



An overview of the NWC's experimental products

2023 FFaIR seminar series

B. Peggy Lee

NWS/OWP/WPOD

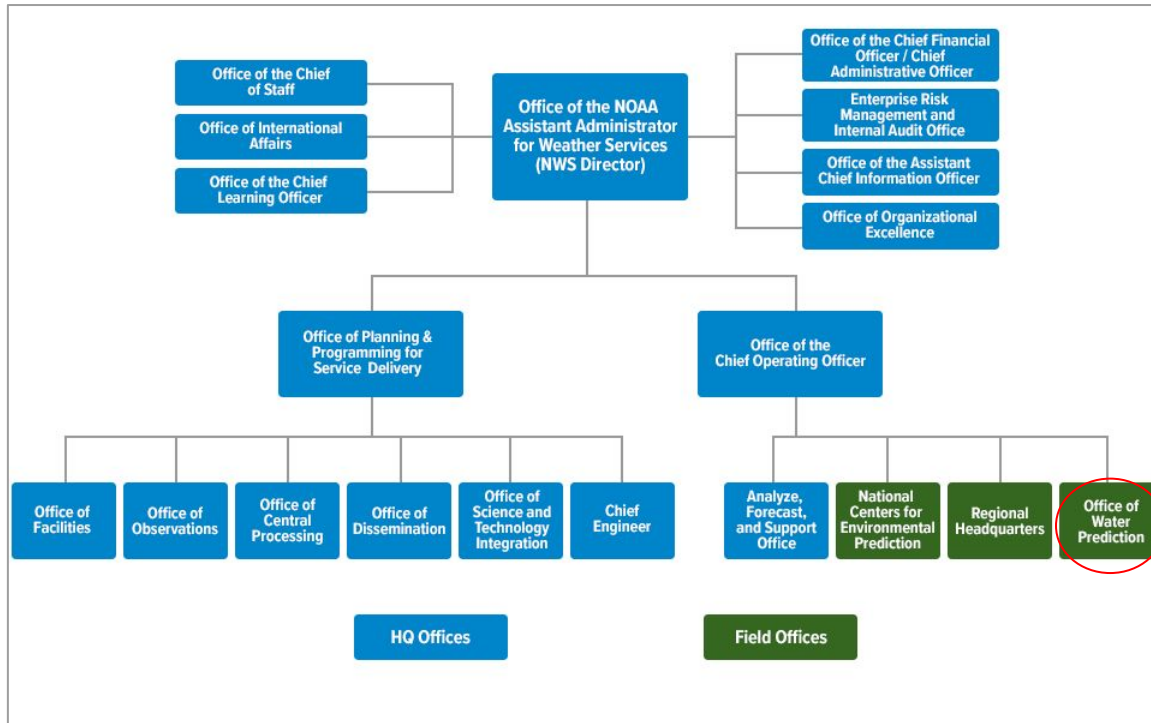
Techniques and Development Hydrologist

June 1, 2023



Who is the NWC?

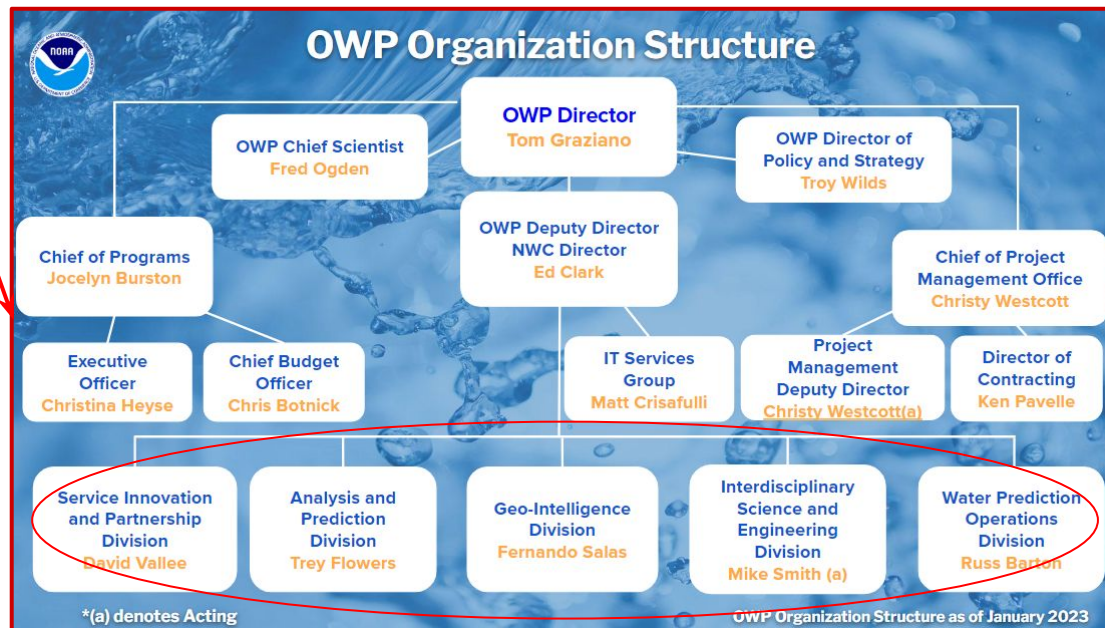
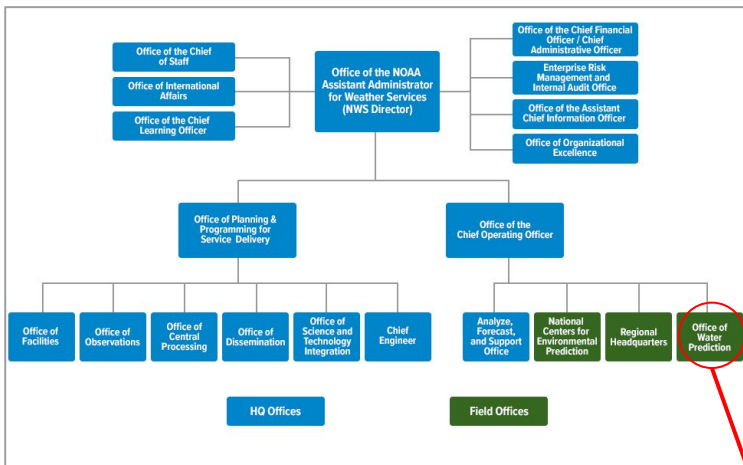
Nice to Meet You (Again)!



