

AVERAGE FLOW OF MAJOR STREAMS IN FLORIDA

by
W. E. Kenner, E. R. Hampton, and C. S. Conover

Prepared by
UNITED STATES GEOLOGICAL SURVEY
in cooperation with the
BUREAU OF GEOLOGY
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1969

The flow of streams varies daily, seasonally, and from year to year, depending upon the weather and climate. Because of these variations, determination of a fairly reliable average flow requires at least a 5 year record of flow. The degree of reliability of the average increases with the length of record used; about 30 years of record is considered sufficient for most natural streams.

In Florida a major stream (as used in this study) is one that has an average flow of at least 1,000 cfs (cubic feet per second), equivalent to 646 mgd (million gallons a day) or 1,983 acre-feet a day. Defined thusly and based on estimated flows at mouths or outlets, Florida has 11 major streams.

The average flow of major streams in Florida is shown on the attached map by the blue overprint. Average flow is for the period of record prior to September 30, 1967, which is generally 25 or more years for each stream. The flow of some smaller streams is also shown in order to better portray the areal range of average flow. Flows of the larger canals in southern Florida also have been depicted, though usually the canals are not classed as streams, and their flow is regulated.

The average flow of a stream depends on size of drainage basin, topography, climate, geology, and land development. In general, the drainage basins in northern Florida are large compared with those in southern Florida; topographic relief is greater, evaporation rate is lower, lakes are fewer, and the land is developed to a lesser degree. In general, therefore, average flow of streams in northern Florida is greater than that for streams in southern Florida. Four of Florida's five largest streams are in northern Florida. They are the Apalachicola, Suwannee, Choctawhatchee, and Escambia Rivers. The third largest stream, the St. Johns River, drains both southern and northern Florida. Except for the St. Johns River, all five of the largest rivers derive flow from beyond the borders of Florida.

Florida's largest stream, the Apalachicola River, is formed by the confluence of the Flint and Chattahoochee Rivers at the Georgia-Florida line. The Apalachicola River drains 19,600 square miles, of which 17,200 square miles are in Alabama and Georgia and 2,400 square miles in Florida. At the Florida line the average flow of the Apalachicola River is 22,000 cubic feet per second, or about 14,000 mgd. Jim Woodruff Dam, at the Georgia-Florida line, impounds the river to form Lake Seminole (about 37,500 acres). Other large reservoirs upstream include Lake Sidney Lanier and Lake Harding in Georgia. At the Gulf of Mexico the average flow of the Apalachicola River is about 16,000 mgd.

The Chipola River is the largest of the Florida tributaries to the Apalachicola River. The average flow of the Chipola River near Altha is 980 mgd.

The Suwannee River, which drains about 10,000 square miles, is the second largest river in Florida. The Suwannee River heads in the Okefenokee Swamp of southern Georgia and flows southward to the Gulf of Mexico. At the Georgia-Florida line the flow averages about 1,000 mgd and increases rapidly downstream because of contributions from the numerous springs. The Suwannee River has two main tributaries, the Withlacoochee and the Santa Fe Rivers. The Withlacoochee River drains about 2,300 square miles in Florida and southern Georgia and adds about 1,100 mgd to the flow of the Suwannee. The Santa Fe River drains about 1,600 square miles in northern Florida and adds about 1,500 mgd. The Santa Fe River is unusual because the river enters the ground near Oleno State Park and emerges about three miles downstream to continue its course as a surface stream. The average flow of the Suwannee River, at its mouth, is about 11,000 mgd.

Large springs that flow into the Suwannee River or its tributaries include White Springs, Suwannee Springs, Troy Spring, Ichatucknee Spring, Rock Bluff Spring, Fannin Spring, and Manatee Spring. Four of these springs—Troy, Ichatucknee, Fannin and Manatee, are first magnitude springs with flows averaging at least 100 mgd, and together discharge an average of about 500 mgd to the Suwannee.

The St. Johns River, the third largest river in the state, heads in the marshes west of Vero Beach and meanders northward 275 miles, roughly paralleling the east coast and flowing into the

Atlantic Ocean east of Jacksonville. Its principal tributary is the Ocklawaha River, which has an average flow of 1,400 mgd and drains nearly 2,900 square miles in the northeastern part of the peninsula. The St. Johns drains about 9,400 square miles and its average flow exceeds 3,700 mgd.

The main stem of the St. Johns River connects several large lakes, which, in downstream order, are Lakes Washington, Poinsett, Harney, Monroe, Beresford, Dexter, and Lake George. The major tributary, the Ocklawaha River, also has large tributary and channel lakes, including Lakes Apopka, Dora, Eustis, Louisa, Minnehaha, Harris, Griffin, Orange, and Lochloosa.

