



# THE AQUATIC BARRIER INVENTORY AND PRIORITIZATION TOOL

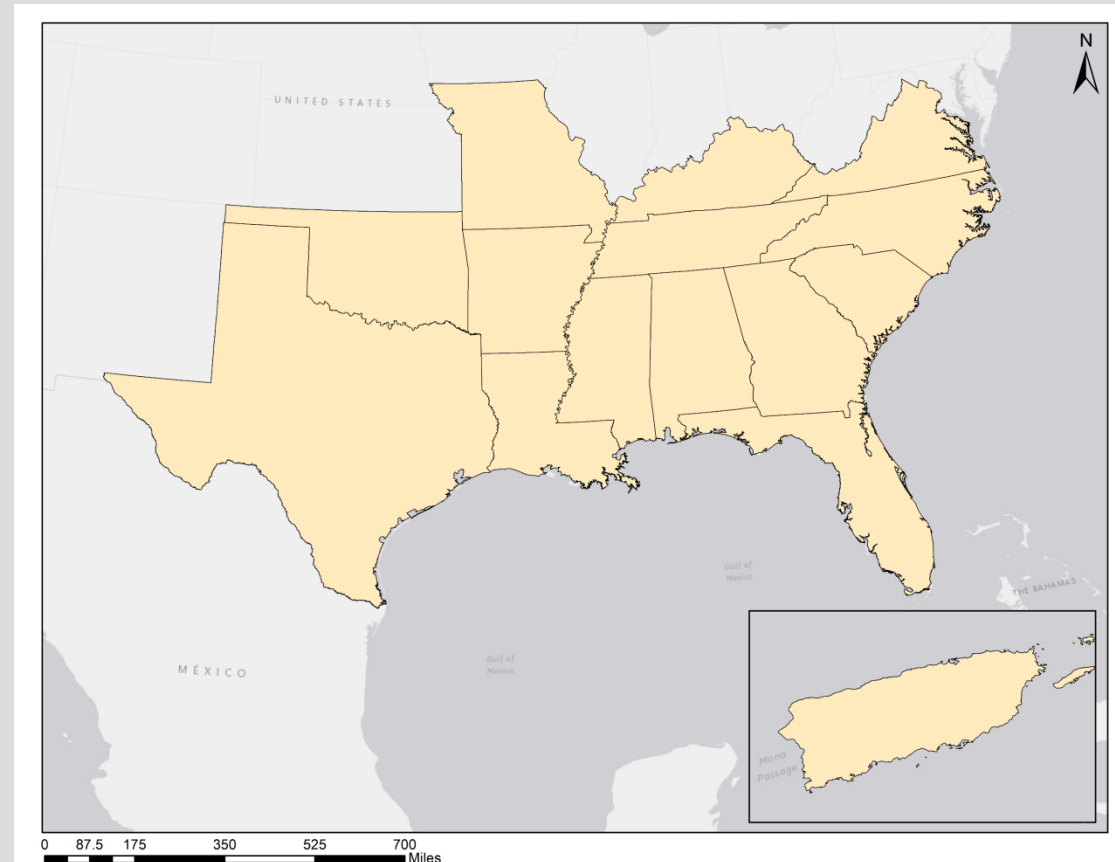
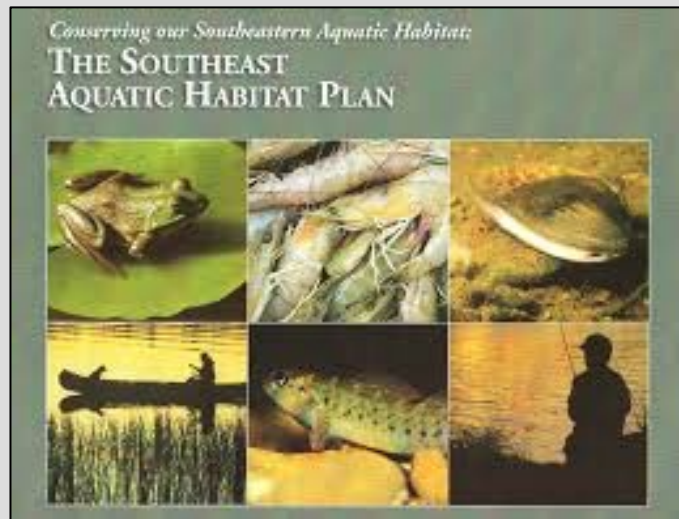


Kat Hoenke  
GIS Coordinator

# SOUTHEAST AQUATIC RESOURCES PARTNERSHIP

## Mission

SARP will, with partners, protect, conserve and restore aquatic resources including habitats throughout the Southeast for the continuing benefit, use and enjoyment of the American people.





# SARP CONNECTIVITY PROGRAM

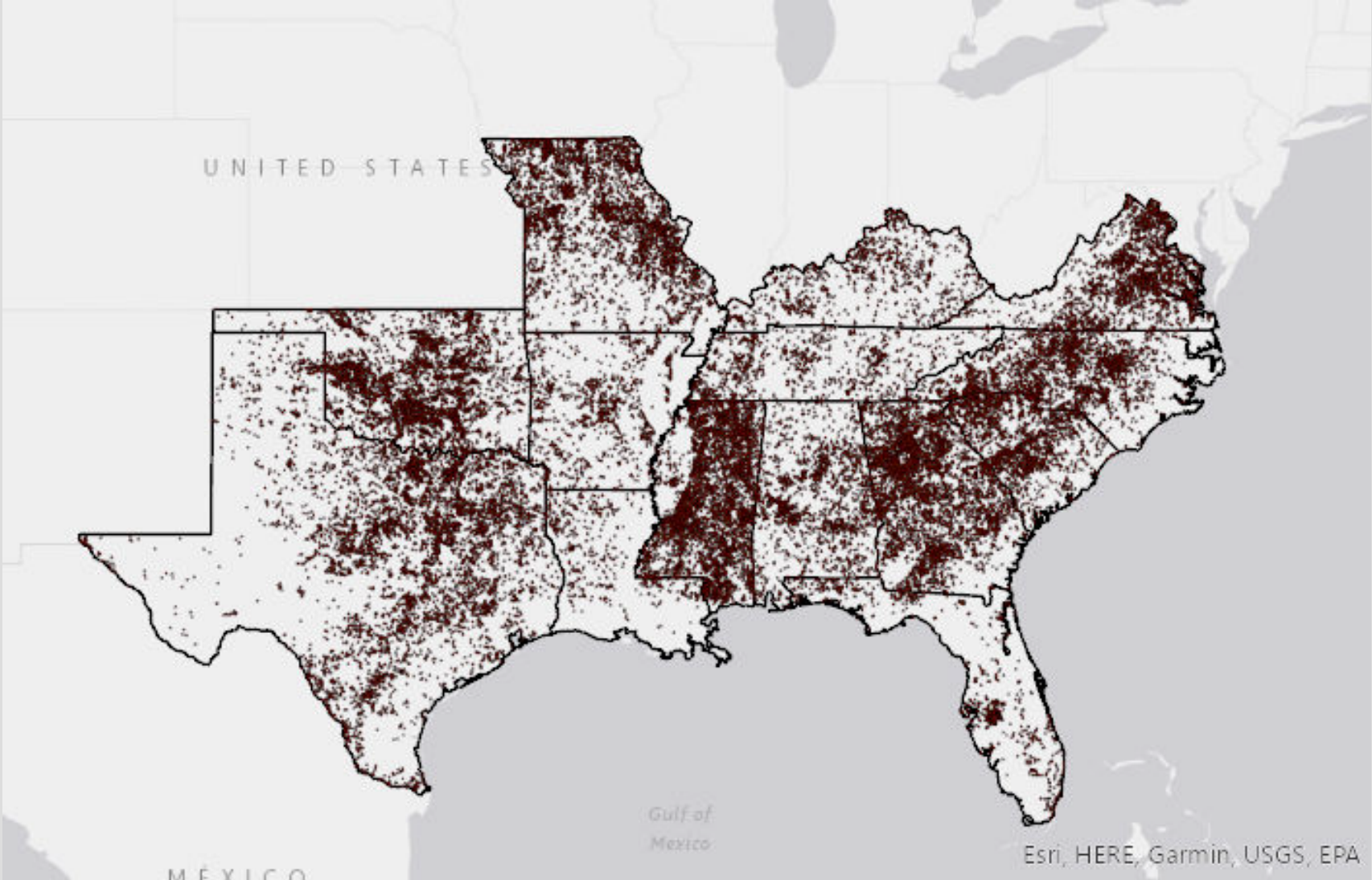
**Inventory**

**Prioritization**

**Connectivity  
Teams**

# National Inventory of Dams

44,000 dams tracked in Southeast



# SARP CONNECTIVITY PROGRAM

## Inventory

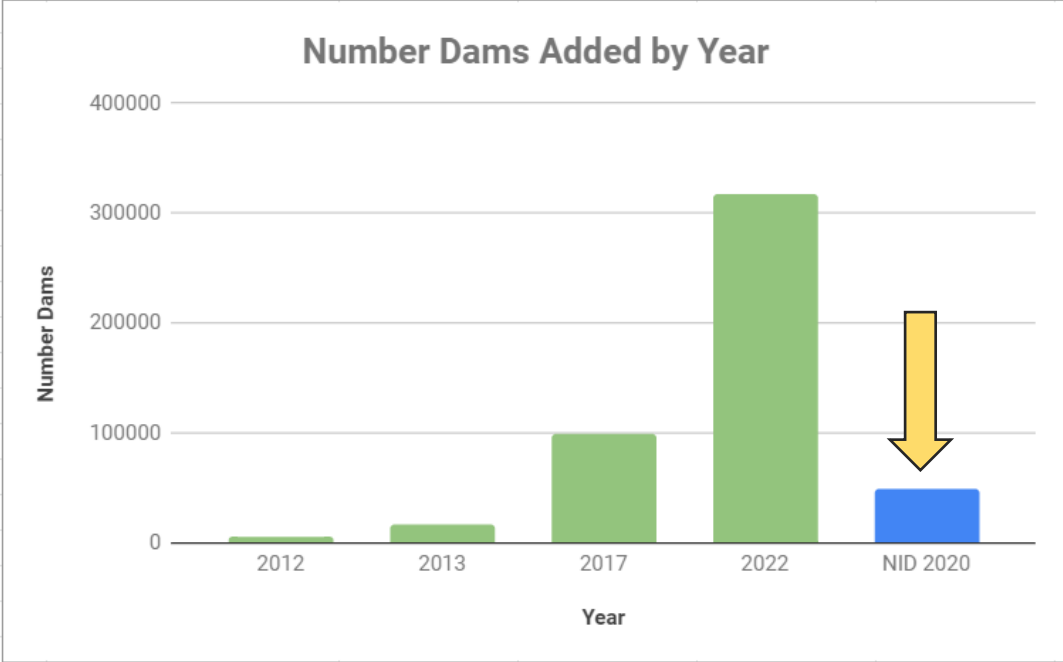
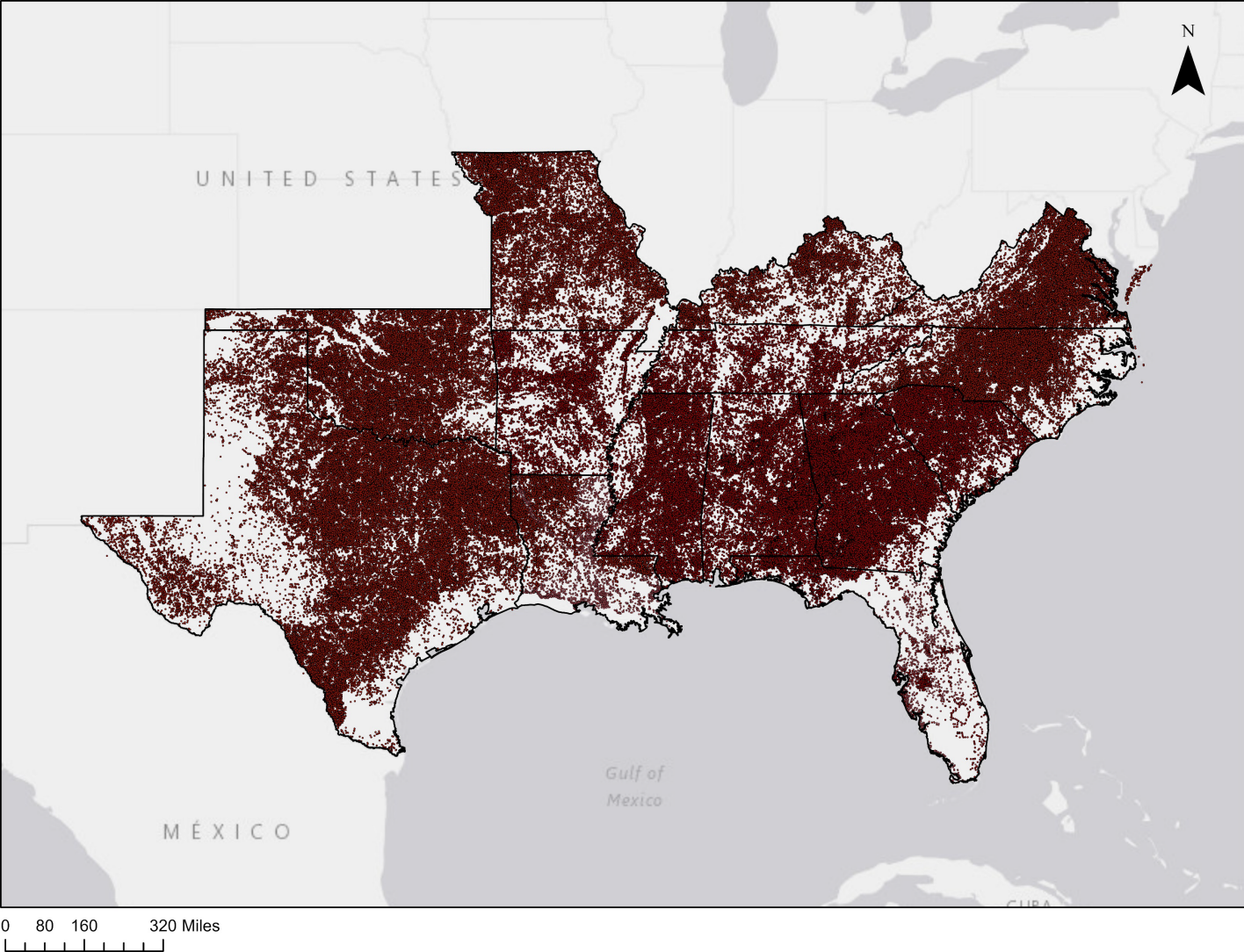
Dams

