GEORGIA
DEPARTMENT OF NATURAL RESOURCES
WILDLIFE RESOURCES DIVISION

Native Freshwater Mussels: Conserving Unique Aquatic Biodiversity in the Southeastern US

Matthew Rowe

Georgia Department of Natural Resources

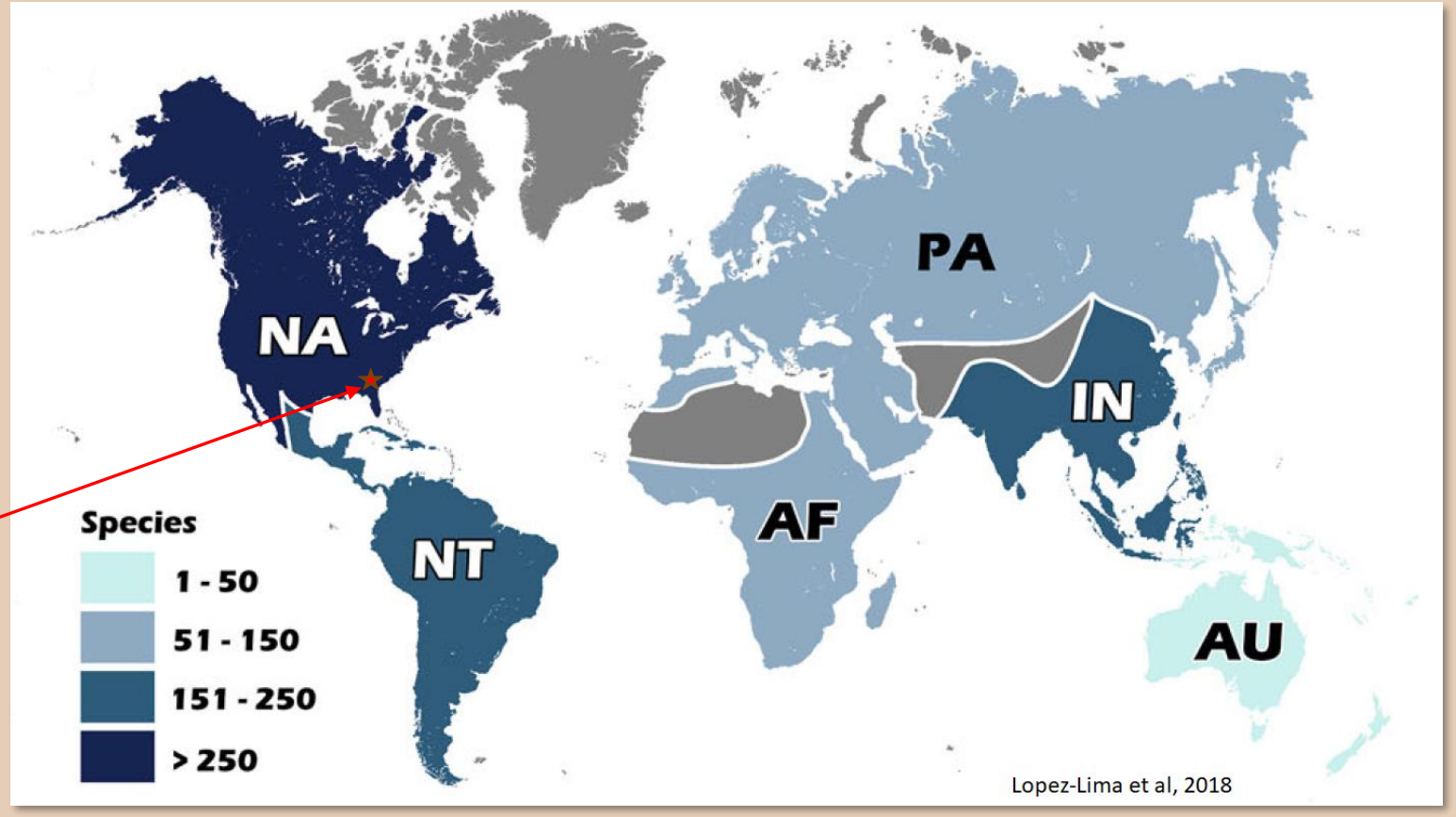
- What are freshwater mussels?
- Biology, Ecology, and local Diversity
- Conservation Status
- Threats
- Conservation and management strategies

What are Freshwater Mussels?

Definition, Diversity, distribution

- Freshwater mussels are a diverse group of bivalve mollusks (clams) which occupy freshwater habitats across the world.
  - ~ 900 species worldwide
  - All continents except Antarctica and the Pacific Islands
  - Greatest diversity is in North America (~300 species)

