INFORMATION BULLETIN ON A STUDY OF
WATER RESOURCE DEVELOPMENT
COLUMBIA RIVER BASIN

INTRODUCTION

Purpose. - This bulletin is to acquaint interested persons with the status and preliminary findings of the review of the plan for comprehensive development of the water resources of the Columbia River Basin contained in House Document No. 531.

SUMMARY OF PRELIMINARY FINDINGS

Flood Control. - No significant change has been found in the basic requirements for Columbia River flood control. A minimum acceptable flood control plan requires strengthening and extending the existing levee systems substantially as now authorized 1/ and the development of sufficient upstream storage to reduce a flood equivalent to that of 1894 (1,240,000 cfs) to a flow of 800,000 cfs at The Dalles, Oregon. A greater degree of control by storage would be desirable and is obtainable within the limits of economic and needed development of the water resource for the generation of hydro-electric power. (See Table II).

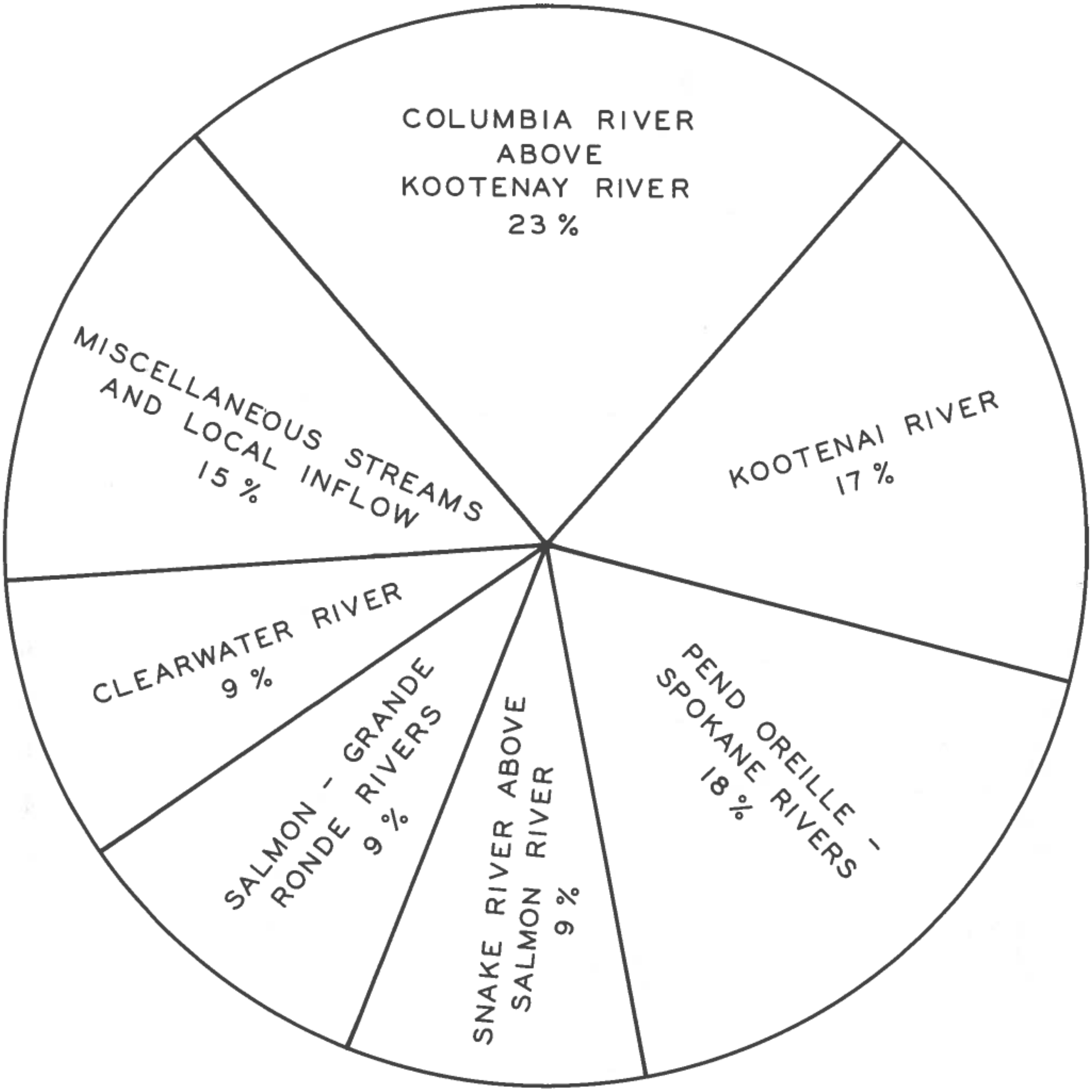
The effect of irrigation diversions during flood periods on the reduction of flow has been reanalyzed and increased. As a result, the previous requirement of about 21,000,000 acre-feet of usable flood control storage to control the 1894 flood to 800,000 cfs at The Dalles

1/ Present study contemplates modification of the Vancouver Lake flood control project as described in attachments to this bulletin.

has been reduced to approximately 19,000,000 acre-feet. A total of about 10,000,000 acre-feet of this basic requirement is available or reasonably assured at the present time.

Major floods on Columbia River are the result of high run-off from all principal tributaries east of the Cascade Range. Studies of a large number of floods show that the pattern of relative contribution between tributaries is reasonably constant. Chart I depicts the relative pattern for the 1894 flood. The tabulation which follows provides general guides for an equitable distribution of the storage necessary to limit flows equivalent to those of 1894 at The Dalles to 800,000 cfs and 700,000 cfs, respectively.

