STATE OF WASHINGTON

CLARENCE D. MARTIN, *Governor*

EIGHTH BIENNIAL REPORT

OF THE

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

October 1, 1934 – September 30, 1936

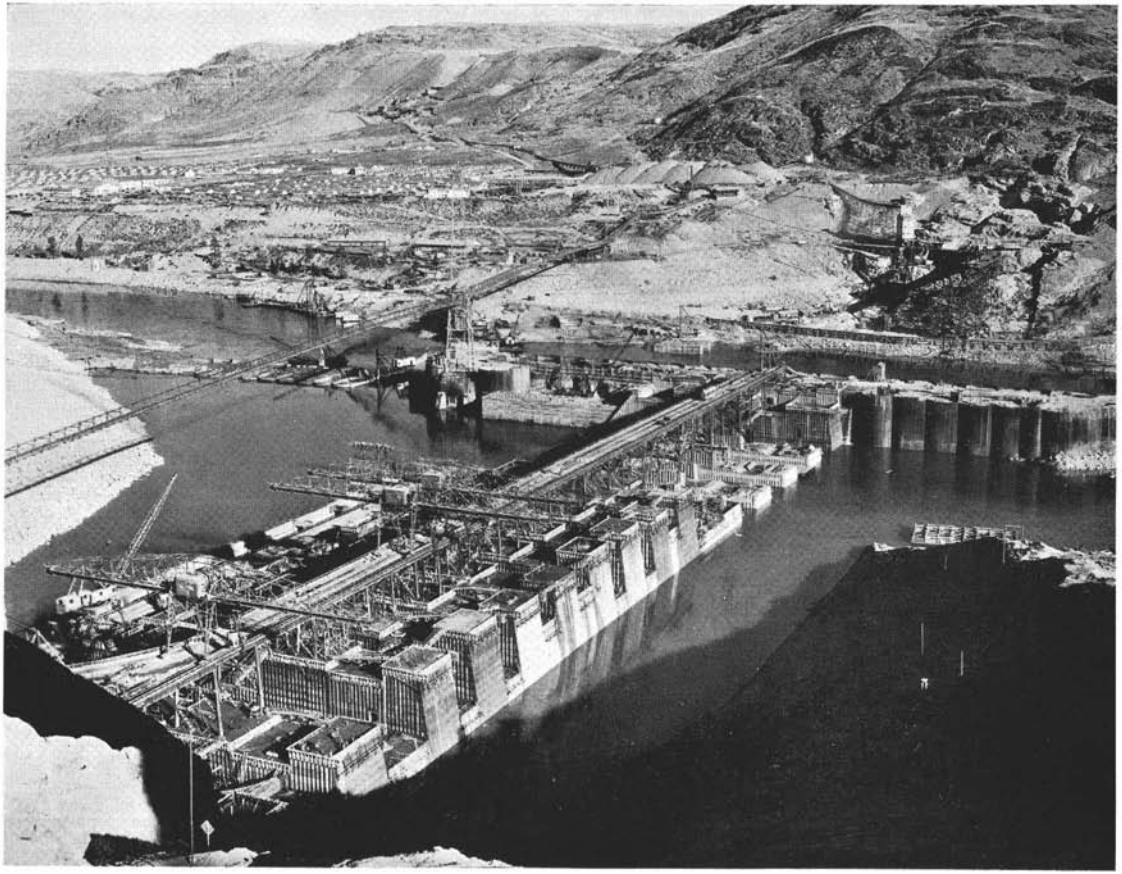
J. B. FINK

Acting Director

OLYMPIA

STATE PRINTING PLANT

1937



General view of Grand Coulee dam site showing west end of the dam shortly after Columbia river was diverted in November, 1936, to permit construction of center section. Construction of east section will follow.

"The conservation of our natural resources and their proper use constitute the fundamental problem which underlies almost every other problem of our national life."

PRESIDENT THEODORE ROOSEVELT.

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"These United States cannot fail. With their God-given natural resources, through their proper conservation and utilization our people will never suffer want."

PRESIDENT WOODROW WILSON.

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"You have acreage capable of supporting a much larger population than you now have. And we believe that by proceeding with these great projects it will not only develop the well-being of the far West and the Coast, but will also give an opportunity to many individuals and many families back in the older settled parts of the Nation to come out here and distribute some of the burdens which fall on them more heavily than fall on the West. You have great opportunities and you are doing nobly in grasping them."

PRESIDENT FRANKLIN D. ROOSEVELT,
when visiting this State in 1934.

DEPARTMENTAL ORGANIZATION

DEPARTMENT
OF
CONSERVATION AND DEVELOPMENT

J. B. FINK
Acting Director

FRANK R. SPINNING
Assistant Director

DIVISION OF RECLAMATION
J. B. FINK
Acting Director

DIVISION OF FORESTRY
T. S. GOODYEAR
Supervisor

DIVISION OF HYDRAULICS
CHAS. J. BARTHOLET
Supervisor

DIVISION OF GEOLOGY
HAROLD E. CULVER
Supervisor

DIVISION OF MINES AND MINING
THOMAS B. HILL
Supervisor

COLUMBIA BASIN COMMISSION
J. B. FINK
Chairman

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LETTER OF TRANSMITTAL

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

December 15, 1936.

To His Excellency,
Clarence D. Martin, Governor.

Sir:

I have the honor to submit herewith, pursuant to law, the Eighth Biennial Report of the Department of Conservation and Development, covering the period October 1, 1934 to September 30, 1936.

Respectfully,

J. B. FINK,
Acting Director.

INTRODUCTION

The present Acting Director assumed office on August 16, 1936 by appointment of the Governor, upon the resignation of Hon. E. F. Banker, who had served as Director of the Department the previous three and one-half years.

The work of the Department of Conservation and Development is probably the most interesting of all the state departments since it is the agency of the state which directs the development of our unsurpassed natural resources.

The functions of this department are to encourage and assist in the conservation and development of these natural resources, which means, on the one hand, to prevent waste and exploitation, and, on the other, to assist in the development of these resources for the best interests of all the people. It embraces the reclamation and use of land; the highest and most beneficial use of water, both surface and underground, for irrigation, hydroelectric power, industrial and other purposes; the protection of state and private forested lands; the control of floods; and the development of our mineral resources. In a word, this department administers the laws affecting nearly all of the sources of the state's natural wealth.

For the administration of this broad activity the department is divided into the following six divisions: Reclamation, Hydraulics, Forestry, Flood Control,, Geology, and Mines and Mining, and the director is also chairman of the Columbia Basin Commission.

Few fully realize the very effective work that is being done by the Division of Forestry not only in the protection of our state and private timber but in the acquisition of forest lands and in the development of new forests. The report of the Supervisor of Forestry sets out this activity in detail.

The Division of Hydraulics is concerned with numerous problems of water supply arising from the irrigation of more than 600,000 acres of land from the streams of this state; the collection of stream flow data; passing upon applications for new water rights for all purposes; the examination of plans for dams and the inspection of existing hydraulic structures as to safety, and the collection of annual license fees from the 170 hydroelectric power projects within the state.

The Division of Geology is engaged in working out the basic geology of the state and in platting the formation and structures which indicate in a general way the mineralized areas, all of which is fundamental to mining and other industries.

The Division of Mines and Mining was created by the Legislature of 1935 to aid in development of our mineral resources. There may be untold wealth under the surface of our state, the location of much of which may be known, the geology may be worked out, the metallurgical problems may be solved, but if there is no development the minerals are of no value to us. It is, therefore, the primary duty of this division to be of practical service to those who are interested in our mineral deposits, and in mining, milling, and marketing them.

The department, in cooperation with the Water Resources Division of the U. S. Geological Survey, is maintaining 100 gaging stations on rivers and

streams of the state. The state bears approximately 30 per cent of the cost of the maintenance of these stations.

The department is also cooperating with the Conservation branch of the United States Geological Survey in making surveys of rivers and lakes in order to determine possible and feasible hydroelectric development and flood control, and also with the Topographic Branch of the U. S. Geological Survey in topographic mapping of the state.

This department has frequent dealings with city, county, and reclamation district officials, with the U. S. Bureau of Reclamation, the U. S. Army engineers, officials of the U. S. Geological Survey, U. S. Bureau of Mines, Public Works Administration, Works Progress Administration and the Federal Power Commission, as well as with the personnel of many of the state departments. It is gratifying to report that these relations are of the most cordial and satisfactory nature, and I want to express my appreciation of their service and cooperation.

May I further state that the department is functioning smoothly and efficiently. Interdepartmental relations are pleasant and everywhere the spirit of loyalty and wholehearted cooperation prevails. It is a real pleasure to be able to pay this tribute to the entire personnel.

J. B. FINK, Acting Director.

DIVISION OF RECLAMATION

J. B. FINK, ***Acting Director***

The Division of Reclamation is that branch of the Department of Conservation and Development charged with the administration of reclamation activities under provisions of the State Reclamation Act. The work involves the loaning of moneys from the 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. The State accepts district bonds as security for both types of loans. 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 legal, engineering and financial 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 Director of the Department, 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. Part of the costs incurred in investigating districts which have been refinanced or to which moneys have been advanced for other purposes were collected from such districts, and the State has thereby been relieved of a portion of such expense.

RECLAMATION ACT

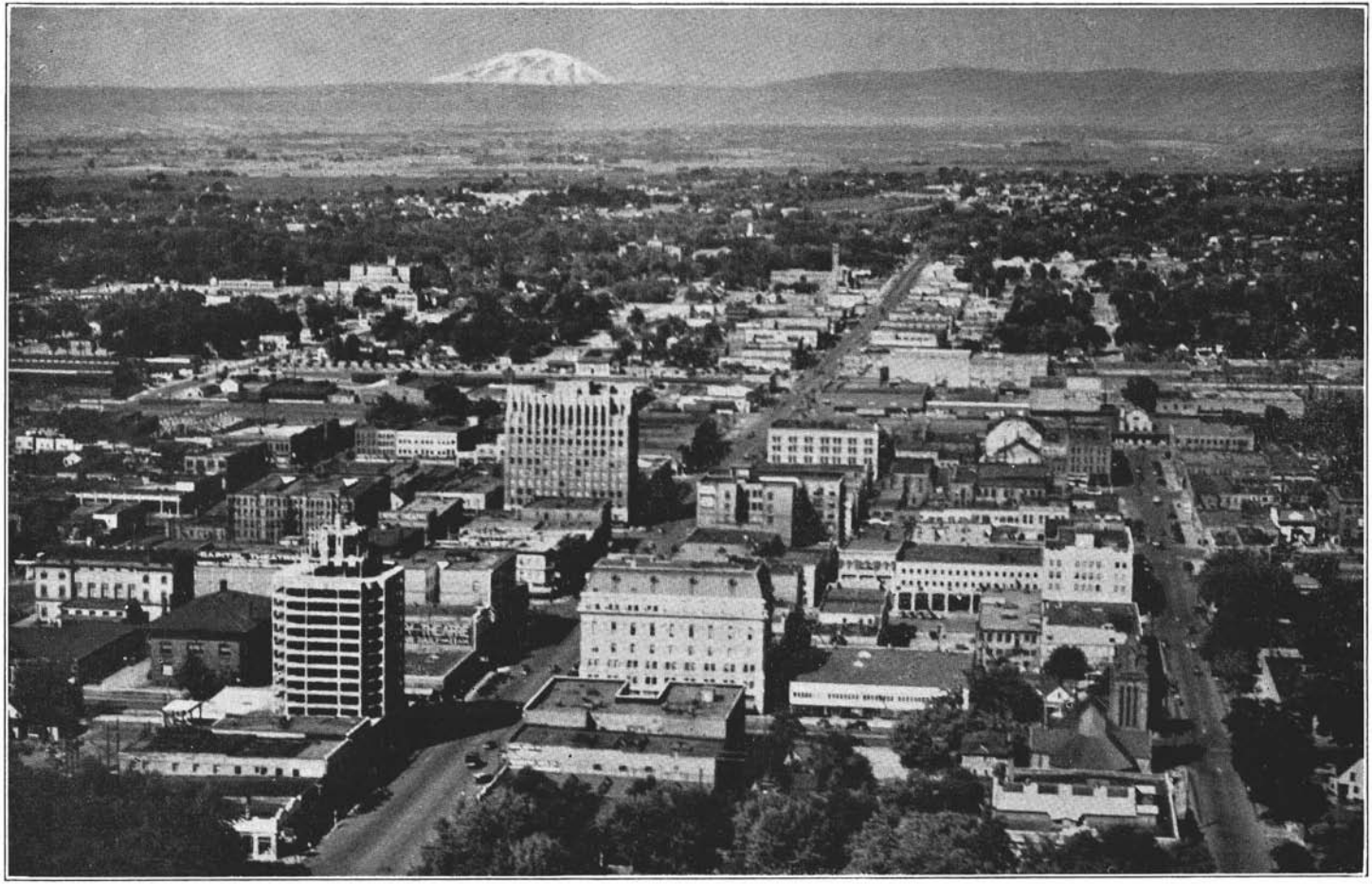
(Chapter 158, Laws of 1919)

The Reclamation Act provided for the reclamation and development of arid, swamp, overflow, and logged-off lands, and for the establishment of the Reclamation Revolving Fund, funds of which were to be used to assist financially distressed reclamation districts. The Act further provided that revenue for the Reclamation Revolving Fund should be derived from a one-half mill tax to be levied on all taxable property within the state. This tax was levied through the years 1919 to 1925 and from it $3,993,224.81 has been collected and placed to the credit of the State Reclamation Revolving Fund. The 1925 Legislature suspended the levy for the year 1926 and it has since remained suspended by acts of succeeding sessions of the Legislature.

Formerly moneys collected and credited to the Reclamation Revolving Fund were used for various and sundry purposes in connection with reclamation work, both reclamation of new lands, and refinancing irrigation districts, but the statute appropriating money from the Reclamation Revolving Fund as enacted by the 1933 Legislature carried a provision that it could be loaned only to reclamation districts organized before that time, thus preventing the use of money for the development of new lands.

RESULTS ACCOMPLISHED BY RECLAMATION LOANS

Although some mistakes may have been made in the investment of these funds during the early years the Reclamation Act was in operation, yet the good that has been accomplished far outweighs the losses. As a result of the recent depression and deflation in prices of farm products, many irrigation,



City of Yakima — Product of Irrigation

"I took in the Yakima Valley, for instance. It is a sight worth seeing after leaving the drought belt. Never have I observed greener fields, greener orchards, greener stretches of symmetrically arranged rows of planting. For miles around, the valley was productive, rich, fruitful.

"Millions of people now live where once were arid lands. And not only have great farms sprung up but every now and then little cities have grown in the very center of such inland empires. Take the town of Yakima, built in a reclamation area. Its wide streets and good-looking office buildings, its comfortably spaced lots and grassy yards and lawns, its fine looking shops and stores—all these might be expected in a seaboard city. The quality of its merchandise, its wares, its conveniences and amusements are just as good as in any city of 100,000 people, and there are only 25,000 persons in Yakima."

DAVID LAWRENCE in The Saturday Evening Post, *December 5, 1936.*

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diking and drainage districts in this state, as elsewhere, were unable to meet their obligations and were threatened with assessment foreclosures, which would have caused the eviction of many landowners. This occurred principally in those districts that had constructed improvements at the peak of high prices and high costs and the payments therefor matured when farm incomes had shrunk to a mere fraction of their former level. Help has been given to such districts in the form of refinancing loans from the State Reclamation Revolving Fund. The districts' debts have been taken up at substantial discounts, overdue assessments replaced by smaller charges at low rates of interest, and longer periods of time allowed for the discharge of the indebtedness of the various districts. Thus these districts have been placed upon a solvent basis.

Some districts, also, were in urgent need of replacements or additional structures. Funds have been loaned from the Reclamation Revolving Fund for this purpose. In some instances such loans were supplemented by W. P. A. funds through joint federal and state action.

By advancing moneys of the Reclamation Revolving Fund as the sponsor's share of the cost of construction it has been possible for various districts to obtain W. P. A. grants for the reconstruction and improvement of their reclamation works. For example, loans totalling $69,500 have been made to five diking districts in Cowlitz County. These funds are being used as the sponsor's share of the cost of work to which the Works Progress Administration has allotted an additional $715,000. This $715,000 will not have to be repaid. This work, which is being done under the supervision of the U. S. Corps of Engineers and is now practically completed, has been done in a very fine workmanlike manner and will provide adequate and substantial protection against the flood waters which threaten the dikes during each high water period. Had funds not been available from the State to pay the sponsor's share of the cost of these improvements, it is doubtful if the project could have been approved by the Federal agency and the work done.

In their early days the farmers in these districts had enjoyed the credit facilities of the Federal Land Bank, but after the financial collapse of the districts, when the landowners were faced with impossible burdens, that institution had to suspend the making of loans in practically all such districts. However, since completion of their refinancing and rehabilitation, the credit facilities of the Federal Land Bank and other loan agencies have again become available to these landowners.

INSPECTION OF RECLAMATION DISTRICTS APPLYING FOR LOANS

Before a district is refinanced or a loan made for improvements a careful analysis is made of the physical condition of the reclamation works and of the financial condition of the district. Consideration is also given to water rights, soils, improvements, etc., and the legal aspects of the district must be approved by the Attorney General. This is done in order to be sure that the district will be on a sound basis after the loan has been made, thereby insuring a safe investment for moneys of the Reclamation Revolving Fund.

Reclamation districts refinanced during period covered by this report, referred to on following page.

COUNTY	DISTRICT	Par Value of Bonds Purchased	Percentage of Par Value Paid	Amount Paid April 1, 1933 to Oct. 1, 1934	Amount Paid Oct. 1, 1934 to Oct. 1, 1936
Cowlitz	Diking Improvement District No. 11	$79,400	42.4242%		$34,684.81
Cowlitz	Diking Improvement District No. 13	19,500	50%		9,750.00
Grays Harbor	Diking and Drainage Improvement District No. 4	74,000	50%		37,000.00
Lewis and Thurston	Joint Drainage District No. 7	24,500	15% and 20%		4,558.00
Yakima and Benton	Joint Drainage Improvement District No. 1	114,500	31.8725%		37,109.90
Yakima	Drainage Improvement District No. 3, Sub-district No. 8	17,400	70%		12,990.44
Yakima	Drainage Improvement District No. 35	61,000	50%	$17,080.00	17,649.33
	Interest	4,229.33	100%		
Clallam	Cline Irrigation District	100	70%		70.00
Stevens	Fruitland Irrigation District	263,900	24.436% & 24.5%	63,482.34	1,466.74
Benton	Kiona Irrigation District—Bonds	52,400	25%		
	Warrants	7,000	100%		20,100.00
Chelan	Lake Chelan Reclamation District	374,000	50%	156,234.23	35,785.83
Kittitas	Middle Kittitas Irrigation District	39,360	75%		29,520.00
Okanogan	Oroville-Tonasket Irrigation District	814,000	25%	202,500.00	1,000.00
Benton	Priest Rapids Irrigation District—Bonds	91,000	70%		65,611.00
	Interest	2,730	70%		
Yakima and Benton	Sunnyside Valley Irrigation District	111,000	90%		99,825.00
Chelan	Wenatchee Chewawa Irrigation District	90,000	6.67%	3,007.50	3,000.00
Thurston	Yelm Irrigation District—Bonds	209,200	33.33%	93,618.91	6,066.67
	Warrants	78,000	and 35%		
Total par value of refunded obligations		$2,527,219.33			
Average percentage of par value paid			37.43%		
Total paid prior to Oct. 1, 1934, under refinancing agreements incomplete as of that date				$535,922.98	
Total paid during biennium from Oct. 1, 1934, to Oct. 1, 1936, to refinance districts					$416,187.72

ALLOTMENT OF FUNDS

Refinancing Loans

In the following table are listed all districts which have received funds from the Reclamation Revolving Fund for refinancing purposes during the biennium from October 1st, 1934, to October 1st, 1936, together with the approximate par value of bonds purchased, percentage of par value at which such bonds have been refinanced, and the amount paid to refinance the districts. In several instances the amount paid for refinancing purposes includes the amount advanced to cover expenses incidental to the refunding operations. Districts whose refinancing was completed during the preceding biennium are not listed.

