



# **Evaluation of Shovelnose Sturgeon and Paddlefish reproduction in the Des Moines River**

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# Global Status of Sturgeon and Paddlefish

- Sturgeon spp. and Paddlefish are apart of one of the most imperiled Order of fishes in the world
- Numerous species are critically endangered
  - Habitat degradation- Channelization, dams, and levees
  - Overfishing- Caviar
- Chinese Paddlefish Extinct



# Introduction

- Overfishing has caused the collapse of numerous Caspian Sea sturgeon fisheries, once the main source of world caviar
- Has led to increased harvest of domestic stocks of caviar bearing species
  - Shovelnose Sturgeon and Paddlefish



# Order: *Acipenseriformes*

- 3 Sturgeon spp. and 1 Paddlefish species in Iowa
  - Lake Sturgeon (State Endangered), Pallid Sturgeon (Federally Endangered), and Shovelnose Sturgeon (Federally Threatened), Paddlefish (Vulnerable)
- Shovelnose Sturgeon is the most numerous and only species in the Upper Mississippi River (UMR) that still supports both commercial and recreational fisheries
  - Popular sport fisheries in connected tributaries
- Paddlefish recreational fisheries



# Concerns do still exist...

- In the Middle Mississippi River (MMR) Shovelnose Sturgeon was listed as threatened under the Endangered Species Act under the Similarity of Appearance clause in 2009
  - Closed commercial harvest of Shovelnose Sturgeon in MMR
- Potential to lead to increased harvest in waters in the UMR



# Large Mortality Events

- Multiple Midwest rivers (i.e., Wabash, Platte, and lower Des Moines rivers) have experienced summer Shovelnose Sturgeon kills
- The Lower Des Moines River experienced a severe Shovelnose Sturgeon kill during the summer of 2012 with estimates of the number of dead sturgeon exceeding 37,000
- This fish kill was associated with low flows and high water temperatures ( $>32^{\circ}\text{C}$ )



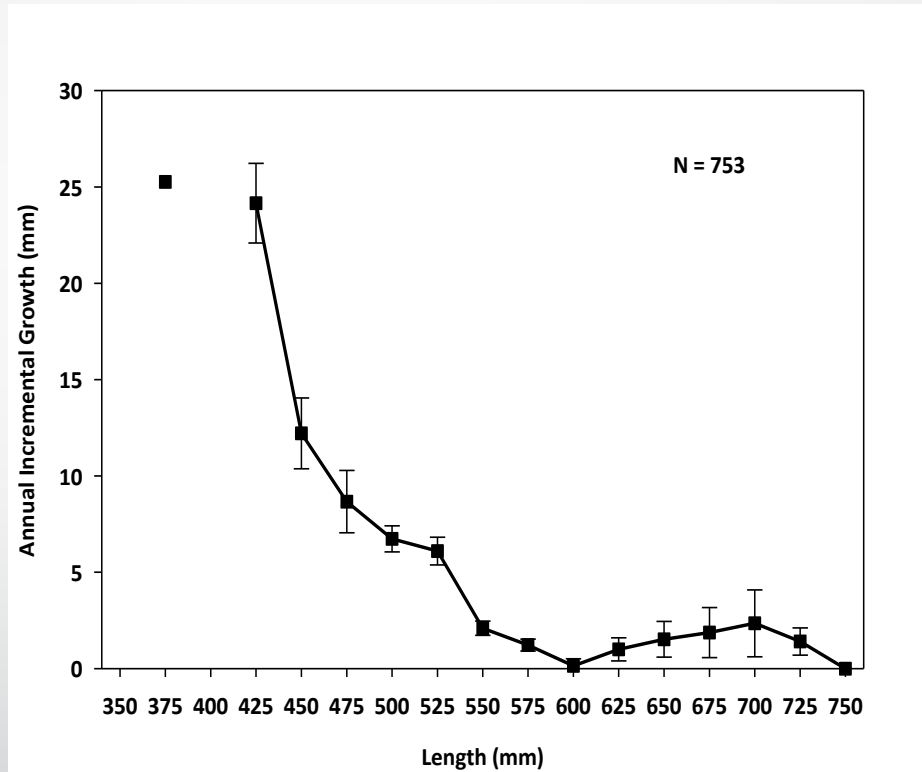
# Spawning Location

- Important spawning habitat is known to occur in the Des Moines River
  - Potentially other tributaries of the Upper Mississippi River (e.g., Cedar/Iowa rivers)
- During spawning season, Shovelnose Sturgeon congregate in huge numbers which provides popular recreational fisheries
- Illegal harvest potential of mature females to produce caviar
  - Very lucrative!
- Amount of recreational harvest?



