STATE OF WASHINGTON

SEVENTH BIENNIAL REPORT

OF THE

Department of Conservation and Development

From October 1, 1932, to September 30, 1934

E. F. BANKER, Director

OLYMPIA
STATE PRINTING PLANT
1935

GOVERNOR
Hon. Clarence D. Martin.

DEPARTMENT OF CONSERVATION AND DEVELOPMENT
E. F. Banker, Director.

Division of RECLAMATION
Chas. J. Bartholet
Acting Supervisor.

- Refinancing, Reorganization, Rehabilitation and Supervision of construction of Diking, Drainage & Irrigation Districts.
- Land Settlement
- Logged-off Land Problems
- Special Investigations re State Development.
- Advice & Assistance to Reclamation Districts.

Division of FORESTRY
T. S. Goodyear.
Supervisor.

- Administration of Forest Protection Laws, Slash Disposal, Logging Operations, Railroads, Highways C.C.C. Camps on State & Private Lands, Reforestation Act.
- Forest Patrol Assessments on Privately Owned Lands.
- Selection of Lands for State Forest Board.
- Reforestation & Timber Development Investigation.
- Construction & Maintenance Fire Protection Roads, Trails, Telephone Systems, Lookout & Ranger Stations.

Division of WATER RESOURCES
Chas. J. Bartholet.
Supervisor.

- Supervision of Water Resources.
- Determination & Administration of Existing Rights.
- Acquisition of New Rights for Municipal, Domestic Irrigation, Manufacturing, Mining and all other beneficial uses.
- Examination of proposed Hydraulic Works and Safety Inspection of Existing Structures.
- Hydrographic Surveys. Stream Measurments.

Division of GEOLOGY
Harold E. Culver.
Supervisor.

- ECONOMIC STUDIES.
  - Inventory of Mineral Resources.
  - Compilation of data on Mining Development.
  - Mineral Statistics (co-op)
  - Special Investigations:-
    - Coal, Oil & Gas.
    - Clay, Magnesite, Talc & Saline Deposits.
    - Municipal & Domestic Water Supplies (co-op).
    - Gold, Silver, Lead, Zinc, Copper & Mercury
    - Chromium, Molybedenum, Tungsten & Mangenese.
- BASIC GEOLOGY
  - Stratigraphy
  - Structures.
  - Paleontology
  - Bibliography.
- TOPOGRAPHIC MAPPING (co-op)

Division of COLUMBIA BASIN
E. F. Banker.
Chairman.

Commission appointed by the Governor

Commissioners
E. F. Banker.
Ervin W. King.
J. E. McGovern.
W. G. Ronald.
Rufus Woods.

Charged with the responsibility of securing imediate development of the Columbia Basin Area by the construction of a High Dam on the Columbia River at Grand Coulee for the development of Power and for Irrigation.

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DEPARTMENT OF CONSERVATION AND DEVELOPMENT

E. F. BANKER, *Director*
J. B. FINK, *Asst. Director*
Olympia

DIVISION OF HYDRAULICS

CHAS. J. BARTHOLET, *Supervisor*
J. F. R. APPLEBY, *Asst. Supervisor*
Olympia

DIVISION OF RECLAMATION

CHAS. J. BARTHOLET, *Supervisor*
Olympia

DIVISION OF FORESTRY

T. S. GOODYEAR, *Supervisor*
Olympia

DIVISION OF GEOLOGY

H. E. CULVER, *Supervisor*
Pullman

DIVISION OF NATURAL RESOURCES

THOS. B. HILL, *Assistant*
Olympia

COLUMBIA BASIN COMMISSION

E. F. BANKER, *Chairman*
Olympia

LETTER OF TRANSMITTAL

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

December 30, 1934.

To His Excellency, Clarence D. Martin, Governor.

Sir: I have the honor to submit herewith, in accordance with law, the Seventh Biennial Report of the Department of Conservation and Development, covering the period from October 1, 1932, to September 30, 1934.

Respectfully,

E. F. BANKER, Director.
Department of Conservation and Development.

INTRODUCTION

The Department of Conservation and Development comprises five divisions, namely: Reclamation, Hydraulics, Geology, Forestry and Columbia Basin Survey. The reports of each of these divisions for the biennium recently closed are submitted, except for the Columbia Basin Survey. The functions of this division are now performed by the Columbia Basin Commission of which I am chairman, and its report is filed independently.

The Director of the Department is the directing head of each division. In addition to its normal duties the Department has begun a survey of the state's natural resources under an allotment of $80,000 from Washington Emergency Relief Commission. With this fund our activities in stream measurement and appraisal of our water resources were largely extended and the program of river surveys was enlarged, both in cooperation with the Water Resources and Conservation branches of the United States Geological Survey; our geological investigations were enlarged, and an extensive program of investigation of our mineral resources has been carried on. In connection with these mineral investigations the Department supervised a C. W. A., and later a W. E. R. A. project, employing trained unemployed men, expending under these projects on this work to December 20, 1934, the sum of $31,023.26. Special investigations have been made of our oil and gas resources, and a progress report on the fields of Western Whatcom County is published. The Department also carried on an independent program of topographic mapping, surveying two 15 minute quadrangles. For this work the Emergency Relief allotment was supplemented by $14,546.50 in C. W. A. and W. E. R. A. projects.

Another allotment of Emergency Relief funds, in the sum of $20,000 was made to investigate the opportunity for a power market in the reduction and processing of minerals, and to equip a laboratory in connection therewith in the State College of Washington. This equipment has been purchased, and the power market investigations are under way, with encouraging preliminary results.

The supervision of twelve C. C. C. camps in the Division of Forestry, was also an activity in addition to the normal functions of the Department. In the biennium a State Forest policy has been definitely established. Eighty-five thousand acres have been purchased, and a program adopted under which 500,000 acres will be included in State Forests within five years. In addition 300,000 acres have already been classified under the reforestation act, and there are applications on file for 500,000 additional acres. At the end of the coming biennium there should be upwards of one million acres in state owned or state controlled forests.

The flood of December, 1933, and January, 1934, heavily increased the duties of the Department. In addition to the direct work that the Department could do in this emergency, it supervised a number of C. W. A. projects for flood protection and repair of damage.

The director of the Department is also a member of the Washington State Planning Council. These activities are all closely related to the work of the Department of Conservation and Development in connection with the survey and use of our great natural resources.

E. F. BANKER, Director,
Department of Conservation and Development.

DIVISION OF RECLAMATION

E. F. Banker, Director

The Division of Reclamation is that branch of the Department of Conservation and Development charged with the administration of State reclamation activities under provisions of the State Reclamation Act. The work involves the loaning of moneys from the State Reclamation Revolving Fund for the purpose of (1) refinancing legally organized irrigation, diking and drainage districts which are in financial distress, and (2) making repairs and improvements of the systems of such districts. For both types of loans the State accepts district bonds. In addition to financing reclamation districts, the Division of Reclamation has, when called upon, given its services and advice to many districts concerning their various problems.

Although the Reclamation Act provides for a staff of employees to carry on the activities of this division, the work has been handled by the general office, with the assistance of the Division of Hydraulics. This makes possible the saving of considerable sums that would otherwise be paid out of the Reclamation Revolving Fund to maintain a Reclamation Division. The actual costs incurred in investigating districts which have been refinanced or to which loans have been advanced were collected from such districts, and the State has thereby been relieved of such expenditures.

When I assumed office in April, 1933, there were fifty applications on file for the use of funds of the State Reclamation Revolving Fund. The districts which had filed these applications were in bad financial straits and many of the landowners were ready to abandon their farms because of the heavy bonded burden they were carrying. The number of applications soon increased to seventy-six, containing requests for funds amounting to double the $1,250,000 appropriated for this purpose by the 1933 session of the Legislature.

RECONSTRUCTION FINANCE CORPORATION LOANS

The appropriation being wholly inadequate to meet the requirements of the districts in this State, we began to plan a method of allotment of the funds.

About this time Congress had a bill placed before it for the appropriation of $50,000,000 for refinancing drainage, levee, diking and irrigation districts in the United States, such funds to be provided from those of the Reconstruction Finance Corporation under the Emergency Farm Mortgage Act. We lost no time in backing this measure through our Congressional delegation, as we saw a real necessity for it. The bill was finally passed and approved June 16, 1933. Since then, an additional $75,000,000 has been appropriated for this purpose.

Our next move was to obtain a fair allotment of these funds for this state to supplement the amount appropriated by our own Legislature. We advised all the districts which had made application to this office for financial relief that Federal funds had been made available for the relief of districts and requested them to send in their applications immediately. We next prepared forms for preliminary applications and sent them to the various districts in order that their applications might be expedited. Also, we sent instructions and advice concerning the information required by the Reconstruction Finance Corporation.

To date, of twenty-seven applications filed by districts in this state,

eleven have been approved for Federal loans amounting to a total of $1,079,195.70, to retire an indebtedness of $2,215,087.82.

INSPECTION OF DISTRICTS FOR LOANS

It became apparent that the refinancing of reclamation districts by the Reconstruction Finance Corporation would be slow at best, so we began an investigation of the districts which had made application to the State for financial relief. Each investigation included an inspection of the district on the ground, at which time the condition of the reclamation works, the lands, crops, improvements, etc., were examined. This was followed by a study of the financial condition of the district. The next move in the consideration of each application was an investigation by the Attorney General's office of the District's legal status. This detailed examination of each of the districts was made in order to enable us to determine where the funds would do the greatest good and benefit the largest number of people.

ALLOTMENT OF FUNDS

As the districts were inspected and studied complete reports were prepared on those which seemed to be in most dire need of refinancing and a copy of each such report was forwarded to the Governor for his approval, as required by state law.

Our examinations have resulted in the refinancing of the following districts:

DISTRICT	County	Approximate Par Value of Bonds Purchased	Percentage of Par Value Paid	Amount Paid
Drainage District No. 1	Jefferson	$57,500 00	40%	$23,000 00
Diking and Drainage Improvement District No. 4 ($25,000 to be paid for additional bonds, par value $50,000, when funds become available).	Grays Harbor.	24,000 00	50%	12,000 00
Drainage Improvement District No. 35.. ($17,000 to be paid before Feb. 15, 1935, for additional bonds)	Yakima	30,500 00	50% (plus int.)	17,080 00
Drainage Improvement District No. 41..	Yakima	$4,599 38	100%	$4,599 38
Drainage Improvement District No. 43..	Yakima	7,375 00	100%	7,375 00
Fruitland Irrigation District	Stevens	259,800 00	24.436 & 24.5%	63,482 34
Grandview Irrigation District	Benton and Yakima	14,500 00	62%	9,000 00
Horse Heaven Irrigation District	Benton, Klickitat and Yakima.	180,000 00	66.67%	120,000 00
Icicle Irrigation District	Chelan	80,000 00 13,000 00 18,000 00	75% 77% 78.3%	84,104 00
Lake Chelan Reclamation District	Chelan	305,500 00	50%	152,750 00
Oroville-Tonasket Irrigation District	Okanogan	$11,000 00	25%	202,750 00
Outlook Irrigation District	Yakima	30,000 00	80%	24,300 00
Richland Irrigation District	Benton	538,000 00	26.5%	142,570 00
Stemilt Irrigation District	Chelan	15,780 00	75%	11,825 00
Union Gap Irrigation District	Yakima	20,000 00	100%	20,000 00
Wenas Irrigation District	Yakima	17,500 00	75%	13,100 00
Wenatchee-Chewawa Irrigation District. ($3,000 to be paid Jan. 1, 1935 for additional bonds, par value $45,000)	Chelan	45,000 00	6.67%	3,000 00
Wenatchee Heights Reclamation District	Chelan	37,212 67	50%	18,606 34
Yelm Irrigation District	Thurston (warrants)	202,200 00 7,000 00 60,000 00	35% 33.33% & 35% 33.33% & 35%	93,618 91
Total approximate par value of bonds and warrants refunded		$2,778,467 05		
Average percentage of par value paid			36.8%	
Total paid to date to refinance districts				$1,023,161 02

It will be noted that the State has refinanced nineteen districts during the biennium, paying an average price of 36.8 cents on the dollar for the districts' bonds.

In the case of two of the districts, the original bondholders have taken part of the refunding issues. With few other exceptions, the State has purchased the entire issue, there remaining some bonds that have not been taken up because they have not been located or because the bond owners are holding out for a higher figure than the amount offered. These bonds, however, will eventually be purchased at the price paid for the main issues.

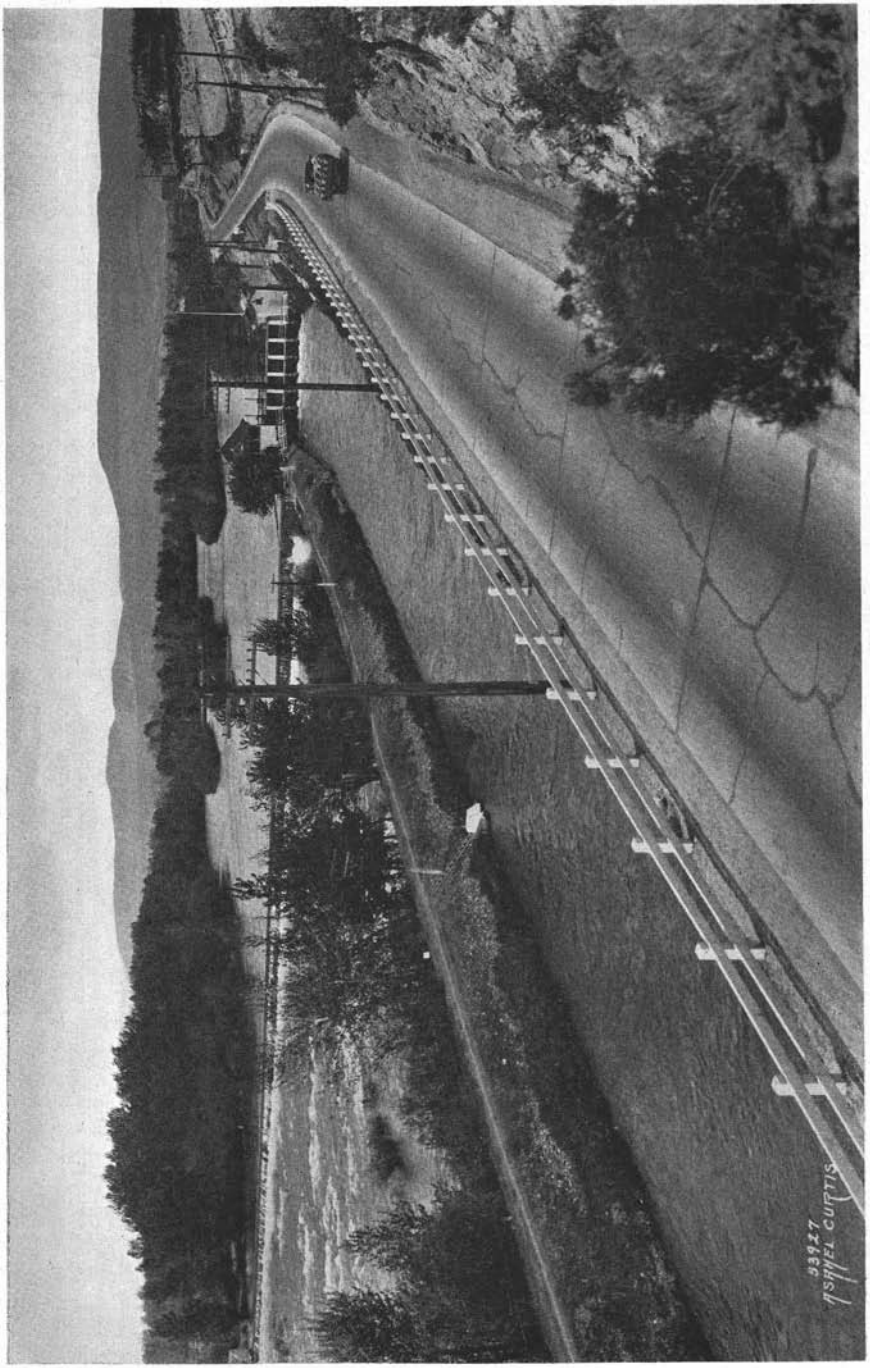
We believe that these districts are now on a sound financial basis and will be able to meet their assessments and taxes without further trouble.

FUNDS FOR REPAIRS AND IMPROVEMENTS

Some districts required funds for improvements and repairs as well as for refinancing, as the reclamation works were in a bad state of repair. Funds were advanced for improvements after plans had been submitted to this office and approved by it as to the feasibility of the work to be done. All the work was carried on under the supervision of the Department.

