

These user instructions are applicable to the StreamStats version 3 web application. States that are initially implemented in version 3 will not have all of the functionality that was available in version 2. Available functionality will vary among states until all state applications have been fully transitioned from version 2 to version 3.

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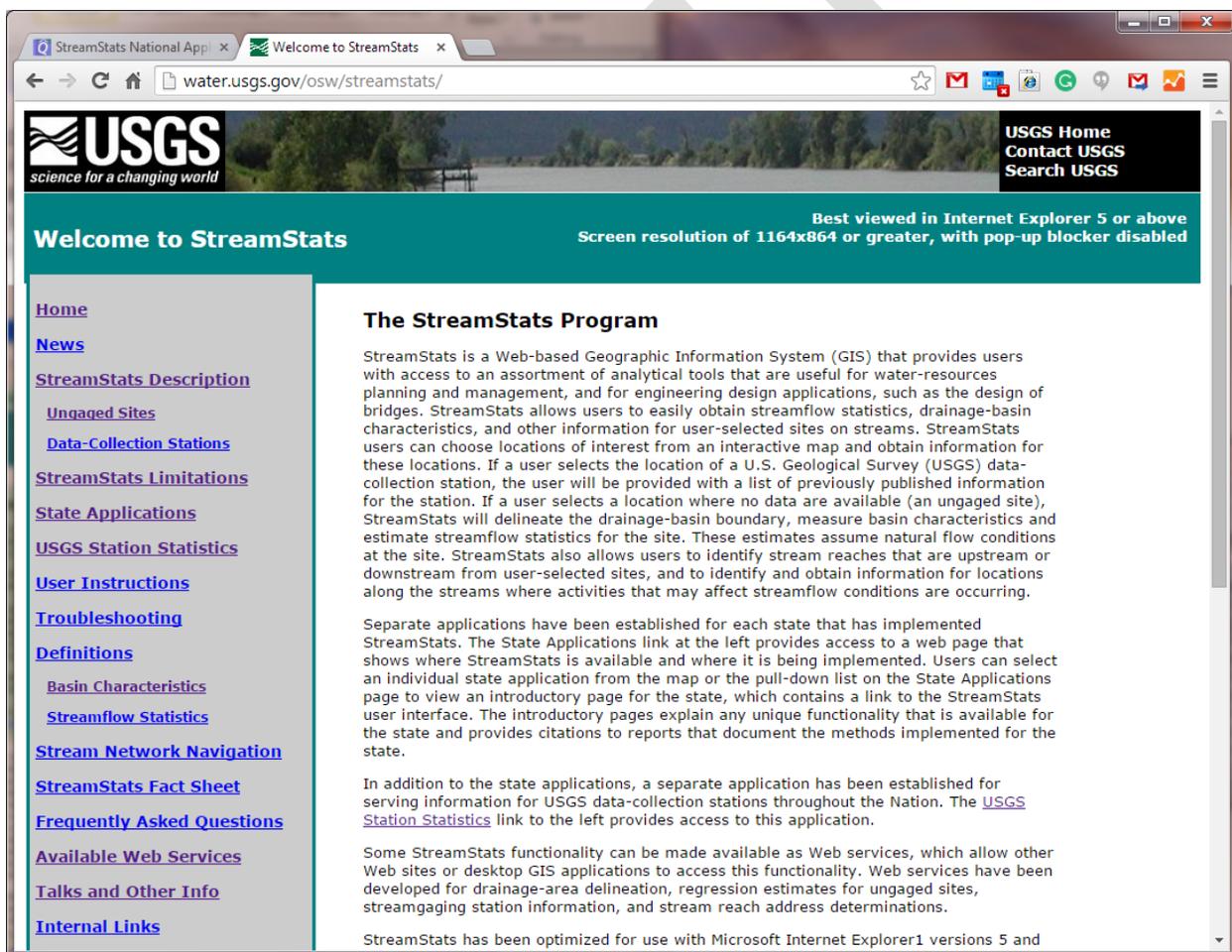
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Introduction

The StreamStats home page can be accessed at:

<http://streamstats.usgs.gov>

The home page provides a brief description of the application. A gray box on the left side of the page provides links to the individual state applications, a national application that provides statistical information only for USGS data-collection stations, documentation for use of StreamStats, news items, contact information, and current streamflow conditions at USGS data-collection stations.



