

Minnesota River Paddlefish, Sturgeon, Backwaters, Plankton, and More!

Outcomes of a 3-year ENRTF funded project



Tony Sindt
Minnesota River Specialist





DEPARTMENT OF
NATURAL RESOURCES



Project Staff: Eric
Katzenmeyer, Mike Vaske,
Mike Wolf, Kayla Stampfle

Jodie Hirsch

Heidi Rantala

Joel Stiras

Brian Schultz

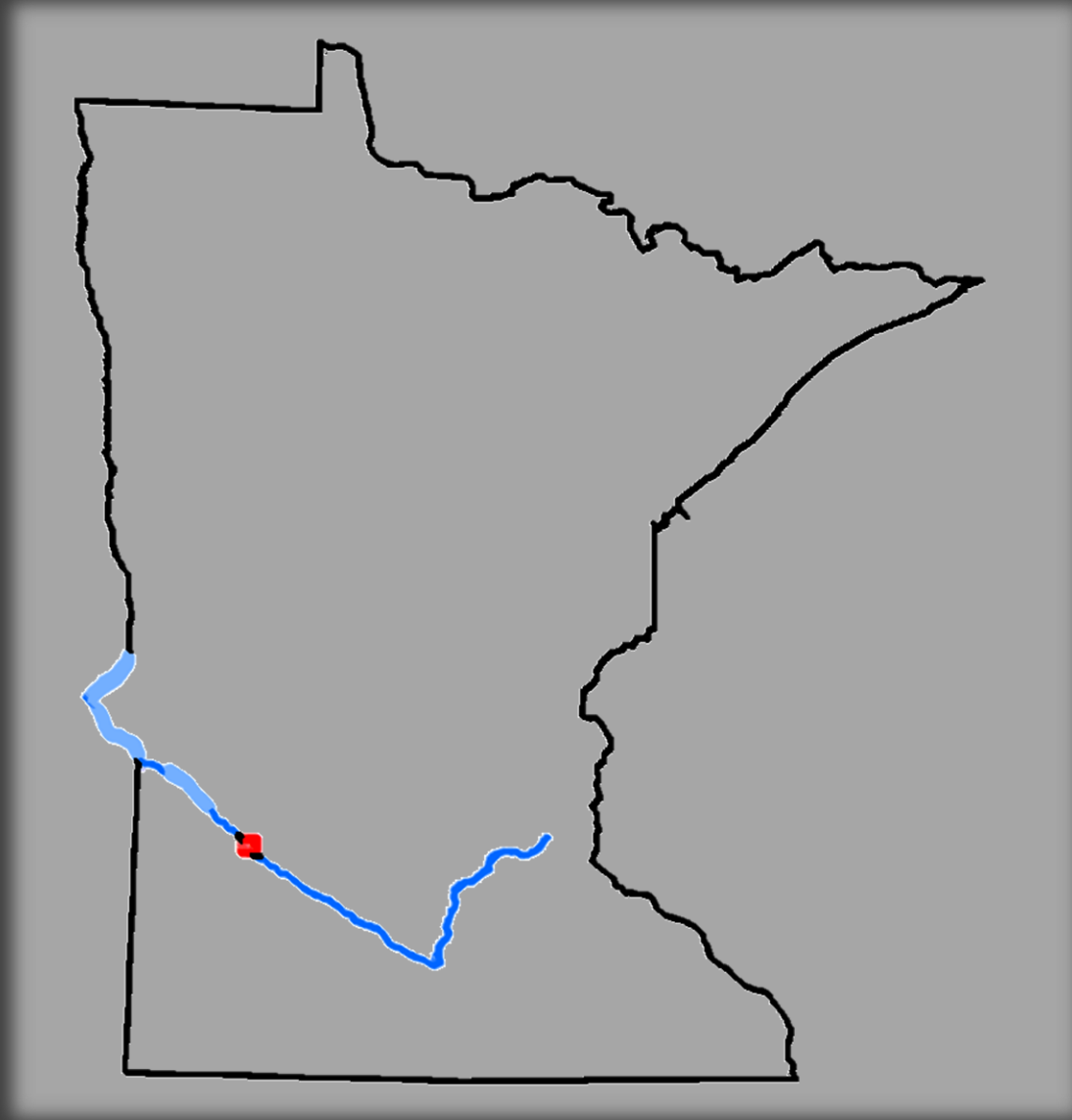
AND MANY MORE!



Interns: Garrett Ober,
Ben Erb, Melissa
Oubre, Sam Peterson



Enhance understanding of the Minnesota River ecosystem



Enhance understanding of the Minnesota River ecosystem



Enhance understanding of the Minnesota River ecosystem



Enhance understanding of the Minnesota River ecosystem



**Objectives: Establish baseline datasets
and enhance understanding**

Outline



Outline



PLANKTON

Lower Trophic Ecology:
Evaluate spatial and temporal trends
in water chemistry and phytoplankton
and zooplankton communities



HABITAT



**BACKWATER
ECOSYSTEMS**



FISH

Outline



Skip: bathymetry maps & fish community assessments

Outline



Paddlefish:
presence, abundance, and
telemetry

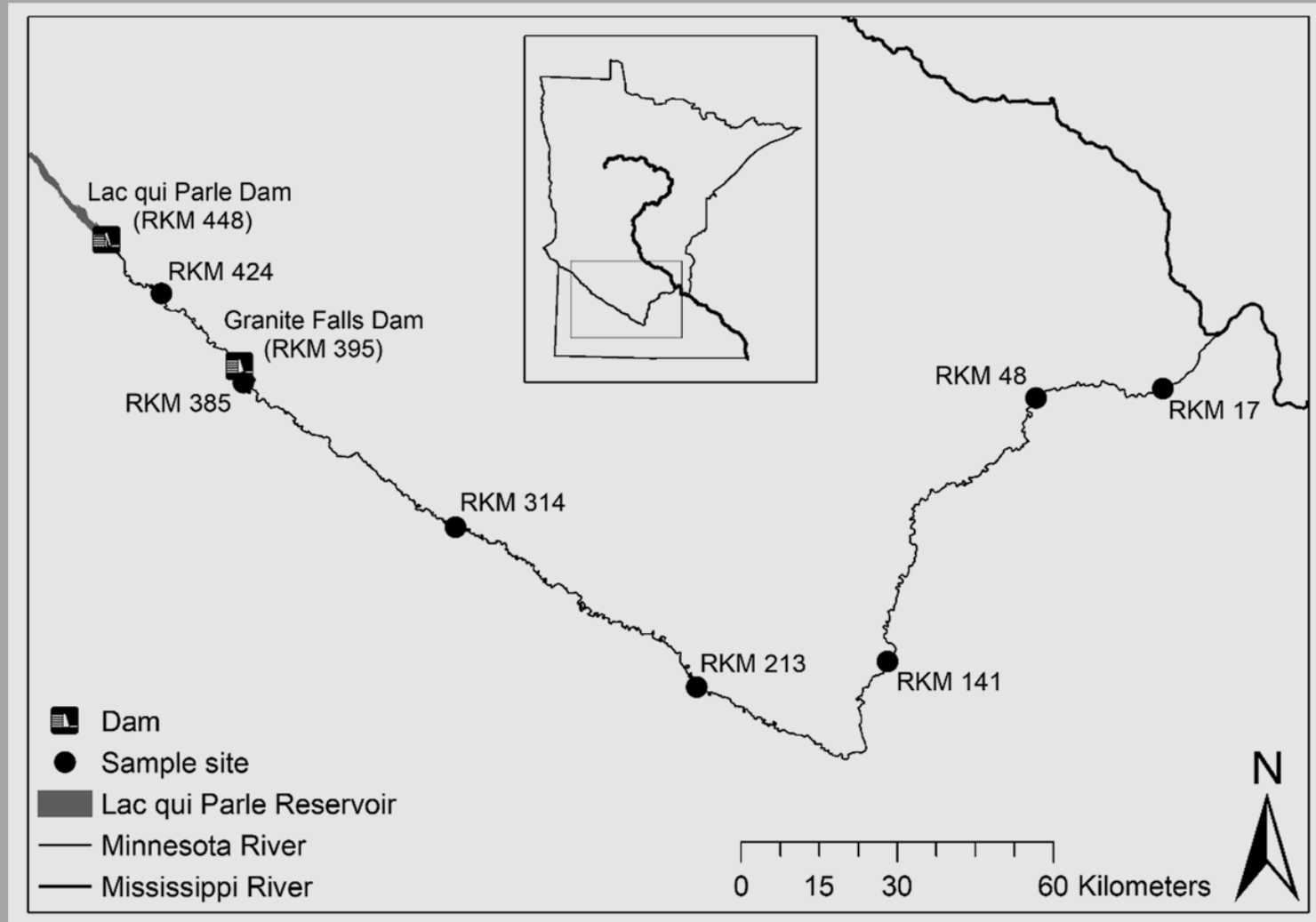
Shovelnose Sturgeon:
population dynamics and
telemetry

