



# Michigan's Arctic Grayling Initiative

## *Action Plan*



July 2017

# MISSION STATEMENT

*Restore self-sustaining populations of Arctic Grayling within its historic range in Michigan.*

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## Introduction

The Arctic Grayling *Thymallus arcticus* (Grayling) was historically found in many coldwater streams throughout the Lower Peninsula of Michigan and in one Upper Peninsula stream. Large populations of Grayling flourished in the Manistee and Au Sable Rivers, commanding such importance that one community adopted and bears its namesake. Over a few decades in the late 1800s, the Grayling played a prominent role as both a commercial food fish and as an attractive game fish, and the species is recognized as an important part of Michigan's history. But habitat destruction, unregulated harvest, and predation/competition with introduced trout species led to the demise of one of Michigan's iconic stream salmonids, resulting in Grayling being extirpated from Michigan by 1936.

Numerous Grayling reintroduction efforts in Michigan have been attempted in the past. Management actions over the years include the stocking of millions of fry into streams during the late 1800s and early 1900s and stocking of hatchery-reared yearlings into lakes and streams during the latter part of the 1980s. None of these earlier attempts resulted in self-reproducing populations of Grayling. This renewed effort looks to draw upon the lessons learned from previous reintroduction attempts, as well as new approaches, new dedicated partnerships, and technologies not available in the past to achieve success.

It is worth noting that Grayling are considered native to only two states in the lower 48: Montana and Michigan. Advances and innovations in both scientific evaluation and fish culture techniques allowed the state of Montana to successfully carry out rehabilitation of Grayling in a select number of streams. Using in-stream Remote Site Incubators (RSIs), Montana successfully reestablished populations of Grayling in two streams where they were historically found. Today, self-sustaining Grayling populations exist in these streams.

In contrast to historical stocking events of fry, fingerlings, or adults, Michigan hopes to replicate Montana's success using RSI technology while implementing an adaptive approach that relies on continued scientific evaluation, partnerships, and collaboration. Some work has already been accomplished to identify suitable stream habitat for Grayling, and to better understand the use of RSIs. This collaboration and information, coupled with effective outreach and involvement of dozens of stakeholders and agencies, forms the foundation for a successful reintroduction effort.

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## FOCUS AREAS AND GOALS

Understanding the historical significance and cultural importance of Grayling in Michigan, and drawing upon the work already accomplished by collaborators, more than 30 organizations and agencies met in August 2016 to consider Grayling reintroduction and rehabilitation. Many ideas, questions, and information gaps regarding the reintroduction effort were recognized at the inaugural meeting, and a follow up meeting in December 2016 condensed these ideas into four main Focus Areas. Following is a description of the Focus Areas, along with the associated goals and timelines that will guide Grayling reintroduction efforts.

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### Research Focus Area:

Michigan's Grayling reintroduction effort is a "management experiment" intended to reestablish self-sustaining Grayling populations. It is also intended to build knowledge and inform future restoration efforts in Michigan and elsewhere. After examining information from recent studies in Michigan, Montana, and elsewhere, knowledge gaps were identified which currently limit agencies' ability to successfully restore naturally-reproducing populations of Grayling in Michigan streams. The main research objective is to improve chances of success by addressing these gaps.

Hundreds of streams in Michigan may have historically held Grayling, and could potentially support the species again. To ensure success, it is critical to focus on streams and watersheds that are most suitable to Grayling restoration efforts at this time. After thorough review, the Manistee River watershed was selected for initial reintroduction work. However, the Manistee River has more than one hundred tributaries, and additional prioritization effort is required to identify a subset of streams where success is most likely. In support of this effort, the partners are 1) developing a rational approach to prioritizing streams for reintroduction, 2) identifying information needed for the prioritization process, and 3) assembling existing data and collecting new data to support the prioritization work.

Predation by and competition with introduced trout species are thought to have been factors contributing to the decline of Grayling in Michigan in the 1800s, and represent significant possible impediments for Grayling reintroduction success in Michigan today. Biologists in Montana also believe that interactions with brown trout are a key factor limiting reintroduction success in that state, and have generally avoided reintroducing Grayling to streams with established populations of brown trout. Understanding relationships between resident trout and Grayling is essential for selecting streams where reintroduction success is most likely. This has been identified as a top research priority for this effort.

Restoration of Grayling in Michigan rests on the assumption that critical imprinting processes, which



enable fish to initially establish residency and later home to their natal stream, will occur during in-stream incubation of eggs and fry. More detailed studies in the lab and field will enable us to determine when and how Grayling imprint on their home waters. This information will allow adjustments in rearing techniques for improved success.

In addition to their use in characterizing the genetic fitness of the Grayling broodstock being developed in Michigan, genetic techniques may provide a key tool in addressing various research questions. For example, environmental DNA (eDNA) methods can be used to assess movement of Grayling from reaches where they were introduced (via RSIs) to nearby tributaries, and genetic bar-coding methods may be used to initially assess the level of predation on Grayling by an array of resident fish species.



