

ST-1

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>Corks Creek</u>	LOCATION <u>ST-21 HEADWATERS EAST (SOUTH (KUNSMAN) SUPER)</u>	
STATION # <u>ST-21</u> RIVERMILE	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>W. Douglas</u>	DATE <u>12/2018</u> TIME _____ AM PM	REASON FOR SURVEY

WEATHER CONDITIONS	<p>Now</p> <p><input type="checkbox"/> storm (heavy rain)</p> <p><input type="checkbox"/> rain (steady rain)</p> <p><input type="checkbox"/> showers (intermittent)</p> <p><input type="checkbox"/> %cloud cover</p> <p><input checked="" type="checkbox"/> clear/sunny</p>	<p>Past 24 hours</p> <p><input type="checkbox"/> storm (heavy rain)</p> <p><input type="checkbox"/> rain (steady rain)</p> <p><input type="checkbox"/> showers (intermittent)</p> <p><input type="checkbox"/> %cloud cover</p> <p><input checked="" type="checkbox"/> clear/sunny</p>	<p>Has there been a heavy rain in the last 7 days?</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>Air Temperature _____ °C</p> <p>Other _____</p>
SITE LOCATION/MAP	<p>Draw a map of the site and indicate the areas sampled (or attach a photograph)</p>		
STREAM CHARACTERIZATION	<p>Stream Subsystem</p> <p><input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal</p> <p>Stream Origin</p> <p><input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed</p> <p><input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins</p> <p><input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____</p> <p>Stream Type</p> <p><input checked="" type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater</p> <p>Catchment Area _____ km²</p>		

