Appendix A—Stream Survey Field Forms

PHOTO LOG

Watershed: _____ Date: _____

Stream(s): _____ Investigators: _____

Camera ID: _____ (If using non-digital camera, start new sheet for each new roll of film)

Photo #	Inventory ID	Direction (u/s,d/s,RB,LB)	Notes

u/s = upstream; d/s = downstream; RB, LB = right bank and left bank (when looking d/s)

BUFFER RESTORATION AREAS
(within 50 feet of Streambank)

Reach ID: _____ Date: _____

Watershed: _____ Investigators: _____

Stream(s): _____

Buffer ID	Bank (Circle one)	Linear Feet w/ Forest Buffer <50' width	Buffer Type of Non-Forest Area	Impact Score	Buffer Restoration Candidate
Ex. ABC01.B##	looking downstream		1. Forbs 4. Pasture 2. Lawn 5. Cultivated Crop 3. Pavement 99. Other (Specify)	(See Below)	
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor
	Left / Right				Good / Poor

Scoring:

No forest, buffer is entirely pavement, other.	10
50% of buffer is not forested	5
Forested buffer totally intact	0

Appendix_Inventory forms 2 Wash buffer

EROSION PROBLEMS

Reach ID: _____ Date: _____

Watershed: _____ Investigators: _____

Stream(s): _____

Bank Erosion ID Ex. ABC01.E##	Bank looking d/s (circle one)	Photo #	Restoration Potential (Circle one)	Eroded Bank Height (ft)	Linear Feet	Impact Score (See Below)
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			
	Left / Right		Yes / No			

Scoring:

Bank Stable; erosion absent or minimal. Side slopes are generally less than 45% and are stable.
Banks may be reinforced by rock thus increasing slope >30% while providing stability

-Up to 5% bank affected by erosion **[DO NOT RECORD]**	N/A
Moderately stable bank; small areas of erosion or bank slumping visible. Most areas are stable with only Slight potential for erosion at flood stages.	
-Up to 30% of Bank with erosional areas **[DO NOT RECORD]**	N/A
Moderately unstable bank; frequency and size of raw areas are such that high water events have eroded some areas of the bank. Medium sized areas of erosion or bank slumping visible. High erosion potential during floods.	N/A
-approx. 50% of bank has erosional areas [25-50 feet of bank erosion]	4
-approx. 50% of bank has erosional areas [50-100 feet of bank erosion]	5
-approx. 50% of bank has erosional areas [>100 feet of bank erosion]	6
Unstable Bank; mass erosion and bank failure is evident; erosion and pronounced undercutting present at bends and along some straight channel areas. Many raw areas and 70-100% of bank has erosional scars.	
-70-100% of bank has erosional areas. [0-25 feet of bank erosion]	7
-70-100% of bank has erosional areas. [25-50 feet of bank erosion]	8
-70-100% of bank has erosional areas. [50-100 feet of bank erosion]	9
-70-100% of bank has erosional areas. [>100 feet of bank erosion]	10

*IA = Immediate Action Recommended (ex: sewer lines, manholes, roads, buildings, etc. in imminent danger of collapse.)
Artifical stabilization (note on field maps)
**Annotate on field map as appropriate.

OBSTRUCTIONS

Reach ID(s): _____ Date: _____

Watershed: _____ Investigators: _____

Stream(s): _____

Obstruction ID	Photo #	Type/Cause	Impact Score
Ex. ABC01.T##		1. Trees 5. Riprap 2. Debris 6. Beaver Dam 3. Sediment 7. Sewer Line 4. Concrete 99. Other (Specify)	(See Below)

Scoring:

Severe:	Blockage causing significant erosion problem and/or potential for flooding. Stream usually almost totally blocked (>75%)	10
Moderate:	Blockage is causing moderate erosion and could cause flooding. Stream partially blocked, but obstruction should probably be removed, because problem could worsen. Obstruction blocking approx. ½ of channel.	5
Minor:	Blockage is causing some erosion problems but does have potential to worsen and probably should be looked at/or monitored	2

Notes:

1. **Obstructions that partially block stream but are not causing erosion problems or that may even be beneficial to instream habitat should not be identified**
2. **Photograph all recorded obstructions.**

DUMP SITES

Reach ID(s): _____ Date: _____

Watershed: _____ Investigators: _____

Stream(s): _____

Dump Site ID	Bank looking d/s	Photo #	Location	Description of Materials	Impact Score
Ex. ABC01.M##	(circle one)		1. Instream 2. Bank 3. Floodplain 99. Other	1. Appliances 5. 55-gal Drums (Closed) 2. Trash 6. 55-gal Drums (Leaking) 3. Petroleum 4. Tires 99. Other (Specify)	(See Below)
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				
	Left / Right				

Scoring:

Active and/or Threatening: Material may be considered toxic or threatening to environment (concrete, petroleum, empty 55 gal. Drums etc.) or site is large (>2,500 s.f. (50'x50')) and appears active. 10

Dumpsite (<2,500 s.f. (50'x50')) non-toxic material, does not appear to be used often, however clean-up would definitely be a benefit. 5

Dumpsite appears small (<1,000 s.f.) and material stable (will not likely be transported downstream by high water). Not high priority. 1

Note:
Photograph all recorded dump sites.

OPEN CHANNELS (DRAINAGE DITCHES AND OTHER TRIBUTARIES)

Reach ID(s): _____

Watershed: _____ Investigators: _____

Stream(s): _____

Ditch ID	Bank looking d/s	Photo #	Average Ditch	Type of Discharge	Drainage Pipe Distance from Channel	Discharge Quality (if any)	Estimated Flow Rate	Erosion	Impact Score
Ex. ABC01.D##	(circle one)		Width, (ft)	1. None 2. Intermittent 3. Perennial 4. Stormwater 5. Other Non-stormwater or possible illicit discharge 99. Other (Specify)	(ft)	1. Clear 2. Oil Slick 3. Oil Sheen 4. Iron Flocculent 5. Significant Algae 99. Other (Specify)	1. Low 2. Medium 3. High	1. None 2. Minor 3. Moderate 4. Major	(See Below)
	Left / Right								
	Left / Right								
	Left / Right								
	Left / Right								
	Left / Right								
	Left / Right								
	Left / Right								
	Left / Right								
	Left / Right								
	Left / Right								
	Left / Right								

Scoring:

Ditch is causing a significant erosion problem to stream bank or stream and/or discharge is coming from ditch that may not be stormwater. **[picture needed]** 10

Ditch is causing moderate erosion problem and should be fixed, it may get worse if left unattended. OR Discharge may be coming from ditch, probably stormwater - unsure without 5

Ditch is not causing erosion problem and no discharge is occurring. **[no picture needed]** 0

Notes:

1. **Please document all ditches, even if the score is zero.**
2. **Photographs scores greater than 0.**

PIPES

Reach ID(s): _____

Watershed: _____ Investigators: _____

Stream(s): _____

Pipe ID	Bank looking d/s	Photo #	Pipe Diameter	Distance from Channel	Type of Discharge	Discharge Quality (if any)	Estimated Flow Rate	Erosion	Conditions	Impact Score
Ex. ABC01.P##	(circle one)		(inches)	(ft)	1. None 2. Wet weather 3. Dry weather 4. Sewage 5. Other Non-stormwater or possible illicit discharge 99. Other (Specify)	1. Clear 2. Oil Slick 3. Oil Sheen 4. Iron Flocculent 5. Significant Algae 99. Other (Specify)	1. <¼ Full 2. ¼ Full 3. ½ Full 4. Full	1. None 2. Minor 3. Moderate 4. Major	1. Good 2. Cosmetic 3. Functional 4. Unusable	(See Below)
	Left / Right									
	Left / Right									
	Left / Right									
	Left / Right									
	Left / Right									
	Left / Right									
	Left / Right									
	Left / Right									
	Left / Right									
	Left / Right									
	Left / Right									

Scoring:

Pipe is causing a significant erosion problem to stream bank or stream and/or discharge is coming from pipe that may not be stormwater. **[picture needed]** 10

Pipe is causing moderate erosion problem and should be fixed, it may get worse if left unattended. OR Discharge may be coming from pipe, probably stormwater - unsure without further investigation.**[picture** 5

Pipe is not causing erosion problem and no discharge is occurring. **[no picture needed]** 0

Notes:

1. **Please document all pipes, even if the score is zero.**
2. **Photographs scores greater than 0.**

PUBLIC UTILITY LINES

Reach ID(s): _____ Date: _____

Watershed: _____ Investigators: _____

Stream(s): _____

Utility ID	Bank looking d/s	Photo #	Size	Type	Description	Impact Score
Ex. ABC01.U##	(circle one)		(Inches) or MH for Manhole	1. Sanitary 2. Water 3. Gas 4. Cable 99. Other (Specify)	1. Within Stream banks 2. Within Buffer 3. Crossing Stream partially buried 4. Crossing Stream above base flow 5. Crossing Stream above high water 99. Other (Specify)	(See Below)
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					
	Left / Right					

Scoring:

Line is leaking 20

Exposed line causing a significant erosion problem &/or obstruction (blockage) OR sanitary line potential to burst/leak appears high 10

Half exposed line causing moderate erosion problem 5

Line is partially visible however mostly buried in stream bed little if any erosion. **[No picture needed]** 2

Note:
Photograph scores greater than 2.

