TRBN 2022

Tennessee River Basin Network

Diverse Connections for Diverse Watersheds

2022

TRBN 2022

WELCOME

2022

GOLD SPONSORS

SOUTHEASTERN PARTNERSHIP FOR FORESTS&WATER

TVA

TENNESSEE TECH 19 15 THE WATER CENTER

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WILDLANDS ENGINEERING

TRBN 2022

Opening Networking Session

A chance for you to gather, engage, and build valuable connections across our community working to safeguard our Basin's aquatic life.

TRBN 2022

Theodore Coopwood, III

National Coordinator of Youth Programing and Regional Coordination, Environmental Protection Agency

THE CHOICE FOR DIVERSITY

Having the Knowledge, Courage, and Vision to Realize Change

THE BENEFITS OF DIVERSITY

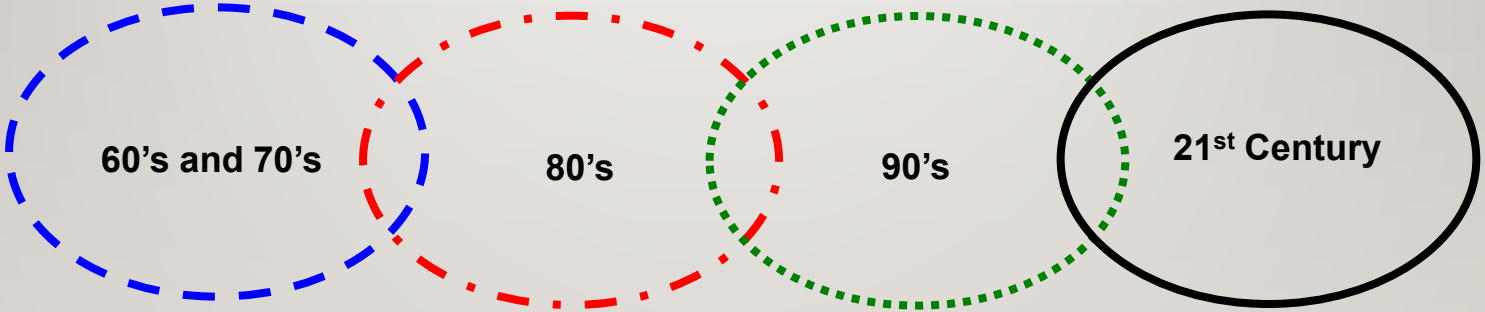
- Provides Strength
- Promotes Excitement
- Promotes Opportunity and Advancement
- Promotes Creativity
- Promotes and Encourage Vision

THE BIG QUESTION

If diversity can do all these amazing things, why do we struggle with achieving it?

WHAT'S GOING ON IN THE WORLD?

~ EEO TO GLOBAL VALUES ~



EEO

Establish a workplace free of discrimination

Affirmative Action

Initiating proactive behaviors and actions in making EEO a reality for everyone

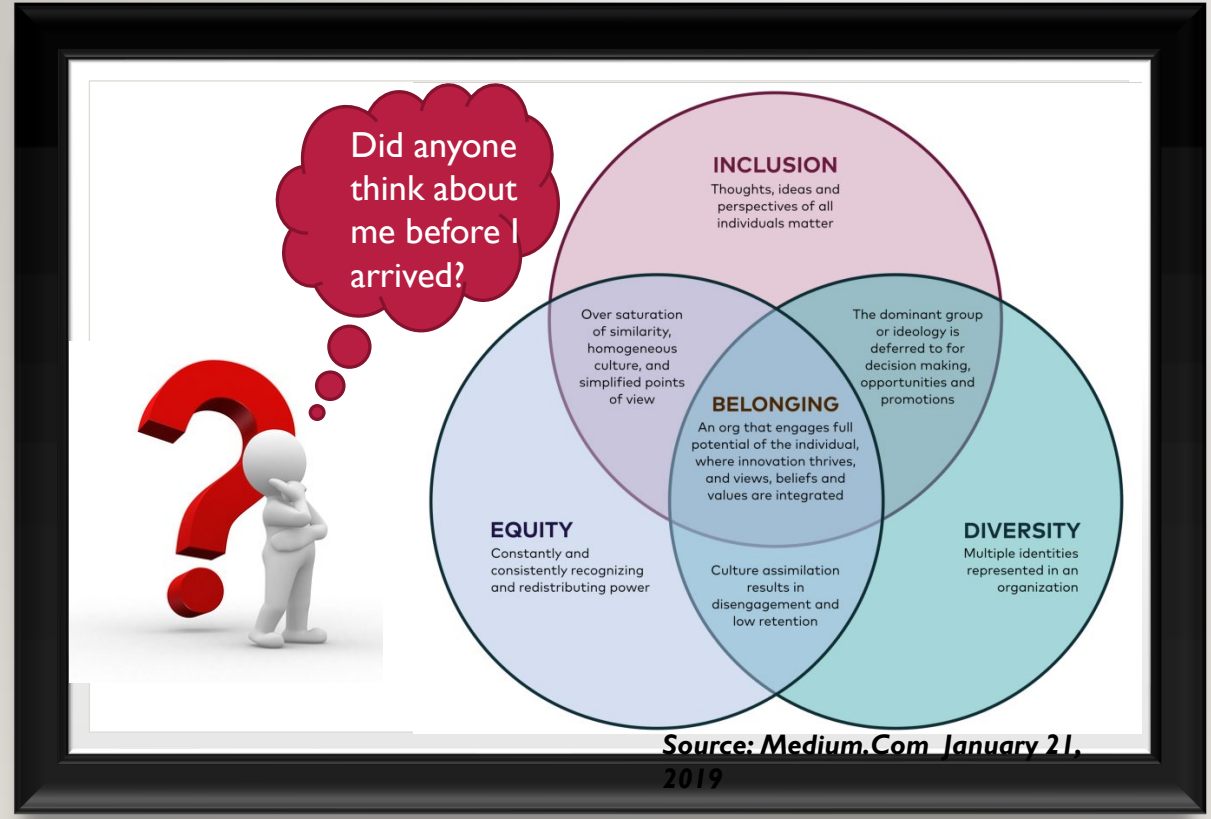
Diverse Workforce

Creating an inclusive work environment that values all employees

Global Workplace

Actualizing cross-cultural understanding, acceptance and strengths of diverse teams

WHAT'S THE BIG DEAL ABOUT SOME WORDS?

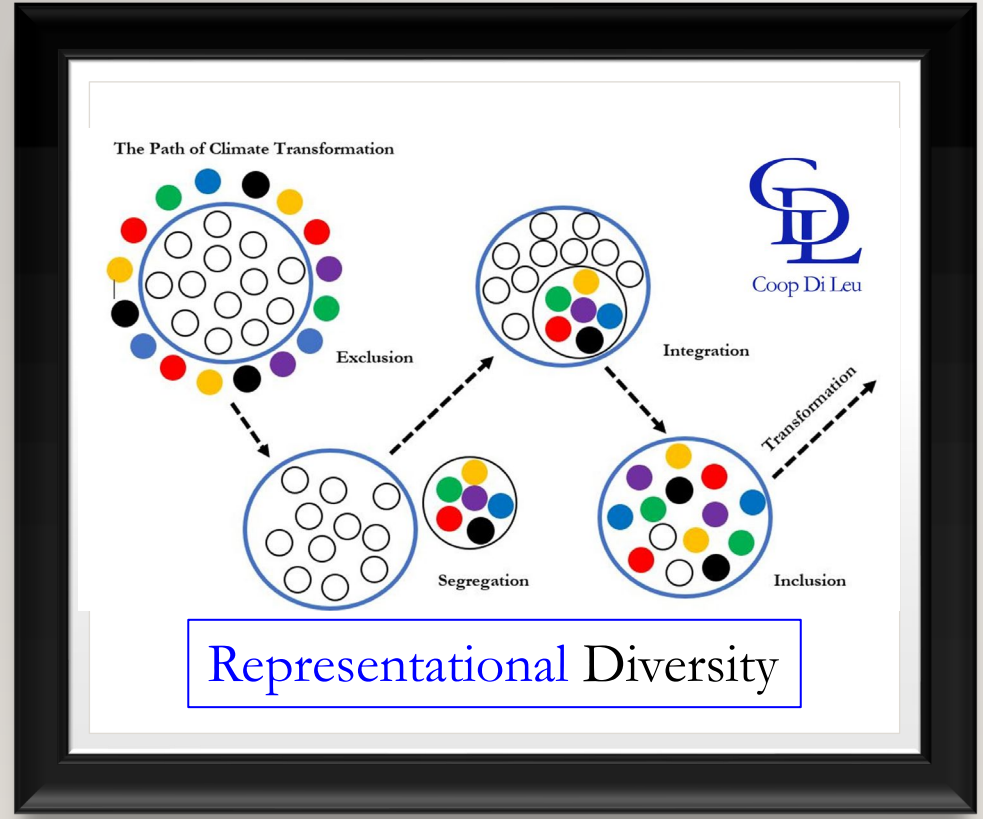


Source: Medium.Com January 21, 2019

Terminology Review

~ definitions that impact

~



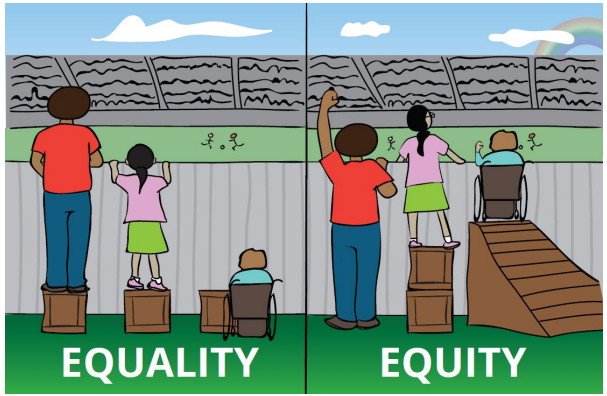
COOPWOOD DIVERSITY LEADERSHIP & EDUCATION UNIVERSAL

Terminology Review

The degree to which an entity intentionally plans to attract and include underrepresented professionals and creates mechanisms for relevant inclusion in its recruitment, onboarding, retention, promotion, and pipeline development.

COOPWOOD DIVERSITY LEADERSHIP & EDUCATION UNIVERSAL

Terminology Review

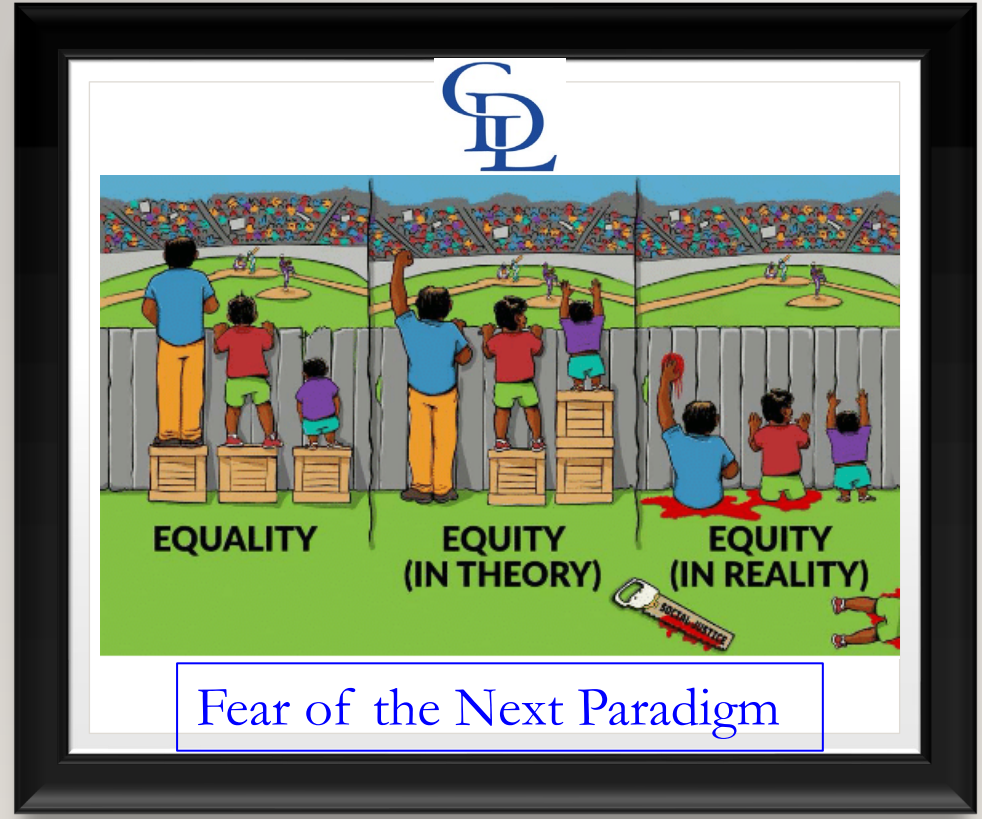


Know the Difference!

What is needed to succeed versus what is provided?

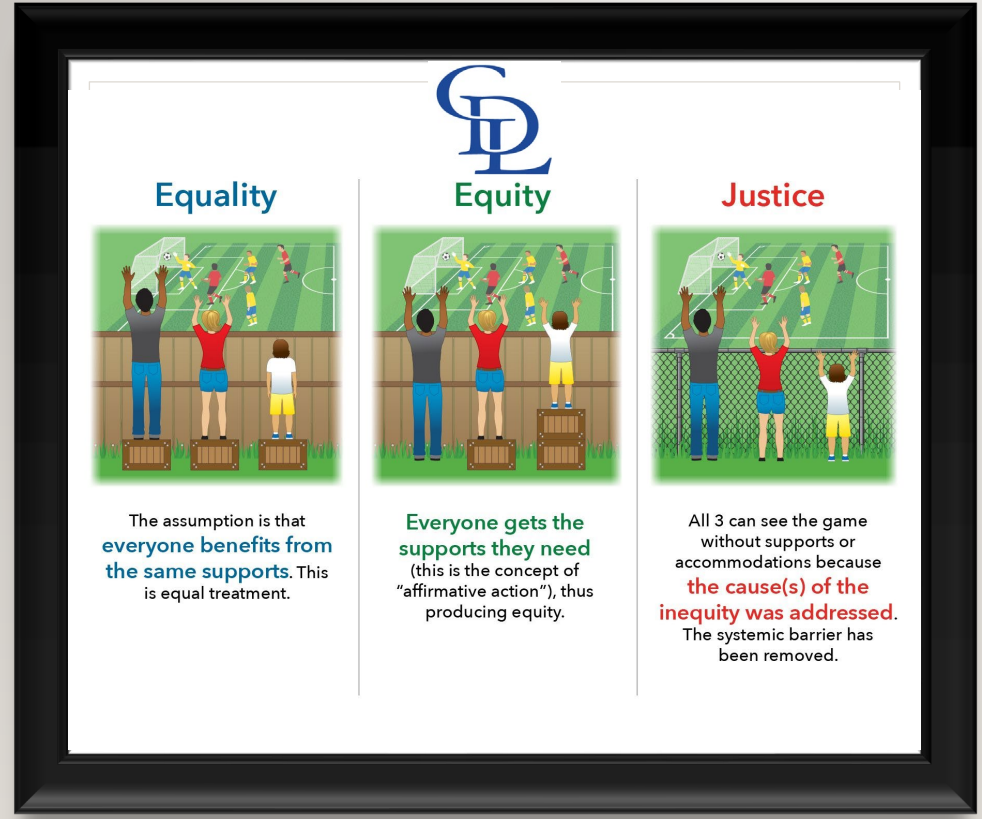
COOPWOOD DIVERSITY
LEADERSHIP &
EDUCATION UNIVERSAL

Terminology Review



Fear of the Next Paradigm

Ignoring the CAUSE brings wrath to ALL the people!



COOPWOOD DIVERSITY LEADERSHIP & EDUCATION UNIVERSAL

Terminology Review

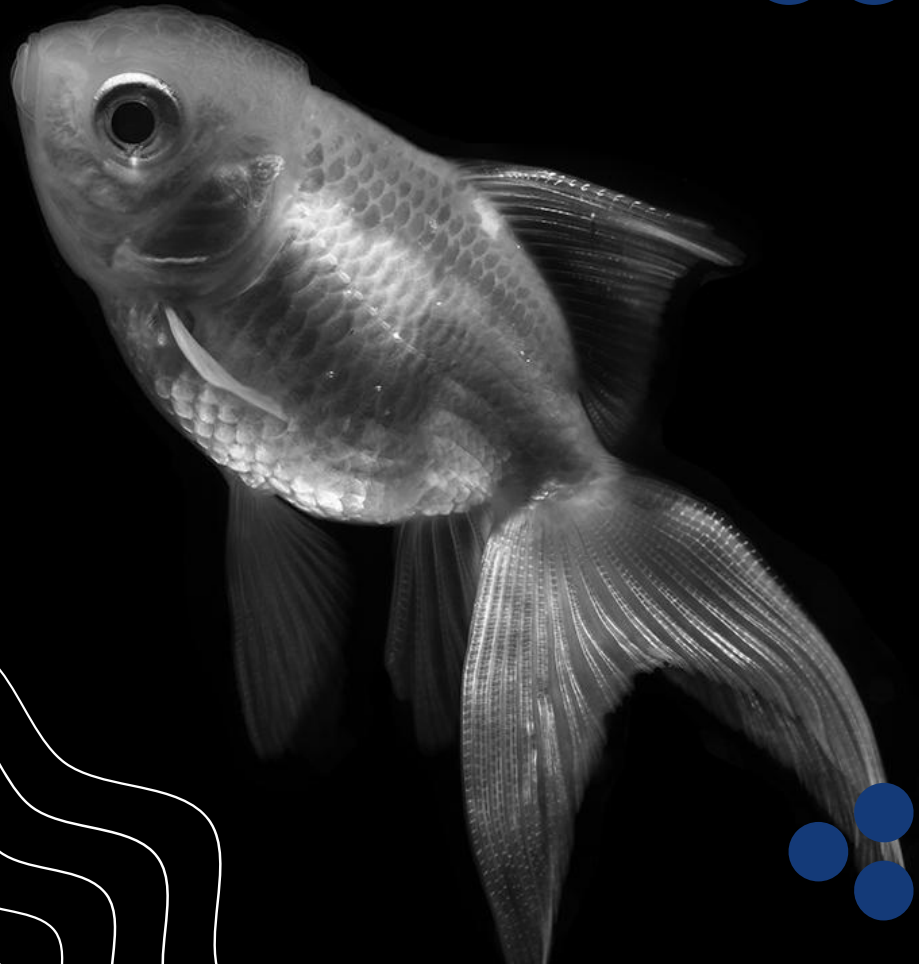
JUSTICE – Removing the CAUSE.

"At the end of the day,
I'd rather be excluded for who I include
than included for who I exclude."

Rev. Eston Williams, clergy Aley UMC

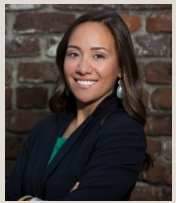
QUOTE FOR THE "INTENT"

BREAK



Aquatic Connectivity Informational Session

Dr. Kit Wheeler



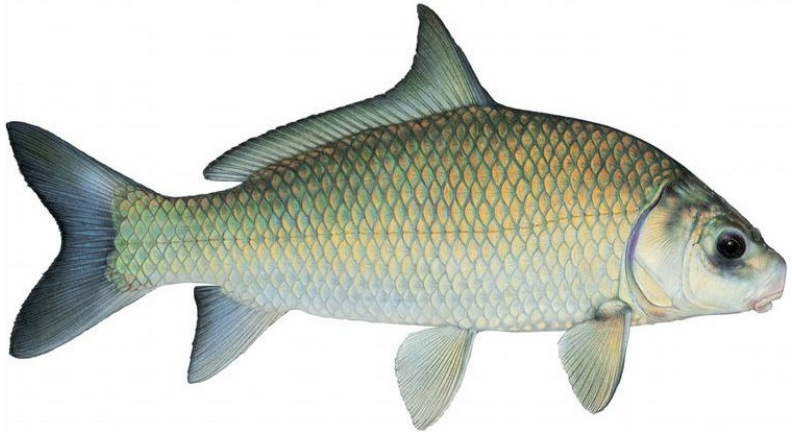
Victoria Ruddle

Daniel West

Erin McCombs

A NEW DIMENSION OF AQUATIC CONNECTIVITY?

nutrient transport by migratory fishes



Kit Wheeler

Tennessee Tech University

Department of Biology

ACKNOWLEDGMENTS

undergrads/techs

Jarrett Tallent
Caleb Moses
Will Schibig
Brandon Tincher
Katie Luna
Ethan Babcock
Hunter Hemontolor

Tennessee Tech Stream Fish Ecology Lab

FUNDING PARTNERS

Tennessee Tech Department of Biology

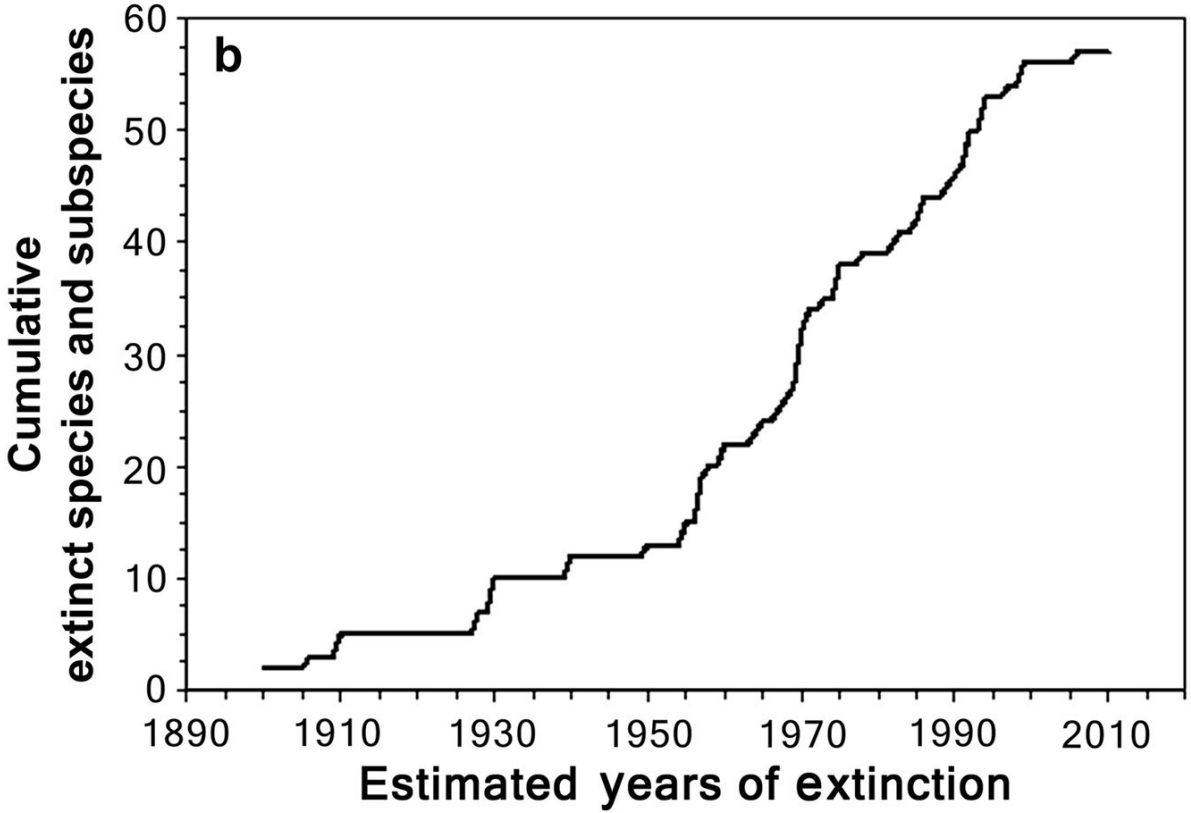
Tennessee Tech Water Center

Tennessee Tech Office of Research

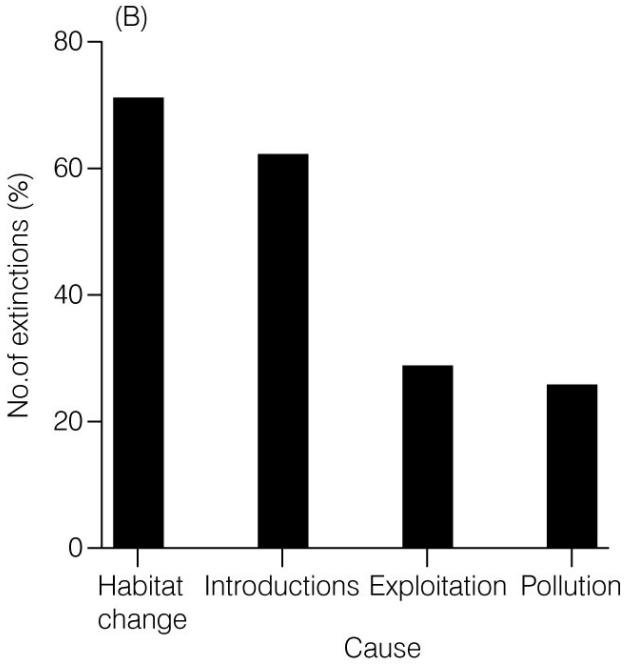
Sicklefin Redhorse Conservation Committee

What role do fishes play in freshwater environments?

freshwater fish conservation



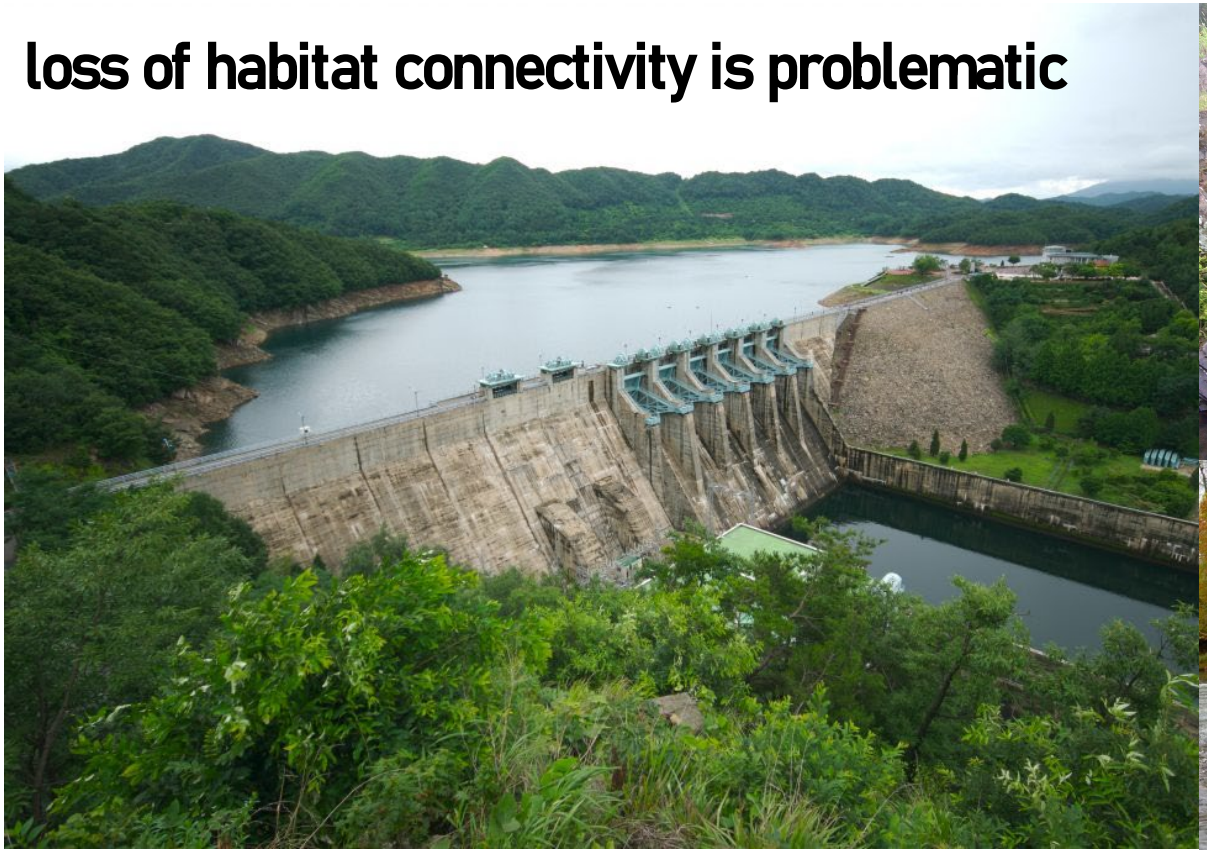
Burkhead 2012

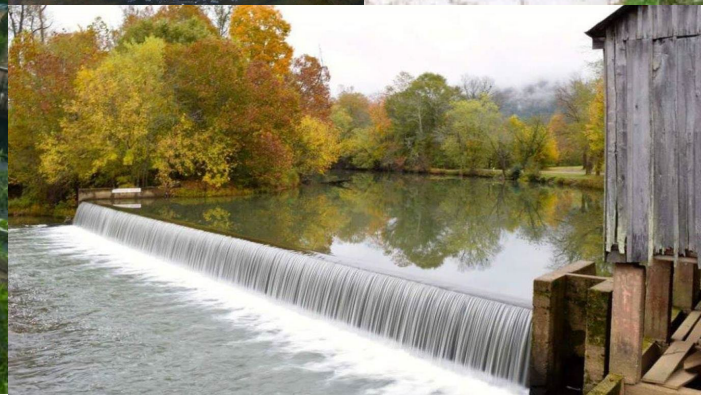


Harrison & Stiassny 1999

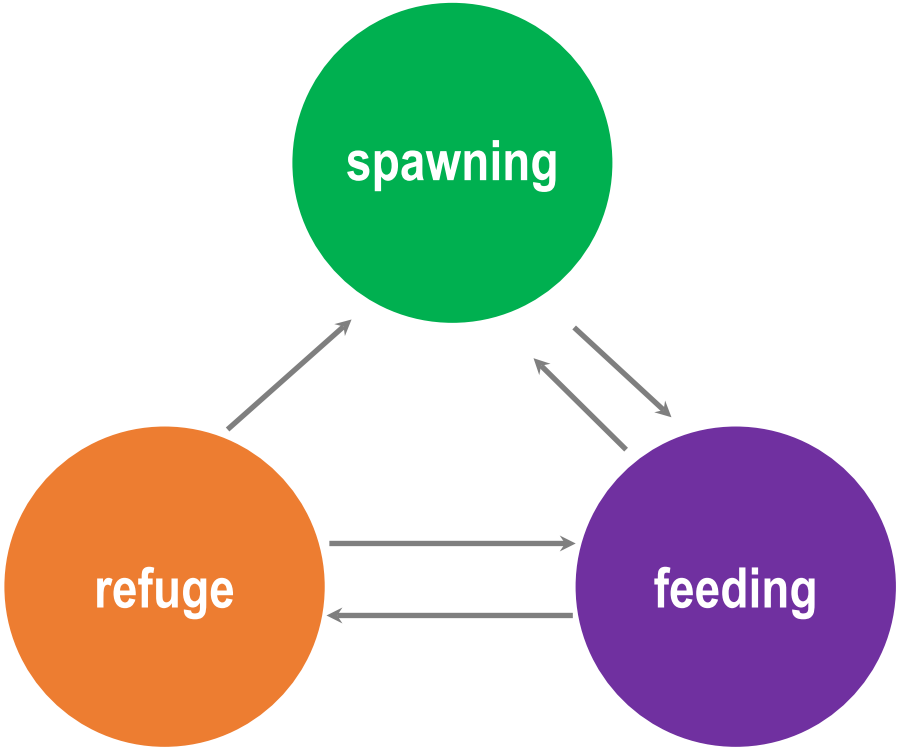
freshwater fish conservation

loss of habitat connectivity is problematic





migratory freshwater fishes



Schlosser and Angermeier 1995

- distance between habitats is important, but **access** to **distinct** habitats **is critical**
- at least **25%** of North American freshwater fishes are migratory
- **66%** of migratory North American freshwater fishes move **exclusively** in fresh water

