Andrews Forest NEWSLETTER

Issue 24 Spring 2019

Flowering Plants and Flower-visitors in Meadows

Students and faculty mentors studied plants and pollinators in the high meadows of the Andrews Forest.

Montane meadows cover only a few percent of the Andrews Forest landscape, but contain incredible richness of flowering plants and flower-visitors such as bees, beetles, and hummingbirds. Encounters of flower-visitors with flowering plants were sampled in summers of 2011–2018 in twelve montane meadows of different size, proximity (how close one meadow was to another), and soil moisture. A total of 178 flowering plant species, 688 flower-visitor species, and 137,916 interactions were recorded. The number of different species of flower-visitors was related to meadow patch size—larger meadows contained more species of flower-visitors. Soil moisture also mattered—wet, intermediate, and dry meadows contained very different species. Proximity did not seem to matter—neither plant nor flower-visitor richness was related to meadow isolation. Conservation and restoration of a variety of meadow types and sizes may promote landscape diversity which in turn, is expected to promote diversity of wild plant and pollinator species.

Sampling was carried out by undergraduate students in the National Science Foundation-sponsored Ecosystem Informatics Summer Institute, based at the Andrews Forest and led by OSU professors Desiree Tullos, Julia Jones, and Rebecca Hutchinson. OSU professor and entomologist Andy Moldenke provided critical contributions.

Snowdown Topples Thousands of Trees

The western Cascades, home of the Andrews Forest, is a disturbance-rich landscape—wildfires, floods, landslides, blowdown. Every few decades we are reminded that a heavy, wet snowfall can bring down trees, producing a "snowdown" disturbance. A late February snowdown toppled thousands of trees, especially in plantations and along roadsides, blocking traffic and breaking powerlines. Forest damage was largely restricted to elevations below 2,500 ft. Data from our meteorological stations showed that snow accumulations during the storm had nearly three times the density at the headquarters station, Primet, at 1430 ft elevation, compared to Cenmet a 3370 ft. Damage was patchy; the 50-year old plantation in Watershed 1, for example, suffered extensive treefall on its south side, but less on the north side or along the riparian alder forest. Plantations that were recently thinned appear to have been less susceptible to damage from the heavy snow.

A 2006 publication by Jim Lutz and Charlie Halpern documented similar disturbances in Watershed 1, indicating that a forest experiences frequent disturbance and tree mortality. We plan follow-up studies using our extensive long-term vegetation plots and LIDAR images to assess changes over time in forest dynamics, impacts on streamflow, and other phenomena.

The snowdown knocked out power at the offices and homes of Andrews Forest staff and created a major, unexpected workload to open roads and repair damaged facilities. We give thanks for the above-and-beyond efforts of staff involved in the special recovery efforts.

Heavy, wet snow brought down thousands of trees across the landscape, mostly second-growth trees at elevations below 2,500 feet.

HJ ANDREWS EXPERIMENTAL FOREST

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The **Andrews Forest Newsletter** is a semi-annual publication of the Andrews Forest Program.

Editors:
Lina DiGregorio, OSU
Mark Schulze, OSU
Fred Swanson, USFS
Michael Nelson, OSU

Contact:
Andrews Forest Newsletter
College of Forestry
330 Richardson Hall
Oregon State University
Corvallis, OR 97331-5752

andrewsnewsletter@fsl.orst.edu

Web: *http://andrewsforest.oregonstate.edu*

Twitter: *@andrews_forest*

Facebook: *facebook.com/AndrewsForest*

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, arts, and the humanities.

Letter from the Leadership


Tom Spies

We sometimes use the tagline "where ecosystems are revealed" to describe our program. We sometimes say that the Andrews Forest is a place of inquiry. The contents of our newsletter wonderfully illustrates how much the forest is a place of deep involvement by a wide variety of scholars and over an unusual amount of time considering the short-attention-span norm for most research. Long-committed staff clearing trees and snow from our recent disturbance event, senior researchers mentoring younger scholars, and the long-view presented collectively via history and art all speak to the range of our program. And on top of this long-term, steady-paced engagement we layer on shorter-term research efforts: undergraduate and graduate students actively engaged in research and education, newer faculty researchers coming into the forest and our community, and citizen scientists efforts in phenology.

Involvement is an old word meaning to "envelop or surround." It literally means "to roll into." We see that rolling into in this issue of our newsletter. We see it because that is what our community does. We roll into our work with the passion to discover, the aspiration to understand, the eagerness to express, and all with a graceful sense of companionship and good humor to boot.