# Additional Uncertainties

- Population dynamics
  - Unreliable age estimates
  - Growth- Appear to be very SLOW!
  - Max Age- ~40 years





# UMR-DMR River Dynamics?

- Fish move between the UMR and Des Moines River
  - Recaptures
  - Egg checks



- UMR-DMR dynamics?
  - How much does the Des Moines River contribute to the UMR population that is commercially harvested?
  - How much does that harvest influence the Des Moines River population?

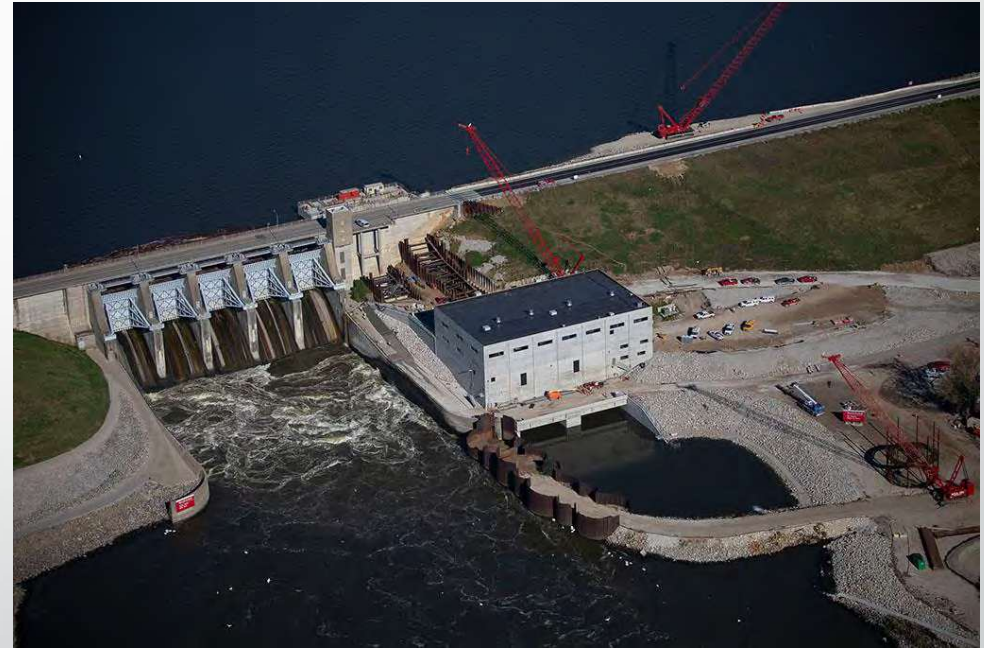
# Introduction

- Because of all of these stressors and uncertainties, it is imperative to gain the appropriate population level information to properly monitor and manage the species for future generations



# Introduction

- Early life history knowledge gap
  - Little is known on the success or amount of reproduction that is occurring in these rivers
  - What factors influence natural reproduction
- Evaluating natural reproduction is imperative



