National Hydrography Dataset (NHD) Analysis in StreamStats

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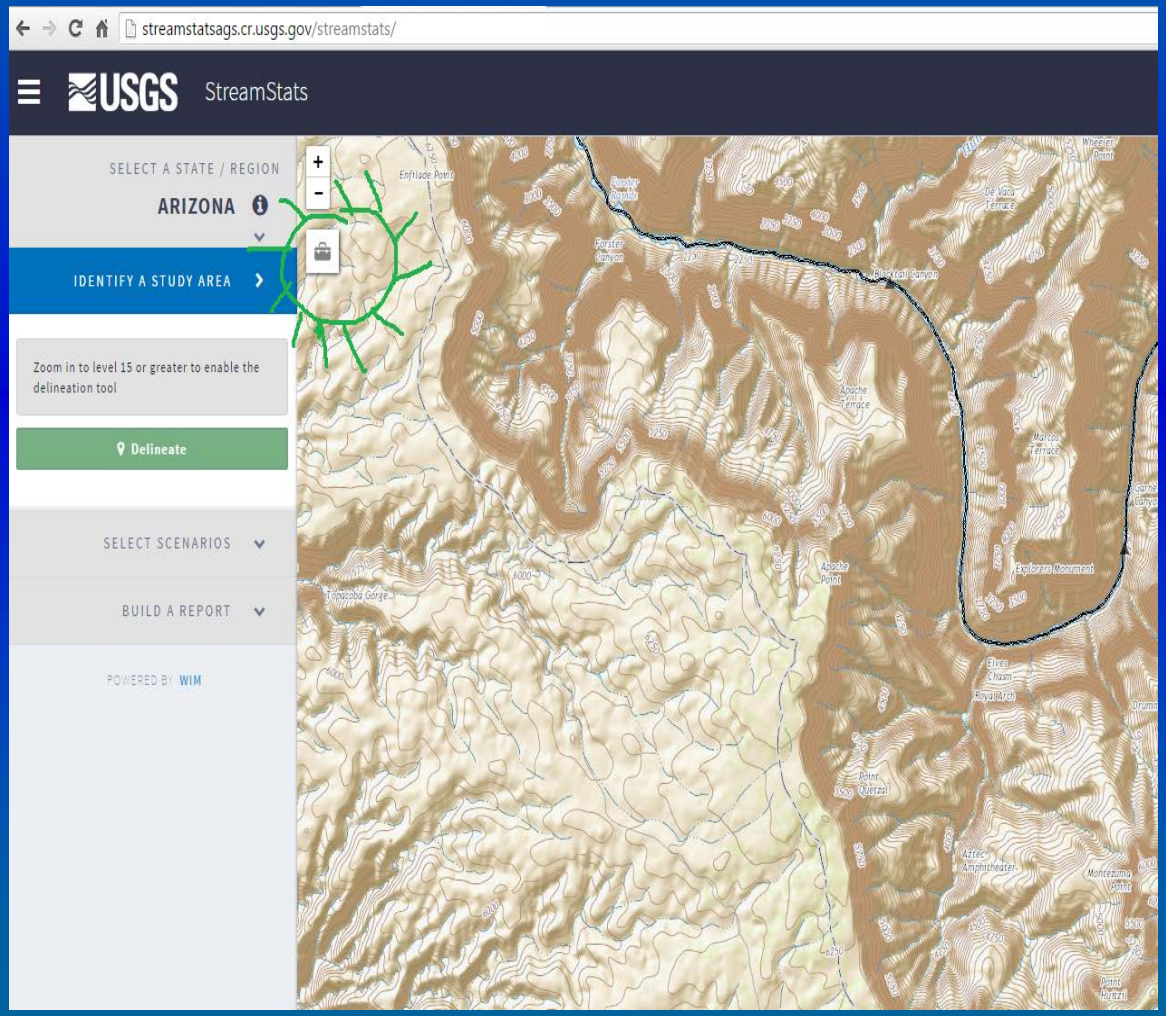
Overview of Presentation

- ***Toggling between the new Version 4 (V4) NHD Navigation tools in StreamStats (that are in development) and the longtime Version 2 (V2) tools***
- ***Plans moving forward***

StreamStats As An Outreach Tool for Advanced NHD Analysis

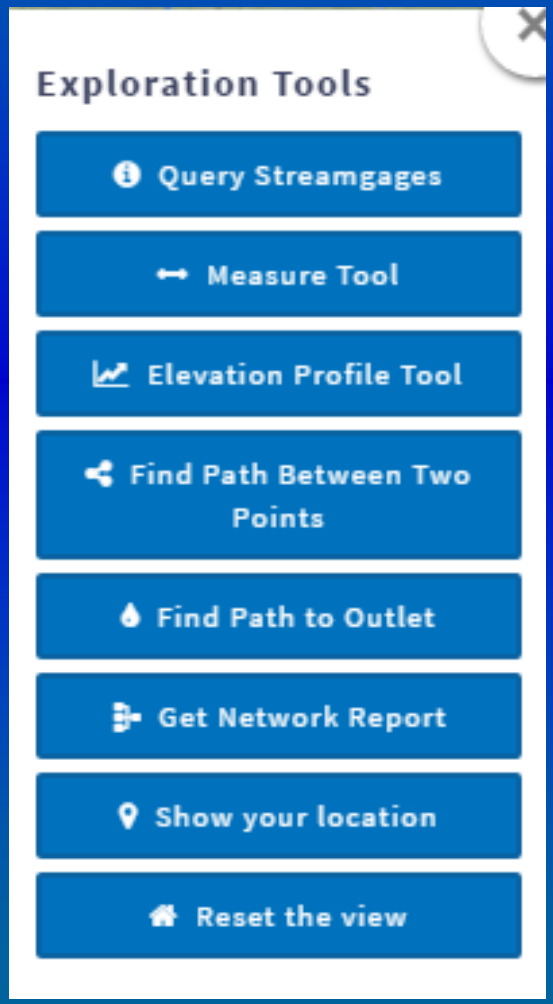
- *StreamStats has long been an outreach tool for NHD analysis (2008), particularly on the WEB*
- *It was realized early on that the alignment of vector (NHD) and raster (DEM) in our preprocessing enhanced the analysis capacity of both*
- *And so, what started as a watershed-centric analysis environment expanded into the geometric-network vector realm*
- *This functionality was eye-opening for our users*

