



**LAKE ECOLOGY EDUCATION PROGRAM (L.E.E.P.)
ECO-EDUCATION
FALL OUTDOOR LAB MANUAL**

NAME: _____ **HOUR** _____

<u>LAB MODULE NAME</u>	<u>PAGE</u>	<u>POINTS</u>
Critical Habitat	2-5	_____ (55)
Water Quality	6-7	_____ (40)
Aquatic Plants	8	_____ (50)
Canoeing Safety/Skills		_____ (10)
	TOTAL	_____ (155)

INSTRUCTOR COMMENTS:

Critical Habitat Designation Descriptions



Biologically Diverse Submerged Aquatic Plants produce oxygen through photosynthesis and use nutrients that might otherwise fuel midsummer algae blooms. Submerged aquatic plants also provide spawning and nursery areas for certain types of fish; northern pike and yellow perch lay their eggs on aquatic plants.



Submerged Aquatic Vegetation Important to Fish and Wildlife Habitat. Aquatic plants provide food for waterfowl and habitat for insects, invertebrates, zooplankton, and many species of fishes. Specifically, the leaves and stems of aquatic plants are colonized by invertebrates offering forage opportunities for fish.



Emergent and Floating Leaf Vegetation help prevent shoreline erosion by stabilizing shoreline sediments and buffering wave action. The floating leaves offer shade and shelter for fish, reptiles, and invertebrates. The seeds of emergent and floating leaf plants are eaten by waterfowl including mallard, pintail, ringneck, and scaup. Muskrats and beaver also eat the rhizomes.

Rush Beds trap and prevent silt carried by waves from covering gravel used by bass and panfish for spawning. Bulrushes and other Rushes also reduce shoreline erosion by absorbing wave energy and stabilizing bank sediments. Rushes provide food and nesting material for muskrats, waterfowl, and marsh birds.



Wild Rice is valued by some waterfowl during migration specifically Sora rails. Red-wing blackbirds will also move into rice beds as the grains mature and consume the rice grains. Muskrats use the wild rice stems as both a food source as well as construction material for building their lodges.

Extensive Riparian Wetlands are spawning grounds for northern pike, nurseries for fish and ducklings, critical habitat for shorebirds and songbirds and lifelong habitat for some frogs and turtles. Wetlands also provide essential habitat for smaller aquatic organisms in the food web, including crustaceans, mollusks, insects, and plankton. Wetland vegetation provides food and cover for waterfowl, muskrats, and other wildlife. Wetlands also help keep lakes and rivers clean by filtering sediments and excess nutrients. Wetlands slow down the flow of water and act like natural sponges to reduce flooding, stabilize stream flow and lake levels, and provide recharge for groundwater.



Woody Habitat is critical for all kinds of aquatic and terrestrial life. Water insects such as mayflies graze on the algae that grow on decomposing wood. Dragonfly nymphs hunt prey among the stems and branches. Fish often find food, shelter, or nesting habitat among these fallen trees. Above water, ducks and turtles loaf and sun themselves on the trunks. Muskrats use the trees as feeding platforms.



Spawning Substrate Walleyes use clean gravel along wind swept shores for spawning. Aquatic insects, crayfish, rock bass, and smallmouth bass also hide and forage among the rocks and gravels.

Water Quality Physical features of lakes and streams that ensure protection of water quality. Physical features that protect water quality include stands of aquatic plants (that protect against erosion and so minimize sedimentation), natural streambed features such as riffles or boulders (that cause turbulent stream flow and so provide aeration), and natural ground water springs.



Natural Scenic Beauty –Reaches of bank, shore or bed that are predominantly natural in appearance (not man-made or artificial) or that screen man-made or artificial features. Reaches include those with stands of vegetation that include intermixed trees, shrubs and grasses; stands of mature pines or other conifer species; bog fringe; bluffs rising from the water's edge; beds of emergent plants such as wild rice, wild celery, reeds, arrowhead.

