# NONSTRUCTURAL ANALYSIS: DEVELOPING AND APPLYING A LOGICAL AGGREGATION METHODOLOGY IN THE FIRST 90 DAYS OF A STUDY

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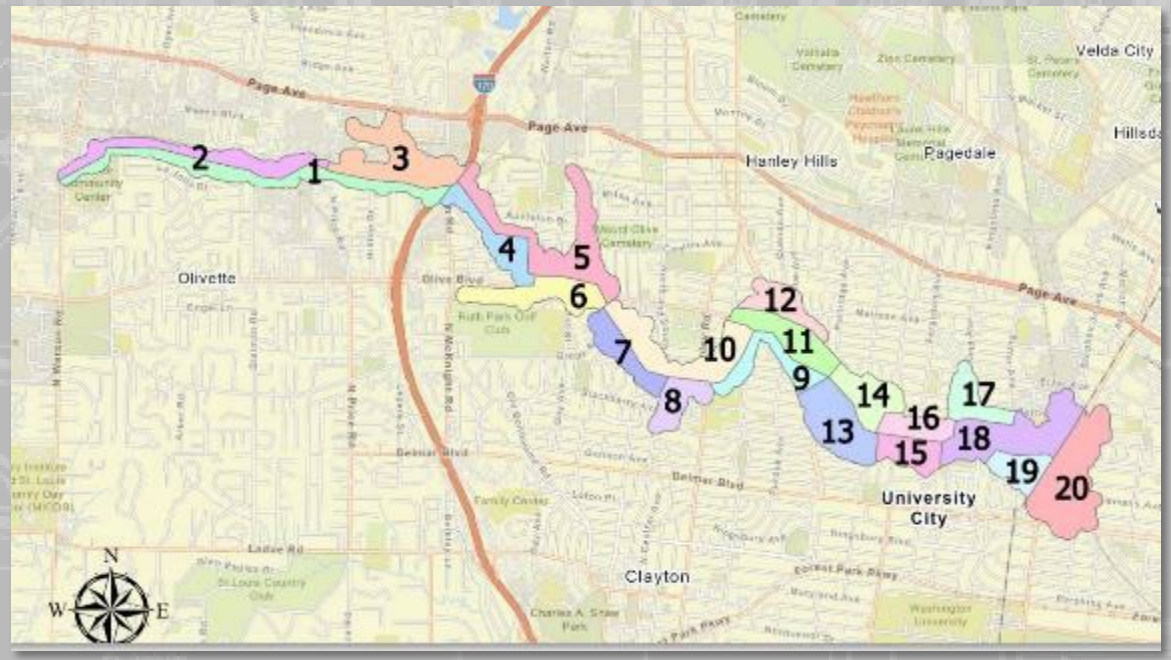


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# WHAT IS YOUR FAMILIARITY WITH DEVELOPING AND APPLYING A LOGICAL AGGREGATION METHODOLOGY?

Never heard of it

Some familiarity

Ask me anything!

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# WEBINAR OVERVIEW

- ✓ Aggregation Methodology Policy Requirements and Intent (PB 2019-03)
- ✓ Recommendations for Developing and Applying a Logical Aggregation Methodology in the 1st 90 Days of a Study
- ✓ Lessons Learned
- ✓ Q & A

# BOTTOM LINE UP FRONT

An initial logical aggregation methodology should:

- ✓ Be developed during the study scoping phase (1st 90 days)
- ✓ Be developed using the same information used to inform the future without project (FWOP) condition and the formulation and evaluation of structural measures
- ✓ Facilitate the formulation, evaluation, and comparison of nonstructural measures and alternatives and inform decision making

# LOGICAL AGGREGATION METHODOLOGY POLICY

# POLICY: REQUIREMENTS

Planning Bulletin 2019-03, Further Clarification of Existing Policy for USACE Participation in Nonstructural Flood Risk Management and Coastal Storm Risk Management Measures, 13 Dec 2018

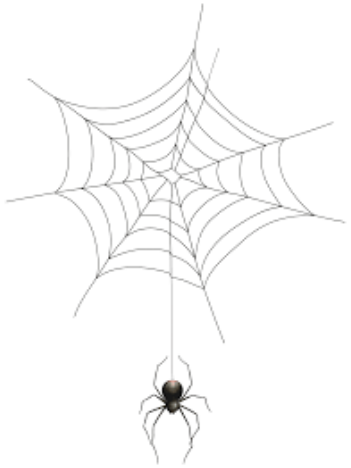
- All future nonstructural analyses will **formulate** and **then evaluate** measure and plans using a **logical aggregation method**.

- Project delivery teams shall **describe the logic and methodology** for such aggregation in the decision document and supporting appendices.

# AGGREGATION POLICY: INTENT

- Improve the quality (fidelity) of nonstructural analyses
- Promote overall risk management and consideration of all benefit categories
- Promote consistency and compatibility between the formulation and evaluation of structural and nonstructural measures and alternatives

**BOTTOM LINE:** A logical aggregation methodology should facilitate the formulation, evaluation and comparison of nonstructural measures and alternatives and inform decision making.



