

# Ridges to Rivers: Protecting the Biodiverse Rivers and Streams of the Southeastern United States



**Anna George** Tennessee Aquarium



# Water is life!

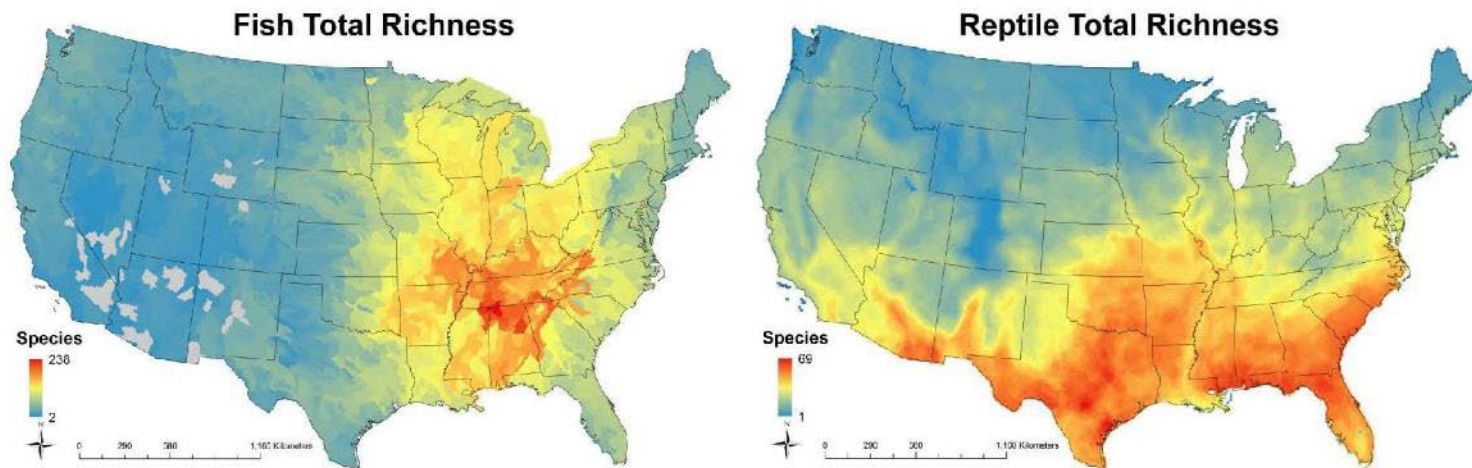
- We depend on 0.01% of Earth's water for our existence
- Roughly 25% of all vertebrate species are found in these same freshwater habitats



