



National Water Center Update

7th Annual FIRO Workshop

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Aug 6, 2020



Outline

- National Water Center
- Status of HEFS (Already Covered)
- National Water Modeling Update
- Water Resources Evaluation Capabilities
- Flood Inundation Mapping
- Water Prediction Operations Division - Initial Operating Capability

National Water Center



- Center of excellence for water resources science and prediction
- Catalyst to transform water prediction through enterprise collaboration leveraging the IWRSS Partnership
- Operations Center for water resources common operating picture and decision support services on all time scales



NWC has hosted more than 80 scientific meetings with over 2800 participants



Enhancing the NWM: Development Trajectory

v1.0



v1.1/1.2/2.0

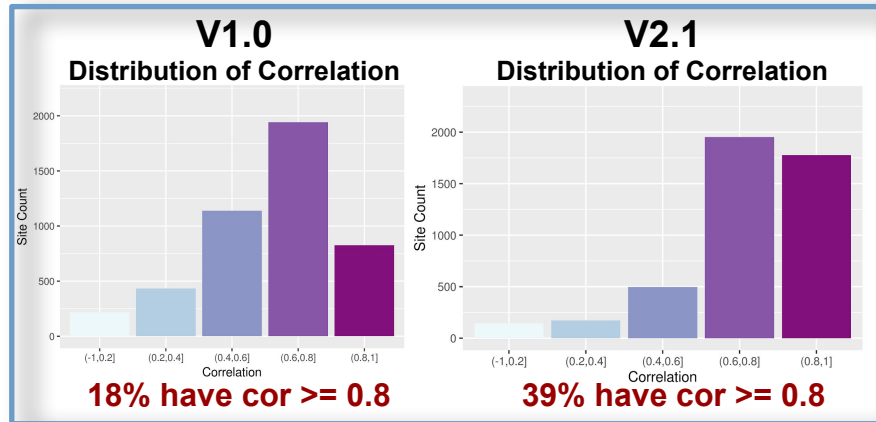


v2.1

Foundation: 2016
Water resource model
2.7 million reaches

Upgrades: 2017/2018/2019
Hawaii, medium range ens.,
physics upgrades, improved
modularity, MPE ingest

Next Upgrade: Early 2021
Expansion to PR and Great
Lakes, reservoir modules,
forcing upgrades, open-loop,
and improved Hawaii forcing



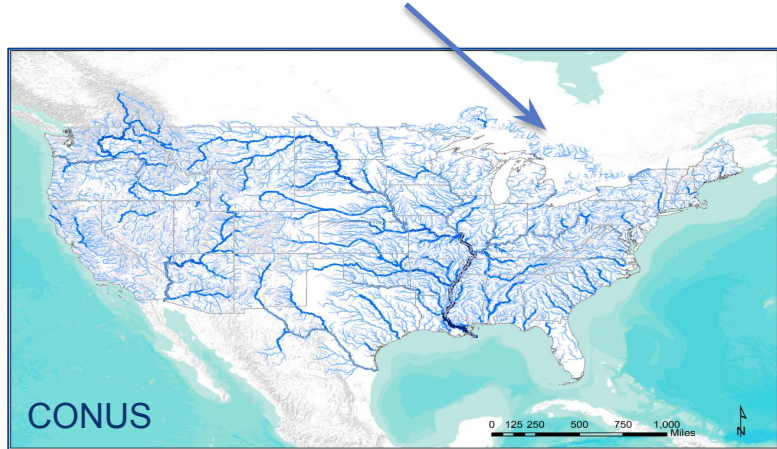
v3.0



Future Upgrade: 2022
Coastal coupling, expansion to Alaska,
improved infiltration, inland hydraulic
routing, hydro-fabric upgrades

NWM V2.1: OCONUS Domain Expansion

- NWM V2.1 channel routing domain expanded to include Great Lakes and Lake Champlain drainage basins
- NCAR and Great Lakes Environmental Research Lab (GLERL) collaboration with onboarding by OWP and NCAR