*With great FLEXIBILITY comes great RESPONSIBILITY*

# WHAT CHALLENGES HAVE YOU ENCOUNTERED WHEN DEVELOPING AND APPLYING A LOGICAL AGGREGATION METHODOLOGY?

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# LOGICAL AGGREGATION METHODOLOGY RECOMMENDATIONS

# WHAT IS A LOGICAL AGGREGATION METHODOLOGY?

- A logical aggregation methodology is the set of criteria that a PDT applies to the study area to group structures by shared characteristics.
- Typically, a logical aggregation methodology should be based on multiple criteria/shared characteristics.
- A logical aggregation should be primarily based on shared flood risk characteristics.
- A logical aggregation methodology should be developed in concert with hydraulic reaches and consequence areas.

# HOW TO GET STARTED

Begin with an initial iteration of the planning process to gain an understanding of what you know and don't know about the study area:

- Problems, opportunities, objectives and constraints
- Existing and future without project (FWOP) conditions
- Overall flood risk and how it might vary across the study area
- Likely measures and alternatives to be considered in the study

Then think critically about how specific criteria/shared characteristics can be used in an aggregation methodology to facilitate the formulation, evaluation, and comparison of nonstructural measures and inform decision making.

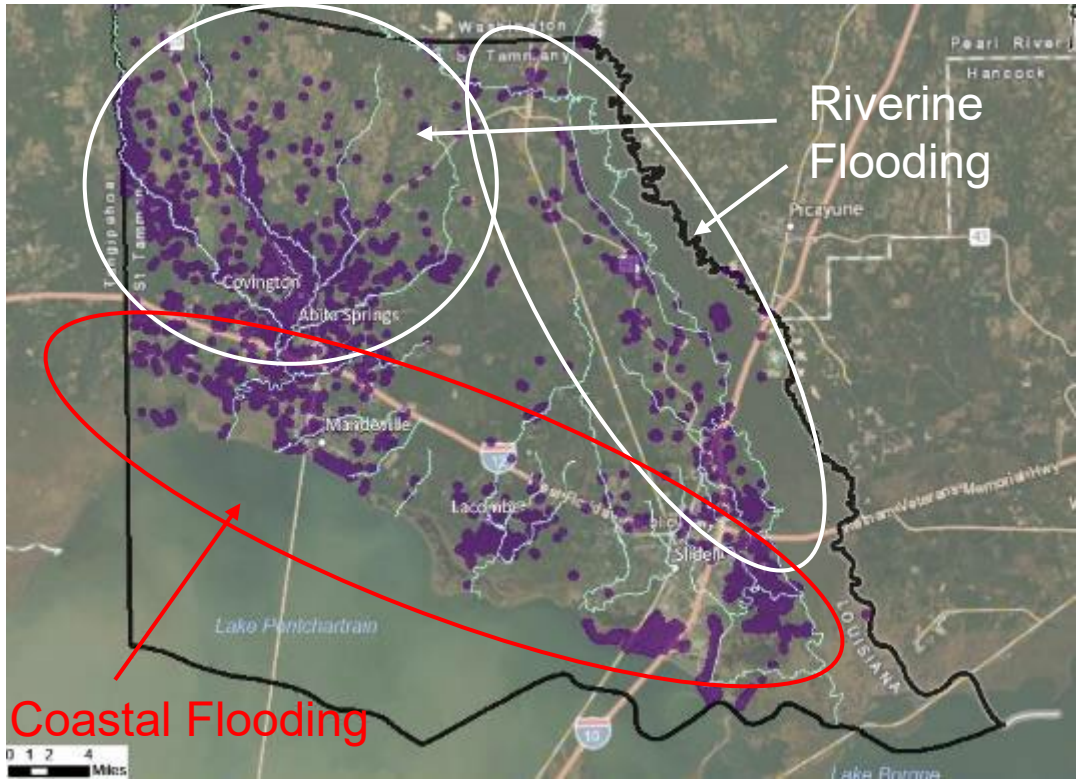
*Now, lets talk about specific criteria/shared characteristics we can use during the 1st 90 days of a study…*

