Bio-monitoring

Data Collection Checklist
tier 3

In collecting samples, sorting, identifying and recording data, please strive to be as meticulous as possible, following the protocols as carefully and completely as possible and recording your data thoroughly and legibly. This is what gives all of our data its meaning. To this end, be sure to fill out the BMI Protocol sheet and strive for the highest level of QA/QC possible (see discussion on page 32 of the Rough Guide to BMI with CSI).

Checklist (for turning in results)

to be sure that we have everything we need to use your data

- ☐ 2 completed "BMI Protocol" sheets (one for each replicate sample) - may be on one double-sided page
- ☐ 5 completed "Reporting Sheets for Sampling" - Physical Survey/Habitat Assessment pages (p.44-48 of HBRW guidance document)
- ☐ Completed BMI Sorting Worksheets (4 pp) or HBRW Tier 3 "Benthic Macroinvertebrate Family Level Data Sheet" (2 pp)
- ☐ Containers of identified organisms preserved in 70% alcohol, each labeled with sampling location, sampling date and rep #
- ☐ Container of sorted but unidentified organisms preserved in 70% alcohol labeled with sampling location, sampling date and rep #

If you have any questions on any part of the BMI sampling/identification/reporting process, please don't hesitate to contact Adrianna at adriannalouise@gmail.com.

Worksheets Needed for Sampling, Sorting and Identification:

FOR SAMPLING	FOR SORTING & ID
"Reporting Sheets for Sampling" (5 pages)	"BMI Protocol" Sheets (continue 2 started for sampling)
"BMI Protocol" Sheets (1 for each rep)	"BMI Sorting Worksheets" (4 pages) OR HBRW Family Level Data Sheet (2 pages)

Get more copies of worksheets from the CSI website or at the lab:
www.communityscience.org
607-257-6606

Required

HBRW Tiers 2 & 3

Physical Survey / Habitat Assessment

* Note: As you collect your sample, check for crayfish. Crayfish should be released but numbers recorded here:
rep 1_____crayfish released
rep 2_____crayfish released

Assess a 200 foot segment up & downstream from your sample site

School/Group_____ River/Stream_____
Survey Site_____ Survey Date & Time_____
Name of person(s) completing survey_____

Weather: Today_____ ***Temperature:*** Air_____°C
Past 2 days_____ Water_____°C

Sampling Site Type (Select one from each row)									
Stream Size	Headwater Tributaries			Creeks and Streams				Larger Rivers	
Gradient	FAST (primarily riffle)			VARIED (pools and riffles)				SLOW (low gradient)	
Surrounding Land Use	Forested		Agricultural		Residential			Urban	
	dense	sparse	pasture-land	crop-land	rural	village	suburban	Resi-dential	commercial/ industrial

Stream Width: The stream is on average _____ meters wide and _____meters deep.

Water Level: Compared to the height of the stream channel, the water level seems relatively: ☐ high ☐ medium ☐ low

Water Appearance/Odor:

Turbidity substantially greater than natural conditions: ☐ Yes ☐ No

Describe_____

Oily film, grease globules, or unusual odor or color present ☐ Yes ☐ No

Describe:_____

Algae or Weed Growth: Substantially greater than natural conditions: ☐ Yes ☐ No

Describe_____

Upstream Dam: ☐ Yes ☐ No How far upstream: _____

Average Velocity of Sampling Site:

0.45 – 0.75 m/sec is optimal for BMI collection

Average time it takes to flow 3 meters:
a) 3 m / _____sec = v1 _____
b) 3 m / _____sec = v2 _____
AVERAGE: _____ m/sec

Average Depth of Sampling Site: _____meters

Assessment Factors: Circle the box that best applies for each assessment factor.

