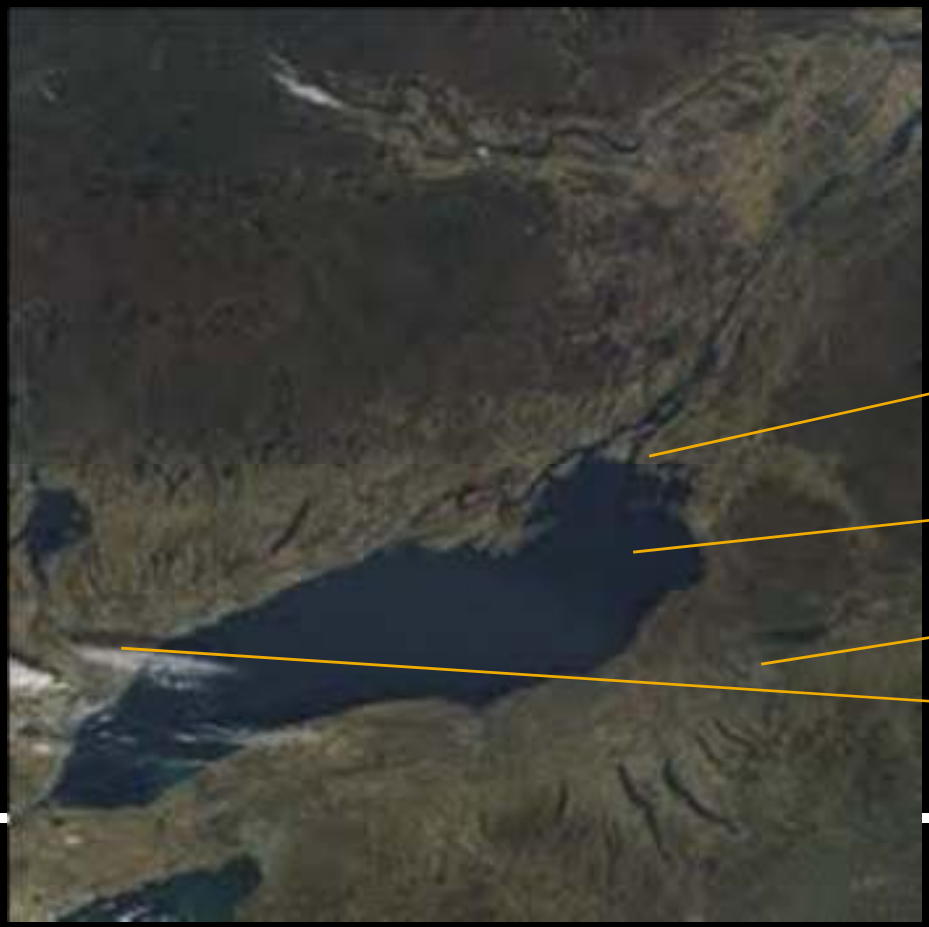


St. Lawrence River Valley
As viewed from space.