Contracts for loans of this type have been entered into with the twenty-six districts listed below. Some of these loans will be repaid in cash and some by bonds. With the exception of a few cases the work has been entirely completed.

District	County	Amount of Loan
Bacon Tracts Irrigation District ($4,000 additional to be advanced later)	Spokane	$4,000.00
Diking Improvement District No. 2	Cowlitz	8,000.00
Diking Improvement District No. 5	Cowlitz	4,000.00
Diking Improvement District No. 13	Cowlitz	2,000.00
Diking District No. 1	Snohomish	20,000.00
Diking District No. 2	Snohomish	8,195.00
Drainage District No. 1	Snohomish	8,000.00
Drainage District No. 2	Snohomish	10,000.00
Drainage District No. 13	Pierce	2,000.00
Dungeness Irrigation District	Clallam	2,060.82
Kennewick Irrigation District	Benton	30,000.00
Lake Chelan Reclamation District	Chelan	5,000.00
Larrabee Irrigation District	Okanogan	8,700.00
Methow Valley Irrigation District	Okanogan	1,000.00
Orchard Avenue Irrigation District	Spokane	9,250.00
Oroville-Tonasket Irrigation District	Okanogan	18,000.00
Otis Orchards Irrigation District	Spokane	48,500.00
Priest Rapids Irrigation District	Benton	26,500.00
Snipes Mountain Irrigation District	Yakima	10,000.00
Spokane Valley Irrigation District	Spokane	10,000.00
Stemilt Irrigation District	Chelan	23,175.00
Wenatchee-Chewawa Irrigation District (Additional $6,911.40 to be advanced later)	Chelan	2,088.60
Wenatchee Heights Reclamation District	Chelan	21,331.91
Whitestone Reclamation District	Okanogan	3,900.00
Wolf Creek Reclamation District	Okanogan	1,500.00
Yelm Irrigation District	Thurston	5,000.00
Total		$292,201.33



Diversion dam, intake and irrigation canal.

FUNDS FROM OTHER SOURCES FOR RECLAMATION DISTRICT IMPROVEMENTS

In addition to assisting irrigation, diking and drainage districts in obtaining loans from the Reconstruction Finance Corporation for refinancing purposes, the Department was instrumental in obtaining funds from the State Emergency Relief Administration as grant-in-aid, and from the Civil Works Administration and the Washington Emergency Relief Administration for repairs and improvements. These funds were direct gifts to the districts in the following amounts:

Grant-in-Aid	Irrigation, diking and drainage districts	$91,081.92
C. W. A. and W. E. R. A.	Diking districts	123,285.49
C. W. A. and W. E. R. A.	Drainage districts	159,995.12
C. W. A. and W. E. R. A.	Irrigation districts	234,129.97
Total		$608,492.50

BONDS

The greater part of the bonds purchased by the State is to be retired over a period of twenty years, and the bonds bear two per cent interest except in the case of two loans for which the interest is fixed at four per cent. In several instances where it was necessary to refinance districts whose one per cent bonds the State already owned, the interest rate was increased to two per cent.

EFFORT TO OBTAIN LOAN FOR THE RECLAMATION REVOLVING FUND

After the Reclamation Revolving Fund became practically exhausted and it was apparent that districts which have not yet received assistance from the State are very much in need of refinancing, efforts were begun to secure a loan in accordance with the authority given the Department under an Act of the 1933 Special Session of the Legislature, which authorized the Director of the Department of Conservation and Development to borrow money and to use as security any bonds held by the Department. Although our efforts up to this time have been somewhat unsuccessful, we believe that eventually such a loan can be secured. We are applying to every source where such a loan could be obtained.

RECLAMATION BONDS OWNED BY THE STATE OF WASHINGTON

Following is a list of reclamation district bonds owned by the State of Washington on November 15, 1934, together with the interest rates thereon:

District	County	Par Value	Interest Rate
Cascade Irrigation District	Kittitas	$40,000.00	4% to 1-1-38; 6% thereafter
Columbia Irrigation District	Benton	12,500.00	1%
Diking District No. 1	Snohomish	20,000.00	1%
		20,000.00	2%
Drainage District No. 1 (Face value of these bonds, $57,500; discounted 60% and bear interest on remaining 40% only.)	Jefferson	23,000.00	2%
Drainage District No. 1	Snohomish	8,000.00	2%
Drainage District No. 2	Snohomish	5,000.00	2%
Drainage Improvement District No. 41	Yakima	4,599.38	2%

District	County	Par Value	Interest Rate
Drainage Improvement District No. 43	Yakima	7,375.00	2%
First Creek Irrigation District	Chelan	18,500.00	1%
Franklin County Irrigation District No. 1	Franklin	21,013.82	5%
Grandview Irrigation District	Benton and Yakima	9,000.00	2%
Horse Heaven Irrigation District	Benton, Klickitat and Yakima	120,000.00	4%
Icicle Irrigation District	Chelan	257,100.00	2%
Kennewick Irrigation District	Benton	200,700.00	1%
		30,000.00	2%
Methow Valley Irrigation District	Okanogan	150,150.00	1%
		15,000.00	2%
Oroville-Tonasket Irrigation District	Okanogan	13,000.00	2%
Otis Orchards Irrigation District	Spokane	106,500.00	1%
Outlook Irrigation District	Yakima	24,300.00	2%
Richland Irrigation District	Benton	142,570.00	2%
Snipes Mountain Irrigation District	Yakima	22,500.00	1%
		6,000.00	2%
Spokane Valley Irrigation District	Spokane	28,500.00	6%
Stemilt Irrigation District	Chelan	75,000.00	1%
		35,000.00	2%
Sunnyside Irrigation District	Benton	108,000.00	1%
Union Gap Irrigation District	Yakima	20,000.00	2%
Wenas Irrigation District	Yakima	13,100.00	2%
Wenatchee-Chewawa Irrigation District	Chelan	5,000.00	2%
White Salmon Irrigation District	Klickitat	30,000.00	1%
Whitestone Reclamation District	Okanogan	253,805.00	1% 1st 10 yrs. 6% thereafter
Wolf Creek Reclamation District	Okanogan	90,000.00	1%
Yelm Irrigation District	Thurston	125,100.00	2%
Sub-total		$2,060,313.20	

Bonds purchased, but refunding operations not yet completed:

District	County	Par Value	Interest Rate
Drainage Improvement District No. 35 Par value of bonds purchased, $30,500; discounted 50% but $1,830 interest coupons paid also; to be exchanged for refunding bonds in the amount of	Yakima	$17,080.00	2%
Fruitland Irrigation District Par value of old bonds purchased, $259,800, for which we paid 24.436% and 24.5% of par; to be exchanged for refunding bonds in the amount of	Stevens	63,482.34	2%
Lake Chelan Reclamation District Par Value of old bonds purchased, $43,500, for which we paid 50% of par; to be exchanged for refunding bonds in the amount of	Chelan	21,750.00	2%
Bonds of refunding issue, for which old bonds have already been exchanged		131,000.00	2%
Old issue bonds purchased by State several years ago, not to be refunded		218,000.00	1%

Bonds Purchased, but Refunding Operations Not Yet Completed—Continued:

District	County	Par Value	Interest Rate
Wenatchee Heights Reclamation District	Chelan		
Par value of old bonds purchased, $34,000, for which we paid 50% of par, plus interest to be exchanged for refunding bonds in the amount of		18,606.34	2%
Six per cent bonds purchased by State several years ago, to be exchanged at par for refunding bonds in the amount of		20,000.00	2%
One per cent bonds purchased by state several years ago, to be exchanged at par for refunding bonds in the amount of		28,000.00	2%
West Okanogan Valley Irrigation District (now Oroville-Tonasket Irrigation District)	Okanogan		
Par value of old bonds purchased, $811,000, for which we paid 25% of par; to be exchanged for Oroville-Tonasket bonds in the amount of		$202,750.00	2%
Sub-total		$720,668.68	
Total, Reclamation District Bonds Owned by the State of Washington		$2,780,981.88	
Present investment in Diking and Drainage Improvement District No. 4, Grays Harbor County		12,000.00*	
Amount to be paid to State in bonds or cash for moneys advanced under contracts for repairs and improvements		241,705.56	
GRAND TOTAL, State's investment in irrigation district bonds and contracts		$3,034,687.44	

*The State is holding all the outstanding bonds of Diking and Drainage Improvement District No. 4, Grays Harbor County. The face value of these bonds is $74,000. The State is purchasing them at fifty cents on the dollar and has paid $12,000 of the purchase price. Twenty-five thousand dollars additional is to be paid when the funds are available in the Reclamation Revolving Fund.

BONDED AND WARRANT INDEBTEDNESS OF RECLAMATION DISTRICTS BEFORE REFINANCING OPERATIONS WERE COMMENCED

Our investigation of the districts disclosed that, before refinancing operations were commenced by the Reconstruction Finance Corporation and the State of Washington, the 97 irrigation districts in the State had a bonded and warrant indebtedness of approximately $9,000,000, and the 142 diking and drainage districts were carrying a bonded and warrant indebtedness of approximately $4,500,000, or a total indebtedness of irrigation, diking and drainage districts amounting to approximately $13,500,000.

FLOOD CONTROL

During the winter of 1933-1934 the State experienced the greatest and most destructive floods since settlement by the white man. This office co-operated with the Civil Works Administration and the Washington Emergency Relief Administration in outlining projects for the repair of damages and improvements to prevent further disasters. The Department was also instrumental in obtaining more liberal allotments of Government funds for such purposes. Long after the C. W. A. flood relief funds were exhausted, appeals came to this office from all sections of the state, requesting financial assistance for flood repairs and improvements. Although the relief could not be rendered, we offered advice and agreed to use every effort to obtain money from some source, either Federal or State, to carry on flood control work.

RECOMMENDED LEGISLATION

We recommend that Chapter 29, Laws of the Extraordinary Session of 1933, which said chapter refers to elections, be amended to exclude irrigation, diking and drainage districts.

We ask, also, for an appropriation of $1,250,000 to enable us to carry on further refinancing operations during the coming biennium.

DIVISION OF HYDRAULICS

Honorable E. F. Banker, Director,
Department of Conservation and Development,
Olympia, Washington.

Dear Sir: It gives me pleasure to submit, herewith, a brief report of the Division of Hydraulics for the biennium October 1, 1932, to October 1, 1934.

In this report we have included only such information as may be of interest to yourself, the Governor and members of the Legislature and to the public in general.

While general financial conditions have considerably reduced the number of applications and the size of the developments coming under our jurisdiction, they have also created a number of new problems to be handled through this division, such as giving assistance in flood control, etc. The personnel of the office has been reduced almost 50% since the last biennium.

Respectfully submitted,

CHAS. J. BARTHOLET,
State Supervisor of Hydraulics.

PERSONNEL

Division of Hydraulics

Chas. J. Bartholet.....Supervisor
J. F. R. Appleby.....Assistant Supervisor
Gwendolyn Hallahan.....Secretary
Deena Philbrick.....Stenographer

FOREWORD

There could be no human habitation without water and on the water supply largely depends the development of the country, as it is necessary for domestic and municipal supplies, for stock, irrigation, manufacturing, mining and power purposes. So valuable is this resource that in 1917 the Legislature of this state passed the Water Code, giving the central authority over its regulation and supervision to the "State Supervisor of Hydraulics" under the Department of Conservation and Development.

The activities of the office during the present biennium in conducting its affairs will be briefly outlined.

ADMINISTRATION

For administrative purposes the work of the Division of Hydraulics has been divided into four branches, namely:

1. Supervision and Regulation of Use and Development of Water Resources of the State.
2. Determination of Existing Rights.
3. Initiation of New Rights.
4. Collection and Recording of Hydrographic Data.

Under the first classification probably rests the greatest responsibility, owing to the fact that it is necessary to regulate the diversion of waters from many small streams in the State which supply water for irrigation of about 210,000 acres of land.

Also many disputes arise over the use of water from small streams and springs for domestic use. This supervision was carried on during the biennium with the following staff of water masters and stream patrolmen:

WATER MASTERS

Loyd Fairbrook ..... Yakima County
Harlow Barney ..... Walla Walla County
Ben Magill ..... Columbia County
Benj. Vaughn .....Kittitas County
H. M. Dixon .....Garfield and Asotin Counties
O. M. Bise ..... Chelan County
C. A. Ledgerwood .....Stevens and Ferry Counties
Calvin Casteel .....Okanogan County
August Hanson ..... Klickitat County

STREAM PATROLMEN

George Wiltz, Myers Creek .....Okanogan County
T. R. Hawkins, Squillchuck .....Chelan County
C. H. Quinn, Stemilt Creek .....Chelan County
Geo. Meek, Menastash Creek.....Kittitas County
W. E. Burns, Beaver Creek.....Okanogan County
Alvier Kuhnhausen, Bird Creek .....Klickitat County
M. Saylor (1933), Reeser Creek .....Kittitas County
Harold Lutzenbiser (1934), Reeser Creek .....Kittitas County
H. A. Long, Ahtanum Creek .....Yakima County
Martin Haberman, Wilson Creek .....Kittitas County
Jess Tresetter, Johnson Creek .....Okanogan County
Geo. Eckfield (1933), Garrison and Yellowhawk.....Walla Walla County
W. F. Boyles (1934), Garrison and Yellowhawk ....Walla Walla County
Howard Cooke (1933), Nanum Creek .....Kittitas County
Purce Frear and Chas. Collier (1934), Nanum Creek.....Kittitas County
H. H. Kelly, Peshastin Creek .....Chelan County
Arthur Gearson (1933), Chambers Creek .....Pierce County
Ed Dahl and E. L. Laney (1933), Wenas Creek.....Yakima County
D. L. Fisher (1933), Mission Creek .....Chelan County
A. B. Flint (1933), Cowiche Creek .....Yakima County

In most instances where disputes arise the differences are settled on the ground through the efforts of the Supervisor of Hydraulics. So successfully have these matters been handled during this biennium that only one appeal from the order of the Supervisor has been made to the court.

EXTENT OF WATER RIGHT DETERMINATIONS UNDER WATER CODE

Under the second classification comes the adjudication of water rights. From June 15, 1917, the date on which the Water Code became effective, to September 30, 1932, fifty cases had been completely or practically completed, involving 3163 water rights for the irrigation of 190,000 acres. Since September 30, 1932, four additional cases have been completed, involving 157 water rights for the irrigation of 1,505.61 acres of land. In addition to the four cases which have been completed this biennium, hearings have been held in three other cases, in which 93 water rights are involved.

Fewer new cases have been undertaken during the biennium than during the few years immediately preceding due to financial conditions of the water users of the State who must bear the cost of such proceedings.

The office has completed approximately sixty per cent of the field surveys preliminary to the institution of proceedings to determine the water rights of the Yakima River and its tributaries and forty per cent of such surveys preliminary to the institution of proceedings to determine the water rights on the Colville River and its tributaries. On Eagle Creek in Chelan County and Salmon Creek in Okanogan County the surveys have been completed, but the adjudication proceedings have not yet been started.

FUTURE NECESSITY FOR DETERMINATION OF WATER RIGHTS

During the biennium three petitions for the determination of water rights have been filed with the Supervisor of Hydraulics. Forty-one petitions for adjudication of streams on which proceedings have not yet been instituted were on file prior to the beginning of the biennium. Of these there are several on which we believe conditions do not warrant action at an early date. Eventually, however, the water rights on all streams east of the Cascade Mountains, except perhaps the Snake and Columbia rivers, must be adjudicated, as the available water supply is limited and a fair distribution can be had only after proper legal action to determine the extent and relative priority of the various rights.

INITIATION OF NEW RIGHTS

It is necessary to go on the ground to examine each application for a water right in order to determine if waters are available for appropriation. Following such an examination it is necessary to prepare findings concerning all matters relating to the application and need for same, which findings then become records of this office.

RECORD OF APPLICATIONS AND PERMITS

From October 1, 1932, to October 1, 1934, there were 311 applications for permits to appropriate and store water filed in this office; 221 applications were approved and permits issued and development under 190 permits was completed and final water right certificates were issued, and eight certificates of change of point of diversion and place of use were granted. Most

of the applications and permits were for domestic supply and irrigation. There have been very few large developments because of financial conditions. This has also made considerable difference in the development of even the small projects.

USE AND POTENTIAL USE OF WATER IN THIS STATE

There are 594,865 acres of land in this State now being irrigated, and 1,981,128 acres of irrigable land for which there is a water supply and for which plans and engineering studies have been completed.

There are about 90 large hydroelectric power plants in the State with a capacity of 1,000,000 horse power. The potential horse power in the streams of the State is estimated at 12,600,000 at 50% of the time, or 9,875,000 horse power 90% of the time.

