

Andrews Forest NEWSLETTER

Issue 16

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Stories from Long-Term Science

The nature of long-term ecological research evolves as LTER sites, like the Andrews Forest, accumulate long-term records on ecosystem components, and as LTER-affiliated scientists dig deeper into records at their home sites and other places. Three recent publications connected with the Andrews Forest exhibit use of long-term data from sites over great expanses of geography.



Tagged tree at the Andrews Forest. Photo by Lina DiGregorio

Growth of trees as they age. An international team of 38 researchers, including Andrews Forest scientists Mark Harmon, Jerry Franklin, and Rob Pabst, compiled growth measurements of nearly 700,000 trees belonging to more than 400 species from tropical and temperate regions on six continents to examine how mass growth rate varies over a tree's lifespan. Their article in *Nature* reveals the surprising finding that, in general, individual mature trees continue to accumulate mass. As the article states, "large, old trees do not act simply as senescent carbon reservoirs but actively fix large amounts of carbon compared to smaller trees." This finding runs contrary to the common notion that, at a certain point in their maturation, trees senesce and their mass growth rate slows. "Remarkably, a single old tree may add much more mass than

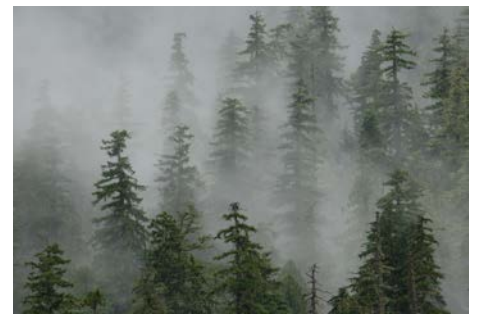
many individual young trees," Mark Harmon notes, "however, that does not mean older forests continue to take up carbon, because in the analysis of carbon sequestration, we need to take the whole forest system, not just individual trees, into account."

Biotic community shifts over time. In a recent paper in *Science* (18 April 2014), titled *Assemblage Time Series Reveal Biodiversity Change but Not Systematic Loss*, Dornelas *et al* examined changes in local species diversity over the course of 100 long-term, time-series datasets from marine, terrestrial, and freshwater ecosystems collected around the globe. They observed wide variation in measures of species diversity that appears to reflect the wide range of causes of change—such as secondary succession following disturbance, species migration in response to climate change, and invasion of non-native species. The two datasets from Andrews Forest used in the study, Jeff Miller's moth data from habitats that changed little over the study period, and the Watersheds 1 and 3 post-clearcut succession data that Charlie Halpern and Jim Lutz recently reported on, exemplify the mix of factors that may influence species change.



The geometrid, *Nemoria darwiniata*, is common and widespread throughout the Andrews Forest. Photo by Jeff Miller

Trends in cation, nitrogen, sulfate and hydrogen ion concentrations in precipitation in the United States and Europe.



Old-growth canopy at the Andrews Forest. Photo by T. Iraci, USFS.

OSU professors Kate Lajtha and Julia Jones examined long-term precipitation chemistry (1978–2010) from nearly 30 sites in the US and Europe that are variably affected by acid deposition and that have varied industrial and land-use histories. This work, published in *Biogeochemistry* in 2013, reveals substantial regional differences in the trajectories of air quality and precipitation acidity reflecting factors such as regulation of industrial sulfur and nitrogen emissions, acid-neutralizing dust from the Sahara/Sahel, and the pace of fossil fuel combustion, all of which vary across the US and between western and eastern Europe. Generally, air quality has improved in these parts of the world, but the number of sites collecting high-quality records remains remarkable low, despite the high value for such records in ecological and policy studies. The records from the Andrews Forest stand out as little influenced by anthropogenic sources of pollution in the mid-latitudes of the northern hemisphere, where pollution sources are generally extensive.



HJ ANDREWS EXPERIMENTAL FOREST

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The H.J. Andrews Experimental Forest Where Ecosystems Are Revealed

The H.J. Andrews Experimental Forest is the hub of a cooperative program of research, education, and research-management partnership involving Oregon State University and the USDA Forest Service's Pacific Northwest Research Station and Willamette National Forest. The mission of this partnership is to support basic and applied research concerning forests, streams, and watersheds, and to foster strong collaboration among ecosystem science, education, natural resource management, and the humanities.



