

# **The Increasing Flood Threat in Virginia**

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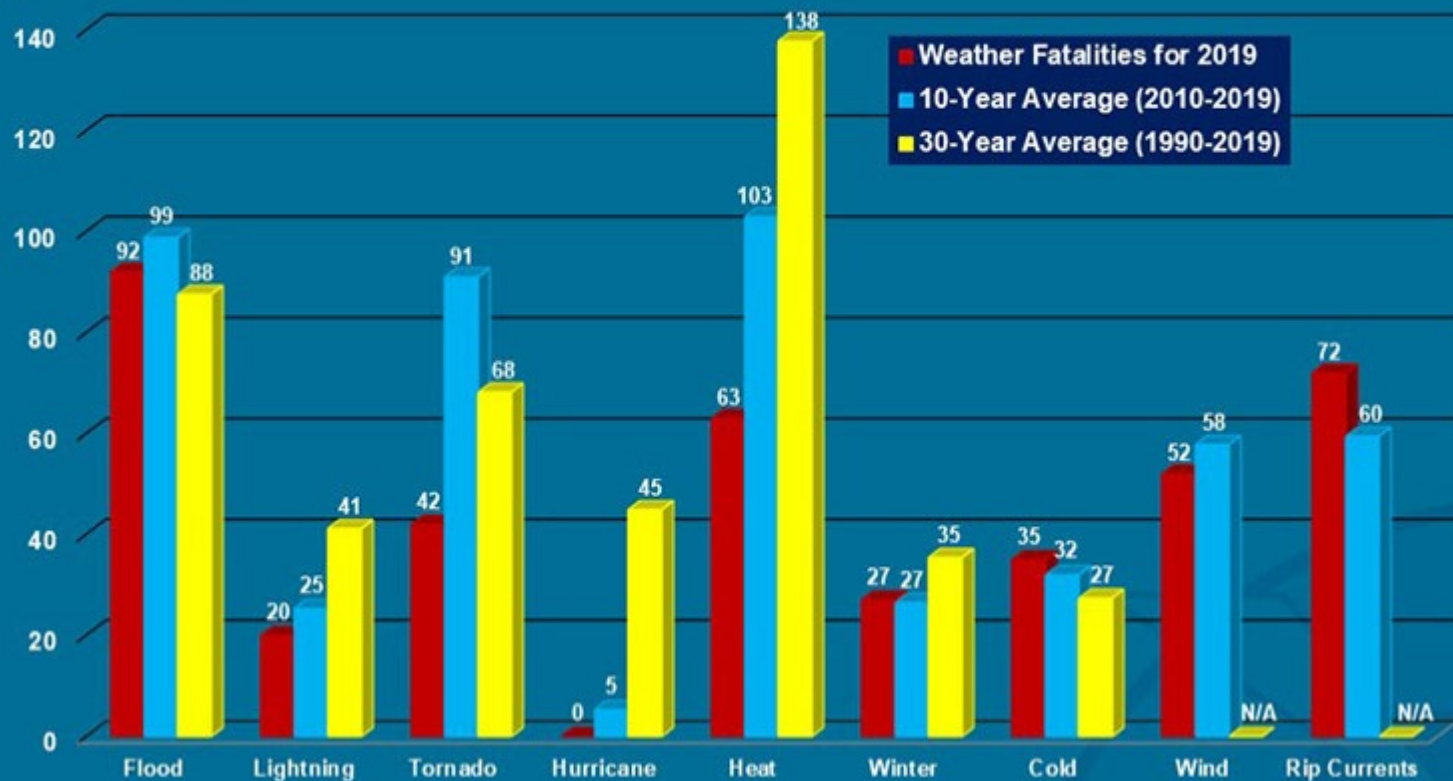
# The Increasing Flood Threat in Virginia

## Topics to be covered:

- Identifying Types and Causes of Flooding
- Impact-Based Flash Flood Warnings
- Flood Product Consolidation
  - Watches and Advisories
- How Localities can assist in Flood protection and Awareness

# The Flooding Threat

## Weather Fatalities 2019



- In Virginia, flooding is almost always the biggest weather threat of the year.
- On average, the annual cost of damage from floods is higher than any other severe weather event

# Type of Flooding



**Coastal**



**Inland**

# Inland Flooding

- The usual cause for inland flooding is heavy rain.
- Flooding types are:
  - Flash – Usually within 6 hours of causative event
  - River – This is limited to gauged locations with forecast
  - General – any inundation not covered above.



# Flash Flooding

In Virginia, Flash Flooding can happen at any time of the year

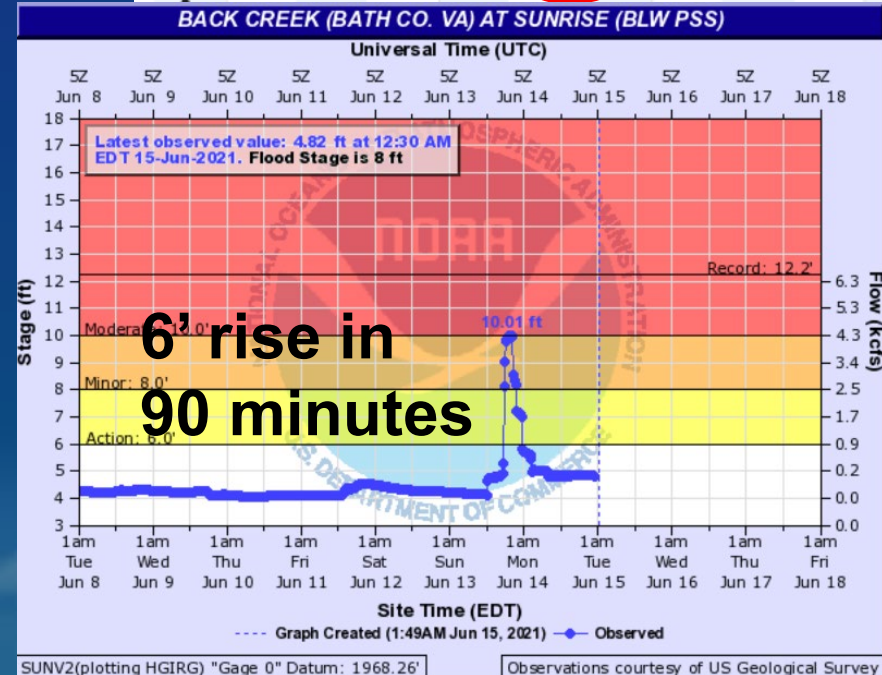
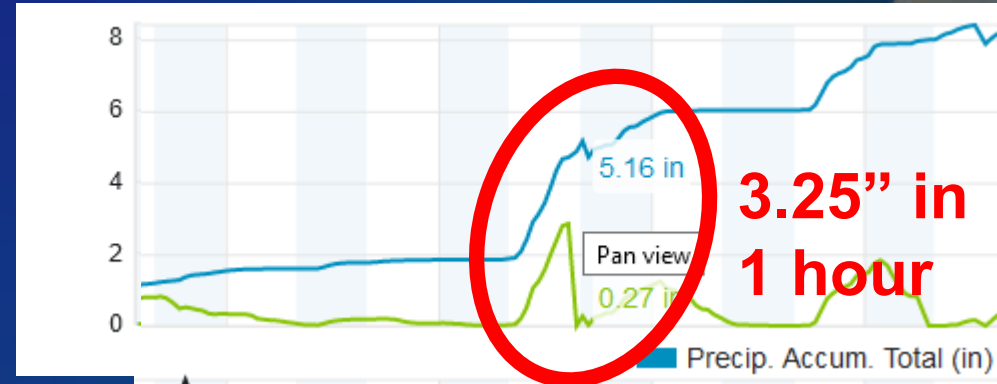
1. Usually the result of slow-moving, intense thunderstorms

2. Where storms pass repeatedly over the same locations

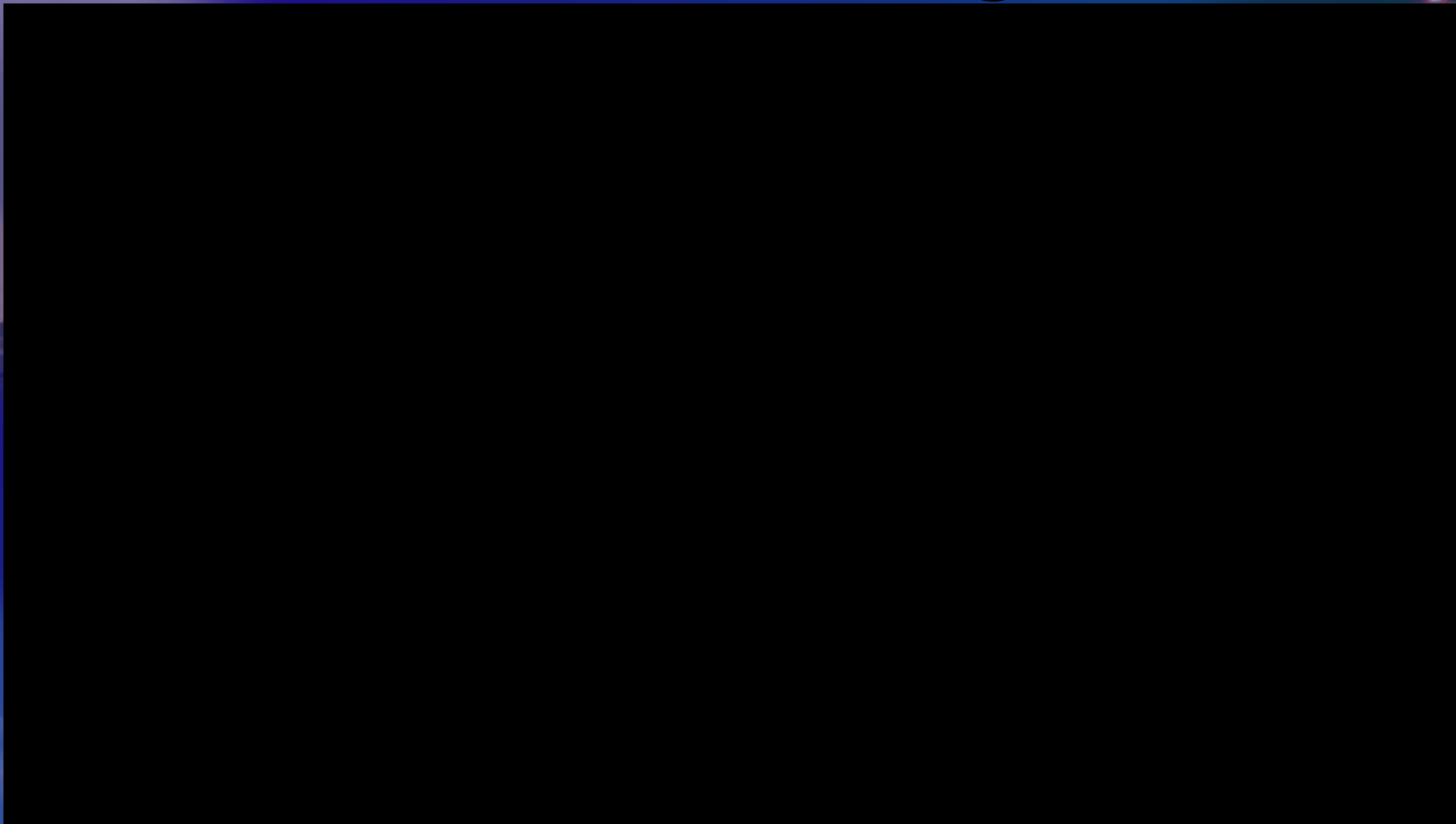
3. High rainfall rates (2+ inches/hr)

4. Higher risk factors:

- Steep slopes
- Rocky terrain
- Saturated soil conditions
- Urban locations



# Flash Flooding



# River Flooding



NCC033-157-VAC143-590-120833-  
/O.EXT.KRNK.FL.W.0042.181012T0316Z-181014T2013Z/  
/DVLV2.3.ER.181012T0316Z.181013T0000Z.181014T0813Z.NR/  
432 PM EDT Thu Oct 11 2018

The Flood Warning continues for the Dan River at Danville

- \* until Sunday afternoon
- \* At 0415 PM Thursday the stage was 18.2 feet.
- \* Flood Stage is 17.0 feet.
- \* Record flooding is forecast with a crest over 29 feet.
- \* Forecast...Rise to near 29.1 feet by tomorrow evening.  
The river will fall below.  
flood stage by Sunday morning.
- \* This compares to the record crest at Danville set of 28.7 feet set Sep 7 1996.

