



# Progress Update: Assessing Aquatic Connectivity in the Black River Watershed

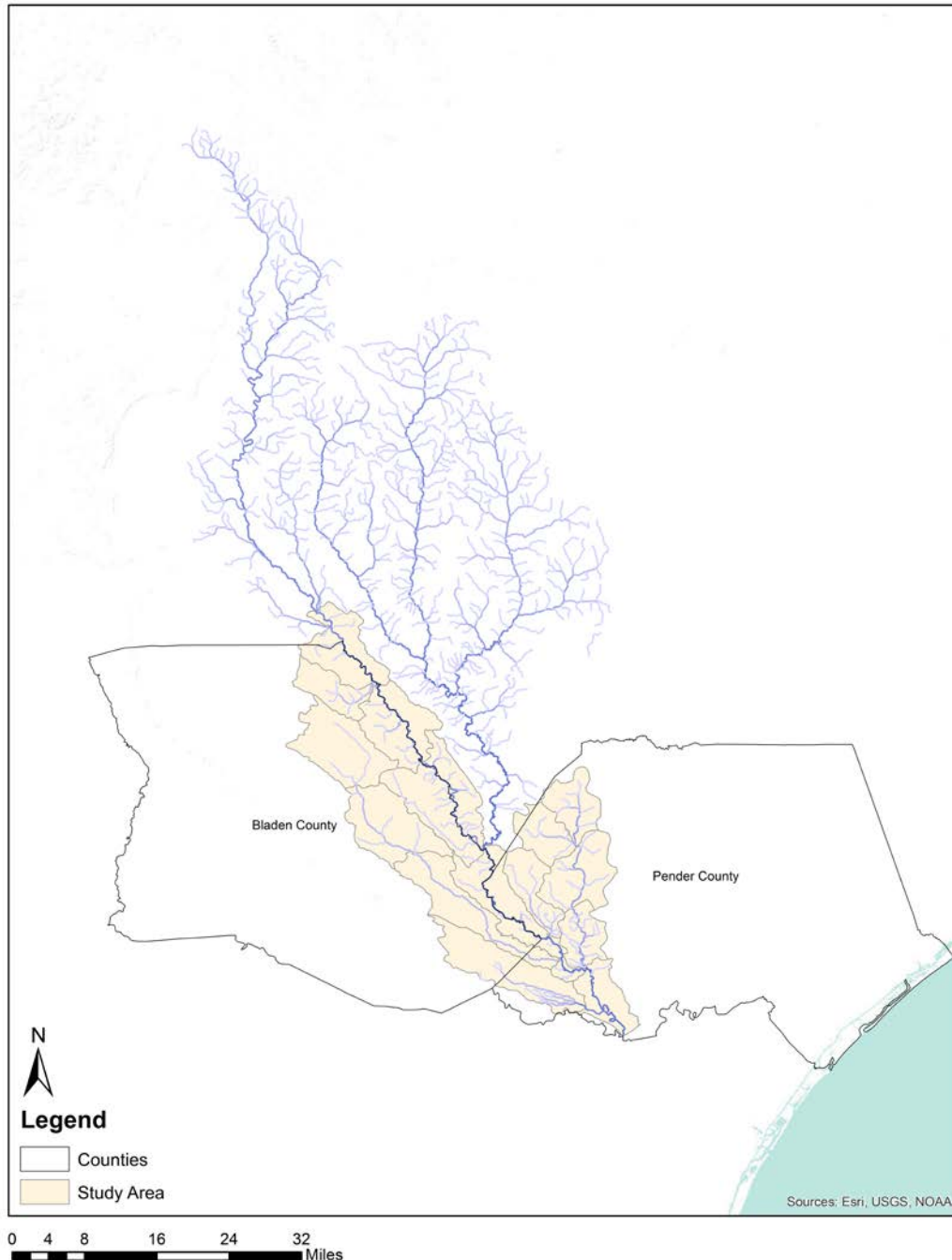
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# Assessing Aquatic Connectivity in the Cape Fear River Basin

- **Long-Term Plan:** Assessing Aquatic Connectivity across the Cape Fear River Basin
- **Current Pilot Project:** lower Black River watershed based on priorities by partners
- **Cape Fear Resource Conservation & Development (CFRC&D)** has completed stream crossing assessments of 200 culverts and preliminary engineering of retrofitting one barrier within the lower Black River watershed of Bladen and Pender Counties



# Goal 1: Restore Access to Historic Migratory Fish Habitat

WHAT ARE THE PROBLEMS?	WHAT WILL THE PARTNERSHIP DO TO ADDRESS THE PROBLEMS?	WHAT WILL THE RESULTS OF THE PARTNERSHIP'S WORK BE?
<b>PROBLEM 1:</b> Obstructions block or impede migratory fish access to historic spawning and nursery habitat.	<b>STRATEGY 1A:</b> Modify obstructions to fish passage in the Cape Fear River mainstem and monitor passage.	<b>TARGET 1A:</b> Safe, timely, effective passage for all anadromous species is restored at Lock and Dam 1. Designs for safe, timely, effective passage are completed and initiated at Lock and Dams 2 and 3 within five years.
	<b>STRATEGY 1B:</b> Modify obstructions to fish passage in tributaries of the Cape Fear River Basin	<b>TARGET 1B:</b> At least five obstructions on tributaries are removed or modified within five years.



