

Title: Something's Fishy

Author / Organization / Email

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Lesson Overview

Students work in groups to examine a time period's interaction and influence on the Great Lakes fishery. They categorize the events of the time period, including the arrival and impacts of invasive species during the time period, and then present the information to the class, using discussion and diagrams to synthesize information and come to a historical understanding of the Great Lakes fishery.

Introduction/Teacher Background Knowledge (1-2 paragraphs and/or link to additional resources)

The fishery resources of the Great Lakes were long known to native peoples, who used nets, hook and line, spears and other techniques to catch fish for a thousand years before Europeans entered the region. Native peoples in the area included the Odawa, Saukteaux, Potawatomi, and Ojibwe (Chippewa). They hunted fish for subsistence and for trading between tribes and, later, for trade with Europeans. Indigenous people's diet included species like Whitefish, Lake Trout, Sturgeon, Walleye, Cisco, and Atlantic Salmon, which were plentiful in the Great Lakes.

When Europeans first arrived in the Great Lakes region, they were astounded at the variety of fish in the Great Lakes, encountering giant lake trout and huge schools of yellow perch. Settlers consumed the bountiful fish locally as well as shipping their catch out to major population centers for food. Ancient lake sturgeon were so abundant that, in the early 19th century, they were derided as "trash fish," burned as fuel, or simply allowed to rot on the shore. It was said that Atlantic salmon were so plentiful in Lake Ontario that they could be removed by hand.

In the mid-19th century, the abundant fisheries became the target of serious overfishing by commercial fishermen and habitat alterations from deforestation. Catches of sturgeon, now commercially valuable, had plummeted. Atlantic salmon had been completely removed from Lake Ontario. States began to try their hand at fish stocking (adding fish to the lakes) with little success. As if the damage wrought by the 19th century wasn't enough, Great Lakes fish faced a host of new problems: invasive species and industrial pollution. To make up for the decline in native predator fish, state fishery managers began stocking Pacific salmon that ate another invasive species, the alewife. By the mid-20th century, the Great Lakes had fewer native fish than they ever had, and many of the fish that were left were unsafe to eat or embattled in a fight with the sea lamprey. The most abundant fish were artificially stocked and invasive species.

Several 20th century policies have figured into the stabilization of the problems with the Great Lakes fishery, but the Great Lakes fishery is still embattled today. It is unclear if the balance is shifting towards renewal or continued decline. More information about the history and current status of the Great Lakes fishery can be found in the source reference by Brandon C. Schroeder, Dan M. O'Keefe, and Shari L. Dann (2019). See also <https://fishingbooker.com/blog/history-of-fishing-on-the-great-lakes-part-1/> and <https://fishingbooker.com/blog/history-of-fishing-on-the-great-lakes-part-2/>

Target Grade & Subject

Middle School Science

Duration: # Class Periods (assuming 50 minute periods)

2 or more class periods

Instructional Setting:

Classroom

Advance Preparation:

- Print journal page for each student.
- Photocopy and cut up the different sections of "fishery time" for the student groups.
- Teacher's version of the "fishery time" timeline

Learning Objectives

At the end of this lesson, students will be able to:

- Present historical information to the class.
- Discuss the relative impact of events on the Great Lakes fishery, including the impacts of invasive species.
- Create a diagram that synthesizes historical understanding of the Great Lakes fishery.

Michigan Science (or Social Studies) Performance Expectation Addressed

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

DCI: Disciplinary Core Ideas

ESS3.C: Human Impacts on Earth Systems

Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

CCC: Cross-Cutting Concepts

Cause and Effect

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

List Materials & Quantities Needed per class and per student group

- Great Lakes Fishery Background Information (1 per teacher)
- Great Lakes Fishery Timeline for Teachers (1 per teacher)
- Great Lakes Fishery Timeline for Student (1 per class, to be cut into separate time period segments)
- Select [Creature Cards](#): native fish could be yellow perch, walleye, lake trout, and whitefish (samples to share with class). Non-native cards could be sea lamprey, alewife, Pacific salmon, and round goby
- Something's Fishy Journal Page (1 per student)
- Notecards and three different colored pencils/markers for each group of 4 students

Guiding Question(s):

- How have the types and numbers of fish in the Great Lakes changed over time?
- What events or modifications in the Great Lakes region have caused these changes?

5E Model

ENGAGE:

- 1) Ask students what it means to "eat locally." *Eating "bioregionally" means that individuals eat what is living (bio) within a certain area (region). This can be termed "eating locally."*
- 2) Ask students why "eating locally" would have been more common during historical times. *Prior to rapid transportation and refrigeration, people only ate what was from their region. In the Great Lakes area, native people and settlers ate a diet that consisted primarily of Great Lakes fish, meat from animals hunted locally, and fruits and vegetables grown in the region.*
- 3) Ask students to create a list of fish they might eat from the Great Lakes. They will probably struggle to create this list. Many of the fish we eat are from the ocean, and fish may not be a big part of students' diets. Familiarize students with some Great Lakes fish by showing them the yellow perch, walleye, lake trout, and whitefish Creature Cards.
- 4) Discuss the following: Why don't we eat fish from the Great Lakes as much as we used to? Should people be able to eat what grows and lives in the region?
- 5) How did invasive species get into the Great Lakes? Did this occur "naturally," or did they arrive in the Great Lakes because of something that people did or built? *The Great Lakes could not be reached by big ships until canals were built to enable them to avoid rapids, water falls, or land separating rivers from the lakes. Ask students to locate and discuss the roles of the Erie Canal, the Welland Canal (part of the St. Lawrence Seaway system), and the Soo Locks.*

EXPLORE:

- 1) Explain that students will do an activity that will show them the changes the Great Lakes have gone through in the past several hundred years that have impacted the fish in the lakes.
- 2) Assign students to eight small groups, and give each group a time period card and a stack of note cards. Depending on the size of the group, some time periods can be combined to create fewer stations. Have students write out one timeline event on each note card.

