OWP | OFFICE OF WATER PREDICTION

Implementation of Forecast Flood Inundation Mapping Services to the Nation

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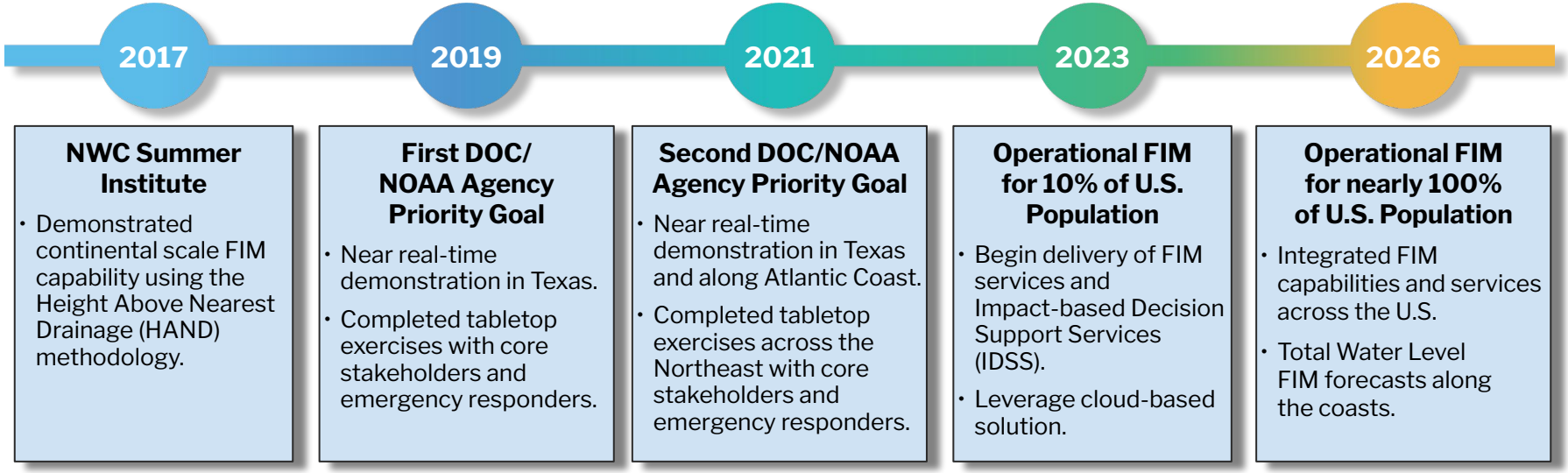
Continental Scale Forecast FIM Services

Transforming Water Prediction Services by Putting Water On A Map

- Services provide neighborhood level guidance of flood extent to operational forecasters along 3.4 million river miles of the U.S., and is the first time flood impact information is available at this scale.
- Services depict forecasts from both River Forecast Centers and the National Water Model.

Development, Demonstration, and Implementation Timeline



Implementation of NWS Flood Inundation Mapping Services

Map Legend

10% Population served by **October 2023**.

30% Population served by **October 2024**.