Cape Fear River Partnership 5-Year Implementation Plan

<https://capefearriverpartnership.com/implementation-plan/>



# SARP Stream Crossing Surveys & Barrier Prioritization Tool

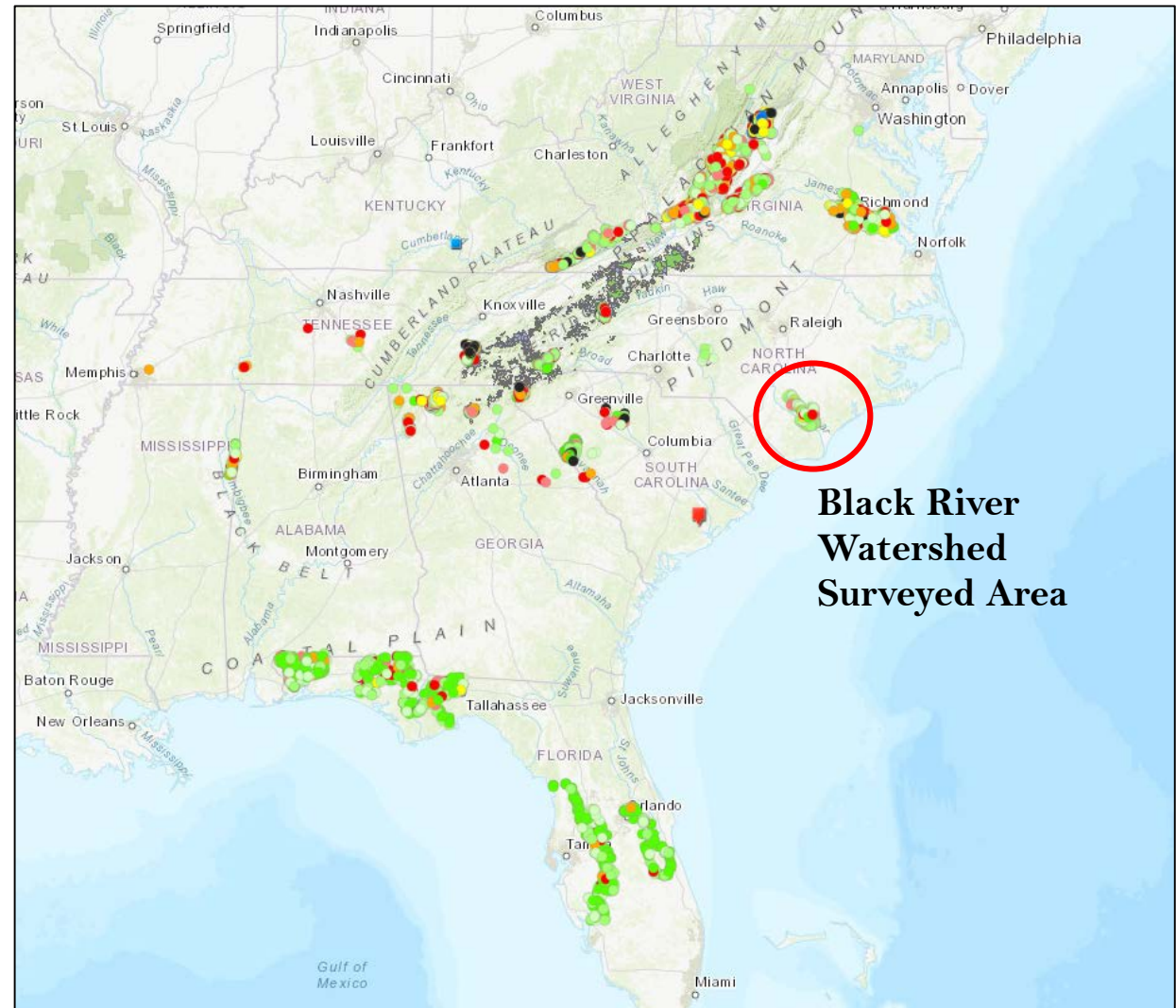
**SARP** AQUATIC CONNECTIVITY Stream Crossing Survey DATA FORM

