

Major Risks, Uncertain Outcomes: Making Ensemble Forecasts Work for Multiple Audiences

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How/If to Present Uncertainty

How can the potential of the Hydrologic Ensemble Forecast System (HEFS) to be a central decision-making support tool for users including residential, emergency management and water resource management audiences on a national level be best realized.

- Jefferson County, WV and Frederick County, MD
- 2 rounds of focus groups + surveys with residents and emergency managers
- 2 virtual focus groups with water resource managers
- 4 day Tropical Storm scenario

This project was funded by the NOAA National Weather Service Grant number NA16NWS4680004.

FOCUS GROUP STUDY SEEKS PARTICIPANTS
Jefferson County Area Residents
Have you experienced flooding?
Do you rely on flood forecasts to decide when to prepare?



Nurture Nature Center is recruiting participants for focus groups, as part of a research project with National Oceanic and Atmospheric Administration, about the use of National Weather Service flood forecast and warning tools.

Participants will be asked to answer questions and provide input about various flood warning tools and products issued by the National Weather Service.



Participants should live in the Jefferson County area and be at least 18 years of age. Each participant will receive \$20 compensation for their time and input. Light refreshments will be provided.

Wednesday, October 19 — 7 p.m.
Jefferson County Maintenance Department
128 Industrial Blvd.
Kearneysville, WV 25430

Focus groups will also be held for residents in Frederick County, MD and Water Resource and Emergency Managers in both Jefferson County, WV and Frederick County, MD. For information on these sessions, see socialsciencefocusinfo.org or contact Rachel Hogan Carr at rhogan@nurturenature.org or 610-253-4432.

Register online at socialsciencefocusinfo.org
or by email or phone at rhogan@nurturenature.org or 610-253-4432.



The Nurture Nature Center is a nonprofit organization whose focus is on flood education.



This project was funded by the NOAA National Weather Service, Eastern Division.

Research Questions and Products

- What improvements to NWS flood forecast products would better motivate people to take flood preparedness and response actions?
- How do residential, emergency manager, and water resource managers identify the utility of HEFS products? How will they use these products?
- What barriers do each of these audiences identify in understanding and accessing the HEFS products?
- What modifications to the product design will help improve the utility, understandability, and accessibility of the products?



Focus Group Experience

- Four-day scenario of a tropical storm
- Developed in conjunction with MARFC and Sterling WFO
- 2-hour facilitated discussions:

What does this product tell you?

What actions would you take?

Would you share this product?

What else are you using for decision-making?



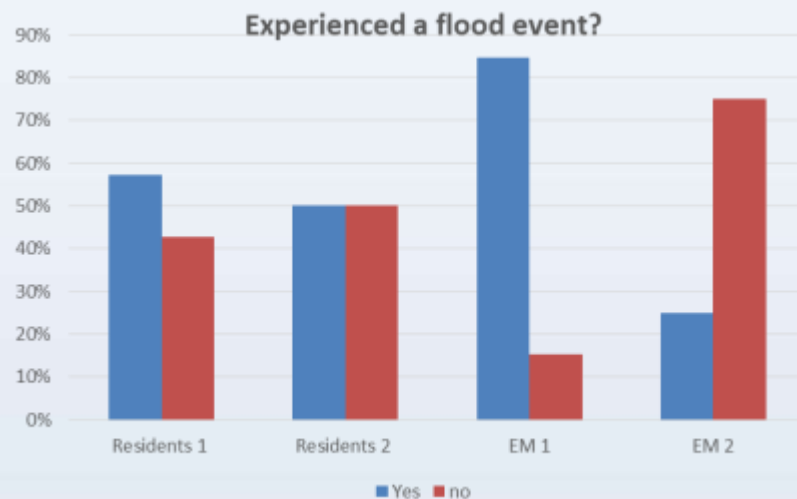
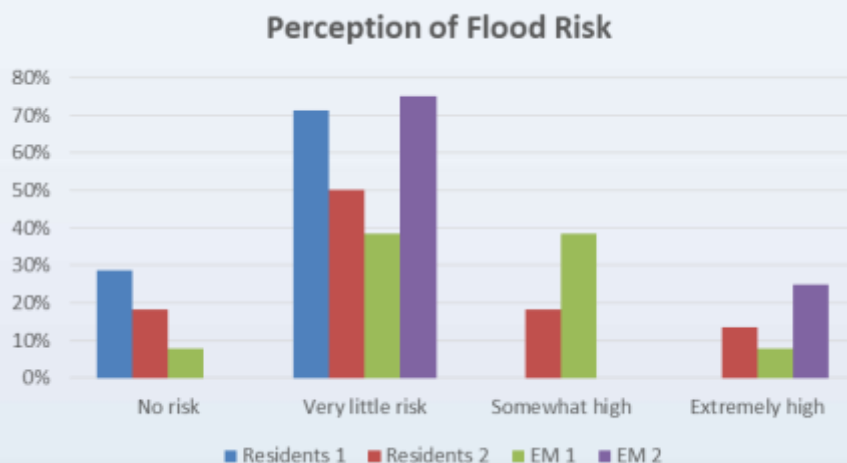
Focus Group Participants

Round one: 14 residents and 13 emergency managers (Oct 2016)
- two resident focus groups and two EM groups