Lower Trophic Ecology



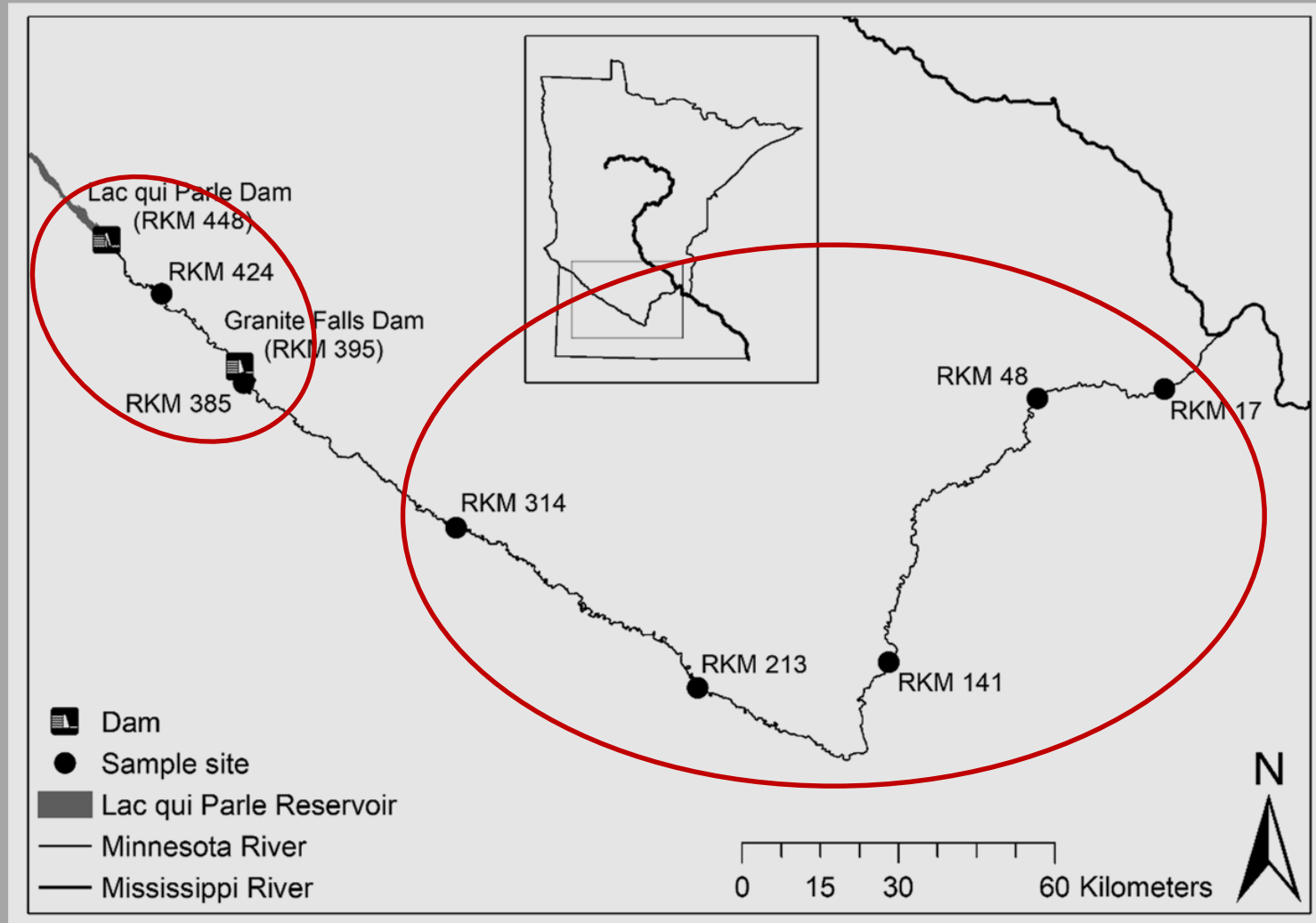
Lower Trophic Ecology

- Water, phytoplankton, and zooplankton samples
- Monthly May–October
- 2016*, 2017, & 2018



Lower Trophic Ecology

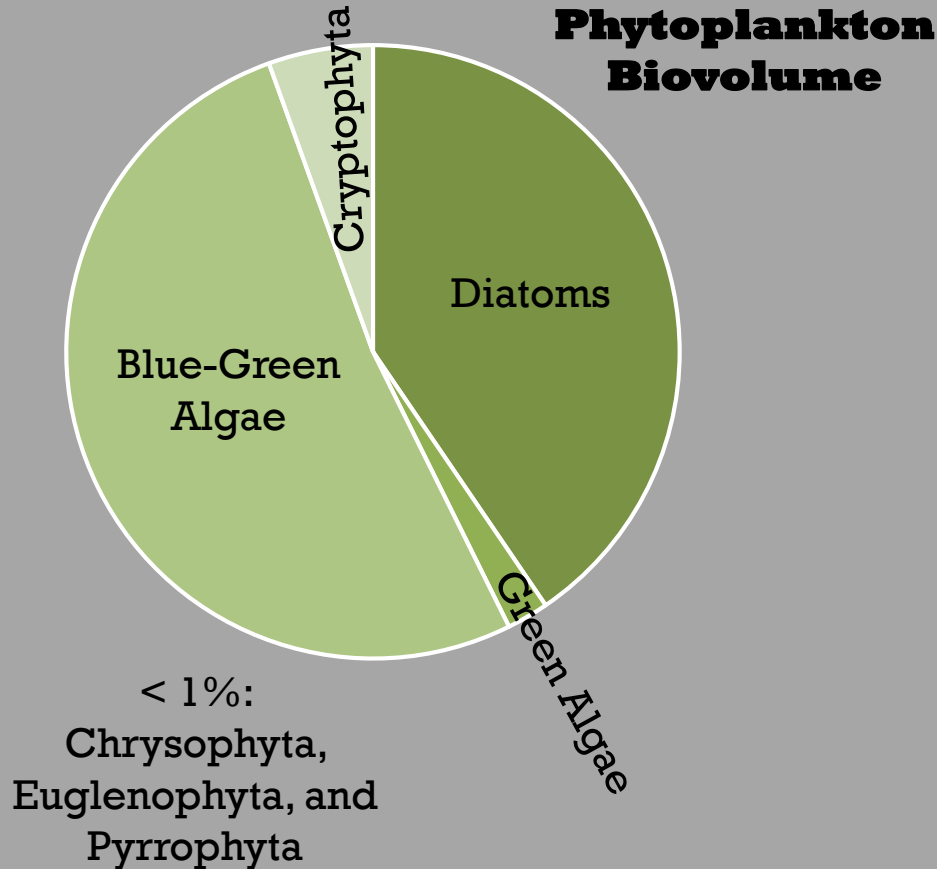
- Water, phytoplankton, and zooplankton samples
- Monthly May–October
- 2016*, 2017, & 2018



