

Comparison of Stream Habitat, Macroinvertebrate Community, Stream Sediment, and Channel Condition Data Collection Methodologies in the Chattooga River watershed, Chattahoochee National Forest, Georgia



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Introduction

Approximately 70% of the 180,000 acre Chattooga River watershed is managed by the U. S. Forest Service (USFS) (U. S. EPA 1999). In 1999, the U. S. Environmental Protection Agency (EPA) completed a report assessing water quality conditions in the Chattooga River watershed (U. S. EPA 1999). The EPA report was prepared in response to the settlement of the Georgia total maximum daily load (TMDL) lawsuit, which required the EPA to determine whether waters in the watershed were not meeting water quality standards because of forestry or forestry-related activities. The EPA collected macroinvertebrate, sediment, and channel condition data at sample stations within six designated sub-watersheds of the Chattooga River watershed to assess water quality. Results of the report were used to list streams that currently had, or were in danger of developing water quality problems.

In 2000, the Chattahoochee-Oconee National Forest (CONF) requested that the USFS Center for Aquatic Technology Transfer (CATT) further examine the effects of forestry and forestry-related activities on streams within the CONF in two Chattooga River sub-watersheds. We used the methodologies set forth in the 1999 EPA report and basinwide visual estimation technique (BVET) habitat surveys to intensively sample streams on CONF managed lands within the Warwoman Creek and West Fork sub-watersheds. The purpose of the surveys was to 1) determine if intensive sampling within streams would yield similar results to the 1999 report, and 2) examine for variability in results within a given stream.

Note that data for U. S. EPA (1999) was collected from September 1997-March 1999 (e.g. macroinvertebrate collections were made in September 1997 and sediment data was collected throughout 1998 and 1999), however for simplification we refer to all of their data as being from 1998. See U. S. EPA (1999) for more specific information on their data collection dates.

Study Site

The Chattooga River watershed is located in northeast Georgia, northwest South Carolina, and southwest North Carolina Figure 1. The Warwoman Creek and West Fork sub-watersheds are located within Georgia and North Carolina. We surveyed four streams in the West Fork and four streams in the Warwoman sub-watersheds (Table 1, Figure 2). Bedrock in the Chattooga River watershed consists of mica schists, mica gneiss, and aluminous schists. The soils derived from these parent materials (fine sandy loam, sandy loam, stony loam) are considered highly erodible (U. S. EPA 1999).

Methods

Habitat Survey

We used the basin-wide visual estimation technique (BVET) (Hankin and Reeves 1988, Dolloff et al. 1993) to inventory stream habitat in seven streams in July 2000 (Table 1). Habitat in each of the streams was classified and inventoried by a two-person crew using two-stage visual estimation techniques. During the first stage, one crew member identified each habitat unit by type, estimated surface area, average and maximum depth, dominant and subdominant substrates (Table 2), and instream cover for each habitat unit, and estimated pool residual depth (average depth minus riffle crest depth), and the degree to which pool substrates were embedded. Habitat unit types included pools (areas in the stream with concave bottom profile, gradient equal to zero, greater than average depth, and smooth water surface), and riffles (areas in the stream with convex bottom profile, greater than average gradient, less than average depth, and turbulent water surface). Glides (areas in the stream similar to pools, but with average depth and flat bottom profile) were identified during the survey but were grouped with pools for data analysis. Runs (areas in the stream similar to riffles but with average depth, less turbulent flow, and flat bottom profile) and cascades (areas in the stream with $> 12\%$ gradient, high velocity, and exposed bedrock or boulders) were grouped with riffles for data analysis. The length (0.1 m) of each habitat unit was measured with a hip chain and wetted width was visually estimated. Average depth of each habitat unit was estimated by taking depth measurements at various places across the channel profile with a graduated staff marked in 5 cm increments. We visually estimated the linear meters of cover provided by rock, wood, and undercut banks. Cover was defined as structure within the wetted channel under which a 15 cm long object could be hidden from overhead view. We visually estimated the percent of the total substrate surface area that was embedded. We considered substrate to be embedded if interstitial spaces around large substrate particles were filled by smaller substrate particles.

The second crew member classified and inventoried large woody debris (LWD) within the stream channel, determined the Rosgen's channel type for each habitat unit, estimated bank instability, and recorded data on a Husky Hunter data logger. LWD was divided into seven classes (Table 4). All woody debris less than 1 m long and less than 5 cm in diameter were omitted from the survey. Bank instability was estimated for both left and right banks. We defined bank instability as the percent of the bank between the wetted channel and bankfull channel that consisted of erodible materials. Rosgen channel type was estimated visually based on channel type descriptions found in Rosgen (1996) (Table 5).

The first unit of each habitat type selected for intensive (second stage) sampling (i.e. accurate measurement of surface area) was determined randomly. Additional units were selected systematically (every 10th unit for each habitat type). The width of each systematically selected habitat unit was

measured with a 30-m measuring tape at intervals ranging from about 1 m to 15 m. Interval size was determined by the length and the morphology of the unit (i.e. interval of measured width increased with increasing unit length). In each of the systematically selected riffles we also estimated the bankfull stream channel width as described by Harrelson et al. (1994), and measured channel gradient with a clinometer. Surveys were terminated where the stream became intermittent (wetted channel width was less than 0.5 m).

The relationship between estimated surface area and measured surface area typically is strongly and positively correlated when the estimates are made by experienced personnel; thus we could correct visual estimates by multiplying them by a calibration ratio (Hankin and Reeves 1988). The calibration ratio, the estimated true total area, and the variance of the area estimator were calculated separately for each habitat type and each section. BVET calculations were computed with a Microsoft Excel spreadsheet using the formulas found in Dolloff et al. (1993). Data were summarized using Excel spreadsheets and SigmaPlot graphics software.

Macroinvertebrates

Macroinvertebrate samples for the study were taken using the rapid bioassessment protocols detailed in the standard operating procedures (SOPs) of the U. S. Environmental Protection Agency's (EPA's) Region 4 Science and Ecosystem Support Division (SCSD) (U. S. EPA 1999) between May and September 2000. This protocol calls for materials to be collected from five habitat types: 1) deep riffle, 2) shallow riffle, 3) pool bottoms, 4) leaf litter, and 5) LWD. We used a D-frame net to collect materials from each habitat type within a 100 m reach of stream. Habitat specific samples were then combined into a single sample for each 100 m reach. We collected at least one sample per kilometer within each surveyed stream. Samples were also collected from 100 m reaches immediately upstream and downstream of any road crossing or major trail crossing on the surveyed streams.

Samples were analyzed under the supervision of Dr. Reese Voshell, Department of Entomology, Virginia Polytechnic Institute and State University. The lab sub-sampled 200 organisms from each sample and identified each organism to the lowest possible taxonomic level. The lab calculated 17 metrics for each sample and provided the results of the analysis in the form of a written report provided to the CATT. We used five of the 17 metrics for comparison with U. S. EPA (1999) results. Scoring criteria used to compare U. S. EPA (1999) results to present survey results are presented in U. S. EPA (1999).

Sediment

We used U. S. EPA (1999) sediment sampling protocols to perform pebble counts and assess cobble embeddedness in the survey streams. Sediment sample sites corresponded to the 100 m reaches used for macroinvertebrate sampling. Where possible, we didn't collect sediment and macroinvertebrate samples from the same habitat units, to limit bias in either sample. Sediment measurements were assumed to be representative of each 100 m stream reach.

Pebble counts were performed by walking perpendicular transects within the bankfull channel (Harrelson et al. 1994). The person walking the transect (caller) began at the edge of the bankfull channel on one side of the stream and walked heel-to-toe across the stream channel to the opposite bank. At each step the caller picked up the pebble at the tip of their toe and measured its intermediate axis. This procedure was repeated until 100 pebbles were measured. Due to difficulty in measuring their intermediate axis, clay, silt, sand, and bedrock were placed into categories (Table 3). If detritus, LWD, or other organic materials were encountered, we sampled the rock substrate found directly below them. We only performed pebble counts in riffles. Scoring criteria used to compare U. S. EPA (1999) results to present survey results are presented in U. S. EPA (1999).

In addition to comparing results with U. S. EPA (1999), we used the pebble count data to calculate the D_{50} (median particle diameter of entire sample), inflow D_{50} (median particle diameter from particles within the wetted channel only), D_{33} (33rd percentile of particle diameter sizes), D_{84} (84th percentile of particle diameter sizes), and percent fine sediment (<2 mm). D_{50} is typically calculated for particles taken from within the bankfull channel, however it can be difficult to distinguish the true boundaries of the bankfull channel. We compared D_{50} vs. inflow D_{50} to see if particles sampled from within the wetted channel were similar to those taken from within the entire bankfull channel. We calculated D_{84} and D_{33} to more completely describe the distribution of particle sizes within the bankfull channel.

Cobble embeddedness was measured by randomly selecting cobble size (64 mm - 256 mm) materials from the most downstream one-third of pools. After a cobble was selected, it was removed from the stream bed while maintaining its spatial orientation, and then measured for its total height and embedded height perpendicular to the streambed surface (Bunte and Abt 2001). Typically we selected cobbles from more than one pool, until 100 cobbles had been collected and measured. We used the cobble embeddedness data to determine percent embeddedness for each cobble and an overall site embeddedness (average percent embeddedness). In addition, we used scoring criteria presented in U. S. EPA (1999) to compare results with U. S. EPA (1999).

Channel Condition

We used the Pfankuch Channel Stability Rating form (Pfankuch 1975) and the EPA RBP habitat assessment form (Barbour et al. 1999) to assess channel condition (Appendix E). Channel condition was assessed in the same 100 m reaches used for macroinvertebrate samples and sediment measurements. Both forms contained a series of questions asking the observers to rate the condition of the stream channel on a point scale. After walking through the entire 100 m reach, the crew members answered each of the questions on the forms. The overall Pfankuch and EPA ratings for each 100 m reach were determined by the total score (sum of scores for individual questions on each form). Scoring criteria used to compare U. S. EPA (1999) results to present survey results are presented in U. S. EPA (1999). The EPA habitat assessment form in 2000 had a possible total score of 200 points vs. 135 points in U. S. EPA (1999). We recalculated the scoring criteria based on a 200 point scale. For example, in U. S. EPA (1999) a stream ranked as 'very good' if its total score was 112 or greater. In 2000 a score of 166 (calculated as $112 \times 200 / 135$) or greater was needed for a rank of 'very good'.

Results

Survey results are presented in the following appendices:

- A) Compares results of U. S. EPA (1999) to present survey, and presents BVET habitat survey data summaries
- B) Macroinvertebrate report produced under the supervision of Dr. Reese Voshell, includes detailed sample and metric calculation results, these data were used to calculate the biological rating in Appendix A
- C) Pebble count and embeddedness results, includes D33, D50, D84, % ≤ 2 mm, and % cobble embeddedness, these data were used to calculate the average sediment rank in Appendix A
- D) Pfankuch and EPA RBP habitat assessment results, includes individual question scores and total site scores, these data were used to calculate the Pfankuch rating and the RBP habitat rating in Appendix A

Of the seven streams for which both 1998 and 2000 data were available, EPA use support rating in 2000 was lower in two streams (Martin-Finney Creek, and Rock Mountain Creek), stayed the same in four streams (Roach Mill Branch, Warwoman Creek, Addie Branch, and Law Ground Creek), and increased (based on mean score) in one stream (Reed Mill) (Appendix A, U. S. EPA 1999 vs. present survey comparison tables).

Sand was the dominant substrate in >50% of pools in Martin-Finney Creek, Reed Mill Creek, Law Ground Creek, and Rock Mountain Creek (Appendix A, BVET results). Law Ground Creek had the highest percentage of pools with a dominant substrate of sand (>80%), whereas Addie Branch had the lowest percentage (<20%). Sand was the dominant substrate in >15% of riffles in Reed Mill Creek and Rock Mountain Creek. Sand was not recorded as the dominant substrate in any riffles in Addie Branch, Bailey Branch, or Roach Mill Branch. The most frequently encountered and severe cases of bank instability (Appendix A, BVET results) were observed in Rock Mountain Creek and downstream reaches of Reed Mill Creek. Addie Branch, Roach Mill Branch, Martin-Finney Creek, and Law Ground Creek had isolated areas of highly unstable banks, but overall had relatively stable banks.

Discussion and Recommendations

The use of a single sampling station (U. S. EPA 1999) as compared to multiple sampling stations (present report) produced similar use support ratings for individual streams. This could be interpreted to suggest that multiple sampling stations were unnecessary, however a closer examination of results revealed that multiple sample stations exposed within stream variability that would not have been detected with single sample stations. For example, Rock Mountain Creek's use support rating went down from 'full support (watch)' in U. S. EPA (1999) to 'partial support' in the present survey. Examination of the results revealed that sample stations in the downstream reaches of the stream, where the 1999 sample station was located, received higher ratings than stations in the upstream reaches (Table A35). Without multiple sample stations the stream would have ranked the same in the present survey as it did in U. S. EPA (1999).

Multiple sample stations allowed us to locate reaches with lower use support ratings, however BVET habitat surveys allowed us to detect potential problem areas at a much finer spatial scale, and over an entire length of stream. For example, in Addie Brach the use support rating at every sample station was 'full support' (Table A5), however BVET habitat survey results showed that there were several isolated areas of high bank instability (Figure A8). Left unchecked, these areas could become less stable and more widespread, leading to increased sedimentation and a subsequent decrease in use support rating.

BVET habitat surveys performed in tandem with macroinvertebrate sampling could provide the necessary combination of biological and physical habitat data necessary to make management decisions regarding sediment TMDLs in the Chattooga River watershed. BVET habitat surveys provide a detailed description of habitat conditions within the entire stream, which allowed us not only to assess overall stream condition, but also to locate potential trouble spots. The major determinant in the EPA's use support rating was the biological (i.e. macroinvertebrate) rating. If the biological rating was 'fair' or 'poor' then the use support rating was either 'partial support' or 'not supporting', respectively, regardless of the pebble count, cobble embeddedness, Pfankuch, and RBP habitat assessment results. If the biological rating was 'very good' or 'good' then the other ratings could affect the overall use support rating. Using BVET habitat surveys in combination with macroinvertebrate sampling would allow us to 1) locate 'partial support' and 'not supporting' areas through the use of the biological rating (i.e. macroinvertebrate sample results), 2) identify unsuitable habitat conditions in 'partial support' and 'not supporting' reaches, 3) locate potential problem areas within reaches where biological rating was 'very good' or 'good', and 4) assess habitat conditions in stream reaches for which no biological rating is taken.

The amount of sediment already found within these streams and the nature of soils within the region warrant a vigilant monitoring program within the Chattooga River watershed. Future monitoring should include repeated surveys of reference watersheds (minimal activity within watershed), and

watersheds with varying levels and types of activity to investigate the response of stream habitat and the biological community to varying levels of disturbance. The response of stream systems to varying levels of activity within their watersheds can provide context within which watershed management strategies can be developed. Without such context we may be obliged to assume that any activity will result in a decrease in use support rating.

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Table 1. Sub-watersheds and streams sampled during 1998 and 2000. Macroinvertebrate, stream sediment, and channel condition data were collected at EPA sample sites in 1998 and 2000 using methodologies outlined in U. S. EPA (1999). BVET habitat surveys (Dolloff et al. 1993) were performed in 2000 only.

Sub-watershed	Stream	# EPA Sample Sites		BVET survey length (km)
		1998	2000	
Warwoman	Martin-Finney Creek	1	11	3.5
	Rock Mountain Creek	1*	11	3.6
	Roach Mill Branch	1	2	0.9
	Warwoman Creek	1	2	no BVET
West Fork	Addie Branch	1	7	3.8
	Bailey Branch	0	4	1.0
	Law Ground Creek	1	4	1.3
	Reed Mill Creek	1	5	3.3

*1998 sample site was on Martin-Finney Creek, at the confluence with Rock Mountain Creek

Table 2. Substrate size classes used during BVET habitat surveys. Diameter was estimated for the intermediate axis.

Size Class	Class Name	Diameter (mm)
1	organic debris	
2	clay	
3	silt	
4	sand	Silt – 2
5	small gravel	3 – 10
6	large gravel	11 – 100
7	cobble	101 – 300
8	boulder	>300
9	bedrock	

Table 3. Substrate size classes used during pebble count and cobble embeddedness surveys (EPA protocol). Diameter was measured on the intermediate axis.

Size Class	Diameter (mm)
Clay	< 0.002
Silt	0.002 – 0.05
Sand	0.05 – 2
small gravel	3 – 8
large gravel	9 – 64
small cobble	65 – 128
large cobble	129 – 256
small boulder	257 – 512
medium boulder	513 – 1024
large boulder	> 1024
bedrock	permanent underlying layer

Table 4. Large woody debris (LWD) size classes used during BVET habitat surveys. Diameter was measured at thickest portion of LWD piece. All woody debris less than 1 m long and less than 5 cm in diameter were omitted from the survey.

Size Class	Length (m)	Diameter (cm)
1	< 5	5 – 10
2	< 5	10 – 50
3	< 5	> 50
4	> 5	5 – 10
5	> 5	10 – 50
6	> 5	> 50
7	rootwad	rootwad

Table 5. Rosgen (1996) channel type descriptions used during BVET habitat surveys.

	A	B	C	D	E	F	G
Entrenchment	< 1.4	1.4 – 2.2	> 2.2	n/a	> 2.2	< 1.4	< 1.4
W/D Ratio	< 12	> 12	> 12	> 40	< 12	> 12	< 12
Sinuosity	1 – 1.2	> 1.2	> 1.2	n/a	> 1.5	> 1.2	> 1.2
Slope	.04 - .099	.02 – 0.39	< .02	< .04	< .02	< .02	.02 - .039

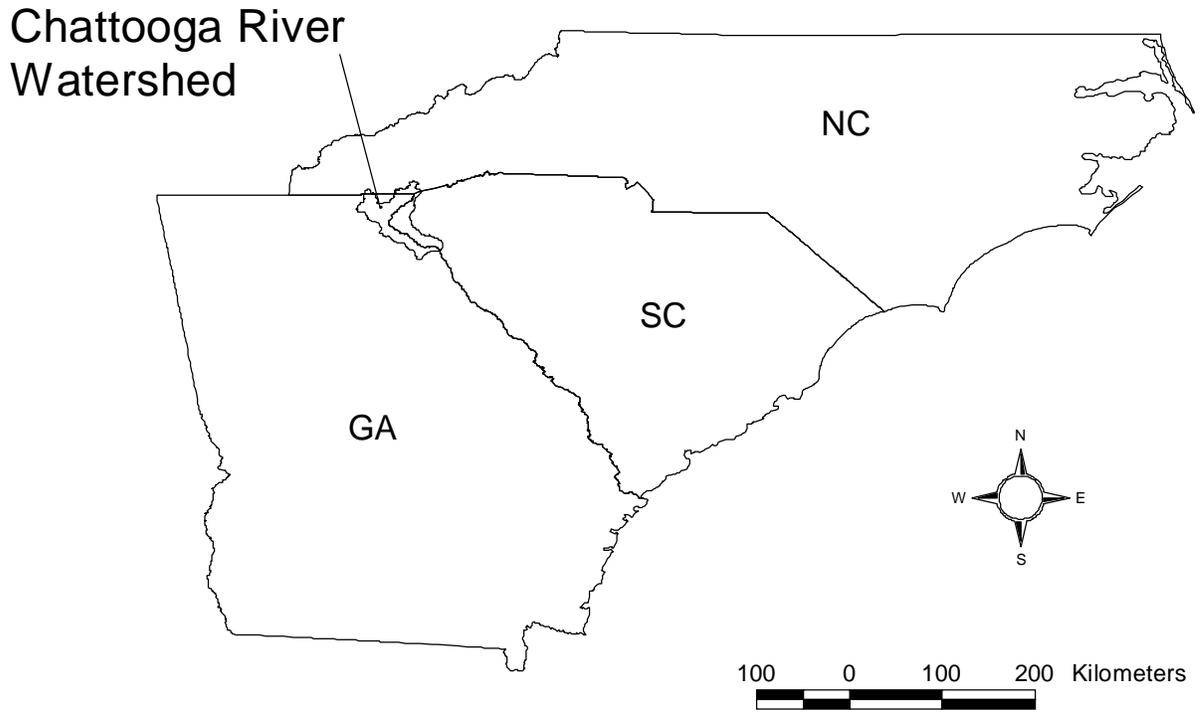


Figure 1. Location of the Chattooga River watershed in Georgia, South Carolina, and North Carolina. All streams surveyed for this report were located in the Chattahoochee National Forest in Georgia.

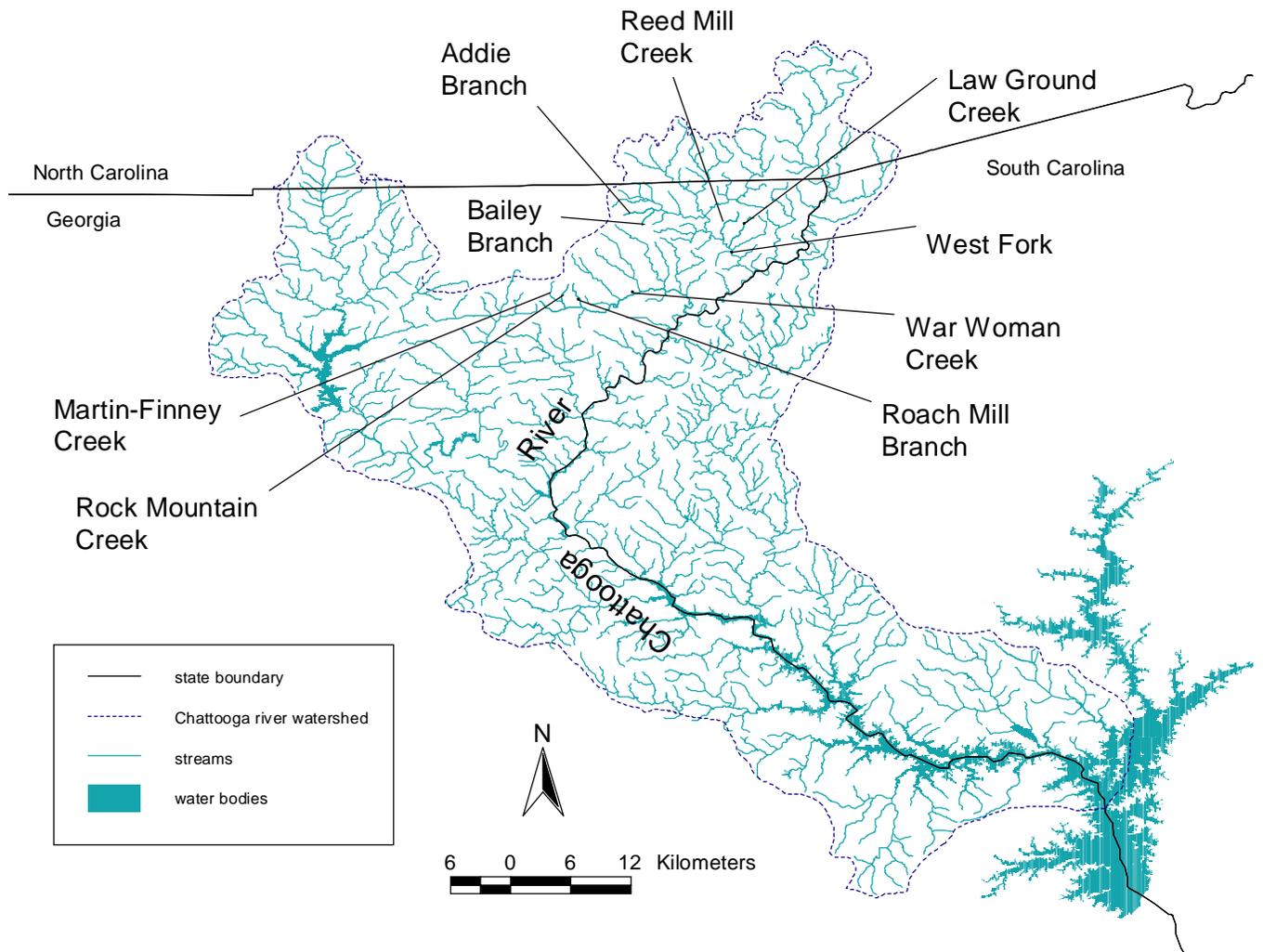


Figure 2. Streams within the Warwoman Creek and West Fork sub-watersheds that were surveyed in 1998 (U. S. EPA 1999) and 2000 (present report). See Table 1 for the total number of samples collected in each stream.

Appendix A: EPA and BVET Survey Results

West Fork sub-watershed

Addie Branch

Table A1. Results, rankings, and biological ratings for macroinvertebrate samples collected at sites in Addie Branch during 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u># of EPT Taxa</u>		<u>% EPT Taxa</u>		<u>% 2 Dominant Taxa</u>		<u>NCBI</u>		<u>Clinger Taxa</u>		<u>Final Score</u>		<u>Bio. Rating</u>	
	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>
	# rank	# rank	% rank	% rank	% rank	% rank	# rank	# rank	# rank	# rank				
RFS02R01		18 6		47.47 2		48.48 2		3.68 6		9 2		18		good
RFS02R02		18 6		77.60 6		52.08 2		1.80 6		8 2		22		good
RFS02S03		22 6		55.67 4		40.21 2		3.28 6		11 2		20		good
RFS02R04		19 6		61.54 4		33.85 2		3.06 6		10 2		20		good
R-1	16 4		73.60 6		25.28 4		4.30 4		20 6		24		v. good	
RFS02R06		18 6		54.77 4		49.25 2		3.06 6		7 2		20		good
RFS02S05		18 6		82.49 6		62.21 0		2.03 6		10 2		20		good
RFS02S07		13 4		80.98 6		71.20 0		1.87 6		7 2		18		good
Total Mean	16 4	18 6	73.60 6	65.79 4	25.28 4	51.04 2	4.30 4	2.68 6	20 6	9 2	24	20	v. good	good
Total Median	16 4	18 6	73.60 6	61.54 4	25.28 4	49.25 2	4.30 4	3.06 6	20 6	9 2	24	20	v. good	good

Table A2. RBP habitat form total scores, rankings, and ratings for sites in Addie Branch in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>RBP Habitat</u>				<u>RBP Habitat Rating</u>	
	<u>1998</u>		<u>2000</u>		<u>1998*</u>	<u>2000*</u>
	<u>score</u>	<u>rank</u>	<u>score</u>	<u>rank</u>		
RFS02R01			168	3		very good
RFS02R02			173	3		very good
RFS0203			148	2		good
RFS02-R04			150	2		good
R-1	125	3			very good	
RFS02R06			173	3		very good
RFS02S05			164	2		good
RFS02S07			142	2		good
Total Mean	125	3	160	2	very good	good
Total Median	125	3	164	2	very good	good

*The EPA habitat assessment form in 2000 had a possible total score of 200 points vs. 135 points in U. S. EPA (1999). Habitat rating in 2000 was based on the 200 point scale.

Table A3. Pebble count and cobble embeddedness results and rankings for sample sites in Addie Branch in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	D50				% ≤ 2 mm				% Cobble Embeddedness				Average Sediment Rank	
	<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>
	size (mm)	rank (0-2)	size (mm)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	rank (0-2)	rank (0-2)
RFS02R01			bedrock	2			10.8	2			34.0	1		1.7
RFS02R02			185	2			24.0	2			35.4	1		1.7
RFS02S03			60	2			34.3	1			56.9	0		1.0
RFS02R04			75	2			29.9	1			46.4	1		1.3
R1	95	2			9.0	2			14.0	2			2.0	
RFS02R06			920	2			34.0	1			48.7	1		1.3
RFS02S05			70	2			23.8	2			41.6	1		1.7
RFS02S07			118	2			14.8	2			48.2	1		1.7
Total Mean	95	2	789	2	9.0	2	24.5	2	14.0	2	44.5	1	2.0	1.7
Total Median	95	2	118	2	9.0	2	24.0	2	14.0	2	46.4	1	2.0	1.7

Table A4. Pfankuch score and rank, average sediment rank (from Table A3), and overall site and stream ratings for Addie Branch in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	Pfankuch				Ave. Sediment Rank		Sum (Pfankuch+Sediment Rank)		Sediment+Pfankuch Rating	
	<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>
	score (136-0)	rank (0-2)	score (136-0)	rank (0-2)	rank (0-2)	rank (0-2)	sum (0-4)	sum (0-4)	rating	rating
RFS02R01			58	2		1.7		3.7		good
RFS02R02			60	2		1.7		3.7		good
RFS02S03			76	2		1.0		3.0		good
RFS02R04			52	2		1.3		3.3		good
R-1	58	2			2.0		4.0		very good	
RFS02R06			42	2		1.3		3.3		good
RFS02S05			33	2		1.7		3.7		good
RFS02S07			74	2		1.7		3.7		good
Total Mean	58	2	56	2	2.0	1.7	4.0	3.7	very good	good
Total Median	58	2	58	2	2.0	1.7	4.0	3.7	very good	good

Table A5. Use support rating, based on results of final biological, RBP habitat, and sediment and Pfankuch ratings for Addie Branch in 1998 and 2000. Tables used to derive sediment+Pfankuch, RBP, and final biological ratings are found on the preceding pages. Criteria used for use support rating can be found in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>Final Biological Rating</u>		<u>RBP Habitat Rating</u>		<u>Sediment+Pfankuch Rating</u>		<u>Use Support Rating</u>	
	1998	2000	1998	2000	1998	2000	1998	2000
RFS02R01		good		very good		good		full support
RFS02R02		good		very good		good		full support
RFS02S03		good		good		good		full support
RFS02R04		good		good		good		full support
R1	very good		very good		very good		full support	
RFS02R06		good		very good		good		full support
RFS02S05		good		good		good		full support
RFS02S07		good		good		good		full support
Total Mean	very good	good	very good	good	very good	good	full support	full support
Total Median	very good	good	very good	good	very good	good	full support	full support

Table A6: BVET habitat survey results for Addie Branch.

District:	Tallah
Quadrangle:	Rabun Bald
Survey Date:	07/11/00
Downstream Starting Point:	confluence with Holcomb Creek
Total Distance Surveyed (km):	3.8
Percent of Total Area Pools:	41
Number of Pools:	165
Number of Pools per km:	44
Total Pool Area (m ²):	5385+/-937
Mean Pool Area (m ²):	33
Correction Factor:	1.16
Mean Maximum Depth (cm):	56
Mean Average Depth (cm):	37
Mean Residual Pool Depth (cm):	21
Percent of Total Area Riffles:	59
Number of Riffles:	127
Number of Riffles per km:	34
Total Riffle Area (m ²):	7594+/-1570
Mean Riffle Area (m ²):	60
Correction Factor:	1.47
Mean Maximum Depth (cm):	21
Mean Average Depth (cm):	13
Number of LWD pieces per km:	80
LWD < 5 m, 5-10 cm:	57
LWD < 5 m, 10-50 cm:	35
LWD < 5 m, > 50 cm:	19
LWD > 5 m, 5-10 cm:	94
LWD > 5 m, 10-50 cm:	80
LWD > 5 m, > 50 cm:	48
Rootwads:	2
Mean Channel Width (m):	6
Mean Riparian Width (m) (Total*):	15
Maximum Riparian Width (Total):	40
75th Percentile (Total):	18
25th Percentile (Total):	9
Minimum Riparian Width (Total):	5
Mean Riparian Width (m) (Left, Right**):	4
Maximum Riparian Width (Left, Right):	20
75th Percentile (Left, Right):	5
25th Percentile (Left, Right):	1
Minimum Riparian Width (Left, Right):	0
Percent of Pool Habitat Surveyed as Glides:	4
Rosgen's Channel Type Frequency (%):	
% Type A:	12
% Type B:	88
% Type C:	0
% Type D:	0
% Type E:	0
% Type F:	0
% Type G:	0
Percent Pools with > 35% Embeddedness:	18
Average Channel Gradient (%):	17

*Calculation sums left riparian + right riparian + stream channel

**Calculation uses left and right riparian values, not the sum of left and right

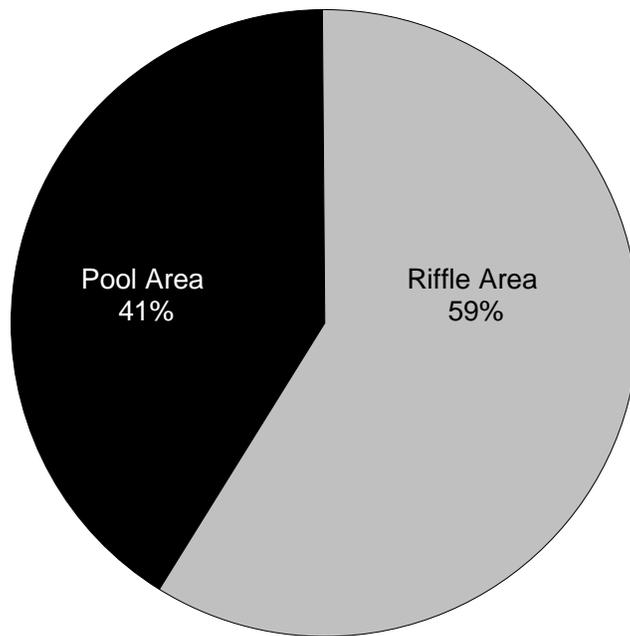


Figure A1. Percent pool and riffle surface area in Addie Branch, Chattahoochee National Forest, 2000.

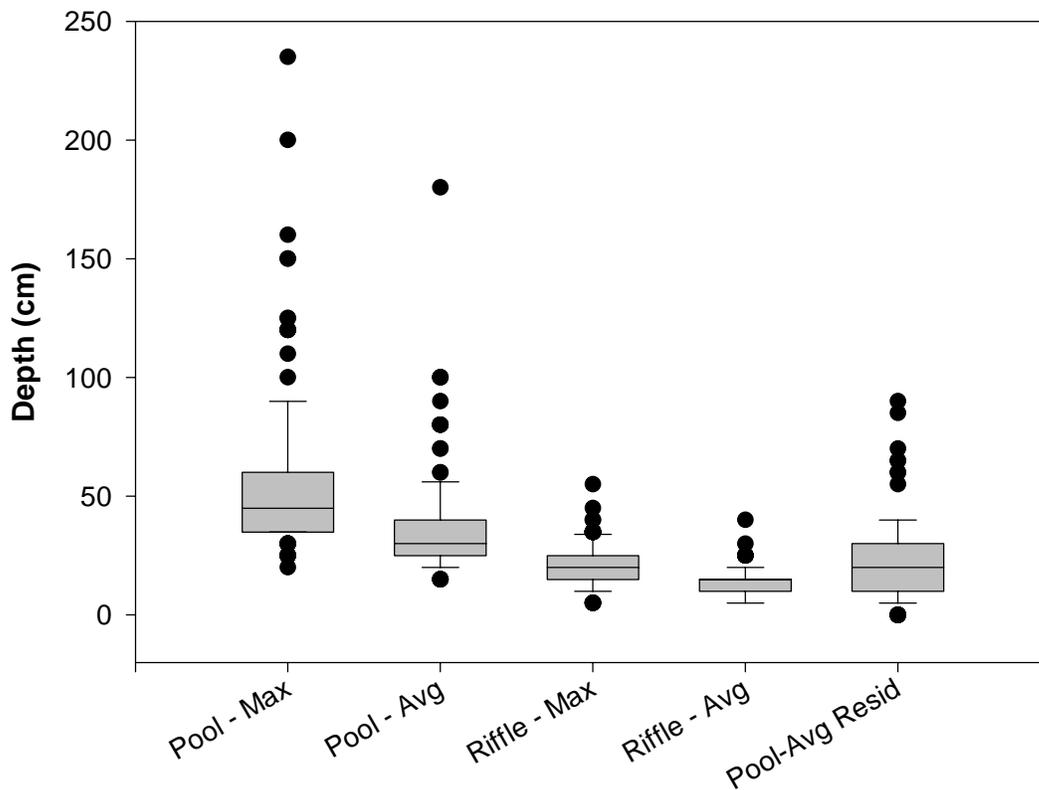


Figure A2. Maximum and average depths for pools and riffles, and average residual pool depths for Addie Branch, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

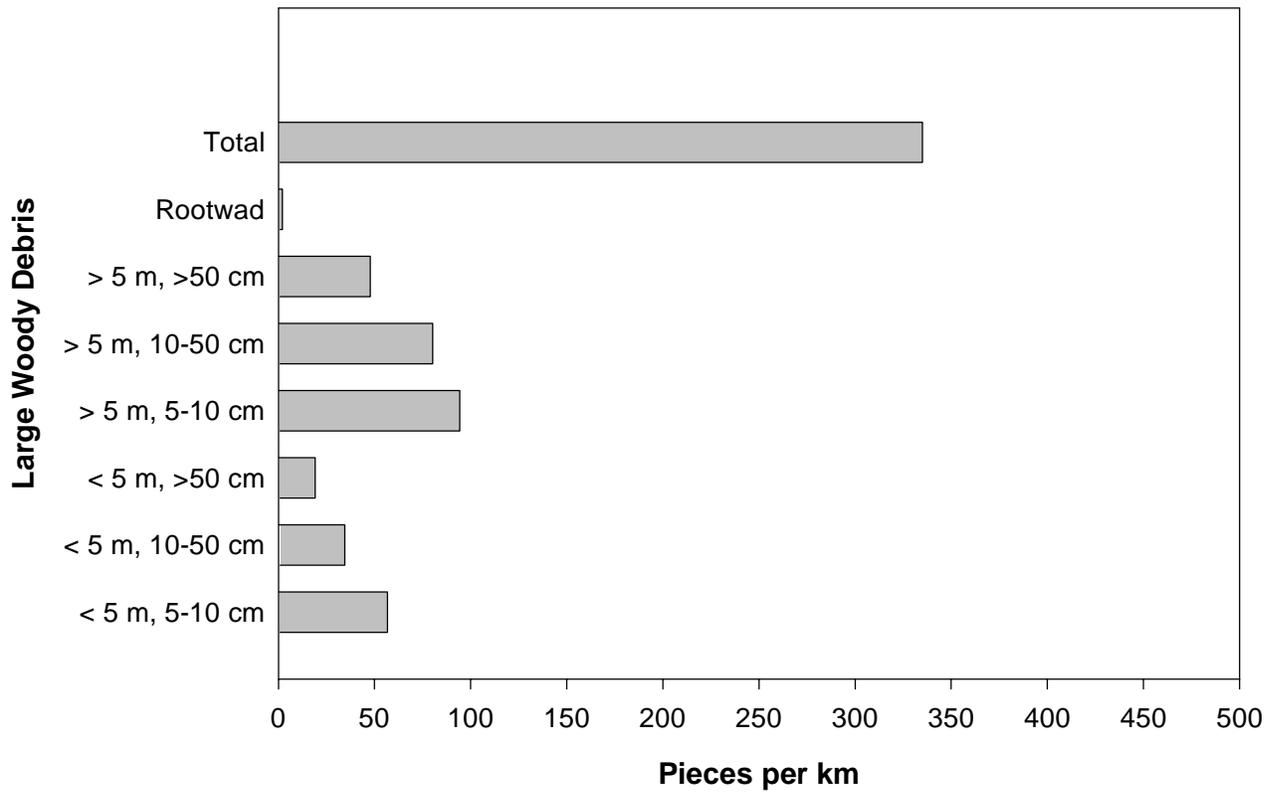


Figure A3. Pieces of large woody debris (LWD) per kilometer in Addie Branch, Chattahoochee National Forest, 2000.

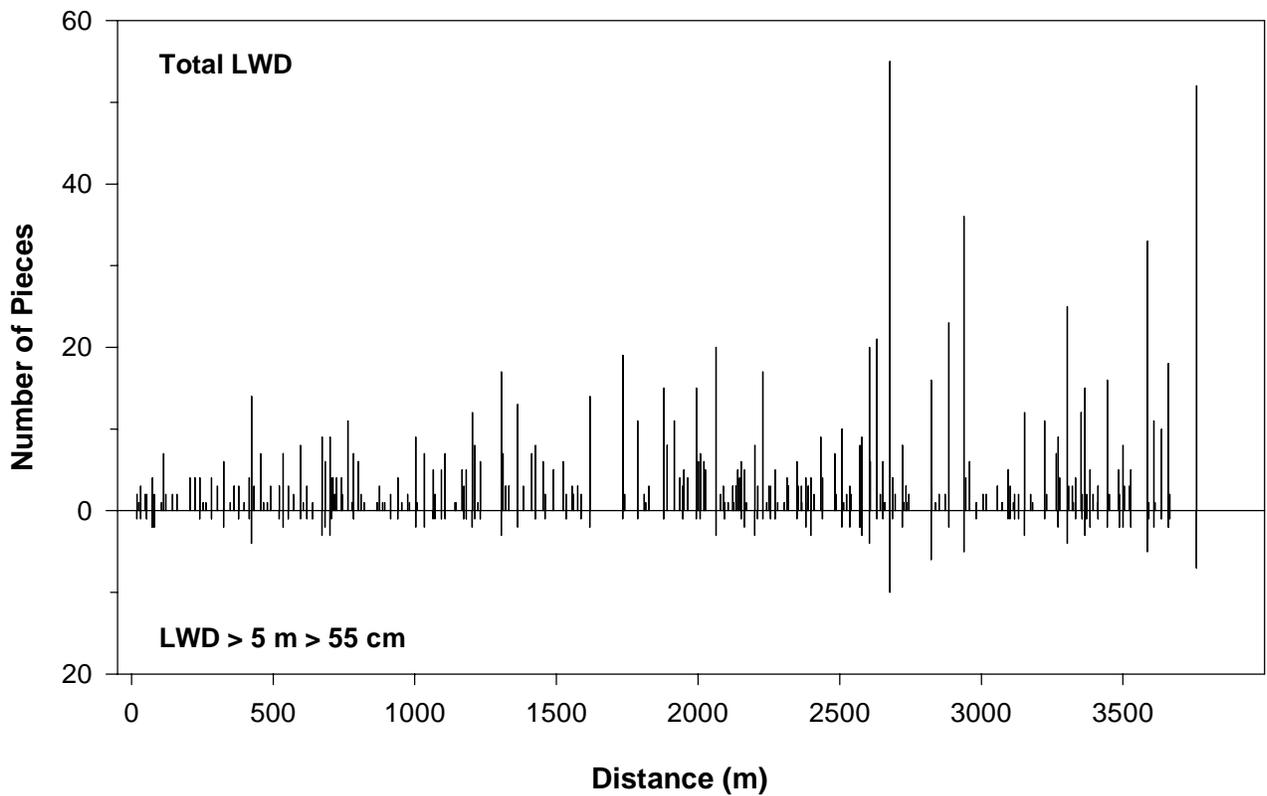


Figure A4. Distribution and abundance of LWD in Addie Branch, Chattahoochee National Forest, 2000.