The Choctawhatchee River is the fourth largest stream in the state. With headwaters in southeastern Alabama it enters Florida near Graceville and flows southwestward into Choctawhatchee Bay at the Gulf. It drains about 4,600 square miles, of which about 3,100 square miles are in Alabama and 1,500 square miles are in Florida. At Caryville, 15 miles south of the state line, the average flow of the Choctawhatchee River is about 3,500 mgd; at its mouth the average flow exceeds 4,500 mgd.

The major tributaries to the Choctawhatchee River in Florida include Wrights Creek, Sandy Creek, Holmes Creek, and Pine Log Creek. Holmes Creek, the largest, has an average flow of 40 million gallons a day.

The Escambia River in extreme northwestern Florida is the fifth largest stream in the state. Escambia Creek and the Conecuh River join a few miles south of the Alabama-Florida line to form the Escambia River, which flows southward into Pensacola Bay. The river forms the boundary between Escambia and Santa Rosa counties. The Escambia River and its tributaries drain 3,760 square miles in Alabama and 440 square miles in Florida. The average flow of the Escambia River at the mouth exceeds 4,000 million gallons a day. Pine Barren Creek and Canoe Creek are two of the largest tributaries to the Escambia in Florida.

In central peninsular Florida the largest stream is the Kissimmee River. With headwaters in southern Orange County, it flows southward and empties into Lake Okeechobee. It drains approximately 3,000 square miles and has an average flow of about 1,500 mgd. Included among the large lakes in the Kissimmee River basin are Lakes East Tohopekaliga, Tohopekaliga, Hatchineha, Weohyakapka, and Kissimmee, which lie in the upper part, and Lakes Jackson, Istokpoga, June-in-Winter, and Placid, which lie in the lower part.

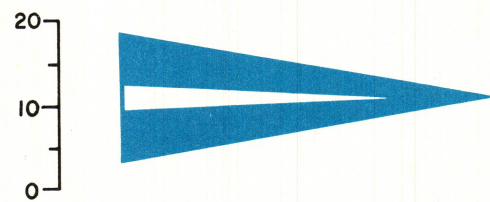
Other large streams in central Florida include the Withlacoochee River, the Hillsborough River, and the Peace River. The Withlacoochee River drains about 2,000 square miles and flows northwestward from headwaters in the Green Swamp area into the Gulf of Mexico near Yankeetown. The average flow at the mouth of the Withlacoochee River is about 1,300 mgd. The Hillsborough and Peace Rivers also have headwaters in the Green Swamp area. The Hillsborough River, which flows westward into Tampa Bay, drains about 690 square miles and has an average discharge at the mouth of about 460 mgd. The Peace River flows southward into Charlotte Harbor. The average flow of the Peace River, which drains about 2,400 square miles, is about 1,400 mgd.

In southern Florida, streams for the most part are poorly developed and most of the drainage is through a system of canals that have been expanded and improved to relieve high water conditions as the area has grown in population. Two of the larger canals in the area, the St. Lucie Canal (average discharge 1951-66, about 800 mgd) and the Caloosahatchee Canal (average discharge 1938-66, about 700 mgd), drain excess water from Lake Okeechobee, and together with the lake form a navigable cross-state waterway. The discharge of the Caloosahatchee River at the mouth is probably twice that of the canal, which carries only flow from Lake Okeechobee. Other important canals in southern Florida include the West Palm Beach Canal, the Hillsboro Canal, the North New River Canal, and the Miami Canal, which discharge, on the average, 600, 250, 350, and 350 mgd, respectively, to the ocean. In southernmost Florida the Tamiami Trail outlets discharge an average of about 700 mgd southward and westward toward the Gulf of Mexico.