Lower Trophic Ecology

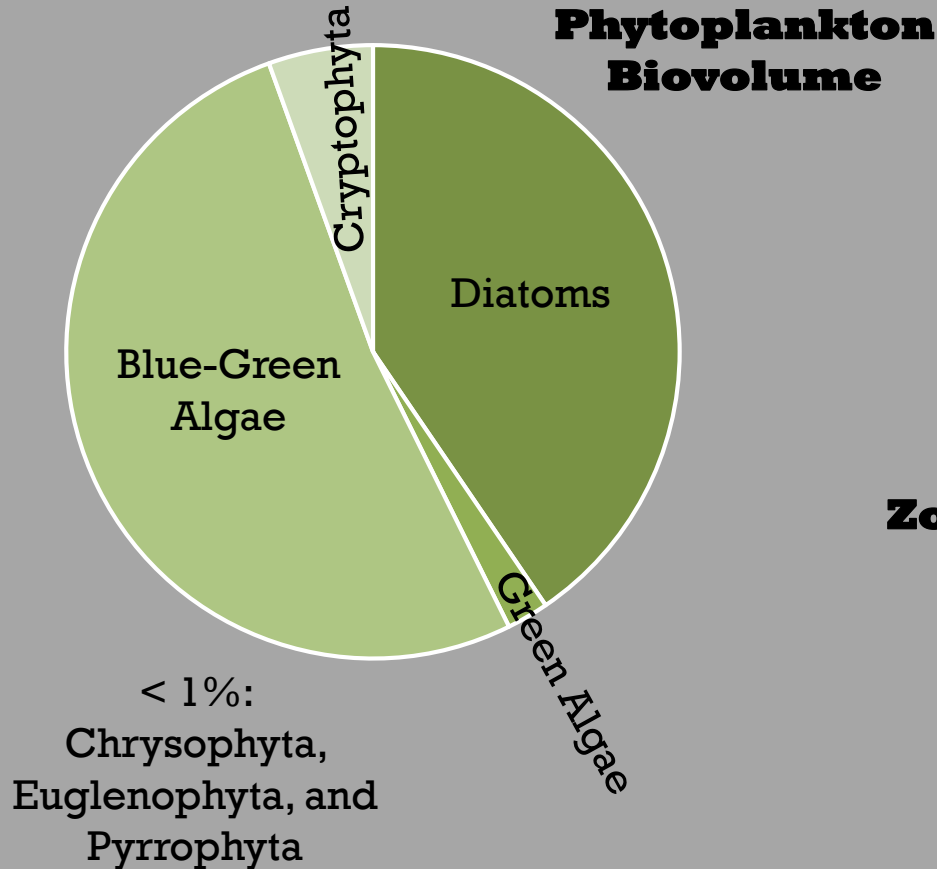
Lower Trophic Ecology

Phytoplankton



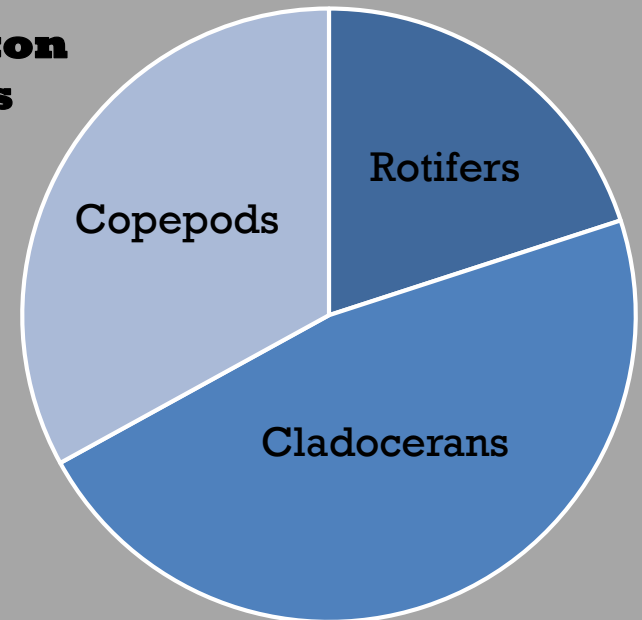
Lower Trophic Ecology

Phytoplankton

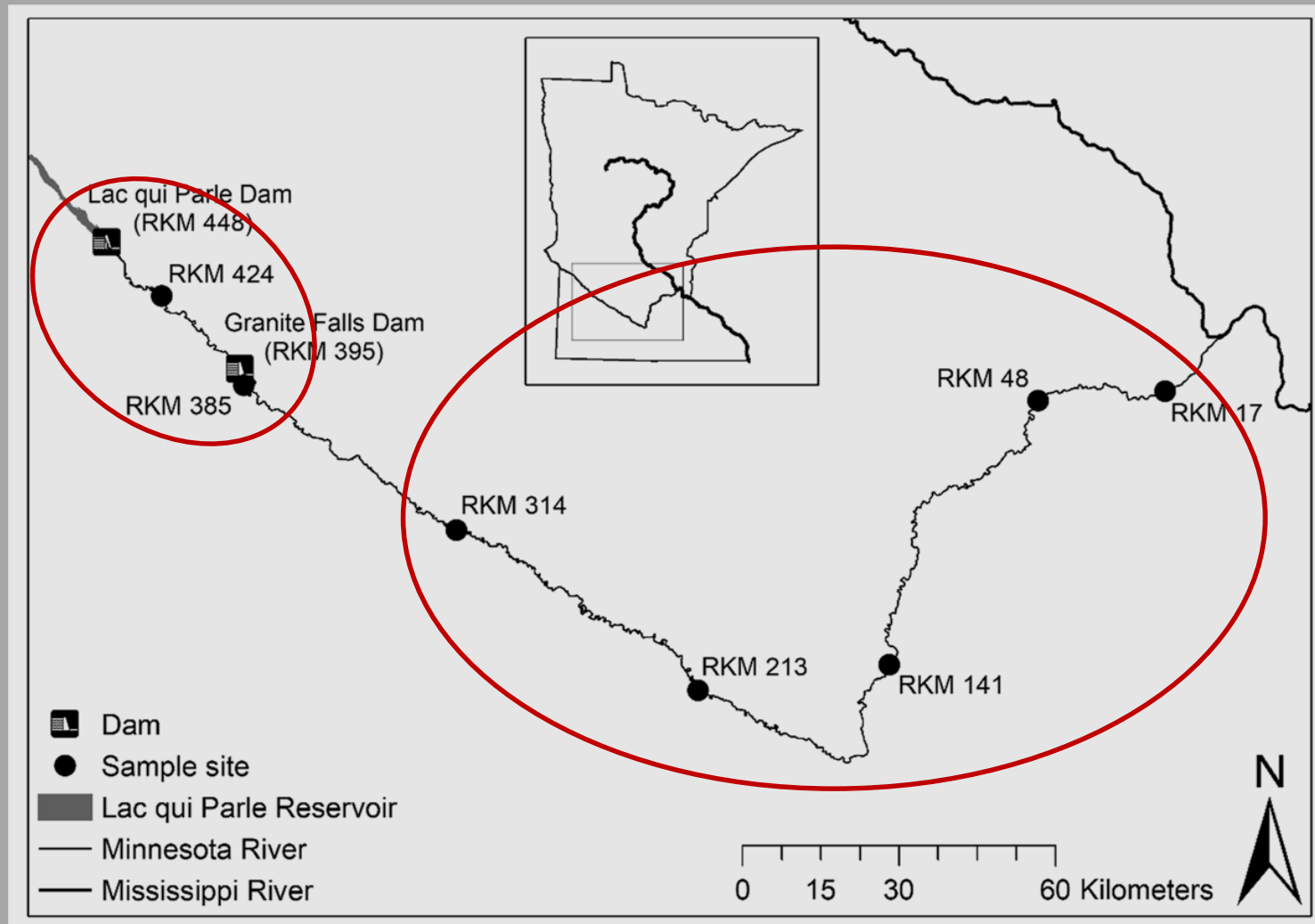


Zooplankton

Zooplankton Biomass

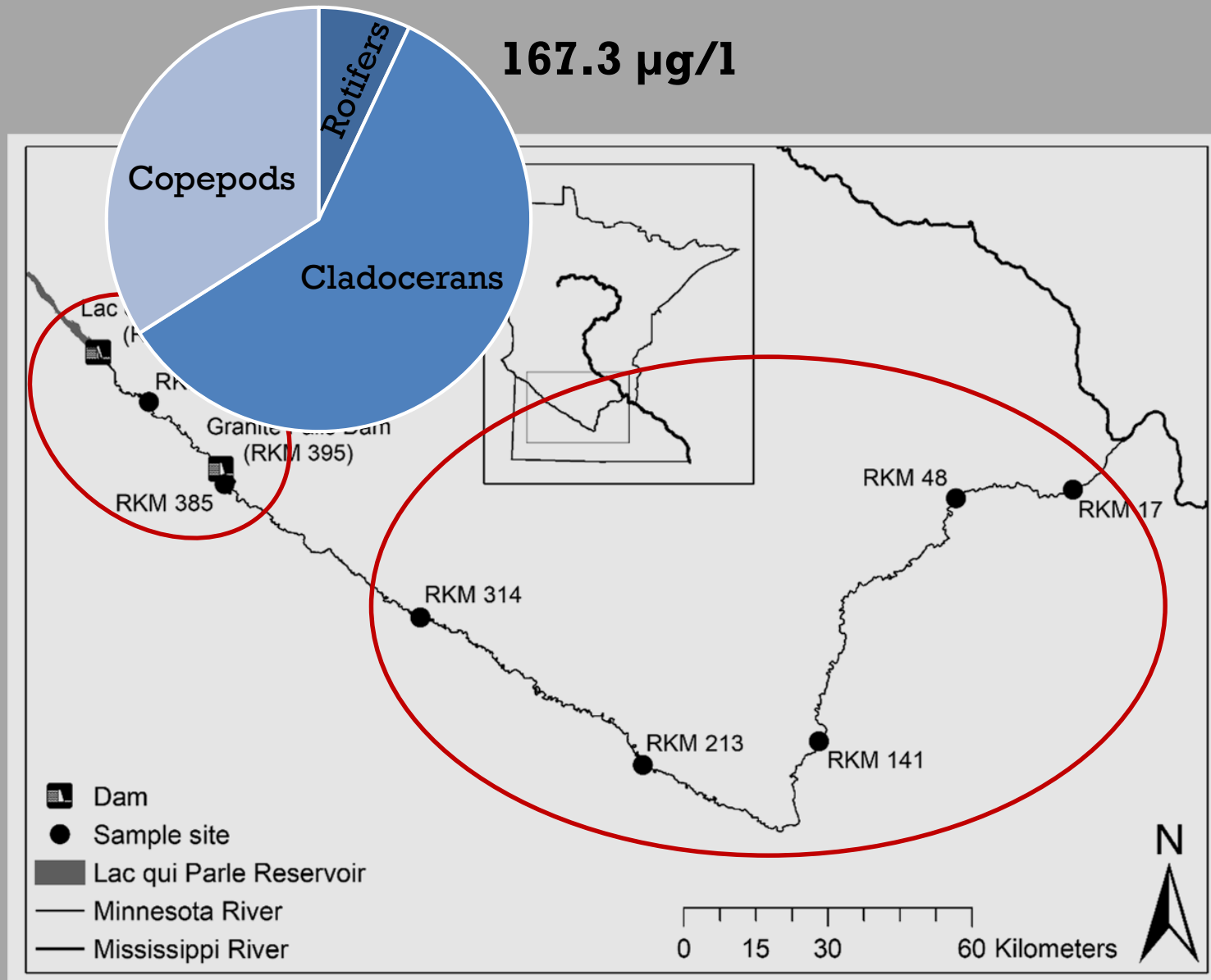


Lower Trophic Ecology

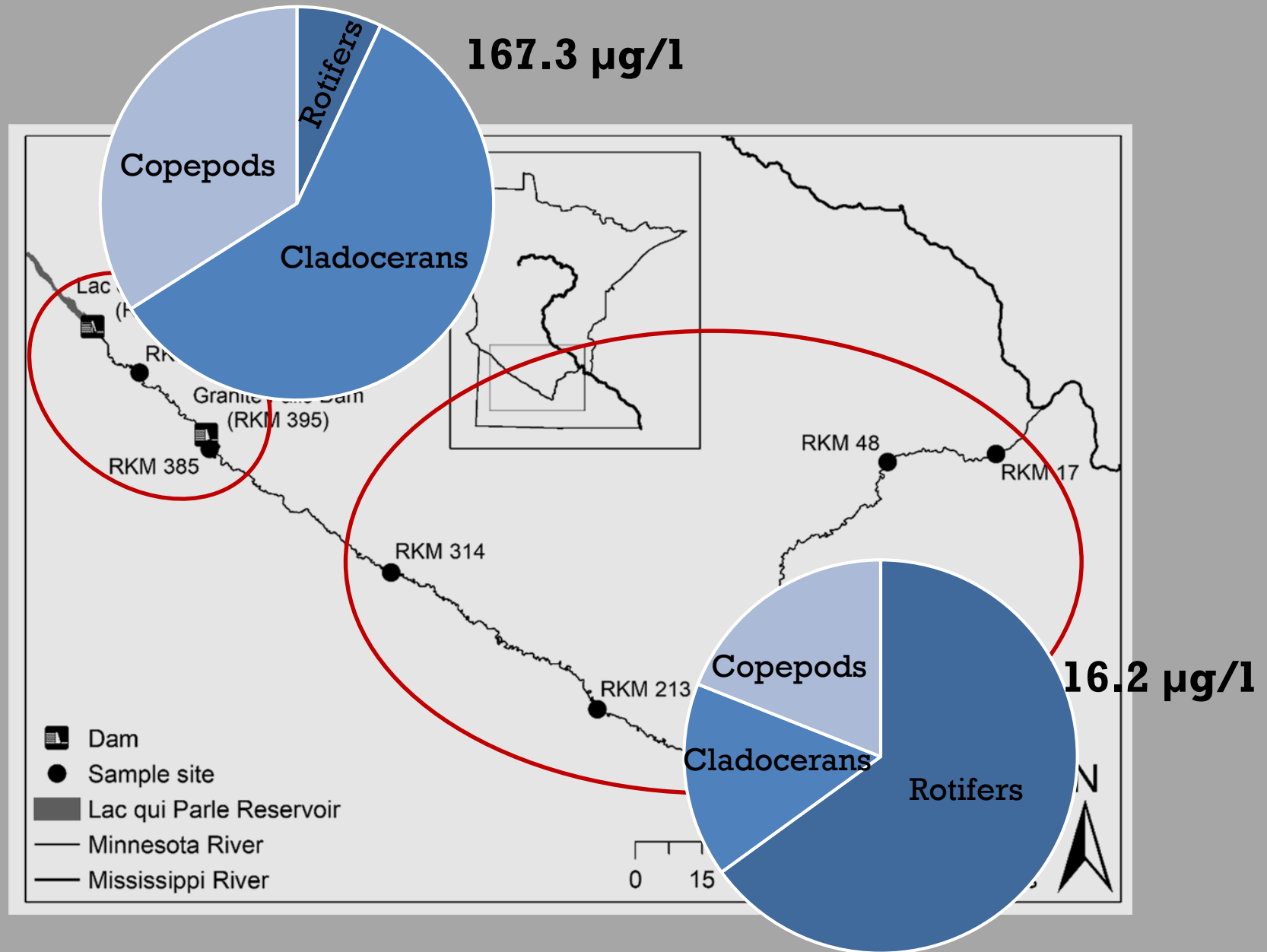


Lower Trophic Ecology

167.3 $\mu\text{g/l}$



Lower Trophic Ecology



Lower Trophic Ecology - SUMMARY

Lower Trophic Ecology - SUMMARY

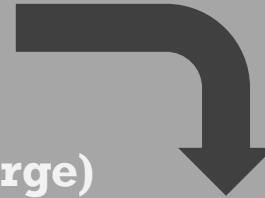
Many Abiotic Variables

- **Spatial (sites)**
- **Temporal (year, season, month)**
- **Water chemistry (e.g., TSS, TKN)**
