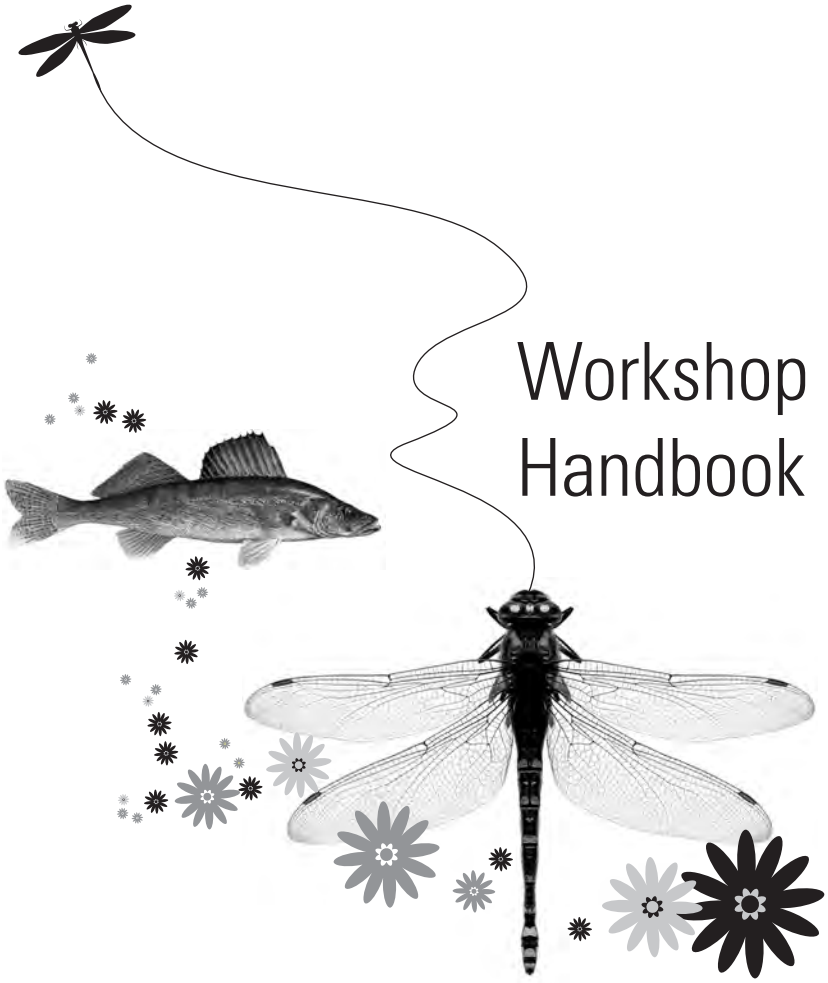
STONE
LABORATORY



Workshop Handbook

The Ohio State University's Island Campus on Lake Erie

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ACKNOWLEDGEMENTS

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Visit Stone Lab online at ***stonelab.osu.edu***

WELCOME *to Stone Laboratory!*

Welcome to Gibraltar Island and The Ohio State University's Franz Theodore Stone Laboratory, the oldest freshwater biological field station and research laboratory in the United States.

Since the Laboratory's beginning in 1895, college classes and research have been conducted from it by both students and professional scientists on Lake Erie and the Great Lakes watershed. Gibraltar Island's location in the western basin of Lake Erie provides an ideal setting for the study of pollution, shoreline erosion, and population studies of native and exotic species. The island region and nearby shallow reefs are also some of the major spawning grounds for Lake Erie's food and sport fish, providing unique access for students and researchers alike.

Your class' workshop will put you among the 5,000 or more students in grades 4-12 who will learn at Stone Lab in fall or spring. The lab also offers summer courses for college credits, including both basic and applied field studies in biology, geology, environment and natural resources, and science education.

Since 1990, students from 100 colleges and more than 340 high schools have taken courses for college credit at Stone Laboratory. Someday, you may wish to return for this kind of experience!

While you are here, we want you to learn a lot and have fun, but most importantly, to be safe. Because we are on an island and the next closest body of land is another island, medical facilities are not easily reached in the case of an injury. Please observe the following safety guidelines: NO running on the island, NO throwing of rocks, stay away from the edges of the steep cliffs, and be careful of slippery dock surfaces! In the event of a medical emergency, immediately contact a chaperone to begin the process to get emergency assistance, evaluation and transportation as needed.

Where in the World are We?

The Great Lakes

The Great Lakes of North America hold 90% of the United States' surface freshwater and 20% of the world's. Ten percent of the population of the United States and 25% of Canadians live in the watershed of the Great Lakes!

How many states and provinces border Lake Erie?_____ List them and draw arrows to their locations on the map to the right.

_____
_____
_____
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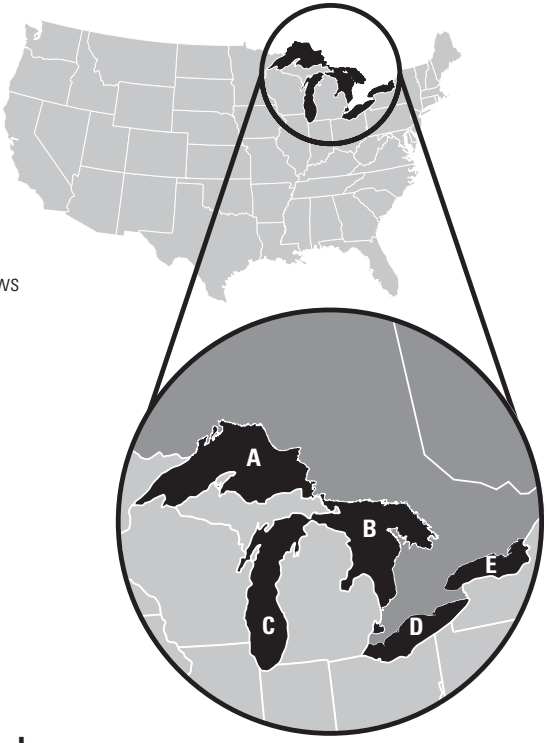
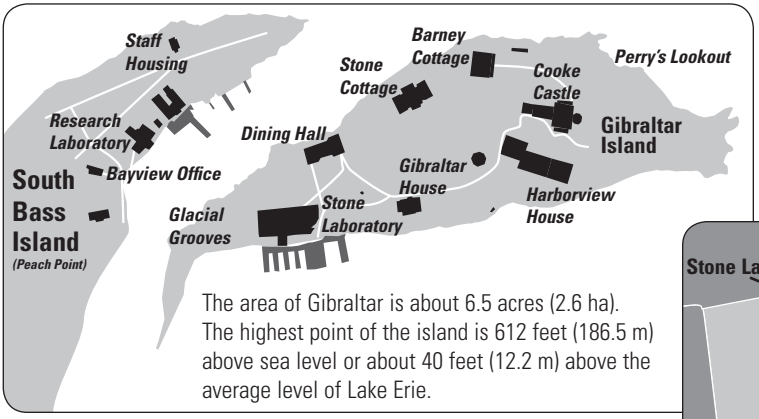


Name the Great Lakes on the above map

A_____ B_____ C_____ D_____ E_____



The area of Gibraltar is about 6.5 acres (2.6 ha). The highest point of the island is 612 feet (186.5 m) above sea level or about 40 feet (12.2 m) above the average level of Lake Erie.

