

# Projects - Rogers

- **Contributions of stocked fingerling, stocked adult, and native rainbow trout to fisheries in the Norris and Fort Patrick Henry tailwaters of east Tennessee**
- **Relative Density of Bigheaded Carps in the Tennessee and Cumberland rivers: habitat preferences influencing distribution and controls**
- **Sensitivity and Precision of eDNA for Detecting Asian Carp in Tennessee**
- **Evaluating Asian Carp Movement in the Tennessee River with Focus on Prohibiting Lock and Dam Passage**

# Projects - Rogers

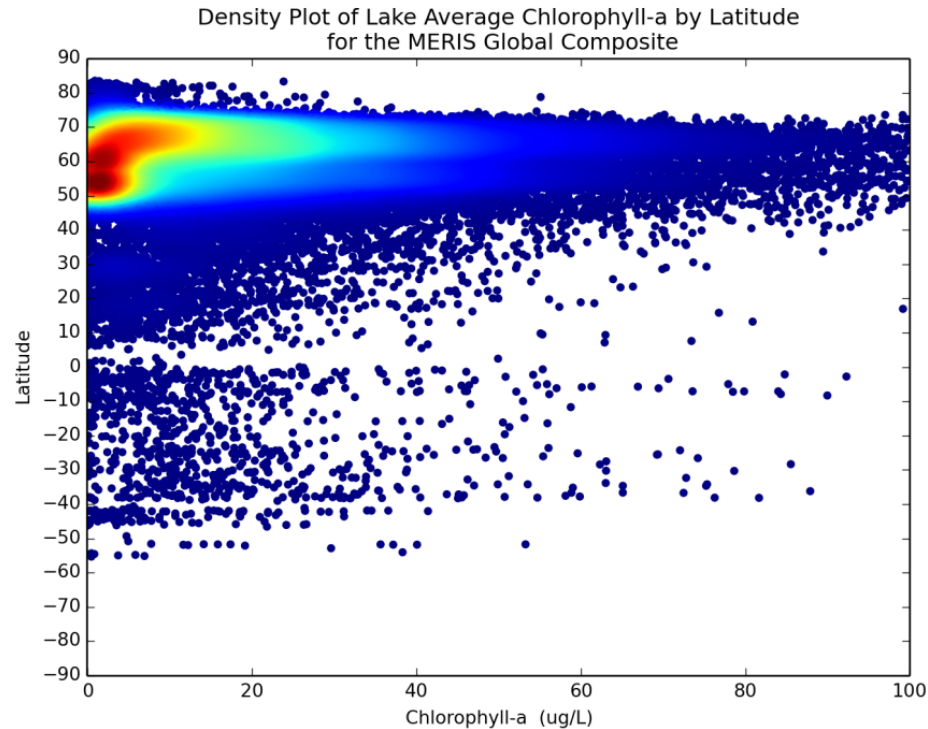
- **Predicted Ecosystem Effects and Population Control Needs of Bigheaded Carp in Productive Southeastern Reservoirs**
- **Using eDNA to detect African Walking Catfish in Puerto Rico rivers**
- **Global inland fish production: importance and threats**

# Rogers – exemplar project

- What drives global inland fisheries production?
  - Hypothesis: fish production at a global scale must come from bottom up (chlorophyll)

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  - FAO estimates of inland fish harvest are underestimated
  - Some U.N. countries derive 85% of their protein from freshwater fisheries