- **Site (temp, Secchi, relative discharge)**

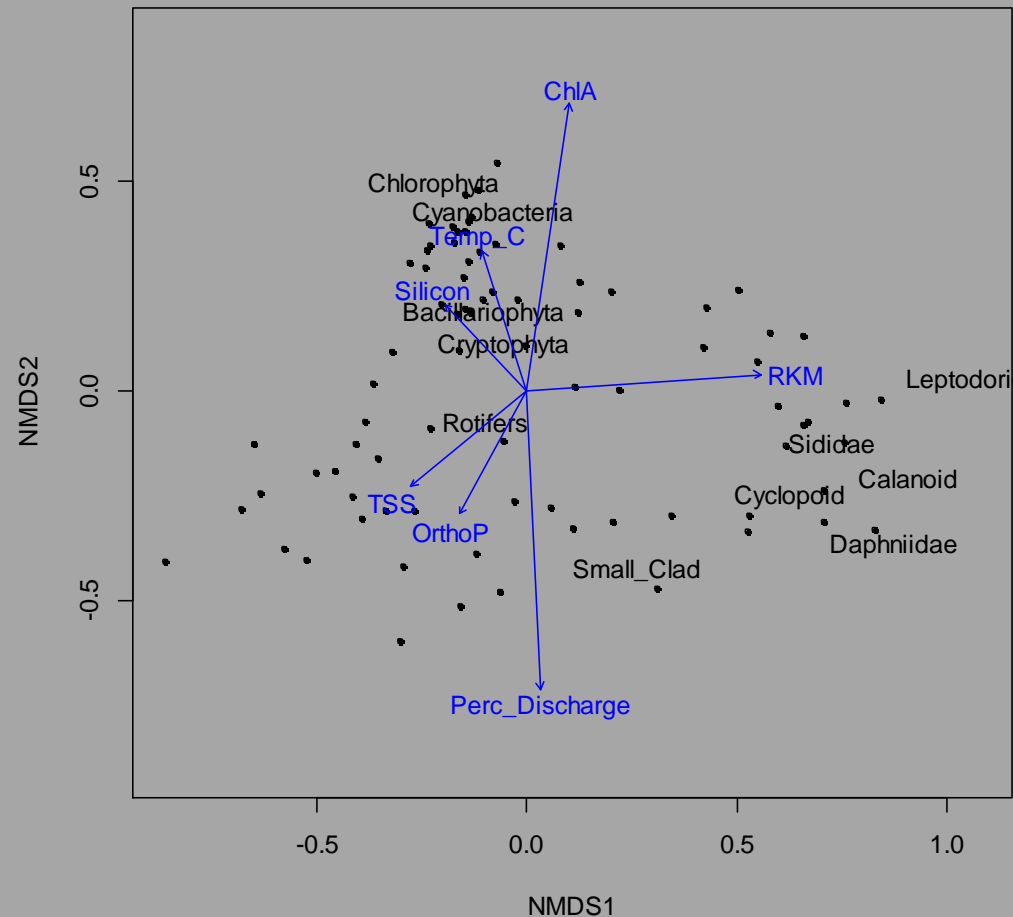
Lower Trophic Ecology - **SUMMARY**

Many Abiotic Variables

- Spatial (sites)
- Temporal (year, season, month)
- Water chemistry (e.g., TSS, TKN)
- Site (temp, Secchi, relative discharge)



Multivariate Analyses (NMDS)



Lower Trophic Ecology - **SUMMARY**

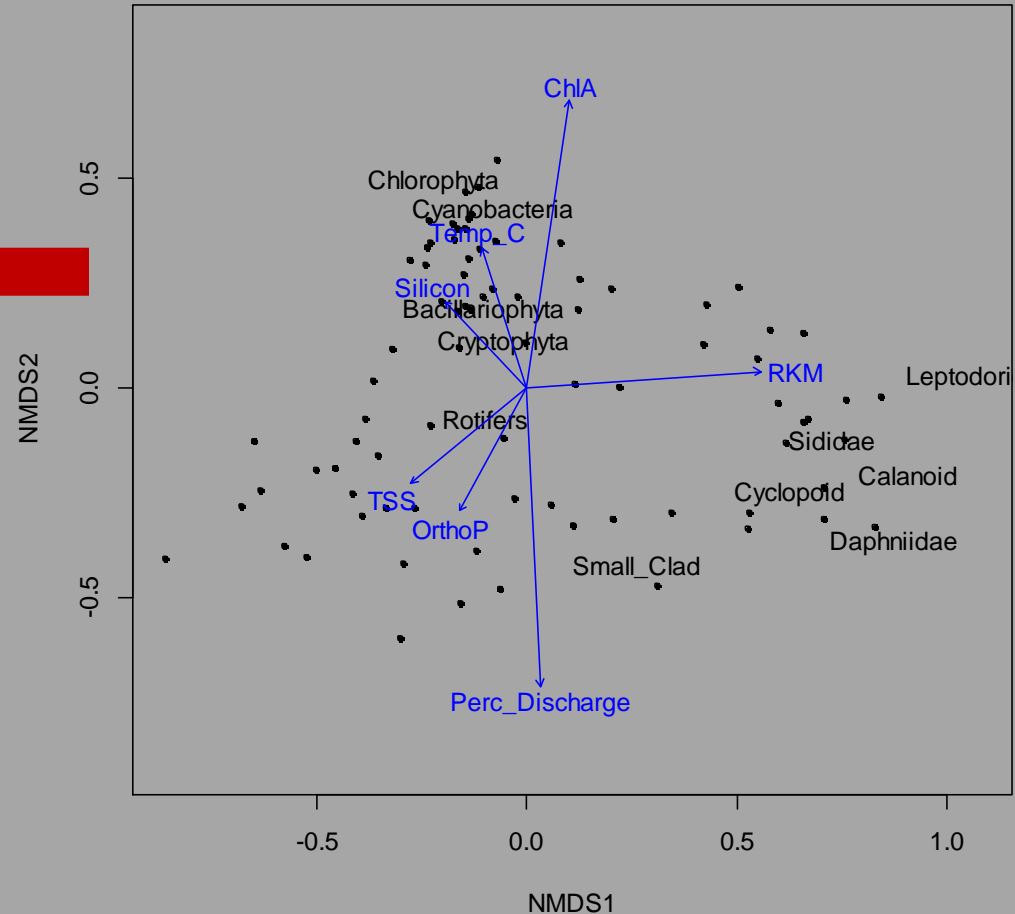
Many Abiotic Variables

- Spatial (sites)
- Temporal (year, season, month)
- Water chemistry (e.g., TSS, TKN)
- Site (temp, Secchi, relative discharge)

Multivariate Analyses (NMDS)

Summary

- Impoundments have the greatest influence on **zooplankton**.



