



BRING BACK THE SALMON

LAKE ONTARIO

supported by

**ONTARIO POWER
GENERATION**

DRAFT

CLASSROOM HATCHERY PROGRAM

GRADE 7 LESSON GUIDE

Made possible through funding from:



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Lesson Summaries

<p><i>Lesson 1:</i> Program Introduction</p>	<p>Students will be introduced to Atlantic Salmon identification, basic biology, and terminology. Students will be introduced to the classroom hatchery equipment and the class's responsibilities regarding the equipment.</p>	<p>60-90 Minutes</p>
<p><i>Lesson 2:</i> Fin Pal Program</p>	<p>Through a pen pal program, students will share through letter writing their classroom hatchery program learnings with students participating in a similar program in another region.</p>	<p>60-90 Minutes</p>
<p><i>Lesson 3:</i> Dams - benefits and impacts</p>	<p>In groups and as a class, students will examine the benefits and impacts of dams. They will also look at ways that impacts of dams can be minimized.</p>	<p>60-90 Minutes</p>
<p><i>Lesson 4:</i> Invasive Species Fact Sheet</p>	<p>In groups, students will create a fact sheet about an invasive species found in Ontario.</p>	<p>2-3 Hours</p>
<p><i>Lesson 5:</i> Trees are Cool</p>	<p>Through simple experimentation, students will learn how trees help to keep water cool in the streams Atlantic Salmon depend on.</p>	<p>60-90 Minutes</p>
<p><i>Lesson 6:</i> Missing Species</p>	<p>Students will learn about species extinction and the extirpation of Atlantic Salmon from Lake Ontario. They will then create a poster about an extinct, extirpated, or endangered Canadian species.</p>	<p>2-3 Hours</p>



Class size: Unlimited

Setting: Classroom

Grade 7 Classroom Hatchery Activities

Lesson 1: Program Introduction

Lesson Objectives:

Part 1

- Familiarize students with the identification of Atlantic Salmon
- Familiarize students with basic fish biology, identification, and terminology
- Assist students in recognizing the value of proper species identification

Part 2

- Introduce the class to the hatchery components, their responsibilities and the importance of monitoring and maintenance
- Involve students in daily monitoring and record keeping of the classroom hatchery
- Quickly identify any issues with the classroom hatchery unit so they can be resolved

Materials:

Part 1

- Projector connected to computer or printed presentation (found below)
- Handout containing Atlantic Salmon
- Pens

Part 2

- Classroom hatchery along with all components (listed below)
- "Lake Ontario Atlantic Salmon Classroom Hatchery" sheet (below – 1 copy)
- "Classroom Hatchery Daily Checks Sheet" (below – 5 copies if set up in Feb, 6 if set up in Jan)
- Pencil
- Clipboard

Background

Part 1

Ontario is home to nearly 150 fish species, 129 of which are native. Proper identification of individual species is useful for monitoring (species presence and location, population size, fish health, etc), and for managing and complying with fishing regulations. Identification can also help build a deeper connection with a species and enable the observation of patterns and life stories. It can also be a lot of fun!

Fish just like all other living things have unique physical characteristics that distinguish one species from another. Size, colouration, shape, and presence or absence of particular features are some of these characteristics. Atlantic Salmon like other salmon have an adipose fin (the small fin on the back of fish just in front of the tail) and a soft dorsal fin. Atlantic Salmon have dark spots (sometimes x shaped) on a lighter coloured body, only 2-3 large spots on the gill cover, a mouth that stops at the eye, and a long narrow caudal peduncle (the part of the fish that connects the body with the tail). These characteristics are shown in the presentation below.

It is important that scientists and anglers can properly identify Atlantic Salmon to give the Atlantic Salmon the best level of care and so that anglers can follow fishing regulations. Anglers with proper identification skills can be valuable citizen scientists who can greatly contribute to monitoring efforts.

Part 2

The survival of your classroom hatchery fish is dependent on properly functioning hatchery equipment. If the temperature becomes too low the fish will not develop and in the case of freezing temperatures the aquarium tank may be damaged. Too high of a temperature will cause the fish to develop too quickly and may result in mortality. If the fish develop too quickly, they will use up their yolk sacs too soon and may need to be fed prior to their release into the stream. When the fish are fed, water quality is greatly reduced. Not all fish will take to the unnatural food source and may die. The most common cause of warm temperatures is a malfunction of the chiller unit. It is imperative that if a component fails that it is noticed and remedied quickly. A daily check data sheet helps to catch issues quickly.

Daily checks on weekends and short holidays are not practical and therefore are an accepted risk of the program.

Teaching and Learning Sequence

Part A. Share this Atlantic Salmon **Fact:** *Atlantic Salmon first started to inhabit Lake Ontario 11,000 years ago. Land changes caused by a few hundred years of European settlement caused them to disappear!*

Part B. **Ask** these Guiding Questions:

1. Has anyone ever seen an Atlantic Salmon?
2. How might you tell the difference between an Atlantic Salmon and another fish?
3. What do you know about the Lake Ontario Atlantic Salmon Restoration Program?

Part C. Present "Basic Fish ID" (on a projector screen or print/display to class).

1. Page 1 of Presentation: Allow time for the students to talk about what they see. You are not looking for specific answers; rather engaging their observation skills.
2. Ask the students how a fish breathes? Point out and define the ***gills*** = *the breathing organ of fish and some other animals used to extract oxygen from water.*
3. Page 2- 4: Show the 1 or 2 characteristics identified on each fish. This can be done quickly and is intended to show the students some of the main physical differences between fish. Atlantic Salmon being our focal fish has more characteristics identified.
4. Page 5 shows the fins of the Atlantic Salmon. The presence of these fins is characteristic of all the salmon species. Point out and define the ***adipose fin*** = *a small fleshy fin just in front of the tail. Found on only a small number of fish species including salmonoids (fish in the salmon family).*
5. Supply students with a copy of the **Atlantic Salmon (handout)** and have students label the fins. Have them try first to label without looking at the presentation.

Part D.

Gather the students around the hatchery unit, point out each of the components below and ask the students what they think each component does.

<i>Part</i>	<i>Purpose</i>
Tank (15 or 20 gallon)	Holds the water
Chiller unit	Chills the water
Gravel	Substrate for the eggs/fish to hide in
Scotty incubator unit ("fish condo")	Holds the eggs and makes them visible as they develop into alevin and hatch
Filter with cartridge (Marineland or Aquaclear)	Cleans the water
Mesh screen and elastic	Prevent fish from swimming into the filter
Air pump with hose and air stone	Adds oxygen to the water
Thermometer	Displays water temperature
4" net (NOTE most classes won't have a net)	Captures fish and removes mortalities
Uniodized, freshwater aquarium salt	Reduce fungal and harmful bacterial growth
Insulation	Insulates the tank to conserve energy and maintains darkness until fry are released
Power bar (GFCI - water fail-safe)	Powers the components
Water Pump, Hoses (2), and Clamps (3)	For pumped-water chillers only; coil type chillers will not have these

Part E.