Road Crossings

Waterfalls

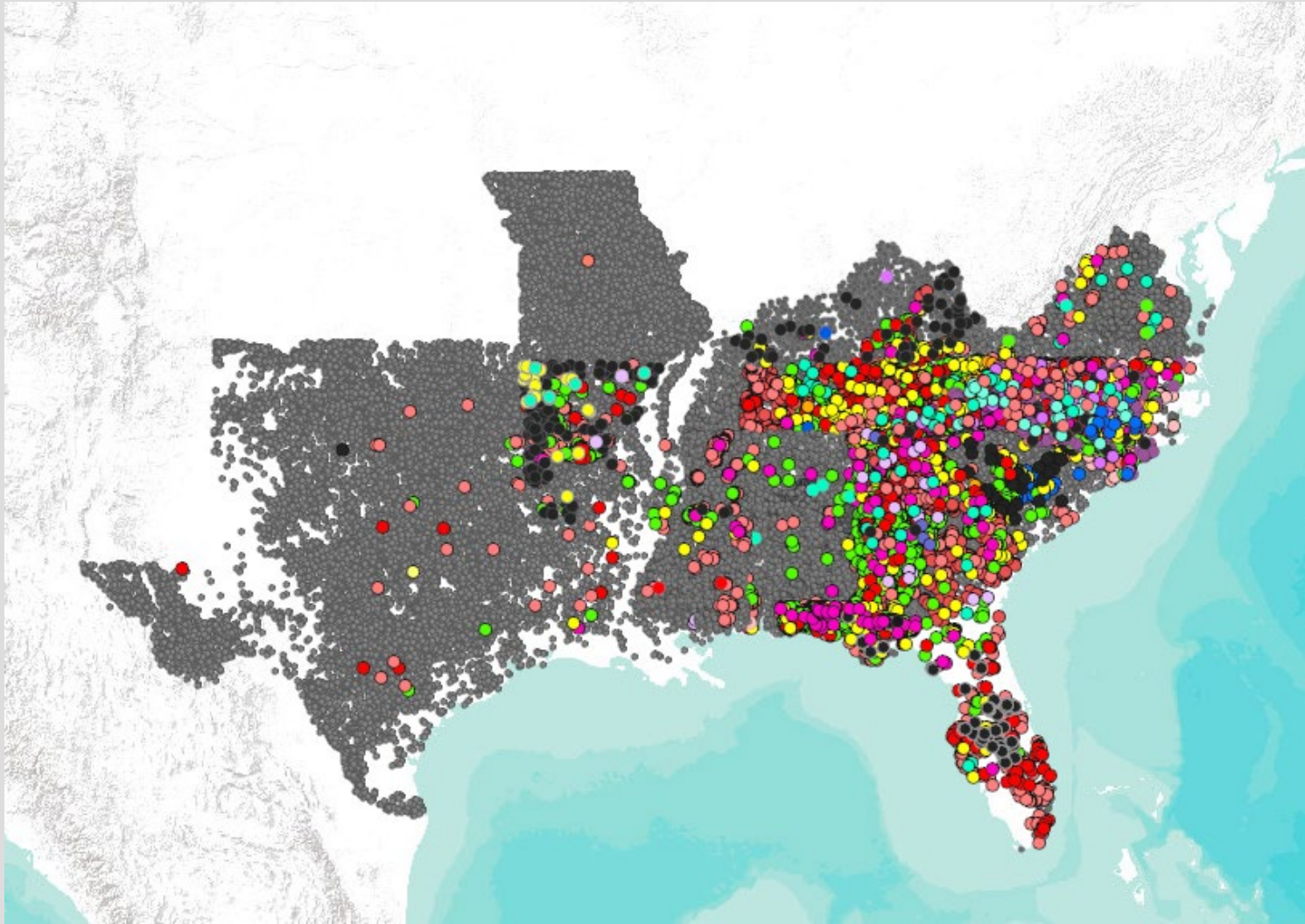


# Dams

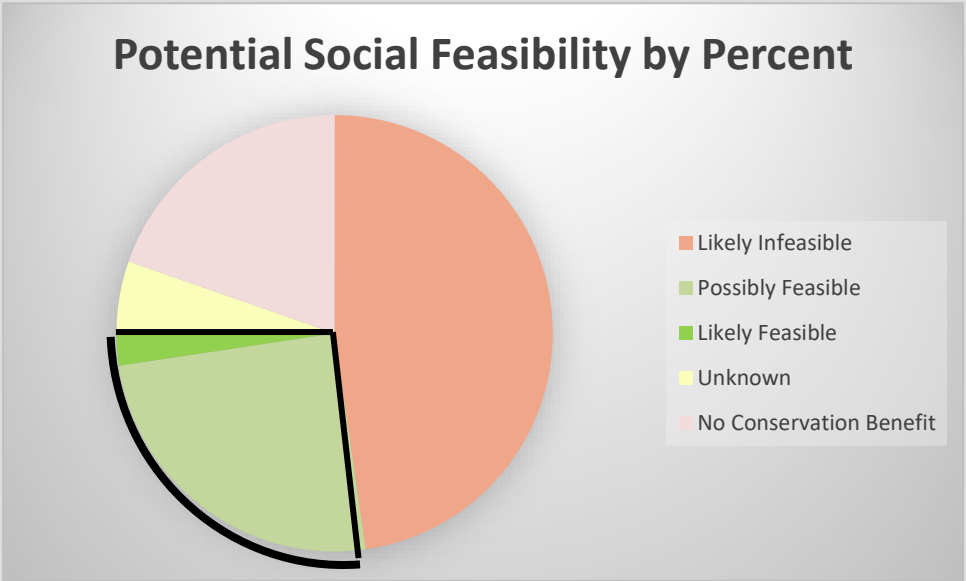




# REGIONAL RECON: ~18000



- 6% of dams reconned
- 30% of reconned are potentially feasible



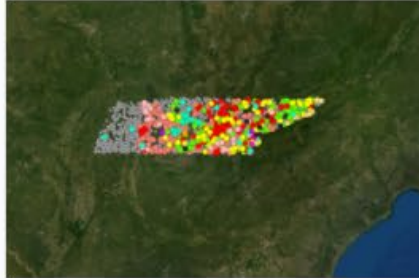




### Aquatic Barrier Prioritization Tool

Instructions to Edit Barriers in Each Webmap: 1) Click on the appropriate box below. 2) When the map opens, select "I want to use this." 3) Then, click "Open in ArcGIS online." 4) Now, you will be able to edit individual points. If performing social feasibility reconnaissance, click below to read instructions.

[Read Dam Recon Instruction Manual](#)



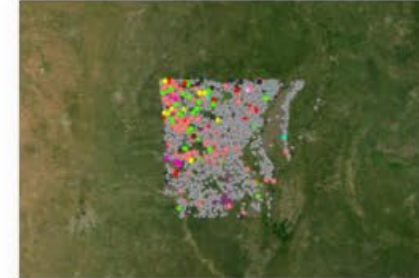
01 Tennessee Aquatic Connectivity Team Map



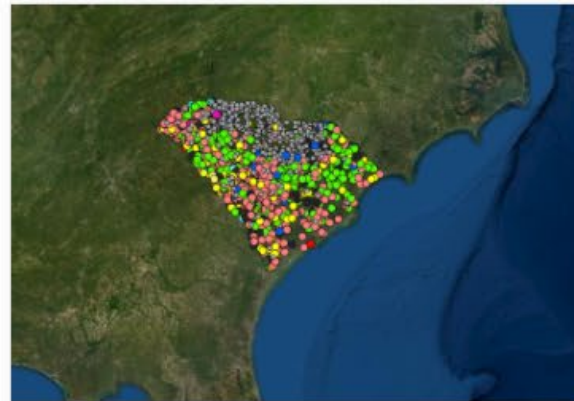
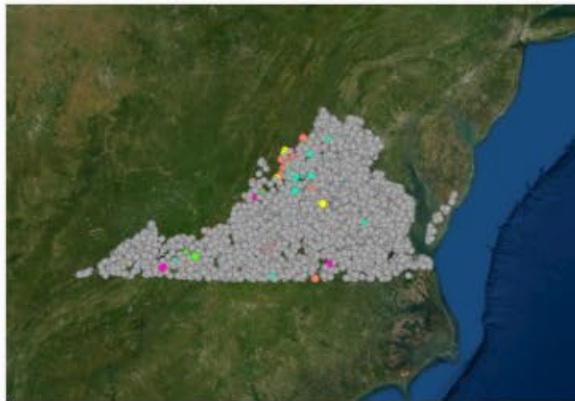
02 North Carolina Aquatic Connectivity Team Map



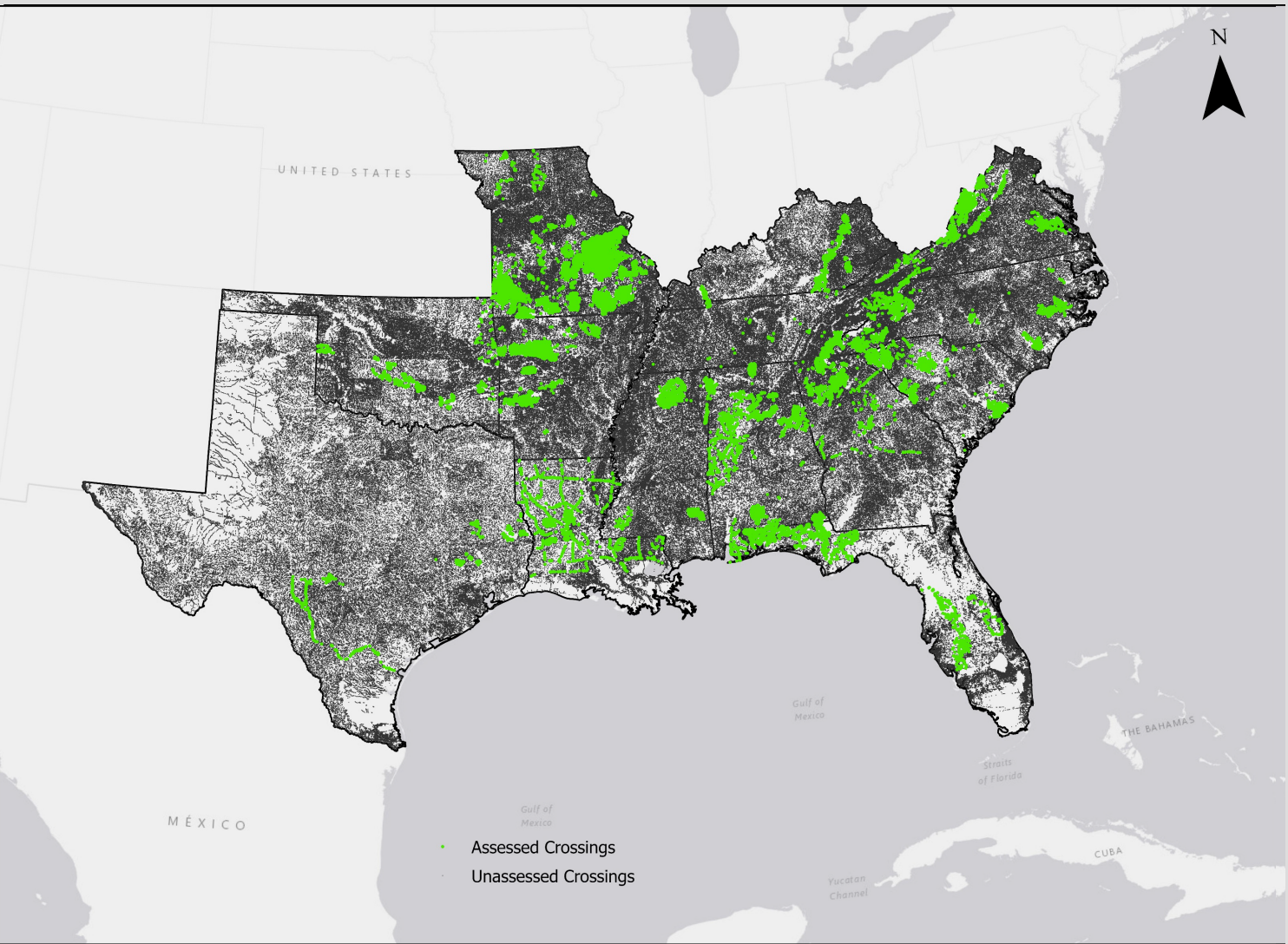
03 Georgia Aquatic Connectivity Team Map



