

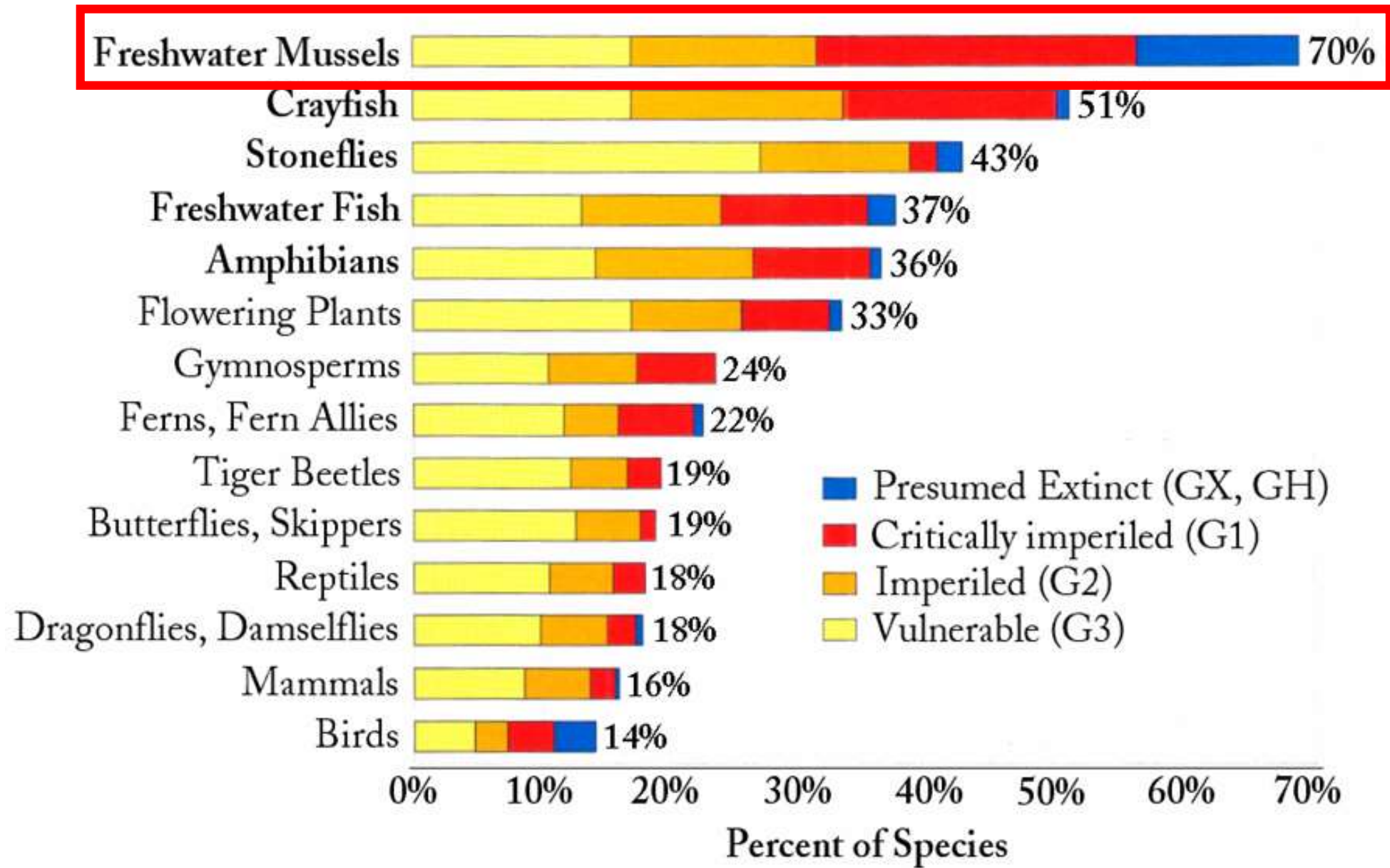


# A Tool for Identifying Potential Threats to Species on a Landscape Level



An example geared towards endangered freshwater mussels in Missouri

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# Threats to mussels

- Impoundments
- Channel alteration
- Sedimentation
- Poor water quality
- Mining
- Modified Hydrology
- Overharvest
- Invasive species





# Successful Conservation Plan

- Where are they?
- Why are they there?



# Habitat

Geomorphological & Hydrological Characteristics:

Stream power

Proximity to bluff

Drought refuge

Bed stability

Distance to gravel bar

Channel stability



# Fundamental Niche

# Fundamental Niche

Factors and threats corresponding to species richness

Demographic



- Distance to suitable reach
- Density of suitable reaches
- Tributary density
- Length of suitable reach

