

US Geological Survey- Flooding and Data Resources

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US Geological Survey-Water Mission Area

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USGS Water Mission Area

Water information is fundamental to national and local economic well-being, protection of life and property, and effective management of the Nation's water resources. The USGS **works with partners** to monitor, assess, conduct targeted research, and deliver information on a wide range of water resources and conditions including streamflow, groundwater, water quality, and water use and availability.

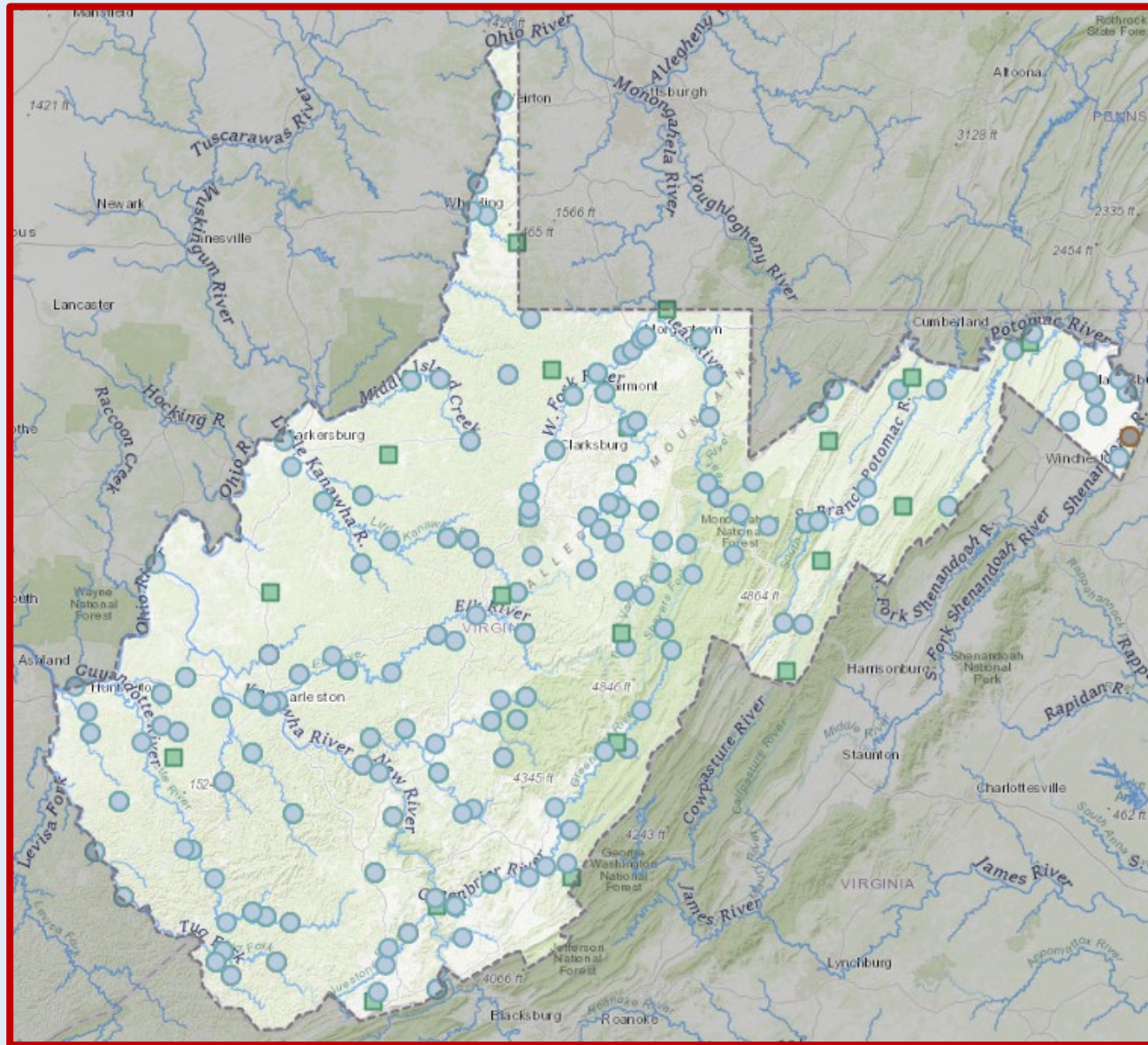
In WV, this mission is primarily focused on the USGS Streamgaging Network, response to flooding events, and data analysis through partnerships with the State of WV, including WV EMD, WV DEP, WV DOH, WV DNR, USACE,, and other federal, state, and local partners.



WV Streamgaging Network

- **184 Total Streamgages**
 - -110 State funded (full or partial)
 - -74 funded by other partners
- **All operated by USGS**
- Streamgages in WV are operated as a “statewide network” distributed across multiple funding partners and coordinated by the WV Water Gaging Council
- ~\$2.4M per year for streamgaging across all partners in WV

****THIS IS AN IMPORTANT DISTINCTION****



What USGS Gage Data is Available in WV?



