GLPOA Fish Committee

Meeting #2 – March 2, 2023

Agenda

- Introduction and Fish Committee Activity to Date
- Walleye Life History
- Past Ontario MNRF Approaches
- Our Proposal
- Volunteer Roles and Recruitment
- Other Activities
- Questions

Introduction

- Bios for Don and Peter
- 40 years of Walleye decline
- Research into the problem
- Contacting the experts
- Analysis and a proposal

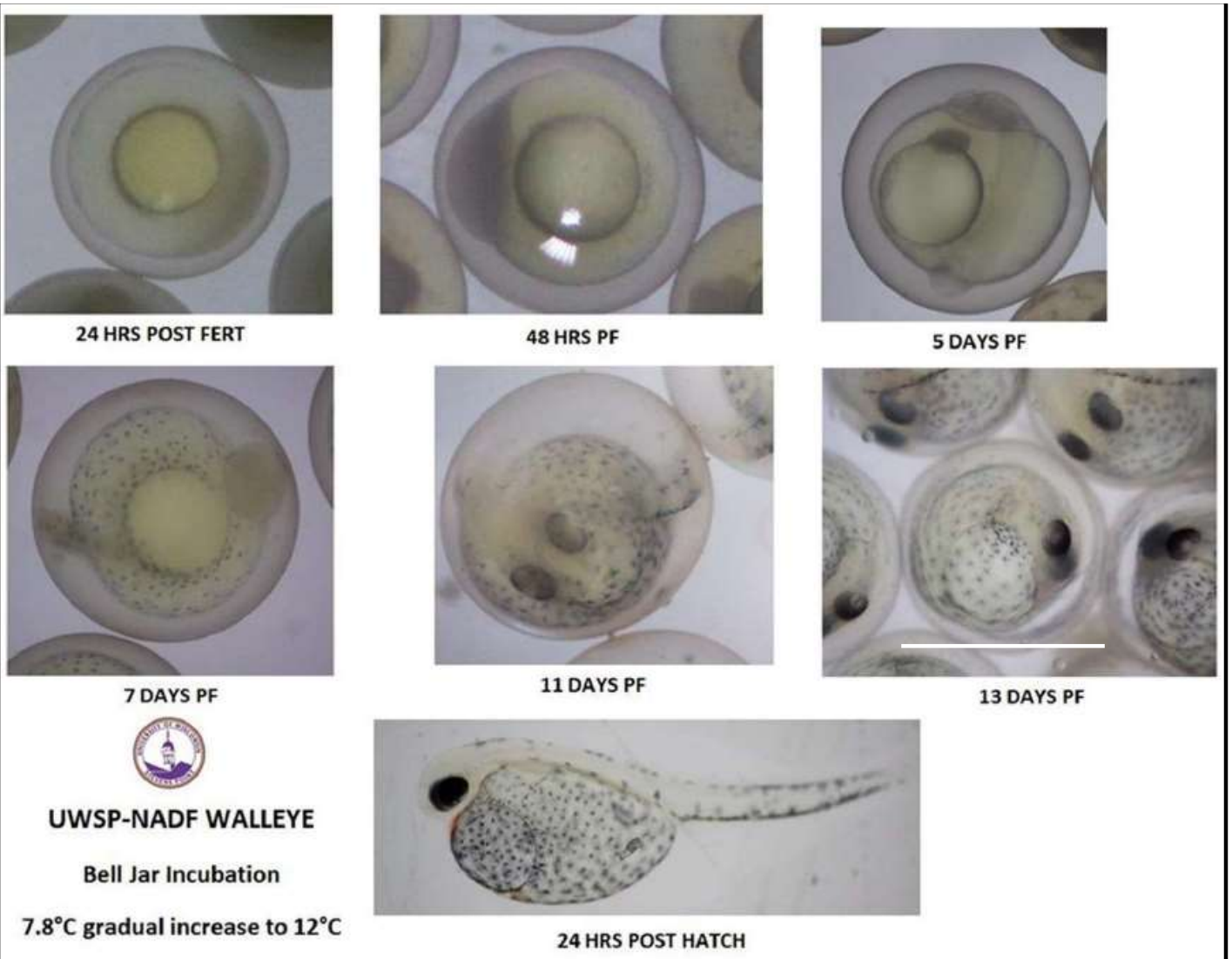
Activity to Date

- Aug. 15, 2022 - Don and Peter become co-chairs
- Dale Benoit Zohr and Peter help with Rainbow Smelt hydroacoustic study on Aug. 9, 2022
- Visit to White Lake Fish Culture Station (Tim Drew)
- Contacts and discussions with Tania Baker (Pembroke), Matt Burley (Community Hatchery Program Coordinator, OFAH), James Kushny (Algonquins of Pikwakanagan First Nation), Drs. Greg Fischer, Alan Johnson, Kevin Kelsey (Intensive culture experts for Walleye), Andy Todd (Lake Ontario Manager), Adam Bloskie (MNRF), Gary Chapman (consultant), Mike Meeker (Cage culture), Thomas Plebon (Tournament Fisherman) and others
- Create a database of project contacts and experts
- Create a database of references pertaining to Walleye
- Search for and compile stocking history of Golden Lake
- Submission of a Walleye rehabilitation proposal to the Chief of Staff, Minister's Office, MNRF (Jan. 21, 2023)

Walleye Life History

Walleye Life Cycle Stages and Sizes (Bozek et al. 2011)

- Eyed eggs (0.2 cm diameter)
- Newly hatched larvae (0.6 to 0.9 cm in length)
- One- to two-month-old fry (2.5 – 3.2 cm)
- Summer fingerlings (3.8 – 5.1 cm)
- Fall fingerlings (12.7 – 17.8 cm)
- Yearling fish (~22.9 cm)
- Mature adults (males ~35.0 cm, females~45.0 cm)
- Adult brood stock (>51 cm)



