

Final Report

**Support for the Hazard
Simplification Project
Phase V:
Findings and Recommendations
from Focus Groups and Partner
Engagement**

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Arlington, Virginia**



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NOAA's Office for Coastal Management "Coastal management" is the term used by communities and organizations striving to keep the nation's coasts safe from storms, rich in natural resources, and economically strong. The national lead for these efforts is NOAA's Office for Coastal Management, an organization devoted to partnerships, science, and good policy. This agency, housed within the National Ocean Service, oversees major initiatives that include the National Coastal Zone Management Program, Coral Reef Conservation Program, Digital Coast, and National Estuarine Research Reserve System.

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I. EXECUTIVE SUMMARY

Background

The National Weather Service (NWS) issues a variety of hazardous weather warnings, watches, and advisories (WWAs) to alert the public and partners of expected hazardous weather, water, and climate events. Based on results of years of public and partner interactions, and also on post-storm Service Assessments, the NWS has learned that the current WWA system has shortcomings—both in public understanding of the different WWA warning levels, products, and in terminology (particularly for Advisory, which is often misunderstood or confused with Watch) and from an operational perspective.

Through its national Hazard Simplification Project, the NWS has been systematically exploring the strengths and weaknesses of the WWA system and exploring possible language-based alternatives to the current terms and warning levels. This research culminated in a generalizable public survey that assessed knowledge of the current system and tested four alternative “prototypes” for a variety of hazards. The survey was designed to gauge which of these approaches were most effective in compelling the appropriate action (e.g., do nothing, monitor the situation, prepare, take some protective action, take protective action) at different warning levels.

Based on the survey results, the NWS developed two prototypes (see Figure ES-1) for further testing with partners and NWS forecasters.

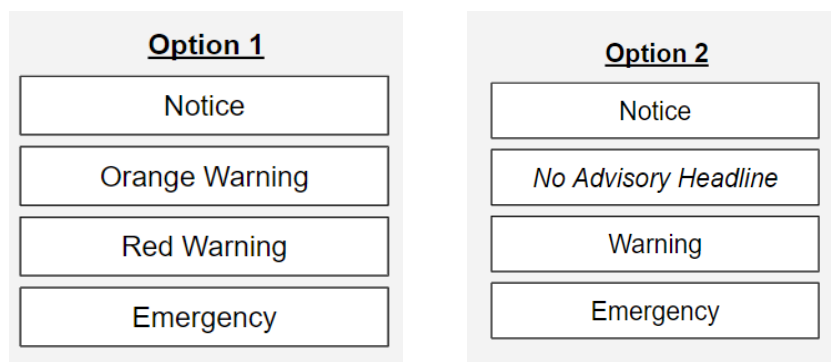


Figure ES-1. Prototypes Tested

Option 1 combines the words that tested best in the generalizable public survey. It maintains the current system levels, with Notice replacing Watch, Orange Warning replacing Advisory, and Red Warning replacing Warning. **Option 2** removes the Advisory headline but leaves open whether to retain the Advisory level of alerting or not. Both options include the proposal to expand use of the Emergency level beyond its current usage for tornadoes and flash floods only.

2018-2019 Partner and Forecaster Engagement

NWS representatives traveled to six locations and conducted 25 focus groups to socialize the two prototypes. The NWS also held briefings with partners in other agencies and sectors. The engagement was designed to gather input on the prototypes across a spectrum of partners, geographies, and hazard types; document key concerns that would need to be addressed before the NWS could move forward

with a chosen prototype; and enable a decision as to whether a single prototype option should undergo further testing.

Key Findings

The focus groups echoed many of the social science findings that the Hazard Simplification project has been documenting for the past five years. These include the following:

- There is a spectrum of understanding of the Watch and Warning levels and terms, and an acknowledgment that some people confuse the two because of the similar (Wa-Wa) sound.
- Advisory is problematic in that many members of the public, and even some partners, don't understand the level or term. It is also the least "institutionalized" (i.e., embedded in organizational policies and/or law) of the WWA terms in terms of policies, statutes, procedures, by-laws, and other decision-making processes or guidelines.
- Even though Advisory is problematic, there is a desire to maintain that level of messaging, though not necessarily the term or products.
- Emergency is a level that people desire for the rare, high-impact event as long as it isn't overused.
- There is a desire for an intuitive system with actionable, impact-based messaging that does not require detailed explanation.

Colors

The focus groups also contradicted some prior social science findings that supported the adoption of a color-coded system. While there was some support for Option 1, which used Orange Warning and Red Warning at the current Advisory and Warning levels, respectively, participants generally endorsed the use of color as a **visual display** option only. In particular, participants felt that Orange Warning and Red Warning were not intuitive and would require explanation. They also said the language is wordier than the current system when used in a headline such as Orange Warning for Snow as opposed to the current Winter Weather Advisory. They expressed concerns about conflicts with existing internal and external color schemes as well. Participants did praise the ability of colors to cross cultural and language boundaries, facilitate dissemination warning communication over mobile phones and social media, and potentially improve internal coordination.

Notice

Both of the prototypes tested in the 2018-2019 focus groups used the term Notice in place of Watch. This switch garnered mixed reactions. All agreed Notice would eliminate the Wa-Wa confusion. Some endorsed Notice because it is an intuitive or commonplace term (e.g., you get a notice in the mail or on a smartphone), while others felt the term was too vague or soft. Some were concerned that using Notice would cause international confusion given that Watch is used currently by global partners for certain hazards. They were also concerned with the institutionalization of Watch, particularly for severe and tropical weather.

Advisory

Participants were critical of Advisory and they were also generally not wed to the Advisory products or term (though there were some exceptions among individuals, particularly in the mariner and Spanish-speaking focus groups). However, there was a general consensus not to lose the alerting level currently provided by these Advisory products.

Emergency

Overall, participants agreed with extending the use of the Emergency level to other hazards (currently Emergency is only used for tornadoes and flash floods) for rare events but urged caution in its use.

Prototype Option Variations

Across all the focus groups, Option 2 was better received than Option 1, but participants also offered several ideas for enhancing or adjusting Option 2. Based on these discussions, three variations of Option 2 emerged for further testing (see Figure ES-2). The variations differ in the way they handle the Watch and Advisory levels, but all have the Warning and Emergency levels.

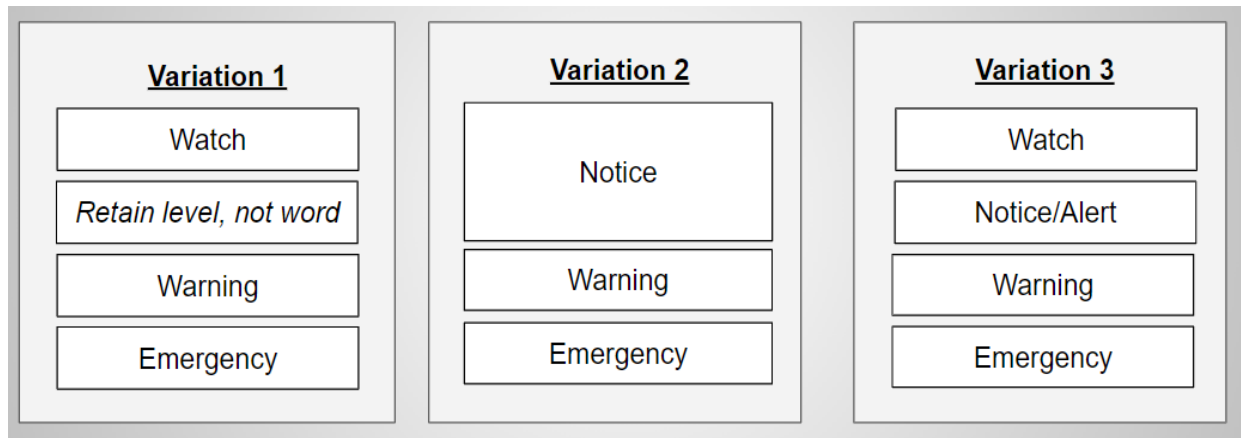


Figure ES-2. Prototype Variations

Variation 1 retains Watch and removes the Advisory products and term but maintains the Advisory level. Advisory-level information could be conveyed in a variety of ways, such as through the forecast, a statement like the Special Weather Statement (SPS), or impact-based decision support services (IDSS). The idea of using a messaging approach like the current SPS product in place of the Advisory headline came up independently across several different partner groups and locations.

Variation 2 eliminates Watch and Advisory and adds Notice to cover the intent of both. Participants provided several suggestions for handling current Advisories, such as wrapping sub-warning events under Notice, but moving to the Warning level when there is a more serious impact. Another suggestion was to review current Advisories to ascertain whether any of them should become Warnings.

Variation 3 retains Watch but changes Advisory to Notice or Alert. Many participants across different partner groups and locations suggested that Notice was a better replacement for Advisory than Watch. Participants in a few the groups also suggested the term Alert to replace Watch.

Findings Relative to Partner Groups or Locations

Some of the insights gathered through the focus groups were particular to a geographic location:

- In **Anchorage, Alaska**, participants favored replacing Watch with Notice since Watch is used sparingly in Alaska (and not at all in the marine product suite). They noted that the existing SPS

is used as a Hazardous Weather Outlook (HWO) in Alaska for a lower confidence Watch or prelude to a potential Watch, and that colors could be confusing since regional websites currently display yellow for Advisories with Watches as orange.

- In **Louisville, Kentucky**, participants noted there are special populations that present messaging considerations, including those who live in remote rural locations and depend on radio for weather forecasts and those who cannot read or write. EMs cautioned against a system where people must learn something new and suggested that change will only be successful if the NWS makes the system easier (not harder) to understand.
- The **Wakefield/Norfolk, Virginia**, groups voiced concerns about introducing a new color system, stating that it could be confused with the colors and tiers already used in hydrology for minor, moderate, major flooding levels. Many in the mariner and EM groups expressed a strong preference for the current system but were divided on whether or not to replace Advisory.
- In **Miami, Florida**, participants, including the Federal Emergency Management Agency (FEMA) Hurricane Liaison Team, supported maintaining the current system, pointing to the area's familiarity with Hurricane Watches and Warning, which are also codified into some types of operational decision-making. Participants also noted that Watch is used by international partners.
- In **Norman, Oklahoma**, participants were open to changing the current system for winter weather but not for severe weather, saying it could do more harm than good. They suggested a one-size-fits-all system might not be feasible or advisable.

Special Insights by Partner Group

Some of the insights gathered through the focus groups were particular to different partner groups:

- **Mariners** generally supported maintaining the current system. In fact, all 17 Wakefield mariners unanimously supported keeping the current system. They debated the pros and cons of the Small Craft Advisory product. Many felt that the phrase Small Craft is ambiguous (and can refer to fairly large vessels), but they were divided on whether or not to replace the Advisory.
- None of the **broadcast meteorologist (BM)** groups supported using colors as actual warning terms, though many liked using colors to enhance visual communication. In general, BMs wanted to see more event-driven, impact-focused messaging. As with emergency managers (EMs), most wanted the Advisory level but were not wed to the term. Many also advised against any system that would require explanation and re-education, as BMs have limited time on air.
- Many **EMs** were comfortable with the current system, but also adaptive to change. All EM groups wanted to retain the Advisory level, though not necessarily the word. Many said they only notify on Watch/Warning (be prepared/take action), but that Advisory is necessary for internal operations and preparation. While changing terminology wouldn't pose a significant hurdle (it would just require changes to policies and manuals), EMs were worried about getting the training they would need to transition to a new system, as well as the education they would have to provide to members of the public.

- **Forecasters** were split on options. Some were more supportive of colors than others, seeing its utility for impact-based decision making (IDSS) and social media. They had varying opinions on Notice, but were inclined to maintain Watch for the tropical, tsunami, and severe programs. They generally supported maintaining the Advisory level, though not necessarily the term, and adding the Emergency level as long as it was not overused.
- The **National Tsunami Hazard Mitigation Program (NTHMP)**, Washington/Baltimore **Metropolitan Area Transportation Operations Coordination (MATOC)**, and **Spanish-speakers'** focus groups all generally favored maintaining the current system. The Spanish speakers' group said Notice does not translate well into Spanish and that the current terms are better. However, some Spanish-speaking media markets are inconsistent about the way they use WWA terms, and the generic "Alerta" is often used. The **NWS Partners'** group was split on options, but generally favored the use of colors as a visual display option to enhance messaging, rather than as actual warning terms.

Other Discussion Topics

There was a good deal of debate around whether a change in levels, terms, or colors, even if it was for the better, was worth the effort, given the amount of training, education, and policy and procedural adjustments such a change could necessitate. Forecasters and partners also suggested that changing terminology won't address some of the fundamental problems with the system, such as getting members of the public to take appropriate protective actions. Instead, there were suggestions to "fix the engine, not the paint" by focusing on the meteorological criteria underlying WWA products as well as improving messaging and calls to action.

There was also a recognition that the system has to meet the needs of many audiences, with significantly different levels of knowledge and messaging needs. Making the system better for a public audience could require adjustments on the part of some sophisticated users who already understand and use the system every day, including members of the media and mariners. Even if not all participants embraced the idea of change, they acknowledged they could adapt.

Additional focus group findings largely mirror other feedback about the hazardous weather warning system gathered from the prior social science engagements. General themes include:

- **A desire for consolidation and simplification of NWS products.** Participants applauded the efforts already under way and noted the significance of this achievement.
- **A need for flexible consistency.** Some questioned whether a "one size fits all" system can work, or whether there could be room for a hybrid system whereby different terms are used for different hazards.
- **A need for education and training.** There was a strong consensus that if the NWS makes any changes to the present system, it will require time, training, and outreach to ensure success.

Many believed that even if the NWS makes no changes to the current system, it still warrants more public education.

- **A consideration of delivery mechanisms and visualization.** While language will remain important, particularly for text products and radio, larger (and younger) proportions of the U.S. population now access weather information over cellphones and other handheld devices. For this reason, the NWS must continue to consider new delivery mechanisms and that visual depictions of a threat might be more valuable than words alone.

Next Steps and Recommendations

The partner and forecaster engagements provided an opportunity for the NWS to socialize potential prototypes drawn from the public survey before committing to a possible alternative. This feedback proved invaluable. As a next step in the project the NWS should further explore the three prototype variations that emerged from the focus groups, select one variation, and define the technical and policy requirements for that prototype. In March of 2019, representatives from the NWS Analyze, Forecast, and Support (AFS) Office, Regions, Field Offices, National Centers, and Service Delivery Portfolios met to discuss project updates, including the generalizable public survey results and preliminary focus group results. The group recommended further testing and exploration of Variation 1, which removes the Advisory headline but retains the Advisory level.

