

RIVERS AND FLOODS

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In the greater part of the country the rivers were low in December 1933. Exceptions were the basin of the Green River of Kentucky, where there was a minor overflow, which caused only slight losses, and the Columbia Basin of the Northwest, where severe and damaging floods occurred.

Floods in the Columbia were not unknown in December, but this one was quite unusual, both on account of its severity and the great length of time it prevailed. At Vancouver, Wash., on the Columbia River, a crest stage of 22.3 feet occurred on December 25, 1933, exceeding by 4.8 feet the highest previous record for December. The fact that this flood caused so much more damage in the basin as a whole than higher spring and early summer floods have caused is an apparent anomaly. However, spring and early summer floods are due largely to melting snow and the very high stages are confined almost wholly to the Columbia proper. The December 1933 flood was caused principally by excessive rains and the greatest damage occurred in tributary and minor streams. The following excerpts from reports of the Weather Bureau offices in Portland, Oreg., and Seattle and Yakima, Wash., are of interest, and give complete details of the floods.

Portland, Oreg.—December 1933 was one of the wettest months ever experienced in western Washington and northwestern Oregon. At Portland only one wetter month has been recorded since records were begun in 1871.

At the beginning of the month streams in this region were low. The first threat of high water was on the morning of the 6th. At that time one atmospheric depression had passed inland over southwestern Canada during the night, and another was centered in the Gulf of Alaska. Very heavy rains had fallen in the middle and lower portions of the Willamette Basin, and in all of western Washington.

The next serious threat was on the morning of the 18th, when wide-spread and heavy, warm rains were reported. Flood warnings were issued for the Santiam River at Jefferson, Oreg., and for the Cowlitz River at Kelso, Wash. The warning for the Santiam was verified but the flood stage at Kelso was not reached till later.

A critical period in the freshet was reached on the morning of the 22d. Very heavy rains had fallen during the night from Albany, Oreg., northward, and rapid rises were reported in most of the streams in this region. A stage of 24 or 25 feet was forecast for Portland, 23 or 24 feet for Vancouver, 16 feet for Oregon City, and 15 feet for Jefferson, and flood warnings were issued for Albany and Salem, Oreg. A still further rise was forecast for Kelso, Wash. Fortunately, later in the day there was a temporary lull in the heavy precipitation, and Albany did not have a flood stage, but warnings for the other places were substantially verified.

On the 23d a very rapid rise appeared in the Snake River at Riparia, Wash., causing some alarm, but it smoothed out as it proceeded, and did little more than delay the fall in the lower Columbia and in the Willamette at Portland. It came mostly from the North Fork of the Clearwater River in Idaho, as was afterward learned.

Damage done in Oregon, Washington, and Idaho, was enormous, running into millions of dollars, but the greater part of it was on streams not covered by the river and flood service of the Weather Bureau. The experience of this wet period emphasizes the necessity for a material extension of this service.

Yakima, Wash.—The Yakima and Naches Rivers began to rise noticeably on December 9, reaching, on December 12, the highest crest since 1917, and caused some slight damage to river roads, tourist camps, etc. The flood waters receded gradually from the 13th to 17th, during which period the Reclamation Bureau opened its reservoir gates to the limits of safety and discharged as much water as possible from the nearly full reservoirs. The waters began rising again on December 18 and continued fairly steadily until 2 a.m. on the 23d, when there was a maximum discharge of 53,000 second-feet at the Sunnyside diversion dam. This discharge was approximately three times that recorded on December 12.

All the Yakima and Naches River bottom lands were inundated, amounting probably to 20,000 or 25,000 acres. Much of the flat country near the town of Toppenish, Wash., was covered. All bridges, both highway and railroad, in the valley, except one, the abandoned Yakima-Selah bridge, were unusable on account of

washed-out approaches. All transportation in and out of Yakima was by air lines alone for about 3 days. Between 500 and 600 families were driven out of their homes. There was some confusion on the night of December 22–23, when shallow water ran through the streets in the north and northeast portions of the city of Yakima, but there was no serious damage except to plants and structures near the river.