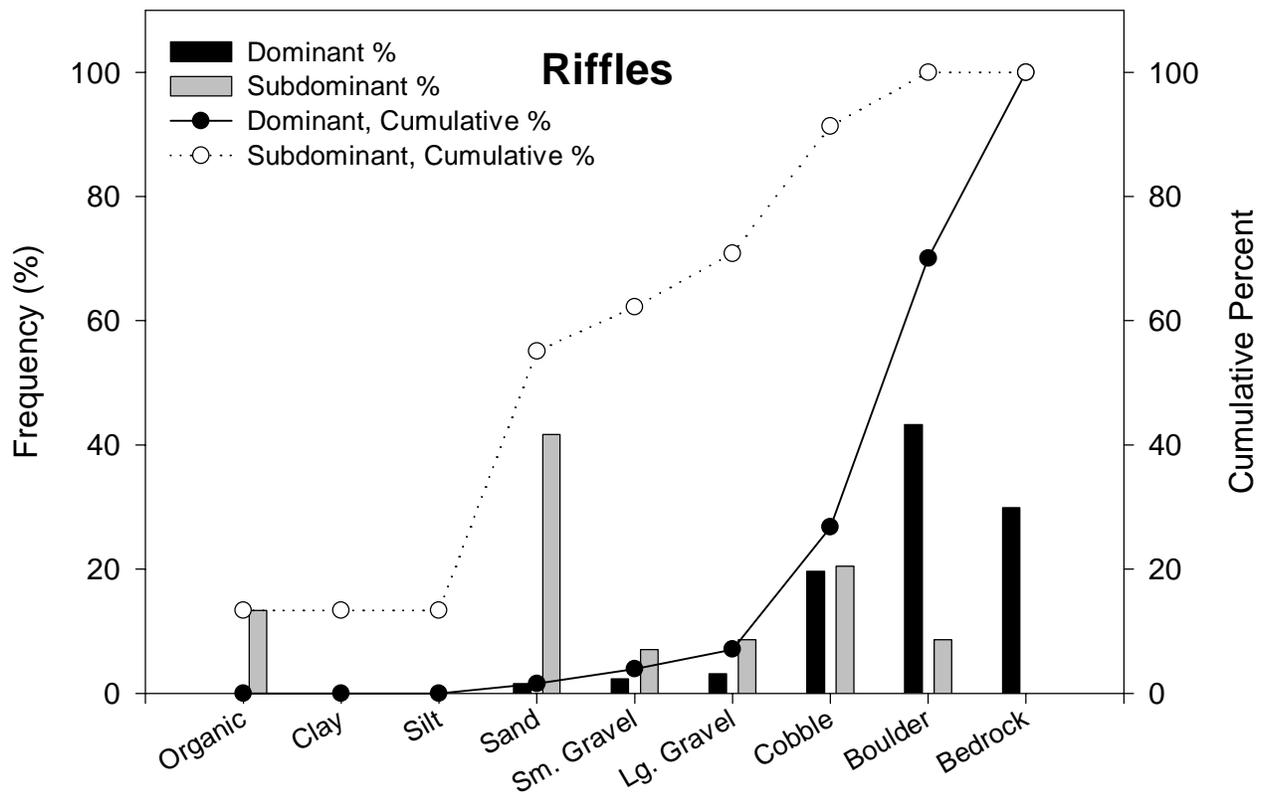
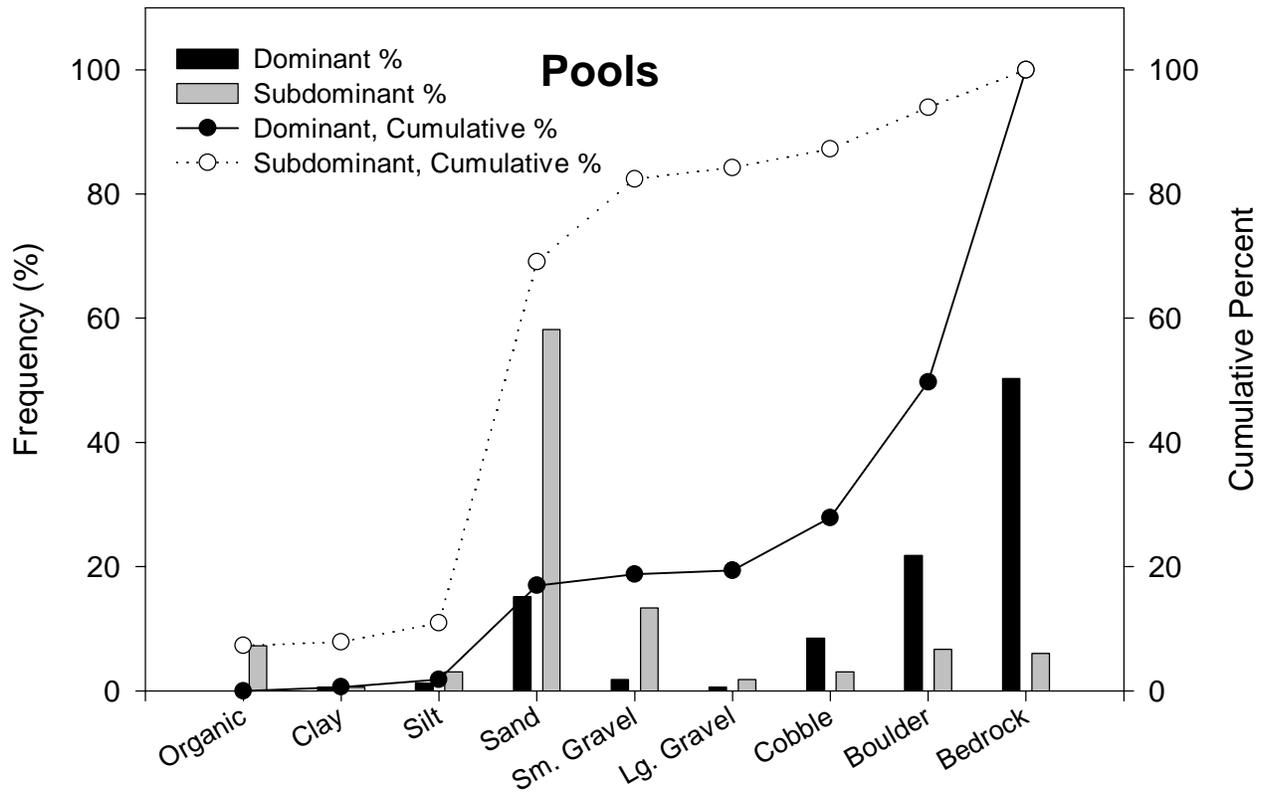


Figure A5. Frequency (percent) of dominant and subdominant substrate occurrence for pools and riffles in Addie Branch, Chattahoochee National Forest, 2000. Solid dots and bars represent percent and cumulative percent of dominant substrate, open dots and gray bars represent percent and cumulative percent of subdominant substrate.

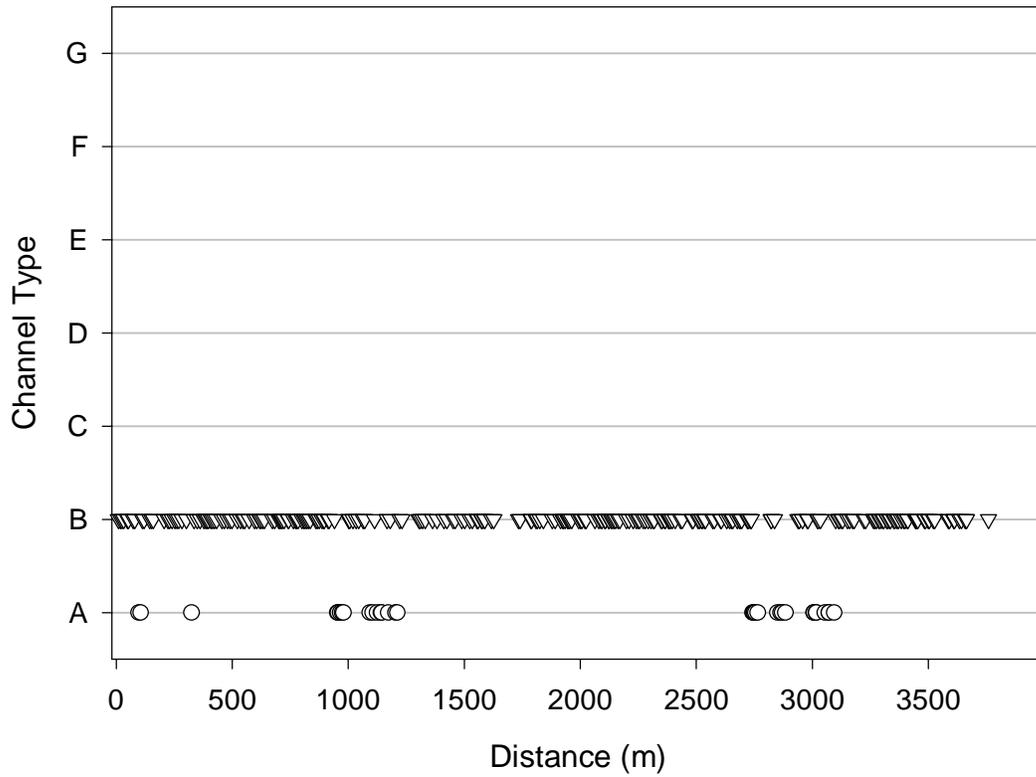


Figure A6. Rosgen's channel type distribution in Addie Branch, Chattahoochee National Forest, 2000.

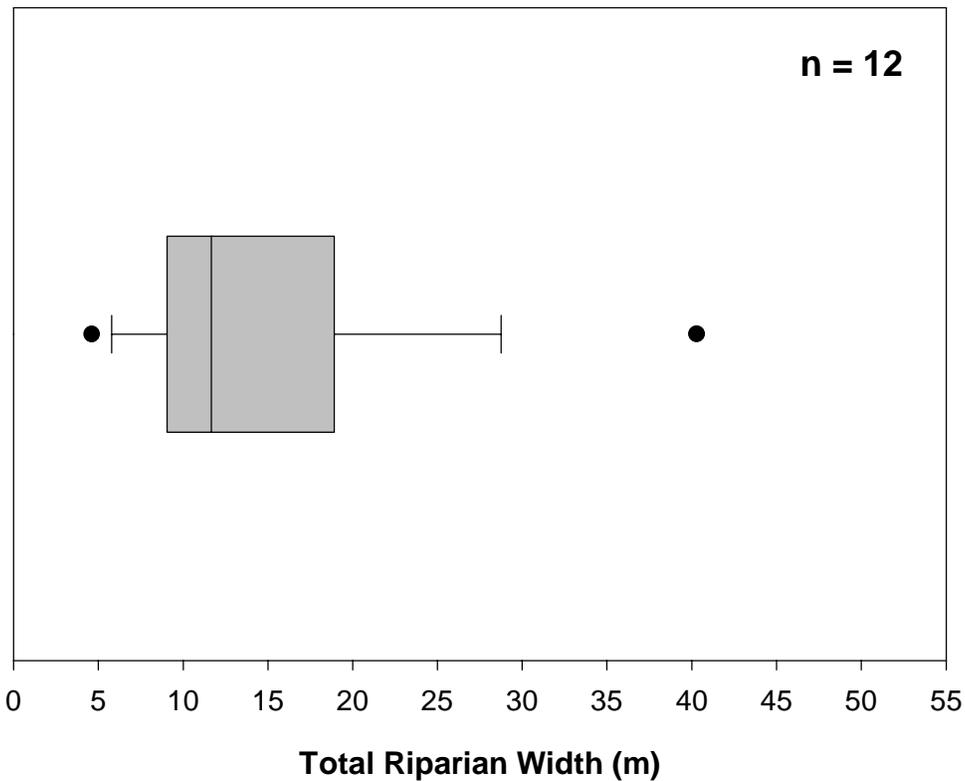


Figure A7. Total riparian width (channel width+right riparian+left riparian) for Addie Branch, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

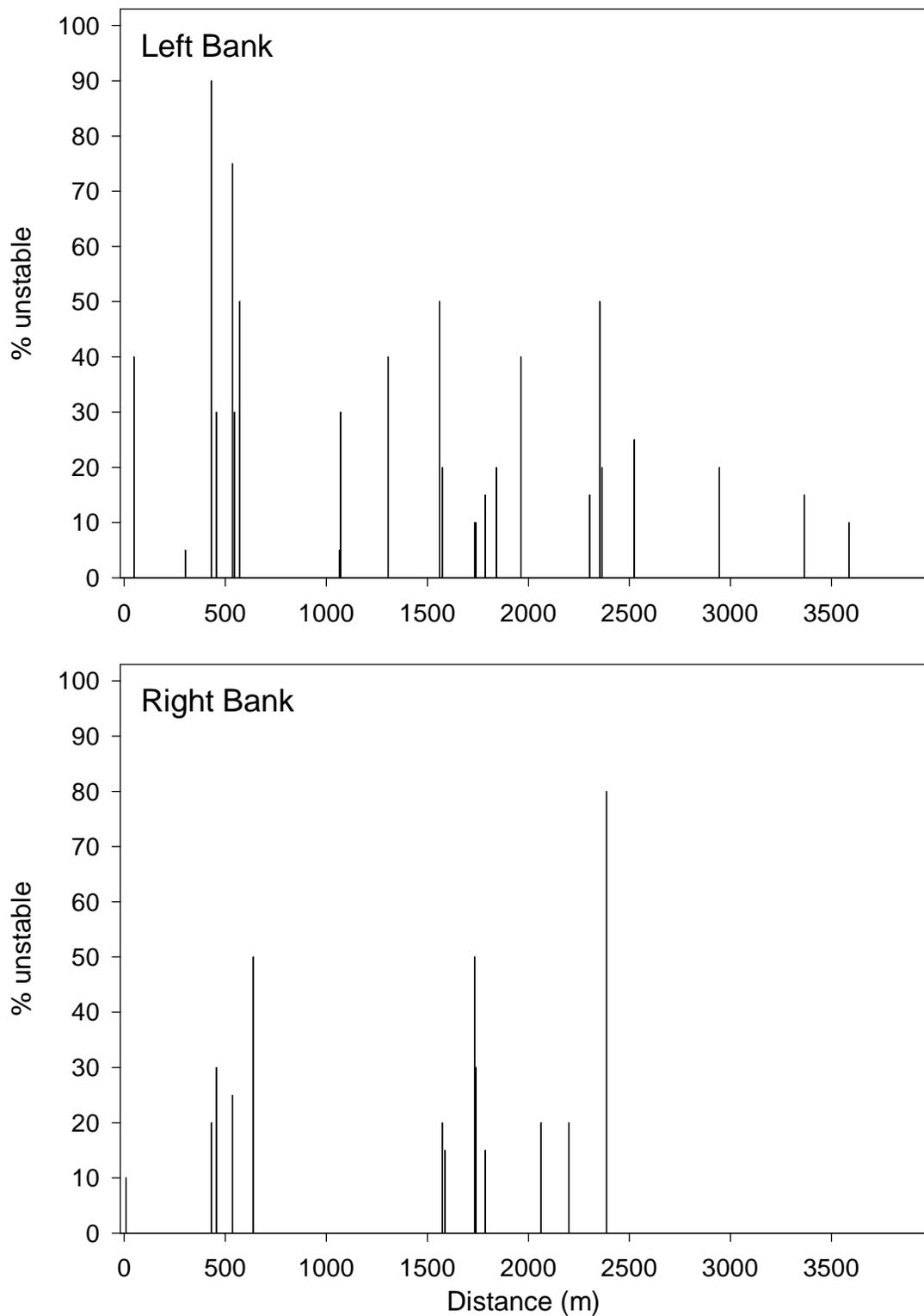


Figure A8. Percent of bank in the Addie Branch, Chattahoochee National Forest, 2000, considered to be unstable (% of bank composed of exposed erodible material from water's edge to bankfull). Estimated for every habitat unit.

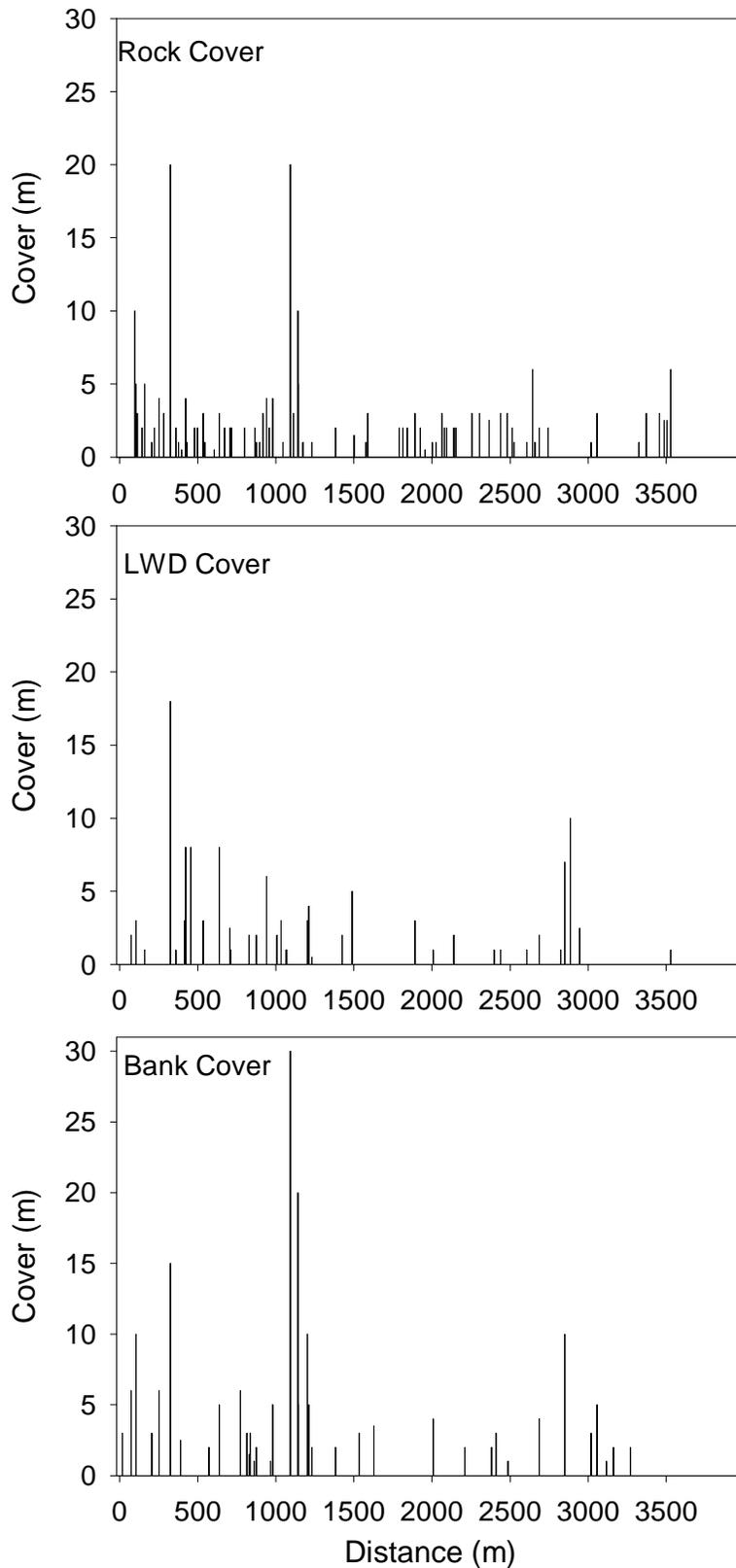


Figure A9. Estimated linear meters of overhead cover provided by rock, LWD, and undercut banks within the wetted stream channel for each habitat unit in Addie Branch, Chattahoochee National Forest, 2000. Cover was considered to be provided if a 15 cm object could be hidden beneath the cover type.

West Fork sub-watershed

Bailey Branch

Table A7. Results, rankings, and biological ratings for macroinvertebrate samples collected at sites in Bailey Branch during 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u># of EPT Taxa</u>		<u>% EPT Taxa</u>		<u>% 2 Dominant Taxa</u>		<u>NCBI</u>		<u>Clinger Taxa</u>		<u>Final Score</u>		<u>Bio. Rating</u>											
	1998		2000		1998		2000		1998		2000		1998	2000										
	#	rank	#	rank	%	rank	%	rank	#	rank	#	rank	#	rank										
RFS03S01			9	2	37.66	2	53.25	2	4.05	6	3	0	12	fair										
RFS03R02			14	4	49.19	2	48.65	2	4.13	6	4	0	14	fair										
RFS03R03			14	4	44.38	2	48.13	2	3.84	6	6	0	14	fair										
RFS03S04			11	2	40.00	2	63.53	0	4.19	4	5	0	8	poor										
Total Mean	*	*	12	2	*	*	42.81	2	*	*	4.05	6	*	*	5	0	*	12	*	fair				
Total Median	*	*	13	2	*	*	42.19	2	*	*	50.95	2	*	*	4.09	6	*	*	5	0	*	12	*	fair

*no data were reported for Bailey Branch in U. S. EPA (1999)

Table A8. RBP habitat form total scores, rankings, and ratings for sites in Bailey Branch in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>RBP Habitat</u>				<u>RBP Habitat Rating</u>	
	1998		2000		1998*	2000*
	score	rank	score	rank		
RFS03S01			142	2		good
RFS03R02			143	2		good
RFS03R03			139	2		good
RFS03S04			153	2		good
Total Mean	*	*	144	2	*	good
Total Median	*	*	143	2	*	good

*no data were reported for Bailey Branch in U. S. EPA (1999)

Table A9. Pebble count and cobble embeddedness results and rankings for sample sites in Bailey Branch in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	D50				% ≤ 2 mm				% Cobble Embeddedness				Average Sediment Rank	
	<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>
	size (mm)	rank (0-2)	size (mm)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	rank (0-2)	rank (0-2)
RFS03S01			10	0			37.0	1			68.4	0		0.3
RFS03R02			17	1			20.0	2			42.5	1		1.3
RFS03R03			6	0			43.0	1			43.4	1		0.7
RFS03S04			15	0			26.9	1			44.5	1		0.7
Total Mean	*	*	12	0	*	*	31.7	1	*	*	49.7	1	*	0.7
Total Median	*	*	12	0	*	*	32.0	1	*	*	43.9	1	*	0.7

*no data were reported for Bailey Branch in U. S. EPA (1999)

Table A10. Pfankuch score and rank, average sediment rank (from Table A9), and overall site and stream ratings for Bailey Branch in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	Pfankuch				Ave. Sediment Rank		Sum (Pfankuch+Sediment Rank)		Sediment+Pfankuch Rating	
	<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>
	score (136-0)	rank (0-2)	score (136-0)	rank (0-2)	rank (0-2)	rank (0-2)	sum (0-4)	sum (0-4)	rating	rating
RFS03S01			87	1		0.3		1.3		fair
RFS03R02			87	1		1.3		2.3		fair
RFS03R03			83	1		0.7		1.7		fair
RFS03S04			70	2		0.7		2.7		fair
Total Mean	*	*	82	1	*	0.7	*	1.7	*	fair
Total Median	*	*	85	1	*	0.7	*	1.7	*	fair

*no data were reported for Bailey Branch in U. S. EPA (1999)

Table A11. Use support rating, based on results of final biological, RBP habitat, and sediment and Pfankuch ratings for Bailey Branch in 1998 and 2000. Tables used to derive sediment+Pfankuch, RBP, and final biological ratings are found on the preceding pages. Criteria used for use support rating can be found in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>Final Biological Rating</u>		<u>RBP Habitat Rating</u>		<u>Sediment+Pfankuch Rating</u>		<u>Use Support Rating</u>	
	1998	2000	1998	2000	1998	2000	1998	2000
RFS03S01		fair		good		fair		partial support
RFS03R02		fair		good		fair		partial support
RFS03R03		fair		good		fair		partial support
RFS03S04		poor		good		fair		not supporting
Total Mean	*	fair	*	good	*	fair	*	partial support
Total Median	*	fair	*	good	*	fair	*	partial support

*no data were reported for Bailey Branch in U. S. EPA (1999)

Table A12. BVET habitat survey results for Bailey Branch.

District:	Tallulah
Quadrangle:	Rabun Bald
Survey Date:	7/??/00
Downstream Starting Point:	Addie Confluence
Total Distance Surveyed:	1.0
Percent of Total Area Pools:	49
Number of Pools:	51
Number of Pools per km:	50
Total Pool Area (m ²):	1101+/-405
Mean Pool Area (m ²):	22
Correction Factor:	0.91
Mean Maximum Depth (cm):	35
Mean Average Depth (cm):	22
Mean Residual Pool Depth (cm):	14
Percent of Total Area Riffles:	51
Number of Riffles:	30
Number of Riffles per km:	29
Total Riffle Area (m ²):	1130+/-273
Mean Riffle Area (m ²):	38
Correction Factor:	0.91
Mean Maximum Depth (cm):	19
Mean Average Depth (cm):	11
Number of LWD pieces per km:	87
LWD < 5 m, 5-10 cm:	120
LWD < 5 m, 10-50 cm:	51
LWD < 5 m, > 50 cm:	16
LWD > 5 m, 5-10 cm:	110
LWD > 5 m, 10-50 cm:	87
LWD > 5 m, > 50 cm:	20
Rootwads:	2
Mean Channel Width (m):	4
Mean Riparian Width (m) (Total*):	17
Maximum Riparian Width (Total):	29
75th Percentile (Total):	22
25th Percentile (Total):	11
Minimum Riparian Width (Total):	8
Mean Riparian Width (m) (Left, Right**):	6
Maximum Riparian Width (Left, Right):	23
75th Percentile (Left, Right):	5
25th Percentile (Left, Right):	2
Minimum Riparian Width (Left, Right):	1
Percent of Pool Habitat Surveyed as Glides:	33
Rosgen's Channel Type Frequency:	
% Type A:	6
% Type B:	93
% Type C:	1
% Type D:	0
% Type E:	0
% Type F:	0
% Type G:	0
Percent Pools with > 35% Embeddedness:	39
Average Channel Gradient (%):	7

*Calculation sums left riparian + right riparian + stream channel

**Calculation uses left and right riparian values, not the sum of left and right

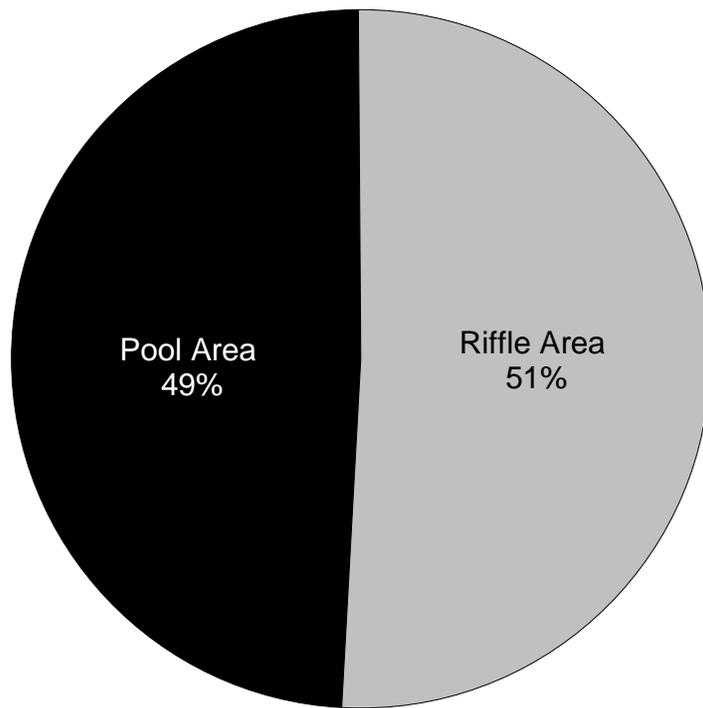


Figure A10. Percent pool and riffle surface area in Bailey Branch, Chattahoochee National Forest, 2000.

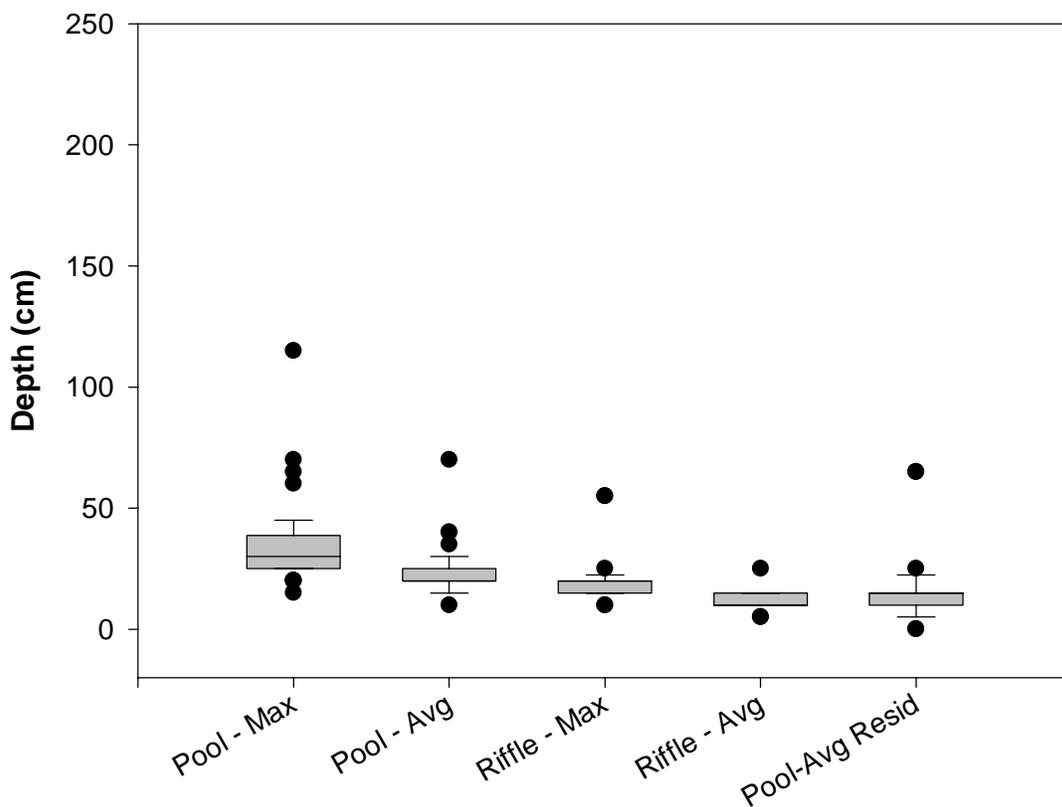


Figure A11. Maximum and average depths for pools and riffles, and average residual pool depths for Bailey Branch, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

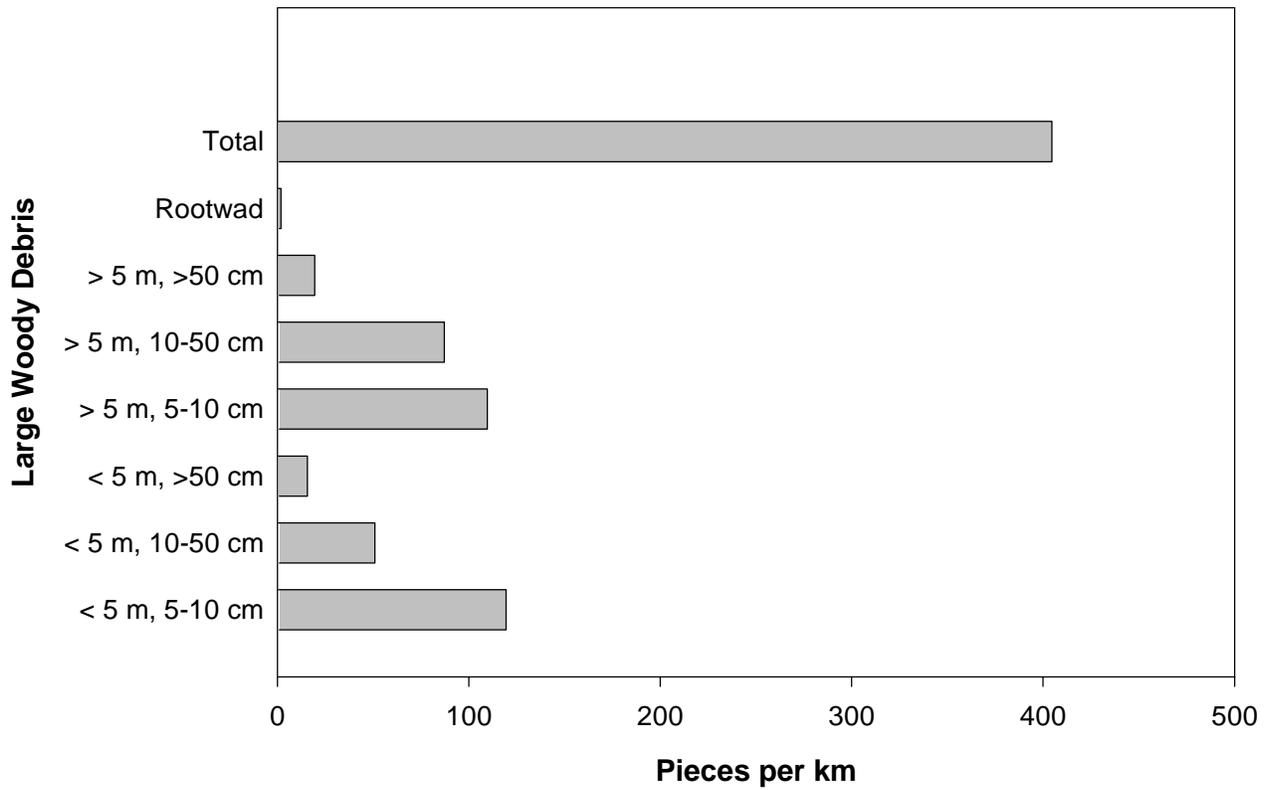


Figure A12. Pieces of large woody debris (LWD) per kilometer in Bailey Branch, Chattahoochee National Forest, 2000.

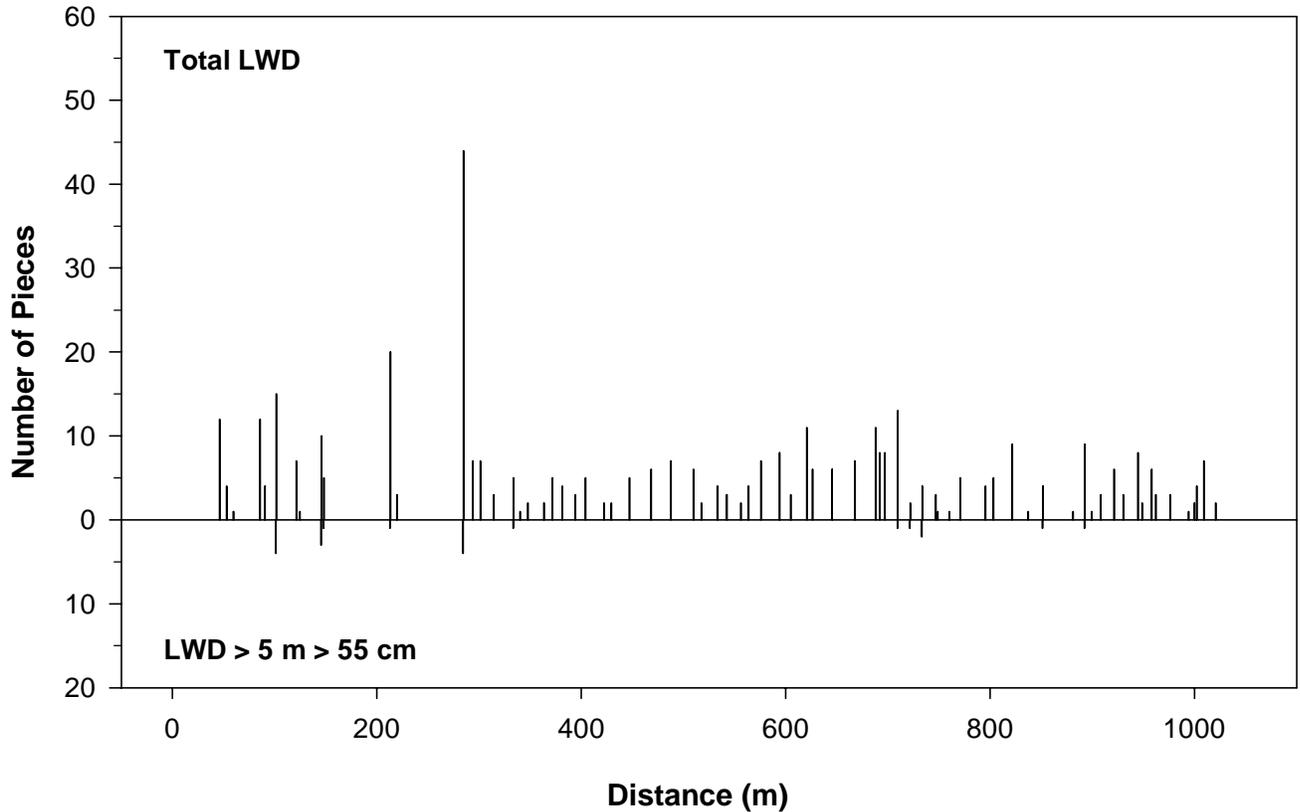


Figure A13. Distribution and abundance of LWD in Bailey Branch, Chattahoochee National Forest, 2000.

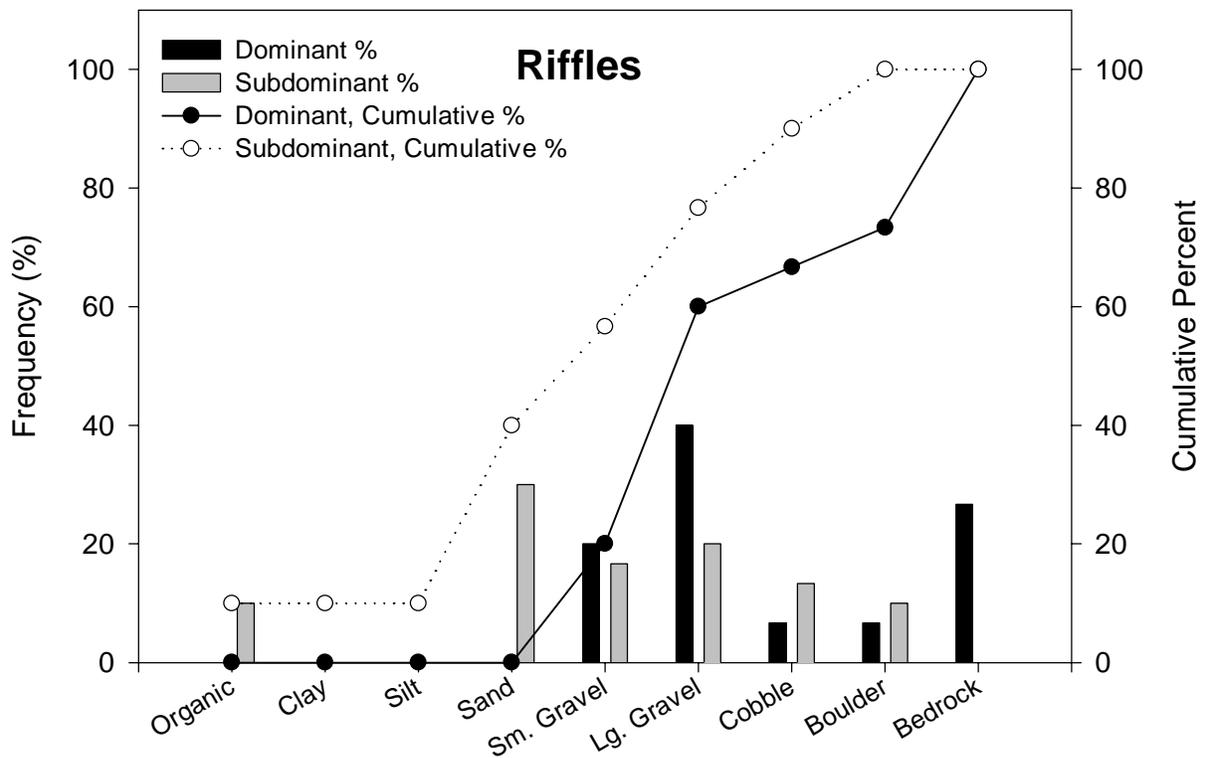
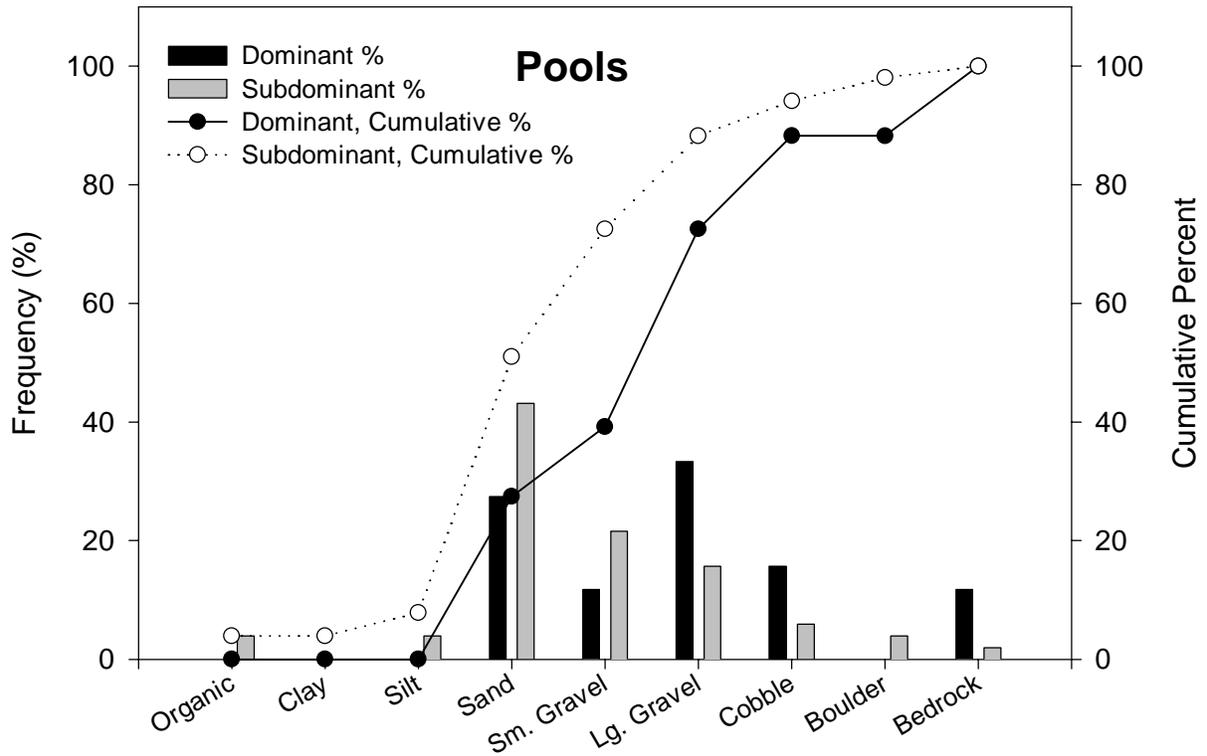


Figure A14. Frequency (percent) of dominant and subdominant substrate occurrence for pools and riffles in Bailey Branch, Chattahoochee National Forest, 2000. Solid dots and bars represent percent and cumulative percent of dominant substrate, open dots and gray bars represent percent and cumulative percent of subdominant substrate.

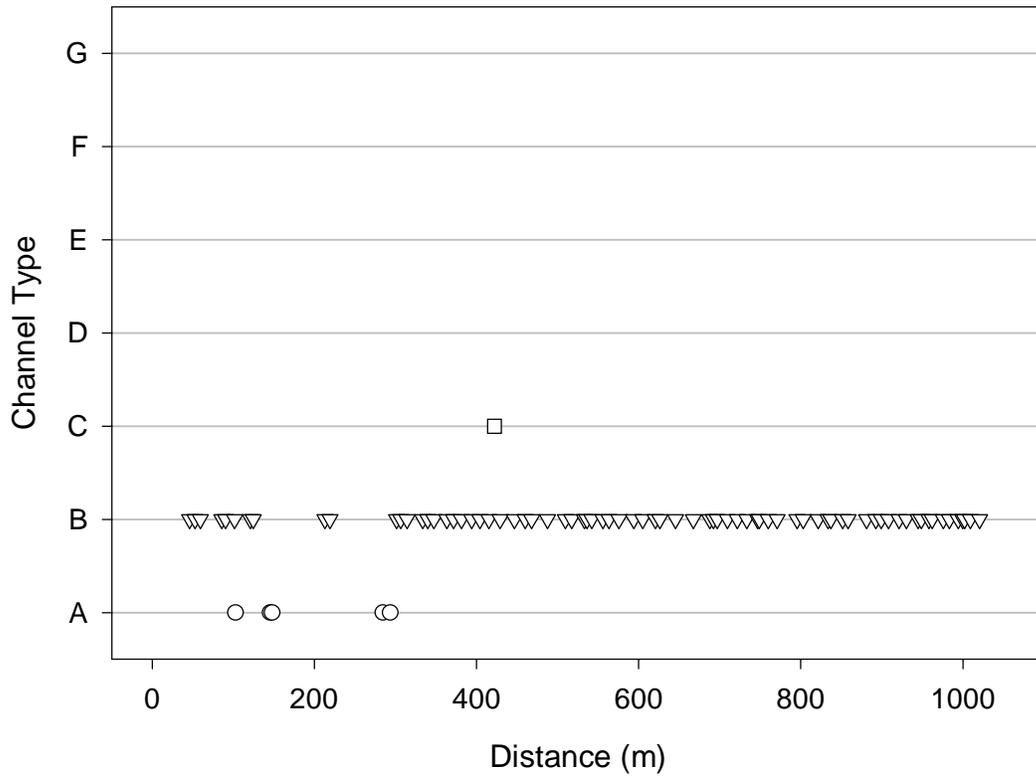


Figure A15. Rosgen's channel type distribution in Bailey Branch, Chattahoochee National Forest, 2000.

