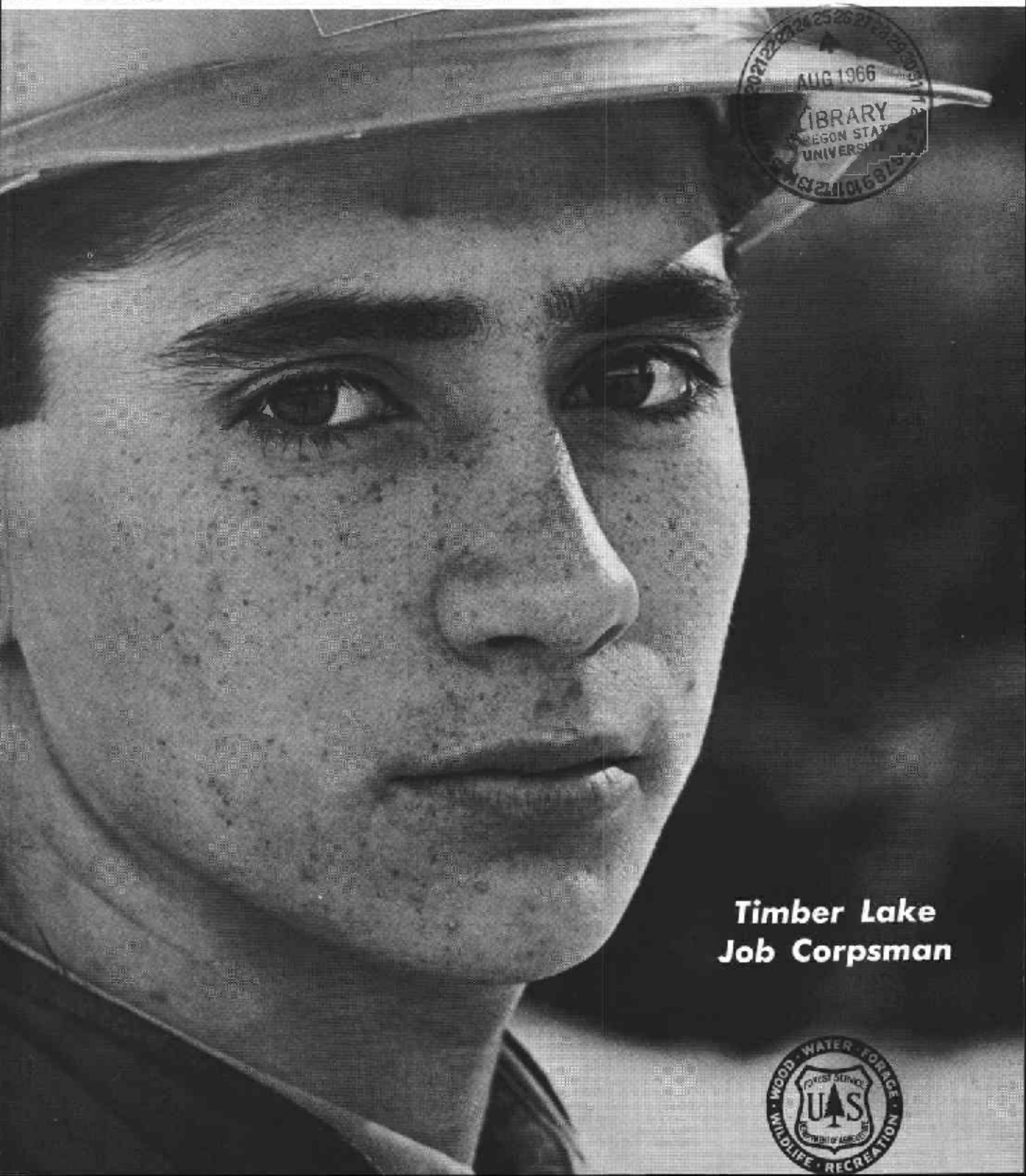




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The Sixtieth Year

**Forest Service -- 1965
In the Pacific Northwest**



**Timber Lake
Job Corpsman**



Forest Service -- 1965

In the Pacific Northwest

The National Forests

Managing and protecting
the Lands of Many Uses

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The Job Corps

"Stand straight. Look people
in the eye. Be proud."

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Cooperative Forestry

Special forest products prove
boon to small woodland owners

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Forestry Research

Research is key to meeting
greater demands on forests

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Mist-shrouded forest giants look down on a new crop of young evergreens thriving in a clear-cut area where timber was harvested a few years earlier on the Olympic National Forest.



HIGHLIGHTS OF OUR SIXTIETH YEAR

To the Public — Stockholders in the Lands of Many Uses:

The year 1965 was the 60th Anniversary of the Forest Service's founding.

In 1905, a Congress motivated by the conservation statesmanship of President Theodore Roosevelt transferred millions of acres of forests and rangelands, then known as the Forest Reserves, from the Department of the Interior to the Department of Agriculture. Under the inspiring leadership of Forest Service Chief Gifford Pinchot and Secretary of Agriculture James Wilson, the land was to be administered by the Forest Service as America's National Forest System.

For six decades, this system has flourished under the professional climate of the U. S. Department of Agriculture. The expertise here in soils, plant growth, and insect and disease control has contributed to effective multiple use management. The National Forests have become an important element in rural area development.

This is a report on the highlights of multiple use management for the year 1965 on the National Forests of the Pacific Northwest. We also are reporting on a significant contribution in cooperative forestry.

This year, the Pacific Northwest Forest and Range Experiment Station under the leadership of Director Philip A. Briegleb joins us in reporting highlights of some of the research activities of the Station's scientists.

Looking ahead, we know that the pressures on the National Forest System will be unprecedented. But the challenges will be successfully met by the fine young men of today, trained in the latest technologies and grounded in the principles of good management and good public administration.

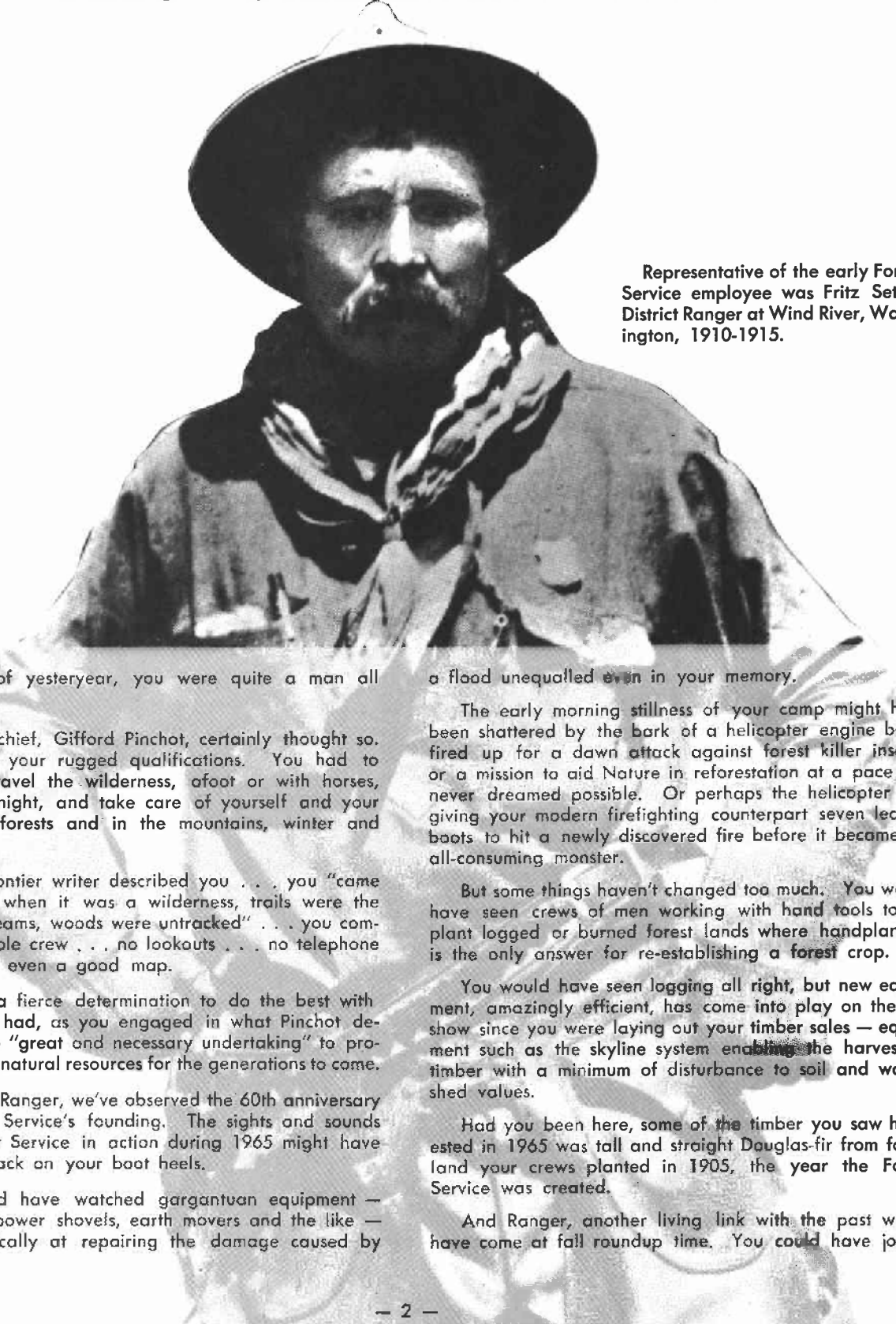
In addition to a proud tradition, we now have benefit of spectacular technological developments and the more specialized skills to assist in doing the job you expect of us in managing and protecting your National Forests — the Lands of Many Uses.

J. HERBERT STONE

Regional Forester

The Forest Service, U. S. Department of Agriculture, is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives -- as directed by Congress -- to provide increasingly greater service to a growing Nation.

The Sixtieth Year



Representative of the early Forest Service employee was Fritz Sethe, District Ranger at Wind River, Washington, 1910-1915.

Ranger of yesteryear, you were quite a man all right.

Your first chief, Gifford Pinchot, certainly thought so. He set down your rugged qualifications. You had to be able to travel the wilderness, afoot or with horses, by day and night, and take care of yourself and your stock in the forests and in the mountains, winter and summer.

As one frontier writer described you . . . you "came to the forest when it was a wilderness, trails were the rivers and streams, woods were untracked" . . . you comprised the whole crew . . . no lookouts . . . no telephone lines . . . not even a good map.

You had a fierce determination to do the best with the tools you had, as you engaged in what Pinchot described as the "great and necessary undertaking" to protect America's natural resources for the generations to come.

And now, Ranger, we've observed the 60th anniversary of the Forest Service's founding. The sights and sounds of your Forest Service in action during 1965 might have rocked you back on your boot heels.

You would have watched gargantuan equipment — dump-trucks, power shovels, earth movers and the like — work methodically at repairing the damage caused by

a flood unequalled even in your memory.

The early morning stillness of your camp might have been shattered by the bark of a helicopter engine being fired up for a dawn attack against forest killer insects, or a mission to aid Nature in reforestation at a pace you never dreamed possible. Or perhaps the helicopter was giving your modern firefighting counterpart seven league boots to hit a newly discovered fire before it became an all-consuming monster.

But some things haven't changed too much. You would have seen crews of men working with hand tools to replant logged or burned forest lands where handplanting is the only answer for re-establishing a forest crop.

You would have seen logging all right, but new equipment, amazingly efficient, has come into play on the big show since you were laying out your timber sales — equipment such as the skyline system enabling the harvest of timber with a minimum of disturbance to soil and watershed values.

Had you been here, some of the timber you saw harvested in 1965 was tall and straight Douglas-fir from forest land your crews planted in 1905, the year the Forest Service was created.

And Ranger, another living link with the past would have come at fall roundup time. You could have joined

Symbolic of the new era in Forest management and protection, Forest Service personnel are caught up in the realism of a timber wildfire simulated by sight and sound. The fire control simulator, described later in this report, is a revolutionary firefighter training device.



folks like Will Vernon down in Lake County, Oregon, whom you may remember as the young stockman just starting out in 1905 when the Service was born.

You could have been on hand, Ranger, at one of the four new Job Corps Conservation Centers opened on the National Forests of the Pacific Northwest as part of President Johnson's War Against Poverty. We think you would have nodded approval at the words of one of the camp directors, himself a career Forest Service man on a new and challenging assignment, as he welcomed the boys from the big city ghettos, the red clay farms, and the broken homes across the land.

"Stand straight and tall, look people in the eye, be proud," the director said. "Black . . . yellow . . . pink — we don't care what color you are, A man is a man, no matter what color he is."

Ranger, you might find it difficult to understand the talk of Forest Service men who have earned the right to use the word Doctor in front of their names. In your day, this title was reserved for the medical men you had to sometimes call upon to keep you or your saddle horses and packstock patched up. Today, the title also applies to the learned experts who are working in forest research to find the answers to problems that have plagued foresters through the years.

Equally incomprehensible to you might be the amazing machines — computers, they call them — capable of digesting thousands of bits of information. The output from this miraculous machinery of the space age is providing

invaluable assistance to today's managers and protectors of your National Forests.

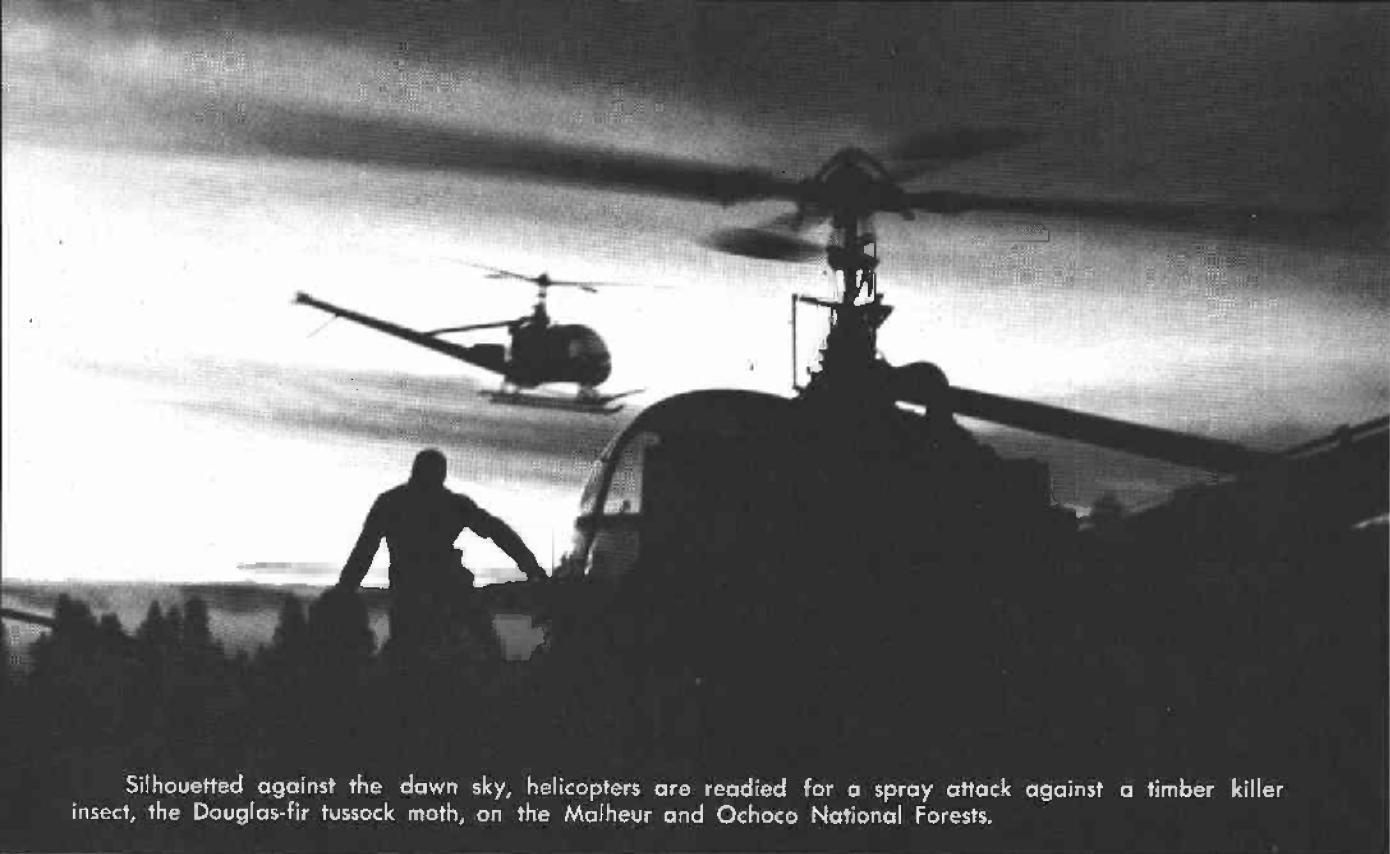
Yes, you would have seen more and more of the long familiar forest lookouts — which provided you with your "eyes" over the forest — being boarded up, perhaps forever. But it's all part of the continuing revolution in the never-ending search to do a better job of protecting your forests against fire.