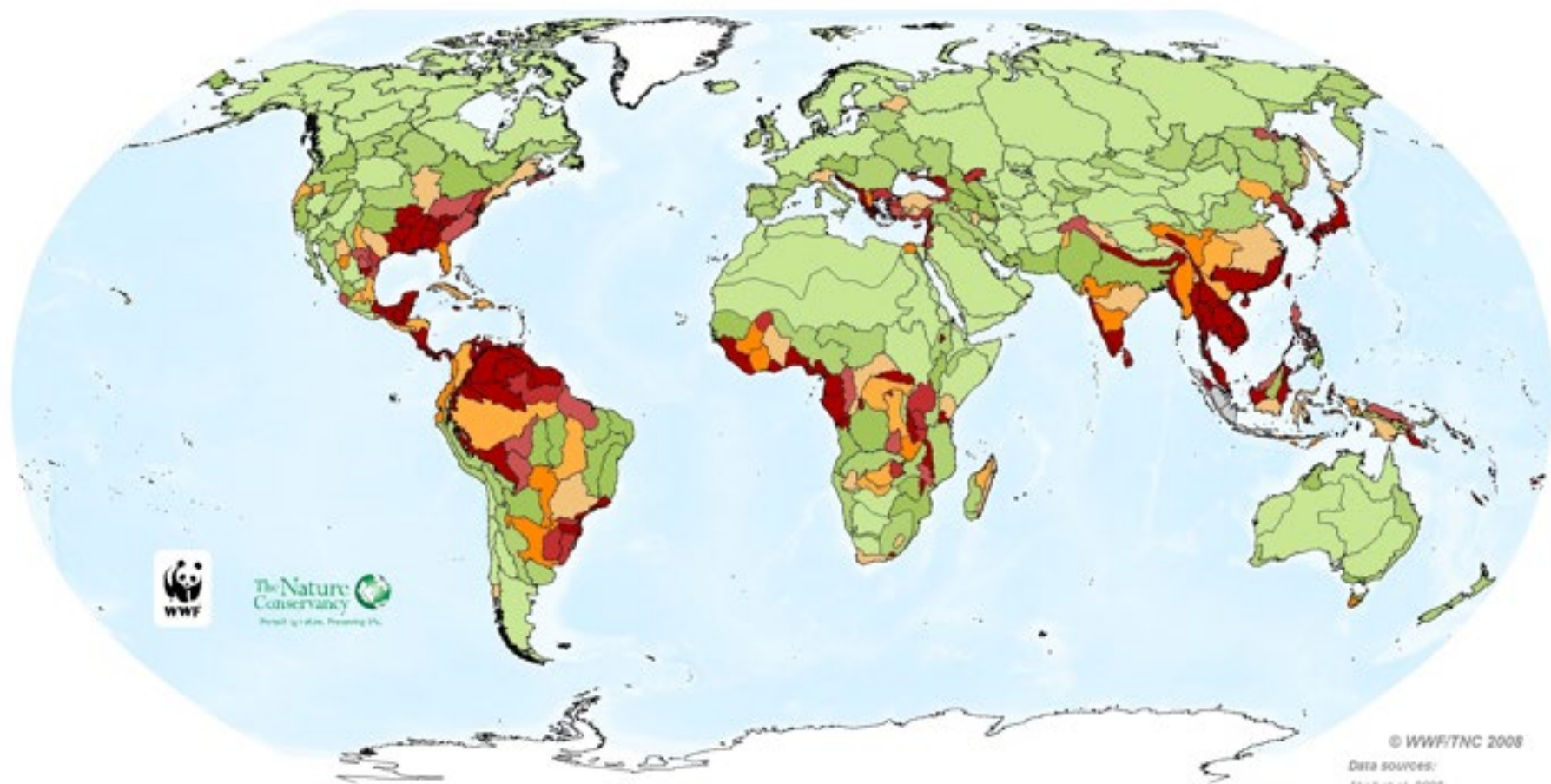
# Southeastern biodiversity

Rich diversity of fishes, mussels, snails, crayfishes, insects...

But many species poorly understood



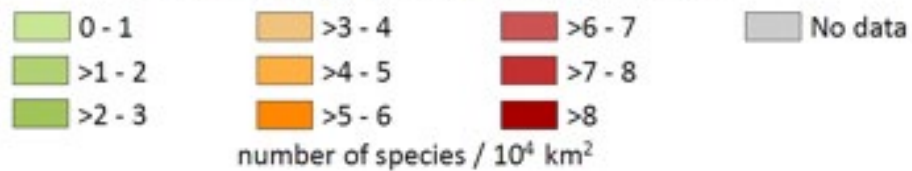
Jenkins, C. N., Van Houtan, K. S., Pimm, S. L., & Sexton, J. O. 2015. US protected lands mismatch biodiversity priorities. *Proceedings of the National Academy of Sciences*, 112:5081-5086.



© WWF/TNC 2008

Data sources:  
Abell et al. 2008  
[www.fish.org](http://www.fish.org)