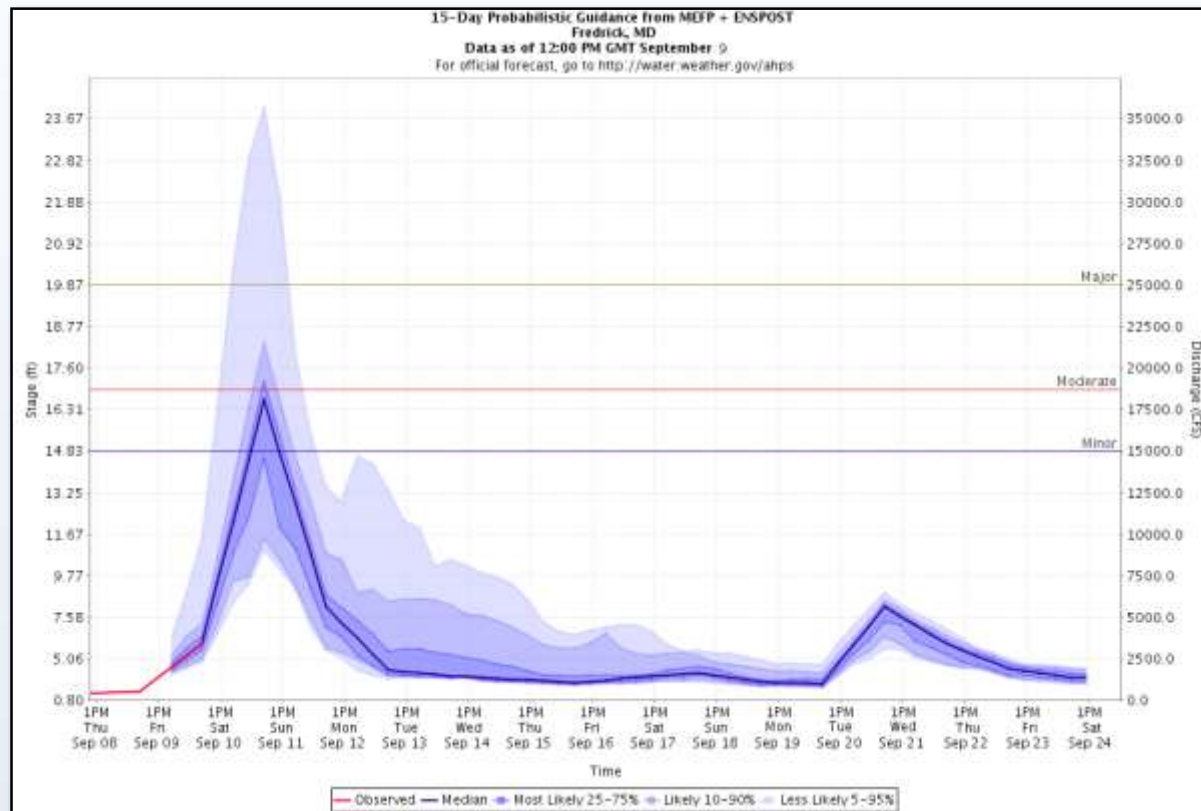
Round two: 22 residents and 4 emergency managers (April 2017)
- two resident focus groups and one EM group

Water Resources: 8 participants

Round three survey: 23 respondents



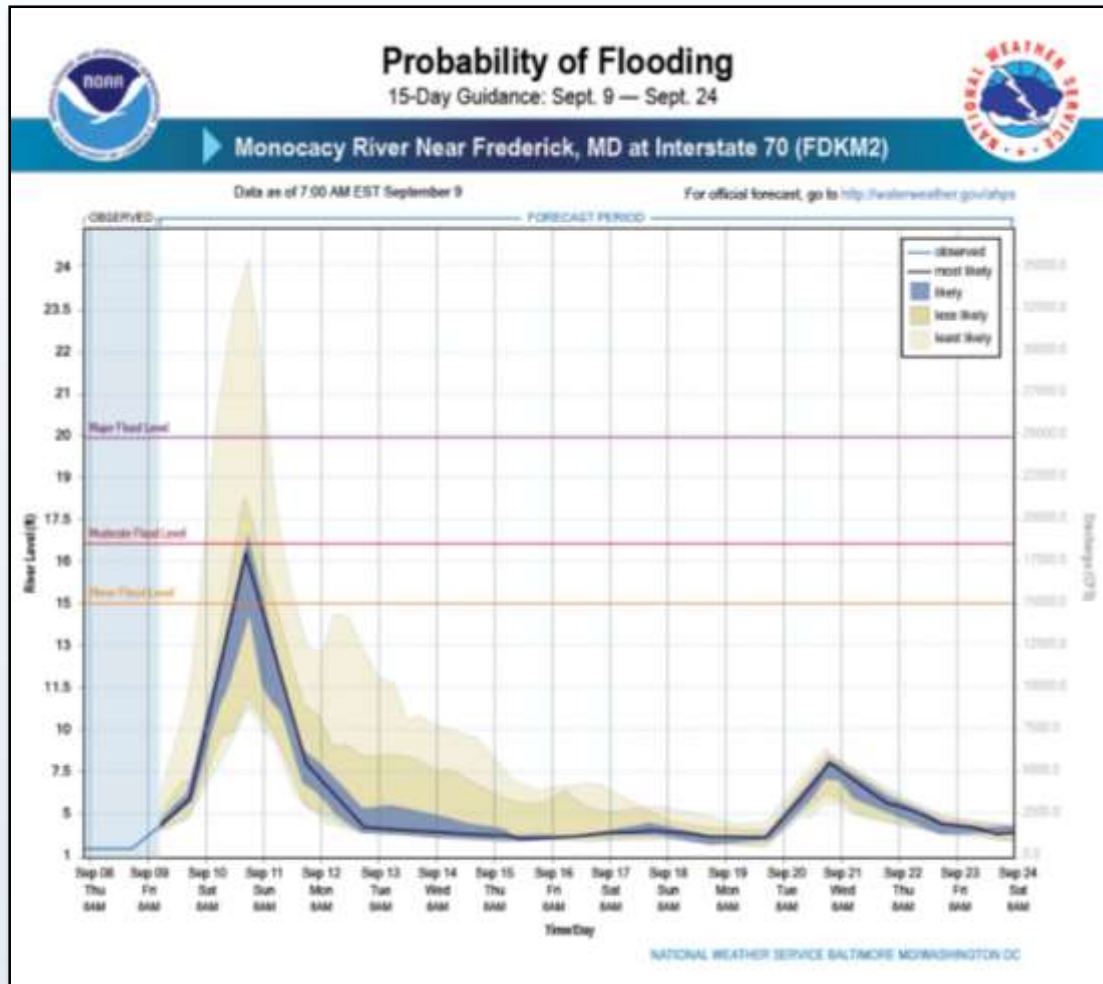
Round One



Residents found the product confusing.