Maintenance and Monitoring

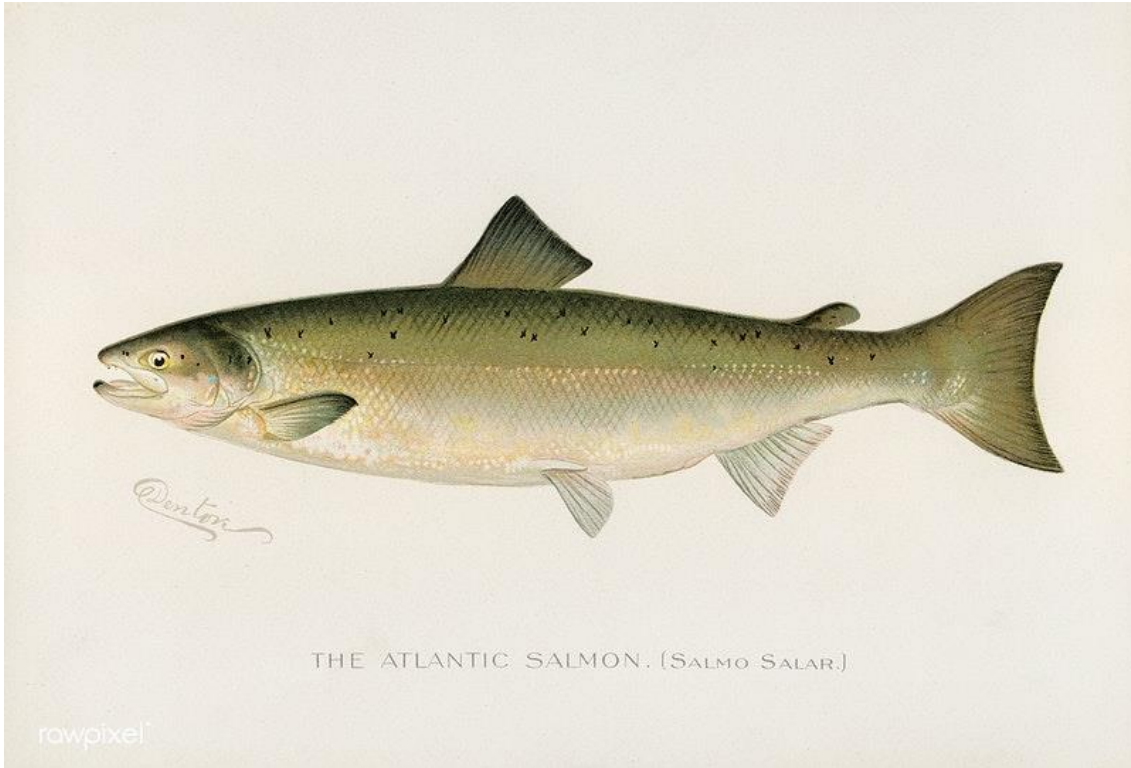
1. Explain the importance of properly monitoring the classroom hatchery unit. A missed problem could result in substantial mortality in your classroom hatchery. Common issues are:
 - a. **Temperature:** Ensure that you check daily that the temperature remains at 4°C (it will fluctuate from 3°C - 6°C) until instructed otherwise in preparation for the release.
 - i. Too high – this results in faster development of young fish. If the fish develop too fast they will use up their yolk sacs (their only nourishment when they are in the aquarium) too soon.
 - ii. Too low – this results in under-developed fish that are more delicate and not ready for stream life on release day.
 - b. **Screen on intake of water filter missing or has gaps** – fish can get into the filter area and may die. If this happens check in the filter for any fish. Some units have a mesh screen, others have a slotted end piece on the filter intake.
 - c. **No aeration** – air pump has stopped working or hose has come off; fish can suffocate. Functioning aeration is verified by the presence of bubbles coming out of the air stone.
 - d. **No filtration** – filter has lost power or there is insufficient water in the reservoir or has become clogged; water quality will be reduced. Functioning filtration is verified by water flowing out of filter like a waterfall.