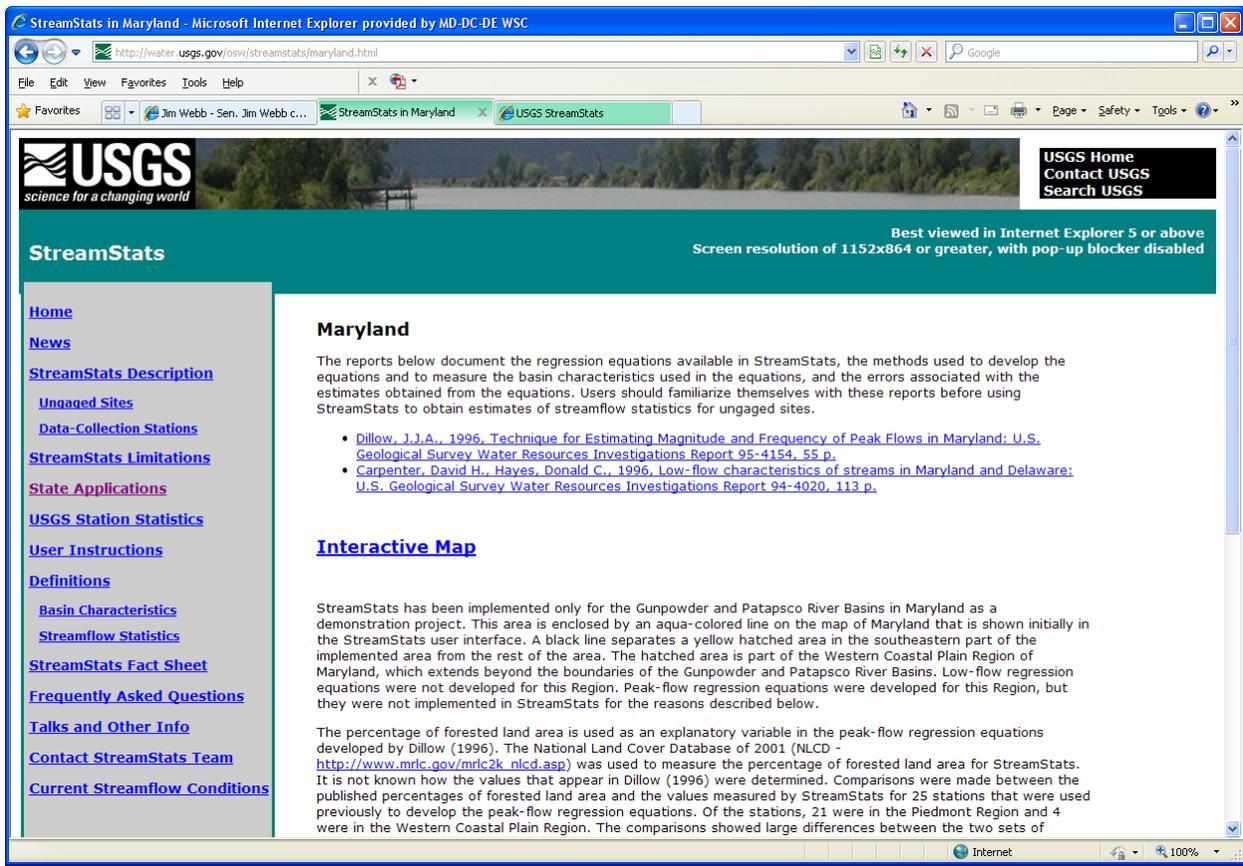
Users should read and be familiar with the descriptions of the StreamStats output pages and user instructions before attempting to use the application. The Definitions pages give detailed definitions for the abbreviated names of basin characteristics and streamflow statistics that appear in the output pages.

Browser requirements

StreamStats is best viewed in Internet Explorer 10 or higher, or newer versions of Chrome and Firefox, with pop-up blocker disabled. The browser must allow HTML5 asynchronous script execution.

