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USGS Flood Inundation Mapping Program: Communicating Flood Risk and Consequences to Communities at Streamgages

Local solutions for flood risk communication

The USGS Flood Inundation Mapping Program focuses on expanding the USGS Streamgage Network flow data out across the landscape away from the gage. The efforts at state and local levels to help communities understand flood risks and make cost-effective mitigation decisions are supported by detailed flood maps and real-time data. We partner with local communities to assist in the development and validation of flood inundation map libraries. Communities use these maps to help protect lives and property.

The USGS works with the National Weather Service, the U.S. Army Corps of Engineers, and the Federal Emergency Management Agency to connect communities with available resources and ensuring the quality and consistency of flood inundation maps across the country.

Atlanta, GA

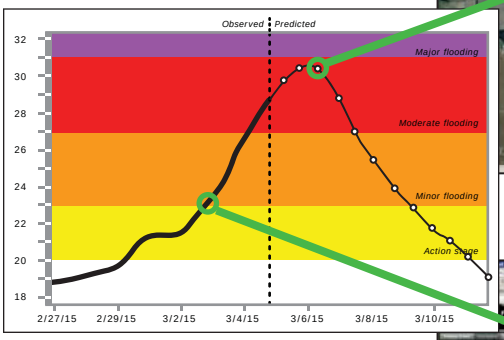
What is a flood inundation map library?

A **flood inundation map library** contains a series of sequential maps that help communicate where flooding may occur over a range of river levels. The library can be connected to real-time and forecasted river levels at USGS streamgages to help communities identify immediate risks during a flood.

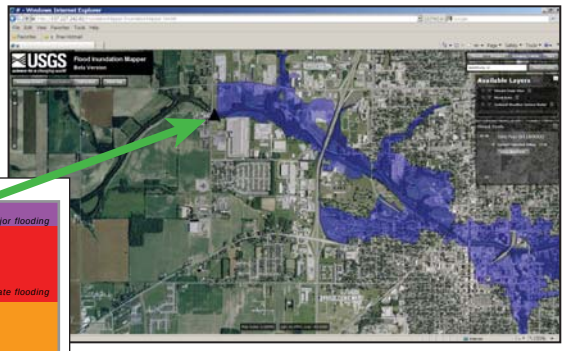
INUNDATION MAPS CAN BE USED FOR:

- **Preparedness** - "What-if" scenarios
- **Timely Response** - tied to real-time gage and forecast information
- **Recovery** - damage assessment
- **Mitigation and Planning** - flood risk analyses
- **Environmental and Ecological Assessments** - wetlands identification, hazardous spill cleanup

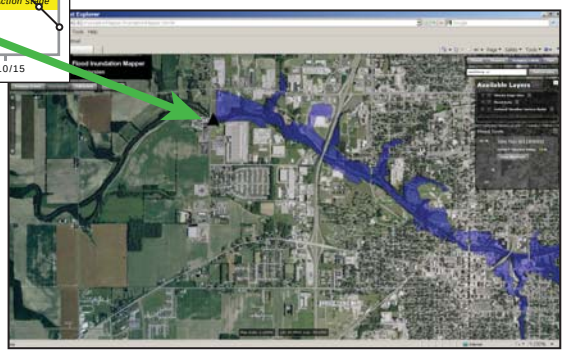
Example hydrograph of a flood:



High flood stage inundation map:



Low flood stage inundation map:



Inundation maps translate flood data into operational maps that communicate risk and the consequences of current and forecasted flooding.

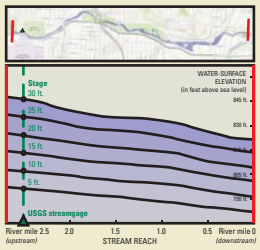
How do we make a Flood Inundation Map Library?

Step 1 - Stream selection

The mapping process is initiated by a local community that is interested in identifying its flood risk. The most appropriate stream or river reaches are near USGS streamgages located in a populated areas. The National Weather Service (NWS) produces flood forecasts at about half of USGS-gaged streams. These stream reaches are preferred because they support both flood monitoring and response activities.

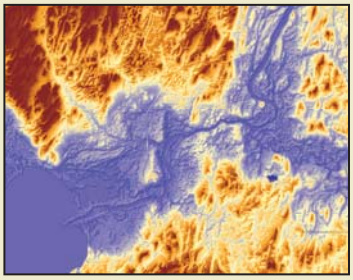
Step 2 - Hydraulic modeling

A carefully calibrated hydraulic model is developed for the selected stream reach and is used to define the height of a flood along the reach at a selected river level. This model is run multiple times for sequential levels, producing a series of flood heights from near-bankfull river levels to record flooding levels.



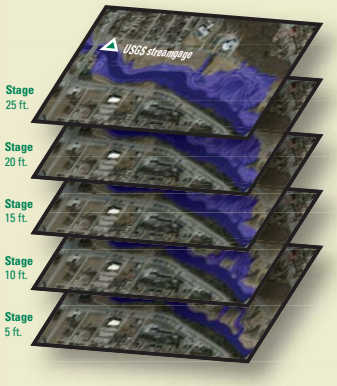
Step 3 - Geospatial processing

The hydraulic model results are intersected with a very detailed (LiDAR-based) ground-surface elevation model (DEM). This process creates a spatial grid showing the depth of flooding at each cell in the modeled flood area. These grids define the probable areas of floodwater inundation.



Step 4 - Map library production

A **flood inundation map** shows the probable areas of floodwater inundation overlaid onto a city map, which help communities plan and respond to floods. A **flood inundation map library** is the full set of maps showing flood inundation from near-bankfull river levels to record flooding levels.



Bring it all together using the online Flood Inundation Mapper…

Flood Inundation Map Library

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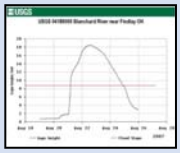
USGS Streamflow Data



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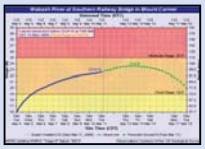
NWS Flood Forecast



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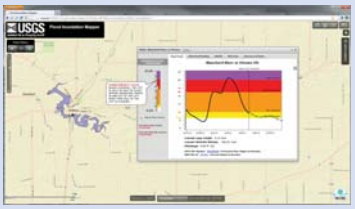
USGS Flood Inundation Mapper



The **USGS Flood Inundation Mapper** combines the flood inundation map libraries with real-time USGS river-level data and National Weather Service flood forecasts into a powerful tool that helps communicate when and where it may flood and allows for better tools to inform local responses that can protect lives and property.

Access the Flood Inundation Mapper and available flood inundation map libraries at: ***http://water.usgs.gov/osw/flood_inundation***

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For assistance with developing a flood library for your community, please contact your local USGS office: ***www.usgs.gov***