Head of St. Lawrence, near Cape Vincent

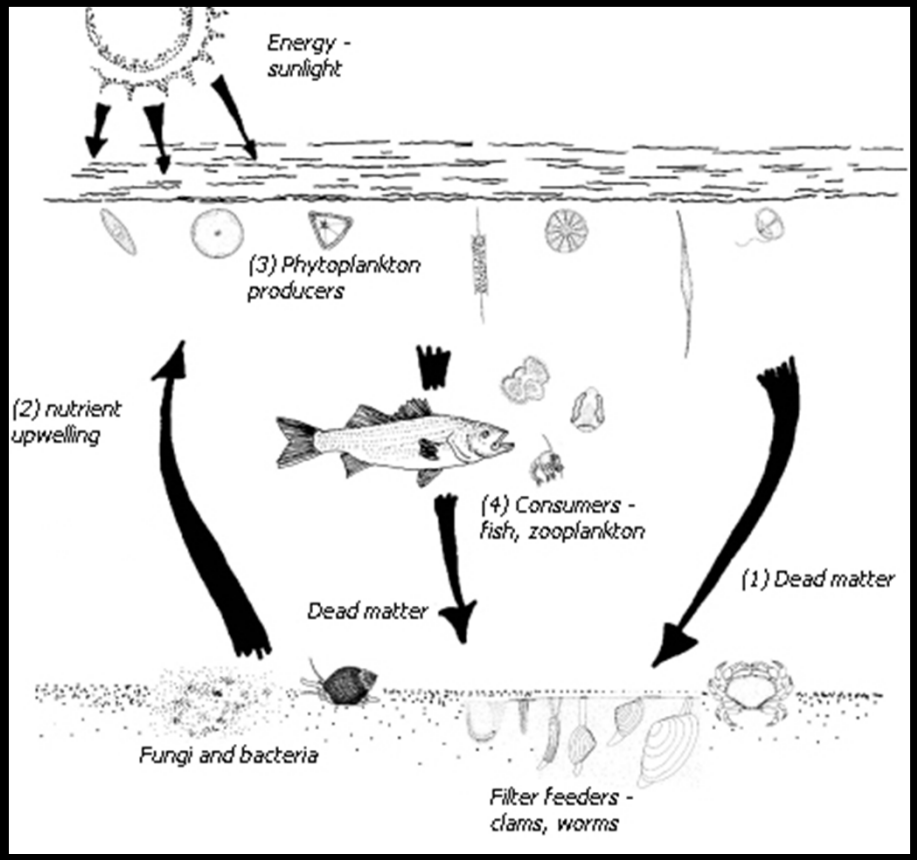
Lake Ontario

Syracuse

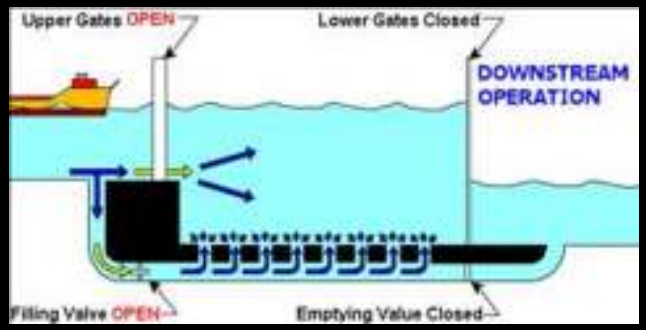
Toronto, Ontario, Canada

St. Lawrence River Life

St. Lawrence River-Aquatic Energy Cycle



Seaway Locks and Lachine Rapids



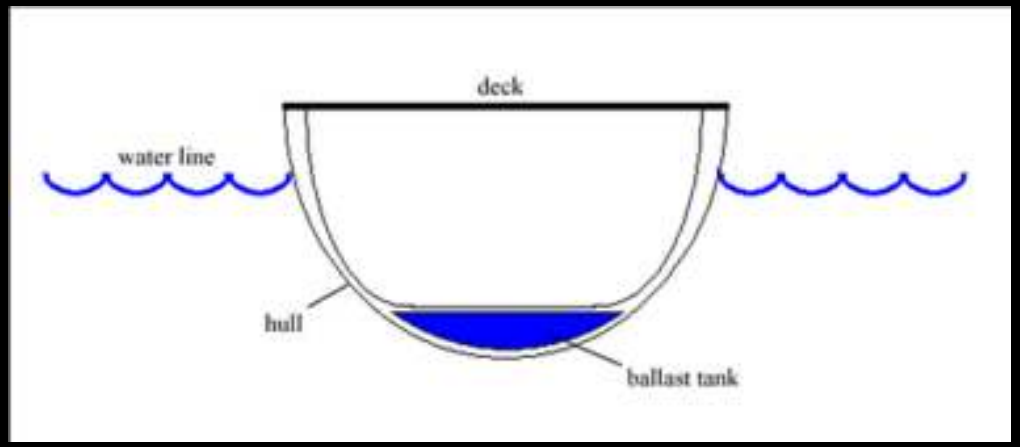
Ocean Cargo Ships in St. Lawrence River

Inland Seaway Ships

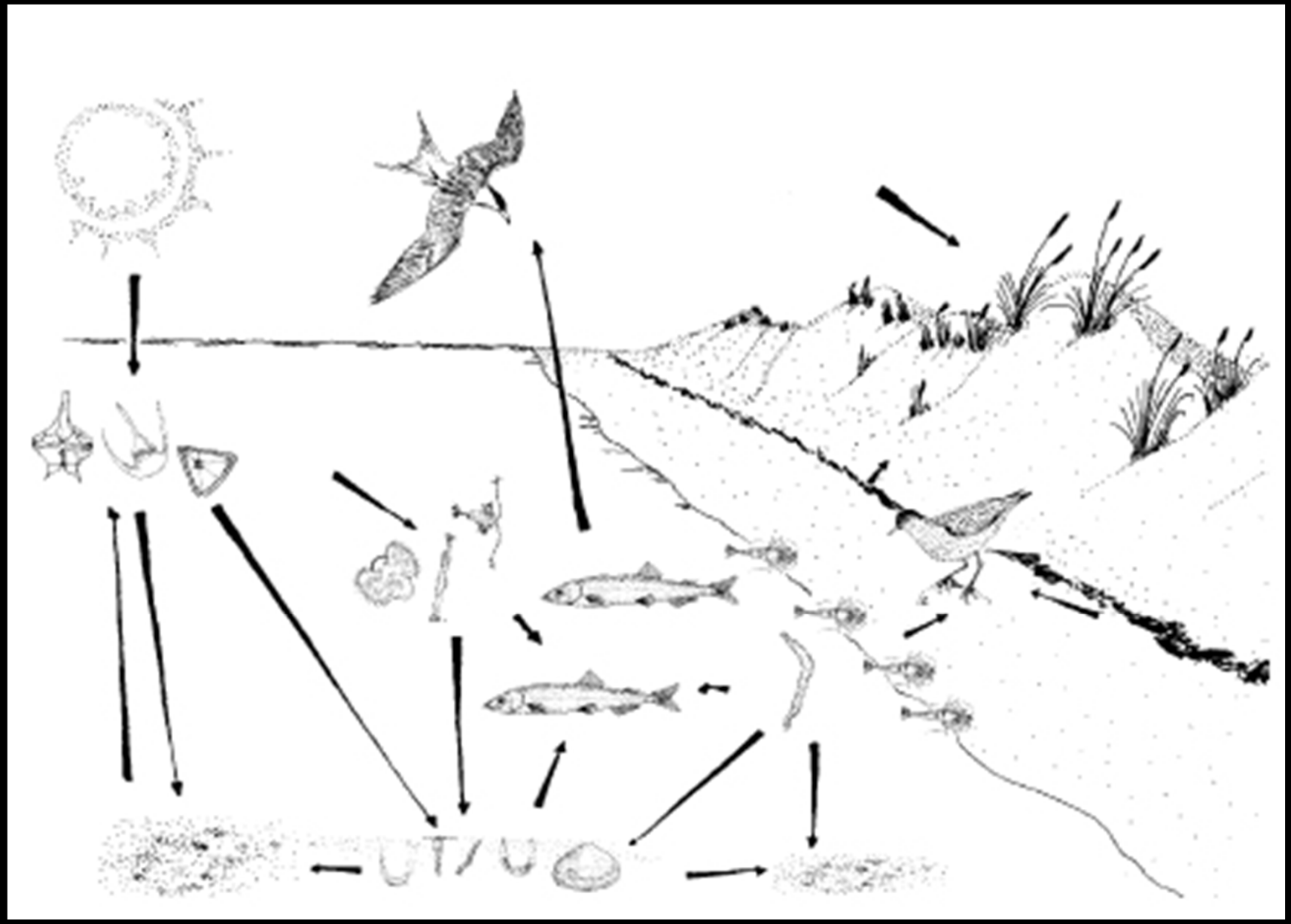
Ship ballast tanks are filled with water to help stabilize the ship's movement in the ocean waters.

