UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STATEMENT FOR THE FOREST RESEARCH COUNCIL

CONCERNING THE WORK OF THE

PACIFIC NORTHWEST FOREST EXPERIMENT STATION

FOR THE YEAR 1930, AND PLANS FOR 1931.

One of the permanent plots under observation by the Experiment Station to study growth and the results of various methods of selection cutting in the western yellow pine type.

Upper-taken immediately after logging and slash disposal
Lower-taken fifteen years later from the same location.

Statement for the Forest Research Council
Concerning the Work of the
Pacific Northwest Forest Experiment Station
For the Year 1930, and Plans for 1931

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February 19, 1931

GENERAL

The outstanding feature of the past year's activities of the Forest Experiment Station is the prominence of studies in forest economics. Three major economic studies are now under way, (1) the forest survey of the Douglas fir region, (2) a study of the practicability and technic of standing timber insurance in the Douglas fir region, and (3) the economics of forest management and exploitation, particularly the financial aspects of harvesting Douglas fir forests according to the principles of economic selection. All these projects promise to yield results that can be of great use in helping the timber industries to organize on a more permanent and stable basis and in generally promoting forest welfare.

These new projects, made possible by special allotments, have necessitated a marked expansion in the year-long technical personnel which has jumped from 6 to 20.

The exhaustive Douglas fir growth and yield study by McArdle and Meyer (Tech. Bull. 201) is the outstanding publication of the year. A large edition has been distributed; it was very favorably received, and will be a very useful instrument for foresters and forest economists. The completion of three years of field work on a similar growth and yield study in the western yellow pine type is another milestone in the program of thoroughgoing mensurational studies in the principal forest types.

Fire studies, which are perhaps the most difficult in their technic of any on the Station program, yet most promising of results, have made substantial progress yet not reached the major publication stage. An important project begun during the year is a statistical analysis of all past fires on the national forests east of the Cascades, made in cooperation with the Regional Forester. The appropriation bill, now in Congress, gives to this Station $15,000 for this work, providing the wherewithal to make fire research more commensurate with its importance than has been possible before.

Cooperative relations with many other forest agencies have continued to be close and mutually helpful. Worth-while contacts with the public and those who are in a position to use the results of the Station's findings have been increasing at a gratifying rate.

EXPERIMENTAL FORESTS AND NATURAL AREAS

A recent regulation of the Secretary of Agriculture makes mandatory upon the Regional Foresters and Experiment Station Directors the setting aside of certain areas of national forests for scientific study, either as experimental forests, experimental ranges, or natural areas (virgin timber reservations). This is an expansion of a previous order of like objective. A Committee has been engaged upon the selection of such areas and to date two experimental forests, each of several

thousand acres, have been tentatively selected, one in the Douglas fir type on the Columbia National Forest within the Wind River valley, and the other in the pine type on the Deschutes National Forest. A few natural areas each of about 1000 acres have also been tentatively selected as follows: one representative of the Sitka spruce type of Washington, one of the Douglas fir type, one in the cedar type of the northern Cascades, and three in the western yellow pine type. Other experimental forests and natural areas are under consideration.

PRINCIPAL ACTIVE PROJECTS IN 1930

Economic Studies

Forest Survey of the Douglas Fir Region

The Forest Survey has been under way just a little over one year. At the time of the Council Meeting last year, only three of the present personnel had been selected, and only the major items of what to get and how to get it were under consideration. Since then these items have been decided upon, working plans for all aspects of the inventory phase of the project have been drawn up, and about 40 per cent of the field work has been completed. Working plans for the growth, depletion, and requirements phases are as still at the formative stage as was the inventory phase a year ago.

Work on the inventory divided itself into two major subheads, namely, procedure on national forest land, and procedure on all other lands. On the national forests, existing data, aside from that for the areas which have been cruised intensively for timber sales, land exchanges, claims, etc., consisted of the extensive reconnaissance made in 1912-1915 and revised in 1922-3. On these areas a plan for gathering both type and volume data by what might be called an intensive application of the reconnaissance method has been used, and to date field work has been completed on two national forests and is in various stages of progress on all the others, with a total of five million acres of national forest land covered. Present plans contemplate the completion of field work on the national forests by the end of the 1931 field season. Twelve men are employed on this work.