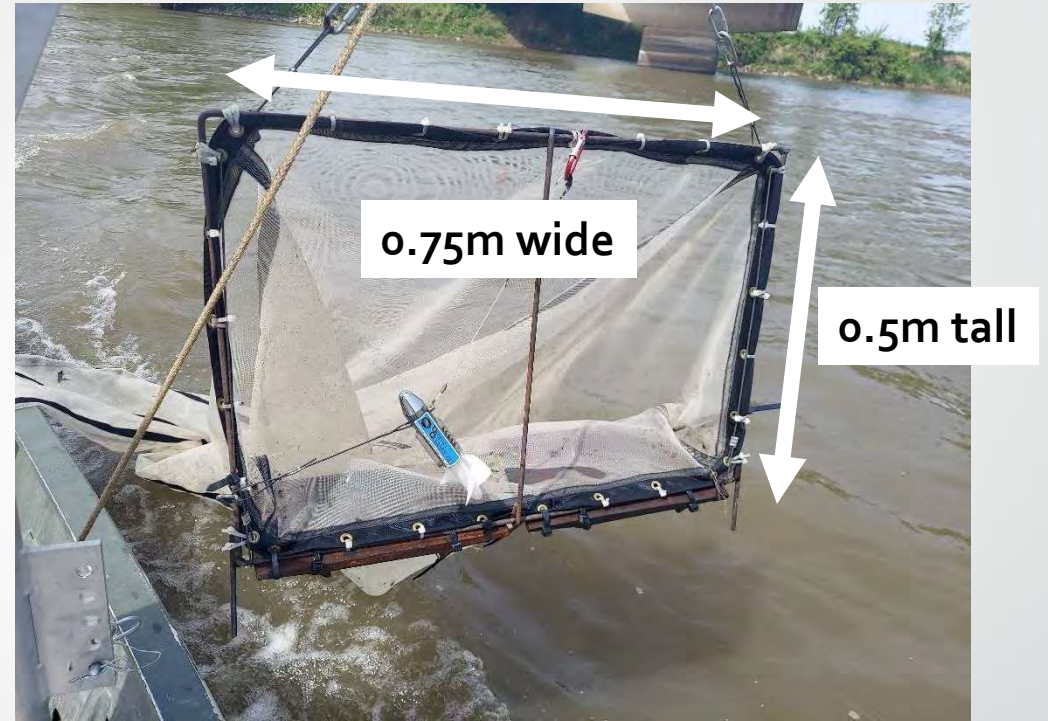
# Introduction

- Has been done on larger river systems
  - Drift duration, growth, and river conditions
- The Sustainable Rivers Program has provided a great opportunity!
  - Understand how environmental flow pulses may influence natural reproduction
- Determining the timing and magnitude of flow pulses for successful natural reproduction will be useful to guide manipulation of flow releases from dams

