



Analyzing Surface Water With StreamStats

Vermont Mapping Forum
Colchester, VT
June 11, 2014

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Objectives of Presentation

- Explain what StreamStats is
- Describe current status and implementation process
- Explain StreamStats components and their functionality
- Tour of web pages
- Describe planned additional functionality
- Live demonstration

What is StreamStats?

- A map-based Web application that provides information that can be used by engineers, managers, planners, and others to make informed decisions on water-related activities
- Primary product is streamflow statistics, such as 100-year flood, mean flow, 7-day, 10-year low flow, etc.
- Allows analysis of upstream/downstream relations along streams and water use

How is StreamStats Information Used?

- **Engineering Design**—Bridges, culverts, flood-plain management
- **Water and Land Management**—Water rights adjudications; water & land-use planning; in-stream flow, fish passage, & habitat studies
- **Water Quality Regulation**—Low flows, perennial vs. intermittent streams (TMDL's, NPDES Permits)
- **Design of Sampling Networks**—Cover a range of desired flows

Development Team

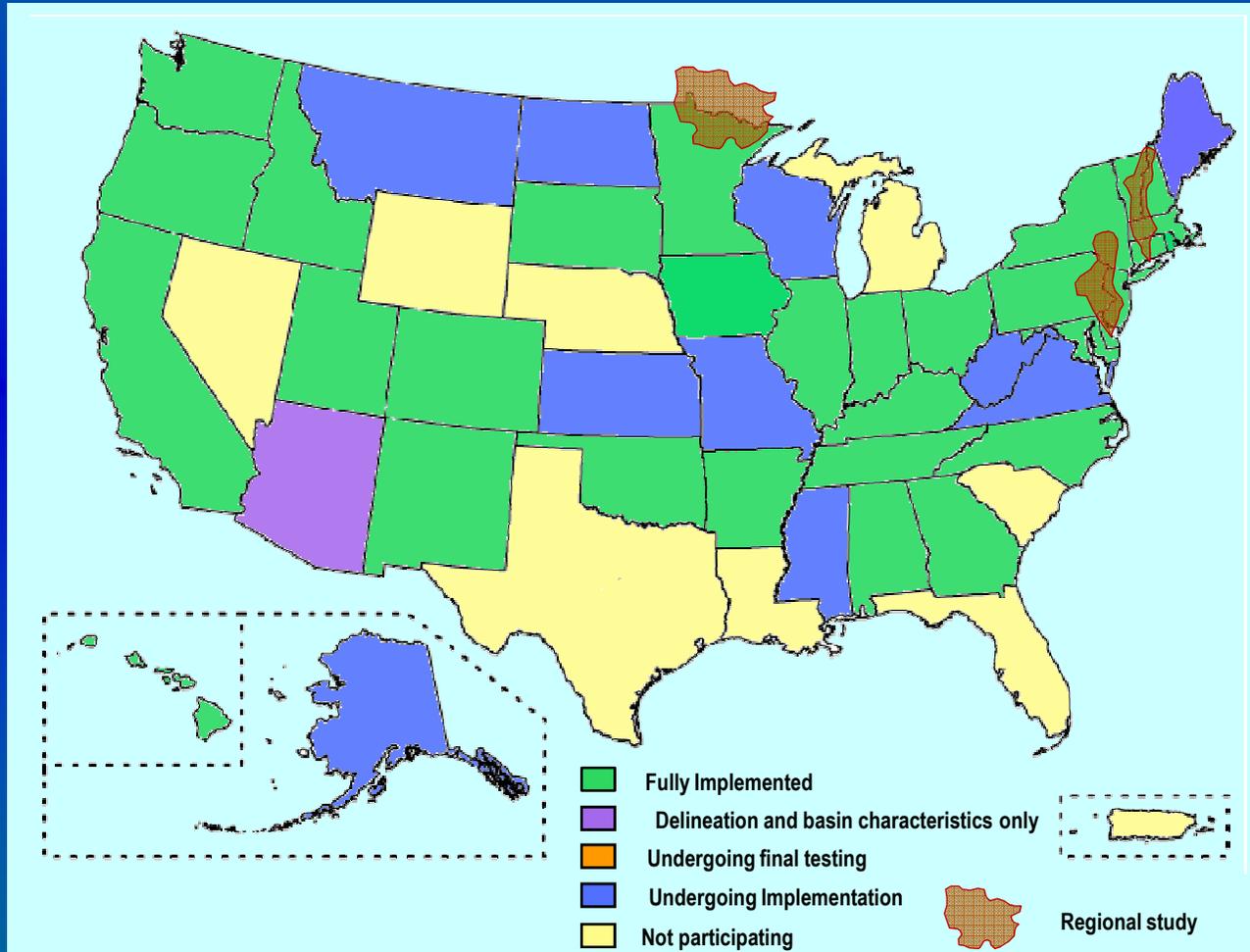
- John Guthrie, RMMC, programmer
- Al Rea, ID WSC, GIS specialist
- Kernell Ries, OSW, hydrologist, coordinator
- Pete Steeves, MA WSC, GIS specialist
- Dave Stewart, OSW, GIS specialist

- Consultants
 - ESRI
 - Aqua Terra

State Implementation Process

- Usually funded through cooperative agreements with local agencies
- 1. Local USGS Water Science Centers (WSC)
 - Prepare GIS datasets
 - Populate database of statistics for USGS gages
- 2. Development team sets up internal test site
- 3. WSC evaluates accuracy of internal test site
- 4. Development team and/or WSC makes any needed changes
- 5. Site is made available to public

StreamStats Status March 2014



- 31 states fully implemented
- 1 state partly implemented
- 9 states in implementation process
- Regional Studies
 - * Connecticut River Basin implemented
 - * Delaware River Basin partly implemented
 - * Rainy River Basin in development

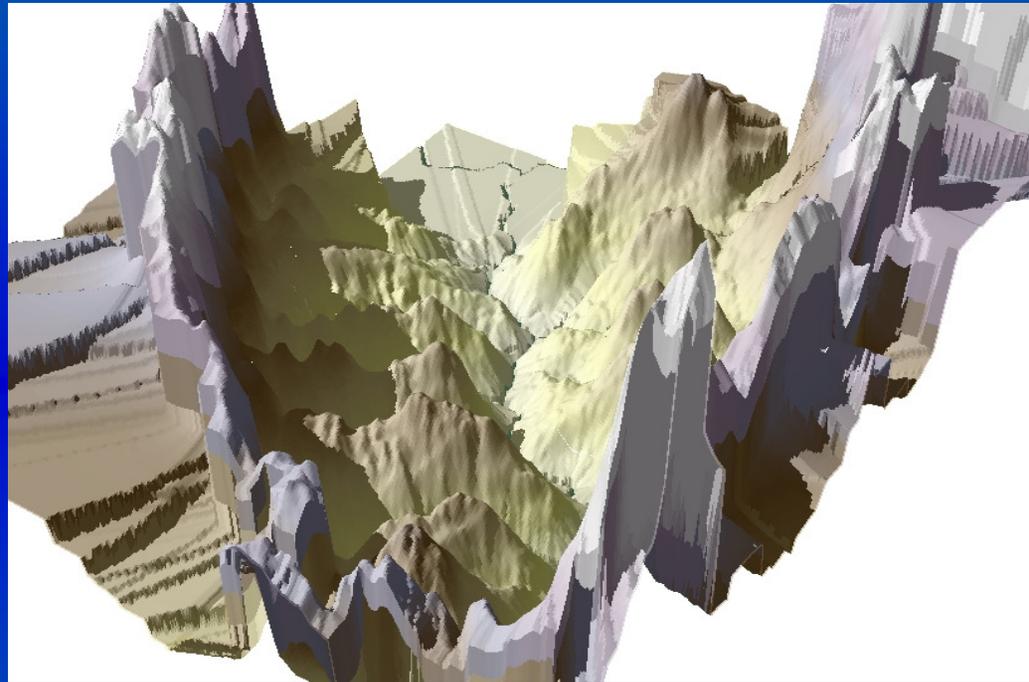
StreamStats Components

- **USGS Station Statistics site**
 - National site that provides information for data-collection stations only
- **State Applications**
 - Separate application for each state
 - All raster (watershed) and vector (network) analysis performed here
 - Functionality varies
 - ArcGIS Server 9.2 based (soon to be 10.1 platform)

GIS Data Preparation

- Data preparation and watershed characteristics measurements done using the ESRI ArcHydro Data Model and USGS Tools
- Data for boundary delineation
 - DEM – National Elevation Dataset (NED)
 - Stream network – National Hydrography Dataset (NHD)
 - Basin boundaries – Watershed Boundary Dataset (WBD)
- DEM forced to conform with stream network and basin boundary datasets
- Standard data processing is done by 8-digit WBD (HUC)

Burning and Walling



Forces DEM to agree with stream network and WBD or locally digitized drainage boundaries

StreamStats Home Page

<http://streamstats.usgs.gov>

The screenshot shows a Microsoft Internet Explorer browser window displaying the StreamStats home page. The address bar shows the URL <http://water.usgs.gov/osw/streamstats/>. The page features the USGS logo with the tagline "science for a changing world" and a navigation menu on the left. The main content area includes a welcome message, a description of the StreamStats tool, and a list of links for users to explore the site's features and limitations.