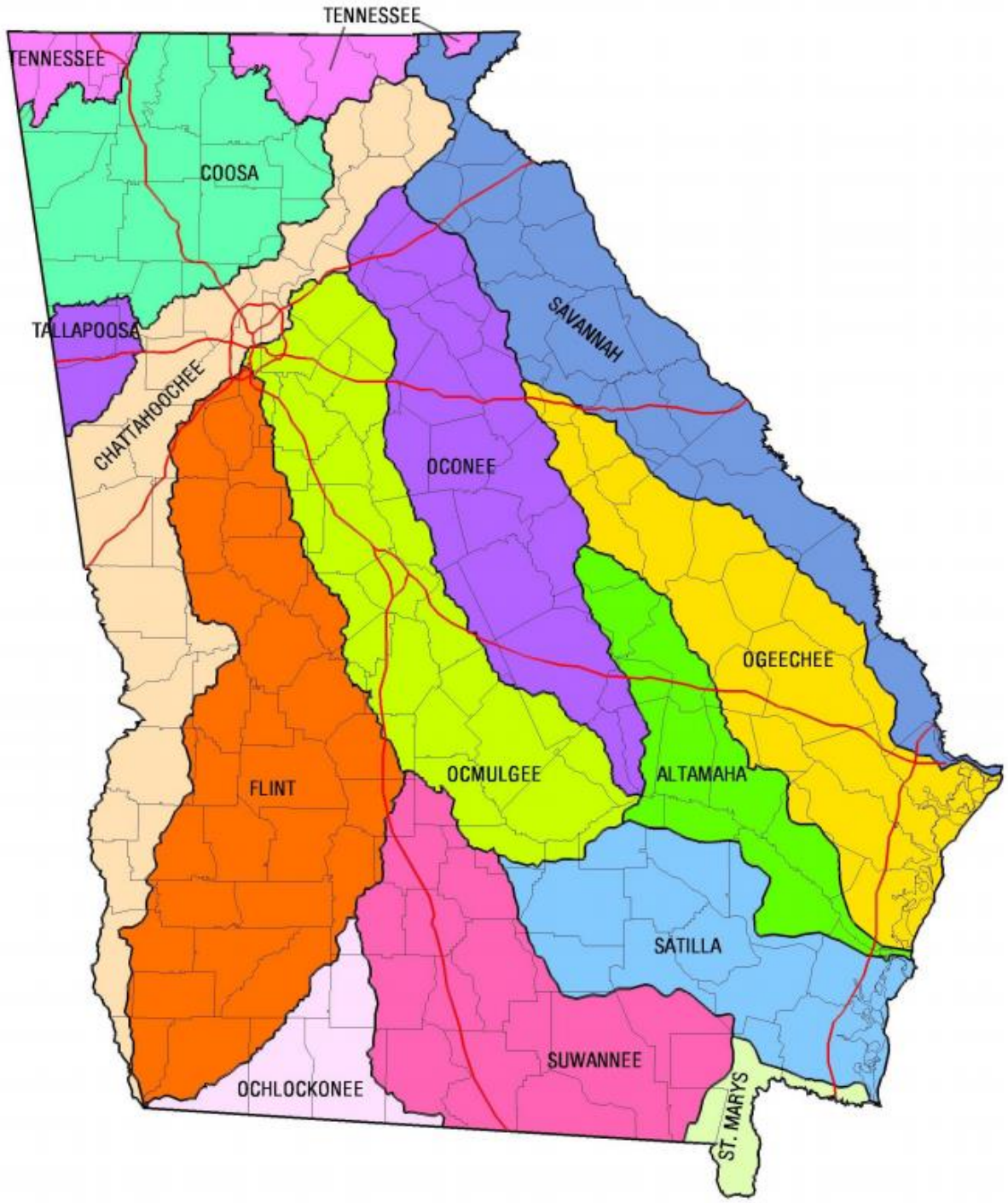
Global diversity hotspot!



