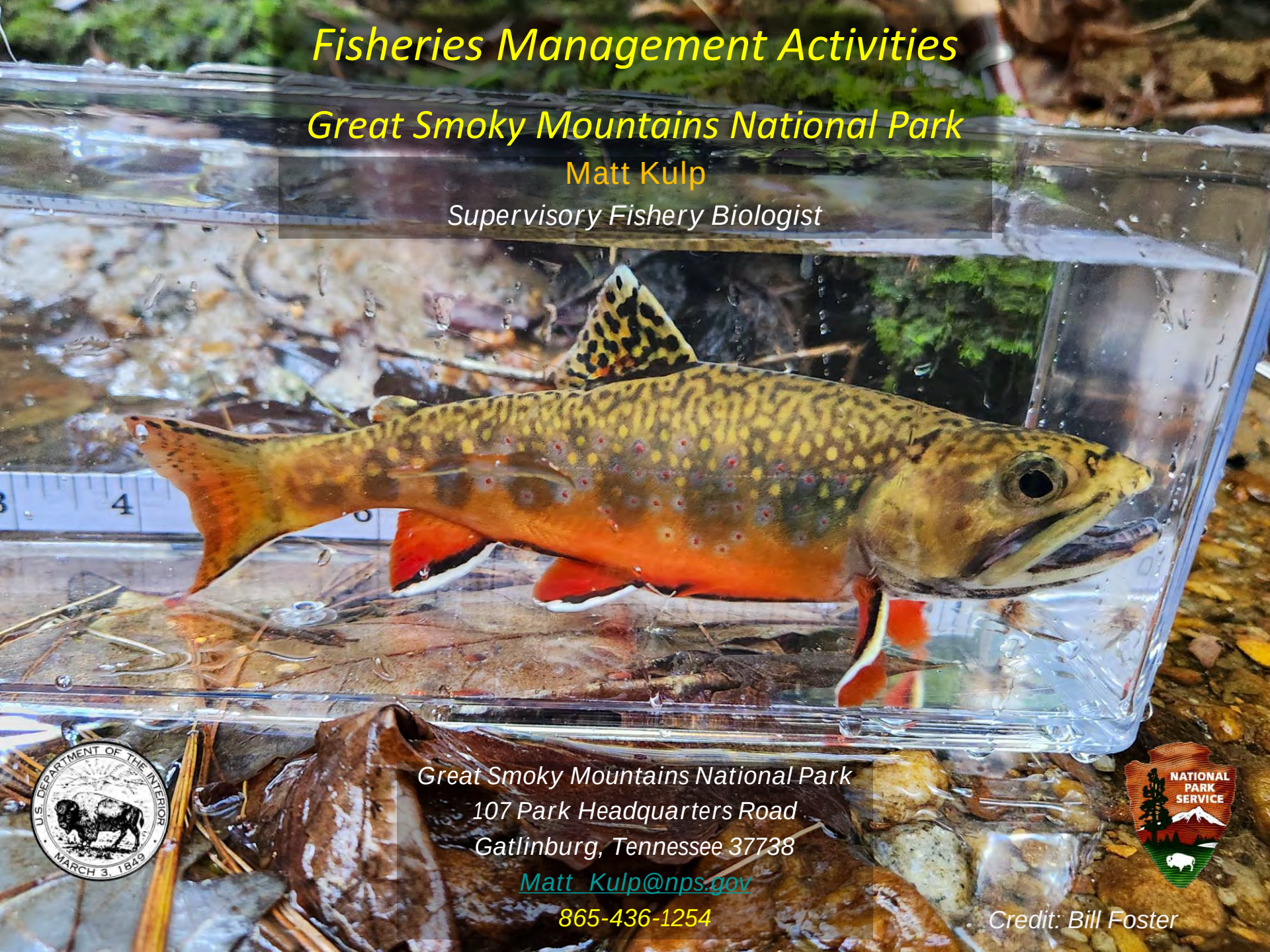
# Fisheries Management Activities

## Great Smoky Mountains National Park

Matt Kulp

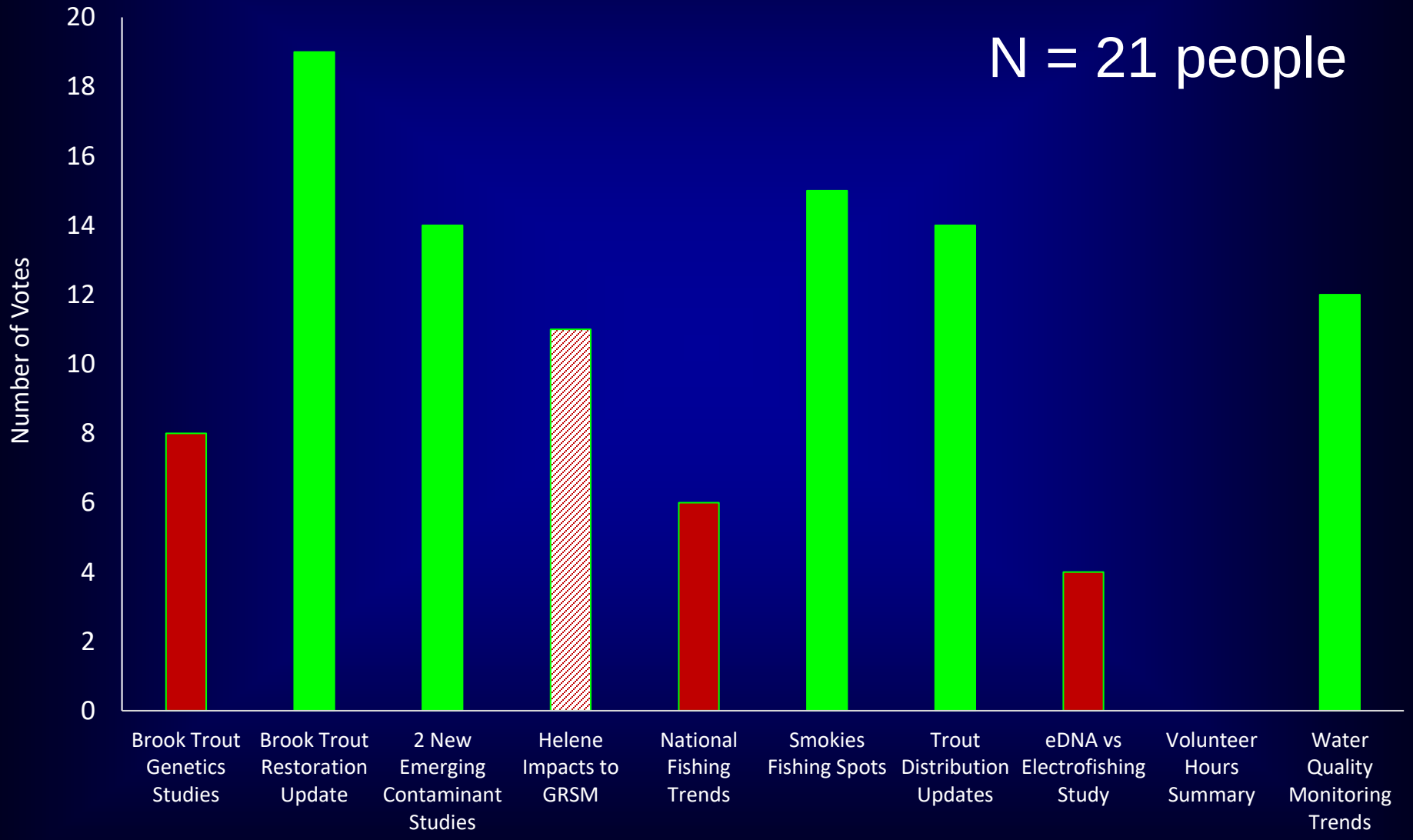
*Supervisory Fishery Biologist*



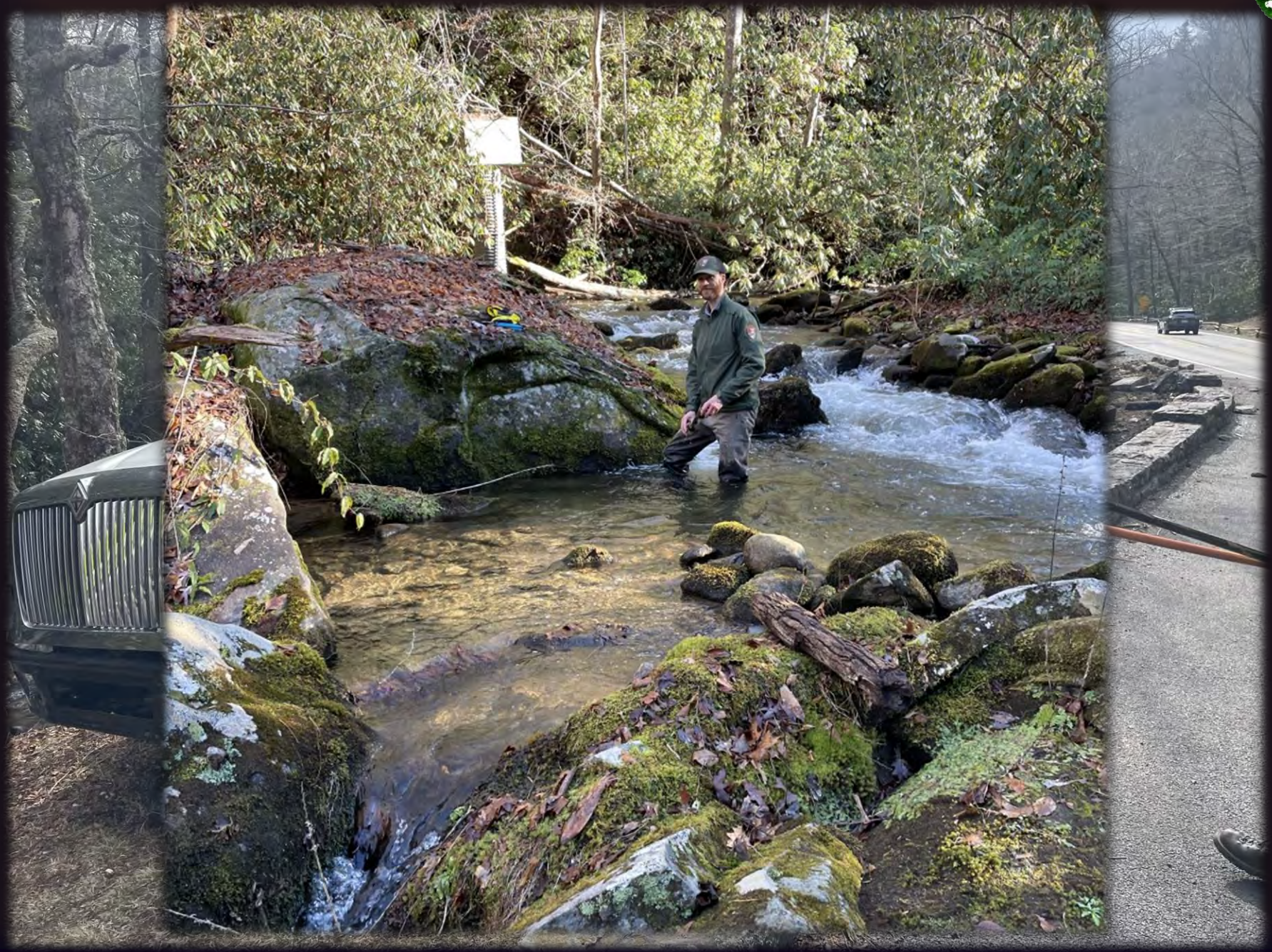
*Great Smoky Mountains National Park*
*107 Park Headquarters Road*
*Gatlinburg, Tennessee 37738*
*Matt_Kulp@nps.gov*
*865-436-1254*

*Credit: Bill Foster*

# What do YOU want to hear about?



# What's a GRSM Fisheries Field Season Looks Like…?



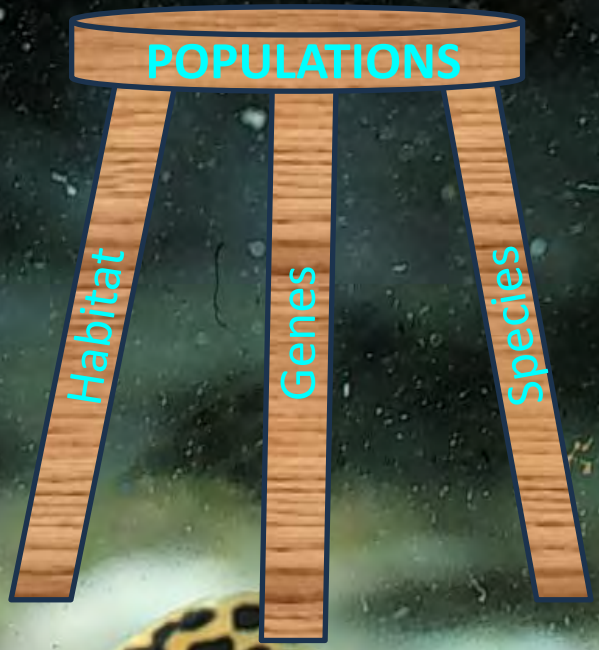


# Brook Trout Genetics Studies

- ✓ 2 studies to report on…

# WHY DO WE CARE?

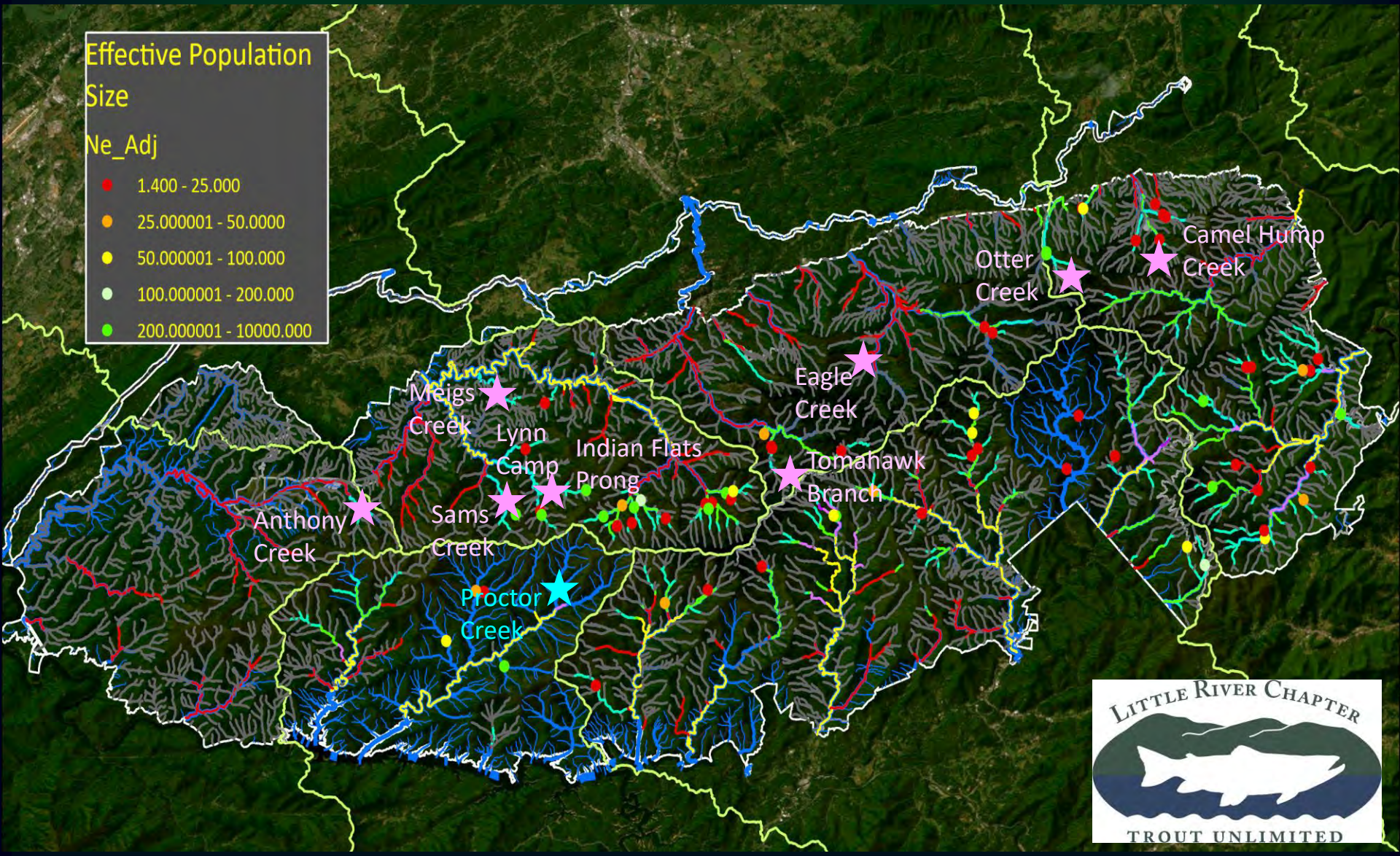


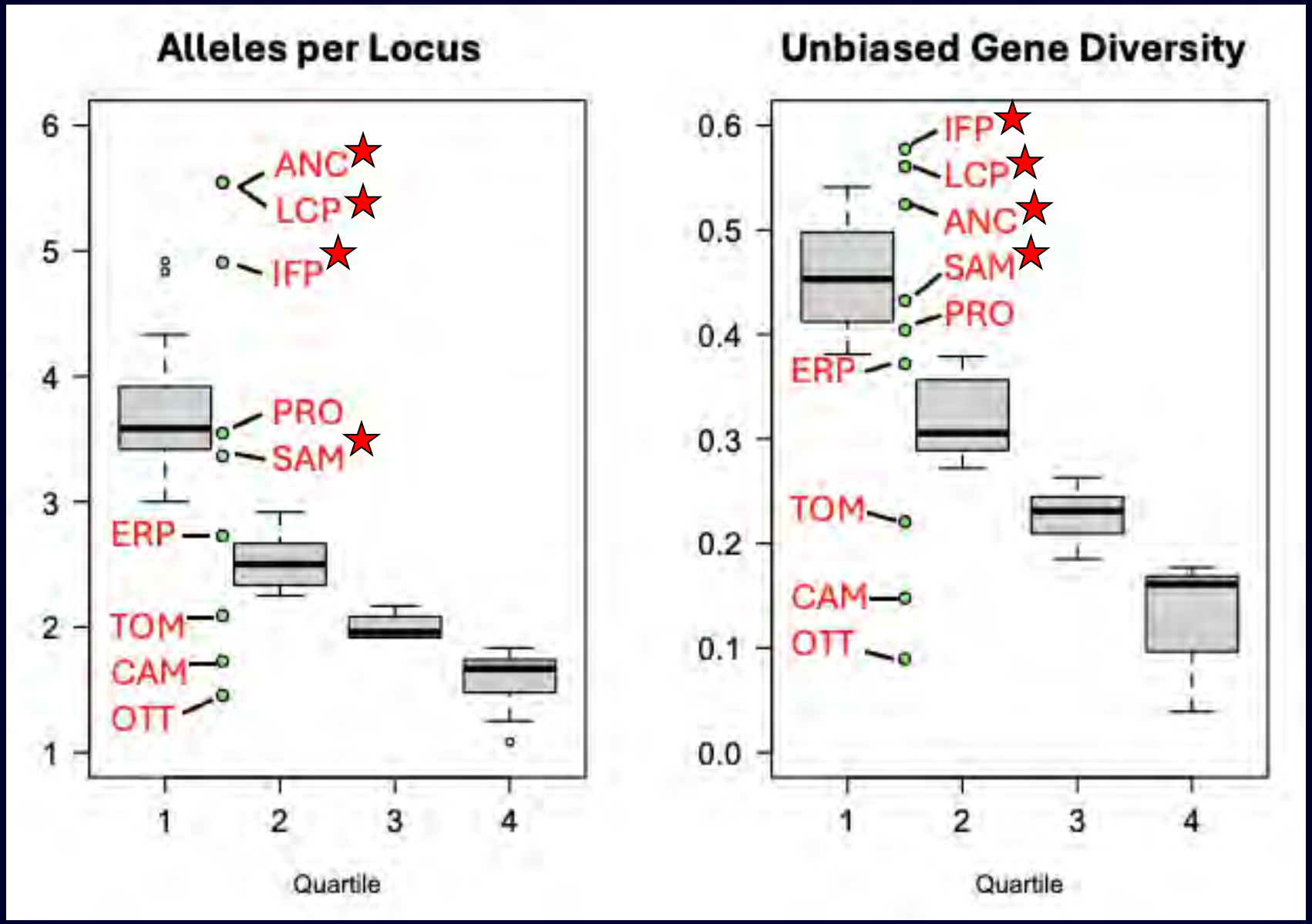



*From Allendorf and Luikart 2007*

## *2024-2025 TU License Plate Grant*

- LRTU/TN TU Council grant funded collection (2023-2024) and analyses (2024-2025) of 8 remaining sites in TN