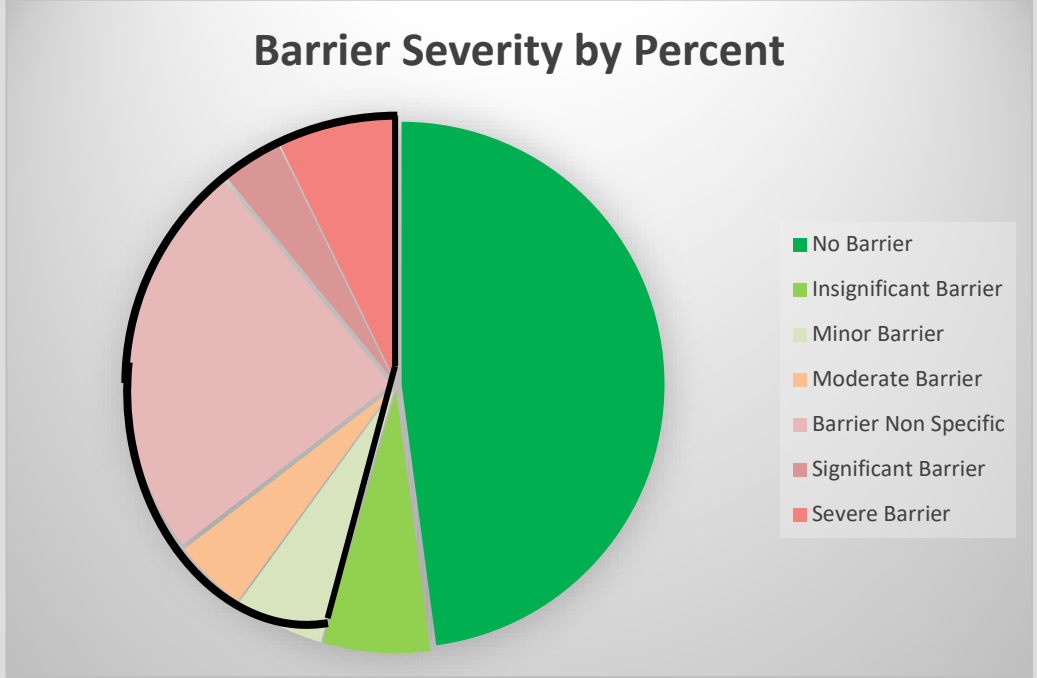
04 Arkansas Stream Heritage Partnership...



# Road Crossings



- 30,000 assessed
- 45% are barriers





**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 (00/00/0000): \_\_\_\_\_ Lead Observer: \_\_\_\_\_  
Town/County: \_\_\_\_\_ Stream: \_\_\_\_\_  
Road: \_\_\_\_\_ Type:  MULTILANE  PAVED  UNPAVED  DRIVEWAY  TRAIL  RAILROAD  
GPS Coordinates (Decimal degrees): \_\_\_\_\_ "N Latitude \_\_\_\_\_ "W Longitude \_\_\_\_\_

**CROSSING DATA**

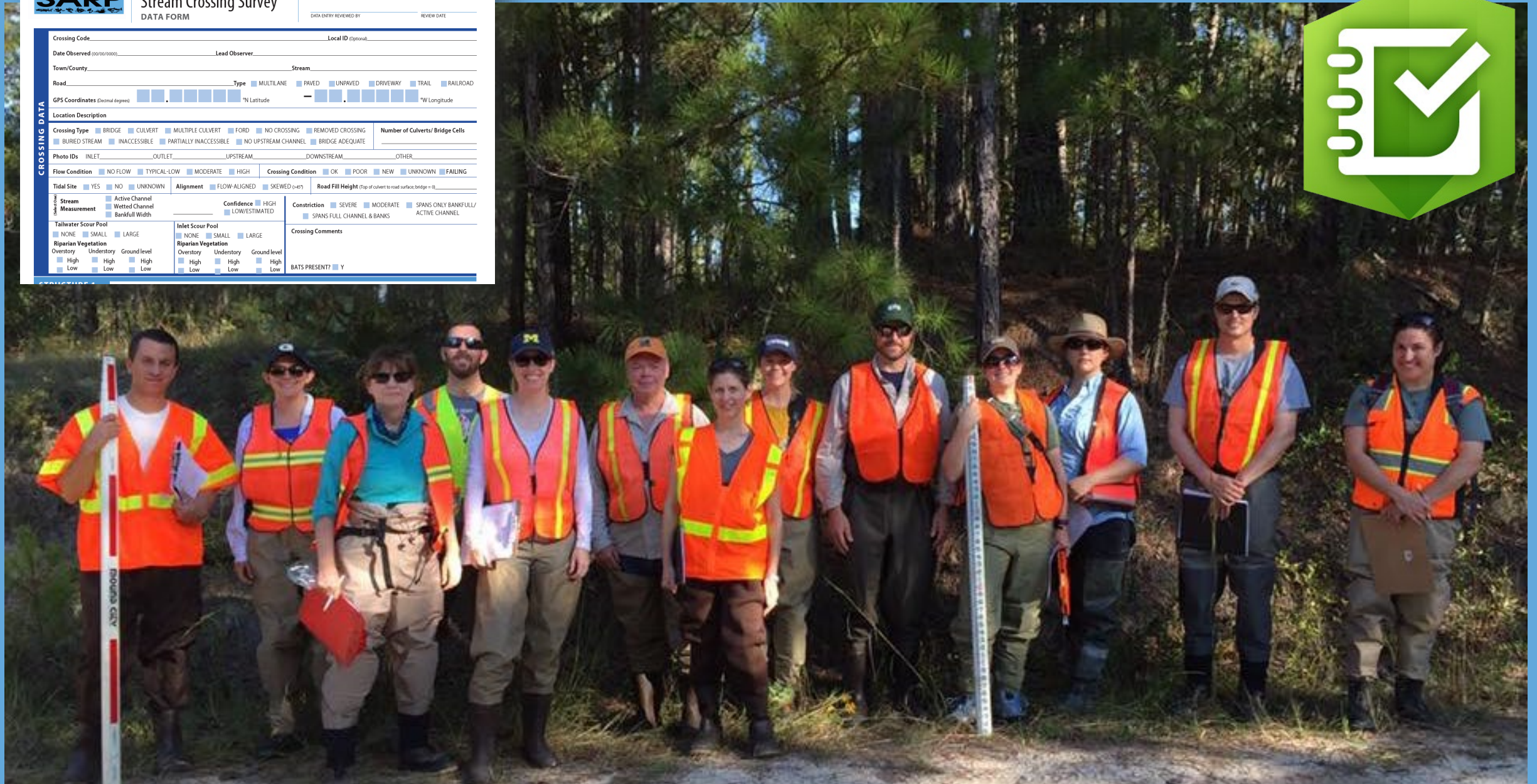
Location Description  
Crossing Type:  BRIDGE  CULVERT  MULTIPLE CULVERT  FORD  NO CROSSING  REMOVED CROSSING  
 BURIED STREAM  INACCESSIBLE  PARTIALLY INACCESSIBLE  NO UPSTREAM CHANNEL  BRIDGE ADEQUATE  
Number of Culverts/Bridge Cells: \_\_\_\_\_  
Photo IDs: INLET \_\_\_\_\_ OUTLET \_\_\_\_\_ UPSTREAM \_\_\_\_\_ DOWNSTREAM \_\_\_\_\_ OTHER \_\_\_\_\_

Flow Condition:  NO FLOW  TYPICAL-LOW  MODERATE  HIGH  
Crossing Condition:  OK  POOR  NEW  UNKNOWN  FAILING  
Tidal Site:  YES  NO  UNKNOWN  
Alignment:  FLOW-ALIGNED  SKEWED (>45°)  
Road Fill Height (Top of culvert to road surface, bridge = 0): \_\_\_\_\_

Stream Measurement:  Active Channel  Wetted Channel  Bankfull Width  
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  
Riparian Vegetation: Overstory Understory Ground level  
 High  High  High  High  High  High  
 Low  Low  Low  Low  Low  Low

Crossing Comments: \_\_\_\_\_  
BATS PRESENT?  Y



GA ACT AOP training



# Inventory

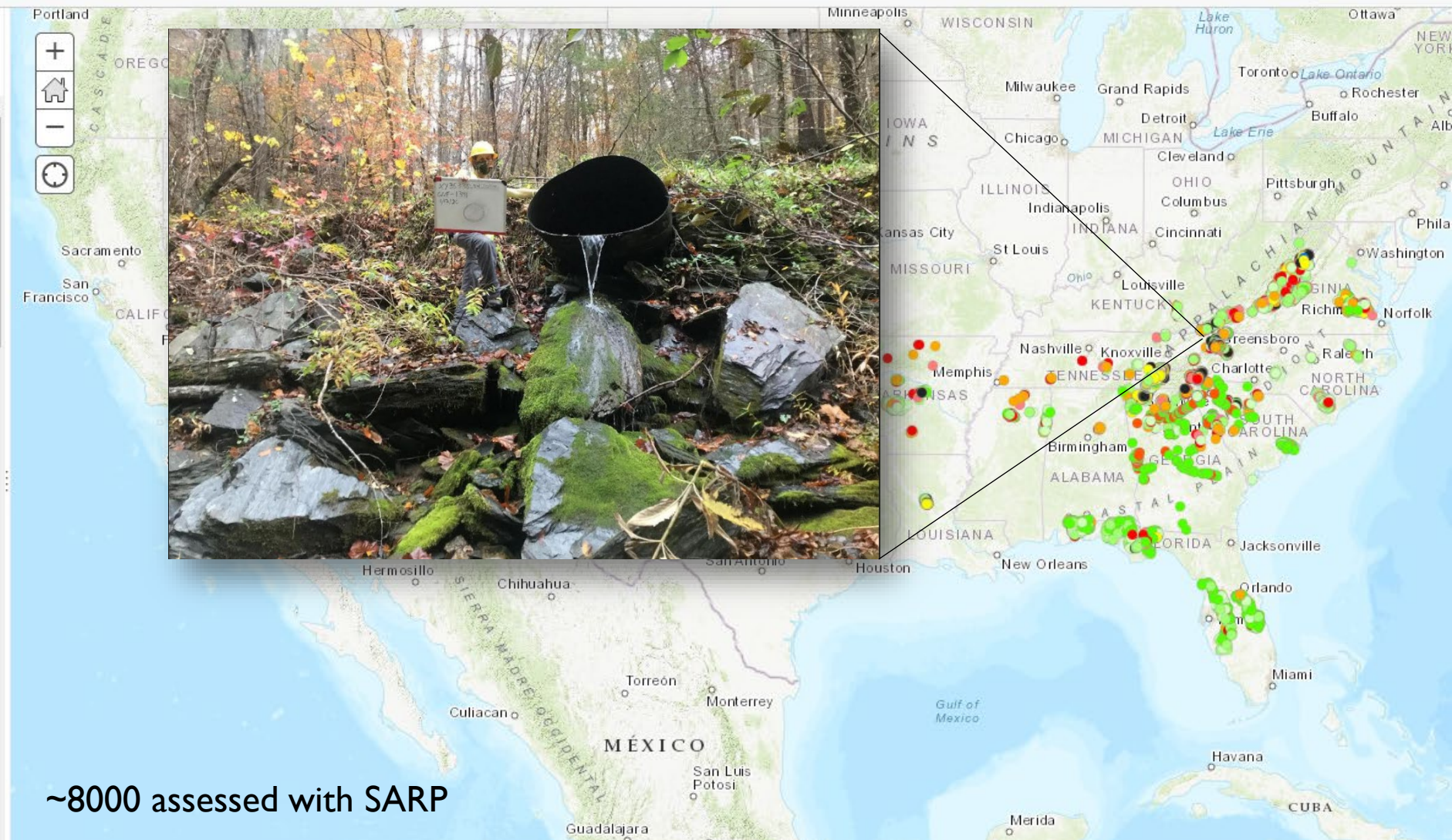
[Details](#) [Add](#) [Edit](#) [Basemap](#) [Analysis](#)

[Save](#) [Share](#) [Print](#) [Directions](#) [Measure](#) [Bookmarks](#)

[About](#) [Content](#) [Legend](#)

- ### Legend
- #### 05012019 SARP AOP Stream Crossing Survey Protocol
- Severe Barrier
  - Minor Barrier
  - No Upstream Channel
  - Insignificant Barrier
  - No Barrier
  - Moderate Barrier
  - Significant Barrier
  - No Crossing
  - Inaccessible
  - Not Scored
  - Buried Stream

- #### SARP AOP Coarse Survey Form
- No Drop
  - Severe Drop
  - Significant Drop
  - Minor Drop
  - Insignificant Drop
  - Moderate Drop



~8000 assessed with SARP





**Bats in culverts!**



# SARP CONNECTIVITY PROGRAM

**Inventory**

**Prioritization**

# Aquatic Barrier Prioritization Tool

Improve aquatic connectivity by prioritizing aquatic barriers for removal using the best available data.