Work on private lands, O & C railroad grant lands, and other publicly owned lands resolved itself into four major phases.

1. Transcribing existing cruises, including the copying of private, O & C, and county cruises, and also the records of areas cut over.

2. Field mapping and volume estimating for all areas not covered by existing cruises.

3. Adjusting of private, county, and O & C cruises to a common standard by the checking of sample areas in the field.

4. Assembly and recapitulation of all data obtained both from office records and by field work.

At this time practically all of the transcribing of existing data has been completed. Field mapping and volume determination has been done for eight counties and is now in progress in four others with four men spending all of their time on it. Adjusting of cruises by field checking has been completed in six counties and is under way in three others with four men spending all of their time on this work. Compilation procedure has been completed for one county and working plans for standardizing this procedure are under way.

If work continues at the present rate of progress, and if appropriations are as large next year as this, it is expected that the bulk of the field work on lands outside of the national forests could be completed late in the winter of 1931-32.

The base map of Oregon, upon which the forest cover type map will be printed in colors, is well under way and should be completed by spring; the base map of Washington has just been started. The drafting and publication of these base maps is being financed wholly by several cooperating state agencies. Since these maps, which are on a scale of 1/4 inch to the mile, cannot be expected to show all the forest cover detail which the field men have obtained, it is the hope that funds may permit of producing a limited number of maps for each county on a larger scale for the detailed use of the State Foresters, wardens, and other interested agencies.

The cooperation of the State Foresters and their staffs and of the timberland owners has been very cordial and exceedingly useful. Without it the project could not have progressed as rapidly and as successfully as it has. State wardens have this winter been acting as assistants to the check cruisers in both States. Private owners have been, with few exceptions, willing to allow the confidential use of their cruises. The Chief Forester has asked the Governors of both Oregon and Washington for financial cooperation, and bills to that effect asking $25,000 from each State have been drafted but at this writing have not been acted upon by either Legislature.

In order to test out for a county or two the methodology of linear strip surveys in this region and to make a comparison of that method with the compilation method, a crew of three has been assigned to Lewis County which will be covered with strips three miles apart. A detailed working plan for this method has been prepared.

Difficult technical problems are constantly being encountered and puzzling the staff and the advice of others has been sought and is always welcome. Questions such as the size and boundaries of release units, what will be the trend in agricultural land use, accessibility zones, how best to get depletion from all causes, how to figure growth, how far ahead to figure both growth and depletion, how best to keep the data gathered current, etc., are not finally settled as yet but are being worked upon.

Forest Insurance in the Douglas Fir Region

The forest insurance study was begun in the Douglas fir region last July. This project is authorized by the Clark-McNary Act and will be extended later to the other forest regions of the country. Its purpose is to make a scientific study of the practicability of insuring the various types of mature and immature timber and developing the technic for writing such insurance. Working plans have been prepared, a thorough search of the existing sources of information, statistical and otherwise, has been made, and some field work has been done in western Oregon.

The field work consisted of making a careful cruise of the larger burns of the last two years in five counties to determine the loss ratio in the several types and to work out the correlation between the fire wardens' reports of these same fires and the actual damage from an insurance point of view, including salvage, based upon this later and more detailed examination. Similar field work for sample counties will be continued in both Oregon and Washington this spring. The fire wardens in both states are being asked to submit a supplementary report as to the damage and behavior of their larger fires for the period 1926 to 1930. A tentative schedule of the factors that must be taken account of in writing insurance for any individual property has been prepared, and it is now the task to rate these various factors. Progress has been made in evaluating certain factors such as climatic hazard and efficiency of protective effort.

Economics of Forest Management and Exploitation
Phase I - Selective Logging in the Douglas Fir Region

In the statement to the Advisory Council last year among the "Additional Important Studies", which it would be desirable to undertake, was suggested "Economic and Silvicultural Aspects of Selection or Spot Logging in the Douglas Fir Region". It has been possible to start such a study in the last few weeks as a part of a comprehensive nation-wide study of the economics of forest land management and exploitation. This broad study will investigate and analyze the financial aspects of all phases of timberland ownership, logging, and manufacture in the hope that it may point remedies which will put the timber business on a more stable, profitable, and sustained yield basis than at present.

