





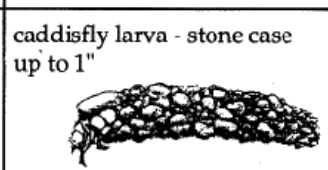
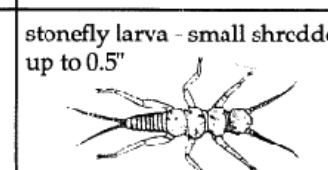

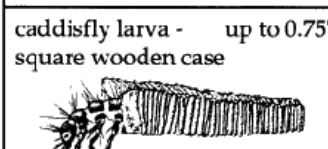
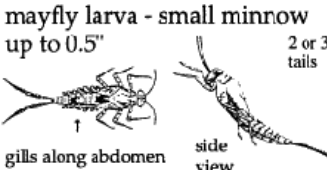

## Benthic Macroinvertebrate Sorting (EPT & Total Taxa Richness) Worksheet

Name(s) \_\_\_\_\_


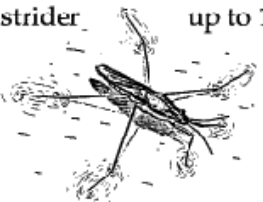





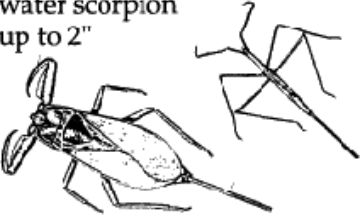

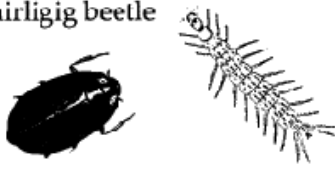


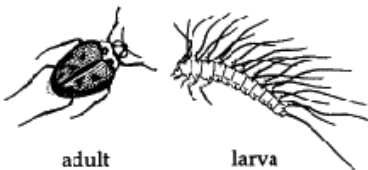


School/Group \_\_\_\_\_ Date \_\_\_\_\_

Stream \_\_\_\_\_ Site \_\_\_\_\_ Replicate \_\_\_\_\_





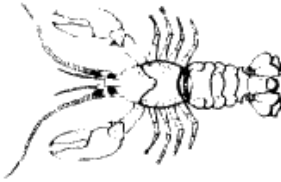












- Sort and identify organisms to the level of order (stoneflies, caddisflies, beetles, true bugs, etc). Within each order, try to distinguish different taxa and sort organisms accordingly.
- Count the number of organisms of each taxa and mark a tally in the appropriate box next to the picture of the taxa. For taxa not pictured, make up your own description, write it in the "other" box for the appropriate order, and indicate with a tally the number of organisms found for that taxa.
- To calculate an EPT Richness estimate, add up the number of different mayfly, caddisfly and stonefly taxa found. Count the number of boxes that have tallies, NOT the number of tallies. Record the EPT Richness estimate in the box at the bottom right hand corner of the page.
- To calculate the Total Taxa Richness estimate, add up the number of different taxa found. Count the number of boxes that have tallies, NOT the number of tallies. Record the Total Taxa Richness in the box at the bottom right hand corner of page three.

MAYFLY LARVAE	CADDISFLY LARVAE	STONEFLY LARVAE
<p>mayfly larva - flatheaded up to 1"</p>  <p>side view 2 or 3 tails gills along abdomen</p>	<p>caddisfly larva - netspinner up to 1"</p>  <p>3 dorsal plates</p>	<p>stonefly larva - predator up to 1.5"</p>  <p>gills under legs</p>
<p>mayfly larva - brushlegged up to 1"</p>  <p>gills along abdomen</p>	<p>caddisfly larva - stone case up to 1"</p> 	<p>stonefly larva - small shredder up to 0.5"</p> 
<p>mayfly larva - spiny crawler up to 0.75"</p>  <p>gills along abdomen</p>	<p>caddisfly larva - up to 0.75" square wooden case</p> 	<p>stonefly larva - other</p>
<p>mayfly larva - small minnow up to 0.5"</p>  <p>gills along abdomen 2 or 3 tails side view</p>	<p>caddisfly larva - fingernet up to 0.5"</p>  <p>yellow body with darker head</p>	
<p>mayfly larva - other</p>	<p>caddisfly larva - other</p>	<p><b>EPT RICHNESS SCORE:</b></p> <div style="border: 1px solid black; width: 100px; height: 30px; margin: 5px auto;"></div> <p>Level of Impact:                      &gt;7 = non-impacted                      3 - 7 = slightly impacted                      1-2 = moderately impacted                      0 = severely impacted</p>