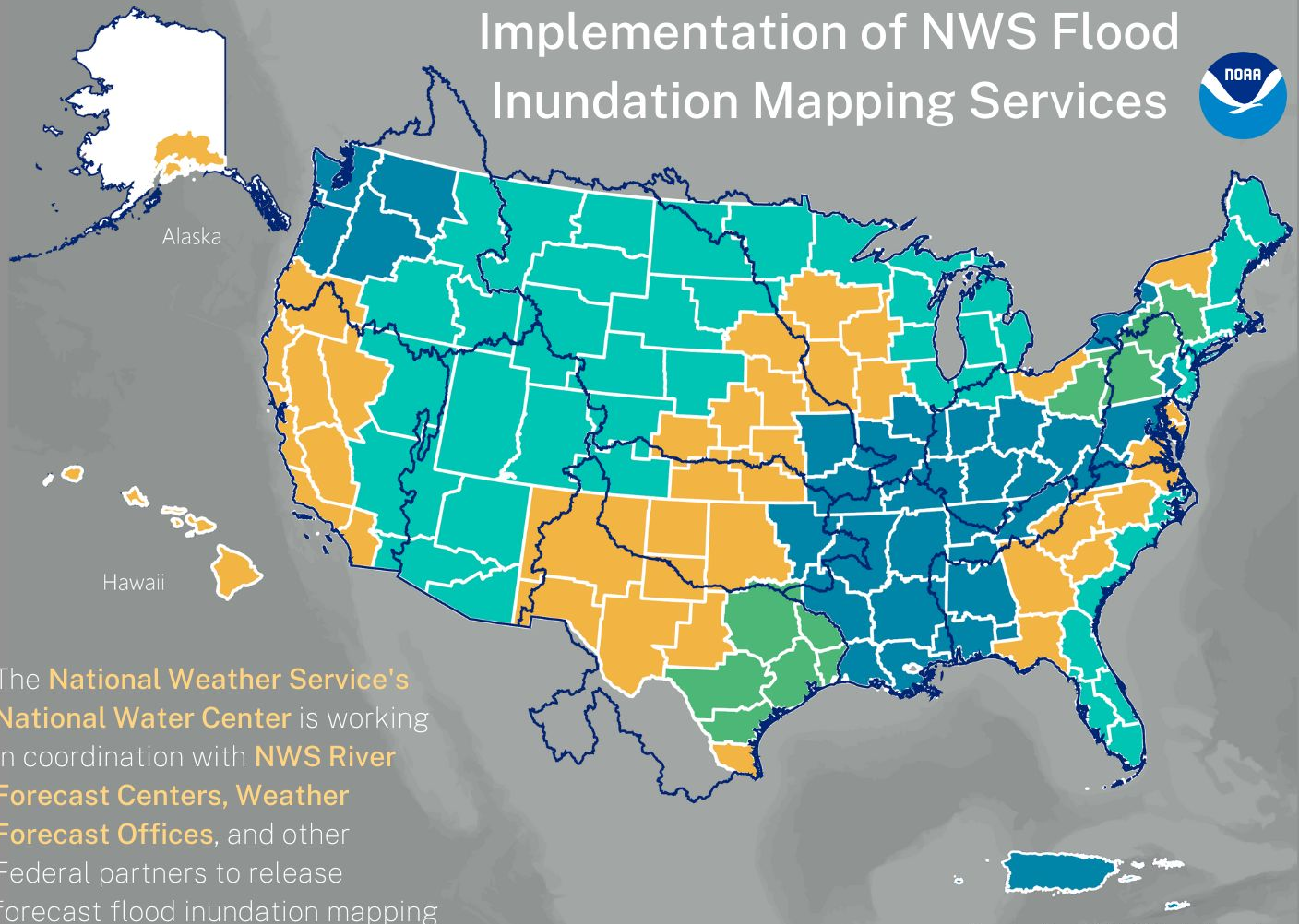
60% Population served by **October 2025**.

100% Population served by **October 2026**.

NWS County Warning Areas

NWS River Forecast Center Boundaries

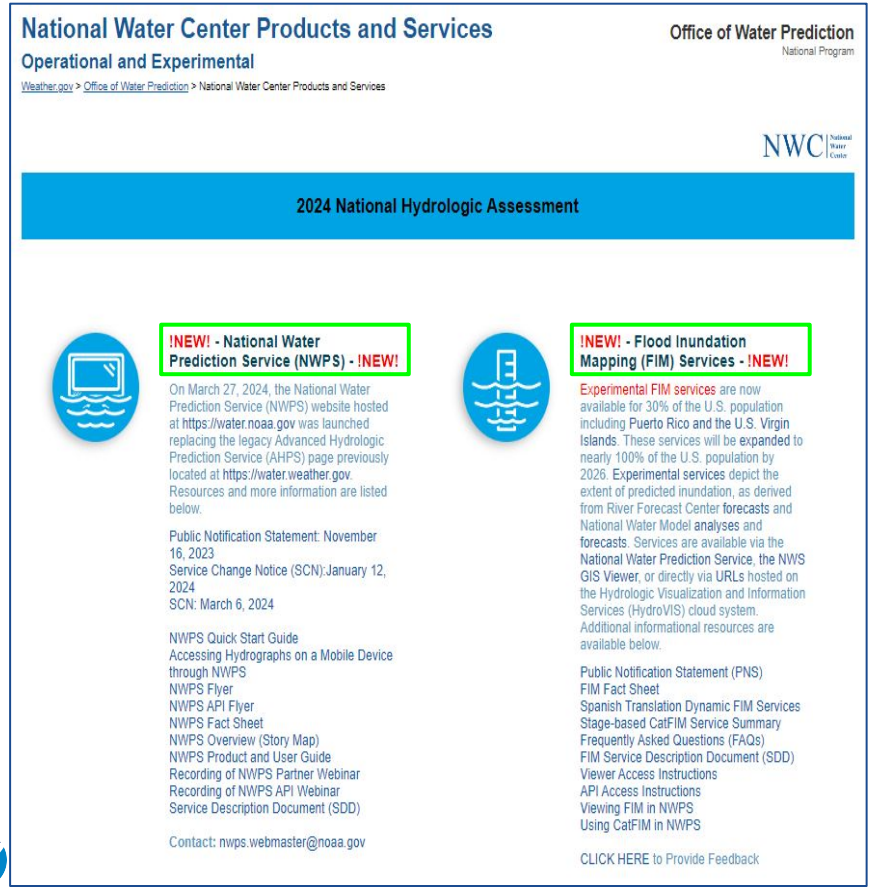
*100% is approximate. Does not include all parts of Alaska, American Samoa, and Guam. Implementation areas are subject to change.