A reasonable approximation of these relationships is desirable to achieve the most effective development of multipurpose storage reservoirs in the basin. Such distribution in addition to satisfying the requirements for lower river flood control, will provide the broadest distribution of local flood protection in tributary areas, create more opportunities for economic power generation on the tributaries, and disperse the availability of impounded water for future irrigation, domestic and industrial water supplies, pollution abatement, recreation and fish and wildlife enhancement. For comparative purposes the table also lists the maximum storage by tributaries usable to control a flood equivalent to that of 1894 to 800,000 cfs at The Dalles.



SOURCE OF 1894 FLOOD

VOLUME CONTRIBUTED DURING FLOOD CONTROL OPERATIONS

CHART I
Sept. 57

STORAGE GUIDES FOR FLOOD CONTROL
(Storage in millions of acre-feet)

Stream	Maximum storage Usable for control of 1894 flood to 800,000 cfs at The Dalles 1/	Equitable distribution of storage for control of 1894 flood at The Dalles		
		Control to 800,000 cfs without Canadian storage	Control to 700,000 cfs	
			Without Can. Storage	With Can. Storage
Columbia River in Canada	9.9	-	-	4.1
Kootenai River	5.4	3.7	4.8	3.8
Clark Fork and Spokane Rivers	9.8	4.1	5.1	4.0
Snake River above Salmon River	4.3	1.7	2.2	1.7
Salmon & Grande Ronde Rivers	6.4	2.0	2.6	2.0
Clearwater River	5.3	2.0	2.4	1.9
Main Stem Columbia River	-	5.2	5.7	5.7
TOTAL		18.7	22.8	23.2

1/ Amounts shown are based on the practical limitations for storage on each tributary, e.g.,
- Columbia in Canada - Based on flows at Mica Creek and Arrow Lakes. Flood control storage in Arrow Lakes limited to 1.2 million acre-feet.
- Kootenai River - Based on flows at Libby and Long Meadows. Libby limited to elevation 2459 pursuant to international studies.
- Clark Fork and Spokane - Based on flows at Paradise and Enaville - otherwise unlimited.
- Snake above Salmon - Based on flow at Oxbow less net diversions during flood period for irrigation.
- Salmon and Grande Ronde - Based on flow at mouth of Salmon and at Wenaha. Amount of 6.4 acre-feet divided: Salmon River 5.3 million acre-feet; Grande Ronde 1.1 million acre-feet.
- Clearwater - Based on flows at mouths of three major tributaries.

An appropriate distribution of storage between tributaries for the generation of hydro-electric power is compatible with the pattern of distribution for flood control since a major portion of the annual refill for power generation results from retention of run-off during flood periods.

Navigation. - As authorized, the head of slackwater navigation on the Columbia will be the upper end of the McNary pool and on the Snake River slackwater will extend to Lewiston, Idaho. Preliminary forecasts of waterborne tonnages and estimates of transportation savings indicate that it will be economically feasible to extend navigation to the foot of Rock Island Dam near Wenatchee by means of open channel improvements and installation of locks at Priest Rapids and Wanapum Dams and to extend slackwater navigation to Lime Point, Idaho, by means of Asotin Lock and Dam.

Construction of the Ben Franklin project on the Columbia River in the vicinity of Richland, Washington, near the head of the McNary pool would eliminate the necessity for open channel improvement below Priest Rapids and would increase the controlling navigable depth of the project from 9 feet to 14 feet.

Provision of a new lock at Bonneville, 86 feet wide and 675 feet long, although beneficial to navigation for increased efficiency and safety does not appear economically justified on the basis of traffic forecasts for the reasonably near future.

The economic feasibility of a 40-foot channel from Portland and Vancouver to the mouth of the Columbia River can be determined only after extensive survey and study. Limits of time and funds preclude its inclusion in this review. Separate study is being initiated and will require two or more years, if adequate funds are made available.

Power. - The requirements for power in the Pacific Northwest have increased rapidly since the 1948 forecasts and will continue to grow at a rapid rate. The Federal Power Commission predicts that power requirements of the Pacific Northwest will be of the following general magnitude:

Year	Energy Requirements (kw)	Peaking Requirements (kw)
1955 (actual)	4,900,000	7,200,000
1965 (forecast)	10,000,000	14,000,000
1975 "	16,000,000	23,000,000
1985 "	23,000,000	33,000,000
2000 "	39,000,000	56,000,000

The forecasted load requirements for 1965 can be met by addition of hydro-electric projects now under construction or scheduled for early initiation. Continued development of hydro-electric projects up to the level indicated as Level 4 in Table II, which constitutes a fairly full use of the remaining economic and feasible developments in the basin, will satisfy forecasted requirements until about 1975. Assuming this development in effect, about one-third of the forecasted loads for 1985 will be supplied by thermal generation and in the year 2000, thermal generation will supply about two-thirds of the power needs.

It is apparent therefore that the power system serving the Pacific Northwest will change in the next 40 years from substantially an all hydro-electric system to a system supported largely by thermal generation.

Additional units will be added to most of the hydro-electric projects as the system grows. For approximately the next 25 years the utility of added units will be influenced by two factors - load growth, and increase in upriver storage. After that time load growth will be the main influence for any continued plant expansion and plants will be operated on a lower load factor (greater peaking operation).

Eventually some decline in the use of storage can be expected. Increased installations will make it possible to utilize higher flows during flood periods, thus reducing the magnitude of average storage use to prevent serious spills. The hydraulic capacity of a fully developed powerhouse of 22 units at The Dalles, for example, would be about 300,000 cfs.