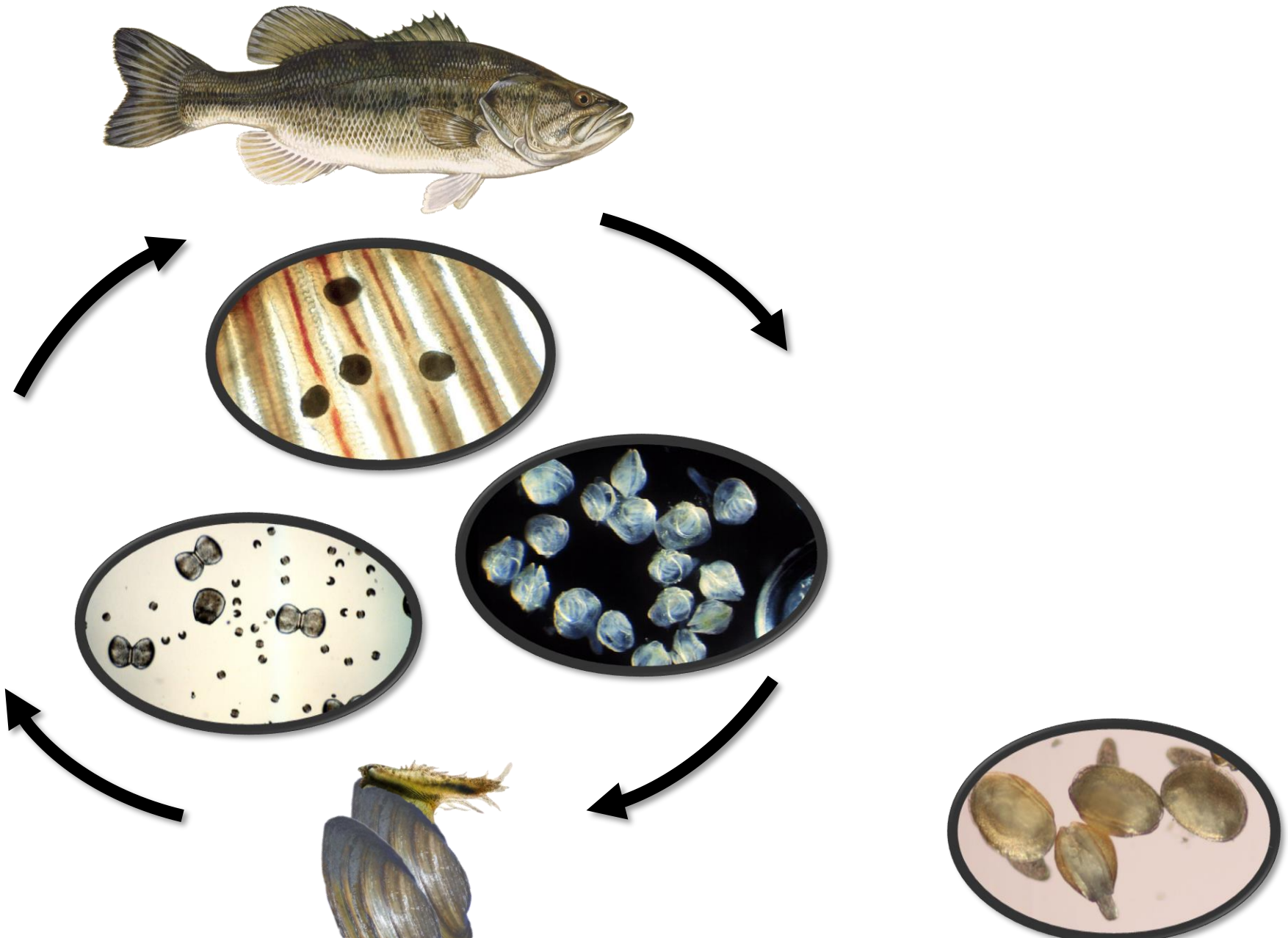
Major Georgia River Basins

Total - 126 species, 14 extirpated, 7 extinct

- Coosa – 41 species, 2 extinct
- Tennessee – 39 species, 2 extinct
- Apalachicola – 31 species, 2 extinct
- Savannah – 23 species
- Ochlockonee - 23 species, 1 extinct
- Altamaha - 20 species
- Ogeechee – 18 species
- Suwannee – 15 species
- St. Marys – 9 species
- Tallapoosa – 7 species
- Satilla – 3 species



Freshwater Mussel Life Cycle



Host Attraction Strategies

Ecology

- Water Filters
  - Remove suspended particles from the water column
  - Deposit suspended nutrients to the bottom
  - Remove algae and bacteria from system
- Food source
  - Fish, otter, muskrat, raccoon, waterfowl
- Bioturbation
  - Stir the substrate to mix and incorporate oxygen
- Epifauna
  - Provide habitat for bryozoans, sponges, and other invertebrates

Conservation Status

- "Most endangered group of animals in the world" (> 70% of species threatened at some level)
- 88 Federally Listed Species in the Southeast
  - 73 Endangered, 15 Threatened
- 20 federally listed species in GA
  - 16 Endangered, 4 threatened
  - 25 state listed in GA
- 26 species already extinct, 9% of NA fauna!

Basin	Number of Species	Species in GA	Endemic	Extinct
Tennessee	93	39	36	11
Coosa	54	43	10	5
Apalachicola	33	33	7	2
Savannah	25	25	0	0
Ochlockonee	23	18	2	1
Altamaha	20	20	5	0
Ogeechee	18	18	0	0
Suwannee	16	16	2	0
St. Mary's	8	8	0	0

Ochlockonee Arkmussel
(Alasmidonta wrightiana)