Navigation Thoroughfares are areas traditionally used for navigation during recreational boating, angling, hunting or enjoyment of natural scenic beauty. Physical features indicative of navigation thoroughfares include shallow water areas typically used by wading anglers or areas frequently occupied by regularly repeated public uses such as water shows.



**OUTDOOR CRITICAL HABITAT
MODULE LAB**

Team Members:

Materials: Get the following materials from your instructor/assistant:

- Printed Map previously made in computer lab session
- Laminated photo guide of critical habitat designations
- Copy of the “Aquatic Plants Field Guide” if available (one per team of two)
- Canoes with two paddles
- Aqua View tube (one per team of four)
- Clip board, plastic bag, pencil and lab sheet (one per team of two)
- Camera (one per team of four)
- Proper fitting life jackets and keep it on for the entire activity

Directions- After getting the equipment:

- Assemble on dock for canoe assignment and instruction
- Pair up in canoes and follow map and canoe to the marker buoys
- Survey each Critical Habitat area to determine type
- Take a photo of each area and marker buoy
- Mark lab sheet with types of critical habitat (some have multiple types)
- Paddle to other selected areas and repeat tasks
- Return to canoe dock when complete
- Clean out canoe and return equipment
- Clean and dry Aqua View Tube and other equipment
- Fill in lab sheets and check for completeness and sign your names
- Turn in lab sheet, map, camera and other supplies

Describe your contributions to your groups work? (This may be used after the field by the instructor) (5 pts)_____

Short Essay Questions: (5pts)_____

1. How did this activity impact you and your attitude toward how you will use the lakes in the future? (5 pts)_____

2. Your thoughts on why critical habitat designations are “Critical”? (5 pts)_____

**OUTDOOR CRITICAL HABITAT
SELECTION ANALYSIS MODULE LAB**

Directions:

Paddle to critical habitat area, look on and into the water between the marker buoys using the Aqua View Tube for different types of habitat. For each site, select the proper description options (A,B,C,D,E) and mark in the ID space. (there can be more than one). Take a picture of each of your sites.

<u>CRITICAL HABITAT TYPE</u>	<u>SITE NUMBER</u>	<u>ID</u>
Description options (see attached photo examples)	MEC 5	_____ (5 pts)_____
	MEC 16	_____ (5 pts)_____

A) Submerged Aquatic Vegetation
(under water vegetation)

B) Emergent and Floating Vegetation
(vegetation that is growing through the surface or floating)

C) Rush Beds
(reed or grass like growing up from bottom usually clusters of brown spikelets)

D) Woody Habitat
(Fishsticks, submerged trees)

E) Extensive Riparian Wetland
(usually large areas or sections of a lake that include in water and shoreland habitat.)

AQUATIC PLANTS:

Collect aquatic plants in the plastic bag while canoeing and while on shore use the supplied “Aquatic Plants Field Guide” to identify as many species of aquatic plants that you collected. Five points for each plant successfully identified.

- | | |
|----------|---------------|
| 1. _____ | (5 pts) _____ |
| 2. _____ | (5 pts) _____ |
| 3. _____ | (5 pts) _____ |
| 4. _____ | (5 pts) _____ |
| 5. _____ | (5 pts) _____ |

TOTAL CRITICAL HABITAT POINTS (55 pts) _____

WATER QUALITY FACTORS

FACTOR	DEFINITION	IMPORTANCE	ACCEPTABLE
Turbidity	Water clarity soil/algae/plankton/ Microbes	Affects water temperature/ oxygen/photosynthesis/ clog fish gills/spawning	50 NTU
Dissolved Oxygen	Oxygen in water More in cold, shade, Running water	For fish to breathe	4-5 mg/L
Phosphorus Phosphate	Plant growth fertilizer, animal Wastes	Cause eutrophication and fish kills	Less than .1 mg/L
Acidity	pH 1-6 range 7-neutral-water	Affects oxygen use by organisms	5.5- 7.5- most fish 6.5- 8.2- optimal
Alkalinity (Base)	pH 8-14 range 7-neutral-water In rocks/soils	Buffers (neutralizes) acids	100-200 mg/l- best
Nitrate	In fertilizers Septic systems	Cause eutrophication fish kills	Unpolluted water < 1 mg/L
Temperature	Certain species can't tolerate warm water		Most fish: 35-65 degrees F

