Franklin, Jerry F. 1968.

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H. J. Andrews Experimental Forest

Nomination as an IBP Study Area

Outline of Criteria

1432

I. Characteristics

A. 15,000 acres in Lookout Creek drainage; surrounded by National Forest lands.

Six gaged watersheds -- 40-250 acres.

Two 25-acre gaged watersheds nearby.

Two large (15,000- and 7,000-acre) watersheds--Lookout Creek and upper Blue River.

B. Three major vegetative (life) zones based on climax forest types: (1) *Tsuga heterophylla* Zone; (2) *Abies amabilis* Zone; (3) *Tsuga mertensiana* Zone.

Tsuga heterophylla Zone

Elevation of zone from lowest part of Lookout Creek (1,350 feet) to about 3,500 feet. Major cover type *Pseudotsuga menziesii* with varying mixture of western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*). Major age class 350 to 450 years but with considerable acreage of 125 to 175 years. Approximately 20 percent of this zone has been clearcut in small blocks which range in age from 0 to 16 years. Several large blocks (7,100 acres) of completely virgin.

Full range of habitat and community types typical of the zone from very dry with Douglas-fir the predicted climax (*Pseudotsuga/Corylus comuta* Association) to riparian herb- and fern-rich communities with hemlock and cedar the climax (*Tsuga-Thuja/Polystichum-Oxalis* Association). Other important associations are *Tsuga/Acer circinatum-Gaultheria shallon, Tsuga/Rhododendron macrophyllum-Gaultheria, Tsuga/Coptis laciniata,* the latter probably the zonal climax. Small components of sugar pine (*Pinus lambertiana*), incense cedar (*Libocedrus decurrens*), red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), and grand fir (*Abies grandis*) mainly confined to specific habitat.

Abies amabilis Zone

Elevation of zone 3,500 to 5,000 feet. Major cover type a mixed-conifer stand of Pacific silver fir (*Abies amabilis*), noble fir (*Abies procera*), Douglas-fir, western hemlock, and western white pine (*Pinus monticola*). Age class as in the *T. heterophylla* Zone. Cutover areas 0 to 14 years old. Several large blocks completely virgin.

Range of habitat and community types typical of the zone from dry *Abies amabilis/Xerophyllum tenax* Association on lithosols to very wet *Abies amabilis/Oplopanax horridum*. Other important associations include *A. amabilis/Vaccinium ovalifolium* and *A. amabilis/Achlys triphylla*. Several seasonal ponds supporting aquatic life. Extensive acreages of *Acer circinatum*/talus and *Alnus sinuata*/snowslide communities, widespread and important northwestern non-forest communities.

Tsuga mertensiana Zone

Intermittently represented zone on the high ridges and and peaks at 5,000 to 5,350 feet (highest point in watershed). Major species mountain hemlock (*Tsuga mertensiana*), Pacific silver fir, noble fir, Alaska-cedar (*Chamaecyparis nootkatensis*), and subalpine fir (*Abies lasiocarpa*). No cutover areas. Innumerable rock outcrop habitats and subalpine meadow areas. Most important forest association *Tsuga mertensiana/Xerophyllum tenax* Association.

Cutthroat and rainbow trout, deer, and a small herd of elk are common in the area. Some beaver, coyote, bobcat, and an occasional cougar have been seen. A new reservoir being constructed by the Corps of Engineers will back up Blue River to the lower boundary of the Experimental Forest.

C. The H. J. Andrews Experimental Forest is representative of a wide area, environmentally and vegetationally very typical of a large part of the western Oregon and Washington conifer forests. As will be pointed out later, the geology, soils, climate, and topography are representative of the western slopes of the Cascade Range. Comparison of the plant communities with those in the Coast Ranges and other parts of the Cascade Range show the same spectrum of community types (e.g., physiognomy of entire community) and similar composition.

D. The Experimental Forest had no roads or other developments before 1948, only a few ridge trails to forest fire lookouts. Beginning in 1950, about 1 percent of the area has been cut each year. There are now about 40 miles of road giving good access to the entire area and 3,000 acres of clearcuts of various sizes from 5 to 250 acres and 0 to 16 years of age. All aspects and slopes are represented. Records of activities on the area have been kept by the Forest Service.

The adjacent area of upper Blue River was the Willamette Basin Snow Laboratory from 1947 through 1952.