V4 Exploration Tools

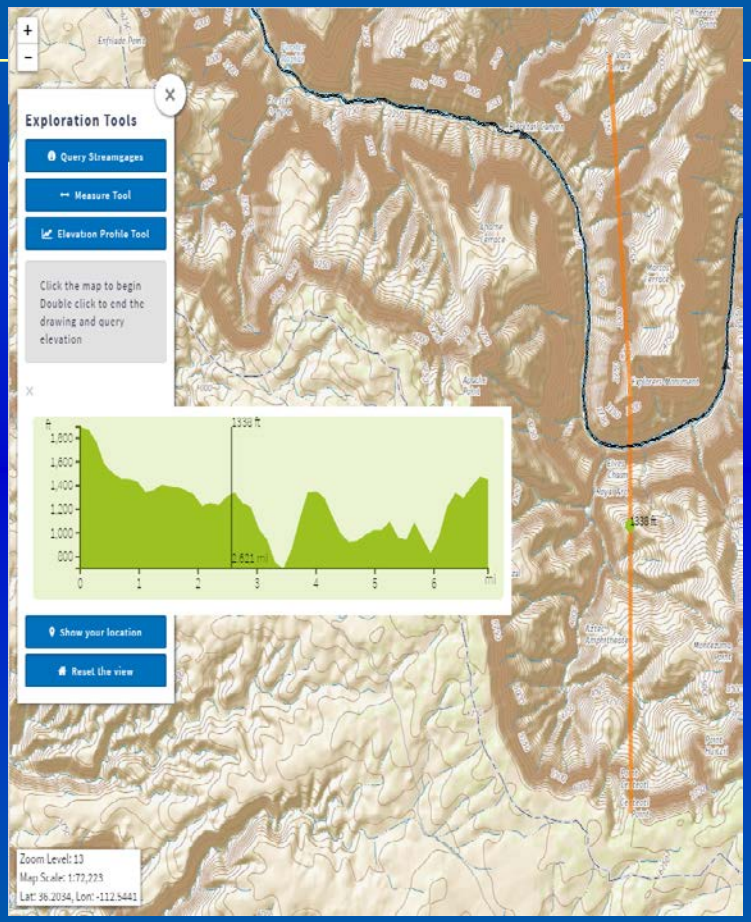


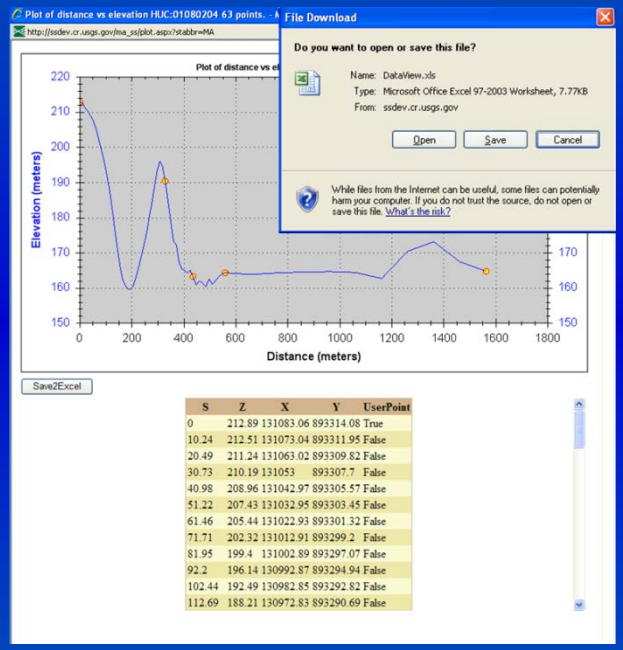
New Navigation Tools in Version 4

- Elevation Profile Tool
- Find Path between Two Points
- Find Path to Outlet
- Get Network Report
- The functionality kicks in at “Zoom Level 10” (~ 1:600K)



V4 “Elevation Profile Tool” (already on production) (try it at United States scale!)