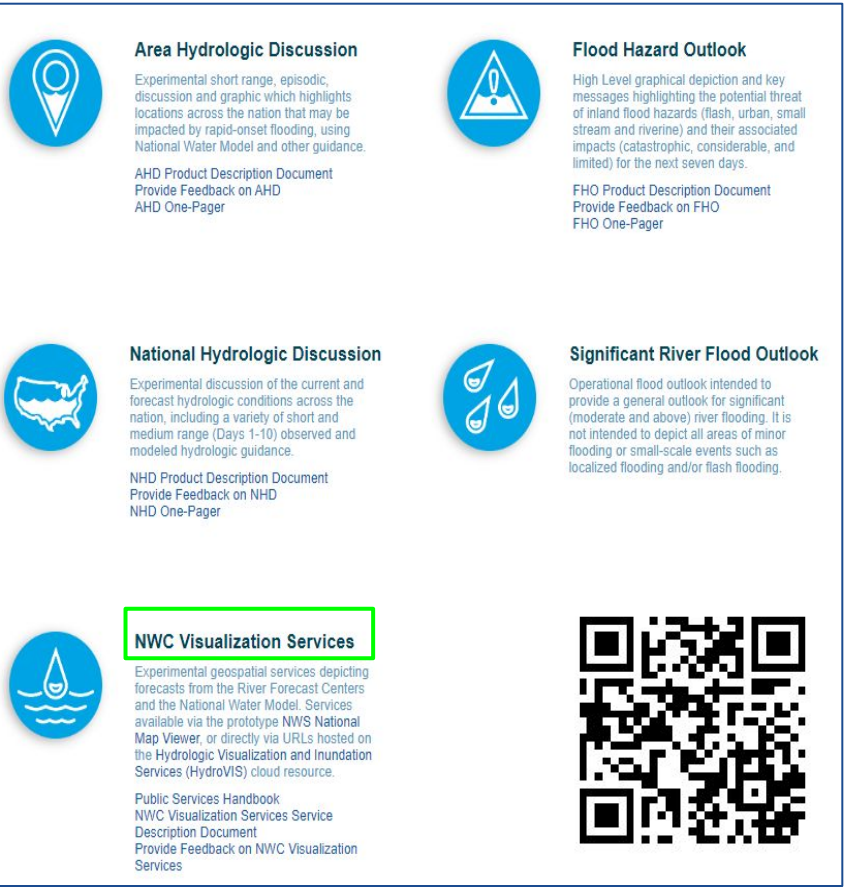


The **National Weather Service's National Water Center** is working in coordination with **NWS River Forecast Centers, Weather Forecast Offices**, and other Federal partners to release forecast flood inundation mapping services to the Nation.