Storage utilization will vary from year to year depending on the natural water yield during the low flow winter months. For a system having a reasonably full development of the basin's water resources as illustrated by Level 4 of Table II, it is estimated that storage utilization would be in the range of 40 to 45 million acre-feet until sometime around the year 2000 and thereafter would gradually decline to a use level of about 30 million acre-feet. This ultimate lesser use does not appreciably affect the economic value of the project because such reduction would occur late in the economic life of the project and further, nearly all of the projects with storage incorporate generating facilities at the site. Output from these facilities would increase somewhat with a lesser average drawdown of the reservoir. It should be understood, also, that a reduction in average storage use does not preclude full use of available storage for either flood control or power when critical conditions arise.

Other Water Uses. - Storage projects, properly designed and operated, will greatly enhance the recreational opportunities of the region. The National Park Service and U. S. Forest Service are evaluating the recreational requirements and potentials of the projects under study.

Storage releases increase low water flows which benefit fish and wildlife and assist in alleviating stream pollution. Some reservoirs will afford opportunities for irrigation of additional lands and provide supplemental irrigation water for others.

Each of the reservoirs under study generate fish and wildlife problems to some degree. State fish and game agencies and the Fish and Wildlife Service are working closely with the Corps of Engineers in formulating programs to minimize adverse effects and to maximize favorable effects on fish and wildlife resources. Those reservoirs affecting national forest lands are being studied in collaboration with the U. S. Forest Service in the same manner and for similar purposes. The attached project descriptions contain further discussions of the storage projects involved.

WILLAMETTE RIVER BASIN

Water resource problems in the Willamette River Basin, although more or less separate from those of the main Columbia Basin, are of major significance. Further improvements in the interest of flood control and other water use needs contemplated for this basin include Gate Creek Reservoir in the McKenzie River Basin; Cascadia Reservoir on South Santiam River; an increase in the height of the existing Fern Ridge Dam to provide additional flood control storage; supplemental levees along lower

McKenzie River and main stem Willamette River from Eugene to the mouth of Long Tom River; and channel improvements along the main stem and major tributaries to permit more effective flood control use of existing and proposed reservoirs. Foster Reservoir which will be covered in a separate report constitutes an essential element in the plan. Consideration is also being given to a reregulating dam and reservoir at the Strube site on the South Fork of the McKenzie River, two miles below Cougar Dam which would make it feasible to increase the proposed power installation at Cougar from 25,000 KW to 50,000 KW.

POTENTIAL DEVELOPMENTS

A large number of projects have been studied by the Corps of Engineers and the Bureau of Reclamation in this review of H. D. 531. Extensive studies are being made also by Canadian agencies on projects in the Canadian portion of the Columbia River Basin, and system operating studies to determine the effect of Canadian storage projects on existing and prospective developments in the United States and prospective developments in Canada are being conducted by representatives of Canada in coordination with representatives of the United States under the auspices of the International Columbia River Engineering Committee.

Table 1 lists multipurpose storage projects in the United States found, on the basis of studies to date, to be economically justified. Greater detail is included in the attached project descriptions and maps. The Smoky Range project on the North Fork of the Flathead River, part of which would lie within the western boundary of Glacier National Park, has been omitted from Table I. Further consideration of this project was

TABLE I

19 Sep 1957

STORAGE PROJECTS - PERTINENT DATA

Project	Pool Elevation Normal	Pool Elevation Minimum	Effective Head (Normal Pool to Tailwater)	Storage in Acre-Feet Usable for Multi-Purpose	Storage in Acre-Feet Usable for Flood Control	Power Inst. Initial No. Unit	Power Inst. Initial KW	Estimated Cost (Initial Power)	Local Flood Control Benefits	Economic Feasibility
Kootenai River Basin										
Libby	2459	2287	344	5,010,000	5,010,000	6	516,000	$285,000,000	$885,000	A
Long Meadows	3100	3040	193	400,000	400,000	1	16,700	24,700,000	100,000	A
Clark Fork-Pend Oreille Basin										
Paradise	2700	2616	243	4,080,000	4,080,000	6	432,000	450,000,000	180,000	B
Flathead Lake Channel	No change from present limits			minor	500,000		-	6,900,000	55,000	B
Spruce Park	4420		870	400,000	300,000	2	78,000	78,000,000	30,000	B
Buffalo Rapids	2700	2633	170	670,000	670,000	5	280,000	80,200,000	45,000	A
Ninemile Prairie	3819	3685	284	885,000	720,000	3	60,000	53,100,000	100,000	B
Spokane River Basin										
Enaville	2430	2324	273	700,000	650,000	2	50,000	69,500,000	100,000	C
Snake River Basin										
Garden Valley	3335	3143	423	1,940,000	600,000	3	105,000)			
Garden Valley Reregulating Fac.				pondage	0	2	24,000)	93,800,000	120,000	A
Wenaha	1770	1575	520	900,000	900,000	3	200,000	78,900,000	0 1/	B
Pleasant Valley	1490		371	500,000	500,000		720,000	94,500,000* (Power Company Estimate)	0 1/	A
Nez Perce	1490	1290	595	4,150,000	4,120,000	10	1,500,000	340,000,000	0 1/	A
Clearwater River Basin										
Bruces Eddy	1540	1397	570	1,433,000	1,433,000	3	240,000	131,000,000	400,000	A
Penny Cliffs	1855	1650	590	2,300,000	2,300,000	4	292,000	210,000,000	650,000	A
Salmon River Basin										
Lower Canyon	1575	1367	625	2,300,000	2,300,000	5	800,000	210,000,000	0 1/	A
Crevice	2445	2245	600	1,700,000	1,700,000	3	405,000	140,000,000	0 1/	A

* Note: Economic feasibility given as "A" for B/C at better than 1.5 to 1; "B" = 1.2 to 1.5; "C" = 1.0 to 1.2

1/ Flood damages in the vicinity of Lewiston-Clarkston will be substantially eliminated by construction of the levees authorized for that area.

suspended in June 1956 at the request of the Secretary of the Interior. Other projects considered which do not appear in Table I include Swan Lake and Marsing, dropped following the hearings of July 1956; a plan for pumping water into high flow periods from Columbia River into Omak Lake, found to be lacking in economic feasibility; and the Chiwawa project on the Wenatchee River which also appears to lack economic feasibility.

