

**Stream Habitat Distribution in the North Sylamore Creek Drainage,
Ozark National Forest, AR, 2004**



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Introduction

In June 2004, the USDA Forest Service, Southern Research Station, Center for Aquatic Technology Transfer (CATT) performed stream habitat inventories on Sylamore Creek and several tributaries to provide stream habitat information to Ozark National Forest resource (ONF) managers. The stream habitat inventories are part of a larger effort to monitor the physical, chemical and biological resources within the watershed. Specifically, we coordinated with faculty and students from the Arkansas Tech University Biological Sciences Department as they simultaneously collected fish data within the watershed. The stream habitat information we collected can be used as a baseline for comparison with future inventories and will be of immediate use for assessment of land-use practices in combination with other physical, chemical, or biological data collected in the watershed.

Inventory Area

The North Sylamore Creek watershed is characterized by steep V-shaped, limestone and dolomite sided valleys separated by long, narrow winding ridges. Land cover in the watershed is 99 percent forest and 1 percent cleared land and private land holdings account for less than 5 percent of lands within the Forest boundary (Mast and Turk 1999). Over 23 km of the mainstem of North Sylamore Creek are designated National Wild and Scenic River corridor and the stream is also considered Extraordinary Resource Waters by the State of Arkansas. North Sylamore Creek flows southeast into the White River, which is a tributary to the Mississippi River. Recreational activities within the watershed include camping, horseback riding, hiking and fishing, particularly for smallmouth bass.

We performed stream habitat inventories on the mainstem of North Sylamore Creek and the tributaries Bad Branch, Stewart Fork and Cole Fork (Figure 1). The mainstem was divided into a lower section beginning at the confluence with South Sylamore Creek and ending at the USGS gauging station (road 1102 bridge), and an upper section beginning at the USGS gauging station and ending at the confluence of Cole Fork and Stewart Fork. The tributary inventories all began at the confluence with the mainstem of North Sylamore Creek and ended after the stream channel went underground.

Methods

We used two-stage visual estimation techniques to quantify stream habitat. During the first stage, habitat was stratified into similar groups based on naturally occurring habitat units including 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.

Habitat in each stream was classified and inventoried by a two-person crew. One crew member identified each habitat unit by type (as described above), estimated average wetted width, average and maximum depth, riffle crest depth (RCD), substrate composition, and percent fines. The length (0.1 m) of each habitat unit was measured with a hip chain. Average wetted width was visually estimated. Average and maximum depth of each habitat unit were estimated by taking depth measurements at various places across the channel profile with a graduated staff marked in 5 cm increments. The RCD was estimated by measuring water depth at the deepest point in the hydraulic control between riffles and pools. The RCD was subtracted from average pool depth to obtain an estimate of residual pool depth. Substrates were assigned to one of nine size classes (Appendix B). Dominant substrate (covered greatest amount of surface area in habitat unit) and subdominant substrate (covered 2nd greatest amount of surface area in habitat unit) were visually estimated. Percent fines was the percent of surface area of the stream bed that consisted of sand, silt, or clay substrate particles (particles < 2 mm diameter).

The second crew member classified and inventoried large woody debris (LWD) within the stream channel, determined the Rosgen's channel type (Appendix B) associated with each habitat unit, and recorded data on a Husky fex21 data logger. LWD was assigned to one of four size classes (Appendix B). All woody debris less than 1.0 m long and less than 10 cm in diameter were omitted from the survey. Rosgen's channel type was visually estimated using criteria found in Rosgen (1996). In underground sections we recorded only substrate type, percent fines, LWD, and Rosgen type at 100 m intervals.

The first unit of each habitat type selected for intensive (second stage) sampling (i.e. accurate measurement of wetted width) was determined randomly. Additional units were selected systematically (every 5th habitat unit). The wetted width of each systematically selected habitat unit was measured with a meter tape across at least three transects and averaged. In each of the systematically selected (second stage) riffles we also estimated the bankfull stream channel width and riparian width, measured channel gradient and water temperature, and took a digital photograph. We estimated bankfull channel width by measuring the width of the bankfull channel perpendicular to flow. We estimated riparian width by measuring from the edge of the bankfull channel to the intersection with the nearest landform at an elevation equal to two-times maximum bankfull depth as described by Rosgen (1996). Gradient was estimated by using a clinometer to site from the downstream to the upstream end of the selected riffle. Water temperature was measured with a thermometer in flowing water out of direct sunlight.

We used the ratio of measured to estimated area to develop a calibration ratio, which allowed us to correct visual estimates and estimate stream area with confidence intervals (Hankin and Reeves 1988).

BVET calculations were computed with a Microsoft Excel spreadsheet using formulas found in Dolloff et al. (1993). Data were summarized using Excel spreadsheets and SigmaPlot graphics software.

Results

We inventoried a total of 37 km of stream habitat in North Sylamore Creek (25.6 km), Bad Branch (2.1 km), Cole Fork (7.3 km), and Stewart Fork (2.0 km) (Appendix A). All streams except lower North Sylamore Creek contained at least one extended underground section. All streams contained at least 68% of their total surface area in slow water habitat types (pools and glides). Average residual pool depth in the streams ranged from 13 cm in Bad Branch to 36 cm in lower North Sylamore Creek. The most common substrates in pools in the lower and upper mainstem, Cole Fork and Stewart Fork were large gravel and bedrock. In Bad Branch bedrock was most frequently encountered in pools, followed by small gravel. The most common substrate size in riffles was large gravel, except in Bad Branch, where cobbles were dominant. Sand, silt, and clay were rarely classified as the dominant or subdominant substrate types in pools or riffles and typically covered less than 35% of the total surface area in each habitat unit. Slightly higher amounts of LWD were found in the upper mainstem (17 pieces per km) than the lower mainstem (7 pieces per km) or Cole Fork (15 pieces per km). The highest amounts of LWD were found in Stewart Fork (35 pieces per km) and Bad Branch (111 pieces per km). Water temperatures averaged between 15 C in Stewart Fork and 23 C in lower North Sylamore Creek. The lowest water temperature recorded was 13 C, near a spring in Cole Fork.

Discussion

The North Sylamore Creek watershed has been recognized by both the Federal government and the State of Arkansas as an outstanding natural resource area. Several designations, including National Wild and Scenic River, Extraordinary Resource Waters, and Clifty Canyon Botanical Area provide special protections to portions of the watershed. Probably the greatest threat to the watershed is future increases in recreational activity. Low levels of private land ownership within the watershed provide an excellent opportunity to maintain the integrity of the physical, chemical, and biological resources found here. Given the special designations and current land uses within the watershed, the stream habitat found in the North Sylamore Creek watershed may represent high quality stream habitat for the region. However, additional data from other watersheds would provide better context as to the relative quality of habitat we observed.

An interesting characteristic of streams within the watershed is the presence of large underground or dry sections, particularly in the tributaries, but also in the upper mainstem. Some of these sections contained residual pools that likely play an important role in the distribution of fish, crayfish, and amphibians within the watershed. We noted fish, crayfish, and tadpoles in many residual pools separated

from flowing water by several hundred meters. Springs appear to play a vital role in maintaining both base flow and water temperature within many stream sections. The watershed provides ample opportunity for research on the role of residual pools in maintaining biological communities.

We recommend continued monitoring of the stream habitat within the North Sylamore Creek watershed and other watersheds within the region, especially as recreation pressure increases. It is particularly important to continue working with partners such as Arkansas Tech and the USGS in monitoring biological, hydrological, and chemical characteristics of the watershed. Such efforts should be coordinated to the extent possible to provide resource managers with comprehensive information on the quality of natural resources within the watershed.

Literature Cited

- Dolloff, C. A., D. G. Hankin, and G. H. Reeves. 1993. Basinwide estimation of habitat and fish populations in streams. General Technical Report SE-83. Asheville, North Carolina: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experimental Station.
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- Rosgen, D.L. 1996. *Applied River Morphology*. Wildland Hydrology Books, Pagosa Springs, Colorado.

Acknowledgements

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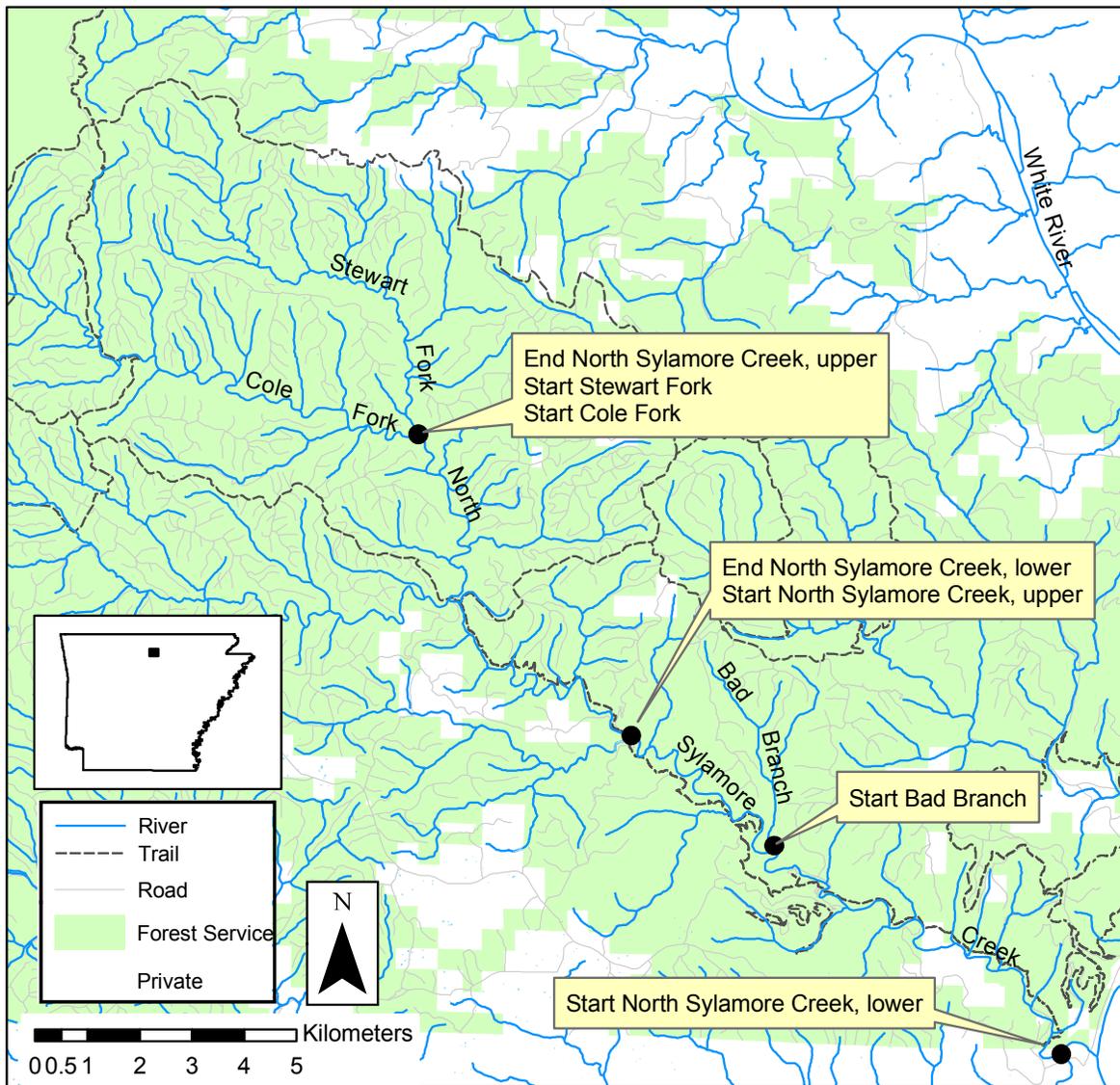


Figure 1. Location of starting points (closed circles) for BVET stream habitat inventories in the North Sylamore Creek watershed, summer 2004.