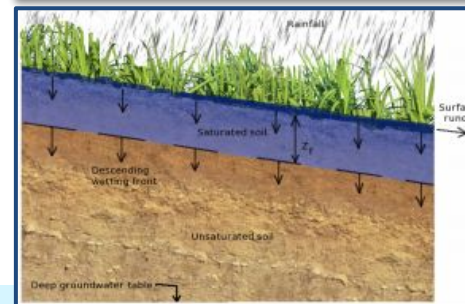
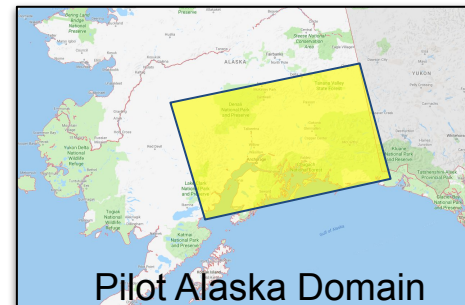
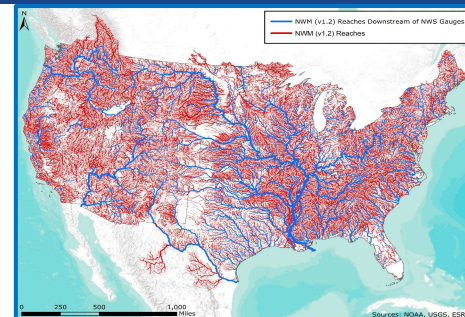
- NWM V2.1 domain expanded to include Puerto Rico / US Virgin Islands
- Designed in partnership with SERFC and Puerto Rico WFO



NWM V3.0 and Beyond

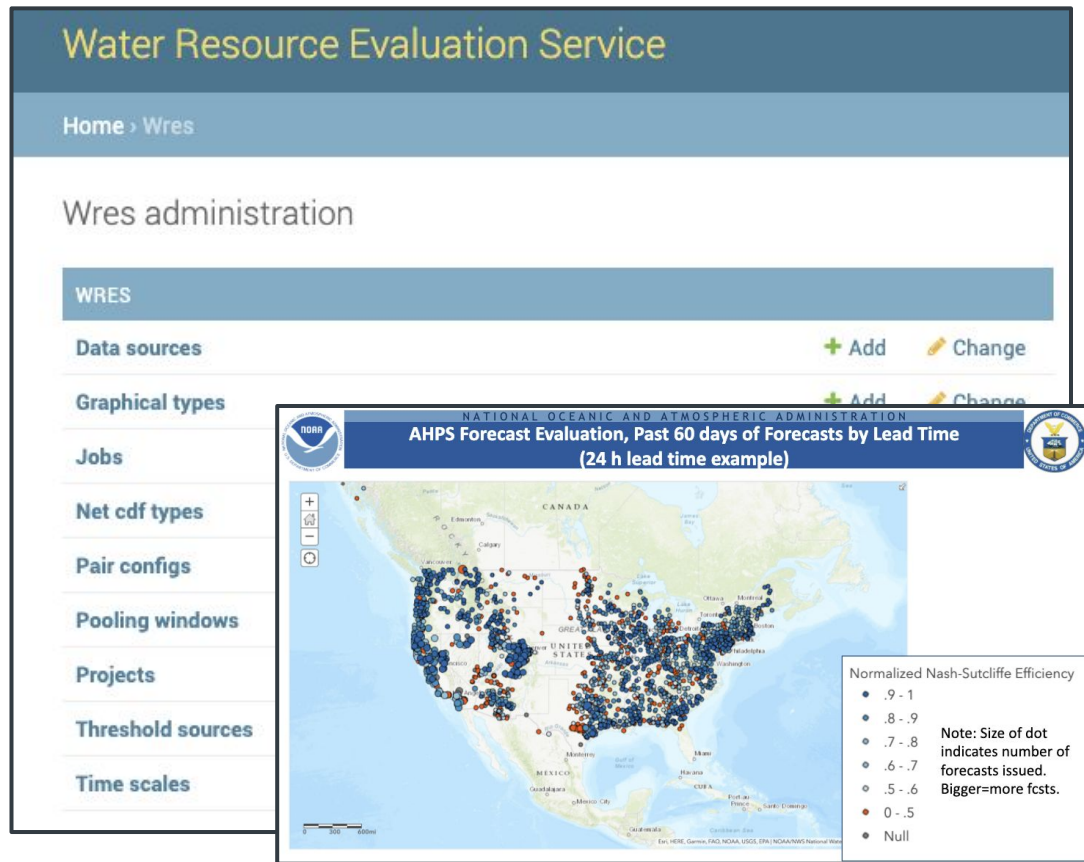
- Coastal Coupling
 - Freshwater-estuary-ocean model coupling
 - Simulate compound flooding—freshwater/surge/tides
- Expansion to south-central Alaska (with APRFC)
 - Beginning with Cook Inlet/Copper River Basin
 - Accompanying cold land physics upgrades
- Inland Hydrologic and Hydraulic Routing
 - Improved routing for backwater and complex channels
 - Accompanying hydrofabric upgrades for routing and FIM
- Improved runoff scheme for partitioning rainfall
 - Optimization of existing runoff options
 - Foundational physics upgrade, evolving Noah-MP*