While removing the Advisory headline is not a panacea to all the perceived shortcomings of the current system, it does address a key problem flagged in the social science research conducted to date, which found that many members of the public, and even some partners, misunderstood the definition and use of Advisory. Removing Advisory also supports another finding from every phase of this research—to simplify the current suite of warnings and move toward simpler and more intuitive language.

In addition to defining technical and operational requirements, the selected prototype should be further tested in a simulated operational setting (e.g., testbeds) across different dissemination platforms with partners and end users. These simulations would provide an opportunity to see how forecasters and partners message Advisory-level risk information without an Advisory headline—and how recipients of this messaging respond. The testbed results could also be used to formulate best practices and training.

Importantly, any change to the system requires training, education, and outreach to ensure success. This point was made emphatically in both the 2018-2019 focus groups and in every prior stage of the social science research conducted.

FULL REPORT

II. INTRODUCTION AND BACKGROUND

The National Weather Service (NWS) issues a variety of hazardous weather warnings, watches, and advisories (WWAs) to alert the public and partners of expected hazardous weather, water, and climate events. They can be issued for a single forecast zone (usually one county or a part of a county) or for many forecast zones. Based on years of public and partner interactions and also on post-storm Service Assessments,¹ the NWS has learned that the current WWA system has shortcomings—both in public understanding of the levels, products, and terms (particularly Advisory, which is often misunderstood or confused with Watch) and from an operational perspective.

Through the Hazard Simplification Project, the NWS has been systematically exploring the strengths and weaknesses of the WWA system and exploring possible language-based alternatives to the current terms and warning levels. Initial research associated with this project dates to 2011, when the NWS asked visitors to its website to complete a voluntary survey about the WWA system. In 2014, the NWS engaged social scientists to conduct exploratory focus groups in various locations. Since then, several phases of systematic social science research have been completed (see Figure 1), which are described in more detail on the following pages.

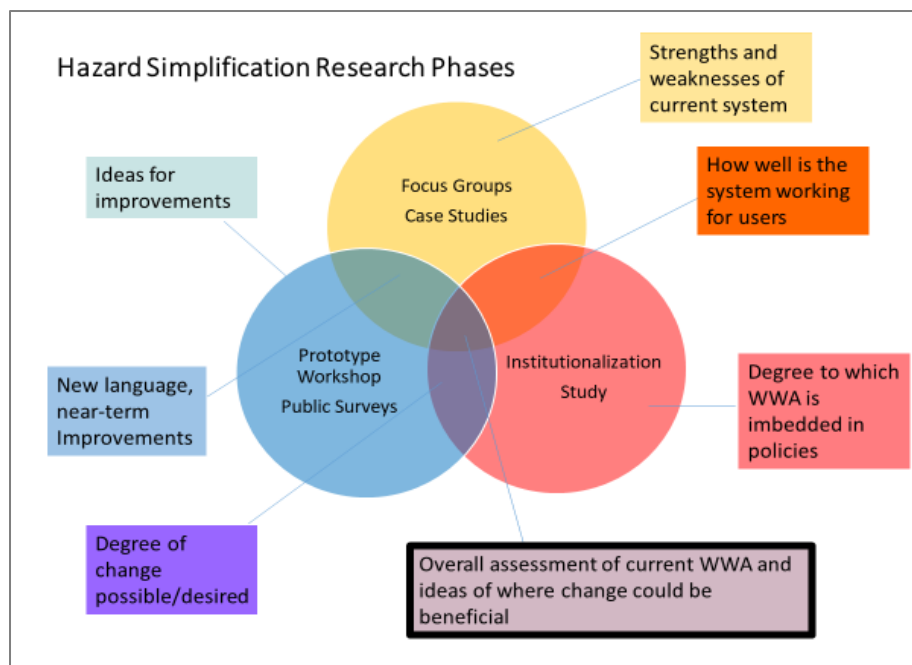


Figure 1 Hazard Simplification Social Science Research Phases

¹ For example, Service Assessments have pointed out that different types of products can be confusing to the public (as with [Hurricane/Post-Tropical Cyclone Sandy](#)), they can be in conflict with one another when they occur simultaneously (as with the [Oklahoma tornados](#)), and they can sometimes be limiting in their ability to adequately message threats and impacts as with the [2012 derecho](#) in the Washington DC metropolitan area.

2014 Focus Groups

Social scientists conducted 20 focus groups with NWS forecasters, emergency managers (EMs), broadcast meteorologists (BMs) and other members of the media, and a random sample of the public in four locations. Among the public focus groups, there was a spectrum of comprehension of the current WWA system, ranging from ignorance to misunderstanding to understanding. Few participants understood Advisory, and partners didn't uniformly see a need for it. NWS forecasters and partners felt the system has too many WWA products and lacks flexibility due to policy limitations (e.g., criteria restrictions and product limitations). Participants supported a simple, action-based hierarchical system with colors denoting warning levels and an additional emergency tier used sparingly for an extreme event. Many participants were cautious about creating a new system that might not alleviate current confusion and noted that the present WWA system is institutionalized into certain kinds of decision-making (e.g., evacuation, insurance decisions). Some participants advocated for just providing more public education on the current system. Others suggested eliminating advisories or adding colors and/or simple action statements (but not changing the WWA terms).

Not sure if Advisory is a good word. It's a promise ring. Sometimes it means it's happening; sometimes it means it's going to happen.

Houston broadcaster (2014)

2015 American Meteorological Society (AMS) Annual Conference

In 2015, the NWS collected feedback via a voluntary survey on a set of three prototypes designed as alternatives to the WWA system based on results from the 2014 focus groups. Over 350 AMS conference attendees took the survey. Overall, respondents preferred options that suggested "more change" than those that were closer to the status quo. However, the results were nongeneralizable and did not validate a specific prototype that could serve as an alternative to the current system.

2015 Case Studies

Also, in 2015, the NWS conducted a web-based survey that asked participants to share a particular hazardous weather event they experienced and respond to a series of open-ended questions about whether the messaging did (or did not) work well from their viewpoint or from the viewpoint of their community or audience. Of the 706 case studies analyzed, EMs represented about 80% of the responses. Nearly three-fourths of these EMs supported maintaining the current system. Other respondents included the forecasters, media, federal agencies, and researchers. All categories of respondents supported simplifying and reducing the number of WWA products, improving formatting, and using concise, easy-to-understand language; expanding education and outreach internally and externally with partners; examining the rigid criteria for issuing WWA products, which can complicate coordination

I know that flash flood warning, flood warning and areal flood advisory all have different meanings and uses. But the public does not understand the difference between them and neither do many emergency managers.

Emergency manager (2015 Case Study)

among NWS offices; and ensuring a balance between providing flexibility to NWS offices with maintaining consistency across regions.

2015 Institutionalization Survey

This survey gathered feedback from nearly 4,500 organizations across 32 sectors that use hazardous weather warning information to discern the degree to which WWA products or terms are embedded or institutionalized in their decision-making, laws, policies, operating procedures, bylaws, or other activities or processes. Approximately 30 percent of the total sample responded that WWA terms are specifically written into their policies and statutes. Warnings were the most institutionalized of the WWA terms while Advisories were the least institutionalized. Respondents depend on Warnings the most, followed by Watches, and then Advisories. The survey also revealed that most respondents could adapt to any potential changes to WWA terms within a year.

2015 Workshop

In 2015, the NWS hosted a workshop with 105 EMs, BMs, NWS forecasters, private industry meteorologists, and social scientists to develop language-based prototypes to replace all or parts of the WWA system and gather ideas for simplifying NWS hazard messages. The prototypes that emerged from the workshop ranged from changing the system altogether to maintaining the WWA construct, but changing the word Advisory and not issuing warnings for certain hazards. In polls conducted during the workshop, one prototype scored consistently above average. It focused on a color-coded, tiered hierarchical system that tells a story and puts actionable phrases at the forefront of the messaging. Participants also favored consolidating and/or eliminating some products and improving the product formatting (e.g., including bullets, colors, boldface, and “who, what, where, and when” details).

2015 Testbed

The NWS’s Forecasting a Continuum of Environmental Threats (FACETs) program tested variations of some of the prototypes developed in the 2015 workshop in a testbed environment. The study revealed that the current WWA system is ingrained within forecasters’ operational mindsets. They had difficulty mapping new terms to meteorological criteria and distinguishing between probability and confidence. The study also showed that EMs and BMs relied more on graphical information than text. They were more like to share text if it was concise and written in complete sentences. BMs also stressed the importance of knowing the criteria, thresholds, or reasons behind different alert levels.

2017 - 2018 Public Survey

In 2017 to 2018, the NWS conducted a generalizable public survey that tested four prototypes (and the current system) for nine hazards (winter weather, mild and cold; thunderstorms; tornadoes; areal, coastal, and flash flooding; high winds; and excessive heat, mild and cold). The surveys resulted in the collection of nearly 8,600 responses from members of the public across a broad geography where these hazards are most prevalent. Collectively, the surveys determined that two prototypes were the strongest performers.

Table 1 shows the prototypes tested and highlights the warning levels where Prototypes 2 and 4 were effective (if both are highlighted, they were both effective at that level).

Table 1. Prototypes Tested in the Public Survey

Level	Current System	Prototype 1	Prototype 2	Prototype 3	Prototype 4
Watch Level	X Watch	X Outlook	X Notice	Possible X Event	Possible X Conditions
Advisory Level	X Advisory	X Warning	X Alert	Moderate X Warning	Level Orange X Warning
Warning Level	X Warning	X Warning	X Warning	Severe X Warning	Level Red X Warning
Emergency Level	X Emergency	X Warning	X Emergency	Extreme X Warning	Level Purple X Warning

While the survey found that Prototypes 2 and 4 were most effective overall, it also found that different prototypes were more effective at different levels. At the Watch level, Prototype 2 (Notice) was the best performer, but Prototype 4 (Possible Conditions) never outperformed the current system. At the Advisory level, Prototype 1 (Warning), Prototype 2 (Alert), and 4 (Level Orange Warning) were strong performers with each outperforming the current system. At the Warning level, Prototype 4 (Level Red Warning) was the strongest performer. The survey also tested knowledge of the current WWA terms and found that knowledge is relatively low overall. Across all hazards, Advisory was the least understood term. Flash Flood Warning and Tornado Warning had the best understanding at 67% and 70% respectively. Not only did members of the public not understand the WWA terms, they sometimes confused one for another; for example, in the winter weather survey, more than 60% of respondents confused Advisory and Watch (see Table 3).

Table 2. Summary of Current Knowledge Questions

Survey	Term Tested	% Correct	Term Tested	% Correct	Term Tested	% Correct
Winter Weather, Mild	Winter Storm Warning	43.1%	Winter Weather Advisory	14.5%	Winter Storm Watch	70.6%
Winter Weather, Cold	Winter Storm Warning	43.8%	Winter Weather Advisory	17.4%	Winter Storm Watch	68.9%
Thunderstorms	Severe Thunderstorm Watch	43.5%	Significant Weather Advisory	24.3%	Severe Thunderstorm Warning	56.8%
Tornadoes	Tornado Watch	67.3%	Tornado Warning	70.6%	Tornado Emergency	28.9%
Coastal Flooding	Coastal Flood Watch	41.6%	Coastal Flood Advisory	44.4%	Coastal Flood Warning	55.6%
Flash Flooding	Flood Watch	50.0%	Flash Flood Warning	64.5%	Flash Flood Emergency	62.2%
Areal Flooding	Flood Watch	44.4%	Flood Advisory	42.6%	Flood Warning	43.6%

Table 3. Winter Weather Example

Winter Term Used in Question	Response Options		
	A storm is possible, and may pose a threat to life and/or property	A storm is certain, and may pose a threat to life and/or property	A storm is certain, but does not pose a direct threat to life and/or property
Winter Storm Warning	43.9%	43.1%	13.0%
Winter Weather Advisory	60.6%	24.9%	14.5%
Winter Storm Watch	70.6%	18.6%	10.8%

III. FOCUS GROUP AND ENGAGEMENT ACTIVITIES

Following the public survey, the NWS designed two prototypes based on the survey results and prior social science research for further testing with NWS forecasters and partners (see Figure 2).

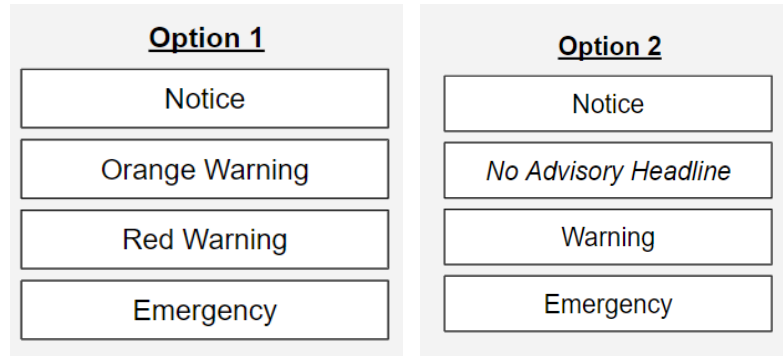


Figure 2. Prototypes Tested

Option 1 is a hybrid approach that combines the words that tested best in the public survey. It maintains the current system levels, with Notice replacing Watch, Orange Warning replacing Advisory, and Red Warning replacing Warning. **Option 2** removes the Advisory headline, but leaves open whether to retain the Advisory level or not. This option was offered based on the persistent misunderstanding of the Advisory term across all social science engagements.

Both options expand the use of the Emergency level to other hazards (currently, the Emergency level is only used for tornadoes and flash floods). Although Alert performed well at the Advisory level in the public survey, the research showed that respondents were more likely to take appropriate action at the Warning level, when it was preceded by a Notice prompt as opposed to an Alert. Based on this finding, Alert was not included in the prototypes for further testing. In other words, respondents that moved from Alert to Warning within the public survey did not increase their action as appropriate.

Goals of the Engagement

The NWS designed a series of focus groups and other engagement activities to gather feedback on the prototypes. Conducted from Fall 2018 through Spring 2019, the goals of this engagement were to:

- Socialize the two prototype options across the Weather, Water, Climate Enterprise and determine strengths and weaknesses of each.
- Document key concerns and topics that must be addressed to move forward with a chosen prototype.
- Ultimately, inform a decision on selecting a single prototype option that should undergo further testing.

Methods

NWS representatives conducted 25 live focus groups across six locations and five remote focus groups with different partner groups (see Table 4) to socialize the options and gather feedback. They also briefed several federal agencies and the participants of the NWS Spring 2019 Partners' meeting, which brought together representatives from a broad range of expertise across the weather, water, and climate enterprise. While these briefings were not intended to produce the same level of feedback as the focus groups, they did allow the NWS to ensure there were no red flags regarding the prototypes.

