

# Streamflow of 2016—Water Year Summary

## Introduction

The maps and graphs in this summary describe national streamflow conditions for water year 2016 (October 1, 2015, to September 30, 2016) in the context of streamflow ranks relative to the 87-year period of 1930–2016, unless otherwise noted. The illustrations are based on observed data from the U.S. Geological Survey’s (USGS) National Streamflow Network (U.S. Geological Survey, 2017a). The period of 1930–2016 was used because the number of streamgages before 1930 was too small to provide representative data for computing statistics for most regions of the country.

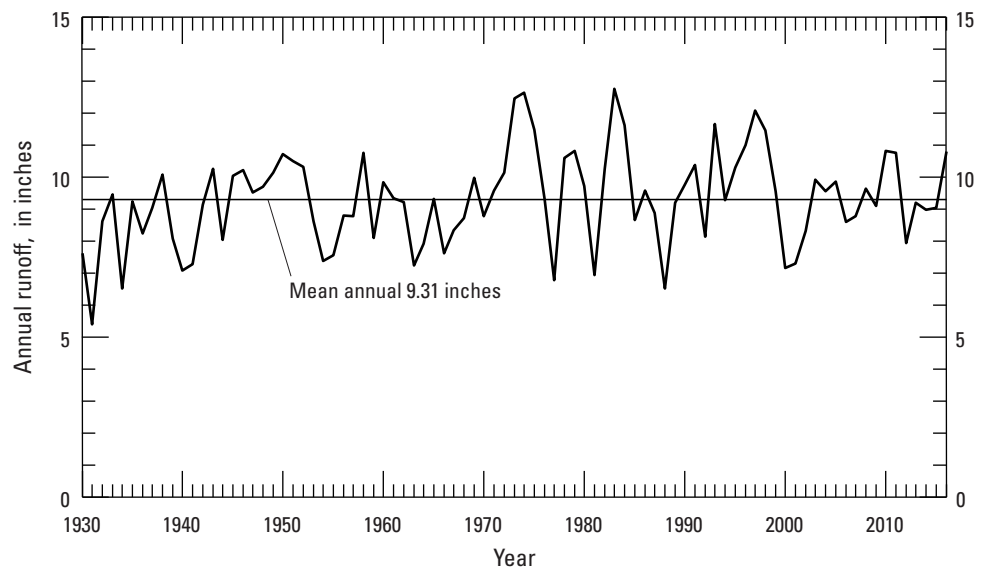
In the summary, reference is made to the term “runoff,” which is the depth to which a river basin, State, or other geographic area would be covered with water if all the

streamflow within the area during a specified period was uniformly distributed on it. Runoff quantifies the magnitude of water flowing through the Nation’s rivers and streams in measurement units that can be compared from one area to another.

In all the graphics, a rank of 1 indicates the highest flow of all years analyzed and 87 indicates the lowest flow of all years. Rankings of streamflow are grouped into much below normal, below normal, normal, above normal, and much above normal based on percentiles of flow (less than 10 percent, 10–24 percent, 25–75 percent, 76–90 percent, and greater than 90 percent, respectively; U.S. Geological Survey, 2017b). Some of the data used to produce the maps and graphs are provisional and subject to change.