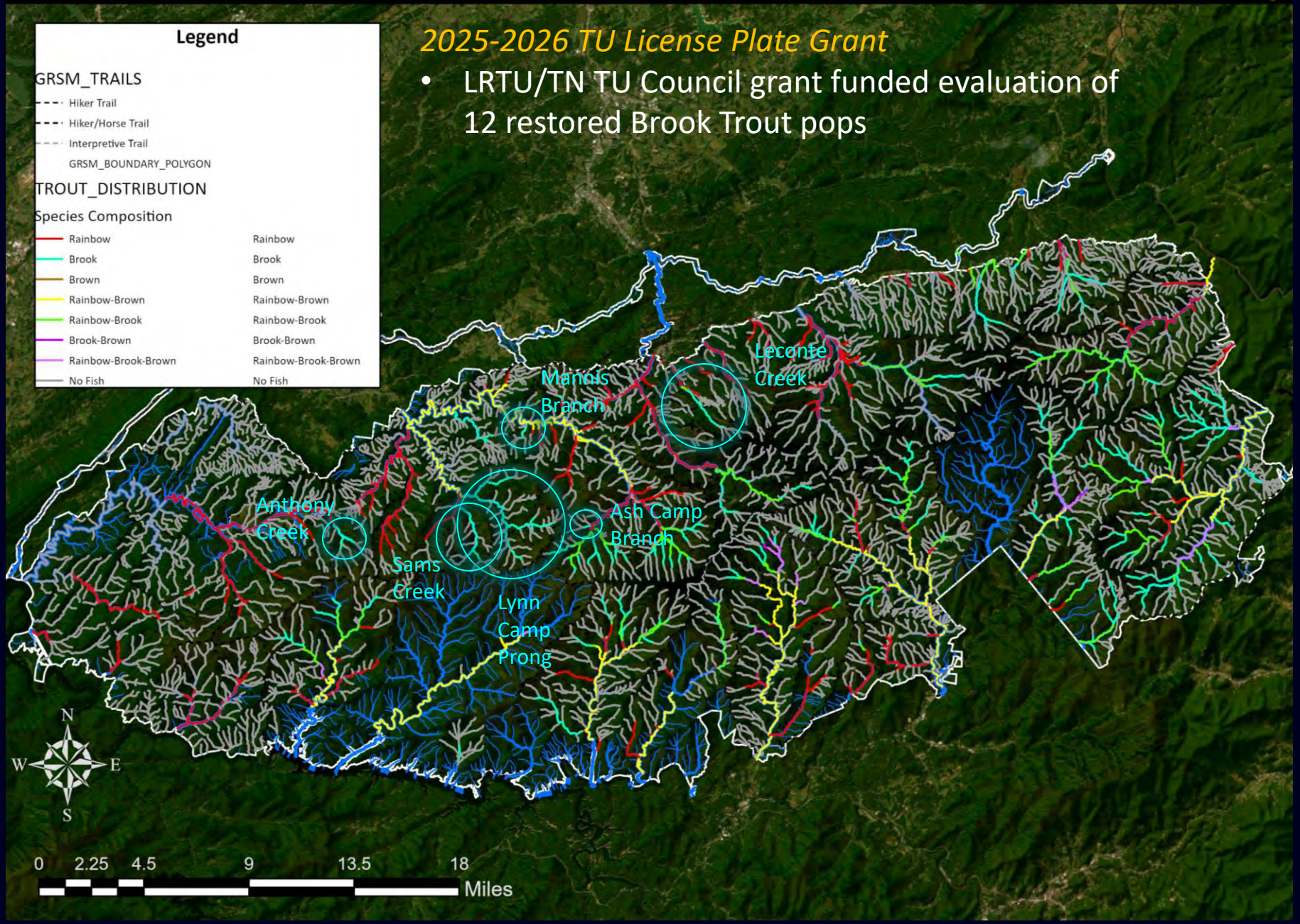



Alleles per Locus
6
5
4
3
2
1
ANC
LCP
IFP
PRO
SAM
ERP
TOM
CAM
OTT
1
2
3
4
Quartile
Unbiased Gene Diversity
0.6
0.5
0.4
0.3
0.2
0.1
0.0
IFP
LCP
ANC
SAM
PRO
ERP
TOM
CAM
OTT
1
2
3
4
Quartile

Great Smoky Mountains National Park
Tennessee - North Carolina

# Great Smoky Mountains National Park Trout Distribution

National Park Service
U.S. Department of the Interior



## *2025-2026 TU License Plate Grant*

- Study Streams

| Restored Stream | Agency | Year Restored | Years Since Restored | Restoration Type | Number of Source Stocks | Number Translocated | Restored Length (km) | BKT per km |
|---|---|---|---|---|---|---|---|---|
| Anthony Creek | NPS | 2017 | 8 | Multiple Pass E-Fish | 4 | 801 | 3.20 | 250 |
| Ash Camp Branch | NPS | 2000 | 25 | Multiple Pass E-Fish | 1 | 75 | 0.86 | 87 |
| Leconte Creek | NPS | 2000 | 25 | Multiple Pass E-Fish | 3 | 320 | 2.80 | 114 |
| Lynn Camp Prong | NPS | 2008 | 17 | Antimycin | 10 | 3,339 | 16.32 | 205 |
| Mannis Branch | NPS | 1996 | 29 | Multiple Pass E-Fish | 2 | 217 | 1.60 | 136 |
| Sams Creek | NPS | 2001 | 24 | Antimycin | 6 | 480 | 4.80 | 100 |
| Left Fork Hampton Creek | TWRA | 1999 | 26 | Translocation | 3 | 273 | 2.00 | 137 |
| Little Stoney Creek | TWRA | 2014 | 11 | Hatchery Stocked | 1 | 152 | 2.30 | 60 |
| Little Jacob Creek | TWRA | 2000 | 25 | Translocation | 3 | 294 | 3.10 | 95 |
| Sycamore Creek | TWRA | 1992 | 32 | Translocation & Hatchery | 3 | 328 | 3.70 | 89 |
| Norton Creek | TWRA | 2021 | 4 | Translocation | 3 | 293 | 2.00 | 147 |
| Green Mountain Branch | TWRA | 2020 | 5 | Translocation | 3 | 89 | 2.40 | 37 |



*2025-2026 TU License Plate Grant*

- LRTU and other chapters to help collect fin clips from 12 restored Brook Trout pops and source stocks

# Brook Trout Restoration Update

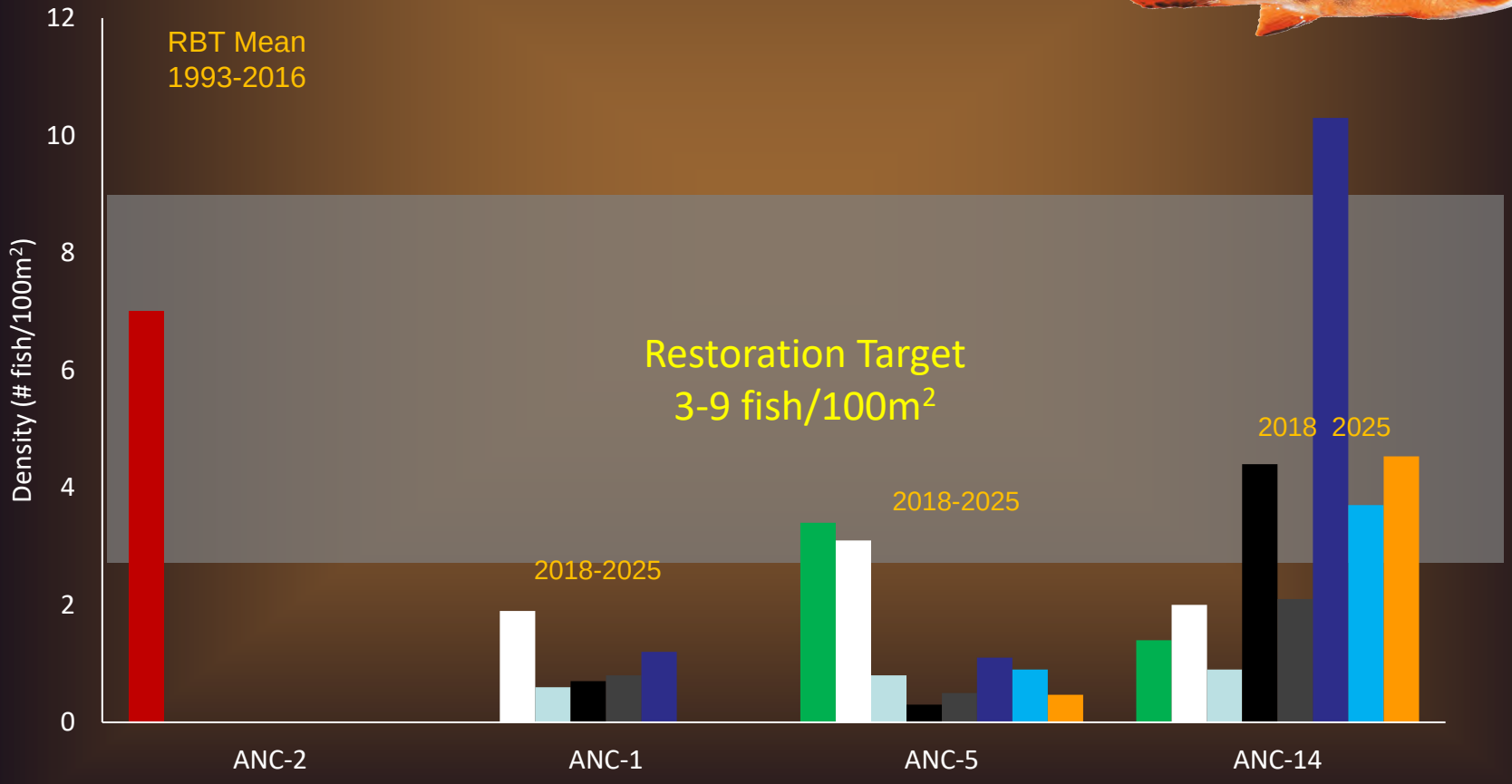


Moore Springs Branch Cascades

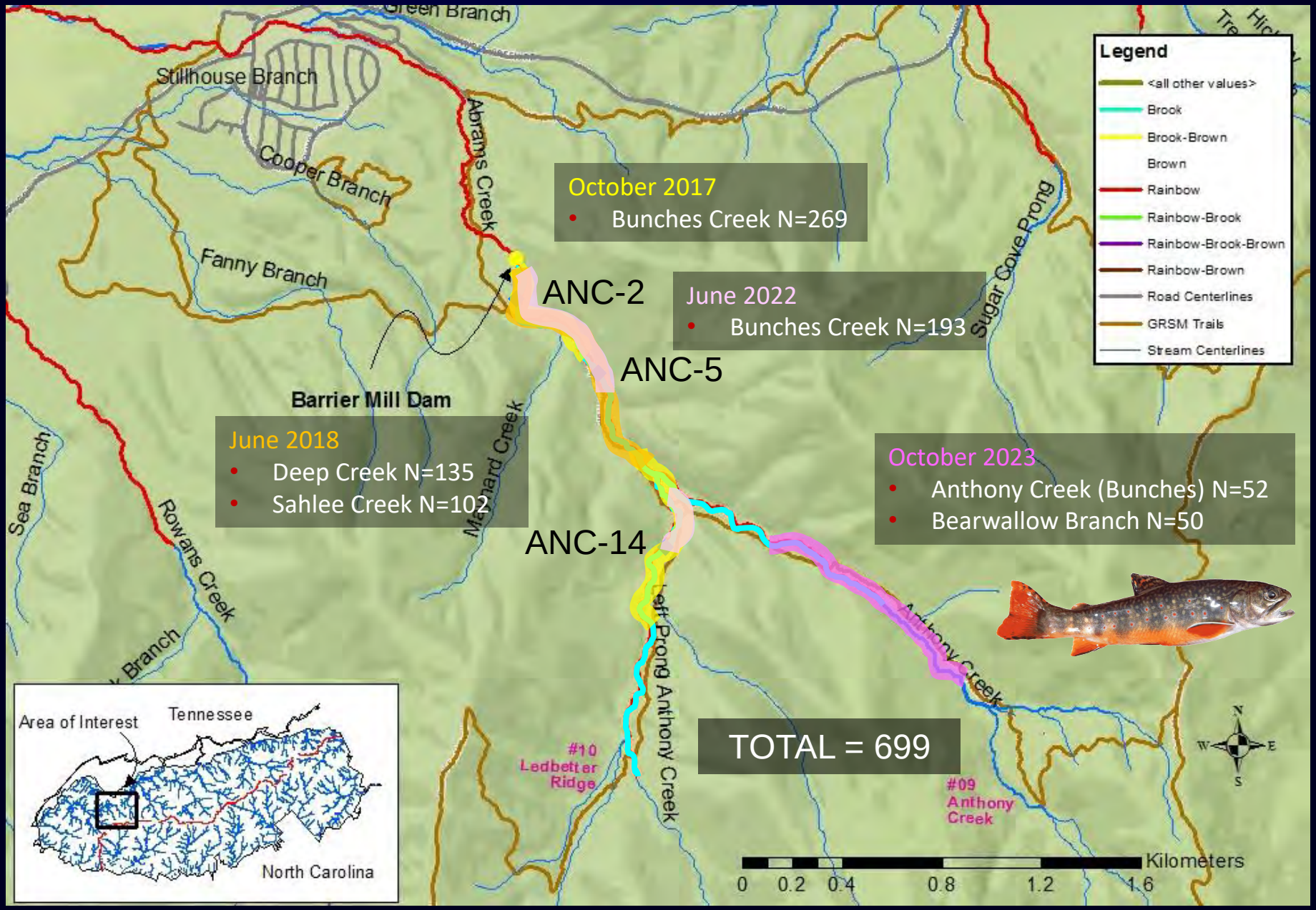
# *Brook Trout Restoration* – *Anthony Creek*

- Removed 2,284 RBT from 2.8 km in 2016 and 2017 (1.63 miles)
- Translocated 699 Brook Trout from 4 source stocks between 2018-2023
  - ✓ *Used most genetically robust population (Bunches Creek)*
  - ✓ *May be better adapted to higher summer temps*





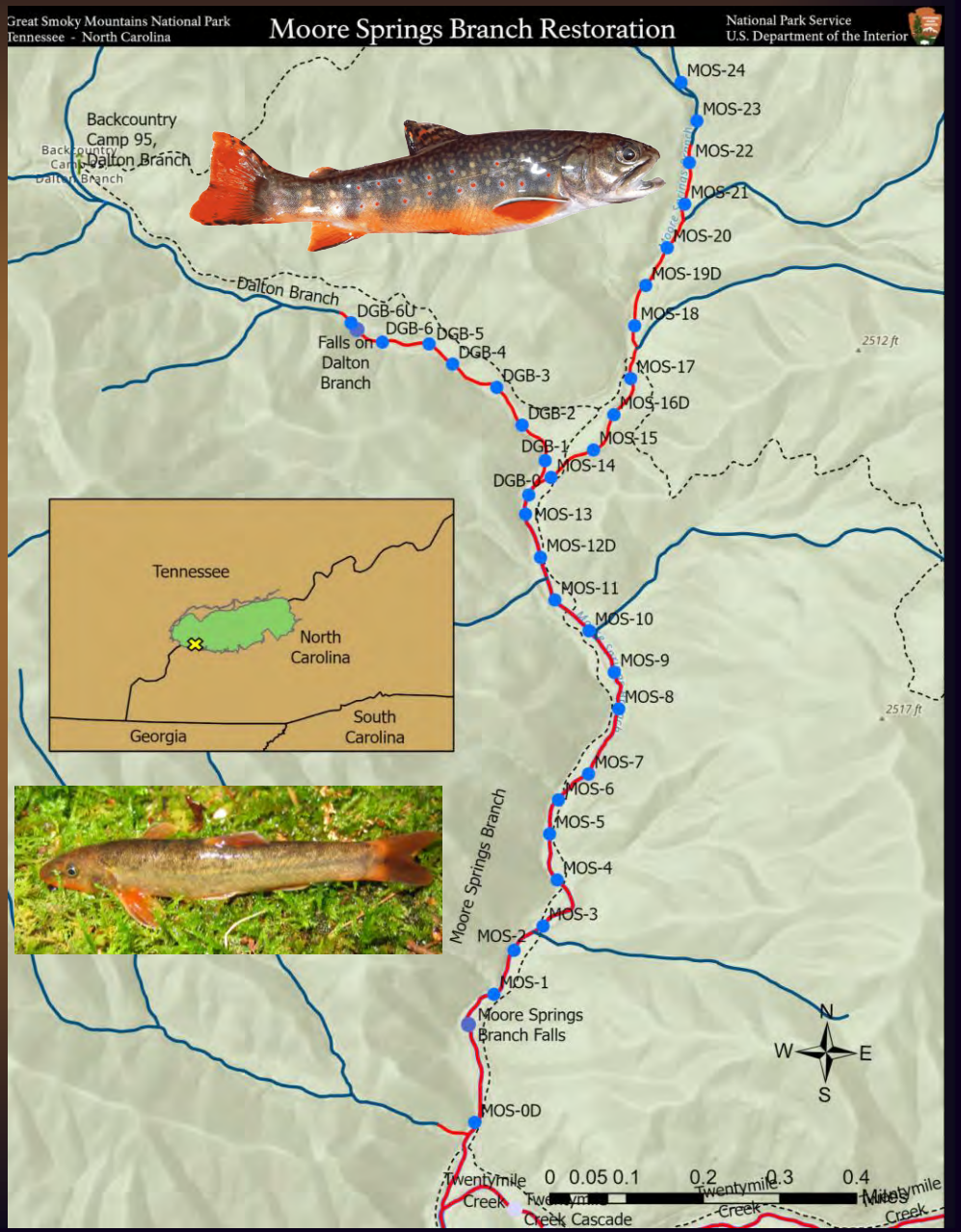
# *Brook Trout Restoration* – *Anthony Creek*



# *Brook Trout Restoration* – *Moore Springs Branch*

- Purpose: Restore Brook Trout to 3.8 km (2.4 miles) of Moore Springs Branch
- Use fish piscicide antimycin to remove the non-native Rainbow Trout (*2027*)
  - ✓ *Longnose Dace temporarily moved out of stream during treatment*
- Translocate roughly 600 Brook Trout (160 fish/km) from 3-4 genetically pure source stocks within the Little TN River system over two years (2026-2027)
- Pretreatment electrofishing will continue to establish recovery goals

