



# GRAYLING IN MICHIGAN: THEIR PAST, PRESENT, AND FUTURE

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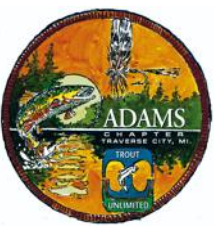
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# WHAT IS A GRAYLING?

- Member of the Salmon and “Trout” family (Salmonidae)
- Cool/cold water species, variable body color, individually unique patterns of black spots on sides



# WHAT IS A GRAYLING?

- Sail-like dorsal fin with color patterning unique to each individual



# WORLD DISTRIBUTION OF GRAYLING

- Six recognized species of Grayling found globally

**Arctic Grayling:** North America, Asia, limited Eastern European tributaries

**European Grayling:** Europe

**Amur Grayling:** Russia, China, Mongolia

**Hovsgol Grayling:** Mongolia (found in only one lake)

**Baikal Grayling:** Asia

**Mongolian Grayling:** Russia and Great Lakes Basin in Mongolia



# ARCTIC GRAYLING OF NORTH AMERICA

- Found in northern Canada and Alaska
- Glacial relict populations in Michigan and Montana



# GRAYLING LIFE HISTORY



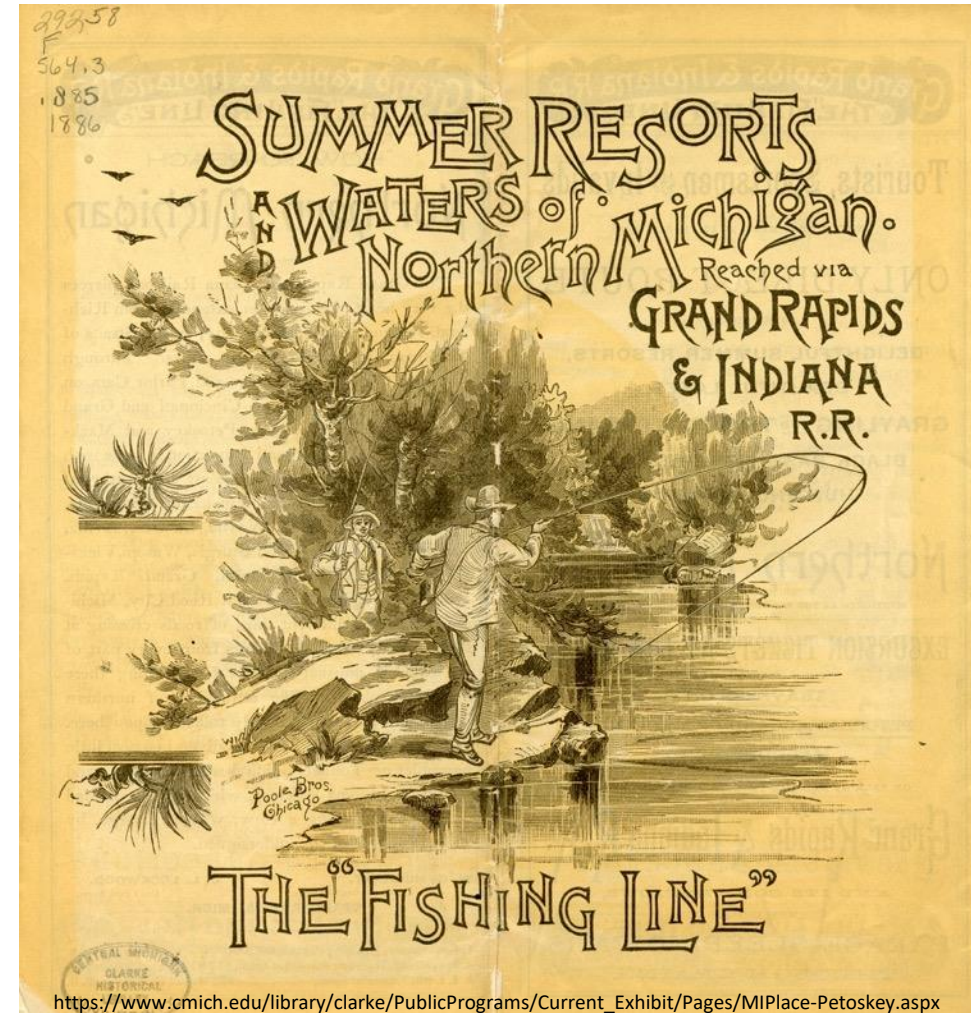
- Spring spawners, iteroparous (spawn several times over lifespan)
- Small eggs: 2.5mm
- Mature: 3-4 years
- Lifespan: average is 18 years
  - Oldest: 32 years, Alaska
  - MT: average 5 years
  - MI: 5-10?