DATE ENTRY BY: \_\_\_\_\_ ENTRY DATE: \_\_\_\_\_  
DATA ENTRY REVIEWED BY: \_\_\_\_\_ REVIEW DATE: \_\_\_\_\_

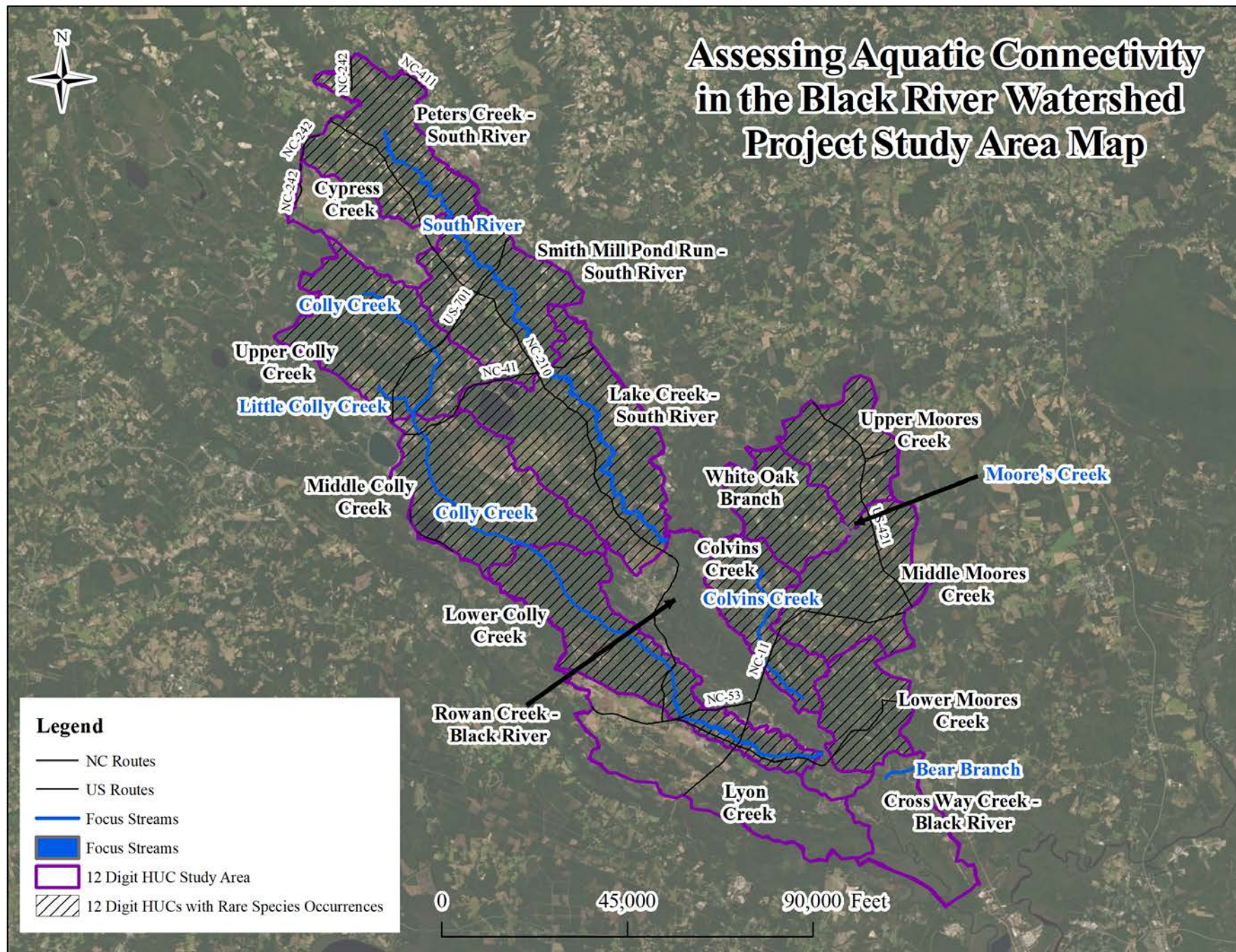
Crossing Code: \_\_\_\_\_ Local ID (Optional): \_\_\_\_\_  
Date Observed: \_\_\_\_\_ Lead Observer: \_\_\_\_\_  
Town/County: \_\_\_\_\_ Stream: \_\_\_\_\_  
Road: \_\_\_\_\_ Type: ☐ MULTILANE ☐ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD  
GPS Coordinates (Decimal degrees):  N Latitude:  W Longitude:   
Location Description: \_\_\_\_\_  
Crossing Type: ☐ BRIDGE ☐ CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☐ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE ☐ Number of Culverts/Bridge Cells: \_\_\_\_\_  
Photo IDs: ☐ INLET ☐ OUTLET ☐ UPSTREAM ☐ DOWNSTREAM ☐ OTHER: \_\_\_\_\_  
Flow Condition: ☐ NO FLOW ☐ TYPICAL LOW ☐ MODERATE ☐ HIGH ☐ Crossing Condition: ☐ OK ☐ POOR ☐ NEW ☐ UNKNOWN  
Tidal Site: ☐ YES ☐ NO ☐ UNKNOWN Alignment: ☐ FLOW-ALIGNED ☐ SKEWED (>45°) Road Fill Height (Top of culvert to road surface; bridge = 0): \_\_\_\_\_  
Bankfull Width (Optional): \_\_\_\_\_ Confidence: ☐ HIGH ☐ LOW/ESTIMATED ☐ Constriction: ☐ SEVERE ☐ MODERATE ☐ SPANS ONLY BANKFULL/ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS  
Tailwater Scour Pool: ☐ NONE ☐ SMALL ☐ LARGE Inlet Scour Pool: ☐ NONE ☐ SMALL ☐ LARGE ☐ Crossing Comments: \_\_\_\_\_  
Riparian Vegetation: ☐ Overstory ☐ Understory ☐ Ground level ☐ Riparian Vegetation: ☐ Overstory ☐ Understory ☐ Ground level ☐

