



# 10 LESSONS LEARNED FROM 20+ FLOOD RESPONSE PLANS

INAFSM ANNUAL CONFERENCE

SEPTEMBER 2018 – EVANSVILLE, IN





DOES YOUR  
COMMUNITY  
HAVE A  
FLOOD  
RESPONSE  
PLAN?

# WITH EVERY MAJOR FLOOD

- OVERWHELMING  
LEVEL OF ACTIVITY
- NEED FOR QUICK  
INFORMATION AND  
RESPONSE
- NEED TO BE PREPARED  
AND HAVE A GOOD  
PLAN



# FLOOD RESPONSE PLAN...

- PURPOSE: reduce risk of loss of life, injury and damage to property
- SCOPE: limited to the actions of the FRP Coordinator





# FLOOD RESPONSE PLAN...



1. Documents the flood response process
2. Informs those involved in the chain of command
3. Lists specific responsibilities and task assignments
4. Provides a schedule of activities tied to stages of the flood fight

## A GOOD PLAN...



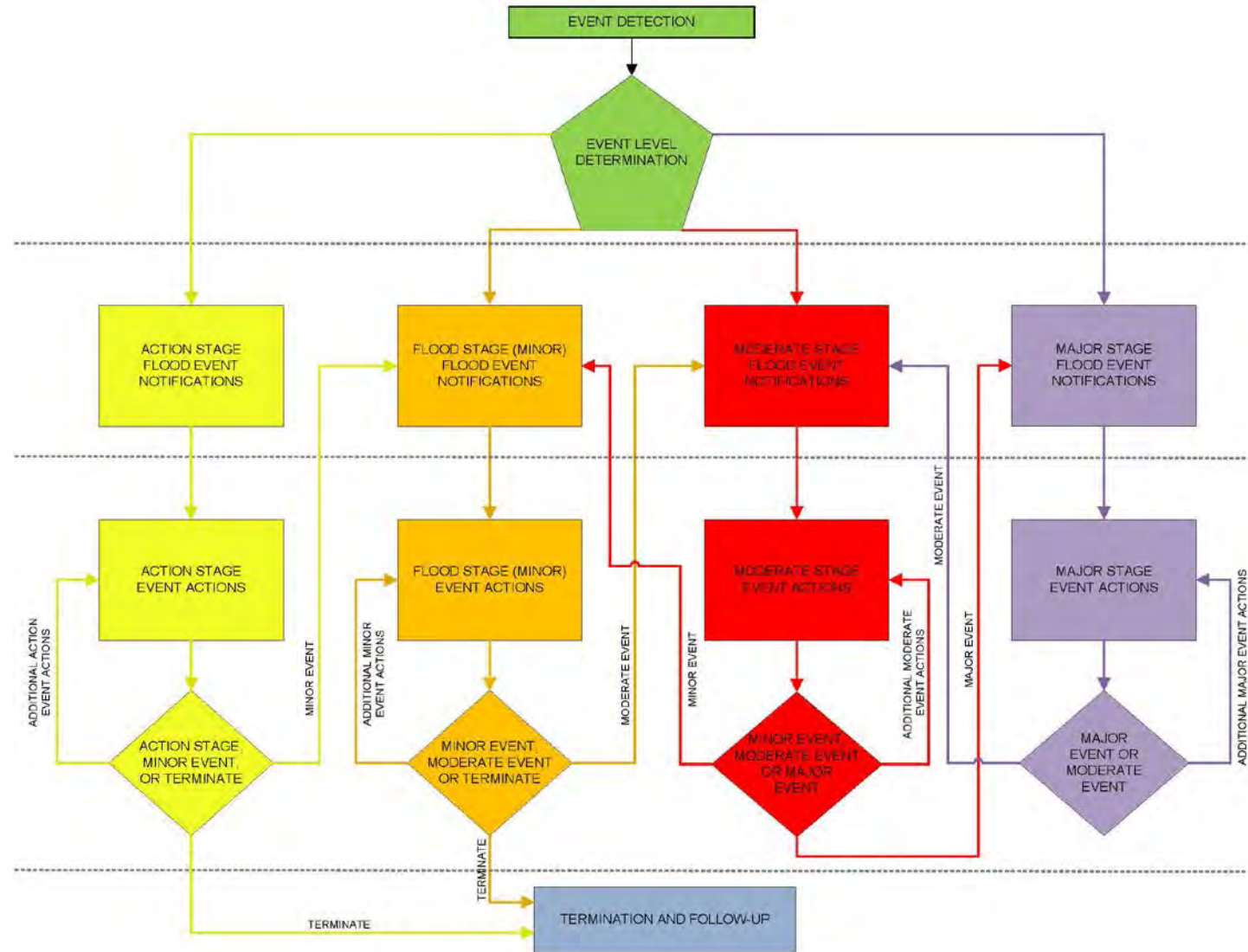
1. Prevents duplication of efforts and wasted resources
2. Helps avoid gaps in response and recovery
3. Provides continuity during events if experienced staff is not available

## Event Detection & Level Determination

## Notification & Communication

## Expected Actions

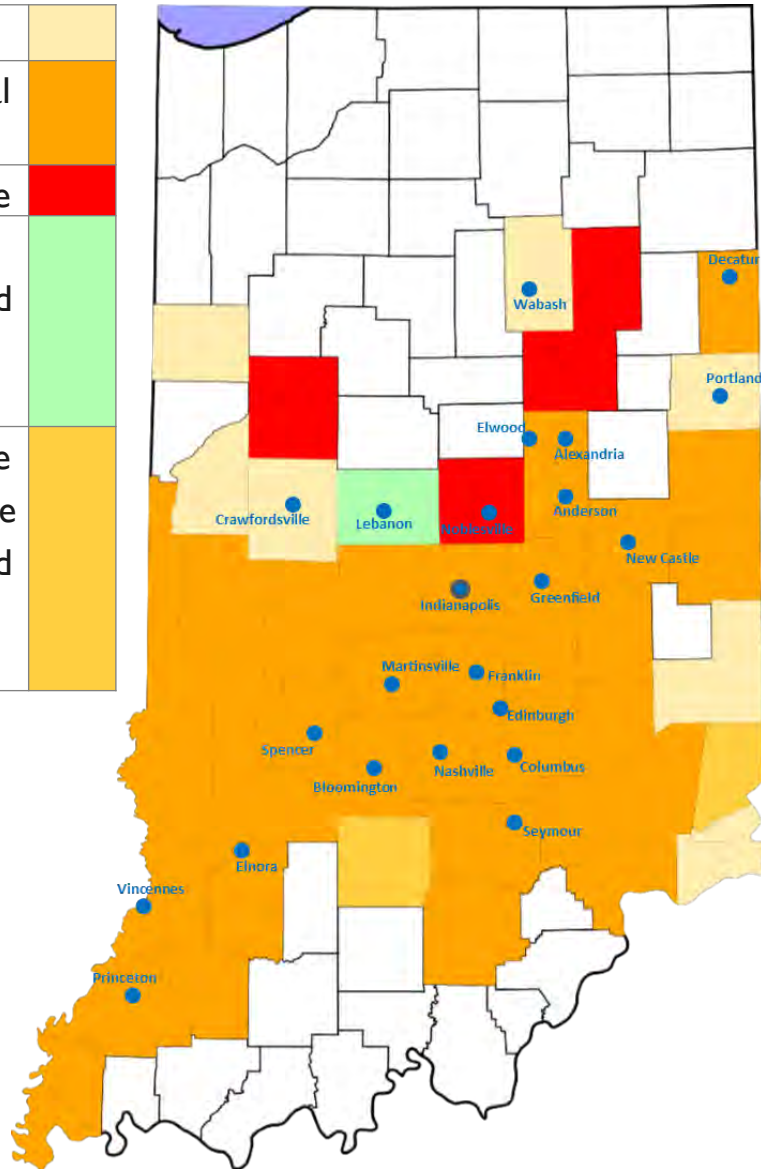
## Termination & Follow-up





## JUNE 2008 FLOOD DISASTER AREAS & FUNDING

Public Assistance	
Public and Individual Assistance	
Individual Assistance	
Public Assistance (Category B) limited to direct Federal assistance	
Individual Assistance and Public Assistance (Category B) limited to direct Federal assistance	



