SPRING INDOOR LAB MANUAL

NAME:_____HOUR_____

MODULE NAME	PAGE	POINTS
Tree Study	2-6	(40)_____
Macroinvertebrates	7-10	(25)_____
Shoreline Restoration	11-12	(35)_____

TOTAL (100)_____

INSTRUCTOR COMMENTS:

L.E.E.P.
Lake Ecology Education Program

TREE STUDY
INDOOR LAB

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

- "Key" to Trees
- Cones, needled branches, leaves and wood slab
- Tape measure
- Clinometer
- Safety glasses

Directions: Using the "Key" to determine each cone/leaf/needled branch. ***A point for each correct identification.***

1. _____ **(1 pt.)**_____
2. _____ **(1 pt.)**_____
3. _____ **(1 pt.)**_____
4. _____ **(1 pt.)**_____
5. _____ **(1 pt.)**_____
6. _____ **(1 pt.)**_____
7. _____ **(1 pt.)**_____
8. _____ **(1 pt.)**_____
9. _____ **(1 pt.)**_____
10. _____ **(1 pt.)**_____

Using the clinometer and safety glasses, how high is the wall in this room?

_____ **(5 pts.)**_____

If you have correctly identified the above you may continue:

If a tree is 100 feet high and 50 years old, on average how high did it grow each year?
Show your work: **(5 pts.)**_____

Hint: $\frac{\text{Height}}{\text{Age}}$ = *average growth each year* _____

If the tree is 120 inches around (circumference), what is its thickness (diameter)

(5 pts.)_____

Hint: diameter = 2 X radius

_____

$$\text{radius} = \frac{\text{circumference}}{6.28}$$

How old was the above tree when it was cut down? _____ **(5 pts.)**_____

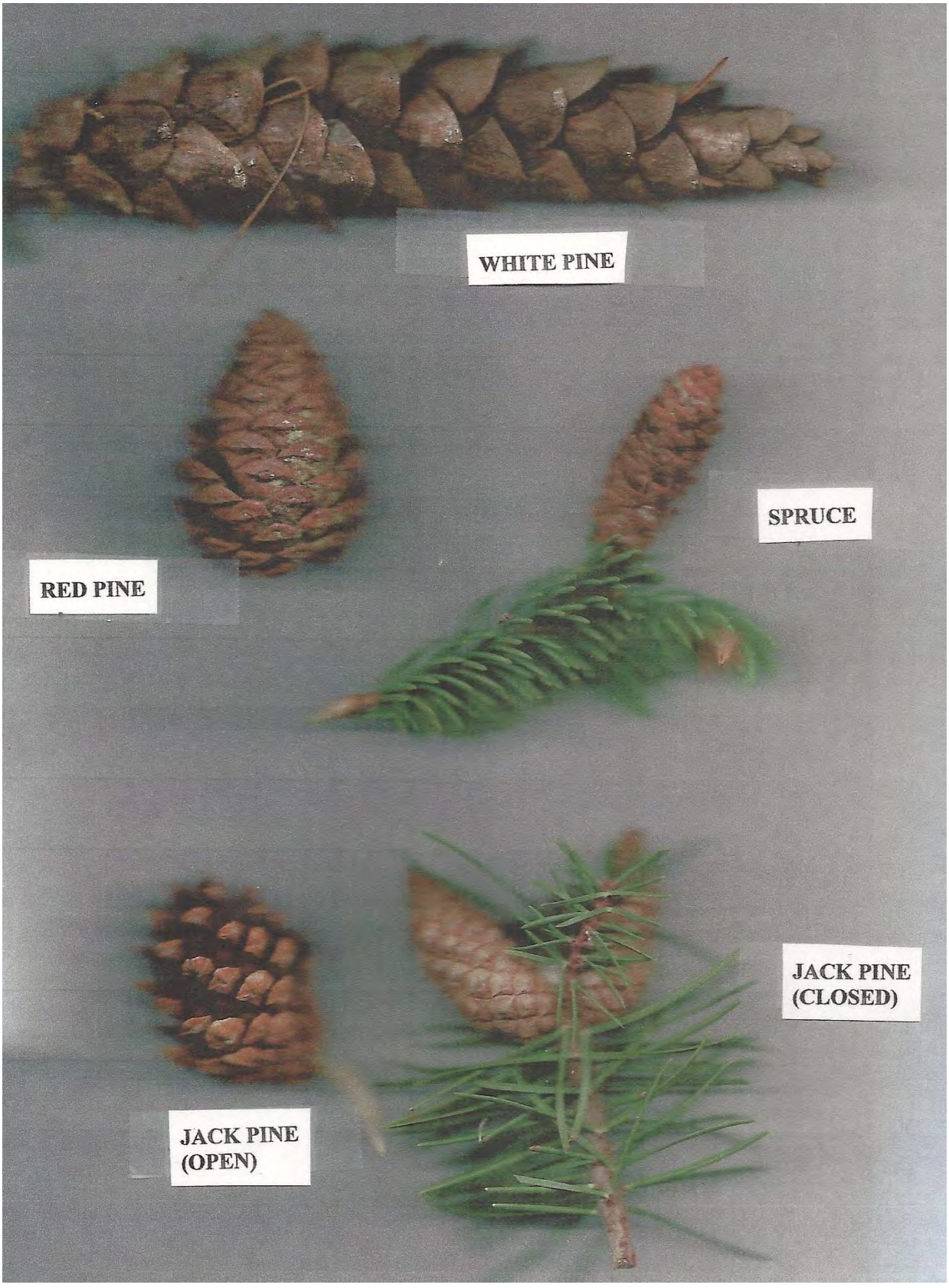
Now check the tree cross-section (harvested in 2013) at the front of the room and answer the following questions: **(5 pts.)**_____