And although you might have found it difficult to accept the fact that there could ever be that many people, you could readily understand the attractions that bring ever-increasing thousands of families to your National Forests. After all, they are only discovering the secrets you knew from the beginning.

This was your Forest Service in 1965, Ranger. Many of the happenings would have amazed you, but we like to think that the people who are doing the job today are carrying on the proud heritage you helped to found.

Remember Gifford Pinchot's words " . . . no one in the whole history of Government administration, I am certain, has ever had a finer collection of men to work with than I had. They were simply superb."

It is to you, Ranger, that we dedicate this words-and-pictures report highlighting the accomplishments of your modern-day counterparts in the Pacific Northwest Region during this — the 60th Anniversary Year of the United States Forest Service.



Silhouetted against the dawn sky, helicopters are readied for a spray attack against a timber killer insect, the Douglas-fir tussock moth, on the Malheur and Ochoco National Forests.

Managing and Protecting the Lands of Many Uses

Flood Damage Repair was Major Effort

The year of 1965 — 60th anniversary of the Forest Service's founding — began with the National Forests of the Pacific Northwest reeling from one of the worst flood disasters in the history of the West.

An awesome combination of heavy snowpack, followed by warm temperatures and torrential rains, spawned the

flood which caused an estimated \$14.5 million in damages to Pacific Northwest Forests. Most of destruction during Christmas week, 1964, was to forests in Oregon, especially the Mount Hood, Willamette, Umpqua and Siskiyou. Additional flooding, on a lesser scale, hit several National Forests in Washington during January, adding to the massive restoration task.

To help meet the challenge, the Region's annual engineering workload increased by 15 percent and the contracting activities showed a 25 percent increase, with much of the extra effort concentrated within the period of a few weeks.

A total of \$5.9 million was spent toward the restoration of flood damaged transportation facilities during the year. The rebuilding job in 1965 involved 2,389 miles of Forest roads, 43 bridges, 256 miles of trail, and four trail bridges.

This distinctively-shaped Forest Service sign became part of the decor in Portland's Multnomah Building lobby late in 1965. Upstairs, the old hotel had been transformed into a modern office facility occupied by the Forest Service's Regional Office and other federal agencies.



National Forest Timber Cut and Sold Pacific Northwest Region, 1964 - 1965

		Volume, Board Feet	Value
Harvested	1965 —	5,419,569,000	\$109,475,722
	1964 —	5,021,415,000	\$ 91,871,824
Sold	1965 —	4,475,085,000	\$122,011,511
	1964 —	4,351,960,000	\$104,545,898



Skyline logging, such as in this timber sale on the Willamette National Forest, allows timber to be harvested with a minimum of disturbance to watershed values. Suspended from a radio-controlled carriage, logs are carried aloft along the skyline, instead of being dragged on the ground to the landing. The technique is particularly valuable on steep terrain.

Record Timber Harvest

Critical log shortages were foreseen because of the flood-shattered Forest transportation systems, but quick restoration of key access routes made it possible for loggers operating on Pacific Northwest National Forests to have their biggest year in history.

Timber harvested from the National Forests reached an all-time high of 5.4 billion board feet, valued at \$109.4 million, compared with the previous record of 5.02 billion board feet, valued at \$91.8 million, harvested in 1964.

The Pacific Northwest Region's annual sustained-yield allowable cut is 4.311 billion board feet. Since harvest volumes are averaged out over a period of years, the higher harvest figure for 1965 does not violate the sustained-yield principle.

Volume of timber auctioned from Northwest National Forests in 1965 totalled 4.4 billion board feet with a value of \$122 million, compared with a total of 4.3 billion board feet valued at \$104.5 million sold from the Forests in 1964.

During the 1964-65 reforestation season, meanwhile, more than 20 million seedlings were handplanted on 56,431 acres of Pacific Northwest National Forest land. Also, 8,970 acres were seeded with 10,060 pounds of seed.

Logs on this truck were commercially thinned from a stand of timber hand-planted on the Mount Hood National Forest around 1905, the year the Forest Service was established.





In a scene typical of the restoration following one of the biggest flood disasters in the West, heavy equipment works at rebuilding a washed-out highway and clearing the channel on the Collawash River, Mount Hood National Forest.

Transportation Improvements

In addition to restoration of flood-damaged roads and bridges, work went ahead on other Forest access projects. A total of 1,520 miles of new road and 28 bridges were completed, representing an investment value of \$41.8 million. Also, 973 miles of road was reconstructed at a cost of \$9.7 million. Most of the new construction and reconstruction was accomplished by National Forest timber purchasers as part of their timber sale contracts.

Lands and Rights-of-Way

In a continuing program to block up National Forest lands into more manageable units, the Region worked on 56 active land exchange cases in 1965. Fourteen exchanges were completed for the trade of 13,436 acres

of National Forest land for 15,538 acres owned by private owners or local governments.

Acquisition of permanent right-of-way for Forest access and multiple-use management resulted in 241 new easements for raw land right of way, 173 easements for existing road, and 146 title approvals on old right-of-way easements.

Negotiations proceeded on 25 new share-cost road agreements between the Forest Service and private timber owners. The agreements provide for sharing construction and maintenance costs and exchanging rights-of-way for a joint road system within areas of checkerboard ownership. Over the years, nearly 1,300 miles of road have been built in the Region under share-cost agreements, making 45 billion board feet of timber available for harvest.

Protecting the Forest Against Fire, Insects

Those two mortal enemies of the forest — fire and insects — were confronted and held in check during 1965 on the National Forests of the Pacific Northwest.

In Eastern Oregon, forest protectors used aerial warfare to control a major outbreak of one of the West's most feared timber killer insects — the Douglas-fir tussock moth.

And during the 1965 fire season, Regional fire crews confined a total of 1,902 forest and range fires to a total area of 3,209 acres. It was one of the best years on record, despite the fact that fire weather conditions were severe over much of the Northwest.

The tussock moth outbreak, on the Malheur and Ochoco National Forests, was controlled through the precision spraying of 65,945 acres by helicopters. DDT mixed with fuel oil was the controllant material. It achieved a tussock moth kill ranging from 93 to 100 per cent, with an overall average of 98 per cent.

A special surveillance committee of scientists from state and federal agencies monitored the forest spray project. To date, they have found no evidence of any adverse impact on fish, wildlife, livestock, or water resources. The project required 455 hours of helicopter flight time, and cost \$235,000, but the forest resources threatened with destruction were valued at \$16.5 million.

Meanwhile, the annual cooperative aerial surveys in 1965 covered 54 million acres of public and private timber lands in Oregon and Washington, and showed that 1.4 million acres were infested by insects. However, no large-scale control projects were foreseen for 1966 in order to protect timber values.

Eradication of the European pine shoot moth continued in Portland, Oregon, and new infestations were found in Christmas tree plantations outside an established pine shoot moth containment zone in Western Washington. Some infested pines were intercepted in Portland.

The Douglas-fir bark beetle, still working in the wake of the 1962 Columbus Day windstorm, killed 700 million board feet of timber on state, private, and federal land in Western Oregon during 1965. This brought the total kill to 2.6 billion board feet as a result of the storm, which provided a breeding ground for the beetle to hatch and spread to adjoining stands of green timber. Quick salvage of blowdown timber prevented this in many areas.

Although latest surveys showed that the bark beetle threat is waning, the need for continued aggressive salvage programs on the part of the Forest Service, Bureau of Land Management, and state and private timber owners was emphasized in order to recover beetle-killed timber while it is still merchantable.

The search continues for better methods of protecting forests against insects and disease. Bottles being labelled at the Corvallis Forest Sciences Laboratory, right, contain tussock moth virus, one of the biological controls which show promise for possible future widescale use.



A helicopter skims over the tree tops to apply DDT spray for the control of a timber killer insect, the Douglas-fir tussock moth, in Eastern Oregon. Trailing helicopter carries an observer who watches over the operation.



The 1965 Fire Season

Rapid and effective fire control — with more and more of the action airborne — spelled the difference in a 1965 fire season that held a potential for serious losses on the National Forests of the Pacific Northwest.

There were 1,902 fires, but they were held to a loss averaging 1.7 acres per fire, or a total of 3,209 acres.

Weatherwise, the 1965 season was critical on the west side of the Cascades in the heavy timber country where some of the greatest forest fire losses have occurred in past years. East of the Cascades, it was a different weather picture, with the season less severe than normal.

Accounting for most of the fires in 1965 were 1,135 lightning-caused blazes, 456 of which were concentrated in a four-day period, July 25 through 31. Eighty smokejumpers from Regions 1, 4 and 5 were moved into the Pacific Northwest during this peak lightning fire situation to supplement the Region's regular force of 89 jumpers.

Thanks to the availability of the smokejumpers, most of the back country fires during the July "bust" were manned within a minimum of time after discovery.

At the Region's Redmond Air Center, which completed its second season of operation, a \$92,174 contract was awarded late in 1965 for the construction of a new 25-man barracks with attached training auditorium. This will give the Air Center on-base housing for 50 jumpers, in addition to the 25-man inter-regional fire crew which can be airlifted to fight fire anywhere on the National Forests of the West.

More Aircraft Utilized

The trend toward aerial detection, with more of the traditional forest lookouts being replaced by air patrol, also was credited with helping to keep the 1965 fire loss at a low figure.

Two more Forests, the Ochoco and the Fremont, adopted a formal contract aerial detection system, joining the Mount Hood, Gifford Pinchot and Mount Baker National Forest where such systems were already in effect.

Several other Forests placed greater emphasis on aerial patrol, and of the approximately 390 lookouts usually manned on the National Forests of Oregon and Washington, some 200 were not used during 1965. Experience continued to show that the airborne "lookouts" provide a much quicker detection and a resulting speedup in initial attack. Patrol aircraft were also used to more effectively lead crews and jumpers to fires.

Monetary savings in aerial detection are also impressive. Take the Mount Hood National Forest for instance. Costs of the Mount Hood's detection system for 1965, including the contracted flight line, salaries of observers, and maintenance of the five lookouts still manned, totalled \$24,966. This is less than half the estimated \$59,000 it would have cost to operate the old fixed detection system of 27 lookouts.

Effective attack by aerial tankers was also rated as one of the main contributors towards the low fire losses of 1965. Nine air tankers were under contract at six

bases within the Region, and six more tankers were available for reinforcement when needed. A total of 364,600 gallons of retardant was dropped on 133 fires.

Solving a Training Dilemma

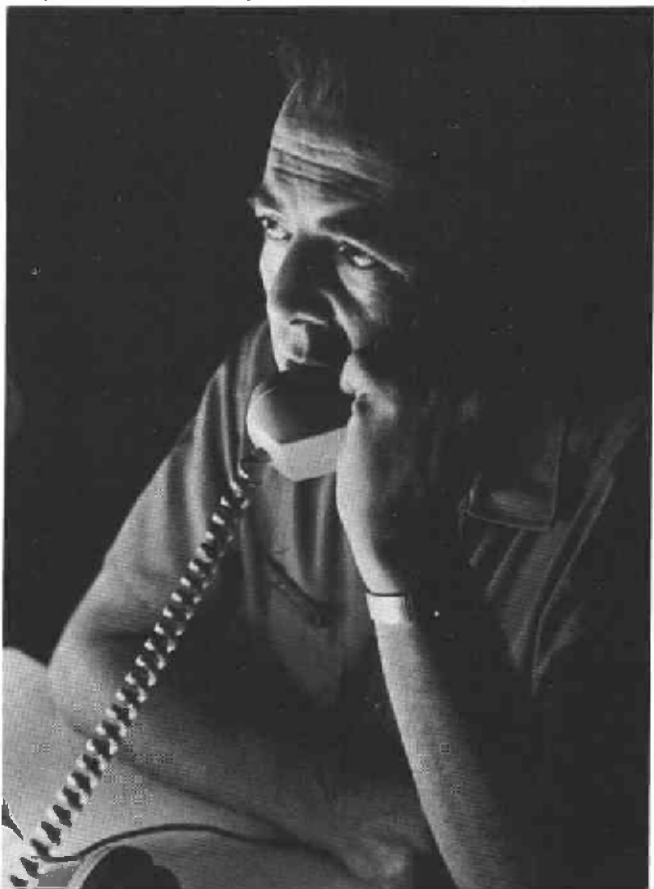
Success of fire prevention and suppression efforts during recent years has created a dilemma. There are fewer fires reaching large-scale or project proportions, and thus fewer opportunities to train and maintain the proficiency of firefighting personnel under actual conditions.

An answer to this problem is believed to have been found in a fire simulator which can create just about everything but the heat and smell of smoke for fire control trainees. The revolutionary device mechanically and electronically simulates actual fire conditions, but in a classroom.

Through the use of the simulator, supervisory fire personnel are trained to evaluate the many variables inherent in a fire situation. They are trained to make the sound organizational and tactical decisions which can mean the difference between success and failure — or even life and death — on an actual fire.

One of the Forest Service's newest fire simulators was used by the Region during November and December to train 110 men as fire bosses, plans chiefs, line bosses, and service chiefs. Further use of the simulator is scheduled for 1966.