The phase of this project upon which the first work will be done, is the economic desirability and practical application of group selective logging in the Douglas fir region. Time and cost studies will be made of various types of machinery and other basic factors entering into the aggregate cost of logging stands of various densities and characteristics as to log size, location, topography, etc. The results of these investigations will be applied to studies in typical logging areas designed to predetermine the location and order of cutting which will yield the largest profits from currant operations, and leave areas unsuited for any immediate cutting in the best situation for future increase in value.

Investigations already made by Mr. Brandstrom, while he was connected with the University of Washington, who will direct this phase of the project, indicate that group selective logging leaves forest areas in excellent condition for natural regeneration and for protection from fire, as well as being more profitable under certain conditions than indiscriminate clear cutting of continuous large areas.

Three or four crews of two men each will be placed in the field at once to analyze by time studies and log quality studies the economics and finance of logging on several representative operations in cooperation with the companies concerned. A detailed working plan for this study has been prepared.

Planting Studies

Regional Races of Western Yellow Pine

In the spring of 1928, over 32,000 trees, grown from seed collected in ten localities in the natural range of western yellow pine, were set out on six areas in Washington and Oregon. These plantations, which are located on three national forests and on the demonstration areas of the three local forest schools, are examined each fall for survival and growth. In 1930 the mortality for all the plots averaged nearly 8 per cent. As expected the plantations west of the Cascades have a much better survival and growth than similar plots east of the mountains. Although these plots are annually examined no analysis of the data to determine adaptability and hereditary characteristics will be made until the plants are well established and larger in size.

Tests of Species at Wind River Arboretum

At the Wind River Arboretum there were several additions to the 400 separate lots of seed or plants previously tested. While no results have been published yet, a significant point brought out by the work is that the Wind River climate is decidedly unfavorable to broadleaf species. The customary exchange of seeds and stock with various domestic and foreign agencies was continued as usual and a special effort was made to secure South American species, of which we now have but a single representative.

Primarily for the use of the Portland Superintendent of Parks in the development of the Portland Civic Arboretum, a complete list of the conifers from all parts of the world likely to survive in the milder portions of Oregon and Washington was prepared; it was based partly upon experience at Wind River.

Nursery and Field Planting Technic (Conducted chiefly by the Regional Forester's Organization)

Studies under way have been continued on seed storage and nursery practice of several northwest species. Special attention was given to development of seedling stock satisfactory for outplanting, hoping thereby to eliminate the expensive step of transplanting in the nursery. Damping-off studies previously carried in cooperation with the B.P.I. were followed up, and in the field tests of different species, spacing, and fall and spring planting, are being continued. Direct seeding tests with the small seeded species of the fog belt conducted in 1929 and 1930 were repeated in January 1931. The 1929 seeding now has an average of over 1000 seedlings to the acre, but the 1930 was not so successful, having an average of only 800 to the acre at the end of the first year.

Natural Reproduction

Reproductive Habits of Douglas Fir

This study as in the past includes:

a. Instrumental measurement of physical factors and careful observation of biological factors to determine the cause of seedling losses when and where they occur.

b. Natural germination and survival on various site and ground conditions on logged-off lands - observed on a total of over 300 plots in 20 different parts of the region.

c. Influence of sheep grazing on coniferous seedling survival and on the reduction of fire hazard on logged-off lands.

d. Seed production, its season and distance of dissemination and its destiny after it falls.

e. The survival and effectiveness of seed trees left singly or in groups or strips.

None of the above phases of the study were completed last season as these are long time studies, yet many important facts were established.

On the area where the intensive study was being made, it was found that the white-footed mouse was, under certain conditions, the prime agent in the destruction of newly germinated seedlings. It was quite definitely established that comparatively little of the seed that falls on the forest floor retains its viability more than one year. That which is not consumed by birds and rodents was observed to germinate and die or decay within a year from the date of fall.

During the past year two additional groups of plots (b) were put in on freshly burned areas to check the germination resulting from the heavy seed crop of the past season. Seed traps were set along with these sample plots thus combining the seed dissemination study with the germination and survival study and thereby furnishing a potential measure of the seed fall that it takes to produce the seedlings that occur.

