

One x One Degree
Climate Change Atlas Tree Species
 Current and Potential Future Habitat, Capability, and Migration

| | | | |
|----------------|---------|---------|-----------|
| | sq. km | sq. mi | FIA Plots |
| Area of Region | 8,985.5 | 3,469.3 | 280 |

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 RCP45 | Scenario RCP85 | Scenario RCP45 | Scenario RCP85 | SHIFT RCP45 | SHIFT RCP85 | | | | |
| Ash | 3 | | | High | 24 | 23 | Increase | 21 | 26 | Very Good | 4 | 5 | Likely | 0 | 0 |
| Hickory | 4 | | | Medium | 27 | 47 | No Change | 9 | 6 | Good | 17 | 16 | Infill | 15 | 14 |
| Maple | 5 | Abundant | 7 | Low | 33 | 17 | Decrease | 22 | 20 | Fair | 7 | 11 | Migrate | 6 | 14 |
| Oak | 7 | Common | 19 | FIA | 5 | | New | 26 | 29 | Poor | 14 | 11 | | | |
| Pine | 4 | Rare | 31 | | | | Unknown | 11 | 8 | Very Poor | 7 | 7 | | | |
| Other | 34 | Absent | 31 | | | | | | | FIA Only | 3 | 3 | | | |
| | 57 | | 88 | | 89 | 87 | | 89 | 89 | Unknown | 6 | 3 | | | |
| | | | | | | | | | | | 58 | 56 | | | |

Potential Changes in Climate Variables

Temperature (°F)

| | Scenario | 2009 | 2039 | 2069 | 2099 | |
|--------------------------|----------|------|------|------|------|--|
| Annual Average | CCSM45 | 44.8 | 46.7 | 49.2 | 49.3 | |
| | CCSM85 | 44.8 | 47.3 | 49.9 | 53.2 | |
| | GFDL45 | 44.8 | 47.9 | 51.4 | 52.8 | |
| | GFDL85 | 44.8 | 48.5 | 52.8 | 57.8 | |
| | HAD45 | 44.8 | 47.9 | 51.2 | 52.9 | |
| HAD85 | 44.8 | 48.0 | 52.2 | 57.8 | | |
| Growing Season (May—Sep) | CCSM45 | 62.5 | 64.6 | 66.5 | 66.9 | |
| | CCSM85 | 62.5 | 64.9 | 67.4 | 71.2 | |
| | GFDL45 | 62.5 | 65.7 | 69.7 | 71.4 | |
| | GFDL85 | 62.5 | 66.6 | 71.3 | 76.6 | |
| | HAD45 | 62.5 | 65.6 | 68.3 | 70.7 | |
| HAD85 | 62.5 | 65.3 | 69.7 | 76.0 | | |
| Coldest Month Average | CCSM45 | 16.9 | 18.7 | 21.1 | 21.3 | |
| | CCSM85 | 16.9 | 20.0 | 21.2 | 23.7 | |
| | GFDL45 | 16.9 | 20.2 | 22.6 | 23.7 | |
| | GFDL85 | 16.9 | 21.1 | 23.3 | 26.2 | |
| | HAD45 | 16.9 | 19.6 | 22.7 | 23.0 | |
| HAD85 | 16.9 | 20.7 | 23.4 | 27.0 | | |
| Warmest Month Average | CCSM45 | 68.4 | 70.9 | 72.1 | 72.2 | |
| | CCSM85 | 68.4 | 71.3 | 73.0 | 75.1 | |
| | GFDL45 | 68.4 | 71.4 | 73.6 | 75.0 | |
| | GFDL85 | 68.4 | 72.7 | 75.6 | 78.4 | |
| | HAD45 | 68.4 | 71.7 | 73.2 | 74.7 | |
| HAD85 | 68.4 | 71.5 | 74.1 | 78.6 | | |