Welcome to StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC

<http://water.usgs.gov/osw/streamstats/>

File Edit View Favorites Tools Help

Welcome to StreamStats

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science for a changing world

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Welcome to StreamStats

Best viewed in Internet Explorer 5 or above
Screen resolution of 1024x768

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StreamStats is a Web-based tool that allows users to obtain streamflow statistics, drainage-basin characteristics, and other information for user-selected sites on streams. StreamStats users can choose locations of interest from an interactive map and obtain information for these locations. If a user selects the location of a U.S. Geological Survey (USGS) data-collection station, the user will get previously published information for the station from a database. If a user selects a location where no data are available (an un-gaged site), a Geographic Information System (GIS) program will estimate information for the site. The GIS program determines the boundary of the drainage basin above the site, measures the physical characteristics of the drainage basin, and solves the appropriate regression equations to estimate streamflow statistics for the site. The results are presented in a table and a map showing the basin outline. The estimates assume natural flow conditions at the site. In the past, it could take an experienced person more than a day to estimate this information for an un-gaged site. StreamStats reduces the effort to only a few minutes.

Separate applications have been established for each state that has implemented StreamStats. The state applications provide access to all of the functionality that is available for the state. The State Applications link at the left provides access to the individual applications. In addition to the state applications, a separate application has been established for serving information for USGS data-collection stations throughout the Nation. The USGS Station Statistics link to the left provides access to this application.

Some StreamStats options will not work in Netscape. The application continues to be improved and expanded. Please continue to come back to this page to see future enhancements. [Contact us](#) if you have any questions.

Users should familiarize themselves with StreamStats Description, Instructions, and Limitations (using the links on the left) before utilizing the application.

The StreamStats Web application provides access to automated procedures and very large, complex data sets. These data sets are known to contain occasional errors. Users are hereby advised to carefully check all results for accuracy and to exercise their own professional judgment in evaluating the appropriateness of the results for their application. Basin delineations in particular frequently have been found to be erroneous. The Web site provides tools and base maps useful for verifying the accuracy of the basin delineations.

Done

Internet 100%

StreamStats Home Page

<http://streamstats.usgs.gov>

Welcome to StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC

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

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Done

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New National Station Statistics Site

StreamStats National Data-Collection Station Information - Microsoft Internet Explorer provided by MD-DC-DE WSC

USGS
StreamStats National Data-Collection Station Information

Zoom In to at least 1:5,000,000 to see gages. Click on a gage to get additional information.

Zoom To: [v]

Imagery Street Map World Topo USA Topo

Explanation

Gaging Stations

- Continuous Streamgage
- Lowflow Streamgage
- Peakflow Streamgage
- Peak, Low and Partial Record
- Miscellaneous Record
- Unknown

HUC 8
HUC 12

0 1.5 3mi
Scale: 1 : 288,895

IDAHO
Boise

Meridian Garden City Boise

184 69

Boise County

Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
URL: <http://streamstatsags.cr.usgs.gov/gages/viewer14.htm>
Page Contact Information: StreamStats Help
Page Last Modified: 02/11/2011 11:30:13

Streamstats Status News

USA.gov
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Streamgauge Reports

StreamStats Data-Collection Station Report - Microsoft Internet Explorer provided by MD-DC-DE WSC

http://ssdev.cr.usgs.gov/gagepages/html/13200000.htm

Number_of_years_to_compute_BFI	53	years	42
Std_dev_of_annual_BFI_values	0.058	dimensionless	42
Precipitation Statistics			
24_Hour_2_Year_Precipitation	1.7000	inches	31
Mean_Annual_Precipitation	24.76	inches	39
Temperature Statistics			
Mean_January_Temperature	20.000	degrees F	31
Mean_July_Temperature	63.000	degrees F	31
Mean_Min_January_Temperature	11.000	degrees F	31

Citations

Citation Number	Citation Name and URL
00	none
31	Imported from Basin Characteristics file
38	Hortness, J.E., and Berenbrock, Charles, 2001, Estimating Monthly and Annual Streamflow Statistics at Ungaged Sites in Idaho: U.S. Geological Survey Water-Resources Investigations Report 01-4093, 36 p.
39	Berenbrock, Charles, 2002, Estimating the Magnitude of Peak Flows at Selected Recurrence Intervals for Streams in Idaho: U.S. Geological Survey Water-Resources Investigations Report 02-4170, 59 p.
40	Hortness, J.E., and Berenbrock, Charles, 2003, Estimating the Magnitude of Bankfull Flows for Streams in Idaho: U.S. Geological Survey Water-Resources Investigations Report 03-4261, 36 p.
41	Wolock, D.M., 2003, Flow characteristics at U.S. Geological Survey streamgages in the conterminous United States: U.S. Geological Survey Open-File Report 03-146, digital data set
42	Wolock, D.M., 2003, Base-flow index grid for the conterminous United States: U.S. Geological Survey Open-File Report 03-263, digital data set

Streamstats Status News

U.S. Department of the Interior
U.S. Geological Survey
URL: http://streamstats.cr.usgs.gov/gages/viewer/14.html
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Page Last Modified: 02/11/2011 11:30:13

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Current Streamflow Conditions

USGS WaterWatch -- Streamflow conditions - Microsoft Internet Explorer provided by MD-DC-DE WSC

http://waterwatch.usgs.gov/new/index.php?id=ww_drought

compendium definition

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★ Favorites eRAS VPN ... FTP direct... Ungaged S... USGS Web... USGS ...

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 - Retrieve Streamgage Statistics
 - Rating Curve Builder
 - Streamflow Map Builder
 - State Google Map Builder
 - Flood Table Builder
 - Flood-Tracking Chart
 - AHPS River Forecast
 - Water-Quality Map
 - NwisWeb Hydrograph (internal)
 - Flood Table Builder 2 (internal)
 - Site Visit (internal)
- Flood
- Drought
- Past Flow/Runoff
- Animation
- Toolkit
- Additional Information
- About WaterWatch

by normal 7-day average streamflow compared
streamflow for the day of year (United States)