Vision

A “water-ready” nation, capable of addressing the nation’s challenges relating to water extremes, water scarcity, and water quality through improved water prediction and related decision support services.

Nice to Meet You (Again)!



*(a) denotes Acting

OWP Organization Structure as of January 2023

Water Prediction Operations Division

- Current operations:
 - 50% staffed
 - 2 shifts every day (5am - 8:30pm)
 - Winter Desk (every day Nov - May)
 - Surge up to 24 hrs/day for events
- GIS and Software Engineering teams
- Full Operating Capability
 - 41 total employees
 - 24 / 7 operations

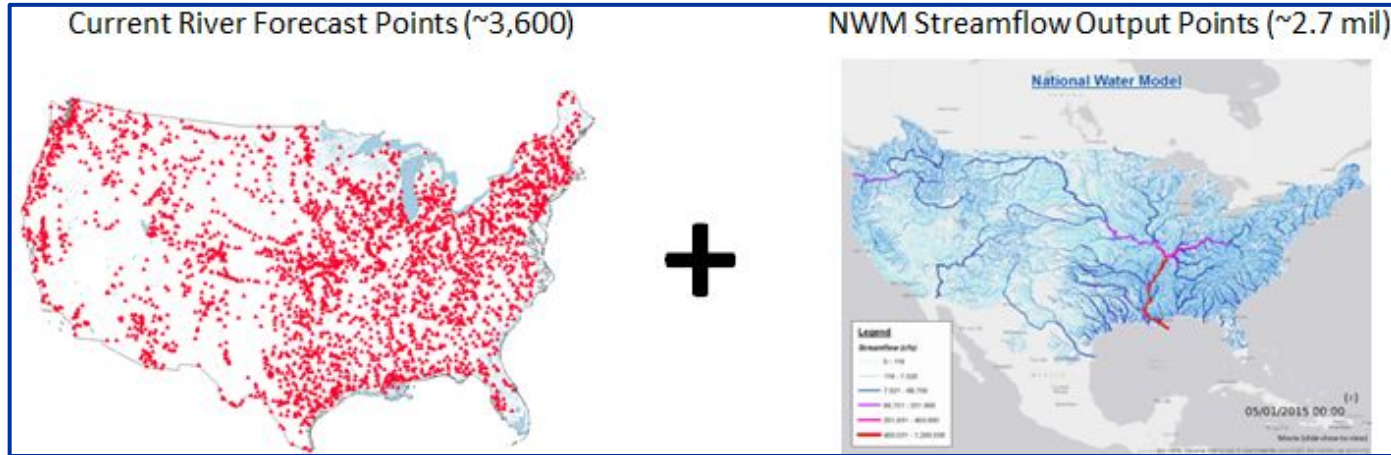




Experimental Products

National Water Model in Two Slides!

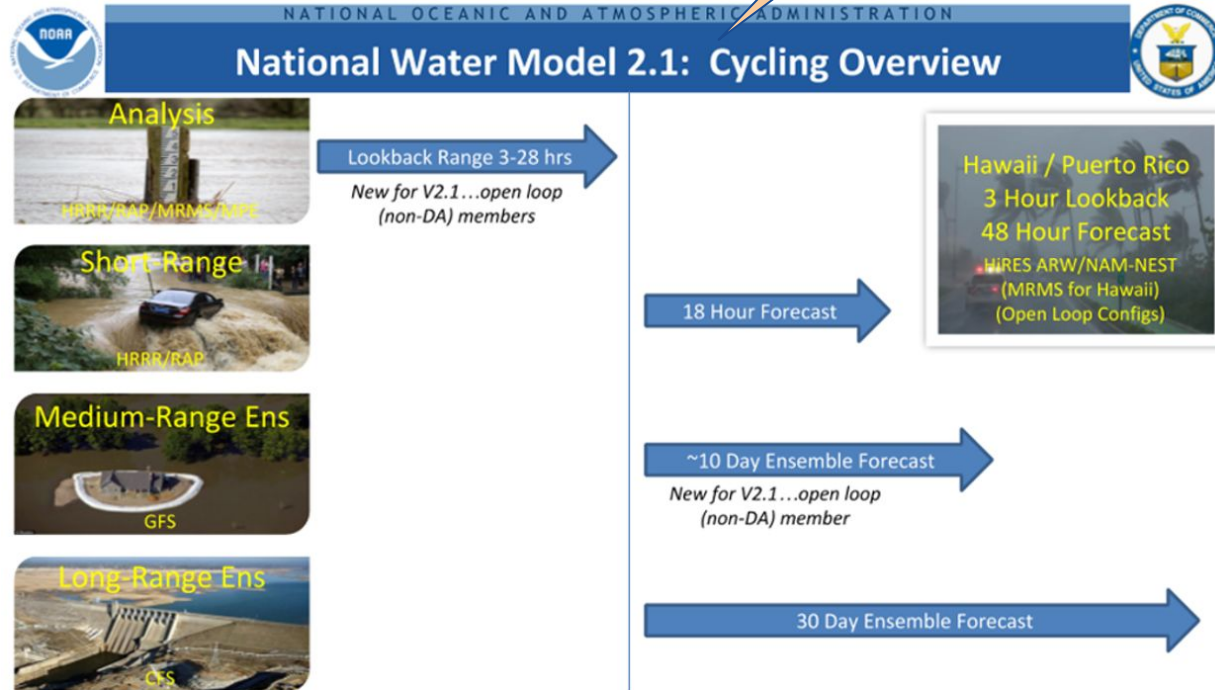
- NWM is a hydrologic model that simulates observed and forecast **streamflow**
- *Compliments* official NWS river forecasts provided at approximately 3,600 locations across the CONUS with a very fine spatial and temporal scale and a large spatial coverage (2.7 million river reaches/3.4 million river miles)