National Water Center Operations Page

https://www.weather.gov/owp/operations





FIM Visualization Services

FIM Services available for 30% of the continental United States

- ***NWM Latest Analysis FIM***
- ***RFC 5-Day Max Extent FIM***
- ***NWM 5-Day Max Extent FIM***

Visualizations available on NWPS & the NWS GIS Viewer

- *NWPS (https://water.noaa.gov)*
  Includes FIM services, CATFIM, RFC & NWM forecast hydrographs, and a few NWM non-FIM visualizations
- *NWS GIS Viewer (https://viewer.weather.noaa.gov/water)*
  Includes FIM services and all Non-FIM NWM services

National Oceanic and Atmospheric Administration

Dynamic FIM Services Comparison Table [Public Domain]

FIM Service	NWM Latest Analysis FIM	RFC 5-Day Maximum Forecast FIM	NWM NBM 5-Day Maximum Forecast FIM
Data Type	Observation-Based Simulations [precipitation estimate and assimilated with USGS gage observations]	Forecast [5-day RFC forecasts]	Forecast [5-day NBM QPF]
Total Latency	55 Minutes	45 Minutes	6 Hours 30 Minutes
Update Frequency	Hourly	Hourly [if new forecasts are available]	Every 6 hours
FIM Domain	NWM Domain for FIM 30%	Downstream of NWPS Forecast Points for FIM 30%	NWM Domain for FIM 30%
When to Use	Use as a snapshot of the most recent modeled inundation	Use when RFC forecast is available	Use for rivers and streams not covered by RFC forecast

FIM Visualization Services

FIM Services available for Puerto Rico and the U.S. Virgin Islands

- ***NWM Latest Analysis FIM***
- ***NWM 48-hour Max Extent FIM***

Visualizations available on NWPS & the NWS GIS Viewer

- *NWPS (https://water.noaa.gov)*
  Includes FIM services, NWM forecast hydrographs, and a few NWM non-FIM visualizations
- *NWS GIS Viewer (https://viewer.weather.noaa.gov/water)*
  Includes FIM services and all Non-FIM NWM services available for Puerto Rico

Dynamic FIM Services Comparison Table – Puerto Rico & U.S. Virgin Islands [Public Domain]

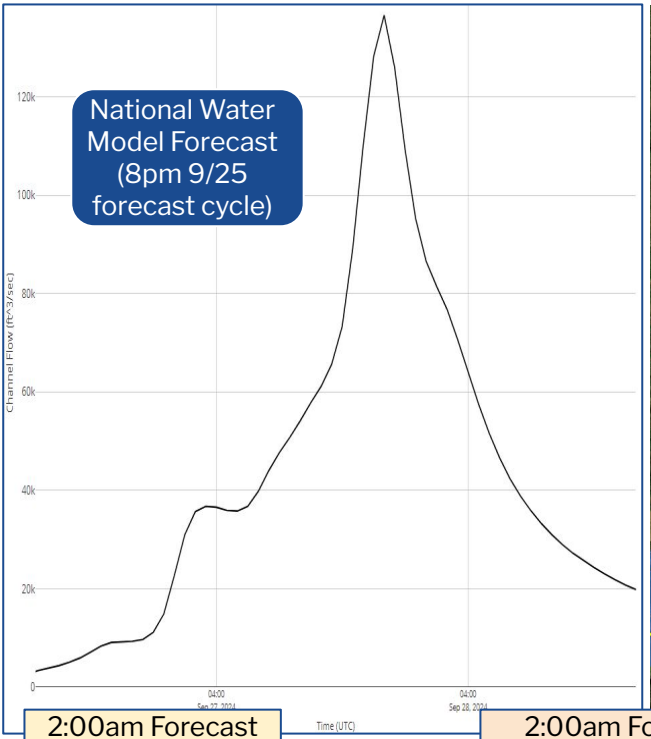
FIM Service	NWM Latest Analysis FIM	NWM 48-Hour Maximum Forecast FIM
Data Type	Observation-Based Simulations [precipitation estimate and USGS gage observations]	Forecast [48-hour WRF-ARW QPF]
Total Latency	30 Minutes	3 Hours
Update Frequency	Hourly	Every 12 Hours [06 UTC & 18 UTC]
FIM Domain	NWM [Puerto Rico & U.S. Virgin Islands]	NWM [Puerto Rico & U.S. Virgin Islands]
When to Use	Use as a snapshot of the most recent modeled inundation	Use for rivers and streams not covered by RFC forecast