Gibraltar Island is in Ottawa County, Ohio. Its global address is

N 41° 40′
W 82° 49′

Little Known Facts About Lake Erie

Are you good at trivia games? Here are some Lake Erie facts that aren't widely known. While we don't consider that anything about Lake Erie is trivial, we suspect that you can stump your friends and astound your parents by turning the interesting facts below into questions.

1. In one eight- to nine-month navigation season, more traffic passes over Lake Erie than travels through the Panama, the Suez, the Manchester Canal in England and the Kiel Canal in Germany combined in a year.

2. Three-fourths of all Great Lakes ship traffic enters Lake Erie ports.

3. Lake Erie is the 11th largest fresh water lake and the thirteenth largest lake in the world. (The salty Caspian and Aral Seas are considered lakes.)

4. Lake Erie has approximately 20 islands depending upon water levels.

5. "Erie" is an Indian word meaning "cat." This name was given to the lake because of the fierce tribe who lived along Erie's shores until the mid 1600s.

6. In 1988 Dr. Seuss changed the wording in his famous book, *The Lorax*. Because of great water quality improvement, the line "I hear things are just as bad up in Lake Erie!" is not in newer editions of the book.

7. In a normal year, Lake Erie produces more fish for human consumption than all the other Great Lakes put together.

8. Starve Island is less than one acre (0.4 ha) of rocks with a few trees. A legend says that a human skeleton was found there, thus the island's name.

9. Lake Erie has the shortest "retention time" of any of the Great Lakes. A drop of water moves through the lake in 2.6 years compared to 191 years in Lake Superior.

10. Lake Erie contains 116 cubic miles (483 km^3) of fresh water. It would take almost 26 Lake Eries to fill Lake Superior's 3,000 cubic mile (12,504 km^3) volume!

11. Stouffer's uses about 450,000 gallons (1,703,435 L) of Lake Erie water per day in preparing its frozen food specialties at its plant in Solon, east of Cleveland.

12. Lake Erie draws swimmers to its beaches because of warm water temperatures. The average water temperature in August is 72° F (22° C) compared to Lakes Michigan and Ontario at 69° F (20° C), Lake Huron at 64° F (18° C) and Lake Superior at 53° F (12° C).

13. Middle Bass Island was the scene of the first Catholic mass ever celebrated in the Midwest.

14. At Put-In-Bay in the 1800s, a crew of 70 men could harvest 75 to 100 tons (68-91 tonnes) of ice an hour. Ice cutting could begin when the water was frozen 12-14 inches (30-35 cm) thick. It was then cut into 22-inch (56-cm) blocks.

15. Agriculture uses 41 million gallons (155 million L) of Lake Erie water per day.

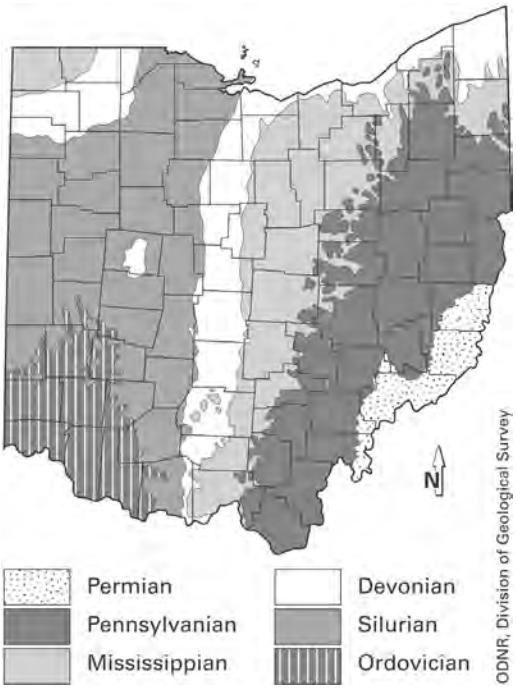
16. In 1814 a ship weighing 96 tons (87 tonnes) was built to use on Lake Erie but was found to be too big to be successful. Today ships of 1,000 tons (907 tonnes) are common on Lake Erie.

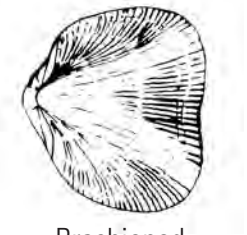
17. Ships loaded in the fresh water of the Great Lakes will rise 6 or 7 inches (15-18 cm) upon entering the ocean.

18. Freshwater ice floats in fresh water with one tenth of its mass above water. Ice formed and floating in salt water has one ninth of its mass above water.

Geology of the Lake Erie Islands

The Great Lakes region has been shaped by the geologic periods of the past and the Ice Ages of the present period of geologic history. A look at the bedrock types present in Ohio shows what kinds of environments have been present in the region.



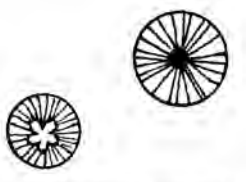


Brachiopod

Horn coral

The rock of Gibraltar Island is **dolomite** which has the composition of limestone with some magnesium added. The dolomite can be distinguished from **limestone** by dripping dilute hydrochloric acid on a fresh rock surface. Limestone will fizz rapidly but dolomite fizzes slower and less.

Limestone, and occasionally dolomite, may contain fossils of sea animals that lived in the shallow seas here in the period when the rocks were formed. Some of the common forms of fossils are pictured at the right.



Crinoid stems

Geology of the Lake Erie Islands

In addition to the evidence of past life in this region, Gibraltar's geology indicates the more "recent" past of the Ice Age. Glaciers left their mark on Ohio in many ways and Gibraltar shows some of these.

On this map, the line that separates southeastern Ohio from the rest of the state marks the extent of the glacial coverage in the last Ice Age. The continental glaciers of the Pleistocene Era had a spreading center in the area of Hudson Bay. Moving out from there, they grew by the addition of more and more snow, compacting to ice and pushing forward under their own weight.

As recently as 15,000 years ago, this area of Ohio was under about a mile of ice! As the glaciers pushed against the land below, they picked up large rocks and carried them along, frozen in the base of the moving mass, scraping bedrock of the earth beneath. The rocks gouged channels in the underlying stone and we observe these today as **glacial grooves**. In some areas, only small pebbles and sand were carried, so the marks left behind are small **striations** rather than deep grooves. When the glaciers retreated (melted), they left behind those rocks and pebbles they were carrying. We can recognize these glacial deposits because they do not match the local types of rock. These rocks are known as **erratics**. Some erratics can be found along the path leading to Harborview Dormitory.

Challenges:

Use the map of Gibraltar on page 2 to mark the locations where you can find evidence of glaciers. Show where the erratics are found and measure the compass angle of the glacial grooves.

1. Make a prediction about the angle of the glacial grooves on other Lake Erie islands. How did you decide which way the grooves would line up? How could you test your hypothesis?

