LEVEL-TWO SURVEY DATA SHEET

Save Our Streams
A citizens volunteer stream monitoring program

(1) DETERMINE THE STREAM-REACH BOUNDARY. (2) NEAR THE LOWER END OF THE REACH (IN THE DEEPEST PORTION OF THE RUN), COLLECT WATER SAMPLES AND ANALYZE USING THE CHEMICAL TESTS YOU HAVE AVAILABLE. YOU MAY USE YOUR COLLECTION CONTAINER TO OBSERVE WATERCOLOR AND CLARITY AND TO DETERMINE WATER ODORS. (3) MEASURE THE WIDTH-DEPTH AND VELOCITY, AND ESTIMATE THE WATER LEVEL. (4) IF YOU USE A TWO-POLE **KICK-NET**, COLLECT A MINIMUM OF **THREE** BENTHIC MACROINVERTEBRATE SAMPLES FROM THE BEST RIFFLE OR RUNS WITHIN YOUR STREAM REACH. USE THE TABLE ON PAGE FIVE TO RECORD INFORMATION ABOUT YOUR COLLECTIONS. (5) EVALUATE THE PHYSICAL AND HABITAT CONDITIONS; RECORD INFORMATION ABOUT KNOWN LAND USE ACTIVITIES. (6) SKETCH YOUR REACH OR SUBMIT PHOTOGRAPHS WITH THE SURVEY, AND ADD ANY OTHER COMMENTS THAT YOU FEEL ARE IMPORTANT. NOTE: A **SCIENTIFIC COLLECTION PERMIT** FROM WVDNR IS REQUIRED FOR ALL BENTHIC COLLECTIONS.

Stream name Bakers Run — Survey date 11/13/2007
Watershed Cacapon River — Station code
Latitude 39.0483 — Longitude 78.75713 — Directions to site From HS follow path from pavilion to the stream
Survey completed by East Hardy HS / The Mountain Institute
Current weather conditions Cloudy & cool, scattered showers
Past weather conditions (last 3-days) Some rain, low 50s
Affiliation — Email
Mailing address — Phone number

WATER CHEMISTRY: Use the spaces below to record the results of your water chemistry analysis; attach additional sheets if necessary.

	Result	units		Result	units		Result	units
Temperature (C/F)	11	C	Conductivity	250	us/cm	Alkalinity		
Dissolved oxygen	10.0	ppm	Nitrates	ND		Iron		
pH	7.5		Turbidity			Fecal/E-coli		

Additional tests (describe and record results) Phosphate 1.6 ppm; used hach kit

PHYSICAL CONDITIONS: Use the check boxes below to describe the conditions that closely resemble those of your stream. The extra lines are provided to write in any additional comments. You may see more than one type of condition; if so, be sure to indicate these on your survey (check all that apply). If multiple conditions are observed, always indicate the most dominant condition. If the condition you observe is not listed, describe it in the comment section.

Water clarity		Water color		Water/Sediment odor	Water	Sediment	Surface foam	
Clear	X	None	X	None	X		None	
Murky		Brown		Fishy			Slight	X
Milky		Black		Musky			Moderate	
Muddy		Orange/red		Rotten egg			High	
Other (describe)		Gray/White		Sewage				
		Green		Chemical				

Algae color		Algae abundance		Algae growth habit		Streambed color	
Light green		None		Even coating		Brown	X
Dark green	X	Scattered		Hairy	X	Black	
Brown		Moderate		Matted		Green	
Other (describe)		Heavy	X	Floating		White/gray	
						Orange/red	

Physical condition comments:

Estimate and indicate the percentage of your reach that is shaded.

> 80	80-60	60-40	< 40
Excellent	Good	Marginal	Poor

WIDTH AND DEPTH: Record the wetted width and depth of the channel's features (riffles, runs or pools). Choose two or more features to measure. Record the average depth from a minimum of four measure-ments (one of these should be from the deepest part of the feature). The width should be measured from the widest section of the feature.