# THE PAST



Michigan Grayling. Taken from Black River  
in 1903.

<https://quod.lib.umich.edu/m/mershon/851844.0047.017/48#?s=0&cv=47>

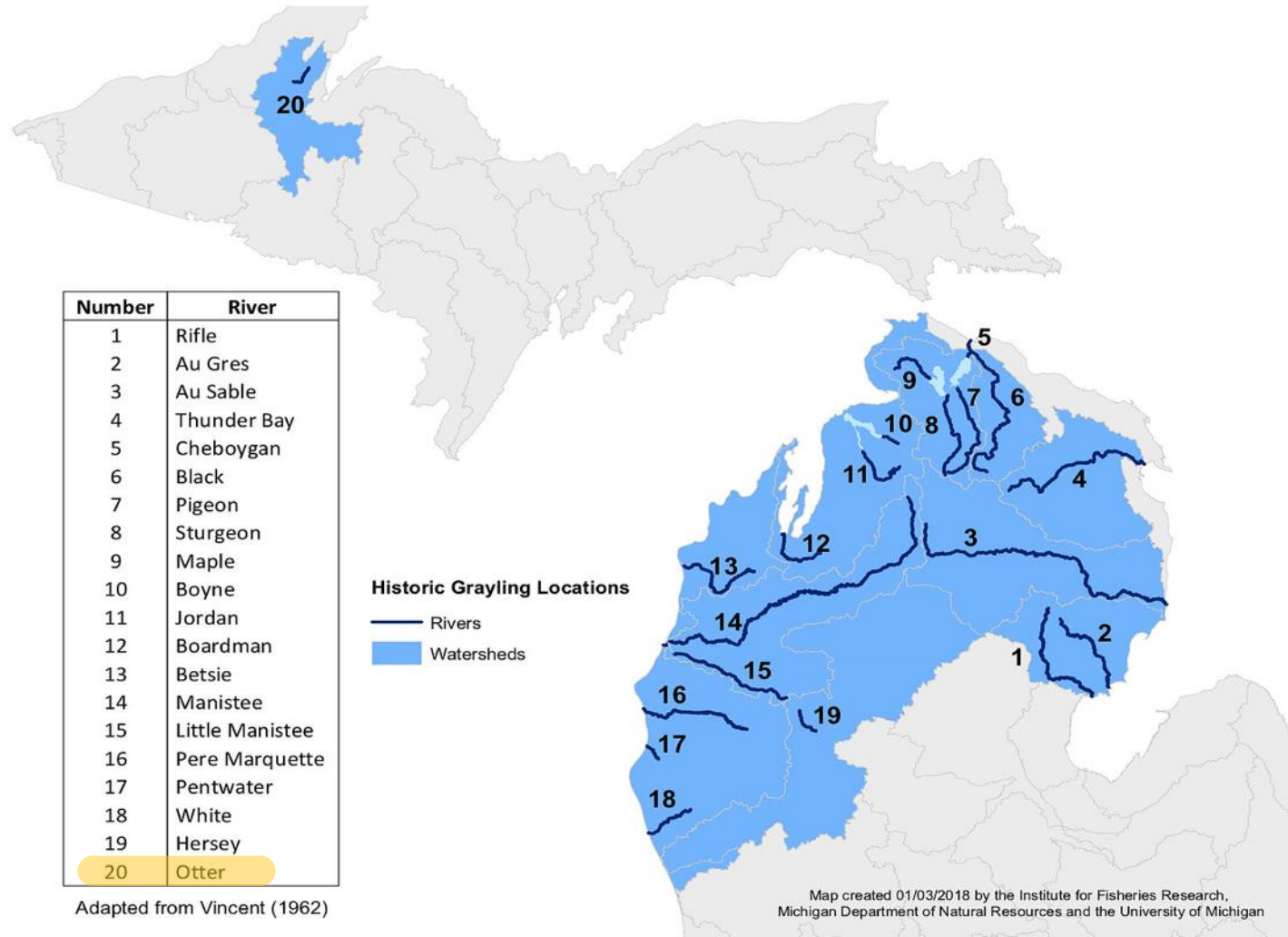


[https://www.cmich.edu/library/clarke/PublicPrograms/Current\\_Exhibit/Pages/MIPlace-Petoskey.aspx