&&

LAT...LON 3646 7974 3650 7976 3664 7941 3663 7920  
3648 7923 3650 7949

- Limited to stream gauges for which the NWS produces a forecast
- Flood stages (minor, moderate, major) are coordinated with local government officials



# Other Causes of Flooding

## Rapid Snowmelt

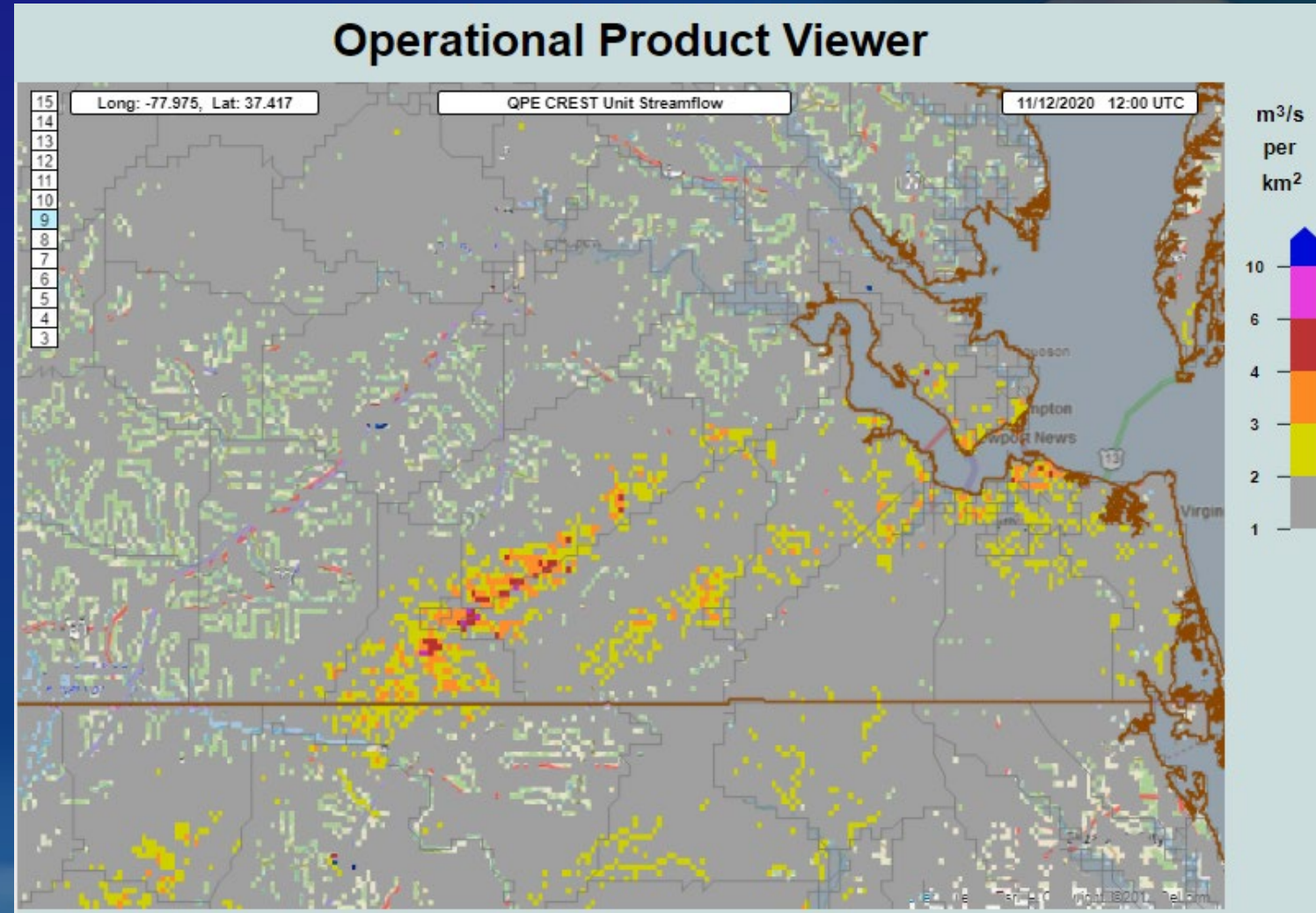
- Thick snowpack that melts quickly in unseasonably warm/humid air
- Snowmelt can be highly variable over short distances
- Ground is often frozen
- Usually accompanied by prolonged or heavy rain
- Flooding especially dangerous due to near-freezing water temperatures
- Hypothermia sets in quickly



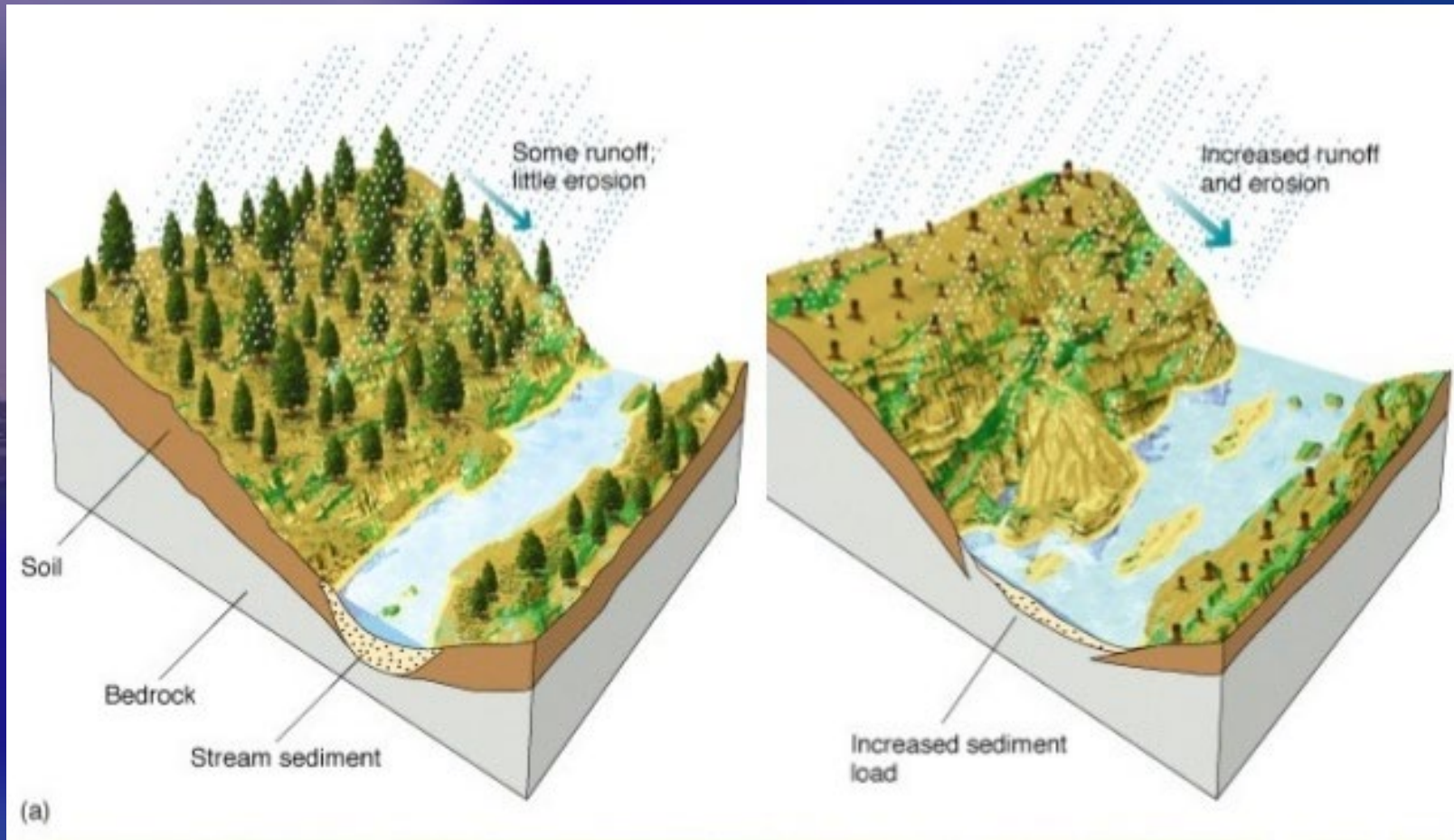
# Inland Flooding Tools

Detection Tools:

- FLASH – New tool
  - Routes water
  - Comparisons
  - Updates runoff thresholds
- Gauges – Rain and water levels
- Radar – Precipitation estimates



# Increased Flooding Threat: Changes in Land-Use



- Near clear-cut hillsides.
- Less vegetation to hold soil, absorb the rainfall
- Greater potential for rainfall to convert to runoff
- Rivers/streams fill with sediment washed down from hillside, raising the riverbed

## Detailed question(s) to ask

“Are there any recent large changes to land use in my jurisdiction?”

“If so, what are the potential impacts downstream of this location? Towns? Roads?”

# Increased Flooding Threat: Maintenance Issues



↑ This.....can result in a better chance of.....This ↑  
occurring with less rainfall than observed during previous storms

# Increased Flooding Threat: Maintenance Issues



Increasing Threat to life, Cost of mitigation, Time to complete work

# Coastal Flooding

Causes for Coastal flooding

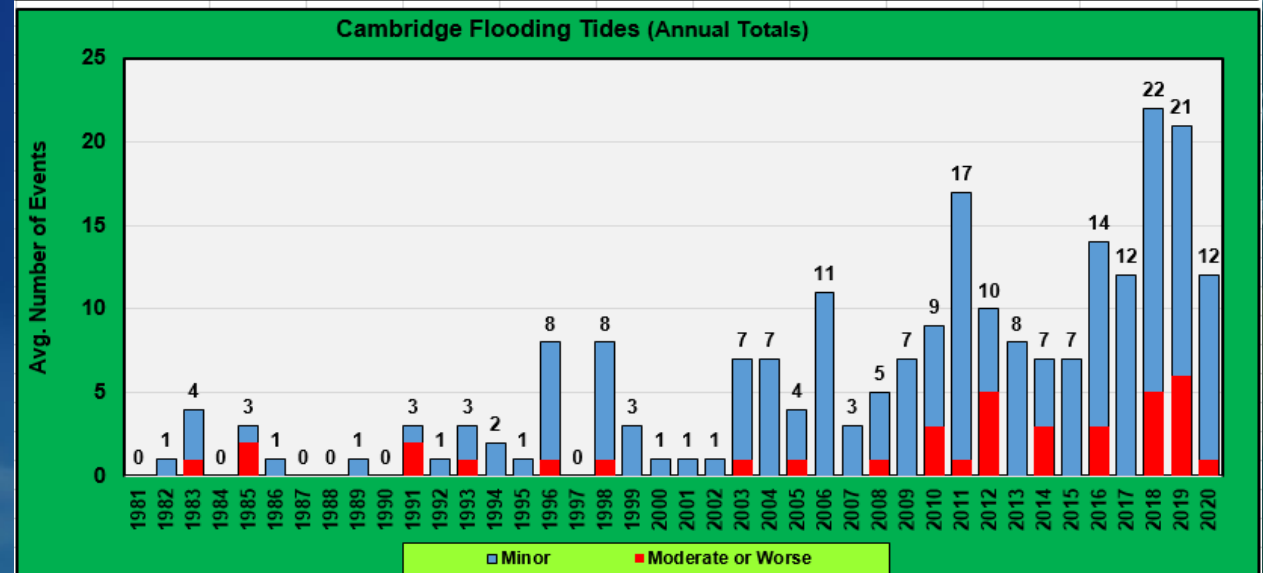
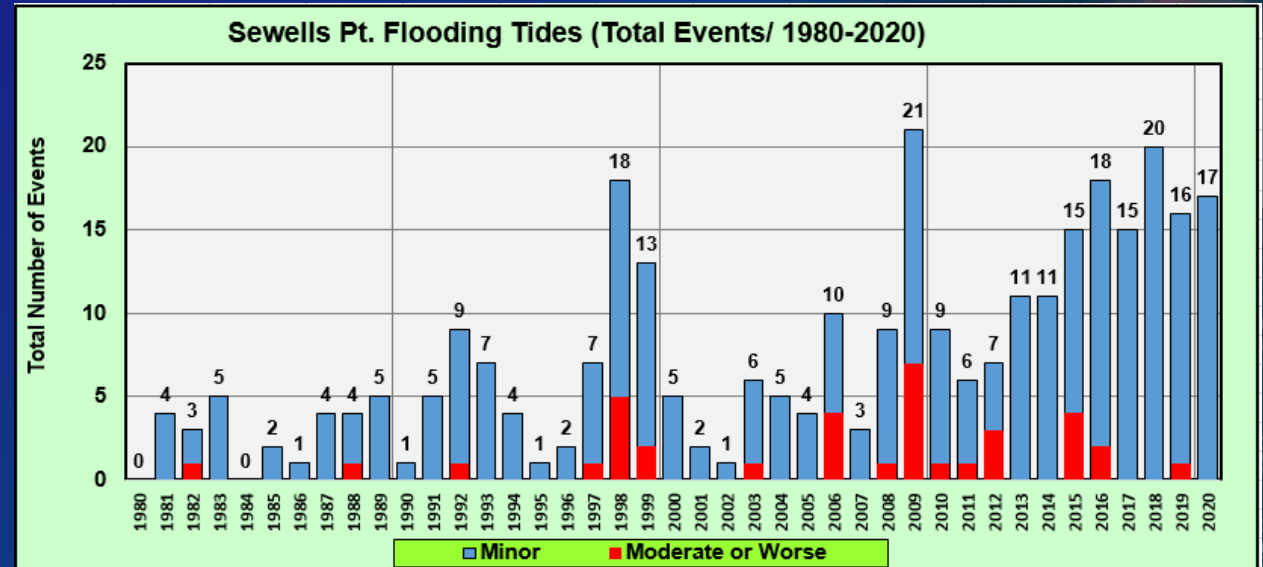
- High Astronomical Tides (King)
- Storm Surge
  - Tropical cyclones
  - Coastal Lows
  - Onshore flow