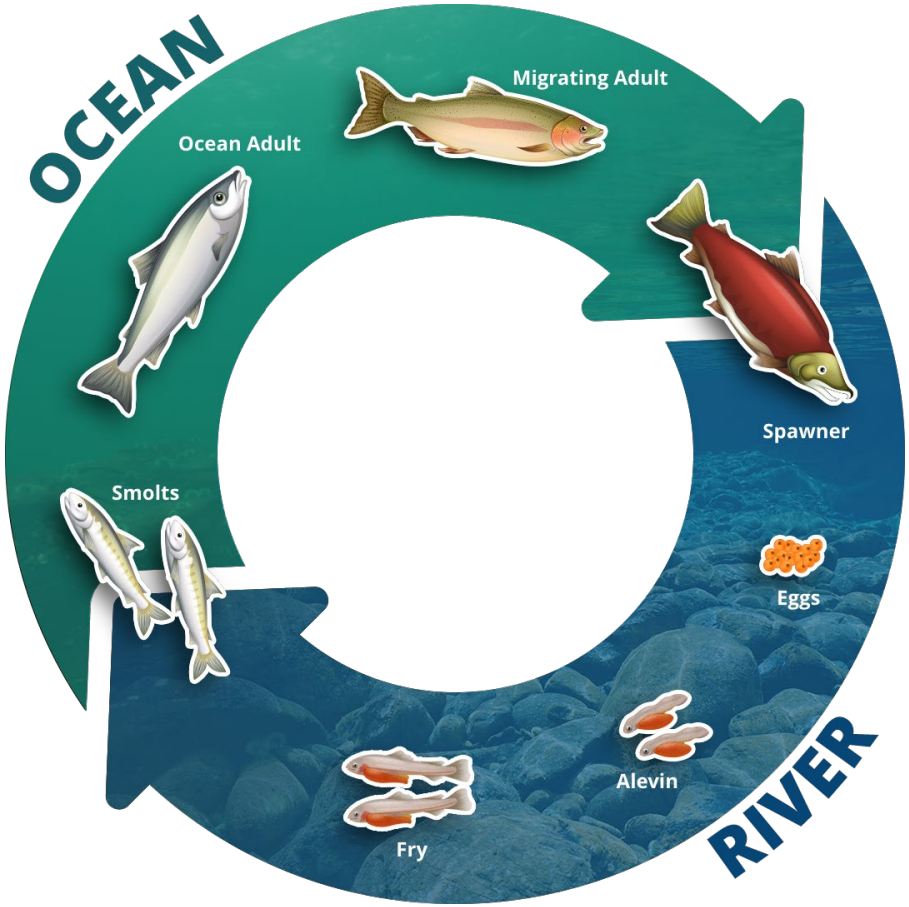
The North American Freshwater Migratory Fish Database (NAFMFD): Characterizing the migratory life histories of freshwater fishes of Canada, the United States and Mexico

Emily M. Dean[1] | Arthur R. Cooper[1,2] | Lizhu Wang[3] | Wesley Daniel[4] | Solomon David[5] | Clayton Ernzen[1] | Keith B. Gido[6] | Edward Hale[7] | Tim J. Haxton[8] | William Kelso[9] | Nancy Leonard[10] | Chris Lido[11] | Joseph Margraf[12] | Michael Porter[13] | Casey Pennock[14] | David Propst[15] | Jared Ross[1] | Michelle D. Staudinger[16] | Gary Whelan[2] | Dana M. Infante[1]

Dean et al. 2022

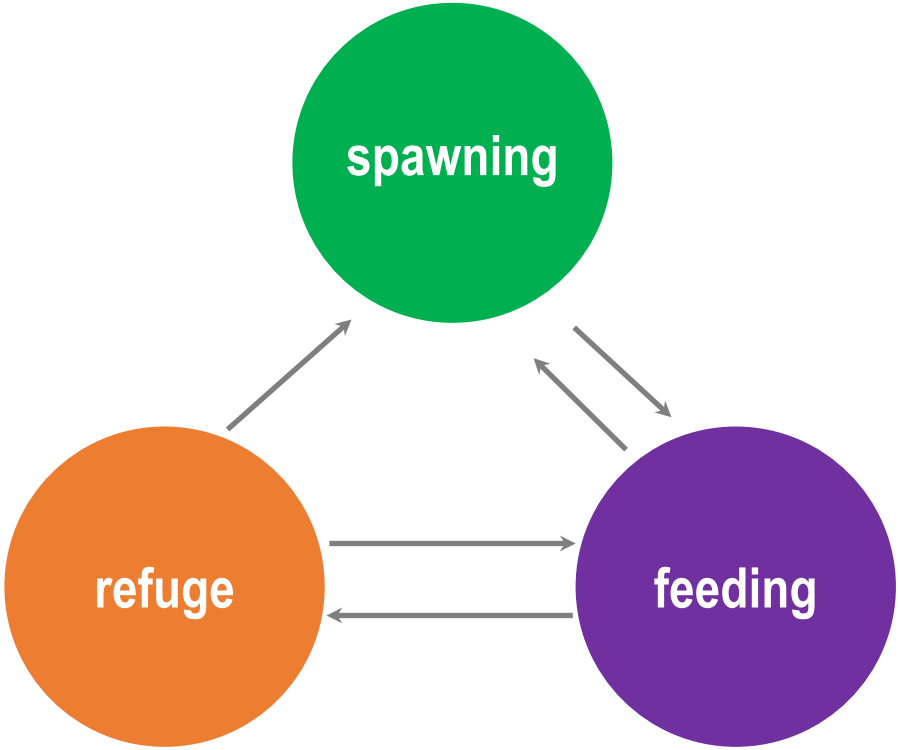
Pacific Salmon: a useful migration model

Pacific Salmon: a useful migration model



Pacific salmon have a life cycle that links marine and freshwater habitats.

migratory freshwater fishes



Schlosser and Angermeier 1995

more than **80%** of nearly 70 North American species are migratory

Dean et al. 2022


suckers as the salmon of the South

suckers in the Southeast US

nine genera, seven of which have documented spawning migrations
(100s m – 100s km)

can be large, with lots of eggs
(weights up to 40 kg reported)

iteroparous

long-lived
(up to 30+ years)

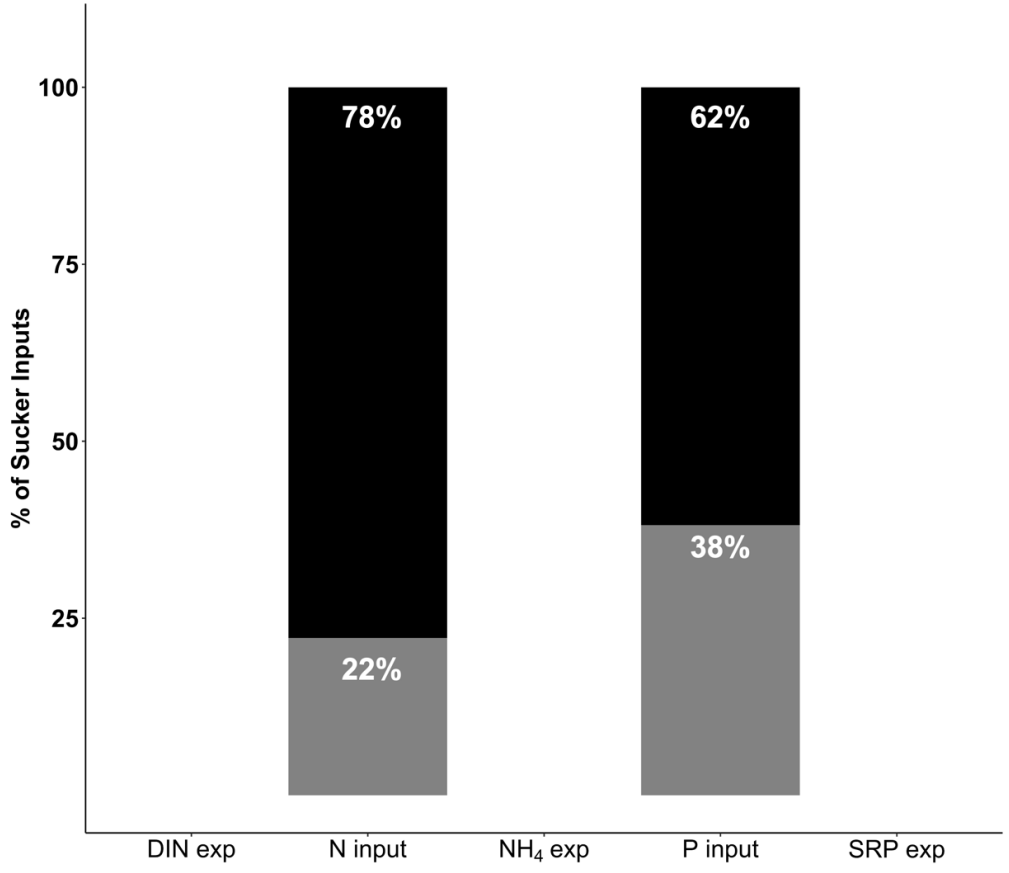
spring spawning migrations

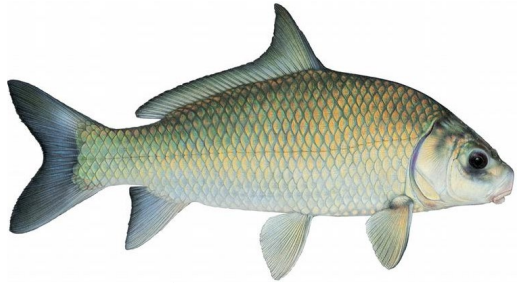
2019 Citico Creek Buffalo migration

Redhorse migration in Brasstown Creek (NC/GA)

connect conservation with important ecological role

2019 Citico Creek Buffalo migration

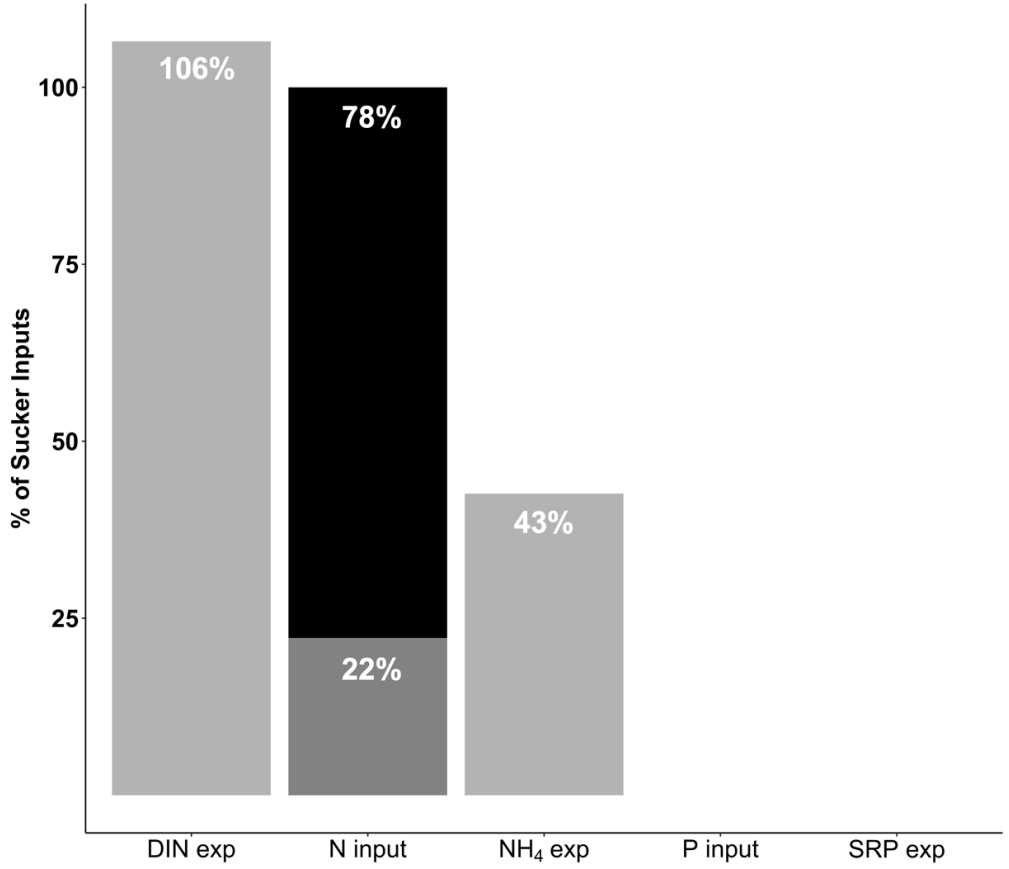


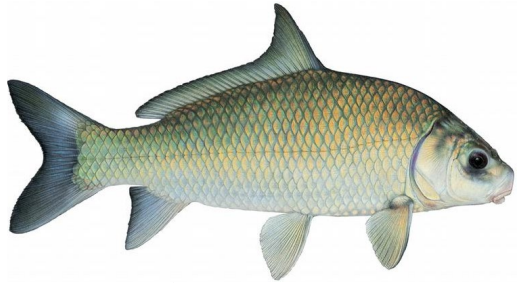


eggs
excretion
exported

White et al., in revision

2019 Citico Creek Buffalo migration





White et al., in revision

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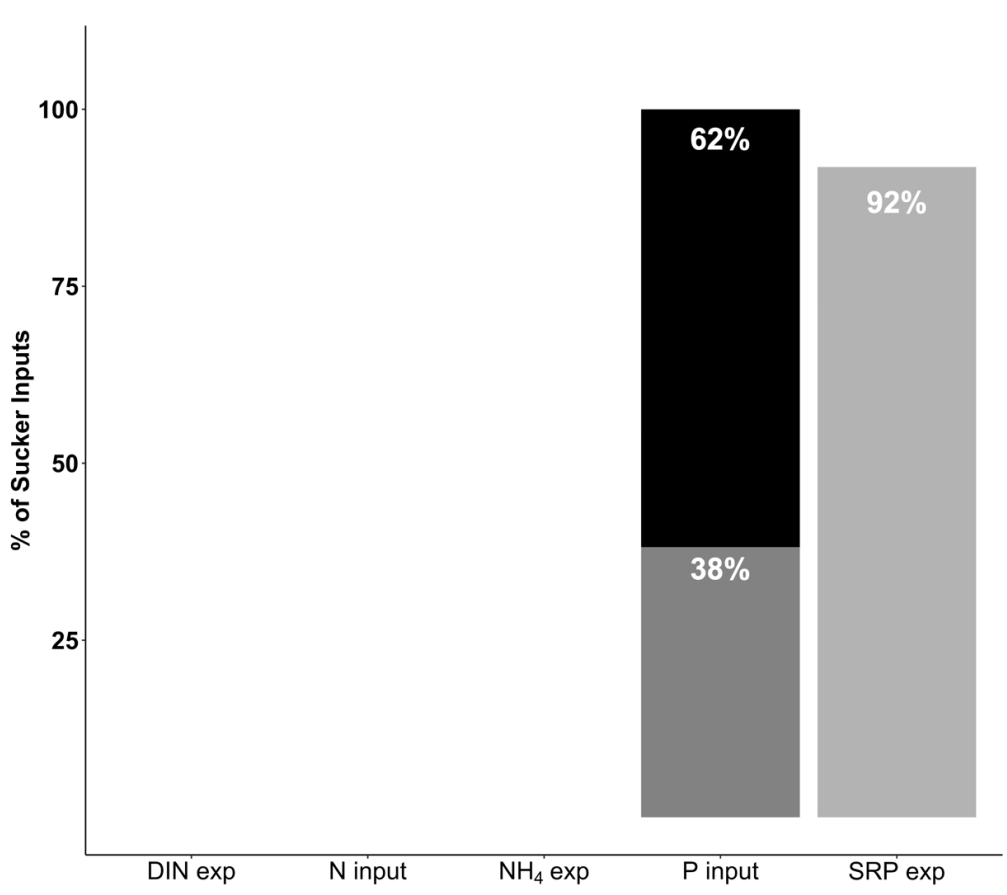
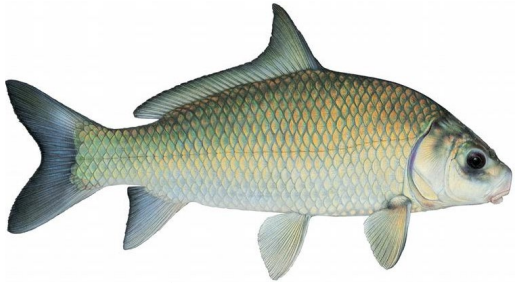
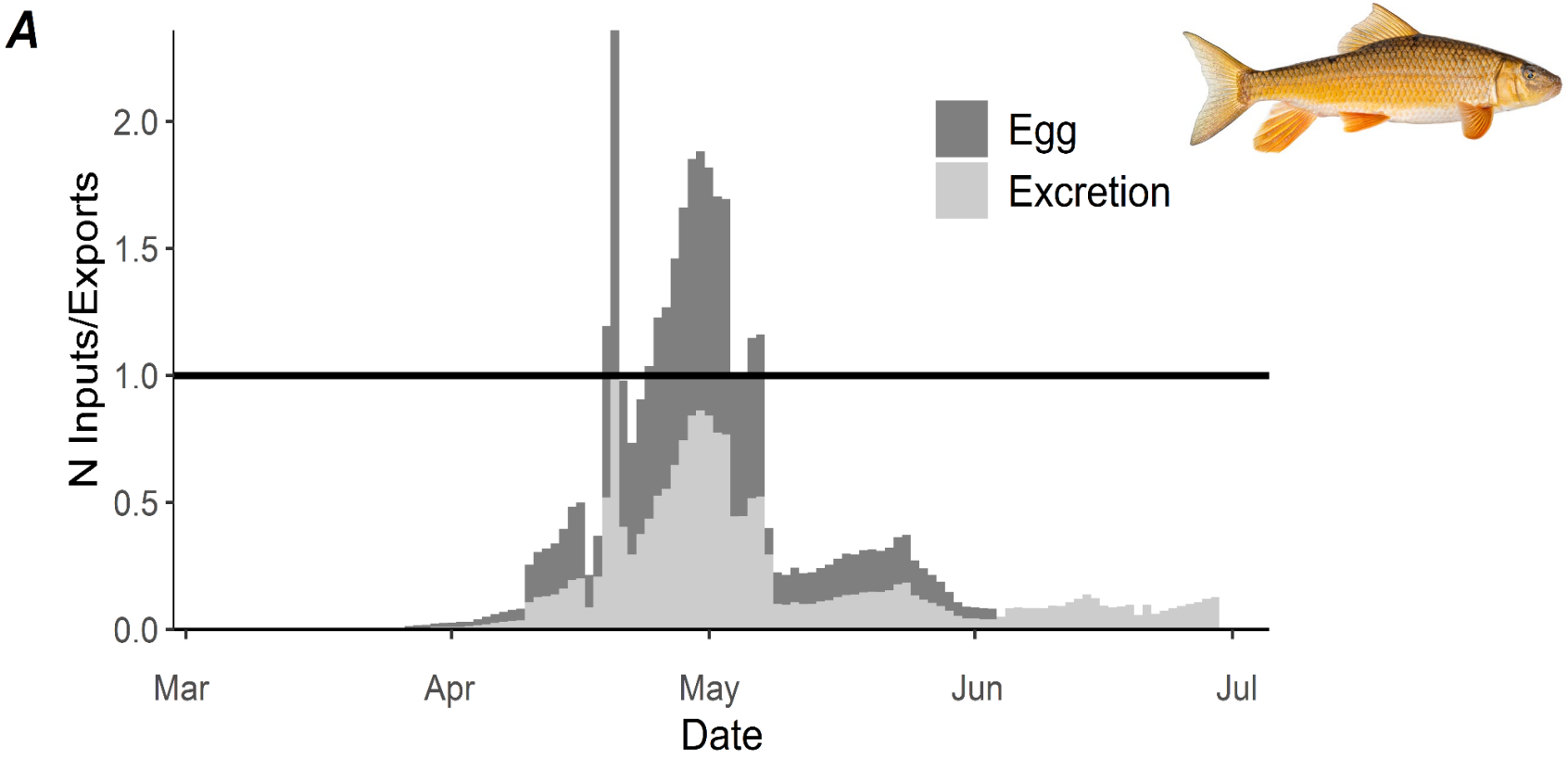




White et al., in revision

Redhorse migration in Brasstown Creek (NC/GA)

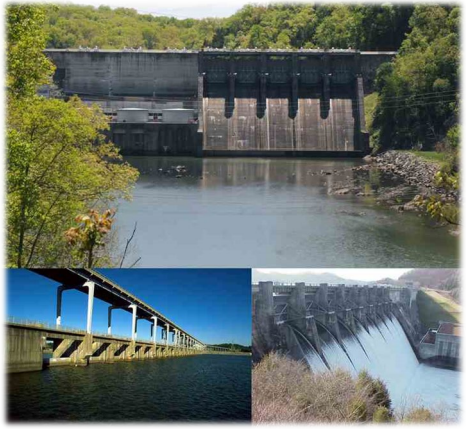


Hudson et al., in prep

considerations: migratory suckers (and other fishes)

connectivity:
must protect and restore migratory corridors

- What do we stand to gain by restoring freshwater connectivity?
- What have we lost in fragmented river systems?



conservation and **protection**:
must understand ecological role

- What is being lost through unregulated harvest?
- What is the functional role of migratory suckers?
- What other fishes are migratory and serve

THANKS VERY MUCH!

email: kitwheeler@tntech.edu
web: tntechstreamfishecology.org

NAIAD.org

Dave Herasimtschuk © FI

AQUATIC CONNECTIVITY TEAMS IN THE SOUTHEAST

Victoria Ruddle
Southeast Aquatic Resources Partnership, ACT Facilitator

American Rivers
RIVERS CONNECT US®

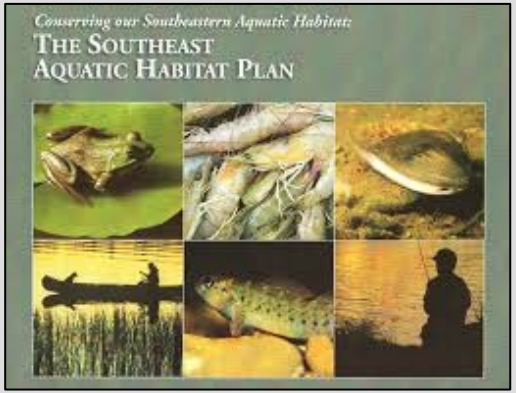
SOUTHEAST AQUATIC RESOURCES PARTNERSHIP
SARP

SOUTHEAST AQUATIC RESOURCES PARTNERSHIP

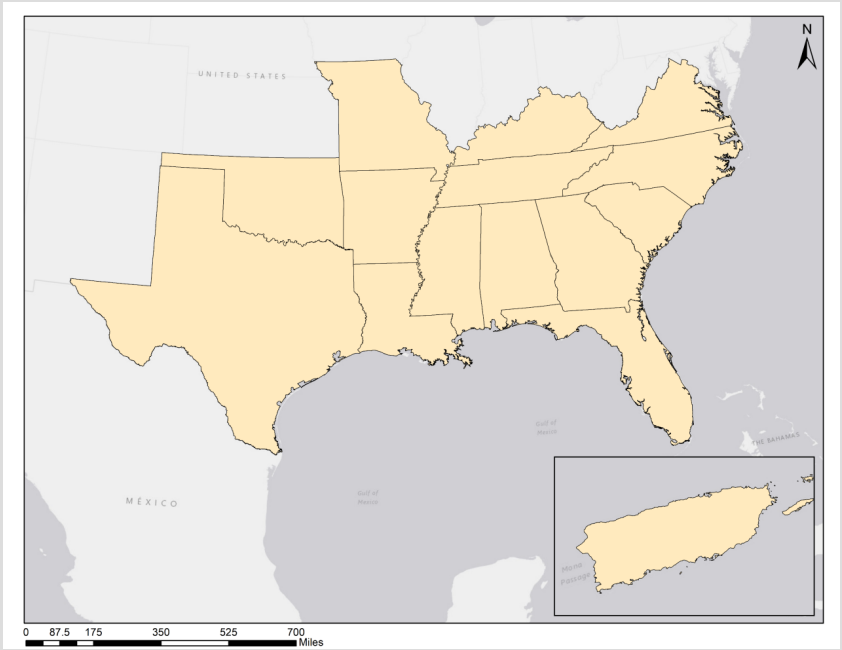
Mission

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.

SOUTHEASTERN ASSOCIATION OF FISH AND WILDLIFE AGENCIES



NATIONAL FISH HABITAT PARTNERSHIP



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SARP

AQUATIC CONNECTIVITY PROGRAM

Inventory

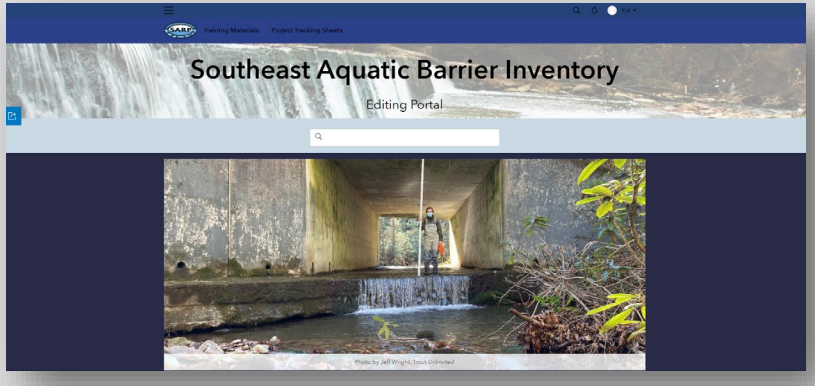
Prioritization

Connectivity Teams

AQUATIC CONNECTIVITY PROGRAM

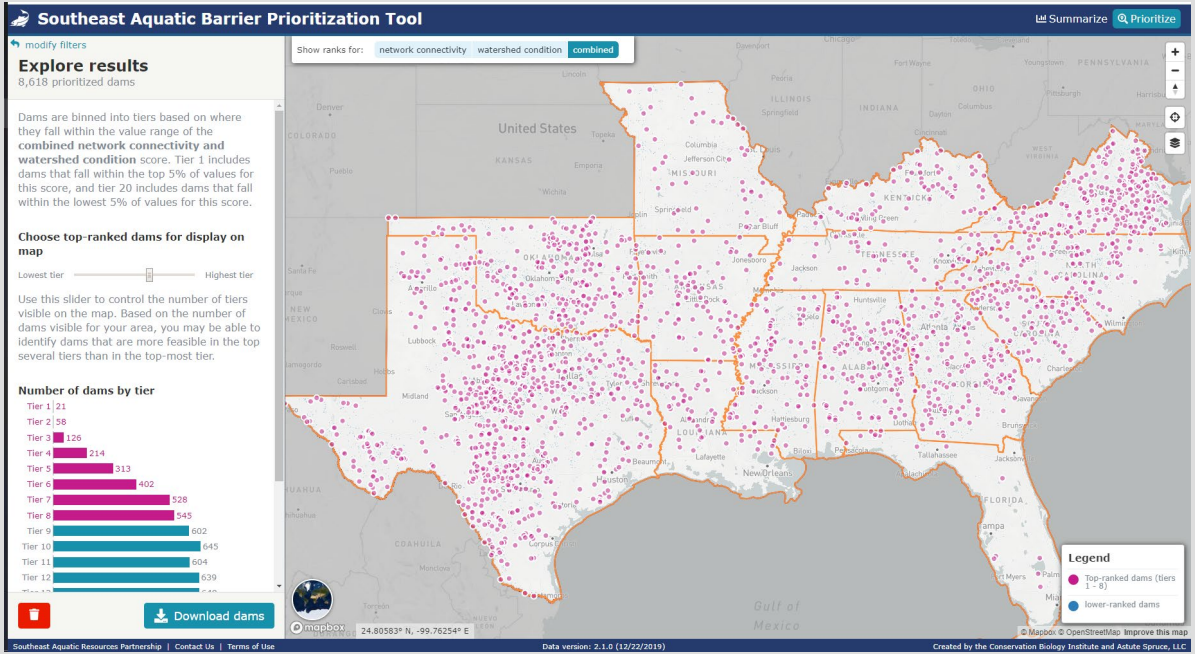
Inventory

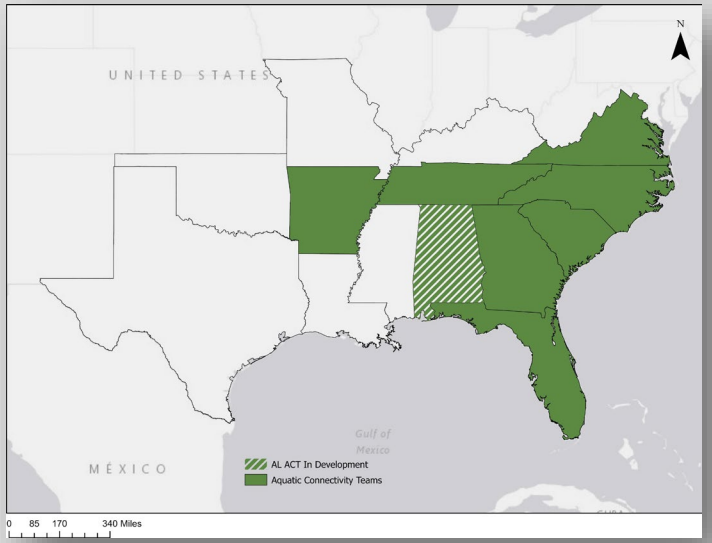
Dams	Road Crossings	Waterfalls



PRIORITIZATION

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





CONNECTIVITY TEAMS

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

CONNECTIVITY TEAMS

- Support efforts to inventory and assess barriers in priority watersheds
- Provide information on barrier removal and aquatic connectivity for the public or potential project managers
- Align priorities with regional and national funding opportunities

Teams

MINE CREEK DAM, AR

- Ouachita National Forest
- Opens 6.5 miles of tributary
- Reconnects Mine creek to Cossatot River
- Small concrete structure < 10 feet
- No purpose, filled with sediment and leaves
- Previously funded work here
- Removed Jan 21, 2020!