### Freshwater fish species per ecoregion area

























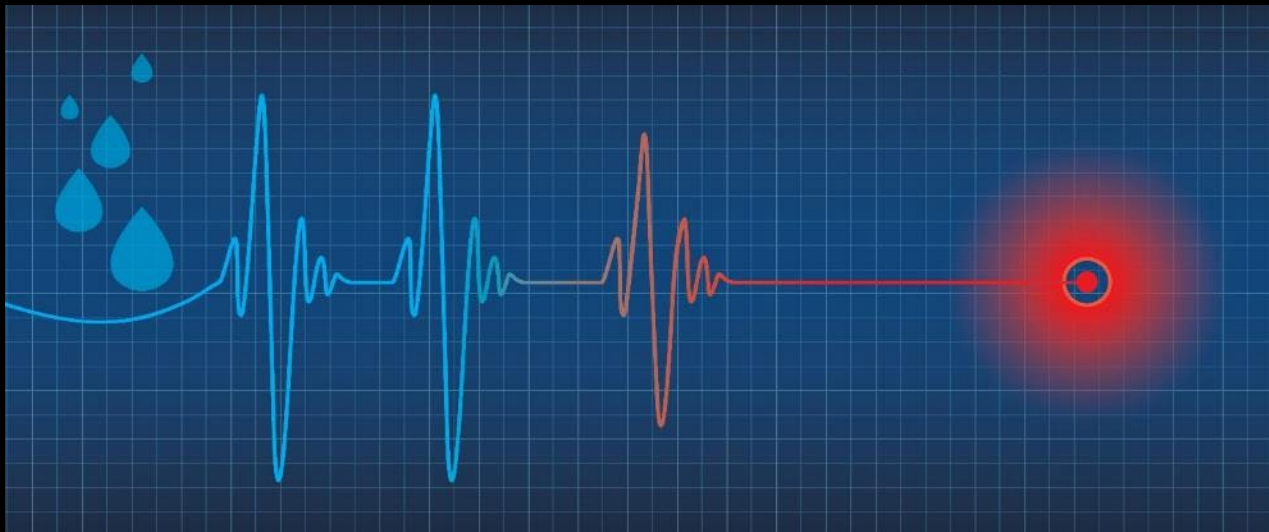






# Our freshwater crisis

- Freshwater ecosystems are the most threatened on Earth
- Extinction rate of freshwater animals 3-5 times higher than terrestrial or marine
- Freshwater availability fluctuating from climate change