Total property damages amounted roughly to \$1,000,000 in the Yakima and Naches Basins. Greatest losses were of roads, washed lands, houses, and stock. Very little of the commercial orchard section was touched, most of the apple trees, especially, having been planted on the deeper soils at higher elevations. The most wide-spread losses were in the vicinity of Toppenish, where hay in the stack and stored vegetables were flooded and many cattle, hogs, sheep, and chickens perished. Very unfortunate, also, were the results of the flood in the upper Naches River region. Much work had been expended for years to construct a first-class highway into this beautiful scenic and recreational region, including an eastern gateway into the Rainier National Park. Considerable portions of this highway were washed entirely away; years probably will be required to replace the highway and for the area to recover.

It was fortunate, but rather remarkable, that only two human lives were lost by drowning.

The floods were the result of a combination of circumstances, namely: A heavy snow covering on the upper drainage areas, unseasonably warm weather with melting of snow and copious rainfall. A marked temperature accumulation took place after October 1 and through December. Precipitation for December averaged about 25 inches in the upper drainage areas, an amount far above normal, and with considerable fresh snowfall.

Seattle, Wash.—Heavy and continuous rains during December 1933 wrought havoc and devastation over much of western and portions of eastern Washington. The swift water of swollen streams and rivers swept away bridges and damaged their approaches, washed out culverts, destroyed the surfaces of highways, and inundated lowlands. On the coast and Sound region, gales lashed unusually high tides, driving salt water inland and flooding coastal towns and reclaimed areas. Transportation facilities were paralyzed, and for a time Seattle, Tacoma, Yakima, Wenatchee, and other cities in Washington were isolated except for travel by boat or airplane. Communication was hampered and the water supply of several towns was cut off. The damage will undoubtedly total \$9,000,000 in addition to the 14 lives that were lost in the State. This enormous toll and wide-spread damage, plus hardships endured by thousands of people forced from their homes, represents the greatest loss the State has ever suffered from a similar catastrophe.

The flood situation became of major importance on December 10, when the rivers of southwestern Washington and their tributaries overflowed their banks. In addition to the heavy local rains, mild temperature and rains at high elevations released tremendous quantities of water from the melting mountain snows. The Puyallup River broke through its dykes when it reached a flood stage much greater than ever before experienced or even anticipated. The deluge of fresh water was further impounded by extremely high tides which flooded coastal towns and some of the tide flats in the Sound region. At Tacoma, where much damage was done and a portion of the city inundated, the tide rose to 2.2 feet above the predicted high level. Farm houses were carried away by the rampant waters, fields submerged, and herds drowned. Bridges, highways, and roadbeds were the vulnerable points upon which the flood worked destruction. Certain highways were entirely impassable. Busses and trains cooperated to maintain passenger service from Seattle to Portland. Aberdeen and Hoquiam, Wash., were completely isolated and many commercial houses and buildings in these cities were damaged. It was necessary to carry mail from Tacoma to Seattle by boat. Hundreds of families in the vicinity of Centralia and Chehalis, Wash., were marooned and had to be rescued in skiffs. Two deaths were reported in this early crisis and the flood shortly claimed two more lives.

On the following day flood conditions were manifest farther northward when a dyke on the Snohomish River crumbled and floods were reported from the Skagit Valley. However, the waters in the southwest portion were receding slightly and relief work was begun. In Seattle, where the soil was oversaturated with moisture, slides menaced several homes situated on hills.

Very little relief was accomplished during the following week because of the continuous rains, and about December 20 the situation again became critical. At this time serious conditions were reported not only from southwestern Washington, but from the Olympic Peninsula, the Wenatchee and Yakima districts, and many

other sections. On the 21st a dyke gave way on the Lewis River and the waters flooded Kelso and Woodland, Wash. At Kelso the raging current broke the water main. Woodland was almost completely evacuated as water 8 feet deep covered the main section of the town. The greatest loss occurred in Cowlitz County. The devastation was extensive and according to the Red Cross 2,800 persons were compelled to leave their homes, 795 homes were flooded, and 600 head of cattle were lost. Families throughout the county were housed in schools or private homes at the expense of the Red Cross.

Railroad lines were blocked by slides and Seattle was without train service to the east. Much holiday travel was prevented. Christmas mails were delayed and crews of postmen, organized for the final rush, had only local mail to deliver on December 23. The Snohomish and Cedar Rivers cut new channels in several places. Ten homes were destroyed as the Cedar River shifted its course. Two women were buried alive in a sea of mud as a gigantic slide engulfed a farmhouse in Maple Valley near Renton, Wash., on December 24. Drownings were reported from various localities. In Seattle there were 76 slide-areas and many homes were swept down hill sides. On the 30th six homes were hurled into the Sound at Dash Point near Tacoma.