CONNECTIVITY TEAMS

- Support efforts to inventory and assess barriers in priority watersheds
- Provide information on barrier removal and aquatic connectivity for the public or potential project managers
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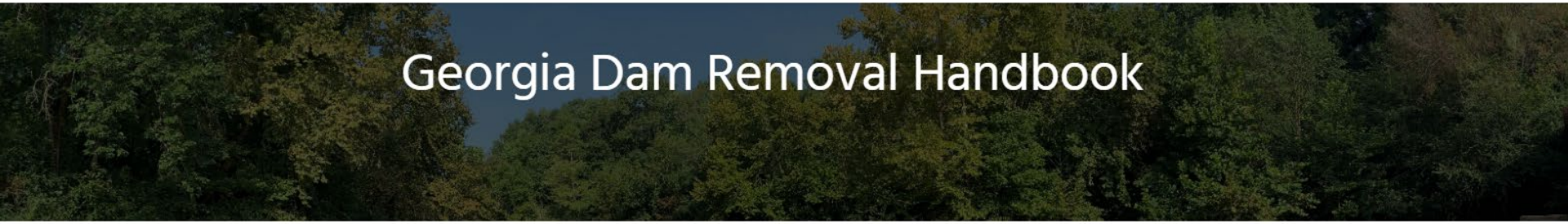


Georgia Dam Removal Handbook

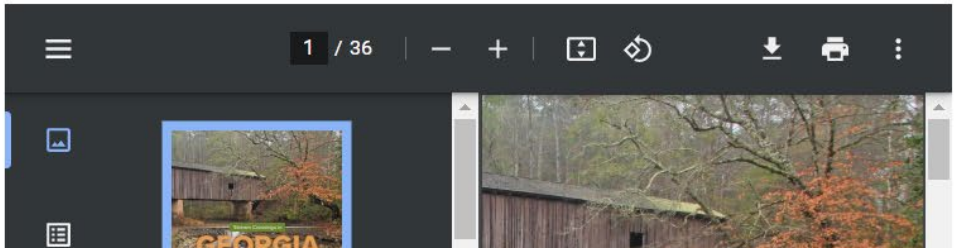
The GA-ACT Regulatory and Education Outreach Subcommittees developed this document to assist practitioners and dam owners through the assessment, planning and permitting process for removing or modifying a dam. This handbook, entitled *"Removal or Modification of Obsolete Dams in Georgia: A Handbook for Project Managers and Dam Owners,"* is organized into sections that correspond to a typical workflow for a dam removal or modification project, with easy-to-find references to regulations and resources relevant to projects in Georgia. These sections include:

- Research the Dam
- Research the River and Surrounding Landscape
- Understanding the Regulatory Process for Obtaining a Permit for Removal of Dams in Georgia
- Planning and Design of the Project
- Implementation/Deconstruction
- Post-Removal Actions

Georgia Stream Crossing Handbook

This handbook is intended to encourage the proper design and implementation of all new stream crossings in Georgia to maintain stream connectivity, improve stream health, provide for public safety, improve water quality, and make communities more resilient. Originally published in 2012, this 2021 update represents the work of 18 authors drawn from State and Federal Agencies, NGOs, academia, and private firms.

You can scroll and zoom the Stream Crossing Handbook in the viewer below, or click here to download a copy.



CONNECTIVITY TEAMS

- Support efforts to inventory and assess barriers in priority watersheds
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Teams

H.R.3684 - INFRASTRUCTURE INVESTMENT AND JOBS ACT

$800 million for dam removals:

- US Army Corps of Engineers - Section 206 Aquatic Ecosystem Restoration Program - $115 million
- NOAA - Community Based Restoration Grant Program - $400 million with up to $60 million reserved for tribes
- US Fish & Wildlife Service - National Fish Passage Program - $200 million
- US Forest Service - Legacy Roads and Trails- for removal of non-hydropower federal dams- $10 million
- FEMA – High Hazard Dams Program - $75 million for dam removal

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NORTH CAROLINA

NORTH CAROLINA

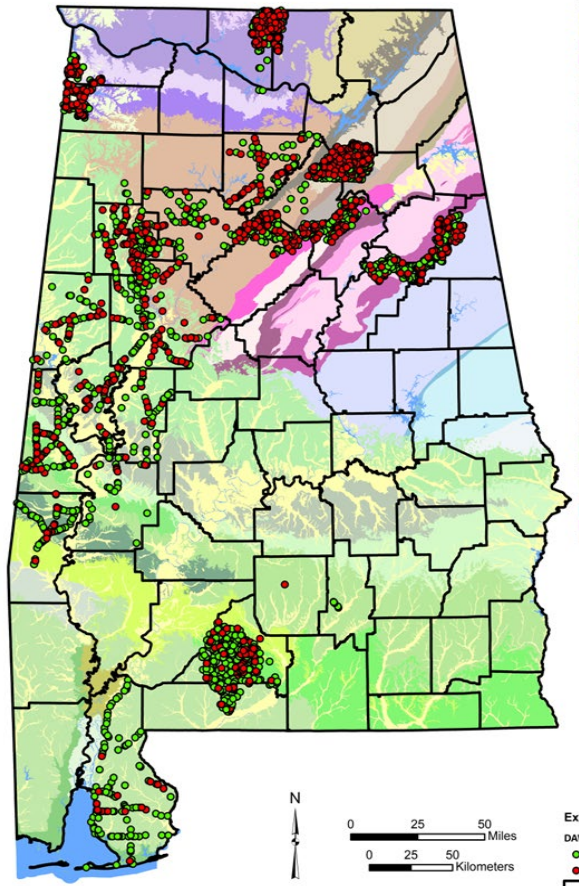
Ward Mill, Watauga River, Valle Crucis, NC

- New ACT lead is Gail Lazaras (AR)
- Next meeting : Wed., Aug 31st in Cherokee
- 57 dams removed to date
- First ACT, formed in 2012
- Started "Active 150"
- Take a capacity building approach: leadership, momentum, project managers, dam owner incentives to remove dams, regulations, funding
- Working on an equity lens to dam removal

TENNESSEE

Harms Mill, Elk River, TN

- Rob Bullard is TACT lead
- Next meeting TBD
- TACT formed in 2014
- Focusing on developing the "Active 150"
- Take a capacity building approach: leadership, momentum, project managers, dam owner incentives to remove dams, regulations, funding



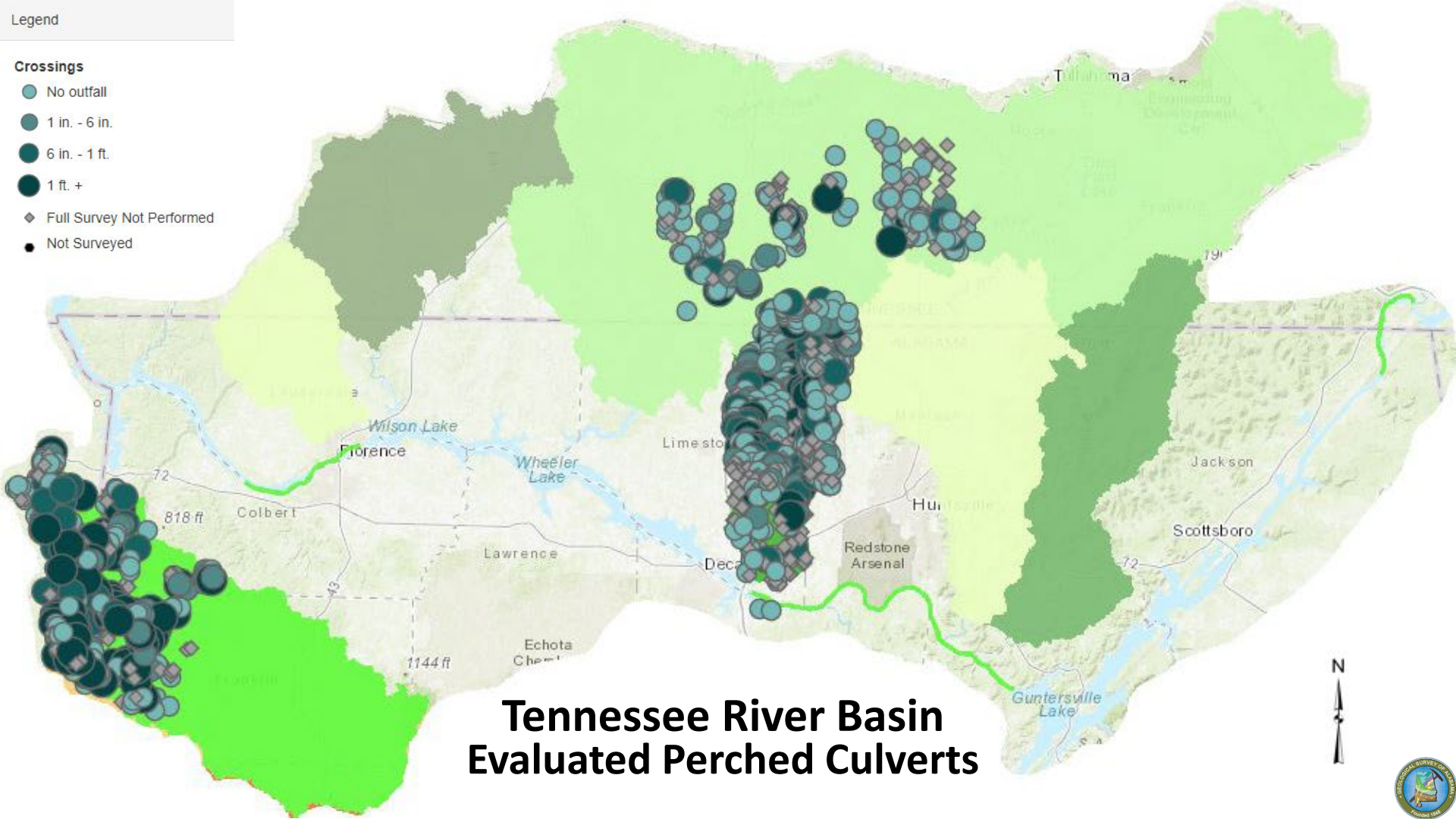
ARSNiC

Alabama Rivers and Stream Network including Connectivity

http://alh2o.org/

https://gsa.state.al.us/gsa/ecosystems

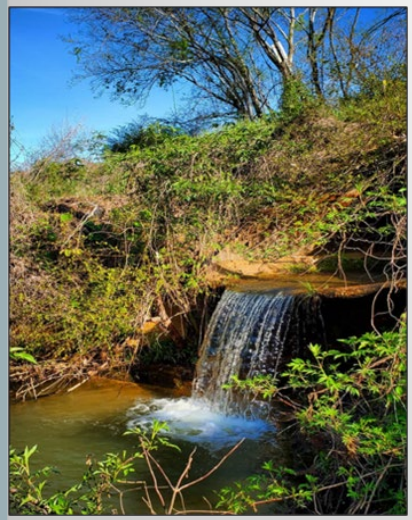
https://warcapps.usgs.gov/SHU/Map

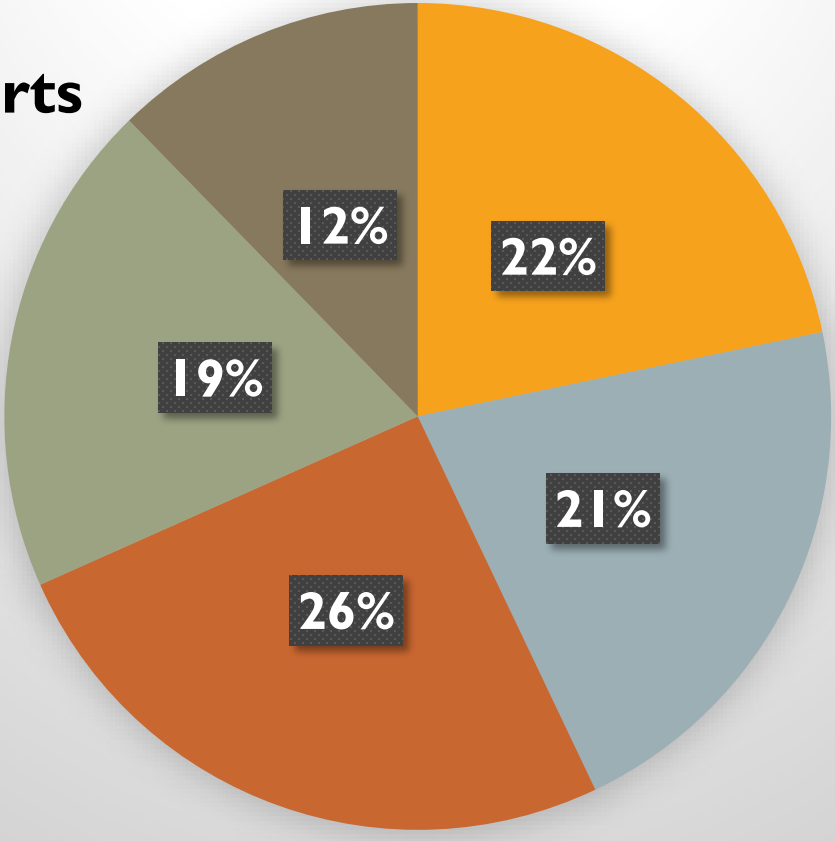


Tennessee River Basin
Evaluated Perched Culverts

FRAGMENTATION HAZARD

Perched Culverts





Hazard Risk Level

- None
- Low
- Moderate
- High
- Extreme

Total Surveys = 1706
Full Surveys = 1035
Partial Surveys = 671

Aquatic Connectivity Informational Session

TRBN 2022

Bipartisan Infrastructure Bill Informational Session

Gail Lazaras
American Rivers

AQUATIC CONNECTIVITY OPPORTUNITIES IN THE INFRASTRUCTURE INVESTMENT AND JOBS ACT OF 2021

August 25, 2022

American Rivers

RIVERS CONNECT US®

INFRASTRUCTURE INVESTMENT AND JOBS ACT

*Quick Summary**

USACE – Sec. 206 Aquatic Ecosystem Restoration Program - $115M (p. 932)

NOAA - Community Based Restoration Grant Program - $400M (p. 928)

US Fish & Wildlife Service - National Fish Passage Program - $200M (p. 961)

US Forest Service – for removal of non-hydropower federal dams - $10M (p. 981)

FEMA – High Hazard Dams Program - $75M (p. 985)

Dam Safety

FEMA - National Dam Safety Program federal agency dam safety - $67M (p. 958)

FEMA - National Dam Safety Program grants to states - $658M (p. 958)

USACE - Water Infrastructure Finance and Innovation Act dam safety funding - $75M (p. 935)

American Rivers
RIVERS CONNECT US®

**dam removal/dams funding AR advocated for*

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments in dam removal

NOAA - Community Based Restoration Grant Program - $400 million (p. 928)

a. For restoring fish passage through NOAA Community Based Restoration Grant Program (Section 117 of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (16 U.S.C. 1891a)

b. 15% set aside for Tribes and Tribal partnerships

c. Eligibility: institution of higher education, non-profit, commercial (for profit) organizations, U.S. territories, state or local governments, and Indian Tribes

d. Non-federal match requirements: no

e. NOFO: Closed for this year August 15th: $1-15M range, 3-5 years. $65M available.

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments in dam removal

US Fish & Wildlife Service - National Fish Passage Program - $200 million (p. 961)

a. For restoring fish and wildlife passage by removing in-stream barriers and providing technical assistance under the National Fish Passage Program

b. This is intended to be used for dam removal (dams are the in-stream barriers)

c. One half of one percent of the funds to be transferred for oversight of funding

d. Eligibility: institution of higher education, non-profit, commercial (for profit) organizations, U.S. territories, state or local governments, Indian Tribes, and individuals

e. Non-federal match requirements: no (see notes)

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments in dam removal

FEMA – High Hazard Dams Program - $75 million (p. 958)

a. $75,000,000 (of the $585,000,000 for the High Hazard Potential Dams program, (33 U.S.C. 467f-2)) for the removal of dams

b. Eligibility: states (see notes)

c. Non-federal match requirements: not less than 35 percent

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments in dam removal

US Army Corps of Engineers - Section 206 Aquatic Ecosystem Restoration Program - $115 million (p. 932)

a. For restoring fish and wildlife passage by removing in-stream barriers and providing technical assistance to non-Federal interests at full Federal expense, notwithstanding the individual project cost limitations of Section 206 ($10 million in Federal spending)

b. This is intended to be used for dam removal (dams are the in-stream barriers)

c. Not to be used for the removal, breach, or otherwise alter the operations of a Federal hydropower dam

d. Eligibility: Non-federal entities can request Corps assistance under the 206 program and enter into a cooperative agreement. Non-profits can be a non-federal entity if there is no future requirements for OMRR&R. However, the elimination of non-federal match changes the need for a non-federal sponsor.

e. Non-federal match requirements: no (new)

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments in dam removal

US Forest Service - for removal of non-hydropower Federal dams- $10 million (p. 981)

a. $10,000,000 in equal amounts for each of the fiscal years 2022 through 2026 for the removal of non-hydropower Federal dams and for providing dam removal technical assistance

b. One half of one percent of the funds to be transferred for oversight of funding

c. Funds under this heading may be transferred to USFWS and NMFS for the costs of carrying out their responsibilities under ESA

d. Eligibility: Non-profits should be eligible to receive funding to assist the USFS with executing this work (see notes)

e. Non-federal match requirement: no

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments in dam safety

FEMA - National Dam Safety Program federal agency dam safety - $67 million (p. 958)

FEMA - National Dam Safety Program grants to states - $658 million (p. 958)

Water Infrastructure Finance and Innovation Act dam safety funding - $75 million (p. 935)

Eligibility: states

Non-federal match requirements: not less than 35 percent for the High Hazard Potential Dam Program; not less than 50 percent for state assistance grants*

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments in culverts and road stream crossings

Forest Service Legacy Road and Trail Remediation Program

a. $250 million for USFS to restore fish passage by addressing roads, Culverts and removing barriers on USFS or land where the USDA/DOI have a cooperative agreement

b. Projects must have received public comment for changing the management status to close the road or trail to public access

c. USDA Secretary establishes program based on criteria established in bill language

d. Eligibility: Non-profits should be eligible to receive funding to assist the USFS with executing this work

e. Non-federal match requirement: no

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments in culverts and road stream crossings

National Culvert Removal, Replacement and Restoration Grant Program (DOT)

$1 billion to establish an annual competitive grant program to award grants to eligible entities for projects for the replacement, removal, and repair of culverts or weirs that--

``(1) would meaningfully improve or restore fish passage for anadromous fish; and

``(2) with respect to weirs, may include--

``(A) infrastructure to facilitate fish passage around or over the weir; and

``(B) weir improvements.

Eligibility: An entity eligible to receive a grant under the program is (1) a State; (2) a unit of local government; or (3) an Indian Tribe.

Non-federal match requirements: no less than 20 percent

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments in culverts and road stream crossings

Bridge Investment Program (DOT) (p56-58) - $3.265B

Establishes a bridge investment program (BIP) to provide financial assistance for eligible projects with the goal of improving the safety, efficiency, and reliability of the movement of people and freight over bridges.

a. Eligible projects include “a project to replace or rehabilitate culverts for the purpose of improving flood control and improved habitat connectivity for aquatic species.”

b. Grants solely for addressing culverts shall be no more than 5 percent of the amount available for each fiscal year for grants made under the BIP

c. Eligibility: states and local governments (and other political subdivisions), tribal governments, multistate or multijurisdictional groups, federal land management agencies

d. Non-federal match: varies (federal assistance from other federal programs also appear eligible)

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments with potential barrier removal benefits

USDA NRCS Watershed and Flood Prevention Operations Program (PL-566) - $500 million

a. Rehabilitate/remove irrigation infrastructure to provide river benefits and/or watershed restoration (language shared by the Resource Legacy Fund)
b. Must have at least 20 percent agricultural land benefits

US Army Corps of Engineers - $1.9 billion (p. 932)

a. For aquatic ecosystem restoration projects, of which not less than $1B shall be for multi-purpose projects or multi-purpose programs that include aquatic ecosystem restoration as a purpose.
b. Eligibility: see slide 7
c. Match: 50 percent (study phase); 35 percent (design/construction)

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Investments with potential barrier removal benefits

FEMA – $4.5 billion

Building Resilient Infrastructure and Communities - $1,000,000,000

a. Supports states, local communities, tribes, and territories in undertaking pre- disaster hazard mitigation projects, reducing the risks they face from disasters and natural hazards. Focus is to shift funding from reactive disaster spending and toward research-supported, proactive investment in community resilience so that when the next hurricane, flood, or wildfire comes, communities are better prepared.
b. Eligibility: state, local government, tribe (see notes)
c. Non-federal match requirements: not less than 25 percent (10 percent for “small impoverished communities”)

Flood Mitigation Assistance Program - $3,500,000,000

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Regional watershed investments

ENVIRONMENTAL PROTECTION AGENCY– Environmental programs and management (examples)

a. $1B shall be for Great Lakes Restoration Initiative;

b. $238,000,000 shall be for Chesapeake Bay;

c. $24,000,000 shall be for San Francisco Bay;

d. $89,000,000 shall be for Puget Sound;

e. $106,000,000 shall be for Long Island Sound;

NOAA – Pacific Coastal Salmon Recovery - $172,000,000

Bureau of Reclamation – Western Water Infrastructure (p688-690)

INFRASTRUCTURE INVESTMENT AND JOBS ACT

Resources

White House Guidebook: https://www.whitehouse.gov/wp-content/uploads/2022/01/BUILDING-A-BETTER-AMERICA_FINAL.pdf

White House funding spreadsheet:

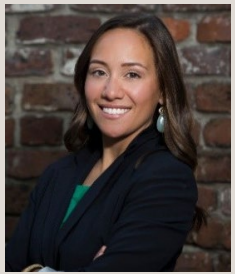
https://www.whitehouse.gov/wp-content/uploads/2022/01/BUILDING-A-BETTER-AMERICA_FINAL.pdf

IIJA water-related resources and information: https://www.rivernetwork.org/resource/infrastructure-investment-and-jobs-act-resources/

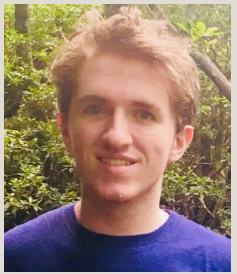
**dam removal/dams funding AR advocated for*

Decision Support Tools & Resources

Emily Granstaff



Victoria Ruddle



Jonathan Cawthon

Southeast Conservation Blueprint

Emily Granstaff,
Blueprint User Support | Southern Apps Region

8-24-2022

Southeast Conservation Adaptation Strategy (SECAS) - a regional conservation initiative

Southeastern Association of Fish & Wildlife Agencies

Southeastern Association of Fish & Wildlife Agencies and Southeast Natural Resource Leaders Group

Southeastern Association of Fish & Wildlife Agencies and Southeast Natural Resource Leaders Group

The SECAS Vision

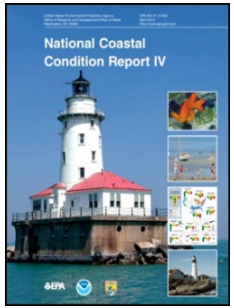
*"A **connected network** of lands and waters that supports thriving fish and wildlife populations and improved quality of life for people"*

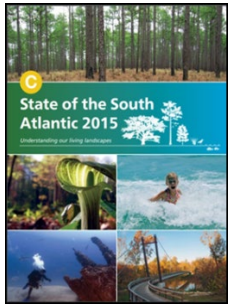
The SECAS Goal

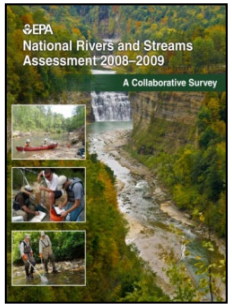
A 10% or greater improvement in the health, function, and connectivity of southeastern ecosystems by 2060

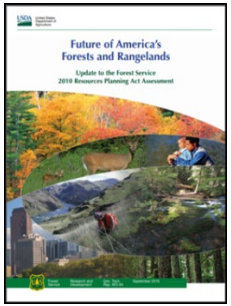
Metrics:

- 1% improvement every 4 years (ecosystem assessments)
- 1% increase in conservation actions within the Blueprint every 4 years (efficient use; new resources)