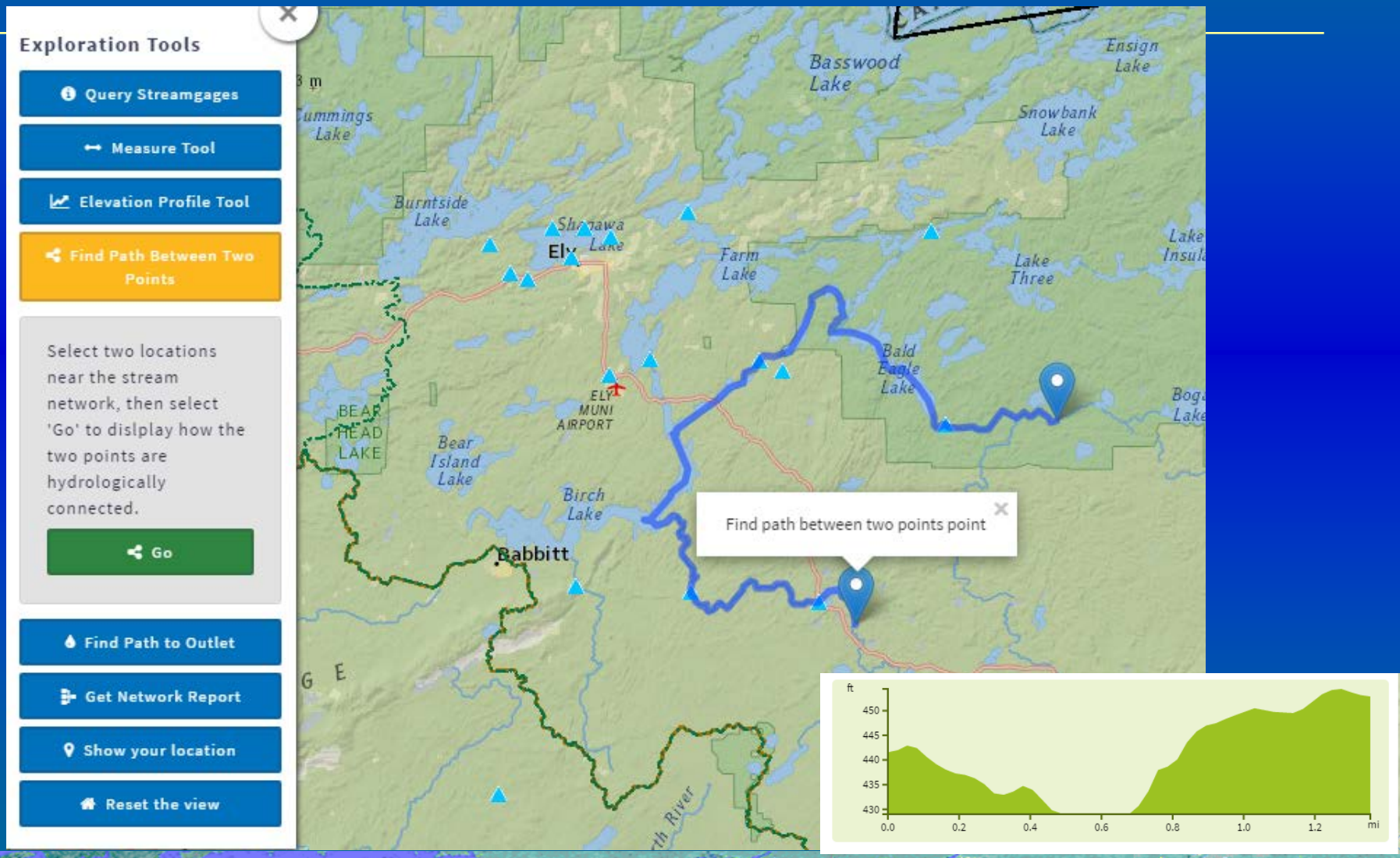




S	Z	X	Y	UserPoint
0	212.89	131083.06	893314.08	True
10.24	212.51	131073.04	893311.95	False
20.49	211.24	131063.02	893309.82	False
30.73	210.19	131053	893307.7	False
40.98	208.96	131042.97	893305.57	False
51.22	207.43	131032.95	893303.45	False
61.46	205.44	131022.93	893301.32	False
71.71	202.32	131012.91	893299.2	False
81.95	199.4	131002.89	893297.07	False
92.2	196.14	130992.87	893294.94	False
102.44	192.49	130982.85	893292.82	False
112.69	188.21	130972.83	893290.69	False

Pending

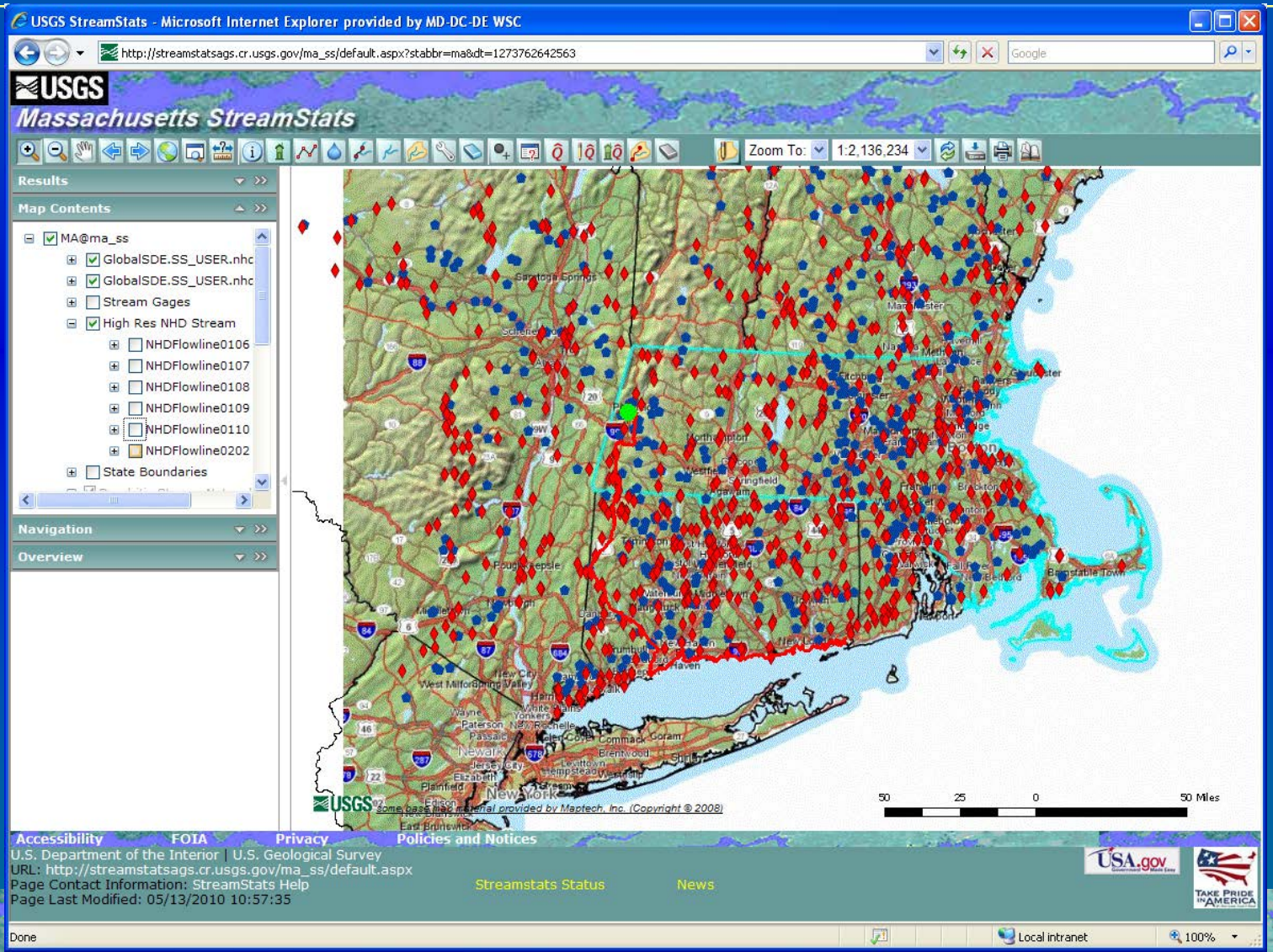
V4 “Find Path Between Two Points” (NHD only)



