



A Lesson plan for the NSF-ITEST project* and the Michigan Invasive Species Grant Program#
“Promoting Student Interest in Science & Science Careers through Field Trips to the Belle Isle Aquarium”
and
“Educating Educators and their Students Everywhere about Invasive Species”



Calling all cars!!! Be on the Lookout for Invasive Species

Teacher Name: Beth Thomason School: Brenda Scott Academy
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Office of Science Lesson Planner Rubric

Teacher: Beth Thomason Target Grade: 5th

Unit Driving Question: How much do invasive species cost us?

Lesson Level Question: Calling all cars!!! Be on the lookout for invasive species

Plan for success using NGSS (10 points): Lessons and assessments should be designed in a way that allows students to engage in all three dimensions simultaneously.			
NGSS Performance Expectation(s):	The 3-Dimensions of the Next Generation Science Standards		
5-LS2-1 – Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. Emphasis is on the idea that matter us not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. 5-LS2-1 – Science explanations describe the mechanisms for natural events.	Science and Engineering Practices: Eight practices that represent how scientists investigate the natural world.	Disciplinary Core Ideas: Key ideas in science that have broad importance.	Cross Cutting Concepts: Concepts that have connections across all domains of science.
	SEP: Asking questions and defining problems. Developing and using models. Obtaining, evaluating, and communicating information.	DCI Matter and its interactions. Ecosystems: interactions, energy, and dynamics. Engineering design	CCC: Systems and system models. Stability and change (Small changes in one part of a system might cause large changes in another part. (MS-LS2-5))

*This material is based upon work supported by the National Science Foundation under Grant No. 1614187.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation. #Creation of this educational resource was also funded in part by the Michigan Invasive Species Grant Program through the Departments of Natural Resources, Environmental Quality, and Agricultural and Rural Development.

<p>Learning Target: Students will read about invasive species and what they cost us, and then play a card game of cops and robbers. Students will have to know if they have good cards (native species—the cops) or bad cards (invasive species—the robbers).</p>	<p>Academic Language: <i>(Students should discover these terms and concepts through scientific investigations)</i> Invasive species Food chain Ecosystem Environment</p>	<p>Materials: Pen Books on invasive species Cop cards (native species) Robber cards (invasive species) Directions to play</p>
	<p>3-Dimensional Learning Elements</p>	
<p>Phenomena: <i>(Real-world/natural occurrence used to create or support Driving Question Board and connects to each lesson within the unit)</i> Invasive species are like criminals: Invasive species rob environmental value from people just as surely as outlaws in the Wild West robbed banks. Some estimates put the costs of invasive species at more than \$100 billion per year due to effects on the health and diet of fish and people, interference with recreation, damage to water users, and competition with native species. For example, zebra mussels attach to and clog pipes. It is costly to clean them out every year. What can be done to stop these invasions?</p>		<p>Lesson Connection to Phenomena: <i>(How does this investigation help students explain the phenomenon)</i> Students will read about invasive species from selected books. Afterwards, they will play a game utilizing what they’ve learned.</p>

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Exploration, Discussion, Investigation Activities:

Exploration: Students will learn about native and invasive species of Michigan. They will be able to determine which species are native and which are invasive. Students will create groups to continue with the next phase in the lesson. This part will show whether students remember or know how to identify which animals are which and how they cost us money.

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

How does an invasive species impact native species?

How will the effect that invasive species have on fishing, boating, or the appearance of the environment cost us money?

What solutions can you design that would address those impacts? Will your solutions cost us money?

Each student will have a set of invasive and native species cards. The cards attached to this lesson are obtained from the Alliance for the Great Lakes (<https://greatlakes.org/>). [Alternatively, you could have students create the cards based on the reading about invasive species they do for the “Lesson Connection” above. Some students would also need to make “native species” cards so you have both types of cards.] In the game that the students will do the native species are the cops and the invasive species are the criminals. Students will place cards in front of them and take turns turning over the cards. If a native card is chosen, the students can collect a card from the three other students in their group. If an invasive species card is chosen, students are to give one card to each student in the group. Before giving or taking cards, students should read at least one interesting fact to other students about the species on the card. The game ends with the student who has the most cards (more native=cop, more invasive=robber).

Differentiation of instruction for exceptional learners:

Small group

Teacher-led instruction

Students should draw pictures in journals of what animals they have observed, and then write one or two sentences about each invasive species.

Formative Assessment(s): *(Progress monitoring strategy used to assist with lesson adaptations based on students' needs)*

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<p>Student Artifact: <i>(Tangible evidence of student learning)</i> Students will identify various invasive species. Students will have ideas about how invasive species cost us money.</p>	<p>Student Discourse: <i>(What you should hear that is evidence of student learning; see Talk Moves)</i> Students will discuss the importance of knowing the difference between native and invasive species. Students will discuss how an invasive species could cost you extra money (a good example is the emerald ash borer, which kills beautiful ash trees.)</p>
<p>Learning Extensions: <i>(Learning beyond the classroom)</i> Read more books about invasive species. Visit local, state, or national parks and find out if they have any invasive species. Find out how much it costs to remove them.</p>	

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Great Lakes in My World

Creature Cards

Over 60 illustrated information cards featuring Great Lakes plants and animals



ALLIANCE FOR THE GREAT LAKES
WWW.GREATLAKES.ORG

Name: Species' common and scientific names are provided.
*: Indicates that this card can be used in the activities Tangled Web and Web of Life.

who? description

A description of the species that includes type, physical characteristics and species status (endangered, invasive, etc.)

Scale: A scale conveys the relative size of the species. A darkened column indicates the species place in the size range. The sizes for each column are as follows:

- #1: less than .6 cm / .25 in
- #2: .6 cm / .25 in – 6.3 cm / 2.5 in
- #3: 6.6 cm / 2.6 in - 30 cm / 12 in
- #4: 31 cm / 12.1 in - 61 cm / 24 in
- #5: 63.5 cm / 25 in - 122 cm / 48 in
- #6: 123 cm / 48.5 in - 183 cm / 72 in
- #7: more than 183 cm / 72 in

Size:



where? environment

An explanation of the species' general environment and specific habitat

what? characteristics

Facts about the species role in the food web, reproduction and other distinguishing habits



Interesting Fact ★

Characteristics that make this plant or animal unique

Creature Card Definitions

Carnivore: a flesh-eating animal

Colony: a population of plants or animals in a particular place that belong to one species

Consumer: a plant or animal that preys on other living things or eating particles of organic matter

Crustacean: any of a large class of mostly water-dwelling arthropods (as shrimps, wood lice, water fleas, and barnacles) having an exoskeleton of chitin

Decomposer: an organism that lives on and breaks down dead organisms

Detritus: particles of decaying organic material

Diurnal: active in the daytime

Endangered species: a species in immediate danger of extinction

Flock: a group of birds or mammals assembled together

Forage fish: fish that primarily eat phytoplankton and zooplankton (especially diporeia); they are prey for larger predators such as lake trout and whitefish; they include smaller fish such as herring, alewives, chubs, and smelt.

Herbivore: an animal that eats only plants

Introduced species: a plant or animal that is intentionally brought into an ecosystem by human beings either to diversify or to control a population within that ecosystem

Invasive species: a plant or animal that enters an ecosystem to which it is not native and competes with one or more species for food, shelter, and/or reproductive opportunities.

