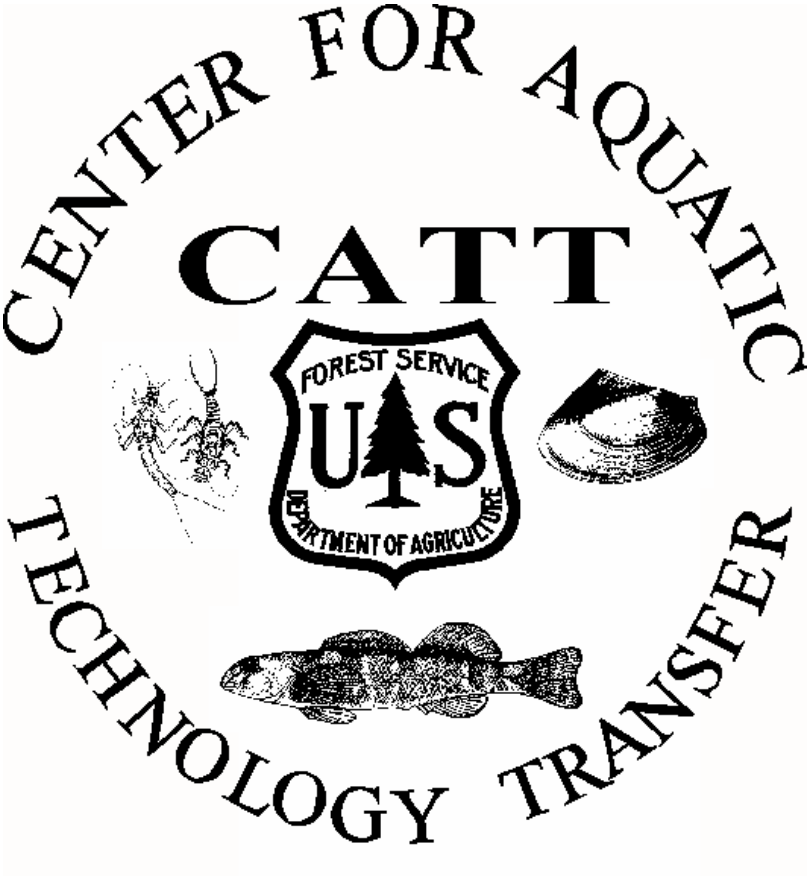
Stream Habitat Conditions in the North River, Dry River Ranger District, George Washington-Jefferson National Forest, VA 2005



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Introduction

In summer 2005 we conducted stream habitat inventories on selected sections of the North River within the Dry River Ranger District, George Washington-Jefferson National Forest (GWJNF), Virginia, to quantify stream habitat conditions. Habitat conditions were classified and inventoried between June 20 and June 30, 2005 using basinwide visual estimation technique (BVET) habitat inventories (Dolloff et. al 1993). Stream sections were selected for inventory by Dawn Kirk, GWJNF Fisheries Biologist to provide information on stream habitat attributes prior to a stream habitat modification project intended to improve fish habitat in the reaches between the confluence with Little River (Stokesville) and Little River (Palo Alto).

We modified standard BVET methods to measure stream habitat parameters identified in the George Washington Forest plan. Included in the Forest plan is an outline of the desired-future-condition (DFC) for all the streams within the Forest. The pertinent DFCs for the Forest include: woody debris loading - 78 to 186 pieces per kilometer, and percent pool habitat - 35 to 65 percent of the total stream habitat.

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 inventory 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 inventoried reach was broken into five sections. Section A extends from the confluence with Little River (Stokesville) to a beaver pond located 3.6 km upstream from the starting point. Section B extends from the upstream end of Section A to the base of Staunton Dam, 9.6 km from the start of the inventory. Staunton Reservoir was measured using computerized mapping software, and was found to be 0.7 meters long. Section C extends from the head of Staunton Reservoir to Elkhorn Lake Dam, about 12.2 km from the initial starting location. Elkhorn Lake was measured and found to be about 0.9 km. Section D extends from the upstream end of Elkhorn Lake to the Forest Road 95A bridge, 18.6 km from the initial starting position at Little River (Stokesville). Section E extends from the upstream end of section D to the confluence with Little River (Palo Alto). The total inventory length (including lakes) was 23.5 km.

Habitat in each section of 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 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 A). 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). In addition, several attributes of road-stream crossings (location, type, size, etc.) were recorded, where encountered.

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

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 10th habitat unit type for streams >1000 m and every 5th habitat unit type for streams <500 m). 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. Bankfull channel width was determined by measuring the width of the bankfull channel perpendicular to flow. Riparian width was measured 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.

By using the ratio of measured to estimated area, we developed 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.

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.

Hankin, D. G., and G. H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences 45:834-844.

Roghair, C. N., and D. R. Nuckols. 2005. Guide to stream habitat characterization using the BVET methodology in the George Washington-Jefferson National Forest, VA. Unpublished File Report. Blacksburg, VA: U.S. Department of Agriculture, Forest Service, Southern Research Station.

Rosgen, D.L. 1996. Applied River Morphology. Wildland Hydrology Books, Pagosa Springs, Colorado.

Acknowledgements

We would like to thank the CATT summer field crew for collecting all of the data presented in this report. The field crew included Jill Christoferson, David Ferguson, Tomas Ivasauskas, Chastine Kyger, Ernie Stanley, and Sarah Whisman. In addition, we thank Dawn Kirk, the Dry River Ranger District, and the GWJNF for providing assistance and funding for the inventories.

Table 1. Summary of general stream habitat attributes for sections of the North River inventoried using BVET techniques in summer 2005. NA = data was not recorded. No access = stream was not inventoried due to lack of access. 'Length' is total inventory length, 'Width' is mean bankfull channel width, 'Gradient' is mean channel gradient, and 'Temperature' is mean water temperature.

Section	Quad	Date	Length (km)	Width (m)	Gradient (%)	Temperature (C)
Section A:	Stokesville	06/20/05	3.6	12	4	21
Section B:	Stokesville	06/20/05	6.0	16	3	19
Section C:	Stokesville	06/20/05	1.8	13	3	21.5
Section D:	Stokesville, West Augusta	06/30/05	5.5	13	2	18
Section E:	West August, Palo Alto	06/30/05	5.0	13	2	NA
Total Stream:	Stokesville, West Augusta, Palo Alto	06/30/05	23.6*	14	3	19

*Lakes included in calculation for total distance but are omitted from habitat data analysis.

Table 2. Summary of pool attributes for sections of the North River inventoried using BVET techniques in summer 2005. The George Washington National Forest DFC is between 35% and 65% of total stream area in pools. NA = could not be calculated. 'Total Area (%)' is percent of total stream surface area in pools (includes glides), 'Total Area (m2)' is surface area of stream in pools, 'Mean Area' is mean surface area of individual pools, 'Mean Max Depth' is the mean maximum depth of all pools, 'Mean Ave Depth' is mean average depth of all pools, 'Mean Resid Depth' is mean residual depth of all pools, 'Glides' is percent of pool habitat units inventoried as glides, '>35% Fines is percent of pools with greater than 35% of substrate materials < 2 mm in diameter.

Section	Total Area (%)	Total Area (m^2)	Total Count (n)	# per Km	Mean Area (m^2)	Mean Max Depth (cm)	Mean Ave Depth (cm)	Mean Resid Depth (cm)	Glides (%)	>35% Fines (%)
Section A:	47	16188 ± 4853	31	9	522	78	48	29	10	0
Section B:	57	31041 ± 2919	77	13	403	61	33	19	30	0
Section C:	36	7213 ± 1175	19	10	380	76	49	29	37	0
Section D:	29	7328 ± 685	65	12	113	61	35	25	8	0
Section E:	13	3736 ± 527	41	8	91	62	33	19	32	0
Total Stream:	41	66236 ± 5552	233	11	284	65	37	23	22	0

Table 3. Summary of riffle attributes for sections of the North River inventoried using BVET techniques in summer 2005. NA = could not be calculated. 'Total Area (%)' is percent of total stream surface area in riffles (includes runs and cascades), 'Total Area (m^2)' is surface area of stream in riffles, 'Mean Area' is mean surface area of individual riffles, 'Mean Max Depth' is the mean maximum depth of all riffles, 'Mean Ave Depth' is mean average depth of all riffles, 'Runs' is percent of riffle habitat units inventoried as runs, 'Cascades' is percent of riffle habitat units inventoried as cascades.

Section	Total Area (%)	Total Area (m^2)	Total Count (n)	# per Km	Mean Area (m^2)	Mean Max Depth (cm)	Mean Ave Depth (cm)	Runs (%)	Cascades (%)
Section A:	53	17907 ± 2926	32	9	560	48	31	13	3
Section B:	43	238583 ± 3247	67	11	352	32	15	12	0
Section C:	64	12848 ± 7375	22	12	584	40	28	9	0
Section D:	71	18207 ± 1776	63	11	289	20	10	3	0
Section E:	87	24432 ± 5833	35	7	698	24	13	0	0
Total Stream:	59	95230 ± 9021	220	10	433	30	17	7	0

Table 4. Summary of LWD per km and Rosgen's channel types for sections of the North River inventoried using BVET techniques in summer 2005. The GWJNF DFC for total LWD is 78 to 186 pieces per km. LWD sizes: 1) <5 m long, <55 cm diameter, 2) < 5 m long, >55 cm diameter, 3) >5 m long, <55 cm diameter, 4) >5 m long, >55 cm diameter. See Appendix A for description of Rosgen channel types.

Section	Large Woody Debris per km					Rosgen's Channel Type						
	1	2	3	4	Total	A	B	C	D	E	F	G
Section A:	5	0	18	1	24	0	54	46	0	0	0	0
Section B:	3	1	6	1	10	0	87	13	0	0	0	0
Section C:	10	0	28	3	41	0	59	0	0	0	0	41
Section D:	2	1	10	2	16	0	0	100	0	0	0	0
Section E:	14	1	17	3	34	0	60	40	0	0	0	0
Total Stream:	6	1	13	2	22	0	48	47	0	0	0	4

Table 5. Summary of riparian width calculations for sections of the North River inventoried using BVET techniques in summer 2005. NA = data not recorded. The left riparian width, right riparian width, and bankfull channel widths were added together before values for 'Riparian Width Total' were calculated. Left and right riparian widths were pooled together before values for 'Riparian Left & Right Width' were calculated.

Section	Riparian Width Total (m)					Riparian Left & Right Width (m)				
	Mean	Max	75^{th}	25^{th}	Min	Mean	Max	75^{th}	25^{th}	Min
Section A:	24	31	26	23	16	6	18	7	2	0
Section B:	35	82	35	27	22	9	41	11	4	1
Section C:	18	21	19	17	15	2	6	4	1	1
Section D:	42	115	39	26	10	14	50	16	1	1
Section E:	19	26	24	16	6	3	11	4	1	1
Total Stream:	29	115	31	21	6	8	50	10	2	0

