

Tennessee StreamStats: A Web-Enabled Geographic Information System Application for Automating the Retrieval and Calculation of Streamflow Statistics

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The U.S. Geological Survey (USGS) provides streamflow and other stream-related information needed to protect people and property from floods, to plan and manage water resources, and to protect water quality in the streams. Streamflow statistics provided by the USGS, such as the 100-year flood and the 7-day 10-year low flow, frequently are used by engineers, land managers, biologists, and many others to help guide decisions in their everyday work. In addition to streamflow statistics, resource managers often need to know the physical and climatic characteristics (basin characteristics) of the drainage basins for locations of interest to help them understand the mechanisms that control water availability and water quality at these locations.

Users of stream information may require streamflow statistics and basin characteristics at any location along a stream. The USGS periodically calculates and publishes streamflow statistics and basin characteristics for streamflow data-collection sites such as gages and partial-record stations, but these data commonly are scattered among many reports that may not be readily available to the public. The USGS provides and periodically updates regional analyses of streamflow statistics which include regression equations and other prediction methods for estimating statistics for ungaged and unregulated streams across the State of Tennessee. Use of these prediction methods for a site can be complex and require the user to determine a number of basin characteristics that may require interpretation. The basin characteristics may include drainage area, classifiers for physical properties, climatic characteristics, and other inputs. Obtaining these input values for gaged and ungaged sites has traditionally been time consuming, subjective, and sometimes leads to inconsistent results.

StreamStats is a Web-enabled geographic information system (GIS) application that makes it easy for users to obtain streamflow statistics, basin characteristics, and other information for USGS data-collection stations and for ungaged sites of interest. If a user

selects the location of a data-collection station, StreamStats will provide previously published information for the station from a database. If a user selects a location where no data are available (an ungaged site), StreamStats will run a GIS program to delineate a drainage basin boundary, measure basin characteristics, and estimate streamflow statistics based on USGS streamflow prediction methods. A user can download a GIS feature class of the drainage basin boundary with attributes including the measured basin characteristics and streamflow estimates.

StreamStats consists of five major components: (1) a user interface (fig. 1) that displays maps and streamflow statistics based on user-selected stream locations, (2) a database containing available streamflow statistics and descriptive information for USGS data-collection stations, (3) a GIS database that stores base-map data needed for users to locate sites and stores other map data needed for determining basin characteristics, (4) an automated GIS process that determines drainage-basin boundaries for user-selected ungaged sites and determines basin

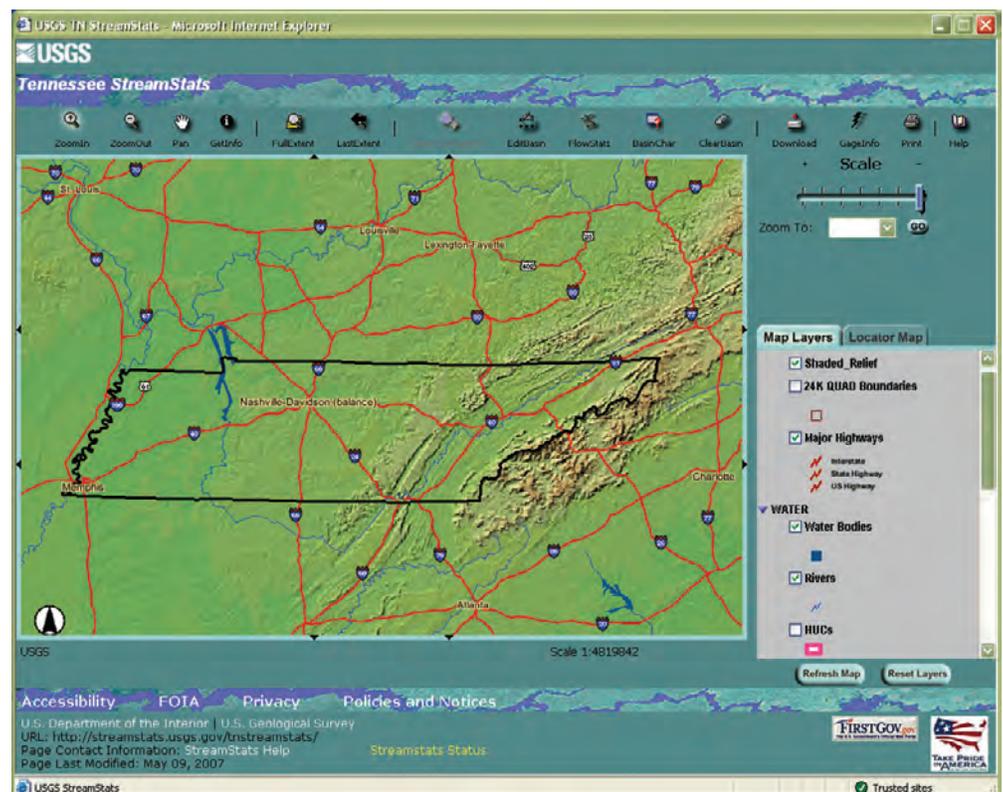


Figure 1. View of the Tennessee StreamStats user interface.

characteristics for those sites (fig. 2), and (5) an automated process that uses USGS streamflow prediction methods to estimate various streamflow statistics for gaged and ungaged sites based on basin characteristics (fig. 2).