# Coastal Flooding

Frequency of flooding

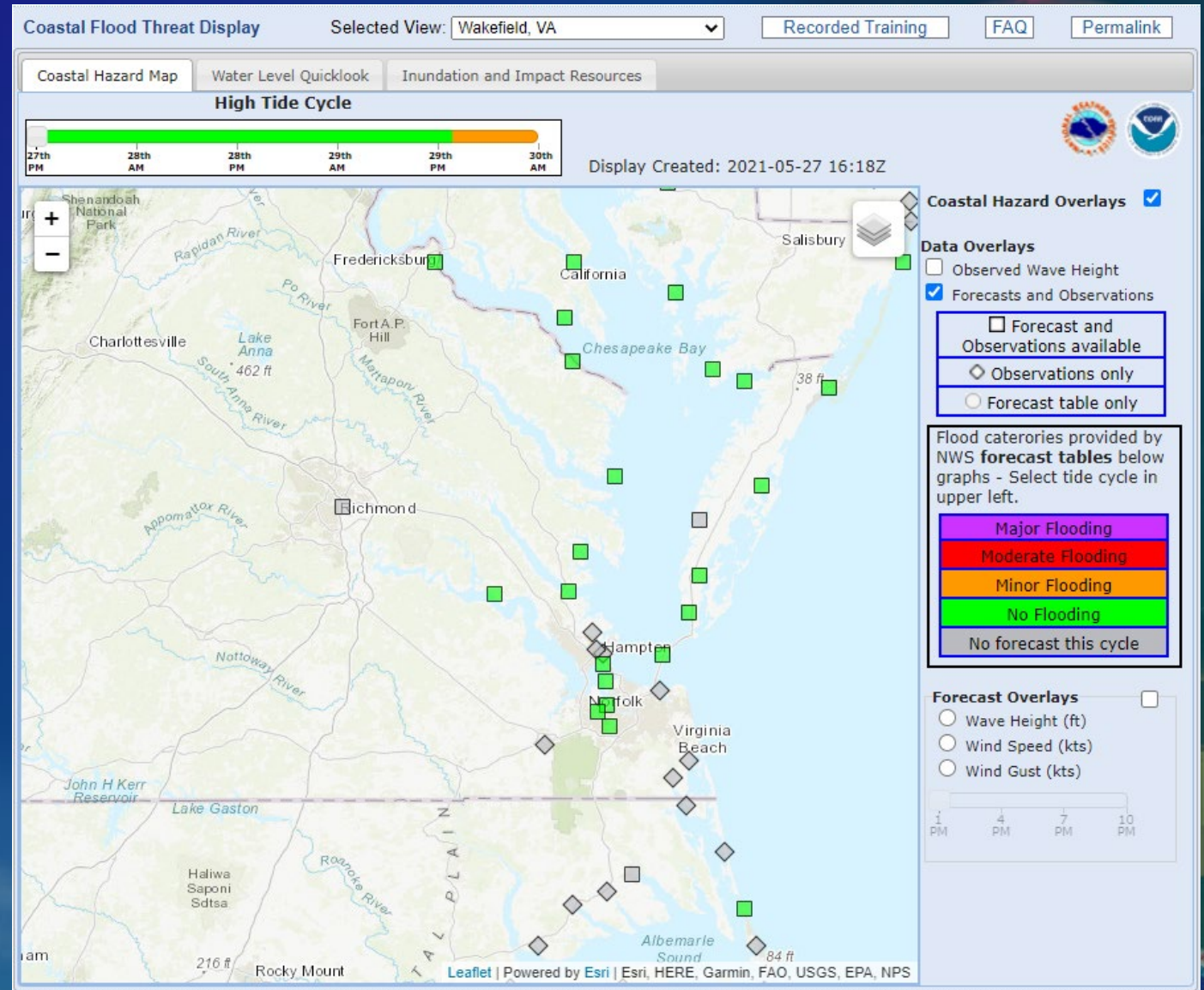
- Large increase in minor events
- However, not seeing the same increase in moderate or major events



# Coastal Flooding

Forecasting tool

- Total Water Level (TWL)
  - Forecast Guidance
  - Tidal Gauges
- Output Available
  - AHPS
  - Wakefield Tide Gauge
  - Coastal Flood Threat display





# Changes and Simplification of NWS Flood Products

# Why are we changing?

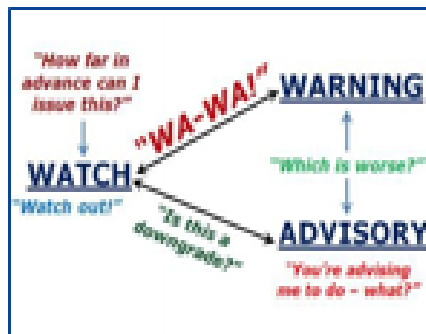
The NWS Watch, Warning, and Advisory System is confusing and has too many products.

**Watch** There is the **potential** for a dangerous hazard to occur.

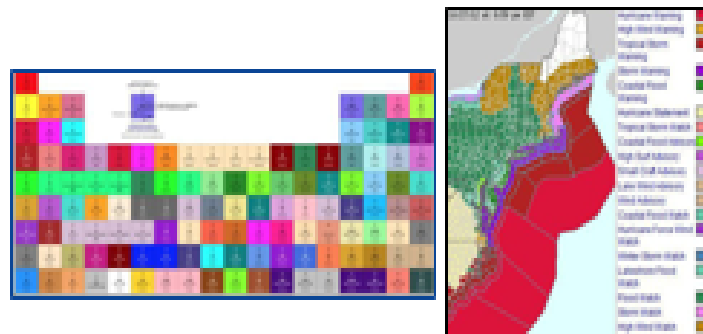
**Warning** A life-threatening hazard is **imminent or occurring**.

**Advisory** A less serious hazard is **imminent or occurring**.

Confusing terms



Too many products

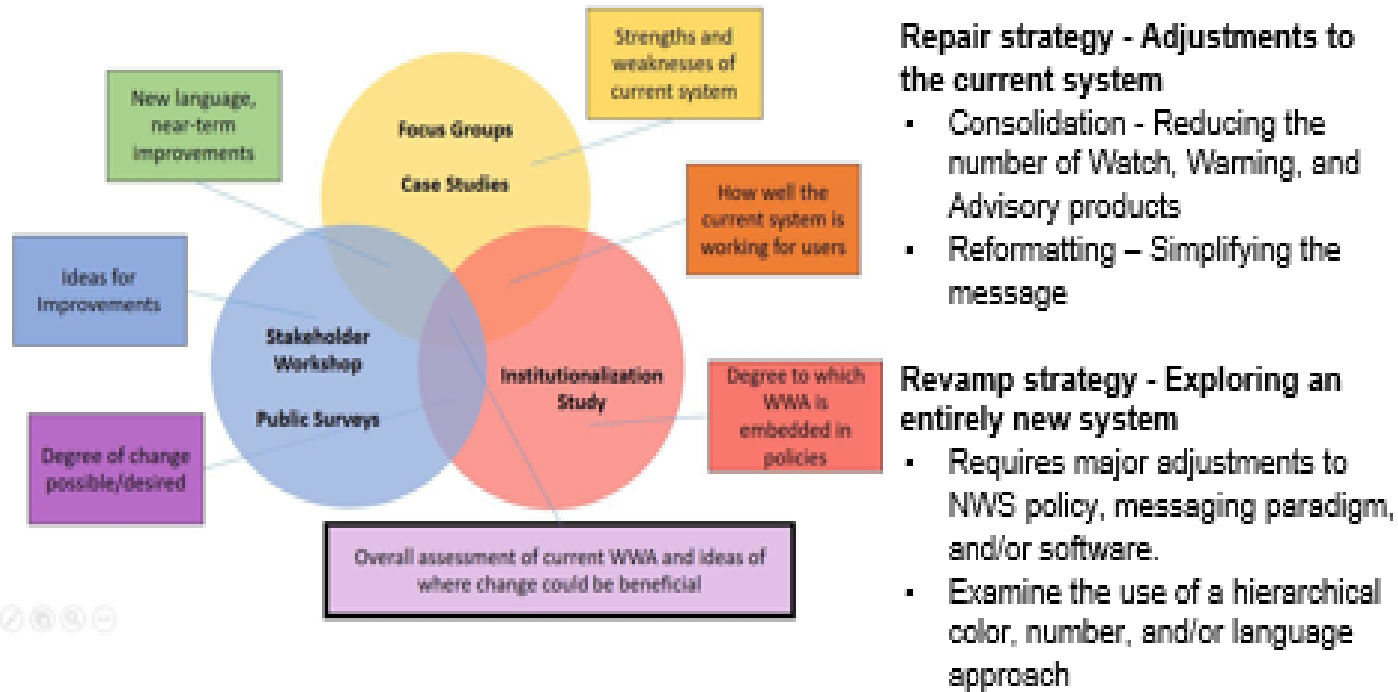


- During Hurricane Sandy, it took 19 products to describe 2 hazards, wind and flooding.
- Users said that, “NWS products for coastal storms are confusing”, according to Service Assessment feedback.