HYDROGRAPHIC DATA

Classification 4 covers the gathering of stream flow data for the purpose of determining the value of any stream for whatever purposes it may be used. This data is very necessary and essential in administering the duties covered in the other three branches of work already mentioned.

This activity is carried on in cooperation with the Water Resources Branch of the United States Geological Survey, for which $10,000 was appropriated by the legislature for the biennium for maintenance and operation of gaging stations, and is matched by an equal amount allotted by the Federal Government.

Twenty thousand dollars was allotted from the State Emergency Relief Fund for the construction of new gaging stations. The Federal Government likewise allotted $15,000 for the rehabilitation and improvement of existing gaging stations.

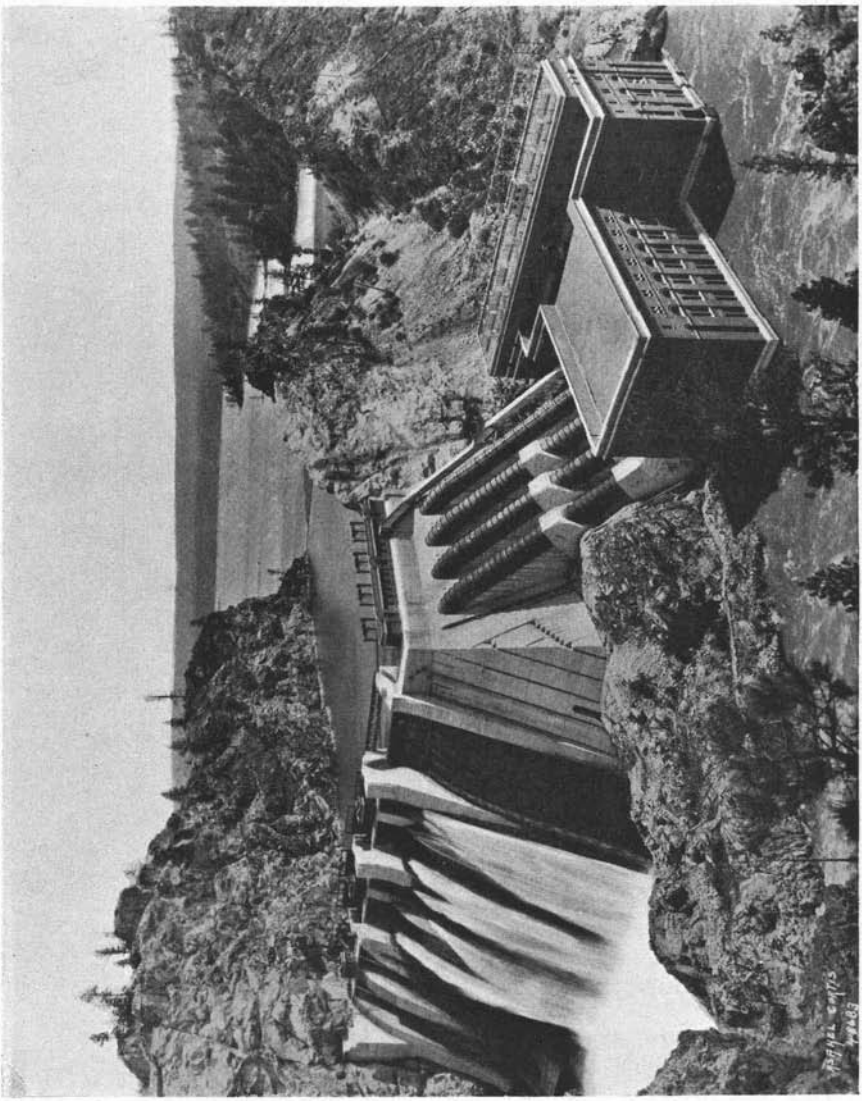
All of the work is carried on under the direction of Mr. G. L. Parker, District Engineer for the Water Resources Branch of the United States Geological Survey at Tacoma. With the funds referred to as coming from the State Emergency Relief Administration eleven permanent gaging stations have been constructed on the following streams:

Quinault River	Grays Harbor County
North Fork of Nooksack River	Whatcom County
Middle Fork of Nooksack River	Whatcom County
South Fork of Nooksack River	Whatcom County
Methow River, near Twisp	Okanogan County
Soleduck River	Clallam County
Cowlitz River at Mayfield	Lewis County
Yakima River, near Kiona	Benton County
Sultan River, above Everett intake	Snohomish County
South Fork of Skykomish River	Snohomish County
Chehalis River, near Grand Mound	Thurston County

The above named stations bring the total number operating on various streams in the State up to one hundred and seven. The records taken from these stations will be published by the United States Geological Survey.

INSPECTION OF HYDRAULIC WORKS

The Supervisor of Hydraulics is charged with the responsibility of inspecting all dams and hydraulic works in so far as may be necessary to insure safety to life and property. While no scientific inspection of 27 major dams in the State has been made during the biennium owing to the costs,



Hydroelectric Power Plant.

we do make casual inspections of such works from time to time to satisfy ourselves that the works are functioning properly. We stand ready at any time to make an inspection of such works on complaint of interested citizens or when we find any unusual conditions which indicate that repairs or improvements are necessary to prevent damage which would be caused by failure of such structures. The loss of property in the State due to failure of hydraulic works has been very small.

ROUTINE WORK AND MISCELLANEOUS ACTIVITIES

Many water users have applied to this office for assistance in solving their water right problems, involving both engineering and legal questions. We have received more such requests than usual, probably because many water users did not have the means with which to employ engineers or attorneys, due to prevailing financial conditions. These problems have received prompt attention and have, whenever possible, been solved by this office.

RIVER SURVEYS

This work consists of studies and surveys of the rivers of the State for power purposes and flood control and for other beneficial uses and is carried on by the Conservation Branch of the United States Geological Survey. During the present biennium $10,000 was allotted from the State Emergency Relief fund and was matched by an equal amount allotted by the Federal Government.

These surveys have already been made on 115 streams in Washington, covering 1,372 miles and include 69 reservoir sites.

Many of the earlier surveys are incomplete and still others are of a reconnaissance nature with insufficient information to permit a satisfactory appraisal of possibilities. They serve very well, however, in indicating what additional surveying is needed and where the topography can be expended most advantageously. Some of the streams have not been surveyed at all so that considerable new surveying and resurveying is required prior to the preparation of a dependable inventory of water resources. A total of 444 miles of new surveys and 909 miles of resurveys on 50 streams are needed. The surveys would include 42 reservoir sites and 43 dam sites.

During the biennium to date surveys were completed on the Clark Fork in Pend Oreille County, extending from Albany Falls to a point two miles below Metaline Falls, a distance of 66 miles.

On Sheep Creek in Stevens County the survey extended from the Columbia River to the international boundary line, a distance of 10 miles, including a survey of a reservoir site, containing three square miles and two dam sites.

On the East Fork of the Quinault River in Grays Harbor County surveys extended from the junction of the North and East forks, a distance of 15 miles.

The Humptulips River surveys in Grays Harbor County extended from Deep Creek to the junction of the East and West forks, a distance of 15 miles, also up the East Fork 10 miles and up the West Fork about 15 miles.

Detailed surveys were made of several dam sites.

Satsop River surveys in Grays Harbor County extended from the junction with the Chehalis River to the junction of the East and West branches,

up the West Branch to Canyon Creek, and up the East Branch to the highway bridge, a total of 45 miles.

In the Nooksack Basin in Whatcom County surveys extended on Ruth Creek upstream from the mouth four miles, up Swamp Creek six miles, up Canyon Creek from the end of previous work four miles. These streams are tributaries of the North Fork of Nooksack River. Surveys on the South Fork extend from the end of the previous work to Wanlich Creek, a distance of ten miles, also along Jones Creek a distance of ten miles, including five square miles of reservoir.

On the Toutle River in Cowlitz County 20 square miles of reservoir, covering Silver Lake, were surveyed.

On Chewack Creek in Okanogan County preliminary work was done on 29 miles.

On the Similkameen River in Okanogan County from the junction with the Okanogan River to the Canadian boundary, including Palmer Lake Reservoir, is now being surveyed.

Total number of miles of river surveys	224
Total square miles of reservoir surveys	28

POWER LICENSE FEES

Power license fees for projects, developed or undeveloped, claiming over 50 theoretical horse power, are collected annually since 1929, when the act providing for such fees was passed, by the Department of Conservation and Development through this office. One hundred and fifty-seven claims have been filed, paying close to $42,000 annually.

FLOOD CONTROL

Chapter 150, Laws of 1933, is an act relating to the control of flood waters. This act authorizes the Supervisor of Hydraulics to construct controlling and diversion works and provides for the payment of the cost of construction.

In this connection $7,000 was appropriated by the legislature for the engineering surveys and studies. The only application for services under this act came from the City of Walla Walla in connection with control of Mill Creek. Surveys and plans were made under direction of this office but were later turned over to the C. W. A. and W. E. R. A. to be completed. However, the channel of Mill Creek was improved and retaining walls constructed along the banks of the stream at critical locations, but there is much work left to complete the plans prepared by this office.

LITIGATION

The State of Washington vs. State of Oregon proceedings were instituted in the Supreme Court of the United States by the State of Washington to obtain an equable share of the waters of the Walla Walla River for the Washington Water users.

For years the entire flow of the Walla Walla River has been diverted by the Oregon water users for at least part of the irrigation season, leaving the land owners on the Washington side of the line without sufficient water to mature their crops.

In preparing the case for the attorneys representing the State of Washington much engineering data was required, including stream flow measurements, land areas and underground water studies, crop and soil surveys, all of which took the better part of two years to obtain and put in shape for evidence. The case was heard before Wm. W. Ray, Special Master, who was appointed by the Supreme Court of the United States.

Fifteen thousand dollars was appropriated by the 1933 session of the legislature to cover the cost of this case. The entire amount has been expended although the services of the Master have not yet been paid.

There was also the case of R. E. Smith, as administrator of the Estate of Orville G. Smith, deceased, vs. Chas. J. Bartholet, Supervisor of Hydraulics. This case was an appeal to the Court from the order of this office, regulating the waters of Johnson Creek in Okanogan County. In this case the plaintiff sought to recover from the Supervisor of Hydraulics $4,000 for alleged damages. The case went to trial in February, 1934. The Court sustained the action of the Supervisor of Hydraulics.

RECOMMENDED LEGISLATION

Plans for all structures crossing water courses, channel changes, erection of dikes and other structures for controlling waters in stream channels should be submitted to the Supervisor of Hydraulics for his approval as to the adequacy of their openings to permit a free passage of water.

COOPERATION WITH C. W. A.

During the winter of 1933 and 1934 the greatest floods in the State history occurred. This office assisted the C. W. A. in planning improvements for temporary relief as well as permanent relief. Its representatives visited many of the projects and prepared plans and estimates and bills of material for the necessary improvements.

RECEIPTS AND EXPENDITURES

The expenditures for the Division of Hydraulics from October 1, 1932, to October 1, 1934, were $27,376.42, while the expenditures from October 1, 1930, to October 1, 1932, were $48,714.90.

The receipts for the period October 1, 1932, to October 1, 1934, were $12,834.36. These receipts include examination fees for all applications filed, filing and recording fees for permits and certificates, miscellaneous filing and recording and copying fees and adjudication fees.

Power license fees collected by this office for 1933 amounted to $40,-961.28 and for 1934 they amounted to $41,823.39.

DIVISION OF GEOLOGY

Honorable E. F. Banker Director,
Department of Conservation and Development,
Olympia, Washington.

Sir: I have the honor to submit herewith the biennial report for the Division of Geology covering the period from April 1, 1933, to November 30, 1934. During this time the work of the Division has been considerably enhanced through the allocation of relief funds from both state and federal sources. In accordance with your request, a special report of the Mineral Survey by Mr. J. D. Hull, in charge, is included.

I wish to acknowledge with gratitude the courteous cooperation extended to the Division of Geology by members of the faculties of the University of Washington and the State College of Washington.

Very respectfully,

HAROLD E. CULVER,
Supervisor.

College Station, Pullman, Washington,
December 8, 1934.

BIENNIAL REPORT OF THE SUPERVISOR OF THE DIVISION OF GEOLOGY

The time covered by this report is readily divided into two periods: the first extending from April 1 to September 30, 1933, and the second from the latter date to December 1, 1934. In the first period the activities of the Division of Geology were necessarily restricted by the limitation imposed by a reduced budget allotment. During the second period, the scope of activities of the Division of Geology was enlarged in connection with a systematic survey of the natural resources of the State undertaken by the Department of Conservation and Development.

For the purpose of carrying out the general survey of natural resources more efficiently, and to provide employment for unemployed engineers, technical men, and laborers, both in making the survey and through opportunities that might be developed by the survey, the Washington State Emergency Relief Commission granted the sum of $80,000 to the Department of Conservation and Development, making particular reference to stream gauging, river surveys, topographic mapping and geological and mineral investigations.

There was allocated from this fund to the Water Resources Branch of the U. S. Geological Survey for cooperation in stream measurements the sum of $20,000, and to the Conservation Branch of the U. S. Geological Survey for cooperative work in river surveys the sum of $10,000, leaving a balance of $50,000 for geological and mineral investigations and research and for topographic mapping. Supplementing this fund were allocations for C. W. A. and W. E. R. A. projects under which there was expended in mineral and oil and gas investigations the sum of $29,962.36 and for topographic mapping the sum of $14,546.50.

ACTIVITIES

The work of the Division of Geology constitutes one of the fundamental activities of the State. In compiling accurate information as to the character and mineral worth of all the land of the State, it is providing basic information for a large number of the important branches of state government. The relation between geology and mining is generally understood, but it is not as commonly recognized that other activities such as reforestation, water resource investigations, land classification, and land use have an equally close dependence upon geology.

In a general sense, the activities of the Division of Geology may be grouped to combine (1) those related to topography, (2) those related to basic geology, and (3) those of an economic character. In considering this subdivision, it must be recognized that the third group—the economic studies—is the objective of all the geologic work. Other activities are of value to the Division of Geology itself only as they help this program. It is to be recognized, also, that economic studies can be efficiently undertaken only on a foundation of basic geology. In the same way, a topographic base is essential to geologic work.

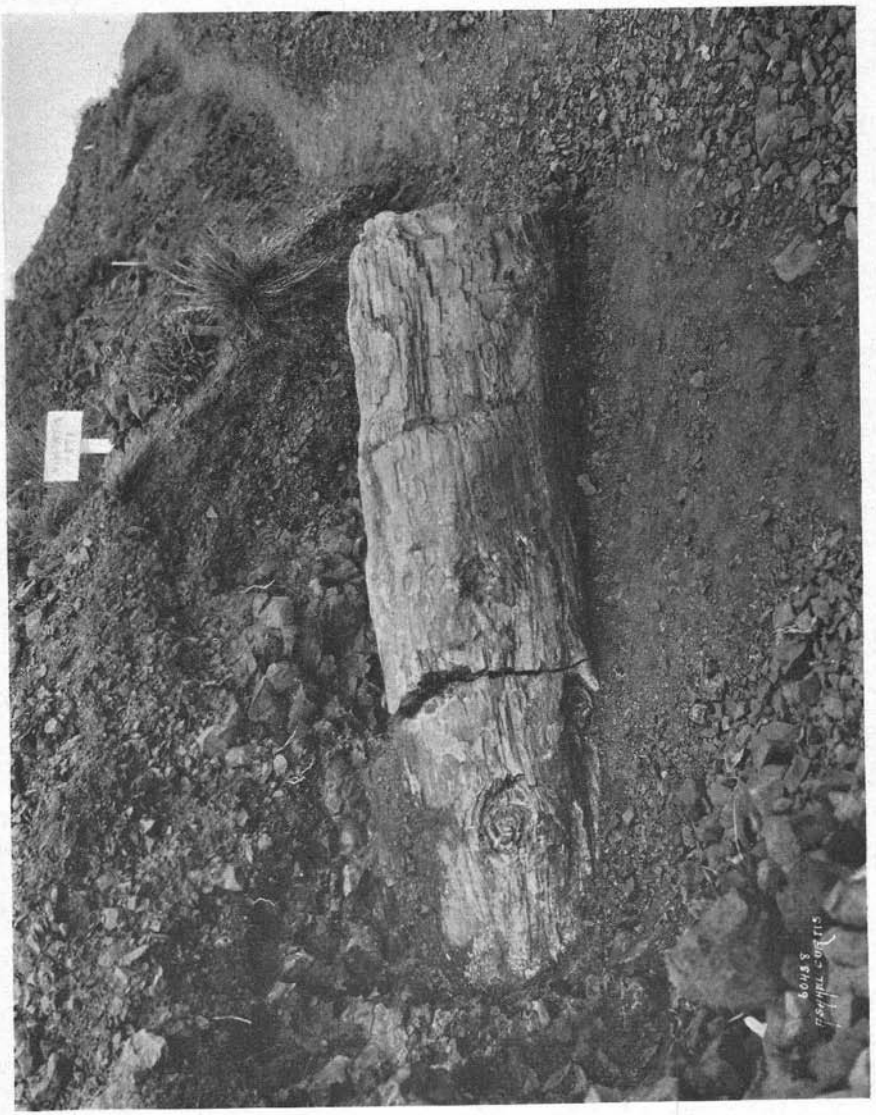
During its 34 years of continuous operation, the geologic organization has been able to do efficient work only because it has recognized this dependence of one group of activities on another.