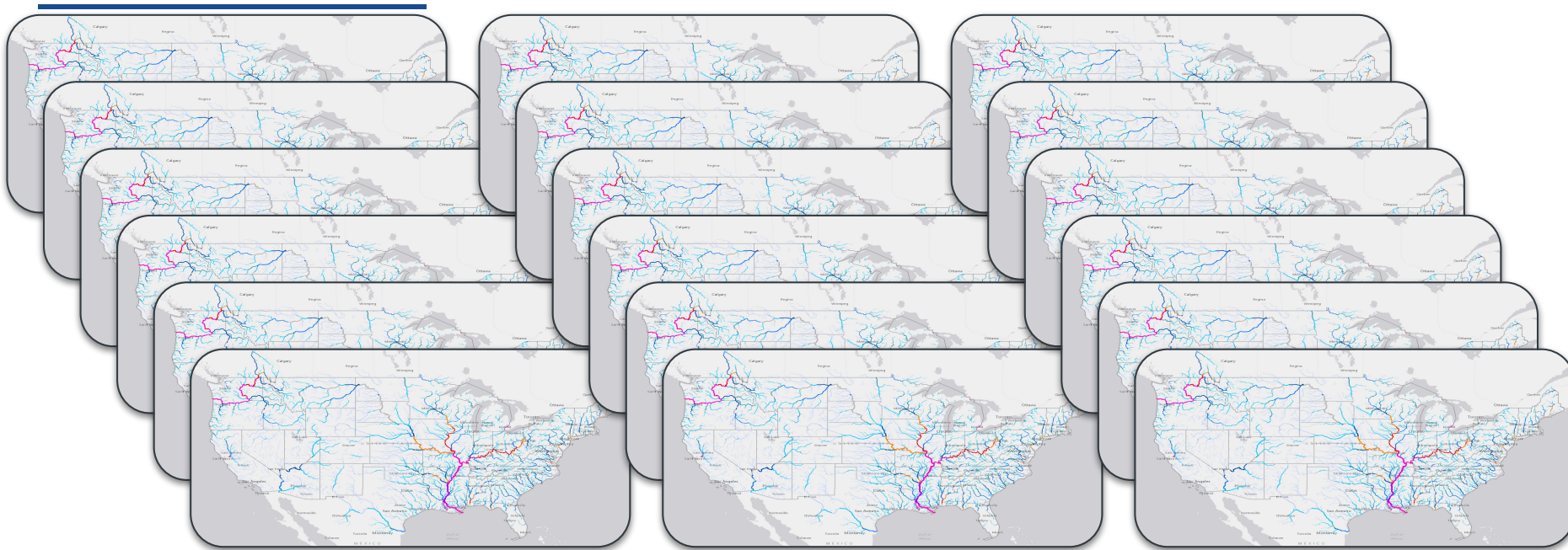
National Water Model, Cont.

- Visit: <https://water.noaa.gov/about/nwm>

ver2.2



1TB/Day

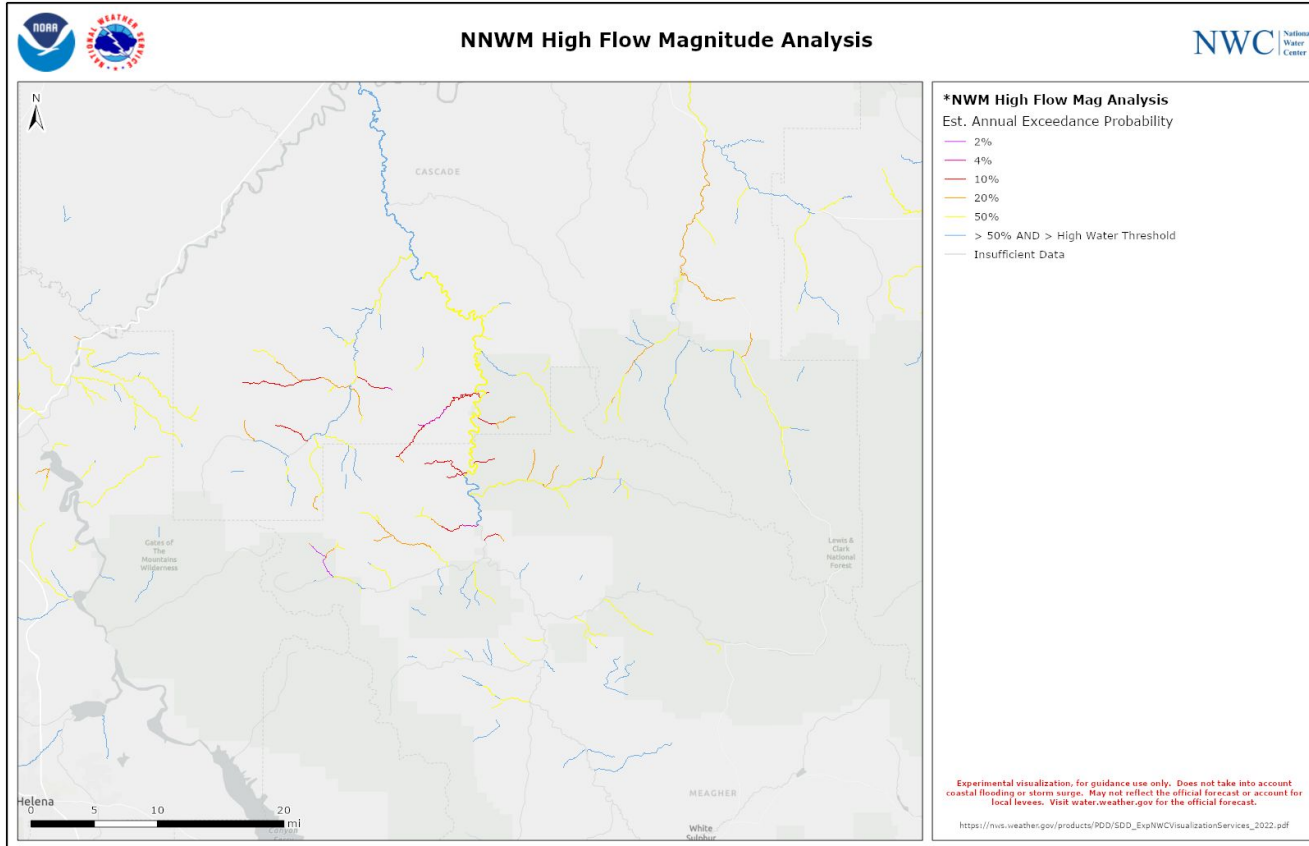


18 time steps x 24 forecasts for
the NWM Short Range Forecast
per day

- **How do we extract actionable intelligence from that much of data?**
- **70+ services**

