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LARGE RIVERS OF THE UNITED STATES

Prepared by Water Resources Division

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CORRECTION

Figure 1

Cableway across Columbia River near The Dalles, Oreg. has a clear span of 1727 feet, steel towers are 100 feet high. Installation by U.S. Geological Survey, completed in 1937

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Everyone knows that the Mississippi River is the largest river in the United States. But what rivers are the second and third largest? To compare the size of rivers, one must know what is meant by large or small.

The simplest measurement to use, and the most common in our school geographies, is length. Length is most meaningful in comparing navigable rivers. The thousands of miles of navigation afforded by the Mississippi - Ohio-Missouri River system played a large and significant part in the development of the interior of our country. The great navigable length of the Missouri made it an important arterial trail to the West. It is interesting to consider the profound extent to which the settlement of the West might have been altered had the early Spanish settlers in Mexico been

able to ascend the Colorado by boat.

Rivers may also be compared in relation to the size of the basin drained. Drainage area is a measure of the region contributory to a river, but is not so much a characteristic of the river itself.

It is the flow of water in the river that turns the wheels of industry, supplies water for cities and for innumerable industrial processes, and maintains navigable depths for shipping. Consequently, the flow of a river is perhaps the most significant index of its utility in a highly productive country. It tells us how much water the river can supply for development. Therefore, in this report, rivers are classified with respect to their flows. Their lengths and their drainage areas

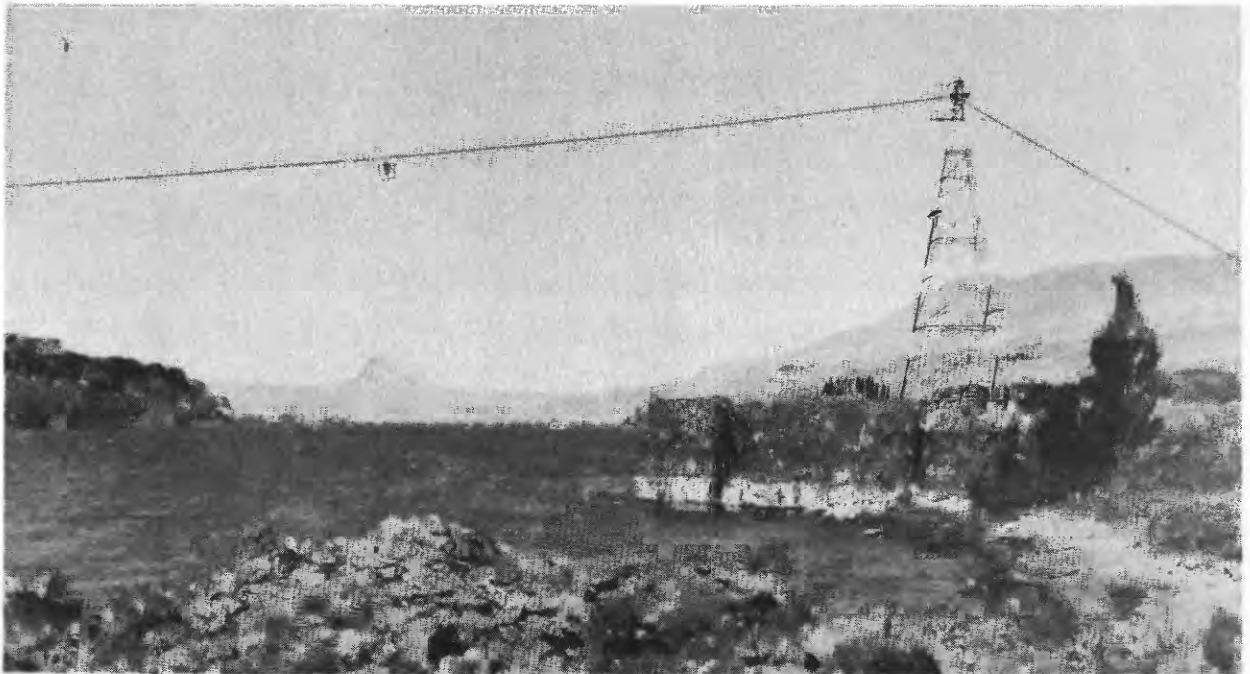


Figure 1.--Cableway across Columbia River near The Dalles, Oreg., for measuring river discharge.