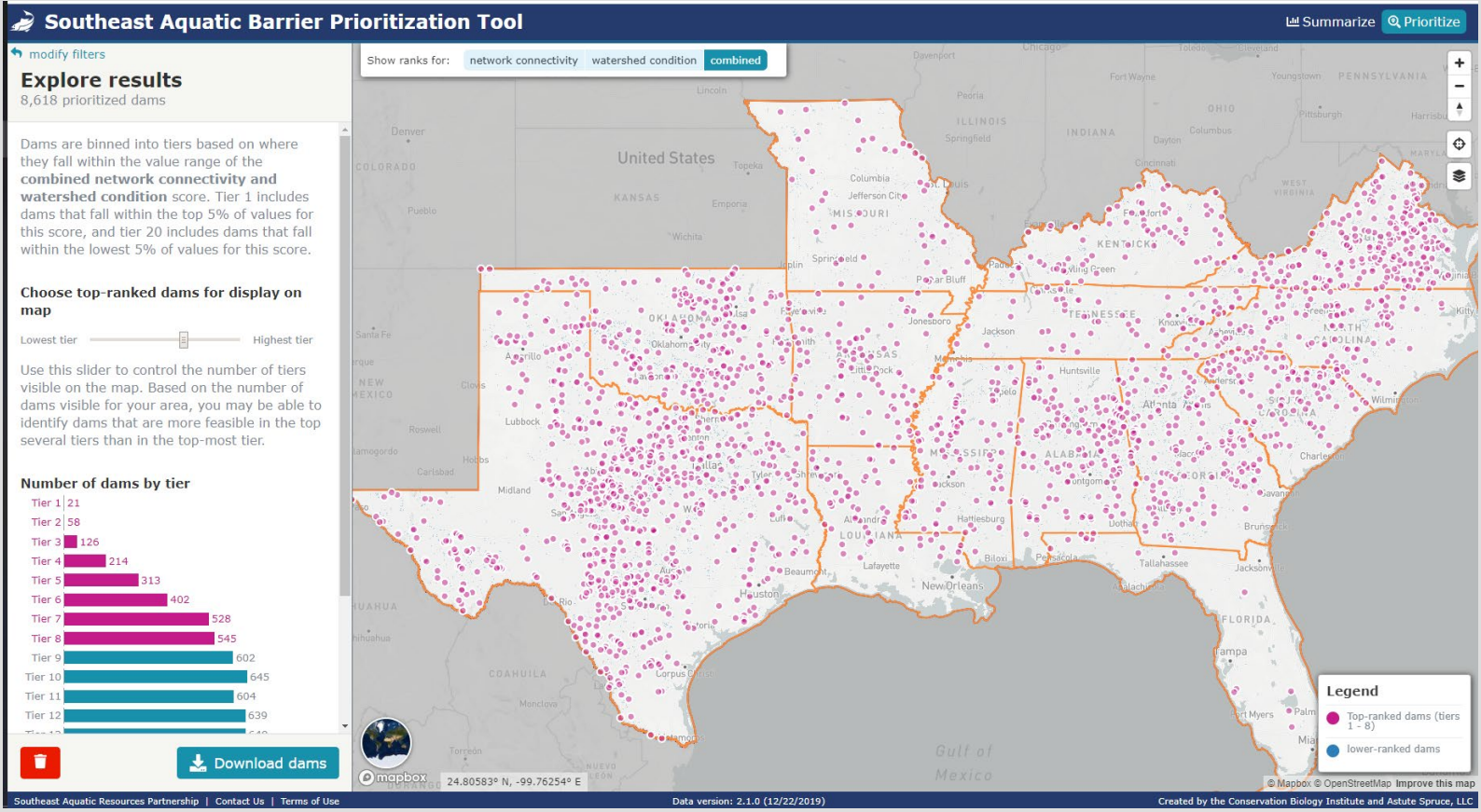
Aquatic connectivity is essential. Fish and other aquatic organisms depend on high quality, connected river networks. A legacy of human use of river networks have left them fragmented by barriers such as dams and culverts. Fragmentation prevents species from dispersing and accessing habitats required for their persistence through changing conditions.

Recently improved inventories of aquatic barriers enable us to describe, understand, and prioritize them for removal, restoration, and mitigation. Through this tool and others, we empower you by providing information on documented barriers and standardized methods by which to prioritize barriers of interest for restoration efforts.

[connectivity.sarpdata.com](https://connectivity.sarpdata.com)

# PRIORITIZATION

- Improve or maintain watershed connectivity
- Move from opportunistic to a strategic approach to barrier removal fish passage improvement
- Support management decisions





# INDICATORS



## Network Length

Network length measures the amount of connected aquatic network length that would be added to the network by removing the barrier. Longer connected networks may provide more overall aquatic habitat for a wider variety of organisms and better support dispersal and migration.

[Read more...](#)



## Network Complexity

Network complexity measures the number of unique upstream size classes that would be added to the network by removing the barrier. A barrier that has upstream tributaries of different size classes, such as small streams, small rivers, and large rivers, would contribute a more complex connected aquatic network if it was removed.

[Read more...](#)



## Channel Alteration

Altered river and stream reaches are those that are specifically identified as canals or ditches. These represent areas where the hydrography, flow, and water quality may be highly altered compared to natural conditions.

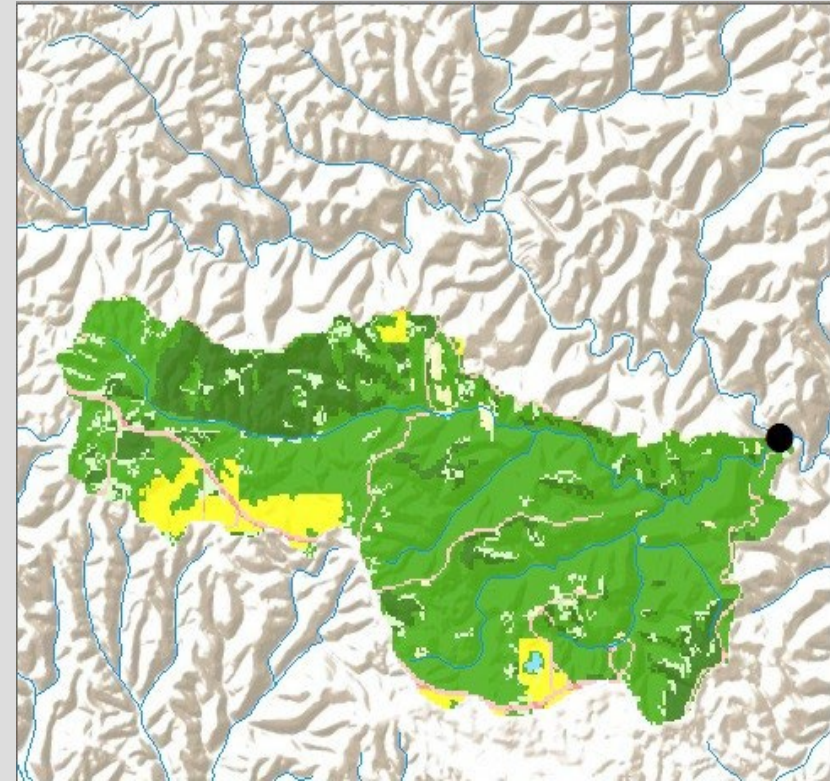
[Read more...](#)



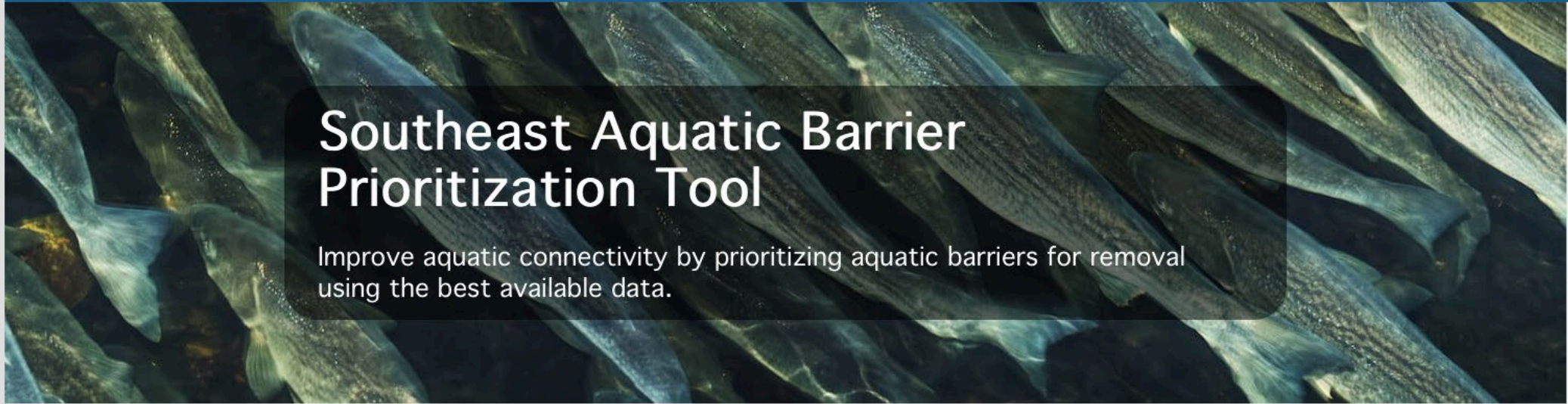
## Natural Landcover

Natural landcover measures the amount of area within the floodplain of the upstream aquatic network that is in natural landcover. Rivers and streams that have a greater amount of natural landcover in their floodplain are more likely to have higher quality aquatic habitat.

[Read more...](#)



*The landcover types present in a contributing watershed of a dam on the Ozark National Forest.*



## Southeast Aquatic Barrier Prioritization Tool

Improve aquatic connectivity by prioritizing aquatic barriers for removal using the best available data.

Aquatic connectivity is essential. Fish and other aquatic organisms depend on high quality, connected river networks. A legacy of human use of river networks have left them fragmented by barriers such as dams and culverts. Fragmentation prevents species from dispersing and accessing habitats required for their persistence through changing conditions.

Recently improved inventories of aquatic barriers enable us to describe, understand, and prioritize them for removal, restoration, and mitigation. Through this tool and others, we empower you by providing information on documented barriers and standardized methods by which to prioritize barriers of interest for restoration efforts.



modify area of interest

## Filter dams

45,984 selected

reset filters

[OPTIONAL] Use the filters below to select the dams that meet your needs. Click on a bar to select dams with that value. [Show more ...](#)

### Feasibility & Conservation Benefit

Not assessed 44,104

Not feasible 381

Removal planned 35

Likely infeasible 2,600

Possibly feasible 1,732

Likely feasible 148

No conservation benefit 152

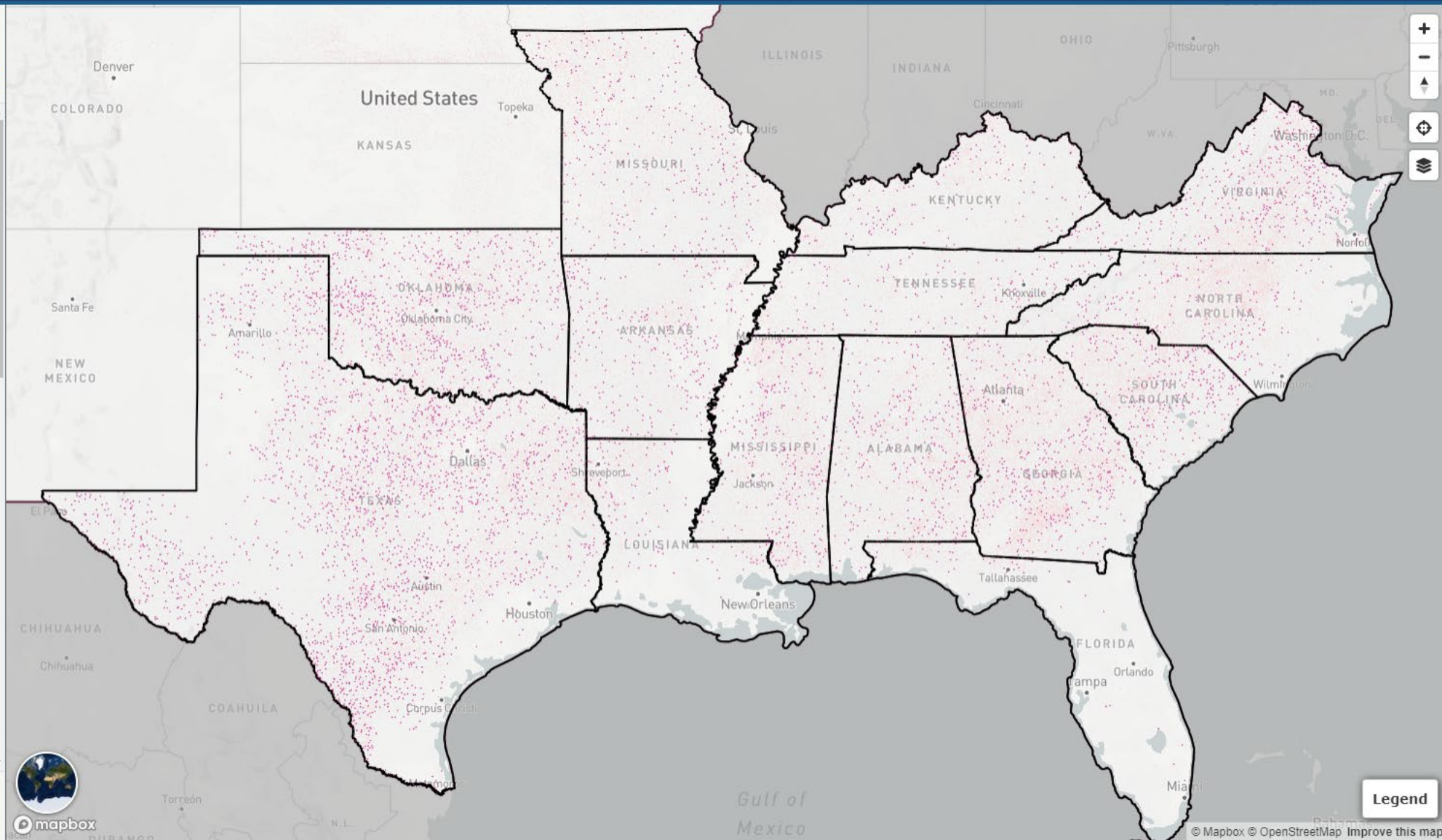
Unknown 347

Note: feasibility is based on further reconnaissance to evaluate individual barriers. Values are provided only for those that have been evaluated. There may be more feasible or infeasible dams than are indicated above.