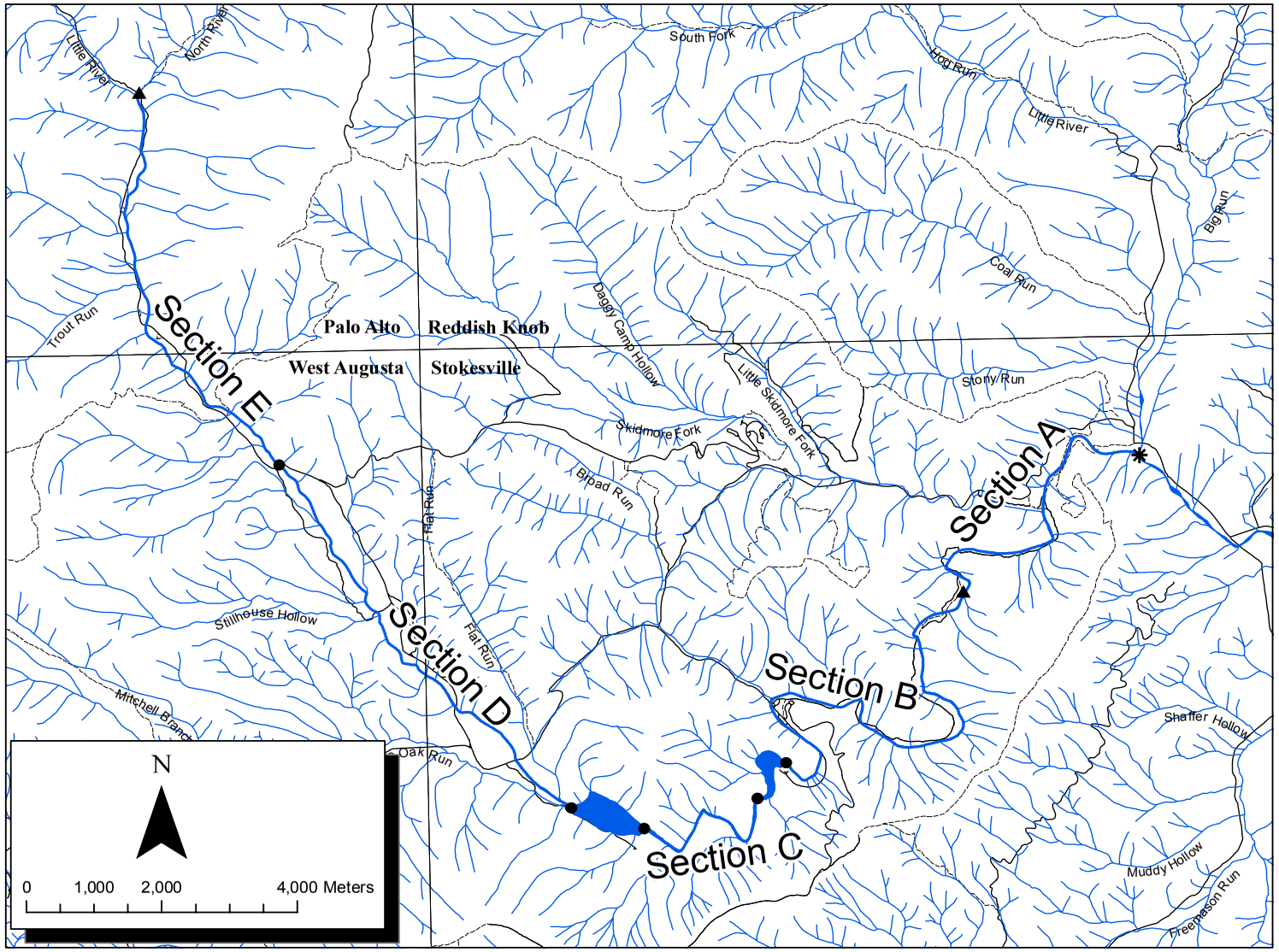
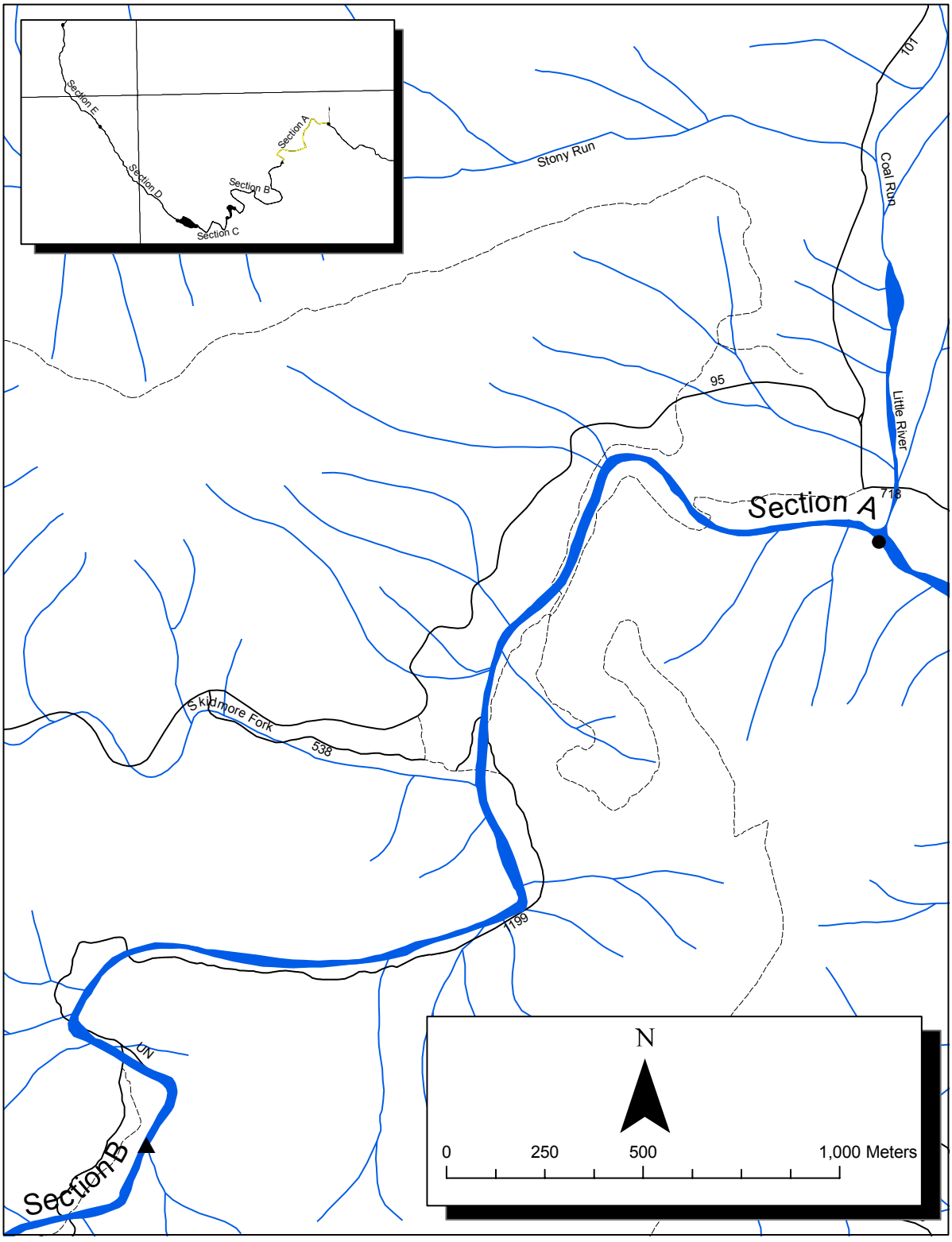


Figure 1: Sections of the North River inventoried during summer 2005. The downstream starting position is indicated by an asterisk. The upstream ending position of the inventoried reach is indicated by a triangle. Sections are delineated by circles at their downstream and upstream ends.

Section Summaries



Section A of the North River. The downstream starting position of the inventory is indicated by the closed circle and the upstream ending position is indicated by the closed triangle.

Stream:	**North River, Section A**
District:	Dry River
USGS Quadrangle:	Stokesville
Inventory Date:	06/20/05
Downstream Starting Point:	Confluence with Little River, downstream of Camp Mayflather
Upstream Ending Point:	Beaver pond on left side of stream
Total Distance inventoried (km):	3.6

	Pools	**Riffles**
Percent of Total Stream Area:	47	53
Total Area (m^2):	16188 ± 4853	17907 ± 2926
Correction Factor Applied:	1.05	1.17
Number of Paired Samples:	6	6
Total Count:	31	32
Number per km:	9	9
Mean Area (m^2):	522	560
Mean Maximum Depth (cm):	78	48
Mean Average Depth (cm):	48	31
Mean Residual Depth (cm):	29	--
Percent Inventoried as Glides:	10	--
Percent Inventoried as Runs:	--	13
Percent Inventoried as Cascades:	--	3
Percent with >35% Fines:	0	0

Large Woody Debris Size	**Pieces per km**
< 5 m long, 10 cm – 55 cm diameter:	5
< 5 m long, > 55 cm diameter:	0
> 5 m long, 10 cm – 55 cm diameter:	18
> 5 m long, > 55 cm diameter:	1
Total:	24

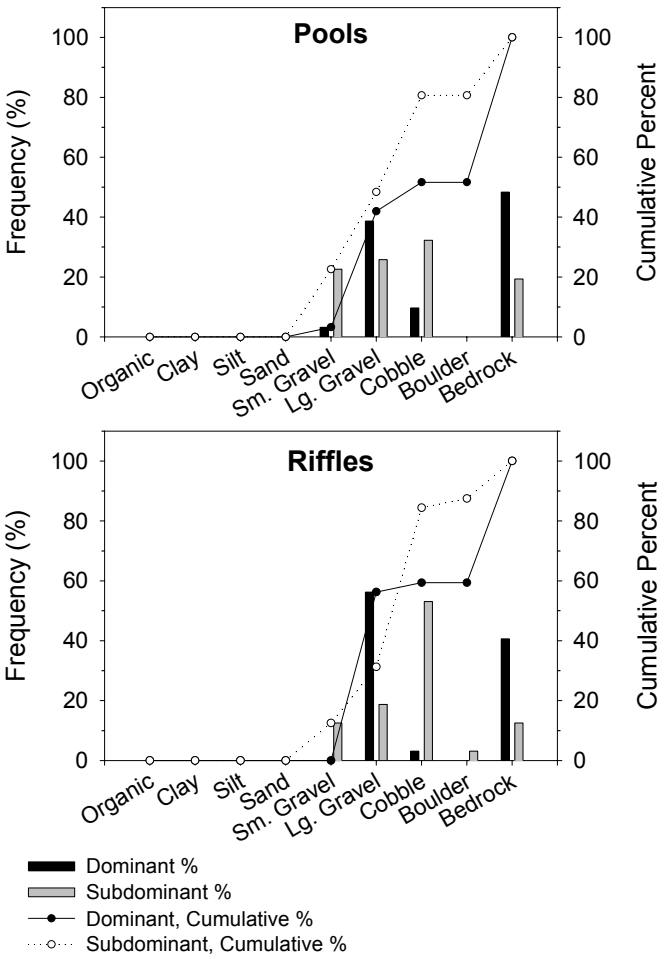
Riparian Width	**Total Width* (m)**	**Left & Right Width** (m)**
Mean	24	6
Maximum	31	18
75th Percentile	26	7
25th Percentile	23	2
Minimum	16	0

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

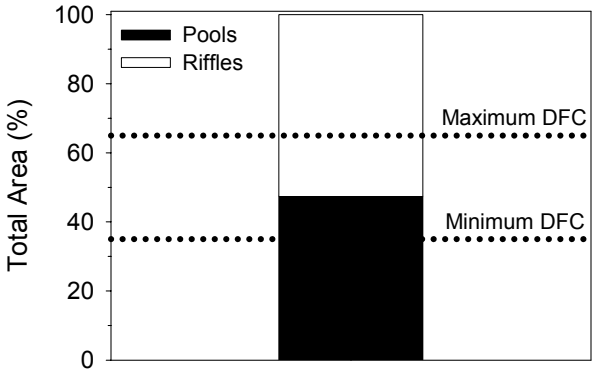
**Left and right riparian widths were grouped (not added) together for calculations

Rosgen's Channel Type	**Frequency (%)**
A:	0
B:	54
C:	46
D:	0
E:	0
F:	0
G:	0

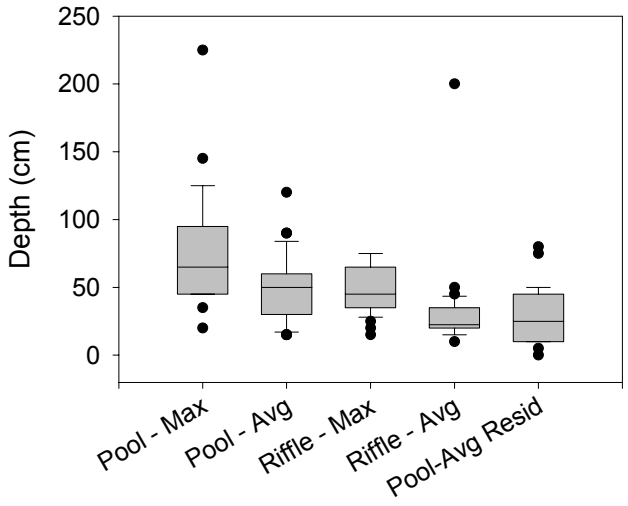
Other Stream Attributes	
Mean Bankfull Channel Width (m):	12
Mean Channel Gradient (%):	4
Median Water Temperature (C):	21



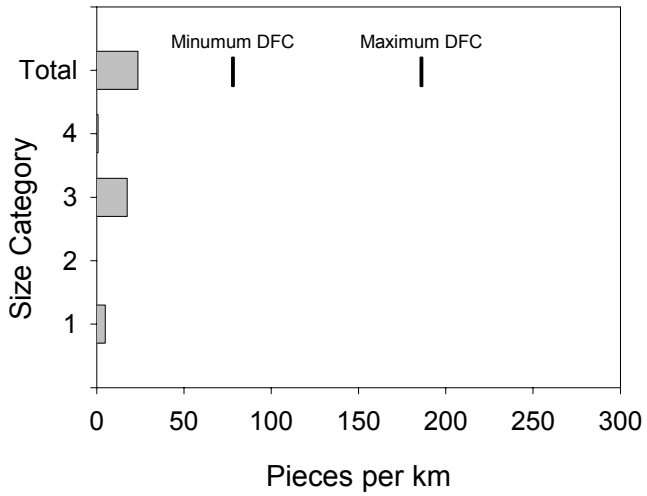
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in section A of the North River, summer 2005.



Estimated area of section A in pools and riffles as calculated using BVET techniques, summer 2005. The GWJNF DFC is between 35 and 65 percent of total stream area in pools.



Maximum and average depths and residual pool depths for pools and riffles in section A, summer 2005. 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.

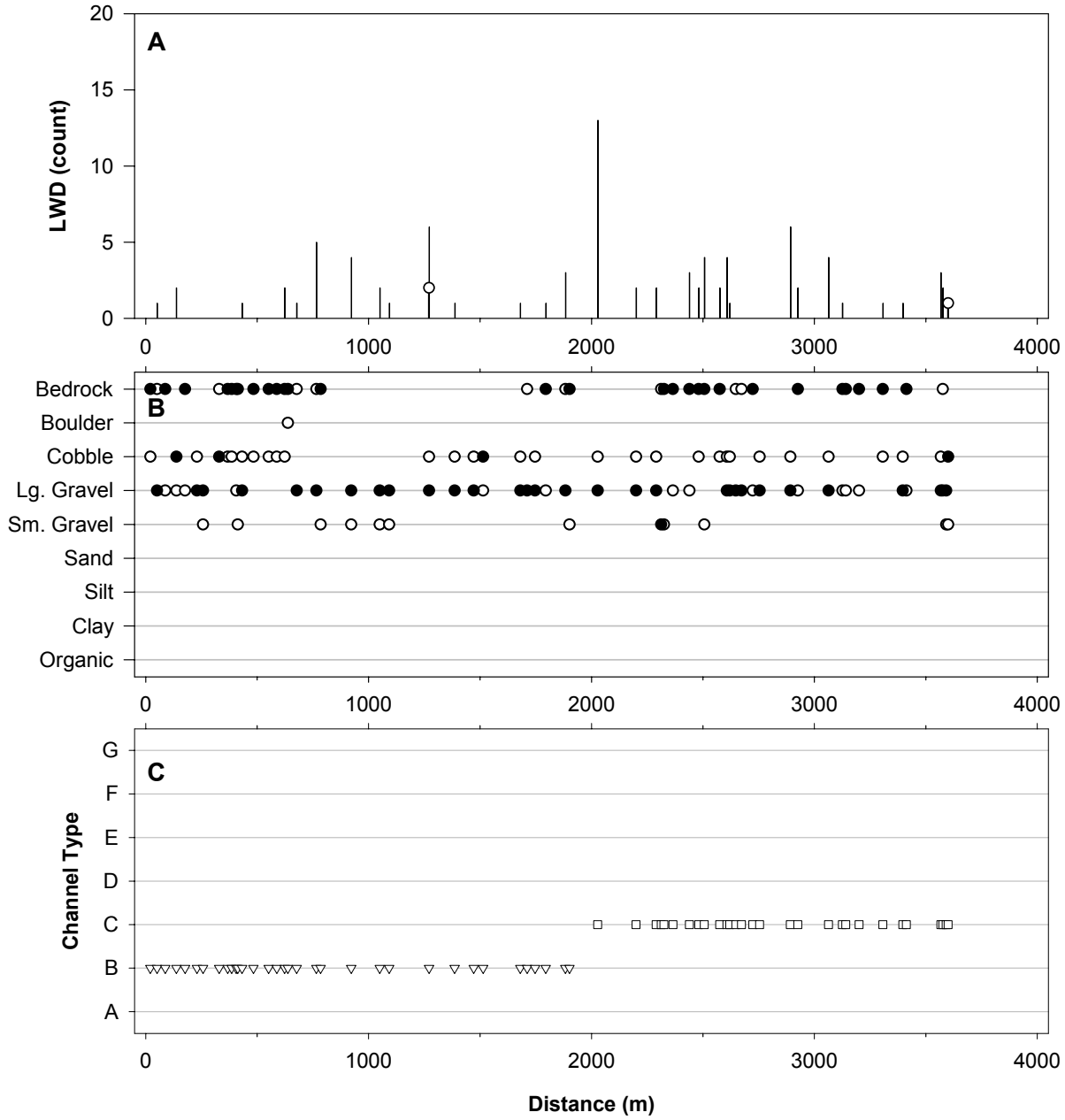


LWD per kilometer in section A, summer 2005. Y-axis labels are LWD size classes described below. The GWJNF DFC for total LWD is between 78 and 186 pieces per km.