City/Town	County	Population	Funding Source
Spencer	Owen	2,271	CBBEL/USGS
Indianapolis	Marion	863,002	Self-Funded
Columbus	Bartholomew	46,850	Self-Funded
Decatur	Adams	9,524	OCRA/IDHS
Lebanon	Boone	16,098	OCRA/IDHS
Nashville	Brown	1,067	OCRA/IDHS
Elnora	Daviess	657	OCRA/IDHS
Princeton	Gibson	8,362	OCRA/IDHS
Noblesville	Hamilton	60,183	OCRA/IDHS
Greenfield	Hancock	21,709	OCRA/IDHS
Portland	Jay	6,161	OCRA/IDHS
Franklin	Johnson	24,867	OCRA/IDHS
Anderson	Madison	55,130	OCRA/IDHS
Alexandria	Madison	5,024	OCRA/IDHS
Martinsville	Morgan	11,669	OCRA/IDHS
New Castle	Henry	17,426	OCRA/IDHS
Seymour	Jackson	19,384	OCRA/IDHS
Edinburgh	Johnson	4,577	OCRA/IDHS
Vincennes	Knox	17,924	OCRA/IDHS
Elwood	Madison	8,416	OCRA/IDHS
Crawfordsville	Montgomery	16,001	OCRA/IDHS
Bloomington	Monroe	84,465	OCRA/IDHS
Wabash	Wabash	10,253	OCRA/IDHS





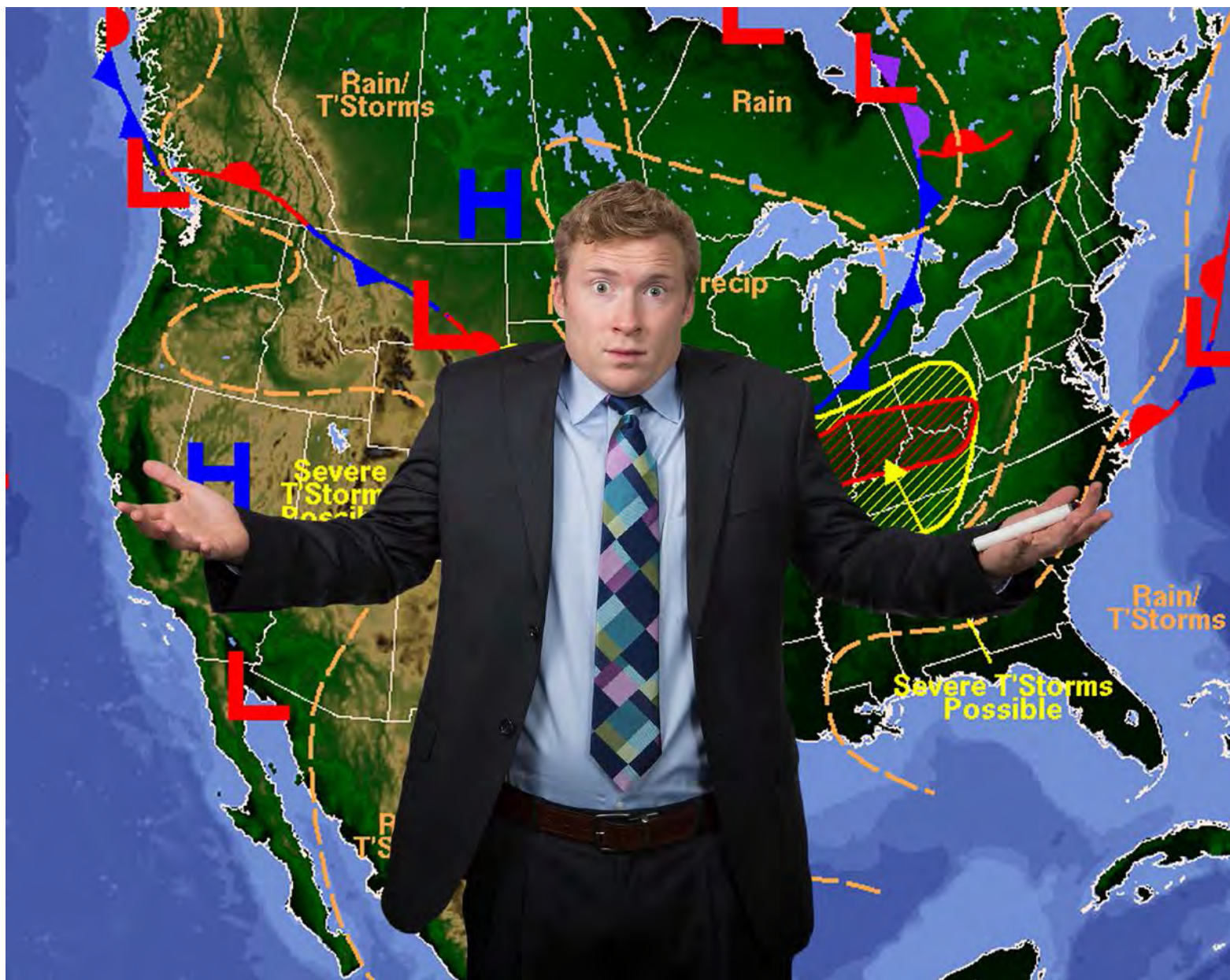
# 10 LESSONS LEARNED FROM 20+ FLOOD RESPONSE PLANS





