

## MEMORANDUM

**TO:** Mike Rolband

**FROM:** Alison Robinson

**CC:** Jennifer Feese, Ben Rosner, Mark Headly, Frank Graziano

**RE:** Northern Virginia Stream Restoration Bank

Snakeden Branch Watershed

Supplemental Biological Monitoring 2012 (Year 4)

WSSI #20003, Task L2

**DATE:** November 27, 2012

Per maintenance and monitoring requirements defined in the "Northern Virginia Stream Restoration Bank Banking Instrument", Section VI.B.2.(i), biological stream assessments are to be monitored prior to stream restoration, then in years 1, 5, and 10. However, monitoring was undertaken voluntarily in Year 4 (2012) at biomonitoring Reaches 1-A through 1-F, 2-A, 2-B, and 3-A to better understand and document the effects of stream restoration on the benthic community within the Snakeden Branch Watershed. Field work was conducted by WSSI environmental scientists Alison Robinson, WPIT, CT<sup>1</sup> and Mark Navarro on April 10 and 11, 2012. Benthic macroinvertebrate and habitat field data sheets and benthic macroinvertebrate bench sheets for each reach are enclosed herein.

Habitat results for Year 4 (2012) show that all nine stream reaches have "Optimal" habitat conditions (<u>Table 1</u>, <u>Figure 1</u>). The average habitat assessment score for all restored stream reaches assessed in 2012 is 177 (Optimal) out of 200 following restoration. These results show improved habitat conditions following restoration, with scores exceeding the pre-restoration scores (which averaged 113 (Sub-Optimal) out of 200)<sup>2</sup>.

The results of our data analysis indicate that the benthic macroinvertebrate community at all nine stream reaches (Reaches 1-A through 1-F, 2-A, 2-B, and 3-A) were still in "Severe Stress" in 2012, based on their Stream Condition Index for Virginia Non-coastal Streams (VA-SCI)<sup>3</sup> scores (<u>Table 2</u>, <u>Figure 2</u>). The average VA-SCI numerical score for all reaches assessed in 2012 is 21.99 ("Severe Stress"). Note that while all the reaches still remain in "Severe Stress", on average, the VA-SCI scores are still above the pre-restoration average of 20.47<sup>4</sup>. In conclusion, when compared to pre-restoration scores, there has been definite improvement in stream habitat while the benthic community composition in the 2012 sample reaches has remained similar to

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Wetland Professional In-Training, Society of Wetland Scientists Certification Program, Inc.; North American Benthological Society (NABS) Certified Level 1 Taxonomist: All Phyla; ISA Certified Arborist MA-5179A.

This is an average of the pre-restoration Habitat Condition scores from 2007 and 2008.

The VA-SCI is a multi-metric Index of Biotic Integrity developed for the DEQ to assess Streams of the Commonwealth.

This is an average of the pre-restoration VA-SCI scores from 2007 and 2008.

both the pre-restoration scores and the post-restoration benthic communities. The fluctuations in the VA-SCI scores from 2007 through 2012 indicate that although the habitat has improved, degraded water quality is still a factor in the composition of the benthic community. In addition, annual variation within the benthic community itself may be a factor in the absence of a steady increase in VA-SCI scores from the pre- and post-restoration levels.

## **Enclosures**

Table 1. 2012 To	otal Habita	t Assessment Scores
BIOMONITORING REACH	Total Habitat	Narrative Rating
1-A	178	Optimal
1-B	179	Optimal
1-C	186	Optimal
1-D	184	Optimal
1-E	175	Optimal
1-F	177	Optimal
2-A	174	Optimal
2-B	174	Optimal
3-A	170	Optimal
Average	177	Optimal

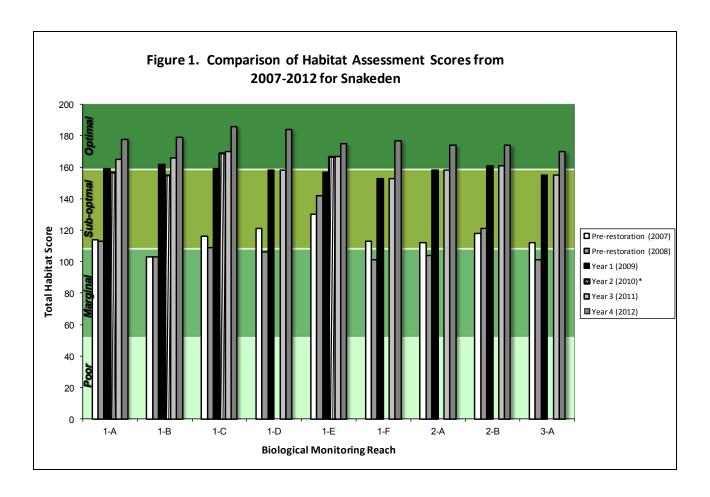
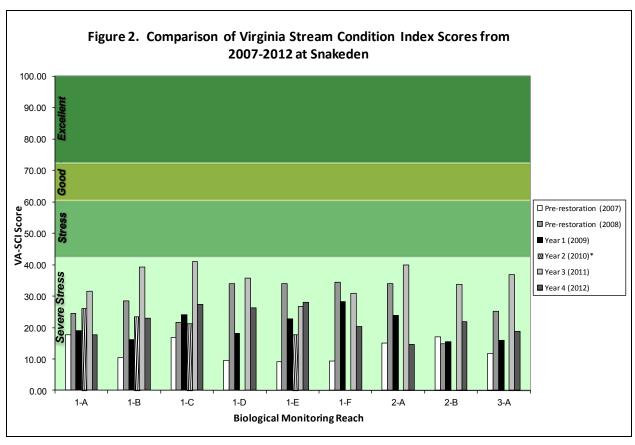


Table 2. 2012 Bio	tic Metric	and Ind	ex Weig	hting an	d VA-SC	l at Snak	eden Brar	nch.	
WEIGHTED METRIC				BIOLOGIC	CAL MON	TORING R	EACH		
WEIGHTED WETRIC	1-A	1-B	1-C	1-D	1-E	1-F	2-A	2-B	3-A
Total Taxa	31.82	27.27	18.18	36.36	22.73	9.09	18.18	27.27	22.73
EPT Taxa	0.00	18.18	9.09	9.09	9.09	0.00	0.00	0.00	0.00
Percent Ephemeroptera	0.00	0.00	0.00	2.91	1.36	0.00	0.00	0.00	0.00
Percent Plecoptera + Trichoptera (Excluding Hydropsychidae)	0.00	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent Scrapers	4.12	3.84	0.00	3.46	6.46	0.00	0.00	3.23	1.94
Percent Chironomidae	20.21	35.64	68.04	49.11	64.17	50.50	20.47	42.50	34.00
Percent Top Two Dominant	15.37	12.88	41.71	11.61	8.43	0.00	3.41	7.23	4.34
HBI	69.46	82.56	82.63	97.03	111.52	103.38	75.50	94.49	87.65
VA-SCI Numerical Score	17.62	22.89	27.46	26.20	27.97	20.37	14.70	21.84	18.83
VA-SCI Narrative Score	Severe	Severe	Severe	Severe	Severe	Severe	Severe	Severe	Severe
VA-SCI Narrative Score	Stress	Stress	Stress	Stress	Stress	Stress	Stress	Stress	Stress
Average VA-SCI Numerical Score	21.99								
Average VA-SCI Narrative Score	Severe								
Average VA-301 Natiative 3001e	Stress								



\*Note that biological monitoring reach 1-D, 1-F, 2-A, 2-B, and 3-A were not assessed in 2010. Reaches 1-A and 1-B were assessed as part of a comprehensive study with South Lakes High School and the U.S. Geological Survey. Reaches 1-C and 1-E were assessed to determine the effects of a documented continuous diesel fuel leak, just above biomonitoring Reach 1-E, on the benthic community within Snakeden Branch.

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## **EXHIBIT 6: HABITAT ASSESSMENT FIELD DATA SHEET - SUMMARY WORKSHEET**

Stream ID	ID: Snakeden and Unnamed Tributaries of Snakeden					Date: 4/10/12 through 4/11/12									
Evaluators: ABR/MN						HUC: 020	70008								
Assessment Period: Post-construction - Year 4						4									
						Condition	Category								
Assess Reach N		Substrate	Embedded- ness	Velocity	Sediment Depostion	Flow Status	Channel Alteration	Frequency of Riffles	Bank Stability*	Vegetation Protection*	Riparian Zone*	TOTAL SCORE	Condition	Reach Length	Strear Type
Stream 1	1-A	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	178	Optimal	300	R3
	1-B	Optimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	179	Optimal	300	R3
	1-C	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	186	Optimal	300	R3
	1-D	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	184	Optimal	300	R3
	1-E	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	175	Optimal	300	R3
	1-F Suboptimal Optimal Suboptimal Optimal Subopti							Optimal	Optimal	Optimal	Optimal	177	Optimal	300	R4/RE
Stream 2	2-A	Suboptimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	174	Optimal	300	R3

Optimal

Optimal

Optimal

Optimal

Optimal

Optimal

Optimal

Optimal

Average

174

170

177

Optimal

Optimal Total 300

300

2,700

R3

R3

Optimal

Optimal

Optimal

Optimal

Suboptimal

Optimal

Suboptimal Suboptimal

Optimal Suboptimal

2-B

3-A

Stream 3

Optimal

Suboptimal

<sup>\*</sup> The score for Bank Stability, Vegetation Protection and Riparian Zone combines the left and right bank scores.

<sup>\*\*</sup> The stream is characterized as non-perennial by Fairfax County and is thus either intermittent or ephemeral.