The cableway supports a car from which an engineer operates a current meter to measure the speed of the water, and a sounding weight to measure the depth of the water. Supporting the 1,237 foot cableway are two 54-foot towers, one on each side of the river. The maximum flow that has been measured was about 1,000,000 cfs during the floods of May-June 1948.

are listed for subsidiary classification.

Possibly the first effort to classify rivers on the basis of flow was made in 1880 by H. B. Guppy, a British naturalist. Dr. Guppy, who had made some measurements of the Yangtse and Pei-Ho Rivers in China, using floats and sounding lines, was curious to know how his measurements compared with measurements on other rivers of the world. He was able to collect information as to the relative magnitude of the flow of 17 rivers. In 1880 facts on river flow were obtained only by specially investigative-minded individuals like Dr. Guppy and published data were very limited, -- and still are in many parts of the world. About this time the United States Geological Survey began its river measurement work in the West to obtain needed stream-flow information so that settlers and other water users might know how much water was available for irrigation and other purposes. Water users in other parts of the country also needed stream-flow information. There are now about 6,000 gaging stations in continuous operation on rivers, large and small, to guide the control and utilization of the nation's water resources. The Geological Survey maintains gaging stations near the mouths of most of the large rivers of the United States. A photograph of the measuring cableway on the Columbia River near The Dalles, Oreg. is shown on figure 1. A list of the gaging stations maintained by the Geological Survey near the mouths of the large rivers of the United States is given in table 1. The list includes the drainage area above each gaging station and

the mean flow in cubic feet per second.

For practical reasons it is not often feasible to operate gaging stations directly at the mouth of a river. Therefore, in order to determine the flow at the mouth, it becomes necessary to add the inflow to the river below the most downstream gaging station. For most rivers this additional flow is minor in comparison with that measured at the gaging station. Flows in cubic feet per second thus computed are listed in table 2 for the 26 largest streams in the country in order of volume of flow. No figures of flow are shown for the White, Sacramento and Colorado Rivers because the unmeasured flow was so great in proportion to the total, or so uncertain that no dependable estimate could be made for flow at the mouth. However, these rivers are listed in what is believed to be their proper rank in relation to others in the table. The information on discharge in tables 1 and 2 has been computed from basic data especially for this report. Data on lengths and drainage areas in table 2, on the other hand, have been obtained from previously published sources. The locations of the rivers listed are shown on figure 2. The rivers are drawn so as to show their relative rates of flow.

The Mississippi, early named "Father of Waters", is the greatest river by all standards of comparison, -- flow, drainage area, and length. Of its tributaries or components, 11 are included among the ranking 26 rivers in the United States. The Mississippi together with a parallel distributary, the Atchafalaya,

Table 1.--Discharge at downstream gaging stations on large rivers

River	Gaging station location	Drainage area (square miles)	Mean discharge (1921-45) (cfs)
Alabama	At Claiborne, Ala.	22,000	30,800
Allegheny	At Natrona, Pa.	11,410	18,700
Apalachicola	At Chattahoochee, Fla.	17,100	21,400
Arkansas	At Little Rock, Ark.	157,900	44,500
Colorado	At Yuma, Ariz. ^a	242,900	14,800
Columbia	Near The Dalles, Oreg.	237,000	168,000
Cumberland	At Smithland, Ky.	18,080	27,800
Delaware	At Trenton, N. J. ^b	9,167	14,900
Hudson	Below Mohawk River, N. Y. ^c	7,956	12,800
Illinois	At Meredosia, Ill.	25,300	24,800
Mississippi	At Alton, Ill.	171,500	91,200
Mississippi	At Vicksburg, Miss.	1,144,500	561,000
Missouri	At Hermann, Mo.	528,200	70,000
Ohio	At Metropolis, Ill.	203,000	254,000
Pend Oreille	Below Z Canyon, Wash.	25,200	24,000
Red	At Alexandria, La. ^d	81,300	51,000
Sacramento	At Verona, Calif. ^e	-	21,400
St. Lawrence	At Ogdensburg, N. Y. ^f	298,100	221,000
Snake	Near Clarkston, Wash.	103,200	44,500
Susquehanna	At Marietta, Pa.	25,990	33,800
Tennessee	Near Johnsonville, Tenn.	38,520	60,400
Tombigbee	Near Leroy, Ala.	19,100	26,400
Wabash	At New Harmony, Ind.	29,160	27,500
White	At Newport, Ark.	19,800	24,500
Willamette	At Salem, Oreg.	7,280	21,150

^a Wasteway flow has been added. A considerable part of the natural flow is used for irrigation in the basin above Yuma.