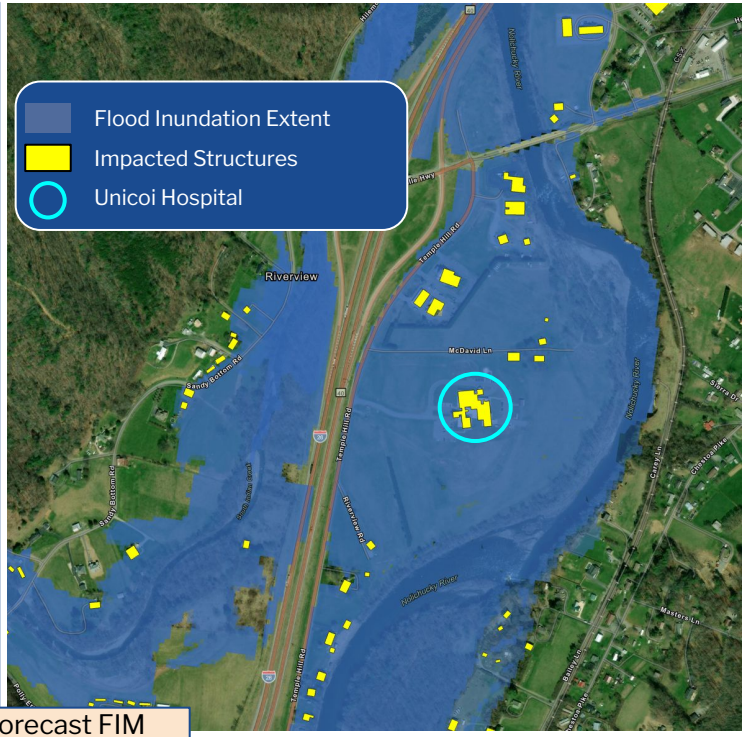
Example of RFC 5-day Forecast Flood Inundation Extent

River Forecast Center (RFC) 5-Day Max Inundation Extent Forecast, along the Winooski River, Montpelier, VT, for July 11, 2023.

Aerial view of Montpelier, VT taken with University of Vermont Spatial Analysis Center Drone. Photo was taken on July 11, 2023 during the height of the major flood event. Photo credit: USDA Forest Service and University of Vermont.

NWM-Based FIM: Fills in Gaps via Guidance at Ungauged Locations
Unicoi Hospital High Water Rescue along the Nolichucky River near Erwin, TN





Information Deficit
-non-forecast gauge point 53 miles upstream
-nearest NWS forecast point 9 miles downstream

2:00am Forecast FIM Shows Hospital Cut Off

2:00am Forecast FIM Shows Hospital Inundated (shown above)

9/25 12:00 am **9/26** 12:00 pm **9/26** 12:00 am **9/27**

Example of NWM 48-hour Forecast Flood Inundation Extent

National Water Model 48 hour Max Inundation Extent Forecast, along the Rio De La Plata River, Comerio, Puerto Rico for Hurricane Fiona.

FIM Impact-based Decision Support Workshops

- Online Training Curriculum
- Intensive 3 day workshop
- Event simulations including the delivery of IDSS to partners
- Science November of 2022 we've trained:
  - **~230 field staff in 103 offices: 13 RFCs, 83 WFOs, 6 ROCs, and the NWS NOC**
- Field offices SMEs train their staff & train their partners
- Suite of training and outreach resources for local office and partner training

Local Office & Partner Training Reference Information

National Oceanic and Atmospheric Administration

Dynamic FIM Services Comparison Table [Public Domain]

FIM Service	NWM Latest Analysis FIM	RFC 5-Day Maximum Forecast FIM	NWM NBM 5-Day Maximum Forecast FIM
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When to Use	Use as a snapshot of the most recent modeled inundation	Use when RFC forecast is available	Use for rivers and streams not covered by RFC forecast

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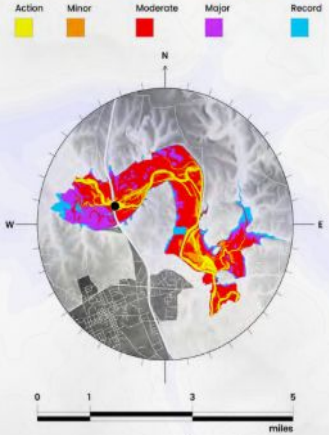
Stage-Based Categorical Flood Inundation Mapping [CatFIM] Factsheet [Public Domain]



Categorical Flood Inundation Mapping [CatFIM] uses the HAND Method developed by the National Water Center [NWC] to create FIM extents for the official National Weather Service [NWS] flood stage category thresholds [Action, Minor, Moderate, Major, and Record]. This Static FIM Library Service serves as an invaluable tool for emergency planning and delivering effective Impact-Based Decision Support Services [IDSS] on "blue-sky" days ahead of actual future flood events. This factsheet outlines the Stage-Based CatFIM Method, its limitations, and application.