1. Riffle Wetted width (feet) 15 Depth (feet) 0.7
2. Run Wetted width (feet) 6-8 Depth (feet) 0.9
3. Pool Wetted width (feet) Depth (feet)

CHANNEL PROFILES: Width and depth measurements can be used to create a cross section profile within your reach. Choose a location in your reach across one of the channel types above. Stretch a tape from bank to bank and anchor it at both ends. Move from left to right facing in an upstream direction; measure the distance from the stream bottom to the top of the tape at selected intervals (i.e. every foot). Record your measurements in the table below. The table provides enough spaces for 20 measurements; if more are necessary you can create your own table on a separate piece of paper. Your tape measure will probably not start at zero so make sure to record the actual position of the tape as you measure across the channel.

Width intervals

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Depth measurements

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

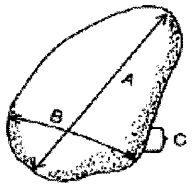
PEBBLE COUNT: Collect a minimum of 100-particles from your reach using a Zigzag method, percent habitat method or specific transects (e.g. every 10-meter). If you do not complete a pebble count, **ALWAYS ESTIMATE** streambed composition from the riffles/runs chose for your macroinvertebrate sample collections.

Indicate your method from the choices below.	
Zigzag	
% Habitat	
10-m Transects	X

Woody Debris

Includes sticks, roots, leaves etc.
—

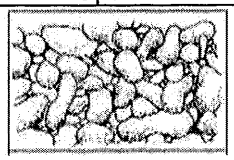
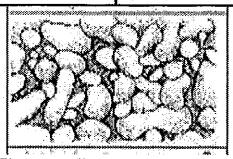
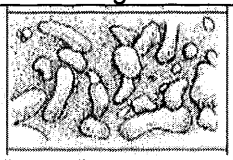
Size Classes (Intermediate axis in millimeters)						
Silt/clay < 0.06	Sand 0.06 – 2	Fine Gravel 2 – 24	Coarse Gravel 25 – 64	Cobble 65 – 255	Boulder 256 – 1096	Bedrock > 1096
	6	21	20	27	19	3
Totals	0	10				



(A) Long axis (**Length**)
(B) Intermediate axis (**Width**)
(C) Short axis (**Height**)

Pebble counts require two people, one in the stream and one on shore. The person in the stream slowly walks upstream from bank to bank using one of the methods above. After each step the person reaches down without looking, picks up the first particle touched, and measures the intermediate axis with a ruler. The on-shore partner records the measurement. The process continues until 100 pebbles have been measured or the reach has been walked.

HABITAT CONDITIONS: Score each habitat condition using the scales provided. Add all of the scores to determine your overall habitat score and integrity rating. Feel free to describe additional features that you feel are important. See the next page for more information about sediment deposition.

Point values	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Sediment deposition	Little or no formation of depositional features; < 20% of the reach affected.	Some increase in depositional features; 20-40% of the reach affected.	Moderate amounts of depositional features; 40-60% of the reach affected.	Heavy amounts of deposition; > 60% of the reach affected.
Rating 17	**Optimal**	**Suboptimal**	**Marginal**	**Poor**
Embeddedness	 Fine sediments surrounds <10% of the spaces between the gravel, cobble and boulders.	 Fine sediment surrounds 10-30% of the spaces between the gravel, cobble and boulders.	 Fine sediment surrounds 30-60% of the spaces between the gravel, cobble and boulders.	 Fine sediment surrounds > 60% of the spaces between the gravel, cobble and boulders.
Rating 12	**Optimal**	**Suboptimal**	**Marginal**	**Poor**

Embeddedness should be evaluated in riffles, prior to or during your macroinvertebrate collections.