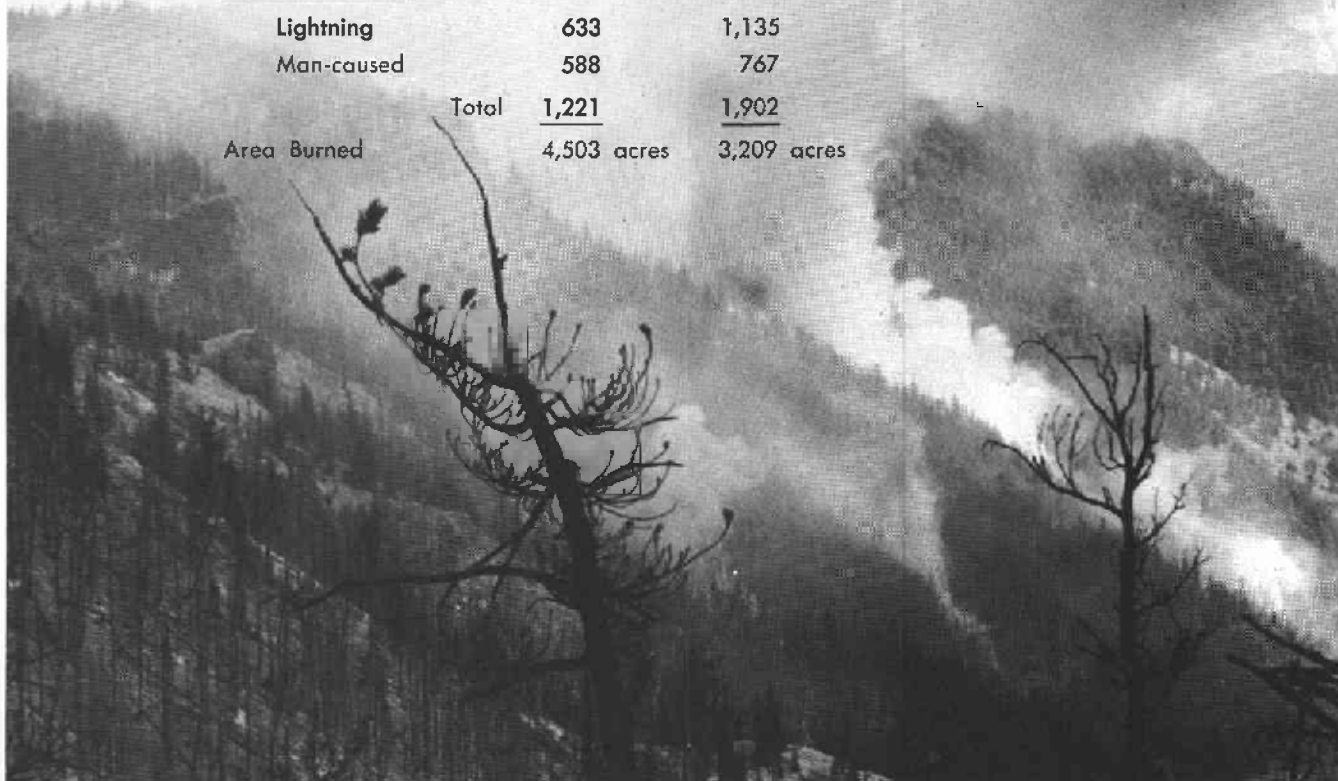
His face reflecting the realism of training under the fire control simulator, Snow Mountain District Ranger Calvin E. Weissenfluh, Ochoco National Forest, studies the screened image of the fire's progress, and relays a decision.



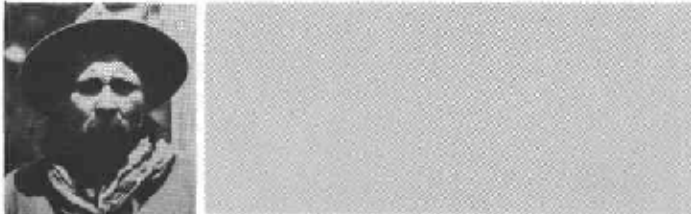
Fire Roundup

On lands protected by the Forest Service in Oregon and Washington

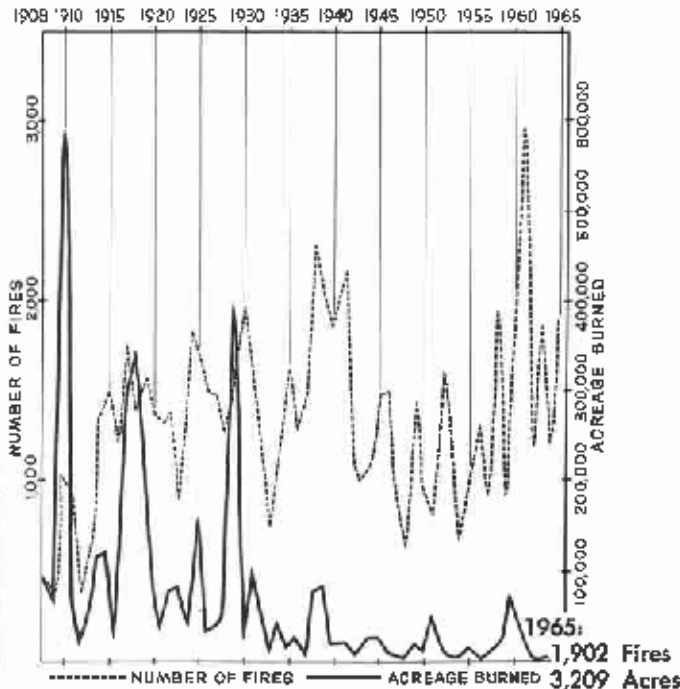
<u>Number of Fires</u>	<u>1964</u>	<u>1965</u>
Lightning	633	1,135
Man-caused	588	767
Total	<u>1,221</u>	<u>1,902</u>
Area Burned	4,503 acres	3,209 acres



Comparative fire statistics for 1964 and 1965 on Pacific Northwest National Forests are superimposed here against a view of the Union Creek Fire on the Snoqualmie National Forest. Union Creek was the most serious forest fire of 1965 in the Region. Started by lightning on July 26, the fire burned 740 acres before being brought under control on August 2. Five hundred men were on the firelines at the height of the blaze. Aircraft dropped 138,300 gallons of fire retardant to help bring the fire under control.



Increasingly effective fire suppression is shown in this graph depicting the number of fires and acreage burned on Pacific Northwest National Forests since 1908. The number of fires remains high, which isn't surprising considering the ever-increasing number of forest users, but the acreage burned shows a general downward trend.



Will Vernon, on horseback at left, and Phil Lee, Fremont National Forest, look over Vernon cattle grazing at Vernon Meadows. Vernon holds the second oldest National Forest grazing permit in the Pacific Northwest Region.



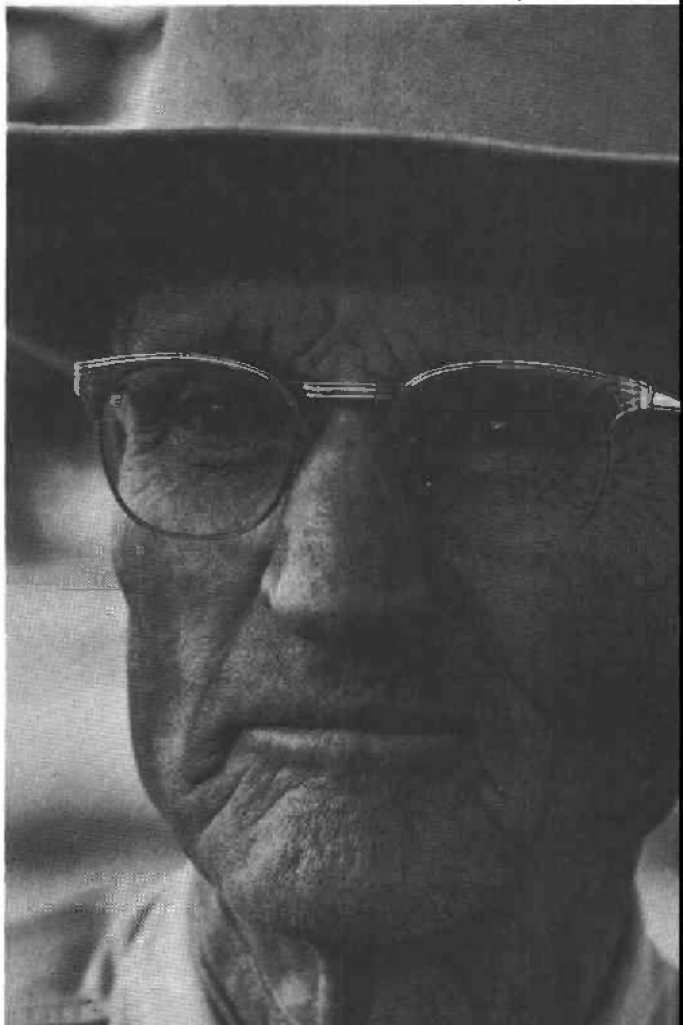
Will Vernon, now 82, still takes an active part in ranching.

Grazing is Historic National Forest Use

Will Vernon was just starting out in the cattle business when the Forest Service was created in 1905. Two years later his father, pioneer Lake County, Oregon, rancher Thomas B. Vernon, received a permit to graze cattle on the Fremont National Forest. In 1911, the permit was changed to be in Will's name.

In 1965 — 60th anniversary year of the Forest Service — cattle still grazed on the Fremont under the permit of Will Vernon, who at 82, still seemed as tough and durable as his favorite hand-braided rawhide riata.

Vernon has one of the 1,187 grazing permits in the Forest Service's Pacific Northwest Region, and his is the second oldest permit in the Region. Regional records show that the oldest permit is held by the Stearns Cattle Company,



Inc., Prineville, with grazing privileges dating back to 1906 on the Deschutes National Forest. The Vernon and Stearns permits are among 33 grazing permits in the Region, held by an individual or a family, in effect for half a century or longer.

Will and Mrs. Vernon now live in Lakeview, but he likes nothing better than to drive out regularly to the home ranch south of town and help his son, Thomas Benson (Bennie) Vernon, with chores ranging from fence mending to roping and branding.

The Vernon operation is representative of the ranches which graze stock on some 6.9 million acres of National Forest land in Oregon and Washington as one of the important, historical, and continuing uses of the National Forests in the West.

In 1965, a total of 119,249 cattle and horses, and 92,386 head of sheep grazed on the 19 National Forests and one National Grassland in Oregon and Washington. Grazing fees totalled \$237,048. Among rangeland improvements, 7,249 acres were sprayed for sagebrush control, and 9,671 acres were seeded.

The Wildlife Habitat

Wild game habitats on the National Forests in Oregon and Washington were in better than average condition in 1965. Summer game ranges continued an upward trend, due to adjustments in livestock use and new water developments to encourage better game distribution. It was also a good growing year for game forage in most areas, including winter range.

The 1964-65 winter floods, however, caused severe damage to anadromous fish habitats. Flood-caused erosion was also noted on some of the big game ranges. Restoration work, such as removing debris from migratory fish waters, will continue through 1966.

By the end of 1965, most Forests had completed comprehensive wildlife habitat management plans, drawn up in cooperation with Game Department personnel from the respective states. Completion of the jointly prepared plans was regarded as a significant step forward in state-federal cooperation toward better wildlife management on the National Forests.

State and federal wildlife management specialists continued to work cooperatively toward the solution of game problems, such as animal damage to young forest reproduction, adjustment of game harvests to coincide with the carrying capacity of ranges and determining what to do about the loss of game range caused by water impoundments.

There were two major "first" for Oregon hunters in 1965 on the National Forests. Five tags were issued by the State Game Department for the taking of mountain goats from the Eagle Cap Wilderness area, Wallowa-Whitman National Forest. And 300 tags were issued for the taking of wild turkeys on the easterly slopes of Mount Hood. It was the first time either game had been offered in Oregon.



On the National Forests, where wildlife is one of the five basic resources, state and federal technicians are working cooperatively to find the solutions to game habitat management problems such as animal damage to young forest reproduction. Below, Homer Brent, left, Washington State Game Department, and John Hughes, Olympic National Forest, inspect a Douglas-fir deformed by the browsing of deer or elk.



The Water Resource

Of all the resources associated with the National Forests, the quality and the quantity of water are of the most direct consequence to millions of persons. In the Pacific Northwest, the National Forests supply approximately 45 percent of the total water runoff, serving more than 150 cities, generating power, irrigating thirsty crop and orchard lands, and providing recreation opportunities of inestimable value.

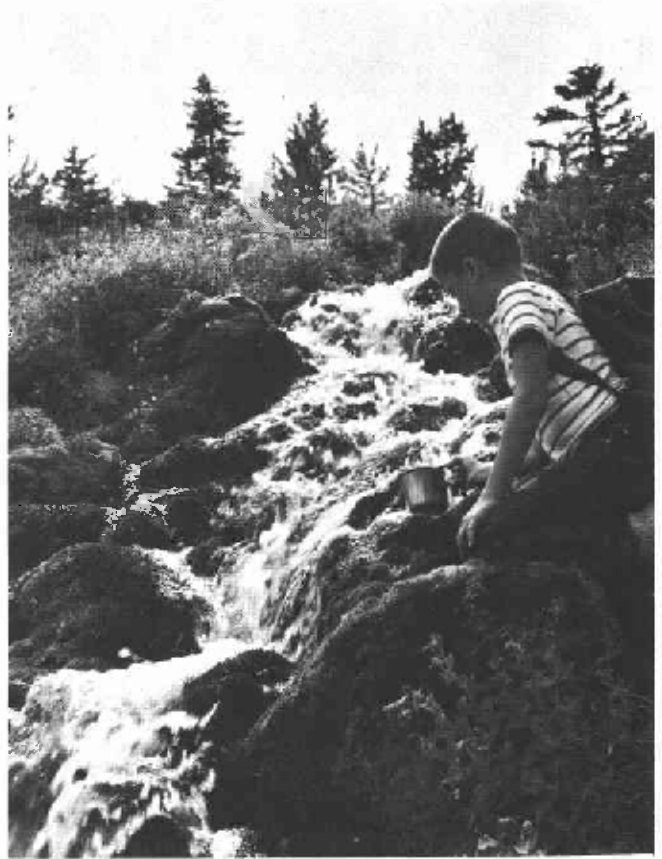
Water on the National Forests — whether it be flowing in the streams and rivers, or stored in the soil, reservoirs and lakes — must be maintained in good clean supply and the land must be protected against erosion.

To help meet this objective, Forest Service watershed management specialists during the past two years have established four "barometer" watersheds in the Northwest. Ranging in size from 50,000 to 150,000 acres, the "barometer" watersheds serve as pilot projects for evaluating and establishing watershed and multiple resource management practices. These barometer watersheds are: The Green River on the Snoqualmie National Forest; Entiat River on the Wenatchee National Forest; Clackamas River on the Mount Hood National Forest; and Umatilla River on the Umatilla National Forest. Scientific instrumentation provides the data necessary for inventory and appraisal of the soil-water-plant relationships within the watersheds.

On a broader scale, the Forest Service and other Department of Agriculture agencies are working with other federal, state, and local agencies in making major river basin studies in the Northwest. The Forest Service is concerned particularly from the standpoint of determining treatment, development, and management of National Forests to meet basin-wide needs for water and related land resource development, and also in determining the impacts of proposals by other agencies on National Forests and other forest lands.

There were outstanding examples during 1965 when close interagency cooperation minimized the impact on National Forests from such projects as transmission line construction and highway relocation. Construction was underway on the Pacific Northwest-Southwest Intertie, the giant power transmission system authorized by Congress in 1964. The lines will stretch 130 miles across two National Forests, the Deschutes and the Fremont, and the Crooked River National Grassland, enroute from the Columbia River to California. Forest Service personnel are working closely with representatives of the Bonneville Power Administration and Portland General Electric Company to facilitate construction. In this atmosphere of close coordination, impact on National Forest resources is being kept to a minimum.