Point source

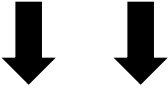


- Distance to gravel mines
- Distance to landfills
- Bridge crossings

Watershed

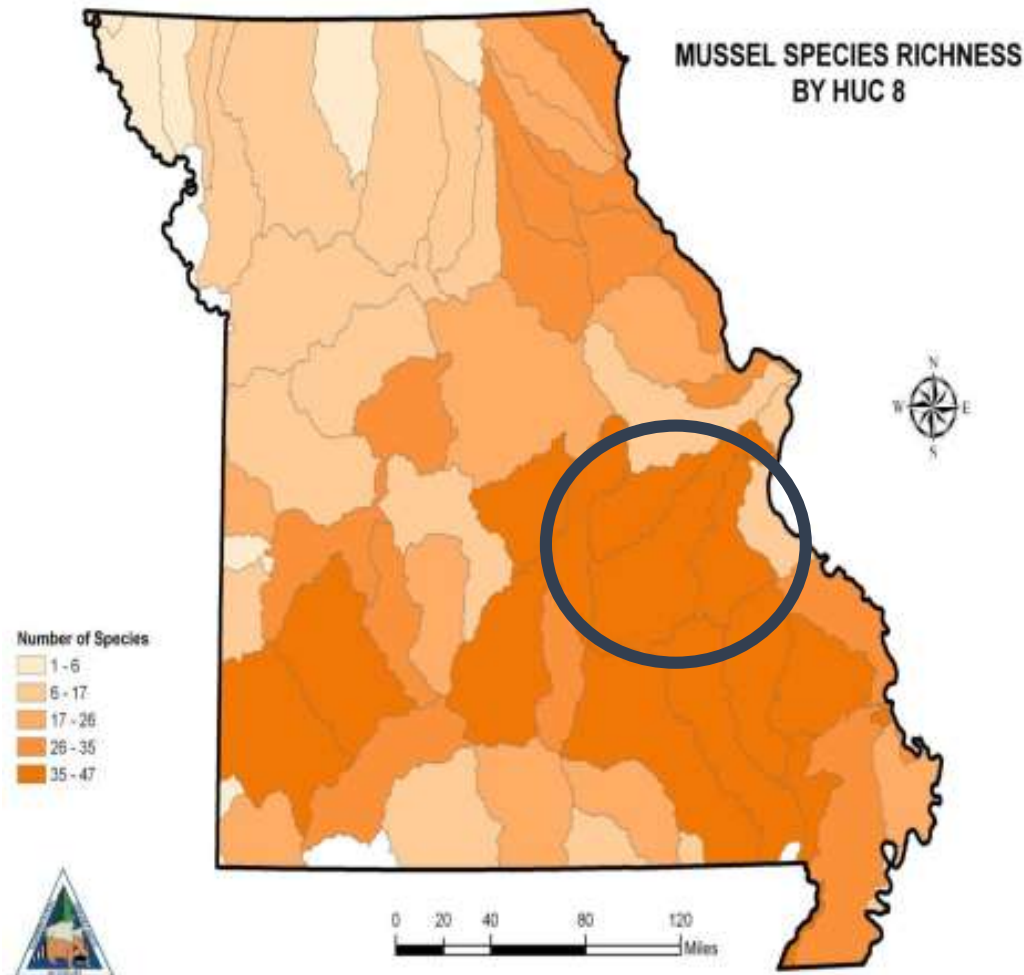


- Landcover
- Land use
- Pollution
- Dam Density



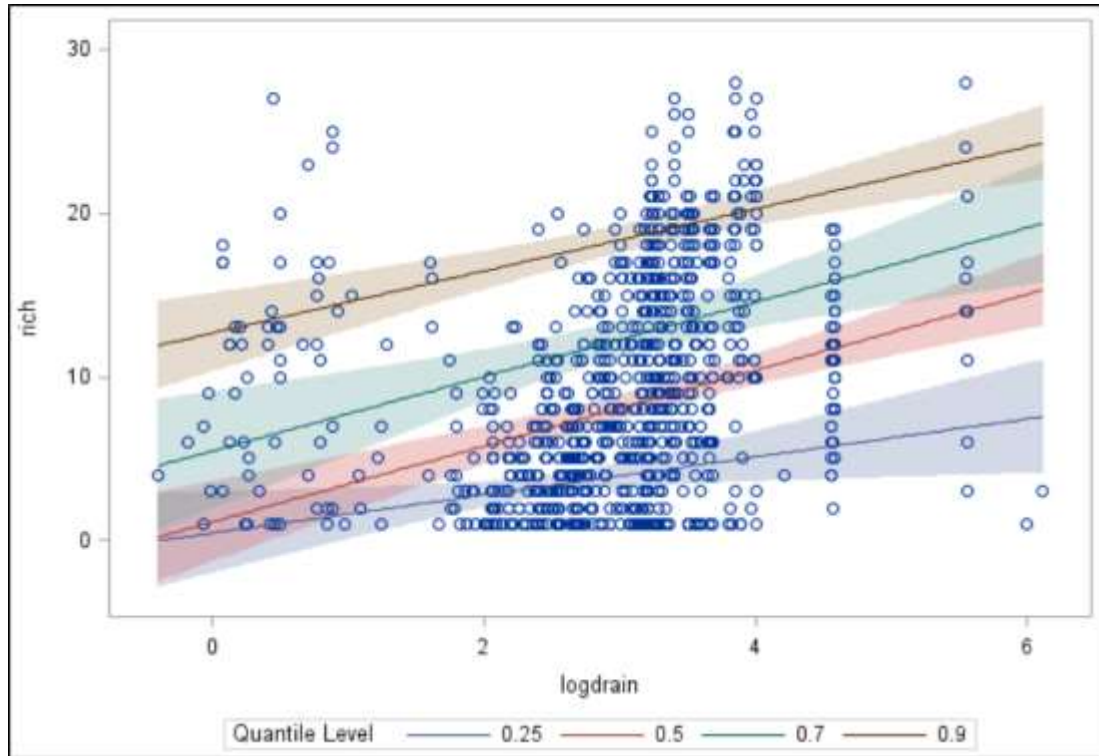
# Realized Niche

# Meramec River Basin



- One of the most diverse mussel faunas in the Midwest.
- >40 species
- 5 federally endangered species
- 13 SOCC
- Hotspot of mussel diversity!

# Modeling the Fundamental niche



Environmental variables:

Bed stability

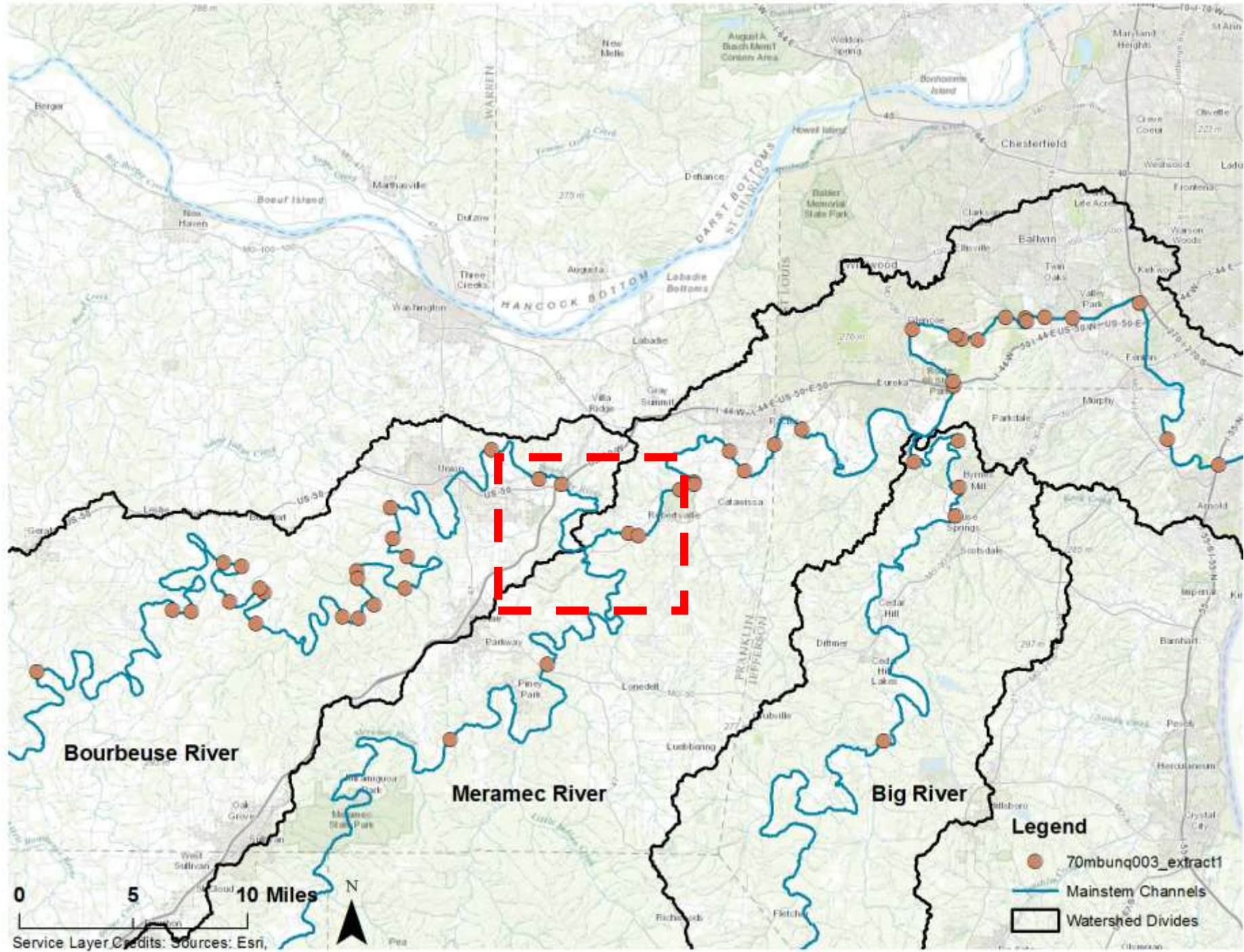
Channel stability

Stream power

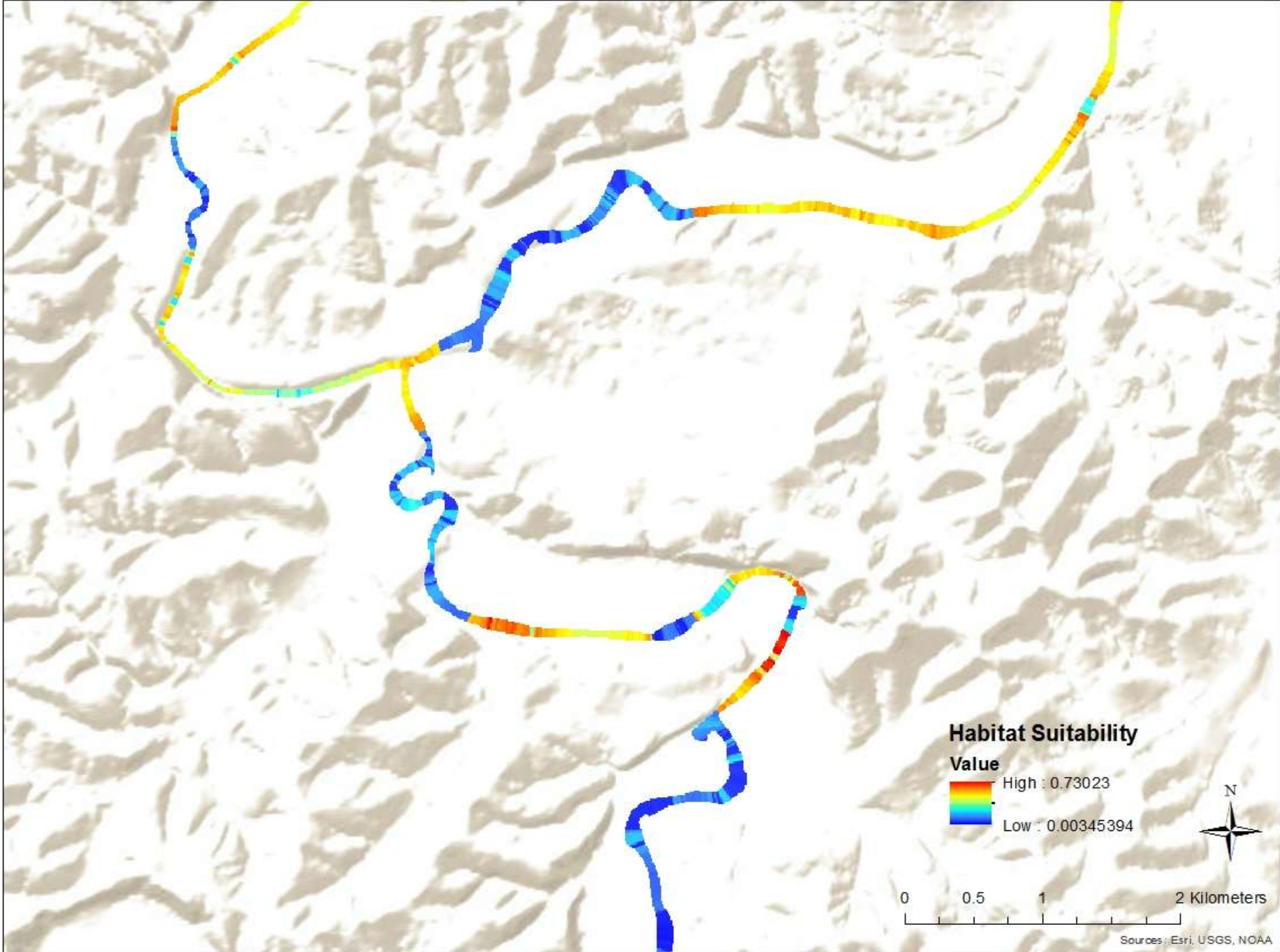
Distance to bluffs

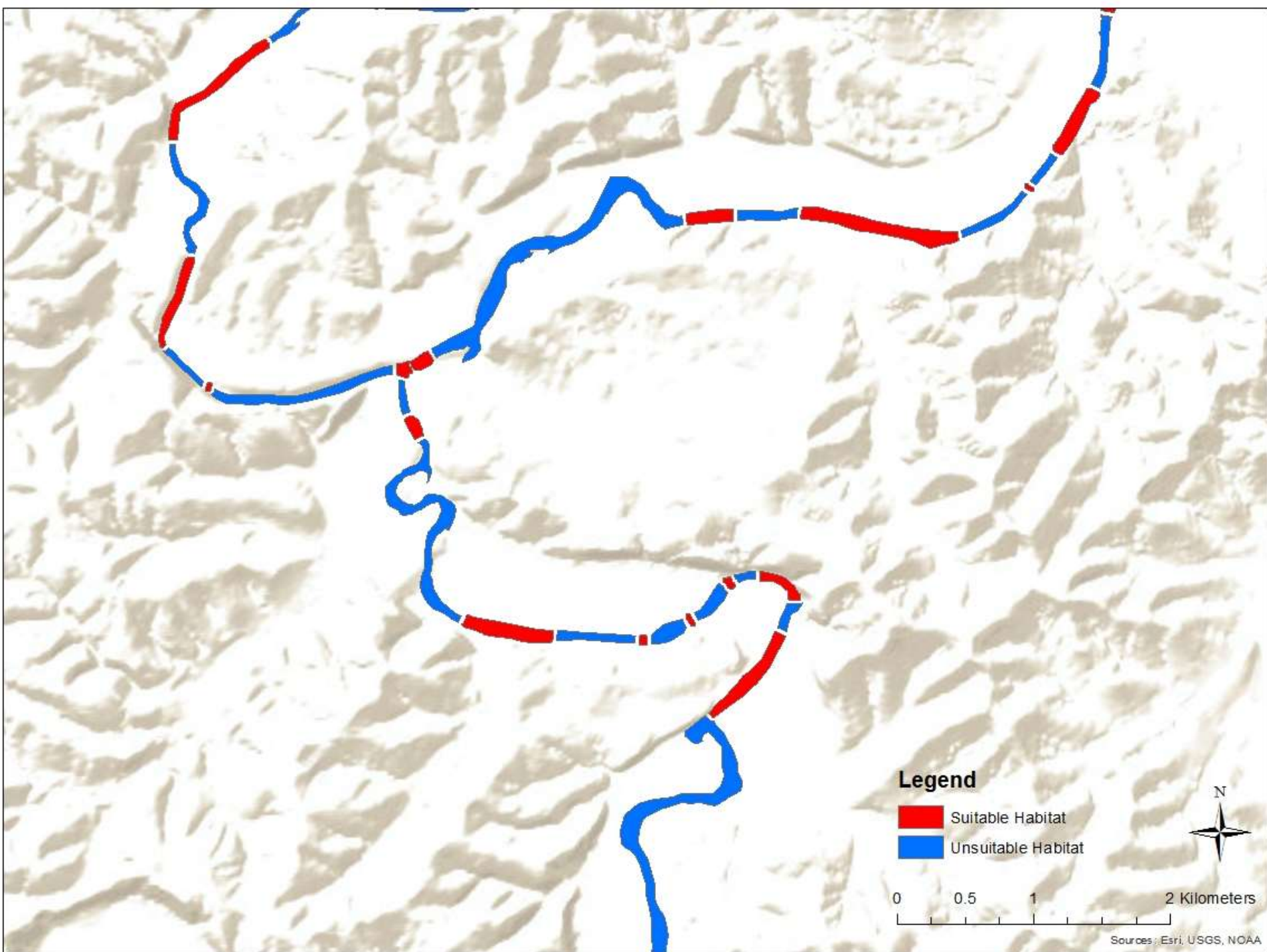
Distance to persistent gravel bars











# Fundamental Niche

Factors and threats corresponding to species richness

Demographic



- Distance to suitable reach
- Density of suitable reaches
- Tributary density
- Length of suitable reach

