Andrews Forest NEWSLETTER

Issue 17 Fall 2014

Andrews Forest LTER Receives $6.7M Grant

Andrews Forest stream in summer.

Recently, the Andrews LTER Program received another six years of funding from the National Science Foundation to continue its long-term ecological research. Here's a snapshot. The goal of this work will be to understand how climate and land use changes interact to affect forest and stream ecosystems. Studies will explore the rich connectivity among the physical, biological, and human components of the forest.

The proposed work of the current grant, LTER7, will continue to investigate how global climate patterns are manifest in the mountainous terrain of the Andrews Forest. We plan to use records from established weather stations and stream gages scattered throughout the watershed to reveal how temperature and precipitation vary across the landscape, and how they have changed over time. We will also study how air, water, and nutrients flow through the landscape.

Our work will evaluate how physical aspects of the landscape affect the plants and animals that live there. We will study how pockets of cold air, which accumulate in topographic low points, may influence tree health, and whether climate-induced drought stresses old-growth forests less than younger stands of trees. Other researchers will track how changes in climate and land use might lead to mismatches between the timing of plant cycles, including growth and flowering, and the cycles of the insects and animals.

In addition, our work will consider the role of human activities in shaping the forest, and the role of science in shaping human decision-making. We will delve into the long history of the Andrews Forest, which spans several policy shifts in forest management strategies, to understand how prevailing attitudes translate into action. We will also evaluate how science influenced forest policy by studying whether decisions were made based on valid scientific findings and sound logical reasoning.

As we investigate these questions over the next several years, the Andrews Forest will continue to serve as a meeting place for society and nature. The Andrews Forest is open to the public for tours and events, and welcomes writers, artists, teachers, students, and citizen scientists throughout the year. We have been, and will continue to be, a leader in the Long-Term Ecological Research Network, working to facilitate collaborations among scientists, resource managers, policymakers, and the public.

Undergraduate Researchers

Undergraduate students are a valued part of the research program at the Andrews Forest. This summer we hosted undergraduate field and lab technicians, undergraduate class and field trip participants, and NSF-sponsored Research Experience for Undergraduate (REU) participants.

TOP: Stream ecology undergraduate researchers work with a graduate student (left) on a stream productivity project.
MIDDLE: REU participant Emily Purvis (right) discusses stream processes with PI mentor Dana Warren (left).
BOTTOM: REU participant Janel Hull studied plant phenology with PI mentor Mark Schulze.

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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

Over the summer we received the wonderful news that the seventh cycle of our LTER grant (LTER7) had been funded. The Andrews Forest LTER program is supported by the National Science Foundation in 6-year increments upon a successful review by a panel of experts. As in past years, however, some LTER programs were not so fortunate. A number of LTER programs have been put on probation, others have been closed down completely. I confess that it's not completely obvious to me why some LTER programs rise and persist, while others stumble and fail. A 1986 study by the Institute of Ecosystem Studies analyzed several long-term ecological studies in the hopes of identifying factors common to successful long-term programs. It turned out, however, there was no consistent theme, research characteristic, or subject of study that seemed to explain persistence. The only point worth mentioning was that frequently there was one person whose commitment and interest provided the long-term foundation. "Every successful long-term study that we studied," they wrote, "has had associated with it one (or a few) good, dedicated scientist who has devoted much time and energy to the long-term study." But this sort of focus is rare. Scientists do not typically spend their careers unpacking the mysteries of a single place or a single relationship. Academia does not often reward or encourage scientists whose sense of place is so strong (in fact, quite the opposite). While some hard thinking about the value of long-term ecological research lies ahead of us, I am quite pleased to be—for the moment at least—in the company of a group of "good, dedicated scientists."

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

Student Spotlight— Hayley Corson-Rickert and Nicolas Dosch

Hayley Corson-Rickert (left) and Nicolas Dosch (right), doing field work at the Andrews Forest in 2014.

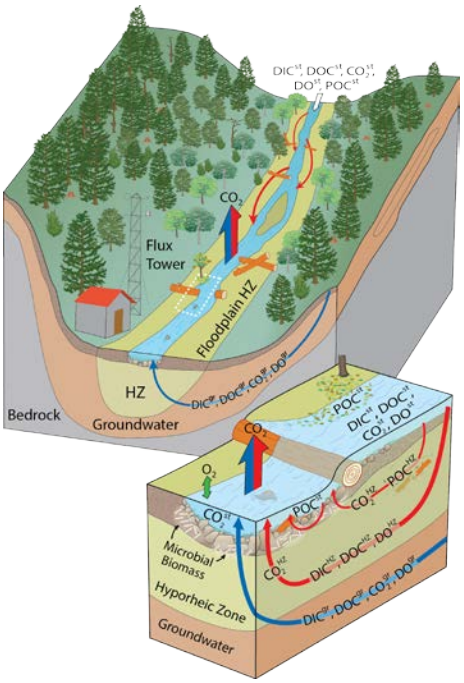
Hayley Corson-Rickert and Nicolas Dosch recently completed MS degrees in OSU's Water Resources Programs with complementary thesis projects supervised by Steve Wondzell and Roy Haggerty. Hayley and Nick examined carbon dynamics in surface streamwater and floodplain and streambed groundwater (hyporheic) systems, capitalizing on the network of shallow wells in the valley floor of Watershed 1 (WS1), which has become the most intensively instrumented site of the Andrews Forest. Hayley examined changes in dissolved organic carbon along hyporheic flow paths, and helped disentangle sources of carbon dissolved in streamwater. Nick studied the monthly dynamics of CO_2 dissolved in streamwater at 38 sites across the whole Andrews stream network, revealing high variability of pCO_2 concentration over time and space. Additionally, Nick's detailed studies in WS1 detected persistent super saturation with CO_2 with respect to the atmosphere, indicating that biochemical processes in the hyporheic zone influence streamwater chemistry, especially during summer low flows.

