

CLIMATE CHANGE PROJECTIONS FOR INDIVIDUAL TREE SPECIES COASTAL PLAIN (SUBREGION 6)



This region's forests will be affected by a changing climate and other stressors during this century. A team of managers and researchers created an assessment that describes the vulnerability of forests in the region ([Butler-Leopold et al. 2018](#)). This report includes information on observed and future climate trends, and also summarizes key vulnerabilities for forested natural communities. The Landscape Change Research Group recently updated the Climate Change Tree Atlas, and this handout summarizes

that information. Full Tree Atlas results are available online at www.fs.fed.us/nrs/atlas/. Two climate scenarios are presented to "bracket" a range of possible futures. These future climate projections (2070 to 2099) provide information about how individual tree species may respond to a changing climate. Results for "low" and "high" emissions scenarios can be compared on the reverse side of this handout.

The updated Tree Atlas presents additional information helpful to interpret tree species changes:

- **Suitable habitat** - calculated based on 39 variables that explain where optimum conditions exist for a species, including soils, landforms, and climate variables.
- **Adaptability** - based on life-history traits that might increase or decrease tolerance of expected changes, such as the ability to withstand different forms of disturbance.
- **Capability** - a rating of the species' ability to cope or persist with climate change in this region based on suitable habitat change (statistical modeling), adaptability (literature review and expert opinion), and abundance (FIA data). The capability rating is modified by abundance information; ratings are downgraded for rare species and upgraded for abundant species.
- **Migration Potential Model** - when combined with habitat suitability, an estimate of a species' colonization likelihood for new habitats. This rating can be helpful for assisted migration or focused management (see the table section: "New Habitat with Migration Potential").

Remember that models are just tools, and they're not perfect. Model projections can't account for all factors that influence future species success. If a species is rare or confined to a small area, model results may be less reliable. These factors, and others, could cause a particular species to perform better or worse than a model projects. Human choices will also continue to influence forest distribution, especially for tree species that are projected to increase. Planting programs may assist the movement of future-adapted species, but this will depend on management decisions. Despite these limits, models provide useful information about future expectations. It's perhaps best to think of these projections as indicators of possibility and potential change.

SOURCE: This handout summarizes the full model results for the Mid-Atlantic region, available at www.fs.fed.us/nrs/atlas/combined/resources/summaries. More information on vulnerability and adaptation in the Mid-Atlantic region can be found at www.forestadaptation.org/mid-atlantic. A full description of the models and variables are provided in Iverson et al. 2019 (www.nrs.fs.fed.us/pubs/57857 and www.nrs.fs.fed.us/pubs/59105) and Peters et al. 2019 (www.nrs.fs.fed.us/pubs/58353).

CLIMATE CHANGE CAPABILITY

POOR CAPABILITY

American beech	Northern red oak
Atlantic white-cedar	Pignut hickory
Bigtooth aspen	Pin oak
Black ash	Quaking aspen
Black locust	Sassafras
Black walnut	Scarlet oak
Boxelder	Shortleaf pine
Cherrybark oak	Slippery elm
Common persimmon	Sweet birch
Eastern cottonwood	Sycamore
Eastern hemlock	Virginia pine
Eastern white pine	White ash
Flowering dogwood	Yellow birch

FAIR CAPABILITY

American holly	Pitch pine
Black oak	Pond pine
Chestnut oak	Sugar maple
Green ash	Swamp chestnut oak
Hackberry	Yellow-poplar
Overcup oak	

GOOD CAPABILITY

American hornbeam	Southern red oak
Bald cypress	Sweetbay
Laurel oak	Sweetgum
Loblolly pine	Water oak
Mockernut hickory	White oak
Post oak	Willow oak
Red maple	

NEW HABITAT WITH MIGRATION POTENTIAL

Honeylocust	Sourwood
Loblolly-bay	Sugarberry
Longleaf pine	Swamp tupelo
Pecan	Turkey oak
Redbay	Water tupelo
Shagbark hickory	Winged elm



ADAPTABILITY: Life-history factors, such as the ability to respond favorably to disturbance, that are not included in the Tree Atlas model and may make a species more or less able to adapt to future stressors.

- + **HIGH** Species may perform better than modeled
- **MEDIUM**
- **LOW** Species may perform worse than modeled

HABITAT CHANGE: Projected change in suitable habitat between current and potential future conditions.