OUTDOOR WATER QUALITY MODULE LAB

Team Members:

Materials: Get the following materials from your instructor before you get on the pontoon boat and return in good order when the lab is completed:

- Proper fitting life preserver
- This lab/pencil/clip board
- Oxygen/temperature meter
- Secchi disk
- Ph paper
- Cup to collect water sample
- Aquatic Chemical Factors Sheet

Directions: *Keep the life preserver on at all times when aboard the boat/canoe and keep close to your partner! Stay seated anytime the boat is moving and always in the canoe!* Use the above equipment to gather data as directed by your instructor and as you learned during the indoor session.

Use the meter to determine the temperature and dissolved oxygen at 5 foot increments:

Oxygen (10 pts) _____
Surface 5 ft. 10ft. 15ft. 20ft. 25ft. 30ft. 35ft. 40ft. 45ft. bottom

Temperature (10 pts) _____
Surface 5 ft. 10ft. 15ft. 20ft. 25ft. 30ft. 35ft. 40ft. 45ft. bottom

Acidity/Alkalinity: take a small sample of water in your cup and test with pH paper
What was the pH? _____ (5 pts) _____

Is it an acidic/alkaline/neutral? _____ (5 pts) _____

Turbidity/clarity: Use the secci disc to determine turbidity/clarity (how clear the water is): Holding on to the cord, drop the disc into the water on the shady side of the boat until you can not see the secci disc. Retrieve the disc and determine how many feet down it was. *Be sure to not lose the disc!*

What was the water clarity in feet? _____ (10 pts) _____

TOTAL WATER QUALITY PIONTS (40 pts) _____

1. Provided other factors are okay, what do you think of the water quality of this lake?

OUTDOOR AQUATIC PLANT MODULE LAB

Team Members:

Materials: Get the following materials from your instructor/assistant:

- Clip board/pencil
- Resource book *Through the Looking Glass* and *Lake Plants You Should Know*

Directions:

1. Take one of the sample plants from the “bucket” or raked from the shore as requested by the instructor/assistant
2. Look at samples and through the resource books and identify the plant
3. Also tell what type of plant you have (emergent (E)/ free floating (FF)/ submersed (S)/ floating leaf (FL) and if native (N) or invasive (I)
4. Identify your plant and show it to your instructor/assistant. You will receive a “sticker” for your name tag/lab if correct.
5. Return the plant to the “alternate bucket” and select the next plant until you have completed all the samples/as many as time will permit.
6. If you correctly identify 8 plants the instructor may ask you to collect and identify a plant/s from the lake with the rake.

SAMPLE	PLANT NAME (From Text)	TYPE (E/FF/S/FL)	NATIVE/INVASIVE (N/I)	(pts)
1.	_____	_____	_____	(5 pts)
2.	_____	_____	_____	(5 pts)
3.	_____	_____	_____	(5 pts)
4.	_____	_____	_____	(5 pts)
5.	_____	_____	_____	(5 pts)
6.	_____	_____	_____	(5 pts)
7.	_____	_____	_____	(5 pts)
8.	_____	_____	_____	(5 pts)
9.	_____	_____	_____	(5 pts)
10.	_____	_____	_____	(5 pts)

TOTAL AQUATIC PLANTS POINTS (50 pts) _____

Assessment: Write below or on back what you think the major problems are with an invasive aquatic plant species and how we can prevent their spreading to other lakes. Explain what YOU can do to prevent the spread of aquatic invasive species.