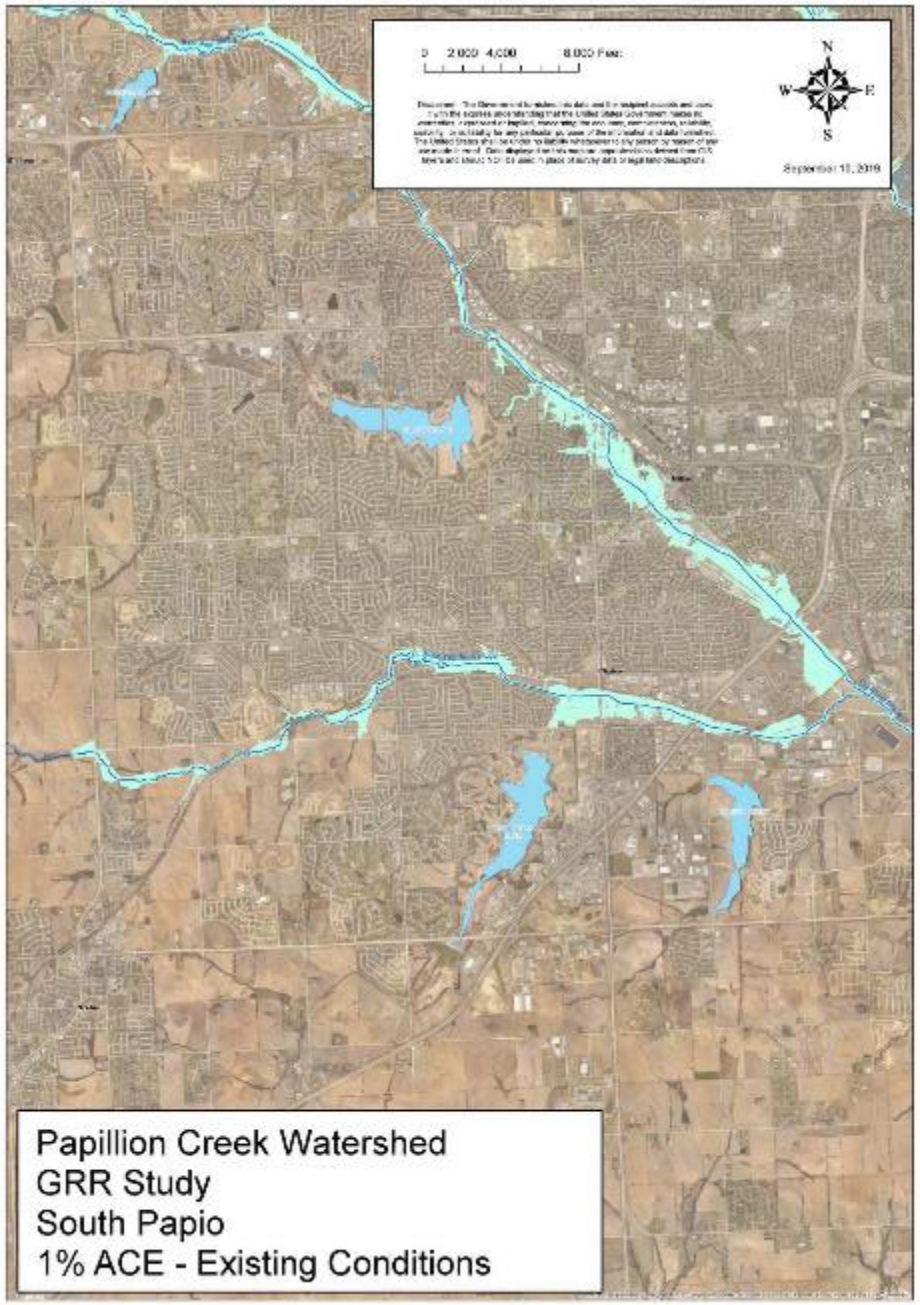
# SOURCES OF FLOODING

Aggregate (group) structures by source of flooding

Examples:

- Coastal vs inland flooding
- Individual river or stream flood sources
- Areas with multiple flood sources