The Red Cross and local and Federal relief agencies gave prompt assistance. At the close of the month many refugees from flood areas were returning home and commencing the task of rehabilitation. Cities, counties, and the State have appropriated funds for this purpose.

The "why" of this unusual wet period is of considerable meteorological interest. The prime factor was the pronounced polar air mass which maintained its position from the interior of eastern Alaska southeastward over northwestern Canada during the greater part of the month with varying degrees of intensity, blocking the eastward movement of low pressure areas from the Gulf of Alaska and shunting them south of their normal track. During the first 4 days low pressure persisted off the southeastern Alaska and British Columbia coast. Moderate precipitation was general in western Washington as secondary depressions passed inland over British Columbia. On December 4 a storm center of considerable intensity was central over the Gulf of Alaska, moving slowly southeastward, gathering energy and increasing in magnitude as it progressed. Although an offshoot of this storm passed eastward, the center remained over the Gulf of Alaska for 3 days, causing heavy rains in the west division and snow in the mountains. On the morning of December 8 another center was charted a little south of latitude 40 and at 146 west longitude. From this vicinity several "lows" advanced northeastward to the Washington coast and passed inland, accompanied by mild weather and heavy rains. It was the warm air masses borne aloft, that caused the melting of snows that had accumulated in the Cascade Range.

During the remainder of the month the main center of low pressure was at times just off the Washington coast, or considerably to the west over the Pacific. Sometimes it would work slightly northward to be repulsed by the polar air mass previously mentioned. Even with this shifting of the "low" secondary depressions from time to time moved eastward over Washington or British Columbia, between the high-pressure system to the north and another which was in evidence at times over the southwestern United States. The arrangement of air masses was ideal for the genesis of new "lows" which were fed by a steady stream of moist tropical air from the south Pacific. These depressions originated and moved inland with great frequency causing high winds and abundant rains.

Thus, over an area where orographic influences are favorable for the formation of rain, a persistent succession of fronts made climatic history for Washington. Of 89 stations recording precipitation in western Washington during December, 10 received a measurable amount of rain on every day of the month, 13 received rain on all days but one, and 21 stations had but two days without rain. The average number of rainy days during the month for the 89 stations was 28. Moreover, the precipitation was unusually heavy during a number of periods within the month.

In January 1934 there were minor floods in the Susquehanna, Tombigbee, Elk (in Tennessee), Sulphur (in Texas), and Willamette Rivers. Slight damage was caused in the Sulphur Basin, but none in the others.

Flood stages and dates of prevalence at Weather Bureau river-gage stations in December 1933 and January 1934 have been combined in the following table:

Table of flood stages in December 1933 and January 1934

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
Chenango: Sherburne, N.Y.	8	Jan. 1	Jan. 2	8.1	Jan. 1
Susquehanna: Bainbridge, N.Y.	11	do.	Jan. 4	14.2	Jan. 2
EAST GULF OF MEXICO DRAINAGE					
Tombigbee: Lock No. 3, Ala.	33	Jan. 11	Jan. 12	33.8	Jan. 12
MISSISSIPPI SYSTEM					
<i>Ohio Basin</i>					
Green: Lock No. 4, Woodbury, Ky.	33	Dec. 19	Dec. 22	35.4	Dec. 21
Elk: Fayetteville, Tenn.	14	Jan. 7	Jan. 7	16.1	Jan. 7
<i>Red Basin</i>					
Sulphur: Ringo Crossing, Tex.	20	Jan. 4	Jan. 6	25.0	Jan. 4
Naples, Tex.	22	Jan. 10	Jan. 12	23.0	Jan. 11
PACIFIC SLOPE DRAINAGE					
<i>Columbia Basin</i>					
Clearwater: Kamiah, Idaho.	12	Dec. 23	Dec. 23	12.3	Dec. 23
Long Tom: Monroe, Oreg.	10	Dec. 18	Dec. 27	13.7	Dec. 22
		(Dec. 7)	Dec. 7	11.7	Dec. 7
Santiam: Jefferson, Oreg.	10	Dec. 18	Dec. 24	15.4	Dec. 22
		Jan. 22	Jan. 24	13.2	Jan. 23
Willamette:					
Harrisburg, Oreg.	10	Jan. 24	do.	12.2	Jan. 24
Salem, Oreg.	20	Dec. 23	Dec. 23	20.4	Dec. 23
Portland, Oreg.	18	Dec. 22	Dec. 28	23.6	Dec. 24
Cowlitz: Kelso, Wash.	23	Dec. 21	Dec. 24	27.3	Dec. 23
Columbia: Vancouver, Wash.	15	do.	Dec. 30	22.3	Dec. 25