Letter from the Leadership

Conservation might be defined as caring for the world—the world to which we belong, upon which we depend. While the *ability* to properly care for the world is contingent upon sound science, the desire to care is a matter of ethics. Both are required for conservation. In this issue we are reminded of one value of long-term ecological research (lter): inferences made and trends observed over the long-term are often very different than those made in a shorter time frame. Aldo Leopold poetically captures this value of lter in a reflection on his 1936 visit to the Rio Gavilan in northern Mexico:



Michael Paul Nelson

The song of the waters is audible to every ear, but there is other music in these hills, by no means audible to all. To hear even a few notes of it you must first live here for a long time, and then you must know the speech of hills and rivers. Then on a still night, when the campfire is low and the Pleiades have climbed over rimrocks, sit quietly and listen for a wolf to howl, and think hard of everything you have seen and tried to understand. Then you may hear it—a vast pulsing harmony—its score inscribed on a thousand hills, its notes the lives and deaths of plants and animals, its rhythms spanning the seconds and the centuries.

I wonder if LTER might also have something to do with, some impact upon, our *desire* to care for the world as well.

—Michael Paul Nelson, Principal Investigator of the Andrews Forest LTER, Ruth H. Spaniol Chair, Department of Forest Ecosystems and Society, Oregon State University

Student Spotlight—Kevin Briggs

Kevin Briggs, a Masters student in OSU's Department of Forest Ecosystems and Society, and working with Warren Cohen, is using satellite-based remote sensing to track forest phenology at the Andrews Forest and vicinity. This research will make it possible to monitor the green-up of the forest as new foliage develops in the spring. Past research has utilized NASA's MODIS sensor for its ability to capture daily images to characterize the timing and rate of green-up. However, the coarse spatial resolution of MODIS imagery limits its application in the Andrews Forest, due to the complex topography and fragmented forest landscape. To overcome this challenge, Kevin is using image-fusion techniques to blend the MODIS images with fine spatial resolution images from the Landsat sensor to produce a fine scale, near-daily time-series of images that will enable monitoring of phenology at



Kevin Briggs presents work at the Andrews Forest. Photo by Lina DiGregorio.

the stand level. To provide for ground-truthing of the remote sensing data, Kevin operates a network of time-lapse cameras that capture images of the forest throughout the year. When completed, Kevin's research will show how the timing of spring green-up has changed over the past 15 years, an important component for understanding the impacts of climate change in the area.

Mark Harmon—an OPUS Opus

Mark Harmon received a National Science Foundation OPUS (Opportunities for Promoting Understanding through Synthesis) grant to produce a synthesis of his career-long research fixation with wood decomposition in forests. The resulting opus (a book) will update the 170-page monograph paper that Mark led as a graduate student, assisted by a dozen more senior authors. That paper appeared in 1986 in *Advances in Ecological Research* and summarized the state of knowledge about dead wood in temperate forest and stream ecosystems. According to the Google Scholar count, it has been cited more than 2,700 times, forming a cornerstone for a new field of research that has flourished around the world. Mark's new synthesis will distill lessons from the



Mark Harmon installing a log in 1985 for the 200-year log decomposition study at the Andrews Forest. Photo by Jay Sexton.

hundreds of publications appearing over the past 30 years and share findings from the monumental 200-year log decomposition experiment in the Andrews Forest (which will be about 15% completed!). Mark will also bring results of his many other field and modeling studies into the collective dead wood and forest carbon dynamics story.

In Memory— Bob Anthony

Noted wildlife ecologist Bob Anthony died in December 2013 while working on his land south of Corvallis. Bob was retired after a long and very fruitful career in research, education, and conservation policy. Ten of his 175 publications were based on work in the Andrews Forest on topics such as northern spotted owl (in cooperation with Eric Forsman and others) and small mammals, especially those who are prey of the spotted owl. He played many leadership roles, including heading the US Geological Survey's Oregon Cooperative Wildlife Research Unit based at OSU and the Oregon chapter of The Wildlife Society. Bob left an important and lasting legacy of dealing with high-impact issues with resolve, calm, and integrity.

Stream Team Reunion

A Stream Team reunion in May at the Andrews Forest attracted 30 current researchers, faculty, alumni, and a few guests from as far away as Australia and Japan. Age classes of attendees ranged from new graduate students, to young faculty, to retirees. The reunion preceded a joint meeting of four international aquatic science societies in Portland, Oregon (the Joint Aquatic Sciences Meeting), which several Andrews Forest scientists helped organize. The highly productive stream research community is notable for its 40+ year history of collaborative, nation-spanning projects, starting with the River Continuum Project of the 1970s, continuing to the Lotic Intersite Nitrogen eXperiment (LINX), and the new STReam Experimental Observatory Network (STREON) field experiments. Most recently, a new National Science Foundation-sponsored Research Coordination Network (RCN) grant on stream resilience, co-led by Andrews Forest aquatic scientist Sherri Johnson, continues to build upon the stream team's strong foundation of collaborations.