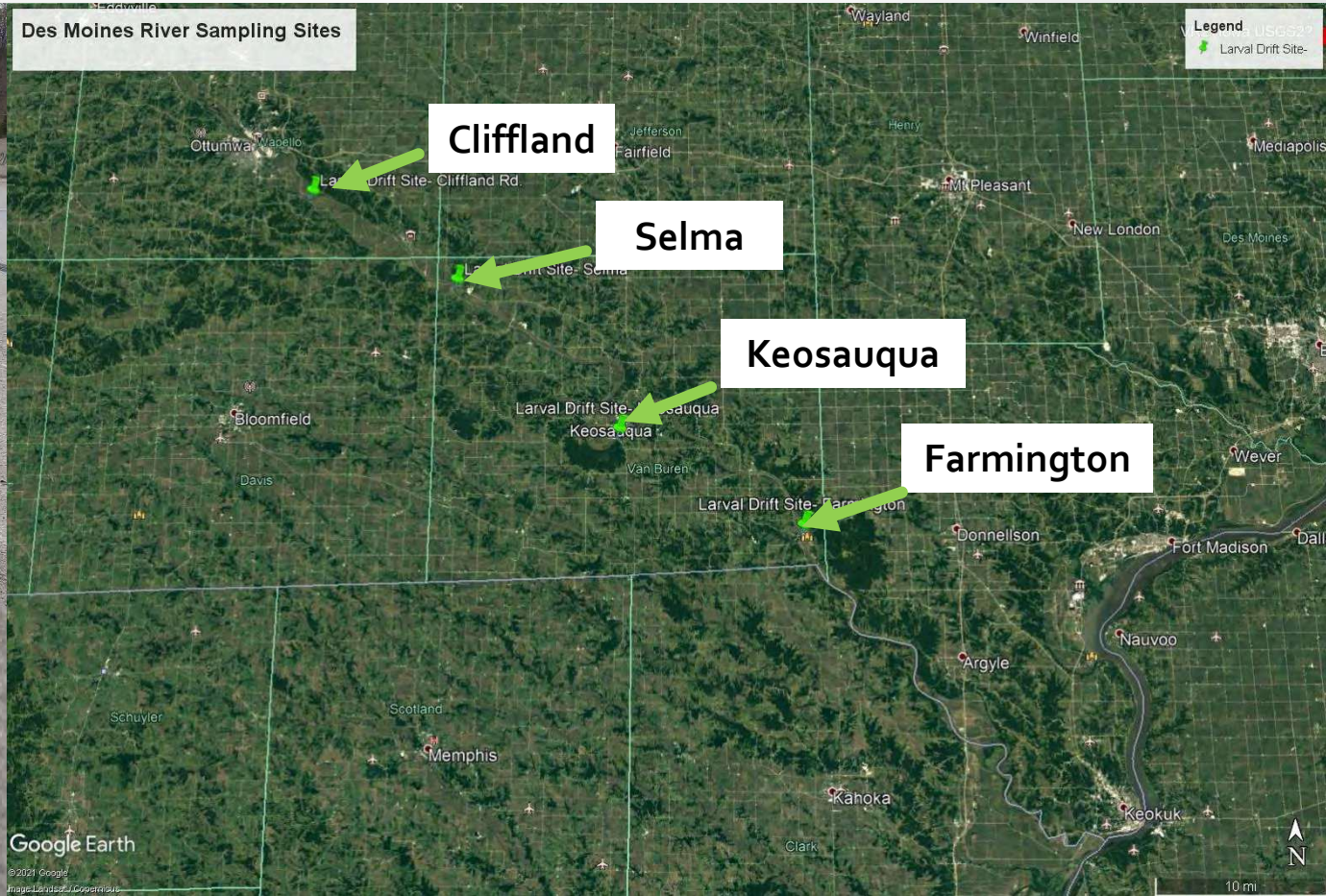


# Methods

- Rectangular 1000 micron mesh net (Braaten et al. 2010)
- ~5 minute bottom sets
- Sampling: ~15-20°C
  - Twice a week
- Flowmeter to estimate volume of water filtered
- Samples affixed in 95% ethanol



# Methods



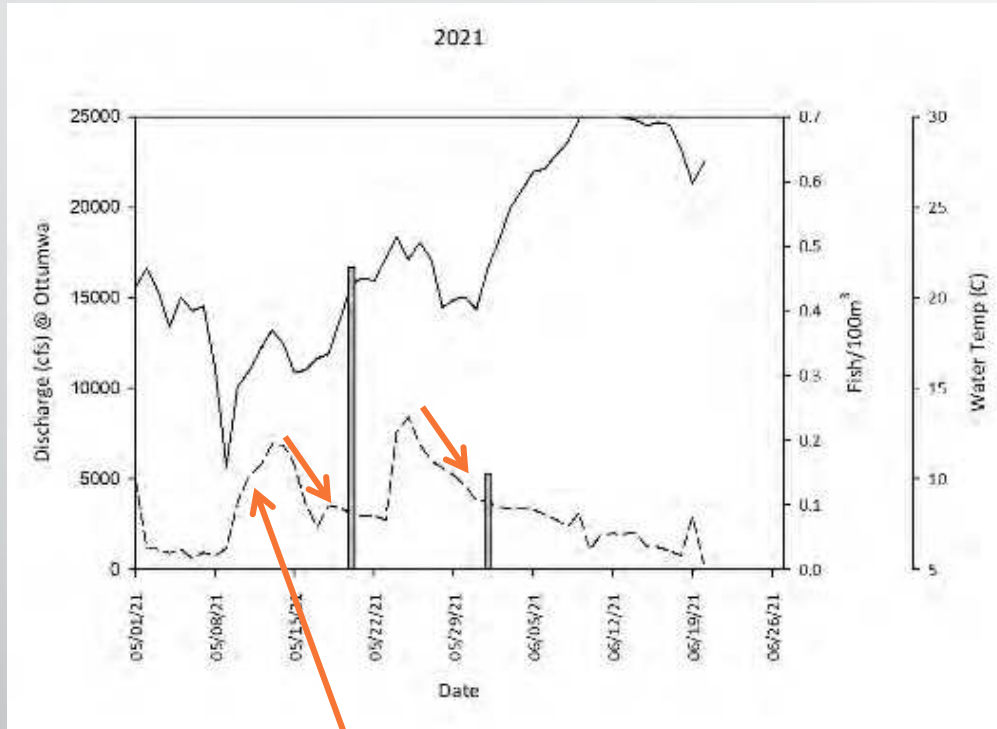
# Methods

- Processed drift samples in lab
  - Identified and separated Sturgeon and Paddlefish
  - Sent samples to SIU for confirmation
- Calculated CPUE by fish/100m<sup>3</sup>

