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StreamStats

Delivering Streamflow Information to the Public

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In Cooperation with the New Jersey Department of Environmental Protection
And the U.S. Army Corps of Engineers

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Objectives

- Update Special Report 38, by Stankowski, published in 1974
- StreamStats web application is available for the public to determine flood magnitude and frequency and basin characteristics for existing gaged sites and at ungaged sites

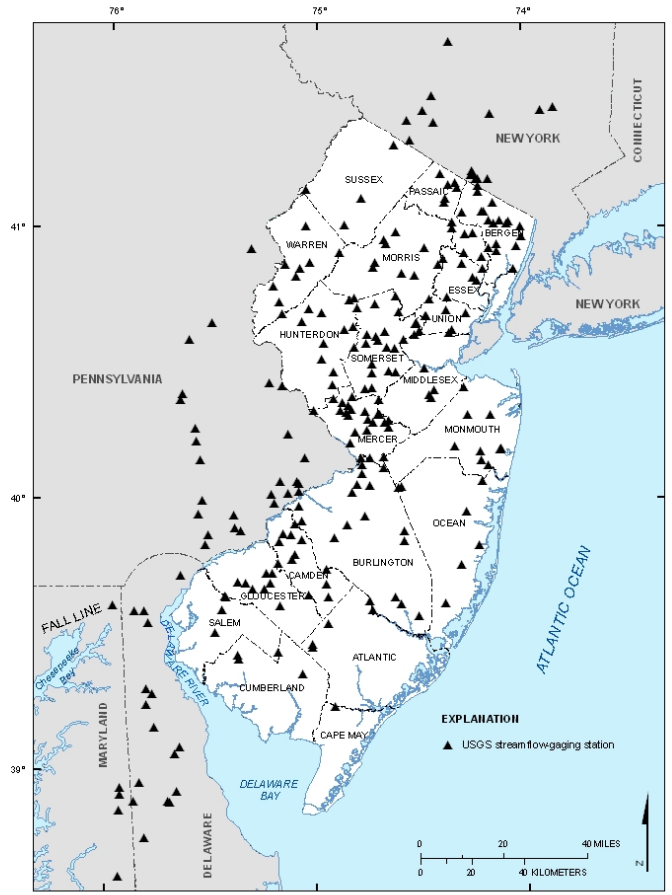
Need for Streamflow Statistics

- Water resources planning, management, and permitting
- Flood-plain mapping
- Engineering design of structures such as roads, bridges, dams, culverts, locks, and levees

- Streamflow statistics are not available everywhere they are needed

Flood Frequency

- 254 streamflow-gaging stations in New Jersey and surrounding states were used in the study
- Peak-flow data collected through the 2007 water year for most gages



Flood Frequency Regions

- Divided the State into five geographic regions for the regression analysis
- The regions follow physiographic province boundaries and take into account glaciated extent and coastal geology