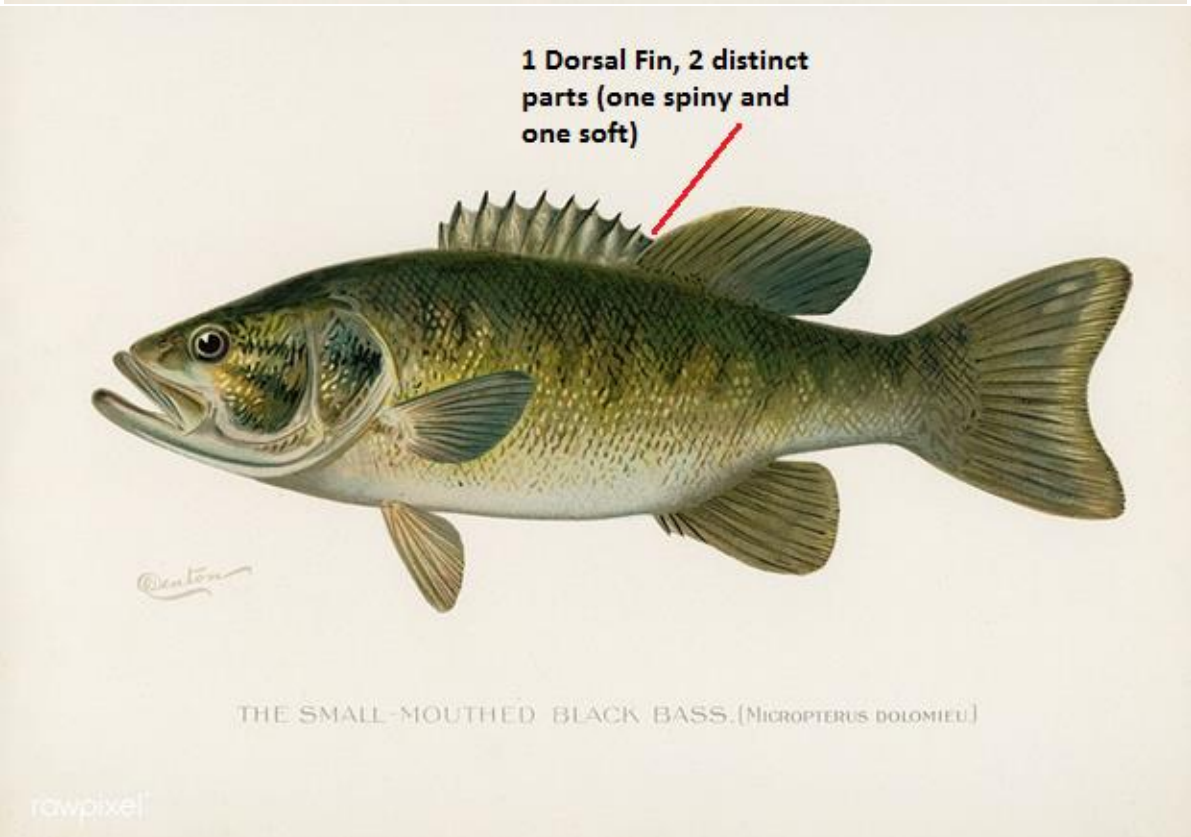
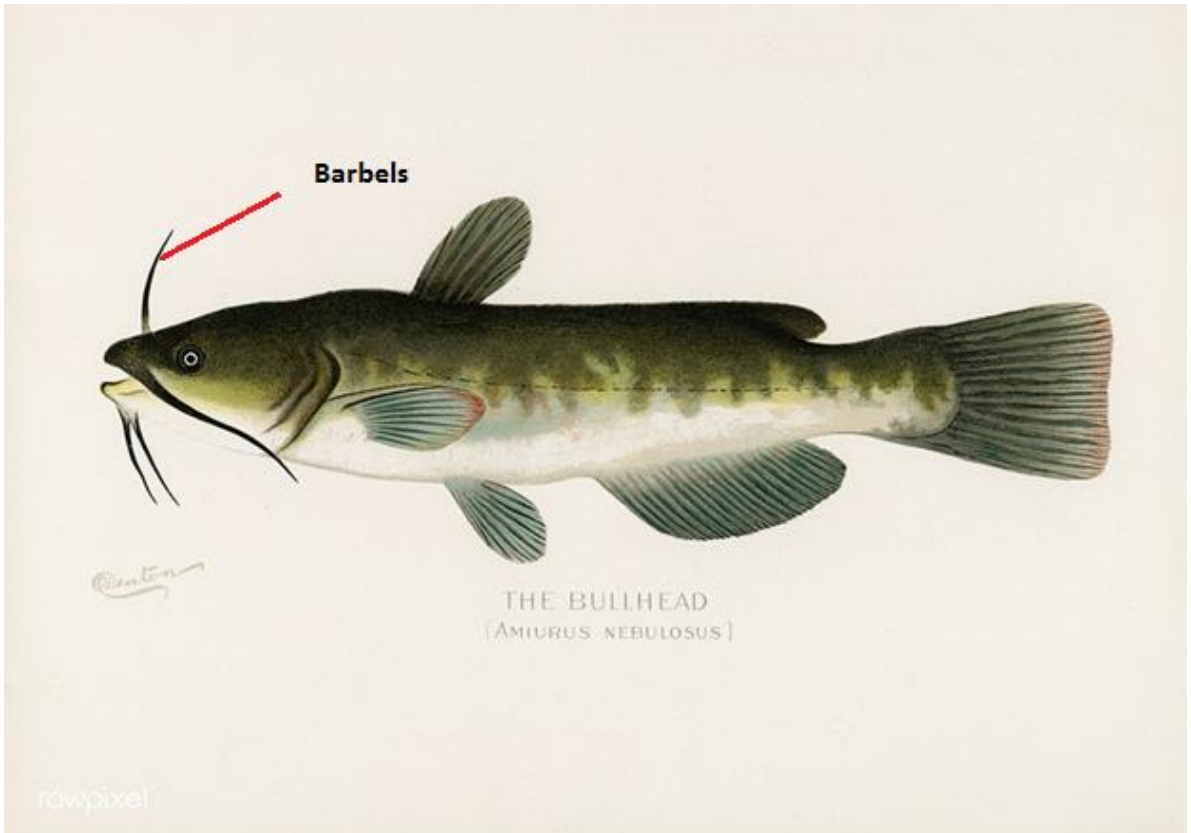
Part F.