***Including evaluation of snow accumulation and ablation model portion of Noah-MP in partnership with CW3E, funded through NOAA's Joint Technology Transfer Initiative**



Water Resources Evaluation Service

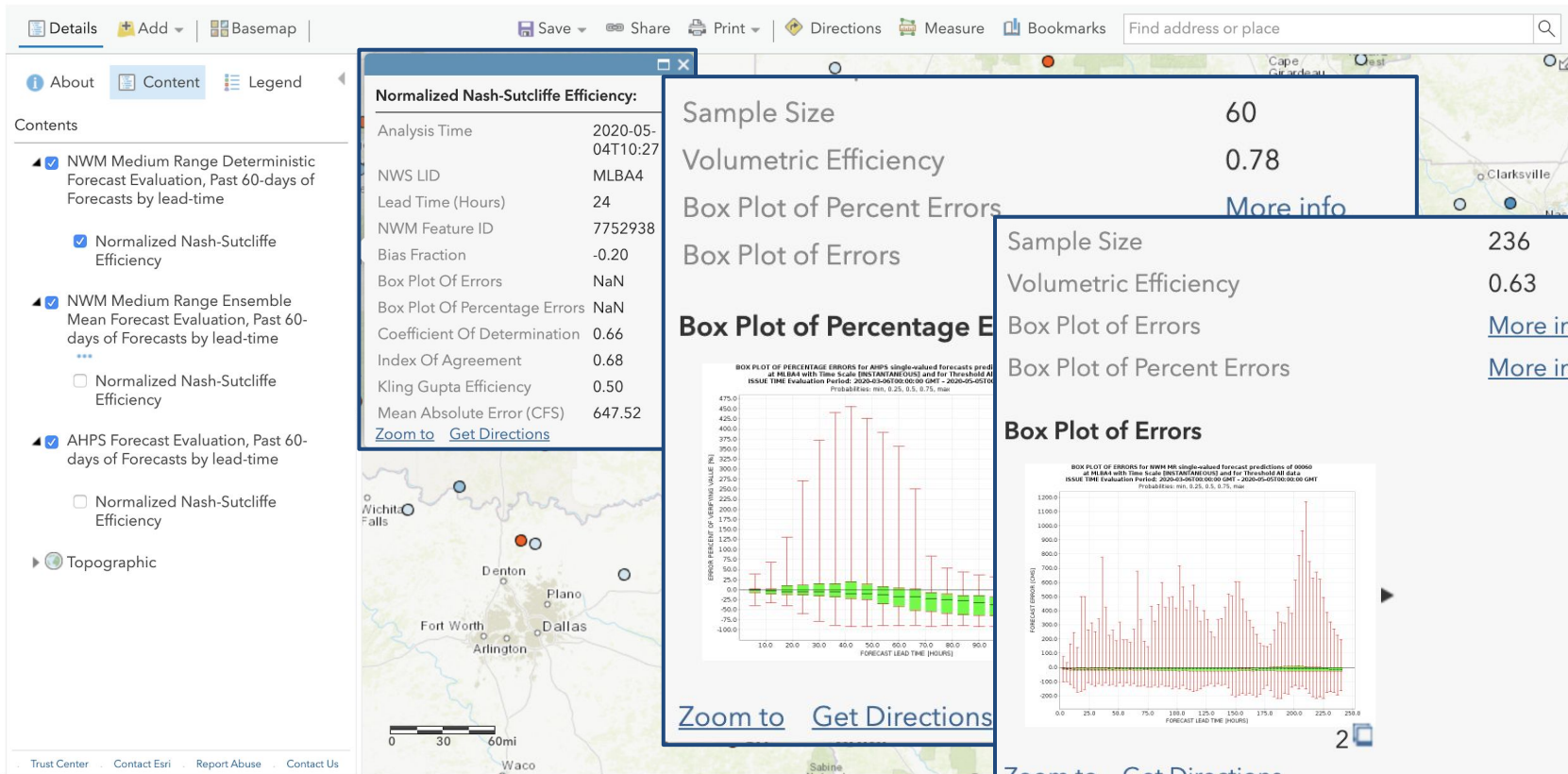
WRES is a software service for performing robust evaluations of hydrologic forecasts. It can be accessed as a service or via a GUI.