**STRUCTURE 1** Structure Material: ☐ METAL ☐ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION  
Outlet Shape: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED ☐ Outlet Armoring: ☐ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE  
Outlet Grade (pick one): ☐ AT STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN  
Outlet Dimensions: A. Width: \_\_\_\_\_ B. Height: \_\_\_\_\_ C. Substrate/Water Width: \_\_\_\_\_ D. Water Depth: \_\_\_\_\_  
Outlet Drop to Water Surface: \_\_\_\_\_ Outlet Drop to Stream Bottom: \_\_\_\_\_ E. Abutment Height (Type 7 bridges only): \_\_\_\_\_  
L. Structure Length (Overall length from inlet to outlet): \_\_\_\_\_ Evidence of undermining: ☐ Y ☐ N  
Inlet Shape: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED ☐ Inlet Armoring: ☐ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE  
Inlet Type: ☐ PROJECTING ☐ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE  
Inlet Grade (pick one): ☐ AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN ☐ Undermining: ☐ Y ☐ N  
Inlet Dimensions: A. Width: \_\_\_\_\_ B. Height: \_\_\_\_\_ C. Substrate/Water Width: \_\_\_\_\_ D. Water Depth: \_\_\_\_\_ E. Inlet Drop to Stream Bottom: \_\_\_\_\_  
Slope % (overall): \_\_\_\_\_ Slope Confidence: ☐ HIGH ☐ LOW Internal Structures: ☐ NONE ☐ RAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER: \_\_\_\_\_  
Structure Substrate Matches Stream: ☐ NONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN  
Structure Substrate Type (pick one): ☐ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ ORGANIC MTRL ☐ UNKNOWN  
Structure Substrate Coverage: ☐ NONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN  
Physical Barriers (pick all that apply): ☐ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER  
Severity (Choose carefully based on barrier type(s) above): ☐ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE  
Water Depth Matches Stream: ☐ YES ☐ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY  
Water Velocity Matches Stream: ☐ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY  
Dry Passage through Structure?: ☐ YES ☐ NO ☐ UNKNOWN Height above Dry Passage: \_\_\_\_\_  
Comments: \_\_\_\_\_

1 AQUATIC CONNECTIVITY STREAM CROSSING SURVEY DATA FORM









# Impacts of Hurricane Florence

- According to the National Hurricane Center, during Hurricane Florence, “high water levels in the Cape Fear River backed up the Black River and Moore's Creek, leading to exceptional flooding in the Currie and Canetuck communities. The town of Atkinson was isolated by high water.” (Stewart and Berg, 2019).
- Two weeks after Hurricane Florence, parts of 270 roads remained closed due to high water or flood damage and nearly 3,000 sites still needed repairs.
- Project schedule shifted due to high water levels.
- Project priorities were placed on local feedback on the need to assess for flood impacts to local communities.