Lower Trophic Ecology - SUMMARY

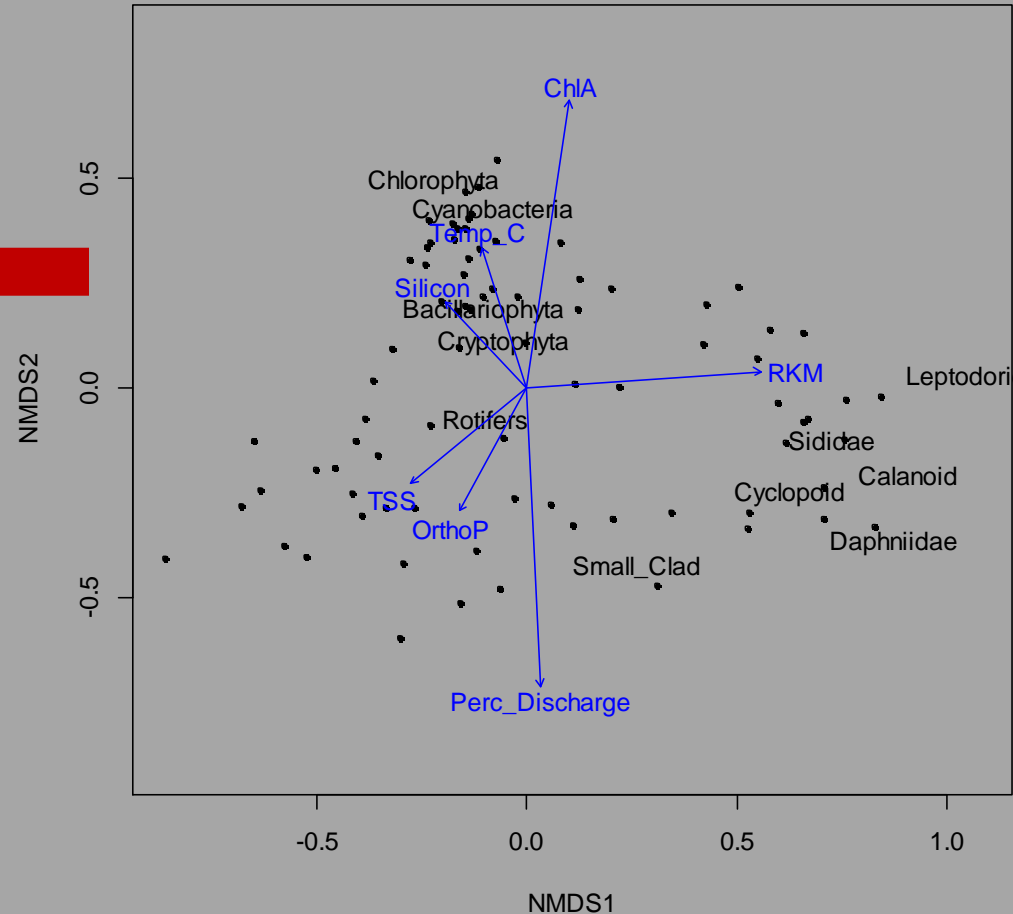
Many Abiotic Variables

- Spatial (sites)
- Temporal (year, season, month)
- Water chemistry (e.g., TSS, TKN)
- Site (temp, Secchi, relative discharge)

Multivariate Analyses (NMDS)

Summary

- Impoundments have the greatest influence on **zooplankton**.
- Excluding that influence, temporal variability (month) is greatest for both **phytoplankton** and **zooplankton**.



Lower Trophic Ecology - SUMMARY

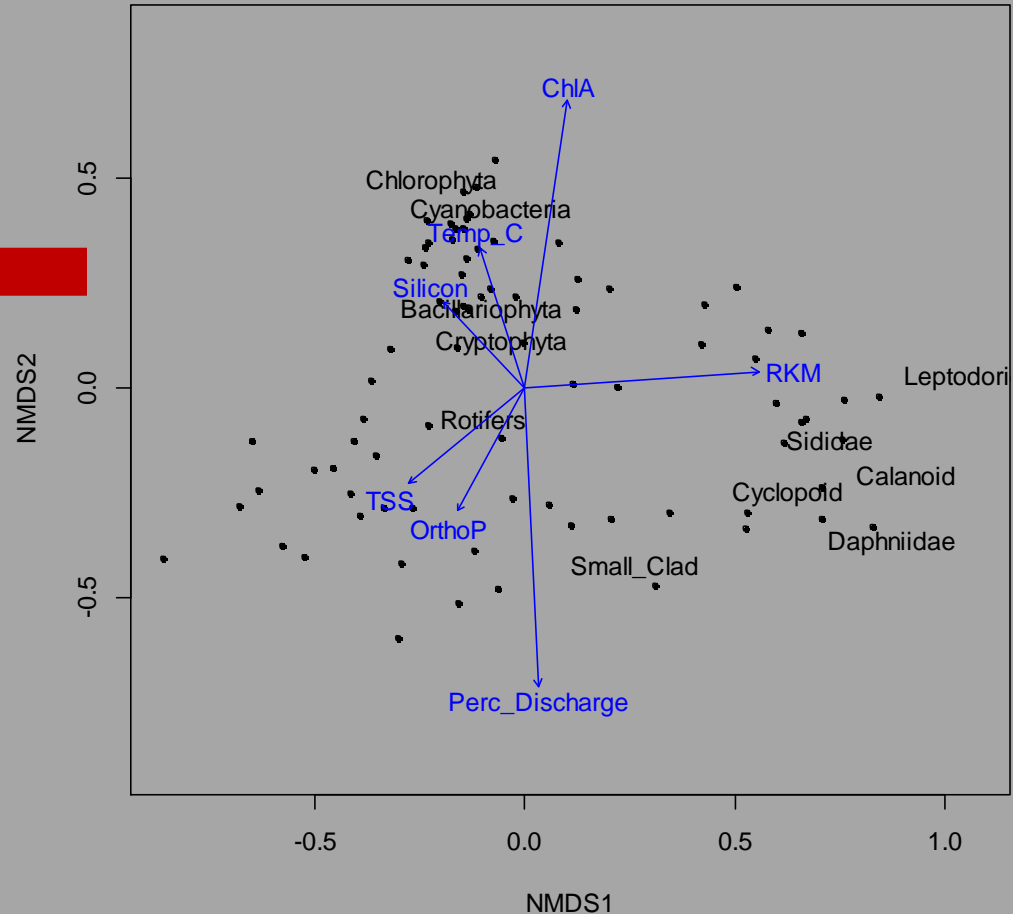
Many Abiotic Variables

- Spatial (sites)
- Temporal (year, season, month)
- Water chemistry (e.g., TSS, TKN)
- Site (temp, Secchi, relative discharge)

Multivariate Analyses (NMDS)

Summary

- Impoundments have the greatest influence on **zooplankton**.
- Excluding that influence, temporal variability (month) is greatest for both **phytoplankton** and **zooplankton**.
- The greatest influence on temporal variability is **relative discharge**.



Paddlefish



Paddlefish



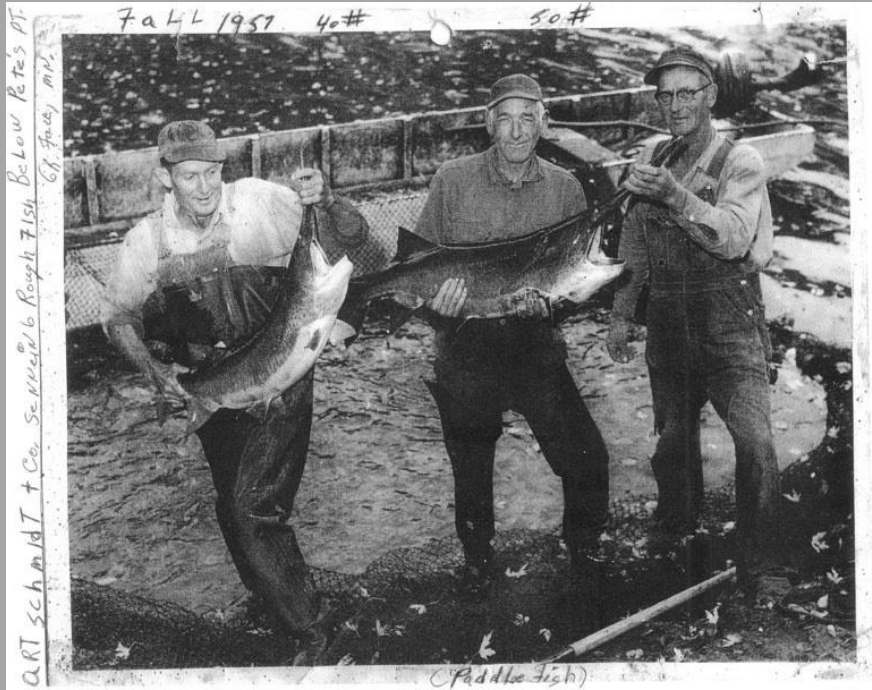
Oldest photo evidence



Paddlefish



Oldest photo evidence

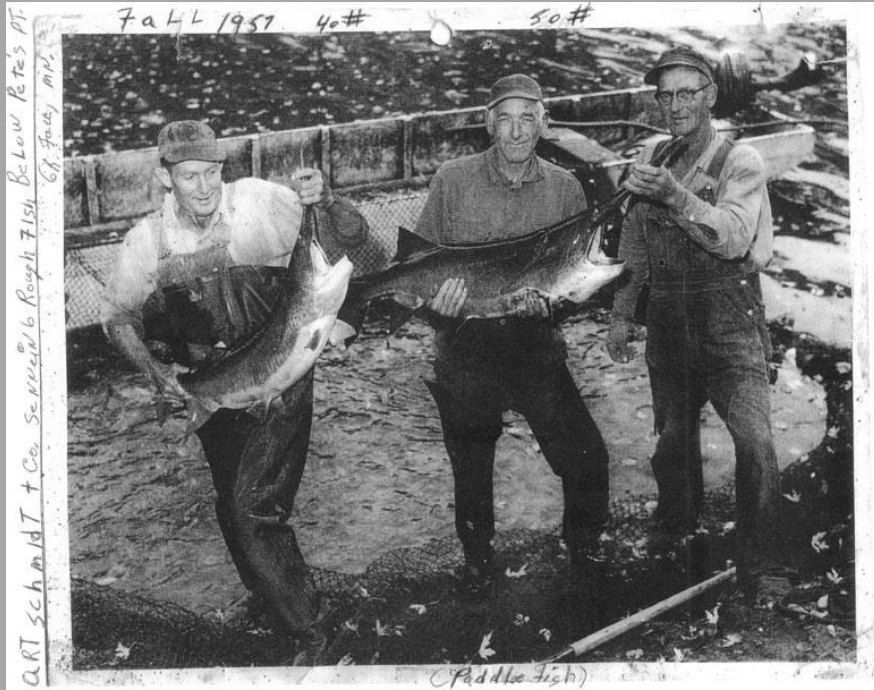


**Only 1
sampled
by DNR
staff prior
to 2016**

Paddlefish



Oldest photo evidence



**Only 1
sampled
by DNR
staff prior
to 2016**

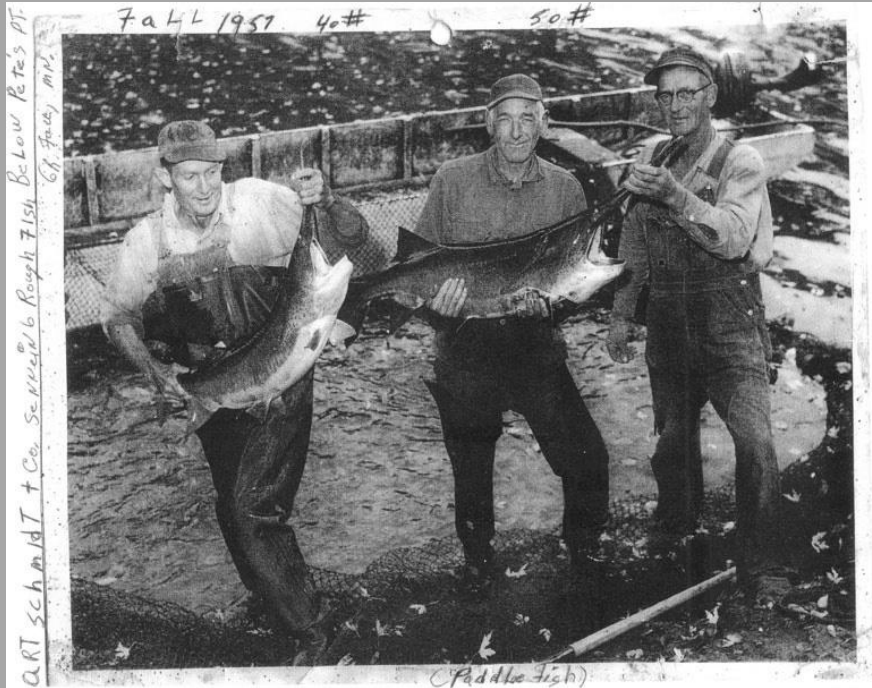
**Last 20 years:
Increasing incidental
catches by anglers and
commercial fishermen**



