

HUC 041300 Southwestern 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	9,231.1	3,564.1	158

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				
				Reliability	Adaptability	Scenario	Scenario	Scenario	Scenario	SHIFT	SHIFT			
				High	20	Increase	RCP45	RCP85	Very Good	8	7	Likely	1	1
Ash	3			Medium	30	No Change	14	8	Good	10	12	Infill	12	13
Hickory	3			Low	27	Decrease	15	22	Fair	8	5	Migrate	7	18
Maple	6	Abundant	3	FIA	6	New	26	29	Poor	10	11			
Oak	8	Common	24			Unknown	13	10	Very Poor	9	8			
Pine	3	Rare	25						FIA Only	3	3			
Other	29	Absent	31						Unknown	7	4			
	52		83				85	85						
										55	50			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	41.6	42.9	44.7	44.7	
	CCSM85	41.6	43.2	45.0	47.2	
	GFDL45	41.6	44.0	45.7	46.6	
	GFDL85	41.6	43.9	46.5	49.7	
	HAD45	41.6	43.8	46.0	47.2	
HAD85	41.6	43.8	46.7	50.4		
Growing Season (May—Sep)	CCSM45	52.7	54.0	55.5	55.7	
	CCSM85	52.7	54.2	56.0	58.6	
	GFDL45	52.7	55.4	57.7	58.8	
	GFDL85	52.7	55.8	58.7	62.1	
	HAD45	52.7	55.1	56.9	58.6	
HAD85	52.7	54.8	58.1	62.1		
Coldest Month Average	CCSM45	24.4	25.8	27.4	27.4	
	CCSM85	24.4	26.6	27.5	28.8	
	GFDL45	24.4	26.3	27.5	27.9	
	GFDL85	24.4	26.8	27.9	29.5	
	HAD45	24.4	25.7	27.9	27.9	
HAD85	24.4	26.6	28.3	30.6		
Warmest Month Average	CCSM45	56.7	58.2	59.1	59.3	
	CCSM85	56.7	58.6	59.7	61.2	
	GFDL45	56.7	58.7	60.3	61.0	
	GFDL85	56.7	59.7	61.4	63.3	
	HAD45	56.7	59.4	60.4	61.6	
HAD85	56.7	59.4	61.6	64.6		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	24.8	25.0	24.2	25.8	
	CCSM85	24.8	25.6	25.6	25.7	
	GFDL45	24.8	27.3	28.2	27.8	
	GFDL85	24.8	25.7	27.7	28.5	
	HAD45	24.8	25.1	25.9	25.8	
HAD85	24.8	25.9	24.8	27.1		
Growing Season (May—Sep)	CCSM45	12.1	12.2	11.3	12.2	
	CCSM85	12.1	11.8	11.8	11.2	
	GFDL45	12.1	12.8	12.4	12.1	
	GFDL85	12.1	12.0	12.0	11.6	
	HAD45	12.1	11.9	11.0	11.6	
HAD85	12.1	11.9	10.3	10.9		

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.