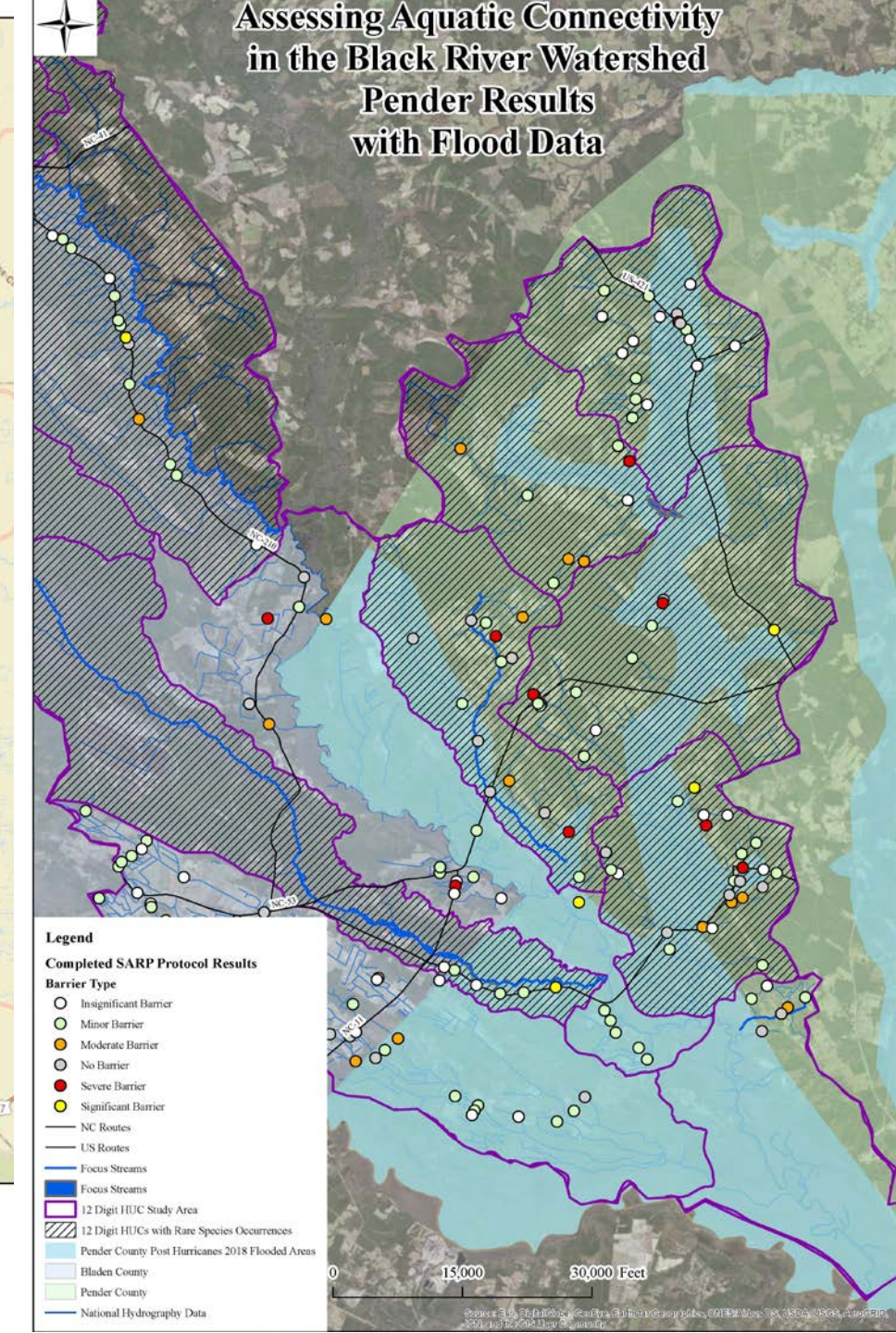
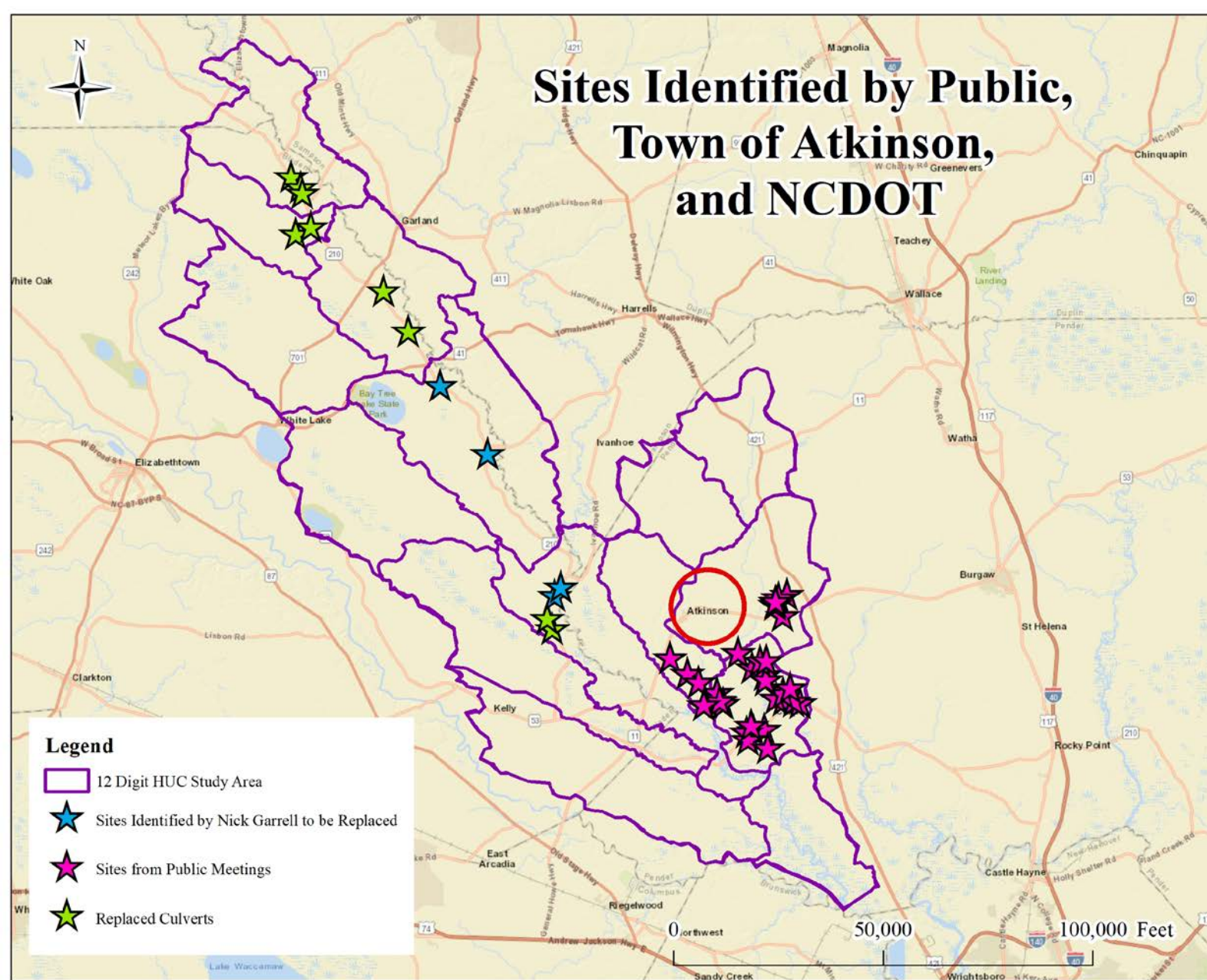