](https://www.cmich.edu/library/clarke/PublicPrograms/Current_Exhibit/Pages/MIPlace-Petoskey.aspx)



# THE PAST: GRAYLING IN MICHIGAN

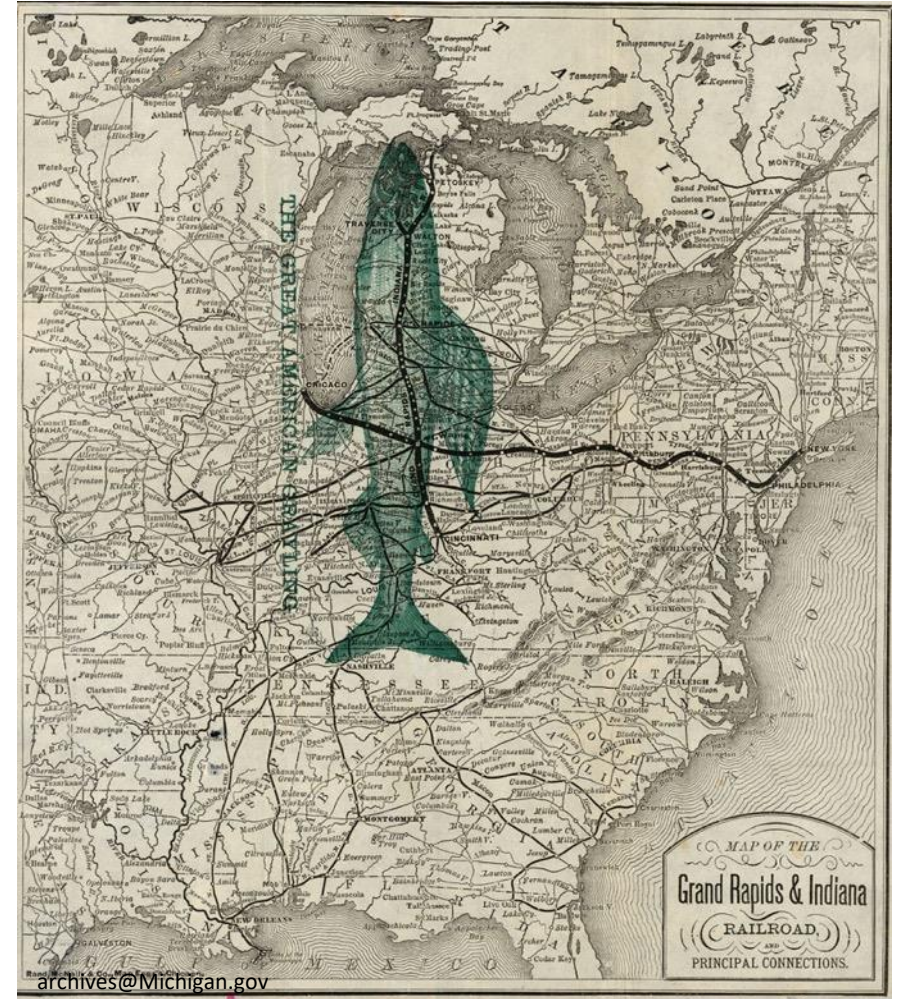
- First “discovered” in the mid-1800’s
- Northern lower peninsula
- Otter River in upper peninsula