Large swell or waves can make the ships rock enough to make the people and cargo shift.

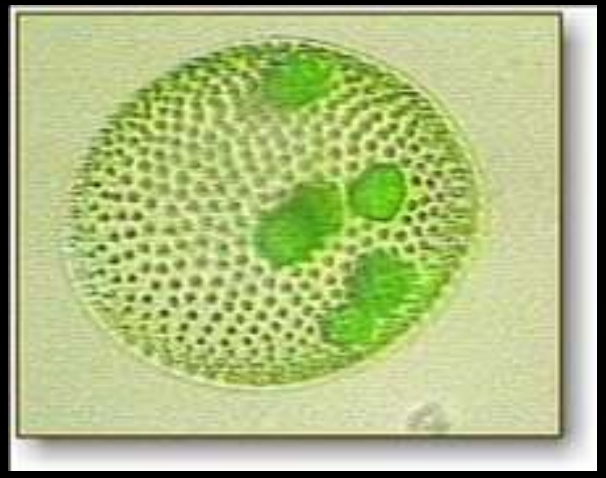
Once the ship is in calmer waters, the water is pumped out, which also makes the ship lighter and easier to maneuver.

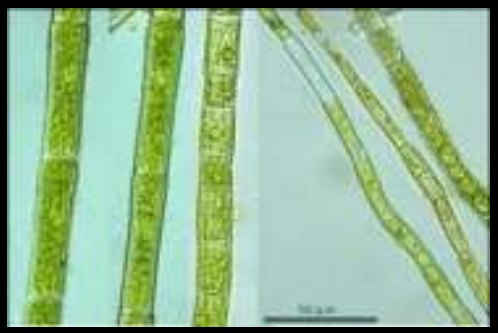


St . Lawrence Terrestrial and Aquatic Food web Relationships



Phytoplankton





Phytoplankton are small green plants which produce carbohydrates through photosynthesis.

They usually live in the upper regions of bodies of water to be able to use the sunlight for photosynthesis.

Many zooplankton and small aquatic animals consume phytoplankton for energy in carbohydrates, fats and minerals.

Fresh water Sea Grasses

Elodea

Vallisneria

Seaweeds can be either algae or flowering plants that are anchored in the bottom of freshwater ecosystems.

These produce significant amounts of O_2 and carbohydrates through photosynthesis while providing habitats for small fish and other aquatic species.

They also provide stability to the bottom of the water body, but must be close enough to the surface for light for photosynthesis.

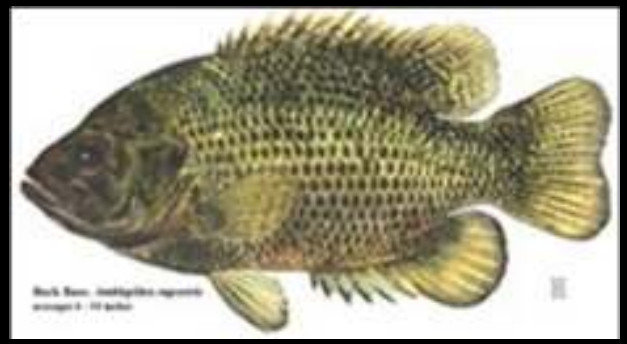
Canada Goose

Canada Geese are usually herbivores, eating grasses and seeds on land and seaweeds in the water. Sometimes they will eat small insects.

Their population has increased due to few predators.

They are considered by some to be an increased nuisance due to their aggressive behavior and fecal matter messes.