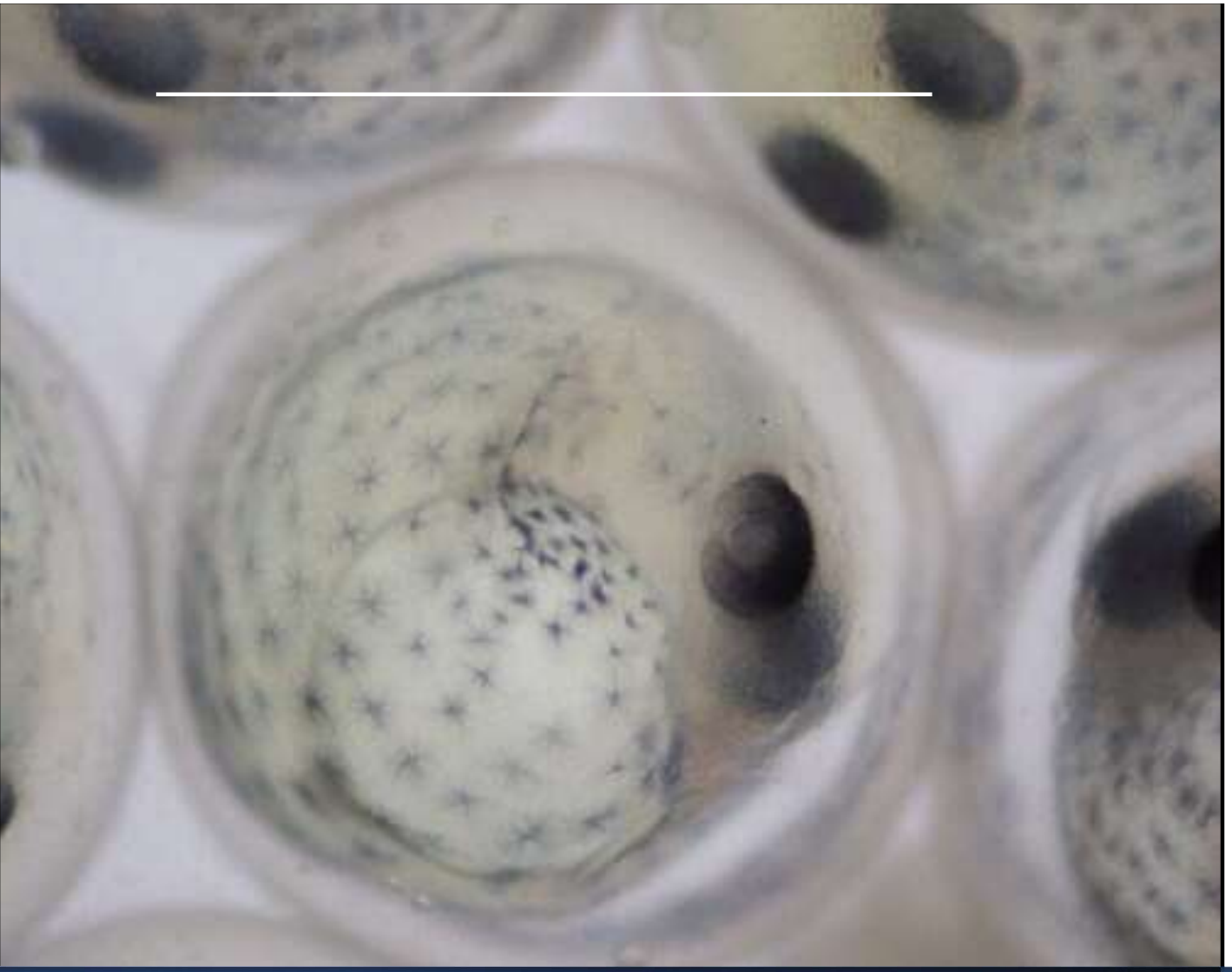
Walleye Embryo Development

- Scale bar = 0.2 cm

Eyed eggs a few days before hatching

- Scale bar = 0.2 cm

Public Domain, Sam Stukel, USFWS



Eyed egg just before hatching

- Scale bar = 0.2 cm

Walleye Larval Stage

Key Points:

- **Size: 6-9mm sac fry**
- **Photopositive Behavior**
- **3-5 days to exogenous feeding**
- **Cannibalism starts at exogenous stage**
- **Key for Initial Survival: Feed Acceptance & Gas Bladder Inflation**