# GRAYLING IN MICHIGAN: FISHING

## Grand Rapids & Indiana Railroad: *The Fishing Line*

Early fishing industry in Michigan – no fishing regulations



# GRAYLING IN MICHIGAN: EXTIRPATION

Declines noted in the late 1800's

## Three primary factors

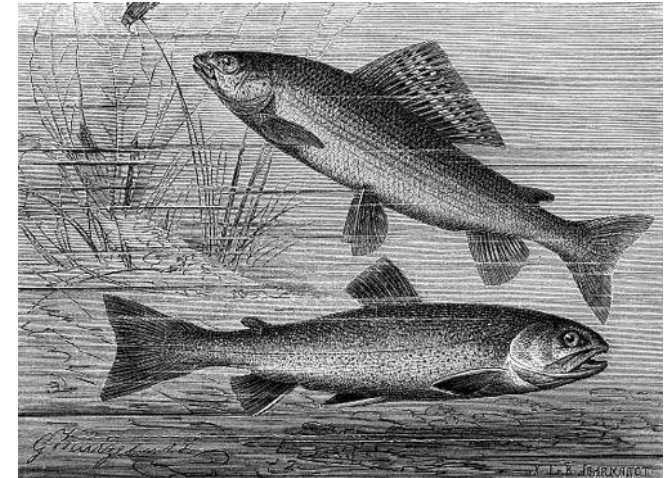
Overfishing



Logging



Competition



**Extirpation in 1936**



# PREVIOUS REINTRODUCTION ATTEMPTS

1880-1925	Range expansion
1900-1933	Over 3 million fry stocked
1934-1941	70,000 yearling stocked
1958-1960	300,000 fry stocked
1987-1991	145,000 yearlings stocked 13 lakes and 7 streams

# THE PRESENT



# MICHIGAN ARCTIC GRAYLING INITIATIVE (MAGI)

- Established in 2016
- Currently over 50 partners
- Goal: “restore self-sustaining populations of Arctic grayling within its historical range in Michigan”



[www.migrayling.org](http://www.migrayling.org)

# REINTRODUCTION KEY CONCERNS

- Presence of non-native species
  - Competition
  - Predation
- Rapid outmigration in previous attempts
  - Lack of imprinting?
  - Unfamiliar water?
- Habitat requirements
  - Habitat is available
  - But may need to address connectivity concerns (dams) and climate change impacts