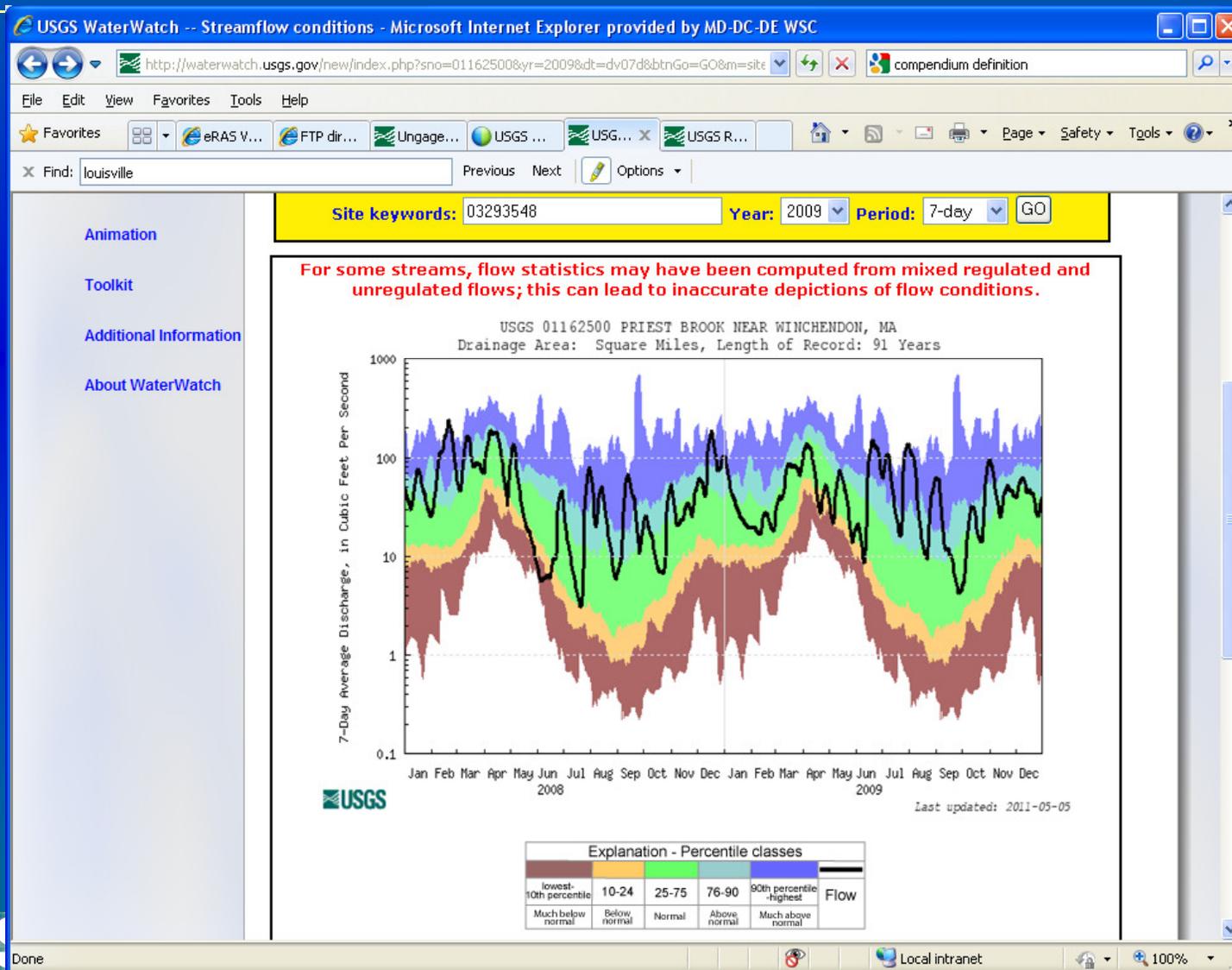
State or Water-Resources Regions

Wednesday, May 04, 2011

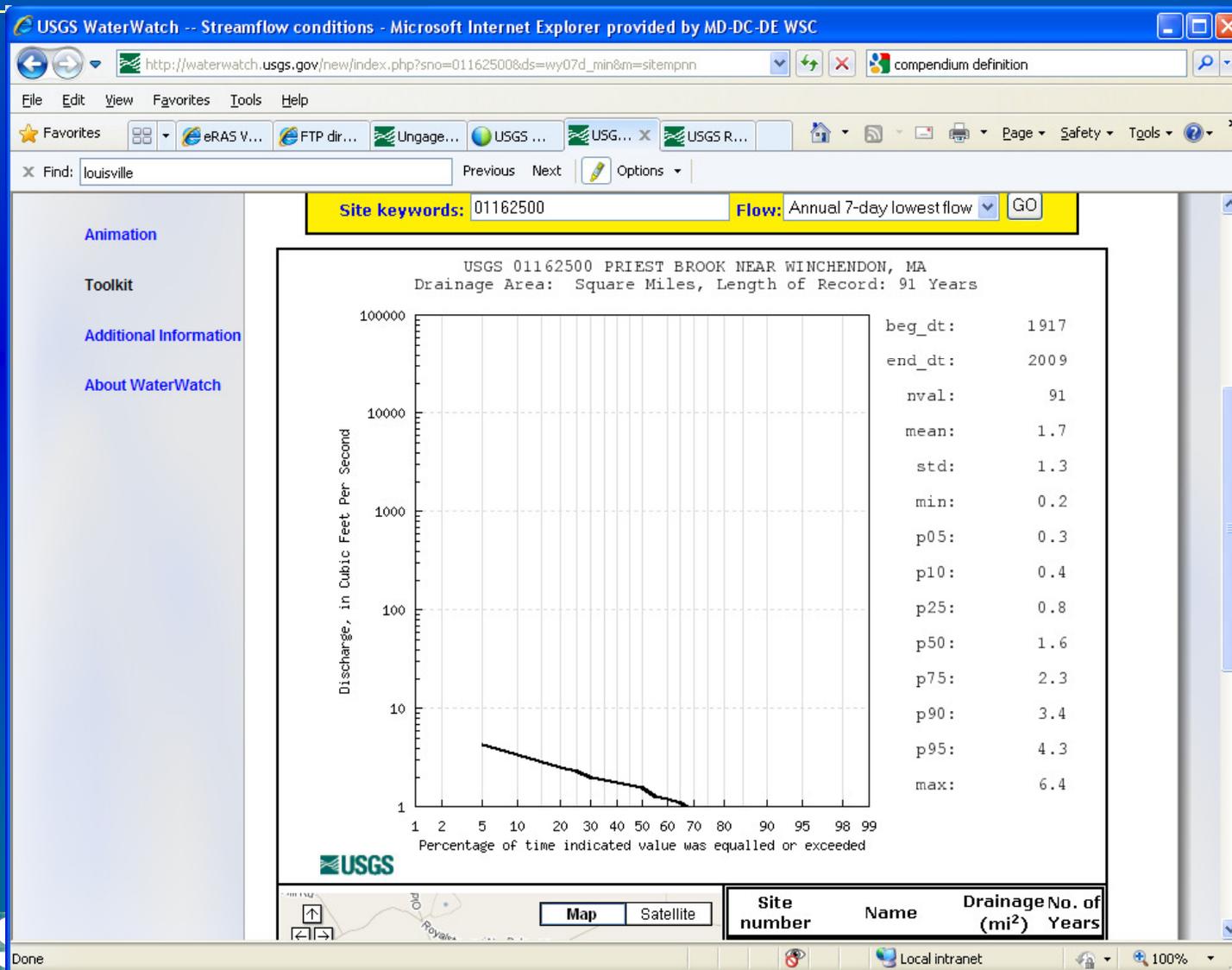
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http://waterwatch.usgs.gov/new/index.php?id=ww_toolkit

Duration Hydrographs



Retrieve Streamgauge Statistics



StreamStats Home Page

<http://streamstats.usgs.gov>

Welcome to StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC

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

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Done

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Massachusetts Introductory Page

StreamStats in Massachusetts - Microsoft Internet Explorer provided by MD-DC-DE WSC

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

Gruber-Veilleux

File Edit View Favorites Tools Help

StreamStats in Mass... Joint Federal Interagenc... eRAS VPN - Home washingtonpost.com - n... AWRA Water Blog EarthPortal » Archive » ...

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Welcome to StreamStats

Best viewed in Internet Explorer 5 or above
Screen resolution of 1152x864 or greater, with pop-up blocker disabled

Massachusetts

Attention!
A new equation for estimating the probability of perennial flow and several new tools have been added to this application.

StreamStats for Massachusetts can be used to estimate the long-term 99-, 98-, 95-, 90-, 85-, 80-, 75-, 70-, 65-, 60-, 55-, and 50-percent duration flows, the 7-day, 2-year and the 7-day, 10-year low flows, and the August median flow for ungaged sites (Ries and Friesz, 2000). An equation for estimating the probability of a stream flowing perennially also is available (Bent and Steeves, 2006). The reports below present the equations used to estimate the flow statistics, describe the errors associated with the estimates, and describe 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 ungaged sites.

- Ries, K.G., III, and Friesz, P.J., 2000, *Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p.*
- Bent, G.C., and Steeves, P.A., 2006, *A revised logistic regression equation and an automated procedure for mapping the probability of a stream flowing perennially in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2006-5031, 107 p., 1 CD-ROM.*

The equations are applicable for most areas of Massachusetts except eastern Buzzards Bay, Cape Cod, and the Island regions, and the main branches of the Connecticut and Merrimack Rivers. Estimates obtained from the equations assume natural flow conditions at the site.

For the equations from Ries and Friesz (2000), StreamStats reports the uncertainty of the estimates for basins with drainage areas between 1.61 and 149 mi². For equations from Bent and Steeves (2006), StreamStats reports the uncertainty of the estimates for basins with drainage areas between 0.01 and 1.99 mi². Errors for basins with drainage areas beyond these bounds are unknown.

The "Estimate Flows Using Regression Equations" tool provides flow statistics at most any site, but better estimates of streamflow statistics generally can be obtained by using the "Estimate Flow Based on Similar Streamgaging Stations" tool. The site of interest has a drainage area that is between 0.3 and 1.5 times the drainage area for an gaged station on the same stream. The Ries and Friesz (2000) report describes the basis for implementing this method.