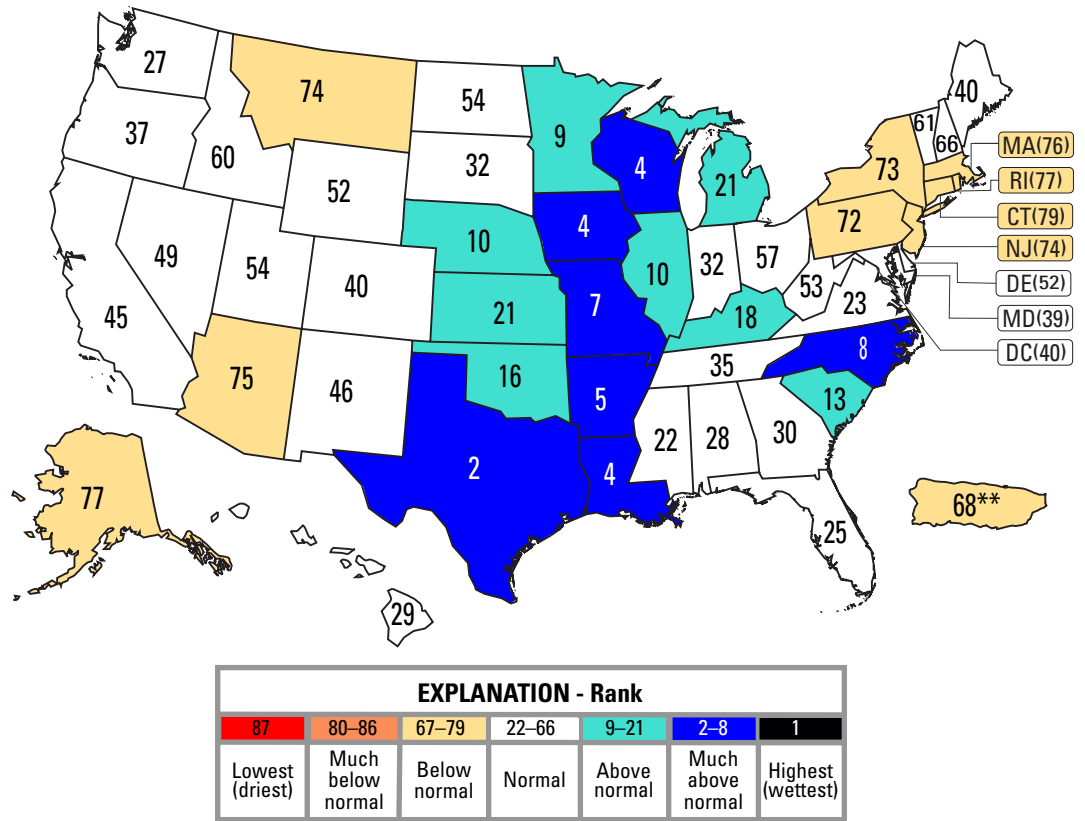
## National Overview

Average runoff in the Nation’s rivers and streams during water year 2016 (10.81 inches) was higher than the long-term (1930–2016) mean annual runoff of 9.31 inches for the contiguous United States (fig. 1). Nationwide, the 2016 streamflow ranked 12th highest out of the 87 years in 1930–2016. Note that in some previous water year summaries (before 2011) prepared by the USGS, the median runoff, not the average runoff, was compared among periods.



**Figure 1.** Annual runoff in the United States, 1930–2016.

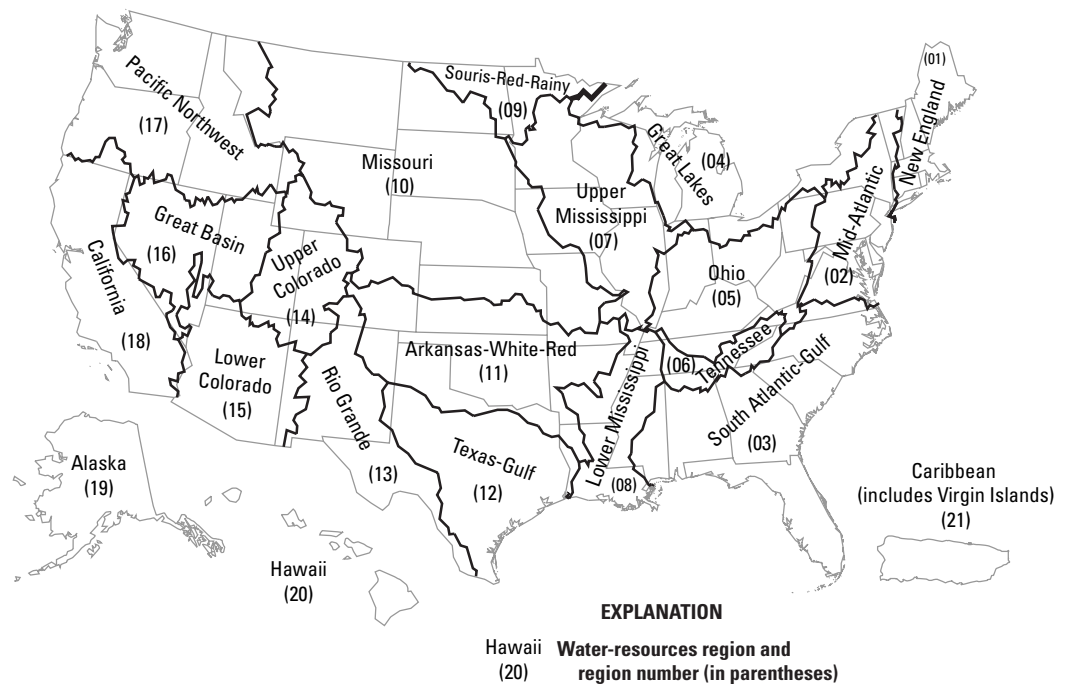
Streamflow levels were below normal in Connecticut, Rhode Island, Alaska, Massachusetts, Arizona, New Jersey, Montana, New York, Pennsylvania, and Puerto Rico–Virgin Islands (fig. 2). Streamflow was above normal in Michigan, Kansas, Kentucky, Oklahoma, South Carolina, Illinois, Nebraska, and Minnesota. Streamflow was much above normal in North Carolina, Missouri, Arkansas, Wisconsin, Louisiana, Iowa, and Texas. Most States had streamflow in the normal range.