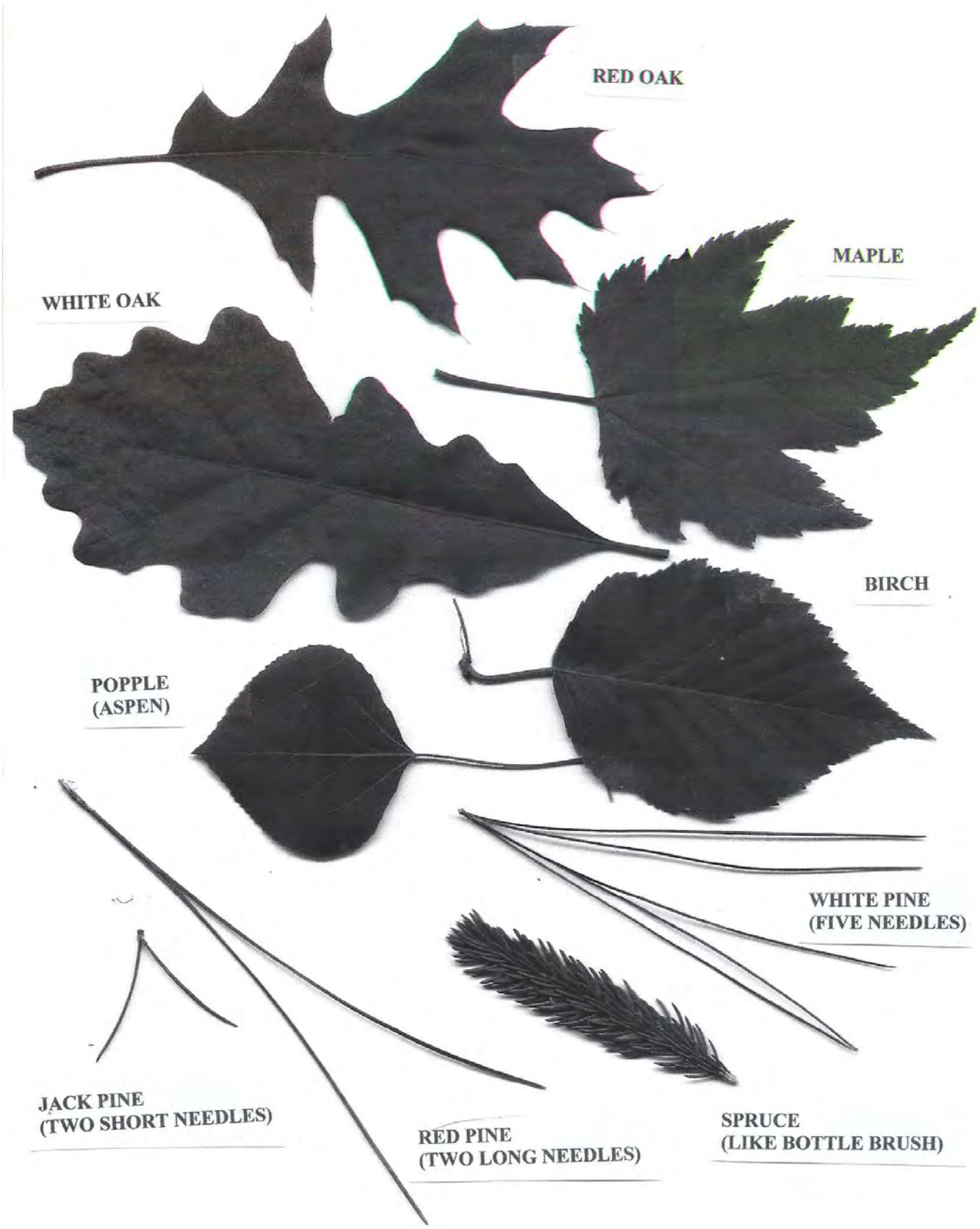
1. How old was the tree when it was cut down? _____
2. What was the tree's best growing year? _____
3. When did it grow the slowest/least? _____

