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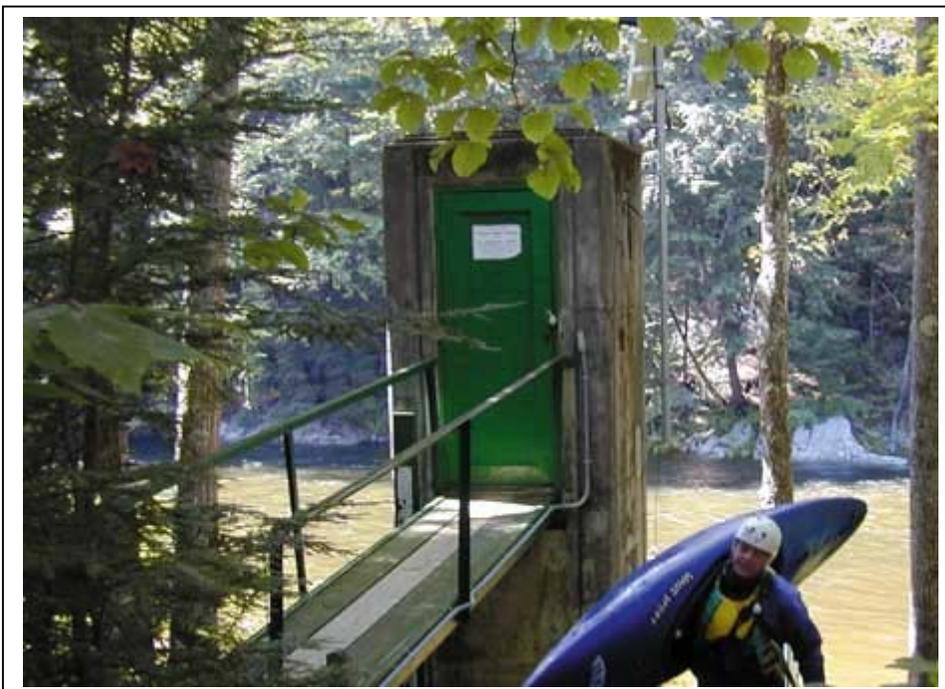
River Monitoring Makes for Better Paddling Trips

Compiled By Jeffrey R. Deacon, Richard G. Kiah, and Michael J. Brayton

All compilers are USGS hydrologists in the New Hampshire/Vermont District who kayak, canoe, and (or) fish for recreation in New England rivers.

For more than 100 years, scientists have been measuring and recording the flow of water in the Nation's rivers. The United States Geological Survey (USGS) is the principal Federal agency providing water information needed to manage the Nation's water resources. In 2001, more than 7,000 streamgages were operated and maintained by the USGS on rivers and streams across the United States. In New Hampshire and Vermont, streamflow is monitored continuously at 97 locations by the USGS. Streamflow information is used by Federal and State agencies for a number of purposes including (1) forecasting floods and droughts (2) managing and operating dams and reservoirs, and (3) protecting water quality. The information is also useful for recreational purposes by kayakers, canoeists, rafters, and fisherman.

The USGS streamgaging network provides information that can make for safer and more enjoyable outings for river recreationists. River sports enthusiasts always want to know the "conditions" of the river when planning an outing. Streamflow data obtained and evaluated before a river trip can prevent the disappointment and loss



of time associated with a long drive to a favorite spot, only to find it unwadeable for fishing or too low for a canoe trip. On the other hand, an adventurous canoeist may be willing to travel farther for a river outing, knowing that flow conditions on their favorite river are optimal. By using available information on current river flow, recreationists can plan safe trips to match the conditions of the water or to match their own abilities or skill levels.

Kayaker "taking out" by a USGS streamgage on the West River at Jamaica, Vermont as part of the West River release event every fall.