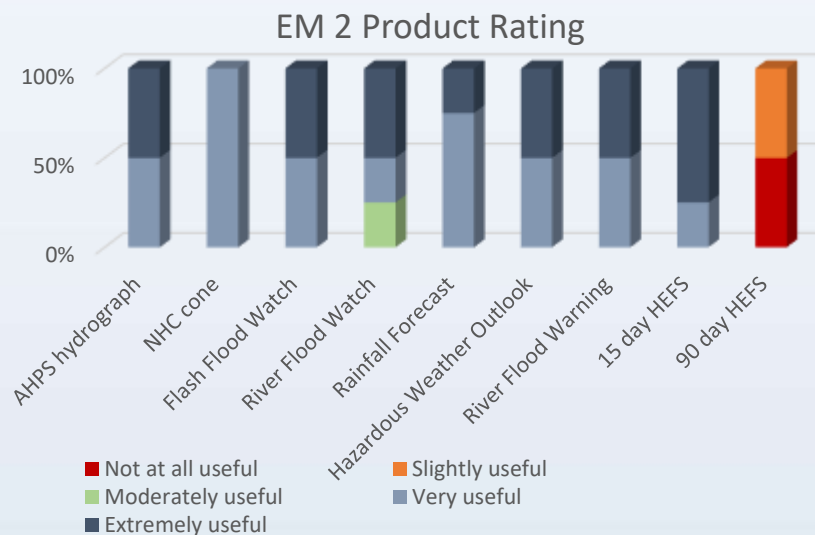
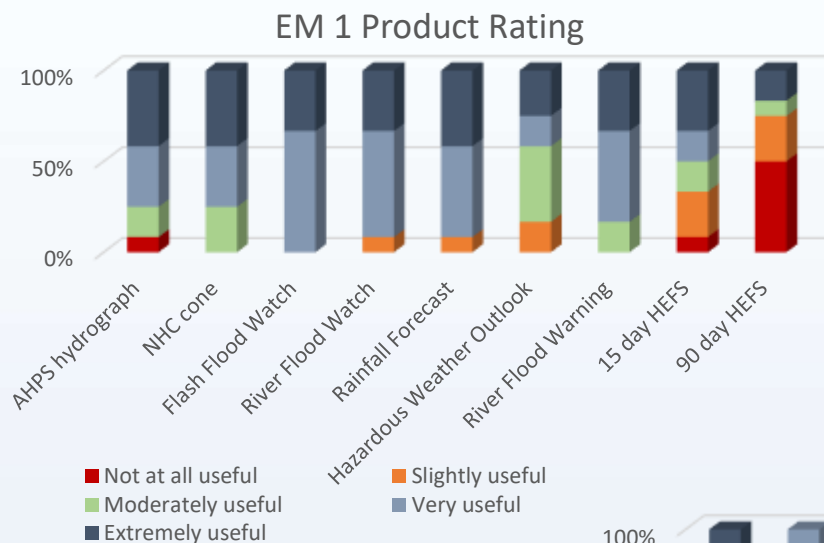
Emergency managers noted utility in the information conveyed.

Round Two



Several examples were tested in each scenario, representing low, moderate and higher river levels

Results: Emergency Managers



Results: Residents

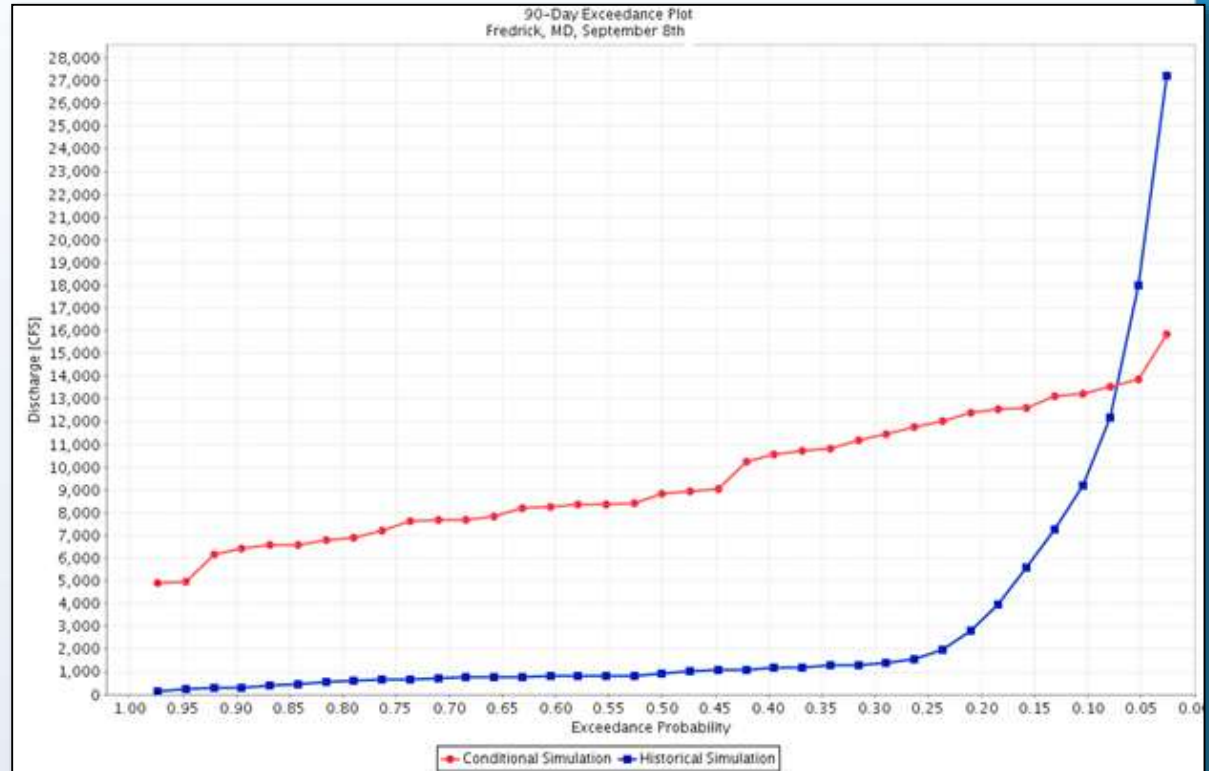
Average Rank 1	Average Rank 2	Product
1.2	2	National Hurricane Cone
2	4.8	AHPS hydrograph
2.8	4.4	Hazardous Weather Outlook
3.4	3.5	WFO Rainfall Forecast
4.2	5	WFO River Flood Watch
4.4	4	WFO Flash Flood Watch
5	4.8	WFO River Flood Warning
6.6	7.4	15 day HEFS