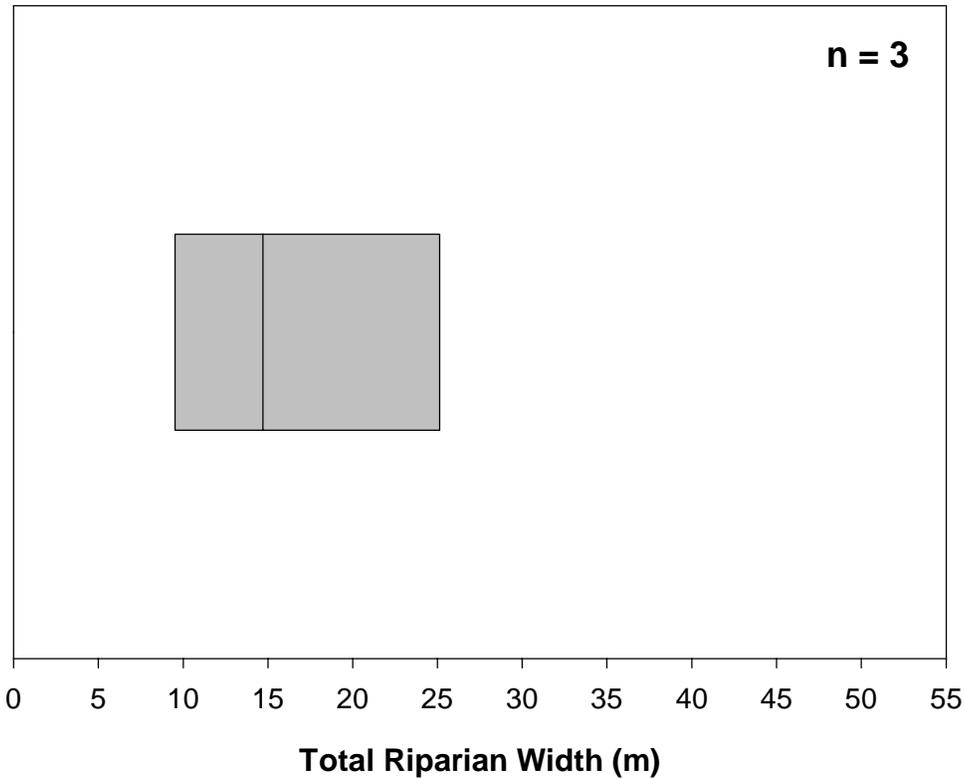


Figure A16. Total riparian width (channel width+right riparian+left riparian) for Bailey Branch, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

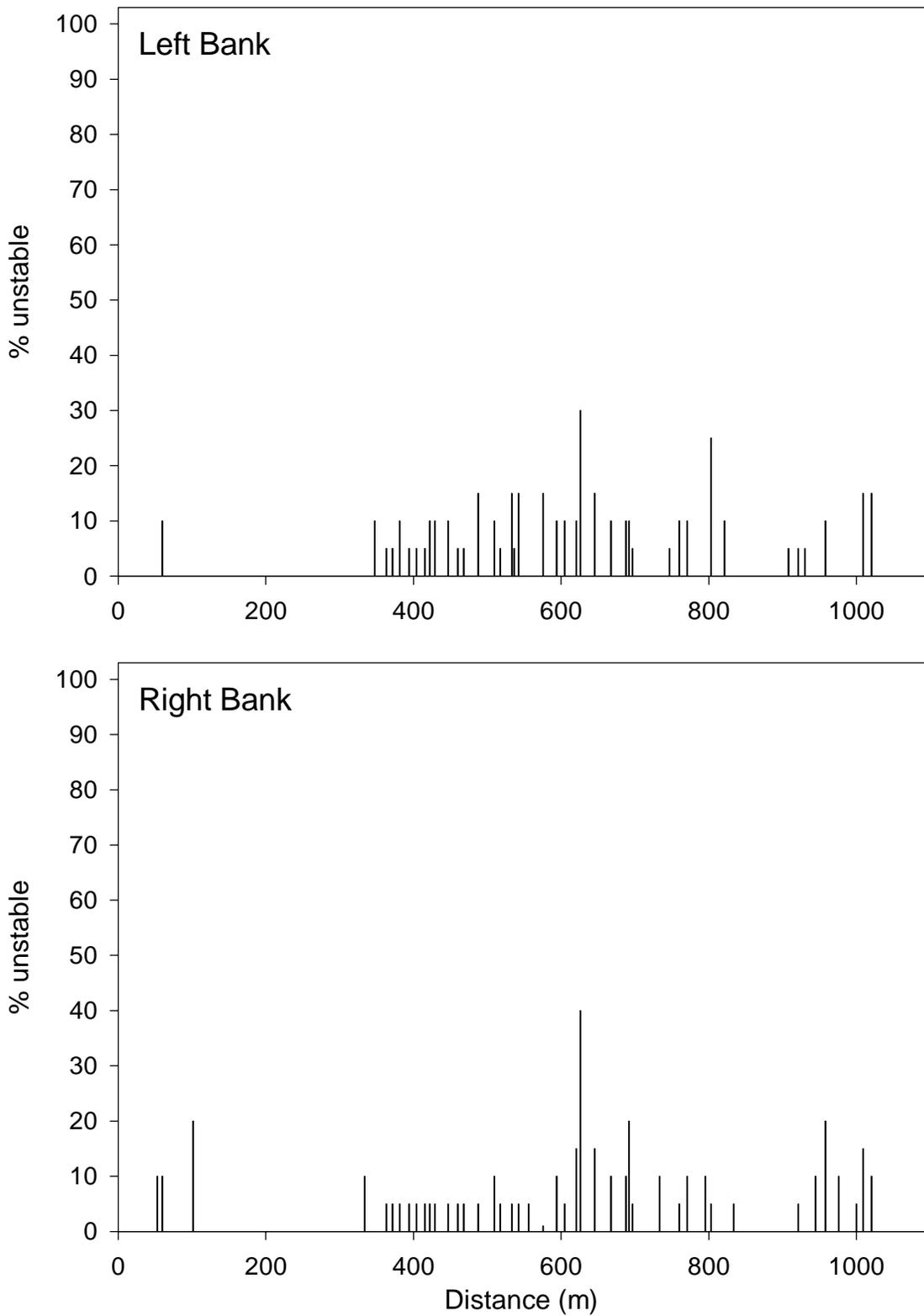


Figure A17. Percent of bank in the Bailey Branch, Chattahoochee National Forest, 2000, considered to be unstable (% of bank composed of exposed erodible material from water's edge to bankfull). Estimated for every habitat unit.

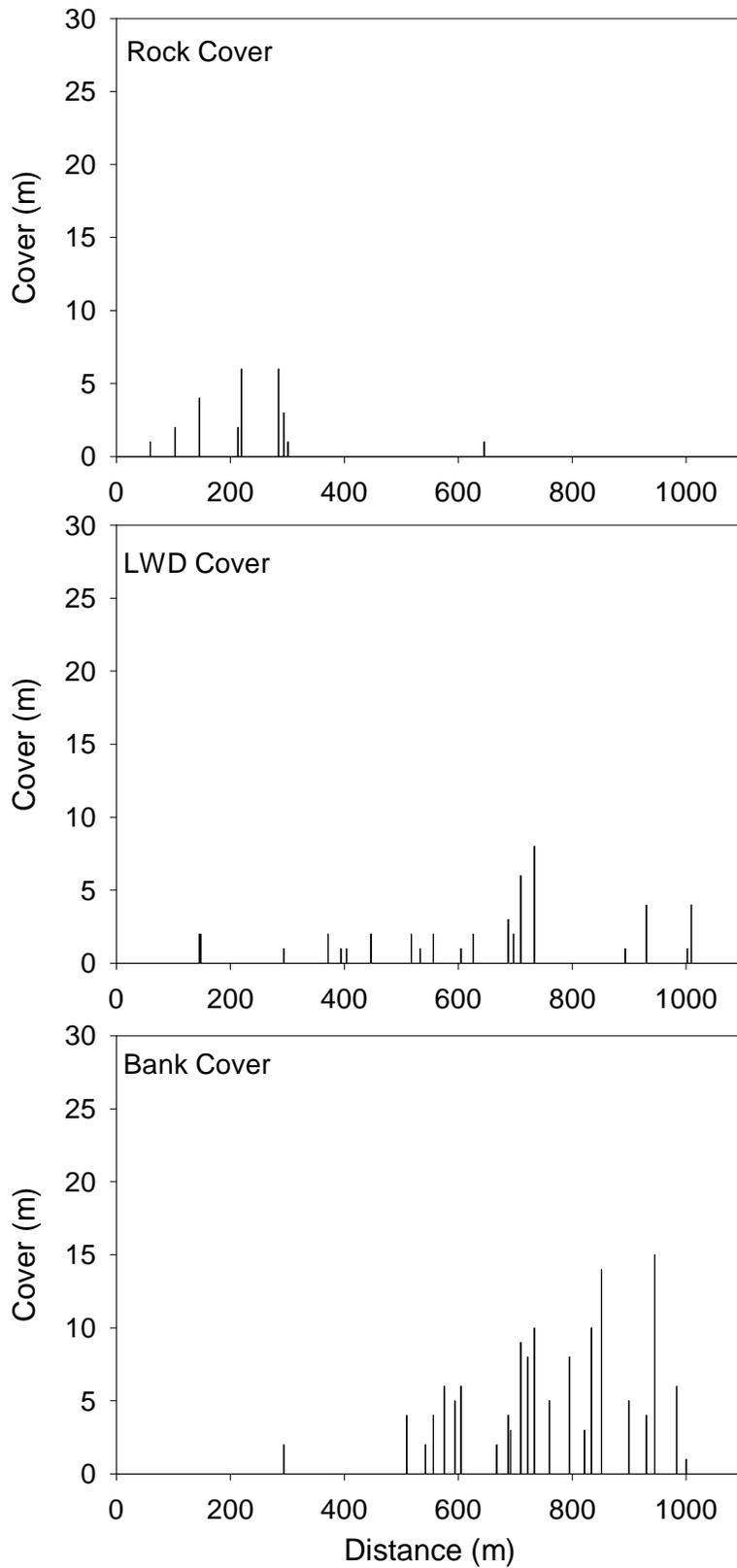


Figure A18. Estimated linear meters of overhead cover provided by rock, LWD, and undercut banks within the wetted stream channel for each habitat unit in Bailey Branch, Chattahoochee National Forest, 2000. Cover was considered to be provided if a 15 cm object could be hidden beneath the cover type.

West Fork sub-watershed

Law Ground Creek

Table A13. Results, rankings, and biological ratings for macroinvertebrate samples collected at sites in Law Ground Creek during 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u># of EPT Taxa</u>		<u>% EPT Taxa</u>		<u>% 2 Dominant Taxa</u>		<u>NCBI</u>		<u>Clinger Taxa</u>		<u>Final Score</u>		<u>Bio. Rating</u>													
	1998		2000		1998		2000		1998		2000		1998	2000												
	#	rank	#	rank	%	rank	%	rank	#	rank	#	rank	#	rank												
	(0-6)		(0-6)		(0-6)		(0-6)		(0-6)		(0-6)															
WF-11	12	2			62.79	4			54.65	0			4.58	4			12	2			12		fair			
WFFS11S01			7	2			54.55	4			56.15	0			2.73	6			5	0			12		fair	
WFFS11R02			19	6			59.65	4			38.60	2			3.02	6			11	2			20		good	
WFFS11R03			11	2			49.35	2			48.05	2			3.62	6			7	2			14		fair	
WFFS11S04			11	2			57.76	4			31.90	2			2.77	6			8	2			16		fair	
Total Mean	12	2	12	2	62.79	4	55.33	4	54.65	0	43.67	2	4.58	4	3.04	6	12	2	8	2	12	16	fair	fair		
Total Median	12	2	11	2	62.79	4	56.15	4	54.65	0	43.32	2	4.58	4	2.89	6	12	2	8	2	12	16	fair	fair		

Table A14. RBP habitat form total scores, rankings, and ratings for sites in Law Ground Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>RBP Habitat</u>				<u>RBP Habitat Rating</u>	
	1998		2000		1998*	2000*
	score	rank	score	rank		
	(0-135)*		(0-200)*			
		(0-3)		(0-3)		
WF11	48	0			poor	
WFFS11S01			138	2		good
WFFS11R02			150	2		good
WFFS11R03			84	0		poor
WFFS11S04			104	1		fair
Total Mean	48	0	119	1	poor	fair
Total Median	48	0	121	1	poor	fair

Table A15. Pebble count and cobble embeddedness results and rankings for sample sites in Law Ground Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	D50				% ≤ 2 mm				% Cobble Embeddedness				Average Sediment Rank	
	<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>
	size (mm)	rank (0-2)	size (mm)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	rank (0-2)	rank (0-2)
WF11	70	2			30.0	2			45.7	1			1.7	
WFFS11S01			bedrock	2			22.0	2			71.5	0		1.3
WFFS11R02			61	2			22.0	2			54.3	0		1.3
WFFS11R03			12	0			33.6	1			56.9	0		0.3
WFFS11S04			288	2			18.0	2			74.1	0		1.3
Total Mean	70	2	1114	2	30.0	2	23.9	2	45.7	1	64.2	0	1.7	1.3
Total Median	70	2	174	2	30.0	2	22.0	2	45.7	1	64.2	0	1.7	1.3

Table A16. Pfankuch score and rank, average sediment rank (from Table A15), and overall site and stream ratings for Law Ground Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	Pfankuch				Ave. Sediment Rank		Sum (Pfankuch+Sediment Rank)		Sediment+Pfankuch Rating	
	<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>
	score (136-0)	rank (0-2)	score (136-0)	rank (0-2)	rank (0-2)	rank (0-2)	sum (0-4)	sum (0-4)	rating	rating
WF11	98	1			1.7		2.7		fair	
WFFS11S01			62	2		1.3		3.3		good
WFFS11R02			71	2		1.3		3.3		good
WFFS11R03			115	0		0.3		0.3		poor
WFFS11S04			102	1		1.3		2.3		fair
Total Mean	98	1	88	1	1.7	1.3	2.7	2.3	fair	fair
Total Median	98	1	87	1	1.7	1.3	2.7	2.3	fair	fair

Table A17. Use support rating, based on results of final biological, RBP habitat, and sediment and Pfankuch ratings for Law Ground Creek in 1998 and 2000. Tables used to derive sediment+Pfankuch, RBP, and final biological ratings are found on the preceding pages. Criteria used for use support rating can be found in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>Final Biological Rating</u>		<u>RBP Habitat Rating</u>		<u>Sediment+Pfankuch Rating</u>		<u>Use Support Rating</u>	
	1998	2000	1998	2000	1998	2000	1998	2000
WF11	fair		poor		fair		partial support	
WFFS11S01		fair		good		good		partial support
WFFS11R02		good		good		good		full support
WFFS11R03		fair		poor		poor		partial support
WFFS11S04		fair		fair		fair		partial support
Total Mean	fair	fair	poor	fair	fair	fair	partial support	partial support
Total Median	fair	fair	poor	fair	fair	fair	partial support	partial support

Table A18. BVET habitat survey results for Law Ground Creek.

District:	Tallulah
Quadrangle:	Satolah
Survey Date:	07/??/00
Downstream Starting Point:	at road S884
Total Distance Surveyed:	1.3
Percent of Total Area Pools:	25
Number of Pools:	34
Number of Pools per km:	27
Total Pool Area (m ²):	1290+/-126
Mean Pool Area (m ²):	38
Correction Factor:	1.15
Mean Maximum Depth (cm):	30
Mean Average Depth (cm):	18
Mean Residual Pool Depth (cm):	6
Percent of Total Area Riffles:	75
Number of Riffles:	39
Number of Riffles per km:	31
Total Riffle Area (m ²):	3783+/-164
Mean Riffle Area (m ²):	97
Correction Factor:	1.03
Mean Maximum Depth (cm):	24
Mean Average Depth (cm):	13
Number of LWD pieces per km:	32
LWD < 5 m, 5-10 cm:	94
LWD < 5 m, 10-50 cm:	36
LWD < 5 m, > 50 cm:	9
LWD > 5 m, 5-10 cm:	36
LWD > 5 m, 10-50 cm:	32
LWD > 5 m, > 50 cm:	7
Rootwads:	6
Mean Channel Width (m):	4
Mean Riparian Width (m) (Total*):	21
Maximum Riparian Width (Total):	49
75th Percentile (Total):	29
25th Percentile (Total):	8
Minimum Riparian Width (Total):	7
Mean Riparian Width (m) (Left, Right**):	8
Maximum Riparian Width (Left, Right):	30
75th Percentile (Left, Right):	13
25th Percentile (Left, Right):	1
Minimum Riparian Width (Left, Right):	1
Percent of Pool Habitat Surveyed as Glides:	12
Rosgen's Channel Type Frequency:	
% Type A:	n/a
% Type B:	n/a
% Type C:	n/a
% Type D:	n/a
% Type E:	n/a
% Type F:	n/a
% Type G:	n/a
Percent Pools with > 35% Embeddedness:	97
Average Channel Gradient (%):	9

*Calculation sums left riparian + right riparian + stream channel

**Calculation uses left and right riparian values, not the sum of left and right

n/a Rosgen Channel Type not recorded

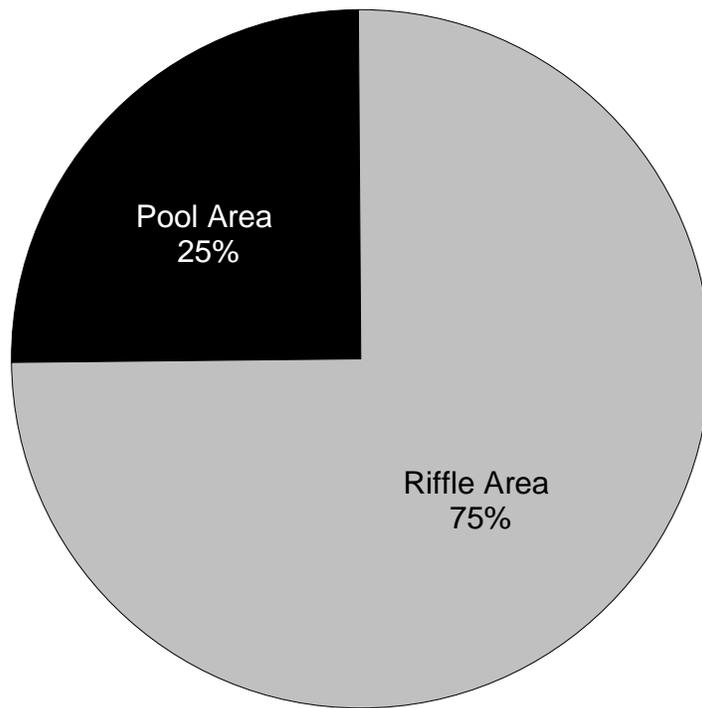


Figure A19. Percent pool and riffle surface area in Law Ground Creek, Chattahoochee National Forest, 2000.

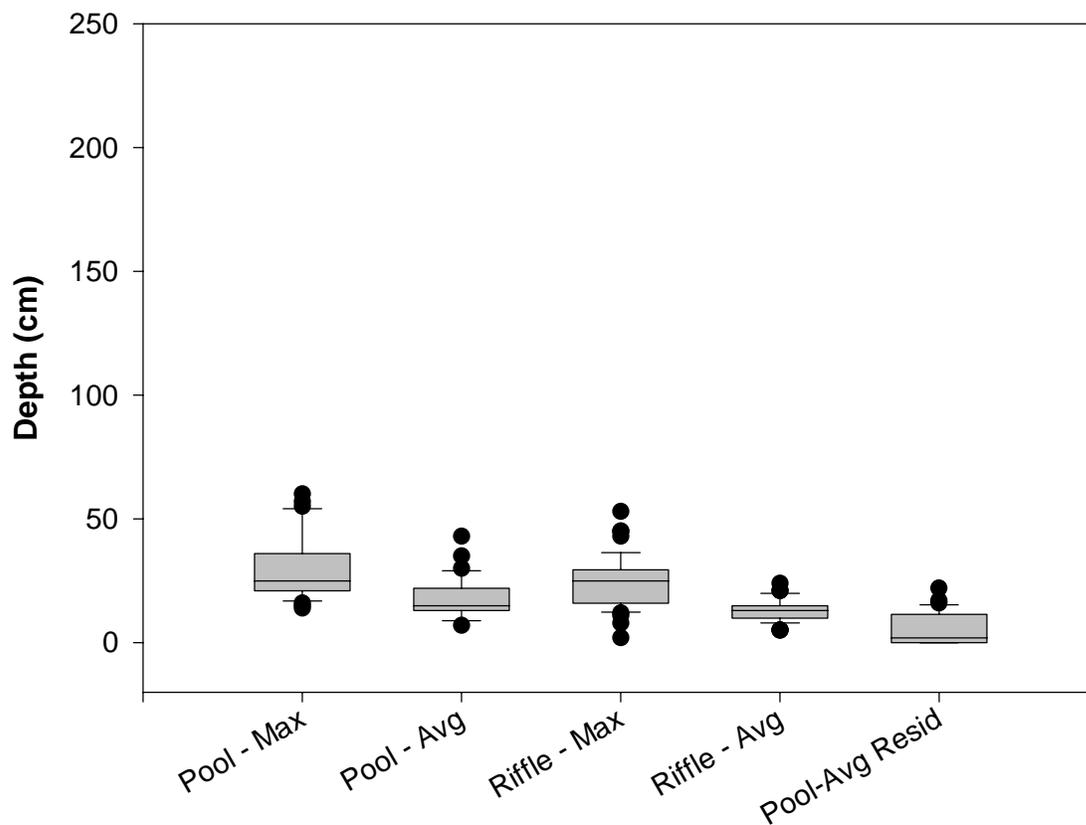


Figure A20. Maximum and average depths for pools and riffles, and average residual pool depths for Law Ground Creek, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

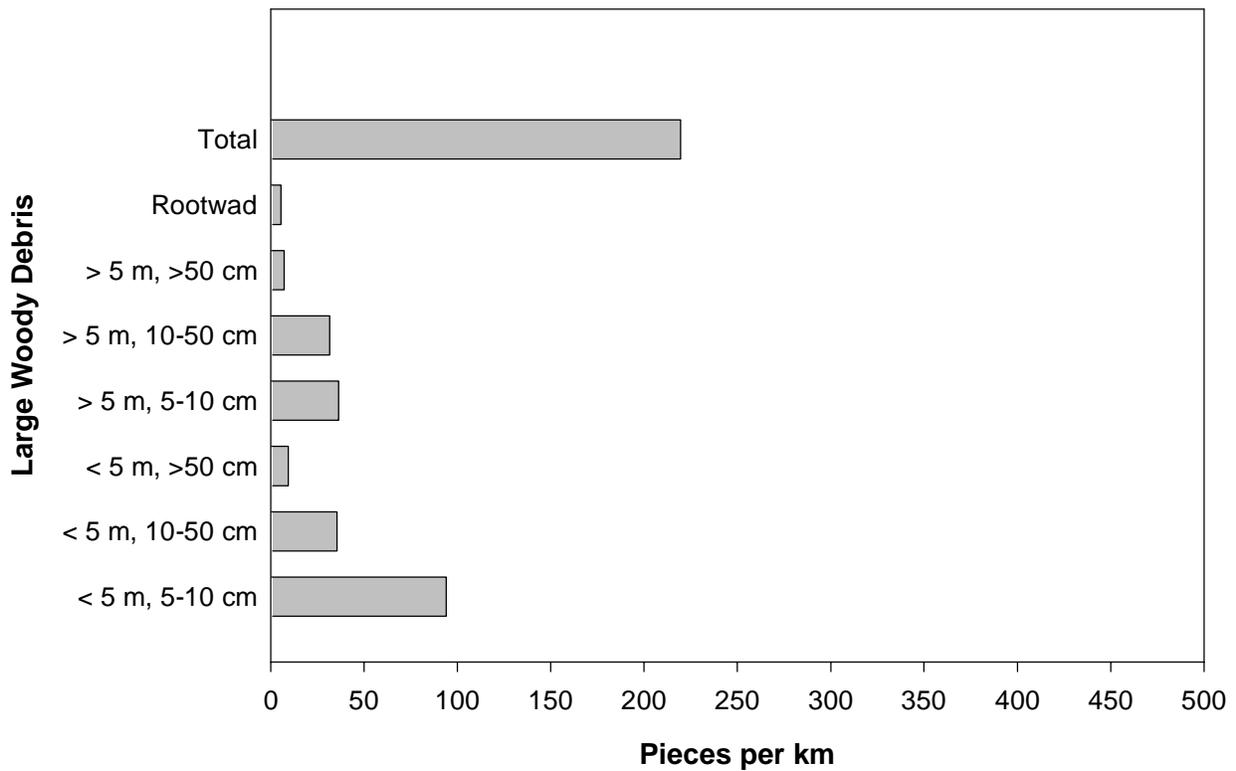


Figure A21. Pieces of large woody debris (LWD) per kilometer in Law Ground Creek, Chattahoochee National Forest, 2000.

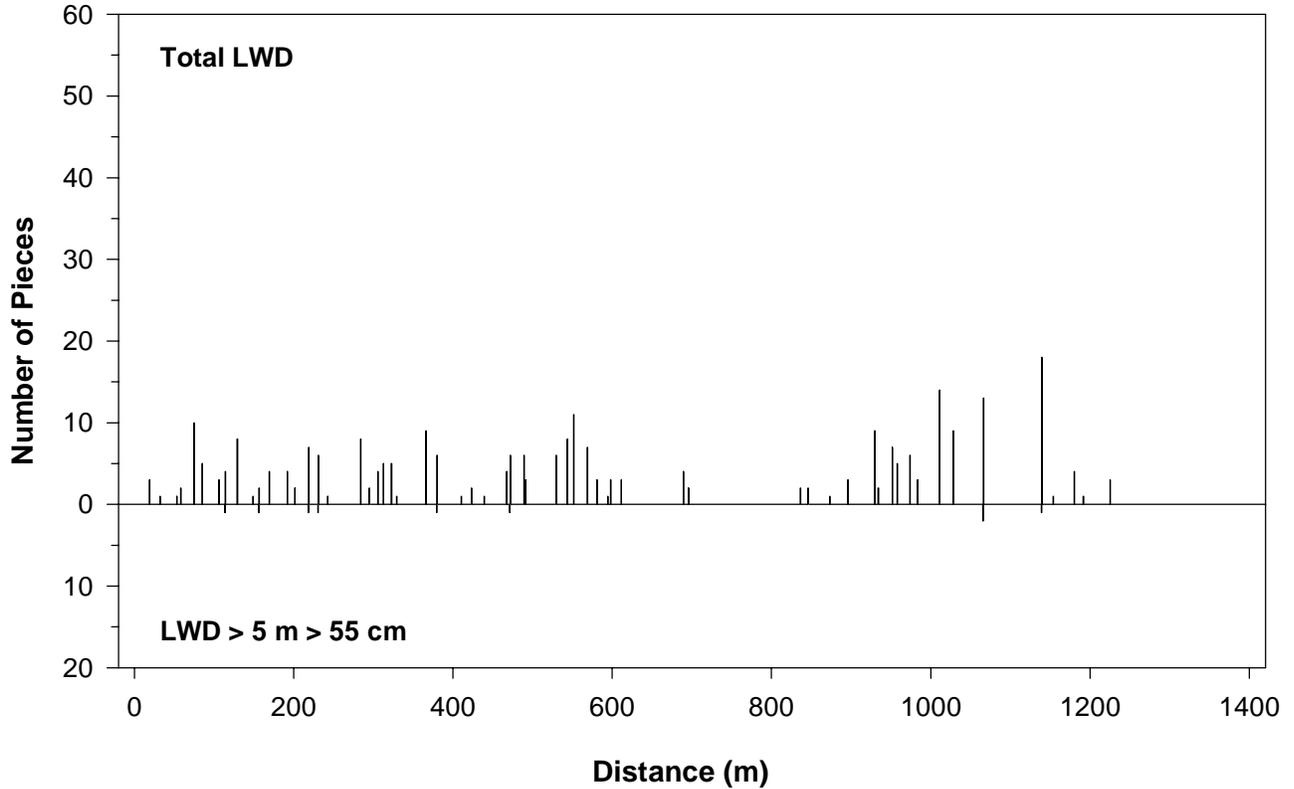


Figure A22. Distribution and abundance of LWD in Law Ground Creek, Chattahoochee National Forest, 2000.

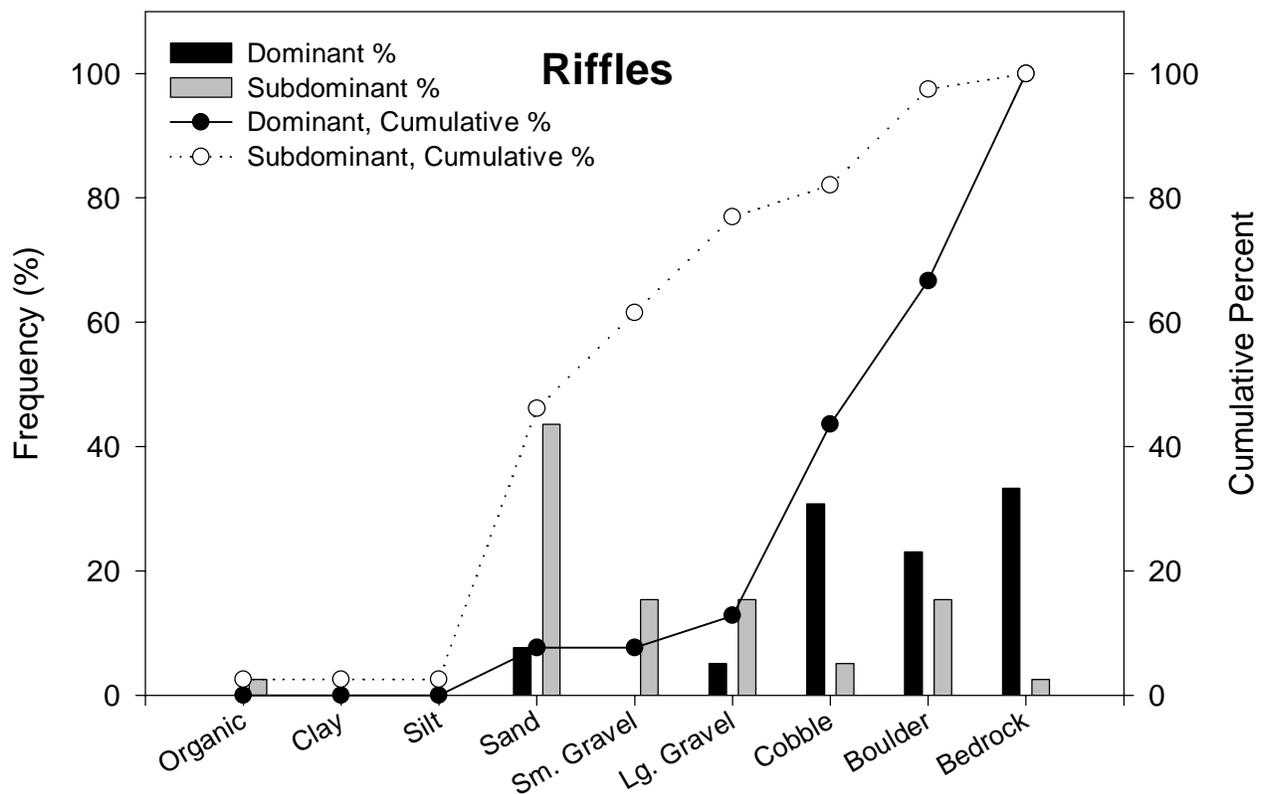
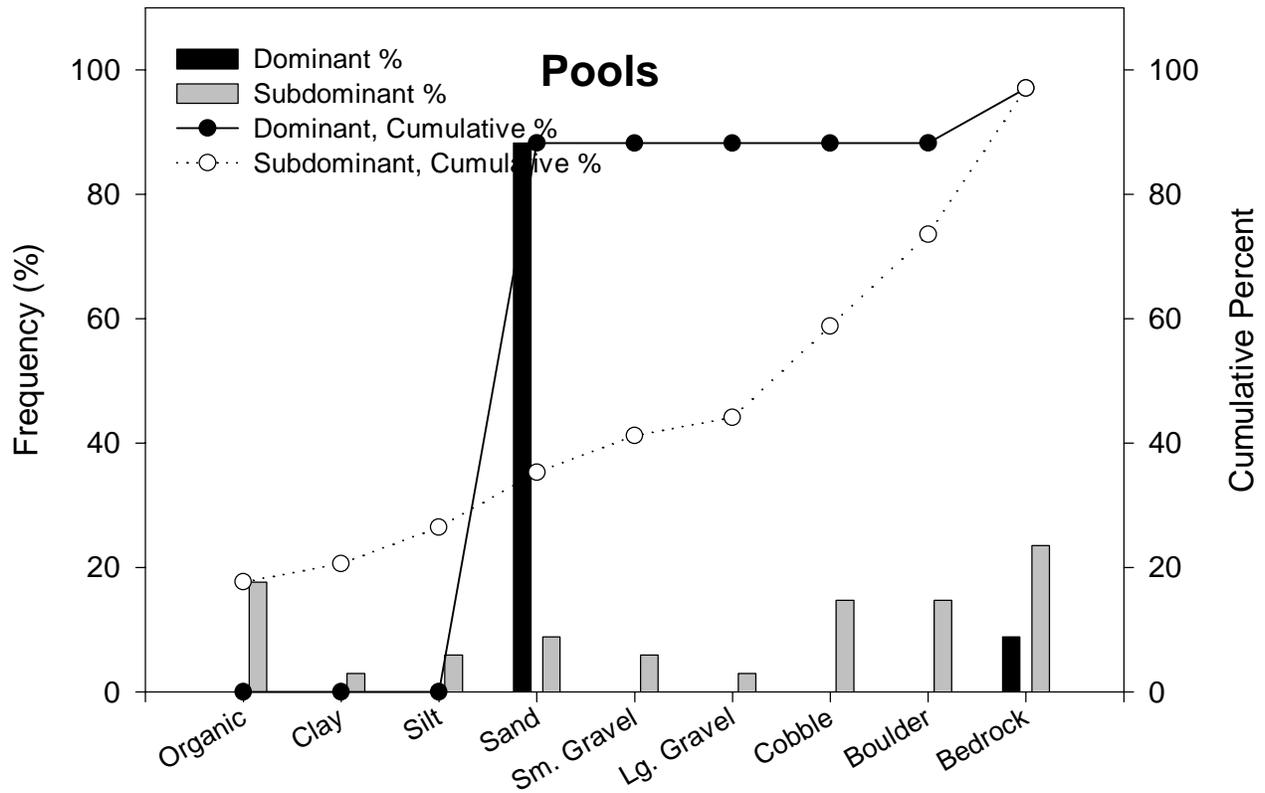


Figure A23. Frequency (percent) of dominant and subdominant substrate occurrence for pools and riffles in Law Ground Creek, Chattahoochee National Forest, 2000. Solid dots and bars represent percent and cumulative percent of dominant substrate, open dots and gray bars represent percent and cumulative percent of subdominant substrate.

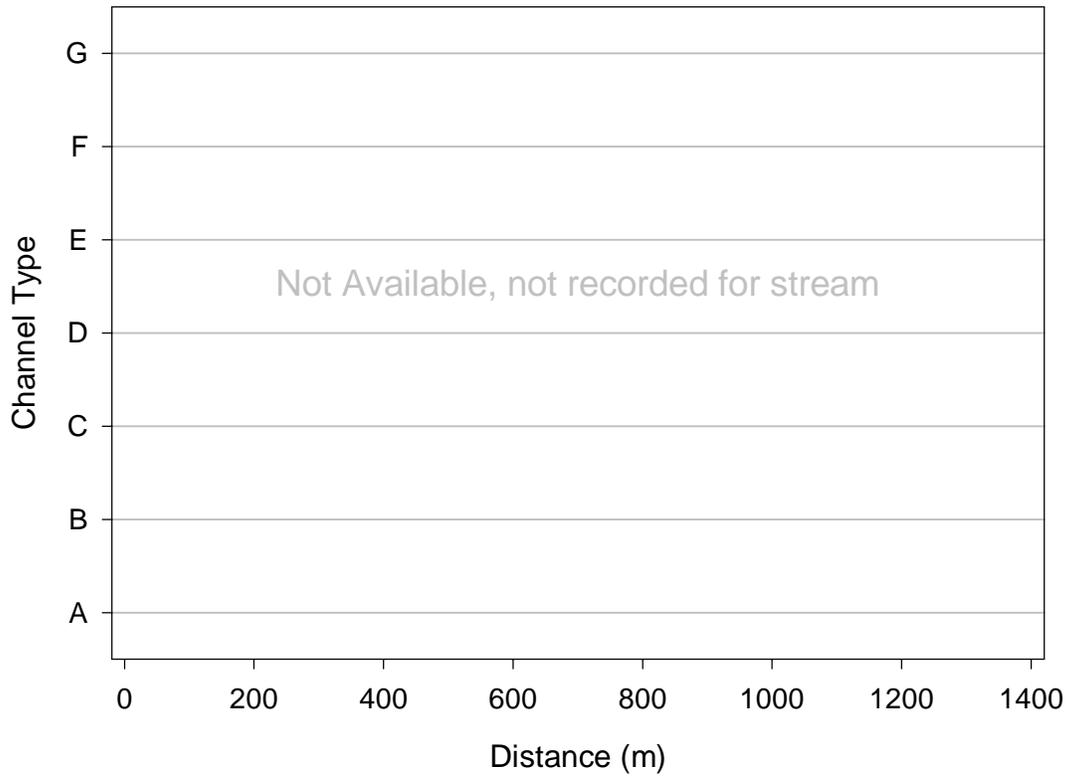


Figure A24. Rosgen's channel type distribution in Law Ground Creek, Chattahoochee National Forest, 2000.

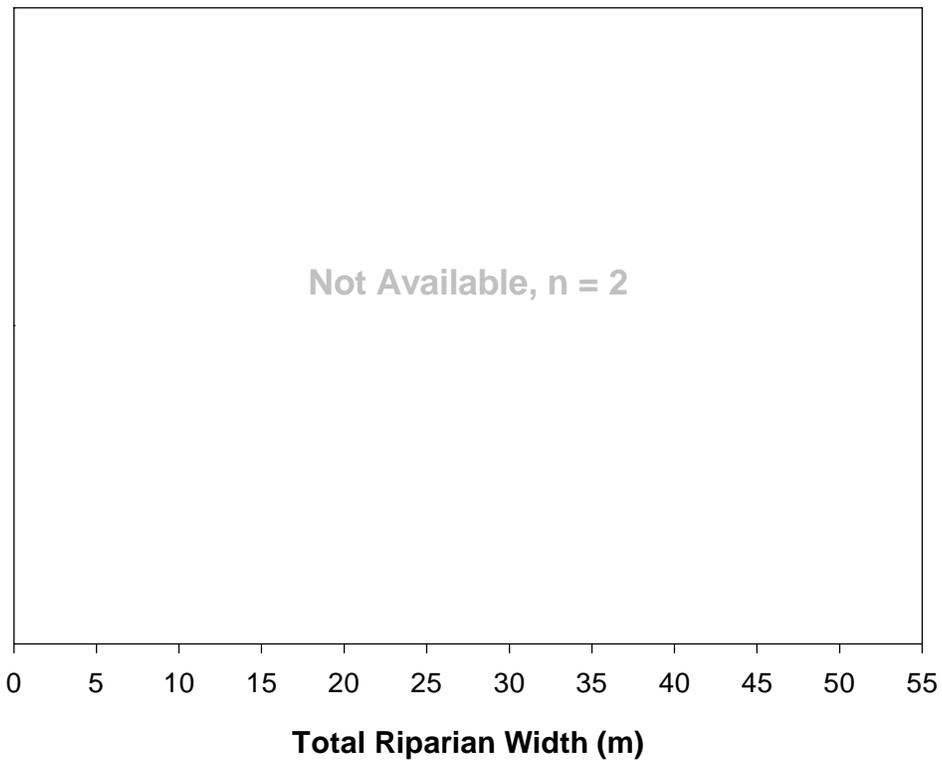


Figure A25. Total riparian width (channel width+right riparian+left riparian) for Law Ground Creek, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

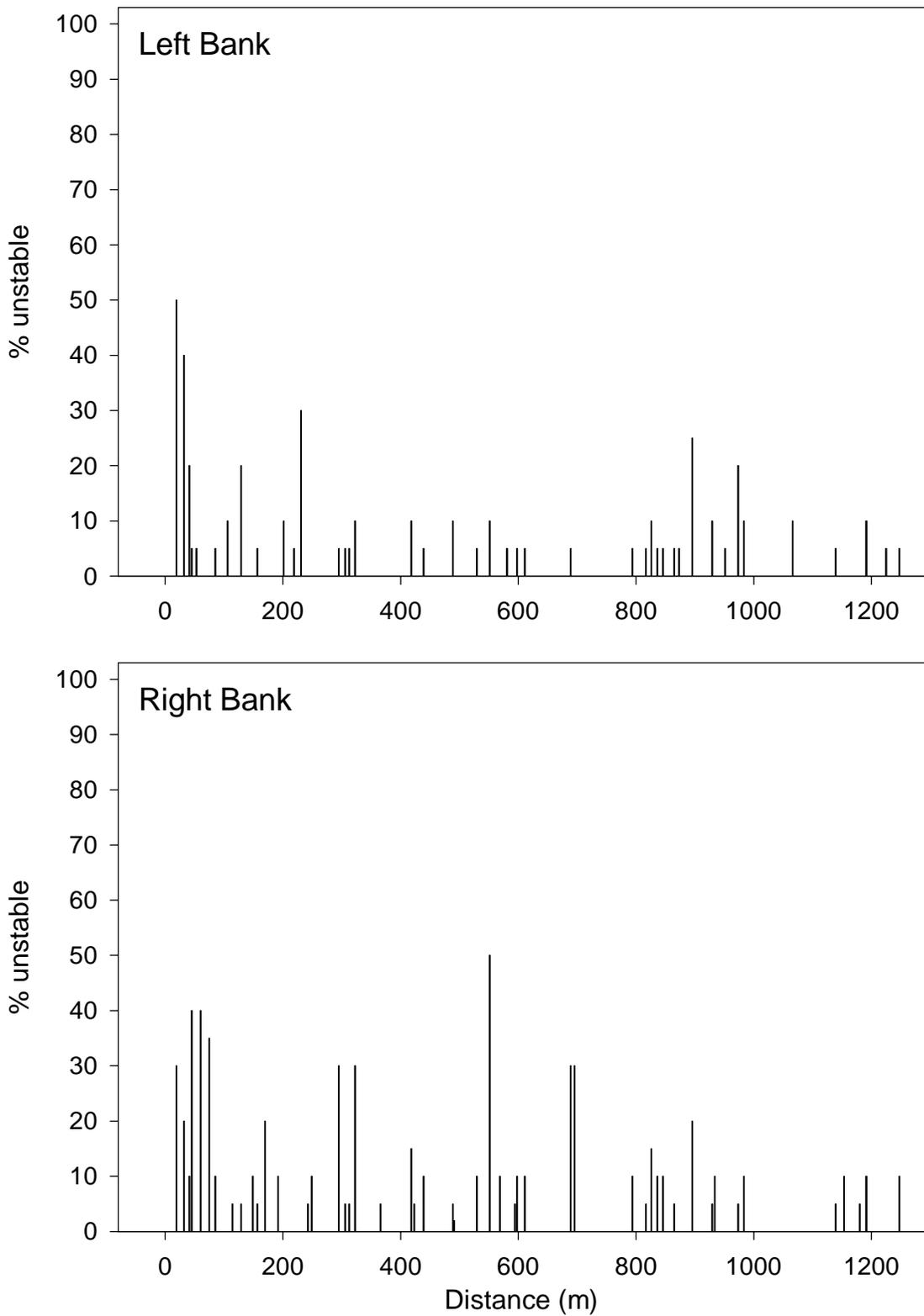


Figure A26. Percent of bank in Law Ground Creek, Chattahoochee National Forest, 2000, considered to be unstable (% of bank composed of exposed erodible material from water's edge to bankfull). Estimated for every habitat unit.