### Miles Gained

### Dam Height

Prioritize dams



# POTENTIALLY FEASIBLE IN FLORIDA: 487

### Southeast Aquatic Barrier Prioritization Tool

Summarize Prioritize

modify filters

Show ranks for: network connectivity watershed condition **combined**

#### Explore results

487 prioritized dams

Dams are binned into tiers based on where they fall within the value range of the **combined network connectivity and watershed condition** score. Tier 1 includes dams that fall within the top 5% of values for this score, and tier 20 includes dams that fall within the lowest 5% of values for this score.

#### Choose top-ranked dams for display on map

Lowest tier ————— Highest tier

Use this slider to control the number of tiers visible on the map. Based on the number of dams visible for your area, you may be able to identify dams that are more feasible in the top several tiers than in the top-most tier.

#### Number of dams by tier

Tier	Number of Dams
Tier 1	3
Tier 2	2
Tier 3	8
Tier 4	11
Tier 5	26
Tier 6	20
Tier 7	31
Tier 8	26
Tier 9	33
Tier 10	28
Tier 11	34
Tier 12	46
Tier 13	44

Download dams

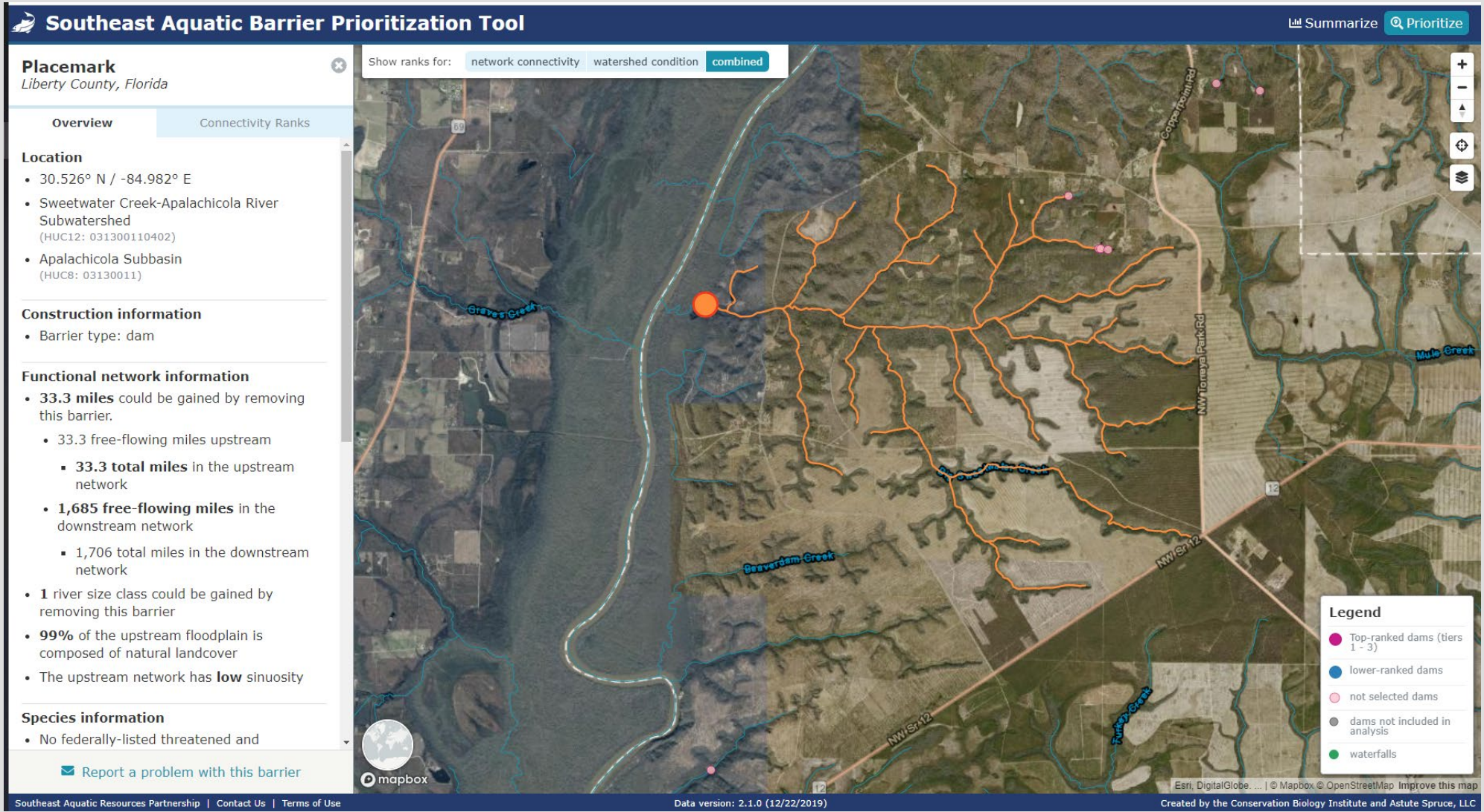
Legend

- Top-ranked dams (tiers 1 - 3)
- lower-ranked dams

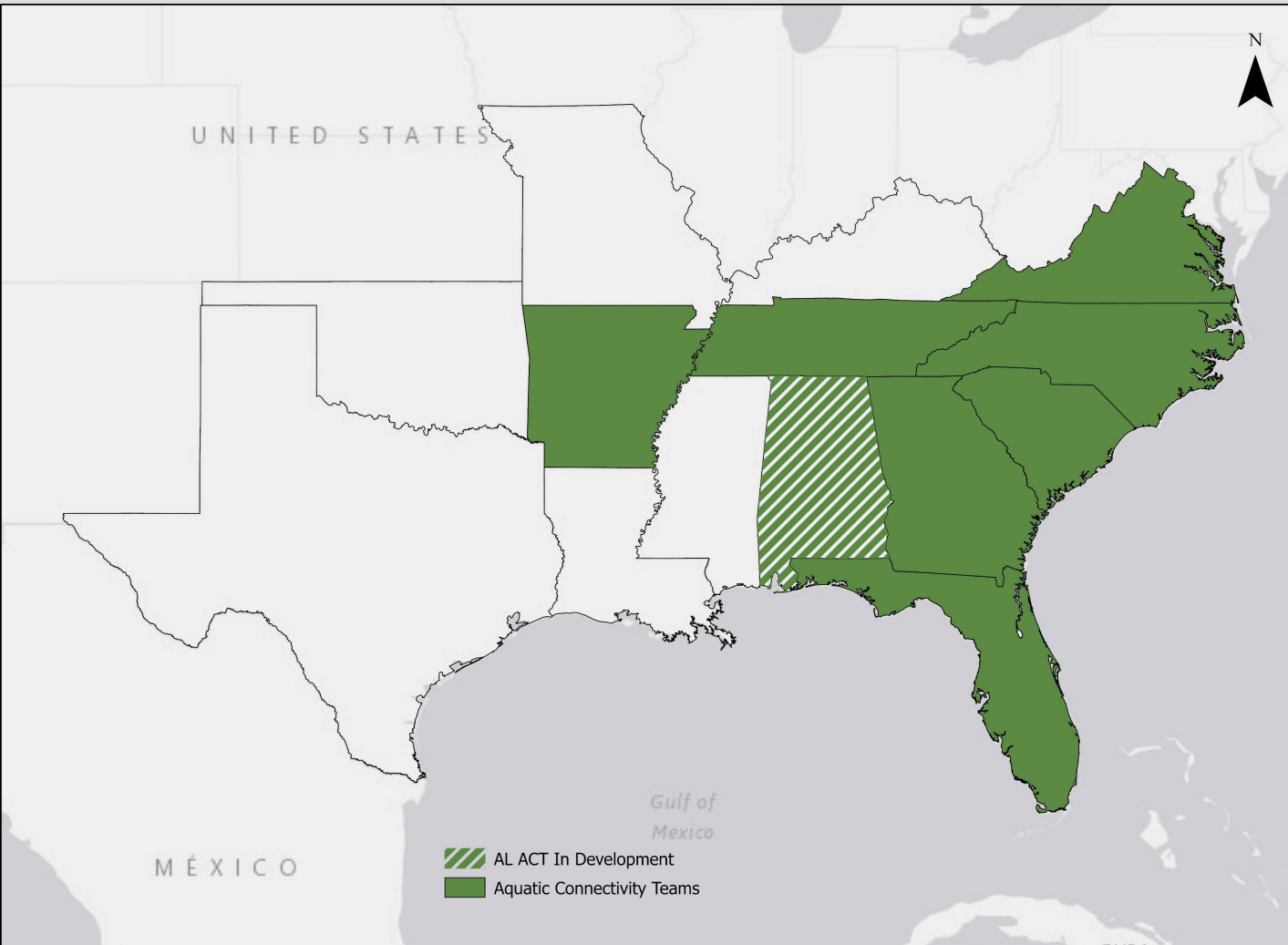
© Mapbox © OpenStreetMap Improve this map  
Southeast Aquatic Resources Partnership | Contact Us | Terms of Use  
Data version: 2.1.0 (12/22/2019)  
Created by the Conservation Biology Institute and Astute Spruce, LLC



# SWEETWATER CREEK DAM



# CONNECTIVITY TEAMS



- Composed of partners from all sectors.
- Work together to tackle aquatic connectivity.
- Prioritization results fed to Connectivity Teams for collaborative efforts.





MINE CREEK DAM,  
AR

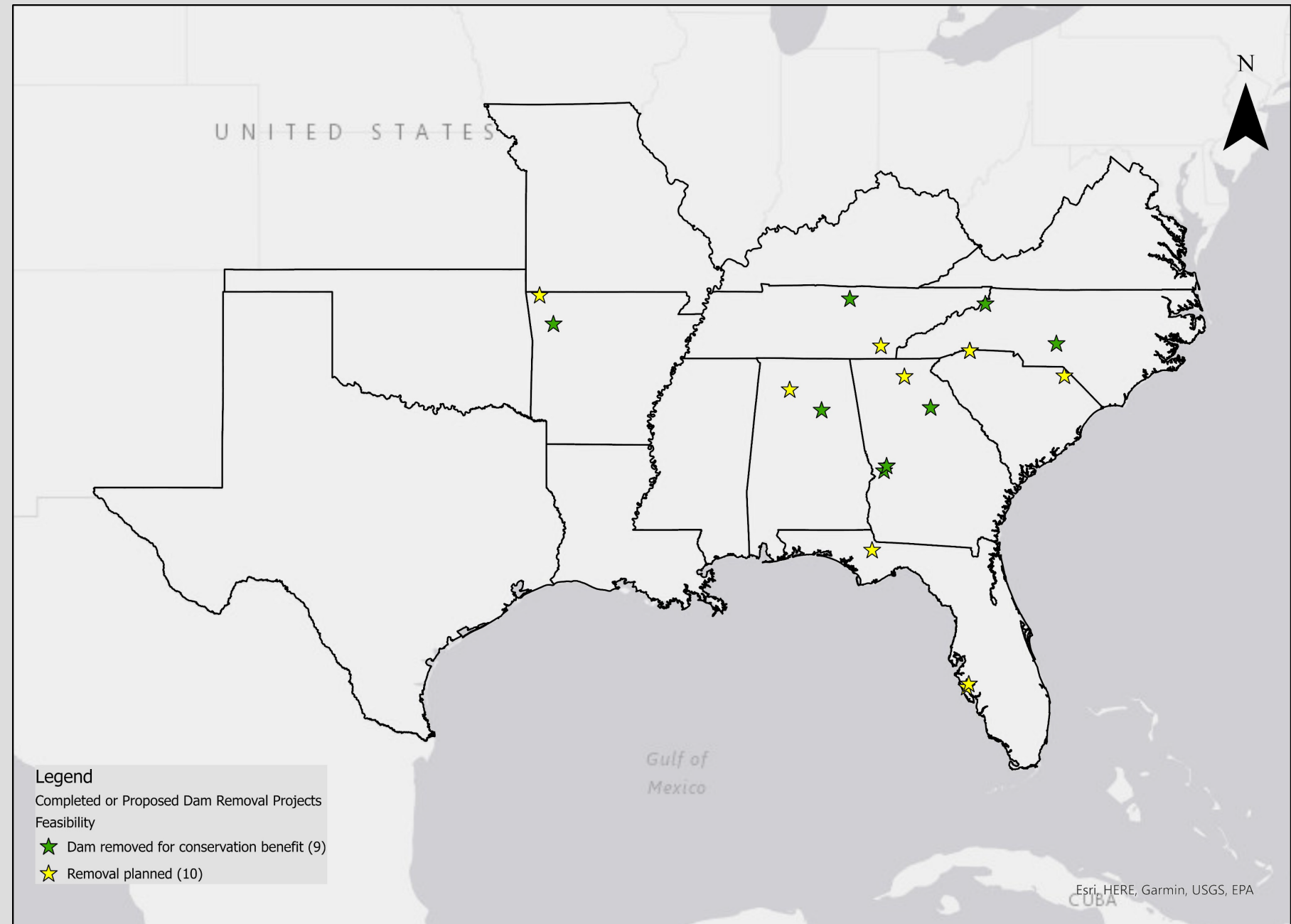
- Ouachita National Forest
- Reconnected Mine creek to Cossatot River
- Removed Jan 2021