It will be noted that the State has advanced funds for refinancing purposes to seventeen districts during the biennium. Refinancing of six of these districts was commenced during the preceding biennium.

In the departmental report for the biennium from October 1st, 1932, to October 1st, 1934, $12,000 is shown as having been paid for bonds of Diking and Drainage Improvement District No. 4, Grays Harbor County. This amount was not actually paid until after September 30th, 1934, and is shown in this report as a portion of the total, $37,000, advanced to the district.

The amount expended during the former biennium for the refinancing of Lake Chelan Reclamation District has been increased from $152,750.00 in the previous report to $156,234.23 in the above list. This apparent discrepancy is explained by the fact that in this report we are including expenditures to cover costs incidental to the refunding operations, whereas in the former report only the amount set aside for that purpose was shown, in the case of the Lake Chelan Reclamation District, $5,000, listed among the loans for repairs and improvements.

The refunding bonds of the Sunnyside Valley Irrigation District, par value $100,000.00, have been resold by the Department to the State Finance Committee.

The refinancing of most of the above listed districts has been completed, or practically so. 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.

In addition, the Department has entered into refinancing agreements with two other districts. Steps will be taken to commence refunding of their bonded indebtedness as soon as funds become available.

LOANS FOR REPAIRS AND RECONSTRUCTION

During the biennium October 1, 1934, to October 1, 1936, funds were advanced for reconstruction, repair and improvement of the reclamation works of the twenty-two districts listed below. Twelve of these districts had previously (during the present administration) received no financial assistance from the Department for such purposes; the other ten had entered into construction contracts with and received funds from the Department during the preceding biennium but had not completed the work at the end of that biennium or have since entered into new contracts for additional work. Contracts entered into and consummated prior to October 1, 1934, are not listed.

COUNTY	DISTRICT	Total construction Contracts Since April 1, 1933	Advances April 1, 1933 to Oct. 1, 1934	Advances Oct. 1, 1934 to Oct. 1, 1936
Cowlitz	Diking Improvement District No. 2	$22,000.00	$ 8,067.38	$14,373.11*
Cowlitz	Diking Improvement District No. 5	28,000.00	3,995.84	19,158.05*
Cowlitz	Diking Improvement District No. 11	20,000.00		14,345.72*
Cowlitz	Diking Improvement District No. 13	5,000.00	1,911.13	3,379.35*
Cowlitz	Diking Improvement District No. 15	10,000.00		6,491.59*
Pierce	Drainage Improvement District No. 19	1,450.00		923.45
Skagit	Diking District No. 16	1,500.00		1,500.00
Skagit	Drainage District No. 19	7,000.00		6,982.50
Snohomish	Diking District No. 1	27,050.00	19,668.58	5,880.99
Snohomish	Drainage District No. 2	10,000.00	6,598.68	3,290.66
Snohomish	Drainage District No. 6	1,000.00		992.94
Spokane	Bacon Tracts Irrigation District. (Contract for $8,000 but acct. closed after expenditure of $4,021.44)	4,021.44	2,706.56	1,314.88
Benton	Kiona Irrigation District	2,400.00		2,342.50
Chelan	Lake Chelan Reclamation District	40,000.00		32,438.33
Clallam	Lindsay Irrigation District	1,000.00		899.80
Okanogan	Okeh Irrigation District	1,226.00		856.22
Spokane	Orchard Avenue Irrigation District	9,250.00	8,401.05	717.33
Okanogan	Oroville-Tonasket Irrigation District	40,000.00	15,202.88	14,726.30
Spokane	Otis Orchards Irrigation District	48,500.00	41,895.92	6,314.27
Okanogan	Pateros Irrigation District	2,000.00		1,990.00
Chelan	Wenatchee Chewawa Irrigation District	9,000.00	2,050.65	4,156.42
Okanogan	Whitestone Reclamation District	3,900.00		3,875.00
Total construction contracts since April 1, 1933, under terms of which advances were made during biennium Oct. 1, 1934 to Oct. 1, 1936		$294,297.44		
Total under said contracts prior to October 1, 1934			$110,498.67	
Total advanced for repair, etc., during biennium Oct. 1, 1934 to Oct. 1, 1936				$146,749.41*
Less advances from Flood Contrl District Fund				20,283.53
Total advanced for repair, etc., during biennium Oct. 1, 1934 to Oct. 1, 1936, from Reclamation Revolving Fund				$126,465.88

* A total of $20,283.53 included in the advances to five Cowlitz districts was advanced from the Flood Control District Fund.

COLLATERAL TRUST BONDS

It was foreseen that the funds in the Reclamation Revolving Fund would be insufficient to meet the refinancing demands of all of the worthy reclamation districts, and to meet this situation the Legislature, at the 1933 Extraordinary Session, enacted a law authorizing the Director to hypothecate and pledge reclamation district bonds as security for a loan, in order to build up the Reclamation Revolving Fund. After negotiating with several banks and bond houses, an agreement was executed whereby the Director pledged $1,265,569.38 state owned reclamation district bonds as security for a $600,000 issue of collateral trust bonds. Of this amount $269,000 had been sold as of September 30, 1936, and the proceeds immediately used to refinance districts in financial straits and to finance improvements of other districts which were unable to meet the cost of such work. Although the disposal of these collateral trust bonds has been somewhat slower than anticipated, the Department has been able to meet emergency needs of the districts with the proceeds from their sale, and additional bonds will be sold as fast as the money is required for other districts. The rate of interest paid on these bonds is four per cent (4%) and the same rate is charged the districts when the money is loaned to them, except that, in case of short time loans, the rate in increased to five per cent (5%).

RECONSTRUCTION FINANCE CORPORATION LOANS

Since the money available in the Reclamation Revolving Fund was inadequate to meet the needs of the numerous irrigation, diking and drainage districts which required financial assistance, and when the Reconstruction Finance Corporation was empowered by Congress to make loans to such districts, the department asked the various districts to cooperate with us in our attempt to rehabilitate as many districts as possible with the funds available, by applying to the R. F. C. for assistance. Each application approved by that organization reduced the demands on the Reclamation Revolving Fund.

Since 1933 thirty-two reclamation districts within the state have applied to the Drainage, Levee and Irrigation Division of the Reconstruction Finance Corporation for refinancing loans. The applications of seventeen of these districts have been approved for loans totaling $1,194,195.70 to refinance an outstanding indebtedness of $2,493,275.38. These refunding operations will reduce the average debt per assessed acre within the seventeen districts from $58.28 to $27.92. Except in a few instances the loans have not yet been consummated.

RECLAMATION DISTRICT BONDS OWNED BY THE STATE OF WASHINGTON

Following is a list of reclamation district bonds owned by the State of Washington on September 30th, 1936, on deposit with the Peoples Bank and Trust Company, Seattle, as security for the $600,000 issue of collateral trust bonds referred to in the paragraph above:

COUNTY	DISTRICT	Par Value	Interest Rate
Jefferson	Drainage District No. 1	$ 21,400.00	2%
Snohomish	Drainage District No. 1	8,000.00	2%
Snohomish	Drainage District No. 2	6,000.00	2%
Yakima	Drainage Improvement District No. 35	32,500.00	2%
Yakima	Drainage Improvement District No. 41	4,599.38	2%
Yakima	Drainage Improvement District No. 43	7,375.00	2%
Spokane	Bacon Tracts Irrigation District	4,000.00	2%
Kittitas	Cascade Irrigation District	40,000.00	4% to 1-1-38; 6% thereafter
Stevens	Fruitland Irrigation District	63,200.00	2%
Benton & Yakima	Grandview Irrigation District	5,500.00	2%
Benton, Klickitat and Yakima	Horse Heaven Irrigation District	78,000.00	4%
Chelan	Icicle Irrigation District	257,100.00	2%
Benton	Kennewick Irrigation District	200,700.00	1%
		27,000.00	2%
Benton	Kiona Irrigation District	29,250.00	2%
Okanogan	Oroville-Tonasket Irrigation District	22,000.00	2%
Yakima	Outlook Irrigation District	15,525.00	2%
Benton	Richland Irrigation District	142,570.00	2%
Yakima	Snipes Mountain Irrigation District	21,250.00	1%
		7,500.00	2%
Chelan	Stemilt Irrigation District	75,000.00	1%
		35,000.00	2%
Benton	Sunnyside Irrigation District	100,800.00	1%
Yakima	Union Gap Irrigation District	12,000.00	2%
Yakima	Wenas Irrigation District	13,100.00	2%
Chelan	Wenatchee Chewawa Irrigation District	8,000.00	2%
	Total state owned bonds held as collateral	$1,228,369.38	

The following reclamation district bonds are owned by the State of Washington and are on deposit with the State Treasurer:

COUNTY	DISTRICT	Par Value	Interest Rate
Grays Harbor	Diking and Drainage Improvement District No. 4	$ 38,000.00	4%
Skagit	Drainage District No. 19	2,500.00	2%
Snohomish	Diking District No. 1	20,000.00	1%
		20,000.00	2%
Snohomish	Diking District No. 2	7,695.00	2%
Yakima	Sub-district 8, Drainage Improvement District No. 3	12,800.00	2%
Benton	Columbia Irrigation District	12,500.00	1%
Chelan	First Creek Irrigation District	18,500.00	1%
Franklin	Franklin County Irrigation District No. 1	18,169.35	5%
Chelan	Lake Chelan Reclamation District	218,000.00*	1%
Okanogan	Methow Valley Irrigation District	150,150.00	1%
		15,000.00	2%
Okanogan	Oroville-Tonasket Irrigation District	223,000.00	2%
Chelan	Wenatchee Chewawa Irrigation District	4,500.00	2%
Chelan	Wenatchee Heights Reclamation District	84,000.00	2%
Kliekitat	White Salmon Irrigation District	30,000.00	1%
Okanogan	Whitestone Reclamation District	253,805.00	1% to 7-1-38; 6% thereafter
Okanogan	Wolf Creek Reclamation District	90,000.00	1%
Thurston	Yelm Irrigation District	138,500.00	2%
	TOTAL	$1,357,119.35	

* In addition to the $218,000 Lake Chelan Reclamation District bonds shown above, a $500 first issue bond and $152,000 fifth issue bonds of said district are on deposit with the State Treasurer, increasing the total par value of reclamation district bonds on deposit with the State Treasurer to $1,509,619.35. Said fifth issue bonds are being held for safekeeping and are not the property of the Department. The $500 first issue bond is, for purposes of this report, listed among the incomplete refunding transactions.

NOTE: As of September 30, 1936, the Oroville-Tonasket and Wenatchee Chewawa irrigation districts had moneys due them in the form of advances for repairs, etc., from the Reclamation Revolving Fund for bonds included among those shown opposite their names in the above list.

The following bonds of various districts have been purchased at discounts, but refunding operations have not yet been completed. The par value of bonds purchased and the purchase price of such bonds are shown below. These discounted bonds will later be exchanged for refunding bonds in amounts approximating the amounts expended for the bonds, plus incidental expenses.

COUNTY	DISTRICT	Par Value	Purchase Price	Interest Rate on Investment
Cowlitz	Diking Improvement District No. 11	$ 79,400.00	$ 33,684.81	5% 5 years 3% 5 years 2% 10 years
Cowlitz	Diking Improvement District No. 13	19,500.00	9,750.00	Ditto
Lewis and Thurston	Joint Drainage Improvement Dist. No. 7	24,500.00	4,558.00	4%
Yakima and Benton	Joint Drainage Improvement Dist. No. 1	114,500.00	37,109.90	4%
Clallam	Cline Irrigation District	100.00	70.00	.....
Chelan	Lake Chelan Reclamation District	324,500.00	162,350.00	2%
Benton	Priest Rapids Irrigation District	91,000.00	65,611.00	5% 5 years 3% 5 years 2% balance
	Total par value	$653,500.00	$313,133.71	

A summary of the above figures reveals that the State of Washington owns a total of $3,238,988.73, par value, reclamation district bonds. Of this amount $653,500 have been purchased during the past three years at a discount and are involved in refunding operations which have not yet been completed, leaving a balance of $2,585,488.73 state owned bonds not involved in active refunding agreements. A total of $313,133.71 has been paid for the $653,500.00 bonds above mentioned. It may be assumed that, including accrued interest and expenses incidental to refinancing, these bonds will be exchanged for approximately $315,000.00 refunding bonds. Using this figure ($315,000) rather than the par value ($653,500) the total reclamation district bonds owned by the State may be said to be as follows:

Total state owned bonds held as collateral with Peoples Bank and Trust Company	$1,228,369.38
Other state owned bonds not involevd in active refunding operations	1,357,119.35
Bonds purchased for refunding purposes:	
Par value, $653,500; purchase price, $313,133.71; approximate refunding bonds to cover such refunding operations	315,000.00
Total	$2,900,988.73

The above summary does not include the refunding bonds of the Sunnyside Valley Irrigation District in the amount of $100,000.00, which were purchased by the Department and resold to the State Finance Committee during the biennium.

FLOOD CONTROL

J. B. FINK, *Acting Director*

THE FLOOD CONTROL DISTRICT ACT

Chapter 160, Laws of 1935, provides for the creation of flood control districts with powers to plan, construct, operate and maintain flood control works and to raise funds therefor by ad valorem taxes levied on real property within the district. It also provides for certain state control of the creation, management and operation of such districts to be exercised by and through the Director of the Department of Conservation and Development.

Since this law became operative seventeen petitions have been received by the Director for the establishment of districts in various localities of the State. In accordance with provisions of the Act, the Department has made preliminary surveys and examinations and has proposed tentative plans for flood control works under the several petitions.

The present status of proceedings in connection with the creation of districts pursuant to these petitions may be briefly stated as follows:

Elections held, carried and certified by the Director in the Hoquiam and South Aberdeen districts in Grays Harbor County, the Shelton-Goldsborough district in Mason County, and the Walla Walla Mill Creek district in Walla Walla County.

Elections held and carried but certification held up by injunctions in Pierce County Flood Control District No. 1 (Puyallup County), Skokomish River in Mason County, Stillaguamish River district in Snohomish County, and the Skagit County district.

Elections held but proposals defeated in the Sammamish River district in King County, the Whatcom County district, and in the Cosmopolis district in Grays Harbor County.

In process of being established are the South Snohomish County district, the Big Bottom project and the Toledo project on Cowlitz River in Lewis County, also the Cowlitz River project in Cowlitz County, the Grays Harbor County project on Chehalis River, and the King County project embracing all of King County except the Sammamish River area.

Of the four districts which are fully established and in which no legal contests are pending, the Hoquiam Flood Control District has completed its flood control works in cooperation with the Federal Works Progress Administration and under the direct supervision of the U. S. Army, Corps of Engineers. The Walla Walla County Mill Creek Flood Control District is also engaged in construction work in cooperation with the Works Progress Administration and the work was for a time under the supervision of the U. S. Army. Corps of Engineers. Much of the work involved in the Shelton-Goldsborough Flood Control District has been performed by the W. P. A., and the South Aberdeen Flood Control District has received approval of a W. P. A. project embracing the dikes planned for the protection of that district.

Injunctions against final establishment were secured by landowners in four districts on the ground that the plaintiffs' lands would not be benefited by the proposed improvement. Boundaries had been tentatively established so as to include substantial portions of the watersheds, including timbered and logged-off uplands not affected by floods.

In the proposed Pierce County Flood Control District No. 1, on Puyallup

River and its tributaries, large areas of uplands not subject to floods were included within the tentative boundaries. As owners of uplands sought to be included, the Weyerhaeuser Timber Company and others, other efforts having failed, brought an action in the Superior Court for Pierce County seeking to enjoin the canvassing and certification of the election by the county election board and the issuance of an order by the State Director declaring the district to be duly organized, all on the grounds that the company's lands would not be benefited and were therefore sought to be unlawfully included. Upon dismissal of this action by the lower court an appeal was taken to the Supreme Court.

In its decision in the case (Weyerhaeuser Timber Company, et al., Appellants, v. E. F. Banker, as Director of the State Department of Conservation and Development, et al., Respondents), the Supreme Court among other things said: "Upon the primary question, we conclude that appellants are in no way benefited by the proposed improvement and that, therefore, their lands could not be lawfully included in the proposed district"; also, "The fact that the burden to be imposed upon appellants is denominated a 'tax' instead of a 'special assessment' is of no consequence. The purpose sought to be accomplished by the project is special, and the property within the district is to be taxed in order to carry out the will of the landowning petitioners and those similarly situated. The burdens here sought to be imposed are in effect special assessments for local improvements."

The effect of this decision is to confine the area which may be included within a flood control district to the lands benefited. Since the four districts first above mentioned have been permitted to become organized without interference of property owners it may be assumed that they are in a position to function even though specific properties which may be included but not benefited may not be subject to taxation or assessments for district purposes. The balance of the proposed districts in various formative stages are subject to the objections raised by the Supreme Court in the Puyallup Valley case in that large areas of non-benefited lands are sought to be included. Consequently, efforts at completion of organizations under way or the initiation of proceedings for formation of additional districts have been at a standstill since the Supreme Court decision was handed down.

While the decision did not invalidate the Flood Control Act, it in effect said that in the case at bar an attempt was being made to establish the boundaries in a manner contrary to law, and the opinion is quite general that the law is unsatisfactory and should either be amended or a new law substituted. A special committee representing the State Planning Council and assisted by this Department is studying necessary changes in the flood district legislation.

Under the Flood Control District Act engineering and other investigations preliminary to the formation of flood control districts are delegated to the Department of Conservation and Development and have been made at the cost and expense of the State. Chapter 163, Laws of 1935, appropriated funds to the Department for the above purposes and for state participation in flood control projects.