Appendix A: Stream Habitat Inventory Summaries

Stream:	North Sylamore Creek (lower)
District:	Sylamore
USGS Quadrangle:	Sylamore, Fifty Six
Survey Date:	06/01/04
Downstream Starting Point:	15579331E 3977532 N 103M; Confluence of North and South Sylamore Creek
Total Distance Surveyed (km):	14.3, none underground

	Pools	Riffles
Percent of Total Stream Area:	83	17
Total Area (m ²):	154896±8739	32568±3572
Correction Factor Applied:	0.89	0.86
Number of Paired Samples:	28	21
Total Count:	158	116
Number per km:	11	8
Mean Area (m ²):	980	281
Mean Maximum Depth (cm):	96	40
Mean Average Depth (cm):	53	23
Mean Residual Depth (cm):	24	--
Percent Surveyed as Glides:	63	--
Percent Surveyed as Runs:	--	35
Percent Surveyed as Cascades:	--	0
Percent with >35% Fines:	6	1

Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	2
< 5 m long, > 55 cm diameter:	0
> 5 m long, 10 cm – 55 cm diameter:	4
> 5 m long, > 55 cm diameter:	1
Total:	7

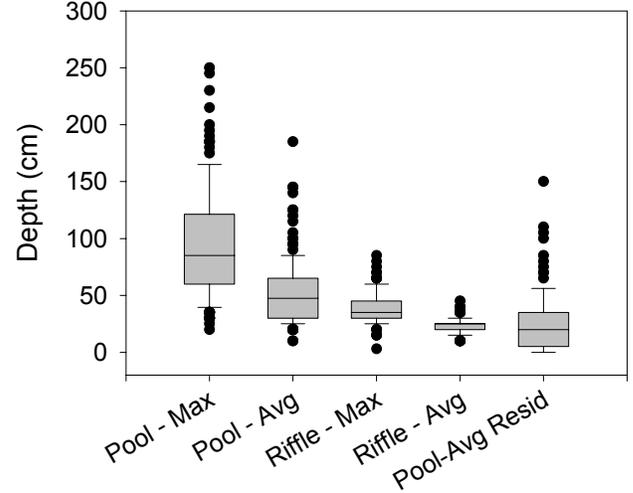
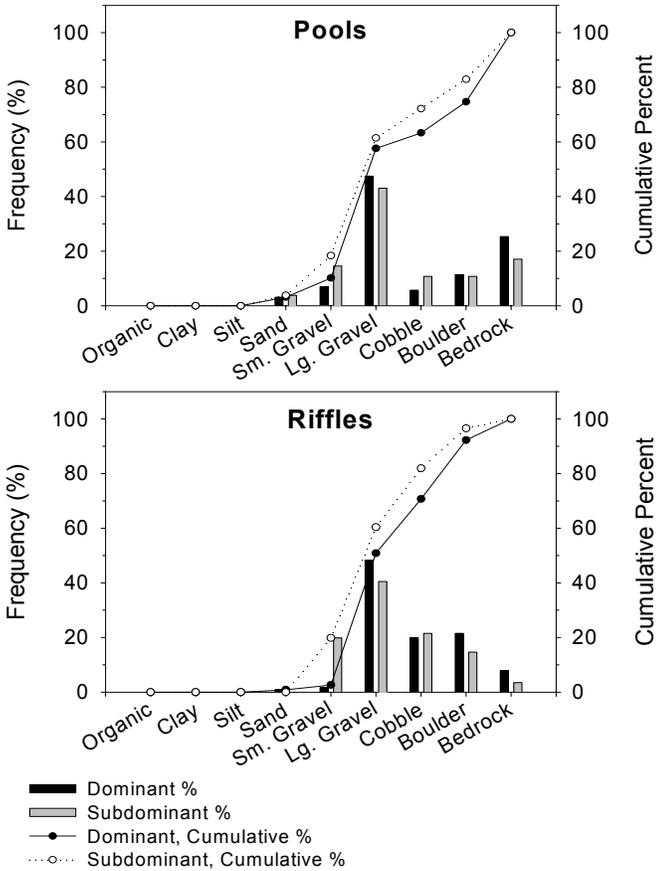
Riparian Width	Total Width* (m)	Left & Right Width** (m)
Mean	41	7
Maximum	78	32
75 th Percentile	45	9
25 th Percentile	33	2
Minimum	25	0

*Left riparian, right riparian, and bankfull channel widths were added together for calculations

**Left and right riparian widths were grouped (not added) together for calculations

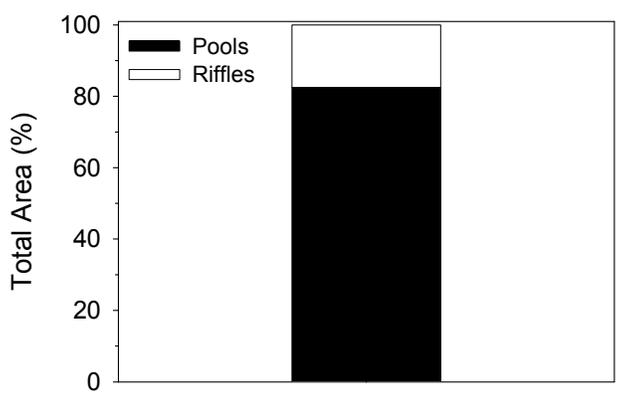
Rosgen's Channel Type	Frequency (%)
A:	0
B:	0
C:	5
D:	0
E:	0
F:	95
G:	0

Other Stream Attributes	
Mean Bankfull Channel Width (m):	26
Mean Channel Gradient (%):	2
Median Water Temperature (C):	23

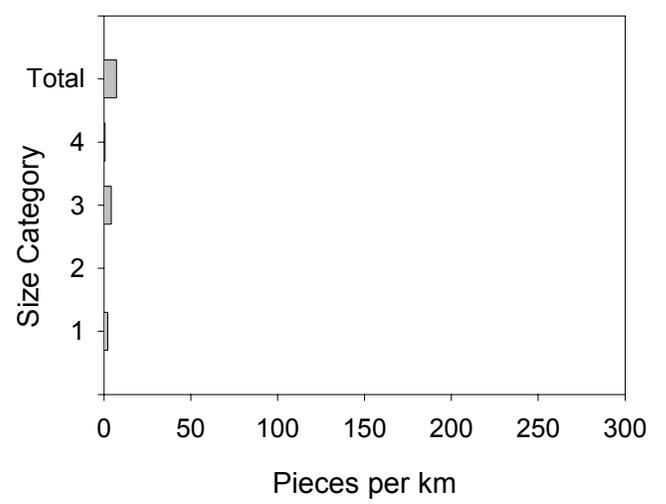


Maximum and average depths and residual pool depths for pools and riffles in North Sylamore Creek (lower), summer 2004. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in North Sylamore Creek (lower), summer 2004.



Estimated area of North Sylamore Creek (lower) in pools and riffles as calculated using BVET techniques, summer 2004. .



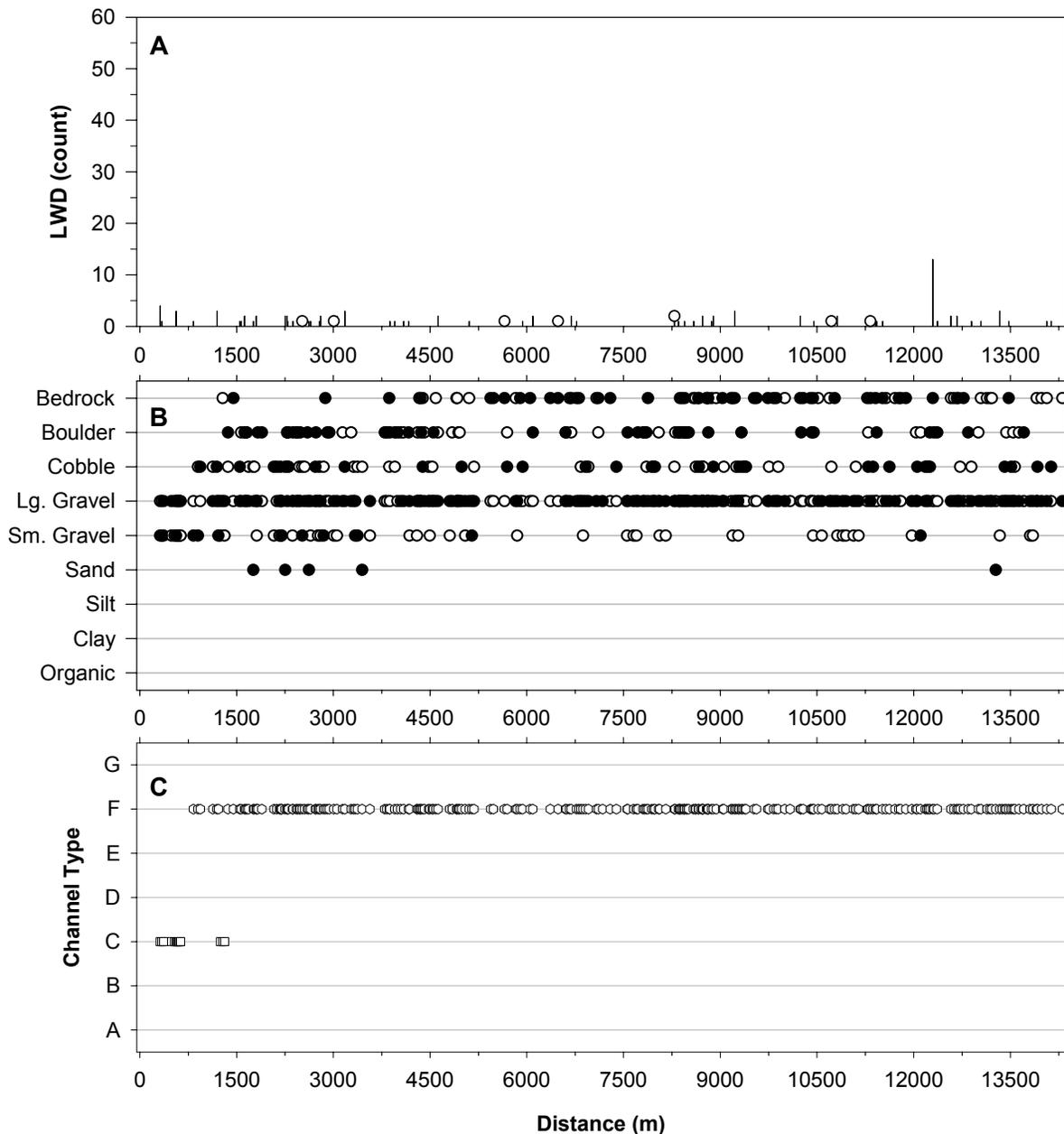
LWD per kilometer in North Sylamore Creek (lower), summer 2004. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on North Sylamore Creek (lower) during BVET habitat survey, summer 2004.
Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
FORD	600		NORTH SYLAMORE TRAIL 600M ON THE LEFT
FORD	652.5		N. SYLAMORE TRAIL ENTERS ON LEFT AND RIGHT BANK, DEPRESSIONS IN STREAMBED POSSIBLY FROM HORSES, BAMBOO GROWING ON RIGHT BANK
FORD	750		TRAIL WITH STAIRS ENTERS ON RIGHT TRAIL CONTINUES ON LEFT
TRIBUTARY	969		DRIED UP IN ON RIGHT, ROPER HOLLOW
FORD	1210		GRAVEL ROAD 3M WIDE N. SYLAMORE HORSE TRAIL
SIDE CHANNEL	1247		ON LEFT
SIDE CHANNEL	1280		OUT LEFT
SIDE CHANNEL	1284	4	IN LEFT
SIDE CHANNEL	1313	10	OUT LEFT WIDE AND SHALLOW
TRIBUTARY	1506		RIGHT 2M WIDE
FORD	1703.6		LOOKS LIKE VEHICLE CROSSING
SIDE CHANNEL	1810		LEFT OF GRAVEL BAR
FORD	1866		N. SYLAMORE HORSE TRAIL
SIDE CHANNEL	2162.3	8	ON RIGHT
SIDE CHANNEL	2197.2		OUT ON RIGHT, UNDERGROUND
FORD	2302.7		N. SYLAMORE HORSE TRAIL
TRIBUTARY	2359	1	RIGHT SIDE
FORD	2382		BLUFFS ON LEFT 2404 RUN FOR 100M OR MORE, HORSE TRAIL ON RIGHT, BLUFFS HAVE UNDERCUT AREA
TRIBUTARY	2503	0.3	LEFT
SIDE CHANNEL	2518	2	ON LEFT OF GRAVEL BAR
FORD	2575		OUT ON LEFT
SIDE CHANNEL	2620	1.5	LEFT
SIDE CHANNEL	2643		OUT LEFT
SIDE CHANNEL	2822		LARGE GRAVEL BAR ON LEFT, SCH LEFT
SIDE CHANNEL	2873		OUT ON LEFT
SIDE CHANNEL	3007		ON RIGHT
SIDE CHANNEL	3033		ON LEFT
SIDE CHANNEL	3056		IN ON RIGHT
SIDE CHANNEL	3062.5		IN ON LEFT
FORD	3063		N.SYLAMORE HORSE TRAIL
SIDE CHANNEL	3168		OUT ON RIGHT
SIDE CHANNEL	3193		IN ON RIGHT
FORD	3297		START 6/2/04 AT RIFFLE BELOW CORNFIELD HOLLOW, HORSE TRAIL CROSSING
TRIBUTARY	3301	1	CORNFIELD HOLLOW
SIDE CHANNEL	3338		OUT ON LEFT
SIDE CHANNEL	3502		IN ON LEFT
SIDE CHANNEL	3566		FLows FOR ABOUT 40M ON RIGHT
FORD	3876		