StreamStats was designed for national implementation. However, since each State has its own unique streamflow prediction methods, separate applications are established for each State that implements StreamStats. Tennessee StreamStats provides stream-related information quickly and reliably without requiring users to have large investments in computer

hardware and software and without requiring advanced knowledge of computer science, geographic analysis, or hydrology. The application is intended to substantially reduce the effort and subjectivity involved in the calculation of streamflow statistics by the many different users across the State. The StreamStats application was developed cooperatively by the USGS and the Environmental Systems Research Institute, Inc. (ESRI). The development of StreamStats for Tennessee is a cooperative effort of the USGS and the Tennessee Departments of Environment and Conservation (TDEC) and Transportation (TDOT).

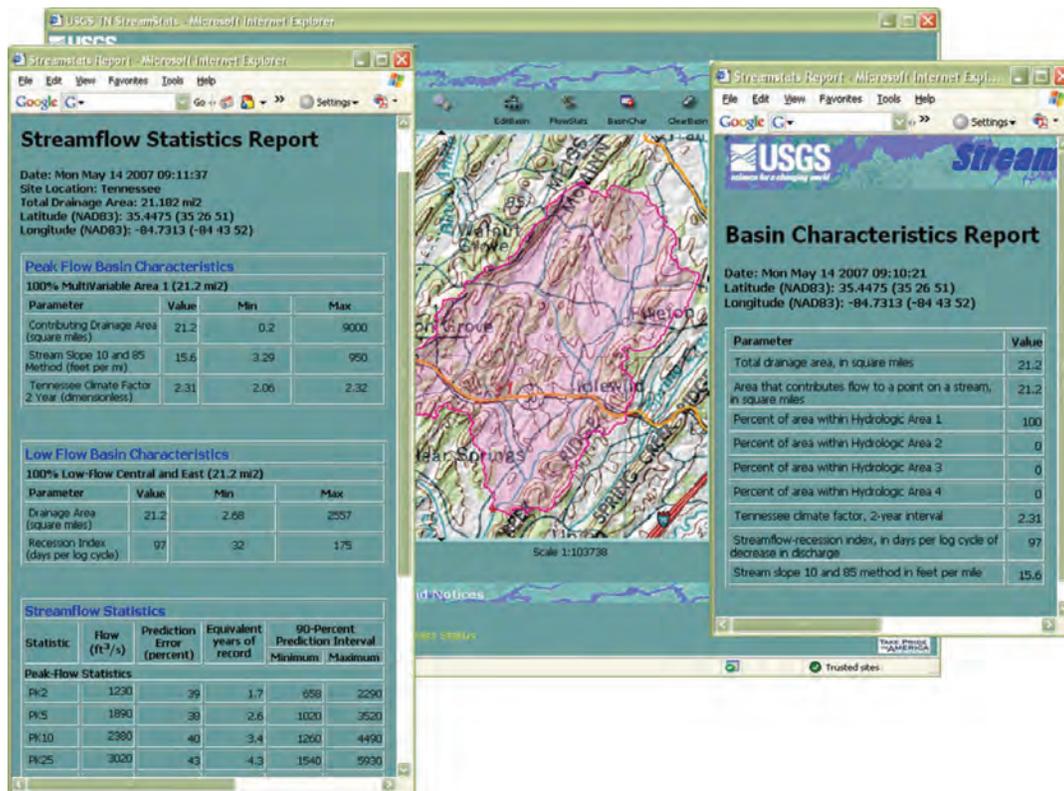


Figure 2. Basin delineation, partial streamflow statistics report, and basin characteristics report for an ungaged site using Tennessee StreamStats.

Additional Information

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or visit:

The USGS Office of Surface Water StreamStats homepage at:
<http://streamstats.usgs.gov/> or <http://water.usgs.gov/osw/streamstats/>

The Tennessee StreamStats homepage at:
<http://water.usgs.gov/osw/streamstats/tennessee.html>

The USGS Tennessee Water Science Center homepage at:
<http://tn.water.usgs.gov/>

Some of the information in this document was obtained from StreamStats: A U.S. Geological Survey Web Application for Stream Information: U.S. Geological Survey Fact Sheet FS-2004-3115, by K.G. Ries III, P.A. Steeves, J.D. Coles, A.H. Rea, and D.W. Stewart.

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