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CASCADE CENTER *Research & Management* NEWS No. 3

SUMMER 1997 H.J. ANDREWS FOREST • ECOSYSTEM RESEARCH • EDUCATION • ADAPTIVE MANAGEMENT

The Cascade Center for Ecosystem Management is a research & management partnership among the Pacific Northwest Research Station, Oregon State University and the Willamette National Forest. Established in 1991, the Center integrates research and management programs historically centered on the H.J. Andrews Experimental Forest near Blue River, Oregon. The mission of the Cascade Center is to develop, apply, demonstrate, and share new research findings with resource managers and interested individuals.

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CASCADE CENTER TO SPONSOR FLOOD FORUM

All interested parties are invited to attend a free public forum entitled **Floods in the Forest: Ecological Effects and Public Policy** on Saturday, May 31st, at the University of Oregon. Three panels will present findings from recent flood-related research, identify management issues, and clarify policy options.

The forum will begin at 1:00 pm in Room 100, Willamette Hall across east 13th from the Erb Memorial Union.

The first panel, *Flood Effects and Links to Forest Management* will include Gordon Grant, Research hydrologist with the USDA Forest Service, Pacific Northwest Research Station; Stan Gregory, professor, Department of Fisheries and Wildlife and leader of the Stream and Riparian Ecosystem Team, Oregon State University; and George Robison, hydrologist, Forest Practices, Oregon Department of Forestry.

The second panel, *Focusing on Forest Policy Issues*, will include Ward Armstrong, Executive Director of the Oregon Forest Industries Council and David Bayles, Conservation Director of the Pacific Rivers Council.

The third panel, *Clarifying Forest Policy Options* will include Dorothy Anderson, Chair of the McKenzie Watershed Council; John Baldwin, Director of the Institute for a Sustainable Environment, University of Oregon; Jim Brown, State Forester of the Oregon Department of Foresty; and Darrel Kenops, Supervisor of the Willamette National Forest.

For more information contact:

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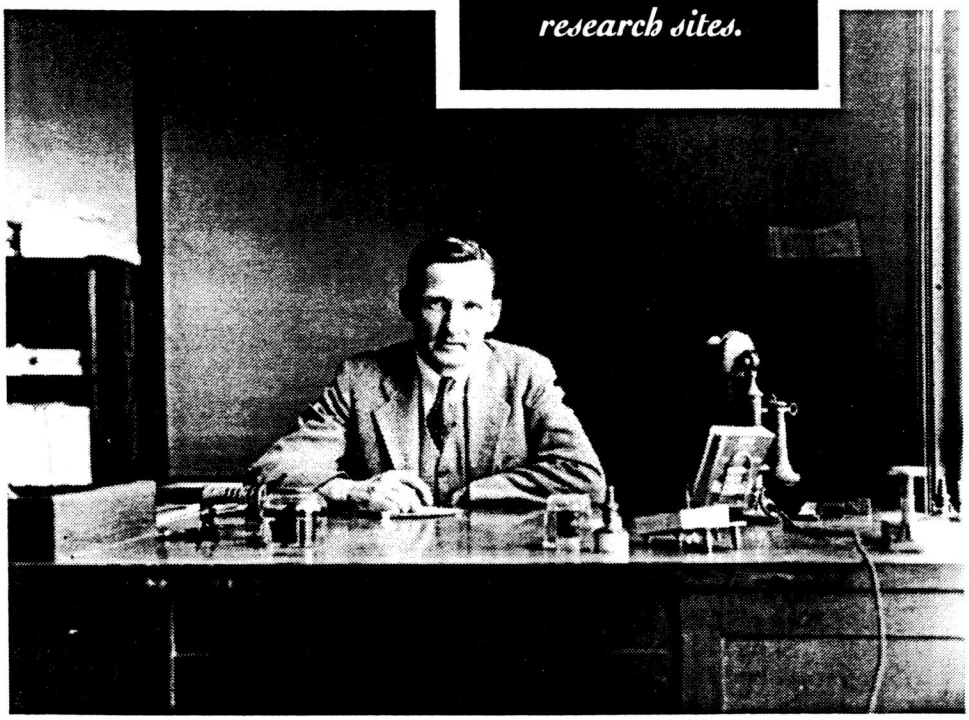
THE ANDREWS EXPERIMENTAL FOREST CELEBRATES FIFTY YEARS OF RESEARCH & EDUCATION

Experimental forests were established to provide a place for conducting research unencumbered by other management objectives and to protect long-term research sites.

Next year, the H.J. Andrews Experimental Forest will celebrate its fiftieth anniversary. Several commemorative events are in the planning stage including field tours, open houses, and publication of a site history. The Andrews Forest is neither the oldest or largest experimental forest in the system. However, it has achieved distinction in several important arenas.

