



**LAKE ECOLOGY EDUCATION PROGRAM (LEEP)
FALL OUTDOOR LAB MANUAL**

NAME: _____ **HOUR** _____

<u>LAB MODULE NAME</u>	<u>PAGE</u>	<u>POINTS</u>
Critical Habitat	2-3	_____ (50)
Water Quality	4-5	_____ (40)
Aquatic Plants	6	_____ (50)
Plankton Module	7	_____ (25)
Fish Management	8-9	_____ (30)
Canoeing Safety/Skills		_____ (10)
	TOTAL	_____ (205)

LAB NOTES:



CRITICAL HABITAT OUTDOOR LAB

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

- Laminated photo guide of critical habitat designations.
- Canoes with two paddles.
- Aqua View tube (one per team of four).
- You should have a pencil and lab book.
- Camera.
- 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 paddle 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.
- Complete the Post Lab Work discussion/Critical thinking questions.
- Fill in lab sheets and check for completeness and sign your names.
- Have your instructor check, total and initial your points, putting them on the cover page of this lab manual.

***These Summary Questions are for AFTER the Lab Work has been completed. ***

Describe your contributions to your groups work. (5 pts)_____

Short Essay Questions:

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) and mark in the ID space (there can be more than one). Take a picture of each of your sites.

CRITICAL HABITAT DESIGNATION DISCRPTIONS

(Use the laminated photo sheet for examples)

	<u>SITE NUMBER</u>	<u>ID</u>
A. Submerged Aquatic Vegetation (underwater vegetation)	Bony #1	_____ (5 pts)_____
B. Emergent and Floating Vegetation (vegetation that is growing through the surface or floating)	Bony #2	_____ (5 pts)_____
C. Rush Beds (reed or grass like growing up from bottom usually clusters of brown spikelets)	Bony #3	_____ (5 pts)_____
D. Woody Habitat (fishsticks, submerged trees)		

Name the Organisms That Depend on Critical Habitat:

List the Names of 2 Mammals, Amphibians, Insects, Fish, Reptile or Birds that would be found in each of the 4 Critical Habitat Types: (Do not use more than once)

Critical Habitat Description Types (listed above)

<u>C H TYPE:</u>	<u>Animals Listed</u>	
A.	_____	(5 pts) _____
B.	_____	(5 pts) _____
C.	_____	(5 pts) _____
D.	_____	(5 pts) _____

TOTAL CRITICAL HABITAT POINTS (50 pts)_____



WATER QUALITY OUTDOOR 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 manual/pencil/clip board/camera.
- Thermometer and chemette set.
- Secchi disc.
- pH paper.
- Vial 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.

Oxygen

Use the chemette set to determine surface oxygen only _____ (10 pts)_____

Temperature: Use the meter to get the water temperature at the following depths:

	Surface	10 feet	20 feet	30 feet	40 feet
Temperature					

(10 pts)_____

Acidity/Alkalinity: take a small sample of water in your cup and test with pH paper

What was the pH? _____ (5 pts)_____

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

Turbidity/clarity: Use the Secchi 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 cannot see the disc. Retrieve the disc and determine how many feet down it was.

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

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

TOTAL WATER QUALITY POINTS (40 pts)_____

WATER QUALITY RESOURCE TABLE

Factor	Indicates	Affected by	Effects on lake	Method	Acceptable Range
Turbidity	Water clarity	sediment, algae, tannins	Temperature, photosynthesis, clogs gills, spawning	Secchi disc	Clearer is better
Dissolved Oxygen	Oxygen available in water	Higher in cold water, wind, storms, shade, running water, springs	Respiration: breathing for fish, insects, bacteria	Chemettes	Greater than 5, but less than 15 mg/L
Temperature	Warm/cold	Air temperature, season, sun, wind, depth of lake	Algae growth increases, Dissolved oxygen decreases	Thermometer	35-65 F (most fish prefer)
pH	Acidity	Sediment, type of substrate and rock, pollution	Which species can live in that lake	pH paper	5-9 (7 is neutral)
Phosphates	Possible pollution	Fertilizer or animal waste	Increased plant/algae growth, killing fish	Lab test	< 0.1 mg/L
Nitrates	Possible pollution	Fertilizer, septic systems	Increased plant/algae growth, killing fish	Lab test	<1 mg/L

pH Color Codes

EFFECTS OF ACIDITY ON FISH SPECIES (Olszyk 1980)	
pH	Effects
6.5	Walleye spawning inhibited
5.8	Lake trout spawning inhibited
5.5	Smallmouth bass disappear
5.2	Walleye, burbot, lake trout disappear
5.0	Spawning inhibited in many fish
4.7	Northern pike, white sucker, brown bullhead, pumpkinseed, sunfish and rock bass disappear
4.5	Perch spawning inhibited
3.5	Perch disappear
3.0	Toxic to all fish





AQUATIC PLANTS OUTDOOR LAB

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

- Clipboard and pencil.
- Resource book *Through the Looking Glass* and *Lake Plants You Should Know*.

