



(1) Determine your stream-reach boundary; this is a stream length up to 100-meters, which may be more or less under certain circumstances. (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 for evaluating the conditions of your stream study site.

Stream name SPRING RUN Survey date 10/23/2009  
 Watershed SOUTH BRANCH POTOMAC Station code SR (2.1)  
 Latitude 38-55-15 Longitude 79-05-12 Directions to site FROM DORCAS TRAVEL  
SPRING RUN RD FOR ABOUT 1 1/2 MILES, SITE IS ABOUT 1/4 MILE DOWNSTREAM FROM HATCHERY  
 Survey completed by N. GILLIES, B. KEPLINGER, C. RETTENBURG AND T. CRADDOCK  
 Current weather conditions PARTLY CLOUDY AND COOL  
 Past weather conditions (last 3-days) SCATTERED SHOWERS, SOME HEAVY AT TIMES  
 Affiliation SPRING RUN PROJECT TEAM 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)	15.6	C	Conductivity	296	µ/CM	Alkalinity		
Dissolved oxygen	9.1	PPM	Nitrate			Iron		
pH	8.4		Turbidity	10	NTU	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
		Water Sediment	
Clear <input checked="" type="checkbox"/>	None <input checked="" type="checkbox"/>	None <input type="checkbox"/> <input type="checkbox"/>	None <input type="checkbox"/>
Murky <input type="checkbox"/>	Brown <input type="checkbox"/>	Fishy <input type="checkbox"/> <input type="checkbox"/>	Slight <input checked="" type="checkbox"/>
Milky <input type="checkbox"/>	Black <input type="checkbox"/>	Musky <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Moderate <input type="checkbox"/>
Muddy <input type="checkbox"/>	Orange/red <input type="checkbox"/>	Rotten egg <input type="checkbox"/> <input type="checkbox"/>	High <input type="checkbox"/>
Other (describe) <input type="checkbox"/>	Gray/White <input type="checkbox"/>	Sewage <input type="checkbox"/> <input type="checkbox"/>	
	Green <input type="checkbox"/>	Chemical <input type="checkbox"/> <input type="checkbox"/>	

Algae color	Algae abundance	Algae growth habit	Streambed color
Light green <input type="checkbox"/>	None <input type="checkbox"/>	Even coating <input type="checkbox"/>	Brown <input checked="" type="checkbox"/>
Dark green <input checked="" type="checkbox"/>	Scattered <input type="checkbox"/>	<b>Hairy</b> <input checked="" type="checkbox"/>	Black <input type="checkbox"/>
Brown <input type="checkbox"/>	Moderate <input type="checkbox"/>	Matted <input checked="" type="checkbox"/>	Green <input type="checkbox"/>
Other (describe) <input type="checkbox"/>	Heavy <input checked="" type="checkbox"/>	Floating <input type="checkbox"/>	White/gray <input type="checkbox"/>
			Orange/red <input type="checkbox"/>

Physical condition comments: ALGAE EXTREMELY ABUNDANT, EVEN ENTRAINED IN THE SEDIMENT; SEDIMENT HAD A STRONG ORGANIC ODOR

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 features (riffles, runs or pools). Choose two or more 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. Be sure to indicate the types of channel features that you have chosen.

1. Width <sup>(feet)</sup>	<u>13</u>	Depth <sup>(feet)</sup>	<u>0.7</u>	Riffle	Run	Pool
2. Width <sup>(feet)</sup>	<u>18</u>	Depth <sup>(feet)</sup>	<u>2.3</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Width <sup>(feet)</sup>	<u>        </u>	Depth <sup>(feet)</sup>	<u>        </u>	Enter (1,2, or 3) indicating the feature measured		

**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

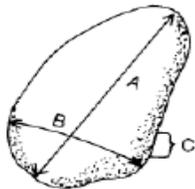
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

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 chosen for your macroinvertebrate sample collections.