Assessment Factor	Excellent	Good	Fair	Poor
Riffle size	Well-developed riffle, as wide as stream & as long as 2x stream width	Riffle as wide as stream but riffle length less than 2x stream width	Riffle not as wide as stream and length less than 2x stream width	Riffles or run virtually nonexistent
Substrate size (at BMI collection site)	Cobble predominates; boulders, gravel common	Cobble less abundant; boulders and gravel common	Gravel, boulders or bedrock prevalent; some cobble	Large boulders and bedrock or sand & silt prevalent; cobble lacking
Shelter for fish	Snags, submerged logs, undercut banks, or other stable habitat are found in over 50% of the site	Snags, submerged logs, undercut banks, or other stable habitat are found in 30-50% of the site	Snags, submerged logs, undercut banks, or other stable habitat are found in 10-30% of the site	Snags, submerged logs, undercut banks, or other stable habitat are found in less than 10% of the site
Embeddedness (at BMI collection site)	Rocks in stream <25% embedded; very little sand, silt, or mud	Rocks 25-50% embedded; can easily turn over rocks	Rocks 50-75% embedded and firmly stuck in sediments	Rocks >75% embedded; bottom mostly sand, silt, or mud
Flow pattern (deep is > 2 ft)	All 4 patterns present: slow/deep, fast/shallow,fast/deep, slow/shallow	Only 3 of 4 flow patterns present	Only 2 of 4 flow patterns present	Dominated by 1 flow pattern
Channel alteration	Stream straightening, dredging, artificial embankments, dams or bridge abutments absent or minimal; stream with meandering pattern	Some stream straightening, dredging, artificial embankments, or dams present, usually near bridge abutments; no recent channel alteration	Artificial embankments present to some extent on both banks; and 40-80% of stream site straightened, dredged, or otherwise altered	Banks shored with gabion or cement; over 80% of the stream site straightened and disrupted
Stream bank cover and stability *	Banks stable; no evidence of erosion; bank covered by vegetation or rock	Moderately stable; small areas of erosion; most of bank covered by vegetation or rock	Largely unstable; almost half of bank has areas of erosion or is not covered by vegetation or rock	Unstable, eroded; less than half of bank covered by vegetation or rock, or rock slumping into creek
Disruption of riparian bank coverage* (land bordering stream bank)	Mature trees and vegetation; most growing naturally; no disturbance by forestry, grazing, or mowing	Trees, woody plants, soft green plants dominate; some disruption but not affecting full plant growth potential	Obvious disruption; patches of bare soil, cultivated fields or closely cropped vegetation are the norm	Not much natural vegetation left or it has been removed to 3" or less in height
Width of riparian vegetation zone*	More than 35 yards wide; human activities have not impacted zone	Zone 12-35 yards wide; marginal impact from human activities	Zone 6-12 yards wide; impact from human activities evident	Zone less than 6 yards wide; lots of nearby human activities
Litter	No litter (metal or plastic) in area	Very little litter; accidentally dropped	Litter fairly common; purposely dropped	Lots of litter present; obviously dumped

*if the two banks are very different, assess the worst side

Given the assessment above, how would you rate your habitat overall? _____

Describe how land uses / human activities may be impacting the stream.

HBRW Tier 3

Stream Bottom Survey

Evaluate your specific BMI collection site (riffle area)

School/Group_____ River/Stream_____
Survey Site_____ Survey Date & Time_____
Name of person(s) completing survey_____

1. Set up 2-4 transects across the stream, in riffle habitats.
2. Starting at the water' s edge, take one step at a time toward the opposite bank. With each step, reach over the toe of your wader with your forefinger without looking down and feel the substrate material closest to your large toe (could be mud or sand; does not have to be a rock). Pick it up (if possible), measure its size, and mark a tally in the appropriate column in the "Substrate Size Table" below.
3. If the substrate is a cobble, be careful as you pick it up out of the stream bottom so you can estimate how much it is covered up by silt or sand. Feel with your fingers for the edge of the cobble where it emerges from the silt or sand, and keep your fingers on that edge as you pick it up. Often there will be a "bathtub ring" line on the cobble where the level of the silt or sand was. There is also often algae growing on the top surface of the cobble down to that line. Estimate the percentage that the cobble is embedded and check the appropriate box in the "Cobble Embeddedness Table" below.
4. Continue until you have sampled approximately 50 substrate sizes and 20 cobbles.
5. In the "Substrate Size Table," total the tallies for each substrate type and record these numbers in the second row. Calculate the percentage of each substrate size by dividing the number of tallies by the total number (this should be approximately 50) and multiplying by 100.

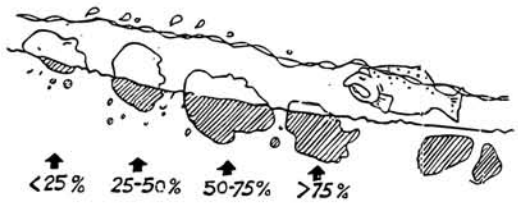
Substrate Size Table

Substrate Type	**Silt/Clay/Mud** (makes the water cloudy if disturbed)	**Sand (up to 0.1″)**	**Gravel (0.1-2″)**	**Cobbles (2-10″)**	**Boulders (>10″)**	**Bedrock** (solid rock covers stream bottom)
Tallies						
# of Tallies						
Percentage						

Cobble Embeddedness Table

Cobble #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
0-25%																				
25-50%																				
50-75%																				
75-100%																				