Para No.	THE PARTY OF THE	Bent	hic Macro	oinvertebrate an	d Habitat F	ield Data Sheet
Station ID:	Reach 1-A		Ecoregion:	Piedmont	Land Use:	Urban
Field Team:	ASO/MN		Survey Reason	Year 4 Biomonitoring	Start time:	
Stream Name:	Snakeden		Location:	Reston, Virginia	Finish time:	
Date:	4/11/2012		Latitude:	38°55'58"	Longitude	77°21'01"
Stream Phys	siochemical Me	asureme	nts			
Instrument ID r	number:	N	/A	pH:	N/A	
Temperature:	_	N/A	°C	Conductivi	ty: N/A	uS/cm
Dissolved Oxyg	en:	N/A	mg/L	Did	instrument pass al	l post-calibration checks? N/A
				If NO	)- which parameter	(s) failed and action taken: N/A
Benthic Mad	roinvertebrate	Collectio	n			
Method Used:		Sir	gle Habitat (Rif	fle):	Multi H	Habitat (Logs, Plants, etc.):
Riffle Quality:		Good	X	Marginal	Poo	r None
Habitats Sample	ed:	Riffle	X	Snags	Sedimen	t Vegetation X
	# Jabs:		15			5
Weather Ob	servations					
Current Weath	er:	Cloudy	X	Clear	Rain/Snow	Foggy
Recent Precipit	ation:	Clear	X	Showers	Rair	nStorms
Stream Flow:		Low	X	Normal	Above Norma	Flood
Biological O	oservations					
Periphyton		2		Salamanders	0	Other
Filamentous Alg	ae	2		Warmwater Fish	0	0= Not observed
Submerged Ma	crophytes	0		Coldwater Fish	0	1= Sparse
Emergent Macr	ophytes	0		Beavers	0	2= Common to Abundant
Crayfish		0		Muskrats	0	3= Dominant-
Corbicula		0		Ducks/Geese	0	abnormally high density where other taxa
Unionidae		0		Snakes	0	are insignificant in relation to the dominant
Operculate Snai	ls	0		Turtles	0	taxa. There can be situations where multiple
Non-operculate	Snails	0		Frogs/Tadpoles	2	taxa are dominant such as algae and snails
Notes						

Habitat Parameter		Con	dition Category		
nabitat Parameter	Optimal	Suboptimal	Marginal	Poor	Score
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at stage to allow full colonization potential (i.e. snags/logs that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintainance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization.	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	17
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16
Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow- shallow, fast-deep, fast shallow)(slow is <0.3m/s, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16
4. Sediment Deposition	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16



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Habitat Parameter			dition Category		
nabitat Parameter	Optimal	Suboptimal	Marginal	Poor	Score
5. Channel Flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the availible channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the availible channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18
6. Channel Alteration	Channelization or dredging absent or minimal; stream width normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of pagt channelization, i.e. dredging, may be present, but recent channelization is not present.	Channeliztion may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
7. Frequency of Riffles	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distances between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	17
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10
9. Vegetation Protection (score each bank) Note: Determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetation disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riperian zone <6 meters; little or no riparian vegetation due to human activities.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	9
					10

				ACROINVERTEBRAT				
Job Name/#	S	nakeden-20	003	Sample subsorted by:	ASO,	SG, KG	- CVVI-AL- I	<b>\</b>
Station ID:		Reach 1-A	1	Date Subsorted:	6/2	8/12	Wetland	)
Stream Name	9:	Snakeden		# of Grids subsorted		6	Studies and Solutions, I	111-
Date Sample	d:	4/11/12					T-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	
Markette Francisco (Control				Total # of subsorted insects:		103	Total # identified:	94
Sampling Met		Multihabita	t	Sample Identified by:	Al	BR	Date Identified:	9/27/12
Taxa Collec	ted:							
			_	Metretopodidae		ì	Lepidostomatidae	
Porifera	Spongillidae		]	Neoephemeridae			Leptoceridae	
Ostracoda	Unknown			Oligoneuridae			Limnephilidae	
Flatworms	Tricladida	-	-	Psuedironidae			Molannidae	
Gastropoda	Planariidae Unknown		-	Polymitarcyidae Potamanthidae			Odontoceridae	
Limpets	Ancylidae		-	Siphlonuridae			Philopotamidae	
Snails	Immature	+	1	Tricorythidae			Phryganeidae Polycentropodidae	
	Lymnaeidae	1	Zygoptera	Early Instar and/or damaged			Psychomyiidae	
	Physidae	1		Calopterygidae			Ryacophilidae	
	Planorbidae		1	Coenagrionidae	1		Sericostomatidae	
	Hydrobiidae		]	Lestidae			Uenoidae	
	Pleuroceridae		1	Protoneuridae		Lepidoptera	Early Instar and/or damaged	
5	Viviparidae		Anisopteera	Early Instar and/or damaged			Pyralidae	
Bivalvia	Immature Corbiculidae			Aeshnidae		Coleoptera	Early Instar and/or damaged	
	Sphaeriidae		ł	Cordulegastridae			Chrysomelidae	
	Unionidae		ł	Corduliidae Gomphidae			Curculionidae	
Oligochaeta	Unknown	9		Libellulidae			Dryopidae Dytiscidae	
Lumbriculida				Macromiidae			Elmidae	
	Lumbriculidae			Petaluridae			Gyrinidae	
Tubificida				Cordullidae/Libelluidae			Haliplidae	
	Enchytraeidae		Plecoptera	Early Instar and/or damaged			Helodidae	
	Naididae	2		Capniidae			Helophoridae	
	Tubificidae		ĺ	Chloroperlidae			Hydraenidae	
Haplotaxida	Destruction of the second			Leuctridae			Hydrochidae	
Leeches	Haplotaxidae Hirudinea			Nemouridae			Hydrophilidae	
Leeches	Erpobdellidae			Peltoperlidae Perlidae			Limnichidae	
	Glossiphoniidae			Perlodidae			Noteridae Baanhanidae	
	Hirudinidae			Pteronarcyidae			Psephenidae Ptilodactylidae	
	Pisciolidae			Taeniopeterygidae			Scirtidae	
Branchiobdellida	Branchiobdellidae		Hemiptera	Early Instar and/or damaged		Diptera	Early Instar and/or damaged	
Copepoda	Unknown	4	9	Belostomatidae		·	Athericidae	
Decapoda	Cambaridae			Corixidae			Blephariceridae	
a	Portunidae			Gelastocoridae			Canaceidae	
Shrimp	Delegen de la companya de la company			Gerridae			Ceratopogonidae	
sopoda	Palaemonidae			Hebridae			Choaboridae	
sopoda	Asellidae			Hydrometridae Mesoveliidae			Chironomidae	75
Amphipoda	/ Iooliidae			Naucoridae			Culicidae Dixidae	
	Crangonyctidae			Nepidae			Dolichopodidae	
	Gammaridae			Notonectidae			Epididae	
	Talitridae			Veliidae			Ephydridae	<u> </u>
Water Mites				Pleidae			Muscidae	
	Hydracarina		Neuroptera				Nymphomyiidae	
phemeroptera	Early Instar and/or damaged			Sisyridae			Pelecorhynchidae	
	Acanthometropodidae		Megaloptera			1	Psychodidae	
	Ameletidae Baetidae			Corydalidae			Ptychopteridae	
	Baetidae		Trichoptera	Sialidae Early Instar and/or damaged			Sciomyzidae	
	Behningiidae			Branchycentridae			Simuliidae	11
	Caenidae			Calamoceratidae			Stratiomyidae Syrphidae	
	Ephemerellidae			Glossosomatidae			Syrpnidae Tabanidae	
	Ephemeridae			Goeridae			Tanyderidae	
	Heptageniidae			Heliicopsychidae			Thaumaleidae	
	Isonychiidae			Hydropsychidae			Tipulidae	
	Leptophlebiidae			Hydroptilida				76
TOTAL:		17	TOTAL:		1	TOTAL:		



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		Bent		oinvertebra	te and			a Sheet	
Station ID:	Reach 1-B		Ecoregion	Piedmont		Land Use:	Urban		
Field Team:	ASO/MN			Year 4 Biomonitor	ing	Start time:			
	Snakeden		Location:	Reston, Virginia		Finish time:			
Date:	4/11/2012		Latitude:	38°55'58"		Longitude	77°21'01"		
Stream Phy	siochemical M	leasureme	nts						
Instrument ID	number:	N	/A	_ pH	t:	N/A			
Temperature:	_	N/A	.°C	Co	nductivity:	N/A	uS/cm		
Dis <b>s</b> olved Oxyg	en:	N/A	mg/L		Did ins	trument pass all	post-calibrati	on checks?	N/A
					If NO- w	hich parameter(	s) failed and a	ction taken:	N/A
Benthic Ma	croinvertebrat	e Collectio	n						
Method Used:		Sin	gle Habitat (Rif	fle):		Multi H	abitat (Logs, P	Plants, etc.):	Х
Riffle Quality:		Good	х	Marginal		Poor		None	
Habitats Sampl	ed:	Riffle	X	Snags	Х	Sediment	Х	Vegetation	
	# Jab	s:	14		2	_	4		10
Weather Ob	servations								
Current Weath	er:	Cloudy	Χ	Clear		Rain/Snow		Foggy	
Recent Precipit	ation:	Clear	X	Showers		Rain		Storms	X
Stream Flow:		Low	Х	Normal		Above Normal		Flood	
Biological O	bservations							_	
Periphyton		2		Salamanders		0		Other	
ilamentous Al	gae	2		Warmwater Fish		0		0= Not observed	
Submerged Ma	crophytes	0		Coldwater Fish		0	•	1= Sparse	
mergent Macr	ophytes	0		Beavers		0	•	2= Common to Ab	undant
Crayfish	_	0		Muskrats		0	•	3= Dominant-	
Corbicula	-	0		Ducks/Geese		0			density where other taxa
ınionidae		0		Snakes		0	•	are insignificant in	relation to the dominant
Operculate Sna	ils	0		Turtles		0	•		e situations where multip
Non-operculate	Snails	0		Frogs/Tadpoles		1	•	taxa are dominant	such as algae and snails
Notes	_						•		

		High Gradient Hai	Ditat Data		
Habitat Parameter		Con	dition Category	RELIEVE BEING THE PROPERTY.	THE STATE OF
Habitat Farameter	Optimal	Suboptimal	Marginal	Poor	Score
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at stage to allow full colonization potential (i.e. snags/logs that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintainance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization.	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18
Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow- shallow, fast-deep, fast shallow)(slow is <0.3m/s, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 8	5 4 3 2 1 0	16
4. Sediment Deposition	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15



Habitat Daramatar			dition Category		Work I'm
<u>Habitat Parameter</u>	Optimal	Suboptimal	Marginal	Poor	Score
5. Channel Flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the availible channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the availible channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
6. Channel Alteration	Channelization or dredging absent or minimal; stream width normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging, may be present, but recent channelization is not present.	Channeliztion may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
7. Frequency of Riffles	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distances between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	17
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	mall areas of erosion mostly bank reach has areas of ealed over. 5-30% of bank in erosion; high erosion potential		
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	9
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	9
9. Vegetation Protection (score each bank) Note: Determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetation disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	9
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riperian zone <6 meters; little or no riparian vegetation due to human activities.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Leit Darin	10	V V	The second secon	the second secon	

