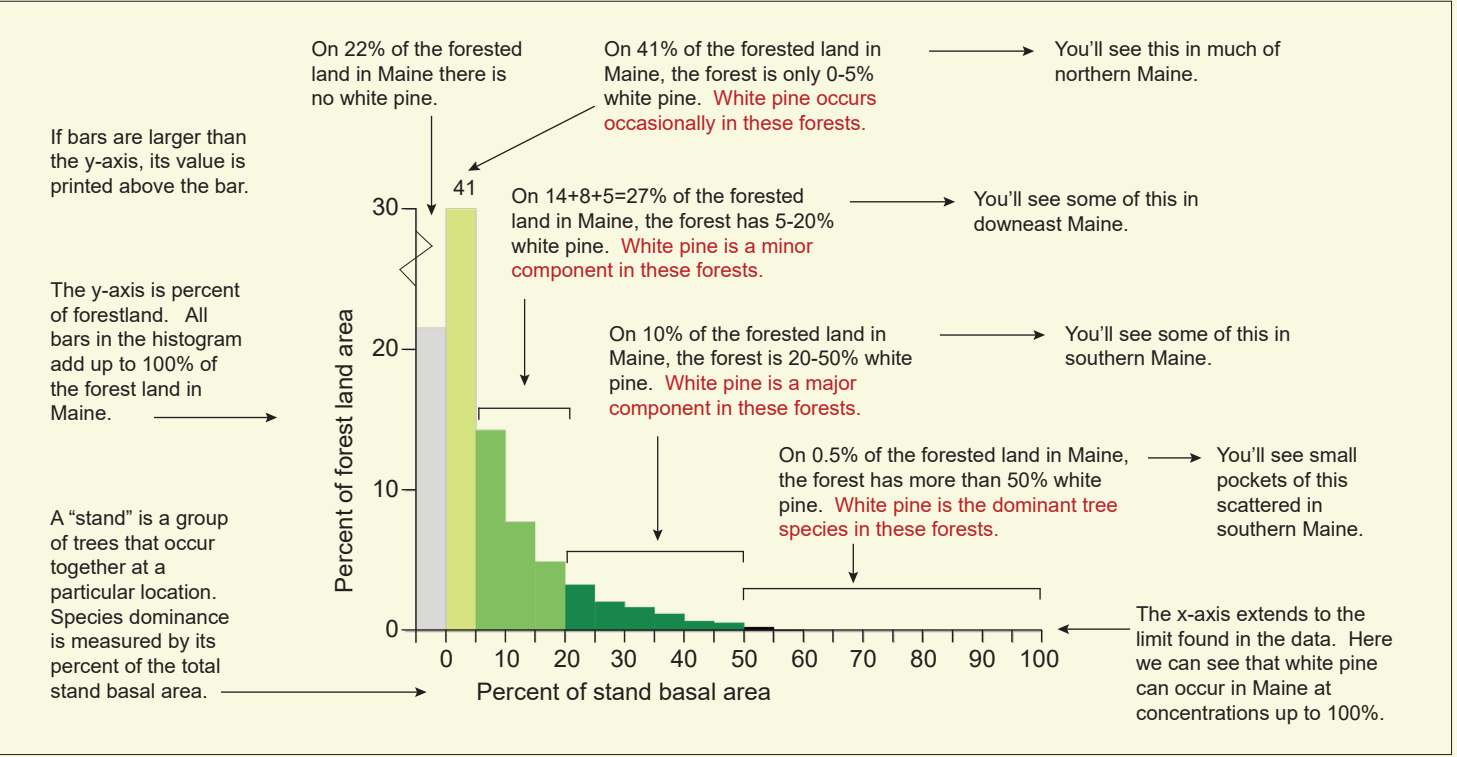# Modeled distributions of 12 tree species in Maine

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Map Description

These maps depict the distribution of 12 tree species across Maine. The maps show where these trees do not occur (gray), occasionally occur (pale green), are a minor component (medium green), are a major component (dark green), or are the dominant species (black) in the forest, as determined by that species' total basal area. **Basal area** is the area of a cross-section of the trunk at 1.37 meters (4.5 feet) above ground (breast height). Basal area is a way of measuring how dominant a particular species is in a stand because of the way large trees contribute more to the total basal area than small trees. The map at the top of the circle (balsam fir) is the species with the greatest amount of basal area in Maine. All other maps are generally arranged to group species that commonly occur together. Of the 57 tree species recorded in Maine in the 2005-2009 inventory, the species presented here are the top 12 in the state by total basal area, and together represent 87% of the total live tree basal area and 87% of the tree count in Maine. The center map shows where forest, nonforest, and water are present. In all maps, white is nonforest and water is blue.

Each map has an associated histogram in which the colors and the range of values they span serve both as the legend for interpreting the map and provide additional information about the distribution of that species in Maine. Because of the small pixel size of the data relative to the scale of the maps, the exact shade of green in the maps may appear to be a blend of classes in areas where pixels of many colors/classes occur close together. Below is a description of the histogram corresponding to the white pine map.