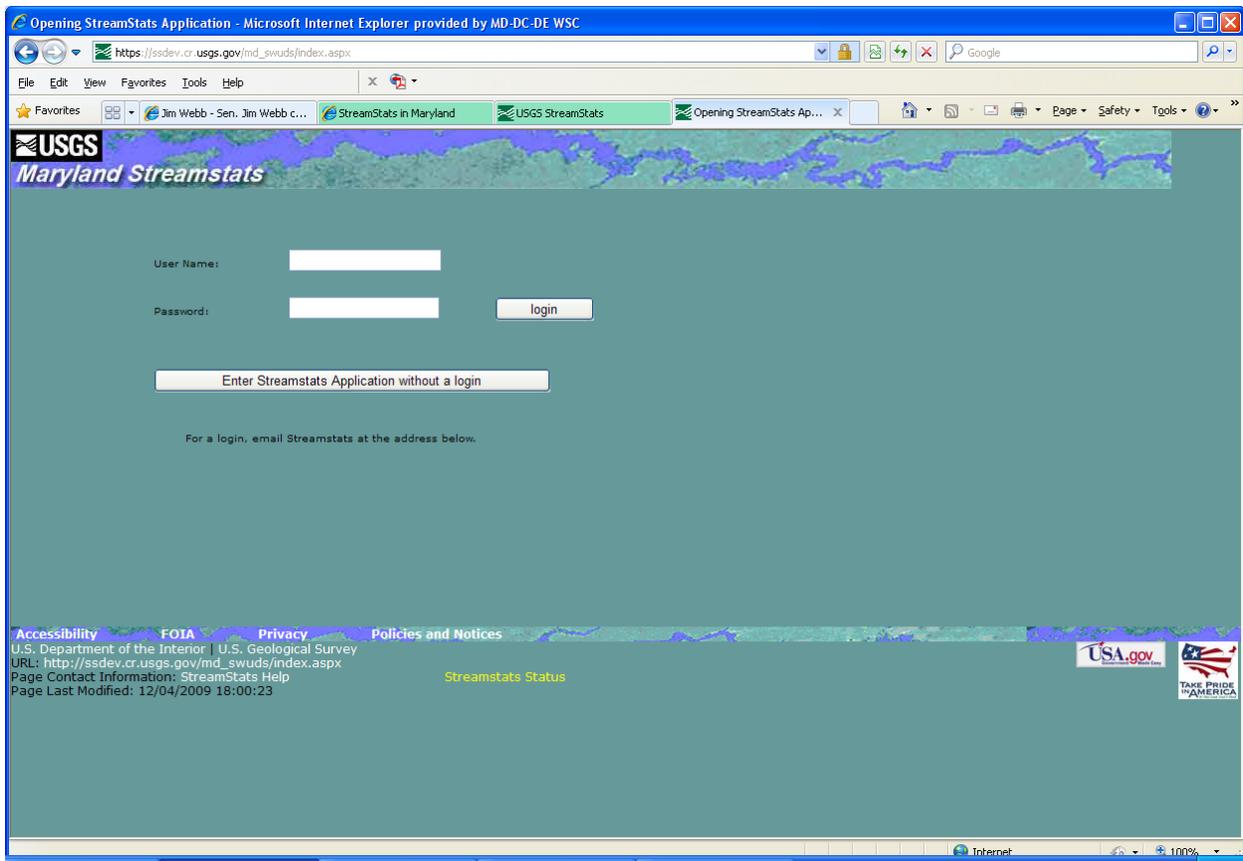
Access to the State Introductory Pages

Each state is implemented in StreamStats as a separate web application. There is also a separate web application for the Connecticut River Basin. The State Applications link in the gray links box on the left side of the home page provides access to a web page with a map that shows the status of the various state and basin applications and pull-down lists of implemented states and river basins. Applications are available for states colored in green on the map. Clicking on the state or river basin name from one of the pull-down lists or clicking on a state on the map causes an introductory page for the selected state or river basin to appear. *It is suggested that frequent users of a state application should bookmark the state introductory page for quick future access.* The Maryland introductory page, for example, can be accessed directly at <http://water.usgs.gov/osw/streamstats/maryland.html>. Other state introductory pages can be accessed directly by changing the state name in this URL to the name of the desired state.



The introductory pages describe the streamflow statistics that can be estimated for ungaged sites by use of regression equations, and the reports from which those equations were taken. Citations and links to online versions of the reports are provided. The introductory pages also describe any unique issues with use of StreamStats for the selected state or river basin. In addition, the pages identify the agencies with which the USGS partnered to develop StreamStats. Links to the home pages of those agencies are provided. *It is important to read the discussion on the introductory page and review the cited reports before using a state application.*

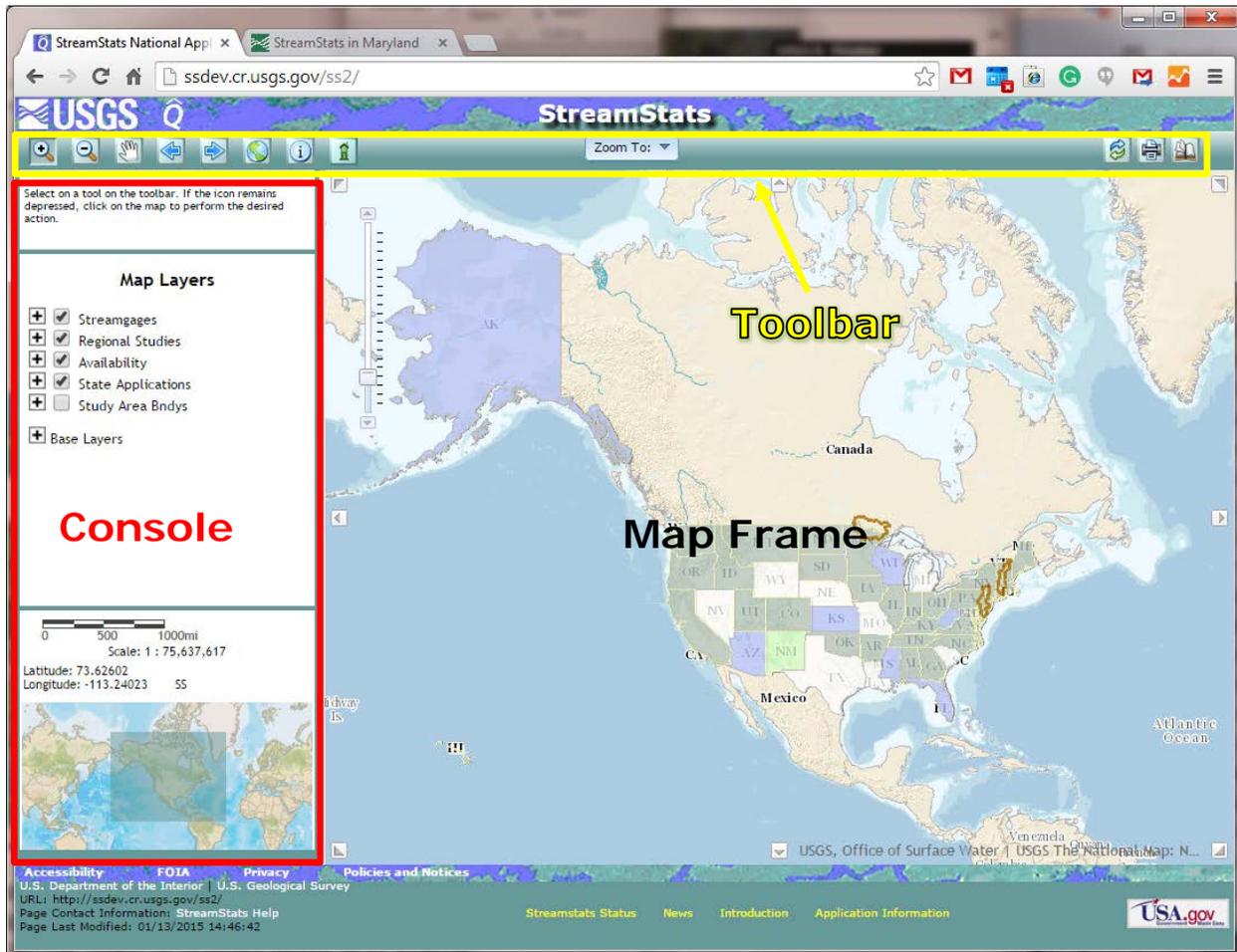
Except for Maryland, clicking on the Interactive Map link on the introductory page for a state or a river basin will cause a new web browser window to appear that will display the StreamStats user interface. When the Interactive Map link is clicked on the Maryland introductory page, a new web page will appear that allows users to either continue on to the user interface or to login to the Maryland application.