List 5 ways trees benefit lakes, rivers, wetlands and lake animals **(5 pts.)**_____

1.
2.
3.
4.
5.

TOTAL TREE POINTS **(40 pts.) _____**


WHITE PINE
RED PINE
SPRUCE
JACK PINE
(CLOSED)
JACK PINE
(OPEN)


RED OAK
MAPLE
WHITE OAK
BIRCH
POPPLE
(ASPEN)
WHITE PINE
(FIVE NEEDLES)
JACK PINE
(TWO SHORT NEEDLES)
RED PINE
(TWO LONG NEEDLES)
SPRUCE
(LIKE BOTTLE BRUSH)

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.

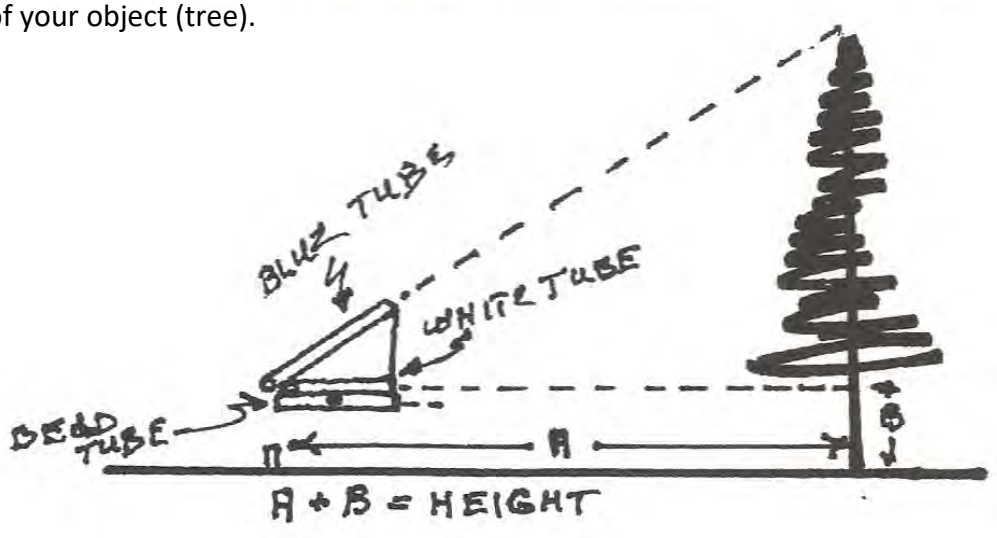
Equipment:

- 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).