Sugarspoon
Epioblasma arc

Angled Riffleshell
marginata

Ohio Riffleshell
Epioblasma cincinnatiensis

Leafshell
Epioblasma flexuosa

Upland Combshell
Epioblasma metastriata

Acornshell
ioblasma haysiana

Lined Pocketbook
Lampsilis binominata

Forkshell
Epioblasma lewisii

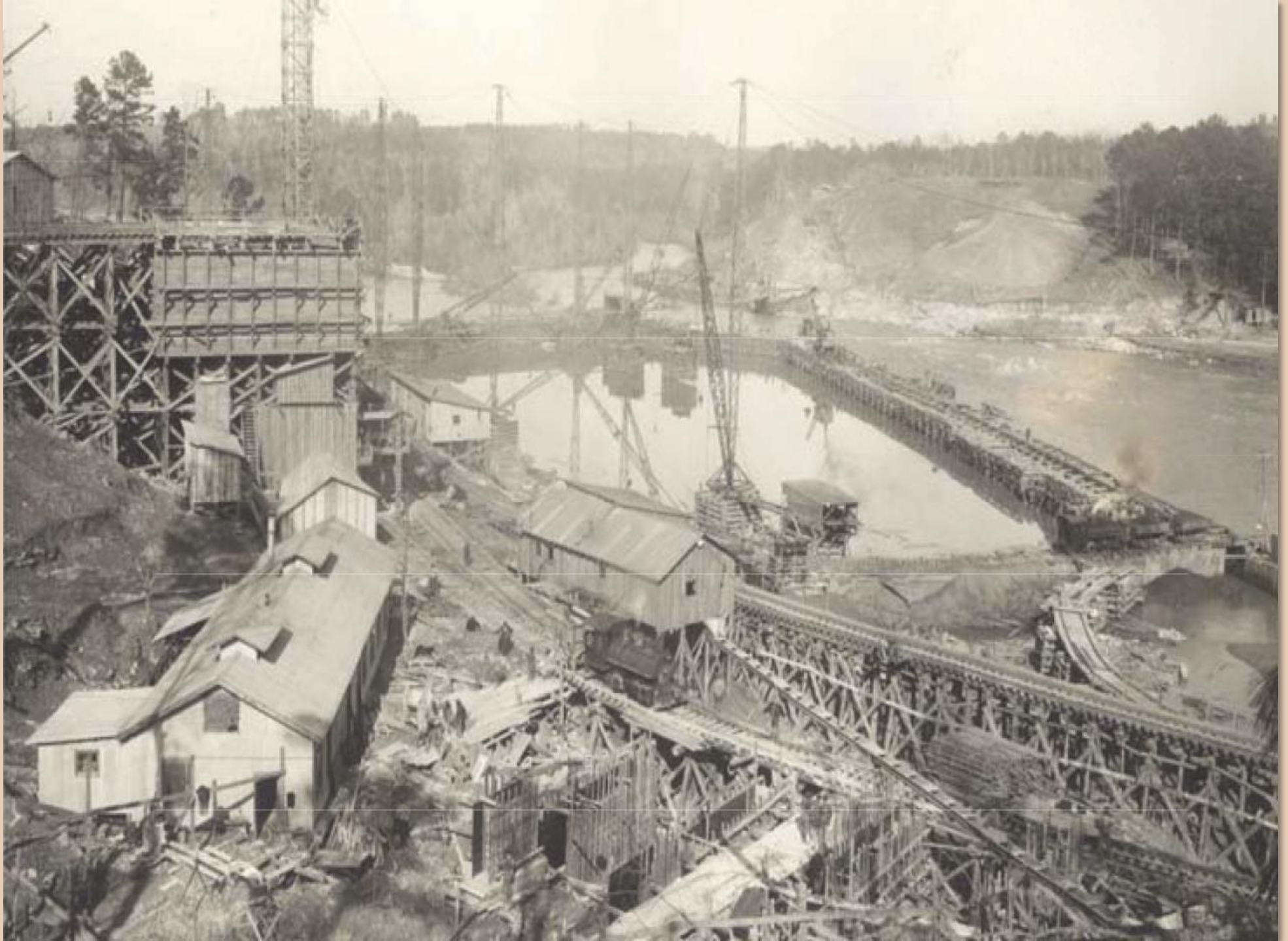
Round Combshell
Epioblasma personata