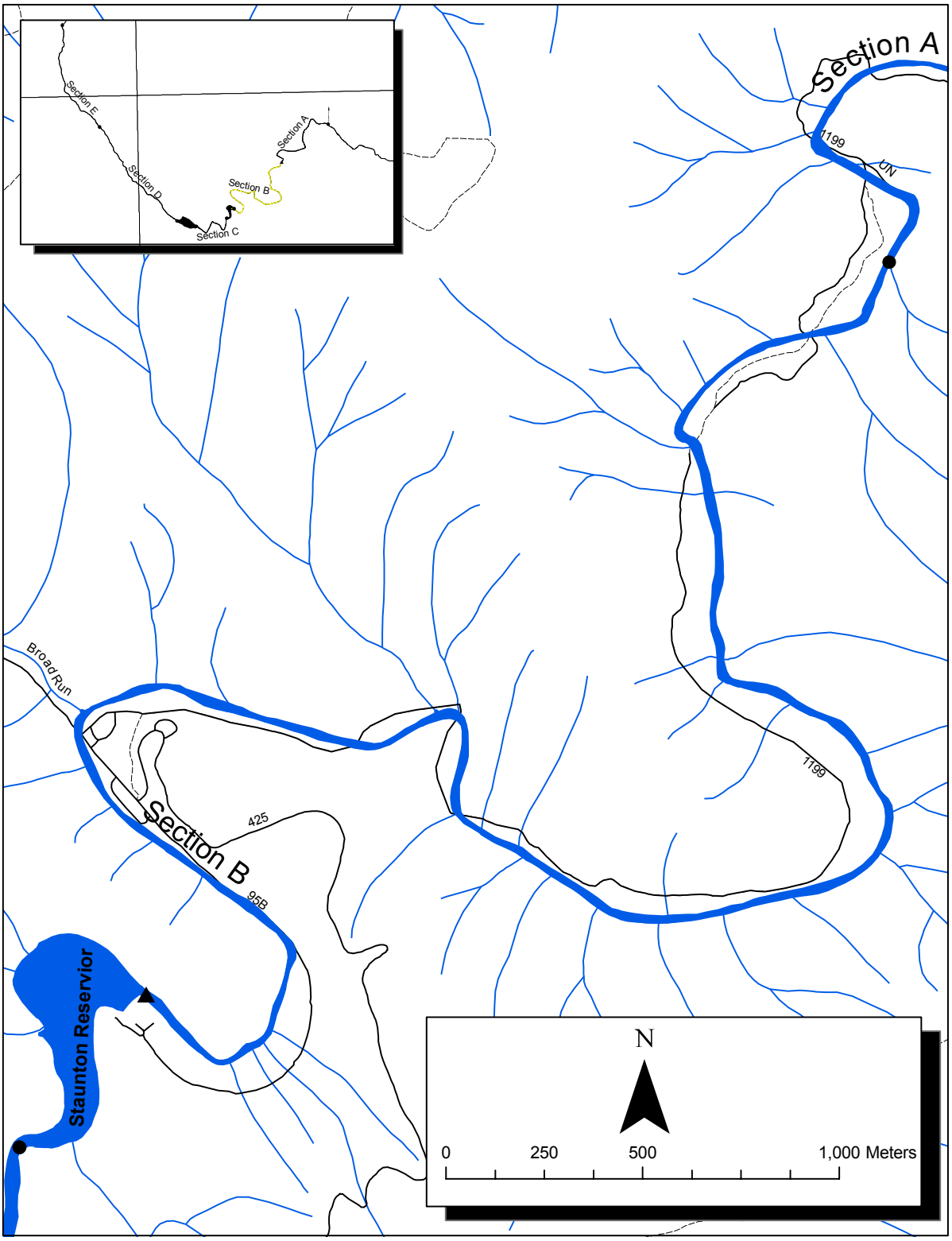
Size 1: < 5 m long, 10-55 cm diameter
Size 2: <5 m long, > 55 cm diameter
Size 3: > 5 m long, 10-55 cm diameter
Size 4: > 5 m long, > 55 cm diameter

Stream features found on section A of the North River during BVET habitat inventory, summer 2005. Distance is meters from start of inventory.

Stream Feature	Distance (m)	Width (m)	Comments
TRIBUTARY	43	1	IN ON RIGHT
TRIBUTARY	68	1	IN ON RIGHT
BRIDGE	288		
BRIDGE	481		TRAIL 538 (NORTH RIVER GORGE TRAIL)
SIDE CHANNEL	806		IN ON LEFT
SIDE CHANNEL	870		IN ON LEFT
SIDE CHANNEL	1026		OUT ON LEFT
BRIDGE	1055		TRAIL 538 (NORTH RIVER GORGE TRAIL)
SIDE CHANNEL	1184		IN ON RIGHT
SIDE CHANNEL	1223		IN ON LEFT
SIDE CHANNEL	1271		OUT ON LEFT
SIDE CHANNEL	1271		OUT ON RIGHT
FORD	1528		TRAIL 538 (NORTH RIVER GORGE TRAIL)
FORD	1674		TRAIL 538 (NORTH RIVER GORGE TRAIL)
TRIBUTARY	1707	2	IN ON RIGHT
SIDE CHANNEL	2781		IN ON LEFT
SIDE CHANNEL	2858		OUT ON LEFT
FORD	3064		FOREST ROAD 548
TRIBUTARY	3254	5	IN ON LEFT
SIDE CHANNEL	3404		IN ON LEFT
SIDE CHANNEL	3460		OUT ON LEFT
FORD	3480		FOREST ROAD 548
TRIBUTARY	3517		IN ON LEFT.
OTHER	3600		BEAVER POND ON LEFT SIDE OF STREAM.
END	3600		END OF LOWEST INVENTORIED PORTION OF STREAM.



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in section A of the North River, summer 2005. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from National Forest boundary. 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).



Section B of the North River. The downstream starting position of the inventory is indicated by the closed circle and the upstream ending position is indicated by the closed triangle.

Stream:	**North River, Section B**
District:	Dry River
USGS Quadrangle:	Stokesville
Inventory Date:	06/20/05
Downstream Starting Point:	Beaver Pond that marked end of Section A.
Upstream Ending Point:	Staunton Dam
Total Distance Inventoried (km):	6.0

	Pools	**Riffles**
Percent of Total Stream Area:	57	43
Total Area (m^2):	31041 ± 2919	23583 ± 3247
Correction Factor Applied:	0.96	1.11
Number of Paired Samples:	15	11
Total Count:	77	67
Number per km:	13	11
Mean Area (m^2):	403	352
Mean Maximum Depth (cm):	61	32
Mean Average Depth (cm):	33	15
Mean Residual Depth (cm):	19	--
Percent Inventoried as Glides:	30	--
Percent Inventoried as Runs:	--	12
Percent Inventoried as Cascades:	--	0
Percent with >35% Fines:	0	0

Large Woody Debris Size	**Pieces per km**
< 5 m long, 10 cm – 55 cm diameter:	3
< 5 m long, > 55 cm diameter:	1
> 5 m long, 10 cm – 55 cm diameter:	6
> 5 m long, > 55 cm diameter:	1
Total:	10

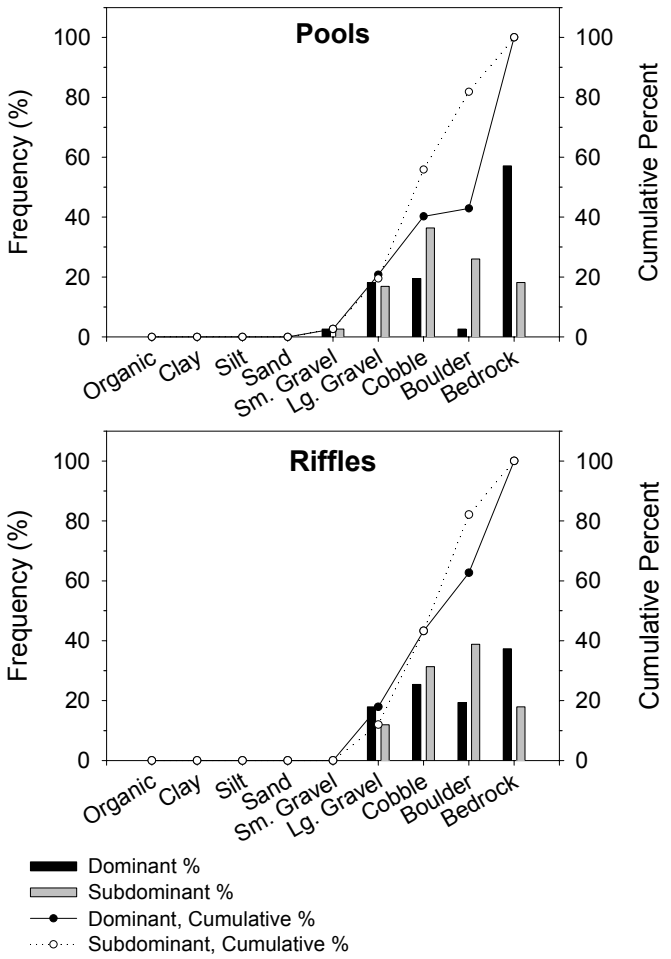
Riparian Width	**Total Width* (m)**	**Left & Right Width** (m)**
Mean	35	9
Maximum	82	41
75th Percentile	35	11
25th Percentile	27	4
Minimum	22	1

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

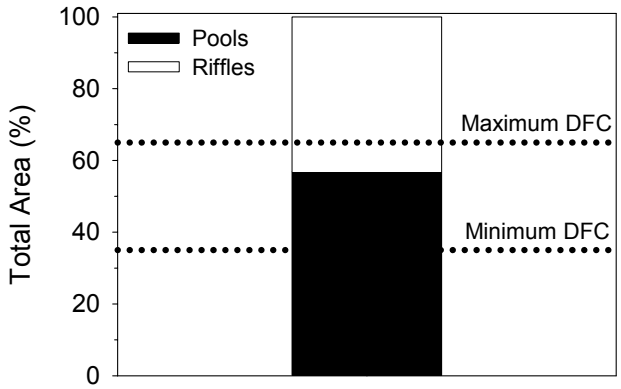
**Left and right riparian widths were grouped (not added) together for calculations

Rosgen's Channel Type	**Frequency (%)**
A:	0
B:	87
C:	13
D:	0
E:	0
F:	0
G:	0

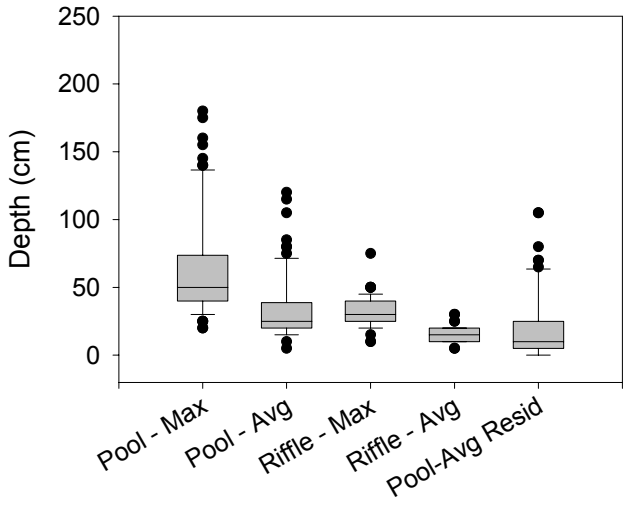
Other Stream Attributes	
Mean Bankfull Channel Width (m):	16
Mean Channel Gradient (%):	3
Median Water Temperature (C):	19



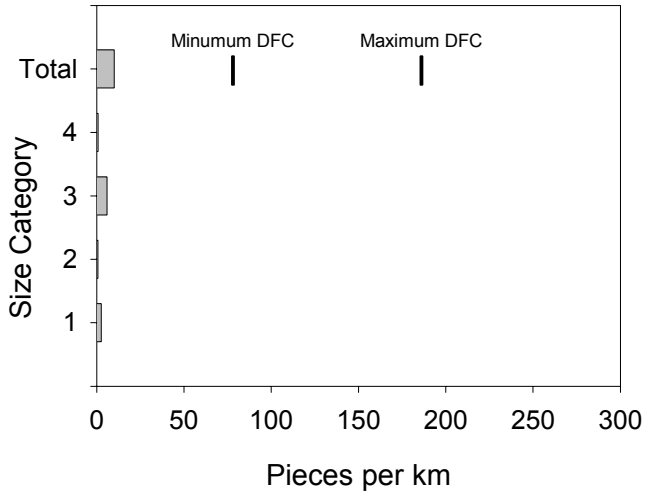
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in section B of the North River, summer 2005.



Estimated area of section B in pools and riffles as calculated using BVET techniques, summer 2005. The GWJNF DFC is between 35 and 65 percent of total stream area in pools.



Maximum and average depths and residual pool depths for pools and riffles in section B, summer 2005. 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.