ROAD CROSSINGS

Reach ID(s): ______________________ Date: _______________

Watershed: _______________________ Investigators: _______________

Stream(s): _______________________

Crossing ID Ex. ABC01.C##	Photo #	Crossing Type	Conveyance Material	Number of Barrels	Width or Diameter of Barrel (ft)	Height of Barrel (ft)	Conveyance Length (ft)	Upstream Conditions				Downstream Conditions				Impact Score
								Debris	Sediment	Bank Erosion	Bed Erosion (Specify Height, ft)	Debris	Sediment	Bank Erosion	Bed Erosion (Specify Height, ft)	
		Box Elliptical Circular Bridge	Concrete CMP Natural Other ____					None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	
		Box Elliptical Circular Bridge	Concrete CMP Natural Other ____					None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	
		Box Elliptical Circular Bridge	Concrete CMP Natural Other ____					None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	
		Box Elliptical Circular Bridge	Concrete CMP Natural Other ____					None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	
		Box Elliptical Circular Bridge	Concrete CMP Natural Other ____					None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	
		Box Elliptical Circular Bridge	Concrete CMP Natural Other ____					None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	None Low Medium High	

Offline Wetland Potential

Crossing ID (use for GIS/map ID)	Photo #	Bank Height, ft	Bank Slope, ft/ft	Length, ft	Width, ft

Debris & Sediment: Low - Present, but not impeding flow
Medium - Impeding flow through part or some of barrels
High - Impeding flow through all barrels

Bank Erosion: Low - Exposed soil on banks
Medium - Eroded more than 10 % of channel width
High - Impacting on structural integrity of crossing or more than 20% of channel width

Bed Erosion: Height from culvert invert to bed is
0 ft: None
0-0.5 ft: Low
0.5-1.0 ft: Medium
>1.0 ft: High

Impact Score: Look at highest scores in "conditions"

More than 1 score of High	10
1 score of High	8
More than 1 score of Medium	5
1 score of Medium	3
All scores Low or None	0

Note:
1. Photograph all recorded crossings.

Low Houses

Reach ID(s): _____ Date: _____

Watershed: _____ Investigators: _____

Stream(s): _____

Low House ID	Address
Ex. ABC01.L##	

Note any houses or other buildings, garages, sheds, etc. that may be in flood plain. Note address.

B—Field Forms for Rosgen Stream Classification

Stream Type ____

STREAM CLASSIFICATION AND CHARACTERISTICS FORM

Reach ID:

Stream:

Watershed

Estimated Length of Reach:

Investigators:

Date: | Time:

Weather in past 24 hours

- ☐ 1. Storm (heavy rain)
- ☐ 2. Rain (steady rain)
- ☐ 3. Showers (intermittent rain)
- ☐ 4. Overcast
- ☐ 5. Clear/Sunny

Weather now:

- ☐ 1. Storm (heavy rain)
- ☐ 2. Rain (steady rain)
- ☐ 3. Showers (intermittent rain)
- ☐ 4. Overcast
- ☐ 5. Clear/Sunny

Flow present ☐ Yes ☐ No

Right Flood Plain Description: (circle one)

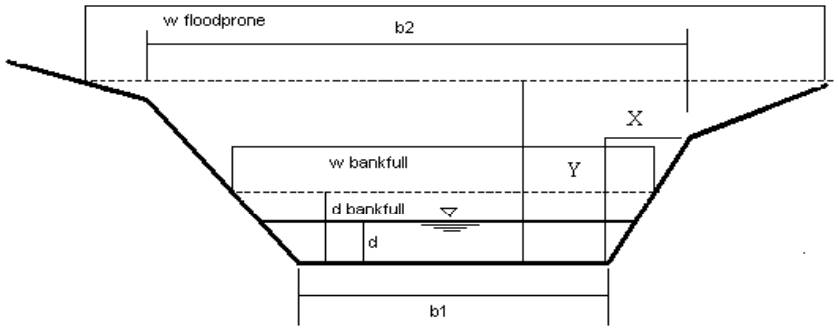
1. Bare
2. Grass
3. Sparse Brush
4. Thick Brush
5. Impassable
6. Construction

Left Flood Plain Description: (circle one)

1. Bare
2. Grass
3. Sparse Brush
4. Thick Brush
5. Impassable
6. Construction

Manning "n": _____

Typical Cross Section Sketches
(looking downstream)
(indicate areas of erosion and undercutting on sketch)



Flow Depth, d (ft)	
Top Width, b2 (ft)	
Bottom Width, b1 (ft)	
Bankfull Width ($w_{bankfull}$) (ft)	
Bankfull Depth ($d_{bankfull}$) (ft)	
Floodprone Width ($w_{floodprone}$ = width @ 2 X $d_{bankfull}$)	

	Left Bank	Right Bank
Bank Width, X (ft)		
Bank Height, Y (ft)		
Bank Stability: % Unstable		

Stream Canopy: % Coverage

Reach ID _____

Other Influences

Dominant Bank Substrate: (circle one)

1. Clay_____% 4. Gravel _____% 7. Bedrock_____%
2. Silt_____% 5. Cobble _____% 99. Other _____%
3. Sand _____% 6. Boulder _____%

Dominant Surface Substrate: (circle one)

1. Clay_____% 4. Gravel _____% 7. Bedrock_____%
2. Silt_____% 5. Cobble _____% 99. Other _____%
3. Sand _____% 6. Boulder _____%

Stream Restoration Candidate: N/A Major Minor

	circle one	If No Provide Reason
Stream Assessment	Yes / No	Reason: _____
Infrastructure Inventory	Yes / No	Reason: _____

Reasons for not performing assessments/inventory:

1. Wetland 3. Dangerous Conditions 5. Other
2. No Access 4. Pond/Lake

*** In Office Calculations ***

Entrenchment Ratio ($w_{floodprone}/w_{bankfull}$) _____

Slight = 2.2+ Moderate = 1.41-2.2 Entrenched = 1.0-1.4

Sinuosity (2 methods): **OR**

Stream Length (S_L) _____ Valley Slope (V_S) _____

Valley Length (V_L) _____ Channel Slope (C_S) _____

Sinuosity S_L/V_L _____ Sinuosity V_S/C_S _____

Stream Characteristic Form (cont.)

A **Water appearance:**

☐ 1. clear ☐ 5. light brown ☐ 7. oily sheen
☐ 2. milky (other than tannin) ☐ 8. reddish
☐ 3. foamy ☐ 6. dark brown ☐ 9. greenish
☐ 4. turbid (other than tannin) ☐ 99. other _____

B **Water odor:**

☐ 1. sewage ☐ 3. fishy ☐ 5. none
☐ 2. chlorine ☐ 4. rotten eggs ☐ 6. other _____

C **Sediment odor:**

☐ 1. sewage ☐ 3. petroleum ☐ 5. none
☐ 2. chlorine ☐ 4. rotten eggs ☐ 6. other _____

D **Fish:**

☐ 1. none ☐ 3. medium (3-6 in.)
☐ 2. small (1-2 in.) ☐ 4. large (7 in. & above)

E **Aquatic Plants:**

Percent area: ☐ 1. (0%) ☐ 3. (10-30%) ☐ 5. (>50%)
☐ 2. (1-10%) ☐ 4. (30-50%)

If present, are they: ☐ attached ☐ free-floating

Where are they located?

☐ stream margin ☐ pools ☐ near riffles

Reach ID _____

Other Influences

F **Algae:**

Algae "slime" coating:

(on submerged stones, twigs or other material in the stream)

☐ 1. none ☐ 3. heavy

☐ 2. light

Algae color:

☐ 1. brown ☐ 2. green

☐ 99. other _____

Filamentous (stringlike) algae:

☐ 1. none ☐ 3. green ☐ 99. other _____

☐ 2. brown ☐ 4. orange

Floating Algae:

(detached "clumps" or "mats" on the water's surface)

☐ 1. none ☐ 3. green

☐ 2. brown ☐ 99. other _____

G **Trash:**

☐ 1. none ☐ 3. plentiful

☐ 2. occasional

H **Iron Flocculent**

☐ 1. none ☐ 3. heavy

☐ 2. light

Comments:

Sketch the following on GIS map

outfalls (ditches, pipes); obstructions (dams, debris), wetlands, unmapped tributaries, dumping, stream crossings (unmapped road crossings), utility crossings.

Appendix C—Field Sheets for Habitat Assessment

Habitat Assessment - Riffle/Run Prevalent Streams

I. Instream Cover

Measures substrates that are available as refuge for aquatic organisms. A wide variety and/or abundance of submerged structures in the stream provides macroinvertebrates with a large number of niches, thus increasing the potential diversity. As the variety and abundance of cover decreases, habitat structure becomes monotonous, diversity decreases, and the potential for recovery following disturbance decreases.

Circle habitat types which occur at this site: fallen trees/large woody debris, deep pools, shallow pools, overhanging shrubbery in water, large rocks, cobble, undercut banks, thick root mats, dense macrophyte beds, or deep riffles with lots of turbulence (habitat type found in cold-water, mountain streams)

A. Habitat(s) expected for stream type make up >70% of reach

1. 7 habitats common	20
2. 6 habitat types common, additional habitat types rare	19
3. 5 habitat types common, additional habitat types rare	18
4. 4 habitat types common, additional habitat types rare	17
5. Less than 4 habitat types present	16

B. Habitat(s) expected for stream type make up >50% of reach

1. 7 habitats common	15
2. 6 habitat types common, additional habitat types rare	14
3. 5 habitat types common, additional habitat types rare	13
4. 4 habitat types common, additional habitat types rare	12
5. Less than 4 habitat types present	11

C. Habitat(s) expected for stream type make up <50% of reach

a. 7-3 habitats common

1. 7 habitats common	10
2. 6 habitat types common, additional habitat types rare	9
3. 5 habitat types common, additional habitat types rare	8
4. 4 habitat types common, additional habitat types rare	7
5. 3 habitat types common, additional habitat types rare	6

b. 2-0 habitats common

1. 2 habitat types present, additional habitat types rare	5
2. 2 habitat types only and common	4
3. 1 habitat type common, additional habitat types rare	3
4. 1 habitat type only and common	2
5. 1 habitat type rare	1
6. 0 habitat types present	0

II. Epifaunal Substrate

Measures the availability of benthic habitat for macroinvertebrate (insects and snails) colonization. Riffle areas are critical for maintaining a healthy variety of insects in most riffle prevalent streams.