If bars are larger than the y-axis, its value is printed above the bar.

The y-axis is percent of forestland. All bars in the histogram add up to 100% of the forest land in Maine.

A "stand" is a group of trees that occur together at a particular location. Species dominance is measured by its percent of the total stand basal area.

On 22% of the forested land in Maine there is no white pine.

On 41% of the forested land in Maine, the forest is only 0-5% white pine. White pine occurs occasionally in these forests. → You'll see this in much of northern Maine.

On 14+8+5=27% of the forested land in Maine, the forest has 5-20% white pine. White pine is a minor component in these forests. → You'll see some of this in downeast Maine.

On 10% of the forested land in Maine, the forest is 20-50% white pine. White pine is a major component in these forests. → You'll see some of this in southern Maine.

On 0.5% of the forested land in Maine, the forest has more than 50% white pine. White pine is the dominant tree species in these forests. → You'll see small pockets of this scattered in southern Maine.

The x-axis extends to the limit found in the data. Here we can see that white pine can occur in Maine at concentrations up to 100%.

You can see that some species, such as balsam fir, frequently occur in Maine as a large proportion (> 20%) or even a majority (> 50%) of the forest stands in which it occurs (more areas in darkest green and black). Other species more typically occupy less than 20% of the total tree basal area where it occurs, either because of its tendency to be a minor stand component in this region (e.g. quaking aspen) or because Maine is at the edge of its natural range (e.g. northern red oak).

Methods:

These maps are created from data that is part of a larger dataset covering the entire contiguous United States (Wilson et al. 2012). The data were modeled from tree data collected on U.S. Forest Service Forest Inventory and Analysis (FIA) field plots (3537 plots in Maine), in combination with vegetation phenology derived from MODIS satellite imagery, climate data derived from daily surface weather data by the Oak Ridge National Laboratory, topographic data from the U.S. Geological Survey, and finer resolution tree canopy cover data derived from the National Land Cover Database (NLCD) which was produced by a consortium of federal agencies.

The tree species distributions were modeled at a 250-m grid cell size using imputation and canonical correspondence analysis techniques. Much of the species covariance found on the forest inventory plots is retained in the datasets, which means that each grid cell in the modeled datasets contains close to the same mix and proportion of species as found on the ground in the field plots. Regionwide and neighborhood accuracy assessment results are available in Wilson et al. (2012), and are associated with each species in the online database (Wilson et al. 2013). In addition, we are currently working on methods to calculate measures of per-pixel model uncertainty to accompany the datasets.

Field data were collected during 2005-2009 by: Melanie Duffy, Joe Bither, Aron Bishop, Jamie Dow, Chad Barton, Jeff Harriman, Greg Bjork, Dustin Bouchard, Bill Phipps, Elicia Landry, Jonathan Tyler, Scott Barnes, Eric Therriault, Joshua Brown, Ronna Gosselin, Kate Locke, Adam Blanchard, Mike Devine, Mark McLellan. Field data were processed and compiled by: Carol Alerich, Chuck Barnett, Dale Gormanson, Mark Hatfield, Barbara O'Connell, and Paul Sowers.

Leaf images by Linda Ellis, Galena, MO.

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References:
Wilson, B.T.; Lister, A.J. Riemann, R.I. 2012. A nearest-neighbor imputation approach to mapping tree species over large areas using forest inventory plots and moderate resolution raster data. Forest Ecology and Management. 271:182–198.

Dataset Reference:
Wilson, B.T.; Lister, A.J.; Riemann, R.I.; Griffith, D.M. 2013. *Modeled tree species distributions across the contiguous United States*. Newtown Square, PA: USDA, Forest Service, Northern Research Station. [Dataset]. Archived at: http://dx.doi.org/10.2737/RDS-2013-0013. See also www.nrs.fs.fed.us/fia for additional links to datasets.

Suggested Citation
Riemann, Rachel I.; Wilson, Barry T.; Lister, Andrew J.; Cook, Oren; Crane-Murdoch, Sierra. 2018. Tree species distribution in the United States Part 1. Journal of Maps 14(3):484-488.

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Balsam Fir
Abies balsamea

Red Maple
Acer rubrum

Red Spruce
Picea rubens

Paper Birch
Betula papyrifera

Sugar Maple
Acer saccharum

American Beech
Fagus grandifolia

Quaking Aspen
Populus tremuloides

Yellow Birch
Betula alleghaniensis

Northern White Cedar
Thuja occidentalis

White Pine
Pinus strobus

Eastern Hemlock
Tsuga canadensis

Northern Red Oak
Quercus rubra

Water
Nonforest
Forest

Miles: 0 15 30 60
Kilometers: 0 25 50 100

N

Projection: Transverse Mercator (ME state plane)
Spheroid: GRS 1980 Datum: NAD 83 (2011) meters