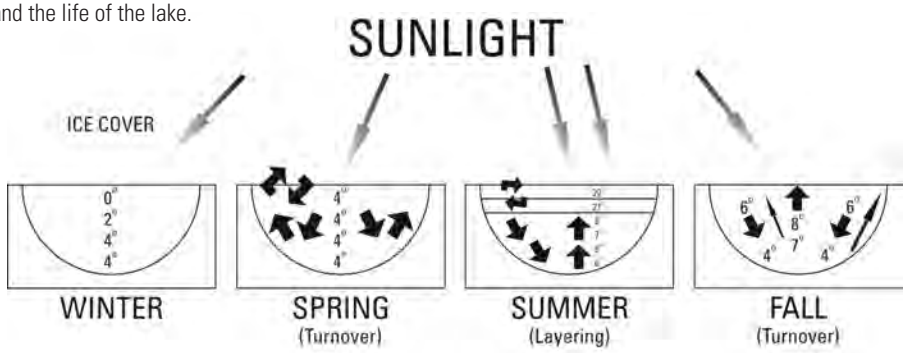
2. Examine a sample of 50 rocks on the beach by the dock. Predict the proportion of rocks that are limestone versus the percentage that are dolomite.

Climate and Water Interactions

*The study of inland waters is called **limnology**.*

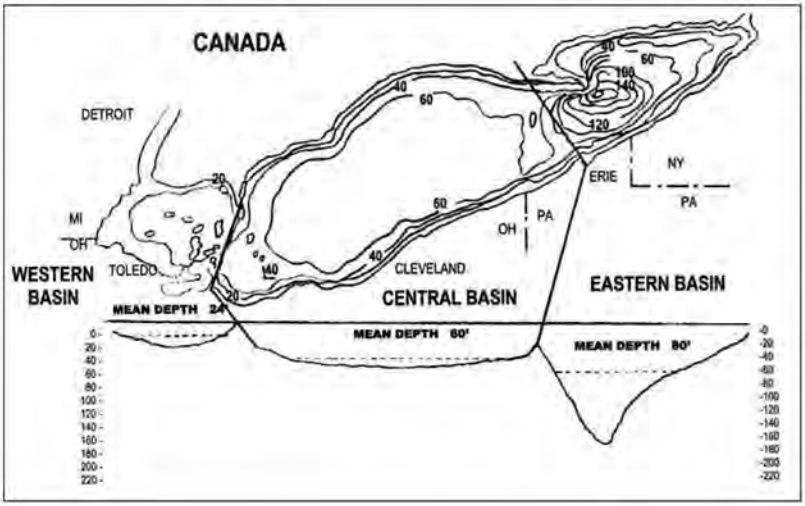
1. The weather affects the lake

Lakes in the temperate zones of the world have a seasonal pattern of change that affects the water itself and the life of the lake.



Some parts of Lake Erie are likely to **stratify** (form layers) with different temperatures in the summer. The top layer, or **epilimnion**, is the warmest and is mixed well by the wind and waves. The bottom, or **hypolimnion**, is colder and does not mix with the surface layer. The dividing layer is called the **thermocline**. It serves as a barrier to mixing.

Did your group find the temperature pattern you would expect for this season?



The Central and Eastern Basins stratify in summer, but the Western Basin is shallow enough to mix well most of the year. This is important because the Western Basin is most productive. When things die, they use up oxygen in the hypolimnion. Mixing stirs in more oxygen to replace what has been depleted.

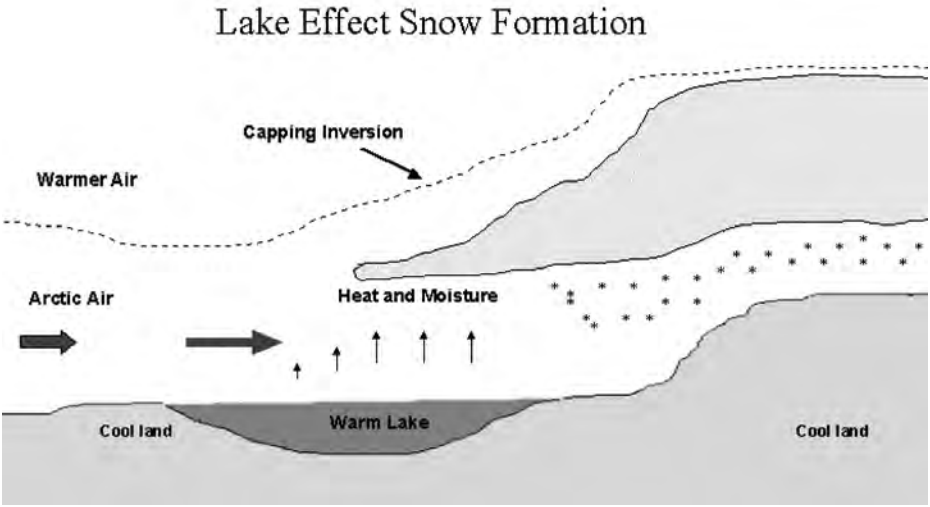
Climate and Water Interactions

In the past, Lake Erie had unusually large amounts of nitrates and phosphates from farm-field runoff and sewage waste. These chemicals act as fertilizers, allowing algae in the lake to grow to an unhealthy population. As these plants died off, sank to the bottom and decomposed, the oxygen in the water was depleted. In the central basin's hypolimnion, there was no available oxygen for fish and invertebrates to use. People along the lake found dead fish, rotting algae, and an unbearable smell that led them to conclude that Lake Erie was dead.

Actually, the lake was too much alive! We say that the lake suffered from cultural eutrophication. **Eutrophication** is a normal process as lakes age, but the actions of people have sped up this process. We have since removed much of the phosphate from detergents, changed some farming practices and further treat sewage from cities in order to control the amount of nutrients entering the lake.

2. The Lake affects the weather

The Great Lakes influence the local climate throughout the entire year. Water temperatures change more slowly than land temperatures. In summer, the air is warmer than the water so the lake environment has natural air conditioning! In the fall, the warmer water gives up its heat to the air and extends the growing season. Winter brings lake effect snow downwind of the lakes.



http://www.erh.noaa.gov/er/buf/lakeffect/form.html

Sampling Equipment

A

B

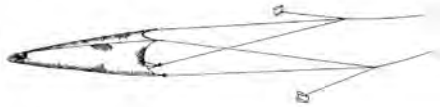
C

D

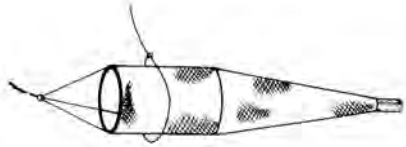
E

F

G



H



Match the equipment with its use:

1. _____ **Ekman dredge:** Used to sample bottom sediments and any benthic macroinvertebrates present in them

2. _____ **Thermometer:** Used to measure temperature

3. _____ **Plankton net:** used to collect a concentrated sample of plankton, both zooplankton and phytoplankton

4. _____ **Kemmerer bottle:** used to collect water samples from known depth, including plankton in their actual densities

5. _____ **Bottom trawl:** funnel-shaped net towed along the bottom of the lake to catch fish

6. _____ **Secchi disk:** circular plate used to measure water transparency and estimate the photic zone

7. _____ **Anemometer:** instrument for measuring wind speed

8. _____ **Dissolved oxygen meter:** measures the amount of oxygen dissolved in water at various depths (ours measures temperature too)

Limnology Data

Sampling Location: _____

Latitude/Longitude: _____

Date: _____ Time: _____ AM/PM

Air Temperature: _____ °C _____ °F Celsius = 5/9 (F-32) Fahrenheit = 9/5 C + 32

Wind Direction: _____ Wind Speed: _____ mph _____ m/s m/s = mph x 0.447 mph = m/s ÷ 0.44704

Wave Height: _____

Percent Sunlight: _____ % (an estimate of clear sky versus cloudy)

Station Depth: _____ Meters = _____ cm = (_____ feet)

Sunlight Penetration

Secchi Depth	_____ cm (going down)
	_____ cm (coming up)
(Total)	_____ cm
(÷ 2 = average)	_____ cm
x 3 = Photic Zone Depth =	_____

The photic zone is the depth which provides the minimum sunlight required by aquatic plant life and is 1% of the surface light.