**Figure 2.** Statewide streamflow ranks of the United States for 2016 relative to 1930–2016 mean annual streamflow. [\*\*For Puerto Rico–Virgin Islands, 73 years of available data were used and the rank was adjusted accordingly.]

## Regional Patterns

The United States (including Puerto Rico–Virgin Islands and the District of Columbia) is divided into 21 large drainages, or water-resources regions (fig. 3). These water-resources regions are based on surface topography and contain the drainage area of a major river, such as the Columbia River; the combined drainage areas of a series of rivers, such as the Texas-Gulf region, which includes several rivers draining into the Gulf of Mexico; or the area of an island or island group. Water-resources regions provide a coherent, watershed-based framework for depicting streamflow variations.

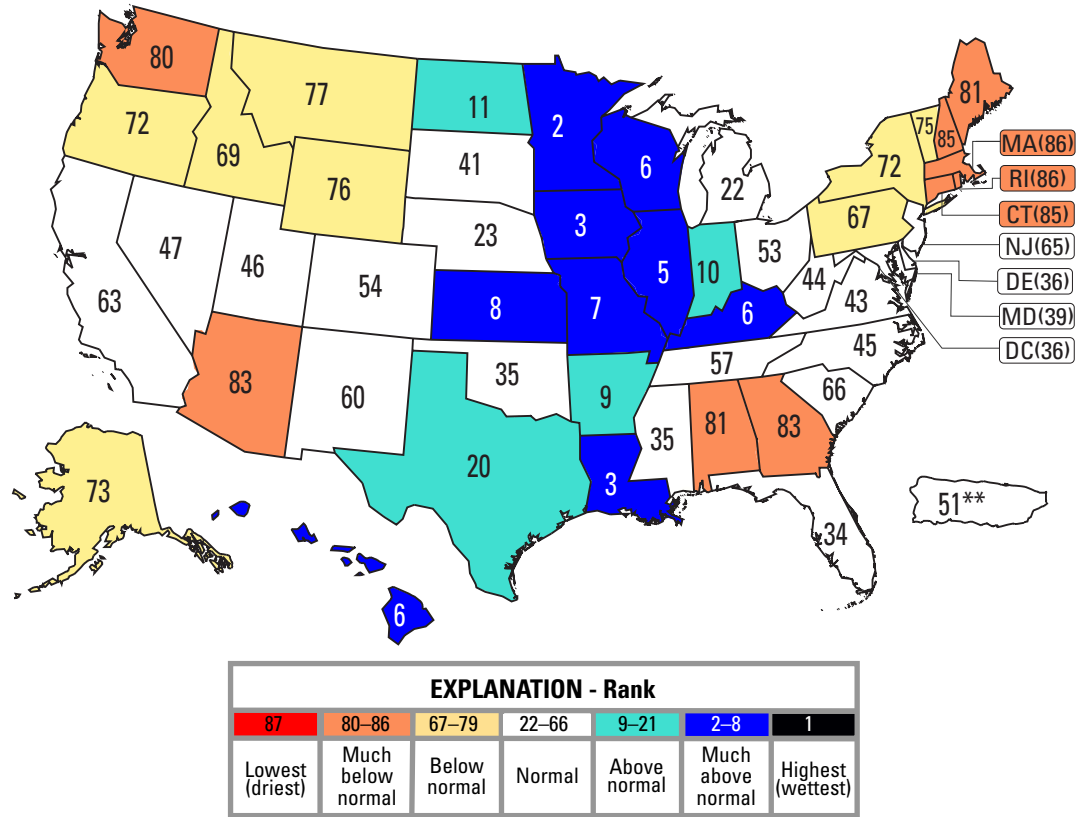


**Figure 3.** Water-resources regions of the United States.





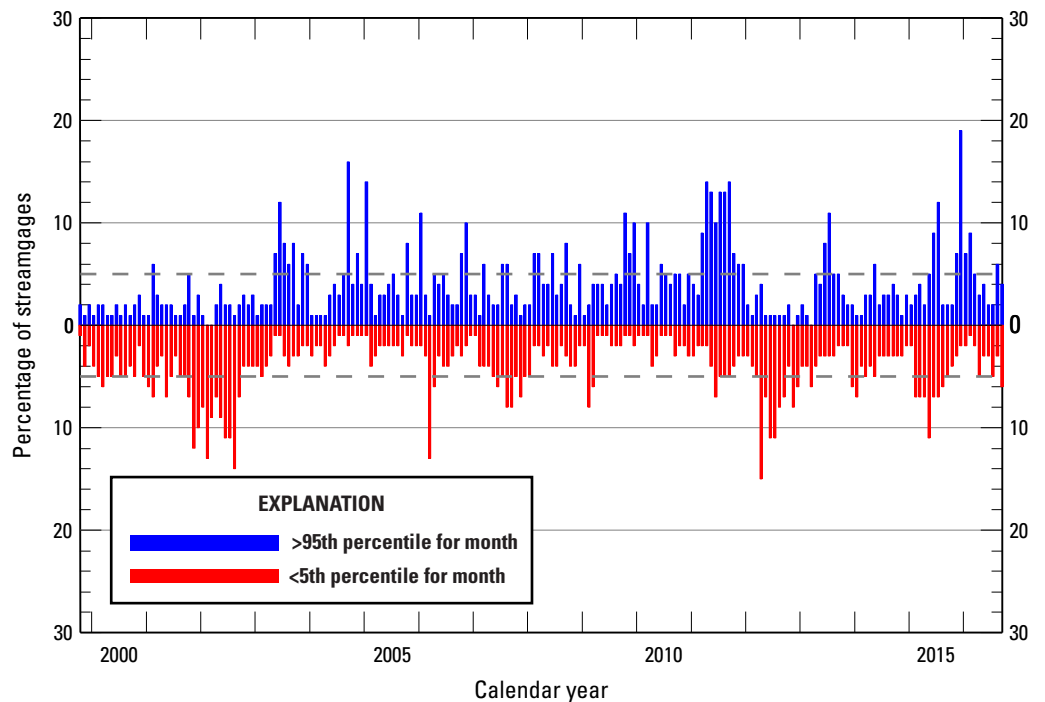
Summer (July–September) streamflows were much below normal in Massachusetts, Rhode Island, Connecticut, New Hampshire, Arizona, Georgia, Alabama, Maine, and Washington (fig. 8). Below normal streamflows were reported in Montana, Wyoming, Vermont, Alaska, New York, Oregon, Idaho, and Pennsylvania. Above normal streamflows were observed in Texas, North Dakota, Indiana, and Arkansas. Much above normal streamflows were reported in Kansas, Missouri, Hawaii, Wisconsin, Kentucky, Illinois, Iowa, Louisiana, and Minnesota. Nationwide, summer-season streamflow ranked 32nd highest out of 87 years.



**Figure 8.** Summer (July–September) statewide ranks in the United States relative to 1930–2016 mean annual streamflow. [\*\*For Puerto Rico–Virgin Islands, 73 years of available data were used and the rank was adjusted accordingly.]

## High and Low Flows

In any given month, it is expected that the average streamflow at 5 percent of the streamgages will be very high (greater than 95th percentile) and 5 percent will be very low (less than the 5th percentile). The percentages of streamgages reporting very high streamflow in November, December, January, February, and August of water year 2016 were higher than expected (7, 19, 7, 9, and 6 percent, respectively; fig. 9). In contrast, there was only one month (September) during which percentages of streamgages reporting very low flows were greater than expected (6 percent).