- 98 Discharge gages (flow)
- 63 Stage-only gages (water-level)
- 21 Reservoir gages
- 63 Rain gages
- 19 Groundwater monitoring wells
- 30 Water-quality monitors
- 13 Crest-stage gages (annual peak only, non-telemetry)



Water Data Delivery in near Real-time

- Most USGS gages in WV transmit to GOES Satellites
 - Hourly Transmissions of 15-minute data
 - RANDOM transmissions could be utilized to deliver data every 15 minutes based on thresholds
- Many small-basin sites deliver 5-minute data every 15 minutes
 - RANDOM transmissions could be utilized to deliver data every 5 minutes based on thresholds
- 40 sites, established in 2019, transmit every 5 minutes via Iridium satellite network
- From transmission, to the USGS database, to the public web takes less than 5 minutes



Streamgage Data Delivery-Databases

- Data are publicly available through the Water Data for the Nation in near real-time and on a provisional basis
- Streamflow data, stage, water-quality data, groundwater data, rainfall data
- Statistical data-annual **peaks**, daily, instantaneous highs and lows, . . .
- Current, and **historical data** are all publicly available
 - 22 Centennial streamgages in WV (1039 across the US) with >100 years of continuous data
- USGS API services allow for automatic retrieval into other databases
- Data are also pulled directly from the downlinks by NWS and Army Corps of Engineers
 - USACE operations at Locks and Dams
 - NWS flood forecasts



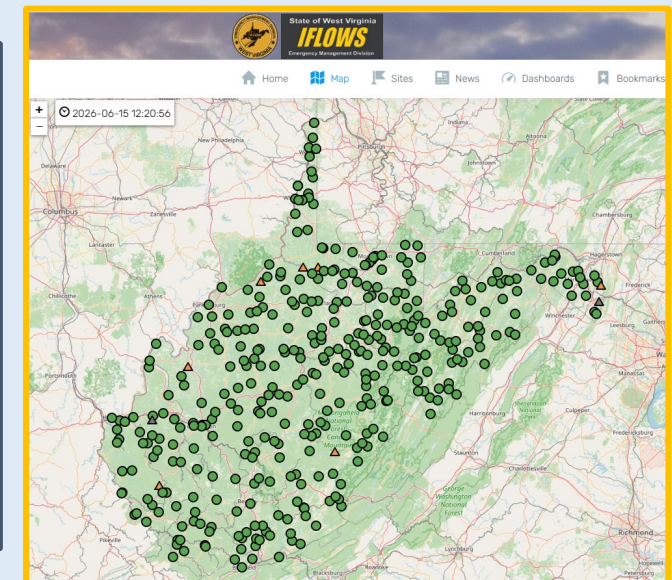
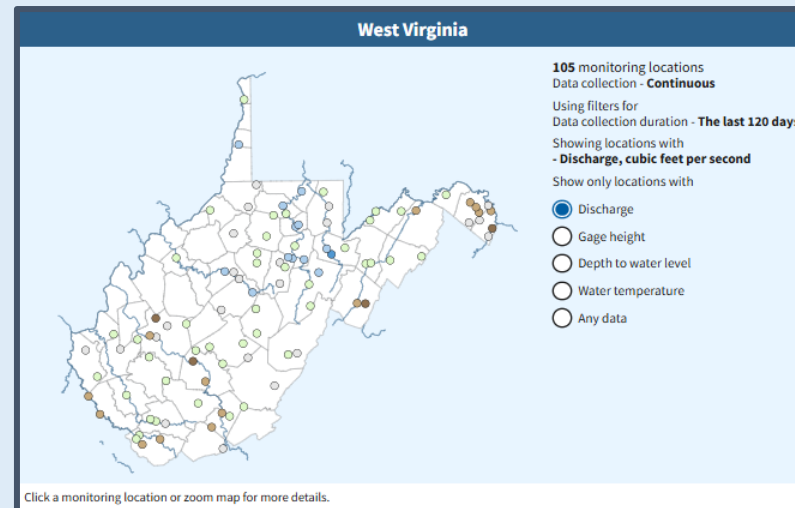
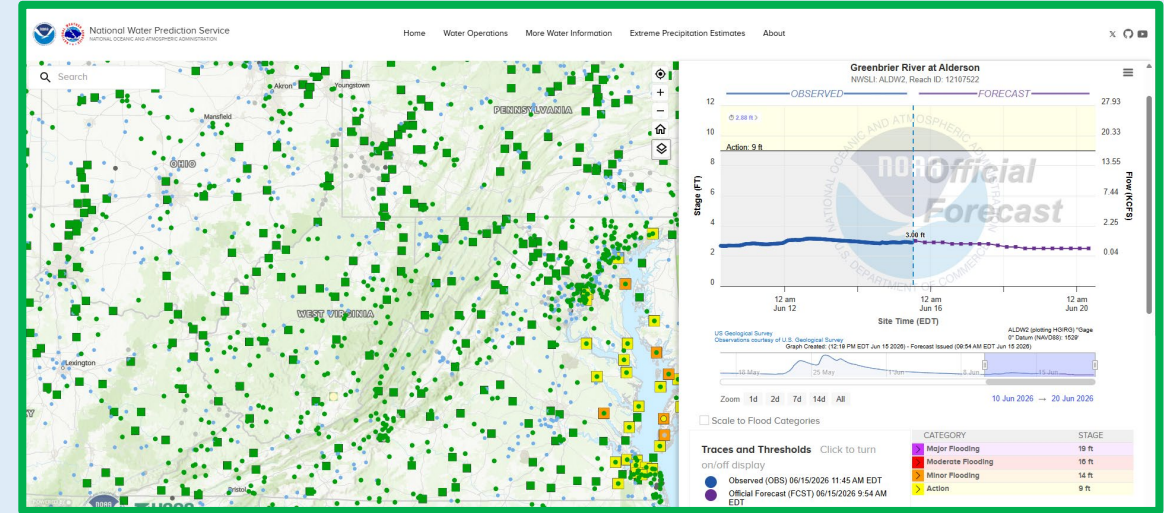
Why is Gaging Data Important for Floodplain Preparedness and Awareness?

