

sq. km sq. mi FIA Plots
Area of Region 62,652 24,190 192

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 | 24 | RCP45 | RCP85 | RCP45 | RCP85 | RCP45 | RCP85 | | | | |
| Ash | 3 | | | | | Increase | 14 | 14 | Very Good | 0 | 0 | Likely | 1 | 1 | |
| Hickory | 7 | | | Medium | 30 | 44 | No Change | 24 | 23 | Good | 11 | 10 | Infill | 31 | 31 |
| Maple | 5 | Abundant | 0 | Low | 31 | 12 | Decrease | 21 | 22 | Fair | 12 | 14 | Migrate | 2 | 6 |
| Oak | 10 | Common | 3 | FIA | 7 | | New | 12 | 13 | Poor | 18 | 16 | | | |
| Pine | 5 | Rare | 63 | | | | Unknown | 12 | 11 | Very Poor | 17 | 18 | | | |
| Other | 36 | Absent | 16 | | | | | | | FIA Only | 4 | 4 | | | |
| | 66 | | 82 | | 83 | 80 | | 83 | 83 | Unknown | 5 | 4 | | | |
| | | | | | | | | | | | 67 | 66 | | | |

Potential Changes in Climate Variables

Temperature (°F)

| | Scenario | 2009 | 2039 | 2069 | 2099 | |
|--------------------------|----------|------|------|------|------|--|
| Annual Average | CCSM45 | 51.0 | 53.0 | 55.3 | 55.5 | |
| | CCSM85 | 51.0 | 53.7 | 56.2 | 59.0 | |
| | GFDL45 | 51.0 | 57.3 | 56.5 | 57.4 | |
| | GFDL85 | 51.0 | 54.1 | 57.5 | 61.6 | |
| | HAD45 | 51.0 | 53.9 | 57.4 | 59.1 | |
| | HAD85 | 51.0 | 54.2 | 59.0 | 63.5 | |
| Growing Season (May—Sep) | CCSM45 | 69.1 | 71.3 | 73.2 | 73.9 | |
| | CCSM85 | 69.1 | 72.1 | 74.5 | 77.8 | |
| | GFDL45 | 69.1 | 76.8 | 75.4 | 77.0 | |
| | GFDL85 | 69.1 | 72.8 | 76.7 | 81.7 | |
| | HAD45 | 69.1 | 72.2 | 75.1 | 77.3 | |
| | HAD85 | 69.1 | 72.4 | 78.0 | 82.5 | |
| Coldest Month Average | CCSM45 | 21.9 | 23.4 | 25.5 | 25.6 | |
| | CCSM85 | 21.9 | 24.7 | 26.2 | 27.7 | |
| | GFDL45 | 21.9 | 26.2 | 27.0 | 27.6 | |
| | GFDL85 | 21.9 | 25.5 | 27.0 | 28.2 | |
| | HAD45 | 21.9 | 23.5 | 26.9 | 26.9 | |
| | HAD85 | 21.9 | 25.6 | 28.6 | 31.0 | |
| Warmest Month Average | CCSM45 | 74.8 | 76.9 | 78.3 | 79.1 | |
| | CCSM85 | 74.8 | 78.4 | 80.2 | 81.8 | |
| | GFDL45 | 74.8 | 77.9 | 79.6 | 80.7 | |
| | GFDL85 | 74.8 | 78.8 | 80.6 | 83.8 | |
| | HAD45 | 74.8 | 78.2 | 80.4 | 81.4 | |
| | HAD85 | 74.8 | 79.6 | 83.1 | 85.9 | |

Precipitation (in)

| | Scenario | 2009 | 2039 | 2069 | 2099 | |
|--------------------------|----------|------|------|------|------|--|
| Annual Total | CCSM45 | 37.8 | 36.7 | 37.5 | 37.1 | |
| | CCSM85 | 37.8 | 37.4 | 37.4 | 38.3 | |
| | GFDL45 | 37.8 | 41.3 | 44.7 | 45.6 | |
| | GFDL85 | 37.8 | 41.3 | 46.9 | 47.6 | |
| | HAD45 | 37.8 | 39.4 | 41.4 | 41.1 | |
| | HAD85 | 37.8 | 40.9 | 39.0 | 42.3 | |
| Growing Season (May—Sep) | CCSM45 | 19.1 | 18.7 | 18.6 | 17.4 | |
| | CCSM85 | 19.1 | 17.8 | 17.5 | 17.1 | |
| | GFDL45 | 19.1 | 20.3 | 21.4 | 21.9 | |
| | GFDL85 | 19.1 | 20.6 | 22.0 | 21.5 | |
| | HAD45 | 19.1 | 19.4 | 18.2 | 18.9 | |
| | HAD85 | 19.1 | 19.3 | 16.4 | 16.7 | |