The following tables are statements of estimated flood losses, and savings effected by Weather Bureau flood warnings, in the year 1933. The custom of publishing this information monthly was discontinued a year ago because many floods cover parts of 2 months, and confusion resulted from efforts to segregate the amounts by months.

STATEMENT OF ESTIMATED FLOOD LOSSES DURING THE YEAR 1933

ST. LAWRENCE DRAINAGE

Maumee River in Ohio and Indiana

Prospective crops..... \$5,000

Sandusky River in Ohio

Tangible property totally or partially destroyed..... 65,000
Prospective crops..... 4,000
Suspension of business, including wages of employees... 250

Total..... 74,250

ATLANTIC SLOPE DRAINAGE

Connecticut River in Connecticut

Tangible property totally or partially destroyed..... 6,125
Prospective crops..... 4,500
Livestock and other movable property..... 25
Suspension of business, including wages of employees... 5,000

Schuylkill River in Pennsylvania

Tangible property totally or partially destroyed..... 1,000,000

Delaware River in New Jersey and Pennsylvania

Tangible property totally or partially destroyed..... 200,000

Susquehanna River in New York and Pennsylvania

Tangible property totally or partially destroyed.....	\$4, 178, 160
Matured crops.....	5, 000
Livestock and other movable property.....	5, 000
Suspension of business, including wages of employees..	158, 718

James River in Virginia

Prospective crops.....	2, 000
Suspension of business, including wages of employees..	2, 175

Waccamaw River in South Carolina

Tangible property totally or partially destroyed.....	1, 800
Matured crops.....	500
Suspension of business, including wages of employees..	6, 300

Peedee River in South Carolina

Livestock and other movable property.....	40
Suspension of business, including wages of employees..	4, 680

Altamaha River in Georgia

Tangible property totally or partially destroyed.....	2, 500
Prospective crops.....	1, 000
Livestock and other movable property.....	1, 400
Suspension of business, including wages of employees..	1, 000

Total.....	<u>5, 585, 923</u>
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EAST GULF OF MEXICO DRAINAGE

Apalachicola River in Florida

Tangible property totally or partially destroyed.....	6, 200
Prospective crops.....	3, 000
Livestock and other movable property.....	1, 000
Suspension of business, including wages of employees..	5, 000

Choctawhatchee River in Alabama and Florida

Tangible property totally or partially destroyed.....	20
Matured crops.....	50
Livestock and other movable property.....	497
Suspension of business, including wages of employees..	150

Conecuh River in Alabama

Tangible property totally or partially destroyed.....	750
Livestock and other movable property.....	200
Suspension of business, including wages of employees..	2, 000

Coosa River in Georgia and Alabama

Tangible property totally or partially destroyed.....	19, 900
Matured crops.....	9, 000
Livestock and other movable property.....	2, 600
Suspension of business, including wages of employees..	5, 000

Cahaba River in Alabama

Tangible property totally or partially destroyed.....	50
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Alabama River in Alabama

Tangible property totally or partially destroyed.....	9, 852
Prospective crops.....	6, 878
Matured crops.....	700
Livestock and other movable property.....	6, 245
Suspension of business, including wages of employees..	7, 524

Tombigbee River in Alabama and Mississippi

Tangible property totally or partially destroyed.....	19, 450
Prospective crops.....	9, 250
Matured crops.....	3, 000
Livestock and other movable property.....	47, 025
Suspension of business, including wages of employees..	3, 600

Pearl River in Mississippi

Tangible property totally or partially destroyed.....	2, 000
Prospective crops.....	59, 000
Matured crops.....	8, 000
Livestock and other movable property.....	4, 000
Suspension of business, including wages of employees..	5, 700

Bogue Chitto River in Louisiana

Tangible property totally or partially destroyed.....	\$50, 000
Matured crops.....	3, 500
Prospective crops.....	75, 000
Total.....	<u>376, 141</u>