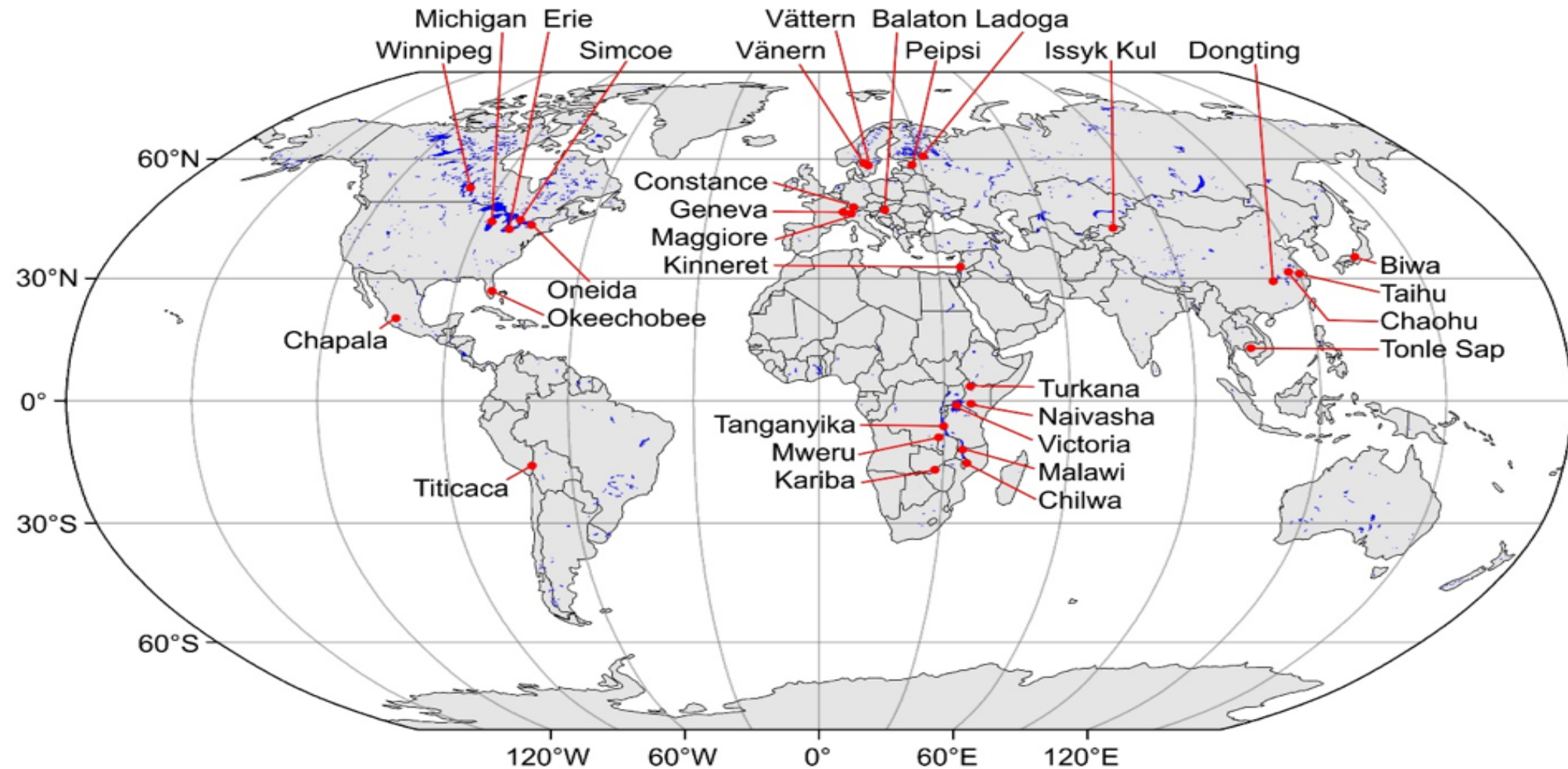
# Rogers – exemplar project

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- Implications:
  - Conservation, water management and food security decision must take inland fisheries into account

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- Next steps
  - Can we describe how land use and climate have affected inland fisheries?