Larva: a young wingless, often wormlike, form (grub or caterpillar) that hatches from the egg of many insects

Migrate: to pass from one region or climate to another usually on a regular schedule for feeding or breeding

Creature Card Definitions

Mollusk: any of the category (phylum: mollusca) of invertebrate animals (as snails, clams, and mussels) with a soft body lacking segments and usually enclosed in a shell

Nocturnal: active in the night

Omnivore: feeds on both animal and plant matter

Phytoplankton: very small, freely floating plant that drifts with water currents

Plankton: small water organisms that exist in a drifting, floating state; is the base of freshwater ecosystems, provides food for larger animals and indirectly for humans, whose fisheries depend on phytoplankton and zooplankton

Predator: an animal that lives by killing and eating other animals

Prey: an animal hunted or killed by another animal for food

School: group of fish that swim together; generally of the same species for protection, feeding and other reasons

Sepals: petal-like leaves of flowering plants that lie under and protect the petals, often green in color or share the same coloring as the petals

Solitary: growing or living alone; not forming part of a group or cluster

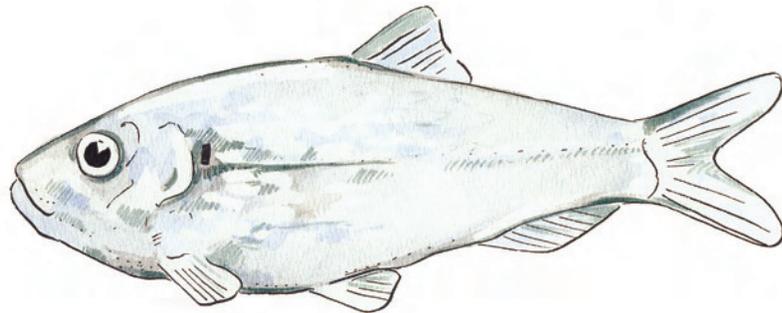
Spawn: to produce or deposit eggs

Species of concern: a plant or animal that may become threatened

Threatened species: a plant or animal needing special action to protect it from becoming endangered

Toxin: a substance produced by a living organism that is very poisonous

Zooplankton: very small floating or swimming animals that drift with water currents



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:





Bald Eagle*

Scientific Name:
Haliaeetus leucocephalus

who? description

Type: bird
Length: 76-94 cm / 30-37 in
Weight: 7 kg / 15 lbs
Coloring: dark brown body, white head and tail
Body Features: yellow eyes, beak, and feet

where? environment

Habitat: forested backdune, lakeshore and seacoast, nests in trees (especially conifers) or on cliffs near water; nests are 182 cm / 6 ft wide and 91 cm / 3 ft high

what? characteristics

Feeding:
 ☞ **Who eats me?**
scavengers eat dead eagles
 ☞ **What do I eat?**
dead or wounded fish, aquatic birds, and mammals
Role: consumer, carnivore
Reproduction: 2 eggs in spring
Grouping: solitary or in pairs, live in groups in winter
Activity: diurnal



Interesting Fact ★

Bald eagles can see 3 or 4 times as far as humans and eat one pound of fish in four minutes. They have a 182 cm / 6 ft wingspan!

Size:



Bloodworm*

Scientific Name:
Family: *Chironomidae*

who? description

Type: insect (in larval stage)

Length: 2.5-3.8 cm / 1-1.5 in

Coloring: red

Body Features: distinct head, segmented abdomen, prolegs (leg-like projections), and gills

where? environment

Habitat: muddy, bottom areas of ponds, lakes and rivers; the worms build tubes of mud around themselves that are attached to objects in the water

what? characteristics

Feeding:

↳ **Who eats me?**
fish, aquatic insects

↳ **What do I eat?**
phytoplankton, detritus

Role: consumer, omnivore

Reproduction: lay eggs as adults

Grouping: often found in groups

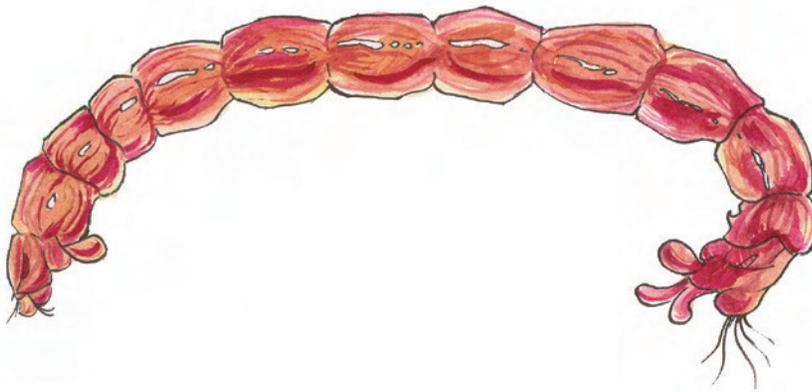
Activity: mainly nocturnal

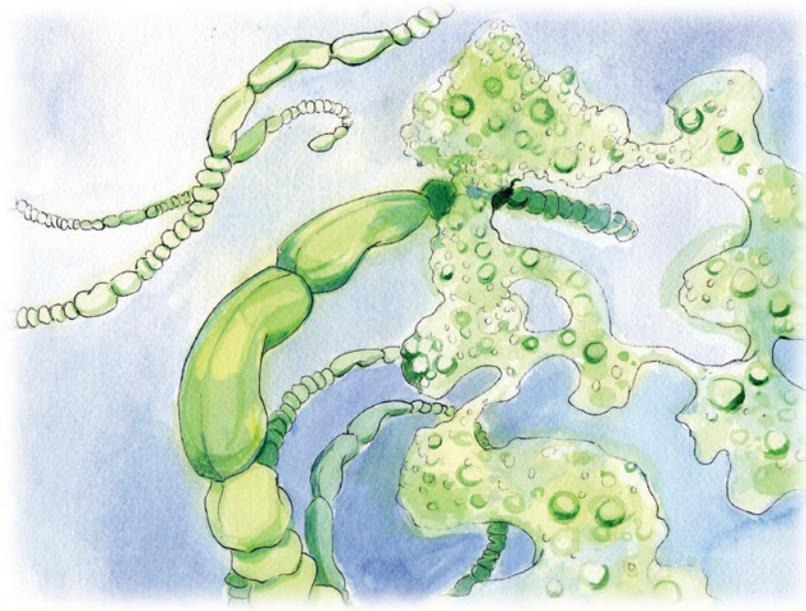


Interesting Fact *

A bloodworm is in the larval stage of its lifecycle. When it becomes an adult, it turns into a midge, an insect that looks like a mosquito. Freshwater bloodworms and humans both have hemoglobin which allows red blood cells to carry oxygen.

Size:





Blue-Green Algae (cyanobacteria)*

Scientific Name:
Anabaena, Microcystis

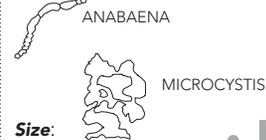
who? description

Type: bacteria

Size: microscopic

Color: some, but not all are blue-green; can be yellow-green, green, grey-green, grey-black, and even red

Other: microcystis colonies look like tiny grey-green clumps



Size:

where? environment

Sunlight: varies - direct and dim sunlight

Habitat: water; attach to surface of rocks, stones and plants in water, or on the bottom sediment of lakes

what? characteristics

Feeding:

↳ **Who eats me?**
daphnia, copepod

↳ **What do I use to make food?**
sunlight

Role: producer

Reproduction: can grow individually as single cells or in colonies; when algae reproduces quickly it is called a "bloom"



Interesting Fact ★

Blue-green algae movements can be seen under a microscope as they glide, rotate and jerk. Their fossils have been identified as over three billion years old!



