

LEVEL-THREE SURVEY DATA SHEET



(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, 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 and add any other comments that you feel are important. Note: A WVDNR Scientific Collection Permit 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	Watercolor	Water/sediment odor	Surface foam
Clear <input type="checkbox"/>	None <input type="checkbox"/>	None <input type="checkbox"/>	None <input type="checkbox"/>
Murky <input type="checkbox"/>	Brown <input type="checkbox"/>	Fishy <input type="checkbox"/>	Slight <input type="checkbox"/>
Milky <input type="checkbox"/>	Black <input type="checkbox"/>	Musky <input type="checkbox"/>	Moderate <input type="checkbox"/>
Muddy <input type="checkbox"/>	Orange/red <input type="checkbox"/>	Rotten egg <input type="checkbox"/>	High <input type="checkbox"/>
Other (describe) <input type="checkbox"/>	Gray/White <input type="checkbox"/>	Sewage <input type="checkbox"/>	
	Green <input type="checkbox"/>	Chemical <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 type="checkbox"/>
Dark green <input type="checkbox"/>	Scattered <input type="checkbox"/>	Hairy <input type="checkbox"/>	Black <input type="checkbox"/>
Brown <input type="checkbox"/>	Moderate <input type="checkbox"/>	Matted <input type="checkbox"/>	Green <input type="checkbox"/>
Other (describe) <input type="checkbox"/>	Heavy <input type="checkbox"/>	Floating <input type="checkbox"/>	White/gray <input type="checkbox"/>
			Orange/red <input type="checkbox"/>

Physical condition comments: _____

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

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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

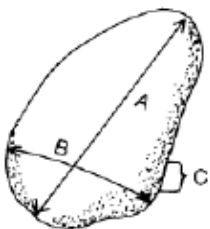
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

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 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.

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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). 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
 Channel width _____ feet

Low Normal High Dry

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					
25					
26					
27					
28					
29					
30					

Average Depth _____ feet

Cross Sectional Area (CSA) _____ ft²
(CSA = Average Depth x Width)

Discharge = CSA x Velocity
 = _____ x _____
 = _____ cfs (ft³/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 (in)	Velocity	Rise (in)	Velocity
1/4	1.2	3 1/4	4.2
1/2	1.6	3 1/2	4.3
3/4	2.0	3 3/4	4.5
1	2.3	4	4.6
1 1/4	2.6	4 1/4	4.8
1 1/2	2.8	4 1/2	4.9
1 3/4	3.1	4 3/4	5.0
2	3.3	5	5.2
2 1/4	3.5	5 1/4	5.3
2 1/2	3.7	5 1/2	5.4
2 3/4	3.8	5 3/4	5.5
3	4.0	6	5.7

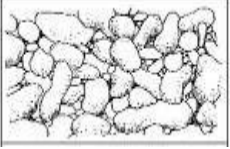
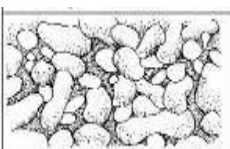
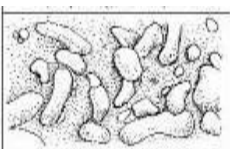

VHR Velocity = $8 \times \sqrt{R}$, where R is rise

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HABITAT CONDITIONS: Score each habitat condition using the scales provided. Add all 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 <input type="text"/>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6

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 <input type="text"/>	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 <input type="text"/>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6
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 <input type="text"/>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6
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 <input type="text"/>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6
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 <input type="text"/>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6
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 <input type="text"/>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6

Habitat assessment continues page four.

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The last three conditions are assessed on both sides of the channel. The **LEFT** and **RIGHT** sides are determined by looking downstream.

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, roadbeds, 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 - 130	129 - 100	< 100

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
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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. _____

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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.



Submit the original or a clear copy of your survey to the **Program Coordinator**. The information will be reviewed and returned. For more information visit: <https://go.wv.gov/sos>

Philippi field office

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Attn: Callie Cronin Sams

Coordinator

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Office: (304) 314-6095
Mobile: (304) 341-9305

Note: The level-3 benthic data sheet is found on page seven. This analysis cannot be completed streamside. Your samples must be properly preserved and evaluate in a laboratory or similar setting. If you do not want to complete this task yourself support may be available from WVDEPs Watershed Assessment Branch. Contact the coordinator for details.

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BENTHIC COLLECTION DATA SHEET

Stream _____ Watershed _____
 Date _____ Station code _____ Latitude _____ Longitude _____
 Location _____ County _____

	Count		Count
Annelida		Trichoptera	
Total			
Bivalvia			
Total			
Gastropoda			
		Total	
		Plecoptera	
Total			
Crustacea			
TOTAL		Total	
Ephemeroptera		Odonata	
		Total	
		Coleoptera	
Total		Total	
Megaloptera		Diptera	
Total			
Miscellaneous invertebrates			
Total		Total	
Total Taxa		Total Count	

ID by: _____

Collected by: _____