Likewise, close cooperation is lessening the impact of a new transmission line system being constructed between the John Day Dam and the upper Willamette Valley. The right-of-way will cross the upper Clackamas drainage on the Mount Hood National Forest. Forest Service and BPA



Though he may not realize it yet, this thirsty young hiker at Bird Creek Meadows, Gifford Pinchot National Forest, is being introduced to the fact that water is one of the most precious of the Forest resources.

representatives evaluated five possible routings before deciding on the final location.

Another example of inter-agency cooperation involves the relocation of State Highway 220 around Mason Reservoir, now under construction on the Wallowa-Whitman National Forest, just east of Baker, Oregon. The relocated highway represents a choice of routes after combined review by the Bureau of Reclamation, National Park Service, Oregon State Highway Department, and the Forest Service.

During 1965, Congress for the first time formally recognized the financial burden placed on the Forest Service by the planning and construction of large water impoundments by other agencies or private utilities. A new Water Resource Development Related Activities Fund was created. It provides money for studying the impacts a proposed impoundment will have on multiple use management of National Forest lands, and it finances construction of public facilities in advance of the project's completion. Also, funds are provided for land and stream improvements associated with such a project. One of the first applications of the fund in the Northwest was for removal of shoreline stumps from the Detroit Reservoir on the Willamette National Forest.



North Cascades Study Completed

The 2½-year North Cascades Study, intended to help decide the future management of Washington's North Cascades Mountains, was completed in 1965 by a five-man team from the Departments of Interior and Agriculture. Continued Forest Service administration of the Glacier Peak Wilderness was one of the unanimous recommendations of the team.

Recreation on the Forests

Visitors from across the land enjoyed the National Forests of the Pacific Northwest in great numbers during 1965. It was also the year for completion of a joint study intended to help decide the future management of the North Cascade Mountains in the State of Washington.

Among the National Forest recreationists was one in particular — Secretary of Agriculture Orville L. Freeman — who found out for himself what qualifies Oregon's famous Rogue River for the high public regard it enjoys.

The North Cascades Study, 2-1/2 years in the making, embraced all of the National Forest land north of the White Pass highway. Included were the Mount Baker, Wenatchee and Snoqualmie National Forests, portions of the Okanogan and Gifford Pinchot National Forests, and Mount Rainier National Park, for a total of 6.3 million acres of federal land.

Dr. Edward C. Crafts, Director, Bureau of Outdoor Recreation, U. S. Department of Interior, was chairman of the five-man team. Two members were from the Department of Interior — Dr. Owen S. Stratton, consultant to the Interior Secretary, and George B. Hartzog, Jr., Director, National Park Service. The other two members represented the U. S. Department of Agriculture — Dr. George A. Selke, consultant to the Secretary, and Arthur W. Greeley, Deputy Chief, Forest Service.

Unanimous recommendations of the team would establish four new wilderness areas totaling 720,000 acres, enlarge the Glacier Peak Wilderness Area, provide for a small addition to Mount Rainier National Park, provide more coordinated management between the National Park and surrounding National Forest land, eliminate the "limited" status of three areas, thereby making additional timber available for commercial harvest, provide for a system of scenic roads and trails, and designate portions of the Skagit River as a wild river.

Team members failed to agree on management of the National Forest area north of Cascade Pass. Three alternatives were advanced:

1. Chairman Crafts recommended a new National Park which would include the Picket Range country, Ross Lake, and the Eldorado Peak-Stehekin Valley vicinity. Combined with this would be continued Forest Service administration of the Glacier Peak Wilderness Area; the portion of the present North Cascade Primitive Area lying east of Ross Lake, as a Wilderness Area; and the Mount Baker area with emphasis primarily for recreation, as at present.

2. Dr. Selke and Deputy Chief Greeley recommended the creation of a National Recreation Area under Forest Service administration for the Eldorado Peak-Stehekin Valley country, including Ross Lake. Combined with this would be wilderness classification for the North Cascade Primitive Area east and west of Ross Lake; and continuation of the present Glacier Peak Wilderness Area. Also, this alternative proposed continued Forest Service administration of the Mount Baker-Mount Shuksan areas, with emphasis on management for general-type recreation.

3. Dr. Stratton and Park Service Director Hartzog recommended a National Park which would include the Mount Baker-Mount Shuksan country, the Picket Range country, Ross Lake and the Eldorado Peak-Stehekin Valley vicinity. Combined with this would be Forest Service-administered wilderness for the Glacier Peak Wilderness Area and for that part of the North Cascade Primitive Area east of Ross Lake.

Secretaries Freeman and Udall said the report would be given their "careful personal attention in an effort to resolve these differences in the best public interest."

Washington's Senator Henry M. Jackson scheduled a public hearing for February, 1966, in Seattle, on the study team's report. Action by Congress would be necessary to implement any of the team's major recommendations.

Visitors Were Many

In 1964, a record 13.4 million recreational visits were counted on the National Forests in Oregon and Washington, for a 12 percent increase over the number of visitors in 1963. Due to a different reporting system, compatible with modern electronic data processing techniques, recreational visit totals for 1965 will not be available until sometime in the spring of 1966. However, it was obvious that recreation visits continued to increase in 1965, due to a long favorable spring, summer and fall, and new records were undoubtedly set in all activities.

As was the case elsewhere at federally managed recreation areas across the land, National Forest recreationists in the Northwest were confronted for the first time with the need to pay for the use of facilities designated under the new Land and Water Conservation fee system. Users had the option of a \$7 season sticker, good at any designated federal recreation area, a specific area season permit, or a single-day entry permit.

It can best be described as a shakedown year for the fee system. Total collections in the Pacific Northwest Region were \$112,626, including the sale of 10,427 stickers. This was less than the total receipts anticipated. However, the basic concept of "the user paying for facilities used and services received" was generally well accepted by visitors to National Forest sites.

Several changes are expected for the 1966 season, including a switch from the bumper sticker to a wallet-sized card which will admit its purchaser and all who accompany him in a private automobile to more than 7,000 federal recreation areas throughout the Nation. Cost will remain the same, \$7.

The Land and Water Conservation Fund Act provides authority to purchase lands needed for public recreation. In the Northwest Region, eight different areas were examined to determine whether they meet the requirements of the Act. Comprising a total of 1,945 acres, the areas include private lands within established wilderness areas,



Oregon's famed Rogue River is a river of contrasts, ranging from exciting whitewater rapids to stretches of millstream-smooth water such as that bearing Secretary of Agriculture Orville Freeman's boat in this photo at dusk on the Siskiyou National Forest. The Secretary joined a float trip down the lower Rogue River last October to see for himself how the Rogue qualifies for proposed National Wild Rivers protection under legislation pending in Congress.

ocean frontage, high country lakes, and areas of particular geographical significance. Agreement was reached with private and local government owners for the purchase of 260 acres.

Although winter sports visits dropped due to adverse weather conditions and flood damage, interest and enthusiasm in the sport continued during 1965. One new development, Mission Ridge, was established 14 miles south of Wenatchee on the Wenatchee National Forest, and facilities will be available for the 1966-67 ski season. Another development, Hood River Meadows, on the east face of Mount Hood, was advertised. New facilities were constructed at Crystal Mountain, Hyak, White Pass, Spout Springs, Timberline, Bachelor Butte, and Hoodoo Ski Bowl.

Many Campgrounds and other recreational facilities sustained heavy damages during the 1964-65 floods, and \$400,000 was allocated for repair work during 1965.

After making the float trip, Secretary Freeman called the Rogue "one of America's great treasures." Here he holds up another reason for the Rogue River's fame — a fighting steelhead he has just landed.



North Cascade Highway Route

While the future of Washington's North Cascade Mountains continued under study, construction moved ahead on what is destined to be one of the most scenic routes in the land — the North Cross-State Highway.

This aerial photo shows right-of-way clearing on Early Winters Creek approaching Washington Pass and Liberty Bell Mountain at the upper left center. Glacier Peak appears at left on the skyline to the southwest.

A cooperative project of the State of Washington Highway Commission, Bureau of Public Roads, and Forest Service, the North Cross-State Highway will be complete from Marblemount on the west, to Mazama on the east, after 35 more miles are constructed.

The new route will open to public travel and outdoor recreation a vast mountain land, including rugged and beautiful back-country portions of the Mount Baker, Okanogan, and Wenatchee National Forests. Department of Agriculture members of the North Cascade Study Team propose that the area traversed by the new highway be designated for National Recreation Area status.

Meeting what is regarded as a clear-cut obligation to plan and prepare for present and future recreational use of the area, the Forest Service has already opened the new Colonial Creek Campground as the first of 120 campgrounds, totalling more than 3,000 family units, to be located along the highway.

Plans also call for adding 100 more miles of trail to the 320-mile trail network already existing. Highway overlooks will offer splendid mountain views. Public tramway sites are also under study.

Major ski areas, year-round resorts, organizational camps, and visitor information services are other important features of the development plans. The area abounds with wildlife and is a favorite of hunters and wildlife photographers. Many sportsmen regard the North Cascades as one of the most important areas in the West for mule deer and mountain goat.







Corpsman Leonardo Caban (Cover photo), 19, Puerto Rico — "All of us learn something here we didn't have an opportunity to learn before."



Corpsman Marvin Grinage, 17, Maryland — "We only get out of this what we put in."



Corpsman Paul Hjelden, 18, North Dakota—"I think the program is good. It's helping a lot of people."



Forests Welcome Job Corpsmen

"Stand straight and tall. Look people in the eye. Be proud. You're a Job Corpsman now."

The words were those of a Job Corps Conservation Center director. His audience, listening intently, was made up of youths from across the land — big city ghettos, red clay farms — from rural and urban pockets of poverty everywhere.

The young men were being welcomed to the Center as they embarked on a road to a brighter future. The scene was repeated many times in 1965 when the Region's four Job Corps Conservation Centers began their role in

the Nation's war against poverty, offering work, educational and social opportunities to youths who'd lost out on such advantages.

Three Forest Service-Office of Economic Opportunity Job Corps Conservation Centers were established in Oregon — Wolf Creek, activated April 13 on the Umpqua National Forest; Angell, opened April 28, Siuslaw National Forest, and Timber Lake, activated August 20 on the Mount Hood National Forest. In Washington, the Cispus Center was activated June 15 on the Gifford Pinchot National Forest. Each has a capacity of 220 Corpsmen, except Angell which was built for 120 men.

With their time divided between education and work, major conservation accomplishments of the Corpsmen from the four centers during the first few months of operation included 15 miles of forest trails, 685 acres of forest land planting, 104 acres of thinning and other forest stand improvement, 800 man-days on campground development, and nearly 400 man-days on firefighting. By the end of 1965, 158 Corpsmen had graduated to urban centers for more specialized training, to go back to school; or to accept jobs utilizing their training.

At the Timber Lake Job Corps Conservation Center, Director Norman E. Gould welcomes a newly arrived group of Job Corpsmen and tells what is expected of them.





Corpsman Gerald McCaslin, Pennsylvania, practices with a welding torch at the Cispus Job Corps Conservation Center. Welding is one of the many vocational skills Corpsmen can learn at the centers.



Corpsmen are also taught to operate heavy equipment. Here, Work Leader Technician Albert B. Shroy gives some pointers on bulldozer operation to Cispus Corpsman Wendel J. Nelson of Alabama.

At Cispus, Corpsmen operate their own "closed-circuit" radio station, KJOB. Corpsman Richard L. Morris, Maryland, is at the control console.



Timber Lake Job Corpsmen built this section of trail and trail bridge along the Clackamas River. Looking over the project are, left to right, Corpsman Hubert Vitatoe, Virginia; Corpsman Bill Clowers, Tennessee; Work Supervisor Vern Fridley, and Corpsman John Green of Georgia.





Native Transplants



Christmas Trees



Floral Greenery



Small Roundwood



Cooperative Forestry in Action — Farm Forester Al Hedin, Tree Farmer Ed Haase, and Martin Syverson, Forest Service Division of State and Private Forestry, check rate of growth in a stand of Douglas-fir. Haase, a Field Supervisor for the Washington State Department of Natural Resources, also has his own tree farm in Lewis County, Washington.



Split Cedar



Seed Cones



Crude Drugs

Cooperative Forestry Builds Interest In Many Special Woodland Products

Special forest products were of little commercial importance in 1905 when the Forest Service was born. True, some of these smaller forest products were important for home use, particularly in rural areas. Grandfather depended on poles and shakes from the "back 40" to build his barn. He split fence posts from the rougher portions of cedar logs that wouldn't make shakes. Fuelwood was not just something to burn in the fireplace for aesthetic pleasure — it was necessary to keep the house warm and the cook stove going. Grandmother probably brewed up home remedies of cascara extract and princes pine tea to help cure her family's ills. And certainly, cutting the family Christmas tree was a joyous traditional event.

But not many people of that day could visualize special forest products becoming an important industry in Oregon and Washington.

Today, persons who harvest special forest products in Oregon and Washington earn better than \$14 million annually. And of course, product value and employment benefits multiply when the products pass through the hands of wholesalers, processors, and retailers.

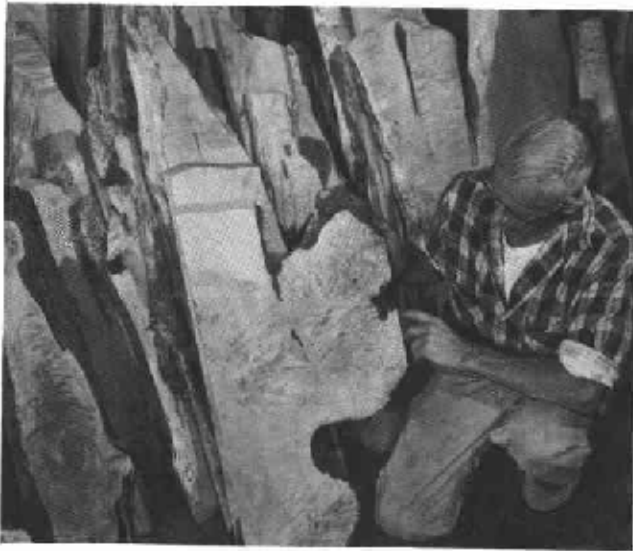
Some of the more common special forest products are Christmas trees, huckleberry brush, edible berries, cascara bark, fence posts, cedar shakes, and seed cones. More



YESTERDAY — Hand-split shakes, logs and poles were used to build this oldtimer's home. Beyond that, not much use was made of the special forest products which today contribute millions of dollars to the Northwest economy.

TODAY — The rustic charm and fine insulating properties of hand-split shake roofs are featured in the construction of fine modern homes. But many other uses are also made of special forest products whose potential only began to be realized in comparatively recent years.





Figured logs and burls of Oregon myrtle and bigleaf maple are converted into table tops, gunstocks, and other items featuring beauty in wood.



A flower arranger is using salal leaves as an attractive framing material. Cut greenery gathered from Oregon and Washington woodlands is used by florists throughout the country.

