
Appendix G

Stream Condition Data Sheets

Broad Run Rapid Stream Assessment Technique (RSAT) Score Matrix

Evaluation Category	Field Characteristics	Excellent	Good	Fair	Poor
Channel Stability	General Narrative	Vertically stable channel, no recent signs of incision	Predominately stable channel with few, limited areas of incision or deposition	20-60% of channel with signs of deposition or incision including mid-channel bars, head cuts, and/or exposed pipes	>60% of channel with signs of deposition or incision including mid-channel bars, head cuts, and/or exposed pipes
	Channel Type	U shaped (Class B) stream with cobble / boulder substrate	B Channel or C Channel in gravel, sand and fine sediment	Trapezoidal Channel (Class F)	V-shaped channel, gully formation (Class G)
	Incision / Degradation	Channel vertically stable, grade control provided by bedrock or boulders	Few, small headcuts present, down cutting limited	Several headcuts evident, down cutting prevalent but less than 2 feet	Large headcuts and severe (>2') down cutting evident
	Deposition / Aggradation	Point bars stable, pavement of gravel, pools well developed	Point bars enlarging, no mid-channel or other bars	bars and deltas common, pools full of sediment, some sediment on banks	Deep deposits of unconsolidated sand dominate channel and are common on banks
	Exposed Pipes	None	Top of pipes exposed in streambed	Pipes exposed above streambed undercutting pipes by <12 inches	Streambed >1 foot below bottom of exposed pipes
	Point range	20 18	16 14 12	10 8 6	4 2 0
	General Narrative	Nearly all banks are stable, less than 5% unstable	Most banks are stable with small areas (5-30%) showing signs of slumping or erosion	Many banks (30-60%) are unstable with slumping and erosion common	Most banks (>60%) are unstable, evidence of erosion common
	Bank Slumping	Rare and small	Infrequent or small	Common or large	Abundant and large
	Bank Height above channel	< 2 feet (3 feet for larger streams)	2-3 feet (3-4 feet for larger streams)	3-4 feet above (5-7 feet for larger streams)	>4 feet above (7+ feet for larger streams)
	Bank angle	<45%, point bar and outside bends stable	45-60%, outside bend steep	60-90%, near vertical on both banks	Unstable undercuts common (>90% slope)
Bank Stability	Bank Material	Bedrock, boulder, (non-erodible)	Cobble, gravel, and /or clay; slightly erodible material	Sand and silt, some clay and gravel, erodible layers	Silt and sand, or otherwise highly erodible
	Tree Falls (don't include if not forested)	0-1 per 1,000, usually small and partially healed	2-3 recent, tree falls per 1,000	4-5 recent large tree falls per 1,000	>6 recent, large tree falls per 1,000
	Vegetation	90% covered with dense vegetation or root mass	70-90% covered with vegetation and/or roots	50-70 % covered; most outside bends eroding	<50% covered; bare soil predominant
	Point range	10 9	8 7 6	5 4 3	2 1 0
	General Narrative	Wide, forested buffer providing optimal shading of stream	Moderately to wide buffer with woody vegetation, providing stream shading.	Moderate width buffer lacking woody vegetation, which provides some shade	Narrow buffer lacking vegetation, which is heavily distributed and provides no shade
	Average width of vegetative buffer	>50+ feet	25-50 feet	10-25 feet	<10 feet
	Dominant Buffer Type	Mature Trees	Shrubs / Saplings	Non-woody vegetation	Lawn or no vegetation
	Shading	>60%	30-60%	10-30%	<10
	Point range	10 9	8 7 6	5 4 3	2 1 0
	Riparian Habitat	Condition of buffer			