Some areas of the Experimental Forest were burned by wild fires resulting in younger timber from 60 to 125 years of age. Since the area has been opened by roads, the clearcut units have been burned to reduce fire hazard. Protection has limited fires to a few small areas.

Human influences in the area have been controlled by the Pacific Northwest Forest and Range Experiment Station to accomplish given research objectives.

E. The Experimental Forest is administered by the U.S. Forest Service for research purposes. Activities can be directed as requested or necessitated by the IBP provided they do not conflict with the research program of the Experiment Station. Forest Service administration assures continuity and the control needed.

II. Attributes favorable for study

A. Meteorology

Climate is primarily maritime as influenced by the Cascade Range to the east.

Precipitation records since 1952 average 94 inches annually, about 90 percent of which falls from October through April. Evapotranspiration averages near 21 inches annually. Extremes of temperature are rare.

At lower elevations, snow seldom accumulates to an all winter snowpack. At elevations above 3,000 feet, snowpack may exceed 3 or 4 feet.

Temperature and relative humidity records have been maintained since 1957.

Long-term records (40 years) for the general area are available from the nearby U.S. Weather Bureau Station (McKenzie Bridge) #5362.

B. Hydrology

Ten tributary streams are currently gaged. The earliest were started in 1950 and 1952. Annual streamflow is about 65 percent of the precipitation and follows the same seasonal pattern, high flows in winter months, base flow during the summer. The main streams and major tributaries support a native fishery of cutthroat and rainbow trout. Peak winter flows may be 1,000 times low summer flows. Except during extreme floods, water is of excellent clarity and general quality.

No ground water information is available except in the adjacent Willamette Basin Snow Laboratory.

C. Geography and topography (see guidebook)

Forty-five miles east of Eugene, Oregon.

Five miles from Blue River, Oregon.

Tributary drainage to Blue River at mile 7.6 which joins the McKenzie River at mile 57.0.

Lookout Creek is a headwaters drainage within the Western Cascades Province. Narrow bottom lands have formed along the lower part of Lookout Creek. Topography is geologically mature with well developed drainage system and sharp ridges. The upper end of the drainage has more gentle, glacial type topography.

D. Geology and geochemistry

Most of the area is in the Western Cascades Province with portions of the upper ridges in the High Cascades Province. Geology of the area is described by Peck of USGS. Some current stratigraphic work is being done by the University of Oregon and mineralogical study by Oregon State University.

The two major formations are the Sardine and Cascade Andesite Series. All rock formations are of volcanic origin with tuffs, breccias and basalts predominating in lower elevations and cascade andesites on the ridges.

E. Soils

A soils map has been prepared for the entire drainage. More detailed mapping and characterization has been done in small experimental watersheds. The major soil groups are Brown Podzolics and Reddish-Brown Lateritics. Deep colluvial soils are common.

F. Physical and chemical limnology

Current and continuing studies are being conducted to determine chemical and physical qualities of the water: sediment, dissolved chemicals, temperature.

The area contains numerous all-year streams and a few small ponds. A new reservoir under construction downstream from the entrance to the Experimental Forest will be filled in 1969.

There are no anadromous fish in the drainage, but native cutthroat, rainbow, sculpin, etc., are residents.

G. Biotic systems

Reconnaissance phase of a study of plant communities, their structure, and dynamics and relation to environment is in progress [illegible] in communities of entire area.

Successional studies beginning with virgin communities following changes after logging began in 1962. Annual inventory of changes continuing.

Studies of relation of small mammals and birds to vegetational and yearly changes completed in 1966 after 10 years.

Fish population studies were conducted for several years by the Oregon Cooperative Wildlife Research Unit (OSU).

III. Prior research

A. Check list of vascular plant species has been prepared for the forest. About 300 vascular plants out of an expected total of 500 are included in the list. Work is continuing and a complete flora will probably be available in 2 years.

Northwestern taxonomic references provide adequate keys for the entire biotic spectrum excepting some gaps in insect and fungal coverage. Coverage of vascular plants and higher animals excellent.

B. Local specialists on all major biotic groups and many of the minor (e.g., subterranean fungi and aquatic insects) are available at Oregon State University (80 miles) and University of Oregon (40 miles). For some groups (e.g., vascular plants, mosses and lichens, and mammals) personnel presently working on the area can function as specialists.

C. Plant and animal reference collections (not all restricted to H. J. Andrews but including all taxons on the area) are available at OSU and U of O.