A. Well developed riffle-run complex. Riffle is as wide as the stream and its length extends twice the stream width. Substrate dominated by:

1.	Softball size cobble stones	20
2.	Cobble and boulder stones (>10 in.)	19
3.	Boulder stones only	18
4.	Mixture of cobble and gravel stones and/or stable woody debris	17
5.	Mixture of gravel stones and boulders/bedrock and/or stable woody debris	16

B. Riffle is as wide as the stream and its length does not extend twice the stream width. Substrate dominated by:

1.	Softball size cobble stones	15
2.	Cobble and boulder stones (>10 in.)	14
3.	Boulder stones only	13
4.	Mixture of cobble and gravel stones and/or stable woody debris	12
5.	Mixture of gravel stones and boulders/bedrock and/or stable woody debris	11

C. Riffle is not as wide as the stream and its length does not extend twice the stream width. Substrate dominated by:

1.	Softball size cobble stones	10
2.	Cobble and boulder stones (> 10 in.)	9
3.	Boulder stones only	8
4.	Mixture of boulders/bedrock and gravel stones and/or stable woody debris	7
5.	Mixture of bedrock and/or gravel stones and/or stable woody debris	6

D. Riffles or runs virtually nonexistent, no cobble substrate. Substrate dominated by:

1.	Large boulders, short runs	5
2.	Mixture of boulders and bedrock	4
3.	Rock and sand with long runs, no riffles	3
4.	Rock and sand with short runs, no riffles	2
5.	Rock and sand, no runs or riffles	1
6.	Sand with no riffles or runs	0

III. Embeddedness In Run Areas

Measures the degree to which cobble, boulders, and other rock substrate are surrounded by fine sediment. Embeddedness relates directly to the suitability of the stream substrate as habitat for macroinvertebrates and for fish spawning and egg incubation.

Fine sediments/sands range from 0.062 mm to 2 mm in size. Silt particles measure less than 0.062 mm. Sediment and silt particles smaller than 2 mm can be distinguished using "texture by feel techniques" employed in soil surveys.

A. Little or no embeddedness present by fine silt and/or sediment surrounding and covering rocks

1. <10% embeddedness	20
2. 10% embeddedness by sediment	19
3. 10% embeddedness by sediment and silt	18
4. 20% embeddedness by sediment	17
5. 20% embeddedness by sediment and silt	16

B. Fine sediment and silt surrounds and fills 25-50% of the living spaces around and in between gravel, cobble, and boulders

1. 30% embeddedness by sediment	15
2. 30% embeddedness by sediment and silt	14
3. 40% embeddedness by sediment	13
4. 40% embeddedness by sediment and silt	12
5. 50% embeddedness by sediment	11

C. Fine sediment and silt surrounds and fills 50-75% of the living spaces around and in between gravel, cobble, and boulders

1. 50% embeddedness by sediment and silt	10
2. 60% embeddedness by sediment	9
3. 60% embeddedness by sediment and silt	8
4. 70% embeddedness by sediment	7
5. 70% embeddedness by sediment and silt	6

D. Fine sediment and silt surrounds and fills more than 75% of the living spaces around and in between gravel, cobble, and boulders

1. 80% embeddedness by sediment	5
2. 80% embeddedness by sediment and silt	4
3. 90% embeddedness by sediment	3
4. 90% embeddedness by sediment and silt	2
5. 100% embeddedness by sediment	1
6. 100% embeddedness by sediment with a thick layer of silt on its surface	0

IV. Channel/Bank Alteration

Measurement of large-scale alteration of instream habitat, which affects stream biotic integrity and causes scouring. Channel alteration is present (circle or identify conditions) when: artificial embankments, rip rap, and other forms of artificial bank stabilization or structures are present; when dredging has altered bank stability; when dams and bridges are present; when banks and channels have been disturbed by livestock, other agricultural practices; or hydrology; and when other changes have occurred (list).

A. Stream follows a normal and natural meandering pattern. Alteration is absent.

1. No evidence of disturbance with bends and riffle/runs frequent; bend angles average > 60° 20
2. No evidence of disturbance with bends combination of riffle/runs and gild/pool habitats frequent; bend angles average between 60°- 40° 18
3. No evidence of disturbance with bends and glide pools prevalent; bend angles average < 40° 16

B. Some dredging, artificial embankments, or dams present but NO evidence of recent alteration activities; but mostly recovered.

1. Disturbance is more than 20 years old; no other channel disturbance present 15
2. 10% of reach or less has channel disturbance other than bridge 14
3. 20% of reach has channel disturbance other than bridge 13
4. 30% of reach has channel disturbance other than bridge 12
5. 40% of reach has channel disturbance other than bridge more than 20 years old 11

C. Somewhat channelized; 40-80% of the area has been straightened, dredged, or otherwise altered.

1. 40% of reach has channel disturbance other than bridge 10
2. 50% of reach has channel disturbance other than bridge 9
3. 60% of reach has channel disturbance other than bridge 8
4. 70% of reach has channel disturbance other than bridge 7
5. 80% of reach has channel disturbance other than bridge 6

D. More than 80% of the stream site has been dredged, or otherwise altered; banks most likely box-cut or rip-rap or no longer have native vegetation; instream habitat highly altered.

1. 90% of reach has channel disturbance 5
2. Channel reach 100% disturbed; with no artificial embankments 3
3. Channel reach 100% disturbed; with artificial embankments 2
4. Channel reach 100% disturbed; with natural and manmade artificial embankments 1
5. Channel 100% shored by gabion and/or cement 0

V. Sediment Deposition

Relates to the amount of sediment that has accumulated and the changes that have occurred to the stream bottom as a result of deposition. Sediment deposition may cause the formation of islands, point bats (areas of increased deposition usually at the beginning of a meander that increase in size as the channel is diverted toward the outer bank) or shoals, or result in the filling of pools. Depositional material comes from the watershed and bank erosion (Barbour and Stribling 1995). The growth, or appearance of bars/islands where they did not previously exist is an indication of upstream erosion. Sediment bars/islands tend to grow in depth and length with continued watershed disturbance because increased sedimentation results in increased deposition. High levels of sediment deposition create an unstable and continually changing environment that becomes unsuitable for many organisms (FL DEP, 1996).

A. No enlargements of islands/point bars present or less than 20% bottom affected by sand or silt accumulation.

1. No sediment deposition detected; especially in pools	20
2. Less than 20% sediment deposition with accumulation in pools only	18
3. Less than 20% sediment deposition with accumulation in runs and pools	17
4. Less than 20% sediment deposition with few, old, small point bars or islands made up of coarse gravel in stream channel	16

B. 20-50% bottom affected by sand or silt accumulation; slight deposition in pools; some new increase in bar and island formation.

1. 20-30% sediment deposition with gravel and/or sand	15
2. 20-30% sediment deposition with sand and/or silt	14
3. 40-50% sediment deposition with gravel and/or sand	12
4. 40-50% sediment deposition with sand and/or silt	11

C. 50-80% bottom affected with moderate deposition in pools. Number of shallow pools increases. Habitats smothered by sand, silt, and possibly coarse gravel. Deposits of fresh, fine, gravel, sand, and silt observed on old and new point bars, islands, and behind obstructions. Formation of few new bars/islands is evident and old bars are deep and wide; deposition at bends obvious.

1. 60-70% sediment deposition with gravel and/or sand	10
2. 60-70% sediment deposition with sand and/or silt	9
3 70-80% sediment deposition with gravel and/or sand	7
4 70-80% sediment deposition with sand and/or silt	6

D. More than 80% bottom affected with heavy deposition from coarse and fine gravel and sand at stream bends, constrictions, and/or pools. Extensive deposits of fine sand and/or silt on old and new bars, islands, and along banks in straight channels. Few pools are present due to siltation. Only larger rocks in riffle areas remain exposed.

1. 80-90% sediment deposition; pools almost absent due to substantial deposition; bottom silt may move with almost any flow above normal	3
2. 90-100% sediment deposition; pools almost absent	1
3. 100% sediment deposition; pools absent due to substantial deposition; bottom silt moves with almost any flow above normal	0

VI. Frequency of Riffles

Estimates the frequency of occurrence of riffles as a measure of sinuosity. Riffles are a source of high-quality habitat and diverse fauna; therefore, an increased frequency of occurrence greatly enhances the diversity of the stream community. Divide the average distance between riffles by the average width of the stream to estimate run-to-riffle ratio. May need to cover more area than one sampling reach to estimate riffle-to-run ratio.

A. Occurrence of riffles relatively frequent. Deep pools may be present and riffles are deep enough to allow passage of fish.

1. Riffles are continuous: run-to-riffle ratio = 1-2	20
2. Run-to-riffle ratio = 3-4	19
3. Run-to-riffle ratio = 5	18
4. Run-to-riffle ratio = 6	17
5. Run-to-riffle ratio = 7	16

B. Occurrence of riffles moderately frequent; adequate depth in pools and riffles.

1. Run-to-riffle ratio = 8	15
2. Run-to-riffle ratio = 10	14
3. Run-to-riffle ratio = 11	13
4. Run-to-riffle ratio = 13	12
5. Run-to-riffle ratio = 15	11

C. Infrequent riffles or bends variable bottom contours may provide some habitat.

1. Run-to-riffle ratio = 16	10
2. Run-to-riffle ratio = 18	9
3. Run-to-riffle ratio = 20	8
4. Run-to-riffle ratio = 22	7
5. Run-to-riffle ratio = 24	6

D. Generally all flat water or shallow riffles; essentially a straight and uniform depth stream; riffles are not deep enough to provide free passage for fish.