Point values	10 9	8 7 6	5 4	3 2 1
NOT RATED **Bank vegetative protection**	> 90% of the banks are covered by natural vegetation; all levels (trees, shrubs and herbs) represented; disruption from grazing, mowing etc. minimal or absent; all plants allowed to grow naturally.	70-90% of the banks covered by natural vegetation; one level of plants may be missing or not well represented; some disruption of vegetation evident; > 50% of the potential plant height remains.	50-70% of the banks covered by natural vegetation; patches of bare soil may be present and closely cropped vegetation is common; < 50% of the potential plant heights remains.	< 50% of the banks covered by natural vegetation; disruption is high; vegetation has been removed or the potential plant heights are greatly reduced.
Left / Right	**Optimal**	**Suboptimal**	**Marginal**	**Poor**
Bank stability	Banks are stable; no evidence of erosion or bank failure; little or no potential for future problems.	Banks are moderately stable; infrequent areas of erosion occur, mostly shown by banks healed over.	Banks are moderately unstable; 60% of the reach has some areas of erosion; high potential for erosion during flooding events.	Banks are unstable; many have eroded areas (bare soils) along straight sections or bends; obvious bank collapse or failure; > 60% of the reach has erosion scars.
Left 7 / Right 8	**Optimal**	**Suboptimal**	**Marginal**	**Poor**
Riparian buffer width	Mainly undisturbed vegetation > 60 ft; no evidence of human impacts such as parking lots, road beds, clear-cuts, mowed areas, crops, lawns etc.	Zone of undisturbed vegetation 40-60 ft; some areas of disturbance evident.	Zone of undisturbed vegetation 20-40 ft; disturbed areas common throughout the reach.	Zone of undisturbed vegetation < 20 ft; disturbed areas common throughout the entire reach.
Left 9 / Right 4	**Optimal**	**Suboptimal**	**Marginal**	**Poor**

Totals 57	> 80	80 - 60	59 - 40	< 40
	Optimal	**Suboptimal**	**Marginal**	**Poor**

Habitat comments: 71.25

SEDIMENT DEPOSITION may cause the formation of islands, point bars (areas of increased deposition usually at the beginning of a meander that increase in size as the channel is diverted toward the outer bank) or shoals, or result in the filling of runs and pools. Usually deposition is evident in areas that are obstructed by natural or manmade debris and areas where the stream flow decreases, such as bends.

LAND USE: Indicate the land uses that you believe may be having an impact on your stream station. Use the letters (**S**) streamside, (**M**) within ¼ mile and (**W**) somewhere in the watershed, to indicate the approximate location of the disturbance and the numbers (**1**) slight, (**2**) moderate or (**3**) high, to represent the level of disturbance.

Active Construction		M	Pastureland		M	Single-family residences		S
Mountaintop mining			Cropland		W	Sub-urban developments		
Deep mining			Intensive feedlots			Parking lots, strip-malls etc.		
Abandoned mining			Unpaved Roads		W	Paved Roads		M
Logging		W	Trash dumps			Bridges		S
Oil and gas wells			Landfills			Other (describe)		
Recreation (parks, trails etc.)		S	Industrial areas		W			

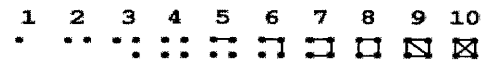
Land use comments: _____ Pipes? Yes (No)

Describe the types of pipes observed and indicate if there is any discharge from the pipes. Also describe the colors and odors of the discharge.

PHOTOGRAPH and **SKETCH YOUR REACH**: Use the space below or a separate piece of paper to draw your study reach. Indicate the direction of flow, north, sample locations and important features of the reach. Photographs are an excellent method for tracking changes, especially changes related to the condition of the habitat. Choose a minimum of two permanent locations from which to take your photos. Submit your photos with your survey data sheet.

BENTHIC MACROINVERTEBRATES: Assess your macroinvertebrate collections by counting and identifying to the family-level if possible. Use the table on the **below** to record your collections data. Although streamside identification is possible at this level, WV Save Our Stream's recommends preserving your samples using a full count or standard sub-sampling procedure in a well-lit and more comfortable setting.