Lake Ecology Education Program

MACROINVERTEBRATES
INDOOR LAB

TEAM MEMBERS:

PART 1

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

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


Stonefly Larva

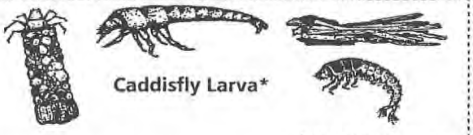

Dobsonfly Larva


Alderfly Larva


Water Snipe Fly Larva

Number of group 1 animals circled: ☐

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


Caddisfly Larva*

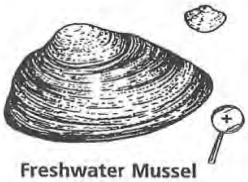
*All Caddisfly Larva = 1


Dragonfly Larva


Water Penny

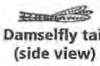

Crawfish


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 support 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.) _____

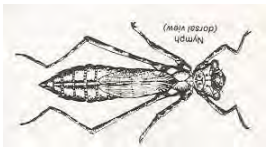
TOTAL MACRO POINTS (25 pts.) _____

BENTHIC MACROINVERTEBRATE SAMPLES



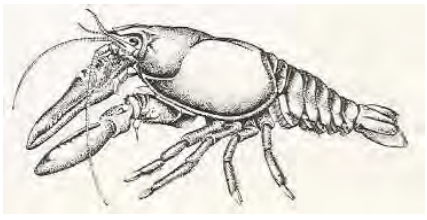

RED











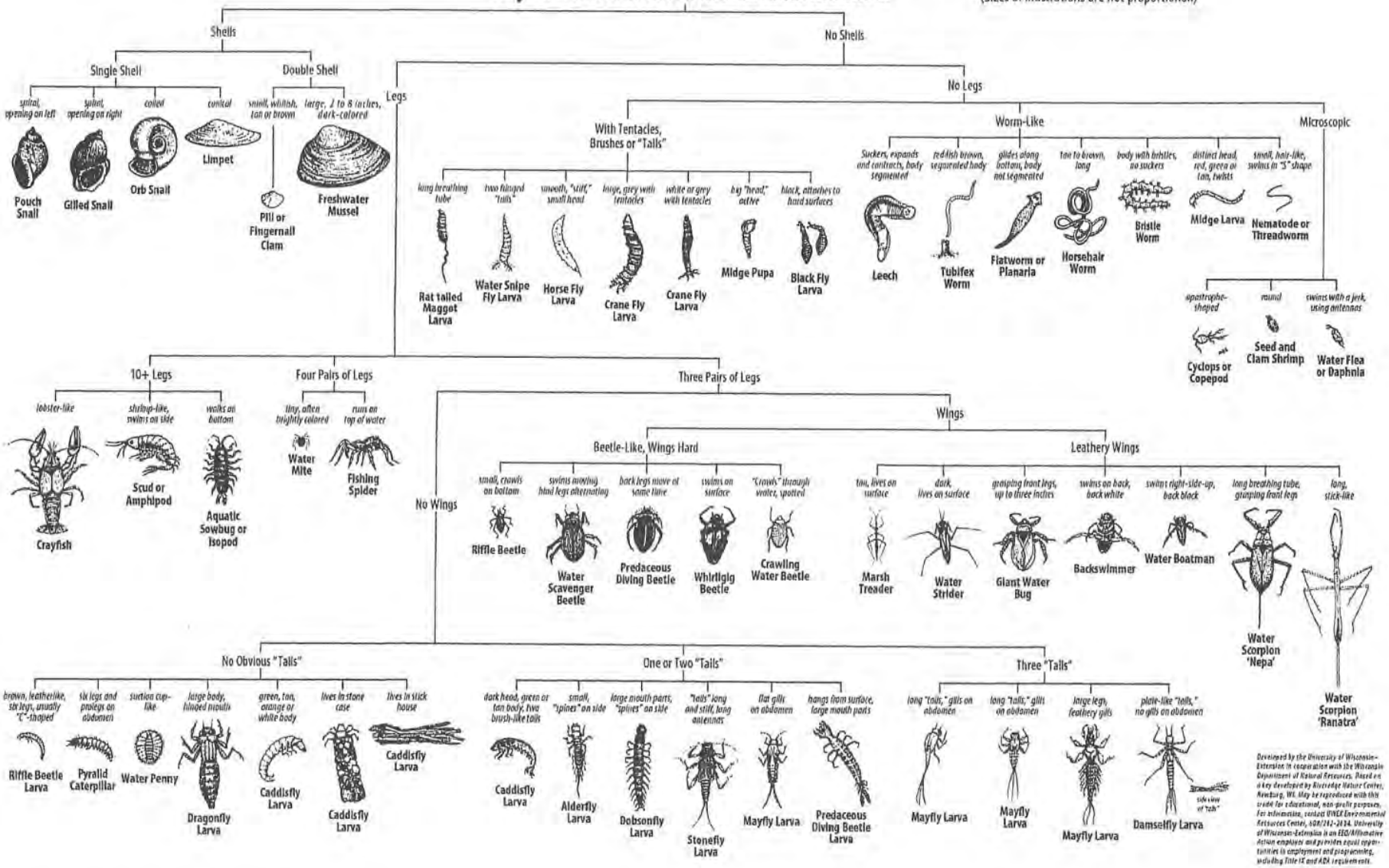







Key to Macroinvertebrate Life in the River

(Sizes of illustrations are not proportional.)



Developed by the University of Wisconsin–Extension in cooperation with the Wisconsin Department of Natural Resources. Based on a key developed by Riveredge Nature Center, Newburg, WI. May be reproduced with this credit for educational, non-profit purposes. For information, contact UWEX Environmental Resources Center, 608/262-2424. University of Wisconsin–Extension is an EEO/Affirmative Action employer and provides equal opportunities in employment and programming, including Title IX and ADA requirements.

G20 U.S. GOVERNMENT PRINTING OFFICE: 2008—560-014/42034

SHORELINE RESTORATION
INDOOR LAB

BACKGROUND

Things you should know. Define the following:

- Littoral zone:
- Limnetic zone:
- Woody plants:
- Forbs/flowers:
- Grass/sedges:

Factors that affect rain/water "run-off" into lakes (erosion):

- Slope - How steep is the land surrounding the shore
- Type of soil - Sandy soil drains well, but doesn't hold well
- Vegetation - Plants hold back water flow
- Prevailing wind - Winds "buff" shorelines causing erosion. Our prevailing winds come from the West.
- Light - Essential for plants to grow, but too much causes drying.
- Human activity - Paths/roads directly to the lake enhance erosion.

MAP WORK: Study the map of Bony Lake on the next page, near Barnes, WI.

- Where is the deepest part of the lake? Put a ***BLACK "D"*** on the area.
- How deep is it? **(5 pts.)**_____

- Close contour lines mean "drop-offs." Put a ***BLACK "DO"*** on the three areas with extreme drop offs. These drop-off areas usually extend into shoreline and land areas, so they will also be steep. **(5 pts.)**_____
- With the ***BLUE*** marker color the lake and a little of the shoreline where it might be wet. **(5 pts.)**_____
- With the ***YELLOW*** marker, color the land area around the lake and a little into the lake. Green should appear where the blue and yellow overlap. This ***GREEN*** area is the ***LITTORAL*** zone where most of the plants should be to enhance the shoreline and lake that we should aggressively protect. **(5 pts.)**_____
- With the ***RED*** marker, color the areas most prone to erosion. Consider slope, wind and human activity. **(5 pts.)**_____
- Now design your ideal house/cabin site. With the ***BLACK*** marker, make a ***SQUARE*** for a house/cabin and a ***LINE*** for a road to the cabin and trail to the lake. **(10 pts.)**_____

TOTAL SHORELINE RESTORATION POINTS (35 pts.)_____

Bony Lake, Bayfield County, Wisconsin.