	VV	221 DEI	I I IIIC IVIA	ACROINVERTEBRA	ILE BEN	CH SHE	ET	
Job Name/#	S	nakeden-20	0003	Sample subsorted by:	В	NR	(NY) 1	
Station ID:		Reach 1-E	3	Date Subsorted:	9/2	26/12	- — Wetland	1)
Stream Name	PIER CHARLES	Snakeder	)	# of Grids subsorted		8	Studies and Solutions	Inc.
Date Sampled	· Carallana and	4/11/12		Total # of subsorted insec		103	Total # identified.	404
Sampling Met		Multihabita	nt .			-	Total # identified:	101
		Willinabile		Sample Identified by:	A	BR	Date Identified:	9/27/12
Taxa Collect	ed:							
D. 16.	0 3111	1		Metretopodidae		1	Lepidostomatidae	
Porifera Ostracoda	Spongillidae Unknown	-	-	Neoephemeridae			Leptoceridae	
Flatworms	Tricladida	-	-	Oligoneuridae Psuedironidae	-	-	Limnephilidae	
· idenomic	Planariidae.		1	Polymitarcyidae		ł	Molannidae Odontoceridae	<del> </del>
Gastropoda	Unknown	<del>                                     </del>	1	Potamanthidae		ł	Philopotamidae	+
Limpets	Ancylidae		1	Siphlonuridae		ł	Phryganeidae	<del>                                     </del>
Snails	Immature		1	Tricorythidae		1	Polycentropodidae	
	Lymnaeidae		Zygoptera	Early Instar and/or damaged		1	Psychomyiidae	
	Physidae		]	Calopterygidae		1	Ryacophilidae	
	Planorbidae			Coenagrionidae		]	Sericostomatidae	
	Hydrobiidae		1	Lestidae		l	Uenoidae	
	Pleuroceridae Viviparidae		Aniat-	Protoneuridae		Lepidoptera	Early Instar and/or damaged	
Bivalvia	Immature		Anisopteera	Early Instar and/or damaged Aeshnidae		0.1	Pyralidae	
Divaivia	Corbiculidae			Cordulegastridae		Coleoptera	Early Instar and/or damaged	
	Sphaeriidae		ł	Corduliidae		ŀ	Chrysomelidae Curculionidae	
	Unionidae		i	Gomphidae		ł	Dryopidae	<del> </del>
Oligochaeta	Unknown	27	1	Libellulidae		1	Dytiscidae	-
Lumbriculida			1	Macromiidae			Elmidae	1
	Lumbriculidae		]	Petaluridae		1	Gyrinidae	
Tubificida			1	Cordullidae/Libelluidae			Haliplidae	
	Enchytraeidae		Plecoptera	Early Instar and/or damaged			Helodidae	
	Naididae Tubificidae			Capniidae			Helophoridae	
Haplotaxida	Tubilicidae	1	1	Chloroperlidae Leuctridae			Hydraenidae	
Taplotaxida	Haplotaxidae			Nemouridae			Hydrochidae Hydrophilidae	
Leeches	Hirudinea			Peltoperlidae			Limnichidae	<u> </u>
	Erpobdellidae			Perlidae			Noteridae	
	Glossiphoniidae	i		Perlodidae			Psephenidae	
	Hirudinidae			Pteronarcyidae			Ptilodactylidae	
_	Pisciolidae			Taeniopeterygidae			Scirtidae	
Branchiobdellida	Branchiobdellidae		Hemiptera	Early Instar and/or damaged		Diptera	Early Instar and/or damaged	
Copepoda Decapoda	Unknown Cambaridae			Belostomatidae			Athericidae	
Decapoua	Portunidae			Corixidae Gelastocoridae			Blephariceridae	
Shrimp	ortanidae			Gerridae			Canaceidae Ceratopogonidae	
·	Palaemonidae			Hebridae			Choaboridae	
Isopoda				Hydrometridae			Chironomidae	65
	Asellidae			Mesoveliidae			Culicidae	
Amphipoda				Naucoridae			Dixidae	
	Crangonyctidae			Nepidae			Dolichopodidae	
	Gammaridae			Notonectidae			Epididae	
Water Mites	Talitridae			Veliidae Pleidae			Ephydridae	
vvater ivilles	Hydracarina		Neuroptera	rieldae			Muscidae	
Ephemeroptera	Early Instar and/or damaged		ricaroptera	Sisyridae			Nymphomyiidae Polooorhymphidae	
. , , , , , , , , , , , , , , , , , , ,	Acanthometropodidae		Megaloptera				Pelecorhynchidae Psychodidae	
	Ameletidae			Corydalidae			Ptychopteridae	
	Baetidae			Sialidae			Sciomyzidae	
	Baetiscidae		Trichoptera	Early Instar and/or damaged			Simuliidae	3
	Behningiidae			Branchycentridae			Stratiomyidae	
	Caenidae			Calamoceratidae			Syrphidae	
	Ephemerellidae			Glossosomatidae			Tabanidae	
	Ephemeridae Hentageniidae			Goeridae			Tanyderidae	
	Heptageniidae Isonychiidae			Heliicopsychidae Hydropsychidae			Thaumaleidae	
	Leptophlebiidae			Hydroptilida	1	TOTAL:	Tipulidae	69
TOTAL:	•	28	TOTAL:	,	4	IOIAL.		09



	Benth	ic Macro	oinvertebrate a	nd Habitat F	ield Data Sheet	A CONTRACT OF
Station ID: Reach 1-C		coregion:	Piedmont	Land Use:	Urban	
Field Team: ASO/MN	s	urvey Reason:	Yr 4 Biomonitoring	Start time:		
Stream Name: Snakeden		ocation	Reston, Virginia	Finish time:		
Date: 4/11/2012	L	atitude	38°55'58"	Longitude	77°21'01"	
Stream Physiochemical	Measurement	S				
Instrument ID number:	N/A	١	pH:	N/A		
Temperature:	N/A °	С	Conduct	ivity: N/A	uS/cm	
Dissolved Oxygen:	N/A n	ng/L		Did instrument pass all	post-calibration checks? N/A	A
			. If	NO- which parameter(	s) failed and action taken: N//	Α
Benthic Macroinvertebra	ate Collection					
Method Used:	Sing	le Habitat (Rif	fle)	Multi H	abitat (Logs, Plants, etc.) X	
Riffle Quality:	Good _	Х	Marginal	Poor	None	
Habitats Sampled:	Riffle _	X	Snags	Banks		
# Ja	abs:	20				<del></del>
Weather Observations						
Current Weather	Cloudy	Х	Clear	Rain/Snow	Foggy	
Recent Precipitation	Clear	X	Showers	Rain		
Stream Flow	Low _	Х	Normal	Above Normal	Flood	
Biological Observations						
Periphyton	22		Salamanders	0	Other	
Filamentous Algae	2		Warmwater Fish	0	0= Not observed	
Submerged Macrophytes .	0		Coldwater Fish	0	1= Sparse	
Emergent Macrophytes	0		Beavers	0	2= Common to Abundant	t
Crayfish	0		Muskrats	0	3= Dominant-	
Corbicula	0		Ducks/Geese	0	abnormally high density	
unionidae •	0		Snakes	0	are insignificant in relation	
Operculate Snails	0		Turtles	0	taxa. There can be situat	

Frogs/Tadpoles

Non-operculate Snails

Notes

taxa are dominant such as algae and snails

		High Gradient Ha				
Habitat Parameter		Con	dition Category		THE REAL PROPERTY.	
Habitat I aramotor	Optimal	Suboptimal	Marginal	Poor	Score	
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at stage to allow full colonization potential (i.e. snags/logs that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintainance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization.	20-40% mix of stable habitat; habitat availability less than	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18	
2. Embeddedness  Gravel, cobble, and boulder particles are 0-25% surrounde by fine sediment. Layering cobble provides diversity of niche space.		Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19	
Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow- shallow, fast-deep, fast shallow)(slow is <0.3m/s, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15	
4. Sediment Deposition	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19	



		NEWS GOOD HOUSE TO SE	CERTIFICATION OF THE	1 · 网络中国工程设计的图片设计	14 6 1 1 1 1	
THE CONTRACT OF THE PARTY.	mercial surveys	Con	dition Category	SHALL SANDERS OF THE SAND		
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor	Score	
5. Channel Flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the availible channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the availible channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18	
6. Channel Alteration	Channelization or dredging absent or minimal; stream width normal pattern.	ream width channelization, i.e. dredging. banks; and 40-80% of stream disrupted. Instream habitat				
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19	
7. Frequency of Riffles	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distances between riffles divided by the width of the stream is between 15 to 25.	provide some habitat; between riffles divided width of the stream is shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19	
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.		
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10	
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10	
9. Vegetation Protection (score each bank) Note: Determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetation disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	9	
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10	
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; hurnan activities (i.e. parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riperian zone <6 meters; little or no riparian vegetation due to human activities.		
	1					
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10 10	

