SPRING LEEP-DAY OUTDOOR LAB MANUAL

NAME: _____ HOUR_____

		Page(s)	Available Points	Points
MODULES	Macroinvertebrates	2-4	**25**	
	Field Notes	5		
	Shoreline Restoration	6-7	**25**	
	Tree Study	8-9	**35**	
	Leaves/Needles Resource Materials	10		
	Cones Resource Materials	11		
SCAVENGER HUNTS	Food/Energy Relationships	12-13	**20**	
	Critical Habitat/Water Quality	14	**20**	
	Aquatic Plant Identification	15	**25**	
CANOEING SAFETY/SKILLS		(Teacher Check)	**10**	
	GRAND TOTAL		**160**	
	Optional Activity (page 8)		***25***	

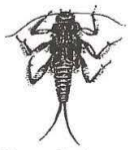
INSTRUCTOR COMMENTS:

Lake Ecology Education Program

INDOOR/OUTDOOR MACRO LAB
PART 1

TEAM MEMBERS:

Group 1: These are sensitive to pollutants. Circle each animal found.


Stonefly Larva


Dobsonfly Larva


Alderfly Larva


Water Snipe Fly Larva

Relative Size Key:
(+) = larger than picture
(-) = smaller than picture

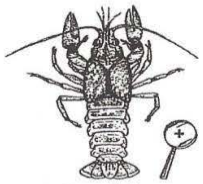
Number of group 1 animals circled: ☐

Group 2: These are semi-sensitive to pollutants. Circle each animal found.

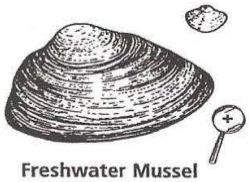

Caddisfly Larva*
*All Caddisfly Larva = 1


Dragonfly Larva


Water Penny

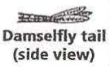

Crawfish


Crane Fly Larva


Freshwater Mussel or Fingernail clam


Mayfly Larva


Damselfly Larva

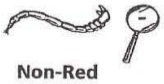

Damselfly tail (side view)

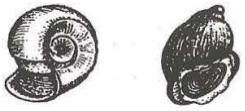

Riffle Beetle Larva*
Riffle Beetle Adult*
*All Riffle Beetles = 1

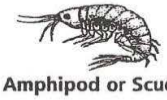
Number of group 2 animals circled: ☐

Group 3: These are semi-tolerant of pollutants. Circle each animal found.


Black Fly Larva


Non-Red Midge Larva


Snails: Orb or Gilled (right side opening)


Amphipod or Scud

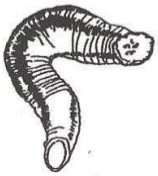
Number of group 3 animals circled: ☐

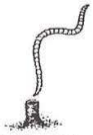
Group 4: These are tolerant of pollutants. Circle each animal found.


Pouch Snail (left side opening)


Isopod or Aquatic Sowbug


Bloodworm Midge Larva (red)


Leech


Tubiflex Worm

Number of group 4 animals circled: ☐

Water Action Volunteers

Collected samples of macros (5 pts)_____

PART 2

1. Calculate how many of each category of ***benthic macroinvertebrates*** you have counted and multiply by the designated number.

	(A)	(B)
Number of animal types from group 1: Sensitive	_____ X 4 =	_____
Number of animal types from group 2: Semi-sensitive	_____ X 3 =	_____
Number of animal types from group 3: Semi-tolerant	_____ X 2 =	_____
Number of animal types from group 4: Tolerant	_____ X 1 =	_____
TOTAL NUMBER OF ANIMAL TYPES (A)	_____	
TOTAL VALUE AFTER MULTIPLYING (B)		_____

Calculated Total Values (5 pts.)_____

2. Calculate the ***Index Score***: divide the total value of (B) by the total number of animal types (A).

$$\text{Index Score} = \frac{(B)}{(A)} = \_\_\_\_\_$$

3. The ***Index Score*** will tell us how healthy our lake/river/wetland is. Circle the appropriate health:

Excellent (index score of 3.6 or higher)