MISSISSIPPI SYSTEM—UPPER MISSISSIPPI BASIN

Rock River in Illinois

Suspension of business, including wages of employees..	20, 000
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Cedar and Iowa Rivers in Iowa

Tangible property totally or partially destroyed.....	59, 500
Prospective crops.....	50, 000

Des Moines River in Iowa

Tangible property totally or partially destroyed.....	44, 000
Prospective crops.....	17, 700
Matured crops.....	200
Suspension of business, including wages of employees..	1, 000

Illinois River in Illinois

Tangible property totally or partially destroyed.....	70, 800
Prospective crops.....	377, 000
Matured crops.....	330, 000
Livestock and other movable property.....	2, 000
Suspension of business, including wages of employees..	12, 800

Meramec River in Missouri

Tangible property totally or partially destroyed.....	7, 450
Prospective crops.....	25, 000
Suspension of business, including wages of employees..	20, 400

Mississippi River in Missouri and Illinois

Prospective crops.....	1, 000
Matured crops.....	2, 500
Suspension of business, including wages of employees..	5, 000

Total.....	<u>1, 046, 350</u>
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MISSISSIPPI SYSTEM—MISSOURI BASIN

Big Sioux River in Iowa, Minnesota, and South Dakota

Tangible property totally or partially destroyed.....	193, 435
Prospective crops.....	18, 000
Matured crops.....	116, 000
Livestock and other movable property.....	9, 000
Suspension of business, including wages of employees..	11, 000

Smoky Hill River in Kansas

Tangible property totally or partially destroyed.....	28, 500
Prospective crops.....	15, 000
Matured crops.....	5, 000
Livestock and other movable property.....	11, 000
Suspension of business, including wages of employees..	1, 000

Cherry Creek in Colorado

Tangible property totally or partially destroyed.....	953, 790
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Grand River in Missouri

Matured crops.....	5, 000
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Total.....	<u>1, 366, 625</u>
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MISSISSIPPI SYSTEM—OHIO BASIN

Allegheny River in Pennsylvania

Tangible property totally or partially destroyed.....	25, 850
Suspension of business, including wages of employees..	2, 000

Monongahela River in Pennsylvania

Tangible property totally or partially destroyed.....	150, 000
Suspension of business, including wages of employees..	25, 000

Muskingum River in Ohio

Tangible property totally or partially destroyed.....	\$480,000
Prospective crops.....	300
Suspension of business, including wages of employees.....	100

Hocking River in Ohio

Tangible property totally or partially destroyed.....	151,500
Prospective crops.....	400
Matured crops.....	2,200
Suspension of business, including wages of employees.....	800

Scioto River in Ohio

Tangible property totally or partially destroyed.....	404,000
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Barren River in Kentucky

Prospective crops.....	16,600
Matured crops.....	1,000
Suspension of business, including wages of employees.....	2,500

Green River in Kentucky

Tangible property totally or partially destroyed.....	4,200
Prospective crops.....	16,500
Matured crops.....	4,100
Suspension of business, including wages of employees.....	500

West Fork of White River in Indiana

Tangible property totally or partially destroyed.....	115,000
Matured crops.....	10,550
Prospective crops.....	220,600
Livestock and other movable property.....	10,600
Suspension of business, including wages of employees.....	17,000

East Fork of White River in Indiana

Tangible property totally or partially destroyed.....	15,000
Matured crops.....	12,000
Prospective crops.....	187,300
Suspension of business, including wages of employees.....	7,000

White River in Indiana

Tangible property totally or partially destroyed.....	34,500
Matured crops.....	2,750
Prospective crops.....	72,650
Livestock and other movable property.....	2,200
Suspension of business, including wages of employees.....	6,600

Wabash River in Indiana and Illinois

Tangible property totally or partially destroyed.....	80,000
Matured crops.....	35,260
Prospective crops.....	1,077,850
Livestock and other movable property.....	11,785
Suspension of business, including wages of employees.....	42,406

Cumberland River in Tennessee

Tangible property totally or partially destroyed.....	1,000
Suspension of business, including wages of employees.....	1,100

Pigeon River in Tennessee

Tangible property totally or partially destroyed.....	350
Prospective crops.....	1,500
Suspension of business, including wages of employees.....	100