—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—Karla Jarecke

Karla Jarecke is a PhD student in the Department of Forest Ecosystems and Society at Oregon State University. Karla conducted field campaigns from 2016–2018 to measure soil moisture, soil depth, and soil hydraulic properties along gradients of topography. Her research will advance understanding of subsurface water storage in forests. Specifically, Karla focuses on linking spatiotemporal variability in soil moisture to catchment physiography, vegetation, and soil properties. The results of her research will inform forest management strategies aimed to reduce water stress in forests and sustain water supplies in critical water regions in the Pacific Northwest. Additionally, Karla has a strong interest in communicating her research to the public. She participated in the 2018 Science Communication Program—a partnership between OSU and the Oregon Museum of Science and Industry—where she developed an exhibit that demonstrated the movement of water through soil. Through this experience Karla enjoyed teaching visitors how to use the scientific process to generate research questions and hypotheses.


Lina DiGregorio

Karla studies how water moves through and collects in soil on steep slopes.

Focus on Faculty — Taal Levi and Damon Lesmeister

Taal Levi and Damon Lesmeister collaborate to study wildlife and food webs in the Andrews Forest. Taal, an Assistant Professor in OSU's Department of Fisheries and Wildlife, uses quantitative and molecular methods to address research questions related to wildlife, community, and disease ecology across tropical and temperate forests. Damon, a Research Wildlife Biologist with the USFS Pacific Northwest Research Station, works on long-term studies of demography, spatial ecology, occupancy, and resource selection of many forest-adapted species. At the Andrews Forest, Damon's work involves long-term research on small mammals, and on spotted owls in a study that began in 1969.

Together, Taal and Damon advise PhD student Marie Tosa, who is investigating the terrestrial food web of Pacific Northwest forests and the ecology of western spotted skunks, an abundant yet understudied carnivore. Marie is using DNA metabarcoding and biodiversity surveys across different forest types at the Andrews Forest and other National Forest land to better understand food web dynamics. This work includes camera traps, radio tracking, bird point counts, genetic analysis of prey species in scat of all major mammalian carnivores, and surveys of flying and ground-dwelling invertebrates, fungal communities, and vegetation. This comprehensive biodiversity survey will provide the Andrews Forest with a critical link between biophysical variables, historical forest management, and species composition and diversity.

Damon Lesmeister (left) studies how animals, like the western spotted skunk, move through and are connected to the landscape through food web dynamics. Taal Levi (right) uses molecular methods to study animals, such as extracting and analyzing DNA from stream water to assess abundance of fish.

Climate Change and Citizen Science

Sarah Ward studied phenology, the timing of biological events, such as bud break of first leaves or first blooms on a plant each spring.

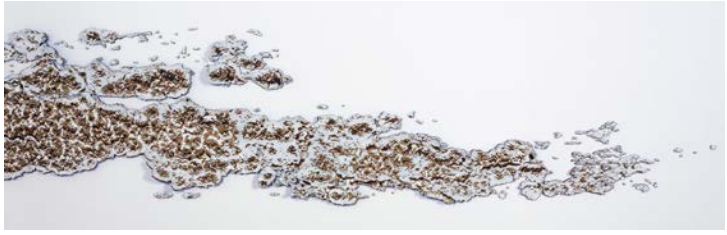
Sarah Ward recently published her thesis which capitalized on our 2009-2016 dataset documenting spring phenology—the recurring seasonal events in an organism's life—of 18 species of native forest plants within the Andrews Forest. Observations on timing of first leaves and first blooms, gathered broadly across the landscape, show big differences across geography, and between years, reflecting the wide range of micro-environmental conditions and climate variability. During years when regional climate matched conditions predicted in some climate change scenarios—low snowpack and high frequency of winter temperature inversions that trap cool air in valleys—the date of bud burst did not vary strongly across elevation, contrasting with years that more closely matched long-term climate averages.

The phenology dataset was also used in a recently published comparison of phenology models based on data from four LTER sites and observations of citizen scientists in the National Phenology Network (NPN). Our local NPN program, Oregon Season Tracker, was recently named "PhenoChampion" of the year by the Network.

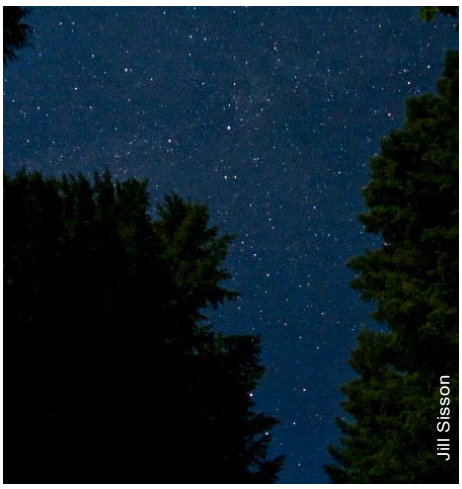
Forest Director Mark Schulze has overseen the plant phenology project. University of Oregon professor Bitty Roy advised Sarah's degree. Brad Withrow-Robinson and Jody Einerson of OSU Extension and more than 300 citizen scientists are responsible for Oregon Season Tracker's success.