Federal Agencies Briefed

- Federal Aviation Administration (FAA)
- U.S. Geological Survey (USGS) (Coastal Storms Group and Water Mission Areas)
- U.S. Department of Agriculture (USDA) (Climate Hub Directors)
- U.S. Department of Transportation
- FEMA
- U.S. Army Corps of Engineers (USACE)

The engagement activities were designed to gather input on the prototypes across a spectrum of geographies and hazard types. Each engagement began with the NWS gathering each participant's opinion about the strengths and weaknesses of the current system, which is documented in Appendix A. Following these remarks, the NWS provided background on the current system and the social science research gathered to date.

The NWS then introduced each prototype (one at a time) through a scenario-based format (see example in Figure 3) around a relevant hazard for the location. The participants also viewed a series of text products, showing how the headline for the prototype would appear as the weather situation progressed. Appendices A and B provide an example of the focus group script and the slide deck used at one of the focus groups. The NWS worked with the local Weather Forecast Office (WFO) to customize each scenario and product suite(s) by location.

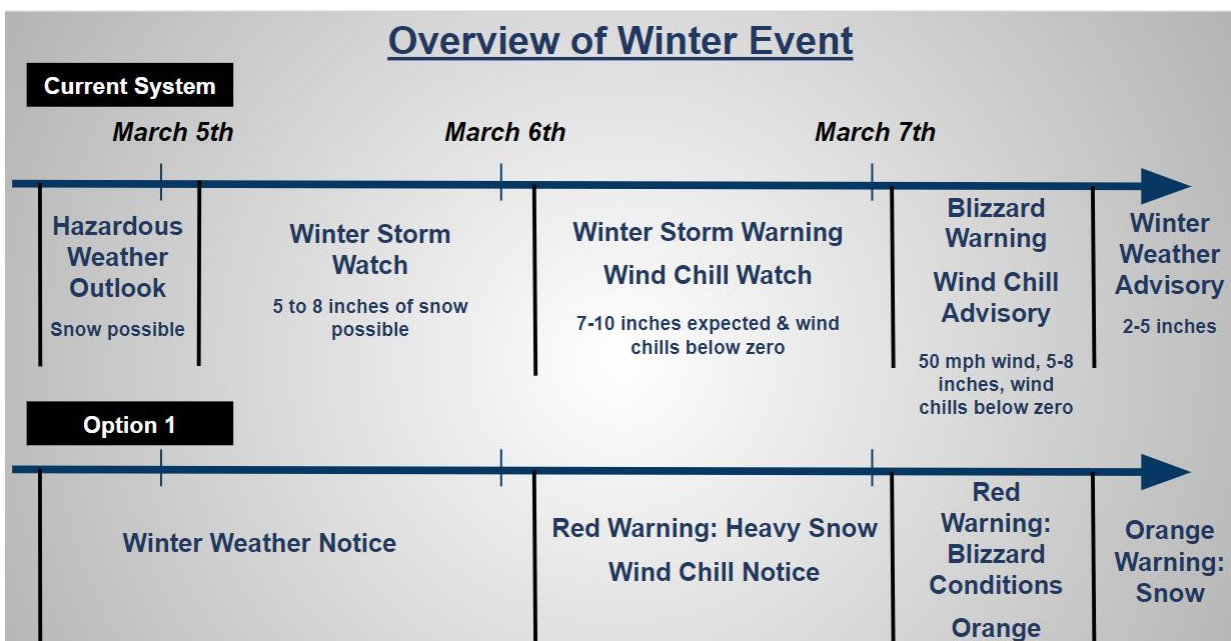


Figure 3. Sample Scenario Overview Used in the Focus Groups

Sample

Approximately 400 individuals were engaged through the focus groups, meetings, and webinars. Table 4 shows the number of focus group participants broken down by location and affiliation.

Table 4. Focus Group Make-Up by Location and Partner Type

Location	EM	BM	WFO/Natl Centers	Mariners	Mixed/Other	Total
Sterling, VA	N/A	13	N/A	N/A	17 (Metropolitan Area Transportation Operations Coordination [MATOC])	30
Louisville, KY	10	N/A	12	N/A	18*	40
Anchorage, AK	5	5	15	12*	~60 (Bureau of Indian Affairs)	97
Norman, OK	21*#	4	9	N/A	N/A	34
Miami, FL	16	9	24*^	6	5 (FEMA)	60
Wakefield, VA	12	4	6	17	N/A	39
Remote	N/A	16*	N/A	35	14 (partners representing Spanish-speakers); 26 (National Tsunami Hazard Mitigation Program [NTHMP])	91
Total	64	51	66	70	140	391

* Combined total from two separate focus groups

^ Included one BM

Included some school and hospital officials, but job responsibilities included EM

Limitations

Some limitations with the approach are noted below.

- There was uneven representation of participant types across locations and groups. For instance, there was poor representation from BMs and other media representatives in most locations. To address this issue, remote webinars were held with BMs across the country.
- Some groups were mixed among the participant types, so the discussion may have been somewhat different as opposed to if groups were a single participant type.

- The options were always presented in the same order. Participants always saw Prototype 1 (colors) followed by Prototype 2 (no Advisory headline). The lack of randomization could have introduced a possible bias. For example, if participants strongly disliked Option 1, they could have been more accepting of Option 2.
- Focus group content was presented in a text product only. It may have been challenging for some participants to visualize the extent of change proposed without graphics, maps, and other visuals—or how changes would look and sound in other mediums, such as radio and smartphones. Additionally, feedback on the options were limited to the change in text.
- The scenarios shown in the focus groups were fairly simplistic and most only covered one hazard. It is difficult to surmise how well Prototypes 1 and 2 would work in a more complex, realistic scenario.
- The NWS attempted to encourage open and honest conversation by asking participants to share their views on the current system before presenting the alternative prototypes. However, the fact that the NWS was present during the sessions could have hindered the degree to which participants felt comfortable providing their true opinions. Also, the NWS representatives answered questions and gave additional context in some circumstances, which may have introduced bias in some cases. For example, in some groups, when asked, the NWS shared its own perspective of who they think is the primary intended audience of the WWA system (i.e., the general public).

IV. FINDINGS

The engagement offered an opportunity to discuss both the strengths and weaknesses of the current system, as well as gather specific feedback on the two prototypes. Table 5 presents a simplified snapshot of the preferred prototype option by location and group. The table reflects the overall discussion in each group. In cases where there was no consensus, selections were split across one or more options or no clear preference emerged.

Table 5. Simplified Snapshot of Preferred Prototype by Partner Group and Location

	Louisville	Alaska	Norman	DC Area	Miami	Wakefield	Remote
Emergency Manager	Variation 2	Option 2	Current system		No consensus	No consensus	
Broadcast Media		Option 2	Option 2	Variation 2	Variation 1	Variation 2	Variation 1
Forecaster	Option 1	Variation 2	No consensus		Variation 1	Option 1	
Mariner		Current system			No consensus	Current system	Current system (Miami mariner workshop)
Other	No consensus	Current system (Alaskan tribal leaders)		No consensus (MATOC) No consensus (Partners' meeting)	Variation 1 (NHC)		Current system (NTHMP) Current system (Spanish group)

Option 1	Option 2	Variation 1	Variation 2
Notice	Notice	Watch	Notice
Orange Warning	Remove Advisory	Retain Advisory Level, not headline	Notice
Red Warning	Warning	Warning	Warning
Emergency	Emergency	Emergency	Emergency

Feedback on Current System

At the beginning of each focus group, participants were asked to comment on the strengths and weaknesses of the current system. As the groups discussed the alternative prototype options, they often expounded on some of these strengths and weaknesses. The main strengths and weaknesses identified by the participants are summarized below.

Strengths

- Institutionalized and very familiar in some locations.
- Easy to understand for sophisticated users.
- Is simple.
- Is concise.
- Is event-driven and detailed.
- Is hazard specific.
- Covers a lot of hazards.
- Is improving (e.g., new storm surge products added).
- Is detailed and comprehensive.
- Is delivered in multiple formats.
- Conveys timing well and provides an early warning.
- Conveys urgency.
- Catches people's attention.
- Can ramp up and down.
- Provides precise information that informs action and decision-making.
- Acts as an authoritative source; the terms "carry weight"

I would rather keep the bones of the condo and fix the units rather than bulldoze the entire thing.

Miami broadcaster (2019 Focus Group)

Weaknesses

- Has no clear hierarchy.
- Has too many products.
- Has ambiguous definitions.
- Is misunderstood (particularly Advisories).
- Is not intuitive enough for some users; requires interpretation and explanation.
- Can have overlapping/multiple products up; map can get confusing and can mask some hazards.
- Is too granular with too many nuanced warnings.
- Is not specific enough for making some decisions.
- Does not always convey actionable information.
- Can be inconsistently applied between WFOs and WFOs/National Centers.
- Is not impact-based enough.
- Can be confusing or misunderstood. Watch and Warning terms can be confused due to the "Wa-Wa" sound.
- Doesn't use metric system.

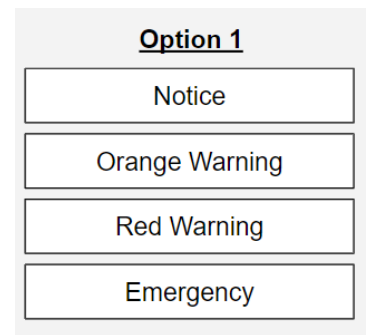
Why are we issuing Advisories? They aren't a threat to life and property so it may be better to avoid the clutter and confusion by not issuing.

Sterling broadcaster (2018 Focus Group)

- Doesn't always convey timelines appropriately; for example, the Hurricane Watch comes out too late for preparation.
- Doesn't capture all events (e.g., some fall between existing product types).
- Is not a single authoritative source.
- Lacks geographic specificity in some cases.
- Is based on meteorological criteria that can be rigid and misaligned with impacts.
- Can lead to over-warning, such as when forecasters issue a Watch early on to meet decision support needs.
- Can be unclear; for example, it can be unclear what to do when the system goes from a Watch to Advisory (can be perceived as downgrade)
- Have blurred lines between Advisory and Warning criteria.
- Can cause forecasting inconsistencies because some WFOs are more criteria-based than others.
- Can cause collaboration problems when forecasters cannot agree on a product/headline.
- Does not tailor information to diverse audiences as well as it should.
- Uses too much jargon/technical information.
- System doesn't use enough visuals/graphics.

Feedback on Option 1: Colors at Two Warning Levels (Option 1)

Since Option 1 and 2 share common elements (both replace Watch with Notice and both introduce Emergency), the discussion below focuses on the pros and cons of colors. Pros and cons of Notice and Emergency are presented separately after the discussion of Option 1 and 2.



Pros (Colors)

- Can cross language and cultural barriers.
- Could help provide a clearer hierarchy and show an escalation of threat.
- Could improve national consistency and collaboration.
- Can be more intuitive to people and help to make the warning system more self-evident.
- Work very well over mobile devices.
- Could help simplify the national map but having only a few colors could also mask certain hazards or warnings (some people noted that the current map also can mask warnings).
- Could be used effectively for IDSS and to simplify the message.
- If there was a matrix behind the colors, it could be a useful tool for decision-making.

Now we are calling a word that everyone doesn't understand [Advisory] just orange?

Louisville forecaster (2018 Focus Group)

Cons (Colors)

- Mixes up different things (adjectives/nouns) at different levels; lacks internal consistency.
- Could cause potential confusion with external color schemes. For example, an NWS color scale can be easily confused with other tiered color systems (such as the Department of Homeland Security's post-9/11 warning system, as well as EPA's air quality warning system). Also, many media stations use their own color schemes.

- Could cause confusion within the NWS system as different colors could be interpreted differently depending on the hazard and from one region to another. For example, someone from the Midwest who is used to a Red Warning for winter weather might not take a Red Warning for a hurricane seriously if vacationing in Florida.
- Using Warning at two different levels may lead to warning fatigue.
- Using a warm color for a cold event is confusing (e.g., Red Warning for Wind Chill).
- Colors are not that intuitive to some people and could require extra explanation or a translation step (e.g., what does orange mean? Is red the worst, or is there a purple?)
- Adding color terminology requires extra language in the headline.
- Adding certain colors like red poses challenges for color-blind or visually impaired people.
- Colors could be confusing when multiple warnings for different hazards are up (e.g., Orange Warning: Wind Chill and Red Warning: Heavy Snow) as people may not remember which is worse or not pay attention to the Orange Warning.
- Colors could be difficult to relay over media. For example, over radio, people might just hear the term Warning, and miss the color.
- Colors can appear differently on different screens, so orange may look red on one computer, but yellow on another one. Orange and red could also be challenging to delineate on a map because they are so similar.
 - Orange and red are also problematic on television.
- Colors would necessitate changes to a lot of guidance and policies.
- Adding color terminology would diminish the meaning of Warning.

Suggested Variations to Option 1 (Colors)

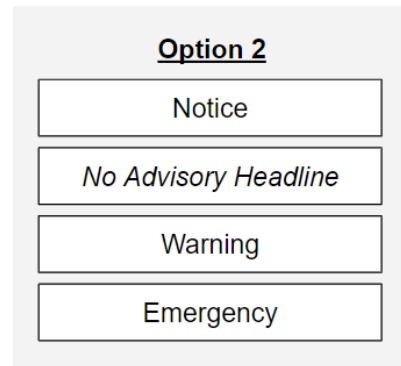
- Avoid having multiple headlines in different colors. Participants across many groups suggested the NWS just issue a single headline for the higher-category warning (e.g., instead of simultaneously issuing an Orange Warning: Wind Chill and Red Warning: Heavy Snow, just issue a Red Warning for both Wind Chill and Heavy Snow).
- Use yellow instead of orange and use a stoplight (green, yellow, red) color scheme, though some felt that yellow could be hard to read and is not intuitive.
- Assign a color to every level (i.e., Use of color at the Watch and Emergency level)
- Use Red Warning and Orange Alert, since some participants were concerned that people would fixate on warning and not pay attention to the rest of the headline title.
- Use color as a visual aid rather than as part of the actual language. For example, show Warning: Heavy Snow in red or in a red box rather than as part of the actual term. One group also suggested displaying different-colored flags at a marina to warn the boating community of weather conditions.

Feedback on Option 2: No Advisory Headline

This option removes the Advisory level. The bullets below capture the pros and cons of removing Advisory as expressed by the focus groups.

Pros (of Removing Advisory)

- Removes “Wa-Wa” confusion
- Removes widely confused Advisory term.
- Removes conflation of certainty and impact – simpler two-tier system.
- Easier on forecasters to use.
- Some WFOs have already eliminated Advisories.



Cons (of Removing Advisory)

- Some thought that the use of the Advisory term is paramount for tsunamis and small marine crafts; others thought another term could be used, such as threat or alert.
- Advisory level information is needed by partners.
- Some forecasters felt it would be a disservice to omit Advisory level information entirely.