Rock Bass

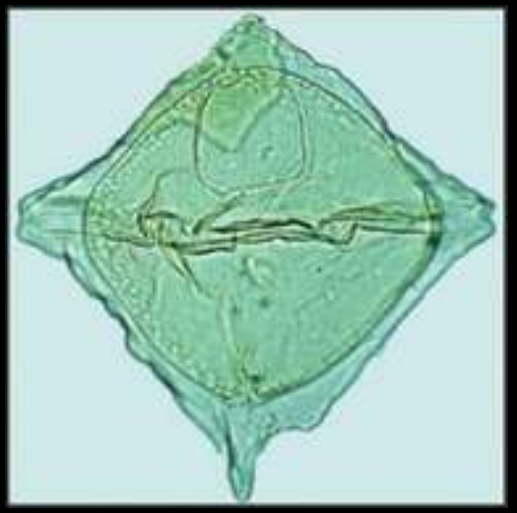


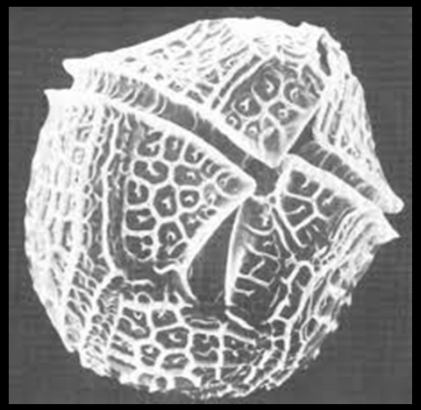
Rock bass are considered ‘food’ fish for other fish species. Some people call them ‘pan’ fish.

They like to live in clear, rock bottomed vegetated bodies of water.

They like to eat insects, smaller fish and some crustaceans.

Phytoplankton
Dinoflagellates



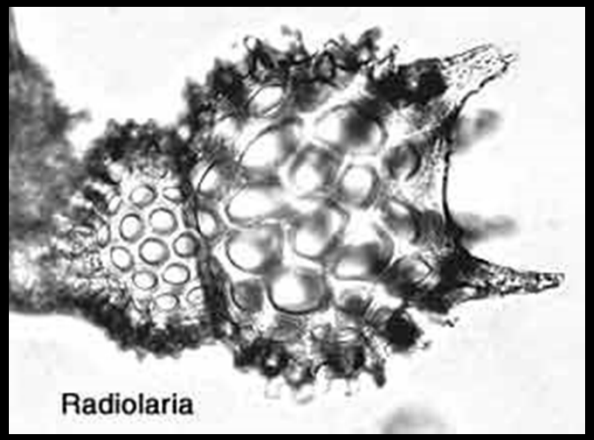


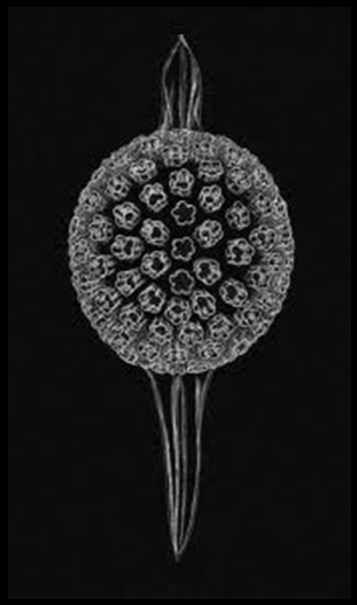
Dinoflagellates are a type of phytoplankton which also use photosynthesis to make carbohydrates.

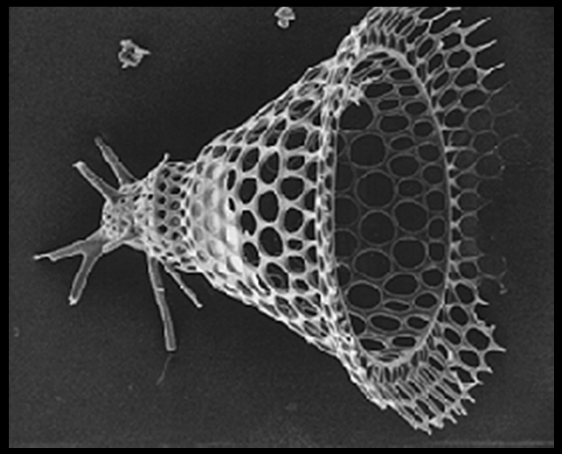
They all have a small whip-like flagella which lets them move, usually to an area of greater sun-light.

Some dinoflagellates reproduce quickly and produce toxins which can kill fish and other animals, like humans. Some of these produce ‘Red Tide,’ which can fill large areas with toxins.

Phytoplankton
Radiolarian and Foraminiferan







Radiolarians are a type of small single celled organism, or protist, which have a silica skeletons. They have a symbiotic smaller single celled algae living inside which makes their food through photosynthesis. They also store lipids which makes them float.

Foraminiferans are another type of protist which have a calcium carbonate skeletons. They also can have symbiotic algae living inside which makes their food.

Freshwater Crayfish

Crayfish need to live in running fresh water, like brooks and streams that do not freeze to the bottom with rocks and stones for hiding from predators.