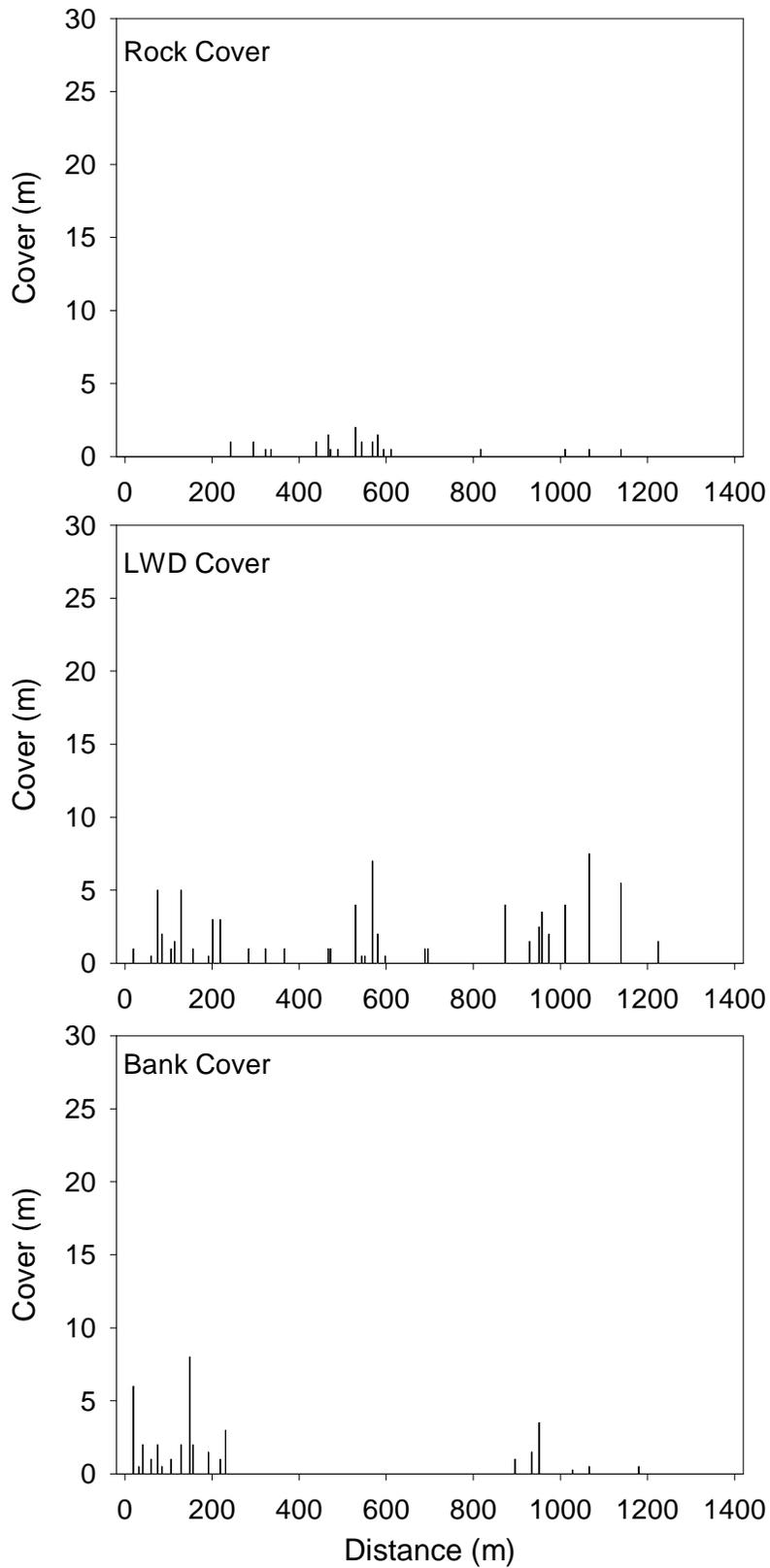


Figure A27. Estimated linear meters of overhead cover provided by rock, LWD, and undercut banks within the wetted stream channel for each habitat unit in Law Ground Creek, Chattahoochee National Forest, 2000. Cover was considered to be provided if a 15 cm object could be hidden beneath the cover type.

West Fork sub-watershed

Reed Mill Creek

Table A19. Results, rankings, and biological ratings for macroinvertebrate samples collected at sites in Reed Mill Creek during 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u># of EPT Taxa</u>		<u>% EPT Taxa</u>		<u>% 2 Dominant Taxa</u>		<u>NCBI</u>		<u>Clinger Taxa</u>		<u>Final Score</u>		<u>Bio. Rating</u>												
	1998		2000		1998		2000		1998		2000		1998	2000											
	#	rank	#	rank	%	rank	%	rank	#	rank	#	rank	#	rank											
	(0-6)		(0-6)		(0-6)		(0-6)		(0-6)		(0-6)														
WF10	16	4			76.97	6			39.89	2			3.34	6			16	4			22			good	
WFFS10S01			14	4			68.82	4			32.35	2			2.92	6			11	2			18		good
WFFS10S02			15	4			62.86	4			28.00	4			2.70	6			12	2			20		good
WFFS10S03			11	2			76.37	6			35.16	2			2.50	6			6	0			16		fair
WFFS10R04			12	2			58.76	4			38.98	2			3.40	6			8	2			16		fair
WFFS10R05			11	2			63.91	4			37.87	2			3.25	6			6	0			14		fair
Total Mean	16	4	13	4	76.97	6	66.14	4	39.89	2	34.47	2	3.34	6	2.95	6	16	4	9	2	22	18	good	good	
Total Median	16	4	12	2	76.97	6	63.91	4	39.89	2	35.16	2	3.34	6	2.92	6	16	4	8	2	22	16	good	fair	

Table A20. RBP habitat form total scores, rankings, and ratings for sites in Reed Mill Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>RBP Habitat</u>				<u>RBP Habitat Rating</u>	
	1998		2000		1998*	2000*
	score	rank	score	rank		
	(0-135)*		(0-200)*			
		(0-3)		(0-3)		
WF10	79	1				fair
WFFS10S01			133	2		good
WFFS10S02			118	1		fair
WFFS10S03			120	1		fair
WFFS10R04			116	1		fair
WFFS10R05			87	0		poor
Total Mean	79	1	115	1	fair	fair
Total Median	79	1	118	1	fair	fair

Table A21. Pebble count and cobble embeddedness results and rankings for sample sites in Reed Mill Creek in 1998 and 2000. Sites are arranged from upstream to downstream. Ranking criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	D50				% ≤ 2 mm				% Cobble Embeddedness				Average Sediment Rank	
	<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>
	size (mm)	rank (0-2)	size (mm)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	rank (0-2)	rank (0-2)
WF10	1.8	0			54	0			45.0	1			0.3	
WFFS10S01			1300	2			24.1	2			65.0	0		1.3
WFFS10S02			13	0			36.0	1			50.9	0		0.3
WFFS10S03			11	0			36.7	1			55.5	0		0.3
WFFS10R04			24	1			28.4	1			55.3	0		0.7
WFFS10R05			10	0			38.0	1			82.3	0		0.3
Total Mean	1.8	0	271	2	54	0	32.6	1	45.0	1	61.8	0	0.3	1.0
Total Median	1.8	0	13	0	54	0	36.0	1	45.0	1	55.5	0	0.3	0.3

Table A22. Pfankuch score and rank, average sediment rank (from Table A21), and overall site and stream ratings for Reed Mill Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	Pfankuch		Ave. Sediment Rank		Sum (Pfankuch+Sediment Rank)		Sediment+Pfankuch Rating			
	<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>		
	score (136-0)	rank (0-2)	score (136-0)	rank (0-2)	rank (0-2)	rank (0-2)	sum (0-4)	sum (0-4)	rating	rating
WF10	103	1			0.3		1.3		poor	
WFFS10S01			88	1		1.3		2.3		fair
WFFS10S02			106	1		0.3		1.3		fair
WFFS10S03			103	1		0.3		1.3		fair
WFFS10R04			89	1		0.7		1.7		fair
WFFS10R05			111	1		0.3		1.3		fair
Total Mean	103	1	99	1	0.3	1.0	1.3	2.0	poor	fair
Total Median	103	1	103	1	0.3	0.3	1.3	1.3	poor	fair

Table A23. Use support rating, based on results of final biological, RBP habitat, and sediment and Pfankuch ratings for Reed Mill Creek in 1998 and 2000. Tables used to derive sediment+Pfankuch, RBP, and final biological ratings are found on the preceding pages. Criteria used for use support rating can be found in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>Final Biological Rating</u>		<u>RBP Habitat Rating</u>		<u>Sediment+Pfankuch Rating</u>		<u>Use Support Rating</u>	
	1998	2000	1998	2000	1998	2000	1998	2000
WF10	good		fair		poor		support threatened	
WFFS10S01		good		good		fair	full support (watch)	
WFFS10S02		good		fair		fair	full support (watch)	
WFFS10S03		fair		fair		fair	partial support	
WFFS10R04		fair		fair		fair	partial support	
WFFS10R05		fair		poor		fair	partial support	
Total Mean	good	good	fair	fair	poor	fair	support threatened	full support (watch)
Total Median	good	fair	fair	fair	poor	fair	support threatened	partial support

Table A24. BVET habitat survey results for Reed Mill Creek.

District:	Tallulah
Quadrangle:	Satolah
Survey Date:	07/11/00
Downstream Starting Point:	Confluence w/ Chattooga
Total Distance Surveyed:	3.3
Percent of Total Area Pools:	36
Number of Pools:	131
Number of Pools per km:	40
Total Pool Area (m ²):	3686+/-405
Mean Pool Area (m ²):	28
Correction Factor:	0.97
Mean Maximum Depth (cm):	32
Mean Average Depth (cm):	19
Mean Residual Pool Depth (cm):	7
Percent of Total Area Riffles:	64
Number of Riffles:	116
Number of Riffles per km:	35
Total Riffle Area (m ²):	6588+/-765
Mean Riffle Area (m ²):	57
Correction Factor:	1.07
Mean Maximum Depth (cm):	22
Mean Average Depth (cm):	12
Number of LWD pieces per km:	56
LWD < 5 m, 5-10 cm:	127
LWD < 5 m, 10-50 cm:	37
LWD < 5 m, > 50 cm:	16
LWD > 5 m, 5-10 cm:	68
LWD > 5 m, 10-50 cm:	56
LWD > 5 m, > 50 cm:	22
Rootwads:	8
Mean Channel Width (m):	6
Mean Riparian Width (m) (Total*):	14
Maximum Riparian Width (Total):	37
75th Percentile (Total):	16
25th Percentile (Total):	9
Minimum Riparian Width (Total):	8
Mean Riparian Width (m) (Left, Right**):	4
Maximum Riparian Width (Left, Right):	24
75th Percentile (Left, Right):	5
25th Percentile (Left, Right):	1
Minimum Riparian Width (Left, Right):	0
Percent of Pool Habitat Surveyed as Glides:	14
Rosgen's Channel Type Frequency:	
% Type A:	82
% Type B:	18
% Type C:	0
% Type D:	0
% Type E:	0
% Type F:	0
% Type G:	0
Percent Pools with > 35% Embeddedness:	97
Average Channel Gradient (%):	12

*Calculation sums left riparian + right riparian + stream channel

**Calculation uses left and right riparian values, not the sum of left and right

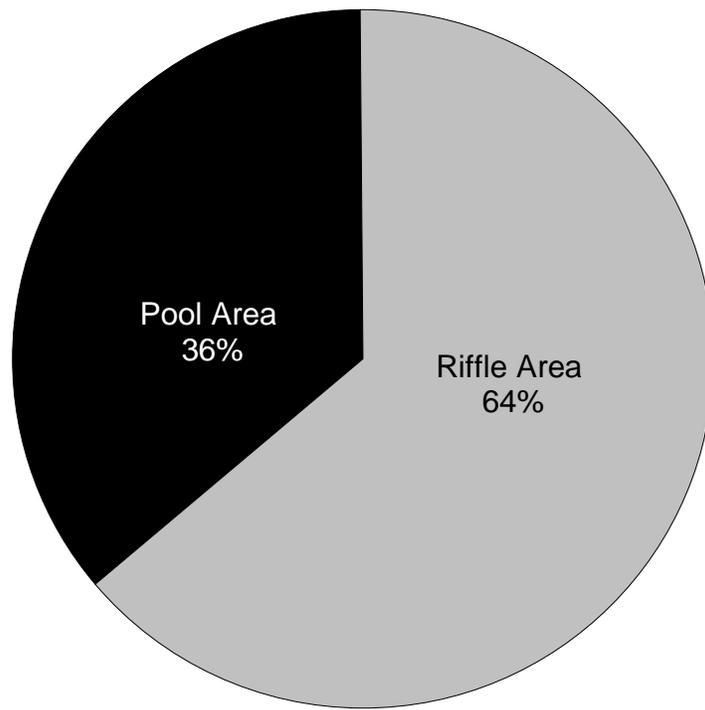


Figure A28. Percent pool and riffle surface area in Reed Mill Creek, Chattahoochee National Forest, 2000.

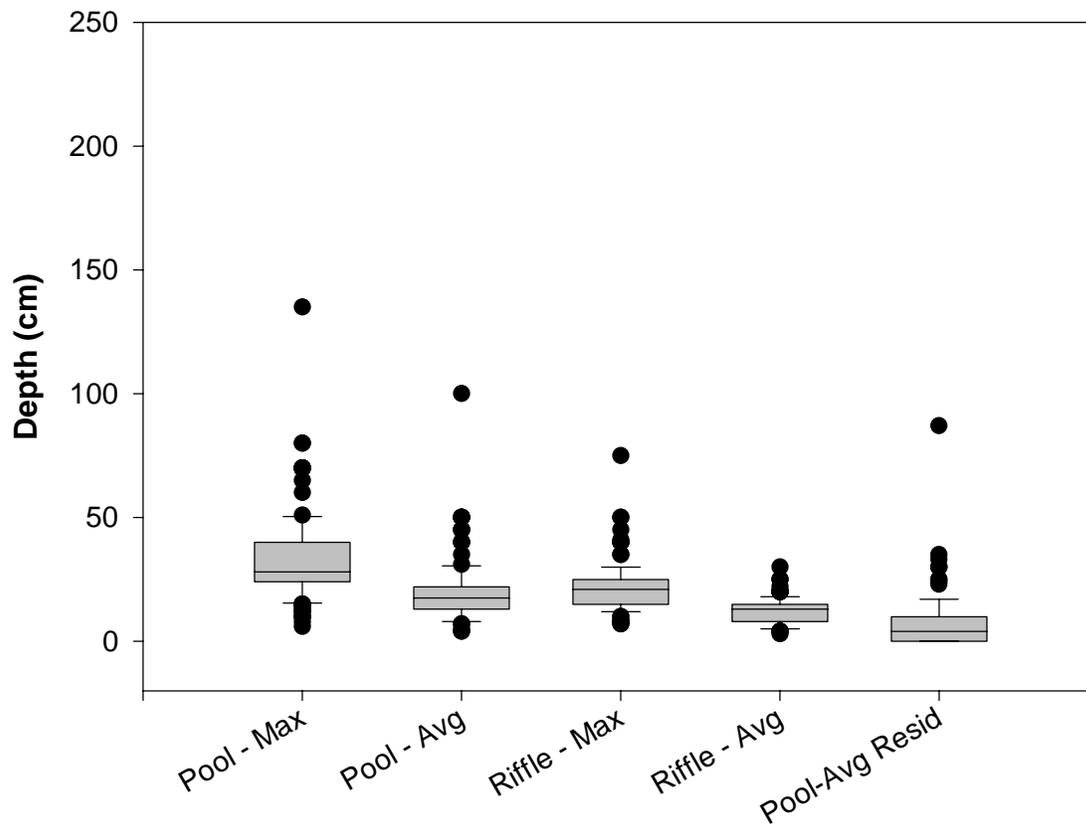


Figure A29. Maximum and average depths for pools and riffles, and average residual pool depths for Reed Mill Creek, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

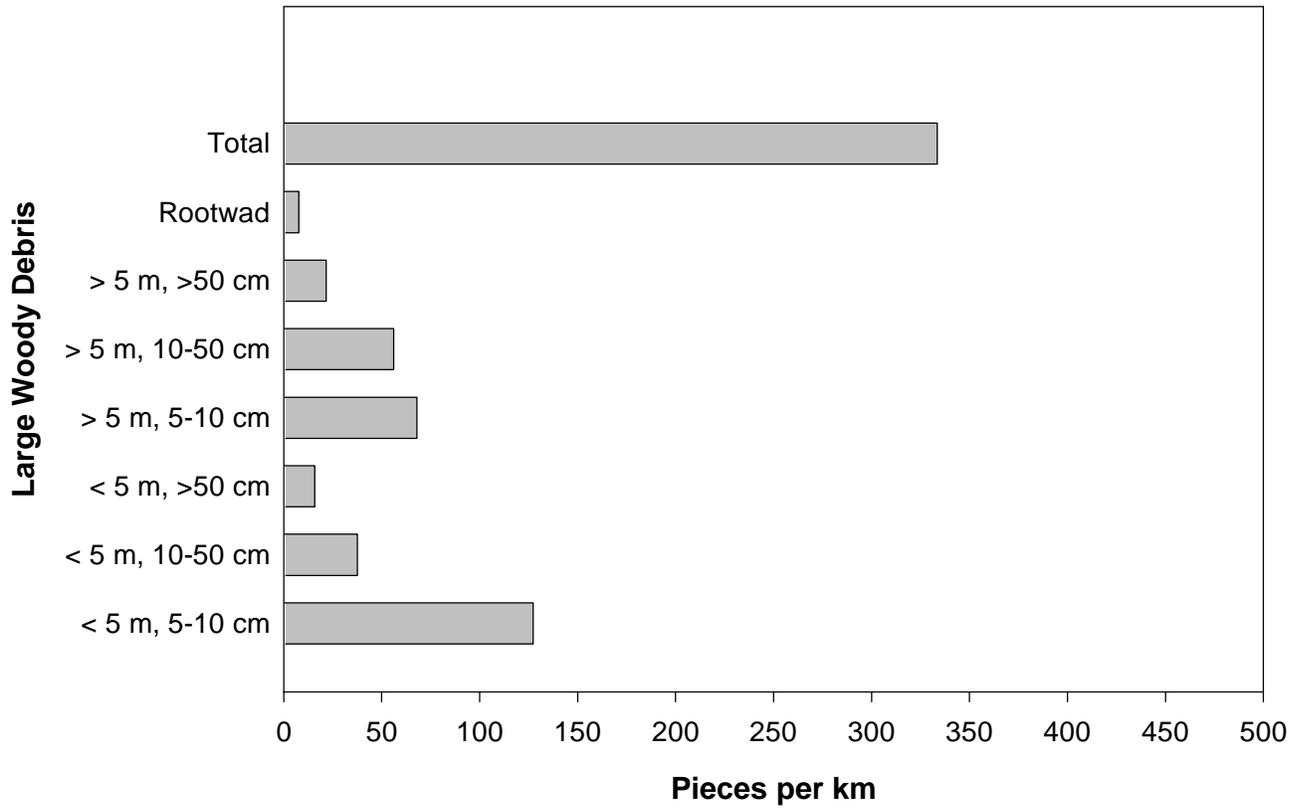


Figure A30. Pieces of large woody debris (LWD) per kilometer in Reed Mill Creek, Chattahoochee National Forest, 2000.

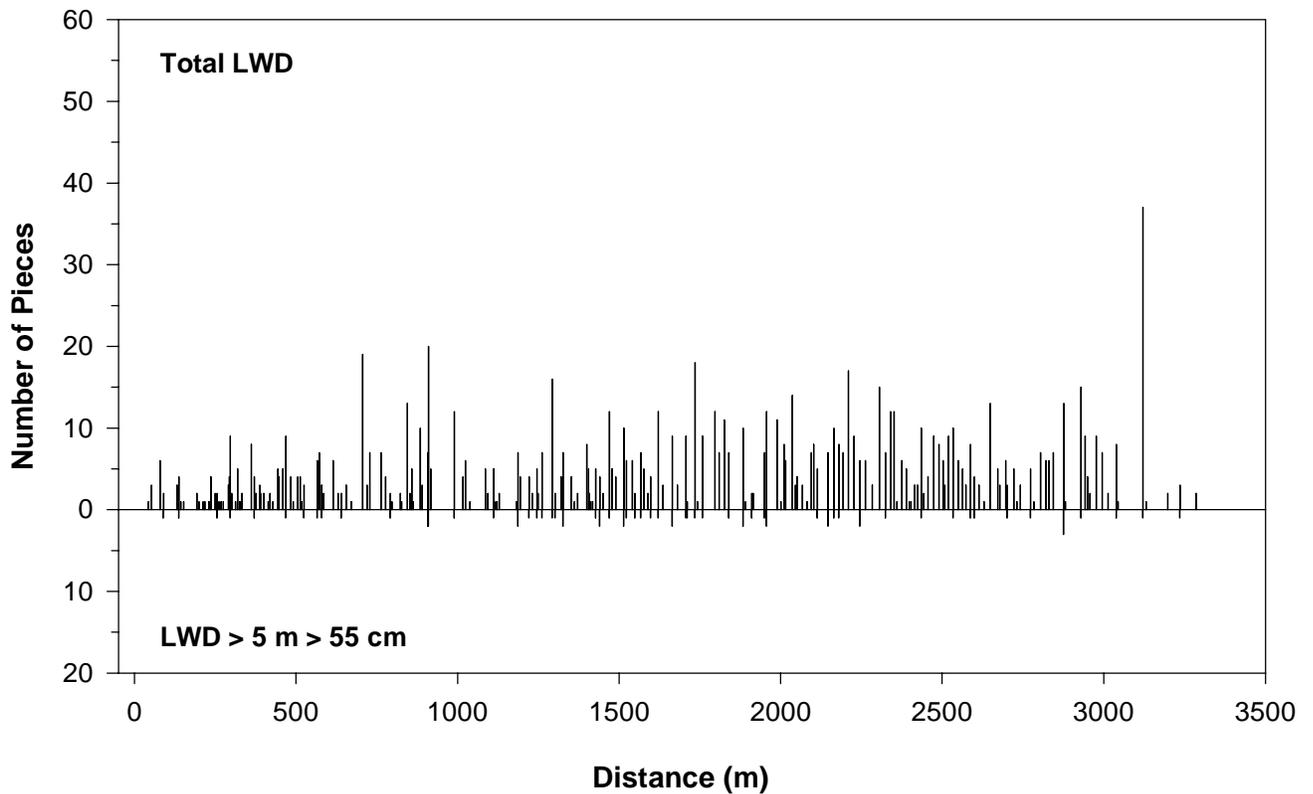


Figure A31. Distribution and abundance of LWD in Reed Mill Creek, Chattahoochee National Forest, 2000.

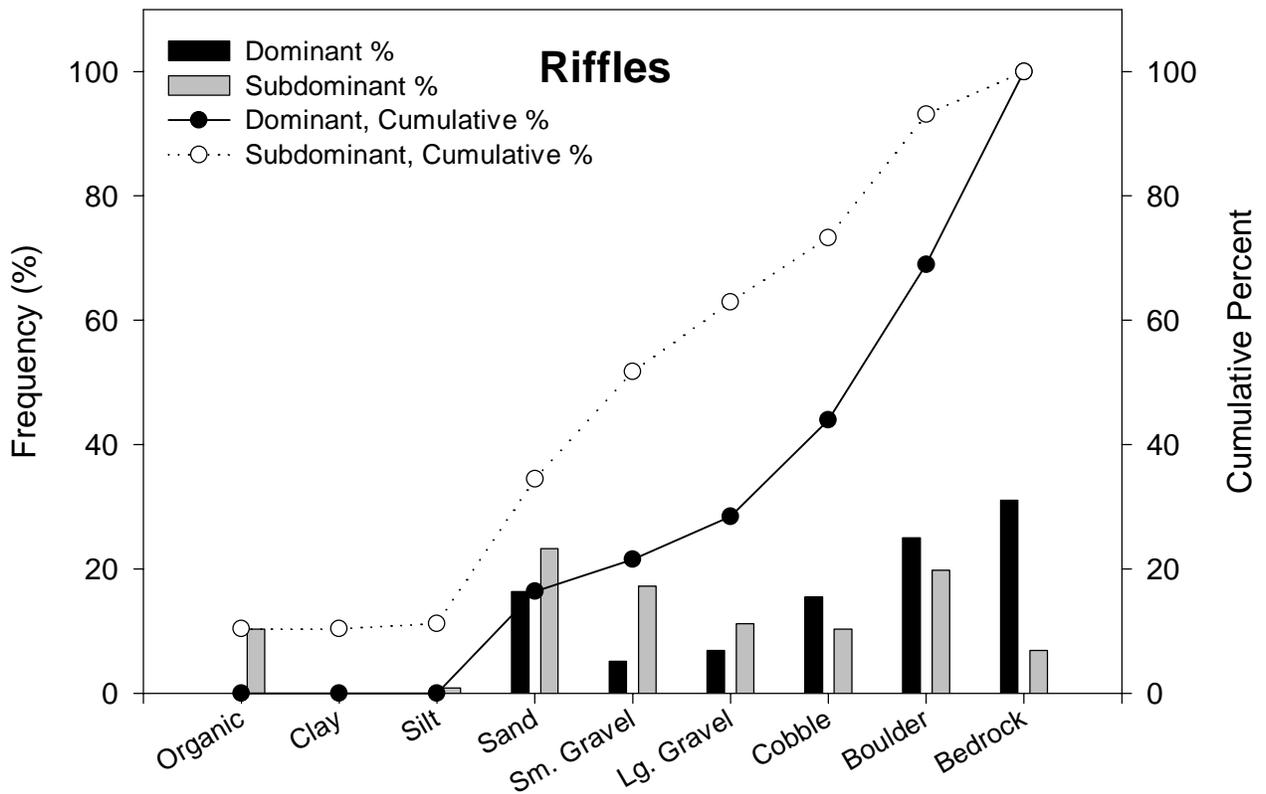
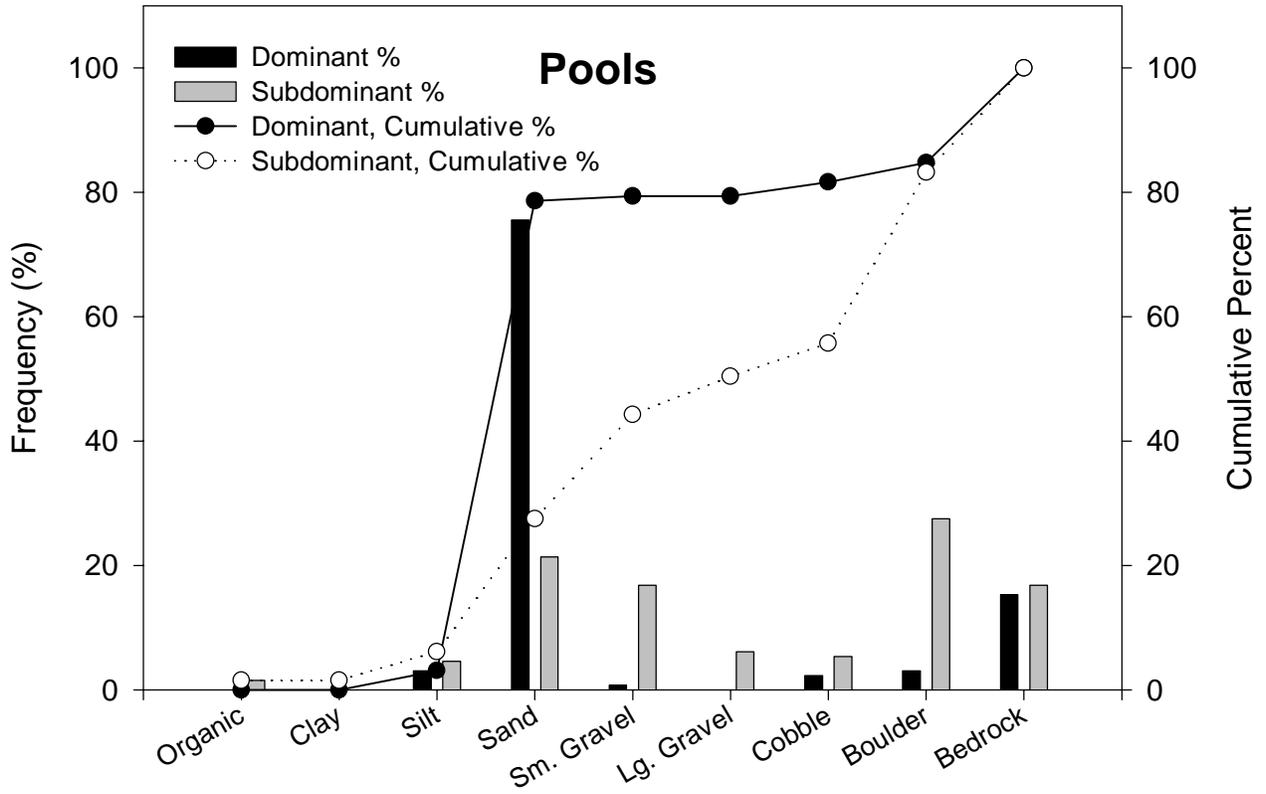


Figure A32. Frequency (percent) of dominant and subdominant substrate occurrence for pools and riffles in Reed Mill Creek, Chattahoochee National Forest, 2000. Solid dots and bars represent percent and cumulative percent of dominant substrate, open dots and gray bars represent percent and cumulative percent of subdominant substrate.

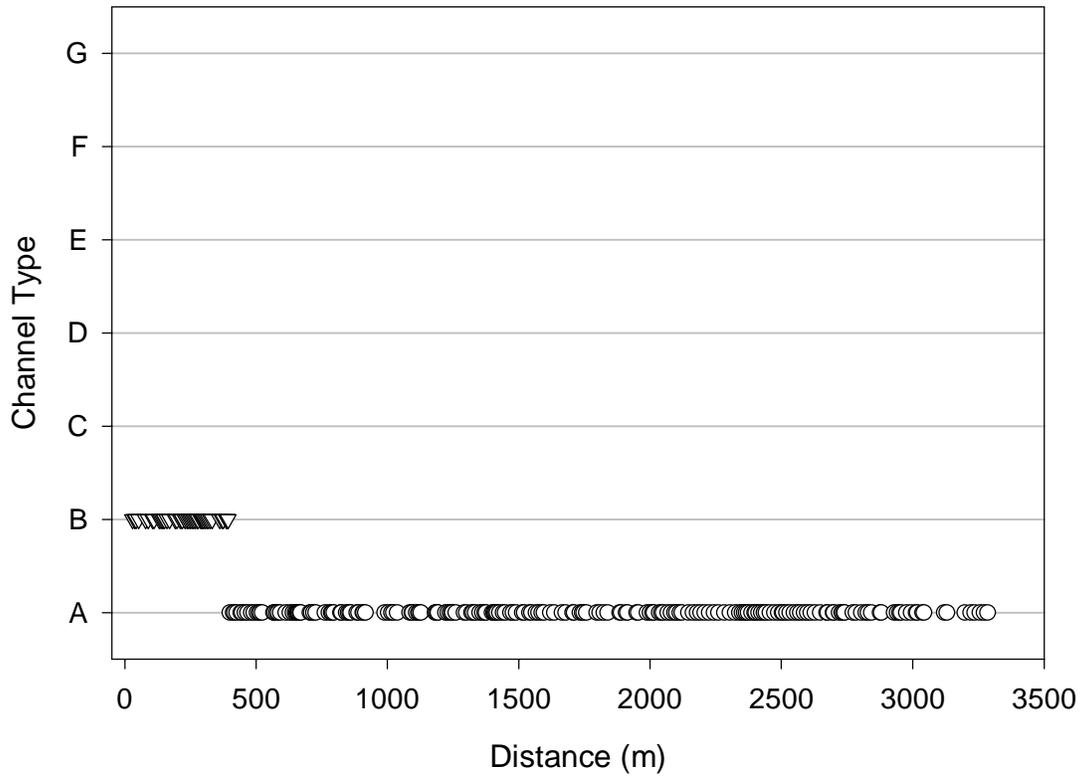


Figure A33. Rosgen's channel type distribution in Reed Mill Creek, Chattahoochee National Forest, 2000.

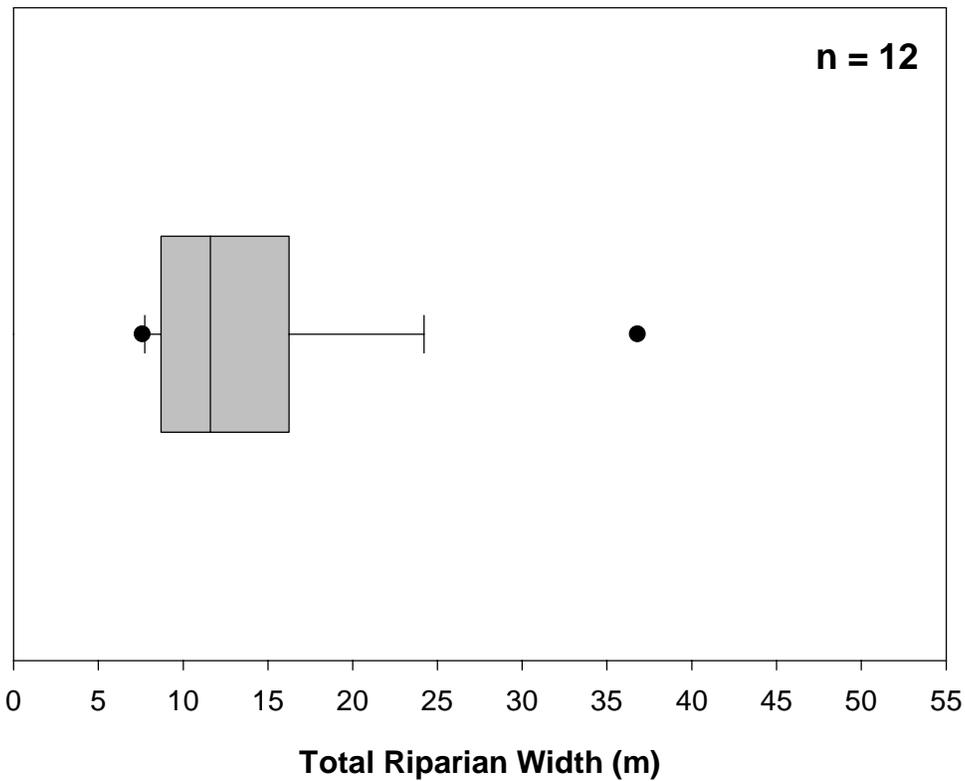


Figure A34. Total riparian width (channel width+right riparian+left riparian) for Reed Mill Creek, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

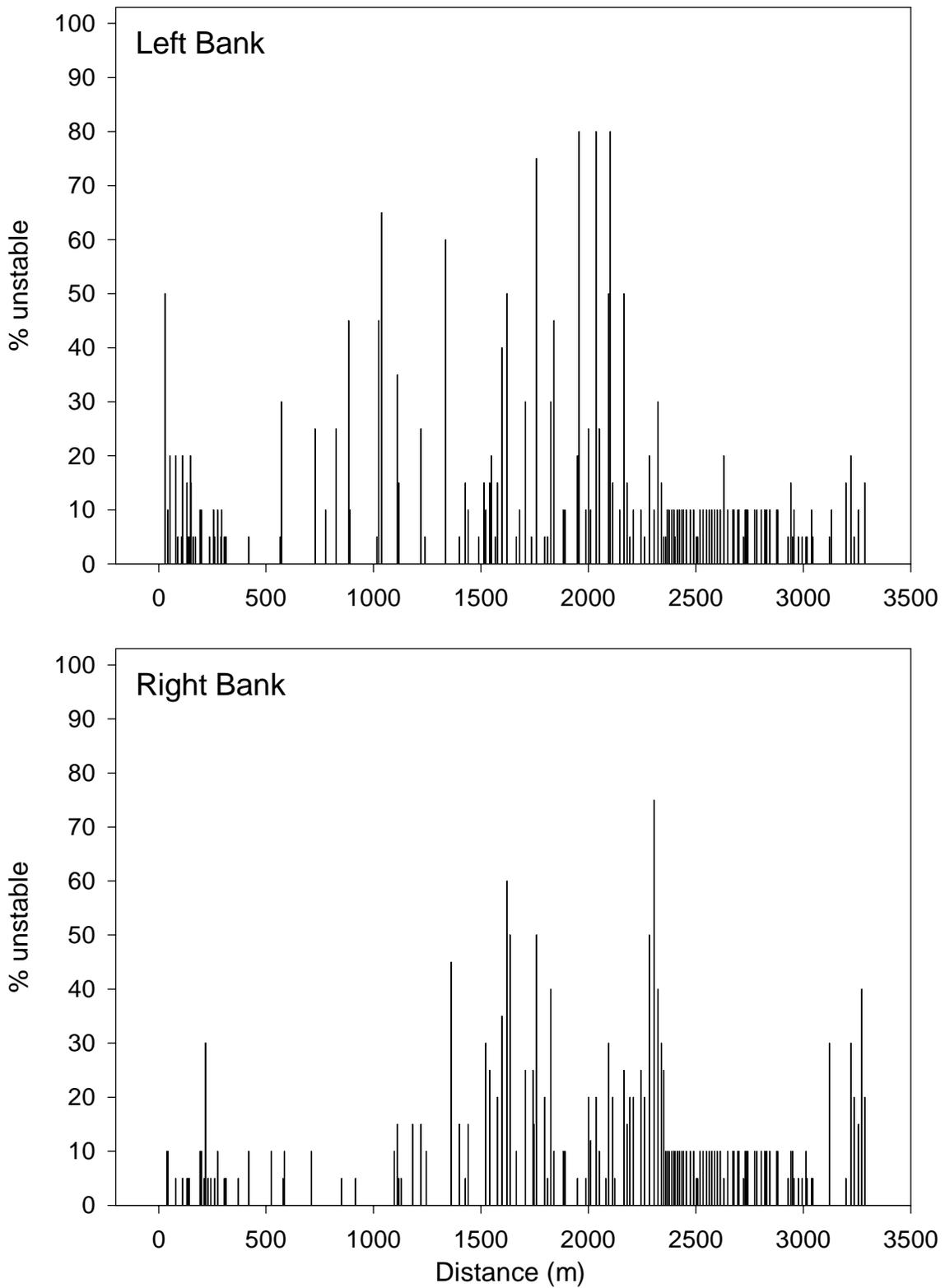


Figure A35. Percent of bank in Reed Mill Creek, Chattahoochee National Forest, 2000, considered to be unstable (% of bank composed of exposed erodible material from water's edge to bankfull). Estimated for every habitat unit.

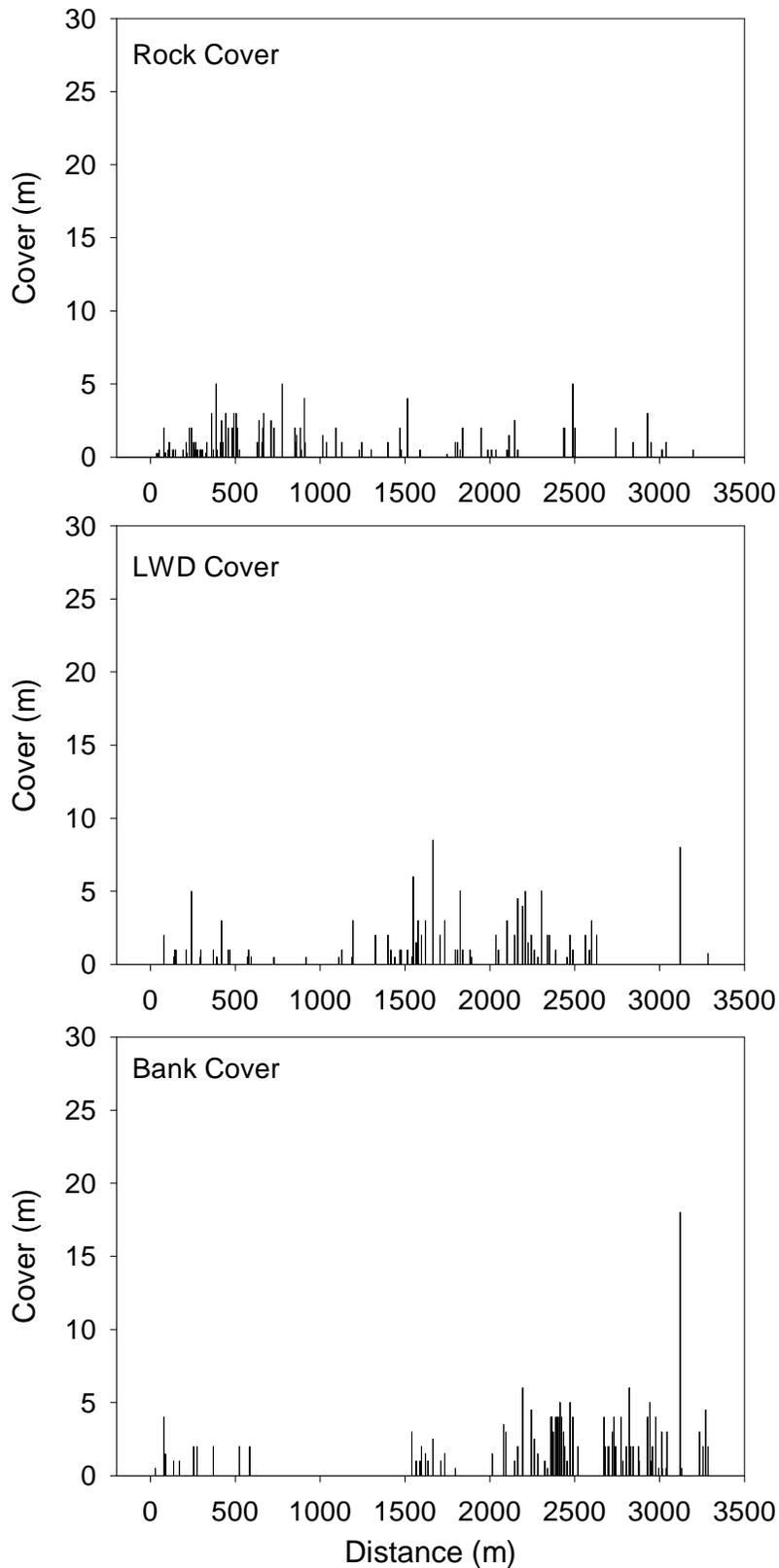


Figure A36. Estimated linear meters of overhead cover provided by rock, LWD, and undercut banks within the wetted stream channel for each habitat unit in Reed Mill Creek, Chattahoochee National Forest, 2000. Cover was considered to be provided if a 15 cm object could be hidden beneath the cover type.

Warwoman sub-drainage

Martin-Finney Creek

Table A25. Results, rankings, and biological ratings for macroinvertebrate samples collected at sites in Martin-Finney Creek during 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u># of EPT Taxa</u>				<u>% EPT Taxa</u>				<u>% 2 Dominant Taxa</u>				<u>NCBI</u>				<u>Clinger Taxa</u>				<u>Final Score</u>		<u>Bio. Rating</u>		
	<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	
	#	rank	#	rank	%	rank	%	rank	%	rank	%	rank	#	rank	#	rank	#	rank	#	rank					
	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)					
WWFS03S01			16	4			72.22	6				42.86	2			2.82	6			8	2		20		good
WW03	14	4			37.09	2			19.25	4			4.30	4			15	4			18			good	
WWFS03S02			2	0			100.00	6				100.00	0			1.96	6			1	0		12		fair
WWFS03S03			14	4			61.84	4				30.92	4			3.04	6			11	2		20		good
WWFS03R04			11	4			69.19	4				52.53	2			2.43	6			4	0		16		fair
WWFS03R05			10	2			57.32	4				53.66	2			2.86	6			2	0		14		fair
WWFS03S05			15	4			56.10	4				37.80	2			2.90	6			7	2		18		good
WWFS03S06			17	4			50.31	2				38.65	2			3.38	6			7	2		16		fair
WWFS03S07			16	4			48.41	2				37.58	2			3.79	6			6	0		14		fair
WWFS03T08			19	6			70.16	4				40.84	2			2.46	6			10	2		20		good
WWFS03S09			16	4			75.40	6				42.78	2			2.34	6			7	2		20		good
WWFS03T10			16	4			75.17	6				51.68	2			2.31	6			8	2		20		good
Total Mean	14	4	14	4	37.09	2	66.92	4	19.25	4	48.12	2	4.30	4	2.75	6	15	4	6	0	18	16	good	fair	
Total Median	14	4	16	4	37.09	2	69.19	4	19.25	4	42.78	2	4.30	4	2.82	6	15	4	7	2	18	18	good	good	

Table A26. RBP habitat form total scores, rankings, and ratings for sites in Martin-Finney Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	RBP Habitat				RBP Habitat Rating	
	1998		2000		1998*	2000*
	score (0-135)*	rank (0-3)	score (0-200)*	rank (0-3)		
WWFS03S01			107	1		fair
WW03	94	2			good	
WWFS03S02			152	2		good
WWFS03S03			115	1		fair
WWFS03R04			133	2		good
WWFS03R05			94	0		poor
WWFS03S05			118	1		fair
WWFS03S06			130	2		good
WWFS03S07			141	2		good
WWFS03T08			146	2		good
WWFS03S09			137	2		good
WWFS03T10			144	2		good
Total Mean	94	2	129	1	good	fair
Total Median	94	2	133	2	good	good

Table A27. Pebble count and cobble embeddedness results and rankings for sample sites in Martin-Finney Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	D50				% ≤ 2 mm				% Cobble Embeddedness				Average Sediment Rank	
	1998		2000		1998		2000		1998		2000		1998	2000
	size (mm)	rank (0-2)	size (mm)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	rank (0-2)	rank (0-2)
WWFS03S01			40	2			1.0	2			61.6	0		1.3
WW03	50	2			26.0	1			43.8	1			1.3	
WWFS03S02			75	2			11.0	2			44.5	1		1.7
WWFS03S03			56	2			22.2	2			45.0	1		1.7
WWFS03R04			sand	0			53.0	0			97.9	0		0.0
WWFS03R05			5	0			42.2	1			N/A	N/A		N/A
WWFS03S05			16	0			32.0	1			50.9	0		0.3
WWFS03S06			10	0			39.0	1			54.2	0		0.3
WWFS03S07			44	2			18.0	2			50.2	0		1.3
WWFS03T08			9	0			37.3	1			47.6	1		0.7
WWFS03S09			29	1			28.4	1			62.7	0		0.7
WWFS03T10			50	2			16.0	2			63.2	0		1.3
Total Mean	50	2	30	1	26.0	1	27.3	1	43.8	1	57.8	0	1.3	0.7
Total Median	50	2	29	1	26.0	1	28.4	1	43.8	1	52.6	0	1.3	0.7

N/A – less than 100 cobbles were found at this site

Table A28. Pfankuch score and rank, average sediment rank (from Table A27), and overall site and stream ratings for Martin-Finney Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	Pfankuch				Ave. Sediment Rank		Sum (Pfankuch+Sediment Rank)		Sediment+Pfankuch Rating	
	<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>
	score (136-0)	rank (0-2)	score (136-0)	rank (0-2)	rank (0-2)	rank (0-2)	sum (0-4)	sum (0-4)	rating	rating
WWFS03S01			102	1		1.3		2.3		fair
WW03	105	1			1.3		2.3		fair	
WWFS03S02			70	2		1.7		3.7		good
WWFS03S03			83	1		1.7		2.7		fair
WWFS03R04			83	1		0.0		1.0		poor
WWFS03R05			82	1		N/A		N/A		N/A
WWFS03S05			100	1		0.3		1.3		fair
WWFS03S06			52	2		0.3		2.3		fair
WWFS03S07			77	1		1.3		2.3		fair
WWFS03T08			69	2		0.7		2.7		fair
WWFS03S09			80	1		0.7		1.7		fair
WWFS03T10			75	2		1.3		3.3		good
Total Mean	105	1	79	1	1.3	0.7	2.3	1.7	fair	fair
Total Median	105	1	80	1	1.3	0.7	2.3	1.7	fair	fair

Table A29. Use support rating, based on results of final biological, RBP habitat, and sediment and Pfankuch ratings for Martin-Finney Creek in 1998 and 2000. Tables used to derive sediment+Pfankuch, RBP, and final biological ratings are found on the preceding pages. Criteria used for use support rating can be found in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>Final Biological Rating</u>		<u>RBP Habitat Rating</u>		<u>Sediment+Pfankuch Rating</u>		<u>Use Support Rating</u>	
	1998	2000	1998	2000	1998	2000	1998	2000
WWFS03S01		good		fair		fair		full support (watch)
WW03	good		good		fair		full support (watch)	
WWFS03S02		fair		good		good		partial support
WWFS03S03		good		fair		fair		full support (watch)
WWFS03R04		fair		good		poor		partial support
WWFS03R05		fair		poor		N/A		partial support
WWFS03S05		good		fair		fair		full support (watch)
WWFS03S06		fair		good		fair		partial support
WWFS03S07		fair		good		fair		partial support
WWFS03T08		good		good		fair		full support (watch)
WWFS03S09		good		good		fair		full support (watch)
WWFS03T10		good		good		good		full support
Total Mean	good	fair	good	fair	fair	fair	full support (watch)	partial support
Total Median	good	good	good	good	fair	fair	full support (watch)	full support (watch)

Table A30. BVET habitat survey results for Martin-Finney Creek.