Point source

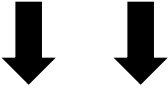


- Distance to gravel mines
- Distance to landfills
- Bridge crossings

Watershed



- Landcover
- Land use
- Pollution
- Dam Density

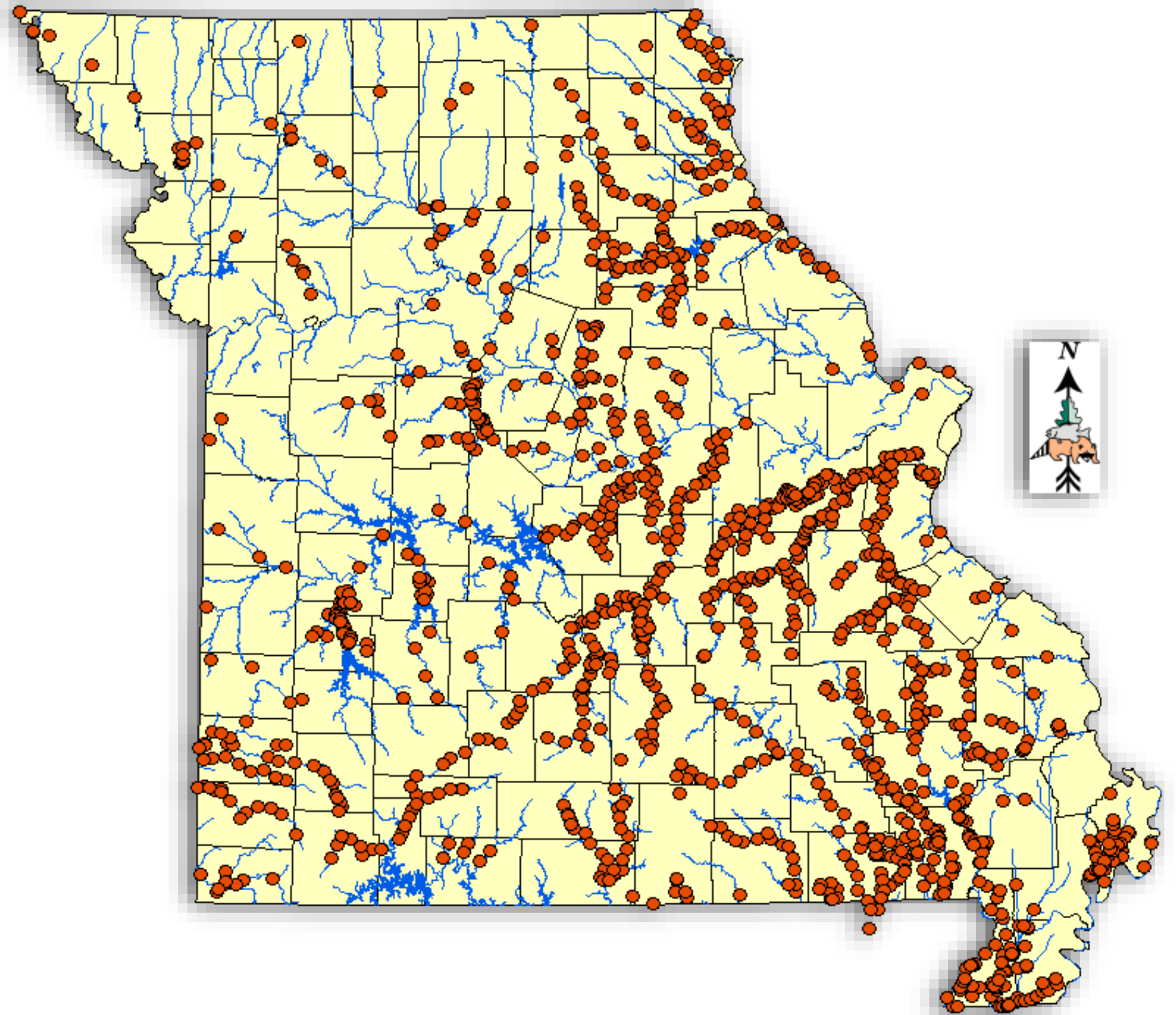


# Realized Niche



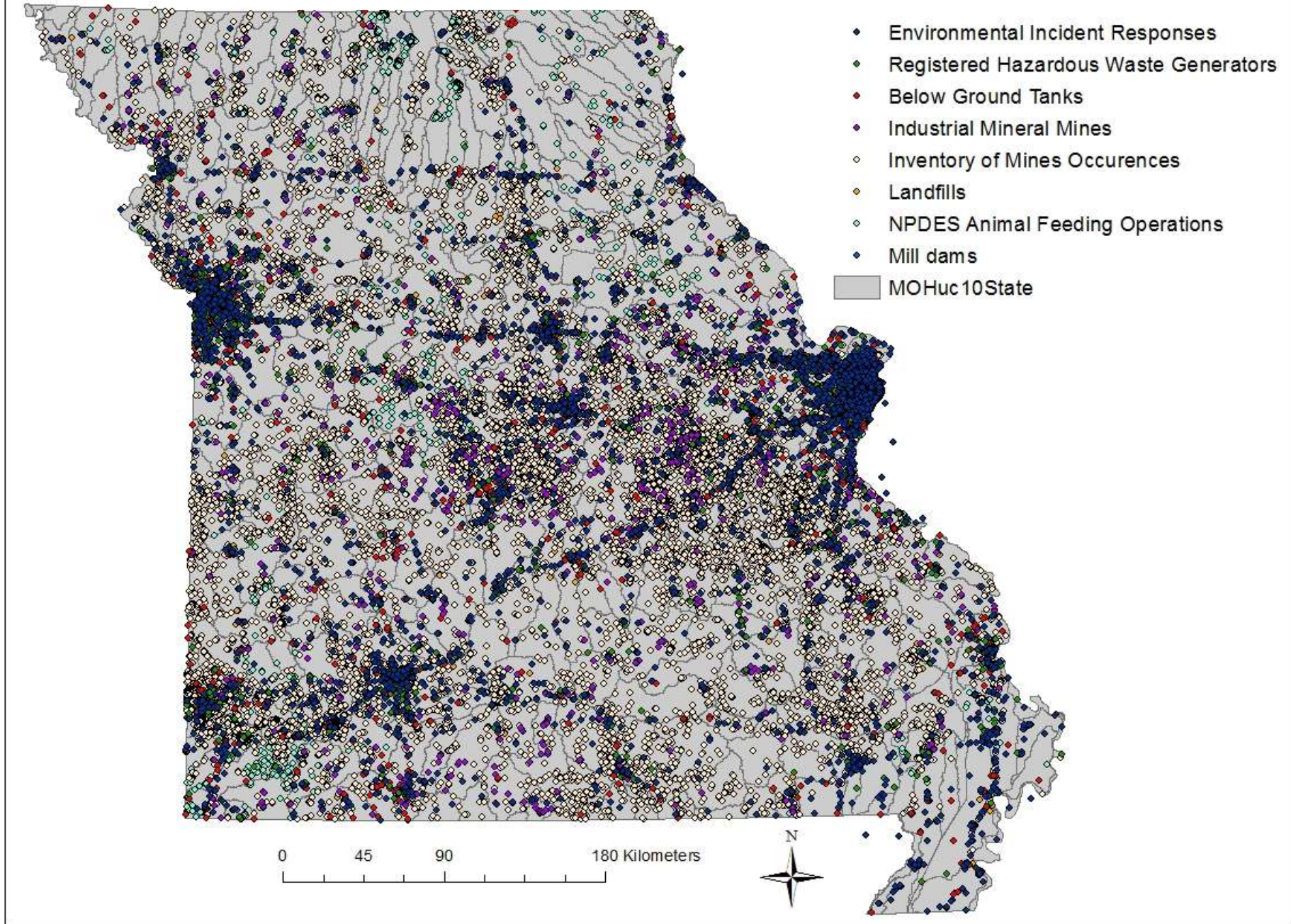
# Mussel Data

- MDC mussel survey
- 1994-current
- Species Richness



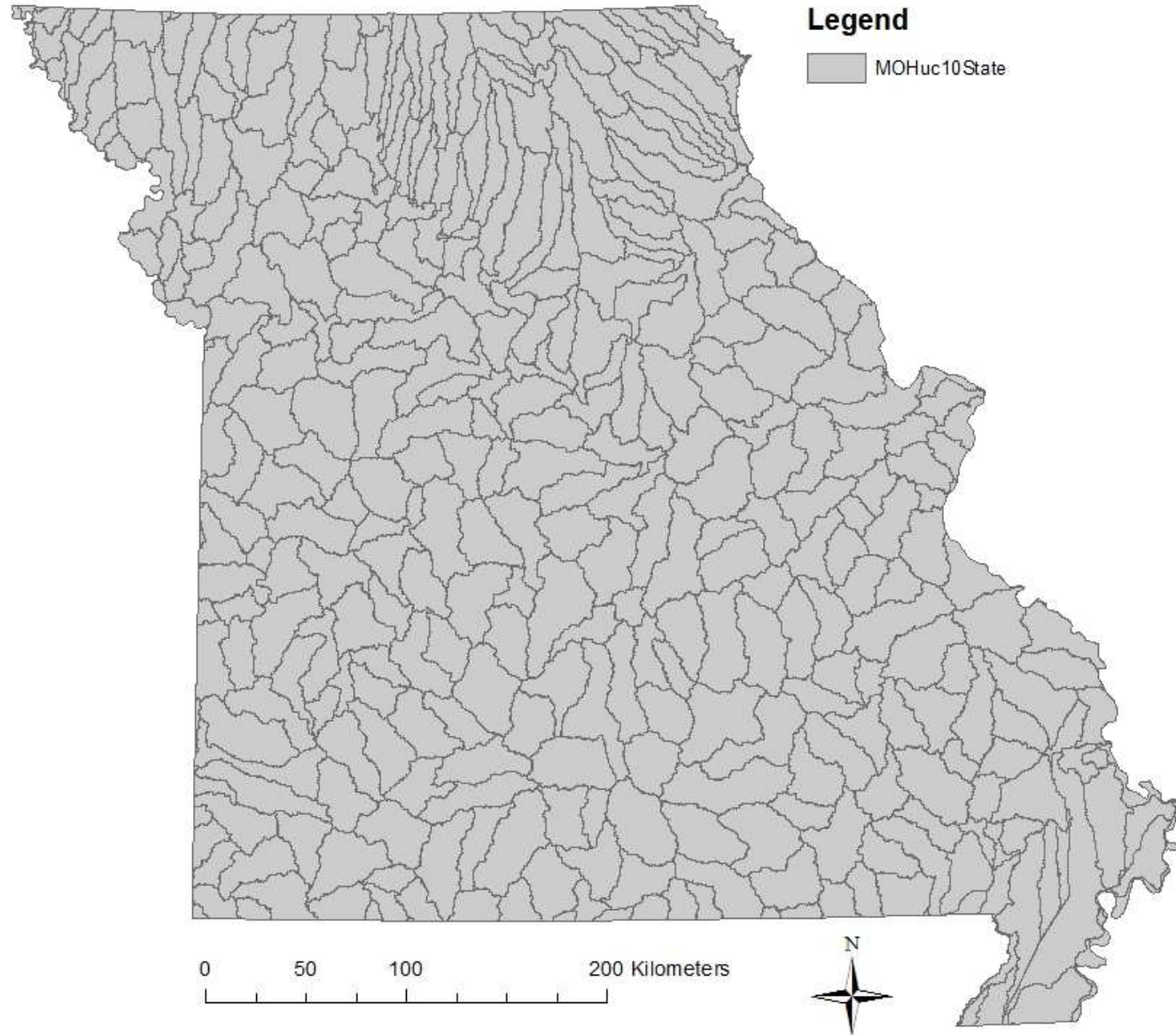


# Potential threats (MSDIS/MDC)





# Hydrologic Unit Code 10



# Goal:

Develop tool to generate a map describing potential threats to species rich mussel beds in Missouri based on HUC10 boundaries of interest.