Job Name/#		nakeden-20	· · · · · · · · · · · · · · · · · · ·	Sample subserted by				
	S			Sample subsorted by:	ASO, SG,		- — Wetland	)
Station ID:		Reach 1-C	;	Date Subsorted:	8/16/12	2	Studies and Solutions,	Inc.
Stream Name	9:	Snakeden		# of Grids subsorted	4		and Solutions,	
Date Sample	d:	4/11/12		Total # of subsorted insects:		100	Total # identified:	97
Sampling Met		Multihabita	+	Sample Identified by:	APD	100		
		Wullinabila		Sample Identified by:	ABR		Date Identified:	10/10/12
Taxa Collec	ted:							
			-	Metretopodidae			Lepidostomatidae	
Porifera	Spongillidae	ļ	_	Neoephemeridae			Leptoceridae	
Ostracoda	Unknown			Oligoneuridae			Limnephilidae	
Flatworms	Tricladida	-	-	Psuedironidae			Molannidae	
Gastropoda	Planariidae Unknown		-	Polymitarcyidae			Odontoceridae	
Limpets	Ancylidae	+	1	Potamanthidae Siphlonuridae			Philopotamidae	
Snails	Immature		ł	Tricorythidae			Phryganeidae	
Onano	Lymnaeidae		Zygoptera	Early Instar and/or damaged			Polycentropodidae	
	Physidae		Zygoptera	Calopterygidae			Psychomyiidae	
	Planorbidae	1	* *	Coenagrionidae			Ryacophilidae Sericostomatidae	
	Hydrobiidae	1	1	Lestidae			Venoidae	
	Pleuroceridae		1	Protoneuridae		idoptera	Early Instar and/or damaged	
	Viviparidae		Anisopteera	Early Instar and/or damaged		-Gopieia	Pyralidae	
Bivalvia	Immature			Aeshnidae	Cole	eoptera	Early Instar and/or damaged	
	Corbiculidae	1	1	Cordulegastridae		- spioia	Chrysomelidae	
	Sphaeriidae		1	Corduliidae			Curculionidae	
	Unionidae		1	Gomphidae			Dryopidae	
Oligochaeta	Unknown	38	1	Libellulidae			Dytiscidae	
_umbriculida			1	Macromiidae			Elmidae	
	Lumbriculidae		1	Petaluridae			Gyrinidae	
Γubificida				Cordullidae/Libelluidae			Haliplidae	
	Enchytraeidae		Plecoptera	Early Instar and/or damaged			Helodidae	
	Naididae	18		Capniidae			Helophoridae	
	Tubificidae	9		Chloroperlidae			Hydraenidae	
-laplotaxida			l	Leuctridae			Hydrochidae	
	Haplotaxidae			Nemouridae			Hydrophilidae	
_eeches	Hirudinea			Peltoperlidae			Limnichidae	
	Erpobdellidae			Perlidae			Noteridae	
	Glossiphoniidae			Perlodidae			Psephenidae	
	Hirudinidae			Pteronarcyidae			Ptilodactylidae	
	Pisciolidae			Taeniopeterygidae			Scirtidae	
Branchiobdellida			Hemiptera	Early Instar and/or damaged	Dipte	era	Early Instar and/or damaged	
Copepoda Decapoda	Unknown Cambaridae			Belostomatidae			Athericidae	
Decapoda	Portunidae			Colortoporido			Blephariceridae	
Shrimp	ortunidae			Gelastocoridae Gerridae			Canaceidae	
	Palaemonidae			Hebridae			Ceratopogonidae Chasharidae	
sopoda	- sacrifornado			Hydrometridae			Choaboridae Chironomidae	04
	Asellidae			Mesoveliidae			Culicidae	31
mphipoda				Naucoridae			Dixidae	
, , ,	Crangonyctidae			Nepidae			Dolichopodidae	
	Gammaridae			Notonectidae			Epididae Epididae	
	Talitridae			Veliidae			Ephydridae Ephydridae	
ater Mites				Pleidae			Muscidae	
	Hydracarina		Neuroptera				Nymphomyiidae	
phemeroptera	Early Instar and/or damaged		'	Sisyridae			Pelecorhynchidae	
	Acanthometropodidae		Megaloptera				Psychodidae	
	Ameletidae			Corydalidae			Ptychopteridae	
	Baetidae			Sialidae		1	Sciomyzidae	
	Baetiscidae		Trichoptera	Early Instar and/or damaged			Simuliidae	
	Behningiidae			Branchycentridae			Stratiomyidae	
	Caenidae			Calamoceratidae		ĺ	Syrphidae	
	Ephemerellidae			Glossosomatidae			Tabanidae	
	Ephemeridae			Goeridae			Tanyderidae	
	Heptageniidae			Heliicopsychidae			Thaumaleidae	
	Isonychiidae			Hydropsychidae	1		Tipulidae	
	Leptophlebiidae			Hydroptilida		TOTAL:		31



	Bentl	hic Macr	oinvertebrat	e and	Habitat Fi	ield Data	Sheet	
Station ID: Reach 1-D		Ecoregion:	Piedmont		Land Use:	Urban		
Field Team: ASO/MN		Survey Reasor	Yr 4 Biomonitoring		Start time:			
Stream Name. Snakeden		Location:	Reston, Virginia		Finish time:			
Date: 4/10/2012		Latitude:	38°55'58"		Longitude	77°21'01"		
Stream Physiochemic	al Measuremen	ts						
Instrument ID number:	N/	/A	рН	:	N/A			
Temperature:	N/A	°C	Coi	nductivity:	N/A	uS/cm		
Dissolved Oxygen:	N/A	mg/L		Did ins	trument pass all	post-calibration	checks?	N/A
				If NO- w	hich parameter(	s) failed and act	ion taken:	N/A
Benthic Macroinverte	brate Collection	1					_	
Method Used:	Sin	gle Habitat (Ri	fle):		Multi H	abitat (Logs, Pla	nts, etc.):	X
Riffle Quality:	Good_	Х	Marginal		Poor		None	
Habitats Sampled:	Riffle_	X	Snags		Banks:		Vegetation	X
	# Jabs	12				7		1
Weather Observation	is							
Current Weather:	Cloudy_		Clear	Х	Rain/Snow		Foggy	
Recent Precipitation:	Clear _	Х	Showers		Rain		Storms	
Stream Flow:	Low _	Х	Normal		Above Normal		Flood	
<b>Biological Observatio</b>	ns						_	
Periphyton	2		Salamanders		1		Other	
Filamentous Algae	0		Warmwater Fish		1		0= Not observed	
Submerged Macrophytes	0		Coldwater Fish		0		1= Sparse	
Emergent Macrophytes	0		Beavers		0		2= Common to Ab	oundant
Crayfish	0		Muskrats		0		3= Dominant-	
Corbicula	0		Ducks/Geese		0			density where other taxa
unionidae	0		Snakes		0	-		relation to the dominant
Operculate Snails	0		Turtles		0	-		e situations where multiple
Non-operculate Snails	0		Frogs/Tadpoles		2	•	taxa are dominant	t such as algae and snails
Votes								

Habitat Damesta		Con	dition Category	have a support of	
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor	Score
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at stage to allow full colonization potential (i.e. snags/logs that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintainance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization.	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18
Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast shallow)(slow is <0.3m/s, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15
4. Sediment Deposition	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	17



	Bentino maore	mvertebrate and r	labitat Field Data S	MESSERVICE AND ADDRESS OF THE PARTY OF THE P	
WILL THE SELECTION OF THE SERVICES	REPORT FOR THE PROPERTY OF THE PARTY OF THE	Con	dition Category		
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor	Score
5. Channel Flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the availible channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the availible channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18
6. Channel Alteration	Channelization or dredging absent or minimal; stream width normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging, may be present, but recent channelization is not present.	Channeliztion may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
7. Frequency of Riffles	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10
9. Vegetation Protection (score each bank) Note: Determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetation disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riperian zone <6 meters; little or no riparian vegetation due to human activities.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
	10 9	8 7 6	5 4 3	2 1 0	10

	VV	221 BEI	I I HIC WA	ACROINVERTEBRAT	E BEN	CH SHE	ET	
Job Name/#	S	nakeden-20	003	Sample subsorted by:	ASO, EJ	, SG, KG	- VVI 1	
Station ID:		Reach 1-D	)	Date Subsorted:	6/2	7/12	- — Wetland	
Stream Name		Snakeden		# of Grids subsorted	-	7	Studies and Solutions,	Inc.
Date Sampled	1:	4/10/12	*)	Total # of subsorted insects:		112	Total # identified:	440
Sampling Met		Multihabita	t					112
		Widitiliabita		Sample Identified by:	At	BR	Date Identified:	10/10/12
Taxa Collect	<u>ea:</u>							
Porifera	Spongillidae		7	Metretopodidae			Lepidostomatidae	
Ostracoda	Unknown		-	Neoephemeridae Oligoneuridae			Leptoceridae	
Flatworms	Tricladida		1	Psuedironidae			Limnephilidae	<u> </u>
i iativoiiiio	Planariidae		1	Polymitarcyidae			Molannidae Odontoceridae	
Gastropoda	Unknown		1	Potamanthidae			Philopotamidae	
Limpets	Ancylidae		1	Siphlonuridae			Phryganeidae	<del> </del>
Snails	Immature		1	Tricorythidae			Polycentropodidae	<del></del>
	Lymnaeidae	1	Zygoptera	Early Instar and/or damaged			Psychomyiidae	
	Physidae		1	Calopterygidae			Ryacophilidae	
	Planorbidae	1	1	Coenagrionidae	1		Sericostomatidae	
	Hydrobiidae		]	Lestidae			Uenoidae	
	Pleuroceridae		]	Protoneuridae		Lepidoptera	Early Instar and/or damaged	
	Viviparidae		Anisopteera	Early Instar and/or damaged			Pyralidae	
Bivalvia	Immature			Aeshnidae		Coleoptera	Early Instar and/or damaged	
	Corbiculidae		1	Cordulegastridae			Chrysomelidae	
	Sphaeriidae	1		Corduliidae			Curculionidae	
Oligophosts	Unionidae	40		Gomphidae			Dryopidae	
Oligochaeta Lumbriculida	Unknown	46	1	Libellulidae			Dytiscidae	
Lumbriculiua	Lumbriculidae			Macromiidae Petaluridae			Elmidae	
Tubificida	Lumbriculidae		ł	Cordullidae/Libelluidae			Gyrinidae	
rabiliolaa	Enchytraeidae		Plecoptera	Early Instar and/or damaged			Haliplidae	
	Naididae		Посория	Capniidae			Helodidae Helophoridae	
	Tubificidae		1	Chloroperlidae			Hydraenidae	
Haplotaxida				Leuctridae			Hydrochidae	
	Haplotaxidae		1	Nemouridae			Hydrophilidae	
Leeches	Hirudinea		1	Peltoperlidae			Limnichidae	
	Erpobdellidae		1	Perlidae			Noteridae	
	Glossiphoniidae			Perlodidae			Psephenidae	
	Hirudinidae			Pteronarcyidae			Ptilodactylidae	
	Pisciolidae			Taeniopeterygidae			Scirtidae	
Branchiobdellida	Branchiobdellidae		Hemiptera	Early Instar and/or damaged		Diptera	Early Instar and/or damaged	
Copepoda	Unknown	3		Belostomatidae			Athericidae	
Decapoda	Cambaridae Portunidae			Corixidae			Blephariceridae	
Shrimp	Portunidae			Gelastocoridae Gerridae			Canaceidae	
ор	Palaemonidae			Hebridae			Chapterides	
Isopoda				Hydrometridae			Choaboridae Chironomidae	57
·	Asellidae			Mesoveliidae			Culicidae	5/
Amphipoda				Naucoridae			Dixidae	
	Crangonyctidae			Nepidae			Dolichopodidae	
	Gammaridae			Notonectidae			Epididae	
	Talitridae			Veliidae			Ephydridae	
Water Mites				Pleidae			Muscidae	
	Hydracarina		Neuroptera				Nymphomyiidae	
Ephemeroptera	Early Instar and/or damaged			Sisyridae			Pelecorhynchidae	
	Acanthometropodidae		Megaloptera				Psychodidae	
	Ameletidae			Corydalidae			Ptychopteridae	
	Baetidae	2	T.2.6	Sialidae			Sciomyzidae	
	Baetiscidae Behningiidae		Trichoptera	Early Instar and/or damaged			Simuliidae	
	Behningiidae Caenidae			Branchycentridae			Stratiomyidae	
	Ephemerellidae			Calamoceratidae			Syrphidae	
	Ephemeridae Ephemeridae			Glossosomatidae Goeridae			Tabanidae	
	Heptageniidae			Heliicopsychidae			Tanyderidae Thoumalaidae	
	Isonychiidae			Hydropsychidae			Thaumaleidae Tipulidae	
	Leptophlebiidae			Hydroptilida		TOTAL:	Tipulidae	57
TOTAL:		54	TOTAL:	· · ·		· OIAL		51