District:	Tallulah
Quadrangle:	Rabun Bald
Survey Date:	07/??/00
Downstream Starting Point:	Warwoman Rd. FS boundary
Total Distance Surveyed:	3.5
Percent of Total Area Pools:	55
Number of Pools:	183
Number of Pools per km:	52
Total Pool Area (m ²):	7123+/-4340
Mean Pool Area (m ²):	39
Correction Factor:	1.45
Mean Maximum Depth (cm):	43
Mean Average Depth (cm):	20
Mean Residual Pool Depth (cm):	5.2
Percent of Total Area Riffles:	45
Number of Riffles:	156
Number of Riffles per km:	44
Total Riffle Area (m ²):	5874+/-434
Mean Riffle Area (m ²):	38
Correction Factor:	1.13
Mean Maximum Depth (cm):	21
Mean Average Depth (cm):	9
Number of LWD pieces per km:	66
LWD < 5 m, 5-10 cm:	39
LWD < 5 m, 10-50 cm:	80
LWD < 5 m, > 50 cm:	7
LWD > 5 m, 5-10 cm:	9
LWD > 5 m, 10-50 cm:	66
LWD > 5 m, > 50 cm:	14
Rootwads:	5
Mean Channel Width (m):	5
Mean Riparian Width (m) (Total*):	25
Maximum Riparian Width (Total):	90
75th Percentile (Total):	33
25th Percentile (Total):	10
Minimum Riparian Width (Total):	7
Mean Riparian Width (m) (Left, Right**):	10
Maximum Riparian Width (Left, Right):	76
75th Percentile (Left, Right):	8
25th Percentile (Left, Right):	2
Minimum Riparian Width (Left, Right):	1
Percent of Pool Habitat Surveyed as Glides:	2
Rosgen's Channel Type Frequency:	
% Type A:	41
% Type B:	59
% Type C:	0
% Type D:	0
% Type E:	0
% Type F:	0
% Type G:	0
Percent Pools with > 35% Embeddedness:	90
Average Channel Gradient (%):	16

*Calculation sums left riparian + right riparian + stream channel

**Calculation uses left and right riparian values, not the sum of left and right

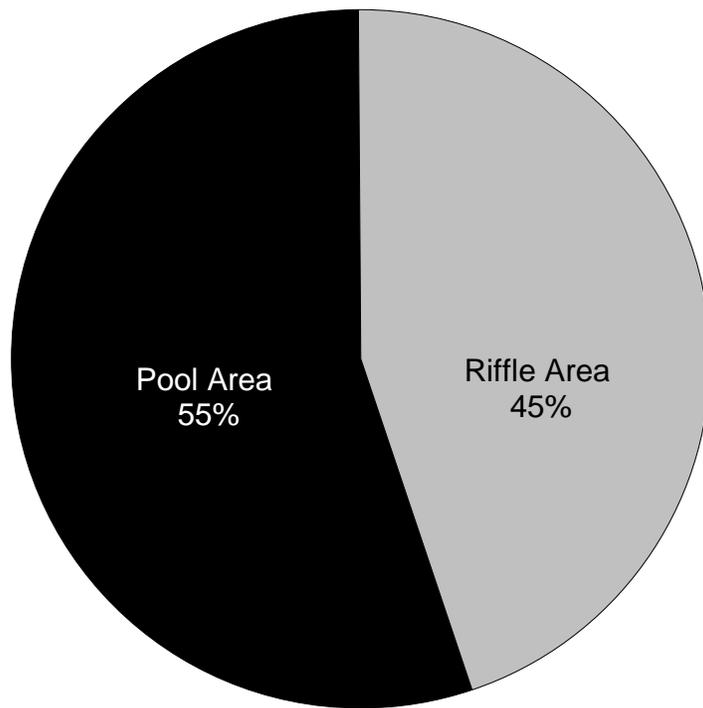


Figure A37. Percent pool and riffle surface area in Martin-Finney Creek, Chattahoochee National Forest, 2000.

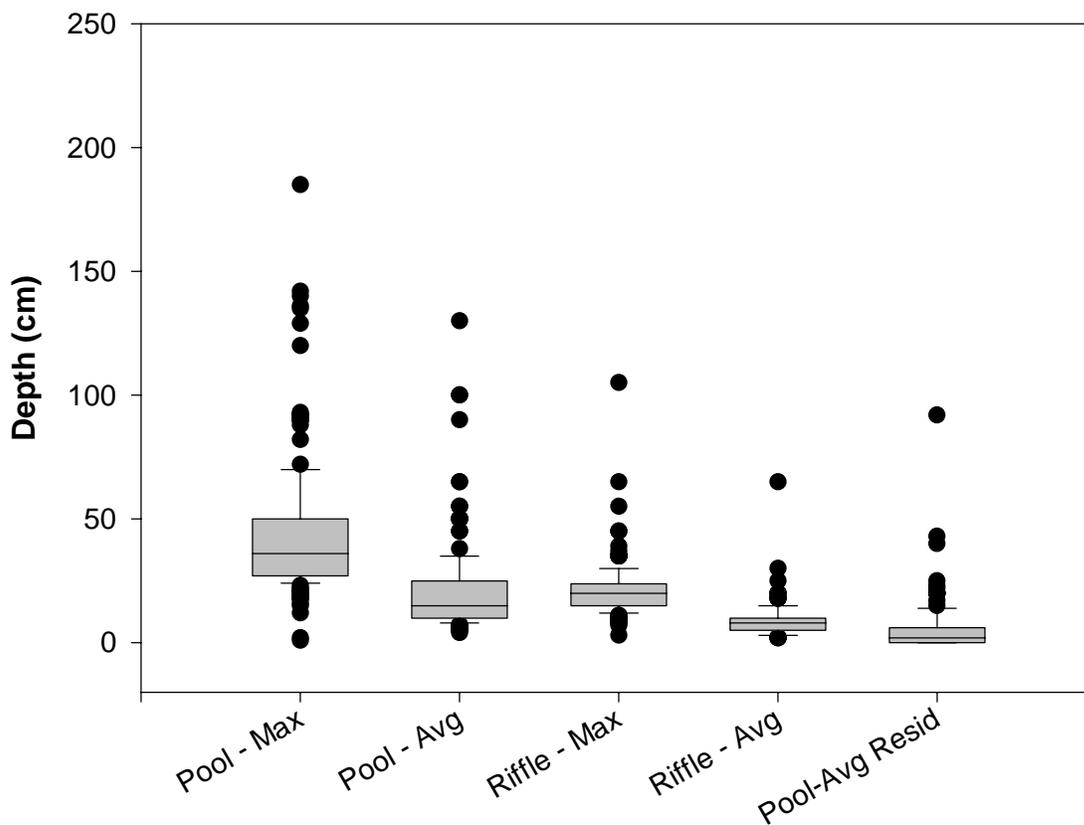


Figure A38. Maximum and average depths for pools and riffles, and average residual pool depths for Martin-Finney Creek, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

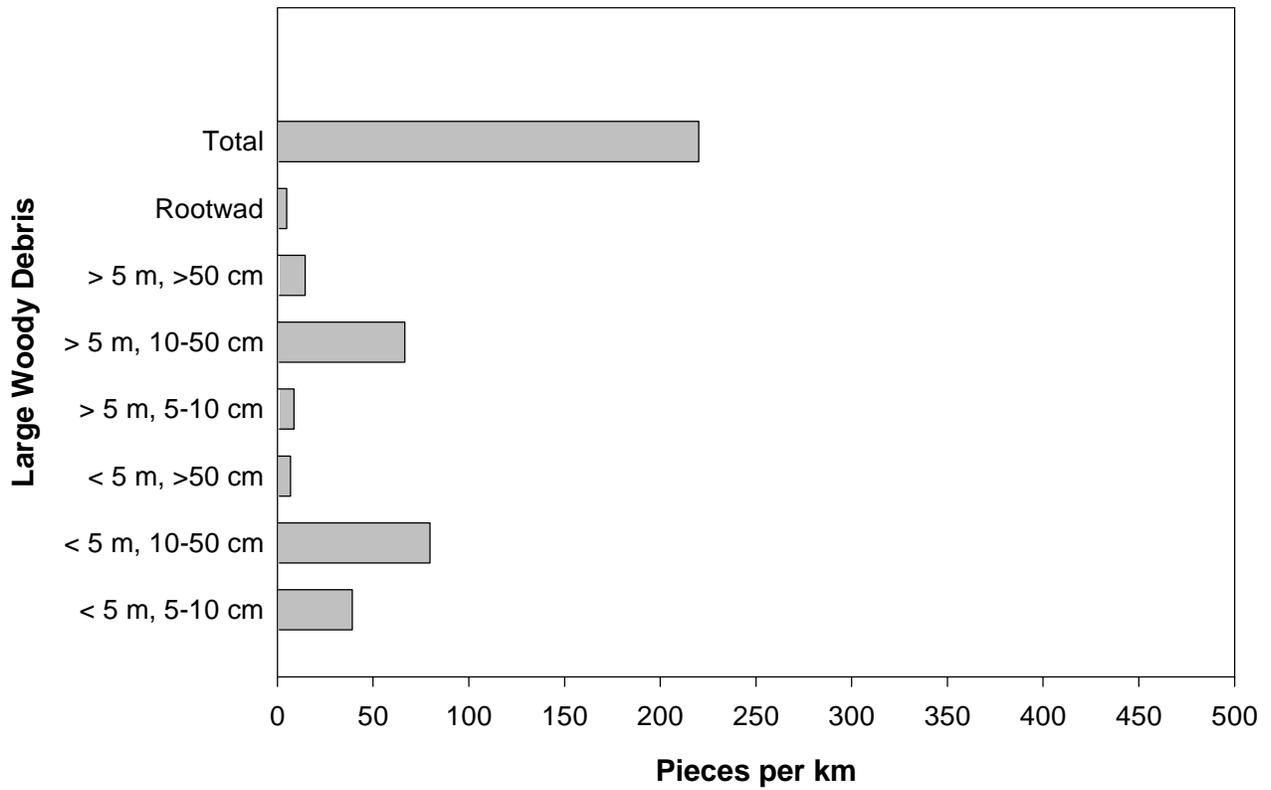


Figure A39. Pieces of large woody debris (LWD) per kilometer in Martin-Finney Creek, Chattahoochee National Forest, 2000.

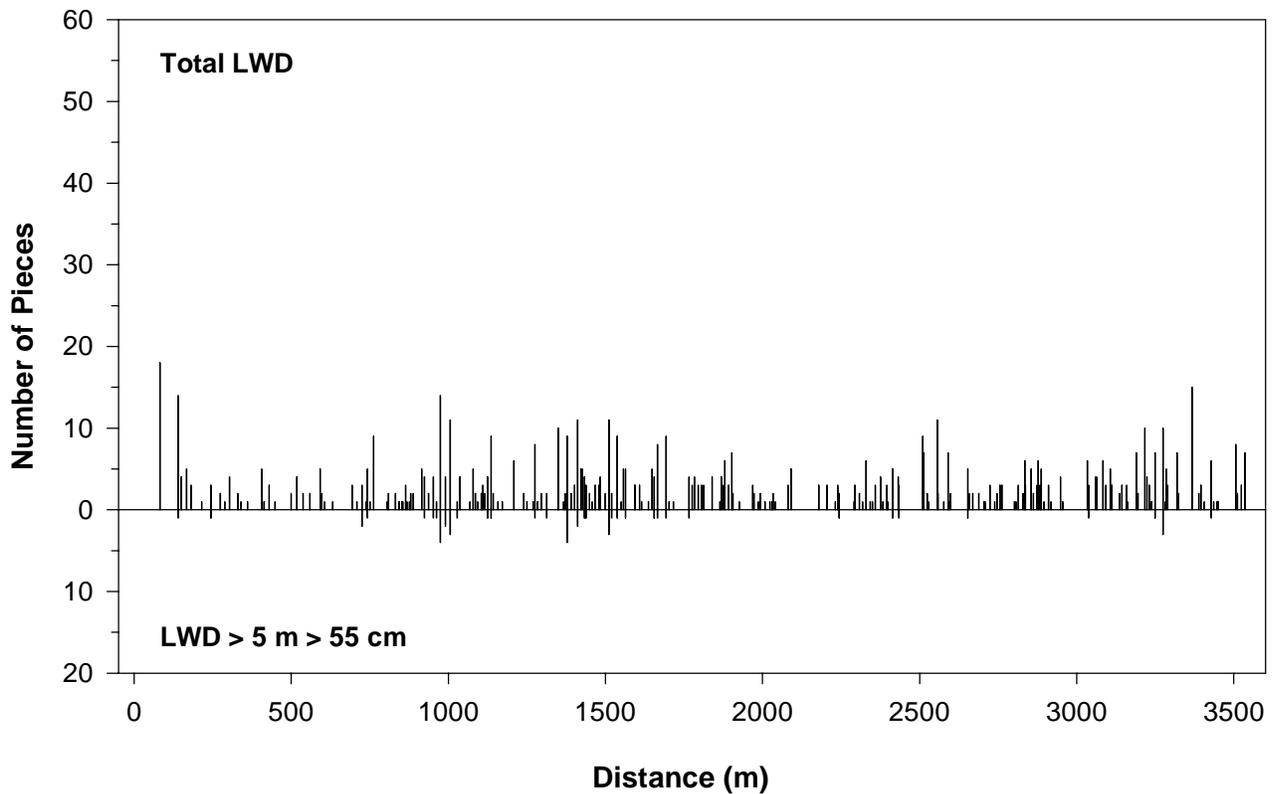


Figure A40. Distribution and abundance of LWD in Martin-Finney Creek, Chattahoochee National Forest, 2000.

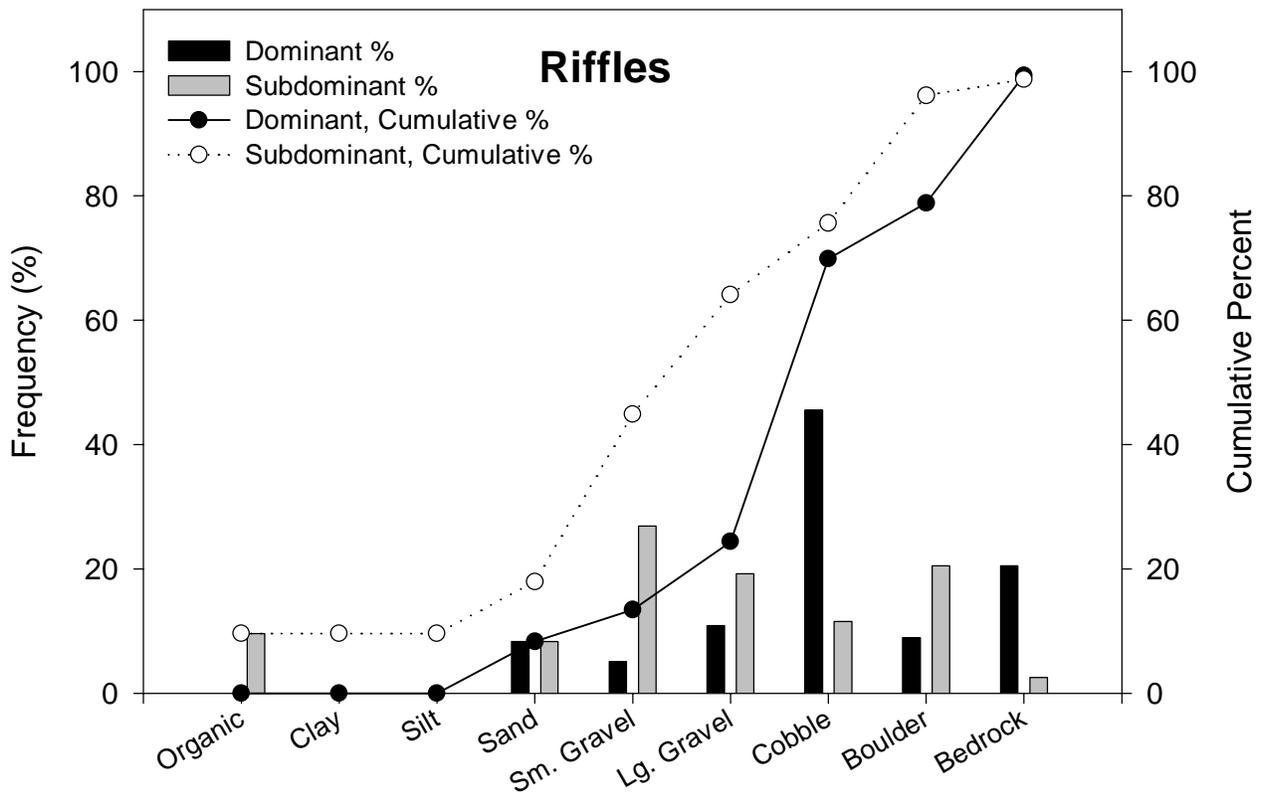
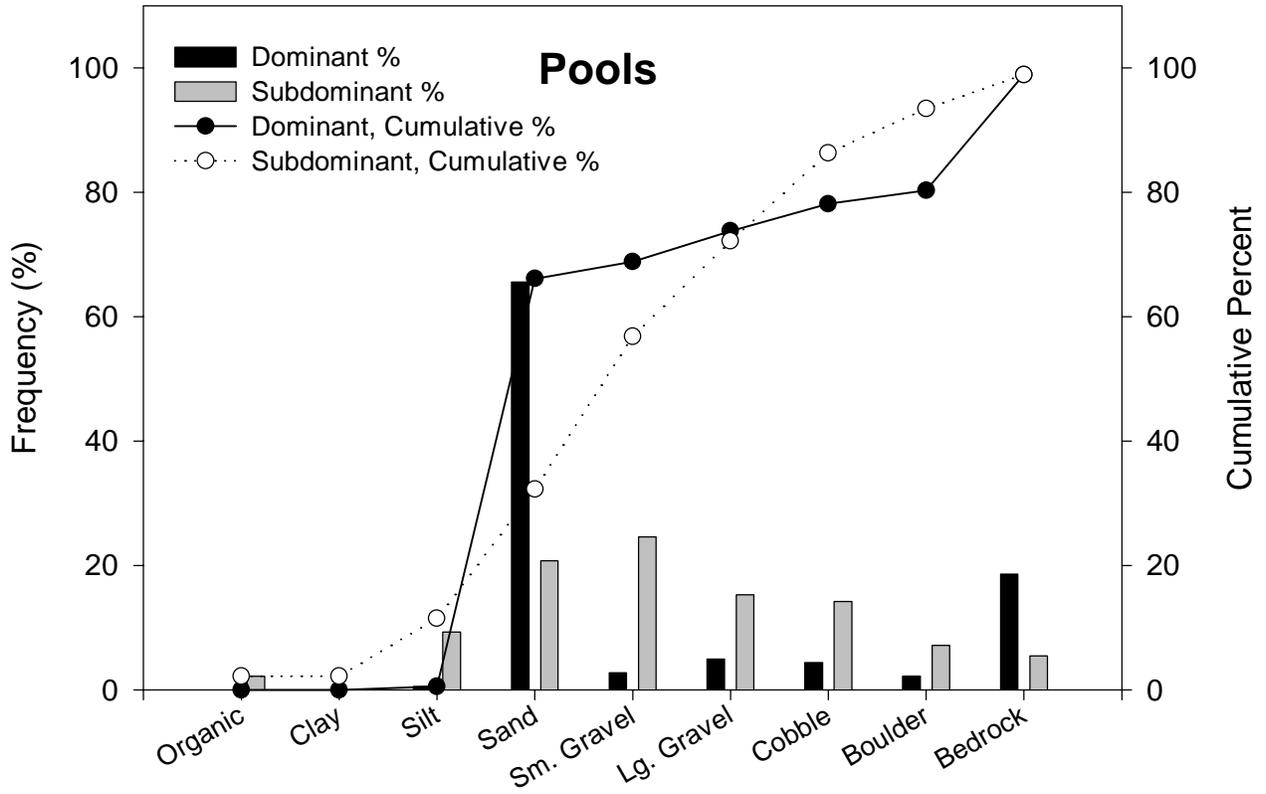


Figure A41. Frequency (percent) of dominant and subdominant substrate occurrence for pools and riffles in Martin-Finney Creek, Chattahoochee National Forest, 2000. Solid dots and bars represent percent and cumulative percent of dominant substrate, open dots and gray bars represent percent and cumulative percent of subdominant substrate.

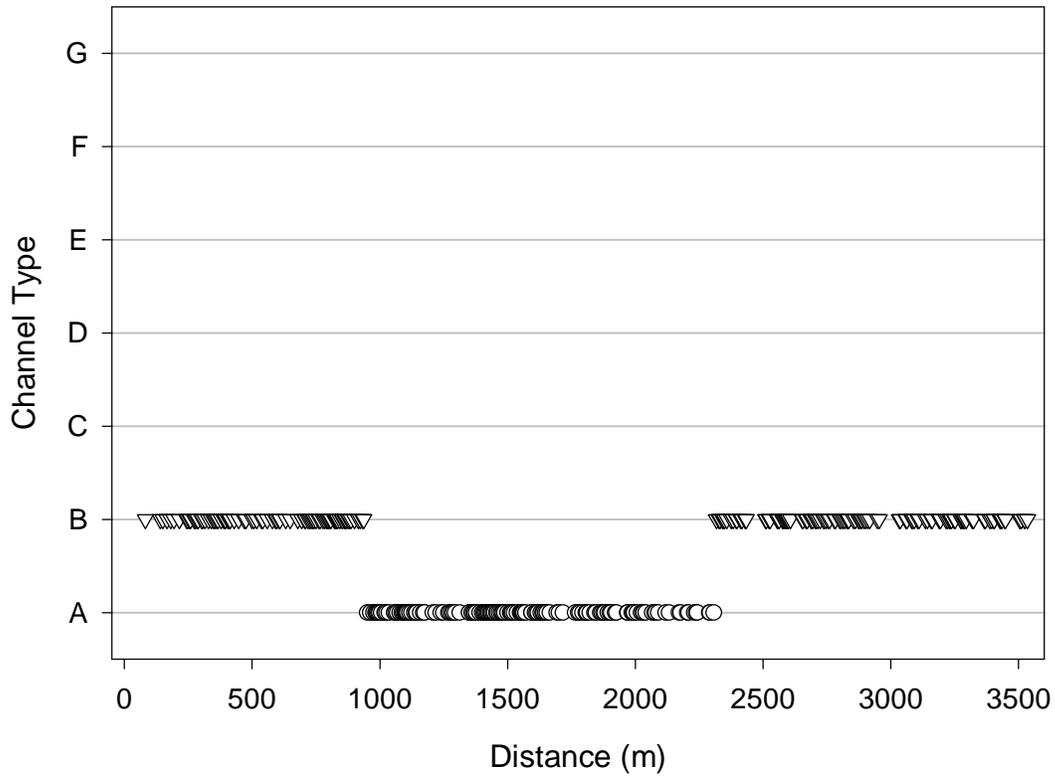


Figure A42. Rosgen's channel type distribution in Martin-Finney Creek, Chattahoochee National Forest, 2000.

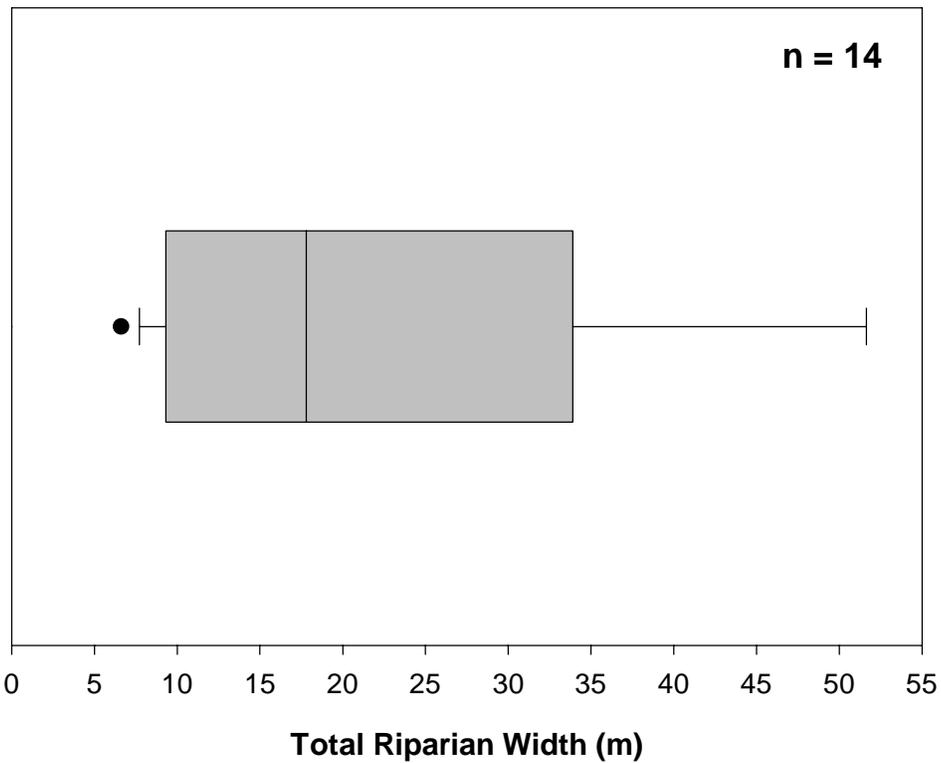


Figure A43. Total riparian width (channel width+right riparian+left riparian) for Martin-Finney Creek, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

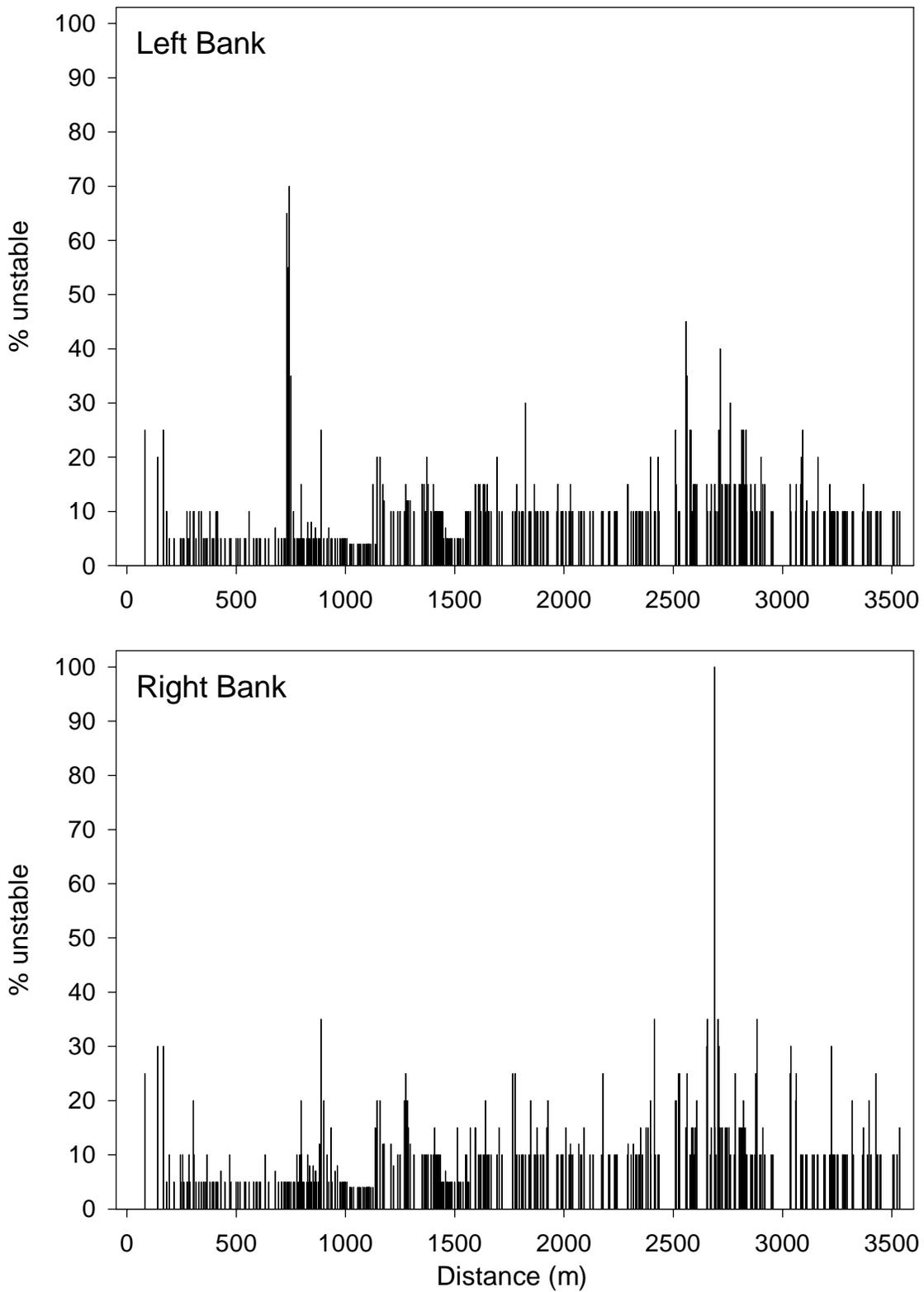


Figure A44. Percent of bank in Martin-Finney Creek, Chattahoochee National Forest, 2000, considered to be unstable (% of bank composed of exposed erodible material from water's edge to bankfull). Estimated for every habitat unit.

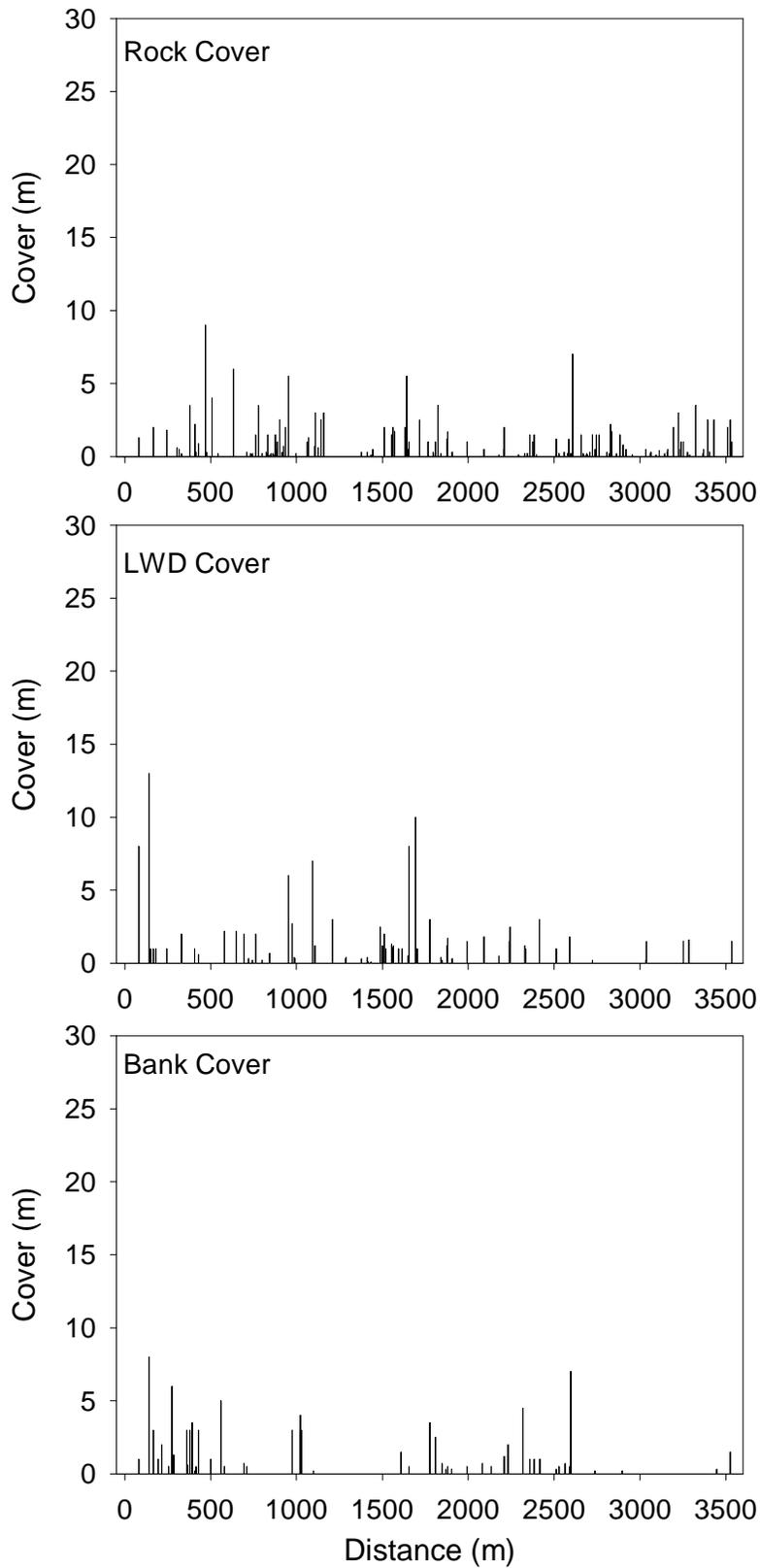


Figure A45. Estimated linear meters of overhead cover provided by rock, LWD, and undercut banks within the wetted stream channel for each habitat unit in Martin-Finney Creek, Chattahoochee National Forest, 2000. Cover was considered to be provided if a 15 cm object could be hidden beneath the cover type.

Warwoman sub-drainage

Rock Mountain Creek

Table A31. Results, rankings, and biological ratings for macroinvertebrate samples collected at sites in Rock Mountain Creek during 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u># of EPT Taxa</u>		<u>% EPT Taxa</u>		<u>% 2 Dominant Taxa</u>		<u>NCBI</u>		<u>Clinger Taxa</u>		<u>Final Score</u>		<u>Bio. Rating</u>											
	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>										
	# rank	# rank	% rank	% rank	% rank	% rank	# rank	# rank	# rank	# rank														
WW03	14	4	37.09	2	19.25	4	4.30	4	15	4	18		good											
WWFS12R01		17	4	72.65	6	29.06	4	2.62	6	7	2	22		good										
WWFS12R02		12	2	46.53	2	28.47	4	3.27	6	7	2	16		fair										
WWFS12S03		15	4	59.39	4	37.58	2	3.19	6	8	2	18		good										
WWFS12R04		15	4	53.72	4	23.94	4	2.84	6	9	2	20		good										
WWFS12R05		15	4	46.98	2	39.60	2	3.33	6	5	0	14		fair										
WWFS12S06		10	2	26.83	2	48.78	2	4.49	4	5	0	10		poor										
WWFS12R07		7	2	46.59	2	52.27	2	3.23	6	1	0	12		fair										
WWFS12R08		12	2	32.90	2	49.68	2	4.42	4	3	0	10		poor										
WWFS12S09		10	2	23.24	0	58.45	0	4.62	4	5	0	6		poor										
WWFS12R10		12	2	23.87	0	60.65	0	4.26	4	5	0	6		poor										
WWFS12R11		11	2	37.41	2	43.17	2	4.11	6	2	0	12		fair										
Total Mean	14	4	12	2	37.09	2	42.74	2	19.25	4	42.88	2	4.30	4	3.67	6	15	4	5	0	18	12	good	fair
Total Median	14	4	12	2	37.09	2	46.53	2	19.25	4	43.17	2	4.30	4	3.33	6	15	4	5	0	18	12	good	fair

Table A32. RBP habitat form total scores, rankings, and ratings for sites in Rock Mountain Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	RBP Habitat				RBP Habitat Rating	
	1998		2000		1998*	2000*
	score (0-135)*	rank (0-3)	score (0-200)*	rank (0-3)		
WW03	94	2			good	
WWFS12R01			116	1		fair
WWFS12R02			149	2		good
WWFS12S03			132	2		good
WWFS12R04			103	1		fair
WWFS12R05			110	1		fair
WWFS12S06			121	1		fair
WWFS12R07			96	0		poor
WWFS12R08			111	1		fair
WWFS12S09			137	2		good
WWFS12R10			108	1		fair
WWFS12R11			111	1		fair
Total Mean	94	2	118	1	good	fair
Total Median	94	2	111	1	good	fair

Table A33. Pebble count and cobble embeddedness results and rankings for sample sites in Rock Mountain Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	D50				% ≤ 2 mm				% Cobble Embeddedness				Average Sediment Rank	
	1998		2000		1998		2000		1998		2000		1998	2000
	size (mm)	rank (0-2)	size (mm)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	rank (0-2)	rank (0-2)
WW03	50	2			26.0	1			43.8	1			1.3	
WWFS12R01			78	2			11	2			46.7	1		1.7
WWFS12R02			64	2			11	2			55.0	0		1.3
WWFS12S03			233	2			14	2			49.2	1		1.7
WWFS12R04			30	1			13	2			50.6	0		1.0
WWFS12R05			45	2			14	2			61.3	0		1.3
WWFS12S06			55	2			33	1			41.5	1		1.3
WWFS12R07			10	0			46	1			54.9	0		0.3
WWFS12R08			23	1			27	1			56.7	0		0.7
WWFS12S09			9	0			35	1			44.6	1		0.7
WWFS12R10			45	2			32	1			50.2	0		1.0
WWFS12R11			75	2			18	2			54.4	0		1.3
Total Mean	50	2	61	2	26.0	1	23	2	43.8	1	51.4	0	1.3	1.3
Total Median	50	2	45	2	26.0	1	18	2	43.8	1	50.6	0	1.3	1.3

Table A34. Pfankuch score and rank, average sediment rank (from Table A33), and overall site and stream ratings for Rock Mountain Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	Pfankuch				Ave. Sediment Rank		Sum (Pfankuch+Sediment Rank)		Sediment+Pfankuch Rating	
	<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>
	score (136-0)	rank (0-2)	score (136-0)	rank (0-2)	rank (0-2)	rank (0-2)	sum (0-4)	sum (0-4)	rating	rating
WW03	105	1			1.3		2.3		fair	
WWFS12R01			81	1		1.7		2.7		fair
WWFS12R02			68	2		1.3		3.3		good
WWFS12S03			86	1		1.7		2.7		fair
WWFS12R04			94	1		1.0		2.0		fair
WWFS12R05			104	1		1.3		2.3		fair
WWFS12S06			83	1		1.3		2.3		fair
WWFS12R07			97	1		0.3		1.3		fair
WWFS12R08			79	1		0.7		1.7		fair
WWFS12S09			86	1		0.7		1.7		fair
WWFS12R10			88	1		1.0		2.0		fair
WWFS12R11			82	1		1.3		2.3		fair
Total Mean	105	1	86	1	1.3	1.3	2.3	2.3		fair
Total Median	105	1	86	1	1.3	1.3	2.3	2.3		fair

Table A35. Use support rating, based on results of final biological, RBP habitat, and sediment and Pfankuch ratings for Rock Mountain Creek in 1998 and 2000. Tables used to derive sediment+Pfankuch, RBP, and final biological ratings are found on the preceding pages. Criteria used for use support rating can be found in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>Final Biological Rating</u>		<u>RBP Habitat Rating</u>		<u>Sediment+Pfankuch Rating</u>		<u>Use Support Rating</u>	
	1998	2000	1998	2000	1998	2000	1998	2000
WW03	good		good		fair		full support (watch)	
WWFS12R01		good		fair		fair	full support (watch)	
WWFS12R02		fair		good		good	partial support	
WWFS12S03		good		good		fair	full support (watch)	
WWFS12R04		good		fair		fair	full support (watch)	
WWFS12R05		fair		fair		fair	partial support	
WWFS12S06		poor		fair		fair	Not supporting	
WWFS12R07		fair		poor		fair	partial support	
WWFS12R08		poor		fair		fair	Not supporting	
WWFS12S09		poor		good		fair	Not supporting	
WWFS12R10		poor		fair		fair	Not supporting	
WWFS12R11		fair		fair		fair	partial support	
Total Mean	good	fair	good	fair		fair	full support (watch)	partial support
Total Median	good	fair	good	fair		fair	full support (watch)	partial support

Table A36. BVET habitat survey results for Rock Mountain Creek.

District:	Tallulah
Quadrangle:	Rabun Bald
Survey Date:	7/11/000
Downstream Starting Point:	Confluence w/ M-Finney
Total Distance Surveyed:	3.6
Percent of Total Area Pools:	28
Number of Pools:	148
Number of Pools per km:	41
Total Pool Area (m ²):	1564+/-179
Mean Pool Area (m ²):	11
Correction Factor:	0.98
Mean Maximum Depth (cm):	28
Mean Average Depth (cm):	15
Mean Residual Pool Depth (cm):	11
Percent of Total Area Riffles:	72
Number of Riffles:	136
Number of Riffles per km:	38
Total Riffle Area (m ²):	4083+/-275
Mean Riffle Area (m ²):	30
Correction Factor:	1.05
Mean Maximum Depth (cm):	14
Mean Average Depth (cm):	5
Number of LWD pieces per km:	25
LWD < 5 m, 5-10 cm:	183
LWD < 5 m, 10-50 cm:	43
LWD < 5 m, > 50 cm:	5
LWD > 5 m, 5-10 cm:	18
LWD > 5 m, 10-50 cm:	25
LWD > 5 m, > 50 cm:	6
Rootwads:	0
Mean Channel Width (m):	5
Mean Riparian Width (m) (Total*):	11
Maximum Riparian Width (Total):	18
75th Percentile (Total):	12
25th Percentile (Total):	9
Minimum Riparian Width (Total):	6
Mean Riparian Width (m) (Left, Right**):	3
Maximum Riparian Width (Left, Right):	10
75th Percentile (Left, Right):	4
25th Percentile (Left, Right):	1
Minimum Riparian Width (Left, Right):	1
Percent of Pool Habitat Surveyed as Glides:	0
Rosgen's Channel Type Frequency:	
% Type A:	50
% Type B:	49
% Type C:	1
% Type D:	0
% Type E:	0
% Type F:	0
% Type G:	0
Percent Pools with > 35% Embeddedness:	98
Average Channel Gradient (%):	11

*Calculation sums left riparian + right riparian + stream channel

**Calculation uses left and right riparian values, not the sum of left and right

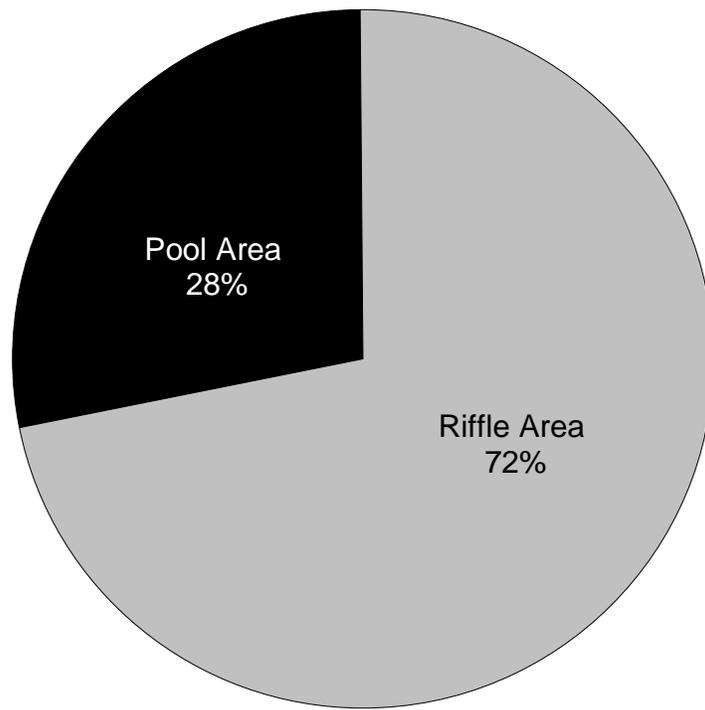


Figure A46. Percent pool and riffle surface area in Rock Mountain Creek, Chattahoochee National Forest, 2000.