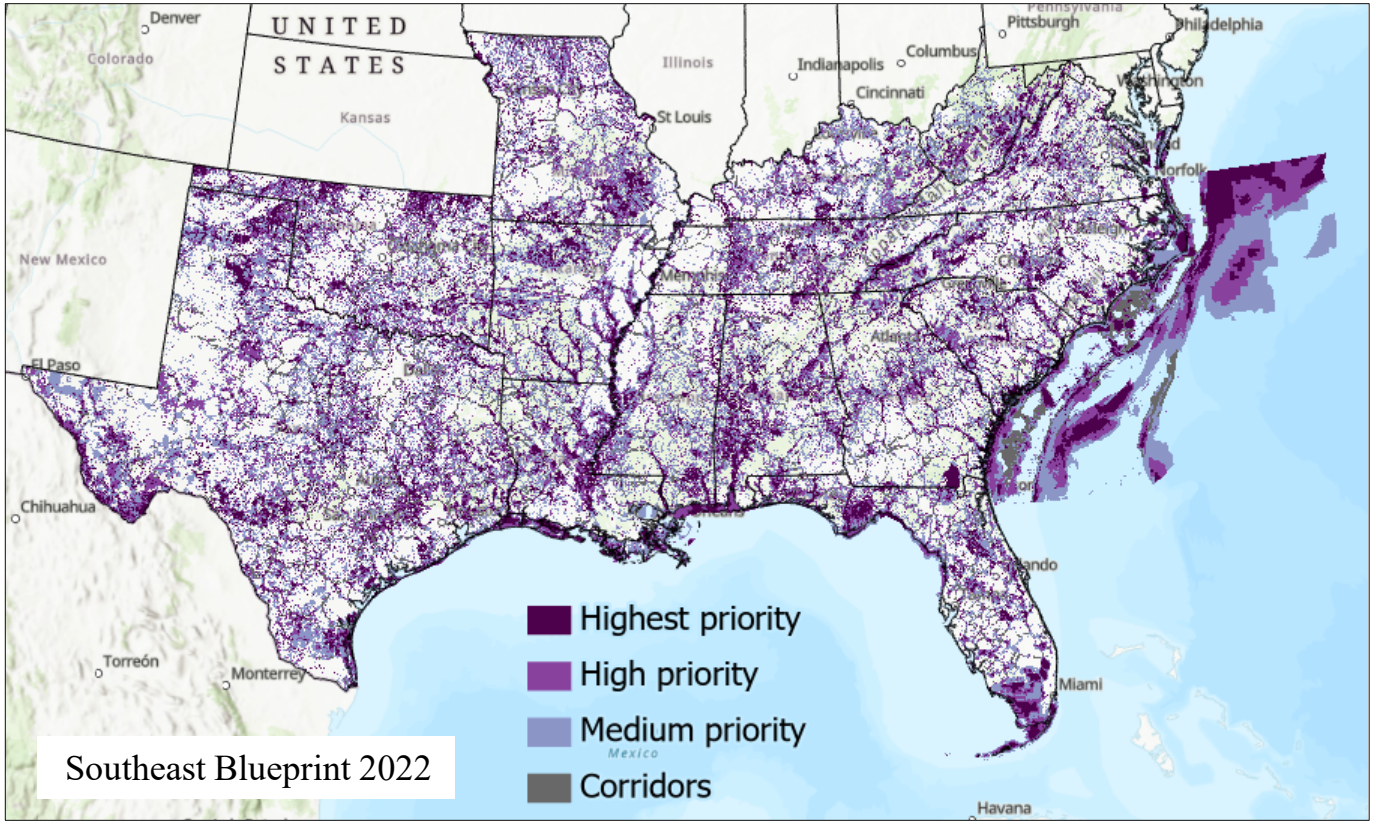




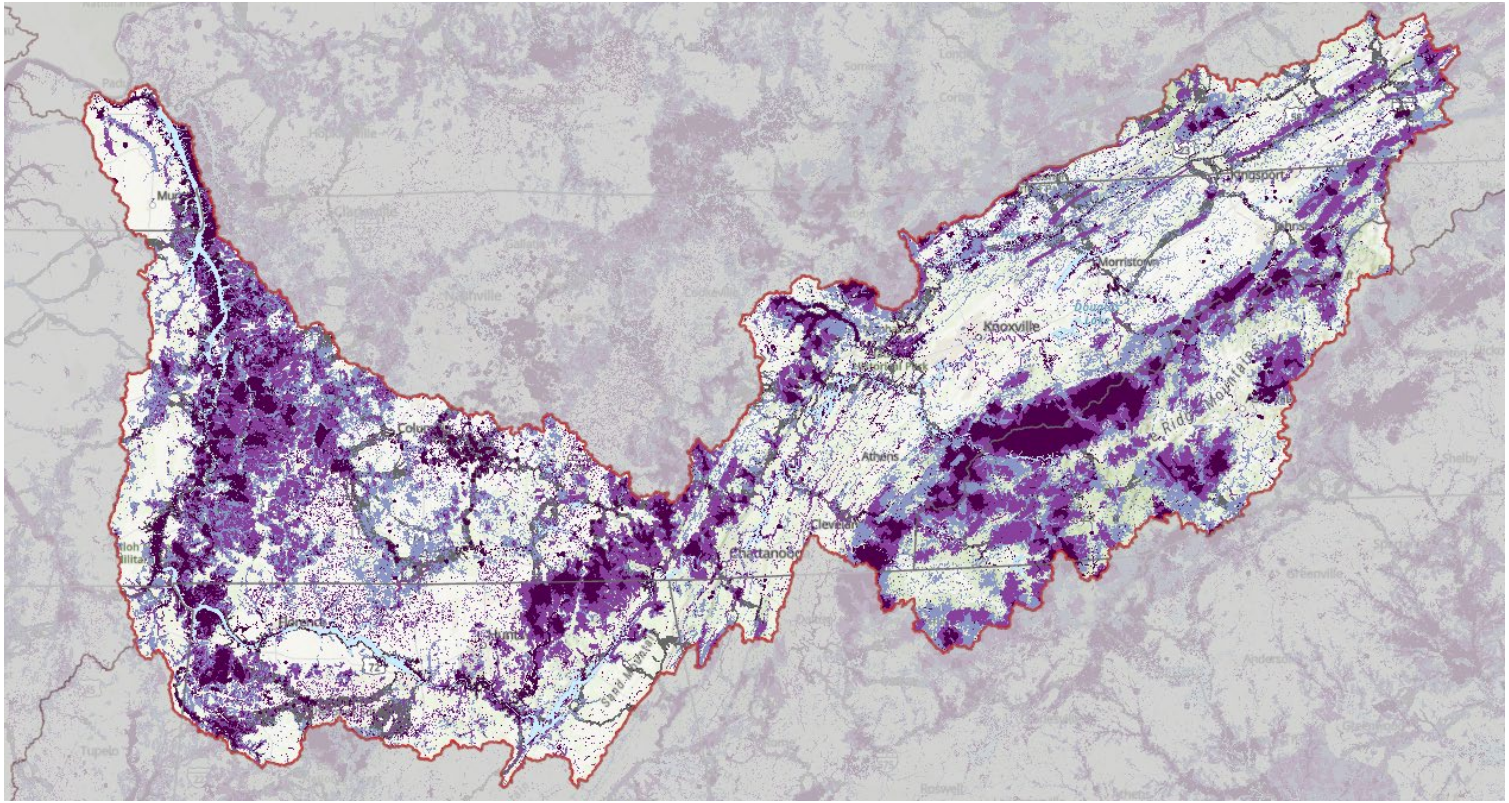




The Southeast Conservation Blueprint



Blueprint 2022 for TRBN

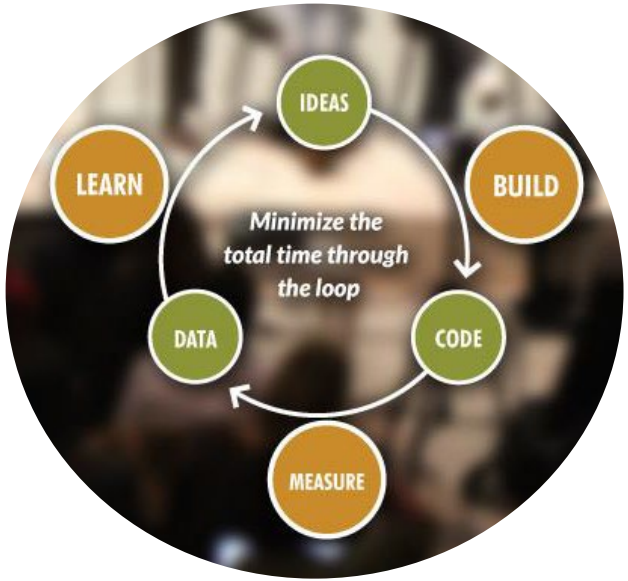


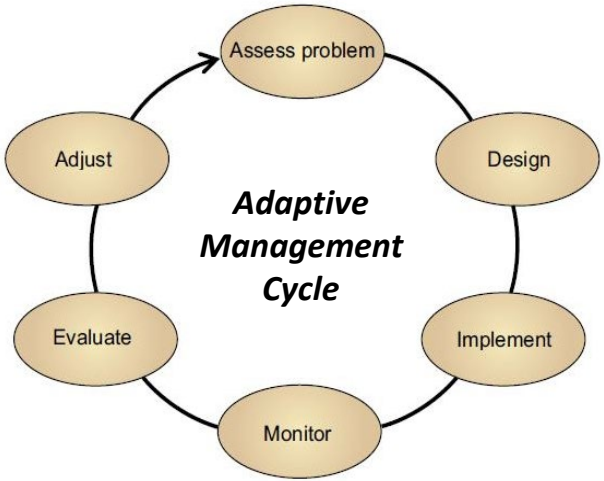
Process

- The Lean Startup method
- Input from the conservation community
- Document everything

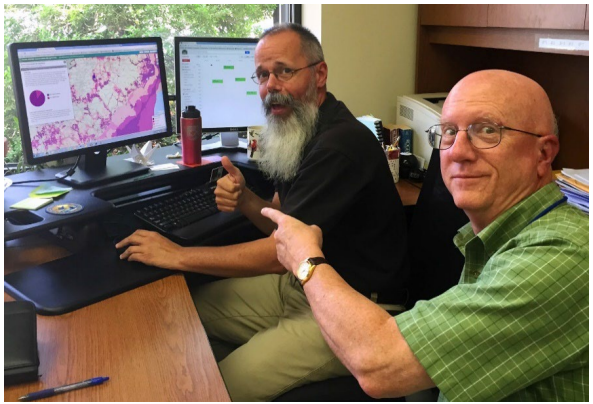
The Process - lean startup method

Adaptive management, fast and furious



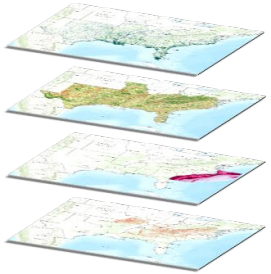


The Process - input from the conservation community

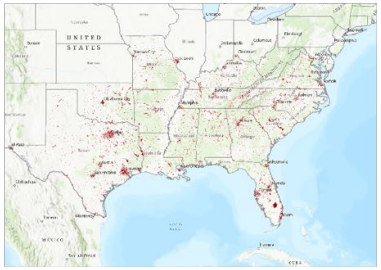


Overall Blueprint methods

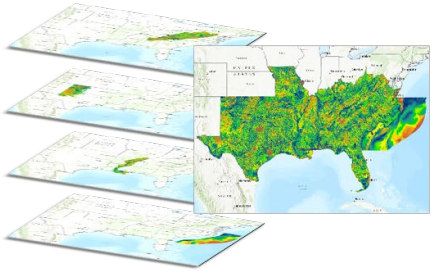
Step 1: Start with ecosystem indicators



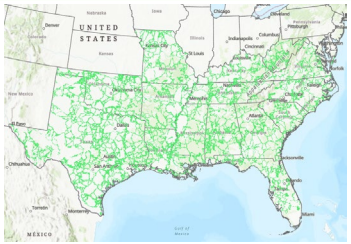
Step 2: Remove highly altered areas



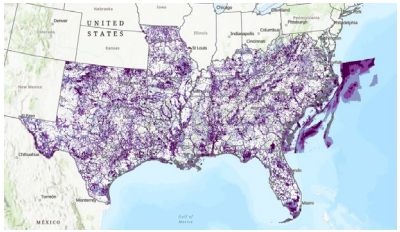
Step 3: Use indicators to rank areas within subregions



Step 4: Add connectivity by identifying corridors linking hubs



Step 5: Combine priority areas and corridors in the Blueprint



What's "under the hood"?

Terrestrial Indicators

- **Amphibian & reptile areas:** Priority Amphibian and Reptile Conservation Areas.
- **Beach birds**: Index of habitat suitability for four shorebird species.
- **Equitable access to potential parks:** Identifies areas where residents currently lack access to parks within a 10-minute walk
- **Fire frequency**: Estimates the number of times an area has been burned from 2010-2019.
- **Forest birds**: Index of habitat suitability for twelve upland hardwood and forested wetland bird species.
- **Forested wetland extent**: Current forested wetlands.
- **Greenways & trails:** Index of natural condition and connected length of recreational paths.
- **Intact habitat cores**: Size of large, unfragmented patches of natural habitat.
- **Low-urban historic landscapes**: Index of sites on the National Register of Historic Places surrounded by limited urban development.
- **Maritime forest extent**: Current maritime forest.
- **Marsh extent**: Current freshwater and saltwater marsh.
- **Marsh birds**: Index based on the patch size needs of four marsh bird species.
- **Piedmont prairie**: Represents known and potential Piedmont prairies.
- **Pine birds**: Index of habitat suitability for three pine bird species.
- **Resilient sites:** Depicts the ability of terrestrial habitats and tidal complexes to continue supporting biodiversity and ecosystem function in the face of climate change.
- **Shoreline condition:** Index based on presence of hardened structures and ease of development.
- **Urban park size:** Measures the size of urban parks.

Marine & Estuarine Indicators

- **Atlantic estuarine fish habitat**: Index of Atlantic estuarine fish habitat condition based on water quality, marsh edges, seagrass and oyster reefs, fragmentation, and more.
- **Estuarine coastal condition**: Index of estuarine water quality, sediment quality, and benthic community condition.
- **Hardbottom & deep-sea coral**: Represents known and predicted suitable locations of hardbottom habitat and deep-sea corals.
- **Marine mammals**: Index of predicted monthly dolphin and whale density.
- **Marine birds**: Index of predicted seasonal relative abundance for birds that feed exclusively or mainly at sea.

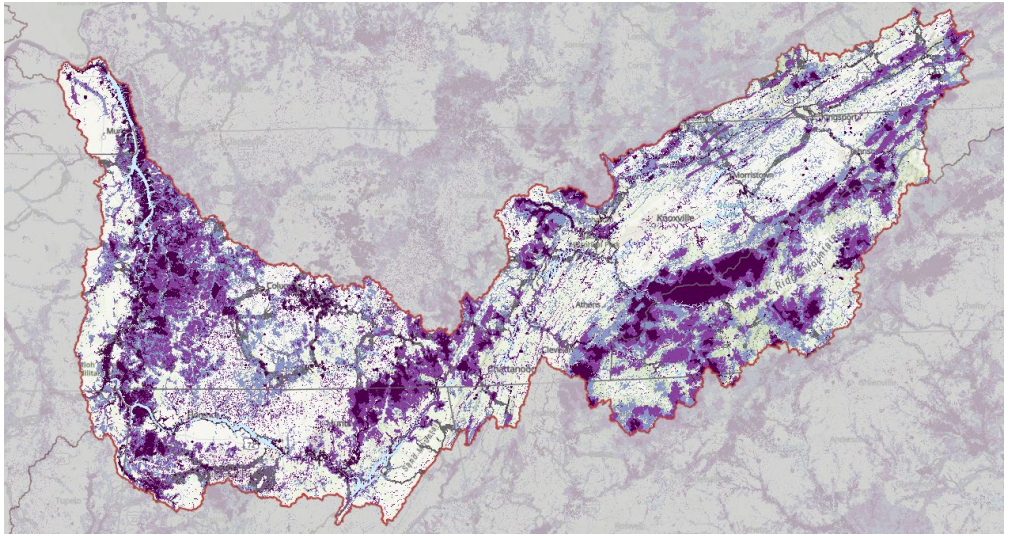
Freshwater Indicators

- **Atlantic migratory fish habitat:** Index of Atlantic migratory fish habitat condition based on water quality, connectivity, fragmentation, flow alteration, and more.
- **Gulf migratory fish connectivity**: Index capturing how far upstream migratory fish in the Gulf of Mexico have been observed.
- **Imperiled aquatic species:** Number of globally imperiled, threatened, and endangered aquatic species within each watershed.
- **Network complexity**: Index depicting the number of stream size classes in a river network not separated by large dams.
- **Permeable surface**: Percent of non-impervious cover by catchment.
- **Riparian buffers**: Percent natural habitat in the estimated floodplain, by catchment.

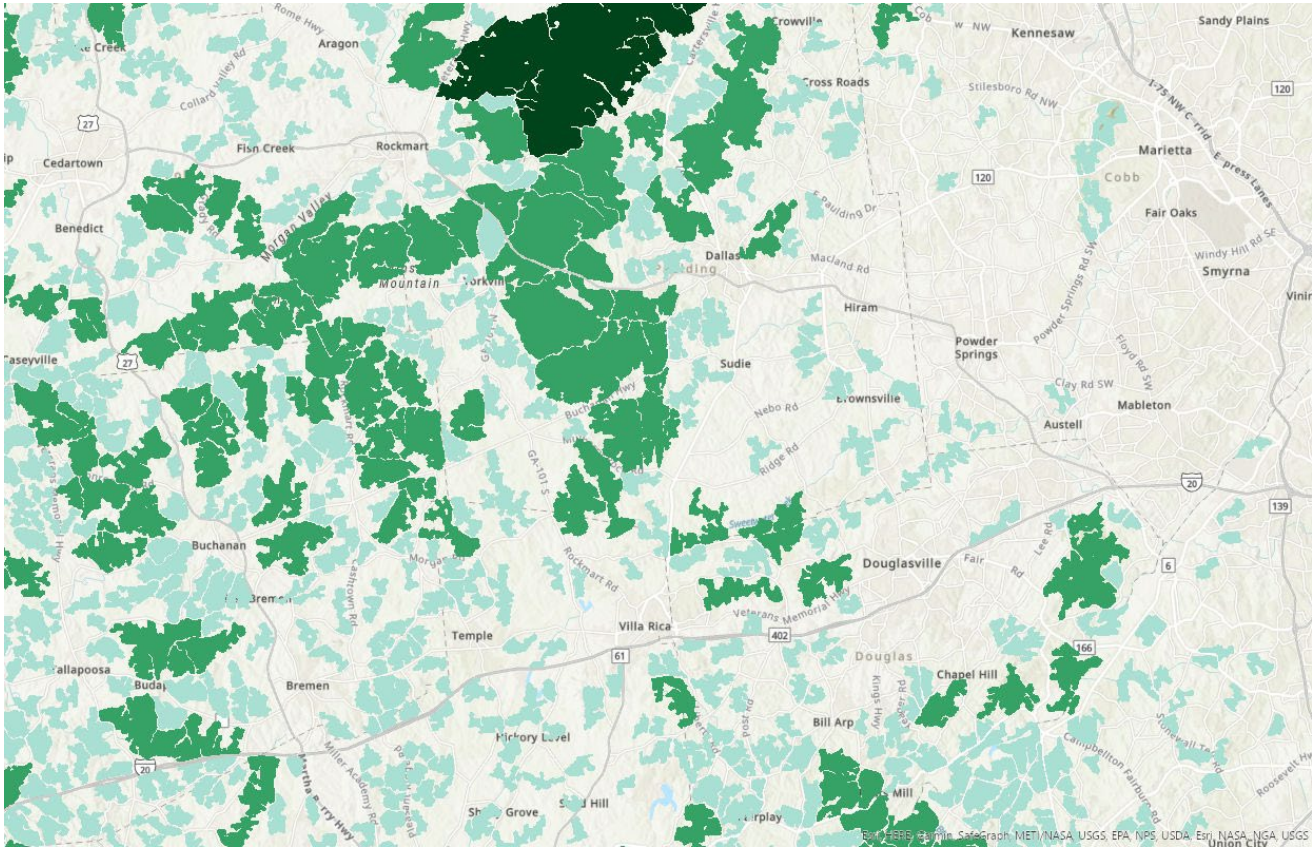
What becomes a priority?

- Not just a stacking exercise
  - Focused on a portfolio of places that support all the indicators

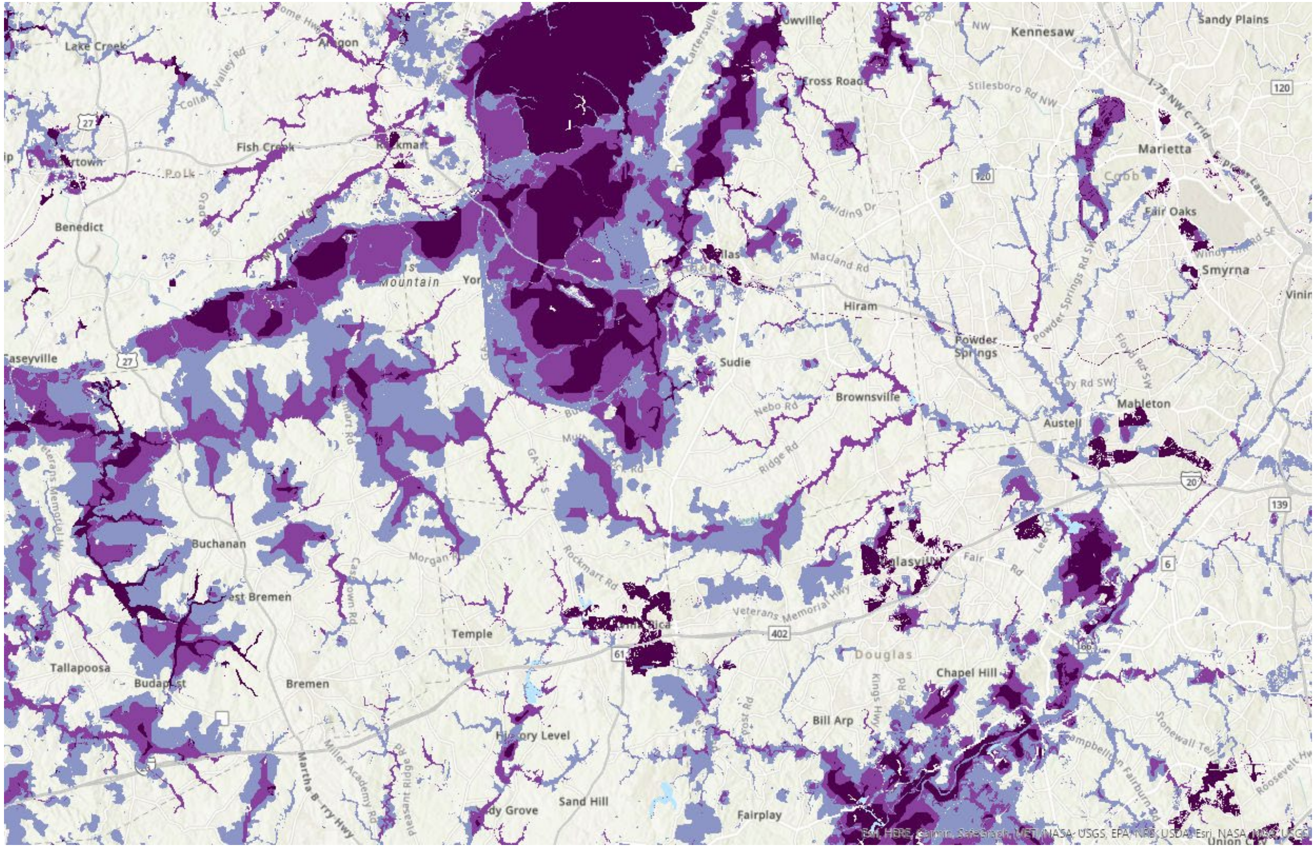
- Two types of places end up as high priority
  - Places with high values for multiple indicators
  - Places with high values for a single indicator that can't be found anywhere else