EMERGENCY FLOOD CONTROL PROJECTS

The serious flood of December, 1933, left many emergency problems along the valleys west of the Cascades, such as rapidly eroding river banks and other similar menaces. Federal relief funds have been made available to alleviate

the worst of these situations since the beginning of 1934. When the Works Progress Administration took over the administration of work relief, supervision of W. P. A. projects pertaining to flood control projects was delegated to the U. S. Army, Corps of Engineers. In order, however, to receive approval, projects required sponsorship by a governmental agency and acceptable plans for the work had to be prepared and submitted with the applications. Counties, cities, and diking and drainage districts were willing and anxious to act as sponsors but generally lacked both the organization and the funds necessary for proper preparation of plans and applications. In this emergency the Department undertook to make the necessary investigations and plans and to defray the cost thereof from the appropriation for state participation in flood control projects.

Accordingly, investigations were made and applications prepared for 131 separate projects, largely west of the Cascades, but a few also on the East Side. The following list indicates the distribution over the state:

Applicant	Number of Project Applications
City of Bellingham	1
Clallam County	40
Clark County and Vancouver Chamber of Commerce	1
Columbia County	1
Cowlitz County Planning Commission	11
Grays Harbor County	9
Grays Harbor County Drainage District No. 1	1
Inter County River Improvement	6
Jefferson County	9
King County	5
Kittitas County	2
Lewis County	2
Mason County	1
Mason County and City of Shelton	1
Okanogan County	1
Pacific County and Dike District No. 3	1
Pierce County	1
Pierce County Drainage District No. 15	1
Skagit County	1
Snohomish County	7
Snohomish County Diking and Drainage District No. 6	1
South Aberdeen Flood Control District	1
City of Tacoma	1
Thurston County	4
Wahkiakum County	17
City of Waitsburg	1
City of Walla Walla	1
Walla Walla County	1
Whatcom County	1
Town of Wilkeson	1
Total	131

Most of these applications were approved substantially as presented and placed in operation. On several of the major streams, such as the Cowlitz, Chehalis, Puyallup, Snohomish, Stilaguamish, Skagit and Nooksack rivers, substantial projects involving channel rectification, bank protection, etc., have been and are still operated under the efficient supervision of the Corps of Engineers. Several smaller streams and tributaries have been and still are being similarly improved. Special attention is called to the projects operated along the Columbia river on the deltas of the Cowlitz and Lewis rivers where the several diking districts have been substantially protected by enlargement of like sections, by installation of new or improvement of existing pumping plants, etc., thus insuring safety to life and property heretofore sadly lacking. The program in these localities has been facilitated by financial assistance from the Reclamation Revolving Fund as referred to elsewhere in this report.

Upper section and platform of 83-foot Lookout Tower on Baw Faw Peak, Lewis County.

DIVISION OF FORESTRY

Honorable J. B. Fink, Acting Director
Department of Conservation and Development,
Olympia, Washington.

Sir:

Herewith are the thirty-first and thirty-second annual reports of the Division of Forestry, covering period from December 1, 1934, to November 30, 1936.

Respectfully submitted,

T. S. GOODYEAR,
Supervisor of Forestry.

SUMMARY OF 1935 FIRE SEASON

The 1935 fire season was a long and severe one, beginning April 6th and ending October 15th. The following quotation from the United States weather observer in Olympia is rather significant: "Rainfall recorded the first eleven months of 1935 was 11.15 inches below average. July and August were practically without precipitation, July's measuring but .25 and August's .26." May was the driest since 1890 and, with one exception, since 1875. Weather records show for western Washington 37 days with a relative humidity of 30 and less, against an average of only 16 such hazard days for each of the three previous years. East of the Cascade Mountains, 76 days were reported with relative humidity of less than 20, while 1932 and 1933 showed only 42 and 43 days respectively of such weather.

Early in April it became necessary to place most of the district wardens in the field and call out some 500 men from the CCC camps in order to control the early spring fires, set for the purpose of burning ferns. From May 2nd until October 15th there was nearly continuous fire fighting—the number of men varying from 500 to 2,000. The most acute period of the entire season occurred between August 19th and August 27th, during which there were some 500 fires set.

As a rule the fires in northeastern Washington are much more numerous and damaging than those west of the Cascade Mountains. However, in 1935 the situation was reversed. There were few fires in eastern Washington and they were easily controlled—the loss and damage being very light. Most of the fires occurred in western Washington. At times they were extremely difficult to control and, in some cases, caused considerable loss and damage.

A comparison with 1934 fire statistics brings out some rather significant facts. While there was a 40 per cent increase in number of fires in 1935, there was only a 25 per cent increase in acreage burned. Normally, the ratio between number of fires and acreage burned is in direct proportion. The average acreage burned per fire in 1934 was 69.5, while in 1935 it was reduced to 62.7. Incendiary fires during 1934 numbered 223 and in 1935 increased to 351. The lumber strike, which occurred during the peak of fire season, withdrew thousands of men from the woods who ordinarily are available for fire fighting. In a number of cases it became necessary to use men from the CCC camps in order to control fires started either in or dangerously near logging operations. In spite of a very long and dry season and a 40 per cent increase in number of fires, the actual acreage burned was less than 1 per cent of the total forest area protected by the state and the total loss and damage to property was only $88,696.00. Of a total area of 120,027 acres burned over, there was but 6,759 acres of merchantable timber killed, most of which is salvable.

For the first time since organized protection there was an effort made to control every fire on the 12,000,000 acres for the protection of which this department is responsible, regardless of origin, locality, or ownership. There was continued progress in reduction of acreage burned and loss and damage to property. This may be attributed in a large measure to the following factors: first, the numerous roads, trails, lookouts, and telephone systems constructed by men from the CCC camps, which enabled crews to reach fires before they gained headway; and, second, availability and mobility of organized fire fighting crews.

Most of the fire fighting on state and private lands was done by CCC boys who spent 35,204 man-days on fire suppression: of this total, 10,965 man-days were contributed by State Parks CCC Camps, operating under direction of the State Parks Board. The boys, as a rule, took their work seriously and performed a very effective job in fire control. The State of Washington realized a net saving of $105,612.00 in fire fighting wages.

While property losses for the season were comparatively low, the toll of human lives was high. One young man by the name of William Maxwell, from Chicago, enrolled at Lewis and Clark State Park CCC Camp, was instantly killed by a falling snag while fighting fire in Lewis County. The sympathy of this department is extended to his family. A woodcutter lost his life in a 300-acre fire that occurred in Thurston County. A settler in Cowlitz County was overcome and perished in the flames of a fire set on his farm. Of the 1,914 fires reported for 1935, 1,784 were man-caused. Is it not time to pause and consider the human lives that are jeopardized every time a fire is set in the woods, either through carelessness or by willful intent?

Cooperation

For the accomplishment and degree of success attained in forest fire prevention and suppression during 1935, acknowledgment for effective cooperation is herewith made to the Director of Emergency Conservation Work, the officers, enrolled men, and supervisory personnel of the Civilian Conservation Corps; the members, individually and collectively, of the United States Forest Service; The Pacific Northwest Forest Experiment Station; the United States Weather Bureau; the Washington Forest Fire Association, and logging operators throughout the state. A lot of credit is due the fire wardens, rangers and lookouts. Owing to their ceaseless vigilance, loyalty, leadership and faithful efforts, few fires spread beyond control and property losses were reduced to a minimum. In spite of collapse of the Lumber Code, and with it the "Rules of Forest Practice," the West Coast Lumbermen's Association and the Western Pine Association have maintained field representatives to encourage logging operators to standardize fire fighting equipment, fall snags, properly plan and prepare for slash disposal, and close operations during extremely hazardous fire weather. The able assistance supplied by these associations has materially reduced the fire hazards created by logging and consequently lessened the number of resultant damaging fires.

Civilian Conservation Corps

The Division of Forestry was alloted thirteen CCC camps in the spring of 1935; this number was reduced to nine camps during the fire season and further reduced to seven camps for the winter. There follows a combined progress report of work accomplished by men from these camps, for the period January 1st, 1935 to December 31st, 1935.

Truck trail construction	200.2	Miles
Horse trail construction	15.7	Miles
Vehicle bridges	54	
Telephone lines	97.6	Miles
Fire suppression	24,239	Man-days
Road and trailside clearing	76.7	Miles
Fire hazard reduction	3,122	Acres
Fire break	3.0	Miles
Lookout towers	3	
Lookout houses	1	
Tree nursery (Capitol Forest)	2,662	Man-days
Seed cones collected	396	Bushels
Rodent control	7,495	Man-days

Land Classification

Applications were received for classification under the Reforestation Act of some 150,000 acres of forest lands scattered through nine western Washington counties. These lands were all examined by the district wardens, public hearings held in the various county seats, and 121,896 acres duly classified by State Tax Commission, in accordance with recommendations of the State Forest Board.

Slash Disposal

Favorable burning weather in the fall made it possible to dispose of approximately 100,000 acres of logging slashings. Half of this acreage has been examined and certificates of clearance issued to the operators and landowners.

Equipment

A new 1½-ton stake body Ford truck was purchased and placed in Stevens County; a 1½-ton stake body Chevrolet truck was bought for Ahtanum Ranger Station in Yakima County; and a ¾-ton Dodge truck purchased for use in Thurston County, to replace the old Graham truck that was entirely demolished last season by a head-on collision. Normal replacements were made for the smaller fire fighting equipment, such as hose, shovels, axes, saws, etc.

State Land Acquisition

The various timbered counties throughout the state are burdened with an ever increasing acreage of tax-delinquent cut-over lands. The lands which have any remaining value in the form of cord wood, pulp wood, shingle bolts, etc., are often sold to the highest bidder, who immediately strips the land and again lets it revert to the county for taxes. Other lands are sold on a basis of ten cents per acre down and ten cents per year on a ten-year contract, during which time the prospective purchaser removes any timber values, often over-grazes the land, and pays very little, if any, taxes for his interest in the uncompleted contract with the county.

Another type of purchaser is the prospective settler who bids in an isolated tract of land entirely unsuitable for agricultural development, moves in with a family, demands construction and maintenance of a road, and also presents the problem of getting his children back and forth to school. While clearing land with fire, this settler is very often a high risk to adjoining timber.

Few, if any, of the counties have the organization, funds, equipment or other facilities necessary to adequately protect, administer and develop large areas of cut-over lands during the period required to grow a merchantable crop of timber.

Section 5812-3b, Remington's Revised Statutes of Washington, provides that, "Any lands heretofore acquired, or which may hereafter be acquired, by any county through foreclosure of tax liens, or otherwise, may be offered by such county to the State of Washington for forest lands, and if such lands come within the classification of lands described in section 3 of chapter 154, Laws of 1923, the state forest board may select any or all of the lands so offered to become a part of state forest lands. * * * 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."

In several of the western Washington counties the department has examined extensive areas of tax delinquent forest lands—in some cases a joint examination was made with a representative of the county commissioners. All lands suitable for agriculture, or even with potential agricultural possibilities, were withdrawn and only those lands unsuitable for other purposes than growing timber have been tentatively offered by the counties to the State Forest Board. The commissioners of Skamania County have already deeded 19,812 acres of tax delinquent forest lands to the state; Clark County has transferred title to some 7,629 acres; and at present there are negotiations under way with Cowlitz, Lewis, Wahkiakum, Thurston, Grays Harbor, Snohomish, Skagit, and Whatcom Counties that involve the transfer of some 250,000 acres of cut-over lands.

The state agrees to administer, protect, and develop these lands and turn back to the counties in which the lands are situated any monies derived from the lease of such lands, or from the sale of forest products, oils, gases, coal, minerals, or fossils therefrom; deducting only the costs of administration, protection, and ten per cent that reverts to the forest development fund of state treasury.

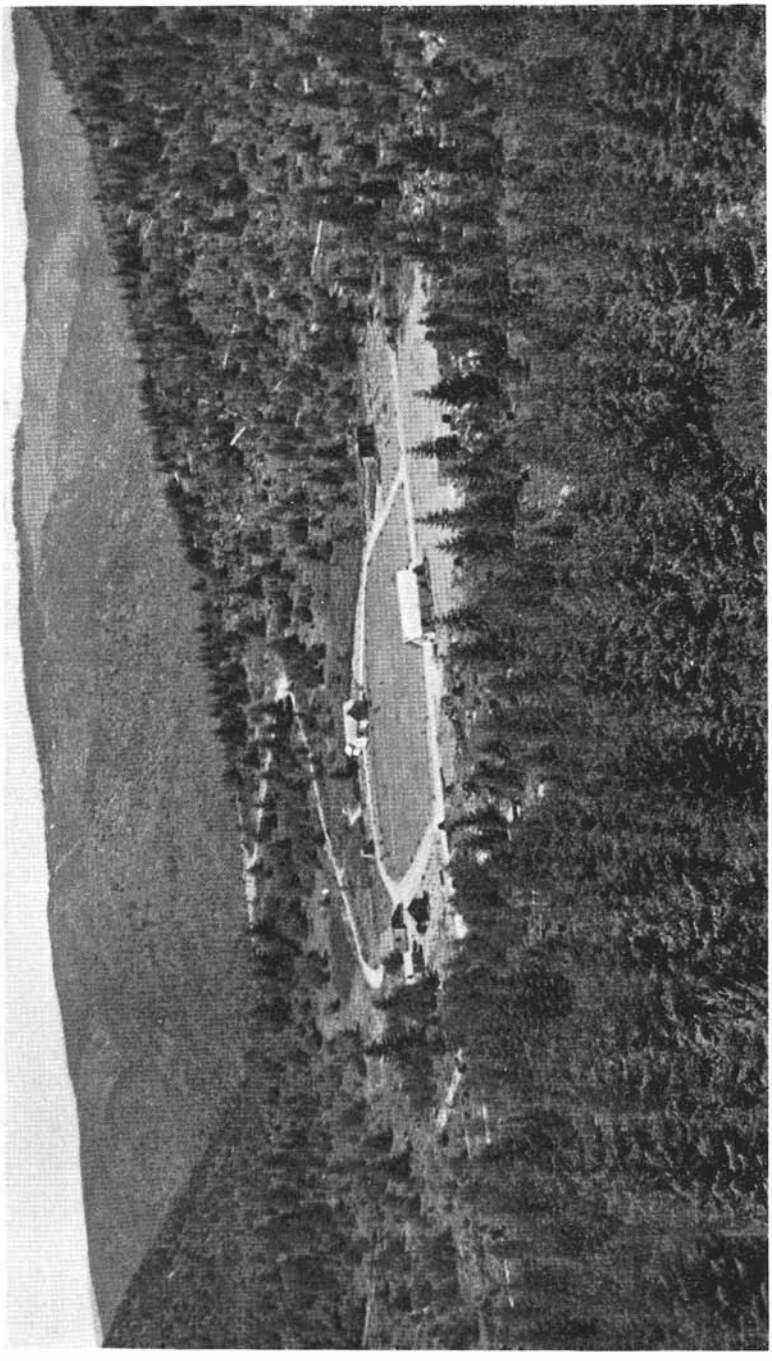
This arrangement has a two-fold advantage over land acquisition by the federal government. First, it insures local control of the forest land policy, which can be administered with greater benefits to the local communities and state than a policy formulated and dictated from Washington, D. C. Second, under state control the counties may recover up to 75 per cent of the receipts that are collected from the lease of land or sale of its products. Under government ownership, the maximum amount that may be returned to the counties is 35 per cent of the gross receipts.

Capitol State Forest and Nursery

Under the direction of this office a tree nursery is being developed on the Capitol State Forest, twenty miles southwest of Olympia, near Bordaeux, Washington.

At present the forest includes 40,000 acres of cut-over land which is well stocked with approximately a 95 per cent stand of Douglas fir, ranging in age from 0 to 15 years. The land was recently purchased by the State Forest Board. Within the near future this forest will be extended to include approximately 100,000 acres of first class forest land in one block with no human habitation inside the boundaries. A centrally located 100-foot ring-connected lookout tower, constructed from pressure creosoted Douglas fir, has been completed and overlooks the entire area.

The nursery which is now being developed will produce coniferous and hardwood seedlings and transplants which will be planted on state owned lands. At present, under normal conditions, the yearly capacity is 1,200,000 seedlings and this will be increased to 2,000,000 in 1936. An overhead sprinkling system is being installed.



Capitol State Forest Nursery site situated in the Black Hills fourteen miles southwest of Olympia.

A complete power seed extraction plant and cone drying room is now in operation at the nursery, producing seed for spring planting. The drying room has a capacity of 200 bushels of cones per charge and is heated with a hot water system.

Labor involved in this development is supplied from CCC enrollees at Camp P-208, Elma, Washington. There is a side camp of 25 enrollees at the nursery, under the control of a competent forestry foreman.

The forest is valuable for carrying on experimental work in determining the relation between natural and artificial restocking, as it now contains all degrees of natural restocking from 0 to 100 per cent, which may be closely correlated with artificial restocking that will start in the near future. Other forest experimental work may be advantageously carried on within the forest.

Due to many favorable conditions, such as accessibility, good site quality, rapidity of growth, natural restocking of desirable species, low fire hazard, moderate improvement costs, low logging costs and close proximity to market, the area is very valuable from a forestry standpoint.

A cordial invitation is hereby extended to anyone who is desirous of inspecting the Capitol State Forest and nursery.

Comment and Recommendations

The next important forward step in forestry should be an immediate revised taxation system applicable to timber and forest lands. The present system of annual property taxes on timber and forest lands alone approximates eighty cents per thousand board feet of lumber produced, exclusive of taxes on logs, logging equipment, logging railroads, camp buildings, and manufacturing plants, and consequently compels an early liquidation of private timber holdings, which is disastrous to any permanent forest policy. The Pacific Coast is far removed from a market for lumber and its by-products. Consequently, operators can hardly afford to transport logs from woods to the mill unless they cut out at least 50 per cent merchantable lumber. The balance is wasted and left in the woods. There are comparatively few lumbermen operating on the Pacific Coast who have realized even a fair return on their timber investments—largely attributable to an unsteady and adverse market. Since a great percentage of our remaining timber is in private ownership and also the best timber producing lands are privately owned, it is rather hopeless to develop a sound forest policy until such time as there may be some inducements offered landowners to manage their timber holdings on a sustained yield basis. This can be accomplished only by a deferred or yield tax against timber and a reduced tax against lands supporting immature timber.

