Lecture 10
GIS and Modeling Integration 2: Examples

Youngstown
STATE UNIVERSITY
IN YOUNGSTOWN, OHIO

April 27, 2009
CEEN 4800/6965 - Special Topics
Geographic Information Systems and Hydrologic & Hydraulic Modeling
Uzair (Sam) Shamsi, Ph.D., P.E.
Adjunct Professor
Department of Civil / Environmental & Chemical Engineering

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
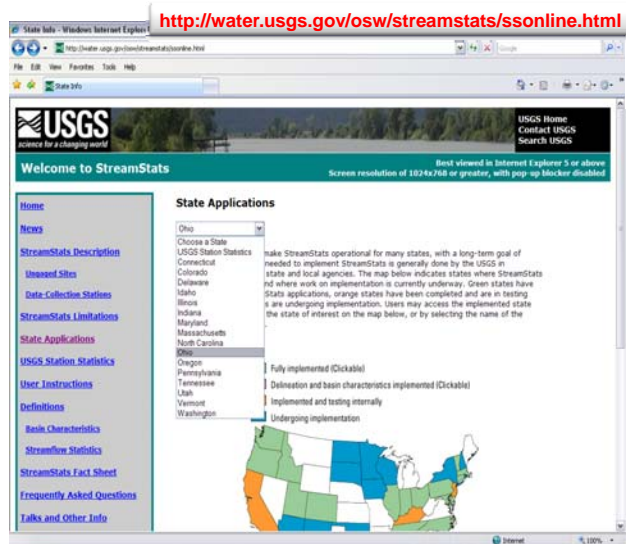
Presentation by Eli Zini

- 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 – Sanity 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 Hydologic 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&mid=15.**
- **StreamStats allows users to obtain:**
  - **Streamflow statistics**
  - **Basin characteristics, and**
  - **Descriptive information for USGS data-collection stations and user-selected ungaged 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.

