



**TENNESSEE WILDLIFE RESOURCES AGENCY'S
INSTREAM FLOW STUDIES**

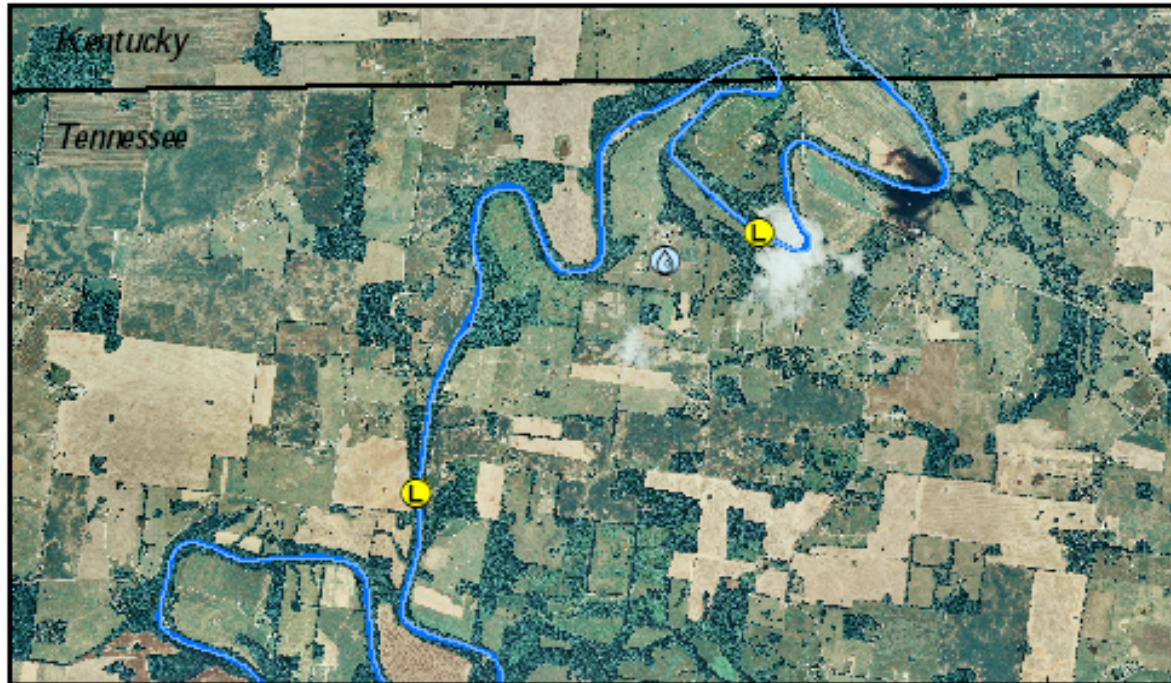
**ENVIRONMENTAL SERVICES
INSTREAM FLOW PROGRAM**

OVERVIEW

- **Case Study: Red River**
- **Hydrology and Biology**
- **Instream Flow Methodology**
- **Analysis and Discussion**
- **Future Research**

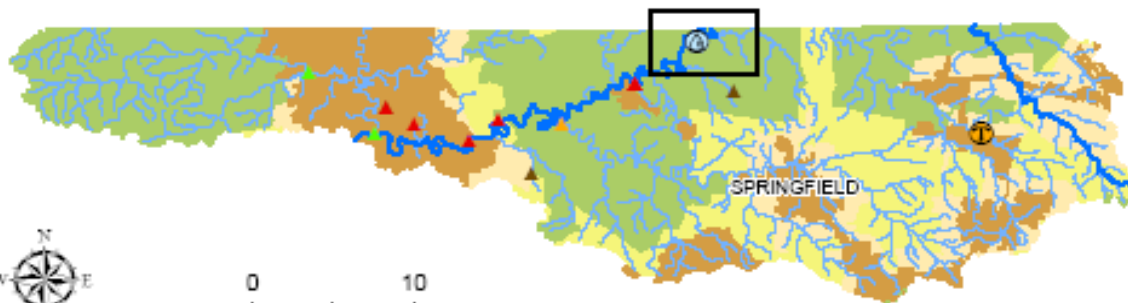
Red River Watershed

Red River



0 0.5 Miles

Inset



Sample Sites

- logger
- transect
- water plant

Rare Species

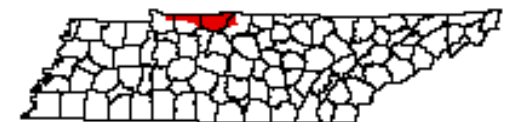
- Fish
- Mollusc
- Crustacean
- Amphibian