# DAM REMOVALS

- **228** completed or proposed

- **19** of these influenced by inventory and tool



0 100 200 400 Miles

# ROAD BARRIER PRIORITIZATION

[modify filters](#)

Show ranks for: [network connectivity](#) [watershed condition](#) **[combined](#)** for [full networks](#) [perennial reaches only](#)

## Explore results

113 prioritized road-related barriers

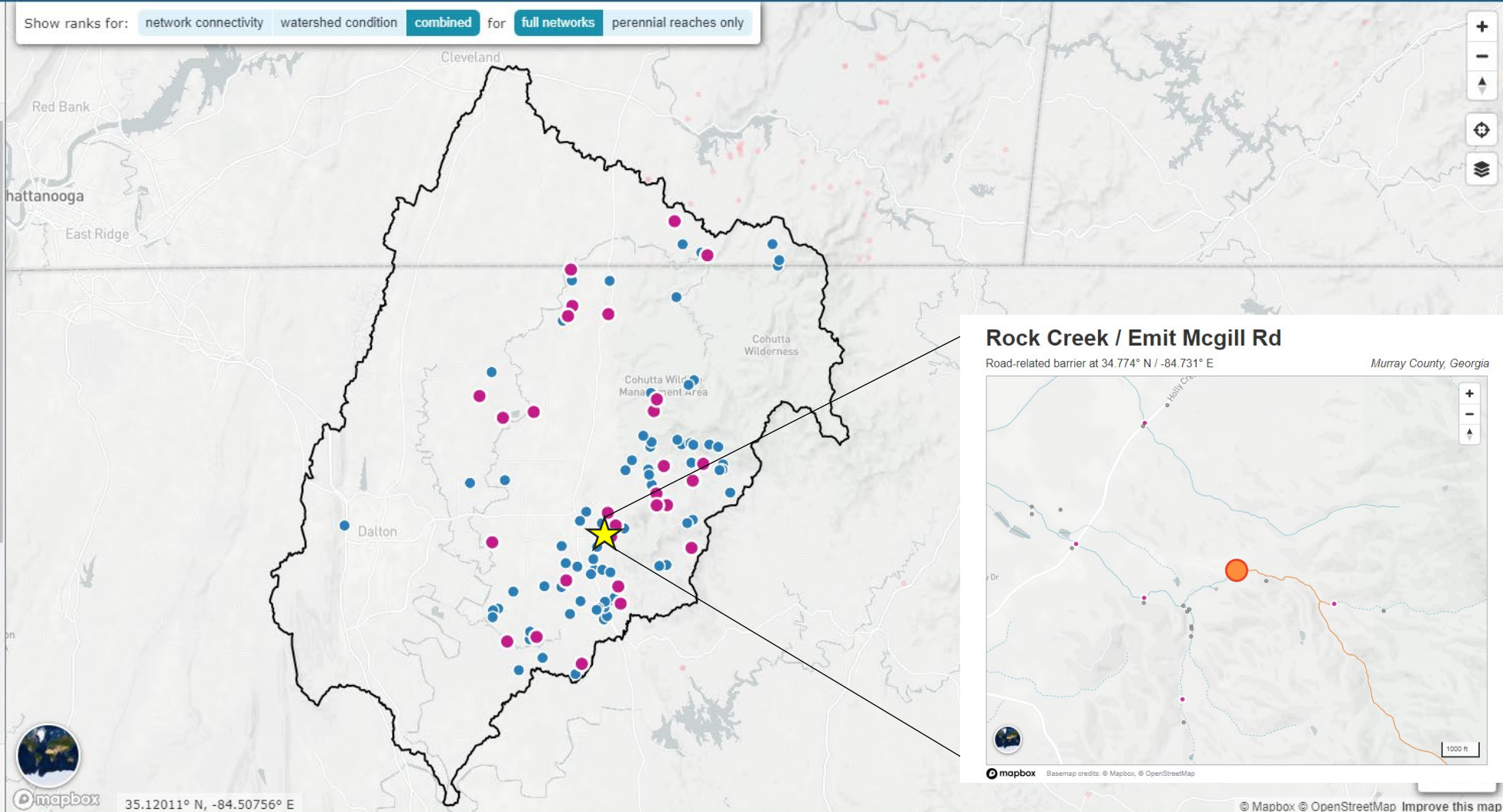
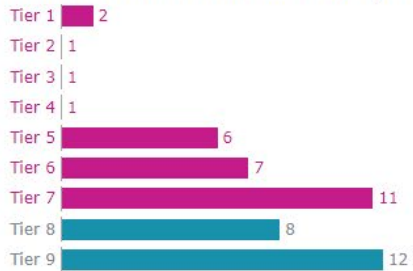
Road-related barriers are binned into tiers based on where they fall within the value range of the **combined network connectivity and watershed condition** score. Tier 1 includes road-related barriers that fall within the top 5% of values for this score, and tier 20 includes road-related barriers that fall within the lowest 5% of values for this score.

### Choose top-ranked road-related barriers for display on map

Lowest tier  Highest tier

Use this slider to control the number of tiers visible on the map. Based on the number of road-related barriers visible for your area, you may be able to identify road-related barriers that are more feasible in the top several tiers than in the top-most tier.

### Number of road-related barriers by tier



[Download road-related barriers](#)



HOLLY CREEK, GA  
EARTH DAY 2021

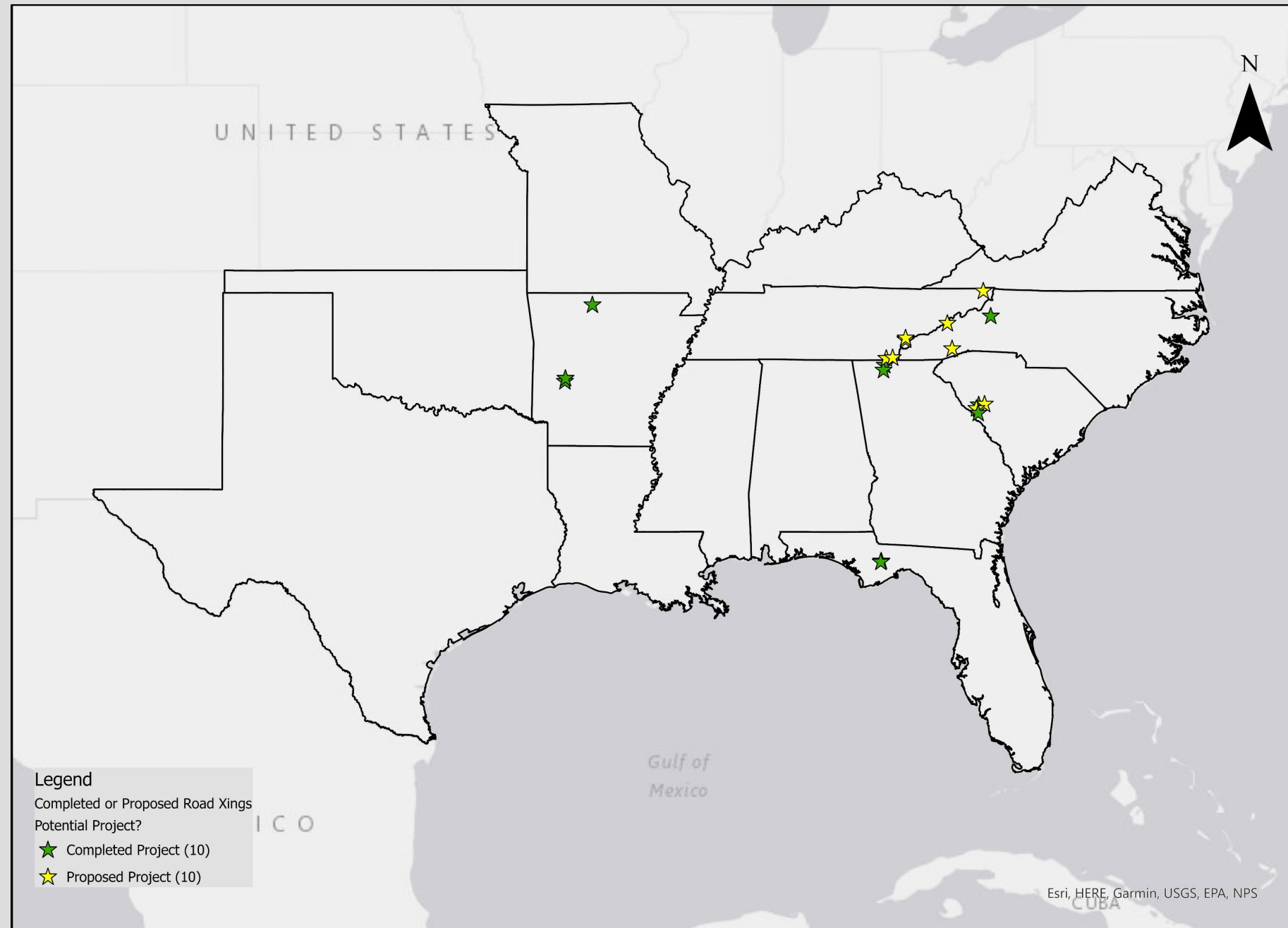




# ROAD XING REPLACEMENTS

- **275** completed or proposed

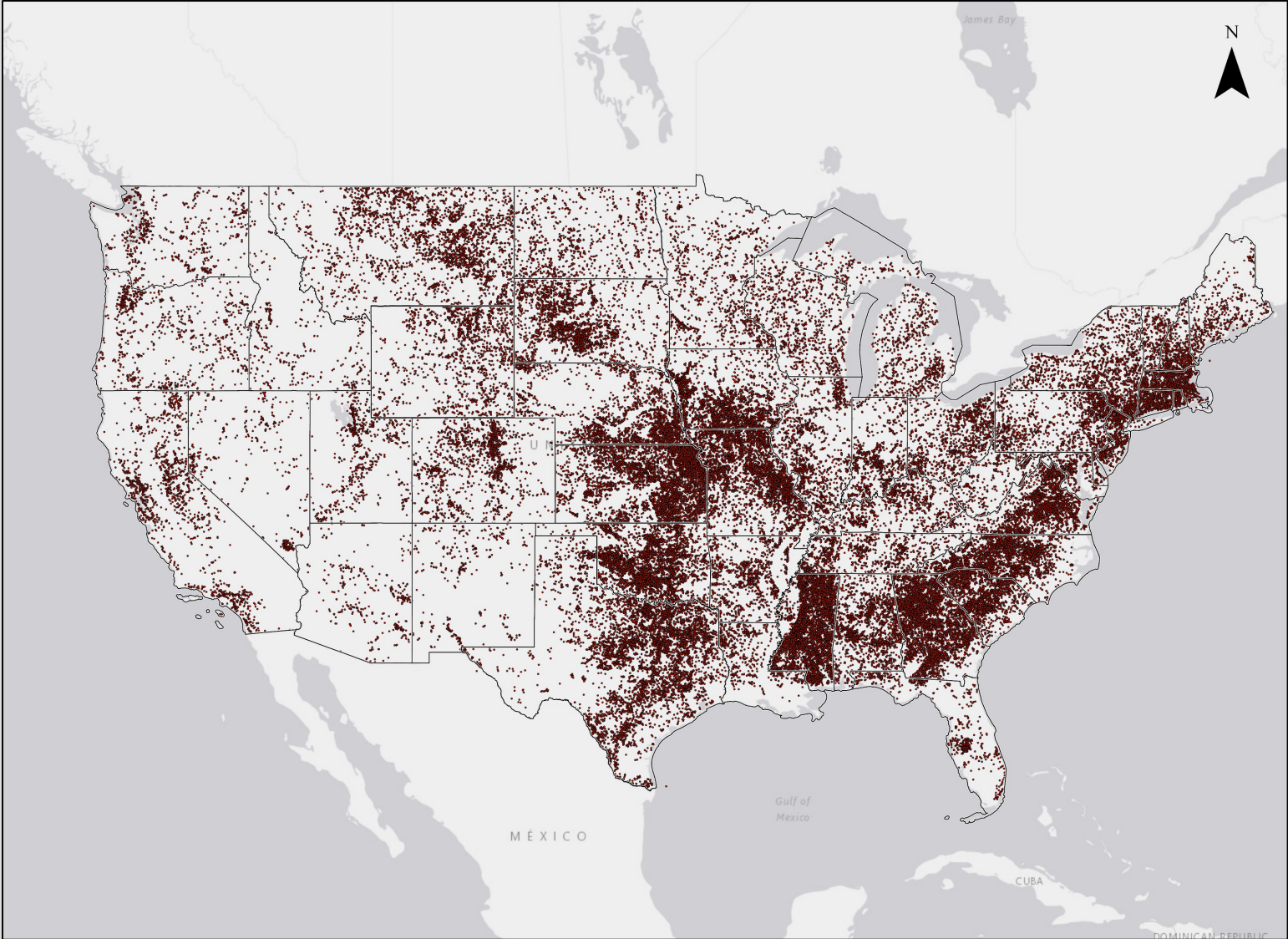
- **20** of these influenced by inventory and tool