Supporting students during exploration: *Questions that the teacher could ask to guide the exploration.*

- Were these events positive or negative, or did they not have an impact on the health of the fishery?
- Did these events have to do with technology, the environment, social change, or a combination?

EXPLAIN:

- 1) Have students develop a creative way to orally present their time period to the class, highlighting what they think are the most important events. They will have 3-5 minutes to present the events during the following class period. Every student should participate in the oral presentation. Have the students post their note cards in chronological order along a class timeline once they have planned their presentation.
- 2) In the next class, students present their timeline sections to each other. Each presentation should include highlights from the time period, an explanation of which events seem most important to the Great Lakes fishery and a research question each student had after learning about this time period.
- 3) After listening to each other's presentations, look around the room at the changes that have been posted.

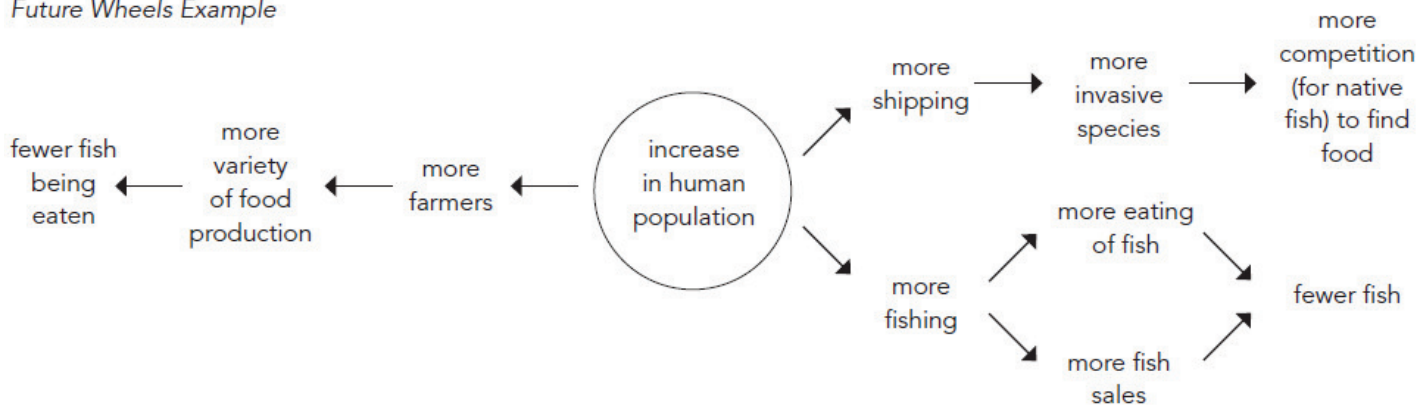
ELABORATE:

Supporting students during elaboration: *Questions that the teacher could ask to clarify student thinking.*

- How did we know there were problems in the Great Lakes fishery?
- Think about Lake Erie. Why did Lake Erie get singled out early on for its environmental problems? Think about the size of Lake Erie compared to the other lakes. *It is much smaller.* How does Lake Erie serve as a warning signal for the rest of the lakes?
- Which positive and negative changes seemed to have the biggest impact on the fishery? Have students discuss specific events. The changes were categorized as social, environmental and technological. Which kind of change seemed to have a larger impact than another?
- Choose one of the research questions raised by the student groups (see #2 in the previous section). Discuss what observations or experiments could be done to answer the research question.

- 1) Future Wheels: Have each student choose two changes that happened to the fishery:
 - Write the change at the center of the page and draw lines toward words that answer the question: What did this change mean?
 - Remember that changes and their results can be both positive and negative.
 - As an example, choose one change and work through it on the board with the class.
 - Example:
One example that touches on many categories is an increase in human population.
An increase in human population means: more fishing, more eating of fish, fewer fish, more fish sales, more shipping, more invasive species
Another aspect of a growing human population could be: more farmers – more variety in food types – less fish being eaten
 - Other ideas might include:
 - Invasive species mean...
 - Canals mean....
 - War means...
 - Overfishing means...
 - People who care about the Great Lakes mean...

Future Wheels Example



EVALUATE:

- 1) Ask students to write an answer for the following: How have humans both hurt and helped the Great Lakes? Give specific examples.
- 2) Ask students also to write three to five questions that will require additional research on the Great Lakes fishery. Some aspect of the question and research must be related to impacts of past events on the Great Lakes fishery. These questions can be used for class research projects that result in experiments (hands-on activities), research papers, or educational posters.

Supporting students during evaluation: *Questions the teacher could ask to tie student ideas to big ideas.*

- What change(s) seems to have the most impact on Great Lakes fish?
- What caused the problems in the Great Lakes? *Ultimately, human action.*
- How did humans go about trying to solve the problems?