Broad Run Rapid Stream Assessment Technique (RSAT) Score Matrix

Evaluation Category	Field Characteristics	Excellent	Good	Fair	Poor	
Water Quality Long-term level of pollutants as reflect by benthos and other readily observable signs	General Narrative	Diverse community of pollution intolerant taxa with minimal evidence of pollution	Moderately diverse community with some evidence of pollution	Poor diversity, dominated by pollution tolerant taxa with evidence of pollution common	Severely degraded benthic community with abundant evidence of pollution	
	Benthic Community Composition (dominate taxa)	Pollution sensitive taxa Dominated by stoneflies, mayflies, cased caddisflies, dobsonfly, water penny, riffle beetle, right handed snails	Somewhat pollution sensitive Dragonfly, damselfly, cranefly, alderfly, beetle larvae, hydroscidae caddisfly, scud, clams	Pollution Tolerant Taxa Midges, blackfly, left handed snails, leeches, aquatic worms	Very Pollution Tolerant Taxa Midges, Leeches and aquatic worms or none	
	Diversity of pollution sensitive taxa	4+ taxa	2-3 taxa	1 taxa	None	
	Proportion of Pollution Sensitive Individuals	>32% pollution sensitive individuals	16-32 % Pollution sensitive Individuals	<16% pollution sensitive individuals	Few or No pollution sensitive individuals	
	Litter / Floatables	No litter in channel, minimal along banks	Some litter along banks and in channel	Litter common along bank and in channel	Active dumping in channel and along banks	
	Substrate Fouling	<20% fouling, primarily algae	20-50% of substrate covered primarily with algae	50-75% of substrate; includes sewage fungi, acid drainage	75%+ of substrate covered with algae, or any amount of sewage fungi, oil, pollutants	
	Odors (sewage, oil, etc.)	None	Slight odor	Moderate odor	Strong odor	
	Point range	10	8	5	2	0
	General Narrative	Diverse habitat consisting of deep and shallow pools, with riffles with clean substrate	Most of aquatic habitat only slightly degraded, typically with increased sediment	Aquatic habitat limited to small riffles and pools	Much of the habitat has been eliminated by pass modifications, remaining habitat degraded	
	Channel Modification (Riprap, concrete or channelized)	Less than 5% of channel modified	Limited areas (5-20%) of channel modified	20-50% of channel modified	Most (>60%) of the channel has been modified	
Riffle Substrate Type	Cobble, boulder, gravel abundant	Cobble, gravel, and sand predominate	Gravel and sand predominate	Sand and finer predominate		
Riffle Embeddedness	Riffle substrate surrounded by <25% fine sediment	Riffle substrate surrounded by 25-50% fine sediment	Riffle substrate surrounded by 50-75% fine sediment	Riffle substrate surrounded by >75% fine sediment or totally absent		
Pools	>24 inch deep	18-24 inch deep	12-18 inch deep	<12 deep		
Fish Cover	Abundant > 75% pools	25 - 75% of pools	present < 25% of pools	Absent		
Point range	7	5	3	1	0	
Aquatic Habitat Physical structure of pools and riffles within stream						

Evaluation Category	Field Characteristics	Excellent	Good	Fair	Poor						
Channel Stability Vertical Stability of channel, particularly degradation	General Narrative	Vertically stable channel, no recent signs of down cutting	Predominately stable channel with few, limited areas of down cutting or deposition	20-60% of channel with signs of deposition or down cutting including mid-channel bars, headcuts, and/or undercut pipes	>60% of channel with signs of deposition or down cutting including mid-channel bars, headcuts, and/or undercut pipes						
	Channel Shape	U shaped (Class B) stream	B Channel or C Channel in gravel, sand and fine sediment	Trapezoidal Channel (Class F)	V-shaped channel, gully formation (Class G)						
	Down Cutting / Degradation	Channel vertically stable, grade control provided by bedrock or boulders	Few, small headcuts present, down cutting limited	Several headcuts evident, down cutting prevalent but less than 2 feet	Large headcuts and severe (>2') down cutting evident						
	Deposition / Aggradation	Point bars stable, pavement of gravel, pools well developed	Point bars enlarging, no mid-channel or other bars	bars and deltas common, pools full of sediment, some sediment on banks	Deep deposits of unconsolidated sand dominate channel and are common on banks						
	Exposed Pipes	None	Top of pipes exposed in streambed	Pipes exposed above streambed undercutting pipes by <12 inches	Streambed >1 foot below bottom of exposed pipes						
	Point range	20	18	16	14	12	10	8	6	4	2