1. Run-to-riffle ratio = 25	4
2. Run-to-riffle ratio > 30 with some shallow riffles	2
3. Run-to-riffle ratio >30 with no shallow riffles	0

VII. Channel Flow Status

Is the degree to which the channel is filled with water during normal flow periods. The flow status will change as the channel enlarges or as flow decreases as a result of dams and other obstructions, diversions for irrigation, drought, or aggrading stream bottoms with actively widening channels. This is a seasonal parameter. A decrease in water will wet smaller portions of the streambed, thus decreasing available habitat for aquatic organisms. Use the vegetation line on the lower bank as your reference point to estimate channel flow status.

Stretch a tape very tight across the channel. Level and secure tape at the base of both lower banks. This channel cross-section may help the investigator(s) estimate what percentage of the available channel is full.

A. Water reaches the base of both lower banks and minimal amount of channel substrate is exposed (100% channel full) 20

1. > 95% channel is full 18
2. 90-95% channel is full 16

B. Water fills > 75% of the available channel (or <25% of channel substrate is exposed)

1. 90% of channel is full 15
2. 85% of channel is full 13
3. 80% of channel is full 11

C. Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed

1. 75% of channel is full 10
2. 60-65% of channel is full 9
3. 50% of channel is full 8
4. 35-40% of channel is full 7
5. 25% of channel is full 6

D. Very little water in the channel and mostly present as standing pools

1. 20% of channel is full 5
2. 10% of channel is full 4
3. < 10% of channel is full 3
4. Water present as isolated standing pools 1
5. Channel is dry 0

VIII. Bank Vegetative Protection

Measures the amount of the stream bank that is covered by vegetation. This parameter supplies information on the ability of the bank to resist erosion as well as some additional information on the uptake of nutrients by the plants, the control of instream scouring, and stream shading. Banks that have full, natural plant growth are better for fish and macroinvertebrates than those without vegetation protection and those shored up with concrete or riprap.

Four factors to consider when scoring bank vegetative protection: (1) is the vegetation native or natural or planted and introduced? (2) Is the upper story, under story, and ground cover vegetation well balanced?; (3) What is the standing crop biomass?; and (4) During which season are you conducting this assessment?

Determine left or right bank by facing downstream. Score left and right banks separately.

A. Left Bank or Right Bank

1. More than 90% streambank surfaces is covered by native/natural vegetation. A variety of vegetation present (e.g., trees, shrubs, understory, or nonwoody macrophytes). Any bare or sparsely vegetated areas are small and evenly dispersed.

    a. 100% plant cover on streambank 10
    b. > 90% plant cover on streambank 9

2. A variety of vegetation is present and covers 70-90% of streambank surface, but one class of plants is not well represented. Some open areas with unstable vegetation are present. Disruption evident but not affecting full plant growth potential.

    a. 90% plant cover but one class of plants is not well represented 8
    b. 80% plant cover with a few barren or thin areas present 7
    c. 70% plant cover with a few barren or thin areas present with fewer plant species 6

3. 50-70% of streambank surface covered by vegetation; typically composed of scattered shrubs, grasses, and forties. Thin or bare spots visible and/or closely cropped vegetation with less that ½ plant stubble height remaining.

    a. 70% vegetation cover; typically of shrubs, grasses, and forbs 5
    b. 60% vegetation cover; typically of shrubs, grasses, and forbs 4
    c. 50% vegetation cover; typically of shrubs, grasses, and forbs 3

4. Less than 50% streambank surface covered by vegetation; 2 inches or less in average stubble height remaining. Any shrubs or trees on bank exist as individuals or widely scattered clumps.

    a. 40% vegetation cover with many bare spots/rock 2
    b. 20% vegetation cover with many bare spots/rock 1
    c. No vegetation cover on streambank 0

IX. Bank Stability

Measures the existence of or the potential for detachment of soil from the upper and lower stream banks and its movement into the stream. Steep banks are more likely to collapse and suffer from erosion than are gently sloping banks and are therefore considered to be unstable. Signs of erosion include crumbling, unvegetated banks, exposed tree roots, and exposed soil. Reinforcement of banks via rocks, artificial or natural, provides stability.

Determine left or right bank by facing downstream. Score left and right banks separately.

A. Left Bank or Right Bank

1. Bank stable; erosion absent or minimal. Side slopes are generally less than 30% and are stable. Bank may be reinforced by rock thus increasing slope >30% while providing stability.

    a. No evidence of erosion or bank failure 10
    b. Less than 5% bank affected by erosion 9

2. Moderately stable bank; small areas of erosion or bank slumping visible. Most areas are stable with only slight potential for erosion at flood stages. Side slopes up to 40% on one bank. Bank may be reinforced by rock thus increasing slope > 40% while providing stability.

    a 5% bank has erosional areas 8
    b. 15% bank has erosional areas 7
    c. 30% bank has erosional areas 6

3. Moderately unstable bank; frequency and size of raw areas are such that high water events have eroded some areas of the bank. Medium size areas of erosion or bank slumping visible. Side slopes up to 60% on some of the bank. High erosion potential during floods.

    a. 40% - 50% bank has erosional areas 5
    b. 50% - 60% bank has erosional areas 4
    c. 60% - 70% bank has erosional areas 3

4. Unstable bank; mass erosion and bank failure is evident; erosion and pronounced undercutting present at bends and along some straight channel areas. Side slopes > 60% are common. Many raw areas present and 60-100% bank has erosional scars.

    a 70%- 80% bank has erosional areas 2
    b. 80%-90% bank has erosional areas 1
    c. > 90% streambank has eroded 0

X. Vegetation Buffer Zone Width

Measures the width and conditions of the vegetation or land use from the edge of the upper streambank out through, and in some cases, beyond the flood plain and riparian zone. The vegetative zone serves as a buffer to pollutants entering a stream from runoff, and minimizes erosion. Far less useful buffer zones occur when roads, parking lots, fields, heavily used paths, lawns, bare soil, rocks, or buildings are near the bank.

Determine left or right bank by facing downstream. Score left and right banks separately.

When evaluating this parameter, walk around in the buffer area paying close attention to the amount of natural vegetation present and how deep it extends from the bank, and disturbances that may effect the transport of pollutants through the zone. Vegetated buffer zone assessment involves documenting three condition factors: 1) Vegetation Cover Type, 2) Breaks, and 3) Vegetated Zone Width. A break in the buffer zone is an area, which allows sediment or other pollutants to enter directly into the stream. Breaks refer only to the near stream portion of the buffer zone and may or may not extend into the entire buffer zone. Breaks include storm drains, culverts etc. If breaks occur, subtract 1 if moderated and 2 if substantial.

Identify Left and Right Bank Cover Conditions (circle appropriate value)

1 Width of forested vegetated buffer zone >18 meters wide and no man-made activities. Forest – generally a later successional stage or climax community with a diversity of growth forms including ground cover, vines, and shrubs. 10

a. Man-made activities include paths, utility lines (pipes, power etc) and other minor disturbances parallel to the creek. 9

2 Width of forested vegetated buffer zone 12 - 18 meters wide. Impacts beyond 18 meters are <50% impervious and predominantly:

a. Shrub: An earlier successional growth stage on disturbed land, mostly consisting of shrubs and a few trees. 8
b. Old Field: Any stage of old field succession with herbaceous or shrub species (few if any trees). 7
c. Planted lawn grass: Includes yards and other landscaped surfaces consisting of mostly lawn grass vegetation such as parks and cemeteries. 6
d. Pasture/Agricultural: Active pasture consisting of planted grasses and forbs and land for row crops. 5
e. Forested vegetated buffer zone 12 - 18 meters & impacts beyond 18 meters are >50% Impervious: 4

3 Width of forested vegetated buffer zone 6 - 12 meters wide. Impacts beyond 12 meters are < 25% impervious and predominantly:

a. Shrub: An earlier successional growth stage on disturbed land, mostly consisting of shrubs & a few trees. 7
b. Old Field: Any stage of old field succession with herbaceous or shrub species (few if any trees). 6
c. Planted lawn grass: Includes yards and other landscaped surfaces consisting of mostly lawn grass vegetation such as parks and cemeteries. 5
d. Pasture/Agricultural: Active pasture consisting of planted grasses and forbs and land for row crops. 4
e. Forested vegetated buffer zone 6 - 12 meters & impacts beyond 12 meters are >25% Impervious: 3

4 Width of forested vegetated buffer zone 1 - 6 meters wide. Impacts beyond 6 meters are <20% impervious and predominantly:

a. Shrub: An earlier successional growth stage on disturbed land, mostly consisting of shrubs & a few trees. 5
b. Old Field: Any stage of old field succession with herbaceous or shrub species (few if any trees). 4
c. Planted lawn grass: Includes yards and other landscaped surfaces consisting of mostly lawn grass vegetation such as parks and cemeteries. 3
d. Pasture/Agricultural: Active pasture consisting of planted grasses and forbs and land for row crops. 2
e. Forested vegetated buffer zone 1-6 meters & impacts beyond 6 meters are >20% Impervious: 1

5 No forested vegetate buffer zone

a. Shrub: An earlier successional growth stage on disturbed land, mostly consisting of shrubs and a few trees. 4
b. Old Field: Any stage of old field succession with herbaceous or shrub species (few if any trees). 3
c. Planted lawn grass: Includes yards and other landscaped surfaces consisting of mostly lawn grass vegetation such as parks and cemeteries. 2
d. Pasture/Agricultural: Active pasture consisting of planted grasses and forbs and land for row crops. 1
e. >75% Impervious along creek: Includes parking lots, road, structures etc. 0

Habitat Assessment - Glide/Pool Prevalent Streams

I. Bottom Substrate / Available Cover

Measures substrates that are available as refuge for aquatic organisms. A wide variety and/or abundance of submerged structures in the stream provides macroinvertebrates with a large number of niches, thus increasing the potential diversity. As the variety and abundance of cover decreases, habitat structure becomes monotonous, diversity decreases, and the potential for recovery following disturbance decreases.