Good (index score of 2.6 - 3.5)

Fair (index score of 2.1 - 2.5)

Poor (index score of 1.0 - 2.0)

Calculated Index Score (5 pts.)_____

4. How did the various types of macroinvertebrates in your sample influence your evaluation of the lake?

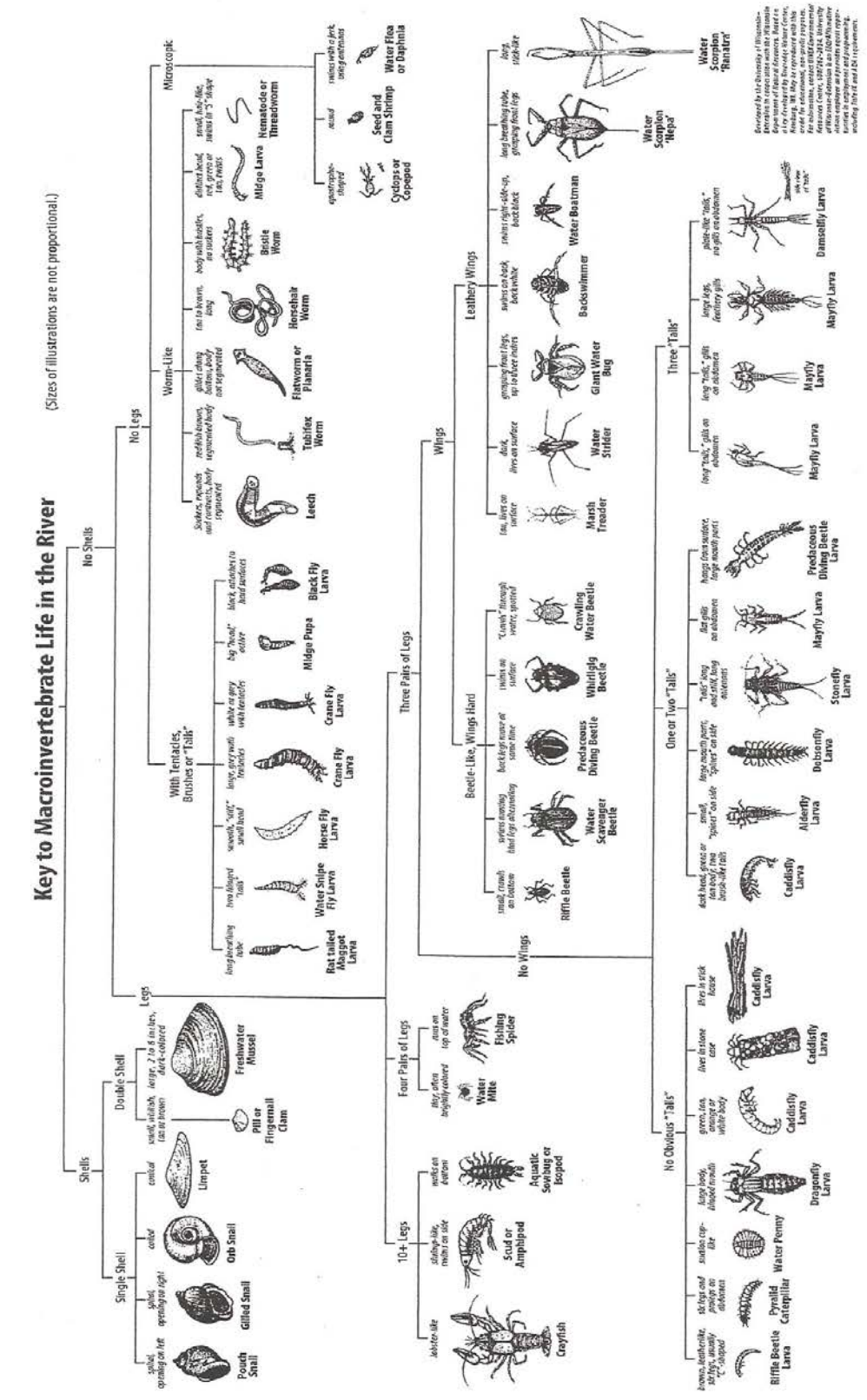
Determined "Health" of lake area (5 pts.)_____

5. List some characteristics that may be affecting the health of the lake area based on the index score that you calculated.

