

The Continuous-Record Streamflow Data-Collection Program in Maine



U.S. Department of the Interior—U.S. Geological Survey

Introduction

As recent events, such as the flood of April 1987 or the drought of 1995 have shown, the water resources of Maine play a critical role in the lives of Maine's citizens. The effects of too much or too little water can be devastating, both economically and personally, if not adequately planned for. In addition, day-to-day activities such as canoeing, fishing, generating hydropower, providing drinking water, and making paper show the importance of water to the well-being of the State.

Since 1901, the U.S. Geological Survey (USGS) has maintained the only statewide program of continuous-record stream-gaging stations in Maine. This program, part of a national network of stream-gaging stations, fulfills an important part of the mission of the USGS and

is critical to the long-term management of the surface-water resources of Maine. The data these stations provide are used in countless water-resources related decisions each year.

History

The first stream-gaging station operated in the United States by the USGS was established in 1889 on the Rio Grande near Embudo, New Mexico. In Maine, the USGS began publishing streamflow data collected by private dam operators as early as 1898. The USGS stream-gaging program in Maine began with the installation of a vertical rod on a bridge across the Kennebec River at The Forks on September 28, 1901 by Nathan C. Grover. Mr. Grover was then a professor of civil engineering at the University of Maine at Orono, but later became head

of the Water Resources Branch (now the Water Resources Division) of the USGS. This gage was read twice daily by local resident William W. Young (Newell, 1903). Four additional gaging stations were established by Grover that year.

By 1912, the USGS was operating 17 stream-gaging stations in Maine, all of which were read one or more times daily by cooperative observers. In December 1912, the first automatic recorder was installed on the Penobscot River at West Enfield. In 1972, the first satellite transmitter, which allowed for near real-time monitoring of streamflow, was installed in the station on the St. John River at Fort Kent.

The number of stations in the program rose steadily from 1901 until 1979, when 61 stations were operated. Since 1979, the number of stations has declined, primarily as a result of budget cuts.

Current Status

The stream-gaging program in Maine currently consists of 43 stations (fig. 1), which have an average record length of 59 years. Twenty-seven stations have record lengths of more than 50 years. Five stations have been established within the last 10 years.

The USGS stream-gaging program in Maine does not consist of a single network of stations, but is an aggregation of several networks, each with its own purpose. Funding for the program reflects those different purposes in that it does not come from one source, but from a variety of Federal, State, and local agencies. The 43 stations currently in the program can be divided into the following networks:

- **The USGS Federal-State Cooperative Program Stations-** This network of long-term hydrologic-data stations forms the backbone of the data-collection program in Maine and is funded equally by the USGS and the

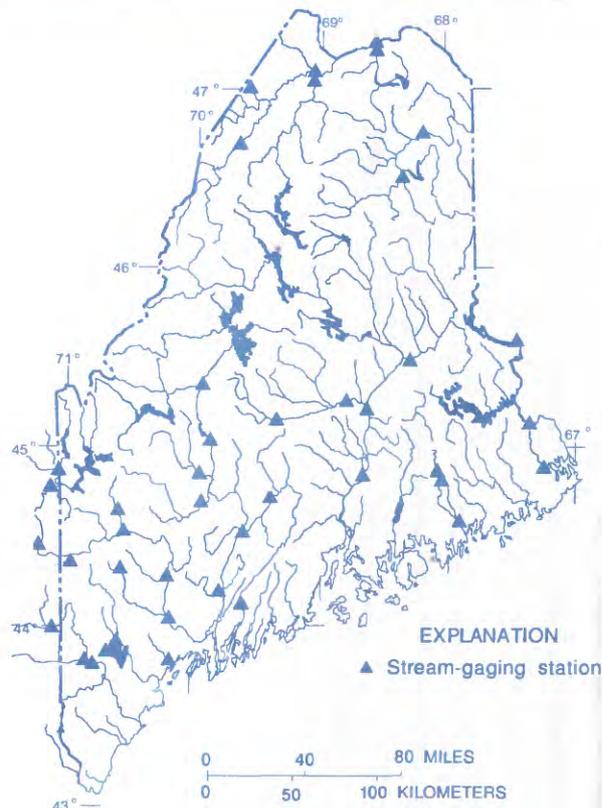


Figure 1. The Maine continuous-record streamflow data collection network, 1996.

Maine Departments of Conservation and Transportation. Twenty stations are fully funded and two are partially funded through this program.