Tennessee Riffleshell
Epioblasma propinqua

Wabash Riffleshell
Epioblasma sampsonii

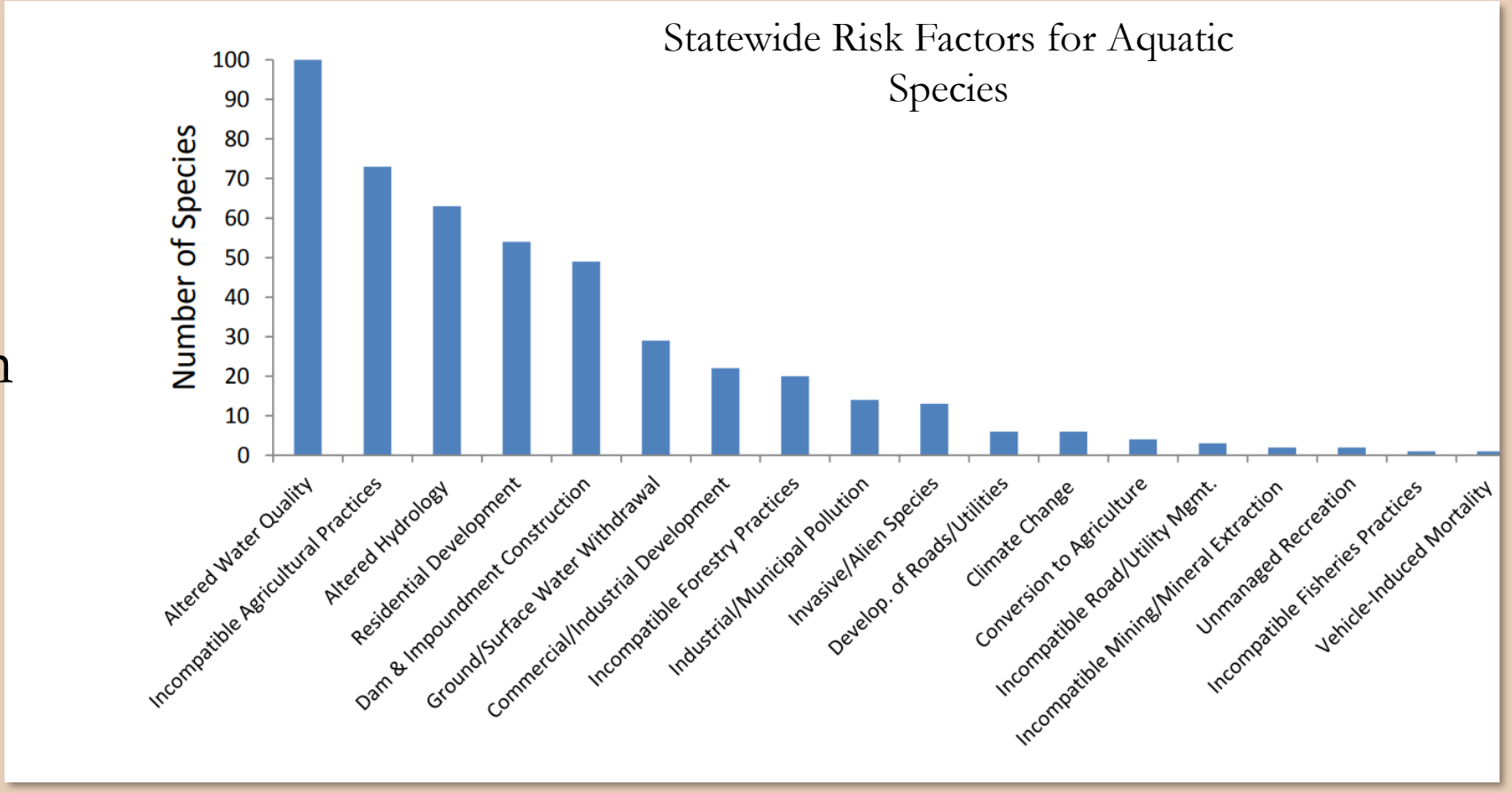
Turgid Blossom
Epioblasma turgidula

Threats



Mussel-specific Threats

- Impoundments
- Habitat Loss (water)
- Habitat Loss (substrate)
- Reproductive Disruption
- Pollution
- Eutrophication
- Invasive Species
- Dredging
- Harvest