RedRiver

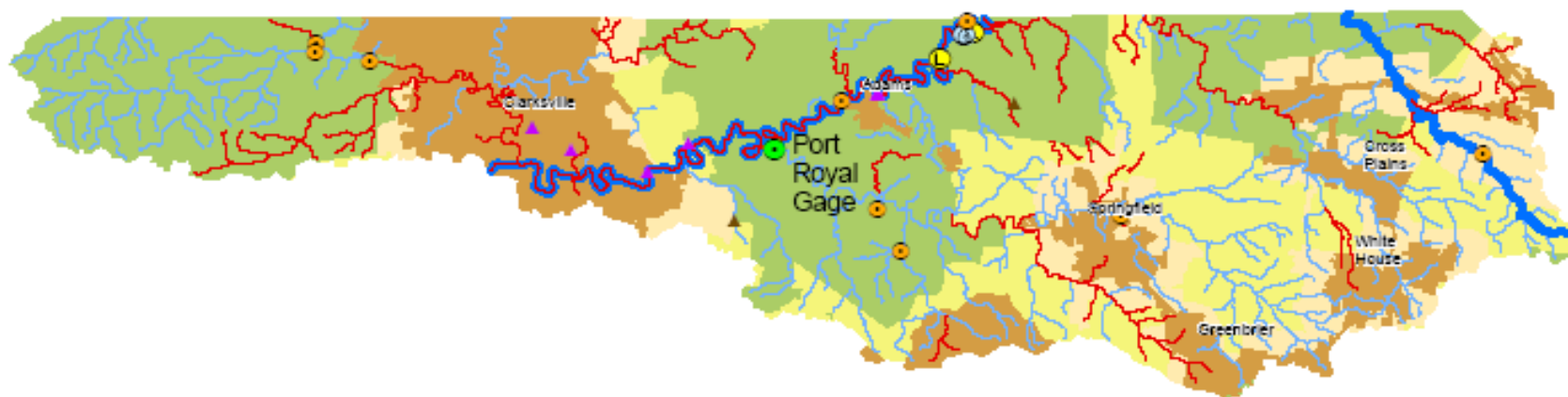
1482 sq miles in TN

Land Use

- Urban
- Urban Growth Boundary
- Planned Growth Area
- Rural



Red River Watershed



Land Use

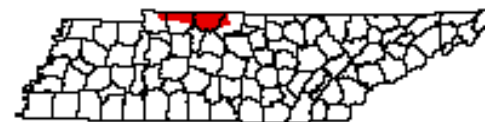
- Urban
- Urban Growth Boundary
- Planned Growth Area
- Rural

Rare Species

- Fish
- Mollusc
- Crustacean
- Amphibian

- Logger/Transect
- Water plant
- Active Gage
- Inactive Gage

- Red River
- Impaired Streams
- Streams



RED RIVER SPECIES OF CONCERN

- Threatened Fish Species

- Ashy Darter (breed late Jan-April)



Ashy Darter



Smallscale Darter

- Fish Species In Need of Management

- Smallscale Darter (breed April-May)

- Slenderhead Darter (breed March-July)



Slenderhead Darter

- Tippecanoe Darter (breed March-May)



Tippecanoe Darter

- Southern Cavefish (breed during Spring floods)



Southern Cavefish

- Threatened Mussel Species

- Spectaclecase (2 broods/season)