90-Day Exceedence Plot

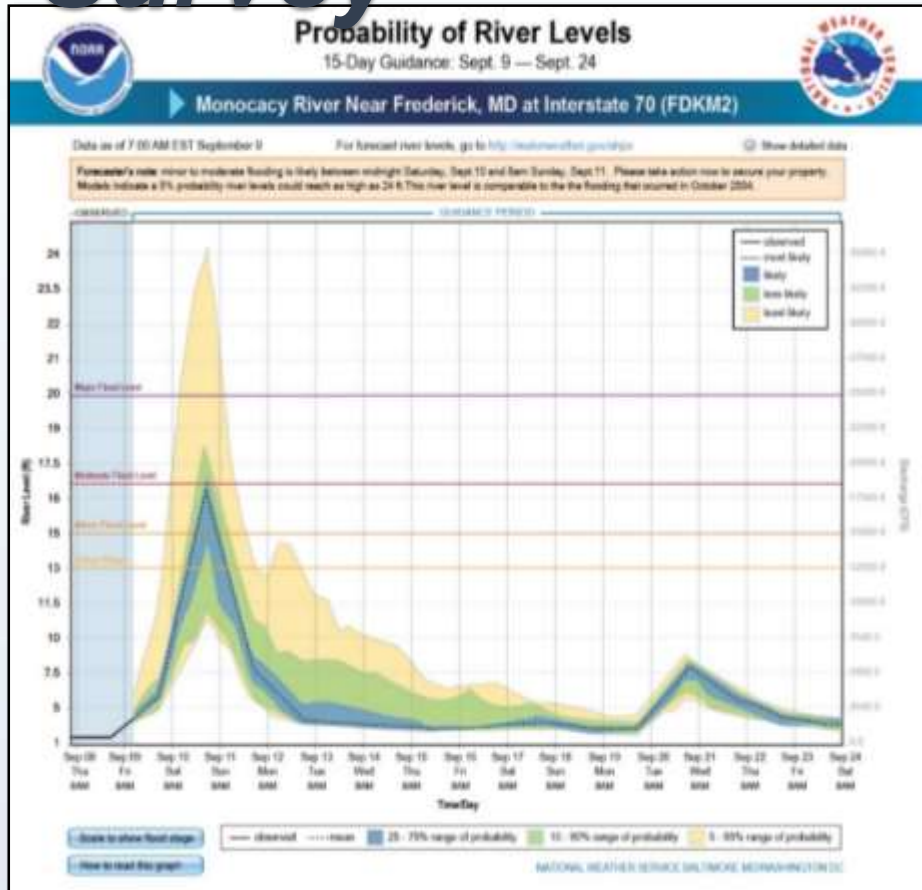
Helpful to reservoir managers

Helpful for:

- situational awareness
- ground-truthing/QC-ing models
- monitoring low-flow trends for reservoirs
- seasonal comparison: wetter/drier



Round 3: Online Survey



Survey questions asked about:

- understanding of information
- usefulness of product
- actions taken after seeing product
- helpful elements
- confusing elements

Summary of changes

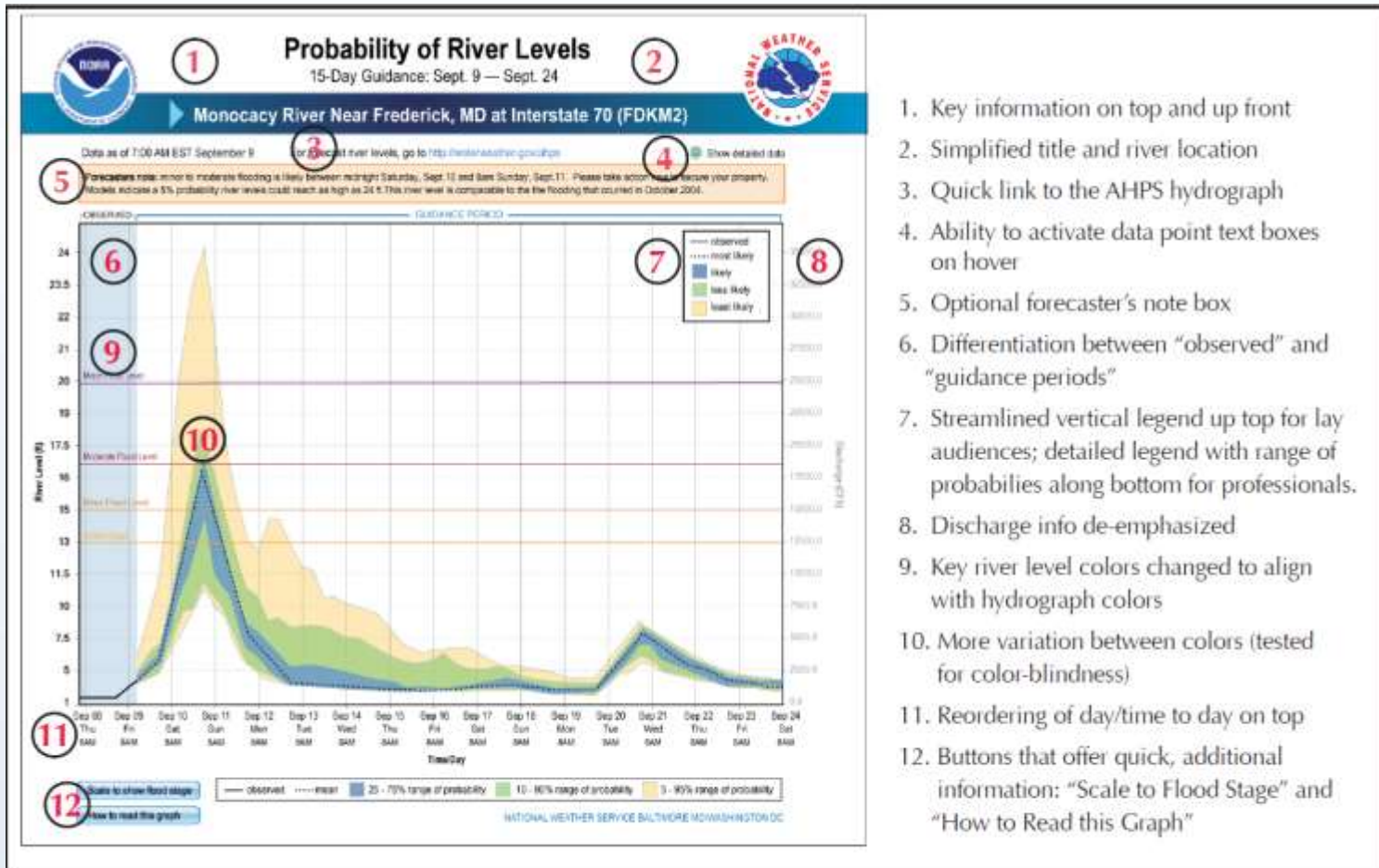
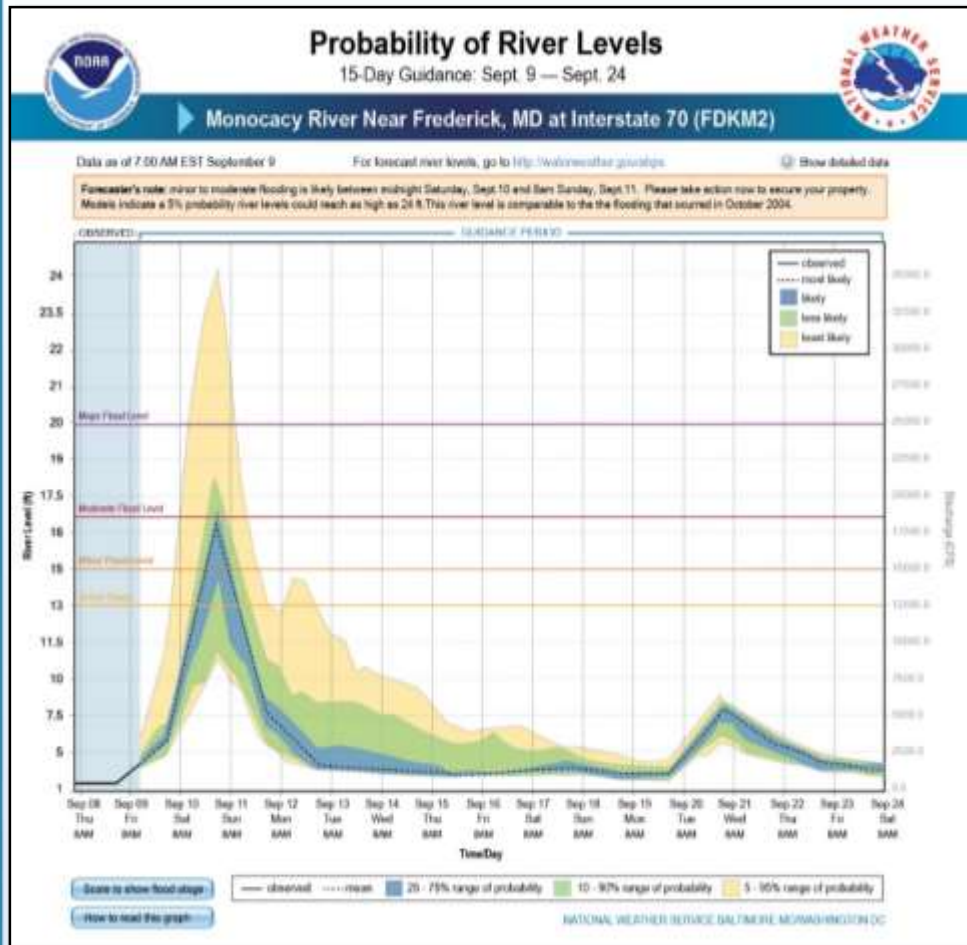


