

Lecture 10

GIS and Modeling Integration 2: Examples



April 27, 2009
CEEN 4800/6965 - Special Topics
Geographic Information Systems and Hydrologic & Hydraulic Modeling
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FINAL EXAM

- Date: 5/4/09
- Duration: 1 hour
- Content: All lectures and exercises covered since mid term exam starting Lecture 6: Creating and Editing Data and ending what's covered today.
- Type: Open book (you can use your book, handouts, notes, and computer)
- Format: 30 multiple choice and short answer questions
 - 2 minutes / question
 - Not enough time to search the answers; you should study and know where the answers are

Presentation by Eli Zini

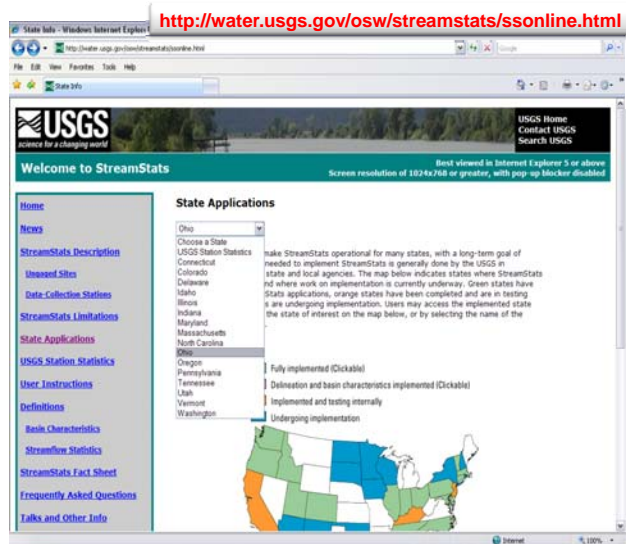
- Civil Associate II, Michael Baker Jr., Inc., Moon Township, PA
 - Department Civil Engineering
 - Supervisor: Larry Diday
- Work Experience
 - FEMA Floodplain Modification Review
 - Water Resources (Hydrology/Hydraulics)
 - Open Channel H&H – Bridge and Culvert Modeling
 - Conduit Modeling – Sanitary Systems
 - Site Development (Grading/Stormwater Management)
- Education
 - B.S., Civil and Environmental Engineering, University of Pittsburgh, 2005
 - Professional Certificates
 - Engineer in Training (EIT), 2005

Outline

- Introduction
- GIS Applications in Hydrologic Modeling
- Exercise Using USGS Streamstats
- Additional Software
- Homework

USGS Stream Stats Website

- StreamStats is a Web-based GIS application created by USGS, in cooperation with ESRI
- StreamStats functionality is based on ESRI's ArcHydro Data Model and Tools, described at <http://support.esri.com/index.cfm?fa=downloads.dataModels.filteredGateway&dmid=15>.
- StreamStats allows users to obtain:
 - Streamflow statistics
 - Basin characteristics, and
 - Descriptive information for USGS data-collection stations and user-selected sites.
- It also allows users to identify stream reaches that are upstream and downstream from user-selected sites.



Toolbar Buttons

- Help button describes the toolbar on top.

The toolbar provides the user with a set of tools to interact with the map. From this point you can zoom, pan, or otherwise interact with the map. The toolbar is located at the top of the map. The toolbar is described below. The toolbar is described below. The toolbar is described below.