The heavy seedling losses on the intensive study area and on the sample plots scattered throughout the region coupled with the infrequent heavy seed crops, recurring fires, and rapid rate of clear cutting indicate definitely that some changes in methods of logging must be adopted if natural reproduction is to follow the removal of the virgin forest. A more adequate seed supply and more adequate fire protection must be provided. One method of accomplishing this is the economic selection system of logging, by which settings or portions of the tract

not suitable for profitable logging are left for a later time. The leaving of such areas where an economic analysis indicates its advisability is sound business, and at the same time breaks up the cut-over areas for better fire protection and for better seeding in from adjacent timber. Another possibility is the leaving of trees of low merchantable value as seed trees, as was done automatically in the days of horse logging and ground logging. Another partial remedy of the present condition is to leave unburned areas of low fire hazard upon which there is seed on the ground or a considerable number of living trees.

The reproduction studies in the fir region should be extended to the fog belt. That region has now but a single small group of plots that were put in last year.

Methods of Cutting Western Yellow Pine

Four areas on the Malheur Forest, comprising 35 acres, were added this past season to the series of permanent sample plots to test various methods of cutting in the western yellow pine type. This brings the total number of plots in this project to 21, with an area of 278 acres. These plots range from 5 to 50 acres in size and are located on four national forests in eastern Oregon. All plots are examined at least once each year; those on which more intensive reproduction studies are carried on are gone over two or three times during the growing season.

These plots are designed to test the results of various styles of selection cutting upon quantity and quality of growth, upon reproduction, and upon the financial aspects of the timber harvest. The four plots established this year exemplify the following methods of cutting:

a. Standard Selection - Current Forest Service practice leaving uncut about 20 per cent by volume.

b. Uniform Selection, tending towards an even-aged stand.

c. Improvement Selection, in which only overmature and defective trees are removed, here leaving about 50 per cent by volume.

d. Value Selection - the highest quality material up to 50 per cent of the volume of the virgin stand is cut.

The earliest group of plots have passed their 15th year since cutting. The photographs on the cover of this report give an example of what takes place in one and a half decades. On this plot there are now 45 more trees per acre over 4 inches in diameter than at the time of cutting. Also it was noted that at the end of the fifteen-year period there were alive nearly 1,000 tree seedlings per acre that had started since cutting.

Slash Disposal

Slash Disposal in Douglas Fir Forests

The proper disposal of logging slash in the Douglas fir region continues to be a most important technical problem. A solution to this problem is being sought in several ways: by intensive studies of the changes taking place on permanently marked plots in typical slash areas; by extensive surveys of areas for which the slash histories are known; and by assembling data already collected by other agencies which have a bearing on the slash problem. Thus far a series of 132 examination and remeasurements have been made on 58 permanent sample plots, some of which have been reexamined 4 times. Last summer 9 new plots were established in strategic localities, 26 of the older plots were reexamined and 6 plots were remeasured to find out how much material had been removed by slash fires. Detailed notes on the history of 28 typical slash areas also were obtained. The results of these investigations have been computed and compiled, but the data are still too scanty to justify making definite conclusions concerning this very controversial subject,

Slash Disposal in Yellow Pine Forests

This project was concluded by the preparation of a manuscript covering the results of the study; it was edited for publication this year and should be published in the near future.

Mensuration

Douglas Fir Region

Thirty-seven permanent sample plots on six national forests furnish the material for a long-time study of the growth and yield of second-growth Douglas fir, in addition to which there are under observation in cooperation with the Forest Supervisors, ten permanent plots for determining the effect of thinning. The 1930 additions include three plots on the Mt. Hood Forest in the neighborhood of Rhododendron. All these plots are remeasured at five-year intervals and reports on each group appear after each remeasurement.