Figure 11. Summary of Revisions

Round 3: High flow

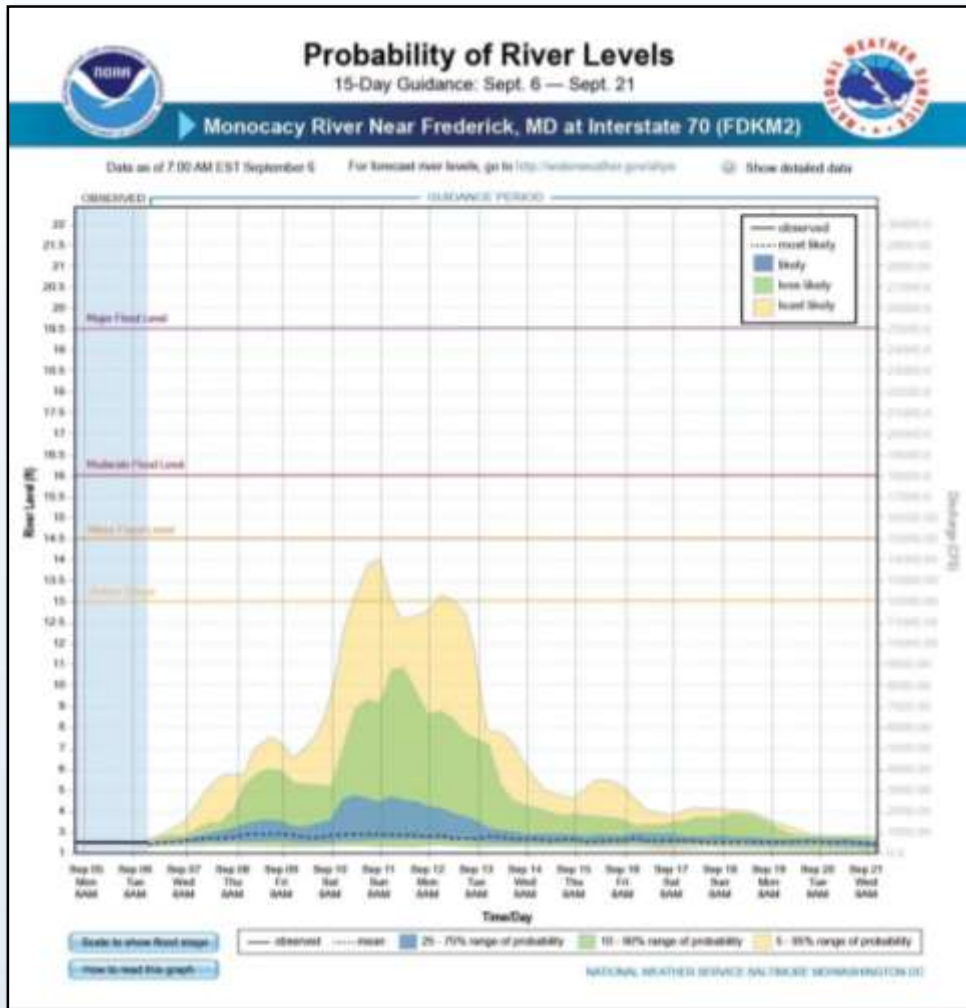


RISK OF FLOODING FOR HIGH FLOW GRAPHIC

Very high ■ Somewhat high ■ Neither high nor low ■ Somewhat low ■ Very low

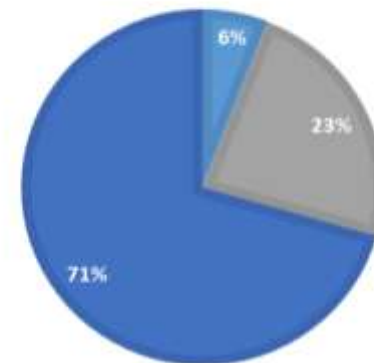


Round 3: Low flow

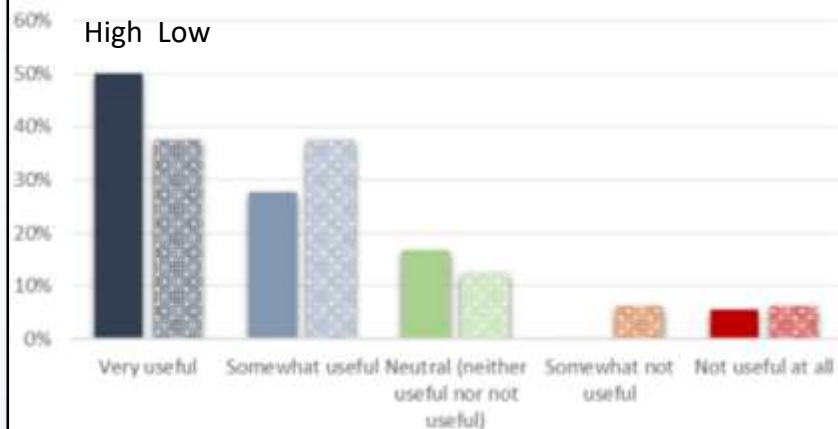


RISK OF FLOODING FOR LOW FLOW GRAPHIC