Precipitation (in)

| | Scenario | 2009 | 2039 | 2069 | 2099 | |
|--------------------------|----------|------|------|------|------|--|
| Annual Total | CCSM45 | 44.5 | 43.7 | 41.9 | 46.7 | |
| | CCSM85 | 44.5 | 44.3 | 45.6 | 47.3 | |
| | GFDL45 | 44.5 | 48.7 | 50.5 | 48.9 | |
| | GFDL85 | 44.5 | 46.5 | 49.5 | 51.5 | |
| | HAD45 | 44.5 | 47.1 | 48.8 | 48.0 | |
| HAD85 | 44.5 | 48.1 | 47.9 | 51.4 | | |
| Growing Season (May—Sep) | CCSM45 | 20.4 | 20.1 | 18.7 | 20.3 | |
| | CCSM85 | 20.4 | 19.9 | 20.6 | 19.4 | |
| | GFDL45 | 20.4 | 21.0 | 19.9 | 19.9 | |
| | GFDL85 | 20.4 | 20.4 | 20.0 | 19.1 | |
| | HAD45 | 20.4 | 21.8 | 20.7 | 21.3 | |
| HAD85 | 20.4 | 20.7 | 20.5 | 21.8 | | |

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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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 |
|----------------------------|-------------------------|-------|--------|-------|--------|-------|-----------|-----------|--------|----------|-----------|-----------|-----------|-----------|-----|----|
| sugar maple | Acer saccharum | WDH | High | 91.1 | 1848.6 | 13.5 | Sm. dec. | Sm. dec. | High | Abundant | Good | Good | | | 1 | 1 |
| eastern white pine | Pinus strobus | WDH | High | 78 | 1302.2 | 13.1 | Sm. dec. | Sm. dec. | Low | Abundant | Fair | Fair | | | 0 | 2 |
| red maple | Acer rubrum | WDH | High | 90.6 | 1029.7 | 8.1 | Sm. inc. | Sm. inc. | High | Abundant | Very Good | Very Good | | | 1 | 3 |
| American beech | Fagus grandifolia | WDH | High | 78.6 | 1009.9 | 8.6 | Sm. dec. | Sm. dec. | Medium | Abundant | Fair | Fair | | | 0 | 4 |
| eastern hemlock | Tsuga canadensis | NSH | High | 65.4 | 964.7 | 12.6 | Sm. dec. | Sm. dec. | Low | Abundant | Fair | Fair | | | 0 | 5 |
| white ash | Fraxinus americana | WDL | Medium | 81.2 | 662.9 | 6.0 | No change | No change | Low | Abundant | Fair | Fair | | | 0 | 6 |
| northern red oak | Quercus rubra | WDH | Medium | 59 | 580.7 | 6.8 | Sm. inc. | Sm. inc. | High | Abundant | Very Good | Very Good | | | 1 | 7 |
| yellow birch | Betula alleghaniensis | NDL | High | 54.3 | 444.4 | 5.0 | Sm. dec. | Sm. dec. | Medium | Common | Poor | Poor | | | 0 | 8 |
| paper birch | Betula papyrifera | WDH | High | 66.1 | 383.8 | 3.7 | Sm. dec. | Sm. dec. | Medium | Common | Poor | Poor | | | 0 | 9 |
| black cherry | Prunus serotina | WDL | Medium | 57.2 | 333.5 | 3.4 | Sm. inc. | Sm. inc. | Low | Common | Fair | Fair | | | 1 | 10 |
| eastern hophornbeam; ironw | Ostrya virginiana | WSL | Low | 66.8 | 297.3 | 3.5 | Sm. dec. | Sm. dec. | High | Common | Fair | Fair | | | 1 | 11 |