Canada Goose*

Scientific Name:
Branta canadensis

who? description

Type: bird
Length: 63.5-114 cm / 25-45 in
Weight: 1-8 kg / 2-17 lbs
Coloring: black head and neck, white cheek patches, mottled grey-brown body
Body Features: brown webbed feet

where? environment

Habitat: interdunal pond, freshwater lakes, wetlands, ponds; builds a nest on the ground, near water

what? characteristics

Feeding:
 ☞ **Who eats me?**
 coyotes eat geese; eggs are eaten by fox, raccoons and coyotes
 ☞ **What do I eat?**
 Plants and insects
Role: consumer, omnivore
Reproduction: lays 5-7 eggs
Grouping: pairs and flocks
Activity: diurnal, migrate south in the winter



Interesting Fact ★

Canada geese fly in a "V" formation during migration. They use their large, strong wings as weapons when protecting their young.

Size:





Common Loon *

Scientific Name:
Gavia immer

who? description

Type: bird

Length: 91 cm / 3 ft

Weight: 3-6 kg / 6-13 lbs

Coloring: black and white checkered body, black head, white belly and underwing, white collar

Body Features: large webbed feet



Size:



where? environment

Habitat: freshwater lakes, sleep on deep water areas away from land; nest on small islands

what? characteristics

Feeding:

↳ **Who eats me?**

large fish, snapping turtles, gulls, eagles, crows

↳ **What do I eat?**

fish, crayfish, frogs, snails, salamanders, leeches

Role: consumer, carnivore

Reproduction: 2 eggs in summer

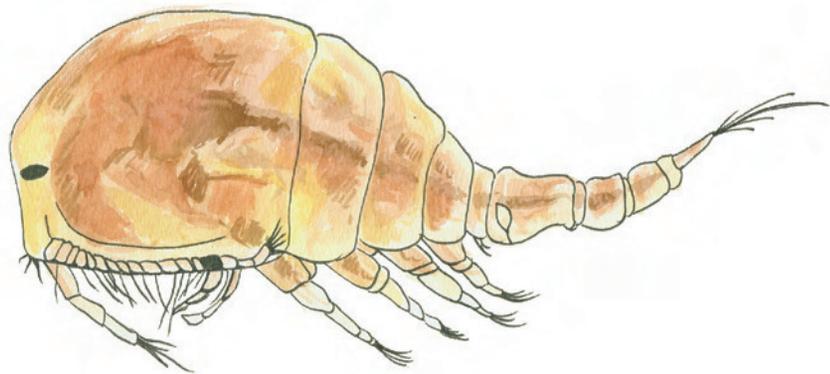
Grouping: pairs

Activity: diurnal



Interesting Fact ★

Many bones of the loon's body are solid, rather than hollow like those of other birds. These heavy bones help loons dive for food.



Copepod (cyclops)*

Scientific Name:
Cyclops strenuus

who? description

Type: zooplankton, crustacean
Length: 2-3 mm / .08-.1 in
Coloring: clear, tan
Body Features: single eyespot and curved body

where? environment

Habitat: quiet waters of ponds, lakes, and rivers

what? characteristics

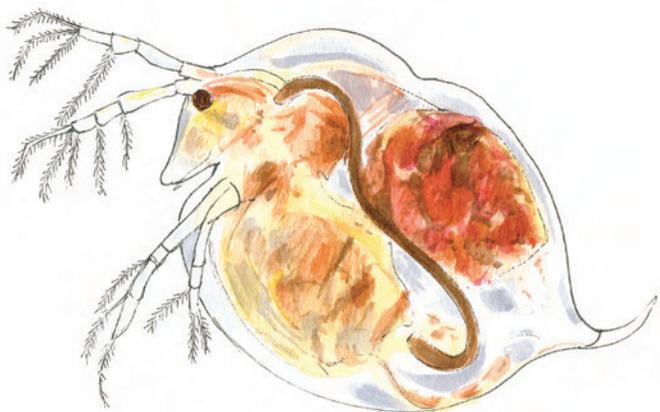
Feeding:
 ☞ **Who eats me?**
insects and small fish
 ☞ **What do I eat?**
algae, bacteria, dead plant and animal matter
Role: consumer, omnivore
Reproduction: females carry twin egg sacs

! Interesting Fact ★

Copepods are difficult for scientists to catch to study because they dart so quickly! It is sometimes called a cyclops because the single eyespot reminds people of the one-eyed monster in Greek mythology.

Size:





Daphnia*

Scientific Name:
Daphnia pulex

who? description

Type: zooplankton, crustacean

Length: less than 3 mm / .1 in

Coloring: clear body tissue shows organs inside

Body Features: 5 pairs of legs used to capture food, large antennae are pushed downward for swimming

where? environment

Habitat: near the surface of lakes, ponds, and quiet streams

what? characteristics

Feeding:

↳ **Who eats me?**
fish

↳ **What do I eat?**
phytoplankton

Role: consumer, herbivore

Reproduction: lays eggs in lake bottom sand, young hatch in spring

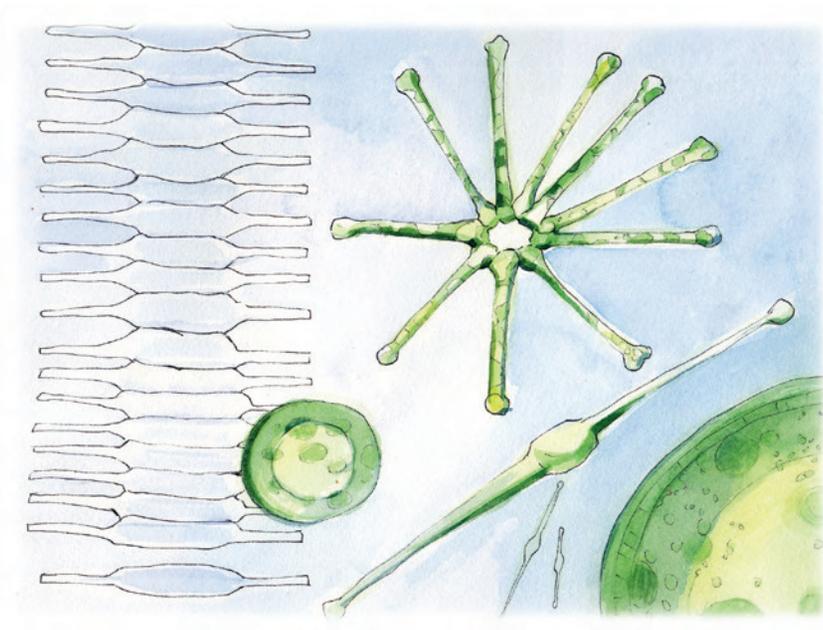


Interesting Fact ★

Dozens of daphnia can fit on a single fingernail.