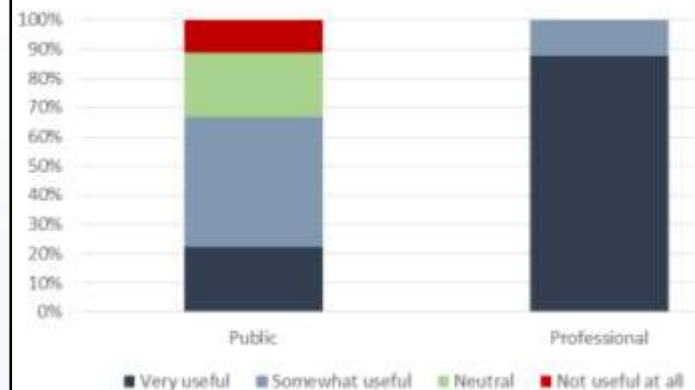
■ Somewhat high ■ Somewhat low ■ Very low



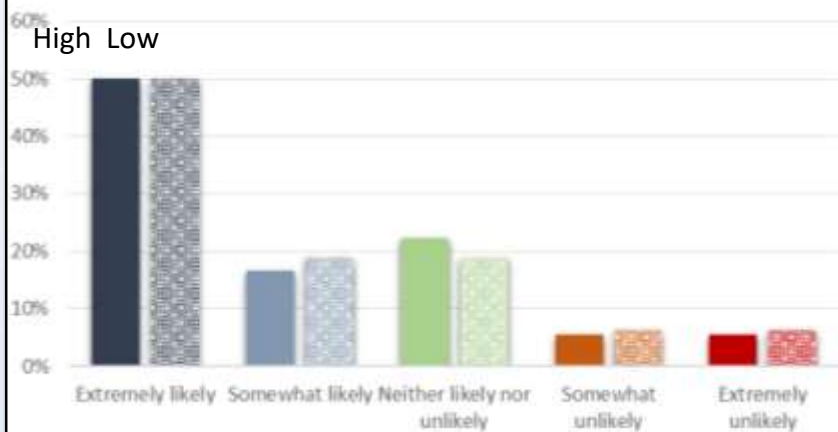
How useful is this product?



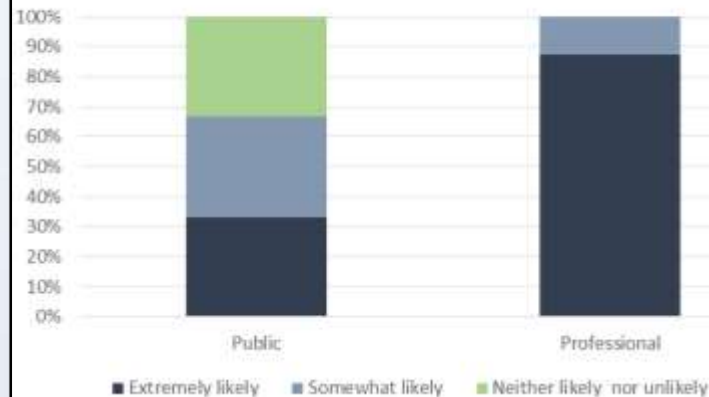
Usefulness of Graphics (High and Low flow)



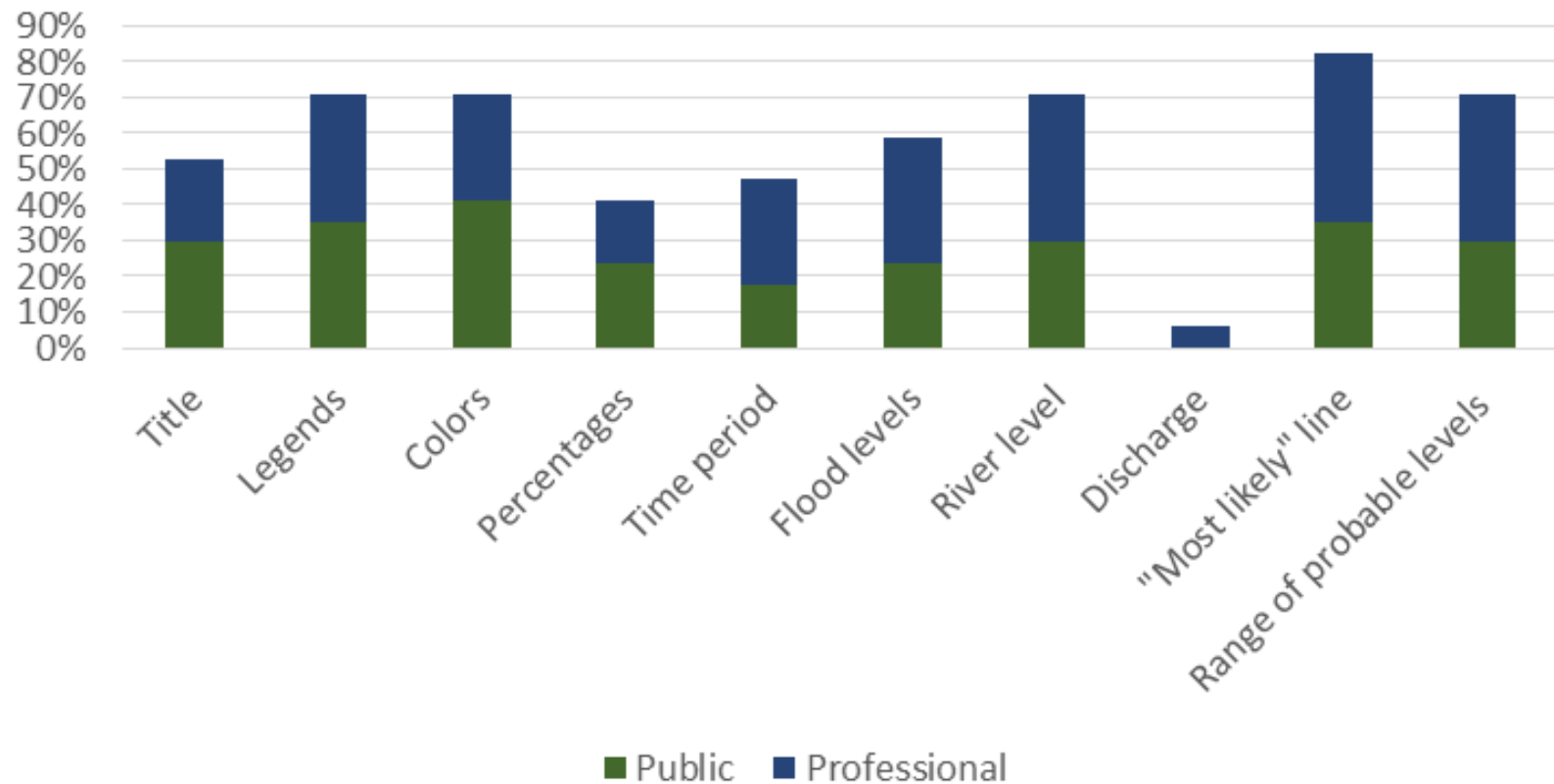
How likely are you to use this product?