Maryland users who choose to login will have access to site-specific water-use information when they obtain estimates of flow statistics for locations on streams that they select. Users who do not login will be able to obtain a summary of water withdrawals and returns upstream from their selected sites, but not site-specific information. A link is provided on the page for users to request a login ID and password. The user interface will appear after the user either enters logs in, or after the user clicks on the button that allows entering the application without logging in.

The state introductory pages also can be accessed from links provided in the user interface, as described below.

The User Interface



StreamStats version 3 replaces the separate user interfaces for each state that were available in version 2 with a single national user interface. The state applications will be transitioned from version 2 to version 3 individually over a period of time. The version 3 user interface, shown above, displays a map with the states shown in various colors to indicate their status, including which version of StreamStats is available for the state. Currently, the StreamStats home page provides a link to the USGS Station Statistics application, a separate national application that provides only information for USGS data-collection stations. This application, and the link to it, will be removed once all state applications have been transitioned to version 3.

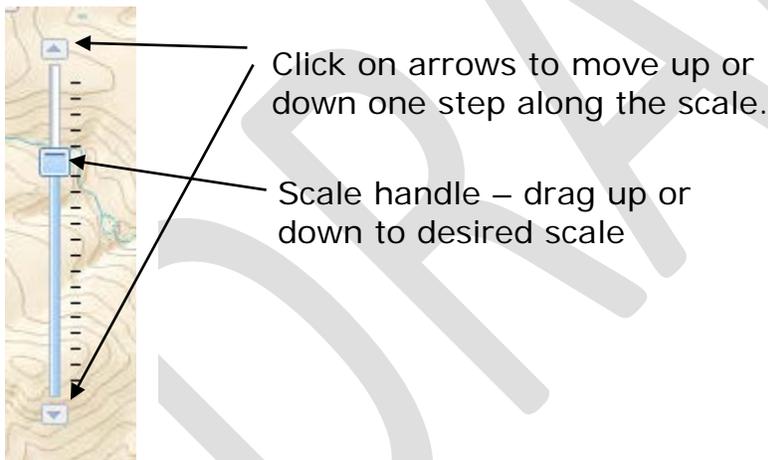
Above the map frame is the toolbar, outlined in yellow above, and to the left is the console, outlined in red above. The toolbar includes buttons and a pull-down list for moving around on the map, identifying features, obtaining information for streamgages, refreshing and printing the map, and getting

help. Within the console, from top to bottom are the message panel, the Map Layers panel, the scale panel, and the overview map panel. Each of these is explained below.

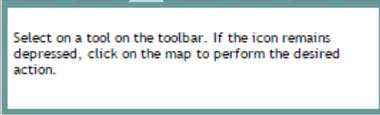
The Map Frame

The map frame displays the map. At each of the eight major points of the compass along the perimeter of the map are arrow buttons that when clicked on will cause the center of the map to move in that direction. At the top left of the map frame is a sliding scale that allows for selection of the map scale. Clicking on the arrow buttons at either end of the sliding scale will cause the map scale to increase or decrease incrementally in the direction that is selected. Clicking at a particular location along the scale will cause the map to display at the selected scale. Clicking and holding down on the on the handle on the scale, and then moving it up or down, will cause the scale to change to whatever scale is selected when the handle is released.

The Scale Slider



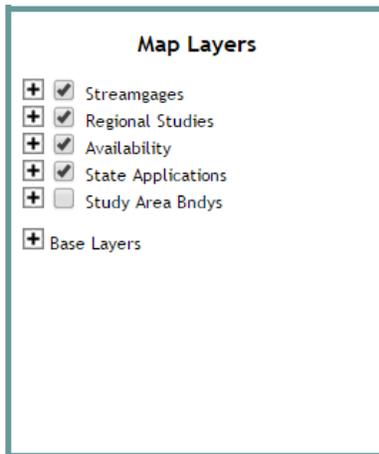
The Message Panel



Select on a tool on the toolbar. If the icon remains depressed, click on the map to perform the desired action.

This panel provides instructions on use of the application and warnings when errors are encountered.

The Map Layers Panel



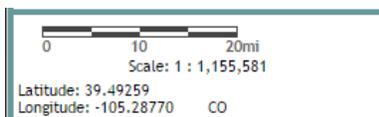
The Map Layers panel to the left of the map lists the layers that can be displayed on the map. To the left of each layer name is a plus sign and a check box. Clicking on the plus sign will cause the symbology used to display the layer on the map to appear in the Map Layers panel. Clicking on the check box for a layer will cause the layer to be displayed on the map. The map redraws automatically whenever a check box is changed.

Clicking on the plus sign to the left of Base Layers at the bottom of the Map Layers panel will cause a list of the base layers that can be displayed on the map to appear. Beside each listed base layer is a radio button that, when clicked on, will cause the map to display that base layer. Only one base layer may be displayed at once. After a base layer is selected, credits for the base layer will appear at the bottom right side of the map frame. The base layer may be changed and will be displayed at any map scale.

When the user interface is first opened, only the Availability layer and the base map will be shown in the map frame. The Availability layer will disappear automatically whenever the map is zoomed into any scale that is larger than the initial scale. Some layers will not appear until the map zoomed into some minimum scale. For example, although the Streamgages layer is set to display by default

The toolbar above the map contains a series of buttons that allow moving around on the map and accessing custom functionality developed for StreamStats. Each button is explained following sections below.

Scale Panel



The Scale panel displays a scale bar, in miles, and the current scale. Note that the scale must be at

1:24,000 or greater before basin boundaries can be delineated for user-selected sites on streams. Also shown are the latitude and longitude of the current location of the cursor in the map frame.

Overview Panel



The Overview panel shows a small-scale map of the general area. The area that is highlighted in green on this map corresponds to the area that is displayed in the map frame.