The dot-dash tally method is a convenient way to record your data. Each dot or dash represents one tally.



INSECT GROUPS

Patterned stoneflies III Taxa 1 Total 3	Winter stoneflies 𝍸 Taxa 1 Total 5	Roach-like stonefly Total
Giant stonefly Total	Brown stonefly Total	Spiny crawler mayfly Total
Square-gilled mayfly Total	Minnow mayflies III Taxa 1 Total 3	Flatheaded mayfly 𝍸 𝍸 𝍸 Total 20
Brush-legged mayfly Total	Burrowing mayflies Taxa Total	Net-spinning caddisflies 𝍸 II Taxa 1 Total 7
Case-building caddisflies Taxa Total	Free-living caddisfly Total	Common netspinner 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 II Total 42
Dragonflies IIII Taxa 1 Total 4	Damselflies Taxa Total	Riffle beetle I Total 1
Long-toed beetle Total	Water penny 𝍸 𝍸 III Total 14	Other beetles (true bugs) II Taxa 1 Total 2
Hellgrammite/Fishfly 𝍸 𝍸 III Total 13	Alderfly Total	Aquatic moth Total

CONTINUE ON THE NEXT PAGE

Non-biting midge Total	Black fly 1 Total 1	Crane fly 1 Total 1
Watersnipe fly 𝍸 𝍸 1 Total 11	Dance fly Total	Dixid midge Total
Net-wing midge Total	Horse fly Total	Other fly larva 1 Biting midge Taxa 1 Total 1

NON-INSECT GROUPS

Crayfish Total	Scud/Sideswimmer Total	Aquatic sowbug Total
Water mite 11 Total 2	Operculate snails Taxa Total	Non-operculate snails Taxa Total
Pea clam Total	Asian clam Total	Mussel Total
Flatworms Total	Aquatic worms 1111 Total 4	Leeches Total
Other aquatic invertebrates Taxa Total	Comments:	

Total Taxa	Total Number
16	134

Describe other aquatic life (e.g. fish, amphibians) collected or observed, as well as other indications that the reach is being used by other animals (i.e. birds, mammals, reptiles).

BIOLOGICAL INTEGRITY

The SHADED boxes indicate that multiple **FAMILIES** are possible; tolerance values are provided.

TV	Macroinvertebrates	Totals	Tolerance score	Number of kinds	TV	Macroinvertebrates	Totals	Tolerance score	Number of kinds
1	Patterned stoneflies	3	3	1	6	Aquatic moth			
2	Winter stoneflies	5	10	1	4	Riffle beetle	1	4	1
1	Roach-like stonefly				5	Long-toed beetle			
1	Giant stonefly				3	Water penny	14	42	1
2	Little brown stonefly				5	Whirligig beetle			
3	Spiny crawler mayfly				7	Other beetles/bugs	2	14	1
5	Square-gilled mayflies				3	Hellgrammite/Fishfly	13	39	1
4	Minnow mayflies	3	12	1	6	Alderfly			
3	Flatheaded mayfly	20	60	1	9	Non-biting midge			
3	Brush-legged mayfly				6	Black fly	1	6	1
5	Burrowing mayflies				#5	Crane fly	1	5	1
4	Net-spinning caddisflies	7	28	1	3	Watersnipe fly	11	33	1
3	Case-building caddisflies				6	Dance fly			
5	Common netspinner	42	210	1	5	Dixid midge			
3	Free-living caddisfly				2	Net-wing midge			
4	Dragonflies	4	16	1	7	Horse fly			
7	Damselflies				8	Other fly larva	1	8	1
	Non-Insect Groups								
5	Crayfish				5	Pea clam			
5	Scud/Sideswimmer				6	Asian clam			
7	Aquatic sowbug				4	Mussel			
6	Water mite	2	12	1	5	Operculate snails			
10	Aquatic worms	4	40	1	7	Non-operculate snails			
10	Leeches				Other invertebrates				
7	Flatworms								

Complete your calculations using the metrics below. These metrics are combined to determine your overall score and integrity rating.