	Sand Pers	Benth	ic Macro	oinvertebrat	e and	Habitat Fi	ield Data Sheet
Station ID:	Reach 1-E		Ecoregion	Piedmont		Land Use:	Urban
Field Team:	ASO/MN		Survey Reason	Yr 4 Biomonitoring		Start time:	
Stream Name:	Snakeden		Location:	Reston, Virginia		Finish time:	
Date:	4/10/2012		Latitude:	35°55'58"		Longitude	77°21'01"
Stream Phy	siochemical M	easuremen	ts				
Instrument ID	number:	N/	A	pH	:	N/A	
Temperature:	_	N/A	°C	Cor	nductivity:	N/A	uS/cm
Dissolved Oxyg	en:	N/A	mg/L		Did inst	rument pass all	post-calibration checks? N/A
					If NO- w	nich parameter(s	s) failed and action taken: N/A
Benthic Ma	croinvertebrat	e Collection	1				
Method Used:		Sing	gle Habitat (Rif	fle)		Multi H	abitat (Logs, Plants, etc.) X
Riffle Quality:		Good_	Х	Marginal		Poor	
Habitats Sampl	ed:	Riffle_	Х	Snags		Banks	
	# Jabs	s: _	19	_			1
Weather Ob	servations						
Current Weath	er	Cloudy		Clear	Х	Rain/Snow	Foggy
Recent Precipit	ation	Clear_	X	Showers		Rain	
Stream Flow		Low	Х	Normal		Above Normal	Flood
Biological O	bservations						
Periphyton	_	2		Salamanders		0	Other
Filamentous Alg		2		Warmwater Fish		0	0= Not observed
Submerged Ma	crophytes	0		Coldwater Fish		0	1= Sparse
Emergent Macr	ophytes	0		Beavers		0	2= Common to Abundant
Crayfish	100	0		Muskrats		0	3= Dominant-
Corbicula	_	0		Ducks/Geese		0	abnormally high density where other taxa
unionidae		0		Snakes		0	are insignificant in relation to the dominant
Operculate Snai		0		Turtles		0	taxa. There can be situations where multiple
Non-operculate	Snails	0		Frogs/Tadpoles		1	taxa are dominant such as algae and snails
Notes							

Habitat Parameter	8412 1836 1100 1100 1333	Con	dition Category		
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor	Score
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at stage to allow full colonization potential (i.e. snags/logs that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintainance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization.	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	17
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18
Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow- shallow, fast-deep, fast shallow)(slow is <0.3m/s, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow- shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15
4. Sediment Deposition  Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.		Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16



	<b>在是某些时间的</b>			Seaton of Company of Comp	
Habitat Danamatan	THE CONTRACTOR OF THE	Con	dition Category	Control of the Contro	Mark to
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor	Scor
5. Channel Flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the availible channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the availible channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	17
6. Channel Alteration	Channelization or dredging absent or minimal; stream width normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging, may be present, but recent channelization is not present.	Channeliztion may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
7. Frequency of Riffles	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	9
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	9
9. Vegetation Protection (score each bank) Note: Determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetation disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	9
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	9
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riperian zone <6 meters; little or no riparian vegetation due to human activities.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	8
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10

Ich Nama/#		naked- co	1000	Campala and			
Job Name/#	Service Servic	nakeden-20	0003	Sample subsorted by:	BC, SG, EJ	- Watland	1
Station ID:		Reach 1-E		Date Subsorted:	8/14/12	— — Wetland	
tream Name:		Snakeder	1	# of Grids subsorted	6	Studies and Solutions,	Inc
ate Sampled	:	4/10/12		Total # of subsorted insects:	120	Total # identifical.	400
	10.24					Total # identified:	120
Sampling Meth		Multihabita	11	Sample Identified by:	ABR	Date Identified:	10/10/
Taxa Collecte	<u>ed:</u>						
			_	Metretopodidae		Lepidostomatidae	
orifera	Spongillidae		]	Neoephemeridae		Leptoceridae	
stracoda	Unknown	2	2	Oligoneuridae		Limnephilidae	
latworms	Tricladida		1	Psuedironidae		Molannidae	
	Planariidae			Polymitarcyidae		Odontoceridae	
astropoda	Unknown		- "	Potamanthidae		Philopotamidae	
mpets nails	Ancylidae Immature		-	Siphlonuridae		Phryganeidae	
iialis	Lymnaeidae		7	Tricorythidae		Polycentropodidae	
	Physidae		Zygoptera	Early Instar and/or damaged		Psychomyiidae	
	Planorbidae	4	1	Calopterygidae		Ryacophilidae	
	Hydrobiidae	+	1	Coenagrionidae Lestidae		Sericostomatidae	<u> </u>
	Pleuroceridae		1	Protoneuridae	l and down	Uenoidae	
	Viviparidae		Anisopteera	Early Instar and/or damaged	Lepidopte	-	
valvia	Immature		1	Aeshnidae	Coleopter	Pyralidae Early Instar and/or damaged	-
	Corbiculidae		1	Cordulegastridae	Coleopter	Chrysomelidae	
!	Sphaeriidae		1	Corduliidae		Curculionidae	
l	Unionidae		1	Gomphidae		Dryopidae	
ligochaeta	Unknown	70	1	Libellulidae		Dytiscidae	
mbriculida			1	Macromiidae		Elmidae	
	Lumbriculidae		1	Petaluridae		Gyrinidae	
ıbificida			l	Cordullidae/Libelluidae		Haliplidae	
	Enchytraeidae		Plecoptera	Early Instar and/or damaged		Helodidae	
	Naididae			Capniidae		Helophoridae	
	Tubificidae			Chloroperlidae		Hydraenidae	
plotaxida				Leuctridae		Hydrochidae	
	Haplotaxidae			Nemouridae		Hydrophilidae	
eches	Hirudinea			Peltoperlidae		Limnichidae	
	Erpobdellidae Glossiphoniidae			Perlidae		Noteridae	
	Hirudinidae			Perlodidae		Psephenidae	
	Pisciolidae			Pteronarcyidae Taeniopeterygidae		Ptilodactylidae	
	Branchiobdellidae		Hemiptera	Early Instar and/or damaged	Dintore	Scirtidae	
pepoda	Unknown		riomptora	Belostomatidae	Diptera	Early Instar and/or damaged	
capoda	Cambaridae			Corixidae		Athericidae Blephariceridae	
	Portunidae			Gelastocoridae		Canaceidae	
rimp				Gerridae		Ceratopogonidae	
	Palaemonidae			Hebridae		Choaboridae	
poda				Hydrometridae		Chironomidae	43
	Asellidae			Mesoveliidae		Culicidae	
nphipoda				Naucoridae		Dixidae	
	Crangonyctidae			Nepidae		Dolichopodidae	
	Gammaridae			Notonectidae		Epididae	
	Talitridae			Veliidae		Ephydridae	
iter Mites				Pleidae		Muscidae	
	Hydracarina		Neuroptera			Nymphomyiidae	
	Early Instar and/or damaged			Sisyridae		Pelecorhynchidae	
	Acanthometropodidae  Ameletidae		Megaloptera	Constalidad		Psychodidae	
	Ameletidae Baetidae	1		Corydalidae Sialidae		Ptychopteridae	
	Baetiscidae		Trichoptera	Early Instar and/or damaged		Sciomyzidae	
	Behningiidae		попорсета	Branchycentridae		Simuliidae	
-	Caenidae			Calamoceratidae		Stratiomyidae	
	Ephemerellidae			Glossosomatidae		Syrphidae	
	Ephemeridae			Goeridae		Tabanidae Tapyderidae	
-	Heptageniidae			Heliicopsychidae		Tanyderidae Thaumaleidae	
L.	Isonychiidae			Hydropsychidae		Tipulidae	
Ţ.	isonyoniidae						



	MENSION OF THE STATE OF	Bentl	hic Macre	oinvertebrate	e and	Habitat Fi	eld Dat	a Sheet	SALMONIA.	THE PARK
Station ID:	Reach 1-F		Ecoregion	Piedmont		Land Use:	Urban			
Field Team:	ASO/MN		Survey Reasor	Yr 4 Biomonitoring		Start time:				
Stream Name:	Snakeden		Location:	Reston, Virginia		Finish time:	1			
Date	4/10/2012		Latitude:	38°55'58"		Longitude	77°21'01"			
Stream Phys	siochemical Me	asuremer	nts							
Instrument ID r	number:	N,	/A	pH;		N/A				
Temperature:		N/A	°C	Con	ductivity:	N/A	uS/cm			
Dissolved Oxyg	olved Oxygen: N/A mg/L			Did inst	rument pass all	post-calibrati	on checks?	N/A		
					If NO- wi	nich parameter(s	) failed and a	action taken:	N/A	
Benthic Mad	roinvertebrate	Collection	n					_	.,,,,	
Method Used:		Sin	gle Habitat (Ri	ffle)		Multi Ha	abitat (Logs, I	Plants, etc.)	Х	
Riffle Quality:		Good	X	Marginal		Poor		None		
Habitats Sample	ed:	Riffle	Х	Snags		Banks	Х	Vegetation	X	
	# Jabs:		16				3		1	
Weather Ob	servations							_		
Current Weath	er	Cloudy	X	Clear	Х	Rain/Snow		Foggy		
Recent Precipita	ation	Clear	Х	Showers		Rain		Storms		
Stream Flow		Low	Х	Normal		Above Normal		Flood		
Biological O	bservations									
Periphyton		3		Salamanders		1		Other		
Filamentous Alg	gae	3		Warmwater Fish		0		0= Not observed		
Submerged Mad	crophytes	0		Coldwater Fish		0		1= Sparse		
Emergent Macr	ophytes	0		Beavers		0		2= Common to Ab	undant	
Crayfish		0		Muskrats		0		3= Dominant-		
Corbicula		0		Ducks/Geese		0		abnormally high	density where	other taxa
unionidae		0		Snakes		0	are insignificant in relation t			
Operculate Snai	ls	0		Turtles		0		taxa. There can be		
Non-operculate	Snails	0		Frogs/Tadpoles		2		taxa are dominant	such as algae	and snails
Notes										

		riigii Gradient Hai			
Habitat Parameter		Con	dition Category		
Habitat i arameter	Optimal	Suboptimal	Marginal	Poor	Score
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at stage to allow full colonization potential (i.e. snags/logs that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintainance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization.	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18
Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow- shallow, fast-deep, fast shallow)(slow is <0.3m/s, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	14
4. Sediment Deposition	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19