French Broad River in Tennessee

Tangible property totally or partially destroyed.....	100
Prospective crops.....	200
Suspension of business, including wages of employees.....	250

Elk River in Tennessee and Alabama

Tangible property totally or partially destroyed.....	1,500
Prospective crops.....	1,250
Matured crops.....	1,000
Livestock and other movable property.....	300

Tennessee River in Alabama and Tennessee

Tangible property totally or partially destroyed.....	8,300
Prospective crops.....	5,000
Matured crops.....	7,000
Livestock and other movable property.....	250
Suspension of business, including wages of employees.....	11,630

Ohio River from Pittsburgh, Pa., to Cairo, Ill.

Tangible property totally or partially destroyed.....	\$1,127,070
Prospective crops.....	1,244,695
Matured crops.....	26,377
Livestock and other movable property.....	43,775
Suspension of business, including wages of employees.....	442,830

Total..... 6,174,178

MISSISSIPPI SYSTEM—WHITE BASIN

Black River in Missouri and Arkansas

Tangible property totally or partially destroyed.....	38,600
Prospective crops.....	21,000
Matured crops.....	7,000
Livestock and other movable property.....	16,500
Suspension of business, including wages of employees.....	600

White River in Missouri and Arkansas

Tangible property totally or partially destroyed.....	22,300
Prospective crops.....	121,400
Matured crops.....	51,000
Livestock and other movable property.....	30
Suspension of business, including wages of employees.....	23,800

Total..... 302,230

MISSISSIPPI SYSTEM—ARKANSAS BASIN

Verdigris River in Kansas and Oklahoma

Tangible property totally or partially destroyed.....	30,000
Prospective crops.....	28,000
Livestock and other movable property.....	2,500
Suspension of business, including wages of employees.....	2,500

Neosho River in Kansas and Oklahoma

Tangible property totally or partially destroyed.....	15,000
Prospective crops.....	4,500
Livestock and other movable property.....	1,000
Suspension of business, including wages of employees.....	1,000

North Canadian River in Oklahoma

Prospective crops.....	3,200
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Canadian River in Oklahoma

Tangible property totally or partially destroyed.....	61,100
Matured crops.....	12,000

Arkansas River in Kansas, Oklahoma, and Arkansas

Tangible property totally or partially destroyed.....	80,400
Prospective crops.....	270,965
Matured crops.....	9,450
Livestock and other movable property.....	20,400
Suspension of business, including wages of employees.....	10,800

Total..... 552,815

MISSISSIPPI SYSTEM—RED BASIN

Sulphur River in Texas

Tangible property totally or partially destroyed.....	250
Prospective crops.....	20,000
Livestock and other movable property.....	1,300
Suspension of business, including wages of employees.....	500

Total..... 22,050

MISSISSIPPI SYSTEM—LOWER MISSISSIPPI BASIN

St. Francis River in Missouri and Arkansas

Tangible property totally or partially destroyed.....	23,838
Prospective crops.....	939,200
Matured crops.....	22,000
Livestock and other movable property.....	8,300
Suspension of business, including wages of employees.....	119,650

Tallahatchie and Yazoo Rivers in Mississippi

Tangible property totally or partially destroyed.....	\$150, 000
Prospective crops.....	1, 430, 000
Livestock and other movable property.....	15, 000
Suspension of business, including wages of employees.....	185, 000

Ouachita River in Arkansas and Louisiana

Tangible property totally or partially destroyed.....	7, 000
Livestock and other movable property.....	1, 000
Suspension of business, including wages of employees.....	7, 750

Lower Mississippi River from Cairo, Ill., to mouth

Tangible property totally or partially destroyed.....	171, 230
Prospective crops.....	3, 193, 800
Matured crops.....	39, 050
Livestock and other movable property.....	39, 640
Suspension of business, including wages of employees.....	614, 475

Total..... 6, 966, 933

WEST GULF OF MEXICO DRAINAGE

Sabine River in Texas and Louisiana

Tangible property totally or partially destroyed.....	181, 990
Prospective crops.....	390, 000
Matured crops.....	394, 500
Livestock and other movable property.....	109, 500
Suspension of business, including wages of employees.....	38, 800

Rio Grande River in New Mexico

Tangible property totally or partially destroyed.....	2, 473
Prospective crops.....	6, 320
Suspension of business, including wages of employees.....	337