An Advisory is...

A Warning's kid brother
A stepchild
Broken

Various focus group participants (2018 to 2019)

Suggested Variations to Option 2

Focus groups were encouraged to provide feedback not only on how removing the Advisory headline would affect their operations, but also how they would like to see the level handled (e.g., replace the term Advisory with something else, or merge the level into the Watch or Warning levels). From a replacement perspective, there were suggestions to replace Advisory with either Notice, Alert, or Outlook. Many were not wed to the word Advisory but wanted to retain the Advisory level. Suggestions for how this could be handled included:

- Expand Notice to include anything that is not a Warning.
 - Differentiate between potential and certain events.
- Lower Warning criteria and wrap all current Advisories into Warnings.
 - Base Warnings on impact-based criteria rather than meteorological criteria.
- Meet in the “middle” by lowering Warning criteria a bit and wrapping low-level/inconvenient/sub-warning Advisory events into Notice/Watch.
 - Have Notice/Watch cover inconvenient events, and move to Warning when there are life-threatening impacts.
- Have two levels of Notice/Watch and encompass the current HWO as a “pre-watch.”
- Keep Notice up throughout the whole event, but during a Warning, the Notice doesn't show up as prominently.
- Issue a Special Weather Statement (SPS) rather than an Advisory.
- Put Advisory information into the forecast.

- Provide Advisory level information through impact-based decision support services (IDSS) rather than the Advisory headline.

Feedback on Watch Vs. Notice

In addition to considering Notice as a replacement to Watch (as presented in the prototypes), some participants suggested using Notice as a replacement for Advisory instead, or to issue a Notice before a Watch.

“My most precious tools are words. Watch is one of my most powerful tools.”

NHC forecaster and media spokesperson (2019 Focus Group)

Pros (replacing Watch with Notice)

- Replacing Watch with Notice removes the “Wa-Wa” issue.
- Notice is more intuitive (e.g., “I’m ‘On Notice’”).
- May provide more flexibility to forecasters and help them break away from the strict connection to Watch and Warning.
- Notice is a commonplace term (e.g., you get a notice in the mail or on a smartphone) that most would understand.
- It is clear that Warning is a step up from Notice.
- Operationally, it would be easier to use Notice when upgrading or downgrading a Warning.

Cons

- Notice could cause international inconsistency (Tropical, Marine, Tsunami).
- Notice sounds “soft” or less impactful than Watch. Because of this, Notice might work better for some hazards than others (e.g., it may work better for winter weather than severe weather or hurricanes).
- Notice sounds too certain for the Watch level (e.g. Tornado Notice sounds like the tornado already happened).
- The word Notice already exists for mariners; they get notices from the Coast Guard.
- Notice does not translate well into Spanish; Spanish-speaking forecasters and media would need to come together to determine how to translate Notice into Spanish so that an appropriate, consistent term could be used.
- Notice has legal/administrative connotations in some areas, such as with Alaskan Native tribes.

I get notices about condo association, but I get warnings on my chemicals.

Miami broadcaster (2019)

Even among some of the participants who liked the word Notice, they were not sure that changing the entire system was worth the effort.

Feedback on Adding Emergency Level (Options 1 and 2)

Currently, an Emergency level, as a tag on the Warning, is used for Tornado and Flash Flood hazards. Focus group participants were asked to comment on the pros and cons of expanding this to other hazards. Most participants supported a rarely used Emergency level for appropriate hazards. They noted, however, that the Emergency level should not draw attention away from an existing hazard at a

lower level. They also suggested that the timing and scope of an event should be considered for issuing Emergency. A few participants felt Emergency should be determined at a local level by EMs. Forecasters noted that if the product is introduced, it should be accompanied by training, so forecasters understand how to use it. Some media participants also said while Emergency might help communicate the gravity of an Emergency event, it is equally important to communicate the impacts along with the term.

Pros

- Emergency could be useful for public awareness and to heighten the need to act.
- Emergency could help distinguish the rare, high impact event.

Cons

- A weather-related Emergency could be conflated with a State of Emergency (non-weather related).
- Some suggested that by the time a weather event rises to an Emergency level, it is too late to warn people (others disagreed).
- Adding another term/level could cause more confusion and create the need for more internal training.
- Emergency could get over-used and desensitize the public and partners.

Special Insights by Location

Some of the insights gathered through the focus groups and other engagements were particular to the geographic location. These are captured in the discussion below.

Anchorage, Alaska

There was a general concern about the NWS making decisions based on a national average level that might not work in Alaska, given the state's broad and varying geographic area, large marine constituent, and Native/Tribal populations. There was acknowledgment that Alaskans are well-versed in the current system. Other noteworthy information included:

- There was a good deal of support for replacing Watch with Notice since Watch is used sparingly in Alaska (and not at all in the marine product suite), so a switch to Notice wouldn't be a great impact. However, mariners pointed out they get notices from the Coast Guard, and Tribal populations mentioned notices have a legal connotation.
- SPS is used in place of HWO in Alaska for a lower confidence Watch or prelude to a potential Watch.
- Option 1 colors could be confusing since regional websites currently display yellow for Advisories and Watches as orange. NWS flooding products also use a color system for minor, moderate, and major flooding.

Louisville, Kentucky

Some participants in Louisville commented that their populations include individuals in remote rural locations who depend on radio for weather forecasts, so having text as part of the warning system is important. They also stated that there are significant numbers of individuals in some counties who cannot read or write, as well as "educated people who are not educated in meteorology." For this reason, EMs cautioned against a system where people have to learn something new and suggested that change will only be successful if the NWS makes the system easier (not harder) to understand.

Wakefield/Norfolk, Virginia

The Wakefield/Norfolk area is prone to flooding from many sources—flash flooding, river and stream flooding, and coastal flooding. Despite the recurrence of flooding issues in the area, participants said that many partners and members of the public are not familiar or are confused by the WWA hydrology products. One EM, who has been serving the area as the floodplain manager for six years, realized he had Advisory and Watch mixed up.

There is a large Coast Guard and Navy presence in this area, as well as many recreational boaters, so the marine product suite is also of critical importance. Groups voiced concerns about introducing a new color system, stating that it could be confused with the colors and tiers already used in hydrology for minor, moderate, major flooding levels. For example, there would be a disconnect if a red warning was issued for a flood since the major flood level is currently depicted as purple.

The mariners group also expressed a strong preference for the current system, voicing concern about the retraining that would be needed for people who “use and understand the system every day.” They also advocated for retaining Small Craft Advisory since the community heavily relies on this product to make operational and emergency response decisions. About half of the EMs agreed with mariners about improving the current system instead of transitioning to a new one. Given the potential confusion with introducing a new color scheme, they said using impact-based warnings and consolidating flood products would be sufficient changes to improve the current system. They recommended investing efforts toward education instead.

Miami, Florida

There was a good deal of support for maintaining the current system given the population’s understanding and familiarity with tropical WWA headlines. Hurricane Watches and Warnings are not only well understood, they are also codified into operational decision-making. Participants in these groups noted that Watch is used differently in the Tropical program than in other parts of the NWS. In the Tropical program, Watch is currently serving as a pre-warning.

The FEMA Hurricane Liaison Team also did not favor replacing Watch with Notice. It advocated for earlier Watch/Warning issuance times and liked the Emergency level.

There were temporal concerns with using the word Notice instead of Watch, in that people may have been tracking (and therefore “noticing”) a hurricane for days; and as such, an official Notice may not have the intended effect or could even increase attention prematurely. Additionally, the NHC track forecast cone (cone of uncertainty) already serves as a defacto Watch. Groups also discussed the current lead times for Hurricane Watches and Warnings, with many noting they would like to see another 12 hours added, which would give people more time to prepare. In addition to the concerns around Watch, participants also noted that there is no WWA Advisory headline in the tropical program, but the term Advisory is used in a different way (i.e., Public Advisories are issued that can include multiple Watches and Warnings).

Norman, Oklahoma

Given its location in “Tornado Alley,” participants were generally less receptive to changing the current system for convective weather than they were for winter weather products (the two hazards groups examined in the scenarios). There was concern that a change from Tornado Watch to Tornado Notice

could be interpreted as “just a piece of information,” or as “something way out there that could become hazardous.” Also, red is currently associated with tornadoes in this area of the country; thus, a switch to Red Warning for all hazards could cause confusion. Some felt that the potential harm caused by changing the system for tornadoes and severe thunderstorms would outweigh any good achieved by changing the system for other hazards. There was considerable discussion that a one-size-fits-all system might not be feasible or advisable. There was general acknowledgment that Advisory is not well understood; however, many supported maintaining the Advisory level (if not the word). Some liked using Notice as a replacement for Advisory.

Special Insights by Partner Group

Some of the insights gathered through the focus groups and other engagements were particular to different partner groups. These are captured in the discussion below.

Federal Agency Briefings

While no major red flags were found during the federal agency briefings, some relevant issues were raised. The main concerns were conflicting color schemes among the agencies, use of the term Emergency in other contexts, and potential loss of service if the Advisory headline was eliminated (per Option 2).

Mariners (Anchorage, Miami, Wakefield, Remote Webinar)

All 17 Wakefield mariners unanimously voted to keep the current system. The marine communities in Florida and Alaska were also in favor of maintaining the current system. In Alaska, mariners pointed out that they make life and death decisions every day. Other reservations about changing the current system included:

- **International consistency.** There were concerns about the need for international consistency in terminology and the need to re-educate international users if the NWS were to change terminology. They noted that in some sectors of the maritime industry, most of the crew on a ship are non-Americans with few English speakers on board so new terminology could cause potential translation issues.² There also were concerns that mariners traversing from U.S./Canada (or other international waters) would be confused by any terminology change.
- **Existing use of Notice.** Mariners currently receive a “notice to mariners” from the Coast Guard so introducing Notice as part of the WWA system could be confusing.
- **Potential dissemination issues with radio transmission.** From a marine perspective, any additional wording in the warning system could be difficult because mariners rely heavily on radio communication and are accustomed to hearing specific words (e.g., Gale, Storm). They also suggested that with Option 1, when they are at sea, they may only hear the words orange or red and miss the Warning part altogether.

Instead of reinventing the wheel, we should be teaching people how to use the wheel. The marine/maritime who rely and use the WWA products everyday would have to be retrained. Why change and retrain the marine and other professionals who actual know and use the products when you already have to train the public.

Wakefield Mariner (2019 Focus Group)

² As a side note, mariners expressed it would be useful to have NWS information in metrics since this is the system the marine community uses, and there also are many international workers in the community.

- **Small Craft Advisory.** Participants across all the groups debated the merits of both the Small Craft language as well as the Advisory language in the product. Many felt that Small Craft is an ambiguous or “cop-speak” phrase (and can refer to fairly large vessels), but they were divided on whether or not to replace it. In Miami, some mariners suggested using a Boating Public Advisory. In Wakefield and Anchorage, mariners were in general agreement that maintaining the Small Craft portion of the product was more essential than maintaining the Advisory term.
- **Colors.** While there was strong support for the current system, some were interested in the use of colors, particularly for transient populations (tourists, recreational boaters, small commercial crafts/boats), with participants stating that it is important to distinguish between recreational boaters and seasoned mariners since they have different needs and levels of understanding. Some suggested posting colored flags at marinas to warn recreational boaters about hazardous weather conditions similar to the color-coded flags displayed for beach conditions.

Broadcaster Meteorologists (Anchorage, Miami, Norman, Sterling, Wakefield, and Two Remote Webinars)

BMs coalesced around several issues:

- **Colors.** None of the BMs supported using colors as actual terms in the headline, though some endorsed colors for visual communication. Some thought that since many stations already have their own branded colors, moving to a set of standard colors could improve national consistency.
- **Impact-based messaging.** There was a recurring theme among the BMs to have a more event-driven, impact-driven headline message.
- **Re-education.** Many felt that changing WWA levels or terms or introducing colors would require a good deal of explanation and re-education. This could be problematic, as they have a limited amount of time on air to do weather, and they don’t want to have time to explain everything. Some also noted that their station may have its own terminology, such as Weather Alert Day or Weather Aware.
- **Advisory.** The groups tended to agree that they need the Advisory level, though they noted that the actual term can be confusing and that the different products can “get lost in the shuffle,” or be misunderstood by the public. Among all of the groups, there was some support for using Notice as a replacement for Advisory (rather than as a replacement for Watch) and/or encompassing both the Watch and Advisory levels under Notice.
- **Emergency.** There was support across all groups for the use of Emergency for rare, life-threatening situations.

Spanish-Speaking Media Markets

The Spanish speakers’ group noted an inconsistent use of terms and messaging in some media markets. In addition to the WWA words (Watch = Vigilancia; Warning = Aviso; and Advisory = Advertencia), the word Alerta is used frequently. Some media use Alerta when hazardous weather is threatening. Some also say, “Today is a special day, a storm alert day.” The group noted that similar to the Wa-Wa issue with Watch and Warning, Advertencia and Aviso both begin with A.

Others noted they have seen all three A words (Alerta, Aviso, Advertencia) used interchangeably and suggested there is an opportunity with the Hazard Simplification project for education and outreach.

Emergency Managers (Anchorage, Louisville, Miami, Norman, Wakefield)

Across all the groups, many EMs stated they are comfortable with the current system. However, only the two Norman groups were both in consensus for maintaining the current system. Key takeaways include:

- **Notice and Emergency.** Many EMs liked Notice as a replacement for Watch and endorsed the rarely used Emergency level.
- **Advisory.** All groups endorsed retaining the Advisory level, which they use internally to organize resources and people. In Wakefield, Advisory also triggers certain timelines and preparatory actions. Even then, a number of Wakefield EMs said that the level was more important than the products or term. Many EMs in Miami, Norman, and Louisville, in contrast, said they work on a prepare or act framework. They only pay close attention to the Watch and Warning levels. One Miami EM said, “We don’t notify on the ‘good to know’ stuff. It loses value.”
- **Policy changes.** Many EMs across different locations said that changing terminology wouldn’t pose a significant hurdle; it would just require changes to policies and manuals.
- **Education.** All EMs did worry that changing the current system would require a good deal of public education and messaging. Alaskan EMs said that removing Tsunami Advisory would not only require education among all Alaskans and people living on the coasts but would have international implications as well. (Even so, most preferred Tsunami Warning to Tsunami Advisory due to life-threatening nature of the hazard.) Some EMs also stated that they “don’t want to be NWS’s translator to the public.” Along these lines, they want to be able to cut and paste NWS messaging into their own platforms, stating they need headline information in a format whereby “we can push a button and send it out.”

When you send me a Watch, orange, garanimal, then I need to do something... It’s all semantics to us.