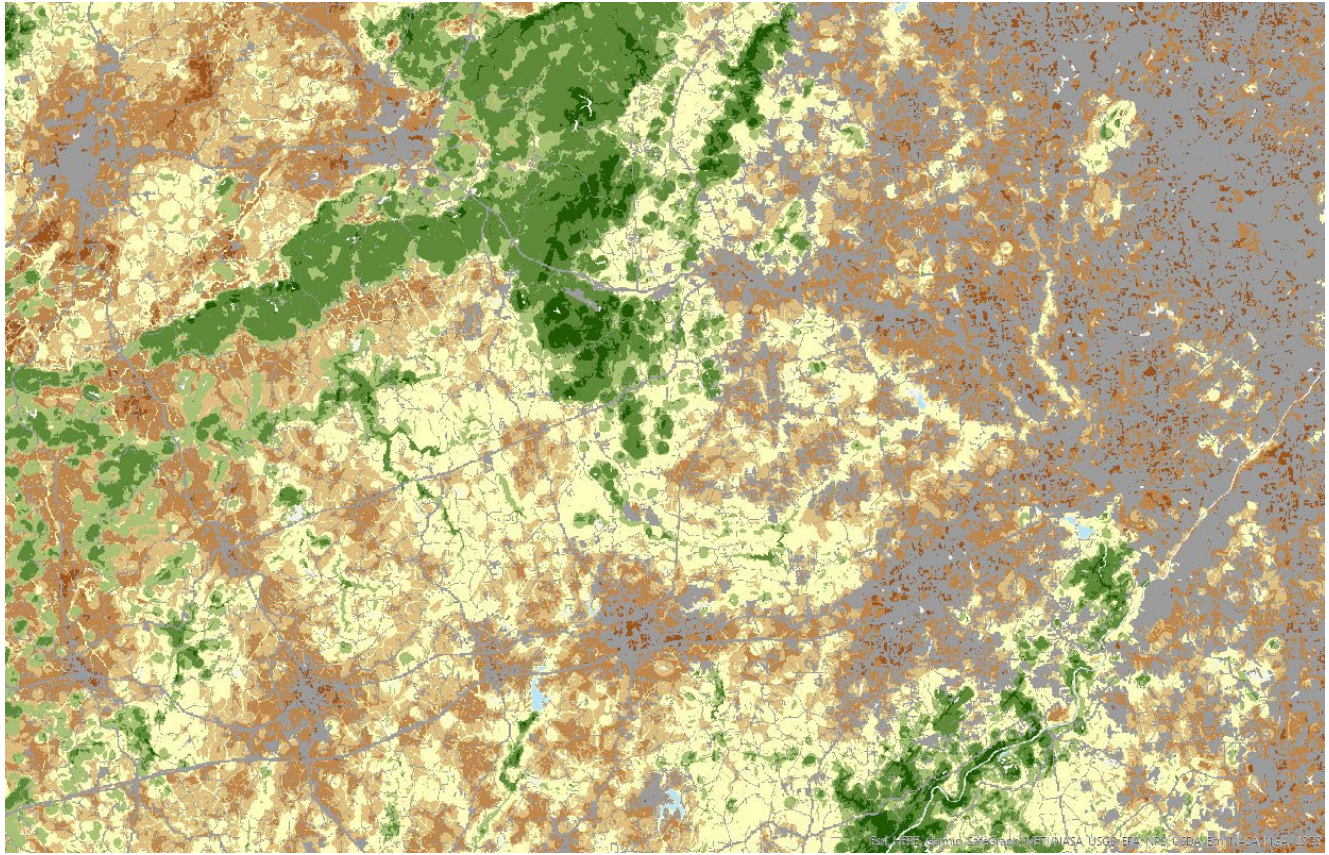
Intact habitat cores



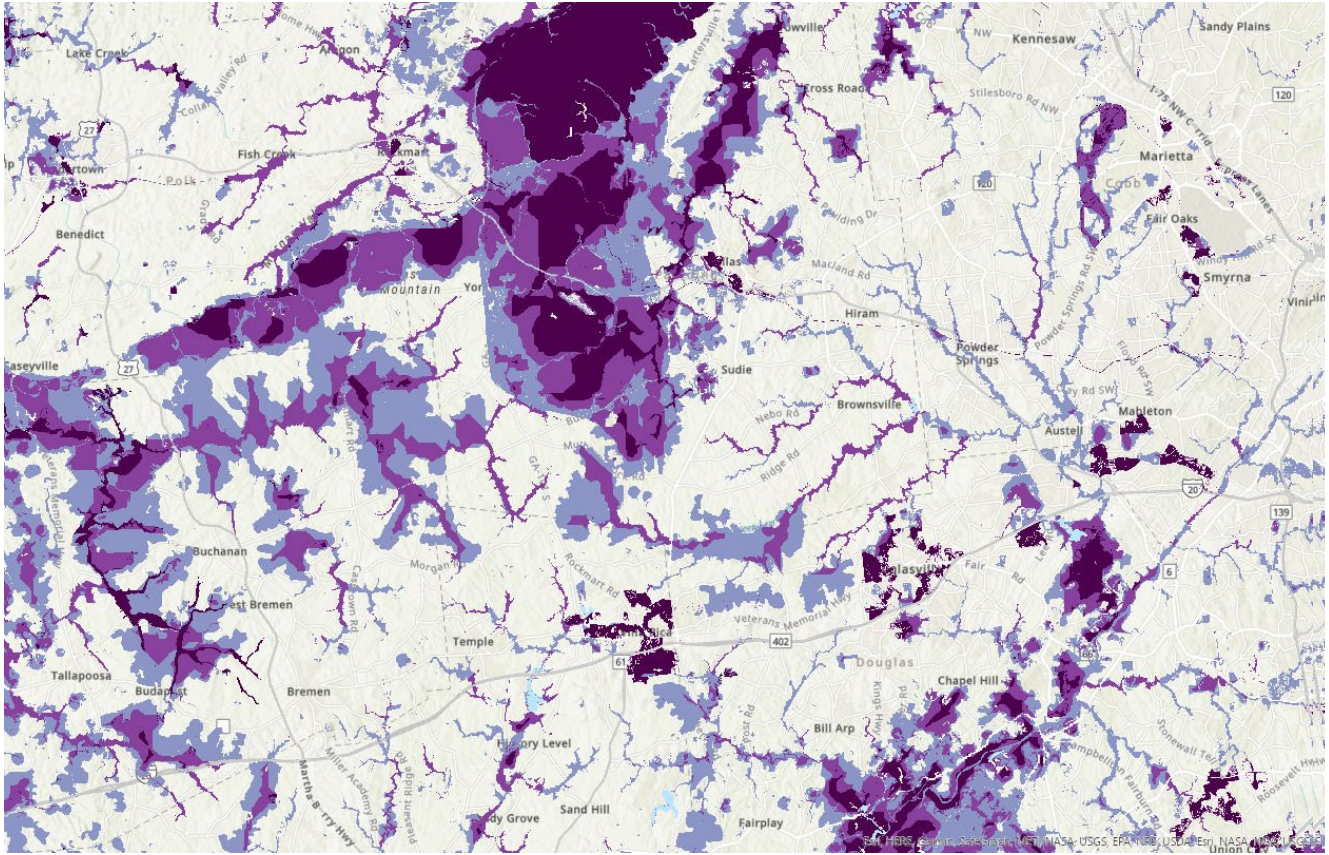
Intact habitat cores



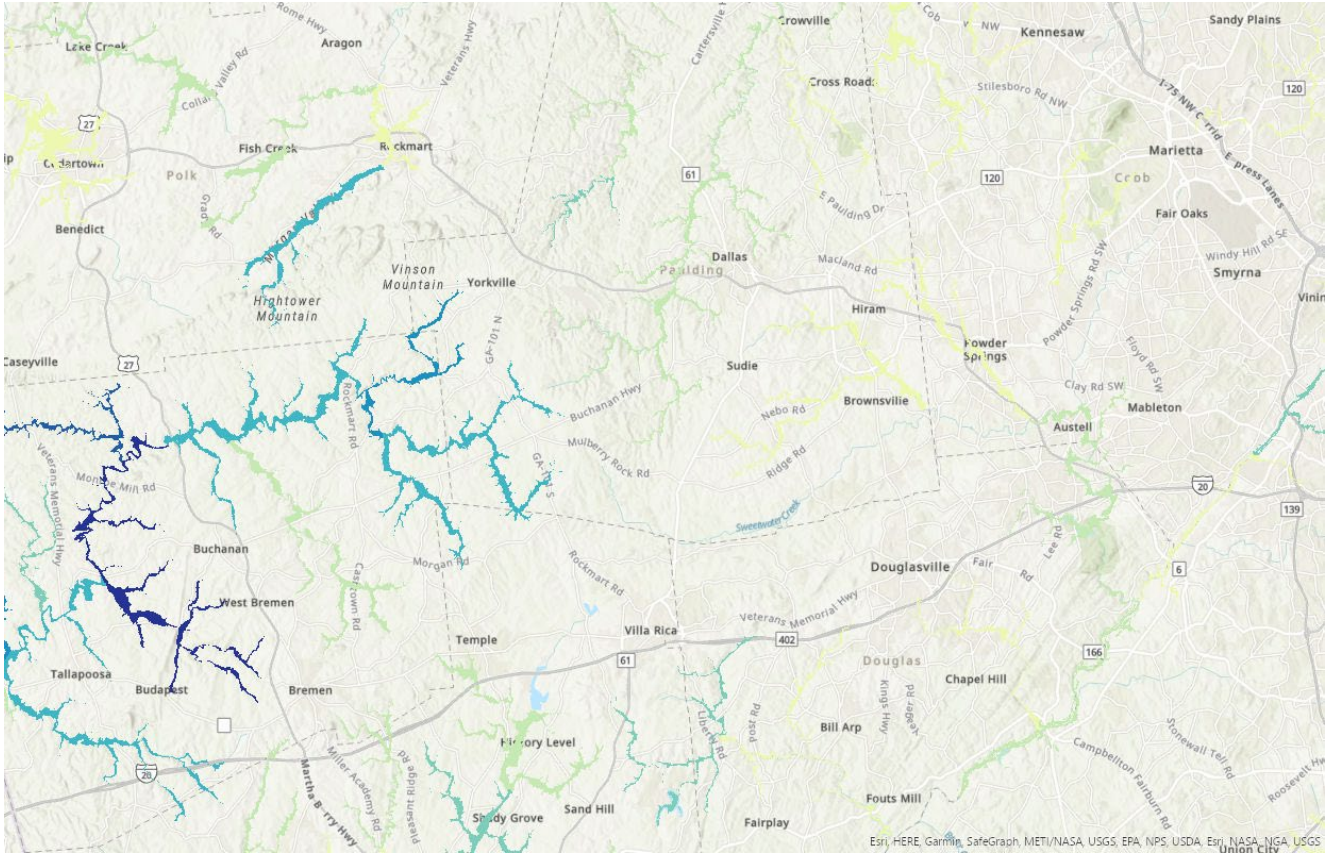
Resilient Terrestrial Sites



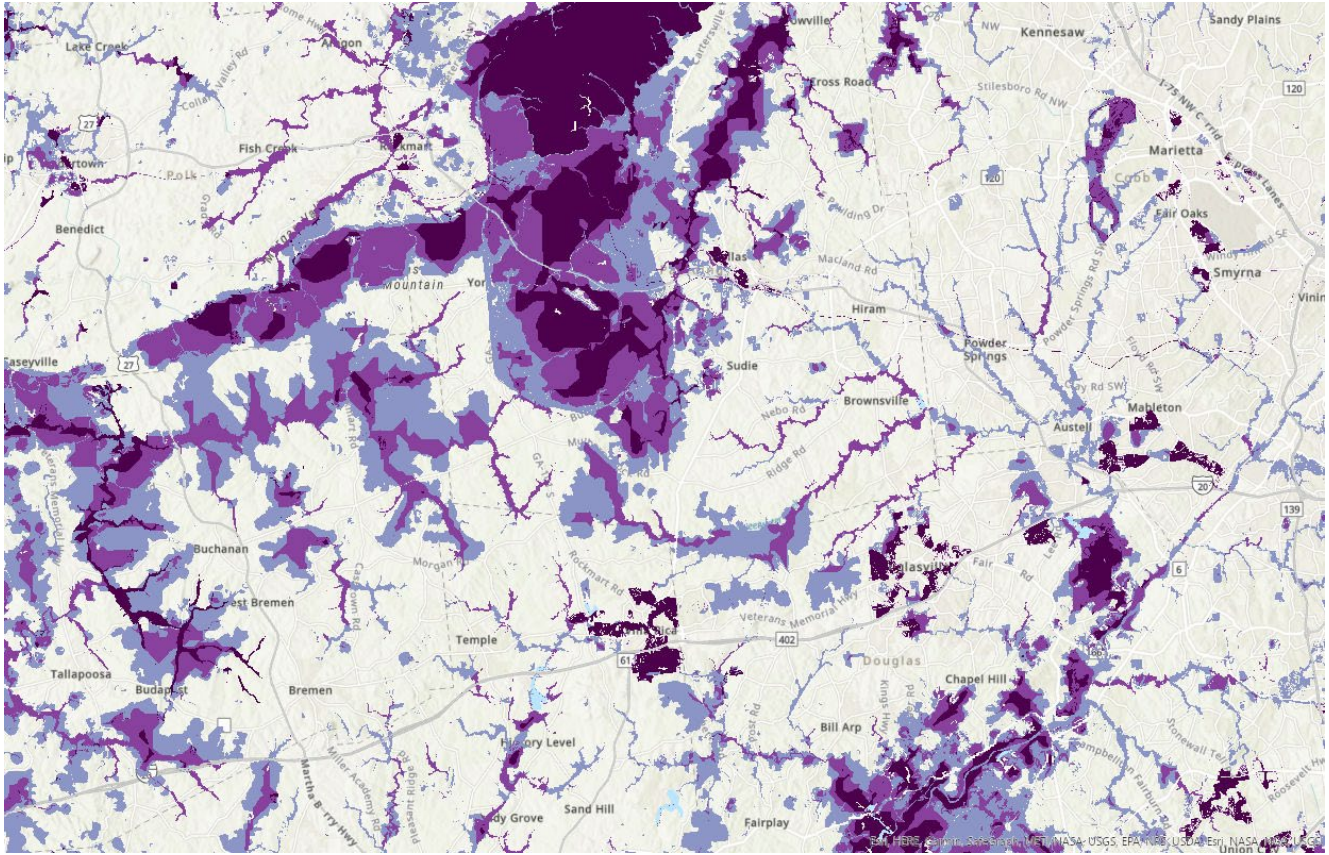
Resilient Terrestrial Sites



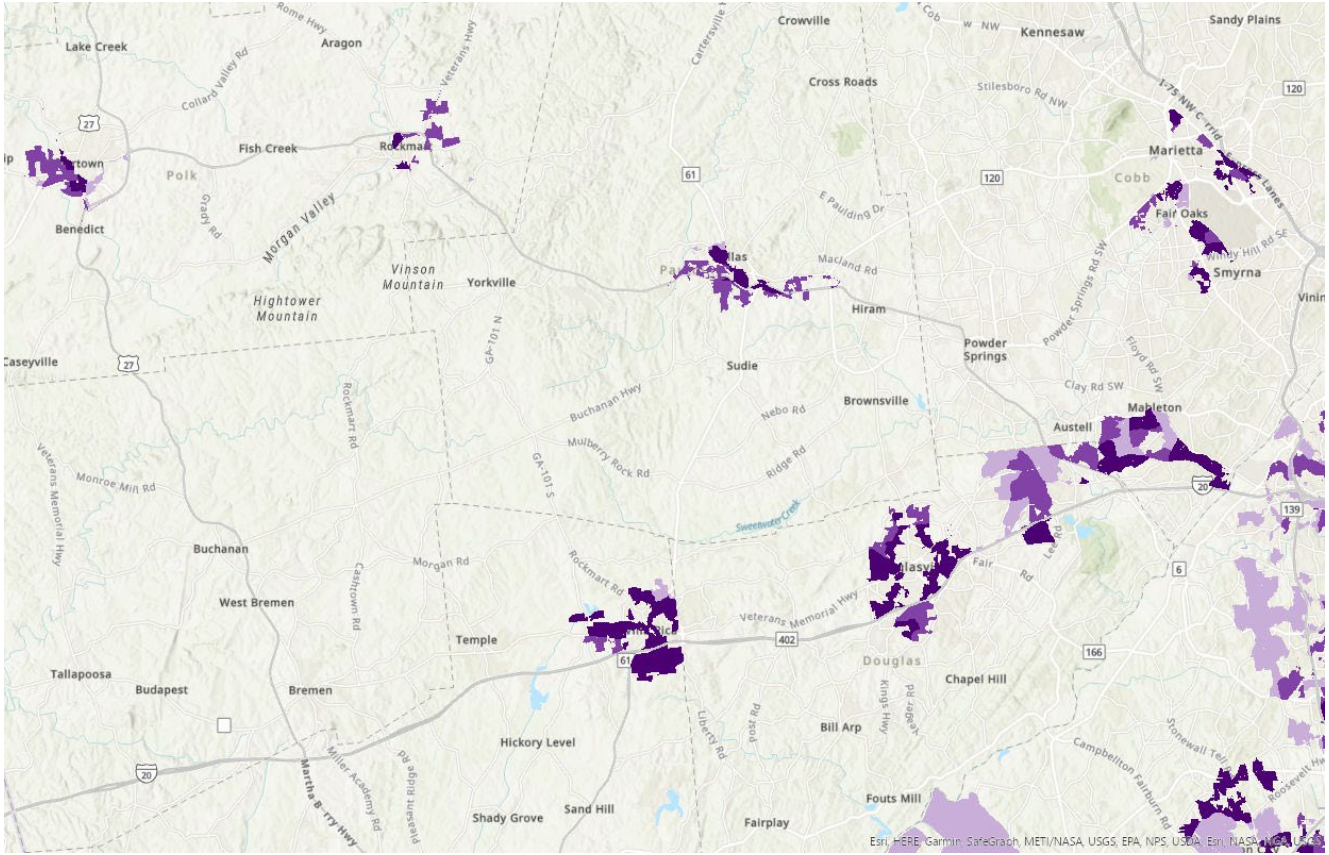
Imperiled Aquatic Species



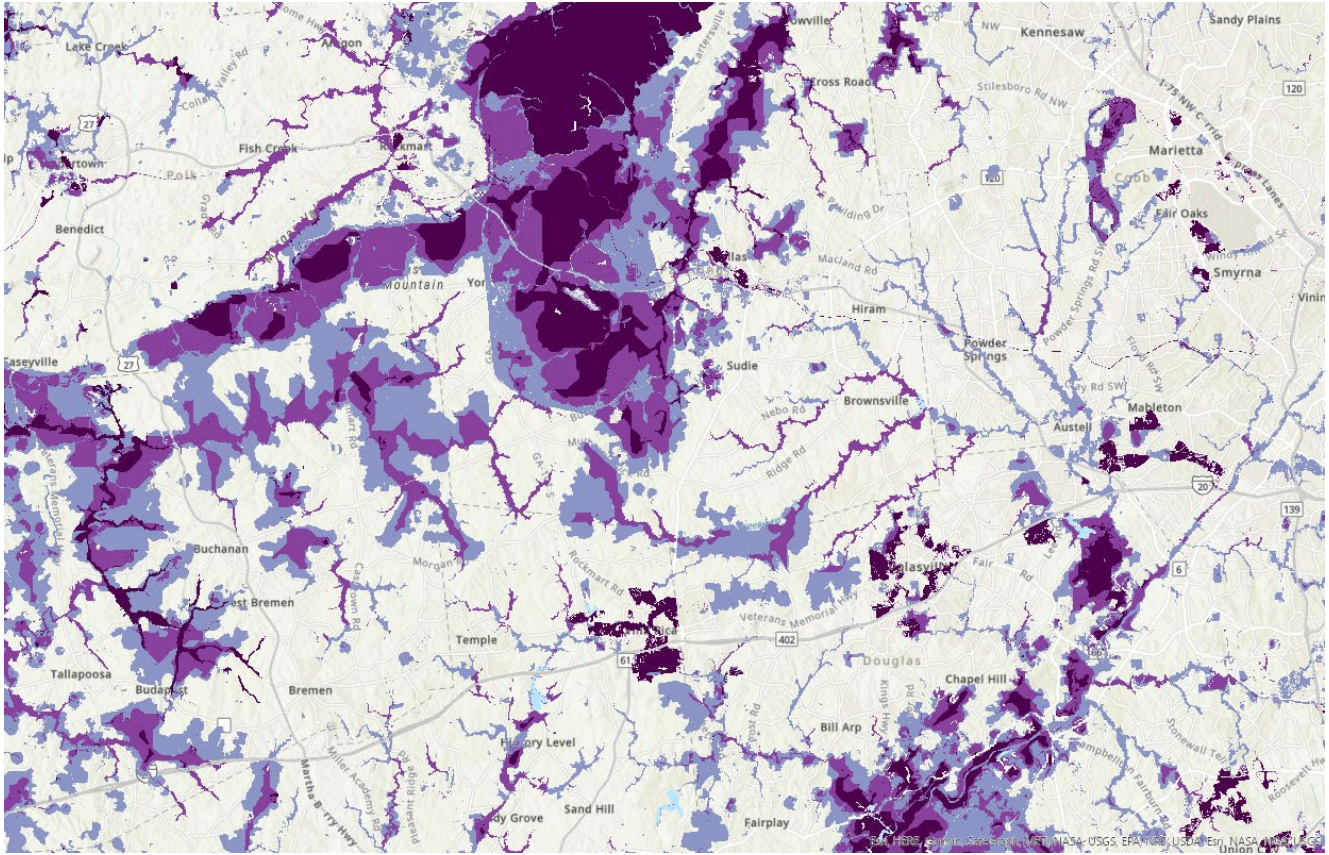
Imperiled Aquatic Species



Equitable access to potential parks



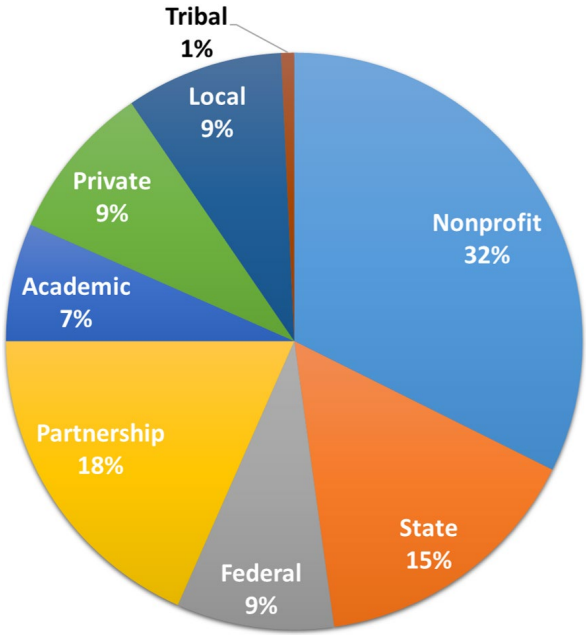
Equitable access to potential parks



How is the Blueprint being used?

The Blueprint is helping more than 300 people from over 130 organizations:

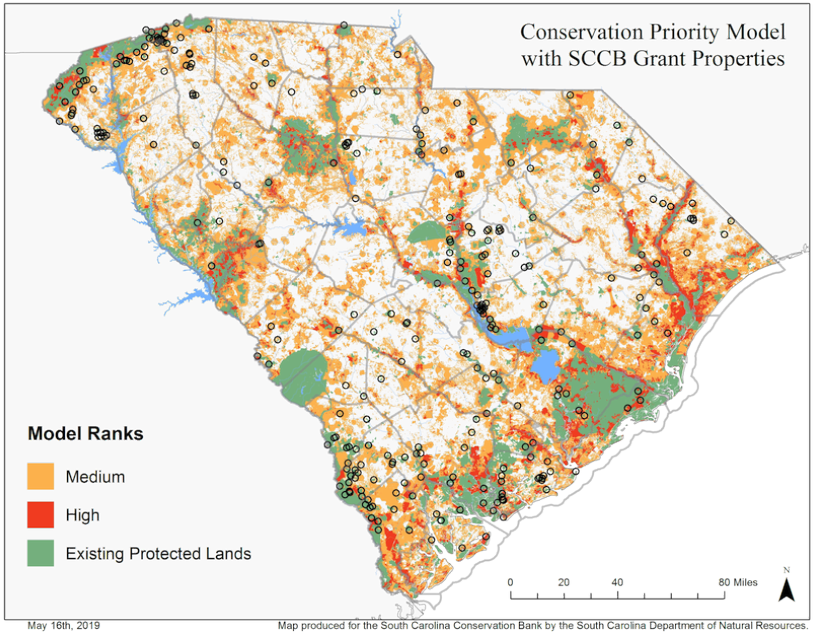
- 21 state agencies
- 9 land trusts
- 1 tribal government
- 12 federal agencies
- 12 local governments and planning organizations
- 35 nonprofits
- 25 conservation partnerships
- 12 private businesses
- 9 universities and academic organizations



Number of organizations using the Blueprint as of July 2022

Informing statewide land acquisition

- South Carolina Conservation Bank
- Re-authorization was in question due to perceived lack of shared priorities
- The Blueprint is being used to help in the distribution of public funds



Informing statewide land protection

Sub-Map 2 – Ecological Conservation Priorities

South Carolina faces various ecological challenges. Many species are being driven out from their natural habit due to invasive species, deforestation, or urbanization. By identifying lands that can support wildlife populations, South Carolina can conserve these lands for natural wildlife. Areas that have existing endangered species also have priority for conservation

Data Layers

TNC and SECAS Conservation Modeling

Attribute	Ranking	Explanation
TNC SC Conservation Vision - cores, buffers, and restoration areas.	3	See TNC SC Conservation Vision for more details.
TNC SC Conservation Vision - corridors or patches of resilience not already captured.	2	See TNC SC Conservation Vision for more details.
Southeast Conservation Blueprint - high and medium ranks not coincident with TNC SC Conservation Vision.	1	The areas of the SE Conservation Blueprint that are not coincident with the TNC Conservation Vision are represented to capture areas of more local, or finer scale importance. See SE Conservation Blueprint for more details.

Data Sources

1. The Nature Conservancy (TNC) – An Updated Conservation Vision for South Carolina (2018).
2. Southeast Conservation Adaption Strategy (SECAS) – The Southeast Conservation Blueprint version 3.0.

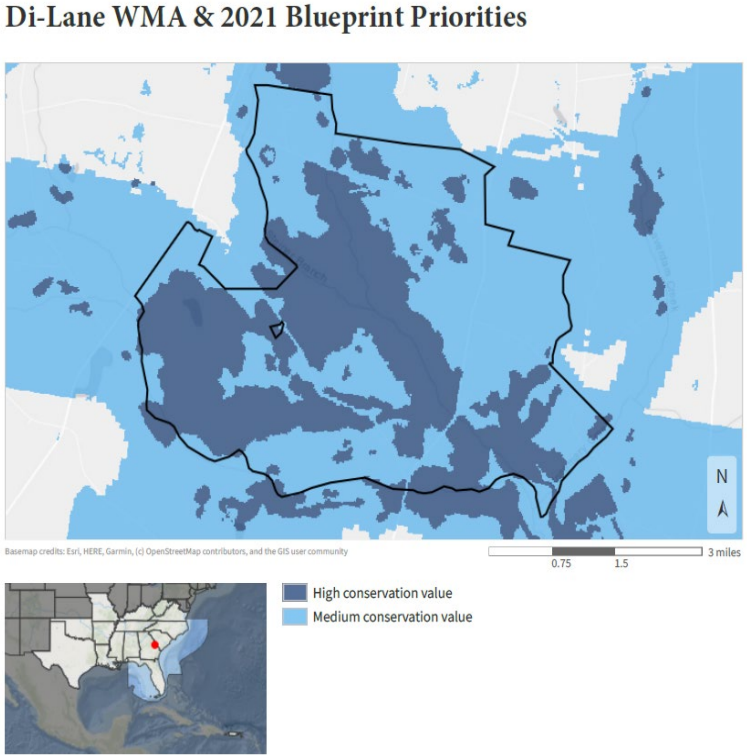
Processing Steps

The TNC Conservation Vision was reclassified as above. SECAS Blueprint raster values of High and Medium were reclassified into one value. The SECAS dataset was then merged with the TNC Conservation Vision dataset. Appropriate ranks were assigned to the merged raster dataset.

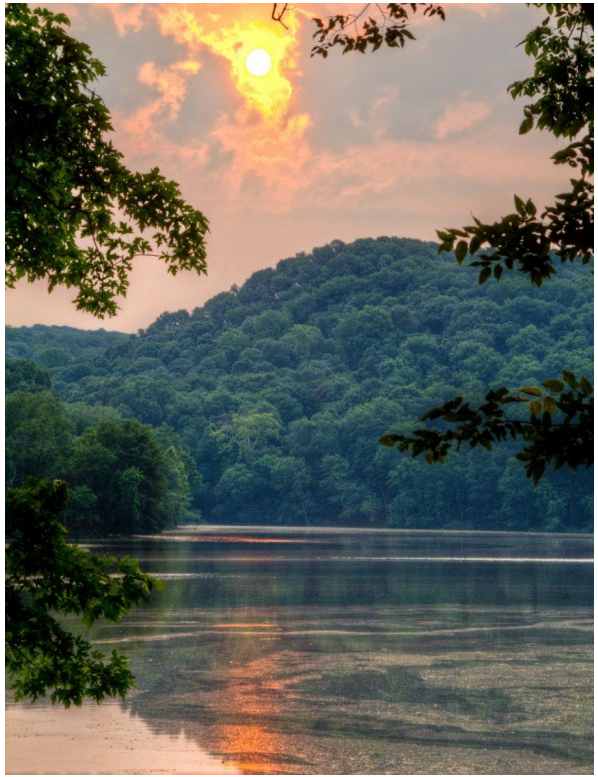
South Carolina CONSERVATION BANK

Grant Support

- America the Beautiful Challenge NFWF 2022
  - More than $15 million
  - 13 proposals
  - Plus, more that we didn't directly help with

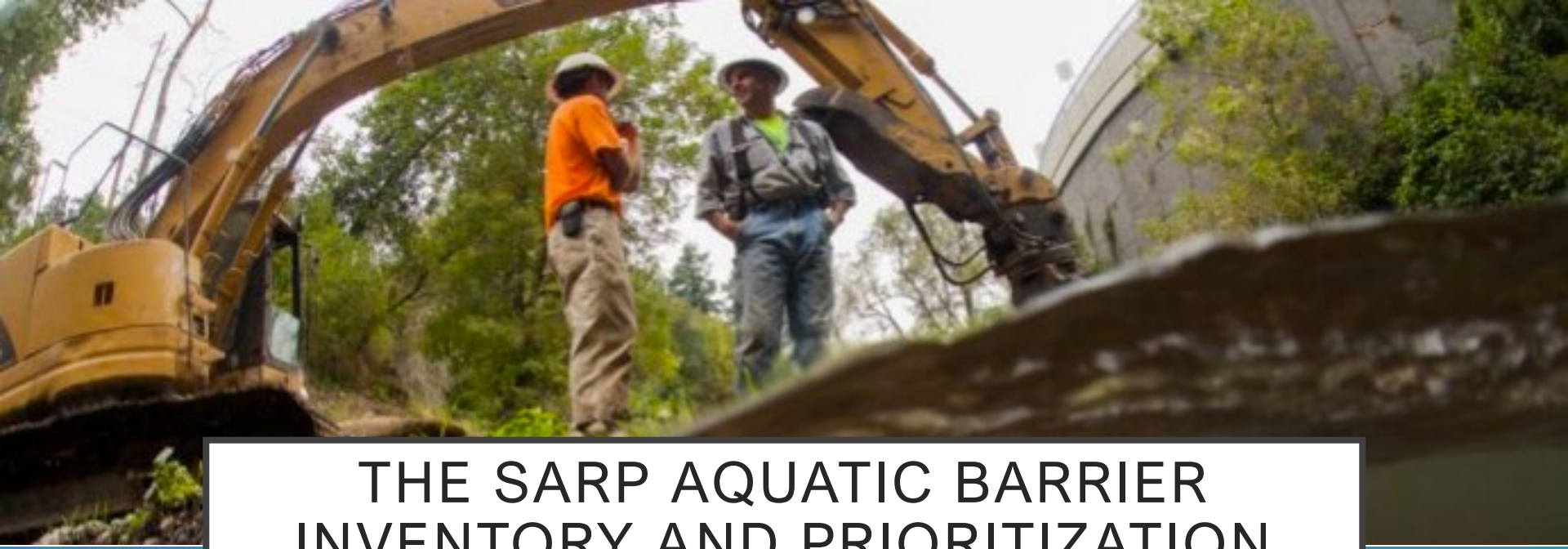


On the Horizon for SECAS and the Blueprint



- Blueprint 2022 Release at SEAFWA
- Serving the entire Southeast
  - Supporting internships with Minorities in Natural Resource Conservation Committee through SEAFWA
  - Expanding the Blueprint to the Caribbean
- America the Beautiful
  - Connecting state-federal-NGOs-private landowners
  - Supporting proposals for 2023 AtB Challenge from NFWF
- Social Network Analysis
  - Integrated social/organizational data with Southeast Blueprint biophysical data – Partnership Atlas


Thank you!



THE SARP AQUATIC BARRIER INVENTORY AND PRIORITIZATION TOOL

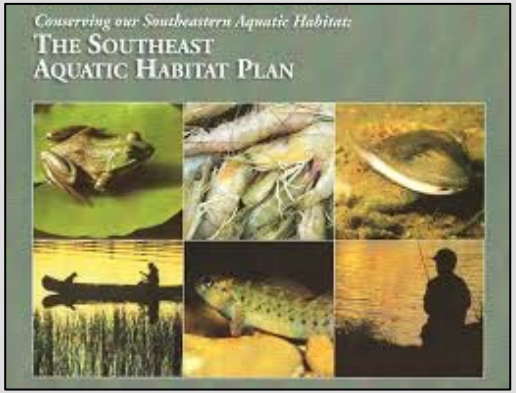
Kat Hoenke
GIS Coordinator
Southeast Aquatic Resources Partnership

SOUTHEAST AQUATIC RESOURCES PARTNERSHIP

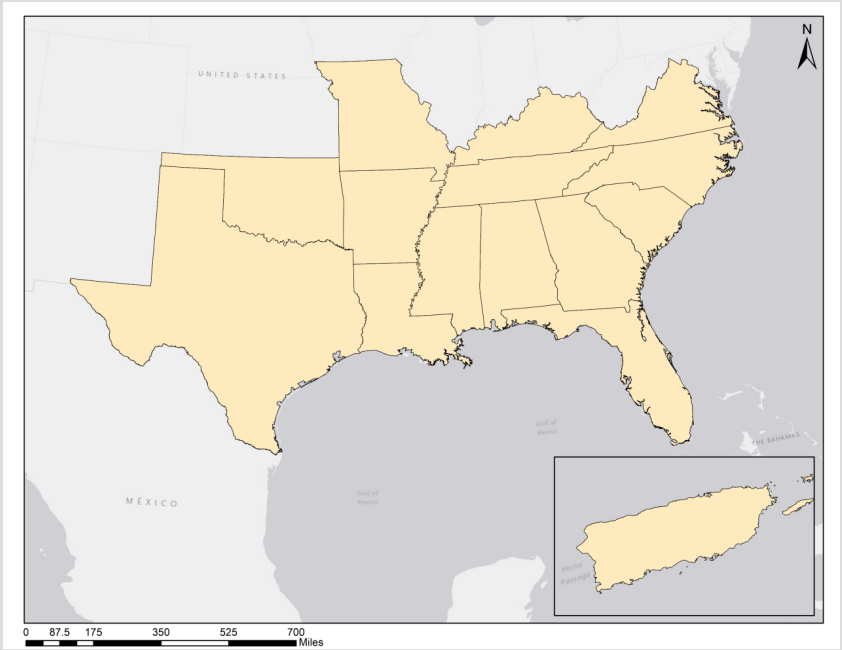
Mission

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.

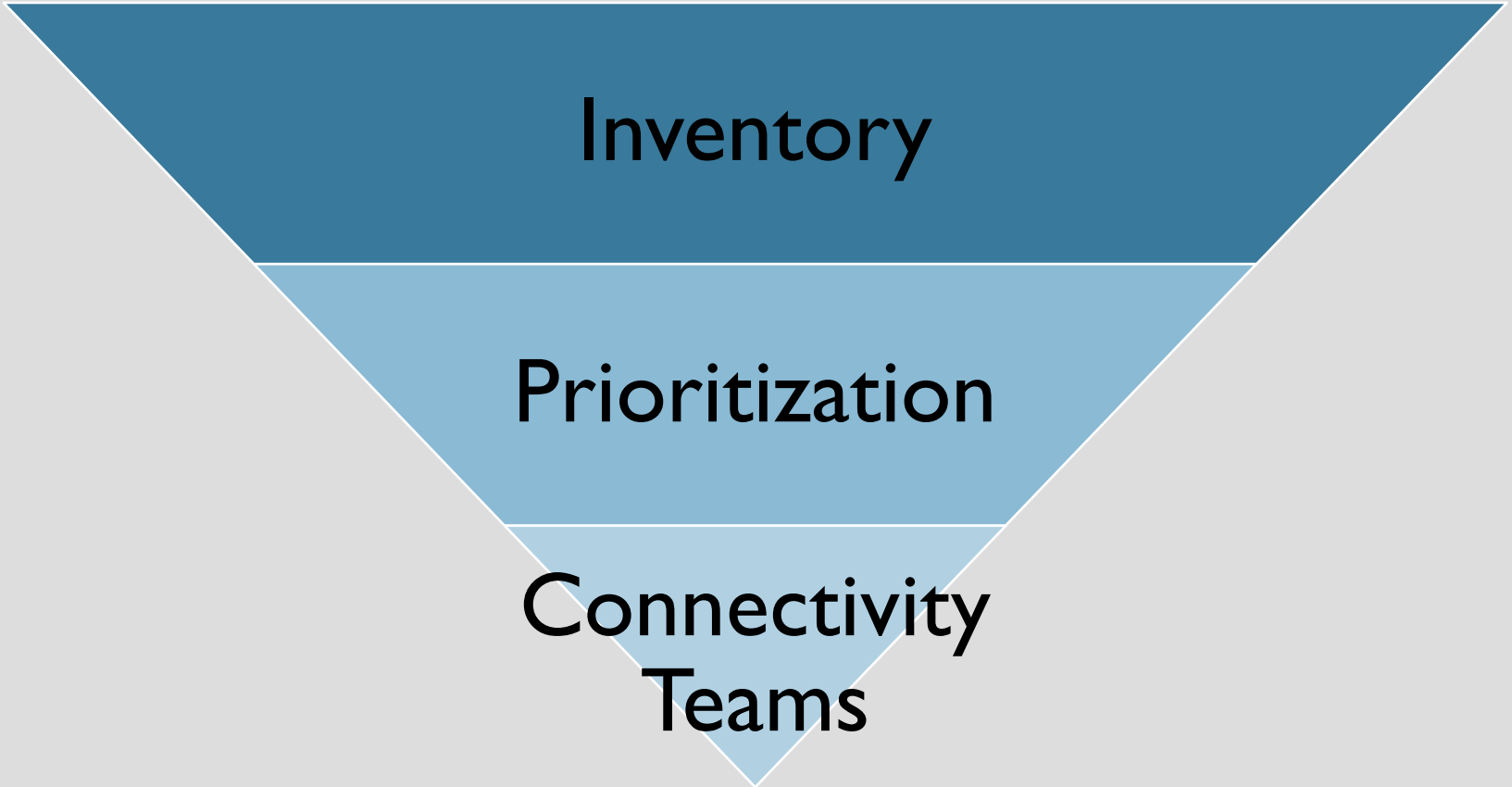
SOUTHEASTERN ASSOCIATION OF FISH AND WILDLIFE AGENCIES