	Benthic Macro	invertebrate and h	labitat Field Data	Sheet	
		Con	dition Category		
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor	Score
5. Channel Flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the availible channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the availible channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	14
6. Channel Alteration	Channelization or dredging absent or minimal; stream width normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging, may be present, but recent channelization is not present.	Channeliztion may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
7. Frequency of Riffles	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distances between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10
9. Vegetation Protection (score each bank) Note: Determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetation disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riperian zone <6 meters; little or no riparian vegetation due to human activities.	
Score Left Bank	10 9	8 7 6	5 4 3 5 4 3	2 1 0	9

Job Name/#				ACROINVERTEBRAT				
		nakeden-20		Sample subsorted by:	ВС,5	G,KG	Wetland	)
Station ID:		Reach 1-F	: 	Date Subsorted:	8/1	3/12	Studies and Solutions,	nc.
Stream Name		Snakeden		# of Grids subsorted		4	_	
Date Sampled	1:	4/10/12		Total # of subsorted insects	:	118	Total # identified:	101
Sampling Met	hod:	Multihabitat		Sample Identified by:	А	BR	Date Identified:	10/10/12
Taxa Collect	ed:							
				Metretopodidae		1	Lepidostomatidae	
Porifera	Spongillidae		1	Neoephemeridae			Leptoceridae	
Ostracoda	Unknown		1	Oligoneuridae			Limnephilidae	
Flatworms	Tricladida		1	Psuedironidae			Molannidae	
	Planariidae		1	Polymitarcyidae			Odontoceridae	
Gastropoda	Unknown			Potamanthidae			Philopotamidae	
Limpets	Ancylidae			Siphlonuridae			Phryganeidae	
Snails	Immature			Tricorythidae			Polycentropodidae	
	Lymnaeidae		Zygoptera	Early Instar and/or damaged			Psychomyiidae	
	Physidae		1	Calopterygidae			Ryacophilidae	
	Planorbidae		-	Coenagrionidae			Sericostomatidae	(8)
	Hydrobiidae Pleuroceridae	-	1	Lestidae			Uenoidae	
	Viviparidae		Anicontages	Protoneuridae		Lepidoptera	Early Instar and/or damaged	
Bivalvia	Immature	<b> </b>	Anisopteera	Early Instar and/or damaged Aeshnidae	- i	Colorat	Pyralidae	
-11 a1 7 ld	Corbiculidae		ł	Cordulegastridae		Coleoptera	Early Instar and/or damaged Chrysomelidae	
	Sphaeriidae		1	Corduliidae			Curculionidae	
	Unionidae		1	Gomphidae			Dryopidae	
Oligochaeta	Unknown	51	1	Libellulidae			Dytiscidae	
Lumbriculida			1	Macromiidae			Elmidae	<del></del>
	Lumbriculidae		1	Petaluridae			Gyrinidae	
Tubificida			1	Cordullidae/Libelluidae			Haliplidae	
	Enchytraeidae		Plecoptera	Early Instar and/or damaged			Helodidae	
	Naididae		]	Capniidae			Helophoridae	
	Tubificidae			Chloroperlidae			Hydraenidae	
Haplotaxida				Leuctridae			Hydrochidae	
Landon	Haplotaxidae			Nemouridae			Hydrophilidae	
Leeches	Hirudinea Emphdellides			Peltoperlidae Perlidae			Limnichidae	
	Erpobdellidae Glossiphoniidae			Periodidae Periodidae			Noteridae	
	Hirudinidae			Diamond			Psephenidae	<del> </del>
	Pisciolidae			Taeniopeterygidae			Ptilodactylidae Scirtidae	
Branchiobdellida	Branchiobdellidae		Hemiptera	Early Instar and/or damaged		Diptera	Early Instar and/or damaged	
Copepoda	Unknown			Belostomatidae		Dipiola	Athericidae	
Decapoda	Cambaridae			Corixidae			Blephariceridae	
	Portunidae			Gelastocoridae			Canaceidae	
Shrimp				Gerridae			Ceratopogonidae	
	Palaemonidae			Hebridae			Choaboridae	
Isopoda				Hydrometridae			Chironomidae	50
Amphicade	Asellidae			Mesoveliidae			Culicidae	
Amphipoda	Crangopyetidas			Naucoridae			Dixidae	
	Crangonyctidae Gammaridae			Nepidae Notonectidae			Dolichopodidae	
	Talitridae			Veliidae			Epididae Ephydridae	
Water Mites	- cantilodo			Pleidae			Ephydridae Muscidae	
	Hydracarina		Neuroptera				Nymphomyiidae	
Ephemeroptera	Early Instar and/or damaged			Sisyridae			Pelecorhynchidae	
	Acanthometropodidae		Megaloptera				Psychodidae	
	Ameletidae			Corydalidae			Ptychopteridae	
	Baetidae			Sialidae			Sciomyzidae	
	Baetiscidae		Trichoptera	Early Instar and/or damaged			Simuliidae	
	Behningiidae			Branchycentridae			Stratiomyidae	
	Caenidae			Calamoceratidae			Syrphidae	
	Ephemerellidae			Glossosomatidae			Tabanidae	
	Ephemeridae			Goeridae			Tanyderidae	
	Heptageniidae			Heliicopsychidae			Thaumaleidae	
i	Isonychiidae Leptophlebiidae			Hydropsychidae			Tipulidae	
	rebiohilieniidae			Hydroptilida		TOTAL:		50



		Benth	ic Macro	invertebrat	e and l	Habitat F	eld Data	Sheet	or full (Statilization of the
Station ID:	Reach 2-A	E	coregion:	Piedmont		Land Use:	Urban		
Field Team:	ASO/MN	9	Survey Reason:	Yr 4 Biomonitoring		Start time:			
Stream Name:	Snakeden	L	ocation:	Reston, Virginia		Finish time:	1		
Date	4/11/2012	L	.atitude:	38°55'58"		Longitude	77°21'01"		
Stream Phy	siochemical N	1easurement	S						
Instrument ID	number:	N/A	4	pH:		N/A			
Temperature:	_	N/A °	С	Con	ductivity:	N/A	uS/cm		
Dissolved Oxyg	en:	N/A mg/L			Did inst	rument pass all	post-calibrati	on checks?	N/A
					If NO- wh	nich parameter(	s) failed and a	ction taken:	N/A
Benthic Ma	croinvertebra	te Collection							
Method Used:		Sing	le Habitat (Rif	fle)		Multi H	abitat (Logs, F	Plants, etc.)	X
Riffle Quality:		Good _	Х	Marginal		Poor		None	
Habitats Sampl	ed:	Riffle _	Х	Snags		Banks	X	Vegetation	
	# Jab	os:	18				1		2
Weather Ob									
Current Weath		Cloudy _	X	Clear		Rain/Snow		Foggy	
Recent Precipit	ation	Clear _	X	Showers		. Rain		Storms	
Stream Flow		Low _	X	Normal		Above Normal	mal Flood		
Biological O	bservations								
Periphyton	_			Salamanders				Other	
Filamentous Ala	_	3		Warmwater Fish				0= Not observed	
Submerged Ma	· · · —			Coldwater Fish				1= Sparse	
Emergent Macr	ophytes	-		Beavers				2= Common to Ab	undant
Crayfish	_			Muskrats			•	3= Dominant-	
Corbicula	_			Ducks/Geese					density where other taxa
unionidae				Snakes				•	relation to the dominant situations where multiple
Operculate Sna	_			Turtles					such as algae and snails
Non-operculate	Snails			Frogs/Tadpoles					as argue arra straits
Notes									

		High Gradient Hai	oliai Data		
Habitat Parameter		Con	dition Category		May al Record
Habitat Farameter	Optimal	Suboptimal	Marginal	Poor	Score
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at stage to allow full colonization potential (i.e. snags/logs that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintainance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization.	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16
Velocity/Depth Regime  All four velocity/depth regin present (slow-deep, slow shallow, fast-deep, fast shallow)(slow is <0.3m/s, di is >0.5 m).		Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15
4. Sediment Deposition	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16



	Benthic Macro	invertebrate and h	labitat Field Data	Sheet	W. D.
		Con-	distant Cotonomi		
Habitat Parameter	Ontimal		dition Category  Marginal	Poor	Score
CHECK COMMONWALL PROPERTY AND	Optimal	Suboptimal	Warymai	POOI	Score
5. Channel Flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is	Water fills >75% of the availible channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the availible channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
	exposed.			- 10010	47
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	17
6. Channel Alteration	Channelization or dredging absent or minimal; stream width normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging, may be present, but recent channelization is not present.	Channeliztion may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19
7. Frequency of Riffles  Riffles  Occurrence of riffles refrequent; ratio of dis between riffles divided of the stream <7:1 (ge to 7); variety of habitat streams where riffle continuous, placemboulders or other large obstruction is impo		Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distances between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10
9. Vegetation Protection (score each bank) Note: Determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetation disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10
10. Riparian Vegetative Zone Width (score each pank riparian zone)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riperian zone <6 meters; little or no riparian vegetation due to human activities.	
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	8 10