Also not listed in Table I are a number of potential run-of-river type power projects. Detailed studies of this group will not be included in the current review of H. D. 531, but it is expected that the majority of the projects will be found economically feasible following the provision of adequately distributed upstream storage. The majority of these projects have been included in the system operating studies from which the data on dependable capacity given in Table II were obtained.

The more important of these head plants are:

Project	Installed Capacity (Initial) (kw)
Kootenai River Basin	
Mile 204.9	75,000
Kootenai Falls	240,000
Katka	150,000
Clark Fork-Pend Oreille Basin	
McNamara	22,000
Plateau	20,000
Quartz Creek	80,000
Superior	16,000
Quinn Springs	48,000
Eddy	90,000

Project	Installed Capacity (Initial) (kw)
Snake River Basin	
Mountain Sheep	282,000
China Gardens	240,000
China Gardens (alt)	126,000
Asotin	288,000
Freedom	270,000
Clearwater River - Series of low head developments totaling approximately	540,000
Main Stem Columbia	
Ben Franklin	468,000

An approximate evaluation of a number of possible levels of storage development is summarized in Table II. These several demonstrations embody those projects under study which are considered to be economically justified. The plans range from a relatively complete development (Level 4) to one which satisfies only the minimum goal for flood control (Level 1). The dependable capacities in Table II are the capacities added by the new projects listed to a base regional system of about 15,500,000 KW. By 1970, the forecasted power load will require a supply equal to the capability of a system incorporating the projects of Level 1. By 1975, the forecasted loads will require the capability of a system incorporating the projects of Level 4. Thus it is evident that the water resources of the basin which can be developed within the limits of sound economic return will be overtaken by anticipated load requirements within a period of not much more than 15 years, a much shorter time than contemplated in H.D.

19 September 1957

TABLE II

APPROXIMATE EVALUATION OF SEVERAL ALTERNATIVE LEVELS OF RESOURCE DEVELOPMENT

Stream	UNITED STATES PROJECTS WITH STORAGE Level 1		Level 2		Level 3		Including Canadian Projects Level 4	
	Project	Flood Control Storage in millions of A.F.	Project	Flood Control Storage in millions of A. F.	Project	Flood Control Storage in millions of A. F.	Project	Flood Control Storage in Millions of A. F.
Columbia River in Canada	-		-				Mica Creek Arrow Lakes	10.90 1.20 12.10
Kootenai River	**Long Meadows**	.40	Libby **Long Meadows**	5.01 .40 5.41	Libby Long Meadows	5.01 .40 5.41	Libby Long Meadows	5.01 .40 5.41
Clark Fork and Spokane Rivers	Ninemile Prairie Spruce Park Buffalo Rapids Flathead L. outlet Enaville (Hungry Horse)	.72 .30 .67 .50 .65 2.29 5.13	Ninemile Prairie Spruce Park Buffalo Rapids Flathead L. Outlet Enaville (Hungry Horse)	.72 .30 .67 .50 .65 2.29 5.13	Paradise Flathead L. outlet Enaville (Hungry Horse)	4.08 .50 .65 2.29 7.52	Paradise Flathead L. outlet Enaville (Hungry Horse)	4.08 .50 .65 2.29 7.52
Snake River above Salmon River	(Upper Snake) (Brownlee) Garden Valley Pleasant Valley	1.76 1.00 .60 .50 3.86	(Upper Snake) (Brownlee) Garden Valley Pleasant Valley	1.76 1.00 .60 .50 3.86	(Upper Snake) (Brownlee) Garden Valley Nez Perce	1.76 1.00 .60 4.10	(Upper Snake) (Brownlee) Garden Valley Pleasant Valley	1.76 1.00 .60 .50 3.86
Salmon and Grande Ronde Rivers	Wenaha	.90	Wenaha	.90	Wenaha	.90 8.36	Lower Canyon Crevice Wenaha	2.30 1.70 .90 4.90
Clearwater River	Bruces Eddy Penny Cliffs	1.40 2.30 3.70	Bruces Eddy Penny Cliffs	1.40 2.30 3.70	Bruces Eddy Penny Cliffs	1.40 2.30 3.70	Bruces Eddy Penny Cliffs	1.40 2.30 3.70
Main Stem Columbia River	(Grand Coulee) (Priest Rapids) (John Day)	4.20 .50 .50 5.20	(Grand Coulee) (Priest Rapids) (John Day)	5.20 0 .50 5.70	(Grand Coulee) (Priest Rapids) (John Day)	5.20 0 .50 5.70	(Grand Coulee) (Priest Rapids) (John Day)	1.50 0 .50 2.00
Total Flood Control Storage (Millions of A.F.)	19.2 1/		24.7 1/		30.7 1/		39.5 1/	
Control of 1894 flood at The Dalles, Oregon	800,000 cfs		690,000 cfs		610,000 cfs		590,000 cfs	
Power Storage (Millions of A.F.)	20.7		25.7		33.3		49.1	
Dependable Capacity added at 70% load factor (kw)	3,000,000		4,400,000		5,400,000		6,500,000 2/	
Cost of new storage projects	$900,000,000		$1,200,000,000		$1,700,000,000		$1,800,000,000 3/	

( ) Denotes project existing or under construction.