Interactive Map

StreamStats for Massachusetts was developed in cooperation with the former Massachusetts Department of Environmental Management, now part of the Massachusetts Department of Conservation and Recreation. Additional support for StreamStats was provided by the Massachusetts Department of Environmental Protection and the Massachusetts Geographic Information

Local intranet 85%

Special notices about application

Lists statistics estimated by regression equations

Gives report citations

Describes physical limits of applicability

Link to application

Other issues, cooperative statement

Massachusetts User Interface

USGS StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC

http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx?stabbr=ma&dt=1304640744523

USGS
Massachusetts StreamStats

Zoom To: 1:2,000,000

Panel Banners

Console

Toolbar

Results >>
Map Contents >>
Navigation >>
Overview >>

Accessibility FOIA Privacy Policies and Notices
U.S. Department of the Interior | U.S. Geological Survey
URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
Page Last Modified: 05/05/2011 20:12:41

Streamstats Status News

USA.gov
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AutoRefreshMap:38,1,5 Thu May 5 20:31:47 EDT 2011/Thu May 5 20:49:42 EDT 2011

Local intranet 100%

Zoom-To Tools

Lat/Long

Zoom to Latitude-Longitude - Microsoft Internet Explorer provided by MD-...

USGS
Massachusetts StreamStats

Enter a valid NAD83 Latitude, Longitude

Coordinates can be in DD.dddd, DD MM.mmm, or DDD MM SS.ss format

Latitude Longitude

Zoom To: [v]

Zoom To:

- Lat/Long
- Place Name
- Reach Code

Named Place

GNIS Info Page - Microsoft Internet Explorer provided by MD-DC-DE WSC

USGS
Massachusetts StreamStats

Geographic Name / Feature Lookup

Geographic Names Information System (GNIS) (Help)

You must enter at least two parameters.

Feature Name

Exact Match Starts With Contains

Feature Type (Definitions)

None Selected [v]

State

Massachusetts [v]

County

All Counties [v]

Contact GNIS Manager
GNIS Frequently Asked Questions

Reach Code

Zoom to NHD Reach and Measure - Microsoft Internet Explorer provided by...

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Massachusetts StreamStats

Enter a valid NHD Reach and Measure

NHD Resolution

Help

Help that is
specific to
StreamStats
is under
More
Information

Streamstats Application Help - Microsoft Internet Explorer provided by MD-DC-DE WSC

http://streamstatsags.cr.usgs.gov/ma_ss/Help/default.htm

USGS
Massachusetts StreamStats

Application Help

Getting started
Quick tour

Find

- Identify features on the map
- Search for features
- Measure distance and area
- Using Results

Explore the map

- Using the mouse
- Using the keyboard
- Using the Overview and Magnifier
- Using the Toolbar

Personalize

- Working with layers and map contents

More information

- StreamStats User Instructions
- System requirements
- Frequently asked questions and troubleshooting
- Getting more help and information

USGS

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Working With Panels

USGS StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC

http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx?stabbr=ma&dt=1304640744523

USGS
Massachusetts StreamStats

Zoom To: 1:2,000,000

Results >>>
Map Contents >>>

- MA@ma_ss
- NHDHGage
- NHDHDam
- GlobalWatershedPoint
- GlobalWatershed
- Stream Gages
- Hinh Res NHD Stream

Navigation >>>
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User Interface with NHD Gages and Dams

USGS StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC
http://ssdev.cr.usgs.gov/ma_ss/default.aspx?stabbr=MA&dt=1253907157705

USGS
Massachusetts StreamStats

Zoom To: 1:2,000,000

Results

Map Contents

- MA@ma_ss
 - SDE92data.DBO.nhdhdai
 - SDE92data.DBO.nhdhga
 - Stream Gages
 - High Res NHD Stream
 - State Boundaries
 - Dendritic Stream Network

Navigation

Overview

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U.S. Department of the Interior | U.S. Geological Survey
URL: http://ssdev.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
Page Last Modified: 09/25/2009 15:32:57

Streamstats Status

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Select Ungaged Site

USGS StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC

http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx?stabbr=ma&dt=1273683533647

USGS
Massachusetts StreamStats

Results >>>
Map Contents >>>
MA@ma_ss
GlobalSDE.SS_USER.nhc
GlobalSDE.SS_USER.nhc
Stream Gages
Gaging Station, Conti
Low Flow, Partial Rec
Peak Flow, Partial Re

Navigation >>>
Overview >>>

Scale: 1:20,792

Scale must indicate 1:24,000 or greater

USGS
some base map material provided by Maptech, Inc. (Copyright © 2008)

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URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
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Streamstats Status News

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Delineated Basin

USGS StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC

http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx?stabbr=ma&dt=1304855891909

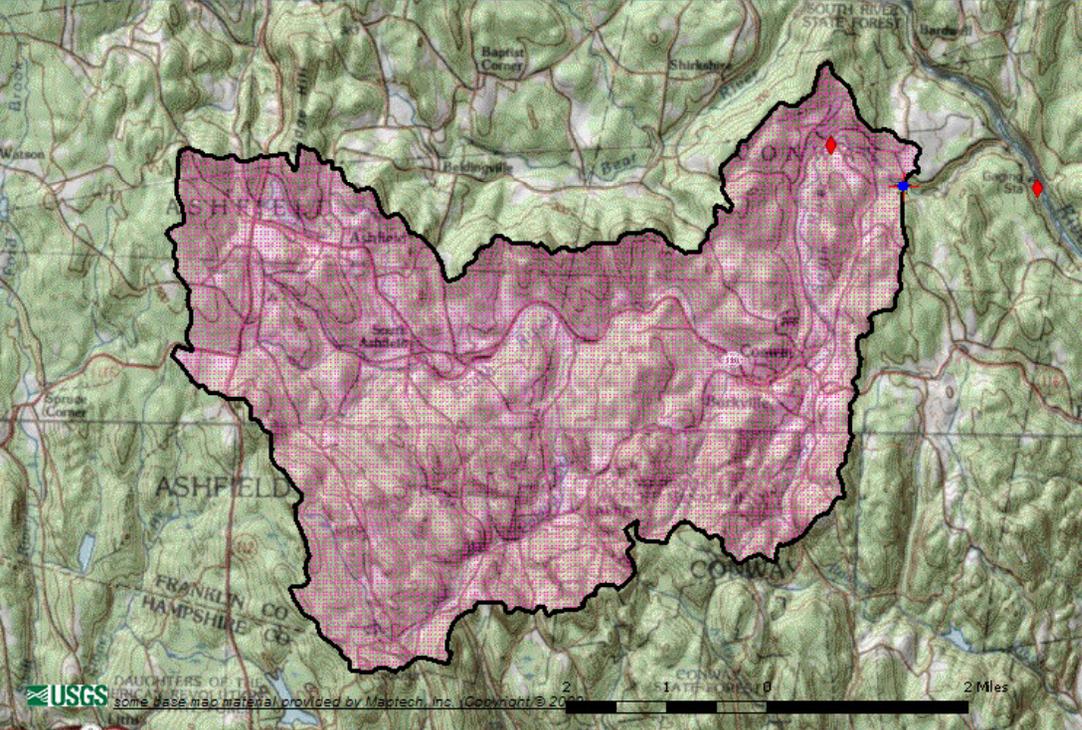
USGS Massachusetts StreamStats

Map Contents

- MA@ma_ss
 - NHDHGage
 - NHDHDam
 - GlobalWatershedPoint
 - GlobalWatershed
 - Stream Gages
 - ▲ Gaging Station, Conti
 - ▲ Low Flow, Partial Rec
 - ▲ Peak Flow, Partial Rec

Navigation

Overview



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URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx
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Streamstats Status News

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Flow Statistics from Regression Equations

USGS StreamStats - Microsoft Internet Explorer provided by ...

USGS Massachusetts StreamStats

Streamstats Ungaged Site Report

Date: Thu Aug 26 2010 12:27:36 Mountain Daylight Time
 Site Location: Massachusetts
 NAD27 Latitude: 42.5360 (42 32 10)
 NAD27 Longitude: -72.6800 (-72 40 48)
 NAD83 Latitude: 42.5361 (42 32 10)
 NAD83 Longitude: -72.6795 (-72 40 46)
 ReachCode: 01080203000130
 Measure: 41.38
 Drainage Area: 25.4 mi²

Low Flows Basin Characteristics

100% Statewide Low Flow (25.4 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	25.4	1.61	149
Mean Basin Slope from 250K DEM (percent)	9.62	0.32	24.6
Stratified Drift per Stream Length (square mile per mile)	0.0679	0	1.29
Massachusetts Region (dimensionless)	1	0	1

Probability of Perennial Flow Basin Characteristics

100% Perennial Flow Probability (25.4 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	25.4 (above max value 1.99)	0.01	1.99
Percent Underlain By Sand And Gravel (percent)	13.51	0	100
Percent Forest (percent)	78.29	0	100
Massachusetts Region (dimensionless)	1	0	1

Warning: Some parameters are outside the suggested range. Estimates

Low Flows Regression Equations

USA.gov U.S. Department of the Interior
 TAKE PRIDE IN AMERICA

Flow Statistics from Regression Equations

USGS StreamStats - Microsoft Internet Explorer provided by ...

Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.

Low Flows Streamflow Statistics

Statistic	Flow (ft ³ /s)	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
				Minimum	Maximum
D50	25.9	18		15.6	42.7
D60	18.3	20		10.8	30.9
D70	13.5	24		7.44	24.3
D75	11.2	26		6.12	20.8
D80	9.77	28		5.25	18.2
D85	8.54	30		4.56	16.1
D90	7.54	33		3.94	14.6
D95	6.73	37		3.42	13.2
D98	6.18	41		3.02	12.0
D99	5.78	45		2.71	11.0
M7D	4.23	51		1.97	8.73
AUGD50	8.42	33		4.14	16.8
M7D10Y	2.5	71		0.77	7.53

The equation for estimating the probability of perennial flow is applicable for most areas of Massachusetts except eastern Buzzards Bay, Cape Cod, and the Island regions. The estimate obtained from the equation assumes natural flow conditions at the site. The equation also is best used for sites with drainage areas between 0.01 to 1.99 mi², as errors beyond for basins beyond these bounds are unknown.

Probability of Perennial Flow Statistics

Statistic	Value	Standard Error (percent)
PROBPEREN	0.99	

Regression equation estimates assume natural flow conditions at the selected site

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U.S. Department of the Interior | FOIA
URL: http://streamstatsags.cr.usgs.gov
Page Contact Information: StreamStats
Page Last Modified: 05/08/2011 09:00 AM

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Example Regression Equation

■ $Q_{100} = 5.39DA^{0.874}(E/1000)^{-1.13}P^{1.18}$

where

- Q_{100} is the 100-year flood, in feet³/second
- DA is Drainage Area, in square miles
- E is mean basin elevation, in feet
- P is mean annual precipitation, in inches

Citation: Berenbrock, Charles, 2002, Estimating the Magnitude of Peak Flows at Selected Recurrence Intervals for Streams in Idaho: U.S. Geological Survey Water-Resources Investigations Report 02-4170, 59 p.

Get Basin Characteristics

The screenshot displays a web browser window with two tabs. The active tab is titled "Basin Characteristics Report - Microsoft Internet Explorer provi..." and shows a report from the USGS Massachusetts StreamStats website. The report includes the following information:

Basin Characteristics Report

Date: Fri May 9 2008 08:38:15
NAD83 Latitude: 42.5361 (42 32 09)
NAD83 Longitude: -72.6795 (-72 40 46)
NAD27 Latitude: 42.5360 (42 32 09)
NAD27 Longitude: -72.6800 (-72 40 47)

Parameter	Value
Average area slope in percent	9.62
Total stream length in miles	50.4
low flow region indicator for Massachusetts	1
stratified drift per unit stream length	0.00755
square mile area covered by stratified drift	0.38
Area in square miles	25.4

The second browser window shows a topographic map of the same watershed area, outlined in black. The map includes labels for "SOUTH RIVER STATE FOREST", "CONWAY STATE FOREST", and "Gaging Sta". A scale bar indicates 2 Miles. The footer of the report contains the following text:

Accessibility FOIA Privacy Policies and Notices
U.S. Department of the Interior | U.S. Geological Survey
URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
Page Last Modified: 05/08/2011 07:58:21

Streamstats Status News

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Flow Estimation Based on a Similar Gage

Estimate flows based on gages

Use regulated sites

Estimate Flows Based on Similar Gaging Stations

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URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
Page Last Modified: 05/08/2011 07:58:21

Streamstats Status | News

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Flow Estimation Based on a Similar Gage

Flows Report based on gages - Microsoft Internet Explorer provided by MD-DC-DE WSC

USGS
Massachusetts StreamStats

Flow Estimates Based on Flows at Nearby Streamgaging Stations

Date: Thu Aug 26 2010 12:41:48 Mountain Daylight Time
NAD27 Latitude: 42.5360 (42 32 10)
NAD27 Longitude: -72.6800 (-72 40 48)
NAD83 Latitude: 42.5361 (42 32 10)
NAD83 Longitude: -72.6795 (-72 40 46)
ReachCode: 01080203000130
Measure: 41.38
User-Selected Site Watershed Area, in square miles: 25.4
Use Regulated Station: Yes

Upstream Gage(s)

STATID	NAME	AREA (mi ²)	RATIO	ISREGULATED
01169900	SOUTH RIVER NEAR CONWAY, MA	24.06	0.9472	No

Downstream Gage(s)

STATID	NAME	AREA (mi ²)	RATIO	ISREGULATED
01170000	DEERFIELD RIVER NEAR WEST DEERFIELD, MA	557	21.9291	Yes
01170500	CONNECTICUT RIVER AT MONTAGUE CITY, MA	7860	309.4488	Yes
01172003	CONNECTICUT RIVER BELOW POWER DAM AT HOLYOKE, MA	8309	327.1260	No
01172003	CONNECTICUT RIVER BELOW POWER DAM AT HOLYOKE, MA	8309	327.1260	No
01193000	CONNECTICUT RIVER AT MIDDLETOWN, CT.	10888.0	428.6614	undefined

Print

USGS

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Estimates provided if
RATIO ≥ 0.5 and ≤ 1.5

Flow Estimation Based on a Similar Gage

Flows Report based on gages - Microsoft Internet Explorer provided by MD-DC-DE WSC

MAXDV Maximum_daily_flow 1.0557 1570 37 1660

Estimated flows for the user-selected site determined by weighting of regression equation-based estimates and nearby streamgaging station estimates.

Weighted flows based on regression and gage station estimates

Low-Flow Statistics

Flow types	Flow description	Regression estimates	Drainage-area ratio estimates	Weighted estimates	Weighted equivalent years of record
M7D10Y	7_Day_10_Year_Low_Flow	2.5	3.5	3.39	
M7D2Y	7_Day_2_Year_Low_Flow	4.23999977	5.67	5.51	

Flow-Duration Statistics

Flow types	Flow description	Regression estimates	Drainage-area ratio estimates	Weighted estimates	Weighted equivalent years of record
D99	99_Percent_Duration	2.53999996	3.8	3.66	
D98	98_Percent_Duration	3.20000004	4.56	4.41	
D95	95_Percent_Duration	4.69000005	5.91	5.78	
D90	90_Percent_Duration	6.61000013	7.6	7.49	
D85	85_Percent_Duration	8.14999961	9.61	9.44	
D80	80_Percent_Duration	9.77000045	11.6	11.4	
D75	75_Percent_Duration	11.20000078	13.7	13.4	
D70	70_Percent_Duration	12.5	15.9	15.5	
D60	60_Percent_Duration	18.29999923	23.2	22.7	
D50	50_Percent_Duration	25.89999961	31.7	31	

Weighting methods described in Ries, 2006, USGS T&M, Book 5, Chap. A6)

Done Local intranet 100%

National Hydrography Dataset

- Digital representation of streams, water bodies, and wetlands shown on USGS topographic maps
 - Medium resolution from 1:100,000-scale maps
 - High resolution from 1:24,000-scale maps
- Connections through water bodies, wetlands, road crossings made to provide continuous network
- Navigation to upstream and downstream events
- Numerous national datasets linked as events to NHD (<http://nhd.usgs.gov/>) by reach addressing

Network Navigation/NHD Reach Indexing

Explanation

-  User-selected site
-  Streamgaging station
-  Dam site
-  Point discharge
-  Water withdrawal
-  Biological sampling site

StreamStats provides reach addresses for user-selected sites, consisting of reach number and percentage distance from downstream end of reach

Network Trace Configuration

USGS StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC

Configure NHD Trace - Microsoft Internet Explorer provided by MD-DC-DE ...