- 31 lakes, 35 years of data, 5 continents
- Land use, climate and many variables

- Conclusion:
  - **Investing in Clean Water Can Benefit Food Security Worldwide (USGS press release)**
  - **Nature Communications (In Press)**

# Projects - Rosenberger

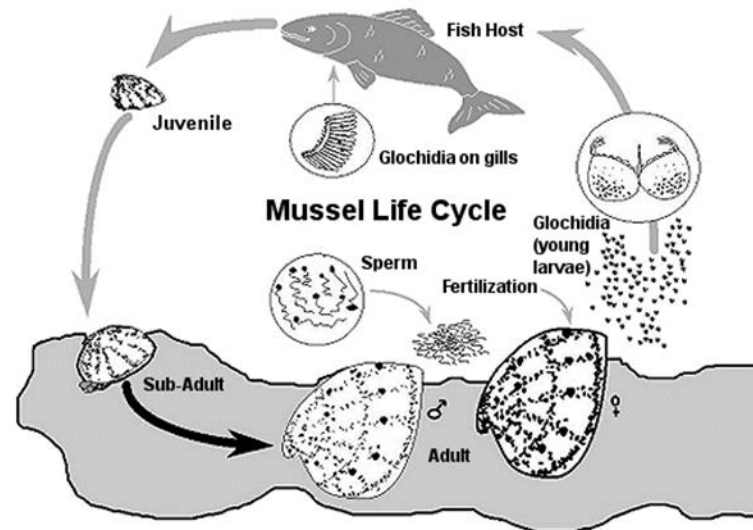
- **Modeling Fundamentally Suitable Freshwater Mussel Habitat in the Duck River Drainage, Tennessee**
- **Blotchside Logperch recovery**
- **Habitat Associations and Life History Characteristics of the Longnose Darter (*Percina nasuta*) in Missouri**
- **Water Quality Assessment for Cumberland River Aquatic Center**
- **A Spatial Assessment of the Status and Risks to Mussel Assemblages in the Meramec Drainage of Missouri**

# Projects - Rosenberger

- **Habitat and Suitability Monitoring of Freshwater Mollusks in Tennessee**

# Rosenberger – exemplar project

- Difficult task
  - Life cycle
  - Cryptic nature
- Difficulties with habitat modeling and threat identification



# Stakeholders

- **Conservation status of mussels in Missouri?**
- **How are threats on the landscape distributed?**
- **Can threats be managed or mitigated?**