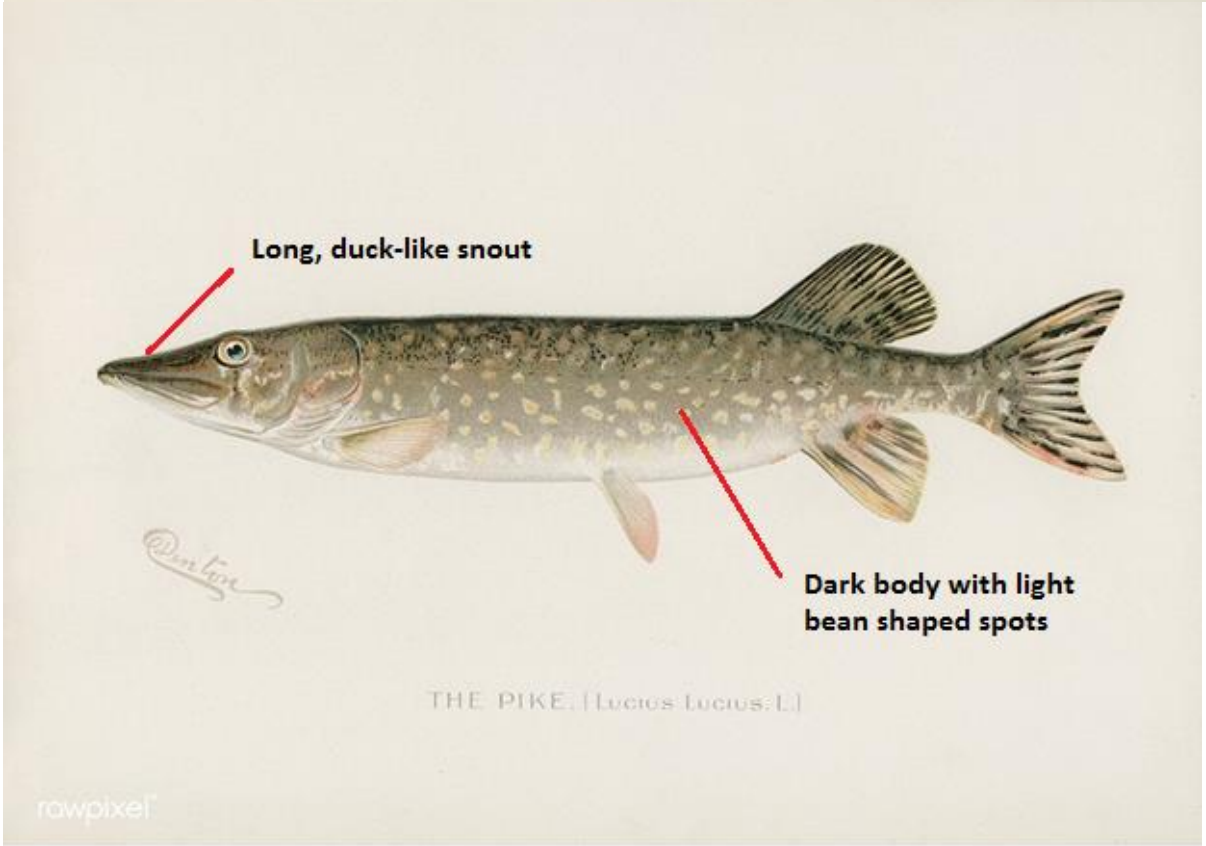
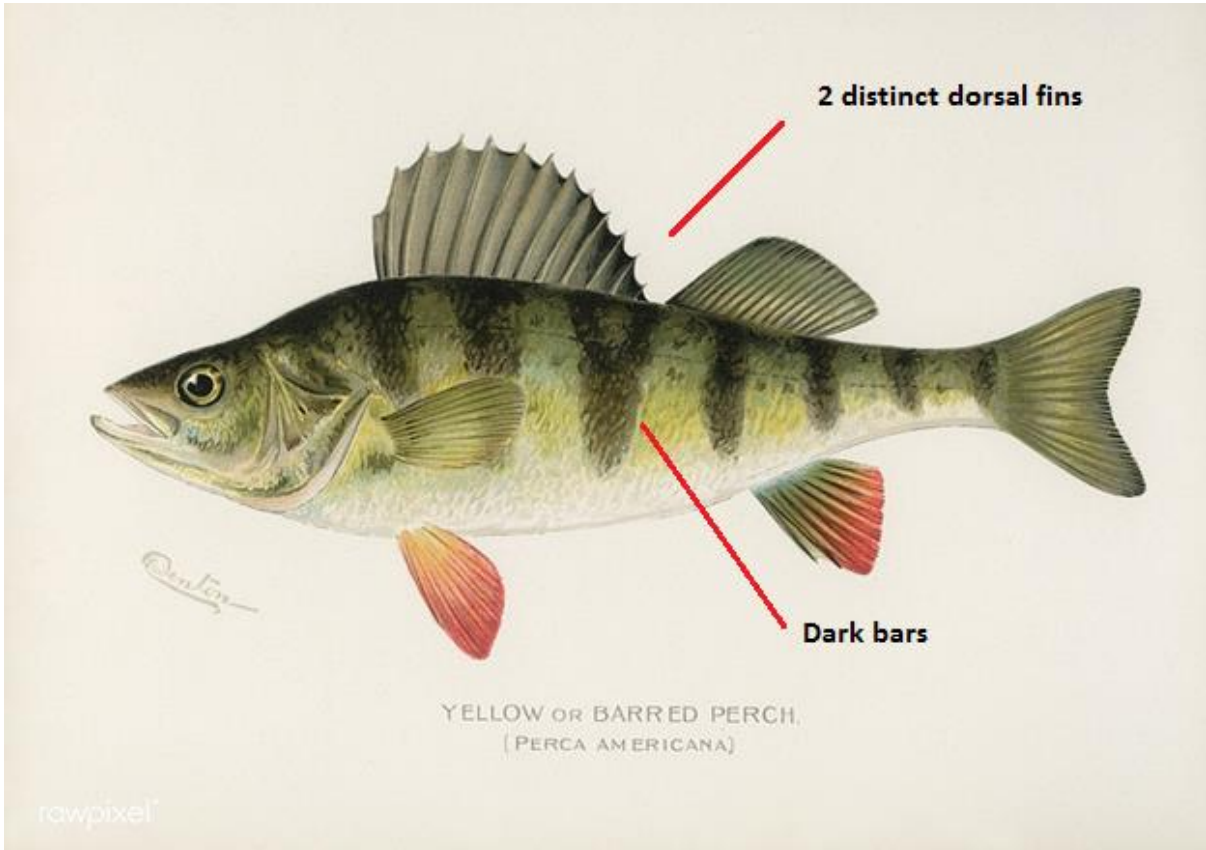
1. Post "Lake Ontario Atlantic Salmon Classroom Hatchery" sheet by the hatchery unit and fill out as a class as data is obtained.
2. Introduce the students to the "Classroom Hatchery Daily Checks Sheet" below.
3. Print off 5-6 (one for each month you will have the hatchery unit) and put sheets on clipboard and leave them near the hatchery unit.
4. Assign groups of 3 for each day to complete the daily checks and fill in the check list, assisting where needed. Instruct the students to notify you immediately if anything is not functioning or if the temperature has changed.
5. Double check the unit to make sure that nothing was missed.

