

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 | 7,371.1 | 2,846.0 | 48 |

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 | 2 | | | High | 13 | 22 | Increase | 12 | 13 | Very Good | 1 | 1 | Likely | 0 | 0 |
| Hickory | 4 | | | Medium | 25 | 33 | No Change | 15 | 13 | Good | 11 | 10 | Infill | 28 | 27 |
| Maple | 5 | Abundant | 0 | Low | 24 | 7 | Decrease | 18 | 19 | Fair | 11 | 13 | Migrate | 6 | 9 |
| Oak | 8 | Common | 13 | FIA | 3 | | New | 15 | 15 | Poor | 11 | 10 | | | |
| Pine | 3 | Rare | 35 | | | | Unknown | 5 | 5 | Very Poor | 10 | 10 | | | |
| Other | 26 | Absent | 15 | | | | | | | FIA Only | 0 | 0 | | | |
| | 48 | | 63 | | 65 | 62 | | 65 | 65 | Unknown | 2 | 2 | | | |
| | | | | | | | | | | | 46 | 46 | | | |

Potential Changes in Climate Variables

Temperature (°F)

| | Scenario | 2009 | 2039 | 2069 | 2099 | |
|--------------------------|----------|------|------|------|------|--|
| Annual Average | CCSM45 | 50.3 | 52.2 | 54.7 | 54.9 | |
| | CCSM85 | 50.3 | 52.9 | 55.6 | 58.5 | |
| | GFDL45 | 50.3 | 56.3 | 55.9 | 56.8 | |
| | GFDL85 | 50.3 | 53.4 | 56.9 | 61.1 | |
| | HAD45 | 50.3 | 53.3 | 56.8 | 58.5 | |
| | HAD85 | 50.3 | 53.6 | 58.3 | 63.1 | |
| Growing Season (May—Sep) | CCSM45 | 68.3 | 70.3 | 72.5 | 73.0 | |
| | CCSM85 | 68.3 | 71.1 | 73.6 | 77.0 | |
| | GFDL45 | 68.3 | 75.6 | 74.8 | 76.3 | |
| | GFDL85 | 68.3 | 72.0 | 76.1 | 81.2 | |
| | HAD45 | 68.3 | 71.5 | 74.3 | 76.5 | |
| | HAD85 | 68.3 | 71.4 | 76.9 | 81.8 | |
| Coldest Month Average | CCSM45 | 21.7 | 23.0 | 25.4 | 25.4 | |
| | CCSM85 | 21.7 | 24.2 | 25.9 | 27.5 | |
| | GFDL45 | 21.7 | 25.7 | 26.6 | 27.2 | |
| | GFDL85 | 21.7 | 25.3 | 26.7 | 28.2 | |
| | HAD45 | 21.7 | 23.1 | 26.8 | 26.8 | |
| | HAD85 | 21.7 | 25.4 | 28.5 | 31.3 | |
| Warmest Month Average | CCSM45 | 74.3 | 76.4 | 77.9 | 78.6 | |
| | CCSM85 | 74.3 | 77.8 | 79.6 | 81.2 | |
| | GFDL45 | 74.3 | 77.3 | 79.1 | 80.2 | |
| | GFDL85 | 74.3 | 78.4 | 80.3 | 83.4 | |
| | HAD45 | 74.3 | 77.8 | 79.9 | 81.0 | |
| | HAD85 | 74.3 | 78.9 | 82.3 | 85.6 | |