Challenge: Why is photic zone depth important in the lake ecosystem?

Dissolved Oxygen Depth Measurements

Depth (m)	Temperature (ºC)	Dissolved oxygen (mg/L)
(surface) 0		

Organisms Collected

Plankton: all the microscopic plants and animals that are at the mercy of water movements

(Examples: algae, water fleas—check your finds on pages 12-13.)

Benthos: bottom-dwelling invertebrates

(Examples: insect larvae, dreissenid mussels, aquatic worms)

Nekton: free-swimming animals

(Examples: all species of fish caught with the trawl)

Plankton

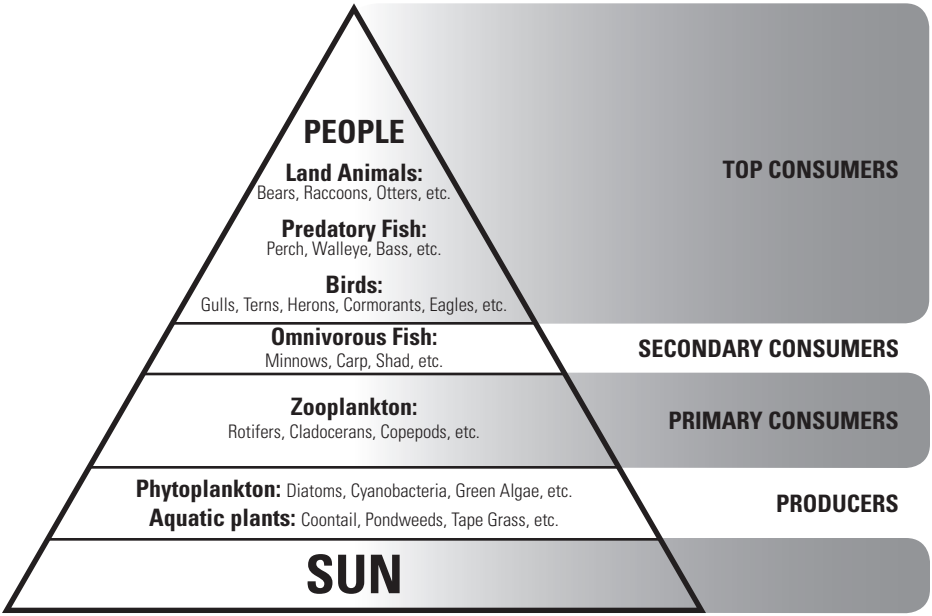
Plankton refers to living things that drift with the movement of the water. Plankton includes all plants and animals that are at the mercy of water movements. Animals that can overcome the currents and move on their own (that is, those that can swim) are called **nekton**. Most mature fish are nekton. **Benthos** refers to bottom dwellers, described as benthic.

Most plankton are found in the Photic Zone. **Phytoplankton** (those like plants) are producers that use the sun's energy for photosynthesis and produce oxygen:

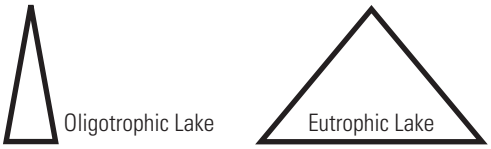
$$6CO_2 + 12H_2O \xrightarrow{\text{SUNLIGHT}} 6H_2O + 6O_2 + C_6H_{12}O_6 \text{ (sugars)}$$

Phytoplankton, like **dinoflagellates** and **diatoms**, may produce over 50% of the world's oxygen.

Zooplankton (those like little animals) are consumers. They eat other plankton, absorb oxygen from the water, and give off carbon dioxide (CO_2).



The food pyramid of a eutrophic lake has a large base of phytoplankton. A lake that is oligotrophic has a "skinny" pyramid because of fewer phytoplankton.



Challenge: Where would you place Bacteria and Scavengers in this pyramid?

Common Plankton of Lake Erie

The types of **phytoplankton** in Lake Erie are blue-green algae (cyanobacteria), green algae, diatoms, and dinoflagellates.

The types of **zooplankton** in Lake Erie are rotifers, cladocerans, copepods, and larvae of other animals.
Different kinds of plankton will be found over the seasons.
Check the ones you find in your workshop.

Phytoplankton: Blue-Green Algae

Anabaena

Spirulina

Lyngbya

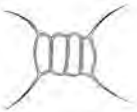
Aphanizomenon

Microcystis

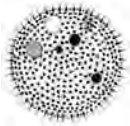
Phytoplankton: Green Algae

Pediastrum

Scenedesmus



Volvox



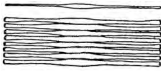
Cladophora

Spirogyra

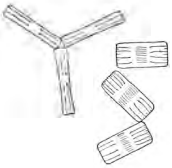
Phytoplankton: Diatoms

Asterionella

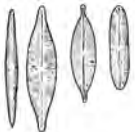
Fragellaria



Tabellaria



Navicula



Melosira

Phytoplankton: Dinoflagellates

Ceratium

Cryptomonas

Gymnodinium

Common Plankton of Lake Erie

Zooplankton: Rotifers

Keratella

Kellicottia

Asplanchna

Polyarthra

Zooplankton: Cladocerans

Leptodora

Daphnia

Bosmina

Eubosmina

Zooplankton: Copepods (adults)

Cyclopoid

Harpacticoid

Calanoid

Side view

Nauplius (larva)

Zooplankton: Veliger

Dreissenid *(zebra or quagga mussel)*

Other forms seen (draw)

Macroinvertebrates: Biotic Indicators of Water Quality

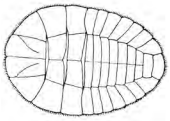
Macroinvertebrates are animals without backbones, like insects and mussels, that are large enough to be seen with the naked eye.

Group A (3 points for each kind found):

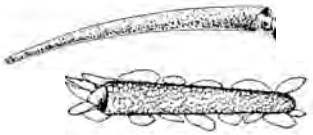
These organisms are generally intolerant of pollution, so their dominance in the water generally signifies good water quality. They do not survive in polluted water.

Mayfly nymph

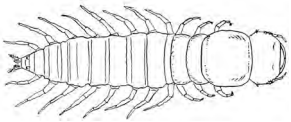
Water penny (beetle larva)



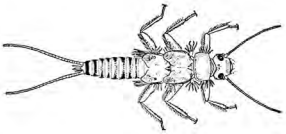
Caddisfly nymph



Dobsonfly larva



Stonefly larva



Right-handed gill snail

Group B (2 points each):

These organisms can exist in a wide range of water quality conditions.
They can live in both polluted and non-polluted water.

