

## **Feds Plan to Enlist Citizen Help to Look for Warming's Impact on Wildlife**

*by Scott Streater  
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As part of a multipronged effort to study and understand the effects of global warming, the federal government is adopting a new tack: It has partnered with an environmental organization to engage regular citizens to track the impacts on wildlife as part of a far-reaching program that is ultimately designed to find ways to cope with climate change.

The U.S. Geological Survey this month announced it is partnering with the Wildlife Society to recruit thousands of volunteers to monitor everything from the date when mule deer migrate south to when monarch butterflies first appear in the sky each spring.

The study of seasonal changes in plants and wildlife is called phenology, and the information is critical to scientists trying to get a handle on the domino effect caused by global warming. For example, if mammals come out of hibernation and birds migrate earlier in the year they could starve if the flowers and fruits they feed on don't also adjust to the warming climate, scientists warn.

"We don't want to collect data for data's sake. We are trying to track the immediate effects of climate change on plants and animals and landscapes," said Jake Weltzin, a USGS ecologist and executive director of the federal program called the USA National Phenology Network.

The information collected by the volunteers will be entered into a massive database that will allow scientists not only to gauge the

repercussions of global warming but also devise strategies to cope with them.

The wildlife monitoring partnership is the second phase of the 30-year program funded primarily by USGS and U.S. Fish and Wildlife Service. The first part of the program kicked into high gear this past summer with a successful effort to sign up more than 4,000 people nationwide to monitor cyclical changes to trees, flowers and even invasive weeds, such as cheatgrass. Volunteers record their observations online for use in the database.

The wildlife portion of the program probably will not begin recording observations online until the spring of 2010. Researchers at USGS and the Wildlife Society are in the process of developing a list of which birds, mammals, amphibians, insects, and fish they want to track.

One goal of the National Phenology Network effort is to use all the information gathered in the database to develop computer models and other tools to help forecast where drying weather has increased the danger of forest fires and when non-native invasive plant species are green enough to apply herbicides.

"Wildlife managers are trying to quickly adapt to a changing climate, and this program is designed to help them adapt effectively," said Michael Hutchins, executive director of the Wildlife Society, a professional association of nearly 8,000 wildlife scientists, managers and conservationists.

### **Many sets of eyes**

The National Phenology Networks aims to capitalize on the abundance of gardeners, hikers and anglers who can observe and

document seasonal changes, and the relevance of the data could be far-reaching. "Because these changes are happening on such a broad scale the only way to do that is to have a bunch of eyes out there helping us," Weltzin said.

People with absolutely no scientific training have been doing it for centuries. One of the most famous was Henry David Thoreau, the writer who famously chronicled life on Walden Pond in Concord, Mass., during the 19th century.

Abraham Miller-Rushing, an ecologist with the Wildlife Society who will coordinate the wildlife portion of the National Phenology Network, was one of a group of scientists that compared Thoreau's observations to conditions in Concord today. In a study published last month in the *Proceedings of the National Academy of Sciences*, it was reported that many of the buttercups, orchids and lilies that Thoreau described are not found anywhere in Concord because the flowers could not adapt to the warming climate.

Miller-Rushing said the National Phenology Network researchers would search for other credible historical observations, particularly in the West where records are scarce in many regions, and compare them to current conditions to gauge the warming impact. "People want to do something about climate change and understand the impacts it's already having on nature," Miller-Rushing said. "With this program, people can participate in the climate change science in a meaningful way."

## **Warming climate impacting nature**

Few dispute that the climate is warming and that there are effects to wildlife. A groundbreaking 2002 study published in the

journal *Nature* reported that the date when plants bloom and birds migrate in North America and Europe has occurred as much as four days earlier each spring every decade for the past 30 years.

In the area north of the Mason-Dixon Line, satellites have been able to measure that the time when the land turns green each spring has been occurring, on average, eight hours earlier every year since 1982.

The changes appear to have a direct effect on nature since the lifecycles of plants and wildlife are intertwined. If flowers adjust to the warming climate and bloom early, but bees do not, the timing is confused and the bees do not have access to enough nectar. "We disrupt these natural systems, we're really playing with fire," Hutchins said.

Examples abound. At a research station in the Rocky Mountains at Crested Butte, Colo., researchers have found that marmots are emerging from hibernation three months early and robins are migrating to the mountains each spring three weeks early, when a frost still covers the ground, said David Inouye, a biologist at the University of Maryland.

"The food the marmots and the robins depend on may not be there if the snow is not completely melted," Inouye said. "This is particularly important for the marmots because they haven't eaten for eight months. They run the risks of running out of food."