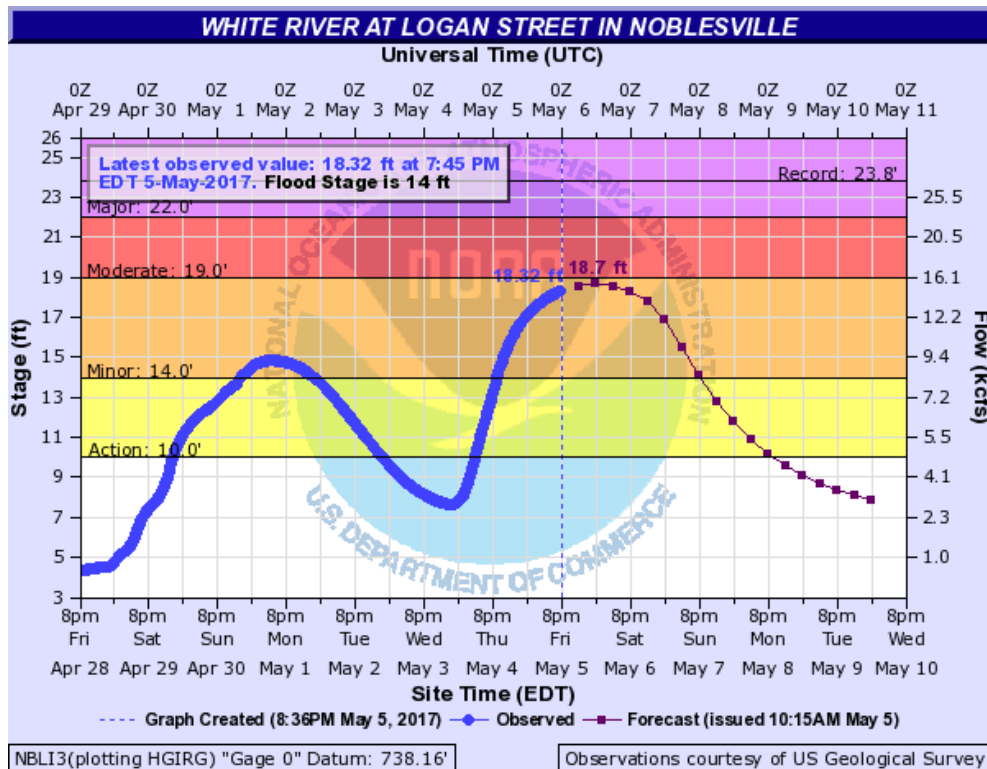
I. FORECAST IS NOT ALWAYS ACCURATE



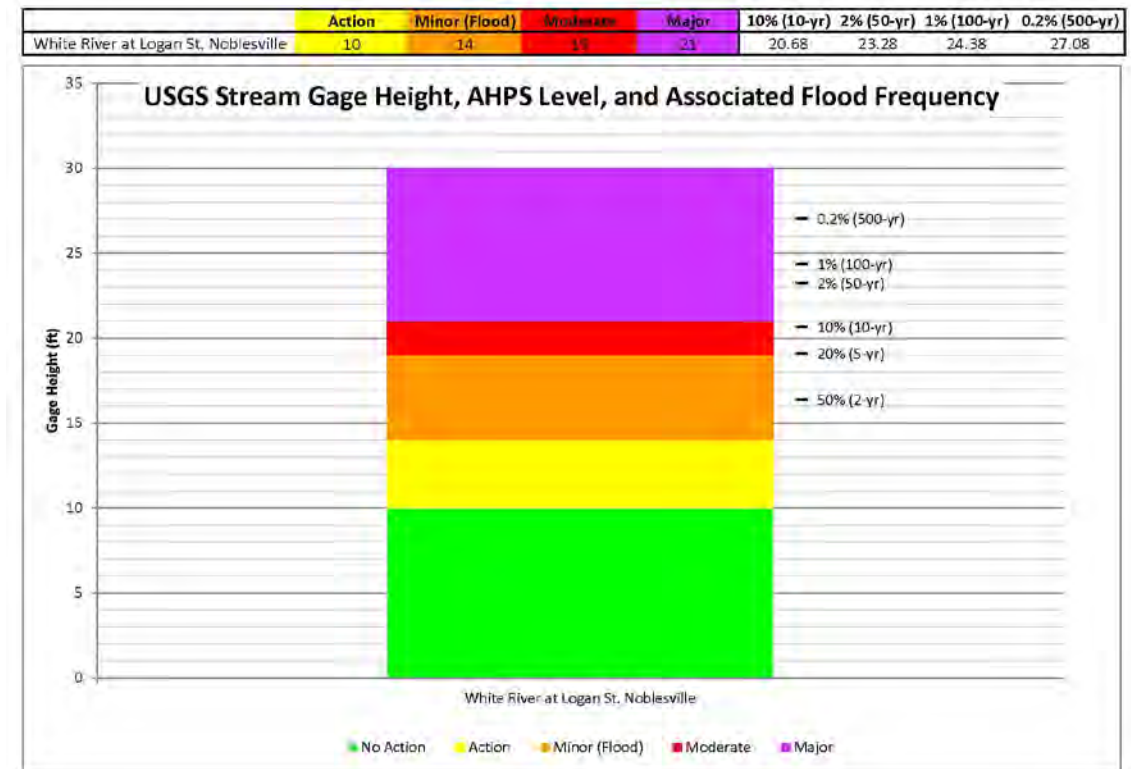


VARIABLES IN  
FORECASTING  
WEATHER...

# FRP – FLOOD DETECTION & FORECAST RESOURCES



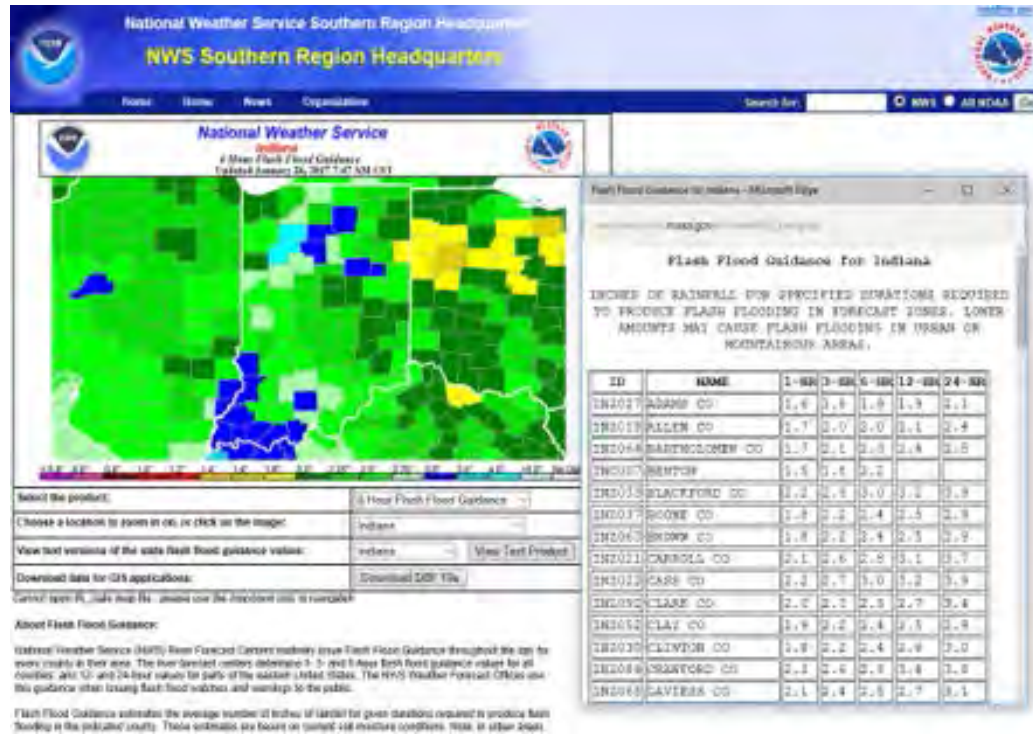
Advanced Hydrologic Prediction Service (AHPS)