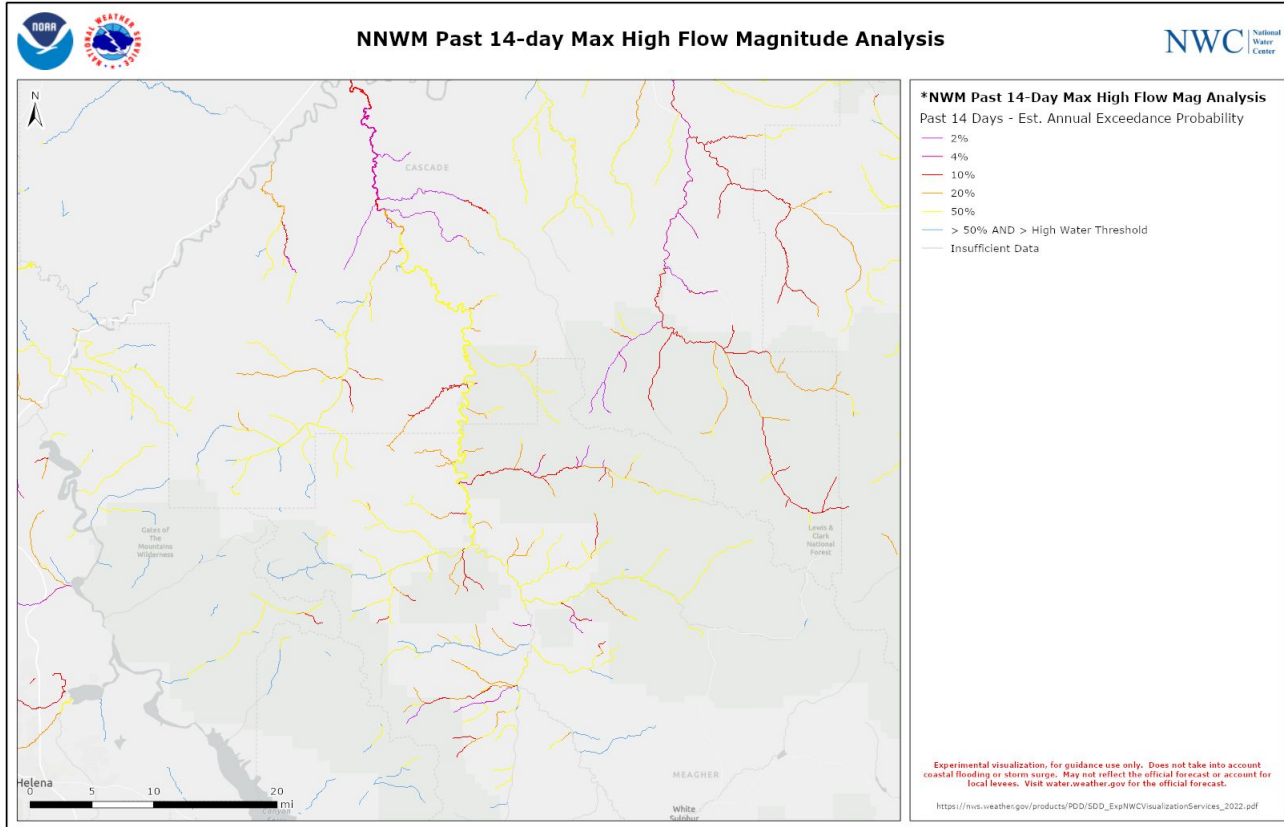


NWM AnA Visualization Services



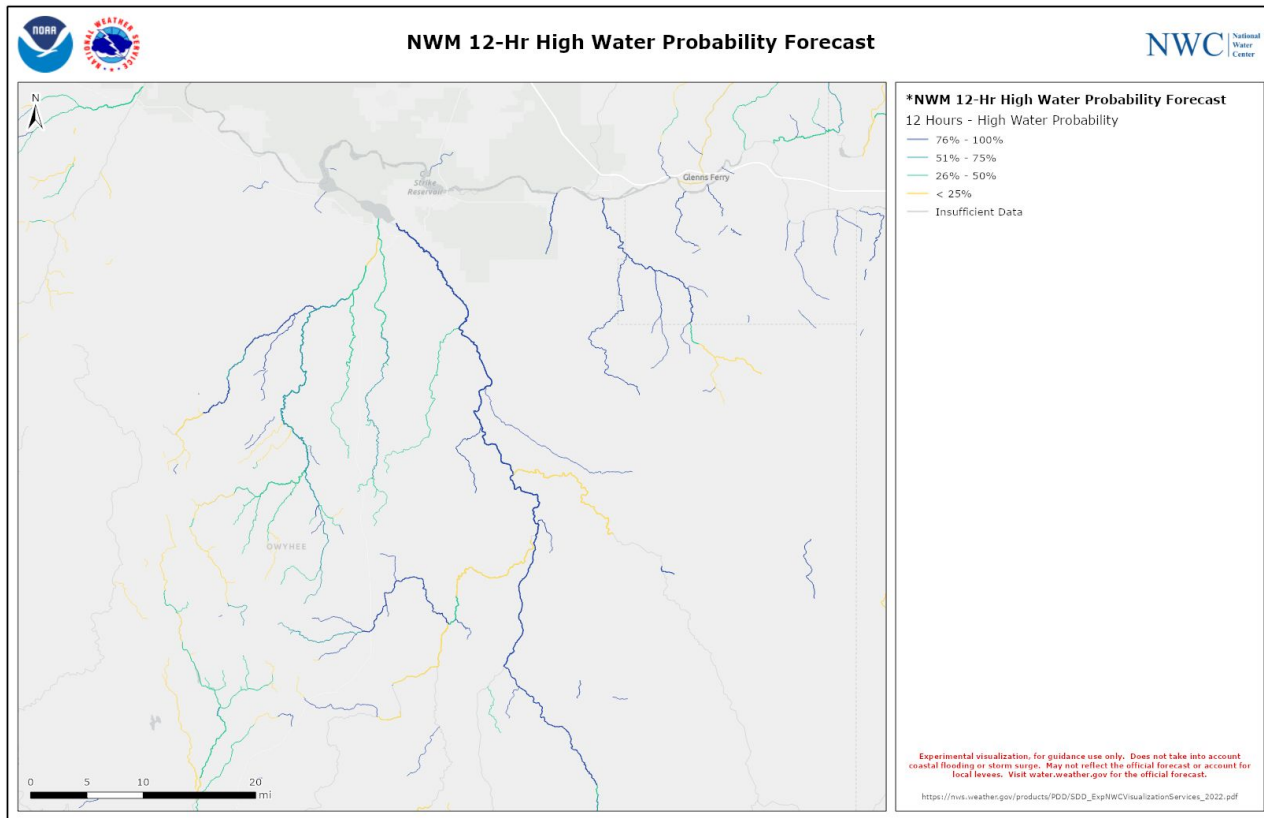
- Depicts the magnitude of the National Water Model (NWM) streamflow analysis and assimilation (AnA) simulations where the NWM is signaling at or above high water thresholds over the contiguous U.S.
- Reaches are colored by the estimated annual exceedance probability (AEP) of their current flow.
- High water thresholds (regionally varied) and AEPs were derived using the 40-year NWM v2.1 reanalysis simulation.