- Streamgages tell us....
 - How High, How Much, How Often, When, and What are the Trends
- Specific uses of streamgage data
 - Flood hazard planning and forecasting
 - Development of Flood Inundation Maps
 - Understanding long-term changes in streamflow
 - Resource appraisal and allocation
 - Design of water infrastructure (bridges, culverts)
 - Reservoir operations
 - Water-quality management
 - In-stream flows for habitat assessment
 - Recreational safety



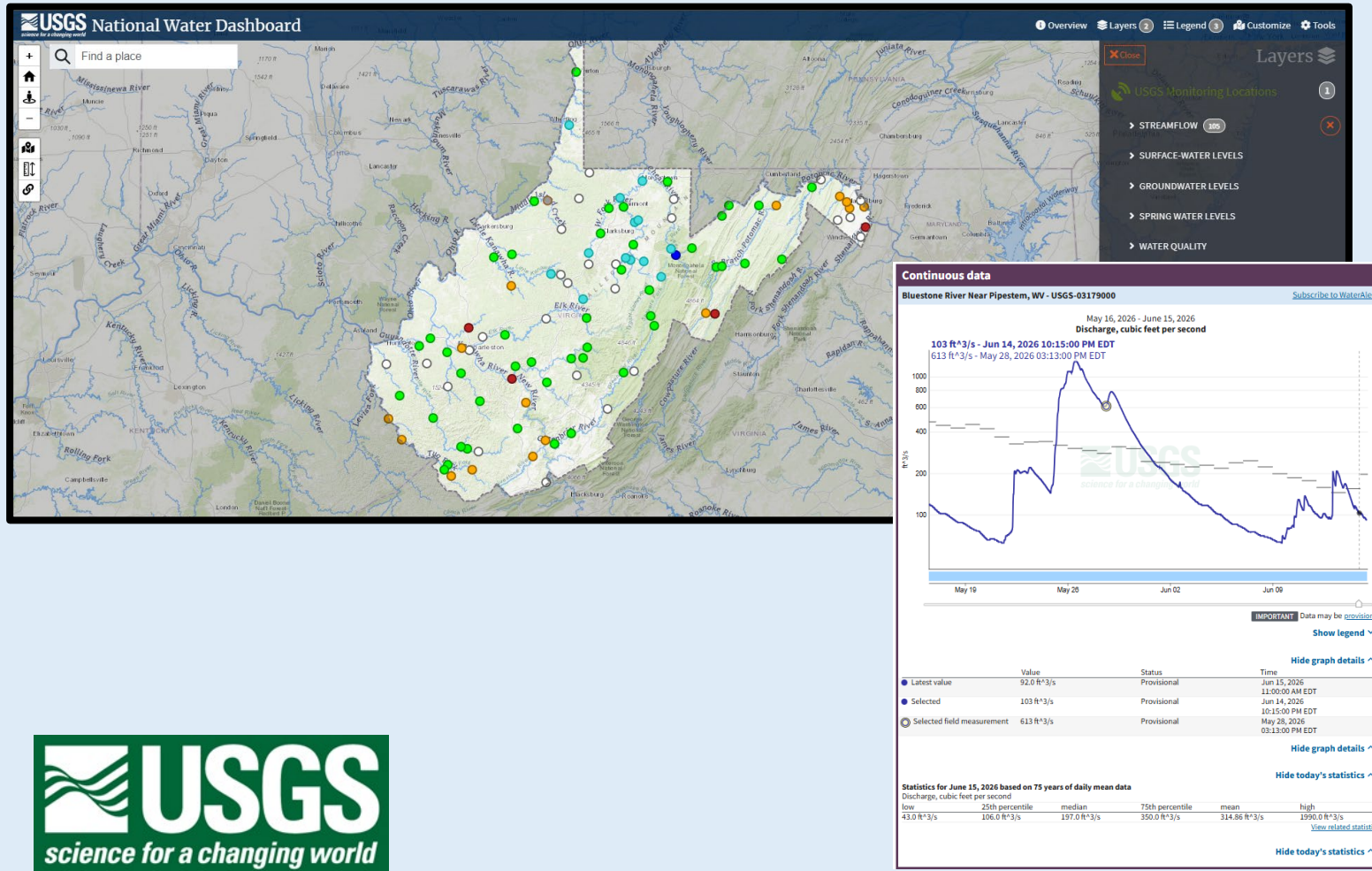
Starting to understand the data available...