- Zoom In** (magnifying glass icon): Zooms in on the map. Clicking this tool, then clicking on the map, will zoom in on the map. The zoom factor is approximately 2x.
- Zoom Out** (magnifying glass with minus icon): Zooms out on the map. Clicking this tool, then clicking on the map, will zoom out on the map. The zoom factor is approximately 0.5x.
- Full Extent** (rectangle with arrows icon): Zooms out to the full extent of the map.
- Pan** (hand icon): Used to drag the map in any direction and recenter the view. Simply click on the Pan Tool, then drag the map to a new location.
- Get Info** (i icon): Used to discover the attributes attached to spatial features in the map. Simply click on the Get Info tool, then click on a feature on the map.
- Load Extent** (rectangle with arrows icon): Load Extent will change the extent to the last extent (the rectangle features just for the zoom tools).
- Basin Delineation** (dashed line icon): Used to click on the Streamfield and delineate a basin. This tool is only active when connected to a 24000.
- Edit Basins** (edit icon): Used to edit the delineation if it is incorrect. For further help on this tool [click here](#).
- FlowStats** (flow icon): Allows the user to get the flow statistics after you have used the Basin Delineation button to get your polygons and have thoroughly checked its accuracy.
- Basin Char** (basin icon): Allows the user to get the basin characteristics after you have used the Basin Delineation button to get your polygons and have thoroughly checked its accuracy.
- Download** (download icon): Will allow the user to download the delineated basin polygons. If the download is done after FlowStats and Basin Char, the watershed attribute table will contain values for the basin characteristics and streamflow estimates that are returned in the reports.
- Google Earth** (Google Earth icon): Displays a report containing descriptive information, physical characteristics and streamflow statistics for gage stations, along with options for the sources of these data. To use, run on the StreamStats layer under "Water" in the Map Layers. After selecting the Google Earth tool, click on a gage shown on the map to open a new browser window containing the report.
- Print** (print icon): Will produce a map that shows the same area, and the same layers in a new browser window. This new window will have no frames, so it will not be interactive.
- Help** (help icon): Will display these user instructions.

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- Refresh Map** (refresh icon): Refresh Map redraws the current view of the map, resequencing the data layers, and reordering images.
- Reset Layers** (reset icon): Reset Layers will return the layers to match the map. If you have made changes to the data layers and have not hit REFRESH then change your mind use the RESET to return layer list to match the current display.

StreamStats in Ohio - Windows Internet Explorer

http://water.usgs.gov/oh/streamstats/ohio.html

StreamStats in Ohio

StreamStats

Best viewed in Internet Explorer 5 or above
Screen resolution of 1024x768 or greater, with pop-up blocker disabled

Home
News
StreamStats Description
Unaged Sites
Data Collection Stations
StreamStats Limitations
State Applications
USGS Station Statistics
User Instructions
Definitions
Basin Characteristics
Streamflow Statistics
StreamStats Fact Sheet
Frequently Asked Questions
Talks and Other Info
Contact StreamStats Team
Current Streamflow Conditions

Ohio

The reports below document the regression equations available in StreamStats for Ohio, the methods used to develop the equations and to measure the basin characteristics used in the equations, and the errors associated with the estimates obtained from the equations. Users should familiarize themselves with this report before using StreamStats to obtain estimates of streamflow statistics for ungaged sites.

- Koltun, G.F., Kula, S.P., and Puskas, B.M., 2006, *A Streamflow Statistics (StreamStats) Web Application for Ohio: U.S. Geological Survey Scientific Investigations Report 2006-5312*, 62 p.
- Koltun, G.F., 2003, *Techniques for estimating flood-peak discharges of rural, unregulated streams in Ohio: U.S. Geological Survey Scientific Investigations Report 03-4164*, 75 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 Scientific Investigations Report 02-4068*, 50 p.

Interactive Map

StreamStats for Ohio was developed in cooperation with:
Ohio Department of Transportation,
U.S. Department of Transportation, Federal Highway Administration,
Federal Emergency Management Agency,
Ohio Environmental Protection Agency, and
Ohio Department of Natural Resources.

Logos: STATE OF OHIO DEPARTMENT OF TRANSPORTATION, U.S. Department of Transportation Federal Highway Administration, FEMA, OhioEPA State of Ohio Environmental Protection Agency.

javascript:openMap("http://streamstats.usgs.gov/ohstreamstats/index.asp");

USGS OH StreamStats - Windows Internet Explorer

http://streamstats.usgs.gov/ohstreamstats/index.asp

Pop-up blocked. To see this pop-up or additional options click here...