Dams

- Impede movement
- Change flow patters
- Change substrate composition
- Alter water quality

Eutrophication

- Increased nutrients alter natural systems
- Algae blooms cause oxygen depletion
- Cyanobacteria cause toxic blooms

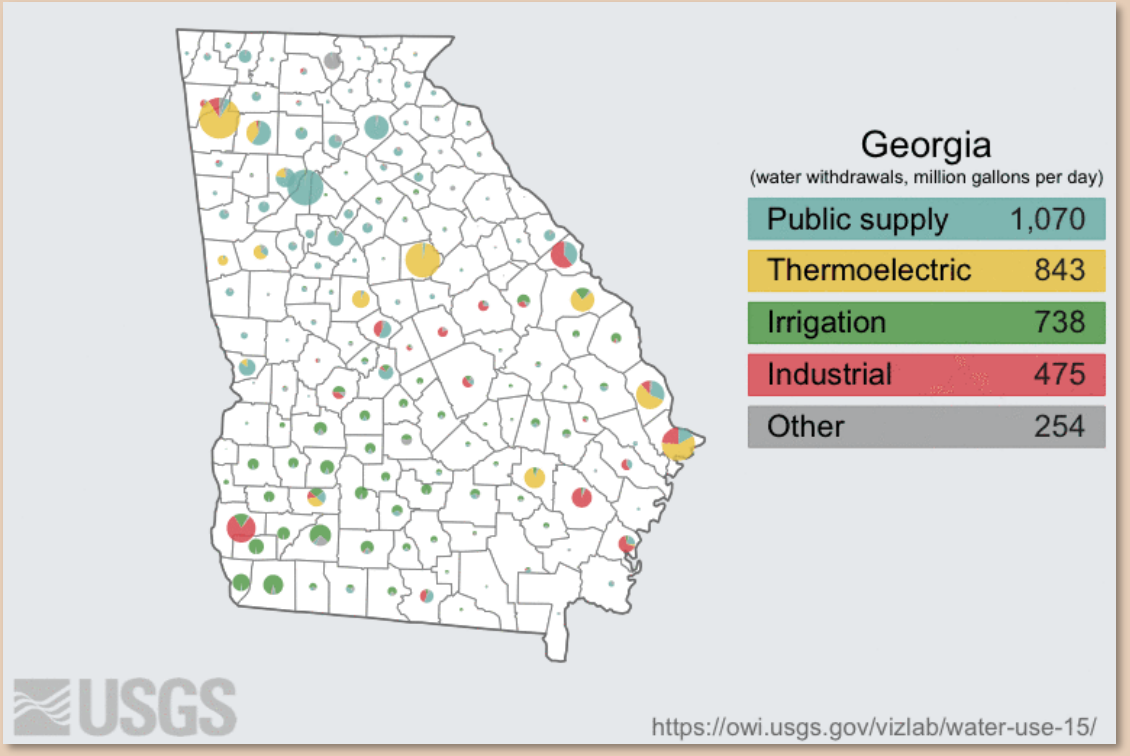
Invasive Species

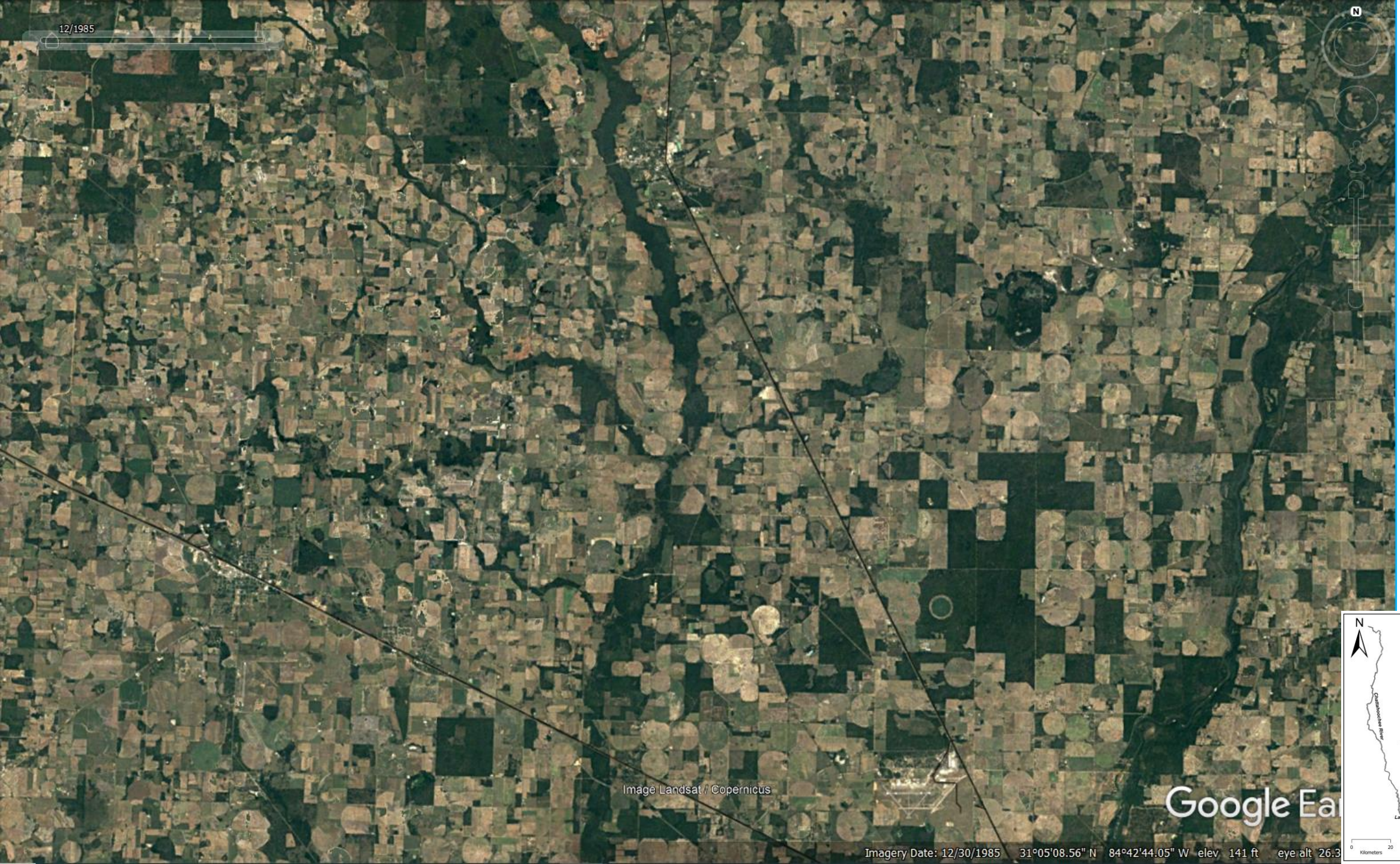
- Asian Clam (*Corbicula fluminea*)
- Zebra Mussels (*Dreissena polymorpha, D. bugensis*)
- Invasive vertebrates
  - Disrupt mussel-host relationship
  - Damage habitat
- Non-native unionids