- There are a variety of sources of gaging data
 - USGS, WVEMD (IFLOWS), NWS (NWPS),...
- Get to know what's available
- What does a flow or gage height mean to your community?
- How long it takes a flood wave to reach you?
- Look at historic peaks
- Maximize use of WaterAlert
- Reach out for assistance



USGS Data Tools— The National Water Dashboard

<https://dashboard.waterdata.usgs.gov/app/nwd/en/?region=lower48&aoi=default>



View USGS data for any continuous type collected from your desktop or mobile device

- Views based on basic statistics
 - High Flow, Low Flow, Increasing, Decreasing, NWS Flood Status,...
- Add NWS Weather Layers
 - Radar loop, Recent rainfall, Predicted rainfall, Air temperature...
- View Drought Map

Maybe more than for data retrieval, this serves as a tool for field operations?

The National Water Dashboard

<https://dashboard.waterdata.usgs.gov/app/nwd/en/?region=lower48&aoi=default>

Search: USGS National Water Dashboard or USGS NWD

Some Questions that can be answered through the NWD

- 1) How can I display all the streamgages in my area?
 - 1) What are the different ways to view/screen those sites?
- 2) Are there any rain gages in the area?
- 3) Is there any other gage data that might be useful to me?
- 4) What was the highest gage height in the past 30 days?
- 5) What was the first year that an annual peak was collected?
- 6) What is the peak of record for this site?
- 7) What was the peak discharge during the 2016 flood for XX site?
- 8) How could I automatically retrieve data for this site?



USGS WaterAlert Tool

<https://maps.waterdata.usgs.gov/mapper/wateralert/>

- Free subscription service designed to provide alerts via email or text message based on user defined thresholds
 - Users select parameters (ex. gage height, flow, rain) and the trigger threshold
 - Daily or hourly alerts
- June 21-27, 2016--15,769 notifications were sent

USGS
science for a changing world

WaterAlert

Home Help Contact USGS Water home

Search USGS Water Sites:
Google Go

WATER DATA FOR THE NATION

National Water Information System
View current and historical stream flow, ground-water level, and water-quality data

Data by State... ▼

Today's Water Conditions
View comparisons of current and historical conditions using maps

USGS WaterAlert

Real-time data parameters available for subscription
The basic real-time parameters supported by WaterAlert are the following:

Surface Water:	Groundwater:	Water Quality:	Precipitation:
Streamflow	Water level (depth)	Water temperature	Total precipitation
Gage height (stage)	Water Level (elevation)	Specific conductance	
Lake/reservoir level		pH	
Stream level		Dissolved oxygen	
Stream velocity		Salinity	
		Turbidity	

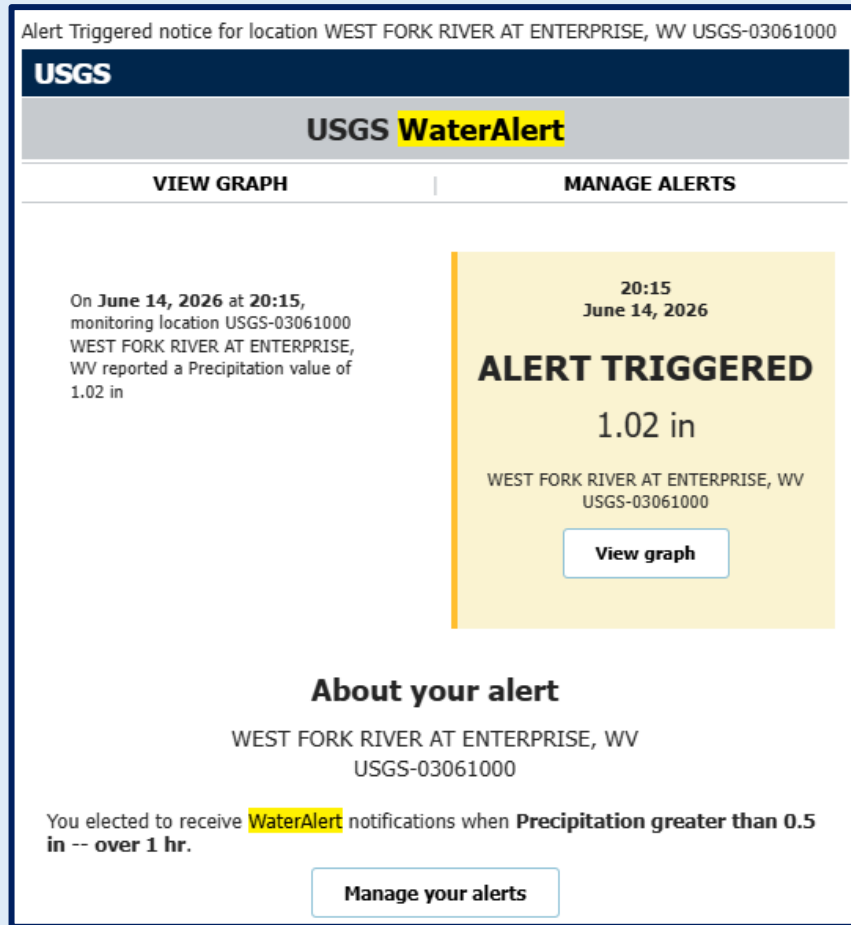
[Additional parameters](#) are available at some sites, such as tide elevation, nitrate plus nitrite, or

Related Services

[USGS WaterNow](#)
The USGS WaterNow service lets you send a query for a USGS gaging site, via email or cell-ph



What Scenarios might you use WaterAlert??



- Leading up to a potential flooding event?
- General personal safety?
- Are you an emergency manager?
- Are you responsible for road closures?
- Recreation?