# Why are we changing?

## Social science feedback generated two types of Hazard Simplification strategies.



- The repair strategy involves making adjustments to the current system. Repairing may involve consolidating and/or reformatting products.
- The revamp strategy involves exploring an entirely new system. Major changes to NWS policy, messaging paradigm, and software are required

# Flood Simplification Timeline

HazSimp Strategies for Flood Products			
Strategy Name	Strategy Type	Date(s)	Public Information Statement/ Service Change Notice
Collect comments on proposed consolidation and reformatting of NWS flood hazard messaging products	Repair	August 8 - September 7, 2018	<a href="#">PNS 18-22</a>
Reformat flash flood warnings and statements to Impact-Based Warning (IBW) Format via rolling Implementation	Repair	September 16 - December 31, 2019	<a href="#">SCN 19-50</a>
Collect comments on proposed major changes to the NWS watch, warning, and advisory (WWA) system - "Discontinue advisories"	Revamp	June 11 - August 21, 2020	<a href="#">PNS 20-43</a>
Collect comments on discontinuance of certain short-fused NWS warning update statements - "Update warnings with warnings"	Repair	December 8, 2020 - January 7, 2021	<a href="#">PNS 20-90</a>
Consolidate and/or reformat flood products via turnkey Implementation	Repair	On or after June 28, 2021	SCN may be released as soon as April 14, 2021.
Discontinue the Flood Statement (FLS), which updates the Flood Warning (FLW), and the Flash Flood Statement (FFS), which updates the Flash Flood Warning (FFW) - "Update warnings with warnings"	Repair	Develop requirements in FY22 and Implement in FY23	
Transition Flood Watch (FFA) from zone or county-based to polygon-based	Repair	Develop requirements in FY21, but implementation not likely until FY24.	
Discontinue advisory and initiate generic, plain language statements to convey information for lower-level hazardous events that are not expected to reach watch or warning levels	Revamp	TBD, but implementation not likely until FY24 at the earliest	

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- The implementation of the consolidation and reformatting of flood products is dependent upon all WFOs having installed AWIPS OB 20.2.2. If this hasn't happened by June 28, 2021, the implementation date will be delayed to FY21 Quarter 4.

# Reformatted Flash Flood Warnings

The National Weather Service in Wakefield has issued a

\* Flash Flood Warning for...  
Northwestern Chesterfield County in central Virginia...

\* Until 1100 AM EDT.

\* At 828 AM EDT, local law enforcement reported thunderstorms producing heavy rain across the warned area. Between 3 and 6 inches of rain have fallen. Dangerous flash flooding is ongoing. A swift water rescue was reported on Otterdale Road. Numerous roads are closed throughout Chesterfield County.

**HAZARD...Life threatening flash flooding. Thunderstorms producing flash flooding.**

**SOURCE...Law enforcement.**

**IMPACT...Life threatening flash flooding of creeks and streams, urban areas, highways, streets and underpasses.**

\* Some locations that will experience flash flooding include...  
Bon Air and Midlothian.

Additional rainfall amounts of 1 to 3 inches are possible in the warned area.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Turn around, don't drown when encountering flooded roads. Most flood deaths occur in vehicles.

Move to higher ground now. Act quickly to protect your life.

&&

LAT...LON 3751 7758 3749 7757 3745 7757 3741 7759  
3740 7761 3739 7765 3740 7771 3741 7773  
3744 7776 3746 7775 3750 7771 3751 7769  
3753 7765 3754 7762 3752 7758

**FLASH FLOOD...OBSERVED  
FLASH FLOOD DAMAGE THREAT...CONSIDERABLE  
EXPECTED RAINFALL...1-2 INCHES IN 2 HOURS**

**HAZARD...Life threatening flash flooding. Thunderstorms producing flash flooding.**

**SOURCE...Law enforcement.**

**IMPACT...Life threatening flash flooding of creeks and streams, urban areas, highways, streets and underpasses.**

**FLASH FLOOD...OBSERVED  
FLASH FLOOD DAMAGE THREAT...CONSIDERABLE  
EXPECTED RAINFALL...1-2 INCHES IN 2 HOURS**

- In the Fall of 2019, Flash Flood Warnings were reformatted to Impact Based Warning format, just like Tornado warnings.
- Warnings contain clear stated **Hazards**, **Source** of information and **Impact** information
- **Machine-readable tags** at the bottom of the warning



# IBW Flash Flood Warnings

The Impact-Based Warning tags characterize the flash flood damage threat, source information, and causative event.

Flash Flood Damage Threat Tag	Explanation
"Base" (No Tag)	Use most of the time, when flash flood impact damage is possible.
CONSIDERABLE*	Use rarely, when there are indications flash flooding capable of unusual severity of impact is imminent or ongoing and urgent action is needed to protect lives and property.
CATASTROPHIC*+	Use exceedingly rarely, when a flash flood threat to life and catastrophic damage is occurring or is imminent, and floodwaters have risen or will rise to levels rarely if ever seen.
Flash Flooding Source Information Tag	Explanation
FLASH FLOOD... RADAR INDICATED	Evidence on radar and near storm environment is supportive, but no confirmation.
FLASH FLOOD... OBSERVED	Flash flood impacts confirmed by trained spotters, law enforcement, media, other credible human observers, etc.
Flash Flooding Causative Event Tag	Explanation
EXPECTED RAINFALL RATE... [##-## INCHES PER HOUR] [## INCHES IN ## MINUTES] [##-## INCHES IN ## MINUTES]	Use to identify rainfall rate leading to potential or observed flash flooding, including rain falling on a burn scar.
[DAM or LEVEE] FAILURE... [IMMINENT or OCCURRING]	Use to provide additional information about the status of the failing dam or levee, whether it is "imminent" or "occurring".

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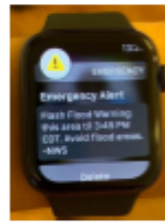
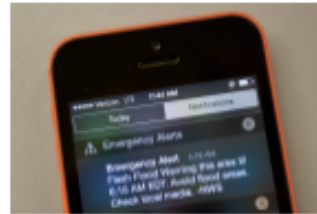
- A retrospective tagging analysis of FFWs from 2012 and 2018 revealed:
  - 90% were "base"
  - 8% were "considerable"
  - 2% were "catastrophic".
- "Expected Rainfall" tag will be changed to "Expected Rainfall Rate"
- The causative event tag can also be used to indicate if a dam failure is imminent or occurring.



# IBW Flash Flood Warnings

## The NWS reduced the number of Flash Flood Warning Wireless Emergency Alerts beginning February 19, 2020.

- There have been fewer, more targeted alerts for life-threatening flash flood events when urgent action is needed to protect lives and property.
- Only those warnings tagged as "Considerable" or "Catastrophic" appear on your mobile devices.
- All Flash Flood Warnings are still being distributed via other methods, including EAS, NOAA weather radio, and weather.gov.



- NWS issues more than 4,000 Flash Flood Warnings a year.
- User perception was an over-alerting for Flash Floods.
- FEMA noted large number of complaints about WEA alerts during the overnight periods for perceived little impact.
- NWS working to improve public response to Flash Flood Warnings by issuing WEAs only for events requiring immediate life-saving action.



# IBW Flash Flood Warning Tags

## Base



## Considerable



## Catastrophic





# IBW Flash Flood Warnings: Base



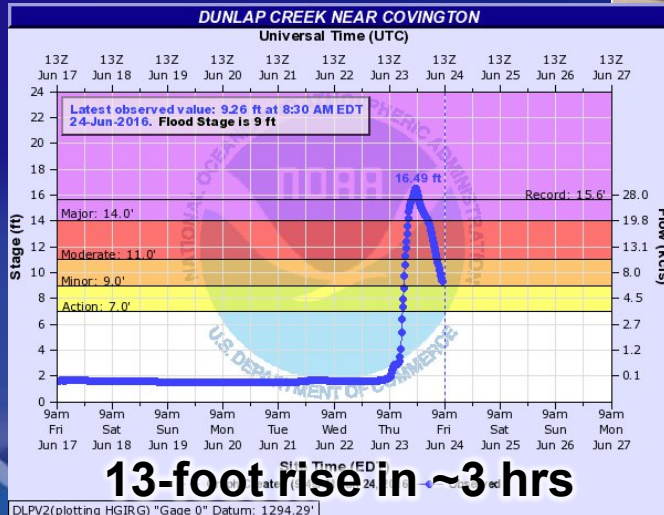
Flash Flood Damage Threat Tag	"Base" (No Tag)
Explanation	Use most of the time, when flash flood impact damage is possible.
Impact Keywords Derived from Analysis	<ul style="list-style-type: none"> <li>• Heavy Rain Reported/Expected</li> <li>• High/Standing Water</li> <li>• Runoff</li> <li>• Roads flooded/closed</li> <li>• Any "uncertain" language (ex. "flooding possible")</li> <li>• Generic Call to Action language</li> </ul>

# IBW Flash Flood Warnings: Considerable



<b>Flash Flood Damage Threat Tag</b>	<b>FLASH FLOOD DAMAGE THREAT... CONSIDERABLE*</b>
<b>Explanation</b>	<p>Use rarely, when there are indications flash flooding capable of unusual severity of impact is imminent or ongoing and urgent action is needed to protect lives and property.</p>
<b>Impact Keywords Derived from Analysis</b>	<ul style="list-style-type: none"> <li>▪ Basement/House/Building flooded</li> <li>▪ Bridges/Roads/Highways washed out</li> <li>▪ Closed/Impassable Highway/Interstate/Major Road</li> <li>▪ Evacuations</li> <li>▪ Major Dam/Levee Failure</li> <li>▪ Debris Flows</li> <li>▪ Slides (mud/land)</li> <li>▪ Vehicles stranded</li> <li>▪ Water rescues</li> <li>▪ More urgent/serious Call to Action language</li> </ul>

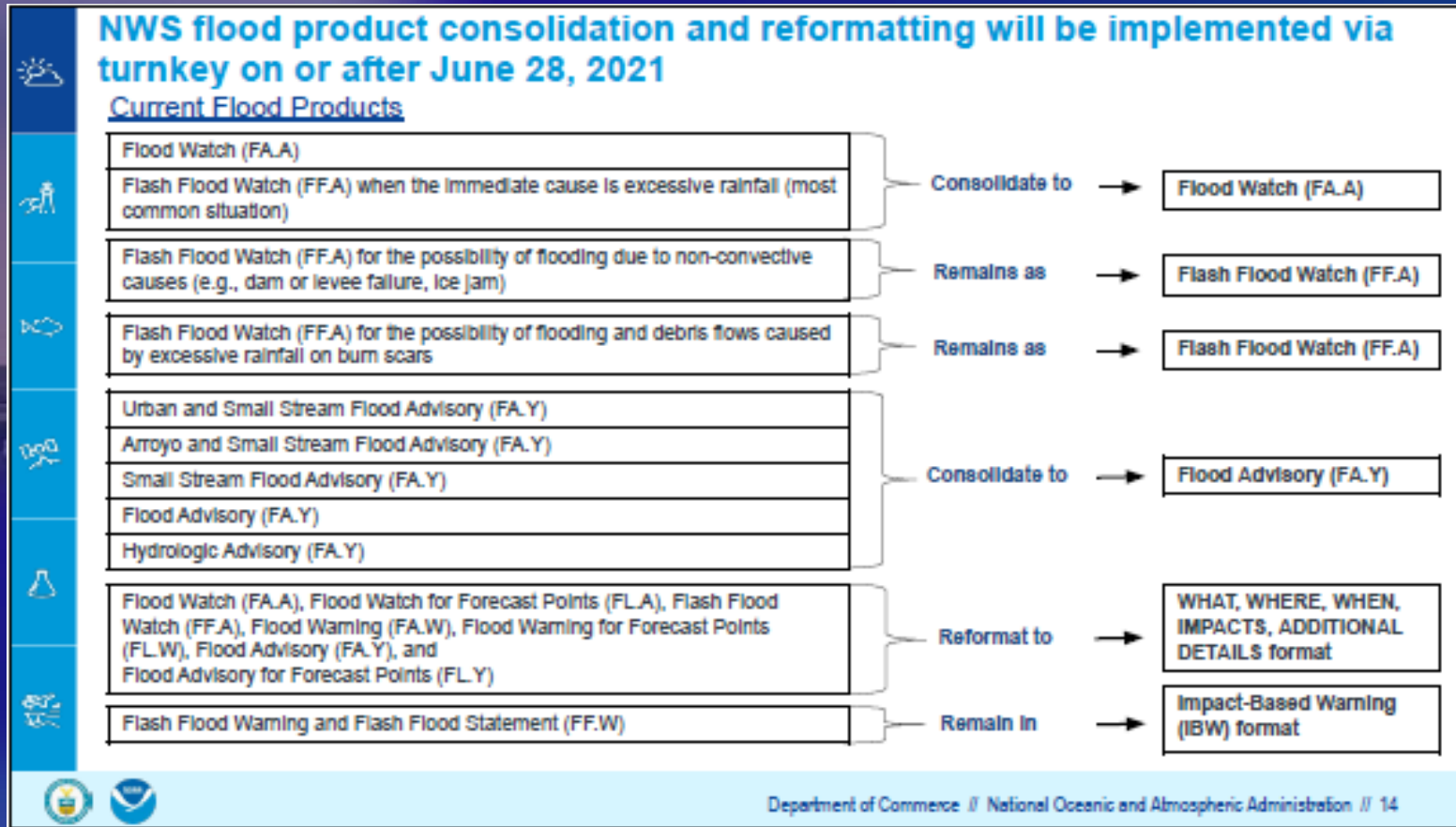
# IBW Flash Flood Warnings: Catastrophic