NWM and AHPS Forecast Evaluation

Home ▾ Hydrologic Analysis and Forecast Evaluations. [✎](#)

New Map Create Presentation [David ▾](#)



Extended AnA Event Coincidence Evaluation

Filter: Extended Analysis and Assimilation Event Coincidence Evaluation - Peak Discharge Error (%)

View Edit

All of these expressions must be true:

- Days Since Event Peak Discharge is less than 14
- Days Since Event Peak Discharge is greater than 7

REMOVE FILTER

CLOSE

Past 60 Day NWM Extended AnA Coincidence Evaluation

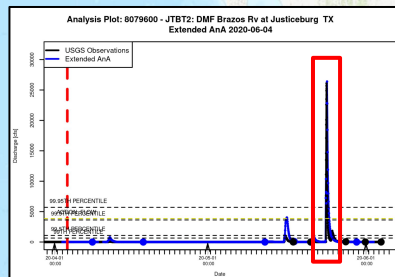
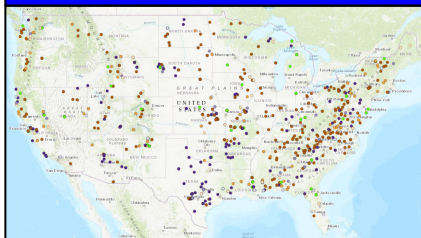
☐ Probability of Detection

☐ Normalized Nash-Sutcliffe Efficiency

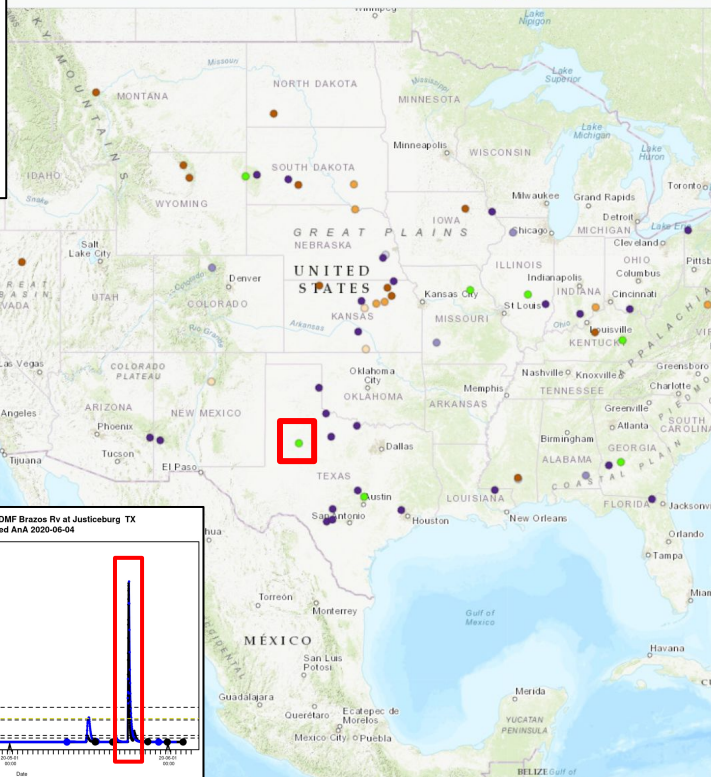
☒ Peak Discharge Error (%)