^b Five tributaries below Trenton have been added.

^c Sum of flow at gaging stations on Hudson River at Mechanicville, N. Y. and Mohawk River at Cohoes, N. Y.

^d Ouachita River at Monroe, La., has been added.

^e American River and Yolo bypass have been added.

^f Operated by Corps of Engineers, Department of the Army.

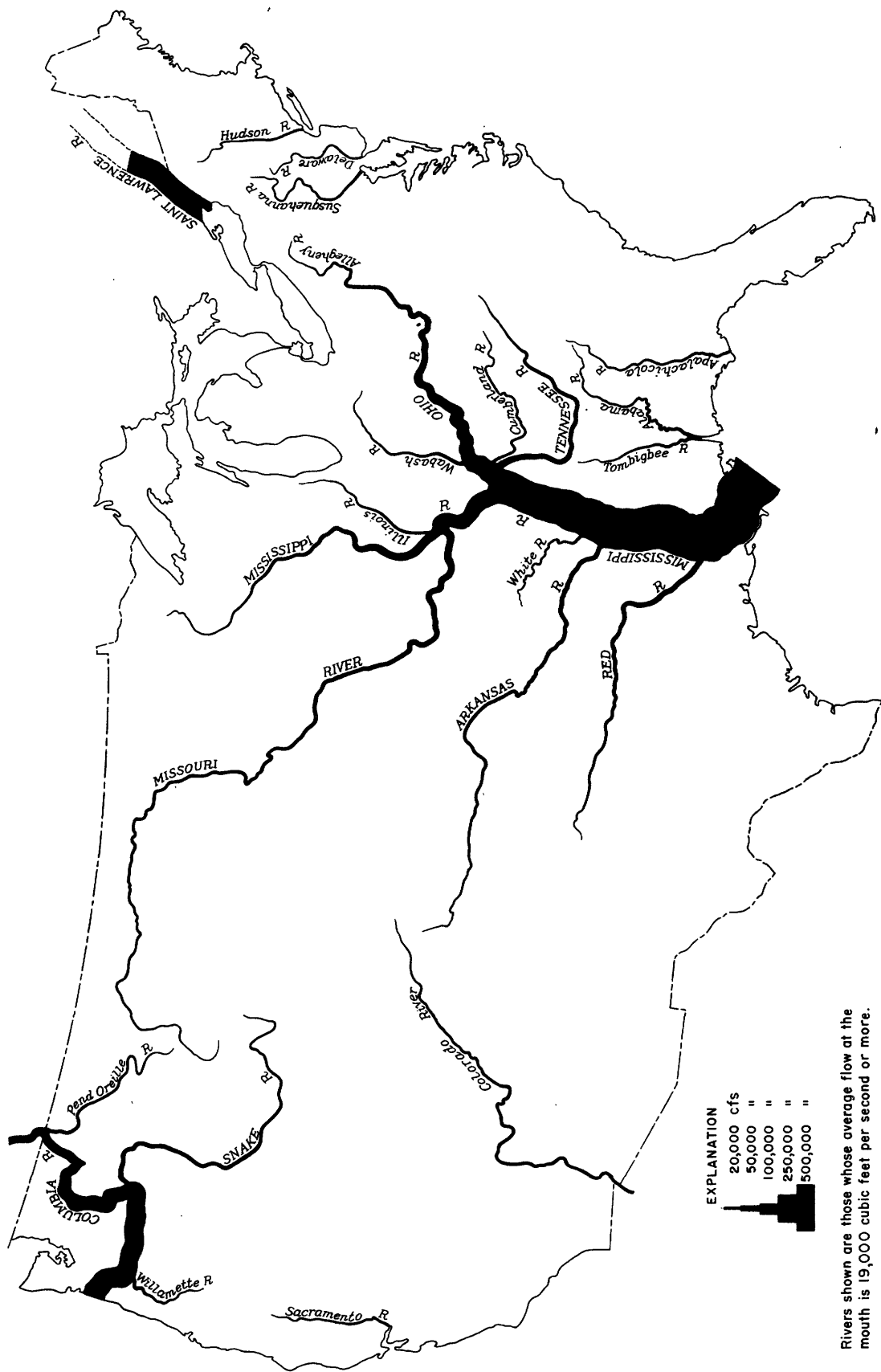


Figure 2.-- Large rivers in the United States.