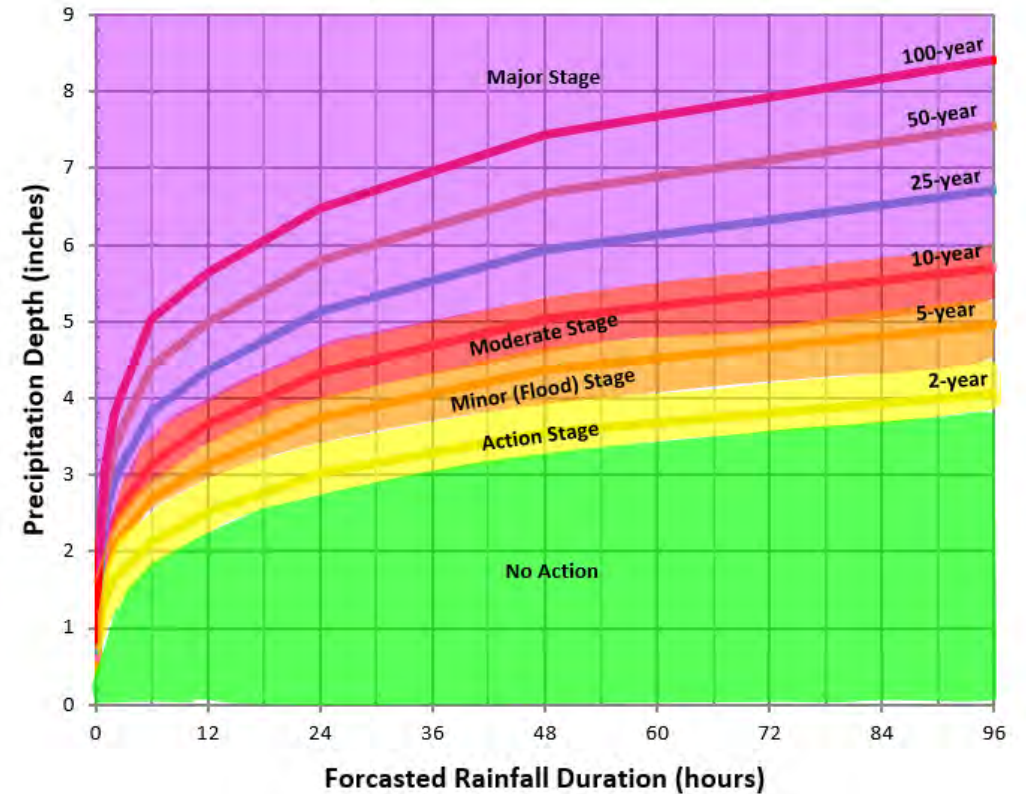
Compiled by CBBEL



# FRP – FLOOD DETECTION & FORECAST RESOURCES



NWS Flash Flood Guidance



Compiled by CBBEL



## 2. HAVE AN ALTERNATE TO YOUR ALTERNATE

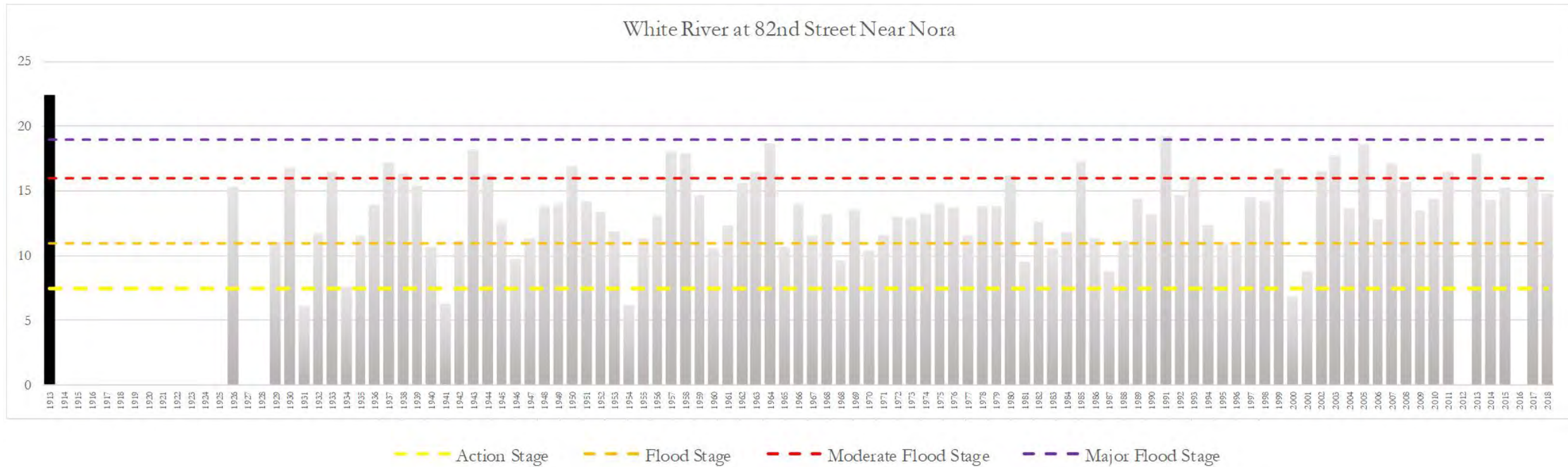


## RECENT FLOODS...

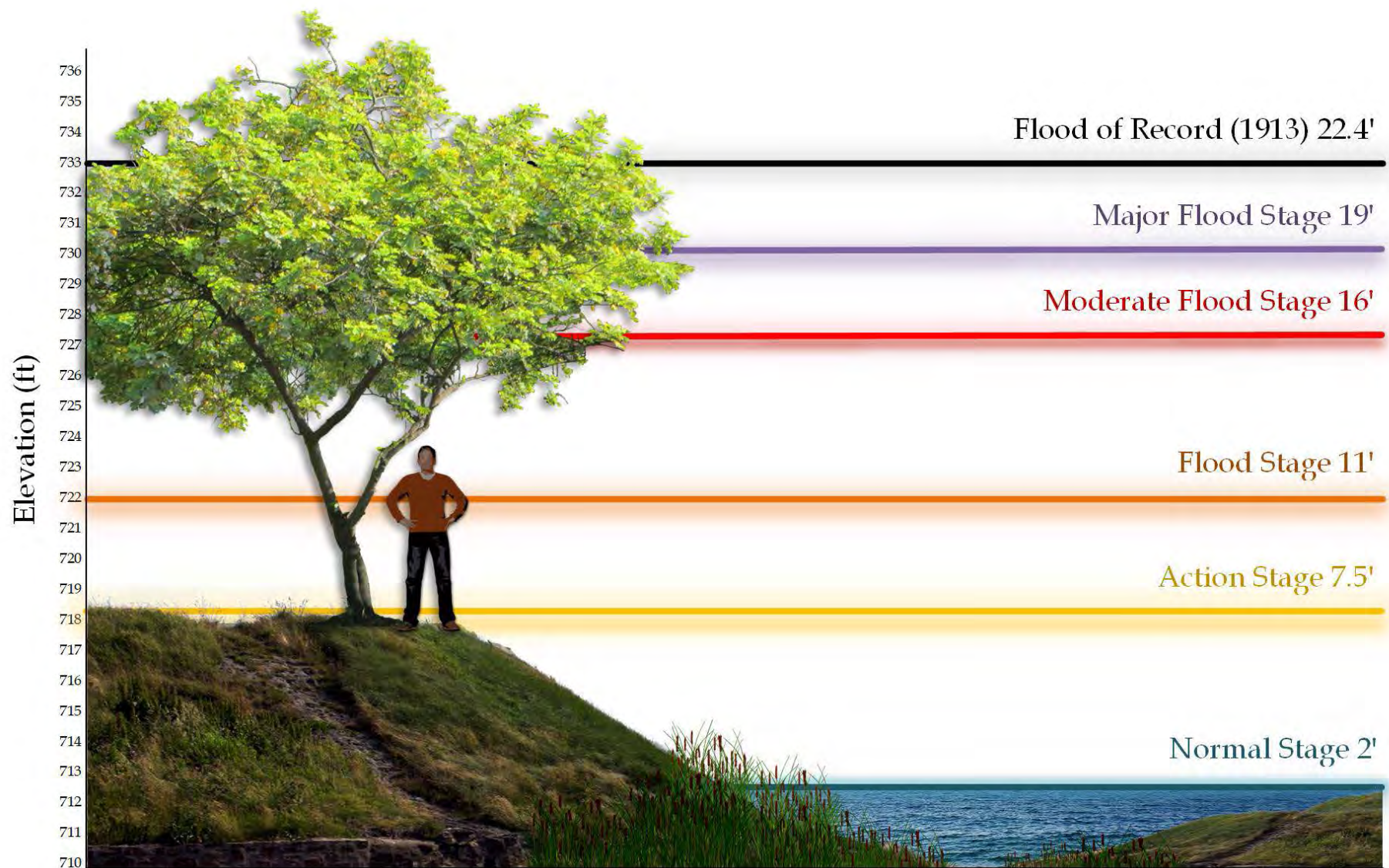
- 33% floods since 1996 on weekends and/or holidays
  - July 4<sup>th</sup> 2003
  - Labor Day 2005
- Flood Disaster Declaration
  - September 2006
  - June 2008
  - April 2011
  - February 2018