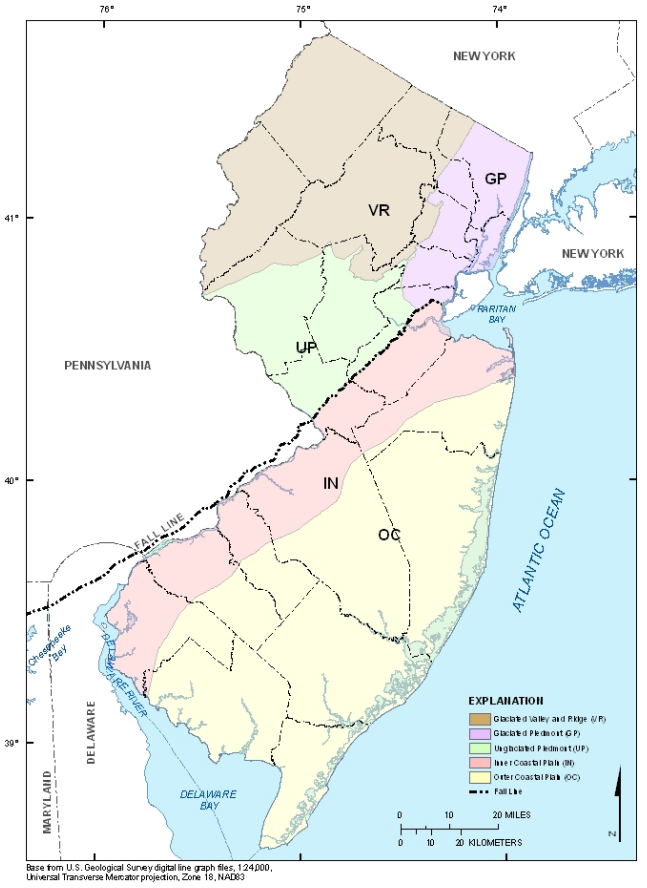


Figure 2. Location of flood-frequency regions and streamflow-gaging stations in New Jersey and surrounding states for which flood frequency estimates were computed.

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Final Regional Regression Equations

- Equations estimate peak flow for 2-, 5-,10-, 25-, 50-, 100-, and 500-year floods
- All equations use the same basin characteristics – Drainage area, percent storage, 10-85 slope, and 1990 population density
- Varies by flood-frequency region

Flood Frequency Equations

Estimation at Ungaged Sites

- Use regional regression equation
- Weighted by the percentage of the drainage basin within each region

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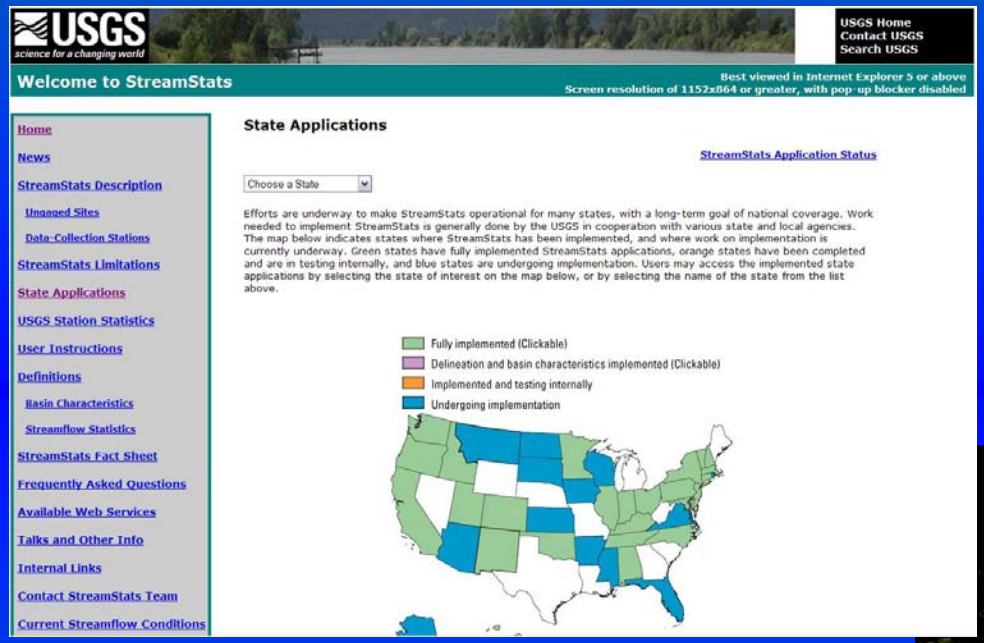

- Currently used to estimate peak flows and basin characteristics

StreamStats New Jersey

- StreamStats is an interactive map-based USGS web application available for public use
- Users can access flood-frequency statistics and basin characteristics
- Utilizes the updated regional regression equations to obtain flood-frequency estimates for ungaged sites in New Jersey

StreamStats Benefits

- Published statistics are readily available
- Consistent information delivery
- Little or no additional error is introduced
- Estimates for ungaged sites takes <1 minute

GIS Database Includes

- Datasets used to delineate accurate basin boundaries-10 meter Digital Elevation Model (DEM), National Hydrography Dataset (NHD)
- Datasets used to determine basin characteristics (2002 NJDEP Landuse/Landcover, DEM, census block data)
- USGS data-collection station locations