New Vocabulary List new terms and definitions

- *Bioregion:* a region whose limits are naturally defined by topographic and biological features (such as mountains, watersheds and other ecosystems)
- *Commercial catch:* fish that are taken out of the water by people to sell for use as food or other products
- *Commercial fishing:* capture of large quantities of fish using nets, trawlers and/or lines in order to sell to others as a food product
- *Fishery:* the activity or business of fishing; a place or establishment for catching fish. Currently, in the Great Lakes, the fishery is the common resource of naturally reproducing and stocked fish species that moves across state and federal boundaries and supports a large sport fishing industry and a much smaller commercial fishing industry
- *Invasive species:* plant or animal that is not native to an ecosystem and successfully competes against native species for food and shelter, causing harm to the environment, ecology, or humans.
- *Sport fishing:* the pursuit and capture of game fish for the purpose of enjoyment and relaxation; may or may not include eating the fish caught

Safety Considerations

n/a

Sources

Alliance for the Great Lakes. 2010. "Something's Fishy." *Great Lakes in My World K-8*. Chicago, IL.

Brandon C. Schroeder, Dan M. O'Keefe, and Shari L. Dann. 2019. Ann Arbor, MI: Michigan Sea Grant. *The Life of the Lakes: A Guide to the Great Lakes Fishery*, 136 pages. (<https://www.amazon.com/Life-Lakes-4th-Ed-Fishery-ebook/dp/B07RHF1LJ5>)

Appendix

Supporting Materials:

Great Lakes Fishery Background Information

Great Lakes Fishery Timeline for Teachers

Great Lakes Fishery Timeline for Student (to be cut out)

Student journal page "Something's Fishy"

Student Page

Station #1 | Early Times of Abundance – 15,000 years ago to 1800 A.D. or C.E.

15,000 years ago: Glaciers retreat and the Great Lakes begin to take shape.

8,000-10,000 B.C. (Archaic Period) - Prehistoric people hunt, fish and gather food. Fishing is done with spears and hooks.

1,000 BC – 1600 A.D. or C.E. (Woodland Period) – Native people add nets and harpoons to fishing gear.

1600s: Europeans begin to explore the Great Lakes.

1700s: The French and British establish trading posts where fishing gear is traded.

1760s: French and Indian War (1754 – 1763) ends and Great Britain takes control of the region.

1770s – 1790s – U.S. Revolutionary War takes place. U.S./Canadian border is established.

Throughout this era – The fishery is thought to be inexhaustible.

Station #2 | Changing Times: Exploitation and Degradation – 1800-1870s

1800: European settlement increases.

1812: After the War of 1812, the first commercial fisheries are established to serve eastern cities with salted fish.

1820s – 1830s: Fur trading begins to decline and fur companies convert to fishing.

1825: The Erie Canal opens, connecting Lake Ontario with the Atlantic Ocean.

1829: The Welland Canal opens, which allows ships to travel around Niagara Falls.

1830: The sea lamprey, an invasive species, is first reported. The lake trout population will be greatly reduced by the sea lamprey that feed on them.

1836: The Treaty of 1836 (Ottawa-Chippewa Treaty) transfers one of the largest tracts of land in the Great Lakes region from the Native Americans to the United States. Native Americans retain fishing and hunting rights.

1830s – 1840s: The Atlantic salmon is overfished in Lake Ontario. This raises great concerns in the region. (This fish was last seen in the Great Lakes in the late 1800s. Current Great Lakes salmon are non-native Pacific salmon).

1860s – 1870s: Logging activity peaks in the upper Great Lakes region. Logging waste, dammed streams and soil erosion negatively affect fish habitat.

1860s: Fish begin to decline in many areas of the Great Lakes. Fishing is prohibited in some areas.

Station #3 | Early and Continued Efforts of Regulations and Stocking: 1870s – 1918

Late 1800s: Another wave of settlers arrives in the region. Some bring their fishing cultures and skills with them. Cities grow.

1870s: Shipbuilding begins using steel and steam engines in power tugboats. Machine-made nets replace handmade nets.

1875: Railroad cars carry frozen fish from the Great Lakes to the east coast.

1870 – 1890: Fish are raised in facilities called hatcheries. Fish are stocked (added) to the lakes to reverse declining populations.

1880s: Alewives begin to appear in the late 1800s.

1889: More than 10,000 people are fishing the lakes; over 146 million pounds (66.4 million kg) of fish are caught.

Late 1880s – early 1900s: Arctic grayling and Atlantic salmon decline. Fewer blue pike, lake trout, lake whitefish and chubs are being caught in most lakes, particularly in Lake Erie. Lake sturgeon declines in all lakes between 1890 and 1910.

1900: Motorized net lifters are able to haul larger nets from the water. The Chicago Sanitary and Ship Canal is constructed, connecting the Great Lakes with the Mississippi watershed.

Early 1900s: Governments in the Great Lakes region begin to adopt some regulations on fishing by setting limits and quotas on catches, restricting access to certain species, setting constraints on fishing gear, and limits on who may fish.

1909: The Boundary Waters Treaty between the U.S. and Great Britain (in control of Canada) established the International Joint Commission to study water pollution in the Great Lakes and recommend solutions to the governments.

1914: Great Britain (ruling Canada) enters World War I and fishing in Canada is considered an essential service.