Circle habitat types which occur at this site: fallen trees/large woody debris, deep pools, shallow pools, overhanging shrubbery in water, large rocks, undercut banks, thick root mats, dense macrophyte beds, or deep riffles with lots of turbulence (habitat type found in cold-water, mountain streams)

A. Habitat(s) expected for stream type make up >70% of reach

1.	7 habitats common	20
2.	6 habitat types common, additional habitat types rare	19
3.	5 habitat types common, additional habitat types rare	18
4.	4 habitat types common, additional habitat types rare	17
5.	Less than 4 habitat types present	16

B. Habitat(s) expected for stream type make up >50% of reach

1.	7 habitats common	15
2.	6 habitat types common, additional habitat types rare	14
3.	5 habitat types common, additional habitat types rare	13
4.	4 habitat types common, additional habitat types rare	12
5.	Less than 4 habitat types present	11

C. Habitat(s) expected for stream type make up <50% of reach

a. 7-3 habitats common

1.	7 habitats common	10
2.	6 habitat types common, additional habitat types rare	9
3.	5 habitat types common, additional habitat types rare	8
4.	4 habitat types common, additional habitat types rare	7
5.	3 habitat types common, additional habitat types rare	6

b. 2-0 habitats common

1.	2 habitat types present, additional habitat types rare	5
2.	2 habitat types only and common	4
3.	1 habitat type common, additional habitat types rare	3
4.	1 habitat type only and common	2
5.	1 habitat type rare	1
6.	0 habitat types present	0

II. Pool Substrate Characterization

Evaluates the type and condition of bottom substrates found in pools. Firmer sediments and rooted aquatic plants support a wider variety of organisms than a pool substrate dominated by mud or bedrock and no plants.

A. Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. Substrate consists of:

1.	Gravel, firm sand, root mats, and submerged vegetation	20
2.	Gravel, root mats, and submerged vegetation	19
3.	Gravel, root mats or submerged vegetation	18
4.	Firm sand, root mats, and submerged vegetation	17
5.	Firm sand, root mats or submerged vegetation	16

B. Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. Substrate consists of:

1.	Firm and soft sand, root mats, and submerged vegetation	15
2.	Firm and soft sand, root mats or submerged vegetation	l4
3.	Soft sand, mud, clay, root mats and/or submerged vegetation common	13
4.	Soft sand, mud, clay, root mats and/or submerged vegetation sparse	12
5.	Soft sand/mud, soft sand/clay, or clay/mud with sparse root mats and/or submerged vegetation	11

C. All mud or clay or sand bottom; little or no root mat; no submerged vegetation. Substrate consists of:

1.	All sand bottom with few root mats	10
2.	All mud bottom with few root mats	9
3.	All clay bottom with few root mats	8
4.	All sand bottom with no root material	7
5.	All mud or clay bottom with no root material	6

D. Hard pan clay or bedrock; with/no root mats or vegetation. Substrate consists of:

1.	All hard pan clay with sparse root mats or vegetation	4
2.	All bedrock with sparse root mats or vegetation	3
3.	All hard pan clay with no root mats or vegetation	1
4.	All bedrock with no root mats or vegetation	0

III. Pool Variability

Rates overall mixture of pool types according to size and depth thus accommodating a diverse aquatic community consisting of a variety of species and age classes. In rivers with low sinuosity (few bends) and monotonous pool characteristics, very little instream habitat variety exists to support a diverse community. The four basic types of pools are large-shallow, large-deep, small-shallow, and small-deep.

Any pool dimension (e.g., length, width) greater than half the cross-section of the stream is a large pool. Small pools have length and width dimensions less than half the width of the stream. Pools with depths greater than l.0 m are deep. Shallow pools are less than l.0 m deep.

"Reaeration" is defined as the oxygen transfer from the atmosphere to the stream. Reaeration points are any areas where the stream surface is disturbed (e.g., dams, water falling over snags or logs or other debris, riffles),

A. All pool sizes (area and depth) present and mixed.

1. All sizes evenly mixed and below areas of reaeration 20
2. All sizes evenly mixed but can be found below and above reaeration areas l8
3. All sizes evenly mixed not below areas of reaeration l6

B. Majority of pools are large-deep; very few shallow.

1. Large and small deep pools evenly mixed and all below areas of reaeration 15
2. Majority of pools are large-deep and below areas of reaeration 14
3. Large and small deep pools evenly mixed and above and below areas of reaeration 13
4. Majority of pools are large-deep and found above and below areas of reaeration 12
5. Majority of pools are large-deep and not below areas of reaeration 11

C. Shallow pools are much more prevalent than deep pools.

1. Large and small shallow pools evenly mixed and all below areas of reaeration 10
2. Majority of pools are large-shallow and below areas of reaeration 9
3. Large and small shallow pools evenly mixed and above and below areas of reaeration 8
4. Majority of pools are large-shallow and found above and below areas of reaeration 7
5. Majority of pools are large-shallow and not below areas of reaeration 6

D. Majority of pools small-shallow or pools absent

l. Majority of pools are small-shallow and all below areas of reaeration 5
2. Majority of pools are small-shallow and above and below reaeration areas 3
3. Majority of pools are small-shallow and all above areas of reaeration 2
4. Pools absent 0

IV. Channel/Bank Alteration

Measurement of large-scale alteration of instream habitat, which affects stream biotic integrity and causes scouring. Channel alteration is present (circle or identify conditions) when: artificial embankments, rip rap, and other forms of artificial bank stabilization or structures are present; when dredging has altered bank stability ; when dams and bridges are present; when banks and channels have been disturbed by livestock, other agricultural practices; or hydrology; and when other changes have occurred (list).

A. Stream follows a normal and natural meandering pattern. Alteration is absent.

1. No evidence of disturbance with bends and riffle/runs frequent; bend angles average > 60° 20
2. No evidence of disturbance with bends combination of riffle/runs and gild/pool habitats frequent; bend angles average between 60°- 40° 18
3. No evidence of disturbance with bends and glide pools prevalent; bend angles average < 40° 16

B. Some dredging, artificial embankments, or dams present but NO evidence of recent alteration activities;, but mostly recovered.

1. Bridge abutment present but disturbance is more than 20 years old; no other channel disturbance present 15
2. 10% of reach or less has channel disturbance other than bridge 14
3. 20% of reach has channel disturbance other than bridge 13
4. 30% of reach has channel disturbance other than bridge 12
5. 40% of reach has channel disturbance other than bridge more than 20 years old 11

C. Somewhat channelized; 40-80% of the area has been straightened, dredged, or otherwise altered.

1. 40% of reach has channel disturbance other than bridge 10
2. 50% of reach has channel disturbance other than bridge 9
3. 60% of reach has channel disturbance other than bridge 8
4. 70% of reach has channel disturbance other than bridge 7
5. 80% of reach has channel disturbance other than bridge 6

D. More than 80% of the stream site has been dredged, or otherwise altered; banks most likely box-cut or rip-rap or no longer have native vegetation; instream habitat highly altered.

1. 90% of reach has channel disturbance 5
2. Channel reach 100% disturbed; with no artificial embankments 3
3. Channel reach 100% disturbed; with artificial embankments 2
4 Channel reach 100% disturbed; with natural and manmade artificial embankments 1
5. Channel 100% shored by gabion and/or cement 0

V. Sediment Deposition

Relates to the amount of sediment that has accumulated and the changes that have occurred to the stream bottom as a result of deposition. Sediment deposition may cause the formation of islands, point bars (areas of increased deposition usually at the beginning of a meander that increase in size as the channel is diverted toward the outer bank) or shoals, or result in the filling of pools. Depositional material comes from the watershed and bank erosion (Barbour and Stribling 1995). The growth, or appearance of bars/islands where they did not previously exist is an indication of upstream erosion. Sediment bars/islands tend to grow in depth and length with continued watershed disturbance because increased sedimentation results in increased deposition. High levels of sediment deposition create an unstable and continually changing environment that becomes unsuitable for many organisms (FL DEP 1996).

A. No enlargements of islands/point bars present or less than 20% bottom affected by sand or silt accumulation.

1. No sediment deposition detected; especially in pools 20
2. Less than 20% sediment deposition with accumulation in pools only 18
3. Less than 20% sediment deposition with accumulation in runs and pools 17
4. Less than 20% sediment deposition with few, old, small point

B. 5-50% bottom affected by sand or silt accumulation; slight deposition in pools; some new increase in bar and island formation.

1. 20-30% sediment deposition with gravel and/or sand 15
2. 20-30% sediment deposition with sand and/or silt 14
3. 40-50% sediment deposition with gravel and/or sand 12
4. 40-50% sediment deposition with sand and/or silt 11

C. 50-80% bottom affected with moderate deposition in pools. Number of shallow pools increases. Habitats smothered by sand, silt, and possibly coarse gravel. Deposits of fresh, fine, gravel, sand, and silt observed on old and new point bars, islands, and behind obstructions. Formation of few new bars/islands is evident and old bars are deep and wide; deposition at bends obvious.