Willamette National Forest Update— Spotted Owl Plans

Over 40 years ago, a young man hiking in the Oregon Cascades took interest in the northern spotted owl, an intriguing species and denizen of the old-growth forest. That man, Eric Forsman, went on to conduct his MS and PhD studying the owl in and around the Andrews Forest. His work, coupled with an intense political environment, resulted in the owl being listed as a threatened species almost 25 years ago. Since then, the northern spotted owl has been the focus of several recovery plans and critical habitat units (CHU) designations. The current CHU extends a challenge to manage landscapes for multiple ecosystem values: how do we consider the short-term impacts of forest practices, but also take a long view for conservation of the whole forested ecosystem on which the spotted owl relies? Addressing this challenge is a perfect example of the role the Central Cascades Adaptive Management Partnership (CCAMP) in providing a platform for information exchange and discussion. In May, CCAMP held

a symposium at OSU for federal biologists from USFWS, USFS, BLM, EPA, BPA, USGS, and others to share their knowledge on the species and discuss approaches for landscape management. Over 120 people attended; presentations are on-line at <http://ecoshare.info/projects/central-cascade-adaptive-management-partnership/workshops/>.



Northern Spotted Owl. Photo by Alan Dyke.

Long-Term Ecological Reflections

The adventuresome Long-Term Ecological Reflections program took another big step in interdisciplinarity by hosting DJ Spooky (aka Paul Miller) for a one-week residency at the Andrews Forest culminating with a concert on the OSU campus before an enthusiastic crowd of 200. The music and visual artist masterfully blended references to philosophy, science, music, and art from across the ages with accompaniment of two member of the OSU music faculty. Previous work with LTER scientists in Antarctica and elsewhere and his keen interest in the visual and audio properties of the forest suggest interesting outcomes from future collaborations. His performance involving dj-style mixing and sampling resembled and resonated with the way long-term science works—taking ideas from earlier works and prompts from on-going science and other sources to tell stories we hope reverberate in contemporary science and public circles.



Musician DJ Spooky. Image from orionmagazine.com

Join us for HJA Day!



HJA Day 2012. Photo by Theresa Valentine

You are invited to join us for HJA Day, June 26, at the Andrews Forest in Blue River, Oregon. Join us for field tours and presentations and learn about our science and outreach programs. Details and registration at: <http://andrewsforest.oregonstate.edu/hjaday>

New OspreyCam



OspreyCam image showing adult female with a fish brought to the nest by the male.

The Ospreycam is trained on an Osprey nest that has been active every year since at least 2008. Viewers have watched the pair in activities such as bringing in nesting materials and incubating eggs. Connect to the nest: <http://andrewsforest.oregonstate.edu/about/weather/hjawebcams.cfm?topnav=265>

In Praise of Ellie's Log



Ellie's Log illustration by M.L. Herring

Judy Li's and Peg Herring's new book, *Ellie's Log* (see Spring 2013 Newsletter), has drawn praise from many book award committees. *Ellie's Log* was one of three finalists in the American Association for the Advancement of Science: Science Books and Films Prizes for Excellence in Science Books: Hands-On Science, and received an Honorable Mention for a children's book about natural history from the prestigious John Burroughs Association. The book was reviewed in *Science*, and has a growing use in local education programs.



Middle school participants in the Canopy Connections program at the Andrews Forest. Photo by Lina DiGregorio

Support for the Andrews Forest

The Andrews Forest Program is dedicated to research and education about forests, streams, watersheds, and our engagement with the land.

The Andrews Forest Fund enables individuals and organizations to support the important work at the Andrews Forest.

We thank recent donors to the Andrews Forest Fund in the OSU Foundation—especially the anonymous donor of a recent, generous (\$5,000) gift!

Donations have helped complete the GREENHouse, which has now been in service for a year, providing living and working quarters for visiting scientists, writers, scholars, and artists. Donations have also been crucial to the development of education programs such as the middle school Canopy Connections program, offered in collaboration with University of Oregon's Environmental Leadership Program and the Pacific Tree Climbing Institute.