V4 “Find Path to Outlet” of 4-digit HUC (raindrop trace raster to vector)

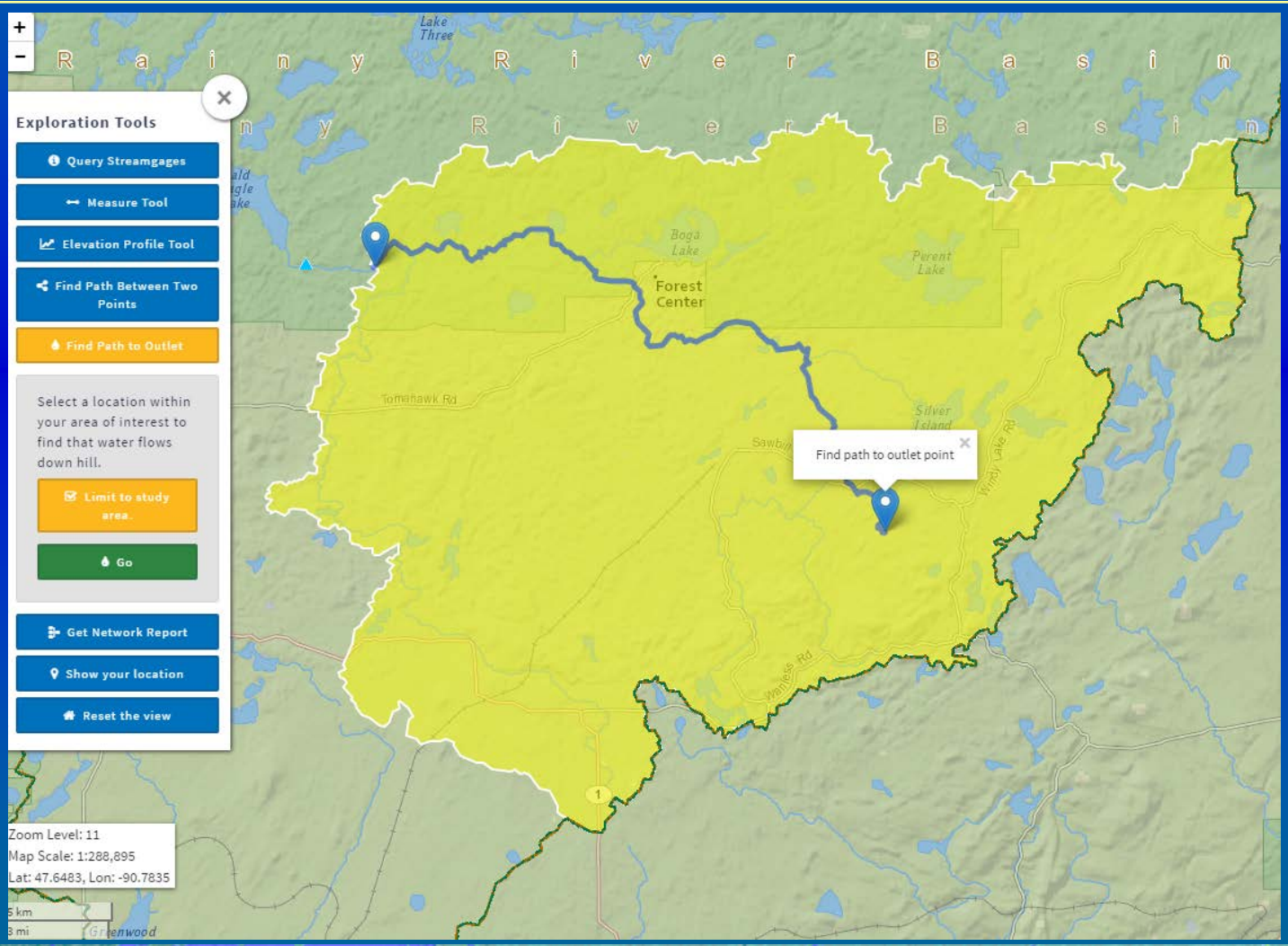
USGS

V2 Raindrop Trace to Network

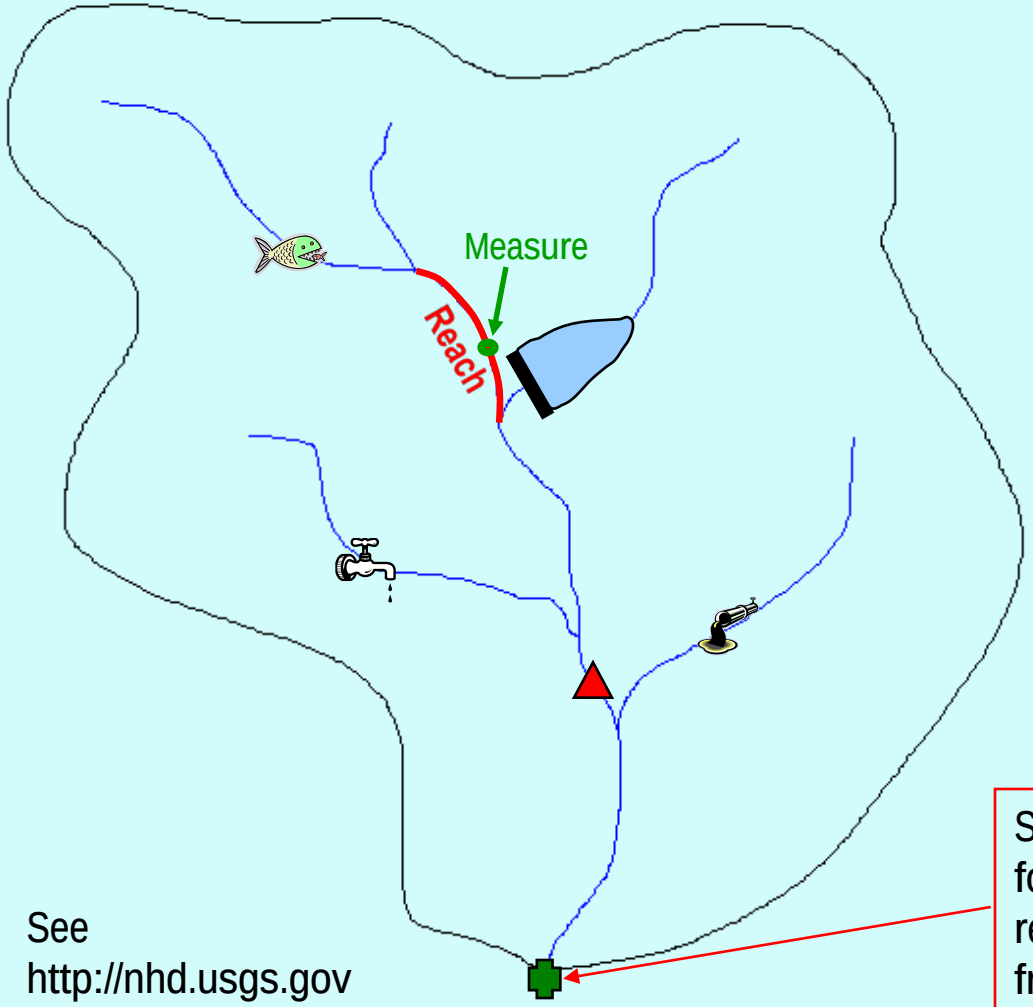


USGS

V4: Alternatively, “Find Path to Outlet” of Delineated Basin (raster only)