Western Yellow Pine Region

The field work on the growth and yield study was completed during the summer of 1930. During three field seasons, old selectively cut areas were visited and examined from the California line to the Canadian line, and from the Cascades to the eastern boundaries of Washington and Oregon. One hundred and seventy-nine sample plots were measured in great detail. An increment boring was taken from each of the 5607 trees which grew on these plots, many of the trees being bored twice so that a total of 8084 cores were measured as the basis for a detailed tree and plot

growth study. In addition 15 extensive areas of cut-over and virgin timber were partly strip surveyed so that definite knowledge of the extensive distribution of the trees would be had. Approximately 85 plots were taken in reproduction and in fully stocked stands of immature timber, to learn the facts about the development of dense young stands. There were several other phases of the field work in this complex study involving the form changes and growth of the individual tree, the yield per unit area, the growth of the immature trees, and finally the application of all this knowledge to the extensive area.

Office work is now proceeding rapidly with the expectation that some of the major conclusions will be reached by the end of this winter, and publication of a thorough treatise on the productive capacity of yellow pine lands under various kinds of treatment will follow later.

Fire Studies

Behavior of Going Fires

Each year a very few large fires are responsible for practically all of the burned acreage and for most of the total suppression costs. The effective suppression of these large fires requires accurate knowledge of the way fire behavior is influenced by various external factors, such as weather, fuels, and topography. This study is an attempt to obtain the information which will make possible a more thorough understanding of fire behavior. Detailed and very intensive studies are made of large fires and correlated with all possible measurements of physical factors. Valuable information has been obtained through these investigations and, now that a satisfactory technic has been developed, a correspondingly greater amount of practical information can be secured. The 1930 season resulted in so few large fires in the Douglas fir region that only four fires could be studied in detail from start to finish.

Reporting and Charting Lightning Storms

Lightning continues to be the chief cause of fires on the national forests of this region. There is no way to prevent fires from this cause and therefore the only possibility for defense is to be able to anticipate the occurrence of lightning storms and to know where these storms are most likely to travel after they form. The study is nationwide on the national forests, and thus covers practically all of the mountainous sections of the country. The basic data are the lightning storm reports annually compiled by the Forest Service and cooperating lookouts. In Washington and Oregon more than 5,000 such reports have been turned in since 1924 and the study must be continued for a number of years yet to obtain enough data for accurate conclusions. The Weather Bureau is using the reports currently to study the meteorological

conditions responsible for the formation of lightning storms. The Experiment Station is charting the paths of travel for individual storms and also is making a detailed statistical analysis of the data.

The Effect of Weather on Fuel Moisture Content

For several years measurements have been made at Wind River to determine the daily and seasonal change in the moisture content of important forest fuels and thus furnish some indication of their inflammability. The field work during the past season was restricted to measurement of the moisture content of a few of the more common fuels every ten days. A progress report giving in detail the results thus far obtained in the study is now in preparation. The 1930 season brought to a close 20 years of weather observations at the Wind River Station, and summaries of these observations were made for distribution to those most likely to have need of them.

Static as an Indicator of Thunderstorms

The results obtained in one of the fire studies suggested that atmospheric static might be used as a warning of approaching lightning storms. Five small meters to indicate static intensity were devised and placed in operation on five national forests, and if successful, these meters will enable local forest officers to determine whether or not thunderstorms are likely to occur within a few hours in the immediate vicinity of the instruments. It was expected that the first season would be required to test the behavior of the meters and to familiarize the forest officers with their operation, but the results obtained are promising enough to justify continuing the study.

The Time Factors in Fire Control

Since the last meeting of the Council a notable advance has been made in the strategy of fire control. This step forward consists of first, the establishment of definite objectives for fire control -- that is, for each major cover type there is now a definite objective expressed as a percentage of the total acreage in each type; if no more than the objective acreage is burned, the fire control may be considered satisfactory. These objectives are based on the damage resulting from fire in the various cover types. The damages and the fire control objectives are expressed on a comparative basis thus providing a relative measure between cover types in various parts of the nation. Secondly, the fire reports are being analyzed to ascertain, on the basis of past experience, how quickly fires must be reached in order to hold the annual burned acreage to the fire control objective. Preliminary work was done on this study in California, later much amplified by the Regional Foresters at their meeting last March in Washington, D. C., and is now being carried forward by the individual forest regions. The Experiment Station is cooperating with the office of the Regional Forester

in making the study for Washington and Oregon and most of the eastern Oregon and Washington forests have been analyzed this winter. For the present, the study is restricted to the national forests, but it is not improbable that the future distribution of Clark-McNary money for fire control on State and private lands will be governed by similar studies outside of the national forests.