discharges the water that drains from 40 percent of the land area of continental United States. Table 2 shows that the Ohio, Columbia, and St. Lawrence Rivers are respectively second, third, and fourth ranking rivers in respect to flow. There is a large difference in the discharges of the fourth and fifth ranking rivers given in table 2. The upper Mississippi River has only about 40 percent of the flow of the St. Lawrence River, which occupies the fourth position in the list. The differences in flow of the remaining streams become progressively smaller.

Rivers vary in flow from year to year. In order to standardize results and to minimize the effects of these variations on the comparisons, the flows of all rivers have been based on the average over the 25-year period, 1921-45. The order of magnitude of the rivers listed in table 2 may depend in part on the period of record on which the flows are based. For example, the trend in flow of the Columbia River has been generally downward since about 1895. A similar trend has been true of other rivers, though perhaps to a lesser degree. Therefore, if comparisons were based on 50-year records (if available for both streams), the Columbia River might outrank the Ohio River. Other reversals, where order of rank is based on small differences in flow, might also occur if the flows were based on a period other than 1921-45.

The flows of most western rivers, such as the Columbia, Snake, Missouri, and Colorado, are depleted by diversions for irrigation. These depletions have not been considered in preparing table 2, except on the Colorado River, where no entry for the flow is given, but the relative position was based on estimates of the virgin flow (i.e., by adding the depletions for irrigation to the measured flow). In general these depletions would not greatly affect the relative position of the rivers listed.

Names of streams have little hydrologic significance, even though they may be of great historic and geographic interest. The rivers listed in table 2 bear the name of the stream at the mouth, because this is the point of greatest flow. The river lengths given in the table and as shown on figure 2 represent not only the length of the stream bearing the given name, but the length of the river system, i.e., distance from mouth to the most upstream source as measured along the watercourse. For the Mississippi River, the length listed is the distance along the stream from the Gulf of Mexico to the source of Red Rock River in the

upper Missouri River Basin in western Montana.

The Mobile River, the eighth ranking river in table 2, is the name given to the meandering stream, some 38 miles long, which together with a parallel distributary, Tensaw River, carries the combined flow of the Alabama and Tombigbee Rivers to Mobile Bay.

Among the 26 large rivers listed in table 2, only 9 are independent; that is, the rivers discharge directly into the ocean. The others, such as the Missouri and the Willamette, are tributary to larger streams included in the list. Some rivers, such as the Tennessee, are second-order tributaries, that is, tributary to a tributary of a river that discharges into the ocean. Although it is common practice to follow accepted names in deciding which river is a tributary and which is the main river, it is largely a matter of historical accident which fork carries the name of the lower stream or is separately named.

The outflow of all streams from the United States into the oceans or across its boundaries totals about 1,800,000 cubic feet per second. Of this total nearly 75 percent is accounted for by the nine independent streams that appear in table 1. The remaining 25 percent is discharged through a host of comparatively minor coastal streams.

We know only a little about rivers when we measure their lengths, drainage areas, and average flows. There is much to be learned about their range from flood to drought, about their sources, about their chemical quality and about their load of silt and the salts they carry in solution. The topography and climate as well as the vegetation growing in various parts of these river basins greatly affect stream flows and the character of our rivers. All these things must be known if we are to make most effective use of our rivers, large and small. Maps of all kinds, especially topographic maps which show elevations of all streams, mountains and plains, are a valuable aid in studying our rivers.

Information on these subjects is contained in the water-supply papers and topographic maps of the Geological Survey, available in major libraries. A list is available on request to the Director, Geological Survey, Washington 25, D. C. This report was arranged by W. B. Langbein and G. E. Harbeck, Jr., with the assistance of other members of the staff of the Geological Survey.