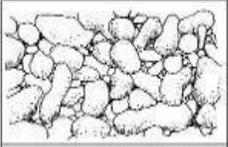
Indicate your method from the choices below.	Size Classes (Intermediate axis in millimeters)						
	Silt/clay < 0.06	Sand 0.06 – 2	Fine Gravel 2 – 24	Coarse Gravel 25 – 64	Cobble 65 – 255	Boulder 256 – 1096	Bedrock > 1096
Zigzag							
% Habitat							
10-m Transects							
Woody Debris Includes sticks, roots, leaves etc.							
Totals	18	3	33	32	13	3	



- (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
<b>Sediment deposition</b>		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	<b>Optimal</b>					<b>Suboptimal</b>					<b>Marginal</b>					<b>Poor</b>				
<b>Embeddedness</b>																					
	Rating	<b>Optimal</b>					<b>Suboptimal</b>					<b>Marginal</b>					<b>Poor</b>				

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		
<b>Bank vegetative protection</b>		> 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	<b>Optimal</b>			<b>Suboptimal</b>			<b>Marginal</b>			<b>Poor</b>		
<b>Bank stability</b>		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 Right	<b>Optimal</b>			<b>Suboptimal</b>			<b>Marginal</b>			<b>Poor</b>		
<b>Riparian buffer width</b>		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 Right	<b>Optimal</b>			<b>Suboptimal</b>			<b>Marginal</b>			<b>Poor</b>		
<b>Totals</b>	<b>53</b>	> 80			80 - 60			59 - 40			< 40		
		<b>Optimal</b>			<b>Suboptimal</b>			<b>Marginal</b>			<b>Poor</b>		

Habitat comments: **SITE WAS ADJACENT TO A RESIDENCE**

**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	1	W	Pastureland	1	W	Single-family residences	2	S
Mountaintop mining			Cropland			Sub-urban developments		
Deep mining			Intensive feedlots	3	M	Parking lots, strip-malls etc.		
Abandoned mining			Unpaved Roads			Paved Roads	2	S
Logging			Trash dumps			Bridges	1	M
Oil and gas wells			Landfills			Other (describe)		
Recreation (parks, trails etc.)			Industrial areas					

Land use comments: THE HATCERY IS THE INTENSIVE FEEDLOT Pipes?  Yes  No

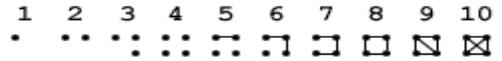
Describe the types of pipes observed and indicate if there is any discharge from the pipes. Also describe the colors and odors of the discharge.

**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 to record your data.

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



**Insect Groups**

Patterned stoneflies  Taxa <input type="text"/> Total <input type="text"/>	Winter stoneflies  Taxa <input type="text"/> Total <input type="text"/>	Roach-like stonefly  Total <input type="text"/>
Giant stonefly  Total <input type="text"/>	Brown stonefly  Total <input type="text"/>	Spiny crawler mayfly  Total <input type="text"/>
Square-gilled mayfly  Total <input type="text"/>	Minnow mayflies IIIII Taxa <input type="text"/> 1 Total <input type="text"/> 5	Flatheaded mayfly  Total <input type="text"/>
Brush-legged mayfly  Total <input type="text"/>	Burrowing mayflies  Taxa <input type="text"/> Total <input type="text"/>	Net-spinning caddisflies III Taxa <input type="text"/> 1 Total <input type="text"/> 3
Case-building caddisflies  Taxa <input type="text"/> Total <input type="text"/>	Free-living caddisfly IIIII IIIII IIIII IIIII Total <input type="text"/> 20	Common netspinner IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII Total <input type="text"/> 45
Dragonflies  Taxa <input type="text"/> Total <input type="text"/>	Damselflies  Taxa <input type="text"/> Total <input type="text"/>	Riffle beetle IIIII IIIII III Total <input type="text"/> 14
Long-toed beetle  Total <input type="text"/>	Water penny  Total <input type="text"/>	Other beetles (true bugs)  Taxa <input type="text"/> Total <input type="text"/>
Hellgrammite/Fishfly  Total <input type="text"/>	Alderfly  Total <input type="text"/>	Aquatic moth  Total <input type="text"/>
Non-biting midge IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII IIIII II Total <input type="text"/> 77	Black fly IIIII I Total <input type="text"/> 6	Crane fly IIII Total <input type="text"/> 4