Administración Nacional de Océanos y Atmósfera

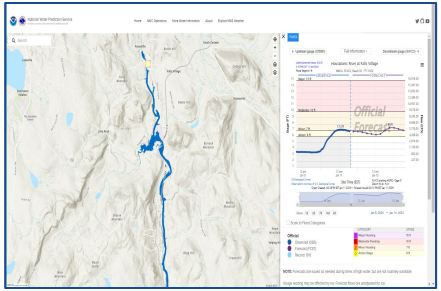
Tabla Comparativa de los Servicios del FIM Dinámicos - Puerto Rico e Islas Vírgenes de los Estados Unidos [Dominio Público]

Servicio del FIM	FIM del Análisis más Reciente del NWM	FIM de la Extensión Máxima de la Inundación a 48-Horas del NWM
Tipo de Datos	Simulaciones Basadas en Observaciones [estimados de precipitación y de observaciones de sensores del USGS]	Pronóstico [48-Horas del QPF WRF-ARW]
Latencia Total	30 Minutos	3 Horas
Frecuencia de Actualizaciones	Cada Hora	Cada 12 Horas [06 UTC e 18 UTC]
Dominio del FIM	El NWM [Puerto Rico e Islas Vírgenes de los Estado Unidos]	El NWM [Puerto Rico e Islas Vírgenes de los Estado Unidos]
Cuándo Utilizarlo	Utilícelo como una vista instantánea del modelaje de la inundación más reciente	Utilícelo para ríos y arroyos que no están cubiertos bajo el pronóstico del RFC

FIM Impact-Based Decision Support Services

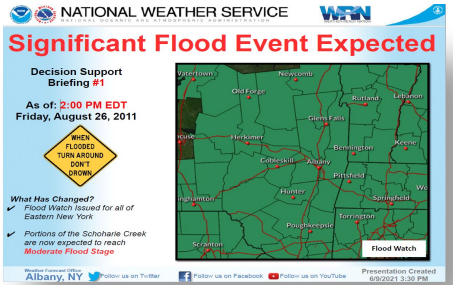
Increasing direct interaction with core partners based on various scenarios and needs

Public Services



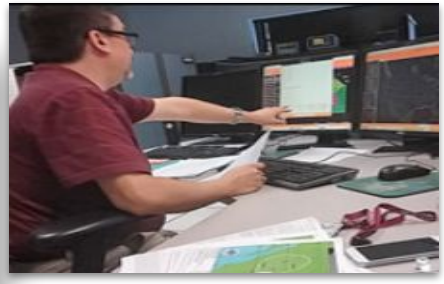
NWPS, National Viewer, providing visualizations and FIM for the partners to ingest into their system (i.e. REST services via HydroVis).

Baseline IDSS



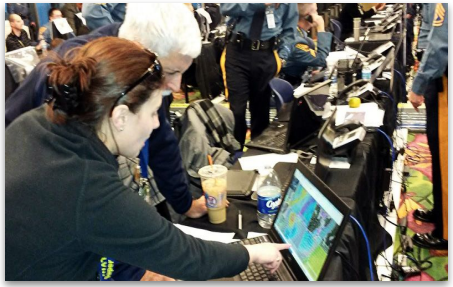
Providing graphics, email packages, webinars, NWSChat, etc. to all core partners to convey general impacts.

Targeted IDSS



Providing targeted graphics, email packages, webinars, etc. to core partners to convey specific impacts based on their specific needs and thresholds.

Integrated IDSS



Providing onsite, integrated support within a core partner's operations with detailed impact informations tailored to the partner's needs and thresholds.