Total..... 1, 123, 920

PACIFIC SLOPE DRAINAGE—COLUMBIA BASIN

Clark Fork in Washington

Suspension of business, including wages of employees.....	2, 200
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Clearwater River in Idaho

Tangible property totally or partially destroyed.....	3, 000
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Snake River in Idaho

Tangible property totally or partially destroyed.....	20
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Willamette River in Oregon

Tangible property totally or partially destroyed.....	2, 600
Prospective crops.....	4, 100
Livestock and other movable property.....	525

Columbia River in Washington and Oregon

Tangible property totally or partially destroyed.....	5, 573, 825
Matured crops.....	121, 500
Prospective crops.....	379, 150
Livestock and other movable property.....	350, 450
Suspension of business, including wages of employees.....	111, 325

Minor streams in Washington where flood service is not maintained

Tangible property totally or partially destroyed.....	5, 182, 300
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Total..... 11, 730, 995

Total estimated losses for the United States... 35, 322, 410

ESTIMATED VALUE OF PROPERTY SAVED BY WARNINGS

ST. LAWRENCE DRAINAGE

Titabawassee River in Michigan.....	\$3, 500
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ATLANTIC SLOPE DRAINAGE

Connecticut River in Connecticut.....	\$89, 000
Schuylkill River in Pennsylvania.....	60, 000
Susquehanna River in Pennsylvania.....	3, 000
James River in Virginia.....	173, 500
Roanoke River in North Carolina.....	1, 000
Neuse River in North Carolina.....	2, 000
Peedee River in South Carolina.....	11, 650
Altamaha River in Georgia.....	51, 500

EAST GULF OF MEXICO DRAINAGE

Apalachicola River in Florida.....	15, 000
Choctawhatchee River in Alabama.....	200
Coneuch River in Alabama.....	500
Coosa River in Georgia and Alabama.....	100, 000
Alabama River in Alabama.....	29, 950
Tombigbee River in Alabama and Mississippi.....	289, 250
Pearl River in Mississippi.....	7, 000

MISSISSIPPI SYSTEM

Upper Mississippi Basin

Cedar and Iowa Rivers in Iowa.....	40, 000
Illinois River in Illinois.....	100, 000
Upper Mississippi River in Illinois and Missouri.....	4, 500

Missouri Basin

Big Sioux River in Iowa and South Dakota.....	24, 000
Smoky Hill River in Kansas.....	100

Ohio Basin

Allegheny River in Pennsylvania.....	500, 000
Monongahela River in Pennsylvania.....	500, 000
Muskingum River in Ohio.....	50, 000
Hocking River in Ohio.....	25, 000
Scioto River in Ohio.....	25, 000
Barren River in Kentucky.....	15, 000
Green River in Kentucky.....	14, 900
West Fork of White River in Indiana.....	17, 500
East Fork of White River in Indiana.....	5, 000
White River in Indiana.....	17, 000
Wabash River in Indiana.....	168, 000
Cumberland River in Tennessee.....	8, 500
Elk River in Tennessee and Alabama.....	3, 000
Tennessee River in Tennessee and Alabama.....	5, 800
Ohio River from Pittsburgh, Pa., to Cairo, Ill.....	4, 351, 122

White Basin

Black River in Missouri and Arkansas.....	8, 000
White River in Missouri and Arkansas.....	77, 250

Arkansas Basin

Neosho River in Kansas and Oklahoma.....	2, 500
Arkansas River in Kansas, Oklahoma, and Arkansas.....	85, 100

Red Basin

Sulphur River in Texas.....	65, 500
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Lower Mississippi Basin

St. Francis River in Missouri and Arkansas.....	13, 000
Yazoo River in Mississippi.....	35, 000
Ouachita River in Arkansas and Louisiana.....	27, 500
Lower Mississippi River from Cairo, Ill., to mouth.....	569, 010

WEST GULF OF MEXICO DRAINAGE

Trinity River in Texas.....	7, 000
Rio Grande River in New Mexico.....	138, 702

GULF OF CALIFORNIA DRAINAGE

Colorado River in Colorado.....	10, 000
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PACIFIC SLOPE DRAINAGE

Columbia Basin

Willamette River in Oregon.....	200
Columbia River in Washington and Oregon.....	478, 075

Total estimated savings for the United States... 8, 228, 309