Stream Feature	Distance (m)	Width (m)	Comments
TRIBUTARY	4149.9		TRIB LEFT, VEHICLE TRACKS ON BEACH AND IN STREAM MAYBE ATV TRACKS
FORD	4182.1		ATV CROSSING
OTHER	4243		NO TRAIL, FOUR WHEELER TRACKS IN STREAM
TRIBUTARY	4622	1	ON RIGHT
FORD	4780		VEHICLE CROSSING
BRAID	4841.2	25	
FORD	5490		DOUBLETRACK
FORD	5537		
SIDE CHANNEL	5661		IN ON RIGHT, ALSO TRAIL PARALLEL WITH STREAM
SIDE CHANNEL	5705		OUT ON RIGHT
FORD	5810		
SIDE CHANNEL	5898		IN ON LEFT
SEEP	6291		POSSIBLE SEEP FROM BANK
BRIDGE	7162		
OTHER	7333		BEDROCK SLIDE
BRIDGE	7396		LOWWATER BRIDGE
FORD	7987		N. SYLAMORE CAMPGROUND, CONCRETE VEHICLE CROSSING
SIDE CHANNEL	8485		OUT ON RIGHT
SIDE CHANNEL	8595		IN ON RIGHT
SIDE CHANNEL	8613		OUT ON RIGHT
TRIBUTARY	8706		BAD BRANCH
SIDE CHANNEL	9223		IN ON RIGHT
SIDE CHANNEL	9313		OUT RIGHT
SIDE CHANNEL	9330		IN ON RIGHT EQUIVILANT IN WIDTH
SEEP	9820		9786 BLUFFS ON RIGHT SMALL WATER TRICKLING OFF TOP EDGE[SEEP] 9820
BRAID	9896	15	
FORD	9896		
TRIBUTARY	10347		DRIED UP TRIB POINTY BLUFFS SAME DISTANCE, OBVIOUS TRIANGLE SHAPE ON MAP
SIDE CHANNEL	10545	2.5	IN LEFT
SIDE CHANNEL	10791		IN RIGHT
SIDE CHANNEL	10844		OUT RIGHT
SIDE CHANNEL	11110		IN RIGHT, ROCK WALL FORMS LEFT BANK FOR ABOUT 40 M
SIDE CHANNEL	11146		OUT RIGHT
SIDE CHANNEL	11366		IN LEFT
SIDE CHANNEL	11422		OUT LEFT
TRIBUTARY	11890		
SIDE CHANNEL	11931		IN LEFT
SIDE CHANNEL	11970		OUT LEFT
TRIBUTARY	13569	2	IN ON RIGHT
BRIDGE	14305		ENDED AT USGS GAGING STATION BRIDGE NEAR GUNNER POOL AT 13:00



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in North Sylamore Creek (lower), summer 2004. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from confluence of North and South Sylamore Creek. Vertical bars on (A) indicate total count of LWD; open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4). Closed circles on (B) are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes. See Appendix A for channel type descriptions from (C).

GPS coordinates for paired sample habitat units and photographs taken in North Sylamore Creek (lower), summer 2004. GPS coordinates are UTM Zone 15, NAD27, CONUS, Meters, not corrected, recorded on Magellan Colortrak GPS unit. Distance is meters from start of survey.

Northing	Easting	Unit Type	Unit Number	Distance (m)	Photo	Comments
3977547	578918	POOL	5	559.9	P6010001	undercut bank on right side
3977611	578957	RIFFLE	5	629.3	P6010003	
3978161	579099	POOL	10	1193	P6010004	gravel bar on left, steep bluffs on right
3978214	578946	RUN	10	1365	P6010005	
3978371	578603	POOL	15	1658	P6010006	
3978635	578562	RUN	15	1810	P6010007	
3979029	578543	GLIDE	20	2162.3	P6010008	
3979122	578173	RIFFLE	20	2302.7	P6010009	
3979106	577938	POOL	26	2441.3	P6010010	
3979345	577914	POOL	30	2620	P6010024	
3979388	577773	RUN	25	2731	P6010025	
3979357	577551	POOL	35	2904.7	P6010027	last GPS for 6/1/2004
3979617	577529	RIFFLE	30	3313.9	P6020001	start 6/2/2004
3979616	577216	GLIDE	40	3337.7	P6020002	
3979508	576540	RIFFLE	35	3992.7	P6020003	
3979530	576516	GLIDE	45	4044	P6020004	large gravel beach on right, tall bluffs on left
3979823	576626	GLIDE	50	4384	P6020005	
3979868	576626	RIFFLE	40	4411	P6020006	
3979916	576152	POOL	56	4920	P6020007	
3979868	576626	RIFFLE	45	4989	P6020008	manmade dam 30 cm tall at top of riffle
3979921	575981	GLIDE	60	5148	P6020009	
3980339	575614	RIFFLE	50	5934.4	P6020011	
3980315	575602	GLIDE	65	6050.3	P6020012	
3980521	574942	GLIDE	70	6770	P6020013	
3980797	574616	GLIDE	80	7655	P6020015	
3980962	577260	GLIDE	85	7968	P6030001	last GPS 6/2/2004
3980972	574256	RIFFLE	60	7986.9	P6030002	start 6/3/2004
3980952	573756	POOL	90	8376.2	P6030003	
3980952	573679	RIFFLE	65	8432.2	P6030004	
3981091	573576	GLIDE	95	8585	P6030005	
3981338	573782	RUN	70	8722.1	P6030007	
3981342	573702	GLIDE	100	8784.7	P6030008	rock wall 6 m high forms left bank for length of unit
3981541	573364	RIFFLE	75	9054.8	P6030009	
3981556	573382	GLIDE	105	9170.6	P6030010	
3981851	573532	RIFFLE	80	9396.4	P6030011	
3981852	573545	POOL	110	9521.3	P6030012	
3981980	572942	GLIDE	116	10286.7	P6030014	
3982109	572928	RIFFLE	85	10414.6	P6030015	
3982217	572832	GLIDE	120	10693	P6030016	
3982459	572560	RUN	90	11066.2	P6030017	
3982434	572322	POOL	125	11279.3	P6030020	
3982725	572275	RIFFLE	95	11621.7	P6030021	

Northing	Easting	Unit Type	Unit Number	Distance (m)	Photo	Comments
3982816	572349	POOL	130	11768.3	P6030023	
3982817	572033	RIFFLE	100	12228.1	P6030024	last GPS 6/3/2004
3982797	572012	POOL	135	12250	P6040008	start 6/4/2004
3983083	571877	GLIDE	140	12668	P6040009	
3983184	571701	GLIDE	145	13135	P6040015	
3983135	571581	RUN	105	13212	P6040016	
3983315	571460	POOL	150	13473	P6040017	bluff on right 10 m high indented 2 m deep throughout
3983291	571295	RIFFLE	110	13705	P6040018	
3983082	571135	GLIDE	155	13982	P6040019	

Stream:	North Sylamore Creek (upper)
District:	Sylamore
USGS Quadrangle:	Fifty Six, Calico Rock, Norfolk SE
Survey Date:	06/01/04
Downstream Starting Point:	Walking bridge at Rt. 1102 parking lot near Gunner Pool, USGS gauging station
Total Distance Surveyed (km):	11.3, 1.1 km underground between 10 km and 11 km

	Pools	Riffles
Percent of Total Stream Area:	68	32
Total Area (m ²):	67078±4011	31542±6493
Correction Factor Applied:	1.02	1.37
Number of Paired Samples:	19	14
Total Count:	105	72
Number per km:	9	6
Mean Area (m ²):	639	438
Mean Maximum Depth (cm):	73	31
Mean Average Depth (cm):	43	19
Mean Residual Depth (cm):	36	--
Percent Surveyed as Glides:	48	--
Percent Surveyed as Runs:	--	3
Percent Surveyed as Cascades:	--	0
Percent with >35% Fines:	1	0

Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	7
< 5 m long, > 55 cm diameter:	0
> 5 m long, 10 cm – 55 cm diameter:	9
> 5 m long, > 55 cm diameter:	1
Total:	17

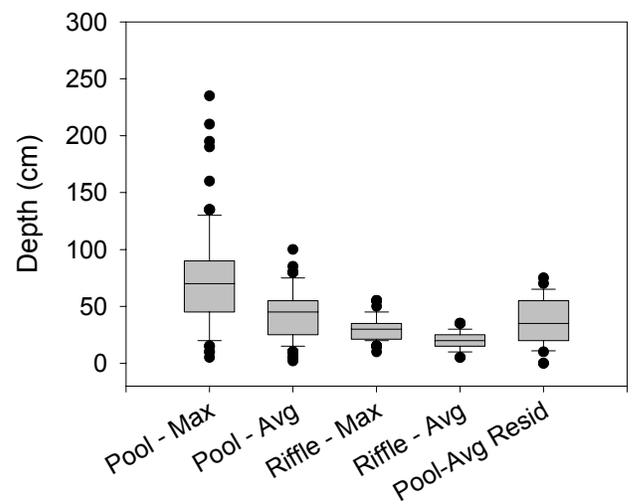
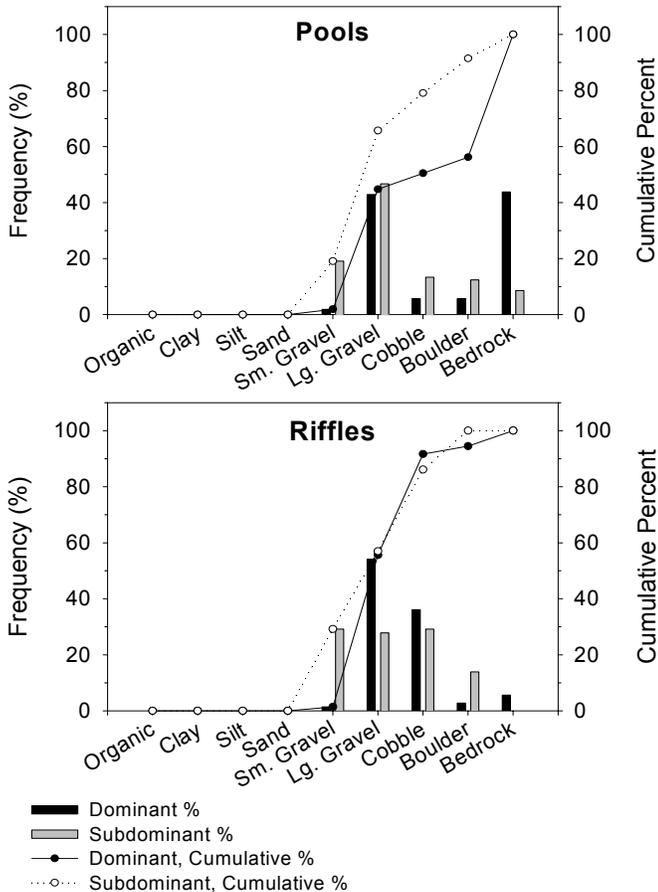
Riparian Width	Total Width* (m)	Left & Right Width** (m)
Mean	35	6
Maximum	54	34
75 th Percentile	36	8
25 th Percentile	32	2
Minimum	26	0