T. S. GOODYEAR,
Supervisor of Forestry.

TABLE No. 1—ORIGIN, NUMBER AND CLASSIFICATION OF FIRES, 1935

COUNTIES	Light-ning	Incen-diary	Camp-ers	Smok-ers	Slash-ing	Log-ging	Brush Burning	Rail-roads	Misc.	Total
Chelan	1	1	3	16	.....	.....	2	3	3	29
Clallam	.....	13	7	26	7	1	11	2	11	78
Clark	.....	8	5	19	1	2	19	.....	7	61
Cowlitz	1	23	5	22	1	4	16	5	8	85
Ferry	7	.....	2	3	.....	.....	.....	.....	.....	12
Grays Harbor	.....	14	12	26	1	1	3	.....	27	84
Island	.....	8	12	7	.....	1	8	.....	5	41
Jefferson	.....	24	13	10	.....	.....	9	1	.....	57
King	.....	18	9	58	1	4	26	17	15	148
Kitsap	.....	17	4	15	6	.....	4	.....	2	48
Kittitas	5	1	6	12	.....	.....	1	3	3	31
Klickitat	5	10	1	10	2	1	6	1	13	49
Lewis	.....	28	.....	14	2	3	11	1	35	94
Mason	.....	20	5	12	1	2	6	1	19	66
Okanogan	8	.....	1	3	.....	.....	.....	.....	1	13
Pacific	.....	9	1	4	.....	.....	6	2	4	26
Pend Oreille	27	4	13	27	.....	1	6	5	26	109
Pierce	2	21	16	39	3	3	30	4	52	170
San Juan	.....	.....	3	4	.....	.....	4	.....	8	19
Skagit	1	17	4	16	1	.....	20	6	3	68
Skamania	2	5	2	8	1	.....	6	4	.....	28
Snohomish	.....	13	1	27	1	3	24	3	12	84
Spokane	12	11	9	67	1	.....	6	29	19	154
Stevens	54	10	2	37	3	.....	8	10	11	135
Thurston	.....	60	6	36	5	1	17	4	13	142
Wahkiakum	.....	.....	.....	1	.....	.....	3	.....	.....	4
Whatcom	.....	15	9	10	.....	2	22	2	4	64
Yakima	5	1	5	2	.....	.....	.....	.....	2	15
TOTALS	130	351	156	531	37	29	274	103	303	1,914

CLASSIFICATION OF FIRES: Class A (¼ acre or less), 527; Class B (¼ to 10 acres), 722; Class C (over 10 acres), 665.

TABLE No. 2—ACREAGE BURNED OVER, 1935 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	1,040	.....	.....	.....	80	81	11,197	28	50	12,476
Clallam	60	153	337	36	1,636	841	1	14	4	3,082
Clark	42	65	458	3,318	290	212	107	224	4	4,720
Cowlitz	40	49	635	1,461	621	3	800	355	36	4,000
Ferry	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grays Harbor	20	470	1,633	2,105	2,027	200	100	312	.....	6,867
Island	3	605	65	15	300	8	63	130	.....	1,189
Jefferson	310	354	972	915	232	360	4	42	1	3,190
King	1	1,390	1,508	1,386	2,438	212	84	3,077	7	10,103
Kitsap	315	31	409	496	2,722	112	20	129	8	4,242
Kittitas	20	130	115	.....	.....	.....	140	2	47	454
Klickitat	1,822	4,072	315	30	359	2,800	519	380	22	10,319
Lewis	660	4,746	613	1,443	1,468	1,219	256	492	3	10,900
Mason	210	1,542	256	1,637	1,372	710	302	729	1,500	8,258
Okanogan	.....	.....	.....	.....	.....	2	7	200	.....	209
Pacific	805	161	20	188	1,034	275	43	42	.....	2,568
Pend Oreille	58	60	.....	.....	9	1	13	14	.....	155
Pierce	323	547	893	560	974	562	511	1,959	53	6,382
San Juan	15	57	15	50	.....	.....	.....	21	.....	158
Skagit	20	1,361	174	91	146	161	4	137	1	2,095
Skamania	520	1,084	910	1,605	15	1	3	9	12	4,159
Snohomish	10	128	212	160	364	419	208	211	3	1,715
Spokane	83	1,385	396	5	265	25	722	1,376	362	4,619
Stevens	112	276	6	20	65	.....	6	7	4	496
Thurston	210	2,408	269	2,599	1,468	1,880	1,020	4,122	47	14,023
Wahkiakum	.....	.....	.....	2	50	.....	40	60	50	202
Whatcom	3	59	57	36	24	25	18	173	3	398
Yakima	57	.....	.....	.....	.....	.....	2,981	.....	10	3,048
TOTALS	6,759	21,133	10,268	18,158	17,959	10,109	19,169	14,245	2,227	120,027

TABLE No. 3—LOSS AND DAMAGE, 1935 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	620	310			$ 350.00
Clallam			12		80.00
Clark	10	10			544.00
Cowlitz	100	30		$5,150.00	290.00
Ferry					
Grays Harbor				100.00	
Island	80	80	3,075	450.00	20.00
Jefferson	100	100			
King	500		3		1,400.00
Kitsap	75	52	25	150.00	750.00
Kittitas	9	9			
Klickitat	1,166	632			2,655.00
Lewis	1,963	413	250	3,200.00	250.00
Mason	803	778	79		430.00
Okanogan	2	2			
Pacific	1,590	268			18,040.00
Pend Oreille	6,002	127			975.00
Pierce	320	185	1,001	500.00	3,090.00
San Juan					2.00
Skagit					50.00
Skamania	8,006	4,000			25.00
Snohomish	106	101			
Spokane					2,820.00
Stevens	49	17		100.00	15.00
Thurston	3	3	112	50.00	1,250.00
Wahkiakum					
Whatcom	8			358.00	500.00
Yakima	30	30		50.00	5.00
TOTALS	21,542	7,147	4,557	$10,108.00	$33,541.00

Total loss and damage to all classes of property—$88,696.00.

TABLE No. 4—BURNING PERMITS, ARRESTS AND FINES, CLASSIFICATION AND ACREAGE OF LAND BURNED UNDER PERMIT, 1935

COUNTIES	BURNING PERMITS				ARRESTS and FINES	
	Permits	Camp Fire Permits	Protection Acres	Agriculture Acres	Number	Fines and Costs
Chelan						
Clallam	591	13	193	1,691		
Clark	862	86	784	4,175	12	$ 239.30
Cowlitz	1,174	119	5,894	3,956		
Ferry	125	24	523	384		
Grays Harbor	1,163	13	1,116	1,335	2	10.00
Island	180	4	121	519		
Jefferson	457	154	9	350		
King	1,962	158	1,664	2,245		
Kitsap	865	65	246	3,228		
Kittitas	31	29	2	242		
Klickitat	354	54	2,075	1,934		
Lewis	2,895	48	2,025	13,541	1	2.50
Mason	523	21	788	763	2	40.00
Okanogan	203	25	1,857	4,299		
Pacific	409	24	1,927	1,258		
Pend Oreille	342	47	359	949	2	12.50
Pierce	1,494	50	1,622	7,286		
San Juan	89	40	74	651	1	
Skagit	856	56	782	2,720		
Skamania	174	22	439	195		
Snohomish	2,265	51	247	6,599		
Spokane	443	36	930	3,111	3	52.50
Stevens	945	222	1,567	6,898	5	97.50
Thurston	1,538	5	5,391	6,283	2	25.00
Wahkiakum	312	20	29	1,823		
Walla Walla	2			20		
Whatcom	1,262	18	457	2,851	1	25.00
Yakima					1	12.50
TOTALS	21,516	1,404	31,121	79,306	32	$516.80

SUMMARY OF 1936 FIRE SEASON

While the fire season of 1936 was the longest in recent years, it was not so severe as some previous seasons which is indicated by the comparatively small acreage burned and low property loss. Favorable weather and fire hazard conditions until the latter part of August contributed very materially toward holding losses to a minimum.

It became necessary to commence control work on the usual crop of fern and slashing fires on April 13 when weather conditions were most favorable for the spread of fires, with a humidity of 20 degrees and strong northeast winds. Fire hazard conditions from the middle of April until the 25th of July were probably below normal. During the last week in July in eastern Washington there was a period of hot east winds and extremely low humidity. Conditions west of the mountains were somewhat relieved by rains and cloudy weather which occurred on August 21st and continued until the 24th. From August 25th to 28th a particularly bad spell of fire weather existed in western Washington. On August 28th the temperature reached 92 degrees with a humidity of 26 degrees. Conditions were again relieved by rain on the 31st of August and 1st day of September. Through the entire month of September weather conditions were very favorable for slash burning and many logging operators took advantage of favorable conditions and disposed of their slashings without losses. October and November remained extremely dry and there was considerable equipment and logs burned by slashing fires spreading beyond control. Heavy rains on December 3rd made it possible to remove some 300 men who had been fighting fires in Clark, Skamania and Klickitat Counties continuously since the 1st of October.

The following statistics from climatological data compiled by the United States Weather Bureau are a summary of conditions as they existed during the fire season:

Month	Average Precipitation for the State	Below Normal	Above Normal	Western Washington Days			Eastern Washington Days		
				Clear	Partly Cloudy	Cloudy	Clear	Partly Cloudy	Cloudy
April	1.11 in.	1.20 in.	.....	9	9	12	13	10	7
May	2.70 in.	.....	0.64 in.	10	7	14	15	10	6
June	3.39 in.	.....	1.88 in.	10	7	13	13	9	8
July	0.86 in.	.....	0.17 in.	19	6	6	25	4	2
August	0.52 in.	0.32 in.	.....	18	7	6	23	6	2
September	1.39 in.	0.34 in.	.....	15	7	8	20	5	5
October	0.69 in.	2.43 in.	.....	13	6	12	22	5	4
November	0.62 in.	4.59 in.	.....	14	6	10	14	7	9

During 1936 there were 1,272 fires reported on the 12,000,000 acres of state and privately owned lands for which this department is responsible for protection. There was a noticeable decrease in incendiary fires compared with 1935, which is probably attributable to a much improved employment situation. The total area burned was 44,182 acres, most of which was either cutover lands or old burns. The total loss and property damage was $62,248.00. The length of fire season, the comparatively small acreage burned and low property loss indicate continued progress in the forest protective organization. The average area burned per fire in 1935 was 62.7 acres, while for 1936 this was reduced to

34.7 acres, which represents a new low record in the history of organized forest protection. One hundred and ninety-two fires, more than 50% of the acreage and approximately 60% of the loss and damage occurred after the close of fire season, September 30th, when the state can no longer regulate burning by permit.

Again most of the fire fighting was performed by boys from the C.C.C. camps, who spent a total of 11,353 man-days on fire suppression. Men from the state and private land camps contributed a total of 10,283 man-days, while the State Parks camps contributed 1,070 man-days. During the entire season there were no fatalities or serious injuries resulting from fire fighting operations.

Cooperation

For the favorable fire prevention and suppression record during 1936 acknowledgment of satisfactory cooperation is herewith extended to the officers, enrolled men, and supervisory personnel of the Civilian Conservation Corps, the United States Forest Service, Pacific Northwest Forest Experiment Station, United States Weather Bureau, Washington Forest Fire Association, the logging and lumber industry, and the field organization of State Forestry Department including wardens, rangers, patrolmen, and lookouts.

The "Rules of Forest Practice" applied to logging operations by the West Coast Lumbermen's Association, such as installation of adequate fire fighting equipment, snag cutting, planned preparation for slash disposal, and closing operations during extremely hazardous fire weather were a helpful contribution in lowering the number of fires caused from logging operations and resulting losses.

Civilian Conservation Corps

There follows a combined progress report of work accomplished by the men from eight Civilian Conservation Corps camps that operated under the direction of this department for the period January 1st to December 31, 1936:

Truck Trails	96.3	miles
Horse Trails	16.4	miles
Vehicle Bridges	24	
Telephone Lines	47.9	miles
Fire Suppression	10,283	man-days
Road and Trailside Clearing	73.2	miles
Hazard Reduction	5,009	acres
Fire Breaks	6.0	miles
Lookout Towers with ground houses	6	
Capitol Forest Nursery	3,128	man-days
Tree Seed (Cones) Collection	543	bushels
Route and/or Grade Survey	163.8	miles

Land Classification

Due to the fact that several western Washington counties established a valuation of $1.00 per acre on cutover lands for taxation purposes, there were practically no applications received for land classification under the Reforestation Act during the past year.

Slash Disposal

A concentrated effort was made during the fall months to dispose of hazardous slashings left from logging operations. Approximately 115,000 acres of slashing were burned. Practically the only slashings carried into the 1937 fire season will be those made during the winter months. Without extensive

unburned slashing areas, there is little danger of disastrous fires. Approximately 65,000 acres have been examined and certificates of clearance issued for proper disposal of slashings.

Buildings and Equipment

District fire warden headquarters, consisting of an office, sleeping quarters for fire crews, tool shop, and warehouse, were constructed at Colville, Ellensburg, Port Angeles, and Elbe. Arrangements for similar buildings have been completed for Kelso, Sultan, and Sedro-Woolley.

Lookout towers ranging in height from 40 to 101 feet, with accompanying ground houses, were constructed on Grass Mountain in King County, National in Pierce County, Blue Mountain in Snohomish, Devils Mountain in Skagit, Simpson in Mason County, and Baw Faw Peak on the line between Lewis and Pacific Counties.

New equipment purchased during 1936 consisted of a 1½-ton Dodge truck for use in Thurston County, and a ½-ton Dodge pick-up for the Colville headquarters. Ordinary replacements were made for the smaller fire fighting equipment, such as power pumps, axes, saws, etc.

Land Acquisition

Under the amendment to Section 3-b, Chapter 288, Laws of 1927, passed by the last legislature, the State Forest Board has examined nearly a half million acres of tax delinquent forest lands acquired by counties through foreclosure and actually accepted title to some 200,000 acres of these lands, a small percentage of which contains merchantable timber. This enables the department to place such lands under intensive forest fire protection and plant stock from the nursery on lands that are not satisfactorily restocking by natural means.

There are some 30 timber sales contracts pending on these newly acquired forest lands, from which approximately 80% of the net receipts will be returned to the counties. According to actual measurements of selected sample plots, some of the fully stocked, Class A forest lands have produced 65,000 board feet of lumber in a period of sixty years. Assuming a stumpage value of $3.00 per thousand for Douglas fir timber, one acre may return a gross revenue of $195.00. Deducting the costs of fire protection on a basis of 5c an acre per year and 3c for administration—representing an investment of $4.80 for a sixty-year period—and 10% of the sales value of timber at $19.50, which reverts to forest development fund, makes a total of $24.30 that is retained by the state and $170.70 turned back to the county. This will net an annual return of $2.80 per acre per year which is more than they now receive for taxes on land covered with a stand of merchantable timber.

Capitol State Forestry Nursery

Capitol State Forest Nursery consists of a suitable office and housing quarters for the nurseryman, a dormitory and living quarters for twenty men, a large warehouse equipped with steam heat for drying cones, a complete seed extraction plant, a large root house and cooler, a warehouse and tool room for constructing seed bed frames and wrapping stock for shipment, a complete lighting plant that supplies electricity to all the buildings, an overhead sprinkling system, some ten acres of land, half of which is already covered by seed

beds and the balance ready for additional beds that will be installed next spring, approximately a million and a half transplants and seedlings consisting of Douglas fir, Port Orford cedar, Engelman, Sitka, and Colorado blue spruce.

During the fall months some 400 sacks of Douglas fir cones were gathered, from which 650 pounds of seed was extracted; also. sufficient western red cedar cones were gathered to yield 17 pounds of seed.

Plans are under way to increase production by 100% during 1937. This nursery represents one of the most complete and best equipped plants on the West Coast.

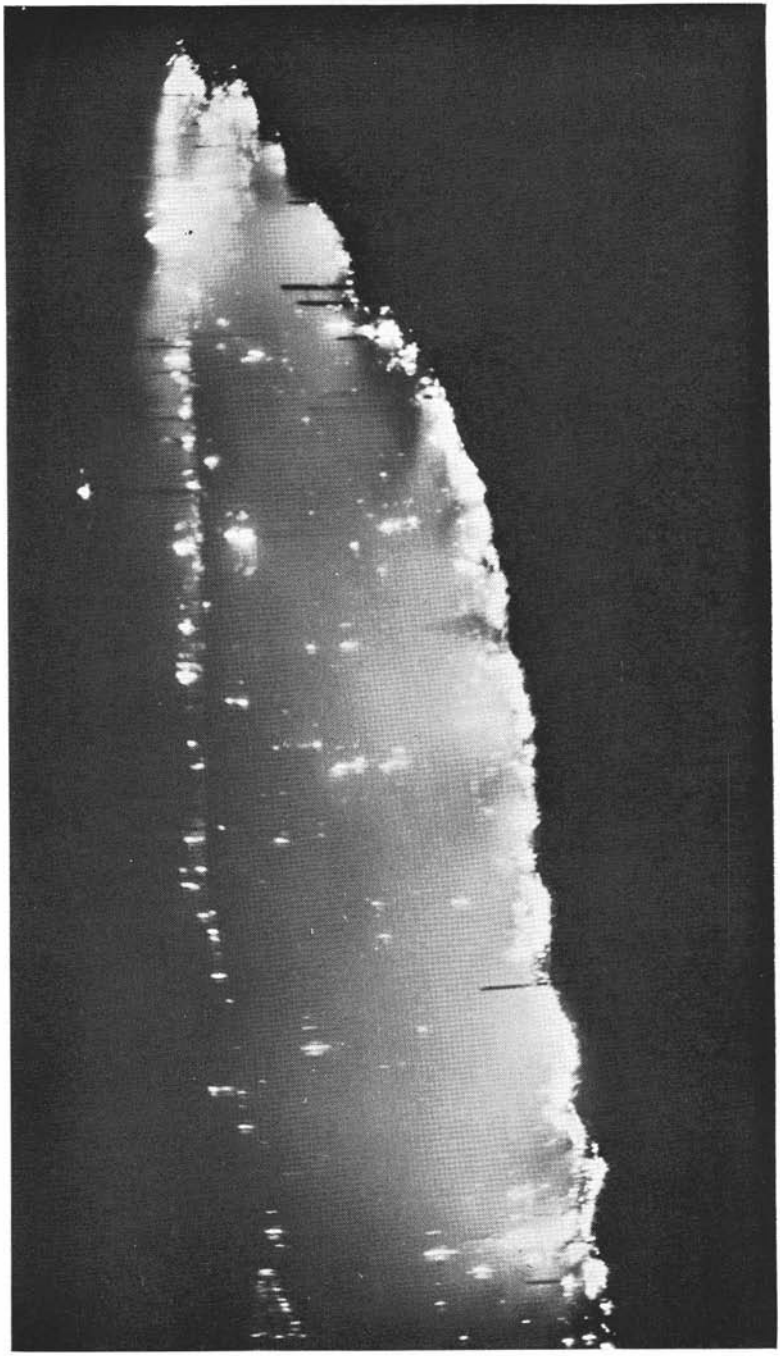
Comment and Recommendations

Recommendations:

1. The statutes now provide for a closed fire season between the first day of May and the first day of October. Each year there are numerous fern and slashing fires set after the middle of April that cause considerable damage to young growth timber. During the closed season the state expends considerable money and effort in an attempt to regulate fires by issuance of burning permits. Hazardous fire weather conditions often prevail after the close of fire season, and yet the state has no authority to regulate or control slash burning. It is therefore recommended that the legislature extend the closed fire season from April 15th to October 15th.
2. A cattle grazing law should be passed in order to regulate this form of grazing on state-owned land and also to legalize collection by the state of fees from this source.
3. The Christmas tree business in the State of Washington has developed into an important industry. The shippers of this product should be compelled to contribute in some manner for the management and protection of the crop they annually harvest. It is therefore suggested the legislature impose a severance tax of one per cent per tree for every Christmas tree shipped outside the state; the fee to be collected through the State License Department and deposited in the forest development fund, after proper costs for administering the act have been deducted.
4. The legislature should authorize states, counties, or other minor political subdivisions, to exchange lands with other owners for the purpose of consolidating and blocking their forest land holdings.