TOPOGRAPHIC MAPPING

The United States government has long been carrying on a program of topographic survey which will eventually provide the nation with a complete topographic base map. This mapping is done in units of 15 or 30-minute quadrangles except where much greater detail is needed.

The first of this mapping in Washington was undertaken in 1893 and carried on independently by the Federal Government until 1910. Since then, under cooperative agreement of equal cost sharing, the mapping has been hastened until by the opening of this biennium about 53 per cent of the State had been mapped. For the purposes of calculation, it is convenient to consider that the total area of the State of Washington is equivalent to approximately eighty-eight 30-minute quadrangles. Of this number, forty-two quadrangles remained unmapped at the close of 1932 and four and one-half additional quadrangles have been mapped during this biennium. The Topographic Branch of the U. S. Geological Survey completed the mapping of the Mt. Constance quadrangle in the Olympic Peninsula, an area of special importance on account of the presence of manganese deposits. In addition, the Eatonville quadrangle in the coal fields south of Tacoma, the Metaline quadrangle in the zinc area of Pend Oreille County, and the Ft. Simcoe quadrangle southwest of Yakima were mapped. Primary control was completed in a fifth quadrangle, Marcus, in a mineralized area of Stevens and Ferry counties.

Under a special agreement with the U. S. Geological Survey, the State has cooperated in mapping two 15-minute quadrangles in western Washington during 1934. Funds for State participation in this work were allocated from Grant 14, which were supplemented by C. W. A. and W. E. R. A. funds. The work of the regular trained topographers of the U. S. Geological Survey was undertaken by engineers without special topographic training. The



Section of fir log completely fossilized—Ginkgo Fossil Forest.

uniformly high standards of topographic mapping were maintained, nevertheless, through the close supervision of the work by Mr. Gerald Fitzgerald, Topographic Engineer, who was detailed from the Alaskan Branch for this particular service during the winter season, and by Mr. R. C. Seitz, Topographic Engineer, U. S. Geological Survey, later. Although the expense of this undertaking was considerably in excess of the usual costs, it must be recognized that the dual purpose of providing topographic maps and unemployment relief was accomplished.

In addition to the four and one-half 30-minute quadrangles of the usual type noted above, an area of approximately one and one-quarter 30-minute quadrangles was completed by the U. S. Army, Corps of Engineers, in the northwestern part of the Olympic Peninsula. This was a part of an aerial mapping program, most of the flight work having been completed in 1933 while the ground work was largely completed in 1934.

BASIC GEOLOGY

Under the heading of Basic Geology are included all those Divisional activities relating to studies which yield fundamental data as to the nature of rock masses making up the State. Here are all stratigraphic and structural studies, either detailed or reconnaissance in character, upon which any and all applications of geology must be based. In a state of such varied and complex geologic relations as Washington, this phase of necessity includes a wide range of specialized lines of investigation. Space does not permit even listing the varied and interrelated technical features which have been followed in prosecuting the investigations in basic geology.

It should be pointed out that in the technological subdivisions there is of necessity a high degree of specialization involving not only trained technicians but specialized equipment. By way of illustration of the complexity of this work in fundamental geology, we may consider the several aspects of one portion of these fundamental studies—those relating to subsurface geology.

Material for this work mainly comes from drilling operations in all parts of the State. The examination yields detailed facts on each formation below the surface. Both the mineral composition and the fossil content are determined with special apparatus by operators using controlled temperature, polarized light of specific wave length, and microscopes of high magnification.

By way of summarizing the accomplishment in these subsurface studies, it may be noted that in the present biennium over 1,500 samples have been received and studied from wells ranging in depth from approximately 100 feet to nearly 7,000 feet. At the present time a continual series of samples is coming in from all of the important drilling operations now under way. Correlated with these are the logs of several hundred additional water and test wells for which samples are not available. By means of this examination, the character and position of a number of identifiable rock formations distributed fairly over the whole State (in seventeen counties) has been completed.

In general, the information comprises detailed descriptions of every formation penetrated by the drill, so that it is possible to identify equivalent formations from one place to another even though their position and character are different.

These results, useful in all geologic work, are particularly valuable in oil prospecting because of the accuracy by which structures can be determined on relatively little drilling expense. Present day practice in the production of oil by the control of water and gas conditions is wholly dependent on detailed information of porosity and other features of the oil-bearing strata obtained from such subsurface studies.

The importance of these studies is attested by the readiness with which well records are submitted by operators. This wholehearted cooperation is assured by the Division's guarantee of confidential handling of private data.

In addition to subsurface studies, many other phases of basic geology must be followed in order to provide an adequate foundation for economic work. This whole field of work leads to an inventory of all rock formations of the State of Washington, furnishing such details as the character of each formation, its component parts, its fossil record, thickness and lateral extent, and, finally, its relations to other formations.

This information, combined with the structural determination based thereon, becomes an organized statement of the geologic history of the State.

Only a practical application of a knowledge of the close relations between a given mineral deposit and the rocks surrounding it makes possible an advance determination of what to expect. Efficient plans for mining operation, estimates of tonnage, and, most important of all, financial arrangements can only be made after these facts are known.

To make some of these results of basic investigations available for economic work, they are presented in a geologic map which shows by a series of colors and symbols all of the geologic formations of the State. Such a map is of inestimable value in the search for mineral deposits.

For example, it shows the zones of granitic rocks which are mainly the source of ore minerals and the nearby rocks in which ore deposits may be expected. Conversely it shows those areas in which prospecting is relatively useless. In the search for oil and gas, this map shows at a glance the districts that should be investigated carefully and those in which there is no hope of production.

The preparation of a State map was systematically undertaken by the Division of Geology in 1925, and during the past biennium it has been completed. Data from many reports of Federal and State governments, from reports of the Canadian Geological Survey, from published or manuscript reports prepared by geologists connected with the University of Washington and the State College of Washington, and in addition, particularly in the vicinity of certain mineral deposits, reports prepared by mining engineers and others have been drawn upon. Some of these are available to the general public, but many are out of print or never have been printed. Careful search has revealed a surprising number of such reports which when combined on a unit map provided information for about 40 per cent of the State.

As the compilation progressed, the size and position of geologically unknown parts of the State became apparent, and during the past nine years, as funds have permitted, field parties have been engaged in securing information on these areas. Painstaking comparison has resulted in an accurate mapping of the whole State. The field work has included large areas in the inaccessible portions of the Cascade Mountains, most of the mountainous section of the Olympic Peninsula, and extensive areas of eastern Washington, both in the Okanogan Highlands and the Columbia Plateau. It has

been necessary to visit every county in the State to secure adequate information to supplement previous work.

The great variety and complexity of the geologic formations are shown by the necessity of designating more than three hundred different formations on the preliminary map. There still remains the very difficult task of reducing the number of formations to be mapped to come within the limitations set by the mechanical process of lithographing. Present progress indicates that the map will be ready for publication shortly after January 1, 1935.

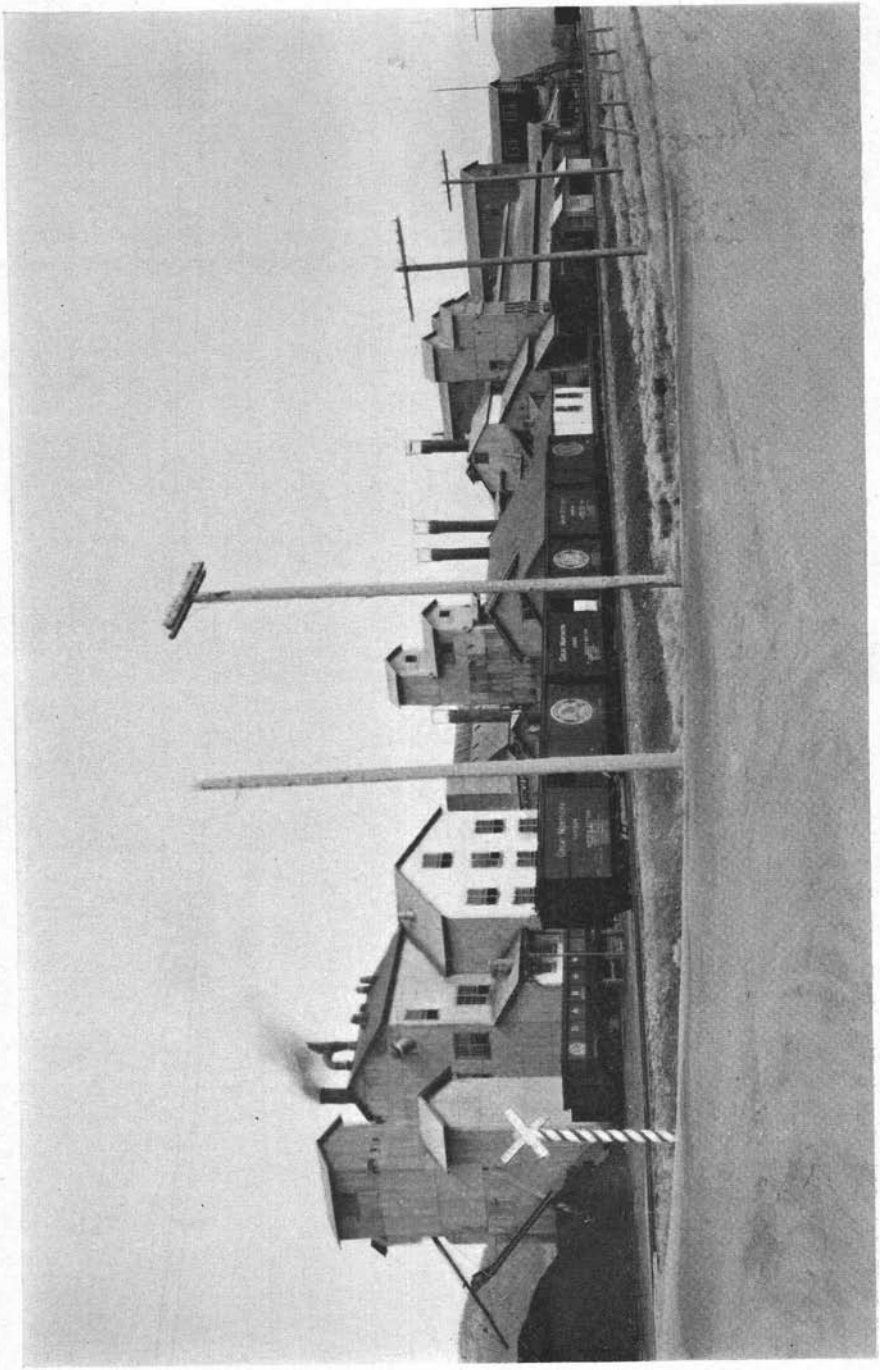
ECONOMIC STUDIES

Economic studies constitute the major objective of all divisional activities. During this biennium this work has been readily divisible into two major sections: The first including the mineral investigatons which were provided for by C. W. A. and W. E. R. A. funds, the second including those investigations of broader scope which have been continuously followed by the Division of Geology. The report on the first part of the economic studies—that designated the **"Mineral Survey"**—is presented herewith substantially as submitted by Mr. J. D. Hull, who was in charge of these investigations.

REPORT OF MINERAL SURVEY

"Field investigations were made of deposits carrying different minerals and metals. Many old reports on different properties, made by reputable mining engineers in the past, were made available to and reviewed by the Mineral Survey. Much other information was secured from engineers and operators familiar with different deposits in the State. The Mineral Survey cooperated with the United States Bureau of Mines and the Mining Departments of the Washington State College and University of Washington, and secured valuable assistance from these agencies.

"A limited amount of special research work was conducted, dealing with market conditions, metallurgical and chemical engineering problems. An assay department was established, utilizing both private laboratories and the laboratory facilities of the State institutions; over 900 samples of a wide variety of minerals, secured by field engineers of the Mineral Survey, were tested. The market research showed that the pulp mills of the State of Washington use in excess of $3,000,000 worth of mineral products annually, of which less than 10% are produced in the State. The principal metallurgical work was in connection with the manganese ores of the Olympic Peninsula and the gold ores of the Republic District. Special electric furnaces were constructed to treat the manganese silicate ores of the Olympic Peninsula, which had previously been considered of little commercial importance because of the chemical combination of the manganese and silica. Several tests were made, showing satisfactory results as far as they went. From these tests, a commercial grade of ferromanganese was produced. Considerable work was done at the Mines Department of the Washington State College, in cooperation with Dean Drucker, to find an economic method of recovery of the values of the gold ores of the Republic District. Such a process would do much toward re-establishing the operations of this district on a permanent basis. While the tests were not completed, much valuable information was secured that should be carried to final conclusion later.



Magnesite plant.

The chemical-engineering research division had to do with the recovery of elemental sulphur from pyrite deposits, and a method of economically recovering the products from the saline deposits of Central Washington.

"Possible additional markets for Washington coal were investigated and reported upon. Field examinations were made of deposits carrying precious and base metals, gold, silver, copper, lead, zinc, etc.; of the ferrous metals, iron, manganese, chrome, tungsten, molybdenum, etc.; of the light metals, aluminum, magnesium, and beryllium; and of a large number of the nonmetallics, including clays and diatomite, limestone, magnesite, sulphur, silica sand, barite, asbestos, graphite, sodium carbonate, sodium sulphate, magnesium sulphate, soapstone, talc, strontium, and many others. Many reports covering separate deposits and districts have been made as a result of these investigations.

"Many of these have been examined and reported upon, including the extensive manganese deposits of the Olympic Peninsula, the chrome deposits of the Sisters Mountains, tungsten, molybdenum and silicon in different sections of Eastern and Central Washington, zinc deposits of Pend Oreille County, the diatomite scattered over a wide area in Central Washington, soapstone and talc in eastern Skagit County, the large lode deposits of the precious and base metals in various sections of the Cascades and North-Central Washington, the important high-alumina clays in Eastern Washington, and many others.

"As a result of the tests made by the Mineral Survey on the benches and bars, for placer gold, along that portion of the upper Columbia River which will be flooded by the Coulee Dam, several operations are now under way, providing gainful employment to over 250 men, and recovering in excess of $1,000 per day.

"The Mineral Survey has investigated a number of properties in various stages of development, and found that many of them, formerly believed to be of little commercial significance, offer opportunities for profitable production, under present-day conditions. This is attributable chiefly to the increased price of the precious metals, substantial improvements in mining and metallurgical methods, availability of cheap power, and improved transportation conditions.

"Many properties were found that could be profitably operated now, if provided with relatively short roads to connect them with existing highways, to permit transportation of ore and supplies at reasonable cost.

"Much valuable information has been secured from old reports made on properties that were worked 30 or 40 years ago, which are now impossible to examine because the workings are flooded or the portals caved in.

"The Mineral Survey has recognized the importance of the abundant supply of cheap electric power that will be available and the desirability of finding a market for the utilization of this power in the mineral industry. Large quantities of power could be used in the production of the ferro alloys, chiefly of the ferromanganese, ferrochrome, ferrotungsten; in the recovery of zinc and copper by electro-metallurgical processes; in the mining operations of some of the so-called large low-grade deposits; in the production of calcium carbide and other electro-chemical processes. Aluminum, magnesium and iron offer future possibilities for power consumption.

"The Mineral Survey has cooperated with the State Land Commissioner

in securing data regarding mineral deposits and mineral royalties on certain State lands. This work has revealed the importance of a classification of mineral occurrences on State lands, and of an effective method of securing the full royalties from the operation of such deposits.

"The marked increase in public interest in mining development since the Mineral Survey started has been demonstrated in many ways. Information has been given in response to a great number of inquiries from people located in various sections of the State regarding a variety of mineral deposits; chambers of commerce and other civic organizations have not only sought information, but have rendered very material assistance to the Mineral Survey, in many cases; industrial concerns have called upon the Mineral Survey to supply them with information regarding the possible sources of raw material required by them from the mineral field. The attention of engineers and mine operators from different sections of the country, desirous of securing authentic information from unbiased sources, has been directed to the mineral deposits of the State by the work of the Mineral Survey. This interest of the mining public is evidenced by the large number of inquiries received.

