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U.S. Geological Survey Streamgage Operation and Maintenance Cost Evaluation

...from the National Streamflow Information Program

This Fact-Sheet is one in a series that highlights information or recent research findings from the USGS National Streamflow Information Program (NSIP). The investigations and scientific results reported in this series require a nationally consistent streamgage network with stable long-term monitoring sites and a rigorous program of data collection, quality assurance, management, archiving, and synthesis. NSIP produces multipurpose, unbiased surface-water information that is readily accessible to all.

To help meet the goal of providing earth-science information to the Nation, the U.S. Geological Survey (USGS) operates and maintains the largest streamgage network in the world, with over 7,600 active streamgages in 2010. This network is operated in cooperation with over 850 Federal, tribal, State, and local funding partners. The streamflow information provided by the USGS is used for the protection of life and property; for the assessment, allocation, and management of water resources; for the design of roads, bridges, dams, and water works; for the delineation of flood plains; for the assessment and evaluation of habitat; for understanding the effects of land-use, water-use, and climate changes; for evaluation of water quality; and for recreational safety and enjoyment.

USGS streamgages are managed and operated to rigorous national standards, allowing analyses of data from streamgages in different areas and spanning long time periods, some with more than 100 years of data. About 90 percent of USGS streamgages provide streamflow information real-time on the web. Physical measurements of streamflow are made at streamgages multiple times a year, depending on flow conditions, to ensure the highest level of accuracy possible. In addition, multiple reviews and quality assurance checks are performed before the data is finalized.

In 2006, the USGS reviewed all activities, operations, equipment, support, and costs associated with operating and maintaining a streamgage program (Norris and others, 2008). A summary of the percentages of costs associated with activities required to operate a streamgage on an annual basis are presented in figure 1. This information represents what it costs to fund a "typical" USGS streamgage and how those funds are utilized. It should be noted that some USGS streamgages have higher percentages for some categories than do others depending on location and conditions. Forty-one percent of the funding for the typical USGS streamgage is for labor costs of the USGS staff responsible for the measurement of the streamflow in the field and the time in the office to quality assure and finalize the data (fig. 1). It is reasonable that funding for the entire national streamgage network would closely follow the percentages shown in figure 1 as to how the funds are invested in the network. However, actual costs are specific to a particular streamgage and can vary substantially depending on location and operational issues.

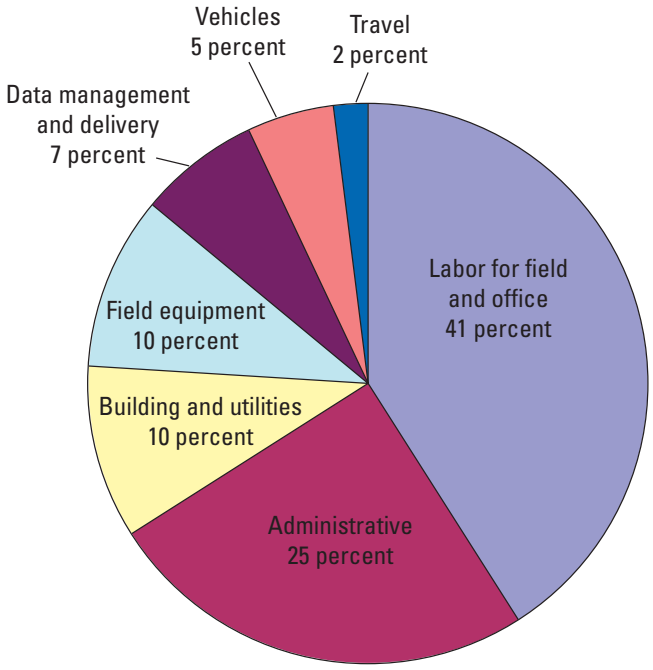

Figure 1. Percentage of operation and maintenance funding invested in various activities for a typical USGS streamgage.

Reference Cited

Norris and others, 2008, Qualitative comparison of streamflow information programs of the U.S. Geological Survey and three non-Federal agencies: U.S. Geological Survey Open-File Report 2007–1426, 12 p.

USGS Streamflow Information can be found at:

- *http://waterdata.usgs.gov/nwis*
- *http://water.usgs.gov/waterwatch*
- *http://water.usgs.gov/nsip*

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Streamgage Operation and Maintenance Tasks

Labor for Field and Office:

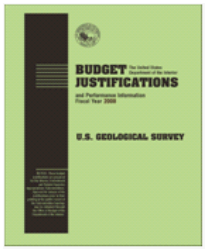
Field

- Routine visits to streamgages
- Emergency repair visits to streamgages
- Visits during flooding
- Maintenance and inspection visits
- Surveying visits
- Streamflow measurements
- Analysis of the discharge computations (field and office)
- Technical training

Office

- Stage data edits
- Development and maintenance of rating curves
- Analysis of rating curve-shifts from changing channel conditions
- Monitoring real-time information for instrumentation problems
- Review of records for rating-curve and discharge computations
- Quality assurance of the data
- Finalization and publication of the streamflow information
- Safety and administrative training

Administrative:



- Safety program management
- National and local management and technical oversight of the program
- Local quality assurance
- Facility costs
- Personnel management
- Purchasing and contracts
- Financial management
- Salary of hydrographers/supervisors
- Salary of administrative support required by the program
- Funding-partner interactions (over 850 nationwide)
- USGS communications (with Congress, the public, and media)
- Development of funding agreements

Building and Utilities:

- Secure storage space for files
- Vehicle parking space, boat storage
- Shop space, laboratory space, warehouse space

- Office space for the streamgage program staff
- Heating, cooling, trash, water, gas, and electric power for office space and streamgages

Field Equipment:

- Gage houses, data loggers, stage or velocity sensors, telemetry equipment, and other equipment for streamgage operation
- Boats and motors, boat maintenance, snowmobiles, all-terrain vehicles, and annual repair and maintenance costs
- Generators, survey equipment, field laptop computers, and hand and power tools
- Equipment for measuring streamflow (meters, Acoustic Doppler Current Profilers, bridge cranes, and automated loggers)
- Safety equipment such as traffic-control equipment and confined-space safety equipment
- Waders, personal floatation devices, and cell phone

Data Management and Delivery:

- Telemetry (satellite up-links, phone lines, etc.)

- Local Information Technology infrastructure, including servers, computers, printers, plotters, and scanners
- Information Technology support, support of the data base, Web access, data archival and retrieval, and network communications

Vehicles:

- Purchasing or leasing field vehicles
- Fuel and vehicle maintenance

Travel:

- Lodging and per diem for staff during visits to streamgages