<p><b>Flash Flood Damage Threat Tag</b></p>	<p><b>FLASH FLOOD DAMAGE THREAT... CATASTROPHIC**</b></p>
<p><b>Explanation</b></p>	<p>Use exceedingly rarely, when a flash flood threat to life and catastrophic damage is occurring or is imminent, and floodwaters have risen or will rise to levels rarely if ever seen.</p>
<p><b>Impact Keywords Derived from Analysis</b></p>	<p><b>FLASH FLOOD EMERGENCY</b></p> <p>Keywords associated with emergencies: (from NWS policy)</p> <ul style="list-style-type: none"> <li>• Multiple swift-water rescues*</li> <li>• Homes destroyed</li> <li>• Life-threatening situations</li> <li>• Total failure of a major dam</li> </ul> <p><b>* Rescue may be impossible due to violent flow of water</b></p>



# Flood Product Consolidation



- Flood Watches and most Flash Flood Watches consolidated to Flood Watches.
- Five separate Flood Advisories consolidated into one Flood Advisory.
- All Flood products reformatted into What, Where, When, Impacts, Additional Details format. Except Flash Flood warnings which are IBW.

# Flood Watch Consolidation

## Flood Watch (FA.A) for the possibility of flash flooding due to excessive rainfall (most common situation)

### Current Product

DC1001-MD1017-04-VA1052-054-240601-  
/O.NEW.NLW.FA.A.0012.201724T0138-210724T0601/  
/00001.0.EK.0100070800E.001007000E.001007000E.001007000E.00/  
District of Columbia-Prince Georges-  
Central and Southeast Montgomery-  
Prince William/Manassas/Manassas Park-Fairfax-  
Arlington/Falls Church/Alexandria-  
Including the cities of Washington, Bowie, Suitland-Silver Hill,  
Clinton, College Park, Greenbelt, Laurel, Camp Springs, Bethesda,  
Rockville, Gaithersburg, Silver Spring, Dale City, Manassas,  
Woodbridge, Lake Ridge, Montclair, Reston, Herndon, Annandale,  
Centreville, Chantilly, McLean, Franconia, Arlington, Alexandria,  
and Falls Church  
112 PM EDT Thu Jul 21 2020

...FLASH FLOOD WATCH IN EFFECT UNTIL 2 AM EDT FRIDAY...

The National Weather Service in Sterling Virginia has issued a

- \* Flash Flood Watch for portions of central Maryland, The District of Columbia, and northern Virginia, including the following areas, is central Maryland, Central and Southeast Montgomery and Prince Georges, The District of Columbia, is northern Virginia, Arlington/Falls Church/Alexandria, Fairfax, and Prince William.
- \* Until 2 AM EDT Friday.
- \* Slow moving thunderstorms are developing across the Washington DC Metropolitan Area this evening. Localized rainfall amounts up to two inches in an hour are possible. These amounts could lead to flash flooding, especially along small streams and in poor drainage urban areas.

### Consolidated and Reformatted Product

DC1001-MD1017-04-VA1052-054-240601-  
/O.NEW.NLW.FA.A.0012.201724T0138-210724T0601/  
/00001.0.EK.0100070800E.001007000E.001007000E.001007000E.00/  
District of Columbia-Prince Georges-  
Central and Southeast Montgomery-  
Prince William/Manassas/Manassas Park-Fairfax-  
Arlington/Falls Church/Alexandria-  
Including the cities of Washington, Bowie, Suitland-Silver Hill,  
Clinton, College Park, Greenbelt, Laurel, Camp Springs, Bethesda,  
Rockville, Gaithersburg, Silver Spring, Dale City, Manassas,  
Woodbridge, Lake Ridge, Montclair, Reston, Herndon, Annandale,  
Centreville, Chantilly, McLean, Franconia, Arlington, Alexandria,  
and Falls Church  
112 PM EDT Thu Jul 21 2020

...FLOOD WATCH IN EFFECT UNTIL 2 AM EDT FRIDAY...

\* WHAT...Flash flooding is possible due to heavy rain.

- \* WHERE...Portions of central Maryland, The District of Columbia, and northern Virginia, including the following areas, in central Maryland, Central and Southeast Montgomery and Prince Georges, The District of Columbia, is northern Virginia, Arlington/Falls Church/Alexandria, Fairfax, and Prince William.
- \* WHEN...Until 2 AM EDT Friday.
- \* IMPACTS...Heavy rain could lead to flash flooding, especially along small streams and in poor drainage urban areas.
- \* ADDITIONAL DETAILS...Slow moving thunderstorms are developing across the Washington DC Metropolitan Area this evening. Localized rainfall amounts up to two inches in an hour are possible.

- VTEC code will change from FF to FA
- Headline changes from Flash Flood Watch to Flood Watch.
- Flash Flood can be mentioned in the What bullet.
- New bulleted format
- FF code and headline only used for dam break or burn scar scenario.



# Flood Advisory Consolidation

## Five types of Flood Advisories (FA.Y) will be consolidated into one Flood Advisory (FA.Y)

### Current Product

ILC075-091-IN073-111-310900-  
/O.NEW.ELOT.FA.Y.0019.190531T0534Z-190531T0900Z/  
/00000.N.ER.00000T0000Z.00000T0000Z.00000T0000Z.00/  
Kankakee IL-Iroquois IL-Newton IN-Jasper IN-  
1234 AM CDT Fri May 31 2019

The National Weather Service in Chicago has issued a

\* **Urban and Small Stream Flood Advisory** for...  
Eastern Kankakee County in northeastern Illinois...  
Northeastern Iroquois County in east central Illinois...  
Newton County in northwestern Indiana...  
Jasper County in northwestern Indiana...

\* Until 400 AM CDT.

\* At 1232 AM CDT, Doppler radar indicated heavy rain due to slow moving thunderstorms. This will cause flooding in the advisory area. Up to nearly two inches of rain has already fallen north of Morocco Indiana.

\* Some locations that will experience flooding include...  
Kankakee, Bourbonnais, Bradley, Manteno, Rensselaer, De Motte,  
Mokenca, Morocco, Percy Junction, Thayer, Roselawn, Gifford, Enos,  
Sembroke, Fair Oaks, Conrad, Sunava Resorts, Beaver City, Moody and  
Forest City.

### Consolidated and Reformatted Product

ILC075-091-IN073-111-310900-  
/O.NEW.ELOT.FA.Y.0019.190531T0534Z-190531T0900Z/  
/00000.N.ER.00000T0000Z.00000T0000Z.00000T0000Z.00/  
Kankakee IL-Iroquois IL-Newton IN-Jasper IN-  
1234 AM CDT Fri May 31 2019

...FLOOD ADVISORY IN EFFECT UNTIL 4 AM CDT...

\* WHAT...Urban and small stream flooding due to heavy rain.

\* WHERE...Eastern Kankakee County in northeastern Illinois,  
Northeastern Iroquois County in east central Illinois,  
Newton County in northwestern Indiana, Jasper County in  
northwestern Indiana.

Some locations that will experience flooding include...  
Kankakee, Bourbonnais, Bradley, Manteno, Rensselaer, De Motte,  
Mokenca, Morocco, Percy Junction, Thayer, Roselawn, Gifford, Enos,  
Sembroke, Fair Oaks, Conrad, Sunava Resorts, Beaver City, Moody and  
Forest City.

\* WHEN...until 400 AM CDT.

\* IMPACTS...Excessive runoff from heavy rainfall will cause flooding  
of small creeks and streams, urban areas, highways, streets and  
underpasses, country roads, farmland, as well as other poor  
drainage areas and low-lying spots.

\* ADDITIONAL DETAILS...At 1232 AM CDT, Doppler radar indicated heavy  
rain due to slow moving thunderstorms. This will cause flooding in  
the advisory area. Up to nearly two inches of rain has already  
fallen north of Morocco Indiana.

- Headline changes from Urban and Small Stream Advisory to just Flood Advisory.
- Advisory type can be mentioned in the What bullet.
- Product is now in the What, Where, When, Impacts, Additional Details format.



# Future changes

## The NWS proposes updating warnings with warnings

### Consolidated and Reformatted Flood Statement used to update a Flood Warning

WGUS81 KILN 051012  
PILN

#### Flood Statement

National Weather Service Wilmington OH  
512 AM EST MON NOV 5 2018

OH0041-051245-  
/O.CON.KILN.PA.W.0033.000000T0000Z-181105T1245Z/  
/00000.D.RR.000000T0000Z.000000T0000Z.000000T0000Z.OO/  
Delaware OH-  
512 AM EST MON NOV 5 2018

...THE FLOOD WARNING REMAINS IN EFFECT UNTIL 745 AM EST...

\* WHAT...Flooding continues.

\* WHERE...Scioto River in Northwestern Delaware County.

\* WHEN...Until 745 AM EST.

\* IMPACTS...At stages near 12 feet, water covers portions of River Road north of Hoskins Road in northwest Delaware County. Lowland flooding is observed along State Route 257 north of Route 36.

\* ADDITIONAL DETAILS...At 509 AM EST, the river gage near Prospect indicated that flooding was occurring along the Scioto River, with the river level near 12 feet.

#### PRECAUTIONARY/PREPAREDNESS ACTIONS...

Do not drive your vehicle into areas where the water covers the roadway. The water depth may be too great to allow your vehicle to cross safely and the road beneath may not be intact.

##

LAT...LON 4044 8322 4044 8318 4036 8317 4028 8314  
4028 8318 4036 8321

### Proposed Flood Warning used to update a Flood Warning

WGUS81 KILN 051012  
PILN

#### Flood Warning

National Weather Service Wilmington OH  
512 AM EST MON NOV 5 2018

OH0041-051245-  
/O.CON.KILN.PA.W.0033.000000T0000Z-181105T1245Z/  
/00000.D.RR.000000T0000Z.000000T0000Z.000000T0000Z.OO/  
Delaware OH-  
512 AM EST MON NOV 5 2018

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##

LAT...LON 4044 8322 4044 8318 4036 8317 4028 8314  
4028 8318 4036 8321

##

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- Updates to flood warnings are through flood statements today.
- Proposal will be to update warnings with warnings.
- Benefits:
  - Streamlined process
  - Increased product reach.
  - FLS only used for advisories.



# Future changes

The NWS proposes a simpler, two-tier system where the NWS only “raises the flag” for the BIG events.



- Two tier system instead of having three tiers.
- Many confuse watch and advisory
- Secondary headlines and products for sub warning level events replaced with plain language statements.

For more information see [public information statement](#) and sign up for one of the webinars in May.