"Many reports dealing with the various mineral resources of the State have been made and are available for reference in the offices of the Department of Conservation and Development. No reports have as yet been published."

DIVISIONAL INVESTIGATIONS

The second part of the economic studies, those of a strictly geologic character, under the close supervision of the Division of Geology, comprises (1) a group of special investigations, (2) a group of cooperative investigations, and (3) certain miscellaneous activities.

SPECIAL INVESTIGATIONS

The special investigations are (a) an inventory of mineral resources, (b) oil and gas resources of certain areas, and (c) magnesite resources of Stevens County.

INVENTORY OF MINERAL RESOURCES

Since the first organization of the Geologic Division in 1900, one of the important activities has been the cataloging of the mineral resources of the State of Washington. On four occasions this information has been published as bulletins in the regular geologic series. Since the last one was released in 1924, a card index system has been maintained recording all known and reported occurrences of both metals and non-metals. Additions to this file are constantly being made as new discoveries are examined or reported. This index constitutes a current catalog of mineral resources and is an invaluable source of information in handling the inquiries constantly being received from all parts of the United States. These data supplemented by later field examinations will be the basis for another bulletin planned for early publication. The tabulation below shows the number of listed occurrences, which include those for which field examinations have been made by the Geological Division and also those which have been reported but not yet investigated. Some of these are commercial; some are in small quantities and of only scientific interest at present; but the fact that even a small

amount of a given mineral is known to occur stimulates and encourages prospecting to meet a known demand. Publication of such information has frequently resulted in the discovery of commercial deposits.

NUMBER OF RECORDED OCCURRENCES OF MINERAL SUBSTANCES

NON-METALLIC RESOURCES

Asbestos	5	Mineral pigments	10 plus
Barium	3	Mineral waters	20 "
Beryl	1	Natural alum—some reported	
Brucite	1	Natural gas—abundant	
Chalk	2	Oil, seeps and tests	8
Diatomite	41	Phosphate rock	1
Dolomite—1 operated; many others		Potash (reported)	1
Feldspar	2	Sand, foundry	2
Fluorite	2	Sand, glass	2
Fuller's Earth—some reported		Semi-precious stones	
Garnet	3	Serpentine	6
Graphite	6	Silica (quartz)	5
Gypsum	1	Sillimanite	1
Kaolin—with Spokane clays		Slate	3
Limestone { Eastern Washington	101	Soapstone	9
Limestone { Western Washington	38	Sodium carbonate	1
Lithium	2	Sodium sulphate	2
Magnesite	11	Sulphur	2
Magnesium sulphate (Epsomite)	2	Talc	9
Marble—see Limestone		Travertine	7
Marl	4	Vesuvianite	4
Mica	4	Vivianite	2
		Volcanic ash—abundant	

METALLIC RESOURCES

Aluminum—from Spokane clays		Mercury	10
Antimony	13	Molybdenum	23
Arsenic	14	Nickel	6
Bentonite	1	Platinum	18
Bismuth	4	Pyrite	19
Chromite	5	Pyrrohotite	15
Cerium	2	Selenium	2
Cobalt	2	Silver	53
Copper	67	Strontium	2
Gold (lode)	95	Tin	7
Gold (placer)	55	Tungsten	19
Iridium	1	Uranium	2
Iron	23	Vanadium	1
Lead	60	Zinc	16
Manganese	24		

SUBSTANCES OF MORE GENERAL OCCURRENCE

Clay
Coal
Granite and Basalt
Road metal
Sand and gravel

OIL AND GAS INVESTIGATIONS

Among the potentially important resources of the State of Washington are oil and gas. The Benton county gas field is on commercial production, the Whatcom county gas field is just becoming commercial, and a large number of tests have been made in many parts of the state. In too many instances these tests have been located without regard to geologic structures. The work of the Division of Geology provides information on structure and

character of sedimentary formations necessary to proper development. During 1934, great activity centered around Bellingham, and detailed field work was undertaken there early in the year. The investigations were completed by mid-summer, and the results are being presented in "Reports of Investigations No. 2." This is a 70-page bulletin with an accompanying geologic map covering western Whatcom county. This work was followed by investigations of the oil possibilities of western Skagit county, the report for which is now in preparation.

Supplementing these detailed regional investigations, the Division of Geology is constantly in touch with all operators who are planning or actually drilling test wells. In each case details of the geologic section as well as logs, usually supplemented by samples of the formation, are obtained. In this way complete records are on file for study and for guidance in future drilling operations.

It is the definite policy of the Division of Geology to lend every possible aid to those engaged in bona fide development work. There is ample evidence that the Division, through close contact with drilling operations, has been of real help in many instances. As such information becomes more complete, the services of the Division will become more valuable.

MAGNESITE INVESTIGATION

The proposed power development in the state has suggested the use of vast quantities of magnesite from the deposits now being worked in Stevens county. To date no means are known by which an accurate estimate of the amount of magnesite in the ground can be determined in advance of actual mining operations.

With the active cooperation of the Northwest Magnesite Company a start has been made on this problem. Using the basic geologic data already on hand, there has been completed the first part of a long term program which will include field and laboratory work.

COOPERATIVE INVESTIGATIONS

The economic investigations of the Division have been amplified and extended during this biennium as usual by cooperation with other state and federal agencies. At the request of the United States Bureau of Mines, a Divisional geologist was assigned to work with Mr. Hewitt Wilson, Ceramic Engineer for the Bureau. Fifty pound samples of talc and soapstone collected from all parts of the state are now being tested for their commercial possibilities at the Bureau's experimental station in Seattle.

Samples of high-silica sand were also obtained, and it is expected that tests will show their acceptability in local markets to replace out-of-state products. Earlier cooperation with the Bureau on clay deposits has been continued during this biennium.

In its investigation of water supplies, the Division of Geology has constantly enjoyed the active cooperation of County Engineers throughout the state. Data are being accumulated which will serve as an inventory of all water supplies, either public or private, in the State of Washington. Information is available as to the source of the water, whether from wells, lakes, or rivers, as to the amount of water available, the chemical character, and related features.

During the present biennium the compilation of data on municipal supply has been aided greatly by the active cooperation of the Department of Home Economics of the Washington Agricultural Experiment Station, which is undertaking a project dealing with the chemical character of public water supplies.

The earnest and enthusiastic response by public officials to the first request for information constitutes ample demonstration of the importance of this work.

Further cooperative work of the Division of Geology is indicated in the work with the Federal Bureau of Reclamation in finding materials for a new type of concrete mix for possible use at the Coulee Dam.

MISCELLANEOUS ACTIVITIES

One of the many incidental but important functions of the Division is the handling of inquiries regarding specimens from all parts of the state. In addition to those submitted to Divisional geologists in the field, hundreds of samples are received each year at the Pullman office. They are examined in the laboratory and the nature and possible use indicated in a personal letter to the senders.

Table No. 0—EXPENDITURES—DIVISION OF GEOLOGY

	GRANT 14	GRANT 46	C. W. A.	W. E. R. A.	TOTAL
Research and Mineral Investigation (Spokane Office)	$ 3,100.00	.....	.....	.....	$ 3,100.00
Mineral Survey (Seattle Office)	4,100.00	$ 5,300.00	$16,500.00	$11,100.00	37,000.00
Geological Investigations	15,600.00	.....	1,900.00	400.00	17,900.00
Topographic Mapping	14,400.00	.....	11,500.00	3,000.00	28,900.00
TOTAL	$37,200.00	$ 5,300.00	$29,900.00	$14,500.00	$86,900.00

DIVISION OF FORESTRY

Honorable E. F. Banker, Director
Department of Conservation and Development,
Olympia, Washington.

Sir:

Herewith are the twenty-ninth and thirtieth annual reports of the Division of Forestry, covering period from October 1, 1931, to November 30, 1934.

Respectfully submitted,

T. S. GOODYEAR,
Supervisor of Forestry.

ANNUAL REPORT—1933

The fire season of 1933 was an unusual one. It started in the early part of April, during which there were seven days that the humidity reached thirty or lower. Fern fires caused considerable trouble and on the twentieth of April it became necessary to put several fire wardens on the payroll for the purpose of protecting young growth timber on the cut-over lands in western Washington.

May was a comparatively damp month with 0.73 inches more rainfall than average for past ten years—consequently, fires caused but little concern and were easly controlled.

Records of United States Weather Bureau show precipitation for June and July was lower than average for past forty-four years, while in August there probably occurred the longest period of successive bad fire days—with extremely low humidity and high temperature—that has been recorded for a number of years. It was during this period of weather that practically the entire loss and damage to timber, logs and equipment resulted from three fires that started in active logging operations.

Early rains the latter part of August brought a sudden end to the fire season, thereby eliminating the usual crop of September fires. Nearly all rangers and patrolmen were off the payroll by middle of September. A good many of the logging operators took advantage of favorable weather conditions for fall burning and disposed of their accumulated slashings with no property loss and nominal expense.

Very favorable progress was made in connection with early detection of fires and a noticeable reduction in the elapsed time between discovery of fires and arrival of crews for control work. This can best be shown by following comparative figures. During eight year period from 1917 to 1924, average area burned per fire was **206** acres; from 1925 to 1932 inclusive, **128** acres; for 1933, average area burned per fire was reduced to **48** acres.

A very marked reduction was made in costs of fire fighting. For in-

stance, during 1930 this department spent for fire suppression $70,139.23; 1931, $74,879.40; 1932, $13,635.69 and for 1933, $1,896.19. There was also a saving in salaries and expense of regular field organization as shown by following comparative figures; for 1930, $137,411.51; 1931, $134,125.01; 1932, $105,056.25 and for 1933, $96,686.30.

Of the 42,502 acres burned over during 1933, there were but 1,610 acres of merchantable timber killed, which will all be salvaged owing to proximity of logging operations.

As a result of decreased expenditures, forest patrol assessments for all counties in western Washington were reduced one-half cent per acre.

There was a noticeable drop in the number of incendiary fires due to the fact that men from Emergency Conservation Work Camps were used exclusively for fire fighting, thus removing the incentive to set fires in order to secure employment.

The successful fire season may, in a large measure, be attributable to the twelve C. C. C. camps that were situated in the more hazardous fire regions, making some 2,400 men available at all times for fire fighting on state and privately owned lands. From experience gained during past summer with Civilian Conservation Corps, timber protective organizations may, in the future, find it both practical and economical to maintain specially trained fire fighting crews during peak season. A comparison with past records shows less acreage burned and a smaller loss of merchantable timber than in any year since organized fire protection.

Organization

The counties in southwestern Washington, that heretofore had comprised one district, were divided into smaller units. Grays Harbor and Mason counties were put in a separate district; Pacific and Wahkiakum counties placed under supervision of one district warden; Lewis and Cowlitz counties were each assigned a district warden; Clark and Skamania counties comprised another district under the supervision of one warden, with headquarters at Vancouver.

An immense amount of additional work, in management of Civilian Conservation Camps, was placed upon the office and field personnel of this department.

Civilian Conservation Corps

In the early part of June this division was allotted twelve Emergency Conservation Work Camps for forest improvement projects on state and privately owned lands. This involved locating suitable camp sites, detailed planning of all work projects, and the organization and management of an overhead personnel to supervise and carry on the various projects approved by Federal Forest Service.

In November it became necessary to move numerous camps from the higher altitudes to the lower country, where weather conditions are such that work might be carried on throughout the winter months. Consequently, sixteen camps were placed under the supervision of this department for the second enrollment period.

A consolidated progress report covering period between June and December 31st for the C. C. C. camps under supervision of State Forestry Di-

vision shows the following projects have been completed on state and privately owned lands.

New road construction	135.3	miles
Conversion of abandoned logging railway grades into vehicle roads	337	"
Horse trails	155	"
Telephone lines	108.7	"
Fire trails	85.9	"
Roadside clearing	37.7	"
Bridges constructed	69	
Snags felled	39,236	
Fire fighting	14,504	man-days
Miscellaneous fire hazard reduction	651	acres
Lookout towers constructed	2	
Ranger stations constructed	2	

Many other minor improvements were made, such as culverts, fences, drainage ditches, removal of slides and clearing public camp grounds.

The work performed by men from Emergency Conservation Camps will be of lasting benefit to the vast timber resources of this state.

For what has already been accomplished, credit is due for the united cooperation of Federal Forest Service, the Army, Major C. S. Cowan of Washington Forest Fire Association, Federal Department of Labor through its local welfare boards, camp superintendents, foremen, and the boys themselves, who constitute the enlisted personnel and are actually carrying on this important work.

Classification of Lands

The constitutionality of yield tax law was challenged and is at present before the Supreme Court pending decision. It appeared a waste of effort and money to classify lands, as provided for in the act, until a decision was rendered. Consequently, there was no land classified by this department during 1933.

Reforestation—State Policy

During the past summer this department negotiated a purchase for State Forest Board of some 33,600 acres of cut-over lands situated in Thurston and Grays Harbor Counties. This represents the first large block of land that has been acquired by state for reforestation purposes since the legislature made provision for purchase of forest lands in 1923. Utility bonds, based on a purchase price of fifty cents an acre and bearing one per cent interest per annum, were exchanged for these lands. Most of the land is well stocked with a thrifty growth of reproduction and a C. C. C. camp has been established at Elma for the purpose of carrying on improvement and development work in the recently acquired state forest. Proceeds from sale of dead cedar and Christmas trees will take care of annual interest payments until the timber has reached a marketable size. Money derived from sale of stumpage can be used to retire the bonds. Consequently, this forest is a self supporting unit and will cost the state no direct outlay of capital.

It is planned eventually to purchase the intermingling and surrounding cut-over lands that will ultimately make a solid block of approximately 100,000 acres. The lands in this particular district will sustain a heavy stand of Douglas fir timber with a comparatively small fire risk. The trees grow rapidly and should therefore net early returns to the State of Washington.

Cooperation

The progress in forest fire protection during the past season was made possible by the effective cooperation extended this department by United States Weather Bureau, Federal Forest Service, Pacific Northwest Forest Experiment Station, Washington Forest Fire Association, and the logging operators throughout the state.

Comment

During the fire season of 1933 this division patrolled and protected some 400,000 acres of unappropriated government lands and approximately 350,000 acres of tax delinquent lands owned by counties with no reimbursement for the costs of protection. Until 1933 the Department of Interior contributed the salaries of some fifteen rangers and lookouts in return for protection of its forest lands.

The alarming increase of tax delinquent lands presents a serious problem in forest fire protection. With less than 33% of 1932 forest patrol assessments collected and a 25% cut in Clarke-McNary allotment, it is obvious the next legislature must devise a means of providing adequate funds to cover the costs of fire protection on non-contributing forest lands.

T. S. GOODYEAR,
Supervisor of Forestry.

January 23, 1934.

Table No. 1—ORIGIN, NUMBER AND CLASSIFICATION OF FIRES, 1933

COUNTIES	Light-ning	Incen-diary	Camp-ers	Smok-ers	Slash-ing	Log-ging	Brush Burning	Rail-roads	Misc.	Total
Chelan		1		4			3		1	9
Clallam		3	1	5	2		2	1	2	16
Clark							5			5
Cowlitz		6	1	7	2	6	3	4	2	31
Ferry	6			8						14
Grays Harbor		18	2	17	1		4	1	11	54
Island		8	8	3	1	1	7			28
Jefferson	1	1	3	4		1	2	1		13
King		7	12	21	1	1	16	2	5	65
Kitsap		11	1	3	1		2		1	19
Kittitas	1	3	2	5					2	13
Klickitat	1	9	1	11		2	2			26
Lewis		16	2	8		6	4	1	11	48
Mason		20	12	4		2	2	2	15	57
Okanogan	6			4			1			11
Pacific		2		4		3	6			15
Pend Oreille	1	19	4	18			1	1	3	47
Pierce		4	5	9	1	10	9	1	4	43
Skagit		4	8	14		2	8	3	7	46
Skamania		1		1		1			2	5
Snohomish		10	2	27	1	2	11	3	1	57
Spokane	3	11	12	49			7	16	11	109
Stevens	3	16	9	33			1	14	4	80
Thurston		11	2	9	1	1	3	1	2	30
Wahkiakum		2	1	2					1	6
Whatcom	1	2	2	6		1	2		4	18
Yakima			3	9					1	13
TOTALS	23	185	93	285	11	39	101	51	90	878

CLASSIFICATION OF FIRES—Class A (¼ acre or less), 289; Class B (¼ to 10 acres), 474; Class C (over 10 acres), 115.