USGS
Massachusetts StreamStats

NHD Tracing Configuration

Network: HYDRO_NET

Trace: Upstream

Select layers participating in the trace

- NHDFlowline
- NHDHGAGE
- NHDHDAM

OK

Close

Browse... Upload

Zoom To: 1:171,564

Worcester, Oxford, Douglas, Webster

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URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx

Page Contact Information: StreamStats Help

Page Last Modified: 05/13/2010 08:29:11

Streamstats Status | News

AutoRefreshMap:18,0,5 Thu May 13 08:43:59 EDT 2010/Thu May 13 08:46:23 EDT 2010

Set Stream Network to Display

The screenshot displays the USGS StreamStats web application in Microsoft Internet Explorer. The browser's address bar shows the URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx?stabbr=ma&dt=1273753741676. The page title is "USGS Massachusetts StreamStats".

The main map area shows a topographic map of a region in Massachusetts, including Worcester and Lowell. A stream network is overlaid on the map, with a central area highlighted in pink. The network consists of numerous small streams and larger channels, some marked with red diamonds. The map includes a scale bar at the bottom right, showing 0 to 4 miles.

On the left side, there is a "Map Contents" panel with the following items checked:

- MA@ma_ss
 - GlobalSDE.SS_USER.nhc
 - GlobalSDE.SS_USER.nhc
 - Stream Gages
 - High Res NHD Stream
 - NHDFlowline0106
 - NHDFlowline0107
 - NHDFlowline0108
 - NHDFlowline0109
 - NHDFlowline0110
 - NHDFlowline0202

At the bottom of the page, there is a footer with the following information:

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URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
Page Last Modified: 05/13/2010 08:29:11

Streamstats Status | News

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AutoRefreshMap:27,0,5 Thu May 13 08:54:56 EDT 2010/Thu May 13 08:55:23 EDT 2010

Upstream Network Trace

Trace Report - Microsoft Internet Explorer provided by MD-DC-D...

01100001002945		0.043	122361550
01100001007504		0.222	122362196
01100001007570		0.228	122361187
01100001000952	Little River	0.076	122370924
01100001001813		0.094	122361622
01100001000227		0.139	122362072
01100001007865		0.093	122361259

NHDHGAGE_MA

Source_FeatureID	ReachCode	Measure
01124350	01100001000545	91.12520526
01124500	01100001001839	37.31125480

NHDHDAM_MA

Source_FeatureID	ReachCode	Measure
MA00967	01100001000546	0.32385042
MA00964	01100001007496	0.05573671
MA00983	01100001007573	0.04830127
MA00105	01100001007593	2.87067293

on Trace Outlet

Zoom To: 1:171,564

USGS
U.S. Department of the Interior | U.S. Geological Survey
URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
Page Last Modified: 05/13/2010 08:29:11

Streamstats Status News

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AutoRefreshMap:29,0,5 Thu May 13 08:54:56 EDT 2010/Thu May 13 08:57:23 EDT 2010

Adhoc Upstream Trace

Trace Report - Microsoft Internet Explorer provided by MD-DC-DE WSC
http://streamstatsags.cr.usgs.gov/gisimg/Reports/Report66.htm

USGS StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC
http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx?stabbr=ma&dt=1273753741676

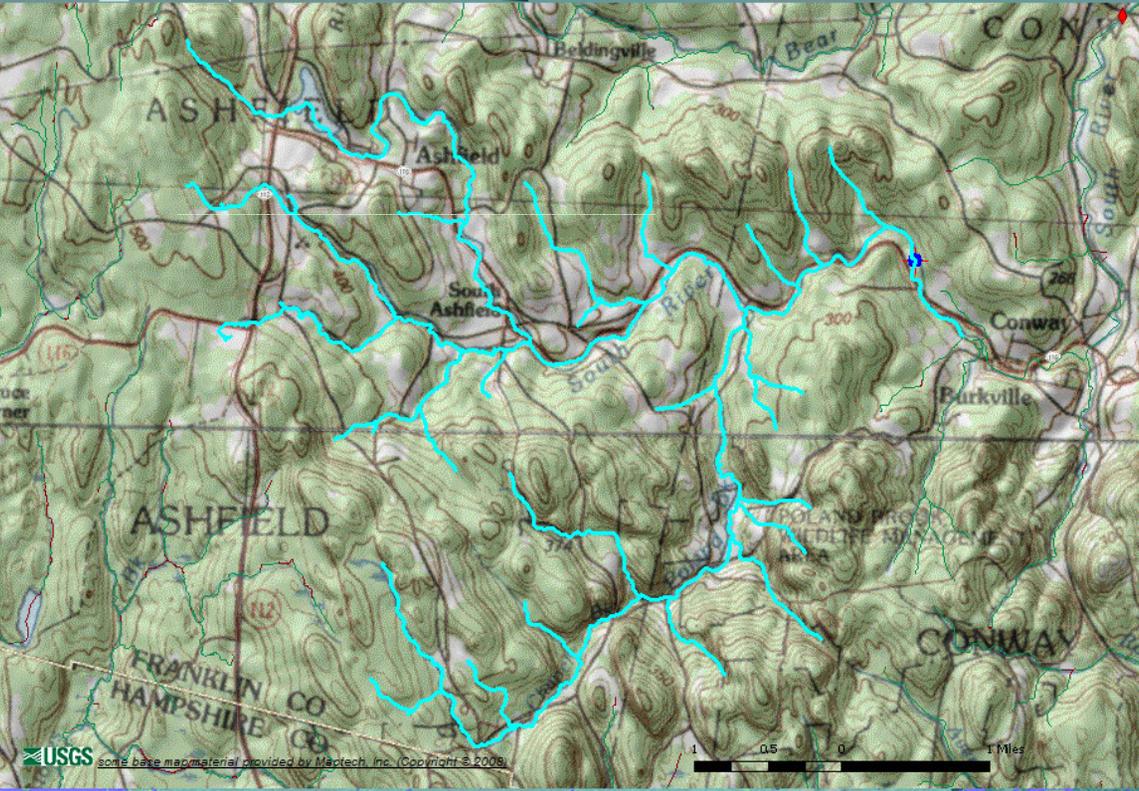
USGS Massachusetts StreamStats

Date: Fri
Network:
Linear Re
Trace dir
ReachCod
Measure:

Results
Map Contents

- MA@ma_ss
 - GlobalSDE.SS_USER.nhc
 - GlobalSDE.SS_USER.nhc
 - Stream Gages
 - High Res NHD Stream
 - NHDFlowline0106
 - NHDFlowline0107
 - NHDFlowline0108
 - NHDFlowline0109
 - NHDFlowline0110
 - NHDFlowline0202

Navigation
Overview



Zoom To: 1:51,698

USGS
some base map material provided by Maptech, Inc. (Copyright © 2008)

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URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
Page Last Modified: 05/13/2010 08:29:11

Streamstats Status | News

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Adhoc Downstream Trace

USGS StreamStats - Microsoft Internet Explorer provided by MD-DC-DE WSC

USGS
Massachusetts StreamStats

Zoom To: 1:329,213

Results

Map Contents

- MA@ma_ss
 - SDE92data.DBO.nhdhda
 - SDE92data.DBO.nhdhga
 - Stream Gages
 - High Res NHD Stream
 - NHDFlowline0106
 - NHDFlowline0107
 - NHDFlowline0108
 - NHDFlowline0109
 - NHDFlowline0110
 - NHDFlowline0202
 - State Boundaries
 - Dendritic Stream Network

Navigation

Overview



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U.S. Department of the Interior | U.S. Geological Survey
URL: http://ssdev.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
Page Last Modified: 05/13/2010 10:15:02

Streamstats Status

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Done, but with errors on page. Local intranet 100%

Terrain Profile Tool

Plot of distance vs elevation HUC:01080204 63 points. - Microsoft Internet Explorer provided by MD-DC-DE WSC
http://ssdev.cr.usgs.gov/ma_ss/plot.aspx?stabbr=MA

Microsoft Excel

Home Insert Page Layout Formulas Data Review View Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