1.1.4.				ACROINVERTEBRAT			<b>-</b> I	
Job Name/#	S	Snakeden-20	003	Sample subsorted by:	BC, SC	G, KG	TWI- 11 1	<b>\</b>
Station ID:		Reach 2-A	١	Date Subsorted:	8/22	/12	Wetland	,
Stream Name		Snakeder	1	# of Grids subsorted	2		Studies and Solutions, I	nc.
Date Sampled	:	4/11/12		Total # of subsorted insects:		116	Total # identified:	107
Sampling Met		Multihabitat		Sample Identified by:	AB			127
		Watthabite		Cample Identified by.	AD	n	Date Identified:	10/10/12
Taxa Collect	<u>ea:</u>							
Porifera	Changillidae	1	1	Metretopodidae			Lepidostomatidae	
Ostracoda	Spongillidae Unknown	-	-	Neoephemeridae			Leptoceridae	
Flatworms	Tricladida	-	-	Oligoneuridae			Limnephilidae	
Tiatwoiiis	Planariidae		-	Psuedironidae Polymitarcyidae			Molannidae	
Gastropoda	Unknown	<del> </del> -	1	Potamanthidae			Odontoceridae	
Limpets	Ancylidae	+	1	Siphlonuridae			Philopotamidae	
Snails	Immature		1	Tricorythidae			Phryganeidae Polycentropodidae	
	Lymnaeidae		Zygoptera	Early Instar and/or damaged			Psychomyiidae Psychomyiidae	
	Physidae		7,3-,	Calopterygidae			Ryacophilidae	
	Planorbidae		1	Coenagrionidae			Sericostomatidae	
	Hydrobiidae		1	Lestidae			Uenoidae	
	Pleuroceridae		1	Protoneuridae		.epidoptera	Early Instar and/or damaged	
	Viviparidae		Anisopteera	Early Instar and/or damaged		, septoru	Pyralidae	
Bivalvia	Immature		1	Aeshnidae		Coleoptera	Early Instar and/or damaged	
	Corbiculidae		1	Cordulegastridae		1	Chrysomelidae	
	Sphaeriidae			Corduliidae			Curculionidae	
	Unionidae		]	Gomphidae			Dryopidae	
Oligochaeta	Unknown	23		Libellulidae			Dytiscidae	
Lumbriculida				Macromiidae			Elmidae	
	Lumbriculidae			Petaluridae			Gyrinidae	
Tubificida				Cordullidae/Libelluidae			Haliplidae	
	Enchytraeidae		Plecoptera	Early Instar and/or damaged			Helodidae	
	Naididae			Capniidae			Helophoridae	
	Tubificidae			Chloroperlidae			Hydraenidae	
Haplotaxida			1	Leuctridae			Hydrochidae	
	Haplotaxidae			Nemouridae			Hydrophilidae	
Leeches	Hirudinea			Peltoperlidae			Limnichidae	
	Erpobdellidae			Perlidae			Noteridae	
	Glossiphoniidae Hirudinidae			Perlodidae			Psephenidae	
	Pisciolidae			Pteronarcyidae			Ptilodactylidae	
Branchiobdellida	Branchiobdellidae		Llomintoro	Taeniopeterygidae Early Instar and/or damaged			Scirtidae	
Copepoda	Unknown		Hemiptera	Belostomatidae		iptera	Early Instar and/or damaged	
Decapoda	Cambaridae			Corixidae			Athericidae	
j	Portunidae			Gelastocoridae			Blephariceridae	
Shrimp	Tortamade			Gerridae			Canaceidae	
	Palaemonidae			Hebridae			Ceratopogonidae Choaboridae	
Isopoda				Hydrometridae			Chironomidae	101
·	Asellidae			Mesoveliidae			Culicidae	101
Amphipoda				Naucoridae			Dixidae	
	Crangonyctidae			Nepidae			Dolichopodidae	
	Gammaridae			Notonectidae			Epididae	
4	Talitridae			Veliidae			Ephydridae	
Water Mites				Pleidae			Muscidae	
	Hydracarina		Neuroptera				Nymphomyiidae	
phemeroptera	Early Instar and/or damaged			Sisyridae			Pelecorhynchidae	
	Acanthometropodidae		Megaloptera				Psychodidae	
	Ameletidae			Corydalidae			Ptychopteridae	
	Baetidae			Sialidae			Sciomyzidae	
	Baetiscidae		Trichoptera	Early Instar and/or damaged			Simuliidae	2
	Behningiidae			Branchycentridae			Stratiomyidae	
	Caenidae			Calamoceratidae			Syrphidae	
i	Ephemerellidae			Glossosomatidae			Tabanidae	
- 1	Ephemeridae			Goeridae			Tanyderidae	
	Heptageniidae			Heliicopsychidae			Thaumaleidae	
	lsonychiidae			Hydropsychidae		- 1	Tipulidae	
I	Leptophlebiidae			Hydroptilida		1		103
TOTAL:		24	TOTAL:		O	TOTAL:		Λ



THE REAL PROPERTY.		Benth	ic Macro	oinvertebrate	and Habitat	t Field Data Sheet
Station ID.	Reach 2-B		Ecoregion	Piedmont	Land Use:	Urban
Field Team:	ASO/MN		Survey Reason	Yr 4 Biomonitoring	Start time:	
Stream Name:	Snakeden	ĺ	Location:	Reston, Virginia	Finish time	
Date:	4/11/2012		Latitude	38°55'58"	Longitude	77°21'01"
Stream Phys	siochemical Me	easuremen	ts			
Instrument ID r	number:	N/	A	pH:	N/A	
Temperature:		N/A	°C	Condu	ctivity: N/A	uS/cm
Dissolved Oxyg	en:	N/A	mg/L			ss all post-calibration checks? N/A
						eter(s) failed and action taken: N/A
Benthic Mad	roinvertebrate	e Collection	1		, and the same parameter	TVA
Method Used:		Sing	gle Habitat (Rif	fle)	Mul	ılti Habitat (Logs, Plants, etc.) X
Riffle Quality:		Good_	Х	Marginal		Poor None
Habitats Sample	ed:	Riffle	Х	Snags	Ba	anks Vegetation X
	# Jabs:	: _	18		1	2
Weather Ob	servations					
Current Weathe	er	Cloudy	Х	Clear_	Rain/Sr	now Foggy
Recent Precipita	ation	Clear _	X	Showers	F	Rain Storms
Stream Flow		Low	Х	Normal	Above Nor	rmal Flood
Biological O	bservations					
Periphyton		2		Salamanders	0	Other
ilamentous Alg	gae	1		Warmwater Fish	0	0= Not observed
Submerged Mad	crophytes	11		Coldwater Fish	0	1= Sparse
mergent Macre	ophytes	0		Beavers	0	2= Common to Abundant
Crayfish		0		Muskrats	0	3= Dominant-
Corbicula	_	0		Ducks/Geese	0	abnormally high density where other taxa
ınionidae		0		Snakes	0	are insignificant in relation to the dominant
Operculate Snai	ls	0		Turtles	0	taxa. There can be situations where multipl
Non-operculate	Snails	0		Frogs/Tadpoles	1	taxa are dominant such as algae and snails
Votes						

		High Gradient Hal			
Habitat Parameter			dition Category	The state of the s	19212000
Habitat T drameter	Optimal	Suboptimal	Marginal	Poor	Score
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at stage to allow full colonization potential (i.e. snags/logs that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintainance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization.	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow- shallow, fast-deep, fast shallow)(slow is <0.3m/s, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15
4. Sediment Deposition	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19



		Com	dition Category	ded as to contact the contact to the year	North residence	
Habitat Parameter	Optimal	Suboptimal	Marginal Marginal	Poor	Score	
5. Channel Flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the availible channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the availible channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	15	
6. Channel Alteration	Channelization or dredging absent or minimal; stream width normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging, may be present, but recent channelization is not present.	Channeliztion may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19	
7. Frequency of Riffles	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distances between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.		
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	18_	
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.		
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10	
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10	
9. Vegetation Protection (score each bank) Note: Determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetation disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	9	
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	9	
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riperian zone <6 meters; little or no riparian vegetation due to human activities.		
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10	
				2 1 0		

	W	SSI BEN	ITHIC MA	ACROINVERTEBRA	TE BEN	CH SHE	ET	
Job Name/#	S	nakeden-20	003	Sample subsorted by:	BC, S	SG, KG		
Station ID:		Reach 2-E	}	Date Subsorted:	8/2	23/12	- — Wetland	
Stream Name		Snakeden		# of Grids subsorted		3	Studies and Solutions	Inc.
Date Sampleo		4/11/12					- -	
				_Total # of subsorted insect		126	Total # identified:	120
Sampling Met		Multihabita	τ	Sample Identified by:	Α	BR	Date Identified:	10/24/12
Taxa Collect	<u>ed:</u>							
Davifora	O		1	Metretopodidae		]	Lepidostomatidae	
Porifera Ostracoda	Spongillidae Unknown	-	-	Neoephemeridae		-	Leptoceridae	
Flatworms	Tricladida		1	Oligoneuridae Psuedironidae		-	Limnephilidae	
	Planariidae	-	1	Polymitarcyidae		ł	Molannidae Odontoceridae	
Gastropoda	Unknown		1	Potamanthidae		1	Philopotamidae	
Limpets	Ancylidae		1	Siphlonuridae		1	Phryganeidae	
Snails	Immature		]	Tricorythidae		1	Polycentropodidae	
	Lymnaeidae		Zygoptera	Early Instar and/or damaged		]	Psychomyiidae	
	Physidae	1		Calopterygidae		1	Ryacophilidae	
	Planorbidae	1		Coenagrionidae		1	Sericostomatidae	
	Hydrobiidae Pleuroceridae		1	Lestidae		l	Uenoidae	
	Viviparidae		Anisopteera	Protoneuridae Early Instar and/or damaged		Lepidoptera	Early Instar and/or damaged	
Bivalvia	Immature		Anisopteera	Aeshnidae		Coleoptera	Pyralidae	
	Corbiculidae		1	Cordulegastridae		Coleoptera	Early Instar and/or damaged Chrysomelidae	<del> </del>
	Sphaeriidae		1	Corduliidae		1	Curculionidae	
	Unionidae		1	Gomphidae			Dryopidae	
Oligochaeta	Unknown	45	1	Libellulidae		i	Dytiscidae	
Lumbriculida				Macromiidae		1	Elmidae	
	Lumbriculidae			Petaluridae			Gyrinidae	
Tubificida				Cordullidae/Libelluidae		1	Haliplidae	
	Enchytraeidae		Plecoptera	Early Instar and/or damaged			Helodidae	
	Naididae Tubificidae			Capniidae			Helophoridae	
Haplotaxida	Tublicidae			Chloroperlidae Leuctridae			Hydraenidae Hydrochidae	
· raprotaria	Haplotaxidae			Nemouridae			Hydrochidae	
Leeches	Hirudinea			Peltoperlidae			Limnichidae	
	Erpobdellidae			Perlidae			Noteridae	
	Glossiphoniidae			Perlodidae			Psephenidae	
	Hirudinidae			Pteronarcyidae			Ptilodactylidae	
December 1981	Pisciolidae			Taeniopeterygidae			Scirtidae	
Branchiobdellida Copepoda	Branchiobdellidae Unknown	3	Hemiptera	Early Instar and/or damaged		Diptera	Early Instar and/or damaged	
Decapoda	Cambaridae	3		Belostomatidae Corixidae			Athericidae	
_ coapoda	Portunidae			Gelastocoridae			Blephariceridae Canaceidae	
Shrimp				Gerridae			Ceratopogonidae	
	Palaemonidae			Hebridae			Choaboridae	
Isopoda				Hydrometridae			Chironomidae	69
	Asellidae			Mesoveliidae			Culicidae	
Amphipoda	0 "1			Naucoridae			Dixidae	
	Crangonyctidae Gammaridae			Nepidae			Dolichopodidae	
	Talitridae			Notonectidae Veliidae			Epididae	
Water Mites	Taitildae			Pleidae			Ephydridae Mussidae	
	Hydracarina	1	Neuroptera	Tioldac			Muscidae Nymphomyiidae	
Ephemeroptera	Early Instar and/or damaged			Sisyridae			Pelecorhynchidae	
	Acanthometropodidae		Megaloptera				Psychodidae	
	Ameletidae			Corydalidae			Ptychopteridae	
	Baetidae			Sialidae			Sciomyzidae	
	Baetiscidae		Trichoptera	Early Instar and/or damaged			Simuliidae	
	Behningiidae			Branchycentridae			Stratiomyidae	
	Caenidae			Classessatidae			Syrphidae	
	Ephemerellidae Ephemeridae			Glossosomatidae			Tabanidae	
	Heptageniidae			Goeridae Heliicopsychidae			Tanyderidae Thoumalaidae	
	Isonychiidae			Hydropsychidae			Thaumaleidae Tipulidae	
	Leptophlebiidae			Hydroptilida		TOTAL:	ripuliuae	69
TOTAL:		51	TOTAL:		0			-