# PAST FLOOD EVENTS







AHPS Flood Stages @ Nora in Indianapolis

CBBEL, 2018

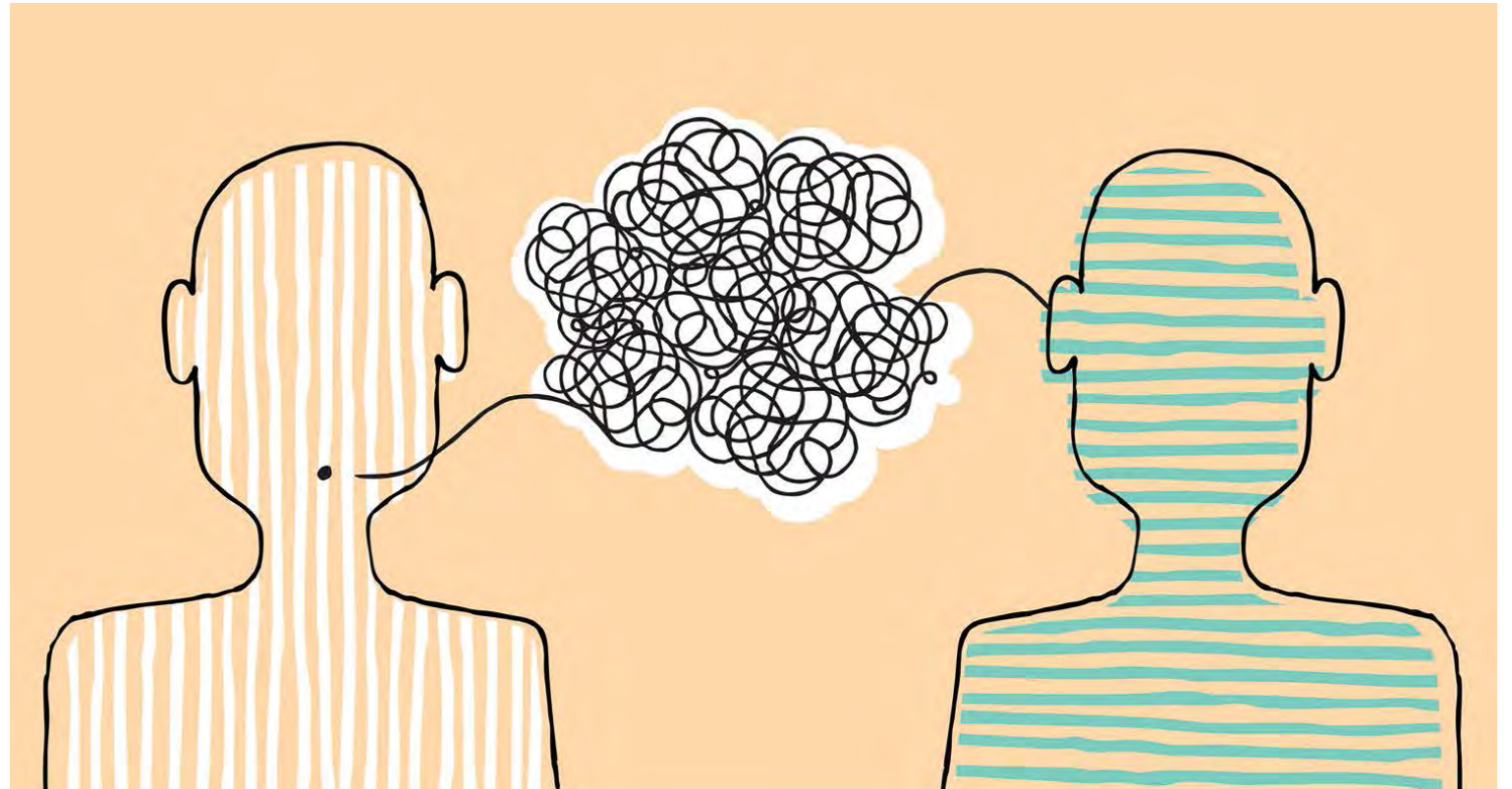


### 3. NEED FOR A CLEAR & CONCISE MESSAGE



# COMMUNICATE RISK

- Need to understand risk from flooding
- Improved preparedness
- Support for mitigation measures



# PRESCRIPTED MESSAGES

## FRP Coordinator

### Moderate Stage Flood Event

- This is **(name)**, FRP Coordinator. I am making this call in accordance with the City's Flood Response Plan.
- A Moderate Stage Flood Event has been detected affecting the Crawfordsville area.
- Moderate flooding condition exists along the **(name)** rivers and/or low-lying areas **(use information from Section 1.5 (extent and severity) to be more specific if flooding is isolated to a certain area)**.
- The FRP has been activated, currently at the Moderate Stage Flood Event level.
- [if applicable] The forecast is for additional rain and we expect to reach **(level)** Flood Stage Event within the next **(number of hours or days)**. Based on this forecast, the following areas may be affected **(list areas)**.
- **Prepare to evacuate** along the **(identify potential evacuee / evacuation limits)**.
- I will keep you apprised of the situation. The best number to contact me during this event is **(emergency contact number)**.

