LEVEL-THREE 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 MACRO-INVERTEBRATE 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 THE WVDNR IS REQUIRED FOR ALL BENTHIC COLLECTIONS.

Stream name _____ Survey date _____

Watershed _____ Station code _____

Latitude _____ Longitude _____ Directions to site _____

Survey completed by _____

Current weather conditions _____

Past weather conditions (last 3-days) _____

Affiliation _____ E-mail _____

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)			Conductivity			Alkalinity		
Dissolved oxygen			Nitrates			Iron		
pH			Turbidity			Fecal/E-coli		

Additional tests (describe and record results) _____

_____

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		Surface foam	
Clear		None		None		None	
Murky		Brown		Fishy		Slight	
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	
Dark green		Scattered		Hairy		Black	
Brown		Moderate		Matted		Green	
Other (describe)		Heavy		Floating		White/gray	
						Orange/red	

Physical condition comments: _____

Estimate the percentage of your reach that is shaded.	> 80	80-60	60-40	< 40
	Excellent	Good	Marginal	Poor

CIRCLE YOUR ESTIMATE

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

Riffle Width (feet) _____ Depth (feet) _____
Run   Width (feet) _____ Depth (feet) _____
Pool   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

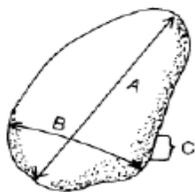| 1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

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 that were chosen for your macroinvertebrate sample collections.

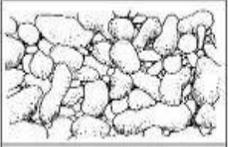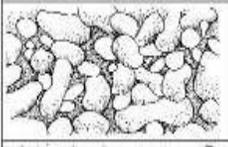| Indicate your method from the choices below.	Size Classes (Intermediate axis in millimeters)						
	Silt/clay < 0.06	Sand 0.06 – 2	Fine Gravel 2 – 24	Coarse Gravel 25 – 64	Cobble 65 – 255	Boulder 256 – 1096	Bedrock > 1096
Zigzag							
% Habitat							
10-m Transects							
Woody Debris Includes sticks, roots, leaves etc.							
Totals							

(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.

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

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

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

Riffle frequency	Occurrence of riffles very frequent, making up > 60% of the reach; habitat variety is key in streams with continuous riffles; note the presence and/or absence of bends and other structures.	Occurrence of riffles relatively frequent, making up 40-60% of the reach; bends and/or other structures may provide additional habitat.	Occurrence of riffles infrequent, making up 20-40% of the reach; there are occasional riffles and bends, but the distances between such areas have greatly increased.	Occurrence of riffles < 20%; mostly all flat water throughout the reach; if riffles are present they are generally shallow and have very little cobble.
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6 5	4 3 2 1

Attachment sites for invertebrates	Well developed riffles and runs; riffles are as wide as the stream and their lengths is twice that of the stream's width; cobble is prevalent, boulders and gravel also may be common.	Riffles are as wide as the stream but their length is less than twice the stream's width; cobble less abundant, gravel, boulders and other substrates maybe more common.	Riffle and runs lacking; if riffles are present they are not as wide as the stream nor is their length twice the stream's width; cobble rare, other substrate (esp. fines) more common.	Riffles and runs virtually nonexistent; large boulders and/or bedrock may be prevalent; or the reach may be mainly flat water throughout with finer sediments.
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6 5	4 3 2 1

Velocity/depth regimes	All four velocity/depth combinations present; slow-shallow, slow - deep, fast-shallow and fast-deep.	3 of 4 velocity/depth combinations present; fast currents generally dominate (score lower if they are absent).	2 of 4 velocity/depth combinations present (score lower if fast current areas are absent).	Stream reach dominated by one velocity/depth regime (usually slow-shallow or slow-deep).
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6 5	4 3 2 1

Channel flow status	Water reaches the base of both lower banks and a minimal amount of channel substrate is exposed.	Water fills > 75% of the channel; < 25% of the channel substrate is exposed.	Water fills 25-75% of the channel; much of the riffle areas are exposed.	Very little water in the channel; mostly present as only standing pools.
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6 5	4 3 2 1

Channel alterations	Stream straightening, dredging, artificial embankments, dams, bridge abutments etc. absent or minimal; stream has a natural pattern.	Some type of channel alteration present, usually in areas of bridge abutments; no evidence of recent channel alterations.	Artificial embankment structures present, at least to some extent, on both sides of the stream; 40-80% of the reach has been altered.	Stream banks are shored with gabions, rip/rap, cement etc.; > 80% of the reach has been disrupted.
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6 5	4 3 2 1

The last three conditions are assessed on both sides of the channel.