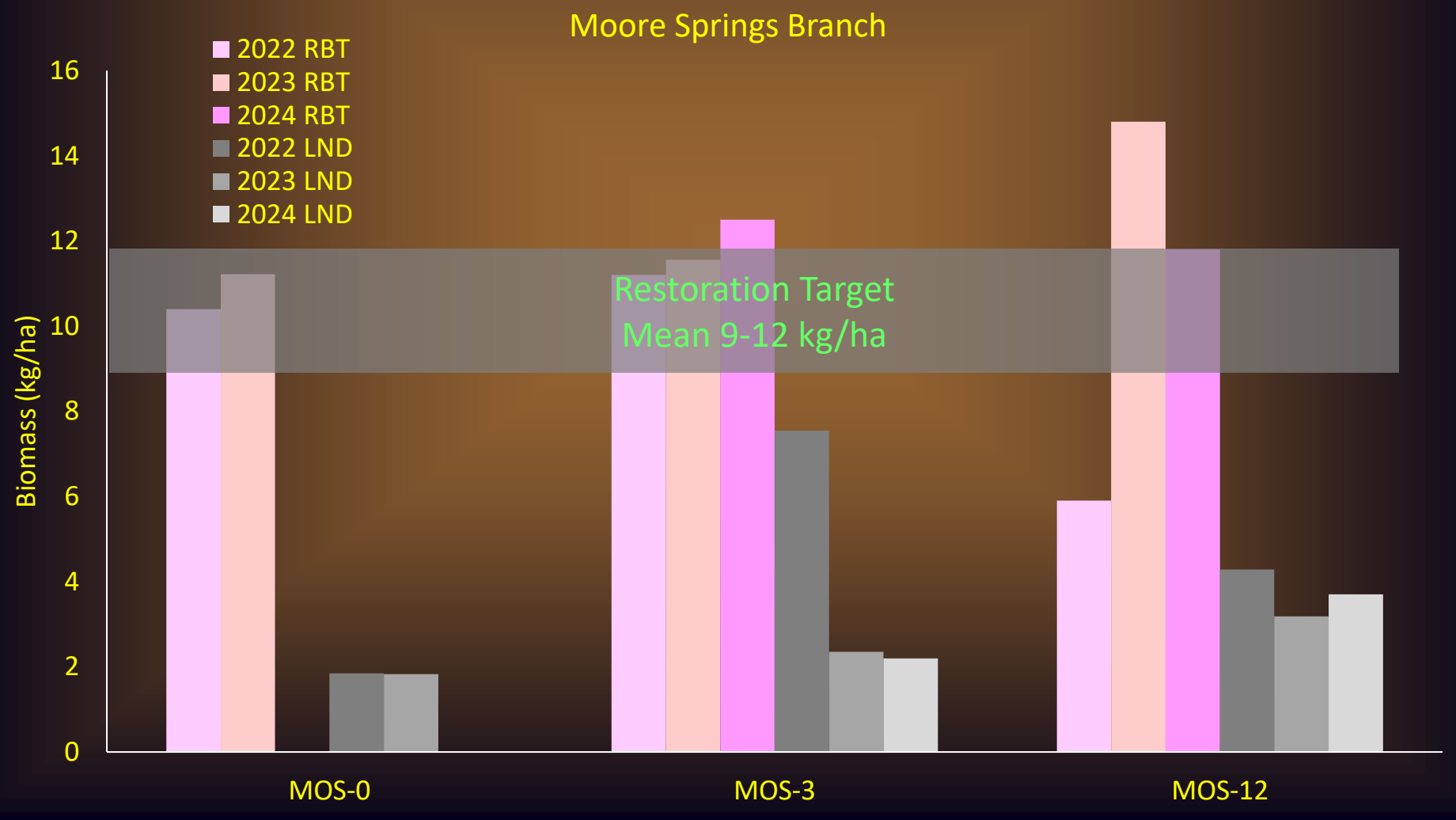




# *Brook Trout Restoration* – *Moore Springs Branch*

- Rainbow Trout biomass ranged from 5.9-14.8 kg/ha
  - ✓ *Used most genetically robust populations (Bunches Creek)*
- Longnose Dace biomass ranged from 1.8-7.5 kg/ha
  - ✓ *Will be moved to Twentymile Creek during treatment*





# Great Smoky Mountains National Park
# Brook Trout Restoration Summary

| Number | Stream | Year Finished | Method | Proposed (mi) | Restored (mi) | Restored (km) |
|---|---|---|---|---|---|---|
| 1 | Taywa Creek | 1981 | Annual Electro | 0.60 | 0.60 | 0.96 |
| 2 | Silers Creek | 1981 | Annual Electro | 0.69 | 0.69 | 1.10 |
| 3 | Lost Bottom Creek | 1995 | Annual Electro | 2.38 | 2.38 | 3.81 |
| 4 | Mannis Branch | 1997 | Multiple Electro | 0.60 | 1.00 | 1.60 |
| 5 | Leconte Creek | 1999 | Multiple Electro | 1.69 | 1.69 | 2.70 |
| 6 | Pilkey Creek | 1999 | No Fish | 0.75 | 0.75 | 1.20 |
| 7 | Ash Camp Branch | 2000 | Multiple Electro | 0.54 | 0.54 | 0.86 |
| 8 | Winding Stair Branch | 2001 | Multiple Electro | 1.00 | 1.00 | 1.60 |
| 9 | Sams Creek | 2001 | Antimycin | 3.00 | 3.00 | 4.80 |
| 10 | Bear Creek | 2003 | Antimycin | 3.50 | 3.50 | 5.60 |
| 11 | Slab Camp Creek | | | 1.00 | | |
| 12 | Desolation Creek | | | 2.00 | | |
| 13 | Lynn Camp Prong | 2005 | Antimycin | 8.50 | 10.20 | 16.32 |
| 14 | Meigs Post | | | 0.50 | | |
| 15 | Indian Creek | | | 6.00 | | |
| 16 | Cannon Creek | | | 1.20 | | |
| 17 | Lowes Creek | | | 1.00 | | |
| 18 | MP Little Pigeon | | | 2.50 | | |
| 19 | Little Cataloochee | 2017 | Antimycin | 4.00 | 3.00 | 4.80 |
| 20 | Jonas Creek | | | 2.30 | | |
| 21 | Anthony Creek | 2017 | Multiple Electro | 2.00 | 2.00 | 3.20 |
| 22 | Moore Springs Branch | | Antimycin | 2.40 | | |
| 23 | (6) NC Tribs | | Translocation | 6.40 | 6.40 | 10.24 |
| | | | | 54.55 | 36.65* | 58.79 |

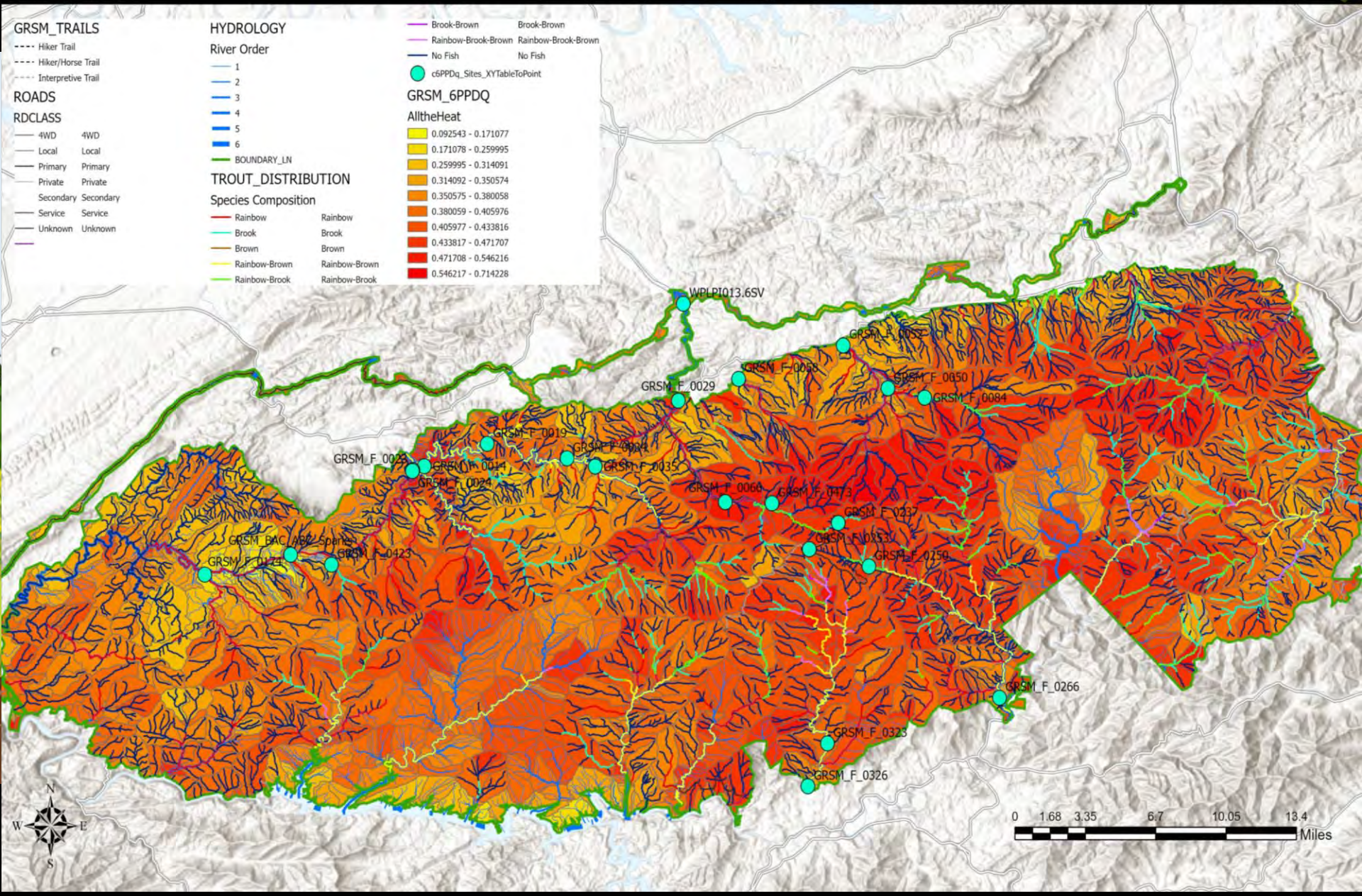
* 66% of Populations Restored

# Emerging Contaminants Study #1 - Tire Wear - 6PPD

Great Smoky Mountains National Park
Tennessee - North Carolina

## 6 PPD-q Proposed Sampling Sites

National Park Service
U.S. Department of the Interior



# Emerging Contaminants Study #2 – Imidacloprid in Streams




USGS Emerging Contaminant Scoping Study

- 2019 scoping study at 16 sites (6 NC, 10 TN)
- Assessed 218 pesticides & 110 pharmaceuticals
- Neonictinoid imidacloprid found in 50% of sites
- Imidacloprid concentrations in 8 sites indicated *"moderate to high"* chronic risks to invertebrates

TROUT DISTRIBUTION



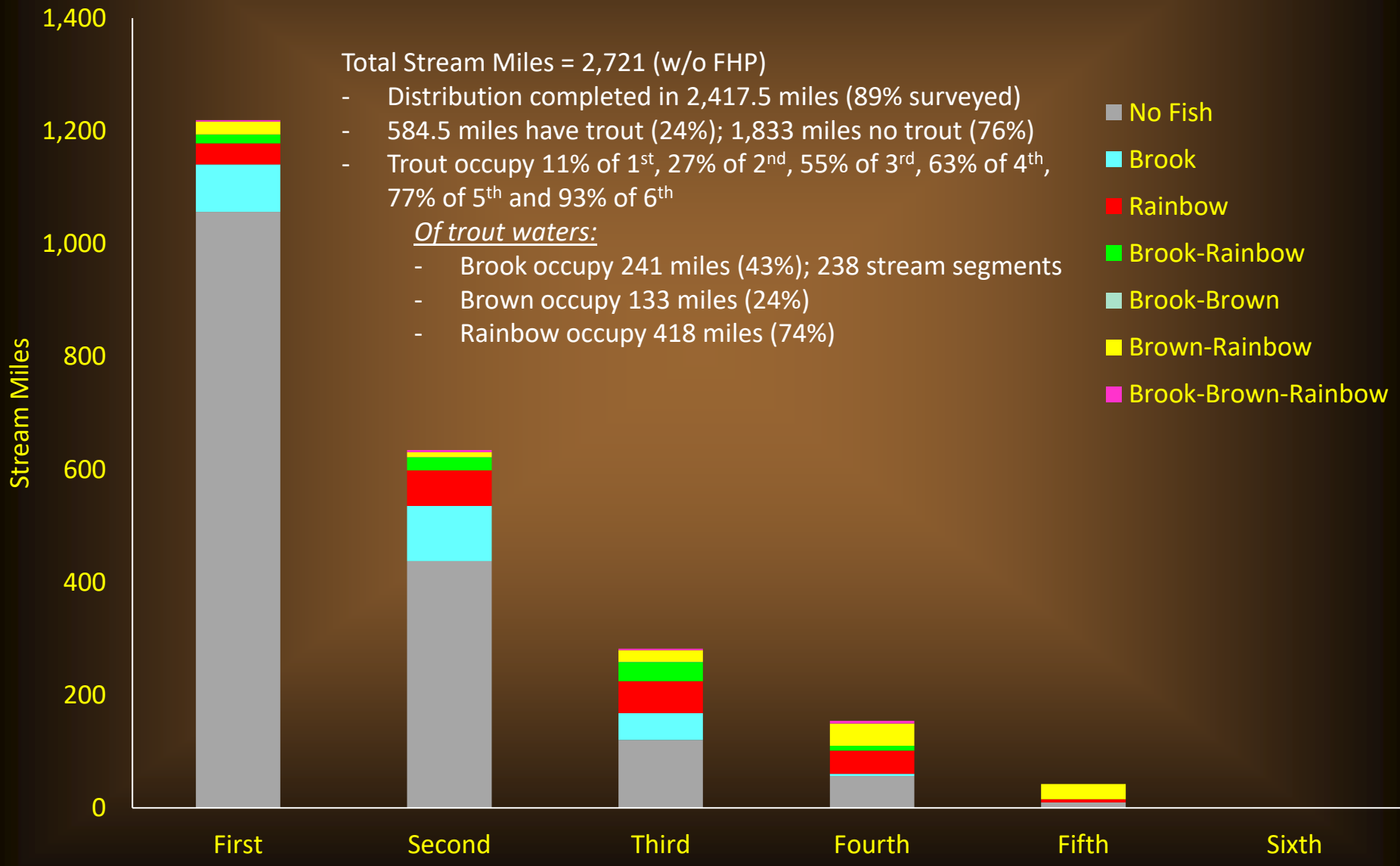
UPDATES

# *Trout Distribution Surveys – 9 Watersheds to Go!*

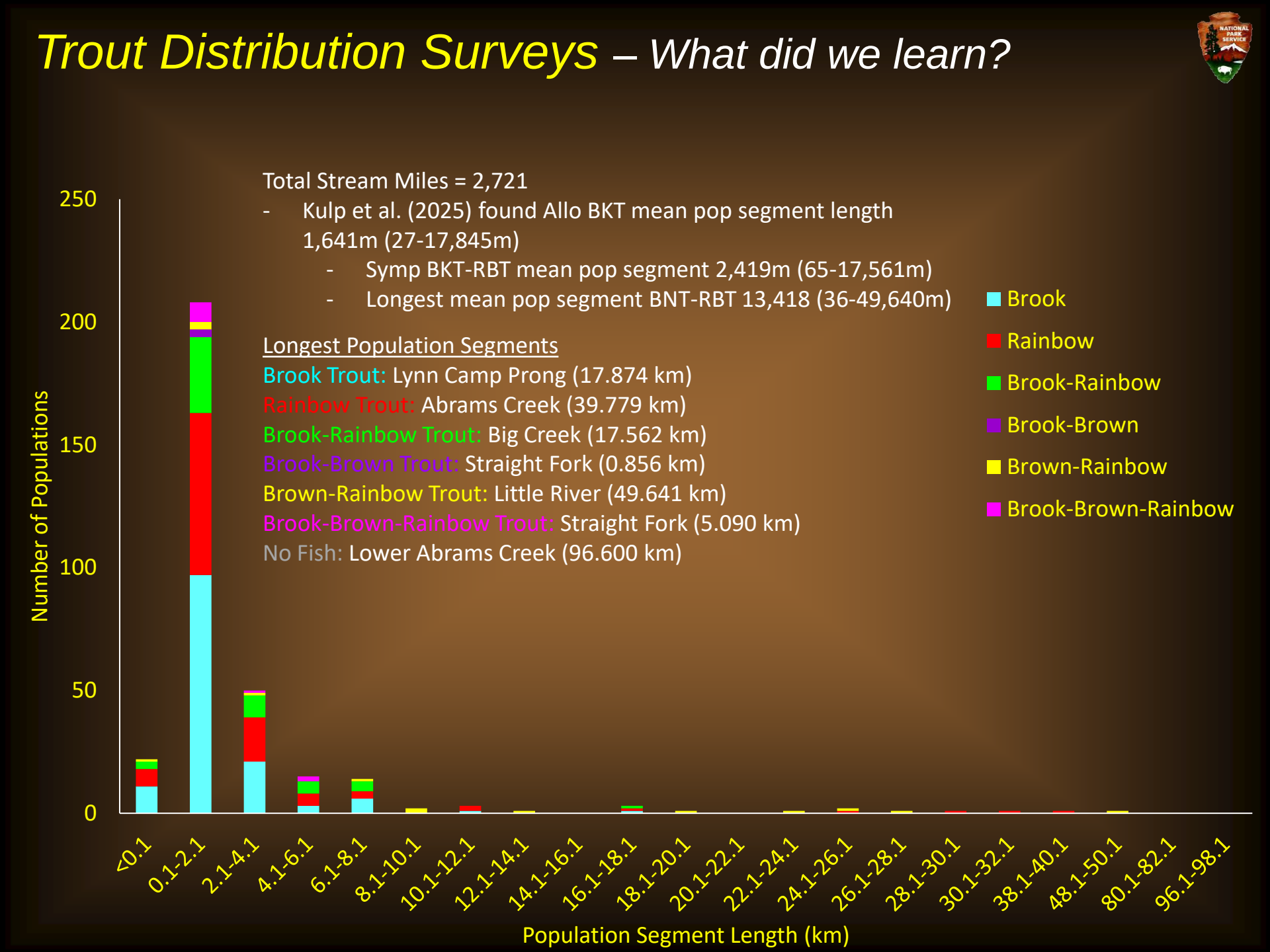


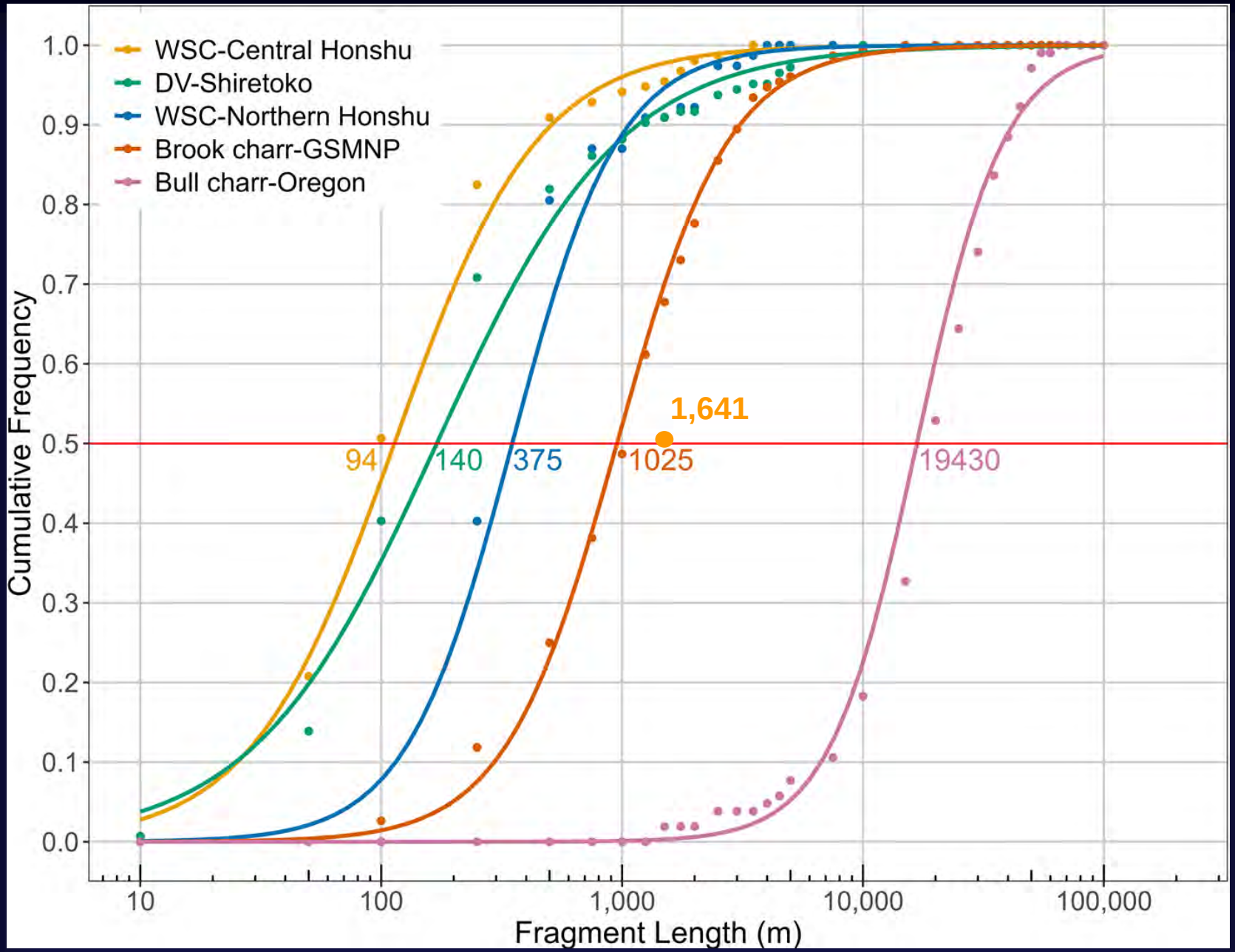

https://www.arcgis.com/apps/mapviewer/index.html?layers=17c641042aa0464cb83e2291195687fd

# *Trout Distribution Surveys – What did we learn?*



# *Trout Distribution Surveys – What did we learn?*






Fausch, K.D., Morita, K., Tsuboi, J.I., Kanno, Y., Yamamoto, S., Kishi, D., Dunham, J.B., Koizumi, I., Hasegawa, K., Inoue, M. and Sato, T., 2024. The past, present, and a future for native charr in Japan. Ichthyological Research: 1-25.