Size:



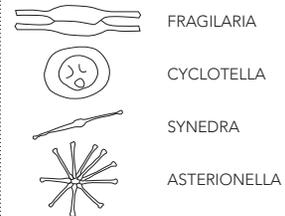


Diatoms*

Scientific Name:
Asterionella, Cyclotella, Fragilaria, Synedra

who? description

Type: phytoplankton
Height: microscopic – less than 1 mm / .04 in
Color: golden brown
Other: no leaves or flowers; single-celled organism



where? environment

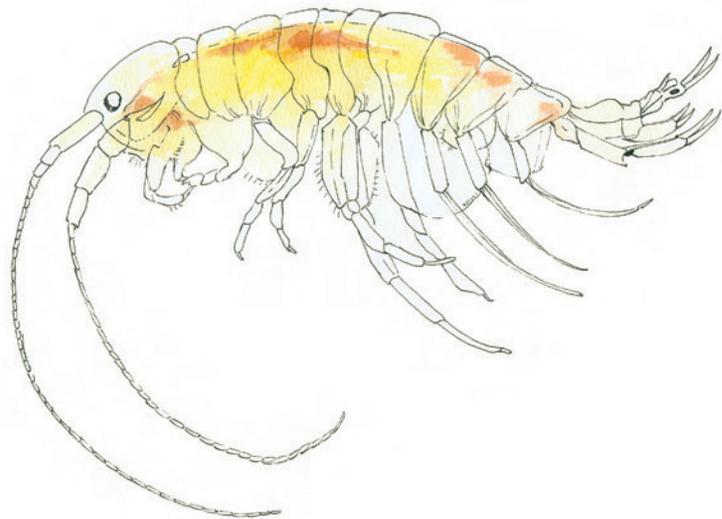
Sunlight: direct sunlight
Habitat: freshwater lakes and pond, and on the surface of oceans

what? characteristics

Feeding:
 ☞ **Who eats me?**
 zooplankton, water fleas, copepods, snails, mollusks, fish
 ☞ **What do I use to make food?**
 sunlight
Role: producer
Reproduction: divide in half (cell division)

! Interesting Fact ★

More than 8000 kinds of diatoms exist. They are a major food source for fish. Diatoms have a shell or cell wall that has a pattern that lets scientists know what type of diatom it is.



Diporeia*

Scientific Name:
Diporeia hoyi

who? description

Type: crustacean
Length: 1.27 cm / .5 in
Weight: .1 oz / 2.8 g
Coloring: clear, yellow
Body Features: 5 pairs of legs

where? environment

Habitat: freshwater lakes,
spends time in the water
column, lives in mud on lake
bottom

what? characteristics

Feeding:
 ↻ **Who eats me?**
whitefish, chub, sculpin
 ↻ **What do I eat?**
algae and bacteria
Role: consumer, herbivore
Reproduction: lay eggs
Grouping: colonies
Activity: nocturnal

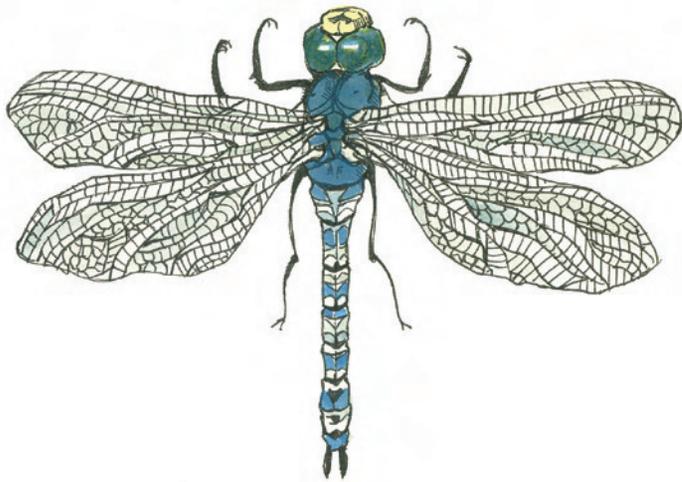


Interesting Fact ★

Diporeia is a very important
food source for forage fish.
Even though they are small,
they are high in fat and calo-
ries when eaten by fish.

Size:





Dragonfly (blue damer)*

Scientific Name:
Aeschna constricta

who? description

Type: insect

Length: 5-8 cm / 2-3 in wing-span

Coloring: primarily blue and green

Body Features: four wings operate independently

where? environment

Habitat: interdunal pond, in and around wetlands; under-water for first stage of life

what? characteristics

Feeding:

↳ **Who eats me?**
fish

↳ **What do I eat?**
mosquitoes, midges and other small, flying insects

Role: consumer, carnivore

Reproduction: lay eggs in water; first stage of life under-water; adult stage on land and in flight

Grouping: solitary

Activity: diurnal



Interesting Fact ★

Dragonflies are a living fossil; they have not changed for over 300 million years. They can hover, fly backwards, loop, and speed up to 56 km / 35 mi per hour.

Size:





Eurasian Milfoil*

Scientific Name:
Myriophyllum spicatum

who? description

Type: plant

Height: up to 91 cm / 3 ft

Leaves: 1.5-4 cm / .6-1.5 in long, have a feather-like outline, in groups of 4; stem is leafless towards the base, but branches out, the top often turns red

Flowers: lower ones are female, upper ones are male

⚡ **Invasive Species**

where? environment

Sunlight: moderate

Habitat: lives in water from 1-3 m / 3-9 ft deep

what? habits

Feeding:

↳ **Who eats me?**
water birds

↳ **What do I use to make food?**
sunlight

Role: producer

Reproduction: stems release fragments that develop roots, new stems and leaves, then sink and grow from the bottom; can also be pollinated



Interesting Fact ★

Eurasian milfoil is an invasive species brought to North America from Europe in the 1940's. It competes with native plants and can impair water quality.

Size:





Fingernail Clam*

Scientific Name:
Sphaeriidae

who? description

Type: mollusk
Length: 1.3 cm / .5 in
Coloring: cream, orange, white
Body Features: fine rows of concentric, raised lines

where? environment

Habitat: sandy bottom of freshwater lakes and streams

what? characteristics

Feeding:
↳ **Who eats me?**
bottom feeding fish
↳ **What do I eat?**
plankton, bacteria
Role: consumer, omnivore
Reproduction: young emerge from parents in adult form
Activity: year-round

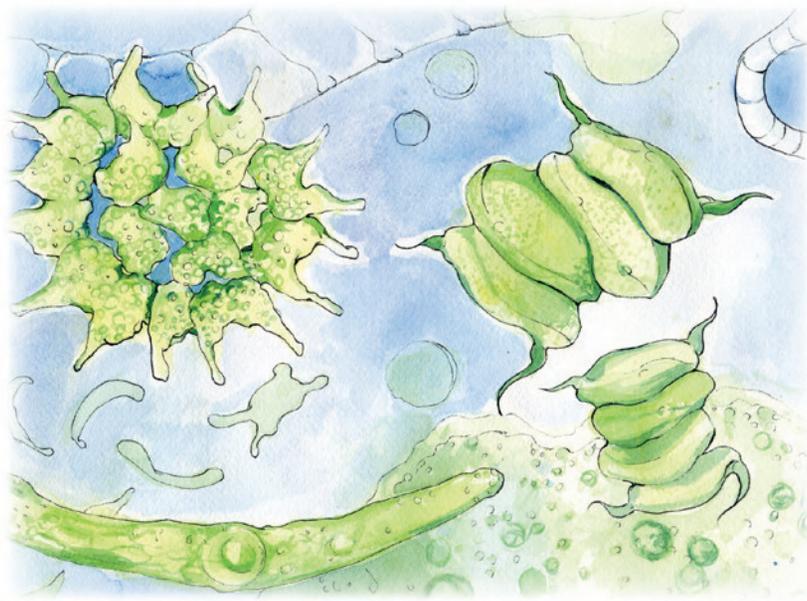


Interesting Fact ★

Fingernail clams do not have eyes, a nose, or antennae, but they do have a foot they push out of the shell to help them to move.