Table No. 2—AREA BURNED OVER, 1933 FIRES

COUNTIES	FOREST LAND			NOT REFORESTED			NON-FOREST LAND			Total
		Reproduction			Cutover Land					
	Merch-antable Timber	Cut-Over	Old Burn	Old Burn	Slash Un-burned	Slash Burned	Pas-ture	Brush	Other	
Chelan	5	10					152	21	14	202
Clallam		40	84	8	99	120		54	6	411
Clark		5		25		1	11			42
Cowlitz		220	2	24	152	1,121	90	73	65	1,747
Ferry		81						1	9	91
Grays Harbor	233	937	470	6,083	2,389	2,054		191	316	12,673
Island		9			30	5	15	9		68
Jefferson		27	10		251			20		308
King		315	1,061	1,259	809	14	210	1,614	90	5,372
Kitsap	100		80		328	11	5	113		637
Kittitas	2	1								3
Klickitat	8	14		12	1		500	970	40	1,545
Lewis	194	10	517	56	55	78	9	202		1,121
Mason	35	1,355	300	197	560	15	10	37		2,509
Okanogan	1	121			82	6	40		80	330
Pacific	25	160	20		4,631	213	4	44	1	5,098
Pend Oreille	100	1,266	190	160	40		1	100	61	1,918
Pierce		63		207	22	211	16	116		635
Skagit	5	9	14		62	118				208
Skamania				3						3
Snohomish			16	269	223	241		138	4	891
Spokane	836	1,210	123	42	10		575	521	413	3,730
Stevens	47	577	43	21	1		214	60	13	976
Thurston	18	44	28	52	3	2		131		278
Wahkiakum		1			723					724
Whatcom		6		20			10		1	37
Yakima	1	5			10		520	9	400	945
TOTALS	1,610	6,486	2,958	8,438	10,481	4,210	2,382	4,424	1,513	42,502

Table No. 3—LOSS AND DAMAGE, 1933 FIRES

COUNTIES	MERCHANTABLE TIMBER		LOGS	LOSS AND DAMAGE TO PROPERTY	
	Timber Killed M.B.M.	Timber Destroyed M.B.M.	Logs Destroyed M.B.M.	Logging Equipment	Settlers and Others
Chelan	10	10			
Clallam					
Clark					$ 58.00
Cowlitz					
Ferry					8.00
Grays Harbor	3,650	900	3,916	$53,505.00	78.00
Island					
Jefferson					
King			50		10.00
Kitsap					
Kittitas	2				120.00
Klickitat					2,010.00
Lewis	57	57		3,000.00	
Mason	37	37	1,605	7,000.00	102.00
Okanogan					
Pacific	5	5	1,800	6,000.00	
Pend Oreille					252.00
Pierce					200.00
Skagit					
Skamania				75.00	
Snohomish					
Spokane	400	40			1,719.00
Stevens	8	4			490.00
Thurston	50				
Wahkiakum					
Whatcom			600	190.00	
Yakima	6	2	2		
TOTALS	4,225	1,055	7,973	$69,770.00	$5,057.00

Total loss and damage to all classes of property (including poles and pulp wood, $3,775.00), $119,499.00.

Table No. 4—BURNING PERMITS, ARRESTS AND FINES, CLASSIFICATION AND ACREAGE OF LAND BURNED UNDER PERMIT, 1933

COUNTIES	BURNING PERMITS				ARRESTS and FINES	
	Permits	Camp Fires	Protection	Agriculture	Number	Fines and Costs
Chelan	30		35			
Clallam	715	17	123	2,257		
Clark	638	74	335	2,878		
Cowlitz	1,073	87	1,408	3,438		
Ferry	117	13	48	266		
Grays Harbor	823	7	1,729	1,305	4	$ 30.00
Island	205	1	270	670		
Jefferson	508	74	1,675	420		
King	2,438	173	140	3,194		
Kitsap	1,326	81	1,209	3,189		
Kittitas	29	18	9,708	185		
Klickitat	701	106	5,451	8,243		
Lewis	2,612	87	936	13,737		
Mason	582	3	974	544		
Okanogan	256	33	238	1,575		
Pacific	395	15	57	2,291		
Pend Oreille	454	48	862	2,448		
Pierce	1,976	79	2,533	10,573		
San Juan	211	59	109	1,342	1	29.00
Skagit	784	70	72	2,661		
Skamania	150	28	180	186		
Snohomish	2,311	95	59	9,249		
Spokane	664	13	899	2,562	3	45.25
Stevens	1,030	192	418	7,222	8	112.50
Thurston	1,438	1	325	6,492		
Wahkiakum	206	21	15	3,230		
Whatcom	1,442	19	172	3,342		
Yakima		38			1	12.50
TOTALS	23,114	1,452	29,980	93,499	17	$229.25

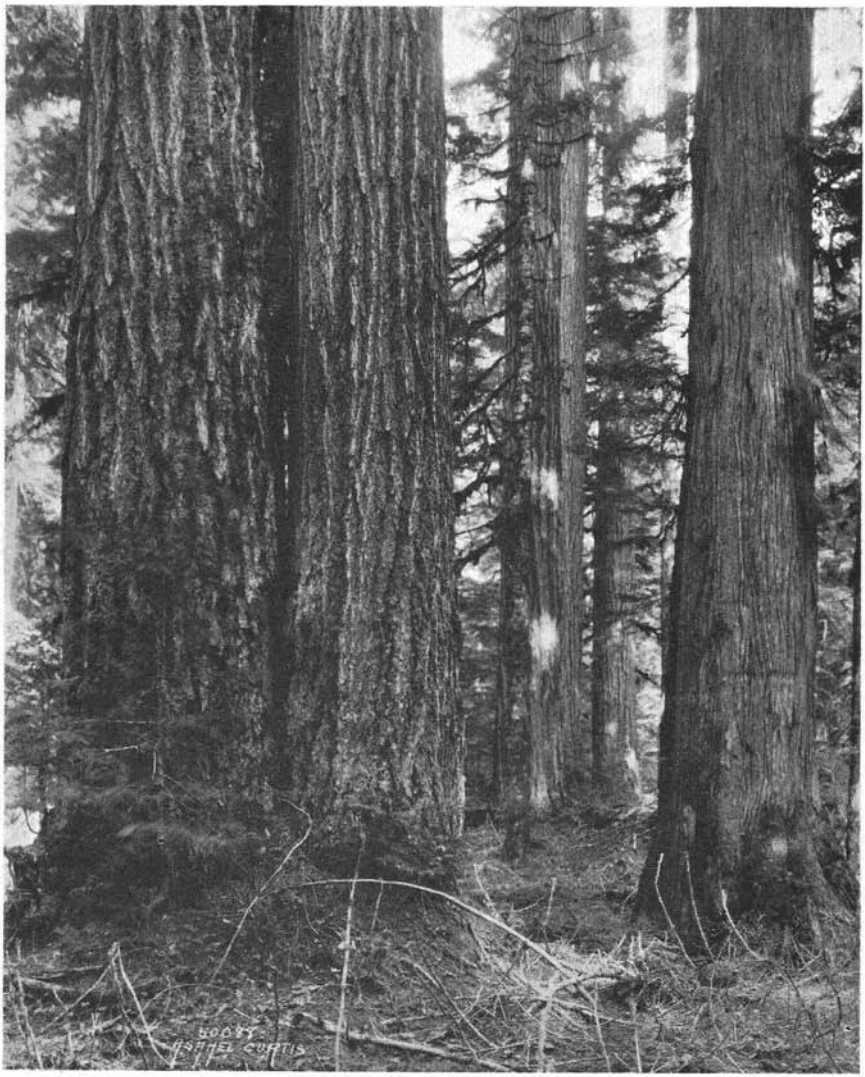
ANNUAL REPORT—1934

The 1934 fire season began March 21st with a humidity of 18 degrees and northeast winds. This weather lasted until March 24th and it became necessary to put a number of regular fire wardens to work and employ about 500 men to fight fern fires. From the standpoint of fire weather, April was a normal month with an average precipitation of 1.42 inches, which is 0.98 inches below average for the past 45 years. In May there was another period of bad fire weather with low humidity and northeast winds, beginning on the 9th and lasting until the 12th. Average precipitation for this month was 1.97 inches, which is 0.05 inches below average for past 45 years. June was a normal month without extremely hazardous fire weather. The average precipitation was 0.67 inches, which is 0.92 inches less than average for past 45 years. While the average precipitation for July was 0.72 inches, and 0.07 inches above average for past 45 years, there was an exceedingly bad spell of weather beginning July 26th and continuing until the end of month. Average precipitation for the month of August was 0.54 inches, which is 0.22 lower than average for past 45 years. On August 2nd and 3rd there were light rains throughout the state that relieved the fire situation for a few days. From August 19th to 25th there was another extremely hazardous fire period with low humidity and northeast winds. Fire weather during September was above normal; the precipitation was 1.77 inches, which is 0.66 inches below average for past 45 years. Dry weather continued until October 19th when the fall rains set in and continued to the end of month. On October 18th the department had approximately 800 men fighting fires which had been set either in slashings or to clear land for grazing purposes.

The 1934 season was one of the longest and driest fire seasons in recent years. The number of fires increased from 878 in 1933 to 1,371 in 1934. However, damage and loss decreased from $119,499 in 1933 to $33,648 in 1934. Out of 12,000,000 acres of state, private, county and unappropriated public domain lands protected by State Forestry Department, a total of 95,404 acres burned over during 1934, most of which was cut-over lands. Of the total area burned there were but 14,479 acres of merchantable timber killed, a large percentage of which is salvable. The largest and most destructive fire occurred in the north end of Stevens and Pend Oreille Counties and burned over an area of approximately 14,000 acres before it was brought under control.

While there was a considerable increase in acreage burned over in 1934, loss to timber and other property was one of the lowest since organized fire protection. This may be largely attributable to availability and mobility of trained fire fighting crews composed of men from five C. C. C. camps operating under direction of this department. Crews from state C. C. C. camps put in 21,355 man-days fighting fire and men from State Parks camps 12,325 man-days, making a total of 33,680 man-days for fire fighting. In the latter part of September and first of October, fires became so numerous there were not enough available C. C. C. men to control them and it became necessary to supplement with a large number of civilian fire crews.

The reduction of loss and damage from logging operation fires may be attributed to Schedule C, Article X of the Lumber Code, the provisions of



Virgin Douglas Fir Forest.

which greatly strengthened existing state fire protection laws. During extremely dangerous weather periods the operators, large and small, closed down; also fire fighting equipment was increased in all active operations. Another requirement of the Code was that all snags must be felled either before, during, or after operations. Code requirements became effective June 1st.

Close cooperation from the logging operators, effective fire control work by men from the C. C. C. camps, and a marked reduction of loss and damage to property are the outstanding features of 1934 fire season.

Organization

There was little change in the personnel or arrangement of districts during 1934. Thurston and Lewis Counties were placed under the supervision of one district warden. During the peak of season there were some 20 temporary special patrolmen placed in the more hazardous districts.

Civilian Conservation Corps

In the spring of 1934 all but five of the Civilian Conservation Corps Camps which had been operating under direction of this department were moved back into the national forests and parks for the summer season. This left four camps for western Washington and one in northeastern Washington. There were not sufficient C. C. C. men available to meet emergencies during peak season. On several occasions C. C. C. crews were moved from western Washington to the extreme northeastern part of the state for fire fighting.

A consolidated progress report of work accomplished by C. C. C. camps operating under direction of State Forestry Division, covering period between January 1st and December 1st, 1934, follows:

New road construction	155.1	Miles
Conversion of abandoned logging railroad grades into truck trail	285.0	"
Horse trail	9.9	"
Telephone line	129.8	"
Fire break	13.6	"
Fire trail	450.0	"
Roadside clearing	296.2	"
Bridges constructed	165	
Snags felled — Number	36,238	
Snags felled — Base area	149,611	Sq. Ft.
Fire fighting	21,355	Man-days
Hazard reduction	5,081	Acres
Lookout towers constructed	3	
Ranger stations constructed	2	

Acknowledgment for successful operation of C. C. C. camps is made to the Federal Forest Service, the War Department, Major C. S. Cowan of Washington Forest Fire Association, the United States Department of Labor through its local Welfare Boards, and to the men enrolled in Civilian Conservation Corps who are directly responsible for the splendid and effective work accomplished.

During the past twenty months this department has operated from five to sixteen C. C. C. camps, each camp containing an average of 215 men. During the entire period there has not been one fatality from accident. This is a remarkable record and a tribute to the superintendents, foremen and Army officers who had direct charge of the men in the field and camps.

Land Classification

On April 2, 1934, the constitutionality of Reforestation Act or Yield Tax Law was confirmed by the Supreme Court. Since that date the department has examined and classified approximately 100,000 acres of land which is now ready for official classification by the State Tax Commission. The State Forest Board has been handicapped in carrying on land examination for the reason there was no appropriation made by the legislature to carry out provisions of the Reforestation Act.

State Acquirement of Forest Lands

During the present year there have been no outright purchases of cut-over land for reforestation purposes. However, the department has examined and has pending negotiations for approximately 100,000 acres situated in Grays Harbor, Cowlitz and Clallam Counties. During the summer of 1934 some 300,000 acres of county owned lands were examined and classified in Stevens and Pend Oreille Counties for the ultimate purpose of transferring these lands from county ownership to the State Forest Board for administration.

In the early fall of 1934 the department used men from C. C. C. camps at Elma for construction and establishment of a State Forest Nursery in the Black Hills Forest. Approximately 40 acres have been cleared and fenced, administrative headquarters for a district ranger and nurseryman constructed, a large drying shed for extraction of seed and handling transplants has been completed, approximately six tons of Douglas fir cone and alder seed have been gathered, and the nursery beds are at present being completed. It is planned within the next two years to produce approximately 3,000,000 seedlings per year, to be used exclusively for restocking state owned lands.

Slash Disposal

During the past year some 75,000 acres of cut-over lands have been examined for slash disposal and certificates of clearance issued to the operator where the slashings had been disposed of in accordance with provisions of state law.

The State Land Commissioner by inserting slash disposal requirements in state timber sale contracts has contributed materially to standardization of fire hazard reduction.

Cooperation

The progress in forest fire protection and hazard reduction made during the fire season of 1934 is directly attributable to the close cooperation extended this department by Federal Forest Service, United States Weather Bureau, Pacific Northwest Forest and Range Experiment Station, Washington Forest Fire Association, State Land Commissioner, State Parks Board, Lumber Code authorities, and the logging operators throughout the state.

The United States Weather Bureau of Seattle furnished the field organization of this department with timely and accurate weather forecasts throughout the fire season.

The field organization contributed considerable time to inspection of logging operations in connection with Code requirements and, in turn, Code authorities rendered very material assistance to this department by enforcement of "Rules of Forest Practice" as provided in the Code.

From experience gained during the past two years, certain weaknesses have been discovered in the existing state forestry laws. The following recommendations are herewith made for your consideration.

1. That in order to promote and encourage the retention of cut-over lands in private ownership the present valuation of lands as provided in the Reforestation Act be amended and reduced to an annual valuation of fifty cents per acre for lands west of Cascade Mountains and twenty-five cents per acre for lands east of Cascade Mountains; applicable only to lands classified under Reforestation Act as more suitable for producing timber than for other purposes.
2. That in order to carry out provisions of Chapter 40, Laws of 1931, Reforestation Act, the legislature be requested to appropriate $18,000.00 to the State Forest Board for purpose of land examination and classification.
3. Cut-over lands are being acquired for delinquent taxes by the various counties in alarming proportions. Since the counties are not in a position to maintain organized fire protection, which is a necessary requisite for timber production, it is hereby recommended that Section 5812-3a Remington's Revised Statutes, providing that counties may offer to the State of Washington lands suitable for growing timber which have been acquired through foreclosure of tax liens, and that part of Section 5812-11 of same statute, providing purchase of tax delinquent lands shall be made on same basis as those purchased from private parties or corporations, be amended as follows: That any cut-over lands heretofore acquired, or which may hereafter be acquired, by any county through foreclosure of tax liens, or otherwise, shall automatically revert to the State of Washington and be administered by State Forest Board. The board may reject any or all lands not suitable for reforestation or which, on account of location, may not be considered an economic unit for state administration.