Precipitation (in)

| | Scenario | 2009 | 2039 | 2069 | 2099 | |
|--------------------------|----------|------|------|------|------|--|
| Annual Total | CCSM45 | 38.4 | 37.9 | 37.3 | 37.3 | |
| | CCSM85 | 38.4 | 38.1 | 37.3 | 38.4 | |
| | GFDL45 | 38.4 | 40.9 | 45.1 | 45.8 | |
| | GFDL85 | 38.4 | 41.7 | 47.4 | 48.0 | |
| | HAD45 | 38.4 | 39.8 | 41.8 | 41.5 | |
| | HAD85 | 38.4 | 41.8 | 39.3 | 42.7 | |
| Growing Season (May—Sep) | CCSM45 | 19.6 | 19.9 | 19.1 | 18.2 | |
| | CCSM85 | 19.6 | 18.5 | 18.0 | 17.6 | |
| | GFDL45 | 19.6 | 20.2 | 22.1 | 22.5 | |
| | GFDL85 | 19.6 | 21.2 | 22.8 | 22.2 | |
| | HAD45 | 19.6 | 19.8 | 18.6 | 19.5 | |
| | HAD85 | 19.6 | 19.9 | 16.8 | 17.2 | |

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-DGP30 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 |
|----------------------------|-------------------------|-------|--------|-------|--------|-------|---------------|---------------|--------|--------|-----------|-----------|-----------|-----------|-----|------|
| black cherry | Prunus serotina | WDL | Medium | 57.4 | 333.4 | 17.2 | Lg. dec. | Lg. dec. | Low | Common | Very Poor | Very Poor | | | 0 | 1 |
| American elm | Ulmus americana | WDH | Medium | 36.9 | 186.0 | 10.3 | No change | No change | Medium | Common | Fair | Fair | Infill + | Infill + | | 1 2 |
| black oak | Quercus velutina | WDH | High | 39.5 | 178.8 | 8.9 | No change | Sm. dec. | Medium | Common | Fair | Poor | Infill + | Infill + | | 1 3 |
| white oak | Quercus alba | WDH | Medium | 33.9 | 168.6 | 7.5 | Sm. dec. | Lg. dec. | High | Common | Fair | Fair | Infill + | Infill + | | 1 4 |
| sassafras | Sassafras albidum | WSL | Low | 22.7 | 98.5 | 4.1 | Sm. dec. | Lg. dec. | Medium | Common | Poor | Poor | Infill + | Infill + | | 2 5 |
| green ash | Fraxinus pennsylvanica | WSH | Low | 27.5 | 96.3 | 9.2 | Sm. inc. | Sm. inc. | Medium | Common | Good | Good | Infill ++ | Infill ++ | | 1 6 |
| black walnut | Juglans nigra | WDH | Low | 23.9 | 87.7 | 5.5 | No change | No change | Medium | Common | Fair | Fair | Infill + | Infill + | | 2 7 |
| shagbark hickory | Carya ovata | WSL | Medium | 14.8 | 79.5 | 7.9 | Lg. dec. | Lg. dec. | Medium | Common | Poor | Poor | Infill + | Infill + | | 2 8 |
| silver maple | Acer saccharinum | NSH | Low | 23.4 | 76.1 | 10.1 | Lg. inc. | Sm. inc. | High | Common | Very Good | Very Good | Infill ++ | Infill ++ | | 2 9 |
| eastern cottonwood | Populus deltoides | NSH | Low | 16.1 | 68.6 | 13.5 | Sm. inc. | Sm. inc. | Medium | Common | Good | Good | Infill ++ | Infill ++ | | 2 10 |
| white ash | Fraxinus americana | WDL | Medium | 25.3 | 68.5 | 4.9 | No change | Sm. inc. | Low | Common | Poor | Fair | Infill + | Infill + | | 2 11 |
| pin oak | Quercus palustris | NSH | Low | 13.2 | 56.7 | 5.9 | Sm. inc. | Sm. inc. | Low | Common | Fair | Fair | Infill + | Infill + | | 2 12 |
| bur oak | Quercus macrocarpa | NDH | Medium | 24.4 | 55.1 | 6.3 | No change | No change | High | Common | Good | Good | Infill ++ | Infill ++ | | 2 13 |
| red maple | Acer rubrum | WDH | High | 4.7 | 44.4 | 5.3 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | | 2 14 |
| boxelder | Acer negundo | WSH | Low | 13.6 | 42.5 | 4.1 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | | 2 15 |
| Osage-orange | Maclura pomifera | NDH | Medium | 0.8 | 41.2 | 19.0 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | | 2 16 |
| northern red oak | Quercus rubra | WDH | Medium | 25.7 | 38.6 | 4.0 | Sm. inc. | Sm. inc. | High | Rare | Good | Good | Infill ++ | Infill ++ | | 2 17 |
| river birch | Betula nigra | NSL | Low | 7.7 | 36.2 | 6.7 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | | 2 18 |
| hackberry | Celtis occidentalis | WDH | Medium | 6.2 | 35.0 | 4.7 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | | 2 19 |
