Fisheries Connectivity; Concepts and Examples

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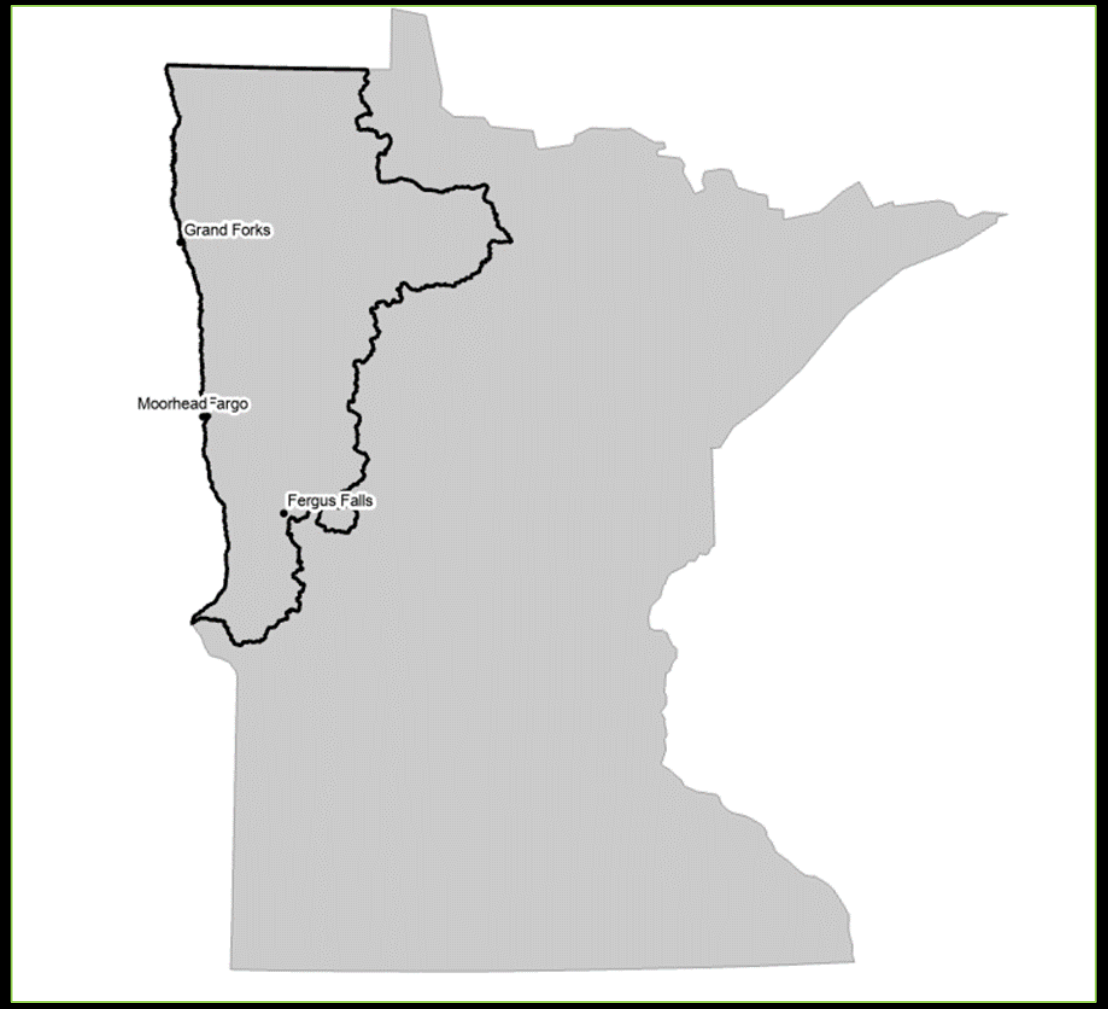
DEPARTMENT OF NATURAL RESOURCES

Division of Fish and Wildlife | www.dnr.state.us

Today's "Field Trip"

- **Welcome to the Red River Basin**



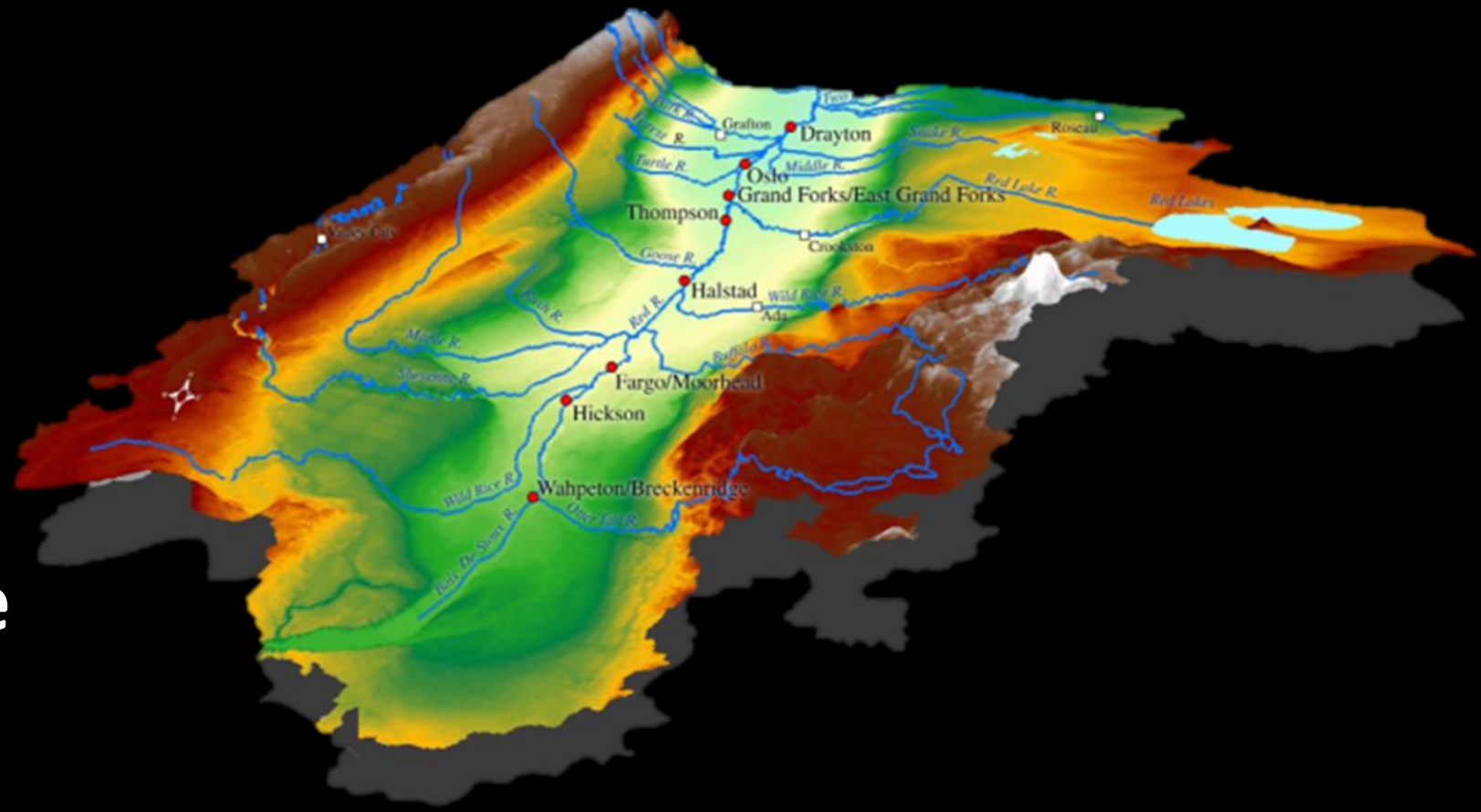
Today's "Field Trip"

- Welcome to the Red River Basin

Today's Concepts

- River Habitat Concepts
- Fish Ecology & Connectivity
- Connectivity Case Studies

Red River Basin Examples



River Habitat and Biology

- Patadromy (freshwater migration) is common among river species
- River habitat gradients influence ecology and movement