*Left riparian, right riparian, and bankfull channel widths were added together for calculations

**Left and right riparian widths were grouped (not added) together for calculations

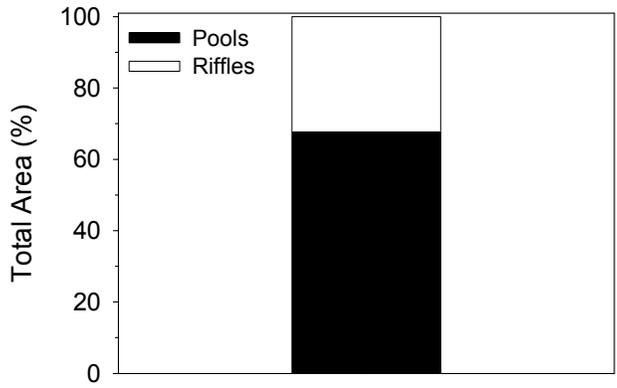
Rosgen's Channel Type	Frequency (%)
A:	0
B:	28
C:	2
D:	0
E:	0
F:	70
G:	0

Other Stream Attributes	
Mean Bankfull Channel Width (m):	22
Mean Channel Gradient (%):	1
Median Water Temperature (C):	19.5

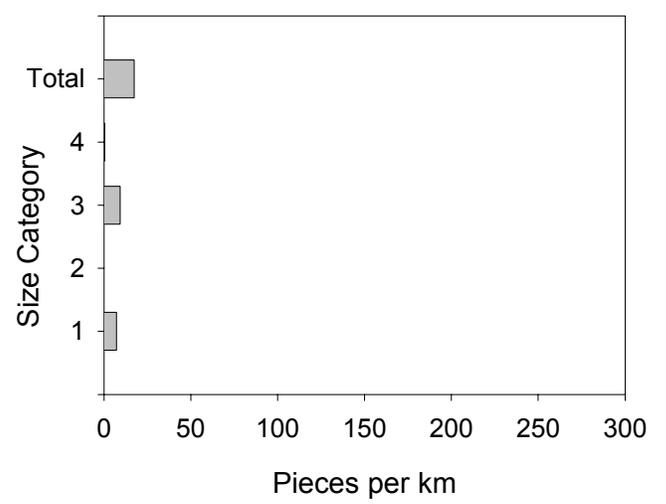


Maximum and average depths and residual pool depths for pools and riffles in North Sylamore Creek (upper), summer 2004. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in North Sylamore Creek (upper), summer 2004.



Estimated area of North Sylamore Creek (upper) in pools and riffles as calculated using BVET techniques, summer 2004. .



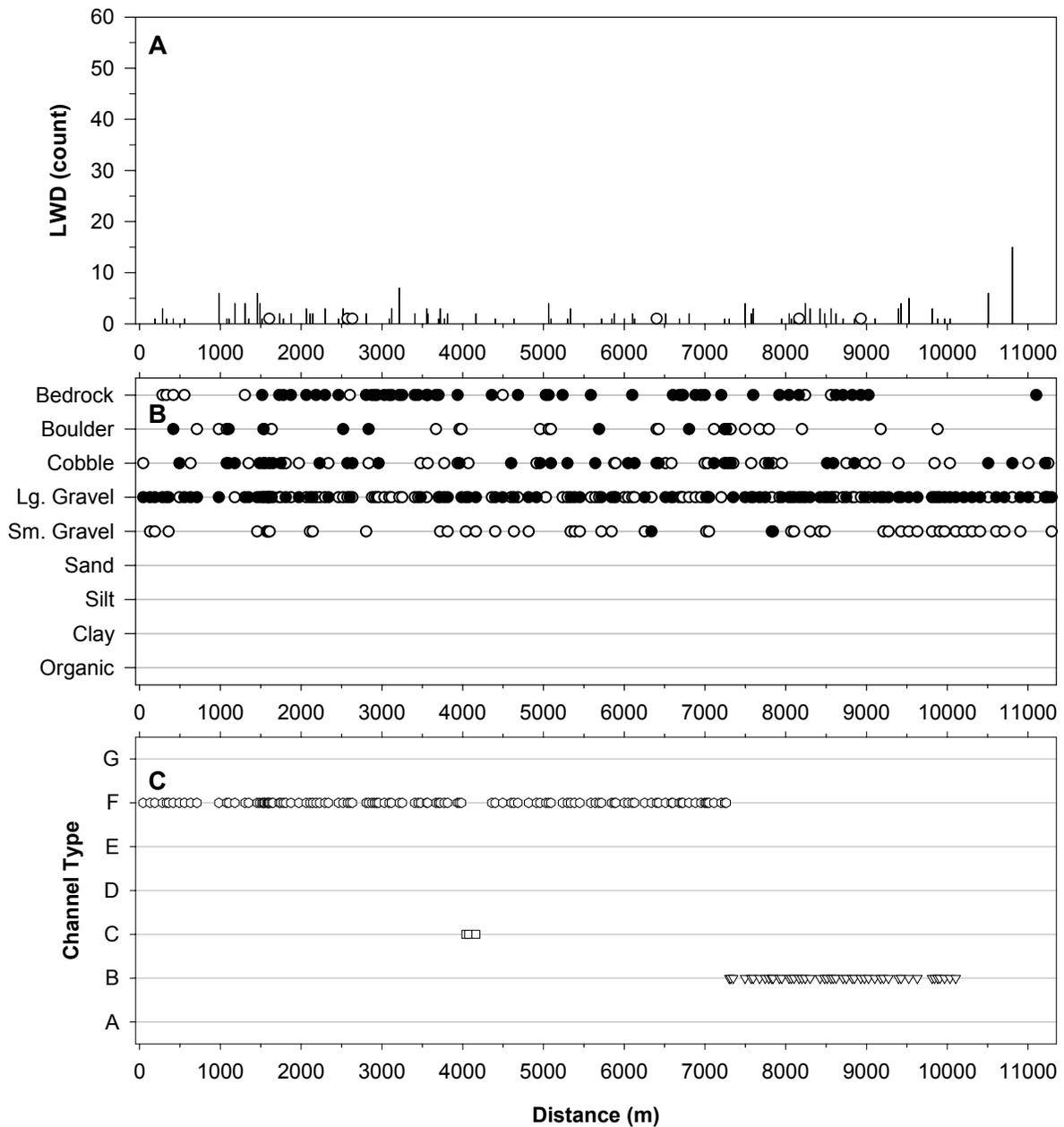
LWD per kilometer in North Sylamore Creek (upper), summer 2004. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on North Sylamore Creek (upper) during BVET habitat survey, summer 2004.
Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
TRIBUTARY	31.7		IN ON LEFT
SIDE CHANNEL	355		ON LEFT IN AT 340 OUT AT 355
SEEP	658		IN ON RIGHT
TRIBUTARY	1322		IN ON RIGHT, DRIED UP
SIDE CHANNEL	1350		IN ON LEFT
SIDE CHANNEL	1375		OUT ON LEFT
SIDE CHANNEL	1471		IN ON LEFT
SIDE CHANNEL	1488		OUT ON LEFT
TRIBUTARY	1553		IN ON RIGHT, TRAIL BRIDGE ABOUT 15M UP TRIB, PIC
SIDE CHANNEL	1588		IN ON LEFT
SIDE CHANNEL	1592		OUT ON LEFT
TRIBUTARY	1601		IN ON RIGHT
SIDE CHANNEL	2525		IN ON LEFT
SIDE CHANNEL	2573		OUT ON LEFT
SIDE CHANNEL	3459		IN ON LEFT
SIDE CHANNEL	3505		OUT ON LEFT
SIDE CHANNEL	3537		IN ON RIGHT
SIDE CHANNEL	3572		OUT ON RIGHT
TRIBUTARY	3614		ON LEFT, WATER TRICKLING DOWN HIGH GRADIENT ROCKS LIKE WATERFALL
SIDE CHANNEL	3786		IN ON LEFT
SIDE CHANNEL	3832		OUT ON LEFT
SIDE CHANNEL	4022		IN ON RIGHT
SIDE CHANNEL	4053		OUT ON RIGHT
SIDE CHANNEL	4361		IN ON RIGHT
SIDE CHANNEL	4393		OUT ON RIGHT
SIDE CHANNEL	4786		IN ON RIGHT
SEEP	4792		IN ON RIGHT
SIDE CHANNEL	4804		OUT ON RIGHT
TRIBUTARY	5173		IN ON LEFT
SIDE CHANNEL	5347		IN ON LEFT
SIDE CHANNEL	5384		OUT ON LEFT
FORD	6127		CONCRETE, RT 1112
TRIBUTARY	6250		IN ON LEFT
BRIDGE	6276		10M ABOVE WATER, CONCRETE BASE ON RIGHT BANK
SIDE CHANNEL	7033		ON RIGHT, IN AT 7015, OUT AT 7033
SIDE CHANNEL	7049		IN ON RIGHT
SIDE CHANNEL	7112		OUT ON RIGHT
SIDE CHANNEL	7240		IN ON RIGHT, DRIES UP AROUND 7245
TRIBUTARY	7350		IN ON LEFT
SIDE CHANNEL	7394		USED TO BE OUT ON RIGHT, DRIED UP FOR FIRST 5 METERS SO IT IS ACTUALLY A LONG SIDEPool
TRIBUTARY	7939		IN ON RIGHT, BEARPEN
SIDE CHANNEL	8803		IN ON LEFT
SIDE CHANNEL	8851		OUT ON LEFT

Stream Feature	Distance (m)	Width (m)	Comments
TRIBUTARY	8858		IN ON RIGHT, DRY
SIDE CHANNEL	9025		IN ON LEFT
SIDE CHANNEL	9104		OUT ON LEFT
TRIBUTARY	9252		IN ON LEFT
SIDE CHANNEL	9812		IN ON LEFT
SIDE CHANNEL	9846		OUT ON LEFT
TRIBUTARY	9966		IN ON RIGHT
UNDERGROUND	10098		FROM 10033 m TO 10098 m; START AT TRIB CONFLUENCE 10:19 6/4/2004
SIDE CHANNEL	10105	1.5	SIDE POOL
UNDERGROUND	11005		FROM 10105 m TO 11005 m
UNDERGROUND	11194		FROM 11102 m TO 11194 m



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in North Sylamore Creek (upper), summer 2004. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from walking bridge at Rt. 1102 parking lot near Gunner Pool. Vertical bars on (A) indicate total count of LWD; open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4). Closed circles on (B) are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes. See Appendix A for channel type descriptions from (C).