- > 50
- > 25 - 50
- > 10 - 25
- > -10 - 10
- > -25 - -10
- > -50 - -25
- > -100 - -50

ALL STATIONS NO FILTER



Save Share Print View Directions Measure Bookmarks



New Map Create Presentation alexander

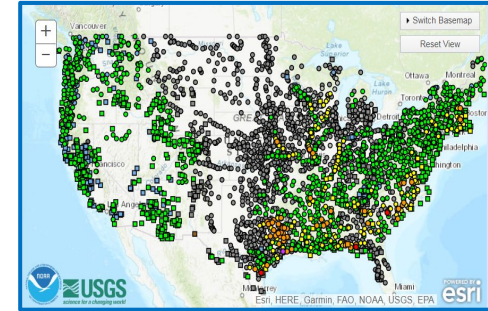
Peak Flow Error (%)

NWS LID	JTB2
USGS Site Code	8079600
nwm_feature_id	13,698,835
Event Start Date	2020-05-21 04:00:00
Event Peak Date	2020-05-24 07:00:00
Event End Date	2020-05-28 01:00:00
Event Start Discharge	3.06
Event Peak Discharge	25,200.00
Event End Discharge	46.00
Number of Peaks	2
Max Flood Stage	BANKFULL_FLOW
Flow Trend Status	DESCENDING
Current Event Status	COMPLETED
Volume (ac-ft)	13,648.39
Direct Discharge Volume (ac-ft)	13,605.82
NSE	0.15
NNSE	0.54
C2M	0.08
Observed Volume (ft3)	594,523,980.02
NWM Peak Date Time	2020-05-24 09:00:00
Days Since Event Peak Discharge	9.00
Event Duration (Days)	6.00
10 day chart	More info
60 day chart	More info
Peak_Discharge_Error_%	1.11
Volume_Error_%	47.21

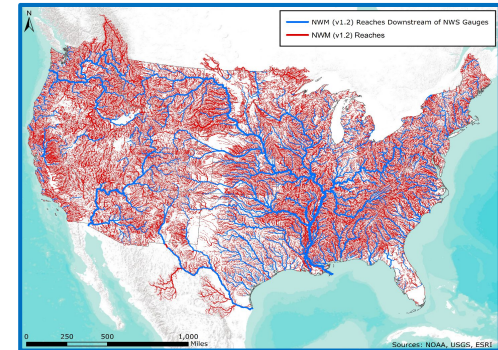


NWS Flood Inundation Mapping Services

- **Collaboration across USACE, USGS, NOAA, and FEMA on integrated Flood Inundation Mapping (iFIM)**
 - Leverage the best available maps from each agency as appropriate
- **NOAA's High-resolution Flood Inundation Mapping (FIM) includes:**
 - NWS River Forecast Center (RFC) forecast flows routed downstream ("Replace-and-Route")
 - National Water Model (NWM) forecast flows at each model reach, for different model configurations:
 - Analysis (current conditions)
 - Short-Range (to 18-hours)
 - Medium-Range (to 10 days)
- **Available as demonstration service to NWS RFCs in near-real-time**