| balsam fir | Abies balsamea | NDH | High | 27.7 | 290.4 | 4.6 | Lg. dec. | Lg. dec. | Low | Common | Very Poor | Very Poor | | | 0 | 12 |
| red spruce | Picea rubens | NDH | High | 37.4 | 246.9 | 3.7 | Sm. dec. | Sm. dec. | Low | Common | Poor | Poor | | | 0 | 13 |
| sweet birch | Betula lenta | NDH | High | 50.1 | 223.9 | 3.8 | Sm. inc. | Sm. inc. | Low | Common | Fair | Fair | | | 1 | 14 |
| American elm | Ulmus americana | WDH | Medium | 40.8 | 206.2 | 3.6 | Sm. inc. | Sm. inc. | Medium | Common | Good | Good | | | 1 | 15 |
| shagbark hickory | Carya ovata | WSL | Medium | 22 | 160.5 | 7.1 | Sm. inc. | Sm. inc. | Medium | Common | Good | Good | | | 1 | 16 |
| quaking aspen | Populus tremuloides | WDH | High | 27.6 | 152.1 | 3.6 | Lg. inc. | Sm. inc. | Medium | Common | Very Good | Good | | | 1 | 17 |
| bitternut hickory | Carya cordiformis | WSL | Low | 28.7 | 147.4 | 4.2 | No change | Sm. inc. | High | Common | Good | Very Good | | | 1 | 18 |
| northern white-cedar | Thuja occidentalis | WSH | High | 14.7 | 144.9 | 6.8 | Lg. dec. | Lg. dec. | Medium | Common | Poor | Poor | Infill + | | 0 | 19 |
| American basswood | Tilia americana | WSL | Medium | 44.8 | 131.3 | 2.4 | Sm. inc. | Lg. inc. | Medium | Common | Good | Very Good | | | 1 | 20 |
| bigtooth aspen | Populus grandidentata | NSL | Medium | 25.8 | 112.1 | 3.3 | Sm. inc. | Sm. inc. | Medium | Common | Good | Good | | | 1 | 21 |
| striped maple | Acer pensylvanicum | NSL | Medium | 35.8 | 98.2 | 1.3 | Sm. dec. | Lg. dec. | Medium | Common | Poor | Poor | | | 0 | 22 |
| black ash | Fraxinus nigra | WSH | Medium | 15.6 | 88.4 | 4.6 | Lg. dec. | Lg. dec. | Low | Common | Very Poor | Very Poor | | | 0 | 23 |
| white oak | Quercus alba | WDH | Medium | 21 | 87.1 | 3.3 | Lg. inc. | Lg. inc. | High | Common | Very Good | Very Good | | | 1 | 24 |
| tamarack (native) | Larix laricina | NSH | High | 3.3 | 71.5 | 6.3 | Lg. dec. | Lg. dec. | Low | Common | Very Poor | Very Poor | | | 0 | 25 |
| red pine | Pinus resinosa | NSH | Medium | 7.4 | 68.9 | 8.2 | No change | No change | Low | Common | Poor | Poor | Infill + | Infill + | 0 | 26 |
| chestnut oak | Quercus prinus | NDH | High | 11.2 | 48.5 | 3.9 | Lg. inc. | Lg. inc. | High | Rare | Good | Good | Infill ++ | Infill ++ | 1 | 27 |
| pitch pine | Pinus rigida | NSH | High | 1.6 | 48.4 | 12.9 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 1 | 28 |
| bur oak | Quercus macrocarpa | NDH | Medium | 3.4 | 44.5 | 8.5 | Sm. dec. | Sm. dec. | High | Rare | Poor | Poor | Infill + | Infill + | 2 | 29 |