#### **Research Goals:**

- 1. Coordinate and facilitate evaluation of RSI rearing efforts**
- 2. Coordinate and facilitate prioritization of streams for Grayling reintroduction**
- 3. Identify and develop approaches to address key knowledge gaps**
- 4. Seek funding and work with external partners to address knowledge gaps**

#### **Management Focus Area:**

The ultimate vision of Grayling reintroduction is to establish self-sustaining populations capable of supporting a fishery. This will require specific management actions aimed at achieving specific long-term goals to succeed. Collaboration among tribal, federal, state, academic, and angler group partners will be important to assess fish communities and habitat conditions in streams throughout the Grayling's historic range. That said, the foundational partners agree to not chemically reclaim streams for the purpose of establishing Grayling populations. Criteria will be developed to determine what habitat and biological conditions provide the best opportunities for reintroduction, and these criteria will assist all partners in standardizing sampling methods for new fish and habitat assessments.

RSI technology will be utilized to begin rehabilitation efforts, and experimental stockings of fingerlings, yearlings, and possibly adults may follow. The size and number of fish to stock will depend on early experimental success and the public's desire to expand populations throughout its historic range in Michigan. Regulation changes also will be necessary as current statute does not allow fishing for Grayling. Changes will need to be made to allow anglers to legally fish in the same streams where Grayling are present. As populations grow, additional regulations may be needed to manage Grayling as a sustainable fishery.



This reintroduction program will use an adaptive management approach based on continued assessments, research findings, and public input. Stocking strategies and regulations will change accordingly as partners work together to share information and further enhance management efforts. Habitat enhancement may become a new focus for the initiative if population expansion becomes a reality.

### **Management Goals:**

- 1. Evaluate key habitat criteria for Grayling**
- 2. Assess suitable Grayling habitat in the Upper Manistee River and other high suitability watersheds**
- 3. Assess fish populations and densities in the Upper Manistee River**
- 4. Establish population goals and limiting factors**
- 5. Change state statute to legalize fishing for Grayling**
- 6. Implement regulation changes to aid in Grayling reintroduction and to manage future fishing opportunities for Grayling**
- 7. Determine final disposition of surplus broodstock as necessary**

### **Fish Production Focus Area:**

The role fish production plays in the effort to reestablish Grayling in Michigan differs significantly from the role it plays in many fish management efforts. In most instances, fish destined for stocking are reared either intensively in tanks and raceways or extensively in ponds, with the product stocked as fingerlings or yearlings. At the onset of this effort, the only fish reared beyond the eyed egg stage are those that are to be used as future broodstock. Eyed egg incubation will be finished in RSI



strategically located in selected streams. As the program advances, future fish production efforts may include rearing to later life stages prior to stocking. The Michigan Grayling initiative will include maintaining broodstocks of Grayling both in external ponds and in raceways to ensure backup supplies of eggs are available. If the captive broodstock program proves successful, the practice of holding broodstock in external ponds will most likely be discontinued.

In preparing for Grayling reintroduction, the principles of genetic management must be followed to ensure success. All efforts will be made to found this population with as much genetic diversity as is practicable. Efforts will be made to obtain fertilized eggs for three successive years from Montana,



and tissue samples will be collected from all future brood lots and production lots so that genetic condition can be monitored as management of this species progresses.

Fish health is also of paramount importance in this initiative. Eggs imported to Michigan from Montana will be held in an isolation facility until they have passed three successive fish health exams. All brood lots will be inspected on an annual basis following the American Fisheries Society “bluebook” protocol for fish disease testing, and pathogen testing will be consistent with the Great Lake Fish Commission’s “Model Program for Fish Health Management in the Great Lakes.”

### **Fish Production Goals:**

- 1. Experiment with Remote Site Incubator (RSI) designs**
- 2. Produce eggs for RSIs that meet management and research needs**
- 3. Ensure that fish health standards are upheld**
- 4. Identify what resources among partners will help to develop captive brood**
- 5. Maintain a genetically diverse broodstock of 800 adults to spawn per year class per facility**

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### **Outreach and Education Focus Area:**

The goals identified in this Focus Area are intended to accomplish several things. They will look to educate Michigan’s public on the many steps of this initiative, gain public support by providing information on the significance of this effort, and engage Michigan’s citizens and visitors to become responsible and informed stewards to assure the program’s success. To be successful, a variety of methods will be employed including an informational website, promotional videos and use of media outlets, and potentially educational modules for students or in-person outreach by project partners. The information provided will include the many reasons why Grayling are being reintroduced, potential outcomes from the reintroduction, and resulting benefits of self-sustaining populations. Information will also be provided to help the public understand why this initiative is important and what has changed since previous reintroduction attempts.



### **Outreach and Education Goals:**

- 1. Promote an informed, supportive and engaged public**
  - a. Informed of the various steps of the initiative and the timeline for progress,**









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- Anglers of the Au Sable
- Au Sable Institute of Environmental Studies
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- Central Michigan University
- City of Grayling
- Conservation Resource Alliance
- Consumers Energy
- Crawford County Commission
- Delta College
- Department of Environmental Quality
- Department of Natural Resources
- Federation of Fly Fishers, Great Lakes Council
- Grand Traverse Band of Ottawa and Chippewa Indians
- Grand Valley State University
- Hannahville Indian Community
- Harrietta Hills Hatchery
- Huron Pines RC&D
- Keweenaw Bay Indian Community
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- Little River Band of Ottawa Indians
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