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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Section 251D

EcoMap 2007
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 |
|----------------------------|-------------------------|-------|--------|-------|--------|-------|-----------|-----------|--------|--------|-----------|-----------|-----------|-----------|-----|----|
| black cherry | Prunus serotina | WDL | Medium | 39.2 | 106.3 | 10.2 | Lg. dec. | Lg. dec. | Low | Common | Very Poor | Very Poor | | | 2 | 1 |
| American elm | Ulmus americana | WDH | Medium | 34.9 | 53.0 | 5.6 | Sm. inc. | Sm. inc. | Medium | Common | Good | Good | Infill ++ | Infill ++ | 2 | 2 |
| black walnut | Juglans nigra | WDL | Low | 32.2 | 52.9 | 9.5 | No change | No change | Medium | Common | Fair | Fair | Infill + | Infill + | 2 | 3 |
| white oak | Quercus alba | WDH | Medium | 20.7 | 44.3 | 8.0 | No change | Sm. dec. | High | Rare | Fair | Poor | Infill + | Infill + | 2 | 4 |
| silver maple | Acer saccharinum | NSH | Low | 16.4 | 43.2 | 18.6 | Sm. inc. | Sm. inc. | High | Rare | Good | Good | Infill ++ | Infill ++ | 2 | 5 |
| black oak | Quercus velutina | WDH | High | 17.6 | 41.4 | 8.8 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 6 |
| honeylocust | Gleditsia triacanthos | NSH | Low | 16.9 | 34.1 | 11.0 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | 2 | 7 |
| hackberry | Celtis occidentalis | WDH | Medium | 26.1 | 31.3 | 8.3 | Sm. inc. | Sm. inc. | High | Rare | Good | Good | Infill ++ | Infill ++ | 2 | 8 |
| sugar maple | Acer saccharum | WDH | High | 13.7 | 30.9 | 7.9 | Sm. inc. | No change | High | Rare | Good | Fair | | Infill + | 2 | 9 |
| Osage-orange | Maclura pomifera | NDH | Medium | 10.4 | 24.8 | 10.9 | Sm. inc. | Sm. inc. | High | Rare | Good | Good | | | 2 | 10 |
| bur oak | Quercus macrocarpa | NDH | Medium | 8.7 | 24.5 | 12.2 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | 2 | 11 |
| boxelder | Acer negundo | WSH | Low | 6.4 | 22.0 | 6.0 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | 2 | 12 |
| Siberian elm | Ulmus pumila | NDH | FIA | 2.3 | 21.1 | 24.2 | Unknown | Unknown | NA | Rare | NNIS | NNIS | | | 0 | 13 |
| green ash | Fraxinus pennsylvanica | WSH | Low | 18.8 | 20.9 | 7.8 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | Infill ++ | Infill ++ | 2 | 14 |
| northern red oak | Quercus rubra | WDH | Medium | 14.6 | 19.0 | 4.8 | Sm. inc. | No change | High | Rare | Good | Fair | | Infill + | 2 | 15 |
| eastern cottonwood | Populus deltoides | NSH | Low | 8.2 | 18.7 | 13.3 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 16 |
| white ash | Fraxinus americana | WDL | Medium | 12.6 | 18.1 | 5.1 | Sm. inc. | Sm. inc. | Low | Rare | Poor | Poor | Infill + | Infill + | 2 | 17 |
| American basswood | Tilia americana | WSL | Medium | 7.9 | 17.8 | 8.1 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | 2 | 18 |
| shagbark hickory | Carya ovata | WSL | Medium | 14.5 | 16.0 | 3.6 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 19 |
| pin oak | Quercus palustris | NSH | Low | 8 | 15.0 | 12.8 | No change | No change | Low | Rare | Very Poor | Very Poor | | | 2 | 20 |
| sassafras | Sassafras albidum | WSL | Low | 11.5 | 14.4 | 4.0 | No change | Sm. dec. | Medium | Rare | Poor | Very Poor | Infill + | | 2 | 21 |
| red mulberry | Morus rubra | NSL | Low | 11.7 | 14.1 | 4.5 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 22 |