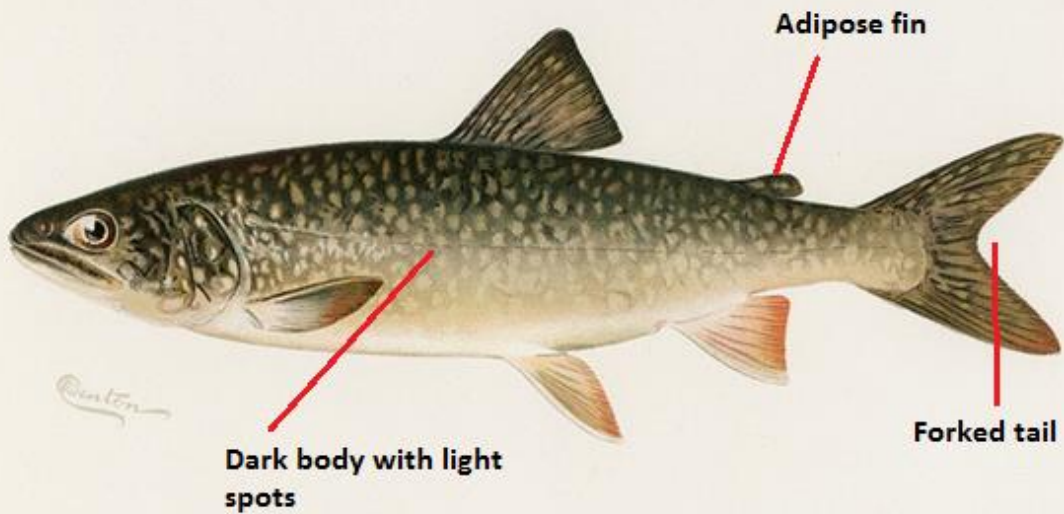
Presentation: Basic Fish Identification

What Differences Do You See? Some Basic Physical Characteristic Differences



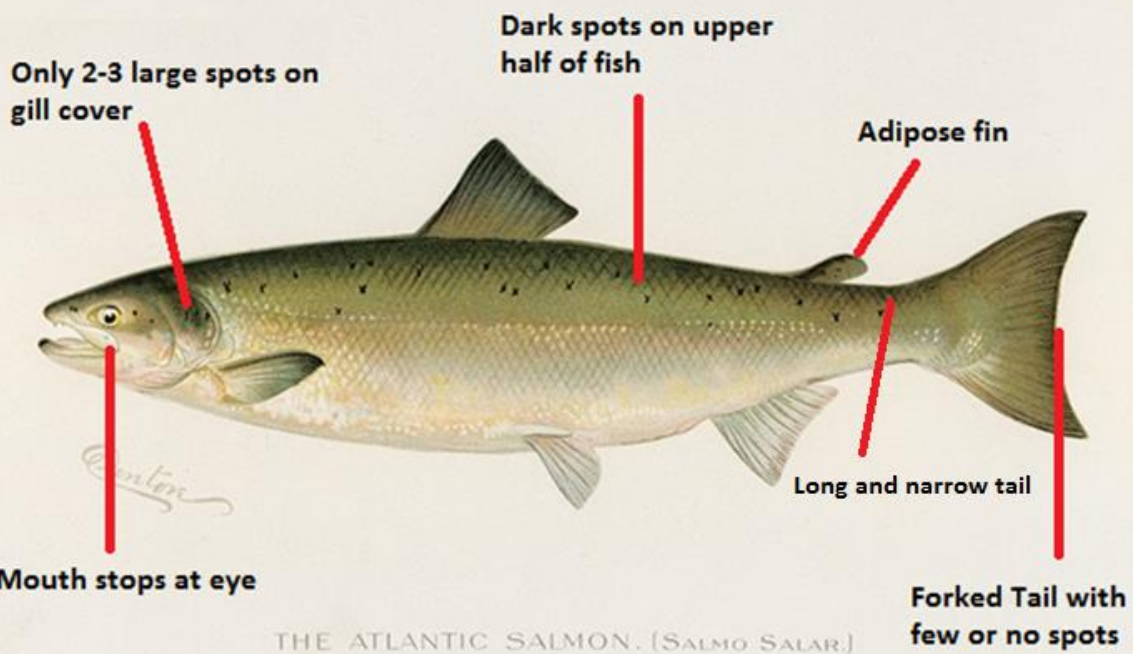






LAKE TROUT. (Cristivomer Namoycush. Walbaum.)

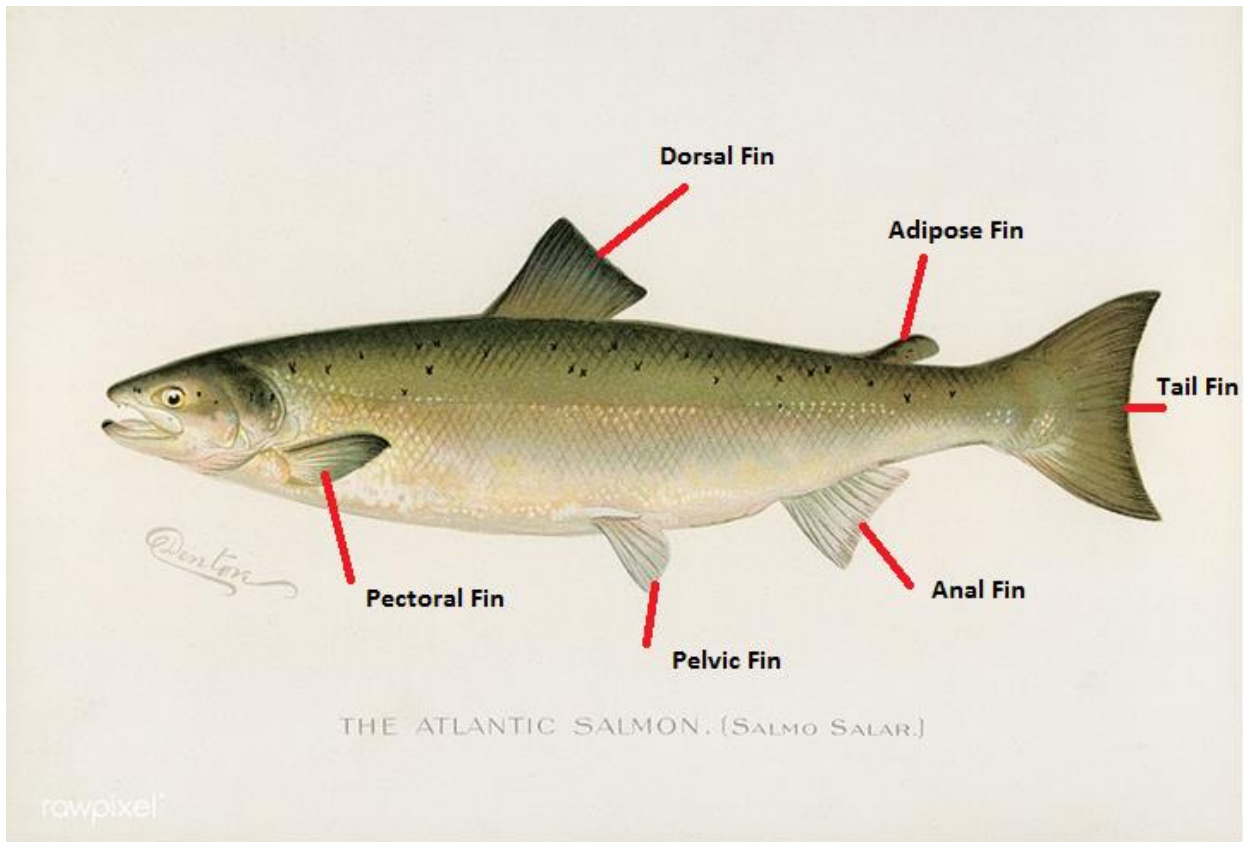
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THE ATLANTIC SALMON. (SALMO SALAR.)

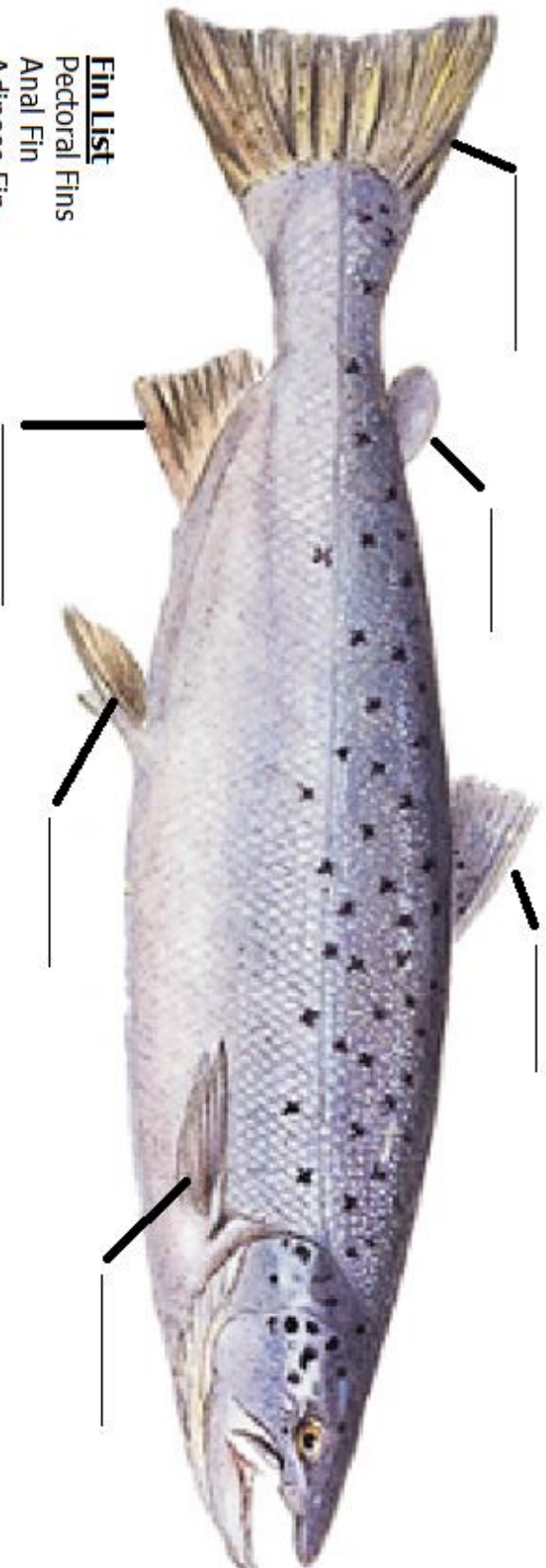
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Fins of a Salmon