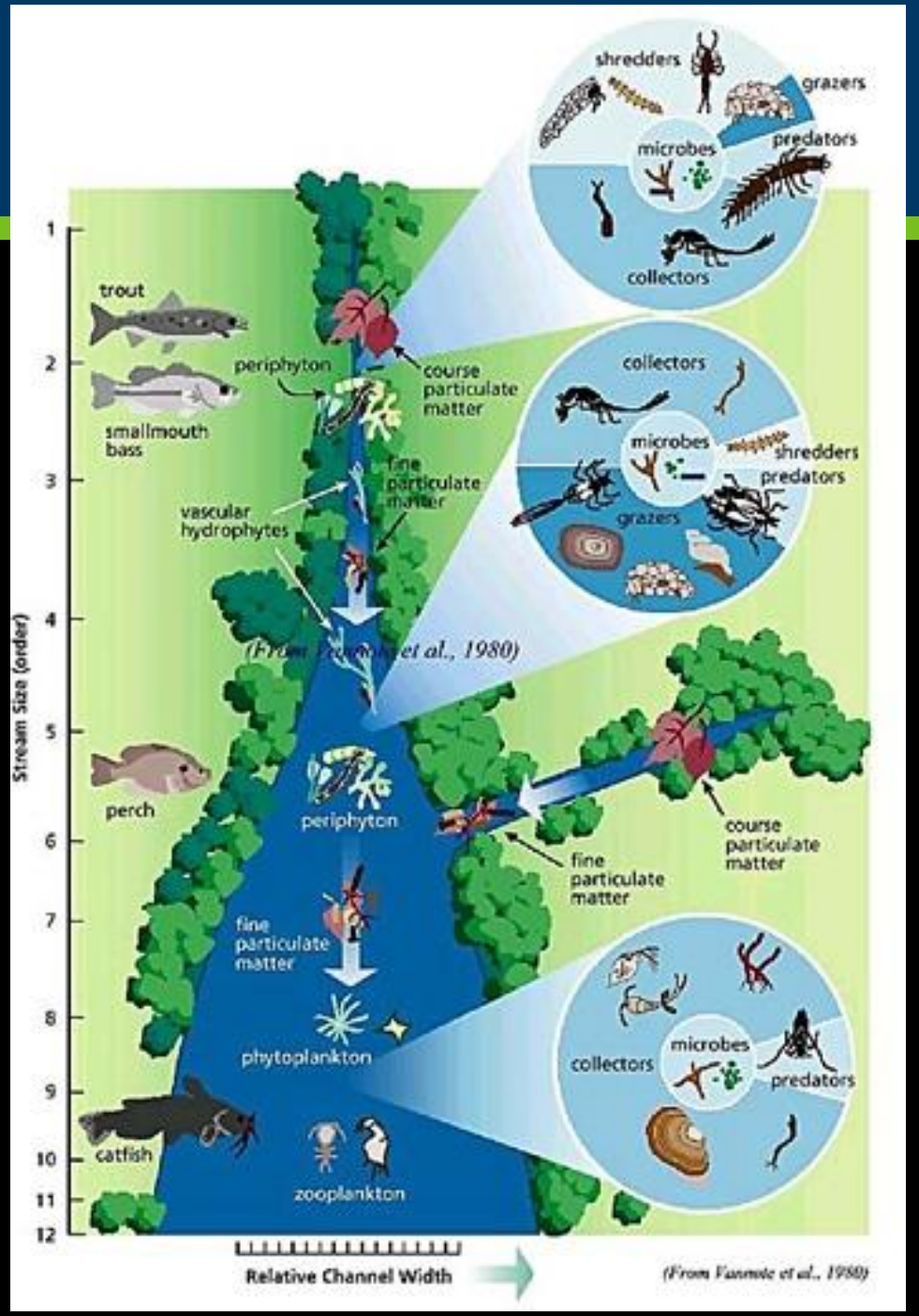
Seasonal

Headwaters

Spawning

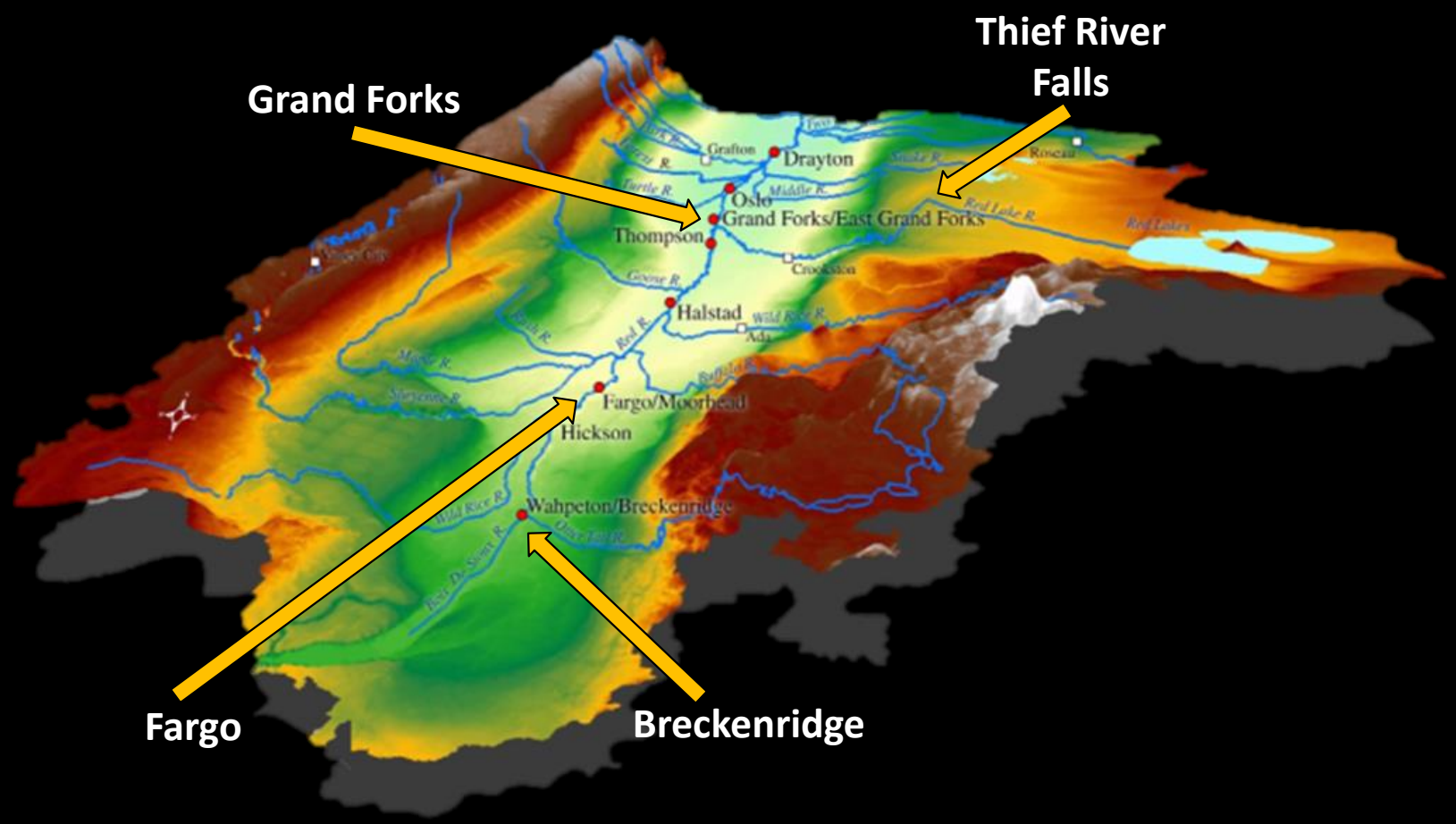
Fish Habitat

- River Continuum Concept
  - Unifying ecological explanation of systems
- Rivers are a gradient
  - Communities
  - Nutrients
  - Habitat



Fish Habitat

- **Red River Basin**
  - Landscape shaped by glacial forces
    - Glacial Lake Agassiz
  - Landscape variation creates strong stream habitat gradients
  - Habitat gradients are critical to stream function and fishery

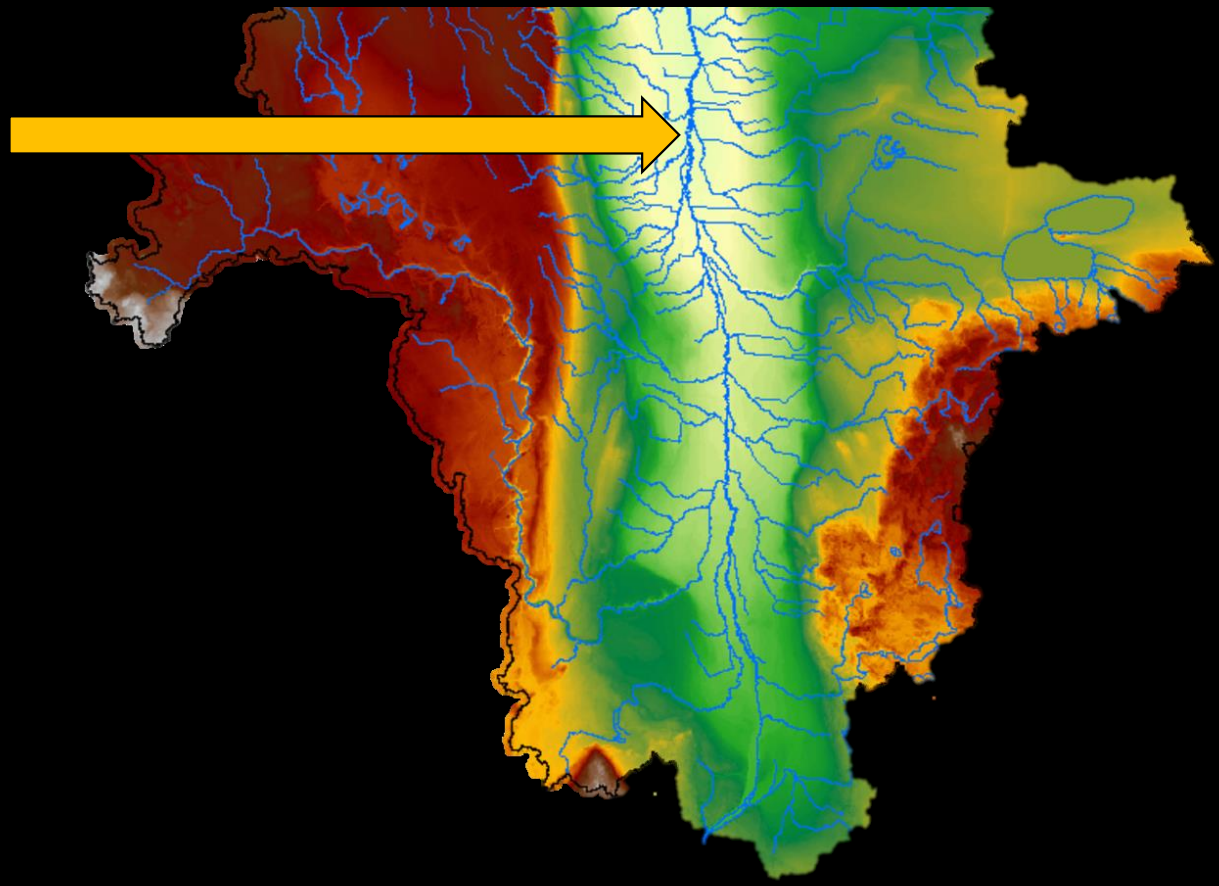


Fish Habitat

- **Stream Habitat Types**

Glacial Lake Bed Streams

- Large rivers
- Very low gradient
- Highly sinuous
- Pools and runs, few riffles
- Sand, silt & clay substrate

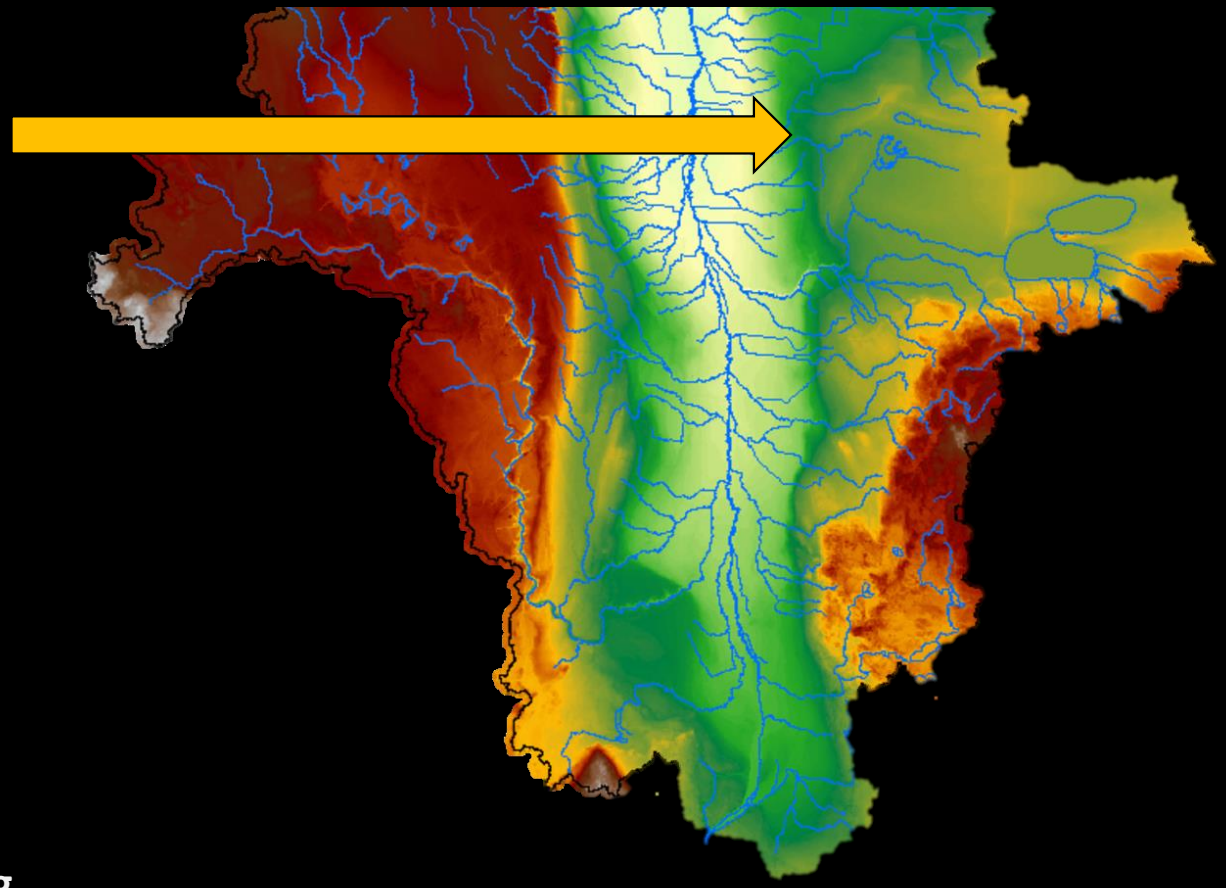


Key Habitat Notes

- Deep water habitat
- Overwintering for larger spp.
- General lack of spawning habitat