LEVEL-TWO SURVEY DATA SHEET

Discharge method used

Water Level

Float

Velocity Head Rod

Flow meter

Low

Normal

High

Dry

Channel width **13** feet

Distance (ft)	Depth (ft)	Velocity (ft/sec)	VHR (Rise-inches)	Float (sec)	Discharge (cfs)
1	0.6	-	-		0
2	2	1.2	¼		0.96
3	2	1.2	¼		1.44
4	1.5	2.3	1		3.11
5	1.5	3.1	1 ¾		6.01
6	1.5	3.3	2		5.45
7	1.5	3.1	1 ¾		5.58
8	1	2.3	1		1.84
9	0.5	1.2	¼		0.24
10	0.3	-	-		0
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
<b>12.4</b>	<b>0.73</b>	<b>1.77</b>			<b>24.13</b>

Average Depth **0.73** feet

Cross Sectional Area (CSA) **9.05** ft<sup>2</sup>  
(CSA = Average Depth x Width)

**Discharge** = CSA x Velocity  
 = \_\_\_\_\_ x \_\_\_\_\_  
 = **24.13** cfs (ft<sup>3</sup>/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

Additional comments: **THIS STATION WAS ADDED TO THE PROJECT IN ORDER TO GATHER ADDITIONAL INFORMATION ABOUT THE RECOVERY OF SPRING RUN**

Submit an original or clear copy of your survey to the coordinator at the address provided below.

WV Department of Environmental Protection  
 Save Our Streams Program  
 601 57<sup>th</sup> Street, SE  
 Charleston, WV 25304

Web page: <http://www.dep.wv.gov/sos>

**LEVEL-TWO BENTHIC ASSESSMENT**

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

Macroinvertebrates	Totals	Tolerance score	Families	Macroinvertebrates	Totals	Tolerance score	Families
1 Patterned stoneflies				6 Aquatic moth			
2 Winter stoneflies				4 Riffle beetle	14	56	1
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	5	20	1	6 Alderfly			
3 Flatheaded mayfly				9 Non-biting midge	77	693	1
3 Brush-legged mayfly				6 Black fly	6	36	1
5 Burrowing mayflies				5 Crane fly	4	20	1
4 Net-spinning caddisflies	3	12	1	3 Watersnipe fly			
3 Case-building caddisflies	1	3	1	6 Dance fly	1	6	1
5 Common netspinner	45	225	1	5 Dixid midge			
3 Free-living caddisfly	20	60	1	2 Net-wing midge			
4 Dragonflies				7 Horse fly			
7 Damselflies				8 Other fly larva	1	8	1
<b>Non-Insect Groups</b>							
5 Crayfish				5 Pea clam			
5 Scud/Sideswimmer	62	310	1	6 Asian clam			
7 Aquatic sowbug				4 Mussel			
6 Water mite				5 Operculate snails			
10 Aquatic worms	31	310	1	7 Non-operculate snails	1	7	1
10 Leeches				Other invertebrates			
7 Flatworms	2	14	1				
Complete your calculations using the metrics below. These metrics are combined to determine your overall score and integrity rating.				Comments: _____			
<b>Total Number</b>				<b>Total Tolerance</b>			
273				1469			
<b>Total Taxa</b>				<b>Total Taxa</b>			
15				15			

Metrics	Results	Points	10	8	6	4	2
1. Total Taxa	15	8	> 18	18 - 15	14 - 11	10 - 7	< 7
2. EPT Taxa	5	6	> 10	10 - 8	7 - 5	4 - 2	< 2
3. Biotic Index	5.38	6	< 3.5	3.5 - 4.5	4.6 - 5.4	5.5 - 6.5	> 6.5
4. % EPT Abundance	27.1	2	> 80	80 - 70	69.9 - 60	59.9 - 40	< 40
5. % Tolerant	41.2	2	< 2	2 - 10	10.1 - 15	15.1 - 20	> 20
6. % Dominance	28.2	4	< 10	10 - 15	15.1 - 25	25.1 - 50	> 50
<b>Stream Score</b>	<b>28</b>	<b>Integrity Rating</b>					
		> 48	48 - 36	35 - 24	< 24		
		Optimal	Suboptimal	Marginal	Poor		