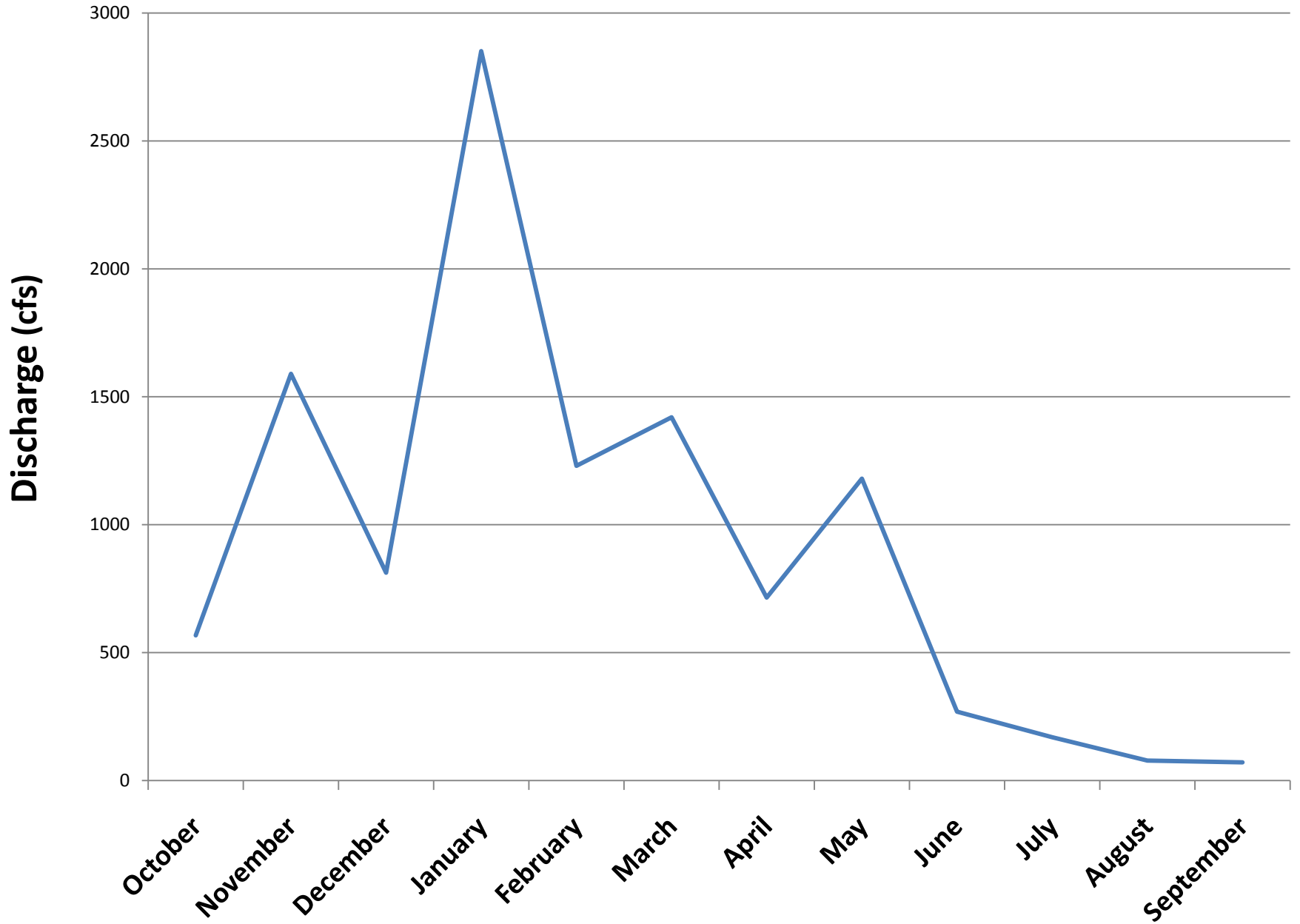
Spectaclecase

- Rabbitsfoot (brood May-July)