Crayfish (or crawdads) are often used for bait for fishing or are eaten.

Crayfish are unable to live in polluted water.

Crayfish eat both living and dead plants and animals.

Bald Eagle-as photographed in Jefferson County

Bald eagles are large raptors which mainly live by Larger bodies of water with older trees allowing for high perches. This allows them to see fish, their main food source.

When fish are not available, Bald eagles will eat small mammals, birds, carrion and even garbage.

Bald eagles are not bald, but the word ‘bald’ used to mean also white haired.

Bald eagles, which were once threatened, live away from human disturbances.

Herring Gull

Herring gulls are large gulls which live near bodies of water and garbage dumps.

They eat a wide variety of foods, including fish, crustaceans and smaller bird chicks. Often they are found where humans leave trash or garbage.

Although once rare, their population has rebounded due to protective hunting laws.

Birds pair in early spring and lay their eggs on scraped land or rocks. Both parents care for their young.

Common Tern

The common tern is a smaller waterbird which lives close to both salt and freshwater.

Common terns mostly fish eating and are diving feeders, which means that they will plunge into the water to catch their prey.

The Common tern nests on rocky areas near the water. This may have some dead plant material at its base, but rarely is there ‘nesting’ material.

They migrate from near Arctic areas in summer to subtropical areas in the winter.

Muskellunge

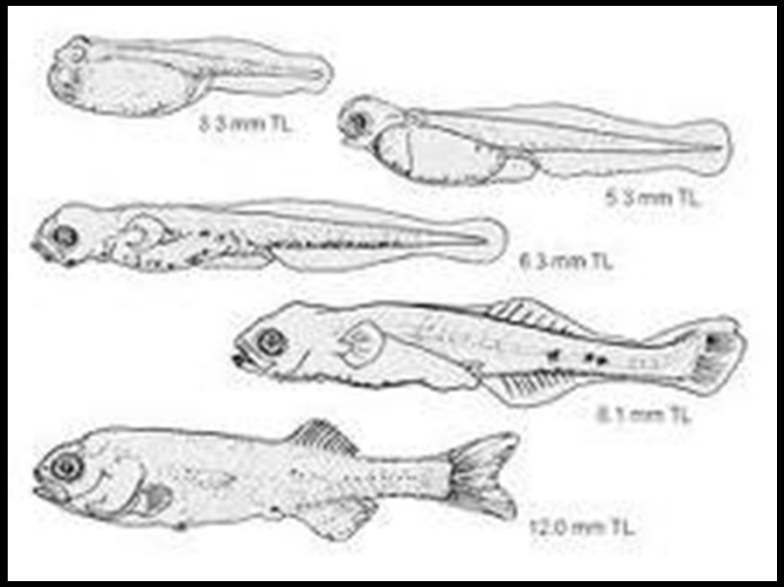
Muskellunge are a very large, rare freshwater fish whose name comes from the Ojibwa words” ugly pike.” They swim very fast for short periods and will fight and jump from the water when caught.

They live in clear water, along the edges of weed beds and rock outcrops.

Muskies will anything that fits in their mouths, like fish, crayfish, ducks, frogs, muskrats and mice. They will take organisms up to 30% their own length.

As larval fish, they eat copepods and other zooplanktons.

Zooplankton-Fish larva, including white bass



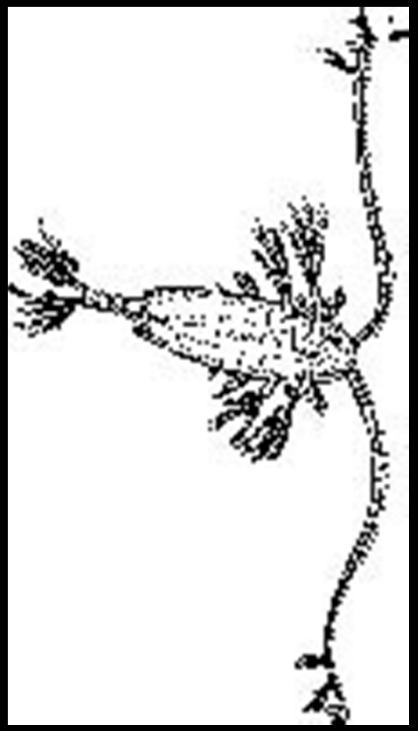
Perch larva

Larval fish are the immature stage of development for many freshwater fish.

After hatching, these fish will use their egg yolk for energy, but will need to begin to eat other zoo plankton to survive.

Rarely is there enough zooplankton for all fish larvae, so many will starve or be eaten as zooplankton for larger fish.

Zooplankton including copepods



Copepods, tiny crustacean, form the largest group of all zooplankton and provide much of the food for fish, birds and whales.