While satisfactory progress was made during the past season in the detection, control, and suppression of forest fires, there are still far too many caused by carelessness. This can only be remedied through a concerted educational program that will bring a realization to the public of its responsibility for the prevention of man-caused forest fires.

T. S. GOODYEAR,
Supervisor of Forestry.



Night View of Bob's Mountain fire, Skamania County. Photographed November 25, 1936.

TABLE No. 5—ORIGIN, NUMBER AND CLASSIFICATION OF FIRES, 1936

COUNTIES	Lightning	Incendiary	Campers	Smokers	Slashing	Logging	Brush Burning	Railroads	Misc.	Total
Chelan	3		1					1	1	6
Clallam	1	4	7	11	1	2	18	1	4	49
Clark	2	4	1	14	3	3	22		5	54
Cowlitz		12	4	11	1	1	6	3	11	49
Ferry	1			2			1	2		6
Grays Harbor		18	4	9		1	1	1	3	37
Island	2	1	9	8	1		1		3	25
Jefferson		13	8	8		1	8		4	42
King	4	10	13	39	4	4	7	13	7	101
Kitsap		9	12	15			5		1	42
Kittitas	1		2	3			1	1	4	12
Klickitat	1	48	6	14	22	3	7	1	20	122
Lewis	1	3	1	6	1	5		1	14	32
Mason	3	10	22	2	1	1	8		6	53
Okanogan	15		2	3			1	1	2	24
Pacific		2	1	1		2	3		2	11
Pend Oreille	20	13	1	21	2	1	11	5	12	86
Pierce	6	1	6	12		2	2	6	4	39
San Juan			1	1		1				3
Skagit	8	14	5	7	1	6	7	3	2	53
Skamania	2	4	1	6	3		17	1	8	42
Snohomish	4	10	6	20		2	16	8	17	83
Spokane	1	9	9	53			6	30	17	125
Stevens	16	7	2	22			13	23	21	104
Thurston		5	2	14			1	2	3	27
Wahkiakum				2			2		1	5
Whatcom		5	5	7			5	2	3	27
Yakima	1	4	2	4					2	13
TOTALS	92	206	133	315	40	35	169	105	177	1,272

CLASSIFICATION OF FIRES: Class A (¼ acre or less), 529; Class B (¼ to 10 acres), 492; Class C (over 10 acres), 251.

TABLE No. 6—ACREAGE BURNED OVER, 1936 FIRES

COUNTIES	FOREST LAND			NOT REFORESTED			NON-FOREST LAND			Total
	Merchantable Timber	Reproduction		Old Burn	Cutover Land		Pasture	Brush	Other	
		Cut-Over	Old Burn		Slash Unburned	Slash Burned				
Chelan							215		40	255
Clallam	3	115	16		184					318
Clark	326	2,204	3,540	609	520	237	1,391	550	1	9,378
Cowlitz	1	1,353	1,693	71	5	26	80	41	5	3,275
Ferry		4							6	10
Grays Harbor		2	74	279	770	100		22		1,247
Island	30	40	11		40			5	15	141
Jefferson	2	65	496	214	513	5	6	4		1,305
King		200	40	91	1,192	10	51	274		1,858
Kitsap		1	121	7	110	66	3	33	15	356
Kittitas		1			2		68			71
Klickitat	3,188	534	635	385	1,557	285	1,419	672	61	8,736
Lewis	10		36	5	964	66		12	6	1,099
Mason	1	11	6	14	222			19		273
Okanogan	93	1			10	80	69	26		279
Pacific					850		4	25		879
Pend Oreille	23	115	1		26			10	4	179
Pierce					42	25	1	323	1	392
San Juan						3		1		4
Skagit		56	9	40	67			57	8	237
Skamania	467	1,714	4,243	366	890	115	1,017	162		8,974
Snohomish		14	5	3	70	39	24	317	25	497
Spokane	85	471	3	60	305	21	69	142	73	1,229
Stevens	299	220	55		16	40	161	136	430	1,357
Thurston		79			39		96	43	40	297
Wahkiakum		10		100	604					714
Whatcom			5		44	20	3	17		89
Yakima	466	6			21		240			733
TOTALS	4,994	7,216	10,989	2,244	9,063	1,138	4,917	2,891	730	44,182

TABLE No. 7—LOSS AND DAMAGE, 1936 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					
Clallam	6		8	$ 25.00	
Clark	1,116	1,012	10	300.00	$ 1,643.00
Cowlitz					
Ferry					
Grays Harbor					
Island				100.00	
Jefferson	9	9		1,250.00	14.00
King				450.00	900.00
Kitsap					
Kittitas					160.00
Klickitat	660	539		600.00	21,625.00
Lewis	525	56	305	575.00	12.00
Mason					
Okanogan	72	60	15		
Pacific			40	8,000.00	70.00
Pend Oreille	11	7			72.00
Pierce	2	1		1,600.00	
San Juan					
Skagit			1,200	290.00	
Skamania	219	99	30		855.00
Snohomish					
Spokane					2,770.00
Stevens	69	24			9,250.00
Thurston					25.00
Wahkiakum					
Whatcom					5.00
Yakima	2	1			
TOTALS	2,691	1,808	1,608	$13,190.00	$37,401.00

Total loss and damage to all classes of property—$62,248.00.

TABLE No. 8—BURNING PERMITS, ARRESTS AND FINES, CLASSIFICATION AND ACREAGE OF LAND BURNED UNDER PERMIT, 1936

COUNTIES	BURNING PERMITS				ARRESTS and FINES	
	Permits	Camp Fire Permits	Protection Acres	Agriculture Acres	Number	Fines and Costs
Asotin	1			5		
Chelan	28		56	7		
Clallam	511	24	141	1,413		
Clark	639	45	247	2,486		
Cowlitz	867	112	1,716	2,329		
Ferry	88	34	73	350		
Garfield	2			20		
Grays Harbor	641	4	2,435	635		
Island	162		2,175	348		
Jefferson	359	208	45	391		
King	1,641	130	2,872	1,722		
Kitsap	786	74	1,071	2,246		
Kittitas	21	11	27	264		
Klickitat	499	58	2,419	5,707	1	$ 32.50
Lewis	1,927	46	11,886	10,442		
Mason	584	52	2,850	787		
Okanogan	185	26	321	5,567		
Pacific	224	16	5,652	636		
Pend Oreille	454	75	1,995	1,125		
Pierce	1,194	53	3,224	4,554		
San Juan	74	51	309	236		
Skagit	632	72	2,510	1,834		
Skamania	127	16	573	221		
Snohomish	1,502	60	399	5,323	1	12.50
Spokane	490	30	4,727	2,835		
Stevens	1,041	314	825	7,302	12	136.50
Thurston	947	4	2,175	3,995		
Wahkiakum	216	13	49	683		
Walla Walla	5		75			
Whatcom	996	6	206	1,449		
Yakima		63			2	7.50
TOTALS	16,843	1,597	51,053	64,912	16	$189.00

TABLE No. 9—STATE APPROPRIATION—GENERAL FUND

December 1, 1934, to March 31, 1935

	EMERGENCY FIRE FIGHTING		SALARIES AND WAGES		OPERATIONS	
UNEXPENDED (1933-35 Appropriation)		$1,839.33		$1,859.98		$1,292.07
EXPENDITURES:						
Office salaries			$1,575.09			
Traveling expense					$ 10.58	
Supplies					6.50	
Telephone and telegraph					69.27	
Postage						
Printing						
Miscellaneous					1,058.74	
Equipment—Field and office					119.28	
Improvements—Trails and lookouts, telephone lines, etc						
Wardens' salaries			219.22			
Wardens' expense					21.38	
Fire fighting—Salaries and expense	688.52					
Total expenditures		688.52		1,794.31		1,285.75
Balance March 31, 1935 (Reverted)		$1,150.81		$ 65.67		$ 6.32

TABLE No. 10—STATE APPROPRIATION—GENERAL FUND

April 1, 1935 to March 31, 1936

	EMERGENCY FIRE FIGHTING		SALARIES AND WAGES		OPERATIONS	
APPROPRIATIONS 1933-37		$16,000.00		$104,000.00		$30,000.00
EXPENDITURES:						
Office salaries			$5,815.50			
Traveling expense					$192.81	
Supplies					143.31	
Telephone and telegraph					213.62	
Postage					839.11	
Printing					477.53	
Miscellaneous					4,528.42	
Equipment—Field and office					1,968.51	
Improvements—Trails and lookouts, telephone lines, etc					10.08	
Wardens' salaries			47,372.79			
Wardens' expense					2,746.47	
Fire fighting—Salaries and expense	1,541.86					
Total expenditures		1,541.86		53,188.29		11,119.86
Balance March 31, 1936		$14,458.14		$50,811.71		$18,880.14

TABLE No. 11—STATE APPROPRIATION—GENERAL FUND
April 1, 1936, to November 30, 1936

	EMERGENCY FIRE FIGHTING		SALARIES AND WAGES		OPERATIONS	
UNEXPENDED (1935-37 Appropriation)		$14,458.14		$50,811.71		$18,880.14
EXPENDITURES:						
Office salaries			$3,948.04			
Examiners' salaries			726.03			
Traveling expense					$ 287.96	
Supplies					68.33	
Telephone and telegraph					153.03	
Postage					62.53	
Printing					97.69	
Miscellaneous					3,486.06	
Equipment—Field and office					2,046.22	
Improvements—Trails and lookouts, telephone lines, etc					47.49	
Wardens' salaries			44,054.63		*3,100.00	
Wardens' expense					3,311.45	
Fire fighting—Salaries and expense	$ 146.19					
Total expenditures		146.19		48,728.70		12,660.76
Balance November 30, 1936		$14,311.95		$2,083.01		$6,219.38

NOTE: * Government contracts.

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

	December 1, 1934 to March 31, 1935		April 1, 1935 to March 31, 1936		April 1, 1936 to November 30, 1936	
UNEXPENDED		$ 36,961.08		$120,935.96		$151,053.28
Reimbursement		90,700.00		89,600.00		950.00
Olympia Nat'l Bank payments		478.96				
Recovery		352.84		598.95		
Total credits		$128,492.88		$211,134.91		$152,003.28
EXPENDITURES:						
Office salaries	$ 813.75		$ 1,579.97		$ 2,318.04	
Traveling expense	146.10		534.92		547.52	
Supplies	20.43		48.95		25.60	
Telephone and telegraph			31.09		.54	
Postage	53.37		39.00		.42	
Printing			551.63		38.38	
Miscellaneous	1,927.17		270.06		260.27	
Equipment—Field and office	441.09		2,904.51		853.63	
Improvements—Trails and lookouts, telephone lines, etc	14.00		133.64		903.24	
Wardens' salaries	1,052.51		42,303.47		43,190.17	
Wardens' expense	2,120.74		7,175.62		5,442.34	
Fire fighting—Salaries and expense	967.76		4,508.77		519.24	
Total expenditures		$ 7,556.92		$60,081.63		$54,099.39
Balance		$120,935.96		$151,053.28		$97,903.89

TABLE No. 13—CLERKS FUND

	December 1, 1934 to March 31, 1935		April 1, 1935 to March 31, 1936		April 1, 1936 to November 30, 1936	
UNEXPENDED		$18,453.65		$20,883.89		$25,776.36
Transfers from Forest Assessment Fund		2,506.37		9,562.08		1,826.87
Olympia Nat'l Bank payments		2,780.84				
Total credits		$23,740.86		$30,445.97		$27,603.23
EXPENDITURES:						
Office salaries	$ 840.00		$ 2,571.44		$ 1,897.61	
Supplies	183.89		245.95		175.70	
Postage	60.00				55.00	
Miscellaneous	23.00		17.00		5.50	
Equipment—Office					1.25	
Wardens' salaries	1,750.08		1,835.22		544.04	
Total expenditures		2,856.97		4,669.61		2,679.10
Balance		$20,883.89		$25,776.36		$24,924.13

TABLE No. 14—FOREST ASSESSMENT FUND

	December 1, 1934 to March 31, 1935		April 1, 1935 to March 31, 1936		April 1, 1936 to November 30, 1936	
UNEXPENDED		$15,032.94		$26,978.27		$41,803.37
Receipts—Collections		32,129.34		84,643.21		67,563.16
Miscellaneous credits		14.29				2.09
Recovery		190.35				
Total credits		$47,366.92		$111,621.48		$109,368.62
EXPENDITURES:						
Association remittances	$16,073.13		$40,757.23		$36,642.90	
Transfers to clerks fund	2,506.37		9,562.08		1,826.87	
Equipment—Field	50.10		109.37		64.30	
Improvements—Trails and lookouts, telephone lines, etc	47.79		42.74		16.66	
Wardens' salaries	322.15		16,858.82		18,189.92	
Wardens' expense	927.84		2,118.96		1,373.82	
Fire fighting—Salaries and expense	461.27		368.91		466.19	
Total expenditures		$20,388.65		$69,818.11		$58,580.66
Balance		$26,978.27		$41,803.37		$50,787.96

TABLE No. 15—RECOVERY FUND

	December 1, 1934 to March 31, 1935		April 1, 1935 to March 31, 1936		April 1, 1936 to November 30, 1936	
UNEXPENDED		$ 582.74		$ 62.97		$ 63.48
Receipts		63.12		708.17		66.45
Olympia Nat'l Bank payments		149.72				
Total credits		$ 795.58		$ 771.14		$ 129.93
EXPENDITURES:						
Refund			$ 9.72			
Fire fighting salaries			87.74		$11.96	
Clarke-McNary Fund	$ 352.84		598.95			
Assessment fund	190.35					
General fund	189.42		11.25			
Total expenditures		732.61		707.66		11.96
Balance		$ 62.97		$ 63.48		$ 117.97

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

COUNTIES	1935	1936
Asotin	15,630	15,630
Chelan	163,809	166,934*
Clallam	139,077	140,508
Clark	77,762	72,417*
Columbia	25,239	25,239*
Cowlitz	152,476	123,782
Ferry	56,872	57,192*
Garfield	7,520	7,520*
Grays Harbor	336,618	315,448*
Island	28,114	21,880
Jefferson	86,438	82,169
King	162,913	162,360*
Kitsap	42,616	43,549
Kittitas	248,706	252,265
Klickitat	263,765	263,654
Lewis	161,390	149,996*
Mason	156,256	161,013*
Okanogan	96,340	103,023*
Pacific	150,570	144,133
Pend Oreille	205,827	211,446*
Pierce	95,791	94,287*
Skagit	195,318	192,464
Skamania	94,109	93,621
Snohomish	162,784	162,783
Spokane	150,609	143,772
Stevens	401,692	394,011
Thurston	137,345	133,236
Wahkiakum	42,271	40,705*
Walla Walla	7,061	7,061*
Whatcom	110,881	111,515*
Yakima	91,825	92,065*
TOTAL	4,067,624	3,985,678

NOTE· * Acreage not yet balanced with County Assessor.

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

December 1, 1934, to March 31, 1935

COUNTIES	1927	1928	1929	1930	1931	1932	1933	1934	Total
Asotin			$ 1.50	$ 3.90	$ 10.30	$ 7.90	$ 16.38	$ 16.45	$ 56.43
Chelan	$ 1.60	$ 6.40	7.46	39.43	844.17	64.27	447.69	40.48	1,451.50
Clallam	166.89	66.79	74.10	131.06	267.47	175.74	252.91	4.35	1,139.31
Clark	10.00	28.06	33.66	42.65	48.51	52.07	81.81	52.05	348.81
Columbia			9.62	9.62	12.02	19.56	81.73		132.55
Cowlitz	22.00	21.00	30.54	40.02	50.87	34.22	125.35	72.43	396.43
Ferry	2.19	9.09	17.10	16.05	34.62	24.87	59.71	73.65	237.28
Garfield						14.28	10.12	11.08	35.48
Grays Harbor	32.15	13.72	21.72	120.28	235.98	300.43	398.44	6.66	1,129.38
Island			6.82	12.15	21.26	12.91	57.48	31.43	142.05
Jefferson	19.80	27.45	35.37	75.90	121.49	78.71	165.12	112.38	636.22
King	224.28	52.43	65.66	221.87	411.70	498.69	566.72	61.56	2,102.91
Kitsap	13.30	10.14	19.93	29.55	28.50	59.70	94.80	21.31	277.23
Kittitas		4.70		2.00	3.60	46.20	112.15	2,744.13	2,912.78
Klickitat	17.55	101.98	83.09	72.21	111.50	56.93	348.09	261.76	1,053.11
Lewis	68.50	40.09	38.15	85.40	91.58	171.43	273.03	130.82	899.00
Mason	20.95	12.60	22.62	63.70	174.62	83.09	367.33	58.45	803.36
Okanogan	36.60	57.66	70.05	145.24	164.88	96.54	216.42	127.83	915.22
Pacific	6.00	12.04	20.44	66.50	225.46	229.20	367.96	42.59	970.19
Pend Oreille	175.15	183.27	50.46	156.92	217.82	164.76	952.14	244.15	2,144.67
Pierce	21.94	11.29	11.39	44.87	172.67	101.61	183.03		546.80
Skagit	136.52	132.33	73.60	162.55	516.36	536.46	882.04	26.39	2,466.25
Skamania		4.20	15.40	34.53	50.95	87.89	162.67	83.08	438.72
Snohomish	51.85	38.06	39.67	178.93	277.35	235.48	531.25	7.38	1,359.97
Spokane							797.28	322.34	1,119.62
Stevens	157.72	169.74	489.53	509.06	679.90	461.44	1,636.23	465.62	4,569.24
Thurston	10.30	28.44	34.59	76.65	132.84	108.11	372.12	28.41	791.46
Wahkiakum				14.00	29.10	21.06	20.79	39.71	124.66
Walla Walla			1.60	1.60	3.80	4.20	6.60	10.24	28.04
Whatcom	59.19	134.90	39.67	198.40	200.25	427.55	564.51	18.11	1,642.58
Yakima		13.70	7.20	27.15	53.50	239.38	319.42	597.74	1,258.09
TOTALS	$1,254.48	$1,180.08	$1,320.94	$2,582.19	$5,193.07	$4,414.68	$10,471.32	$5,712.58	$32,129.34