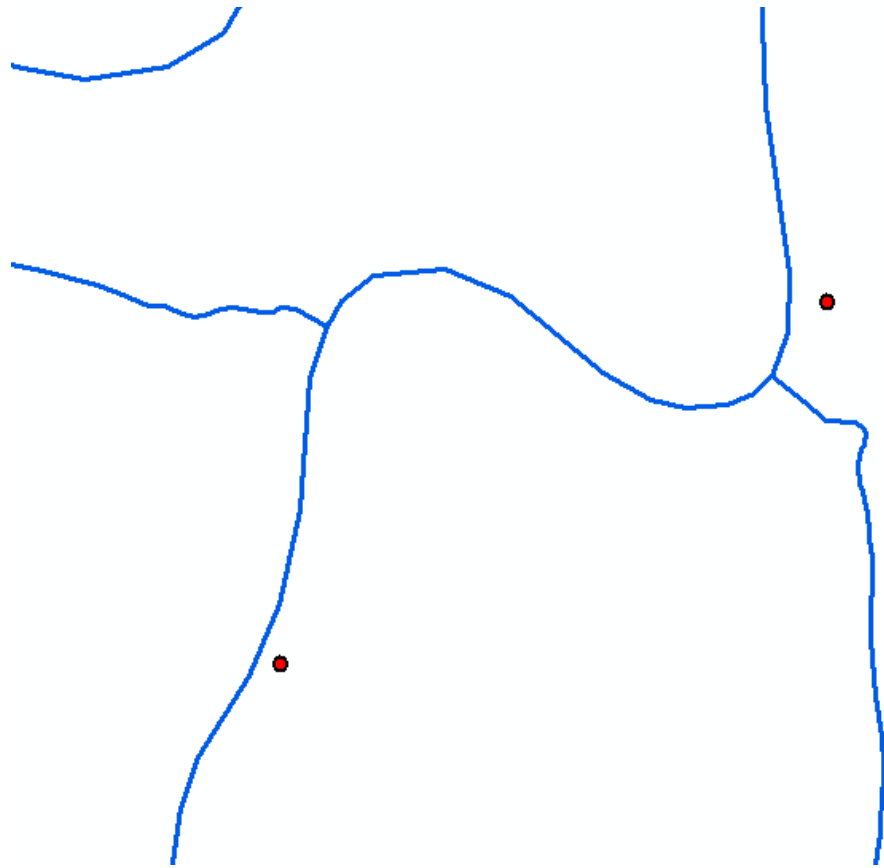
## Two step process:

1. Data processing and preparation
2. Tool generation

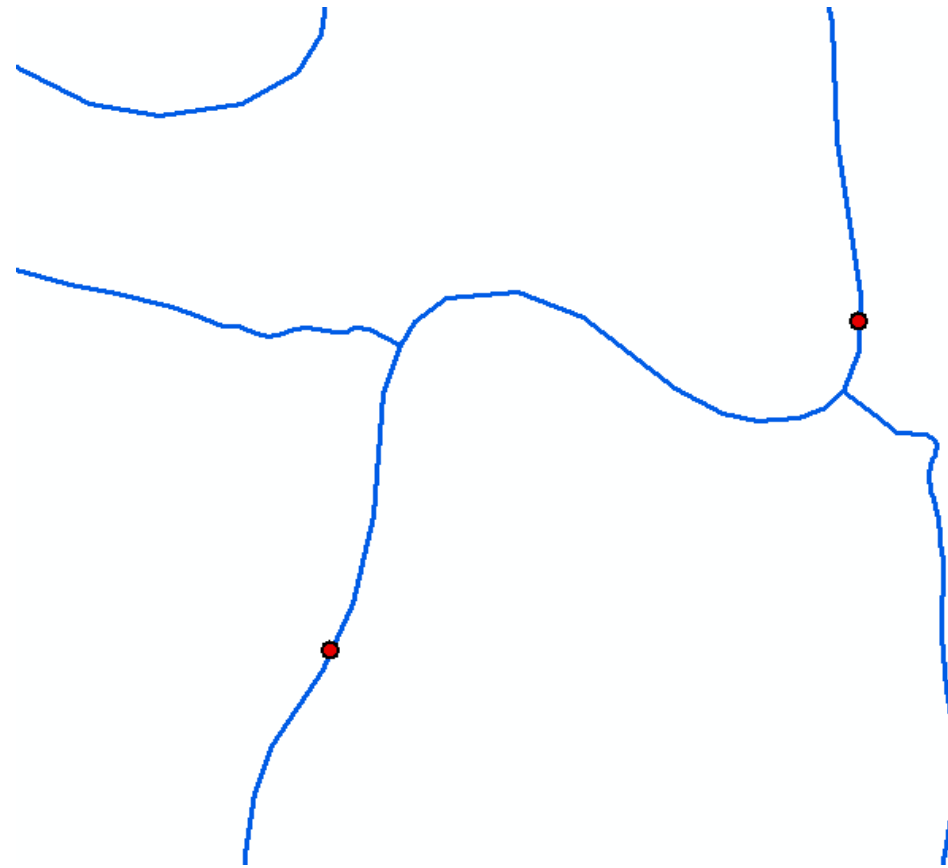
## Objectives:

1. Snap survey points to stream line
2. Assign HUC ID to each survey point
3. Total threats for each HUC
4. Create tool for easy generation of potential threat information