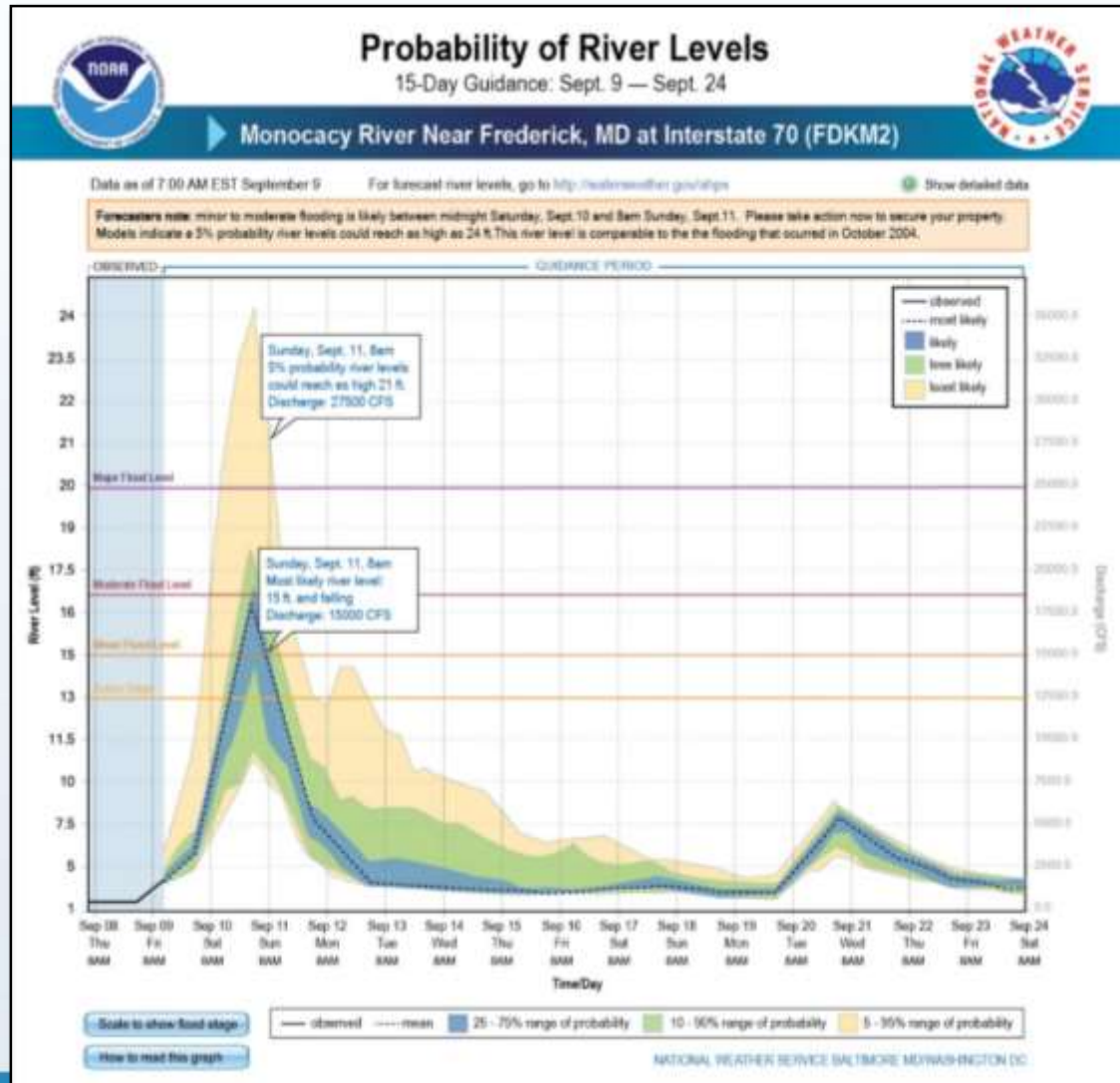
Likelihood of use (High and low graphics)