GPS coordinates for paired sample habitat units and photographs taken in North Sylamore Creek (upper), summer 2004. GPS coordinates are UTM Zone 15, NAD27, CONUS, Meters, not corrected, recorded on Magellan GPS 300 unit. Distance is meters from start of survey.

Northing	Easting	Unit Type	Unit Number	Distance (m)	Photo	Comments
3983527	570862			0	NA	starting position
3983663	570631	POOL	3	333.4	P6010001	40 m high bluff starts here
3983671	570624	RIFFLE	3	358.6	P6010002	dammed at top by size 7 rocks
3983967	570282	POOL	8	1103	P6010003	
3984097	570123	RIFFLE	8	1350	P6010004	
3984668	569973	POOL	13	1541	P6010005	
3984442	569766	RIFFLE	13	1610	P6010007	
3984267	569600	POOL	18	1781	P6010008	last GPS 6/1/2004
3984483	569442	RIFFLE	18	2110	P6020001	start 6/2/2004
3984409	569342	POOL	23	2296	P6020002	
3984564	569160	RUN	23	2836	P6020008	
3984591	569161	POOL	28	2876	P6020009	
3984630	568975	POOL	33	3251	P6020010	old rusted car on right bank filled with rocks and plants
3984481	568761	RIFFLE	28	3567	P6020011	overhanging ledge on left bank
3984622	568679	POOL	38	3701	P6020012	
3984820	568634	RIFFLE	33	4164	P6020013	
3984838	568614	GLIDE	43	4361	P6020014	
3985158	568076	POOL	48	5029	P6020015	
3985247	568018	RIFFLE	38	5092	P6020016	
3985518	567813	GLIDE	53	5587	P6020017	bluff hangs over left bank
3985861	567741	RIFFLE	43	5877	P6020022	
3986051	567661	POOL	58	6100	P6020023	last GPS 6/2/2004
3986061	567585	FORD		6127	P6020024	concrete ford, rt 1112
3986110	567509	BRIDGE		6276	P6030001	rt 1112B bridge, road closed
3986287	567725	POOL	63	6602	P6030002	start 6/3/2004
3986420	567765	RIFFLE	48	6803	P6030003	about 30% aquatic plants, might be changing to rosgen B channel
3986555	567810	GLIDE	68	6951	P6030004	
3986797	567528	RIFFLE	53	7300	P6030005	
3986839	567500	GLIDE	73	7496	P6030006	
3987013	567859	GLIDE	78	7826	NA	camera battery dead
3987091	567874	RIFFLE	58	7950	NA	camera battery dead
3987156	567651	GLIDE	83	8201	NA	camera battery dead
3987441	567833	GLIDE	88	8622	NA	camera battery dead
3987577	567854	RIFFLE	63	8750	NA	camera battery dead
3987983	567473	RIFFLE	68	9428	NA	
3987750	567576	GLIDE	93	9176	NA	camera battery dead
3988399	567412	GLIDE	98	9880	NA	last GPS 6/3/2004, stream underground upstream for >500 m, no paired samples in dry section so no more GPS
3989369	566805			11292	See Cole Fork start	end inventory at confluence of Cole Fork and Stewart Fork

Stream:	Bad Branch
District:	Sylamore
USGS Quadrangle:	Fifty-Six
Survey Date:	06/01/04
Downstream Starting Point:	Confluence with North Sylamore Creek
Total Distance Surveyed (km):	2.1, several underground sections

	Pools	Riffles
Percent of Total Stream Area:	75	25
Total Area (m ²):	2872±874	973±968
Correction Factor Applied:	1.30	1.21
Number of Paired Samples:	4	2
Total Count:	40	23
Number per km:	19	11
Mean Area (m ²):	72	42
Mean Maximum Depth (cm):	33	19
Mean Average Depth (cm):	21	9
Mean Residual Depth (cm):	13	--
Percent Surveyed as Glides:	33	--
Percent Surveyed as Runs:	--	0
Percent Surveyed as Cascades:	--	0
Percent with >35% Fines:	0	0

Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	67
< 5 m long, > 55 cm diameter:	0
> 5 m long, 10 cm – 55 cm diameter:	42
> 5 m long, > 55 cm diameter:	2
Total:	111

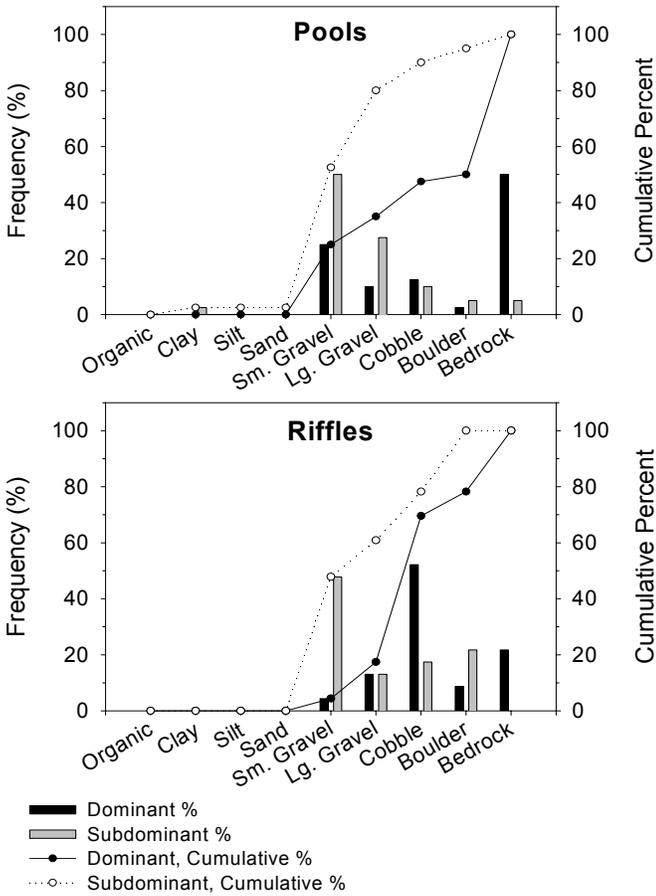
Riparian Width	Total Width* (m)	Left & Right Width** (m)
Mean	24	7
Maximum	35	23
75 th Percentile	29	7
25 th Percentile	18	1
Minimum	13	1

*Left riparian, right riparian, and bankfull channel widths were added together for calculations

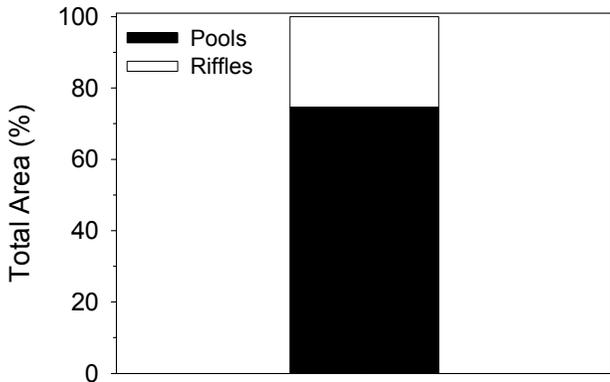
**Left and right riparian widths were grouped (not added) together for calculations

Rosgen's Channel Type	Frequency (%)
A:	0
B:	60
C:	40
D:	0
E:	0
F:	0
G:	0

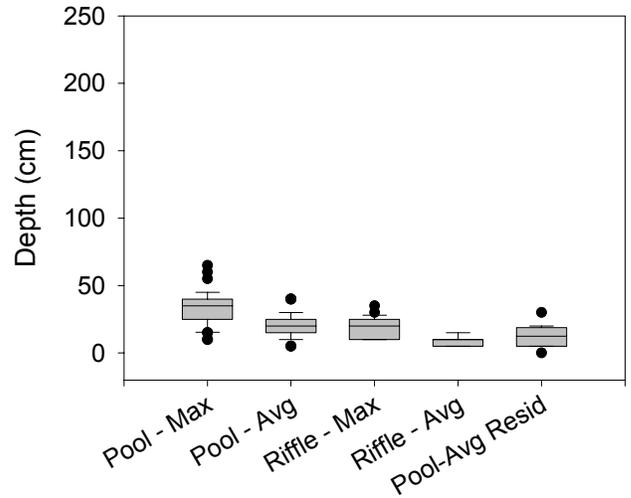
Other Stream Attributes	
Mean Bankfull Channel Width (m):	11
Mean Channel Gradient (%):	2
Median Water Temperature (C):	19



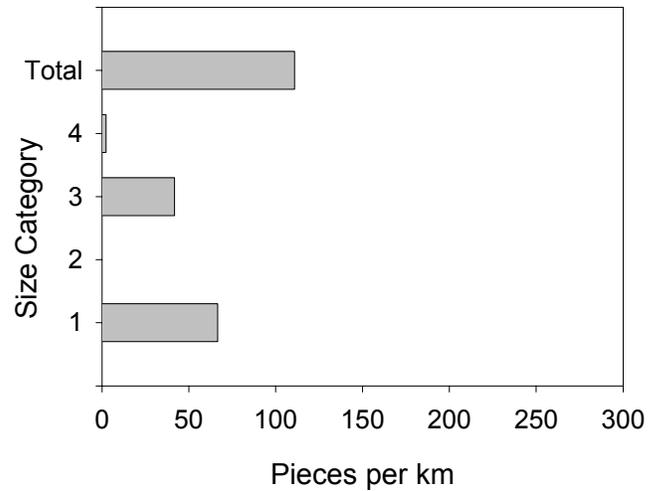
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Bad Branch, summer 2004.



Estimated area of Bad Branch in pools and riffles as calculated using BVET techniques, summer 2004.



Maximum and average depths and residual pool depths for pools and riffles in Bad Branch, summer 2004. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