# Data preparation: Clean up

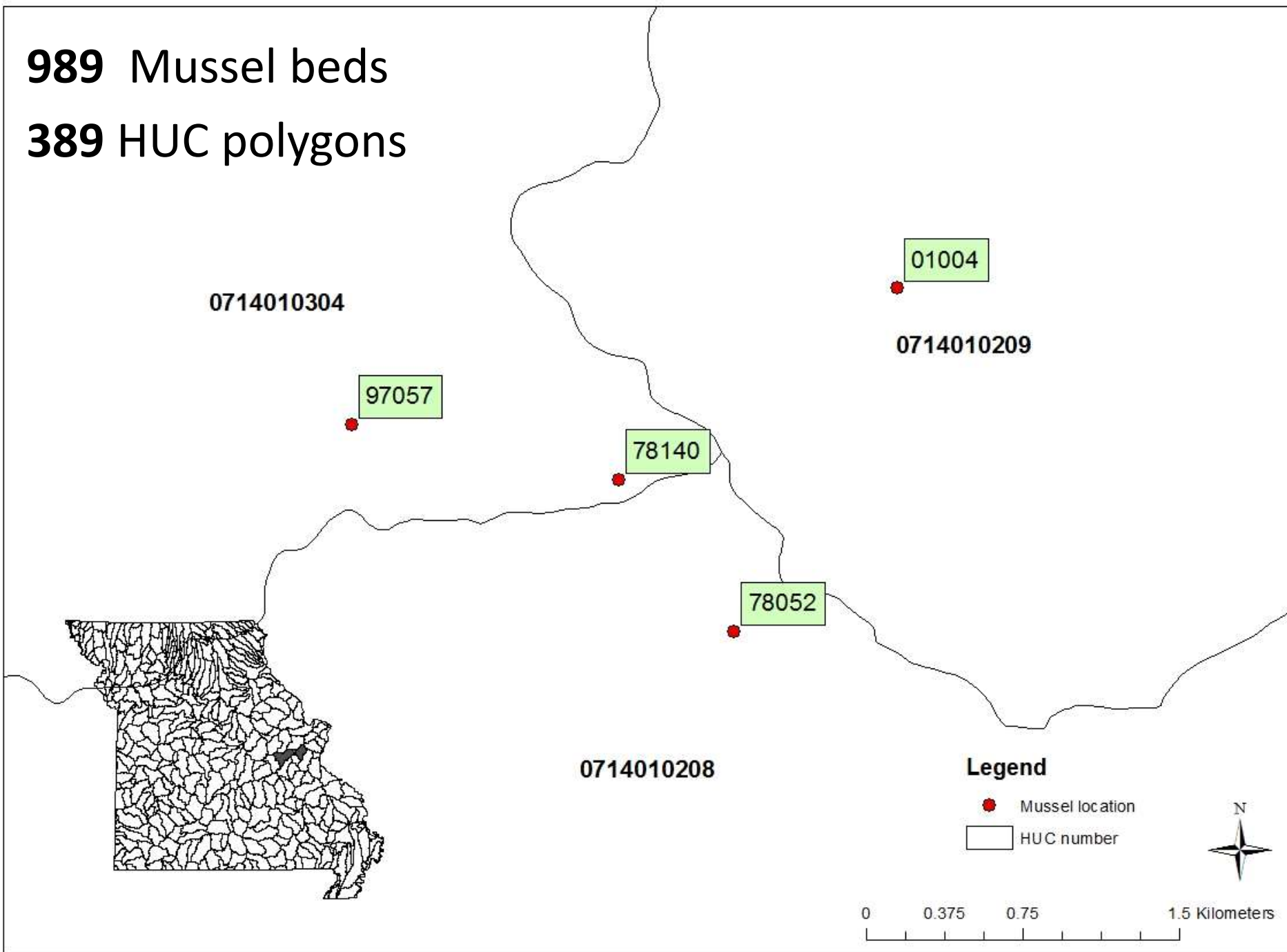


Before

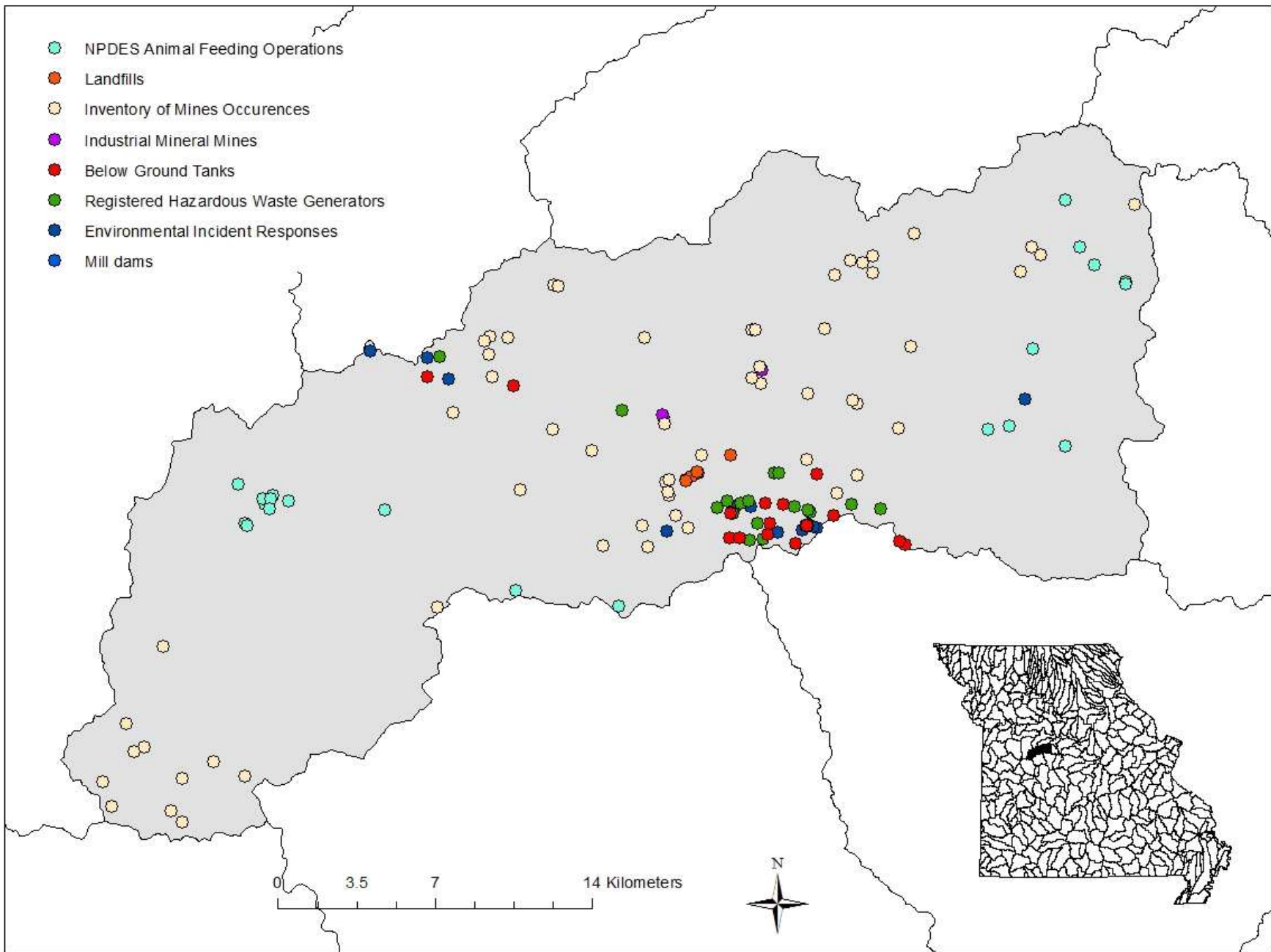


After

**989 Mussel beds**  
**389 HUC polygons**







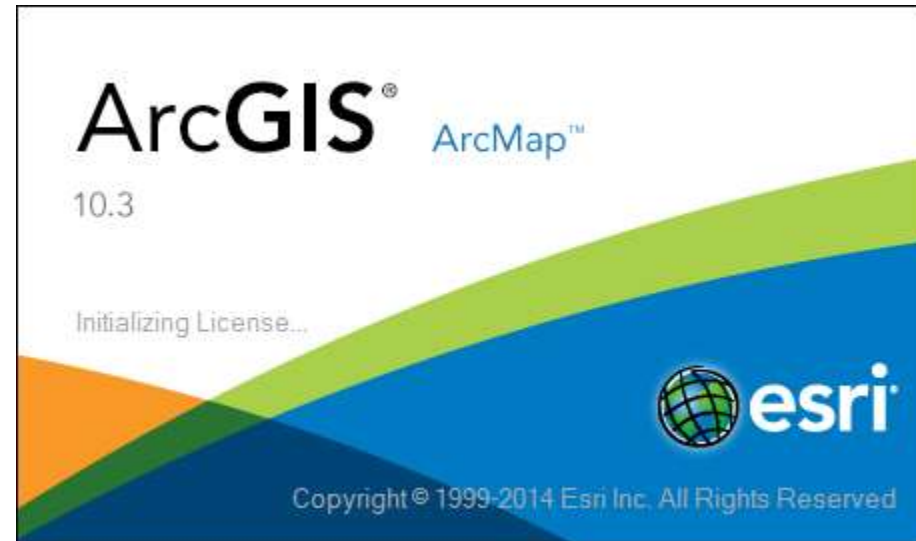
# Threats by HUC

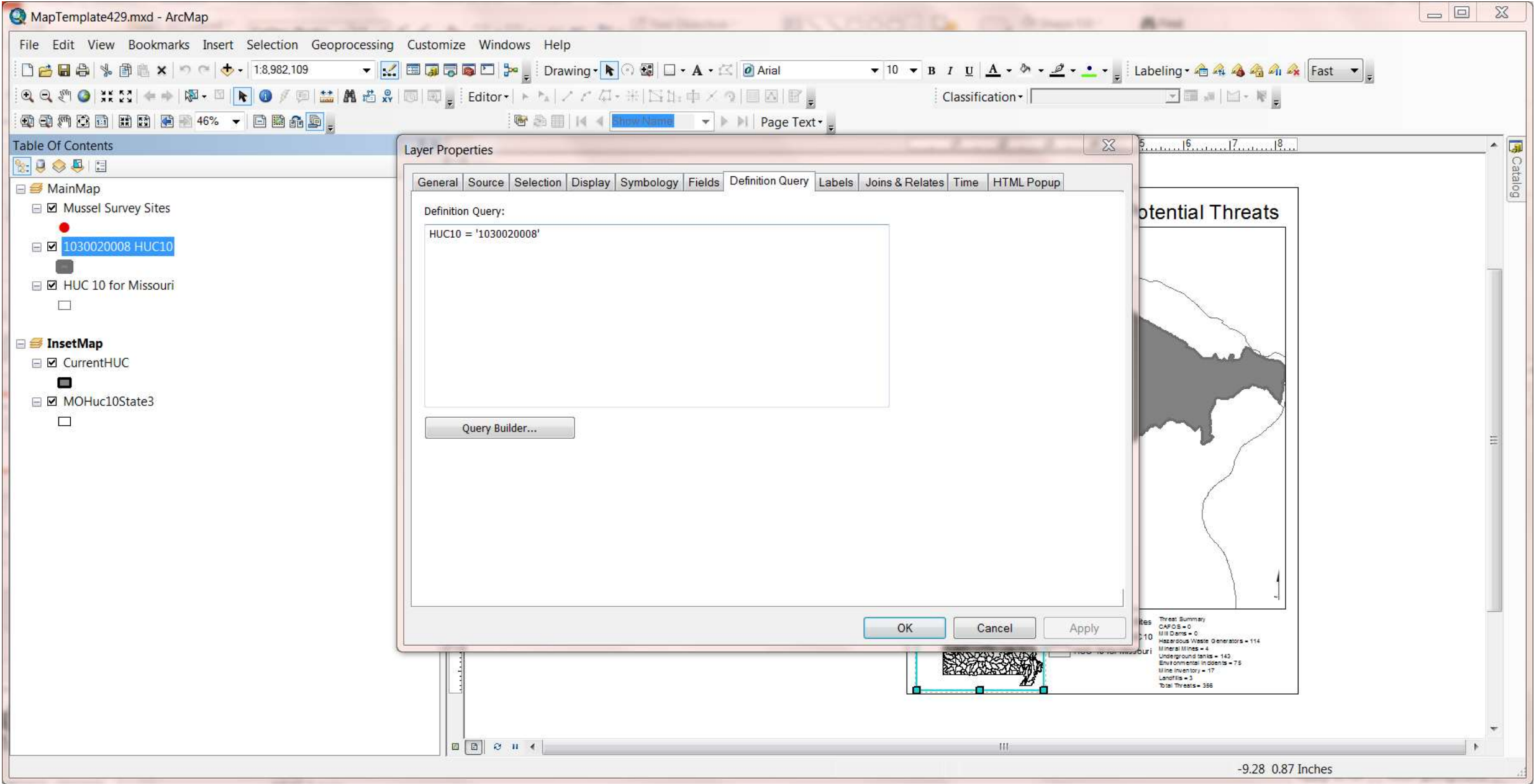
Count threats

- **389** HUC polygons
- **8** threat point layers

# ArcGIS Tool Creation

1. Mxd template creation
2. Parameter setting
3. Dialog box setup





workspace



map template



output folder



HUC number

Select All

Unselect All

Add Value

### Mussel Threat Investigation

This tool allows the user to select one or more HUC10 polygons using the unique ID code to generate a PDF map/maps summarizing potential threats within that HUC and showing mussel survey locations with site ID numbers in green tags and species richness in white tags.