Total Number	Total Tolerance	Total Kinds
134	542	17

Comments: _____

BSVs	Metrics	Results	Points	10	8	6	4	2
18	Total Taxa	17	8	> 18	18 - 15	14 - 11	10 - 7	< 7
10	EPT Taxa	6	6	> 10	10 - 8	7 - 5	4 - 2	< 2
3.00	Biotic Index	4.04	8	< 3.5	3.5 – 4.5	4.6 – 5.4	5.5 – 6.5	> 6.5
90.0	% EPT Abundance	59.7	4	> 80	80 - 70	69.9 - 60	59.9 - 40	< 40
80.0	% Dominance	81.3	4	< 10	10 - 15	15.1 - 25	25.1 - 50	> 50
2.0	% Tolerant	52	8	< 2	2 - 10	10.1 - 15	15.1 - 20	> 20
76.2	**Stream Score**	36						

Integrity Rating

> 48	48 - 36	35 – 24	< 24
Optimal	Suboptimal	Marginal	Poor

Another way to evaluate the benthic community is to use best standard values (BSVs). BSVs are used to calculate an overall score and integrity rating based on a 0-100 scale. CLICK-HERE to learn more.

DISCHARGE

Determine the discharge by using a flow meter (if available) or other methods such as the FLOAT or a VELOCITY HEAD ROD (VHR). Discharge should be measured from a run (area of the channel with fast moving water with no breaks in the surface such as protruding rocks). The more measurements collected the more accurate your discharge results will be. To convert inches into feet divide by 12. For example, if your depth measurement was 6-inches the result in feet would be 0.5. Indicate the methods chosen to measure the discharge and use the tables to record your results. Use the table on the next page to record your measurements.

LEVEL-TWO SURVEY DATA SHEET

Discharge method used

Float	VHR	Flow meter
	X	

Water Level

Low	Normal	High	Dry
	X		

Channel width 15 feet

Use the table on the next page to record your velocity data

Distance (ft)	Depth (ft)	Velocity (ft/sec)	VHR (Rise-inches)	Float (sec)	Discharge (cfs)
1	0.3	1.2	1/4		
2	0.7	1.2	1/4		
3	0.9	2.3	1		
4	1.1	2.6	1 1/4		
5	0.6	2.0	3/4		
6	0.4	1.6	1/2		
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24		1.82			

Average Depth 0.7 feet

Cross Sectional Area (CSA) 10.5 ft^2
(CSA = Average Depth x Width)

Discharge = CSA x Velocity
= 10.5 x 1.82
= 19.1 cfs (ft^3/sec)

If you use a float record your distance below and the number of seconds it took to travel the distance in the column indicated.

Float distance (feet) _____

Use the table below to determine **VHR velocity** from the rises recorded above. The rises below are in inches.

Rise (R)	Velocity	Rise (R)	Velocity
¼	1.2	3 ¼	4.2
½	1.6	3 ½	4.3
¾	2.0	3 ¾	4.5
1	2.3	4	4.6
1 ¼	2.6	4 ¼	4.8
1 ½	2.8	4 ½	4.9
1 ¾	3.1	4 ¾	5.0
2	3.3	5	5.2
2 ¼	3.5	5 ¼	5.3
2 ½	3.7	5 ½	5.4
2 ¾	3.8	5 ¾	5.5
3	4.0	6	5.7

VHR Velocity = $8 \times \sqrt{R}$, where R is rise in feet

Submit an original or clear copy of your survey to the Coordinator at the address provided below. For more information call (304) 926-0499 Ext. 1710 or visit: http://www.dep.wv.gov/sos

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