# THE REMOTE SITE INCUBATOR: SUCCESS IN MT



<https://www.fws.gov/mountain-prairie/fisheries/montanaFWCO.php>



# THE REMOTE SITE INCUBATOR (RSI)

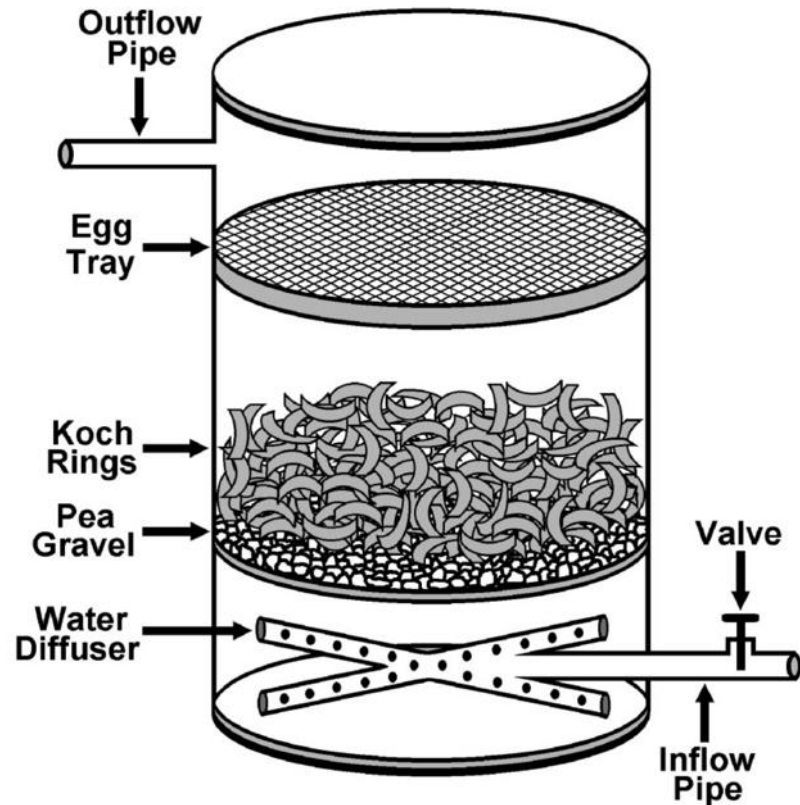


FIGURE 1.—Schematic diagram of key components of the remote-site incubator (RSI) used to house developing Arctic grayling embryos.

*From: Kaeding and Boltz (2003).  
Use of Remote-Site Incubators to Produce Arctic Grayling Fry of Wild Parentage*



Note: these are Steelhead eggs. Grayling eggs are much smaller (2.5 mm)

# MSU RESEARCH GOALS

- Determine timing of imprinting in Grayling early life
- Determine predation rates on Grayling fry by age-1 Brook and Brown trout
- Determine impacts of competition with Brook and Brown trout of the same age-class