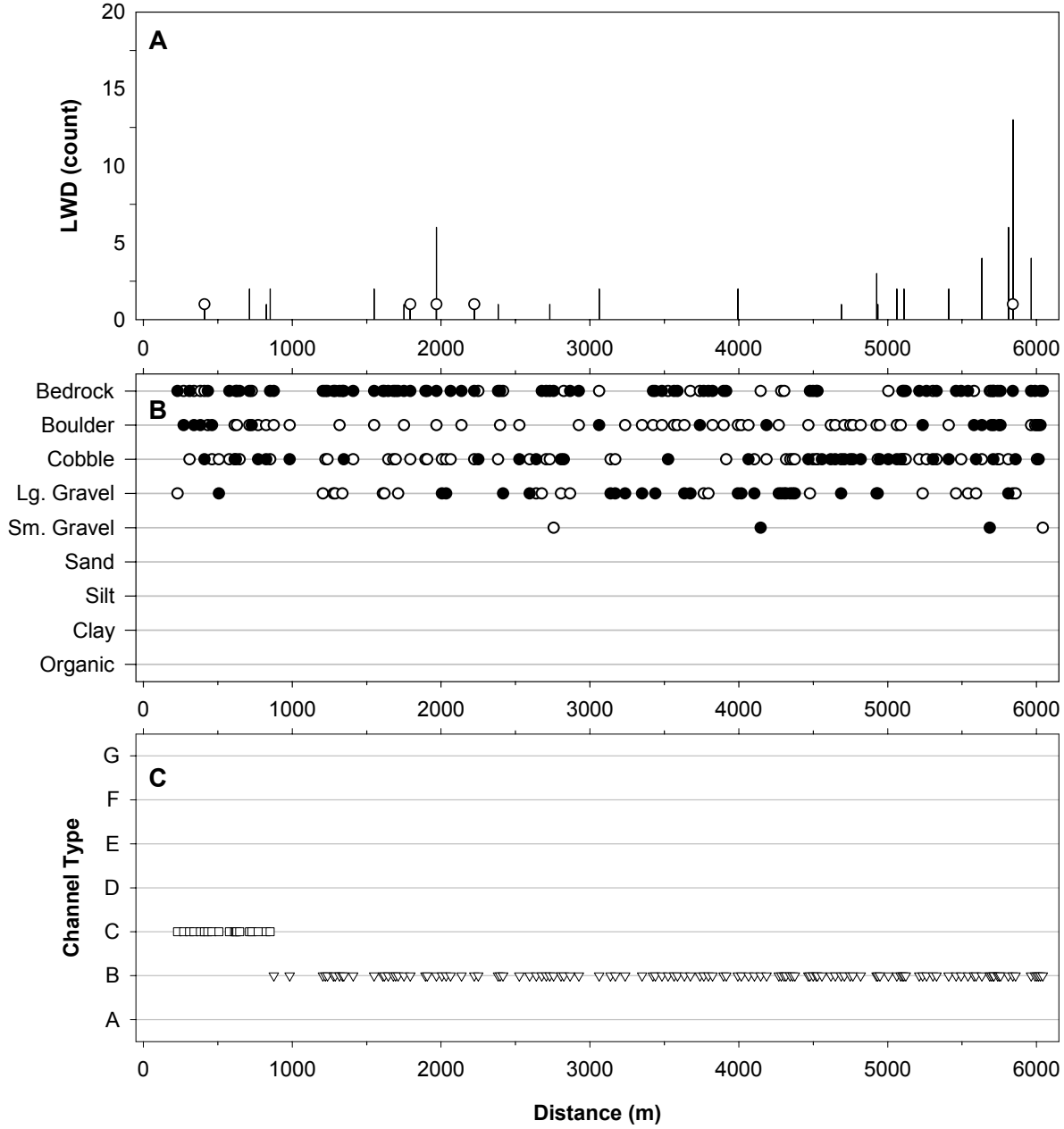


LWD per kilometer in section B, summer 2005. Y-axis labels are LWD size classes described below. The GWJNF DFC for total LWD is between 78 and 186 pieces per km.

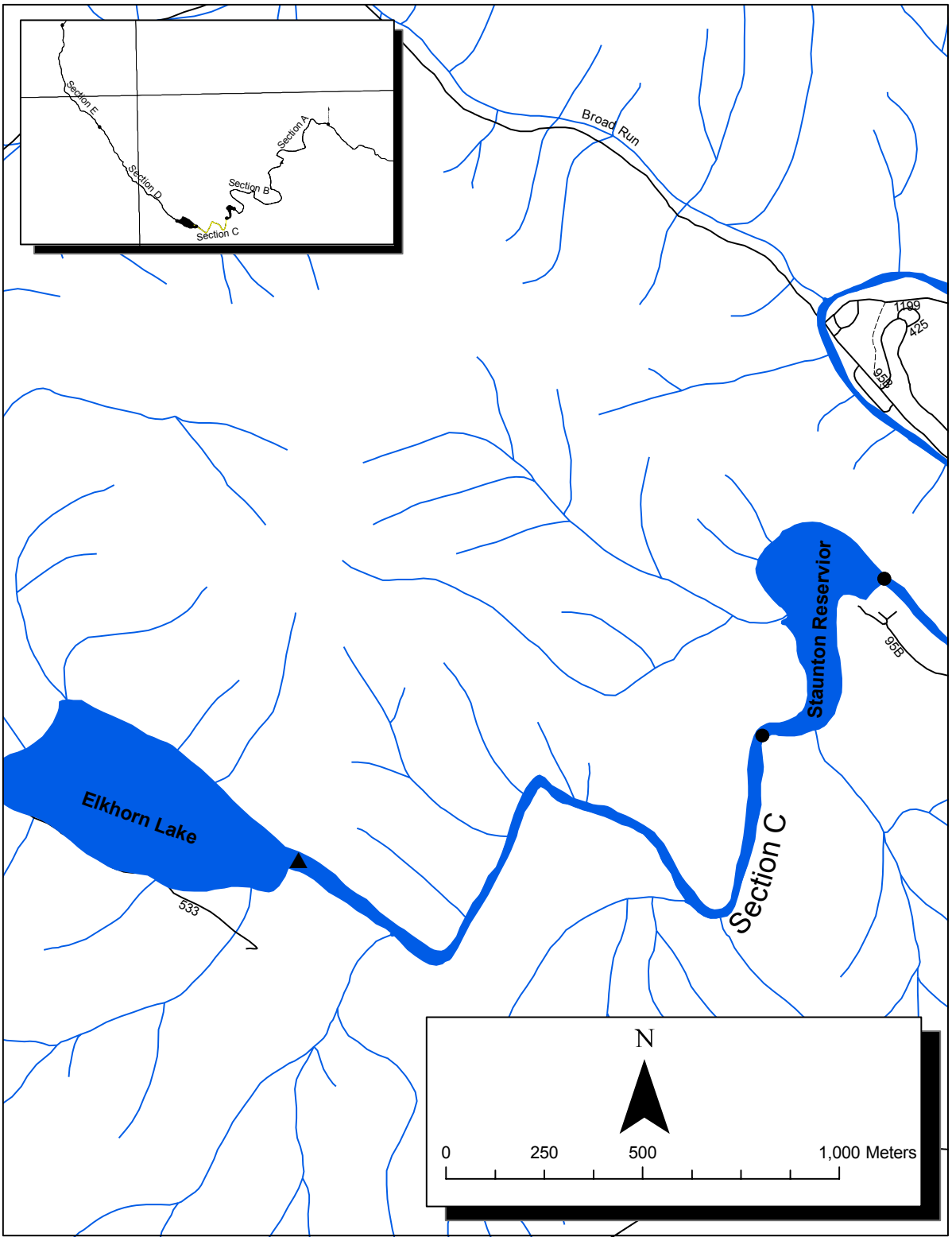
Size 1: < 5 m long, 10-55 cm diameter
Size 2: <5 m long, > 55 cm diameter
Size 3: > 5 m long, 10-55 cm diameter
Size 4: > 5 m long, > 55 cm diameter

Stream features found on section B of the North River during BVET habitat inventory, summer 2005. Distance is meters from start of inventory.

Stream Feature	Distance (m)	Width (m)	Comments
TRIBUTARY	73		DRY. ON RIGHT.
FORD	461		FOREST TRAIL 548 (FOREST ROAD 1199)
SIDE CHANNEL	461		ON LEFT
SIDE CHANNEL	513		OUT ON LEFT
SIDE CHANNEL	876		ON RIGHT
FORD	926		FOREST TRAIL 548 (FOREST ROAD 1199)
SIDE CHANNEL	1814		ON RIGHT
SIDE CHANNEL	1968		OUT ON RIGHT
SIDE CHANNEL	2185		OUT ON RIGHT
SIDE CHANNEL	2416		IN ON LEFT
SIDE CHANNEL	2526		OUT ON LEFT
SIDE CHANNEL	2595		IN ON LEFT
SIDE CHANNEL	2695		OUT ON LEFT
SIDE CHANNEL	3139		IN ON RIGHT
SIDE CHANNEL	3170		OUT ON RIGHT
FORD	3439		FOREST TRAIL 548 (FOREST ROAD 1199)
FORD	3706		FOREST TRAIL 548 (FOREST ROAD 1199)
FORD	3980		FOREST TRAIL 548 (FOREST ROAD 1199)
SIDE CHANNEL	4221		IN ON RIGHT
SIDE CHANNEL	4268		OUT ON RIGHT
SIDE CHANNEL	4567		IN ON RIGHT, NORTH RIVER CAMPGROUND ON RIGHT
FORD	4648		FOREST TRAIL 548 (FOREST ROAD 1199)
BRIDGE	4767		ROAD 95B
SIDE CHANNEL	4819		OUT ON RIGHT
SIDE CHANNEL	5552		OUT ON LEFT
SIDE CHANNEL	5633		OUT ON LEFT
SIDE CHANNEL	5758		ON RIGHT
DAM	6042		STAUNTON DAM
END	6042		STAUNTON DAM MARKS END OF SECOND SECTION.



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in section B of the North River, summer 2005. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from National Forest boundary. 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).



Section C of the North River. The downstream starting position of the inventory is indicated by a closed circle and the upstream ending position is indicated by the closed triangle.

Stream:	**North River, Section C**
District:	Dry River
USGS Quadrangle:	Stokesville
Inventory Date:	06/20/05
Downstream Starting Point:	Head of Staunton Reservoir
Upstream Ending Point:	Elkhorn Lake Dam
Total Distance Inventoried (km):	1.8

	Pools	**Riffles**
Percent of Total Stream Area:	36	64
Total Area (m^2):	7213 ± 1175	12848 ± 7375
Correction Factor Applied:	1.02	1.25
Number of Paired Samples:	3	4
Total Count:	19	22
Number per km:	10	12
Mean Area (m^2):	380	584
Mean Maximum Depth (cm):	76	40
Mean Average Depth (cm):	49	28
Mean Residual Depth (cm):	29	--
Percent Inventoried as Glides:	37	--
Percent Inventoried as Runs:	--	9
Percent Inventoried as Cascades:	--	0
Percent with >35% Fines:	0	0

Large Woody Debris Size	**Pieces per km**
< 5 m long, 10 cm – 55 cm diameter:	10
< 5 m long, > 55 cm diameter:	0
> 5 m long, 10 cm – 55 cm diameter:	28
> 5 m long, > 55 cm diameter:	3
Total:	41

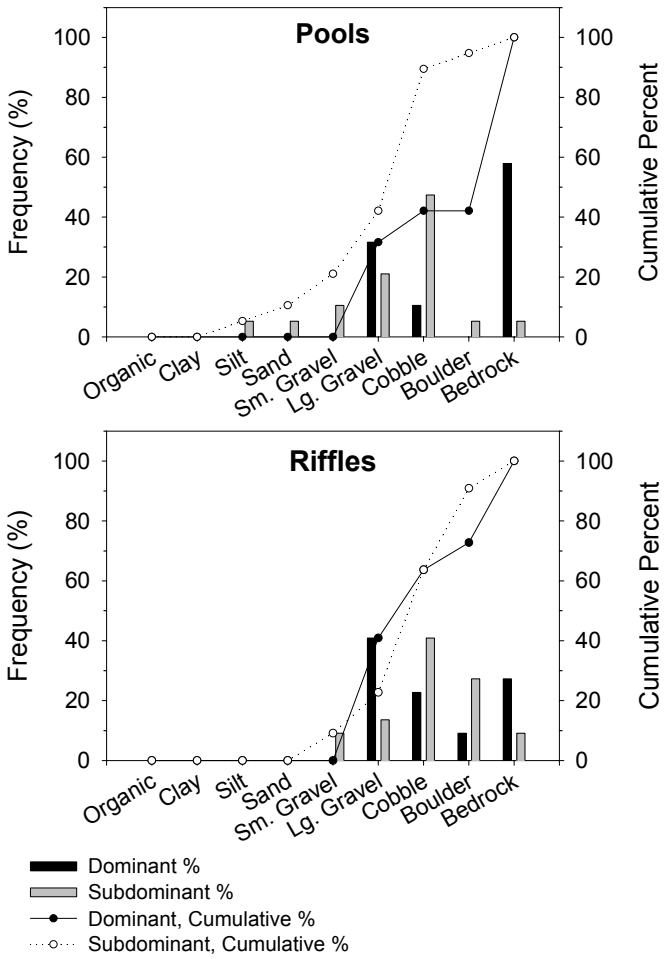
Riparian Width	**Total Width* (m)**	**Left & Right Width** (m)**
Mean	18	2
Maximum	21	6
75th Percentile	19	4
25th Percentile	17	1
Minimum	15	1

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

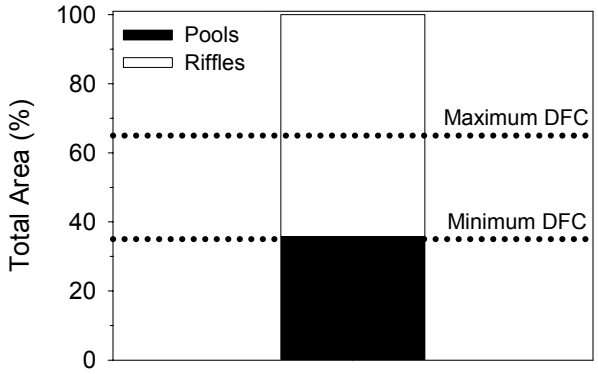
**Left and right riparian widths were grouped (not added) together for calculations

Rosgen's Channel Type	**Frequency (%)**
A:	0
B:	59
C:	0
D:	0
E:	0
F:	0
G:	41

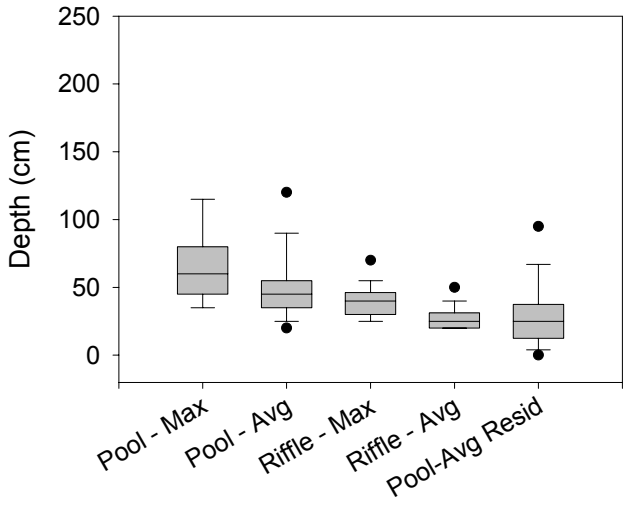
Other Stream Attributes	
Mean Bankfull Channel Width (m):	13
Mean Channel Gradient (%):	3
Median Water Temperature (C):	21.5



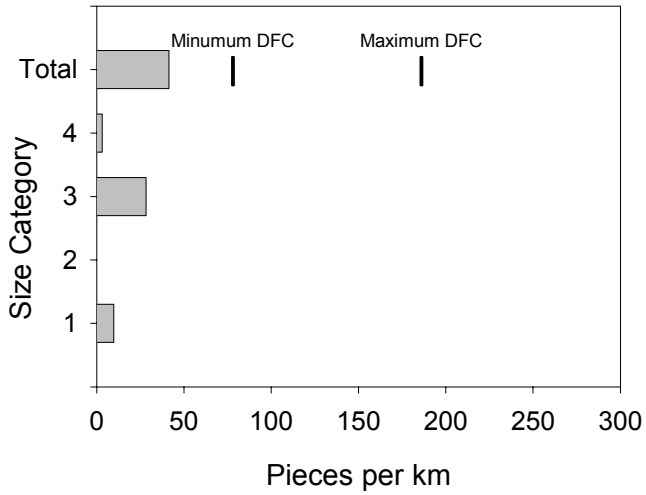
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in section C of the North River, summer 2005.