Comment about water resource (5 pts.) _____

TOTAL MACRO POINTS (25 pts.)_____

MACROINVERTEBRATE RESOURCE MATERIAL



FIELD NOTES

Put notes, sketches, questions, suggestions and calculations here as you go through the LEEP Day:

SHORELINE RESTORATION
OUTDOOR LAB

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

- Piece of string one meter long and two "popsicle" sticks
- Pencil, clipboard with graph paper
- Lake map (from indoor activity)
- Transplanting equipment - bucket, shovel/trowel
- Marker flag with number
- Calculator

Directions (after getting the materials above):

- Go to an area selected by your instructor and make a 2 meter circle
- Mark your area with the sticks and your marker flag (in middle)
- Count/Estimate the number of plant types within your circle:

  Wood plants? _____ Forbs/wild flowers? _____ Grasses/sedges? _____

  Counted/Estimated Plants (5 pts.)_____
- Look up in the sky. What kind of light do you have?

  Very bright_____ Shady_____ Very dark_____

  Determined Light (5 pts.)_____
- What kind of soil do you have in your ring?

  Sand_____ Clay_____ Loam_____ Humus_____

  Determined Soil (5 pts.)_____
- What about the slope?

  Very steep_____ Gradual_____ Level_____

  Determined Slope (5 pts.)_____

Now your instructor will provide a variety of plants for you to plant according to instructions.

- Select trees and plants provided that you think might live in your selected ring area and plant as directed. Be sure to water after you plant. ***Show your instructor.***
- Put your marker flag number on your map and graph paper. Map the location of your ring area and list the plants on your graph paper.
- Clean your tools and hand them in with your ***map and graph paper.***

Planted and mapped area successfully (5 pts.) _____

Total Restoration/Reforestation (25 pts.)_____

***(Optional from pg. 8)* Diversity Points (25 pts.)_____**

Teacher Check: Bucket, trowel, string, pencil, clip board, calculator returned

Evaluation: _____ (*teacher initials*) **Followed directions, worked safely.**

Teacher Comment:

OPTIONAL ACTIVITY AS DIRECTED BY INSTRUCTOR (ONLY DO THIS ACTIVITY IF THE INSTRUCTOR DIRECTS YOU TO DO SO):

Before planting anything, determine the biodiversity of your circled area.

Background: In this activity you will measure the plant biodiversity (different plants) in your location using a simplified version of the ***Diversity Index.*** The closer to 1 (one) the ***diversity index*** is, the more diverse and healthy the habitat is. The number of species in your circle could vary significantly based upon location. You will ***not*** need to know the names of each plant. Instead, you can simply tell which type they are or use visual descriptions or sketches to determine different species/types.

Directions: Count/estimate the number of different species **and** the number of each species in your circle and determine the totals for each column. Calculate the ***Diversity Index*** for your area.

Species (name/sketch/detailed description)	**Number of individuals of the species**
Total # of Different Species:	**Total # of Individuals :**

Diversity Index = $\frac{\text{Total \# of Different Species}}{\text{Total \# of Individuals}}$ = _____ (15 pts)_____

What can you say about the diversity of your quadrant area? (5 pts)_____

How does your area compare with other checked areas? (5 pts)_____

Lake Ecology Education Program

TREE STUDY OUTDOOR LAB

TEAM MEMBERS:

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

- Clipboard and pencil
- Tape measure (share)
- Clinometer (share) **Safety glasses!**
- Tree boring tool (share)
- Calculator (share)

Directions: <u>Your team will be directed to a tree by your instructor/assistant.</u>