NATIONAL FISH HABITAT PARTNERSHIP



SARP CONNECTIVITY PROGRAM

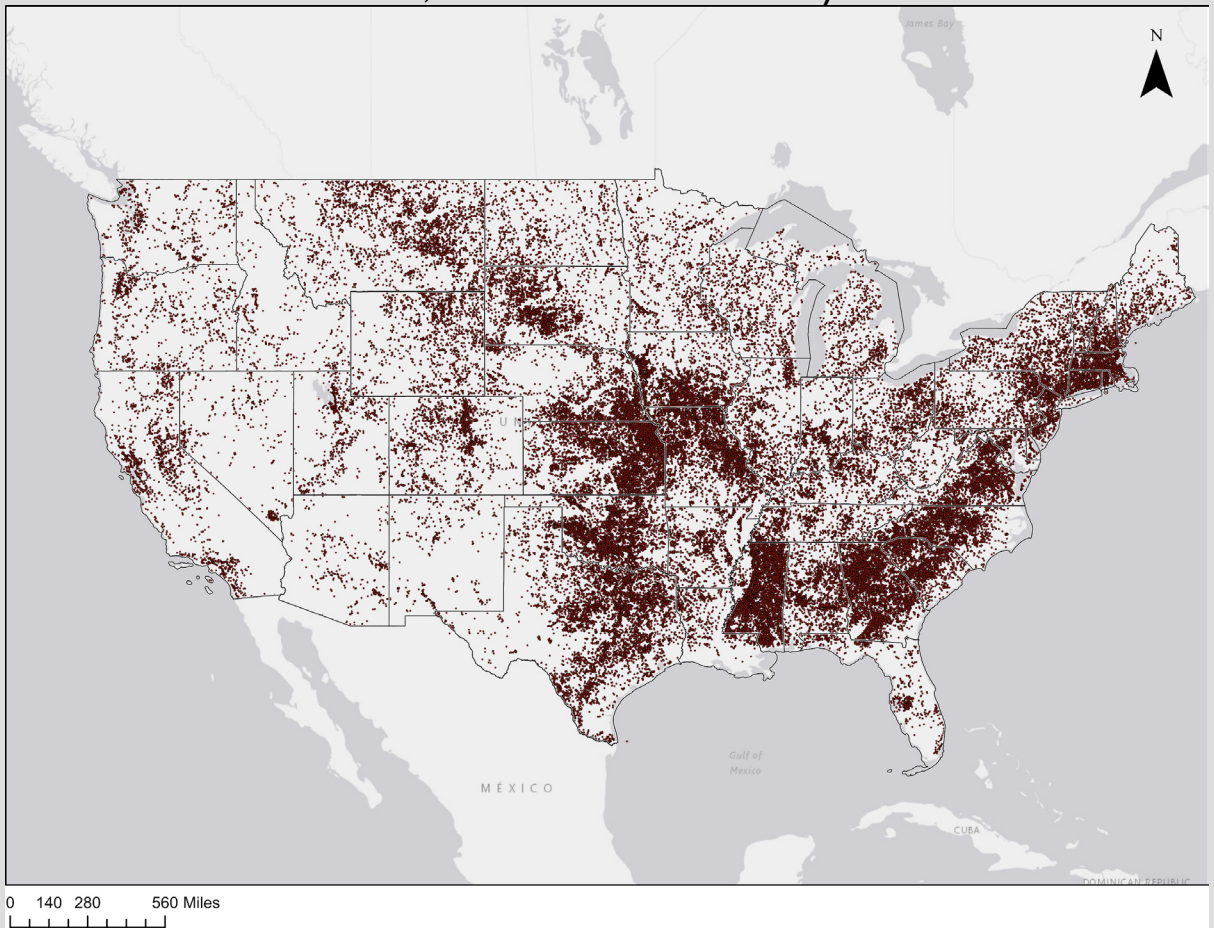


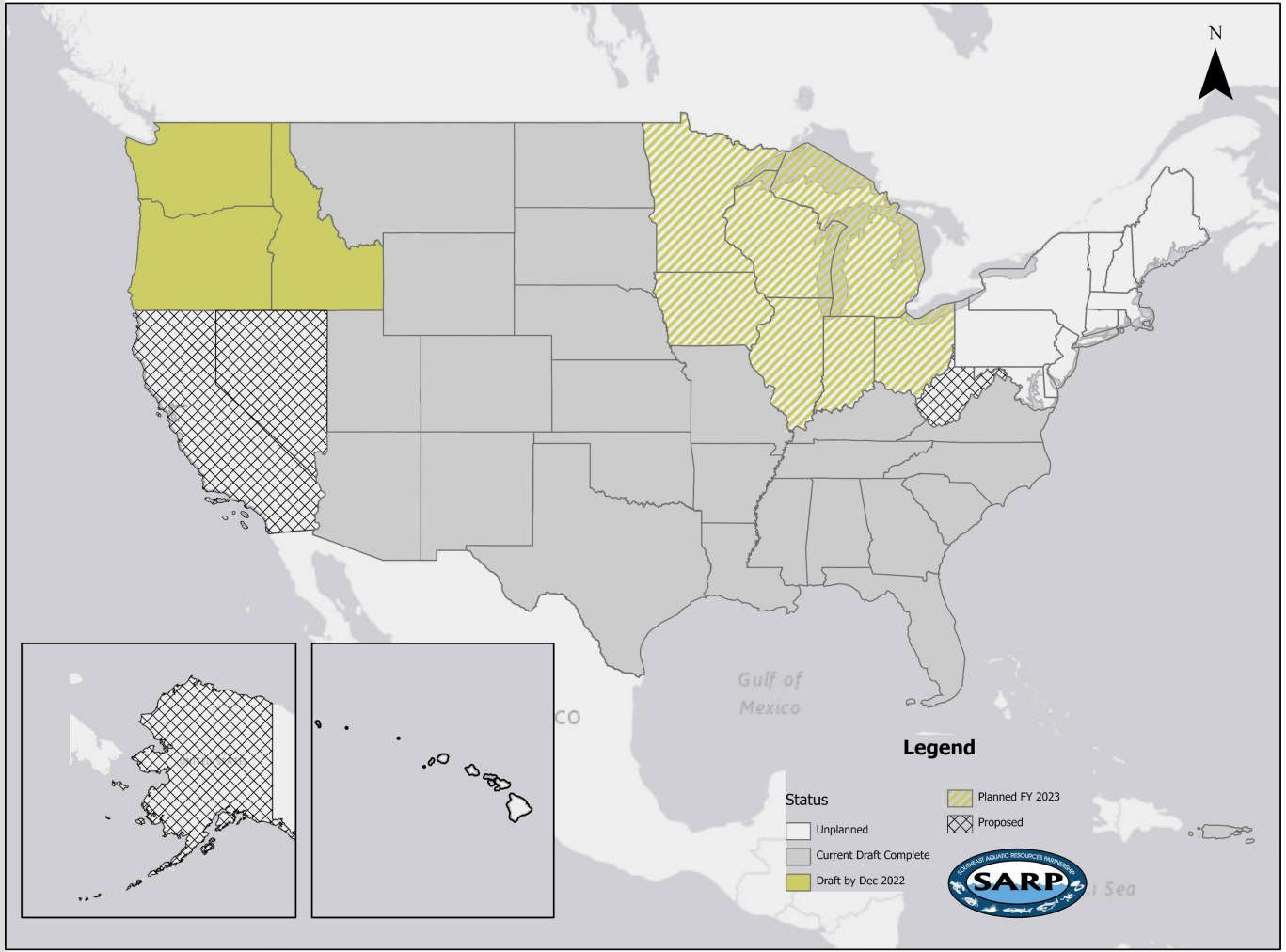
connectivity.sarpdata.com

Inventory

National Inventory of Dams

91,000 dams tracked nationally

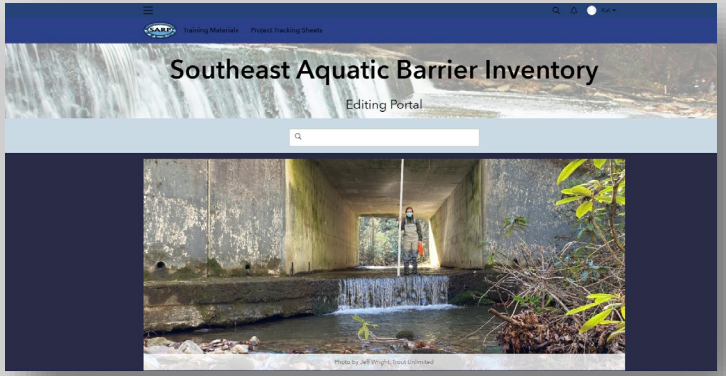


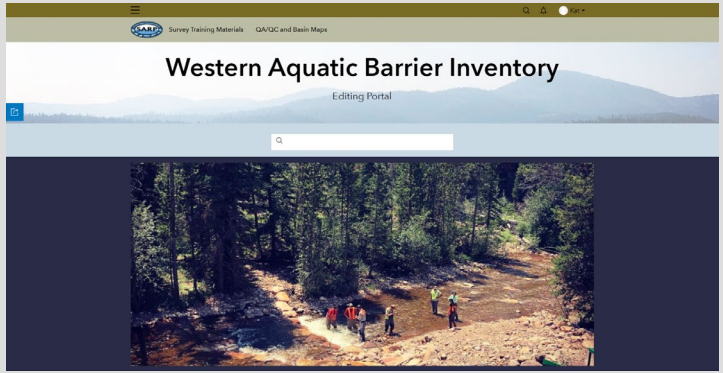

N
Gulf of Mexico
Legend
Status
Unplanned
Current Draft Complete
Draft by Dec 2022
Planned FY 2023
Proposed
SARP
0 225 450 900 Miles

SARP CONNECTIVITY PROGRAM

Inventory

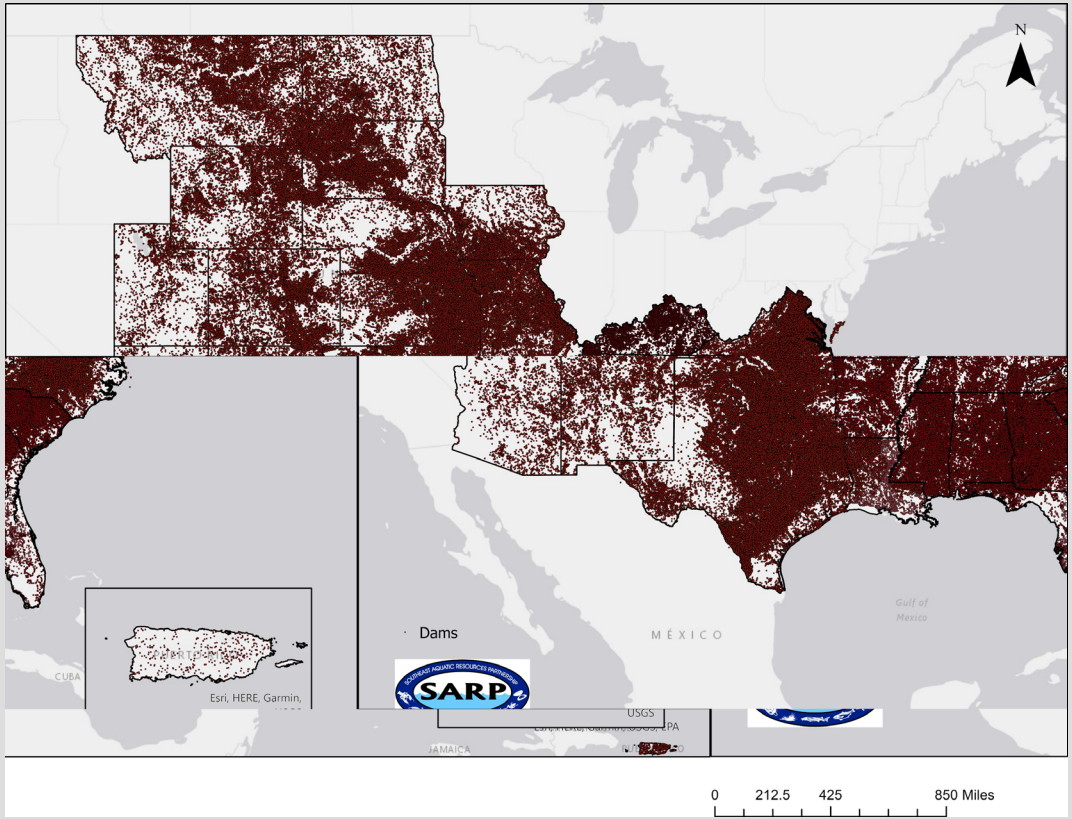
- Dams
- Road Crossings
- Waterfalls

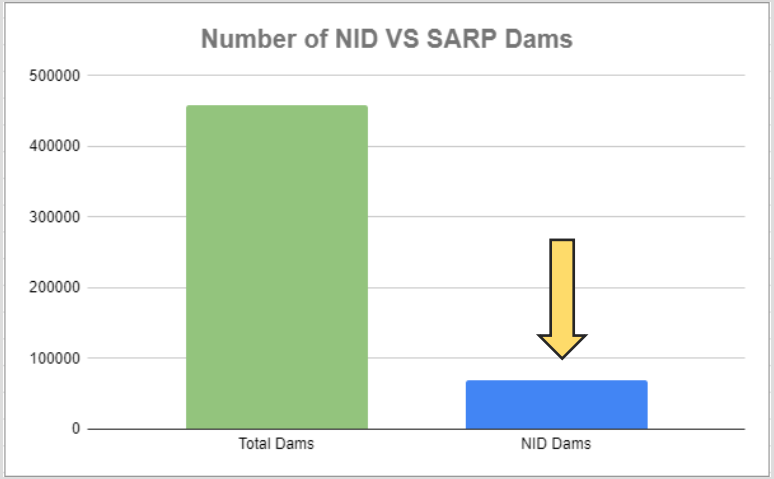




Inventory

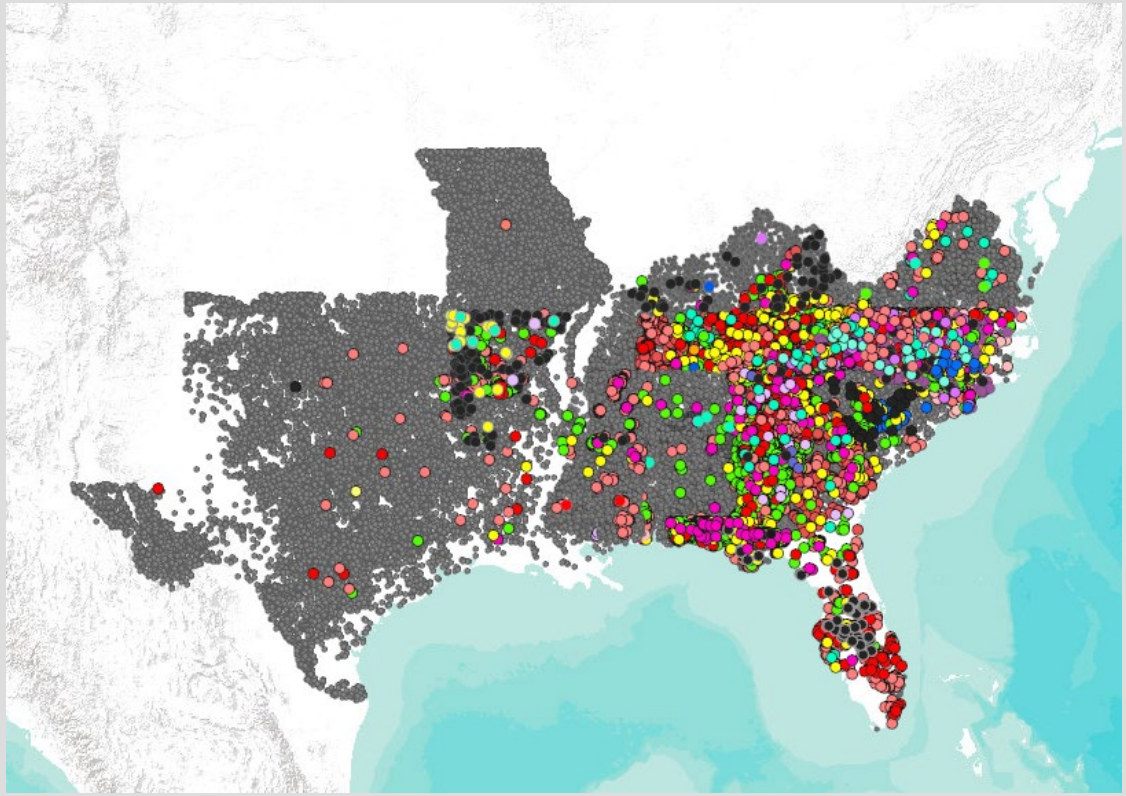
Dams



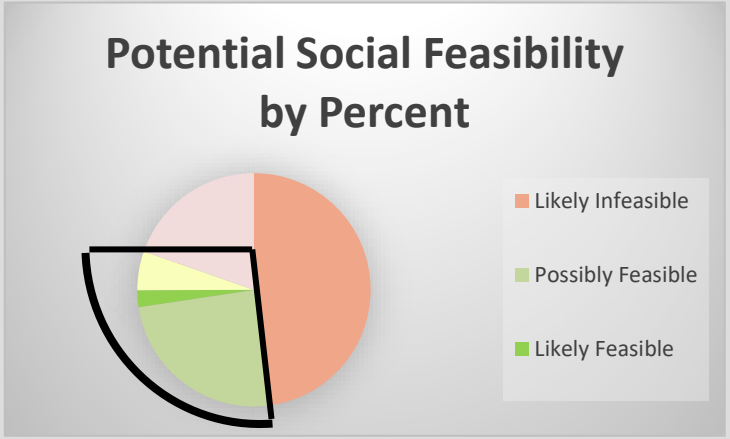


Inventory

REGIONAL RECON: ~20,000



-30% of reconned are potentially feasible

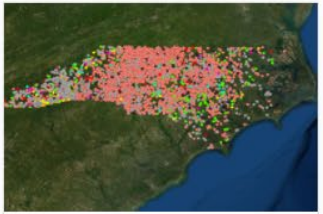


Aquatic Barrier Prioritization Tool

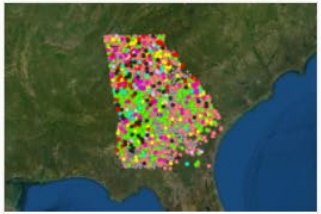
Instructions to Edit Barriers in Each Webmap: 1) Click on the appropriate box below. **2)** When the map opens, select "I want to use this." **3)** Then, click "Open in ArcGIS online." **4)** Now, you will be able to edit individual points. If performing social feasibility reconnaissance, click below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

Read Dam Recon Instruction Manual

01 Tennessee Aquatic Connectivity Team Map

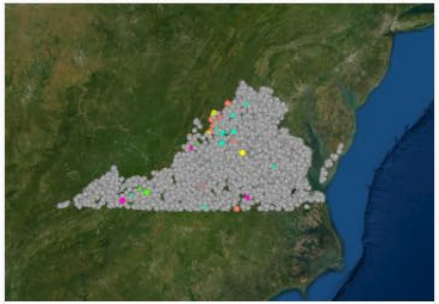


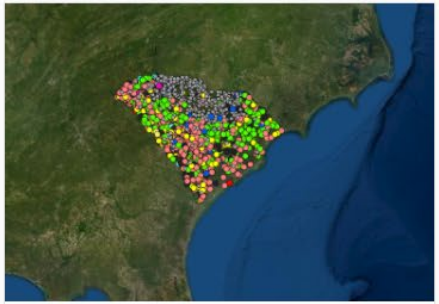
02 North Carolina Aquatic Connectivity Team Map

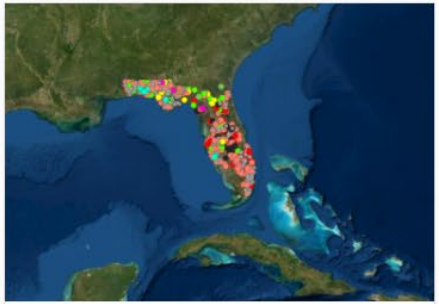


03 Georgia Aquatic Connectivity Team Map

04 Arkansas Stream Heritage Partnership...

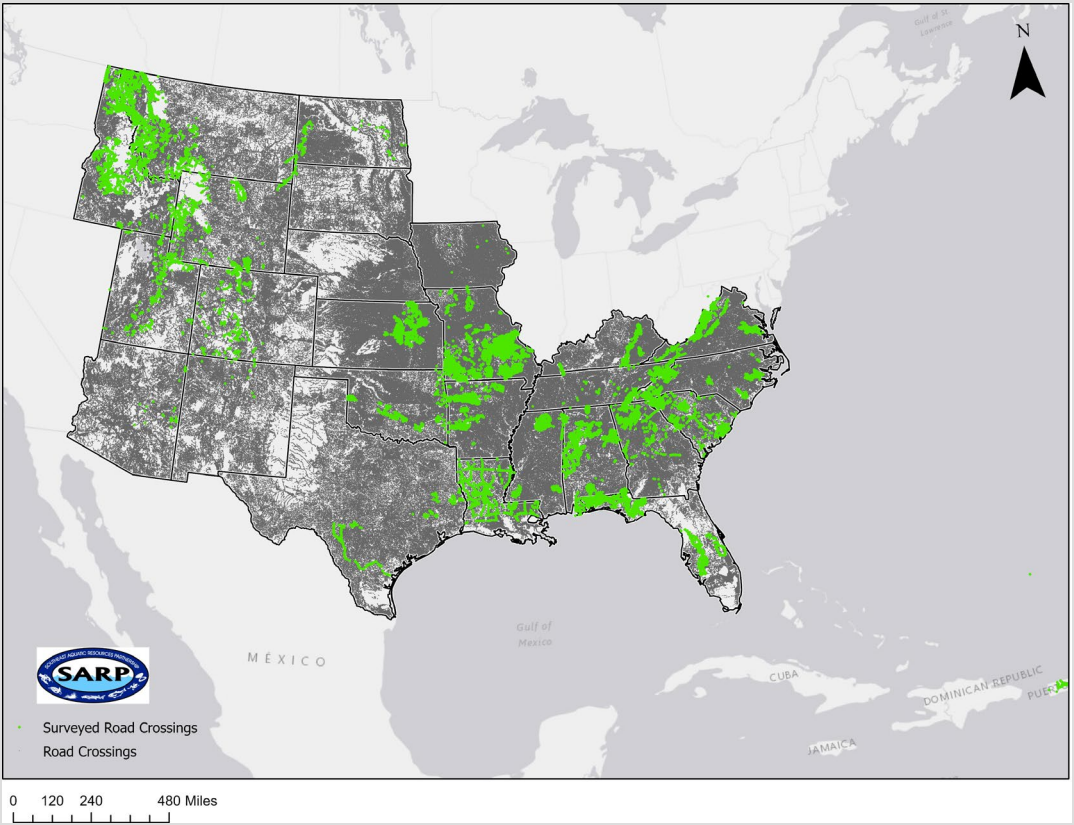






Inventory

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%

North Atlantic Aquatic Connectivity Collaborative

NAACC

SOUTHEAST AQUATIC RESOURCES PARTNERSHIP

SARP

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY | ENTRY DATE

DATA ENTRY REVIEWED BY | REVIEW DATE

CROSSING DATA

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 degree) °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 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

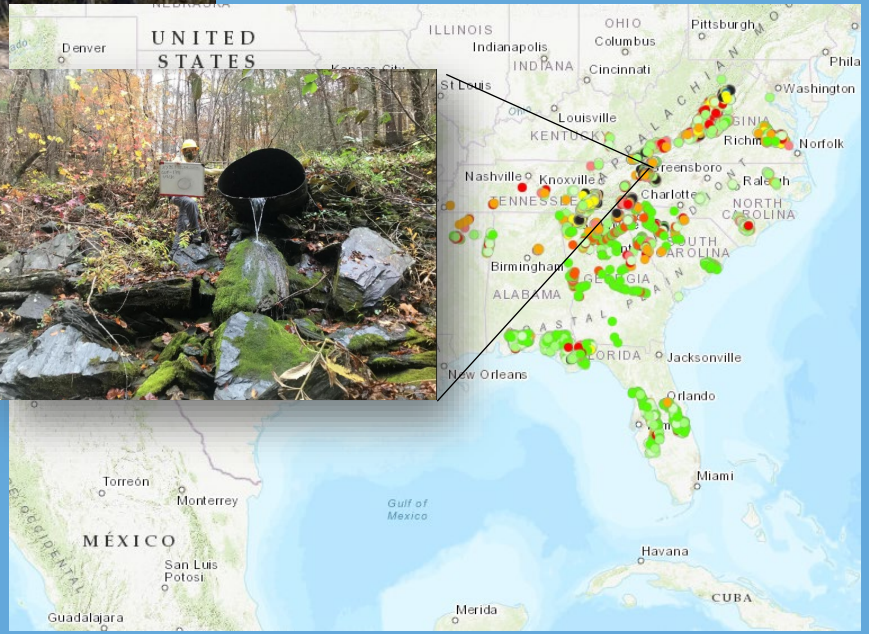
Riparian Vegetation: Overstory High Low; Understory High Low; Ground level High Low

Inlet Scour Pool: NONE SMALL LARGE

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

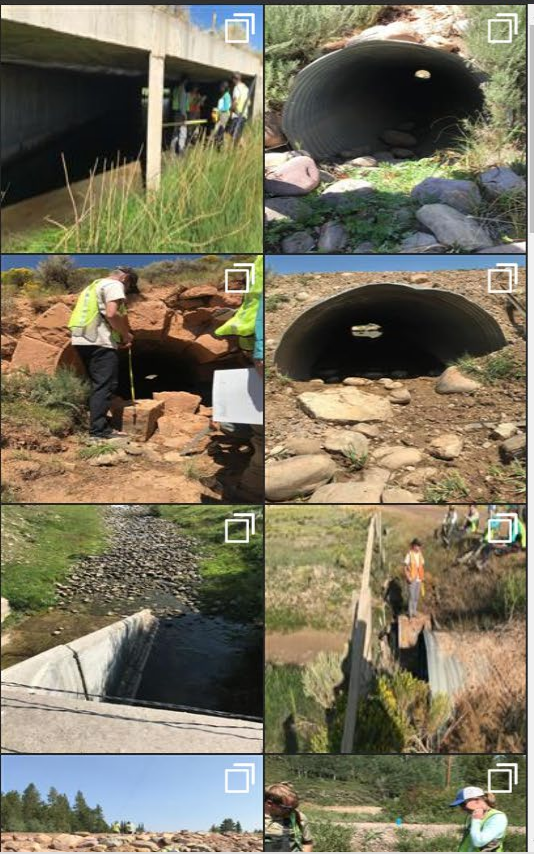
Crossing Comments

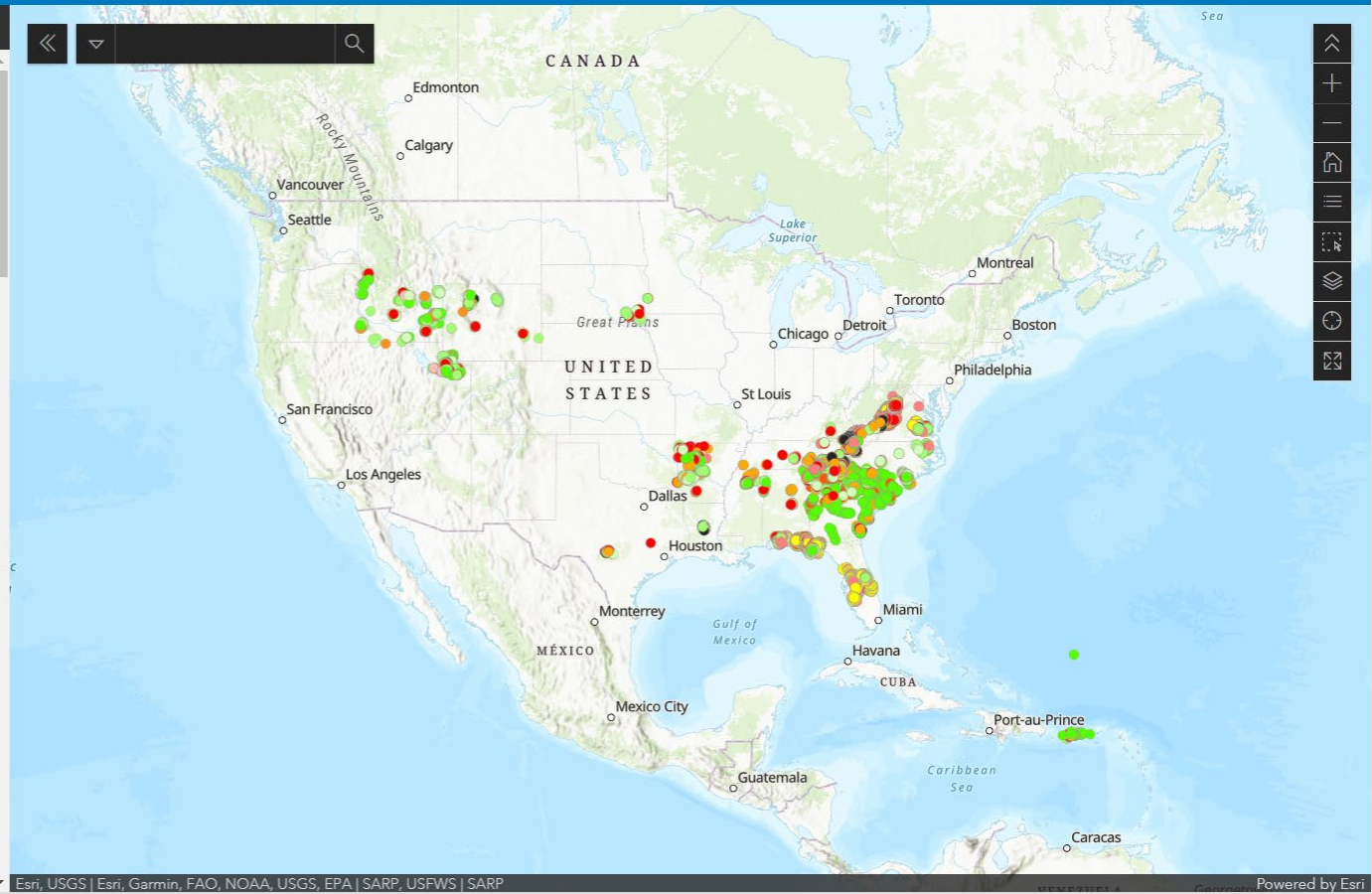
BATS PRESENT? Y



Assessing Road Stream Crossing Barriers in the United States

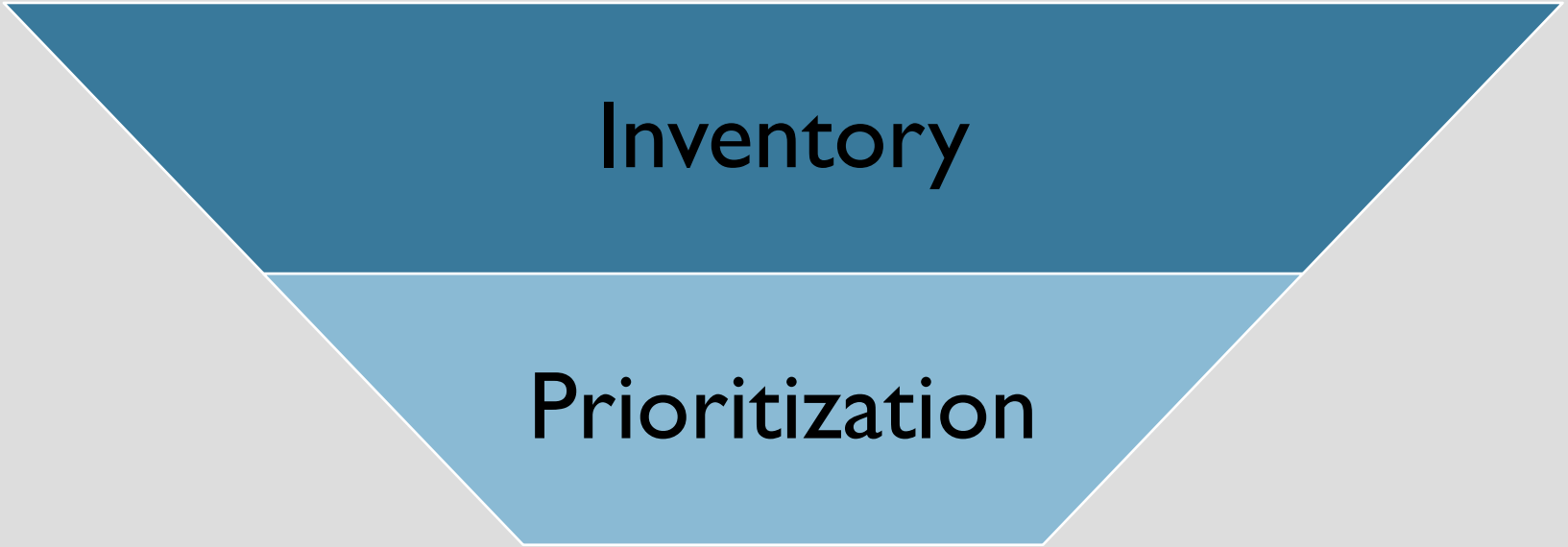
Western_SARP_AOP_Stream_Crossi...