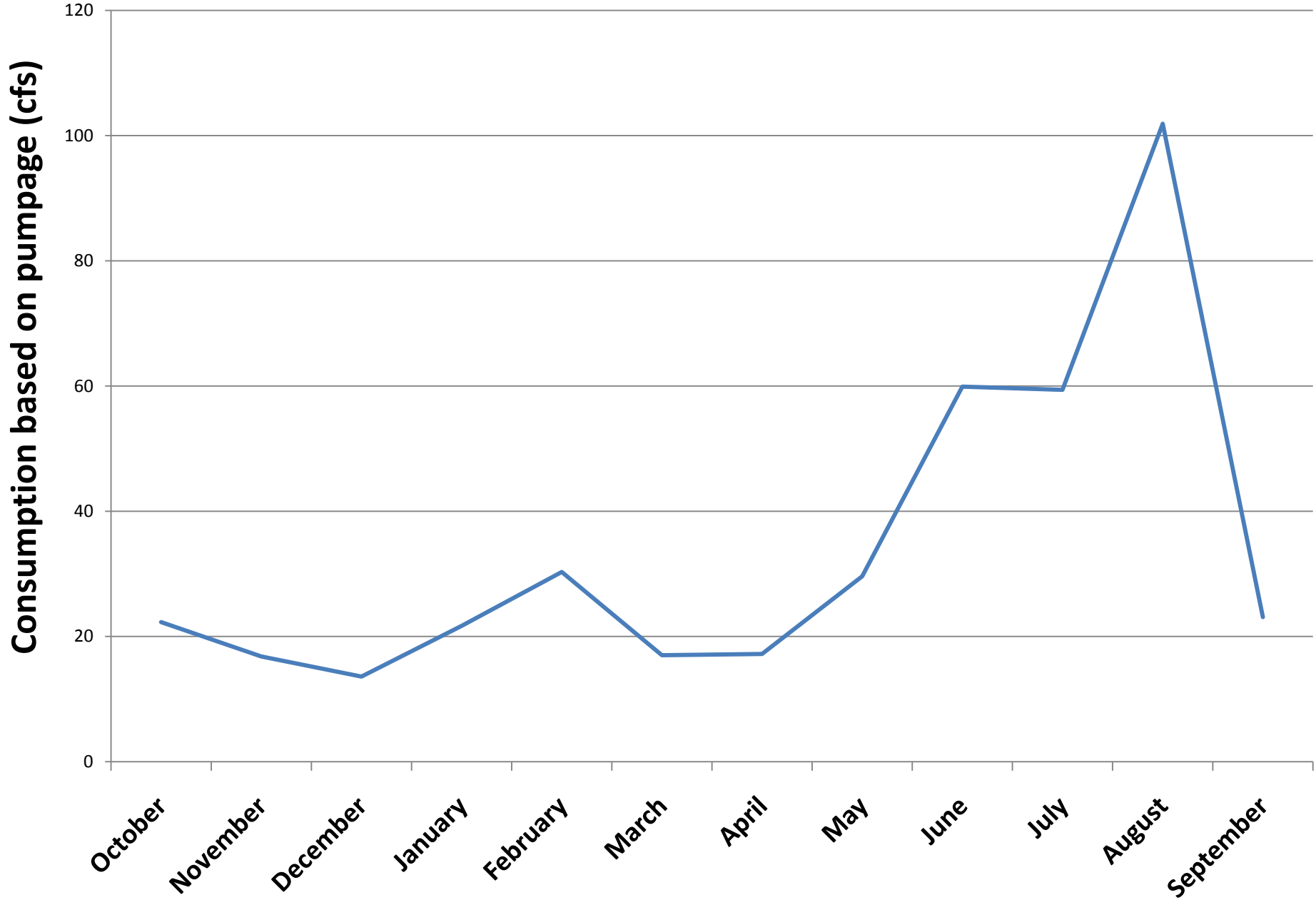


Rabbitsfoot

