oak Quercus rubra WDH Medium 20 33.3 1.7 Lg. dec. Lg. dec. High Rare Poor Poor Poor 1 38  silver maple Acer saccharinum NSH Low 4.7 30.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor Poor 0 39  chestnut oak Quercus prinus NDH High 3.5 21.9 6.2 Sm. dec. Lg. dec. High Rare Poor Poor Poor 0 40  white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Good Infill + Infill ++ 1  eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Lost Lost Lost  Shumard oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. High Rare Poor Poor Poor 0 44  swamp tupelo Nyssa biflora NDH Medium 1.2 15.7 13.3 No change No change Medium Rare Poor Poor Very Poor Very Poor 1 146  Swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	31.8	52.5	1.7 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 32
American beech Fagus grandifolia WDH High 22.4 40.7 1.8 Lg. inc. Lg. inc. Medium Rare Good Good 1 35 American hornbeam; musclev Carpinus caroliniana WSL Low 17.6 39.1 2.2 Lg. inc. Lg. inc. Medium Rare Good Good 1 36 Sugarberry Celtis laevigata NDH Medium 5.9 35.4 6.0 Sm. inc. Lg. inc. Medium Rare Fair Good Infill + Infill ++ 1 37 northern red oak Quercus rubra WDH Medium 20 33.3 1.7 Lg. dec. Lg. dec. High Rare Poor Poor 1 38 Silver maple Acer saccharinum NSH Low 4.7 30.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor Poor 0 39 Chestnut oak Quercus prinus NDH High 3.5 21.9 6.2 Sm. dec. Lg. dec. High Rare Poor Poor Poor 0 40 White ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Fair 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Good Good Infill ++ Infill ++ 1 43 Nuttall oak Quercus texana NSH Medium 3.5 17.8 5.0 Sm. dec. Sm. dec. High Rare Poor Poor Poor 0 42 Swamp tupelo Nyssa biflora NDH Medium 1.2 15.7 13.3 No change No change Medium Rare Poor Poor Very Poor Very Poor 1 2 45 Swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill ++ Infill + 1 46	slippery elm	Ulmus rubra	WSL	Low	24.7	50.2	2.0 Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1 33
American hornbeam; musclev Carpinus caroliniana WSL Low 17.6 39.1 2.2 Lg. inc. Lg. inc. Medium Rare Good Good Infill + Infill ++ 1 37 northern red oak Quercus rubra WDH Medium 20 33.3 1.7 Lg. dec. Lg. dec. High Rare Poor Poor Poor 1 38 silver maple Acer saccharinum NSH Low 4.7 30.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor Poor 0 39 chestnut oak Quercus prinus NDH High 3.5 21.9 6.2 Sm. dec. Lg. dec. High Rare Poor Poor Poor 0 40 white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Fair 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Lost Lost 0 42 Shumard oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. Lg. inc. High Rare Poor Poor 0 40 Avampt upelo Nyssa biflora NDH Medium 1.2 15.7 13.3 No change No change Medium Rare Poor Poor Nor Nor Nor Nor Nor Nor Nor Nor Nor	black locust	Robinia pseudoacacia	NDH	Low	10.6	46.3	4.4 Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 34
sugarberry Celtis laevigata NDH Medium 5.9 35.4 6.0 Sm. inc. Lg. inc. Medium Rare Fair Good Infill + Infill ++ 1 37 northern red oak Quercus rubra WDH Medium 20 33.3 1.7 Lg. dec. Lg. dec. High Rare Poor Poor 1 38 silver maple Acer saccharinum NSH Low 4.7 30.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor 0 39 chestnut oak Quercus prinus NDH High 3.5 21.9 6.2 Sm. dec. Lg. dec. High Rare Poor Poor Poor 0 40 white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Fair 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Lost Lost 0 42 Shumard oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. High Rare Good Good Infill + Infill ++ 1 43 Nuttall oak Quercus texana NSH Medium 1.2 15.7 13.3 No change No change No change Medium Rare Poor Poor Infill + Infill + 1 46	American beech	Fagus grandifolia	WDH	High	22.4	40.7	1.8 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1 35
northern red oak Quercus rubra WDH Medium 20 33.3 1.7 Lg. dec. Lg. dec. High Rare Poor Poor 1 38 silver maple Acer saccharinum NSH Low 4.7 30.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor 0 39 chestnut oak Quercus prinus NDH High 3.5 21.9 6.2 Sm. dec. Lg. dec. High Rare Poor Poor 0 40 white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Fair 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Lost Lost 0 42 Shumard oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. High Rare Good Good Infill ++ Infill ++ 1 43 Nuttall oak Quercus texana NSH Medium 1.2 15.7 13.3 No change No change No change Medium Rare Poor Poor Infill + Infill + 1 46 swamp the chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	American hornbeam; muscle	Carpinus caroliniana	WSL	Low	17.6	39.1	2.2 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1 36