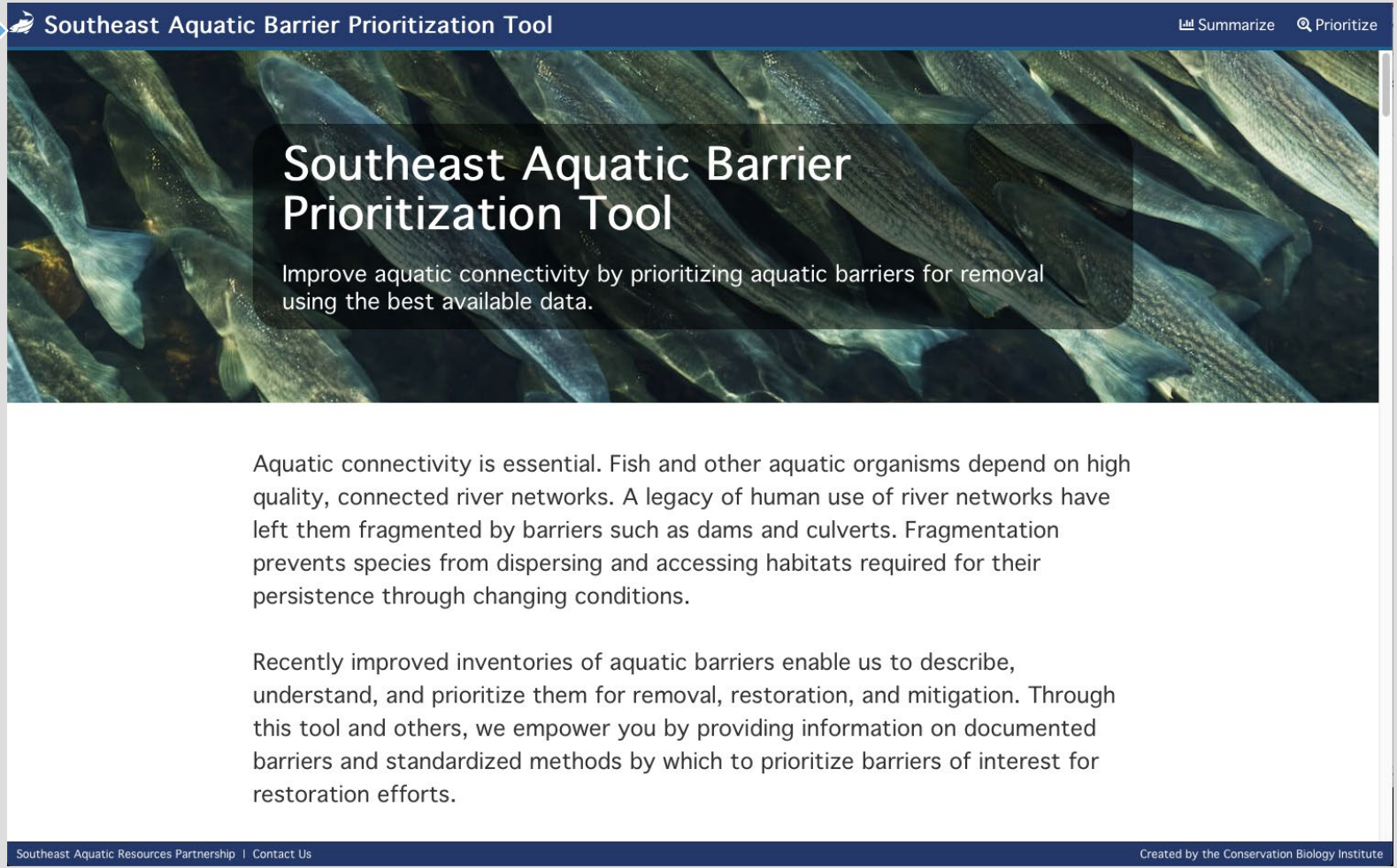


Bats in culverts!

SARP CONNECTIVITY PROGRAM



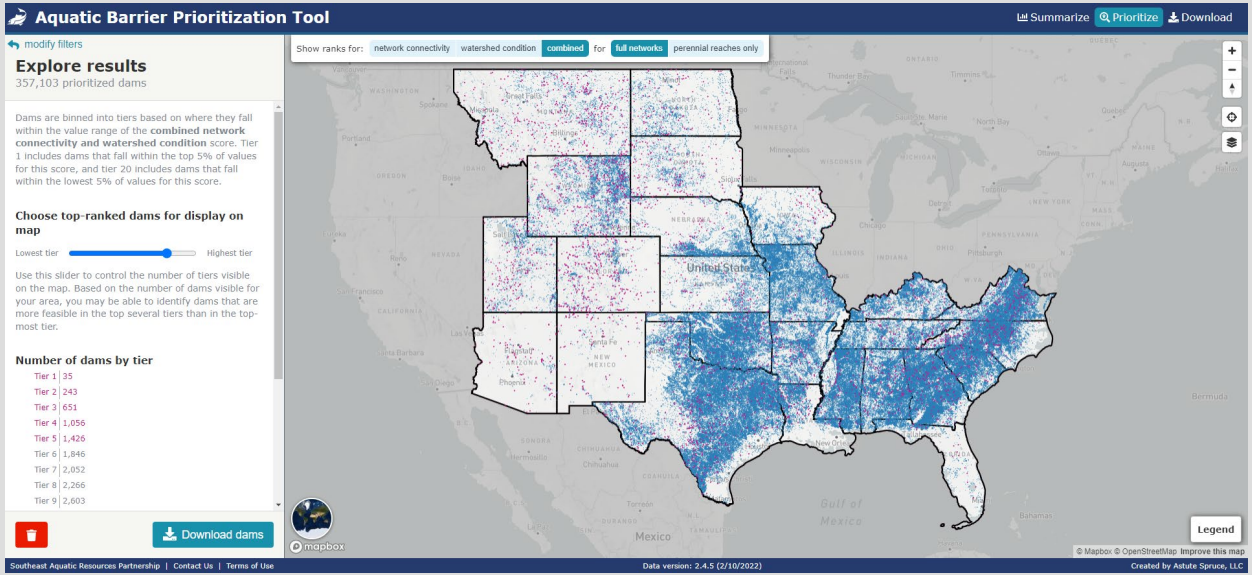
Prioritization



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



Prioritization

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

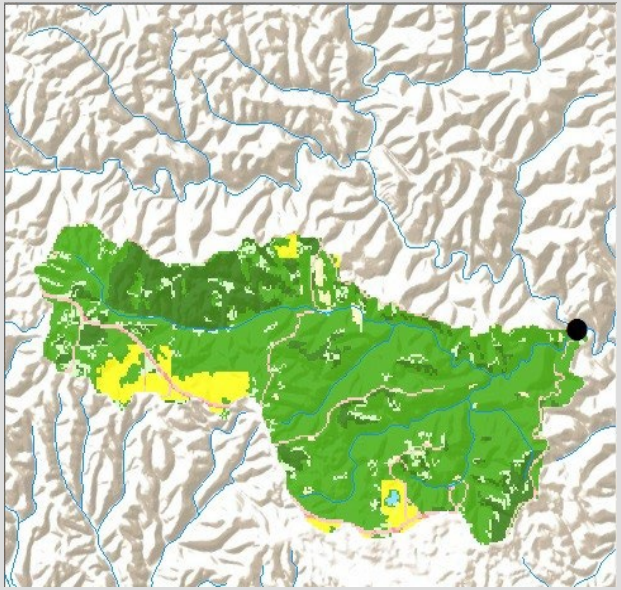
Altered river and stream reaches are those that are specifically identified as canals or ditches. These represent areas where the hydrography, flow, and water quality may be highly altered compared to natural conditions.

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.

Prioritization

SCENARIOS

1 Network Connectivity

Aquatic barriers prioritized according to network connectivity are driven exclusively on the total amount of functional aquatic network that would be reconnected if a given dam was removed. This is driven by the network length metric. No consideration is given to other characteristics that measure the quality and condition of those networks.

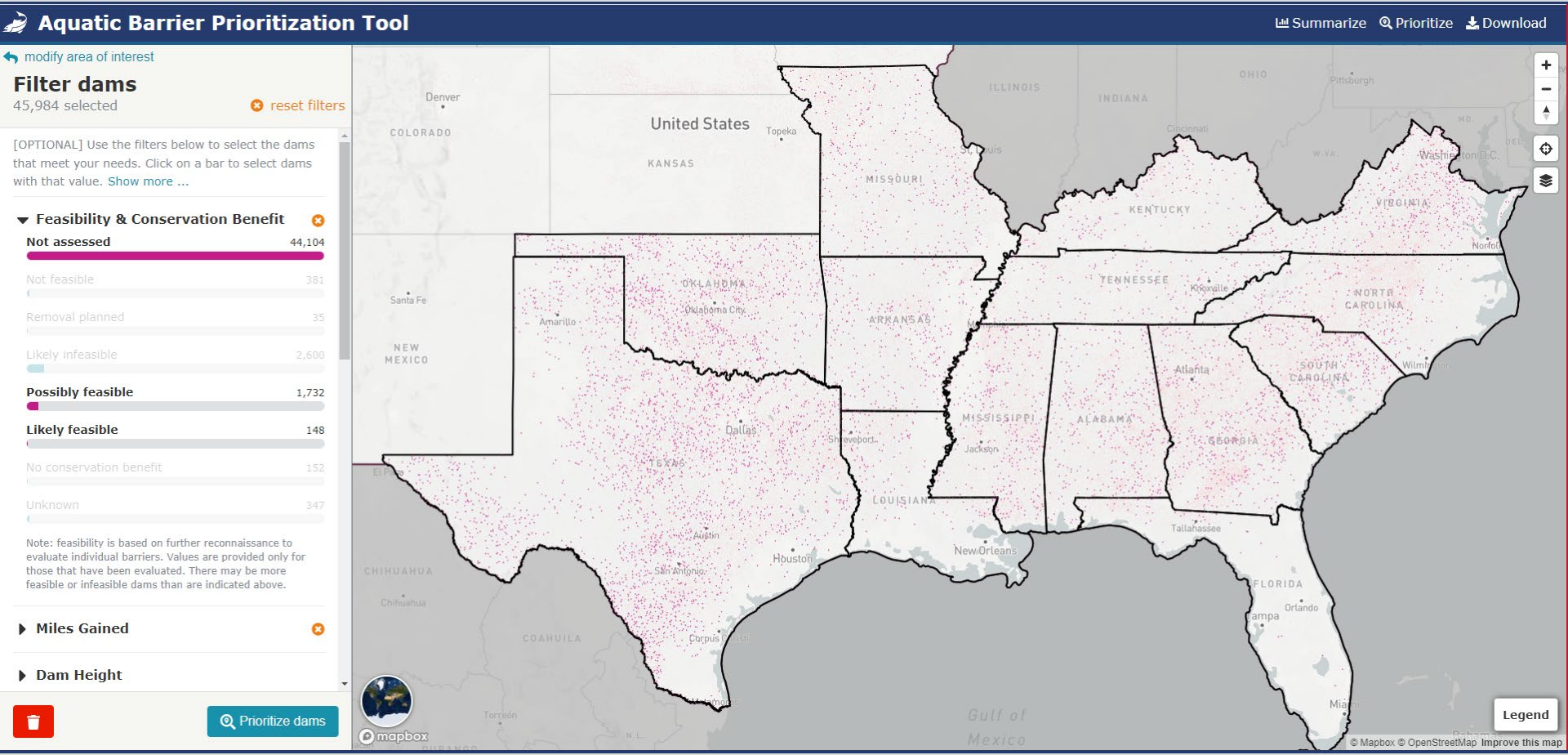
2 Watershed Condition

Aquatic barriers prioritized according to watershed condition are driven by metrics related to the overall quality of the aquatic network that would be reconnected if a given dam was removed. It is based on a combination of network complexity, network sinuosity, and floodplain natural landcover. Each of these metrics is weighted equally.

3 Network Connectivity + Watershed Condition

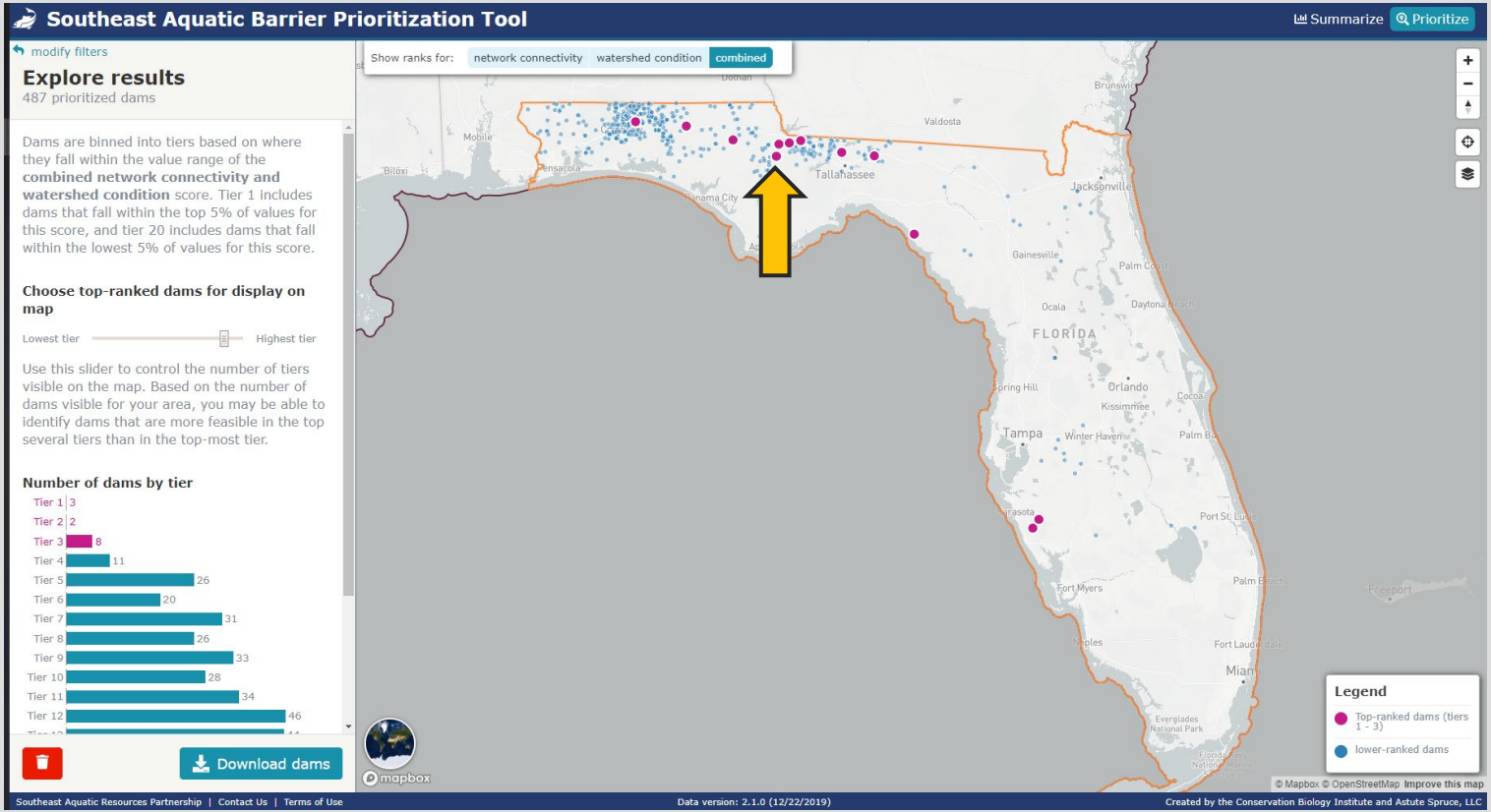
Aquatic barriers prioritized according to combined network connectivity and watershed condition are driven by both the length and quality of the aquatic networks that would be reconnected if these barriers are removed. **Network connectivity** and **watershed condition** are weighted equally.

PRIORITIZATION

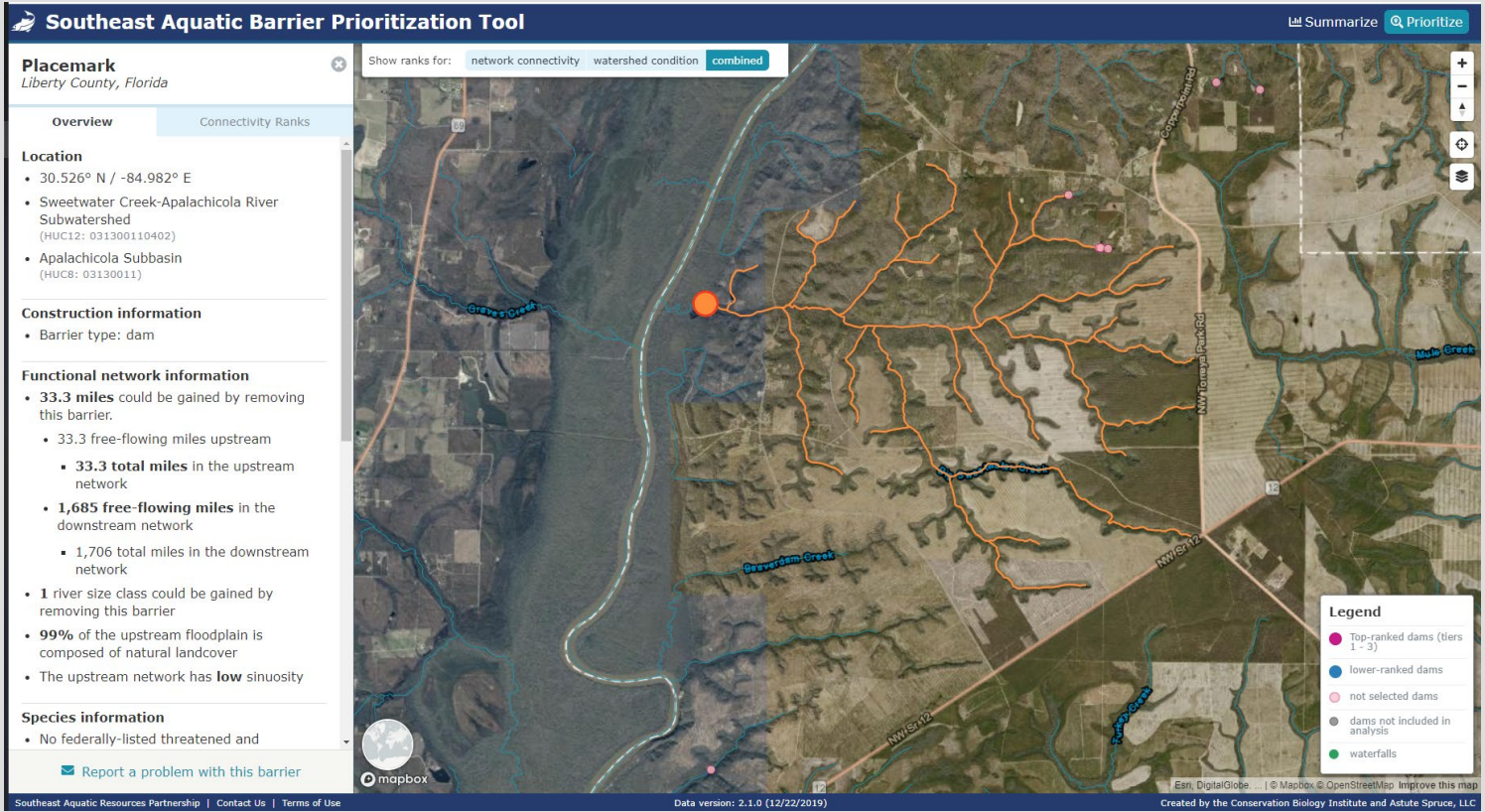


Prioritization

POTENTIALLY FEASIBLE IN FLORIDA: 487



SWEETWATER CREEK DAM



modify area of interest

Filter dams

1,169 selected

reset filters

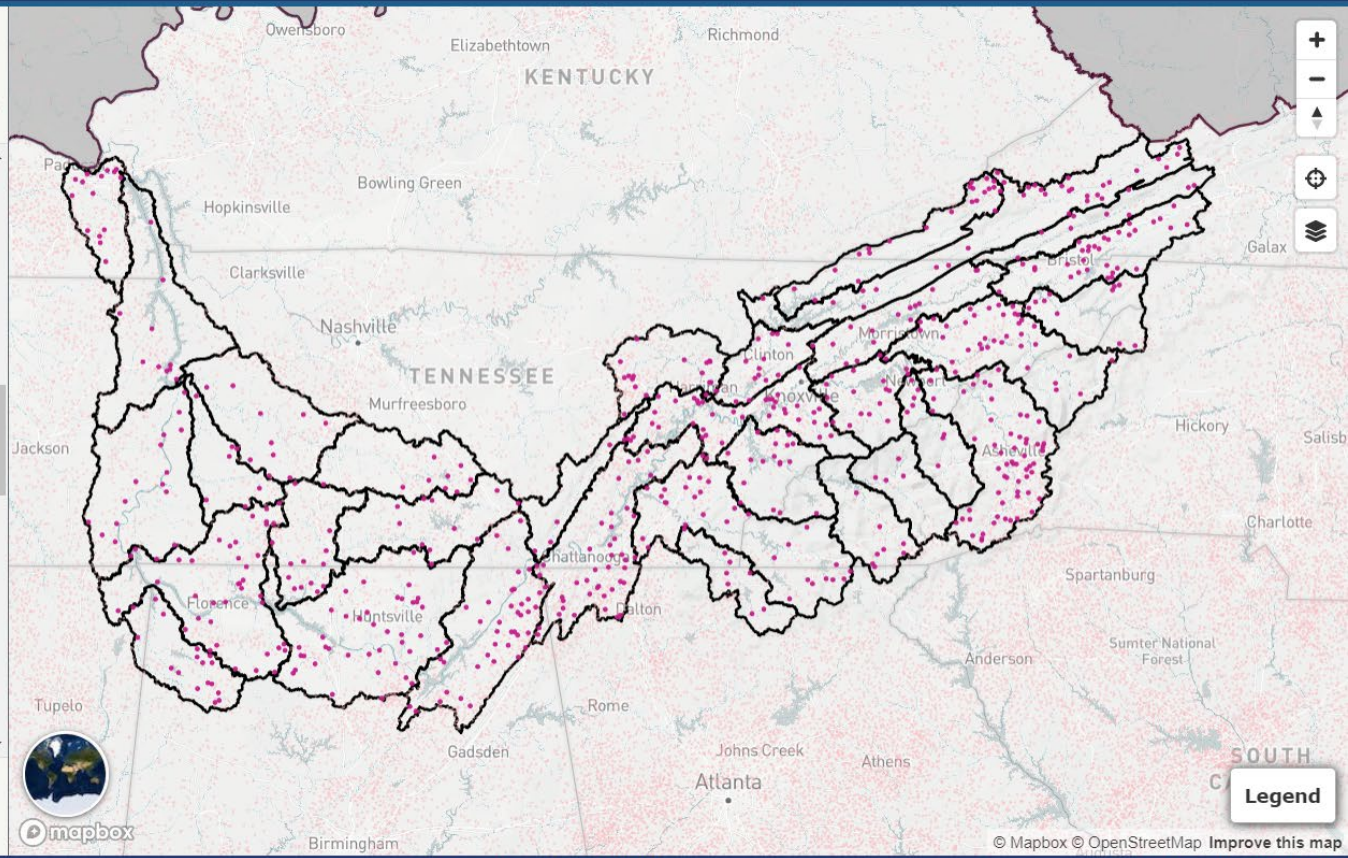
Dam Height

Number of Federally-Listed Threatened & Endangered Species

0	752
1	192
2 - 4	159
5 - 9	56
>= 10	10

Note: This information is based on occurrences of one or more federally- threatened or endangered aquatic species within the same subwatershed as the dam. These species may or may not be impacted by this dam. Information on