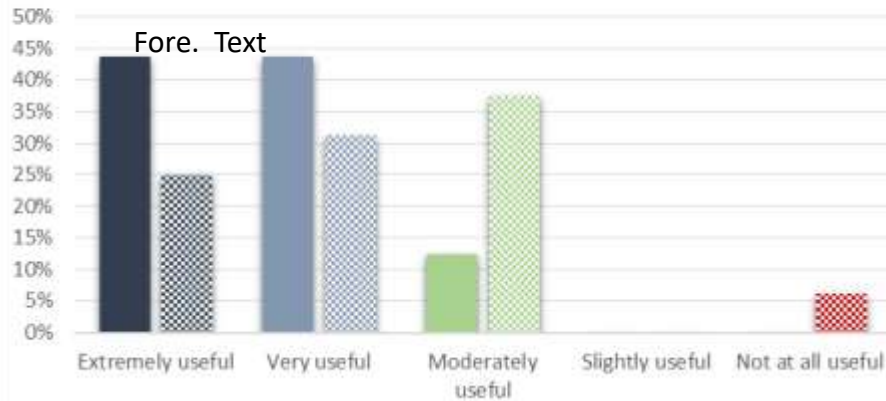
Useful Components of Graphic



Forecaster's Note and Text Box

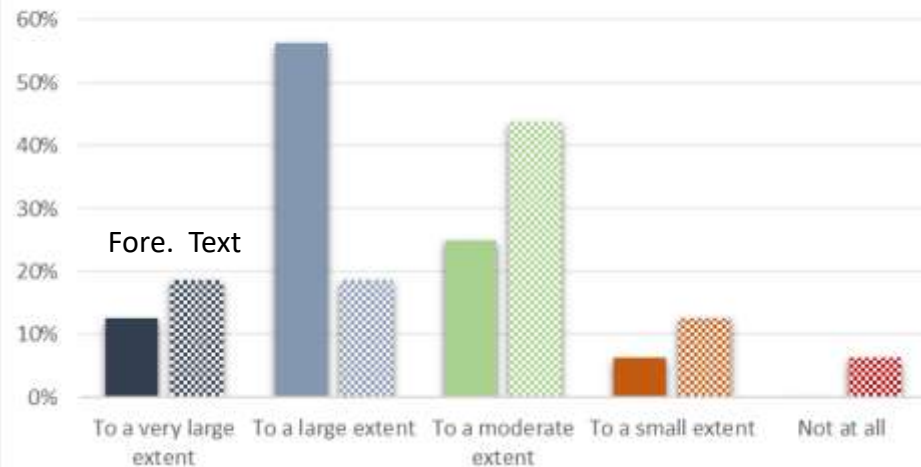


Usefulness of Forecaster Note and Text Box



How do we understand the effect of the “Forecaster’s note?”

Influence on Decision-Making



Summary

- Different user groups have different utility for HEFS products
 - Public had low utility for 15 day HEFS
 - Only water resource managers had utility for 90 day
- Revisions in colors, legends, and text improved understanding but not preference for 15 day HEFS
- Additional elements (forecaster's note and text boxes) were seen as useful for decision-making
- Motivation for preparedness varied among user groups
 - Least effect on residents due to timeframe
- One product may not be suitable for all audiences

Partners:

East Carolina University

Nurture Nature Center

National Weather Service (NWS)
Mid-Atlantic River Forecast Center

National Weather Service (NWS)
Sterling, VA Weather Forecast
Office

For more information

see our published articles in:

BAMS September 2016 –

“Effectively Communicating Risk and
Uncertainty to the Public: Assessing the
NWS’s Flood Forecast and Warning Tools.”
Carr et al.

WCAS October 2016 –

“Motivating Action under Uncertain
Conditions: Enhancing Emergency Briefings
during Coastal Storms.” Carr et al.



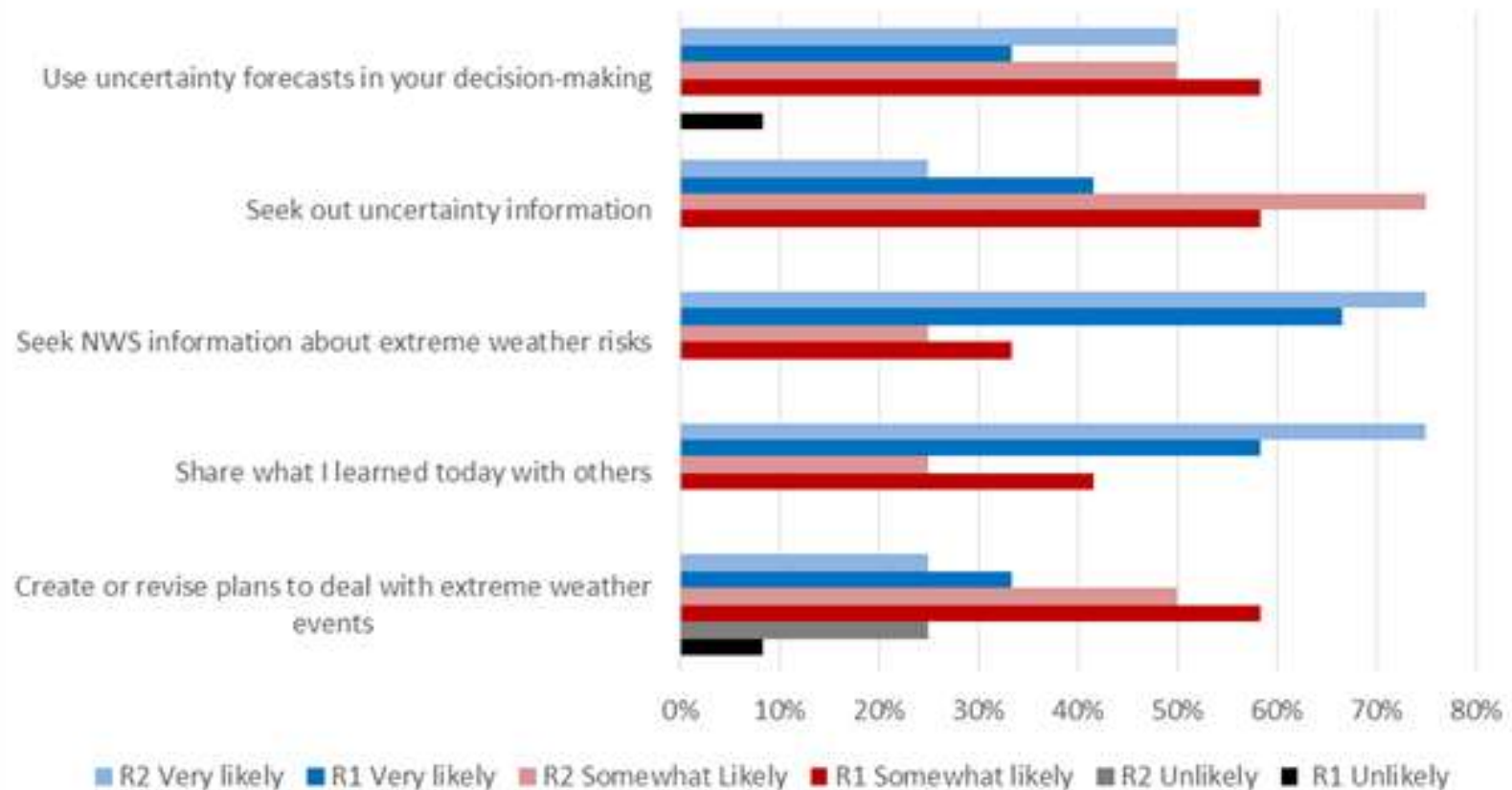
Thank you!

Questions?

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Emergency Manager Actions After Attending Session



Resident Actions After Attending Session