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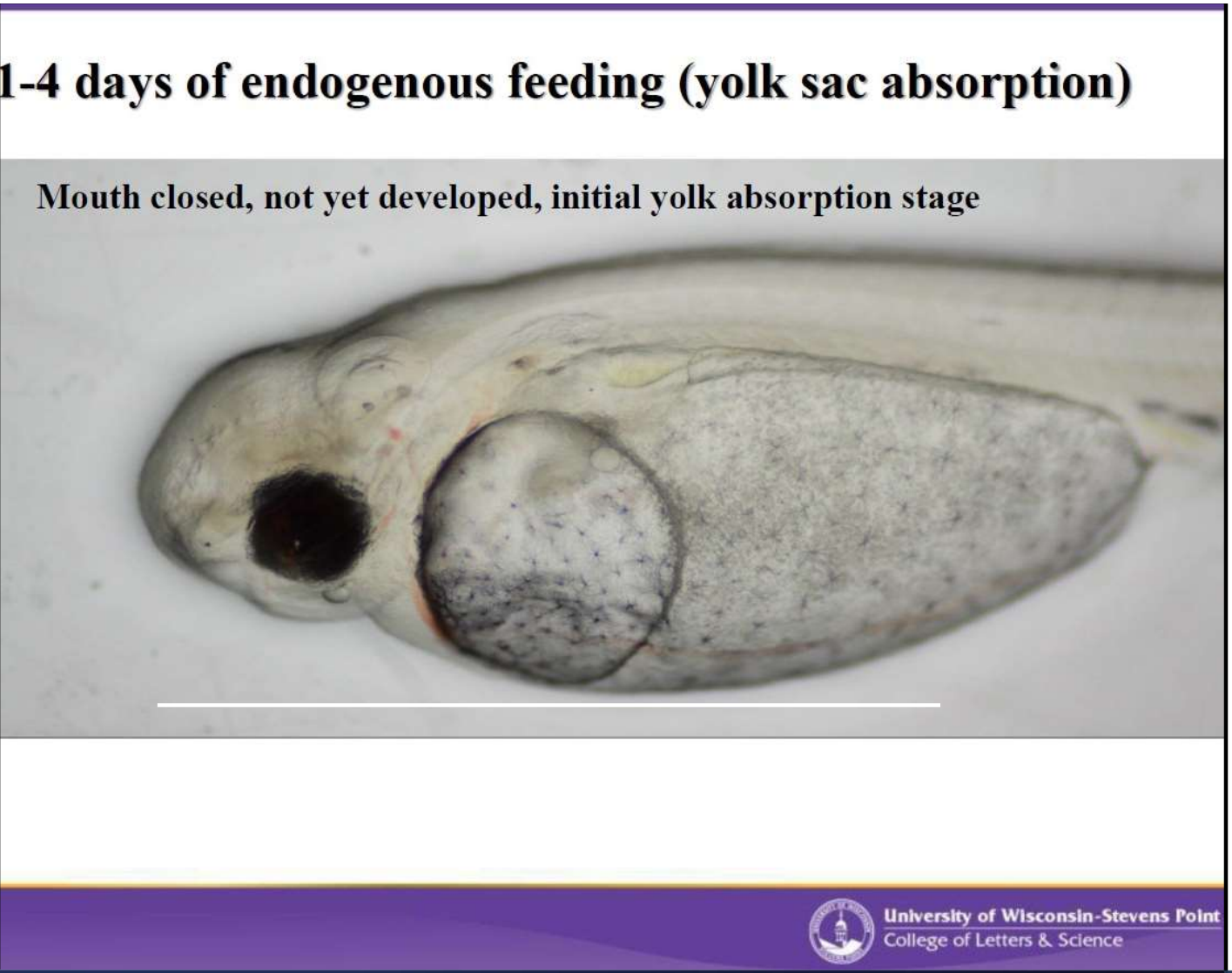
Larva 24 hr post-hatch

- Scale bar = 0.2 cm



Walleye Larval Development

- Scale bar = 0.2 cm

Prolarvae 24 hours post-hatch

- Scale bar = 0.7 cm

Prolarvae 24 hours post-hatch

- Scale bar = 0.7 cm

3-5 days to exogenous feeding

➢ Intestinal tract developed, feed acceptan

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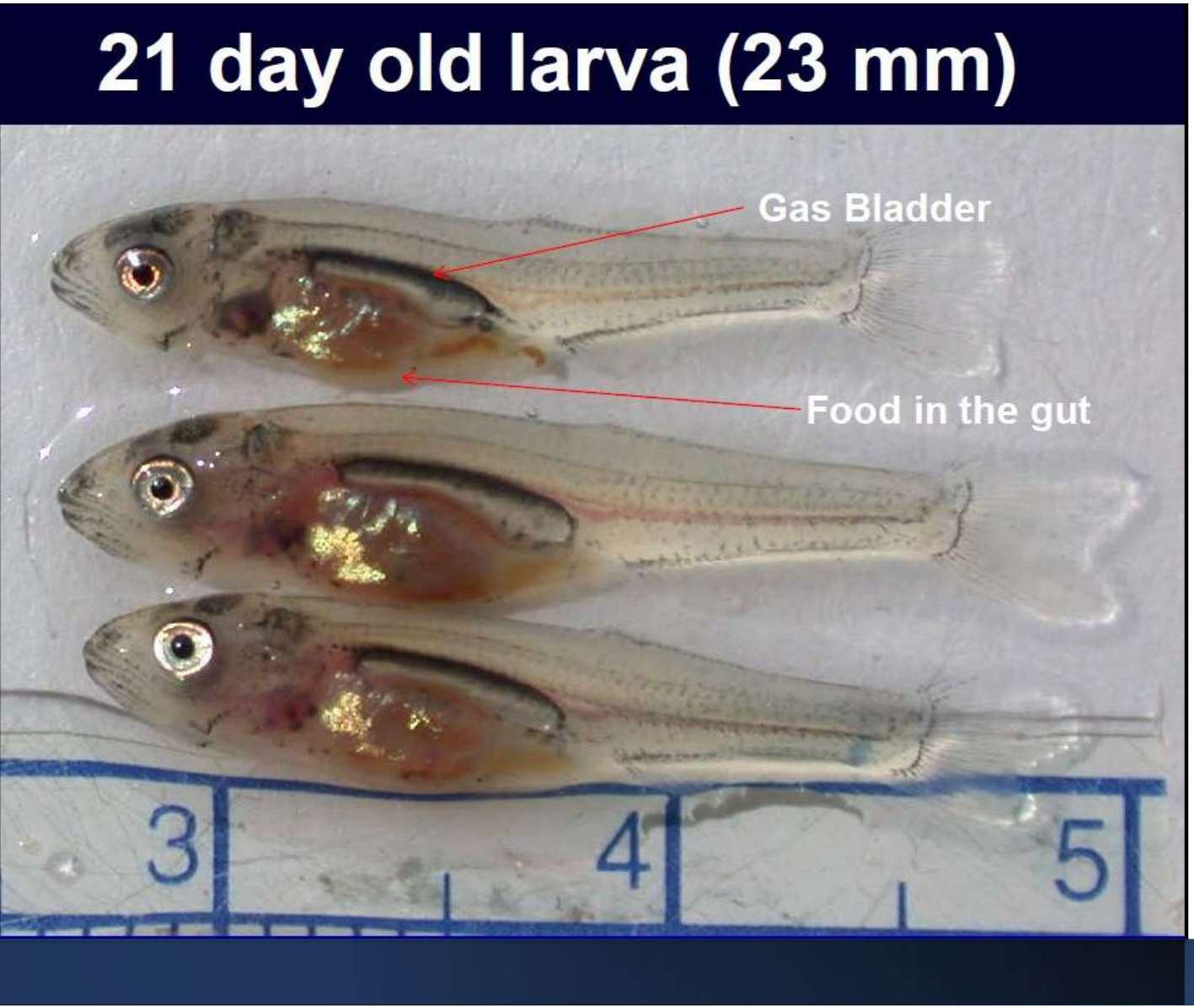
Walleye Larval Development