Estimated area of section C in pools and riffles as calculated using BVET techniques, summer 2005. The GWJNF DFC is between 35 and 65 percent of total stream area in pools.



Maximum and average depths and residual pool depths for pools and riffles in section C, summer 2005. 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.

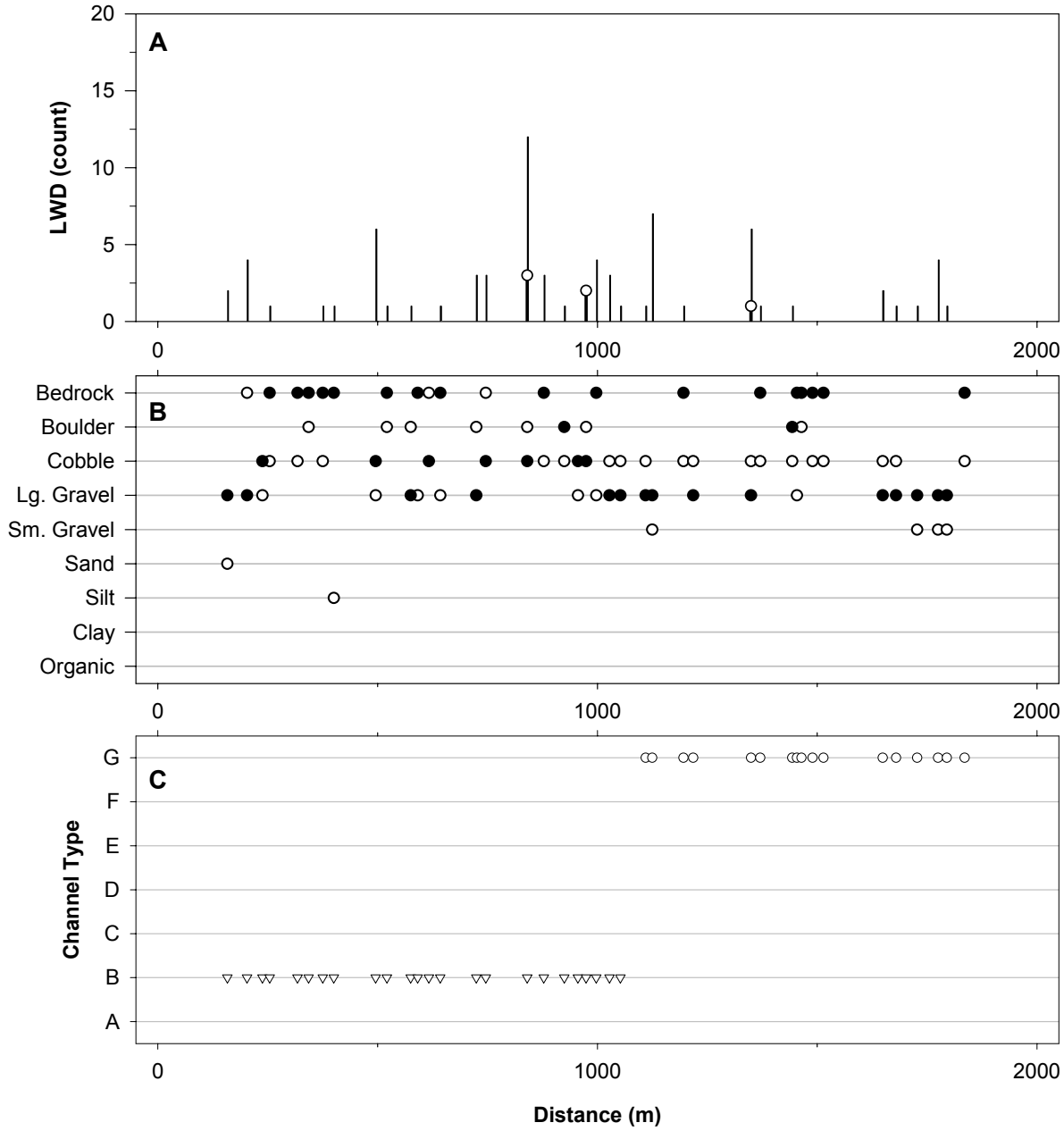


LWD per kilometer in section C, summer 2005. Y-axis labels are LWD size classes described below. The GWJNF DFC for total LWD is between 78 and 186 pieces per km.

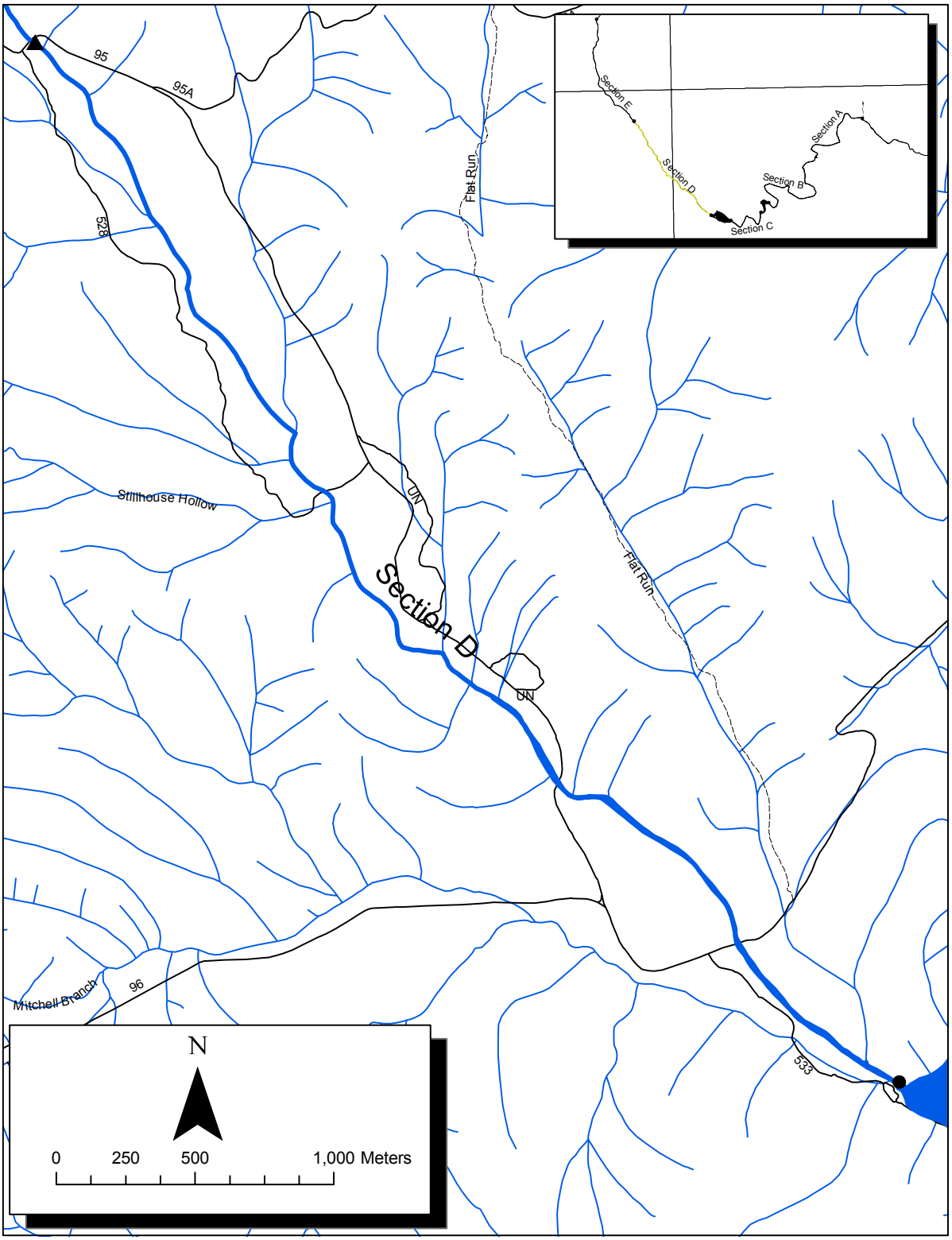
Size 1: < 5 m long, 10-55 cm diameter
Size 2: <5 m long, > 55 cm diameter
Size 3: > 5 m long, 10-55 cm diameter
Size 4: > 5 m long, > 55 cm diameter

Stream features found on section C of the North River during BVET habitat inventory, summer 2005. Distance is meters from start of inventory.

Stream Feature	Distance (m)	Width (m)	Comments
FORD	1649	7.5	RIFFLE MADE AT TRAIL FORD BY ARTIFICALLY PLACED LWDS. AVERAGE BANKFULL DEPTH (BFD) = 35 CM. MAX BFD = 45 CM.
DAM	1836		ELKHORN LAKE DAM.
END	1836		END INVENTORY AT ELKHORN LAKE DAM.



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in section C of the North River, summer 2005. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from National Forest boundary. 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).



Section D of the North River. Inventoried portion is highlighted. The downstream starting position of the inventory is indicated by a closed circle and the stream ending position is indicated by the closed triangle.

Stream:	**North River, Section D**
District:	Dry River
USGS Quadrangle:	Stokesville, West Augusta, Palo Alto
Inventory Date:	06/30/05
Downstream Starting Point:	Elkhorn Lake
Upstream Ending Point:	Forest Road 95A bridge
Total Distance Inventoried (km):	5.5

	Pools	**Riffles**
Percent of Total Stream Area:	29	71
Total Area (m^2):	7328 ± 685	18207 ± 1776
Correction Factor Applied:	1.02	1.30
Number of Paired Samples:	6	6
Total Count:	65	63
Number per km:	12	11
Mean Area (m^2):	113	289
Mean Maximum Depth (cm):	61	20
Mean Average Depth (cm):	35	10
Mean Residual Depth (cm):	25	--
Percent Inventoried as Glides:	8	--
Percent Inventoried as Runs:	--	3
Percent Inventoried as Cascades:	--	0
Percent with >35% Fines:	0	0

Large Woody Debris Size	**Pieces per km**
< 5 m long, 10 cm – 55 cm diameter:	2
< 5 m long, > 55 cm diameter:	1
> 5 m long, 10 cm – 55 cm diameter:	10
> 5 m long, > 55 cm diameter:	2
Total:	16

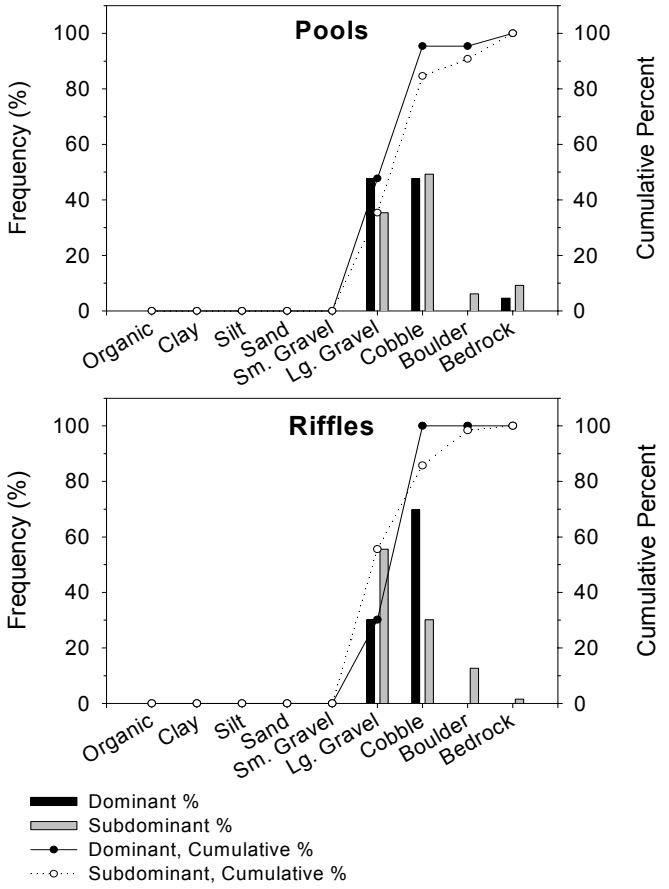
Riparian Width	**Total Width* (m)**	**Left & Right Width** (m)**
Mean	42	14
Maximum	115	50
75th Percentile	39	16
25th Percentile	26	1
Minimum	10	1

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

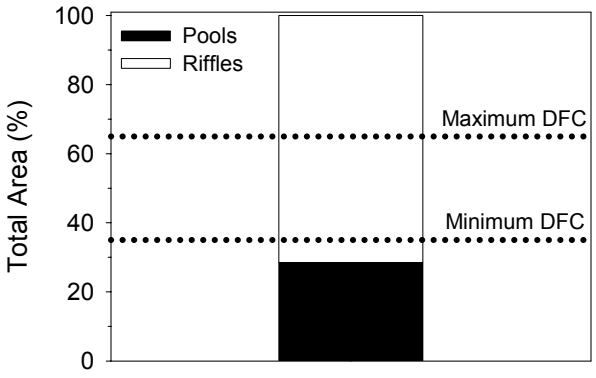
**Left and right riparian widths were grouped (not added) together for calculations

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

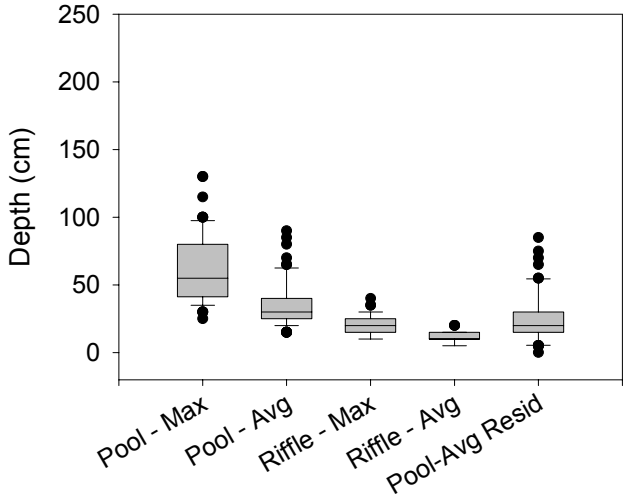
Other Stream Attributes	
Mean Bankfull Channel Width (m):	13
Mean Channel Gradient (%):	2
Median Water Temperature (C):	18



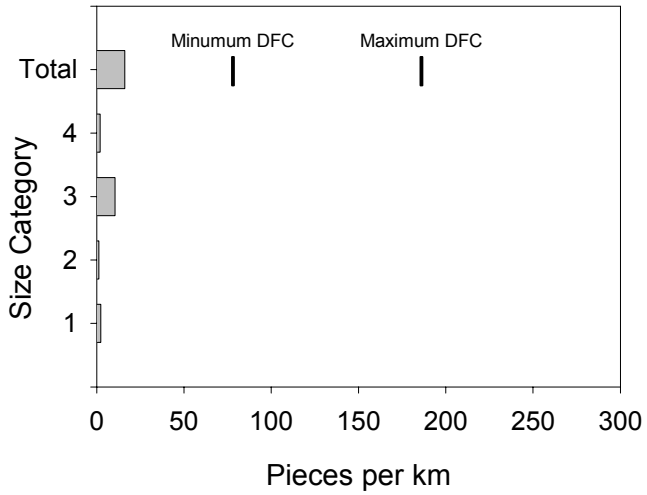
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in section D of the North River, summer 2005.