silver maple Acer saccharinum NSH Low 4.7 30.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor 0 39 chestnut oak Quercus prinus NDH High 3.5 21.9 6.2 Sm. dec. Lg. dec. High Rare Poor Poor 0 40 white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Low Rare Fair Fair 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Lost Lost 0 42 Shumard oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. High Rare Good Good Infill ++ Infill ++ 1 43 Nuttall oak Quercus texana NSH Medium 1.2 15.7 13.3 No change No change No change No change Poor Poor Infill + Infill + 1 46 Swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	sugarberry	Celtis laevigata	NDH	Medium	5.9	35.4	6.0 Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1 37
chestnut oak Quercus prinus NDH High 3.5 21.9 6.2 Sm. dec. Lg. dec. High Rare Poor Poor 0 40 white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Fair Fair 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Lost Lost 0 42 Shumard oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. High Rare Good Good Infill ++ Infill ++ 1 43 Nuttall oak Quercus texana NSH Medium 1.2 15.7 13.3 No change No change Low Rare Very Poor Very Poor 2 45 swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	northern red oak	Quercus rubra	WDH	Medium	20	33.3	1.7 Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			1 38
white ash Fraxinus americana WDL Medium 22.4 21.5 1.0 Lg. inc. Lg. inc. Low Rare Fair Fair 1 41 eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Lost Lost 0 42 Shumard oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. High Rare Good Good Infill ++ Infill ++ 1 43 Nuttall oak Quercus texana NSH Medium 1.2 15.7 13.3 No change No change Low Rare Very Poor Very Poor 2 45 swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	silver maple	Acer saccharinum	NSH	Low	4.7	30.3	6.4 Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0 39
eastern redbud Cercis canadensis NSL Low 12.9 18.8 1.5 Very Lg. dec. Very Lg. dec. Medium Rare Lost Lost 0 42 Shumard oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. High Rare Good Good Infill ++ Infill ++ 1 43 Nuttall oak Quercus texana NSH Medium 1.2 15.7 13.3 No change No change Low Rare Very Poor Very Poor 2 45 swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	chestnut oak	Quercus prinus	NDH	High	3.5	21.9	6.2 Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0 40
Shumard oak Quercus shumardii NSL Low 10.6 17.8 1.7 Lg. inc. Lg. inc. High Rare Good Good Infill ++ Infill ++ 1 43  Nuttall oak Quercus texana NSH Medium 3.5 17.8 5.0 Sm. dec. Sm. dec. High Rare Poor Poor 0 44  swamp tupelo Nyssa biflora NDH Medium 1.2 15.7 13.3 No change No change Low Rare Very Poor Very Poor 2 45  swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	white ash	Fraxinus americana	WDL	Medium	22.4	21.5	1.0 Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair			1 41
Nuttall oak Quercus texana NSH Medium 3.5 17.8 5.0 Sm. dec. Sm. dec. High Rare Poor Poor 0 44 swamp tupelo Nyssa biflora NDH Medium 1.2 15.7 13.3 No change No change Low Rare Very Poor Very Poor 2 45 swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	eastern redbud	Cercis canadensis	NSL	Low	12.9	18.8	1.5 Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0 42
swamp tupelo Nyssa biflora NDH Medium 1.2 15.7 13.3 No change No change Low Rare Very Poor Very Poor 2 45 swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	Shumard oak	Quercus shumardii	NSL	Low	10.6	17.8	1.7 Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1 43
swamp chestnut oak Quercus michauxii NSL Low 8.2 15.6 1.9 No change No change Medium Rare Poor Poor Infill + Infill + 1 46	Nuttall oak	Quercus texana	NSH	Medium	3.5	17.8	5.0 Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0 44
	swamp tupelo	Nyssa biflora	NDH	Medium	1.2	15.7	13.3 No change	No change	Low	Rare	Very Poor	Very Poor			2 45
sourwood Oxydendrum arboreum NDL High 5.9 14.6 2.5 No change No change High Rare Fair Fair Infill + Infill + 1 47	swamp chestnut oak	Quercus michauxii	NSL	Low	8.2	15.6	1.9 No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1 46