Getting Help

The far right button on the toolbar is the *Help*  button. Clicking on this button launches a new window that provides information on supported browsers, on how to create URLs to automatically zoom into a state or a longitude and latitude, and provides a link to this document. Users should review this information before attempting to use StreamStats. The [Troubleshooting](#) link on the StreamStats home page provides access to instructions for solving a number of common web browser and security problems that users may experience. Users may also contact the StreamStats development team for support by emailing support@streamstats.freshdesk.com.

NOTE: Users should always wait until processing is completed and the map is re-drawn before attempting to do additional work with StreamStats. In addition, please help us conserve our server system resources and close the Interactive Map window when you are finished using it. Doing so will help ensure system availability for all users. Thank you.

Moving Around on the Map

Moving around on the map can be done by use of the sliding scale and arrow buttons on the map frame, as described above, or by use of several tools in the toolbar above the map frame. The first six buttons on the left of the toolbar are common to many other internet mapping applications. These include the *Zoom In* , *Zoom Out* , *Pan* , *Previous Extent* , *Next*

Extent , and *Full Extent*  buttons. The *Zoom In* and *Zoom Out* buttons allow changing of the map scale. The *Zoom In* button causes the map to be drawn to a larger scale, meaning that when the map is redrawn a smaller area will be shown. The *Zoom Out* button has the opposite effect. The *Pan* button recenters the map at a new selected location. The *Previous Extent* button redraws the map to the same area that was shown before the map was last re-sized. The *Next Extent* button works only after the *Previous Extent* button was used, and redraws the map to the same area that was shown before the *Previous Extent* button was used. The *Full Extent* button redraws the map to the scale that was shown when the application was first started. In addition to these buttons, the toolbar contains a *Zoom To* tool and a pull-down list for scale selection, both of which are explained below.

Use of the Zoom In Button:

- Click on the *Zoom In*  button.
- Move the cursor over the map, then hold down the left mouse button and drag the cursor to outline a box over an area of interest.
- Release the left mouse button and wait for the map to re-draw.
- **When zooming in to select a site where drainage-basin delineation is desired, the scale of the map must be at 1:24,000 or greater before a delineation can be obtained.**

Use of the Zoom Out Button:

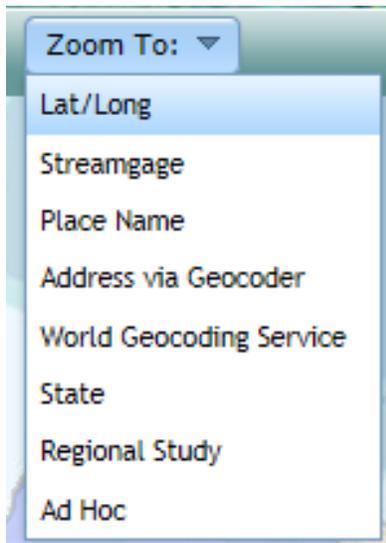
- Click on the *Zoom Out*  button.
- Move the cursor over the map, then hold down the left mouse button and drag the cursor to outline a box.
- Release the left mouse button and wait for the map to re-draw.
- The map will be redrawn so that the current map area will fit into the rectangle drawn. The smaller the rectangle that is drawn, the more the map will zoom out.

Use of the Pan Button:

- Click on the *Pan*  button.
- Move the cursor over the map, then click and hold down the left mouse button.
- Drag the mouse to a new location, release the left mouse button, and wait for the map to re-draw.

- The map will be redrawn so that the location at which the mouse button was released will be the same on the map.

Use of the Zoom To Tools:



Clicking on the *Zoom To* button near the middle of the toolbar provides access to eight separate tools for zooming in to specified locations. Selecting any of these tools will cause a pop-up window to appear in front of the map frame, in which users can provide the information needed to zoom to a place of interest. The zoom-to tools rely on web services that were developed by other entities. Links are provided at the bottoms of the pop-up windows to more information regarding these services. In all cases, it is necessary to zoom to a scale of at least 1:24,000 before a gridded representation of the streams will appear on the map and the *Watershed Delineation from a Point* button will appear in the toolbar, allowing users to select points on the

stream grid and obtain basin delineations. Procedures to follow after selecting one of the Zoom To tools are:

- **Lat/Long.**— Used to center the map on a specified latitude and longitude. Enter a north latitude in the Latitude text box and a west longitude in the Longitude text box in the pop-up window. These coordinates may be entered in formats of DD.dddd, DD MM.mmm, or DD MM SS.ss, where D, M, and S are for degrees, minutes, and seconds, respectively. Capitals letters denote whole numbers and lower case letters denote decimals. Although Western Hemisphere longitudes normally are negative, the minus sign may be omitted when entering longitudes. Click on the *Zoom To* button in the pop-up window after entering the coordinates, and the map will zoom to the desired location.
- **Streamgage.** — Enter all or part of the streamgage name or number in the text box, and click on Find. If only one streamgage matches the given address, then the map frame will zoom to that location. If more than one streamgage matches, then a list of the streamgages will appear, each with a link for zooming to the streamgage.
- **Place Name.**— Used to center the map on user-provided named place. Near the top of the pop-up window is the Feature Name text box, in which users enter the name of the place where the map is to be centered. Below the Feature Name text box are the Layer and

State pull-down lists. The type of feature may be selected using the Layer list. By default, the layer list is set on Community but several other layers may be selected individually, or All Layers may be selected. Similarly, the States list allows for the selection of the state in which the place is located, or All States may be selected. Selecting a specific layer and state will result in quicker response times and more limited results. When all selections have been made then click on the *Find* button. If only one place matches the name given, then the map frame will zoom to the location. If more than one place matches, then a list will be provided of the names of all matching places, each with a link for zooming to the place.