1. 60-70% sediment deposition with gravel and/or sand l0
2. 60-70% sediment deposition with sand and/or silt 9
3. 70-80% sediment deposition with gravel and/or sand 7
5. 70-80% sediment deposition with sand and/or silt 6

D. More than 80% bottom affected with heavy deposition from coarse and fine gravel and sand at stream bends, constrictions, and /or pools. Extensive deposits of fine sand and/or silt on old and new bars, islands, and along banks in straight channels. Few pools are present due to siltation. Only larger rocks in riffle areas remain exposed.

1. 80-90% sediment deposition; pools almost absent due to substantial deposition; bottom silt may move with almost any flow above normal 3
2. 90-100% sediment deposition; pools almost absent 1
3. 100% sediment deposition; pools absent due to substantial deposition; bottom silt moves with almost any flow above normal 0

VI. Channel Sinuosity

Measure of meandering or sinuosity. A high degree of sinuosity provides for diverse habitat and fauna, and the stream is better able to handle surges when the stream fluctuates as a result of storms. The absorption of this energy by bends protects the stream from excessive erosion and flooding.

Divide the distance between bends by the average width of the stream to estimate the run-to-bend ratio. In general, low sinuosity suggests steeper channel gradient, fairly uniform cross section shapes, limited bank cutting, and limited pools. High sinuosity is associated with lower gradients, asymmetrical cross sections, overhanging banks, and bank pools on the outside curves. Channel sinuosity should be determined over a channel reach long enough to make the value meaningful.

Use a distance of 20 times the bankfull width to determine sinuosity.

Sinuosity can best be measured using aerial photography.

A. Occurrence of bends relatively frequent.

1. Run-to-bend ratio = 1-2	20
2. Run-to-bend ratio = 3-4	19
3. Run-to-bend ratio = 5	18
4. Run-to-bend ratio = 6	17
S. Run-to-bend ratio = 7	16

B. Occurrence of bends moderately frequent.

1. Run-to-bend ratio = 8	15
2. Run-to-bend ratio = 10	14
3. Run-to-bend ratio = 11	13
4. Run-to-bend ratio = 13	12
5. Run-to-bend ratio = 15	11

C. Infrequent bends; variable bottom contours may provide some habitat.

1. Run-to-bend ratio = 16	10
2. Run-to-bend ratio = 18	9
3. Run-to-bend ratio = 20	8
4. Run-to-bend ratio = 22	7
5. Run-to-bend ratio = 24	6

D. Essentially a straight and uniform depth stream.

1. Run-to-bend ratio = 25	4
2. Run-to-bend ratio = 30	2
3. Run-to-bend ratio > 30	0

VII. Channel Flow Status

Is the degree to which the channel is filled with water during normal flow periods. The flow status will change as the channel enlarges or as flow decreases as a result of dams and other obstructions, diversions for irrigation, drought, or aggrading stream bottoms with actively widening channels. This is a seasonal parameter. A decrease in water will wet smaller portions of the streambed, thus decreasing available habitat for aquatic organisms. Use the vegetation line on the lower bank as your reference point to estimate channel flow status.

Stretch a tape very tight across the channel. Level and secure tape at the base of both lower banks. This channel cross-section may help the investigator(s) estimate what percentage of the available channel is full.

A. Water reaches the base of both lower banks and minimal amount of channel substrate is exposed (100% channel full) 20
   1. > 95% channel is full 18
   2. 90-95% channel is full 16

B. Water fills > 75% of the available channel (or <25% of channel substrate is exposed)

   1. 90% of channel is full 15
   2. 85% of channel is full 13
   3. 80% of channel is full 11

C. Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed

   1. 75% of channel is full 10
   2. 60-65% of channel is full 9
   3. 50% of channel is full 8
   4. 35-40% of channel is full 7
   5. 25% of channel is full 6

D. Very little water in the channel and mostly present as standing pools

   1. 20% of channel is full 5
   2. 10% of channel is full 4
   3. < 10% of channel is full 3
   4. Water present as isolated standing pools 1
   5. Channel is dry 0

VIII. Bank Vegetative Protection

Measures the amount of the stream bank that is covered by vegetation. This parameter supplies information on the ability of the bank to resist erosion as well as some additional information on the uptake of nutrients by the plants, the control of instream scouring, and stream shading. Banks that have full, natural plant growth are better for fish and macroinvertebrates than those without vegetation protection and those shored up with concrete or riprap.

Four factors to consider when scoring bank vegetative protection: (1) Is the vegetation native or natural or planted and introduced ?; (2) Is the upper story, under story, and ground cover vegetation well balanced?; (3) What is the standing crop biomass?; and (4) During which season are you conducting this assessment?

Determine left or right bank by facing downstream. Score left and right banks separately.

A. Left Bank or Right Bank

1. More than 90% streambank surfaces is covered by native/natural vegetation. A variety of vegetation present (e.g., trees, shrubs, understory, or nonwoody macrophytes). Any bare or sparsely vegetated areas are small and evenly dispersed.

    a. 100% plant cover on streambank 10
    b. > 90% plant cover on streambank 9

2. A variety of vegetation is present and covers 70-90% of streambank surface, but one class of plants is not well represented. Some open areas with unstable vegetation are present. Disruption evident but not affecting full plant growth potential.

    a. 90% plant cover but one class of plants is not well represented 8
    b. 80% plant cover with a few barren or thin areas present 7
    c. 70% plant cover with a few barren or thin areas present with fewer plant species 6

3. 50-70% of streambank surface covered by vegetation; typically composed of scattered shrubs, grasses, and forbs. Thin or bare spots visible and/or closely cropped vegetation with less that ½ plant stubble height remaining.

    a. 70% vegetation cover; typically of shrubs, grasses, and 5
    b. 60% vegetation cover; typically of shrubs, grasses, and forbs 4
    c. 50% vegetation cover; typically of shrubs, grasses, and forbs 3

4. Less than 50% streambank surface covered by vegetation; 2 inches or less in average stubble height remaining. Any shrubs or trees on bank exist as individuals or widely scattered clumps.

    a. 40% vegetation cover with many bare spots/rock 2
    b. 20% vegetation cover with m. any bare spots/rock 1
    c. No vegetation cover on streambank 0

IX. Bank Stability

Measures the existence of, or the potential for detachment of soil from the upper and lower stream banks and its movement into the stream. Steep banks are more likely to collapse and suffer from erosion than are gently sloping banks and are therefore considered to be unstable. Signs of erosion include crumbling, unvegetated banks, exposed tree roots, and exposed soil. Reinforcement of banks via rocks, artificial or natural, provides stability.

Determine left or right bank by facing downstream. Score left and right banks separately.

A. Left Bank or Right Bank

1. Bank stable; erosion absent or minimal. Side slopes are generally less than 30% and are stable. Bank may be reinforced by rock thus increasing slope >30% while providing stability.

    a. No evidence of erosion or bank failure 10
    b. Less than 5% bank affected by erosion 9

2. Moderately stable bank; small areas of erosion or bank slumping visible. Most areas are stable with only slight potential for erosion at flood stages. Side slopes up to 40% on one bank. Bank may be reinforced by rock thus increasing slope > 40% while providing stability.

    a. 5% bank has erosional areas 8
    b. 15% bank has erosional areas 7
    c. 30% bank has erosional areas 6

3. Moderately unstable bank; frequency and size of raw areas are such that high water events have eroded some areas of the bank. Medium size areas of erosion or bank slumping visible. Side slopes up to 60% on some of the bank. High erosion potential during floods.

    a. 40% - 50% bank has erosional areas 5
    b. 50% - 60% bank has erosional areas 4
    c. 60% - 70% bank has erosional areas 3

4. Unstable bank; mass erosion and bank failure is evident; erosion and pronounced undercutting present at bends and along some straight channel areas. Side slopes > 60% are common. Many raw areas present and 60-100% bank has erosional scars.

    a. 70% - 80% bank has erosional areas. 2
    b. 80% - 90% bank has erosional areas 1
    c. > 90% streambank has eroded 0

X. Vegetation Buffer Zone Width

Measures the width and conditions of the vegetation or land use from the edge of the upper streambank out through, and in some cases, beyond the flood plain and riparian zone. The vegetative zone serves as a buffer to pollutants entering a stream from runoff, and minimizes erosion. Far less useful buffer zones occur when roads, parking lots, fields, heavily used paths, lawns, bare soil, rocks, or buildings are near the bank.

Determine left or right bank by facing downstream. Score left and right banks separately.

When evaluating this parameter, walk around in the buffer area paying close attention to the amount of natural vegetation present and how deep it extends from the bank, and disturbances that may effect the transport of pollutants through the zone. Vegetated buffer zone assessment involves documenting three condition factors: 1) Vegetation Cover Type, 2) Breaks, and 3) Vegetated Zone Width. A break in the buffer zone is an area, which allows sediment or other pollutants to enter directly into the stream. Breaks refer only to the near stream portion of the buffer zone and may or may not extend into the entire buffer zone. Breaks include storm drains, culverts etc. If breaks occur, subtract 1 if moderated and 2 if substantial.