In Northern California, the bay checkerspot butterfly -- already listed by the federal government as a threatened species -- is disappearing, and a big part of the blame goes to the disruption of timing caused by the warming. The reason: The dwarf plantain the butterflies feed on is blooming earlier. When the butterflies hatch and enter the first phase of their lifecycle as a caterpillar, they have about a three-week

window to eat and grow. If the plantain has already dried up, they die, said Stuart Weiss, a Stanford-educated conservation ecologist who has spent decades studying the rare butterfly.

"The lifecycles of the butterfly and the caterpillar food plants have to fit into each other in any given year," said Weiss, who founded the Creekside Center for Earth Observation in Menlo Park, Calif. "Basically the warmer the growing season, you tend to see population stability decline. That's not a good sign."

Changes like these could completely alter ecosystems across the United States, said Paul Alaback, a forest ecologist at the University of Montana.

"We're setting up a series of changes in what species survive," Alaback said. "Some will adjust, some won't. The plants that come out too late will not produce as much food or seeds, and they will slowly disappear."

### **Increased threat of forest fires**

One major concern about a warming climate is the increased risk of forest and wildfires. Nationwide, fires destroyed 9.9 million acres in 2006 and 9.3 million acres in 2007 - - the most in the United States since 1960, according to a report by the Natural Resources Defense Council.

For land managers worried about wildfires, May 20 is one of the most important dates on the calendar. The flowering of lilacs, a highly prized ornamental flower for which researchers have an accurate historical record stretching 50 years or more, would hardly seem ominous, but researchers have found that if lilacs bloom before May 20, it is likely going to be a bad year for wildfires.

That is because the lilacs bloom early only when it is warmer -- and drier -- explained Weltzin, the USGS ecologist. The earlier the lilacs bloom signals a shorter winter, which in turn means less snow pack in the mountains and less water coming down streams and rivers. The drier conditions indicate the trees will be drier and more susceptible to fire.

The information can be so precise that just by knowing when lilacs bloom in the Denver area researchers could forecast a higher threat of wildfires two months ahead and hundreds of miles away in South Dakota, Weltzin said.

"Information like this could allow us to develop a predictive tool using flowering dates," said Miller-Rushing. "When the flower blooms early those are typically bigger wildfire years."

### **The spread of tree-killing beetles**

Fires are not the only threat to trees posed by the warming climate. For several years now the devastating bark beetle infestation in the western United States has laid waste to millions of acres of trees in the Yellowstone and Grand Teton national parks in Wyoming, the Dixie National Forest in Utah, and the Medicine Bow-Routt National Forest on the Colorado-Wyoming border, among others (*Land Letter*, Oct. 9).

The warming weather has played a big role in the devastation caused by bark beetles. Milder winters prevent the typical mass-mortalities of the beetles. What's more, the warmer, drier weather means there is less water in the soils, which in turn weakens the trees and prevents them from fighting off the beetle attacks.

"What we're finding is that the insects are responding quickly to the climate changes," said Alaback, the forest ecologist at the University of Montana. "The trees, unfortunately, are not."

As with wildfires, knowing where flowers bloom and plants green earlier than normal can alert land managers with beetle infestation problems to concentrate their resources in those regions.

### **Containing invasive plants**

Perhaps even more devastating than the bark beetle is the destruction wrought by invasive plant species. Non-native species like Canadian thistle, knapweed and cheatgrass have smothered millions of acres of native species across the country.

The Department of Interior estimates more than \$1.3 billion is spent every year to detect and control non-native invasive species like periwinkle, English ivy and Russian olive. Land managers can use herbicides to fight grasses and weeds, but they only have a short, several weeks-long period when the plants turn green in the spring to do so. Taking advantage of that short window of opportunity is made more difficult when the start of spring keeps changing.

In the Tucson, Ariz., area, the city struggles with an African grass that grows in the

desert and poses a big wildfire problem, Weltzin said. Bufflegrass turns green only two times a year, and only for 30 days each time, and if herbicides are not applied at that time the opportunity to kill it is gone.

"The city or county can't just drive all over the Tucson area looking for bufflegrass that has turned green," Weltzin said. "That's why as part of this program we're developing a citizen monitoring group that will track when the bufflegrass turns green. Then the county can send herbicide trucks to deal with it."

To deal with knapweed, forest managers in the West release beetles. When the beetle larvae hatch, they will crawl up to the head of the flower and eat it while it is still in the bud stage, preventing the knapweed from blooming.

It only works if the beetles are released before the knapweed blooms.

"Again, you have to know when plants are in certain stages before you can introduce beetles to eliminate knapweed, and that is where this network of citizen-scientists can help," Weltzin said.

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