Small working herbarium maintained at the Experimental Forest headquarters.

D. No paleoecological work has been done in the H. J. Andrews but work of Hansen (some) on pollen stratigraphy and Peck of fossil biota in Western Cascades applies.

E. Successional studies of plant communities. Completed and in progress, provide extensive data of vegetational population histories.

Unparalleled 10-year population studies of small mammals under virgin and under cutover conditions were completed in 1966.

Studies of fish populations have been conducted.

Study of development of deer population with opening of virgin drainage was conducted.

F. Standard forestry-type inventory and yield data are available. Production rates and biomass information oriented towards timber yield (site index, wood volume production).

IV. Physical facilities

Small field laboratory at Blue River (5 miles from H. J. Andrews Experimental Forest) equiped primarily for preparation and preliminary analysis of soil, water, and plant samples.

Electricity	Balances	Soil samplers
Hot & cold water	Calculators	Cameras
Vacuum	Hood	pH meters
Ovens	Glassware	Etc.

Laboratory, libraries, computer services at:

University of Oregon	40 miles
Oregon State University	80 miles

Field installations

Precipitation - 2 recording gages, 10 standard and storage gages.

2 snow courses.

Soil moisture - 10 sampling points--neutron scattering.

Temperature and humidity - at climatic station.

Water - 10 streamflow installations with continuous recorders, 6 continuous water temperature recorders plus maximum-minimum thermometers.

Solar radiation - Kipp and Zonen radiometer (not installed currently).

Chemical measurements of streamflow and precipitation - periodic as part of nutrient cycling study.

Photographic records of vegetation, human activities, catastrophic events, etc.

Numerous vegetation plots with long-term records.

Good roads provide access to all areas by car. Bus transportation to Blue River. Air and train travel to Eugene and Corvallis.

Motels available in the Blue River-McKenzie Bridge area along the McKenzie River (5-10 miles).

A number of Forest Service campgrounds within easy driving distance.

V. Personnel

A. Scientific staff

U.S. Forest Service people here a major share of the time.

C. T. Dyrness - soil scientist, ecologist (Ph.D.)
Jerry F. Franklin - plant ecologist (Ph.D.)
R. L. Fredriksen - water chemistry and nutrient cycling (M.S.)

Jack Rothacher - forest hydrologist (M.F.)

Other USFS people working here occasionally
Jay S. Gashwiler - fish and wildlife biologist
James Trappe - mycologist (Ph.D.)
Richard Williamson - silviculturist, mensurationist (M.F.)

Others
George Brown - hydrologist, OSU (Ph.D.)
Alan Kays - geologist, U of O (Ph.D.)
Ellis Knox - soil classification, OSU (Ph.D.)
C. T. Youngberg - soil fertility, OSU (Ph.D.)
Richard Waring - plant physiology, OSU (Ph.D.)
Arthur Wollum - soil scientist, OSU (Ph.D.)

Bibliography attached.

B. Supporting staff
Technical help - one technician in Corvallis, two technicians at Blue River

Graduate students at both OSU and U of O work on area.

Research administration by Pacific Northwest Forest and Range Experiment Station.

Road maintenance, timber sales, fire control, etc., by Blue River District.

Photographer available for special projects.

VI. Financial background

Major source of research funds from regular budgets of Pacific Northwest Forest and Range Experiment Station (approximately $50,000).

Cooperative grants to OSU and U of O from Pacific Northwest Forest and Range Experiment Station.

Other sources:
Fish and Wildlife Service
U.S. Geological Survey
U.S. Forest Service administrative funds from Willamette National Forest--road maintenance, reforestation, wildlife habitat improvement, etc.

Administration and maintenance currently primarily USFS funds.

VII. Current research on H.

Streamflow and water temperature.

Effects of harvesting methods on streamflow.

Effects of harvesting methods on stream sedimentation.

Douglas-fir soil moisture use.

Effects of logging on chemical quality of water.

Plant succession following logging and slash burning.

Logging disturbance to the soil.

Physical, chemical and hydrologic characteristics of soils.

Changes in stream characteristics following shelterwood logging.

Grass-legume mixtures for soil stabilization along forest roads.

Soil moisture relationships during re-establishment of Douglas-fir forest.

Identification and preliminary characterization of habitat-types occurring within the H. J. Andrews Experimental Forest.

Mineralogy of soils derived from tuffs and breccias in the Western Cascades of Oregon.