Calibri 11

General

AutoSum Fill Clear Sort & Filter Find & Select

A1

DataView[1].xls

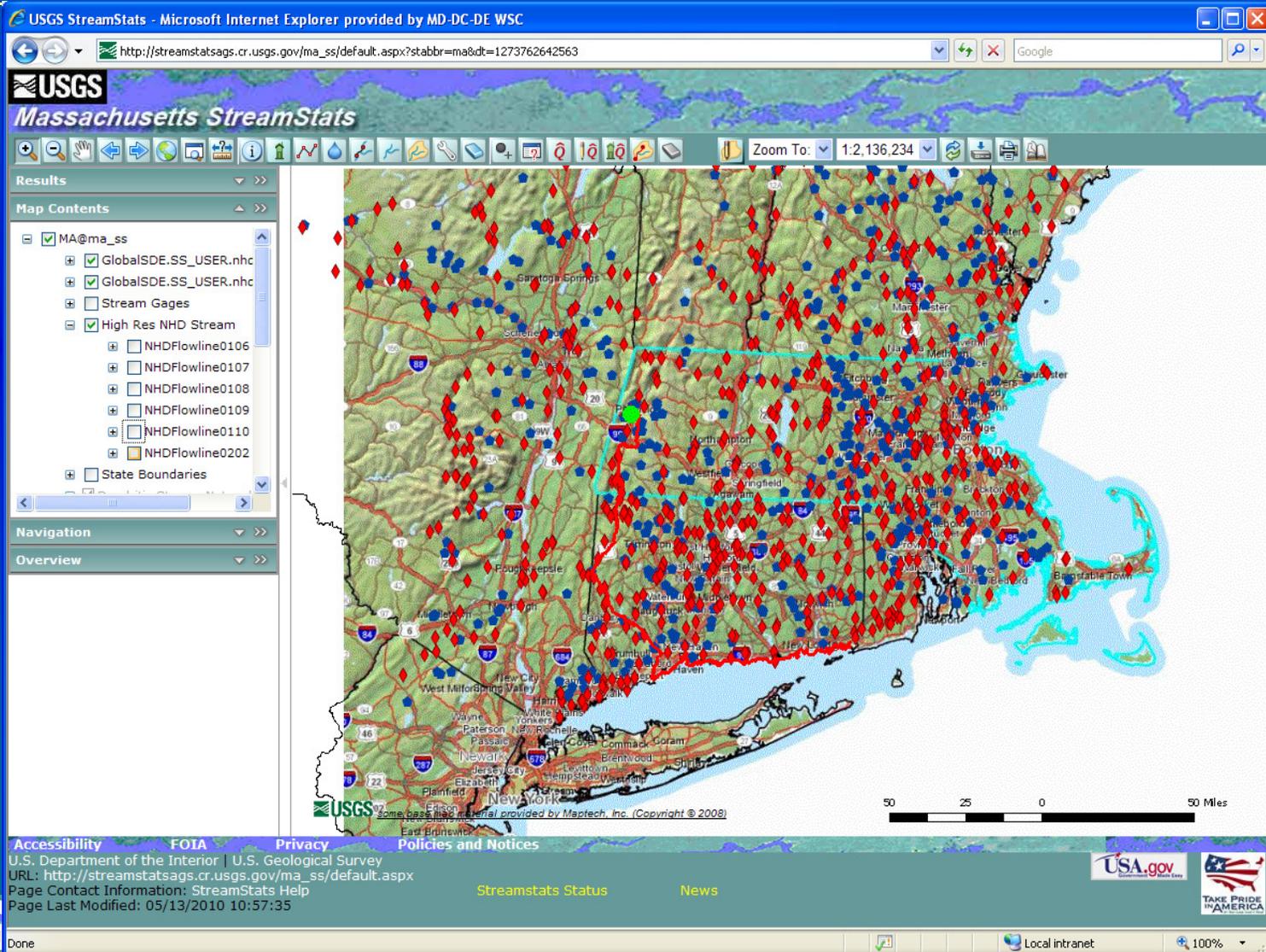
1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
2	S	Z	X	Y	UserPoint													
3	0	212.89	131083.06	893314.08	TRUE													
4	10.24	212.51	131073.04	893311.95	FALSE													
5	20.49	211.24	131063.02	893309.82	FALSE													
6	30.73	210.19	131053	893307.7	FALSE													
7	40.98	208.96	131042.97	893305.57	FALSE													
8	51.22	207.43	131032.95	893303.45	FALSE													
9	61.46	205.44	131022.93	893301.32	FALSE													
10	71.71	202.32	131012.91	893299.2	FALSE													
11	81.95	199.4	131002.89	893297.07	FALSE													
12	92.2	196.14	130992.87	893294.94	FALSE													
13	102.44	192.49	130982.85	893292.82	FALSE													
14	112.69	188.21	130972.83	893290.69	FALSE													
15	122.93	182.88	130962.8	893288.57	FALSE													
16	133.17	177.16	130952.78	893286.44	FALSE													
17	143.42	171.38	130942.76	893284.32	FALSE													
18	153.66	166.34	130932.74	893282.19	FALSE													
19	163.91	162.54	130922.72	893280.06	FALSE													
20	174.15	160.75	130912.7	893277.94	FALSE													
21	184.39	159.77	130902.68	893275.81	FALSE													
22	194.64	159.73	130892.66	893273.69	FALSE													
23	204.88	160.66	130882.64	893271.56	FALSE													
24	215.13	163.23	130872.61	893269.44	FALSE													
25	225.37	165.88	130862.59	893267.31	FALSE													
26	235.62	169.05	130852.57	893265.18	FALSE													
27	245.86	172.38	130842.55	893263.06	FALSE													
28	256.1	175.67	130832.53	893260.93	FALSE													
29	266.35	180.37	130822.51	893258.81	FALSE													

Ready

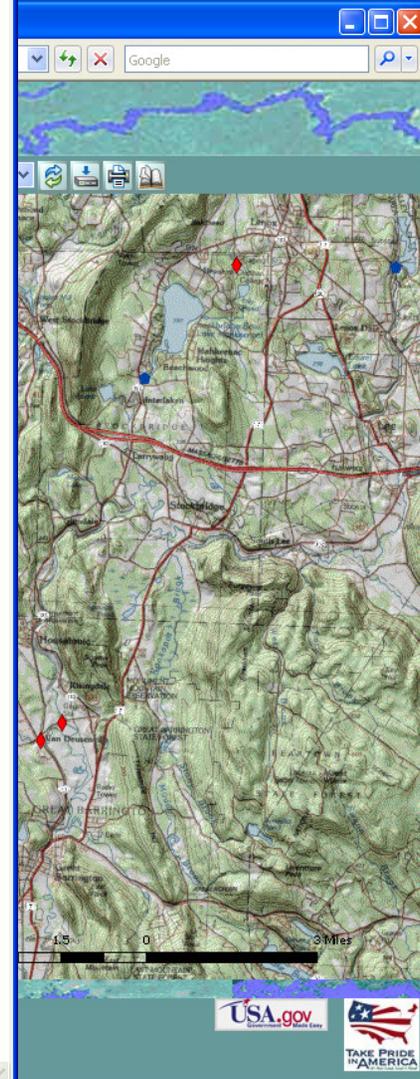
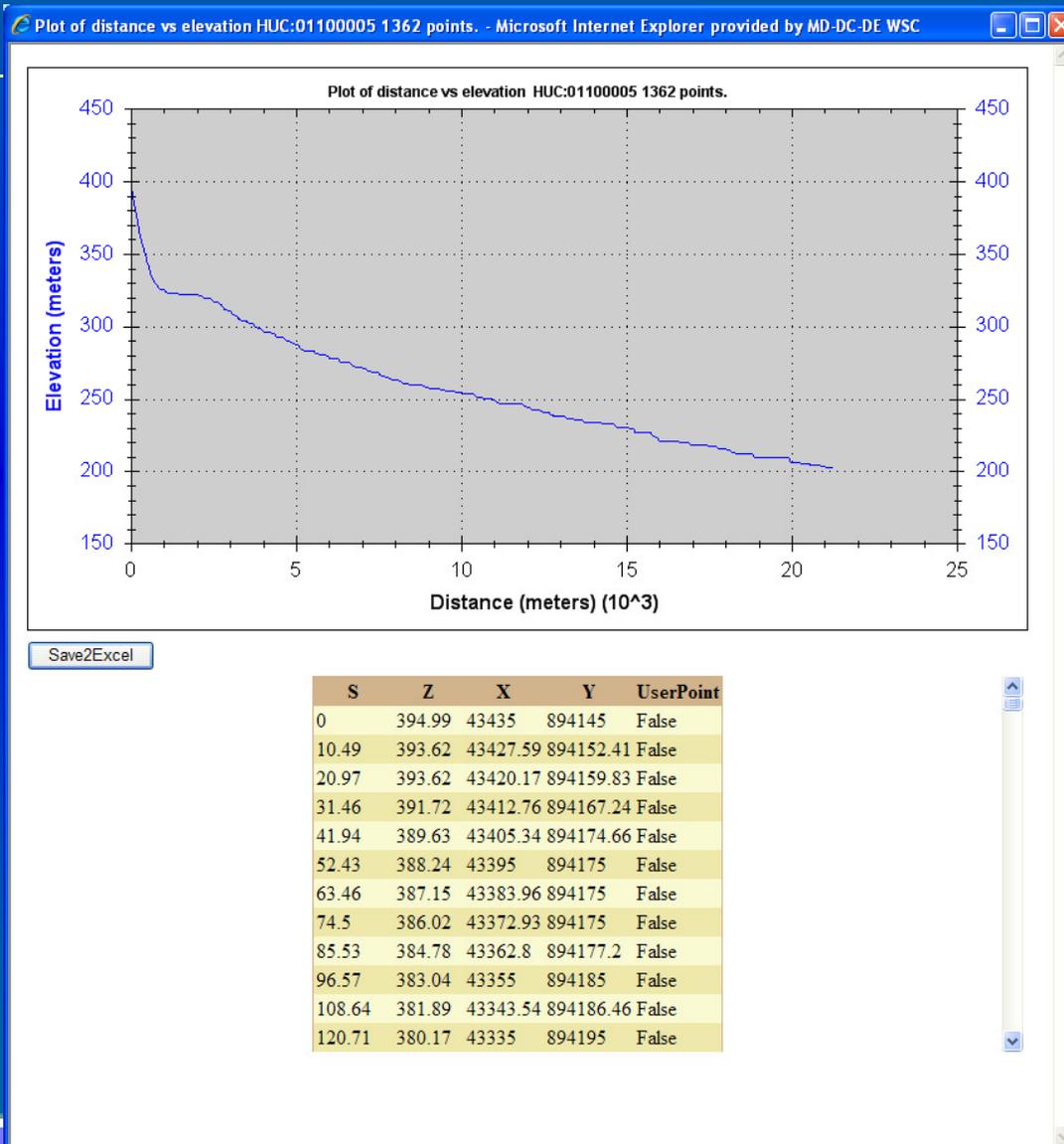
100%