Using StreamStats

http://water.usgs.gov/osw/streamstats/new_jersey.html

New Jersey

StreamStats for New Jersey can be used to estimate instantaneous flood discharges with exceedance probabilities of 0.5, 0.2, 0.1, 0.04, 0.02, 0.01, and 0.002 for ungaged, unregulated or slightly regulated, non-tidal streams in New Jersey. These exceedance probabilities correspond to recurrence intervals of 2-, 5-, 10-, 25-, 50-, 100-, and 500-years, respectively. The report below presents the regression equations used to estimate the peak-flow statistics, describes the errors associated with the estimates, and describes the methods used to develop the equations and to measure the basin characteristics used in the equations. Users should familiarize themselves with the report before using StreamStats to obtain estimates of streamflow statistics for gaged and ungaged sites.

- Watson, K.M., and Schopp, R.D., 2009, Methodology for estimation of flood magnitude and frequency for New Jersey streams: U.S. Geological Survey Scientific Investigations Report 2009-5167

NOTE: Scientific Investigations Report 2009-5167 "Methodology for Estimation of Flood Magnitude and Frequency for New Jersey Streams" has been revised, May 2010. The flood-frequency regression equations, regional constant coefficients, and average standard errors have been updated for this report. The updates are reflected in the current New Jersey StreamStats application.

Interactive Map

Footnote for New Jersey StreamStats: Although 1990 population density was used for the development of the regression equations in SIR 2009-5167, the New Jersey StreamStats application will offer the more current 2000 population-density data.

StreamStats for New Jersey was developed in cooperation the New Jersey Department of Environmental Protection and the U.S. Army Corps of Engineers.

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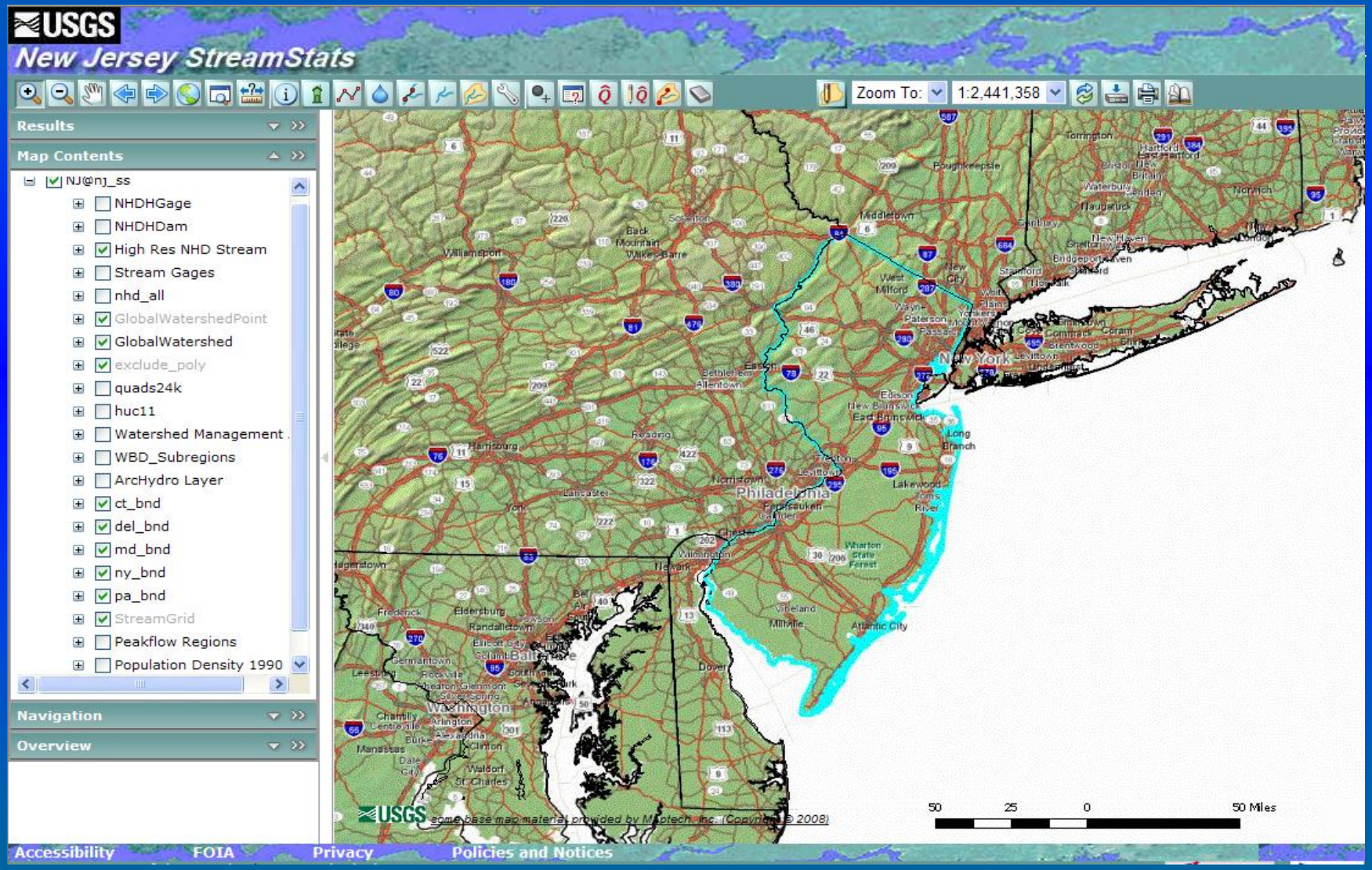
User Interface