WaterAlert Logon Page

<https://accounts.waterdata.usgs.gov/wateralert/>

Don't have an account?

[Create Login.gov account](#)

Your user name and password (authentication information) are managed by the authentication service provider Login.gov.

Login.gov is the public's one account for government services. You can use Login.gov to sign in to WaterAlert and many other services provided by the United States Government -- [learn more](#).

USGS
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Water Resources | Water Dashboard

WaterAlert My Alerts User Guide

[Sign out](#) jswhite@usgs.gov [Settings](#)

✓ You're signed in

USGS WaterAlert

My Alerts

WHEELING CREEK AT ELM GROVE, WV	▼
GREENBRIER RIVER AT DURBIN, WV	▼
CLEAR FORK AT WHITESVILLE, WV	▼
EAST FORK TWELVEPOLE CREEK NEAR DUNLOW, WV	▼
MIDDLE ISLAND CREEK AT LITTLE, WV	▼
WEST FORK RIVER NEAR MOUNT CLARE, WV	▼
CRANBERRY RIVER NEAR RICHWOOD, WV	▼
LITTLE KANAWHA RIVER NR WILDCAT, WV	▼

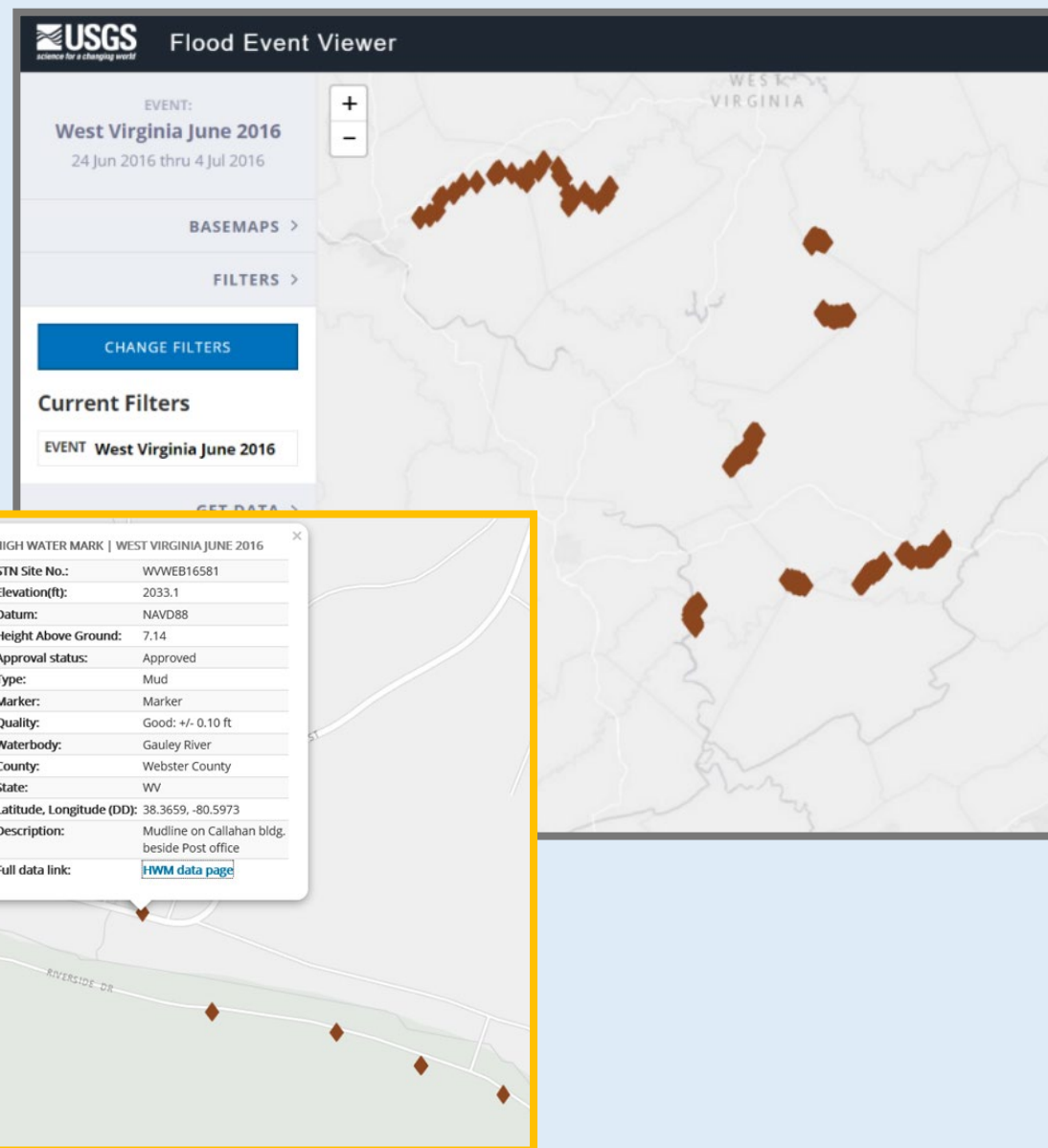


USGS Flood Event Viewer

<https://water.usgs.gov/floods/FEV/>

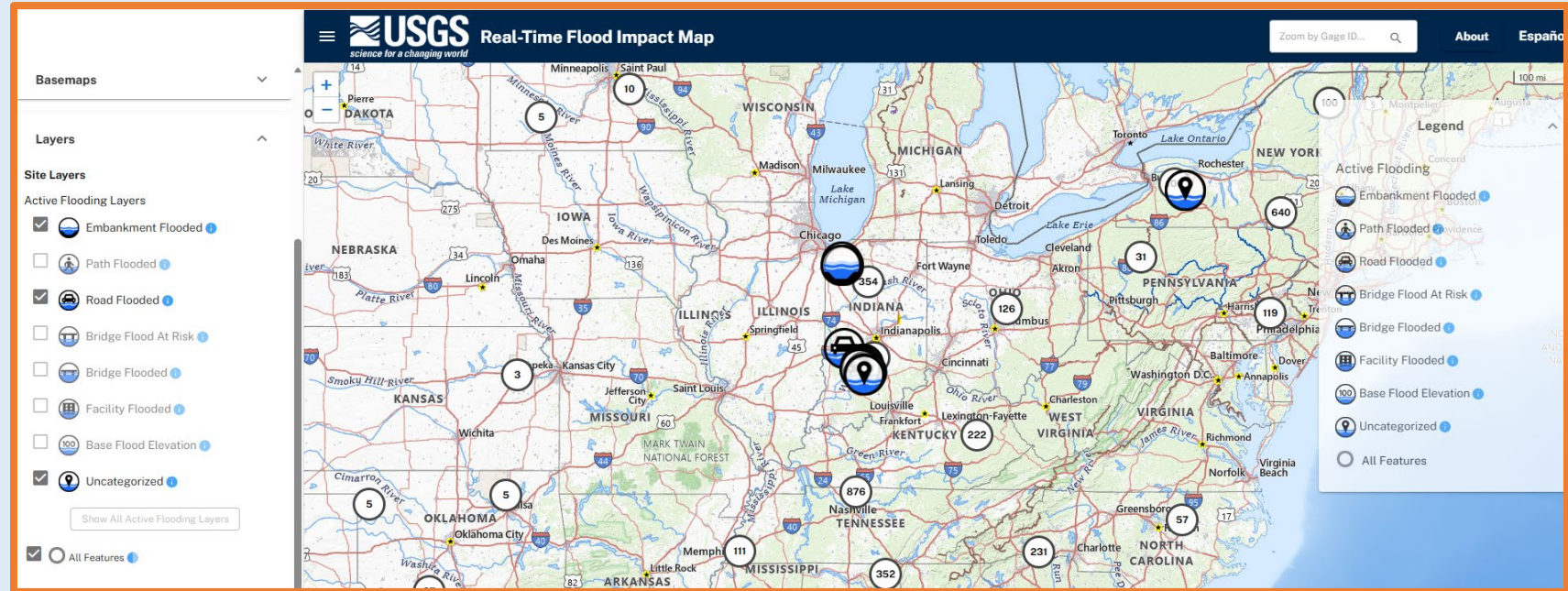
Short Term Network of Flood Events

- Event based (ex. WV June 2016 Flood)
- Publicly available database of High Water Marks (HWMs)
 - ~400 HWMs entered for June 2016 Event
- Document Flood Elevations and Profiles
- Coordination with State and/or FEMA to establish “Event”
- February 2025 Tug Fork Flooding event was documented by USACE and will be uploaded to the USGS FEV



Real-Time Flood Impact Map

[rtfi-map](https://rtfi-map.usgs.gov)



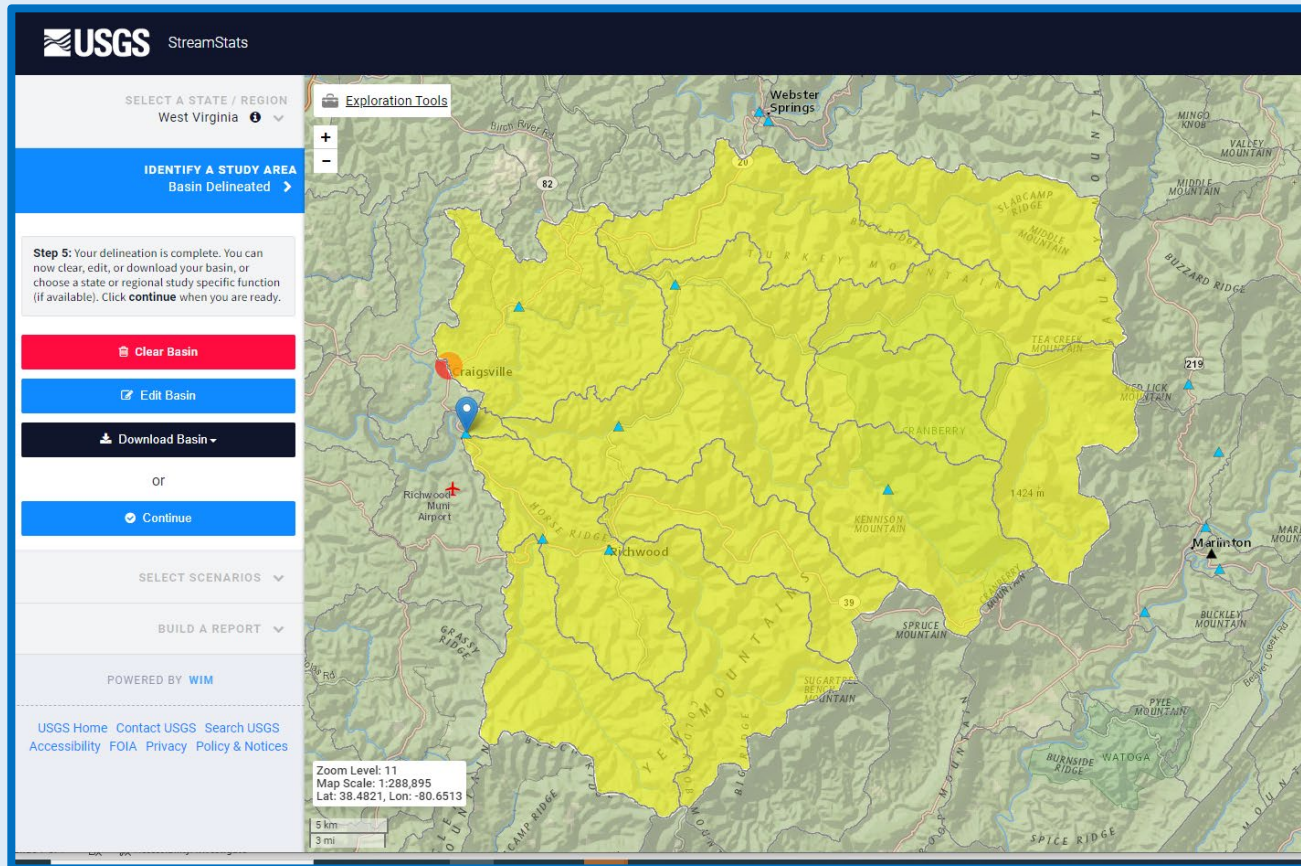
USGS tool that displays conditions at defined locations during high flow events, typically for roadways, paths, bridges.