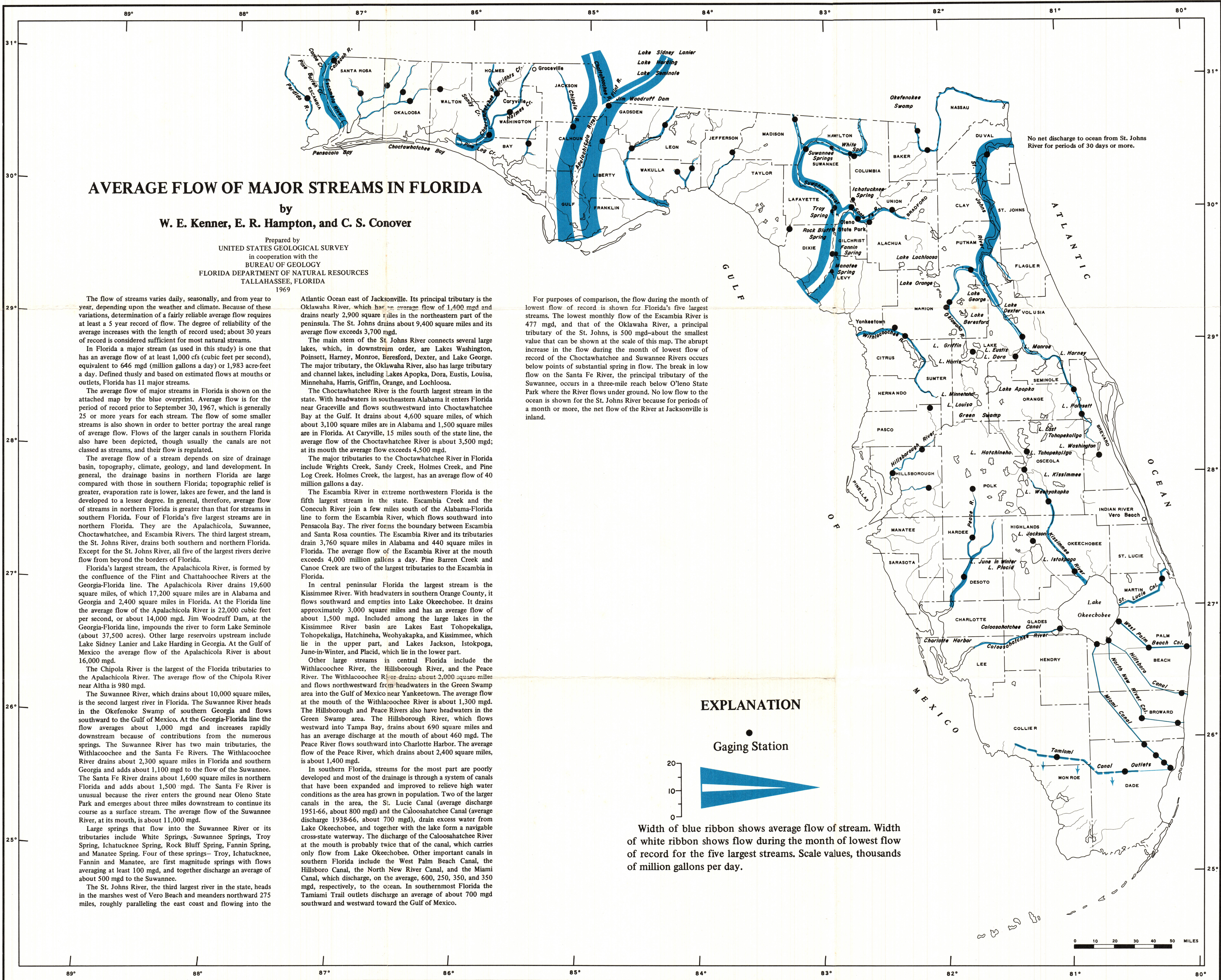
For purposes of comparison, the flow during the month of lowest flow of record is shown for Florida's five largest streams. The lowest monthly flow of the Escambia River is 477 mgd, and that of the Ocklawaha River, a principal tributary of the St. Johns, is 500 mgd—about the smallest value that can be shown at the scale of this map. The abrupt increase in the flow during the month of lowest flow of record of the Choctawhatchee and Suwannee Rivers occurs below points of substantial spring in flow. The break in low flow on the Santa Fe River, the principal tributary of the Suwannee, occurs in a three-mile reach below Oleno State Park where the River flows under ground. No low flow to the ocean is shown for the St. Johns River because for periods of a month or more, the net flow of the River at Jacksonville is inland.

EXPLANATION

Gaging Station



Width of blue ribbon shows average flow of stream. Width of white ribbon shows flow during the month of lowest flow of record for the five largest streams. Scale values, thousands of million gallons per day.



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DEPARTMENT OF NATURAL RESOURCES
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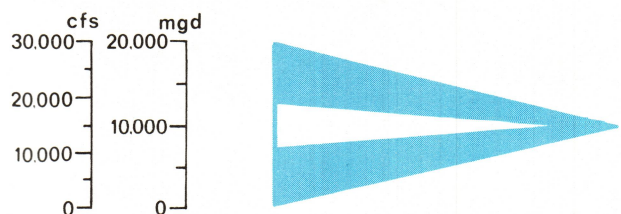
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