1/ Net diversions for irrigation not included. For control to 800,000 cfs this amount approximates 2,900,000 acre-feet.

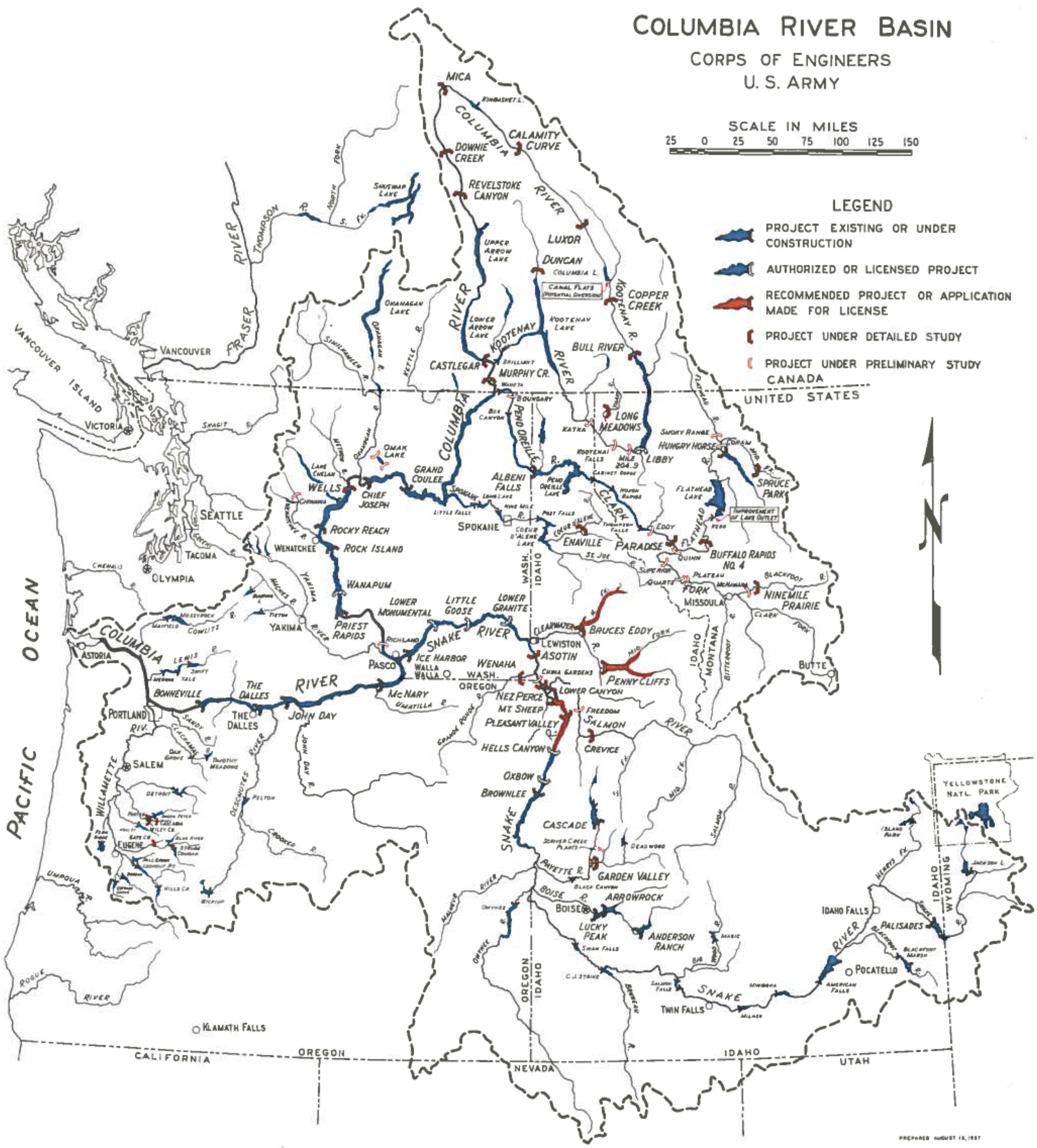
2/ Does not include power generated in Canada

