

Flood Inundation Mapping Program: Communicating Flood Risk to Communities

Flooding is a national problem:

During the past 30 year period, **flood losses** averaged about **\$7.82 billion** with **94 deaths**.

2011 Flood Facts

- \$8.26 billion in direct damages
- 113 deaths were reported.
- 63% of the fatalities were related to driving in floodwaters
- 15% were from falling into the water
- 62% of the flood victims were male

http://www.nws.noaa.gov/hic/flood_safety/index.shtml



A flood inundation map library contains a series of sequential maps that help communicate where flooding may occur over a range of river levels.



Oil spill, Marshall, MI

Inundation Maps can be used for:

- **Preparedness** - "What-if" scenarios
- **Response** - tied to real-time streamgauge and forecasts
- **Recovery** - damage assessment verification
- **Mitigation and Planning** - flood risk analyses
- **Environmental & Ecological Assessments** - wetlands identification, hazardous spill cleanup

With local solutions:

The USGS Flood Inundation Mapping Program focuses its efforts at state and local levels to help communities understand flood risks and make cost-effective mitigation decisions. 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.

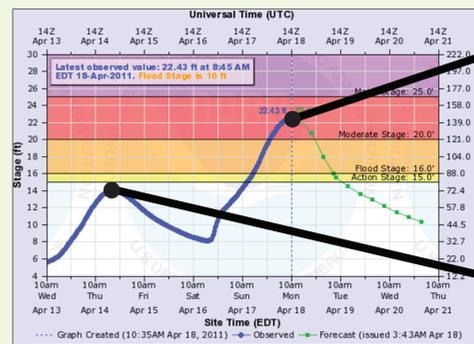
The USGS works with the National Weather Service, the U.S. Army Corps of Engineers, and the Federal Emergency Management Agency to connect communities with available federal resources thereby ensuring the quality and consistency of flood inundation maps across the country.



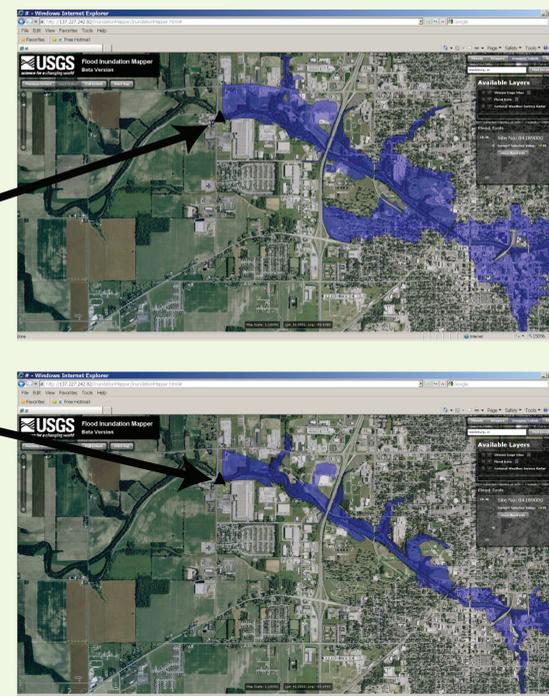
Atlanta, GA



Reedsburg, WI



Inundation maps translate the hydrograph into operational maps that communicate risk and consequences of flooding



How do we make a Flood Inundation Map Library?

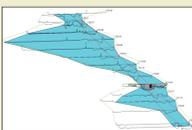
Step 1 - Stream selection

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.



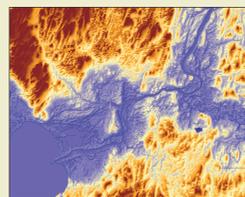
Step 2 - Hydraulic modeling

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.



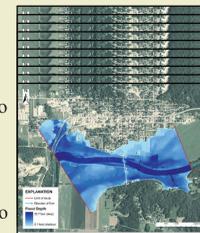
Step 3 - Geospatial processing

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.



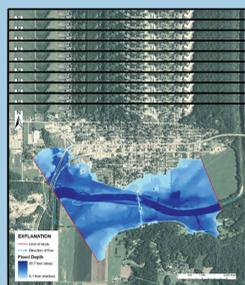
Step 4 - Map library production

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.

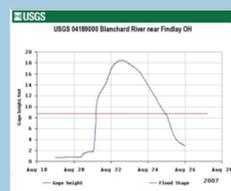


Bring it all together using the online Flood Inundation Mapper...

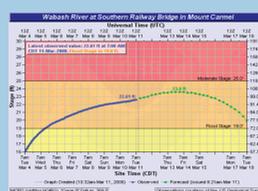
Flood Inundation Map Library



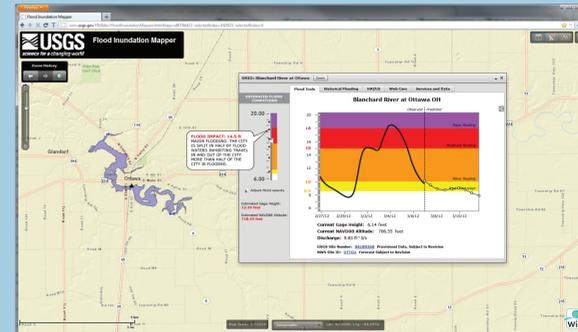
USGS Streamflow Data



NWS Flood Forecast



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.

More Information about the Flood Inundation Mapping Program is available at:
http://water.usgs.gov/osw/flood_inundation