**Hurricane Florence flooding on a road in Bladen County**



**Public Information meeting in Bladen County**



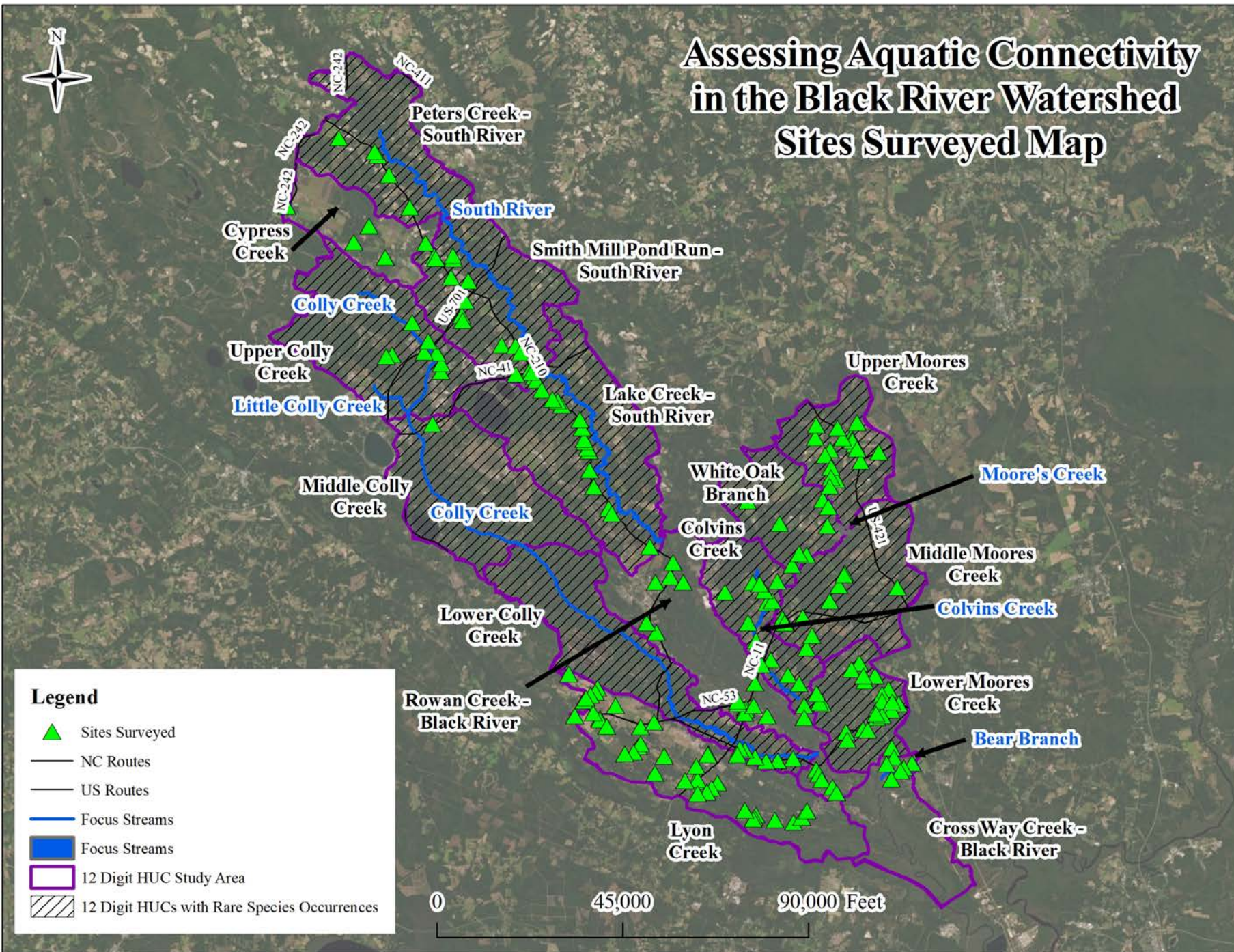


# Extensive Flooding Post-Florence





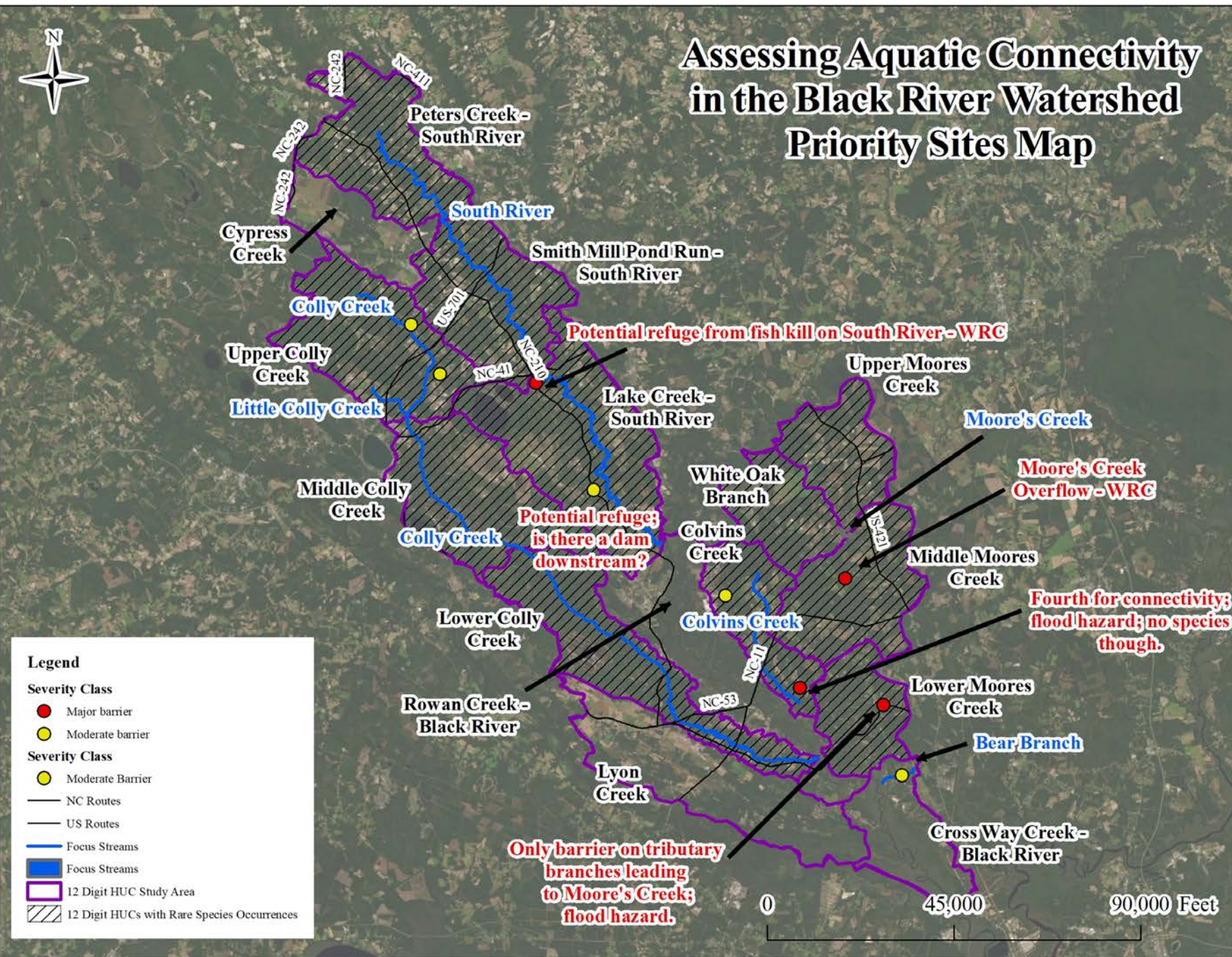
# Assessing Aquatic Connectivity in the Black River Watershed Sites Surveyed Map







# Assessing Aquatic Connectivity in the Black River Watershed Priority Sites Map







**Cracked and collapsing  
culverts at Bear Branch.**



**Moore's Creek Overflow – dry  
culverts creating a severe  
barrier.**



**Beaver activity creating a  
severe barrier.**



# Mutual Benefits to Aquatic Connectivity and Community Resiliency

- Most culverts were designed with principal objective of moving water across a road alignment.
- In the past, little consideration was given to ecosystem processes such as the natural hydrology, sediment transport, fish and wildlife passage, or the movement of woody debris.



- By restoring high priority culverts, aquatic connectivity will be improved along with hydrology and sediment transport.
- ***Supports community resiliency!***



# Partners and Roles



Stream Crossing Protocol and  
Barrier Prioritization Tool



Project Lead



BLADEN COUNTY  
*North Carolina*

Community and Staff  
Support



Funding



Field Assessment/  
Engineering and Design



Technical Support



NOAA  
FISHERIES

Rare Species  
Historical Observations



Protocol Review



Culvert Prioritization



Leverage  
Resources



# Project Schedule & Next Steps

2017

- Grant Award & Project Initiated

2018

- **March** – SARP Stream Crossing Survey Training
- **August** – Contract agreement signed & Notice to Proceed
- **September** – Hurricane Florence
- **Fall** – GIS Data Collection and Map Preparation

2019

- **January** – Project Team Meeting
- **February** – Public Information Meetings in Bladen and Pender Counties
- **June & July** – Field assessments of 200 culverts
- **Fall** – Barrier ranking, ground truthing, and preliminary engineering & design of top 3 severe barriers