| bitternut hickory | Carya cordiformis | WSL | Low | 12.9 | 32.7 | 5.3 | Sm. inc. | No change | High | Rare | Good | Fair | Infill ++ | Infill + | | 2 20 |
| yellow-poplar | Liriodendron tulipifera | WDH | High | 0.8 | 31.2 | 14.4 | No change | Sm. dec. | High | Rare | Fair | Poor | | | | 0 21 |
| pignut hickory | Carya glabra | WDL | Medium | 7.2 | 30.5 | 5.4 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | | 2 22 |
| blackgum | Nyssa sylvatica | WDL | Medium | 14.2 | 24.7 | 4.4 | Sm. dec. | Sm. dec. | High | Rare | Poor | Poor | Infill + | Infill + | | 2 23 |
| black willow | Salix nigra | NSH | Low | 12.5 | 23.1 | 3.7 | Sm. dec. | Lg. inc. | Low | Rare | Very Poor | Fair | | Infill + | | 2 24 |
| slippery elm | Ulmus rubra | WSL | Low | 8.3 | 21.3 | 3.3 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | | 2 25 |
| red mulberry | Morus rubra | NSL | Low | 11.5 | 15.5 | 4.3 | No change | Sm. dec. | Medium | Rare | Poor | Very Poor | Infill + | | | 2 26 |
| mockernut hickory | Carya alba | WDL | Medium | 1.4 | 13.2 | 9.7 | Sm. dec. | No change | High | Rare | Poor | Fair | Infill + | Infill + | | 2 27 |
| sugar maple | Acer saccharum | WDH | High | 1.5 | 12.5 | 2.6 | Sm. inc. | Sm. inc. | High | Rare | Good | Good | | | | 2 28 |
| eastern redcedar | Juniperus virginiana | WDH | Medium | 1 | 11.3 | 6.0 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | | | | 2 29 |
| American basswood | Tilia americana | WSL | Medium | 9.5 | 9.8 | 2.3 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | | 2 30 |
| Virginia pine | Pinus virginiana | NDH | High | 0.5 | 9.6 | 2.9 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 31 |
| black locust | Robinia pseudoacacia | NDH | Low | 15 | 9.6 | 3.9 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | Infill ++ | Infill ++ | | 2 32 |
| northern pin oak | Quercus ellipsoidalis | NSH | Medium | 10.8 | 9.4 | 8.0 | Sm. dec. | Sm. dec. | High | Rare | Poor | Poor | Infill + | Infill + | | 2 33 |
| swamp white oak | Quercus bicolor | NSL | Low | 20.3 | 8.7 | 5.8 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | Infill ++ | Infill ++ | | 2 34 |
| honeylocust | Gleditsia triacanthos | NSH | Low | 8.8 | 6.6 | 3.3 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | | 2 35 |
| bigtooth aspen | Populus grandidentata | NSL | Medium | 8.2 | 3.4 | 4.0 | Lg. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 36 |
| jack pine | Pinus banksiana | NSH | Medium | 5.4 | 2.1 | 6.3 | Sm. dec. | Sm. dec. | High | Rare | Poor | Poor | | | | 0 37 |
| quaking aspen | Populus tremuloides | WDH | High | 1.7 | 1.9 | 0.4 | Lg. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 38 |
| Scots pine | Pinus sylvestris | NSH | FIA | 0.8 | 1.8 | 0.8 | Unknown | Unknown | NA | Rare | NNIS | NNIS | | | | 0 39 |
| balsam poplar | Populus balsamifera | NSH | Medium | 5.4 | 1.6 | 4.6 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 40 |
| ailanthus | Ailanthus altissima | NSL | FIA | 0.8 | 1.4 | 0.6 | Unknown | Unknown | NA | Rare | NNIS | NNIS | | | | 0 41 |
| white mulberry | Morus alba | NSL | FIA | 12.2 | 1.3 | 1.1 | Unknown | Unknown | NA | Rare | NNIS | NNIS | | | | 0 42 |
| serviceberry | Amelanchier spp. | NSL | Low | 5.4 | 1.2 | 3.4 | Sm. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 43 |
| sycamore | Platanus occidentalis | NSL | Low | 5.4 | 1.1 | 3.4 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | | | | 2 44 |
| shingle oak | Quercus imbricaria | NDH | Medium | 1.3 | 1.0 | 0.7 | No change | No change | Medium | Rare | Poor | Poor | Infill + | | | 2 45 |
| eastern hophornbeam; ironw | Ostrya virginiana | WSL | Low | 0.5 | 0.8 | 0.2 | Lg. inc. | Sm. inc. | High | Rare | Good | Good | | | | 2 46 |
| black maple | Acer nigrum | NSH | Low | 5.4 | 0.8 | 2.4 | Very Lg. dec. | Very Lg. dec. | High | Rare | Lost | Lost | | | | 0 47 |