A. <u>Clinometer:</u> *<u>Be sure to wear the safety glasses.</u>*

1. Determine what kind of tree you are studying: _____ (5 pts.)_____

2. Use the clinometer to determine how high your tree is: _____ (5 pts.)_____

B. <u>Tree Boring:</u>

1. Measure the girth (around) of the tree at chest level_____ (5 pts.)_____
2. Now, carefully take a bore sample (at chest level) of the tree and show it to the instructor/assistant.
   Successfully/Safely collected a bore sample. (5 pts.)_____
3. Now count the number of rings in your bore sample.
   How old is your tree? _____ (5 pts.)_____

C. <u>Tree ID:</u>

With the plastic bag/bucket, collect different leaves/pine cones/needles off the ground. One point for each different leaf/cone/needle/s collected and <u>checked by the instructor</u>.

Jack Pine	(1 pt.) _____	White Pine	(1 pt.) _____
Red Pine	(1 pt.) _____	Spruce	(1 pt.) _____
Maple	(1 pt.) _____	Red Oak	(1 pt.) _____
Popple (Aspen)	(1 pt.) _____	Birch	(1 pt.) _____

Cleaned up and Returned Equipment (2 pts.)_____

TOTAL TREE LAB POINTS (35 pts.)_____

HOW TO USE THE CLINOMETER

The clinometer is used to measure the "slope" of a hill or the height of objects, like trees. Here is what you will need and how to use the instrument to measure the height of an object (tree) selected by your instructor.

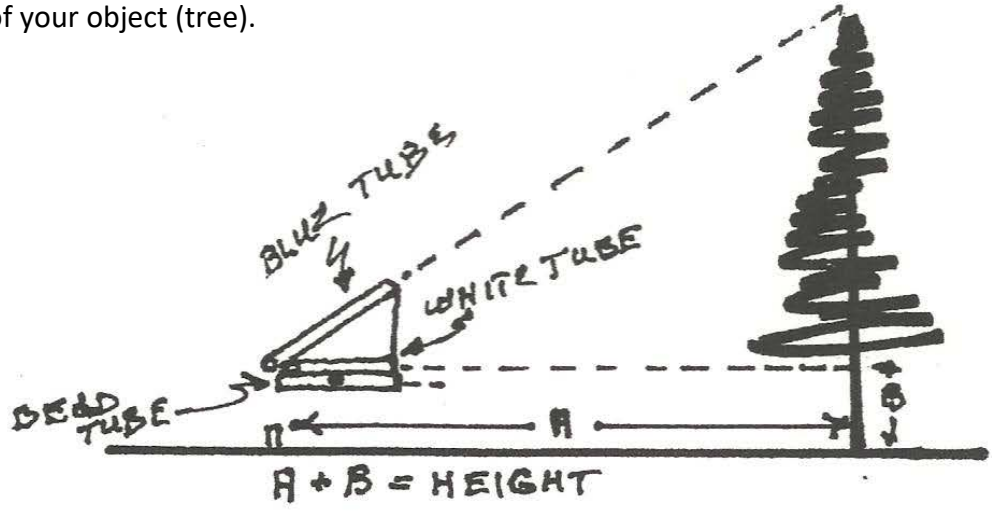
Equipment:

- Safety glasses
- Clinometer
- Measuring tape/meter stick
- Tongue depressor/stick
- Pencil and this lab