50% embeddedness indicates doubtful habitat for many macroinvertebrates, trout, and egg survival



Based on your results, estimate the average embeddedness of the whole site:

Average Embeddedness: _____ %
(record on physical survey/habitat assessment form)

HBRW Tiers 2 & 3

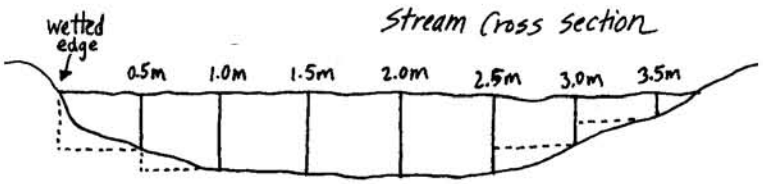
Flow Worksheet

School/Group_____ River/Stream_____ Site_____

Name of person(s) measuring flow_____ Date & Time_____

Area of the Stream's Cross-Section:

1. Stretch a tape measure from wetted edge to wetted edge.
2. At 0.5 meter intervals, across the entire width of the stream, measure the depth (in meters) and record in the table at right. (If stream is more than 10.5m wide, measure in 1m intervals).
3. Each segment you measured is like a small rectangle (see diagram below). The area of each rectangle equals its depth times its width. Since the width of each rectangle is 0.5 meter, the area of each rectangle is 0.5 times its depth, in square meters.



interval (m)	depth (m)	interval (m)	depth (m)
wetted edge	0	5.5	
0.5		6.0	
1.0		6.5	
1.5		7.0	
2.0		7.5	
2.5		8.0	
3.0		8.5	
3.5		9.0	
4.0		9.5	
4.5		10.0	
5.0		10.5	

4. The total cross section area of the stream is estimated by adding up the areas of all the rectangles. This is the same as adding up all the depths you measured and multiplying by 0.5. Record your total cross section area estimate in the box at right. (If measured at 1m intervals, simply add the depths).

Sum of depths _____

x .5 =

Total Cross Section Area _____

Velocity of the Stream's Water:

1. Record the distance of the marked course in the space below.
2. Record the number of seconds it takes the float to travel the marked course. Do this 9 times (3 times on the left side of the stream, 3 times in the center, and 3 times on the right side) and record the average time.
3. Calculate the average velocity by dividing the distance of the course by the average time. Convert to underwater velocity by multiplying by 0.85.

(**Distance** _____ m / **Average Time** _____ sec) X 0.85 = **Average Underwater Velocity** _____ m/sec

Left side	
Center	
Right side	
SUM:	
Avg. Time: (sum/9)	sec.

Flow:

The flow, or discharge of the stream, is the volume of water that moves past a site in a certain amount of time. Calculate the flow by multiplying the total cross section area by the average underwater velocity.

Average Velocity _____ m/sec x **Cross Section Area** _____ m^2 = **FLOW** _____ m^3/sec x 35.32 = **Compare to USGS Data** _____ ft^3/sec

HBRW All Tiers

Site Drawing:

Draw a "bird's-eye" sketch of your 200' long river segment up and downstream from your sampling site, recording:

1. Your sampling sites—include where you collected chemical and BMI samples, and measured velocity and cross section area.
2. Direction of water flow—indicate with arrows.
3. Location and orientation of any photos taken.
4. In-stream habitat—riffles, pools, runs, large woody debris, boulders, organic material, aquatic plants, overhanging vegetation, etc.
5. Streambanks—steep & gently sloping areas, naturally vegetated, bare, eroding, clear-cut, or mowed areas, artificially protected areas, etc.
6. Channel—wide & narrow areas, meanders, shaded & exposed areas, unnatural alterations, dams, culverts, etc.
7. Human land uses—roads, houses, driveways, parking lots, storm drain pipes, sewage pipes, factories, farms, livestock crossings, recreational use, logging, etc.

Required

Sampling Site Description: Describe exactly where you collected chemical and BMI samples and measured velocity and cross section area:

Required

BMI Protocol Sheet

School/Group_____ River/Stream_____
Site_____ Replicate____ Sampling Date_____
Name of person(s) conducting analysis_____

Sampling Protocol

QAQC Level A	QAQC Level B & C
□ Used 18"x8" net with mesh size between 0.8-0.9 mm □ Sampled in a riffle 0.45-0.75 m/sec and < 1 meter deep □ Sampled 5-meter-long diagonal transect in 5 minutes □ Nets thoroughly cleaned of organisms between samples □ Physical/habitat survey attached □ Sampling spots labeled on sketches in physical survey	□ Checked all boxes under A □ Two replicates collected from at least one site per sampling day (required for B and C) □ Whole replicate samples preserved in alcohol (required for C)