Network Navigation/NHD Reach Indexing



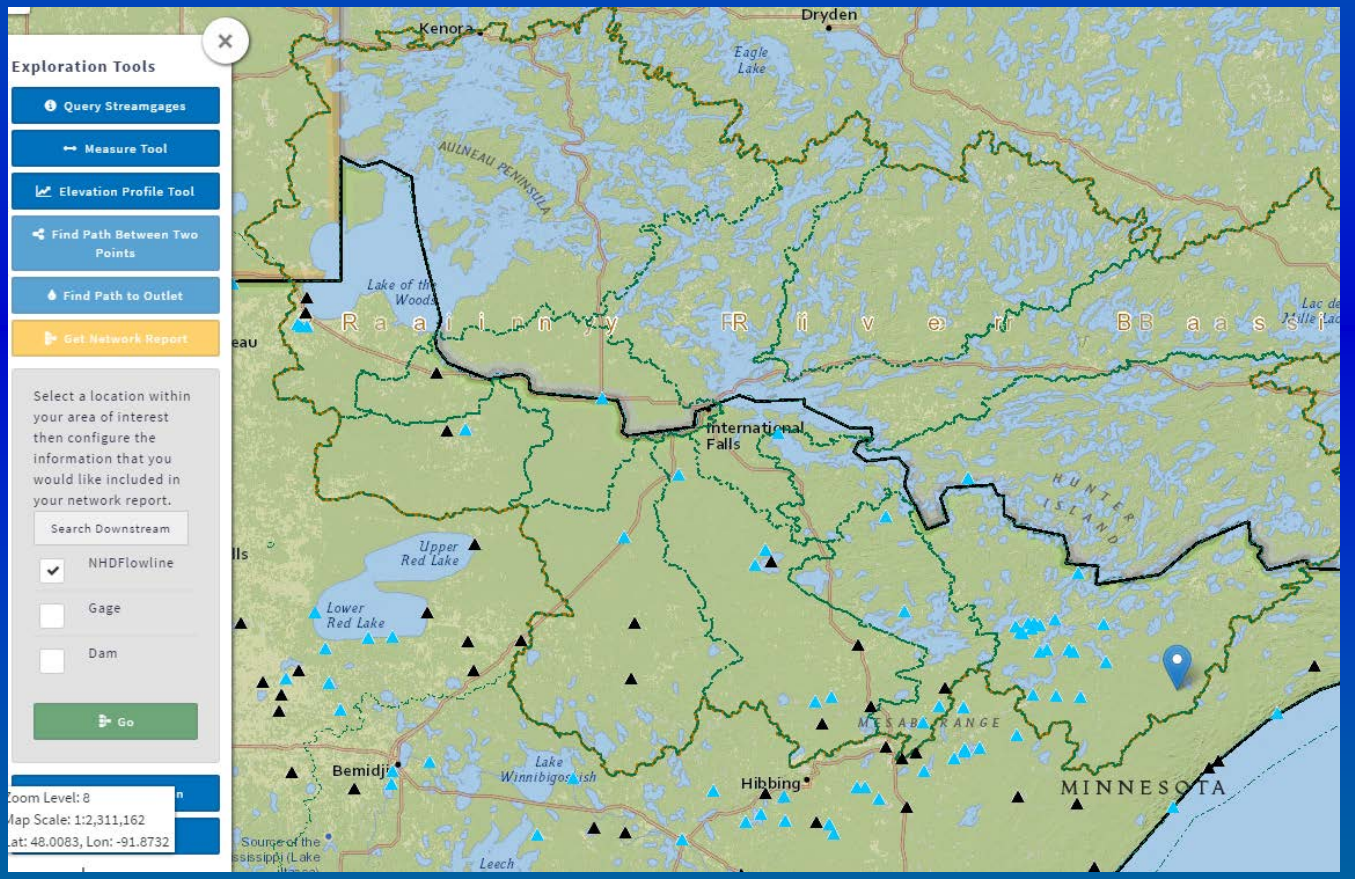
Explanation

- 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

See http://nhd.usgs.gov

V4 “Get Network Report” (includes tracing for events)



