CLIMATE CHANGE PROJECTIONS FOR INDIVIDUAL TREE SPECIES

COASTAL PLAIN (SUBREGION 6)

The region's forests will be affected by a changing climate during this century. A team of forest managers and researchers created an assessment that describes the vulnerability of forests in the Mid-Atlantic region (Butler-Leopold et al. in review). This report includes information on the current landscape, observed climate trends, and a range of projected future climates. It also describes many potential climate change impacts to forests and summarizes key vulnerabilities for major forest types. This handout is summarized from the full assessment.

Remember that models are just tools, and they're not perfect. Model projections don't account for some factors that could be modified by climate change, like droughts, wildfire activity, and invasive species. If a species is rare or confined to a small area, Tree Atlas 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.

TREE SPECIES INFORMATION:

This assessment uses two climate scenarios to "bracket" a range of possible futures. These future climate projections were used with two forest impact models (Tree Atlas and LANDIS) to provide information about how individual tree species may respond to a changing climate. More information on the climate and forest impact models can be found in the assessment. Results for "low" and "high" climate scenarios can be compared on page 2 of this handout.

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. The model results presented here were combined with information from published reports and local management expertise to draw conclusions about potential risk and change in the region's forests.

SPECIES	ADDITIONAL CONSIDERATIONS - 30 MOST COMMON SPECIES
LIKELY TO DECREASE	
Atlantic white-cedar	Requires specific habitat, intolerant of fire and drought
Blackgum	Shade tolerant, fire adapted
MAY DECREASE	
American holly	Requires specific habitat, intolerant of fire
Black locust	Early-successional colonizer, susceptible to insect pests
Northern red oak	Susceptible to insect pests
Sassafras	Early-successional colonizer, susceptible to fire topkill
Tulip tree	Competitive colonizer tolerant of diverse sites
Virginia pine	Intolerant of shade and pollution
NO CHANGE	
American hornbeam	Tolerates shade, susceptible to fire and drought
Flowering dogwood	Shade tolerant
Pitch pine	Early-successional colonizer, susceptible to insect pests
MIXED MODEL RESULTS	
American beech	Susceptible to beech bark disease, extremely shade tolerant
Black cherry	Susceptible to insects and fire, somewhat drought-tolerant

SPECIES	ADDITIONAL CONSIDERATIONS - 30 MOST COMMON SPECIES
MIXED MODEL RESULTS CONTINUED	
Black oak	Drought tolerant, susceptible to insect pests & diseases
Chestnut oak	Establishes from seed or sprout, adapted to fire
Mockernut hickory	Susceptible to fire topkill
Pignut hickory	Susceptible to insect pests and drought
Red maple	Competitive colonizer, tolerant of disturbance
Scarlet oak	Seeds and sprouts, susceptible to fire and disease
White ash	Emerald ash borer causes mortality
White oak	Fire-adapted, grows on a variety of sites
MAY INCREASE	
Boxelder	Drought & shade tolerant, competitive in a range of sites
Eastern red cedar	Shade intolerant, susceptible to fire and insects
Loblolly pine	Susceptible to insect pests, invasive plants, and drought
Persimmon	Shade tolerant
Southern red oak	Tolerant of a range of temperature gradients
Sweetbay	Resistant to fire topkill, susceptible to insect pests
Sweetgum	Seeds and sprouts, susceptible to fire and drought
Willow oak	Establishes across a range of temperature gradients
Water oak	Intolerant of shade and fire topkill

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FUTURE PROJECTIONS

Data for the end of the century are summarized for two forest impact models under two climate change scenarios. The Climate Change Tree Atlas (www.fs.fed.us/nrs/atlas) models future suitable habitat, while LANDIS models changes in forest growth over time (future tree density presented in this table; additional data are available in the assessment).

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

ADAPTABILITY

Factors not included in the Tree Atlas model, such as the ability to respond favorably to disturbance, may make a species more or less able to adapt to future stressors (see reverse page for considerations for the 30 most common species).