Two Major New Grants

Andrews Forest scientists recently scored two major National Science Foundation grants to advance work on topics of past strengths.

First, the new NSF-funded project titled "Hydrologic and Biogeochemical Controls of Carbon Flux from Headwater Streams" led by Roy Haggerty (Geoscience), Steve Wondzell (Forest Service Research), and several other investigators will examine how carbon is processed, stored, and exported from small, steep, forested watersheds. The much-studied Watershed 1 (WS1), with its rapidly growing 45-year-old forest, in the Andrews Forest is the focus of field and modeling studies of carbon dynamics at the terrestrial-aquatic interface along the valley floor. The project will include measurements of carbon processing rates in small, experimental environments and also larger-scale direct observations from the WS1 well network. These observations will be used with the model PFloTran to simulate coupled hydrologic and biogeochemical processes that control carbon processing at the watershed scale. This will provide a better understanding of the role of mountainous headwater ecosystems in global carbon dynamics.

Second, Raviv Raich and Xiaoli Fern (Electrical Engineering and Computer Science) and avian ecologist Matthew Betts (Forest Ecosystems and Society) lead the project titled "Computational Methods for Bioacoustic Avian Species Monitoring". The main thrust of the project is further development of machine learning techniques for automated interpretation of recordings of bird song to identify species and their movement across the landscape during the summer season. Several years of recordings of bird songs at many locations across the Andrews Forest landscape (currently >12 TB of data) will be used to test the techniques and address ecological questions relating to phenological shifts in bird arrival in relation to food availability. The tool will be adaptable to many ecosystems, but will be tested first by addressing bird response to environmental change, including climate variability in the Andrews Forest and land use in Costa Rica.



Conceptual model of hydrologic and biogeochemical processes in the stream carbon budget. From Haggerty/Wondzell.

Automatic bird-ID will seek not only to identify species (like this Hermit Warbler) but also the density of individuals at the Andrews Forest.

History Project. Old and New Records

Historian Sam Schmieding continues to plow through the widely-scattered records of the Andrews Forest program, creating a detailed, 800-page, inventory of files totaling more than 200 feet of shelf length, reams of maps, and thousands of photos. The next step is to create a well-cataloged collection in the OSU Special Collections and Archives Research Center. High value discoveries of "lost" items include Jerry Franklin's notes from early stages of his now classic book "Natural Vegetation of Oregon and Washington" and his 50+ year study of annual variation in conifer cone crops along the Cascades in the two states. Videos of Mark Harmon installing his log decomposition study in 1985 also turned up. This material will be valuable to Jerry and Mark as they each embark on writing their professional memoirs.

Another phase of the history project is gathering new oral histories. Sam conducted lengthy interviews with retired leaders of the Willamette National Forest, including former Supervisors Mike Kerrick and Zane Gray Smith as well as Rolf Anderson, whose many jobs included liaison with the Andrews Forest in the 1980s and 1990s. This valuable record of activities during the period of the "forest wars" when the Willamette NF and Andrews Forest were having pivotal roles will be used in LTER7 social science studies of factors shaping those influences on policy and management.

Historian Sam Schmieding inventorying files in "The Vault".

Long-Term Ecological Reflections—A Flurry of Photography

Photographers have recently been busy creating a rich record of visual perceptions of the Andrews Forest, from top to bottom. Eugene photographer Rob Mutch was stationed at the Carpenter Mountain Lookout all summer, giving him many opportunities to see the top of the world—clouds, sunrises, raptors. In early autumn Rob photographed his perch looking upward across the talus slope on Carpenter's north flank. Creswell journalist/artist Bob Keefer photographed at ground level in many favorite spots in the forest, then subtly hand-colored selected black-and-white images. Bob's photo shows his lighting set up for work with an old-growth stump graced with hemlock seedlings. A sampling of Bob's Andrews Forest work will be displayed at Eugene's Jacobs Gallery May-June, 2015. Artist/writer in residence Ian Boyden plumbed the depths of Andrews Forest in a culvert and conversed with cave crickets.

Talus slope on Carpenter Mountain's north flank. For more on Rob Mutch's work see: http://www.robmutch.com.

Bob Keefer's lighting set up in the forest. For more on Bob Keefer's work see http://www.bobkeeferphoto.com.

Ian Boyden conversing with cave crickets in a subterranean culvert. For more on Ian Boyden's work see http://ianboyden.com.

Fall color in Oregon grape (Mahonia aquifolia) *at the Andrews Forest.*

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.

Please contribute to one of several Andrews Forest Funds in the OSU Foundation. Gifts support projects designated by the donor; Andrews Forest leaders direct undesignated gifts to tackle immediate needs. Also, annual income from gifts to two endowment accounts supports long-term measurements programs and innovative activities, such as hard-to-fund interdisciplinary projects. Past donations supported construction of the Greenhouse, development of the Discovery Trail, installation of webcams, and other new and now-essential parts of the Andrews Forest program. Consistent annual donations have sustained our Canopy Connections education program for middle schoolers. Call 541-737-8480, or donate online: *http://andrewsforest.oregonstate.edu/donate* All gifts are greatly appreciated.