Fish Illustrations from Game Birds and Fishes of North America; illustrated by Sherman F. Denton (1856–1937)

Atlantic Salmon (*Salmo salar*) - Adult
Label the fins from the list below



- Fin List**
Pectoral Fins
Anal Fin
Adipose Fin
Caudal (tail) Fin
Dorsal Fin
Pelvic Fins

ILLUSTRATION: CURTIS ATWATER
www.natureartists.com/atwaterc.htm



Lake Ontario Atlantic Salmon Classroom Hatchery

School Name: _____

Year: _____

Date of Tank Set Up _____

Water Added		Salt Added	
Date	Amount	Date	Amount

Date of Egg Delivery:	# of Eggs Delivered:
------------------------------	-----------------------------

Date Range Egg Hatching:	# of Eggs Hatched:
Date of Release From Condo:	# of Undeveloped Eggs:

Date of Release in Stream:	# of Fish Released:
Location of Release:	Stream Name:



Class size: Unlimited

Setting: Classroom

Grade 7 Classroom Hatchery Activities

Lesson 2: Fin Pal Program

Lesson Objectives:

- Reinforce learnings the students are gaining in relation to Lake Ontario Atlantic Salmon
- Broaden the student's understanding of the challenges and restoration/recovery efforts of salmon species in other geographical regions
- Better students letter writing and reading skills
- Develop social skills
- Make new friends

Materials:

- Letter writing template
- Paper
- Envelopes (optional – could be email based)
- Stamps (optional)

Background

Atlantic Salmon are native to northeastern North America and northwestern Europe. Their range extends from Connecticut, USA, north to northern Quebec, east around southern Greenland and Iceland, over to Russia in the Barents Sea, along the coast of Norway and Sweden and the Baltic Sea, around the United Kingdom and as far south as the border between Portugal and Spain. There are also inland, freshwater populations including ones in Maine, Quebec, and Newfoundland.

Populations of Atlantic Salmon have been greatly reduced or lost across their range for the same reasons that caused the Lake Ontario population to become extirpated: habitat degradation, dams blocking access to spawning grounds, overfishing, and pollution. Farmed Atlantic Salmon in open ocean pens also threaten the health and genetics of migratory Atlantic Salmon.

Salmon of different species in the Pacific Ocean are facing the same challenges and their populations are also suffering. The same issues are also affecting other species of fish all around the world. The ecological consequences and the loss of important human food sources is enormous.

People have rallied to the cause forming organizations and groups to advocate on the behalf of these fish, raising awareness, protecting habitat, and creating recovery programs. These efforts are an attempt to bolster existing populations and to restore populations where they have been lost. Some of these efforts include classroom hatchery programs like yours to help raise young fish for release and educational values.

Teaching and Learning Sequence

Part A. Share this **Cool Atlantic Salmon Fact:** *The largest Atlantic Salmon ever caught was 174 cm long. How tall is your teacher? How tall are you?*

Part B. Ask these **Guiding Questions** for the students to discuss as a group:

1. Where are Atlantic Salmon found geographically?
2. Are there other species of salmon? Where are they found?

Part C.

1. Connect with your OFAH Bring Back the Salmon contact to arrange with another organization facilitating a classroom hatchery for a pen pal exchange.
2. Once given a contact from OFAH, teachers should work together to discuss the particulars of the project and pair students up from their respective schools.
3. As a class or in small groups have the students look at the questions above in Part B.
4. Introduce the activity to the students.
5. Display a map indicating the location of their pen pal's school. If using an online map use it to show different scales for the map; show your location in comparison to their location, their local region, their location close up...
6. Display letter template and letter content (below).
7. Have the students craft their letters.
8. Have students proofread each other's letters and add edits.
9. Have students submit their letters to you for review and edits.
10. Once students have completed their edits, they can prepare the envelopes for sending or resubmit to you for emailing depending on arrangements made with the other school.
11. Students may choose to share their personal address with their pen (fin) pal after a few exchanges and with approval of their parents/guardians.

School Address
Date

Hello (student who you are writing to),

{Body of letter}

Suggested Content for Initial Letter:

- Your name and favorite activity
- Your school name, location, and student population
- Details about local water body e.g. size, depth, location, temperature...
- Brief history of the fish in your classroom including the challenges they face
- Brief piece on the local recovery/restoration efforts including the program components
- Details about your classroom hatchery
- Map showing your location (scale appropriate to location of both schools)
- Questions for who you are writing to

Suggested Content for Response Letter:

- Student name and favorite activity
- Your name and favorite activity
- Your school name, location, and student population
- Details about local water body e.g. size, depth, location, temperature...
- Brief history of the fish in your classroom the challenges they face
- Brief piece on the local recovery/restoration efforts including the program components
- Details about your classroom hatchery
- Map showing your location (scale appropriate to location of both schools)
- Questions for your pen pal

Insert map here

Your Fin Pal,

{Your name}



Class size: Unlimited
Setting: Classroom

Grade 7 Classroom Hatchery Activities

Lesson 3: Dams - benefits and impacts

Lesson Objectives:

- Have students learn about the negative impacts that dams have had on fish species like Atlantic Salmon
- Have students learn the positive functions and reasons why dams have and do exist
- Help students to understand that many issues including dams are not black and white

Materials:

- Access to computers with internet for research
- Paper, pens, chalk or wipe board with chalk or markers

Background

The damming of rivers was a major contributor to the loss of Atlantic Salmon in Lake Ontario. These dams served great and important technological purposes such as powering mills to produce lumber, grain flour, and textiles, and to control water levels. However, these dams break the connectivity of the river and inhibit the movement of aquatic organisms upstream in the river. The dam can also lead to warming of the water and the development of high levels of methyl mercury in the upstream reservoir.

Technologies such as fishways have lessened some of the ecological consequences of dams allowing some species to be able to pass the barrier.

Teaching and Learning Sequence

Part A. Share this fact with the students: *The first known dam in the world was built around 5,000 years ago to fill reservoirs servicing the Mesopotamian (modern day Jordan) village of Jawa.*

Part B. Inform the students that dams have positive uses and some negative impacts. Divide the class into groups of 2-3 and have them make lists of pros and cons of dams in their groups from their own understandings. After 15 minutes have the groups share their thoughts and as a class make a large list on the chalk or wipe board. Once all groups have shared, have the groups research online the uses and impacts of dams. Have them also research ways how impacts from dams have been minimized. Allow up to 30 minutes before once again coming together as a group and adding to the class lists.