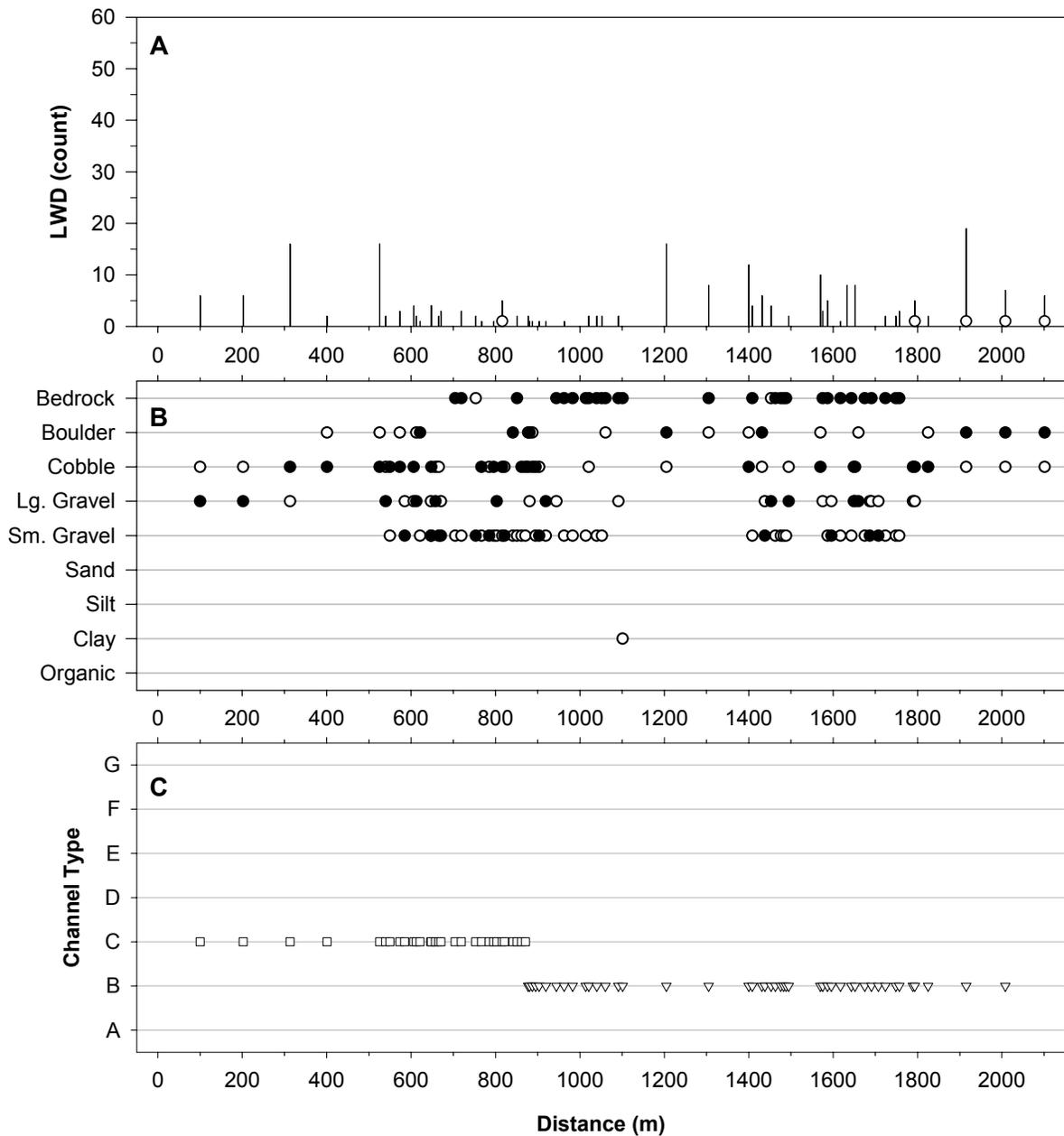


LWD per kilometer in Bad Branch, summer 2004. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on Bad Branch during BVET habitat survey, summer 2004. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
UNDERGROUND	100		DRY AT CONFLUENCE WITH NORTH SYLAMORE CREEK
TRIBUTARY	162.3		DRY TRIB INTERSTREAM LEFT
UNDERGROUND	202		
UNDERGROUND	313		TURTLE PICS
UNDERGROUND	400.8		
TRIBUTARY	428		DRY IN RIGHT
UNDERGROUND	525.3		
SIDE CHANNEL	704		IN ON RIGHT
UNDERGROUND	1052		
UNDERGROUND	1091.3		
TRIBUTARY	1107.7	0.3	IN ON RIGHT, WATER FROM TRIB GOES INTO ROCK, BEDROCK TRIB, THIS TRIB SHOWN AS INTERMITTENT ON QUAD
UNDERGROUND	1205		
UNDERGROUND	1305		
UNDERGROUND	1400		
UNDERGROUND	1431.3		
TRIBUTARY	1492		IN ON RIGHT DRY
UNDERGROUND	1632.9		
UNDERGROUND	1649		
UNDERGROUND	1660		
UNDERGROUND	1686.6		
UNDERGROUND	1915.2		
UNDERGROUND	2008		
UNDERGROUND	2101		END SURVEY 17.23 END AT BLUFF ON LEFT



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in Bad Branch, summer 2004. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from confluence with North Sylamore Creek. Vertical bars on (A) indicate total count of LWD; open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4). Closed circles on (B) are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes. See Appendix A for channel type descriptions from (C).

GPS coordinates for paired sample habitat units and photographs taken in Bad Branch, summer 2004.
 GPS coordinates are UTM Zone 15, NAD27, CONUS, Meters, not corrected, recorded on CMT MC-GPS
 unit. Distance is meters from start of survey.

Northing	Easting	Unit Type	Unit Number	Distance (m)	Photo	Comments
3981347.510	573785.654			0	P5310005 - 7	confluence with North Sylamore Creek
3981790.797	573696.584			525		end dry section
3981887.672	573758.626	RIFFLE	5	658	P53100011	
3981901.546	573760.606	POOL	5	665.5	P53100012	
3982107.752	573784.835	POOL	15	895	P53100013	
3982243.442	573791.167			1040	P53100014	mid channel spring coming out of bedrock, dry upstream
3982646.433	573715.713			1431	P53100019	end underground section
3982659.738	573710.598	POOL	25	1452.8	P53100020	just upstream of dry section end
3982659.395	573723.635	RIFFLE	16	1463	P53100021	
3982811.541	573580.558	GLIDE	35	1690.7	P53100022	
3982908.568	573526.258			1825	NA	start dry section
3983197.504	573408.534			2101	P53100024	end inventory

Stream:	Cole Fork
District:	Sylamore
USGS Quadrangle:	Norfolk SE
Survey Date:	06/02/04
Downstream Starting Point:	Confluence with Stewart Fork/North Sylamore Creek
Total Distance Surveyed (km):	7.3, underground first 0.3 km, and beginning at 5.1 km with scattered residual pools

	Pools	Riffles
Percent of Total Stream Area:	74	26
Total Area (m ²):	24661±9124	8622±2209
Correction Factor Applied:	1.04	1.12
Number of Paired Samples:	12	7
Total Count:	125	78
Number per km:	17	11
Mean Area (m ²):	197	111
Mean Maximum Depth (cm):	51	24
Mean Average Depth (cm):	32	14
Mean Residual Depth (cm):	19	--
Percent Surveyed as Glides:	26	--
Percent Surveyed as Runs:	--	22
Percent Surveyed as Cascades:	--	0
Percent with >35% Fines:	0	0

Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	7
< 5 m long, > 55 cm diameter:	0
> 5 m long, 10 cm – 55 cm diameter:	8
> 5 m long, > 55 cm diameter:	0
Total:	15

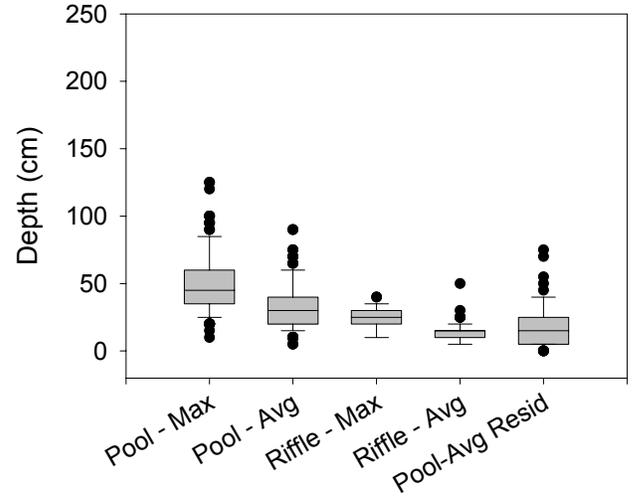
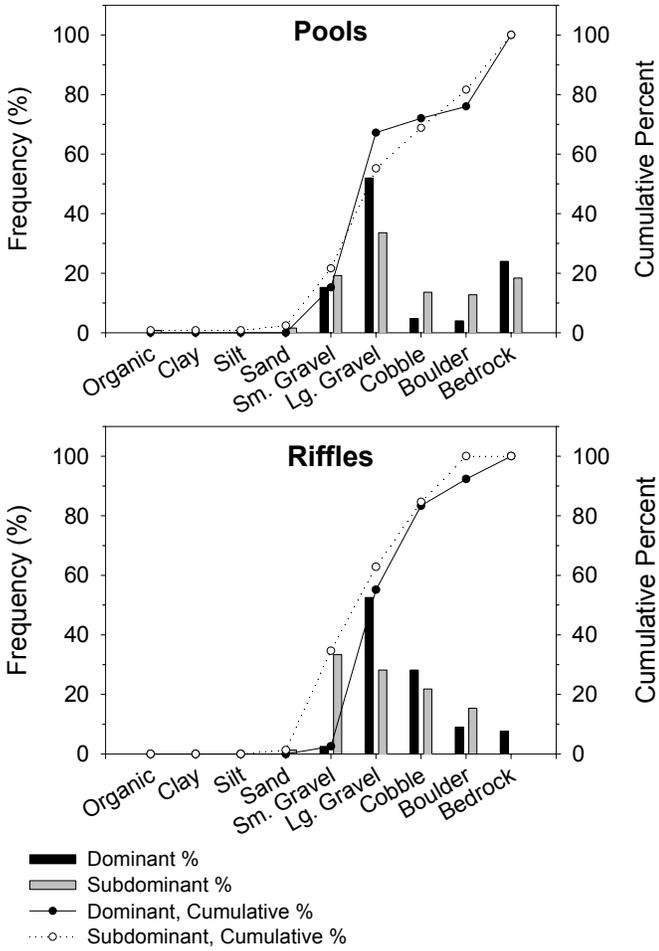
Riparian Width	Total Width* (m)	Left & Right Width** (m)
Mean	27	7
Maximum	58	22
75 th Percentile	30	7
25 th Percentile	18	1
Minimum	16	1

*Left riparian, right riparian, and bankfull channel widths were added together for calculations

**Left and right riparian widths were grouped (not added) together for calculations

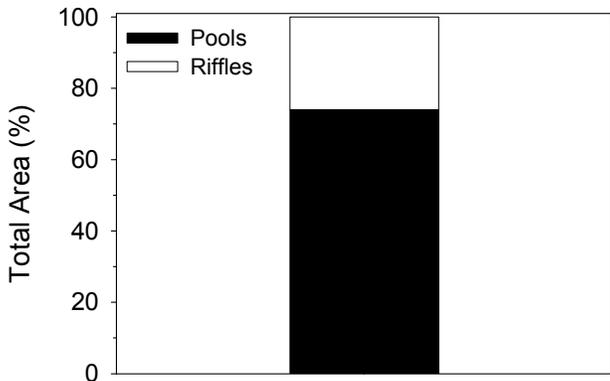
Rosgen's Channel Type	Frequency (%)
A:	0
B:	11
C:	23
D:	0
E:	0
F:	66
G:	0

Other Stream Attributes	
Mean Bankfull Channel Width (m):	14
Mean Channel Gradient (%):	2
Median Water Temperature (C):	21.5

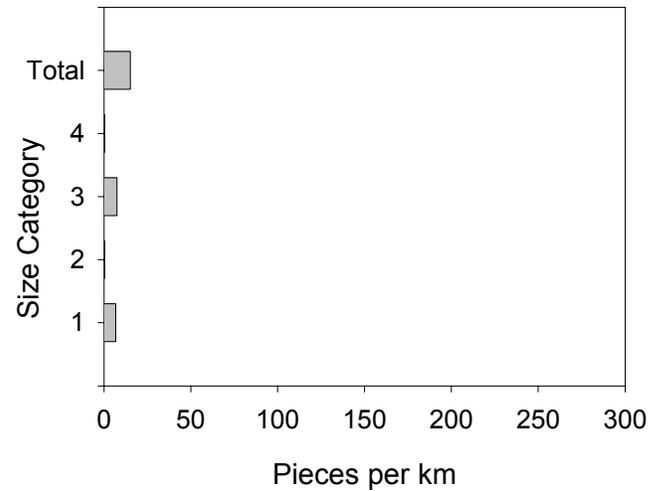


Maximum and average depths and residual pool depths for pools and riffles in Cole Fork, summer 2004. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Cole Fork, summer 2004.



Estimated area of Cole Fork in pools and riffles as calculated using BVET techniques, summer 2004.