# GETTING GRAYLING BACK TO MICHIGAN

**2018**

**“Normal” ice-out**

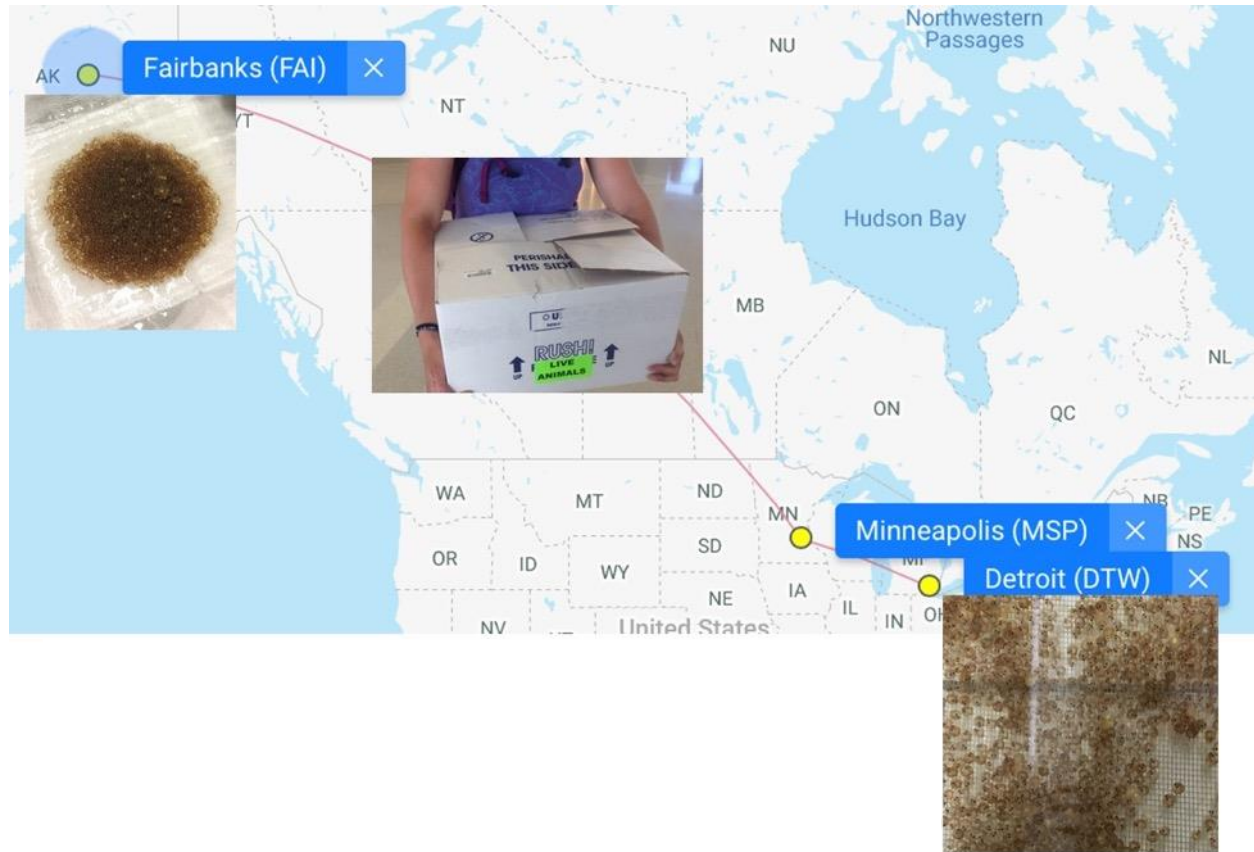
Egg take: 15 May

Arrived FAI: 30 May

Departed FAI: 04 Jun

Hatch date: 08 Jun

(21 days after egg take)



**2019**

**Very early ice-out!**

Egg take: 06 May

Arrived FAI: 10 May

Departed FAI: 20 May

Hatch date: 29 May

(23 days after egg take)

# MSU GRAYLING RESEARCH LAB



# MSU GRAYLING RESEARCH LAB



# IMPRINTING

- Determine time at which very young Grayling are actively imprinting
- Water choice trials to determine if young fish recognize familiar water
  - Did rapid outmigration in past occur due to unfamiliar water? Lack of imprinting?



# PREDATION: WHY?

- Younger age classes of resident trout are often in higher densities
- Important to understand impacts of predation on very young Grayling
- Focus on predation rates of Brook and Brown trout, behavior of Grayling fry