Fish Habitat

- **Stream Habitat Types**



Beach Ridge Streams

- Medium & smaller streams
- Relatively high gradient
- Less sinuous
- Riffles & pools common
- Rocky substrates common

Key Habitat Notes

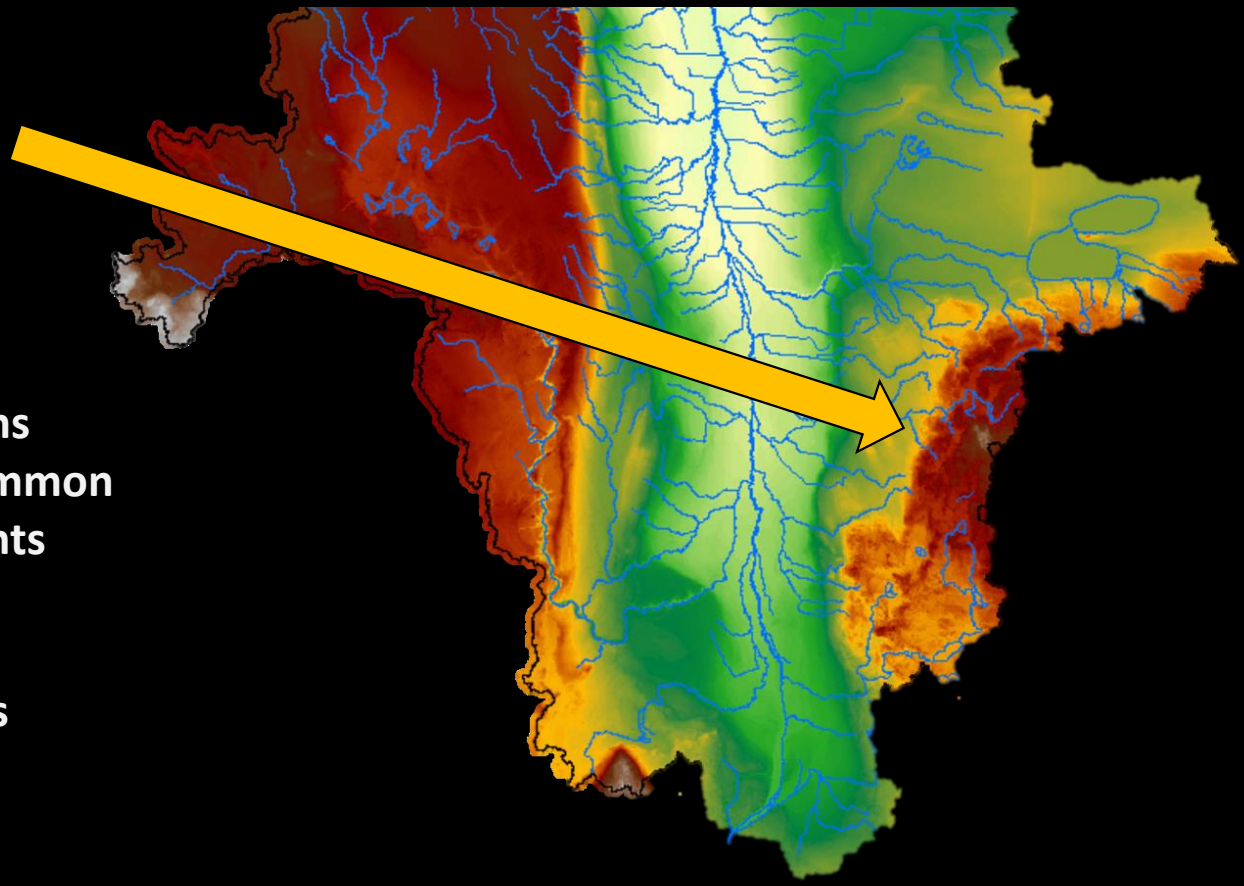
- Higher habitat diversity
- More riffles, key for spawning

Fish Habitat

- **Stream Habitat Types**

Moraine Streams

- Smaller & headwater streams
- Lake and wetland chains common
- Various substrates & gradients