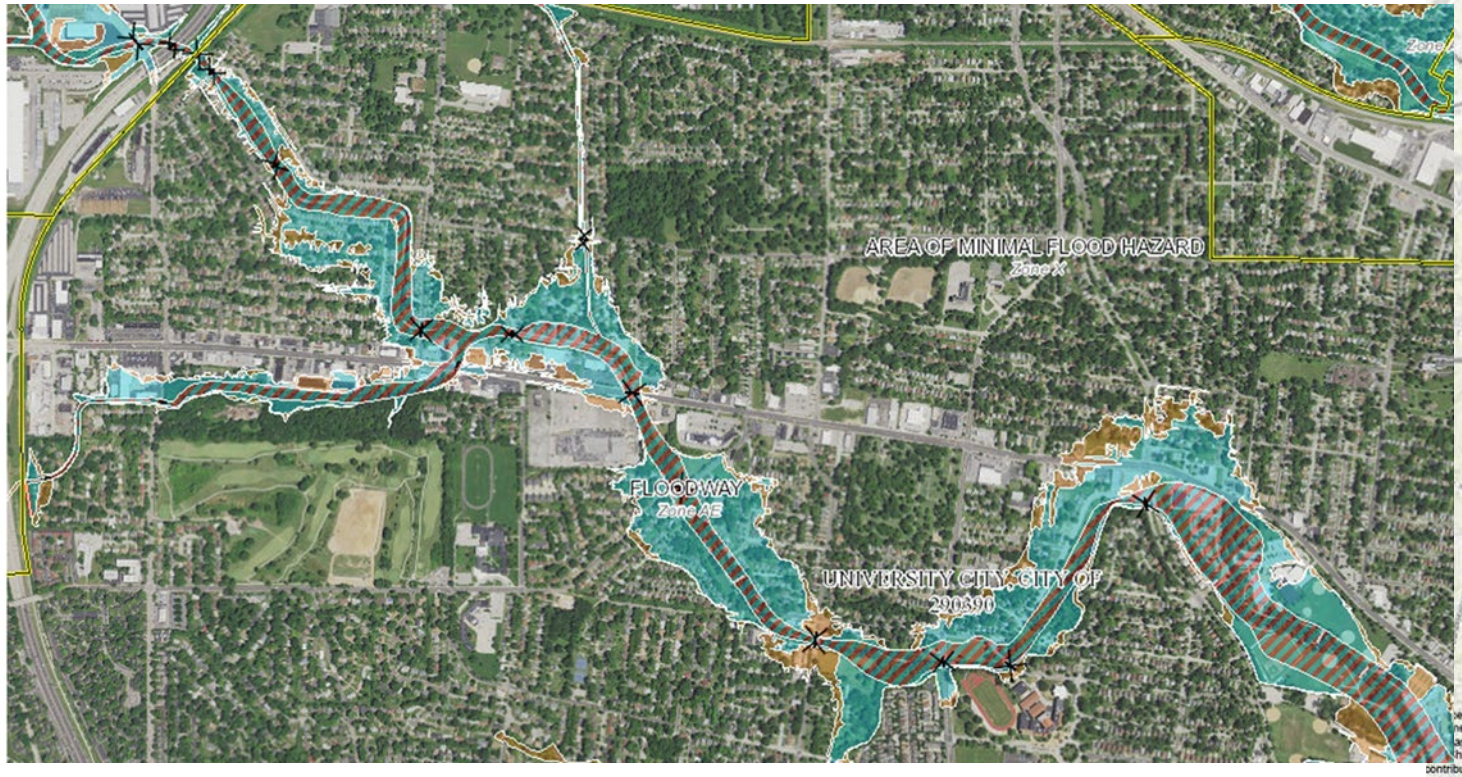



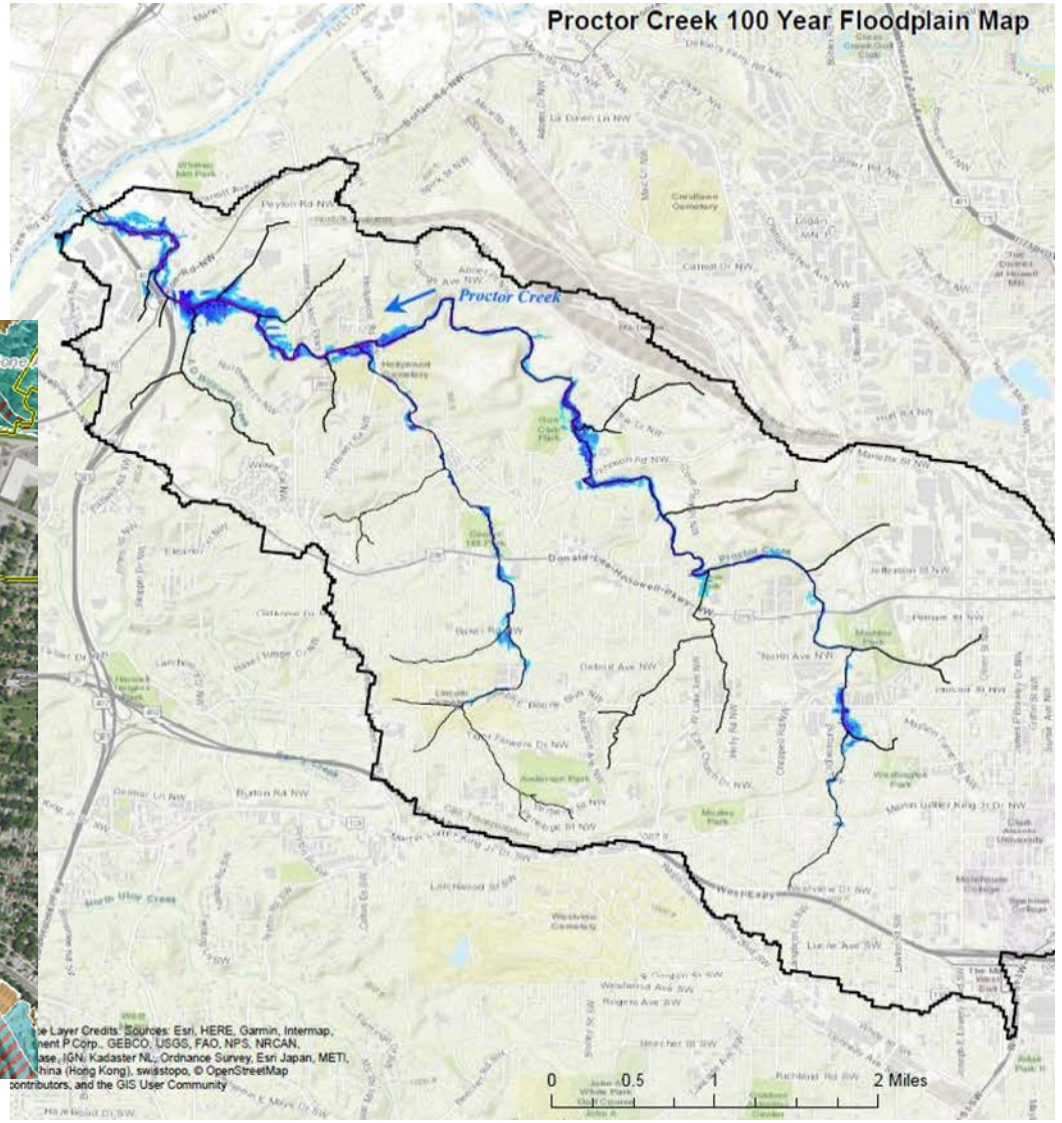
# SEPARABLE FLOODED AREAS

Aggregate (group) structures by separable flooded areas

Examples:

- Right bank vs left bank
- Flooded areas separated by high ground



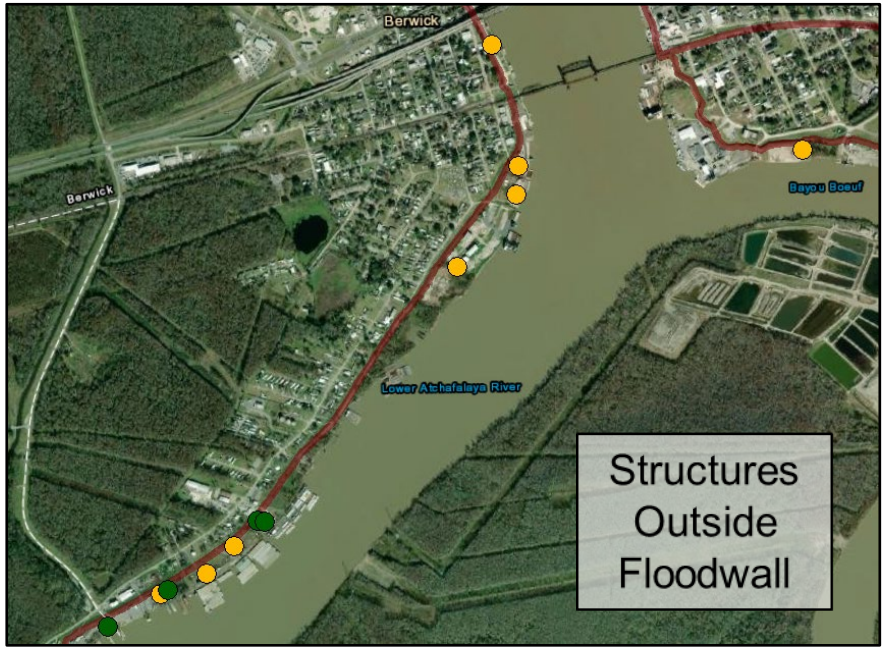



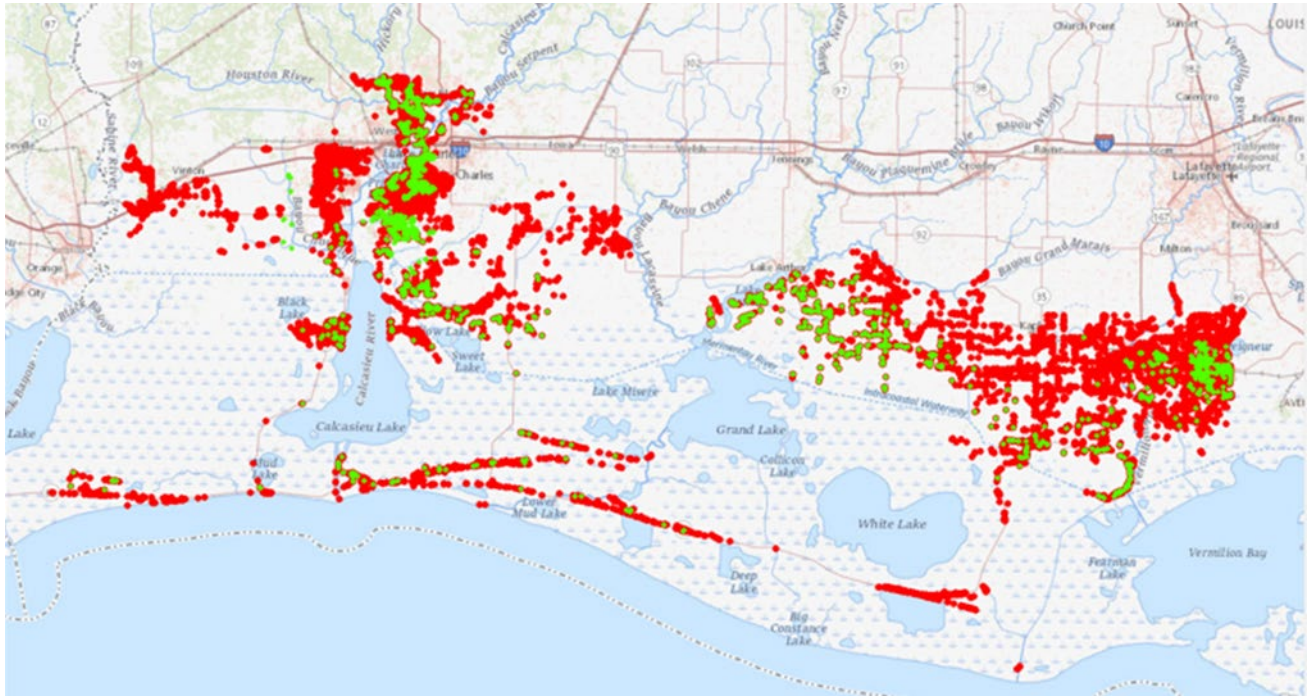
# VARIATIONS IN THE FLOOD HAZARD

Aggregate (group) structures based on differences in flood hazard characteristics

Examples:

- Structures subject to high velocity flood flows
- Structures subject to backwater flooding
- Structures subject to deep flooding or very frequent flooding
- Structures in areas with existing flood risk management infrastructure (e.g., levees)