Size:





Green Algae*

Scientific Name:
Closterium, Pediastrum, Scenedesmus, Tetraspora, Ulothrix

who? description

Type: phytoplankton
Size: microscopic - 1000 could fit on the head of a pin



SCENEDESMUS



PEDIASTRUM



ULOTHRIX



CLOSTERIUM



TETRASPORA



where? environment

Sunlight: direct sunlight
Habitat: mostly freshwater, found in all 5 Great Lakes

what? characteristics

Feeding:
↳ **Who eats me?**
water fleas, copepods, snails, mollusks, fish
↳ **What do I use to make food?**
sunlight

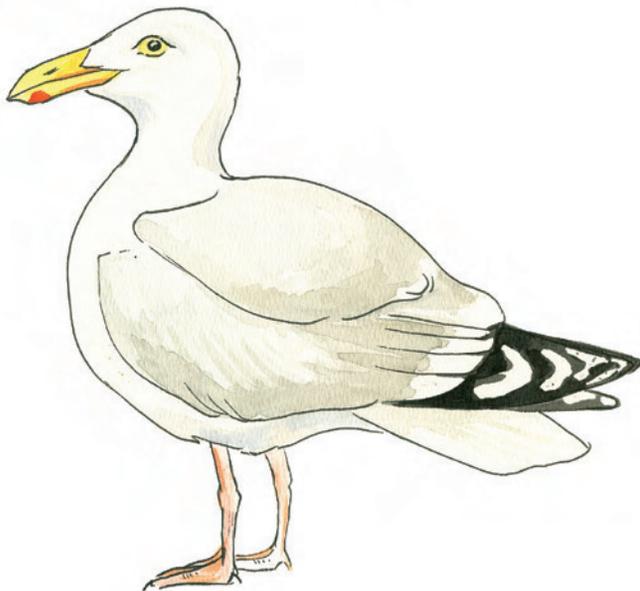
Role: producer

Reproduction: can grow individually as single cells or in colonies; some have spores; when algae reproduce quickly, this is called a "bloom"



Interesting Fact ★

Algae is the base of the lake food web. It produces more oxygen than all of the plants on Earth combined. Of the more than 7,000 types of green algae in the world, *Cladophora* is one type found in clumps along Great Lakes beaches.



Herring Gull*

Scientific Name:
Larus argentatus

who? description

Type: bird
Length: up to 61 cm / 24 in
Weight: 1.1 kg / 2.5 lb average
Coloring: white, grey wing backs, yellow bill with red spot
Body Features: pink legs
Note: The ring-billed gull is also commonly found in the Great Lakes region. It has a black line around its beak and has similar characteristics to the herring gull.

Size:



where? environment

Habitat: beach, lakeshore and seacoast, grass nests on flat ground

what? characteristics

Feeding:
 ☞ **Who eats me?**
 other gulls, eagles eat young
 ☞ **What do I eat?**
 clams, small fish, small mammals, garbage, birds, dead animals
Role: consumer, omnivore, scavenger
Reproduction: 3 eggs in spring
Grouping: colonies
Activity: diurnal



Interesting Fact ★

Herring gulls will travel up to 40 miles from home for food.



Human*

Scientific Name:
Homo sapien

who? description

Type: mammal

Length: adults average 152-182 cm / 5-6 ft

Weight: adults average 50-91 kg / 110-200 lbs

Coloring: skin shades range including, white, pink, beige, tan, light-dark brown

Body Features: 2 arms, 2 legs, 10 digits on hands and feet

Note: rely on sense organs (eyes, ears, mouth, nose) and opposable thumb

Size:



where? environment

Habitat: homes in a variety of ecosystems, rural-urban; homes vary in shape, size, and material depending on culture and location



Interesting Fact ★

Humans do not have natural predators and are able to live in many different types of environments.

what? characteristics

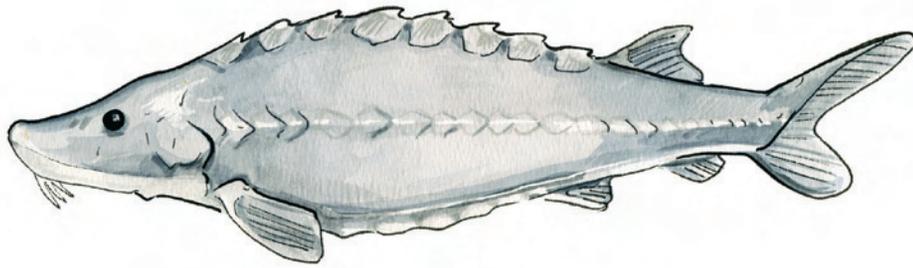
Feeding:

↳ **Who eats me?**
not a primary food source for animals, but may be eaten by large carnivores

↳ **What do I eat?**
depends on culture - various vegetables, fruits, nuts, fish (including lake trout and yellow perch), cows, pigs, chickens

Role: consumer, omnivore

Reproduction: live young which is generally raised by both parents



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

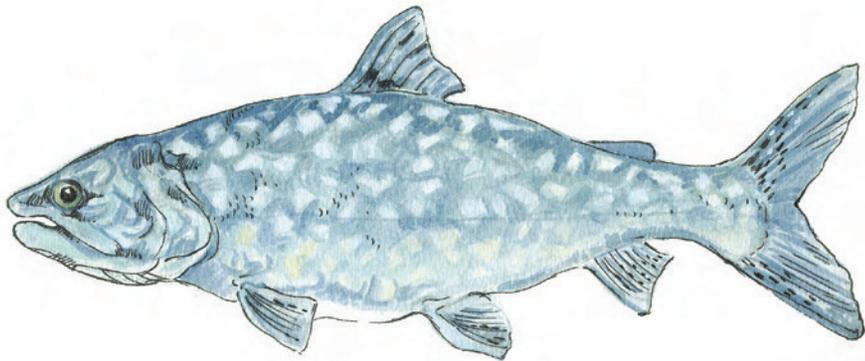
what? characteristics

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



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.



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

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

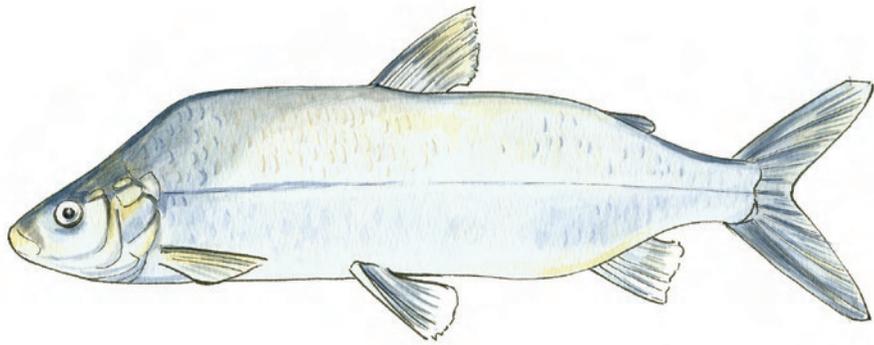


Interesting Fact ★

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."