Other Fire Studies

On July 1 the station will receive an increase of about $15,000 annually to provide adequate personnel for existing fire research projects and to permit some expansion in this type of work. The opinion of the Council is desired as to the direction this proposed expansion of activities should take. Some suggestions which have been offered in the past are listed here to stimulate discussion:

Determination of fire damage by timber types (to furnish basic information for hazard rating to be used in insurance studies and in establishing fire control objectives).

Better and more localized prediction of lightning storms.

Hazard reduction with first attention on slash disposal in the Douglas fir region.

Causes and methods for elimination or reduction in number of smokers' fires.

Improved detection and communication, including equipment.

Suppression equipment.

Improvement of weather forecasts.

The human factor in man-caused fires (incendiary fires to receive first consideration)

Degree of protection as related to values at stake.

Forest fuels.

Fire behavior.

Botanical Studies

Phenology in the Douglas Fir Region

Systematic recording of the life events of forest trees and associated plants has now been done for four years in the Douglas fir region. Observation stations are located on each national forest west of the Cascades, on the Peavy Arboretum of O.S.C., on the Pack Demonstration Forest of the University of Washington, on Seattle's Cedar River watershed, and in the Portland Civic Arboretum. The addition of the last named in the spring of 1930 brought the total number of observation stations up to 23. On these plots during the past season a total of 2403 events were recorded for 27 species of plants.

PROGRAM OF WORK FOR 1931

Practically all the projects on the last year's program are still uncompleted, though progress has been made in all of them, and they are all recommended for continuation until convincing conclusions are reached. The following program is therefore proposed for 1931:

Economic Studies

Forest survey of the Douglas fir region
- (a) Inventory phase
- (b) Growth phase
- (c) Depletion phase (in cooperation with Office of Forest Products, Forest Insect Station, and Office of Forest Pathology)
- (d) Requirements phase (in cooperation with Office of Forest Products)

Forest insurance in the Douglas fir region
Economic aspects of forest management and exploitation
- (a) Economic selective logging in Douglas fir

Planting Studies

Regional races of western yellow pine
Douglas fir heredity
Test of species at Wind River Arboretum and through cooperation with other arboreta
Nursery and planting technic

Natural Reproduction

Reproductive habits of Douglas fir
Methods of cutting in western yellow pine region

Slash Disposal

Slash disposal in western Oregon and Washington

Mensuration

Yield of western yellow pine (office work only)
Growth of Douglas fir stands, studied on permanent plots

Fire Studies

Behavior of going fires
Reporting and charting lightning storms
Static as an indicator of lightning storms
The time factors in fire control
Other fire studies yet to be selected (see page 12)

Botanical Studies

Phenological observations in the Douglas fir region

PERSONNEL OF THE STATION

There have been no losses in the yearlong personnel of the Station during the year, but there have been eleven additions - seven experienced technical men for the forest survey project, two specialists in the field of forest economics, Professors Kirkland and Brandstrom, one specialist for the forest insurance study, Mr. Shepard, and one clerk. Mr. McArdle returned from furlough in June, having been granted the degree of Doctor of Philosophy by the University of Michigan.

The yearlong force now consists of the following:

Name	Title	Field of Work
Thornton T. Munger	Principal Forest Economist	Director
R. E. McArdle	Associate Silviculturist	Fire Studies
W. H. Meyer	Associate Silviculturist	Mensuration
L. A. Isaac	Assistant Silviculturist	Silviculture in the Douglas fir region
E. L. Kolbe	Junior Forester	Silviculture in the western yellow pine region
A. G. Simson	Scientific Aid	Fire studies
Burt P. Kirkland*	Principal Forest Economist	Economics of Forestry
Axel J. Brandstrom	Senior Forest Economist	Economics of forestry
H. B. Shepard	Senior Forest Economist	Forest insurance study
H. J. Andrews	Senior Forest Economist	In charge Forest Survey
R. W. Cowlin	Associate Forest Economist	Forest Survey
J. W. Girard	Logging Engineer	" "
C. W. Kline	Timber Expert	" "
P. N. Pratt	Timber Expert	" "
W. J. Wakeman	Timber Expert	" "
D. N. Matthews	Assistant Forester	Forest Survey on the national forests
W. H. Bolles	Assistant Forester	Forest Survey
P. D. Kemp	Assistant Forester	" "
E. D. Buell	Junior Forester	" "
P. A. Briegleb	Junior Forester	" "
F. L. Moravets	Junior Forester	" "
June H. Wertz	Principal Clerk	Principal Clerk
Grace L. Pinkston	Asst. Clerk-Stenographer	Stenographer
Edith A. Parmeter	Junior Clerk	Stenographer

*On part time employment until June.