Miami emergency manager (2019 Focus Group)

Forecasters (Anchorage, Louisville, Miami, Norman, Wakefield)

Overall these groups seemed split on their choices of options. Key takeaways were:

- **Colors.** Looking across different partner groups, there was somewhat more support for colors in the forecaster groups than other partner groups. Some forecasters recognized the value of color for IDSS, graphics, and collaboration. One forecaster also observed that it may be easier to “agree on a color than a headline” with other WFOs. Colors may even help to dispel the notion that Advisory is a downgrade. If colors were to be used, there was a desire to have a color at every level and consider a stoplight approach. There were also suggestions to connect colors to impacts and confidence and have a matrix behind the scenes similar perhaps to the European Meteoalarm system.
- **Flexibility.** A number of forecasters (as well as a few BMs) were open to the idea of a hybrid system, whereby different words could be used for different hazards.
- **Notice.** There was varying support for Notice. Norman and Miami did not want Notice to replace Watch, which they felt was institutionalized in their areas for tornadoes and hurricanes, respectively. Wakefield was fine with changing Watch to Notice, while in Alaska, Watch is rarely used so it could be easily be replaced by Notice and extended into the Advisory level, eliminating Advisory.

- **Advisory.** Most forecasters outside of the National Hurricane Center (NHC) and Alaska said they needed the Advisory level and debated ways Advisory could be folded into the prototype tiers. Some NHC forecasters said they understood the issues with Advisory, but that they don't have a problem in the Tropical program, noting that "the Tropical Storm Warning is a 'Hurricane Advisory'."
- **Emergency.** There was general support for Emergency among forecasters, though there were concerns it could be overused and lose its impact; this was particularly true in Alaska. In Miami, there was more support for Emergency among WFO forecasters than NHC forecasters since they are warning for more hazards than hurricanes. NHC forecasters observed that because hurricanes are such long-fused events with days of warnings being conveyed, Emergency might not be needed, though there was some support for an Extreme Wind Emergency as the eyewall makes landfall. Norman forecasters observed that warning creep has been happening for 20 years. As a result, Warnings are issued for lower and lower criteria so Emergency could be used to communicate the severe events that Warnings were previously reserved for. Many agreed that if Emergency were to be expanded, the NWS would need to develop policy and thresholds and provide forecaster training.

National Tsunami Hazard Mitigation Program

The [National Tsunami Hazard Mitigation Program \(NTHMP\)](#) is a partnership of NOAA, FEMA, the U.S. Geological Survey, and 28 states and territories that works to reduce the impact of tsunamis on the nation through hazard assessment, warning guidance, and mitigation actions. Most participants were interested in further discussing possible changes to the system and finding ways to improve, but were not ready to move away from the present system. They had some positive reactions toward Notice, but were concerned with moving away from Watch. Like Miami, they noted that the term is institutionalized and changing it would have international implications. There were positive comments around use of Emergency in some situations, but also concerns that it may cause more confusion. Two areas where they expressed a need for improvement were 1) the format of the product text and 2) the distinction between an Information Statement and a Tsunami Watch.

Partners Meeting (Washington, DC)

This group of BMs, technology developers, emergency management representatives, and others liked the idea of color as a display option, but not for as actual warning levels. Some participants expressed that people get weather information on their phones and color is embedded in that technology. One person suggested that the NWS needs to connect new terminology to the fast-approaching ability to depict threats visually through spatial mapping and be able to deal with the uncertainty around these spatial products. Some suggested that the NWS do away with headlines altogether and simply provide an explanation of what is going on, along with more impact-based communication. Others suggested using Alert as an umbrella term and letting customers choose their own level of alerting. Others liked the terms Risk or Threat.

Transportation Officials (Virginia/Maryland/District of Columbia)

While some focus groups included transportation officials, school officials, and/or public works officials, a focus group was also conducted with the [Metropolitan Area Transportation Operations Coordination \(MATOC\)](#), which is a partnership of transportation agencies in Maryland, Virginia, and the District of Columbia that works to improve safety and mobility in the region. Key takeaways from the MATOC group include:

- **New terms.** Changing WWA terms would not present a problem, as transportation officials are looking deeper at forecast information and graphics. One individual also observed that when

they push information out to their leadership, they change the terminology anyway and don't use NWS terms. Even so, they did not express a strong desire to change the current system.

- **Advisory.** The group agreed that some information was needed at the Advisory level, but not necessarily the word or products.
- **Emergency.** They felt Emergency is useful for public messaging as it puts everyone on higher alert level. The group also mentioned concerns with confusion between an NWS Emergency and a governor-declared State of Emergency.
- **Option 2 preference.** There was some support for Option 2, using the terms Notice, Alert, Warning, Emergency. They also did not feel a downgrade product like Advisory is needed after a Warning is issued. The removal of Warning would be enough of a trigger.

Prototype Variations

Across all the focus groups, colors were not well received as actual warning language, though many endorsed the use of color as a display option to enhance warning messaging. There was legitimate support both for and against Notice and support for Emergency used for the rare event. There also was consensus for maintain the Advisory level, though not necessarily the term.

Option 2 was better received than Option 1, but participants also offered a number of ideas for enhancing or adjusting Option 2. Based on these discussions, three variations of Option 2 emerged for further testing (see Figure 4). The variations differ in the way they handle the Watch and Advisory levels, but all have the Warning and Emergency levels.

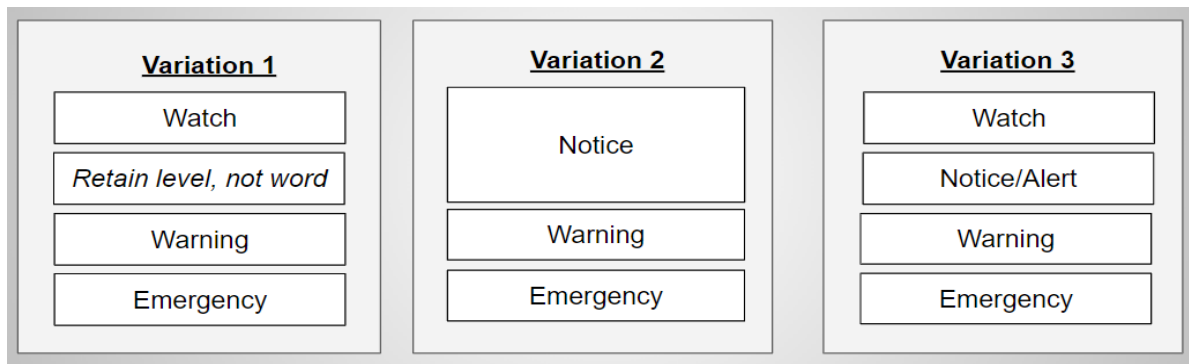


Figure 4. Prototype Variations that Emerged from the Engagement Activities

Variation 1 retains Watch, removes the Advisory headline but maintains the level, retains Warning, and adds an additional Emergency level to be used sparingly for an extreme event. Advisory-level information could be conveyed in the forecast, an SPS, or through IDSS. The suggestion to replace Advisory with an SPS came up independently without prompting in several groups across different partner types and locations. One Miami BM said, “An SPS works because if Advisory is the hang-up word, then the SPS simply provides information on the hazard.”

Variation 2 replaces Watch and Advisory with Notice, retains Warning, and adds Emergency. With this variation, there are a number of ways to handle current Advisories, such as:

- Wrap Watch and Advisory levels under Notice; maintain Warning as is.

- Include Watch under Notice, move all current Advisories (including sub-events) into Warning, and reserve Emergency for impactful events. There were concerns that Warning could be used too much with this option.

Participants also were concerned that with this variation, a Notice could be used a lot of the time, inspiring comments like, “there is another Notice issued again for our area.” Some also wondered how easily this variation would work for multiple events.

Variation 3 retains Watch, changes Advisory to Notice or Alert, retains Warning, and adds Emergency. Many participants across different partner groups and locations suggested that Notice would be a better replacement for Advisory than Watch. Participants in a number of the groups also suggested the term Alert be used at the Advisory level. Alert performed well in the generalizable public survey, and it is a term already in use in some weather situations. For example, one participant said the Coast Guard uses the term, and some of the Spanish-speaking media currently use the term Alerta (which is generic and used with many hazards).

Other Themes

The focus group findings largely mirror other feedback about the WWA system gathered from the prior social science engagements. General themes include:

- **A desire for consolidation and simplification of NWS products.** Focus group participants endorsed the NWS consolidating products and using local impact-based warnings. In Wakefield, one EM said, “We can just stop there and leave the system alone.”
- **A need for flexible consistency.** Some questioned whether a “one size fits all” system can work, or whether there could be room for a hybrid system whereby different terms are used for different hazards. This reflection was particularly relevant in Miami and Norman, where participants observed that Watch and Warning are well understood terms for hurricanes and tornadoes, respectively, whereas a term like Notice might work better than Watch for winter weather or other hazards.

- **A recognition that the warning system serves multiple audiences.** Many participants understand that the WWA products are issued to get the public to react, but that actual users are BMs, EMs, and other partners in various sectors, including schools, transportation, public works, the marine community, the military, and other sectors. Even among these groups, there are varying levels of sophistication and understanding. In

Are people not paying attention because the WWA system is broken or because the dissemination channels and sources they are receiving the WWA products through are broken?

Wakefield emergency manager (2019 Focus Group)

trying to make the system better for a public audience, the NWS could actually be doing a disservice to some of its sophisticated users who understand and use the system every day, including members of the media and the marine community. Some supported flexible consistency in the WWA system as a whole, with one person noting, “It is reasonable to use a

different word for hazards that pose serious risks.” However, there were also concerns that “letting people be creative” will end up in too many products again.

- **A concern over the international reach of the system.** Participants worried that red/orange colors may not resonate the same way in other countries. Also, introducing a new term (i.e., Notice) for Watch could create problems for the Tropical, Marine, and Tsunami programs and introduce inconsistency.
- **A concern that language changes won’t engender better audience understanding.** Some felt that a language change wouldn’t solve fundamental problems with the system. In Norman, some noted “We need to ask (and answer) why there is greater understanding for Tornado Watch and Warning when compared to other product suites.” There also was a fear that once the public becomes calibrated to any changes, then the current issues surrounding the use of WWA products could rematerialize or be worse if misunderstanding of terms exists from the beginning. One forecaster suggested that the NWS was trying to solve the problem on the “wrong” side by using a product name (noun) to define a greater or lesser hazard. This individual suggested a modifier would be more appropriate (e.g., *High* Wind Warning vs. Wind Warning).
- **A desire for more impact-based, event-driven language.** Across all groups, there was a desire to see more impact-based language. Some participants observed that when people don’t take action, it may have nothing to do with the words that the NWS uses, but because of many other factors, including what people see on social media, what their prior experience is, and what their families and friends are doing. Nevertheless, the NWS is the only entity in the nation that officially issues warnings, and the words used by the NWS are authoritative. Participants suggested that the NWS focus on improving its calls to action, and providing clear explanations of potential impacts.

[We need to] look under the hood. Keep the paint, but change the engine. Go to impact wording and tighten up the call to action.

NHC forecaster (2019 Focus Group)
- **A recognition of the need for education and training.** There was a strong consensus that if the NWS makes any changes to the present system, it will require time, training, and outreach to ensure success. Many believed that even if the NWS makes no changes to the current system, it still warrants more public education. While EMs were among the most adaptable group, they also pointed out that they struggle now to get hazardous weather classes and worried about the level of training that would be needed if there were a terminology change in the WWA system.

We are teaching kids nothing about weather. Call it [Advisory] anything you want, but build it into the curriculum. Education is the key to everything we are talking about.

Miami broadcaster (2019 Focus Group)

- **A need to consider information delivery and visualization.** Information delivery is a very important component of any option: a visual depiction of the threat might be more easily understood than words alone, particularly given that cellphones and other handhelds are becoming a key means for alerting an increasing proportion of the U.S. population. Across many groups, there were suggestions to consider ways to more effectively visualize hazardous weather, including on the NWS national map. Some suggested it may be useful to have different maps for different hazards, such as the way individual hurricane hazards (storm surge, wind, tornadoes, rainfall) are depicted in the WFO Hurricane Threat and Impact (HTI) products.

V. RECOMMENDED NEXT STEPS

The findings from the extensive 2018-2019 partner engagement reinforces much of the prior social science results. Collectively, this research points toward eliminating the Advisory term and products, but not the level, and maintaining Watch and Warning. There were mixed reactions to the Notice as a replacement for Watch, as well as observations that Watch is so well institutionalized for some hazards, such as hurricanes and tornadoes, that it would be risky to change it even if Notice has merits. The research also supports using the Emergency level sparingly for certain hazards to indicate a rare, high-impact event.

Given that Option 2 was favored over Option 1 in the focus groups, a final prototype needs to be selected among the three Option 2 variations presented, and a workshop held to define technical and policy requirements associated with the selected prototype. As a first step in this process, representatives from the NWS met at a Hazard Simplification Project summit in March of 2019 to recommend a prototype for further testing based on the social science research conducted to date and their own perspectives and experience (see text box for more detail).

The summit participants agreed to consider testing Variation 1, which uses the current SPS in place of Advisories. The group suggested the new product would be disseminated with a descriptive message, rather than the title of “SPS.” This would allow for a flexible, continual stream of information below the Warning level. While most Advisories would become an SPS, the group also suggested that some could be “upgraded” to Warnings on a case-by-case basis.

Hazard Simplification Project Summit

In March of 2019, representatives from the NWS Analyze, Forecast, and Support (AFS) Office, Regions, Field Offices, National Centers, and Service Delivery Portfolios met to discuss project updates, including generalizable public survey results and preliminary focus group results. The group recommended the following:

- Maintain Watch. While Notice has merits worthy of consideration, its benefits did not ultimately outweigh the potential costs of losing an ingrained and institutionalized term.
- Maintain the Advisory level but not necessarily the term.
- Let each Service Program Team decide how to use the Emergency term.

Workshop Topics

Given this recommendation and feedback from the focus groups, possible topics for the workshop (scheduled for September of 2019) include:

Policy

- Without Advisories, how do we effectively message for this level of hazard?
- What are the meteorological criteria (and/or impact-based criteria) used for the new descriptive message?
- What happens to the current Advisories—do some become warnings rather than SPS-level information? What about unique advisories, like Tsunami Advisory and Small Craft Advisory, especially given some of the strong feedback provided by participants?
- How should the SPS be used—is the name retained, should its format change, how is it disseminated?
- How should Emergency be used—for which hazards and what is the policy and criteria for issuing an Emergency?
- How should complex, multi-hazard events be handled in the new system? What about long-duration events?
- Where do HWO and SPS fit into the new system? (e.g. will their format or policy change)? (Note difference in use of SPS/HWO in Alaska versus the lower 48 states.)
- How can we better incorporate impacts and desired actions in the system?