Describe sampling methods if different from above (indicate mesh size if not 0.8-0.9 mm):

Sample Analysis Protocol

□ Selected and analyzed a sub-sample (Tiers 2 & 3)
Total number of organisms in sub-sample (minimum of 100 organisms recommended) _____
Describe procedure for selecting sub-sample:

Equipment used for ID: (circle) none ____ magnifier ____ dissecting scope (indicate power)

Author & title of reference used to identify macroinvertebrates_____

□ Voucher specimens used (optional) □ List of specimens attached

Number and percent of organisms in sub-sample that you believe you have:

Positively identified	_____number	_____% of total
Tentatively identified	_____number	_____% of total
Not identified	_____number	_____% of total

□ BMI Data Reporting Sheet attached □ Raw BMI worksheets attached

QAQC Level C only:
Name & phone of outside evaluator_____
□ Outside lab's results attached (raw data and Percent Similarity Worksheet)

Sample Status Log

	By Whom	Date	Notes
Rep 2 Sorting			
Rep 2 ID			
Rep 2 Alcohol Check			specific gravity= percentage alcohol=

Required

BMI Protocol Sheet

School/Group_____ River/Stream_____
Site_____ Replicate____ Sampling Date_____
Name of person(s) conducting analysis_____

Sampling Protocol

QAQC Level A	QAQC Level B & C
□ Used 18"x8" net with mesh size between 0.8-0.9 mm □ Sampled in a riffle 0.45-0.75 m/sec and < 1 meter deep □ Sampled 5-meter-long diagonal transect in 5 minutes □ Nets thoroughly cleaned of organisms between samples □ Physical/habitat survey attached □ Sampling spots labeled on sketches in physical survey	□ Checked all boxes under A □ Two replicates collected from at least one site per sampling day (required for B and C) □ Whole replicate samples preserved in alcohol (required for C)

Describe sampling methods if different from above (indicate mesh size if not 0.8-0.9 mm):

Sample Analysis Protocol

□ Selected and analyzed a sub-sample (Tiers 2 & 3)
Total number of organisms in sub-sample (minimum of 100 organisms recommended) _____
Describe procedure for selecting sub-sample:

Equipment used for ID: (circle) none ____magnifier ____dissecting scope (indicate power)

Author & title of reference used to identify macroinvertebrates_____

□ Voucher specimens used (optional) □ List of specimens attached

Number and percent of organisms in sub-sample that you believe you have:

Positively identified	_____number	_____% of total
Tentatively identified	_____number	_____% of total
Not identified	_____number	_____% of total

□ BMI Data Reporting Sheet attached □ Raw BMI worksheets attached

QAQC Level C only:
Name & phone of outside evaluator_____
□ Outside lab's results attached (raw data and Percent Similarity Worksheet)

Be sure to fill out another "BMI Protocol Sheet" (page 2 of 2) for your second replicate sample.

Sample Status Log

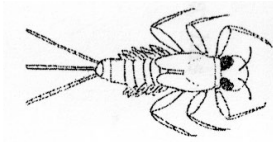
	By Whom	Date	Notes
Turned in to Lab			Accepted by_____
Rep 1 Sorting			
Rep 1 ID			
Rep 1 Alcohol Check			specific gravity= percentage alcohol=

BMI Sorting (& EPT Richness) Worksheet

School/Group_____ River/Stream_____
Site_____ Sampling Date_____ Sorting/ID Date Rep 1:_____, Rep 2:_____ # of Sqares/12_____
Name of person(s) conducting analysis_____

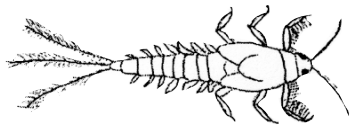
Mayflies
Ephemeroptera

Flatheaded Mayflies
Heptageniidae
-body flattened and eyes on top of head
-often appear to have no neck
-legs often quite stocky



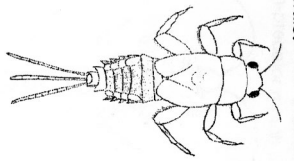
rep 1 | rep 2

Brushlegged Mayflies
Isonychiidae
-long fringe of hairs on inner forelegs
-often larger than other mayflies
-streamlined teardrop shape from the side