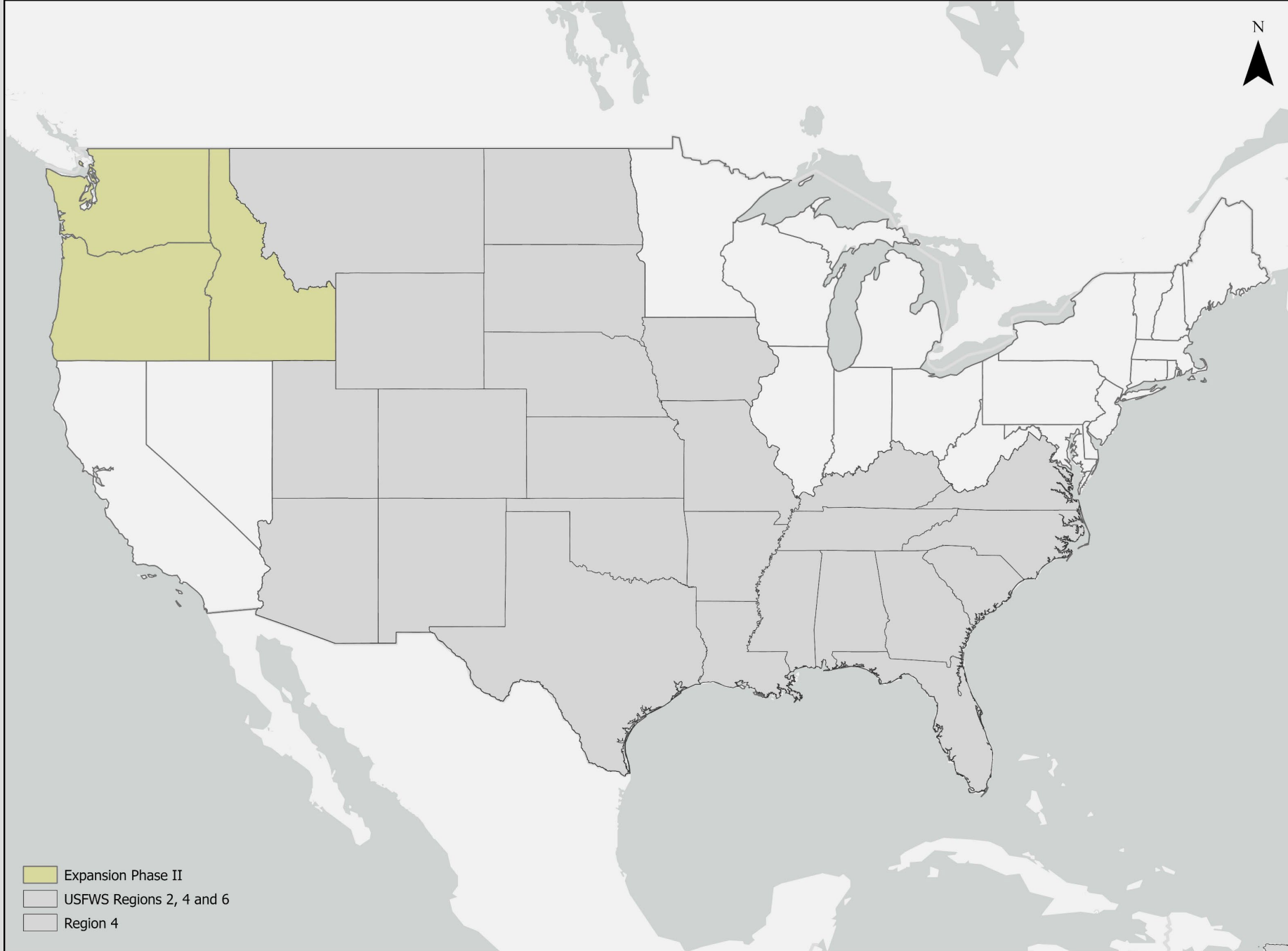
0 100 200 400 Miles

# National Inventory of Dams

91,000 dams tracked nationally



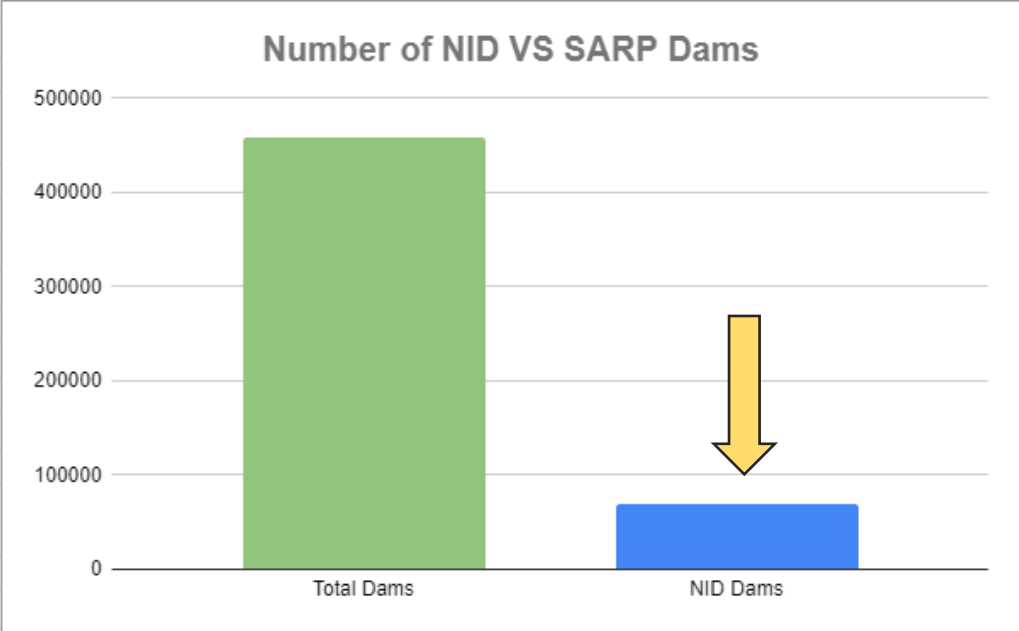
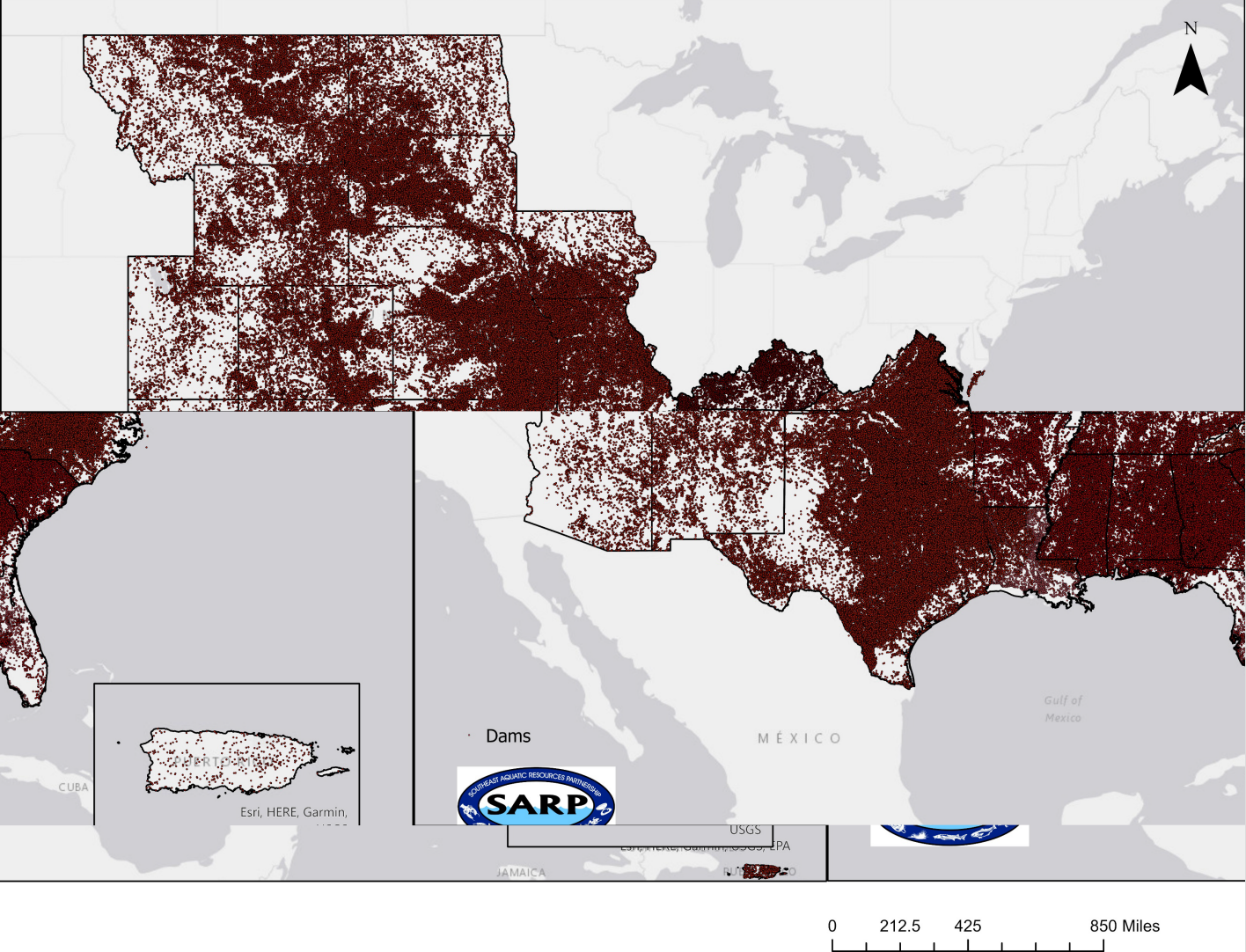
0 140 280 560 Miles



0 180 360 720 1,080 1,440 Miles



# Dams



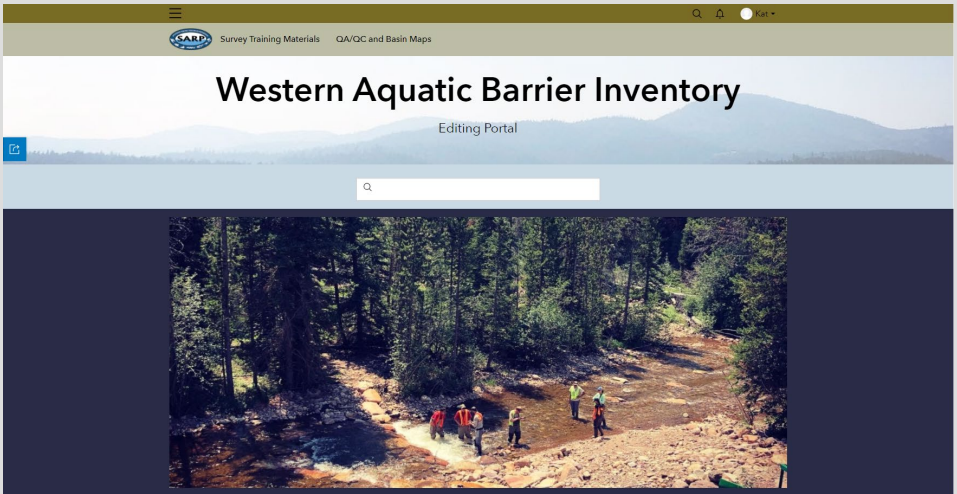
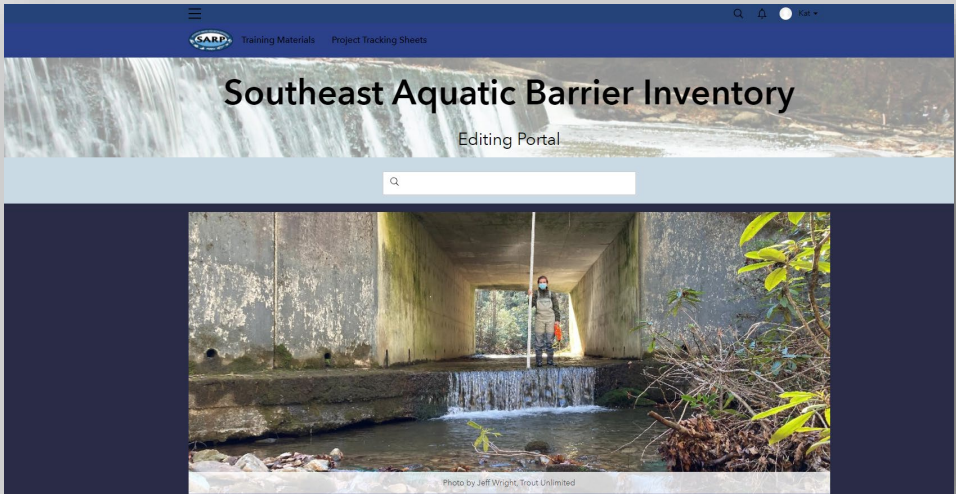
# SARP CONNECTIVITY PROGRAM