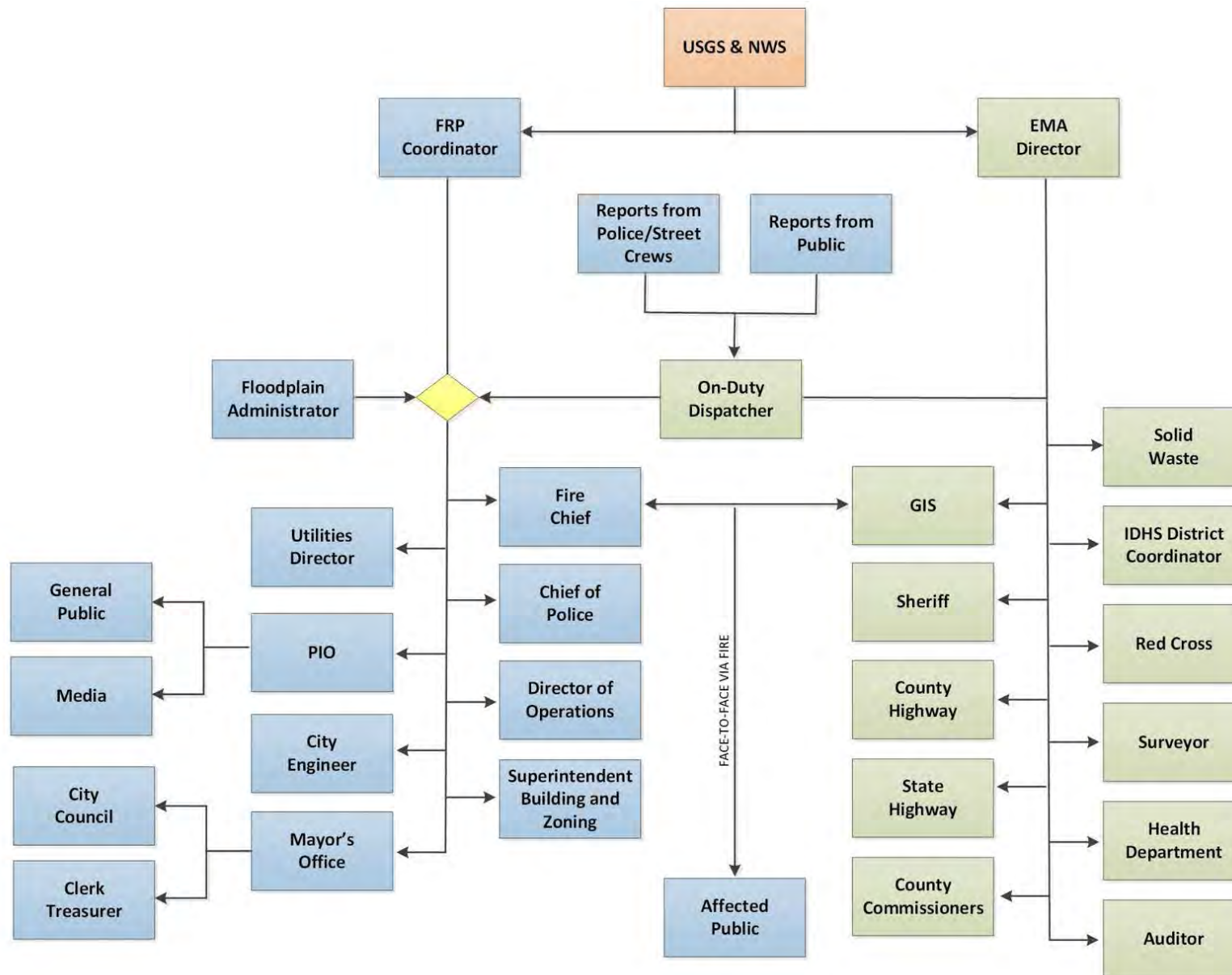
## Public Information Officer

### Announcement for Moderate Stage Flood Event

THE CITY OF CRAWFORDSVILLE ANNOUNCED AT **(time)** TODAY THAT STRUCTURES AND ROADS ADJACENT TO THE **(name of river or stream)** AND IN LOW-LYING AREAS MAY EXPERIENCE MODERATE FLOODING. THE AREAS AND/OR ROADS OF CONCERN INCLUDE **(vary depending on area affected)**. SHOULD THIS CONDITION WORSEN, THE FOLLOWING AREAS SHOULD PREPARE TO EVACUATE: **(list areas and location of shelters for both residents and pets)**

THE CITY OF CRAWFORDSVILLE SPOKESPERSON SAID THAT PEOPLE SHOULD AVOID DRIVING OR WALKING ON ROADS OR BRIDGES THAT ARE COVERED BY WATER. THE DEPTH OF THE WATER OR STRENGTH OF THE CURRENT MAY BE DECEIVING. AS LITTLE AS TWO FEET OF WATER CAN CARRY AWAY A CAR AND SIX INCHES CAN KNOCK A PERSON OFF THEIR FEET. ADDITIONAL INFORMATION WILL BE RELEASED AS PROMPTLY AS POSSIBLE.





# NOTIFICATION & COMMUNICATION FLOWCHART



## 4.VALUE OF A TABLETOP EXERCISE





# FRP REVISITED

1. FLOOD FIGHT
2. ANNUAL REVIEW
3. PERIODIC TEST



## 5. OPPORTUNITY FOR CRS CREDIT





# CRS CREDIT

## 365 POINTS

- **FTR** – Flood Threat Recognition System (75 Pts)
- **EWD** – Emergency Warning Dissemination (75 Pts)
- **FRO** – Flood Response Operations (115 Pts)
- **CFP** – Critical Facilities Planning (75 Pts)
- StormReady Community (25 Pts)



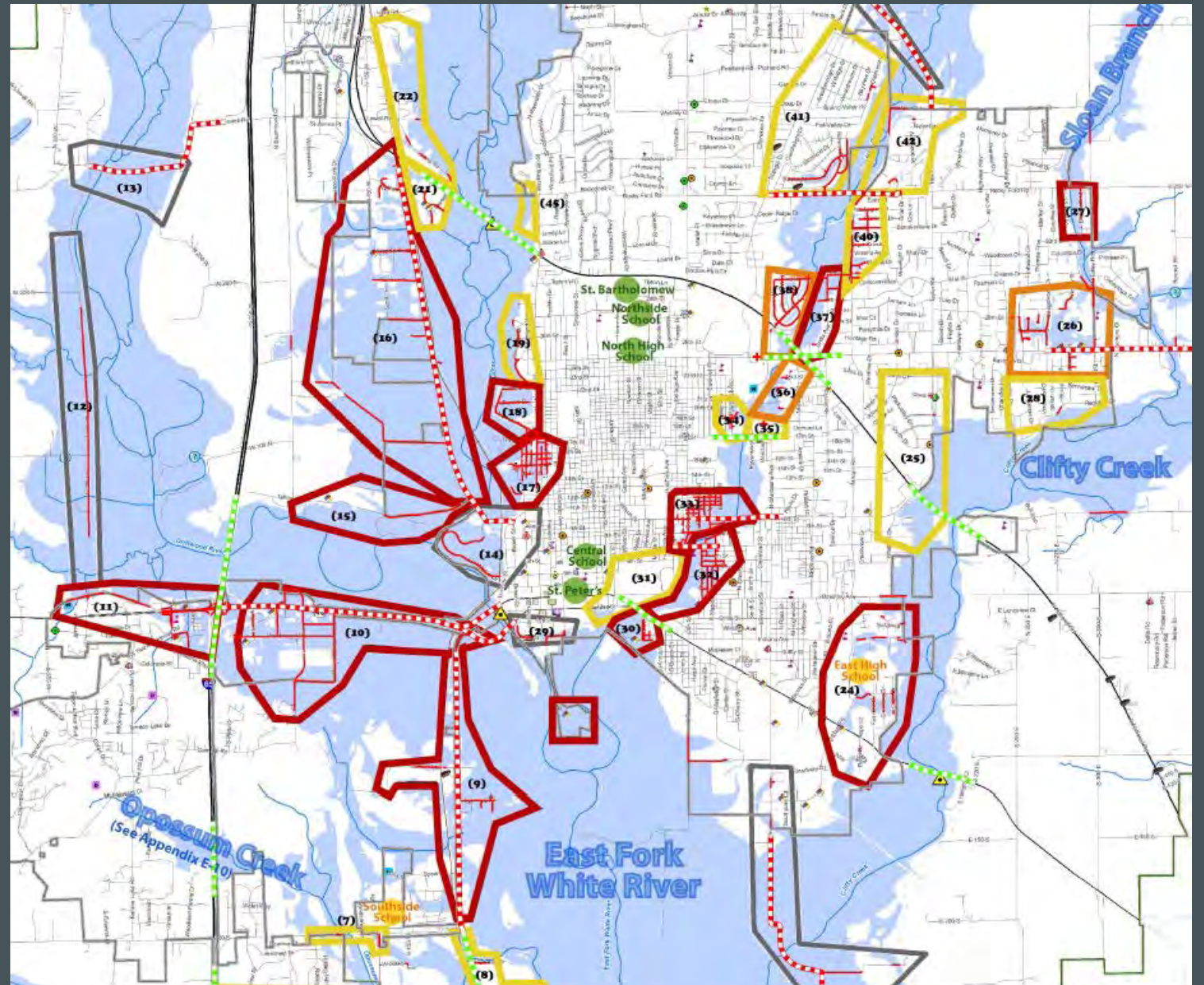


## 6. GREATER UNDERSTANDING OF FLOOD RISK



# FLOOD IMPACT AREAS

- 10, 50, 100 & 500-YR
- COLOR CODED PRIORITY AREAS
- OVERTOPPED ROADS
- SHELTER ACCESS
- BETTER DATA – USGS INUNDATION & BLDG FOOTPRINTS







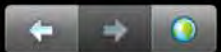
# Flood Inundation Mapper

Print Map

Basemaps



## Zoom History



Indiana: St. Marys Ri...