RFC forecast locations

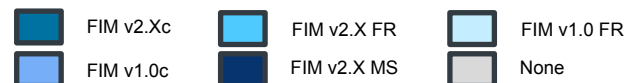
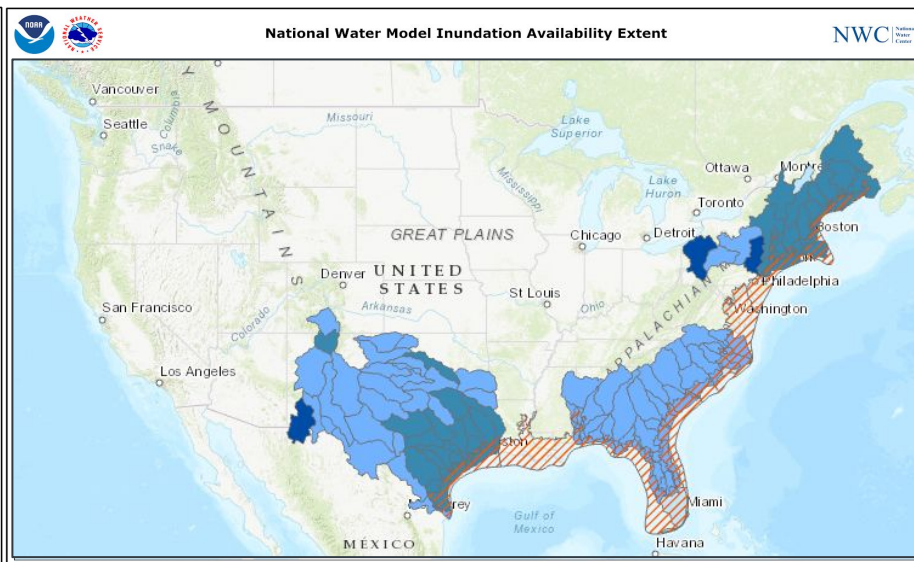
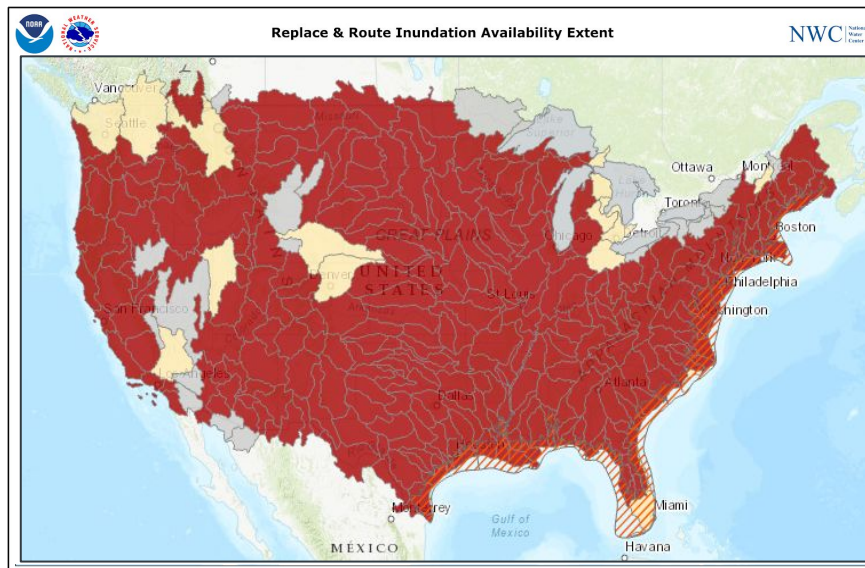


