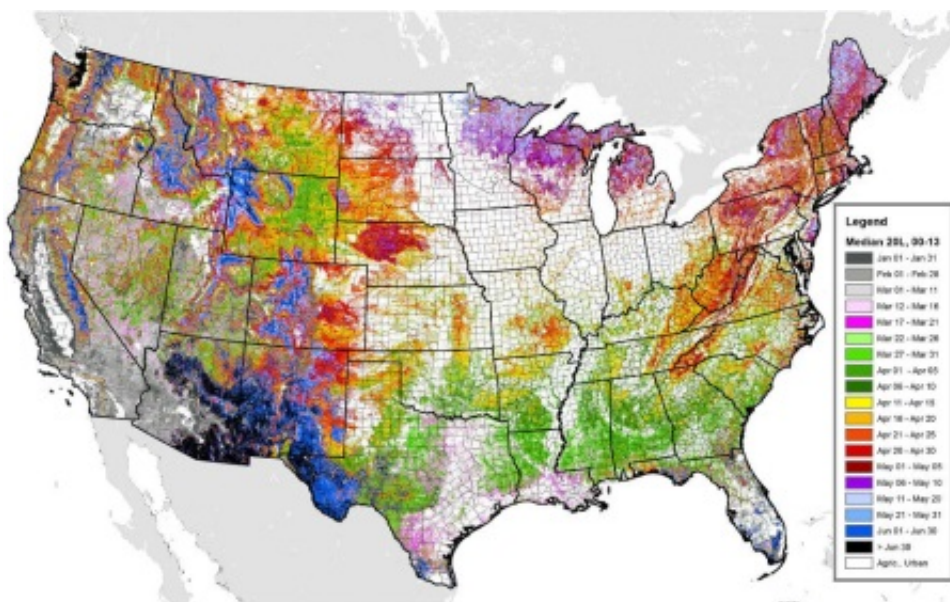


Researchers map seasonal greening in US forests, fields, and urban areas

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ForWarn maps shows the median greenup dates for natural vegetation, agricultural lands, and urban areas (Chicago, Ill. are shown) to help land managers anticipate and plan for the impacts of disturbances.

Using the assessment tool ForWarn, U.S. Forest Service researchers can monitor the growth and development of vegetation that signals winter's end and the awakening of a new growing season. Now these researchers have devised a way to more precisely characterize the beginning of seasonal greening, or "greenup," and compare its timing with that of the 14 previous years. Such information helps land managers anticipate and plan for the impacts of disturbances such as weather events and insect

pests.

Three maps detailing greenup in forests and grasslands, agricultural lands, and urban areas are now available online via ForWarn, which delivers weekly Land Surface Phenology (LSP) maps of seasonal vegetation growth and development detected by satellites, as well as national maps showing vegetation disturbances.

"In contrast to field observations that track leaf emergence for particular species of trees or herbaceous plants, ForWarn's LSP maps capture the response of the mixture of vegetation that can be seen from space," explains William Hargrove, research ecologist from the Forest Service's Eastern Forest Environmental Threat Assessment Center.

The researchers used nationwide satellite imagery collected between 2000 and 2013 to quantify the seasonal progression from dormancy to peak greenness using a common scale from 0 to 100 percent. They picked the median date associated with 20 percent greenup at each location as a common reference point signaling a clear launch of the [growing season](#). The maps' median greenup dates are particularly useful for managers of mainly deciduous forests, grasslands, and crops.

"The start of the annual growing season is among the most important climate-sensitive measures that ForWarn can provide," says Eastern Threat Center research ecologist Steve Norman. "Just as gardeners look to climate data to determine the typical last frost date, the typical greenup dates provides a baseline for [land managers](#) to establish expectations for seasonal duration and productivity."

Managers who know more precisely when the growing season begins can better anticipate the risks and impacts of disturbances such as those from wind, hail, frost, and fire, and can more efficiently monitor for pests such as defoliating insects that become active when leaves appear.

A team of university and federal partners developed ForWarn, which was among the top 25 tools selected for inclusion in the White House's U.S. Climate Resilience Toolkit in 2014. ForWarn's weekly map products compare current landscape phenology with that of previous years to reveal changes in growth and mortality, year-to-year climate variation, effects of disturbance, and recovery following disturbance. Users can see and share the maps via ForWarn's recently upgraded Forest Change Assessment Viewer, which can also be viewed on smart phones and tablets.

More information: www.forwarn.forestthreats.org/highlights

Provided by USDA Forest Service

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