| slippery elm | Ulmus rubra | WSL | Low | 16.6 | 13.8 | 3.9 | No change | Sm. inc. | Medium | Rare | Poor | Fair | Infill + | Infill + | 2 | 23 |
| black locust | Robinia pseudoacacia | NDH | Low | 6.8 | 13.5 | 12.5 | Sm. dec. | No change | Medium | Rare | Very Poor | Poor | | Infill + | 2 | 24 |
| bitternut hickory | Carya cordiformis | WSL | Low | 9.8 | 13.5 | 4.0 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | 2 | 25 |
| black willow | Salix nigra | NSH | Low | 7.7 | 12.8 | 11.9 | Sm. dec. | No change | Low | Rare | Very Poor | Very Poor | | | 2 | 26 |
| shingle oak | Quercus imbricaria | NDH | Medium | 7 | 12.4 | 6.0 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 27 |
| eastern white pine | Pinus strobus | WDH | High | 2.5 | 12.0 | 11.9 | Lg. dec. | Lg. dec. | Low | Rare | Very Poor | Very Poor | | | 0 | 28 |
| yellow-poplar | Liriodendron tulipifera | WDH | High | 1.1 | 10.1 | 8.3 | Sm. dec. | Sm. dec. | High | Rare | Poor | Poor | Infill + | Infill + | 2 | 29 |
| red maple | Acer rubrum | WDH | High | 5 | 7.2 | 5.2 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | 2 | 30 |
| pignut hickory | Carya glabra | WDL | Medium | 3.9 | 6.4 | 3.0 | No change | Sm. dec. | Medium | Rare | Poor | Very Poor | Infill + | | 2 | 31 |
| eastern hophornbeam; ironw | Ostrya virginiana | WSL | Low | 6.4 | 6.0 | 1.8 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | 2 | 32 |
| sycamore | Platanus occidentalis | NSL | Low | 4.9 | 5.8 | 7.5 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 33 |
| mockernut hickory | Carya alba | WDL | Medium | 4.2 | 5.7 | 2.1 | Sm. dec. | No change | High | Rare | Poor | Fair | Infill + | Infill + | 2 | 34 |
| white mulberry | Morus alba | NSL | FIA | 7.9 | 5.1 | 4.8 | Unknown | Unknown | NA | Rare | NNIS | NNIS | | | 0 | 35 |
| river birch | Betula nigra | NSL | Low | 1.5 | 4.5 | 8.0 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | 2 | 36 |
| eastern redcedar | Juniperus virginiana | WDH | Medium | 2.1 | 4.5 | 11.0 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | | | 2 | 37 |
| chinkapin oak | Quercus muehlenbergii | NSL | Medium | 6.3 | 3.3 | 2.1 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 38 |
| blackgum | Nyssa sylvatica | WDL | Medium | 4.8 | 3.3 | 4.3 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | 2 | 39 |
| jack pine | Pinus banksiana | NSH | Medium | 1.9 | 2.8 | 23.4 | Sm. dec. | Sm. dec. | High | Rare | Poor | Poor | | Infill + | 2 | 40 |
| bigtooth aspen | Populus grandidentata | NSL | Medium | 2.1 | 2.4 | 2.5 | Lg. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | 0 | 41 |
| Ohio buckeye | Aesculus glabra | NSL | Low | 2.1 | 2.1 | 1.0 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | 0 | 42 |
| red pine | Pinus resinosa | NSH | Medium | 0.4 | 1.9 | 9.0 | Lg. dec. | Lg. dec. | Low | Rare | Very Poor | Very Poor | | | 0 | 43 |
| northern catalpa | Catalpa speciosa | NSHX | FIA | 1.2 | 1.9 | 15.1 | Unknown | Unknown | Medium | Rare | FIA Only | FIA Only | | | 0 | 44 |
| black maple | Acer nigrum | NSH | Low | 2.4 | 1.9 | 7.1 | Lg. dec. | Lg. dec. | High | Rare | Poor | Poor | | | 0 | 45 |
| swamp white oak | Quercus bicolor | NSL | Low | 3.6 | 1.5 | 3.4 | No change | No change | Medium | Rare | Poor | Poor | Infill + | | 2 | 46 |
| post oak | Quercus stellata | WDH | High | 1.1 | 1.4 | 4.7 | Lg. inc. | Lg. inc. | High | Rare | Good | Good | | | 2 | 47 |