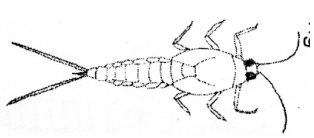
rep 1 | rep 2

Spiny Crawler Mayflies
Ephemerellidae
-no gills on first few abdominal sements
-"tails" tend to be stiff and spiky
-"spines" on outer edge of abdomen



rep 1 | rep 2

Small Minnow Mayflies
Baetidae
-middle "tail" is short or missing
-tend to be smaller than other mayflies
-streamlined teardrop shape from the side



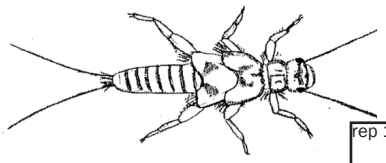
rep 1 | rep 2

Other Mayflies
-describe

rep 1 | rep 2 | rep 1 | rep 2 | rep 1 | rep 2 | rep 1 | rep 2

Stoneflies
Plecoptera

Common Stoneflies
Perlidae
-branched gills where legs attach (under)



rep 1 | rep 2

Other Stoneflies
-describe

rep 1 | rep 2 | rep 1 | rep 2 | rep 1 | rep 2 | rep 1 | rep 2

1. 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.

2. 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.

3. 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 estimates for each rep below and then take their average.

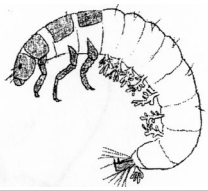
rep 1 EPT Richness = _____
rep 2 EPT Richness = _____

$$\frac{\text{Rep 1 EPT Richness + Rep 2 EPT Richness}}{2} = \text{EPT Richness} = \square$$

>7 = non-impacted
3-7 = slightly impacted
1-2 = moderately impacted
0 = severely impacted

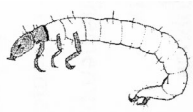
Caddisflies
Trichoptera

Netspinner Caddisflies
Hydropsychidae
-branched gills on underside of abdomen
-top of all 3 thoracic segments sclerotized
-curves like a "C" when dead



rep 1 | rep 2

Fingernet Caddisflies
Philopotamidae
-orange heads, lighter bodies (in alcohol)
-meso- and meta-notum membraneous
-T-shaped membraneous labrum (seen from top)

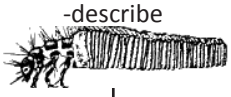


rep 1 | rep 2

Other Caddisflies w/stone cases
-describe

rep 1 | rep 2 | rep 1 | rep 2 | rep 1 | rep 2 | rep 1 | rep 2

Other Caddisflies w/square cases
-describe



rep 1 | rep 2 | rep 1 | rep 2

Other Caddisflies
-describe

rep 1 | rep 2 | rep 1 | rep 2 | rep 1 | rep 2 | rep 1 | rep 2

Complete either these 4 sheets OR 2 HBRW Family-level Data Sheets

BMI Sorting Worksheet 2015 - p.2

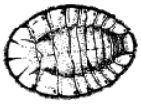
School/Group_____ River/Stream_____

Site_____ Sampling Date_____ Sorting/ID Date Rep 1: _____, Rep 2: _____ # of Sqares/12_____

Name of person(s) conducting analysis_____

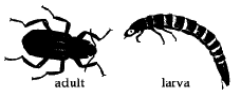
Beetles
Coleoptera

Water Penny Beetle Larvae
Psephenidae
-body flat
-head and legs visible only from underside



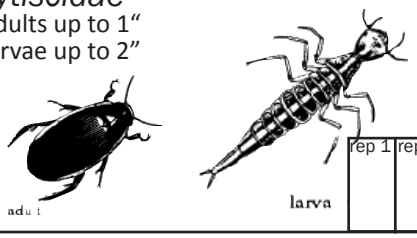
rep 1 | rep 2

Riffle Beetle
Elmidae
-adults usually smaller than 1/8"
-larvae are usually curved slightly



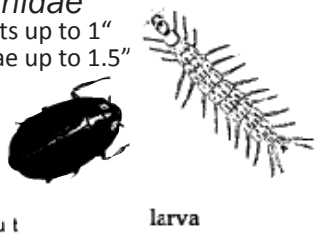
rep 1 | rep 2

Predaceous Diving Beetle
Dytiscidae
-adults up to 1"
-larvae up to 2"