Nutrient cycle of a small watershed in the Douglas-fir region.

Rodent populations and tree seed use.

VIII. Bibliography of publications resulting from research at H. J. Andrews Experimental Forest

PUBLICATIONS RESULTING FROM RESEARCH

AT

H. J. ANDREWS EXPERIMENTAL FOREST

1. 1950 Ruth, Robert H., and Silen, Roy R. Suggestions for getting more forestry in the logging plan. Res. Note 72, 15 pp.

2. 1952 Silen, Roy R. Timing of slash burning with the seed crop--a case history. Res. Note 81, 2 pp.

3. 1953 Silen, Roy R., and Gratkowski, H. J. An estimate of the amount of road in the staggered-setting system of clearcutting. Res. Note 92, 3 pp.

4. 1954 Wustenberg, Donald William. A preliminary study of the influences of controlled logging on a trout stream in the H. J. Andrews Experimental Forest, Oregon. O.S.C. Thesis.

5. 1954 Tarrant, Robert F. Effect of slash burning on soil pH. Res. Note 102, 5 pp.

6. 1955 Silen, Roy R. More efficient road patterns for a Douglas-fir drainage. The Timberman, April, 4 pp.

7. 1955 Tarrant, Robert F., and Wright, Ernest. Growth of Douglas-fir seedlings after slash burning. Res. Note 115, 3 pp.

8. 1956 Gratkowski, H. J. Windthrow around staggered-settings in old-growth Douglas-fir. Forest Sci. 2(1):60-74.

9. 1956 Silen, Roy R. Use of temperature pellets in regeneration research. J. Forest. 54(5):311-312.

10. 1956a Tarrant, Robert F. Effect of slash burning on some physical soil properties. Forest Sci. 2(1):18-22.

11. 1956b Tarrant, Robert F. Effects of slash burning on some soils of the Douglas-fir region. Soil Sci. Soc. Amer. Proc. 20(3):408-411.

12. 1957 Carow, John, and Ruth, Robert H. In logging old-growth Douglas-fir mobile yarder shows promise in salvage. The Timberman, Sept., 5 pp.

13. 1957 Carow, John, and Silen, Roy R. Using the staggered-setting system, what are logging costs? The Timberman, April, 5 pp.

14. 1957 The Timberman. Can there be orderly harvest of old growth? March, 5 pp.

15. 1958 Berntsen, Carl M. A test planting of 2-0 and 3-0 Douglas-fir trees on a steep south slope. Res. Note 165, 4 pp.

16. 1958 Yerkes, Vern P. Successional trends of lesser vegetation following clearcutting in old-growth Douglas-fir stands. O.S.C. Thesis.

17. 1959 Carow, John. Yarding and loading costs for salvaging in old-growth Douglas-fir with a mobile high-lead yarder. Pac. NW. Forest & Range Exp. Sta., Res. Paper 32, 26 pp., illus.

18. 1959 Gashwiler, Jay S. Small mammal study in west-central Oregon. J. Mammal., Feb., 11 pp.

19. 1959 Rothacher, Jack. Debris down the drainage. The Timberman, May 29, 2 pp.

20. 1959 Wyatt, Bruce. Observations on the movements and reproduction of the Cascade form of cut throat trout. O.S.C. Thesis.

21. 1959 U.S. Forest Service. A look at research and multiple-use management on the H. J. Andrews Experimental Forest located on the Willamette National Forest.

22. 1959 Berntsen, Carl M., and Rothacher, Jack. A guide to the H. J. Andrews Experimental Forest, Pac. NW. Forest & Range Exp. Sta. Pamphlet, 21 pp., illus.

23. 1959 Dealy, John Edward. The influence of logging practices on Columbian black-tailed deer in the Blue River area of Oregon. M.S. Thesis, O.S.U.

24. 1960 Yerkes, Vern P. Occurrence of shrubs and herbaceous vegetation. Pac. NW. Forest & Range Exp. Sta., Res. Paper 34.

25. 1960 Silen, Roy R. Lethal surface temperatures and their interpretation for Douglas-fir. Ph.D. Thesis, O.S.U.

26. 1960 Rothacher, Jack. Some characteristics of streamflow from small watersheds in the Douglas-fir type. Paper presented at Hydrology Section, A.G.U., Moscow, Idaho.