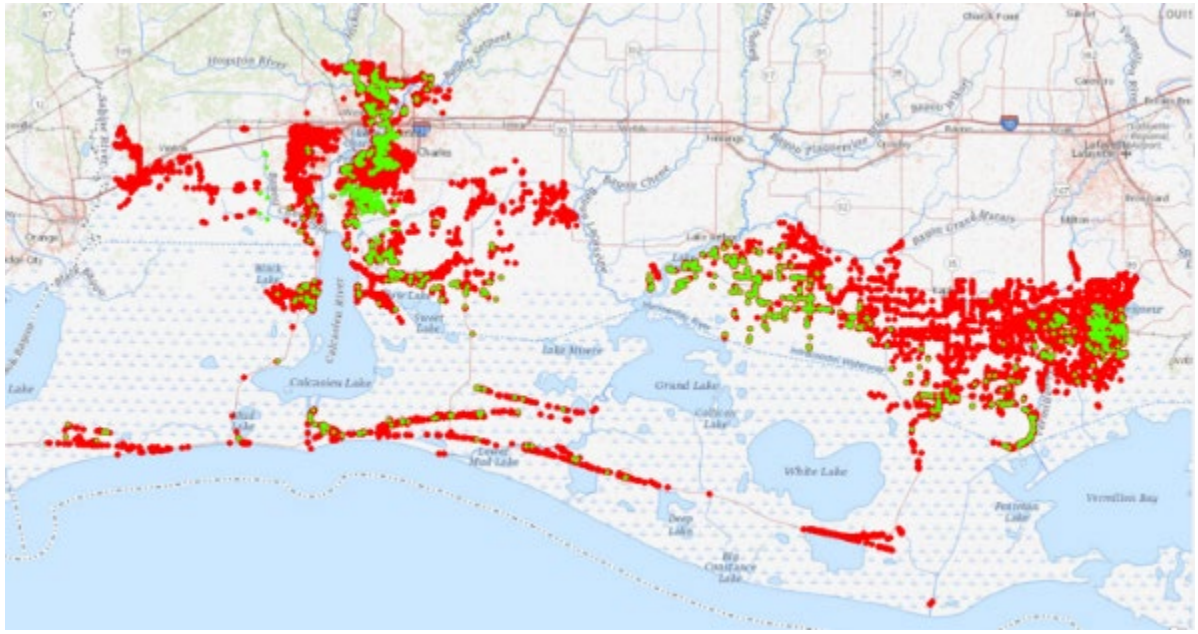



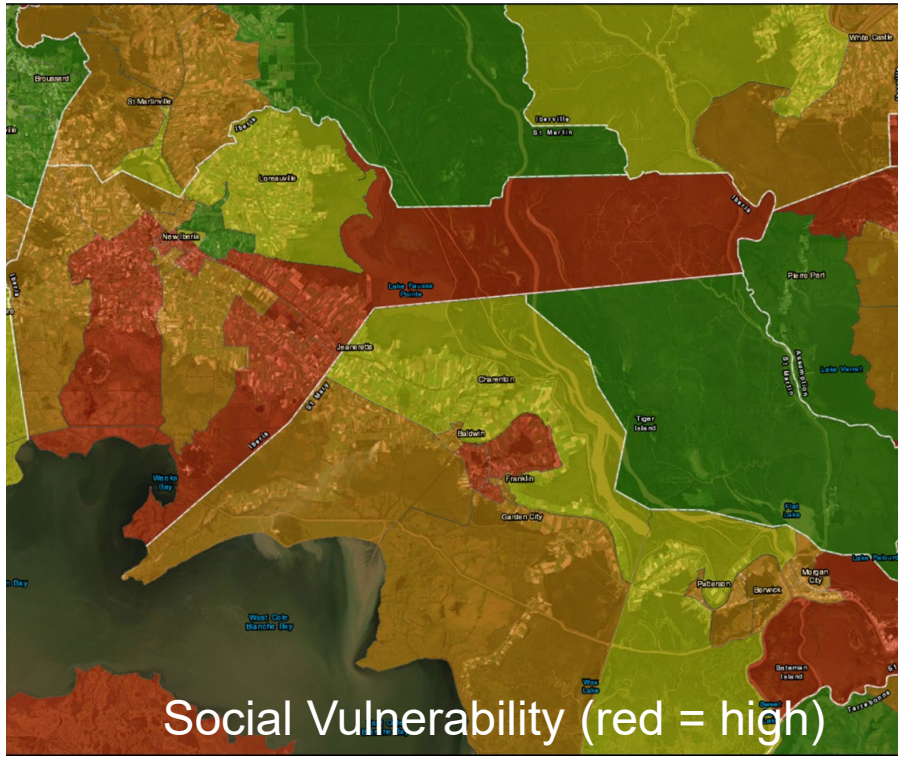
# VARIATIONS IN THE FLOOD CONSEQUENCES

Aggregate (group) structures based on differences in flood consequence characteristics

Examples:

- Separable areas of development