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input checked="" type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources																				
	Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input checked="" type="checkbox"/> Heavy																						
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>SYCAMORE WALNUT</u>																						
INSTREAM FEATURES	<table border="0"> <tr> <td>Estimated Reach Length <u>100</u> m</td> <td>Canopy Cover</td> </tr> <tr> <td>Estimated Stream Width <u>10</u> m</td> <td><input type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded</td> </tr> <tr> <td>Sampling Reach Area _____ m²</td> <td>High Water Mark <u>2'</u> m</td> </tr> <tr> <td>Area in km² (m² x 1000) _____ km²</td> <td>Proportion of Reach Represented by Stream Morphology Types</td> </tr> <tr> <td>Estimated Stream Depth <u>5-1.0 m</u></td> <td><input type="checkbox"/> Riffle <u>40</u> % <input type="checkbox"/> Run <u>30</u> %</td> </tr> <tr> <td>Surface Velocity _____ m/sec</td> <td><input type="checkbox"/> Pool <u>30</u> %</td> </tr> <tr> <td>Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No</td> <td></td> </tr> <tr> <td>Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No</td> <td></td> </tr> </table>			Estimated Reach Length <u>100</u> m	Canopy Cover	Estimated Stream Width <u>10</u> m	<input type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded	Sampling Reach Area _____ m ²	High Water Mark <u>2'</u> m	Area in km ² (m ² x 1000) _____ km ²	Proportion of Reach Represented by Stream Morphology Types	Estimated Stream Depth <u>5-1.0 m</u>	<input type="checkbox"/> Riffle <u>40</u> % <input type="checkbox"/> Run <u>30</u> %	Surface Velocity _____ m/sec	<input type="checkbox"/> Pool <u>30</u> %	Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No		Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No					
Estimated Reach Length <u>100</u> m	Canopy Cover																						
Estimated Stream Width <u>10</u> m	<input type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded																						
Sampling Reach Area _____ m ²	High Water Mark <u>2'</u> m																						
Area in km ² (m ² x 1000) _____ km ²	Proportion of Reach Represented by Stream Morphology Types																						
Estimated Stream Depth <u>5-1.0 m</u>	<input type="checkbox"/> Riffle <u>40</u> % <input type="checkbox"/> Run <u>30</u> %																						
Surface Velocity _____ m/sec	<input type="checkbox"/> Pool <u>30</u> %																						
Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No																							
Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No																							
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)																						
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation _____ % <u>< 10% COVERAGE</u>																						
WATER QUALITY	<table border="0"> <tr> <td>Temperature _____ °C</td> <td>Water Odors</td> </tr> <tr> <td>Specific Conductance _____</td> <td><input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage</td> </tr> <tr> <td>Dissolved Oxygen _____</td> <td><input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical</td> </tr> <tr> <td>pH _____</td> <td><input type="checkbox"/> Fishy <input type="checkbox"/> Other _____</td> </tr> <tr> <td>Turbidity _____</td> <td>Water Surface Oils</td> </tr> <tr> <td>WQ Instrument Used _____</td> <td><input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks</td> </tr> <tr> <td></td> <td><input type="checkbox"/> None <input type="checkbox"/> Other _____</td> </tr> <tr> <td></td> <td>Turbidity (if not measured)</td> </tr> <tr> <td></td> <td><input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid</td> </tr> <tr> <td></td> <td><input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____</td> </tr> </table>			Temperature _____ °C	Water Odors	Specific Conductance _____	<input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage	Dissolved Oxygen _____	<input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical	pH _____	<input type="checkbox"/> Fishy <input type="checkbox"/> Other _____	Turbidity _____	Water Surface Oils	WQ Instrument Used _____	<input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks		<input type="checkbox"/> None <input type="checkbox"/> Other _____		Turbidity (if not measured)		<input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid		<input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
Temperature _____ °C	Water Odors																						
Specific Conductance _____	<input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage																						
Dissolved Oxygen _____	<input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical																						
pH _____	<input type="checkbox"/> Fishy <input type="checkbox"/> Other _____																						
Turbidity _____	Water Surface Oils																						
WQ Instrument Used _____	<input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks																						
	<input type="checkbox"/> None <input type="checkbox"/> Other _____																						
	Turbidity (if not measured)																						
	<input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid																						
	<input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____																						
SEDIMENT/SUBSTRATE	<table border="0"> <tr> <td>Odors</td> <td>Deposits</td> </tr> <tr> <td><input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum</td> <td><input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand</td> </tr> <tr> <td><input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None</td> <td><input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____</td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> <tr> <td>Oils</td> <td>Looking at stones which are not deeply embedded, are the undersides black in color?</td> </tr> <tr> <td><input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse</td> <td><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> </table>			Odors	Deposits	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum	<input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand	<input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None	<input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____	<input type="checkbox"/> Other _____		Oils	Looking at stones which are not deeply embedded, are the undersides black in color?	<input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No								
Odors	Deposits																						
<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum	<input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand																						
<input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None	<input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____																						
<input type="checkbox"/> Other _____																							
Oils	Looking at stones which are not deeply embedded, are the undersides black in color?																						
<input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																						

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		<u>40%</u>	Detritus	sticks, wood, coarse plant materials (CPOM)	<u>< 5%</u>
Boulder	> 256 mm (10")	<u>5</u>			
Cobble	64-256 mm (2.5"-10")	<u>30%</u>	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	<u>15</u>			
Sand	0.06-2mm (gritty)	<u>5</u>	Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME <u>COOKS CREEK</u>	LOCATION <u>ST-1 HEADWATERS SOUTH (KUNSMAN)</u>	
STATION # <u>ST-1</u> RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN <u>COOKS CREEK - DELAWARE</u>	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>S. Douglas</u>	DATE <u>12/2018</u> TIME _____ AM PM	REASON FOR SURVEY _____

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	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
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
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/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
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 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
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 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
7. Frequency of Riffles (or bends)	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; distance 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
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 in 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.					
Note: determine left or right side by facing downstream.																					
SCORE ____ (LB)	Left Bank	10		9		8	7	6			5	4	3			2	1	0			
SCORE ____ (RB)	Right Bank	10		9		8	7	6			5	4	3			2	1	0			
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative 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 ____ (LB)	Left Bank	10		9		8	7	6			5	4	3			2	1	0			
SCORE ____ (RB)	Right Bank	10		9		8	7	6			5	4	3			2	1	0			
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 riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE ____ (LB)	Left Bank	10		9		8	7	6			5	4	3			2	1	0			
SCORE ____ (RB)	Right Bank	10		9		8	7	6			5	4	3			2	1	0			