**Figure 9.** Percentage of streamgages with very high and very low monthly streamflow, October 1999–September 2016.

## Additional Information

The USGS operated a nationwide network of more than 8,200 streamgages in 2016, and almost all streamgages are operated in real time. Current (2017) information derived from these stations is available at <https://waterwatch.usgs.gov>. Tables of data that summarize historical streamflow conditions by State, expressed as runoff, beginning in water year 1901, can be accessed at <https://waterwatch.usgs.gov/?id=statesum>. These tables are updated every few months to reflect the most current streamflow data.

The streamflow information used to prepare this summary is also used for water management, flood and drought monitoring, bridge design, and for several recreational activities. To obtain real-time and archived streamflow data and information, visit <https://waterdata.usgs.gov/nwis>. The National Streamflow Network, which is part of the Groundwater and Streamflow Information Program (GWSIP), is operated primarily by the USGS; however, funding for network operation is provided by the USGS and approximately 850 Federal, State, tribal, regional, and local partners. For more information on this network and the GWSIP, visit <https://www.usgs.gov/science/mission-areas/water/groundwater-and-streamflow-information>.

## References

- U.S. Geological Survey, 2017a, Groundwater and streamflow information program: U.S. Geological Survey National Streamflow Network, accessed June 2017, at <https://www.usgs.gov/science/mission-areas/water/groundwater-and-streamflow-information>.
- U.S. Geological Survey, 2017b, Map of real-time streamflow compared to historical streamflow for the day of the year (United States): U.S. Geological Survey WaterWatch, accessed June 2017, at [https://waterwatch.usgs.gov/?id=ww\\_current](https://waterwatch.usgs.gov/?id=ww_current).

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