Raindrop Trace to Network



Trace Flow Path within Watershed



Reach Navigation Applications

- Identify upstream/downstream point events, such as dams, point discharges, data-collection sites
- Compute distance (i.e. to nearest upstream dam)
- Sum (i.e. of all upstream/downstream public water supply sites)
- Point event attribute queries (i.e. total impounded area upstream)
- Trends (altered flow impacts moving downstream)
- Cross table referencing (i.e. relate dam locations to gage locations)
- Linear event summaries (i.e. total length of all reaches that are bordered by impervious area)

Water-Use Summaries

- Summaries of upstream water-use are provided in the output for ungaged sites in Maryland
- Functionality developed by linking StreamStats to data in USGS SWUDS water-use database
- Simple accounting of withdrawals and discharges
- Does not account for what happens in between
- Functionality is in development for NJ
- Other states interested (PA, NY, MA)

Water-Use Summary

Streamflow Statistics Report - Microsoft Internet Explorer provided by MD-DC-DE WSC

Water-Use Report
Withdrawal-Discharge Summary Report for 2005
[values are in million c

Available to all users

Totals	January	February	March	April	May	June	July	August	September	October	November	December	Annual mean	Annual sum
Withdrawals	0.0027	0.0027	0.0027	0.024	0.0293	0.0497	0.04	0.0343	0.073	0.0087	0.0027	0.0007	0.0225	8.223
Discharges	0.009	0.009	0.1	0.01	0.01	0.01	0.01	0.008	0.009	0.01	0.01	0.01	0.0171	0.205
Net	0.0063	0.0063	0.0973	-0.014	-0.0193	-0.0397	-0.03	-0.0263	-0.064	0.0013	0.0073	0.0093	-0.022	-8.018

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$$\text{Net} = \sum \text{Discharges} - \sum \text{Withdrawals}$$

Detailed Water-Use Site Information

Streamflow Statistics Report - Microsoft Internet Explorer provided by MD-DC-DE WSC

Detailed Site Report

[values are in million gallons per day; FA-DV is a surface-water withdrawal, FA-OF is a surface-water discharge, GW is a ground-water withdrawal]

NAME	TYPE	WATUSECD	PERMITNUM	PERMITCODE	SWUDSID	YEAR	January	February	March	April	May	June	July	August	September	October	Nov
SW Intake-Deer Creek near Mine Field, MD	FA-DV	IR	HA1												0.007	0.004	0.001
SW Intake-Deer Creek at Street, MD	FA-DV	IR	HA1												0.04	0.002	0
HA Ba 89	GW	CO	HA1												0	0	0
HA Bc 40	GW	IR	HA1992G010	ALLC	2147446188	2005	0	0	0	0.003	0.003	0.004	0.005	0.006	0.006	0.002	0.001
HA Bc 39	GW	IR	HA1989G026	ALLC	2147446191	2005	0.0003	0.0003	0.0003	0.005	0.0057	0.0083	0.003	0.0047	0.01	0.0003	0.000
HA Bc 36	GW	IR	HA1989G026	ALLC	2147446082	2005	0.0003	0.0003	0.0003	0.005	0.0057	0.0083	0.003	0.0047	0.01	0.0003	0.000
BA Ad 152	GW	IR	BA1992G027	ALLC	2147447410	2005	0	0	0	0	0	0	0	0	0	0	0
SW Outfall-Deer Creek at Federal Hill, MD	FA-OF		MD0024953	NPDS	2147446325	2005	0.009	0.009	0.1	0.01	0.01	0.01	0.01	0.008	0.009	0.01	0.01

Done

Local intranet 100%

Available only for users with login privileges (mostly gov't agencies)

Custom State App Functionality

- KY – Web service for estimation of daily time series of precipitation and temperature (not on user interface)
- IN – “Coordinated” discharge estimates
- MD – Water-use summaries in ungaged site outputs
- PA – Desktop application incorporating water use
- ID and MA – Estimation of probability of perennial flow
- Daily flow estimation for Connecticut R. Basin, in development for Delaware R. Basin, NY, PA

StreamStats Web Services

Available for:

- Basin delineation
- Gaging station statistics
- Ungaged site statistics
- Compute NHD reach and measure
- More coming

See [Available Web Services](#) link from StreamStats home page for more information

USGS Streamstats

Web Service Query Builder

Request: Returns the geometry for the basin boundary starting at the user-requested point.

State:

Output Format:

Input CRS: NAD83 State Plane Kentucky FIPS 1600 US Feet

X:

Y:

The request to Server:
`http://streamstats09.cr.usgs.gov/ss_ws_client/ngi.aspx?request=DoDelineation&stabbr=KY&outputformat=application/gml+xml&x=5871440&y=3689777&CRS=EPSG:6.6:3089`

The response from Server:

```
<?xml version='1.0' encoding='UTF-8'?>
<gml:Polygon srsName='urn:ogc:def:crs:EPSG:6.6:3089' xmlns:gml='http://www.opengis.net/gml'>
<gml:exterior>
<gml:LinearRing>
<gml:posList>
5871007 96517518 3688215 75261655 5870977 96517517 3688215 75261655 5870977 96517517 3688245 75261656 5870767 96517507 3688275 75261658 5870737 96517505 3688275 75261658 5870737 96517505 3688365 75261662 5870707 96517504 3688365 75261662
5870707 96517504 3688635 75261675 5870737 96517505 3688635 75261675 5870737 96517505 3688665 75261676 5870767 96517507 3688665 75261676
5870767 96517507 3688695 75261677 5870797 96517508 3688695 75261677 5870797 96517508 3688755 7526168 5870827 9651751 3688755 7526168
5870827 9651751 3688785 75261682 5870857 96517511 3688785 75261682 5870857 96517511 3688815 75261683 5870887 96517512 3688815 75261683
```

StreamStats Results in Google Earth

Basin: UT Demo

For more information see:
[StreamStats Web Services](#)

OID = 3708
HydroID = 4575
DrainID = 4575
Name = UT Demo
Descript = W14060009
GlobalWshd = 1
HUCID = 14060009
DRNAREA = 119.47
ELEV = 9211.859
BSLDEM10M = 29.924
PRECIP = 25.516
HERBNAT = 7.945
PK2 = 253
PK5 = 574
PK10 = 856
PK25 = 1340
PK50 = 1780
PK100 = 2420
PK200 = 2840
PK500 = 3720

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Image State of Utah
Image © 2009 DigitalGlobe

USGS

39°44'27.78" N 111°27'27.09" W elev 6929 ft

Google

Eye alt 27.58 mi

Questions or Suggestions?

- URL

- <http://streamstats.usgs.gov>

- Team email

- [GS-W StreamStats@usgs.gov](mailto:GS-W_StreamStats@usgs.gov)