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

where? environment

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

what? characteristics

Feeding:
 ↻ **Who eats me?**
lake trout, walleye, pike, humans; eggs eaten by other fish
 ↻ **What do I eat?**
diporeia, 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

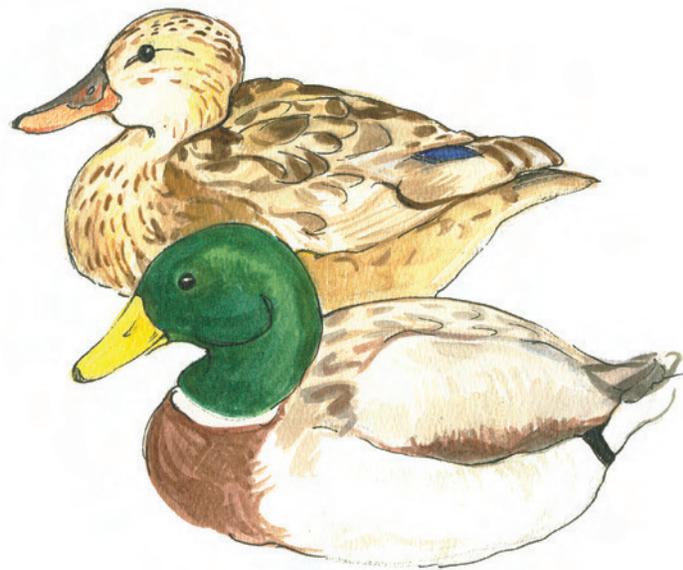


Interesting Fact ★

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

Size:





Mallard Duck*

Scientific Name:
Anas platyrhynchos

who? description

Type: bird
Length: 50-60 cm / 19-23 in
Weight: 1.24 kg / 3 lbs
Coloring: male-green head, white neck ring, brown breast, yellow bill; female-all brown/white mottled, greenish bill, white patch around wing
Body Features: orange webbed feet



Size:



where? environment

Habitat: interdunal pond, freshwater lakes, ponds, swamps, grass nest on the ground

what? characteristics

Feeding:
 ☞ **Who eats me?** muskellunge, humans, coyotes, snapping turtle
 ☞ **What do I eat?** emergent weeds, small invertebrates, larval insects, grains
Role: consumer, omnivore
Reproduction: 8-12 eggs in spring
Grouping: pairs or flocks
Activity: diurnal



Interesting Fact ★

The mallard is the most commonly recognized wild duck in the world.



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

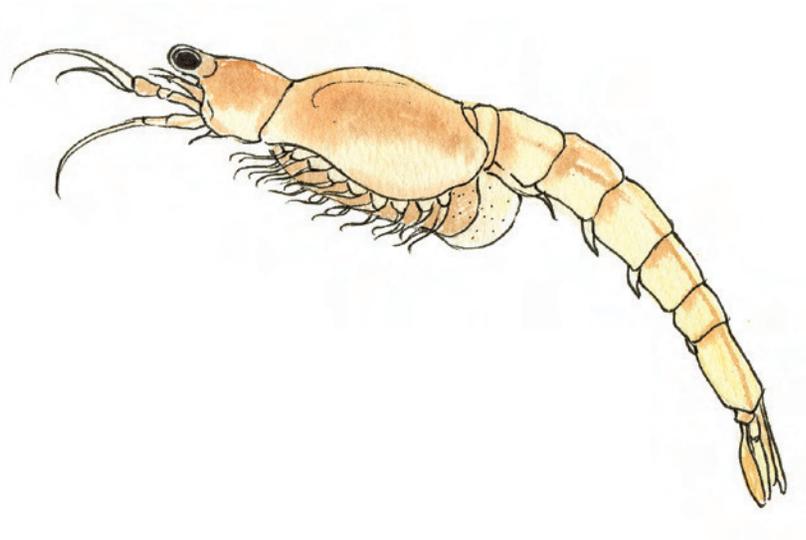


Interesting Fact ★

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

Size:





Opossum Shrimp*

Scientific Name:
Mysis relicta

who? description

Type: crustacean
Length: 2-3 cm / .8-1 in
Coloring: clear, beige
Body Features: 10 pairs of jointed legs

where? environment

Habitat: freshwater lakes, deep cold water

what? characteristics

Feeding:
 ↳ **Who eats me?**
lake trout, alewife
 ↳ **What do I eat?**
Phytoplankton, zooplankton, copepods, detritus
Role: consumer, omnivore
Reproduction: female carries eggs in a pouch
Activity: diurnal movement and nocturnal feeding

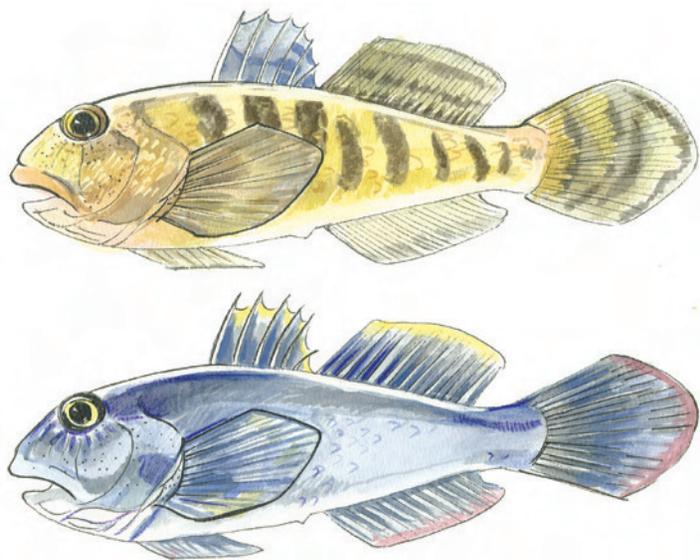


Interesting Fact ★

Opossum shrimp look like a miniature crayfish. They are not actually shrimp.

Size:





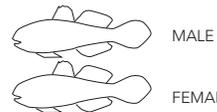
Round Goby*

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



where? environment

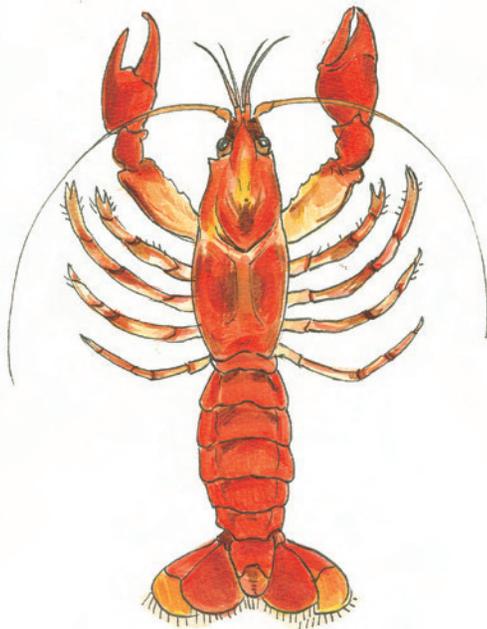
Habitat: lake bottom, found in all the Great Lakes and some nearby lakes
Origin: Black and Caspian Sea regions of Eurasia

! 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



Rusty Crayfish*

Scientific Name:
Orconectes rusticus

who? description

Type: crustacean
Height: 8-10 cm / 3-4 in
Coloring: red / brown color
Body Features: large claws and rusty colored spots on each side of the main body section