# Benthic Macroinvertebrate Sorting Worksheet

<p>water penny beetle larva up to 0.5"</p> 	<p>water strider up to 1.5"</p> 	<p>midge larva up to 0.5"</p> 
<p>riffle beetle 0.25-0.5"</p>  <p>adult larva</p>	<p>giant water bug up to 1.5"</p> 	<p>blackfly larva up to 0.5"</p> 
<p>predacious diving beetle</p>  <p>adult up to 1" larva up to 2"</p>	<p>water scorpion up to 2"</p> 	<p>crane fly larva up to 4"</p> 
<p>whirligig beetle</p>  <p>adult up to 1.0" larva up to 1.5"</p>	<p>backswimmer up to 1"</p> 	<p>mosquito larva up to 0.5"</p> 
<p>crawling water beetle 0.25-0.5"</p>  <p>adult larva</p>	<p>water boatman up to 1"</p> 	<p>watersnipe fly larva up to 0.75"</p> 
<p>other beetles</p>	<p>other true bugs</p>	<p>other true flies</p>

Note: Size does not include tails

snail - flat spiral 	scud  up to 0.5"	dragonfly larva - clubtail up to 1.25" 
snail - left opening 	crayfish  up to 6"	dragonfly larva - skimmer up to 1.5" 
snail - right opening 		aquatic sowbug  up to 0.75"
fingernail clam  up to 0.5"	other crustaceans	
other mollusks	<b>Aquatic Worms</b>	
<b>Dobsonflies, Fishflies, &amp; Alderflies</b>	aquatic earthworm  up to 2"	damselfly larva up to 1.25" 3 oar-shaped tails (gills) 
dobsonfly larva  up to 4" gill tufts at base of each "hair"	flatworm (planarian)  up to 0.75"	damselfly larva up to 1.25" 3 tails (gills); middle one shorter 
fishfly larva  up to 1.5" no gills	leech  up to 2"	<b>TOTAL TAXA RICHENSS SCORE:</b> <input type="text"/>  Level of Impact: >13 non-impacted 10-13 slightly impacted 7-9 moderately impacted < 7 severely impacted
alderfly larva  up to 1"	other worms	

Note: Size does not include tails

## Benthic Macroinvertebrate Major Group Biotic Index Worksheet

School/Group \_\_\_\_\_ River/Stream \_\_\_\_\_  
 Site \_\_\_\_\_ Replicate \_\_\_\_\_ Sampling Date \_\_\_\_\_  
 Name of person(s) conducting analysis \_\_\_\_\_

Major group	A # of Organisms in Sub-sample	B Assigned Biotic Index	C Biotic Value for Group
Stoneflies		1	
Mayflies		2	
All Caddisflies except net spinner		2	
Gilled Snails		3	
Dobsonflies, Fishflies, Alderflies		4	
Dragonflies		4	
Crane Flies		4	
Watersnipe Flies		4	
Water Penny Beetle Larvae		4	
Whirligig Beetles		4	
Other Beetles		5	
Net Spinner Caddisflies		5	
Black Flies		5	
Midges		6	
Damselflies		6	
Water Mites		6	
Crayfish		6	
Clams		6	
Scuds		7	
Other Snails (not gilled)		7	
Leeches		7	
Sowbugs		8	
Aquatic Worms		9	
<b>TOTALS</b>	D		E

**Instructions:** (Try to pick at least 100 organisms.) Using the "BMI Sorting Worksheet," count the number of organisms for each major group identified in your sub-sample and record in column A. Sum the total of column A and record in D. Multiply the number of organisms in each major group by the assigned biotic index value (column B) and record in column C. Sum the total of column C and record in E. For the Biotic Index Score, divide E by D.

$$\text{Biotic Index Score} = \frac{E \text{ (total biotic value)}}{D \text{ (total \# organisms in your sub-sample)}} = \boxed{\phantom{000}}$$

<b>Biotic Index:</b>	0-4.50 non-impacted	4.51-5.50 slightly impacted	5.51-7.00 moderately impacted	7.01-10 severely impacted
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## Benthic Macroinvertebrate Major Group Percent Composition and Percent Model Affinity Worksheet

Name(s) \_\_\_\_\_

School/Group \_\_\_\_\_ Stream \_\_\_\_\_

Date(s) Sampled \_\_\_\_\_ Site \_\_\_\_\_ Replicate \_\_\_\_\_

### Calculating Percent Composition

$$\% \text{ Composition} = \frac{\# \text{ individuals of major group}}{\text{total \# individuals in sub-sample}} \times 100$$

Major group	# individuals of major group	total # of all organisms in sub- sample	Percent Composition	NYS DEC Model Community	Absolute Difference
Mayfly	÷	x 100 =		40%	
Stonefly	÷	x 100 =		5%	
Caddisfly	÷	x 100 =		10%	
Midge	÷	x 100 =		20%	
Beetle	÷	x 100 =		10%	
Worms	÷	x 100 =		5%	
Others	÷	x 100 =		10%	
<b>Sum</b>					

Total # in sub-sample  This is "D" from "Major group biotic index" worksheet

**Steps:**

1. Try to pick at least 100 organisms or 1/4 of your sample. This is your sub-sample. See directions in the analysis section for more details.
2. Fill in the number of individuals you have identified in each group from your sub-sample using the "BMI Sorting" worksheet.
3. Sum the total number of organisms in your sub-sample.
4. For each major group, divide the number of individuals for that group by the total number in your sub-sample. Multiply by 100 to calculate percent composition.
5. Calculate the absolute difference (subtract the lower percent from the higher percent) between the NYS DEC model community and the sample percent composition.
6. Sum these absolute differences.
7. Multiply the sum by 0.5 and subtract this number from 100. This is the percent Model Affinity score.