- There are currently no sites in WV with these defined locations/elevations, but there could be.....



USGS Streamstats

<https://streamstats.usgs.gov/ss/>

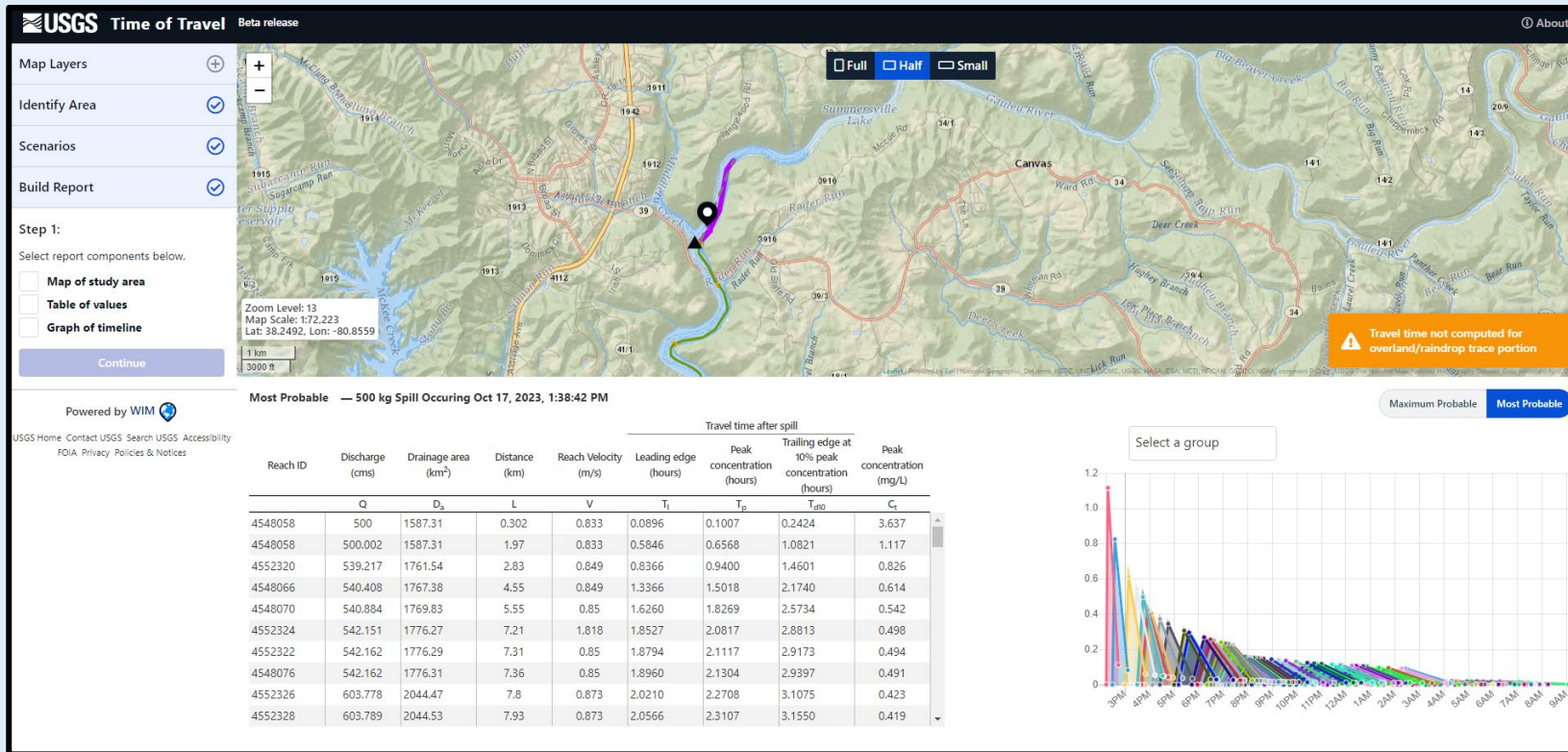


USGS utility that delineates basins, computes flow statistics, and other features