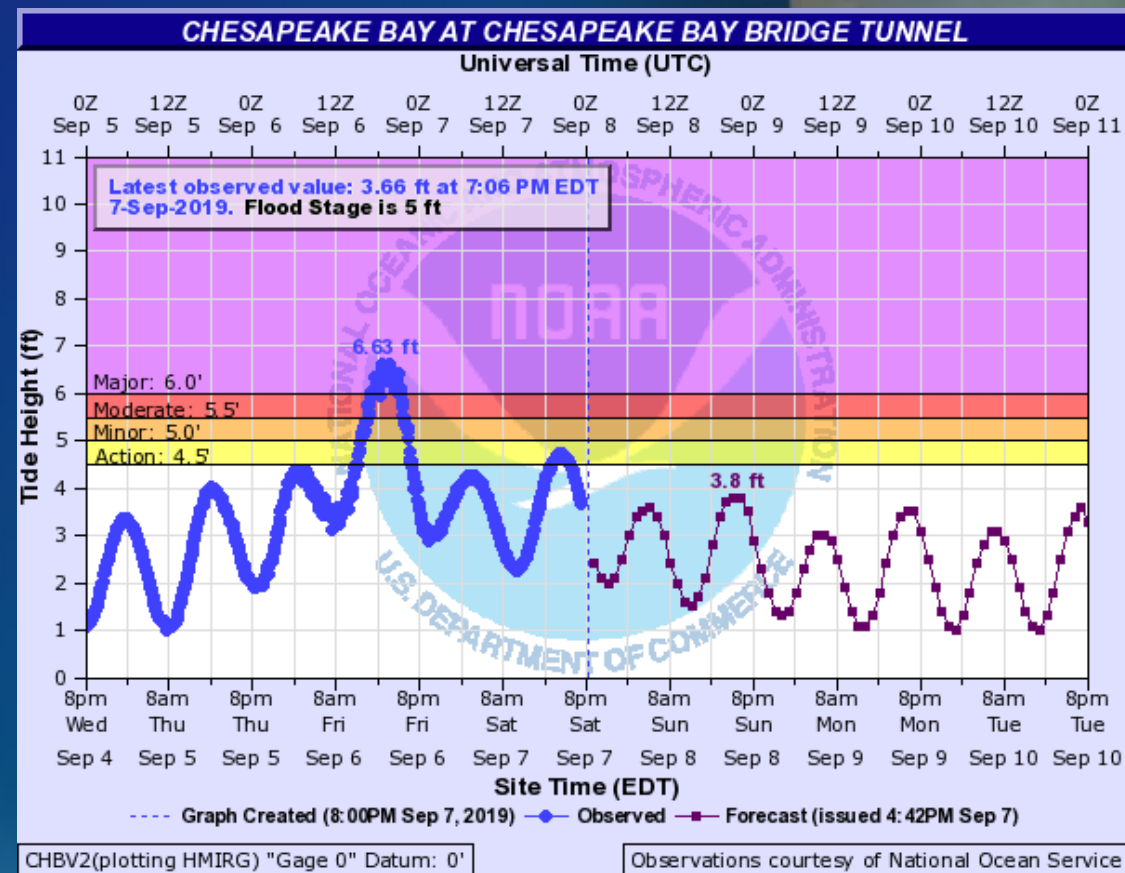




**What can be done to improve  
flood awareness and response?**

# IS THE FULL MESSAGE CONVEYED?

- A river level or tide level is just a number.
- Many confuse watch and warning
- What is minor, moderate or major flooding?
- The best way to relay impacts is to describe locations that are flooded either in the text products or visually.



# How Localities can assist in Flood Protection and Awareness

## NWS Mission

*Provide weather, water, and climate data, forecasts and warnings for the protection of life and property and enhancement of the national economy.*

- 1. The NWS wants to build strong relationships with local communities to improve the flow of information before, during and after severe weather occurs. The more communication, the better the NWS can serve**
- 2. A critical element is to identify the needs of the community and the specific threats that it may face during flooding. This is done by:**
  - Verifying that known flooding impacts are still valid**
  - Identifying any new flooding impacts**
  - Coordinate methods for documenting & sharing information**

# How Localities can assist in Flood Protection and Awareness

## 1. Get to know your local NWS office

- Tour the office (Virtual UFN)
- See the forecast development process
- Tools we use to determine flooding threat and issue warnings

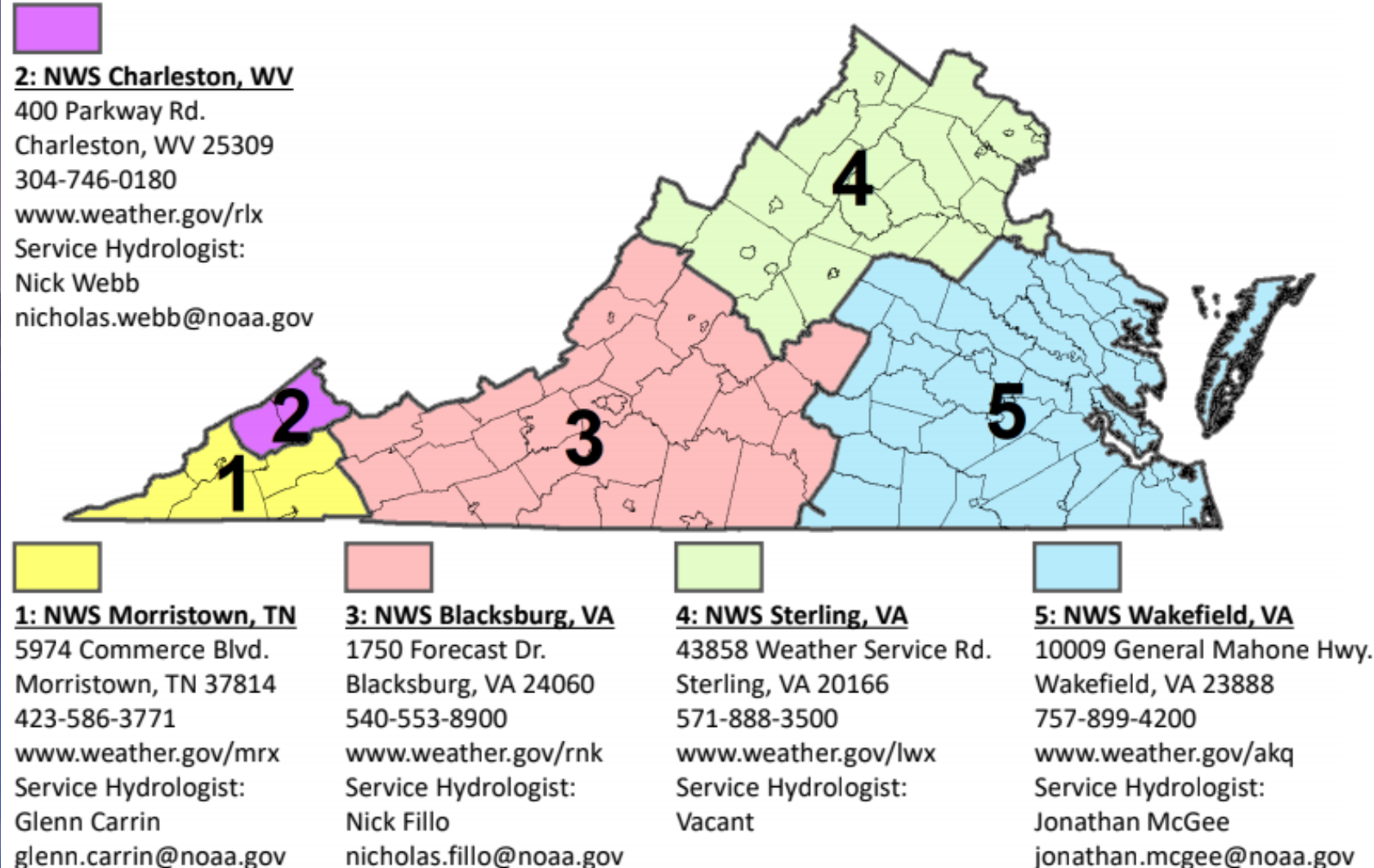
## 2. Discuss known weather challenges/concerns with the NWS

- Identify areas in your jurisdiction prone to flooding
- Discuss recent changes in land-use near waterways (i.e. “A new shopping center was just built along the river”.)
- Develop methods for quickly sharing information during/after storms.
- Provide honest feedback about past NWS service for your area. We try hard to provide the best service possible.



# National Weather Service Contact Information

## National Weather Service Forecast Offices Serving Virginia



Last Updated: 5/25/2021

Feel free to contact the NWS office serving your area to:

- Ask questions or provide feedback about our products and service
- Discuss concerns locations especially prone to flooding in your area.
- Subscribe to weather briefings when severe weather threatens

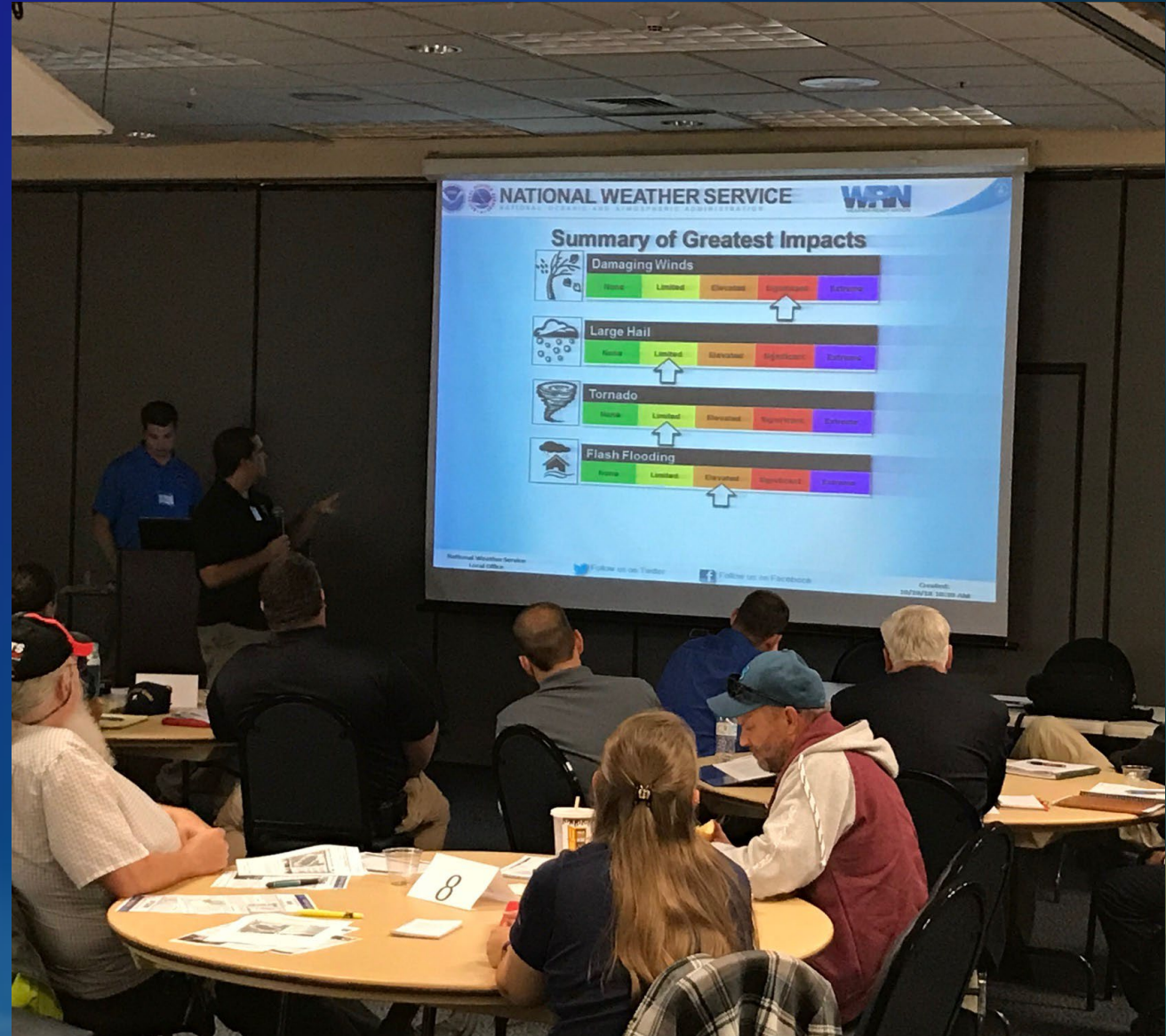


# Tabletop Exercises: Not just for Dam Failures

Simulating a Flood or other Hazardous Weather Event.