- **Address via Geocoder.**— Enter as much information as possible in the text box in the pop-up window, including street address, city, state, and zip code, and then click on the GeoCode button. If only one place matches the given address, then the map frame will zoom to that location. If more than one address matches, then a list of the addresses will be provided, each with a link for zooming to the address.
- **World Geocoding Service.**— Enter as much information as possible in the text box in the pop-up window, including street address, city, state, and zip code, and then click on the GeoCode button. If only one place matches the given address, then the map frame will zoom to that location. If more than one address matches, then a list of the addresses will be provided, each with a link for zooming to the address. Although this is a world service, searching is limited in StreamStats to the initial map extent.
- **State.** — Select a state from the pull-down list. StreamStats will automatically zoom to the extent of the selected state.
- **Regional Study.** — Select the regional application from the list. StreamStats will automatically zoom to the extent of the regional study, which usually will be the extent of a major river basin.
- **Ad Hoc.** — A pull-down list for selecting the layer on which to focus the search is provided at the top of the Ad Hoc Query pop-up window. Nationally, it is possible to search for streamgages, regional studies, availability, state applications, and study area boundaries. Some states have additional layers on which searches can be focused. For example, the Minnesota application allows searching for bridges. After selecting the search layer, type a text string in box below the layer list, and then click on Find.

Selecting a State or Regional Application

The geospatial data that allows for delineating drainage basins for user-selected sites are prepared separately for each state using the map projection that is preferred by the local state agencies. Areas that are in adjoining states, but that drain into the state for which the data are being prepared, also need to be processed in the selected map projection. As a result, data from multiple state applications are available at many user-selected locations. When using the zoom-to tools, the map often will automatically zoom to the selected location, and the map will be displayed at a scale of 1:24,000 or greater (usually 1:18,056). When this happens at a location where data from multiple state applications are available, then a pop-up window will appear that will list the available state applications.



Users generally should select the state in which the selected site is located, but there are some exceptions. In the example pop-up window at left, the map was zoomed into the location of a streamgage along the Connecticut River near North Stratford, Vermont. As a result, Vermont should be selected if the user will want to obtain estimates of streamflow statistics from regression equations. Alternately, if the user will want obtain information that is needed as input to a model for estimating daily flows at the selected site, then the Connecticut River Basin application should be selected. Refer to the introductory pages for [Vermont](#) and the [Connecticut River Basin](#) to understand the differences in functionality between the applications.

Obtaining Information for a USGS Data-Collection Station:

By default, the Map Layers panel is set to display USGS streamgage locations. The locations will automatically appear on the map as various-colored triangles at a scale of 1:1,155,581 or greater. The streamgage locations must be displayed on the map before it is possible to get information for a streamgage. Once the locations are displayed, obtain information for a streamgage by (1) zooming in to the area in which the streamgage of interest is located, (2) clicking on the *Streamgage*

Information tool button , and then (3) clicking on a triangle on the map that indicates the streamgage location.



After selecting a streamgage location, a pop-up window will appear over the map frame. If there is only a single streamgage at the selected location, then the pop-up will be similar to the example at left. Clicking on the site number will cause a separate pop-up window to appear that contains the available descriptive information, basin characteristics, and streamflow statistics for the streamgage. An explanation of this output is provided on the [Streamgages Output](#) description page.

Clicking on (click here) on the line titled NWIS URL will cause a separate window to open on the NWIS-Web page for the streamgage, which provides access to the time-series data that are available for the streamgage. If more than one streamgage is located at the user-selected location, then a list will be presented of the streamgages at the location, with links to select the particular streamgage of interest.

Selecting an Ungaged Site and Delineating a Watershed:

When the map is set at a scale of 1:24000 or greater, a gridded representation of the stream network will appear on the map and the *Watershed Delineation from a Point* button will appear in the toolbar. The gridded stream network was derived entirely or in part from digital elevation data, and does not always agree exactly with the streams shown on the topographic base map. To determine the watershed boundary for a selected site:

- Click on the *Watershed Delineation from a Point* button. . Immediately, a Delineation Results pop-up window will appear over the map frame. Initially, a message box within the window will provide instructions on how select a site of interest.
- Click on the stream network grid cell that is closest to the stream site of interest.
- StreamStats will begin processing to delineate the drainage boundary for the site of interest. When finished, the basin will be displayed on the map, usually in an orange opaque color, and three new buttons will appear on the Delineation Results window. Holding your computer mouse over the buttons will show the button names, *Basin Characteristics* , *Estimate Flows Using Regression Equations* , and *Download* . Use of these buttons is explained below.
- Before using any of the tools in the Delineation Results window, a check of the boundary should be done by use of the *Zoom to Previous Extent*  and *Pan*  buttons to compare the delineated boundary to the topography and streams shown on the base map.
- Users should particularly examine the delineation in the area nearest the selected point, as that is where problems are most likely to occur. An error is indicated if the delineated boundary does not follow the topographic divide or a stream on the base map crosses the boundary.
- If an error has occurred, see below to learn how to notify the StreamStats team about it. It may be possible to eliminate the error by selecting a new point for delineation just upstream or downstream from the previously selected point. If possible, avoid flat areas, such as the middles of lakes, wetlands, or broad valleys. A tool that was available for editing delineated boundaries in StreamStats version 2 is not yet available in version 3.