NWM river reaches

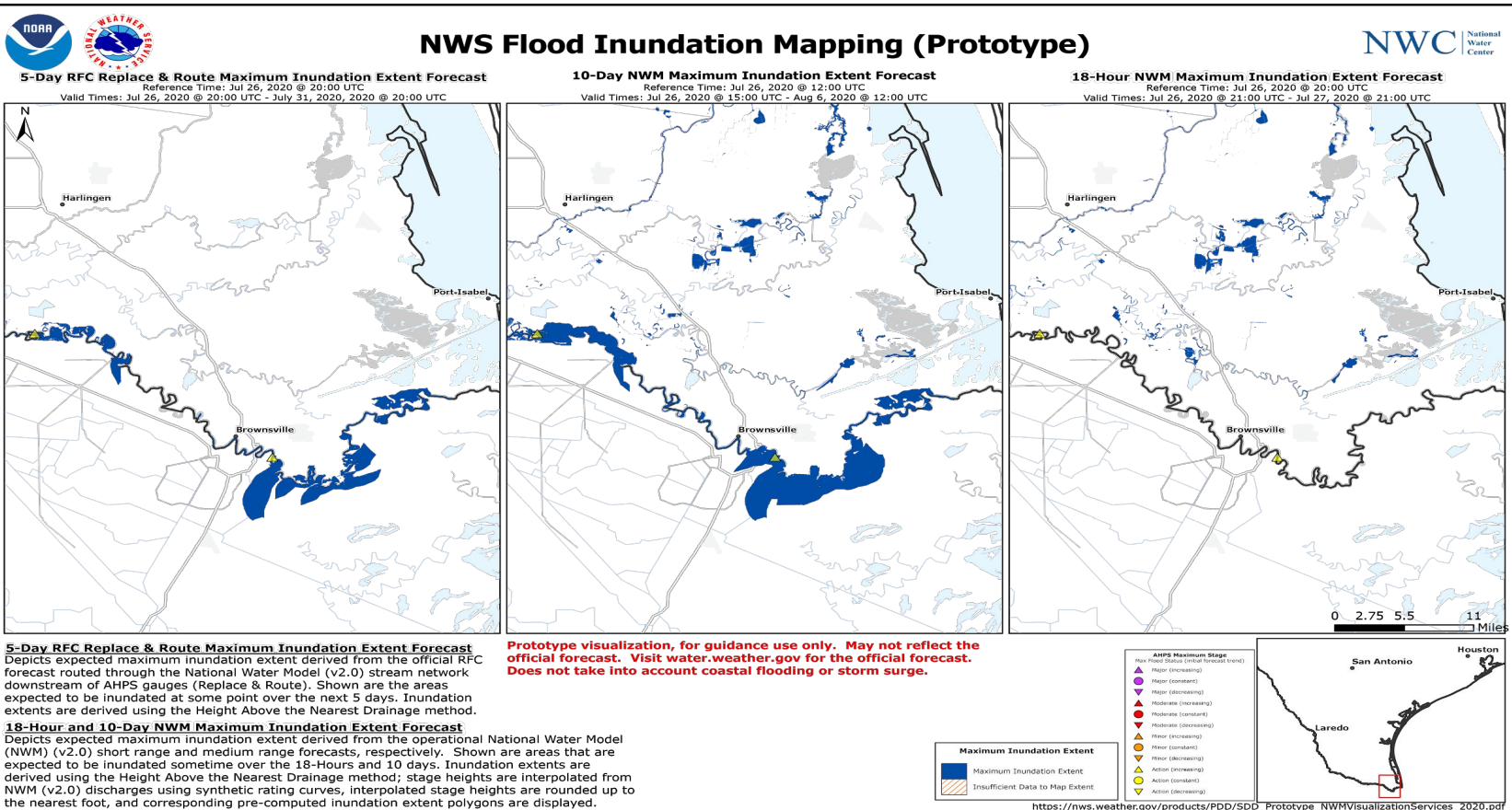
Available FIM Services - August 2020

Model Source: NWS River Forecast Center (mapping downstream of forecast locations)