Francisco Welter Schultes, AnimalBase
(Locality: China, Guangzhou)

Competition for Water

- Humans compete for water with aquatic systems
- Withdrawal for human use can cause lower than expected flows, change water chemistry, and exacerbate droughts

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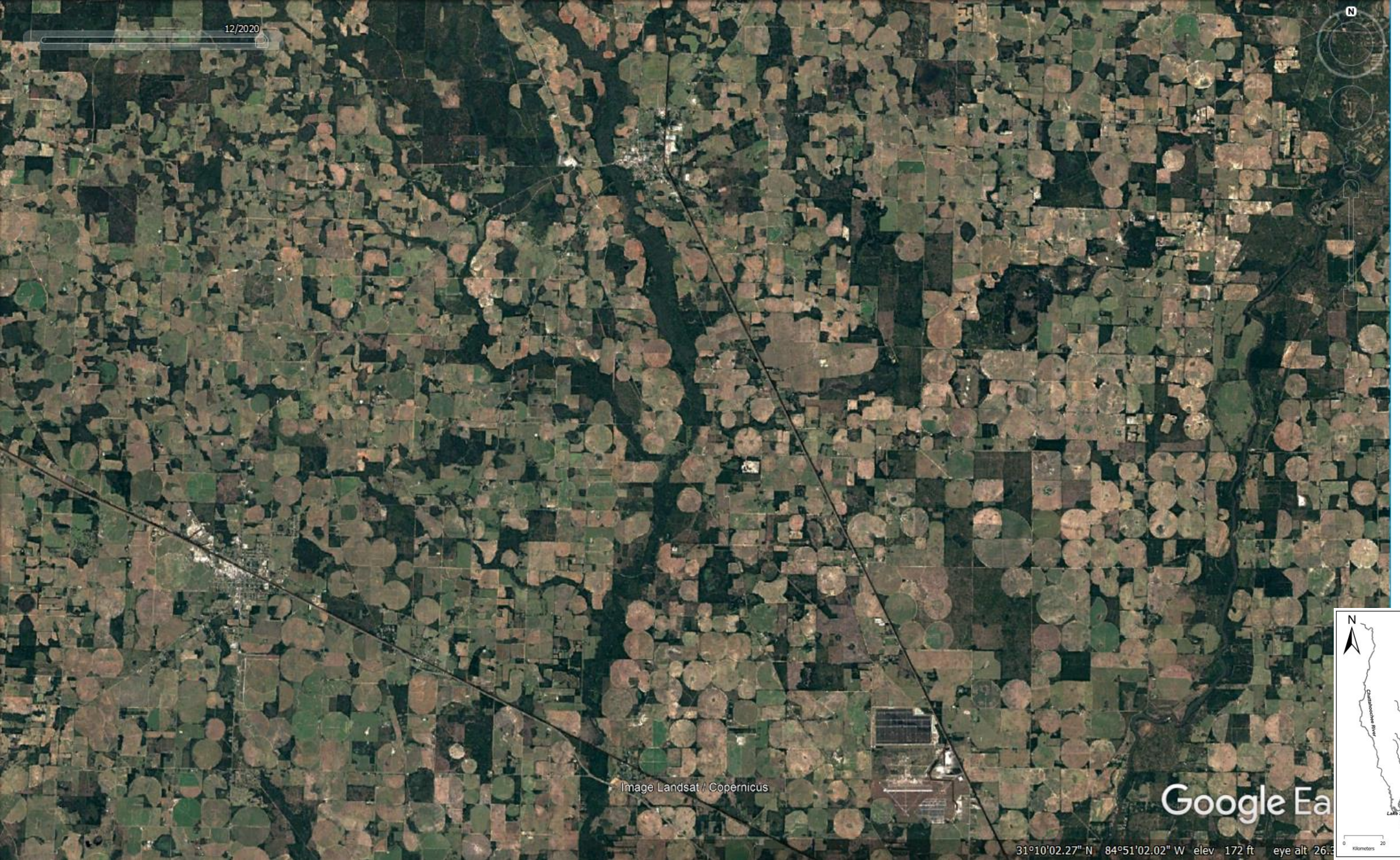
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Flint River
Lake Seminole
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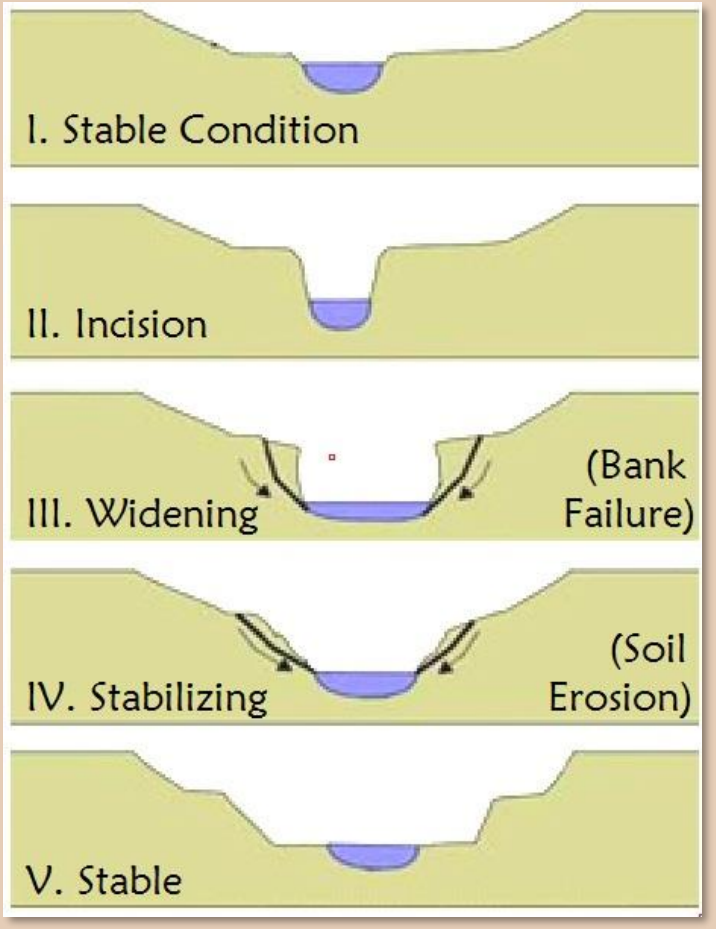
Substrate Destabilization