Age-1 Brook Trout



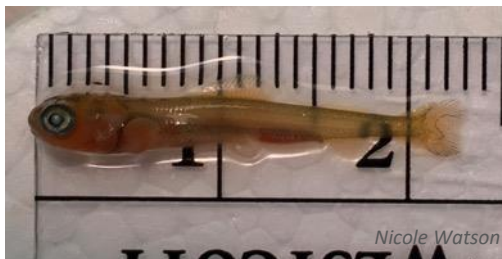
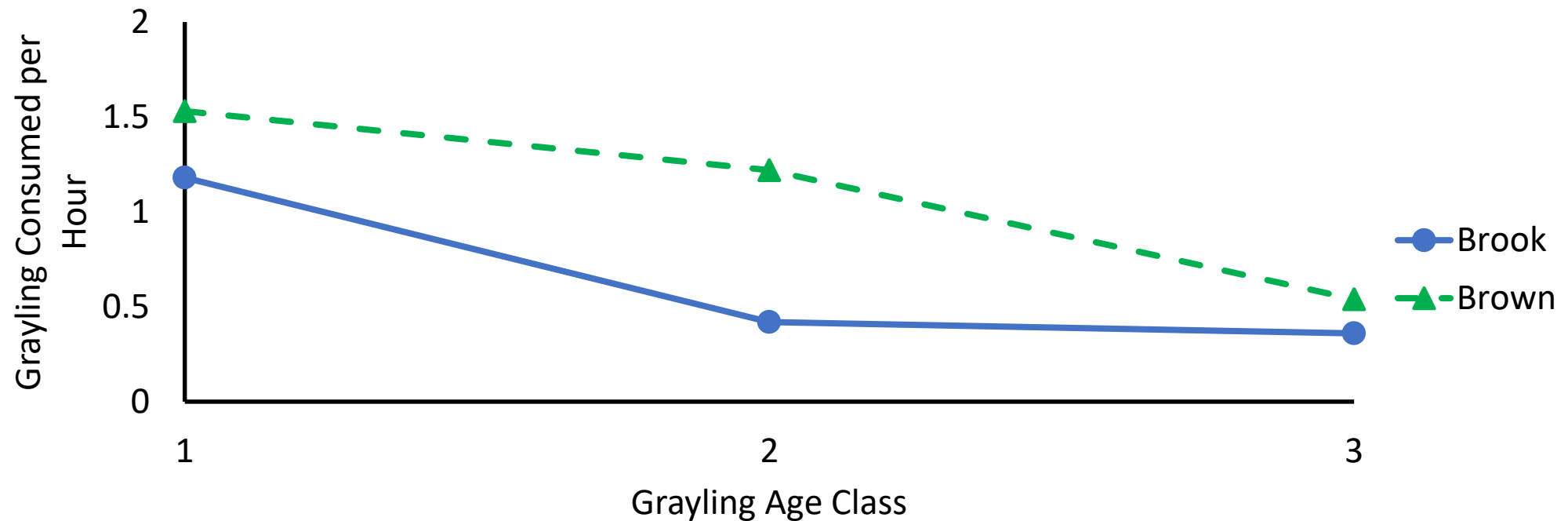
Grayling fry