Total Score _____

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>COOKS CREEK</u>	LOCATION <u>ST-2 HEADWATERS SOUTH (KANSAS)</u> <u>EAST (SLIVER)</u>	
STATION # <u>ST-2</u> RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN <u>COOKS CREEK - DELAWARE</u>	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>W. S. Douglas</u>	DATE <u>12/20/18</u> AM PM	REASON FOR SURVEY _____

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input checked="" type="checkbox"/> %cloud cover <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input checked="" type="checkbox"/> %	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)		
STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____ Stream Type <input checked="" type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²		

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>OAK, BEECH, ASH</u>		
INSTREAM FEATURES	Estimated Reach Length <u>110</u> m Estimated Stream Width <u>8-10</u> m Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth <u>5-18</u> m Surface Velocity _____ m/sec Canopy Cover <input type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input checked="" type="checkbox"/> Shaded High Water Mark <u>< 1</u> m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>40</u> % <input type="checkbox"/> Run <u>30</u> % <input type="checkbox"/> Pool <u>30</u> % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area) <u>one section well established snag</u>		
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>55</u> %		
WATER QUALITY	Temperature _____ °C Specific Conductance _____ Dissolved Oxygen _____ pH _____ Turbidity _____ WQ Instrument Used _____ Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____		
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input checked="" type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	20
Boulder	> 256 mm (10")	5			
Cobble	64-256 mm (2.5"-10")	50 40	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	40 20 40			
Sand	0.06-2mm (gritty)	15	Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME <u>COOK'S CREEK</u>	LOCATION <u>ST-2 HEADWATERS EAST (SLIVER)</u>	
STATION # <u>ST-2</u> RIVERMILE	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>S. Douglas</u>	DATE <u>12/2018</u> TIME _____ AM PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	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 <u>16</u>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
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 <u>14</u> 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/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 <u>18</u> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 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 <u>11</u>	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available 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 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0

ST-3
ST-2

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 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
7. Frequency of Riffles (or bends)	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; distance 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
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 in 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.					
Note: determine left or right side by facing downstream.																					
SCORE ____ (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1	0									
SCORE ____ (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1	0									
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative 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 ____ (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1	0									
SCORE ____ (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1	0									
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 riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE ____ (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1	0									
SCORE ____ (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1	0									

Total Score _____

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>COOKS CREEK</u>	LOCATION <u>ST-3 BRUNSWICK</u>	
STATION # <u>ST-3</u> RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN <u>COOKS CREEK WATERSHED - DELAWARE</u>	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>M. S. Douglas</u>	DATE <u>12/20/18</u> TIME _____ AM PM	REASON FOR SURVEY _____

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input checked="" type="checkbox"/> %cloud cover <input checked="" type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> %	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature <u>15°F</u> Other _____
	SITE LOCATION/MAP Draw a map of the site and indicate the areas sampled (or attach a photograph)		
STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal		Stream Type <input checked="" type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater
	Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____		Catchment Area _____ km ²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential	Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>ASH</u>	
INSTREAM FEATURES	Estimated Reach Length <u>100</u> m Estimated Stream Width <u>25</u> m Sampling Reach Area _____ m ² Area in km² (m²x1000) _____ km ² Estimated Stream Depth <u>1-2 ft</u> m Surface Velocity (at thalweg) _____ m/sec Canopy Cover <input checked="" type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark <u>1+</u> m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>30</u> % <input type="checkbox"/> Run <u>30</u> % <input type="checkbox"/> Pool <u>20</u> % Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area) <u>none</u> <i>some on sides - not permanent</i>	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation _____ % <u>10% coverage, appears scoured</u>	
WATER QUALITY	Temperature _____ °C Specific Conductance _____ Dissolved Oxygen _____ pH _____ Turbidity _____ WQ Instrument Used _____ Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input checked="" type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	10
Boulder	> 256 mm (10")	10%	Muck-Mud	black, very fine organic (FPOM)	5
Cobble	64-256 mm (2.5"-10")	50%			
Gravel	2-64 mm (0.1"-2.5")	20%	Marl	grey, shell fragments	
Sand	0.06-2mm (gritty)	15%			
Silt	0.004-0.06 mm	5%			
Clay	< 0.004 mm (slick)				