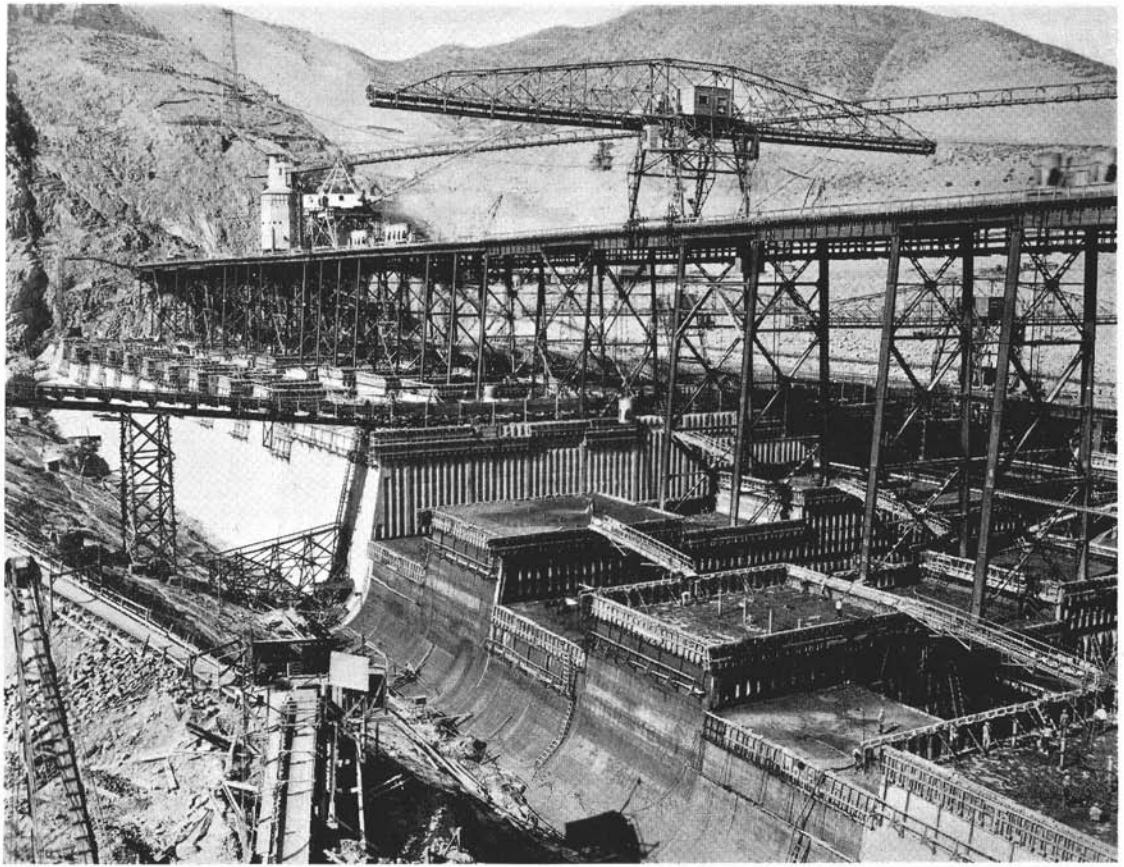
TABLE No. 18 — STATEMENT SHOWING FOREST ASSESSMENT COLLECTIONS RECEIVED FROM COUNTY TREASURERS
April 1, 1935, to March 31, 1936

COUNTIES	1928	1929	1930	1931	1932	1933	1934	1935	Total
Asotin		$ 7.89	$ 30.42	$ 88.17	$ 101.00	$ 82.40	$ 163.69	$ 28.47	$ 502.04
Chelan	$ 250.36	94.74	287.20	499.02	1,537.48	1,083.79	2,335.56	133.87	6,222.02
Clallam	128.67	62.42	184.09	323.10	599.09	192.11	849.79	3.15	2,342.42
Clark	57.05	24.39	52.00	76.07	128.62	122.43	509.70	73.76	1,044.02
Columbia		68.00	86.50	77.65	94.29	110.48	364.52		801.44
Cowlitz	59.12	65.52	205.34	408.02	360.65	467.34	1,985.35	59.74	3,611.08
Ferry	14.25	50.49	72.63	88.71	125.82	97.34	357.16	55.89	862.29
Garfield		3.20	7.20	8.80	16.00	19.40	103.98	13.48	172.06
Garys Harbor	182.38	135.47	496.71	1,129.43	1,059.09	633.62	1,885.00	20.89	5,542.59
Island	72.19	15.58	24.09	38.22	36.49	36.41	224.21	48.83	496.02
Jefferson	83.19	56.12	104.39	158.87	190.49	163.75	714.03	190.16	1,661.00
King	170.09	81.34	278.55	666.05	492.61	415.93	1,608.60	21.40	3,734.57
Kitsap	32.51	12.44	19.60	29.85	159.74	148.08	322.98	17.78	742.98
Kittitas	10.64	12.48	52.34	75.00	434.84	657.85	1,642.19		2,885.34
Klickitat	113.79	105.39	281.31	406.79	506.52	387.67	2,632.88	216.46	4,650.81
Lewis	180.81	106.53	184.97	425.47	463.44	426.74	1,636.50	173.11	3,597.57
Mason	32.11	30.95	88.95	384.55	416.55	285.18	1,207.80	9.80	2,455.89
Okanogan	107.67	146.43	177.60	332.44	383.88	409.59	1,133.45	67.17	2,758.23
Pacific	337.21	79.37	231.91	436.03	469.38	329.54	1,260.07	61.10	3,204.61
Pend Oreille	45.81	104.34	142.59	221.65	305.22	312.44	3,131.51	117.83	4,381.39
Pierce	61.80	29.91	127.46	214.60	269.03	223.66	745.78	41.18	1,713.42
Skagit	27.28	104.18	285.95	434.15	680.74	451.26	2,186.11	7.62	4,177.29
Skamania					255.08	234.82	1,106.68	139.08	1,735.66
Snohomish	176.64	159.40	198.07	624.66	542.01	465.72	1,516.07		3,682.57
Spokane							2,763.51	365.99	3,129.50
Stevens	275.97	400.28	1,020.78	903.70	875.73	886.72	4,810.51	543.99	9,717.68
Thurston	36.87	39.87	128.09	816.94	739.53	626.30	1,578.82	108.47	4,074.89
Wahkiakum	4.20	4.20	26.83	108.15	158.95	105.97	196.90	39.25	644.45
Walla Walla		5.60	10.40	14.40	21.20	36.80	87.54	5.84	181.78
Whatcom	153.52	196.45	342.92	365.16	310.27	251.79	896.11		2,516.22
Yakima	19.20	6.40	17.60	29.80	68.20	85.64	1,108.98	65.56	1,401.38
TOTALS	$2,633.33	$2,209.38	$5,166.49	$9,385.45	$11,801.94	$9,750.77	$41,065.98	$2,629.87	$84,643.21

TABLE No. 19 — STATEMENT SHOWING FOREST ASSESSMENT COLLECTIONS RECEIVED FROM COUNTY TREASURERS
April 1, 1936, to November 30, 1936

COUNTIES	1928	1929	1930	1931	1932	1933	1934	1935	Total
Asotin		$ 6.40	$ 11.53	$ 19.86	$ 16.70	$ 29.74	$ 33.11	$ 157.20	$ 274.54
Chelan	$ 85.28	87.40	53.40	35.72	76.22	755.53	806.01	2,233.80	4,133.36
Clallam	38.13	29.48	36.43	62.12	93.38	120.37	123.27	940.42	1,443.60
Clark	.70	7.53	7.10	55.97	43.66	31.45	55.16	731.93	933.50
Columbia		4.00	13.60	3.63	10.44		14.20	228.64	274.51
Cowlitz	392.39	171.98	139.86	263.77	266.27	260.11	222.76	2,484.82	4,201.96
Ferry	7.20	46.84	14.53	10.10	28.32	39.53	40.37	332.18	519.07
Garfield				1.20	2.40	5.60	14.00	71.64	94.84
Grays Harbor	17.54	6.90	39.76	76.12	291.49	343.63	386.26	2,664.65	3,826.35
Island	32.33	18.07	12.00	12.60	12.15	22.30	28.60	258.91	396.96
Jefferson	9.23	12.91	35.22	31.13	20.37	45.30	42.15	934.99	1,131.30
King	254.97	46.01	80.82	98.06	99.28	177.51	137.10	2,250.12	3,143.87
Kitsap	23.08	14.35	45.40	48.28	50.12	44.14	46.59	383.21	655.17
Kittitas	15.80	29.72	20.51	16.26	19.52	151.03	133.52	4,085.49	4,471.85
Klickitat	188.10	154.71	274.55	160.97	134.15	271.39	292.15	2,458.25	3,934.27
Lewis	28.91	66.53	31.55	339.81	315.62	313.55	307.53	2,142.57	3,546.07
Mason	60.01	73.63	82.98	73.10	65.32	66.46	93.47	1,535.94	2,050.91
Okanogan	46.14	105.48	89.48	59.60	61.14	107.73	145.17	832.74	1,447.48
Pacific	433.92	171.79	77.65	90.20	154.03	503.25	498.59	2,109.48	4,038.91
Pend Oreille	48.69	106.77	125.92	158.88	155.98	186.71	234.96	2,469.99	3,487.90
Pierce	7.24	10.47	7.87	17.18	53.95	63.16	120.41	1,040.53	1,320.81
Skagit	2.80	30.34	65.64	93.55	86.89	48.45	94.30	2,540.38	2,962.35
Skamania					116.70	72.57	80.05	1,364.65	1,633.97
Snohomish	43.71	51.18	51.43	71.11	169.71	156.97	178.69	1,866.18	2,588.98
Spokane								2,213.19	2,213.19
Stevens	334.69	723.86	316.96	412.00	397.14	504.29	660.59	3,795.75	7,145.28
Thurston	19.81	18.41	30.58	47.29	82.81	137.11	157.66	1,850.89	2,344.56
Wahkiakum			7.80	16.85	4.79	15.60	26.27	261.07	332.38
Walla Walla		5.60	5.60	5.60	6.80	11.60	11.80	50.48	97.48
Whatcom	46.13	24.58	24.08	58.16	37.78	55.14	118.26	875.82	1,239.95
Yakima			8.62	4.00	7.20	—24.76*	47.38	1,635.35	1,677.79
TOTALS	$2,136.80	$2,024.94	$1,710.87	$2,343.12	$2,880.33	$4,515.46	$5,150.38	$46,801.26	$67,563.16

* Note—Deduct $24.76 erroneously reported by County Treasurer.



Building west end of Grand Coulee dam illustrating manner in which sections of concrete are constructed — picture shows the high placing trestle with one of the cantilever type placing cranes, and to the left the concrete mixing plant which has been up to a maximum capacity of 8,400 cubic yards per day. This means the placing of one cubic yard in the dam every eleven seconds.

DIVISION OF HYDRAULICS

Hon. J. B. Fink, Acting Director
Department of Conservation and Development
Olympia, Washington.

Sir:

Submitted, herewith, is the report of the activities of the Division of Hydraulics for the biennium October 1, 1934, to October 1, 1936.

At this time I should like to express my appreciation of the efficient work of the entire office staff. By reason of their efforts and some improvement of the methods of handling the work it has been possible to take care of the steadily growing increase of work and the new flood control work with very little increase in the personnel of the division.

Acknowledgment is also due to the field force, water masters and stream patrolmen, for their patient and tactful handling of the many problems with which they have had to deal, and to the water users in general throughout the State for the fine spirit of cooperation always shown by them toward representatives of this office.

Respectfully submitted,

CHAS. J. BARTHOLET,
Supervisor of Hydraulics.

PERSONNEL

Division of Hydraulics

Chas. J. Bartholet	Supervisor
J. F. R. Appleby	Assistant Supervisor
Lars Langloe	Flood Zone Engineer
Wells H. Ashley	Assistant Engineer and Draftsman
Gwendolyn Hallahan	Secretary
Deena Philbrick	Stenographer-Clerk

FOREWORD

The Water Code enacted by the State Legislature in 1917 is comprised of forty-four sections of water law for which material was drawn from several hundred sections scattered through many volumes of session laws. By the enactment and enforcement of this law water rights in the state were stabilized and costly and endless water right litigation was materially reduced. The Water Code as enacted in 1917 was so well drawn that very few amendments have ever been found necessary.

There can be no human habitation without water, and the development of any country depends to a very great extent on its water supply for domestic and municipal uses and for stock, irrigation, manufacturing, mining and power purposes. In accordance with provisions of the Water Code, the State Supervisor of Hydraulics, under the Department of Conservation and Development, has the central authority over the regulation and supervision of this valuable resource.

In 1929 the Legislature enacted the Power License Law (Chap. 105, Laws of 1929) and in 1935 the Flood Zone Act (Chap. 159, Laws of 1935). The administration of both of these laws provides additional duties for the Supervisor of Hydraulics.

ADMINISTRATION

The work of the Division of Hydraulics is divided into seven major activities, which are listed below, together with a brief outline of each.

1. Supervision and Regulation of Use of Water Rights.

Under this classification rests the responsibility of the regulation of diversion of water from the many small springs and streams in the state which are the source of supply for domestic and stock water and the irrigation of approximately 210,000 acres of land. Many disputes arise over the use of waters from small streams which are inadequate during the dry season to meet the demands of the water users. So successfully have these disputes been handled during the past biennium that not one appeal from an order of the Supervisor of Hydraulics has been made to the courts.

This work has been carried on during the past biennium with the assistance of the following staff of water masters, stream and ditch patrolmen:

WATER MASTERS

COUNTY	YEAR 1935	YEAR 1936
Chelan	O. M. Bise (cancelled) W. E. Hill	O. M. Bise (cancelled) W. E. Hill
Columbia	Ben Magill	Ben Magill
Garfield and Asotin	M. H. Dixon	M. H. Dixon
Kittitas	Benjamin Vaughn	Benjamin Vaughn
Klickitat	August Hanson	August Hanson
Okanogan	Calvin Casteel	Calvin Casteel
Spokane		George Stewart
Stevens	C. A. Ledgerwood	C. A. Ledgerwood
Walla Walla	Harlow Barney	Harlow Barney
Yakima	Loyd Fairbrook	Loyd Fairbrook

STREAM PATROLMEN

STREAM	COUNTY	YEAR 1935	YEAR 1936
Ahtanum Creek	Yakima		Wallace Owen
Beaver Creek	Okanogan	Sam Doughty	Tom Tuttle
Bird and Frazier Creeks	Klickitat	William Wright (cancelled) Clarence Lewis	Ivan McCumber
Coleman Creek	Kittitas	O. B. Grimm	T. E. Cowell
Colockum Creek	Chelan	E. E. Ingersoll	
Cowiche Creek	Yakima	H. J. Jacobus	
Douglas Creek	Douglas		E. B. Sheets
Menastash Creek	Kittitas	George Meek	George Meek
Mission Creek	Chelan	D. L. Fisher	
Myers Creek	Okanogan	George H. Wiltz	
Nanum Creek	Kittitas	A. J. Cremer	J. W. McNeley
Peshastin Creek	Chelan	H. H. Kelly	H. H. Kelly
Reeser Creek	Kittitas		A. E. Eslinger
Squilchuck Creek	Chelan	T. R. Hawkins	T. R. Hawkins
Stemilt Creek	Chelan	C. H. Quinn	C. H. Quinn (cancelled) Wm. O. Quinn
Taneum Creek	Kittitas	Ed Oleson	
Wenas Creek	Yakima	E. L. Laney	
Wilson Creek	Kittitas	A. J. Cremer	J. W. McNeley

DITCH PATROLMEN

NAME OF DITCH	Stream from which water is diverted	COUNTY	YEAR 1935	YEAR 1936
Cowiche Ditch	Cowiche Creek	Yakima	H. J. Jacobus	
C. C. Dobson Ditch	Crab Creek	Lincoln	D. H. Durland	D. H. Durland
Wenas Ditch	Wenas Creek	Yakima	Ernest Laney	

2. Determination of Existing Water Rights

Between June 15, 1917, the date on which the Water Code became effective, and October 1, 1934, fifty-six superior court cases for the determination of water rights had been completed or substantially completed. In these proceedings, upon evidence presented, 3,300 water rights were established involving the irrigation of 191,500 acres of land.

Determination proceedings have been completed on the following streams during the biennium from October 1, 1934, to October 1, 1936:

COUNTY	NAME OF STREAM	No. of Rights	Acreage Involved
Pend Oreille	Little Calispell Creek	9	170.0
Stevens	Pingston Creek	17	26.75
Ferry	Twin Creek	9	37.0
TOTAL		35	233.75

Proceedings are now pending to adjudicate the rights to the waters of the following streams:

COUNTY	NAME OF STREAM	Approximate No. of Rights	Approximate Acreage Involved
Lincoln	Crab Creek between Sylvan Lake and Odessa	10	320.0
Lincoln	Crab Creek, South Fork	10	100.0
Stevens	Magee Creek	25	100.0
TOTALS		45	520.0

In addition, there are on file petitions for the determination of water rights on about forty streams on which proceedings have not yet been instituted. Because the expense of water right determinations must be borne by the water users, we have hesitated to proceed except in cases where it appears essential. Eventually the water rights on all streams East of the Cascade Mountains, except perhaps the Snake and Columbia Rivers, and many on the Western Slope, must be adjudicated, as the water supply is limited and fair distribution can be had only after proper legal action to determine the extent and relative priority of the various rights. It is hoped that more of this work can be undertaken during the next two years than has been accomplished during the past few years.

3. Initiation of New Water Rights.

In order to initiate and perfect new rights either for appropriation or storage of water, it has been necessary, since the adoption of the Water Code in 1917, to file applications with this office and to secure premits and final certificates of water right, which are issued subject to prior rights. The procedure is outlined in the Water Code and printed application forms and instructions are furnished on request.

A water right established by use prior to the enactment of the Water Code or by application to the Division of Hydraudics remains appurtenant to the land or place upon which water has been used, and the point of diversion and purpose of use of water remain the same, except that, if application for change is made to the Supervisor and the provisions of the Water Code complied with, a certificate of change may be issued and made of record. However, such transfer can be made only if it appears that other rights will not be adversely affected by the proposed change.

The following table shows the number of applications filed and permits and certificates issued since the enactment of the Water Code both for the period to October 1, 1934, and during the past biennium:

	Total Number Filed Between June 15, 1917 and October 1, 1934	Number Filed During Biennium October 1, 1934 to October 1, 1936	Total
Applications for permits to appropriate water and construct reservoirs	4,038	261	4,299
Permits to appropriate water	2,152	149	2,301
Permits to construct reservoirs	114	3	117
Final water right certificates	824	128	952
Certificates of change (Change of point of diversion, place and/or purpose of use of water)	137	14	151

4. Collection and Recording of Hydrographic Data.

This basic information is essential for the proper planning of our water resources and flood control works.

