

HUC 102600 Smoky Hill

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 | 51,570 | 19,911 | 50 |

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 | 5 | 9 | Increase | 1 | 2 | Very Good | 0 | 0 |
| Hickory | 0 | | | Medium | 11 | 23 | No Change | 8 | 8 | Good | 0 | 1 |
| Maple | 1 | Abundant | 0 | Low | 17 | 5 | Decrease | 8 | 7 | Fair | 3 | 4 |
| Oak | 2 | Common | 0 | FIA | 5 | | New | 10 | 10 | Poor | 8 | 6 |
| Pine | 0 | Rare | 22 | | | | Unknown | 11 | 11 | Very Poor | 6 | 6 |
| Other | 17 | Absent | 14 | | | | | | | FIA Only | 4 | 4 |
| | 22 | | 36 | | 38 | 37 | | 38 | 38 | Unknown | 6 | 6 |
| | | | | | | | | | | | 27 | 27 |

Potential Changes in Climate Variables

Temperature (°F)

| | Scenario | 2009 | 2039 | 2069 | 2099 | |
|--------------------------|----------|------|------|------|------|--|
| Annual Average | CCSM45 | 48.2 | 49.5 | 50.8 | 51.4 | |
| | CCSM85 | 48.2 | 49.8 | 51.4 | 53.6 | |
| | GFDL45 | 48.2 | 52.6 | 51.7 | 52.6 | |
| | GFDL85 | 48.2 | 50.2 | 52.4 | 55.5 | |
| | HAD45 | 48.2 | 50.1 | 52.4 | 53.0 | |
| | HAD85 | 48.2 | 50.3 | 54.0 | 56.1 | |
| Growing Season (May—Sep) | CCSM45 | 61.6 | 63.2 | 64.8 | 65.3 | |
| | CCSM85 | 61.6 | 63.6 | 65.3 | 67.9 | |
| | GFDL45 | 61.6 | 67.7 | 66.1 | 67.7 | |
| | GFDL85 | 61.6 | 64.3 | 66.9 | 70.8 | |
| | HAD45 | 61.6 | 63.2 | 65.0 | 65.7 | |
| | HAD85 | 61.6 | 63.7 | 67.3 | 69.2 | |
| Coldest Month (Average) | CCSM45 | 28.3 | 29.7 | 30.5 | 31.2 | |
| | CCSM85 | 28.3 | 30.1 | 30.5 | 31.8 | |
| | GFDL45 | 28.3 | 30.9 | 31.1 | 31.3 | |
| | GFDL85 | 28.3 | 29.7 | 30.7 | 31.5 | |
| | HAD45 | 28.3 | 29.9 | 31.8 | 31.6 | |
| | HAD85 | 28.3 | 31.5 | 33.5 | 34.7 | |
| Warmest Month (Average) | CCSM45 | 67.0 | 68.8 | 70.0 | 70.5 | |
| | CCSM85 | 67.0 | 69.7 | 70.7 | 72.3 | |
| | GFDL45 | 67.0 | 69.9 | 70.8 | 72.0 | |
| | GFDL85 | 67.0 | 70.3 | 71.2 | 74.2 | |
| | HAD45 | 67.0 | 68.6 | 69.8 | 70.2 | |
| | HAD85 | 67.0 | 69.9 | 71.6 | 72.7 | |

Precipitation (in)

| | Scenario | 2009 | 2039 | 2069 | 2099 | |
|--------------------------|----------|------|------|------|------|--|
| Annual Total | CCSM45 | 19.6 | 19.9 | 19.8 | 19.3 | |
| | CCSM85 | 19.6 | 20.2 | 20.1 | 20.8 | |
| | GFDL45 | 19.6 | 21.4 | 23.0 | 22.2 | |
| | GFDL85 | 19.6 | 22.1 | 24.9 | 23.1 | |
| | HAD45 | 19.6 | 21.6 | 21.2 | 21.9 | |
| | HAD85 | 19.6 | 20.5 | 19.7 | 21.8 | |
| Growing Season (May—Sep) | CCSM45 | 12.5 | 12.1 | 11.7 | 11.4 | |
| | CCSM85 | 12.5 | 12.3 | 11.9 | 12.3 | |
| | GFDL45 | 12.5 | 13.7 | 14.5 | 13.7 | |
| | GFDL85 | 12.5 | 14.1 | 15.8 | 14.5 | |
| | HAD45 | 12.5 | 13.2 | 13.8 | 13.6 | |
| | HAD85 | 12.5 | 12.5 | 11.7 | 12.0 | |