Identify Left and Right Bank Cover Conditions (circle appropriate value)

1 Width of forested vegetated buffer zone >18 meters wide and no man-made activities. Forest – generally a later successional stage or climax community with a diversity of growth forms including ground cover, vines, and shrubs. 10

a. Man-made activities include paths, utility lines (pipes, power etc) and other minor disturbances parallel to the creek. 9

2 Width of forested vegetated buffer zone 12 - 18 meters wide. Impacts beyond 18 meters are <50% impervious and predominantly:

a. Shrub: An earlier successional growth stage on disturbed land, mostly consisting of shrubs and a few trees. 8
b. Old Field: Any stage of old field succession with herbaceous or shrub species (few if any trees). 7
c. Planted lawn grass: Includes yards and other landscaped surfaces consisting of mostly lawn grass vegetation such as parks and cemeteries. 6
d. Pasture/Agricultural: Active pasture consisting of planted grasses and forbs and land for row crops. 5
e. Forested vegetated buffer zone 12 - 18 meters & impacts beyond 18 meters are >50% Impervious: 4

3 Width of forested vegetated buffer zone 6 - 12 meters wide. Impacts beyond 12 meters are < 25% impervious and predominantly:

a. Shrub: An earlier successional growth stage on disturbed land, mostly consisting of shrubs & a few trees. 7
b. Old Field: Any stage of old field succession with herbaceous or shrub species (few if any trees). 6
c. Planted lawn grass: Includes yards and other landscaped surfaces consisting of mostly lawn grass vegetation such as parks and cemeteries. 5
d. Pasture/Agricultural: Active pasture consisting of planted grasses and forbs and land for row crops. 4
e. Forested vegetated buffer zone 6 - 12 meters & impacts beyond 12 meters are >25% Impervious: 3

4 Width of forested vegetated buffer zone 1 - 6 meters wide. Impacts beyond 6 meters are <20% impervious and predominantly:

a. Shrub: An earlier successional growth stage on disturbed land, mostly consisting of shrubs & a few trees. 5
b. Old Field: Any stage of old field succession with herbaceous or shrub species (few if any trees). 4
c. Planted lawn grass: Includes yards and other landscaped surfaces consisting of mostly lawn grass vegetation such as parks and cemeteries. 3
d. Pasture/Agricultural: Active pasture consisting of planted grasses and forbs and land for row crops. 2
e. Forested vegetated buffer zone 1-6 meters & impacts beyond 6 meters are >20% Impervious: 1

5 No forested vegetate buffer zone

a. Shrub: An earlier successional growth stage on disturbed land, mostly consisting of shrubs and a few trees. 4
b. Old Field: Any stage of old field succession with herbaceous or shrub species (few if any trees). 3
c. Planted lawn grass: Includes yards and other landscaped surfaces consisting of mostly lawn grass vegetation such as parks and cemeteries. 2
d. Pasture/Agricultural: Active pasture consisting of planted grasses and forbs and land for row crops. 1
e. >75% Impervious along creek: Includes parking lots, road, structures etc. 0

Crooked Creek Habitat Assessment Worksheet

Riffle/Run Prevalent Stream [High Gradient]

Stream_____ Date_____

Reach ID_____

Watershed_____

Assessor:_____ Assessor:_____ Assessor:_____

Habitat Parameter	Score	Habitat Parameter	Score	Habitat Parameter	Score	AVG.
1. Instream Cover (fish)		1. Instream Cover (fish)		1. Instream Cover (fish)		
2. Epifaunal Substrate (benthic)		2. Epifaunal Substrate (benthic)		2. Epifaunal Substrate (benthic)		
3. Embeddedness		3. Embeddedness		3. Embeddedness		
4. Channel Alteration		4. Channel Alteration		4. Channel Alteration		
5. Sediment Deposition		5. Sediment Deposition		5. Sediment Deposition		
6. Frequency of Riffles		6. Frequency of Riffles		6. Frequency of Riffles		
7. Channel Flow Status		7. Channel Flow Status		7. Channel Flow Status		
8. Bank Vegetative Protection LB		8. Bank Vegetative Protection LB		8. Bank Vegetative Protection LB		
RB		RB		RB		
9. Bank Stability LB		9. Bank Stability LB		9. Bank Stability LB		
RB		RB		RB		
10. Vegetated Buffer Zone Width LB		10. Vegetated Buffer Zone Width LB		10. Vegetated Buffer Zone With LB		
RB		RB		RB		
Total Score:		Total Score:		Total Score:		

Crooked Creek Habitat Assessment Worksheet

Glide/Pool Prevalent Stream [Low Gradient]

Stream_____ Date_____

Reach ID_____

Watershed_____

Assessor:_____ Assessor:_____ Assessor:_____

Habitat Parameter	Score	Habitat Parameter	Score	Habitat Parameter	Score	AVG.
1. Bottom Substrate/Available Cover		1. Bottom Substrate/Available Cover		1. Bottom Substrate/Available Cover		
2. Pool Substrate Characterization		2. Pool Substrate Characterization		2. Pool Substrate Characterization		
3. Pool Variability		3. Pool Variability		3. Pool Variability		
4. Channel Alteration		4. Channel Alteration		4. Channel Alteration		
5. Sediment Deposition		5. Sediment Deposition		5. Sediment Deposition		
6. Channel Sinuosity		6. Channel Sinuosity		6. Channel Sinuosity		
7. Channel Flow Status		7. Channel Flow Status		7. Channel Flow Status		
8. Bank Vegetative Protection LB		8. Bank Vegetative Protection LB		8. Bank Vegetative Protection LB		
RB		RB		RB		
9. Bank Stability LB		9. Bank Stability LB		9. Bank Stability LB		
RB		RB		RB		
10. Vegetated Buffer Zone Width LB		10. Vegetated Buffer Zone Width LB		10 Vegetated Buffer Zone Width LB		
RB		RB		RB		
Total Score:		Total Score:		Total Score:		

Appendix D—Results of Stream Inventory and Condition Factors

TABLE D-1
Bank Erosion Inventory for Crooked Creek

Location	Left Bank	Right Bank	Height of Eroded Area (ft)	Length of Eroded Area (ft)	Impact Score
CC-01.E01		X	4	35	4
CC-01.E02	X		8	40	8
CC-01.E03	X		8	50	8
CC-01.E04		x	6	100	6
CC-01.E05	X		8	40	4
CC-01.E06	X		10	75	5
CC-01.E07		x	8	40	4
CC-02.E01		x	8	40	4
CC-02.E02	X		8	85	5
CC-02.E03		x	8	25	4
CC-02.E04	X		8	45	4
CC-02.E05	X		15	20	7
CC-02.E06		x	10	45	4
CC-03.E01		x	5	30	4
CC-03.E02		x	6	120	6
CC-03.E03		x	15	100	9
CC-03.E04	X		20	45	8
CC-03.E05		x	15	55	9
CC-03.E06	X		8	95	9
CC-03.E07	X		15	700	9
CC-03.E08		x	15	700	10
CC-03.E09		x	10	200	10
CC-03.E10	X		10	150	10
CC-04.E01		x	6	65	5
CC-04.E02	X		6	45	4
CC-04.E03		x	7	600	10
CC-04.E04	X		7	600	10

TABLE D-1
Bank Erosion Inventory for Crooked Creek

Location	Left Bank	Right Bank	Height of Eroded Area (ft)	Length of Eroded Area (ft)	Impact Score
CC-04.E05		x	6	75	5
CC-05.E01	X		10	800	10
CC-05.E02		x	10	800	10
CC-05.E03	X		15	450	10
CC-05.E04		x	15	450	10
TR1-01.E01		x	5	30	4
TR1-01.E02	X		5	25	4
TR1-01.E03		x	6	25	4
TR1-01.E04	X		6	25	4
TR1-01.E05		x	7	25	4
TR1-01.E06		x	7	30	8
TR1-01.E07	X		7	30	8
TR1-01.E08		x	8	120	10
TR1-01.E09	X		10	110	10
TR1-01.E10	X		12	35	8
TR1-02.E01		x	4	60	5
TR2.1.1-02.E01		x	9	15	4
TR2.1.1-02.E02		x	20	110	10
TR2.1.1-02.E03	X		20	110	10
TR2.1.1-02.E04	X	x	6	50	5
TR2.1.3-01.E01		x	6	60	5
TR2.1.3-01.E02	X		15	250	10
TR2.1.3-01.E03		x	15	250	10
TR2.1-02.E01		x	6	20	7
TR2.1-02.E01		x	7	65	5

TABLE D-1
Bank Erosion Inventory for Crooked Creek

Location	Left Bank	Right Bank	Height of Eroded Area (ft)	Length of Eroded Area (ft)	Impact Score
TR2.1-02.E02		x	6	55	5
TR2.1-03.E01	X		5	75	5
TR2.1-03.E02	X		8	30	8
TR2.1-03.E03	X		5	25	4
TR2.1-03.E04		x	6	55	9
TR2.2.1-01.E01	X		10	15	7
TR2.3-01.E01		x	8	45	7
TR2-00.E01	X		6	75	5
TR2-00.E02		x	6	60	5
TR2-00.E03	X		7	60	5
TR2-00.E04	X		6	40	4
TR2-00.E05	X		7	25	4
TR2-02.E01	X		5	30	4
TR2-02.E02	X		10	80	9
TR3.1.1-01.E01	X		2	25	4
TR3.1-01.E01		x	4	50	5
TR3.1-01.E02		x	4	40	4
TR3.1-01.E03		x	5	35	4
TR3.1-01.E04		x	5	130	6
TR3.1-01.E05	X		5	100	6
TR3.1-01.E06		x	8	20	4
TR3.1-01.E07		x	13	45	8
TR3.1-01.E08	X		13	45	8
TR3.2-01.E01	X		4	30	4