Dragonfly nymph

Isopod (sow bug)

Damselfly nymph

Amphipod (scud)

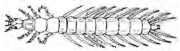
Clam

Dreissenid mussel

Cranefly larva

Planaria

Beetle larva

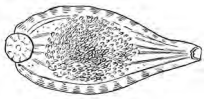


Crayfish

Group C (1 point each):

These organisms are generally tolerant of pollution. Their dominance in the water usually signifies poor water quality.

Leech

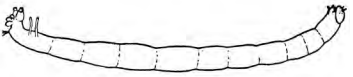


Aquatic worm

Left-handed pouch snail

Blackfly larva

Midge larva



To calculate the water quality from these biological indicators,

1. Compare the value with the following chart to find the water quality. Circle today's quality:

   Group A____ x 3 = ____; Group B ____ x 2 = ____; Group C____ x 1 = _____.

2. Add the group totals to get the Cumulative Index Value. _____

3. Compare the value with the following chart to find the water quality. Circle today's quality:

CUMULATIVE INDEX VALUE	WATER QUALITY ASSESSMENT
23 or more	Excellent
17 – 22	Good
11 – 16	Fair
10 or less	Poor

Modified from Ohio Department of Natural Resources, Division of Natural Areas and Preserves, "Ohio Scenic River Stream Quality Monitoring: A Citizens Action Program."

Common Fish Familes of Lake Erie

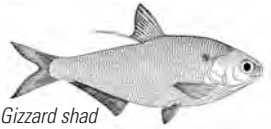
There are more than 20 families of fish in Lake Erie. Some of the ones you may see among the trawl catch or in the lab include these examples:

Lamprey family (Petromyzontidae)

Sea lamprey

These are primitive, eel-like fish that have no jaws or even bones. Their mouths are toothy, sucker-like discs. Many species, like the non-native sea lamprey, are parasitic on other fishes. Native lampreys should not be considered a threat to other fishes.

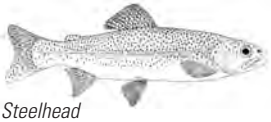
Herring family (Clupeidae)



Gizzard shad

Herrings include the gizzard shad and alewife, also known as "sawbellies" for their jagged undersides. They feed on plankton and are an important prey of larger fish such as walleyes. They may die off in large numbers as water temperatures change with the seasons.

Trout, salmon, and whitefish family (Salmonidae)



Steelhead

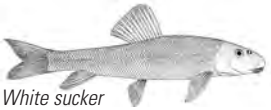
These fish have an extra fatty fin called the adipose fin. Steelhead trout are stocked in Lake Erie for anglers to catch.

Minnow family (Cyprinidae)

Spottail shiner

Minnows, shiners, and chubs are important as food for many larger fish, and they are widely used as bait. The family also includes carp and goldfish!

Sucker family (Catostomidae)



White sucker

Suckers are a lot like minnows, but most have a strongly subterminal mouth and fleshy "sucker" lips. Some, like the quillback and buffalofishes, can get large.

Catfish family (Ictaluridae)

Channel catfish

Catfishes eat both plants and animals that they find on or in the bottom of lakes and streams. Their barbels are like feelers to help them find food. Catfishes have no scales.

Common Fish Familes of Lake Erie

Trout-perch family (Percopsidae)

Trout-perch

Trout-perch have rough scales. They have an adipose fin like trout and a general shape like a perch. Many other fish eat trout-perch.

Temperate basses (Moronidae)

White bass

The white bass and white perch live over sand and gravel bottoms or around reefs in open water. They feed on smaller fish, including their own young.

Sunfish family (Centrarchidae)

Bluegill

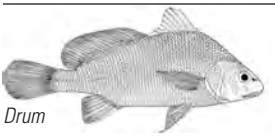
Many types of fish are in this family, from largemouth and smallmouth bass to bluegill. They eat smaller fish, frogs, and macroinvertebrates such as crayfish and insects.

Perch family (Percidae)

Yellow perch

This group includes the walleye, yellow perch, and darters. Walleye live in cold, clear water, but perch can live in warmer water. Perch were considered trash fish when there were many trout and whitefish in Lake Erie, but now they are the most expensive fish on the menu!

Drum family (Sciaenidae)



Drum

These fish get their name from the drumming or purring sound they make. Some people call this fish "sheepshead." They eat crayfish, aquatic insects, and small fish.

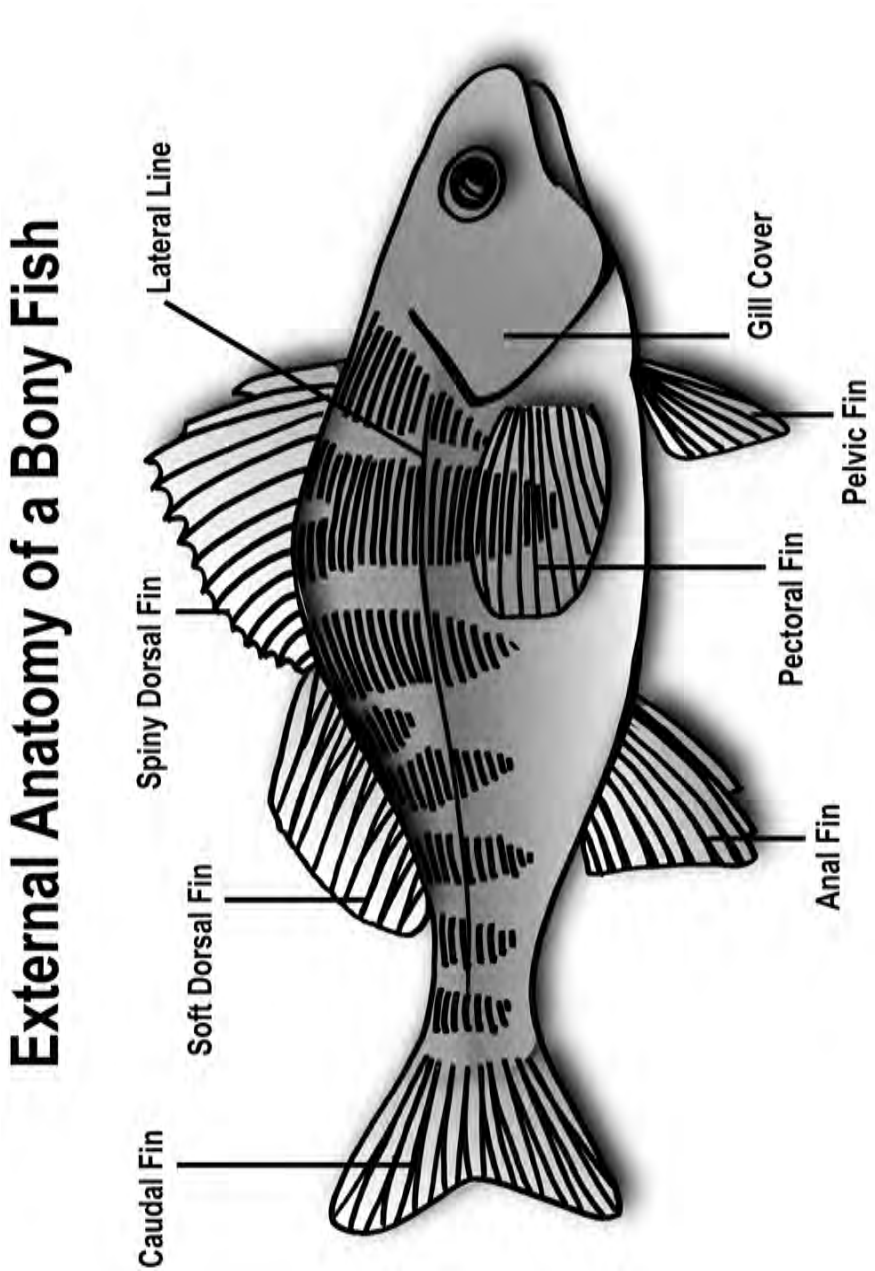
Goby family (Gobiidae)