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME <u>COOKS CREEK</u>	LOCATION <u>ST-3 BRUNSWICK</u>	
STATION # <u>ST-3</u> RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN <u>COOKS CREEK - DELAWARE</u>	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>W. S. Douglas</u>	DATE <u>12/2018</u> TIME _____ AM PM	REASON FOR SURVEY _____

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	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 <u>14</u> 13 12 11	10 9 8 7 6	5 4 3 2 1 0
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 <u>13</u> 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/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 <u>18</u> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 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 <u>14</u> 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available 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 <u>13</u> 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 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
7. Frequency of Riffles (or bends)	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; distance 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
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 in 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.
Note: determine left or right side by facing downstream.				
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 (4) 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative 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 ___ (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
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 riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score _____

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>COOKS CREEK</u>	LOCATION <u>ST-4 SILVER CREEK</u>	
STATION # <u>ST-4</u> RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN <u>COOKS CREEK - DELAWARE</u>	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>W.S. Douglas</u>	DATE <u>12/2018</u> TIME _____ AM PM	REASON FOR SURVEY _____

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input checked="" type="checkbox"/> %cloud cover <input checked="" type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> %	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) 		
STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____ Stream Type <input checked="" type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²		

ST-4

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input checked="" type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources																				
			Local Watershed Erosion <i>(on mainstem, none or little at station)</i> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy																				
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>ASH/OAK</u>																						
INSTREAM FEATURES	<table border="0"> <tr> <td>Estimated Reach Length <u>100</u> m</td> <td>Canopy Cover <input checked="" type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded</td> </tr> <tr> <td>Estimated Stream Width <u>9</u> m</td> <td>High Water Mark _____ m</td> </tr> <tr> <td>Sampling Reach Area _____ m²</td> <td>Proportion of Reach Represented by Stream Morphology Types</td> </tr> <tr> <td>Area in km² (m² x 1000) _____ km²</td> <td><input type="checkbox"/> Riffle <u>75</u> % <input type="checkbox"/> Run <u>25</u> %</td> </tr> <tr> <td>Estimated Stream Depth <u>0.5-1.0 ft</u> m</td> <td><input type="checkbox"/> Pool <u>0</u> %</td> </tr> <tr> <td>Surface Velocity _____ m/sec</td> <td>Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td>(at thalweg)</td> <td>Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> </table>			Estimated Reach Length <u>100</u> m	Canopy Cover <input checked="" type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded	Estimated Stream Width <u>9</u> m	High Water Mark _____ m	Sampling Reach Area _____ m ²	Proportion of Reach Represented by Stream Morphology Types	Area in km ² (m ² x 1000) _____ km ²	<input type="checkbox"/> Riffle <u>75</u> % <input type="checkbox"/> Run <u>25</u> %	Estimated Stream Depth <u>0.5-1.0 ft</u> m	<input type="checkbox"/> Pool <u>0</u> %	Surface Velocity _____ m/sec	Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	(at thalweg)	Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
Estimated Reach Length <u>100</u> m	Canopy Cover <input checked="" type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded																						
Estimated Stream Width <u>9</u> m	High Water Mark _____ m																						
Sampling Reach Area _____ m ²	Proportion of Reach Represented by Stream Morphology Types																						
Area in km ² (m ² x 1000) _____ km ²	<input type="checkbox"/> Riffle <u>75</u> % <input type="checkbox"/> Run <u>25</u> %																						
Estimated Stream Depth <u>0.5-1.0 ft</u> m	<input type="checkbox"/> Pool <u>0</u> %																						
Surface Velocity _____ m/sec	Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																						
(at thalweg)	Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																						
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)																						
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>100</u> %																						