USGS

Ohio StreamStats

ZoomIn ZoomOut Pan GetInfo FullExtent LastExtent Home DataCollection EditBasin FlowStats BasinChar ClearBasin Download GageInfo Print Help

Scale

Zoom To: lat/long

Latitude: 40 0 0
Longitude: 83 0 0

Map Layers | Locator Map

BASE LAYERS
WATER
POLITICAL

USGS Scale 1:4034106

Refresh Map Reset Layers

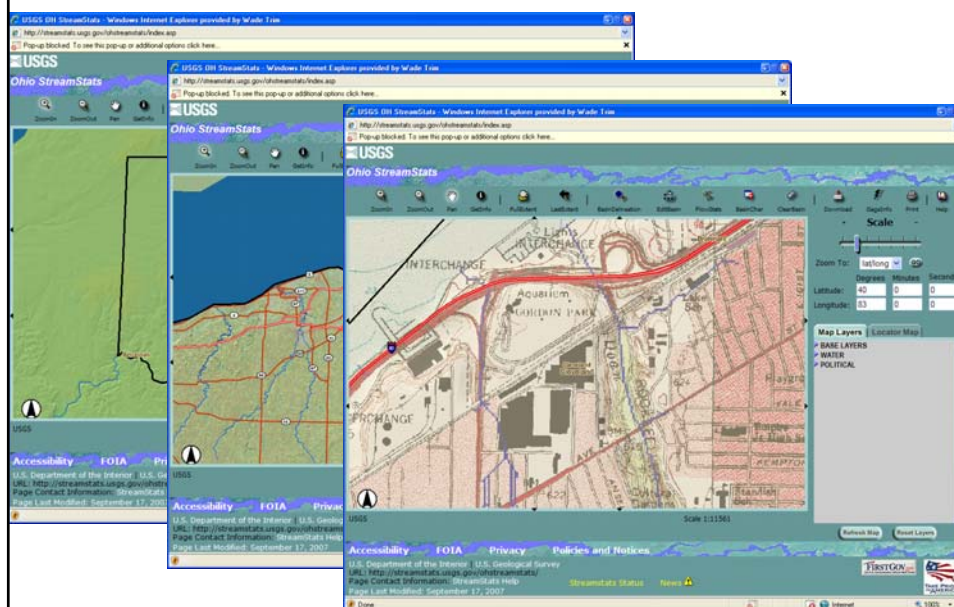
Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
URL: http://streamstats.usgs.gov/ohstreamstats/
Page Contact Information: StreamStats Help
Page Last Modified: September 17, 2007