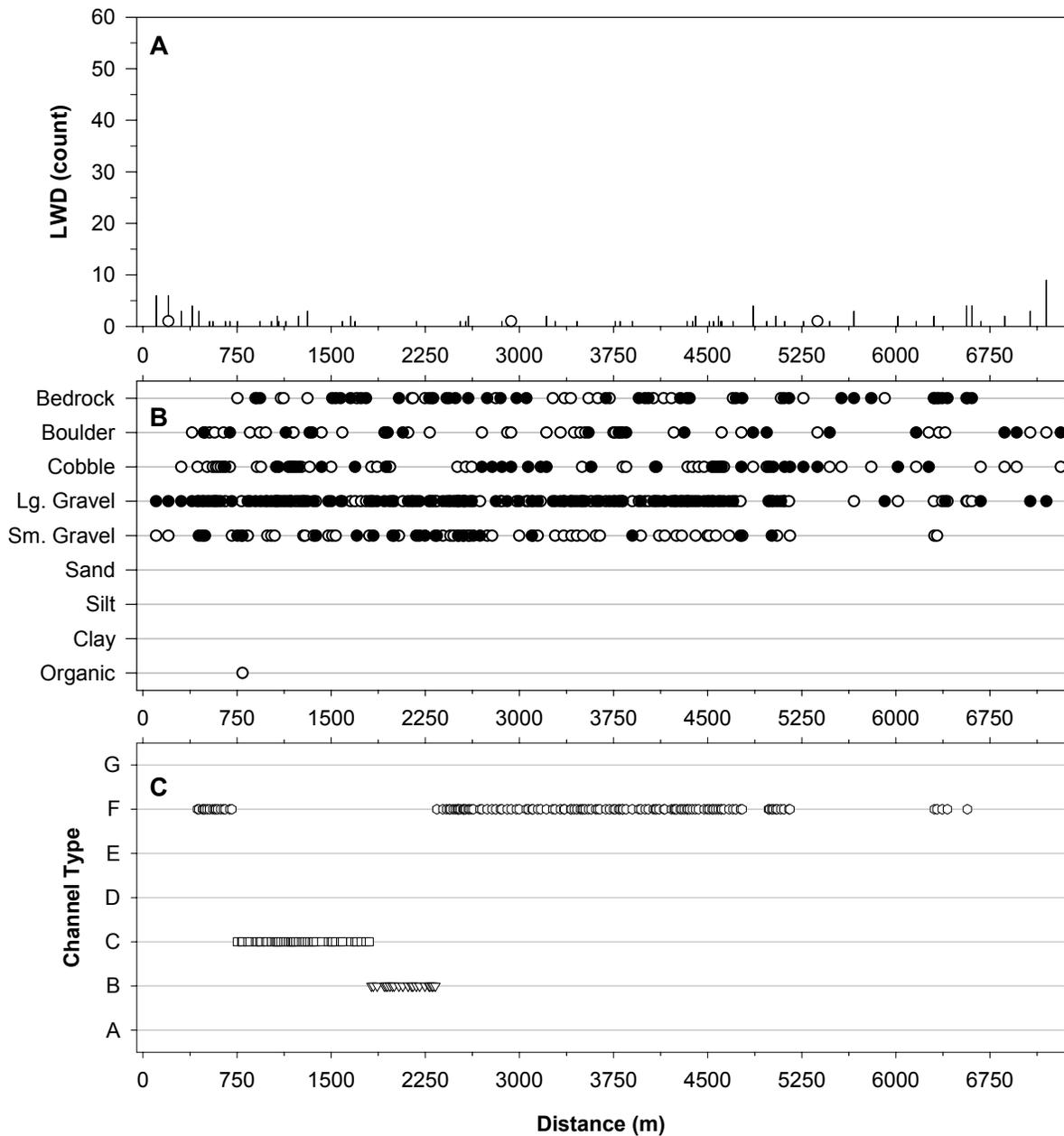
LWD per kilometer in Cole Fork, summer 2004. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on Cole Fork during BVET habitat survey, summer 2004. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
UNDERGROUND	390.9		START 09:40; FROM 0 m TO 390.9m
FORD	834.6		HIKING TRAIL CROSSING
FORD	1023		HIKING PATH CROSSING
FORD	1176.2		HIKING TRIAL
FORD	1429.2		HIKING TRAIL
FORD	1516.8		HIKING TRAIL
FORD	1574.5		HIKING TRAIL CROSSING
FORD	1698		VEHICLE FORD, ROAD 1125, FREQUENTLY USED
TRIBUTARY	1737.8	1	BARKSHED CREEK IN ON LEFT
FORD	2071		TRAIL CROSSING
TRIBUTARY	2112.7	0.3	IN ON RIGHT
FORD	2578.9		HORSE TRAIL
TRIBUTARY	2686		IN ON LEFT WATERFALL
SIDE CHANNEL	2738		IN ON LEFT
SIDE CHANNEL	2788.2		OUT ON LEFT
TRIBUTARY	3087.9	0.5	IN ON RIGHT 20 METER HIGH WATER FALL
FORD	3151.8		LOOKS UNUSED
SIDE CHANNEL	3408.4		IN ON RIGHT
SIDE CHANNEL	3457.9		OUT ON RIGHT
FORD	3641.1		HORSE CROSSING
SIDE CHANNEL	4001.6		IN ON LEFT
FORD	4724.8		HORSE TRAIL CROSSING
SEEP	4724.8		IN ON RIGHT, SPRING COMING OUT OF SAND IN RIGHT BANK
TRIBUTARY	4724.8		13C, TRIB/SPRING IN ON LEFT, 17C UPSTREAM IN MAIN CHANNEL, SPRING PROVIDING 75 PERCENT OF FLOW DOWNSTREAM
SPRING	4749.7		COLLECTED SCUDS FROM SPRING
UNDERGROUND	4768.7		FROM 4761.5 m TO 4768.7 m
UNDERGROUND	4969.9		FROM 4774.8 m TO 4969.9 m; SYCAMORE WITH LARGE CAVITY
UNDERGROUND	5113.8		FROM 5107 m TO 5113.8 m
TRIBUTARY	5150.8		IN ON RIGHT , 15C
FORD	5911.5		HORSE TRAIL
FORD	6282.5		HORSE TRAIL
TRIBUTARY	6282.5		DRY
UNDERGROUND	6302.5		FROM 5155.4 m TO 6302.5 m
UNDERGROUND	6343.4		FROM 6327.9 m TO 6343.4 m
UNDERGROUND	6392		FROM 6369.4 m TO 6392 m
UNDERGROUND	6562.3		FROM 6411.3 m TO 6562.3 m
OTHER	6606		FLAT BEDROCK BOTTOM FOR THIS AND SEVERAL PAST UNITS
FORD	6621.9		HORSE TRAIL
FORD	6676.5		ATV TRAIL WITH RECENT TRACKS
FORD	6883.1		ATV AND HORSE TRAIL

Stream Feature	Distance (m)	Width (m)	Comments
TRIBUTARY	7001.3		DRY IN ON RIGHT.
FORD	7199.1		ATV TRAIL/HORSE
OTHER	7199.1		RATTLESNAKE
UNDERGROUND	7313.1		FROM 6570.4 m TO 7313.1 m; END SURVEY



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in Cole Fork, summer 2004. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from confluence with Stewart Fork. Vertical bars on (A) indicate total count of LWD; open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4). Closed circles on (B) are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes. See Appendix A for channel type descriptions from (C).

GPS coordinates for paired sample habitat units and photographs taken in Cole Fork, summer 2004. GPS coordinates are UTM Zone 15, NAD27, CONUS, Meters, not corrected, recorded on CMT MC-GPS unit. Distance is meters from start of survey.

Northing	Eastng	Unit Type	Unit Number	Distance (m)	Photo	Comments
3989368.574	566805.09			0	P6010001 - 2	confluence with Stewart Fork, stream dry here
3989333.016	566508.519			390.9	P6010005	end dry section
3989270.869	566427.875	POOL	5	529.9	P6010006	
3989216.449	566327.075	RIFFLE	5	641.1	P6010007	
3989333.114	566283.026	POOL	15	939.5	P6010008	
3989286.142	565995.491	POOL	26	1239.8	P6010009	
3989402.716	565859.84	RIFFLE	25	1422.9	P6010010	
3989345.442	565712.488	GLIDE	35	1535.4	P6010011	last GPS taken downstream of ford at end of Cole Fork Rd.
3989669.517	565573.816	POOL	45	2039.9	P6010018	upstream of Barkshed Creek at first large bluff on right
3989445	565393	RIFFLE	35	2071	P6010019	GPS recorded on Magellan GPS 300 unit for next 6 points - CMT battery dead
3987915	564488	GLIDE	55	2389.9	P6010021	Magellan GPS 300
3989558	564927	RIFFLE	45	2633.1	P6010022	Magellan GPS 300
3989428	564947	POOL	65	2742.9	P6010025	Magellan GPS 300
3991167	563955	POOL	75	3327.9	P6010030	Magellan GPS 300
3989793	564435	RIFFLE	55	3353.9	P6010029	Magellan GPS 300
3989843.433	564166.174	POOL	85	3718.7	P6010031	last unit 6/2/2004, returned on 6/3 to get GPS with CMT unit start 6/3/2004
3989925.36	563904.752	RUN	65	3767.3	P6020009	
3989934.295	563807.768	GLIDE	95	4149.7	P6020012	
3989913.307	563491.461	POOL	105	4498.3	P6020013	
3989951.086	563447.874	RIFFLE	75	4545.9	P6020016	stream underground 200 m upstream from here where two 13 C springs enter channel
3990122.326	563274.384	POOL	115	5010.8	P6020022	residual pool, fish and crayfish present
3990193.54	563371.684			5155.4	NA	start dry section
3990402.726	562553.17			6307	P6020024	start of 4 big residual pools, fish, crayfish and tadpoles present
3990645.634	561795.111			7313	NA	end inventory 200 m downstream of trail from end of Wounded Turkey Rd

Stream:	Stewart Fork
District:	Sylamore
USGS Quadrangle:	North Fork
Survey Date:	06/04/04
Downstream Starting Point:	15 566756E 3989343N, confluence with Cole Fork/North Sylamore Creek
Total Distance Surveyed (km):	2.0, final 0.5 km underground

	Pools	Riffles
Percent of Total Stream Area:	72	28
Total Area (m ²):	5916±5012	2249±10188
Correction Factor Applied:	0.99	0.92
Number of Paired Samples:	2	2
Total Count:	27	18
Number per km:	14	9
Mean Area (m ²):	219	125
Mean Maximum Depth (cm):	56	28
Mean Average Depth (cm):	36	14
Mean Residual Depth (cm):	24	--
Percent Surveyed as Glides:	19	--
Percent Surveyed as Runs:	--	22
Percent Surveyed as Cascades:	--	0
Percent with >35% Fines:	7	0

Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	18
< 5 m long, > 55 cm diameter:	1
> 5 m long, 10 cm – 55 cm diameter:	14
> 5 m long, > 55 cm diameter:	2
Total:	35