| green ash | Fraxinus pennsylvanica | WSH | Low | 4 | 43.7 | 6.7 | No change | Sm. inc. | Medium | Rare | Poor | Fair | Infill + | Infill + | 1 | 30 |
| black oak | Quercus velutina | WDH | High | 5.1 | 35.8 | 5.9 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | Infill ++ | Infill ++ | 2 | 31 |
| pin cherry | Prunus pensylvanica | NSL | Low | 8.4 | 32.4 | 2.4 | Sm. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | 0 | 32 |
| slippery elm | Ulmus rubra | WSL | Low | 3.3 | 29.7 | 8.9 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 1 | 33 |
| eastern cottonwood | Populus deltoides | NSH | Low | 2.2 | 27.6 | 12.4 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 34 |
| serviceberry | Amelanchier spp. | NSL | Low | 14.7 | 22.9 | 0.7 | No change | Sm. inc. | Medium | Rare | Poor | Fair | | | 1 | 35 |
| black locust | Robinia pseudoacacia | NDH | Low | 3.3 | 19.3 | 5.8 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | Infill ++ | Infill ++ | 1 | 36 |
| butternut | Juglans cinerea | NSLX | FIA | 4.5 | 18.8 | 1.9 | Unknown | Unknown | Low | Rare | FIA Only | FIA Only | | | 0 | 37 |
| American hornbeam; muscle | Carpinus caroliniana | WSL | Low | 13.6 | 16.7 | 1.0 | Sm. dec. | Sm. inc. | Medium | Rare | Very Poor | Fair | | | 1 | 38 |
| eastern redcedar | Juniperus virginiana | WDH | Medium | 3.4 | 15.5 | 3.2 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | Infill ++ | Infill ++ | 2 | 39 |
| swamp white oak | Quercus bicolor | NSL | Low | 2.2 | 15.0 | 6.7 | No change | Sm. inc. | Medium | Rare | Poor | Fair | Infill + | Infill + | 2 | 40 |
| gray birch | Betula populifolia | NSL | Low | 3.2 | 14.1 | 1.5 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | 0 | 41 |
| Norway spruce | Picea abies | NSH | FIA | 1.8 | 12.9 | 5.1 | Unknown | Unknown | NA | Rare | NNIS | NNIS | | | 0 | 42 |
| Scots pine | Pinus sylvestris | NSH | FIA | 0.9 | 12.0 | 8.4 | Unknown | Unknown | NA | Rare | NNIS | NNIS | | | 0 | 43 |
| pignut hickory | Carya glabra | WDL | Medium | 6.4 | 9.6 | 1.4 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | Infill ++ | Infill ++ | 1 | 44 |
| yellow-poplar | Liriodendron tulipifera | WDH | High | 1.1 | 7.3 | 6.5 | Lg. inc. | Lg. inc. | High | Rare | Good | Good | | | 2 | 45 |
| scarlet oak | Quercus coccinea | WDL | Medium | 2.2 | 4.7 | 2.1 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | | | 2 | 46 |
| sassafras | Sassafras albidum | WSL | Low | 1.1 | 4.6 | 4.1 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | Infill ++ | Infill ++ | 2 | 47 |

