

**Current Condition of Streams on the New River Valley Ranger District,  
George Washington-Jefferson National Forest, Virginia**



**Center for Aquatic Technology Transfer**  
1650 Ramble Road  
Virginia Polytechnic Institute and State University  
Blacksburg, VA 24061-0321

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Forest Service  
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**Introduction** – Throughout the summers of 1999 and 2000 we conducted stream habitat surveys on the old Wythe and Blacksburg Ranger Districts, now combined into the new New River Valley Ranger District (NRVRD), George Washington - Jefferson National Forest (GW - JNF), to quantify current stream conditions. Four streams on the Blacksburg Ranger District (BRD) were surveyed because two were located on recently purchased National Forest property and two were not included in our 1999 BRD survey report. Over 91 kilometers (56 miles) of stream habitat (25 streams) was classified and inventoried between 26 May and 13 August 1999 and 21 May and 18 August 2000 using Basinwide Visual Estimation Techniques (BVET) (Dolloff et. al 1993).

We modified standard BVET methods to measure stream habitat parameters identified in the GW-JNF forest plan. Included in the forest plan is an outline of the desired-future-condition (DFC) for all the streams within the GW-JNF based on physical habitat. The pertinent DFCs for the GW-JNF include woody debris loading of 78 to 186 pieces per kilometer and 30 to 70 percent of the total stream habitat in pools. The BVET survey allowed us to estimate woody debris loading and percentage of pool and riffle area. Further, we were able to map the distribution of woody debris and Rosgen's channel type, and to estimate width of the stream riparian area in all streams surveyed.

The purpose of this report is to describe the current conditions of NRVRD streams in a format useful to NRVRD and the GW-JNF. The enclosed information is intended as a baseline for NRVRD managers involved in habitat improvement projects or land use decisions.

**Methods** - Two-stage visual estimation techniques were used to quantify habitat and DFCs in selected NRVRD streams. During the first stage, all habitat units were classified and the surface area and depth were estimated. Sampling strata were based on naturally occurring habitat units such as pools (areas in the stream with low water velocity, streambed gradient equal to zero, and a smooth water surface), riffles (areas in the stream with moderately steep gradient, shallow water, relatively high velocity, and turbulent surface), glides (areas in the stream with moderate to low water velocity, gradient at or near zero, and uniform depth), cascades (areas in the stream with very high velocity, turbulent surface, and steep gradient), and braids (areas in the stream where multiple channels occur regardless of habitat type). Glides and cascades were combined with pools and riffles, respectively, for data analysis and reporting unless otherwise specified (i.e. percent of pool habitat called as glide). Surveys began at confluences for streams confined to the NRVRD and at the downstream USFS boundary for all other streams. Surveys were terminated when we encountered an upstream USFS property boundary, determined the stream to be intermittent (< 1 m wetted width), or encountered a section that had previously been surveyed.

Habitat in each stream was classified and inventoried by a two-person crew. One crew member identified each habitat unit by type, estimated surface area, average and maximum depth, and substrate composition for each habitat unit and determined if pool substrates were embedded. Substrate was considered to be embedded if larger size substrate was embedded by smaller size substrate over greater than 35% of the surface area of the stream bed in a given habitat unit. Average depth of each habitat unit was estimated by taking depth measurements at various places across the channel profile with a graduated staff marked in 5 cm increments. The length (0.1 m) of each habitat unit was measured with a hip chain.

The second crew member classified and inventoried large woody debris (LWD) within the stream channel, determined the Rosgen's channel type associated with each habitat unit, and recorded data on a Husky Hunter field computer. LWD was divided into four classes: 1) less than 5 m long, less than 55 cm in diameter, 2) less than 5 m long, greater than 55 cm in diameter, 3) greater than 5 m long, less than 55 cm in diameter, and 4) greater than 5 m long, greater than 55 cm in diameter. All LWD less than 1 m long and less than 10 cm in diameter were omitted from the survey. Rosgen's channel types were restricted to A, B, C, D, and F (pers. comm. Gary Kappesser, GW-JNF Hydrologist). Channel type was determined by following the guidelines found in Rosgen (1996).

The first unit of each habitat type selected for intensive (second stage) sampling (i.e. accurate measurement of surface area) was determined randomly. Additional units were selected systematically (every 10<sup>th</sup> unit for each habitat type). The width of each systematically selected habitat unit was measured with a 30-m measuring tape at intervals ranging from about 1 m to 15 m. Interval size was determined by the length and the morphology of the unit (e.g. interval of measured width increased with increasing unit length).

The relationship between estimated surface area and measured surface area typically is strongly and positively correlated when the estimates are made by experienced personnel; thus, visual estimates were corrected by multiplying all estimates by a calibration ratio (Hankin and Reeves 1988). The calibration ratio, the estimated true total area, and the variance of the area estimator were calculated separately for each habitat type and each stream.

In each of the systematically selected riffles we also estimated the stream channel width (m) at bankfull and riparian width (m) as described by Harrelson et al. (1994). We used this information to describe the channel and flood plain associated with each stream. Temperature (C) and channel gradient (%) were also measured at intervals in each stream.