Table 2.-Large rivers in the United States in order of average discharge at mouth
(First order tributaries marked T, second order tributaries marked TT)

Rank	River	Length (miles)	Drainage area (square miles)	Average discharge (1921-45) (cubic feet per second)	Most distant source	Mouth
1	Mississippi	a3,892	1,243,700	b620,000	Source of Red Rock River, Mont.	Gulf of Mexico.
2	Ohio (T)	1,306	203,900	255,000	Potter Co., Pa.	Mississippi River.
3	Columbia	1,214	258,200	235,000	Columbia Lake, B.C.	Pacific Ocean.
4	St. Lawrence	-	c302,000	c226,000	-	-
5	Mississippi above Missouri River (T)	1,170	171,600	91,300	Lake Itasca, Minn.	Confluence with Missouri River.
6	Missouri (T)	2,714	529,400	70,100	Source of Red Rock River, Mont.	Mississippi River.
7	Tennessee (TT)	900	40,600	63,700	SW Virginia	Ohio River.
8	Mobile	758	42,300	59,000	NW Georgia	Mobile Bay.
9	Red (T)	1,300	d91,400	d57,300	Eastern edge of New Mexico	Mississippi River.
10	Arkansas (T)	1,450	160,500	45,200	Lake Co., Colo.	Do.
11	Snake (T)	1,038	109,000	44,500	Ocean Plateau, Teton Co., Wyo.	Columbia River.
12	Susquehanna	444	27,570	35,800	Otsego Lake, Otsego Co., N. Y.	Chesapeake Bay.
13	Alabama (T)	720	22,600	31,600	Jacks Creek, NW Georgia	Mobile River.
14	White (T)	690	28,000	-	Madison Co., Ark.	Mississippi River.
15	Willamette (T)	270	11,250	30,700	Tumblebug Creek, Douglas Co., Oreg.	Columbia River.
16	Wabash (TT)	475	33,150	30,400	Darke Co., Ohio	Ohio River.
17	Cumberland (TT)	720	18,080	27,800	Poor Fork, Letcher Co., Ky.	Do.
18	Illinois (T)	420	27,900	27,400	Source of Kankakee River, Joseph Co., Ind.	Mississippi River.
19	Tombigbee (T)	525	19,500	27,000	NE. Mississippi	Mobile River.
20	Sacramento	382	e27,100	-	Siskiyou Co., Calif.	Suisan Bay.
21	Apalachicola	500	19,500	25,000	Towns Co., Ga.	Gulf of Mexico.
22	Pend Oreille (T)	490	25,820	24,600	Near Butte, Mont.	Columbia River.
23	Colorado	f1,360	f242,900	-	Rocky Mountain National Park, Colo.	-
24	Hudson	306	13,370	21,500	Essex Co., N.Y.	Upper New York Bay.
25	Allegheny (TT)	325	11,700	19,200	Potter Co., Pa.	Ohio River.
26	Delaware	g390	g12,300	19,000	Source of West Branch, Schoharie Co., N. Y.	Delaware Bay.

a The length from mouth to source of Mississippi River in Minnesota is 2,350 miles.

b About 25 percent of the flow occurs in the Atchafalaya River.

c At international boundary, lat. 45°.

d Flow of Ouachita River has been added.

e About.

f At Arizona-Sonora boundary; natural flow not accurately known because of large depletions for irrigation.

g At Deepwater Point on Delaware Bay.

The following rivers, mainly in the Southwest, have large drainage areas but relatively low average flows. They are listed according to drainage area, and are believed to discharge less than 10,000 cfs. Colorado River above its junction with Green River in Utah is believed to be the largest in the group on a flow basis.

	Square miles		Square miles
Rio Grande.....	171,585	Green River (Utah-Wyo.).....	44,400
Platte River.....	90,000	Colorado River (Texas).....	41,500
Kansas River.....	61,300	Pecos River.....	38,300
Gila River.....	58,100	Canadian River.....	29,700
Brazos River.....	44,500	Colorado River (above Green River)...	26,500

Yukon River, which rises in Canada and flows through Alaska to the Bering Sea, is estimated to have an average flow of about 150,000 cubic feet per second. It is about 2,300 miles long and drains an area of about 330,000 square miles.