Getting Streamflow Statistics and Water-Use Summaries for an Ungaged Site:

The *Watershed Delineation from a Point*  button must be used first to obtain the drainage-basin boundary for the point of interest before flow estimates can be obtained. StreamStats version 3 currently allows estimates to be obtained only by use of the *Estimate Flows Using Regression Equations*  tool. An improved version of the *Estimate Flows Based on Similar Streamgaging Stations*  tool that is available in StreamStats version 2 is planned to be added to version 3 in the future. The theoretical

basis for the methods and a detailed description of the outputs from these StreamStats tools are provided on the [Ungaged Sites](#) page.

To obtain estimates based on USGS regression equations:

- After basin delineation and any editing are complete, click on the *Estimate Flows Using Regression Equations* button . StreamStats will determine what regression equations are available to estimate the streamflow statistics for the region in which the selected site is located.
- A pop-up window will appear that lists the flow types for which there are regression equations. Check boxes to the left of each listed flow type allow selection of the flow types to be computed. By default, all flow types are selected. To compute only some flow types, click on the All check box to turn it and all other check boxes off, then check the boxes next to only those flow types that are desired. Click on the Compute Flows button when selecting the flow types is completed.
- A pop-up window will appear showing descriptive information for the site, measured basin characteristics, estimated streamflow statistics, and indicators of the errors associated with the estimates.
- The output should be printed or saved to a file as a record of the analysis. A Print button on the output page allows for printing the output. Alternately, users may click on the *File* menu of the browser window, and then click on *Print* to print the output, or click on *Save As* to save the output to a file on your computer.

Water-Use Summaries for Maryland

StreamStats for Maryland also includes summaries of water use in the reports produced by the *Estimate Flows Using Regression Equations* process. All Maryland users will see a summary of ground-water and surface-water withdrawals, return flows, and net flows with monthly and annual average values.

Water-Use Report														
Withdrawal-Discharge Summary Report for 2005														
[values are in million gallons per day except the annual sum is in million gallons]														
Totals	January	February	March	April	May	June	July	August	September	October	November	December	Annual mean	Annual sum
Withdrawals	0.005	0.005	0.017	0.013	0.016	0.017	0.027	0.02	0.017	0.011	0.008	0.008	0.0137	5.014
Discharges	0.0057	0.0057	0.0046	0.0057	0.0057	0.0053	0.0057	0.0057	0.007	0.0057	0.0057	0.0057	0.0057	0.0682
Net	0.0007	0.0007	-0.0124	-0.0073	-0.0103	-0.0117	-0.0213	-0.0143	-0.01	-0.0053	-0.0023	-0.0023	-0.0136	-4.9458

Maryland users who login will see, in addition to the summary report, a listing of detailed information for each withdrawal and return-flow site that is upstream from the delineated point. Users who login also can display the water-withdrawal sites on the map. Users who do not login do not have access to that information.

A Note on Obtaining the Best Peak-Flow Estimates

The *Estimate Flows Using Regression Equations* tool will provide the best estimates that are available for a user-selected site when there are no upstream or downstream streamgages with a drainage area that is within ± 50 percent of the drainage area for the selected site. In StreamStats version 2, improved estimates can be obtained by using the *Estimate Flows Based on Similar Streamgaging Stations* tool after using the *Estimate Flows Using Regression Equations* tool when (1) there are nearby streamgages that meet this criterion, and (2) peak-flow estimates are available for the nearby streamgages. The *Estimate Flows Based on Similar Streamgaging Stations* tool applies equations that are presented on pages 31-33 of the report by [Ries and Dillow \(2006\)](#), but because of current programming limitations, the tool may not always provide the best possible flow estimates for user-selected sites. Notices at the bottom of the [Ungaged Site Outputs](#) page describe the conditions under which StreamStats version 2 is not able to provide the best possible peak-flow estimates. Improvements are planned for the *Estimate Flows Using Regression Equations* tool in StreamStats version 3 that will eliminate most of the issues that are described on the [Ungaged Site Outputs](#) page. Until the improved tool becomes available, it may be possible to use the StreamStats map and the *Streamgage Information* tool to locate and obtain drainage areas and peak-flow statistics for streamgages that are upstream or downstream from user-selected sites, and then following the instructions provide by [Ries and Dillow \(2006\)](#) to manually compute the best peak-flow estimates for user-selected ungaged sites.

Getting Additional Basin Characteristics for an Ungaged Site:

The basin characteristics provided in the output from the *Estimate Flows Using Regression Equations* tool are limited to those needed to solve the regression equations that are available at the user-selected point. Often,

additional basin characteristics can be obtained by use of the *Basin Characteristics* tool button .

- After basin delineation is complete, click on the *Basin Characteristics* tool button in the Delineation Results pop-up window.
- A separate pop-up window will appear, providing a list of the basin characteristics that are available for the location. By default, all available basin characteristics will be computed when the Compute Basin Chars button is pressed. Alternately, clicking on the All check box will uncheck that check box and the check boxes for all of the individual basin characteristics. The individual basin characteristics may then be checked individually before pressing the Compute Basin Chars button to get a report that contains just those computed basin characteristics.
- The basin characteristics output lists the labels, the values, the units of measure, and the definitions for the basin characteristics.
- The output should be printed or saved to a file as a record of the analysis. Click on the *File* menu of the browser window, and then click on *Print* to print the output, or click on *Save As* to save the output to a file on your computer.

Downloading Shapefiles and Geodatabases:

The StreamStats application allows the user to download delineated points and watersheds, along with any computed basin characteristics and flow statistics, as shapefiles or geodatabases. The downloaded files can be displayed and used for further analysis in other GIS applications. Shapefiles or geodatabases should be retained to serve as documentation of the exact point that was used in the delineation and the resulting watershed polygon. These shapefiles will be needed to verify what was done if there is any reason to question the results from StreamStats.