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| Common Name | Scientific Name | Range | MR | %Cell | FIAsum | FIAiv | ChngCl45 | ChngCl85 | Adap | Abund | Capabil45 | Capabil85 | SHIFT45 | SHIFT85 | SSO | N |
|--------------------|-------------------------|-------|--------|-------|--------|-------|-------------|-------------|--------|---------|-------------|-------------|------------|------------|-----|----|
| pawpaw | Asimina triloba | NSL | Low | 1.3 | 0.2 | 0.1 | Lg. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | 0 | 48 |
| slash pine | Pinus elliottii | NDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 0 | 49 |
| longleaf pine | Pinus palustris | NSH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 0 | 50 |
| red pine | Pinus resinosa | NSH | Medium | 0 | 0 | 0 | Unknown | Unknown | Low | Modeled | Unknown | Unknown | | | 0 | 51 |
| eastern white pine | Pinus strobus | WDH | High | 0 | 0 | 0 | Unknown | Unknown | Low | Modeled | Unknown | Unknown | | | 0 | 52 |
| loblolly pine | Pinus taeda | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 3 | 53 |
| pecan | Carya illinoensis | NSH | Low | 0 | 0 | 0 | New Habitat | New Habitat | Low | Absent | New Habitat | New Habitat | | | 3 | 54 |
| black hickory | Carya texana | NDL | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 55 |
| sugarberry | Celtis laevigata | NDH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 3 | 56 |
| eastern redbud | Cercis canadensis | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 57 |
| common persimmon | Diospyros virginiana | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | Migrate + | 3 | 58 |
| sweetgum | Liquidambar styraciflua | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 59 |
| blackjack oak | Quercus marilandica | NSL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Migrate + | Migrate ++ | 3 | 60 |
| chinkapin oak | Quercus muehlenbergii | NSL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 61 |
| water oak | Quercus nigra | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 0 | 62 |
| Shumard oak | Quercus shumardii | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | Migrate + | 3 | 63 |
| post oak | Quercus stellata | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Migrate ++ | Migrate ++ | 3 | 64 |
| winged elm | Ulmus alata | WDL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | Migrate ++ | 3 | 65 |