Paddlefish



Oldest photo evidence



**Only 1
sampled
by DNR
staff prior
to 2016**

**Last 20 years:
Increasing incidental
catches by anglers and
commercial fishermen**

**Nearest confirmed
spawning: Chippewa
River > 125 km
downstream**



Paddlefish



With targeted
sampling we
captured **81**
PAH during
2016–2018

Paddlefish



With targeted
sampling we
captured **81**
PAH during
2016–2018

**Primarily with
stationary or
drifted 5" mesh
gill nets**



**Most PAH were
caught from 4 sites**

Paddlefish



With targeted sampling we captured **81** PAH during 2016–2018

Primarily with stationary or drifted 5" mesh gill nets



Paddlefish are certainly more abundant in the Minnesota River than previously perceived

Most PAH were caught from 4 sites

Paddlefish



Telemetry data
provides valuable
insight into habitat use
and movement patterns



Paddlefish



Telemetry data
provides valuable
insight into habitat use
and movement patterns



3 Movement Patterns (20 fish):

Paddlefish



Telemetry data
provides valuable
insight into habitat use
and movement patterns



3 Movement Patterns (20 fish):

- **Sedentary: 7 Fish that exhibit small home ranges**

Paddlefish



Telemetry data
provides valuable
insight into habitat use
and movement patterns



3 Movement Patterns (20 fish):

- **Sedentary: 7 Fish that exhibit small home ranges**
- **Mobile: 3 Fish that frequently make large movements**

**Greatest short-
term movement:
> 230 km**

**Greatest total
movement:
> 1,300 km**

Paddlefish



Telemetry data
provides valuable
insight into habitat use
and movement patterns



3 Movement Patterns (20 fish):

- **Sedentary: 7 Fish that exhibit small home ranges**
- **Mobile: 3 Fish that frequently make large movements**
- **Forays: 5 Fish initially tagged in other rivers that made 1 or 2 forays into the MNR (Stiras & Hoxmeier)**

Paddlefish



The Big Question:

Paddlefish



The Big Question:

Are Paddlefish successfully reproducing within the
Minnesota River?

Shovelnose Sturgeon



Shovelnose Sturgeon

Sturgeons are **globally endangered**, but SLS may be among the most resilient spp. due to unique life history characteristics



Shovelnose Sturgeon

Sturgeons are **globally endangered**, but SLS may be among the most resilient spp. due to unique life history characteristics



2015: removed as state species of conservation need and MN DNR opened a catch-and-release season



Shovelnose Sturgeon

Sturgeons are **globally endangered**, but SLS may be among the most resilient spp. due to unique life history characteristics



2015: removed as state species of conservation need and MN DNR opened a catch-and-release season



Likely more abundant in the Minnesota River than any other MN system. Unfortunately, **very little is know about their population dynamics and movement patterns**



Shovelnose Sturgeon

We captured **391** Shovelnose Sturgeon during 2016–2018 from four study reaches using a variety of sampling gears

Shovelnose Sturgeon

We captured **391** Shovelnose Sturgeon during 2016–2018 from four study reaches using a variety of sampling gears

Most Effective Gear:
Fall Trotlines

Shovelnose Sturgeon

We captured **391** Shovelnose Sturgeon during 2016–2018 from four study reaches using a variety of sampling gears

Most Effective Gear:
Fall Trotlines

Sampling Biases:
75% 573–683 mm

Shovelnose Sturgeon

We captured **391** Shovelnose Sturgeon during 2016–2018 from four study reaches using a variety of sampling gears

Most Effective Gear:
Fall Trotlines

Sampling Biases:
75% 573–683 mm

Mark-Recapture:
 $\approx 96/\text{km}$ (≥ 560 mm)

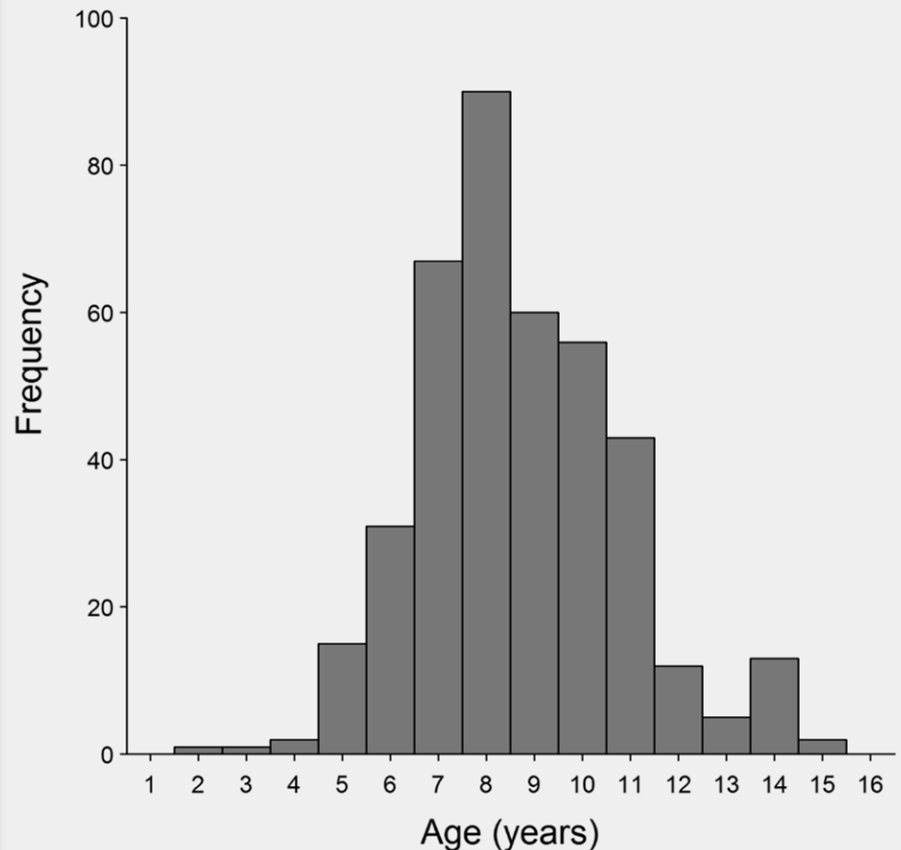
Shovelnose Sturgeon

We captured **391** Shovelnose Sturgeon during 2016–2018 from four study reaches using a variety of sampling gears

Most Effective Gear:
Fall Trotlines

Sampling Biases:
75% 573–683 mm

Mark-Recapture:
 $\approx 96/\text{km}$ (≥ 560 mm)



Shovelnose Sturgeon

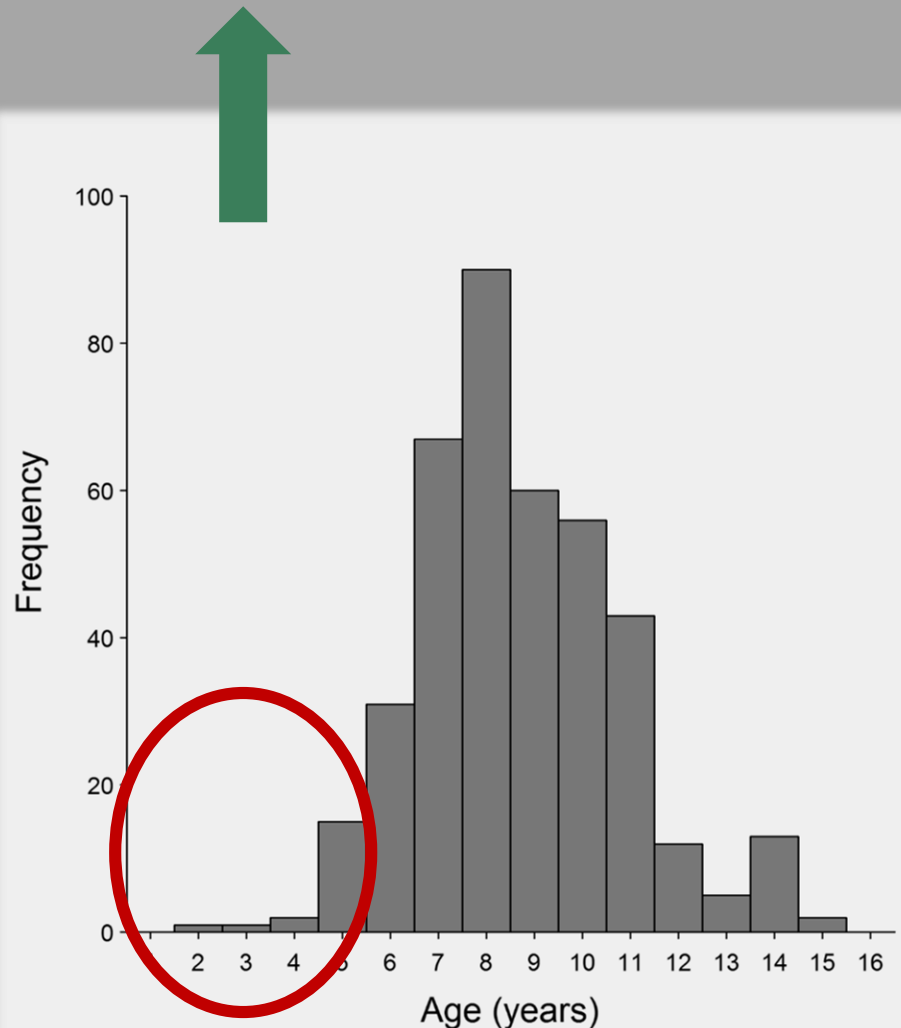
We captured **391** Shovelnose Sturgeon during 2016–2018 from four study reaches using a variety of sampling gears