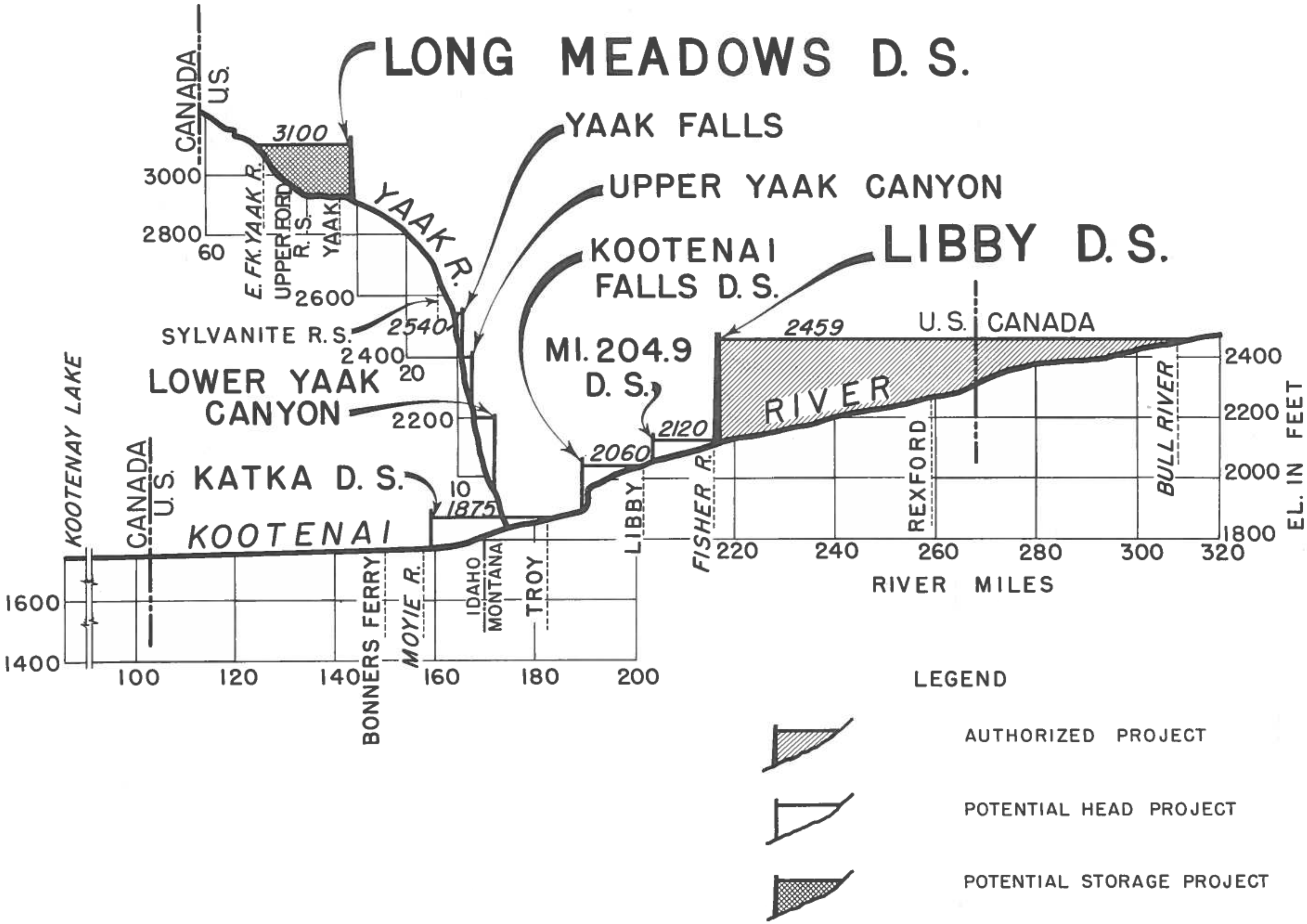
3/ Does not include cost of Canadian projects.

531 on the basis of load growth and resource data available at that time. Further, it appears that the minimum flood control objective as embodied in the Main Control Plan of H. D. 531 providing for control of the 1894 flood to 800,000 cfs at The Dalles can be achieved and considerably bettered with any development reasonably approaching full use of the available economic opportunities.

It is not to be inferred from the presentations in Table II that the recommendations in the forthcoming report will adhere necessarily to any one of the "levels" depicted in this table or that under any plan proposed that authorization of all elements of the plan would be sought at the present time. Many adjustments in these "levels" are possible. It is, however, considered to be one of the prime objectives of the study to indicate the manner in which the water resources of the Columbia River Basin can be most efficiently and fully developed.

The findings and considerations of this bulletin are preliminary and the views of Federal, State, and local agencies and interested organizations and persons will be carefully weighed in the formulation of any finally recommended plan for further water resource development.


COLUMBIA RIVER BASIN
CORPS OF ENGINEERS
U. S. ARMY
SCALE IN MILES
25 0 25 50 75 100 125 150
LEGEND
PROJECT EXISTING OR UNDER CONSTRUCTION
AUTHORIZED OR LICENSED PROJECT
RECOMMENDED PROJECT OR APPLICATION MADE FOR LICENSE
PROJECT UNDER DETAILED STUDY
PROJECT UNDER PRELIMINARY STUDY
CANADA
UNITED STATES
PACIFIC OCEAN
VANCOUVER ISLAND
VANCOUVER
VICTORIA
SEATTLE
TACOMA
OLYMPIA
ASTORIA
PORTLAND
SALEM
EUGENE
KLAMATH FALLS
YAKIMA
WENATCHEE
PASCO
WALLA WALLA
SPOKANE
LEWISTON
MISSOULA
BUTTE
BOISE
IDAHO FALLS
POCATELLO
TWIN FALLS
MICA
DOWNIE CREEK
CALAMITY CURVE
REVELSTOKE CANYON
LUXOR
DUNCAN
COPPER CREEK
BULL RIVER
CASTLEGAR
MURPHY CR.
LONG MEADOWS
LIBBY
HUNGRY HORSE
SPRUCE PARK
WELLS
CHIEF JOSEPH
GRAND COULEE
ALBENI FALLS
ROCKY REACH
ROCK ISLAND
WANAPUM
PRIEST RAPIDS
LOWER MONUMENTAL
LITTLE GOOSE
LOWER GRANITE
ICE HARBOR
McNARY
JOHN DAY
THE DALLES
BONNEVILLE
ENAVILLE
PARADISE
BUFFALO RAPIDS NO. 4
NINEMILE PRAIRIE
BRUCES EDDY
PENNY CLIFFS
ASOTIN
WENAHA
NEZ PERCE
MT. SHEEP
PLEASANT VALLEY
HELLS CANYON
OXBOW
BROWNLEE
CASCADE
GARDEN VALLEY
ARROWROCK
LUCKY PEAK
ANDERSON RANCH
PALISADES
COLUMBIA RIVER
SNAKE RIVER
KOOTENAY RIVER
FRASER RIVER
WILLAMETTE RIV.
SALMON RIVER
CLARK FORK
YELLOWSTONE NATL. PARK
CALIFORNIA
OREGON
NEVADA
IDAHO
UTAH
WASH.
MONTANA
WYOMING
PREPARED AUGUST 15, 1957