In cooperation with the United States Geological Survey 100 gaging stations are maintained on the major streams of the state. Results are compiled and published in the U. S. G. S. Water Supply Papers and a summary of such results are published from time to time in a bulletin by this department and are distributed free to those interested.

It would be difficult to measure the total monetary value of the water re-

sources of the State of Washington. It is estimated that in power alone this state has in its streams 12,600,000 potential horse power 50% of the time. 9,875,000 horse power 90% of the time, with the waters available for irrigation, industrial and other uses, would justify making a complete inventory of the great natural resource, which can only be done by the establishment and maintenance of approximately 135 additional stream gaging stations. The establishing of these stations will also furnish much needed basic data for the construction of flood control works.

The data obtained from the gaging stations is also very essential in administering provisions of the water code of this state.

5. Establishment of Flood Zones and Examination and Regulation of Proposed Structures which might adversely affect Flood Conditions.

Chapter 159 of the Laws of 1935 provides for the creation of flood control zones and requires that plans for the construction of any works in any stream within a flood control zone must be presented to the Supervisor of Hydraulics for examination and approval. To date sixteen flood control zones have been established, as follows:

Puyallup Zone No. 1.....Puyallup, Carbon, Stuck and White Rivers.
Green River Zone No. 2.....Green, Black and Duwamish Rivers.
Cedar River Zone No. 3.....Cedar River.
Sammamish Zone No. 4.....Sammamish River watershed.
Snohomish Zone No. 5.....Snohomish, Pilchuck, Snoqualmie, Skykomish, Sultan and Wallace Rivers.
Stilaguamish Zone No. 6.....Stilaguamish River and its two forks.
Skagit Zone No. 7.....Skagit, Baker, Sauk, Cascade and Samish Rivers.
Nooksack Zone No. 8.....Nooksack River and its three forks and the Sumas River.
Yakima Zone No. 9.....Yakima River and its tributaries: Naches, Teanaway, Cle Elum and Kachess Rivers.
Walla Walla Zone No. 10.....Walla Walla and Touchet Rivers and Mill, Yellowhawk and Garrison Creeks.
Nisqually Zone No. 11.....Nisqually River and Ohop Creek.
Deschutes Zone No. 12.....Deschutes River.
Chehalis Zone No. 13.....Chehalis, Wynooche, Satsop, Black, Skookumchuck and Newaukum Rivers.
Cowlitz Zone No. 14.....Cowlitz, Toutle, Tilton and Gispus Rivers and Coweeman and Olequah Creeks.
Lewis River Zone No. 15.....Lewis River and its two forks.
Skokomish Zone No. 16.....Skokomish River and its two forks.

The boundaries and extent of the zones are determined as far as possible from existing and available information, supplemented by field examinations. In several instances it has been necessary to secure the information largely in the field.

Several zones, especially on the Olmpic Peninsula, still remain to be established.

Through September 30, 1936, seventy permits had been issued for works and improvements of various kinds, ranging from state and county bridges to such minor temporary structures as log dumps.

It is believed that the exercise by the State of the regulatory control provided for by this law will be of inestimable value in minimizing flood damages occasioned by man-made works.

6. Examination of Plans for Dams and Inspection of Existing Hydraulic Structures.

All of the dams in the State impounding large quantities of water have been examined during previous bienniums and found to be safe and in excel-

lent condition, thus relieving the State and the owners of such structures of any expenditures this biennium for inspection work. While there exist twenty-seven such major structures in the State, some of which compare well in size with those throughout the world, since the passage of the Water Code no disaster has been caused by the failure of any such structure.

The Water Code also imposes a duty on the Supervisor of Hydraulics to inspect other hydraulic works and order such changes as will reasonably secure safety to life and property. This is done at any time complaints are made calling our attention to such matters or when we learn of any improvements necessary to put the works in a safe condition. Many problems of this nature, which are of small significance, arise and are promptly taken care of.

7. River Utilization Surveys.

These surveys are made by the Conservation Branch of the United States Geological Survey and the resulting maps and reports published by that organization. The maps are topographic maps of the stream valleys on a larger scale than the standard topographic quadrangles and show greater detail. These maps may be used to determine (1) the location of dam sites and the type and size of dam suitable to the site; (2) the location, area, and capacity of possible reservoir sites; (3) available fall for hydro-electric power; (4) topography of water conduit locations; (5) area and character of irrigable lands; and (6) areas subject to flood overflow and probable methods of flood control.

During the present biennium $10,000 was alloted by the State for cooperation with the United States Geological Survey and was matched by an equal amount allotted by the Federal government.

The following surveys were made during the biennium:

Similkameen River, Okanogan County:

From mouth to International Boundary, 25 miles; Sinlahekin Creek, 5 miles; and Palmer Lake. Three dam site surveys.

Chewack Creek, Okanogan County:

From Winthrop to Thirty Mile Creek, 30 miles. (These two surveys were part of the program carried on under the allotment from the Emergency Relief Fund.)

Lewis River, Cowlitz, Clark and Skamania Counties:

From junction with Columbia River to Ariel Dam, 20 miles; from upper end of Ariel Reservoir (Lake Merwin) to bridge on Guler-Randle road, 51 miles; and the following tributaries: Sioux Creek, 2 miles; Swift Creek, 2 miles; Drift Creek, 2½ miles; Pine Creek, 2 miles; Muddy River, 7 miles; Clear Creek, 3 miles; and Quartz Creek, 2 miles. Detailed surveys were made of seven dam sites, viz.: Yale, Cougar, Devils Backbone, Eagle Cliff, Cascade Gorge, Quartz Creek, and Upper Lewis River. Maps of the Ariel Reservoir (Lake Merwin) were obtained from the Inland Power and Light Company, and have been incorporated with and will be published with the above named surveys.

South Fork Lewis River, Clark County:

From junction with Lewis River to a point two miles upstream from the Heisson Bridge, a distance of 25 miles. One dam site survey, Eddy Rock, near Woodland.

Cowlitz River, Lewis County:

From a point 8 miles upstream from Toledo to a point 3 miles downstream from Randle, a distance of 55 miles. Three dam site surveys, viz: Mayfield, Mossy Rock, and Cowlitz Falls.

Surveys by the Portland office of the Army Engineers from a point 1 mile upstream from Kelso to a point 8 miles upstream from Toledo, a distance of 35 miles, and from a point 3 miles downstream from Randle to Cora Bridge, 19 miles, will be incorporated in and published with the above named surveys.

Cispus River, Lewis and Skamania Counties:

From junction with Cowlitz River to East Canyon Creek, a distance of 30 miles.

Toutle River, Cowlitz and Skamania Counties:

North Fork Toutle River from junction with South Fork to and including Spirit Lake, 39 miles; South Fork Toutle River from junction with North Fork upstream 5 miles; and about 10 square miles in and adjacent to the Silver Lake Reservoir site. (About 20 square miles of this site previously surveyed.) Three dam site surveys, viz: Silver Lake on the Toutle River and Green River and Spirit Lake on the North Fork.

Green River, King County:

From a point 6 miles upstream from Auburn upstream therefrom 10 miles. Two dam site surveys.

Sauk River, Skagit and Snohomish Counties:

From a point 4 miles upstream from junction with Skagit River to Clear Creek, a distance of 21 miles, and Suiattle River from junction with Sauk upstream 6 miles. One dam site survey.

Skagit River, Skagit County:

No river survey. Two dam site surveys, viz: Faber No. 1 and Faber No. 2.

In addition to the topographic surveys geological investigations at dam sites are necessary before a reliable utilization report can be prepared. Geological investigations have been made with Federal funds in addition to those used to match the State allotment. These investigations have been made at all the dam sites above mentioned except the two on the Green River, and in addition one site on the North Fork and one site on the South Fork Nooksack River.

Miscellaneous Activities:

In this category we have included various duties which, though important, consume comparatively little of the time of personnel of the Division of Hydraulics.

(a) Power License Fees

There are about ninety large hydroelectric power plants in the state, with a capacity of approximately 1,000,000 horsepower. The potential horsepower of the streams of the state is estimated at 12,600,000 h. p., fifty per cent of the time and 9,875,000 h. p. ninety per cent of the time. Power projects, both developed and undeveloped, claiming more than fifty theoretical horse power, are required, under provisions of Chapter 105 of the Laws of 1929, to pay an-

nual license fees to the Department of Conservation and Development. Since the enactment of this law 168 such claims have been filed, providing an average annual revenue of about $40,000.

(b) Water Right Problems

Many water users apply to this office for the solution of their water right problems, involving both engineering and legal questions. This has been particularly true during the past few years, apparently because the average water user has not had the funds with which to employ engineers or attorneys. Prompt attention has been given to these problems, and, whenever possible, assistance in their solution has been given by this office.

EXPENDITURES

The following table shows expenditures under the supervision of the State Supervisor of Hydraulics for the biennium from October 1, 1934, to October 1, 1936, as compared to those for the previous biennium. It will be noted that the cost of administering the Water Code and Power License Law, both included in the first item, has been reduced, but additional duties assigned to the Supervisor of Hydraulics by the Legislature have materially increased the total cost of operating the division.

PURPOSE	Expended From Oct. 1, 1932 to Oct. 1, 1934	Expended From Oct. 1, 1934 to Oct. 1, 1936
Administration of water code, power license law, etc.	$27,376.42	$23,398.33
Control of flood waters (Chap. 150, L. 1933)	2,601.19	
Case of Washington vs. Oregon (Chap. 96, L. 1933) and (Chap. 175, L. 1935)	14,752.34	9,369.88
Flood zoning (Chap. 159, L. 1935)		8,123.42
*Hydrographic survey	8,884.80	21,411.71
*River surveys		8,311.30
TOTALS	$53,614.75	$70,614.64

* Expenditures for these purposes are made under cooperative agreements with the U. S. Geological Survey and are matched by Federal funds.

RECEIPTS

The following table shows receipts for the biennium from October 1, 1934, to October 1, 1936, as compared with those for the preceding biennium:

PURPOSE	Received Oct. 1, 1932 to Oct. 1, 1934	Received Oct. 1, 1934 to Oct. 1, 1936
Examination fees:		
Initial	$1,530.00	$1,315.00
Additional	2,078.50	1,853.60
Filing and recording fees:		
Permits	3,734.22	1,752.99
Certificates	303.80	247.80
Miscellaneous	52.00	32.00
Miscellaneous copying	81.05	110.60
Extension of time for beginning of construction	3,161.98	3,264.57
Adjudication of water rights	1,892.81	3,139.92
Dam inspection		20.00
Power license fees	82,434.44	75,474.21
TOTALS	$95,268.80	$87,408.39

DIVISION OF GEOLOGY

Honorable J. B. Fink,
Acting Director,
Department of Conservation and Development,
Olympia, Washington.

Sir:

I have the honor to submit herewith the eighth biennial report for the Division of Geology covering the period from October 1, 1934, to September 30, 1936.

Very respectfully,

HAROLD E. CULVER,
Supervisor.

Pullman, Washington.
October 30, 1936.

EIGHTH BIENNIAL REPORT OF THE SUPERVISOR OF THE DIVISION OF GEOLOGY

Introduction

The Division of Geology is a technical-service organization whose function is fundamentally economic. Its activities are directed toward those geologic investigations which have a general or basic importance or which have an intimate bearing on the development and conservation of the State's mineral resources.

The most important service feature of Divisional activity is the issuing of reports and maps. These give the results of field, office and laboratory work on geologic subjects of general and specific economic value. By this means, the results of investigations reach the greatest number of users. These bulletins are the ultimate result of long and carefully conducted investigations, and until they are published and made available for distribution, the economic value of the studies is not realized to its fullest extent.

In the following report, Divisional activities will be considered under the natural subdivisions of Mapping, Economic Geology, and Basic Geology.

MAPPING

Topographic Mapping

The great need for topographic maps, by Government and industry alike, is increasingly apparent. The equivalent of about ninety 30-minute quadrangles forms the composite map covering the 69,127 square miles of Washington.

A carefully prepared summary of all topographic work up to this biennium was prepared by the Division in 1935 in order to meet the continuing demand for information on this subject. It gave complete information on the areas already mapped and plans for completion of this work in the State. The report was issued as a 10-page mimeographed Circular of Information No. 1.

Since 1893, when the first topographic work was undertaken, and up to the present biennium, about 58 per cent of the State has been mapped in 15 or 30-minute quadrangles. Of this amount, some 15 per cent has been carried on under a cooperative agreement whereby State funds for this work are matched by Federal money.

An appropriation of $25,000 during the present biennium has permitted the mapping to be continued in areas of marked importance. Mapping has been completed in the vicinity of Ellensburg, where problems connected with irrigation necessitated some large-scale work. Two 15-minute quadrangles near Yakima are under way, where information is needed on irrigable land and on possible extensions of the producing gas field of Benton County. In western Washington, work has started in two 15-minute quadrangles, the Destruction Island and Queets, in an area valuable for timber and which appears to be potentially valuable for oil. Control work is also to be started in the Gate quadrangle, comprising parts of Grays Harbor, Thurston, Lewis, and Pacific counties, and in the Mazama quadrangle of Okanogan County.

Geologic Map of the State

As the culmination of over ten years of work directed to one end, the geologic map of the State is now lithographed and shortly will be ready for

distribution. It is published on the scale of 1:500,000 (approximately 8 miles to 1 inch) and measures, over all, 52 inches by 36 inches. Twenty-five colors, overpatterns, and symbols were needed to show the areal extent of the various rock formations comprising the complicated geology of Washington.

The compilation of data for this map has involved a long and intensive study of the existing reports of investigations made by the Division of Geology, the Federal Government, the Canadian Geological Survey, the University of Washington, the State College of Washington, and independent geologists and engineers. This was followed by field work in the great areas that had not been previously investigated. Most of that work was completed in the biennium just past. During the last year, the problems involved in the reduction of the multitudinous data to proportions which permit printing without detriment to accuracy or utility (the mechanical features of reproduction) have been worked out.

The map has a very general appeal but it has special value from the economic aspect. It shows the areas of formations favorable to the occurrence of mineral resources: sand, gravel, limestone, coal, oil, natural gas, and the many metals.

The map will be accompanied by Part I of Bulletin No. 32 on the geology of Washington. This will deal with the general features of the geology and, by explaining the basis of mapping, will make the compilation more generally useful to layman and technician.

Contoured Map of the State

A relatively large map showing by contours the general relief of the State has long been needed as a base upon which to indicate mining districts, forests, highways, and land-use data. Although only a little more than one-half of the State has been mapped in the regular quadrangle sheets, it has been possible, through the careful compilation of all available elevation data, to prepare a usably accurate map. The manuscript copy of this map is on a scale of 1:500,000 (8 miles to 1 inch) with 1,000-foot contours drawn in and colored in a shaded series of yellows and browns. It is ready for lithographic reproduction and when published will be accompanied by a brief bulletin outlining the physiography of Washington.

ECONOMIC GEOLOGY

Mineral Resources

Acquiring knowledge of the mineral resources of the State and making that information available to the public are among the foremost objectives of the Division. The first aim is slowly gained through years of work in the State by men thoroughly trained in geology. It comes only with complete familiarity with the rock formations, their kind, extent, and origin. It is constantly being added to through contact with prospectors and miners and, particularly, by special investigations carried on by the Division staff.

The basic data are kept on constantly growing card indexes which are used in answering inquiries and in preparing reports. The file of nonmetallic minerals contains over 1,000 items; the files of metallic minerals (including [1] reported occurrences of minerals of economic value, [2] the companies organized to develop them, and [3] the names of mines where development has

progressed) contain between 3,000 and 4,000 items. These files are valuable time-saving tools of the Division staff; they incorporate a wealth of information.

To make some of this material available to the public, a report of 132 pages has been prepared, entitled "The Nonmetallic Mineral Resources of Washington, with Statistics for 1933." In it is detailed information on 55 distinct nonmetallic mineral substances that for many years have contributed from 85 to over 95 per cent of the total value of Washington mineral production. Their total yearly output in the eleven years since 1923 has been as high as $23,051,144 (in 1929) and has averaged over 19 million dollars in value. This bulletin also lists 14 minerals of minor importance and 52 other nonmetallic minerals of no present commercial value, all occurring in the State. The manuscript for this report is now in the hands of the printer and shortly will be ready for distribution as Bulletin 33.

A mimeographed report issued as Circular of Information No. 2, entitled "Summary Report on Washington Minerals, Production and Resources," presents the more significant figures on production of both metals and nonmetals, with comments on the present development and future possibilities. There is included a very useful list of the nonmetallic substances and the values thereof which are produced in each of the counties of the State.

Estimation of Magnesite Resources

Such varied estimates (ranging from 1 to 20 million tons) have been published for the magnesite resources of the State of Washington that it seemed desirable to undertake a more accurate calculation. This must be based on the field examination of outcropping rock ledges so that approximate percentages of magnesite can be determined.

During this biennium a large number of outcrops, some of which were known to contain magnesite, have been carefully mapped and measured. For each of these, extensive sampling has furnished ample material on which to conduct laboratory tests as a means of checking the accuracy of a newly devised field-identification method.

The information secured in this whole investigation, both as to the methods of field examination and as to the results obtained, will appear as a new bulletin, superseding Bulletin 25, covering both magnesite and dolomite resources.

Ore Deposits of Northeastern Washington

The study and mapping of the rocks in Chelan, Okanogan, Ferry, Stevens and Pend Orielle counties have made it clear that certain geologic factors have controlled not only the distribution of the intrusive granitic rocks, but also the distribution of the accompanying ore deposits. An examination of published reports on individual mining camps by earlier workers shows that in the main these investigations were restricted to areas of such small size that the regional relations were not perceptible. For nearly a decade the Division has been accumulating field evidence bearing on these broadly operating geologic factors.

During the present biennium, the work has been extended in several particulars. A set of scientific investigations comprising field and laboratory

studies is under way, by which it is hoped to distinguish and correlate the large granitic masses which dominate this region. Another set is concerned with the structures and relations of the very large number of highly metamorphosed rock formations. Still other studies are directed to the determination of the exact character of the solutions which produced the mineralization. Taken together, this series of studies is planned to clear up some of those features of the ore deposits in northeastern Washington which have been puzzling mining men for decades and seriously handicapping both discovery and development.

Two or three areas in which significant relations between the intrusives and the metamorphic rocks are revealed happen to lie in the zone which will be flooded by the waters behind the high dam at Grand Coulee. On that account, work during the present biennium on this problem is being centered on these low areas of the Columbia Valley, and it is planned to complete this portion of the long-term investigations before the region is submerged.

As a part of this general economic study the Division continued its detailed examination of the Metaline district during this biennium. Since the U. S. Geological Survey has a representative doing mapping in the Metaline quadrangle during 1936, the State Division has withdrawn and is cooperating unofficially with that agency.

Miscellaneous Economic Studies

From time to time it has been possible to carry on local detailed studies of economic character in various districts of the State. Preliminary studies such as this have been completed on the St. Helens mining district in Skamania County, and the results were published during this biennium as Report of Investigations No. 3. Similar work has been done during the biennium in other metallic deposits, such as the iron of Pend Orielle County and chromite of Okanogan and Whatcom counties. These studies have not been brought to the publication stage.