1915: The fish catch from the Great Lakes reaches an all-time high of 151 million pounds (68.6 million kilograms).

1918: Fish catches decline.

Station #4 | Era of New Invaders and Challenges: 1920s – 1950s

1920s and 1930s: Tourism and commercial fishing grow.

1920s – 1930s: Total fish catch levels off to less than 120 million pounds (54.5 million kilograms) per year until World War II. The Lake Erie lake herring population crashes.

1929: The U.S. stock market crashes and many fish wholesalers go broke (along with many other people in the U.S.).

1930: A Michigan court case rules that Native Americans have no special fishing and hunting rights under state regulations. Native American commercial fishermen have to purchase commercial state licenses.

Mid 1930s: The unusually efficient bull-net is banned in most areas of the U.S. Great Lakes.

Mid 1930s: There is wide spread acknowledgement that the fishery is in trouble. Lake Superior seems to have been spared.

1930s – 1940s: The non-native alewife and sea lamprey make their way in to the upper Great Lakes through the Welland Canal.

Student Page

- 1939 – 1942: The U.S. and Canada enter World War II. Fish demand is great. People fish more, but catch less.
- Late 1940s: The fishery is in bad shape and getting worse. By the 1950s the Lake Superior lake trout population is fed on by the sea lamprey and begins to collapse.
- 1954: The Convention on Great Lakes Fisheries was signed by the U.S. and Canada. This agreement created the Great Lakes Fishery Commission.
- 1955: The Great Lakes Fishery Commission, a partnership between the U.S. and Canada, is established. Initially, they cooperate to control the sea lamprey. Shared fishery management goals are developed for each Great Lake across state and international boundaries.
- Late 1950s: A chemical is applied to some Great Lakes streams to control the sea lamprey.
- 1959: The Saint Lawrence Seaway opens, allowing medium-sized international ocean-going vessels to travel to the Great Lakes.

Station #5 | Time of New Problems and Recovery: 1960s - 1980s

- Early 1960s: The lake trout is lost, causing alewife populations to increase (normally eaten by the lake trout). Alewife die-offs (piles of dead alewives) litter beaches in the 1960s. This occasionally continues to happen in modern times.
- 1966: Pacific salmon are introduced into Lake Michigan to provide fishing opportunities and prey on the alewife.
- Late 1960s: Mercury is acknowledged to be contaminating walleye in Lake Erie.
- 1969: The Cuyahoga River emptying into Lake Erie is so contaminated that it catches fire. Lake Erie is so polluted with sewage, agricultural and industrial pollution that it contains very little oxygen. The media proclaims Lake Erie “dead.”
- 1969: The National Environmental Protection Act is passed, granting federal protections to the Great Lakes.
- 1970: The entire sport and commercial fisheries of Lake Erie are temporarily closed.
- 1970s: The U.S. and Canada ban the sale of DDT (an insecticide) and PCBs (chemicals which contaminate the Great Lakes).
- 1972: The U.S. and Canada sign the first Great Lakes Water Quality Agreement to protect and improve Great Lakes water quality by controlling sewage, industrial pollution and phosphorus. This sets the stage for the development of Remedial Action Plans (RAPs) that would help clean up the most contaminated sites in the lakes so they could no longer contribute toxic chemicals to the fish we eat.
- 1972: The Clean Water Act is passed protecting the Great Lakes from new chemicals inputs like dioxin and PCBs.
- Late 1970s and 1980s: Walleye rebound in Lake Erie. As other fish begin to make a comeback, the Great Lakes system is seen as resilient, able to “bounce back.”

Station #6 | Continued Time of New Problems and Recovery: 1980s - present

- 1980: The Great Lakes Fishery Commission and several other groups implement a Joint Strategic Management Plan for the Great Lakes fishery.
- 1980s: The total economic impact of the Great Lakes sport fishery is estimated between \$2-4 billion per year, and the recreational fishery supports over 60,000 jobs in the region.
- 1981: The Chippewa-Ottawa Treaty Fishery Management Authority is established to stabilize and enforce fishing regulations for tribal fishermen.
- 1981: Native American tribes and the U.S. government negotiate a settlement called the Entry of Consent Order, which grants tribes exclusive fishing rights in certain treaty waters. In exchange, the tribes agree not to fish commercially in certain areas important for sport fishing or for re-establishing lake trout populations.
- Mid 1980s: Invasive species alert! The zebra mussel arrives via a ship from the ocean. It is native to the Baltic Sea. Zebra mussels proceed to eat a great deal of plankton (plankton is the base of the food chain, upon which many other fish depend), affecting yellow perch populations. In addition, mussels clog water intake pipes, causing expensive maintenance issues. Also, a new exotic species, the spiny water flea (a type of zooplankton) arrives in Lake Huron and spreads throughout the Great Lakes.
- 1989: More invasive species?! The quagga mussel is spotted in the Great Lakes. At first sight it seemed a larger zebra mussel, however, by 1991 it was verified to be a quagga mussel (a new invader).
- 1990: Licensed commercial catch in the Great Lakes is 105 million pounds (47.7 million kilograms) of mostly lake whitefish, yellow perch and alewife. The catch is largest in Canada.
- 1990s: Concentrations of PCBs, DDT and other contaminants in fish decline over 90% from the levels recorded in 1970.
- 2008: The ballast water treatment standards bill passes through the House and Senate, helping to eliminate the transportation of invasive species.
- 2010: Asian carp finally make their first appearance within the Great Lakes, (bighead carp) and the region braces for more to come.