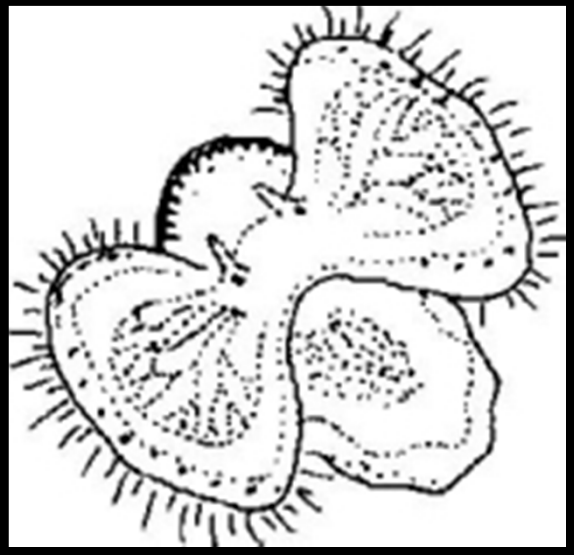
One set of antennae act as oars or paddles through the water.

They live in salt and freshwater ecosystems where they can obtain their food, phytoplankton.

They are used as bio-indicators of water quality as certain harmful bacteria are often found attached to the copepod’s body. They also eat mosquito larvae.

Zooplankton

Mollusk larvae in various stages of development



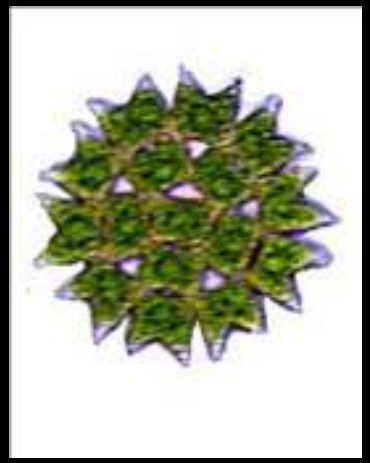
Mollusks, like freshwater clams, have a larval stage, called the VELIGER.

These zooplankton may have cilia on their exterior to move about. They tend to be free living and not yet ready to remain on a solid surface.

Some of them will filter feed on phytoplankton or may be eaten themselves.

Those that survive will develop a foot and usually a shell.

Phytoplankton,
including Pediastrum, Euglena and Chlamydomonas



The green algae are either unicellular or multicellular. Some float, some have flagella to propel themselves and others attach to solid surfaces in long filaments.

They form much of the phytoplankton in freshwater and produce stored energy in the form of starch.

They have chloroplasts with 2 different types of chlorophyll.

Minnows

Minnows, members of the carp family, are a small fish which tend to live in groups in shallower water.

They prefer fairly cool and well oxygenated water.

They eat both phytoplankton and zooplankton as young, but will eat small plants and animals when they mature.

They are often eaten by larger fish, birds or crustaceans.

Zooplankton

Insect in Nymphs Stage in water

Some insects have a water dwelling stage of meta-morphosis. They are called NAIADS in this stage.

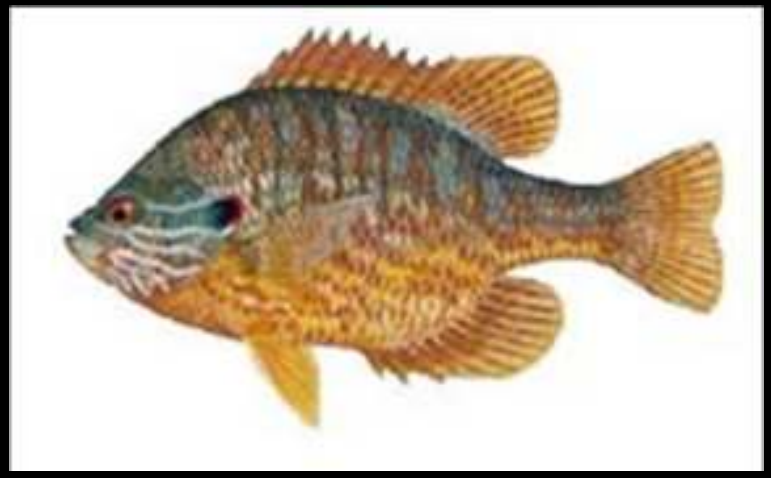
Dragonfly naiads can catch tadpoles and small fish. Some will eat mosquito larvae.

Stonefly naiads may eat either plants or animals.

Mayflies have a full year as an aquatic naiad.

All of these are often eaten by larger birds, fish and insects.

Sunfish



Pumpkinseed sunfish are a small freshwater fish which live in cool water with weedy cover.

They like shallow water and eat insects, smaller fish as well as small crustaceans and mollusks.

They breed rapidly and are often eaten by other fish and birds. Humans eat them, too.

Northern Pike

Northern pike are a freshwater, carnivorous fish, meaning that it eats only animals.

They like shallow weedy areas with clear water as they are ambush predators.

Young pike need to be able to hide in weeds to escape other older northern pike.

They feed on other fish, frogs, insects and leeches and are known for striking the animal at the mid-section.

Yellow Perch

Yellow perch are a fairly small fish, which makes it often the prey for larger fish and birds. This is why some fishing lures are made to look like yellow perch. They are easy to catch.

They can live in water of varying quality and temperature.

They eat fish eggs, insects, insect larvae and other fish.

Large Mouth Bass

Large mouth bass adults live in deeper parts of freshwater ecosystems. They consume frogs, crayfish, salamanders, snakes and small birds.