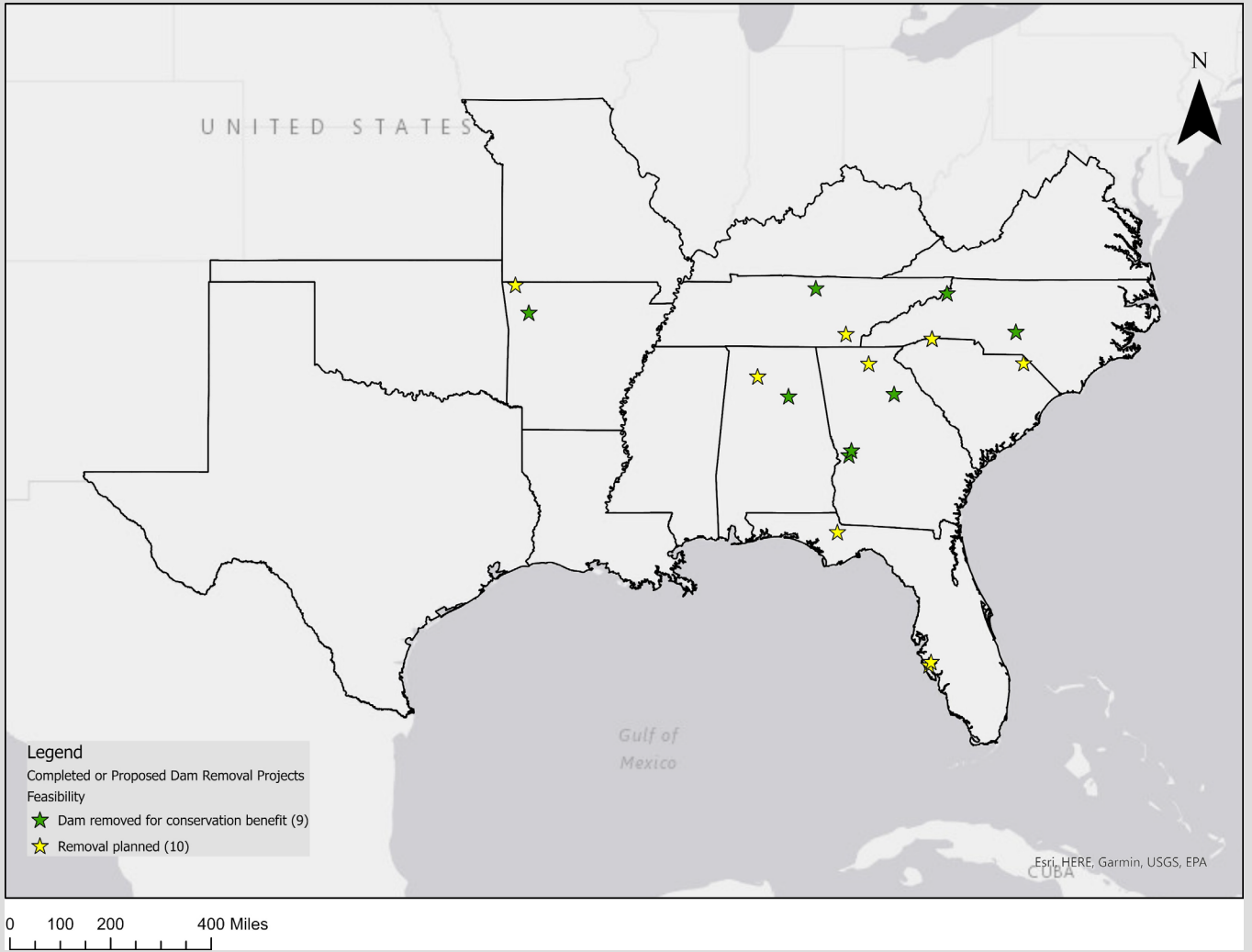
Prioritize dams



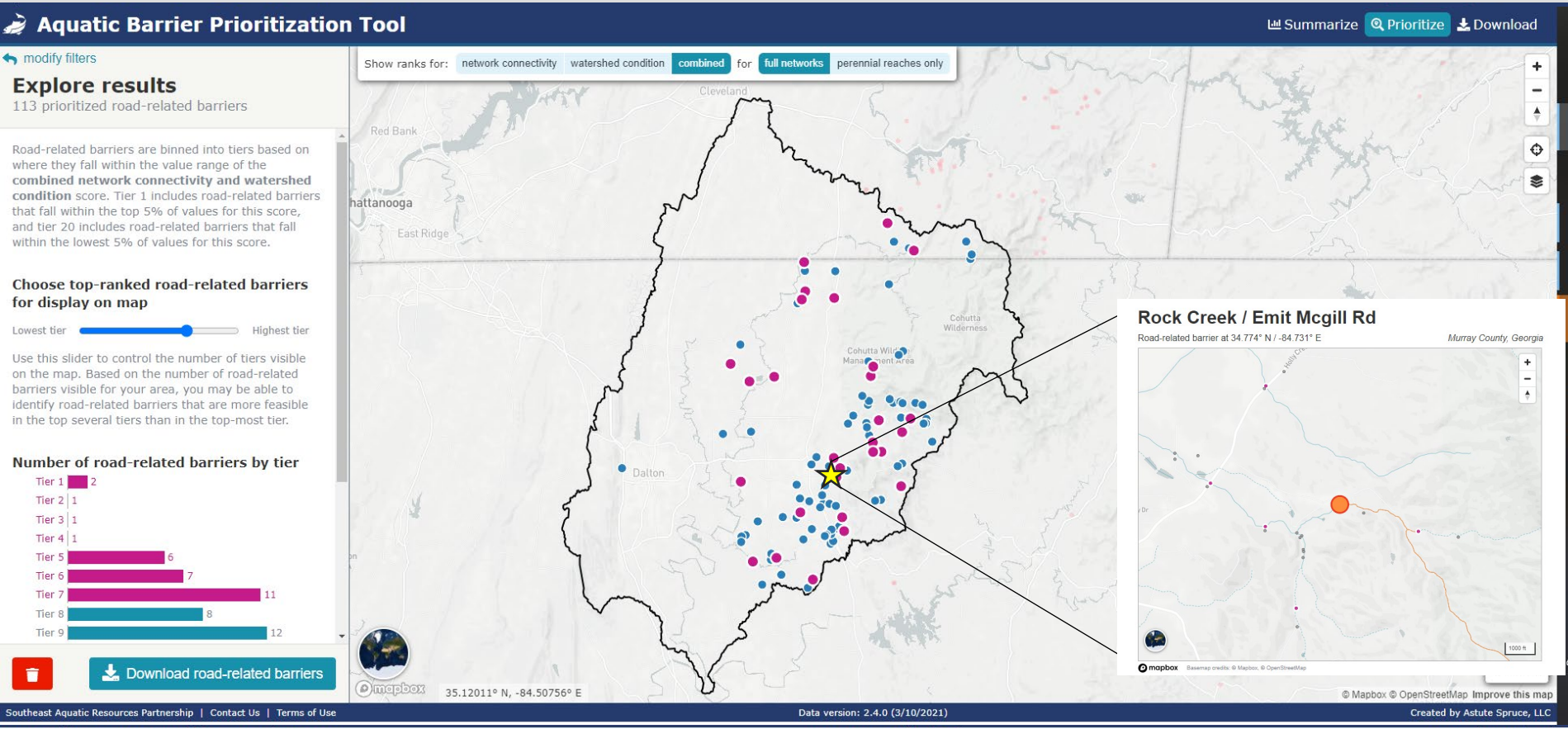
DAM REMOVALS

- **228** completed or proposed

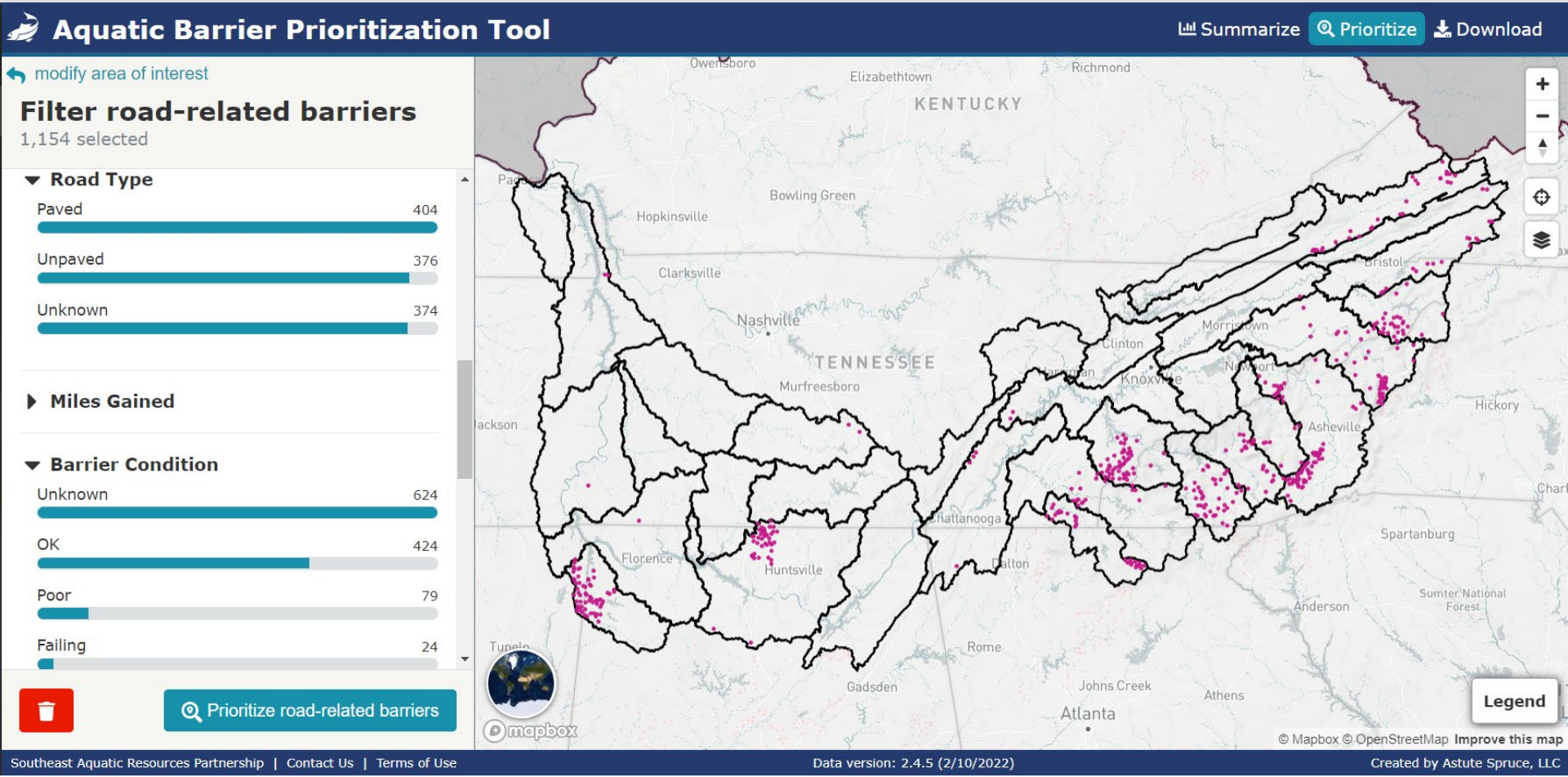
- **19** of these influenced by inventory and tool



ROAD BARRIER PRIORITIZATION



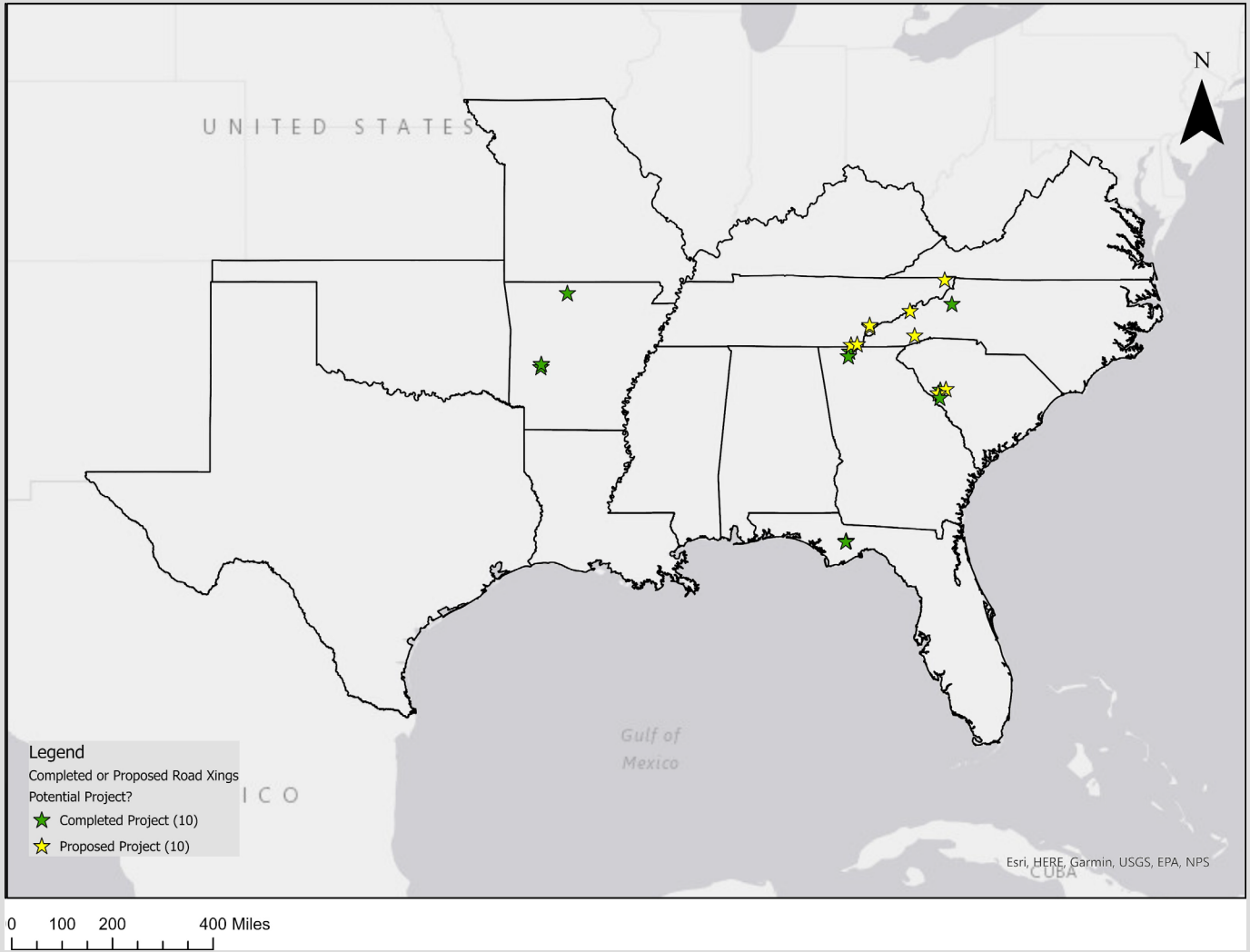
HOLLY CREEK, GA
EARTH DAY 2021


Aquatic Barrier Prioritization Tool
Summarize
Prioritize
Download
modify area of interest
Filter road-related barriers
1,154 selected
Road Type
Paved 404
Unpaved 376
Unknown 374
Miles Gained
Barrier Condition
Unknown 624
OK 424
Poor 79
Failing 24
Prioritize road-related barriers
KENTUCKY
TENNESSEE
Owensboro
Elizabethtown
Richmond
Bowling Green
Hopkinsville
Clarksville
Nashville
Murfreesboro
Knoxville
Chattanooga
Florence
Huntsville
Dalton
Asheville
Hickory
Spartanburg
Anderson
Sumter National Forest
Rome
Gadsden
Johns Creek
Athens
Atlanta
Legend
© Mapbox © OpenStreetMap Improve this map
Southeast Aquatic Resources Partnership | Contact Us | Terms of Use
Data version: 2.4.5 (2/10/2022)
Created by Astute Spruce, LLC

ROAD XING REPLACEMENTS

- **275** completed or proposed

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



NEXT STEPS

- Prioritize dams in the TRBN geography
- Identify high priority basins within the larger TRBN for AOP Assessments

QUESTIONS?

Contact:

Kat Hoenke

SARP GIS Coordinator

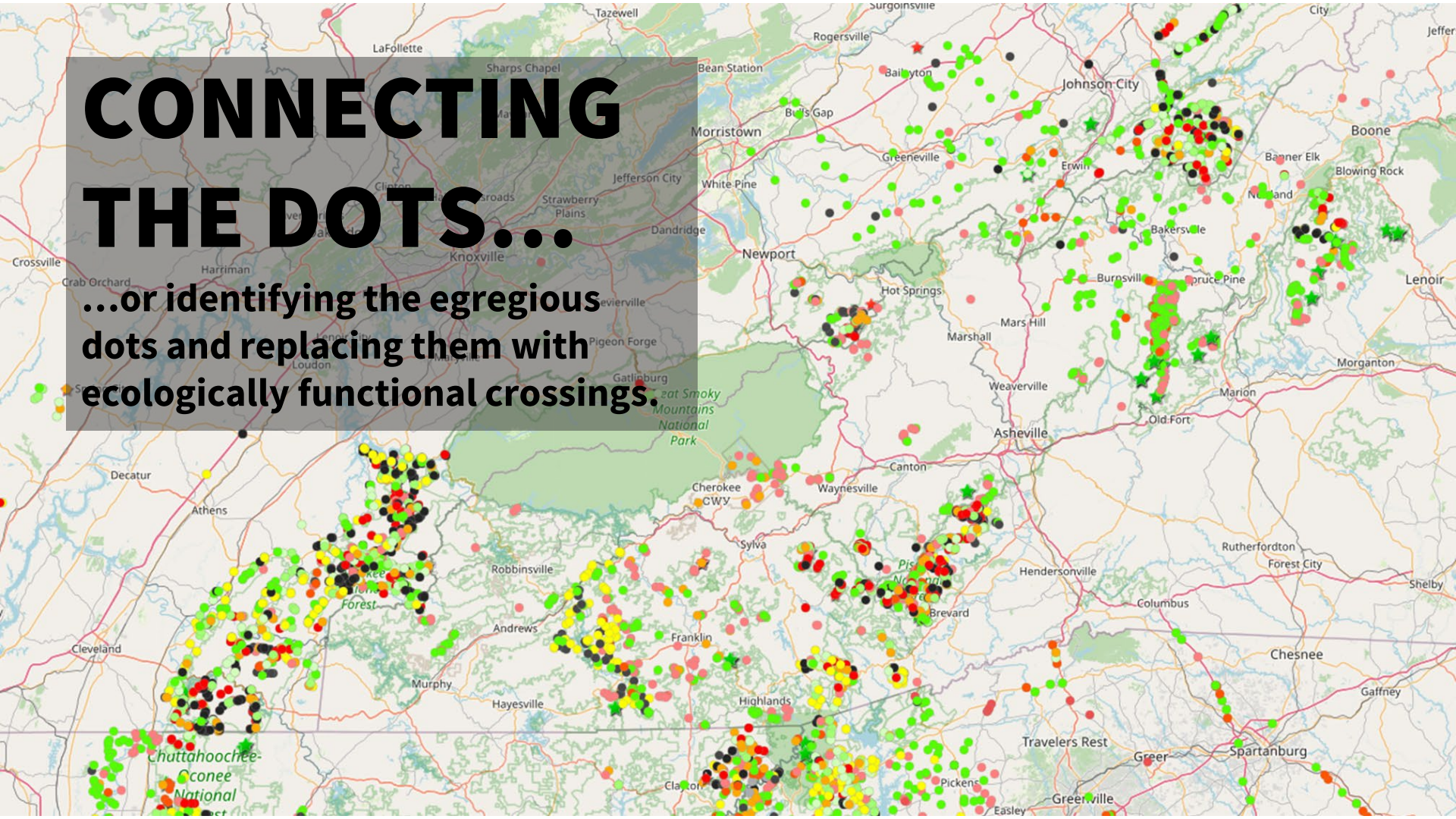
Kat@Southeastaquatics.net

Tool URL: https://connectivity.sarpdata.com

TRBN 2022

Jeffrey Wright, Trout Unlimited

Aquatic Connectivity Working Session


CONNECTING THE DOTS...
...or identifying the egregious dots and replacing them with ecologically functional crossings.
Tazewell
LaFollette
Sharps Chapel
Bean Station
Rogersville
Johnson City
Boone
Morristown
Greeneville
Erwin
Banner Elk
Blowing Rock
White Pine
Jefferson City
Strawberry Plains
Dandridge
Knoxville
Newport
Crossville
Harriman
Crab Orchard
Hot Springs
Mars Hill
Marshall
Pigeon Forge
Gatlinburg
Great Smoky Mountains National Park
Weaverville
Morganton
Marion
Old Fort
Asheville
Canton
Waynesville
Cherokee
Decatur
Athens
Sylva
Robbinsville
Rutherfordton
Forest City
Hendersonville
Shelby
Columbus
Brevard
Andrews
Franklin
Cleveland
Murphy
Hayesville
Highlands
Chesnee
Gaffney
Travelers Rest
Greer
Spartanburg
Pickens
Greenville
Easley
Chattahoochee-Oconee National

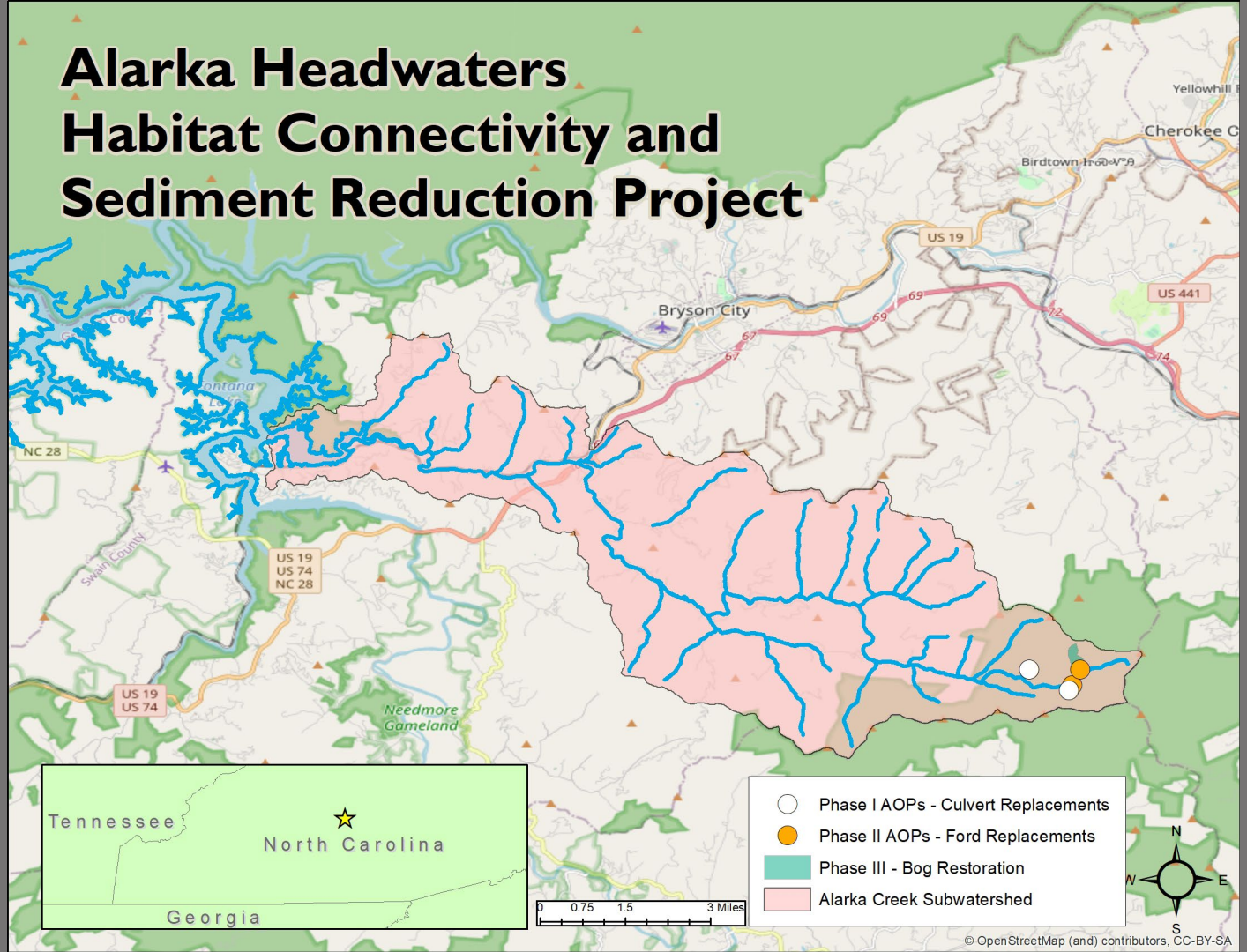
Group Conversation

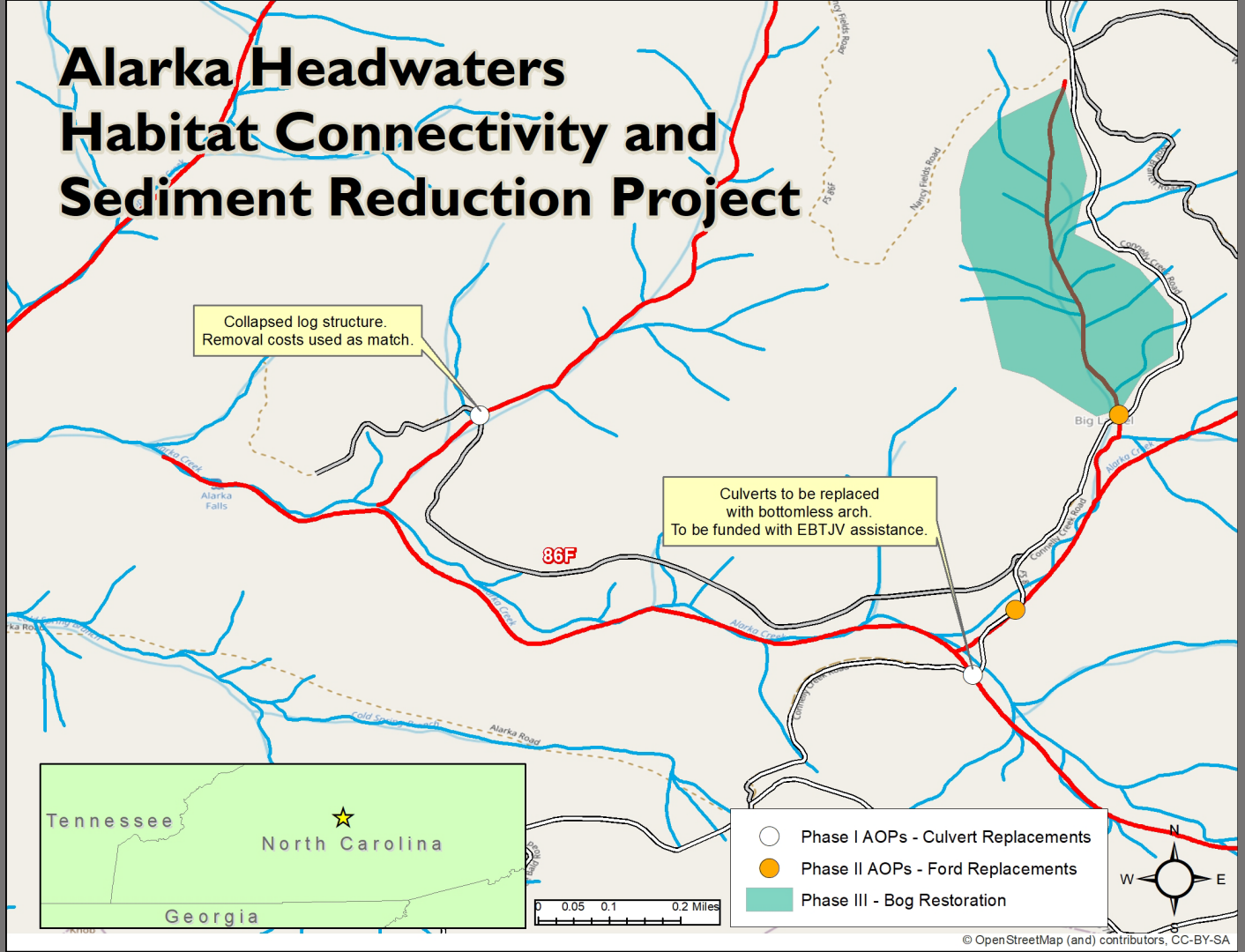
- What organization are you from?
- What is your interest in connectivity?
- How does connectivity fit within your organization’s priorities?

Basic Process

- Identification
- Permitting
- Funding
- Design
- Construction
- Monitoring

Project Management


Alarka Headwaters
Habitat Connectivity and
Sediment Reduction Project
Bryson City
US 19
US 441
NC 28
US 19
US 74
NC 28
US 19
US 74
Needmore
Gameland
Swain County
Tennessee
North Carolina
Georgia
0 0.75 1.5 3 Miles
Phase I AOPs - Culvert Replacements
Phase II AOPs - Ford Replacements
Phase III - Bog Restoration
Alarka Creek Subwatershed
N
W
E
S
© OpenStreetMap (and) contributors, CC-BY-SA


Alarka Headwaters
Habitat Connectivity and
Sediment Reduction Project
Collapsed log structure.
Removal costs used as match.
Culverts to be replaced
with bottomless arch.
To be funded with EBTJV assistance.
86F
Alarka Falls
Alarka Road
Nancy Fields Road
Tennessee
North Carolina
Georgia
0 0.05 0.1 0.2 Miles
Phase I AOPs - Culvert Replacements
Phase II AOPs - Ford Replacements
Phase III - Bog Restoration
N
W
E
S
© OpenStreetMap (and) contributors, CC-BY-SA

Identification

- Allopatric brook trout
- Heavily used roads
- Watershed-scale
- SARP moderate barrier
- Additional sediment issues

Group Conversation

- Do you see anything missing from the project roles?
- What makes Alarka a high-value project? What might aspects lower that importance?
- What role/s is your organization capable of handling? What role are you most hesitant to work on?
- Could your table fill all the necessary roles? If not, who could you contact to fill the gaps?

Permitting

- Varies by state and landowner
- Some form of NEPA
- 404 permit/401 certification
- Stream buffer laws
- May need design prior to permitting

Funding

- Significant time investment
- More funding than ever, less ability to do the work
- Non-federal money unlocks potential

Alarka Funding

Federal

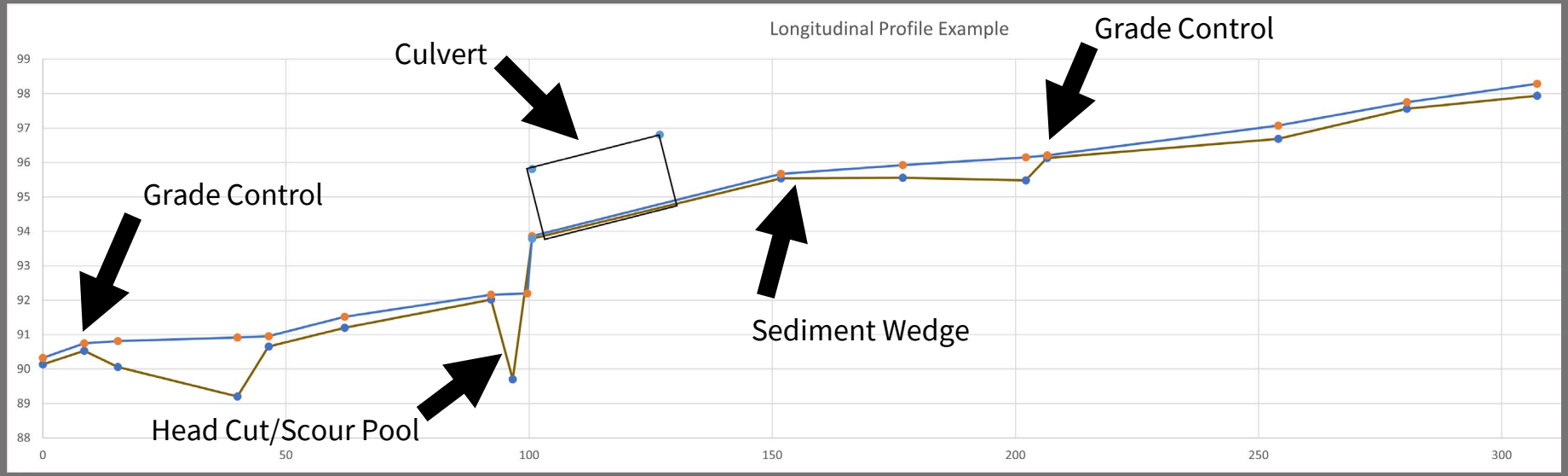
- National Forests in North Carolina
  - Legacy Roads & Trails
  - Requires at least 20% non-federal
- Eastern Brook Trout Joint Venture
  - Fish Habitat Partnership
  - Requires 1:1 non-federal

Non-Federal

- NC Wildlife Commission
- NC Land & Water Fund
- Mainspring Conservation Trust
- Little TN Native Fish Conservation Partnership/TVA
- Dominion Energy Foundation
- Orvis
- TU Chapters

Design

Goal is to identify and repair impacts



Design

- Basic targets for stream ecology
  - Beyond bankfull (≥1.2x)
  - Dry banks along both sides
  - Natural materials filling the entire length
  - Volume to handle major flood events
- USFS Designing for AOP at Road-Stream Crossings
- In house or contracted?

Alarka Design

- Bankfull width ~12’
- Bankfull water depth 1.3’ in riffle, 2.5’ in pool
- Largest pebble 90 mm

Channel Material (mm)	
D16	14.84
D35	29.7
D50	41.3
D84	72.4
D95	85.9
D100	128

Alarka Design

- Structure 1 – 14’x6’ arch
  - Already owned by USFS
  - Raises road 5’ at crossing
  - Requires 494 CY of fill @ $100/CY
- Structure 2 – 15’10” x 3’6” arch
  - Costs $41,000
  - Raises road 2’ at crossing
  - Requires 100 CY of fill @ $100/CY

Alarka Design

- Stream weir rock – 48”x24”x18”
- Streambank rock – 12” – 37”
- Streambed rock

Size (mm)	% Makeup
20	20
38	30
56	20
84	20
110	10

Group Conversation

- Using the guidelines, how wide does the Alarka structure need to be?
- Discuss the benefits of each structure and decide which seems best suited for the site.
- Does the planned rock size fit the project?
- The project is short $40,000. What are some other sources that might exist to help meet this need?

Construction

- Funding can dictate bid process
- Design cannot predict everything
- Project management benefits from partnership
  - Fish removal
  - Hydrologic checkpoints
  - Engineering checkpoints

Alarka Construction

- Just getting started
- Quick bid process
- Bids came back higher than engineer’s estimate
- But I planned for that!

Monitoring

- Increased emphasis
- Multiple aspects to consider
  - Biological
  - Structural

Group Conversation

- What are some potential issues that might impact construction?
- What role does communication and outreach play in a successful project?
- How can project management capacity be increased when many of us feel as though we have a lot to do and no time left to do more?