Directions:

1. Take one of the sample plants from the bucket to identify.
2. Compare to pre-collected samples and resource books to identify the plant.
3. 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. Record each plant’s characteristics in the table below.
5. Show your answers to an instructor/assistant and have them initial each line if correct.
6. 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.

Sample #	Plant Name (from text)	Type (E/FF/S/FL)	Native/Invasive (N/I)	
1				(5pts)_____
2				(5pts)_____
3				(5pts)_____
4				(5pts)_____
5				(5pts)_____
6				(5pts)_____
7				(5pts)_____
8				(5pts)_____
9				(5pts)_____
10				(5pts)_____

TOTAL AQUATIC PLANTS POINTS (50 pts)_____

What do 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.



PLANKTON OUTDOOR LAB

Team Members:

Background: *Plankton* are minute aquatic organisms that drift with water movements.

Phytoplankton (plants) comprise mainly **green algae** and **diatoms**, carry out photosynthesis (“primary producers”) and form the base of aquatic food-chains.

Zooplankton (animals) feed on phytoplankton and include small microcrustaceans (**Copepods and Daphnia**) and protozoans (one celled animals). These are barely visible with the naked eye but seen better with the magnifying lens and “dissecting” stereo microscope with low power objective.

Materials:

1. Plankton net (one per two person mini-team; as soon as you empty collection vial, give net to other team member). Rinse clean and share.
2. Clear plastic glass, plastic bulb pipettes, microscope slides (one plain with cover slip, one with central depression but no coverslip).

Directions:

1. Collect plankton while on pontoon: Straighten the net out and tightly attach the collection bottle at the end of the net. The net is expensive, so attach the lanyard loop to wrist.
2. Place the net in the water at side of pontoon, drag under the surface of the water toward and around front end and back other side.
3. Remove net from the water. You should be able to see minute living things in the collection bottle with the magnifying glass. If none present, collect again without emptying collection bottle.
4. When some visible particles are present, carefully remove the collection bottle and our bottle contents into separate covered container.
5. Rinse collection bottle and give to next team at shoreline plankton station, use plastic pipette, to transfer a drop of sample to depression on slide. Observe with dissection microscope, low power. Look for large **copepods** and possibly **Daphnia**
6. Place another small drop on plain flat slide, cover with cover slip, examine through the other microscopes, observe **algae** and **diatoms**.

After each of your identifications, get confirmation from teacher.

	Teacher initials	Points
1. Safely, cooperatively helped collect plankton off dock with net (5 pts)	_____	_____
2. At microscope, identify a COPEPOD and DAPHNIA (zooplankton) . ___ Copepod (5 pts) ___ Daphnia or other “water flea” (5 pts)	_____ _____	_____ _____
3. Identify ALGAE , tiny light <i>green</i> particles with microscope, phytoplankton ___None ___ Few ___Many (5 pts)	_____	_____
4. Identify DIATOMS , tiny geometric shaped algae, phytoplankton ___None ___ Few ___Many (5 pts)	_____	_____

TOTAL PLANKTON MODULE POINTS (25 maximum) _____



FISHERIES MANAGEMENT OUTDOOR LAB

During this module you will be trying two sampling methods that fisheries managers use to find what types of fish are in the lake.

1. What are three methods that fishery managers use to sample a lake? (5 pts)_____

Section 1. SEINING

Directions (NOTE: your instructor will demo how to seine before you go out).

- a. You and your partner will use the net to sample fish. First you must put on waders to go into the water with the net.
- b. Sit down, take your shoes off, and then slide the waders up until your feet are in the boots. Then stand and pull the waders so that you can fasten the top.
- c. One partner will carry the seine out. When you get to the sampling area, the other partner will grab an end and spread the net out. Make sure the lead weights are on the bottom and the floats are on the top.
- d. Using the poles, keep the seine vertical in the water and walk it across the sampling area towards the shore.
- e. When you get to the shore, place the poles on the shore and collect the rest of the net material so that any fish in the seine end up in the middle.
- f. Collect the fish carefully and place them in a bucket.

2. When seining, why is it important to keep the lead weights on the lake bottom? (5 pts)_____

3. How many fish did you catch seining? _____ (5 pts)_____

4. What were the lengths of the fish you caught?

Section 2. MINNOW TRAPS

Directions:

- a. Fill a bucket halfway with lake water.
- b. Pick one partner to put on waders to enter the water and collect a minnow trap. The other partner will remain on the shore with the bucket nearby.
- c. Make sure you know which minnow trap you should be collecting. Walk out to the minnow trap and pull up the line that the trap is attached to. Be careful to keep the trap horizontal so that fish do not escape.
- d. If there are fish in your trap, walk your trap over to the shore and carefully open the minnow trap over the bucket.
- e. Record how many fish you caught and how long they were below.

1. How many fish did you catch in your minnow trap? _____ **(5 pts)**_____

2. What were the lengths of the fish in your minnow trap?

Carefully followed instructions and attempted both fish collection techniques. **(10 pts)**_____

TOTAL FISH SAMPLING POINTS (30 pts) _____