

HUC 041401 Southeastern Lake Ontario

HUC 6 Watershed 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

	sq. km	sq. mi	FIA Plots
Area of Region	4,344.2	1,677.3	101

Species Information

The columns below provide brief 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	Abundance		Model		Potential Change in Habitat Suitability		Capability to Cope or Persist		Migration Potential					
		Abundant	Common	High	Low	Scenario RCP45	Scenario RCP85	Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85				
Ash	3			High	22	21	Increase	11	16	Very Good	0	1	Likely	2	2
Hickory	3			Medium	25	40	No Change	14	11	Good	12	14	Infill	15	13
Maple	5	Abundant	6	Low	26	14	Decrease	20	18	Fair	11	10	Migrate	6	11
Oak	4	Common	14	FIA	4		New	22	23	Poor	12	10			
Pine	3	Rare	29				Unknown	10	9	Very Poor	10	8			
Other	31	Absent	26							FIA Only	2	2			
	49		75		77	75		77	77	Unknown	6	5			
											53	50			

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	39.4	40.5	41.9	41.9	
Average	CCSM85	39.4	40.8	42.2	44.0	
	GFDL45	39.4	41.2	42.9	43.7	
	GFDL85	39.4	41.4	43.7	46.3	
	HAD45	39.4	41.2	43.0	44.0	
	HAD85	39.4	41.2	43.6	46.6	
Growing Season	CCSM45	48.8	49.9	51.0	51.2	
	CCSM85	48.8	50.0	51.4	53.5	
May—Sep	GFDL45	48.8	50.8	52.9	53.7	
	GFDL85	48.8	51.2	53.7	56.6	
	HAD45	48.8	50.6	52.1	53.5	
	HAD85	48.8	50.4	53.0	56.3	
Coldest Month	CCSM45	24.6	25.6	27.0	27.0	
Average	CCSM85	24.6	26.4	27.1	28.4	
	GFDL45	24.6	26.2	27.4	27.9	
	GFDL85	24.6	26.8	27.8	29.4	
	HAD45	24.6	25.8	27.7	27.8	
	HAD85	24.6	26.6	28.0	30.1	
Warmest Month	CCSM45	52.1	53.3	54.0	54.1	
Average	CCSM85	52.1	53.6	54.5	55.7	
	GFDL45	52.1	53.8	55.1	55.6	
	GFDL85	52.1	54.4	55.9	57.5	
	HAD45	52.1	54.1	54.9	55.9	
	HAD85	52.1	54.1	55.7	58.2	

Precipitation (in)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	25.2	24.9	24.2	26.3	
Total	CCSM85	25.2	25.8	25.6	25.9	
	GFDL45	25.2	27.6	28.6	28.1	
	GFDL85	25.2	26.1	27.9	29.0	
	HAD45	25.2	26.1	27.1	27.1	
	HAD85	25.2	27.0	26.3	28.7	
Growing Season	CCSM45	10.5	10.3	9.4	10.4	
	CCSM85	10.5	10.3	10.0	9.3	
May—Sep	GFDL45	10.5	11.0	10.5	10.4	
	GFDL85	10.5	10.4	10.2	9.7	
	HAD45	10.5	10.4	9.7	10.3	
	HAD85	10.5	10.5	9.4	9.9	

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>.