**Percent Model Affinity  
Score**

Level of Impact: > 64 non-impacted  
 50-64 slightly impacted  
 35-49 moderately impacted  
 <35 severely impacted

# Benthic Macroinvertebrate Data Reporting Sheet

Name(s) \_\_\_\_\_

School/Group \_\_\_\_\_ Stream \_\_\_\_\_

Date(s) Sampled \_\_\_\_\_ Site \_\_\_\_\_ Replicate \_\_\_\_\_

TIER 1 Screening criteria:     non-impacted     "possible" impact-further study recommended

## TIER 2

EPT Richness score \_\_\_\_\_ Level of Impact: \_\_\_\_\_

Total Taxa Richness score \_\_\_\_\_ Level of Impact: \_\_\_\_\_

Percent Model Affinity score \_\_\_\_\_ Level of Impact: \_\_\_\_\_

Major Group Biotic Index score \_\_\_\_\_ Level of Impact: \_\_\_\_\_

## TIER 3

Family EPT Richness score \_\_\_\_\_ Level of Impact: \_\_\_\_\_

Total Family Richness score \_\_\_\_\_ Level of Impact: \_\_\_\_\_

Percent Model Affinity score \_\_\_\_\_ Level of Impact: \_\_\_\_\_

Family Biotic Index score \_\_\_\_\_ Level of Impact: \_\_\_\_\_

# Chemical Data Reporting Sheet

Name(s) \_\_\_\_\_ School/Group \_\_\_\_\_

Stream \_\_\_\_\_ Date(s) Sampled \_\_\_\_\_ Site \_\_\_\_\_

Today's weather conditions:  clear  cloudy  light rain  heavy rain  other \_\_\_\_\_ air temp \_\_\_\_\_ °C

In the past 24 hours, there was:  light rain  heavy rain  snow  other: \_\_\_\_\_

Flow (indicate fast reading here and calculated reading below):  high  medium  low

	Field Replicates		Average	Tier	Notes	Circle Method Used
	1	2				
Lab Duplicates	1	2				
pH						pH paper (1-14, by 1), color comparator, pocket meter (1-14, by 0.1), meter
Alkalinity (mg/)						<i>Sulfuric Acid Titration</i> , LaMotte microburet, <i>Sulfuric Acid Double Endpoint Titration</i> , HACH digital titrator
Chloride (mg/l)						<i>Silver Nitrate Titration</i> LaMotte Microburet, HACH drop count.
Turbidity						Nephelometer
Conductivity						meter or other:
Nitrate-Nitrogen as N or NO <sub>3</sub> * (circle one)						<i>Zinc Reduction</i> ; LaMotte color comparator. <i>Cadmium Reduction</i> HACH colorwheel or LaMotte color comparator, HACH DR700 or 800 colorimeter or spectrophotometer. Standard curve? yes no
Ortho-Phosphate as PO <sub>4</sub> or P** (circle one)						<i>Ascorbic Acid Reduction</i> , HACH color wheel (0-5 by 0.5 ppm), LaMotte color comparator with axial reader, HACH DR700 or 800 series colorimeter or spectrophotometer. Standard curve? yes no
Lab Duplicates	1	2				
Dissolved Oxygen (mg/l)						<i>Modified Winkler Titration</i> : LaMotte micro-burette, HACH drop count, HACH digital titrator
Dissolved Oxygen (% Saturation)						
Other: add units)						

**Describe your QaQc procedures here:**

NOTE: \*Nitrate-Nitrogen: report as NO<sub>3</sub>-N (NO<sub>3</sub>-N = NO<sub>3</sub>/4.4) \*\*Orthophosphate: report as P (P = PO<sub>4</sub>/3)

## Data Analysis Worksheet - Water Quality Standards Survey

Name(s) \_\_\_\_\_

School/Group \_\_\_\_\_ Date \_\_\_\_\_

Stream \_\_\_\_\_ Site \_\_\_\_\_

According to your data, does the stream violate DEC water quality standards according to the classification of your stream site? Describe.

Does the stream exceed guidelines for a healthy stream? Describe.

Are any of the designated uses of the stream site (drinking water, swimming, aquatic life, etc.) impaired? Indicate the level of impact. (Remember that "aquatic life" is a use. Consider what your benthic data tells you about the level of impairment for this use).

Are any other uses, such as recreation or aesthetics, impaired? To what extent?

## **Data Analysis Worksheet – Water Quality Standards Survey (continued)**

What might be causing the impairments? Include type of pollutant/impact and possible sources. Consider how the physical/habitat conditions may have influenced your water chemistry and macroinvertebrate results.

What else does your data tell you about your stream?

List some ideas for follow-up, such as further questions to study, protection or restoration actions, stewardship projects, etc.