In addition temporary field assistants are employed in the summer and temporary computers in the winter.

ALLOTMENTS AND EXPENDITURES

The allotments to date to the Pacific Northwest Forest Experiment Station for the fiscal year ending June 30, 1931 are:

Silvical Investigations	$28,920
Forest Survey	74,700
Forest Insurance (FFC)	7,000
Economics of Forestry	6,000
Equipment and Supplies	350
Improvement (at Wind River)	100
Total	$117,070

The tentative allotments for the Fiscal Year 1932 provide for an increase under Silvical Investigations of $15,000, for fire studies but no increase in other items.

During the Fiscal Year 1930 expenditures for the major lines of work were as follows:

Management (Methods of cutting, natural reproduction and slash disposal)	$12,346.15
Mensuration	9,591.62
Fire	5,934.23
Forestation	1,048.00
Forest Survey	30,000.00
Total	$58,920.00

PRINCIPAL MANUSCRIPT REPORTS PREPARED IN 1930

L. A. Isaac	Survival of Seed Trees in the Douglas Fir Region.
E. L. Kolbe	Phenology as an Instrument of Forest Administration. For Northwest Science Convention.
Richard E. McArdle	The Relation of Mycorrhizae to Coniferous Tree Seedlings.
W. H. Meyer	Volume Tables and Volume Alinement Charts for Western Yellow Pine on Sites II, III, IV, V, and VI.
	Report on the Third Measurement of the Piedmont Thinning Plots, Wind River Branch Station.
	Report on the 1929 Measurements of Permanent Sample Plots 2, 4, 5 and 9. Columbia National Forest.
	The Effect of Dry Cycles upon Forests and Some Forest Uses. For Northwest Science Convention.
Thornton T. Munger	Firebreaks and Intensive Protection vs. Brush Piling in Pine Regions. Paper for meeting of Western Forestry and Conservation Association.
A. G. Simson	The Effect of Relative Humidity on Short-Period Fluctuations in Fuel Moisture Content.

PRINCIPAL PUBLICATIONS PRINTED IN 1930

L. A. Isaac	Northwest Scene of Active Forest Planting. West Coast Lumberman (Annual Review) May 15,1930.
	Seedling Mortality and the Restocking of Douglas Fir Logged-off Land - Annual Cruise O.S.C. Forest School - 1930.
	Seed Flight in the Douglas Fir Region Journal of Forestry - April 1930.
W. H. Meyer	Method of Constructing Growth Tables for Selectively Cut Stands of Western Yellow Pine. Journal of Forestry, December 1, 1930.
	A Study of the Relation between Actual and Normal Yields of Immature Douglas Fir Forests. Journal of Agricultural Research, Vol. 41, No. 9.
	Diameter Distribution Series in Even-aged Forest Stands. Yale University Bulletin No. 28.
R. E. McArdle and W. H. Meyer	Yield of Douglas Fir in the Pacific Northwest. U. S. Dept. of Agriculture Bulletin No. 201T.
R. E. McArdle	Effect of Fire on Douglas fir Slash. Journal of Forestry, April 1930.
Thornton T. Munger	Inventorying Oregon's Forest Wealth Oregon Banking Bulletin, March 1930.
	Ecological Aspects of the Transition from Old Forests to New. Science, October 3, 1930.
A. G. Simson	Relative Humidity and Short-Period Fluctuations in the Moisture Content of Certain Forest Fuels. Monthly Weather Review, Sept. 1930.
	Relative Humidity and Fuel Moisture. Four-L Lumber News.

There were two issues of "Forest Research Notes" mimeographed during the year and about 300 copies distributed.

Thornton T. Munger

Director.