Special Forest Products Harvested From Northwest Woodlands in 1964

Item	Unit	Total	
		Oregon & Washington Volume	Value
Christmas Trees	Trees	3,159,320	\$ 4,810,000
Coniferous Christmas Boughs	Pounds	1,351,840	100,000
Floral Greenery			
Huckleberry	Bunches	3,663,500	960,000
Salal	"	1,776,400	470,000
Fern	"	3,509,400	670,000
Other	"	201,800	30,000
Moss	Bales	2,668	7,000
Native Transplants	Plants	34,710	45,000
Split Cedar Products			
Shakes (Salvage only)	Boards	32,200,000	3,220,000
Fence Posts	Posts	370,000	130,000
Hop Poles	Poles	21,000	30,000
Other			40,000
Small Roundwood Products			
Misc. Posts	Posts	141,100	65,000
Hop Poles	Poles	53,200	35,000
Misc. Poles	"	103,500	90,000
Other	Pieces	170,700	55,000
Fuelwood			
Fuel Cordwood	Cord	90,810	1,820,000
Charcoal Cordwood	"	250	5,000
Crude Drugs			
Cascara	Pounds	1,800,000	306,000
Quinine Conk	"	44,000	11,000
Other	"	305,000	16,000
Forest Seed Cones	Bushels	538,000	1,310,000
Total			\$14,225,000

unusual types include quinine conks, forest moss, maple burls, arrow wood, billets, mistletoe, and mushrooms.

Increased importance of special forest products in recent years reflects new demands for forest products by a growing population. It also reflects improved management and harvesting techniques which improve the yield and quality of the products.

Special forest products, such as Christmas trees and floral greenery, are sometimes intensively managed as the principal forest crop. However, most special forest products occur naturally in the forest, and are considered incidental to growing timber. They often provide a source of early income from forest lands, thereby encouraging woodland owners to retain ownership and manage their timber until it reaches economic maturity.

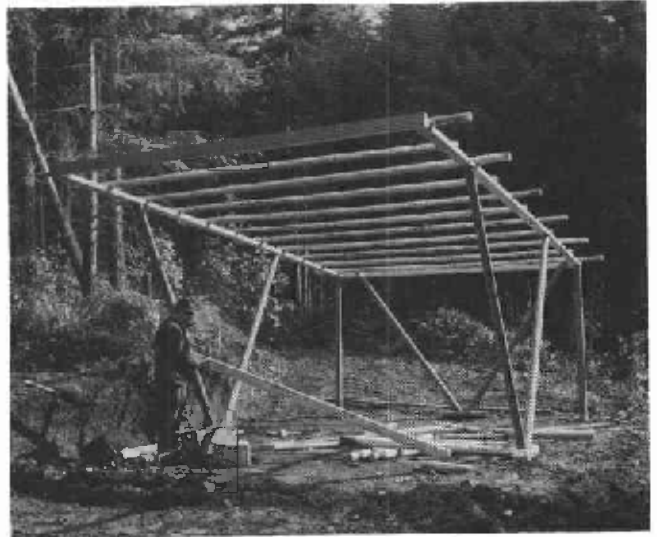
Harvesters should realize that special forest products are not free for the taking. They are private property, the same as timber or farm crops. The owner's permission must be obtained to harvest them. Many harvesters enter into long-term leases with the landowner. This arrangement may be mutually beneficial by providing financial incentives to both parties for good management and sustained harvesting practices.

The first complete special forest products harvesting and marketing report for Oregon and Washington was prepared in 1965. This was a team effort by the following cooperators and coordinated by the Forest Service's Division of State and Private Forestry: Oregon State Forestry Department; State of Washington Department of Natural Resources; Oregon and Washington Extension Services;

Soil Conservation Service; Bureau of Land Management; Forest Service; and special forest products industries.

A County Coordinator was selected in each county from one of the above agencies to head up the gathering and compiling of special forest products data. The County Coordinator, in turn, enlisted assistance of people from other agencies. Finally the completed survey forms were returned to the Division of State and Private Forestry, summarized, and published in the bulletin "Special Forest Products 1964 Harvesting Report — Oregon and Washington." A volume of business report from this bulletin is summarized on page 22. It covers the most common special forest products which were harvested commercially.

This builder of a modern carport has rediscovered what grandfather knew 60 years ago — the versatility of small roundwood for use around home and farm.



Not all of the special products or benefits from woodland tracts can be measured as an economic contribution. Here, youngsters learn about conservation in an outdoor classroom.



Research Serves the Nation

This section constitutes the annual report of the Pacific Northwest Forest and Range Experiment Station for the year 1965.

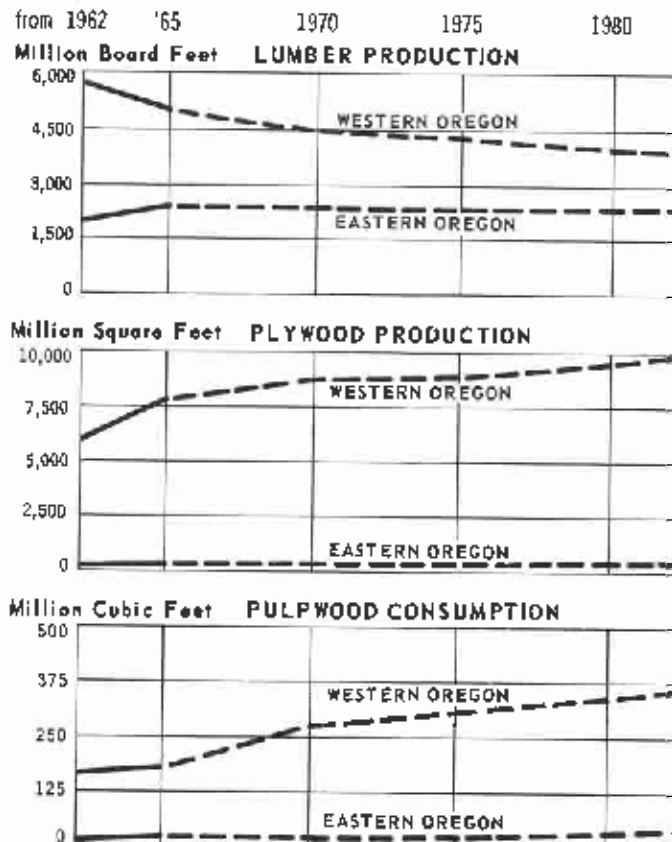
Our forest resources are, and will be, of vast importance to national and individual prosperity, security, and happiness. By the year 2,000 the United States will need twice as much timber as is now being produced. Other uses of the forest are expected to double and redouble in the same time. Research is the key to preservation and the possible increase of this natural wealth. Further progress in forestry depends on new knowledge, on improved timber harvesting

and forest regeneration practices; techniques to prevent soil erosion and floods; safe, positive and efficient insect, disease, and fire control methods; increased utilization of material left in the woods or burned as waste; improved timber measurement techniques; better management of grazing lands; and improvement of recreational and scenic resources. Forestry research must be strengthened to meet the needs of all these accelerating uses of the Forest.

An appendix, "The 1965 List of Publications of the Pacific Northwest Forest and Range Experiment Station" is available from the Station, P. O. Box 3141, Portland, Oregon 97208.

in Forest Survey

Forest Survey, through its reporting and analyses of the timber resource and timber industry situation, provides a sound basis for policy making and program planning on all forest lands. During 1965, the consumption of sawtimber in Oregon, Washington, Idaho, and western Montana was projected to increase from 21.2 billion board feet in 1962 to 25.8 billion in the year 1985. This is the net result of trends expected in the various subregions. In western Oregon, for example, little expansion is expected in the cut of live sawtimber. If trends continue, significant shifts are expected within the timber industry here, with lumber production decreasing 33 percent, plywood and veneer production rising about 67 percent, and pulpwood consumption increasing nearly 114 percent by 1985. In contrast, the total timber cut for the United States is expected to increase 40 percent by the year 1985. Therefore, research in timber management, marketing, and utilization is critical to the supplying of the future consumption expected.

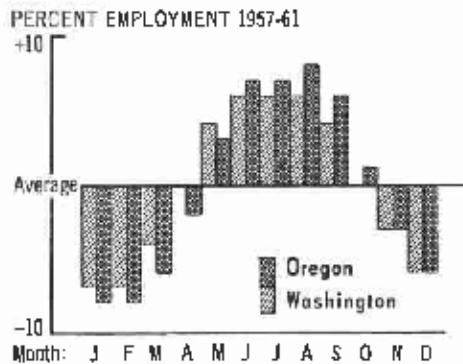


in Products, Marketing and Utilization



Research in logging increases utilization. Potential rates of return for investments in relogging equipment ranged from 2.3 to 13.7 percent. Photo at upper right shows salvaged material which would have gone to waste before re-logging was proved feasible.

A problem in employment is the seasonal variation found in timber industries. Sawmill and planing mill employment in Oregon, for example, ranged from 8 percent below normal in January to 8 percent above average in August.

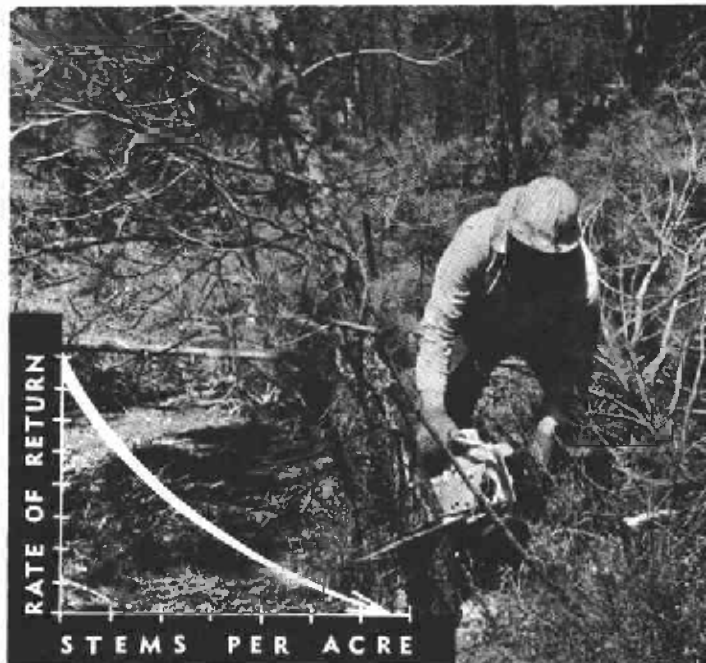


Monthly deviations (in percent) from average employment during 1957-61 in sawmills and planing mills in Oregon and Washington.

in Economics

Production economics research seeks to help the forest-land manager do the best possible job of growing and harvesting timber in view of the dollar and cents consequences of his actions. For example, an evaluation of the impact of potential European pine shoot moth outbreaks in the ponderosa pine region of the Western United States showed possible losses of from 651 million to 4,375 million board feet of allowable timber cut per year and an annual loss of from 11,000 to nearly 74,000 jobs.

A study of dwarfmistletoe control showed that forest managers can expect returns from investments in control measures — which varied in cost from \$5 to over \$100 per acre — to range from 1 to 15 percent. For a given treatment method, stand density is probably one of the most important variables affecting the rate of return. As the photo on the right shows, rate of return varies inversely with stand density (stems per acre).



Research Serves the Nation

in Forest Engineering

Forest Engineering research seeks to solve the problem of how to efficiently log heavy timber from areas of difficult access, critical soils, critical watersheds, and key recreational use. Solution may add as much as 500 million board feet to the allowable cut in the Douglas-fir subregion and 440 million board feet in coastal Alaska while protecting the other values and uses of the forest. Improved balloons and skyline systems are the most promising possibilities for careful logging of the over 25 million acres of forest land not now loggable in western United States. During 1965 an important accomplishment was development of quick methods of calculating wire rope tensions and deflections. This was a necessary breakthrough to achieving more efficient use of skylines.

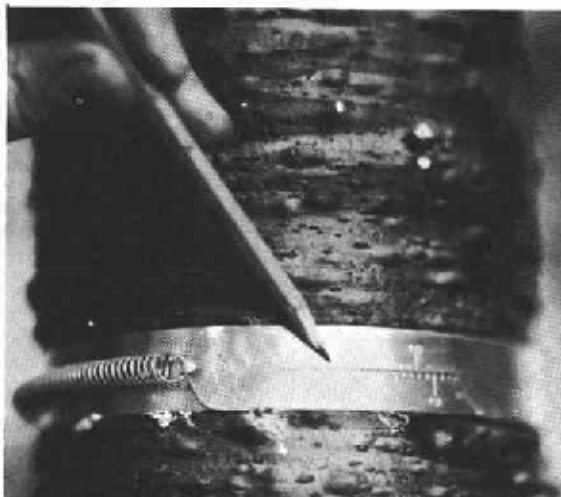


in Timber Management

Boosting timber yields through better knowledge of tree behavior . . . To help determine which trees should be reserved or cut in thinning operations, we must learn how individual trees react to changes in their environment and how various degrees of release may influence crown development, seasonal patterns of growth, and distribution of wood increment all along the tree stem.

Dead branches are being collected (right) from this Douglas-fir tree to reconstruct the pattern of crown die-off.

A band dendrometer attached (below) to this Douglas-fir stem measures seasonal growth patterns.

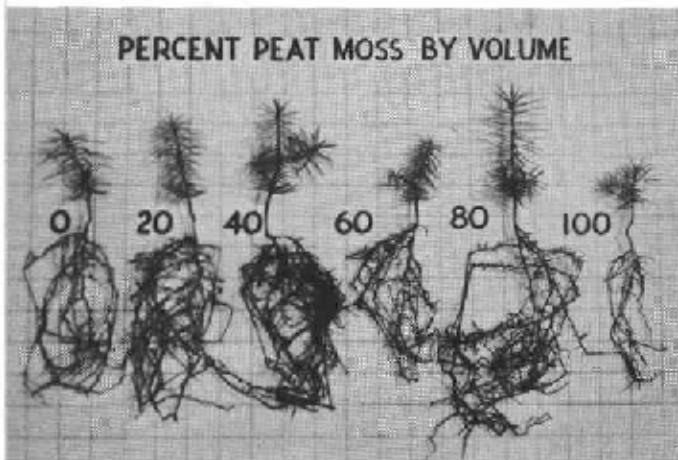


In both laboratory and greenhouse, we are seeking ways to improve Survival and Growth of Planted Trees.

Douglas-fir root tips are cultured (upper right) in flasks under sterile conditions to help pinpoint how factors such as nutrients, vitamins, and hormones favor or inhibit root growth.



How do seedlings of Northwest trees respond to varying overstory densities? What are their relative light requirements? To provide rapid preliminary answers, photosynthesis of Douglas-fir, western hemlock, Sitka spruce, and red alder is compared by monitoring use of carbon dioxide under controlled conditions in the laboratory (right).