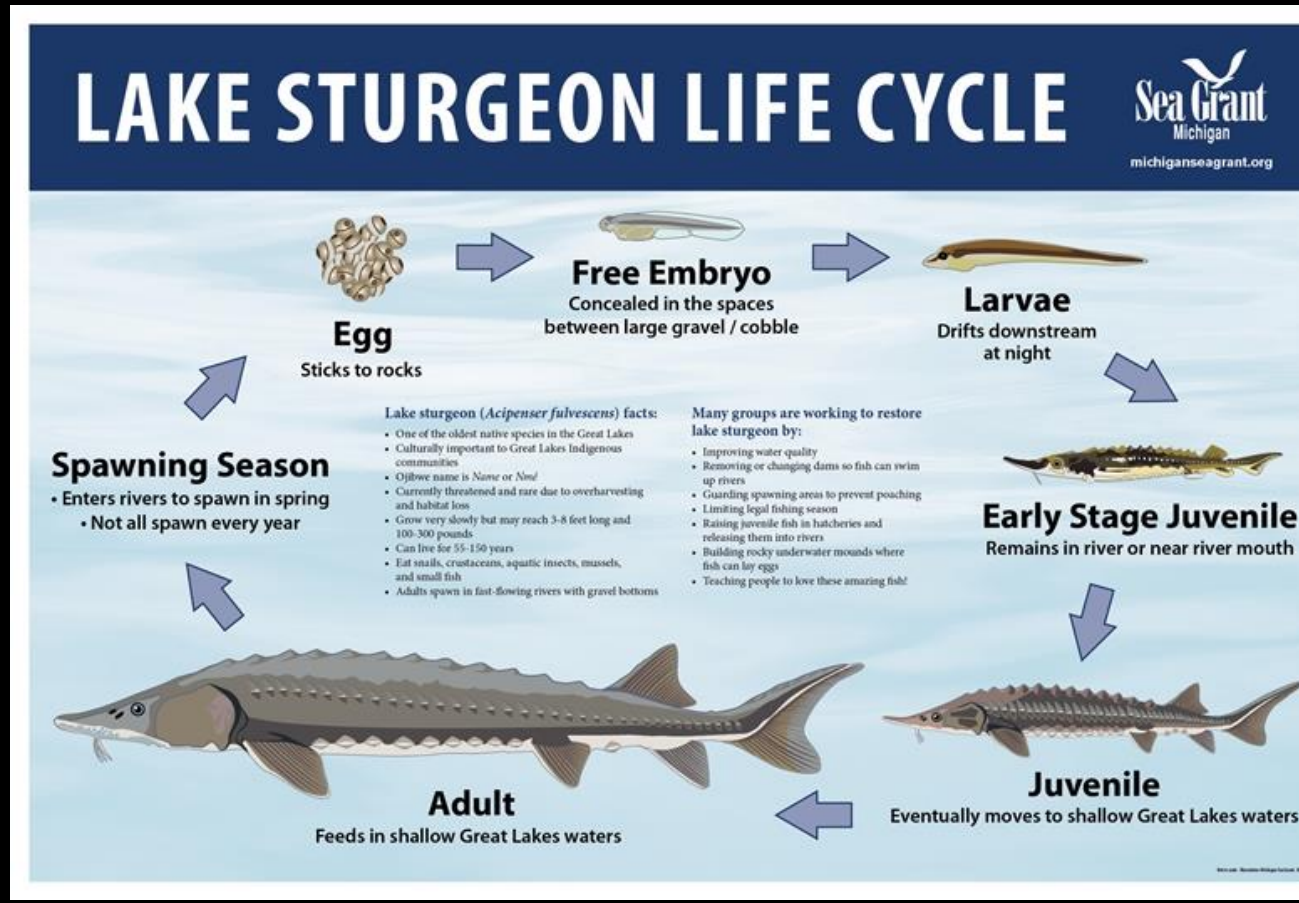


Key Habitat Notes

- High habitat diversity; varies among systems

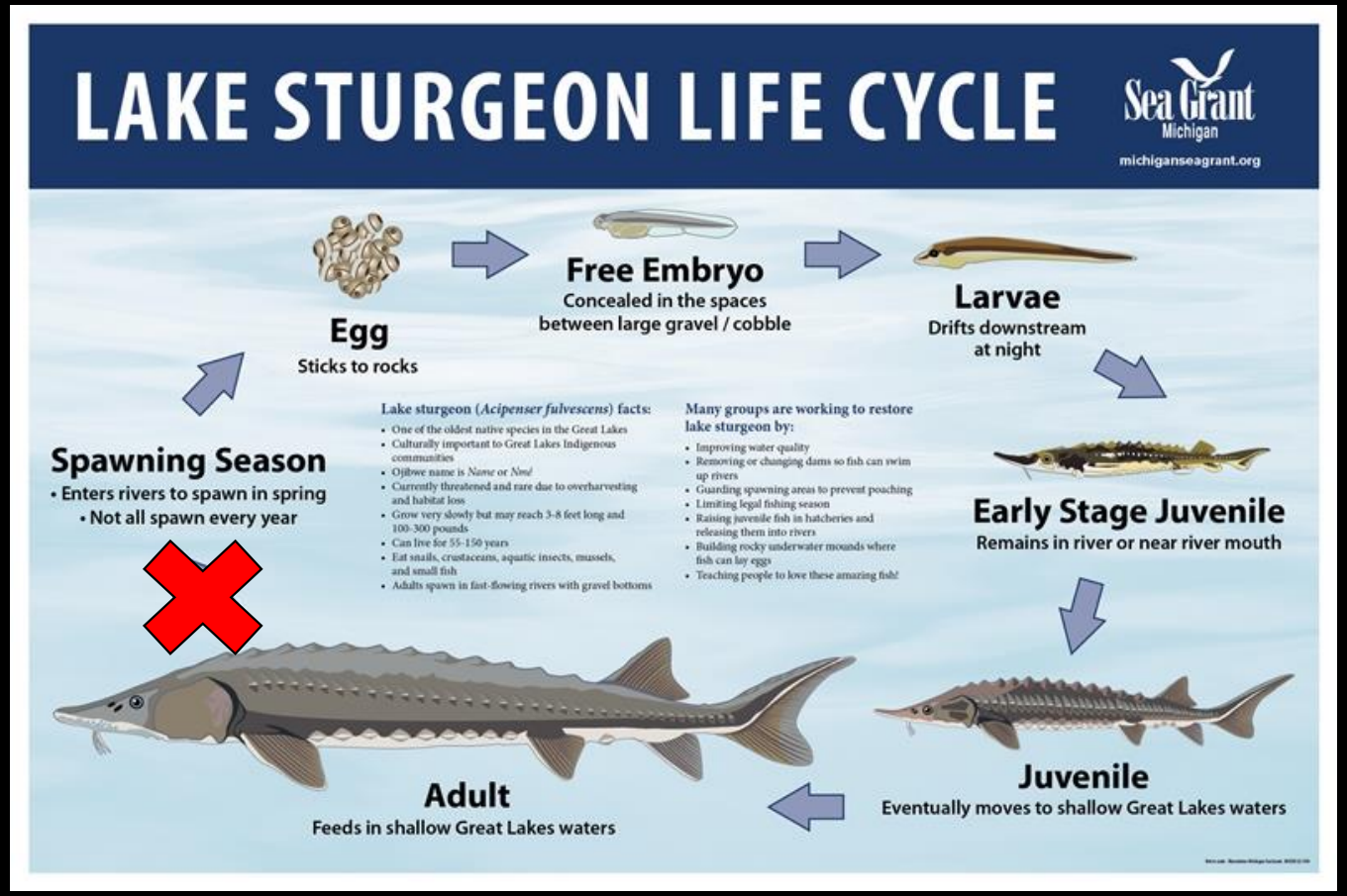
Connectivity Concepts

- Habitat connectivity connects life cycles



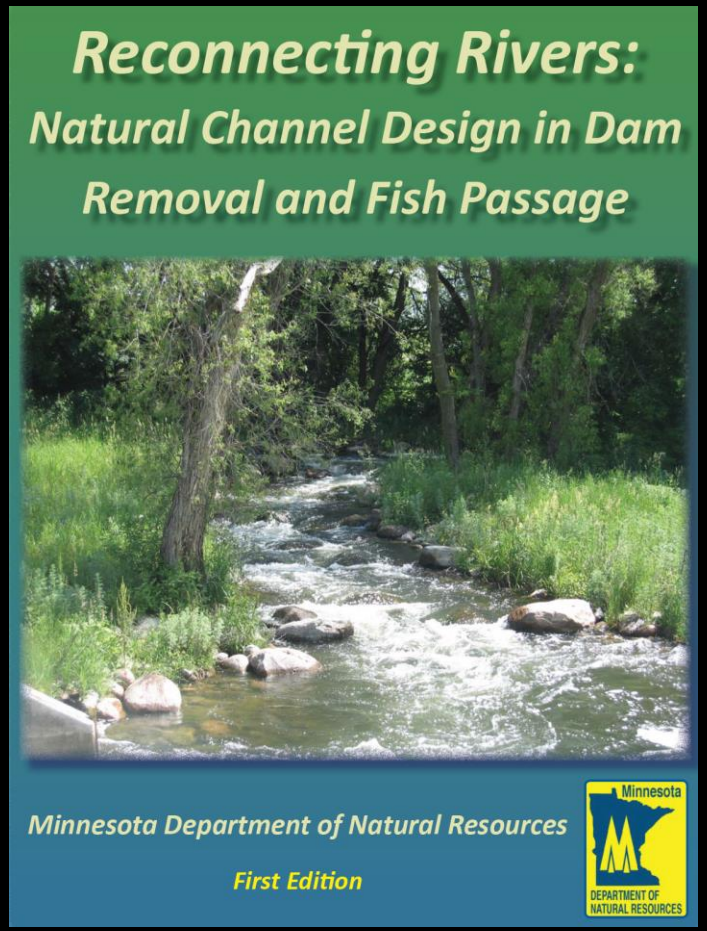
Connectivity Concepts

- Habitat connectivity connects life cycles



Connectivity is a Management Tool

- Barrier Impacts on Native Species
  - Statewide – 37% species missing upstream
  - Red River Basin – 34 % species missing upstream



Connectivity is a Management Tool

- Restoring critical habitat access for multiple species, life stages yields ecosystem-scale impacts

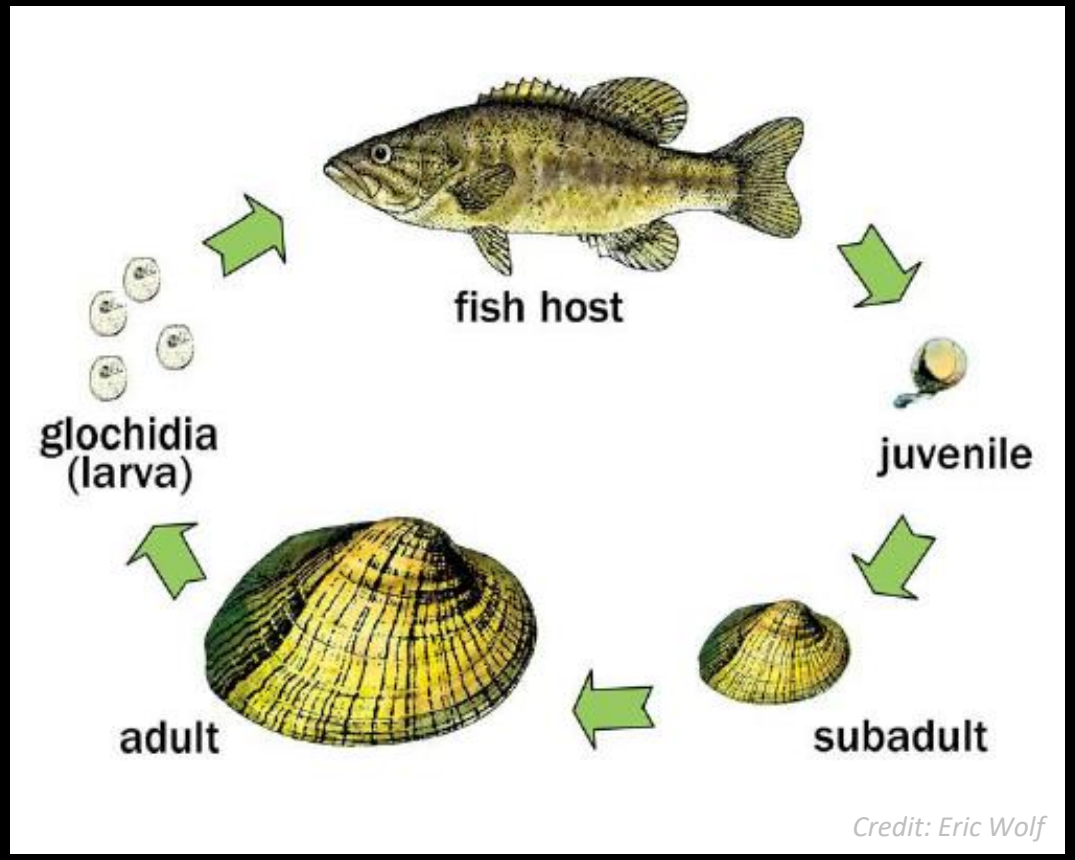
Seasonal

Headwaters

Spawning

Connectivity is a Management Tool

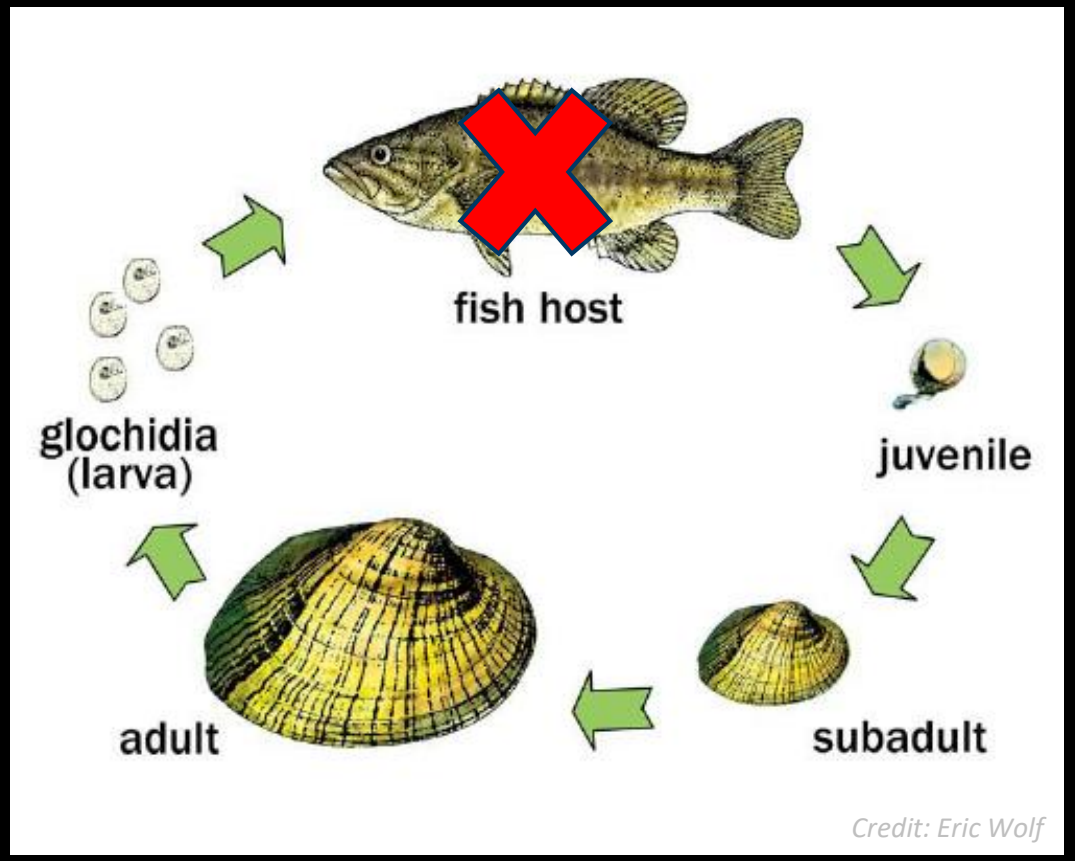
- **Freshwater Mussels**



Credit: Eric Wolf

Connectivity is a Management Tool

- **Freshwater Mussels**



Host = 13 spp., T&E = 5

Host = 11 spp., T&E = 4

Connectivity Benefits

Examples of Connectivity Benefits

- Single species explanations
- Specific project examples
- Native community & basin status