6

USGS GIS Based Map Interface

Zoom To Project Location

Watershed Basin Delineation

POINT OF INTEREST

SELECT MAP ATTRIBUTES
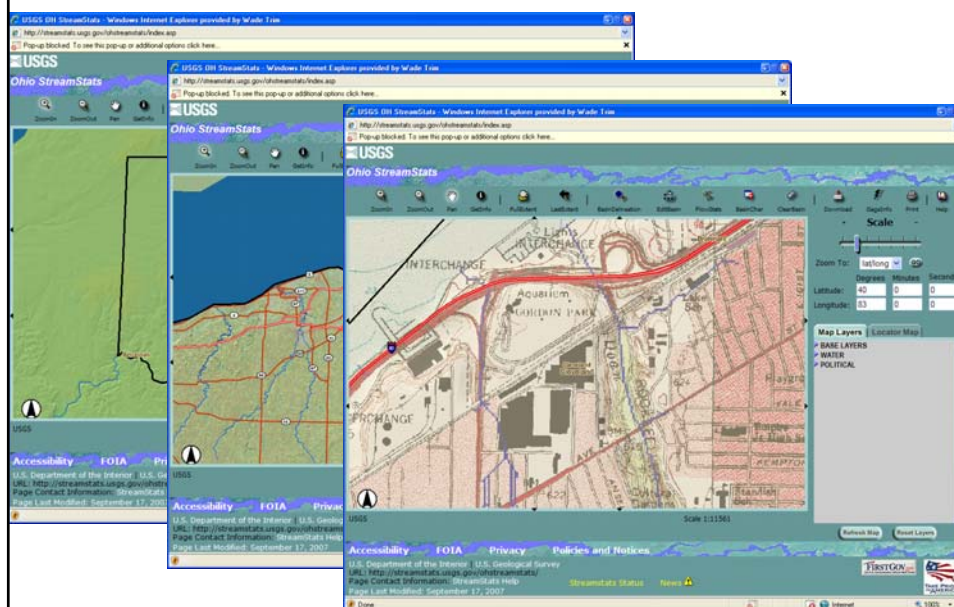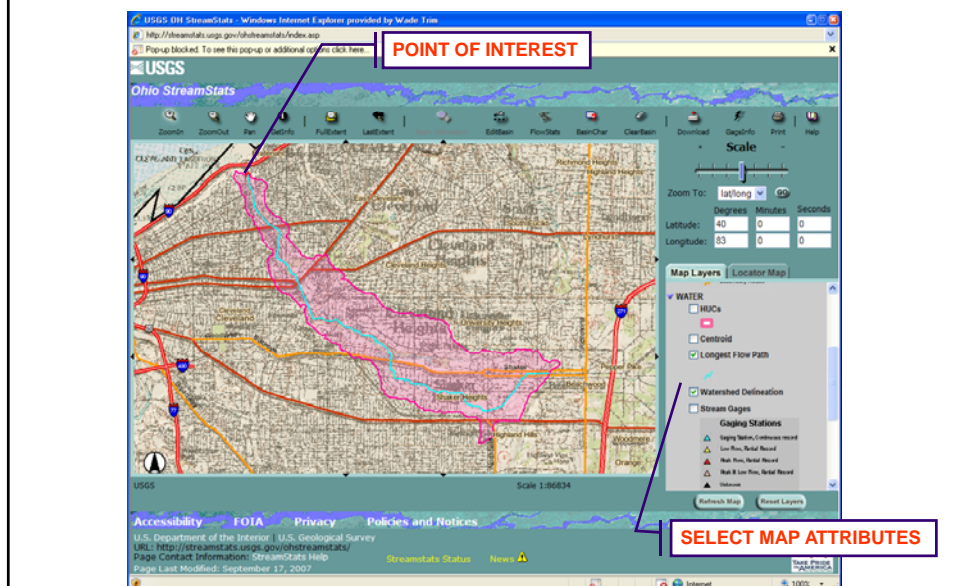
FlowStats
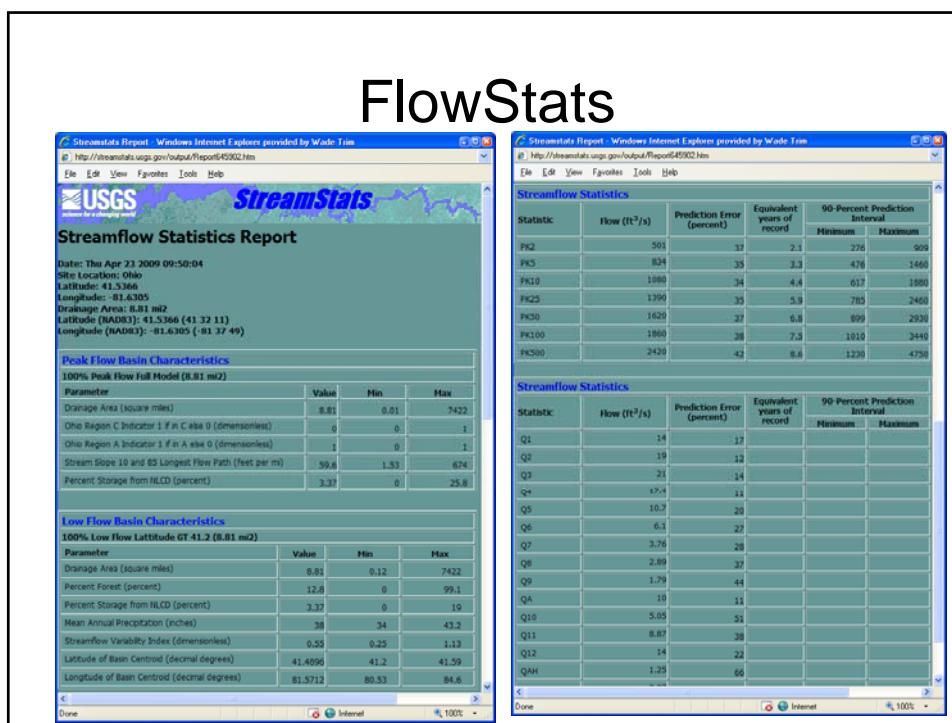
Basin Characteristics
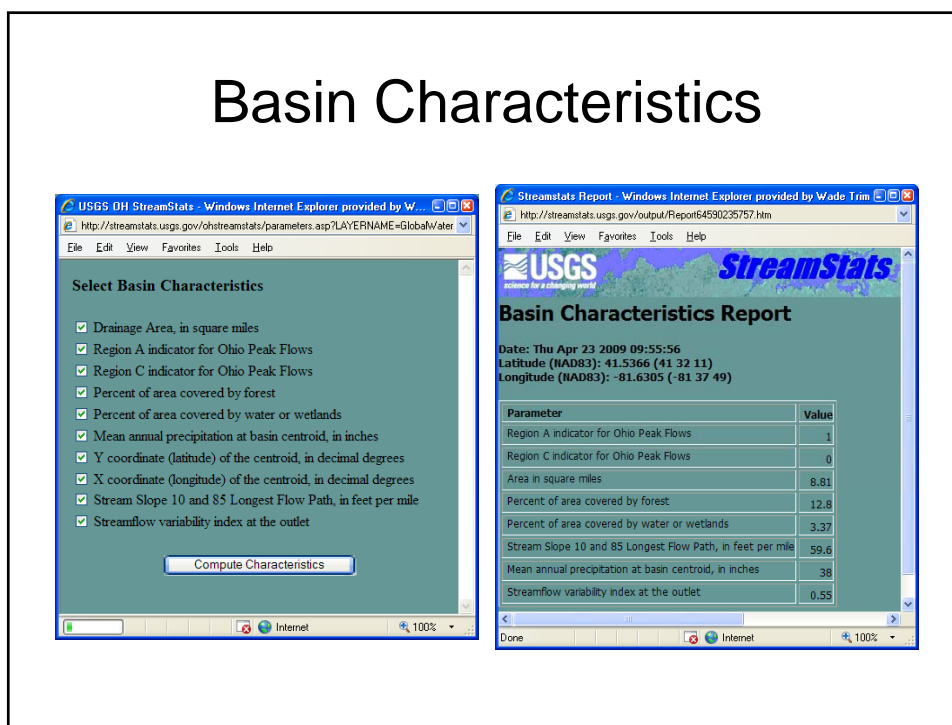
Additional Software