Section 251D

EcoMap 2007

Climate Change Atlas Tree Species

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Northern Research Station
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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 |
|------------------------------|------------------------------|-------|--------|-------|--------|-------|---------------|---------------|--------|---------|-------------|-------------|-----------|------------|-----|------|
| wild plum | Prunus americana | NSLX | FIA | 0.2 | 1.3 | 8.2 | Unknown | Unknown | Medium | Rare | FIA Only | FIA Only | | | | 0 48 |
| northern pin oak | Quercus ellipsoidalis | NSH | Medium | 2.5 | 1.3 | 5.8 | No change | Sm. dec. | High | Rare | Fair | Poor | Infill + | Infill + | | 2 49 |
| Virginia pine | Pinus virginiana | NDH | High | 0.2 | 1.1 | 7.1 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 50 |
| eastern redbud | Cercis canadensis | NSL | Low | 3.7 | 0.8 | 1.7 | No change | Sm. inc. | Medium | Rare | Poor | Fair | Infill + | Infill + | | 2 51 |
| pawpaw | Asimina triloba | NSL | Low | 2.4 | 0.6 | 1.6 | Lg. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 52 |
| American hornbeam; musclev | Carpinus caroliniana | WSL | Low | 1.1 | 0.5 | 0.9 | Sm. dec. | No change | Medium | Rare | Very Poor | Poor | | | | 0 53 |
| black hickory | Carya texana | NDL | High | 0.9 | 0.4 | 1.5 | Sm. inc. | Lg. inc. | Medium | Rare | Fair | Good | | | | 2 54 |
| American beech | Fagus grandifolia | WDH | High | 1 | 0.4 | 0.4 | No change | Lg. dec. | Medium | Rare | Poor | Very Poor | Infill + | | | 2 55 |
| flowering dogwood | Cornus florida | WDL | Medium | 0.7 | 0.4 | 0.5 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 56 |
| blue ash | Fraxinus quadrangulata | NSL | Low | 1.2 | 0.3 | 4.0 | Sm. dec. | Sm. dec. | Low | Rare | Very Poor | Very Poor | | | | 0 57 |
| Kentucky coffeetree | Gymnocladus dioicus | NSLX | FIA | 1.5 | 0.3 | 2.2 | Unknown | Unknown | Medium | Rare | FIA Only | FIA Only | | | | 2 58 |
| serviceberry | Amelanchier spp. | NSL | Low | 1.6 | 0.3 | 0.7 | Lg. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 59 |
| quaking aspen | Populus tremuloides | WDH | High | 1.3 | 0.3 | 3.2 | Lg. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | | 0 60 |
| butternut | Juglans cinerea | NSLX | FIA | 0.6 | 0.1 | 3.2 | Unknown | Unknown | Low | Rare | FIA Only | FIA Only | | | | 0 61 |
| Scots pine | Pinus sylvestris | NSH | FIA | 0.6 | 0.1 | 2.8 | Unknown | Unknown | NA | Rare | NNIS | NNIS | | | | 0 62 |
| shellbark hickory | Carya laciniosa | NSL | Low | 0.5 | 0.1 | 0.4 | Very Lg. dec. | Very Lg. dec. | Medium | Rare | Lost | Lost | | | | 0 63 |
| sweetgum | Liquidambar styraciflua | WDH | High | 0.2 | 0.1 | 0.8 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | | | | 2 64 |
| pecan | Carya illinoensis | NSH | Low | 0 | 0.1 | 0.1 | Lg. inc. | Lg. inc. | Low | Rare | Fair | Fair | Infill + | Infill + | | 2 65 |
| sugarberry | Celtis laevigata | NDH | Medium | 0.4 | 0.0 | 0.5 | Lg. inc. | Lg. inc. | Medium | Rare | Good | Good | | | | 2 66 |
| slash pine | Pinus elliotii | NDH | High | 0 | 0 | 0 | Unknown | New Habitat | Medium | Absent | Unknown | New Habitat | | | | 0 67 |
| longleaf pine | Pinus palustris | NSH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | | 0 68 |
| loblolly pine | Pinus taeda | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | Migrate ++ | | 3 69 |
| yellow birch | Betula alleghaniensis | NDL | High | 0 | 0 | 0 | Unknown | Unknown | Medium | Absent | Unknown | Unknown | | | | 0 70 |
| cittamwood/gum bumelia | Sideroxylon lanuginosum ssp. | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | | | 3 71 |
| common persimmon | Diospyros virginiana | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Likely + | Likely + | | 3 72 |
| black ash | Fraxinus nigra | WSH | Medium | 0 | 0 | 0 | Unknown | Unknown | Low | Modeled | Unknown | Unknown | | | | 0 73 |
| cucumbertree | Magnolia acuminata | NSL | Low | 0 | 0 | 0 | Unknown | Unknown | Medium | Absent | Unknown | Unknown | | | | 0 74 |
| pin cherry | Prunus pensylvanica | NSL | Low | 0 | 0 | 0 | Unknown | Unknown | Medium | Absent | Unknown | Unknown | | | | 0 75 |
| southern red oak | Quercus falcata | WDL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | Migrate + | | 3 76 |
| cherrybark oak; swamp red o. | Quercus pagoda | NSL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | Migrate + | | 3 77 |
| overcup oak | Quercus lyrata | NSL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Low | Absent | New Habitat | New Habitat | | | | 3 78 |
| blackjack oak | Quercus marilandica | NSL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Migrate + | Migrate ++ | | 3 79 |
| water oak | Quercus nigra | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | | 3 80 |
| Shumard oak | Quercus shumardii | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | Migrate + | | 3 81 |
| winged elm | Ulmus alata | WDL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | Migrate + | Migrate ++ | | 3 82 |
| cedar elm | Ulmus crassifolia | NDH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Low | Absent | New Habitat | New Habitat | | | | 2 83 |