Estimated area of section D in pools and riffles as calculated using BVET techniques, summer 2005. The GWJNF DFC is between 35 and 65 percent of total stream area in pools.



Maximum and average depths and residual pool depths for pools and riffles in section D, summer 2005. 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.

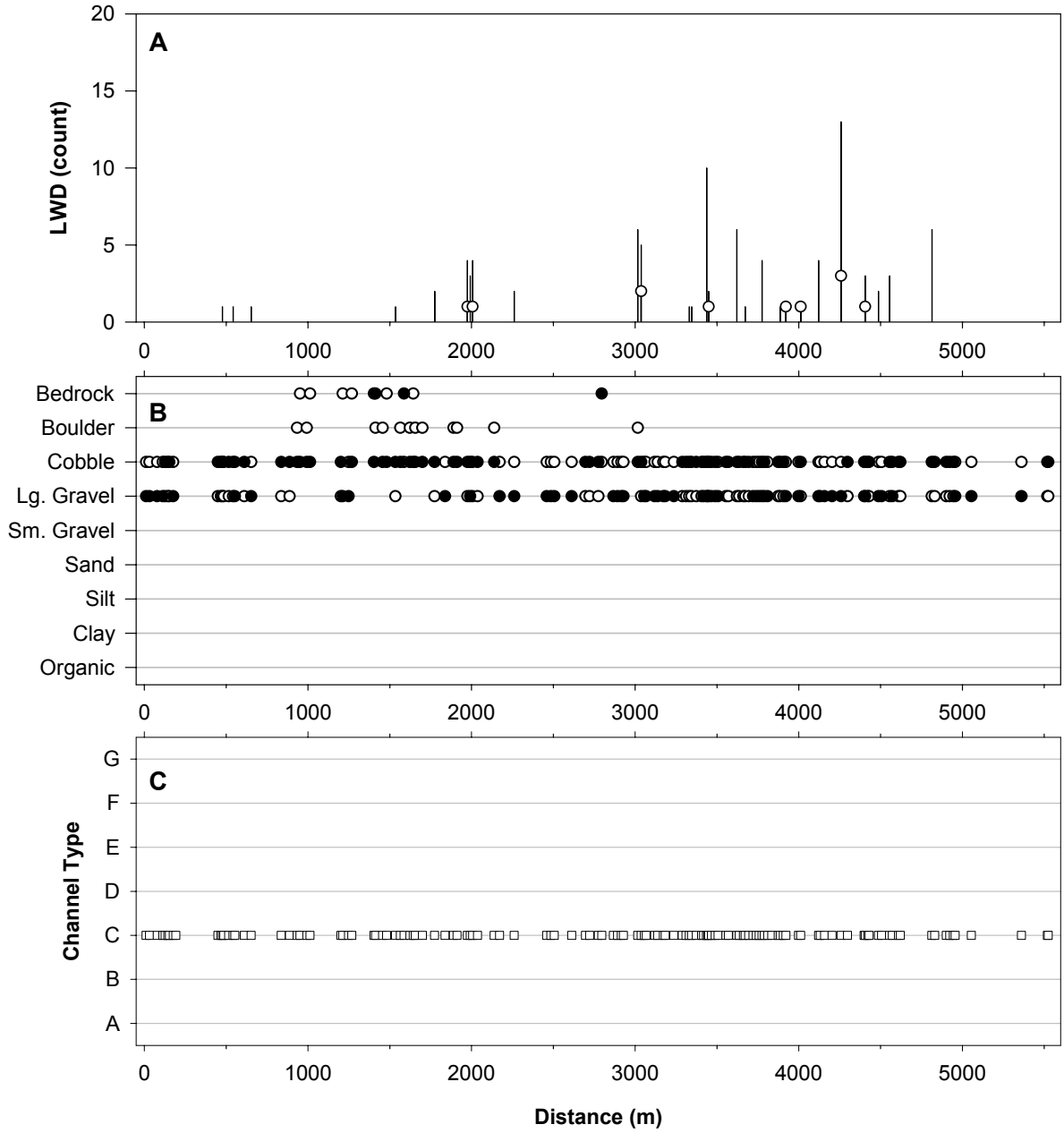


LWD per kilometer in section D, summer 2005. Y-axis labels are LWD size classes described below. The GWJNF DFC for total LWD is between 78 and 186 pieces per km.

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 section D of the North River during BVET habitat inventory, summer 2005. Distance is meters from start of inventory.

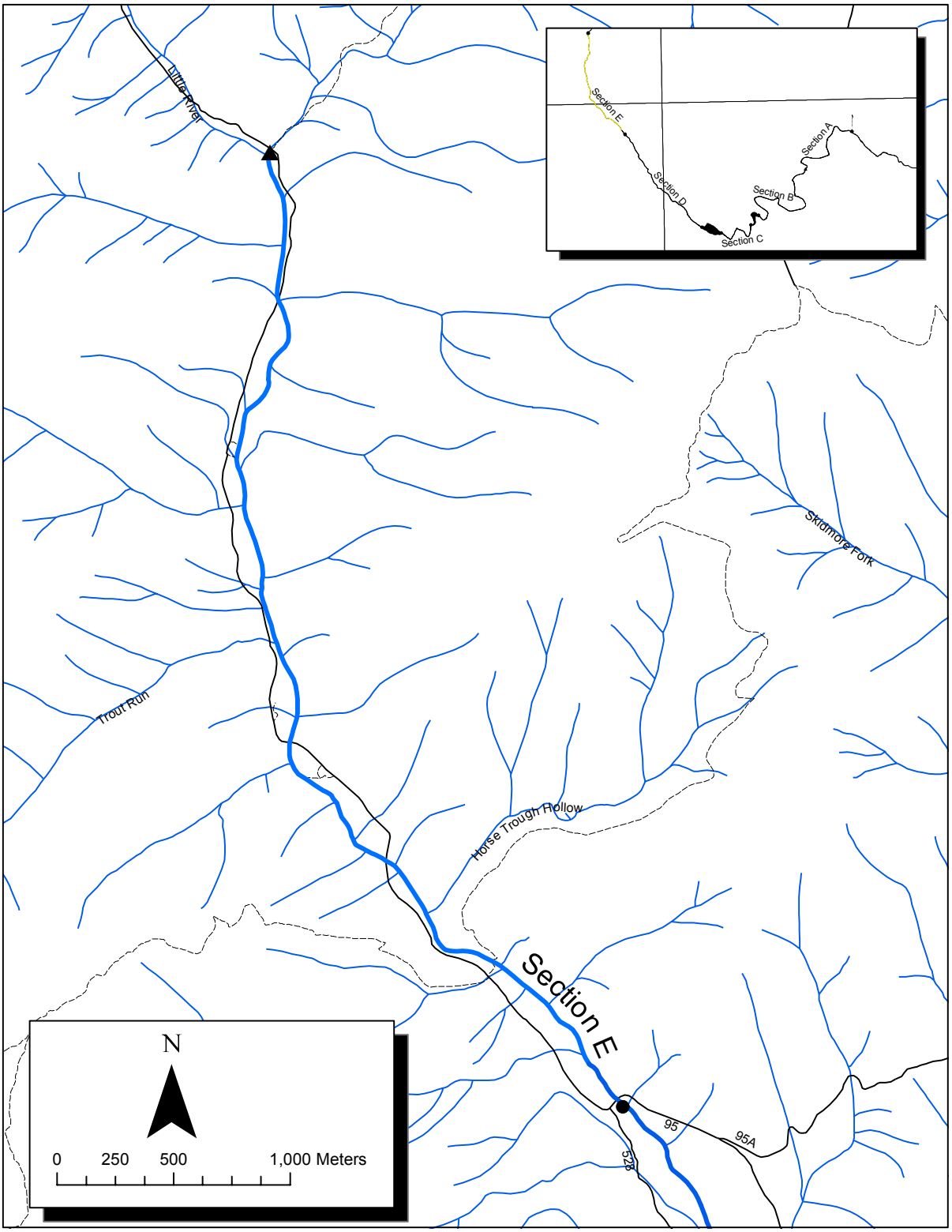
Stream Feature	Distance (m)	Width (m)	Comments
TRIBUTARY	144	2	ON LEFT. WHITE OAK RUN.
TRIBUTARY	193	1.5	ON RIGHT
BRIDGE	856		FOREST ROAD 95
TRIBUTARY	1272	0.5	LEFT FLAT RUN
OTHER	1299		BANK STABILIZERS ON LEFT (ROCKS IN WIRE CAGES)
TRIBUTARY	1623		ON RIGHT
BRIDGE	1788		FOREST ROAD 95
SIDE CHANNEL	2331		ON LEFT
TRIBUTARY	2775		ON LEFT; STILLHUSE HOLLOW
DAM	2960		ROCK DAM
DAM	2988		ROCK DAM AND CAMPSITE ON RIGHT
SIDE CHANNEL	3236		ON LEFT
FORD	3449		NOT ON MAP
TRIBUTARY	3529	1	ON RIGHT
TRIBUTARY	3710	1.5	NAMELESS TRIBUTARY
SIDE CHANNEL	4315		
SIDE CHANNEL	4830		ON LEFT
BRIDGE	5525		FOREST ROAD 95A BRIDGE.
END	5525		BRIDGE MARKS END OF SECTION D.



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in section D of the North River, summer 2005. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from National Forest boundary. 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).

Photos taken on section D of the North River during BVET habitat inventory, summer 2005. Distance is meters from start of inventory.

Unit Type	Unit Number	Distance (m)	Comments
RIFFLE	7	542	
RIFFLE	17	1623	CAMPSITE ON LEFT
RIFFLE	37	3374	
RIFFLE	47	3774	
RIFFLE	57	4487	



Section E of the North River. Inventoried portion is highlighted. The downstream starting position of the inventory is indicated by a closed circle and the upstream ending position is indicated by the closed triangle.

Stream:	**North River, Section E**
District:	Dry River
USGS Quadrangle:	West Augusta, Palo Alto
Inventory Date:	06/30/05
Downstream Starting Point:	Forest Road 95 Bridge
Upstream Ending Point:	Confluence with Little River, downstream of Camp Mayflather
Total Distance Inventoried (km):	5.0

	Pools	**Riffles**
Percent of Total Stream Area:	13	87
Total Area (m^2):	3736 ± 527	24432 ± 5833
Correction Factor Applied:	1.07	1.12
Number of Paired Samples:	7	7
Total Count:	41	35
Number per km:	8	7
Mean Area (m^2):	91	698
Mean Maximum Depth (cm):	62	24
Mean Average Depth (cm):	33	13
Mean Residual Depth (cm):	19	--
Percent Inventoried as Glides:	32	--
Percent Inventoried as Runs:	--	0
Percent Inventoried as Cascades:	--	0
Percent with >35% Fines:	0	0

Large Woody Debris Size	**Pieces per km**
< 5 m long, 10 cm – 55 cm diameter:	14
< 5 m long, > 55 cm diameter:	1
> 5 m long, 10 cm – 55 cm diameter:	17
> 5 m long, > 55 cm diameter:	3
Total:	34

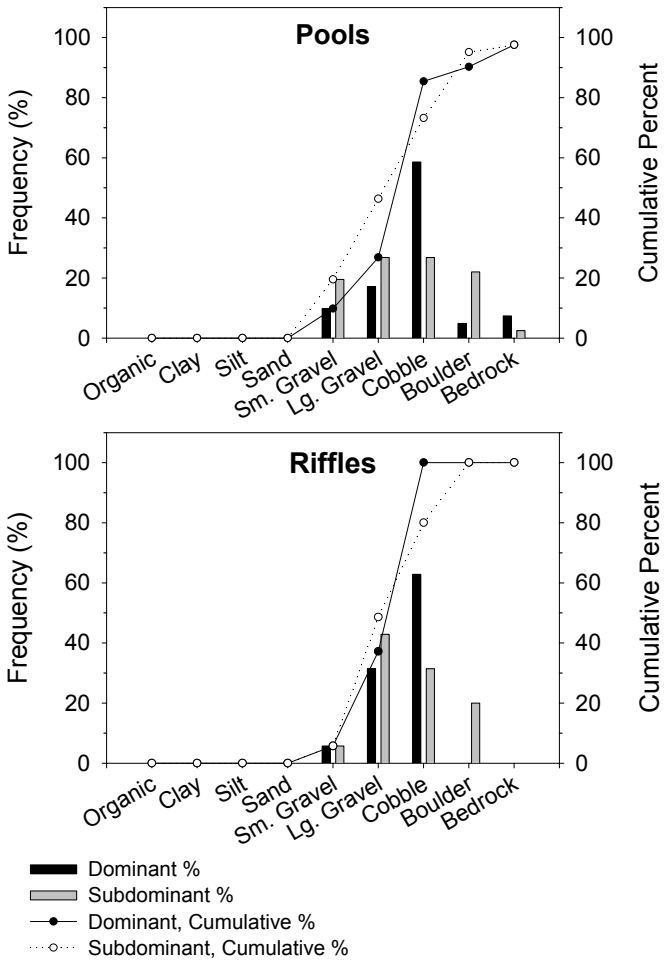
Riparian Width	**Total Width* (m)**	**Left & Right Width** (m)**
Mean	19	3
Maximum	26	11
75th Percentile	24	4
25th Percentile	16	1
Minimum	6	1