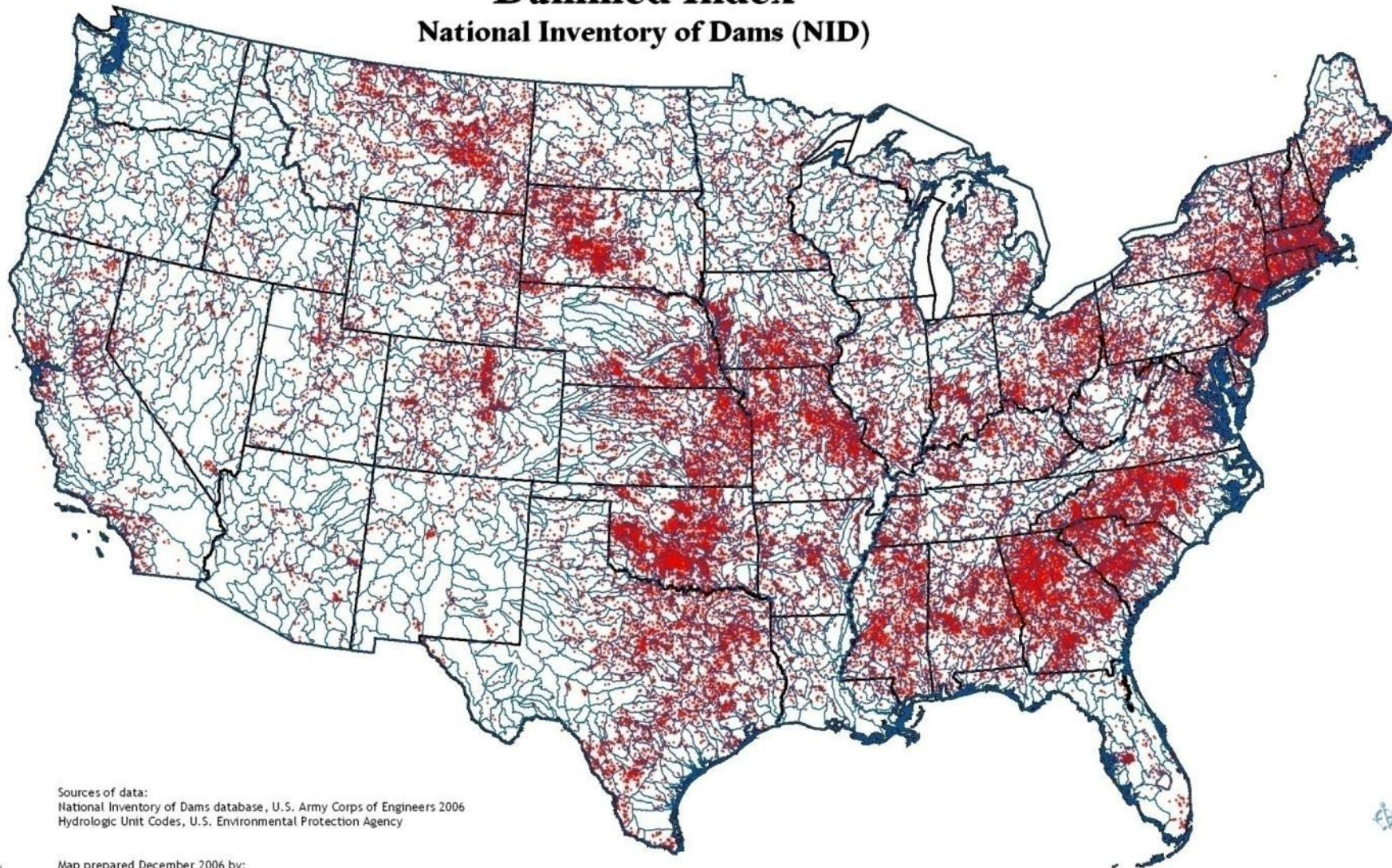






# Dammed Index

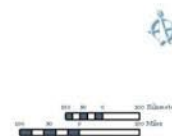
## National Inventory of Dams (NID)



Sources of data:  
National Inventory of Dams database, U.S. Army Corps of Engineers 2006  
Hydrologic Unit Codes, U.S. Environmental Protection Agency

**Legend**  
State Boundary  
8-digit HUCs  
NID\_Dams

Map prepared December 2006 by:  
Mark A. Cantrell, U.S. Fish & Wildlife Service  
[mark\\_a\\_cantrell@fws.gov](mailto:mark_a_cantrell@fws.gov)