Dissemination

- What considerations around display components of the new system? Should color be associated with the headlines? What will the national map look like?
- What are the implications for NWS dissemination methods (e.g., Early Alert System (EAS) and the Wireless Emergency Alert (WEA), NOAA Weather Radio)?
- How should the Common Alerting Protocol (CAP) be utilized in a new system?

Internal Organizational Considerations

- How can the new system improve consistency and collaboration between WFOs and between WFOs and National Centers?
- What kind of forecaster training will be needed (not only technical but behavioral as some forecasters could be resistant to change)? How will it be conducted?

Technical Considerations

- What will the implementation timeline look like? Who needs to be involved? What needs to be done?
- How will the new system incorporate or utilize current machine-readable protocols?
- How will the system link to Hazard Services timetables and capabilities?

External Training and Public Education

- Who will be impacted, and what are their needs?
- What sort of stakeholder training will be needed? Who will provide it? How will the NWS be involved?
- What sort of public education will be needed, and who needs to be engaged in this effort?

VI. FINAL DISCUSSION AND RECOMMENDATION

The partner and forecaster engagement provided an opportunity for the NWS to take the results of the generalizable survey and socialize potential prototypes before committing to a possible alternative. This feedback proved invaluable. As recognized by many participants, the NWS WWA system serves a multitude of audiences, from members of the public to sophisticated partners, some of whom make life and death decisions every day. For this reason, any change to the current system must be completely defensible. The NWS has long recognized that while there are weaknesses with the current system, any change must be thoroughly and deliberately tested, not only with partners across different geographies, but also across the various systems used to disseminate the information.

As a next step in the project, it is recommended that the NWS further test Variation 1, which retains the Advisory level information but not the Advisory term or products. This option arose as a possible solution independently across several different partner groups and geographies. The attendees of the Hazard Simplification Summit have also endorsed this option. While it is not a solution to all of perceived shortcomings of the current system (e.g., inflexible criteria, a lack of impact-based messaging, internal coordination issues, etc.), it does address a key problem flagged in all of the social science research conducted to date.

Beyond the workshop, the final, recommended prototype should be tested in a simulated operational setting (e.g., Testbed) with partners and end users, including members of the public. This testing will provide an opportunity to assess how EMs, the media, and other partners message Advisory-level risk information without an Advisory product—and how recipients of this messaging respond. The testbed results could be used to formulate best practices and training for partners. Testing will be particularly important for certain Advisories, such as Heat Advisory and Small Craft Advisory, where there may be specialized populations or users (e.g., the elderly and recreational boaters respectively) who are accustomed to these products, and where any mishaps in messaging could have potentially deadly consequences.

VII. APPENDIX A. BASIC FOCUS GROUP SCRIPT AND SLIDES

Focus Group Guide

Part 1: Introduction and reflection of the current system (10 minutes)

Introduction of NWS and WWA system by Eli. Before we dive in, we want to remind you that you're king of NWS for the day - So think outside of the box and let us know your thoughts!

Icebreaker (2 minutes): Now we'd like everyone to take a moment and write down one strength and one weakness of the current WWA system based on your experience. You'll be using these as we go around the room and introduce ourselves in a moment.

Ok, now I'd like to do some introductions (**5 minutes**) - please let us know your name, affiliation, and the strength and weakness you wrote down. In the interest of time, let's try to keep it about 30 seconds a person. I'll capture your thoughts on slide up on the screen.

Part 2: Reflection of the current system (10 minutes)

Thank you everyone and we're excited to hear from you over the next couple hours. Now we're going to take some time to introduce the Haz Simp project and some of the work we've done up to this point.

Part 3: Generalizable Surveys and prototype options (5 minutes)

Ok, now we'd like to shift gears a bit. In order to explore large scale change to the WWA system, we conducted a series of social science surveys with the general public. This series of surveys was meant to scientifically understand what language resonates with the general public.

Part 4: Prototype Option 1 (color) (40 mins)

4a. Review prototype examples (10 mins)

Let's focus in on Option 1 first. We've created a fictitious scenario to show this concept in action. So let's step through the slides together.

4b. Focus Group Questions - Option 1 (30 mins)

FORECASTER QUESTIONS

- 1. So to start us off, how would a change to these new WWA headlines facilitate or hamper the way you issue products and produce your forecast?**
 - a. Local flexibility
 - b. Time management and efficiency
 - c. Ability to effectively upgrade and downgrade
 - d. Use and issuance of other (non-WWA) NOAA products and services
- 2. How could this prototype facilitate or hamper your communication with partners?**
 - a. Current IDSS you offer
 - b. Ability to provide clear information to partners
- 3. How could this prototype facilitate or hamper your internal collaborations?**
 - a. Collaboration within your office
 - b. Collaboration with neighboring WFOs

- c. Collaboration with national centers

PARTNER QUESTIONS

1. **So to start us off, how would a change to these new WWA headlines facilitate or hamper your overall understanding of the weather event?**
 - a. Understanding of the event timing, severity, uncertainty
 - b. Understanding of what the impacts will be
 - c. Integration with current NWS decision support services (NWS chat, briefings, graphics, etc.)
 - d. Integration with other sources of weather information (other than NWS)

2. **How could this prototype facilitate or hamper your operations and decision-making process during a weather event?**
 - a. Ability to make quick decisions
 - b. Ability to make good, well-informed decisions
 - c. Ability to communicate actionable weather information to your public, local officials, partners, etc.

GENERAL QUESTION TO ALL FOCUS GROUPS

1. **Would you make adjustments or improvements would you make to this prototype or how it's implemented?**
 - a. Would you make adjustments to how headlines appear or how they're used in this new system?
 - b. How to handle multi-hazard, complex events?
 - c. Use of graphics and visuals?
 - d. How to convey forecast confidence?
 - e. How it's read or conveyed over the radio or TV?
 - f. How to convey confidence?

****Break - 10 mins****

Part 5: Prototype Option 2 (No Advisory) (40 mins)

5a. Review prototype examples (10 mins)

Now we'd like to explore Option 2 in more depth. We've used the same marine scenario as before but applied the Option 2 concept. So let's step through the slides together again.

5b. Focus group questions (30 mins)

FORECASTER QUESTIONS

- 1. So to start us off, how would a change to these new WWA headlines facilitate or hamper the way you issue products and produce your forecast?**
 - a. Local flexibility
 - b. Time management and efficiency
 - c. Ability to effectively upgrade and downgrade
 - d. Use and issuance of other (non-WWA) NOAA products and services
- 2. How could this prototype facilitate or hamper your communication with partners?**
 - a. Current IDSS you offer
 - b. Ability to provide clear information to partners
- 3. How could this prototype facilitate or hamper your internal collaborations?**
 - a. Collaboration within your office
 - b. Collaboration with neighboring WFOs
 - c. Collaboration with national centers

PARTNER QUESTIONS

- 1. So to start us off, how would a change to these new WWA headlines facilitate or hamper your overall understanding of the weather event?**
 - a. Understanding of the event timing, severity, uncertainty
 - b. Understanding of what the impacts will be
 - c. Integration with current NWS decision support services (NWS chat, briefings, graphics, etc.)
 - d. Integration with other sources of weather information (other than NWS)
- 2. How could this prototype facilitate or hamper your operations and decision-making process during a weather event?**
 - a. Ability to make quick decisions
 - b. Ability to make good, well-informed decisions
 - c. Ability to communicate actionable weather information to your public, local officials, partners, etc.

GENERAL QUESTION TO ALL FOCUS GROUPS

- 1. Would you make adjustments or improvements would you make to this prototype or how it's implemented?**
 - a. Would you make adjustments to how headlines appear or how they're used in this new system?
 - b. How to handle multi-hazard, complex events?
 - c. Use of graphics and visuals?
 - d. How to convey forecast confidence?
 - e. How it's read or conveyed over the radio or TV?
 - f. How to convey confidence?

Part 6: Final Discussion (15 mins)

2. **After reviewing both prototypes, what is your gut reaction? Would you prefer to keep the current system, move to Option 1, or move to Option 2?**
 - a. Would you make adjustments to the system you chose?

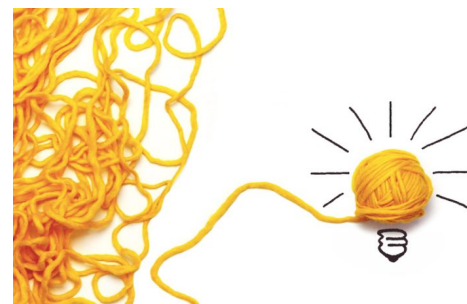
3. **Do you have any other concerns with transitioning to a new system that we haven't already talked about? In other words, what do we absolutely need to address/think about to make sure a transition is successful?**
 - a. Technical concerns?
 - b. Education of forecasters?
 - c. Education of partners/public?
 - d. Software, effects on warning decisions, visuals, perception of false alarms, color blindness, verification, etc.?

Thank you for your time!



Hazard Simplification

Focus Group



Eli Jacks, Chief, Forecast Services Division
Danielle Nagele, Project Manager
Analyze, Forecast and Support Office



The NWS Watch, Warning, Advisory (WWA) System

Headline Term Definitions

Watch

We **FORECAST THE POTENTIAL** for a significant hazard. Timing and/or occurrence is still uncertain.

Warning

We **WARN FOR A DANGEROUS** hazard that is imminent or occurring. Significant threat to life and/or property.

Advisory

We **ADVISE CAUTION** for less serious hazards that are also imminent or occurring - but could pose a threat to life and/or property if caution is not exercised.

WWA Strengths and Weaknesses - Tell us what you think

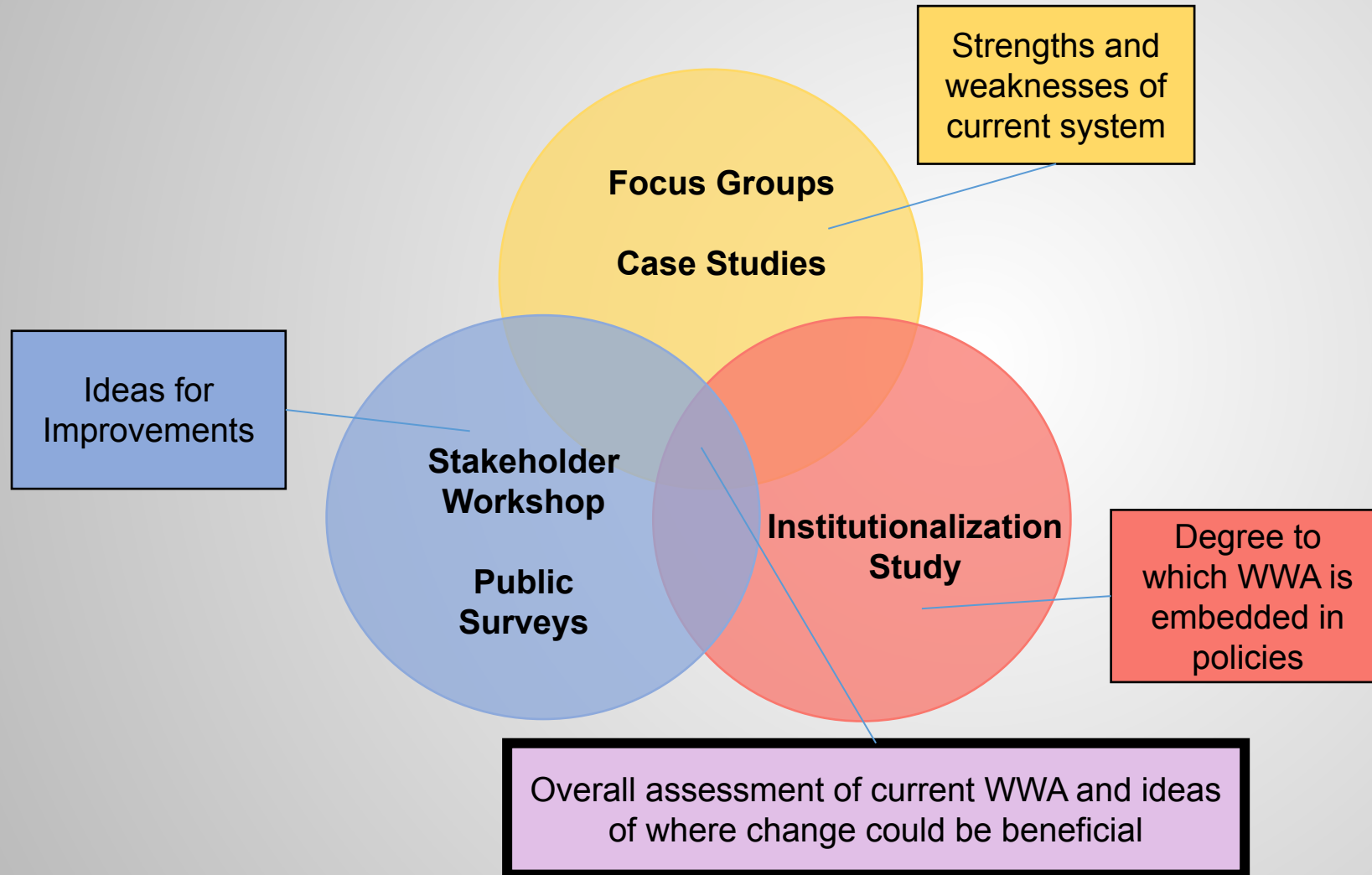
Strengths

-

Weaknesses

-

Social Science Research and Engagement



Repair: Consolidation

Flood - Round 1

Current Products

Urban and Small Stream Advisory
Small Stream Flood Advisory
Arroyo and Small Stream Advisory
Flood Advisory
Hydrologic Advisory

Flood Watch
Flash Flood Watch

Consolidated Products

Consolidated to →

Flood Advisory

Consolidated to →

Flood Watch

Simplify Product Text

“What, Where, When, Impacts” (3W)

...SMALL CRAFT ADVISORY IN EFFECT FROM 6 PM THIS EVENING TO 3 AM
PDT THURSDAY...

- * **WHAT**...Sustained winds or frequent gusts will be 15 to 25 knots.
- * **WHERE**...Northern inland waters including the San Juan Islands
- * **WHEN**...6 pm Wednesday to 3 pm Thursday
- * **IMPACTS**...Wind and wave conditions are hazardous to small craft.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Inexperienced mariners, especially those operating smaller vessels, should avoid navigating in hazardous conditions.

Generalizable Public Surveys

Public Understanding and Response

What: Series of surveys using a representative sample of the general public.

Why: Address two major questions...

1. Does the public understand current headlines (Watch, Warning, Advisory)?
2. How does the public respond to alternative headlines?