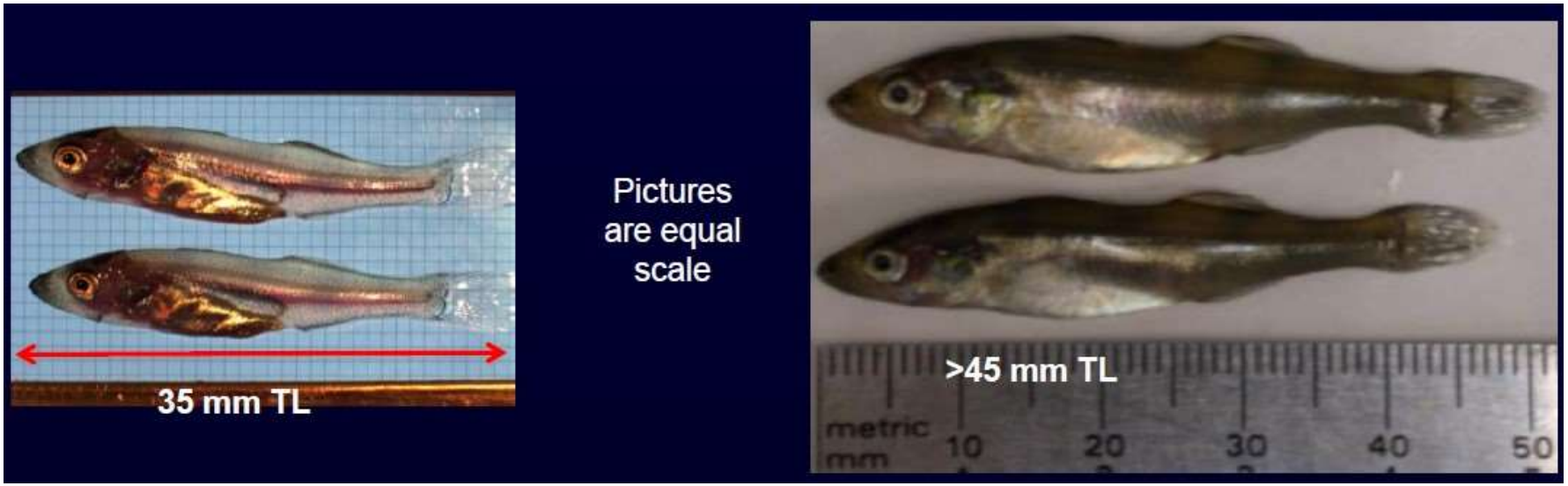
- Scale bar = 0.2 cm

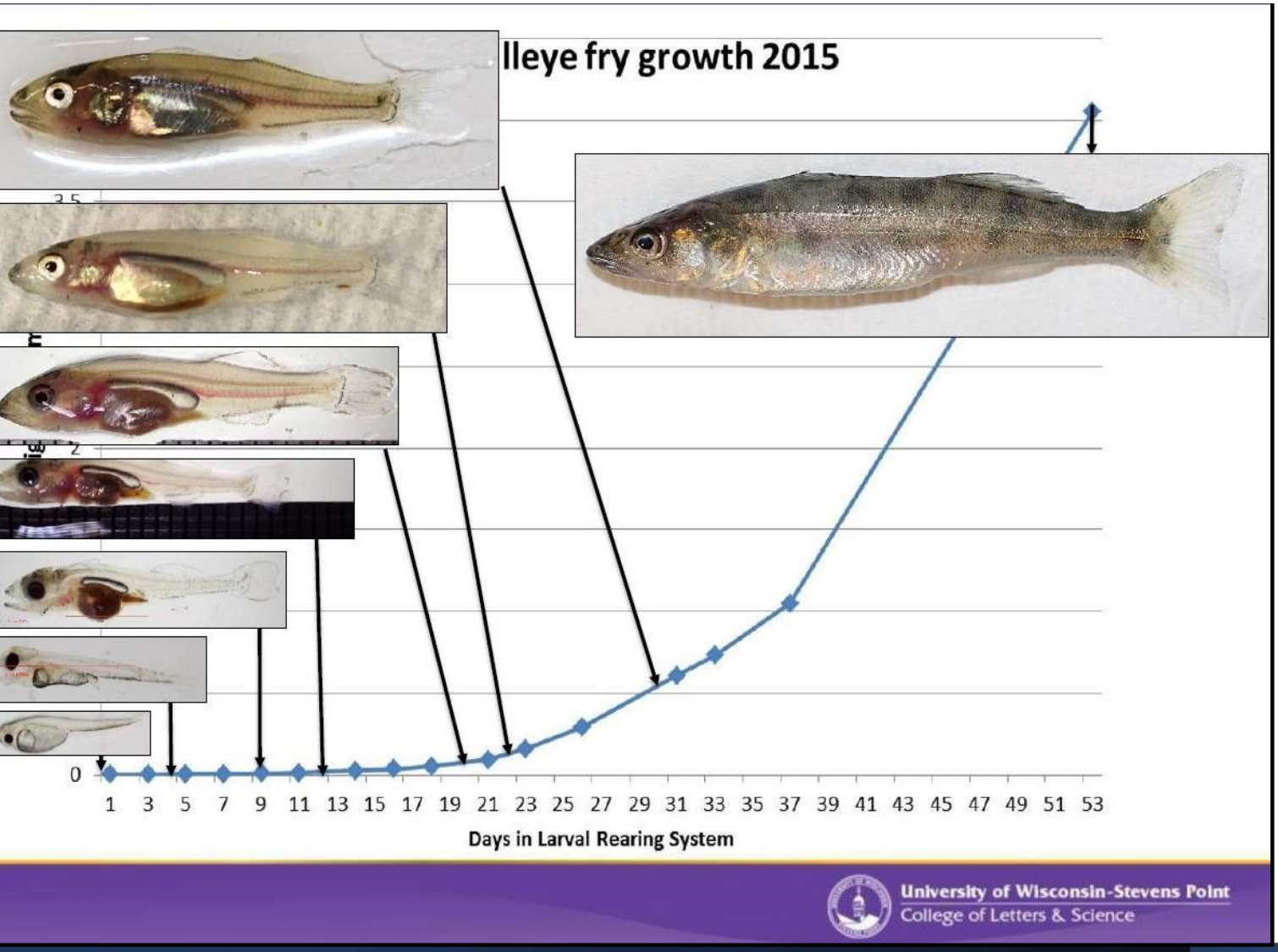
7 Day Old Larvae (1.1 cm TL)