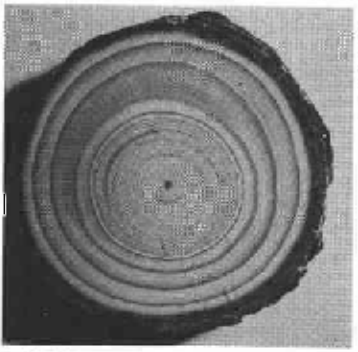
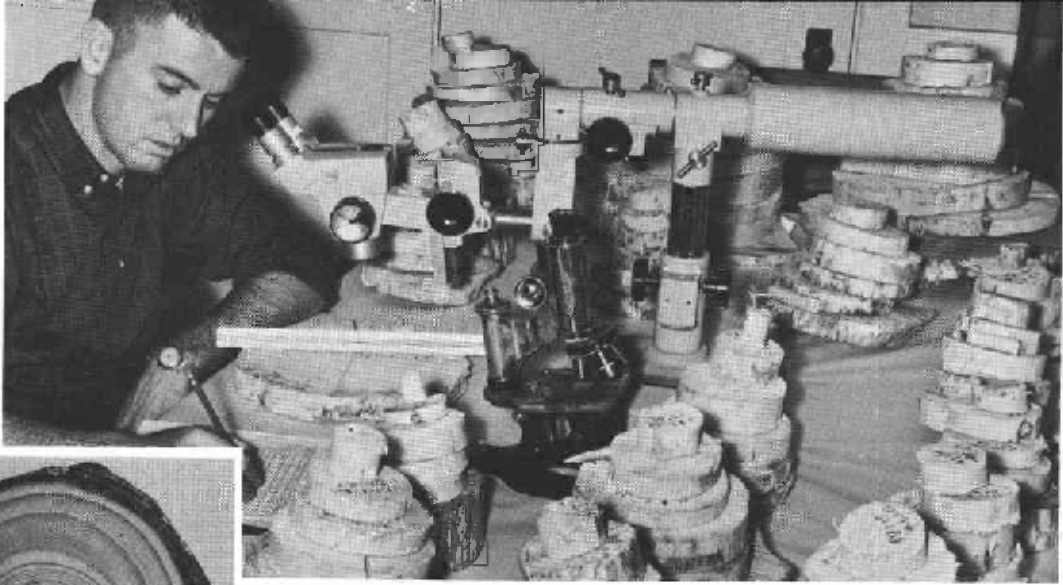


In the greenhouse, height growth of Douglas-fir seedlings was found to vary with proportion of organic matter in the soil (left).

The need to preserve scenic and recreational values during the transition from mature timber to new forest has stimulated renewed interest in the Shelterwood System in multiple-use management of Northwest forest types.

In this stand (right) on the Hemlock Experimental Forest in Western Washington, reserve hemlocks are growing twice as fast since a first-step shelterwood cut was applied.





This 4-inch cross section from a sapling ponderosa pine shows how man can regulate tree growth. In a dense stand, this tree grew 2 inches in diameter in 40 years. Following thinning, the tree added another 2 inches in diameter in only 5 years. Within such limits, tree growth can be controlled to benefit man.



Stem analysis of the unappreciated lodgepole pine (photo above) showed this species to be capable of producing as much total wood as its better known associate species, ponderosa pine. But natural stands of lodgepole pine are usually made up of numerous small trees, most of which die before growing to a usable size. This problem, however, is now being solved through research — the development of thinning schedules which concentrate wood production on limited numbers of selected trees. Such culture produces merchantable trees in a shorter time and utilizes more of the growth potential of the forest site for production of usable wood.

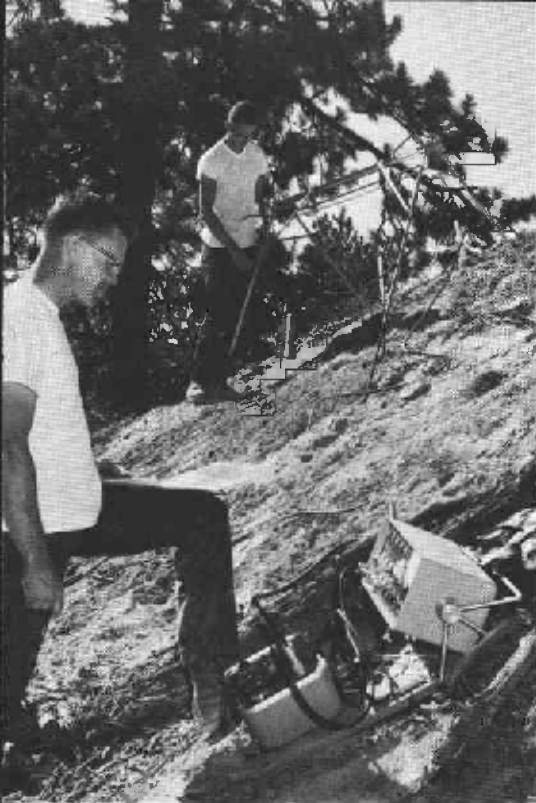
Measurement of upper stems without felling trees is now possible, using a rangefinder dendrometer. This direct sampling of tree volume in cruising avoids volume table errors inherent in older methods.

Research Serves the Nation in Forest Recreation

Better knowledge about wilderness use is essential for management decisions on the allocation of land and maintaining wilderness environment. Unmanned registration stations designed and tested by recreation research were installed on all wilderness areas in Region 6 in 1965.

These stations have proved to be an effective and efficient means of gathering information on wilderness use. Between 70 and 85 percent of all visitors to two Oregon wilderness areas registered at the unmanned stations.





on Forest Watersheds

In studies of rate of soil movement, radioactive tracers are followed by radiation counting devices in the photo (left). With such basic information, researchers are seeking to learn how watersheds can be managed to produce more high quality water.

The rate of water USE by coniferous trees may become an important factor in arid area watersheds. Plant studies in growth chambers, where temperature, heat, light, and relative humidity are controlled and gamma rays measure soil moisture, show relative rate of water use of different species in varying conditions.

in Range and Wildlife

Dense stands of young ponderosa pine produce little merchantable timber and almost no forage. However, with improved management, their productive capacity can be greatly increased. Thinning these stands not only gives the remaining trees more growing room and greatly increased growth, but also favors the understory by allowing it to produce more forage for livestock and game. In addition to the increase in quantity of forage, some aspects of forage quality also change. Mineral salts of deer browse were higher and carbohydrates were lower in unthinned pine stands, but there was no effect on fat or protein levels.



Pesticide residues on forage plants used by cattle, deer and elk were studied as a part of the 1965 Douglas-fir tussock moth control project on the Malheur National Forest. Special techniques shown at right were used to prevent transferring even minute spray residues from one plant to another. Samples collected in late May and early June showed that elk sedge, big sagebrush, and tailcup lupine contained from 0.16 to 1.4 parts per million of apparent DDT before spraying started. Amount of residue in plants, litter and soil will be followed for several years.



Research Serves the Nation

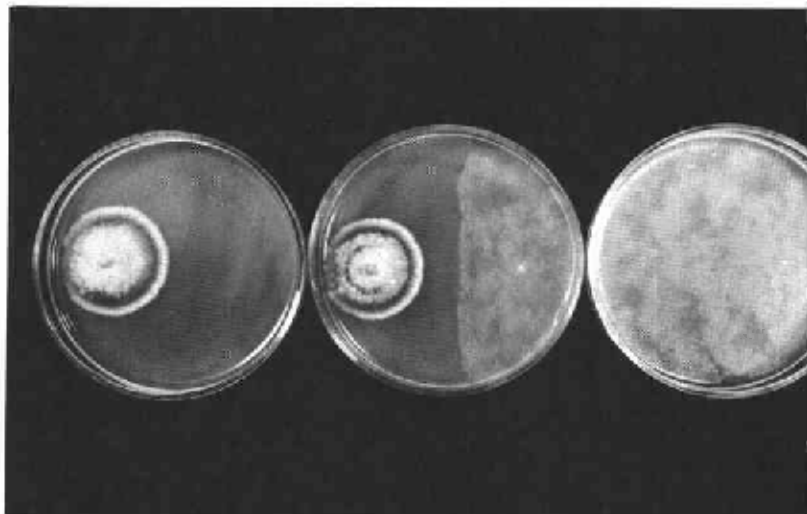
in Forest Protection

One way to solve a pest problem is to eliminate it. Station entomologists and co-operators are studying the feasibility of eradicating the European pine shoot moth from the West by the sterile male technique. Necessary is an accurate method for surveying the shoot moth population. The container pictured tests the drawing power of the female sex attractant. Males are caught in a sticky substance on the outside.



Root diseases in the forest lie deep among tangles of roots, inaccessible by conventional disease-control treatments. However, we are seeking ways to enlist aid from the many common soil organisms that strongly inhibit growth of disease fungi.

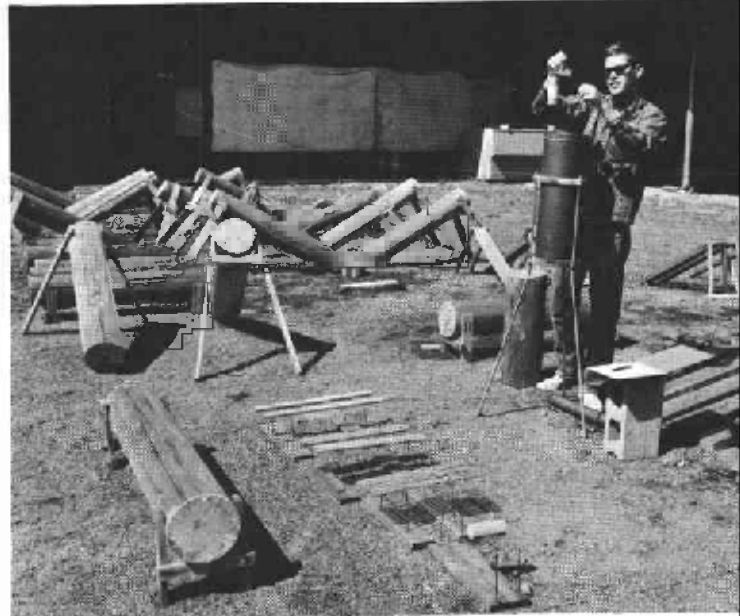
The right-hand dish in the photo contains a culture of a *Pythium* species that attacks rootlets of Douglas-fir; the left-hand dish, a mycorrhizal fungus; in the center dish, containing the two fungi together, the *Pythium* growth has been inhibited by the mycorrhizal fungus. Such antagonistic organisms might be favored at the expense of disease fungi by silvicultural measures that modify the soil environment.



As part of the recent Cascades Fire-Weather Project, a kite balloon with wire-sonde capsule attached begins ascent to 1,000 feet to sample temperature and humidity at levels too low for an instrumented airplane to reach safely. These records will help to define weather variations that produce erratic forest fire behavior in mountains.



Test site, where fuel-moisture relationships are being developed. These will enable forest managers to estimate moisture content of key fuels more precisely. Wooden dowels serve as a standard device for estimating levels of moisture in the outer shell of large fuels such as logs.



Are nursery-grown seedlings that have been outplanted more susceptible to animal damage than natural tree seedlings? As part of an experiment which seeks to answer this question, performance of a nursery-grown Douglas-fir (right) is checked against a natural seedling growing in place (center) and a transplanted wildling (left). By identifying the factors that make small trees less attractive to animals, the door to safe control of animal damage through silvicultural methods may be opened.



RECEIPTS AND EXPENDITURES -- FISCAL YEAR 1965

Region 6

NATIONAL FOREST PROGRAMS

	<u>Receipts</u>	<u>Expenditures</u>	
		<u>Operating</u>	<u>Capital</u>
National Forest Protection and Management & Land Use Projects		\$22,300,012	\$3,412,837
Fighting Forest Fires		1,469,421	11,774
Insect and Disease Control		587,320	2,116
Road & Trail System -- Construction and Maintenance		13,027,346	15,780,293
Flood Prevention & Watershed Management		281,819	5,528
Cooperative Work		3,986	4,396,431
(Including deposits and expenditures for stand improvement)			
Operating \$ 4,009			
Improvements <u>6,322,837</u>	<u>\$6,326,846</u>		
<u>National Forest Fund and Land Use Area Receipts</u>			
National Forest Fund	84,489,728		
Oregon and California Grant Lands	5,209,112		
Warm Springs Indian Lands	95,468		
National Grasslands	9,276		
Other Misc. Receipts	<u>369,312</u>		
	<u>\$96,499,742</u>	<u>\$37,669,904</u>	<u>\$23,608,979</u>
Less Cooperative Deposits Improvements	<u>6,322,837</u>		
	\$90,176,905		
<u>Operating Expenses</u>			
a. Operating Expenditures	\$37,669,904		
b. Estimated annual depreciation on roads, trails & other improvements in place on June 30, 1965	<u>11,702,475</u>	<u>49,372,379</u>	
Excess of Receipts over operating expenditures plus accumulated depreciation.		<u>40,804,526</u>	
Twenty-five percent of National Forest Fund gross receipts were paid to States for distribution to Counties having National Forest Land as follows:			
Oregon	15,614,590		
Washington	5,685,490		
California	<u>116,893</u>		
Total	<u>\$21,416,973</u>		

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AN ANNOTATED LIST OF
PUBLICATIONS
OF THE
**PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION**
FOR THE YEAR **1965**

a supplement to **THE STATION'S ANNUAL REPORT**
as published in **THE 60TH YEAR**
FOREST SERVICE 1965
in the Pacific Northwest



PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

1966

AN ANNOTATED LIST OF PUBLICATIONS
of the
PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION

This is a list of all publications by Station staff and cooperators during the year 1965, including published talks and addresses and a few earlier publications not previously reported.

ANONYMOUS.

Use of wide single tires can reduce logging costs. Forest Ind. 92(3): 78-80, illus. (Copies not available.)

Test results show possible cost savings through reduction in road ballast material, greater payloads, increased fuel mileage, and less equipment maintenance with wide single tires on logging trucks.

ADAMS, THOMAS C.

Economic comparison of relogging and clean logging in mature hemlock. U.S. Forest Serv. Res. Pap. PNW-24, 20 pp., illus.

A time and cost study of high-lead logging which analyzes cost of relogging as compared with clean logging of all material in a single operation.

High-lead logging costs as related to log size and other variables. U.S. Forest Serv. Res. Pap. PNW-23, 38 pp., illus.

Discusses shortcomings of average logging cost concept and develops a schedule of logging costs related to size of log, yarding distance, hauling distance, and other factors.

_____ and HAMILTON, THOMAS E.

Value and employment associated with Pacific Northwest log exports to Japan. U.S. Forest Serv. Res. Pap. PNW-27, 15 pp., illus.

A sample of Pacific Northwest log exports to Japan was found to have a slightly higher value than the products of the same logs if used in domestic manufacture. However, considerably more employment would have occurred in domestic manufacture.

BARRETT, JAMES W.

Spacing and understory vegetation affect growth of ponderosa pine saplings. U.S. Forest Serv. Res. Note PNW-27, 8 pp., illus.

Concludes that tree spacing and presence of understory vegetation are major factors influencing diameter and height growth of suppressed ponderosa pine saplings after overstory harvest.

BARRETT, JAMES W., and *YOUNGBERG, C. T.

Effect of tree spacing and understory vegetation on water use in a pumice soil. Soil Sci. Soc. Amer. Proc. 29: 472-475, illus.

Water use in a pumice soil in central Oregon increased significantly with increased density of a sapling ponderosa pine (*Pinus ponderosa* Laws.) stand.

BERNSTEIN, DAVID A.

Aerial cruises in Douglas-fir. J. Forest. 63: 939-941, illus.

A test of aerial photo cruising for Douglas-fir timber sales showed generally satisfactory results. However, users of this technique are warned that occasional large errors may occur.

BINKLEY, VIRGIL W.

Economics and design of a radio-controlled skyline yarding system. U.S. Forest Serv. Res. Pap. PNW-25, 30 pp., illus.

This study presents an analysis of factors affecting time and costs of skyline logging in mature Sitka spruce and western hemlock on the Cascade Head Experimental Forest near Otis, Oreg. Engineering aspects of skyline yarding operations are also discussed.