# *Brook Trout Distribution – 11% of Watersheds to Go!*

Goals for 2026 – 2027

- Complete 11% of remaining watersheds by seasonals, interns and volunteers
- Hazel Creek (portions), Raven Fork, Chambers Creek, Stillwell Creek





# *Water Quality Monitoring – Better or Worse 1993-2024*





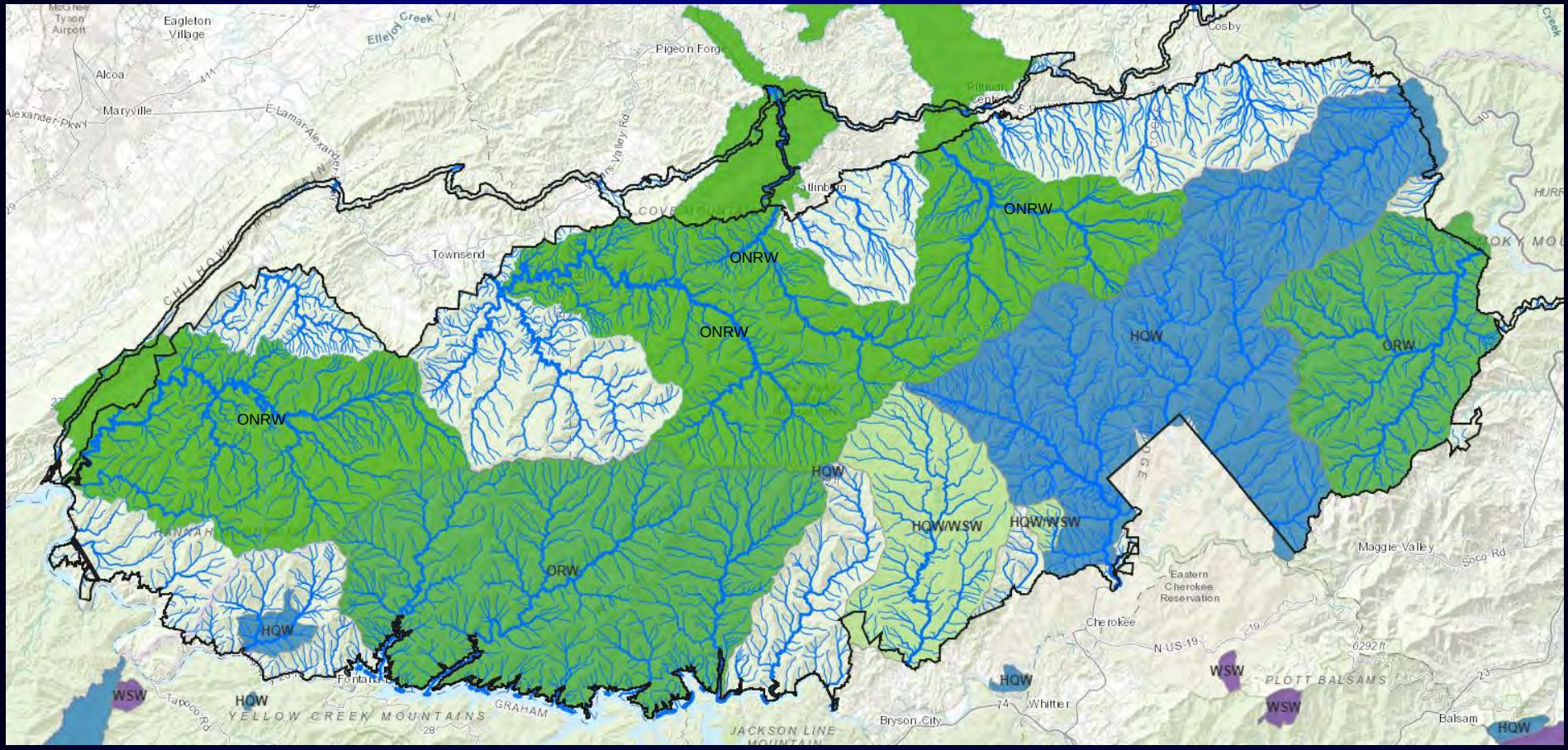


# Water Resource Designations and Uses

***ONRW's and ORW's:***

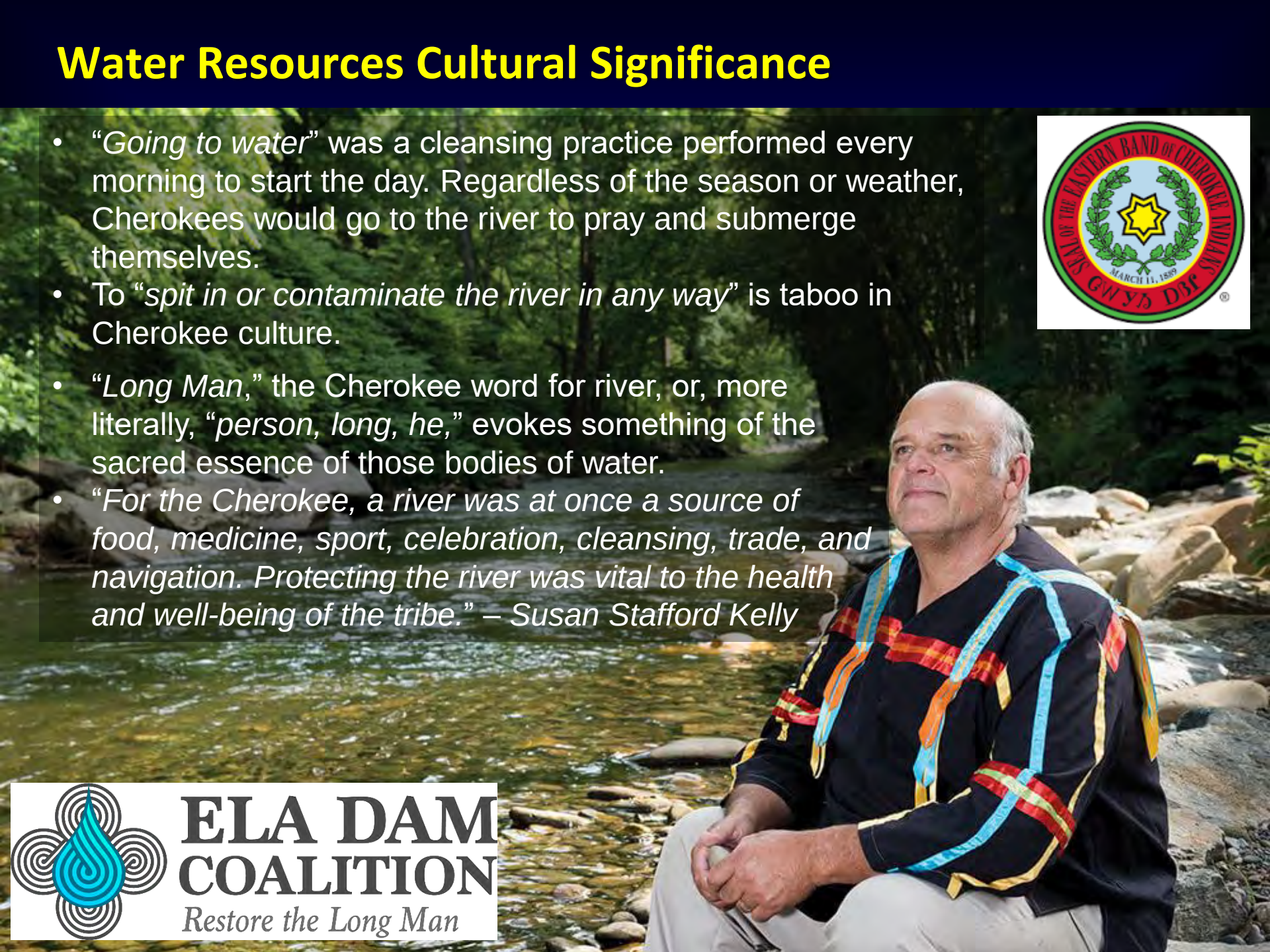
NC – Eagle Creek, Hazel Creek, Forney Creek and all streams in between, Cataloochee Creek

TN – Abrams Creek, East Prong Little River, Middle Prong Little Pigeon, West Prong Little Pigeon



# Water Resources Cultural Significance

- "*Going to water*" was a cleansing practice performed every morning to start the day. Regardless of the season or weather, Cherokees would go to the river to pray and submerge themselves.
- To "*spit in or contaminate the river in any way*" is taboo in Cherokee culture.
- "*Long Man*," the Cherokee word for river, or, more literally, "*person, long, he,*" evokes something of the sacred essence of those bodies of water.
- "*For the Cherokee, a river was at once a source of food, medicine, sport, celebration, cleansing, trade, and navigation. Protecting the river was vital to the health and well-being of the tribe.*" – *Susan Stafford Kelly*