- Computes 10-year, 20-year, 50-year, 100-year events based on local and regional equations
- Streamstats are developed on a state-by-state basis
- VA and WV Statistics are based on USGS Scientific Data Report 2025-5110

USGS Time of Travel tool

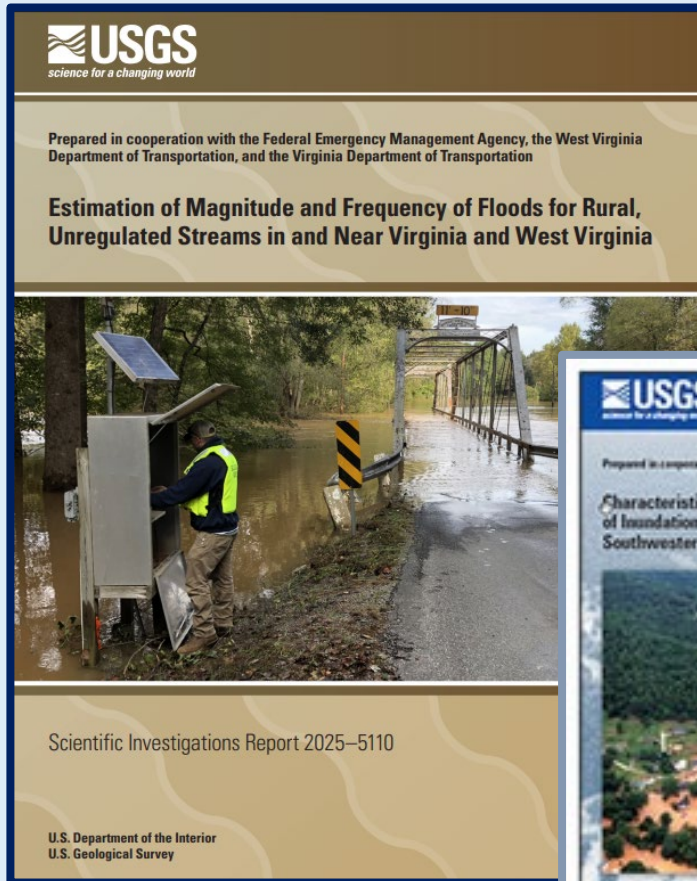
<https://streamstats.usgs.gov/tot-beta/>



Tool based on Jobson's equations to determine time of travel through a stream reach

- Flood waves
- Spill Response
- Spill Planning

Useful USGS Reports

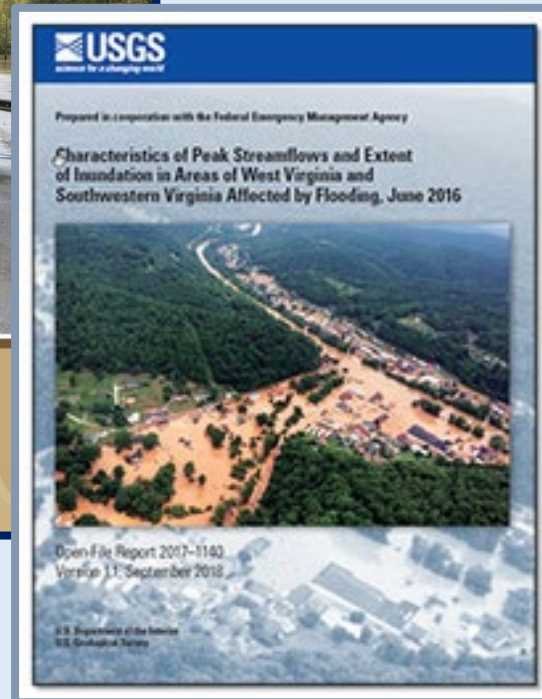


Estimation of Magnitude and Frequency of Floods for Rural, Unregulated Streams in and Near Virginia and West Virginia

- USGS Scientific Investigations Report 2025-5110 (report)
 - This report updates the “flood frequency”, or Annual Exceedance Probabilities (AEPs), across VA and WV
 - Significant work to develop statistics in regulated basins that includes a “regulation index”

Characteristics of Peak Streamflows and Extent of Inundation in Areas of West Virginia and Southwestern Virginia Affected by Flooding, June 2016

- USGS Scientific Investigations Report-SIR 2017-1140



USGS Water Data APIs

API stands for Application Programming Interface and provides a developer with programmatic access to a proprietary software application. An API is software that makes it possible for application programs to interact with each other and share data.

- Typically, Python or R-scripts to define the retrievals

USGS tools such as WaterWatch and Groundwater Watch have been discontinued

- All USGS is still accessible, but many of the summary and visualization tools no longer exist. That's a huge bummer!

IF you have retrievals or visualizations that you need, please reach out to wdfn@usgs.gov or to the VA-WV WSC for assistance.



Questions???



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