Established in 1948, the Andrews Forest was originally designated the Blue River Experimental Forest. The then Regional Forester, Horace Justin Andrews, was a strong supporter of forest research and was directly involved in selecting the location of the Experimental Forest near the community of Blue River, Oregon. The Experimental Forest was renamed in his honor in 1953 after Mr. Andrew's untimely death in an automobile accident in Washington, D.C.



Horace Justin Andrews 1892-1951

Research themes on the Andrews have changed over the years. The emphasis in the 1950s centered on engineering systems for roading, logging old-growth forests, and securing regeneration of trees. In the 1960s, the research focused on effects of logging on water, sediment production, and nutrient losses from small watersheds. In fact, the first watershed study in the Pacific Northwest was initiated on the Andrews Forest in 1948 when gauging stations were installed on 2 drainages to study snowmelt hydrology. Since that time, nine additional watersheds have been gauged.

In 1969, the Andrews Forest was selected as one of the study sites of the Coniferous Biome Project of the International Biological Program (IBP). This designation signaled a shift to basic ecosystem research in forest and stream environments. Several dozen permanent forest vegetation plots, called reference stands, were established on the Andrews as part of the IBP studies. These plots have been central to interdisciplinary studies on species diversity, productivity, biomass, leaf area, stand structure, and successional patterns — the reference stands have served as "bench marks" for dozens of studies, and continue to be important sites for research.

In 1980, the Andrews Experimental Forest became a charter member of the Long-term Ecological Research (LTER) Network. This program, funded by the National Science Foundation, supports long-term studies at 16 sites in the United States and Puerto Rico and 2 in Antarctica. The Network includes sites in Alaskan tundra, tallgrass and short grass prairies, deserts, coastal barrier islands, deciduous forests, and northern temperate lakes. NSF recognizes the central roles of long-term ecological processes, and the importance of sustained financing and continuing leadership for such research. The LTER program has

allowed the Andrews Forest to support long-term research studies that have earned national and international recognition.

Today, the major research themes at the Andrews Forest include disturbance processes, landscape patterns and processes, carbon dynamics, biological diversity, terrestrial/aquatic interactions, spotted owl demography, soil and watershed processes, and long-term site productivity.

In addition to the National Science Foundation, major supporters of the Andrews program are the USDA Forest Service and Oregon State University. Further support is provided by NASA, US Geological Survey, EPA, BLM, private foundations, and other sources.

Oregon State University and the Forest Service's Pacific Northwest Research Station and Willamette National Forest are the three principal partners that cooperatively manage the Andrews program.

Andrews research has generated a large body of information since 1948. The collaborative nature of the Andrews Forest's scientific enterprise and partnerships has significantly contributed to its success.

NSF AWARDS GRANT TO THE ANDREWS FOREST LTER PROGRAM

The National Science Foundation recently awarded the Long-Term Ecological Research (LTER) program at the H.J. Andrews Experimental Forest a grant of $3.3 million to continue long-term studies until 2002. The Andrews Forest LTER program was established in 1980, and is one of the initial LTER sites. The Andrews is located on the Willamette National Forest.

These studies examine changes of forest landscape patterns in response to land use, climate variation, and natural disturbances, such as fire and floods. Effects of landscape change on hydrology, biological diversity, and carbon dynamics are examined through field studies, long-term experiments, and modeling. The LTER program also emphasizes long-term data management and open access to data and other information via the internet: www.fsl.orst.edu/lter.

The critical value of long-term studies was evident following the February 1996 flooding. Many years of records of fish populations, riparian vegetation, and landslides, for example, aided interpretations of flood effects in natural and managed areas.

Andrews LTER efforts contribute to information needs of the Willamette National Forest, the Central Cascades Adaptive Management Area, and other land management units. LTER-derived understanding of disturbance regimes, roles of woody debris in forest and stream systems, successional processes in young, managed stands, nutrient cycling, and other ecosystem processes is finding many applications.

Fred Swanson, Supervisory Geologist with the US Forest Service's Pacific Northwest Research Station, shares the Principal Investigator role with Mark Harmon and Stan Gregory of Oregon State University. Warren Cohen, Gordon Grant, and Tom Spies (USFS PNW) are collaborators along with more than 35 other scientists from Oregon State University and Universities of Oregon and Washington. Art McKee, Director of the Andrews Forest, plays a central role in guiding the Cascade Center program. About 35 graduate students are also engaged in research at the Forest in any given year. The NSF grant is made to Oregon State University.

UPCOMING TOURS/ WORKSHOPS:

5/31 - Flood Forum, University of Oregon, Willamette 100, 1:00pm-6:00pm

6/14 - Lane County Audubon Tour of the Andrews Forest

6/26 - HJA Day

7/5 - Season opener for Nature Talks! 7pm at the Delta Amphitheatre. For a complete series schedule contact Pam Druliner, 822-3317

7/13-19 - Northwest Center for Sustainable Resources (NCSR) workshop at the Andrews forest.