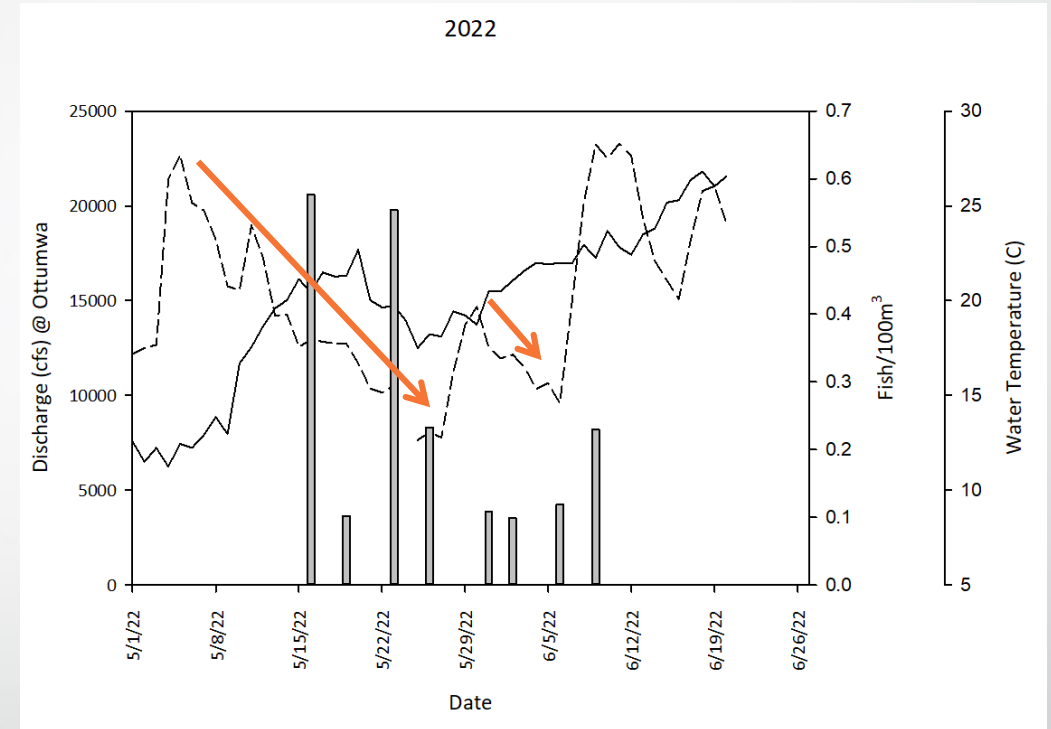


# Results

- - - Discharge (cfs) @ Ottumwa  
 ——— Water Temp (C)  
 █ Fish/100m<sup>3</sup>



\*5/11/21- Flowing female captured  
 -Larval SNSG captured following flow pulse



\*2022 preliminary- awaiting genetics results  
 -Larval SNSG/PDFH captured following flow pulse  
 -Potential of 2 eggs captured  
 -No PDFH confirmed yet





# Results

- All fish ~24 hrs. old or less
  - Most individuals captured just following the flow pulses
- It appears larval Shovelnose Sturgeon reproduction is associated with the flow pulses
  - May have provided some of the only reproduction that occurred in 2021