Fisheries timeline (for teachers): Category answers provided below. For student “Fishery Time” cards, see following section.

S = Social Change: Any change in group behavior, attitude, policy, or politics.

T = Technological Change: Any change that results from a new invention, or which alters the ability of people to use tools.

E = Environmental Change: Any change in the Great Lakes habitat or human/fish populations that affects the health of the ecosystem.

Station #1 | Early Times of Abundance – 15,000 years ago to 1800 A.D. or C.E.

- E** 15,000 years ago: Glaciers retreat and the Great Lakes begin to take shape.
- E/T** 8,000-10,000 B.C. (Archaic Period) - Prehistoric people hunt, fish and gather food. Fishing is done with spears and hooks.
- T** 1,000 B.C. – 1600 A.D. or C.E. (Woodland Period) – Native people add nets and harpoons to fishing gear.
- S** 1600s: Europeans begin to explore the Great Lakes.
- S** 1700s: The French and British establish trading posts where fishing gear is traded.
- S** 1760s: French and Indian War (1754 – 1763) ends and Great Britain takes control of the region.
- S** 1770s – 1790s – U.S. Revolutionary War takes place. U.S./Canadian border is established.
- S** Throughout this era – The fishery is thought to be inexhaustible.

Station #2 | Changing Times: Exploitation and Degradation – 1800-1870s

- S** 1800: European settlement increases.
- E** 1812: After the War of 1812, the first commercial fisheries are established to serve eastern cities with salted fish.
- E** 1820s – 1830s: Fur trading begins to decline and fur companies convert to fishing.
- T** 1825: The Erie Canal opens, connecting Lake Ontario with the Atlantic Ocean.
- T** 1829: The Welland Canal opens, which allows ships to travel around Niagara Falls.
- E/T** 1830: The sea lamprey, an invasive species, is first reported. The lake trout population will be greatly reduced by the sea lamprey that feed on them.
- S** 1836: The Treaty of 1836 (Ottawa-Chippewa Treaty) transfers one of the largest tracts of land in the Great Lakes region from the Native Americans to the United States. Native Americans retain fishing and hunting rights.
- E** 1830s – 1840s: The Atlantic salmon is overfished in Lake Ontario. This raises great concerns in the region. (This fish was last seen in the Great Lakes in the late 1800s. Current Great Lakes salmon are non-native Pacific salmon).
- E** 1860s – 1870s: Logging activity peaks in the upper Great Lakes region. Logging waste, dammed streams and soil erosion negatively affect fish habitat.
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- T** 1875: Railroad cars carry frozen fish from the Great Lakes to the east coast.
- E** 1870 – 1890: Fish are raised in facilities called hatcheries. Fish are stocked (added) to the lakes to reverse declining populations.
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- E** 1889: More than 10,000 people are fishing the lakes; over 146 million pounds (66.4 million kg) of fish are caught.
- E** Late 1880s – early 1900s: Arctic grayling and Atlantic salmon decline. Fewer blue pike, lake trout, lake whitefish and chubs are being caught in most lakes, particularly in Lake Erie. Lake sturgeon declines in all lakes between 1890 and 1910.
- T** 1900: Motorized net lifters are able to haul larger nets from the water. The Chicago Sanitary and Ship Canal is constructed, connecting the Great Lakes with the Mississippi watershed.
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8 | Something's Fishy

FIRST NAME																				
LAST NAME																				

[1] Which time period are you working on?
.....

[2] Read the events and make decisions about each one. Abbreviate and record each event on a separate note card. If you abbreviate, make sure it is understandable to all.

- If it is related to technology, write it in black.
- If it is related to the environment, write it in green.
- If it is a social change, write it in red.
- On each note card, mark a '+' if it is positive for the health of the fishery, a '-' if it is negative for the health of the fishery, and a '0' if it does not cause a change for the fishery.
- Post the note cards in chronological order on the class timeline.

[3] How many of each kind of change do you have in your time period?
.....
.....

[4] What do these changes mean overall for the Great Lakes fishery?
.....
.....

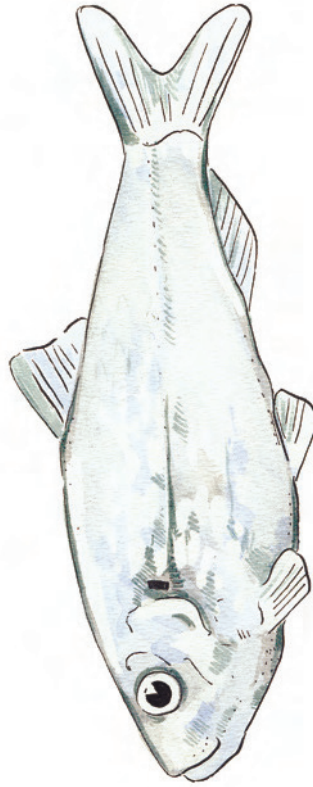
[5] Which events had the greatest impact on the health of the Great Lakes fishery?
.....
.....

[6] How will you creatively present the fishery information from your timeline to the class? Everyone in the group must participate in the presentation. Decide on roles for each person.
.....
.....
.....