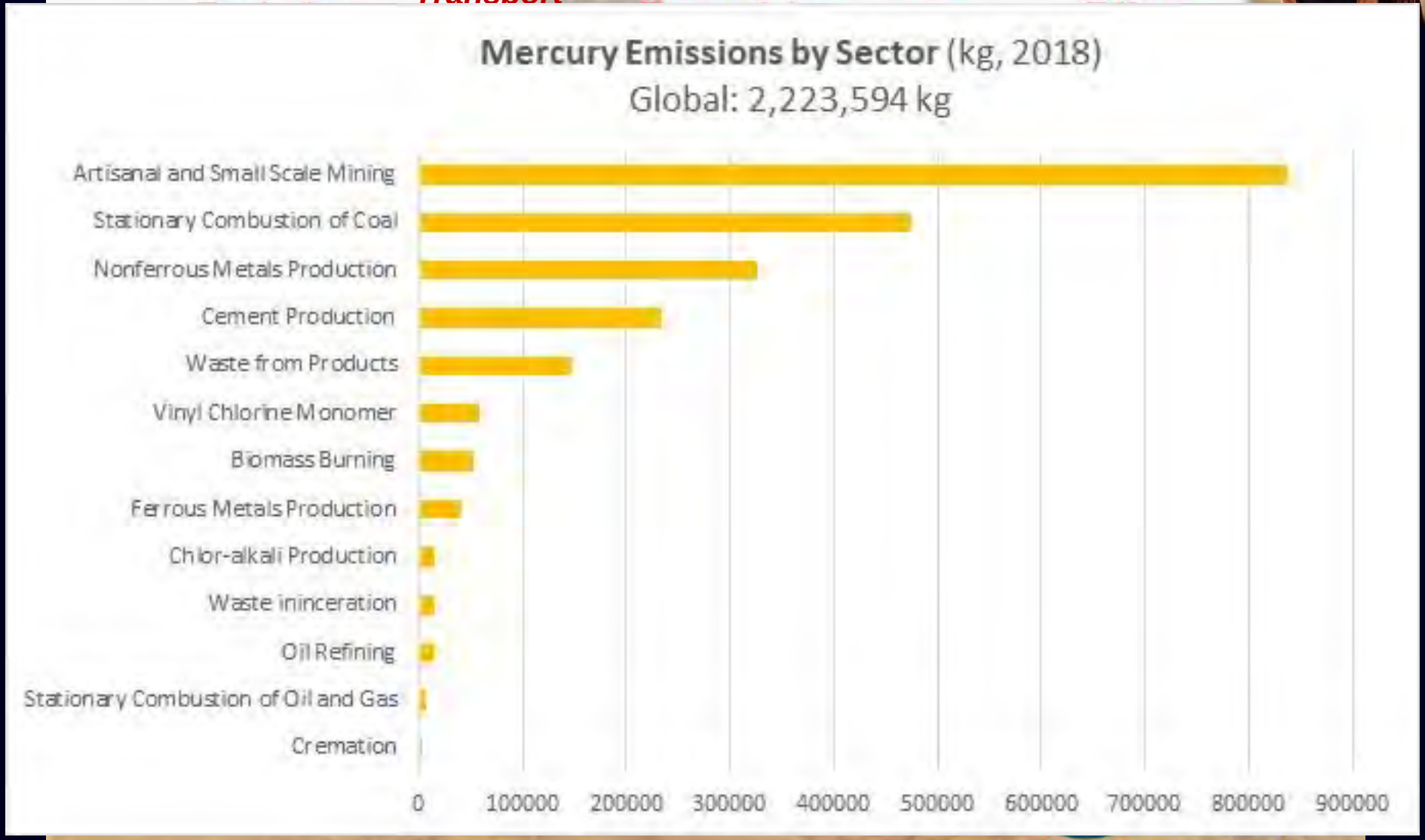


ELA DAM COALITION
Restore the Long Man

# *Acid Rain 1980's-Present? – The Good, the Bad & the Ugly!*

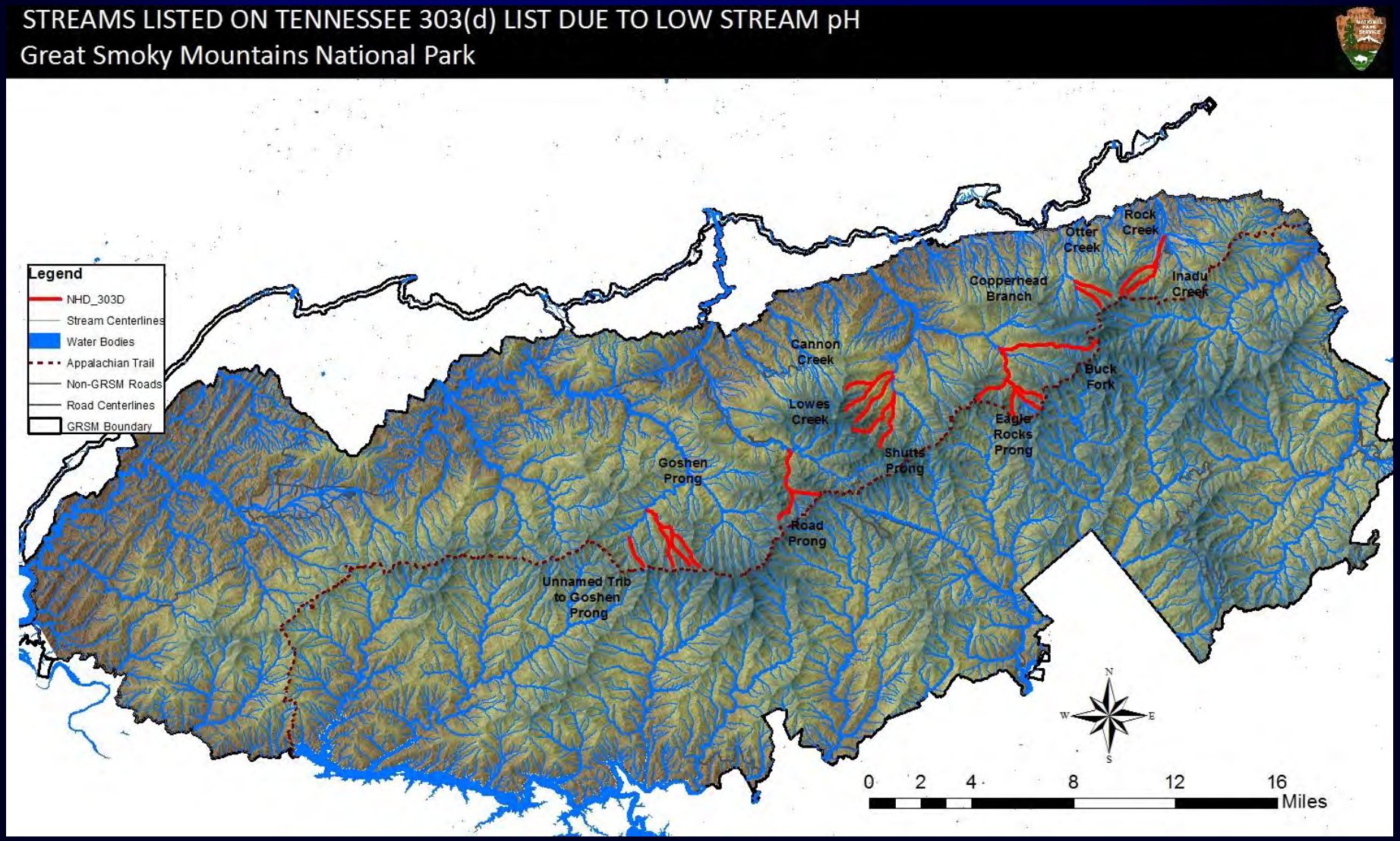


Transport



# *GRSM Impaired Streams – Where Are They?*

- 12 TN streams totaling 41.6 miles listed on 303(d) list in 2006

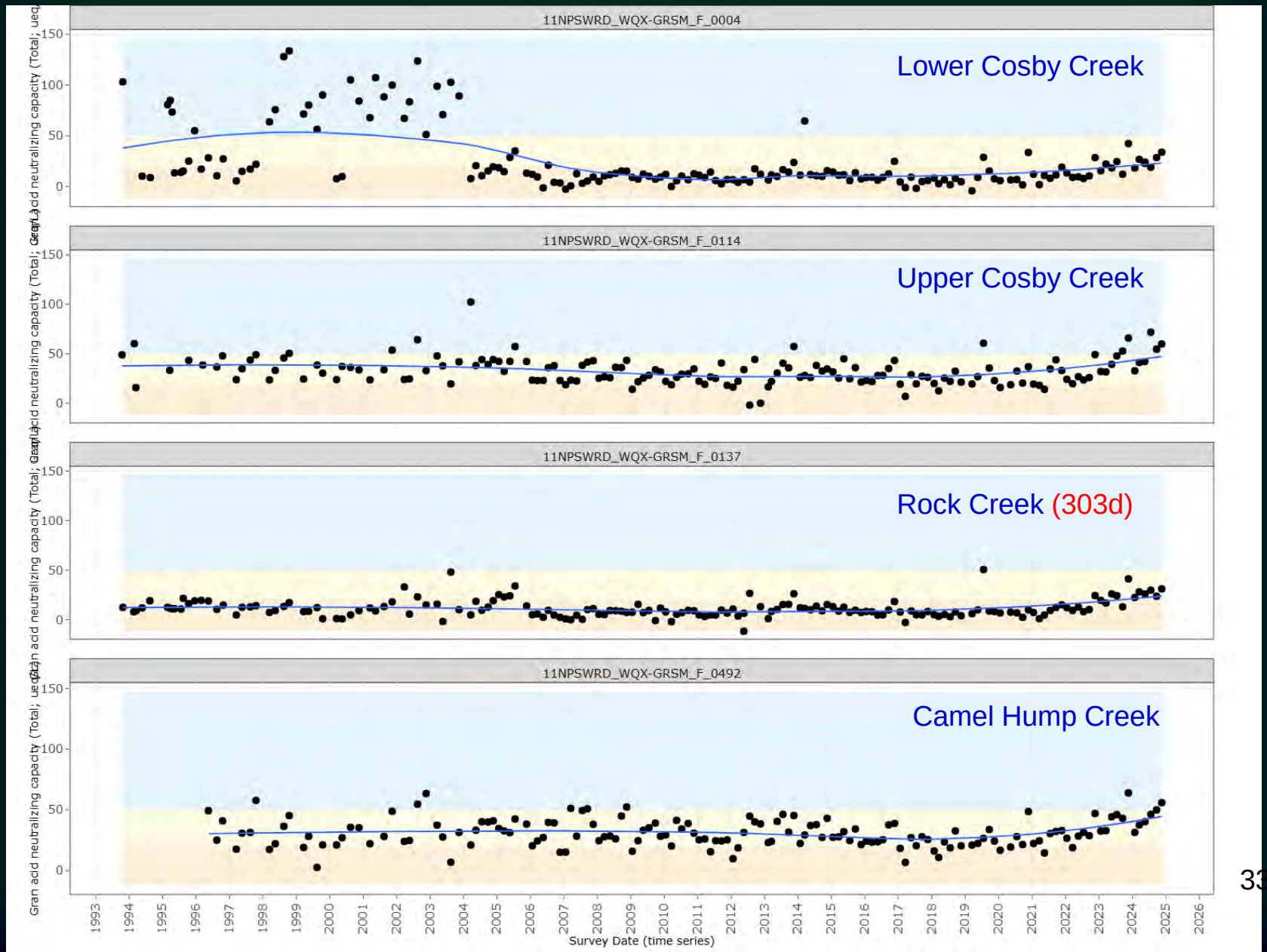


# *Acid Deposition* – *Parkwide Water Quality Monitoring*

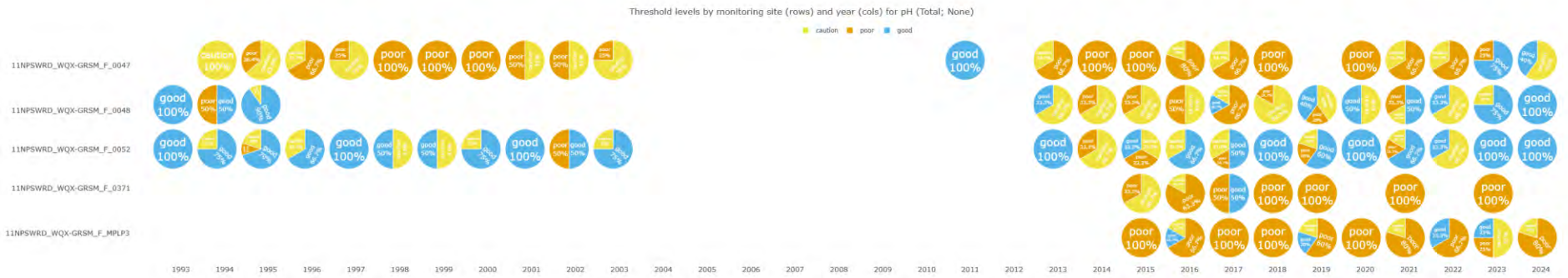


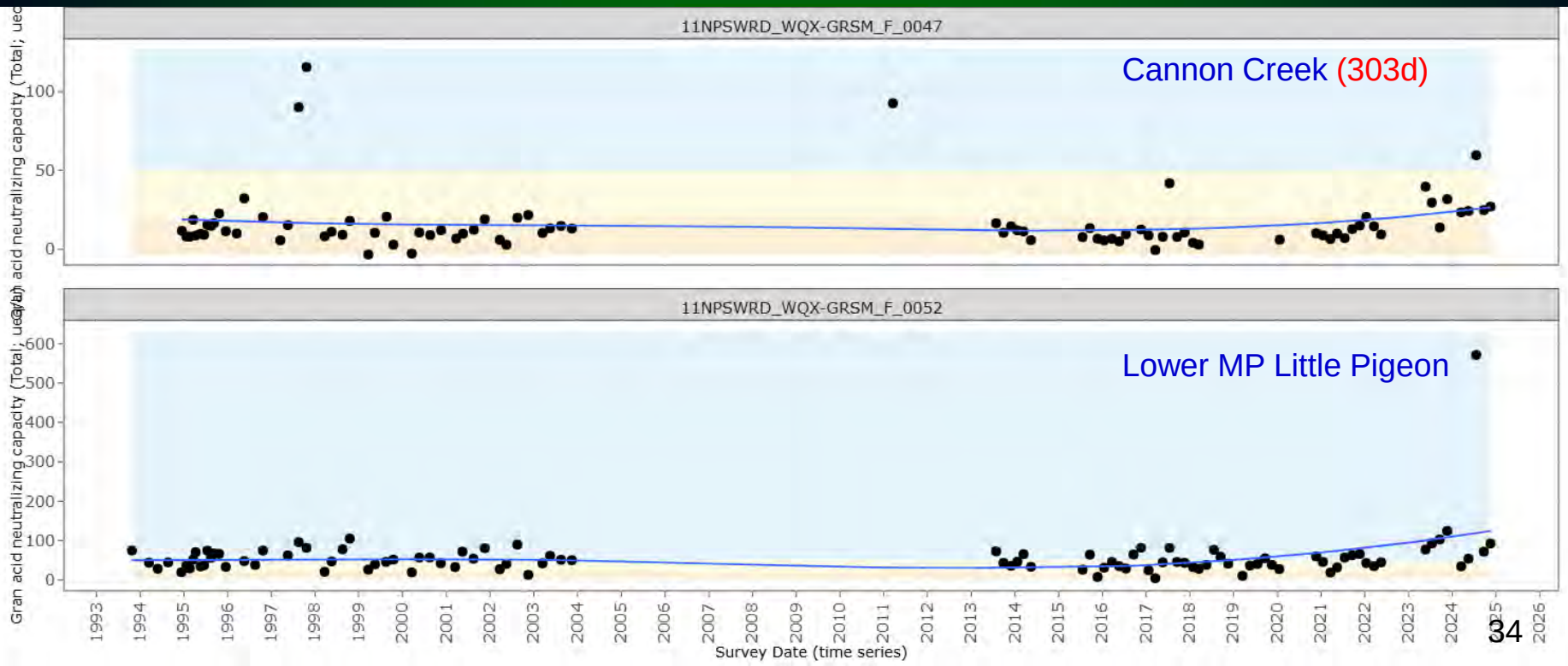


# *Water Quality Monitoring* – *Getting Better!!!*

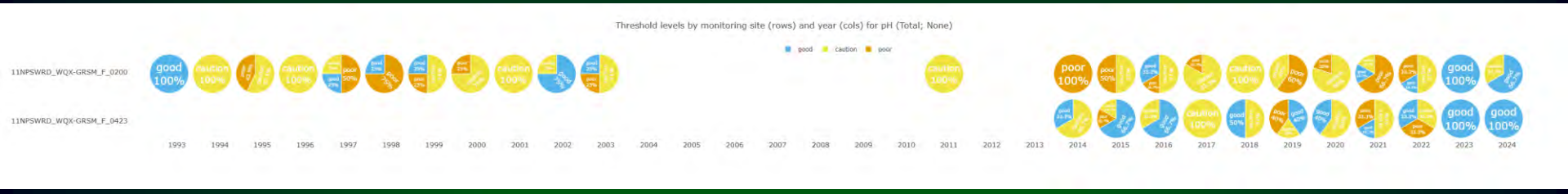


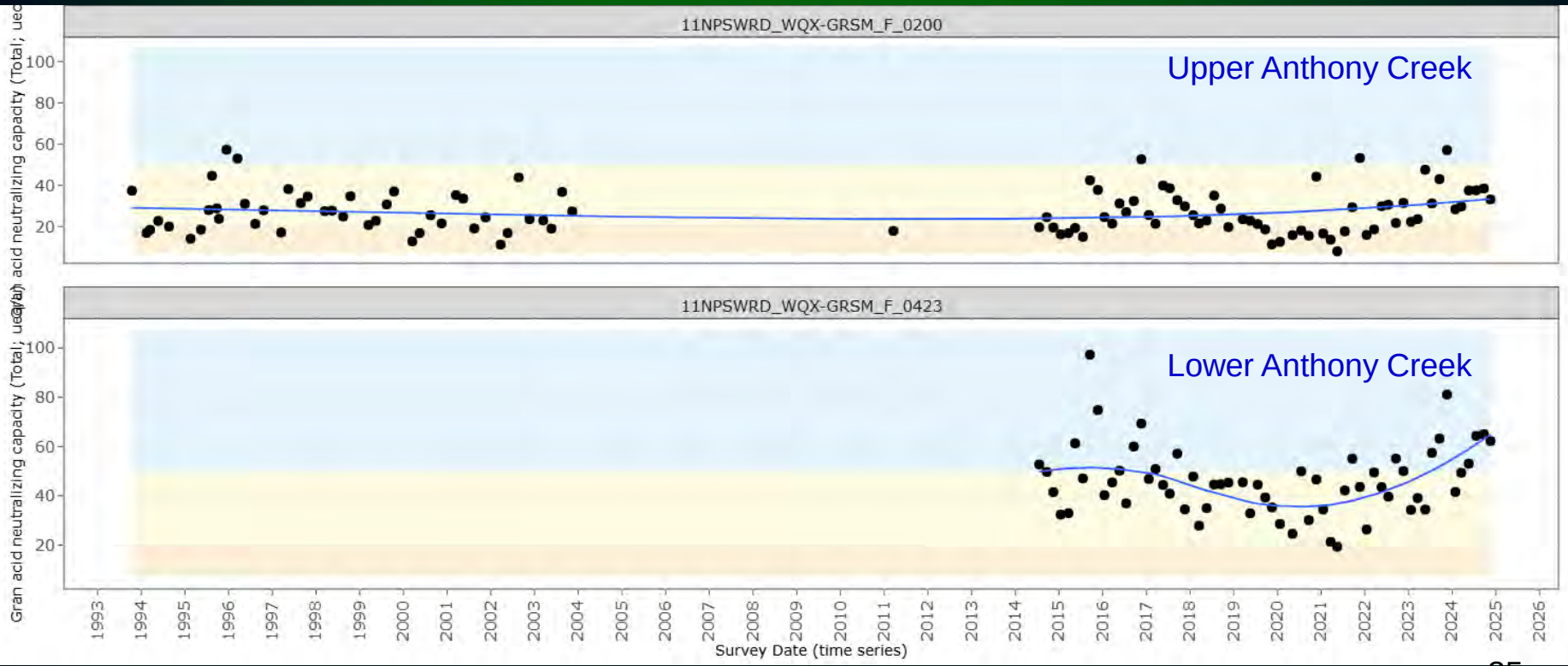
# *Water Quality Monitoring* – *Better or Worse*



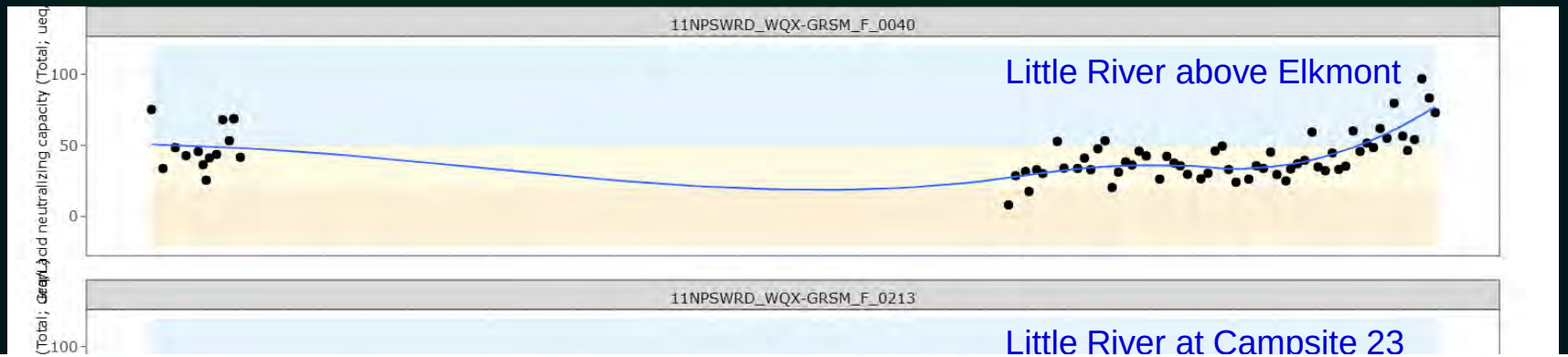



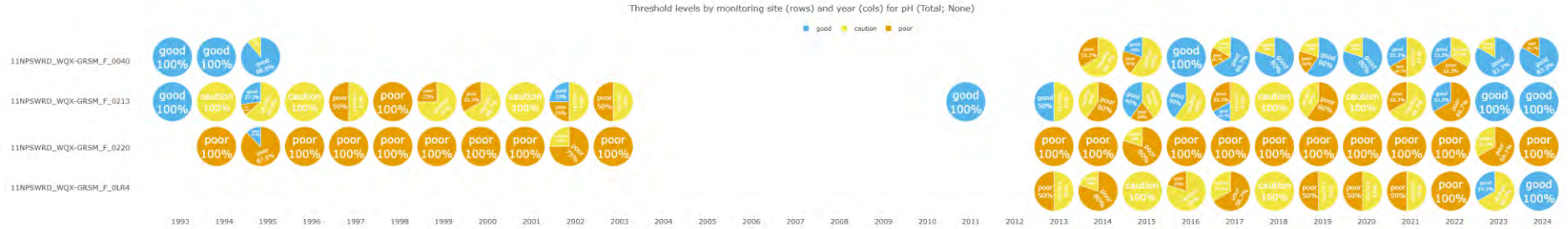
# *Water Quality Monitoring* – *Better or Worse*

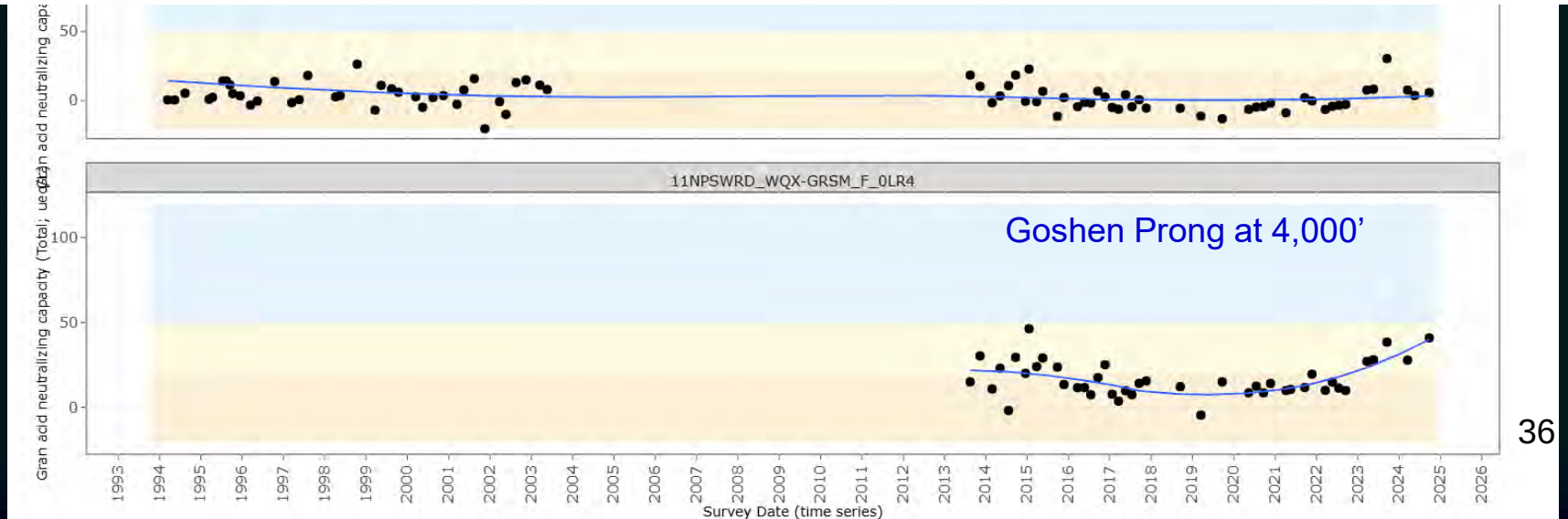


# *Water Quality Monitoring* – *Better or Worse*



# SMOKIES FISHIN' HOTSPOTS!!!







# BROOK TROUT

*Top Four –* Bradley Fork, Bunches Creek, upper Deep Creek, Lynn Camp Prong, Road Prong

*Number per Mile –* 3,200-6,000 fish per mile (50-65% adults)

*Largest –* 11-15” weighing just over 1 pound







# BROWN TROUT



*Top Four –* EP Little River, Straight Fork, Cataloochee, Deep Ck
*Number per Mile –* 1,200-3,500 fish per mile (25-35% adults)
*Largest –* 25-30” weighing just over 10 pounds







# RAINBOW TROUT



*Top Four –* Abrams Creek, EP Little River, Roaring Fork, Oconaluftee River, Cataloochee

*Number per Mile –* 3,600-9,112 fish per mile (40-60% adults)

*Largest –* 11-17” weighing just over 3 pounds



# WILD TIGER TROUT

*Top Two* – Beech Flats Prong, upper Deep Creek
*Number per Mile* – < 3 fish per mile



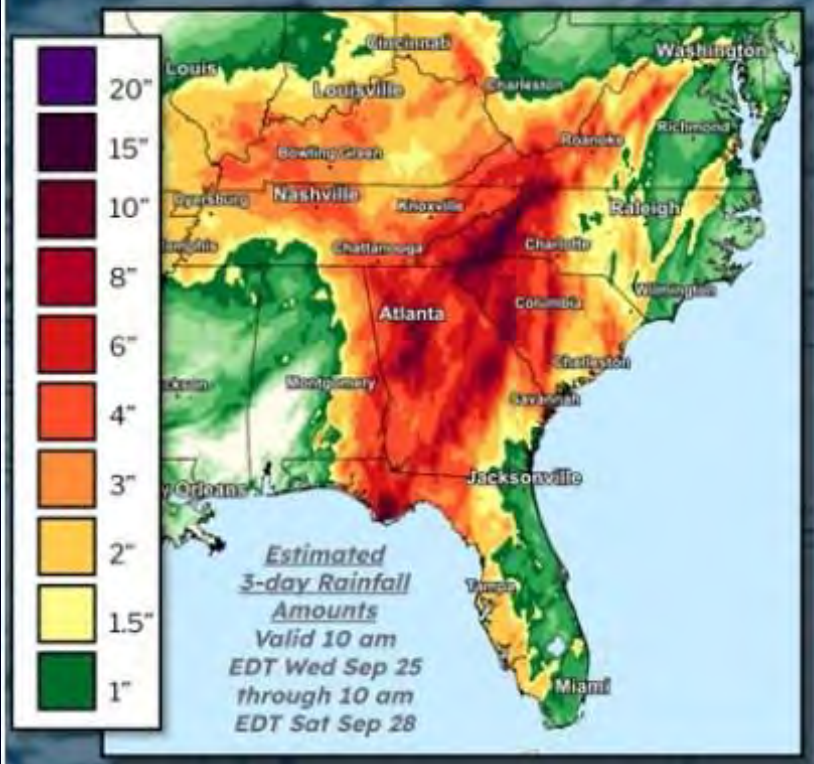




male Brook Trout X female Brown Trout

# What preliminary insights do we have about the impact of the Helene Event on our coldwater ecosystems and fisheries? *– Ecosystem post-event damage assessments*

## Selected Preliminary Storm Total Rainfall Associated with HURRICANE HELENE (Valid Wed 9/25 - Sat 9/28)




### FLORIDA

| | |
|---|---|
| Sumatra | 15.91" |
| Wilma | 11.94" |
| Apalachicola | 9.20" |

### GEORGIA

| | |
|---|---|
| Tallulah | 14.22" |
| Dillard 3.5 NE | 14.06" |
| Atlanta International Arpt | 11.13" |

### ALABAMA

| | |
|---|---|
| Eufaula Municipal Arpt | 9.42" |
| Pansy 1.6 NNE | 8.50" |
| Auburn-Opelika Arpt | 7.13" |

### KENTUCKY

| | |
|---|---|
| Paducah | 6.00" |
| Elizabethtown 6.5 N | 5.98" |
| Fort Knox | 4.58" |

### NORTH CAROLINA

| | |
|---|---|
| Busick | 30.78" |
| Mount Mitchell State Park | 24.20" |
| Boone 3.8 ENE | 20.12" |

### SOUTH CAROLINA

| | |
|---|---|
| Table Rock | 14.34" |
| Salem 1.8 NE | 13.78" |
| Columbia 2.1 NNW | 10.76" |

### TENNESSEE

| | |
|---|---|
| Benton 2.3 ESE | 9.92" |
| Sevierville 3.8 SE | 7.22" |
| Bristol/Kingsport/Johnson City Arpt | 5.79" |

### VIRGINIA

| | |
|---|---|
| Independence 1.3 S | 9.49" |
| Galax 5.3 SW | 8.11" |
| Nora 4 SSE | 7.55" |

*Issued 09/28/2024 11 AM EDT*

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
WEATHER PREDICTION CENTER

- Big Creek & Cataloochee Creek watersheds received 8-11 inches in 72 hours
- Cataloochee Creek reached all time high stream flow of 8,270 cfs
- Significant road, footlog, bridge, and trail damages throughout watersheds