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 |
|-----------------------------|------------------------------|-------|--------|-------|--------|-------|---------------|---------------|--------|---------|-------------|-------------|-----------|------------|-----|----|
| mountain maple | Acer spicatum | NSL | Low | 5 | 3.4 | 0.6 | Lg. dec. | Lg. dec. | High | Rare | Poor | Poor | | | 1 | 48 |
| chokecherry | Prunus virginiana | NSLX | FIA | 2.7 | 2.5 | 0.7 | Unknown | Unknown | Medium | Rare | FIA Only | FIA Only | | | 0 | 49 |
| white spruce | Picea glauca | NSL | Medium | 0.5 | 2.3 | 0.8 | Very Lg. dec. | Very Lg. dec. | Medium | Rare | Lost | Lost | | | 0 | 50 |
| American mountain-ash | Sorbus americana | NSL | Low | 1.1 | 2.1 | 0.4 | Lg. dec. | Lg. dec. | Low | Rare | Very Poor | Very Poor | | | 0 | 51 |
| black willow | Salix nigra | NSH | Low | 1.5 | 1.8 | 0.4 | Very Lg. dec. | No change | Low | Rare | Lost | Very Poor | | | 2 | 52 |
| boxelder | Acer negundo | WSH | Low | 1.1 | 1.4 | 1.2 | Lg. inc. | Lg. inc. | High | Rare | Good | Good | Infill ++ | Infill ++ | 2 | 53 |
| black spruce | Picea mariana | NSH | High | 0.5 | 1.3 | 0.5 | Very Lg. dec. | Very Lg. dec. | Medium | Rare | Lost | Lost | | | 0 | 54 |
| flowering dogwood | Cornus florida | WDL | Medium | 1.1 | 0.8 | 0.8 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | | | 2 | 55 |
| wild plum | Prunus americana | NSLX | FIA | 1.1 | 0.8 | 0.7 | Unknown | Unknown | Medium | Rare | FIA Only | FIA Only | | | 0 | 56 |
| mockernut hickory | Carya alba | WDL | Medium | 1.1 | 0.6 | 0.6 | Lg. inc. | Lg. inc. | High | Rare | Good | Good | | | 2 | 57 |
| shortleaf pine | Pinus echinata | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | Migrate + | 3 | 58 |
| Virginia pine | Pinus virginiana | NDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | Migrate + | 3 | 59 |
| silver maple | Acer saccharinum | NSH | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 60 |
| pawpaw | Asimina triloba | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 3 | 61 |
| cittamwood/gum bumelia | Sideroxylon lanuginosum ssp. | NSL | Low | 0 | 0 | 0 | Unknown | New Habitat | High | Absent | Unknown | New Habitat | | | 0 | 62 |
| pecan | Carya illinoensis | NSH | Low | 0 | 0 | 0 | New Habitat | New Habitat | Low | Absent | New Habitat | New Habitat | | | 0 | 63 |
| shellbark hickory | Carya laciniosa | NSL | Low | 0 | 0 | 0 | Unknown | Unknown | Medium | Modeled | Unknown | Unknown | | | 0 | 64 |
| black hickory | Carya texana | NDL | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 0 | 65 |
| sugarberry | Celtis laevigata | NDH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 0 | 66 |
| hackberry | Celtis occidentalis | WDH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 67 |
| eastern redbud | Cercis canadensis | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 3 | 68 |
| common persimmon | Diospyros virginiana | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | Migrate + | 3 | 69 |
| honeylocust | Gleditsia triacanthos | NSH | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | | 3 | 70 |
| black walnut | Juglans nigra | WDH | Low | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | Migrate + | Migrate ++ | 3 | 71 |
| sweetgum | Liquidambar styraciflua | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | Migrate ++ | 3 | 72 |
| Osage-orange | Maclura pomifera | NDH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | Migrate + | 3 | 73 |
| cucumbertree | Magnolia acuminata | NSL | Low | 0 | 0 | 0 | Unknown | New Habitat | Medium | Absent | Unknown | New Habitat | | Migrate + | 3 | 74 |
| southern magnolia | Magnolia grandiflora | NSL | Low | 0 | 0 | 0 | Unknown | Unknown | Medium | Absent | Unknown | Unknown | | | 0 | 75 |
| bigleaf magnolia | Magnolia macrophylla | NSL | Low | 0 | 0 | 0 | Unknown | Unknown | Medium | Absent | Unknown | Unknown | | | 0 | 76 |
| mountain or Fraser magnolia | Magnolia fraseri | NSL | Low | 0 | 0 | 0 | Unknown | New Habitat | Low | Absent | Unknown | New Habitat | | | 0 | 77 |
| blackgum | Nyssa sylvatica | WDL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 78 |
| sourwood | Oxydendrum arboreum | NDL | High | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | | 3 | 79 |
| sycamore | Platanus occidentalis | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 80 |
| shingle oak | Quercus imbricaria | NDH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 3 | 81 |
| overcup oak | Quercus lyrata | NSL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Low | Absent | New Habitat | New Habitat | | | 0 | 82 |
| blackjack oak | Quercus marilandica | NSL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | | 3 | 83 |
| chinkapin oak | Quercus muehlenbergii | NSL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | Migrate + | 3 | 84 |
| pin oak | Quercus palustris | NSH | Low | 0 | 0 | 0 | New Habitat | New Habitat | Low | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 85 |
| willow oak | Quercus phellos | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 3 | 86 |
| Shumard oak | Quercus shumardii | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | | 0 | 87 |
| post oak | Quercus stellata | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | Migrate ++ | 3 | 88 |
| winged elm | Ulmus alata | WDL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 0 | 89 |