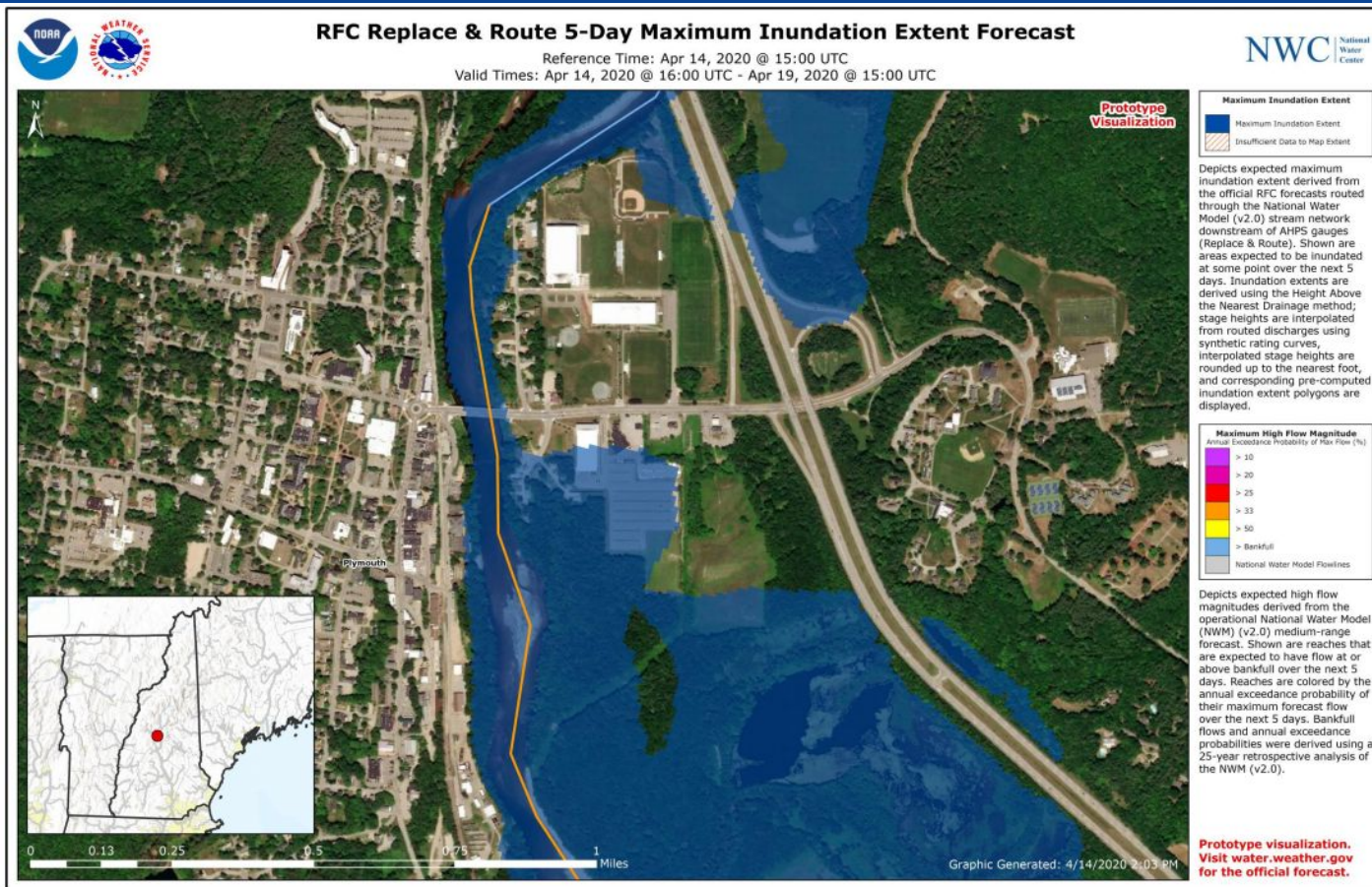
Model Source: NOAA National Water Model (mapping on full resolution NHDplus network)



Inundation Mapping - Hurricane Hannah July 2020



Inundation Mapping - April 2020



WPOD: Staffing and Status

IOC Status (Oct 1, 2019)

- 17 Total (13 Forecasters, 1 System Admin, 1 GIS Specialist, 2 Software Engineers)...and growing
- 7 Days a week
- Hours
 - 5 AM - 8:30 PM CT (Weekdays)
 - 7 AM - 3 PM CT (Weekends/HL)
- Surge for Events



WPOD: Services

Establish a common operating picture for current and forecaster water resources conditions.

Routine services include, but are not limited to:

- Holistic monitoring of observations of current and forecast conditions, to assess potential flash and riverine flood
- Interpretation of hydrologic model-based guidance for parameters including streamflow and streamflow anomaly
- Generation of hydrologic model-based guidance for parameters including time to bankfull conditions and other high/low flow criteria
- Continental snow analysis and data assimilation
- Analysis of snowpack and water supply conditions
- Evaluation of forecast hydrologic models and model guidance and their derivatives
- Remote sensing analysis of snow and soil moisture state conditions
- Flood Inundation Mapping (FIM)* (*APG Domain)

Episodic services include, but are not limited to:

- Flood Inundation Mapping (FIM)
- Dam/Levee Failure Analysis
- Remote sensing analysis which may include, but is not limited to:
 - Snowpack Conditions
 - Flood inundation extent
 - River Ice Locations
 - Other surface dynamics (e.g., burn scars, debris flow paths, vegetative index)
- Event-specific briefings



Closing Thoughts

- **OWP/NWC continues to develop the NWM and HEFS and have developed a broad spectrum of experimental high resolution water resources data services**
- **We are committed to working across the organization with ROCs, RFCs, National Centers, WFOs and with our deep core partners to transform water prediction and related IDSS.**
- **This will take time and we are committed to collaboration and transparency.**