Typical Connectivity Improvement

Rock Arch Rapids & “Natural Channel Design”

Walleye Benefits

Life History Modes

Projected shifts in fish species dominance in Wisconsin lakes under climate change

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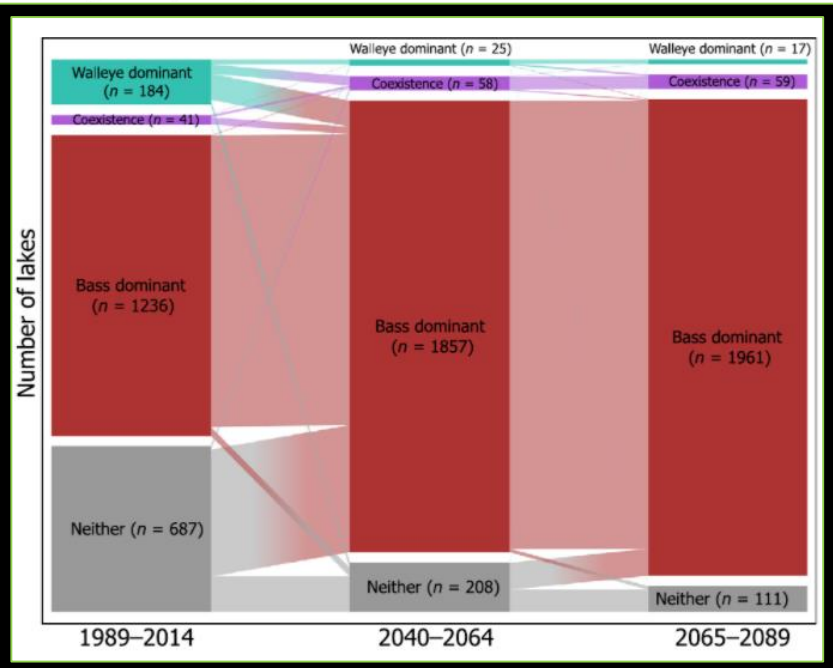


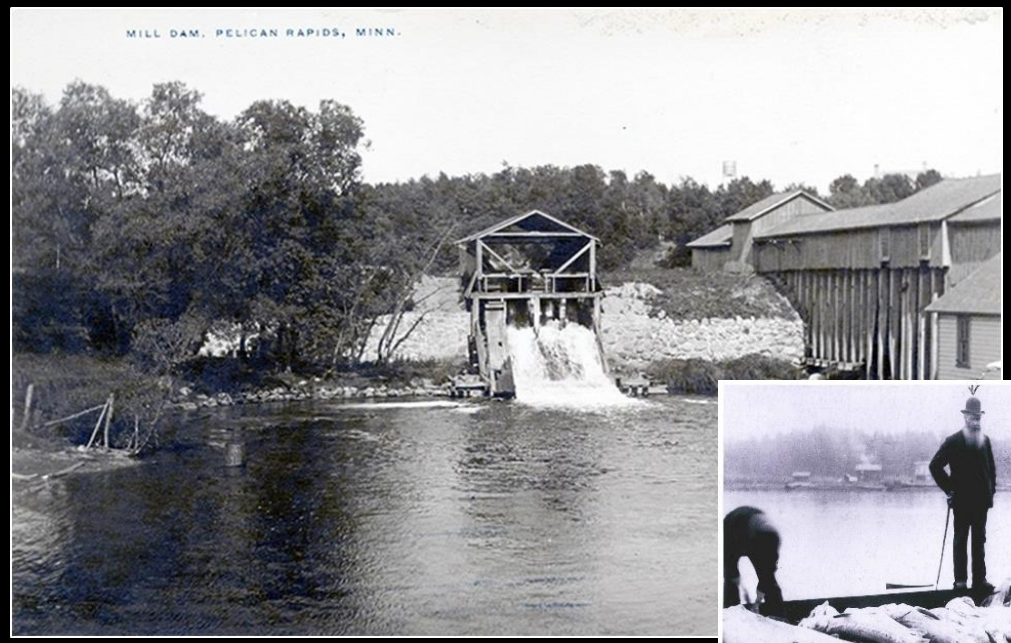
Climate & Reproduction

Walleye Benefits

Spawning Habitat & Connectivity Program

Sturgeon Benefits

- History of decline



Sturgeon Benefits

- Recovery effort

Sturgeon Benefits

- Signs of success, spring of 2022
- 1st verified Red River Basin spawning event in over 100 years!

Spawning Habitat & Connectivity

Sturgeon Benefits

- Spring 2023
- Repeated effort, and <u>new sites</u>

Spawning Habitat & Connectivity

Connectivity Benefits

Examples of Connectivity Benefits

- Single species explanations
- Specific project examples
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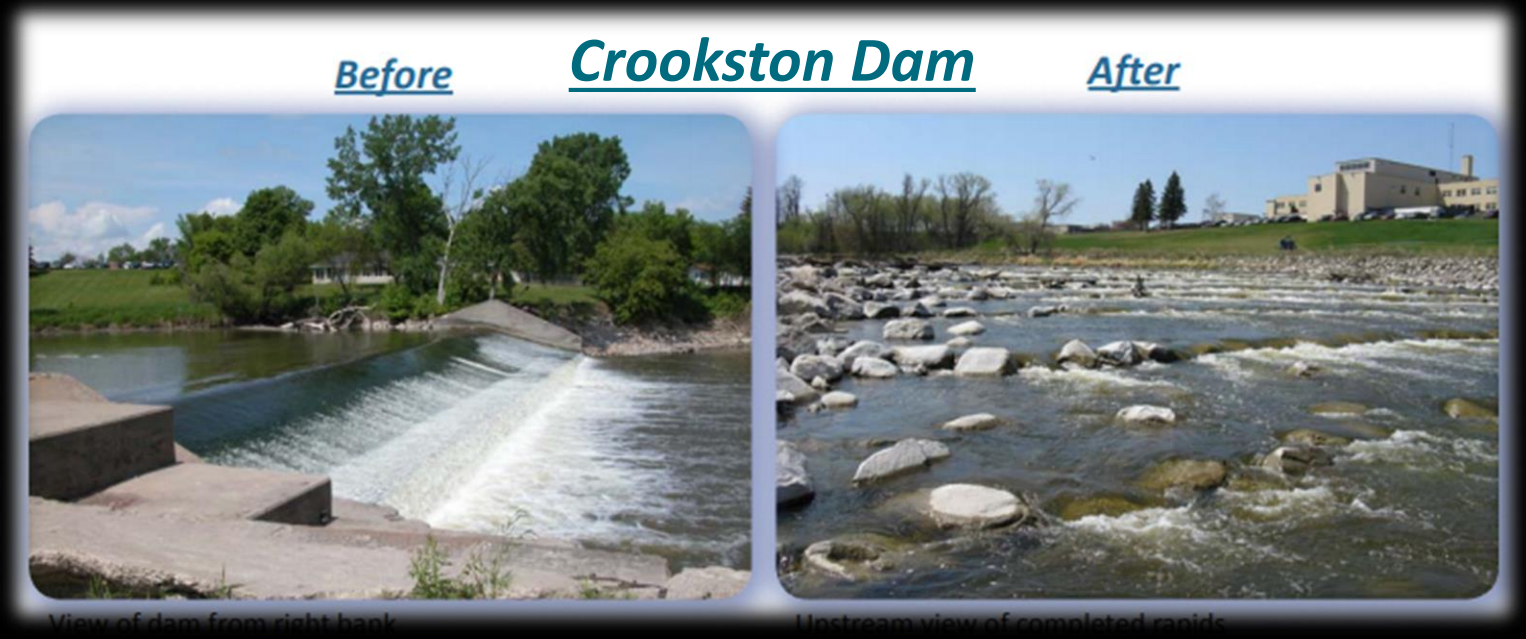
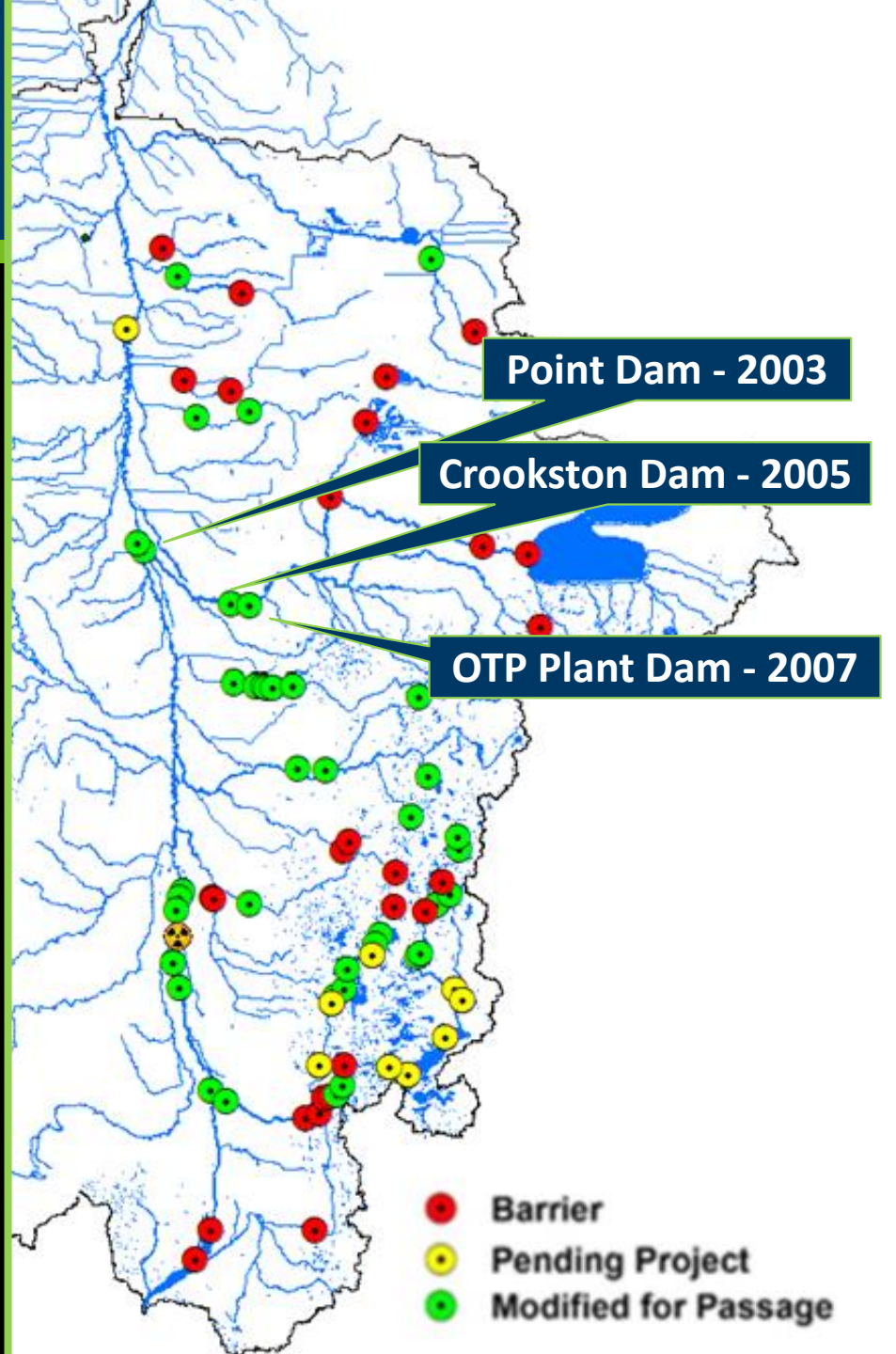
Case Studies