Notes:

- Characteristic Score
- Channel Shape
- Degradation
- Aggradation
- Exposed Pipes
- Average

Evaluation Category	Field Characteristics	Excellent	Good	Fair	Poor							
Bank Stability	General Narrative	Nearly all banks are stable, less than 5% unstable	Most banks are stable with small areas (5-30%) showing signs of slumping or erosion	Many banks (30-60%) are unstable with slumping and erosion common	Most banks (>60%) are unstable, evidence of erosion common							
	Bank Slumping	Rare and small	Infrequent or small	Common or large	Abundant and large							
	Bank Height above channel	< 2 feet (3 feet for larger streams)	2-3 feet (3-4 feet for larger streams)	3-4 feet above (5-7 feet for larger streams)	>4 feet above (7+ feet for larger streams)							
	Bank angle	<45%, point bar and outside bends stable	45-60%, outside bend steep	60-90%, near vertical on both banks	Unstable undercuts common (>90% slope)							
	Bank Material	Bedrock, boulder, (non-erodible)	Cobble, gravel, and /or clay; slightly erodible material	Sand and silt, some clay and gravel, erodible layers	Silt and sand, or otherwise highly erodible							
	Tree Falls (don't include if not forested)	0-1 per 1,000, usually small and partially healed	2-3 recent, tree falls per 1,000	4-5 recent large tree falls per 1,000	>6 recent, large tree falls per 1,000							
	Vegetation	90% covered with dense vegetation or root mass	70-90% covered with vegetation and/or roots	50-70 % covered; most outside bends eroding	<50% covered; bare soil predominant							
	Point range	10	9	8	7	6	5	4	3	2	1	0

Notes:

- Characteristic Score**
- Bank Slumping
 - Bank Height
 - Bank Angle
 - Bank Material
 - Tree Falls
 - Vegetation
 - Average

Evaluation Category	Field Characteristics	Excellent	Good	Fair	Poor						
Riparian Habitat	General Narrative	Wide, forested buffer providing optimal shading of stream	Moderately to wide buffer with woody vegetation, providing stream shading.	Moderate width buffer lacking woody vegetation, which provides some shade	Narrow buffer lacking vegetation, which is heavily disturbed and provides no shade						
	Average width of vegetative buffer	>50+ feet	25-50 feet	10-25 feet	<10 feet						
	Dominant Buffer Type	Mature Trees	Shrubs / Saplings	Non-woody vegetation	Lawn or no vegetation						
	Shading	>60%	30-60%	10-30%	<10						
	Point range	10	8	7	6	5	4	3	2	1	0

Characteristic Score

Width

Buffer Type

Shading

Average

Notes:

Average Width of Vegetative Buffer - In general, the wider the buffer the better habitat it provides and the more functions it provides to the stream system. Some methods use a 100 foot buffer as excellent, however, in an urban watershed buffers tend to be narrower so the widths for each class were reduced.

Dominant Buffer Type - A forested riparian area is the dominant type under normal conditions. However, in urban watersheds many buffers are dominated by shrubs or grasses which still provide some habitat functions to the stream.

Shading is optimal between 20 and 95%. Headwater stream are more often heavily shaded, while wider streams are less shaded. Shading can be provided by any type of vegetation - trees, shrubs, vines or herbs and grasses.