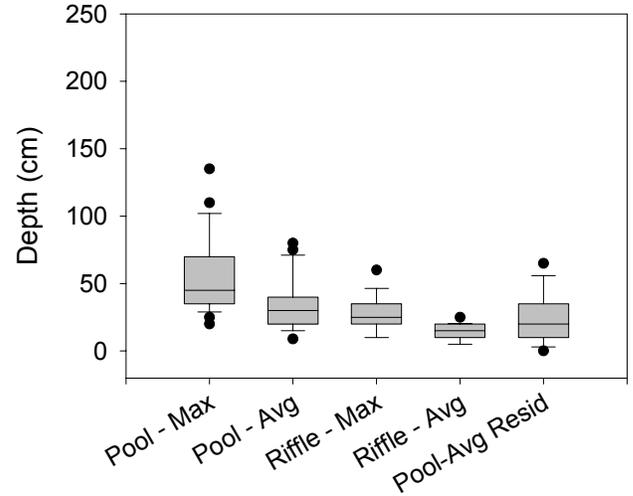
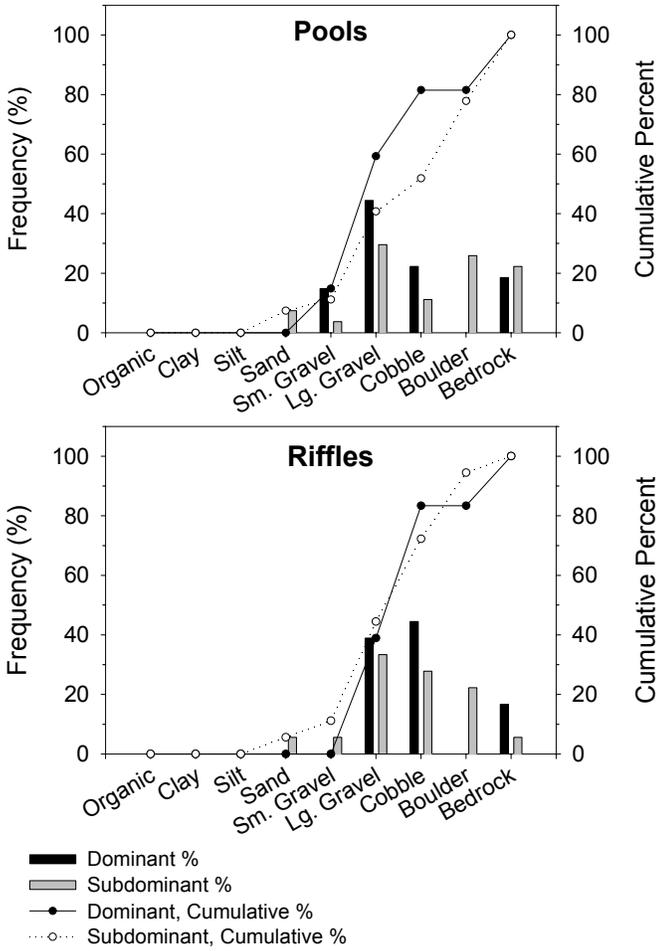
Riparian Width	Total Width* (m)	Left & Right Width** (m)
Mean	17	2
Maximum	18	4
75 th Percentile	18	3
25 th Percentile	17	2
Minimum	17	2

*Left riparian, right riparian, and bankfull channel widths were added together for calculations

**Left and right riparian widths were grouped (not added) together for calculations

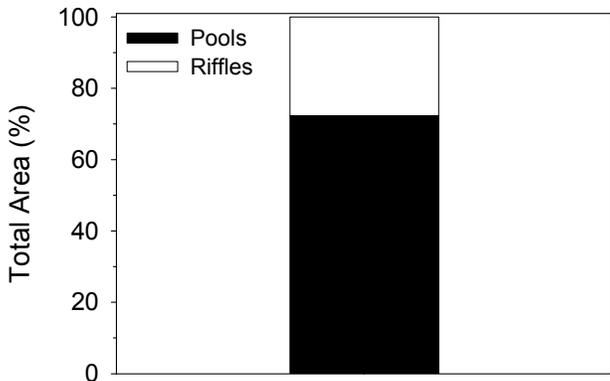
Rosgen's Channel Type	Frequency (%)
A:	0
B:	0
C:	0
D:	0
E:	0
F:	100
G:	0

Other Stream Attributes	
Mean Bankfull Channel Width (m):	13
Mean Channel Gradient (%):	3
Median Water Temperature (C):	15

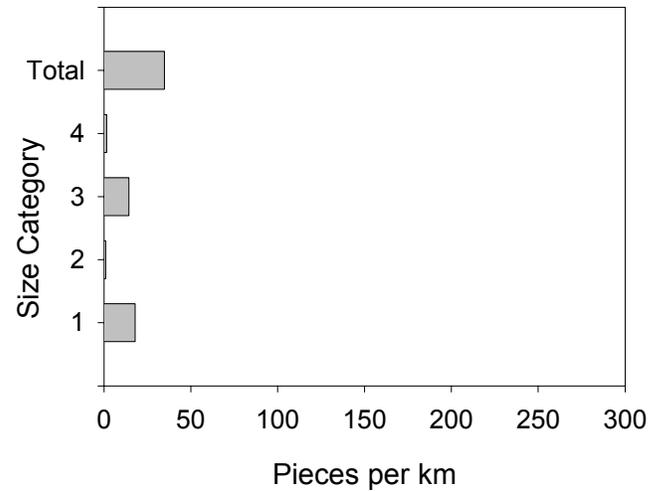


Maximum and average depths and residual pool depths for pools and riffles in Stewart Fork, summer 2004. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Stewart Fork, summer 2004.



Estimated area of Stewart Fork in pools and riffles as calculated using BVET techniques, summer 2004.

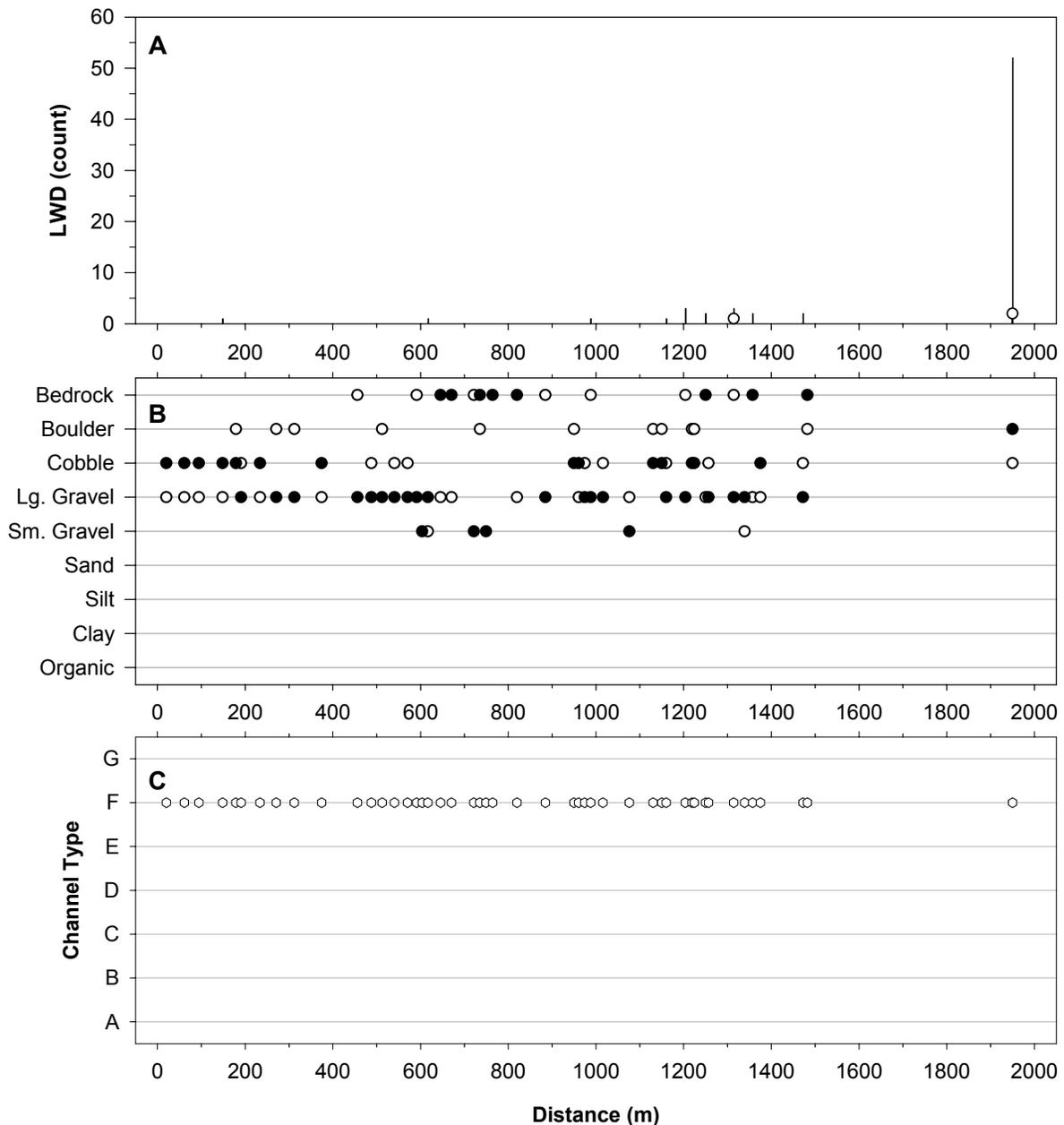


LWD per kilometer in Stewart Fork, summer 2004. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on Stewart Fork during BVET habitat survey, summer 2004. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
TRIBUTARY	94.2		IN ON RIGHT
SIDE CHANNEL	168.6		IN ON LEFT
FORD	197		HIKING/HORSE TRAIL
SIDE CHANNEL	255.1		OUT ON RIGHT
TRIBUTARY	345	0.5	IN ON LEFT HAS WATERFALL
SEEP	471.6		OUT OF BLUFF ON LEFT, WIDTH .3
SEEP	657.4		WATER COMING OFF OF 25FT BLUFF
TRIBUTARY	872.6		RUNNING DOWN 30 FT BLUFF
SEEP	889.7		IN ON LEFT, RUNNING DOWN MOUNTAIN
FORD	966.7		HORSE/TRAIL CROSSING
TRIBUTARY	1137.8	2	IN ON RIGHT
FORD	1166.9		HORSE TRAIL
TRIBUTARY	1357		SPRING COMING OUT OF BEDROCK ONSTREAM LEFT, HEAVY FLOW
UNDERGROUND	1472		FROM 1375 m TO 1472 m
TRIBUTARY	1482	2	IN ON RIGHT, 25FT WATERFALL
UNDERGROUND	1950		FROM 1482 m TO 1950 m; END SURVEY, DRY STREAM



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in Stewart Fork, summer 2004. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from start of survey. Vertical bars on (A) indicate total count of LWD; open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4). Closed circles on (B) are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes. See Appendix A for channel type descriptions from (C).

GPS coordinates for paired sample habitat units and photographs taken in Stewart Fork, summer 2004.
 GPS coordinates are UTM Zone 15, NAD27, CONUS, Meters, not corrected, recorded on Magellan GPS
 300 unit. Distance is meters from start of survey.

Northing	Easting	Unit Type	Unit Number	Distance (m)	Photo	Comments
3989343	566756			0	see Cole Fork start	starting point at confluence with Cole Fork
3989340	566759	P	5	312.2	P6040033	
NA	NA	R	5	374.2	P6040034	
NA	NA	P	15	884.5	P6040038	
NA	NA	R	15	1133.3	P6040039	
NA	NA			1950	P6040040 - 43	end point

Appendix B: BVET Habitat Inventory Categories

Size classes used to categorize large woody debris during BVET habitat surveys. Woody debris < 1.0 m in length or < 10 cm in diameter were omitted.

Size Class	Length (m)	Diameter (cm)
1	<5	10-55
2	< 5	> 55
3	> 5	10-55
4	> 5	> 55

Size classes used to categorize substrate particles during BVET habitat surveys. Size was visually estimated on the intermediate axis (b-axis).

Size Class	Name	Size (mm)	Description
1	Organic	--	Dead organic matter, leaves, detritus, etc.
2	Clay	< 0.00024	Sticky
3	Silt	0.00024-0.0039	Slippery
4	Sand	0.0039-2	Gritty
5	Small Gravel	3-16	Sand to thumbnail
6	Large Gravel	17-64	Thumbnail to fist
7	Cobble	65-256	Fist to head
8	Boulder	>256	Larger than head
9	Bedrock	--	Solid parent material

Bankfull channel characteristics used to determine Rosgen channel types in the field during BVET habitat surveys.

Channel Type	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
Slope (%)	4 – 9.9	2 – 3.9	< 2	< 4	< 2	< 2	2 – 3.9