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 |
|------------------------|------------------------------|-------|--------|-------|--------|-------|-------------|-------------|--------|---------|-------------|-------------|-----------|------------|-----|----|
| green ash | Fraxinus pennsylvanica | WSH | Low | 28.3 | 46.9 | 22.3 | Lg. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | 2 | 1 |
| hackberry | Celtis occidentalis | WDH | Medium | 26.4 | 37.7 | 20.8 | Sm. dec. | Sm. dec. | High | Rare | Poor | Poor | Infill + | Infill + | 2 | 2 |
| American elm | Ulmus americana | WDH | Medium | 26.7 | 26.0 | 14.8 | No change | Sm. inc. | Medium | Rare | Poor | Fair | Infill + | Infill + | 2 | 3 |
| red mulberry | Morus rubra | NSL | Low | 15.3 | 23.1 | 21.4 | Lg. dec. | Lg. dec. | Medium | Rare | Very Poor | Very Poor | | | 2 | 4 |
| honeylocust | Gleditsia triacanthos | NSH | Low | 10.7 | 20.7 | 37.0 | Lg. dec. | Lg. dec. | High | Rare | Poor | Poor | Infill + | Infill + | 2 | 5 |
| Osage-orange | Maclura pomifera | NDH | Medium | 9.7 | 17.5 | 24.9 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | 2 | 6 |
| eastern cottonwood | Populus deltoides | NSH | Low | 7.8 | 14.5 | 31.5 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 7 |
| Siberian elm | Ulmus pumila | NDH | FIA | 5.8 | 9.3 | 37.5 | Unknown | Unknown | NA | Rare | NNIS | NNIS | | | 0 | 8 |
| eastern redcedar | Juniperus virginiana | WDH | Medium | 8.8 | 8.8 | 9.8 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 9 |
| black walnut | Juglans nigra | WDH | Low | 6.9 | 7.0 | 13.6 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 10 |
| bur oak | Quercus macrocarpa | NDH | Medium | 6.7 | 5.4 | 17.2 | No change | No change | High | Rare | Fair | Fair | Infill + | Infill + | 2 | 11 |
| boxelder | Acer negundo | WSH | Low | 12.1 | 5.1 | 10.4 | Sm. dec. | No change | High | Rare | Poor | Fair | Infill + | Infill + | 2 | 12 |
| slippery elm | Ulmus rubra | WSL | Low | 4.4 | 2.8 | 7.9 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | 2 | 13 |
| white ash | Fraxinus americana | WDL | Medium | 3.7 | 2.6 | 17.6 | Sm. dec. | Sm. dec. | Low | Rare | Very Poor | Very Poor | | | 2 | 14 |
| black willow | Salix nigra | NSH | Low | 2.4 | 1.5 | 15.6 | No change | No change | Low | Rare | Very Poor | Very Poor | | | 2 | 15 |
| chinkapin oak | Quercus muehlenbergii | NSL | Medium | 0.7 | 1.4 | 16.6 | Sm. dec. | Sm. dec. | Medium | Rare | Very Poor | Very Poor | | | 2 | 16 |
| black locust | Robinia pseudoacacia | NDH | Low | 0.9 | 1.2 | 18.3 | Sm. inc. | Lg. inc. | Medium | Rare | Fair | Good | Infill + | | 2 | 17 |
| Kentucky coffeetree | Gymnocladus dioicus | NSLX | FIA | 1.2 | 0.3 | 6.8 | Unknown | Unknown | Medium | Rare | FIA Only | FIA Only | | | 2 | 18 |
| wild plum | Prunus americana | NSLX | FIA | 1.2 | 0.3 | 6.8 | Unknown | Unknown | Medium | Rare | FIA Only | FIA Only | | | 0 | 19 |
| peachleaf willow | Salix amygdaloides | NSLX | FIA | 0.3 | 0.3 | 1.8 | Unknown | Unknown | Medium | Rare | FIA Only | FIA Only | | | 0 | 20 |
| eastern redbud | Cercis canadensis | NSL | Low | 1.2 | 0.2 | 4.4 | No change | No change | Medium | Rare | Poor | Poor | Infill + | Infill + | 2 | 21 |
| northern catalpa | Catalpa speciosa | NSHX | FIA | 0 | 0.1 | 0.1 | Unknown | Unknown | Medium | Rare | FIA Only | FIA Only | | | 0 | 22 |
| ashe juniper | Juniperus ashei | NDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 0 | 23 |
| shortleaf pine | Pinus echinata | WDH | High | 0 | 0 | 0 | Unknown | Unknown | Medium | Modeled | Unknown | Unknown | | | 0 | 24 |
| Ohio buckeye | Aesculus glabra | NSL | Low | 0 | 0 | 0 | Unknown | Unknown | Medium | Modeled | Unknown | Unknown | | | 0 | 25 |
| serviceberry | Amelanchier spp. | NSL | Low | 0 | 0 | 0 | Unknown | Unknown | Medium | Absent | Unknown | Unknown | | | 0 | 26 |
| cittamwood/gum bumelia | Sideroxylon lanuginosum ssp. | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Migrate + | Migrate + | 3 | 27 |
| bitternut hickory | Carya cordiformis | WSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Likely + | Likely + | 3 | 28 |
| pecan | Carya illinoensis | NSL | Low | 0 | 0 | 0 | New Habitat | New Habitat | Low | Absent | New Habitat | New Habitat | Migrate + | Migrate ++ | 3 | 29 |
| sugarberry | Celtis laevigata | NDH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | Migrate + | Migrate ++ | 3 | 30 |
| black ash | Fraxinus nigra | WSH | Medium | 0 | 0 | 0 | Unknown | Unknown | Low | Absent | Unknown | Unknown | | | 0 | 31 |
| bigleaf magnolia | Magnolia macrophylla | NSL | Low | 0 | 0 | 0 | Unknown | Unknown | Medium | Absent | Unknown | Unknown | | | 0 | 32 |
| pin cherry | Prunus pensylvanica | NSL | Low | 0 | 0 | 0 | Unknown | Unknown | Medium | Absent | Unknown | Unknown | | | 0 | 33 |
| blackjack oak | Quercus marilandica | NSL | Medium | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | | Migrate + | 3 | 34 |
| water oak | Quercus nigra | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 3 | 35 |
| post oak | Quercus stellata | WDH | High | 0 | 0 | 0 | New Habitat | New Habitat | High | Absent | New Habitat | New Habitat | Migrate + | Migrate ++ | 3 | 36 |
| live oak | Quercus virginiana | NDH | High | 0 | 0 | 0 | New Habitat | New Habitat | Medium | Absent | New Habitat | New Habitat | | | 0 | 37 |
| cedar elm | Ulmus crassifolia | NDH | Medium | 0 | 0 | 0 | New Habitat | New Habitat | Low | Absent | New Habitat | New Habitat | | | 3 | 38 |