27. 1961 Franklin, Jerry F. A guide to seedling identification for 25 conifers of the Pacific Northwest. Pac. NW. Forest & Range Exp. Sta., 65 pp., illus.

28. 1961 Gashwiler, Jay S. Notes on the Harlequin Duck. The Murrelet 42(1).

29. 1962 Franklin, Jerry F. Corkbark fir for Christmas trees. Amer. Christmas Tree Growers' J. 6(1):6,58,60, illus.

30. 1962 Franklin, Jerry F., and Rothacher, Jack S. Are your seedlings being buried? Tree Planters' Notes 51:7-9, illus.

31. 1962 Franklin, Jerry F. Natural regeneration of some modified staggered setting clearcuts in the western Oregon Cascades. Northwest Sci. 36:19. (Abstract of talk).

32. 1962 Forest Industries (Ed.). Heavy-duty Wyssen gets test. Forest Ind., December.

33. 1963 Fredriksen, R. L. A case history of a mud and rock slide on an experimental watershed. Pac. NW. Forest & Range Exp. Sta., Res. Note PNW-1, 4 pp., illus.

34. 1963 Fredriksen, R. L. Sedimentation following logging road construction in a small western Oregon watershed. Federal Inter-Agency Sedimentation Conf. Proc. 1963, U.S. Dept. Agr. Misc. Pub. 970, 1965.

35. 1963 Barnett, Loyd. Storm runoff characteristics of three small watersheds in western Oregon. M.S. Thesis, Colo. State Univ., 84 pp., illus.

36. 1963 Franklin, Jerry F. Natural regeneration of Douglas-fir and associated species using modified clear-cutting systems in the Oregon Cascades. U.S. Forest Serv., Res. Paper PNW3, 14 pp., illus.

37. 1963 Gashwiler, Jay S. Pouch capacity of Cooper's Chipmunks. The Murrelet 44(1).

38. 1964 Rothacher, Jack, and Franklin, Jerry. Fertilizer pellets improve growth on planted Douglas-fir on an unfavorable site. Tree Planters' Notes No. 67.

39. 1965 Rothacher, Jack. Streamflow from small watersheds on the western slope of the Cascade Range of Oregon. Water Resources Res., First Quarter.

40. 1965 Dyrness, C. T. Soil surface condition following tractor and high-lead logging in the Oregon Cascades. J. Forest. 63(4).

41. 1965 Gashwiler, Jay S. Longevity and home range of a Townsend Chipmunk. J. Mammal. 46(4):693.

42. 1965 Fredriksen, R. L. Christmas storm damage on the H. J. Andrews Experimental Forest. U.S. Forest Serv., Res. Note PNW-29, 11 pp., illus.

43. 1965 Rothacher, Jack. Effect of Christmas 1964 and January 1965 storms on sediment concentrations and streamflow of an experimental area. Report of meeting on Erosion and Sedimentation. 1964-65 Flood Season, sponsored by Water Supply & Water Pollution Control Subcommittee, Columbia Basin Inter-Agency Committee, April 29.

44. 1965 Gashwiler, Jay S. Tree seed abundance vs. deer mouse populations in Douglas-fir clearcuts. Div. of Forest-Wildlife Management. Soc. Amer. Forest. Proc.

45. 1965 Dyrness, C. T. The effect of logging and slash burning on understory vegetation in the H. J. Andrews Experimental Forest. U.S. Forest Service, Res. Note PNW-31, 13 pp., illus.

46. 1966 Dealy, J. Edward. Spotlighting deer: potentials for management in western Oregon. U.S. Forest Serv., Res. Note PNW-32, 8 pp., illus.

47. 1966 Gashwiler, Jay S., and Lorin Ward. Western redcedar seed, a food of pine siskins. The Murrelet, Vol. 3.

48. 1967 Gashwiler, Jay S. Conifer seed survival in a westenr Oregon clearcut. Ecology 48(3) (in press).

49. 1967 Tree seed fall in west central Oregon. (In press).

50. 1967 Dyrness, C. T. Soil surface conditions following skyling logging. U.S. Forest Serv., Res. Note PNW-55, 8 pp.

51. 1967 Dyrness, C. T. Mass soil movements in the H. J. Andrews Experimental Forest. (In press).

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53. 1967 Rothacher, Jack, Fredriksen, R. L., and Dyrness, C. T. Hydrologic and related properties of three small watersheds in the Oregon Cascades. (In press).