21 Day Old Larvae (2.3 cm TL)

30 to 35 Day Old Larvae (3.5 to 5.0 cm TL)

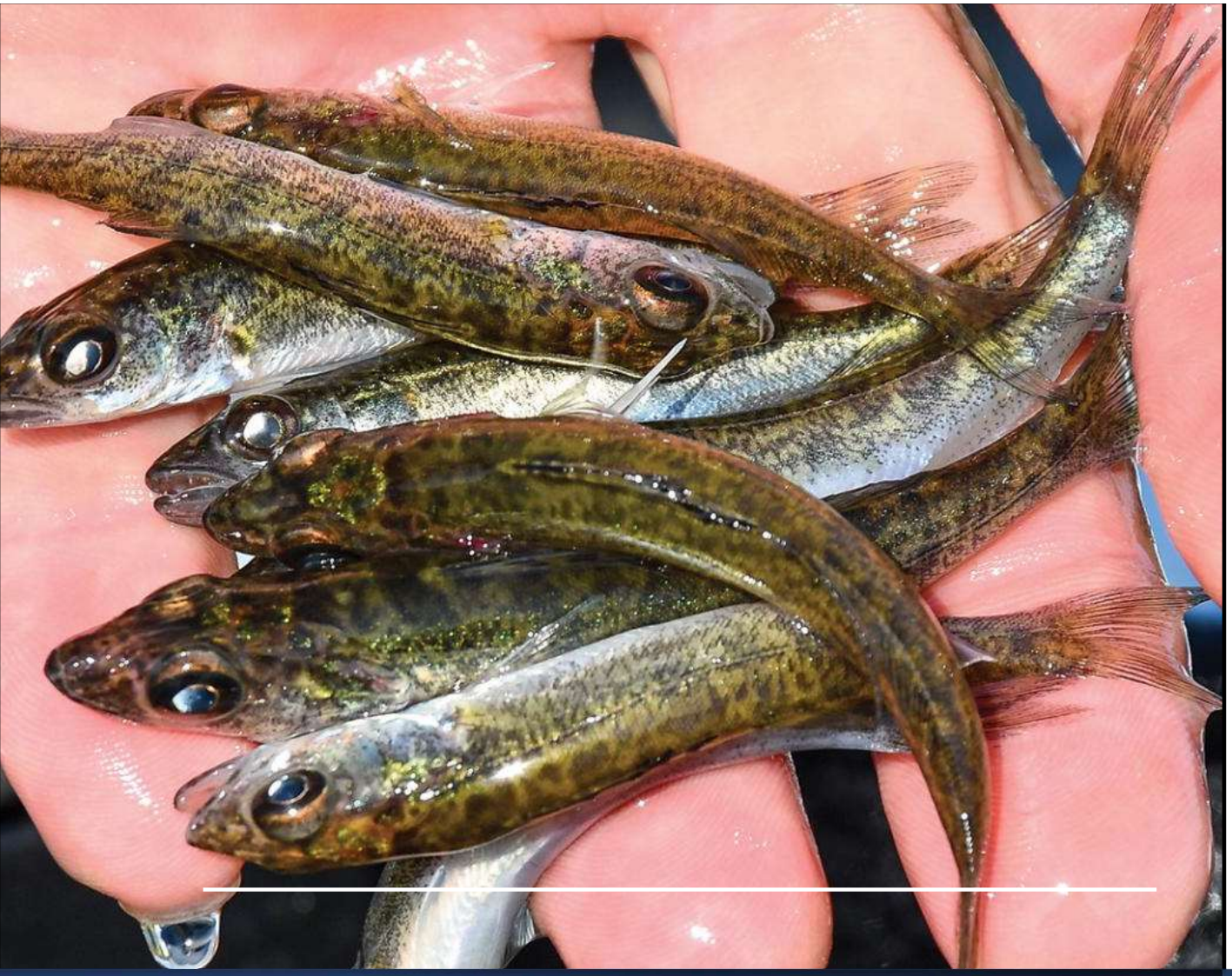




Walleye Fry Growth

Summer fingerlings

- Scale bar = 4.0 cm



Midsummer fingerlings

- Scale bar = 7.0 cm

Late summer fingerling

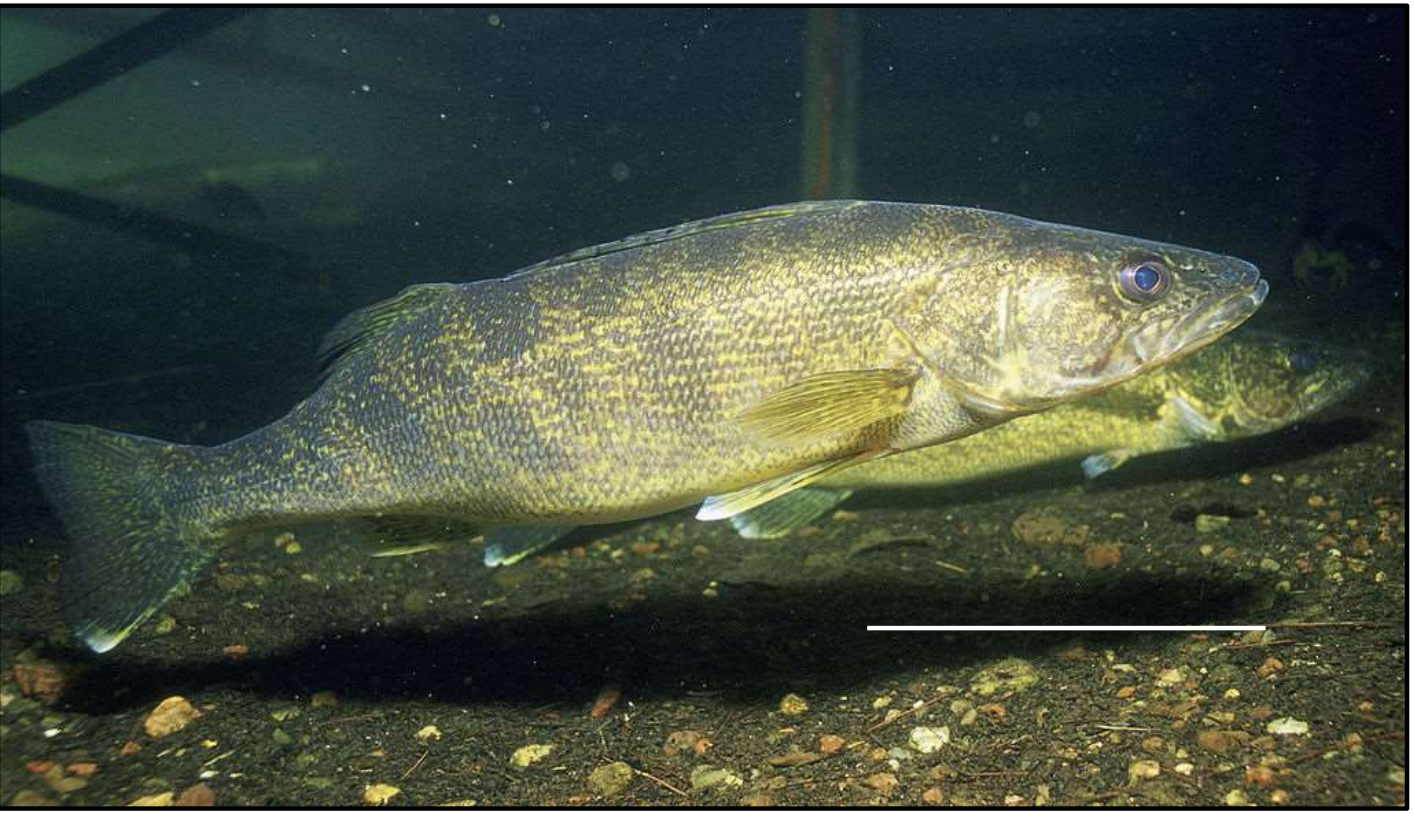
- Scale bar = 7.0 cm

Fall fingerling

- Scale bar = 7.0 cm

Fall fingerling

- Scale bar = 7.0 cm



Mature adult Walleye

- Scale bar = 7.0 cm

Public Domain, Eric Engbretson, USFWS

© Justin Brulé, July 4, 2022

Adult Walleye caught on Golden Lake

© Stephanie Mundt Zohr, May 19, 2018

Walleye Reproduction — from Egg to Adult

Past Ontario MNRF Approaches

- Walleye were first stocked in Golden Lake in 1922 and another ten times until 1945 (AOFRC, 1999, Radford, 2000) but size and life cycle stages have not always been reported. 3.98 million Walleye stocked (most probably eggs and fry).
- From 1946 to 2018 the lake was stocked another 13 times with 2.58 million Walleye of various life cycle stages and sizes.
- These early introductions resulted in an established Walleye population, providing both a recreational and First Nations (Pikwakanagan) subsistence fishery.
- Up until the late 1970s, Golden Lake was considered one of the premier Walleye lakes in eastern Ontario (Radford, 2000, Gillies et al., 2003; Whillans et al., 2013).

Past Ontario MNRF Approaches (cont.)

- Walleye populations declined significantly throughout the 1980s and 1990s.
- From 2002 to 2007 Walleye fishing was closed on Golden Lake. Rehabilitation stocking by the MNRF occurred in 2003, 2004 and 2005.
- Since 2003, only 130,966 summer fingerlings (3.8 – 5.1 cm) and 260 adults (>51 cm) have been stocked, with no visible improvement in resident Walleye numbers.
- No stocking of Walleye fingerlings has occurred since 2014. It is quite clear that the number of Walleye stocked by the Ministry in Golden Lake has declined dramatically and precipitously since 2005 (only 2,232 fish).
- Regulatory changes were also put in place, so that a maximum of two Walleye could be kept and they had to be a minimum of 50 cm in length.