Class size: Unlimited
Setting: Classroom

Grade 7 Classroom Hatchery Activities

Lesson # 4 Invasive Species Fact Sheet

Lesson Objectives:

- Teach students about invasive species identification and impacts
- Illustrate how invasive species are a threat to biodiversity and to species like Atlantic Salmon

Materials:

- Computer with projector
- Computers for students (in groups of 2-3) with internet access for research and fact sheet creation

Background

Since the beginning of life on earth, organisms have been on the move around the globe, using wind, water, the mechanics of their own bodies, and even hitching a ride on other organisms. If the conditions are suitable the organism will survive and may reproduce in the new environment. Atlantic Salmon, for example, moved in from the Atlantic Ocean into the Lake Ontario region around eleven thousand years ago using glacial melt waters to move into the new landscape.

Humans have become very good at moving around the globe. We have been able to use technology to survive and thrive in environments that we are not physically designed for. With our movements we have become vectors for the relocation of other organisms in our ships, wagons, trains, and on our clothing. Humans have also purposely introduced non-native species to new areas for gardens and aquariums. Many introductions have resulted from the disposal of aquarium organisms into local waters and some of these introductions have resulted in severe negative consequences, threatening native biodiversity, impacting recreational activities such as boating and fishing, and affecting food production.

Invasive species are defined as any organism not native to a specific location that causes negative ecological, economic, and/or social impacts (often all three). Invasive species have led to the extinction and reduction in population size of many species around the world. Invasive species reduce biodiversity, alter habitats, and disrupt ecological function.

Invasive species are not bad or evil, rather they have been moved by human action to new environments where they survive and out compete native species, often lacking predators to keep their populations in check. Invasive species control and eradication need not be done out of hatred for them, but rather a care for the success and survival of native biodiversity.

Some of the ecological pressures that invasive species place on southern Ontario ecosystems may affect the survival of Atlantic Salmon in Ontario.

Notable possible impactors on Atlantic Salmon are:

- Zebra and Quagga mussels: filter out tiny aquatic life that small fish depend on as food. With less food for small fish there are fewer small fish to be food for larger fish.
- Sea Lamprey: parasitize adult salmon often resulting in the mortality of the salmon.
- Alewife: displace native prey fish and become salmon prey themselves. They cause a thiamine deficiency in salmonids which results in early mortality and disrupts reproduction.
- Spiny water flea: same impact as Zebra and Quagga mussels.
- Emerald Ash Borer: kills trees resulting in warmer stream temperatures due to less forest cover.

Teaching and Learning Sequence

Part A. Share this invasive species **Fact:**

The Norway rat, *Rattus norvegicus*, is native to northern China. It spread around the globe in the 18th century by stowing away in ships. It is highly adaptable to new environments and reproduces quickly. It is now found on all continents except Antarctica. The Norway rat has destroyed crops, spoiled food stores, chewed wiring and parts of buildings, spread diseases, and caused or contributed to the extinction of many species of birds, reptiles, invertebrates, and mammals through predation and competition.

Part B. Ask these Guiding Questions:

1. What is an invasive species? (help the students establish a definition similar to that of the one given in the background)
2. How might invasive species impact efforts to restore the population of Lake Ontario Atlantic Salmon? (predation, competition, changes to the environment)

Part C.

1. Break the class into groups of 3-4.
2. Display the fact sheet template below.
3. Each group chooses an invasive species that is impacting Southern Ontario (see research resources at the bottom of template sheet) and profiles the species as per the sections on the template.
4. Explain the scientific name. Species have only one scientific name. This name is recognized globally. It is a 2-part name; the first part of the name starts with a capital letter. If hand written the name is underlined. If typed it is italicized. Ex. *Tyrannosaurus rex*
5. Students can alter the layout of the format and add background/text colours for visual appeal and expression.

Part D.

1. Each group presents their species to the class.
2. Print and display the fact sheets (optional).

Common Name

(Many species have multiple common names – choose 1)


Scientific name

(Italicize. Capitalize the first letter of the first part of the name)

Description

(A brief description of what the species looks like and what it does. This will readily available in field guides and online resources – make sure to put it in your own words.)

Picture of Species



Origin

(Where did this species come from and how did it get here?)

Impacts

(Describe any ecological, economic, and/or social impacts that this species has in its non-native range)

Control Methods and Precautions

(List treatment techniques/options that are applied for the removal/control of this species in its non-native range and/or routines that limit spread)

*Research sources: Invading Species Awareness Program (<http://www.invadingspecies.com>), Conservation Ontario (conservationontario.ca), Ontario Government (<https://www.ontario.ca/page/invasive-species-ontario>), Nature Conservancy of Canada (<https://www.natureconservancy.ca/en/what-we-do/resource-centre/invasive-species>), Invasive Species Centre (<https://www.invasivespeciescentre.ca>), Ontario Invasive Plant Council (<https://www.ontarioinvasiveplants.ca>)



Class size: Unlimited
Setting: Classroom

Grade 7 Classroom Hatchery Activities

Lesson # 5 Trees are Cool

Lesson Objectives:

- Illustrate how shade helps keep water cool and how this helps coldwater fish
- Illustrate how heat transfers from the sun to surfaces to water

Materials:

- Pencils
- Clipboards
- Data sheets (below)
- Sample jars (can be a variety of sizes but have 2 of the same size for groups of 2-3 students)
- Masking tape and markers
- Thermometers

Background

Trees moderate temperature in both hot and cold conditions. They block the wind and absorb some of the heat from the sun, slowly releasing the warmth in times of cold weather. In times of warmer weather trees can act like nature's air conditioning through evapotranspiration and by providing shade.

For Atlantic Salmon in the Lake Ontario region trees are very important components of their environment. Tree roots hold together stream banks which reduces soil erosion from entering the system and covering up the gravel beds that this fish species (and others) require for their spawning grounds and to hide in as juvenile fish. Tree branches and roots that either grow into or fall off into the water provide structural habitat for fish and other aquatic organisms. Leaves, needles, branches, and twigs falling off trees input important nutrients from the land to the water that feed the aquatic food web that Atlantic Salmon depend on. Trees provide shade that helps keep the coldwater stream cool and at optimum temperature for the survival and growth of Atlantic Salmon.

The removal of tree cover in Southern Ontario was a major contributing factor for the loss of Atlantic Salmon from the Lake Ontario watershed. As part of the restoration effort, the Bring Back the Salmon Program plants a lot of trees!

Teaching and Learning Sequence

Part A. Share these forest **Facts:**

- Deforestation is the result of clearing trees for a change to a non-forest land use, such as agriculture, housing, or industry. It does not include logging operations where tree cover is either replaced naturally or through plantings.
- “Globally, about 13 million ha of forest are deforested each year—the area of Nova Scotia and New Brunswick combined.” Natural Resources Canada, 2008

Part B. **Ask** these Guiding Questions

1. How do trees help Atlantic Salmon?
2. Have you ever noticed that snow and ice take longer to melt under trees? Why is that?

Part C.