Age-1 Brown Trout



# PREDATION: PRELIMINARY RESULTS (2018 & 2019)



**Fry-age Class 1**



**Fry-age Class 2**

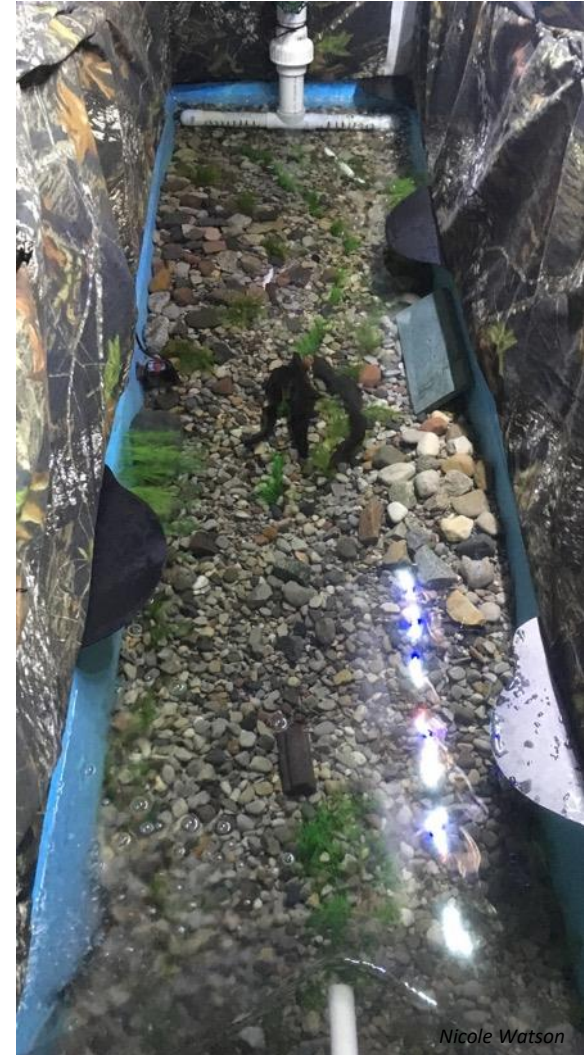


**Fry-age Class 3**

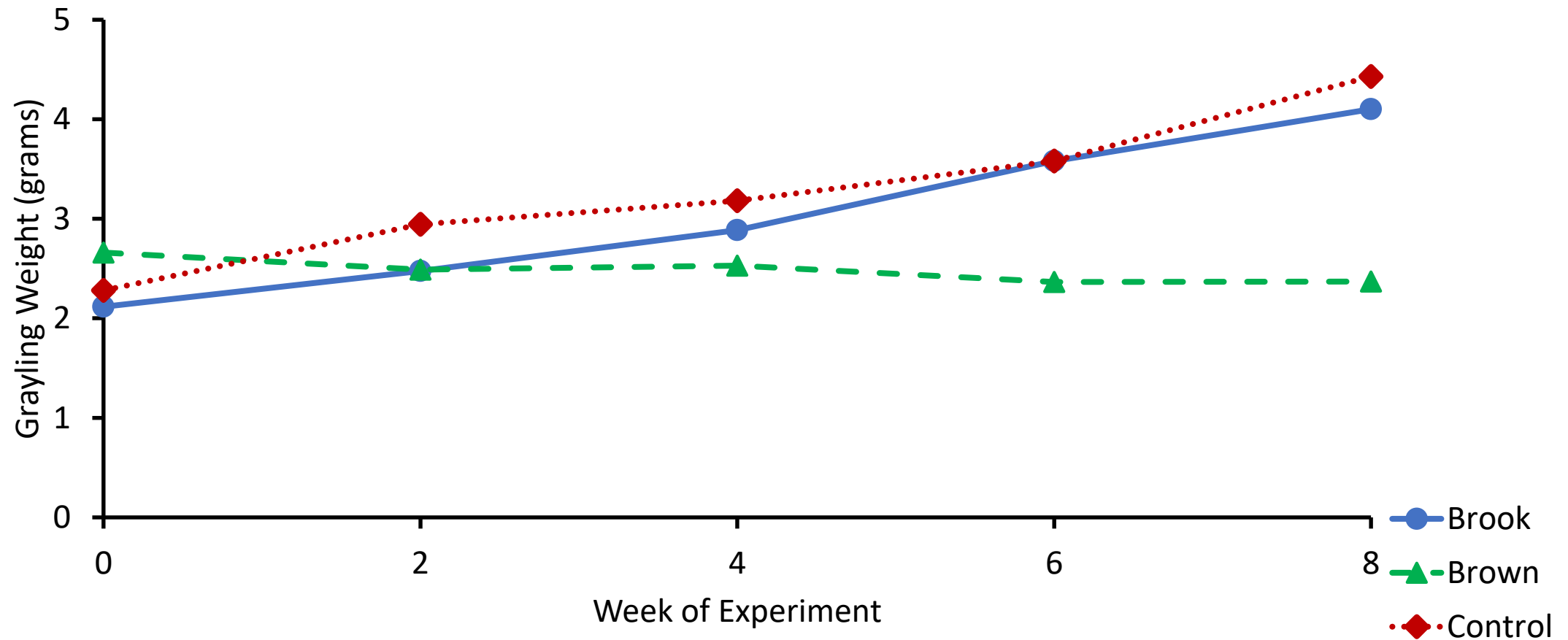


# COMPETITION: WHY?

- Competition between age-0 resident trout could adversely affect Grayling survival
  - Possible size advantage
  - Aggressive interactions
- Focus on changes in growth, behavioral interactions and habitat use



# COMPETITION: PRELIMINARY RESULTS (2018 & 2019)





# SUMMARY

- **Predation**

- Brook and Brown trout both prey upon Grayling
- Brown Trout have slightly higher predation rate overall
- Rate of predation decreases as Grayling growth/development increases

- **Competition**

- Brook Trout do not appear to affect Grayling growth or survival
- Brown Trout have a negative affect on Grayling growth and survival

- These results give us hope that the reintroduction of Grayling to MI streams will be successful



THE FUTURE

THANK YOU!



Nicole Watson