Trace Report

Date: Sat Jul 9 2016 07:31:32 Mountain Daylight Time

Network: HYDRO_NET

Linear Reference Layer: NHDFlowline

Trace direction: Downstream

NHDFlowline		
ReachCode	GNIS_NAME	LengthKM
09030008000003	Rainy River	0.19083959
09030008000003	Rainy River	0.7229629
09030008000002	Rainy River	0.72386771
09030008006005		1.45390999
09030008003886		0.33556345
09030008003886		0.213608
09030008006015	Rainy River	0.26771147
09030008003895		0.167
09030008003889		0.304

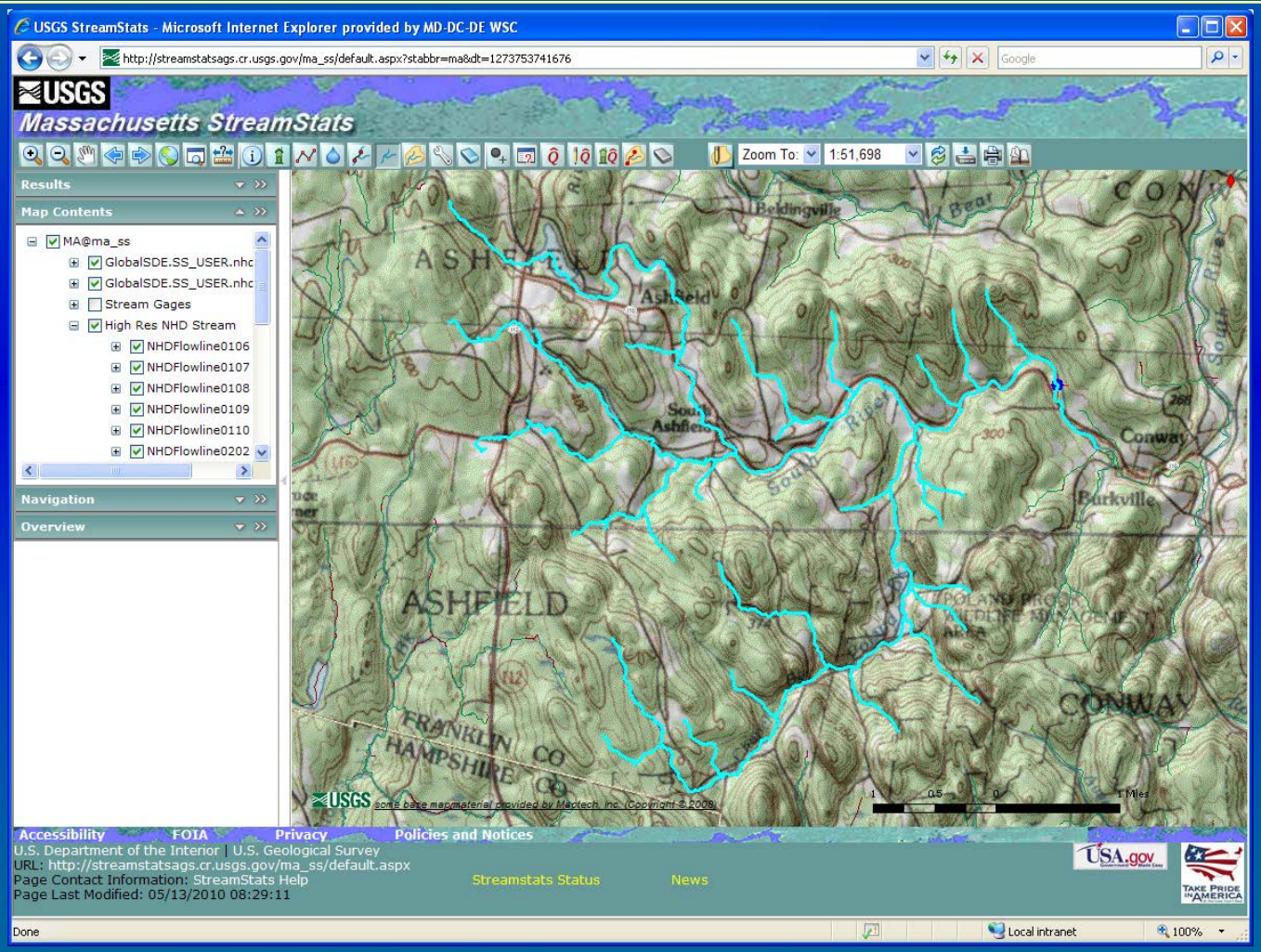
V2 Events Linked to NHD in StreamStats

High Resolution NHD

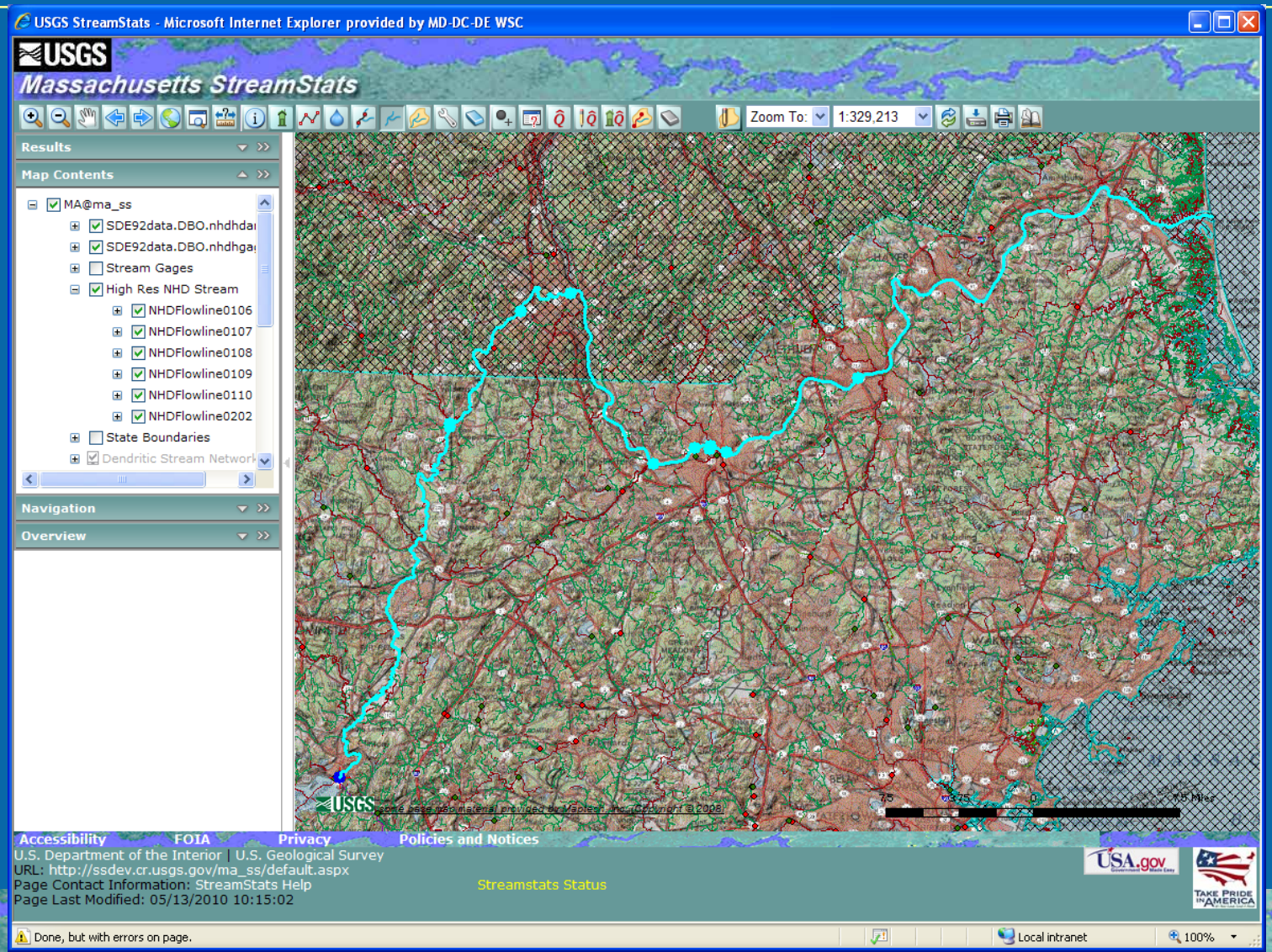
- NWIS Gage and Water Quality sites (all active States)
- National Inventory of Dams
- Maryland Biological Stream Survey locations
- Minnesota and Maine bridge locations (in discussion)
- Upload your events? Talk to us

- NHDPlus
  - NPDES (Point Discharge) locations
  - Impaired Waters (303D) and Total Maximum Daily Loads

V2 Upstream Trace



V2 Downstream Trace (including point events)



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	11.10000038	13.7	13.4	
D70	70_Percent_Duration	13.5	16.9	16.5	
D60	60_Percent_Duration	18.29999923	23.2	22.7	
D50	50_Percent_Duration	25.89999961	31.7	31	

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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: 05/12/2010 12:59:10
Streamstats Status News

AutoRefreshMap:30,0,5 Wed May 12 13:28:15 EDT 2010/Wed May 12 13:28:32 EDT 2010

USGS
science for a changing world

StreamStats Data-Collection Station Report

USGS Station Number	**01593650**
Station Name	**MIDDLE PATUXENT RIVER TRIBUTARY NEAR DAYTON, MD**

Click here to link to available data on NWIS-Web for this site.