- Displays maps and enables site selection
- Displays default data layers for selected scale ranges and allows adding/subtracting map layers
- Zoom to named geographic location or stream
- Print maps and download data shown in the map frame

StreamStats New Jersey



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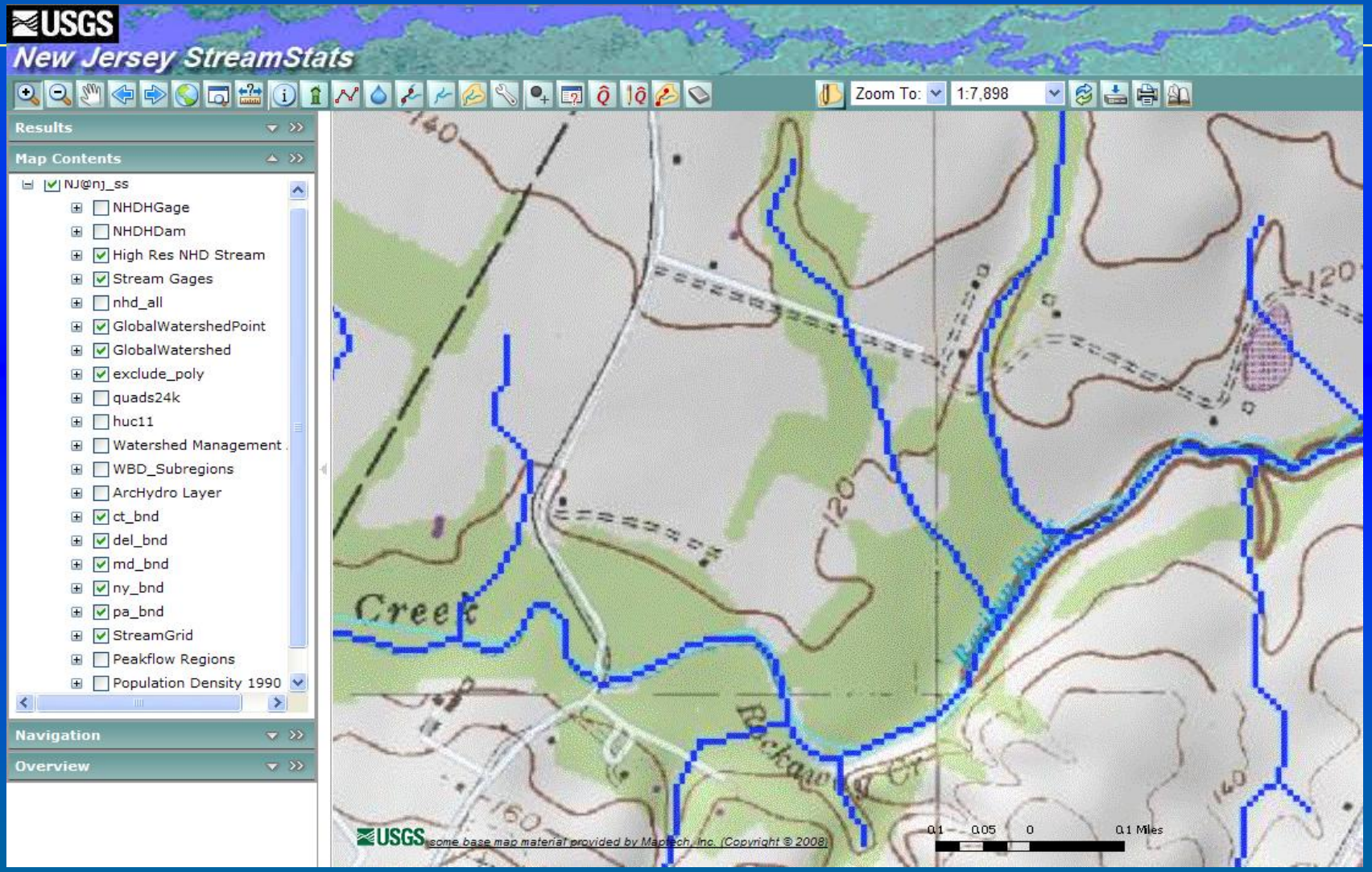
Drainage Boundaries