Tabletop exercises involving multiple agencies are great for:

- Getting to Know Your Partners, Building Relationships
- Testing Response Procedures
- Correcting Inaccurate/Obsolete Information
- Training New Personnel
- Experiment with New Capabilities



# How Localities can assist in Flood Protection and Awareness

## Documenting Flooding Near River Gauge Locations

We can really use photos of flood locations. We can use them for:

- Information in Warnings
- Setting Flood Stages
- Creating Impact Statements

### Need to know:

- Time/Date the photograph was taken
- Specific location of photo.  
Background landmarks always very helpful to provide context.
- Contact information of photographer for questions & clarifications.



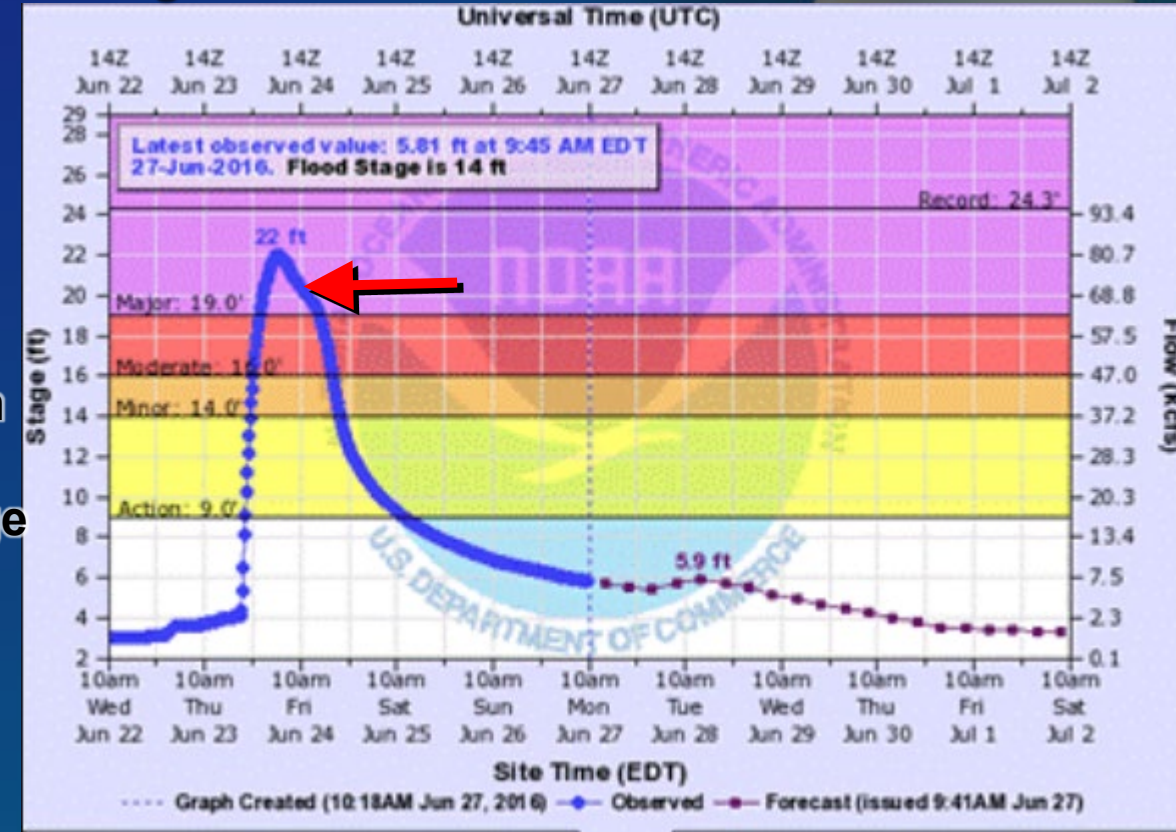
# How Localities can assist in Flood Protection and Awareness

“Photo taken at 10:20 am on 6/16/21 at the 200 block of 1<sup>st</sup> Street near the Big Blue River. Water is about 1 foot deep against the homes when picture taken. Stains on siding indicate flooding was ~2 feet higher.”

Hydrograph of nearby stream gauge on the Big Blue River.



Correlate photo to hydrograph of nearby stream gauge

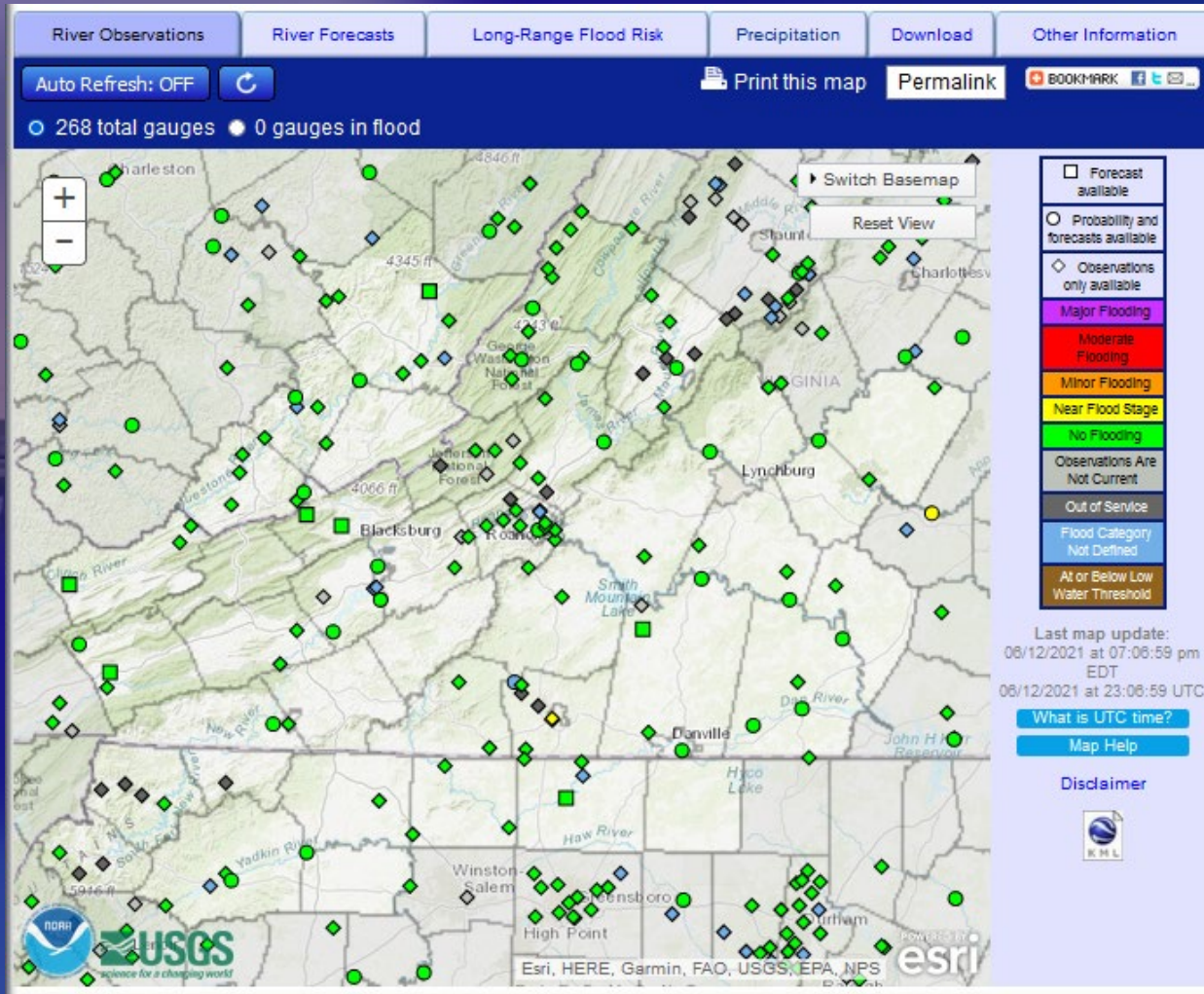


**Coordinate New Impact Statement to add to AHPS:**

***“At 19 feet, water begins to enter homes on 1<sup>st</sup> Street.”***



# Advanced Hydrologic Prediction Service (AHPS)

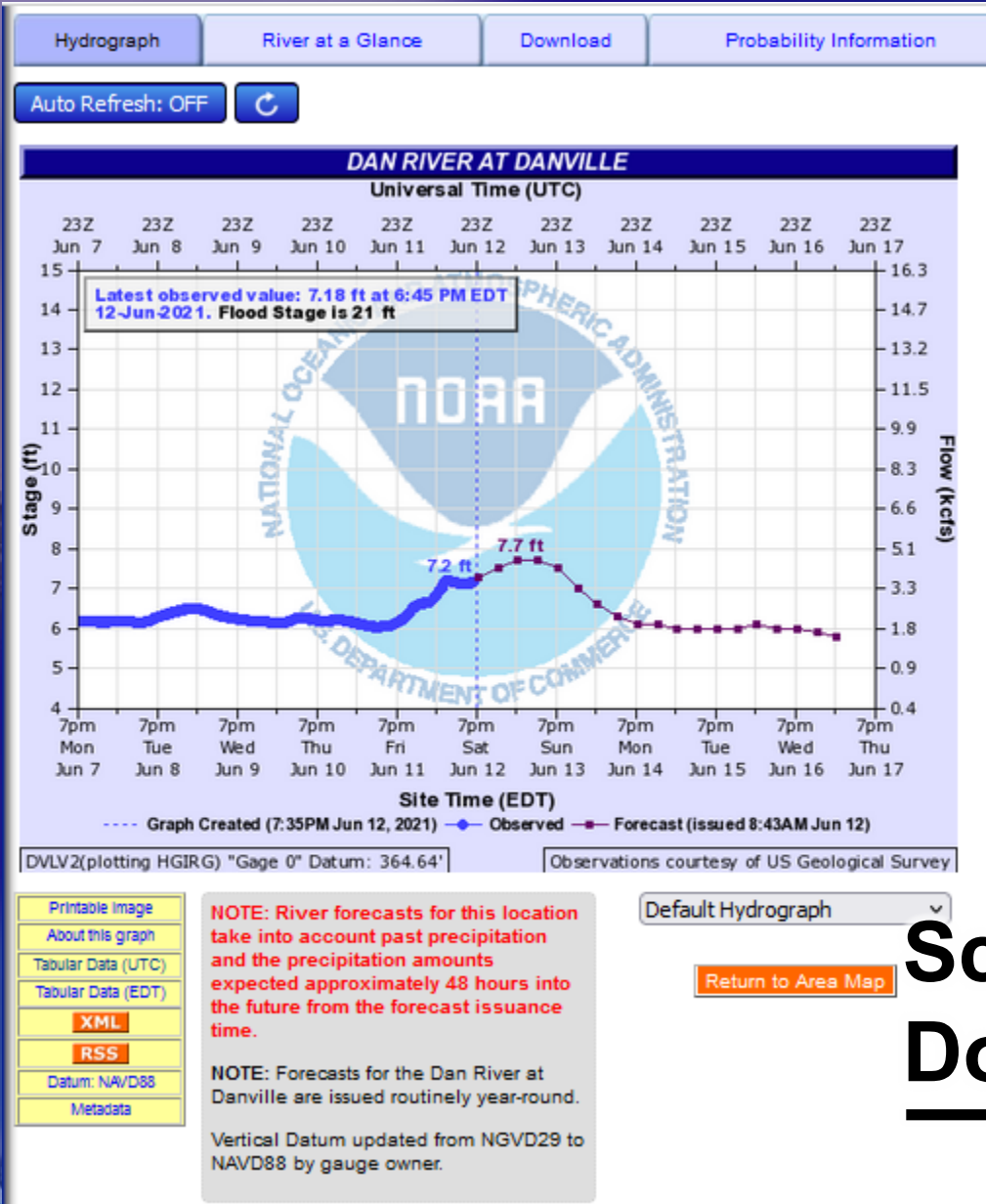


A clickable map of stream gauges, containing the follow:

- Current river stage/streamflow
- Defined flood stages
- Recent & historical crests
- FEMA floodplain data
- Flooding Impact Statements
- And more.....