WATER QUALITY	<table border="0"> <tr> <td>Temperature _____ °C</td> <td>Water Odors</td> </tr> <tr> <td>Specific Conductance _____</td> <td><input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage</td> </tr> <tr> <td>Dissolved Oxygen _____</td> <td><input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical</td> </tr> <tr> <td>pH _____</td> <td><input type="checkbox"/> Fishy <input type="checkbox"/> Other _____</td> </tr> <tr> <td>Turbidity _____</td> <td>Water Surface Oils</td> </tr> <tr> <td>WQ Instrument Used _____</td> <td><input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks</td> </tr> <tr> <td></td> <td><input type="checkbox"/> None <input type="checkbox"/> Other _____</td> </tr> <tr> <td></td> <td>Turbidity (if not measured)</td> </tr> <tr> <td></td> <td><input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid</td> </tr> <tr> <td></td> <td><input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____</td> </tr> </table>			Temperature _____ °C	Water Odors	Specific Conductance _____	<input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage	Dissolved Oxygen _____	<input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical	pH _____	<input type="checkbox"/> Fishy <input type="checkbox"/> Other _____	Turbidity _____	Water Surface Oils	WQ Instrument Used _____	<input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks		<input type="checkbox"/> None <input type="checkbox"/> Other _____		Turbidity (if not measured)		<input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid		<input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
Temperature _____ °C	Water Odors																						
Specific Conductance _____	<input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage																						
Dissolved Oxygen _____	<input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical																						
pH _____	<input type="checkbox"/> Fishy <input type="checkbox"/> Other _____																						
Turbidity _____	Water Surface Oils																						
WQ Instrument Used _____	<input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks																						
	<input type="checkbox"/> None <input type="checkbox"/> Other _____																						
	Turbidity (if not measured)																						
	<input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid																						
	<input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____																						
SEDIMENT/SUBSTRATE	<table border="0"> <tr> <td>Odors</td> <td>Deposits</td> </tr> <tr> <td><input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum</td> <td><input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input checked="" type="checkbox"/> Sand</td> </tr> <tr> <td><input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input checked="" type="checkbox"/> None</td> <td><input type="checkbox"/> Relict shells <input checked="" type="checkbox"/> Other <u>gravel</u></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td>Looking at stones which are not deeply embedded, are the undersides black in color?</td> </tr> <tr> <td>Oils</td> <td><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td><input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse</td> <td></td> </tr> </table>			Odors	Deposits	<input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum	<input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input checked="" type="checkbox"/> None	<input type="checkbox"/> Relict shells <input checked="" type="checkbox"/> Other <u>gravel</u>	<input type="checkbox"/> Other _____	Looking at stones which are not deeply embedded, are the undersides black in color?	Oils	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse									
Odors	Deposits																						
<input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum	<input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input checked="" type="checkbox"/> Sand																						
<input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input checked="" type="checkbox"/> None	<input type="checkbox"/> Relict shells <input checked="" type="checkbox"/> Other <u>gravel</u>																						
<input type="checkbox"/> Other _____	Looking at stones which are not deeply embedded, are the undersides black in color?																						
Oils	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																						
<input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse																							

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	<u>10</u>
Boulder	> 256 mm (10")	<u>10</u>	Muck-Mud	black, very fine organic (FPOM)	<u>0</u>
Cobble	64-256 mm (2.5"-10")	<u>65</u>	Marl	grey, shell fragments	<u>0</u>
Gravel	2-64 mm (0.1"-2.5")	<u>20</u>			
Sand	0.06-2mm (gritty)	<u>5</u>			
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME <u>COOKS CREEK</u>	LOCATION <u>ST-4 SILVER CREEK</u>	
STATION # <u>ST-4</u> RIVERMILE	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN <u>COOKS CREEK - DELAWARE</u>	
STORET #	AGENCY	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>US Douglas</u>	DATE <u>12/20/18</u> TIME _____ AM PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	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 <u>18</u> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
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 <u>18</u> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/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	<u>10</u> 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 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 <u>16</u>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	<u>20</u> 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