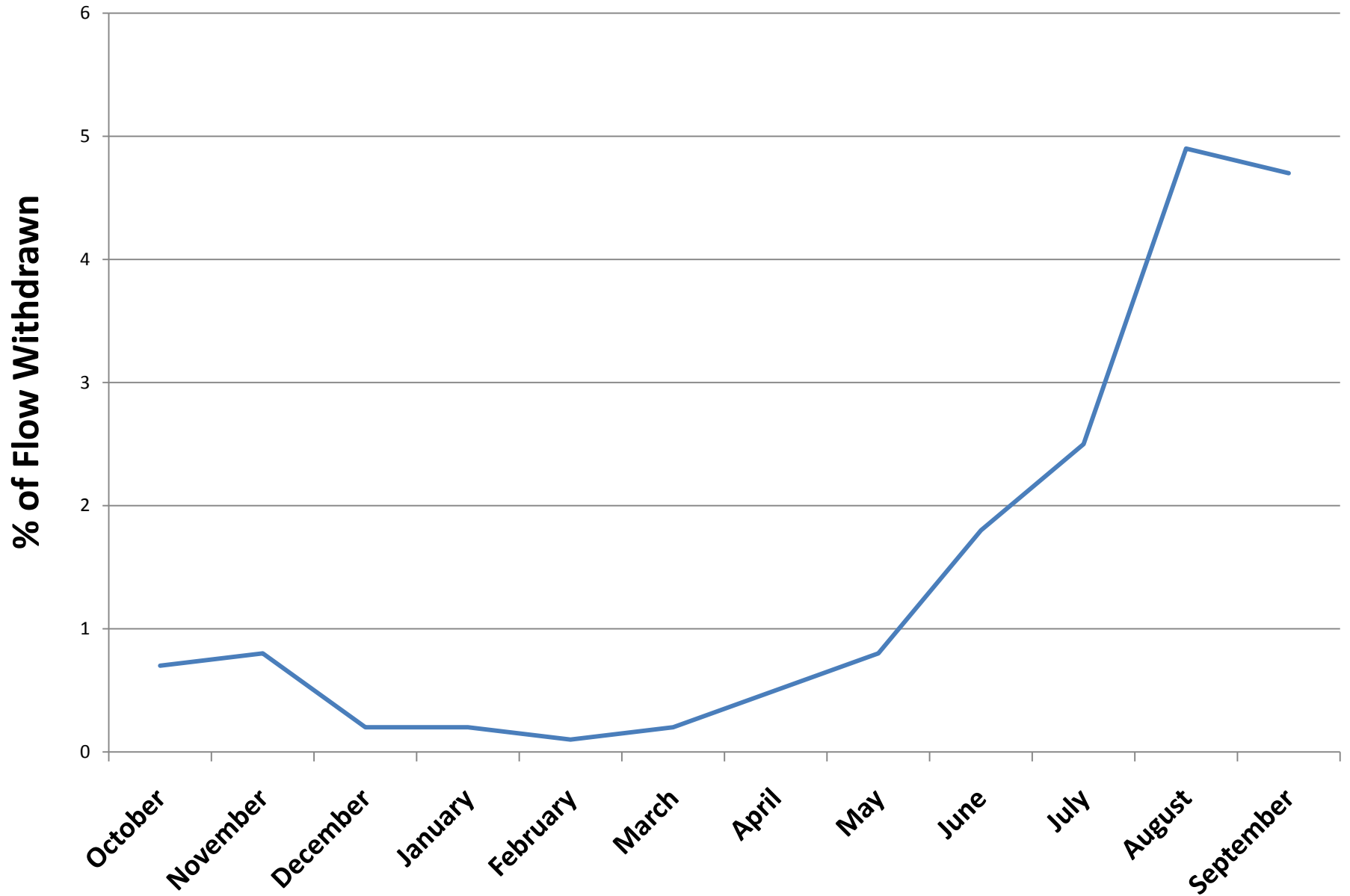
AVERAGE MONTHLY DISCHARGE NEAR PORT ROYAL