2020

- **Spring** - Pilot project completion with final report
- **Summer** - Acquire funding for culvert modification/retrofit implementation
- **Fall** – Conduct engineering/design/permitting of top severe barrier

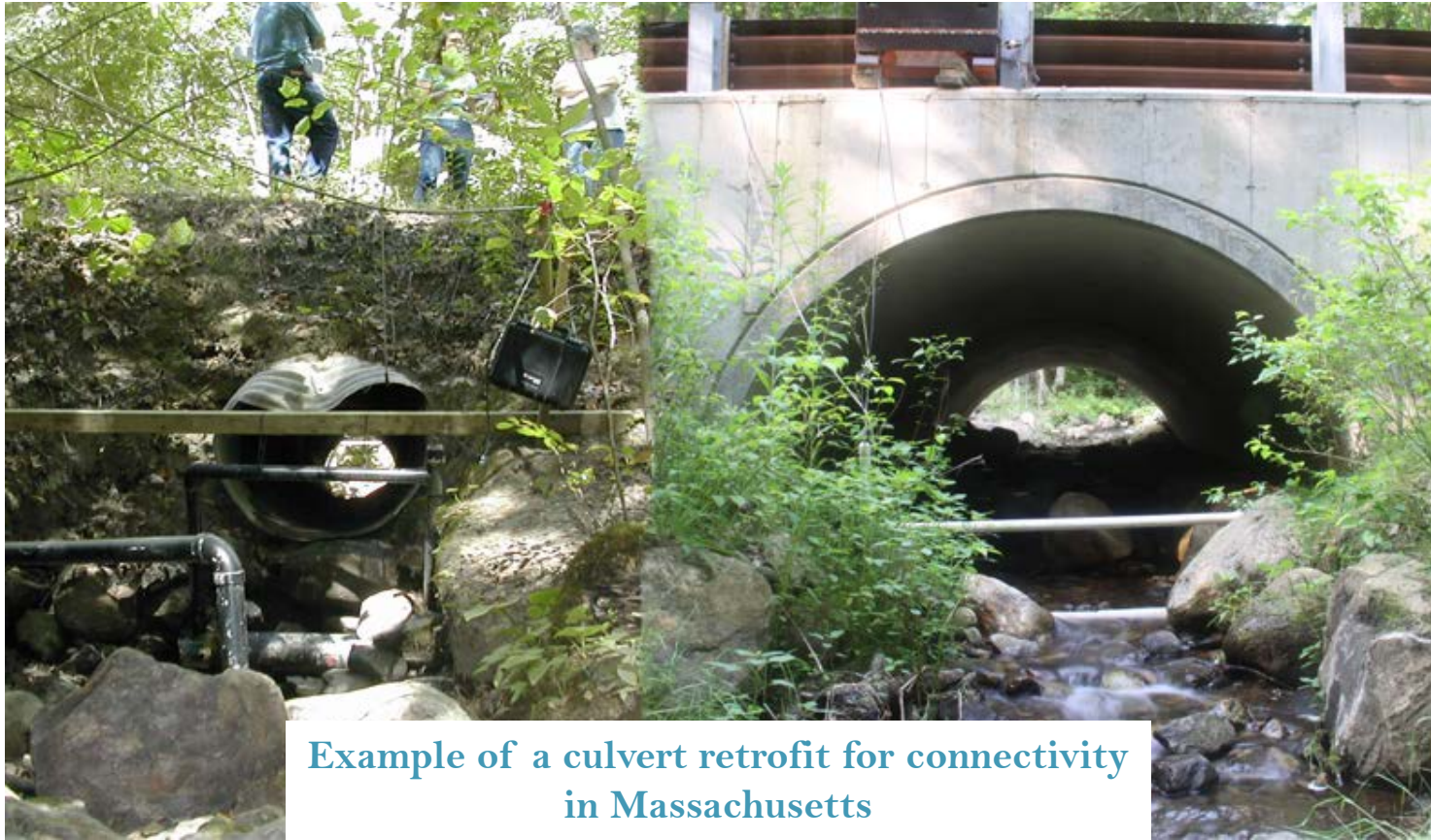


# Implementation Funding Opportunities

- National Fish and Wildlife Foundation (NFWF) Emergency Coastal Resilience Fund (ECRF) 2019 Grant
- Environmental Enhancement Grant (EEG) Program
- Atlantic Coastal Fish Habitat Partnership FY2020 Funds
- Disaster Mitigation Funding







Example of a culvert retrofit for connectivity in Massachusetts

# Recommendations

- Acquisition of funding to retrofit the most severe barriers
- Expand use of Barrier Prioritization Tool to other watersheds within Cape Fear River Basin
- Continue stream crossing assessments to other counties adjacent to Bladen and Pender Counties
- Coordination with state agencies and municipalities to identify additional watersheds to explore surveying for barriers
- County staff to work with state and federal floodplain staff to more accurately assess flooding impacts
- Seek funding for supporting community resilience



# Questions?

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