⌘ Invasive Species

where? environment

Habitat: lakes, ponds, and streams in areas where there is debris on the bottom
Origin: Ohio River basin

what? characteristics

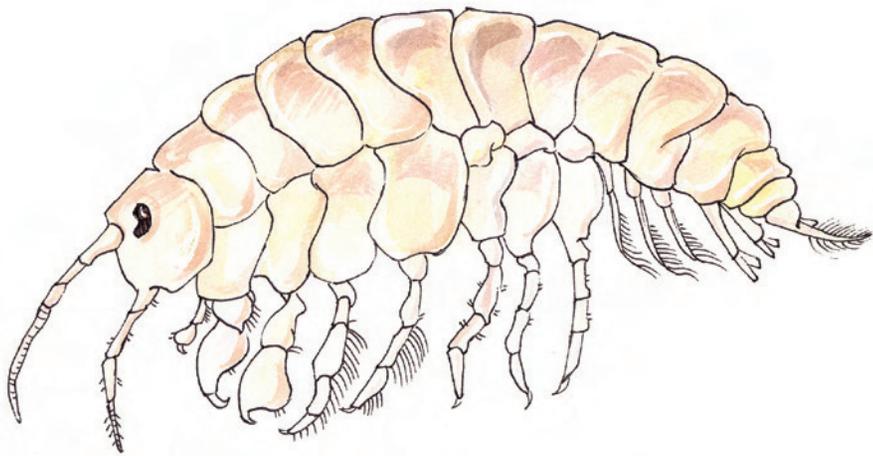
Feeding:
 ⤴ **Who eats me?**
 predator fish, birds, raccoons
 ⤵ **What do I eat?**
 aquatic plants and insects, fish eggs and small fish
Role: consumer, omnivore and scavenger

Reproduction: eggs are usually laid in the spring by the female
Grouping: young crayfish stay with their mother for several weeks. After, they tend to live independently
Activity: nocturnal

! Interesting Fact ★

Rusty crayfish are an invasive species that have been spread when used for bait by fishermen. They have also been spread by science classes who have released them after being classroom pets.





Scud*

Scientific Name:
Gammarus

who? description

Type: crustacean

Length: 2.54 cm / 1 in

Coloring: most are gray and tan; some are shades of green, blue, orange, and purple

Body Features: shrimp-like with an arched, flat body; two pair of antennae and nineteen paired legs

where? environment

Habitat: shallow water in lakes, ponds, and slow moving rivers with abundant vegetation and debris on the bottom

what? characteristics

Feeding:

↳ **Who eats me?**
insects, amphibians, shore birds and fish like sculpin, smelt and chub

↳ **What do I eat?**
algae, dead plants and animals

Role: consumer, omnivore

Reproduction: reproduces after 5-8 years

Grouping: colonies

Activity: mainly nocturnal

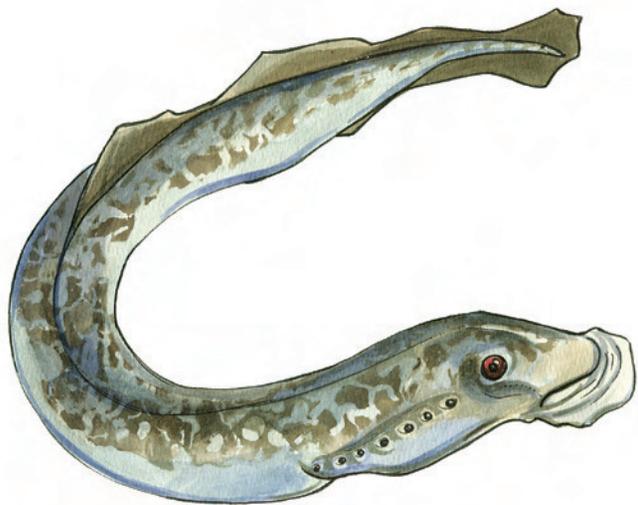


Interesting Fact ★

Scud populations may be declining because of competition with the zebra mussel for phytoplankton.

Size:





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

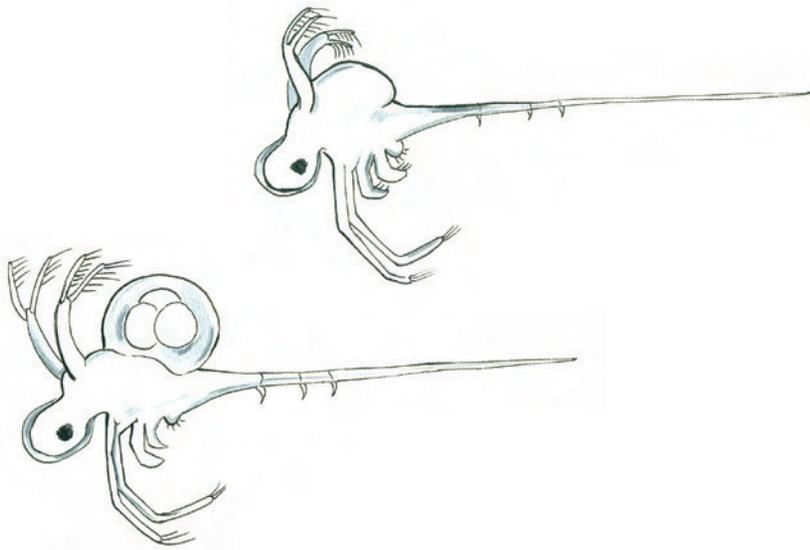


Interesting Fact ★

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



Spiny Water Flea*

Scientific Name:
Bythotrephes cederstroemi

who? description

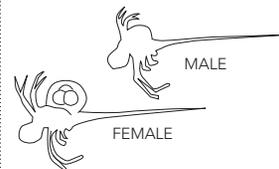
Type: zooplankton, crustacean

Length: less than 1.3 cm / .5 in

Coloring: clear

Body Features: crustacean with long, sharp, barbed tail spine

⚡ **Invasive Species**



Size:



where? environment

Habitat: throughout the Great Lakes and some inland lakes

Origin: Eurasia

what? characteristics

Feeding:

↳ **Who eats me?**
some large fish

↳ **What do I eat?**
plankton

Role: consumer, omnivore

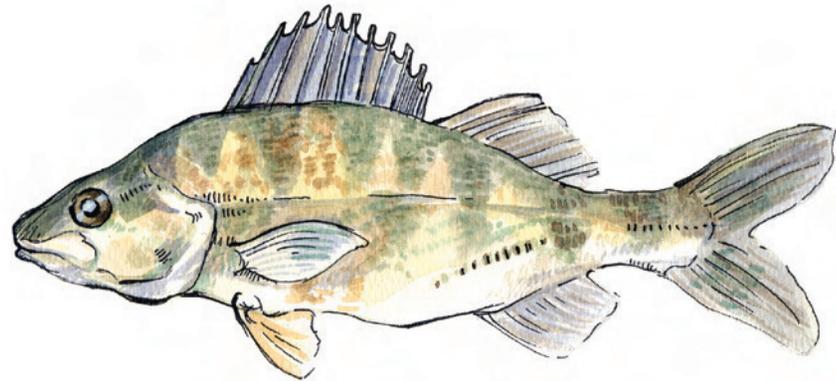
Reproduction: reproduce rapidly; during warm summer temperatures each female produces 10 offspring every 2 wks

Grouping: form clusters with each other



Interesting Fact ★

This creature is not a flea, but a crustacean. Only some larger fish can eat it because the sharp tail spine is hard for smaller fish to swallow. It competes with fish for plankton.