- User selects any point on a stream
- Drainage basin boundary is calculated within the application using GIS datasets
- Creates a basin polygon used to calculate basin characteristics and statistics
- Basin polygons can be downloaded

Using StreamStats



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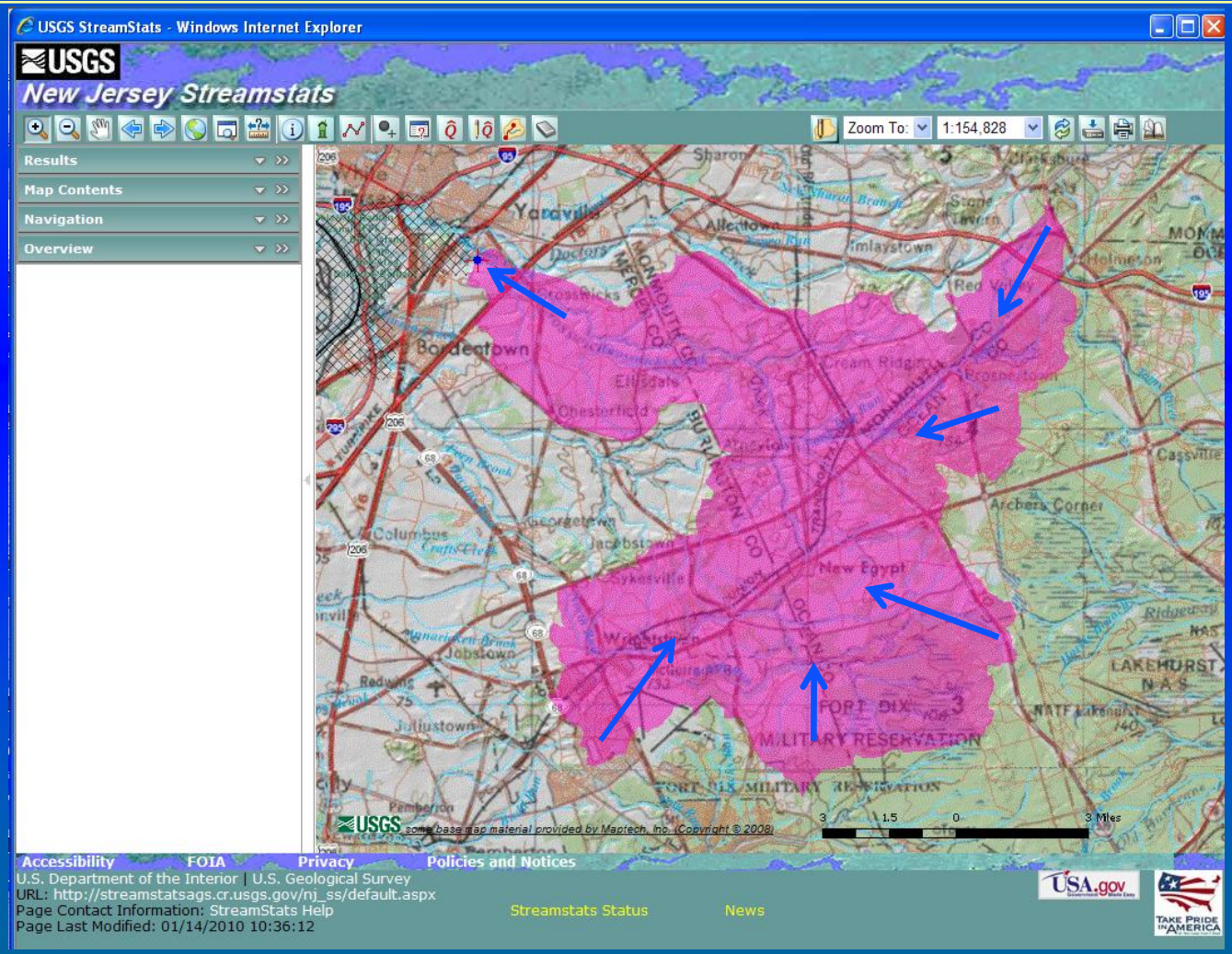
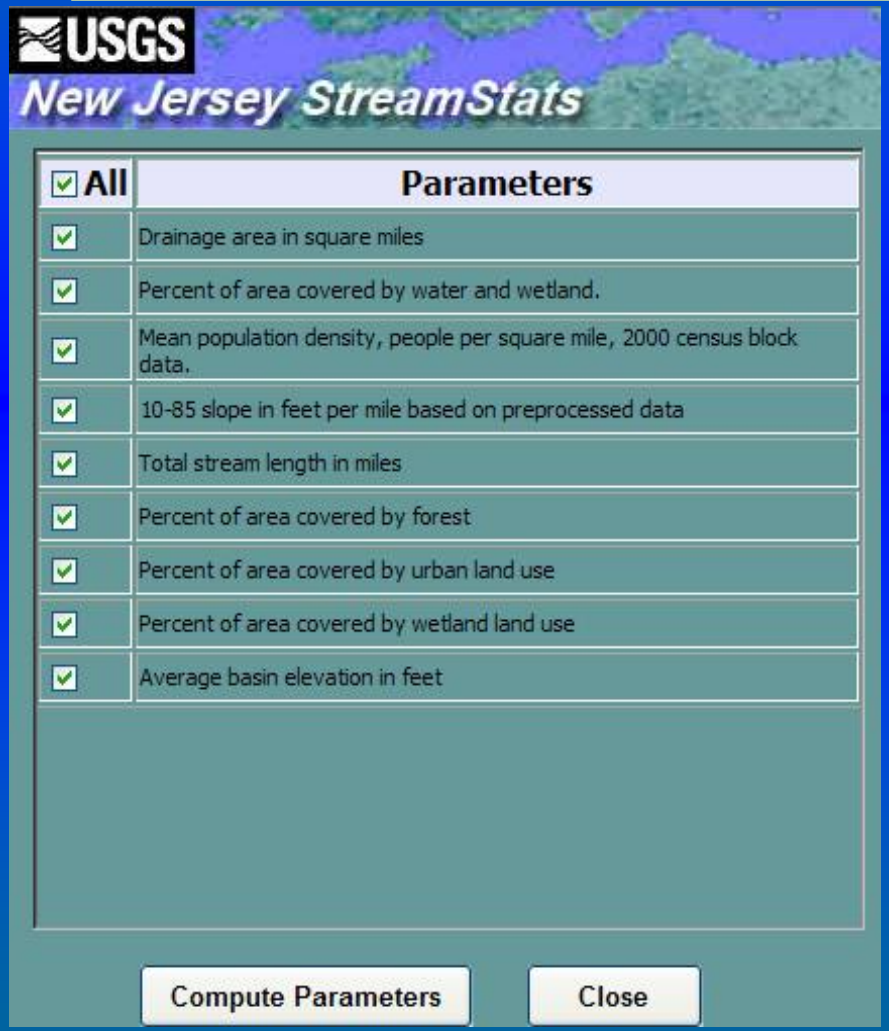
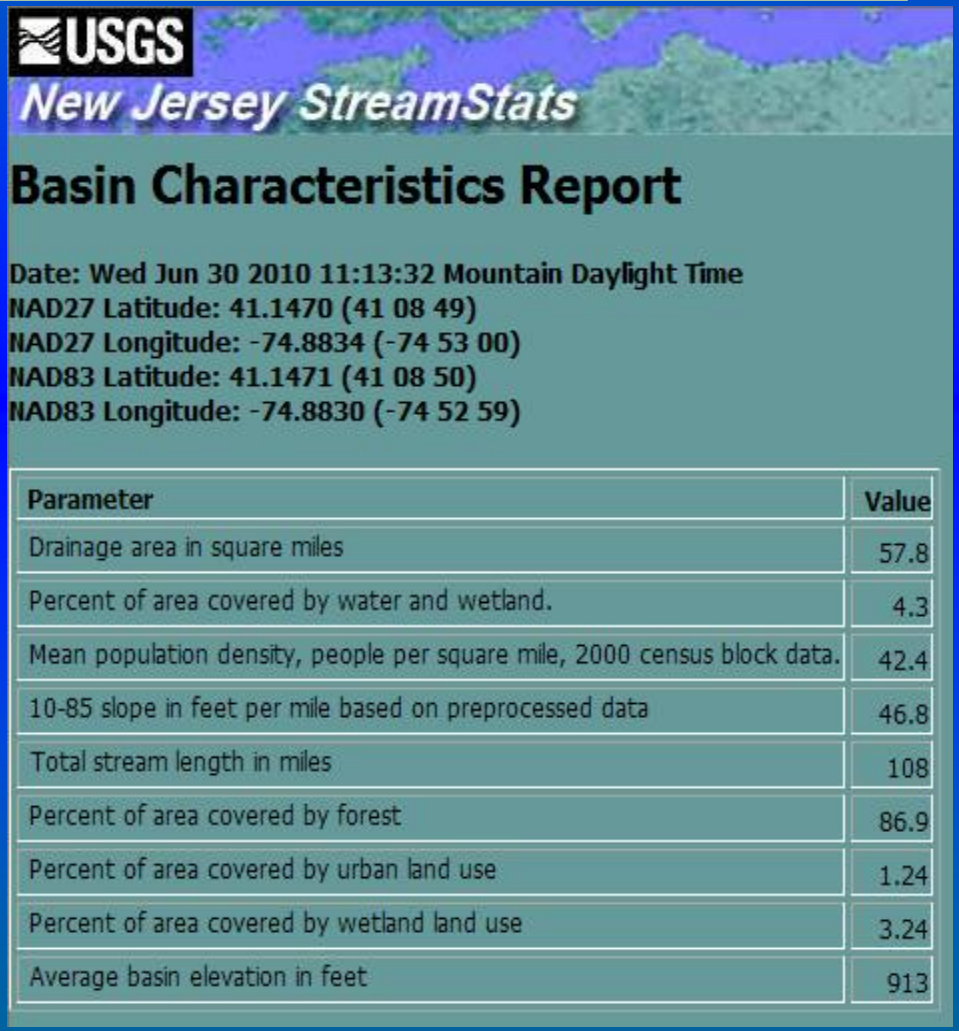
Example Drainage Boundary

