

## Study

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In the Pacific Northwest are  
many of our Northwest tree  
species still poorly understood. A  
study was established in 1947 in  
a Research Natural Area at the  
Northwestern Washington. The age  
is a valuable source of data on  
old-growth forest. The forest  
includes *Pseudotsuga menziesii*) and western  
hemlock (86% of the volume. The  
Pacific silver fir (*Abies amabilis*),  
*Thuja procera*), western redcedar  
(*Juniperus monticola*), and Pacific yew  
distributed from 335 to 610 m in  
elevation between western hemlock/  
fir/salal plant associations.  
University of Washington, Oregon  
Forest Service are collaborating on  
growth and mortality on the 48.6-  
ha study summaries were prepared  
at 36-year intervals on a subset  
of the study. Primary emphasis  
will be on the understory trees,  
as well as all deadwood. The  
results will be helpful in  
understanding dynamics that occur in our

# Old-Growth Reference Stand Network in the Pacific Northwest: Recording Long-Term Ecosystem Dynamics

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Researchers in many regions increasingly recognize the central  
role of long-term studies in predicting the functioning of an old-  
growth ecosystem and its community dynamics. Subtle, complex,  
or gradual forest processes may be noticeable only in terms of de-  
cades or centuries and cannot be properly addressed in the typical  
2-3 year study. Also, random or catastrophic events occur unpre-  
dictably, frustrating researchers whose lack of base-line data se-  
verely limits their description of ecosystem response to such events.  
Temporal dynamics can only be fully addressed by observing spe-  
cific stands over time. Such concerns prompted the U.S. Forest Ser-  
vice to establish an extensive network of unmapped, one-acre plots  
in many Pacific Northwest forest types during the early part of the  
twentieth century. Although some have been harvested, the re-  
maining plots are extremely valuable sources of data due to their  
long record and diverse habitat locations.

There has been an increasing demand for data containing infor-  
mation about spatial patterning in forests and the role of standing  
dead and down woody material. This prompted the Pacific North-  
west Experiment Station of the U.S. Forest Service to begin estab-  
lishing permanent plots in various old-growth forests throughout  
the region in 1971. Termed *reference stands*, they represent a baseline  
data set of many types of old-growth forests that occur in the Pacific  
Northwest. Generally one ha in area, the stands are mapped and  
diameters measured for all trees above 15 cm (or 5 cm in intensive  
plots), as well as all standing dead and down logs. A subset of  
trees is measured for height, diameter, and volume for use in a  
regional data bank. Mortality is periodically checked (usually an-  
nually for the first 10 years and every 5-6 years after that); stand  
remeasurement and mapping of new trees is done every 5-6 years.  
The H. J. Andrews Experimental Forest in the central Oregon Cas-  
cades is the site of 27 reference stands. Mount Rainier National Park  
has another 16. An additional 33, scattered through the Coast Range  
and Cascade Mountains of Washington and Oregon, represent over

50 different old-growth forest types or plant associations. Recently, reference stands have been established outside the region in six mid-montane forests of the Sierra Nevadas in Sequoia National Park, and in the Rocky Mountain subalpine forests of Colorado and Wyoming.

Permanent study plots are not unique to the Northwest, but the thoroughness and dedication with which our reference stand system is managed make it a model for long-term research in all forested areas. Long-term records from permanent plots will prove to be invaluable sources of information in the future for monitoring regional climatic shifts as well as local patterns of ecosystem dynamics in our old-growth forests.

### Washington

#### Microclimatic Pattern and Basic Biological Responses at the Clearcut Edges of Old-Growth Douglas-fir Stands

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During the last several decades, the forest landscape in the Pacific Northwest has been highly fragmented with progressive and consistent clearcuttings. One of the most obvious and important features of this landscape is forest edges formed between land of different ecosystems. There are unique ecosystem composition, structure, and function at these edges, the so-called *edge effects*. Expanded knowledge of edge effects is needed to predict impacts of forest fragmentation on ecosystems and landscapes, and to develop guidelines for management of biological diversity. Microclimatic patterns and associated biological features have been under study along edges of mature and old-growth Douglas-fir (*Pseudotsuga menziesii*) forests in the Pacific Northwest since 1988. Preliminary results are presented here.

This study has focused on forest edges adjacent to recent clearcuts. Edge exposure (orientation) is a primary variable. At each edge, portable weather stations and sampling plots are established at seven points along a transect extending from a clearcut to the interior (240 m) of the forest during summer and early fall. Temperature and moisture content of air and soil, wind speed, and short-wave radiation are monitored. Tree growth, regeneration, mortality, and stem distribution are measured on the sample plots. Twenty different

edges were studied during Andrews (OR) and Wind

Air temperature, relatively very sensitive to distance and daily macroclimate. To interior forest level. However, edge width may exceed case of a hot, windy day. Meters on cool, cloudy day. A relatively narrow edge oscillations in soil conditions air temperature and moisture influenced by forest structure the cutting boundary. The and east-facing edges (12 (30 to 60 m).

Biological variables more sensitive to distance than the differences are obvious within tree-growth rates and a western hemlock (*Tsuga*) and reduced regeneration

Data collection is continuing developing computer model in an ecosystem and landscape completed in 1991.

#### Process Based Attribute Old-Growth Forest Comparison

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The Old-Growth Definition Research Note PNW Douglas-fir and mixed-conifer primary elements of the composition and forest growth are necessary to of the U.S. Forest Service community attributes utilized are the result of ecological may be utilized to describe