Future Wheels

[7] Choose 1 or 2 changes that happened to the Great Lakes fishery and create Future Wheels for each. Use separate paper if needed.

APPROVED BY	
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Alewife*

Scientific Name:
Alosa pseudoharengus

who? description

Type: fish

Length: 15 cm / 6 in

Weight: 113 g / .25 lbs

Coloring: silver with blue or blue green luster on back

⌘ **Invasive Species**

where? environment

Habitat: lakes and oceans

Origin: Atlantic Ocean

what? characteristics

Feeding:

↳ **Who eats me?**
lake trout, salmon

↳ **What do I eat?**

phytoplankton,
zooplankton and small
crustaceans

Role: consumer, omnivore

Reproduction: lay eggs in
summer in water, near the
shore

Grouping: swim in schools
Activity: year-round

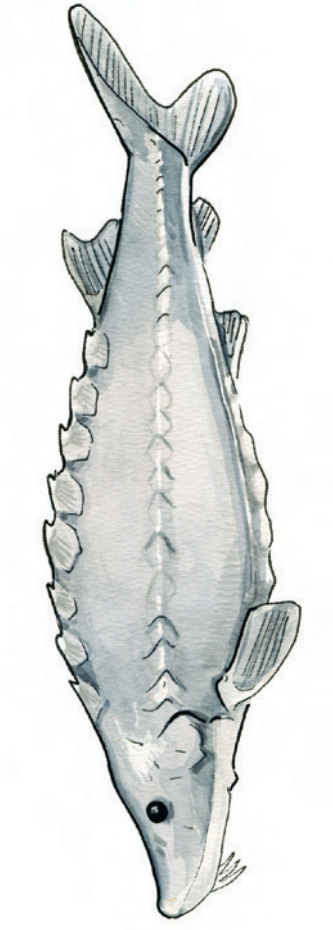


Interesting Fact *

Alewives are usually a salt-water fish, but they spawn in freshwater. After laying their eggs, many die and wash up along the lake shoreline in the spring and summer.

Size:





Lake Sturgeon*

Scientific Name:
Acipenser fulvescens

who? description

Type: fish

Length: 91-183 cm / 3-6 ft

Weight: 4-91 kg / 10-200 lbs

Coloring: olive brown to grey, white belly

Body Features: long, pointed snout with four barbels, or feelers, under the front of the snout

⊗ **Endangered in Illinois, Indiana, and Michigan**

Size:



where? environment

Habitat: freshwater lakes, lives on lake bottom

! Interesting Fact ★

The female sturgeon takes 20 years to mature and can live for 100 years. The sturgeon uses its barbels to find food on the lake bottom.

what? characteristics

Feeding:

↳ **Who eats me?**
humans and other fish eat eggs

↳ **What do I eat?**

crustaceans, mollusks, insects

Role: consumer, omnivore

Reproduction: eggs; spawns every 4-6 years in swift water

Grouping: solitary

Activity: diurnal

Lake Trout*

Scientific Name:
Salvelinus namaycush

who? description

Type: fish
Length: 43-69 cm / 17-27 in
Weight: 1344-4032 g / 3-9 lbs
Coloring: light spots on dark background, color can vary greatly from fish to fish

where? environment

Habitat: freshwater lakes, in cold, clear, deep water



Interesting Fact *

Lake trout are a popular food for humans and the invasive sea lamprey. This has caused overfishing and reduced fish population. The United States and Canada worked together to reduce lamprey numbers. Namaycush is a Native American word that means "dweller of the deep."

what? characteristics

Feeding:

↳ **Who eats me?**

sea lamprey, humans

↳ **What do I eat?**

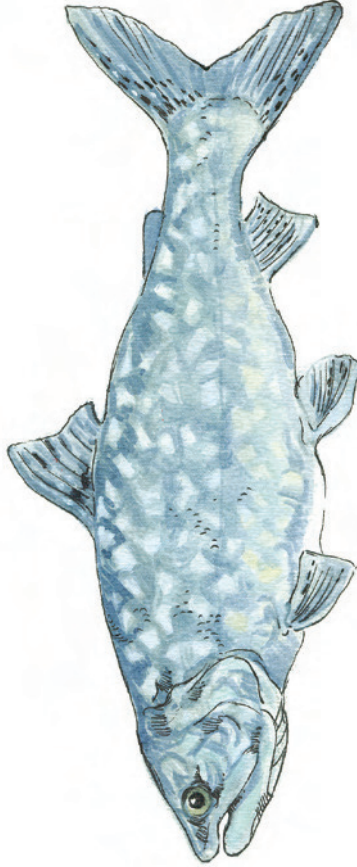
chub, sculpin, smelt, alewives

Role: consumer, carnivore

Reproduction: female lays up to 15,000 eggs; spawns in shallow areas

Activity: year-round

Size:



Lake Whitefish*

Scientific Name:
Coregonus clupeaformis

who? description

Type: fish
Length: 43-56 cm / 17-22 in
Coloring: silver sides, greenish brown back
Body Features: two clear fins on the back and a blunt nose

Size:



where? environment

Habitat: found in all five Great Lakes; prefer deep waters of up to 61 m / 200 ft, deeper in hot weather

! Interesting Fact *

The whitefish population seems to be making a comeback after years of over-fishing and bad environmental conditions had reduced their population.

what? characteristics

Feeding:

↳ **Who eats me?**
lake trout, walleye, pike, humans; eggs eaten by other fish

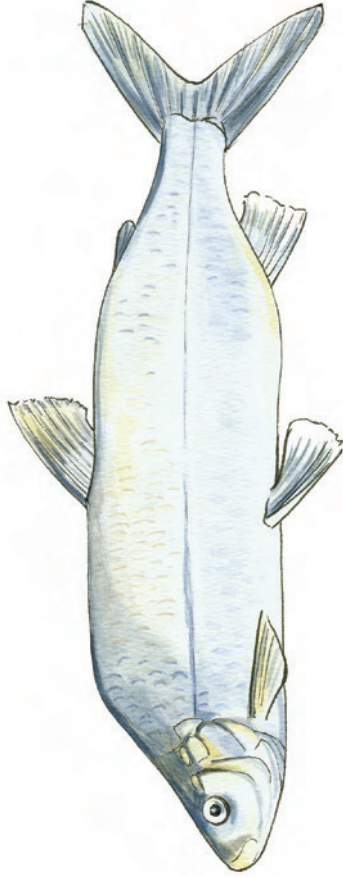
↳ What do I eat?

cliporeia, insects, freshwater shrimp, small fish, fish eggs

Role: consumer, carnivore

Reproduction: eggs laid in early winter in shallow sandy or rocky water 7 m / 25 ft deep; young hatch in spring

Grouping: swims in schools



Muskellunge*

Scientific Name:
Esox masquinongy

who? description

Type: fish
Length: up to 152 cm / 5 ft
Weight: 18-31 kg / 40-70 lbs
Coloring: silver green to light brown with dark bars, cream belly with small brown spots
Body Features: long head and snout, and a large mouth

where? environment

Habitat: freshwater lakes, near weed beds and shore

what? characteristics

Feeding:

↳ **Who eats me?**
humans

↳ What do I eat?

other fish, ducklings, frogs, rodents

Role: consumer, carnivore

Reproduction: lay eggs in shallow water

Grouping: solitary

Activity: most active in warm weather



Interesting Fact ★

Muskies were often caught by fishermen as prize fish, but now fishing of muskies is regulated to protect the population.

Size:



Round Goby*

Scientific Name:
Neogobius melanostomus

who? description

Type: fish
Length: under 18 cm / 7 in
Coloring: slate gray or black body with black or brown spots
Body Features: raised, frog-like eyes; have thick lips, front fin has a black spot, body is covered with fine scales

⚡ Invasive Species



MALE

FEMALE

Size:



where? environment

Habitat: lake bottom, found in all the Great Lakes and some nearby lakes
Origin: Black and Caspian Sea regions of Eurasia



Interesting Fact *

The round goby has a very active sensory system which allows it to find prey and also avoid becoming prey. They have become too numerous to bring under control.

what? characteristics

Feeding:

↳ Who eats me?

bass, pike, walleye

↳ What do I eat?

small fish, zebra mussels, and fish eggs

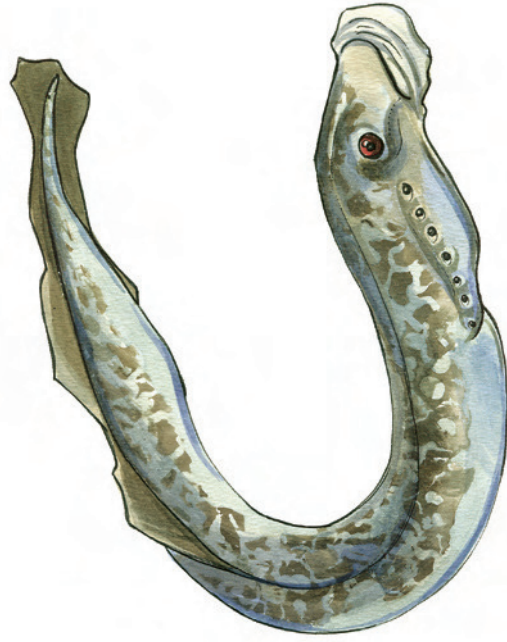
Role: consumer, carnivore

Reproduction: spawns up to five times per mating season; builds nests in rocky areas for eggs

Grouping: found in dense populations

Activity: diurnal





Sea Lamprey*

Scientific Name:
Petromyzon marinus

who? description

Type: fish
Length: 30-50 cm / 12-20 in
Weight: 226-363 g / .5-.8 lbs
Coloring: grey-blue, metallic purple, and silver
Body Features: long, slender body, mouth with sharp teeth enables it to suck out the fluid and tissue of fish, especially the lake trout

⌘ **Invasive Species**

Size:



where? environment

Habitat: freshwater lakes and oceans
Origin: Atlantic Ocean - Europe and North America



Interesting Fact *

Sea lampreys naturally live in saltwater, but came into the Great Lakes through canals. There are efforts to control the lamprey population because they do not have natural predators in the Great Lakes.

what? characteristics

Feeding:
 ↳ **Who eats me?** none in Great Lakes
 ↳ **What do I eat?** fish, including lake trout
Role: consumer, carnivore
Reproduction: lay eggs
Grouping: solitary
Activity: year-round