HUC 041401 Southeastern Lake Ontario

HUC 6 Watershed 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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
red maple	Acer rubrum	WDH	High	76.8	1931.7	15.9	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
sugar maple	Acer saccharum	WDH	High	65.4	1568.7	10.8	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
black cherry	Prunus serotina	WDL	Medium	65.1	826.7	6.6	No change	Sm. dec.	Low	Abundant	Fair	Fair			0	3
white ash	Fraxinus americana	WDL	Medium	68.4	638.3	5.1	No change	No change	Low	Abundant	Fair	Fair			0	4
eastern hemlock	Tsuga canadensis	NSH	High	39.2	597.7	8.3	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	5
green ash	Fraxinus pennsylvanica	WSH	Low	36.8	570.6	11.9	No change	No change	Medium	Abundant	Good	Good			1	6
yellow birch	Betula alleghaniensis	NDL	High	48.5	468.6	5.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	7
American beech	Fagus grandifolia	WDH	High	53.1	386.8	5.2	No change	No change	Medium	Common	Fair	Fair			1	8
quaking aspen	Populus tremuloides	WDH	High	27.8	378.4	8.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	9
American elm	Ulmus americana	WDH	Medium	61.1	279.6	2.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	10
boxelder	Acer negundo	WSH	Low	16.6	227.0	19.4	Lg. dec.	Sm. dec.	High	Common	Fair	Fair			1	11
American basswood	Tilia americana	WSL	Medium	31.7	222.7	3.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	12
silver maple	Acer saccharinum	NSH	Low	23.3	219.4	7.1	No change	Sm. inc.	High	Common	Good	Very Good			1	13
red pine	Pinus resinosa	NSH	Medium	5.6	202.3	16.0	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	14
Norway spruce	Picea abies	NSH	FIA	10.2	195.7	13.6	Unknown	Unknown	NA	Common	NNIS	NNIS			0	15
eastern redcedar	Juniperus virginiana	WDH	Medium	2.6	159.5	21.1	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	16
eastern white pine	Pinus strobus	WDH	High	20.2	154.4	3.9	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	17
bitternut hickory	Carya cordiformis	WSL	Low	25.8	143.3	3.0	Sm. dec.	No change	High	Common	Fair	Good			1	18
eastern cottonwood	Populus deltoides	NSH	Low	5.1	126.7	11.0	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	19
white spruce	Picea glauca	NSL	Medium	4.7	105.0	6.6	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	20
pignut hickory	Carya glabra	WDL	Medium	0.2	62.2	2.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	21
red spruce	Picea rubens	NDH	High	10.7	59.4	2.3	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor	Infill +		0	22
black walnut	Juglans nigra	WDH	Low	7.8	50.6	2.4	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	23
bigtooth aspen	Populus grandidentata	NSL	Medium	7.4	48.2	3.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	24
black locust	Robinia pseudoacacia	NDH	Low	7.6	48.1	9.0	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	25
balsam fir	Abies balsamea	NDH	High	2.6	47.7	4.7	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	26
black willow	Salix nigra	NSH	Low	9.1	46.0	4.2	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			0	27
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	14.8	36.8	1.0	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	28
black ash	Fraxinus nigra	WSH	Medium	17.9	36.4	0.8	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	29
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	15.9	33.5	1.5	Sm. inc.	Lg. inc.	High	Rare	Good	Good			1	30
white oak	Quercus alba	WDH	Medium	2.1	29.9	4.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	31
butternut	Juglans cinerea	NSLX	FIA	12.9	29.7	2.4	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	32
shagbark hickory	Carya ovata	WSL	Medium	9.8	28.2	3.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	33
striped maple	Acer pensylvanicum	NSL	Medium	11	27.7	1.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	34
blackgum	Nyssa sylvatica	WDL	Medium	2	26.9	0.6	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	35
northern red oak	Quercus rubra	WDH	Medium	11.1	23.3	1.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	36
paper birch	Betula papyrifera	WDH	High	3.2	19.1	2.6	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	37
pin cherry	Prunus pensylvanica	NSL	Low	5.7	18.4	2.0	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	38
Scots pine	Pinus sylvestris	NSH	FIA	3.3	17.6	2.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	39
sweet birch	Betula lenta	NDH	High	7.5	12.9	1.3	Sm. inc.	Sm. inc.	Low	Rare	Poor	Poor	Infill +	Infill +	2	40
cucumbertree	Magnolia acuminata	NSL	Low	1.2	11.0	0.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	41
serviceberry	Amelanchier spp.	NSL	Low	14.1	9.9	0.4	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	42
northern white-cedar	Thuja occidentalis	WSH	High	1.9	9.7	3.4	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
gray birch	Betula populifolia	NSL	Low	2.3	7.6	3.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	44
yellow-poplar	Liriodendron tulipifera	WDH	High	9	3.8	0.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	45
black oak	Quercus velutina	WDH	High	1.9	3.6	1.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	46
chokecherry	Prunus virginiana	NSLX	FIA	9.3	2.8	1.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	47



HUC 041401 Southeastern Lake Ontario

HUC 6 Watershed 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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIaiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N		
slippery elm	Ulmus rubra	WSL	Low	0.2	1.5	0.1	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +			2	48	
swamp white oak	Quercus bicolor	NSL	Low	5.9	0.2	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good					2	49
tamarack (native)	Larix laricina	NSH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +			3	50
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat					3	51
pitch pine	Pinus rigida	NSH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat					3	52
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat					3	53
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown					0	54
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat					0	55
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat					0	56
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +			3	57
hackberry	Celtis occidentalis	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +			3	58
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +			3	59
flowering dogwood	Cornus florida	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +			3	60
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +			3	61
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown					0	62
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++			3	63
redbay	Persea borbonia	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown					0	64
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +			3	65
balsam poplar	Populus balsamifera	NSH	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown					0	66
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +			3	67
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat					3	68
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +			3	69
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat					3	70
pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +			3	71
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat					3	72
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +			3	73
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat					3	74
sassafras	Sassafras albidum	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +			3	75
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown					0	76
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat					0	77