- After first thoroughly checking the delineated basin polygon and getting the streamflow estimates, click on the *Download* button  in the Delineation Results pop-up window. A new pop-up window will appear.
- Select whether a shapefile or a file geodatabase is desired using the radio buttons, and then click the Download button on the window.
- Another new window will appear, indicating that a file named Layers.zip has been created, and prompting users to open the file, save it, or save it as a different name. If Open is selected, then the compressed file will be automatically uncompressed and its location

displayed in a Windows Explorer window. If Save is selected, then the file will be saved automatically to the default location on the user's computer where downloaded files are saved. If Save As is selected, then the user will be prompted for the location at which to save the file, and have the option to change the file name.

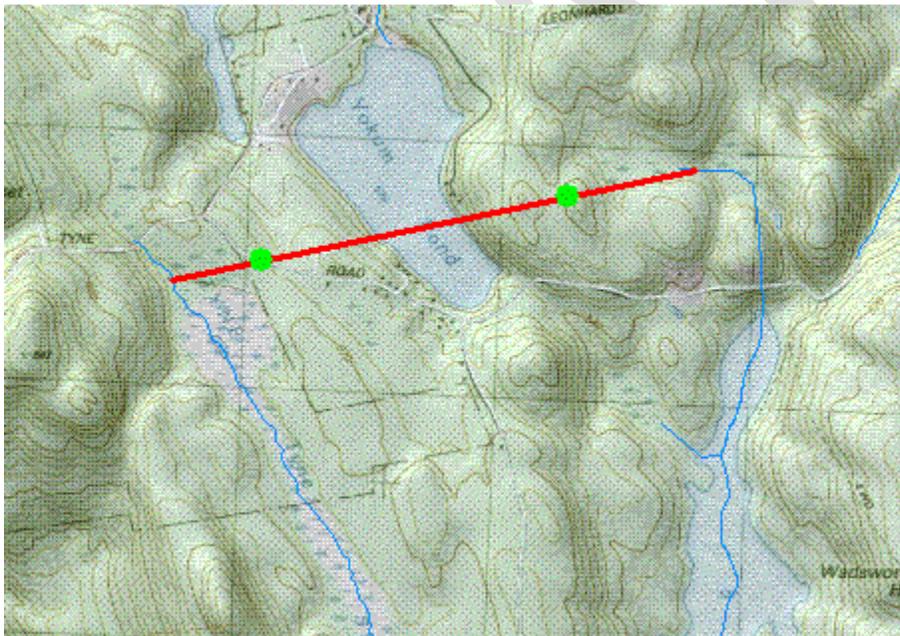
Obtaining Terrain Profiles

This tool generates an elevation profile of the terrain between user-specified points using the underlying Digital Elevation Model (DEM) grid.

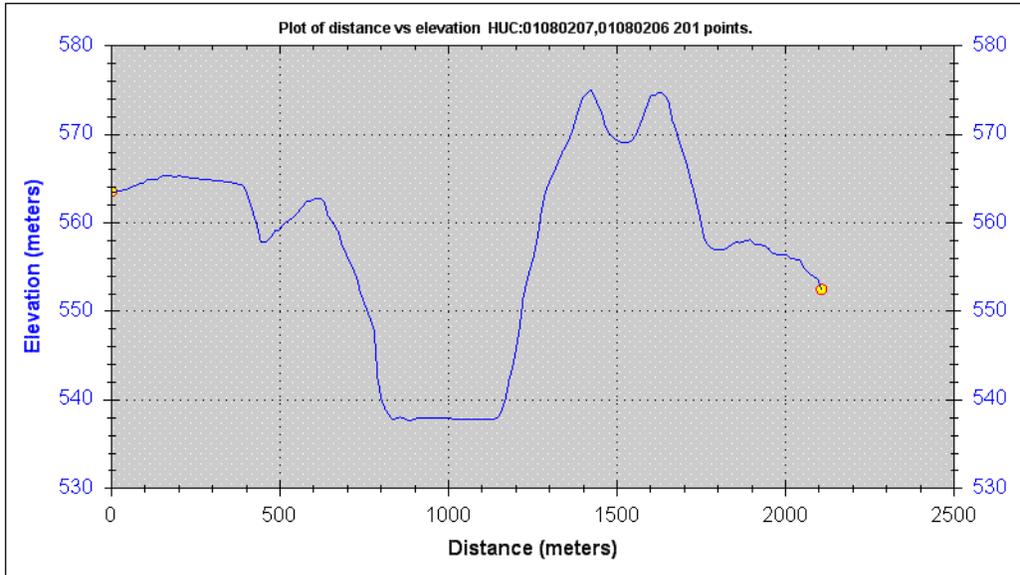
To use this tool:

- Click the *Terrain Profile*  button.
- Click points on the map that will be used to generate profile.

This tool displays the profile path in red, with user-specified points along the line shown as green points.



Also, a graph is generated that shows the profile corresponding to the user specified points. Below the graph is a button that allows saving of the points along the line in an Excel file. The points also are displayed in a table below the graph.



Save2Excel

S	Z	X	Y	UserPoint
0	563.53	65197.04	895550.15	True
10.53	563.51	65207.35	895552.31	False
21.07	563.59	65217.66	895554.46	False
31.6	563.69	65227.97	895556.62	False
42.13	563.74	65238.28	895558.77	False

Reporting Problems

If any problems are encountered with StreamStats, please send email to the StreamStats development team at GS-W_StreamStats@usgs.gov. This email address is monitored during regular working hours by several people, and may also be used to provide any general comments or suggestions to the team. Users usually receive responses to their questions within minutes after they are received. If problems are encountered outside normal working hours, then it is likely that an email response will not be received until the next regular working hours occur. The StreamStats application is automatically recycled each night between midnight and 3 am. This usually fixes most problems that may occur during the day.