Record Flooding Forecast in Asheville, NC

Friday, September 27, 2024
12:45 AM EDT

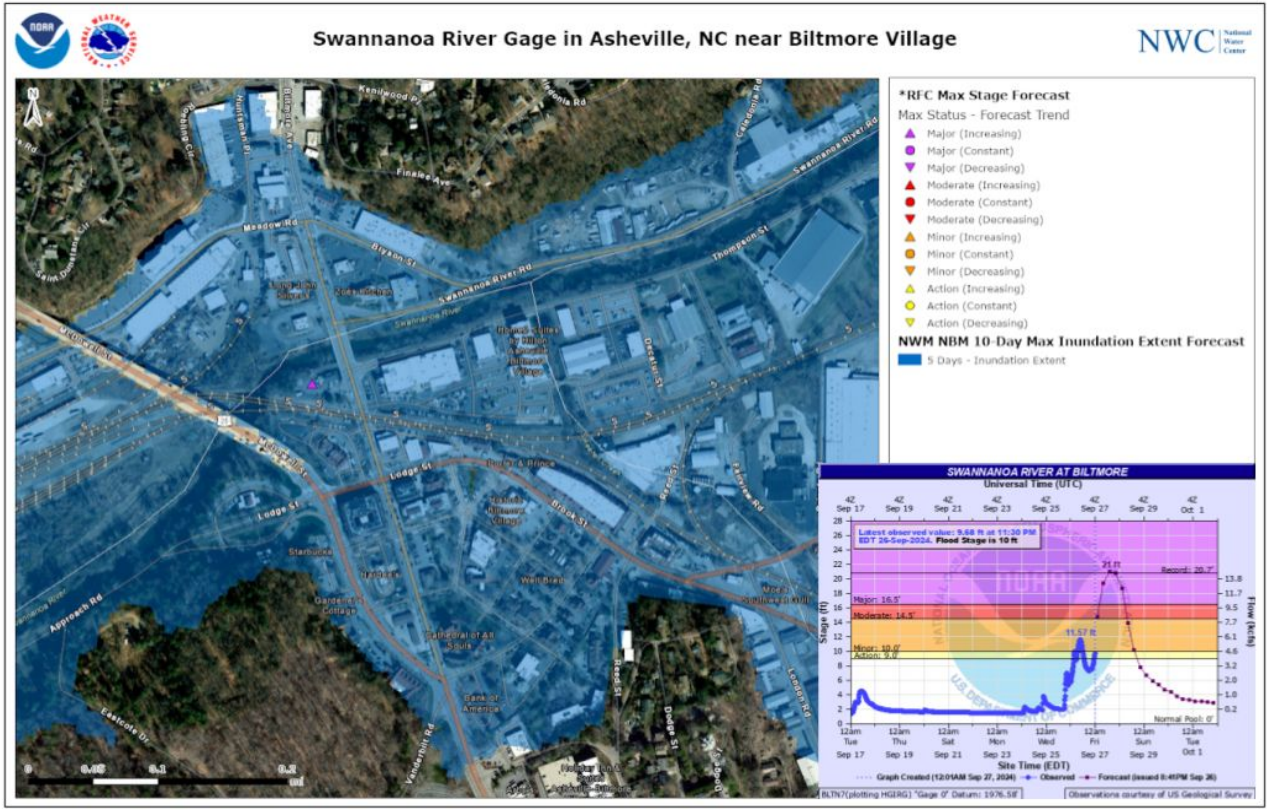
Life Threatening Flooding Possible

Key Messages

- Record flooding is forecast along the Swannanoa River
- Life threatening flooding may be possible
- Flood inundation mapping suggests widespread flooding in the Biltmore Village area of Asheville (shown in blue in the image on the right)
- To escape rising water, take the shortest path to higher ground.

Timing

- Flooding is ongoing and expected to crest Friday evening at record stage



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Thank You!

For More Information:

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https://water.noaa.gov

National Training Program

Curriculum for Subject Matter Experts

1. Introduction to FIM Training Webinar
2. NWM 3.0 / TWL Module
3. NWM Visualizations (NWM and FIM related)
4. HAND Method (Basic) Module
   a. includes DEM Specifications & Hydrography
5. HAND Method (Advanced) Module
   a. includes content from SRCs Webinar and HAND FIM Performance Evaluation Module
6. HydroVIS Introduction Webinar
7. FIM QC - Condensed Checklist Webinar
8. FIM QC - Advanced Checklist Webinar
9. Waterview Application [3 parts]
10. FIM Reviewer Application [4 parts]
11. Using Waterview to Conduct BASIC Review
12. Using FIM Reviewer to Conduct DEEP DIVE Review
13. Static FIM Services Module
    a. includes content from CatFIM and NRP Modules; adds Partner FIM
14. IDSS Coordination & Collaboration

Curriculum for Office Forecasters

1. NWM 3.0 / TWL Module
2. HAND Method (Basic) Module
   a. include DEM Specifications & Hydrography
3. Waterview Application [3 parts]
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