## Estimated Flood Conditions



- ☐ Adjust flood opacity
- ☒ view grids

Selected Gage Height:  
**27.00 feet**  
Selected Discharge:  
**15130.00 cfs**  
Selected NAVD88 Altitude:  
**787.10 feet**

Click on map for  
estimated water depth



## Available Layers

- ☐ National Weather Service Radars
- ☐ Flood Watches/Warnings
- ☐ AHPS Forecast Sites

### Flood depth (in feet)

#### Area in floodplain

- 0 - 2
- 2 - 6
- 6 - 15
- 15 +

### Area of uncertainty (where applicable)

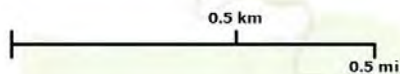


### USGS FIM sites (NWS forecast category)

- ▲ No forecast information available
- ▲ Major flooding
- ▲ Moderate flooding
- ▲ Minor flooding
- ▲ Action stage
- ▲ No flooding

### Levee centerline (where applicable)

### Limit of study area



Map Scale: 1:18056

Geographic

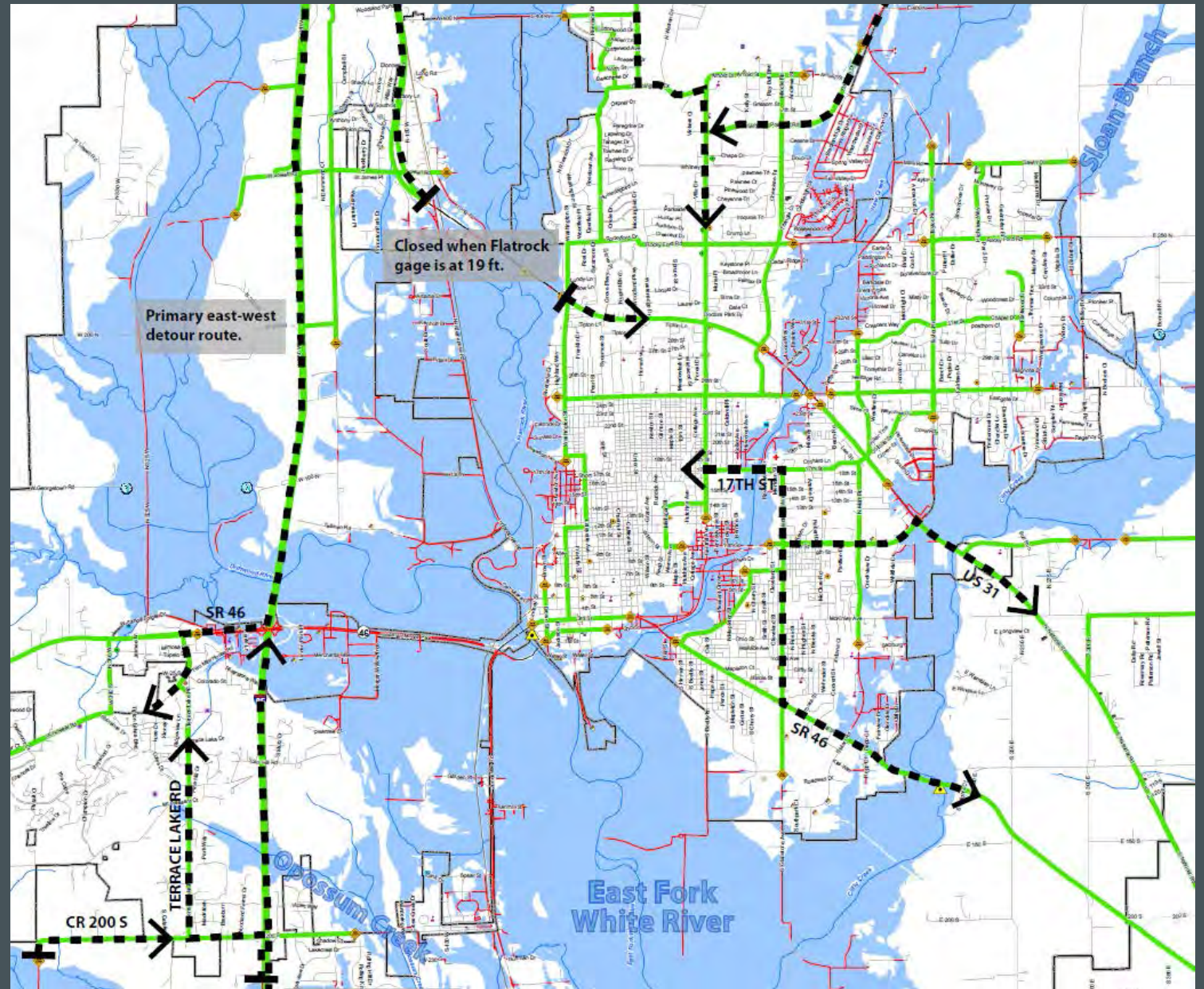
Lat: 40.8481, Lng: -84.9375

ESRI, HERE, Garmin, INCREMENT P, USGS, METI/NASA, USDA, EPA



# FLOOD-SAFE ROUTES

- 500-YR FLOOD
- OVERTOPPED ROADS
- FLOOD-SAFE ROUTES



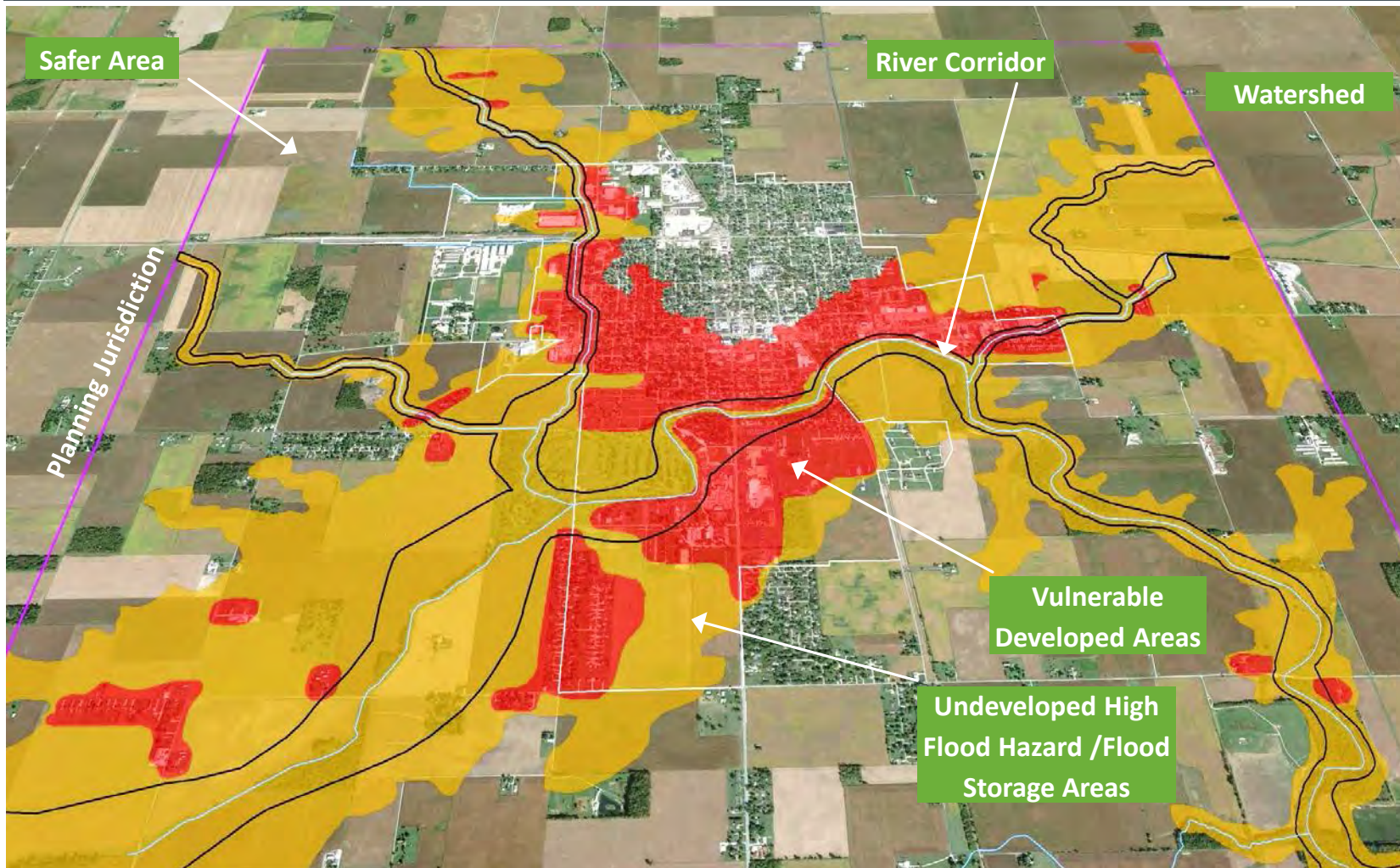


## 7. FLOOD MITIGATION AND SMART GROWTH





# FLOOD RESILIENCE PLANNING AREAS



Planning Area	Area Boundary
River Corridor	Floodway or FEH area, whichever is greater
Undeveloped High Flood Hazard/Flood Storage Area	Undeveloped land in the floodway fringe
Vulnerable Developed Area	Existing developed land in the SFHA
Safer Area	Outside SFHA but within planning jurisdiction
Watershed	Entire drainage area