LONG MEADOWS D. S.
YAAK FALLS
UPPER YAAK CANYON
KOOTENAI FALLS D. S.
LIBBY D. S.
SYLVANITE R. S.
LOWER YAAK CANYON
MI. 204.9 D. S.
KATKA D. S.
CANADA
U.S.
3100
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2120
2459
YAAK R.
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UPPER FORD R. S.
YAAK
KOOTENAY LAKE
KOOTENAI
RIVER
BONNERS FERRY
MOYIE R.
IDAHO
MONTANA
TROY
LIBBY
FISHER R.
REXFORD
BULL RIVER
RIVER MILES
EL. IN FEET
LEGEND
AUTHORIZED PROJECT
POTENTIAL HEAD PROJECT
POTENTIAL STORAGE PROJECT

1 SEPT., 1957

Seattle District
30 August 1957

LIBBY PROJECT

The Libby dam and reservoir would be a multiple-purpose project on the Kootenai River in Lincoln County, Montana, with the dam located at river Mile 217, about 15 miles upstream from the town of Libby and about 51 miles below the Canadian boundary. The project would include an at-site power plant and provide storage for downstream flood control and power. The dam would create a reservoir extending 42 miles into Canada, backing water to the Bull River dam site. The Libby project was authorized by an Act of Congress adopted 17 May 1950.

Following Congressional approval of Libby dam in 1950, an application for the project was officially submitted by the United States Government to the International Joint Commission in January 1951. In April 1953, the United States' application for approval of Libby dam was withdrawn from the International Joint Commission in order to permit redraft of the application to meet domestic requirements. In May 1954, the State Department resubmitted the application of the United States to the International Joint Commission, requesting approval for construction of Libby dam at Mile 217. The project now awaits approving action by the International Joint Commission. Pertinent data on the project are:

Reservoir -	Area, 48,000 acres at full pool elevation of 2,459 Minimum pool elevation, 2,287 Usable storage, 5,010,000 acre-feet	
Spillway -	Type, concrete-gravity ogee Crest Length, 320 feet	Capacity, 250,000 c.f.s. Crest elevation, 2,427
Dam -	Type, concrete gravity Crest length, 2,700 feet	Height (foundation to crest), 400 feet Crest elevation, 2,480
Power plant -	Initial installation, 6 units Ultimate installation, 8 "	at 86,000 kw. = 516,000 kw. at 86,000 kw. = 688,000 kw.

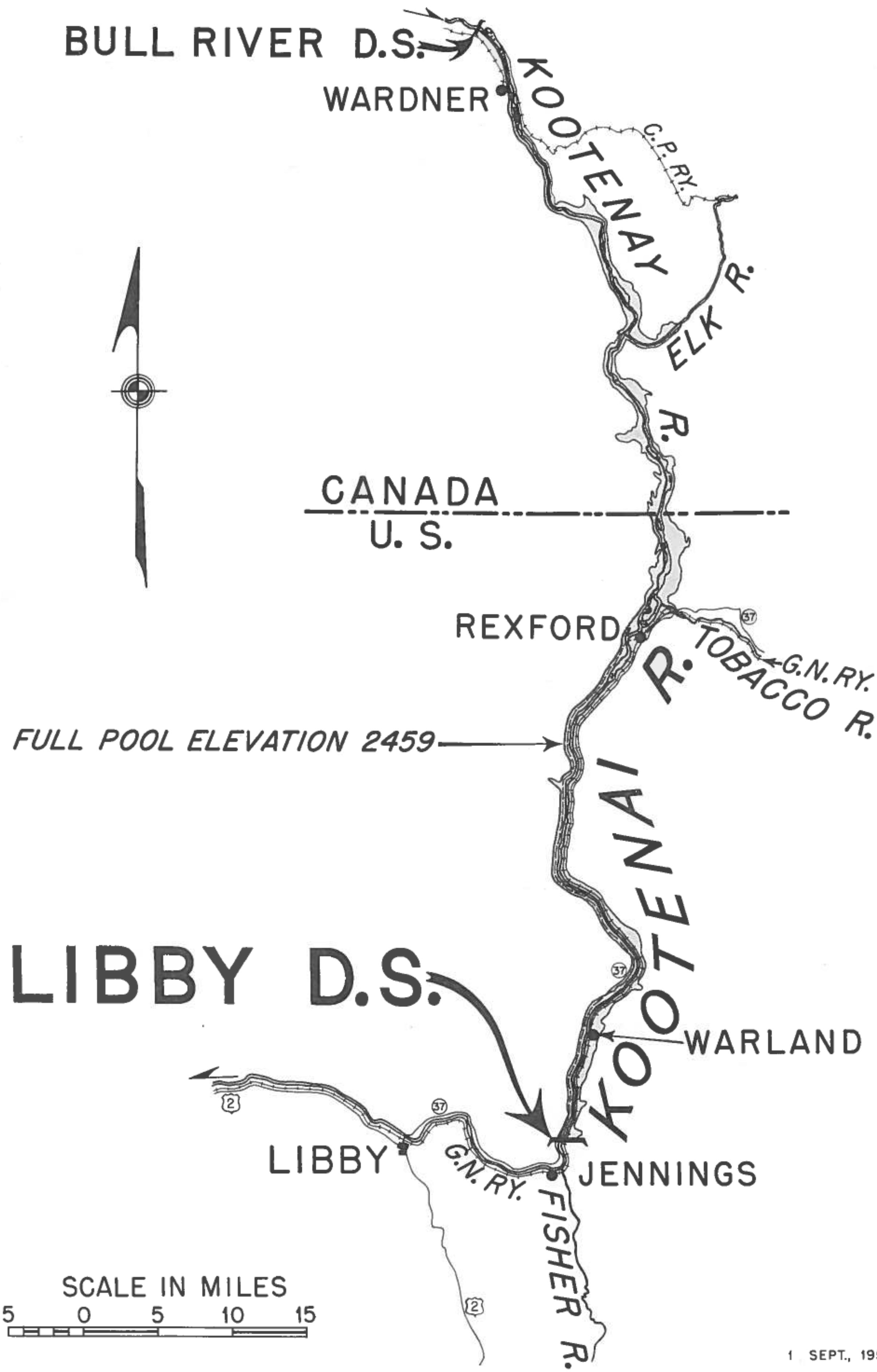
Estimated construction cost - $285,000,000.