   "Such lands shall be held in trust and administered and protected by the said board under the provisions of chapter 154, Laws of 1923, or any amendments thereto. Any monies derived from the lease of such lands or from the sale of forest products, oils, gases, coal, minerals or fossils therefrom, shall be distributed as follows:

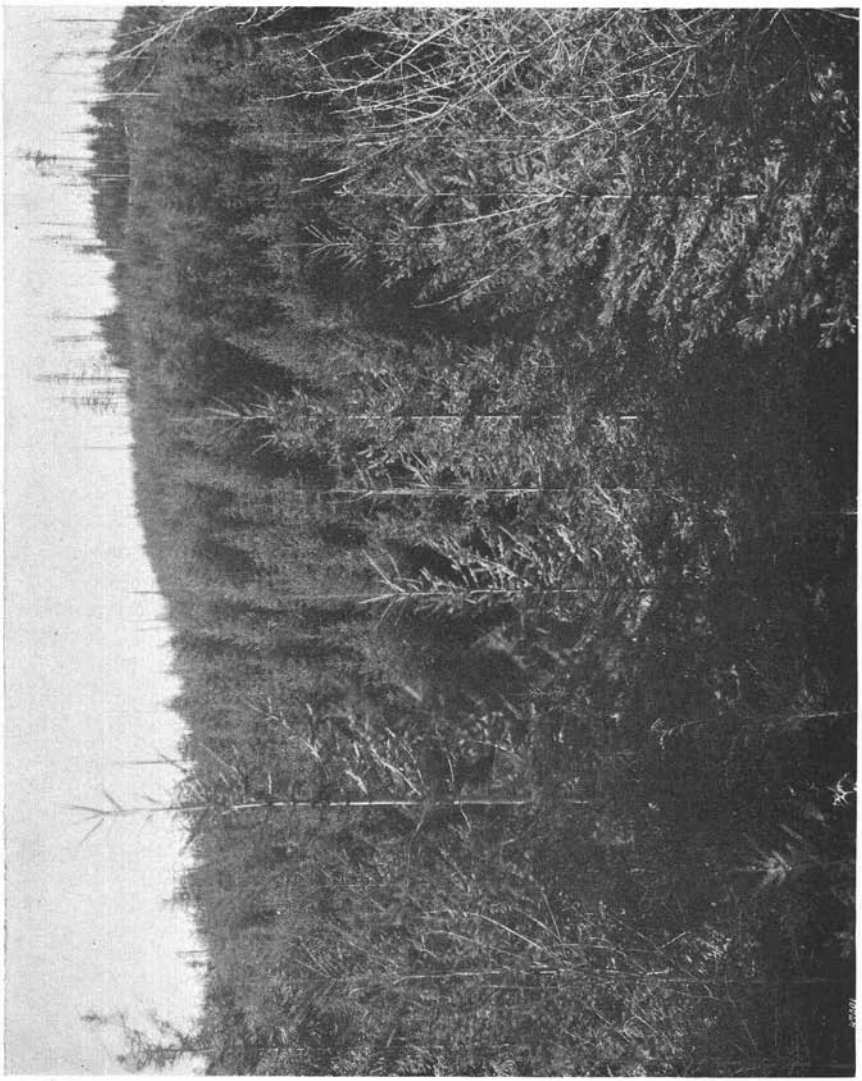
   "(a) The expense incurred by the state for administration, reforestation and protection, shall be returned to the general fund of the state treasury.

   "(b) Ten per centum thereof shall be placed in the forest development fund of the state treasury.

   "(c) Any balance remaining shall be paid to the county in which the lands are located to be paid, distributed and pro-rated to the various funds in the same manner as general taxes are paid and distributed during the year of such payment."

PUBLIC LAND ACQUISITION

1. In order to avoid duplication and competition in acquirement of lands abandoned by private owners, representatives of State Forestry Department and Federal Forest Service shall zone the forest regions of the state into areas and units most suitable for administration by each of the respective agencies. Guiding factors in determining zones shall



Douglas fir reproduction—18 years old.

be (a) present boundaries of national forest reserves, (b) extent of private owned lands inside national forests, (c) natural barriers, (d) proximity to lands already owned or administered by either state or government, (e) sustained yield units.

2. For the purpose of state acquirement of lands abandoned by private ownership the legislature should continue and enlarge the present state utility bond issue to the extent the Forest Board may purchase at least two hundred thousand acres of land per year for reforestation purposes. If practical, land purchase program should be based on a five year period.

GRAZING

The state grazing laws make ample provision for handling trespass of sheep on state owned lands; however, there is no provision to prevent trespass of cattle. In order to administer properly the extensive areas of state owned land and to provide for collection of grazing fees, the following legislation is herewith proposed and recommended:

Section 1. It shall be unlawful in this state for cattle to enter any land or lands, enclosed or unenclosed, belonging to or in the possession of any person other than the owner of such cattle, unless by the consent of the owner of said land, other than the public lands owned and administered by United States Government.

Section 2. That any person, being the owner or having in his possession, charge, or control, as herder, or otherwise, any cattle, who shall herd or drive such cattle upon the lands of another for the purpose of pasture, against the consent of the owner of such lands, shall be deemed guilty of a misdemeanor.

TAXATION

1. There is a considerable amount of cut-over land offered for sale to the State Forest Board in which the original owners retain all mineral and oil rights. As a means of increasing state revenues and clearing title to considerable acreages which have changed ownership, it is herewith recommended that a direct tax be levied against all mineral and oil rights held in separate ownership from the land.

2. As a means of raising additional revenue for forest fire protection purposes, a tax of one cent per tree for every Christmas tree shipped out of the State of Washington; also, one cent per pound for all native greens shipped out of the state for decorative purposes is herewith suggested for consideration of the legislature. A certificate of inspection, issued by Division of Forestry, must be attached to each tree or bundle of trees or consignment of greens and no person, firm or corporation, railroad, automobile transportation company, steamship company, or other common carrier or postal authorities shall accept for shipment or transport or carry any Christmas trees or evergreen decorations to any point outside the State of Washington without official tag or certificate of inspection attached to the material shipped.

T. S. GOODYEAR,
Supervisor of Forestry.

Table No. 5—ORIGIN, NUMBER AND CLASSIFICATION OF FIRES, 1934

COUNTIES	Light-ning	Incen-diary	Camp-ers	Smok-ers	Slash-ing	Log-ging	Brush Burning	Rail-roads	Misc.	Total
Chelan	4	.....	2	5	.....	.....	.....	1	1	13
Clallam	.....	11	1	15	1	1	3	1	6	39
Clark	.....	3	1	14	2	1	11	.....	17	49
Cowlitz	.....	5	1	16	2	3	12	.....	4	43
Ferry	5	.....	.....	5	.....	.....	1	1	1	13
Grays Harbor	.....	12	7	16	.....	2	7	4	3	51
Island	.....	3	18	12	.....	.....	3	.....	3	39
Jefferson	.....	3	4	8	.....	.....	6	.....	.....	21
King	.....	16	15	42	1	1	13	6	13	107
Kitsap	.....	6	7	4	2	1	2	.....	4	26
Kittitas	2	1	.....	7	.....	.....	1	.....	.....	11
Klickitat	2	11	2	16	1	.....	2	2	5	41
Lewis	.....	34	3	8	4	3	7	.....	18	77
Mason	.....	3	32	2	.....	.....	2	.....	12	51
Okanogan	7	.....	2	9	.....	.....	.....	.....	1	19
Pacific	.....	.....	4	2	.....	1	2	.....	1	10
Pend Oreille	14	2	4	20	.....	.....	.....	3	15	58
Pierce	1	12	5	40	1	.....	14	2	20	95
San Juan	.....	.....	6	14	2	.....	3	.....	14	39
Skagit	5	6	4	21	.....	.....	6	.....	8	50
Skamania	.....	1	1	2	1	1	4	.....	4	14
Snohomish	4	18	3	15	.....	.....	8	.....	10	58
Spokane	2	16	19	85	.....	.....	13	24	34	193
Stevens	23	21	12	49	2	1	9	5	22	144
Thurston	.....	33	1	6	.....	.....	4	3	4	51
Wahkiakum	.....	.....	.....	.....	.....	.....	1	1	.....	2
Whatcom	.....	6	6	12	2	.....	17	1	8	52
Yakima	1	.....	1	3	.....	.....	.....	.....	.....	5
TOTALS	70	223	161	448	21	15	151	54	228	1,371

CLASSIFICATION OF FIRES—Class A (¼ acre or less), 268; Class B (¼ to 10 acres), 674; Class C (over 10 acres), 429.

Table No. 6—ACREAGE BURNED OVER, 1934 FIRES

COUNTIES	FOREST LAND			NOT REFORESTED			NON-FOREST LAND			
		Reproduction			Cutover Land					
	Merch-antable Timber	Cut-Over	Old Burn	Old Burn	Slash Un-burned	Slash Burned	Pas-ture	Brush	Other	Total
Chelan	.....	1	.....	.....	1	.....	.....	1,184	.....	1,186
Clallam	1	23	2	3	35	.....	5	5	.....	74
Clark	56	386	60	35	225	.....	192	44	.....	998
Cowlitz	.....	56	36	65	17	40	40	52	1	307
Ferry	476	.....	.....	8	412	390	.....	.....	.....	1,286
Grays Harbor	25	65	1,041	71	560	246	145	73	3	2,229
Island	.....	13	.....	270	.....	.....	15	66	15	379
Jefferson	60	508	.....	138	47	11	.....	8	.....	772
King	31	45	969	414	1,362	51	26	1,908	5	4,811
Kitsap	.....	30	.....	247	404	345	.....	10	.....	1,036
Kittitas	4	4	.....	.....	320	3	.....	2	.....	333
Klickitat	1,337	1,621	.....	67	718	380	473	1,317	165	6,078
Lewis	606	456	2,394	2,221	2,031	106	471	902	6	9,193
Mason	.....	5	40	8	18	.....	2	13	.....	86
Okanogan	295	100	.....	.....	135	555	860	5,360	7	7,312
Pacific	.....	.....	.....	1	17	.....	.....	18	1	37
Pend Oreille	506	1,927	523	4,160	941	.....	3	23	.....	8,083
Pierce	36	171	189	228	658	577	112	1,675	84	3,730
San Juan	.....	25	14	20	96	124	13	60	15	367
Skagit	.....	6	86	5	50	2	2	400	2	553
Skamania	42	30	.....	.....	107	.....	10	12	.....	201
Snohomish	1	55	219	103	893	205	133	156	1	1,766
Spokane	1,986	6,565	229	930	2,440	45	757	429	1,670	15,051
Stevens	8,109	4,911	4,750	1,843	816	240	624	145	101	21,539
Thurston	786	692	952	3	576	165	206	513	.....	3,893
Wahkiakum	.....	.....	.....	80	70	.....	.....	.....	.....	150
Whatcom	75	122	20	253	425	50	272	1,319	6	2,542
Yakima	47	.....	.....	.....	.....	.....	1,365	.....	.....	1,412
TOTALS	14,479	17,817	11,524	11,173	13,374	3,535	5,726	15,694	2,082	95,404

Table No. 7—LOSS AND DAMAGE, 1934 FIRES

COUNTIES	MERCHANTABLE TIMBER		LOGS	LOSS AND DAMAGE TO PROPERTY	
	Timber Killed M.B.M.	Timber Destroyed M.B.M.	Logs Destroyed M.B.M.	Logging Equipment	Settlers and Others
Chelan					$ 300.00
Clallam				$ 35.00	250.00
Clark	940	584	60		376.00
Cowlitz					45.00
Ferry	1,420	1,420			
Grays Harbor					
Island					
Jefferson	73	36			
King	10	5		500.00	
Kitsap					
Kittitas					
Klickitat	1,451	856	12		30.00
Lewis	1,639	549	10		
Mason					
Okanogan	251	249			50.00
Pacific					
Pend Oreille	7,761	155			1,910.00
Pierce	20	20			50.00
San Juan					310.00
Skagit					
Skamania	400		400	600.00	
Snohomish					86.00
Spokane	1,541	902			14,578.00
Stevens	1,654	856		1,200.00	1,600.00
Thurston	175	175			5.00
Wahkiakum					
Whatcom	425	100	200	800.00	607.00
Yakima	41	9			
TOTALS	17,801	5,916	382	$3,135.00	$20,197.00

Total loss and damage to all classes of property—$33,648.00.

Table No. 8—BURNING PERMITS, ARRESTS AND FINES, CLASSIFICATION AND ACREAGE OF LAND BURNED UNDER PERMIT, 1934

COUNTIES	BURNING PERMITS				ARRESTS and FINES	
	Permits	Camp Fires	Protection	Agriculture	Number	Fines and Costs
Chelan	2		2			
Clallam	663	14	133	1,547		
Clark	690	77	277	2,583		
Cowlitz	1,110	146	7,221	3,403		
Ferry	73	10	8	85		
Grays Harbor	807	17	1,668	1,303		
Island	175		261	623		
Jefferson	394	75	181	352		
King	1,957	192	525	2,479	1	37.50
Kittitas	11	5	120	76		
Klickitat	513	56	4,318	4,919		
Lewis	3.057	43	3,438	15,069	1	7.50
Mason	479	7	1,363	713		
Okanogan	78	31	654	2,261		
Pacific	352	23	4,201	1,047		
Pend Oreille	281	54	233	1,267	1	
Pierce	1,344	66	968	7,230		
San Juan	140	63	69	1,039	3	25.00
Skagit	731	58	4,546	2,382		
Skamania	181	31	47	179	2	25.00
Snohomish	1,494	131	123	5,122		
Spokane	413	13	975	1,561	5	93.00
Stevens	819	258	740	4,368	3	15.00
Thurston	1,788	9	1,274	8,905		
Wahkiakum	205	9	25	1,221		
Whatcom	1,432	16	155	3,980	1	27.50
Yakima	12	75	13			
TOTALS	19,201	1,479	33,538	73,723	17	$230.50

Table No. 9—STATE APPROPRIATION—GENERAL FUND

(October 1, 1932, to March 31, 1933)

	SALARIES and WAGES		OPERATIONS	
UNEXPENDED (1931-33 Appropriation)		$ 8,162.66		$ 323.15
EXPENDITURES:				
Office Salaries	$ 3,862.42			
Traveling expense			$ 76.61	
Supplies			3.55	
Telephone and telegraph			58.24	
Postage				
Printing				
Miscellaneous			118.52	
Equipment—Field and office			12.01	
Improvements—Trails and lookouts, telephone lines, etc.				
Wardens' salaries	4,300.24			
Wardens' expense			54.17	
Fire Fighting salaries				
Fire Fighting expense				
Total Expenditures		$ 8,162.66		$ 323.10
Balance March 31, 1933				$ .05*

*Reverted.