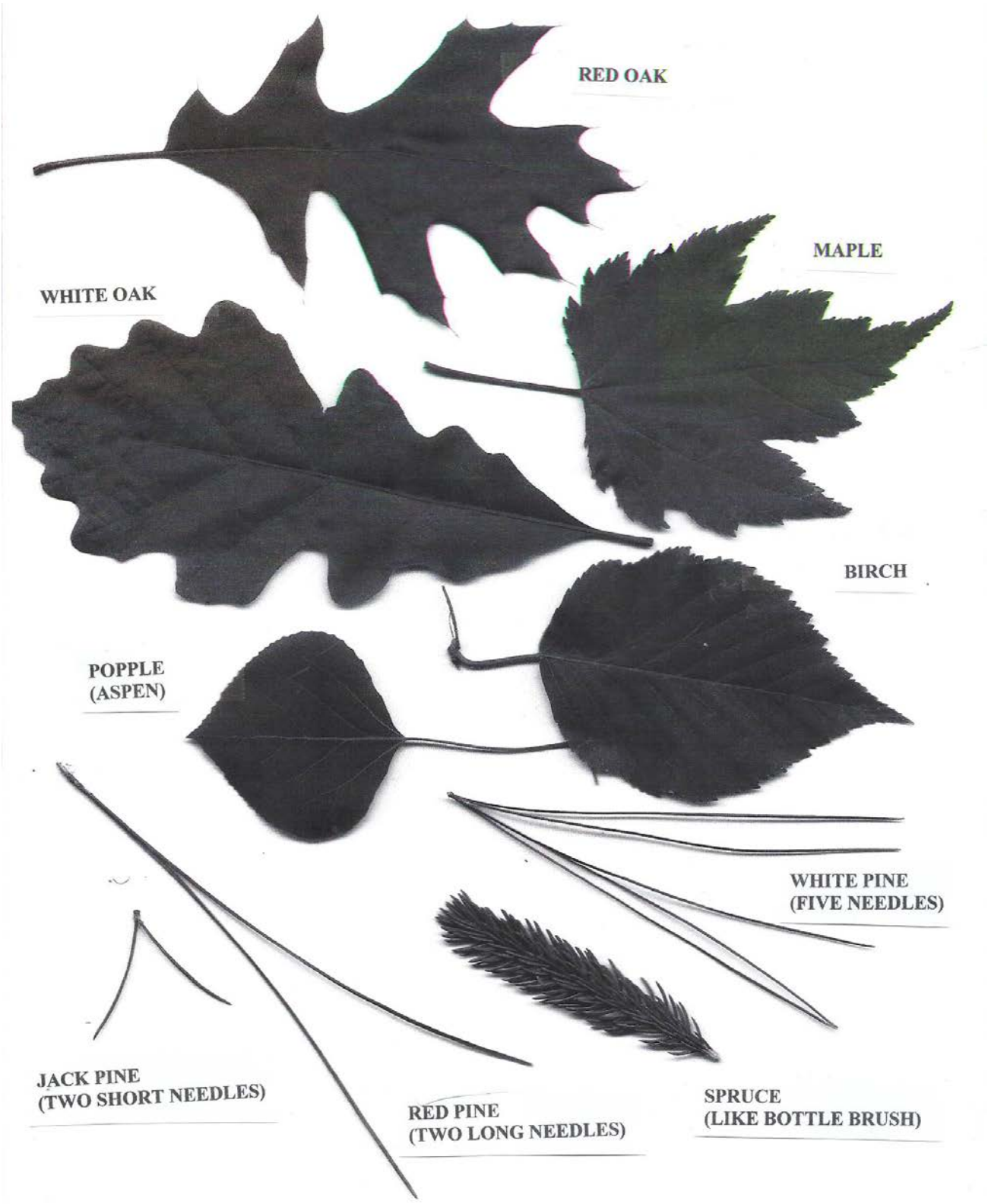
Directions:

You will need three people: One to use the clinometer, one to watch the pendulum level and one "spotter" to make sure nobody gets hurt while moving about and to mark sites.