Map of Economic Minerals

During the last year, a map of the occurrences of economic minerals in Washington has been in preparation and is now completed, and shows three groups of minerals—ferrous, nonferrous, and nonmetallic—the name of each mineral, and whether it was ever produced commercially. Extreme care has been taken to list only bona fide occurrences and then only when definite information is available as to the exact location of the deposit.

Oil and Gas Investigations

The production of natural gas in Washington is becoming increasingly important. The Benton County field had produced nearly 800 million cubic feet valued at $466,920 by the end of 1935. Other fields appear to have quantities of gas almost, if not entirely, commercial in amount. Oil has not yet become a commercial resource but it has been shown to be present in a number of tests and the active exploration for the past 40 years is now greatly stimulated.

The Division of Geology is vitally interested in this activity; it is in con-

stant contact with the drillers and enjoys close cooperation with the development companies.

Early in this biennium a report was published on "Oil and Gas Possibilities of Western Whatcom County." It embodied the results of detailed investigation that had been carried on by the Division in an area where notable discoveries of gas were being made. It was issued in 1935 as Report of Investigations No. 2.

Another study completed early in this biennium was on "Oil and Gas Possibilities of Western Skagit County." The results of this work, a 46-page Report of Investigations with accompanying map, is now in manuscript form awaiting publication.

A general report on the oil and gas possibilities of the state has been published as Report of Investigations No. 4.

An important phase of this part of Divisional activity is the collection, study, and permanent filing of drill cuttings from wells. Valuable information on stratigraphy is obtained by this means at slight cost to the Division. The cooperation of the drillers is assured by the confidential handling of the data they submit.

During the past biennium the Division has cooperated with various Government agencies in obtaining and supplying data on oil and gas in Washington. Such work includes a report made at the request of the Federal Power Commission, one for the use of the U. S. Bureau of Mines, and sampling for analyses to be made by the Cyrogenic Laboratory, Bureau of Mines.

Compilation of Bibliography and Index of the Geology of Washington

A large amount of information on the geology of the State of Washington is scattered through the thousands of books and articles which have been published in past decades. Many of these appeared in obscure publications and are practically lost so far as the general public is concerned, since they are available only in the largest libraries.

During this biennium the Division of Geology has nearly completed not only the most extensive bibliography of Washington geology every attempted, but will have ready at the same time a complete bibliographical index with crossed references.

Mineral Identification Service

To judge from the numbers of samples that have been submitted this biennium, the mineral identification service has greatly increased its usefulness. To date, the samples have been arriving at the rate of nearly 700 for the biennium. This activity constitutes a real service to a large number of persons throughout the State. During the past two years, thirty-two counties have been represented by inquiries regarding samples. About forty per cent of the total number of samples have contained substances of economic importance. To an increasing extent, prospectors and others are availing themselves of this service to secure information on ores and minerals which they find.

Works Progress Administration Mineral Investigations

Late in 1935 the Division received a request from the State Administrator of the Works Progress Administration to plan and supervise an approved W. P. A. project for mineral investigation on public lands in eight specified counties of the State. Although not an important feature of the Divisional activities, it has been possible to gain some information on certain mineral resources.

BASIC GEOLOGY

Under this heading are grouped a few studies of highly technical or scientific character which are undertaken largely as a cooperation between the staff members of the Division of Geology and the faculty members of the Department of Geology of the State College of Washington. Field and laboratory studies to determine the nature and amount of metamorphism of some of the sedimentary rocks which have been intruded by great granitic masses aid in the solution of some of the important problems of the ore deposits in this State. Research studies have also been undertaken to determine the faunal and stratigraphic relations of the Pasayten formation of Mesozoic age in the mountainous portions of Okanogan and Whatcom counties. All of the work of basic character is very largely financed by the State College of Washington, which pays salaries and laboratory expenses. The Division financial cooperation comprises only the very modest field expenses for short periods during the summer.

ACKNOWLEDGMENTS

Owing to the complicated inter-relations of all the activities in which the Division of Geology is engaged, it has not been possible, in the foregoing report, to indicate but a small part played by various cooperating agencies. During the present biennium, the Division of Geology has enjoyed the assistance of representatives of many Federal agencies, including the U. S. Geological Survey, the U. S. Bureau of Mines, the U. S. Department of Agriculture, the U. S. Treasury Department (Building Branch of the Procurement Division), the Agricultural Adjustment Administration, and the Works Progress Administration. Members of the faculties of several institutions of higher learning, including the State College of Washington, the University of Washington, the University of Chicago, and Yale University, have cooperated freely in furthering Divisional work. Most of the State Departments having headquarters at Olympia, including the State Planning Council, have also cooperated in various ways during the biennium. In addition, a really large number of private agencies, both corporate and individual, have made invaluable contributions.

"Civilization was developed upon a metallic basis, as regards implements and instruments, machinery and transport, facility of communication and comfort of living, all of which require the skillful application of metals. . . . When he (the miner) opens the door he leaves the latch string loose. . . . When the miner spoke the word he unloosed the springs of human industry. . . . He blazed the trail for civilization. He has done it with geographic exuberance and equatorial amplitude; from 'the stark and sullen solitudes that sentinel the Pole' to the 'steaming stillness of the orchid-scented glade' in the tropics he has left his mark, as the herald of empire and the pioneer of industry. Trade follows the flag, but the flag follows the pick."

From MAN AND METALS by T. A. Rickard, A.R.S.M., D.Sc.

FIRST BIENNIAL REPORT

of

DIVISION OF MINES AND MINING

June 1, 1935, to December 31, 1936

Hon. J. B. Fink, Acting Director
Department of Conservation and Development,
Olympia, Washington.
Sir:

I have the honor to submit herewith the first biennial report of the Division of Mines and Mining, from June 1, 1935 to December 31, 1936.

Respectfully,

THOMAS B. HILL, Supervisor.

INTRODUCTION

There was passed by the Legislature, and approved by the Governor March 21, 1935, the Mines and Mining Act, its purpose being to aid in the development of the mineral resources of the state. It went into effect June 1, 1935. Under the terms of the act, its administration devolved upon the Director of the Department of Conservation and Development, who, for the purpose of administration, created the Division of Mines and Mining. As no appropriation was made the intention of the Legislature was carried out under the budget of the Department of Conservation and Development.

The work that has been done by the Division of Mines and Mining has been a continuation of that which had been carried on under an allocation of funds from the Emergency Relief Administration, made in September, 1933, which was supplemented by C. W. A., W. E. R. A., and W. P. A. projects. This report will therefore give a summary of what has been accomplished, since the report of Natural Resources Survey issued March 1, 1935.

FUNCTIONS OF DIVISION

According to the provisions of the Act creating the Division of Mines and Mining, the following functions are authorized:

1. To collect, compile, publish and disseminate statistics and information relating to mining, milling, and metallurgy:

2. To make special studies of the mineral resources and industries of the state;

3. To collect and assemble an exhibit of mineral specimens, both metallic and nonmetallic, especially those of economic and commercial importance, such collection constituting the museum of mining and milling development;

4. To collect and assemble a library pertaining to mining, milling, and metallurgy of books, reports, drawings, tracings, and maps and information relating to the mineral industry, and the arts and sciences of mining and metallurgy;

5. To make a collection of models and drawings, descriptions of the mechanical appliances used in mining and metallurgical processes;

6. To issue bulletins and reports with illustrations and maps with detailed information of the natural resources of the state;

7. To preserve and maintain such collections and library open to the public for reference and examination, and maintain a bureau of general information concerning the mineral and mining industry of the state, and to issue from time to time at cost of publication and distribution such bulletins as may be deemed advisable relating to the statistics and technology of mineral and the mining industry;

8. To make determinative examinations of ores and minerals, and consider such other scientific and economical problems relating to mining and metallurgy;

9. To cooperate with all departments of the State government, state educational institutions, the United States Geological Survey and the United States Bureau of Mines.

These functions have been performed insofar as time, funds, and facilities have permitted.

NO. 1—COLLECTION OF INFORMATION

In many respects the collection of information on the mineral resources of the state, and making it available for the use of prospectors, miners and the public, is the most important factor that enters into the practical development of the mineral industry. It is only on the basis of dependable information that capital may be interested and the public protected. The Division, therefore has directed its major efforts to collecting and compiling such information as would be most useful in actual development programs. This information relates first to mining properties, and includes:

List of claims that have been filed on and recorded in county auditors' offices;

Claims that have been surveyed for patent;

Prospectors' leases and mining contracts on State lands;

Claims and properties on which there has been development work, and extent of such work;

Mining corporations of the state with such information as might be obtained with respect to their operations, etc.

Mining Claims

As mining claims are recorded in the auditor's office of the county in which the claim is located, it was necessary to obtain such information from these offices. To do this a W. P. A. project was established to operate in the counties reputed to have large mineralized areas. The work in some of these counties was completed, in others suspended for lack of funds before completion, and in others was not begun. It is estimated that approximately one-half of the mineral claim records or approximately 90,000 have been transcribed.

This W. P. A. project has been continued and will be expanded to include all the counties in the state. When completed the total will amount to approximately 200,000 mineral claims.

Records of claims surveyed for patent have been transcribed in the U. S. Public Survey Office. There have been 2,361 surveyed for patent.

All of these claim records are filed chronologically for each county in the Division of Mines and Mining, with information as to status of claim with respect to kind of ores or mineral material, assessment work, intention to hold, whether patented, and development work that has been done. Ultimately

all claims that have been abandoned will be segregated, and a file of live claims maintained. Claims also will be segregated according to mining properties which they comprise. Ultimately complete information on every mining claim in the state will be compiled and made available.

Mining Properties

The Division has obtained information, more or less complete, on mining properties, on which there has been development. This information includes the names and location of claims comprising the property, the kind and character of ore, results of assays or milling or smelter runs, extent of development work, improvements in the way of buildings and equipment, engineers' reports where these have been made, condition with respect to transportation facilities, and all other information that could be obtained from whatever source.

Where properties are developing or operating number of men employed, and amount of production are reported.

According to reports received by the Division there are 61 operating mines and 25 doing active development work. These figures are known to be low because there have been no field staff or facilities by which information could be obtained or checked in the field.

Mining Corporations

The Division has obtained a list of Washington mining corporations, both active and delinquent for one year in the payment of fees. These have been divided into two classes: Those owning, leasing or otherwise interested in properties in this state, and those with holdings outside the state.

The Division receives many letters and personal inquiries with regard to old mining corporations in which the inquirer holds stock. The Division has given all the information that could be obtained, which usually, because reports of activities of these corporations is not required, is not extensive.

Prospectors' Leases and Mining Contracts

Compilation of information with respect to efforts looking to the production of minerals and oil on State lands reveals the fact that there have been issued by the Commissioner of Public Lands to date 2,080 mineral prospecting leases and 227 mining contracts.

There are in force at the present time about 376 mineral prospecting leases, and about 116 mining contracts.

There have been issued to date about 7,050 oil leases on State lands, of which about 550 are now in force.

Within the last two years there has been a marked increase in interest and activity in prospecting, mining and exploration for oil, not only on State lands, but generally throughout the state.

NO. 2—SPECIAL STUDIES OF MINERALS AND RESOURCES

Although lacking funds and facilities the Division has made a substantial beginning in special studies of the mineral resources and industries of the state. This work has been largely in co-operation with other agencies, such as U. S. Bureau of Mines, U. S. Geological Survey, State departments and institutions and the mining industry. Information that had been developed and compiled,

especially with respect to manganese, chromite, and other minerals, has been made available to public investigators.

The Division furnished to the U. S. Bureau of Mines and the State Metallurgical Research Laboratory at Pullman approximately 4,000 pounds of manganese ores from the Olympic Peninsula. This is the ore that was used in working out successfully a process for the recovery of the metal from these silicate ores. The discovery of this process is regarded as of outstanding importance.

The reports furnished by this Division on the chromite deposits of Whatcom County have been used by those interested in the development and production of this mineral, resulting in much interest and activity.

Information has been furnished to many inquirers on diatomite, molding sands, iron deposits and building stone.

NO. 3—EXHIBIT OF MINERAL SPECIMENS

The Division has begun the assemblage of a mineral exhibit representing mining properties in the state. Already there has been collected and placed on display in the office of the Division approximately 150 specimens of typical ore. In addition to the specimens full information is being obtained with regard to the properties. It is intended that every property in the state shall be represented, and complete information with respect to the properties from which they come shall be on file. This information will show location, owner, character of ore or ores, amount of development work, production, uses, markets, etc. The specimens now on exhibit come from properties in the following counties:

The Olympic Peninsula	Lewis	Skamania
Cowlitz	Okanogan	Snohomish
Chelan	Pend Oreille	Spokane
King	Pierce	Thurston
Kittitas	Skagit	Whatcom
		Yakima

In connection with this exhibit there has been donated to the Division a set of typical ore samples, and also some specimens of gem stone materials found in Washington. In this connection it should be mentioned that the Division is encouraging prospecting and discovery of Washington gem stone material, for which there is an increasing demand.

NO. 4—MINING LIBRARY

The Division has started a library pertaining to mining, milling and metallurgy. This library now contains the following books and publications:

Two complete sets of The Mineral Year Book, issued annually by the U. S. Bureau of Mines, from 1915 to date.
Volume 44 of Mineral Industry.
Glossary of the Mining and Mineral Industry, by Albert H. Fay—U. S. Bureau of Mines Bulletin No. 95.
A History of American Mining, by T. A. Rickard.
Choice of Methods in Mining & Metallurgy—A.I.M.E. Series.
Determination of Minerals, by Edward Henry Kraus & Walter Fred Hunt.
Elements of Mining, by George J. Young.
Flotation, by A. M. Gaudin.
Gems and Gem Materials, by Edward Henry Krause and Edward Fuller Holden.
Geologic Structures, by Bailey Willis & Robin Willis.
Geology Applied to Mining, by Josiah Edward Spurr.
Getting Acquainted With Minerals, by George Letchworth English.
Handbook for Prospectors, by M. W. von Bernewitz.
Handbook of Non-Ferrous Metallurgy—Vol. I and Vol. II, by Donald M. Liddell.
Introduction to Geology, by E. B. Branson.
Introductory Economic Geology, by W. A. Tarr.
Man and Metals—Vol. I and Vol. II, by T. A. Rickard.
Mineral Economics—A.I.M.E. Series.

Mineral Deposits, by Waldemar Lindgren.
Mineralogy, by Edward Henry Kraus.
Non-Metallic Minerals, by Raymond B. Ladoo.
Petroleum Production Engineering, by Lester Charles Uren.
Physiography of Western United States, by Nevin M. Fenneman.
Practical Mine Development and Equipment, by Lucien Eaton.
Principles of Mining, by Herbert C. Hoover.
Technical Writing—A.I.M.E. Series, by T. A. Rickard.
The Alloys of Iron and Silicon, by Earl S. Greiner, J. S. Marsh and Bradley Stoughton.
The Examination of Prospects—A.I.M.E. Series, by C. Godfrey Gunther and Revised by Russell C. Fleming.
The Stone Industries, by Oliver Bowles.
World Minerals and World Politics, by C. K. Leith.
All Bulletins of old Washington Geological Survey not out of print.

In addition there are many bulletins, reports and publications relating to the mineral industry, from various authoritative sources.

NO. 5—COLLECTION OF DESCRIPTIONS OF MECHANICAL APPLIANCES, ETC.

Many books, catalogs, drawings, bulletins, etc., have been furnished by manufacturers, distributors, and others interested in the industry. These are filed and indexed for ready reference and are open to the public.

NO. 6—BULLETINS, REPORTS, ETC.

Having no funds for printing the Division has been able to issue only a few bulletins and reports in typewritten and mimeographed form. Among these has been a summary of federal and state mining laws, for which there has been much demand. Certain reports on the mineral resources including diatomite, manganese deposits of the Olympic Peninsula, chromite deposits, and various miscellaneous reports have been distributed to meet special demands.

NO. 7—BUREAU OF GENERAL INFORMATION

The Division has served as a bureau of general information, in which capacity it has furnished information daily to callers and inquirers by letter on matters pertaining to the mineral resources, mining development, mining properties, companies, etc. Whenever the information has been available it has been given direct. Equally important has been the service rendered in directing inquirers to original sources of information.

Almost daily the Division receives letters asking about companies in which stock is held by the inquirer, or in which the inquirer is otherwise interested. Everything that may be obtained with respect to such companies from the office of the Secretary of State, or other authoritative sources, is collected and furnished. This is a service that is much in demand, and which appears to be deeply appreciated. With reasonable facilities this service will be of great value to the public.

NO. 8—DETERMINATIVE EXAMINATIONS

Through the co-operation of the departments of mining and metallurgy at the University of Washington and State College of Washington, the Division of Geology and the U. S. Bureau of Mines, the Division has been enabled to have determinative examinations made on many samples submitted by prospectors and others interested. These determinations are only qualitative, but in most instances are sufficient to identify the material and to indicate whether there is

likelihood of commercial value. This service somewhat expanded and carefully administered so as not to encroach into the field of private enterprise would be of exceptional value in aiding in the development of our mineral resources.

NO. 9—CO-OPERATION

The Division has co-operated fully with federal and state departments and institutions in furnishing information with respect to the mineral industry of the state. It provided samples of manganese ore to the U. S. Bureau of Mines and to the State Metallurgical Research Laboratory at the State College at Pullman for experiments in developing a process for recovery of manganese metal from silicious ores. It has furnished reports and other information to engineers representing the U. S. Army Engineers in connection with studies of markets for power to be generated at Bonneville and Coulee Dam, and the Department of Interior in a special survey that was made. The Division has co-operated fully with miners and prospectors organizations, with individual miners and prospectors, and all others interested in mineral development.

Mine-to-Market Roads

Lack of roads to serve mineralized areas has been one of the greatest obstacles to the development of the mineral resources of the state. The Division has co-operated with those interested in mineral development during the biennium to have needed roads constructed. The Division has presented information as to mineralized areas to the Forest Service, to Works Progress Administration, to county commissioners in various counties and to the State Highway Department, with the view to having projects undertaken. The forest service has co-operated to the fullest extent, wherever possible under its program and policy, to construct or extend roads that might assist the mining industry. Although W.P.A. is purely a relief agency, it has co-operated as fully as its principles and regulations would permit. County Commissioners are sympathetic and deeply interested. Because of lack of funds, or due to the fact that no provision had been made in their budgets, no extensive work has been done by them. C.C.C. camps have constructed some roads that will serve mineralized sections. However, a beginning has been made in the construction of some roads and in establishing a mine-to-market road policy. There has been some such construction in several parts of the state, some of which has been of great benefit to mining operations. It is probable that hereafter county commissioners will use some of the money obtained from the gas tax for this purpose, and in addition that federal appropriations may be obtained to match with county funds used in mine-to-market roads construction.