A New Andrews Forest History Article

Emeritus OSU professor of history Bill Robbins has been delving into the written and oral history records of the Andrews Forest and recently published a historical account in the *Oregon Historical Quarterly*. The cover of the issue is graced with an image of artist Leah Wilson's "Recompose" piece (pictured right) from the *ROT: The Afterlife of Trees* art exhibit, a great example of an arts-humanities-science merging.



The Sound of the Night

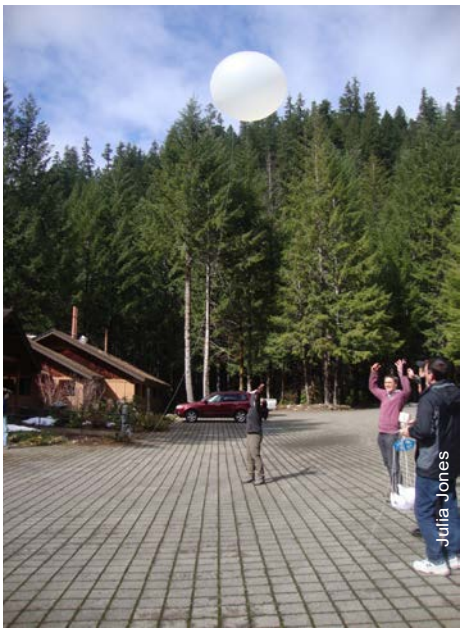


Night at the Andrews Forest. 3 AM, July 13.

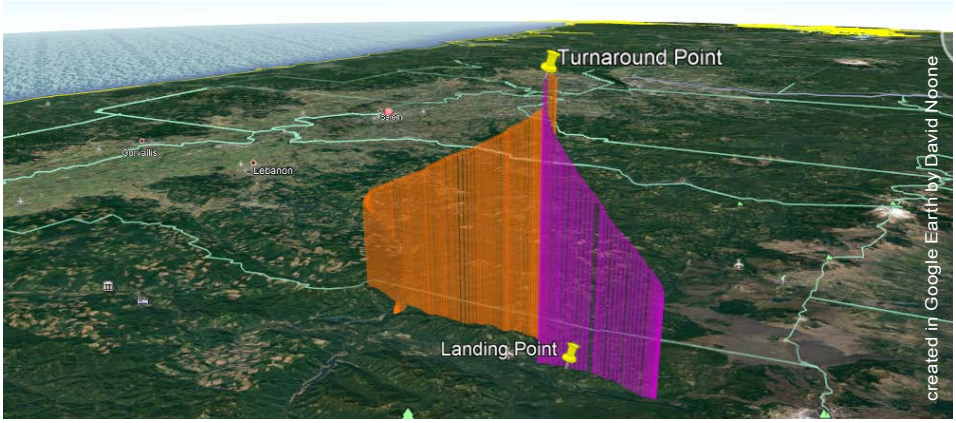
In her 2018 Environmental Arts and Humanities Masters project, Jill Sisson prompts us to reflect on two little-considered properties of the Andrews Forest —darkness and silence. She argues that "human health and well-being depend upon the rhythms shaped by nighttime's darkness. Clearly, the nocturnal world matters, and there is much to lose if we allow it to vanish." Her essays include "themes of wild spaces and species, mystery, and loss, all through the lens of the nocturnal world." Noise and light can be pollution, and impose disturbance to human and other animal populations.

Education—The Sky's the Limit

David Noone, OSU professor of atmospheric sciences, frequently brings his Observing Climate class (ATS 295) to the Andrews Forest during spring break to discover some of the processes that control the climate of the northwest, and to enjoy the quiet of late winter at the forest. This spring the class used a sunny, still day to launch a weather balloon. The balloon soared to 75,000 feet before bursting and drifting 6 miles to the east, all while radioing data on temperature, humidity, and wind speed back to headquarters. The data showed a stable atmosphere up to the height of the nearby mountain ridges, and a significant change in wind direction at the top of the Cascades. These observations provide perspectives and broader atmospheric context for work underway examining how tall trees and steep topography shape the atmospheric landscape of the Andrews Forest.



A weather balloon gives insight into air temperature, humidity, and wind speed. The image of the flight (below) illustrates how the balloon rose 75,000 ft, and drifted 6 miles to the east. The flight time was about 1.5 hours to the top and 2 hours total.



Support the Andrews Forest

Did you know that you can, through a charitable gift, support research, educational programs, and facilities at the Andrews Forest? Some people have specific ideas for support, like a long-term monitoring project, or training for K-12 school teachers, or even new furniture for the apartments. Others give to support a broad range of activities at the Andrews Forest, and every gift helps. Gifts from people like you provide a lasting impact.

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 a range of scientific projects at the Andrews Forest, as well as education and outreach programs.

We encourage you to support the Andrews Forest. To learn more, please call 541-737-8480 or visit *http://andrewsforest.oregonstate.edu/donate.* Thank you for being part of our future.