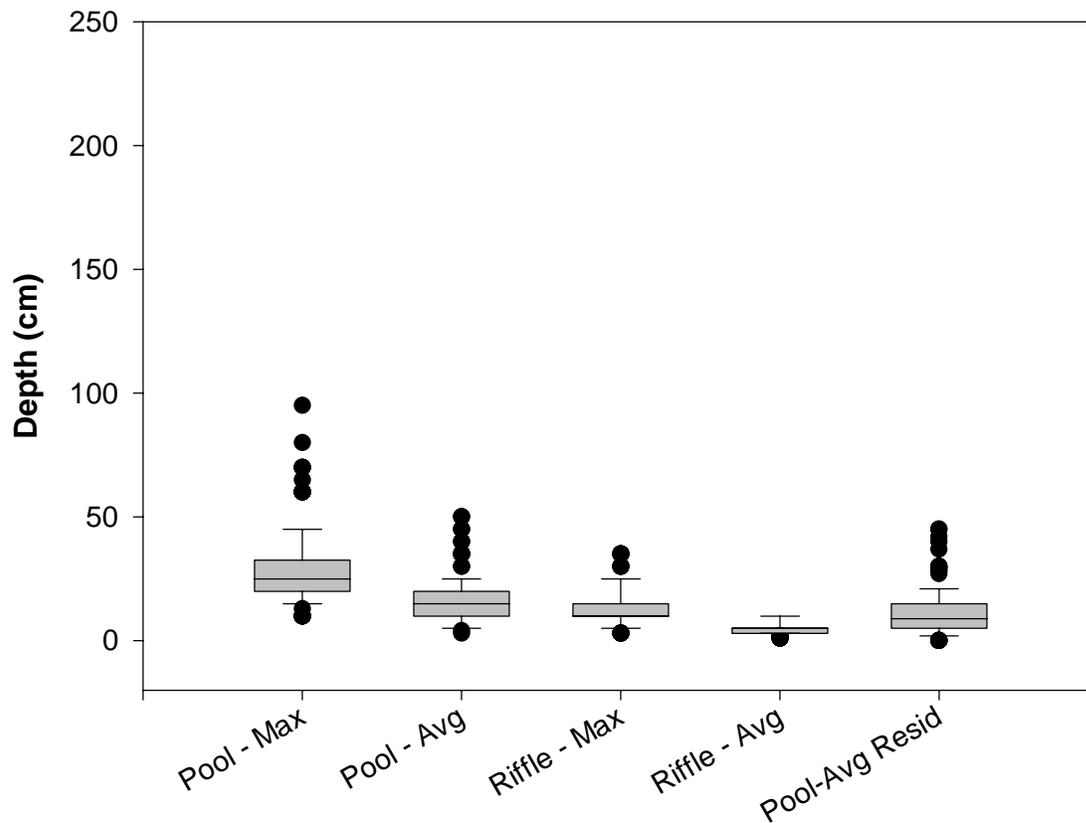


Figure A47. Maximum and average depths for pools and riffles, and average residual pool depths for Rock Mountain Creek, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

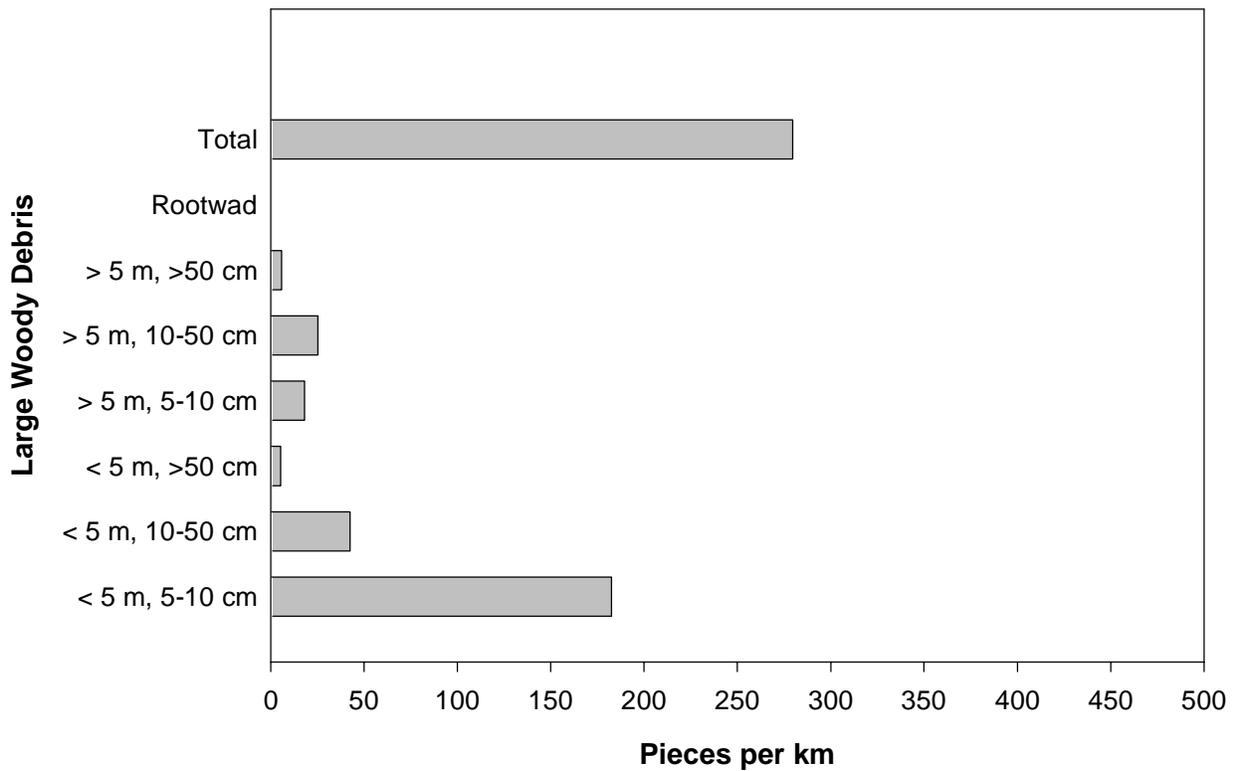


Figure A48. Pieces of large woody debris (LWD) per kilometer in Rock Mountain Creek, Chattahoochee National Forest, 2000.

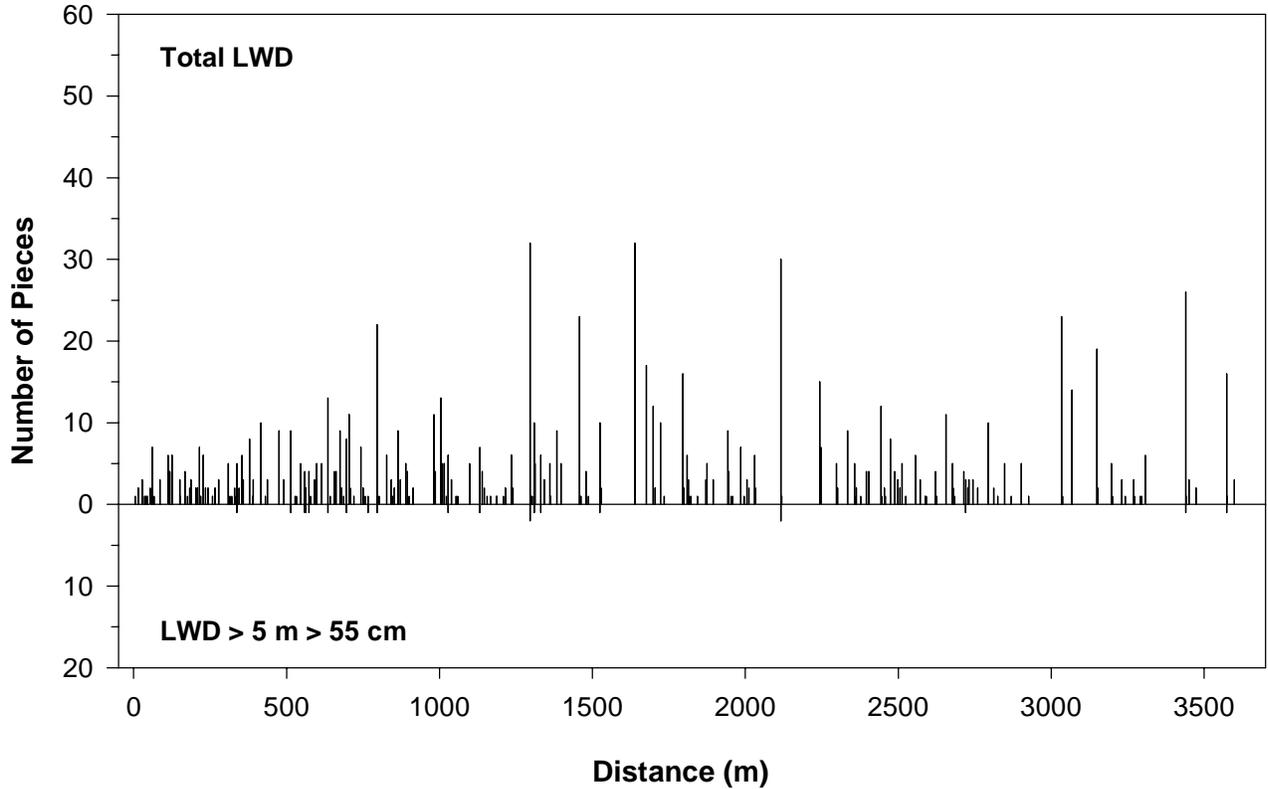


Figure A49. Distribution and abundance of LWD in Rock Mountain Creek, Chattahoochee National Forest, 2000.

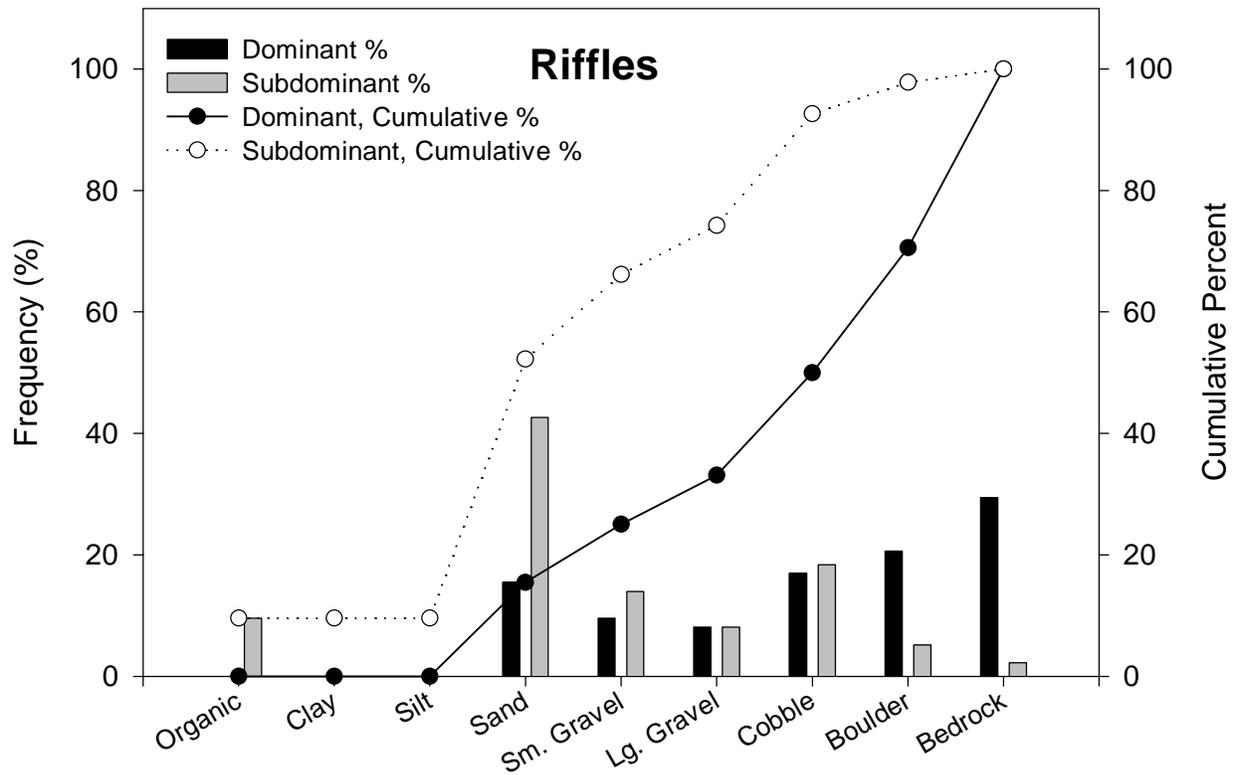
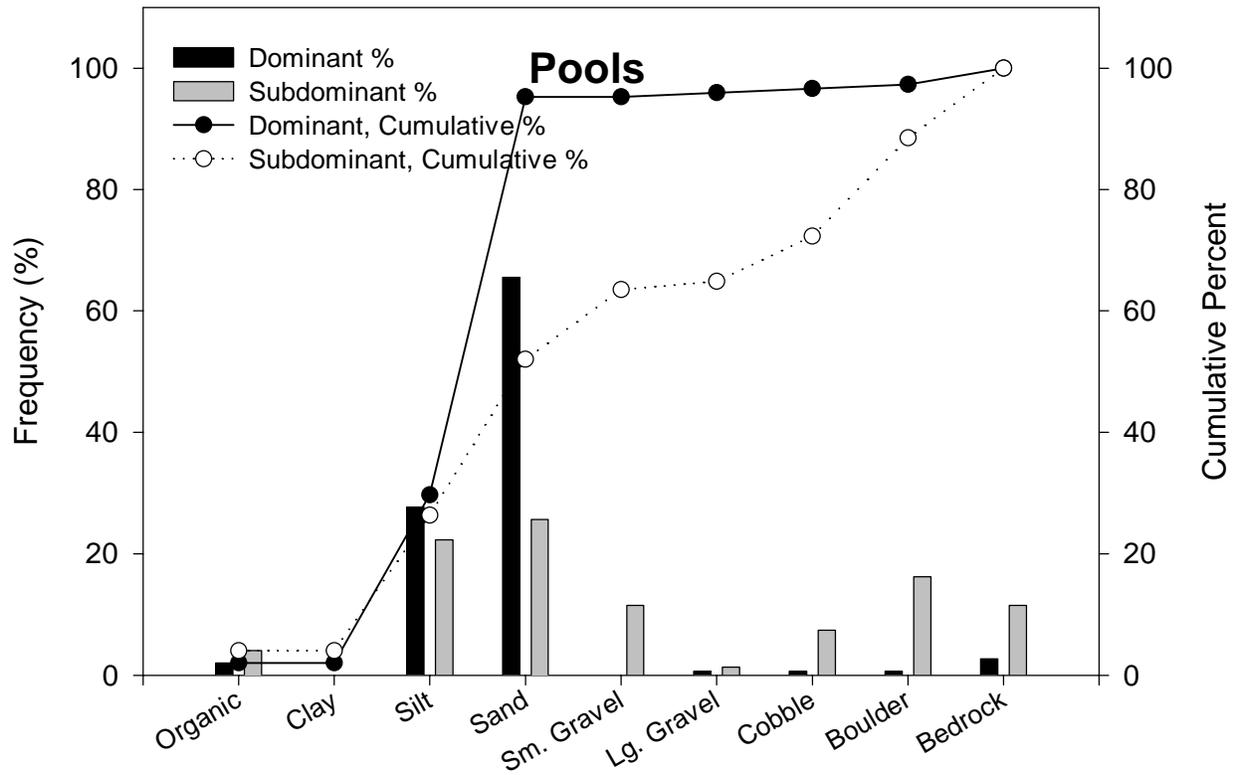


Figure A50. Frequency (percent) of dominant and subdominant substrate occurrence for pools and riffles in Rock Mountain Creek, Chattahoochee National Forest, 2000. Solid dots and bars represent percent and cumulative percent of dominant substrate, open dots and gray bars represent percent and cumulative percent of subdominant substrate.

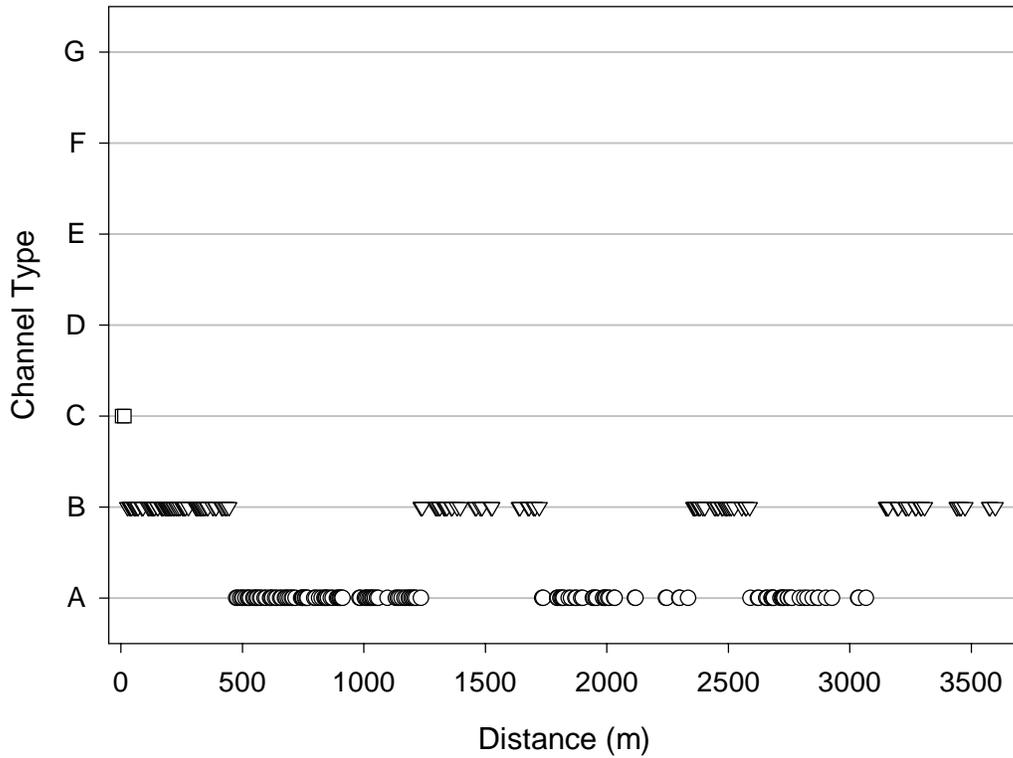


Figure A51. Rosgen's channel type distribution in Rock Mountain Creek, Chattahoochee National Forest, 2000.

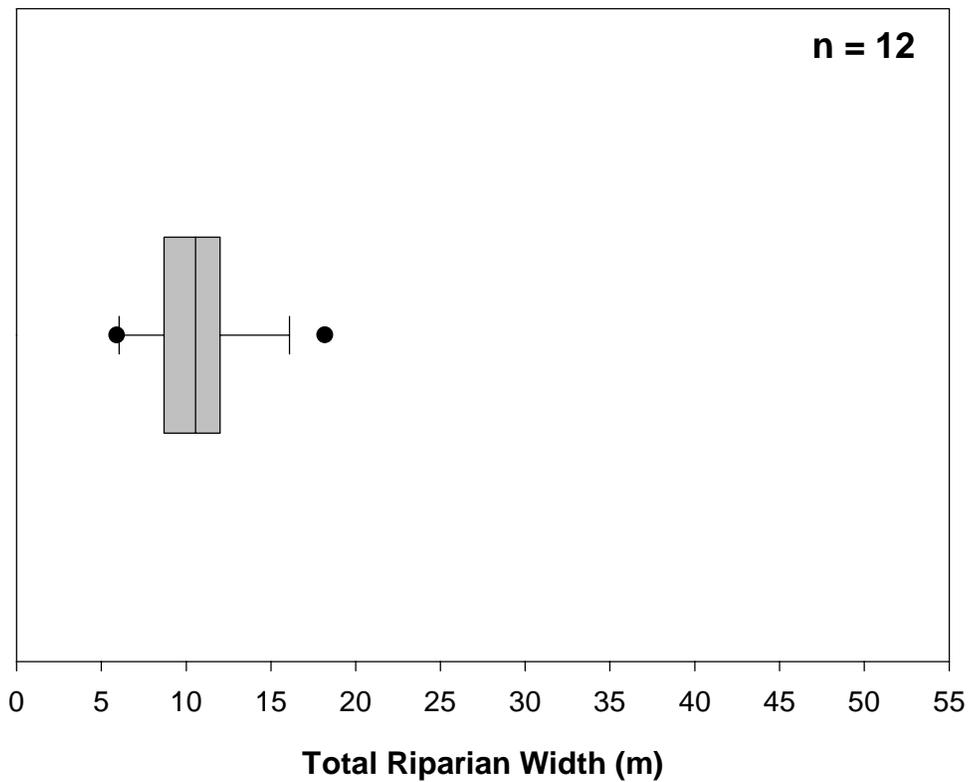


Figure A52. Total riparian width (channel width+right riparian+left riparian) for Rock Mountain Creek, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

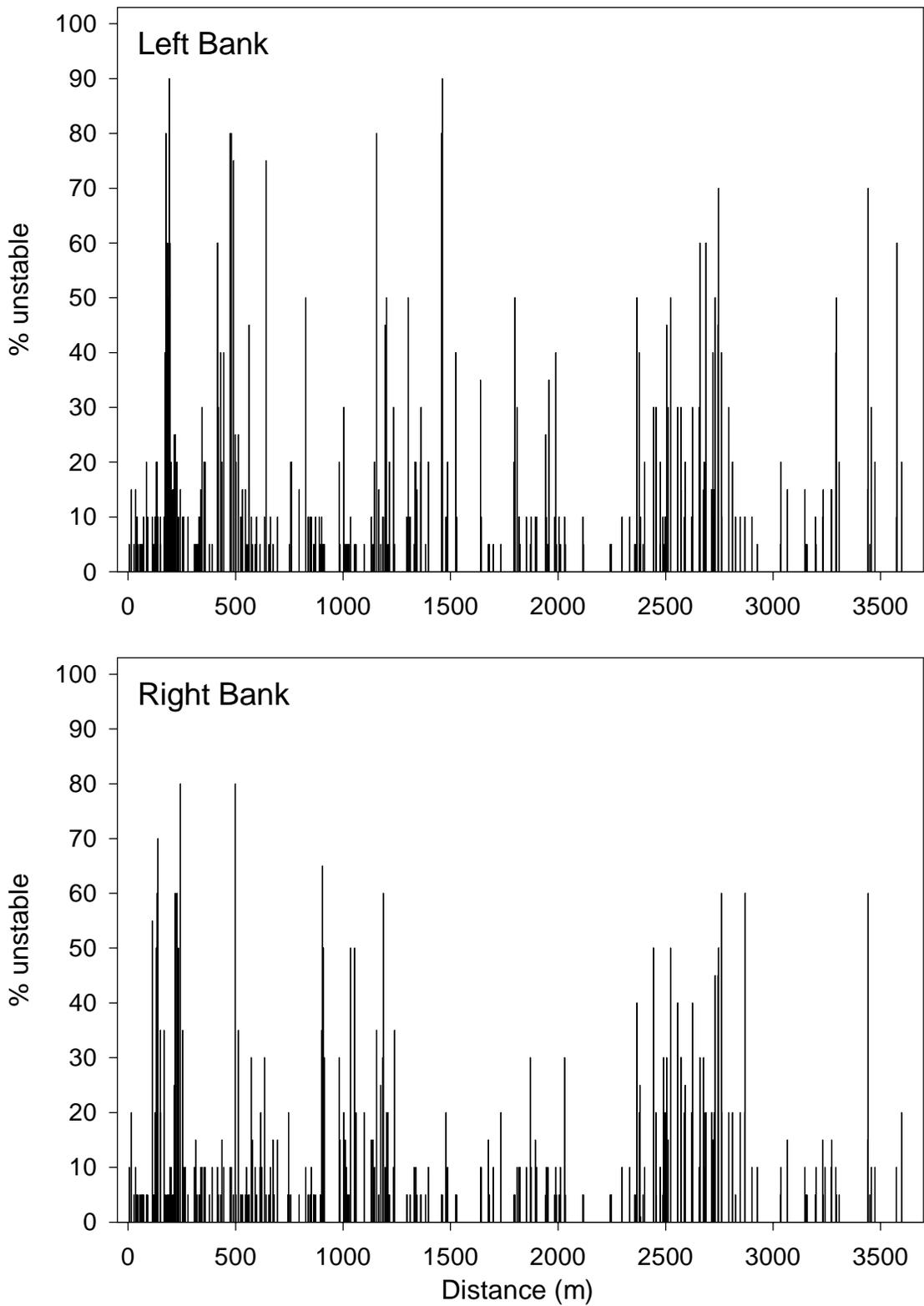


Figure A53. Percent of bank in Rock Mountain Creek, Chattahoochee National Forest, 2000, considered to be unstable (% of bank composed of exposed erodible material from water's edge to bankfull). Estimated for every habitat unit.

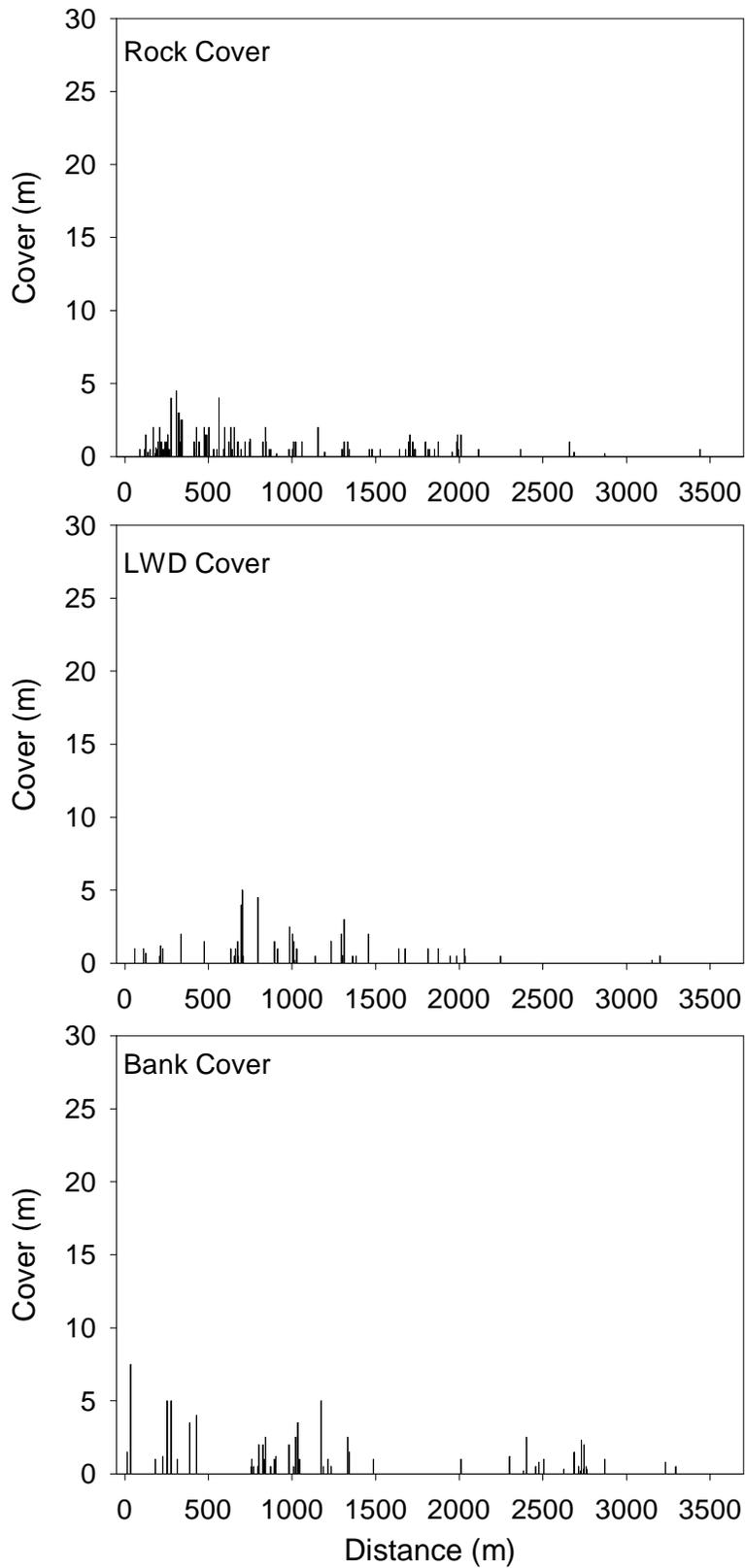


Figure A54. Estimated linear meters of overhead cover provided by rock, LWD, and undercut banks within the wetted stream channel for each habitat unit in Rock Mountain Creek, Chattahoochee National Forest, 2000. Cover was considered to be provided if a 15 cm object could be hidden beneath the cover type.

Warwoman sub-drainage

Roach Mill Creek

Table A37. Results, rankings, and biological ratings for macroinvertebrate samples collected at sites in Roach Mill Branch during 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u># of EPT Taxa</u>		<u>% EPT Taxa</u>		<u>% 2 Dominant Taxa</u>		<u>NCBI</u>		<u>Clinger Taxa</u>		<u>Final Score</u>		<u>Bio. Rating</u>											
	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>										
	# rank	# rank	% rank	% rank	% rank	% rank	# rank	# rank	# rank	# rank														
WW04	15	4	67.70	4	49.07	2	4.37	4	13	2	16		fair											
WWFS04S01		18	6	50.41	2	31.71	2	3.61	6	10	2	18		good										
WWFS04S02		14	4	23.95	0	25.15	4	4.86	4	8	2	14		fair										
Total Mean	15	4	16	4	67.70	4	37.18	2	49.07	2	28.43	4	4.37	4	4.24	4	13	2	9	2	16	16	fair	fair
Total Median	15	4	16	4	67.70	4	37.18	2	49.07	2	28.43	4	4.37	4	4.24	4	13	2	9	2	16	16	fair	fair

Table A38. RBP habitat form total scores, rankings, and ratings for sites in Roach Mill Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>RBP Habitat</u>				<u>RBP Habitat Rating</u>	
	<u>1998</u>		<u>2000</u>		<u>1998*</u>	<u>2000*</u>
	<u>score</u>	<u>rank</u>	<u>score</u>	<u>rank</u>		
WW04	64	1			fair	
WWFS04S01			119	1		fair
WWFS04S02			133	2		good
Total Mean	64	1	126	1	fair	fair
Total Median	64	1	126	1	fair	fair

Table A39. Pebble count and cobble embeddedness results and rankings for sample sites in Roach Mill Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	D50				% ≤ 2 mm				% Cobble Embeddedness				Average Sediment Rank	
	1998		2000		1998		2000		1998		2000		1998	2000
	size (mm)	rank (0-2)	size (mm)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	rank (0-2)	rank (0-2)
WW04	*	*			*	*			*	*			*	
WWFS04S01			41	2			21	2			54	0		1.3
WWFS04S02			bedrock	2			4	2			49	1		1.7
Total Mean	*	*	2069	2	*	*	12	2	*	*	52	0	*	1.3
Total Median	*	*	2069	2	*	*	12	2	*	*	52	0	*	1.3

*no sediment data was reported for Roach Mill Creek in U. S. EPA (1999)

Table A40. Pfankuch score and rank, average sediment rank (from Table A39), and overall site and stream ratings for Roach Mill Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	Pfankuch		Ave. Sediment Rank		Sum (Pfankuch+Sediment Rank)		Sediment+Pfankuch Rating			
	1998		2000		1998	2000	1998	2000		
	score (136-0)	rank (0-2)	score (136-0)	rank (0-2)	rank (0-2)	rank (0-2)	sum (0-4)	sum (0-4)	rating	rating
WW04	N/A	N/A			N/A		N/A		N/A	
WWFS04S01			91	1		1.3		2.3		fair
WWFS04S02			83	1		1.7		2.7		fair
Total Mean	N/A	N/A	87	1	N/A	1.3	N/A	2.3	N/A	fair
Total Median	N/A	N/A	87	1	N/A	1.3	N/A	2.3	N/A	fair

Table A41. Use support rating, based on results of final biological, RBP habitat, and sediment and Pfankuch ratings for Roach Mill Creek in 1998 and 2000. Tables used to derive sediment+Pfankuch, RBP, and final biological ratings are found on the preceding pages. Criteria used for use support rating can be found in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>Final Biological Rating</u>		<u>RBP Habitat Rating</u>		<u>Sediment+Pfankuch Rating</u>		<u>Use Support Rating</u>	
	1998	2000	1998	2000	1998	2000	1998	2000
WW04	fair		fair		N/A		partial support	
WWFS04S01		good		fair		fair		full support (watch)
WWFS04S02		fair		good		fair		partial support
Total Mean	fair	fair	fair	fair	N/A	fair	partial support	partial support
Total Median	fair	fair	fair	fair	N/A	fair	partial support	partial support

Table A42. BVET habitat survey results for Roach Mill Branch.

District:	Tallulah
Quadrangle:	Rabun Bald
Survey Date:	07/12/00
Downstream Starting Point:	FS boundary
Total Distance Surveyed:	0.9
Percent of Total Area Pools:	29
Number of Pools:	60
Number of Pools per km:	68
Total Pool Area (m ²):	583+/-2247
Mean Pool Area (m ²):	10
Correction Factor:	0.90
Mean Maximum Depth (cm):	25
Mean Average Depth (cm):	12
Mean Residual Pool Depth (cm):	7
Percent of Total Area Riffles:	71
Number of Riffles:	49
Number of Riffles per km:	55
Total Riffle Area (m ²):	1403+/-589
Mean Riffle Area (m ²):	29
Correction Factor:	0.97
Mean Maximum Depth (cm):	16
Mean Average Depth (cm):	7
Number of LWD pieces per km:	57
LWD < 5 m, 5-10 cm:	159
LWD < 5 m, 10-50 cm:	50
LWD < 5 m, > 50 cm:	11
LWD > 5 m, 5-10 cm:	49
LWD > 5 m, 10-50 cm:	57
LWD > 5 m, > 50 cm:	15
Rootwads:	3
Mean Channel Width (m):	4
Mean Riparian Width (m) (Total*):	12
Maximum Riparian Width (Total):	18
75th Percentile (Total):	17
25th Percentile (Total):	8
Minimum Riparian Width (Total):	4
Mean Riparian Width (m) (Left, Right**):	4
Maximum Riparian Width (Left, Right):	13
75th Percentile (Left, Right):	6
25th Percentile (Left, Right):	1
Minimum Riparian Width (Left, Right):	1
Percent of Pool Habitat Surveyed as Glides:	8
Rosgen's Channel Type Frequency:	
% Type A:	0
% Type B:	100
% Type C:	0
% Type D:	0
% Type E:	0
% Type F:	0
% Type G:	0
Percent Pools with > 35% Embeddedness:	70
Average Channel Gradient (%):	9

*Calculation sums left riparian + right riparian + stream channel

**Calculation uses left and right riparian values, not the sum of left and right

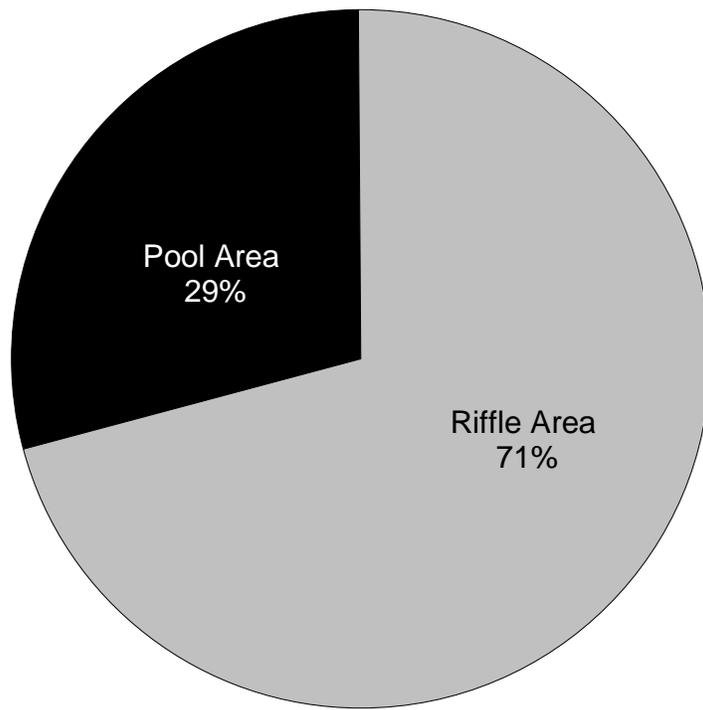


Figure A55. Percent pool and riffle surface area in Roach Mill Branch, Chattahoochee National Forest, 2000.

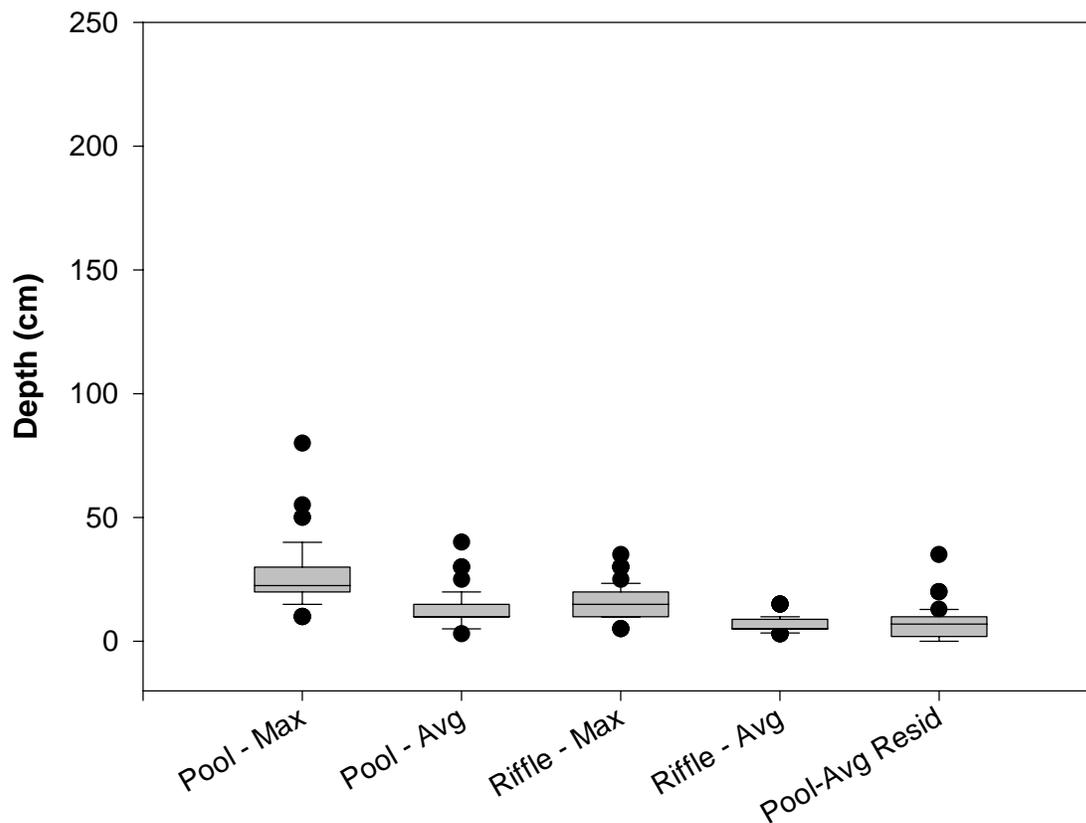


Figure A56. Maximum and average depths for pools and riffles, and average residual pool depths for Roach Mill Branch, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

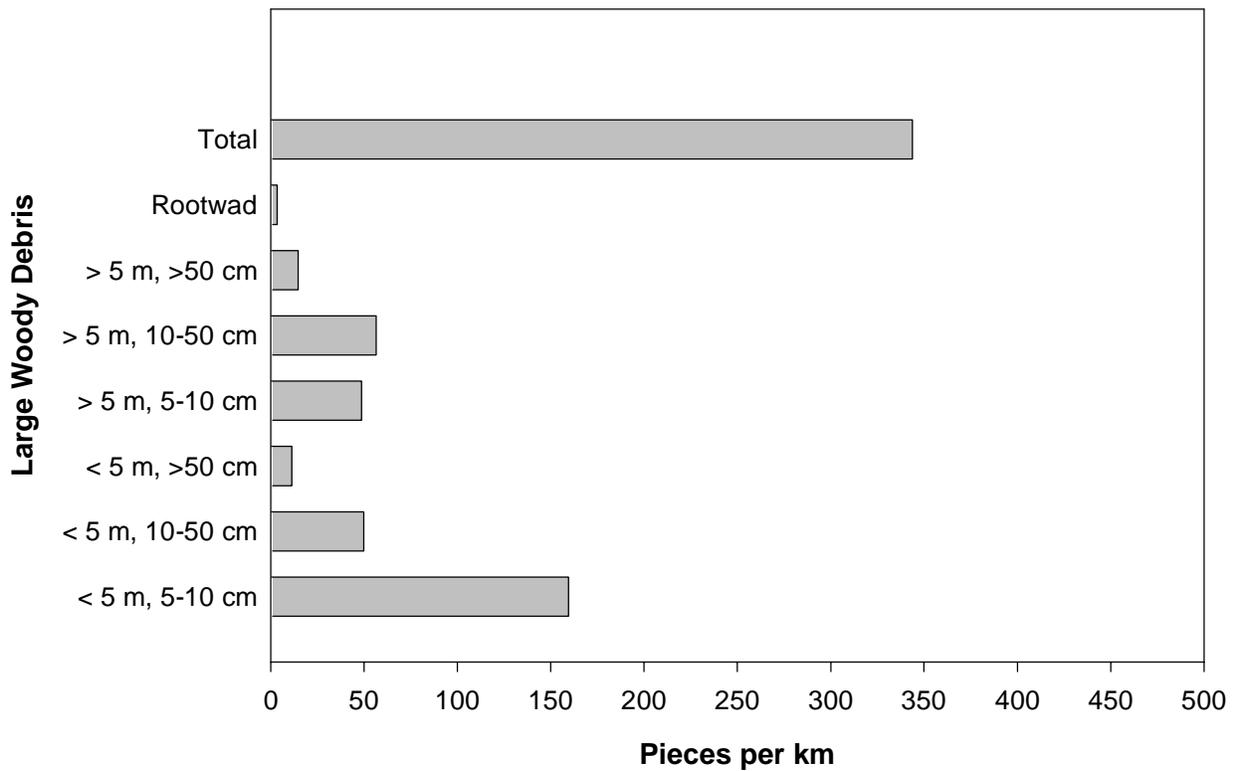


Figure A57. Pieces of large woody debris (LWD) per kilometer in Roach Mill Branch, Chattahoochee National Forest, 2000.