TABLE D-1
Bank Erosion Inventory for Crooked Creek

Location	Left Bank	Right Bank	Height of Eroded Area (ft)	Length of Eroded Area (ft)	Impact Score
TR3.2-01.E02		x	4	25	4
TR3.2-01.E03	X		4	200	10
TR3.2-01.E04		x	4	200	10
TR3.2-01.E05		x	5	30	4
TR3.2-01.E06	X		6	25	4
TR3.2-01.E07	X		6	25	4
TR3.2-01.E08		x	6	30	4
TR3.2-01.E09	X		6	60	5
TR3.2-01.E10		x	8	180	10
TR3.2-01.E11	X		8	250	10
TR3.2-01.E12		x	10	50	8
TR3.2-01.E13	X		8	30	7
TR3.2-01.E14		x	8	30	7
TR3.2-01.E15		x	15	40	8
TR3.2-01.E16		x	10	75	9
TR3.2-01.E17	X		8	75	9
TR3.2-01.E18		x	5	25	4
TR3-01.E01		x	6	90	5
TR3-01.E02	X		6	55	5
TR3-01.E03		x	10	40	4
Tr3-01.E04	X		7	30	4
TR3-01.E06			6	30	4
TR3-01.E07		x	6	60	5
TR3-01.E08	X		6	55	5
TR3-01.E09	X		10	25	8
TR3-01.Eo5	X		7	50	5
TR3-02.E01		x	6	75	5
TR3-02.E02	X		5	80	5
TR3-02.E03		x	8	180	8
TR3-02.E04	X		6	180	10

TABLE D-1
Bank Erosion Inventory for Crooked Creek

Location	Left Bank	Right Bank	Height of Eroded Area (ft)	Length of Eroded Area (ft)	Impact Score
TR4-01.E01	X		6	50	5
TR4-01.E02	X		6	30	4
TR4-02.E01	X		4	9	7
TR4-02.E02		x	10	25	4
TR4-02.E03		x	15	20	7
TR4-02.E04		x	15	25	7
TR5-01.E01		x	3	35	7
TR5-02.E01		x	5	50	9
TR5-02.E02	X		4	75	9
TR5-02.E03		x	6	125	10
TR5-03.E01	X		4	20	7
TR5-03.E02	X		5	30	8

TABLE D-2
Obstruction Inventory for Crooked Creek

	Score for at Each Significant Observation [a]		
Reach	**O1**	**O2**	**O3**
CC-01			
CC-02	5	5	5
CC-03	5		
CC-04			
CC-05			
TR1-01			
TR1-02			
TR2.1.1-01	2		
TR2.1.1-02			
TR2.1.2-01			
TR2.1.3-01			
TR2.1-02	2		
TR2.1-03	5		
TR2.2-01			
TR2.2.1-01			
TR2.3-01			
TR2-00			
TR2-01			
TR2-02	2		
TR3.1.1-01	2		
TR3.1-01			
TR3.2-01			
TR3.3-01			
TR3-01	2	8	
TR3-02			
TR4-01			
TR4-02			
TR5-01			
TR5-02	2	2	
TR5-03			
TR6-01			
TR7-01			

[a] Blank cell indicate no problematic obstructions observed

TABLE D-3
Pipe Inventory for Crooked Creek

	Score for Each Significant Observation [a]					
Reach	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**
CC-01						
CC-02						
CC-03				7		
CC-04	8	5	6	2		
CC-05	10					
TR1-01		2	4	2	5	3
TR1-02		5		2		
TR2.1.1-01						
TR2.1.1-02						
TR2.1.2-01						
TR2.1.3-01						
TR2.1-02						
TR2.1-03						
TR2.2-01						
TR2.2.1-01						
TR2.3-01						
TR2-00	4					
TR2-01						
TR2-02		5				
TR3.1.1-01						
TR3.1-01						
TR3.2-01	5	5	10	5	2	
TR3.3-01						
TR3-01						
TR3-02						
TR4-01						
TR4-02						
TR5-01						
TR5-02						
TR5-03						
TR6-01						
TR7-01						

[a] Blank cell indicate no problematic pipes or pipe crossings observed

TABLE D-4
Utility Line Inventory for Crooked Creek

	Score for Each Significant Observation [a]								
Reach	**U1**	**U2**	**U3**	**U4**	**U5**	**U6**	**U7**	**U8**	**U9**
CC-01									
CC-02			4						
CC-03	2	20		6					
CC-04									
CC-05									
TR1-01									
TR1-02									
TR2.1.1-01	8								
TR2.1.1-02									
TR2.1.2-01									
TR2.1.3-01									
TR2.1-02									
TR2.1-03			8	8			4	4	8
TR2.2-01									
TR2.2.1-01	4								
TR2.3-01									
TR2-00									
TR2-01									
TR2-02									
TR3.1.1-01									
TR3.1-01									
TR3.2-01		3	5						
TR3.3-01									
TR3-01									
TR3-02									
TR4-01									
TR4-02									
TR5-01									
TR5-02	2								
TR5-03									
TR6-01									
TR7-01									

[a] Blank cell indicate no problematic utility lines observed

TABLE D-5
Road Crossing Inventory for Crooked Creek

	Score for Each Significant Road Crossing [a]					
Reach	**R1**	**R2**	**R3**	**R4**	**R5**	**F6**
CC-01	5					
CC-02	5	10				
CC-03	3					
CC-04						
CC-05						
TR1-01	8					
TR1-02						
TR2.1.1-01	10					
TR2.1.1-02						
TR2.1.2-01						
TR2.1.3-01	3	3	3			
TR2.1-02	10	3	8			
TR2.1-03						5
TR2.2-01						
TR2.2.1-01						
TR2.3-01						
TR2-00						
TR2-01						
TR2-02						
TR3.1.1-01						
TR3.1-01						
TR3.2-01	8					
TR3.3-01						
TR3-01	8	5				
TR3-02	3					
TR4-01						
TR4-02						
TR5-01			3	3		
TR5-02						
TR5-03						
TR6-01						
TR7-01			3	3		

[a] Blank cell indicate no problematic road crossings observed

TABLE D-6
Open Channel Inventory for Crooked Creek

	Score for Each Significant Open Channel [a]																			
	D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	**D16**	**D17**	**D18**	**D19**	**D20**
CC-01	2	3																		
CC-02			2		4															
CC-03	2			5	8	3	3													
CC-04		5	2	8	5	2														
CC-05	5	8	7																	
TR1-01	2		3	2	4		2													
TR1-02		8																		
TR2.1.1-01	4																			
TR2.1.1-02																				
TR2.1.2-01																				
TR2.1.3-01				2																
TR2.1-02									10						2		2	2	4	2
TR2.2-01																				
TR2.1-03																				
TR2.2.1-01																				
TR2.3-01																				
TR2-00	5	5																		
TR2-01																				
TR2-02		2	2	10					2	10										
TR3.1.1-01																				
TR3.1-01																				
TR3.2-01	5	2		5																
TR3.3-01																				
TR3-01										4	2	2	2	2						
TR3-02	5																			
TR4-01																				
TR4-02	2	2				5	5													
TR5-01																				
TR5-02																				
TR5-03																				
TR6-01																				

[a] Blank cell indicate no problematic open channels observed

TABLE D-7
Dump Site Inventory for Crooked Creek

Reach	D1	D2	D3	D4
CC-01				
CC-02				
CC-03				
CC-04	7			
CC-05				
TR1-01				
TR1-02				
TR2.1.1-01				
TR2.1.1-02				
TR2.1.2-01				
TR2.1.3-01				
TR2.1-02				
TR2.1-03				
TR2.2-01				
TR2.2.1-01				
TR2.3-01				
TR2-00	7			
TR2-01				
TR2-02				
TR3.1.1-01				
TR3.1-01				
TR3.2-01	1	5	5	5
TR3.3-01				
TR3-01	5			
TR3-02				
TR4-01				
TR4-02				
TR5-01				
TR5-02				
TR5-03				
TR6-01				
TR7-01				

TABLE D-8
Habitat Scores

Station	Raw Score
CC-01	80.5
CC-02	96.5
CC-03	105.5
CC-04	95
CC-05	76
TR1-01	82
TR1-02	83
TR2.1.1-01	126.5
TR2.1.1-02	133.5
TR2.1.2-01	119.5
TR2.1.3-01	108.5
TR2.1-01	89
TR2.1-03	113
TR2.2.1-01	87
TR2-00	93
TR2-01	110
TR2-02	120
TR3.1-01	88
TR3.2-01	64.5
TR3.3-01	140.5
TR3-01	89
TR3-02	101
TR4-01	94
TR4-02	104.5
TR5-01	126
TR5-02	99
TR5-03	101
TR7-01	120.5

TABLE D-9
Stream Classification of Stream Reaches in Crooked Creek Watershed

Reach	Morphological Classification
TR3.2-01	G5
CC-05	B1
CC-01	G5
TR1-01	G5
TR1-02	E6
TR2.2.1-01	G5
TR3.1-01	E5
TR3-01	G5
TR2.1-02	G5
TR2-00	G5
TR4-01	G5
CC-04	G5
CC-02	F5
TR5-02	G5
TR3-02	F5
TR5-03	G1
TR4-02	E5
CC-03	G3
TR2.1.3-01	G1
TR2-01	G5
TR2.1-03	G4
TR2.1.2-01	B5
TR2-02	E5
TR7-01	E5
TR5-01	B5
TR2.1.1-01	F5
TR2.1.1-02	G5
TR3.3-01	E3
TR2.2.1-01	E5
TR2.3-01	G5
TR3.1.1-01	E5
TR6-01	B1

Appendix E—Conceptual Design Sketches of Representative Stream Restoration Projects

Appendix F—Project Selection Criteria Worksheets

Appendix G—Development of TSS and Habitat Benefit/Cost Scores