Walleye*

Scientific Name:
Stizostedion vitreum

who? description

Type: fish

Length: 33-63 cm / 13-25 in

Weight: 4-2 kg / 1-5 lbs

Coloring: brown to yellow

Body Features: The young usually have dark blotches across their backs and down their sides

where? environment

Habitat: freshwater lakes, lives in deep water, near the bottom of the lake in weeds or rocks



Interesting Fact *

Walleyes have large, marble-like eyes that help them see well in dim light.

what? characteristics

Feeding:

↳ Who eats me?

humans, muskellunge, largemouth bass

↳ What do I eat?

yellow perch, aquatic insects, crayfish

Role: consumer, carnivore

Reproduction: occurs in spring/early summer, females release up to 612,000 eggs

Grouping: loose but distinct schools

Activity: feeds at dusk

Size:



Yellow Perch*

Scientific Name:
Perca flavescens

who? description

Type: fish

Length: 15-25 cm / 6-10 in

Weight: 168-448 g / 6-16 oz

Coloring: back is bright to olive green or golden brown, sides are yellow-green; grey to milk-white belly

where? environment

Habitat: lake bottom, less than 30 feet depth, feeds near the shore and rests on the bottom

what? characteristics

Feeding:

↳ **Who eats me?**
alewife (feed on larva), humans

↳ **What do I eat?**

minnows, insect larvae, plankton, worms

Role: consumer, carnivore

Reproduction: lay eggs April-May

Grouping: swims in schools

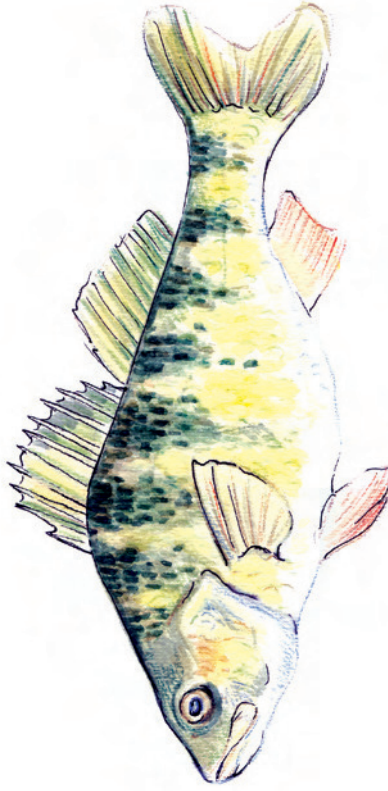
Activity: diurnal, year-round



Interesting Fact *

Yellow perch are a popular food for humans, but have been overfished and the population has decreased. They lay their eggs in long, jelly-like ribbons.

Size:



Bighead Carp*

Scientific Name:
Hypophthalmichthys nobilis

who?
description

Type: fish
Length: 76 – 102 cm / 30-40 in
(as big as 4 ft)
Weight: up to 50 kg / 110 lbs
Coloring: silvery white abdomen, black dorsal and upper lateral sections, black spots on the side of their bodies, fins are a shade of grey

⚠ **Invasive Species**



where?
environment

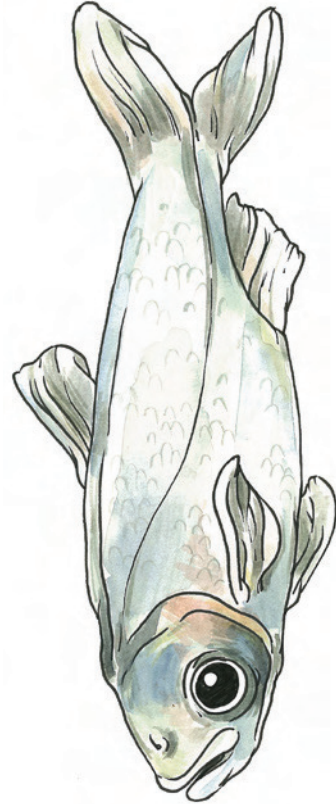
Habitat: lakes, rivers and reservoirs
Origin: China

Interesting Fact *

Bighead carp eat up to 20% of their body weight per day. Carp are currently in waterways connected to the Great Lakes and humans are trying to ensure that the fish do not establish a permanent presence in this ecosystem.

what?
characteristics

Feeding:
↳ **Who eats me?** humans
↳ **What do I eat?** zooplankton, algae
Role: consumer, omnivore
Reproduction: lay semi-buoyant eggs in warm, current-driven water during the summer
Grouping: travel alone or in small groups
Activity: more active in warmer waters



Chinook Salmon*

Scientific Name:
Oncorhynchus tshawytscha

who? description

Type: fish
Length: 50 – 90 cm / 20-35 in
Weight: 6.8 – 13.6 kg / 15-30 lbs
Coloring: green/blue-green on back, silver sides and white/silver underneath; reddish color during spawning

⌘ Introduced Species



Size:



where? environment

Habitat: lakes, rivers, oceans and estuaries
Origin: Pacific Ocean – from Asia to North America and the Arctic

! Interesting Fact *

Chinook Salmon were introduced into Lake Michigan on purpose, to control alewife populations and to be part of the sport fishing economy.

what? characteristics

Feeding:
↳ **Who eats me?** humans and sea lamprey
↳ **What do I eat?** alewives, smelt, bloaters
Role: consumer
Reproduction: spawn eggs once in a lifetime in freshwater during summer/fall in a nest called a redd, usually located on a rocky bottom
Grouping: solitary

