CLIMATE CHANGE PROJECTIONS FOR INDIVIDUAL TREE SPECIES
MID-ATLANTIC REGION

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.

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.

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.

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
MAY DECREASE	
American basswood	Tolerates shade, susceptible to fire
American beech	Susceptible to beech bark disease, very shade tolerant
Bigtooth aspen	Early-successional colonizer, susceptible to drought
Black cherry	Susceptible to insects and fire, mildly drought-tolerant
Eastern hemlock	Hemlock woolly adelgid causes mortality
Eastern white pine	Good disperser, but susceptible to drought and insects
Quaking aspen	Early-successional colonizer, susceptible to heat & drought
Serviceberry	Competitive colonizer, susceptible to drought
Striped maple	Shade tolerant, easily established, susceptible to drought
Sugar maple	Grows across a variety of sites, tolerates shade
Sweet birch	Susceptible to drought, fire topkill, and insects
Yellow birch	Good disperser, susceptible to fire, insects, and disease
NO CHANGE	
American hornbeam	Tolerates shade, susceptible to fire and drought
Eastern hophornbeam	Grows across a variety of sites, tolerates shade
Pitch pine	Early-successional colonizer, susceptible to insect pests

SPECIES	ADDITIONAL CONSIDERATIONS - 30 MOST COMMON SPECIES
MIXED MODEL RESULTS	
Chestnut oak	Establishes from seed or sprout, adapted to fire
Red maple	Competitive colonizer, tolerant of disturbance
Scarlet oak	Seeds and sprouts, susceptible to fire and disease
Tulip tree	Competitive colonizer tolerant of diverse sites
White ash	Emerald ash borer causes mortality
MAY INCREASE	
American elm	Susceptible to Dutch elm disease
Black locust	Early-successional colonizer, susceptible to insect pests
Black oak	Drought tolerant, susceptible to insect pests & diseases
Blackgum	Shade tolerant, fire adapted
Flowering dogwood	Shade tolerant
Northern red oak	Susceptible to insect pests
Pignut hickory	Susceptible to insect pests and drought
Sassafras	Early-successional colonizer, susceptible to fire topkill
Sweetgum	Seeds and sprouts, susceptible to fire and drought
White oak	Fire-adapted, grows on a variety of sites

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SPECIES	LOW CLIMATE CHANGE (PCM B1) TREE ATLAS	LANDIS	HIGH CLIMATE CHANGE (GFDL A1FI) TREE ATLAS	LANDIS	ADAPT
American basswood	●		▼		·
American beech	▼	●	▼	▼	·
American chestnut	●		●		·
American elm	●		▲		·
American holly	●		▼		·
American hornbeam	●		●		·
Balsam fir	▼	▼	▼	▼	−
Balsam poplar	▼		▼		·
Bigtooth aspen	●		▼		·
Black ash	▼		▼		−
Black cherry	●	●	▼	●	−
Black oak	●	●	▲	●	·
Black spruce	▼	▼	▼	▼	·
Black walnut	▲		▲		·
Blackgum	▲		▲		+
Blackjack oak	●		▲		+
Boxelder	●		▲		+
Bur oak	●		▲		+
Chestnut oak	●	▼	●	▲	+
Cucumbertree	▲		▼		·
Eastern hemlock	▼	●	▼	▼	−
Eastern hophornbeam	●		●		+
Eastern red cedar	▲		▲		·
Eastern redbud	●		▲		·
Eastern white pine	▼	●	▼	▼	·
Flowering dogwood	▲		▲		·
Gray birch	▼		▼		·
Green ash	●		▲		·
Hackberry	▲		▲		+
Jack pine	▼		▼		·
Loblolly pine	▲	●	▲	●	·
Longleaf pine	★		★		·
Mockernut hickory	●		▲		+
Mountain maple	▼		▼		+
Northern red oak	●	●	●	▲	+
Northern white-cedar	▼	▼	▼	▼	·
Osage-orange	●		▲		+
Paper birch	▼		▼		·
Persimmon	▲		▲		+
Pignut hickory	●	●	▲	●	·

SPECIES	LOW CLIMATE CHANGE (PCM B1) TREE ATLAS	LANDIS	HIGH CLIMATE CHANGE (GFDL A1FI) TREE ATLAS	LANDIS	ADAPT
Pin cherry	▼		▼		·
Pin oak	▲		▲		−
Pitch pine	●	●	●	●	·
Pond pine	▲		▲		−
Post oak	▲		▲		+
Quaking aspen	▼	▼	▼	▼	·
Red maple	●	●	▼	▲	+
Red pine	▼		▼		·
Red spruce	▼	▼	▼	▼	−
Redbay	★				+
Sassafras	▲		▲		·
Scarlet oak	▲	●	▲	▼	·
Serviceberry	●		▼		·
Shagbark hickory	▲	●	▲	●	·
Shingle oak	●		▲		·
Shortleaf pine	●		▲		·
Silver maple	▼		▲		+
Slippery elm	●		▲		·
Sourwood	▲		●		+
Southern red oak	▲		▲		+
Striped maple	●		▼		·
Sugar maple	●	●	▼	▼	+
Swamp chestnut oak	●		●		·
Swamp tupelo	▲		▲		−
Sweet birch	●		▼		−
Sweetbay	●		●		·
Sweetgum	▲		▲		·
Sycamore	▲		▲		·
Tamarack	▼		▼		−
Tulip tree	▲	●	▼	▲	+
Turkey oak	★		★		+
Virginia pine	●	●	●	▼	·
Water oak	●		▲		·
Water tupelo	●		●		−
White ash	●	●	▼	▲	−
White oak	●	●	▲	▲	+
White spruce	▼		▼		·
Willow oak	●		▲		·
Yellow birch	●	●	▼	▼	·
Yellow buckeye	●		●		−

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

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