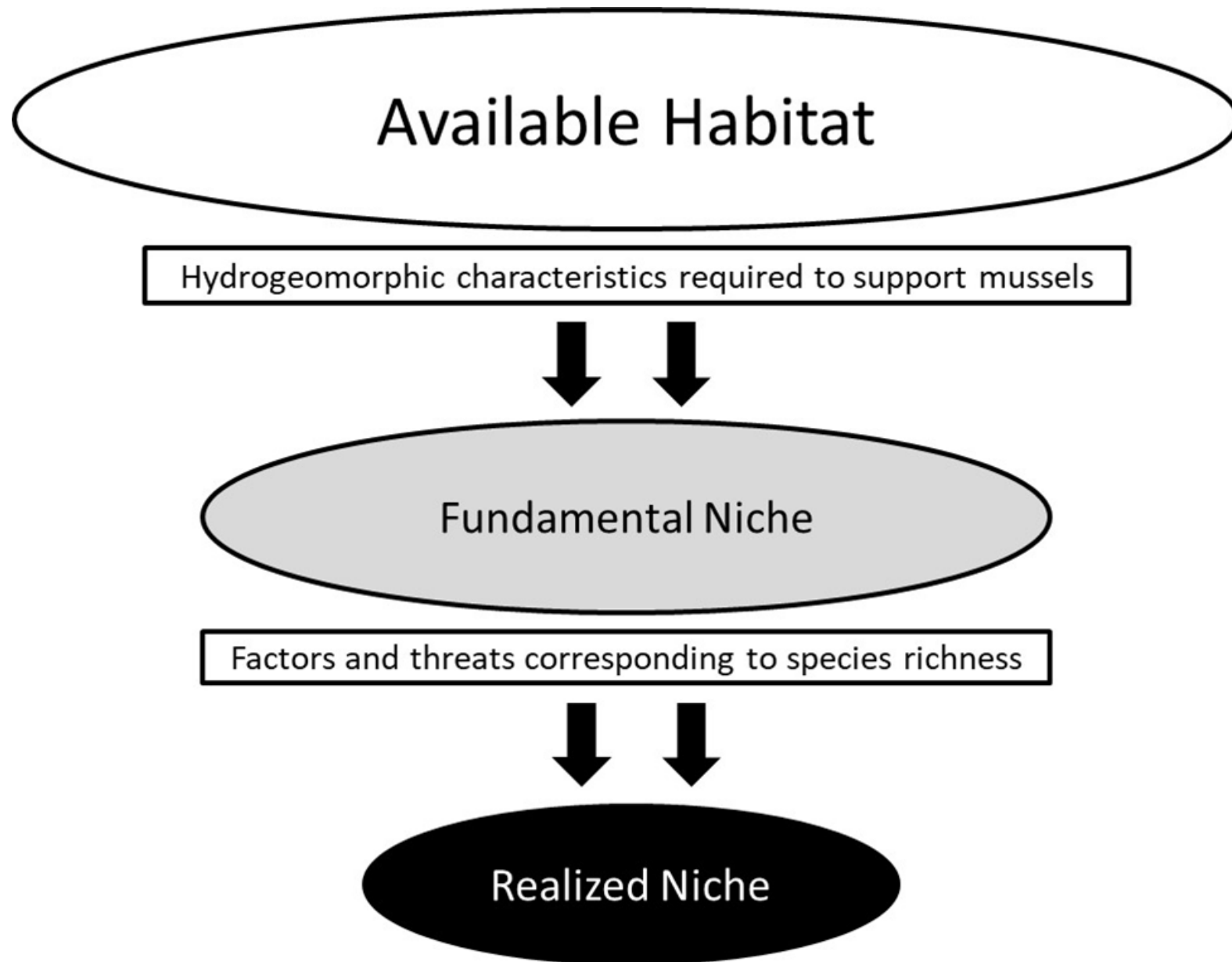
## **Needs for the State of Missouri:**

- **Comprehensive Conservation Assessment**
- **Monitoring Plan**



Goal: Develop a spatial assessment of the status and risks to mussel assemblages in the Meramec River Basin.

1. Identify areas of fundamentally suitable habitat of diverse mussel communities at a scale relevant to mussels and managers
2. Spatially describe threats to mussel assemblages on the landscape and identify areas at risk
3. Develop a monitoring guidance summarizing the spatially-explicit monitoring framework for freshwater mussels with examples from the Meramec River Basin.