NWM AnA Visualization Services (Cont.)



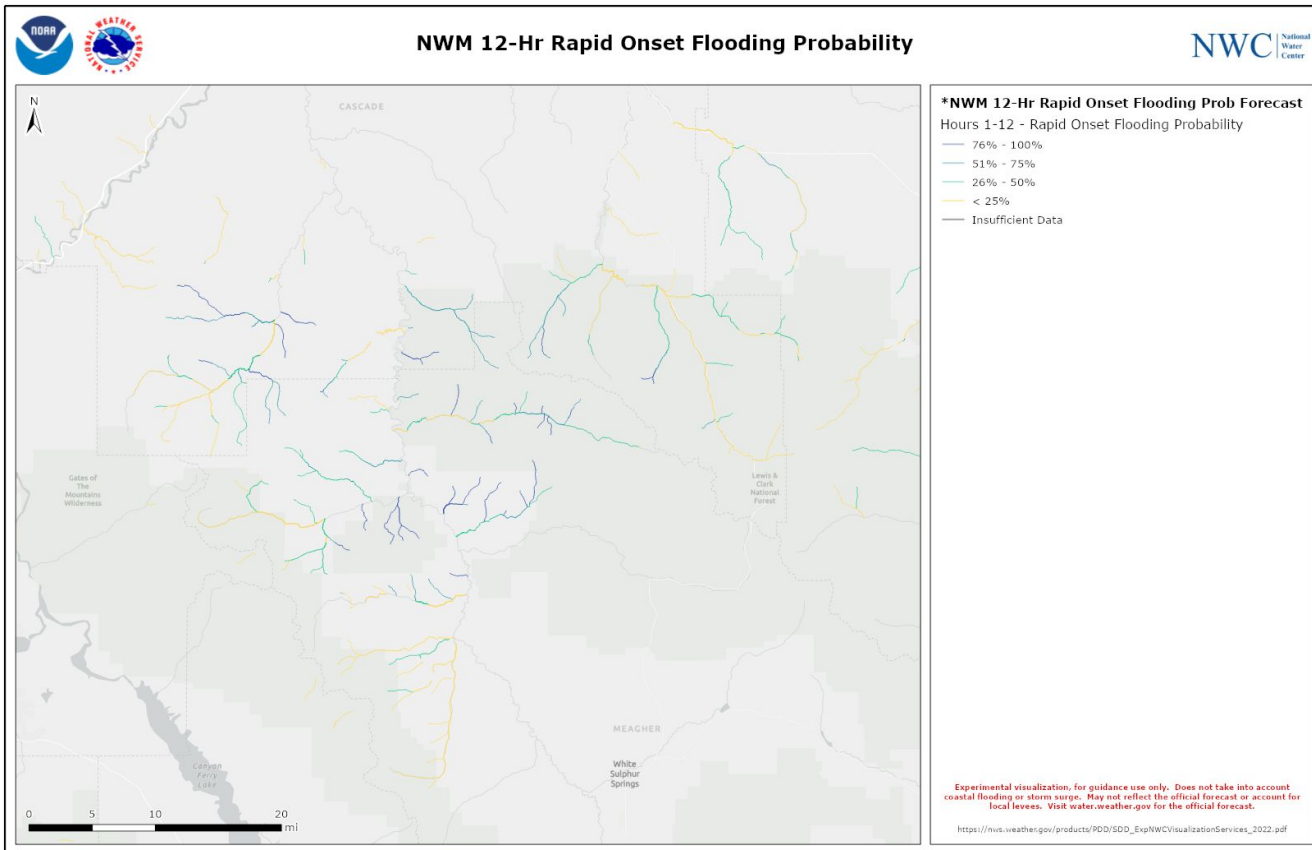
- Depicts the magnitude of the peak NWM streamflow analysis over the past 7/14 days where the NWM signaled high water.
- This service is derived from the NWM AnA over the contiguous U.S.
- Shown are reaches with flow at or above high water thresholds.
- Reaches are colored by the annual exceedance probability (AEP) of their maximum flow over the past 7/14 days.

12-Hour NWM Probability Visualization Services



- Depicts the probability of forecast high water over the next 12 hours, using a time-lagged ensemble from the National Water Model (NWM) short-range forecast over the contiguous U.S.
- These reaches are colored by the probability that they will meet or exceed the high water threshold within the next 12 hours across the last 7 forecasts.

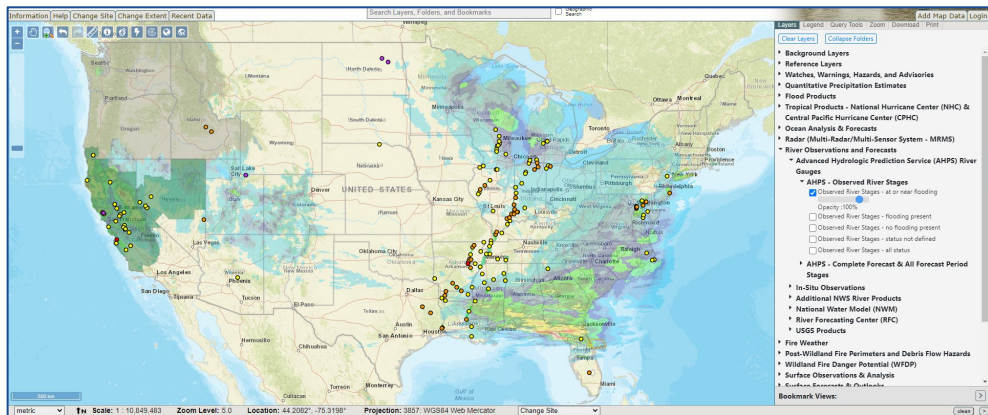
12-Hour NWM Probability Visualization Services (Cont.)



- Depicts the probability of forecast rapid onset flooding over the next 12 hours using a time-lagged ensemble from the NWM short-range configuration over the contiguous U.S.
- Shown are reaches (stream order 4 and below) that are expected to meet rapid onset flooding criteria (flow increase of 100% or greater within one hour and high water threshold conditions within 6 hours) using the most recent 7 forecasts.
- Reaches are colored by the probability that they will meet or exceed rapid onset conditions within the next 12 hours.