Descriptive Information

Station Type	Low Flow, partial record
Location	
Gage	
Regulation and Diversions	
Regulated?	False
Period of Record	
Remarks	

Trace Report - Windows Internet Explorer

Convert Select

NHDHGage

ReachCode	Measure	Source_FeatureID
02060006002615	88.61626000	391533076563301
02060006000620	29.62296000	01593650

100%

Physical Characteristics

Characteristic Name	Value	Units	Citation Number
Physical Characteristics			
Drainage_Area	4.23	square miles	92
Main_Channel_Length	4.1	miles	46
Mean_Basin_Elevation	552	feet	46
Percent_Forest	23	percent	92
Percent_Hydrologic_Soil_Type_A	ND	percent	46
Percent_Impervious	1.99	percent	92
Percent_Storage	0.23	percent	46
Stream_Slope_10_and_85_Method	59.4	feet per mi	46
Precipitation Statistics			
Mean_Annual_Precipitation	43	inches	46

Streamflow Statistics

Statistic Name	Value	Units	Citation Number	Preferred?	Years of Record	Standar Error, percent
Low-Flow Statistics						
7_Day_2_Year_Low_Flow	1.3	cubic feet	46	Y		

October_85_Percent_Duration	0.869	cubic feet per second	92	Y	25.7
November Flow-Duration Statistics					
November_85_Percent_Duration	1.11	cubic feet per second	92	Y	25.7
December Flow-Duration Statistics					
December_85_Percent_Duration	1.36	cubic feet per second	92	Y	25.7
Base Flow Statistics					
Base_Flow_10_Year_Recurrence_Interval	1.2	cubic feet per second	92	Y	25.7

Citations

Citation Number	*Citation Name and URL*
46	Carpenter, D.H., and Hayes, D.C., 1996, Low-flow characteristics of streams in Maryland and Delaware: U.S. Geological Survey Water-Resources Investigations Report 94-4020, 113 p., 10 plates
92	Ries, K.G., III, and Eng, K., 2010, Estimation of selected streamflow statistics for a