Question 1 Results (winter example):

<u>Winter</u> Term Used in Question	Response Options		
	A storm is possible, and may pose a threat to life and/or property	A storm is certain, and may pose a threat to life and/or property	A storm is certain, but does not pose a direct threat to life and/or property
Winter Storm Warning	43.9%	43.1%	13.0%
Winter Weather Advisory	60.6%	24.9%	14.5%
Winter Storm Watch	70.6%	18.6%	10.8%

Possible End-State Options

Based on Previous Engagement and Survey Results

Current System

Watch

Advisory

Warning

Emergency*

Option 1

Color Hierarchy

Notice

Orange Warning

Red Warning

Emergency

Option 2

Remove Advisory level

Notice

Let's Discuss!

Warning

Emergency

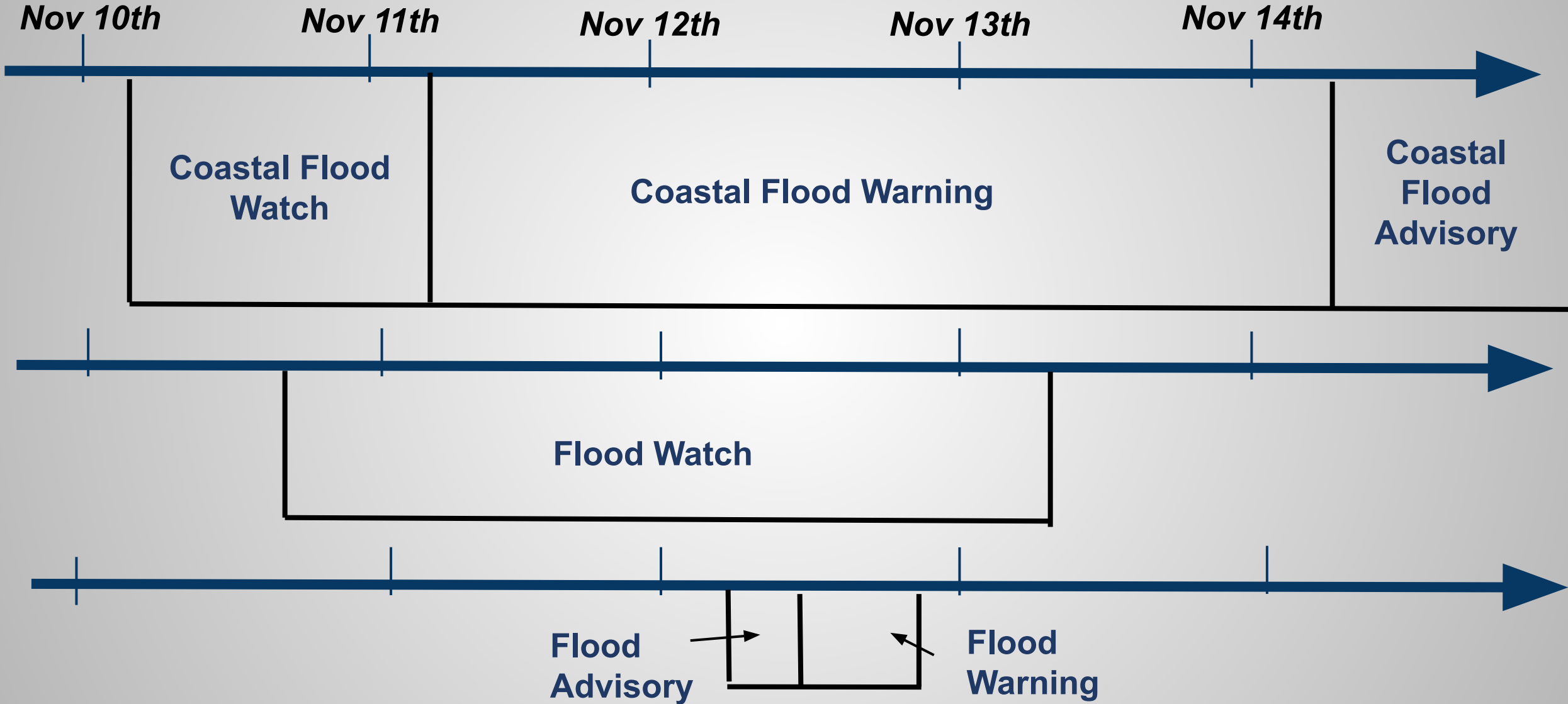
*Tornado and Flash Flood only

Option 1 Application

**Based on VA Beach 2009
Nor'easter (Nor'Ida)**

Timeline

Current System



Option 1

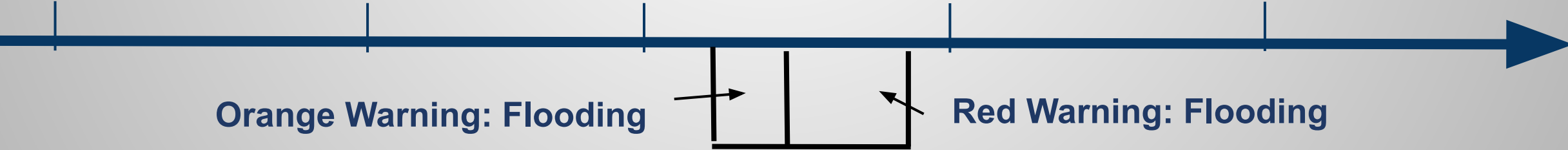
Nov 10th

Nov 11th

Nov 12th

Nov 13th

Nov 14th



Current: Coastal Flood Watch

408 AM EST TUE NOV 10 2009

...**COASTAL FLOOD WATCH** IN EFFECT FROM WEDNESDAY AFTERNOON THROUGH FRIDAY AFTERNOON...

* WHAT...Onshore winds...wave action and/or tides could combine to create flooding of areas along the shore...and near tidal rivers and creeks.

* WHERE...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

* WHEN...A few hours near high Wednesday afternoon through Thursday morning.

* IMPACTS...Widespread flooding of vulnerable areas will result in an elevated threat of property damage to homes and businesses near the waterfront and shoreline. Water will be 1 to 2 feet above ground level in some areas resulting in a sufficient depth to close numerous roads and threaten homes and businesses. Flooding will extend inland from the waterfront along tidal rivers and bays resulting in some road closures and flooding of vehicles.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of road closures and minor flooding of properties. If travel is necessary...do not attempt to drive through water of unknown depth.

Prototype: Coastal Flood Notice

408 AM EST TUE NOV 10 2009

...**COASTAL FLOOD NOTICE** IN EFFECT FROM WEDNESDAY AFTERNOON THROUGH FRIDAY AFTERNOON...

* WHAT...Onshore winds...wave action and/or tides could combine to create flooding of areas along the shore...and near tidal rivers and creeks.

* WHERE...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

* WHEN...A few hours near high Wednesday afternoon through Thursday morning.

* IMPACTS...Widespread flooding of vulnerable areas will result in an elevated threat of property damage to homes and businesses near the waterfront and shoreline. Water will be 1 to 2 feet above ground level in some areas resulting in a sufficient depth to close numerous roads and threaten homes and businesses. Flooding will extend inland from the waterfront along tidal rivers and bays resulting in some road closures and flooding of vehicles.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of road closures and minor flooding of properties. If travel is necessary...do not attempt to drive through water of unknown depth.

Current: Coastal Flood Warning

446 AM EST WED NOV 11 2009

...**COASTAL FLOOD WARNING** IN EFFECT FROM THIS AFTERNOON THROUGH FRIDAY..

* WHAT...Onshore winds...wave action and/or tides will combine to create flooding of areas along the shore...and near tidal rivers and creeks.

* WHERE...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

* WHEN...A few hours near high Wednesday afternoon through Thursday morning.

* IMPACTS...Widespread flooding of vulnerable areas will result in an elevated threat of property damage to homes and businesses near the waterfront and shoreline. Water will be 1 to 2 feet above ground level in some areas resulting in a sufficient depth to close numerous roads and threaten homes and businesses. Flooding will extend inland from the waterfront along tidal rivers and bays resulting in some road closures and flooding of vehicles.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of road closures and minor flooding of properties. If travel is necessary...do not attempt to drive through water of unknown depth.

Prototype: Red Warning: Coastal Flooding

446 AM EST WED NOV 11 2009

...**RED WARNING FOR COASTAL FLOOD** IN EFFECT FROM THIS AFTERNOON THROUGH FRIDAY..

* WHAT...Onshore winds...wave action and/or tides will combine to create flooding of areas along the shore...and near tidal rivers and creeks.

* WHERE...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

* WHEN...A few hours near high Wednesday afternoon through Thursday morning.

* IMPACTS...Widespread flooding of vulnerable areas will result in an elevated threat of property damage to homes and businesses near the waterfront and shoreline. Water will be 1 to 2 feet above ground level in some areas resulting in a sufficient depth to close numerous roads and threaten homes and businesses. Flooding will extend inland from the waterfront along tidal rivers and bays resulting in some road closures and flooding of vehicles.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of road closures and minor flooding of properties. If travel is necessary...do not attempt to drive through water of unknown depth.

Current: Coastal Flood Advisory

1000 AM EST SAT NOV 14 2009

...**COASTAL FLOOD ADVISORY** IN EFFECT FROM WEDNESDAY THROUGH NOON SUNDAY...

* **WHAT**...Onshore winds...wave action and/or tides will combine to create minor flooding of areas along the shore...and near tidal rivers and creeks.

* **WHERE**...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

* **WHEN**...A few hours near high Wednesday afternoon through Thursday morning.

* **IMPACTS**...Shallow flooding is expected in the most vulnerable locations near the waterfront and shoreline resulting in a low threat to life and property. Expect around one foot of inundation in low lying, vulnerable areas. Some roads and low lying property including parking lots, parks and lawns near the waterfront will experience shallow flooding.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of some road closures and minor flooding.

Prototype: Orange Warning: Coastal Flooding

1000 AM EST SAT NOV 14 2009

...**ORANGE WARNING FOR COASTAL FLOOD** IN EFFECT FROM WEDNESDAY THROUGH NOON SUNDAY...

* **WHAT**...Onshore winds...wave action and/or tides will combine to create minor flooding of areas along the shore...and near tidal rivers and creeks.

* **WHERE**...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

* **WHEN**...A few hours near high Wednesday afternoon through Thursday morning.

* **IMPACTS**...Shallow flooding is expected in the most vulnerable locations near the waterfront and shoreline resulting in a low threat to life and property. Expect around one foot of inundation in low lying, vulnerable areas. Some roads and low lying property including parking lots, parks and lawns near the waterfront will experience shallow flooding.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of some road closures and minor flooding.

Current: Flood Watch

336 PM EDT Tue Nov 10 2009

...**FLOOD WATCH** IS IN EFFECT FROM WEDNESDAY MORNING THROUGH THURSDAY AFTERNOON...

* **WHAT**...Periods of moderate to heavy rainfall could lead to flash flooding. Rainfall amounts of 4 to 6 inches are likely through 6pm Thursday...with locally higher amounts possible.

* **WHERE**...Portions of northeast North Carolina and southeast Virginia, including the following areas, in northeast North Carolina, Bertie, Camden, Chowan, Eastern Currituck, Gates, Hertford, Pasquotank, Perquimans, and Western Currituck. In southeast Virginia, Chesapeake, Norfolk/Portsmouth, Suffolk, and Virginia Beach.

* **WHEN**...From Wednesday morning through Thursday afternoon

* **IMPACTS**...The runoff from the heavy rainfall may result in rapid rises in streams and creeks, as well as ponding of water on roadways. This could quickly result in flooding, especially in low lying and poor drainage areas.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Flash flooding is a VERY DANGEROUS SITUATION. You should monitor later forecasts and be prepared to take action should flash flooding occur.

Prototype: Flood Notice

336 PM EDT Tue Nov 10 2009

...**FLOOD NOTICE** IS IN EFFECT FROM WEDNESDAY MORNING THROUGH THURSDAY AFTERNOON...

* **WHAT**...Periods of moderate to heavy rainfall could lead to flash flooding. Rainfall amounts of 4 to 6 inches are likely through 6pm Thursday...with locally higher amounts possible.

* **WHERE**...Portions of northeast North Carolina and southeast Virginia, including the following areas, in northeast North Carolina, Bertie, Camden, Chowan, Eastern Currituck, Gates, Hertford, Pasquotank, Perquimans, and Western Currituck. In southeast Virginia, Chesapeake, Norfolk/Portsmouth, Suffolk, and Virginia Beach.

* **WHEN**...From Wednesday morning through Thursday afternoon

* **IMPACTS**...The runoff from the heavy rainfall may result in rapid rises in streams and creeks, as well as ponding of water on roadways. This could quickly result in flooding, especially in low lying and poor drainage areas.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Flash flooding is a VERY DANGEROUS SITUATION. You should monitor later forecasts and be prepared to take action should flash flooding occur.

Current: Flood Advisory

819 AM EST THU NOV 12 2009

...**FLOOD ADVISORY** IN SOUTHEAST VIRGINIA AND NORTHEAST NORTH CAROLINA...

* **WHAT**...Weather service radar showed a widespread area of moderate to heavy rain.

* **WHERE**...Cities of Franklin, Chesapeake, Newport News, Virginia Beach, Portsmouth, Hampton, Norfolk, Suffolk, and Elizabeth City

* **WHEN**...Until 215 PM EST Thursday.

* **IMPACTS**...An estimated 4 to 6 inches has already fallen over the area. This will likely continue the threat for some flooding of creeks, small streams, low lying and flood prone areas.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Most flood deaths occur in automobiles. Never drive your vehicle into areas where the water covers the roadway. Flood waters are usually deeper than they appear. Just one foot of flowing water is powerful enough to sweep vehicles off the road. When encountering flooded roads make the smart choice, turn around, don't drown.

Prototype: Orange Warning: Flooding

819 AM EST THU NOV 12 2009

...**ORANGE WARNING FOR FLOODING** IN SOUTHEAST VIRGINIA AND NORTHEAST NORTH CAROLINA...

* **WHAT**...Weather service radar showed a widespread area of moderate to heavy rain.

* **WHERE**...Cities of Franklin, Chesapeake, Newport News, Virginia Beach, Portsmouth, Hampton, Norfolk, Suffolk, and Elizabeth City

* **WHEN**...Until 215 PM EST Thursday.

* **IMPACTS**...An estimated 4 to 6 inches has already fallen over the area. This will likely continue the threat for some flooding of creeks, small streams, low lying and flood prone areas.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Most flood deaths occur in automobiles. Never drive your vehicle into areas where the water covers the roadway. Flood waters are usually deeper than they appear. Just one foot of flowing water is powerful enough to sweep vehicles off the road. When encountering flooded roads make the smart choice, turn around, don't drown.

Current: Flood Warning

1104 AM EST THU NOV 12 2009

...**FLOOD WARNING** IN SOUTHEAST VIRGINIA AND NORTHEAST NORTH CAROLINA...