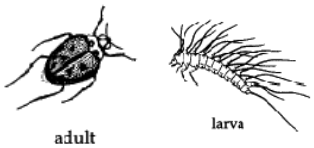
rep 1 | rep 2

Whirligig Beetle
Gyrinidae
-adults up to 1"
-larvae up to 1.5"



rep 1 | rep 2

Crawling Water Beetle
Haliplidae
-1/4"-1/2"



rep 1 | rep 2

Other Beetles
-describe

rep 1 | rep 2

True Flies
Diptera

Non-biting Midge Larvae
Chironomidae
-smaller than 1/2 "
-paired prolegs at both ends
-distinct head

rep 1 | rep 2

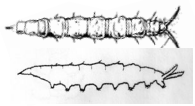
Black Fly Larvae
Simuliidae
-smaller than 1/2"
-head has a pair of fans
-lower abdominal segments are swollen

rep 1 | rep 2

Cranefly Larvae
Tipulidae
-wide variety of body shapes within family
-end of abdomen with lobes and gills
-can be up to 4" long

rep 1 | rep 2

Watersnipe Fly Larvae
Athericidae
-up to 3/4"
- pairs of prolegs on underside of body
-2 protrusions at end longer than prolegs
-highly reduced head



rep 1 | rep 2

Other True Flies
-describe

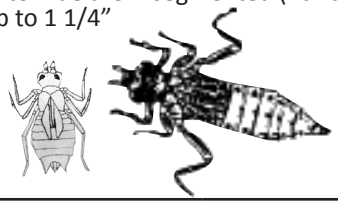
rep 1 | rep 2

Other True Flies
-describe

rep 1 | rep 2 | rep 1 | rep 2

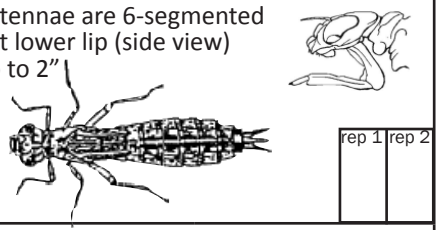
Dragonflies/Damselflies
Odonata

Club-tail Dragonfly
Gomphidae
-antennae are 4-segmented (4th tiny)
-up to 1 1/4"



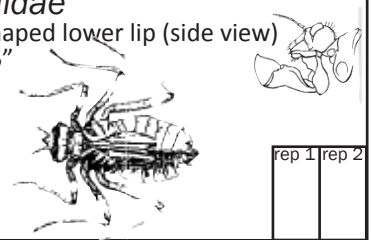
rep 1 | rep 2

Darner Dragonfly
Aeshnidae
-antennae are 6-segmented
-flat lower lip (side view)
-up to 2"



rep 1 | rep 2

Skimmer Dragonfly
Libellulidae
-scoop-shaped lower lip (side view)
-up to 1.5"



rep 1 | rep 2

Other Dragonflies
-describe

rep 1 | rep 2

Damselfly
Various Families
-3 oar-shaped tails (gills)
-up to 1 1/4"

Damselflies
-describe

rep 1 | rep 2 | rep 1 | rep 2

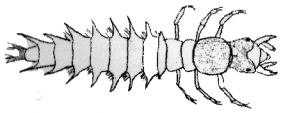
Note: sizes do not include tails

BMI Sorting Worksheet 2015 - p.3

School/Group_____ River/Stream_____
Site_____ Sampling Date_____ Sorting/ID Date Rep 1:_____, Rep 2:_____ # of Sqares/12_____
Name of person(s) conducting analysis_____

Dobsonflies +Alderflies
Megaloptera

Hellgrammite (Dobsonfly)
Corydalidae
-abdomen ends in 2 prolegs (2 hooks ea.)
-up to 4"



rep 1 | rep 2

Alderfly
Sialidae
-abdomen ends in long anal filament
-up to 1"

rep 1 | rep 2

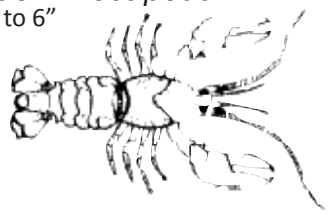
Other Megaloptera
-describe

rep 1 | rep 2

Note: sizes do not include "tails"

Crustaceans

Crayfish
Order - *Decapoda*
-up to 6"



rep 1 | rep 2

Scud
Order - *Amphipoda*
-up to 1/2"

rep 1 | rep 2

Aquatic Sowbug
Order - *Isopoda*
-up to 3/4"

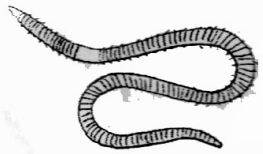
rep 1 | rep 2

Other Crustaceans
-describe

rep 1 | rep 2

Aquatic Worms

Aquatic Earthworms
Class - *Oligochaeta*
-worm-like bodies with >14 segments
-short bristles (sometimes very small)
-up to 2"