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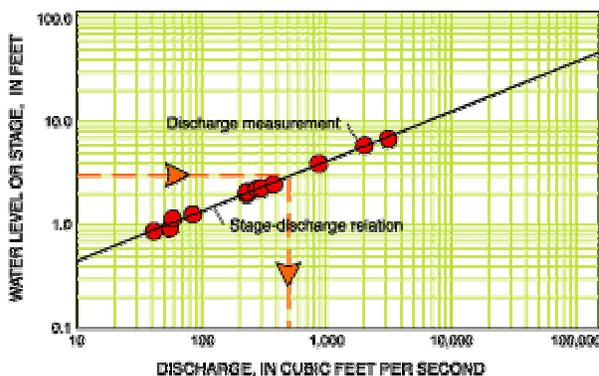
How are Streamflow Data Collected?

Streamflow data are most commonly collected by the USGS at a streamgage along a river or stream. A streamgage house is constructed to hold equipment that measures and records the height of the water surface (stage or gage height). Stage and discharge (the rate water is flowing, reported as cubic feet per second or ft^3/s) are the most common ways that streamflow data are presented. The use of stage alone, however, can be misleading. Stage refers to the water-surface elevation above a fixed reference point near the streamgage. Stage readings are unique to each streamgaging site and may not correspond directly to water depth. Never assume a stage reading is the equivalent of the distance between the water's surface and the streambed. Discharge is a more reliable indicator of the conditions that river recreationists will encounter. The discharge of the river is determined by measuring the width, depth, and the velocity of the stream. To make a discharge measurement, streamgagers will often wade across small streams or larger streams at low flow. At high flow conditions or on larger rivers, measurements are usually made from boats, cableway cars, or bridges.



Amy Wehnke, USGS hydrologic technician, wades into a stream to measure streamflow using a current meter. Sandy Ward, USGS hydrologic technician standing on the shore, records the streamflow data Amy is measuring.

Discharge values from each measurement are plotted on a graph against river stage recorded at the time of measurement to develop a stage-discharge relation, known as a rating curve, for each streamgage. A sample rating curve is shown in the graph below. In this rating curve, when stage is 3 feet, the corresponding discharge is $500 \text{ ft}^3/\text{s}$. By relating stage to rating curves, a continuous record of discharge can be maintained.



This graph shows an example of a stage-discharge relation, which is called a rating curve. The red arrow shows how to determine what the river discharge would be if the stage of the river is known.



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future trips to match the skill level of interest. “Learning the river” by examining conditions over a range of stages and discharges helps the user to visualize the entire flow regime of the river.

Using Streamflow Information

Streamflow information available on USGS Web sites also allows river recreationists to project likely conditions of the river over several days. For example, fishermen may be interested in knowing when it is safe to wade a river after flows decline following a heavy rain storm or snowmelt. By monitoring near-realtime hydrographs (a plot of discharge in relation to time) on the World Wide Web, fisherman can determine if the river flow is rising or falling and make more informed decisions on when it would be safe to wade the river. Paddlers who are interested in high flows can also monitor changing conditions to determine when the water is ideal for their skill level.

Streamflow data at certain streamgages can often be used as an index to determine the likely conditions on other nearby streams in the area. However, the recreationist must recognize that river drainage areas differ in size, elevations, and other characteristics. Generally, the farther away a streamgage is from the river reach of interest, the less reliable the data may be as an index. Also keep in mind that river systems change rapidly due to intense precipitation or the release of water from upstream dams. USGS realtime streamflow data on the Web is provisional and subject to change after verification and approval by USGS personnel. It is important for paddlers and fisherman to realize that streamgages can malfunction for a number of reasons, including equipment failure, ice jams, and vandalism. Although the USGS closely monitors the data for problems with the streamgage readings, recreationists should always “scout” river conditions carefully upon arrival as a safety precaution. When used properly, USGS streamflow information can greatly benefit river recreationists.

For further information or questions please contact:

Debra Foster, Outreach Coordinator, dhfoster@usgs.gov