The juveniles will eat small bait fish, snails and freshwater shrimp.

Living in weedy waters can make finding food difficult for them.

Some states have catch and release programs which encourage anglers to return the fish alive to the water after catching them.

Smallmouth Bass

Small mouth bass tend to live in clearer and cooler water than their Large mouth cousins.

Since small mouth bass are unable to live in poor quality water, they are considered an indicator species.

As adults, they eat small fish, crayfish and insects. As young fish, they eat zooplankton.

River small mouth bass are darker in color than their relatives living in sandy ponds.

Zooplankton-including
Freshwater Shrimp and Daphnia

Freshwater shrimp and daphnia, or water fleas, are small crustaceans that can live in varying water conditions.

They eat smaller crustaceans, bacteria, algae and some protists.

They are an indicator species as they do not tolerate poor water quality well.

As zooplankton, they are often eaten by larger species.

Muskrats

Muskrats are a mammal that lives near water and wetlands, but is successful in a variety of temperatures and habitats.

They provide food for many animals, like mink and eagles.

These rodents are prolific breeders.

Muskrats eat zebra and quagga mussels, crayfish, fish and turtles.

Mink

Mink are a mammal that are both aquatic and carnivorous. they like to eat fish, but also small birds, like ducks, and rabbits.

Mink have a few natural predators, but humans have changed their habitat.

They are very territorial and will drive other animals away.

Zebra and Quagga Mussels

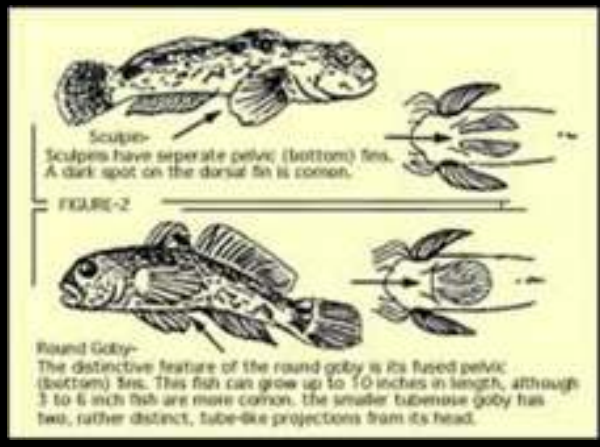
Zebra mussels and Quagga mussels were introduced to North America in the ballast water of ocean ships from lakes in southern Russia through the St. Lawrence Seaway.

Both are filter feeders which means that their food is both phyto- and zooplankton in the water. This increases sunlight deeper into the water. They are eaten by yellow perch, smallmouth bass, crayfish and muskrats.

A female can produce up to 1,000, 000 eggs per year, with about 2-5% surviving until adulthood.

They attach to any surface; blocking water intakes and creating sharp surfaces.

Round Goby and Sculpin



Round gobys and sculpins are invasive freshwater fish introduced to N. America through the ballast water of ocean ships from the Black and Caspian Seas.

Females can spawn eggs up to 6 times per season.

They can live in poor quality water and eat large numbers of native fish eggs. They out compete native fish for nesting sites and food. They are eaten by some Small mouth and Large mouth bass.

Since they eat zebra mussels which bioaccumulate toxins, they can be a significant source of toxins to animals which eat them.

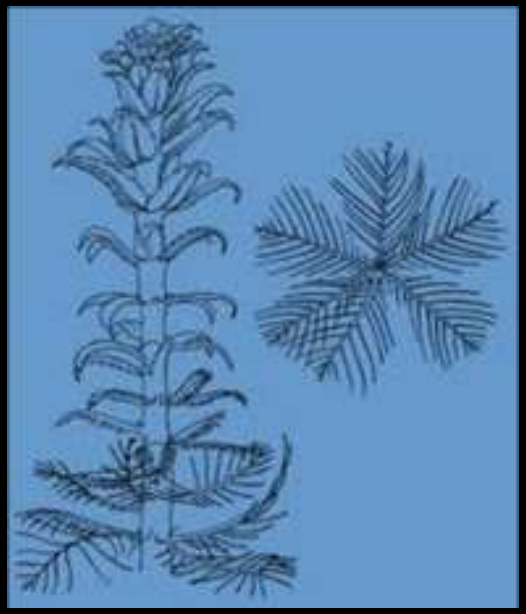
Sea Lamprey

Lamprey eels are an invasive species in N. America. they are unusual in that they are parasites which attach themselves to the body of the fish to suck their blood.

Although eaten by Europeans, they are not eaten in N. America.

They have almost wiped out the native fish species, like Lake trout, of N. America, resulting in many states setting up lamprey control programs. Some are chemical barriers or electric barriers.

Eurasian Milfoil



Eurasian milfoil is an invasive species which entered N. America in the 1950's.

It grow very quickly and can fill a body of water completely, blocking out native water plants.

Often, water recreation is severely impacted by limiting access to the water with its thick mats of vegetation.

If the plant is broken in two, both parts can grow into new plants.

Cormorant

Cormorants are a protected, native water bird with a fast growing population in N. America that lives in coastal waters.

They eat almost a pound of food a day, including fish [like Pumpkinseed sunfish and Yellow perch], small birds and water snakes. they can decimate an areas fish population if there are many of them.