- **Federal Energy Regulatory Commission Stations** - These stations, funded by hydropower licensees of the Federal Energy Regulatory Commission, monitor streamflow downstream from hydropower projects throughout Maine. Ten stations are fully funded and two are partially funded through this program.

- **International Gaging Stations** - Stations in this network, which was established by the International Joint Commission, monitor streamflow on waters shared by the United States and Canada. The network includes three stations in Maine.

- **USGS Stations** - Four long-term hydrologic index stations in the State are fully funded by direct USGS appropriations.

- **Other Stations** - The remaining four stations in Maine are operated as part of site-specific research projects.

In addition to being part of the above networks, each station may also serve the needs of other State or Federal networks. For instance, 13 stations in Maine are used by the National Weather Service as official flood forecast points.

Uses of Streamflow Data

The USGS stream-gaging program is unique in providing a source of continuous, unbiased, reliable data, collected using consistent national standards. The following eight categories summarize some of the major uses of the data in Maine (Thomas and Wahl, 1993):

- Forecasting floods and droughts
- Estimating flow characteristics at sites without stream-gaging information
- Operation of reservoirs and wastewater treatment plants
- Monitoring and analysis of hydrologic systems
- Water-quality monitoring

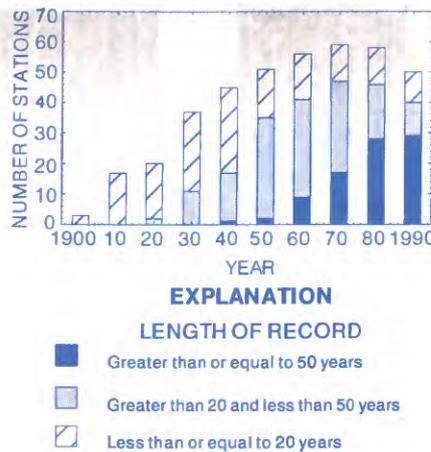


Figure 2. Number of active stations in the Maine stream-gaging program at start of each decade, 1900-90.

- Design of bridges, culverts, dams, and other structures
- Research, such as for projects studying ice jams or long term climatic trends
- Monitoring of river flow for recreational uses, such as canoeing and fishing.

Data collected at an individual station are commonly used for multiple purposes, many of which may be beyond the original purpose for establishing the station. Because of the nationally consistent standards used by the USGS in the data collection and compilation process, data for stations in Maine can be used in conjunction with data from stations in other states in studies of regional or national application and importance.

Dissemination of Data

Daily-streamflow data for stream-gaging stations in Maine are published annually in the USGS report series entitled "Water Resources Data - Maine." Each volume in the series contains the data for one water year (October 1 through September 30). Because of the effort involved in compiling and reviewing the data prior to publication, each volume normally is distributed 6-8 months after the end of each water year. For users involved in decisions that require more timely data, provisional records are made available.

Satellite telemetered data, which is available for every stream-gaging station in Maine, is an important source of near real-time streamflow information. These

data are critical to the needs of many water resources managers throughout the State, particularly in the flood forecasting and response duties of the National Weather Service and the Maine Emergency Management Agency. Satellite telemetered data also allows USGS personnel to monitor station operations.

Data collected by the USGS are available in the national Water Data Storage and Retrieval System (WATSTORE). The number of active stations in the WATSTORE data base for Maine at the start of each decade from 1900-90 is shown in figure 2. Included are stations run by dam operators whose data have been published by the USGS.

Historical daily-streamflow data are available for Maine and other states from the USGS on the World Wide Web. These data can be accessed through the USGS "Home Page" address listed at the end of this Fact Sheet. In the near future, it is also planned to make near real-time streamflow data for Maine available on the World Wide Web as well.

References

Newell, F.H., 1903, Report of progress of stream measurements for the calendar year 1902: U.S. Geological Survey Water Supply Paper 82, p. 26.

Thomas, W.O., Jr., and Wahl, K.L., 1993, Summary of the nationwide analysis of the cost effectiveness of the U.S. Geological Survey stream-gaging program (1983-1988): U.S. Geological Survey Water Resources Investigations Report 93-4168, 27p.

—Joseph P. Nielsen

For More Information, Contact:

District Chief
U.S. Geological Survey
26 Ganneston Drive
Augusta ME 04330
(207) 622-8201
(207) 622-8204 (FAX)
dc_me@usgs.gov (email)

USGS "Home Page":

<http://www.usgs.gov>