Round goby

ODNR-Division of Wildlife

The round and tube-nose gobies are accidental imports, presumably from the ballast tanks of ships coming from overseas. They have a unique fused pelvic fin which acts as a suction cup to attach to rocks.

External Characteristics of Bony Fish

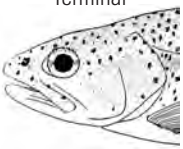


External Characteristics of Bony Fish

Mouth Positions

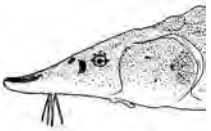
Superior

Terminal



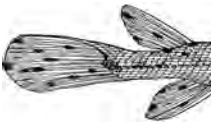
Subterminal

Inferior



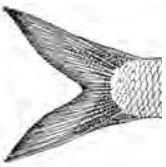
Tail Types

Heterocercal

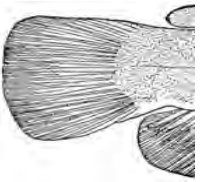


Homocercal

Homocercal: Forked



Homocercal: Round

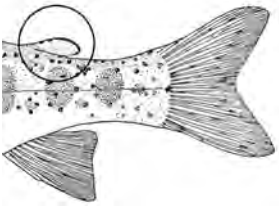


Fin Features

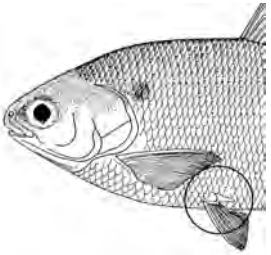
Spine

Ray

Adipose Fin



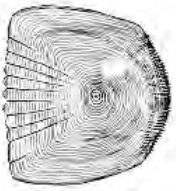
Pelvic Axillary Process

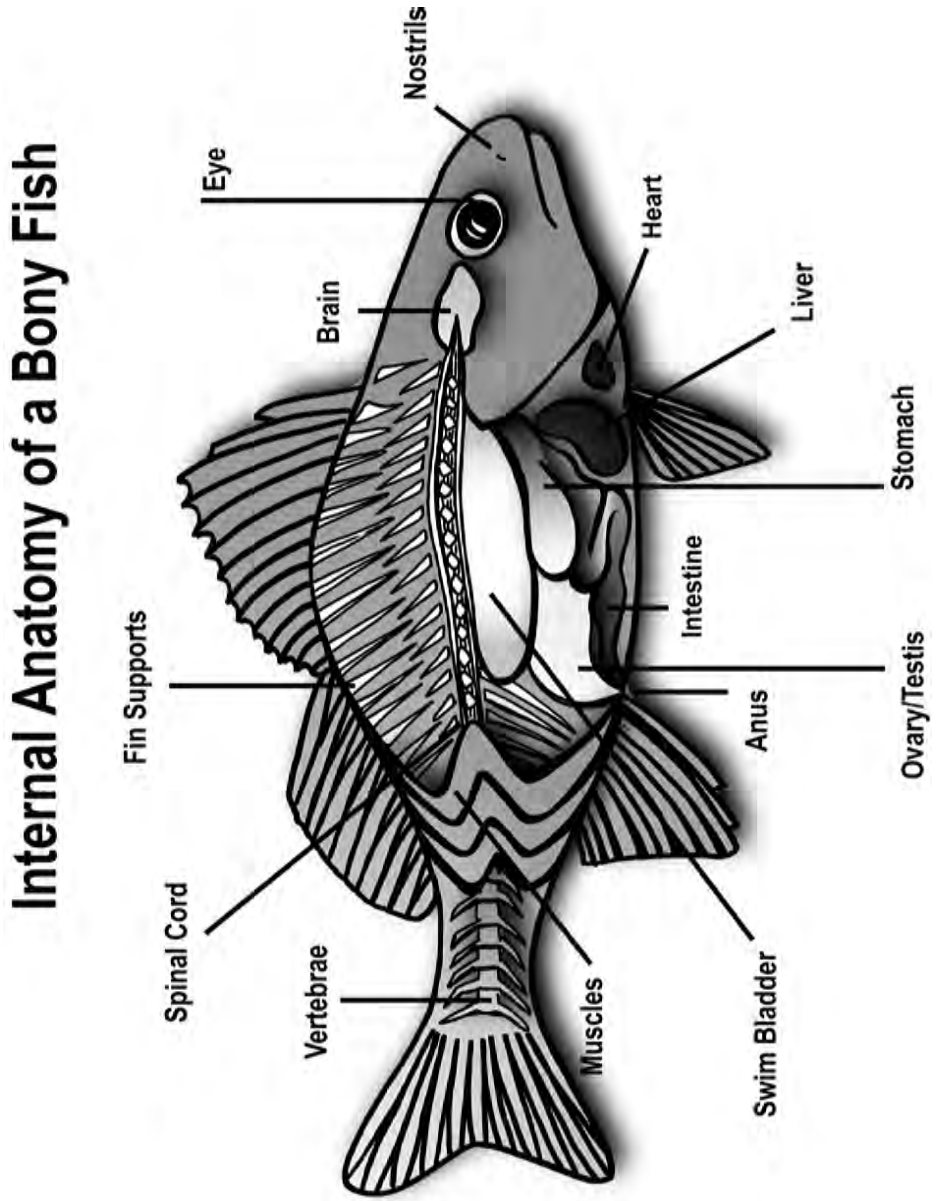


Scale Types

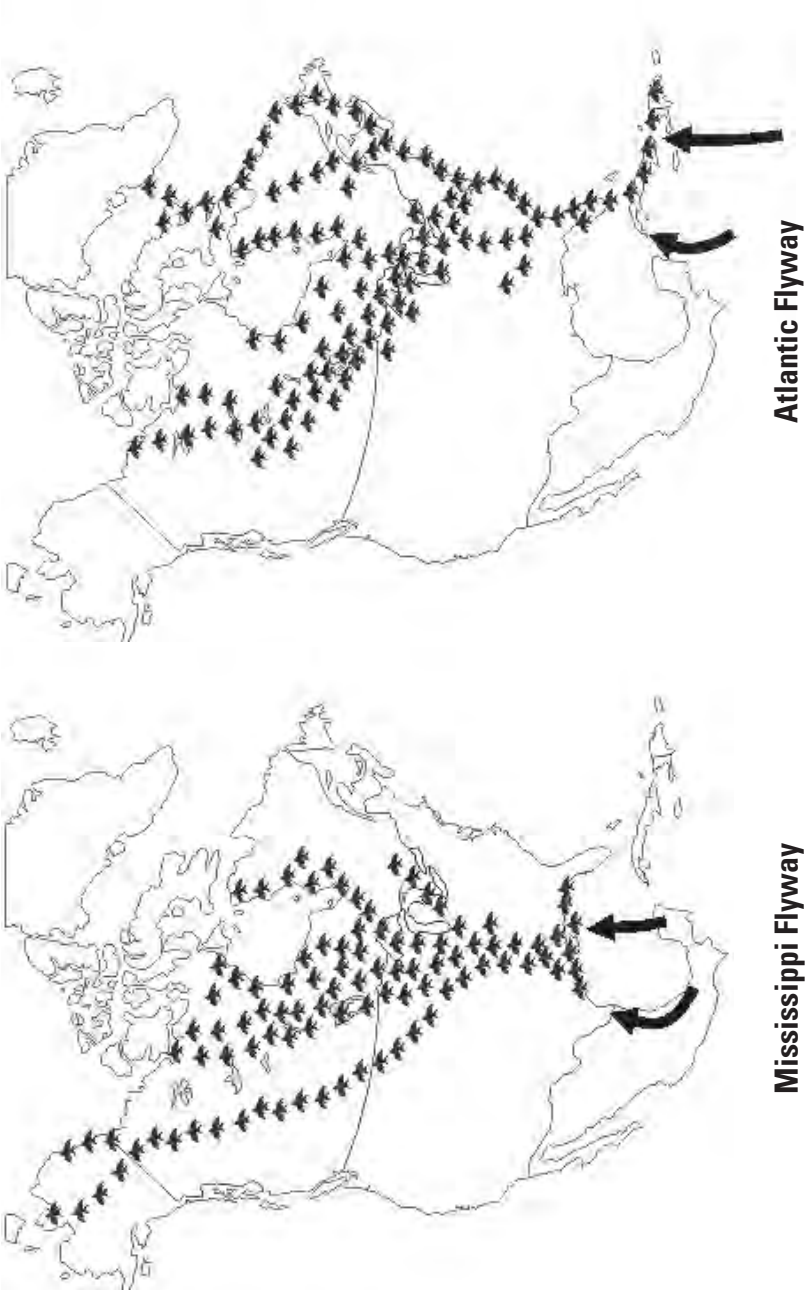
Cycloid

Ctenoid



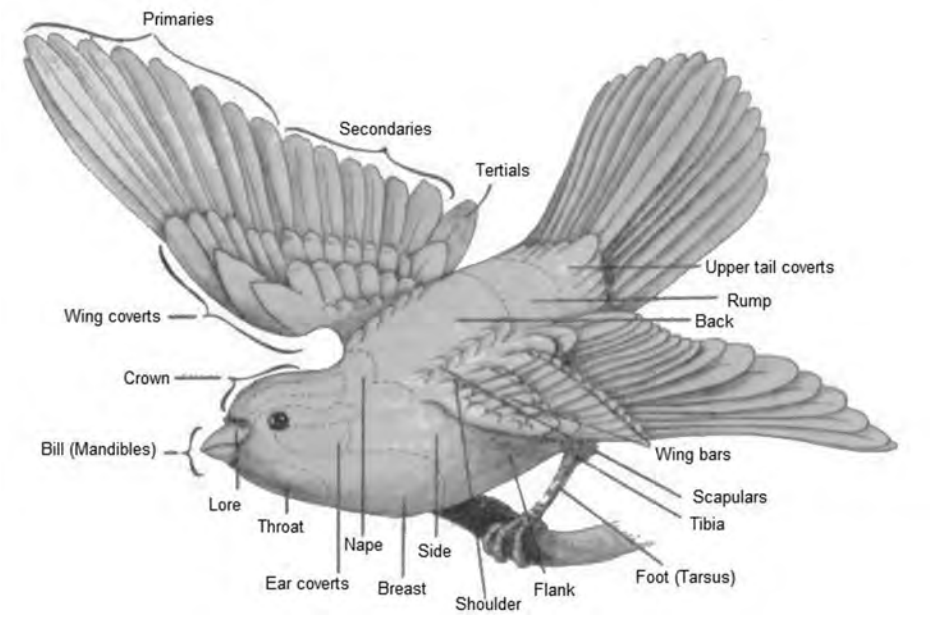

Internal Anatomy of a Bony Fish
Nostrils
Eye
Brain
Heart
Liver
Stomach
Intestine
Fin Supports
Spinal Cord
Vertebrae
Muscles
Swim Bladder
Anus
Ovary/Testis

Migratory Flyways Crossing the Great Lakes



http://www.tpwd.state.tx.us/

Distinguishing Characteristics of Birds



Beak Types

Catches fish

Cormorant

Gleans from bark

Woodpecker

Cracks seeds

Finch

Catches insects

Swallow

Foot Types

Lobed

Perching

Webbed

Talon

Bird Checklist

Waterfowl (family Anatidae)

- ❑ Mallard Duck
- ❑ Bufflehead Duck
- ❑ Red-Breasted Merganser
- ❑ Canada Goose
- ❑ Swan
- ❑ Wood Duck
- ❑ Other _____

Birds of Prey (order Falconiformes)

- ❑ Red-Tailed Hawk
- ❑ Bald Eagle
- ❑ Osprey
- ❑ Cooper's Hawk
- ❑ American Kestrel

Herons (family Ardeidae)

- ❑ Great Blue Heron
- ❑ Green Heron
- ❑ Black-Crowned Night-Heron
- ❑ Snowy Egret

Gulls (family Laridae)

- ❑ Ring-Billed Gull