Most Effective Gear:
Fall Trotlines

Sampling Biases:
75% 573–683 mm

Mark-Recapture:
 $\approx 96/\text{km}$ (≥ 560 mm)

- Consistent recruitment



Shovelnose Sturgeon

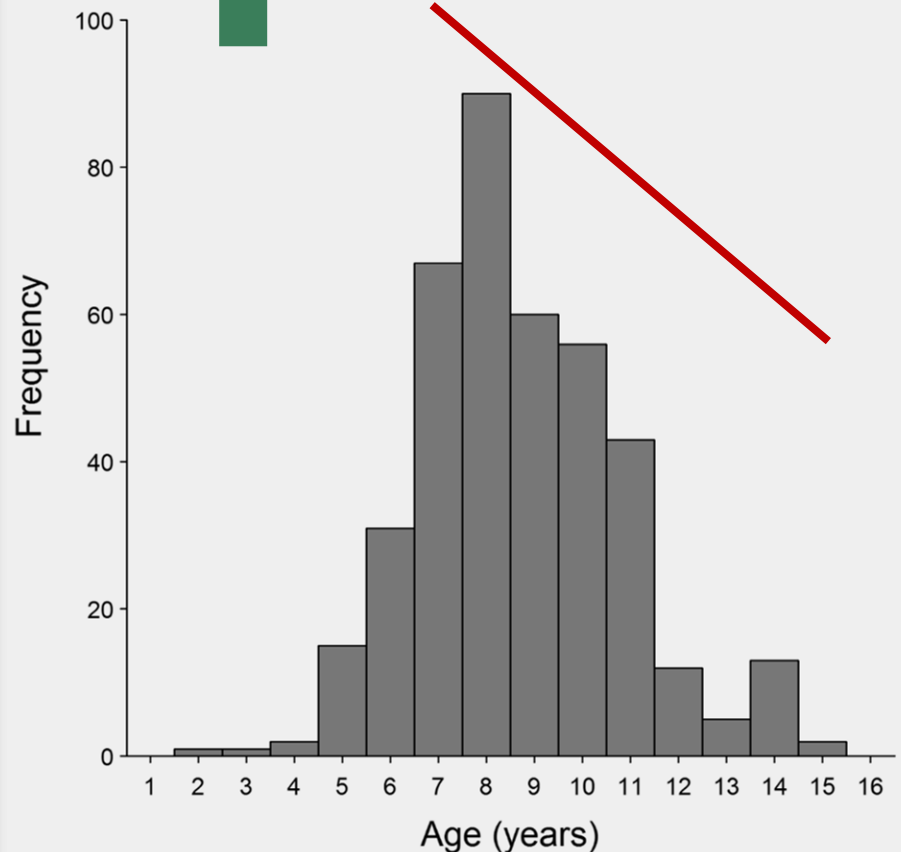
We captured **391** Shovelnose Sturgeon during 2016–2018 from four study reaches using a variety of sampling gears

Most Effective Gear:
Fall Trotlines

Sampling Biases:
75% 573–683 mm

Mark-Recapture:
 $\approx 96/\text{km}$ (≥ 560 mm)

- Consistent recruitment
- Moderate annual mortality (0.33)



Shovelnose Sturgeon

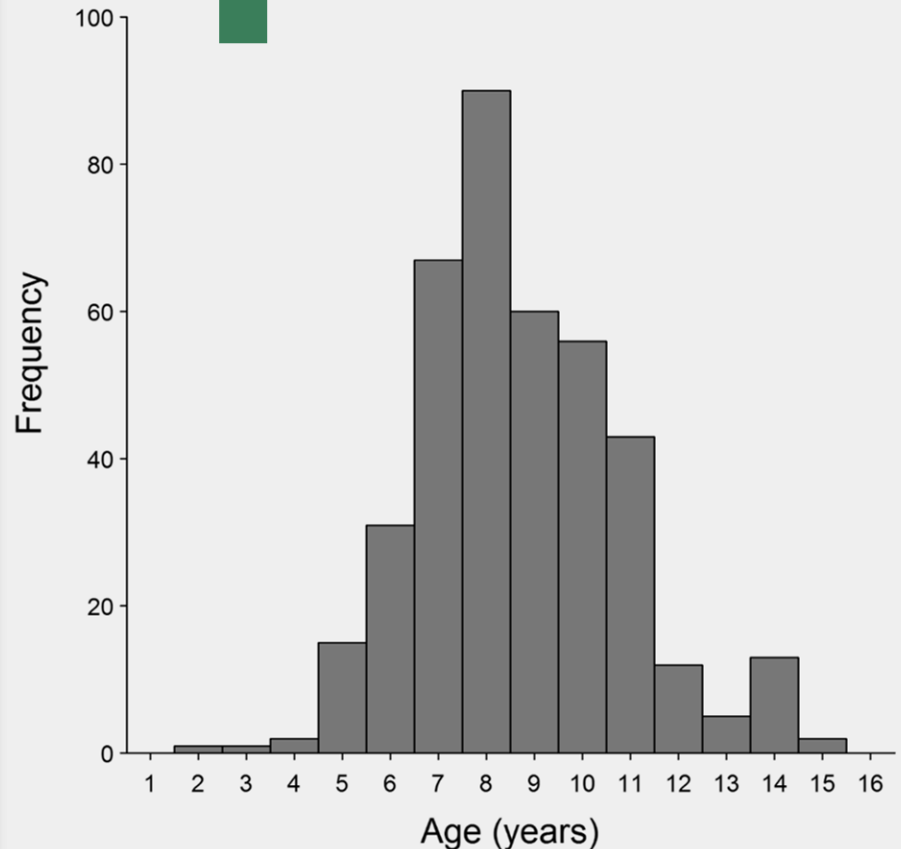
We captured **391** Shovelnose Sturgeon during 2016–2018 from four study reaches using a variety of sampling gears

Most Effective Gear:
Fall Trotlines

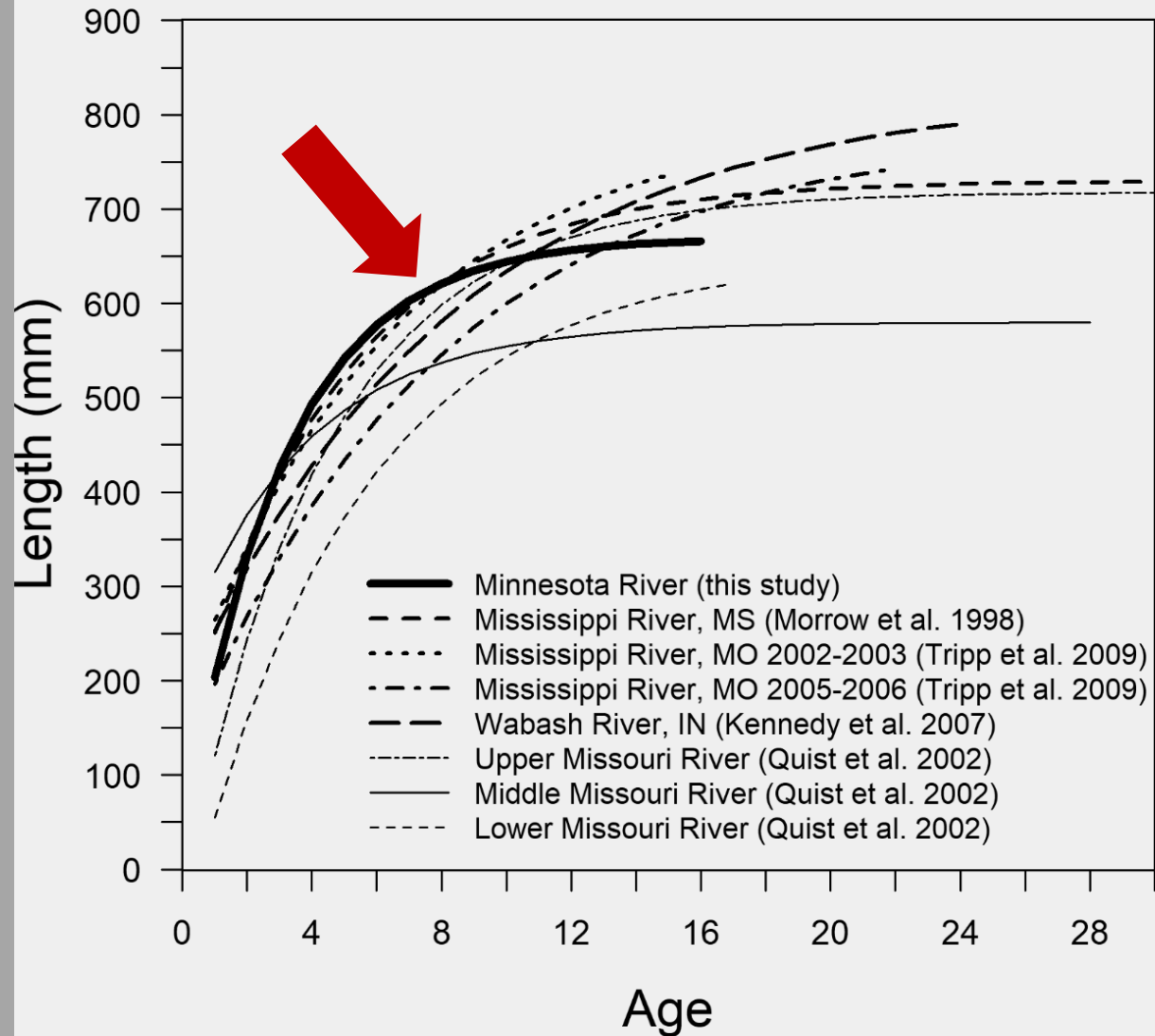
Sampling Biases:
75% 573–683 mm

Mark-Recapture:
 $\approx 96/\text{km}$ (≥ 560 mm)

- Consistent recruitment
- Moderate annual mortality (0.33)
- Growth



A detailed illustration of a European Eel (Anguilla anguilla) shown in profile, facing left. The eel has a long, slender body with a mottled pattern of brown and yellowish-green. It features a long, pointed snout, a small eye, and a dark stripe running along the side of its head. The dorsal fin is a series of small, bony scutes along the back, and the anal fin is a series of small, bony scutes along the bottom. The pectoral fins are small and pointed, and the pelvic fins are also small and pointed. The caudal fin is deeply forked. The eel is shown against a plain white background.