OK

Cancel

Environments...

<< Hide Help

Tool Help



workspace

E:\GIS2MU\project\Final\_Project\project.gdb



map template

E:\GIS2MU\project\Final\_Project\MapTemplate429.mxd



output folder

E:\GIS2MU\project\Final\_Project\PDFs



HUC number

- 0708010418
- 0710000910
- 0710000912
- 0711000101
- 0711000102
- 0711000103
- 0711000106
- 0711000107
- 0711000108



Select All

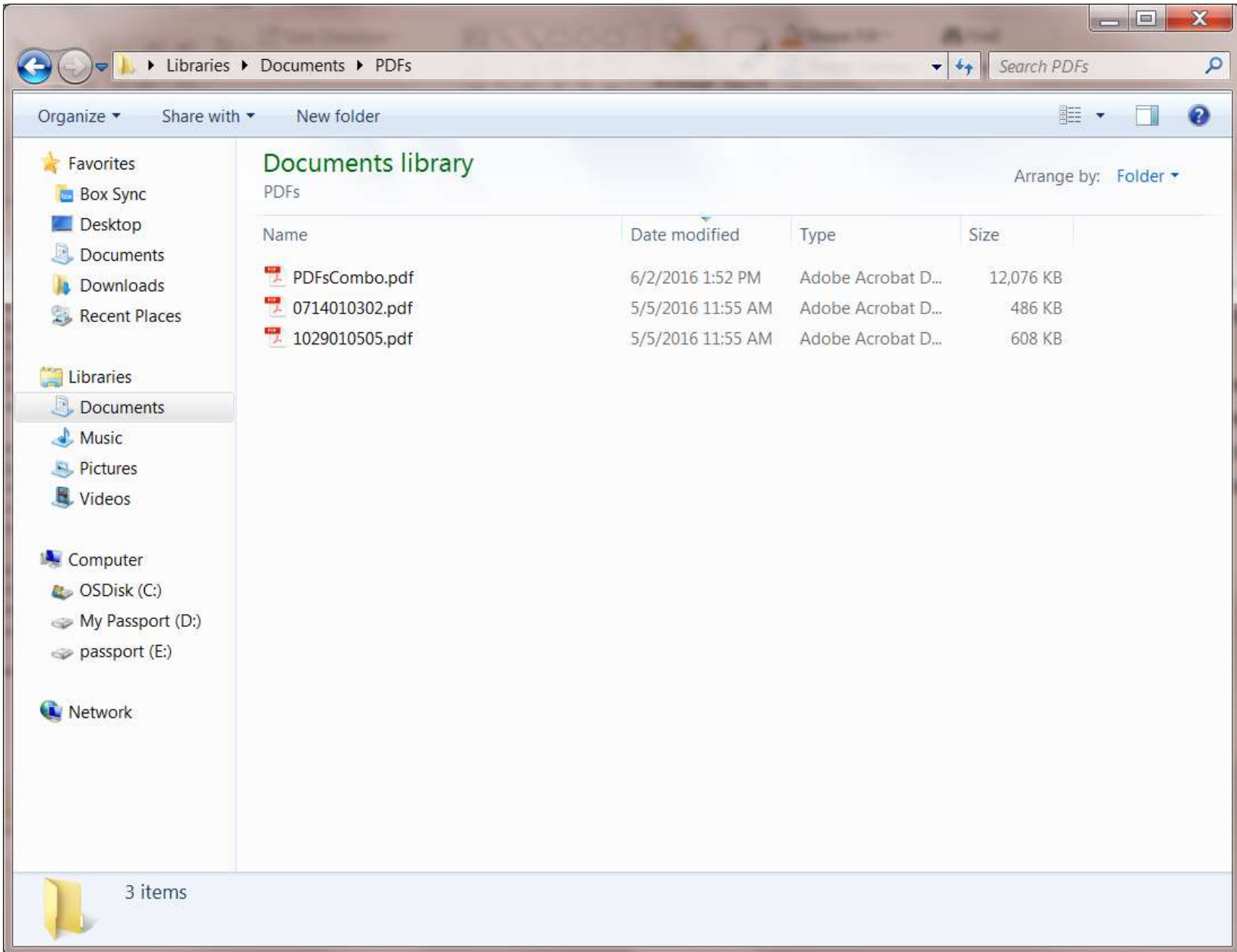
Unselect All

Add Value

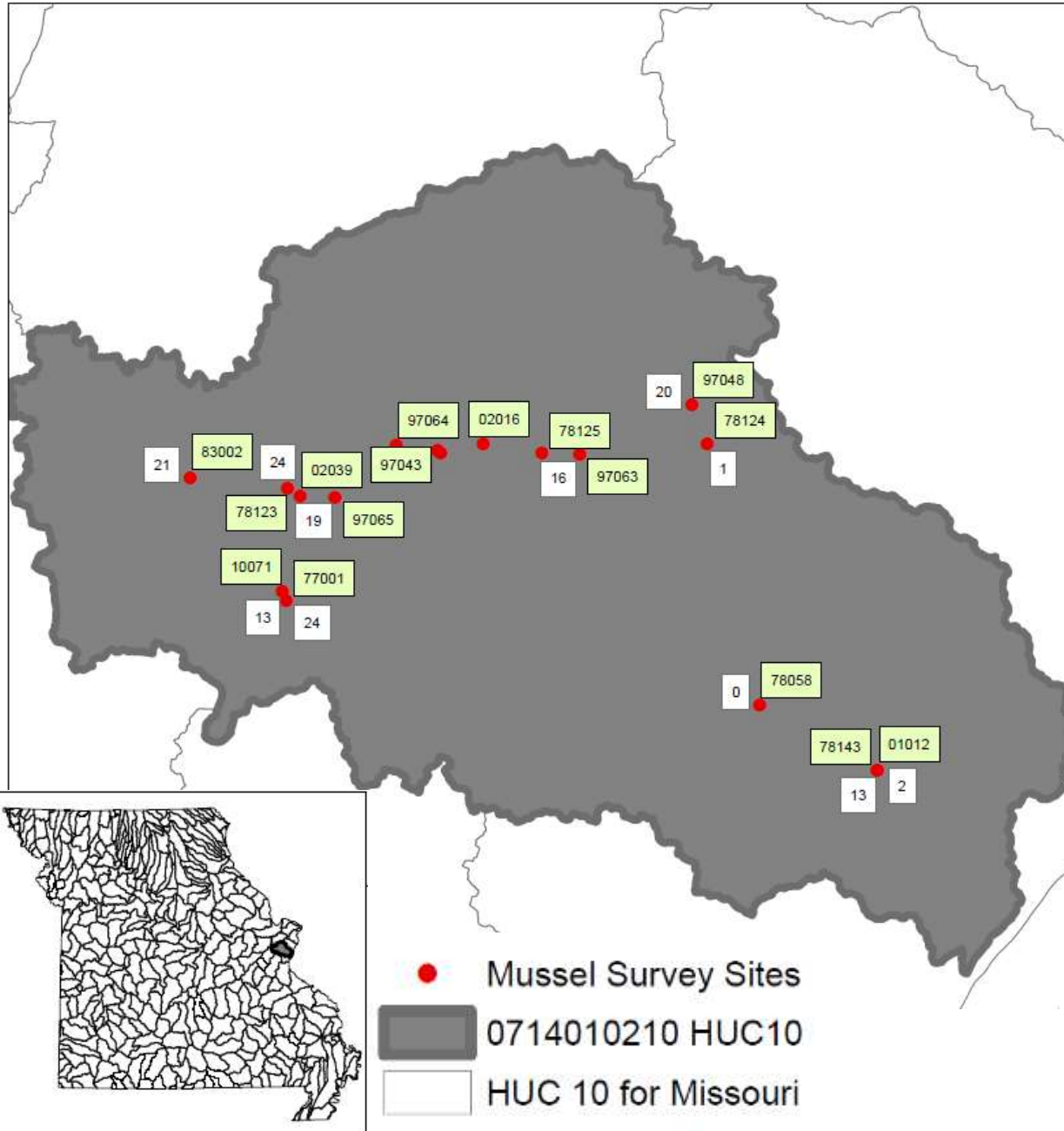
### output folder

No description available





# 0714010210 HUC10 Potential Threats



## Threat Summary

CAFOS = 0

Mill Dams = 0

Hazardous Waste Generators = 139

Mineral Mines = 7

Underground tanks = 134

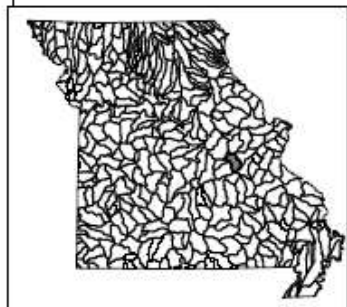
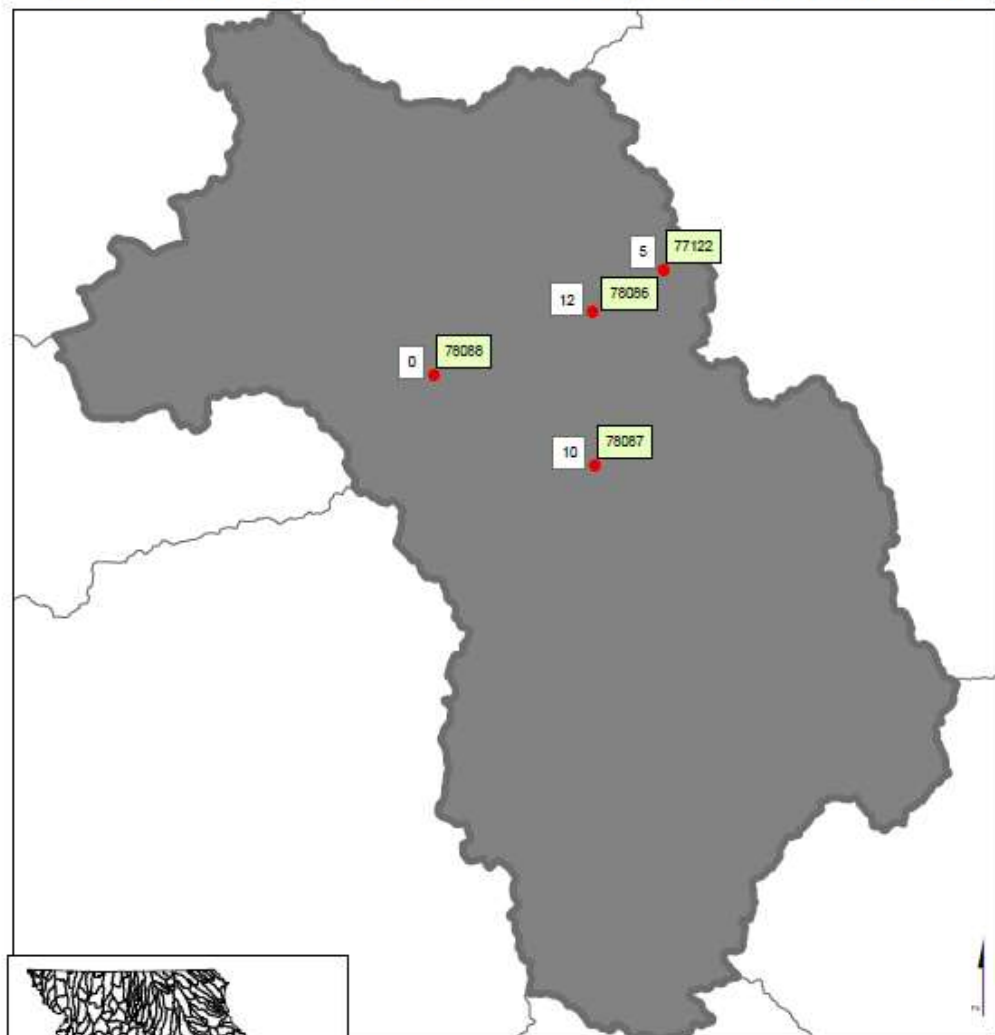
Environmental Incidents = 135

Mine Inventory = 72

Landfills = 10

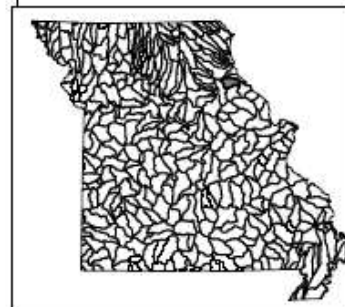
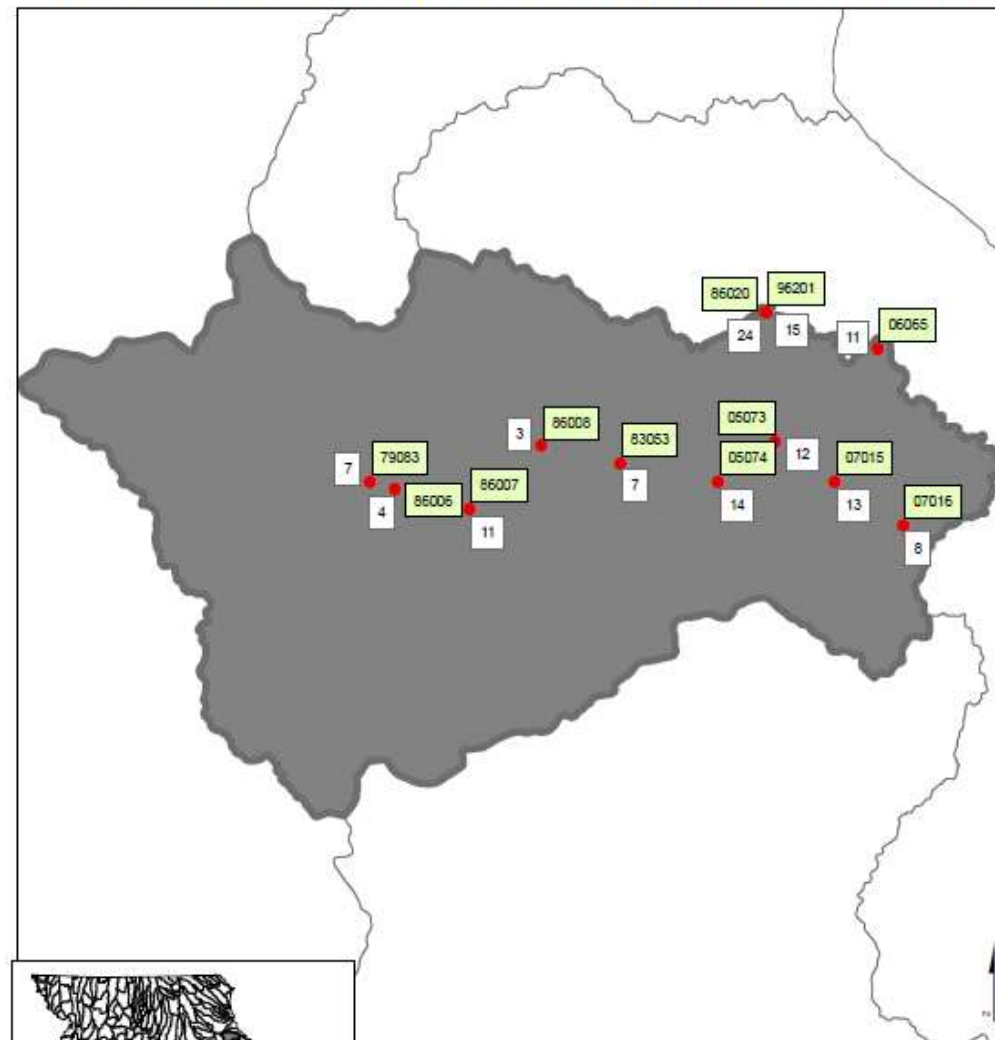
Total Threats = 497

## 0714010303 HUC10 Potential Threats



- Mussel Survey Sites
  - 0714010303 HUC10
  - HUC 10 for Missouri
- Threat Summary**  
 CAFOS = 0  
 Mill Dams = 0  
 Hazardous Waste Generators = 4  
 Mineral Mines = 19  
 Underground tanks = 7  
 Environmental Incidents = 13  
 Mine Inventory = 744  
 Landfills = 5  
 Total Threats = 792

## 0711000703 HUC10 Potential Threats



- Mussel Survey Sites
  - 0711000703 HUC10
  - HUC 10 for Missouri
- Threat Summary**  
 CAFOS = 2  
 Mill Dams = 0  
 Hazardous Waste Generators = 1  
 Mineral Mines = 3  
 Underground tanks = 2  
 Environmental Incidents = 2  
 Mine Inventory = 19  
 Landfills = 2  
 Total Threats = 31

# Goal:

Develop tool for user to generate a map describing potential threats to a biological unit of interest based on specific a boundary of interest.

## Two step process:

1. Data processing and preparation
2. Tool generation

## Objectives:

1. Snap survey points to stream line
2. Assign HUC ID to each survey point
3. Total threats for each HUC
4. Create tool for easy generation of potential threat information
5. Develop tutorial and package



# Questions?



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