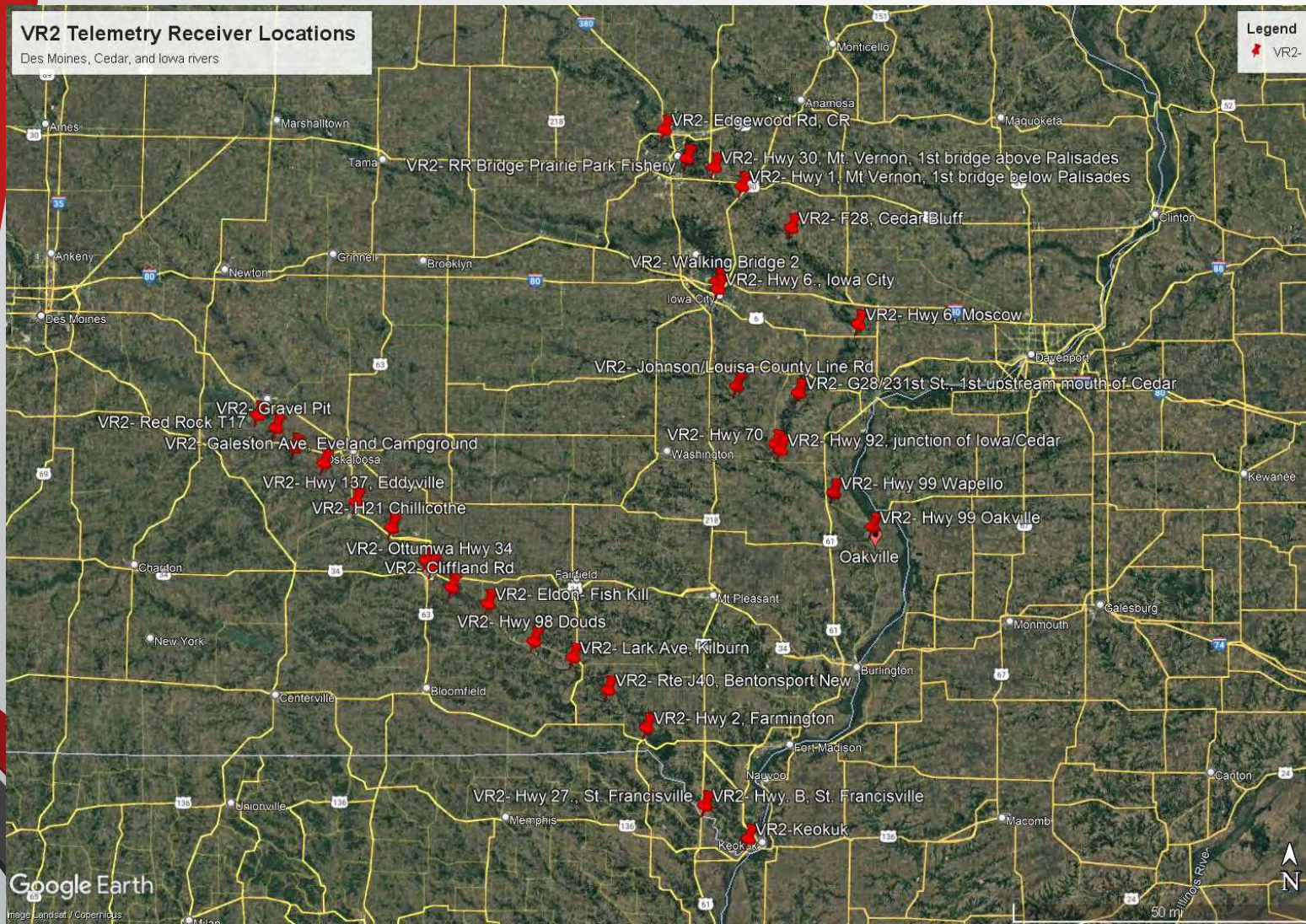
# Discussion

- Flow pulses may provide reproduction in years where flows are low and reproduction is limited in other locations
- Need to continue to analyze data to narrow down parameters that initiate successful reproduction



# Discussion

- Worked with ISU and USFWS to develop telemetry array in the Cedar/Iowa and Des Moines rivers



# Discussion

- Evaluate movement of Shovelnose Sturgeon:
  - Flow pulses (timing and magnitude), temperature, other env. variables
  - Confirm spawning periodicity results
  - Male vs female
  - UMR and Tributary connectivity
  - Residency
- Currently:
  - Cedar River- 27
  - Des Moines River- 22
    - 1 Lake Sturgeon
  - 50 more tags purchased
  - 6-10 year lifespan



# Discussion

- Ultimately, this program appears to be successful and the collaboration has been great!
- Looking forward to continue working as partners with the USACE, TNC, City of Ottumwa Water and Hydro, Iowa DNR Fisheries Bureau, Iowa DNR Wildlife Bureau, and Iowa State University to make this program a success and meet all needs
- Hopefully mirror these successes in other locations (i.e., Iowa River)