7/24-8/2 - North America Dendroecology Fieldweek at the Andrews Forest

8/26 - Natural Areas Association Field Trip

9/21 - Organization of Biological Field Stations Field Trip

EXAMINING THE ROLE OF FOREST ROADS IN DRAINAGE-BASIN HYDROLOGY

On-going research at the Andrews Experimental Forest (Lookout Creek watershed) and adjacent Blue River watershed is directed at understanding the role of forest roads in drainage-basin hydrology. Previous studies throughout the Northwest and elsewhere have examined the role of roads in contributing to erosion and sedimentation, however few detailed studies have examined the mechanisms by which roads may contribute to changes in streamflow. This work seeks to develop a mechanistic understanding of how roads affect floods in mountain watersheds.

A recent study examining road-drainage structures in Lookout Creek and Blue River revealed two hydrologic flow paths that link roads to stream channels: roadside ditches draining to streams and roadside ditches draining to hillslopes where gullies are eroded below culvert outlets. Fifty-seven percent of the surveyed road network in the study basins is connected to the stream network via these surface flowpaths, resulting in the potential to increase drainage density by 20 to 50 percent, depending upon the extent of the channel network. While the effect of logging roads on basin hydrology is not well understood, this work provides one possible explanation for observed (e.g. Harr, Harper et al., 1975; Jones and Grant, 1996) changes in peak flows following road construction. The extended network of channelized flowpaths associated with the road network may provide a more efficient routing system to move runoff rapidly through the drainage basin, thereby contributing to peak flows. Findings of this study and a conceptual model for evaluating the hydrologic effects of roads are detailed in Wemple et al., 1996. (see **Research Literature** below)

Current work in watershed 3 at the Andrews Forest focuses on measuring runoff on logging roads. Road segments have been instrumented to collect storm hydrographs generated by runoff from the road prism and subsurface flow intercepted from the road cut. Field data will be used to validate a model of changes in hillslope water in order to predict the occurrence of seepage at road cuts. Finally, a simple routing model is being developed to evaluate the effect of road runoff at the basin scale. Results of this work are forthcoming.

REFERENCES:

Harr, R. D., W. C. Harper, et al. , 1975. **Changes in storm hydrographs after road building and clear-cutting in the Oregon Coast Range**. Water Resources Research 11(3): 436-444.

Jones, J. A. and G. E. Grant , 1996. **Peak flow responses to clearcutting and roads in small and large basins, western Cascades, Oregon**. Water Resources Research 32(4): 959-974.

The following hardcopy publications are available with request via mail, fax, or e-mail from: **Carol Wood**
Oregon State University, FSL 331, Corvallis, OR 97331 Fax: (541) 737-1393 e-mail: woodc@fsl.orst.edu

RESEARCH LITERATURE

- ☐ Halpern, Charles B.; Antos, Joseph A.; Geyer, Melora A.; Olson, Annette M. 1997. **Species replacement during early secondary succession: the abrupt decline of a winter annual**. Ecology 78(2): 621-631.
- ☐ Lertzman, Ken; Spies, Tom; Swanson, Fred. 1997. **From ecosystem dynamics to ecosystem management**. In: Schoonmaker, Peter K.; von Hagen, Bettina; Wolf, Edward C., eds. The rain forests of home: profile of a North American bioregion. Washington, DC: Island Press: 361-382.
- ☐ Rose, Coulter R.; Muir, Patricia S. 1997. **Green-tree retention: consequences for timber production in forests of the western Cascades, Oregon**. Ecological Applications 71(1): 209-217.
- ☐ Shirazi, A.M.; Muir, Patricia S.; McCune, Bruce. 1996. **Environmental factors influencing the distribution of the lichens Lobaria oregana and L. pulmonaria**. The Bryologist 99(1): 12-18.
- ☐ Wallin, David O.; Swanson, Frederick J.; Marks, Barbara; Cissel, John H.; Kertis, Jane. 1996. **Comparison of managed and pre-settlement landscape dynamics in forests of the Pacific Northwest, USA**. Forest Ecology and Management 85: 291-309.
- ☐ Wemple, Beverley C.; Jones, Julia A.; Grant, Gordon E. 1996. **Channel network extension by logging roads in two basins, western Cascades, Oregon**. Water Resources Bulletin. 32(6): 1195-1207.

CASCADE CENTER PROJECT SUMMARIES (one-page descriptions of key Cascade Center projects)

- ☐ Cascade Center: Purpose, roles, distinguishing features. 1996.
- ☐ The Young Stand Thinning And Diversity Study: Managing for diversity. 1996.
- ☐ Very Young Stand Managment: An adaptive management case study. 1996.
- ☐ Long-term Ecosystem Productivity: Integrated research site. 1996.
- ☐ Blue River Landscape Project: Testing an alternative approach. 1997
- ☐ The Northern Spotted Owl: Central Cascades demography study. 1997.