Shovelnose Sturgeon



Telemetry

Shovelnose Sturgeon



Telemetry

- Successfully tracked movements of 30 acoustic tagged fish

Shovelnose Sturgeon



Telemetry

- Successfully tracked movements of 30 acoustic tagged fish
- 20 were never detected >15 km from their respective tagging reach

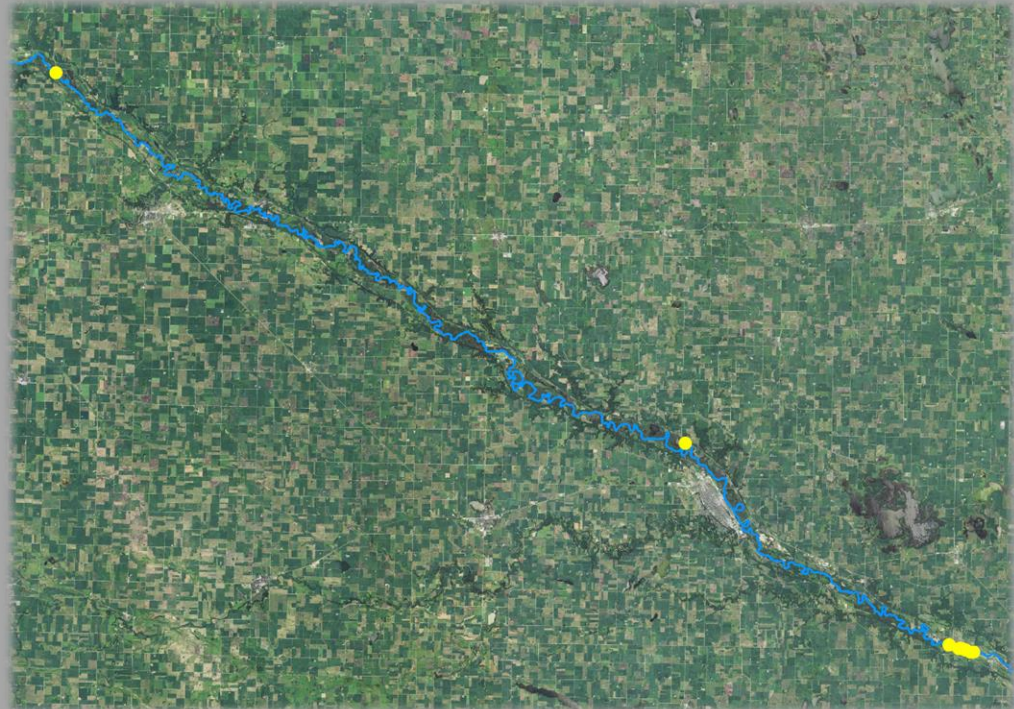


Shovelnose Sturgeon



Telemetry

- Successfully tracked movements of 30 acoustic tagged fish
- 20 were never detected >15 km from their respective tagging reach
- Only 4 fish moved >100 km

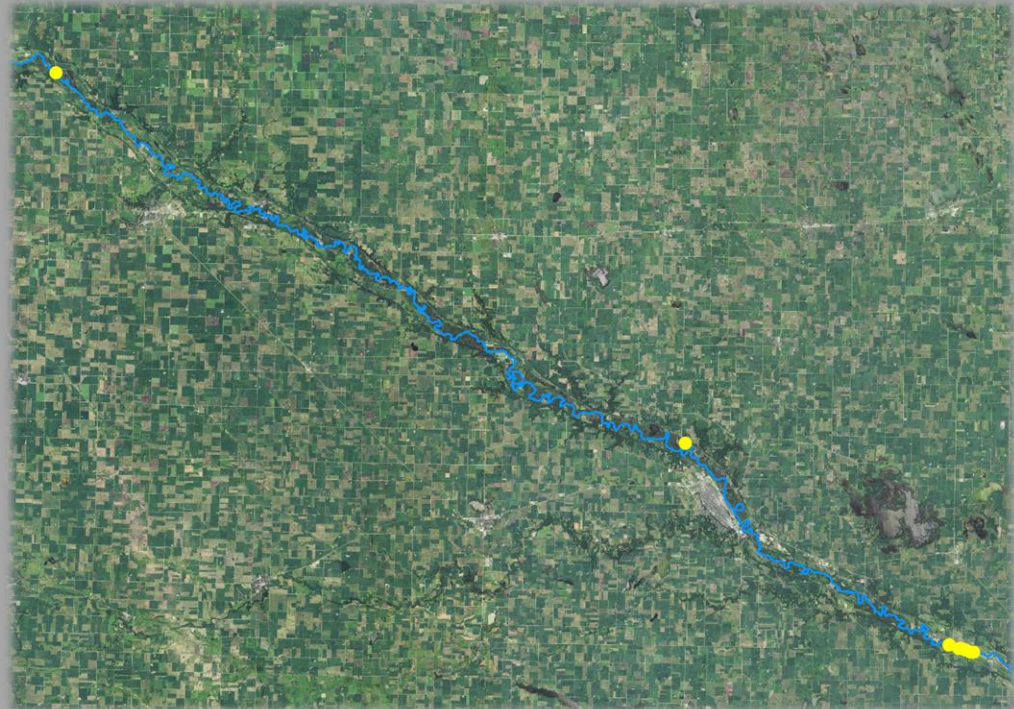


Shovelnose Sturgeon



Telemetry

- Successfully tracked movements of 30 acoustic tagged fish
- 20 were never detected >15 km from their respective tagging reach
- Only 4 fish moved >100 km
- All significant (>15 km) upstream movements occurred during May or June (spawning?)

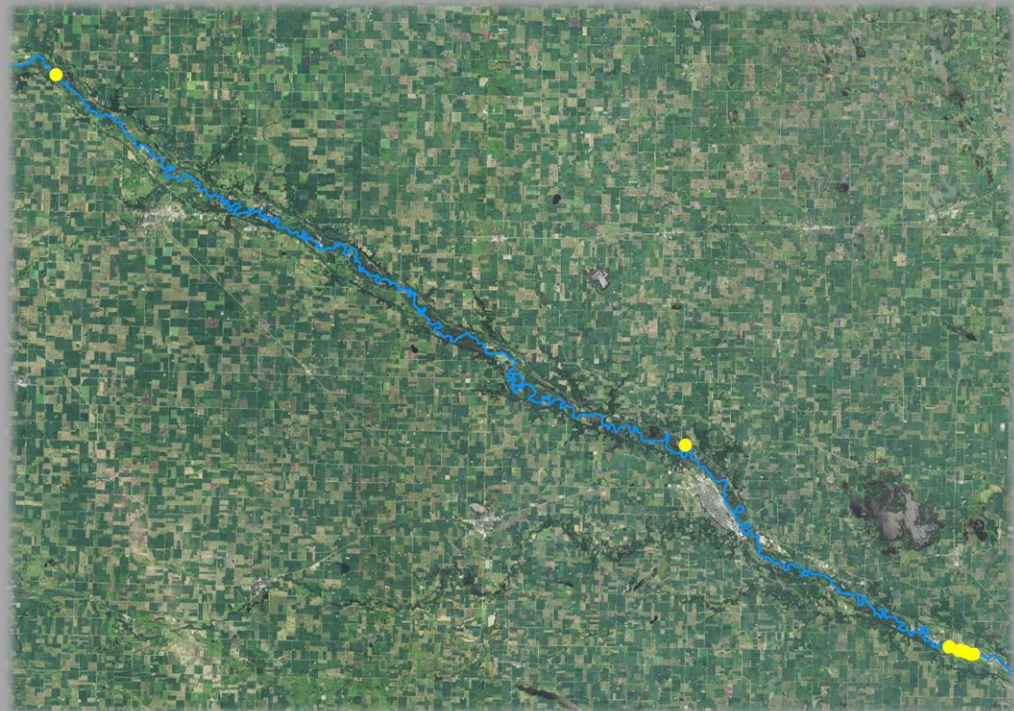


Shovelnose Sturgeon



Telemetry

- Successfully tracked movements of 30 acoustic tagged fish
- 20 were never detected >15 km from their respective tagging reach
- Only 4 fish moved >100 km
- All significant (>15 km) upstream movements occurred during May or June (spawning?)
- Many fish exhibited site fidelity



Shovelnose Sturgeon



Telemetry

- Successfully tracked movements of 30 acoustic tagged fish
- 20 were never detected >15 km from their respective tagging reach
- Only 4 fish moved >100 km
- All significant (>15 km) upstream movements occurred during May or June (spawning?)
- Many fish exhibited site fidelity
- Zero emigrated to the Mississippi River



PLANKTON



HABITAT



BACKWATER
ECOSYSTEMS



FISH

Lots of data, more results than presented, if you have any questions please contact me.

Tony Sindt

anthony.sindt@state.mn.us

Fish Art

© MN DNR, C. Iverson

