



The Ohio Department of Transportation Office of Research & Development Executive Summary Report

A Streamflow Statistics (StreamStats) Web Application for Ohio

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Problem

Equations for estimating selected streamflow statistics recently have been developed for streams in Ohio using digital Geographic Information System (GIS) technology (Koltun, 2003; Koltun and Whitehead, 2002) to derive explanatory variables. The use of a GIS can greatly improve the efficiency of estimating streamflow statistics; however, proper application of the equations with GIS-based explanatory variables depends on use of GIS databases and techniques that are equivalent to those used to determine measures of explanatory variables used in the equations. Unfortunately, use of these GIS databases and techniques requires significant data storage and processing, costly proprietary software programs, and a level of familiarity with GIS techniques that many users lack.

Objectives

- Develop and present revised flood-frequency equations and estimates determined based on channel slope estimates derived with a different and computationally more robust technique than previously presented by Koltun(2003)
- Develop a StreamStats application for Ohio that implements the revised flood-frequency equations as well as equations previously published for selected other streamflow characteristics

- Describe the development, characteristics, and limitations of the StreamStats application constructed for Ohio

Description

Several geospatial datasets were created or compiled and then preprocessed to develop the StreamStats application for Ohio. StreamStats is a Web-based GIS application for serving predetermined streamflow statistics and computing estimates of streamflow statistics at ungaged locations.

A new computationally robust channel-slope characteristic (SL_{10-85}) was implemented to replace the main-channel slope characteristic presented by Koltun (2003). SL_{10-85} values were computed for 305 streamflow-gaging stations in Ohio and adjacent states.

Generalized least-squares (GLS) regression analyses were done using flood-frequency and basin characteristic data from the same 305 streamflow-gaging stations used by Koltun (2003) with the exception that SL_{10-85} was substituted for the NHD-based main-channel slope characteristic (SL) used previously. Revised full-model equations were developed and used to compute revised flood-frequency estimates. The revised full-model equations for estimating 2-, 5-, 10-, 25-, 50-, 100-, and 500-year peak streamflows are implemented in the Ohio StreamStats application along with equations for estimating mean annual streamflow, mean monthly streamflows, harmonic mean streamflow, and 25th-, 50th-, and 75th-percentile streamflows.

Conclusions & Recommendations

A StreamStats application was developed for Ohio that implements equations for estimating 2-, 5-, 10-, 25-, 50-, 100-, and

500-year peak streamflows, mean annual streamflow, mean monthly streamflows, harmonic mean streamflow, and 25th-, 50th-, and 75th-percentile streamflows. The Ohio implementation of StreamStats can be accessed from the StreamStats Web page at <http://water.usgs.gov/osw/streamstats/> beginning February, 2007. A U.S. Geological Survey Water Resources Investigations report describing the StreamStats application and its development is available at <http://pubs.water.usgs.gov/sir2006-5312/>.

Implementation Potential

The StreamStats application implements the revised flood-frequency equations as well as selected previously published equations for estimating other streamflow statistics. The project will be 100% implemented when made available on the Web in February, 2007.

References

- Koltun, G.F., 2003, Techniques for Estimating Flood-Peak Discharges of Rural, Unregulated Streams in Ohio, Second Edition: U. S. Geological Survey Water-Resources Investigations Report 03-4164, 76 p.
- Koltun, G.F., and Whitehead, M.T., 2002, Techniques for Estimating Selected Streamflow Characteristics of Rural, Unregulated Streams in Ohio: U. S. Geological Survey Water-Resources Investigations Report 02-4068, 50 p.