- ❑ Herring Gull
- ❑ Bonaparte's Gull
- ❑ Great Black-Backed Gull

Terns (family Sternidae)

- ❑ Caspian Tern
- ❑ Common Tern

Woodpeckers (family Picidae)

- ❑ Northern (Yellow-Shafted) Flicker
- ❑ Downy Woodpecker
- ❑ Red-Bellied Woodpecker

Owls (family Strigidae)

- ❑ Great Horned Owl
- ❑ Screech Owl

Pigeons & Doves (family Columbidae)

- ❑ Mourning Dove
- ❑ Rock Dove (Common Pigeon)

Perching Birds (order Passeriformes)

- ❑ Yellow-Rumped Warbler
- ❑ Yellow Warbler
- ❑ Magnolia Warbler
- ❑ American Robin
- ❑ Red-Winged Blackbird
- ❑ Common Crow
- ❑ Blue Jay
- ❑ Barn Swallow
- ❑ Tree Swallow
- ❑ Northern Cardinal
- ❑ House Finch
- ❑ Purple Finch
- ❑ American Goldfinch
- ❑ English Sparrow (House Sparrow)
- ❑ Song Sparrow
- ❑ White-Throated Sparrow
- ❑ White-Crowned Sparrow
- ❑ Baltimore Oriole
- ❑ House Wren
- ❑ Brown Creeper
- ❑ White-Breasted Nuthatch
- ❑ European Starling
- ❑ Common Grackle
- ❑ Red-Eyed Vireo
- ❑ Eastern Kingbird
- ❑ Other _____
- ❑ Other _____

Others

- ❑ Coot (family Rallidae)
- ❑ Belted Kingfisher (family Alcedinidae)
- ❑ Turkey Vulture (family Cathartidae)
- ❑ Chimney Swift (family Apodidae)
- ❑ Ruby-Throated Hummingbird (family Trochilidae)
- ❑ Double-Crested Cormorant (family Phalacrocoracidae)

Common Plants of Lake Erie

Ohio's plant species are very diverse with over 2,000 species catalogued, ranging from delicate ferns to stout trees. In addition, over 900 species in the Great Lakes region can be categorized as wetland or aquatic plants. Some plants you might see on Gibraltar Island are poison ivy (an important food source for migrating birds...but don't touch!), Queen Anne's lace (also called wild carrot), wild grape, Virginia creeper, harebell, and non-native garlic mustard. A few species you might see growing in the water around the island are tape-grass, pondweeds, coontail, and non-native Eurasian water-milfoil.