- **Red Lake River**
  - **Reconnected hundreds of miles in RLR & tributaries**





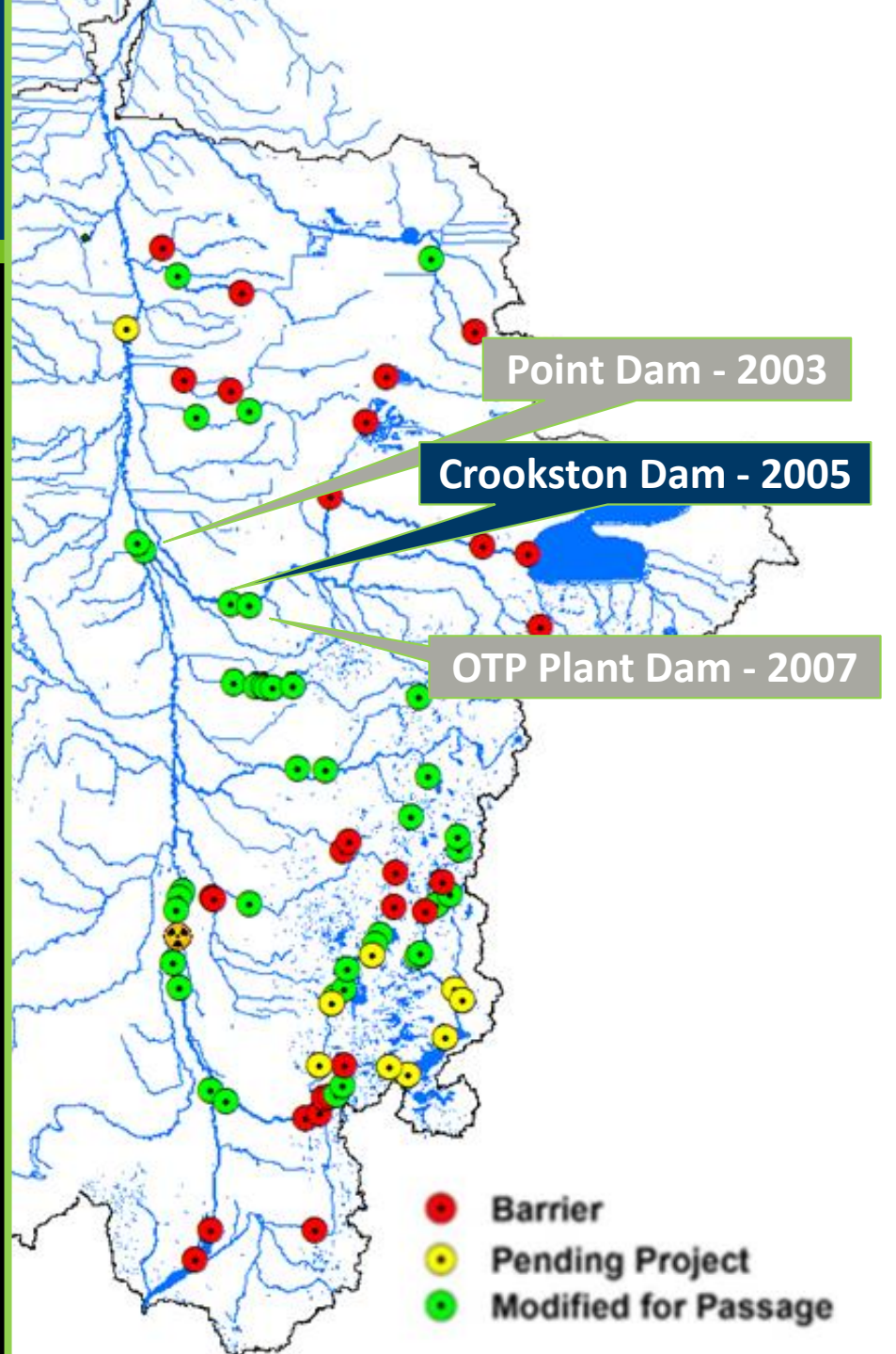
Case Studies

- **Red Lake River**
  - **Reconnected hundreds of miles in RLR & tributaries**

2000 – 0.05/net
2005 – 10.7/net

2000 – 0.16/net
2005 – 0.85/net

TRF angler – "1st Sauger I've caught here in 45 years!"