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

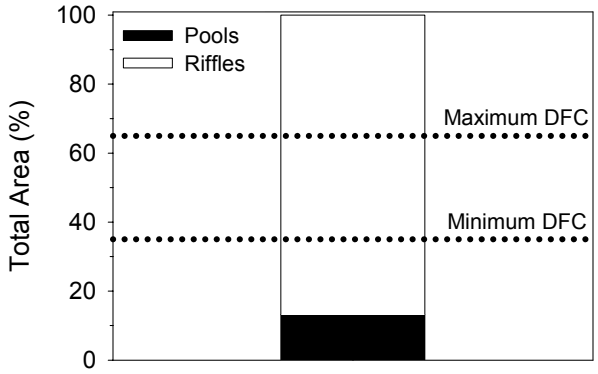
**Left and right riparian widths were grouped (not added) together for calculations

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

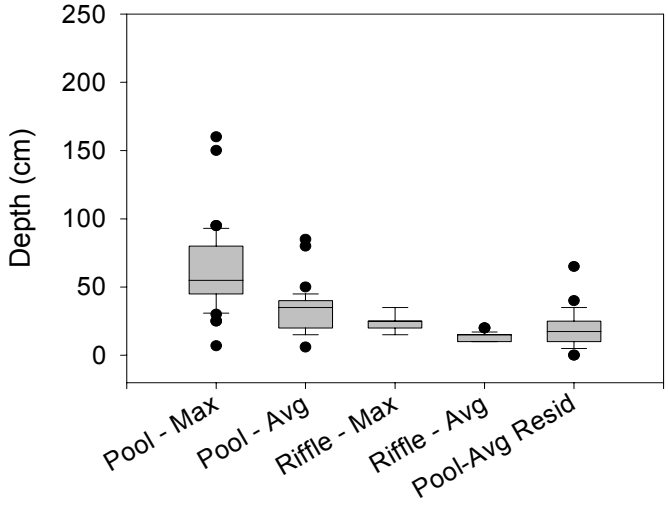
Other Stream Attributes	
Mean Bankfull Channel Width (m):	13
Mean Channel Gradient (%):	2
Median Water Temperature (C):	18



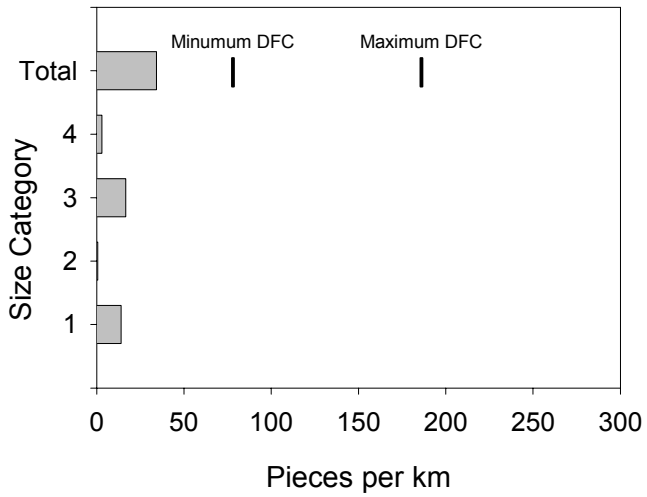
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in section E of the North River, summer 2005.



Estimated area of section E in pools and riffles as calculated using BVET techniques, summer 2005. The GWJNF DFC is between 35 and 65 percent of total stream area in pools.



Maximum and average depths and residual pool depths for pools and riffles in section E, summer 2005. 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.

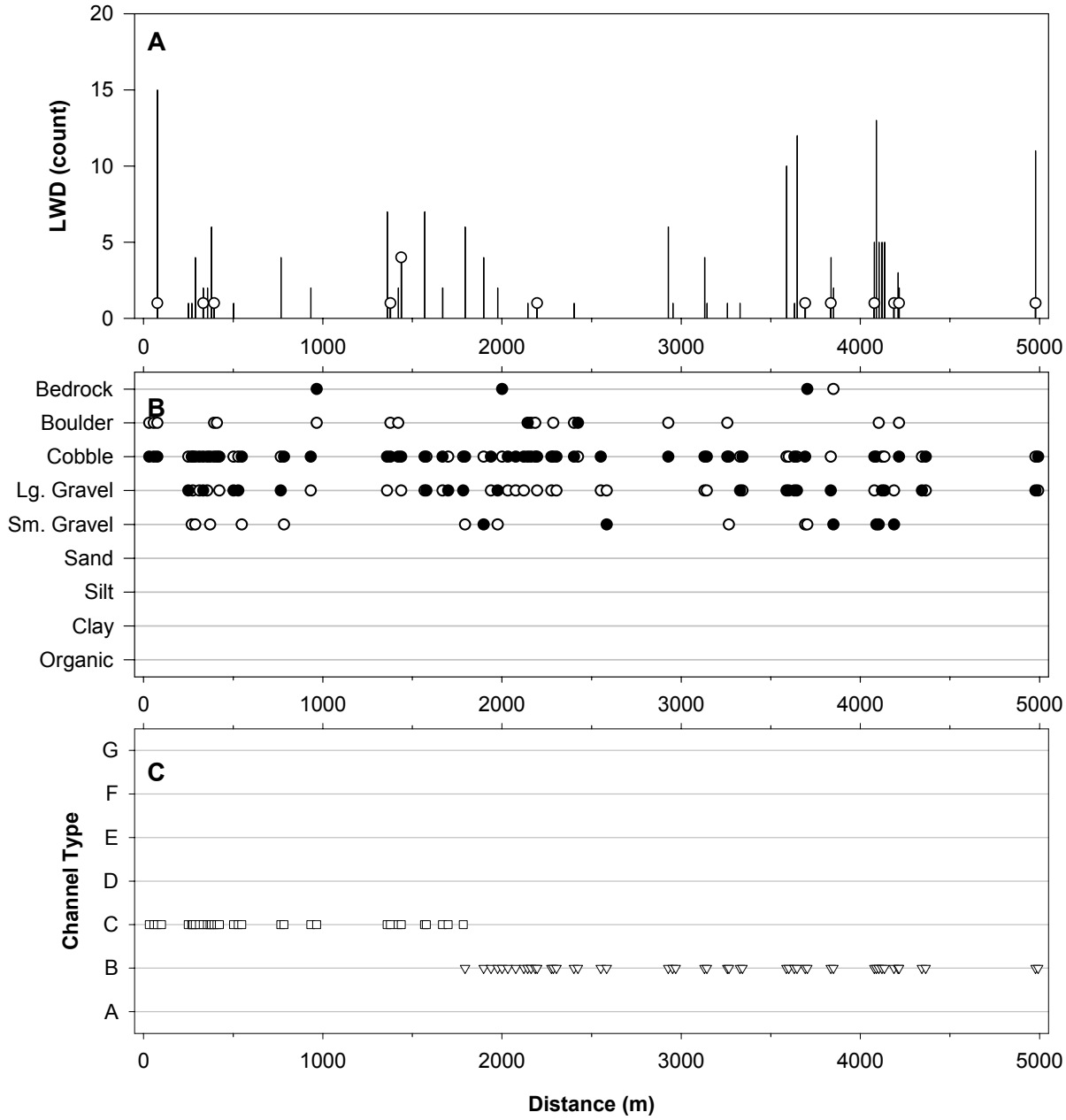


LWD per kilometer in section E, summer 2005. Y-axis labels are LWD size classes described below. The GWJNF DFC for total LWD is between 78 and 186 pieces per km.

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 section E of the North River during BVET habitat inventory, summer 2005. Distance is meters from start of inventory.

Stream Feature	Distance (m)	Width (m)	Comments
SIDE CHANNEL	272		IN ON RIGHT
SIDE CHANNEL	350		OUT ON RIGHT
SIDE CHANNEL	1359		IN ON LEFT
SIDE CHANNEL	1444		IN ON LEFT
SIDE CHANNEL	1483		OUT ON LEFT
BRIDGE	1571		FOREST ROAD 95
SIDE CHANNEL	1700		IN ON RIGHT. DRY.
SIDE CHANNEL	1723		IN ON RIGHT
BRIDGE	2280		FOREST ROAD 95
TRIBUTARY	2615		IN ON RIGHT
TRIBUTARY	2742		IN ON LEFT. TROUT CREEK.
TRIBUTARY	3342	1	IN ON LEFT
OTHER	3608		BEAVER DAM ON LEFT SIDE OF STREAM
SIDE CHANNEL	4033		IN ON RIGHT
SIDE CHANNEL	4089		OUT ON RIGHT
TRIBUTARY	4152	3	IN ON LEFT
SIDE CHANNEL	4180		IN ON LEFT
BRIDGE	4356		FOREST ROAD 95
SIDE CHANNEL	4894		IN ON LEFT
SIDE CHANNEL	4960	4	OUT ON LEFT
TRIBUTARY	4992		IN ON LEFT. LITTLE RIVER.
END	4992		END INVENTORY AT CONFLUENCE WITH LITTLE RIVER.



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in section E of the North River, summer 2005. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from National Forest boundary. 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).

Photos taken on section E of the North River, during BVET habitat inventory, summer 2005. Distance is meters from start of inventory.

Unit Type	Unit Number	Distance (m)	Comments
RIFFLE	5	356	MAX BANKFUL DEPTH (BFD) = 90 CM AVG BFD = 90 CM. CAMP ON LEFT, AFFECTS LEFT RIPARIAN WIDTH. SIDE CHANNEL AFFECTS RIGHT RIPARIAN WIDTH.
RIFFLE	10	1359	MAX BFD = 75 CM. AVG BFD = 65 CM.
RIFFLE	15	1898	MAX BFD = 35 CM. AVG BFD = 45 CM.
RIFFLE	20	2276	MAX BFD = 70 CM. AVG BFD = 55 CM.
TRIBUTARY		2615	IN ON RIGHT
TRIBUTARY		2742	IN ON LEFT. TROUT CREEK.
RIFFLE	25	3257	MAX BFD = 75 CM. AVG BFD = 60 CM.
TRIBUTARY		3342	IN ON LEFT.
OTHER		3608	BEAVER DAM ON LEFT SIDE OF STREAM
RIFFLE	30	3835	MAX BFD = 60 CM. AVG BFD = 45 CM.
BRIDGE		4356	FOREST ROAD 95
RIFFLE	35	4977	ROCK STABILIZER WALL ON EITHER SIDE OF PARTS OF STREAM. MAX BFD = 45 CM. AVG BFD = 35 CM.

Stream:	**North River**
District:	Dry River
USGS Quadrangle:	Stokesville, West Augusta, Palo Alto
Inventory Date:	06/30/05
Downstream Starting Point:	Confluence with Little River (Stokesville)
Total Distance Inventoried (km):	23.6

*Lakes omitted from calculations. Data represents only inventoried sections of North River.

	Pools	**Riffles**
Percent of Total Stream Area:	41	59
Total Area (m^2):	66236 ± 5552	95230 ± 9021
Correction Factor Applied:	1.01	1.15
Number of Paired Samples:	37	34
Total Count:	233	220
Number per km:	11	10
Mean Area (m^2):	284	433
Mean Maximum Depth (cm):	65	30
Mean Average Depth (cm):	37	17
Mean Residual Depth (cm):	23	--
Percent Inventoried as Glides:	22	--
Percent Inventoried as Runs:	--	7
Percent Inventoried as Cascades:	--	0
Percent with >35% Fines:	0	0

Large Woody Debris Size	**Pieces per km**
< 5 m long, 10 cm – 55 cm diameter:	6
< 5 m long, > 55 cm diameter:	1
> 5 m long, 10 cm – 55 cm diameter:	13
> 5 m long, > 55 cm diameter:	2
Total:	22

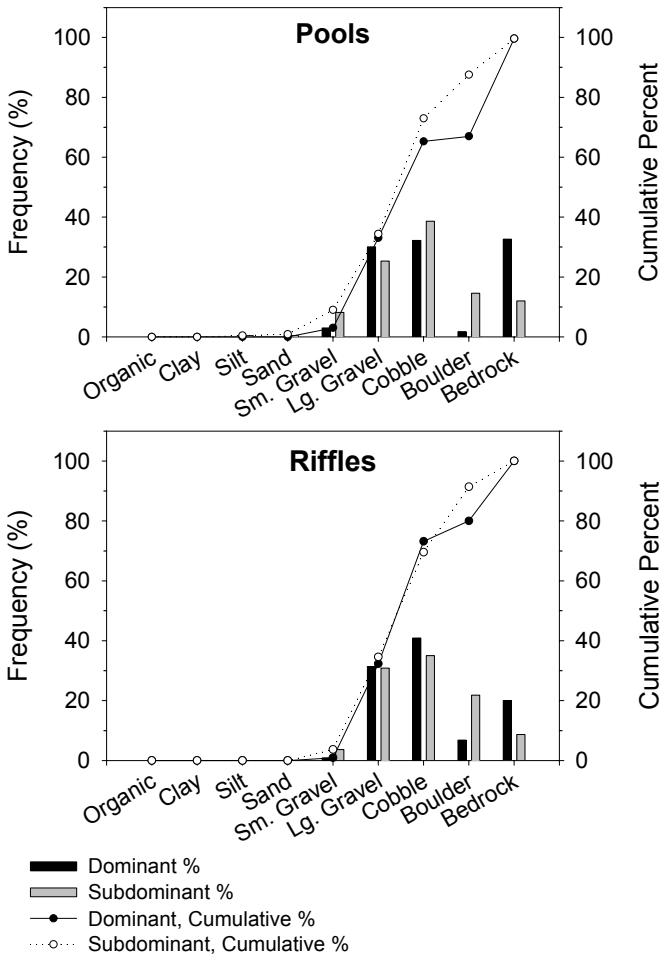
Riparian Width	**Total Width* (m)**	**Left & Right Width** (m)**
Mean	29	8
Maximum	115	50
75th Percentile	31	10
25th Percentile	21	2
Minimum	6	0