* **WHAT**...Radar continues to show moderate to heavy rain over the area. An estimated 3 to 5 inches has already fallen over the area. This will likely cause widespread flooding of some creeks, small streams, low lying and flood prone areas.

* **WHERE**...Cities of, Franklin, Chesapeake, Newport News, Virginia Beach, Portsmouth, Hampton and Elizabeth City.

* **WHEN**...Until 500 PM EST Thursday.

* **IMPACTS**...Stream rises will be slow and flash flooding is not expected. However, all interested parties should take necessary precautions immediately. Additional rainfall amounts of 1 to 2 inches are possible in the warned area

PRECAUTIONARY/PREPAREDNESS ACTIONS....

Most flood deaths occur in automobiles. Never drive your vehicle into areas where the water covers the roadway. Flood waters are usually deeper than they appear. Just one foot of flowing water is powerful enough to sweep vehicles off the road. When encountering flooded roads make the smart choice, turn around, don't drown. To report flooding, have the nearest law enforcement agency relay your report to the national weather service forecast office.

Prototype: Red Warning: Flooding

1104 AM EST THU NOV 12 2009

...**RED WARNING FOR FLOODING** IN SOUTHEAST VIRGINIA AND NORTHEAST NORTH CAROLINA...

* **WHAT**...Radar continues to show moderate to heavy rain over the area. An estimated 3 to 5 inches has already fallen over the area. This will likely cause widespread flooding of some creeks, small streams, low lying and flood prone areas.

* **WHERE**...Cities of, Franklin, Chesapeake, Newport News, Virginia Beach, Portsmouth, Hampton and Elizabeth City.

* **WHEN**...Until 500 PM EST Thursday.

* **IMPACTS**...Stream rises will be slow and flash flooding is not expected. However, all interested parties should take necessary precautions immediately. Additional rainfall amounts of 1 to 2 inches are possible in the warned area

PRECAUTIONARY/PREPAREDNESS ACTIONS....

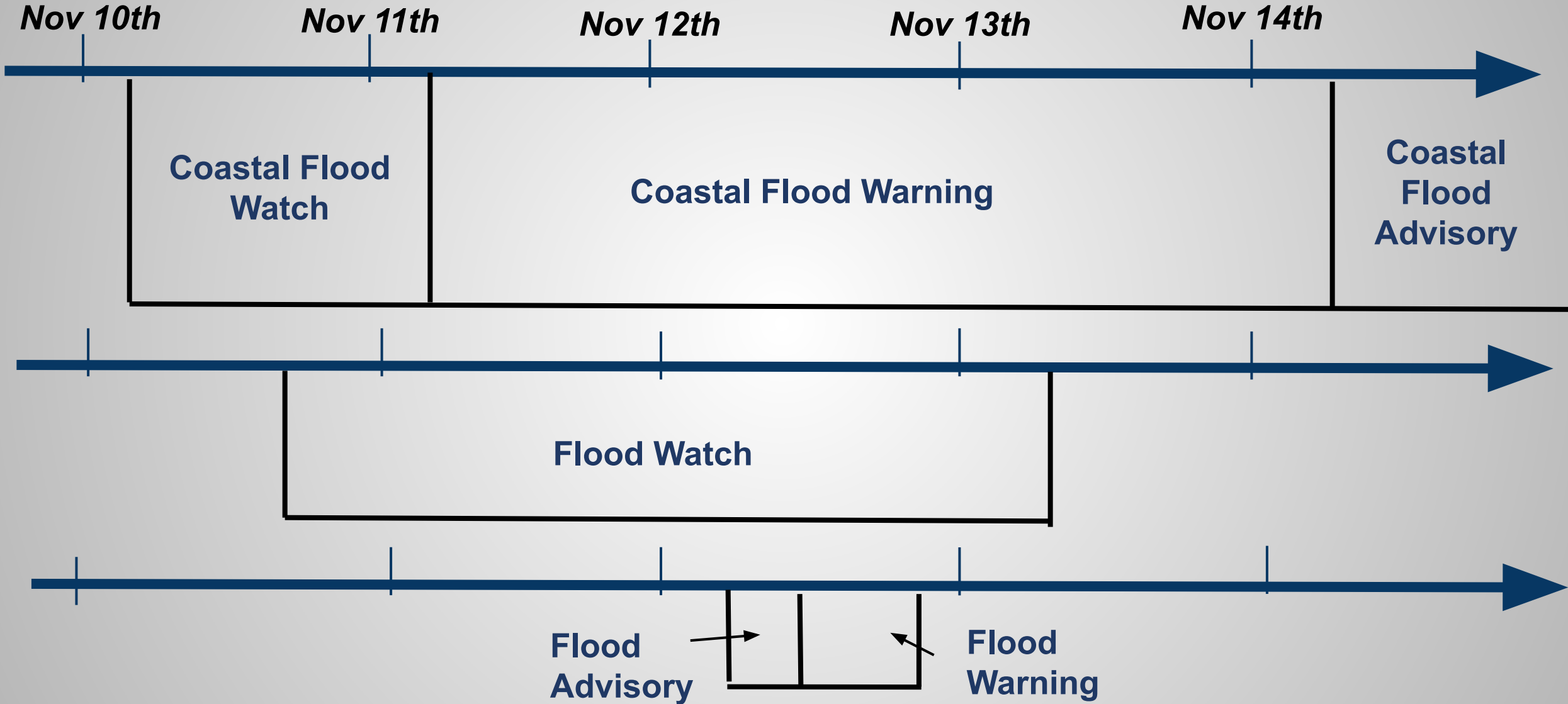
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Option 2 Application

**Based on VA Beach 2009
Nor'easter (Nor'Ida)**

Timeline

Current System



Option 2

Nov 10th

Nov 11th

Nov 12th

Nov 13th

Nov 14th

**Coastal Flood
Notice**

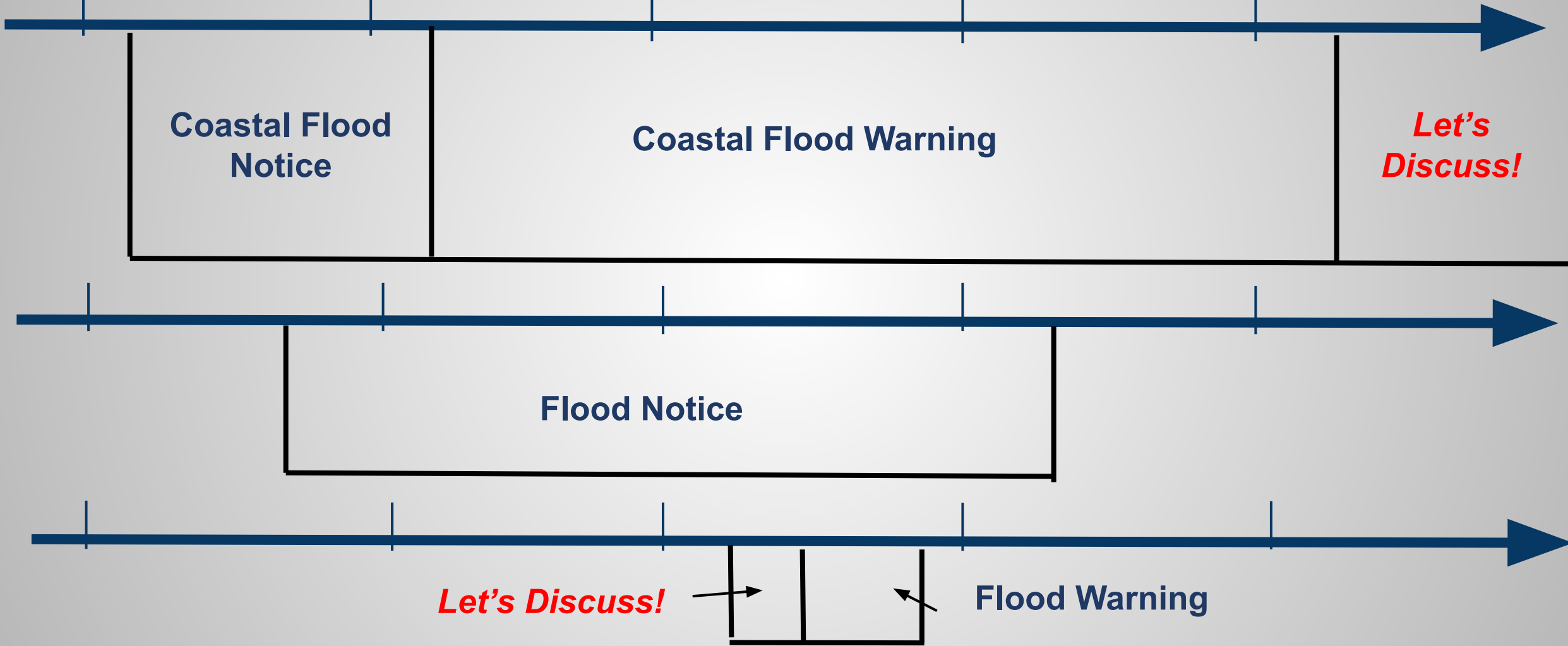
Coastal Flood Warning

*Let's
Discuss!*

Flood Notice

Let's Discuss!

Flood Warning



Current: Coastal Flood Watch

408 AM EST TUE NOV 10 2009

...**COASTAL FLOOD WATCH** IN EFFECT FROM WEDNESDAY AFTERNOON THROUGH FRIDAY AFTERNOON...

* WHAT...Onshore winds...wave action and/or tides could combine to create flooding of areas along the shore...and near tidal rivers and creeks.

* WHERE...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

* WHEN...A few hours near high Wednesday afternoon through Thursday morning.

* IMPACTS...Widespread flooding of vulnerable areas will result in an elevated threat of property damage to homes and businesses near the waterfront and shoreline. Water will be 1 to 2 feet above ground level in some areas resulting in a sufficient depth to close numerous roads and threaten homes and businesses. Flooding will extend inland from the waterfront along tidal rivers and bays resulting in some road closures and flooding of vehicles.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of road closures and minor flooding of properties. If travel is necessary...do not attempt to drive through water of unknown depth.

Prototype: Coastal Flood Notice

408 AM EST TUE NOV 10 2009

...**COASTAL FLOOD NOTICE** IN EFFECT FROM WEDNESDAY AFTERNOON THROUGH FRIDAY AFTERNOON...

* WHAT...Onshore winds...wave action and/or tides could combine to create flooding of areas along the shore...and near tidal rivers and creeks.

* WHERE...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

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PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of road closures and minor flooding of properties. If travel is necessary...do not attempt to drive through water of unknown depth.

Current: Coastal Flood Warning

Prototype:
No change

446 AM EST WED NOV 11 2009

...COASTAL FLOOD WARNING IN EFFECT FROM THIS AFTERNOON THROUGH FRIDAY..

* WHAT...Onshore winds...wave action and/or tides will combine to create flooding of areas along the shore...and near tidal rivers and creeks.

* WHERE...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

* WHEN...A few hours near high Wednesday afternoon through Thursday morning.

* IMPACTS...Widespread flooding of vulnerable areas will result in an elevated threat of property damage to homes and businesses near the waterfront and shoreline. Water will be 1 to 2 feet above ground level in some areas resulting in a sufficient depth to close numerous roads and threaten homes and businesses. Flooding will extend inland from the waterfront along tidal rivers and bays resulting in some road closures and flooding of vehicles.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of road closures and minor flooding of properties. If travel is necessary...do not attempt to drive through water of unknown depth.

Current: Coastal Flood Advisory

Prototype:
??

1000 AM EST SAT NOV 14 2009

...**COASTAL FLOOD ADVISORY** IN EFFECT FROM WEDNESDAY THROUGH NOON SUNDAY...

* **WHAT**...Onshore winds...wave action and/or tides will combine to create minor flooding of areas along the shore...and near tidal rivers and creeks.

* **WHERE**...Bayside portions of the Virginia Delmarva Counties AND Virginia Beach.

* **WHEN**...A few hours near high Wednesday afternoon through Thursday morning.

* **IMPACTS**...Shallow flooding is expected in the most vulnerable locations near the waterfront and shoreline resulting in a low threat to life and property. Expect around one foot of inundation in low lying, vulnerable areas. Some roads and low lying property including parking lots, parks and lawns near the waterfront will experience shallow flooding.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be prepared for the possibility of some road closures and minor flooding.

Let's Discuss!

Current: Flood Watch

336 PM EDT Tue Nov 10 2009

...**FLOOD WATCH** IS IN EFFECT FROM WEDNESDAY MORNING THROUGH THURSDAY AFTERNOON...

* **WHAT**...Periods of moderate to heavy rainfall are expected across the northeast corner of North Carolina and Hampton Roads beginning Veterans Day and lasting through Thursday. Rainfall amounts of 4 to 6 inches are likely through 6pm Thursday...with locally higher amounts possible.

* **WHERE**...Portions of northeast North Carolina and southeast Virginia, including the following areas, in northeast North Carolina, Bertie, Camden, Chowan, Eastern Currituck, Gates, Hertford, Pasquotank, Perquimans, and Western Currituck. In southeast Virginia, Chesapeake, Norfolk/Portsmouth, Suffolk, and Virginia Beach.

* **WHEN**...From Wednesday morning through Thursday afternoon

* **IMPACTS**...The runoff from the heavy rainfall may result in rapid rises in streams and creeks, as well as ponding of water on roadways. This could quickly result in flooding, especially in low lying and poor drainage areas.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Flash flooding is a VERY DANGEROUS SITUATION. You should monitor later forecasts and be prepared to take action should flash flooding occur.

Prototype: Flood Notice

336 PM EDT Tue Nov 10 2009

...**FLOOD NOTICE** IS IN EFFECT FROM WEDNESDAY MORNING THROUGH THURSDAY AFTERNOON...

* **WHAT**...Periods of moderate to heavy rainfall are expected across the northeast corner of North Carolina and Hampton Roads beginning Veterans Day and lasting through Thursday. Rainfall amounts of 4 to 6 inches are likely through 6pm Thursday...with locally higher amounts possible.

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**Current:
Flood Advisory**

**Prototype:
??**

819 AM EST THU NOV 12 2009

...**FLOOD ADVISORY** IN SOUTHEAST VIRGINIA AND NORTHEAST NORTH CAROLINA...

* **WHAT**...Weather service radar showed a widespread area of moderate to heavy rain.

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Let's Discuss!

**Current:
Flood Warning**

**Prototype:
No Change**

1104 AM EST THU NOV 12 2009

...**FLOOD WARNING** IN SOUTHEAST VIRGINIA AND NORTHEAST NORTH CAROLINA...

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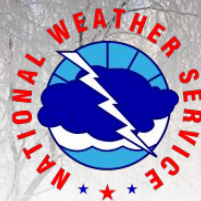
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Thank you!

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<https://www.weather.gov/hazardsimplification/>