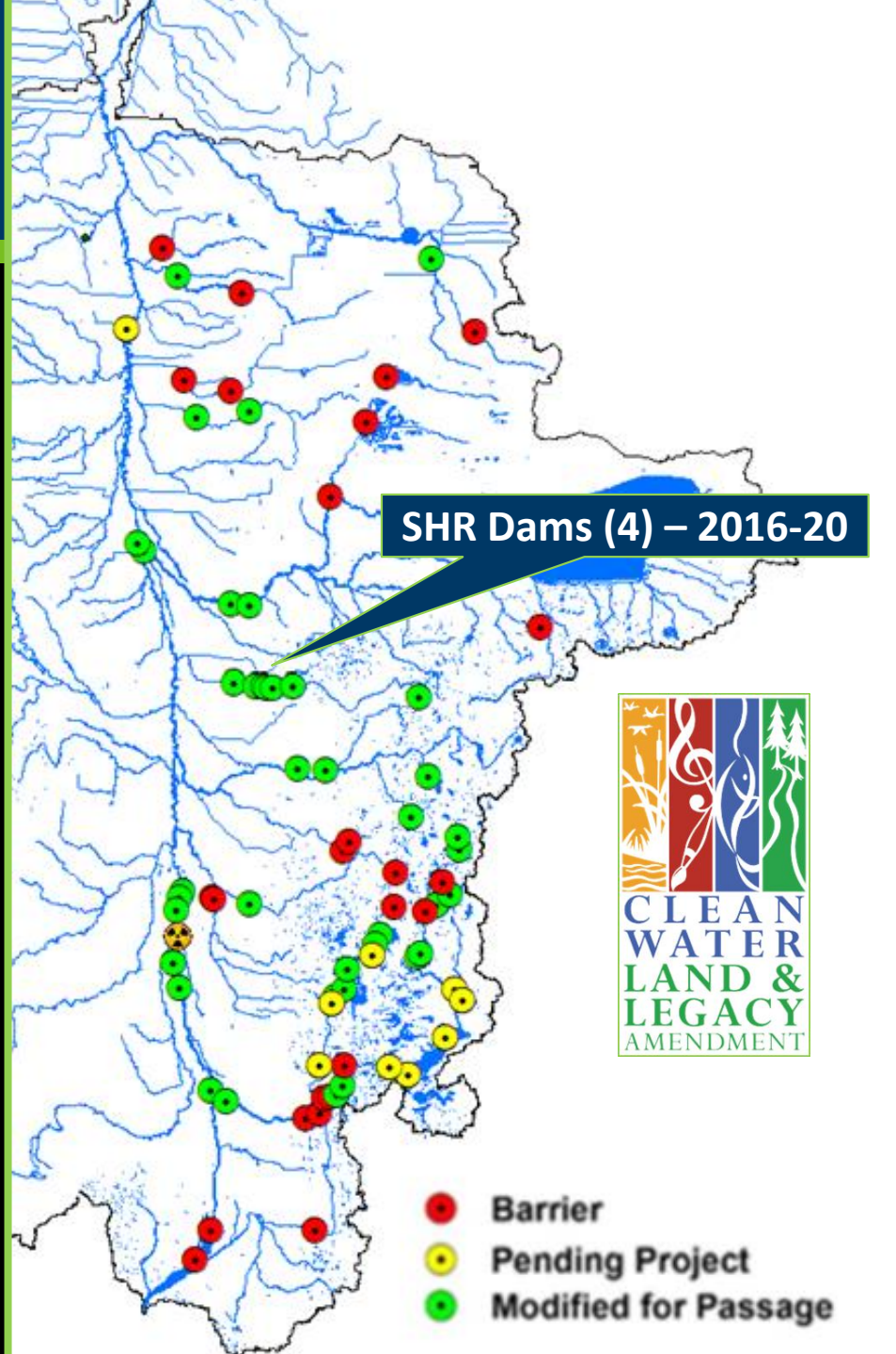


Case Studies

- **Sand Hill River**

Pre-Project

"It's just not worth fishing those upper 50 miles…"
- Local Angler

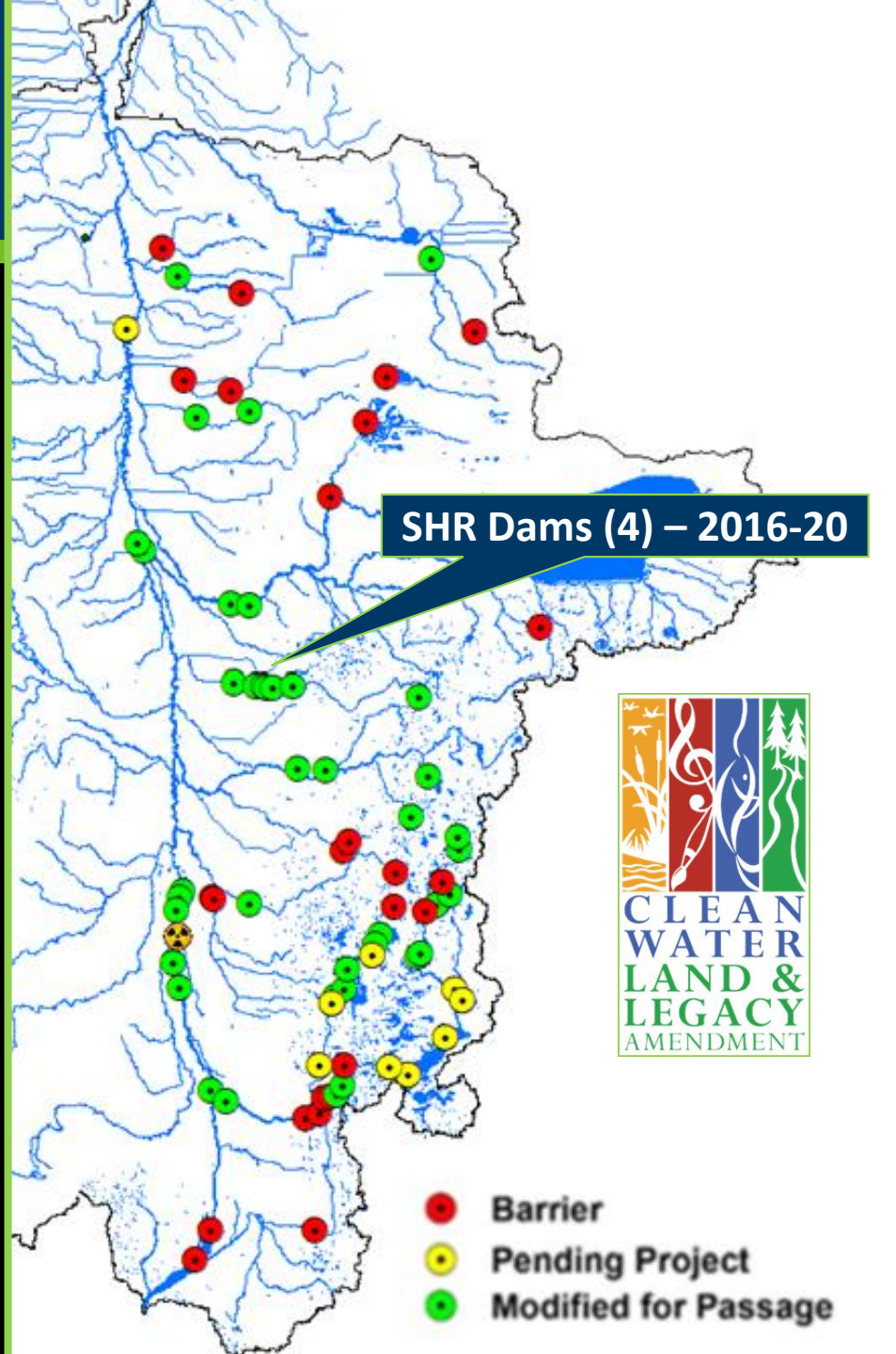


Case Studies

- **Sand Hill River**

Post-Project

"We had a great summer fishing – lots of pike. Walleye, bass & catfish, too! We never used to get those."

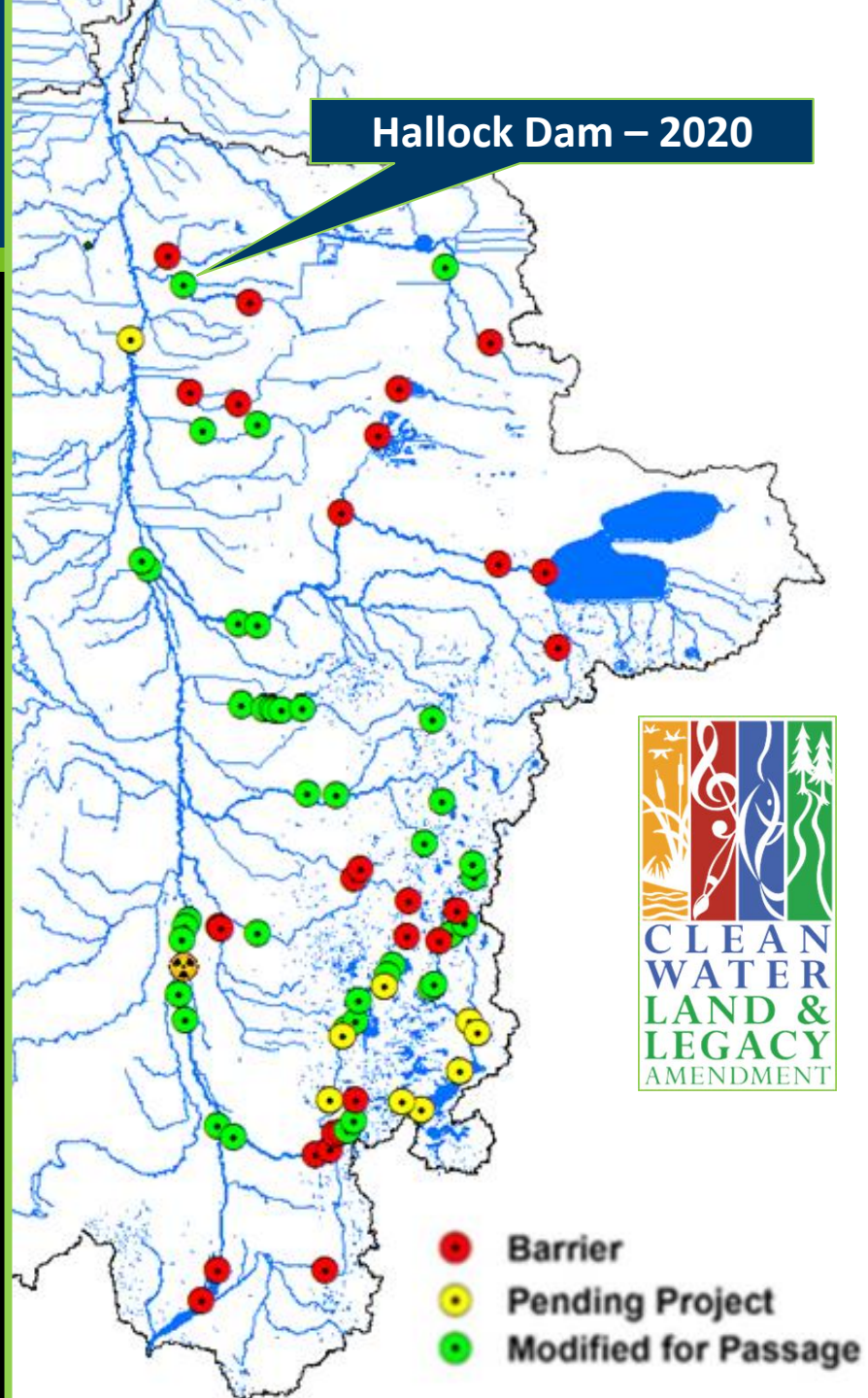


Case Studies

- **Two Rivers**

Pre-Project

"Growing up, we all knew fish couldn't get up the dam."
- Local Angler

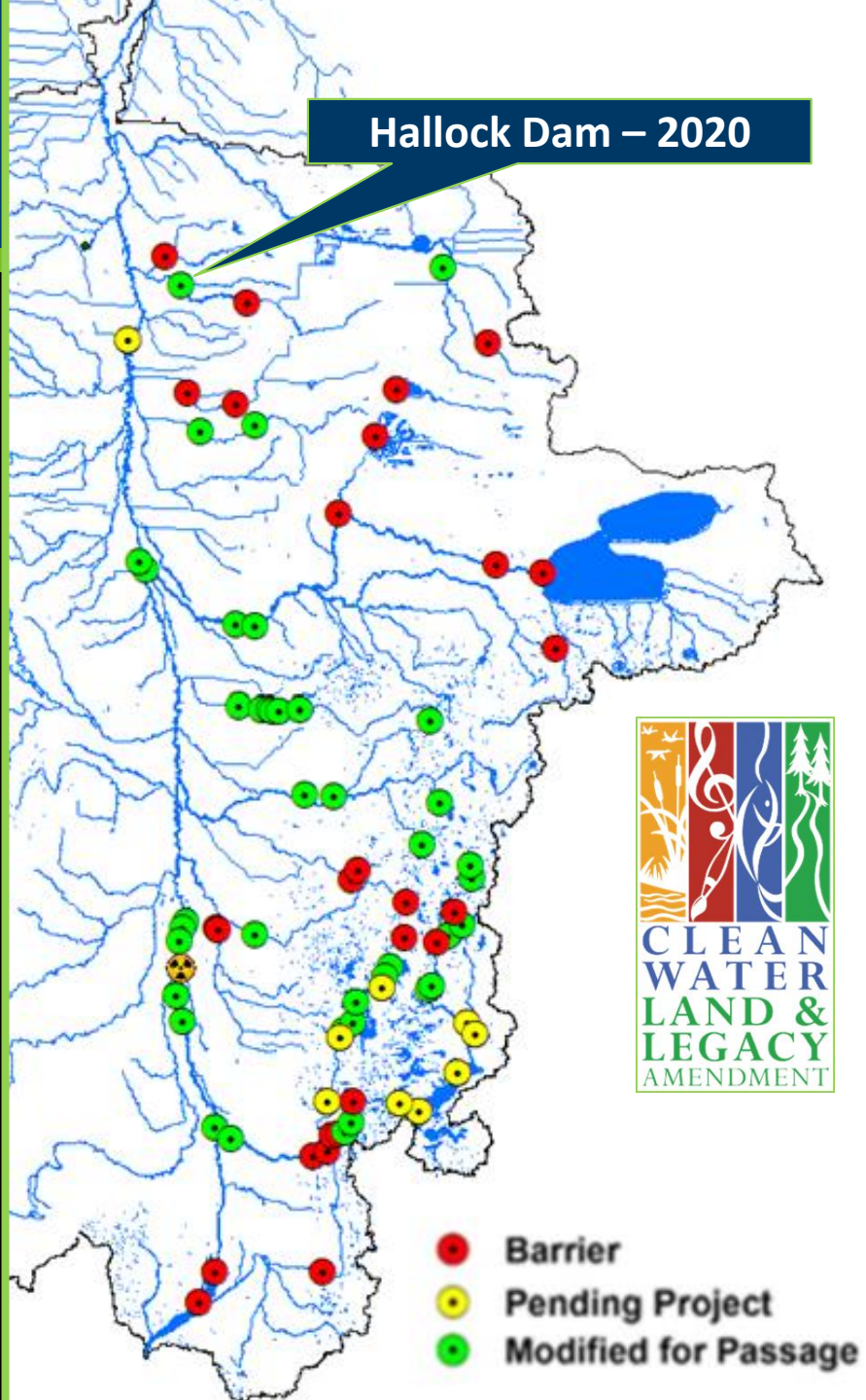


Case Studies

- **Two Rivers**

Post-Project

"Despite the 2021 drought, Channel Catfish have established a fishable population upstream. Several other species also returned, despite extreme low flows."