The project would provide primary benefits of power and flood control and incidental benefits for recreation. Locally, the dam would protect the 48,000 acres of highly productive agricultural lands in the Kootenai Valley and could thus have prevented the disastrous floodings that affected 32,000 acres in 1948, 6,600 acres in 1954, and 17,000 acres in 1956.

Without considering flood protection from Long Meadows storage, the annual benefits locally would be $885,000. As a unit in the coordinated system for controlling floods on the Lower Columbia River, additional annual flood control benefits would be about $3,000,000. The project would develop 207,000 kw. of prime power at-site. In coordinated operation with other downstream projects 530,000 kw. of power would be added to downstream plants by storage releases. These releases would also make it feasible to develop run-of-the-river plants at Kootenai Falls, Katka, and possibly at river Mile 204.9 on the Kootenai River. The project would be beneficial for the recreational use of the area.

The major relocation in the United States portion of the reservoir would be the construction of 70 miles of the main line of the Great Northern Railway to replace 80 miles of existing main line. Other items of relocation would be the construction of 58 miles of new highway to replace 51 miles of Montana State Highway No. 37, connecting Libby and Eureka, and relocation of the towns of Jennings, Warland, Stonehill, and Rexford. In Canada, about one mile of the Canadian Pacific Railway and one mile of the Kootenay Central Railway would be raised to higher ground. The relocation of two bridges and approaches and the installation of a ferry would be required; and some resettlement of small communities and farms would be necessary.

The U. S. Forest Service has appraised the impact of the Libby Dam project on the forest economy of Lincoln County. Compensating measures based on the findings of this study will be included in the project development.


BULL RIVER D.S.
WARDNER
KOOTENAY
C.P. RY.
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REXFORD
37
TOBACCO R.
G.N. RY.
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FULL POOL ELEVATION 2459
KOOTENAI
LIBBY D.S.
37
WARLAND
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1 SEPT., 1957.

Seattle District
30 August 1957

LONG MEADOWS PROJECT

Yaak River

The Long Meadows dam and reservoir would be a multiple-purpose project located on Yaak River in Lincoln County, Montana, 30 miles upstream from the confluence of the Yaak River with the Kootenai River. The project would have an at-site power plant and provide storage for downstream flood control and power. The dam would create a reservoir extending 15 miles upstream to within 3.5 miles of the Canadian border in a widened part of the Yaak valley which is partially covered with timber. The Yaak cantonment of the Air Force lies within the reservoir; otherwise, there are no towns, settlements or main transportation facilities affected by the project. Pertinent data on the project are:

Reservoir - Area, 7,740 acres at full pool elevation of 3,100
Minimum pool elevation, 3,040
Usable storage 400,000 acre-feet

Spillway - Type, concrete-gravity ogee Capacity, 22,500 c.f.s.
Crest length, 60 feet Crest elevation, 3,085

Dam - Type, concrete gravity
Height (foundation to crest), 280 feet
Crest length 1,450 feet
Crest elevation, 3,108

Power Plant - Initial installation, 1 unit at 16,700 kw. = 16,700 kw. total
Ultimate installation, 2 units at 16,700 kw. = 33,400 kw. total

Estimated construction cost - $24,700,000.

The project would develop 6,000 kw. of power at site, and in coordination with other downstream projects would add approximately 38,000 kw. of power to the system by increased dependable flow provided by the storage in this reservoir. The 400,000 acre-feet of usable project storage would reduce annual flood damages locally along the Yaak River and the Kootenai River in the vicinity of Bonners Ferry, Idaho, by about $100,000. Additional annual benefits for control of floods on the Lower Columbia River would amount to $240,000.

The reservoir would be filled during the spring periods of snow melt and held at a high level during the summer, with releases for downstream uses made during the fall and winter months. This operation would enhance the recreational use of the lake above the dam. The National Park Service estimates that the recreational use of the area would increase from a present yearly use of about 9,000 man-days to 20,000 man-days within 50 years after project construction.

An appraisal of project effects on fish and wildlife has been made by the U. S. Fish and Wildlife Service in cooperation with the Montana State Fish and Game Department. The measures included in the project for fish and wildlife would enhance the value of the fisheries in the area. Minimum flow releases from the reservoir would be adequate to maintain fish life downstream from the dam.

The U. S. Forest Service has assisted in evaluating the impact of the project on the access and management of national forests. Compensating measures for the effect on national forests would be included as a part of the project development. A study of recreational potential of the project was made with the assistance of the National Park Service. These findings will be utilized to relocate existing camp grounds and to provide minimum basic facilities to accommodate increased public use of the reservoir. The basic facilities could be expanded to meet the ultimate recreational needs of the area.