		Bent	hic Macr	oinvertebra	te and	Habitat F	ield Data Sheet	HATEL ENDING WENT
Station ID:	Reach 3-A		Ecoregion	Piedmont		Land Use:	Urban	
Field Team:	ASO/MN		Survey Reason	: Yr 4 Biomonitoring	g	Start time:		
Stream Name:	Snakeden		Location:	Reston, Virginia		Finish time:	1	
Date:	4/10/2012		Latitude:	38°55'58"		Longitude	77°21'01"	
Stream Phys	iochemical M	leasuremen	its					
Instrument ID r	umber:	N,	/A	pH	l:	N/A		
Temperature:		N/A	°C	_ Co	nductivity:	N/A	uS/cm	
Dissolved Oxyg	en:	N/A	mg/L		Did inst	trument pass all	post-calibration checks?	N/A
					If NO- w	hich parameter(	s) failed and action taken:	N/A
Benthic Mad	roinvertebra	te Collection	n					· · · · · · · · · · · · · · · · · · ·
Method Used:		Sin	gle Habitat (Ri	ffle)		Multi H	abitat (Logs, Plants, etc.)	Х
Riffle Quality:		Good	Х	Marginal		Poor	None	
Habitats Sample	ed:	Riffle	X	Snags		Banks		<del></del>
	# Jab	os:	20			_		<del></del>
Weather Ob	servations							
Current Weathe	er	Cloudy		Clear	Х	Rain/Snow	Foggy	
Recent Precipita	ition	Clear	Х	Showers		Rain		
Stream Flow		Low	X	Normal		Above Normal	Flood	
Biological O	servations							
Periphyton	_	1		Salamanders		0	Other	
Filamentous Alg	ae	0		Warmwater Fish		0	0= Not observe	d
Submerged Mad	rophytes	0		Coldwater Fish		0	1= Sparse	
Emergent Macr	ophytes _	0		Beavers		0	2= Common to	Abundant
Crayfish	_	0		Muskrats		0	3= Dominant-	
Corbicula	_	0		Ducks/Geese		0	abnormally hig	h density where other taxa
unionidae	_	0		Snakes		0	_	in relation to the dominant
Operculate Snai		0		Turtles		0		be situations where multiple
Non-operculate	Snails	0		Frogs/Tadpoles		1	taxa are domina	ent such as algae and snails

Notes

		High Gradient Hai	Ditat Data					
Habitat Parameter	Condition Category							
Habitat i arameter	Optimal	Suboptimal	Marginal	Poor	Score			
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at stage to allow full colonization potential (i.e. snags/logs that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintainance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization.	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.				
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	14			
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.				
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16			
Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow- shallow, fast-deep, fast shallow)(slow is <0.3m/s, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).				
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	12			
4. Sediment Deposition	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.				
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16			



		DATE OF THE PARTY	A STATE OF THE PARTY OF THE PAR					
Habitat Darameter	Condition Category							
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor	Score			
5. Channel Flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the availible channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the availible channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.				
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	16			
6. Channel Alteration	Channelization or dredging absent or minimal; stream width normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging, may be present, but recent channelization is not present.	Channeliztion may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.				
Score	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	19			
7. Frequency of Riffles	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distances between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.				
Score	20 19 18 17 16	15 14 13 12 11.	10 9 8 7 6	5 4 3 2 1 0	19			
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.				
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10			
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10			
9. Vegetation Protection (score each bank) Note: Determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetation disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	ative ss of ented; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	10			
Score Right Bank	10 9	8 7 6	5 4 3	2 1 0	10			
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riperian zone <6 meters; little or no riparian vegetation due to human activities.				
Score Left Bank	10 9	8 7 6	5 4 3	2 1 0	9			
DUDIE LEIL DEITH								

		331 DEI	TTTIC WIZ	ACROINVERTEBRAT	I E DEN	CH SHE	EI	
Job Name/# Snakeder		Snakeden-20	0003	Sample subsorted by: AEC		J/DRO	- Waterd	
Station ID:		Reach 3-A		Date Subsorted:	8/1	3/12	- — Wetland	
Stream Name:		Snakeder	1	# of Grids subsorted		4	Studies and Solutions,	,nc.
Date Sample	1	4/11/12		Total # of subsorted insects			Total # identificate	
						118	Total # identified:	100
Sampling Me		Multihabita	ıt	Sample Identified by:	A	BR	Date Identified:	10/10/12
Taxa Collec	ted:							
			-	Metretopodidae		]	Lepidostomatidae	
Porifera	Spongillidae		1	Neoephemeridae		]	Leptoceridae	
Ostracoda	Unknown		4	Oligoneuridae			Limnephilidae	
Flatworms	Tricladida Planariidae	+	-	Psuedironidae			Molannidae	
Gastropoda	Unknown		-	Polymitarcyidae Potamanthidae			Odontoceridae	
Limpets	Ancylidae		1	Siphlonuridae		1	Philopotamidae	
Snails	Immature	+	1	Tricorythidae			Phryganeidae Polycentropodidae	
	Lymnaeidae		Zygoptera	Early Instar and/or damaged		l	Psychomyiidae	
	Physidae	1	-,3-,	Calopterygidae			Ryacophilidae	
	Planorbidae		1	Coenagrionidae			Sericostomatidae	
	Hydrobiidae		1	Lestidae			Uenoidae	
	Pleuroceridae		1	Protoneuridae		Lepidoptera	Early Instar and/or damaged	
	Viviparidae		Anisopteera	Early Instar and/or damaged			Pyralidae	
Bivalvia	Immature		]	Aeshnidae		Coleoptera	Early Instar and/or damaged	
	Corbiculidae			Cordulegastridae			Chrysomelidae	
	Sphaeriidae			Corduliidae			Curculionidae	
0	Unionidae		1	Gomphidae			Dryopidae	
Oligochaeta	Unknown	31	1	Libellulidae			Dytiscidae	
Lumbriculida	1	-		Macromiidae			Elmidae	
Tubificida	Lumbriculidae		l	Petaluridae			Gyrinidae	
Tublicida	Enchytraeidae		Diagonton	Cordullidae/Libelluidae			Haliplidae	
	Naididae	+	Plecoptera	Early Instar and/or damaged Capniidae			Helodidae	
	Tubificidae	-	1	Chloroperlidae			Helophoridae	
Haplotaxida	- domoidad	1	ĺ	Leuctridae			Hydraenidae Hydrochidae	
•	Haplotaxidae			Nemouridae			Hydrophilidae	
Leeches	Hirudinea			Peltoperlidae			Limnichidae	
	Erpobdellidae		1	Perlidae			Noteridae	
	Glossiphoniidae		1	Perlodidae		=	Psephenidae	
	Hirudinidae			Pteronarcyidae			Ptilodactylidae	
	Pisciolidae			Taeniopeterygidae			Scirtidae	
Branchiobdellid <b>a</b>	Branchiobdellidae		Hemiptera	Early Instar and/or damaged		Diptera	Early Instar and/or damaged	
Copepoda	Unknown	1		Belostomatidae			Athericidae	
Decapoda	Cambaridae			Corixidae			Blephariceridae	
Chrima	Portunidae			Gelastocoridae			Canaceidae	
Shrimp	Palaemonidae			Gerridae			Ceratopogonidae	
Isopoda	raiaemonidae			Hebridae Hydrometridae			Choaboridae	
ю	Asellidae			Mesoveliidae			Chironomidae Culicidae	66
Amphipoda				Naucoridae			Dixidae	
• •	Crangonyctidae			Nepidae			Dolichopodidae	
	Gammaridae			Notonectidae			Epididae	
	Talitridae			Veliidae			Ephydridae	
Water Mites				Pleidae			Muscidae	
	Hydracarina		Neuroptera				Nymphomyiidae	
Ephemeroptera	Early Instar and/or damaged			Sisyridae			Pelecorhynchidae	
	Acanthometropodidae		Megaloptera				Psychodidae	1
	Ameletidae			Corydalidae			Ptychopteridae	
	Baetidae			Sialidae			Sciomyzidae	
	Baetiscidae		Trichoptera	Early Instar and/or damaged			Simuliidae	
	Behningiidae Caspidae			Branchycentridae			Stratiomyidae	
	Caenidae Enhamerallidae			Classes metidae			Syrphidae	
	Ephemerellidae Ephemeridae			Glossosomatidae			Tabanidae	
	Heptageniidae			Goeridae Heliicopsychidae			Tanyderidae	
	Isonychiidae			Hydropsychidae			Thaumaleidae	
	Leptophlebiidae			Hydroptilida			Tipulidae	67
TOTAL:		33	TOTAL:		0	TOTAL:		0/