- Residential vs commercial vs industrial development
- Structures with significant cultural or historic value
- Communities/structures with relatively higher life risk
- Disadvantaged communities

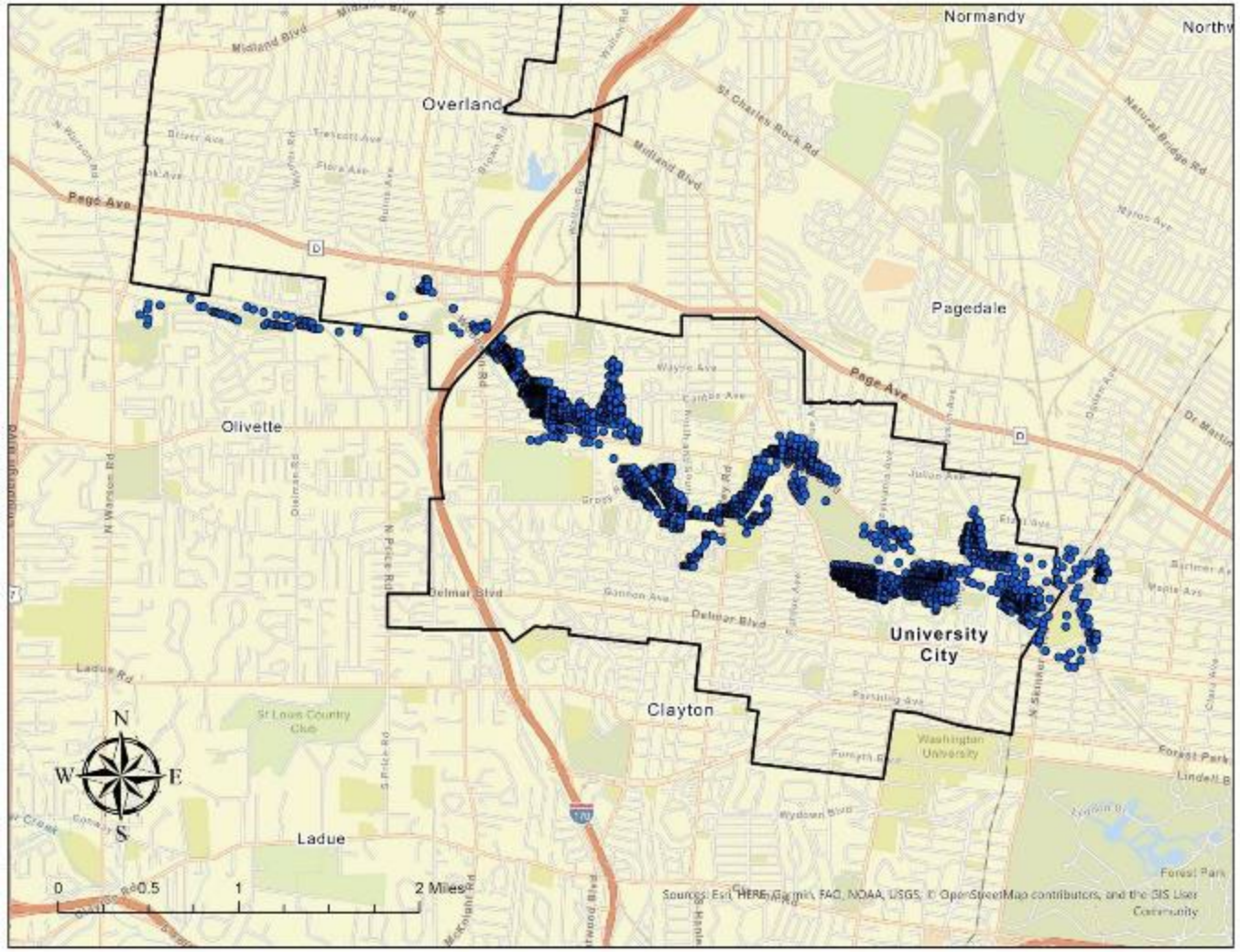




# A FEW MORE IDEAS…

Aggregate (group) structures based on:

- Political jurisdictions
- Likely measures under consideration
  - Nonstructural measures (e.g., acquisition and relocation)
  - Structural measures (e.g., levees)
- Variations in flood risk based on detailed modeling (if available)



# CONSIDERATIONS FOR GROUPING STRUCTURES

1. Hydraulic Characteristics
   - Left bank / right bank
   - Source of flooding
   - Frequency of flooding
   - Timing of flooding (arrival, duration)
   - Physics of flooding (depths, velocities, d*v)
   - Spatially separated areas of flooding

2. Structure Characteristics
   - First floor elevation
   - Common land use, structure type, construction method/category, age
   - Density of development
   - Historic areas or neighborhoods
   - Shared infrastructure (physical)
   - Shared critical infrastructure (buildings)

3. Community Characteristics
   - Shared demographics
   - Shared socioeconomics (i.e., EJ)
   - Shared cultural values
   - Political jurisdictions

4. Life Risk Characteristics
   - Population age (over/under 65)
   - Available evacuation routes
   - Accessibility to public transportation
   - Structural attributes

5. Other Characteristics
   - Common flood risk (i.e., % damage)
   - Potential for reuse of evacuated floodplain for ecosystem restoration or recreation

# SEEK ASSISTANCE OF OTHERS

- ✓ National Nonstructural Committee
  - Lea Adams Chair (HEC)
  - Andrew (Andy) MacInnes (MVN)
  - Drew Minert (NWO)
  - Danielle Tommaso (NAN)
  - Rachel Williams (NWO)
  - Christina (Chris) Rasmussen (NAN) – retiring soon

- ✓ Nonstructural Working Group SharePoint site:
  - Nonstructural guidance documents, best practice guides, Q&As, recorded webinars, etc.
  - https://team.usace.army.mil/sites/IWR/PDT/nonstrucworkgrp

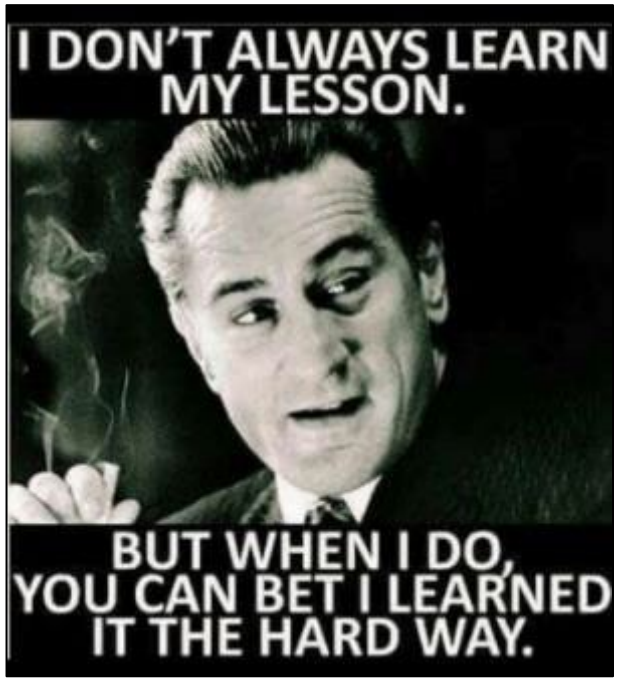
- ✓ Planning Centers of Expertise
  - FRM-PCX: Eric Thaut (SPD), Michelle Kniep (MVP)
  - PCX-CSRM: Donald Cresitello (NAD), Larry Cocchieri (NAD)

# LOGICAL AGGREGATION METHODOLOGY LESSONS LEARNED

# LESSONS LEARNED

- ✓ The requirement to develop and apply a logical aggregation methodology is new and can be challenging.

- ✓ Use of a single aggregation criterion/characteristic (e.g., flood frequency only) usual isn't ideal.
  - It typically fails to effectively reflect the differences in flood risk across a study area and can result in large structure groupings.
  - This can hamper the planning process and decision making in numerous ways:
    - Diminishes the ability to evaluate and compare all potential benefits categories and types
    - Diminishes the ability to compare/integrate nonstructural and structural measures
    - Limits decision making options
    - Reduces opportunities to inform nonstructural implementation



# KEY TAKE AWAY MESSAGES

A logical aggregation methodology should:

- ✓ Be developed during the study scoping phase (1st 90 days)
- ✓ Be developed using the same information used to inform the future without project (FWOP) condition and the formulation and evaluation of structural measures
- ✓ Facilitate the formulation, evaluation, and comparison of nonstructural measures and alternatives and inform decision making

*After the first 90 days…*

- ✓ *As more data is gathered, additional analyses are completed, and detailed modeling is performed, consider if the initial aggregation methodology or structure groupings should be refined to better inform the planning process and decision making*
- ✓ *Seek assistance as needed and stay tuned for future webinars and tools from the NNC and PCXs*

# QUESTIONS?

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