- 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
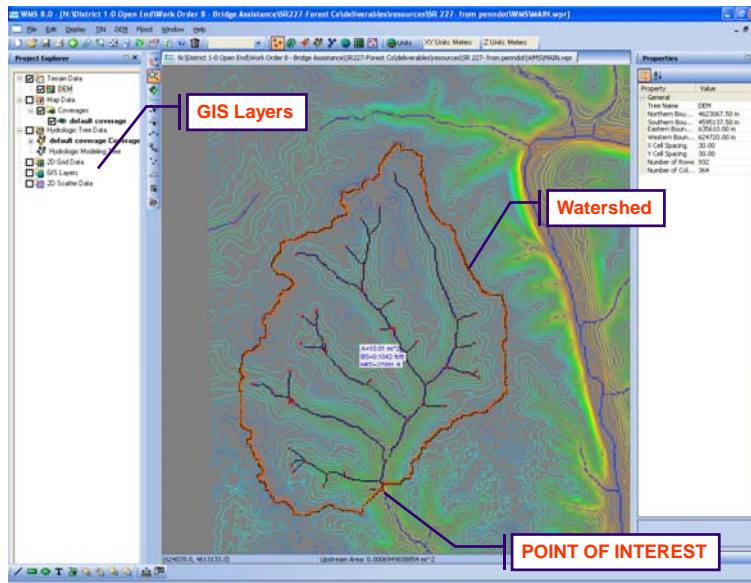
Homework 7
Mandatory for Grad. Students Only
Optional for Undergraduates

- 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

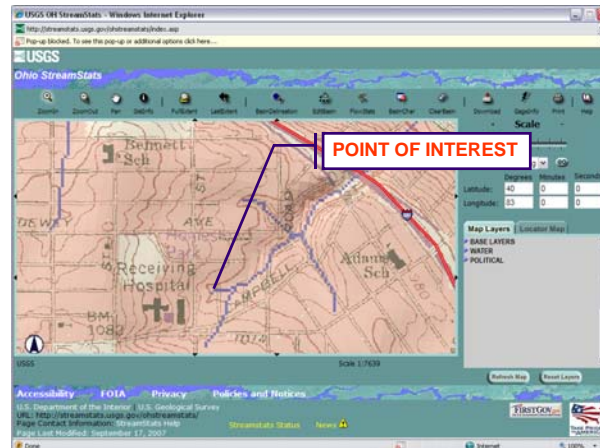- Create a Watershed Basin with an outlet at the Point of Interest on the YSU campus as shown on the previous slide.
- Using the "Map Layers" display the longest flow path and Centroid of the basin.
- Create the Flow Stats Report and the Basin Characteristics Report. Select all parameters for the Basin 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?

Eli Zini, EIT
Michael Baker Jr. Inc.
ezini@mbakercorp.com

Baker