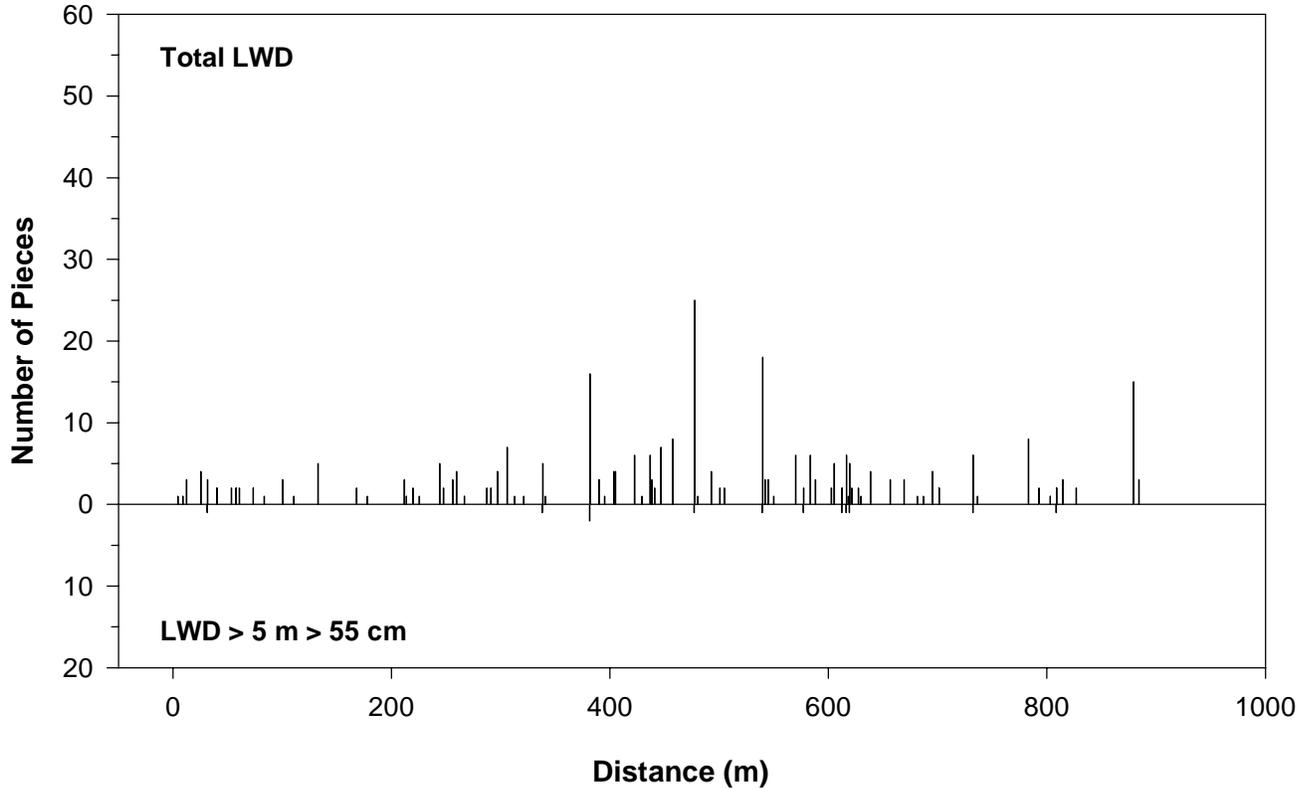


Figure A58. Distribution and abundance of LWD in Roach Mill Branch, Chattahoochee National Forest, 2000.

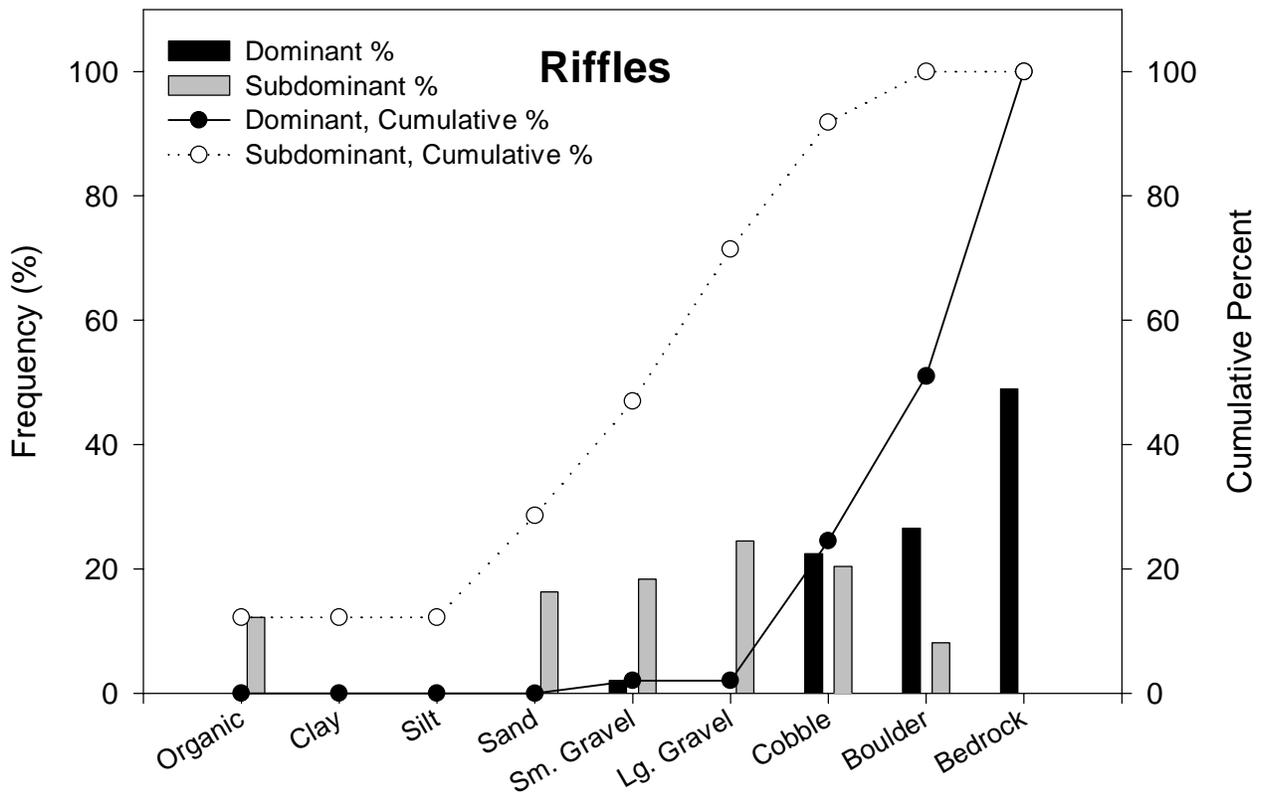
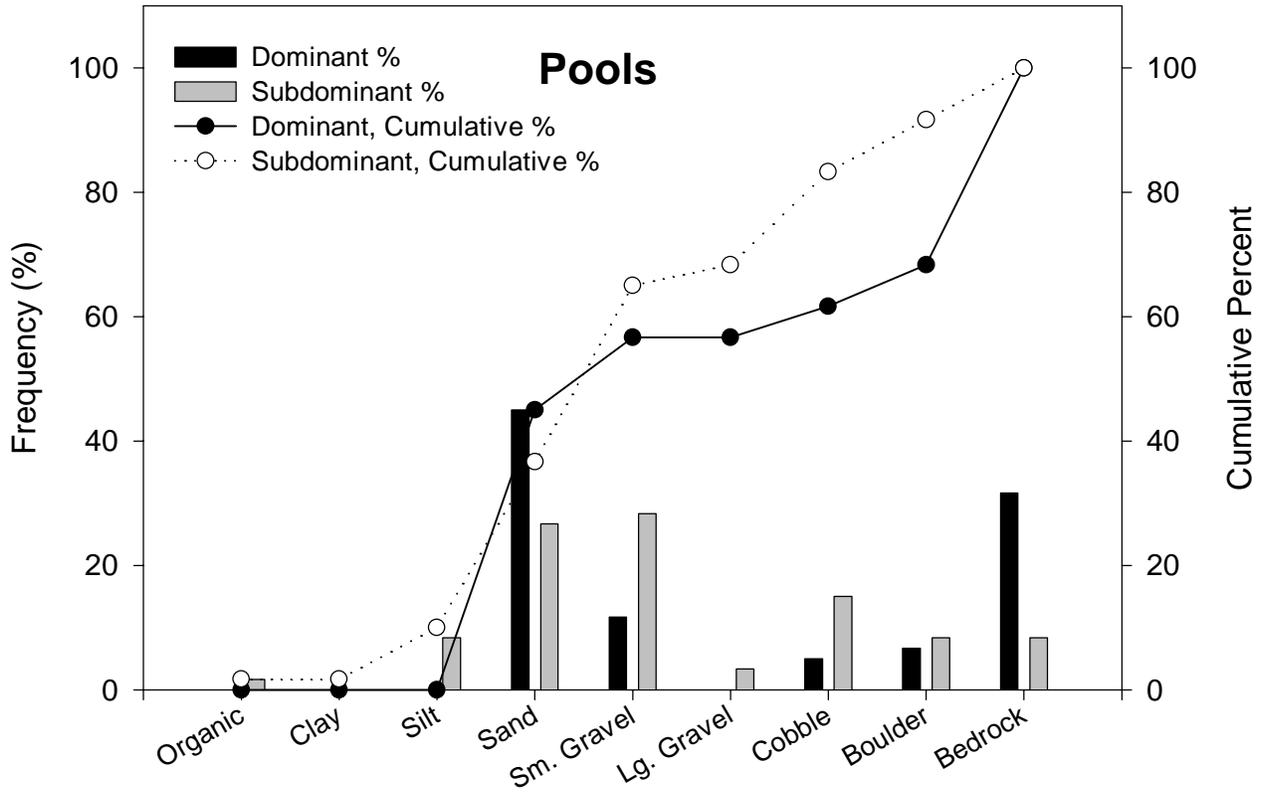


Figure A59. Frequency (percent) of dominant and subdominant substrate occurrence for pools and riffles in Roach Mill Branch, Chattahoochee National Forest, 2000. Solid dots and bars represent percent and cumulative percent of dominant substrate, open dots and gray bars represent percent and cumulative percent of subdominant substrate.

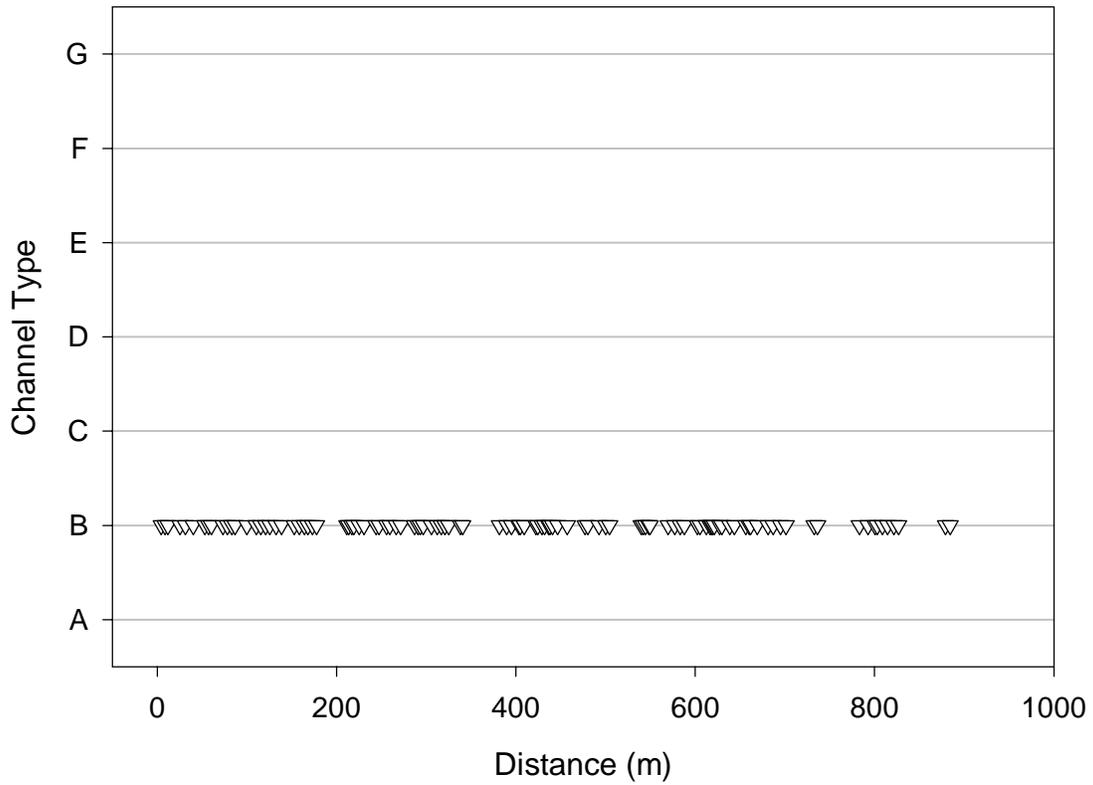


Figure A60. Rosgen's channel type distribution in Roach Mill Branch, Chattahoochee National Forest, 2000.

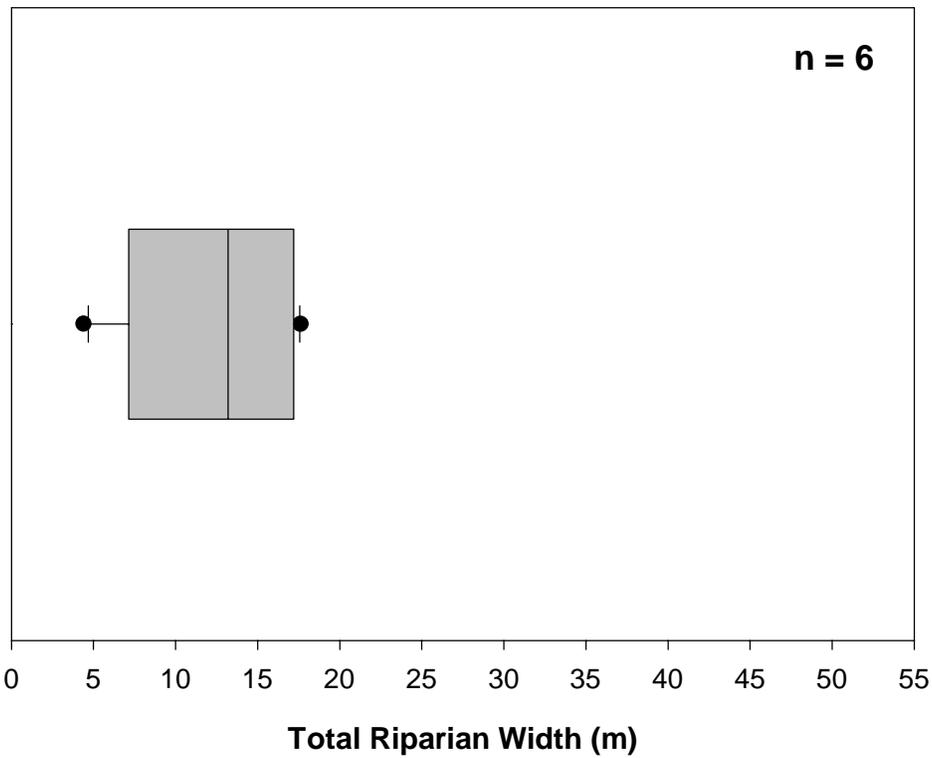


Figure A61. Total riparian width (channel width+right riparian+left riparian) for Roach Mill Branch, Chattahoochee National Forest, 2000. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles. Closed circles represent entire range of data.

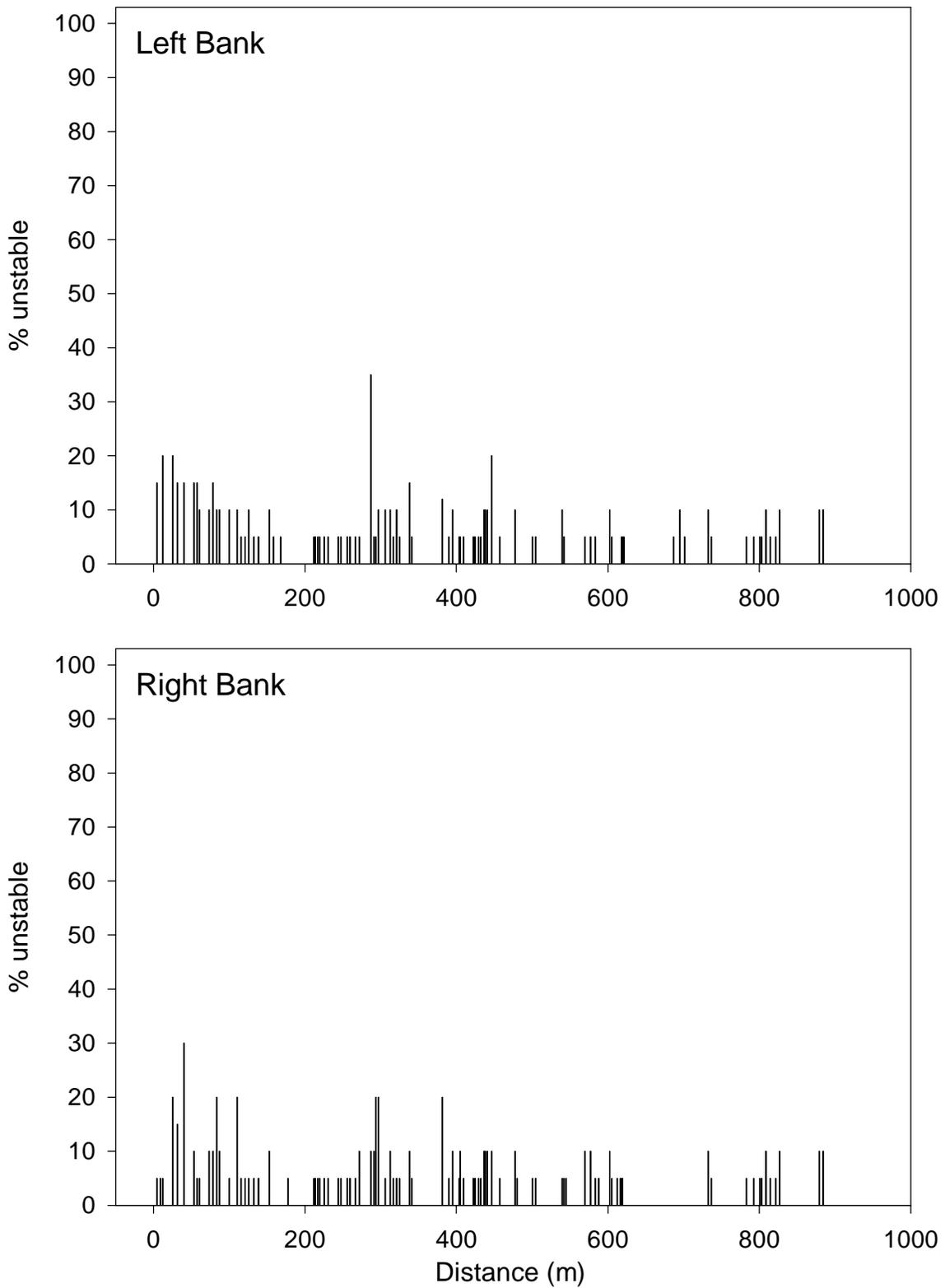


Figure A62. Percent of bank in Roach Mill Branch, Chattahoochee National Forest, 2000, considered to be unstable (% of bank composed of exposed erodible material from water's edge to bankfull). Estimated for every habitat unit.

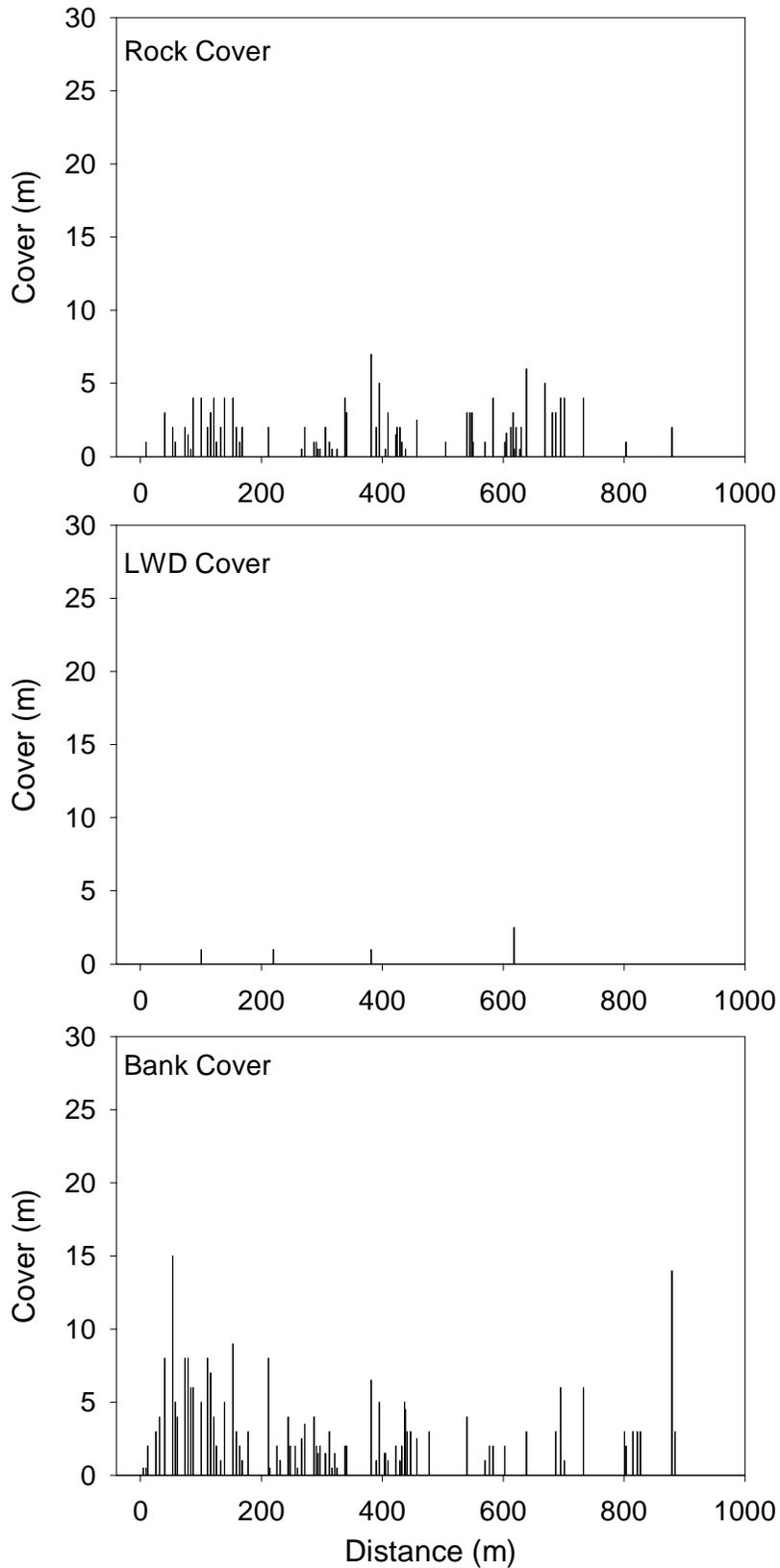


Figure A63. Estimated linear meters of overhead cover provided by rock, LWD, and undercut banks within the wetted stream channel for each habitat unit in Roach Mill Branch, Chattahoochee National Forest, 2000. Cover was considered to be provided if a 15 cm object could be hidden beneath the cover type.

Warwoman sub-drainage

Warwoman Creek

Table A43. Results, rankings, and biological ratings for macroinvertebrate samples collected at sites in Warwoman Creek during 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u># of EPT Taxa</u>		<u>% EPT Taxa</u>		<u>% 2 Dominant Taxa</u>		<u>NCBI</u>		<u>Clinger Taxa</u>		<u>Final Score</u>		<u>Bio. Rating</u>												
	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>											
	# rank	# rank	% rank	% rank	% rank	% rank	# rank	# rank	# rank	# rank															
	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)	(0-6)											
WW01	12	2	19	6	27.87	2	39.72	2	24.04	4	57.01	0	4.43	4	5.03	4	16	4	14	4	16	16	fair	fair	
WWFS13			16	3			42.11	2			41.05	2			4.39	4			14	4			15		fair
Total Mean	12	2	18	4	27.87	2	40.91	2	27.87	2	49.03	2	4.43	4	4.71	4	16		14	4	16	16	fair	fair	
Total Median	12	2	18	4	27.87	2	40.91	2	27.87	2	49.03	2	4.43	4	4.71	4	16		14	4	16	16	fair	fair	

Table A44. RBP habitat form total scores, rankings, and ratings for sites in Warwoman Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>RBP Habitat</u>				<u>RBP Habitat Rating</u>			
	<u>1998</u>		<u>2000</u>		<u>1998*</u>		<u>2000*</u>	
	<u>score</u>	<u>rank</u>	<u>score</u>	<u>rank</u>				
	(0-135)*	(0-3)	(0-200)*	(0-3)				
WW01	63	0	112			poor		fair
WWFS13			132					good
Total Mean	63	0	122			poor		fair
Total Median	63	0	122			poor		fair

Table A45. Pebble count and cobble embeddedness results and rankings for sample sites in Warwoman Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	D50				% ≤ 2 mm				% Cobble Embeddedness				Average Sediment Rank	
	<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>
	size (mm)	rank (0-2)	size (mm)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	percent (%)	rank (0-2)	rank (0-2)	rank (0-2)
WW01	30	1	19	1	19	2	27	1	31	1	26	2	1.3	1.3
WWFS13			26	1			17	2			51	0		1.0
Total Mean	30	1	22	1	19	2	22	2	19	2	38	1	1.3	1.3
Total Median	30	1	22	1	19	2	22	2	19	2	38	1	1.3	1.3

Table A46. Pfankuch score and rank, average sediment rank (from Table A45), and overall site and stream ratings for Warwoman Creek in 1998 and 2000. Sites are arranged from downstream to upstream. Ranking and rating criteria used are presented in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	Pfankuch		Ave. Sediment Rank		Sum (Pfankuch+Sediment Rank)		Sediment+Pfankuch Rating			
	<u>1998</u>		<u>2000</u>		<u>1998</u>	<u>2000</u>	<u>1998</u>	<u>2000</u>		
	score (136-0)	rank (0-2)	score (136-0)	rank (0-2)	rank (0-2)	rank (0-2)	sum (0-4)	sum (0-4)	rating	rating
WW01	126	0	85	1	1.3	1.3	1.3	2.3	poor	fair
WWFS13			89	1		1.0		2.0		fair
Total Mean	126	0	87	1	1.3	1.3	2.3	2.3	poor	fair
Total Median	126	0	87	1	1.3	1.3	2.3	2.3	poor	fair

Table A47. Use support rating, based on results of final biological, RBP habitat, and sediment and Pfankuch ratings for Warwoman Creek in 1998 and 2000. Tables used to derive sediment+Pfankuch, RBP, and final biological ratings are found on the preceding pages. Criteria used for use support rating can be found in U. S. EPA (1999). For samples collected in 2000, the final three digits of the sample site indicate sample location (R=road site, S=once per km site), and sample number (01, 02, etc.).

Sample Site	<u>Final Biological Rating</u>		<u>RBP Habitat Rating</u>		<u>Sediment+Pfankuch Rating</u>		<u>Use Support Rating</u>	
	1998	2000	1998	2000	1998	2000	1998	2000
WW01	fair	fair	poor	fair	poor	fair	partial support	partial support
WWFS13		fair		good		fair		partial support
Total Mean	fair	fair	poor	fair	poor	fair	partial support	partial support
Total Median	fair	fair	poor	fair	poor	fair	partial support	partial support

NO BVET HABITAT SURVEY WAS PERFORMED FOR WARWOMAN CREEK

Appendix B: Macroinvertebrate Report

FINAL REPORT

Submitted: 28 February 2001

Macroinvertebrate Sample Analysis:
USDA Forest Service
Southern Research Station (RWU4202)
Chattooga and Conasauga Watersheds

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Department of Entomology
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Blacksburg, Virginia 24061

In fulfillment of Research Cost Reimbursable Agreement No. SRS 00-CR-11330139-179, USDA Forest Service, Southern Research Station (RWU4202)

Samples of benthic macroinvertebrates that were collected in 2000 by the USDA Forest Service from the Chattooga watershed in Georgia were analyzed to the terms of the purchase order. Our analyses of each sample included:

- 1) washing fine detritus and preservative,
- 2) sorting and subsampling of 200 organisms from debris,
- 3) archiving of sample remains,
- 4) identifying all specimens to lowest possible taxonomic level,
- 5) enumerating specimens in each taxon,
- 6) recording counts, taxa names, and taxa codes on bench sheets
- 7) 17 metrics were calculated.
 - Total Taxa
 - Number of EPT Taxa
 - Number of Clinger Taxa
 - Percent Clingers
 - Percent 1 Dominant Taxon
 - Percent 2 Dominant Taxa
 - Percent Tolerant Organisms
 - Intolerant Taxa
 - Percent Diptera
 - Percent Chironomidae
 - Percent EPT
 - North Carolina Biotic Index (NCBI)
 - Percent Collectors
 - Percent Filterers
 - Percent Scrapers
 - Percent Shredders
 - Percent Predators

Taxonomic identifications were made by means of the following references:

Brigham, A. R., W. U. Brigham and A. Gnilka. Eds. 1982. Aquatic insects and oligochaetes of North and South Carolina. Midwest Aquatic Enterprises, Mahomet, Illinois.

Meritt, R. W. and K. W. Cummins, eds. 1984. An introduction to the aquatic insects of North America, 3rd ed. Kendall/Hunt, Dubuque, Iowa.

Pennak, R. W. 1989. Fresh-water invertebrates of the United States, 3rd ed. John Wiley and Sons, New York.

Stewart, K. W. and B. P. Stark. 1989. Nymphs of North American stonefly genera (Plecoptera). Volume 12, Thomas Say Foundation Series, Entomological Society of America, Hyattsville, Maryland.

Wiggins, G. B. 1996. Larvae of North American caddisfly genera (Trichoptera). 2nd ed. University of Toronto Press, Toronto, Ontario.

Each of the 66 samples has been stored in an individual vial. All samples will be returned to USDA Forest Service personnel.

Table B1. Macroinvertebrates collected in Addie Branch, July 2000.

Addie Branch	RFS02R01	RFS02R02	RFS02S03	RFS02R04	RFS02R06	RFS02S05	RFS02S07
TAXA							
Nematoda							
Oligochaeta				1	2		
Hirudinea							
Cambaridae				1	1	2	1
Pteronarcys	9	3	3		1	5	2
Tallaperla	5	27	1	13	43	92	117
Prostoia							
Amphinemura					2	4	
Perlidae							
Paragnetina							
Agnetina							
Acroneuria	15	5	5	12		3	1
Eccoptura xanthenes							
Perlesta placida group	8	3	6	4	2	2	
Beloneuria					5		
Perlodidae							
Yugus		2					1
Isoperla					1	1	
Sweltsa							
Leuctra	6	73	21	18	22	43	12
Ephemera	3	6	5				
Hexagenia							
Litobranca recurvata							
Neoephemera		1					
Caenis							
Brachycercus							
Serratella			4				
Drunella		1	1	1	1		
Ephemerella	4		4	1			
Eurylophella			1	2			2
Paraleptophlebia							
Habrophlebiodes							
Centroptilum	1						
Baetis (complex)			5				
Stenonema	7	2	11	5		1	1
Epeorus	2	1	3	6	2	2	
Leucrocuta				10			
Tricorythodes							
Isonychia		1					
Cordulegaster	3	4	1	2			
Gomphidae							
Stylogomphus albistylus							
Gomphus							
Hagenius							
Lanthus	5	2	3	5	2	3	2

Addie Branch	RFS02R01	RFS02R02	RFS02S03	RFS02R04	RFS02R06	RFS02S05	RFS02S07
TAXA							
Macromia							
Boyeria	1		1				
Neurocordulia							
Calopteryx							
Argia							
Gerris	2						
Rhagovelia obesa							
Sialis				1			
Corydalis cornutus							
Nigronia fasciatus							
Nigronia serricornis							
Neohermes							
Hydropsyche			1			8	2
Cheumatopsyche					1		
Diplectrona modesta	10	10	15	19	6	1	1
Parapsyche	1						1
Arctopsyche	3	4	1	1		4	
Rhyacophila	3	6	1	5	7	3	6
Chimarra							
Wormaldia							
Dolophilodes							
Lype diversa						1	
Leptoceridae							
Triaenodes							
Setodes							
Oecetis							
Nectopsyche							
Oligostomis	2						
Psilotreta			1	4		1	2
Micrasema							
Brachycentrus							
Lepidostoma	12		9	5	7	6	
Glossosoma	2	2	6	2	2	1	
Agapetus						1	
Pycnopsyche	1		3	2	3		1
Goera							
Neophylax							
Nyctiophylax		1			1		
Phylocentropus							
Polycentropus				2			
Molanna					2		
Fattigia pele							
Heteroplectron americanum		1	1	8	1		
Peltodytes							
Gyrinidae							

Addie Branch	RFS02R01	RFS02R02	RFS02S03	RFS02R04	RFS02R06	RFS02S05	RFS02S07
TAXA							
Psephenus herricki							
Ectopria				2	3		2
Helichus							
Stenelmis							
Macronychus							
Ancyronyx							
Microcyloepus							
Optioservus	5	6	8	4	2	1	2
Dubiraphia							
Promoresia	1	3	4				
Oulimnius latiusculus							
Anchytarsus					5		
Blepharicera			1				
Protoplasa fitchii							
Tipulidae							
Tipula			1	1	2	5	1
Antocha							
Dicranota	3	4	3	7	4	3	3
Hexatoma	1	1	7	2	6		4
Erioptera							
Pericoma							
Dixa					2		3
Simulium							
Chironomidae	81	22	57	47	55	23	14
Ceratopogonidae	2			2	5	1	2
Tabanidae							
Atherix		1					
Hemerodromia					1		
Chelifera							
Muscidae							
Collembola							1
Planorbidae							
Pleuroceridae							
Sphaeriidae							

Table B2. Metric results for macroinvertebrates collected in Addie Branch, July 2000.

Addie Branch							
TAXA	RFS02R01	RFS02R02	RFS02S03	RFS02R04	RFS02R06	RFS02S05	RFS02S07
Total Number of Individuals (N)	198	192	194	195	199	217	184
Number of Taxa	28	26	32	31	31	25	24
Number of EPT Taxa (EPT Taxa)	18	18	22	19	18	18	13
Number of Clinger Taxa (Clinger Taxa)	9	8	11	10	7	10	7
Percent Clingers	16.16	15.10	28.87	28.21	10.55	9.68	5.98
Percent 1 Dominant Taxon	40.91	38.02	29.38	24.10	27.64	42.40	63.59
Percent 2 Dominant Taxa	48.48	52.08	40.21	33.85	49.25	62.21	71.20
Percent Tolerant Organisms	43.43	11.46	29.90	26.15	33.17	14.75	10.33
Intolerant Taxa	24	25	30	27	25	22	20
Percent Diptera	43.94	14.58	35.57	30.26	40.20	14.75	14.67
Percent Chironomidae	40.91	11.46	29.38	24.10	27.64	10.60	7.61
Percent EPT (%EPT)	47.47	77.60	55.67	61.54	54.77	82.49	80.98
North Carolina Biotic Index (NCBI)	3.68	1.80	3.28	3.06	3.06	2.03	1.87
Percent Collectors	45.96	15.63	40.72	29.23	30.65	11.52	10.87
Percent Filterers	7.07	7.81	8.76	10.26	3.52	5.99	2.17
Percent Scrapers	7.58	7.29	16.49	14.36	5.03	2.76	3.80
Percent Shredders	16.67	54.17	20.10	24.10	43.22	71.43	72.28
Percent Predators	22.73	15.10	13.92	21.54	17.09	7.37	10.33

Table B3. Macroinvertebrates collected in Bailey Branch, July 2000.

Bailey Branch	RFS03S01	RFS03R02	RFS03R03	RFS03S04
TAXA				
Nematoda				
Oligochaeta	7		3	5
Hirudinea				
Cambaridae	1	1	1	
Pteronarcys				
Tallaperla	17	5	8	27
Prostoia			1	
Amphinemura				
Perlidae	3			3
Paragnetina				
Agnetina				
Acroneuria		5	1	
Eccoptura xanthenes				
Perlesta placida group				
Beloneuria				
Perlodidae			5	
Yugus	2	4		
Isoperla				
Sweltsa			1	
Leuctra	14	15	15	18
Ephemera	6	4	4	1
Hexagenia				
Litobrantha recurvata				
Neoephemera				
Caenis				
Brachycercus				
Serratella				
Drunella				
Ephemerella				
Eurylophella		1	1	3
Paraleptophlebia				
Habrophlebiodes				
Centroptilum				
Baetis (complex)				
Stenonema		6	4	1
Epeorus				
Leucrocuta				
Tricorythodes				
Isonychia				
Cordulegaster	5	2	4	2
Gomphidae				
Stylogomphus albistylus				
Gomphus				
Hagenius				

Bailey Branch	RFS03S01	RFS03R02	RFS03R03	RFS03S04
TAXA				
Lanthus	1	1	2	2
Macromia				
Boyeria				
Neurocordulia				
Calopteryx				
Argia				
Gerris				
Rhagovelia obesa				
Sialis				
Corydalus cornutus				
Nigronia fasciatus				
Nigronia serricornis				
Neohermes				
Hydropsyche				
Cheumatopsyche				
Diplectrona modesta	6	13	17	8
Parapsyche				
Arctopsyche				
Rhyacophila	4	4	3	1
Chimarra				
Wormaldia				
Dolophilodes				
Lype diversa				
Leptoceridae				
Triaenodes				
Setodes				
Oecetis				
Nectopsyche				
Oligostomis			2	
Psilotreta		1		
Micrasema			1	
Brachycentrus				
Lepidostoma				
Glossosoma				1
Agapetus				
Pycnopsyche				
Goera				
Neophylax				
Nyctiophylax		2		
Phylocentropus		11		2
Polycentropus				
Molanna	1	10		3
Fattigia pele				
Heteroplectron americanum	5	10	8	
Peltodytes				

Bailey Branch	RFS03S01	RFS03R02	RFS03R03	RFS03S04
TAXA				
Gyrinidae				
Psephenus herricki				
Ectopria				1
Helichus				
Stenelmis				
Macronychus				
Ancyronyx				
Microcyloopus				
Optioservus	3	2	5	1
Dubiraphia				
Promoresia	1		2	
Oulimnius latiusculus				
Anchytarsus			1	
Blepharicera				
Protoplasa fitchii				
Tipulidae				
Tipula		2		
Antocha				
Dicranota		1	1	
Hexatoma	4	4	3	1
Erioptera				
Pericoma				
Dixa	3	3	2	2
Simulium				
Chironomidae	65	75	60	81
Ceratopogonidae	5	2	3	5
Tabanidae				
Atherix				
Hemerodromia				
Chelifera				
Muscidae				
Collembola				
Planorbidae				
Pleuroceridae				
Sphaeriidae	1	1	2	2

Table B4. Metric results for macroinvertebrates collected in Bailey Branch, July 2000.

Bailey Branch	RFS03S01	RFS03R02	RFS03R03	RFS03S04
TAXA				
Total Number of Individuals (N)	154	185	160	170
Number of Taxa	20	25	27	21
Number of EPT Taxa (EPT Taxa)	9	14	14	11
Number of Clinger Taxa (Clinger Taxa)	3	4	6	5
Percent Clingers	6.49	11.89	18.75	7.06
Percent 1 Dominant Taxon	42.21	40.54	37.50	47.65
Percent 2 Dominant Taxa	53.25	48.65	48.13	63.53
Percent Tolerant Organisms	51.30	53.51	42.50	57.65
Intolerant Taxa	15	20	23	15
Percent Diptera	50.00	47.03	43.75	52.35
Percent Chironomidae	42.21	40.54	37.50	47.65
Percent EPT (%EPT)	37.66	49.19	44.38	40.00
North Carolina Biotic Index (NCBI)	4.05	4.13	3.84	4.19
Percent Collectors	52.60	44.86	43.75	54.12
Percent Filterers	4.55	13.51	11.88	7.06
Percent Scrapers	3.25	10.27	6.88	4.12
Percent Shredders	23.38	17.30	21.25	26.47
Percent Predators	15.58	13.51	15.63	8.24

Table B5. Macroinvertebrates collected in Law Ground Creek, July 2000.

Law Ground Creek	WFFS11S01	WFFS11R02	WFFS11R03	WFFS11S04
TAXA				
Nematoda				
Oligochaeta	1	3	1	
Hirudinea				
Cambaridae		5	3	2
Pteronarcys	4	9	21	8
Tallaperla	11	4	4	10
Prostoia				
Amphinemura				
Perlidae				
Paragnetina				
Agnetina				
Acroneuria	4	9	10	7
Eccoptura xanthenes		1		
Perlesta placida group				
Beloneuria				
Perlodidae				
Yugus				3
Isoperla				1
Sweltsa				
Leuctra	58	10	9	16
Ephemera		2		
Hexagenia				
Litobrancha recurvata				
Neoephemera				
Caenis				
Brachycercus				
Serratella				
Drunella		4		
Ephemerella		1		
Eurylophella			3	
Paraleptophlebia				
Habrophlebiodes				
Centroptilum				
Baetis (complex)		1		
Stenonema		10	11	3
Epeorus		2		6
Leucrocuta				
Tricorythodes				
Isonychia		1	1	
Cordulegaster	1	1		
Gomphidae				
Stylogomphus albistylus				
Gomphus				
Hagenius				

Law Ground Creek	WFFS11S01	WFFS11R02	WFFS11R03	WFFS11S04
TAXA				
Lanthus	5		2	1
Macromia				
Boyeria				
Neurocordulia				
Calopteryx			1	
Argia				
Gerris				
Rhagovelia obesa				
Sialis				
Corydalus cornutus				
Nigronia fasciatus		1		
Nigronia serricornis				
Neohermes				
Hydropsyche				
Cheumatopsyche				
Diplectrona modesta	14	38	9	4
Parapsyche		2	1	
Arctopsyche				
Rhyacophila		3		7
Chimarra				
Wormaldia				
Dolophilodes				
Lype diversa	3	1		2
Leptoceridae				
Triaenodes				
Setodes				
Oecetis				
Nectopsyche				
Oligostomis				
Psilotreta				
Micrasema				
Brachycentrus				
Lepidostoma	8	1	6	
Glossosoma		1		
Agapetus				
Pycnopsyche		2	1	
Goera				
Neophylax				
Nyctiophylax				
Phylocentropus				
Polycentropus				
Molanna				
Fattigia pele				
Heteroplectron americanum				
Peltodytes				

Law Ground Creek	WFFS11S01	WFFS11R02	WFFS11R03	WFFS11S04
TAXA				
Gyrinidae				
Psephenus herricki				
Ectopria		3	3	
Helichus	1			
Stenelmis				1
Macronychus				
Ancyronyx				
Microcyloopus				
Optioservus		10	2	9
Dubiraphia				
Promoresia				1
Oulimnius latiusculus	4			
Anchytarsus	10	6	5	
Blepharicera				
Protoplasa fitchii				
Tipulidae				
Tipula		1		1
Antocha				
Dicranota	5	4	1	1
Hexatoma			1	2
Erioptera	2	1	1	2
Pericoma				
Dixa	2	2	4	1
Simulium				5
Chironomidae	47	28	53	21
Ceratopogonidae	4			
Tabanidae				
Atherix	2	3	1	
Hemerodromia		1		
Chelifera	1			1
Muscidae				
Collembola				
Planorbidae				
Pleuroceridae				
Sphaeriidae				1

Table B6. Metric results for macroinvertebrates collected in Law Ground Creek, July 2000.

Law Ground Creek	WFFS11S01	WFFS11R02	WFFS11R03	WFFS11S04
TAXA				
Total Number of Individuals (N)	187	171	154	116
Number of Taxa	20	33	24	25
Number of EPT Taxa (EPT Taxa)	7	19	11	11
Number of Clinger Taxa (Clinger Taxa)	5	11	7	8
Percent Clingers	17.11	43.86	20.78	26.72
Percent 1 Dominant Taxon	31.02	22.22	34.42	18.10
Percent 2 Dominant Taxa	56.15	38.60	48.05	31.90
Percent Tolerant Organisms	28.34	18.71	35.71	24.14
Intolerant Taxa	16	30	21	21
Percent Diptera	39.04	26.90	42.86	29.31
Percent Chironomidae	25.13	16.37	34.42	18.10
Percent EPT (%EPT)	54.55	59.65	49.35	57.76
North Carolina Biotic Index (NCBI)	2.73	3.02	3.62	2.77
Percent Collectors	27.81	23.39	40.26	25.86
Percent Filterers	7.49	23.98	7.14	8.62
Percent Scrapers	4.28	16.96	10.39	13.79
Percent Shredders	48.66	19.30	29.87	30.17
Percent Predators	11.76	13.45	10.39	19.83

Table B7. Macroinvertebrates collected in Reed Mill Creek, July 2000.