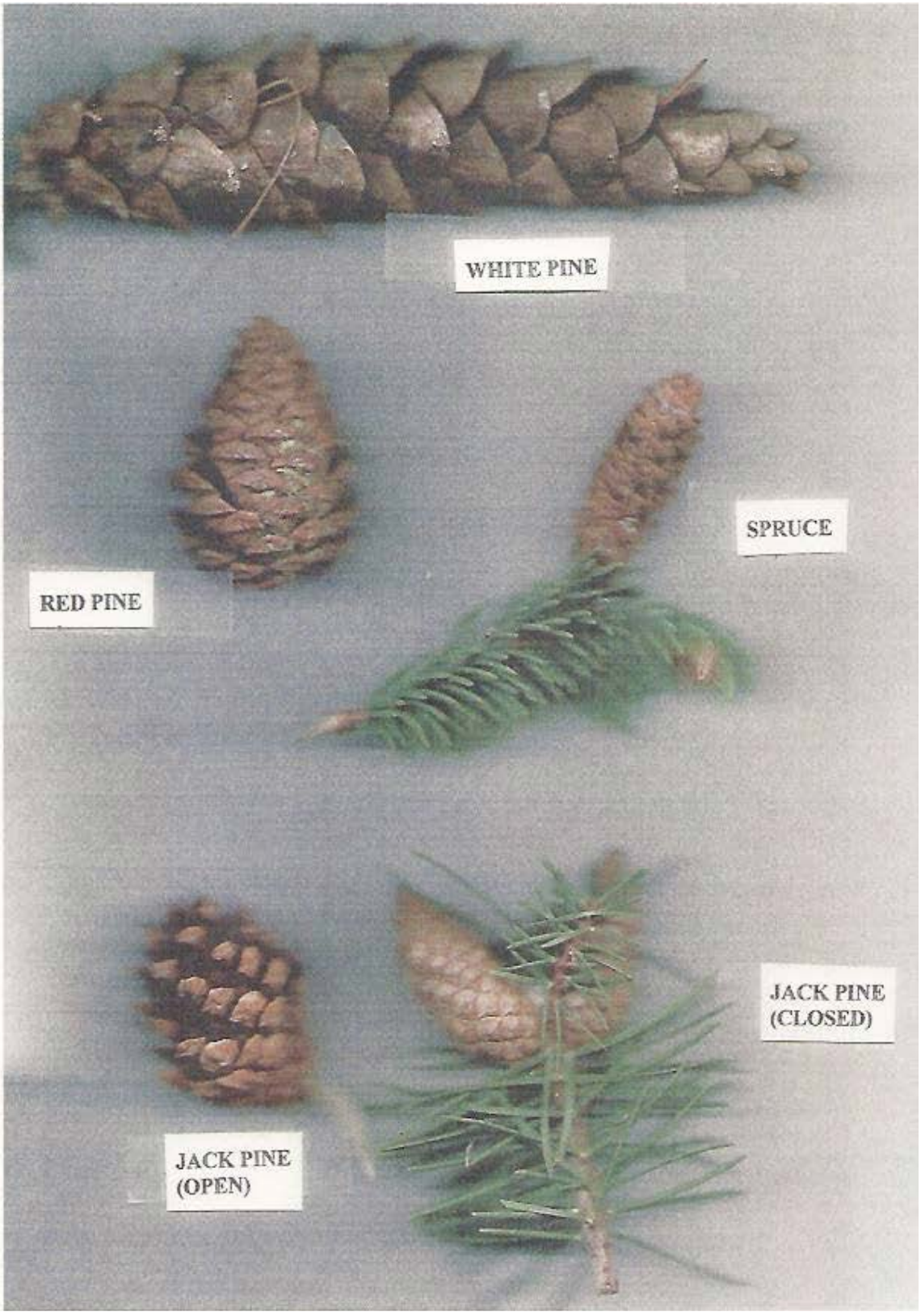
- **First person** stands about as far from the object (tree) as it is "high." Then puts the ***safety glasses*** on and looks through the ***blue*** tube at the top of the object (tree) while keeping the base (bottom) level. Carefully move back and forth until you see the top of the object (tree) and the second person tells you the bottom of the triangle is level.
- **Second person** watches the ***wire pendulum*** making sure it is free to spring and straight down and parallel to the line on the triangle. The bottom of the triangle is then level.
- **Third person** marks designated sites and watches the first person so he/she does not stumble while moving and looking through the blue tube.
- Once the top of the object (tree) has been sighted while keeping the clinometer level, the spotter marks the spot on the ground with the stick.
- First person now looks through the ***white tube*** while keeping it level and the spotter marks the spot on the object (tree). Measure the distance to the object (tree) and the mark on the ground and add the distance from the mark on the object (tree) to the ground. This will be the height of your object (tree).