Experimental Services (Publicly available)

NWS National Map Viewer



- You can also access from the [WaterView](#) Web App
- How do we communicate the NWM output to forecasters and decision-makers?

The screenshot shows the National Weather Service National Water Center Products and Services page. The page features a header with the NWS logo and navigation links. The main content area is titled "National Water Center Products and Services" and includes sections for Area Hydrologic Discussion, Flood Hazard Outlook, National Hydrologic Discussion, and NWC Visualization Services. Each section includes a brief description and links to product description documents and feedback forms.

National Water Center Products and Services

Operational and Experimental

Office of Water Prediction
National Program

Area Hydrologic Discussion

Experimental short range, episodic, discussion and graphic which highlights locations across the nation that may be impacted by rapid-onset flooding, using National Water Model and other guidance.

AHD Product Description Document
Provide Feedback on AHD
AHD One-Pager

Flood Hazard Outlook

High Level graphical depiction and key messages highlighting the potential threat of inland flood hazards (flash, urban, small stream and riverine) and their associated impacts (catastrophic, considerable, and limited) for the next seven days.

FHO Product Description Document
Provide Feedback on FHO
FHO One-Pager

National Hydrologic Discussion

Experimental discussion of the current and forecast hydrologic conditions across the nation, including a variety of short and medium range (Days 1-10) observed and modeled hydrologic guidance.

NHD Product Description Document
Provide Feedback on NHD
NHD One-Pager

NWC Visualization Services

Experimental geospatial services depicting forecasts from the River Forecast Centers and the National Water Model. Services available via the prototype NWS National Map Viewer, or directly via URLs hosted on the Hydrologic Visualization and Inundation Services (HydroVIS) cloud resource. Refer to the "Public Handbook" for additional details.

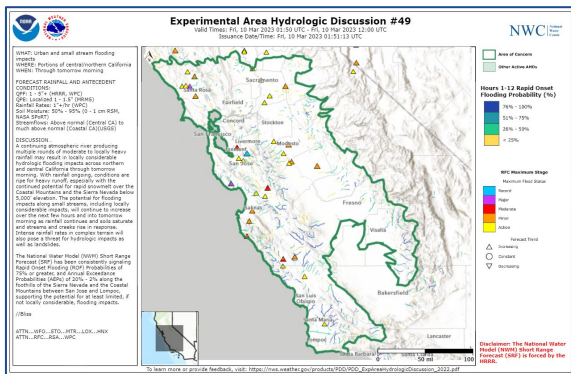
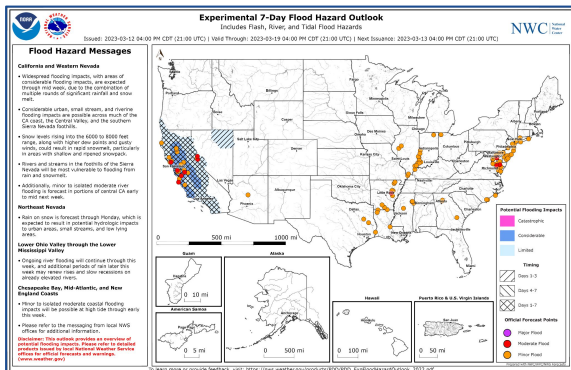
NWC Visualization Services Service Description Document
Provide Feedback on NWC Visualization Services

- High Flow Magnitude
- High Water Arrival Time
- High Water Probability
- Rapid Onset Flooding
- Streamflow Anomaly



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

Experimental Products (Publicly available)



National Water Center Products and Services

Office of Water Prediction
 National Program

Operational and Experimental
[Weather.gov > Office of Water Prediction > National Water Center Products and Services](#)



Area Hydrologic Discussion

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AHD Product Description Document
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FHO Product Description Document
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National Hydrologic Discussion

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NHD Product Description Document
 Provide Feedback on NHD
 NHD One-Pager



Significant River Flood Outlook

Operational flood outlook for significant (moderate and above) river flooding. It is not intended to depict all areas of minor flooding or small-scale events such as localized flooding and/or flash flooding.



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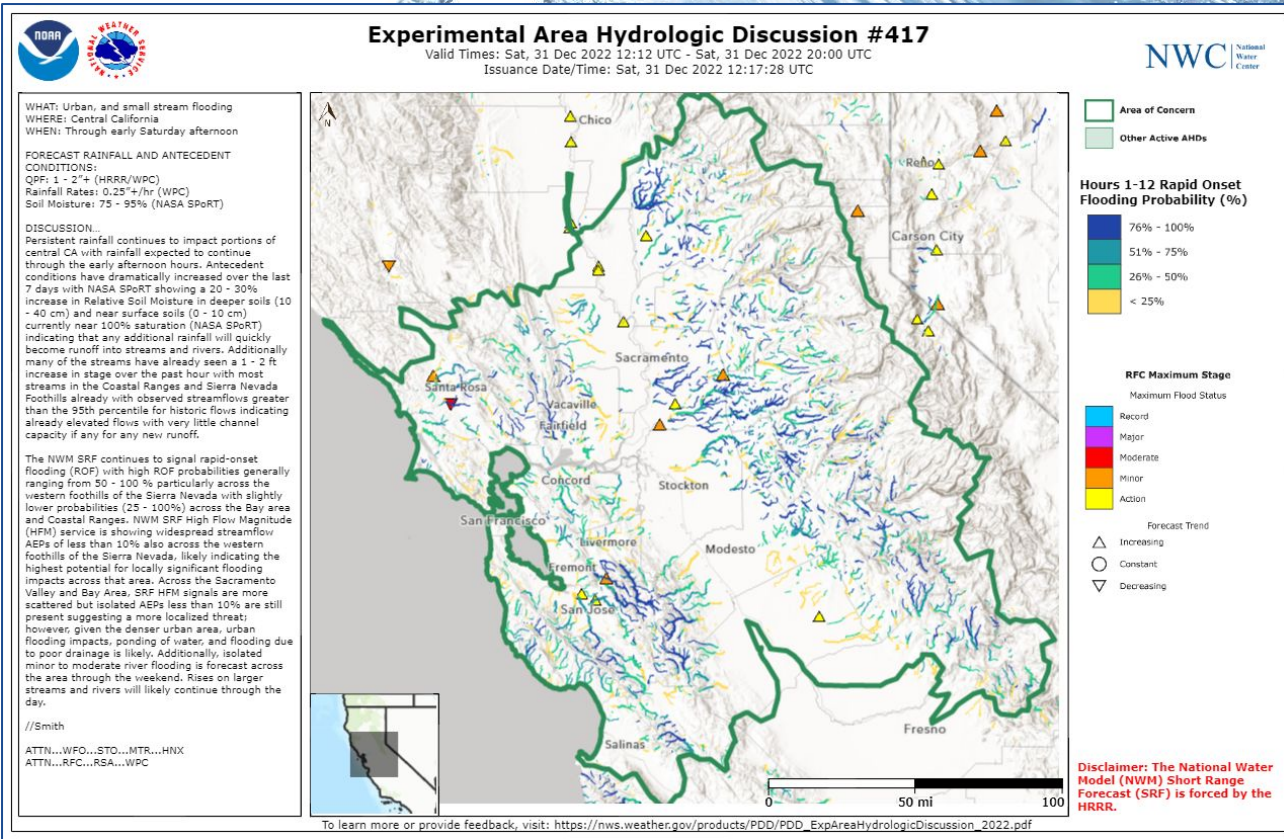
NWC Visualization Services
 Description Document
 Provide Feedback on NWC Visualization Services
 High Flow Magnitude
 High Water Annual Time
 High Water Probability
 Rapid Onset Flooding
 Streamflow Anomaly