Past Ontario MNRF Approaches (cont.)

- In 1946, 200,000 yearlings (~22.9 cm in length) were introduced.
- These initial and significant plantings of larger fish tipped the scales and apparently made a major contribution to the development of an established fishery.
- Since 1947, of the nearly 2.18 million Walleye put into Golden Lake, only 39,254 fish have been Walleye greater than 5.1 cm in length.
- Our suggestion is to return to the original successful approach of stocking larger fish.

Walleye Stocking History of Golden Lake

Stocking_ID											
Species	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye
District	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke
Rearing_Location											
Developmental_Stage	Fry		Fry								Fry
Stock_Strain	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)
Spawn_Year											
Stocked_Fish_Count	50,000	100,000	100,000	1,000,000	250,000	625,000	500,000	500,000	1,000,000	450,000	200,000
Mean_Weight											
Stocking_Purpose											
Stocking_Date											
Stocking_Year	1922	1923	1924	1936	1938	1939	1940	1941	1941	1943	1946
Stocked_Waterbody_Location_Iden											
Stocked_Waterbody_Official_Name	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake
Stocked_Waterbody_French_Name	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden
Stocked_Waterbody_Latitude											
Stocked_Waterbody_Longitude											
Stocked_Site_Name											
ObjectId											
Geographic_Township											

Stocking_ID	P72526-1 (1900-1973)	P72527-1 (1900-1973)	P61158-1 (1900-1973)	P64181-1 (1900-1973)	P45507-1 (1900-1973)	P49088-1 (1900-1973)	A6586-1 (1974-1991)	2614 (FSIS)	9095 (FSIS)	11874 (FSIS)	11875 (FSIS)		
Species	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye	Walleye
District	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke	Pembroke District	Pembroke District	Pembroke District	Pembroke District	Pembroke	Pembroke
Rearing_Location	null	null	null	null	null	null	POND IN ALICE TWP.	WHITE LAKE	WHITE LAKE	WHITE LAKE	WHITE LAKE		
Developmental_Stage	Yearling (10-19 Months)	Fry (1-2 Months)	Fry (1-2 Months)	Fry (1-2 Months)	Egg	Egg	Fingerlings (3-9 Months)	Fingerling (3-9 months)	Fingerling (3-9 months)	Fry (1-2 months)	Fingerling (3-9 months)	Fingerlings	Adult
Stock_Strain	null	null	null	null	null	null	null	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)	Bay of Quinte (Wild)		
Spawn_Year	0	0	0	0	0	0	1988	2003	2004	2005	2005	2014	2018
Stocked_Fish_Count	200,000	50,000	40,000	550,000	600,000	800,000	10,000	23,520	15,474	62,492	27,508	1,972	260
Mean_Weight	0	0	0	0	0	0	0	24	23.1	0.69	0.66		
Stocking_Purpose	null	null	null	null	null	null	Rehabilitation	Rehabilitation	Rehabilitation	Rehabilitation	Rehabilitation		
Stocking_Date	30-Apr-46	31-May-47	30-Apr-48	30-Apr-49	30-Apr-53	30-Apr-54	24-Jun-88	24-Sep-03	03-Oct-04	29-Jun-05	04-Jul-05		
Stocking_Year	1946	1947	1948	1949	1953	1954	1988	2003	2004	2005	2005	2014	2018
Stocked_Waterbody_Location_Iden	18-3186-50482	18-3186-50482	18-3186-50482	18-3186-50482	18-3186-50482	18-3186-50482	18-3186-50482	18-3186-50482	18-3186-50482	18-3186-50482	18-3186-50482		
Stocked_Waterbody_Official_Name	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake	Golden Lake
Stocked_Waterbody_French_Name	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden	lac Golden
Stocked_Waterbody_Latitude	45.574	45.574	45.574	45.574	45.574	45.574	45.574	45.574	45.574	45.574	45.574	45.574	45.574
Stocked_Waterbody_Longitude	-77.336	-77.336	-77.336	-77.336	-77.336	-77.336	-77.336	-77.336	-77.336	-77.336	-77.336	-77.336	-77.336
Stocked_Site_Name	null	null	null	null	null	null	null	Golden L.	Golden L.	Golden L.	Golden L.		
ObjectId	98951	98952	90541	93115	80152	82030	19267	121104	128705	108094	108095	9294	9323
Geographic_Township												NORTH ALGONA	NORTH ALGONA

Summary of Walleye Stocking Totals in Golden Lake

Developmental Stage	Confirmed Walleye Stocking Totals: 1922-2022 a	Unconfirmed Walleye Stocking Totals: 1922-1943 b
Unknown		3,975,000
Eyed eggs	1,400,000	
Fry (1-2 Months)	1,052,492	
Fingerlings (3-9 Months)	78,474	
Yearling (10-19 Months)	200,000	
Adult	260	
Total	**2,731,226**	**3,975,000**

a-OMNRF Geohub (2022)

b-Anishinabek/Ontario Fisheries Resource Centre and Radford (2000)

Walleye Rehabilitation in Golden Lake – A Pilot Project

A proposal by Don Bishop and Dr. Peter Heinermann,
Co-Chairs of the Golden Lake Property Owners Association Fish Committee

The Problem

- The Walleye population in Golden Lake has deteriorated significantly from it's hey day in the 60s and 70s.
- Efforts by the Ministry of Natural Resources and Forestry have not produced any measurable changes in this situation.
- There may be many reasons for the decline, but evidence brought forth in a 2009 hydroacoustic study is probably the most compelling. Rainbow Smelt is the most abundant species in Golden Lake at 4.1 million fish (Middel, pers. comm.). It is a voracious predator that feeds upon the eggs and young of the year of many fishes, including Walleye, leading to recruitment failure.
- In effect, the Ministry's stockings may have just been feeding the smelt.