Click to hide News Bulletins

- February 21, 2014 - We have been notified that the problem that commenced on Feb 19, 2014, with erroneous spikes in graphs and measurements for some real-time sites, has been resolved.
- Read the Mobile Site Tutorial Try it (http://m.waterdata.usgs.gov) from your mobile device!
- New improved user interface.
- Full News

USGS 01593650 MIDDLE PATUXENT RIVER TRIBUTARY NEAR DAYTON, MD

Available data for this site SUMMARY OF ALL AVAILABLE DATA GO

Stream Site

DESCRIPTION:

Latitude 39°14'12", Longitude 76°56'27" NAD27
Howard County, Maryland, Hydrologic Unit 02060006
Drainage area: 4.25 square miles

AVAILABLE DATA:

Data Type	Begin Date	End Date	Count
Field measurements	1977-05-31	2008-10-24	20

File Edit View Favorites Tools Help

Convert Select

Detailed Facility Report

This page updates dynamically based on your sear criteria and selections within the page.

+ Expand All — Collapse All Report Violation Report Data Error Data Dictionary Download Data Pr

Facility Summary

Trace Report - Windows Internet E...

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NPDES

ReachCode	Measure	SOURCE_FEAT
01070006000303	15.7157	MAR05C466
01070006000303	15.7157	MAR05C466

100%

NEWBURYPORT WASTEWATER TREATMENT FACILITY
157 WATER STREET, NEWBURYPORT, MA 01950

Facility Information (FRS)

FRS ID: 110000545232
EPA Region: 01
Latitude: 42.809271
Longitude: -70.861505
Industry:
Indian Country: --
Go To Facility/System Characteristics

Regulatory Interests

Clean Air Act:
Clean Water Act: Minor, Permit Pending (MAR05C466), Major, Permit Effective (MA0
Resource Conservation and Recovery Act: A
CESQG (MAD981892532)
Safe Drinking Water Act:

Also Reports

Air Emissions Inventory (EIS):
Greenhouse Gas Emissions (eGGRT):
Toxic Releases (TRI):

Enforcement and Compliance Summary

Statute	Insp (5 Years)	Date of Last Inspection	Current Compliance Status	Qtrs in NC (of 12)	Qtrs in Significant Violation	Informal Enforcement Actions (5 years)	Formal Enforcement Actions (5 years)	EPA Cases
CWA	4	09/05/2013	Noncompliance	12	0	--	--	--
RCRA	--	--	No Violation	0	0	--	--	--

Data Summary for: HO-P-104-219-97

MARYLAND DEPARTMENT OF NATURAL RESOURCES

HO-P-104-219-97 is located on **little cattail creek** in the Brighton Dam watershed, 8-digit code: (02131108). This stream was visited in the spring 3-13-1997 and again in the summer on 7-15-1997.

Trace Report - Windows Internet Explorer

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Bio_Sampling

ReachCode	Measure	Source_FeatureID	StreamName
02060006000285	64.90128000	HO-P-104-219-97	Little Cattail

Fish IBI	4.00	**Good**
Benthic IBI	3.33	**Fair**

Your Feedback

Catchment area	2246.0 acres
Urban	0.7 %
Agricultural	70.1 %
Forest	27.8 %

Instream Habitat

Epifaunal Substrate

Velocity/Depth Diversity

Acid neutralizing capacity	399.7
Dissolved organic carbon	1.5
pH (lab)	7.21
pH (field)	7.34
Temperature	24.0 °C
Dissolved oxygen	8.9
Conductivity	144.0

The following fishes were collected at HO-P-104-219-97

Common name	Percent of total
LONGNOSE DACE	24.5
WHITE SUCKER	24.3
BLACKNOSE DACE	15.1
TESSELLATED DARTER	14.0
CREEK CHUB	9.1
ROSYSIDE DACE	7.0

Fish IBI metrics	value
Number of native sp.	
Number of benthic fish sp.	2.0
% abundance of dominant sp.	24.2%
Percentage of tolerant sp.	63.3%
biomass (g) per sq. meter	10.1

What does the Fish IBI score mean?

FALLFISH, *Semotilus corporalis*

MARYLAND DEPARTMENT OF NATURAL RESOURCES

Maryland Biological Stream Survey

New search

Search Tips

About the MBSS

Fish Distributions

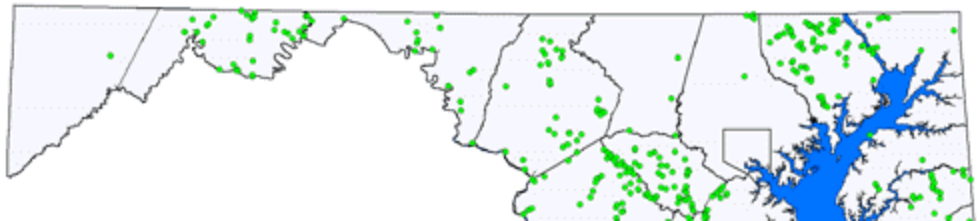
Your Feedback

The Fallfish is a member of the Minnow family (Cyprinidae). The male fallfish may build a large nest of gravel over 3 feet high to protect its mate's eggs.

Illustration by Dave Neely

The map below shows presence (green circles) of this species in the 1995-2002 MBSS dataset.

Distribution of Fallfish in Maryland (MBSS data)



Examples of Reach Navigation Applications

- Upload and compare custom point/linear events, such as fish sampling sites and water temperature reaches
- Compute distance (i.e. to nearest upstream dam)
- Sum (i.e. of all upstream/downstream public water supply site diversion pumping rates)
- 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)

National Coordination

- NLDI (National Linked Data Index)
  - Crawls EPA STORET and NWIS Gages, others
- The National Map (NHDPlus HR)
- Web Services
  - ScienceBase
  - NWIS Web
  - TNM Web Services & Viewer
    - HEM Web (web-based indexing service)