ST-4

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 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
7. Frequency of Riffles (or bends)	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; distance 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
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 in 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.
Note: determine left or right side by facing downstream.				
SCORE ____ (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative 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 ____ (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
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 riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE ____ (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score _____

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>COOKS CREEK</u>	LOCATION <u>ST-5 RED BRIDGE</u>	
STATION # <u>ST-5</u> RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN <u>COOKS CREEK - DELAWARE</u>	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>W. S. Douglas</u>	DATE <u>12/20/18</u> TIME _____ AM PM	REASON FOR SURVEY _____

WEATHER CONDITIONS	<p>Now</p> <p><input type="checkbox"/> storm (heavy rain)</p> <p><input type="checkbox"/> rain (steady rain)</p> <p><input type="checkbox"/> showers (intermittent)</p> <p><input type="checkbox"/> %cloud cover</p> <p><input checked="" type="checkbox"/> clear/sunny</p>	<p>Past 24 hours</p> <p><input type="checkbox"/> storm (heavy rain)</p> <p><input type="checkbox"/> rain (steady rain)</p> <p><input type="checkbox"/> showers (intermittent)</p> <p><input type="checkbox"/> %cloud cover</p> <p><input checked="" type="checkbox"/> clear/sunny</p>	<p>Has there been a heavy rain in the last 7 days?</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>Air Temperature <u>15°F</u></p> <p>Other _____</p>
SITE LOCATION/MAP	<p>Draw a map of the site and indicate the areas sampled (or attach a photograph) <u>27m</u></p>		
STREAM CHARACTERIZATION	<p>Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal</p> <p>Stream Type <input checked="" type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater</p> <p>Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____</p> <p>Catchment Area _____ km²</p>		

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input checked="" type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources
	Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy		
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>HWM/Sycamore</u>		
INSTREAM FEATURES	Estimated Reach Length <u>100</u> m Estimated Stream Width <u>37</u> m Sampling Reach Area _____ m ² Area in km² (m²x1000) _____ km ² Estimated Stream Depth <u>1-2 ft</u> m Surface Velocity _____ m/sec Canopy Cover <input checked="" type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark <u>2</u> m Proportion of Reach Represented by Stream Morphology Types <input checked="" type="checkbox"/> Riffle <u>50</u> % <input checked="" type="checkbox"/> Run <u>50</u> % <input type="checkbox"/> Pool _____ % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area) <u>NONE IN WATER</u>		
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>10</u> %		
WATER QUALITY	Temperature _____ °C Specific Conductance _____ Dissolved Oxygen _____ pH _____ Turbidity _____ WQ Instrument Used _____ Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____		
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No		

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	45%
Boulder	> 256 mm (10")	10 20			
Cobble	64-256 mm (2.5"-10")	40	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	20			
Sand	0.06-2mm (gritty)	20	Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

ST-5

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME <u>COOKS CREEK</u>	LOCATION <u>ST-5 RED BRIDGE</u>	
STATION # <u>ST-5</u> RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN <u>COOKS CREEK - DELAWARE</u>	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>S. DOUGLAS</u>		
FORM COMPLETED BY <u>W. S. Douglas</u>	DATE <u>12/20/18</u> TIME _____ AM PM	REASON FOR SURVEY _____

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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., logs/snags that are <u>not</u> new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	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 <u>18</u> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
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 <u>19</u> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/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	<u>15</u> 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 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 <u>19</u> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 <u>19</u> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

ST-5

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 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
7. Frequency of Riffles (or bends)	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; distance 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
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 in 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.
Note: determine left or right side by facing downstream.				
SCORE __ (LB)	Left Bank 10 9	8 7 6	5 (4) 3	2 1 0
SCORE __ (RB)	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative 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 __ (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE __ (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
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 riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE __ (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE __ (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score _____