Our Proposal

- In a nutshell, conduct Walleye rehabilitation stocking of fall fingerlings (12.7 – 17.8 cm) into Golden Lake with the help of the stakeholders.
- Start with feed-trained summer fingerling Walleye (3.8 – 5.1 cm TL) and feed them in enclosures within Golden Lake until they reach a size that cannot be easily consumed by Rainbow Smelt (i.e. a Fall Fingerling). Target size will be 9.3 cm (Lawson and Carpenter, 2014).
- The enclosures could be floating cages, raceways or a separate remote nursery pond.

Rainbow Smelt

Rainbow of Destruction

Not all the discoveries that our researchers make are happy stories. Last year Harkness scientists discovered just how destructive an invasive species can be. While studying the biodiversity of fishes in Golden Lake, just outside Algonquin Park, they found Rainbow Smelt in large numbers.

Rainbow Smelt are naturally found along the eastern seaboard of the United States but not in Ontario. However, they have been introduced into many lakes by anglers who use them for bait, and are now spreading across Ontario's lakes.

Rainbow smelt are skinny, silvery fish that measure up to 20cm long. Despite their small size they are predators, eating any smaller fish they can catch. These barracuda-like predators can literally form a 'wall' of predators, devouring all small fish they encounter, including young trout.

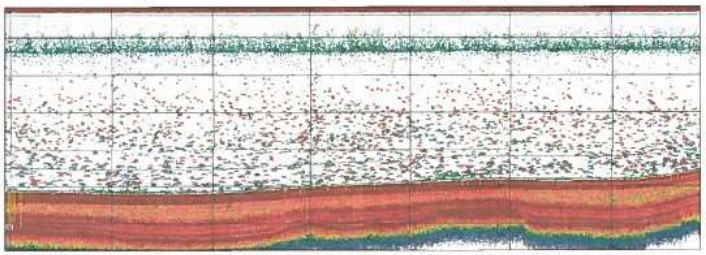
The scary thought about the discovery of Rainbow Smelt in Golden Lake was that there were hardly any other fish found - just thousands and thousands of smelt. In fact, estimates of smelt in the lake number up to 10,000 per hectare meaning Golden Lake literally has millions of smelt. Baby trout, perch and walleye don't stand a chance and the natural food chain in this lake has now been irreparably altered.

Perhaps the most alarming of all is that we know of at least two lakes in Algonquin Park, North Tea Lake and Tim Lake, where Rainbow Smelt have been introduced, almost certainly by anglers using them for bait. There is a real potential that these invasive fish could wreak havoc on our trout fishery. The extent of their impact in Algonquin is not yet known, but our team of researchers from the Harkness Laboratory of Fisheries Research is on the case and will be investigating this summer. We will keep you up to date on the status of Rainbow Smelt in Algonquin Park lakes.

You can help keep Algonquin Park lakes healthy by NEVER using live baitfish, and reporting anyone using live baitfish to Park staff or to 1-888-MNR-TIPS (1-888-667-8477).

Report invasive species wherever you find them to www.invadingspecies.org.

To learn more about research and lakes visit www.algonquinpark.on.ca.



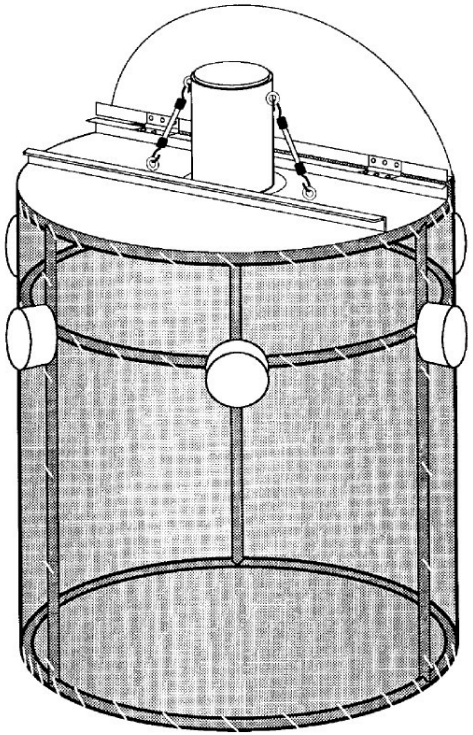
Night echograms from acoustic surveys on Golden Lake, showng dense aggregations of smelt.

4.1 million Rainbow Smelt in Golden Lake

Rainbow Smelt eating a young of the year Walleye

- Scale bar = 7.0 cm

Enclosures



Floating Cage © Harder and Summerfelt

Floating Raceways
© Izumi Aquaculture Inc.

Remote Setting
Ponds, CC BY 2.0

Next Steps

- Secure fish
- Secure funding
- Create a 5-year plan
- Decide on culture method
- Construct and deploy enclosures
- Conduct pilot study
- Assess the Walleye population with creel surveys, Nearshore Community Index Netting and/or End of Spring Trap Netting, etc.

Volunteer Roles and Recruitment

- Marketing/Communications – Mathew Ingram
- Algonquins of Pikwakanagan First Nation Representative – James Kushny, Manager, Department of Natural Resources
- Grants/Fundraising –
- Permits -
- Site Technical Management – Jay Foran
- Biology –
- Records Management –
- Smelt Run and Fry –

Other activities

- Rainbow Smelt regulatory changes
- Smelt Run and Fry
- Walleye CPR (Catch, Photo and Release) Program
- Photo contests
- Creel surveys
- Others

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Questions?