# Establishing a Conservation Unit

## Modeling Mussel Communities as a whole

### 1. Multi-species beds

- Different host fish
- Different LH strategies
- Competition

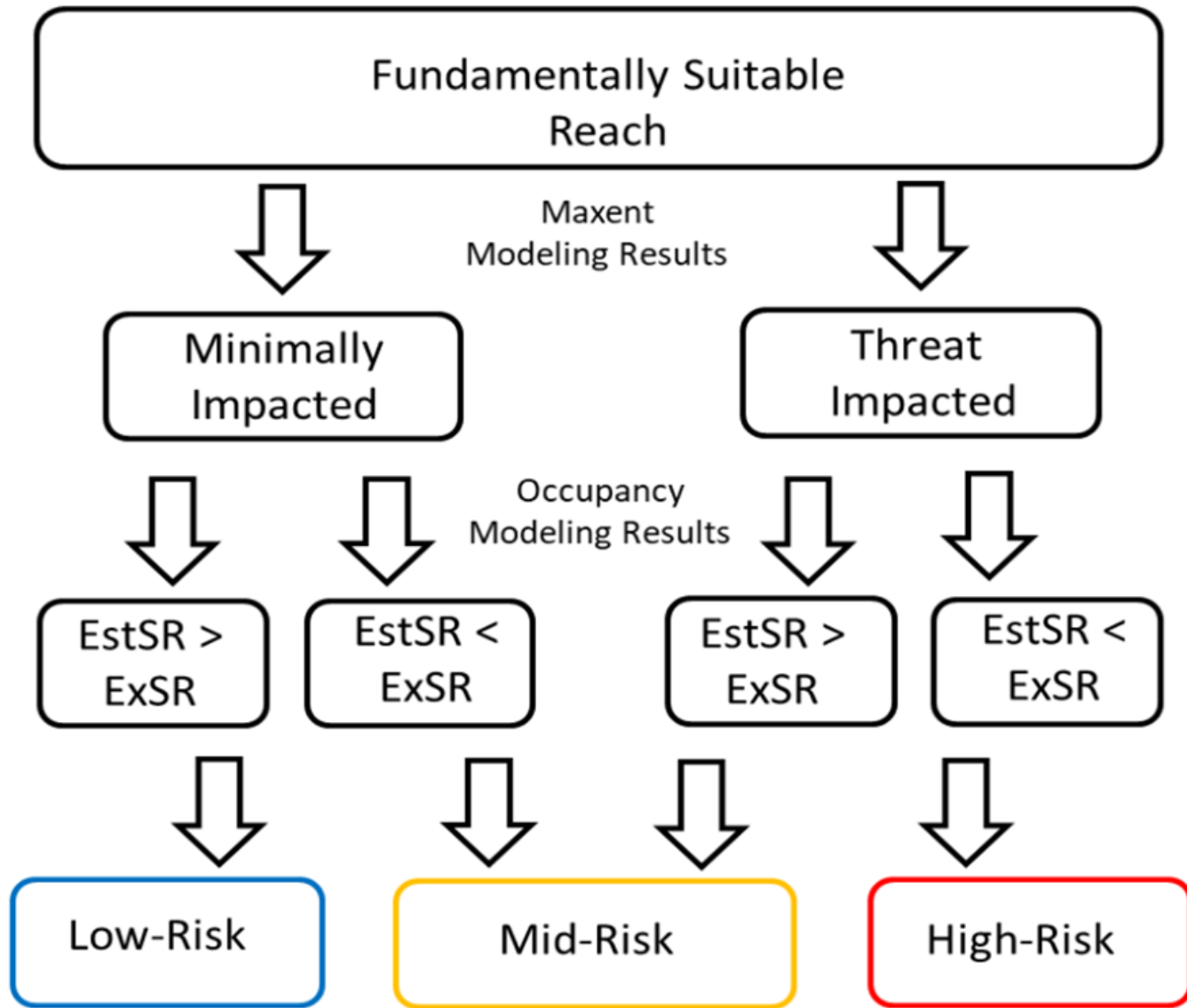
### 2. Hydro-geomorphic Variables

- Complex life cycle
- Low adult mobility
- Juvenile survival



# Factors lowering Richness

1. Number of bridges and public access sites within watershed
2. Proportion of watershed urban land use
3. Proportion of watershed agriculture land use
4. Distance to closest suitable reach
5. Proportion of riparian zone (30m) agriculture



133 Minimally Impacted

156 Threat Impacted

Develop a monitoring guidance summarizing the spatially-explicit monitoring framework

- Guidance document
  - Framework outline and Basin-specific results
  - Reach-specific information for all 288 suitable reaches
- Managers can vary based on risk and reach status:
  - Sampling Goals
  - Sampling Frequency
  - Sampling Intensity

# Framework outcomes



Approach to formulate **attainable** restoration goals:

Ultimate goal: Establish self-sustaining population

Minimize threats to mussel population

**Measurable** goal: Increase richness to “expectations”  
through focused threat mitigation  
and reintroduction efforts



# Next steps

- Applications to Tennessee systems
  - How does climate, hydrology, flow regimes in a changing climate modify conservation and restoration needs?