- ▲ **INCREASE** Projected increase of >20% by 2100
- **NO CHANGE** Projected change of <20% by 2100
- ▼ **DECREASE** Projected decrease of >20% by 2100
- ★ **NEW HABITAT** Tree Atlas projects new habitat for species not currently present

ABUNDANCE: Based on Forest Inventory Analysis (FIA) summed Importance Value data, calibrated to a standard geographic area.

- + **ABUNDANT**
- **COMMON**
- **RARE**

CAPABILITY: An overall rating that describes a species' ability to cope or persist with climate change based on suitable habitat change class (statistical modeling), adaptability (literature review and expert opinion), and abundance within this region.

- ▲ **GOOD** Increasing suitable habitat, medium or high adaptability, and common or abundant
- **FAIR** Mixed combinations, such as a rare species with increasing suitable habitat and medium adaptability
- ▼ **POOR** Decreasing suitable habitat, medium or low adaptability, and uncommon or rare

SPECIES	LOW CLIMATE CHANGE (RCP 4.5)		HIGH CLIMATE CHANGE (RCP 8.5)		SPECIES	LOW CLIMATE CHANGE (RCP 4.5)		HIGH CLIMATE CHANGE (RCP 8.5)	
	ADAPT	ABUN	HABITAT CHANGE	CAPABILITY		ADAPT	ABUN	HABITAT CHANGE	CAPABILITY
American beech	•	•	▼	▼	Pecan*	-		★	★
American elm	•	-	●	▼	Pignut hickory	•	-	●	▼
American holly	•	•	●	○	Pin oak*	-	-	▼	▼
American hornbeam*	•	-	▲	▲	Pitch pine	•	+	▼	○
Atlantic white-cedar*	-	•	▼	▼	Pond pine	-	-	▲	○
Bald cypress	•	-	▲	▲	Post oak	+	-	▲	▲
Bigtooth aspen	•	-	▼	▼	Quaking aspen	•	-	▼	▼
Black ash	-	-	▼	▼	Red maple	+	+	●	▲
Black cherry	-	•	●	▼	Redbay*	+		★	★
Black locust*	•	•	▼	▼	Sassafras*	•	•	▼	▼
Black oak	•	•	▲	▲	Scarlet oak	•	•	▼	▼
Black walnut*	•	-	▼	▼	Shagbark hickory	•		★	★
Blackgum	+	•	▼	○	Shortleaf pine	•	-	●	▼
Blackjack oak	+	-	▼	▼	Slippery elm*	•	-	▼	▼
Boxelder*	+	-	▼	▼	Sourwood	+		★	★
Cherrybark oak	•	-	●	▼	Southern red oak	+	•	▲	▲
Chestnut oak	+	•	▼	○	Sugar maple	+	-	▲	○
Common persimmon*	+	-	▼	▼	Sugarberry	•		★	★
Eastern cottonwood*	•	-	▼	▼	Swamp chestnut oak*	•	-	▲	○
Eastern hemlock	-	-	▼	▼	Swamp tupelo	-		★	★
Eastern redcedar	•	•	▼	▼	Sweet birch	-	-	▼	▼
Eastern white pine	-	-	▼	▼	Sweetbay	•	-	▲	▲
Flowering dogwood	•	-	●	▼	Sweetgum	•	+	▲	▲
Green ash*	•	-	▲	○	Sycamore*	•	-	●	▼
Hackberry	+	-	●	○	Turkey oak	+		★	★
Honeylocust*	+			★	Virginia pine	•	•	▼	▼
Laurel oak	•	-	▲	▲	Water oak	•	-	▲	▲
Loblolly pine	•	+	▲	▲	Water tupelo	-		★	★
Loblolly-bay	•		★	★	White ash	-	-	▼	▼
Longleaf pine	•		★	★	White oak	+	+	▼	▲
Mockernut hickory	+	•	●	▲	Willow oak*	•	•	▲	▲
Northern red oak	+	-	●	○	Winged elm	•		★	★
Osage-orange	+	-	▼	▼	Yellow birch	•	-	▼	▼
Overcup oak	-	-	▲	○	Yellow-poplar	+	•	▼	○

*Species with low model reliability based on five statistical metrics of the habitat models that affect change class. See maps and tables for more information (www.fs.fed.us/nrs/atlas/combined/resources/summaries).