**What is each agency/partner planning to do in 2025 to further evaluate or address the impacts of Helene?**

- Working with SHPO on alternatives to rebuilding “in place” such as: 1) moving road, 2) closing upper end of valley to admin use only, 3) restoring road surface and extend hiking trail
- 2026: Temp rebuild road in place while looking for funding for alternative solutions



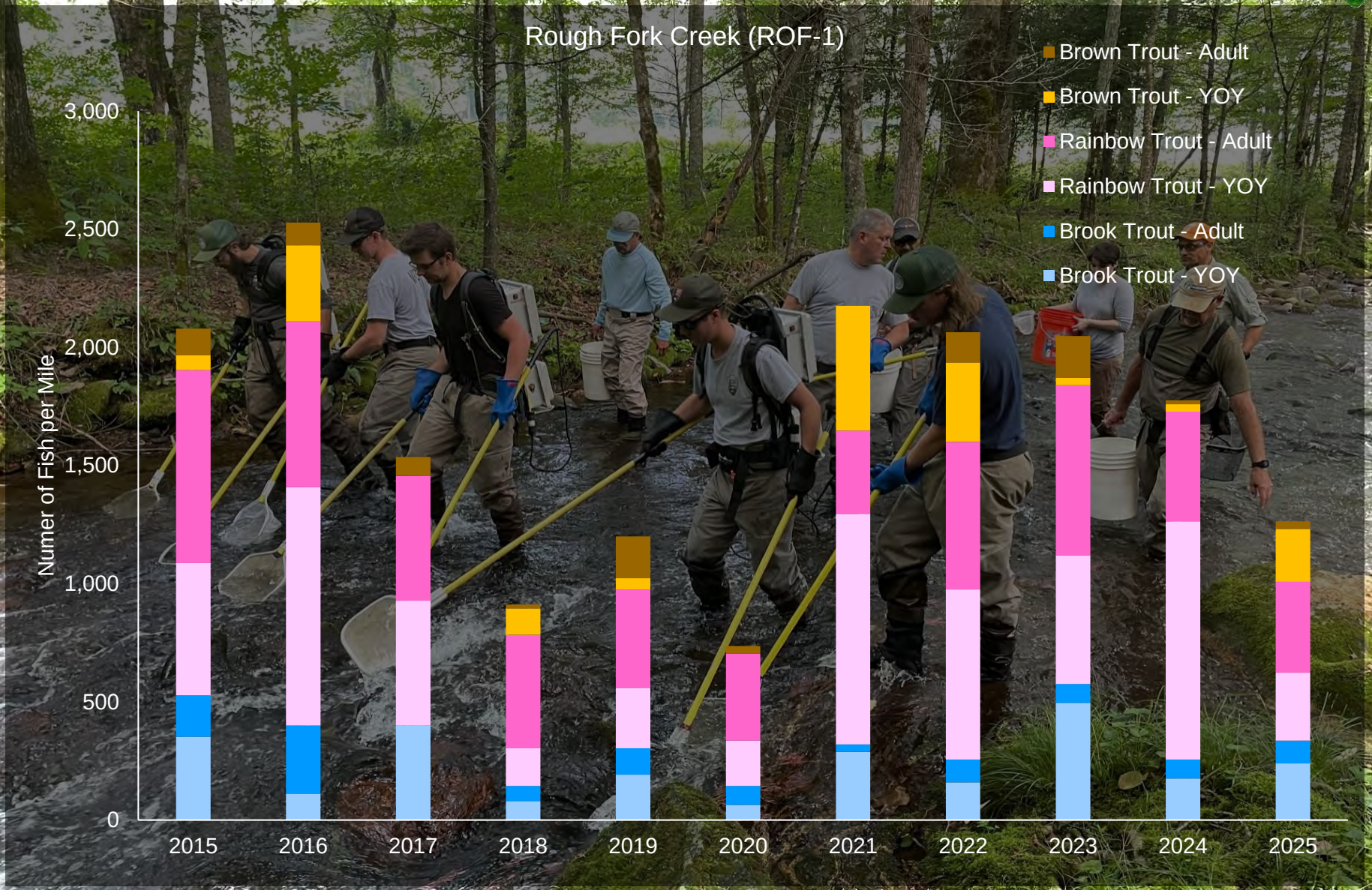


# What preliminary insights do we have about the impact of the Helene Event on our coldwater ecosystems and fisheries? *– Fisheries*

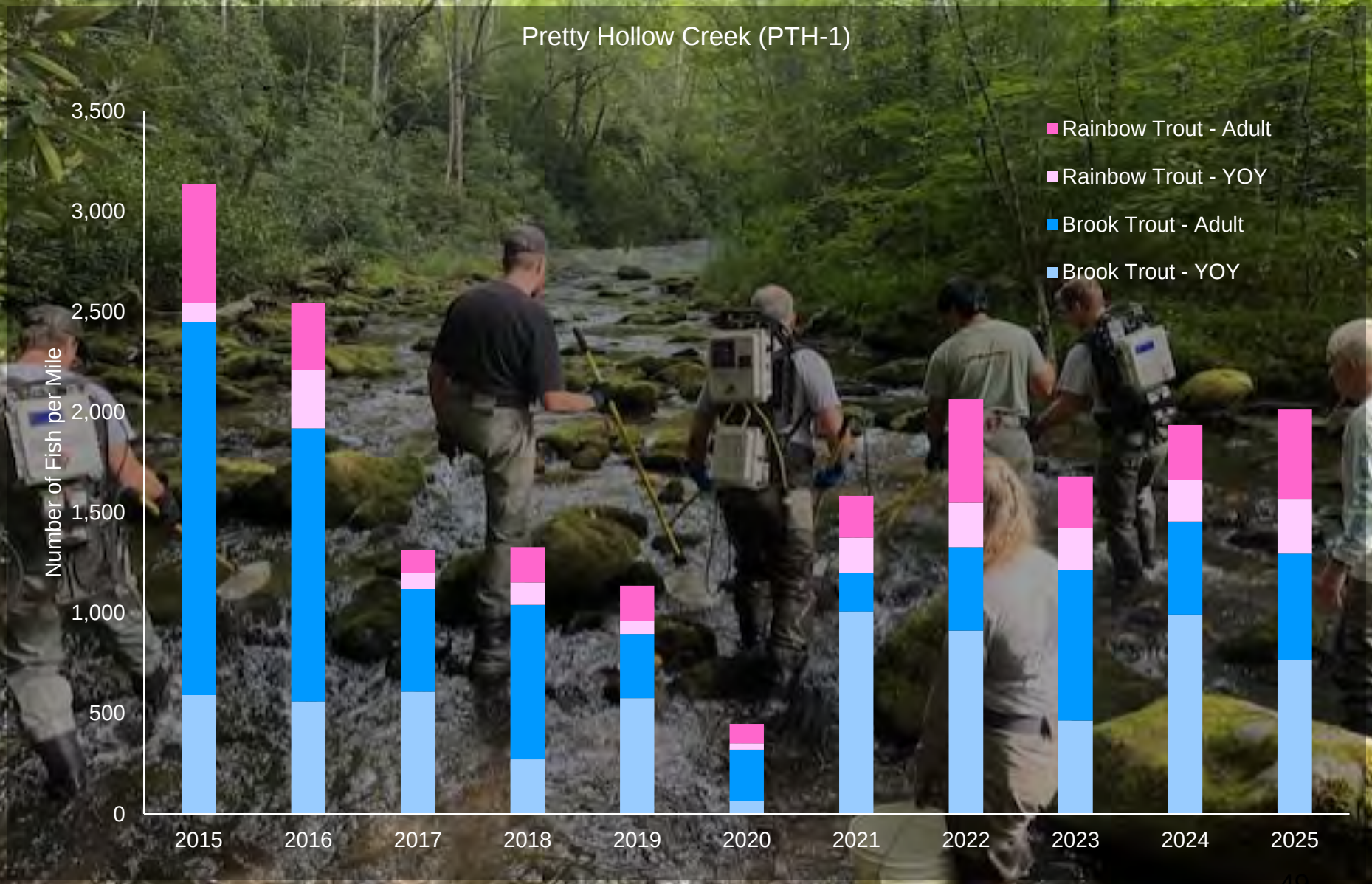


**ACCESS TO CATALOOCHEE VALLEY** – Cataloochee access reopened spring 2025. Upper Cataloochee Road work TBD.

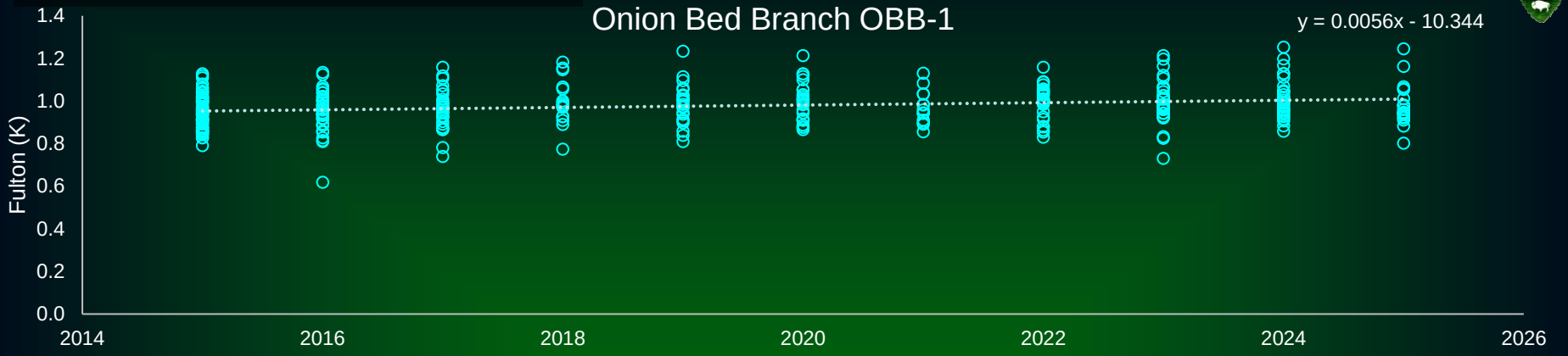
# Population Abundance

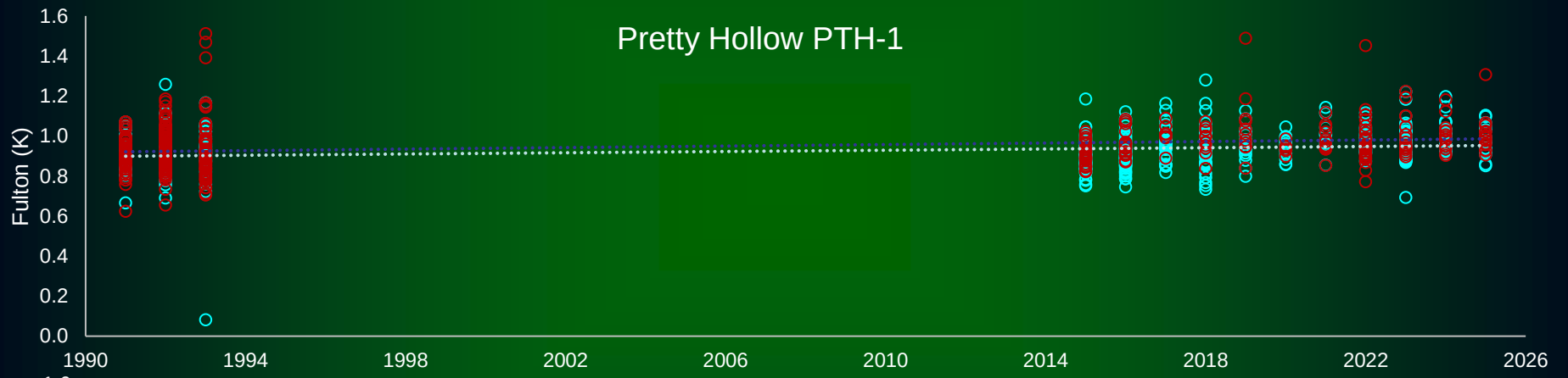


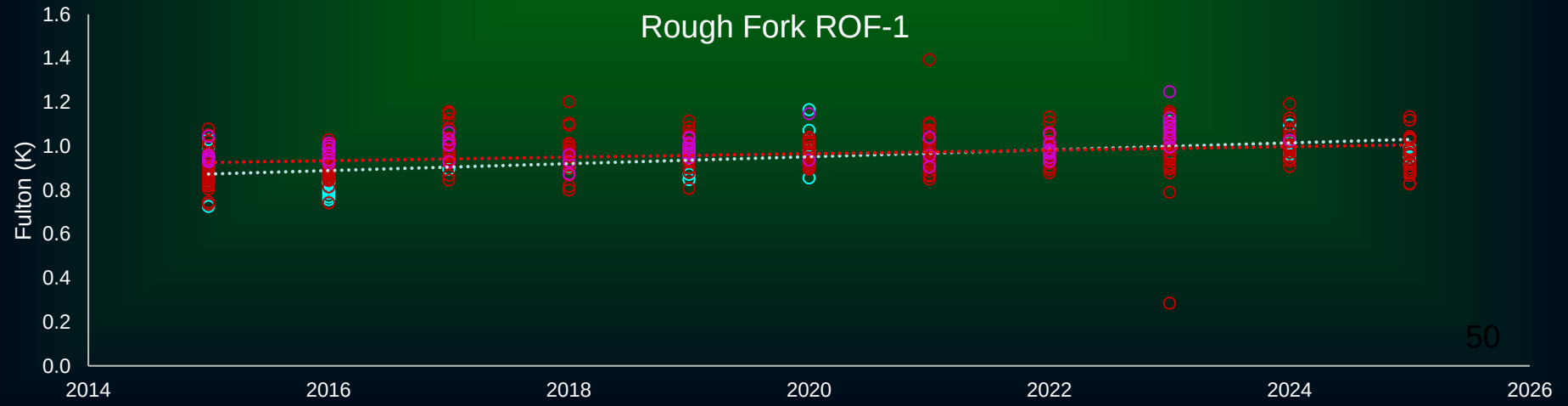
# Population Abundance



# Population Condition



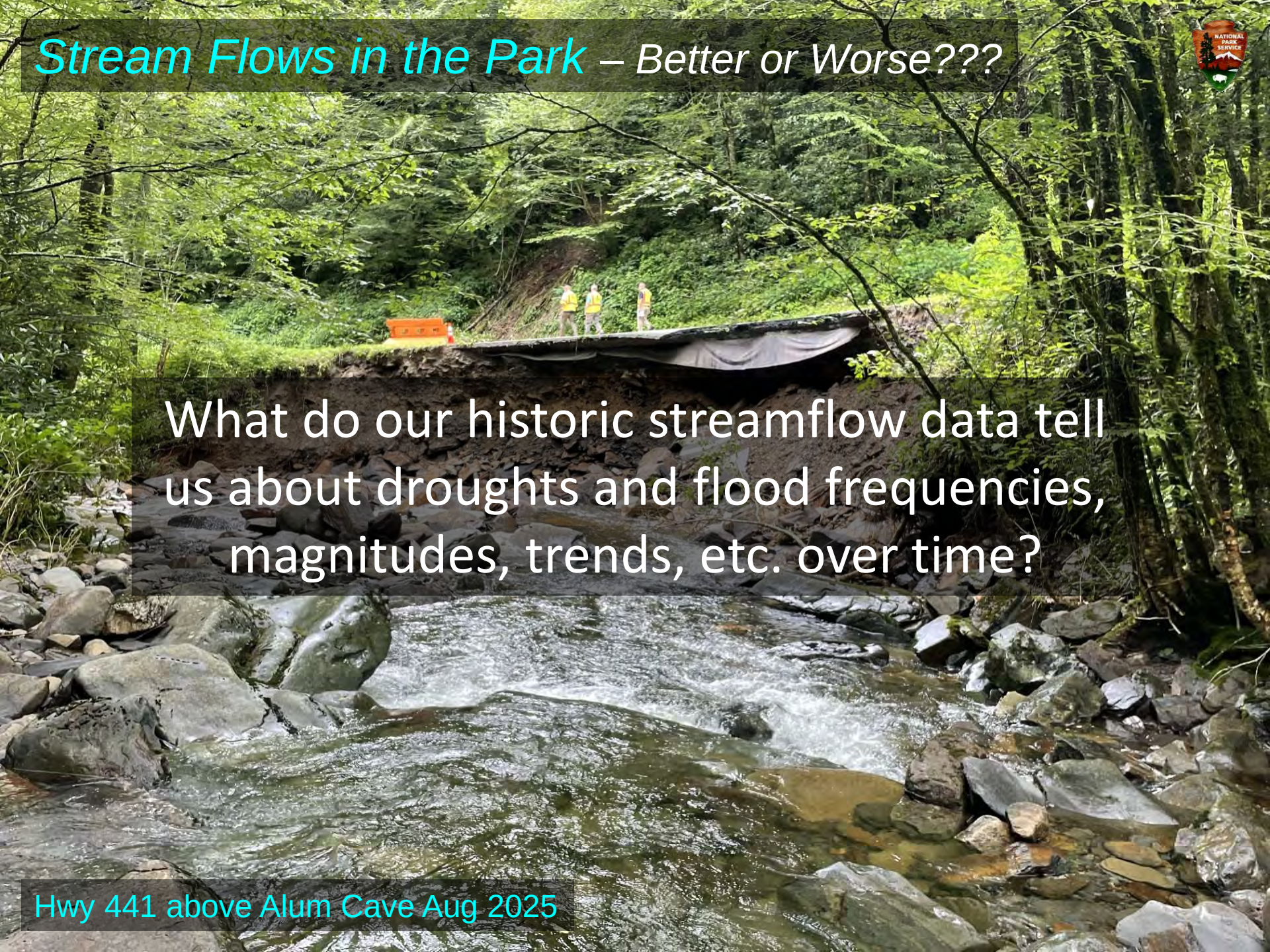
# *Stream Flows in the Park – Better or Worse???*



# *Stream Flows in the Park – Better or Worse???*



# *Stream Flows in the Park* – *Better or Worse???*



What do our historic streamflow data tell us about droughts and flood frequencies, magnitudes, trends, etc. over time?