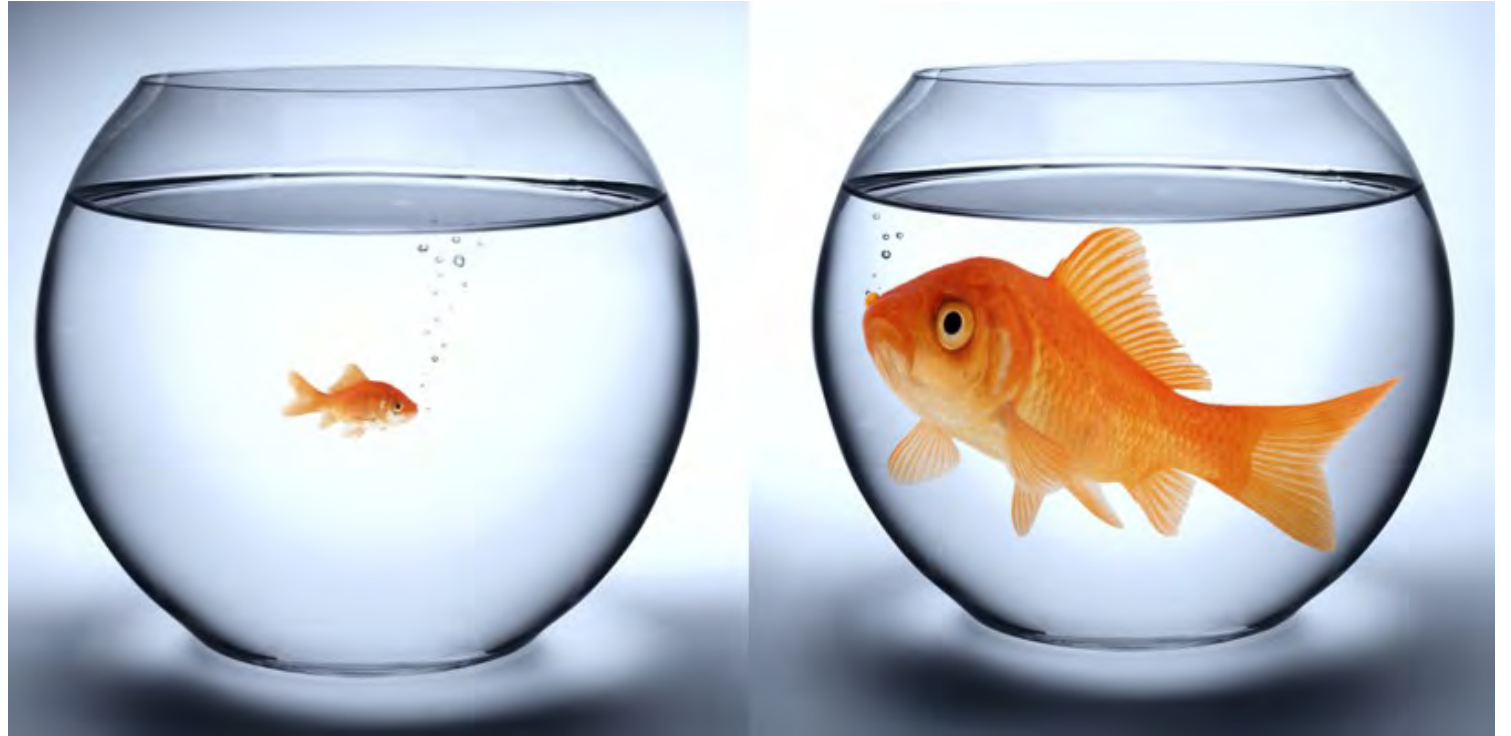
## 8. ONE SIZE DOES NOT FIT ALL





# FLEXIBLE APPROACH

- GAGED STREAMS
- UNGAGED STREAM
- LEVEE PROTECTED
- RESOURCES
- QUALITY OF DATA





## 9. POST-FLOOD DOCUMENTATION



# DOCUMENTATION CHECKLIST

- HIGH WATER MARKS
- DAMAGES – BLDGS & INFRASTRUCTURE
- RAINFALL DATA
- USGS & AHPS LEVELS
- FIRM & FLOODED AREAS
- DEBRIS REMOVAL





## 10. PEOPLE MAKE THE DIFFERENCE







# LOCAL LEADERSHIP

# SUMMARY OF LESSONS LEARNED

FORECAST IS NOT  
ALWAYS ACCURATE

HAVE AN  
ALTERNATE TO  
YOUR ALTERNATE

NEED FOR A CLEAR  
AND CONCISE  
MESSAGE

VALUE OF A  
TABLETOP  
EXERCISE

OPPORTUNITY  
FOR CRS CREDITS

GREATER  
UNDERSTANDING  
OF FLOOD RISK

FLOOD  
MITIGATION AND  
SMART GROWTH

ONE SIZE DOES  
NOT FIT ALL

POST-FLOOD  
DOCUMENTATION

PEOPLE MAKE THE  
DIFFERENCE

## SO WHAT?



- States at Risk: America's Preparedness Report Card, 2015
- Threats posed by changing climate: extreme heat, drought, wildfire, **inland (riverine) flooding** and coastal flooding
- **Inland (riverine) flooding:**
  - Severity of high runoff events
  - Population living in SFHA

# CLIMATE PREPAREDNESS CRITERIA

1. Is the state taking actions to address its **CURRENT RISKS** from the climate threat?
2. Has the state undertaken activities to **UNDERSTAND IT'S FUTURE CHANGES IN VULNERABILITY AND RISKS** from climate threat?
3. Has the state **PLANNED FOR ADAPTION TO THE FUTURE CHANGES IN RISKS** from each climate threat?
4. Is the state **IMPLEMENTING SPECIFIC ACTIONS** to address future changes in risks to each climate threat?



n/a Alabama

C- Indiana

C- Nebraska

C South Carolina

n/a Alaska \*

C Iowa

n/a Nevada

F South Dakota

n/a Arizona

D+ Kansas

n/a New Hampshire

D Tennessee

F Arkansas

F Kentucky

C New Jersey

n/a Texas

A- California

n/a Louisiana

n/a New Mexico

n/a Utah

n/a Colorado

C Maine

A New York

n/a Vermont

A Connecticut

n/a Maryland

B- North Carolina

B Virginia

B+ Delaware

A Massachusetts

C+ North Dakota

B Washington

D- Florida

B- Michigan

D Ohio

D+ West Virginia

C- Georgia

n/a Minnesota

D Oklahoma

C+ Wisconsin

n/a Hawaii \*

n/a Mississippi

C+ Oregon

n/a Wyoming

n/a Idaho

F Missouri

B+ Pennsylvania

D- Illinois

n/a Montana

B Rhode Island

\* graded using different method. See [Methodology](#).



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Isn't it funny  
The people we get to know  
Over a few drinks.