Reed Mill Creek	WFFS10S01	WFFS10S02	WFFS10S03	WFFS10R04	WFFS10R05
TAXA					
Nematoda					
Oligochaeta	3	2	2		
Hirudinea					
Cambaridae	1				1
Pteronarcys	17	11	1	2	
Tallaperla	3	16	40	35	31
Prostoia					
Amphinemura					
Perlidae					
Paragnetina					
Agnetina					
Acroneuria	16	16	4	3	1
Eccoptura xanthenes					
Perlesta placida group					
Beloneuria					
Perlodidae					
Yugus		1	2	2	1
Isoperla					
Sweltsa					
Leuctra	4	6	19	7	30
Ephemera	2	11	23	16	2
Hexagenia					
Litobranca recurvata					
Neoephemera					
Caenis					
Brachycercus					
Serratella					
Drunella	1	3			
Ephemerella					
Eurylophella			1		
Paraleptophlebia					
Habrophlebiodes					
Centroptilum					
Baetis (complex)	4	1			
Stenonema	19	11	17	23	15
Epeorus	8	2		3	
Leucrocuta					
Tricorythodes					
Isonychia		3	3	5	7
Cordulegaster		1	6	4	2
Gomphidae					
Stylogomphus albistylus					
Gomphus			2		
Hagenius					

Reed Mill Creek	WFFS10S01	WFFS10S02	WFFS10S03	WFFS10R04	WFFS10R05
TAXA					
Lanthus	2	2		3	2
Macromia					
Boyeria					
Neurocordulia					
Calopteryx			1		3
Argia					
Gerris					
Rhagovelia obesa					
Sialis					
Corydalus cornutus					
Nigronia fasciatus			4		3
Nigronia serricornis					
Neohermes					
Hydropsyche					
Cheumatopsyche					
Diplectrona modesta	36	26	24	6	16
Parapsyche	3				
Arctopsyche	2	1		1	
Rhyacophila	1	1	5		2
Chimarra					
Wormaldia					
Dolophilodes					
Lype diversa				1	2
Leptoceridae					
Triaenodes					
Setodes					
Oecetis					
Nectopsyche					
Oligostomis					
Psilotreta					
Micrasema					
Brachycentrus					
Lepidostoma					1
Glossosoma	1	1			
Agapetus					
Pycnopsyche					
Goera					
Neophylax					
Nyctiophylax					
Phylocentropus					
Polycentropus					
Molanna					
Fattigia pele					
Heteroplectron americanum					
Peltodytes					

Reed Mill Creek	WFFS10S01	WFFS10S02	WFFS10S03	WFFS10R04	WFFS10R05
TAXA					
Gyrinidae					
Psephenus herricki					
Ectopria	7	2	1	4	
Helichus					
Stenelmis					
Macronychus					
Ancyronyx					
Microcyloopus					
Optioservus	4	22	6		1
Dubiraphia					
Promoresia		2			
Oulimnius latiusculus			1		
Anchytarsus	9	2		5	2
Blepharicera					
Protoplasa fitchii				1	
Tipulidae					
Tipula	2		7	14	12
Antocha					
Dicranota		1		1	1
Hexatoma					
Erioptera					
Pericoma					
Dixa	1		1		
Simulium	2	1			
Chironomidae	14	23	6	34	33
Ceratopogonidae	1	3	2	7	1
Tabanidae					
Atherix	5	2			
Hemerodromia					
Chelifera	2				
Muscidae					
Collembola					
Planorbidae					
Pleuroceridae					
Sphaeriidae		2	4		

Table B8. Metric results for macroinvertebrates collected in Reed Mill Creek, July 2000.

Reed Mill Creek	WFFS10S01	WFFS10S02	WFFS10S03	WFFS10R04	WFFS10R05
TAXA					
Total Number of Individuals (N)	170	175	182	177	169
Number of Taxa	27	28	24	21	22
Number of EPT Taxa (EPT Taxa)	14	15	11	12	11
Number of Clinger Taxa (Clinger Taxa)	11	12	6	8	6
Percent Clingers	55.88	42.29	28.57	27.12	25.44
Percent 1 Dominant Taxon	21.18	14.86	21.98	19.77	19.53
Percent 2 Dominant Taxa	32.35	28.00	35.16	38.98	37.87
Percent Tolerant Organisms	12.94	17.71	9.34	23.73	21.89
Intolerant Taxa	22	23	18	18	19
Percent Diptera	21.18	18.29	8.79	35.03	28.99
Percent Chironomidae	8.24	13.14	3.30	19.21	19.53
Percent EPT (%EPT)	68.82	62.86	76.37	58.76	63.91
North Carolina Biotic Index (NCBI)	2.92	2.70	2.50	3.40	3.25
Percent Collectors	18.82	22.29	18.13	30.51	20.71
Percent Filterers	25.29	18.86	17.03	6.78	13.61
Percent Scrapers	18.82	23.43	13.74	15.82	10.65
Percent Shredders	20.59	20.00	36.81	35.59	44.97
Percent Predators	15.88	15.43	14.29	11.30	9.47

Table B9. Macroinvertebrates collected in Martin-Finney Creek, July 2000.

Marin Finney Creek	WWFS03S01	WWFS03S02	WWFS03S03	WWFS03R04	WWFS03R05	WWFS03S05	WWFS03S06	WWFS03S07	WWFS03T08	WWFS03S09	WWFS03T10
TAXA											
Nematoda											
Oligochaeta	1		4		6	3	6			1	
Hirudinea											
Cambaridae			2			1	1	1	1	1	1
Pteronarcys	7	7	7			19	2	3	2		
Tallaperla	3		4	15	16	10	29	31	51	46	6
Prostoia											
Amphinemura				2	2		3	1	1	2	
Perlidae											
Paragnetina											
Agnetina											
Acroneuria	4					7		3	18	9	5
Eccoptura xanthenes								1			
Perlesta placida group	1										
Beloneuria				9	6		1		3	2	5
Perlodidae											
Yugus							1		1		
Isoperla						4	4				
Sweltsa											
Leuctra	35		4	77	60	14	14	12	17	34	60
Ephemera			11			10		1	6	3	1
Hexagenia											
Litobrancha recurvata											
Neophemera											
Caenis											
Brachycercus											
Serratella											
Drunella	2		4								
Ephemerella	1										
Eurylophella					1		4	2	2	2	9
Paraleptophlebia											
Habrophlebiodes				1				1		2	2
Centroptilum											
Baetis (complex)							1		1		
Stenonema	8	1	28	4			3	3	6	1	1
Epeorus	2		6				1				
Leucrocuta						1					
Tricorythodes											
Isonychia	4			4							1
Cordulegaster	1				5	3		5		3	1
Gomphidae					1						
Stylogomphus albistylus											
Gomphus											
Hagenius											

Marin Finney Creek	WWFS03S01	WWFS03S02	WWFS03S03	WWFS03R04	WWFS03R05	WWFS03S05	WWFS03S06	WWFS03S07	WWFS03T08	WWFS03S09	WWFS03T10
Lanthus			2	1			1		7	3	4
Macromia	1										
Boyeria	1										
Neurocordulia											
Calopteryx	1										
Argia											
Gerris											
Rhagovelia obesa											
Sialis											
Corydalus cornutus											
Nigronia fasciatus								1	6	2	1
Nigronia serricornis											
Neohermes											
Hydropsyche	1						1		1		
Cheumatopsyche	1		3								
Diplectrona modesta			1	15	4	8	5	7	9	27	5
Parapsyche											
Arctopsyche											
Rhyacophila	1		3	3	1	8	7		7	1	4
Chimarra											
Wormaldia											
Dolophilodes			19						1		
Lype diversa			1			1		1		2	
Leptoceridae											
Triaenodes											
Setodes											
Oecetis											
Nectopsyche											
Oligostomis											
Psilotreta					1	2	1	1	1	3	1
Micrasema											
Brachycentrus											
Lepidostoma				5	2	3	2	6		5	5
Glossosoma	8										
Agapetus									2		
Pycnopsyche	11		2		1		3	1		1	
Goera			1								
Neophylax											1
Nyctiophylax											
Phylocentropus	2										
Polycentropus				2				2	1		2
Molanna									4		4
Fattigia pele										1	
Heteroplectron americanum											
Peltodytes											

Marin Finney Creek	WWFS03S01	WWFS03S02	WWFS03S03	WWFS03R04	WWFS03R05	WWFS03S05	WWFS03S06	WWFS03S07	WWFS03T08	WWFS03S09	WWFS03T10
TAXA											
Gyrinidae											
Psephenus herricki	3					1					
Ectopria										1	1
Helichus											
Stenelmis											
Macronychus											
Ancyronyx											
Microcyloopus											
Optioservus	5		4			2	1		1	3	
Dubiraphia											
Promoresia			1								
Oulimnius latiusculus			1								
Anchytarsus			2					1	3	1	
Blepharicera											
Protoplasa fitchii											
Tipulidae											
Tipula	2		3	6	4	1	8	28	1	4	2
Antocha											1
Dicranota				4	4	4	13	7	6		2
Hexatoma			7	8	3		2	4		4	3
Erioptera				10	11				3		
Pericoma				2			1	1			
Dixa				1	2	5	1				
Simulium			3			3					
Chironomidae	19		18	27	28	43	34	27	27	20	17
Ceratopogonidae	1		3	1	4	2	13	4	2	2	2
Tabanidae										1	1
Atherix			8			4					
Hemerodromia								2			
Chelifera											1
Muscidae					2						
Collembola				1							
Planorbidae											
Pleuroceridae											
Sphaeriidae											

Table B10. Metric results for macroinvertebrates collected in Martin-Finney Creek, July 2000.

Marin Finney Creek	WWFS03S01	WWFS03S02	WWFS03S03	WWFS03R04	WWFS03R05	WWFS03S05	WWFS03S06	WWFS03S07	WWFS03T08	WWFS03S09	WWFS03T10
TAXA											
Total Number of Individuals (N)	126	8	152	198	164	164	163	157	191	187	149
Number of Taxa	26	2	27	21	21	27	28	27	29	29	29
Number of EPT Taxa (EPT Taxa)	16	2	14	11	10	15	17	16	19	16	16
Number of Clinger Taxa (Clinger Taxa)	8	1	11	4	2	7	7	6	10	7	8
Percent Clingers	25.40	12.50	45.39	12.63	3.05	10.98	7.98	9.55	13.61	20.32	8.72
Percent 1 Dominant Taxon	27.78	87.50	18.42	38.89	36.59	26.22	20.86	19.75	26.70	24.60	40.27
Percent 2 Dominant Taxa	42.86	100.00	30.92	52.53	53.66	37.80	38.65	37.58	40.84	42.78	51.68
Percent Tolerant Organisms	20.63	0.00	20.39	15.66	24.39	31.10	33.74	21.66	17.80	12.83	16.78
Intolerant Taxa	19	2	22	17	17	23	23	23	25	25	24
Percent Diptera	17.46	0.00	28.95	29.80	35.37	37.80	44.17	47.13	21.99	17.11	19.46
Percent Chironomidae	15.08	0.00	11.84	13.64	17.07	26.22	20.86	17.20	14.14	10.70	11.41
Percent EPT (%EPT)	72.22	100.00	61.84	69.19	57.32	56.10	50.31	48.41	70.16	75.40	75.17
North Carolina Biotic Index (NCBI)	2.82	1.96	3.04	2.43	2.86	2.90	3.38	3.79	2.46	2.34	2.31
Percent Collectors	18.25	0.00	25.66	20.71	29.27	38.41	29.45	19.75	20.42	13.90	18.79
Percent Filterers	6.35	0.00	17.11	9.60	2.44	6.71	3.68	4.46	5.76	14.44	4.03
Percent Scrapers	20.63	12.50	26.32	2.53	0.61	6.10	3.07	3.82	7.33	6.42	6.71
Percent Shredders	46.03	87.50	14.47	53.03	51.83	28.66	37.42	52.87	39.27	50.27	48.99
Percent Predators	8.73	0.00	15.13	14.14	15.85	19.51	25.77	18.47	26.70	14.44	20.81

Table B11. Macroinvertebrates collected in Rock Mountain Creek, July 2000.

Rock Mountain Creek	WWFS12R01	WWFS12R02	WWFS12S03	WWFS12R04	WWFS12R05	WWFS12S06	WWFS12R07	WWFS12R08	WWFS12S09	WWFS12R10	WWFS12R11
TAXA											
Nematoda											
Oligochaeta	3	1		1	2	2	2	3		2	1
Hirudinea											
Cambaridae	6	8	3	6	1	1	1	3			
Pteronarcys	13	12	8	2	1						
Tallaperla	6	4	18	17	9	12	55	6	4	5	11
Prostoia										1	
Amphinemura	1				2	1					
Perlidae											
Paragnetina											
Agnetina											
Acroneuria	21	7	7	18	3	2	3	10	6	3	1
Eccopectura xanthenes				1							
Perlesta placida group											
Beloneuria	2									2	2
Perlodidae											
Yugus			1	4		1	1				
Isoperla			2			1					
Sweltsa											
Leuctra	12	6	11	22	31	5	11	10	4	17	10
Ephemera	4	13	3	13	2						
Hexagenia											
Litobranca recurvata											
Neoephemera											
Caenis											
Brachycercus											
Serratella											
Drunella	5	3	5								
Ephemerella	2										
Eurylophella	1			2	1	1		1		1	
Paraleptophlebia											
Habrophlebiodes					1			3	2		2
Centroptilum											
Baetis (complex)	1		1								
Stenonema		7	6	5	3	2		4	3		3
Epeorus	1	2							1		
Leucrocuta											
Tricorythodes											
Isonychia		1		1	1						
Cordulegaster	1		1			1		1	4		
Gomphidae											
Stylogomphus albistylus											
Gomphus											
Hagenius											

Rock Mountain Creek	WWFS12R01	WWFS12R02	WWFS12S03	WWFS12R04	WWFS12R05	WWFS12S06	WWFS12R07	WWFS12R08	WWFS12S09	WWFS12R10	WWFS12R11
Lanthus		2		2			2				
Macromia											
Boyeria											
Neurocordulia											
Calopteryx											
Argia											
Gerris				1		1					1
Rhagovelia obesa						1					
Sialis											
Corydalus cornutus											
Nigronia fasciatus								5		1	
Nigronia serricornis							2				
Neohermes											
Hydropsyche			1								
Cheumatopsyche											
Diplectrona modesta	5	9	28	4	4	18	8	7	9	3	3
Parapsyche											
Arctopsyche											
Rhyacophila	1		3	1		1	2	3	1	1	3
Chimarra											
Wormaldia								1			
Dolophilodes											
Lype diversa			3								
Leptoceridae											
Triaenodes											
Setodes											
Oecetis											2
Nectopsyche											
Oligostomis											
Psilotreta	1			3	5				2	1	
Micrasema											
Brachycentrus											
Lepidostoma			1	7	1			2			
Glossosoma	8	1		1							
Agapetus											
Pycnopsyche		2			5		2	2		1	13
Goera											
Neophylax	1									1	
Nyctiophylax											
Phylocentropus											
Polycentropus									1		
Molanna					1			2		1	
Fattigia pele											
Heteroplectron americanum											2
Peltodytes											

Rock Mountain Creek	WWFS12R01	WWFS12R02	WWFS12S03	WWFS12R04	WWFS12R05	WWFS12S06	WWFS12R07	WWFS12R08	WWFS12S09	WWFS12R10	WWFS12R11
TAXA											
Gyrinidae											
Psephenus herricki											
Ectopria		1	2	1							
Helichus											
Stenelmis				1							
Macronychus											
Ancyronyx											
Microcyloepus											
Optioservus			3	5	3	1				1	
Dubiraphia											
Promoresia											
Oulimnius latiusculus											
Anchytarsus		3		1		1				2	
Blepharicera											
Protoplasa fitchii											
Tipulidae						1			13		
Tipula	1	4	3	9	2		2	1	1	4	2
Antocha	4										
Dicranota		8	2	11	4	4	5		2	6	2
Hexatoma	3		7	5	8	3	5	8	9	2	9
Erioptera		26		9	21	20	37			45	11
Pericoma				4	2						
Dixa			1	5	2		2	5	4		3
Simulium			5			4					
Chironomidae	13	15	34	23	28	60	32	67	70	49	47
Ceratopogonidae	1	3	4	1	6	19	2	10	1	3	7
Tabanidae											
Atherix											
Hemerodromia											
Chelifera											1
Muscidae											
Collembola		6	2	2			2	1	5	3	3
Planorbidae											
Pleuroceridae											
Sphaeriidae						1					

Table B12. Metric results for macroinvertebrates collected in Rock Mountain Creek, July 2000.

Rock Mountain Creek	WWFS12R01	WWFS12R02	WWFS12S03	WWFS12R04	WWFS12R05	WWFS12S06	WWFS12R07	WWFS12R08	WWFS12S09	WWFS12R10	WWFS12R11
TAXA											
Total Number of Individuals (N)	117	144	165	188	149	164	176	155	142	155	139
Number of Taxa	25	23	27	32	26	25	19	22	19	23	22
Number of EPT Taxa (EPT Taxa)	17	12	15	15	15	10	7	12	10	12	11
Number of Clinger Taxa (Clinger Taxa)	7	7	8	9	5	5	1	3	5	5	2
Percent Clingers	17.95	16.67	29.70	11.70	10.74	15.85	4.55	7.74	11.27	5.16	4.32
Percent 1 Dominant Taxon	17.95	18.06	20.61	12.23	20.81	36.59	31.25	43.23	49.30	31.61	33.81
Percent 2 Dominant Taxa	29.06	28.47	37.58	23.94	39.60	48.78	52.27	49.68	58.45	60.65	43.17
Percent Tolerant Organisms	14.53	17.36	27.88	17.02	26.17	53.66	21.59	53.55	53.52	37.42	43.17
Intolerant Taxa	22	19	22	26	21	18	15	17	16	18	16
Percent Diptera	18.80	40.97	33.94	36.17	48.99	68.29	48.30	58.71	70.42	71.61	58.99
Percent Chironomidae	11.11	10.42	20.61	12.23	18.79	36.59	18.18	43.23	49.30	31.61	33.81
Percent EPT (%EPT)	72.65	46.53	59.39	53.72	46.98	26.83	46.59	32.90	23.24	23.87	37.41
North Carolina Biotic Index (NCBI)	2.62	3.27	3.19	2.84	3.33	4.49	3.23	4.42	4.62	4.26	4.11
Percent Collectors	24.79	43.75	24.85	31.38	38.93	50.61	42.61	49.68	56.34	64.52	46.76
Percent Filterers	4.27	6.94	20.61	2.66	3.36	14.02	4.55	5.16	6.34	1.94	2.16
Percent Scrapers	12.82	8.33	11.52	8.51	8.72	1.83	0.00	5.81	4.93	2.58	3.60
Percent Shredders	28.21	21.53	24.85	30.85	34.23	12.20	39.77	13.55	15.49	19.35	27.34
Percent Predators	24.79	13.89	16.36	23.40	14.09	20.73	12.50	23.87	16.90	11.61	20.14

Table B13. Macroinvertebrates collected in Roach Mill Branch, July 2000.

Roach Mill Branch	WWFS04S01	WWFS04S02
TAXA		
Nematoda		5
Oligochaeta	10	30
Hirudinea		
Cambaridae		1
Pteronarcys	2	
Tallaperla	6	5
Prostoia		
Amphinemura	1	
Perlidae		
Paragnetina		
Aagnetina		
Acroneuria	2	2
Eccoptura xanthenes		
Perlesta placida group		
Beloneuria	7	
Perlodidae		
Yugus		2
Isoperla		1
Sweltsa		1
Leuctra	10	8
Ephemera	8	2
Hexagenia		
Litobrancha recurvata		
Neoephemera		
Caenis		
Brachycercus		
Serratella		
Drunella		
Ephemerella		
Eurylophella		3
Paraleptophlebia		
Habrophlebiodes		
Centroptilum		
Baetis (complex)	1	
Stenonema	2	2
Epeorus		3
Leucrocuta		
Tricorythodes		
Isonychia	1	
Cordulegaster	2	
Gomphidae		
Stylogomphus albistylus		
Gomphus		
Hagenius		

Roach Mill Branch	WWFS04S01	WWFS04S02
TAXA		
Lanthus	1	
Macromia		
Boyeria		
Neurocordulia		
Calopteryx		
Argia		
Gerris		
Rhagovelia obesa	1	
Sialis		
Corydalus cornutus		
Nigronia fasciatus		
Nigronia serricornis		
Neohermes		
Hydropsyche		
Cheumatopsyche		
Diplectrona modesta	13	5
Parapsyche		
Arctopsyche		
Rhyacophila	1	
Chimarra		
Wormaldia	1	
Dolophilodes	1	
Lype diversa		
Leptoceridae		
Triaenodes		
Setodes		
Oecetis		
Nectopsyche		
Oligostomis		
Psilotreta	2	4
Micrasema		
Brachycentrus		
Lepidostoma	1	1
Glossosoma	2	
Agapetus		
Pycnopsyche	1	
Goera		
Neophylax		
Nyctiophylax		
Phylocentropus		
Polycentropus		1
Molanna		
Fattigia pele		
Heteroplectron americanum		
Peltodytes		

Roach Mill Branch	WWFS04S01	WWFS04S02
TAXA		
Gyrinidae		
Psephenus herricki		
Ectopria	1	
Helichus		
Stenelmis		
Macronychus		
Ancyronyx		
Microcyloopus		
Optioservus	1	1
Dubiraphia		
Promoresia		
Oulimnius latiusculus		
Anchytarsus		
Blepharicera		1
Protoplasmata fitchii		
Tipulidae		2
Tipula	4	
Antocha		
Dicranota		
Hexatoma	5	4
Erioptera	1	27
Pericoma		
Dixa	1	1
Simulium		5
Chironomidae	26	37
Ceratopogonidae	6	12
Tabanidae		
Atherix	1	
Hemerodromia		
Chelifera		
Muscidae		
Collembola	1	1
Planorbidae		
Pleuroceridae		
Sphaeriidae		

Table B14. Metric results for macroinvertebrates collected in Roach Mill Branch, July 2000.

Roach Mill Branch	WWFS04S01	WWFS04S02
TAXA		
Total Number of Individuals (N)	123	167
Number of Taxa	32	27
Number of EPT Taxa (EPT Taxa)	18	14
Number of Clinger Taxa (Clinger Taxa)	10	8
Percent Clingers	20.33	13.17
Percent 1 Dominant Taxon	21.14	2.99
Percent 2 Dominant Taxa	31.71	25.15
Percent Tolerant Organisms	35.77	53.89
Intolerant Taxa	27	21
Percent Diptera	35.77	53.29
Percent Chironomidae	21.14	22.16
Percent EPT (%EPT)	50.41	23.95
North Carolina Biotic Index (NCBI)	3.61	4.86
Percent Collectors	39.02	65.27
Percent Filterers	13.01	5.99
Percent Scrapers	6.50	4.79
Percent Shredders	20.33	9.58
Percent Predators	21.14	13.77

Table B15. Macroinvertebrates collected in Warwoman Creek, July 2000.

Warwoman Creek		
TAXA	WW01	WWFS13
Nematoda		
Oligochaeta		1
Hirudinea		
Cambaridae	1	
Pteronarcys	6	2
Tallaperla		
Prostoia		
Amphinemura		
Perlidae		
Paragnetina		
Agnatina		
Acroneuria	1	12
Eccoptura xanthenes		
Perlesta placida group	6	
Beloneuria		
Perlodidae		
Yugus		
Isoperla		
Sweltsa		
Leuctra	5	5
Ephemera		
Hexagenia	1	
Litobrancha recurvata		
Neoephemera		
Caenis		
Brachycercus	2	
Serratella	7	
Drunella		1
Ephemerella	1	
Eurylophella		
Paraleptophlebia		
Habrophlebiodes		
Centroptilum		
Baetis (complex)	2	1
Stenonema	11	11
Epeorus	3	2
Leucrocuta		
Tricorythodes		
Isonychia	5	3
Cordulegaster	1	
Gomphidae		
Stylogomphus albistylus		
Gomphus		
Hagenius		
Lanthus		1

Warwoman Creek		
TAXA	WW01	WWFS13
Macromia		
Boyeria	3	1
Neurocordulia		
Calopteryx		2
Argia		
Gerris		
Rhagovelia obesa		
Sialis	1	
Corydalus cornutus	1	
Nigronia fasciatus		
Nigronia serricornis	7	4
Neohermes		
Hydropsyche	8	10
Cheumatopsyche	20	21
Diplectrona modesta		
Parapsyche		
Arctopsyche		
Rhyacophila		2
Chimarra		
Wormaldia		
Dolophilodes	1	1
Lype diversa	3	2
Leptoceridae		
Triaenodes		
Setodes		
Oecetis		
Nectopsyche		
Oligostomis		
Psilotreta		
Micrasema		
Brachycentrus		2
Lepidostoma	1	4
Glossosoma	1	
Agapetus		
Pycnopsyche		
Goera		
Neophylax		1
Nyctiophylax		
Phylocentropus		
Polycentropus	1	
Molanna		
Fattigia pele		
Heteroplectron americanum		
Peltodytes		
Gyrinidae		
Psephenus herricki		2

Warwoman Creek		
TAXA	WW01	WWFS13
Ectopria		
Helichus		
Stenelmis		
Macronychus	1	
Ancyronyx		
Microcyloopus		
Optioservus	3	12
Dubiraphia		
Promoresia	1	2
Oulimnius latiusculus		
Anchytarsus		
Blepharicera		
Protoplasa fitchii		
Tipulidae		
Tipula		3
Antocha		
Dicranota		1
Hexatoma	3	
Erioptera		
Pericoma		
Dixa		
Simulium	4	12
Chironomidae	102	57
Ceratopogonidae		1
Tabanidae	1	
Atherix		10
Hemerodromia		1
Chelifera		
Muscidae		
Collembola		
Planorbidae		
Pleuroceridae		
Sphaeriidae		

Table B16. Metric results for macroinvertebrates collected in Warwoman Creek, July 2000.

Warwoman Creek		
TAXA	WW01	WWFS13
Total Number of Individuals (N)	214	190
Number of Taxa	32	31
Number of EPT Taxa (EPT Taxa)	19	16
Number of Clinger Taxa (Clinger Taxa)	14	14
Percent Clingers	29.91	43.16
Percent 1 Dominant Taxon	47.66	30.00
Percent 2 Dominant Taxa	57.01	41.05
Percent Tolerant Organisms	63.55	55.26
Intolerant Taxa	26	23
Percent Diptera	51.40	44.74
Percent Chironomidae	47.66	30.00
Percent EPT (%EPT)	39.72	42.11
North Carolina Biotic Index (NCBI)	5.03	4.39
Percent Collectors	55.14	32.11
Percent Filterers	17.76	25.79
Percent Scrapers	9.35	16.32
Percent Shredders	5.61	7.37
Percent Predators	11.68	18.42

Appendix C: Pebble Count and Cobble Embeddedness Results

Table C1. Results of pebble count and cobble embeddedness measurements for streams in the Chattooga River watershed, 2000.

	Inflow D50	D50	D33	D84	% ≤ 2mm	Cobble Embeddedness
West Fork						
Addie Branch						
RFS02-R01	680	bedrock	430	bedrock	11	34
RFS02-R02	228	185	40	bedrock	24	35
RFS02-S03	185	60	sand	550	34	57
RFS02-R04	148	75	9	450	30	46
RFS02-R06	1000	920	197	bedrock	34	49
RFS02-S05	73	70	24	345	24	42
RFS02S07	149	118	23	630	15	48
Bailey Branch						
RFS03S01	15	10	sand	76	37	68
RFS03R02	22	17	10	80	20	42
RFS03R03	10	6	sand	25	43	43
RFS03S04	19	15	5	210	27	45
Law Ground Creek						
WFFS11S01	bedrock	bedrock	239	bedrock	22	72
WFFS11R02	45	61	7	386	22	54
WFFS11R03	36	12	sand	106	34	57*
WFFS11S04	285	288	128	bedrock	18	74*
Reed Mill Creek						
WFFS10S01	633	1300	78	bedrock	24	65
WFFS10S02	17	13	sand	bedrock	36	51
WFFS10S03	28	11	sand	775	37	55
WFFS10R04	43	24	10	210	28	55
WFFS10R05	11	10	sand	31	38	82*
Warwoman						
Martin-Finney Creek						
WWFS03S01	41	40	31	70	1	62
WWFS03S02	75	75	53	144	11	44
WWFS03S03	131	56	11	513	22	45
WWFS03R04	15	sand	sand	155	53	98*
WWFS03R05	7	5	sand	24	42	N/A*
WWFS03S05	23	16	4	121	32	51
WWFS03S06	16	10	sand	76	39	54
WWFS03S07	55	44	15	105	18	50
WWFS03T08	25	9	sand	80	37	48
WWFS03S09	50	29	8	98	28	63
WWFS03T10	61	50	35	94	16	63
Rock Mountain Creek						
WWFS12R01	80	78	30	132	11	47
WWFS12R02	70	64	38	140	11	55
WWFS12S03	236	233	50	bedrock	14	49
WWFS12R04	40	30	20	96	13	51*
WWFS12R05	55	45	28	120	14	61
WWFS12S06	70	55	5	bedrock	33	41
WWFS12R07	40	10	sand	76	46	55*
WWFS12R08	25	23	10	100	27	57*
WWFS12S09	16	9	sand	138	35	45
WWFS12R10	50	45	5	101	32	50
WWFS12R11	80	75	50	111	18	54
Roach Mill Branch						
WWFS04S01	64	41	12	141	21	54
WWFS04S02	bedrock	bedrock	bedrock	bedrock	4	49*
Warwoman Creek						
WW01	25	19	6	84	27	26
WWFS13	29	26	11	89	17	51

*sites with fewer than 100 cobbles measured

Appendix D: Phankuch and RBP Results

Table D1. Individual question and total scores for the Pfankuch Channel Stability Rating form for each site in the West Fork sub-watershed. Sites are arranged from downstream to upstream. Highest scores indicate worst channel condition and lowest scores indicate best channel condition. A copy of the Pfankuch Channel Stability Rating form can be found in Appendix E.

Question #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Possible Score	(0-8)	(0-12)	(0-8)	(0-12)	(0-4)	(0-8)	(0-8)	(0-16)	(0-16)	(0-4)	(0-4)	(0-8)	(0-16)	(0-24)	(0-4)	(0-152)
Addie Branch																
RFS02R01	8	3	6	3	2	2	3	4	6	2	2	4	6	6	1	58
RFS02R02	6	3	4	3	2	2	3	4	5	1	2	3	8	12	2	60
RFS02S03	6	3	8	3	2	4	4	4	12	2	3	4	8	12	1	76
RFS02R04	4	5	3	6	1	3	3	4	4	2	2	2	5	6	2	52
RFS02R06	7	4	5	1	2	1	2	2	4	1	1	2	2	7	1	42
RFS02S05	3	2	4	1	2	2	1	2	7	1	1	2	3	1	1	33
RFS02S07	4	3	6	3	2	2	3	8	11	2	3	4	9	11	3	74
Bailey Branch																
RFS03S01	1	1	6	3	3	8	6	5	14	3	3	5	10	16	3	87
RFS03R02	4	3	4	3	1	4	4	8	12	3	3	5	12	18	3	87
RFS03R03	2	3	6	3	2	8	5	5	13	3	3	4	10	13	3	83
RFS03S04	4	3	6	3	1	4	4	4	8	3	1	2	12	12	3	70
Law Ground Creek																
WFFS11S01	4	6	4	3	1	2	4	5	5	2	2	4	4	14	2	62
WFFS11R02	6	4	5	3	1	2	5	8	8	2	1	2	6	15	3	71
WFFS11R03	6	3	5	6	3	4	7	16	15	2	2	5	15	22	4	115
WFFS11S04	2	4	8	3	2	3	8	12	14	2	3	5	12	20	4	102
Reed Mill Creek																
WFFS10S01	4	3	6	5	1	5	2	3	13	3	3	6	13	18	3	88
WFFS10S02	4	7	6	4	3	6	6	5	13	3	3	8	14	20	4	106
WFFS10S03	3	4	5	5	2	6	4	7	15	3	3	8	12	22	4	103
WFFS10R04	4	3	4	5	2	4	6	8	10	2	2	5	10	20	4	89
WFFS10R05	3	3	4	4	3	6	6	12	14	3	2	8	16	24	3	111

Table D2. Individual question and total scores for the Pfankuch Channel Stability Rating form for each site in the Warwoman sub-watershed. Sites are arranged from downstream to upstream. Highest scores indicate worst channel condition and lowest scores indicate best channel condition. A copy of the Pfankuch Channel Stability Rating form can be found in Appendix E.

Question #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Possible Score	(0-8)	(0-12)	(0-8)	(0-12)	(0-4)	(0-8)	(0-8)	(0-16)	(0-16)	(0-4)	(0-4)	(0-8)	(0-16)	(0-24)	(0-4)	(0-152)
<i>Martin-Finney Creek</i>																
WWFS03S01	2	3	6	5	2	8	4	4	12	2	3	8	16	24	3	102
WWFS03S02	2	3	4	3	1	6	3	4	8	2	2	4	8	18	2	70
WWFS03S03	2	3	5	4	2	3	3	4	13	2	3	4	13	18	4	83
WWFS03R04	5	3	5	6	2	4	4	10	10	1	3	4	9	14	3	83
WWFS03R05	4	3	4	6	1	6	4	5	8	1	4	7	11	14	4	82
WWFS03S05	2	3	5	8	2	2	6	13	14	2	2	4	12	22	3	100
WWFS03S06	2	3	3	6	2	3	4	0	8	2	3	3	9	2	2	52
WWFS03S07	2	3	4	4	1	4	2	12	8	3	3	4	10	14	3	77
WWFS03T08	4	2	4	5	2	4	3	8	10	2	3	4	8	7	3	69
WWFS03S09	2	3	6	4	2	4	5	10	12	2	2	4	8	14	2	80
WWFS03T10	3	3	5	5	2	4	5	7	10	2	3	4	8	12	2	75
<i>Rock Mountain Creek</i>																
WWFS12R01	4	6	4	3	2	3	4	8	8	2	3	5	12	16	1	81
WWFS12R02	5	5	4	6	1	3	3	4	9	2	3	4	6	12	1	68
WWFS12S03	3	6	5	3	2	3	3	5	13	2	3	4	12	18	4	86
WWFS12R04	3	8	5	9	1	3	3	8	12	2	3	4	12	18	3	94
WWFS12R05	6	9	6	9	2	4	6	8	12	3	3	4	12	18	2	104
WWFS12S06	3	9	6	4	2	3	6	13	13	2	3	5	2	8	4	83
WWFS12R07	4	9	4	6	2	4	6	8	12	2	3	6	10	18	3	97
WWFS12R08	4	6	4	6	2	4	4	6	6	3	3	4	10	14	3	79
WWFS12S09	8	3	4	4	2	3	2	6	8	2	2	4	15	20	3	86
WWFS12R10	4	6	4	9	2	4	4	10	6	3	3	6	10	14	3	88
WWFS12R11	6	6	4	6	2	6	4	8	8	2	2	6	8	12	2	82
<i>Roach Mill Branch</i>																
WWFS04S01	6	3	4	5	2	6	3	6	8	3	3	6	12	22	2	91
WWFS04S02	8	6	6	3	1	2	4	4	14	4	2	4	4	18	3	83
<i>Warwoman Creek</i>																
WW01	2	3	4	5	2	6	4	8	11	2	3	4	10	18	3	85
WWFS13	6	3	2	3	2	6	5	6	10	2	2	6	12	21	3	89

Table D3. Individual questions and total scores on the EPA habitat assessment form for each site in the West Fork sub-watershed. Sites are arranged from downstream to upstream. Questions 1-7 were scored from 0 to 20, with 0 indicating worst condition and 20 indicating best condition. Questions 8-10 are broken into left (A) and right (B) banks, and were scored from 0 to 10, with 0 indicating worst condition and 10 indicating best condition. A copy of the EPA habitat assessment form can be found in Appendix E.

Question #	1	2	3	4	5	6	7	8A	8B	9A	9B	10A	10B	Total
Possible Score	(0-20)	(0-20)	(0-20)	(0-20)	(0-20)	(0-20)	(0-20)	(0-10)	(0-10)	(0-10)	(0-10)	(0-10)	(0-10)	(0-200)
Addie Branch														
RFS02R01	15	14	14	17	15	19	18	9	9	10	10	9	9	168
RFS02R02	16	14	19	14	16	19	18	9	10	10	10	9	9	173
RFS02S03	12	7	20	9	16	19	13	7	7	9	9	10	10	148
RFS02R04	13	8	8	15	18	19	19	8	8	8	8	9	9	150
RFS02R06	15	15	17	15	19	19	19	9	9	9	9	9	9	173
RFS02S05	17	11	16	12	16	19	19	9	9	9	9	9	9	164
RFS02S07	11	9	16	8	10	20	17	8	6	9	9	9	10	142
Bailey Branch														
RFS03S01	9	9	16	8	9	19	18	9	9	9	9	9	9	142
RFS03R02	14	10	12	8	12	17	16	9	9	9	9	9	9	143
RFS03R03	10	11	16	5	7	19	18	9	9	9	9	9	8	139
RFS03S04	17	12	17	14	10	20	17	9	9	8	8	7	5	153
Law Ground Creek														
WFFS11S01	7	1	18	12	8	19	19	9	9	8	8	10	10	138
WFFS11R02	16	8	14	10	10	20	17	10	9	10	9	10	7	150
WFFS11R03	6	4	6	4	8	16	16	3	1	3	1	7	9	84
WFFS11S04	7	9	14	6	6	10	16	5	5	8	8	2	8	104
Reed Mill Creek														
WFFS10S01	9	6	12	5	9	19	19	9	9	9	9	9	9	133
WFFS10S02	7	3	8	3	8	19	17	9	9	9	9	8	9	118
WFFS10S03	7	6	8	4	8	19	17	9	9	8	8	8	9	120
WFFS10R04	7	7	6	3	10	19	16	7	6	9	8	10	8	116
WFFS10R05	2	2	8	1	11	17	5	5	3	7	7	10	9	87

Table D4. Individual questions and total scores on the EPA habitat assessment form for each site in the Warwoman sub-watershed. Sites are arranged from downstream to upstream. Questions 1-7 were scored from 0 to 20, with 0 indicating worst condition and 20 indicating best condition. Questions 8-10 are broken into left (A) and right (B) banks, and were scored from 0 to 10, with 0 indicating worst condition and 10 indicating best condition. A copy of the EPA habitat assessment form can be found in Appendix E.

Question #	1	2	3	4	5	6	7	8A	8B	9A	9B	10A	10B	Total
Possible Score	(0-20)	(0-10)	(0-10)	(0-10)	(0-10)	(0-10)	(0-10)	(0-200)						
<i>Martin-Finney Creek</i>														
WWFS03S01	4	2	12	1	17	14	7	8	8	9	9	10	6	107
WWFS03S02	12	12	13	9	14	18	16	9	9	10	10	10	10	152
WWFS03S03	8	7	17	4	10	16	1	9	9	9	9	8	8	115
WWFS03R04	12	8	10	9	15	18	18	6	7	7	7	8	8	133
WWFS03R05	1	2	6	1	7	20	3	10	9	8	8	10	9	94
WWFS03S05	10	6	11	3	10	19	17	4	7	6	8	8	9	118
WWFS03S06	13	8	11	11	13	18	19	6	7	6	6	3	9	130
WWFS03S07	13	15	16	11	15	14	17	4	5	8	6	7	10	141
WWFS03T08	11	13	16	12	15	13	18	7	9	7	7	9	9	146
WWFS03S09	15	13	13	7	14	9	17	8	8	9	9	8	7	137
WWFS03T10	12	12	13	13	13	18	16	7	7	7	8	9	9	144
<i>Rock Mountain Creek</i>														
WWFS12R01	10	11	7	8	9	13	18	7	6	8	8	6	5	116
WWFS12R02	13	13	13	15	13	15	18	8	8	8	7	9	9	149
WWFS12S03	8	8	16	6	8	16	17	9	9	9	9	8	9	132
WWFS12R04	7	8	13	6	9	13	17	4	3	3	4	9	7	103
WWFS12R05	10	11	10	5	10	14	16	6	6	5	5	5	7	110
WWFS12S06	8	9	15	6	7	18	17	5	5	7	7	9	8	121
WWFS12R07	8	6	8	8	7	12	15	6	7	6	6	4	3	96
WWFS12R08	9	9	7	9	9	14	17	6	7	5	5	8	6	111
WWFS12S09	8	9	9	10	9	20	18	9	8	9	9	10	9	137
WWFS12R10	10	10	7	10	8	14	16	8	5	5	3	6	6	108
WWFS12R11	6	12	8	8	9	11	17	7	7	6	6	7	7	111
<i>Roach Mill Branch</i>														
WWFS04S01	5	11	10	7	8	18	16	6	7	6	8	8	9	119
WWFS04S02	11	9	9	6	8	20	16	7	8	10	10	9	10	133
<i>Warwoman Creek</i>														
WW01	11	13	16	6	17	14	14	4	6	2	5	3	1	112
WWFS13	10	10	13	10	15	14	17	8	8	9	9	4	5	132

Appendix E: Pfankuch and RBP Habitat Assessment Forms

PFANKUCH CHANNEL STABILITY RATING FORM										
			Excellent		Good		Fair		Poor	
Upper Banks	Landform Slope	1	Bank slope gradient <30%.	(2)	Bank slope gradient 30%-40%.	(4)	Bank slope gradient 40% - 60%.	(6)	Bank slope gradient 60%+	(8)
	Mass Wasting or failure (existing or potential)	2	No evidence of past or any potential for future mass wasting into channel.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly year long or imminent danger of same	(12)
	Debris Jam potential (floatable objects)	3	Essentially absent from immediate channel area.	(2)	Present, but mostly small twigs and limbs.	(4)	Present volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
	Vegetative Bank Protection	4	90% plant density. Vigor and variety suggests a deep, dense soil binding, root mass.	(3)	70% - 90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50% - 70% density. Lower vigor and fewer species form a shallower, discontinuous root mass.	(9)	< 50% density and fewer species & lower vigor indicate poor, discontinuous, shallow root mass.	(12)
Lower Banks	Channel Capacity	5	Ample for present plus some increases. Peak flows contained W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to depth (W/D) ratio 8 to 15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15 to 25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
	Bank Rock Content	6	65%+ with large, angular boulders 12"+ numerous.	(2)	40% - 65%, mostly small boulders to cobbles 6" - 12".	(4)	20% - 40% with most in the 3" to 6" class.	(6)	< 20% rock fragments of gravel sizes, 1" to 3" or less.	(8)
	Obstructions, Flow Deflectors, Sediment Traps	7	Rocks and old logs firmly embedded. Flow pattern without cutting or deposition. Pools and riffles stable.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(2)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(8)	Frequent obstructions and deflectors cause bank erosion yearlong. Sediment traps full, channel migration occurring.	(8)
	Cutting	8	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves and constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12" - 24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts some over 24" high. Failure of overhangs frequent.	(16)
	Deposition	9	Little or no enlargement of channel or point bars.	(4)	Some new increases in bar formation, mostly from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominantly fine particles. Accelerated bar development.	(16)
	Rock Angularity	10	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners and edges, surfaces smooth and flat.	(2)	Corners and edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surface smooth.	(4)
Bottom	Brightness	11	Surfaces dull, darkened, or stained, Generally not "bright".	(1)	Mostly dull, but may have up to 35% bright surfaces.	(2)	Mixture, 50/50% dull and bright range 35% - 65%.	(3)	Predominantly bright, 65%+ exposed or scoured surfaces.	(40)
	Consolidation or particle packing	12	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
	Bottom Size Distribution and Percent Stable Materials	13	No change in size evident. Stable materials 80% - 100%.	(4)	Distribution shift slight. Stable materials 50% - 80%.	(8)	Moderate change in sizes. Stable materials 20% - 50%.	(12)	Marked distribution change. Stable materials 0% - 20%.	(16)
	Scouring and Deposition	14	Less than 5% of the bottom affected by scouring and deposition.	(6)	5% - 30% affected. Scour at constrictions and where grades steepen. Some deposition in pools.	(12)	30% - 50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change year long.	(24)
	Clinging Aquatic Vegetation (moss and algae)	15	Abundant. Growth largely mosslike, dark green, perennial. In swift water, too.	(1)	Common. Algal Forms in low velocity & pool areas. Moss here too and in swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term bloom may be present.	(4)
Excellent Column Total:					Good Column Total:		Fair Column Total:		Poor Column Total:	

Add values in each column and record the total here:

Habitat Assessment Field Data Sheet-High Gradient Streams (Page 1 of 2)

Stream Name _____		Location _____	
Station# _____ RiverMile _____		Stream Class _____	
LAT _____ LONG _____		River Basin _____	
STORET _____		Agency _____	
Investigators _____			
Form Completed By _____		Date Time _____ AM PM	Reason for Survey _____

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	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 habiat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the for 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 to 50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50 – 75% surrounded by fine sediment.	Gravel, cobble, and boulder particle 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.	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 (Page 2 of 2)

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 if 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 obstructions 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) Note: determine left and right side by facing upstream.	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 area of erosion; high erosion potential during floods.	Unstable; many eroded areas; “raw” areas frequent along straight sections and bends; obvious bank sloughing; 60 – 100% of bank has erosional scars.
Score (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 surface 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, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12 – 18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6 – 12 meters; human activities have impacted zone a great deal.	Width of 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

Parameters to be evaluated broader than sampling reach

Total Score _____