They group together in large numbers to nest and roost. Their fecal matter can destroy vegetation and interfere with the nesting of other water birds.

Rusty crayfish

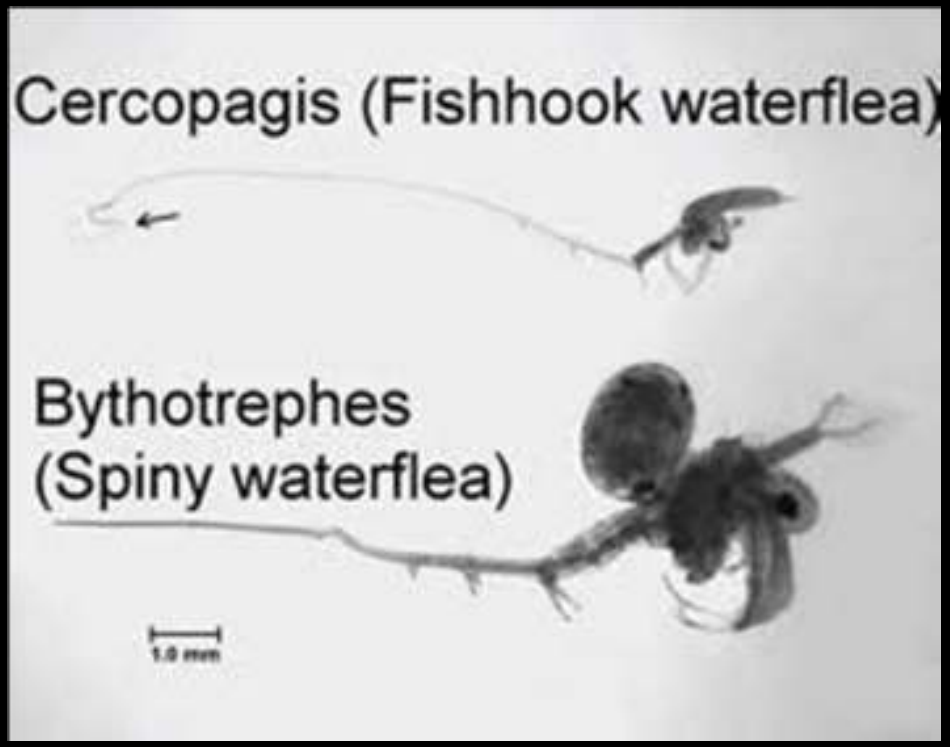
The Rusty crayfish is native to the Ohio River Basin, but is invasive in neighboring regions, like Wisconsin and New York.

This crayfish is fairly aggressive and out competes crayfish. this is partly due to their aggression, but they also have larger claws. These may scare fish predators from eating them.

They also remove weedy plants, which changes the habitat of the sunfish that prey on the crayfish.

They consume the eggs from many fish species.

Spiny Waterflea and Fishhook Waterflea

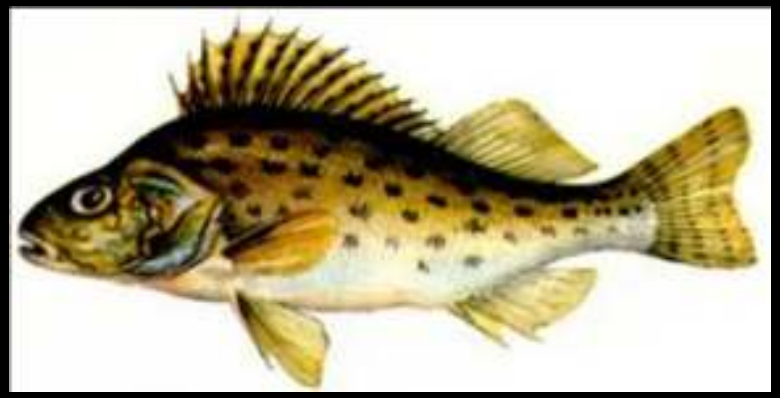


The fishhook and spiny waterflea are both invasive species that came in the ballast tanks of ocean ships coming from the Black and Caspian Sea area.

Since they consume zooplankton, they compete with fish, like the Yellow Perch, and other small crustaceans for them. However, fish that eat zooplankton have them as a new food source.

The hooks and spines can also clog up fishing nets. Small fish have difficulty eating them due to the hooks and spines.

Eurasian Ruffe



The Eurasian ruffe is an invasive freshwater fish that resembles the Yellow Perch. They were introduced through the ballast tanks of ocean ships from Europe.

They compete with native fish for food and habitat space, but also reproduce more rapidly than most fish.

They can tolerate poor water quality and a wide range of water temperatures.

They have sense organs which allow them to sense and avoid predators better than most fish.

Asian Carp

Asia carp are an invasive species which was introduced to North America which were brought as a food fish. They entered the Mississippi River basin and spread throughout the river and its tributaries.

The silver carp, a type of Asian carp, can grow to 100 lbs. and startle by boats passing so much that they jump out of the water.

They filter feed on both phytoplankton and zooplankton. This means that they compete with native filter feeders and are not easily caught.