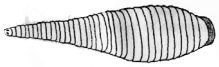


rep 1 | rep 2

Flatworms
Class - *Turbellaria*
-bodies NOT segmented
-may look like a shrivelled piece of leather
-up to 3/4"

rep 1 | rep 2

Leeches
Class - *Hirudinea*
- < segments than Oligochaeta
-suckers at both ends
-no bristles/hairs
-up to 2"



rep 1 | rep 2

Other Aquatic Worms
-describe

rep 1 | rep 2

*** The following criteria are required for meeting data quality control standards. Please answer the following questions and record detailed notes where a sample has been handled differently:

1. Number and percent of organisms in sub-sample that you believe you have:
Positively Identified ___# ___% of total
Tentatively Identified ___# ___% of total
Not Identified ___# ___% of total
Notes:

Rep 1 - # of squares picked = _____ ; total # of squares in grid = _____

Rep 2 - # of squares picked = _____ ; total # of squares in grid = _____

** Be sure to fill in these numbers so that we can estimate organism density in each replicate sample.*

2. Are all of the organisms counted here preserved in 70% alcohol in containers labelled with sampling location, sampling date and rep # with plans to submit them to the Community Science Institute? □Yes □No
If no, please explain:

3. Please describe any unusual circumstance that might have influenced the numbers reported here (involving any aspect of the process, including sampling, sorting, identification, etc.):

BMI Sorting Worksheet 2015 - p.4

School/Group_____ River/Stream_____
Site_____ Sampling Date_____ Sorting/ID Date Rep 1:_____, Rep 2:_____ # of Sqares/12_____
Name of person(s) conducting analysis_____

Mollusks

Snail - flat spiral
Class - *Gastropoda*

rep 1 | rep 2

Gilled Snail - left-opening
Class - *Gastropoda*

rep 1 | rep 2

Gilled Snail - right-opening
Class - *Gastropoda*

rep 1 | rep 2

Fingernail Clam
Class - *Bivalvia*
-up to 1/2"

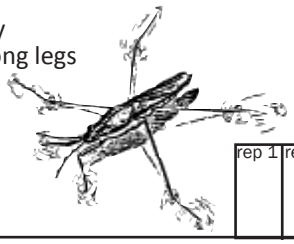
rep 1 | rep 2

Other Mollusks
-describe

rep 1 | rep 2

True Bugs
Hemiptera

Water Strider
Gerridae
-narrow body
-extremely long legs
-up to 1 1/2"



rep 1 | rep 2

Water Boatman
Corixidae
-distinct pattern on wings
-rostrum short, blunt and triangular
-up to 1"

rep 1 | rep 2

Backswimmer
Nonectidae
-up to 1"

rep 1 | rep 2

Giant Water Bug
Belostomatidae
-up to 1 1/2"

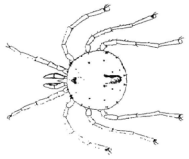
rep 1 | rep 2

Other True Bugs
-describe

rep 1 | rep 2

Other

Water Mites
Class - *Arachnida* (Order *Acari*)
-4 pairs of legs



rep 1 | rep 2

Other
-describe

rep 1 | rep 2

Other
-describe

rep 1 | rep 2

Other
-describe

rep 1 | rep 2

Other
-describe

rep 1 | rep 2

To calculate a Taxa Richness estimate, add up the number of different taxa found. Count the number of boxes that have tallies for all 4 Sorting Worksheets (NOT the number of tallies). Record the Taxa Richness estimate in the box on this page.

TAXA RICHNESS = rep 1 | rep 2

Note: sizes do not include tails

HBRW Tier 3

2015

Benthic Macroinvertebrate Family Level Data Sheet

School/Group_____ River/Stream_____
Site_____ Sampling Date_____
Name of person(s) conducting analysis_____

* Be sure to complete the two boxes (on the front and back of this page) that are indicated with large asterisks.

T= Family Tolerance Value
D= Density (# of organisms found in sub-sample)
TxD=Product of Tolerance Value X Density
%C= Percent Composition
L= lesser of two %C values (for calculating Percent Similarity between replicates)

Families in Major Groups	T	Replicate 1 D	Replicate 1 TxD	Replicate 1 %C	Replicate 2 D	Replicate 2 TxD	Replicate 2 %C	L
EPHEMEROPTERA (E)								
Baetidae	6							
Baetiscidae	4							
Caenidae	6							
Ephemerellidae	2							
Ephemeridae	4							
Heptageniidae	3							
Leptophlebliidae	4							
Metretopodidae	2							
Oligoneuriidae	2							
Polymitarcylidae	2							
Potomanthidae	4							
Siphlonuridae	7							
Tricorythidae	4							
Isonychiidae	2							
Other								
Subtotal E								
PLECOPTERA (P)								
Capniidae	3							
Chloroperlidae	0							
Leuctridae	0							
Nemouridae	2							
Peltoperlidae	0							
Perlidae	3							
Perlodidae	2							
Pteronarcyidae	0							
Taeniopterygidae	2							
Other								
Subtotal P								
MEGALOPTERA (M)								
Corydalidae	4							
Sialidae	4							
Other								
Subtotal M								
LEPIDOPTERA (L)								
Pyralidae	5							
Other								
Subtotal L								