<https://water.weather.gov/ahps2/index.php>

# Advanced Hydrologic Prediction Service (AHPS)



### Flood Categories (in feet)

Major Flood Stage:	32
Moderate Flood Stage:	26
Flood Stage:	21
Action Stage:	18

- ### Historic Crests
- (1) 30.01 ft on 10/12/2018
  - (2) 28.65 ft on 09/07/1996
  - (3) 27.57 ft on 05/23/2020
  - (4) 27.22 ft on 02/08/2020
  - (5) 26.78 ft on 09/04/1996
  - (6) 26.10 ft on 11/14/2020
  - (7) 25.45 ft on 01/01/2007
  - (8) 25.38 ft on 03/22/2003
  - (9) 25.31 ft on 04/25/2017
  - (10) 23.56 ft on 11/13/2009
- Show More Historic Crests

(P): Preliminary values subject to further review.

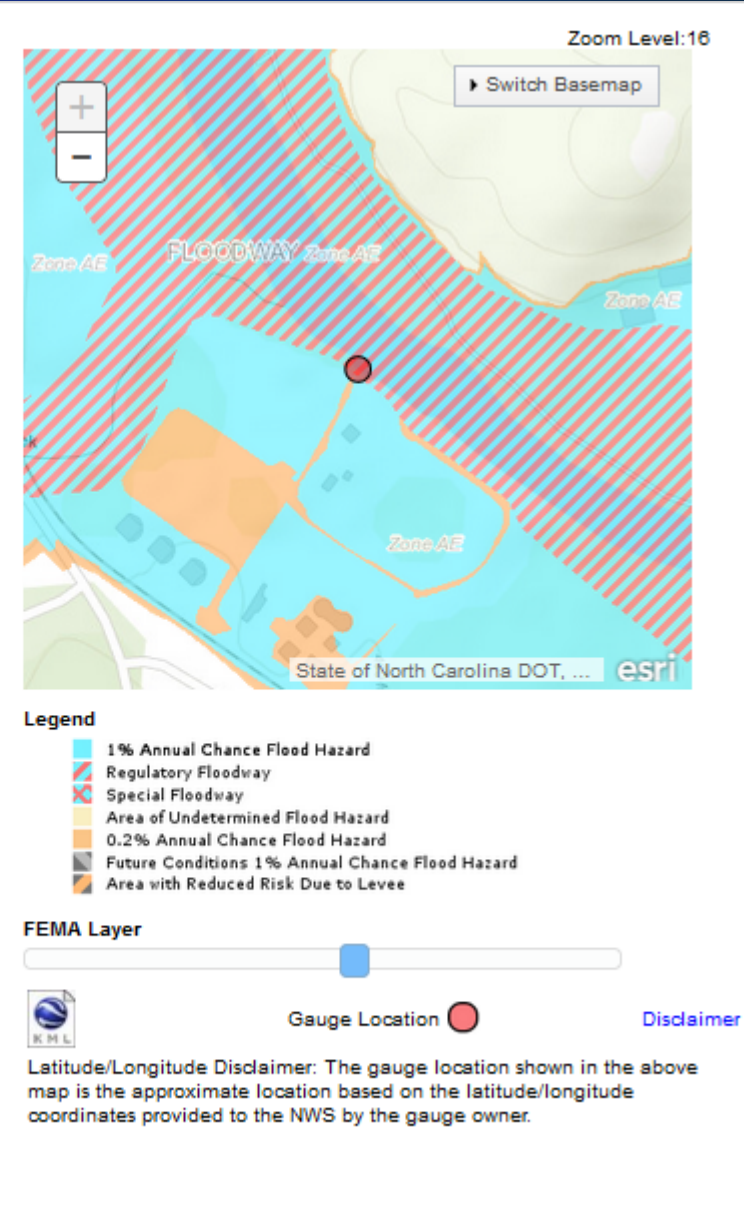
- ### Recent Crests
- (1) 18.51 ft on 02/17/2021
  - (P) 18.19 ft on 12/01/2020
  - (3) 26.10 ft on 11/14/2020
  - (4) 17.49 ft on 10/30/2020
  - (5) 27.57 ft on 05/23/2020
  - (6) 27.22 ft on 02/08/2020
  - (7) 23.28 ft on 02/24/2019
  - (8) 19.61 ft on 12/29/2018
  - (9) 20.34 ft on 12/21/2018
  - (10) 20.59 ft on 12/16/2018
- Show More Recent Crests

(P): Preliminary values subject to further review.

Low Water Records Currently none available.



For more information on your flood risk go to [www.floodsmart.gov](http://www.floodsmart.gov).



Scroll Down

Scroll Down



# Advanced Hydrologic Prediction Service (AHPS)

## Flood Impacts & Photos

### ↓ River Stage (ft)

↓ you notice any errors in the below information, please contact our Webmaster

- 35 Water plant on the west side affected by floodwaters.
- 26 Flood water begins to affect the Danville Utilities Complex and the Public Works complex,
- 23 Flooding begins to affect Riverside shopping center.
- 21 Flooding begins at River District Towers. Minor flooding along River Street begins.
- 20 The road at Trade Street is closed and the parking lot at Newton's landing begins to flood
- 18 Water reaches the walking trail at the MLK bridge
- 17 Water reaches the walking trail at Aiken Bridge

### Photos

- (1) USGS Gage House at Danville WWTP - 1/9/2009
- (2) US view nr. gage - Dir NW; 1/9/2009 - Stage ~ 9.0 ft.
- (3) US view of Dan R. at Danville - 1/9/2009

## Flood Impact Statements

- Coordinated between the NWS and local government officials
- Based on past flooding events or surveys
- Included with NWS River Flood Warnings, providing context as to how bad the flooding may be.
- Designed to make the community better-prepared to deal with flooding.
- The more, the better.....



# How Localities can assist in Flood Protection and Awareness

## After flooding recedes, valuable information still remains

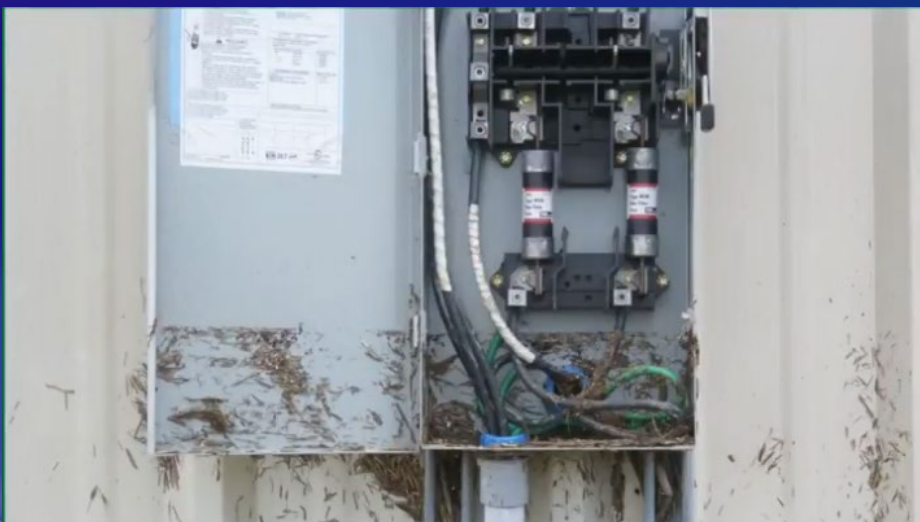


Fences or window screens are usually good sources



Remember to document the specific location where the photo was taken

Always good to mark the debris line with a pen, spray paint, nail, flag or some other marker for further measurements



# How Localities can assist in Flood Protection and Awareness

Drones imagery is now an immensely valuable tool.

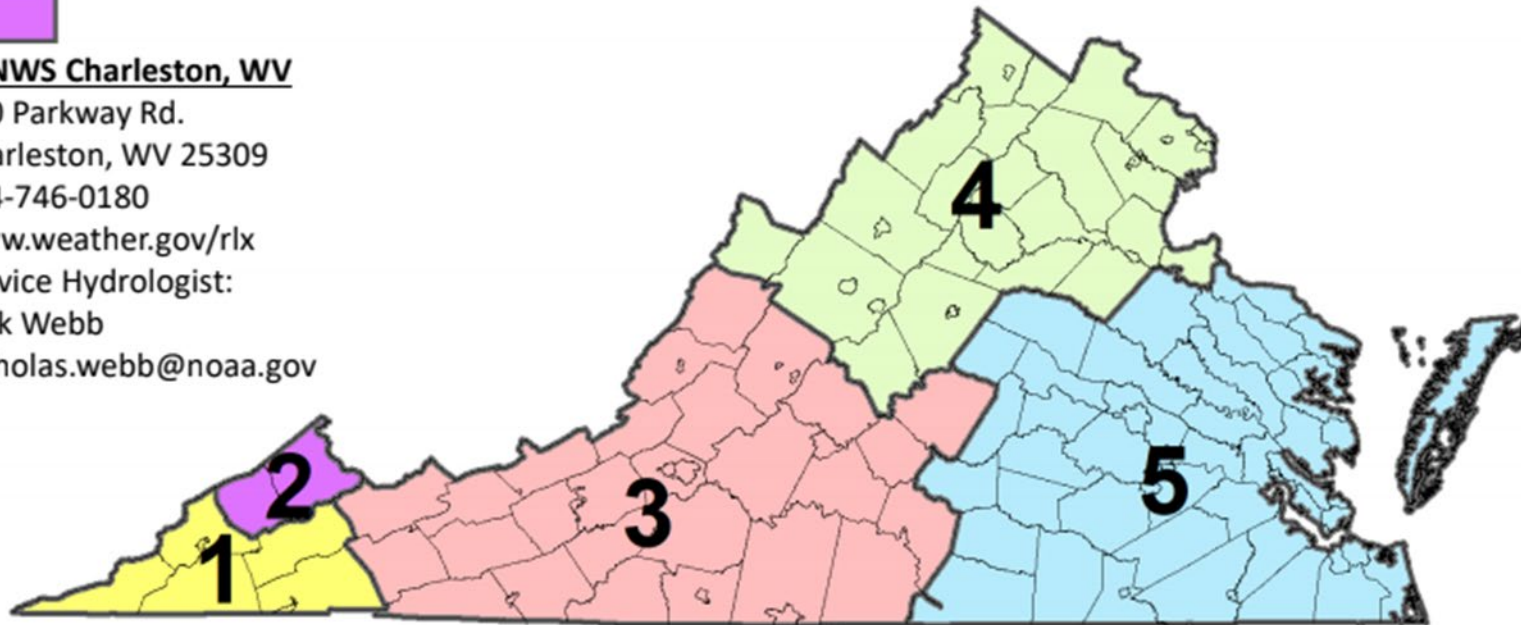


# Questions/Discussion

## National Weather Service Forecast Offices Serving Virginia



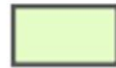
**2: NWS Charleston, WV**  
400 Parkway Rd.  
Charleston, WV 25309  
304-746-0180  
[www.weather.gov/rlx](http://www.weather.gov/rlx)  
Service Hydrologist:  
Nick Webb  
[nicholas.webb@noaa.gov](mailto:nicholas.webb@noaa.gov)



**1: NWS Morristown, TN**  
5974 Commerce Blvd.  
Morristown, TN 37814  
423-586-3771  
[www.weather.gov/mrx](http://www.weather.gov/mrx)  
Service Hydrologist:  
Glenn Carrin  
[glenn.carrin@noaa.gov](mailto:glenn.carrin@noaa.gov)



**3: NWS Blacksburg, VA**  
1750 Forecast Dr.  
Blacksburg, VA 24060  
540-553-8900  
[www.weather.gov/rnk](http://www.weather.gov/rnk)  
Service Hydrologist:  
Nick Fillo  
[nicholas.fillo@noaa.gov](mailto:nicholas.fillo@noaa.gov)



**4: NWS Sterling, VA**  
43858 Weather Service Rd.  
Sterling, VA 20166  
571-888-3500  
[www.weather.gov/lwx](http://www.weather.gov/lwx)  
Service Hydrologist:  
Vacant



**5: NWS Wakefield, VA**  
10009 General Mahone Hwy.  
Wakefield, VA 23888  
757-899-4200  
[www.weather.gov/akq](http://www.weather.gov/akq)  
Service Hydrologist:  
Jonathan McGee  
[jonathan.mcgee@noaa.gov](mailto:jonathan.mcgee@noaa.gov)