LEAVES RESOURCE MATERIAL



CONES RESOURCE MATERIAL



SCAVENGER HUNT
"WOODLAND TRAILS"

OUTDOOR FOOD CYCLE/PYRAMID/WEB MODULE

TEAM MEMBERS:

For Terrestrial (land) Study: With your partner and a faculty guide locate and photograph anything alive without hurting them, or "evidence" of living things: leaf, scat, feathers, fur, etc.

Place the organisms/evidence below in a food/energy pyramid. On ***Part 2*** sheet ***"Sketch/draw/label"*** them in a food cycle. Be sure to label them P, C1-C3, D on both sheets and return them to the collected area unharmed. **Have your instructor check each example.**

FOOD/ENERGY PYRAMID

C3 - TERTIARY CONSUMERS (carnivores)

C2 - SECONDARY CONSUMERS (carnivore/omnivore)

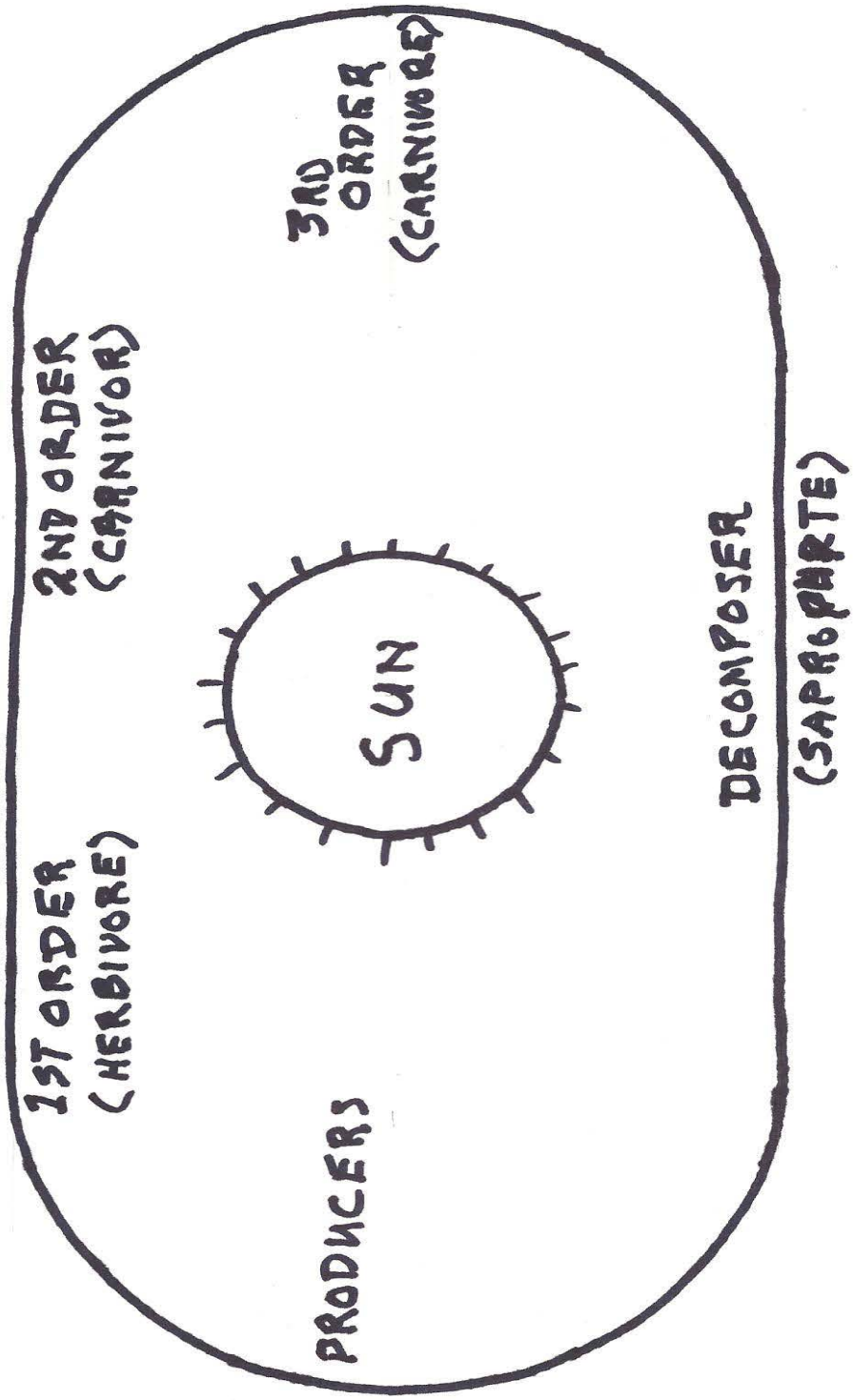
C1 - PRIMARY CONSUMERS (herbivores)