Density of the vegetation was not included, however it can be used to assign points within a class. A heavily vegetated shrub buffer should score higher than a lightly vegetated shrub buffer

Evaluation Category	Field Characteristics	Excellent	Good	Fair	Poor	
Water Quality long-term level of pollutants as reflect by benthos and other readily observable signs - litter, fouling, odors	General Narrative	Diverse community of pollution intolerant taxa with minimal evidence of pollution	Moderately diverse community with some evidence of pollution	Poor diversity, dominated by pollution tolerant taxa with evidence of pollution common	Severely degraded benthic community with abundant evidence of pollution	
	Benthic Community Composition (dominate taxa)	Pollution sensitive taxa Dominated by stoneflies, mayflies, cased caddisflies, dobsonfly, water penny, riffle beetle, right handed snails	Somewhat pollution sensitive Dragonfly, damselfly, cranefly, alderfly, beetle larvae, hydroscidae caddisfly, scud, clams	Pollution Tolerant Taxa Midges, blackfly, left handed snails, leeches, aquatic worms	Very Pollution Tolerant Taxa Midges, Leeches and aquatic worms or none	
	Diversity of pollution sensitive taxa	4+ taxa	2-3 taxa	1 taxa	0	
	Proportion of Pollution Sensitive Individuals	>32% pollution sensitive individuals	16-32 % Pollution sensitive Individuals	<16% pollution sensitive individuals	Few or No pollution sensitive individuals	
	Litter / Floatables	No litter in channel, minimal along banks	Some litter along banks and in channel	Litter common along bank and in channel	Active dumping in channel and along banks	
	Substrate Fouling	<20% fouling, primarily algae	20-50% of substrate covered primarily with algae	50-75% of substrate; includes sewage fungi, acid drainage	75%+ of substrate covered with algae, or any amount of sewage fungi, oil, pollutants	
	Odors (sewage, oil, etc.)	None	Slight odor	Moderate odor	Strong odor	
	Point range	10	8	5	2	0
	Score					

Notes:

- Characteristic
- Community
- Pollution Sensitive
- Abundance
- Litter
- Fouling
- Odor
- Average

Evaluation Category	Field Characteristics	Excellent	Good	Fair	Poor				
Aquatic Habitat Physical structures of pools and riffles within stream	General Narrative	Diverse habitat consisting of deep and shallow pools, with riffles with clean substrate	Most of aquatic habitat only slightly degraded, typically with increased sediment	Aquatic habitat limited to small riffles and pools	Much of the habitat has been eliminated by pass modifications, remaining habitat degraded				
	Channel Modification (Riprap, concrete or channelized)	Less than 5% of channel modified	Limited areas (5-20%) of channel modified	20-60% of channel modified	Most (>60%) of the channel has been modified				
	Riffle Substrate Type	Cobble, boulder, gravel abundant	Cobble, gravel, and sand predominate	Gravel and sand predominate	Sand and finer predominate				
	Riffle Embeddedness	Riffle substrate surrounded by <25% fine sediment	Riffle substrate surrounded by 25-50% fine sediment	Riffle substrate surrounded by 50-75% fine sediment	Riffle substrate surrounded by >75% fine sediment or totally absent				
	Pools	>24 inch deep	18-24 inch deep	12-18 inch deep	<12 deep				
	Fish Cover	Abundant > 75% pools	25 - 75% of pools	present < 25% of pools	Absent				
	Point range	7	6	5	4	3	2	1	0

Notes:

Average
Channel Modification - The amount of channel modification reflects past impacts on aquatic habitat

Riffle Substrate Type - A typical riffle in this region is gravel with some cobble and some sand. A decrease in larger particles in riffles is a typical sign of degradation due to sedimentation. Larger particles can also become scarcer as natural bed load transport is interrupted.

Riffle Embeddedness - The amount of fine particles fill the space between large particles increases as streams degrade. Embeddedness should be estimated visually over several riffles.

Pools - Stable streams have deep pools with cover (woody material, stable undercut banks), degradation results in filling of pools with fine sediment. Pool depth varies with stream flow. Depths are assumed to be during base flow in a typical summer, when pool depth is most critical. Scoring should be adjusted for extreme weather conditions (storm or drought) or other seasons.

Fish Cover-