- \+ high *Species may perform better than modeled*
- . medium
- – low *Species may perform worse than modeled*

SPECIES	LOW CLIMATE CHANGE (PCM B1) TREE ATLAS	LOW CLIMATE CHANGE (PCM B1) LANDIS	HIGH CLIMATE CHANGE (GFDL A1FI) TREE ATLAS	HIGH CLIMATE CHANGE (GFDL A1FI) LANDIS	ADAPT
American beech	●	▲	▼	▼	.
American chestnut	▼		▼		.
American elm	▲		▲		.
American holly	●		▼		.
American hornbeam	●		●		.
Atlantic white-cedar	▼		▼		–
Baldcypress	▲		▲		.
Bear oak:scrub oak	▼		●		.
Bigtooth aspen	▼		▼		.
Bitternut hickory	●		▲		+
Black cherry	▼	▲	▼	●	–
Black hickory	★		★		.
Black locust	●		▼		.
Black oak	●	▲	▼	●	.
Black walnut	●		▼		.
Black willow	▼		▲		–
Blackgum	▼		▼		+
Blackjack oak	▲		▲		+
Bluejack oak	N/A		★		.
Boxelder	▲		●		+
Cedar elm	N/A		★		.
Cherrybark oak	▲		▲		.
Chestnut oak	▼	▲	▼	▲	+
Chinkapin oak	★		★		.
Eastern cottonwood	▼		▲		.
Eastern hemlock	▲	▼	▲	▼	–
Eastern hophornbeam	▲		▲		+
Eastern redbud	●		▲		.
Eastern red cedar	●		▲		.
Eastern white pine	▼	▼	▼	▼	.
Flowering dogwood	●		●		.
Gray birch	●		●		.
Green ash	●		▲		.
Hackberry	●		▲		+
Honeylocust	N/A		★		+
Laurel oak	★		★		.
Loblolly pine	▲	●	▲	●	.
Longleaf pine	★		★		.
Mockernut hickory	▼		▲		+
Northern catalpa	▲		▲		.

SPECIES	LOW CLIMATE CHANGE (PCM B1) TREE ATLAS	LOW CLIMATE CHANGE (PCM B1) LANDIS	HIGH CLIMATE CHANGE (GFDL A1FI) TREE ATLAS	HIGH CLIMATE CHANGE (GFDL A1FI) LANDIS	ADAPT
Northern red oak	▼	●	▼	▼	+
Osage-orange	N/A		★		+
Overcup oak	N/A		★		–
Pawpaw	▼		▼		.
Persimmon	▲		▲		+
Pignut hickory	▼	▲	●	▼	.
Pin cherry	●		▼		.
Pin oak	▲		▲		–
Pitch pine	●	●	●	●	.
Pond pine	▲		▲		–
Post oak	▲		▲		+
Quaking aspen	▼	●	▼	●	.
Red maple	●	●	▼	▲	+
Red mulberry	●		▲		.
River birch	▲		▲		.
Sassafras	●		▼		.
Scarlet oak	▼	▲	▼	▼	.
Serviceberry	▼		▼		.
Shagbark hickory	▲	▲	▲	●	.
Shingle oak	●		▲		.
Shortleaf pine	▲		▲		.
Silver maple	▼		▲		+
Slippery elm	●		▲		.
Sourwood	▲		▼		+
Southern red oak	▲		▲		+
Sugar maple	▲	●	▼	▼	+
Swamp chestnut oak	▲		●		.
Swamp tupelo	▲		▲		–
Swamp white oak	▼		▼		.
Sweet birch	▼		▼		–
Sweetbay	▲		●		.
Sweetgum	▲		▲		.
Sycamore	●		▲		.
Tulip tree	▼	●	▼	●	+
Virginia pine	▼	●	▼	▼	.
Water oak	▲		▲		.
Water tupelo	▲		▲		–
White ash	●	▲	▼	▼	–
White oak	●	●	▼	▲	+
Willow oak	▲		▲		.

SOURCE: Butler-Leopold et al. (in review). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the Mid-Atlantic Climate Change Response Framework, Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.
www.forestadaptation.org/mid-atlantic/vulnerability-assessment