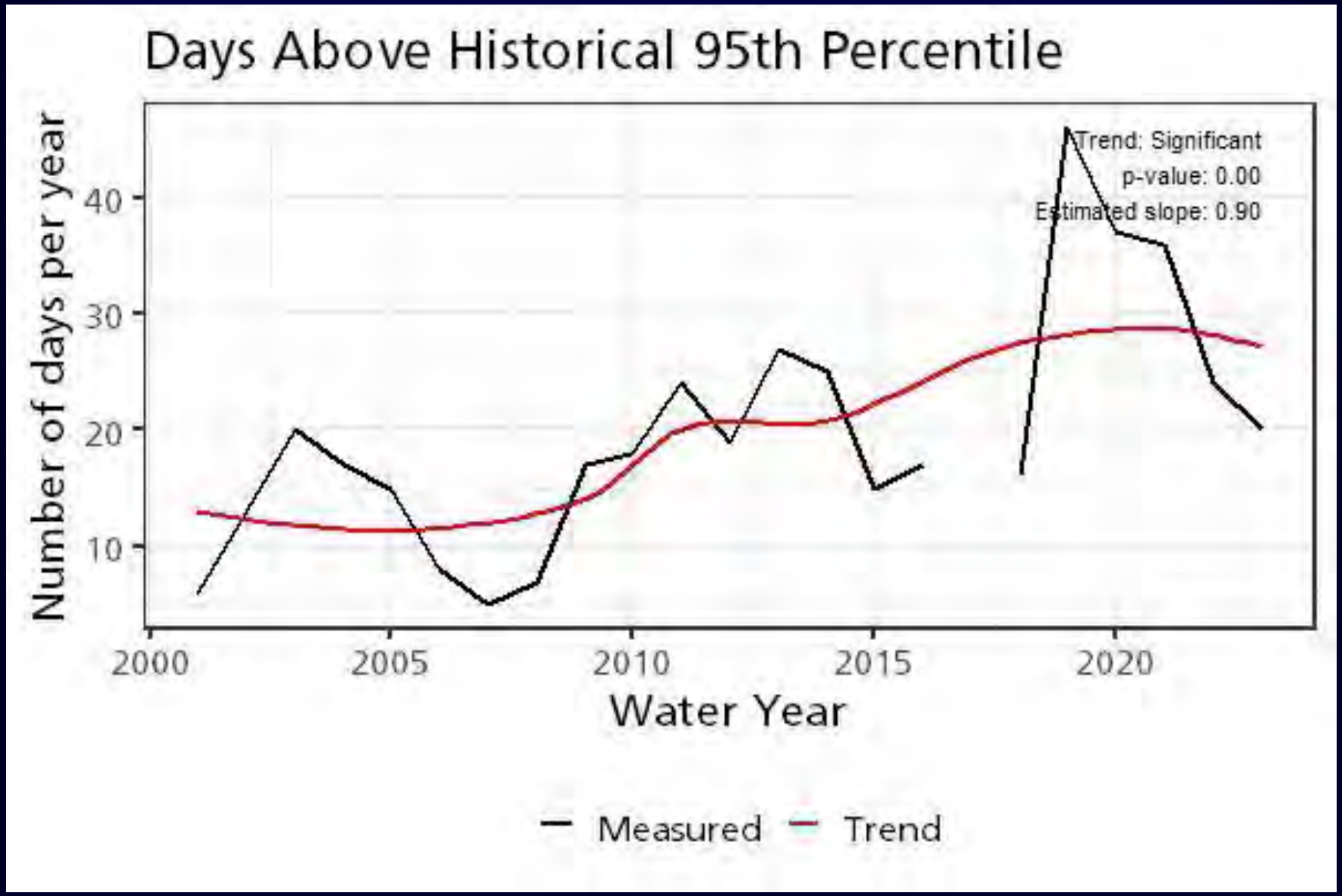
Hwy 441 above Alum Cave Aug 2025



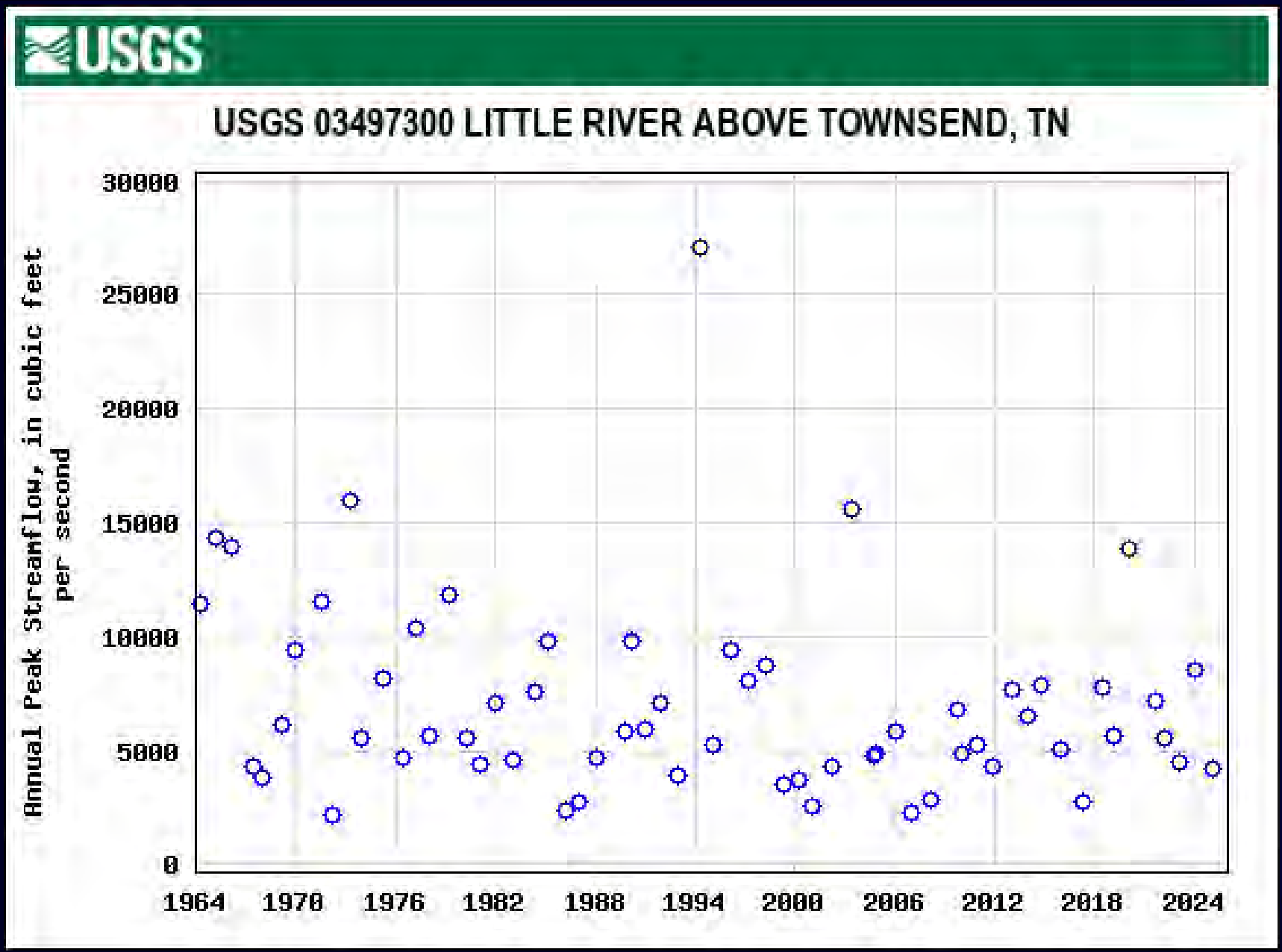
| Historical Trend | Cataloochee Creek USGS 03460000 | Little River USGS 03497300 |
|---|---|---|
| Period of Record | 1934-Present | 1963-Present |
| Annual Streamflow Volume | Increased (Not Sig) | Increased (Not Sig) |
| High Flow Events | Increased (Not Sig) | Increased (Not Sig) |
| Low Flow Events | Decreased (Not Sig) | No Trend |
| Q7 Max (avg 7-day max flow) | No Trend | No Trend |
| Q7 Min (avg 7-day min flow) | No Trend | Decrease (Sig) |
| # Events >580cfs (1%) – Feb-Mar | No Trend | No Trend |
| # Events >580cfs (1%) – Apr-May | No Trend | No Trend |
| # Events >1,250cfs (0.2%) – Feb-Mar | No Trend | No Trend |
| # Events >1,250cfs (0.2%) – Feb-Mar | No Trend | No Trend |

Little River at “the Sinks” Mar 1965

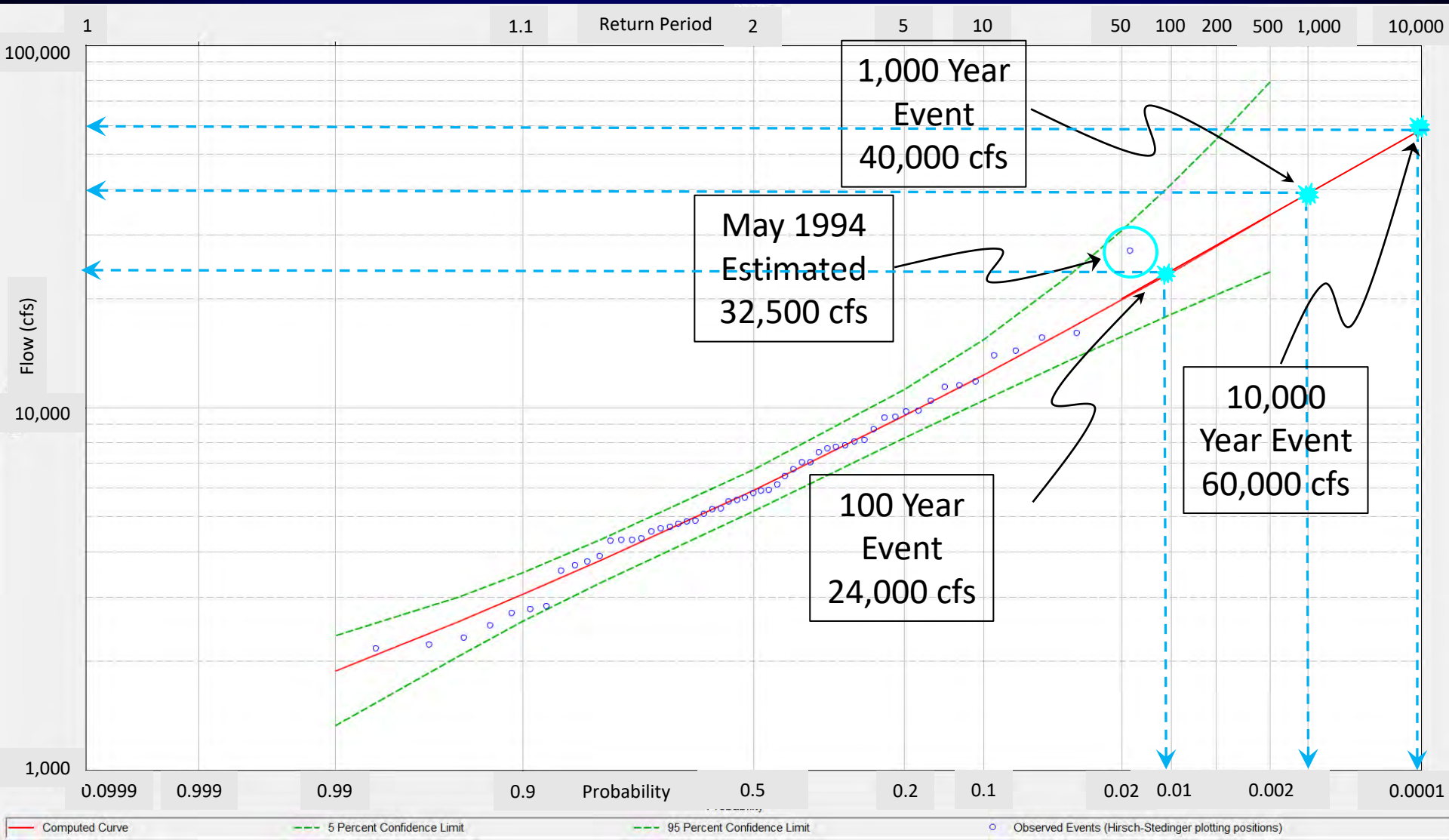
# *Stream Flows in the Park – Little River*



# *Stream Flows in the Park* – *Little River Peak Flows*

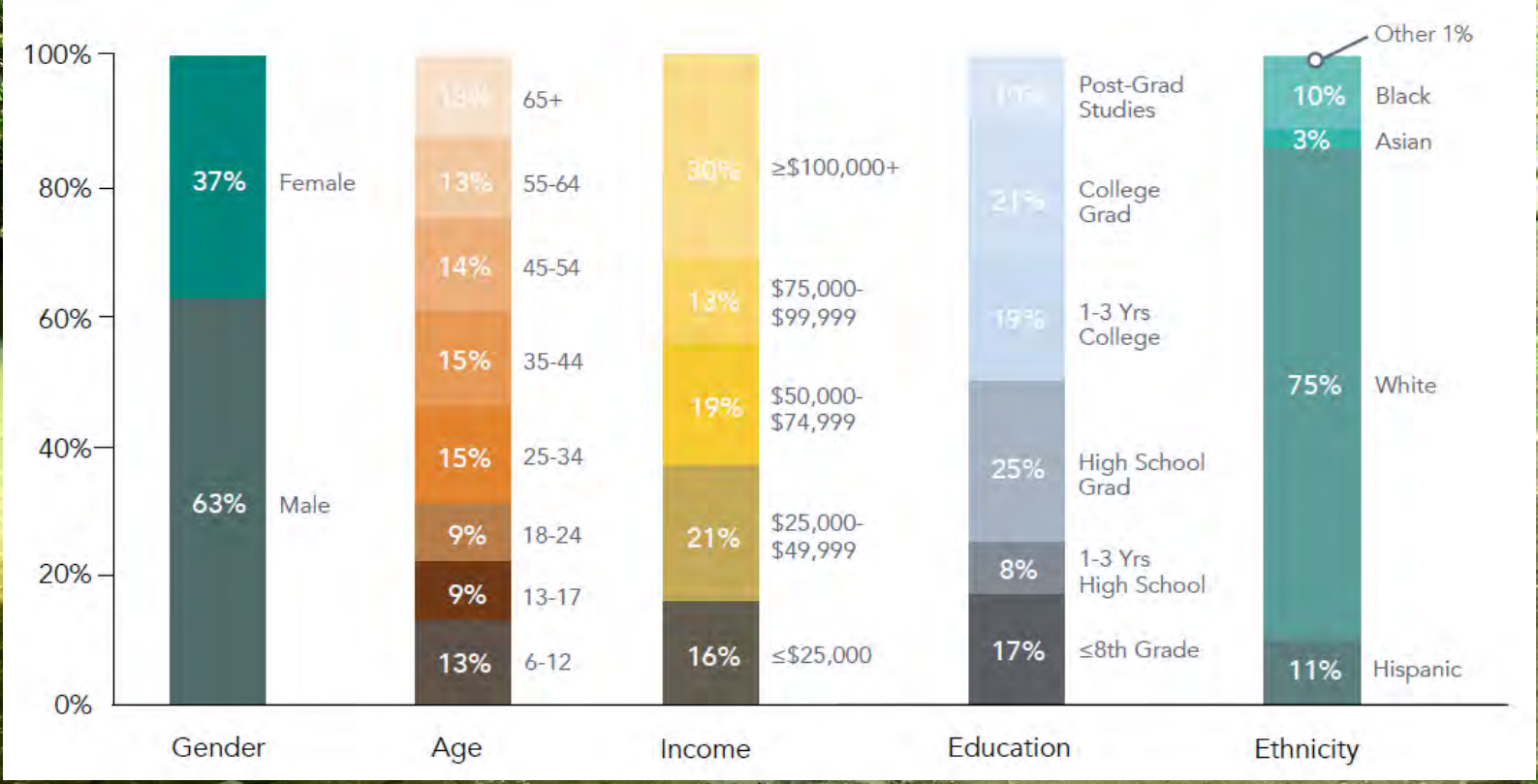


# *Stream Flows in the Park* – *Little River Peak Flows*



# National Fishing Trends by the Numbers

- 57.9 million Americans (>6 yrs old) fished in 2024 (19% U.S. participation)
  - 43.2 million freshwater fishing (14% participation)
  - 15.1 million saltwater fishing (5% participation)
  - 8 million fly fishing (3% participation)

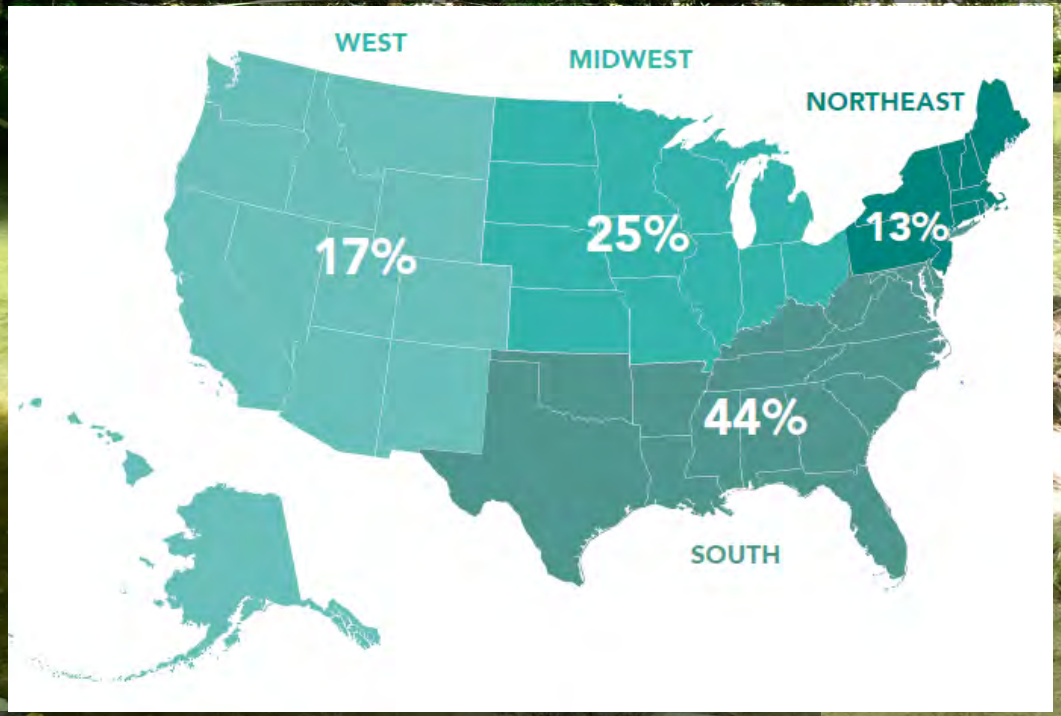



https://www.takemefishing.org/getmedia/a57d8109-fec7-48eb-8b19-47b193e0fb18/2025SpecialReport.pdf

Gary Verholek

# National Fishing Trends by the Numbers

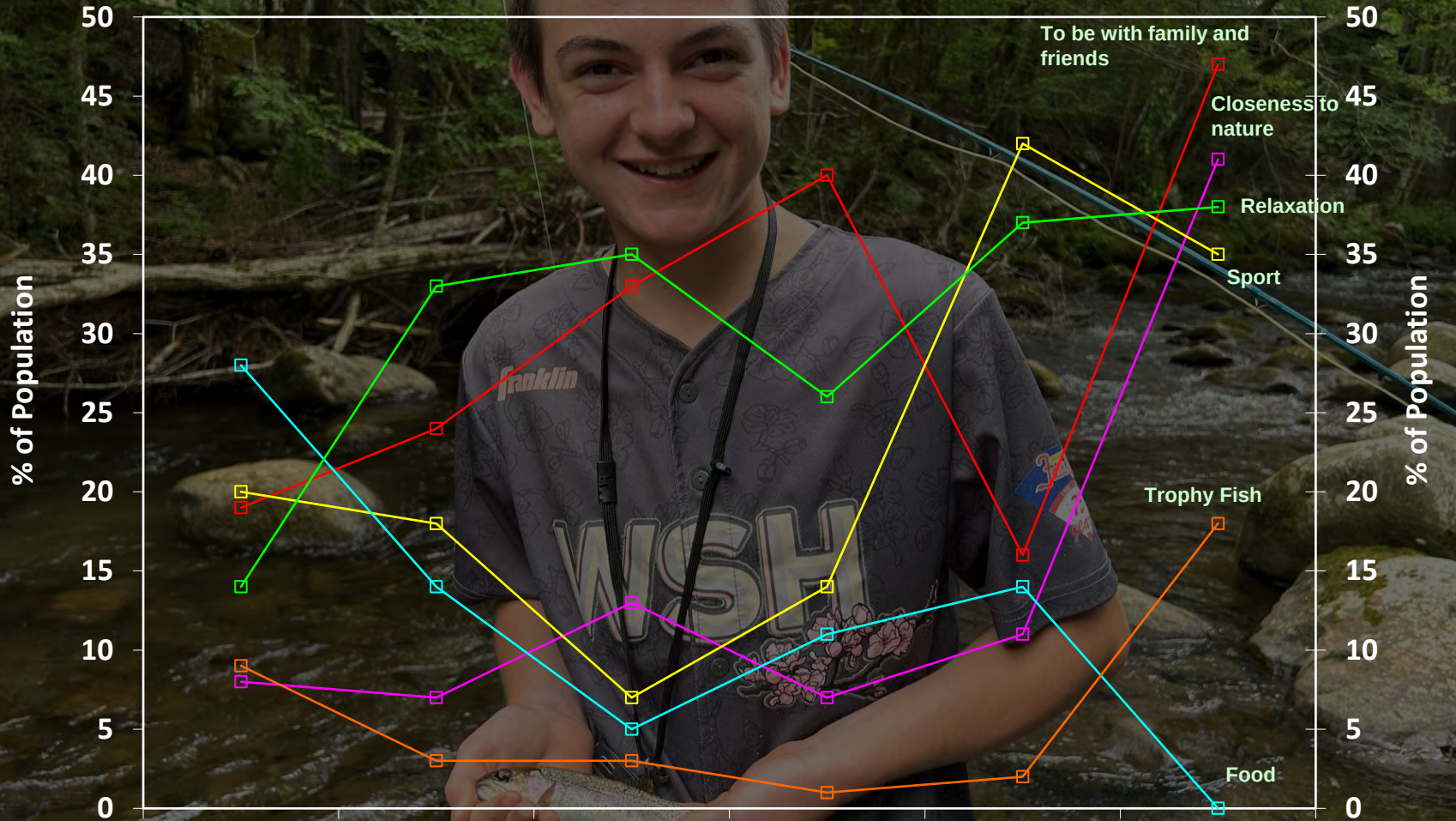
- 57.9 million Americans (>6 yrs old) fished in 2024 (19% U.S. participation)
  - 43.2 million freshwater fishing (14% participation)
  - 15.1 million saltwater fishing (5% participation)
  - 8 million fly fishing (3% participation)
- Black participation increased to 5.5 million (14% participation)
- Hispanic participation increased to 6.6 million (16% participation)
- Female participation increased to 21.3 million (14% participation)




https://www.takemefishing.org/getmedia/a57d8109-fec7-48eb-8b19-47b193e0fb18/2025SpecialReport.pdf

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# Why do people fish???