1. Break the class into groups of 2-3.
2. Provide each group with 2 equal sized containers and a data sheet.
3. Each group label their jars A and B and their names using the masking tape.
4. Fill the jars with equal amounts of cool/cold water, recording the amount on the data sheet.
5. Place one jar in the shade of a tree considering the angle and movement of the sun attempting to have it in continual shade for the duration of the experiment.
6. Fill out the data sheet.
7. Leave the jars for a minimum of 30 minutes (longer is better).
8. Measure the temperatures and fill out the data sheet.
9. Empty and collect the data.

Part D. Discussions

1. Have each group of students share their observations with the class.
2. Discuss as a class variability/biases that might be present and why. (Different substrate type and colour, and different light exposure)
3. How does the human built environment influence water temperatures? (Reduction of tree cover, surfaces that absorb heat from the sun and transfer heat to rain water that runs into waterways)

Part E. Additional Optional Activity

1. Have the students present the data of the whole class in a graph.

Data Sheet

Jar A	Jar B
Location:	Location:
Type of substrate:	Type of substrate:
Colour of substrate:	Colour of substrate:
Water amount:	Water amount:
% Tree shade:	% Tree shade:
Start Time:	Start Time:
Air temperature at start:	Air temperature at start:
Water temperature at start:	Water temperature at start:
% Cloud cover start:	% Cloud cover start:
End Time:	End Time:
Air temperature at end:	Air temperature at end:
Water temperature at end:	Water temperature at end:
% Cloud cover end:	% Cloud cover end:
Total time:	Total time:
Total temperature change:	Total temperature change:

-Type of substrate examples: grass, concrete, pavement, bare earth

-Indicate estimated % Tree shade where the jar is positioned as : 0% (no shade from trees); 25%; 50%; or 100% (no light passes through the tree canopy to the jar)



Class size: Unlimited

Setting: Classroom

Grade 7 Classroom Hatchery Activities

Lesson # 6 Missing Species

Lesson Objectives:

- Strengthen students understanding of the extirpation story of Lake Ontario Atlantic Salmon
- Strengthen students understanding of extinction, its causes, and impacts

Materials:

- Computer connected to a projector
- Computers with access to the internet for students in groups of 2-3
- Printer with paper (optional)

Background

Extinction is defined as the termination of a species. It is a natural event that has happened since the beginning of life on earth: more than 99% of all species that have ever lived are now extinct. Mass extinction events are when the rate of extinction is greatly increased compared to other times in history, resulting in a rapid loss of biodiversity. The first five mass extinctions were the result of enormous volcanic eruptions, large scale glacial events, or large asteroid strikes. All of these causes resulted in global climate change that caused the death of up to 90% of living creatures alive at that time.

Many scientists believe that we are in the beginning of a sixth mass extinction event. This mass extinction event is the direct result of human activity: pollution, loss of habitat, over harvest, and climate change. Scientists predict that over 1 million species are on track to becoming extinct in the next few decades unless we change course and take better care of the world around us.

Atlantic Salmon became extirpated (locally extinct) in Lake Ontario in 1896. The Lake Ontario population became extinct but the species still exists in the wild in other parts of the world.

Teaching and Learning Sequence

Part A. Ask these Guiding Questions:

1. What is extinction? What is extirpation? What does endangered species mean?
2. What animals can you name that have become extinct? What factors caused this to happen?
3. What impacts have extinction had on indigenous people?
4. Are all extinctions the result of human activity? (Since the beginning of life on earth species have been going extinct. While this is a natural process, humans have accelerated the rate at which species are becoming extinct.)

Part B. Explore a visual timeline of the Lake Ontario Atlantic Salmon up to extirpation (pages 1-6). The timeline can be found here:

<https://storymaps.arcgis.com/stories/24ebd4f05c13410dbed13db53f85b5ab>

Optional Additional Videos on extinction:

Stanford researcher warns sixth mass extinction is here (2.5 min)

https://www.youtube.com/watch?v=cmb5hn2X2ok&feature=emb_logo

Vanishing: The extinction crisis is worse than you think (23 min – slightly graphic)

<https://www.youtube.com/watch?v=CUA2VgLrqn0>

What Does The Sixth Mass Extinction Mean For Humans? (6.5 min)

<https://www.youtube.com/watch?v=07qyvX8WBco>

Part C.

1. Break the class into groups of 2-3 students.
2. Display the “Missing Species Poster” template below.
3. Have the students research a Canadian species that is either extinct, extirpated, or endangered and create a “Missing Species Poster”.

Part D. Present and Display

1. Have the students present their poster to the class.
2. Have the students print and display their poster in the class.

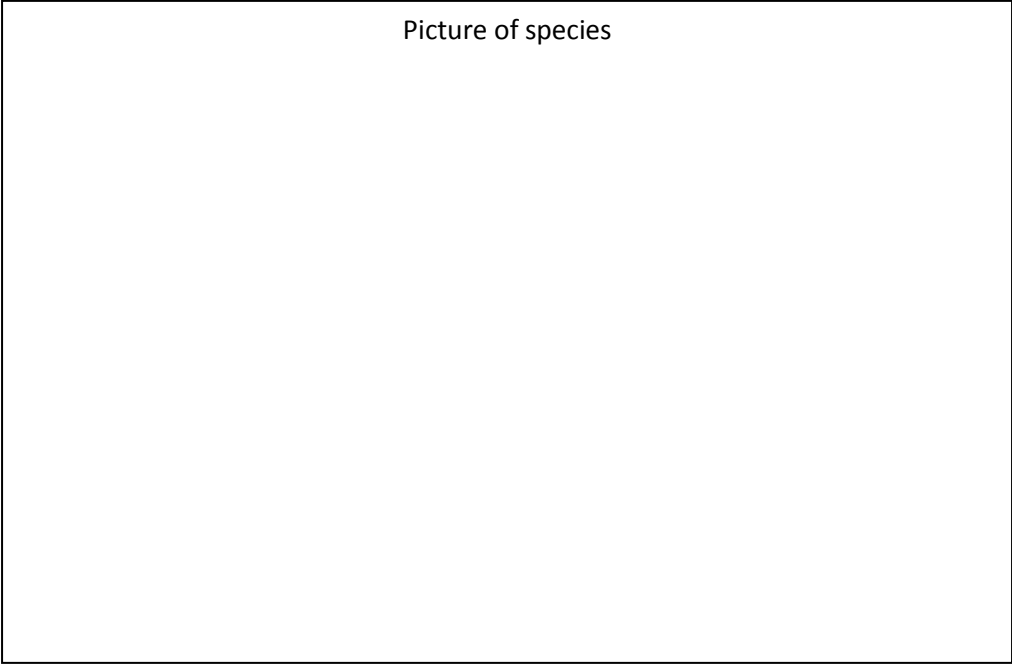
Missing Species

Common Name

Scientific name (italicize both words; first word starts with a capital letter)

STATUS (endangered, extirpated, extinct)

Picture of species



Information about the species including the impact of their loss (ecologically, socially, and or economically)