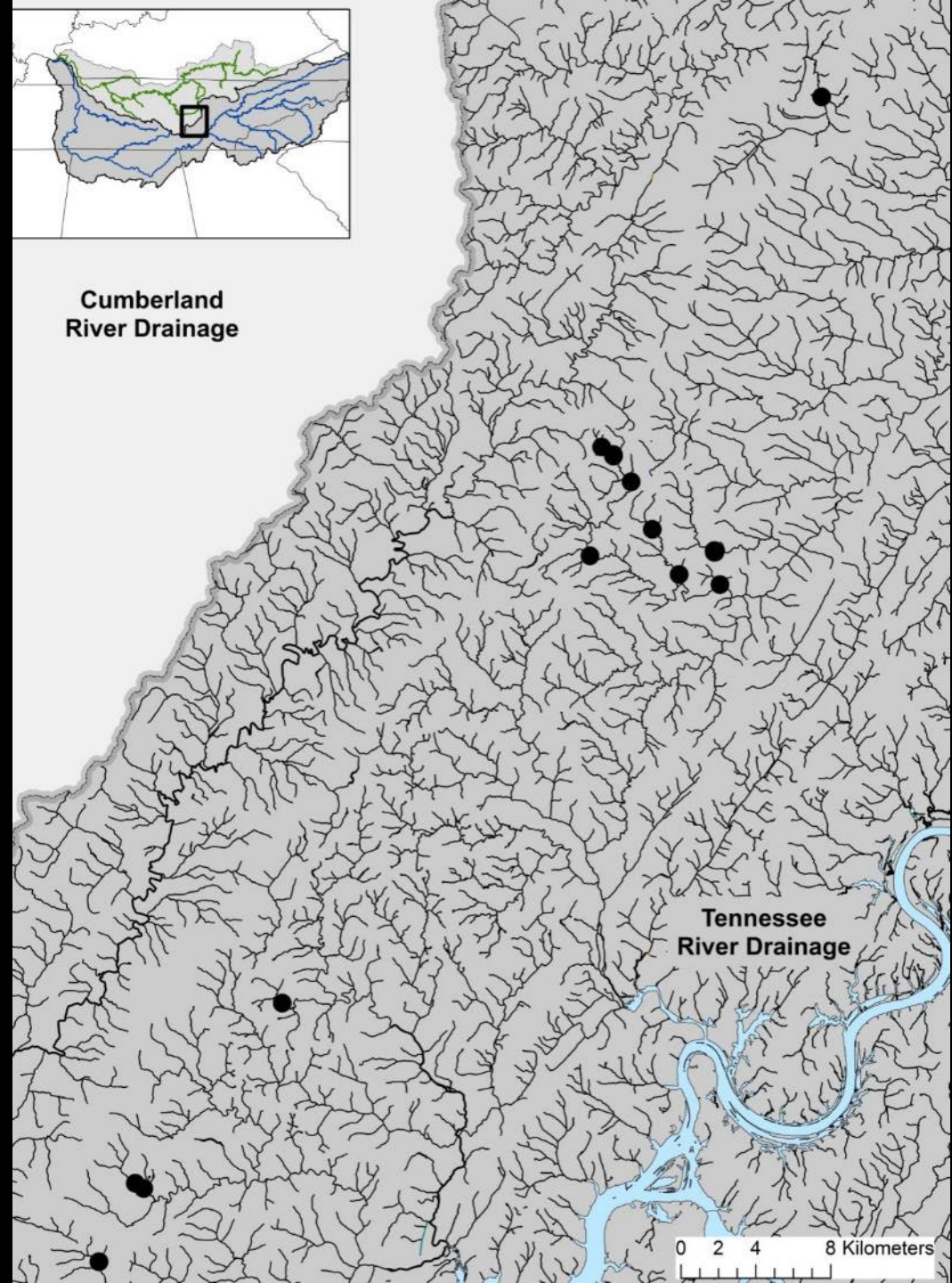




What does this mean for freshwater  
biodiversity?

# Laurel Dace

- First collected in 1976
- Formally described in 2001
- Listed as Federally Endangered in 2011
- Critical habitat designated in 2012







Bumbee Creek – occupied Laurel Dace habitat





Historical localities, but no longer suitable habitat



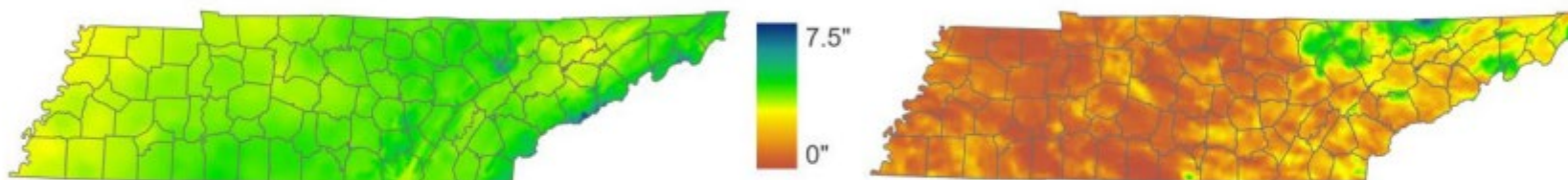
## Other Recovery Challenges:



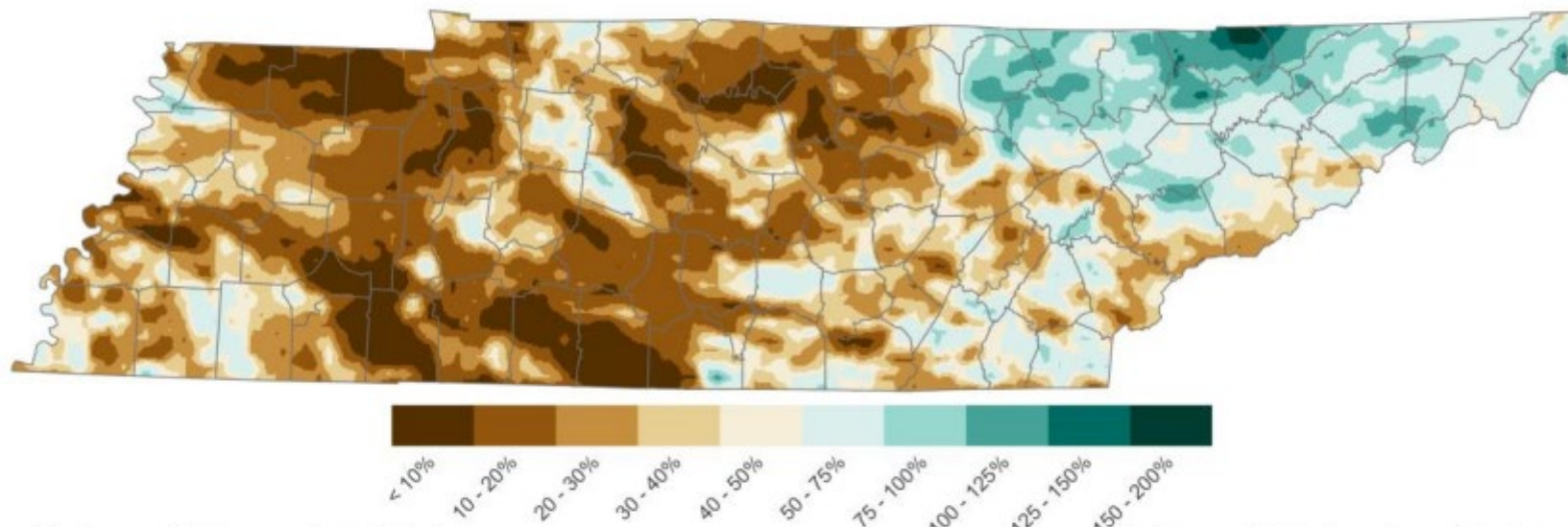


Normal Precipitation

Observed Precipitation



Percent of Normal Precipitation



Stations with the most precipitation

Station Name	Station Type	Total Precipitation (in)
ROAN MOUNTAIN 3SW	COOP	5.6
BRISTOL AP	WBAN	5.24
GREENEVILLE EXP STA	COOP	4.95
ELIZABETHTON	COOP	4.85
TAZEWELL	COOP	4.56

Map Data from PRISM Climate Group,  
Oregon State University.  
1991-2020 Climate Normals Used.  
Station Data Retrieved From xmACIS2

Stations with the least precipitation

Station Name	Station Type	Total Precipitation (in)
PULASKI WASTEWATER PLANT	COOP	0.02
FOREST HILLS 6.7 WSW	CoCoRaHS	0.03
FAYETTEVILLE 8.6 S	CoCoRaHS	0.06
NOLENVILLE 2.4 SW	CoCoRaHS	0.07
WAYNESBORO 7.3 N	CoCoRaHS	0.07

*Note: Data for the infographic below ends at 8am(eastern)/7am(central) August 31, a few areas of Middle TN and northeast TN recorded 2-3" of rain later in the day on August 31.*







# Ridges to Rivers

Regional Conservation  
Partnership Program  
(RCPP) with NRCS

\$10 million through  
2018 Farm Bill for land  
management practices  
to protect water quality





# Project Partners

Conservation Partnerships = \$11,830,231.00 Contributions

Crabtree Farms

Land Trust for Tennessee

Open Space Institute

Soil Conservation Districts: Bledsoe, Hamilton, Marion

Southeast Tennessee Resource Conservation & Development Council

Tennessee Department of Agriculture: Agricultural Enhancement Program, Division of Forestry

Tennessee Department of Environment and Conservation: Division of Water Resources

TennGreen Land Conservancy

Thrive Regional Partnership

University of Tennessee Chattanooga: IGT Lab

US Fish & Wildlife Service: Ecological Services Program, Partners for Fish and Wildlife Program, Science Applications Program

# Project Outcomes

- Reintroduction of one native fish species into former Laurel Dace habitat
- Improve water quality in one stream to meet Clean Water Act standards