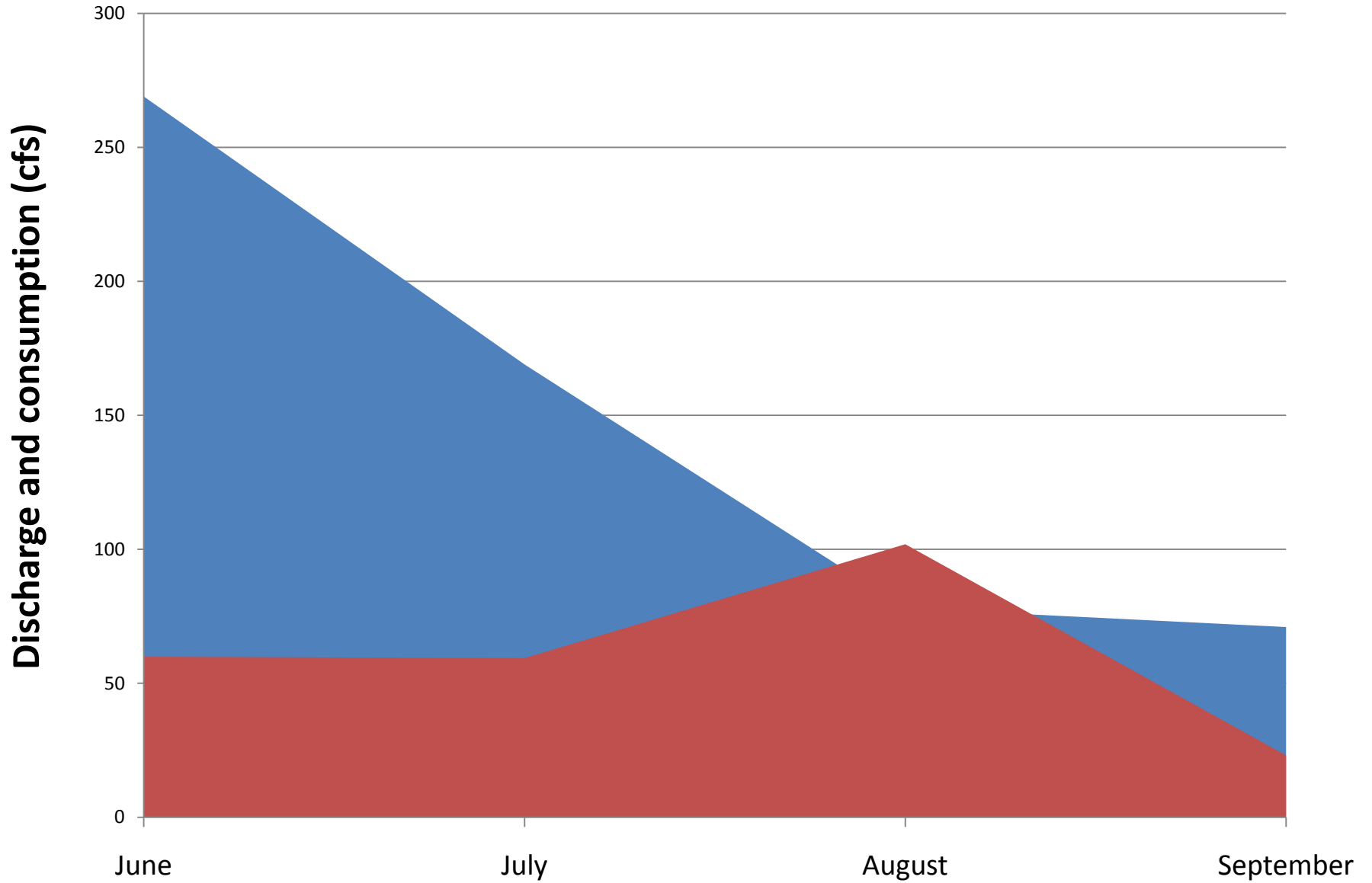
CITY OF SPRINGFIELD'S 2007 WATER CONSUMPTION