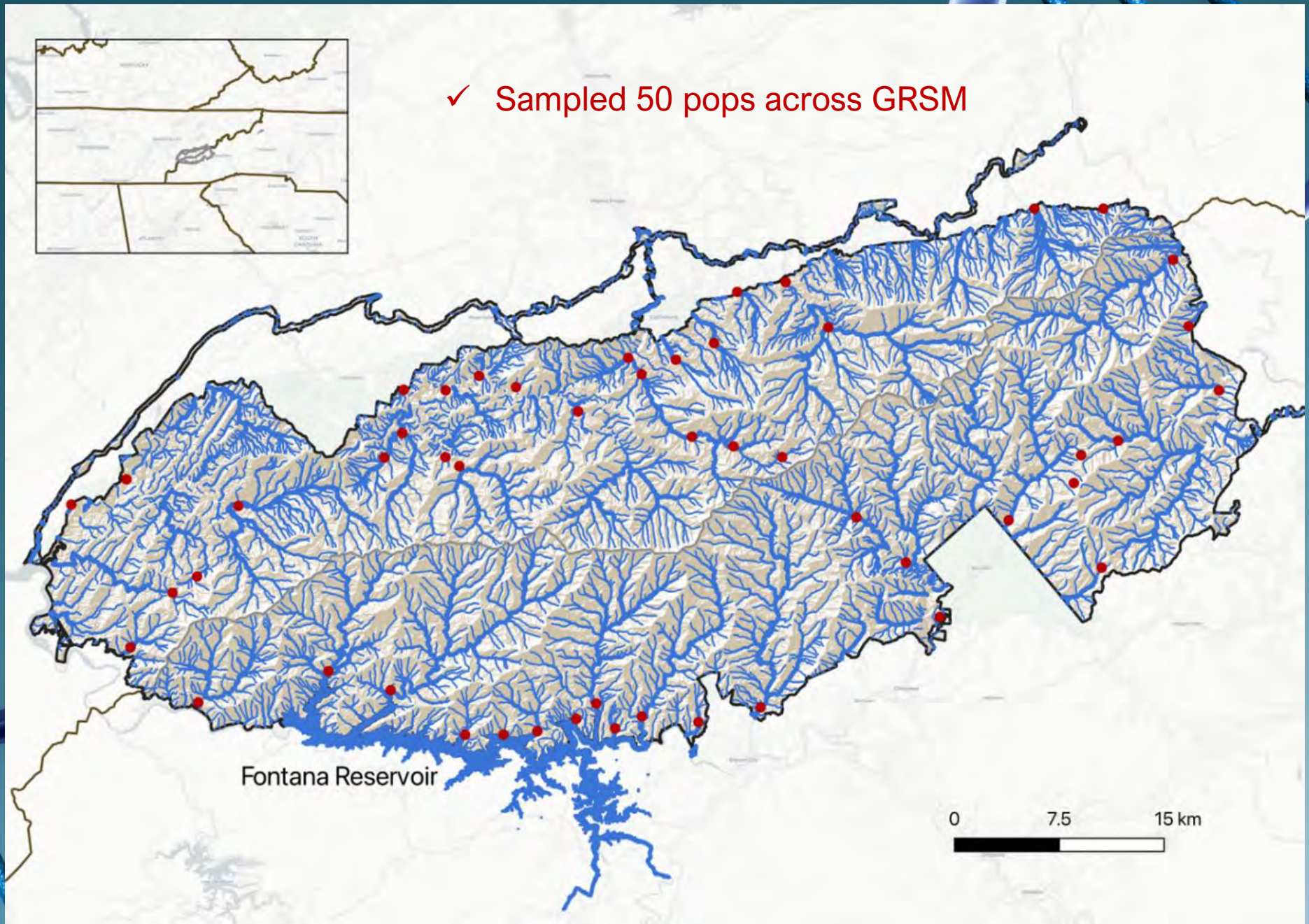
# National Fishing Trends by the Numbers

- Only 1 in 5 anglers fished alone
- 87% caught at least one fish on trip
  - 38% released fish; 35% kept fish; 27% did some of both
- ***85% of current fishing participants fished before the age of 12***
  - ***Youth Programs WORK!!! – TroutCamp, RiverCourse***





# Using eDNA to Help Monitor Fish Populations



# Using eDNA to Help Monitor Fish Populations

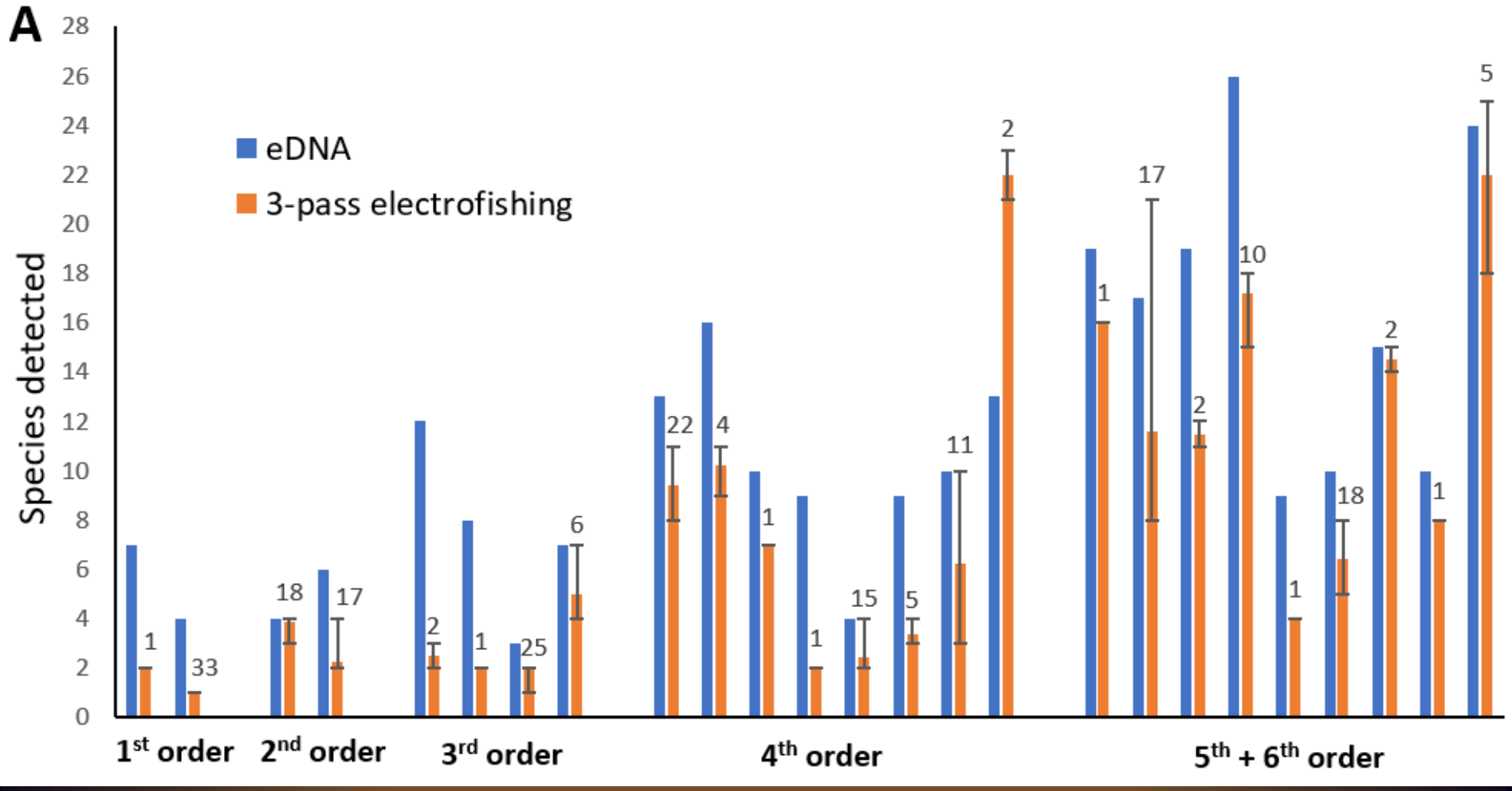


# Using eDNA to Help Monitor Fish Populations



VS





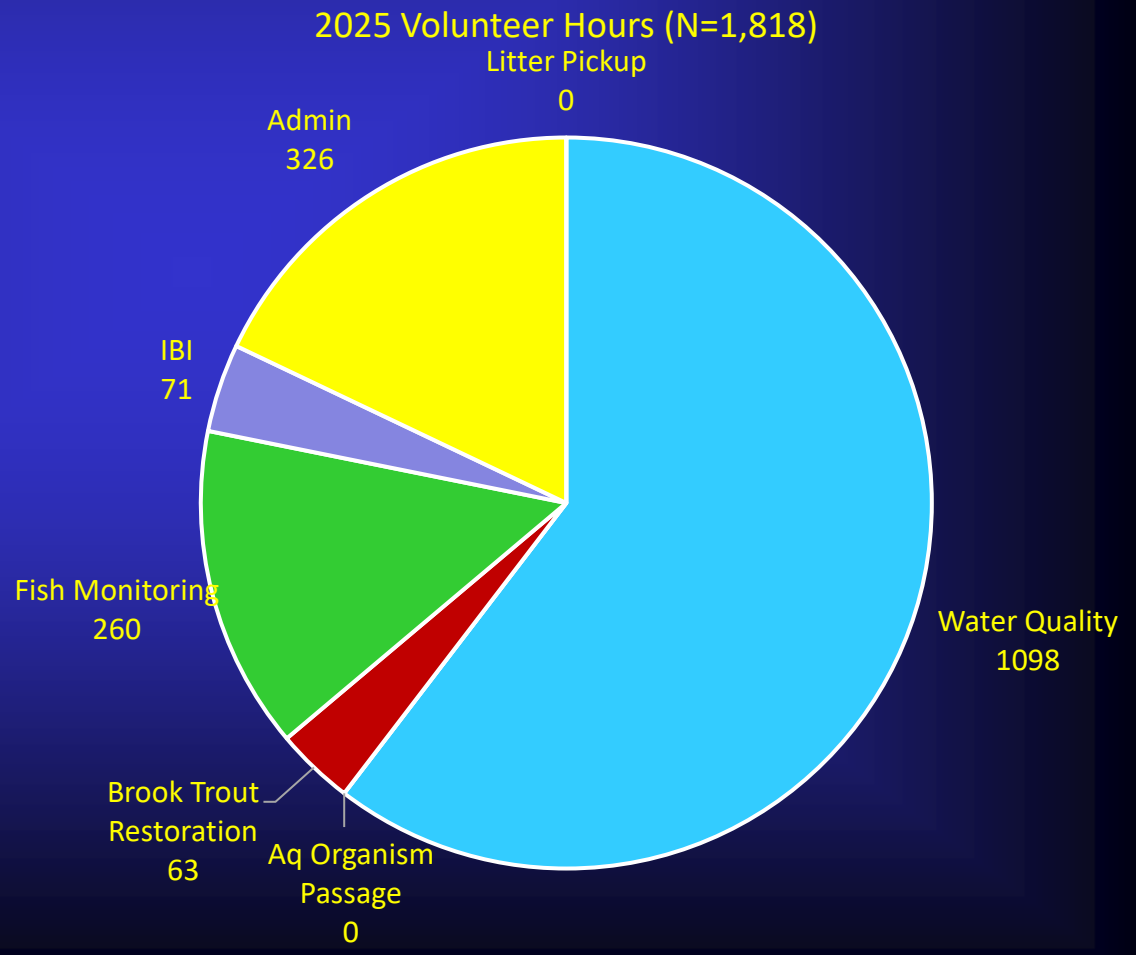

- eDNA detected more species compared to mean electrofishing count over all years
  - ✓ performed best at low order streams
- eDNA detected ~3.6 more species per site than electrofishing (downstream drift?)
- May be useful 1) to determine when Brook Trout recolonize acidified headwater reaches, 2) absence/presence of rare or T&E fish, 3) monitoring difficult locations

# *Volunteer Assistance* – *Donation Totals 1993-2025*

- Total of1,818 hours donated in 2025
  - ✓ 720 field hours, 1,098 water quality hours
- 2025 volunteer hours estimated value of $60,884
- Total hours since 1993 = 51,648
- Total estimated value = $1,421,493!

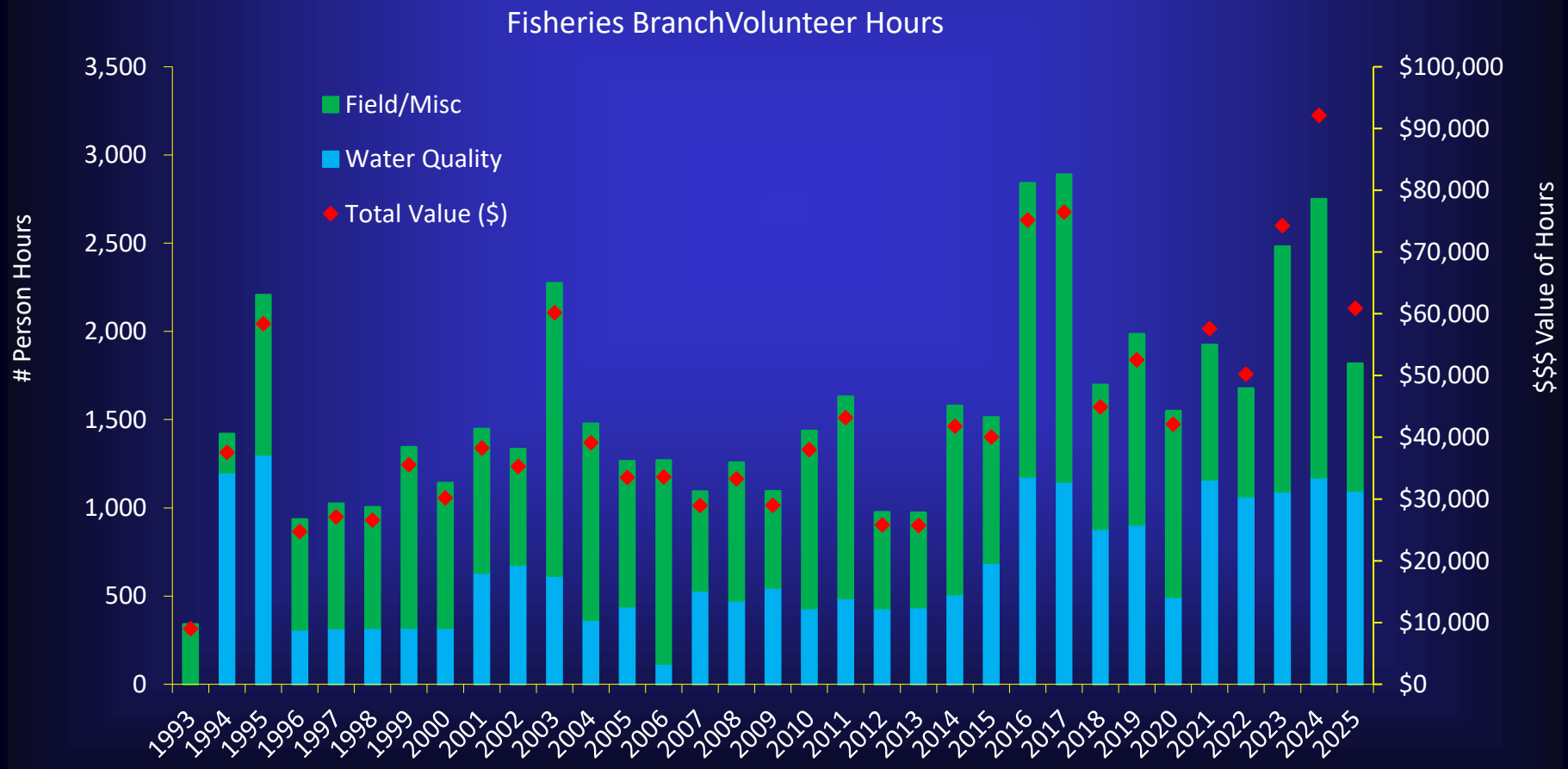




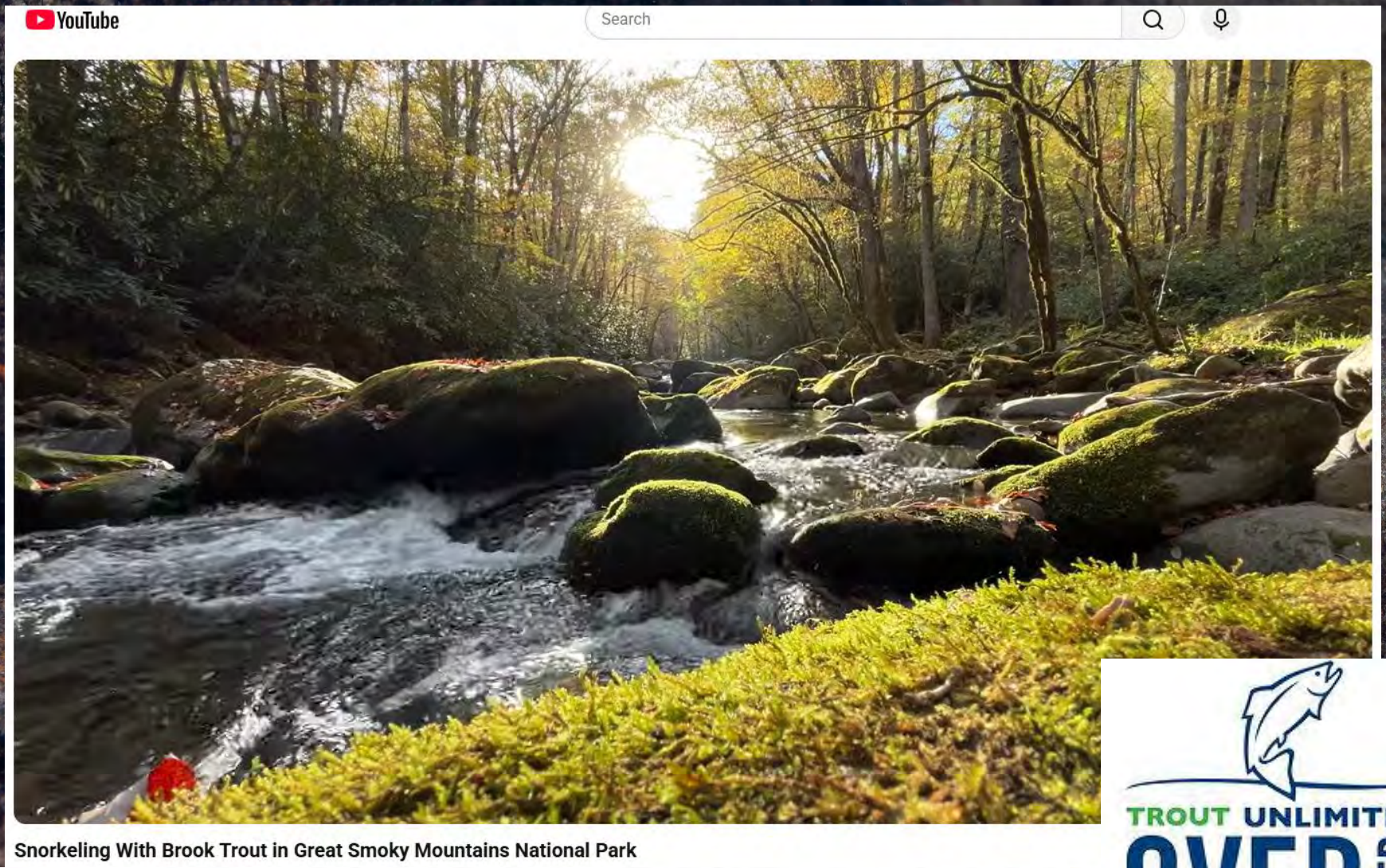


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# Thank You




Snorkeling With Brook Trout in Great Smoky Mountains National Park

Tennessee Council of Trout Unlimited

TROUT UNLIMITED

TROUT UNLIMITED
OVER MOUNTAIN CHAPTER