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	10	9	8	7	6	5	4	3	2	1
Right	10	9	8	7	6	5	4	3	2	1
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	10	9	8	7	6	5	4	3	2	1
Right	10	9	8	7	6	5	4	3	2	1
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	10	9	8	7	6	5	4	3	2	1
Right	10	9	8	7	6	5	4	3	2	1

Total Score		Excellent	Very good	Good	Marginal	Poor
		> 170	170 - 150	149 - 120	119 - 90	< 90
		Optimal	Suboptimal		Marginal	Poor

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.

Habitat comments: _____

_____

_____

_____

_____

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

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 color and odor 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.
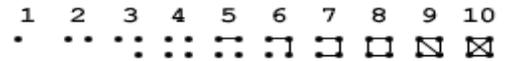
INSECT GROUPS

Patterned stoneflies	Winter stoneflies	Roach-like stonefly
Taxa [ ] Total [ ]	Taxa [ ] Total [ ]	Total [ ]
Giant stonefly	Brown stonefly	Spiny crawler mayfly
Total [ ]	Total [ ]	Total [ ]
Square-gilled mayfly	Minnow mayflies	Flatheaded mayfly
Total [ ]	Taxa [ ] Total [ ]	Total [ ]
Brush-legged mayfly	Burrowing mayflies	Net-spinning caddisflies
Total [ ]	Taxa [ ] Total [ ]	Taxa [ ] Total [ ]
Case-building caddisflies	Free-living caddisfly	Common netspinner
Taxa [ ] Total [ ]	Total [ ]	Total [ ]
Dragonflies	Damselflies	Riffle beetle
Taxa [ ] Total [ ]	Taxa [ ] Total [ ]	Total [ ]
Long-toed beetle	Water penny	Other beetles (true bugs)
Total [ ]	Total [ ]	Taxa [ ] Total [ ]
Hellgrammite/Fishfly	Alderfly	Aquatic moth
Total [ ]	Total [ ]	Total [ ]

6

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

NON-INSECT GROUPS

Crayfish	Scud/Sideswimmer	Aquatic sowbug
Total	Total	Total
Water mite	Operculate snails	Non-operculate snails
Total	Taxa Total	Taxa Total
Pea clam	Asian clam	Mussel
Total	Total	Total
Flatworms	Aquatic worms	Leeches
Total	Total	Total

Other aquatic invertebrates	Comments:
Taxa Total	**Total Taxa** **Total Number**

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				6	Aquatic moth			
2	Winter stoneflies				4	Riffle beetle			
1	Roach-like stonefly				5	Long-toed beetle			
1	Giant stonefly				3	Water penny			
2	Little brown stonefly				5	Whirligig beetle			
3	Spiny crawler mayfly				7	Other beetles/bugs			
5	Square-gilled mayflies				3	Hellgrammite/Fishfly			
4	Minnow mayflies				6	Alderfly			
3	Flatheaded mayfly				9	Non-biting midge			
3	Brush-legged mayfly				6	Black fly			
5	Burrowing mayflies				4	Crane fly			
4	Net-spinning caddisflies				3	Watersnipe fly			
3	Case-building caddisflies				6	Dance fly			
5	Common netspinner				5	Dixid midge			
3	Free-living caddisfly				2	Net-wing midge			
4	Dragonflies				7	Horse fly			
7	Damselflies				8	Other fly larva			
	Non-Insect Groups								
5	Crayfish				5	Pea clam			
5	Scud/Sideswimmer				6	Asian clam			
7	Aquatic sowbug				4	Mussel			
6	Water mite				5	Operculate snails			
10	Aquatic worms				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**	Comments:

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

Stream Score			Integrity Rating			
			> 48	48 - 36	35 – 24	< 24
			Optimal	Suboptimal	Marginal	Poor

DISCHARGE: Determine the discharge by using a flow meter (if available) or other methods such as the **FLOAT METHOD** or the **VELOCITY HEAD ROD METHOD** (VHR). Discharge is 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 to record your measurements.

Discharge method used   Water Level

Float	Velocity Head Rod	Flow meter		Low	Normal	High	Dry

Channel width _____ feet

Distance (ft)	Depth (ft)	Velocity (ft/sec)	VHR (Rise-inches)	Float (sec)	Discharge (cfs)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

Average Depth _____ feet

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

Discharge = CSA x Velocity

= _____ x

= _____ 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

Submit the <u>original or a clear copy</u> of your survey to the **Citizen's Monitoring Coordinator** at the address below. The information will be reviewed and returned; however it may take a month or more for survey reviews to be completed. Always keep a copy for your own records.

WV DEPARTMENT OF ENVIRONMENTAL PROTECTION
SAVE OUR STREAMS PROGRAM
601 57TH STREET, SE
CHARLESTON, WV 25304

For more information go to: http://www.dep.wv.gov/sos