Families in Major Groups	T	Replicate 1 D	Replicate 1 TxD	Replicate 1 %C	Replicate 2 D	Replicate 2 TxD	Replicate 2 %C	L
TRICHOPTERA (T)								
Brachycentridae	2							
Glossosomatidae	1							
Helicopsychidae	3							
Hydropsychidae	5							
Hydroptilidae	6							
Lepidostomatidae	1							
Leptoceridae	4							
Limnephilidae	4							
Molannidae	6							
Odontoceridae	0							
Philopotamidae	3							
Phryganeidae	4							
Polycentropodidae	6							
Psychomyiidae	2							
Rhyacophilidae	1							
Sericostomatidae	3							
Other								
Subtotal T								
DIPTERA (D)								
Anthericidae	4							
Blephariceridae	0							
Ceratopogonidae	6							
Chironomidae	6							
Tipulidae	4							
Empididae	6							
Simuliidae	5							
Tabanidae	5							
Other								
Subtotal D								
ISOPODA (I)								
Asellidae	8							
Other								
Subtotal I								

*

Rep 1 - # of squares picked = __ ; total # of squares in grid = __

Rep 2 - # of squares picked = __ ; total # of squares in grid = __

Benthic Macroinvertebrate Family Level Data Sheet

Page 2

Families in Major Groups	T	Replicate 1 D	Replicate 1 TxD	Replicate 1 %C	Replicate 2 D	Replicate 2 TxD	Replicate 2 %C	L
COLEOPTERA (C)								
Dryopidae	5							
Elmidae	5							
Gyrinidae	4							
Haliplidae	5							
Psephenidae	4							
Other								
Subtotal C								
ODONATA (O)								
Aeshnidae	5							
Calopterygidae	6							
Coenagrionidae	8							
Cordulegastridae	3							
Corduliidae	2							
Gomphidae	4							
Lestidae	9							
Libellulidae	2							
Macromiidae	2							
Other								
Subtotal E								
AMPHIPODA (A)								
Crangonyctidae	6							
Gammaridae	6							
Talitridae	8							
Other								
Subtotal A								

Families in Major Groups	T	Replicate 1 D	Replicate 1 TxD	Replicate 1 %C	Replicate 2 D	Replicate 2 TxD	Replicate 2 %C	L
DECAPODA (DE)								
Cambaridae	6							
Astacidae	6							
Other								
Subtotal DE								
OTHER								
Oligochaeta	9							
Hirudinea	7							
Gastropoda	7							
Pelecypoda	6							
Turbellaria	6							
Nemertea	8							
Other								
Subtotal Other								
TOTALS								

Organism Density/Sample

Total D x Total # squares picked
squares in tray

Rep 1	Rep 2

EPT Family Richness

Total # EPT families

Rep 1	Rep 2

>7 non-impacted
3-7 slightly impacted
1-2 moderately impacted
0 severely impacted

Total Family Richness

Total # families

Rep 1	Rep 2

>13 non-impacted
10-13 slightly impacted
7-9 moderately impacted
<7 severely impacted

Family Biotic Index

(Total T x D) ÷ Total D

Rep 1	Rep 2

0-4.5 non-impacted
4.51-5.50 slightly impacted
5.51-7.00 moderately impacted
7.01-10.00 severely impacted

Percent Model Affinity

Use Tier 2 worksheet

Rep 1	Rep 2

*

The following criteria are required for meeting data quality control standards. Please answer the following questions and record detailed notes where a sample has been handled differently:

1. Number and percent of organisms in sub-sample that you believe you have (for rep 1 and rep 2 separately):
Positively Identified _____number _____% of total
Tentatively Identified _____number _____% of total
Not Identified _____number _____% of total
Notes:

2. Are all of the organisms counted here preserved in 70% alcohol in containers labelled with sampling location, sampling date and rep # with plans to submit them to the Community Science Institute? □Yes □No
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3. Please describe any unusual circumstance that might have influenced the numbers reported here (involving any aspect of the process, including sampling, sorting, identification, etc.):