# Working with Farmers





# Perennial Vegetative Cover





# Livestock Exclusion





# Riparian Buffers





# Culvert Replacement





# Drought Rescue











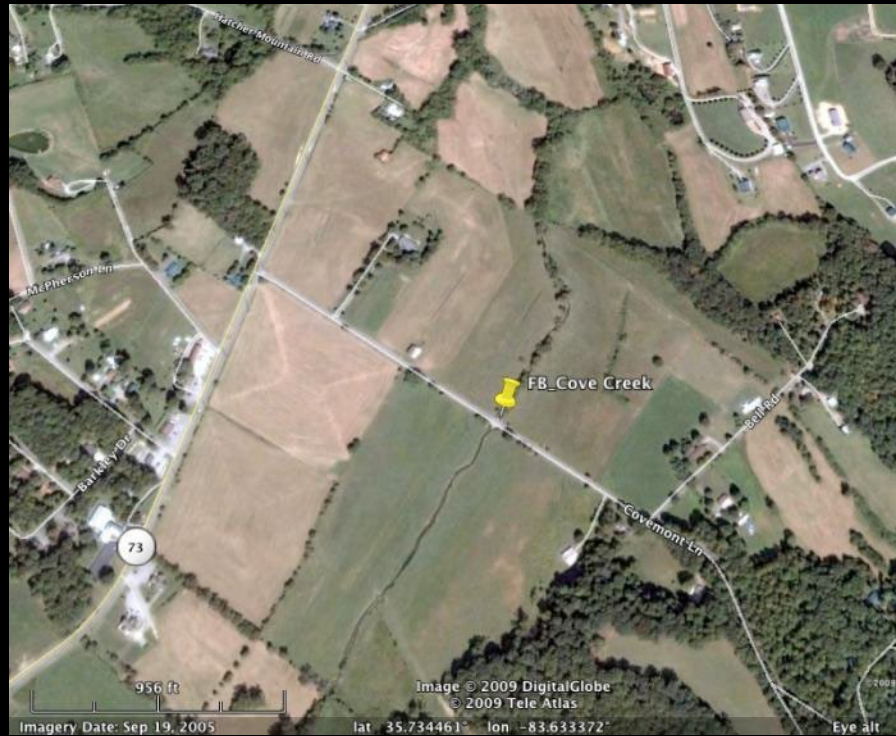


# Program Successes





# Our actions on land are magnified in water





# Acknowledgements

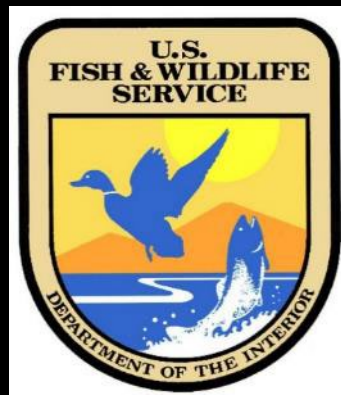


## Tennessee Aquarium Team:

- Sarah Kate Bailey
- Stephanie Chance
- Helaina Gomez
- Drew Hardy
- Abbey Holsopple
- Teresa Israel
- Bernie Kuhajda
- Tigris Nevans

## And Also:

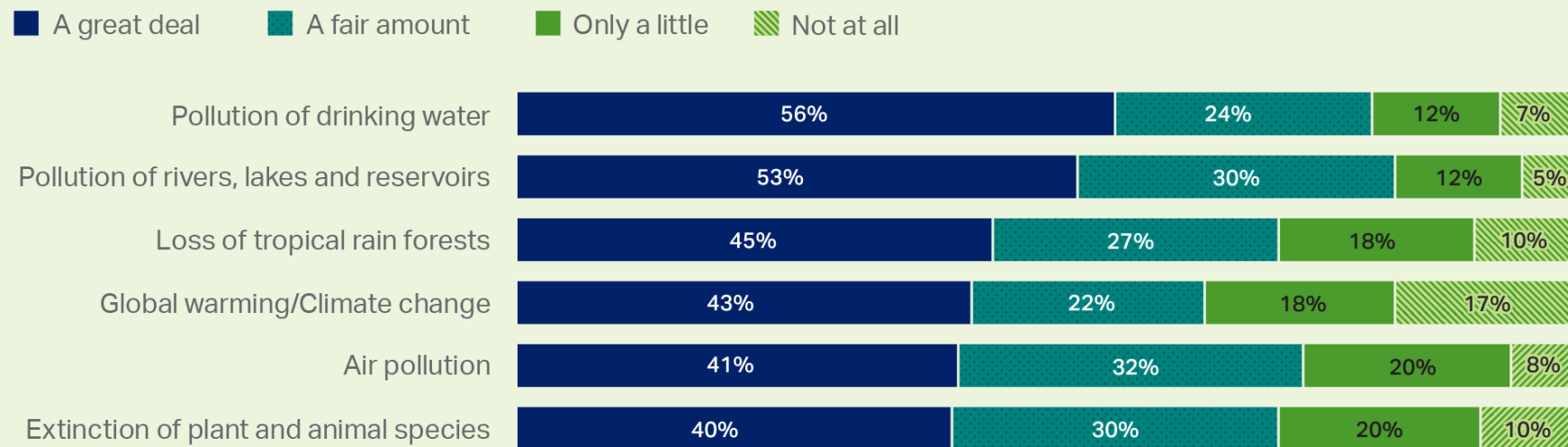
- Shawna Fix
- Justin Howard
- Adam Kennon
- John Roden





## Americans' Level of Worry About Environmental Problems

How much do you personally worry about each problem?



GALLUP, MARCH 1-15, 2021