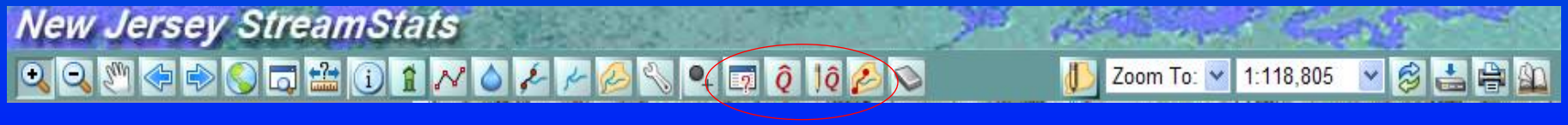


StreamStats Basin Characteristics





StreamStats Statistics



- Estimate flows using regression equations
- Change parameters to re-compute flows

StreamStats Statistics

Peak Flows Region Basin Characteristics

100% Peak Valley and Ridge Region 2009 5167 (57.8 mi2)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	57.8	0.87	763
Percent Storage (percent)	4.3	2.36	30.1
Stream Slope 10 and 85 Method (feet per mi)	46.8	2.56	268
Basin Population Density (persons per square mile)	42.4	35	1493

Peak Flows Region Streamflow Statistics

Statistic	Flow (ft^3/s)	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
				Minimum	Maximum
PK2	1130	50	1		
PK5	1970	51	2		
PK10	2670	52	3		
PK25	3710	55	4		
PK50	4580	57	5		
PK100	5590	60	5		
PK500	8330	66	6		

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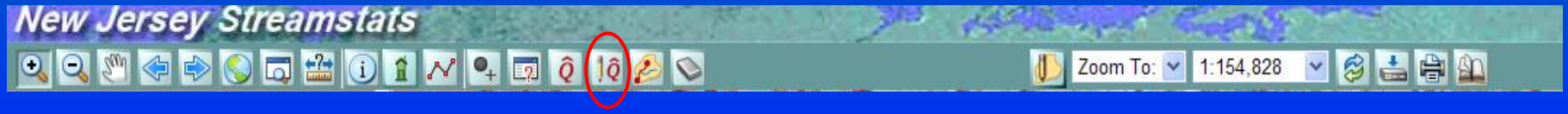
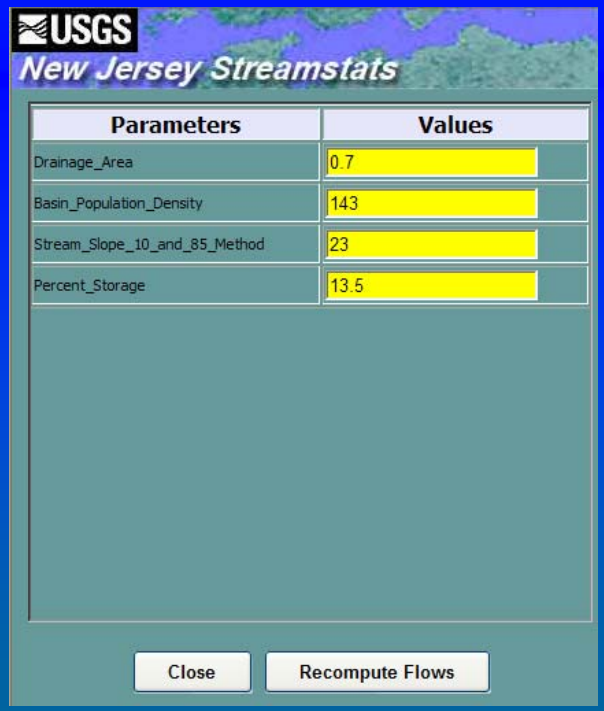
Additional Applications



- Valuable tool to compute flows or check flows found using other methods
- Predict the effect of changes in land use or population

Edit Parameters and Recompute Flows Feature



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Summary

- StreamStats
  - Is a Web application that provides estimates of streamflow statistics, basin characteristics, and other information for gaged and ungaged sites
  - Uses updated flood-frequency regional regression equations for peak-flow estimates

USGS Products

- Methodology for Estimation of Flood Magnitude and Frequency for New Jersey Streams, By Kara M. Watson and Robert D. Schopp, published
  http://pubs.usgs.gov/sir/2009/5167/

- StreamStats web application
  http://water.usgs.gov/osw/streamstats/