BRIEGLER, PHILIP A.

Book review of "New Zealand Forestry," by New Zealand Forest Service. J. Forest. 63: 292. (Copies not available.)

The forester in a science-oriented society. J. Forest. 63: 421-423.

A philosophic review of impacts and implications of science and technology in our society and how foresters can contribute to enlightenment.

*BOGAR, GERALD D., and *SMITH, FRANK H.

Anatomy of seedling roots of *Pseudotsuga menziesii*. Amer. J. Bot. 52: 720-729, illus.

Study of the anatomical development of Douglas-fir roots provided insight into the root initiation process. Numerous adventitious roots arise from the pericycle in young roots and from the vascular cambium and pericycle in older roots following pruning.

BRUCE, DAVID.

Current status of fire research in the Northwest. In Northwest Forest Fire Counc. Annu. Meeting Rep., Nov. 12, 1964. [4 pp., unnumbered] (Copies not available.)

A summary of 1964 fire research at the Pacific Northwest Forest and Range Experiment Station.

* Federal, State, or private cooperator.

BURCH, WILLIAM R., JR.

Book review of "Work and leisure. A contemporary social problem." Edited by Erwin O. Smigel. The Sociol. Quart. 6(1): 75-76. (Copies not available.)

Reviews 11 papers useful as a supplement for courses in sociology of work and leisure, social psychology, and social theory. A significant contribution to the "sociological imagination."

The play world of camping: research into the social meaning of outdoor recreation. Amer. J. Sociol. 70: 604-612.

Two types of play-action systems--expressive and symbolic labor--are compared to indicate the theoretical value in studying outdoor recreation.

Wilderness recreation research in the Forest Service. Pt. 2. Fifth Bien. Conf. Northwest Wilderness Proc. 1964: 36-40. (Copies not available.)

Understanding of wilderness recreation requires that our analysis of values recognizes that quality cannot be known by its quantity. By considering differences in perceptions and perspectives of different groups, we might better provide an appropriate fan of leisure opportunities to permit more persons to fit their own life cycle to the cycles of society and nature.

*CORLISS, J. F., and DYRNESS, C. T.

A detailed soil-vegetation survey of the Alsea Area in the Oregon Coast Range. In Forest-Soil Relationships in North America. Second N. Amer. Forest Soils Conf. Proc. 1963, pp. 457-483, illus.

This soil-vegetation survey, which is not only an inventory of the two resources but includes descriptions of the relationships and lists use limitations, provides land managers with information for evaluating land use alternatives, recognizing potential problems, and the formulation of management plans.

COWLIN, ROBERT W., and FORSTER, ROBERT M.

The timber situation and outlook for northwest Oregon. U.S. Forest Serv. Resource Bull. PNW-12, 56 pp., illus.

Gives detailed information pertinent to the wood products industry of Columbia, Clatsop, Hood River, and Yamhill counties in Oregon. Interprets and analyzes the industry, the resource, and their interrelationship.

CRAMER, OWEN P.

The 1964 fire season in the Pacific Northwest. 8 pp., illus.

Western Washington season severity equaled lowest and eastern Washington's among driest of record. Fire season of northern half of Oregon was below normal and southern half near normal.

* Federal, State, or private cooperator.

DAHMS, WALTER G.

Rust cankers--a threat to central Oregon lodgepole pine? U.S. Forest Serv. Res. Note PNW-20, 3 pp., illus.

This publication points out that western gall rust cankers caused by *Peridermium harknessii* and a diamond-shaped canker caused by *Cronartium stalactiforme* are both numerous and damaging in central Oregon lodgepole pine stands.

DATERMAN, G. E., *RUDINSKY, J. A., and *NAGEL, W. P.

Flight patterns of bark and timber beetles associated with coniferous forests of western Oregon. Oreg. Agr. Exp. Sta. Tech. Bull. 87, 46 pp., illus. (Copies not available.)

In both daily and seasonal flight patterns temperature was the primary factor governing flight activity; light intensity was also influential. Olfactory response to an attractant influenced flight activity of *Trypodendron lineatum*.

*DOERKSEN, ALLAN H., and MITCHELL, RUSSEL G.

Effects of the balsam woolly aphid upon wood anatomy of some western true firs. Forest Sci. 11: 181-188, illus.

Balsam woolly aphid infestations on the main stem of grand, subalpine, and Pacific silver fir cause abnormally wide annual rings of unusually dense, reddish wood. Superficially the rings resemble compression wood. Investigation of the microscopic qualities of the abnormal wood showed that cell walls are about 50 percent thicker than normal, tracheids some 40 percent shorter, fibril angle two to three times greater, and the number of rays per unit area nearly doubled.

DRISCOLL, RICHARD S.

Vegetation-soil units in the central Oregon juniper zone. U.S. Forest Serv. Res. Pap. PNW-19, 60 pp., illus. 1964.

A detailed description of vegetation and soil characteristics of the central Oregon juniper zone, including a key to its plant associations and a discussion of applications of the findings to range and wildlife habitat management.

DYRNESS, C. T.

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

During the first 2 years after logging disturbance, history was at least equally as important as species composition of the undisturbed stand in determining plant distribution on three clearcut units.

* Federal, State, or private cooperator.

DYRNESS, C. T.

Soil surface condition following tractor and high-lead logging in the Oregon Cascades. *J. Forest.* 63: 272-275, illus.

Compaction caused by tractor logging undoubtedly results in some increase in runoff and erosion. However, these undesirable effects are minimized if slopes do not exceed 20 to 30 percent and skidroads are located on the contour.

*EKSE, MARTIN.

Wide single vs. dual tires--a logging road test. 19 pp., illus.

Points out possible gains and other considerations in the use of wide single tires on forest access roads.

FLORA, DONALD F.

Economic evaluation of potential European pine shoot moth damage in the ponderosa pine region. *U.S. Forest Serv. Res. Note PNW-22*, 14 pp.

An examination is made of the regional economic impact that might occur if the European pine shoot moth were to move into the ponderosa pine region of the United States. Analysis is limited to the ponderosa pine type.

FOWLER, W. B.

The energy budget and its use in estimating evapotranspiration. *Soc. Amer. Foresters Proc.* 1964: 101-104, illus.

Extension of radiation climatologies is presented as a requirement for improvement of overall accuracy for evapotranspiration estimation procedure based on energy budget.

FRANKLIN, JERRY F.

Ecology and silviculture of the true fir-hemlock forests of the Pacific Northwest. *Soc. Amer. Foresters Proc.* 1964: 28-32, illus.

An introduction to environment, management systems, and problems in management, and utilization of true fir-hemlock forests of the Pacific Northwest.

An exploratory study of cone maturity in noble fir. *U.S. Forest Serv. Res. Note PNW-21*, 12 pp., illus.

Explores relationship of yield of viable noble fir (*Abies procera*) seed to time of cone collection, treatment of cones after collection, and specific gravity and moisture content of cones at the time of collection.

Tentative ecological provinces within the true fir-hemlock forest areas of the Pacific Northwest. *U.S. Forest Serv. Res. Pap. PNW-22*, 31 pp., illus.

* Federal, State, or private cooperator.

Proposes 11 ecological provinces based on differences in geology, physiography, climate, soils, and forest composition. Describes forest and environmental features of each.

FRANKLIN, JERRY F., and *WEST, NEIL E.

Plant communities of Oregon: a bibliography. Northwest Sci. 39: 73-83.

A listing of references containing information on composition, ecology, or distribution of plant communities of Oregon.

FREDRIKSEN, R. L.

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

Discusses erosion from three experimental watersheds in the western Cascades. Erosion from headwater streams occurs by mass movements during rain-snowmelt runoff periods. Erosion sequences in headwater streams and lower order streams is discussed.

FREDRICKSEN [FREDRIKSEN], R. L.

Sedimentation after logging road construction in a small western Oregon watershed. U.S. Dep. Agr. Misc. Pub. 970: 56-59, illus.

A large, but temporary, increase in suspended sediment occurred during the first storms after road construction. Annual bedload volume increased the first year after construction but the actual increase was small.

GARRISON, G. A.

Changing conditions in Northwest forests and their relation to range use. Soc. Amer. Foresters Proc. 1964: 67-68.

A summary of changing forest and range conditions in the Pacific Northwest resulting from selective logging of ponderosa pine, overstocking of tree reproduction, and clear cutting of white fir stands of the interior.

GOULD, MARIE L.

Bluebunch wheatgrass (*Agropyron spicatum*), 1920-1964; a bibliography. 10 pp.

Shelterwood harvest methods and results for coniferous species, 1930 to 1964; a bibliography. 8 pp.

Soil moisture investigations on grass- and shrub-land soils, 1942-1964; a bibliography. 5 pp.

* Federal, State, or private cooperator.

GOULD, MARIE L.

Wildlife habitat in western Oregon and Washington and northwestern California forests, chiefly for blacktail deer and Roosevelt elk, 1930 to 1965; a bibliography. 10 pp.

GRANTHAM, JOHN B.

Address. *In* Innovation in a Traditional Industry. Sess. I. New Concepts in Wood Construction. Second Annu. Forest Ind. Marketing Conf. Proc., edited by Dr. Stuart U. Rich. pp. 8-14. Eugene, Oreg.: University of Oregon Press. 1965. (Copies not available.)

Describes Forest Service intent to extend its traditional program of forest products research in order to study new design concepts and apply systems analysis techniques to the use of wood in construction.

GRATKOWSKI, H. J., and PHILBRICK, J. R.

Repeated aerial spraying and burning to control sclerophyllous brush. *J. Forest.* 63: 919-923, illus.

Burning and repeated aerial spraying were tested on chaparral. Results showed that even resistant brush species can be controlled with a planned program of treatments.

HAMILTON, THOMAS E.

Production, prices, employment, and trade in Pacific Northwest forest industries, 4th quarter 1964. 18 pp., illus.

Provides current information on lumber and plywood production and prices, employment in the forest industries, international trade in logs and lumber, volume and average prices of stumpage sold by public agencies, and other related items.

Production, prices, employment, and trade in Pacific Northwest forest industries, first quarter 1965. 17 pp., illus.

(Same as above.)

Production, prices, employment, and trade in Pacific Northwest forest industries, second quarter 1965. 20 pp., illus.

(Same as above.)

Production, prices, employment, and trade in Pacific Northwest forest industries, third quarter 1965. 22 pp., illus.

(Same as above.)

HAZARD, JOHN W.

Timber resource statistics for southwest Washington. U.S. Forest Serv. Resource Bull. PNW-15, 32 pp.

Summarizes the results of the latest reinventory of the six counties: Clark, Cowlitz, Lewis, Pacific, Skamania, and Wahkiakum.

HAZARD, JOHN W., and METCALF, MELVIN E.

Forest statistics for west-central Oregon. U.S. Forest Serv. Resource Bull. PNW-10, 35 pp.

Summarizes the results of the latest reinventory of the four counties, Benton, Lane, Lincoln, and Linn.

*HELMs, JOHN A.

Diurnal and seasonal patterns of net assimilation in Douglas-fir, *Pseudotsuga menziesii* (Mirb.) Franco, as influenced by environment. Ecol. 46: 698-708, illus. (Copies not available.)

Net assimilation in 38-year-old Douglas-fir could not be predicted from specific levels of air temperature, light intensity, or relative humidity, except for extreme situations. Diurnal patterns differed by tree crown class, with rates fluctuating within each pattern despite apparently stable environment.

HOYT, MILDRED I., and TOMKINS, EDITH P.

Publications of the Pacific Northwest Forest and Range Experiment Station. 67 pp.

Station publications through 1964. Intended for library and in-Service use.

HUGHES, JAY M.

Bureaucracy, communication, and wilderness. Fifth Bien. Conf. Northwest Wilderness Proc. 1964: 76-81. 1964. (Copies not available.)

This paper discusses some of the political science aspects of wilderness land allocation decision making against the backdrop of the Pacific Northwest experience.

Wilderness land allocation in a multiple use forest management framework in the Pacific Northwest. U.S. Forest Serv. Res. Note PNW-26, 4 pp.

Reveals the interdisciplinary nature of the choice which must be made by land managers in allocating wild lands to institutionalized wilderness use and gives special attention to the role of economics analysis as a tool to aid decision makers.

* Federal, State, or private cooperator.

JOHNSON, FLOYD A.

Sample sizes for timber cruises. U.S. Forest Serv. Res. Note PNW-30, 10 pp.

Will help cruisers select "count" points and "measurement" points in the proper numbers and in the proper proportion when point sampling is being used for timber sale cruises.

Some thoughts on sample scaling. Forest Ind. 92(7): 62-63.

The advantages of sample scaling over scaling all logs in a timber sale may easily outweigh the disadvantages whenever scaling costs are high, truck delays for scaling are considerable, and logs are low in value.

LYSONS, HILTON H.

Project skyhook. 19th Annu. Northwest Wood Prod. Clinic Proc. 1964: 59-61. 1964. (Copies not available.)

Outlined the problems involved in harvesting difficult access areas and possible "skyhook" approaches using balloon and skyline yarding systems.

_____ and MANN, CHARLES N.

Correction of average yarding distance factor for circular settings. U.S. Forest Serv. Res. Note PNW-24, 3 pp., illus.

Recommends that a correct factor of $2/3$ be used in obtaining average yarding distance.

_____ and MANN, CHARLES N.

Skyline logging handbook on wire rope tensions and deflections. 34 pp., illus.

Gives information and procedures for determining capabilities of single and multispan skylines.

McCONNELL, BURT R., and SMITH, JUSTIN G.

Understory response three years after thinning pine. J. Range Manage. 18: 129-132, illus.

Understory yield was greater on thinned than on unthinned plots. When pine canopy exceeded 45 percent, forbs produced more than grasses; below 45 percent, grasses were superior producers.

MANN, CHARLES N.

Forces in balloon logging. U.S. Forest Serv. Res. Note PNW-28, 5 pp., illus.

Provides a better understanding of the mechanics of yarding with a balloon. The sources of the individual forces involved are discussed, and a possible combination of these forces to produce lift and movement of the log is illustrated.

*MARX, DONALD H., and ZAK, BRATISLAV.

Effect of pH on mycorrhizal formation of slash pine in aseptic culture. *Forest Sci.* 11: 66-75, illus. (Copies not available.)

Mycorrhizae developed well in pure cultures stabilized at pH's ranging from 4.0 to 6.6, although best development occurred in less acid substrates. Stimulation of seedling growth differed between species of mycorrhizal fungi inoculated; a fungus species-pH interaction was also apparent. This evidences that not all mycorrhizal fungi will affect seedlings the same in a given soil and that a given fungus may affect seedlings differently in different soils.

METCALF, MELVIN E.

Hardwood timber resources of the Douglas-fir subregion. U.S. Forest Serv. Resource Bull. PNW-11, 12 pp.

Summarizes in one publication current Forest Survey data on area and volume of hardwoods.

Phase I--Collection of sample increment cores and related data. Symposium on Density--A Key to Wood Quality Proc. 1965: 15-20. Also in Western Wood Density Survey Report Number 1, U.S. Forest Serv. Res. Pap. FPL-27, pp. 3-7. (Copies not available.)

Presented the method used to collect sample cores and related data from commercial tree species in 12 western States.

MITCHELL, R. G.

An experiment in biological control of the balsam woolly aphid in northwestern United States. XIIth Int. Congr. Entomol. (London) Proc. 1964: 703-704. (Copies not available.)