Early Plant Use

Burdock: Used by the early settlers and Iroquois Indians as greens in their diet.

Catnip: A tea made from this mint family member can ease a stomachache.

Dandelion: Slowly cooked dandelion roots can be made into a coffee substitute. The leaves and the shoots are edible and high in Vitamin A.

Jewelweed: The juicy plant stalks rubbed on the skin can take the sting out of stinging nettles or relieve the itch from poison ivy. The seeds that explode from the plant when touched are edible.

Milkweed: The sap will dry up warts if applied twice a day for 7 days. Very young shoots and young pods can be eaten after several boilings.

Poke weed: Poisonous berries and roots, colonists used berry juice as a dye.

Queen Anne's Lace (Wild Carrot): Indians used this plant to fight diabetes. The root is edible; this is the same species as our garden carrot—minus the orange color.

Shagbark Hickory: The nuts can be eaten raw or cooked.

Staghorn Sumac: Crush or steep the berries and filter the liquid to make a cold or hot tangy drink (Indian lemonade). Be certain to filter the fine hairs using cheese cloth.

White Pine: The inner bark is used as an ingredient in commercial cough syrups. Steeping the needles in boiling water can make a tea high in Vitamin C.

Yarrow: A poultice made from the leaves has antiseptic qualities and the root will ease the pain of a toothache.

Edible Plants Checklist

- ❑ Asparagus
- ❑ Black Raspberry
- ❑ Burdock
- ❑ Catnip
- ❑ Dandelion
- ❑ Fox Grapes
- ❑ Garlic Mustard (invasive)
- ❑ Ginkgo
- ❑ Hackberry
- ❑ Jewelweed
- ❑ Milkweed
- ❑ Mulberry
- ❑ Oak
- ❑ Paw Paw
- ❑ Pignut Hickory
- ❑ Plantain
- ❑ Purslane
- ❑ Queen Anne's Lace
- ❑ Salsify (Goat's Beard)
- ❑ Shagbark Hickory
- ❑ Staghorn Sumac
- ❑ Sugar Maple
- ❑ Sweet Gum
- ❑ Violet
- ❑ Wild Onion
- ❑ Wild Roses
- ❑ Wild Strawberry
- ❑ Witch Hazel
- ❑ Yarrow

The History of Gibraltar Island

15,000 years ago

Ice Age glaciers covered this part of Ohio with ice over a mile thick! Glacial Grooves formed as glaciers carrying large boulders advanced toward the southwest.

1812

Perry's Lookout: On the northeast shore is a lookout where Oliver Hazard Perry reportedly watched for the British fleet prior to the battle of Lake Erie.

1852

Half of Gibraltar was granted by Alfred P. Edwards for a monument honoring Commodore Oliver H. Perry's naval victory on Lake Erie, 10 September 1813.

1864

Jay Cooke, Civil War financier, purchased Gibraltar Island for $3,001.00

1865

Cooke built an elaborate 15-room Victorian home which he called his castle. The Cooke family visited the castle every year until Jay Cooke died in 1905. Perry's Cornerstone was constructed to commemorate the Battle of Lake Erie.

1880s

Laura Cooke Barney built Barney Cottage to use as a residence for Guests on the island.

Commodore Perry

Jay Cooke

Perry's Cornerstone

Barney Cottage

Cooke Castle

The History of Gibraltar Island

Julius Stone

Stone Laboratory

Gibraltar House

1925

Julius Stone purchased the island and immediately presented the property to Ohio State's Board of Trustees for the Lake Laboratory. The laboratory was named after Julius' father, Franz Theodore Stone.

1929

Stone Laboratory building opened for research and teaching. Today the building provides classrooms, office space, library, bookstore, and computer room. The Dining Hall was also constructed in the same year.

1930

Stone Cottage constructed for family use by Julius Stone. Today it provides housing for instructors, visitors and guests. Gibraltar House was built for the caretaker; now provides housing for laboratory staff.

1981

FOSL: Friends of Stone Lab began as a support group for Stone Lab.

1985

Harborview House was constructed as a modern dormitory for students.

1991

Bat house constructed by FOSL using lumber salvaged from demolition of Jay Cooke's boathouse.

1996

Waldock Gazebo and Lakeview Pavillion constructed with funds donated by Jack Waldock, past Chair of the Northwest Sea Grant Advisory Committee and member of the Director's Advisory Council.

Harborview House

Waldock Gazebo

STONE LABORATORY

This Certifies That

_____

Has Successfully Completed A Program of Study at
Franz Theodore Stone Laboratory On Lake Erie

_____

Instructor

NOTES

stonelab.osu.edu

Image Credits

Balcer, M.D., N.L. Korda & S.I. Dodson. 1984. Zooplankton of the Great Lakes: a guide to the identification and ecology of the common crustacean species. University of Wisconsin Press, Madison.

Bowe, L.M. 1985. The fossil fauna of the islands region of western Lake Erie: CLEAR TR-294, Ohio Sea Grant GS-006. Ohio Sea Grant College Program, Columbus.

Faaborg, J. 1988. Ornithology: an ecological approach. Prentice Hall, Englewood Cliffs, NJ/Addison-Wesley, Chicago.

Froese, R. & D. Pauly, eds. 2007. FishBase. World Wide Web electronic publication: *www.fishbase.org*, version (02/2007).

Murphy, B.R. & D.W. Willis, eds. 1996. Fisheries techniques, 2nd ed. American Fisheries Society, Bethesda.

Needham, J.G. & P.R. 1962, 1988. A guide to the study of fresh-water biology. Holden-Day, Inc., Oakland/McGraw-Hill, New York.

Nichols, S.J. & M.G. Black 1994. Identification of larvae: the zebra mussel (Dreissena polymorpha), quagga mussel (Dreissena rosteriformis bugensis), and Asian clam (Corbicula fluminea). Can. J. Zool. 72:406-417.

Smith, C.L. 1985. The inland fishes of New York state. New York State Department of Environmental Conservation.

Taft, C.E. & C.W. 1971, 1990. The algae of western Lake Erie: Bulletin of the Ohio Biological Survey, 4(1). The Ohio State University-College of Biological Sciences/Ohio Sea Grant College Program, Columbus.

Trautman, M.B. 1981. The fishes of Ohio, revised ed. The Ohio State University Press/Ohio Sea Grant College Program, Columbus.

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