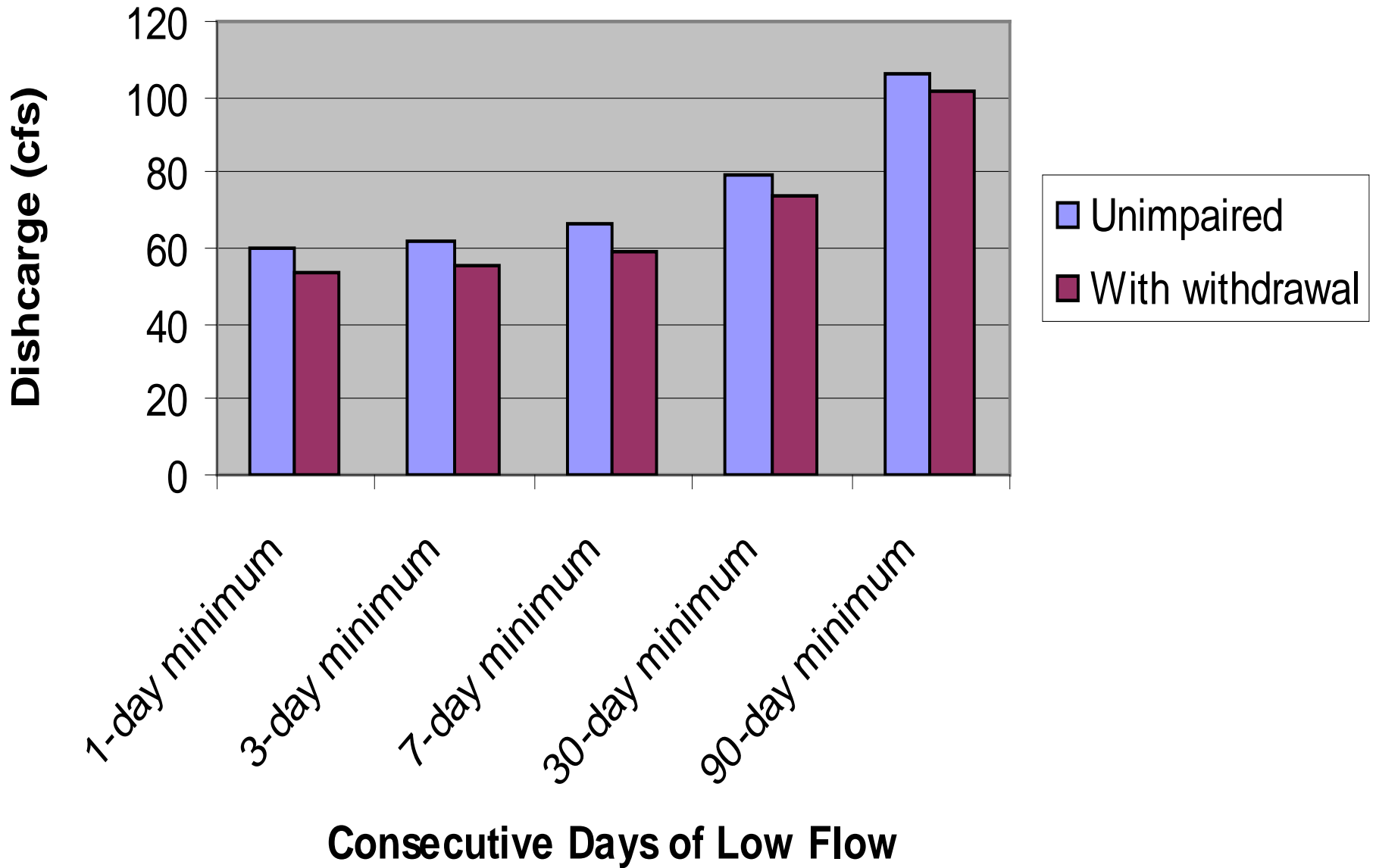
PERCENT OF FLOW WITHDRAWN BY SPRINGFIELD



LOW FLOW DISCHARGE WITH CONSUMPTION



LOW FLOW PERIOD WITH AND WITHOUT WITHDRAWAL





WETTED PERIMETER: HIGH FLOWS



WETTED PERIMETER: LOW FLOWS

ANALYSIS and DISCUSSION

▪ Red River stage discharge relationship

- Greatest influence on in-channel habitat at low flow
- At flows less than 100 mgd, withdrawal of 7-10 mgd could result in 0.5 ft reduced water levels

▪ Percent of flow withdrawn from Red River

- August and September: almost 5% of flow withdrawn
- Expose riffle habitats
- Decrease depths and velocities
- Smallscale Darter: prefer deep, swift riffles
- Tippecanoe Darter: prefer shallow, riffles
- Ashy Darter: prefer 2-6 ft of water, sluggish current
- Spectaclecase and Rabbitsfoot: adjacent to fast currents

ANALYSIS and DISCUSSION

- **Provide Springfield with an adequate water supply**
- **Provide for viable aquatic species populations and habitat**
- **Process to engage communities in water consumption, conservation, and preserving aquatic habitats**
- **Emphasis on water conservation**

FUTURE RESEARCH

- **Continue research on the Red River**
- **Continue research on other sites across the state**
- **Engage communities in promoting water conservation**
- **Work with local NRCS offices and farmers**
- **Incorporate other sources of water withdrawal into analysis**

A photograph of a person wearing a blue shirt, a white and blue cap, and waders, standing in a forest stream. The stream flows over a small waterfall or dam structure. The surrounding area is lush with green vegetation and trees. The text "QUESTIONS???" is overlaid in the center of the image.

QUESTIONS???