- Construction
- Channel modification
- Dredging
- Vegetation removal
- Impervious surfaces

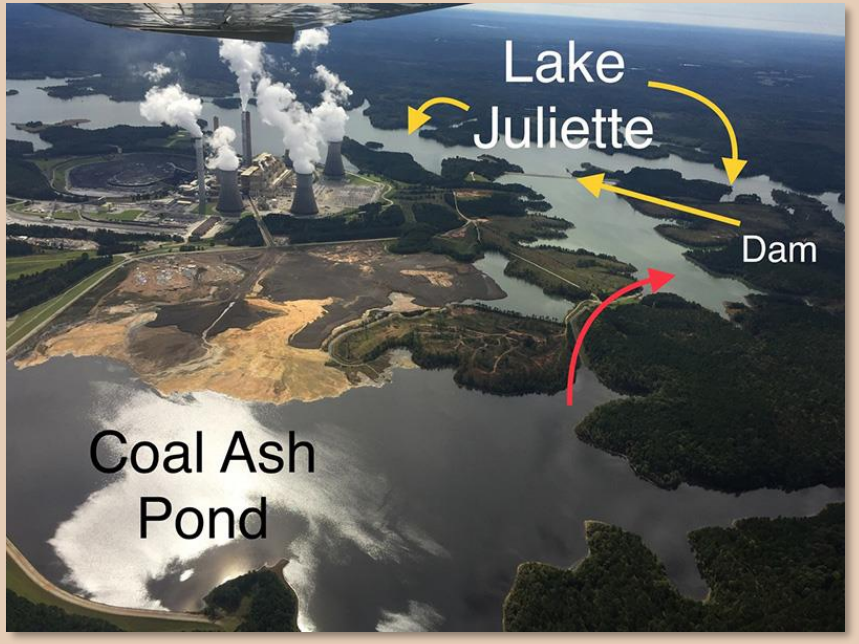


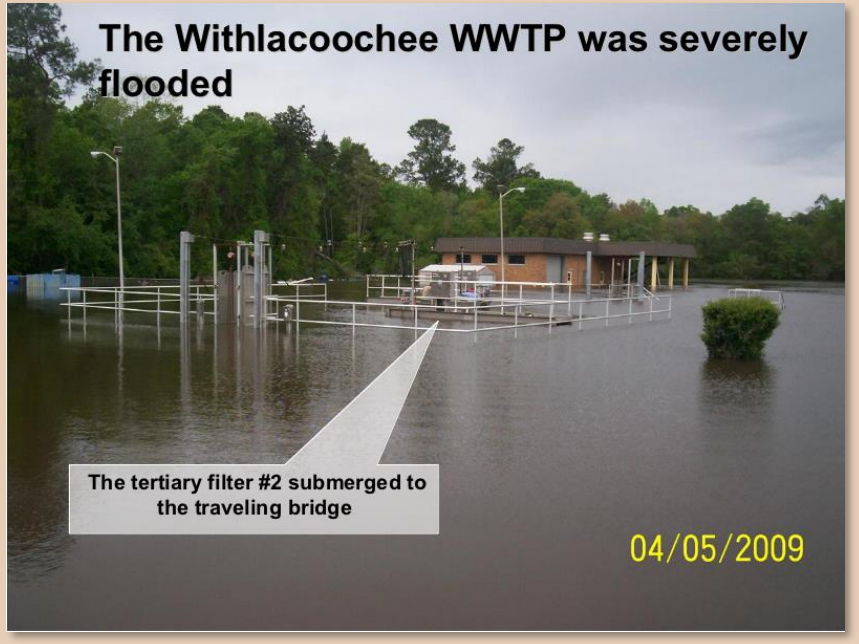
Reproductive Cycle Interruption

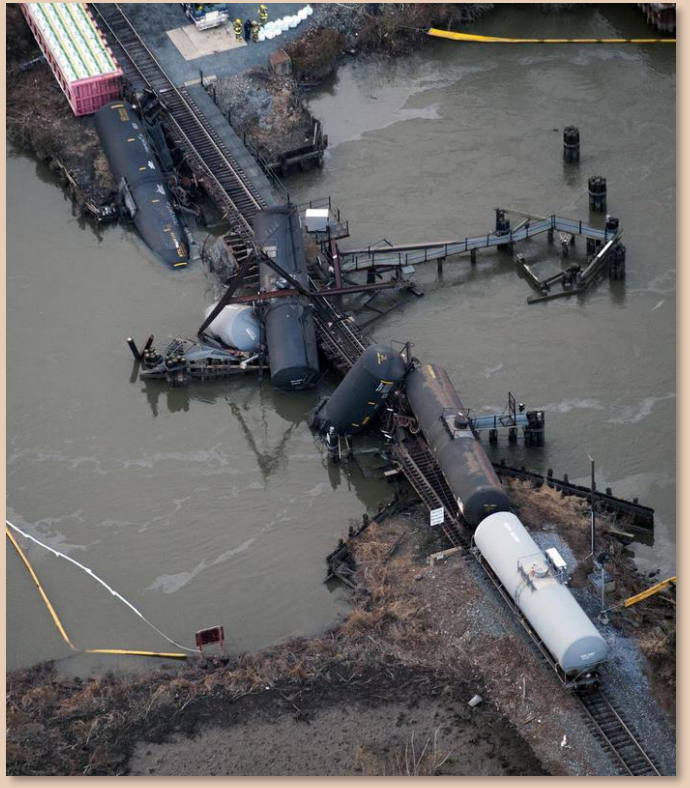
- Dams, improperly installed culverts, and other structures block migrations of anadromous fish
- Mussels lose access to their natural hosts

Pollution

- Thermal
  - Heat
  - Low oxygen
- Chemical
  - Ammonia
  - Spills







Harvest

Native American food source

Turn of the century button industry

Cultured pearl industry

Current shell harvest is regulated to a few common species of adult size

Solutions?

Photo: Kaegan Scully-Engelmeyer

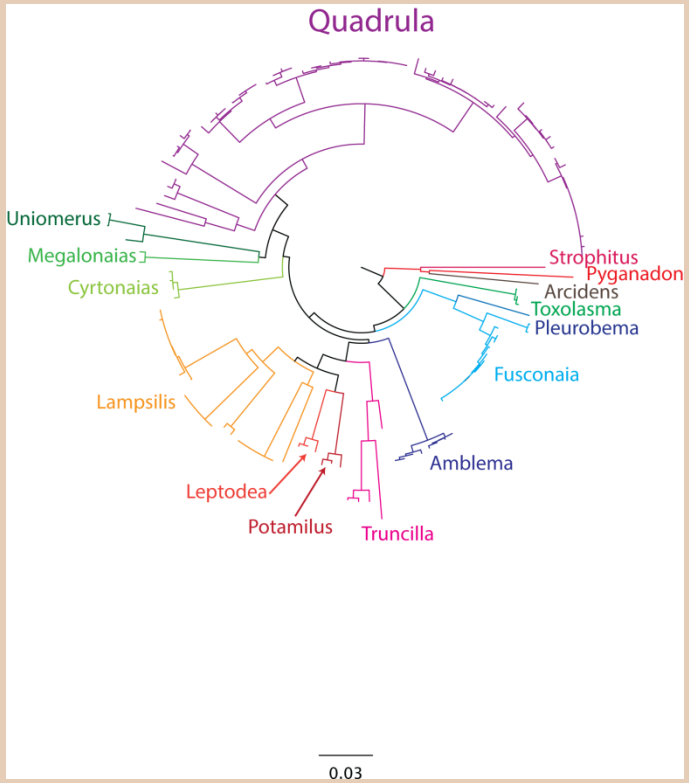
Habitat Restoration

- Dam Removal
- Substrate stabilization

Ask not what your mussels can do for you, but what you can undo for your mussels!

Long-term Monitoring

Filling Data Gaps



Exploratory Surveys

Education and Outreach

www.georgiabiodiversity.org

Artificial Propagation


Gary Peeples, USFWS.


Chris Barnhart, Missouri State University

What can you do to help?

- Conserve energy
- Conserve water
- Avoid pesticide/herbicide use
- Avoid overuse of fertilizers
- Avoid destabilizing streambanks or plant stabilizing vegetation
- Avoid transporting water, plants, and animals
- Educate


Questions?