NOTE: Amount expended in counties from State Appropriation for fire suppression and protection $4,354.41
Amount due the State from the counties for one-third of expenditures 1,451.47

Table No. 10—STATE APPROPRIATION—GENERAL FUND

(April 1, 1933, to March 31, 1934)

	SALARIES and WAGES		OPERATIONS		EMERGENCY FIRE FIGHTING	
APPROPRIATION 1933-35		$85,967.36		$18,164.00		$20,000.00
EXPENDITURES:						
Office Salaries	$5,470.40					
Traveling expense			$ 164.97			
Supplies			105.47			
Telephone and telegraph			196.05			
Postage			482.42			
Printing			712.28			
Miscellaneous			3,051.45			
Equipment—Field and office			2,468.49			
Improvements—Trails and lookouts, telephone lines, etc.			39.36			
Wardens' salaries	39,102.50					
Wardens' expense			2,042.33			
Fire Fighting salaries					228.17	
Fire Fighting expense						
Total expenditures		44,572.90		9,262.82		228.17
Balance March 31, 1934		$41,394.46		$ 8,901.18		$19,771.83

NOTE: Amount expended in counties from State Appropriation for fire suppression and protection $40,354.83
Amount due the State from the counties for one-third of expenditures 13,451.61

Table No. 11—STATE APPROPRIATION—GENERAL FUND

(April 1, 1934, to November 30, 1934)

	SALARIES and WAGES		OPERATIONS		EMERGENCY FIRE FIGHTING	
APPROPRIATION 1933-35 (Unexpended)		$41,394.46		$8,901.18		$19,771.83
EXPENDITURES:						
Office salaries	$3,546.92					
Traveling expense			$ 99.35			
Supplies			68.11			
Telephone and telegraph			229.58			
Postage			398.52			
Printing			938.47			
Miscellaneous			2,134.18			
Equipment—Field and office			1,611.66			
Improvements—Trails and look-outs, telephone lines, etc.			25.19			
Wardens' salaries	35,987.56					
Wardens' expense			2,104.05			
Fire Fighting salaries					14,698.13	
Fire Fighting expense					3,234.37	
Total expenditures		39,534.48		7,609.11		17,932.50
Balance Nov. 30, 1934		$ 1,859.98		$ 1,292.07		$ 1,839.33

NOTE: Amount expended in counties from State Appropriation for fire suppression and protection $55,938.61
Amount due the State from the counties for one-third of expenditures. 18,646.20

Table No. 12—FEDERAL ALLOTMENT—CLARKE-McNARY FUND

	October 1, 1932 to March 31, 1933		April 1, 1933 to March 31, 1934		April 1, 1934 to November 30, 1934	
UNEXPENDED		$27,995.14		$28,680.67		$57,310.03
Reimbursement		33,883.62		64,359.00		20,700.00
Recovery		362.43				
Refund		53.30				
Olympia Nat'l Bank Payments		793.38		470.39		172.35
Total Credits		$63,087.87		$93,510.06		$78,182.38
EXPENDITURES:						
Office salaries	$ 46.67		$ 962.50		$ 833.25	
Traveling expense	344.44		221.56		274.55	
Supplies	33.45		42.74		82.32	
Telephone and telegraph	51.27		11.86			
Postage	1.00		259.32			
Printing	241.97		62.29		15.13	
Miscellaneous	3,895.04		467.79		375.63	
Equipment	394.75		1,306.90		793.99	
Improvements	90.85		30.37			
Wardens' salaries	21,527.81		27,925.40		35,660.98	
Wardens' expense	3,785.87		4,234.44		2,860.06	
Fire Fighting salaries	3,718.65		665.64		259.64	
Fire Fighting expense	275.43		9.22		65.75	
Total expenditures		34,407.20		36,200.03		41,221.30
Balance		$28,680.67		$57,310.03		$36,961.08

Table No. 13—CLERKS' FUND

	October 1, 1932 to March 31, 1933		April 1, 1933 to March 31, 1934		April 1, 1934 to November 30, 1934	
UNEXPENDED		$2,401.40		$8,019.10		$16,986.59
Transfers from forest assessment fund		2,745.41		7,964.61		1,883.54
Olympia Nat'l Bank Payments		4,604.56		2,729.70		1,000.32
Total credits		$9,751.37		$18,713.41		$19,870.52
EXPENDITURES:						
Office salaries	$1,530.20		$1,516.45		$1,236.43	
Supplies	37.40		65.77		20.00	
Miscellaneous	35.00		120.00		45.44	
Equipment			15.00			
Wardens' salaries	129.67				115.00	
Wardens' expense			9.60			
Total expenditures		1,732.27		1,726.82		1,416.87
Balance		8,019.10		$16,986.59		$18,453.65

Table No. 14—FOREST ASSESSMENT FUND

	October 1, 1932 to March 31, 1933		April 1, 1933 to March 31, 1934		April 1, 1934 to November 30, 1934	
UNEXPENDED		$8,411.83		$10,053.55		$18,400.58
Receipts—Collections		23,687.15		65,735.16		47,483.38
Total credits		$32,098.98		$75,788.71		$65,883.96
EXPENDITURES:						
Refund of erroneous assessment	$ 11.16		$ 24.84			
Association remittances	11,704.49		31,787.47		$23,262.60	
Transfer to Clerks Fund	2,745.41		7,964.61		1,883.54	
Equipment—Field	307.04		67.90		344.57	
Improvements—Lookouts, trails and telephones					96.18	
Wardens' salaries	5,255.83		14,602.20		22,072.07	
Wardens' expense	570.73		1,986.09		2,780.40	
Fire Fighting salaries	1,292.37		780.22		269.57	
Fire Fighting expense	158.40		174.80		142.09	
Total expenditures		22,045.43		57,388.13		50,851.02
Balance		$10,053.55		$18,400.58		$15,032.94

Table No. 15—RECOVERY FUND

	October 1, 1932 to March 31, 1933		April 1, 1933 to March 31, 1934		April 1, 1934 to November 30, 1934	
UNEXPENDED		$ 1.50				$ 170.17
Receipts		113.51		$ 36.75		399.11
Olympia Nat'l Bank Payments		247.42		146.63		53.78
Total credits		$ 362.43		$ 183.38		$ 623.06
EXPENDITURES:						
Fire Fighters salary			$ 13.21		$ 40.32	
Clark-McNary Fund	$ 362.43					
Total		362.43		13.21		40.32
Balance				$ 170.17		$ 582.74

Table No. 16—STATEMENT SHOWING NUMBER OF ACRES OF PRIVATELY OWNED FOREST LANDS ASSESSED FOR PROTECTION COSTS

	1933	1934
Asotin	15,630	15,630
Chelan	166,108	166,507
Clallam	132,403	136,110
Clark	75,257	74,162
Columbia	25,119	25,119
Cowlitz	139,429	152,028
Ferry	55,109	55,284
Garfield	7,200	7,520
Grays Harbor	323,259	328,893
Island	27,962	28,144
Jefferson	80,451	79,906
King	146,039	149,189
Kitsap	41,582	41,049
Kittitas	243,922	249,711
Klickitat	264,610	264,009
Lewis	147,728	164,087
Mason	146,616	150,919
Okanogan	98,369	96,348
Pacific	148,127	148,661
Pend Oreille	230,531	227,827
Pierce	91,123	93,121
Skagit	186,509	196,904
Skamania	83,465	96,207
Snohomish	158,082	166,157
Spokane	150,247	149,589
Stevens	387,814	396,866
Thurston	137,036	135,740
Wahkiakum	41,082	43,079
Walla Walla	7,061	7,061
Whatcom	104,564	109,858
Yakima	92,520	92,520
TOTAL	3,954,954	4,048,205

Table No. 17—STATEMENT SHOWING FOREST ASSESSMENT COLLECTIONS RECEIVED FROM COUNTY TREASURERS

(October 1, 1932, to March 31, 1933)

COUNTIES	1927	1928	1929	1930	1931	1932	TOTAL
Asotin			$ 1.60	$ 6.40	$ 18.44	$ 2.40	$ 28.84
Chelan	$ 8.00	$ 7.60	11.64	70.55	784.60	52.74	935.13
Clallam	208.88	18.01	12.81	27.30	716.84	44.66	1,028.50
Clark	25.00			10.00	187.87	41.83	264.70
Columbia							
Cowlitz	36.07	10.81	5.21	10.00	658.43	251.20	971.72
Ferry	15.36			13.83	205.89		235.08
Garfield			3.44	21.04	29.28	14.64	68.40
Grays Harbor	14.20	4.78	4.77	46.60	1,342.92		1,413.27
Island	13.83	3.85	3.85	3.50	72.31	65.27	162.61
Jefferson	48.47	18.20	24.15	40.00	380.36	196.17	707.35
King	98.12	32.97	41.41	49.72	703.93	43.52	969.67
Kitsap	28.78	11.06	1.32	3.75	102.58	13.80	161.29
Kittitas	25.26	3.60	3.19	11.55	186.65	2,761.50	2,991.75
Klickitat	84.40	13.31	13.34	61.23	493.38	58.77	724.43
Lewis	45.23	12.39	31.29	119.83	518.35	116.89	843.98
Mason	5.05	4.74	7.12	14.00	466.52	179.09	676.52
Okanogan	53.46	11.55	12.00	23.96	257.24	128.37	486.58
Pacific	21.10			14.00	640.80	46.39	722.29
Pend Oreille	221.12	22.77	16.44	62.96	945.09	139.80	1,408.18
Pierce	70.47	15.95	20.55	42.34	503.44	94.21	746.96
Skagit	108.18	7.25	8.08	19.12	1,240.95	42.15	1,425.73
Skamania	99.67	20.20	26.18	56.35	258.55	77.13	538.08
Snohomish	16.75	8.79	19.11	33.72	533.04	48.68	660.09
Spokane					730.92	328.55	1,059.47
Stevens	238.58	62.16	66.49	148.82	1,251.96	285.14	2,053.15
Thurston	23.55	15.08	25.42	96.95	737.21	65.53	963.74
Wahkiakum	2.00	1.40	1.40	2.50	28.40	6.78	42.48
Walla Walla					8.00	1.60	9.60
Whatcom	10.00	2.80	6.95	18.04	610.51	46.84	695.14
Yakima	.80		5.60	38.82	148.16	499.04	692.42
TOTALS	$ 1,522.33	$ 309.27	$ 373.36	$ 1,066.88	$14,762.62	$ 5,652.69	$23,687.15

Table No. 18—STATEMENT SHOWING FOREST ASSESSMENT COLLECTIONS RECEIVED FROM COUNTY TREASURERS

(April 1, 1933, to March 31, 1934)

COUNTIES	1927	1928	1929	1930	1931	1932	1933	TOTAL
Asotin			$ 4.00	$ 33.91	$ 7.36	$ 48.49	$ 8.21	$ 101.97
Chelan	$ 12.48	$ 12.54	43.02	94.26	187.26	1,232.11	43.01	1,624.68
Clallam	149.77	76.43	103.01	142.31	673.94	869.56	.....	2,015.02
Clark	29.65	23.35	27.90	75.10	203.80	713.77	.....	1,073.57
Columbia	.....	.....	.....	.....	.....	.....	.....	.....
Cowlitz	298.89	152.53	152.01	268.60	366.22	1,207.06	35.31	2,480.62
Ferry	10.65	12.36	15.21	18.36	49.50	273.19	59.50	438.77
Garfield	.....	.....	4.80	13.60	56.80	88.48	38.24	201.92
Grays Harbor	69.86	33.68	45.62	210.07	911.42	1,877.52	.....	3,148.17
Island	9.28	10.78	42.48	66.76	94.83	231.48	33.18	488.79
Jefferson	79.05	30.60	53.82	110.21	116.80	778.47	1.50	1,170.45
King	163.74	81.22	185.42	331.99	869.60	1,726.51	4.72	3,363.20
Kitsap	15.11	8.26	12.04	23.96	70.35	336.91	23.45	490.08
Kittitas	20.30	20.10	15.64	16.70	448.60	885.14	2,750.48	4,156.96
Klickitat	367.98	73.67	57.40	179.79	398.01	2,493.07	165.42	3,735.34
Lewis	31.80	41.94	79.33	235.58	433.13	1,726.40	66.62	2,614.80
Mason	58.80	37.28	79.17	133.30	330.82	1,235.31	54.46	1,929.14
Okanogan	225.54	139.26	137.82	259.17	447.28	924.84	53.23	2,187.14
Pacific	318.00	148.40	180.03	293.50	409.75	1,389.78	10.74	2,750.20
Pend Oreille	299.99	115.74	124.02	206.62	645.46	3,011.29	219.51	4,622.63
Pierce	92.08	45.68	55.00	91.29	460.59	1,233.84	6.63	1,985.11
Skagit	325.45	101.46	97.10	115.76	225.58	1,910.05	33.16	2,808.56
Skamania	182.97	58.89	91.30	186.13	417.07	1,152.79	59.41	2,148.56
Snohomish	133.96	57.96	102.23	276.66	542.78	1,137.31	2.74	2,253.64
Spokane	.....	.....	.....	.....	.....	3,082.69	227.21	3,309.90
Stevens	308.38	213.63	610.72	1,011.89	1,383.02	3,738.91	458.01	7,724.56
Thurston	77.90	95.71	110.42	285.09	670.15	1,695.09	19.74	2,954.10
Wahkiakum	21.00	72.40	7.16	22.25	61.24	322.02	20.04	526.11
Walla Walla	.....	.....	1.05	7.65	21.90	79.44	19.93	129.97
Whatcom	201.04	52.30	52.22	127.00	489.50	836.94	26.34	1,785.34
Yakima	6.40	6.40	6.40	68.74	150.44	774.24	502.24	1,514.86
TOTALS	$ 3,510.07	$ 1,722.57	$ 2,496.34	$ 4,906.25	$11,143.20	$37,012.70	$ 4,943.03	$65,734.16

Table No. 19—STATEMENT SHOWING FOREST ASSESSMENT COLLECTIONS RECEIVED FROM COUNTY TREASURERS

(April 1, 1934 to November 30, 1934)

COUNTIES	1927	1928	1929	1930	1931	1932	1933	TOTAL
Asotin				$ 7.56	$ 13.23	$ 28.05	$ 61.37	$ 110.21
Chelan	$ 10.80		$ 17.02	41.84	278.58	614.98	1,049.04	2,012.26
Clallam	39.28	$ 37.34	45.46	114.45	256.93	238.69	738.75	1,470.90
Clark	17.18	13.06	20.58	63.98	62.77	94.17	625.61	897.35
Columbia			3.22	16.27	172.72	290.41	184.85	667.47
Cowlitz	18.00	35.74	29.09	46.70	125.25	930.65	1,775.80	2,961.23
Ferry	43.65	23.70	5.31	7.46	14.98	32.49	219.64	347.23
Garfield			.80	2.60	4.20	1.60	46.44	55.64
Grays Harbor	36.12	13.00	24.01	86.08	282.76	332.05	1,628.13	2,402.15
Island	14.50	8.75	10.85	14.30	32.28	31.44	210.90	323.02
Jefferson	6.55	8.08	20.22	35.37	48.27	153.01	764.33	1,035.83
King	89.59	36.52	66.00	95.63	198.14	222.44	1,339.44	2,047.76
Kitsap	3.80	6.90	10.33	16.80	28.85	32.20	196.33	295.21
Kittitas		3.30	3.30	6.24	377.81	278.89	980.17	1,649.71
Klickitat	82.23	54.65	138.93	295.03	391.58	320.80	2,339.03	3,622.25
Lewis	2.17	5.69	13.30	40.90	59.10	177.79	1,173.13	1,472.08
Mason	12.94	10.81	21.18	52.73	140.80	154.91	943.41	1,336.78
Okanogan	41.40	122.73	122.55	83.59	213.42	167.70	767.94	1,519.33
Pacific	44.80	12.32	21.76	73.00	137.15	235.78	1,154.12	1,678.93
Pend Oreille	37.51	88.73	104.73	162.60	281.74	358.47	2,301.52	3,335.30
Pierce	57.02	23.45	27.08	52.11	88.25	162.74	677.82	1,088.47
Skagit	28.79	80.21	77.70	126.20	416.68	225.88	1,294.91	2,250.37
Skamania	10.80	31.18	51.79	39.14	72.85	213.75	875.32	1,294.83
Snohomish	110.04	71.55	57.68	145.37	342.10	285.77	881.48	1,893.99
Spokane							2,053.48	2,053.48
Stevens	151.10	133.00	259.18	453.92	604.14	994.06	2,845.71	5,441.11
Thurston	4.70	5.36	18.14	50.11	140.18	207.61	1,159.96	1,586.06
Wahkiakum	1.20	3.76	4.96	7.67	5.71	17.06	212.51	252.87
Walla Walla			.80	2.40	3.20	6.65	45.00	58.05
Whatcom	17.55	36.46	82.50	101.26	140.45	151.11	522.37	1,051.70
Yakima		12.80	16.00	33.10	33.10	210.44	908.14	1,213.58
TOTALS	$ 881.72	$ 879.09	$1,274.47	$2,274.41	$4,967.22	$7,171.59	$29,976.65	$47,425.15

DEPARTMENT OF CONSERVATION AND DEVELOPMENT
FINANCIAL STATEMENT
From April 1, 1933, to January 1, 1935
General Fund

FUND	Appropriation	Expenditures	Balance
General Office		$10,931 05	
Forestry Division		101,393 82	
Hydraulic Division	$142,936 00	19,553 53	
Geological Division		1,523 93	
		$133,402 33	$9,533 67
Emergency Fire Fighting	20,000 00	18,849 19	1,150 81
Total	$162,936 00	$152,251 52	$10,684 48

Reclamation Revolving Fund

FUND	Appropriation	Expenditures	Balance
*Balance of Reclamation Revolving Fund April 1, 1933	$1,305,436.87		
Reclamation Division	$8,840 00	$8,840 00	.....
Hydrographic Survey	10,000 00	5,393 45	$4,606 55
Columbia Basin Commission	35,000 00	22,178 03	12,821 97
Case of State of Washington vs. State of Oregon	15,000 00	14,841 41	158 59
Diking, drainage and irrigation districts (Chap. 16, Laws of 1933)	1,250,000 00	1,249,998 93	1 07
†Diking, drainage and irrigation districts (Chap. 13, Laws of Extraordinary Session of 1933)	1,250,000 00	60,124 56	
Control of Flood Waters	7,000 00	2,601 19	4,398 81

Grants From Emergency Relief Fund

FUND	Appropriation	Expenditures	Balance
Grant 14— (For a Natural Resources Survey—to include stream gauging, river surveys, topographic mapping and geological investigations)	$80,000 00	$72,777 86	$7,222 14
Grant 46— (For laboratory equipment at State College, and mineral investigations in connection with power development at Grand Coulee)	20,000 00	6,275 74	13,724 26
Total	$100,000 00	$79,053 60	$20,946 40

* The Reclamation Revolving Fund is subject to accretions from interest and bond payments.
† This appropriation was made to cover accretions to fund.