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

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

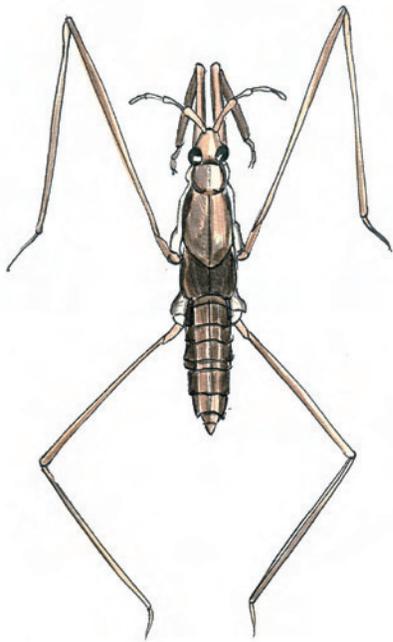


Interesting Fact ★

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

Size:





Water Strider*

Scientific Name:
Gerris remigis

who? description

Type: insect
Length: 1.2 cm / .5 in
Coloring: dark brown to black
Body Features: long legs, two legs can fold under front of body

where? environment

Habitat: interdunal pond, freshwater lakes and wetlands, live under leaves, spend time on surface of water

what? characteristics

Feeding:
↳ **Who eats me?** birds, fish, dragonflies
↳ **What do I eat?** Insects from water and land, plants
Role: consumer, omnivore
Reproduction: lay eggs at water's edge

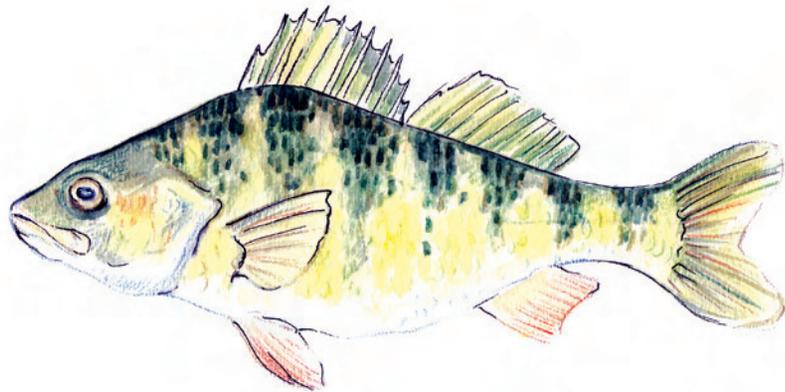


Interesting Fact ★

Water striders communicate with each other through ripples on the surface of the water.

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.





Zebra Mussel*

Scientific Name:
Dreissena polymorpha

who? description

Type: mollusk
Length: up to 5 cm / .75 in
Coloring: tan and blackish stripes (like a zebra)
Body Features: two connected shells hold a small mussel between them, they attach to hard surfaces with byssal threads

⌘ Invasive Species



where? environment

Habitat: freshwater; depths of 2-7 m / 6-23 ft
Origin: Eastern Europe and Western Russia; Caspian and Black Sea

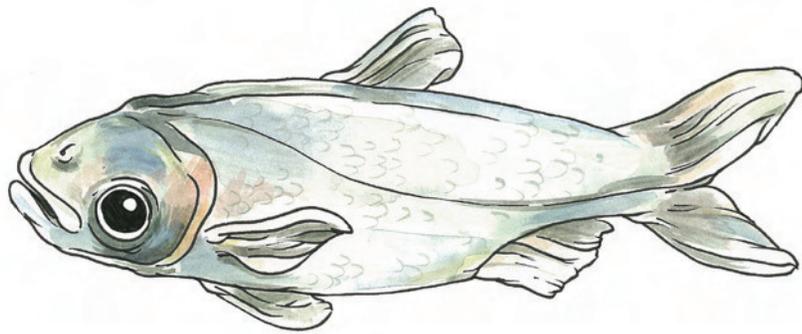


Interesting Fact ★

Zebra mussels in some parts of the Great Lake region have been outnumbered by the quagga mussel, a close relative of theirs. Zebra mussels are in all Great Lakes and some inland lakes.

what? characteristics

Feeding:
 ☞ *Who eats me?*
 round goby
 ☛ *What do I eat?*
 algae
Role: consumer, omnivore
Reproduction: eggs expelled by females and fertilized outside of the body by males in spring / summer
Grouping: singly or in colonies



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

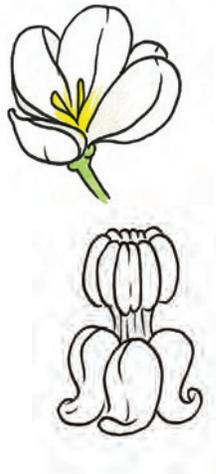


Interesting Fact ★

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



Hydrilla*

Scientific Name:
Hydrilla verticillata

who? description

Type: plant

Height: up to 8 m / 25 ft

Leaves: green with red ribbing, saw-toothed, four to eight around the stem

Flowers: transparent or white (female) or green (male), with three petals and three sepals

⚡ Invasive Species



MALE



FEMALE

Size:



where? environment

Sunlight: require less than 1% of full sunlight or less

Habitat: any partially submerged body of water with a salinity level of less than 7%

Origin: Africa



Interesting Fact ★

Hydrilla, not yet in the Great Lakes, is anticipated to "invade" the system due to its presence in nearby aquatic ecosystems. It is made up of nearly 95% water, which allows for rapid growth.

what? characteristics

Feeding:

↳ **Who eats me?**
coots and other bird species

↳ **What do I use to make food?**
oxygen and sunlight

Role: producer

Reproduction: re-growth of stem fragments and by auxiliary buds (tubers) that can each produce up to 6,000 new plants in 4 years

Other: male and female flowers produced separately on a single plant



Quagga Mussel*

Scientific Name:

Dreissena rostriformis bugensis

who? description

Type: mollusk

Length: 28 mm / 1+ in

Coloring: tan and blackish pattern to all black depending on location

Body Features: a connecting tissue holds the two shell halves together, often with the animal inbetween, this tissue helps connect to hard surfaces and other mussels

⌘ **Invasive Species**

Size:



where? environment

Habitat: freshwater

Origin: Eastern Europe

! Interesting Fact ★

The quagga mussel can live at any depth as long as oxygen is present, while the zebra mussel, a relative, can only survive at depths less than 12 meters.

what? characteristics

Feeding:

↳ **Who eats me?**

ducks, crayfish and lake whitefish, gobies, sculpins

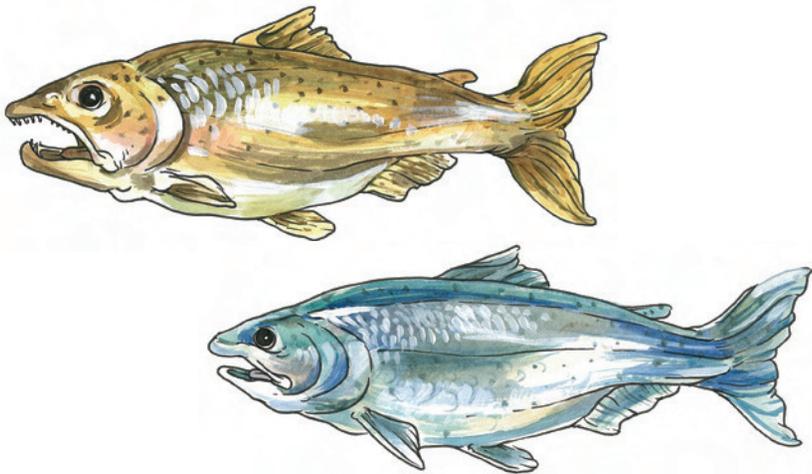
↳ **What do I eat?**

phytoplankton, diatoms

Role: consumer, omnivore

Reproduction: up to one million eggs per year expelled by females and fertilized outside of the body by males in spring / summer

Grouping: singly or in colonies



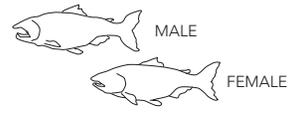
Chinook Salmon*

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



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