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

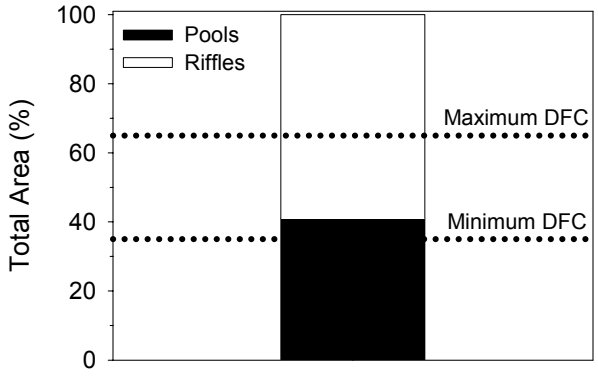
**Left and right riparian widths were grouped (not added) together for calculations

Rosgen's Channel Type	**Frequency (%)**
A:	0
B:	48
C:	47
D:	0
E:	0
F:	0
G:	4

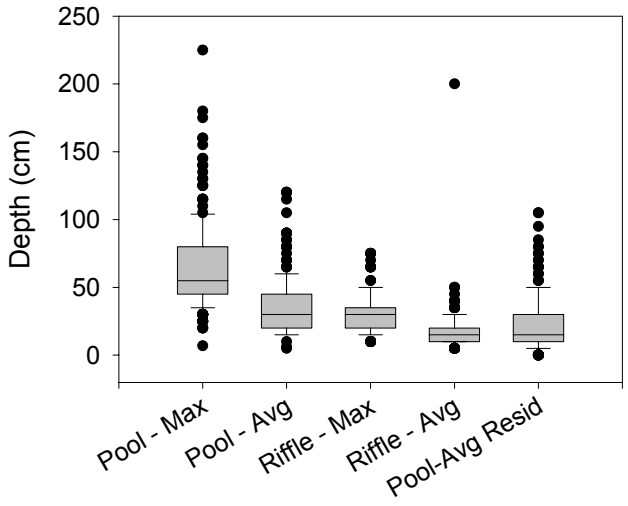
Other Stream Attributes	
Mean Bankfull Channel Width (m):	14
Mean Channel Gradient (%):	3
Median Water Temperature (C):	19



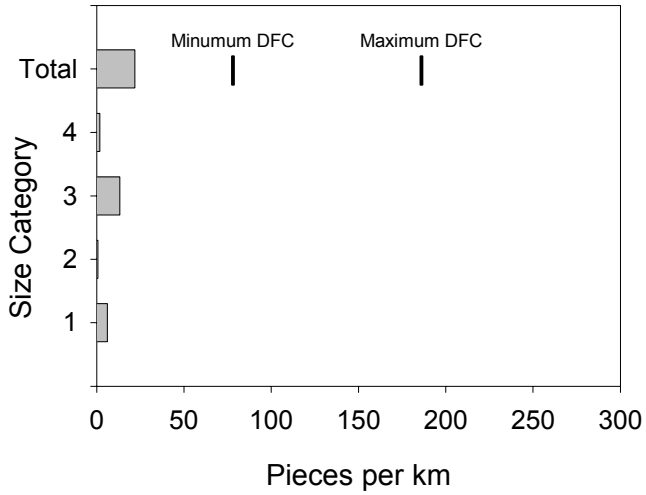
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in North River, summer 2005.



Estimated area of North River in pools and riffles as calculated using BVET techniques, summer 2005. The GWJNF DFC is between 35 and 65 percent of total stream area in pools.



Maximum and average depths and residual pool depths for pools and riffles in North River, summer 2005. 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 North River, summer 2005. Y-axis labels are LWD size classes described below. The GWJNF DFC for total LWD is between 78 and 186 pieces per km.

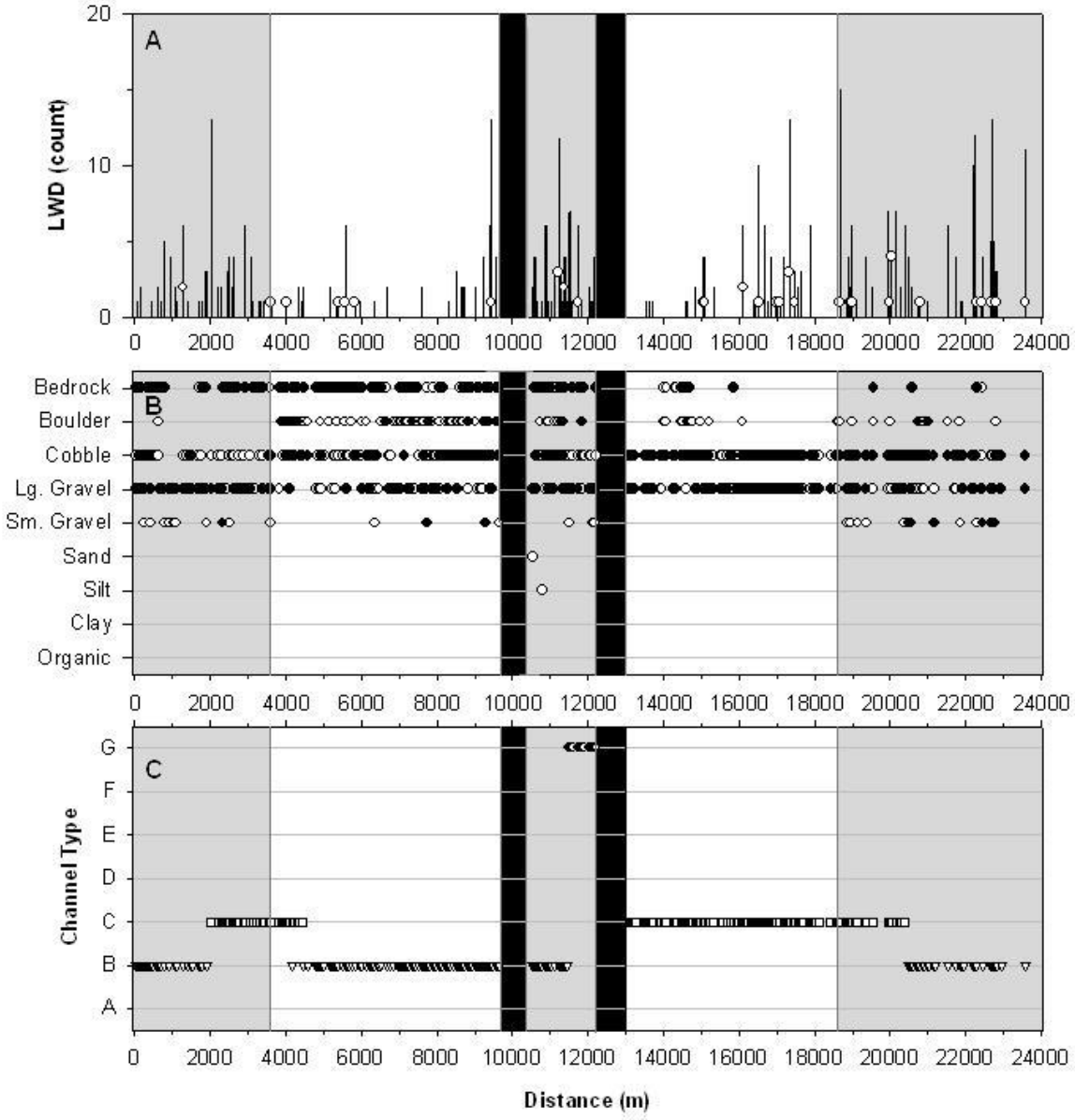
Size 1: < 5 m long, 10-55 cm diameter
Size 2: <5 m long, > 55 cm diameter
Size 3: > 5 m long, 10-55 cm diameter
Size 4: > 5 m long, > 55 cm diameter

Stream features found on North River during BVET habitat inventory, summer 2005. Distance is meters from start of inventory.

Stream Feature	Distance (m)	Width (m)	Comments
TRIBUTARY	43	1	IN ON RIGHT
TRIBUTARY	68	1	IN ON RIGHT
OTHER	288		
OTHER	481		TRAIL 538 (NORTH RIVER GORGE TRAIL)
SIDE CHANNEL	806		IN ON LEFT
SIDE CHANNEL	870		IN ON LEFT
SIDE CHANNEL	1026		OUT ON LEFT
OTHER	1055		TRAIL 538 (NORTH RIVER GORGE TRAIL)
SIDE CHANNEL	1184		IN ON RIGHT
SIDE CHANNEL	1223		IN ON LEFT
SIDE CHANNEL	1271		OUT ON LEFT
SIDE CHANNEL	1271		OUT ON RIGHT
FORD	1528		TRAIL 538 (NORTH RIVER GORGE TRAIL)
FORD	1674		TRAIL 538 (NORTH RIVER GORGE TRAIL)
TRIBUTARY	1707	2	IN ON RIGHT
SIDE CHANNEL	2781		IN ON LEFT
SIDE CHANNEL	2858		OUT ON LEFT
FORD	3064		FOREST ROAD 548
TRIBUTARY	3254	5	IN ON LEFT
SIDE CHANNEL	3404		IN ON LEFT
SIDE CHANNEL	3460		OUT ON LEFT
FORD	3480		FOREST ROAD 548
TRIBUTARY	3517		IN ON LEFT.
OTHER	3600		BEAVER POND ON LEFT SIDE OF STREAM.
END SECTION A	3600		END OF LOWEST INVENTORIED PORTION OF STREAM.
TRIBUTARY	3673		DRY. ON RIGHT.
FORD	4061		FOREST TRAIL 548 (FOREST ROAD 1199)
SIDE CHANNEL	4061		ON LEFT
SIDE CHANNEL	4113		OUT ON LEFT
SIDE CHANNEL	4476		ON RIGHT
FORD	4526		FOREST TRAIL 548 (FOREST ROAD 1199)
SIDE CHANNEL	5414		ON RIGHT
SIDE CHANNEL	5568		OUT ON RIGHT
SIDE CHANNEL	5785		OUT ON RIGHT
SIDE CHANNEL	6016		IN ON LEFT
SIDE CHANNEL	6126		OUT ON LEFT
SIDE CHANNEL	6195		IN ON LEFT
SIDE CHANNEL	6295		OUT ON LEFT
SIDE CHANNEL	6739		IN ON RIGHT
SIDE CHANNEL	6770		OUT ON RIGHT
FORD	7039		FOREST TRAIL 548 (FOREST ROAD 1199)
FORD	7306		FOREST TRAIL 548 (FOREST ROAD 1199)
FORD	7580		FOREST TRAIL 548 (FOREST ROAD 1199)
SIDE CHANNEL	7821		IN ON RIGHT
SIDE CHANNEL	7868		OUT ON RIGHT
SIDE CHANNEL	8167		IN ON RIGHT, CAMPGROUND ON RIGHT
FORD	8248		FOREST TRAIL 548 (FOREST ROAD 1199)

BRIDGE	8367		ROAD 95B
SIDE CHANNEL	8419		OUT ON RIGHT
SIDE CHANNEL	9152		OUT ON LEFT
SIDE CHANNEL	9233		OUT ON LEFT
SIDE CHANNEL	9358		ON RIGHT
DAM	9642		STAUNTON DAM
END SECTION B	9642		STAUNTON DAM MARKS END OF SECOND SECTION.
LAKE	10382		STAUNTON LAKE
FORD	12031	7.5	RIFFLE MADE AT TRAIL FORD BY ARTIFICIALLY PLACED LWDS; AVG BANKFULL DEPTH = 35 CM. MAX = 45 CM.
DAM	12218		ELKHORN LAKE DAM
END SECTION C	12218		DAM MARKS END OF SECTION C
LAKE	13068		
TRIBUTARY	13211	2	ON LEFT-WHITE OAK RUN
TRIBUTARY	13260	1.5	ON RIGHT
BRIDGE	13924		FOREST ROAD 95
TRIBUTARY	14339	0.5	LEFT FLAT RUN
OTHER	14366		BANK STABILIZERSONLEFT-ROCKS IN WIRE CAGES
TRIBUTARY	14691		ENTERS ON RIGHT
BRIDGE	14855		FOREST ROAD 95
SIDE CHANNEL	15398		ON LEFT
TRIBUTARY	15842		LEFT- STILLHUSE HOLLOW
DAM	16028		ROCK DAM
DAM	16056		ROCK DAM AND CAMPSITE ON RIGHT
SIDE CHANNEL	16304		ON LEFT
FORD	16516		NOT ON MAP
TRIBUTARY	16596	1	RIGHT
TRIBUTARY	16777	1.5	NAMELESS TRIBUTARY
SIDE CHANNEL	17382		
SIDE CHANNEL	17897		LEFT
BRIDGE	18592		FOREST ROAD 95A BRIDGE
END SECTION D	18592		END OF SECTION D.
SIDE CHANNEL	18864		IN ON RIGHT
SIDE CHANNEL	18942		OUT ON RIGHT
SIDE CHANNEL	19951		IN ON LEFT
SIDE CHANNEL	20036		IN ON LEFT
SIDE CHANNEL	20075		OUT ON LEFT
BRIDGE	20163		FOREST ROAD 95
SIDE CHANNEL	20292		IN ON RIGHT. DRY.
SIDE CHANNEL	20315		IN ON RIGHT
BRIDGE	20872		FOREST ROAD 95
TRIBUTARY	21207		IN ON RIGHT
TRIBUTARY	21334		IN ON LEFT. TROUT CREEK.
TRIBUTARY	21934	1	IN ON LEFT
OTHER	22200		BEAVER DAM ON LEFT SIDE OF STREAM
SIDE CHANNEL	22625		IN ON RIGHT
SIDE CHANNEL	22681		OUT ON RIGHT
TRIBUTARY	22744	3	IN ON LEFT

SIDE CHANNEL	22772		IN ON LEFT
BRIDGE	22948		FOREST ROAD 95
SIDE CHANNEL	23486		IN ON LEFT
SIDE CHANNEL	23552	4	OUT ON LEFT
TRIBUTARY	23584		IN ON LEFT. LITTLE RIVER.
END	23584		END INVENTORY AT CONFLUENCE WITH LITTLE RIVER.



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen's channel types (Rosgen 1996) in North River, summer 2005. Individual sections are delineated; the black bars indicate lakes where no data was collected. LWD, substrate, and channel type were recorded for each habitat unit in the stream. X-axis indicates distance upstream from National Forest boundary. 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).

Appendix A:

Table A1. Size classes used to categorize large woody debris during BVET habitat inventories on the North River, summer 2005. 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

Table A2. Size classes used to categorize substrate particles during BVET habitat inventories on the North River, summer 2005. 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

Table A3. Bankfull channel characteristics used to determine Rosgen channel types in the field during BVET habitat inventories on the North River, summer 2005.

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