Connectivity Benefits

Examples of Connectivity Benefits

- Single species explanations
- Specific project examples
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Red River Progress

- Native species recoveries

River	Missing	Recolonized	% Recovery
Otter Tail	9	8	88
Buffalo	22	15	68
Wild Rice	20	16	80
Sand Hill	25	12	48

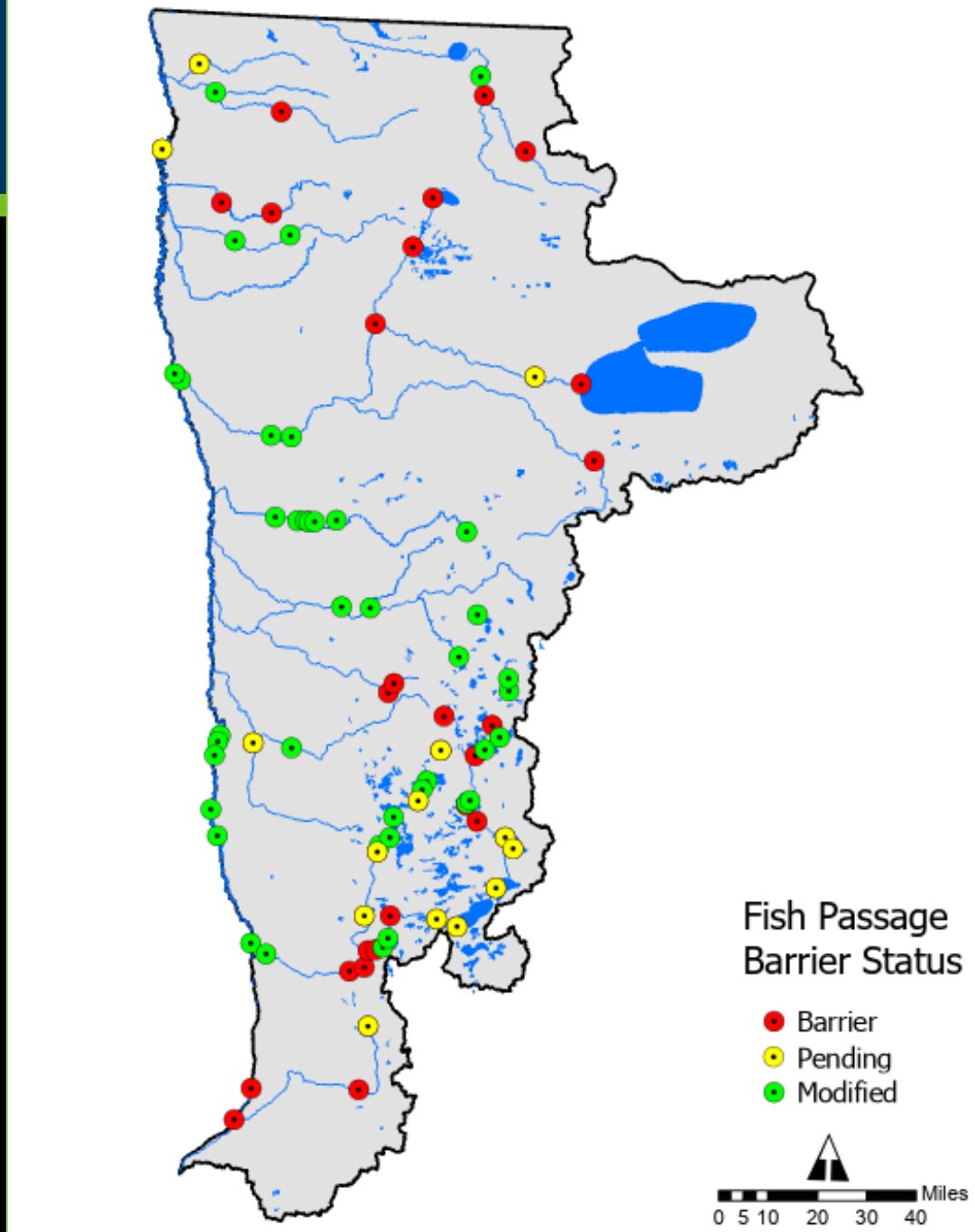
Red River Progress

- Since 1991:
  - 79 barriers identified
  - 69 barriers targeted
  - 40 barriers modified
  - \+
  - 14 current projects

Cleared:

58%

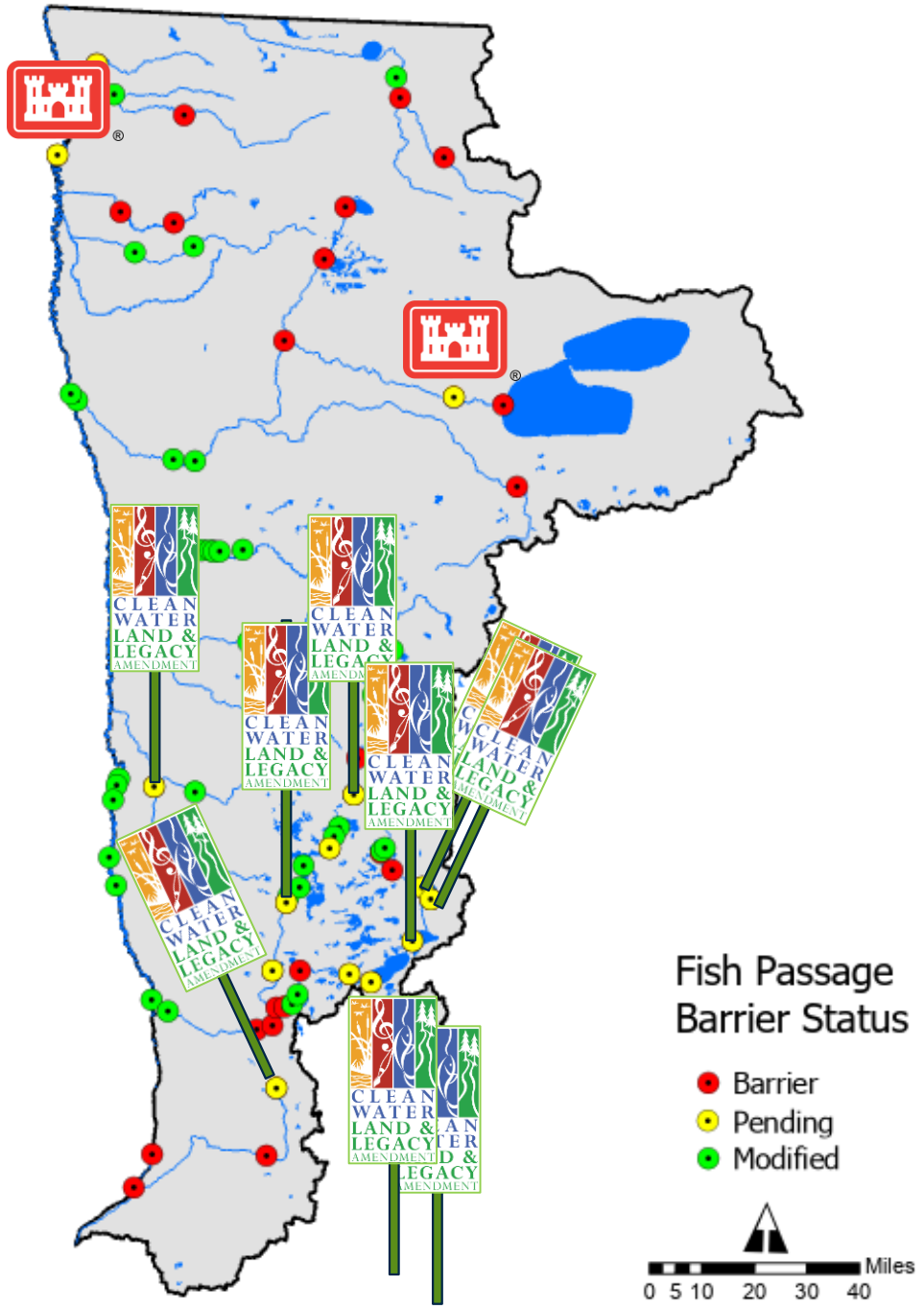
78%



Red River Progress

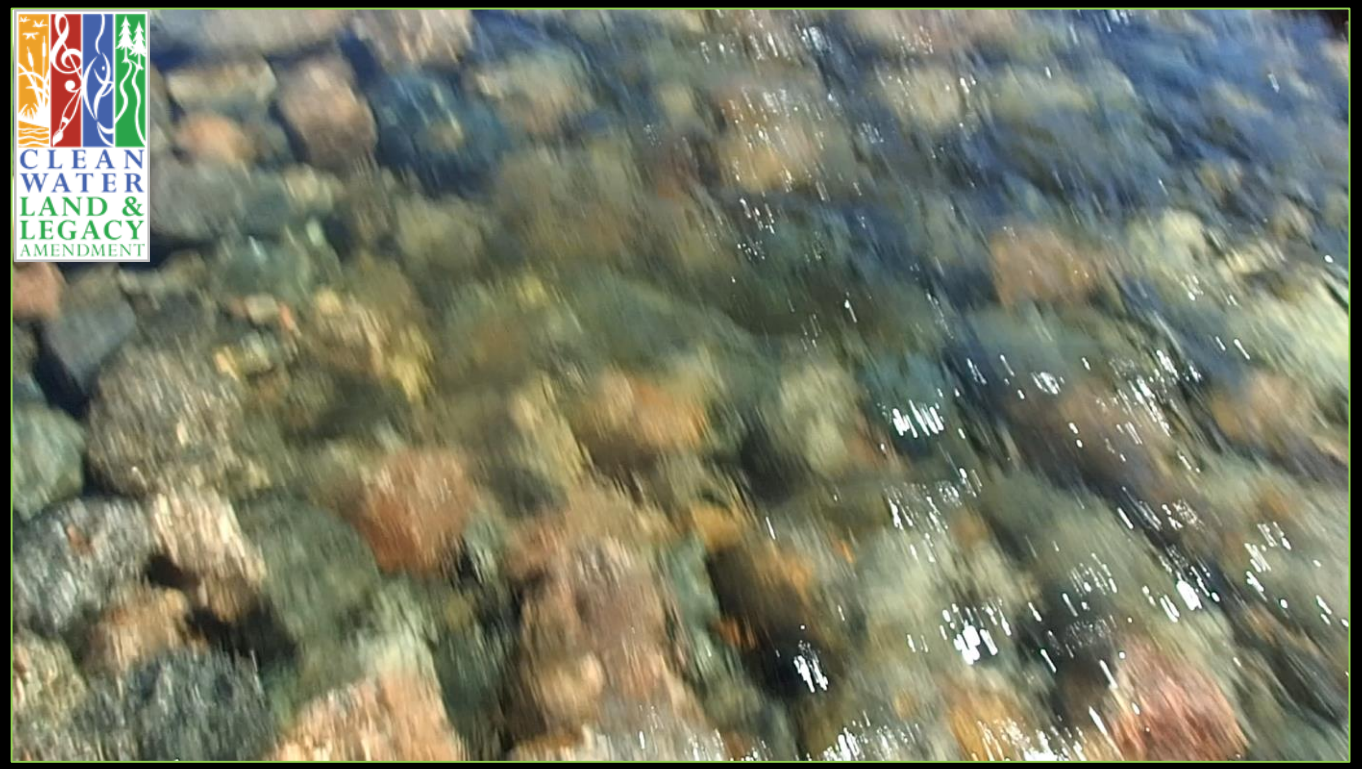
Currently Funded

- LSOHC – 7 projects
- CPL – 2 projects
- USACE – 2 projects



General Takeaways

- Connectivity is essential for natural aquatic ecosystems.
- Aquatic systems and fish populations generally recover after barriers are removed.
- Connectivity investments improve fishing opportunities, and sustain native species.



Connectivity project site use, numerous species

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