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

AHD

- Episodic
- 2-6 hrs
- Rapid-onset
- Flooding
- Flash
- Urban
- Small Stream
- WPC Coordination
- Inform WFO
- Warning Workflow
- PIL: AHDNWC
- Archive



National Hydrologic Discussion (NHD)

- **What:** Discussion for observed, modeled, and expected hydrologic conditions for the United States days 1-10
 - NOT just a National Water Model (NWM) diagnostic discussion
 - Uses all available resources and forecaster knowledge to produce
- **Audience:** Internal & external surface water information users
- **Issuance:**
 - 1530Z
 - PIL: **HMDNWC**
 - <https://www.weather.gov/owp/operations-nhd>

AGUS74 KWCO 021525
HMDNWC

National Hydrologic Discussion - EXPERIMENTAL
NWS National Water Center - Tuscaloosa AL
915 AM CST MON JAN 2 2023

.Synopsis...

Ongoing river flooding with additional flooding impacts today for East Texas and the Lower Mississippi and Lower Ohio Valleys... Periods of rainfall resume Wednesday with flooding impacts expected in California... Possible flooding impacts Tuesday in portions of the Southeast... Rises on streams and rivers this week in the Northeast... Localized flooding impacts possible later this week in Puerto Rico...

.Discussion...

.East Texas and the Lower Mississippi and Lower Ohio Valleys... Moderate to locally heavy rainfall is expected to affect these regions today, bringing a threat for isolated flash, urban, small stream, and riverine flooding impacts. The latest WPC QPF indicates widespread 1 - 3" of rainfall from extreme East TX through northern LA and AR and into southeast MO, southern IL, and western TN/KY, with the highest amounts expected in eastern AR and western TN. Antecedent conditions are wettest in east TX, northern LA, and eastern AR, where riverine flooding is ongoing and forecast from recent rainfall, and soils are primed for flooding impacts from additional rainfall. Top and mid-layer soils are in the 40 - 50% relative soil moisture (RSM) range in southeast MO into the Lower OH Valley, but are dry below those layers (NASA SPOrT). The NWM Short Range Forecast (SRF) indicates rapid-onset flooding (ROF) probabilities of less than 50% from southwest AR into northeast AR; expect these signals to gradually increase in coverage as the day progresses. The NWM MRF also continues to indicate ROF probabilities of generally less than 50% in northern LA, AR, western TN/KY, and southeast MO and southern IL. Overall, with the highest rainfall amounts not overlapping with the most vulnerable areas in the region based on antecedent conditions, widespread flooding impacts are not anticipated; however, isolated lower AEPs on smaller streams in northeast AR and southern IL, depicted in the NWM SRF High Flow Magnitude Forecast, suggest some potential for locally significant flooding impacts in these areas. In addition, new and renewed minor riverine flooding is forecast in East TX, LA, and eastern AR, along with forecasts of in-bank rises in these same areas.

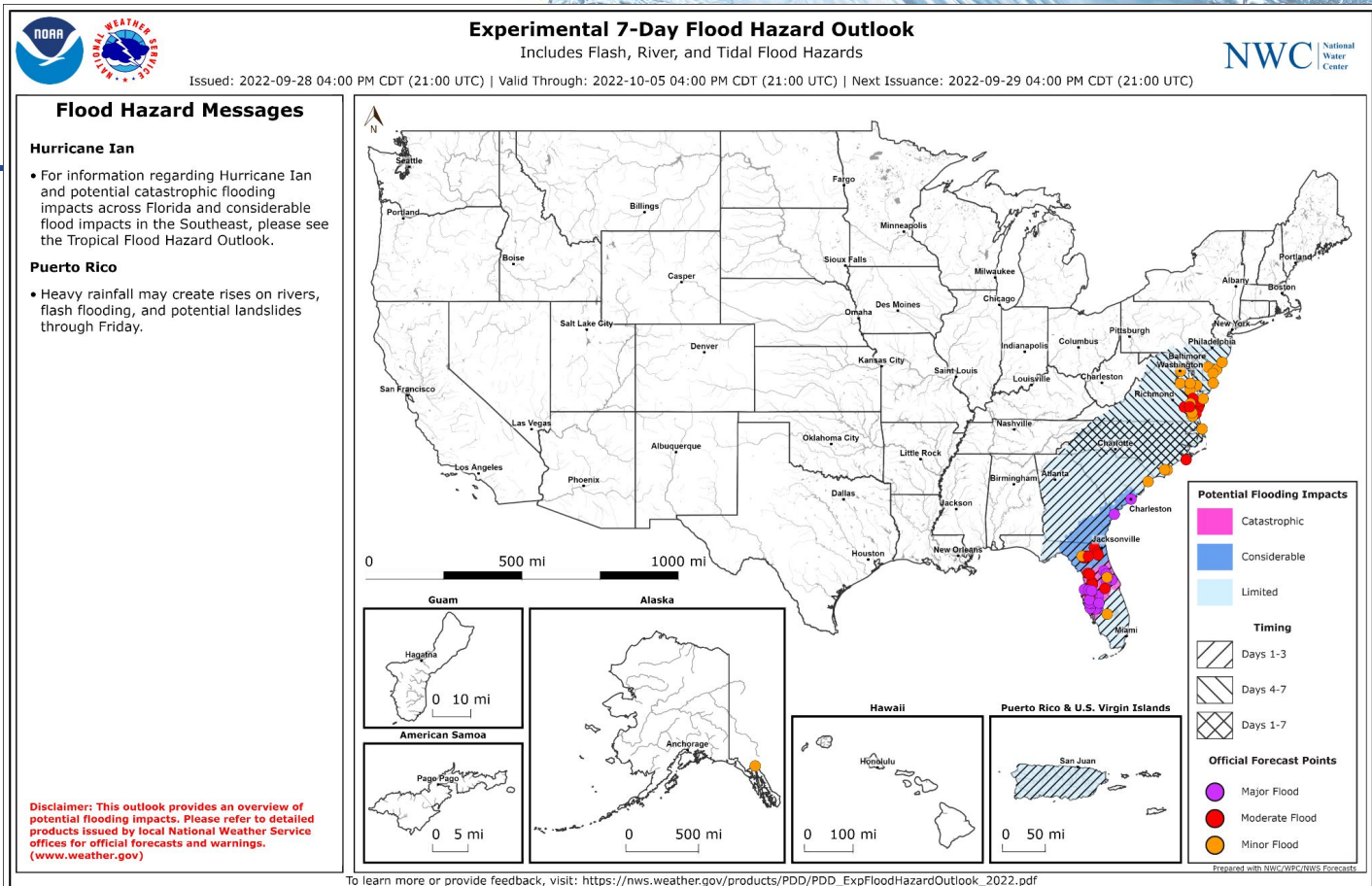
.California...