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
sugar maple	Acer saccharum	WDH	High	57.3	920.3	10.8	No change	Sm. dec.	High	Abundant	Very Good	Good			1	1
red maple	Acer rubrum	WDH	High	66	910.1	10.5	No change	Sm. dec.	High	Abundant	Very Good	Good			1	2
white ash	Fraxinus americana	WDL	Medium	74.9	831.3	10.2	No change	Sm. dec.	Low	Abundant	Fair	Fair			0	3
green ash	Fraxinus pennsylvanica	WSH	Low	37.9	448.7	19.9	No change	No change	Medium	Common	Fair	Fair			1	4
black cherry	Prunus serotina	WDL	Medium	54.7	349.3	4.5	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	5
northern red oak	Quercus rubra	WDH	Medium	43.5	308.1	5.8	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	6
American beech	Fagus grandifolia	WDH	High	36.6	302.3	4.7	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	7
quaking aspen	Populus tremuloides	WDH	High	47	269.3	6.2	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	8
Scots pine	Pinus sylvestris	NSH	FIA	19.7	244.6	10.6	Unknown	Unknown	NA	Common	NNIS	NNIS			0	9
eastern hemlock	Tsuga canadensis	NSH	High	23.2	242.4	6.8	No change	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	10
eastern white pine	Pinus strobus	WDH	High	24.9	237.8	8.3	No change	Sm. dec.	Low	Common	Poor	Poor			0	11
American basswood	Tilia americana	WSL	Medium	42.2	215.5	5.5	No change	Sm. dec.	Medium	Common	Fair	Poor			1	12
eastern cottonwood	Populus deltoides	NSH	Low	16.2	212.7	8.6	Lg. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	13
black willow	Salix nigra	NSH	Low	27.7	160.7	12.1	Lg. dec.	Sm. dec.	Low	Common	Very Poor	Poor			0	14
bitternut hickory	Carya cordiformis	WDL	Low	34.2	148.8	4.6	Sm. dec.	No change	High	Common	Fair	Good			1	15
American elm	Ulmus americana	WDH	Medium	44.7	145.8	3.7	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	16
silver maple	Acer saccharinum	NSH	Low	13.7	143.9	11.3	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	17
black locust	Robinia pseudoacacia	NDH	Low	12.2	112.5	13.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	18
red pine	Pinus resinosa	NSH	Medium	11.7	98.4	8.4	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	19
yellow birch	Betula alleghaniensis	NDL	High	17.5	95.0	3.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	20
Norway spruce	Picea abies	NSH	FIA	14.1	92.1	4.3	Unknown	Unknown	NA	Common	NNIS	NNIS			0	21
shagbark hickory	Carya ovata	WSL	Medium	30.7	91.9	3.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	22
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	43.7	91.5	1.4	No change	No change	High	Common	Good	Good			1	23
white oak	Quercus alba	WDH	Medium	13.9	68.6	3.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	24
boxelder	Acer negundo	WSH	Low	30.3	54.4	7.1	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	25
pignut hickory	Carya glabra	WDL	Medium	16.5	52.1	3.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	26
black walnut	Juglans nigra	WDH	Low	21.4	50.1	4.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	27
sweet birch	Betula lenta	NDH	High	8.8	39.3	1.5	No change	No change	Low	Rare	Very Poor	Very Poor			0	28
bigtooth aspen	Populus grandidentata	NSL	Medium	4.3	35.2	8.1	No change	Sm. dec.	Medium	Rare	Poor	Very Poor			1	29
swamp white oak	Quercus bicolor	NSL	Low	15.6	32.7	4.9	Sm. inc.	No change	Medium	Rare	Fair	Poor	Infill +	Infill +	1	30
serviceberry	Amelanchier spp.	NSL	Low	12.3	30.6	1.6	No change	Sm. dec.	Medium	Rare	Poor	Very Poor			1	31
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	12.7	30.0	1.1	No change	No change	Medium	Rare	Poor	Poor			1	32
bur oak	Quercus macrocarpa	NDH	Medium	10.7	26.3	4.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	33
chestnut oak	Quercus prinus	NDH	High	1.2	23.1	6.3	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	34
black oak	Quercus velutina	WDH	High	7.4	16.0	3.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	35
chokecherry	Prunus virginiana	NSLX	FIA	13.7	12.0	2.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	36
pin cherry	Prunus pensylvanica	NSL	Low	8.3	11.7	1.2	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	37
northern pin oak	Quercus ellipsoidalis	NSH	Medium	1.1	9.6	8.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	38
yellow-poplar	Liriodendron tulipifera	WDH	High	4.5	9.4	3.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	39
black ash	Fraxinus nigra	WSH	Medium	9.5	9.3	1.3	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	40
eastern redcedar	Juniperus virginiana	WDH	Medium	5.5	8.3	8.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	41
butternut	Juglans cinerea	NSLX	FIA	3.1	7.6	1.2	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	42
striped maple	Acer pensylvanicum	NSL	Medium	1.5	5.5	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	43
white spruce	Picea glauca	NSL	Medium	1.1	5.1	4.7	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	44
tamarack (native)	Larix laricina	NSH	High	1.1	5.1	4.7	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	45
sassafras	Sassafras albidum	WSL	Low	2.6	5.0	1.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	46
Norway maple	Acer platanoides	NSL	FIA	2.2	4.1	1.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	47



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cucumbertree	Magnolia acuminata	NSL	Low	4.4	3.0	0.7	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0	48
American chestnut	Castanea dentata	NSLX	FIA	1.7	1.8	0.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only				0	49
pin oak	Quercus palustris	NSH	Low	5.5	1.1	0.8	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +		2	50
northern white-cedar	Thuja occidentalis	WSH	High	1.1	1.1	1.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0	51
slippery elm	Ulmus rubra	WSL	Low	4.4	0.3	1.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good				2	52
balsam fir	Abies balsamea	NDH	High	0	0	0	Unknown	Unknown	Low	Modeled	Unknown	Unknown				0	53
shortleaf pine	Pinus echinata	WDH	High	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat		Migrate +		3	54
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++		3	55
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	56
gray birch	Betula populifolia	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0	57
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0	58
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +		3	59
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0	60
hackberry	Celtis occidentalis	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	61
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	62
flowering dogwood	Cornus florida	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	63
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +		3	64
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	65
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++		3	66
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +		3	67
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0	68
red mulberry	Morus rubra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	69
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++		3	70
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	71
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	72
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	73
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	74
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				3	75
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3	76
swamp chestnut oak	Quercus michauxii	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat				3	77
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	78
water oak	Quercus nigra	WDH	High	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat				3	79
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	80
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3	81
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0	82
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown				0	83
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3	84
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				0	85