	sourwood	Oxydendrum arboreum	NDL	High	5.9	14.6	2.5 No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1 47



# **Holly Springs**

### **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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
red mulberry	Morus rubra	NSL	Low	14.1	13.4	1.0 Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 48
florida maple	Acer barbatum	NSL	Low	4.7	13.2	2.8 Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	1 49
black walnut	Juglans nigra	WDH	Low	9.4	13.2	1.4 Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0 50
chinkapin oak	Quercus muehlenbergii	NSL	Medium	4.7	10.8	2.3 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 51
laurel oak	Quercus laurifolia	NDH	Medium	3.5	7.2	2.0 Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair		Infill +	2 52
bitternut hickory	Carya cordiformis	WSL	Low	9.4	5.8	0.6 Lg. dec.	Lg. dec.	High	Rare	Poor	Poor		Infill +	1 53
Osage-orange	Maclura pomifera	NDH	Medium	3.5	5.7	1.6 No change	Lg. inc.	High	Rare	Fair	Good		Infill ++	2 54
honeylocust	Gleditsia triacanthos	NSH	Low	2.4	5.6	2.4 No change	Sm. inc.	High	Rare	Fair	Good		Infill ++	2 55
pecan	Carya illinoinensis	NSH	Low	2.4	4.9	2.1 Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair		Infill +	2 56
sugar maple	Acer saccharum	WDH	High	1.2	3.9	3.3 Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0 57
water tupelo	Nyssa aquatica	NSH	Medium	2.4	3.6	1.6 Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0 58
American holly	llex opaca	NSL	Medium	5.9	3.4	0.6 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1 59
shellbark hickory	Carya laciniosa	NSL	Low	1.2	3.3	2.8 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 60
water elm	Planera aquatica	NSL	Low	2.4	2.5	1.1 Lg. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2 61
overcup oak	Quercus lyrata	NSL	Medium	2.4	2.3	1.0 Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2 62
serviceberry	Amelanchier spp.	NSL	Low	2.4	2.1	0.9 Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 63
pawpaw	Asimina triloba	NSL	Low	2.4	1.5	0.6 Very Lg. de	c. Very Lg. dec.	Medium	Rare	Lost	Lost			0 64
white mulberry	Morus alba	NSL	FIA	1.2	3.0	0.7 Unknown	Unknown	NA	Rare	NNIS	NNIS			0 65
American basswood	Tilia americana	WSL	Medium	1.2	0.7	0.6 Very Lg. de	c. Very Lg. dec.	Medium	Rare	Lost	Lost			0 66
ailanthus	Ailanthus altissima	NSL	FIA	1.2	0.7	0.6 Unknown	Unknown	NA	Rare	NNIS	NNIS			0 67
eastern cottonwood	Populus deltoides	NSH	Low	1.2	0.7	0.6 Very Lg. de	c. Very Lg. dec.	Medium	Rare	Lost	Lost			0 68
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp	. NSL	Low	1.2	0.4	0.3 Lg. inc.	Lg. inc.	High	Rare	Good	Good			2 69
slash pine	Pinus elliottii	NDH	High	1.2	0.2	0.1 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2 70
ashe juniper	Juniperus ashei	NDH	High	0		0 New Habit	at New Habitat	Medium	Absent	New Habitat	New Habitat			0 71
longleaf pine	Pinus palustris	NSH	Medium	0	) (	0 New Habit	at New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +		3 72
striped maple	Acer pensylvanicum	NSL	Medium	0	) (	0 New Habit	at New Habitat	Medium	Absent	New Habitat	New Habitat			3 73
water hickory	Carya aquatica	NSL	Medium	0	) (	0 New Habit	at New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3 74
black hickory	Carya texana	NDL	High	0	) (	0 New Habit	at New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3 75
black ash	Fraxinus nigra	WSH	Medium	0	) (	0 New Habit	at New Habitat	Low	Absent	New Habitat	New Habitat			3 76
cucumbertree	Magnolia acuminata	NSL	Low	0	) (	0 Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0 77
southern magnolia	Magnolia grandiflora	NSL	Low	0	) (	0 New Habit	at New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +		3 78
sweetbay	Magnolia virginiana	NSL	Medium	0	) (	0 New Habit	at New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate +	3 79
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	) (	0 Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0 80
pin cherry	Prunus pensylvanica	NSL	Low	0	) (	0 Unknown	Unknown	Medium	Absent	Unknown	Unknown			0 81
live oak	Quercus virginiana	NDH	High	0	) (	0 New Habit	at New Habitat	Medium	Absent	New Habitat	New Habitat			3 82
bluejack oak	Quercus incana	NSL	Low	0	) (	0 New Habit	at New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3 83
cedar elm	Ulmus crassifolia	NDH	Medium	0	) (	0 New Habit	at New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++	3 84