P - PRODUCERS (green plants)

D - DECOMPOSERS: _____

Viewed/Placed Items Correctly (10 pts.)_____

FOOD CYCLE PART 2



Listed/Placed/Connected/Collected Items Correctly (10 pts.)_____

TOTAL FOOD/ENERGY PYRAMID/CYCLE POINTS (20 pts.)_____

SCAVENGER HUNT
AQUATIC STUDIES REVIEW

TEAM MEMBERS:

You should have established canoe partners and "sister" canoes. ***Please do not disturb any plants/animals/nests*** while doing this activity. Keep safety in mind and ***keep your life preserver on at all times*** while in canoes. Calculate your total score after verifying items with your instructor. **Return/release the materials to where you collected them.**

Canoe Segment Materials:

- Canoe/paddle/properly fitted preserver/map of area/critical habitat resource
- Small plastic rake and plastic bag for each canoe pair
- Oxygen/temperature meter located with instructor to share
- pH paper/CHEMettes/student camera

Canoe to area selected by instructor and collect the data/materials to earn points:

BOUY #_____

WHAT IS THE CRITICAL HABITAT DESIGNATION? _____

_____ (5 pts.)_____

WATER QUALITY:
Canoe to WQ Pontoon station. Stay close to your sister canoe to maintain stability and use the instruments provided to collect the following data (have instructor verify your findings):

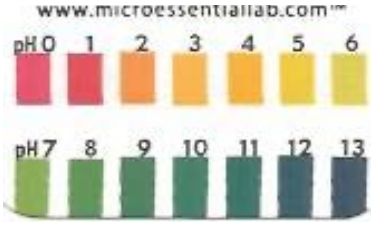
Surface water Temperature: _____ (5 pts.)_____

Surface Dissolved Oxygen : _____ (5 pts.)_____

Surface pH: _____ (5 pts.)_____

TOTAL C. H. AND WATER QUALITY POINTS (20 pts.)_____

pH color code



AQUATIC PLANT COLLECTION/IDENTIFICATION:

With rake carefully collect and identify aquatic plant/s. Bag the plants, bring to shore and have them verified by your instructor. Five points for each different plant you identify.

Sample 1_____ **(5 pts.)**_____

Sample 2_____ **(5 pts.)**_____

Sample 3_____ **(5 pts.)**_____

Sample 4_____ **(5 pts.)**_____

Sample 5_____ **(5 pts.)**_____

Other plants can be identified on the *Field Notes* page for extra credit!

TOTAL AQUATIC PLANT POINTS ***(25 pts.)*** _____

TOTAL COMBINED SCAVENGER HUNT POINTS

(Woodland Trails and Aquatic Studies)

Total Food Cycle/Pyramid/Web points from p. 14 **(20 pts)** _____

Total Critical Habitat and Water Quality points from p. 15 **(20 pts)** _____

Total Aquatic Plant points from p. 16 (above) **(25 pts)** _____

TOTAL SCAVENGER HUNT POINTS ***(65 pts)*** _____

Place all verified Lab & Scavenger Hunt score totals on cover page.