A program of colonizing insect predators was initiated in 1957 to control damaging, true fir-infesting populations of the balsam woolly aphid in the Pacific Northwest. Twenty-two foreign predators have been introduced from Asia, Australia, and Europe. Control benefits to date have not been encouraging.

MORRIS, WILLIAM G.

Moisture content variations in logging slash. *In* Humidity and Moisture. v. 4. 1963 Int. Symposium on Humidity and Moisture (proc.). pp. 321-326, illus.

Moisture content at 1/8, 1/4, and 1/2 inch beneath the surface of coarse logging debris was measured frequently during the summer and related to rainfall, relative humidity, readings of moisture indicator sticks, and slope of the log surface.

* Federal, State, or private cooperator.

*NEAL, J. L., JR., *BOLLEN, W. B., and LU, K. C.

Influence of particle size on decomposition of red alder and Douglas-fir sawdust in soil. *Nature* (London) 205: 991-994. (Copies not available.)

Influence of sawdust added to soil on microbial activity depends on particle size: the smaller the particle, the faster its oxidation. This relationship may be due to the smaller particles' larger surface area in relation to volume and the greater rupturing of lignin-cellulose bonds during their mechanical preparation. Addition of ammonium nitrate to sawdust did not stimulate oxygen uptake of samples, perhaps because the addition relieved microbes from the necessity of decomposing nitrogenous organic matter to meet their nitrogen requirements.

NEWPORT, CARL A.

Address. *In* Innovation in a Traditional Industry. Sess. V. Timber Supply Analysis in New Product Planning. Second Annu. Forest Ind. Marketing Conf. proc., edited by Dr. Stuart U. Rich. pp. 137-144. Eugene, Oreg.: University of Oregon Press. (Copies not available.)

The development of new products and the meeting of new customer demands cannot be turned into profits without thorough consideration of raw material supply. Forest Survey reports help industry pinpoint supply potentials.

Demand and supply trends in British Columbia's principal market, the United States of America, 1985, 2000. Seminar on British Columbia's Future in Forest Products Trade in Asia and the Pacific Area proc. 1965: 41-63, illus. (Copies not available.)

Discusses the United States as a future market for British Columbia forest products. Includes highlights of projected United States timber demand and supply from Forest Resource Report No. 17, "Timber Trends in the United States."

PACIFIC NORTHWEST FOREST & RANGE EXPERIMENT STATION.

1964 annual report. 31 pp., illus.

A summary of the Station's accomplishments for the calendar year 1964.

Timber resource statistics for the Pacific Northwest as of January 1, 1963. U.S. Forest Serv. Resource Bull. PNW-9, 38 pp.

Presents detailed area, volume, and growth statistics for subareas of Oregon and Washington comparable to the statistics in the national report, "Timber Trends in the United States."

* Federal, State, or private cooperator.

RADWAN, M. A.

Determining minimum amounts of TMTD rabbit repellent needed to protect Douglas-fir planting stock. *Tree Planters' Notes* 70: 16-20.

Minimum amounts of TMTD protective to Douglas-fir seedlings under western Washington conditions were found to range from 11 to 22 mg. per seedling when stock is sprayed in the nursery.

Persistence and effect of TMTD on soil respiration and nitrification in two nursery soils. *Forest Sci.* 11: 152-159, illus.

A study of the persistence of tetramethylthiuram disulfide (TMTD) and some of its effects in the soil as related to its use as a repellent in forest tree nurseries.

_____ and *DODGE, WENDELL E.

Effective application rates of TMTD rabbit repellent to Douglas-fir seedlings in the nursery. *Tree Planters' Notes* 72: 7-9.

Minimum effective application rate was 9 gallons of repellent per 1,000 feet of seedbed area and tractor speed of 1.5 m.p.h. optimum.

REUKEMA, DONALD L.

Seasonal progress of radial growth of Douglas-fir western red-cedar and red alder. U.S. Forest Serv. Res. Pap. PNW-26, 14 pp., illus.

Measurements of radial growth during 5 growing seasons in western Washington showed that true growth occurred between mid-April and early September with seasonal distribution of growth varying from year to year.

ROTHACHER, JACK.

Effect of Christmas 1964 and January 1965 storms on sediment concentrations and streamflow of an experimental area. *In* Report of Meeting on Erosion and Sedimentation, 1964-65 Flood Season. Columbia Basin Inter-Agency Comm., Water Supply & Water Pollut. Contr. Subcomm., pp. 41-43, illus. (Copies not available.)

A summary of precipitation, streamflow, and sedimentation associated with two unusually severe storms recorded on experimental watersheds on the H. J. Andrews Experimental Forest.

Snow accumulation and melt in strip cuttings on the west slopes of the Oregon Cascades. U.S. Forest Serv. Res. Note PNW-23, 7 pp., illus.

Discusses the applicability of some recommendations for strip cutting to delay snowmelt under Oregon climatic conditions.

* Federal, State, or private cooperator.

ROTHACHER, JACK.

Streamflow from small watersheds on the western slope of the Cascade Range of Oregon. *Water Resources Res.* 1(1): 125-134, illus.

A limited study in which timber cutting and roadbuilding caused little or no increase in peak flows but a modest increase in low flows.

RUTH, ROBERT H.

Silviculture of the coastal Sitka spruce-western hemlock type. *Soc. Amer. Foresters Proc.* 1964: 32-36, illus.

Outlines silvical characteristics of the two species and current management practices in the Pacific Northwest.

RYAN, ROGER B.

Maternal influence on diapause in a parasitic insect, *Coeloides brunneri* Vier. (Hymenoptera: Braconidae). *J. Insect Physiol.* 11: 1331-1336, illus.

It is concluded that the parent female is sensitive to the photoperiod and transmits the determination for diapause through the egg. Long days and high temperatures favoured unarrested development. Short days and low temperatures favoured the onset of diapause.

SILEN, R. R.

Pollen contamination and isolation. (Abstr.) *IFA Tree Improvement News Letter*: 15-16. (Copies not available.)

Pollen contamination seems unavoidable in the major portion of the Douglas-fir region. Best solution is to enhance pollen production in the orchard and accept some contamination from outside.

SILEN, ROY R.

The forester's crop. *Search* 5 (Special issue 1): 2-3, illus.

A popular article on the contrasts between forestry and agricultural concepts written especially for the American Seed Trade Association audience. (Copies not available.)

Regeneration aspects of the 50-year-old Douglas-fir heredity study. *In* *Western Reforestation*. West. Forestry & Conserv. Ass. West. Reforestation Coordinating Comm. Proc. 1964: 35-39.

Environment appears more important in the pattern of family survival than do genetic differences. The study cautions against making progeny tests in other environments than where the trees are to be grown. No general correlation was found between seedling and mature tree heights.

SILEN, ROY R., *CRITCHFIELD, WILLIAM B., and FRANKLIN, JERRY F.
Early verification of a hybrid between noble and California
red firs. Forest Sci. 11: 460-462, illus.

Noble and California red fir readily hybridize, hence
maintenance of their species identity where ranges overlap
must be sought in other factors. Hybridity was established
by differences in cotyledon number.

SKOVLIN, JON M.

Improving cattle distribution on western mountain rangelands.
U.S. Dep. Agr. Farmers' Bull. 2212, 14 pp., illus.

Summarizes many of the best ideas for gaining valuable
forage which is otherwise often lost as a result of uneven
cattle distribution on the range.

SMITH, RICHARD C., and GEDNEY, DONALD R.

Manpower use in the wood-products industries of Oregon and
Washington 1950-1963. U.S. Forest Serv. Res. Pap. PNW-28,
48 pp., illus.

Data show employment by industry, employment per unit of
wood consumption and product output, and monthly variations
from average employment. An analysis showed increase in
production but decrease in overall employment.

STEEN, HAROLD K.

Comments on "The Cradle of Forestry in America." J. Forest.
63: 378.

The 1828 creation of a little-remembered Naval timber
reserve in Florida marked the beginning of Federal forest
management. Therefore, Reserve Superintendent Brackenridge
may have been America's first practicing forester.

Variation in vegetation following slash fires near Oakridge,
Oregon. U.S. Forest Serv. Res. Note PNW-25, 6 pp., illus.

Photographs of plants on burned and unburned plots illus-
trate variation in plant cover following slash fires.

Recent publications and reports on forest fire research. *In*
Western Forest Fire Conditions, 1964. West. Forestry & Conserv.
Ass. West. Forest Fire Comm. Proc. 1964: 36-40.

A list of 232 U.S. and Canadian publications on topics
related to forest fires, published in 1964 and late 1963.
(Copies not available.)

* Federal, State, or private cooperator.

STEIN, WILLIAM I.

A field test of Douglas-fir, ponderosa pine, and sugar pine seeds treated with hydrogen peroxide. *Tree Planters' Notes* 71: 25-29.

Field germination and subsequent development or mortality of seedlings from seed treated with weak hydrogen peroxide were observed. Treatment effects differed by species and were both favorable and adverse.

Seedspotting--revival of an old technique. *In Western Reforestation. West. Forestry & Conserv. Ass. West. Reforestation Coordinating Comm. Proc. 1964: 18-20.*

In the Pacific Northwest, sugar pine, ponderosa pine, and other species can be successfully established by seedspotting. Additional experience and research are needed for properly selecting areas to be seedspotted. By further improvement in tools and techniques, seedspotting can be made even more economical.

Selected 1964 publications on reforestation. *In Western Reforestation. West. Forestry & Conserv. Ass. West. Reforestation Coordinating Comm. Proc. 1964: 59-61.*

Coverage includes most references pertaining to western species and selected other references having broad general applicability.

STRICKLER, GERALD S.

The flora of the Starkey Experimental Forest and Range. 85 pp.

A list of 411 species collected on the experimental area since 1939. Given for each species are the alpha code, scientific and common name, abundance rating, and vegetation type.

TARRANT, R. F.

Forest soil improvement through growing red alder (*Alnus rubra* Bong.) in Pacific Northwestern United States. (Abstr.) VIIIth Int. Congr. Soil Sci. Abstr. Papers, Comm. IV. Soil fertility and plant nutrition. 1964: 138. (Copies not available.) 1964.

Compared with other species of *Alnus* studied throughout the Northern Hemisphere, red alder (*Alnus rubra*) is at least equally effective in improving soil fertility and growth of associated trees. Silvicultural application of soil-improving and tree-growth-promoting qualities of red alder is considered to be feasible and desirable.

TRAPPE, JAMES M.

Tuberculate mycorrhizae of Douglas-fir. *Forest Sci.* 11: 27-32, illus.

Gross morphology, anatomy, and physiology of two fungi comprising a tuberculate mycorrhizae of Douglas-fir.

and KRUEGER, KENNETH W.

Seedling biographies--keys to rational nursery practice. *In* Western Reforestation. West. Forestry & Conserv. Ass. West. Reforestation Coordinating Comm. Proc. 1964: 10-11.

Examples from an actual study serve to illustrate how seedling biographical data can be collected and used.

and KRUEGER, KENNETH W.

Seedling biographies--keys to rational nursery practice. Proc. 9th Bien. West. Forest Nurseryman's Meeting, Boise, Idaho, Aug. 19-20, 1964, pp. 47-49. (Copies not available.)

Nursery practices should be based on thorough knowledge of seedling growth patterns and abilities. Use of systematically compiled seedling biographical data in nursery decision making is illustrated from the authors' studies of Douglas-fir.

WALL, BRIAN R.

1964 Oregon log production. U.S. Forest Serv. Resource Bull. PNW-13, 2 pp., illus.

Chronicles log production by ownership for 1951-1964 and gives detail by counties for 1964.

1964 Washington Timber Harvest. U.S. Forest Serv. Resource Bull. PNW-14, 2 pp., illus.

Chronicles log production by ownership for 1950-1964 and gives detail by counties for 1964.

WENGER, WILEY D., JR.

Wilderness recreation research in the Forest Service. Pt. 1. Fifth Bien. Conf. Northwest Wilderness Proc. 1964: 31-35.

Answers to questions about wilderness recreation require the collecting of facts and the relating of these facts to one another as theories. Successful wilderness recreation research requires freedom to be skeptical of existing theories about wilderness. Through excellent outdoor club cooperation some progress has been made in description of wilderness recreational use. (Copies not available.)

WILLIAMS, CARROLL B., JR., and FRANKLIN, JERRY F.

Pacific silver fir--a bibliography with abstracts. U.S. Forest Serv. Res. Pap. PNW-21, 84 pp.

Lists references containing information on Pacific silver fir, *Abies amabilis* (Dougl.) Forbes, in North American and European literature. Abstracts are provided for those considered more significant.

WILLIAMSON, RICHARD L., and STAEBLER, GEORGE R.

A cooperative level-of-growing-stock study in Douglas-fir.
12 pp., illus.

Describes purpose and scope of a cooperative study which is investigating the relative merits of eight different thinning regimes. Main features of six study areas installed since 1961 in young stands are also summarized.

WITTIG, GERTRAUDE.

Phagocytosis by blood cells in healthy and diseased caterpillars. I. Phagocytosis of *Bacillus thuringiensis* Berliner in *Pseudaletia unipuncta* (Haworth). J. Invertebrate Pathol. 7: 474-488, illus.

Sixth-instar armyworms were injected with low and high doses of killed and live *B. thuringiensis*. The effects on the differential and total hemocyte count are described and evaluated.

WITTIG, G.

A study of the role of blood cells in insect disease. XIIth Int. Congr. Entomol. (London) Proc. 1964: 743.

Hemocytes of the armyworm, *Pseudaletia unipuncta* (Haworth), readily phagocytosed injected inert materials, virus inclusion bodies, and, under certain conditions, *Bacillus thuringiensis* Berliner, also virus inclusion bodies that appear in the hemolymph during disease. The effects on the differential and total hemocyte counts were discussed.

WOOLDRIDGE, DAVID D.

Soil properties related to erosion of wildland soils in central Washington. In Forest-Soil Relationships in North America. Second N. Amer. Forest Soils Conf. Proc. 1963, pp. 141-152, illus.

Describes a two-phase investigation of the relationship of soil properties to an index of soil erosion, mean aggregate size.

Tracing soil particle movement with Fe-59. Soil Sci. Soc. Amer. Proc. 29: 469-472, illus.

Rates and patterns of actual soil particle movement were established by measuring changes in radiation intensity with time on an eroding sandstone soil.

and WEAVER, HAROLD.

Some effects of thinning a ponderosa pine thicket with a prescribed fire, II. J. Forest. 63: 92-95, illus.

Six years after burning, height growth was reduced, diameter growth unaffected. Refutes results of an earlier study.

WORTH, HAROLD E.

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*YOUNGBERG, C. T., and DYRNESS, C. T.

Biological assay of pumice soil fertility. Div. S-4, Soil fertility and plant nutrition. Soil Sci. Soc. Amer. Proc. 29: 182-187, illus. (Copies not available.)

The fertility of pumice soils is difficult to assess by laboratory analysis. A biological assay of growth responses, utilizing a composite experimental design with ponderosa pine as indicator species, yields more meaningful information.

ZAK, B.

Aphids feeding on mycorrhizae of Douglas-fir. Forest Sci. 11: 410-411, illus.

Aphids were observed feeding directly on mycorrhizae of second-growth Douglas-fir and of seedling western hemlock and Sitka spruce in western Oregon. Attack varied according to type of mycorrhiza.

* Federal, State, or private cooperator.