Periods of moderate to heavy rainfall and mountain snow will again impact much of the state through day 7 (Sun), providing a threat for additional urban, small stream, and riverine flooding impacts. Light to moderate rainfall through day 2 (Tue) is not expected to produce flooding impacts, and it will not likely allow the entire wet soil column to make room ahead of multiple rounds of heavier rainfall beginning on day 3 (Wed), when the threat for more significant flooding impacts increases. SNODAS and the National Water Model (NWM) continue to indicate that there is very little, if any, snow water equivalent (SWE) left to melt in the lower elevations of northern and central CA; as a result, snowmelt should not be a significant



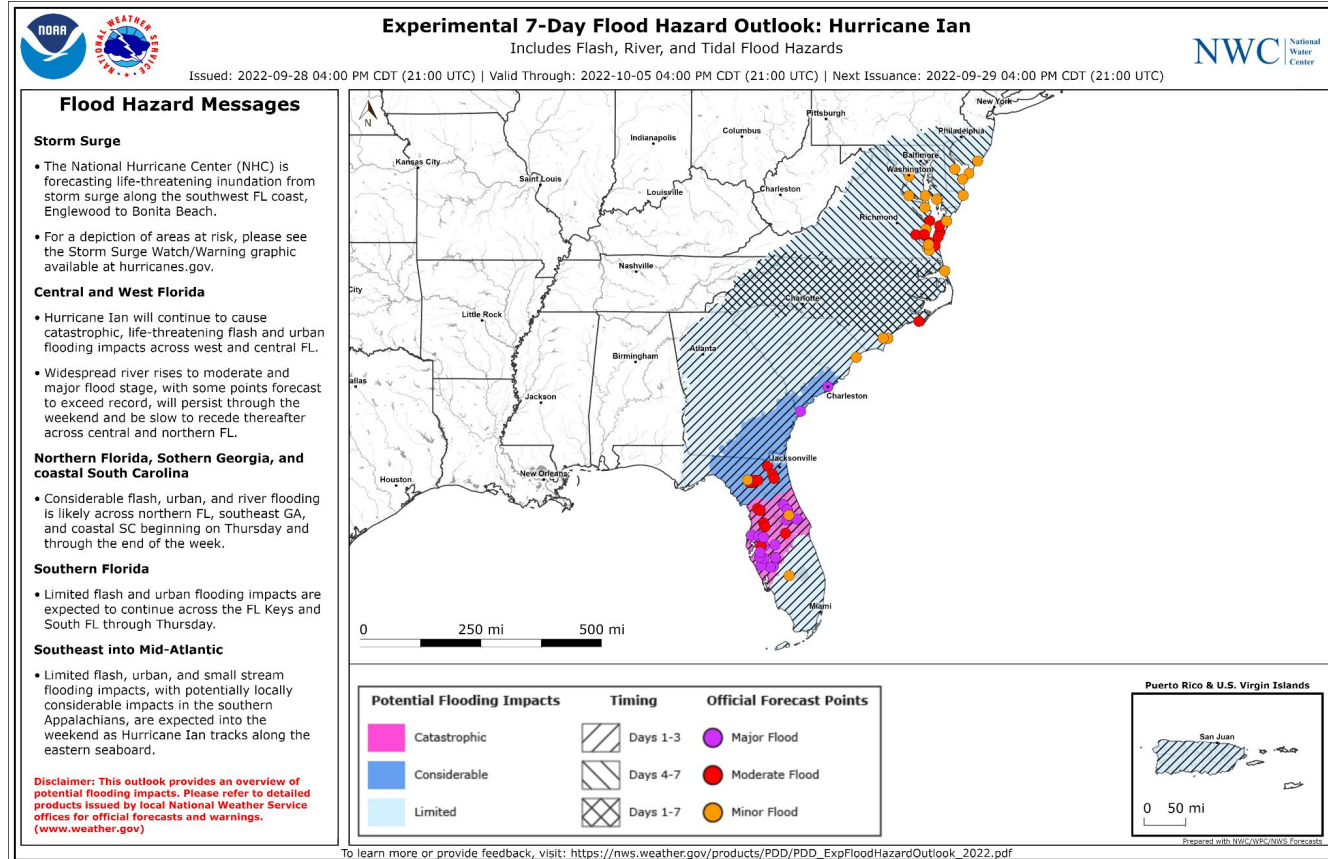
FHO

- High Level
- Heads-up
- 7-Day Outlook
- Comprehensive
- 3 Categories
- 3 Timing Bins
- 1xday* @2100Z
- Static Map
- Map Service



Tropical FHO

- More focused text
- 2x day
 - @2100Z
 - @1130Z
- Static Map
- Service



Thank you!

Peggy Lee

peggy.lee@noaa.gov

Reach NWC/WPOD at:
(205)347-1500

nws.nwc.ops@noaa.gov

nwcchat

5 AM - 8:30 PM, CT

7 days/week