# Inventory

Dams

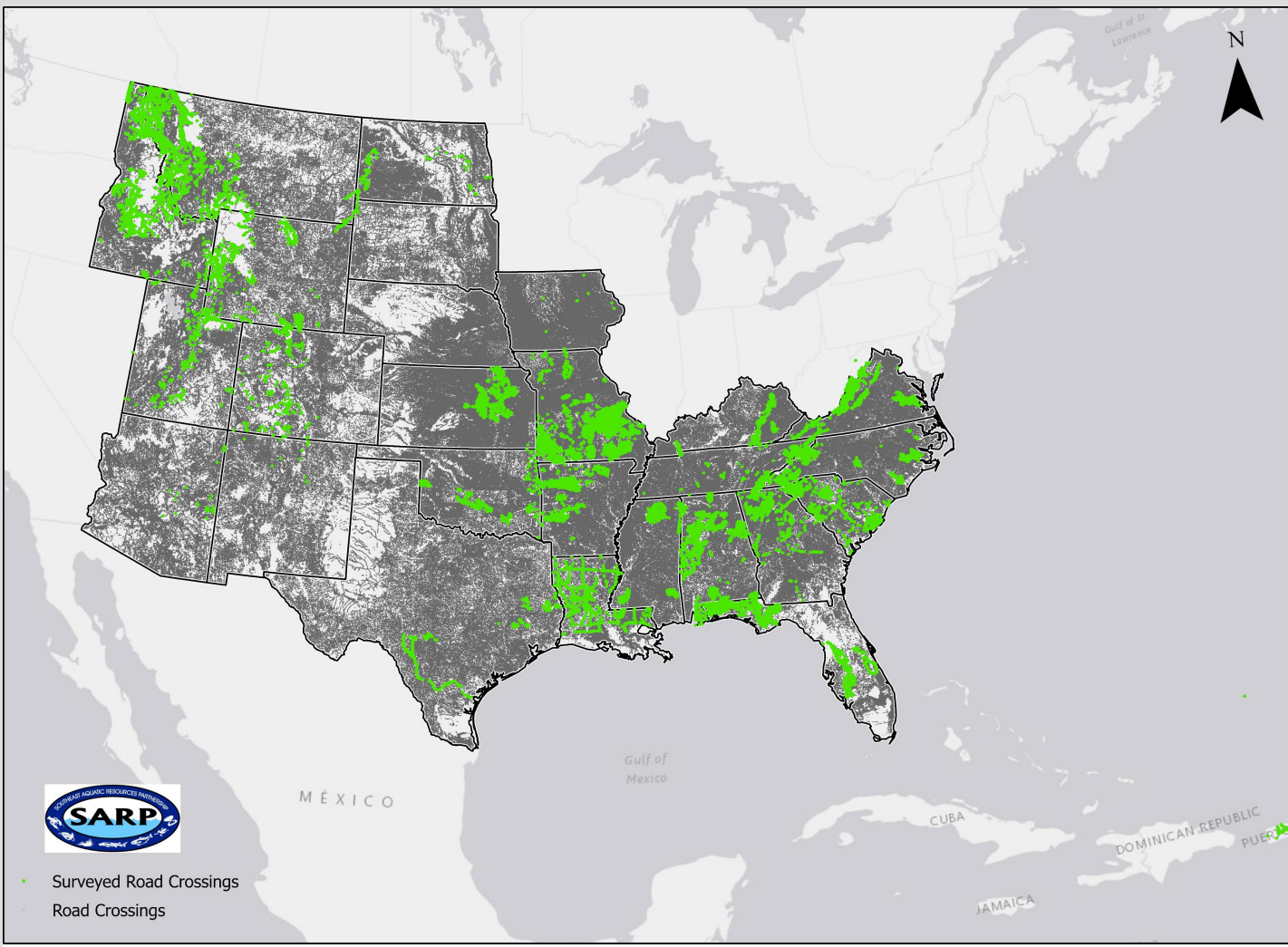
Road Crossings

Waterfalls



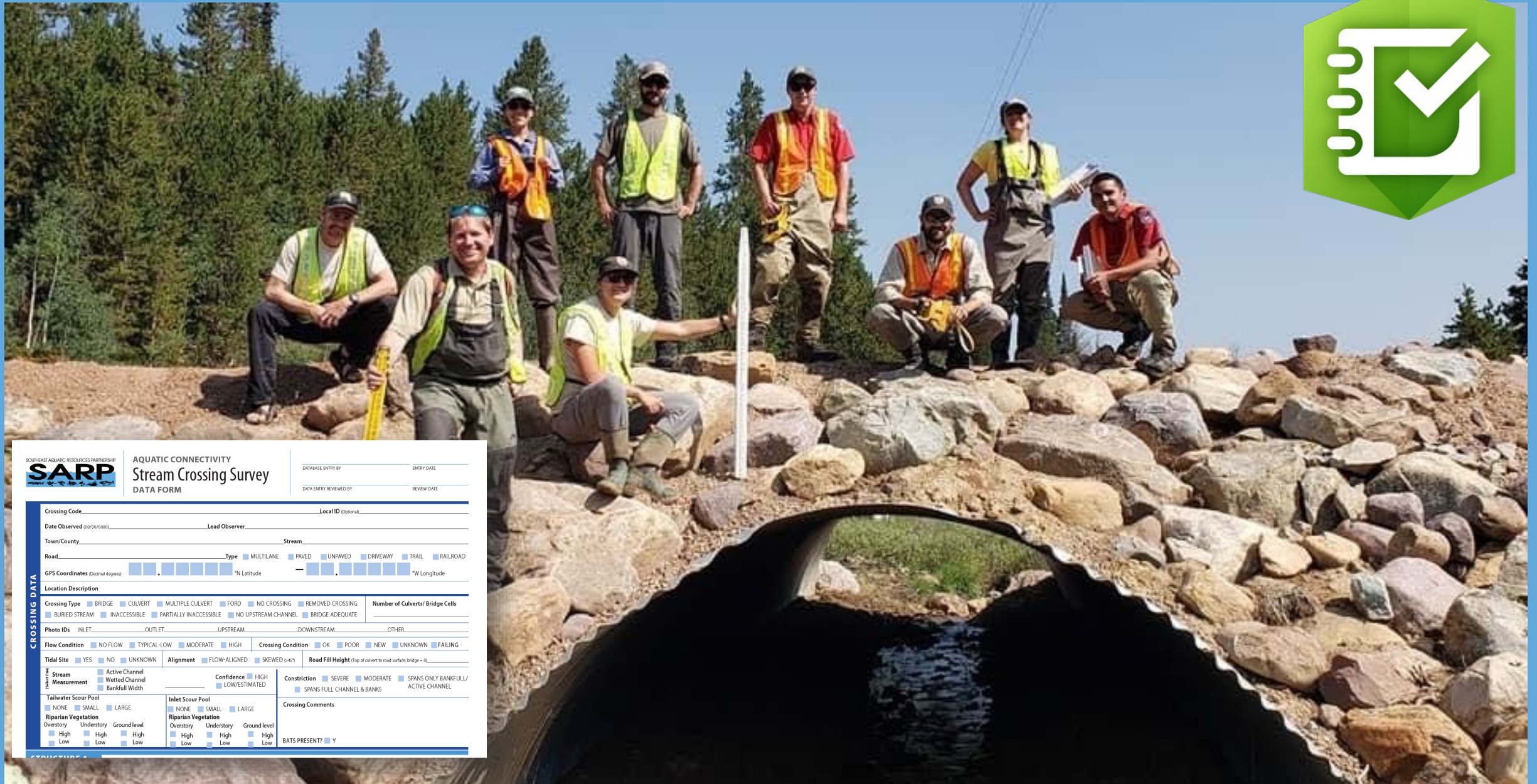
# Road Crossings

- 37,801 assessed
- 46% are barriers



Severity	Number	Percent
No Barrier	20222	53%
Moderate Barrier	1536	4%
Barrier Non-Specific	11784	31%
Major Barrier	4259	11%





**SARP** SOURCE-SIDE AQUATIC RESOURCES PARTNERSHIP

**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 (yy/mm/dd) \_\_\_\_\_ Lead Observer \_\_\_\_\_  
Town/County \_\_\_\_\_ Stream \_\_\_\_\_  
Road \_\_\_\_\_ Type  MULTILANE  PAVED  UNPAVED  DRIVEWAY  TRAIL  RAILROAD  
GPS Coordinates (Decimal degree) \_\_\_\_\_ "N Latitude \_\_\_\_\_ "W Longitude \_\_\_\_\_

**CROSSING DATA**

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  FAILING

Tidal Site  YES  NO  UNKNOWN  Alignment  FLOW-ALIGNED  SKEWED (>45°)  Road Fill Height (Top of culvert to road surface; bridge = 0) \_\_\_\_\_

Stream Measurement  Active Channel  Wetted Channel  Bankfull Width  Confidence  HIGH  LOW/ESTIMATED

Tailwater Scour Pool  NONE  SMALL  LARGE  Inlet Scour Pool  NONE  SMALL  LARGE

Riparian Vegetation  Overstory  Understory  Ground level  Overstory  Understory  Ground level  High  Low  High  Low  High  Low  High  Low  High  Low

Constriction  SEVERE  MODERATE  SPANS ONLY BANKFULL/ACTIVE CHANNEL  SPANS FULL CHANNEL & BANKS

Crossing Comments \_\_\_\_\_

BATS PRESENT?  Y

Bear River training



# PRIORITIZATION EXPANDED

[← modify filters](#)

## Explore results

357,103 prioritized dams

Dams are binned into tiers based on where they fall within the value range of the **combined network connectivity and watershed condition** score. Tier 1 includes dams that fall within the top 5% of values for this score, and tier 20 includes dams that fall within the lowest 5% of values for this score.

### Choose top-ranked dams for display on map

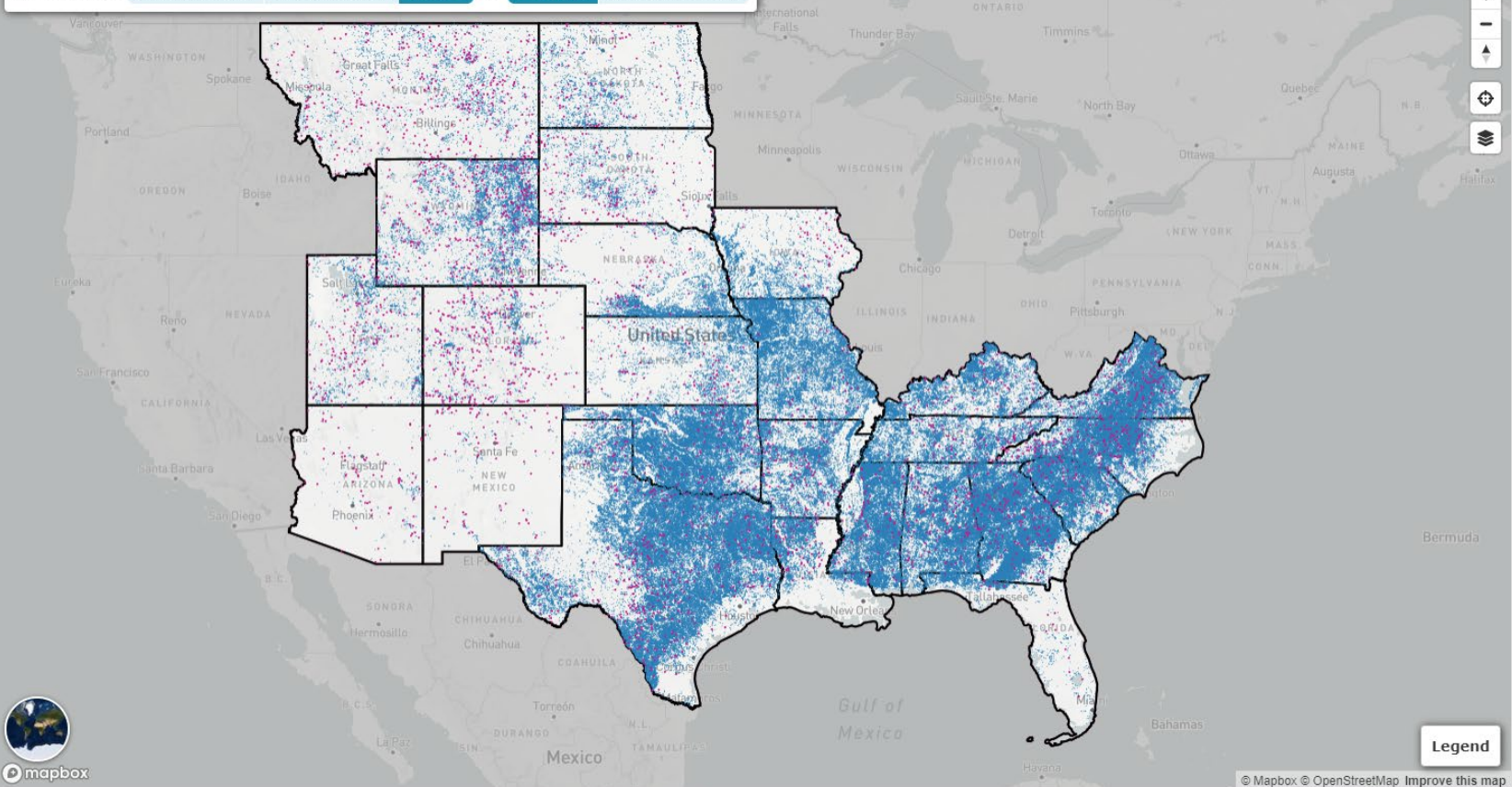
Lowest tier  Highest tier

Use this slider to control the number of tiers visible on the map. Based on the number of dams visible for your area, you may be able to identify dams that are more feasible in the top several tiers than in the top-most tier.

### Number of dams by tier

Tier 1	35
Tier 2	243
Tier 3	651
Tier 4	1,056
Tier 5	1,426
Tier 6	1,846
Tier 7	2,052
Tier 8	2,266
Tier 9	2,603

Show ranks for: [network connectivity](#) [watershed condition](#) **[combined](#)** for [full networks](#) [perennial reaches only](#)



[Download dams](#)



Legend

© Mapbox © OpenStreetMap Improve this map





**Possible Next Step:**

## **Aquatic Connectivity Teams**

Aquatic Connectivity Teams exist in the Northeast, Southeast, and Wyoming. State agencies in the west could begin to create these teams to build capacity and community around this inventory and tool in order to take advantage of it in light of new Infrastructure Bill Funding.





## QUESTIONS?

Contact:

Kat Hoenke

SARP GIS Coordinator

[Kat@Southeastaquatics.net](mailto:Kat@Southeastaquatics.net)

**Tool URL:**

<https://connectivity.sarpdata.com>