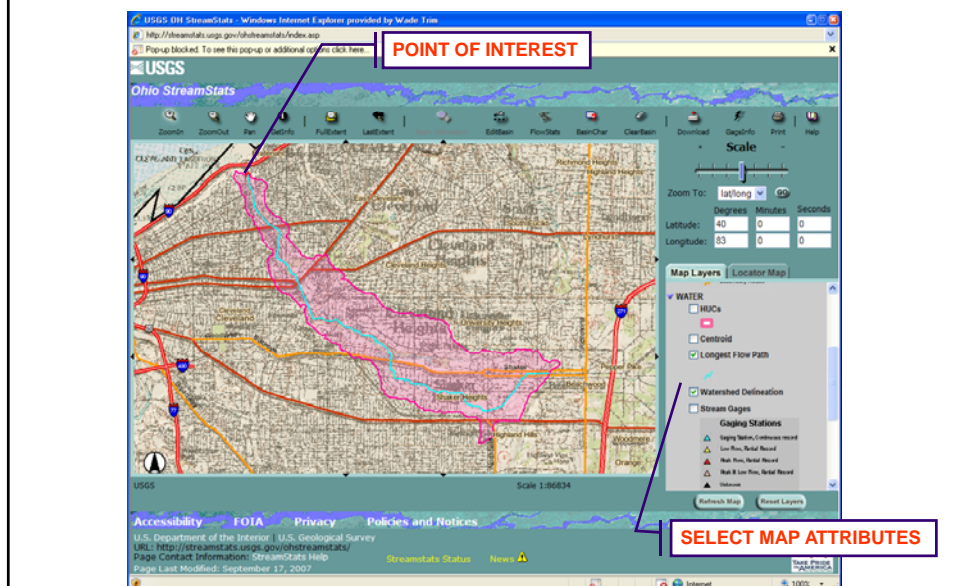
Streamstats Status News

U.S. Geological Survey
FIRSTGOV.gov
TAKE PRIDE IN AMERICA

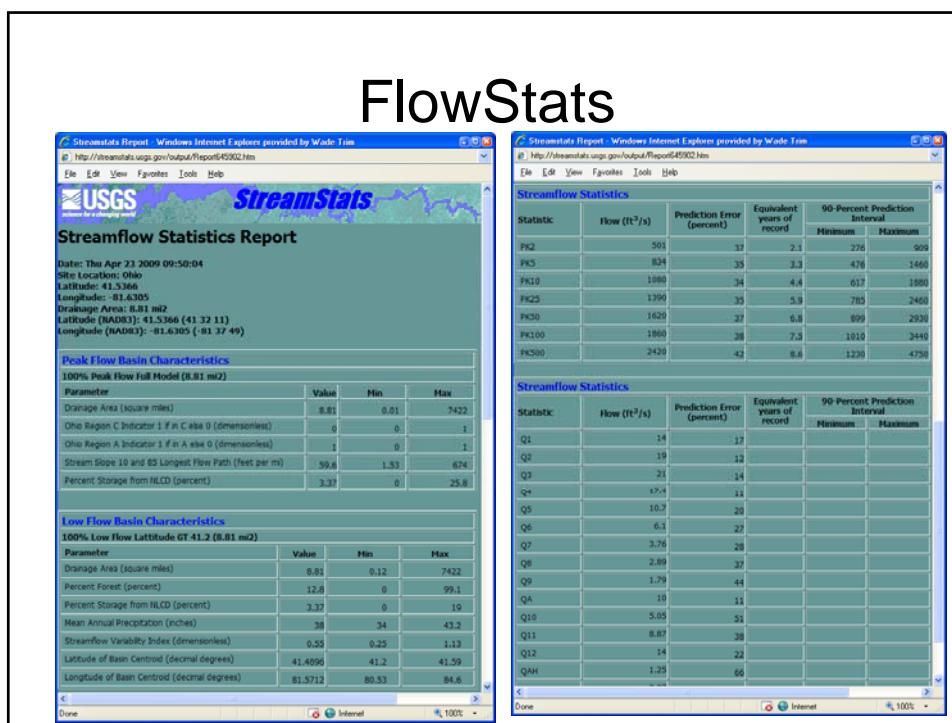
Zoom To Project Location



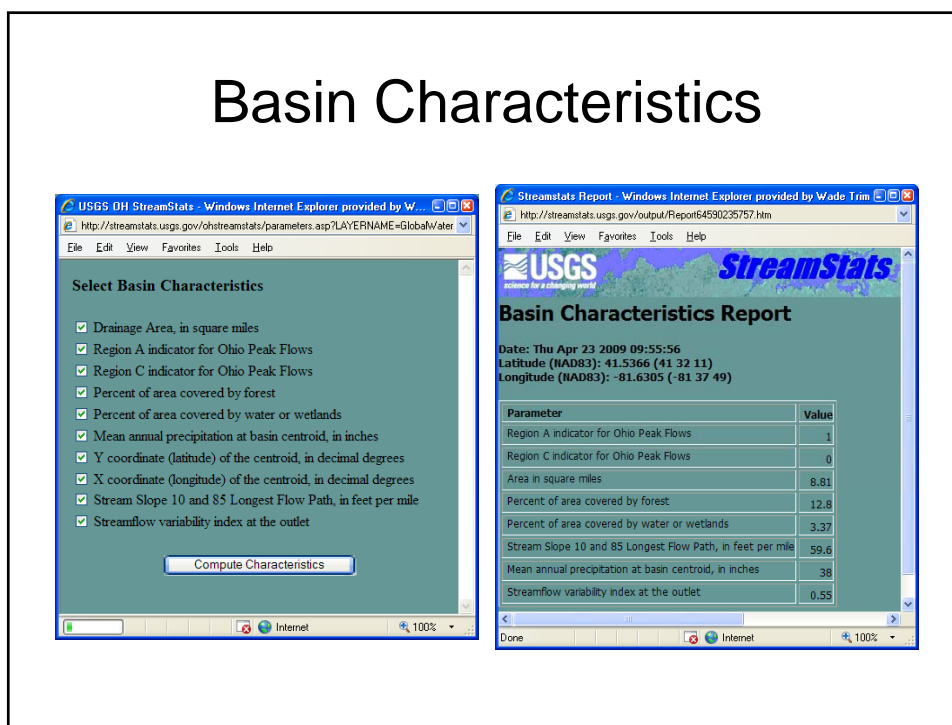
Watershed Basin Delineation



FlowStats



Basin Characteristics

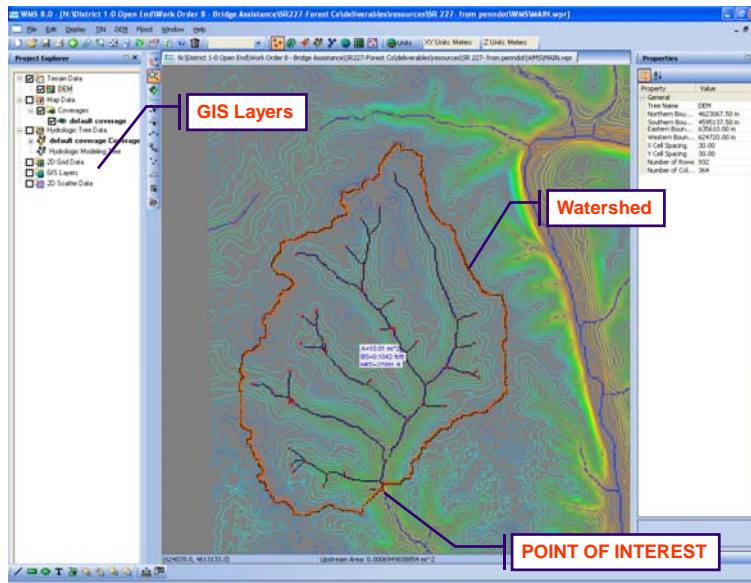


Additional Software

- WMS, Watershed Modeling System, Aquaveo
 - <http://www.aquaveo.com/>
 - Free download of demo version
 - Compatible with ArcGIS
- HEC-GEORAS, Hydrologic Engineering Center Geographic River Analysis System, Army Corp. of Engineers
 - <http://www.hec.usace.army.mil/software/>
 - Free download of full version
 - Compatible with ArcGIS

NOTE: Both WMS and HEC-GEORAS require the user to import GIS based surface, ie: topographic contours in the form of a Digital Elevation Model (DEM) or Triangular Irregular Network (TIN) file. These files are available for some regions of the United States where data has been compiled. For Pennsylvania go to: <http://www.pasda.psu.edu/>

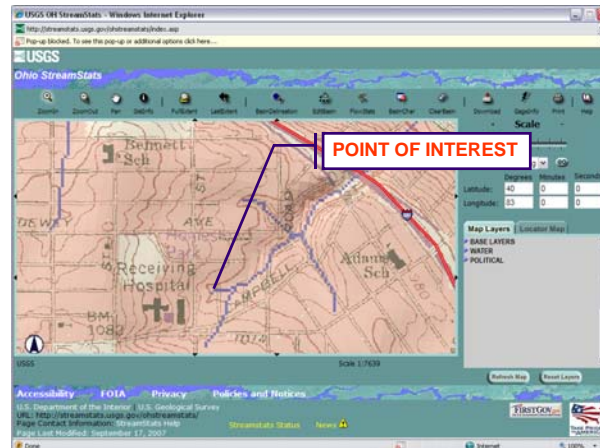
WMS Interface



Homework 7

Mandatory for Grad. Students Only
Optional for Undergraduates

- Create a basin delineation using the USGS StreamStats GIS application. For the watershed outside of the Youngstown State University campus as shown below. Follow the instructions on the following page for details.



Homework 7 Instructions

- Create a Watershed Basin with an outlet at the Point of Interest on the YSU campus as shown on the previous slide.
- Using the "Map Layers" display the longest flow path and Centroid of the basin.
- Create the Flow Stats Report and the Basin Characteristics Report. Select all parameters for the Basin Characteristics Report.
- In a brief (one page) summary tabulate the drainage area in acres, percent forest, latitude and longitude, and the 2, 25, and 100 year peak flow events. Describe how these parameters can be used to design future development on the YSU campus.
- Turn in watershed basin delineation from USGS Streamstats web site, Flow Stats, Basin Characteristics, and your one page summary and future development essay.

Questions?

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