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

**User's Guide** - Stream summaries are organized by U. S. Geological Survey Topographic Quadrangle. Data for each stream section were collected, analyzed, and presented separately. Each stream or stream section summary contains: 1) a synopsis of stream characteristics; 2) boxplots of maximum and average depth for pools and riffles, and average residual pool depth; 3) LWD size graph; 4) LWD distribution graph; 5) substrate composition for pools and riffles; 6) boxplot of riparian measurements; 7) percent pools and riffles graph; and 8) distribution of Rosgen's channel type. One stream, Mudlick Branch, had no riffle habitat due to low water conditions for this stream the substrate composition graph (7) has pool and dewatered areas. GW-JNF DFCs are indicated on all pertinent graphs. We also included references tables of all streams surveyed that will allow managers to quickly assess the present condition of NRVRD streams in relation to pertinent DFCs. Streams are arranged by DFC parameters (percent pool habitat and LWD pieces per kilometer) in descending order. DFCs are indicated within each table.

## **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. 25 pp.

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.

Harrelson, Cheryl C.; Rawlins, C. L.; Potyondy, John P. 1994. Stream channel reference sites: an illustrated guide to field technique. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61p.

Rosgen, D.L. 1996. Applied River Morphology. Wildland Hydrology Books, Pagosa Springs, Colorado. 390pp.

## **Acknowledgments**

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## Reference Tables

**Table 1.** Large woody debris (LWD) pieces per kilometer in streams on the New River Valley Ranger District. **Streams above the double line meet GW-JNF DFCs.**

Stream	LWD per Kilometer	Kilometers Surveyed
Little Wolf Creek	427.2	5.6
Bear Creek	303.5	5.9
Roaring Fork	258.1	6.5
Gullion Fork	226.5	6.5
E.F. Stony Fork Creek	194.9	8.1
Laurel Creek	183.3	3.6
Baker Branch	175.3	0.3
Big Stony Creek (GA)	161.2	2.2
Spur Branch	160.5	2.2
Crab Orchard	145.6	3.8
Kimberling Creek	138.8	5.8
Sulpher Spring Fork	129.0	0.9
Lick Creek (Upper)	122.0	3.5
Reed Creek	105.2	10.7
Kimbalton Branch	105.2	1.7
Mudlick Branch	99.2	2.5
N.F. Kimberling Creek	98.4	4.3
Hungry Mother Creek	85.7	1.9
Wolfpen Branch	79.0	0.9
*****		
<b>LWD ≤ 78 pieces per kilometer</b>		
*****		
Ding Branch	72.8	2.3
N.F. Stony Creek (GA)	37.6	1.6
Peak Creek	36.3	4.9
Hunting Camp Creek	27.1	3.2
Wolf Creek	23.8	1.8
Laurel Branch	11.3	0.4

**Table 2.** Percent pool habitat of streams surveyed on the New River Valley Ranger District. **Streams above the double line meet GW-JNF DFCs.**

<b>Stream</b>	<b>Percent Pool Habitat</b>	<b>Kilometers Surveyed</b>
Mudlick Branch	100.0	2.5
Big Stony Creek (GA)	90.2	2.2
Bear Creek	83.3	5.9
Gullion Fork	80.3	6.5
E.F. Stony Fork Creek	77.6	8.1
Sulpher Spring Fork	71.6	0.9
Kimberling Creek	63.8	5.8
Little Wolf Creek	63.1	5.6
Lick Creek (Upper)	61.0	3.5
Wolf Creek	60.7	1.8
N.F. Stony Creek (GA)	58.2	1.6
N.F. Kimberling Creek	56.1	4.3
Peak Creek	51.9	4.9
Hunting Camp Creek	51.8	3.2
Spur Branch	50.2	2.2
Reed Creek	49.1	10.7
Hungry Mother Creek	48.1	1.9
Crab Orchard	45.3	3.8
Laurel Creek	45.2	3.6
Ding Branch	33.2	2.3
Wolfpen Branch	30.5	0.9
*****		
<b>Percent Pool Habitat ≤</b>		
<b>30%</b>		
*****		
Kimbalton Branch	29.7	1.7
Roaring Fork	29.6	6.5
Laurel Branch	29.5	0.4
Baker Branch	21.1	0.3

# Stream Summaries

# **Blacksburg Ranger District**

**Stream:** Big Stony (Glen Alton)

**District:** Blacksburg

**Quadrangle:** Interior

**Sample Date:** 05/24/00

**Downstream Starting Point:** GA Property Boundary

**Total Distance Surveyed:** 2.4 kilometers

**Percent of Total Area - Pools:** 90.2%

Number of Pools: 48

Number of Pools per kilometer: 20

Total Pool Area: 16030.7 sq. meters  $\pm$  3096.7

Mean Pool Area: 334.0 sq. meters

Correction Factor: 1.23

Mean Maximum Depth: 67.9 cm

Mean Average Depth: 49.0 cm

Mean Average Residual Pool Depth: 22.0 cm

**Percent of Total Area - Riffles:** 9.8 %

Number of Riffles: 28

Number of Riffles per kilometer: 11.7

Total Riffle Area: 1737.2 sq. meters  $\pm$  959.6

Mean Riffle Area: 62.0 sq. meters

Correction Factor: 1.09

Mean Maximum Depth: 31.4 cm

Mean Average Depth: 20.4 cm

**Number of Large Woody Debris Pieces per kilometer:** 161.2

Wood < 5 m and < 55 cm: 97.4

Wood < 5 m and > 55 cm: 12.5

Wood > 5 m and < 55 cm: 45.6

Wood > 5 m and > 55 cm: 5.8

**Mean Channel Width:** 9.7 m

**Mean Riparian Width:** 404.6 m

Mean Maximum Riparian Distance (either side): 295 m

Mean Minimum Riparian Distance (either side): 100 m

Maximum Riparian Width (Total): 486.9 m

Minimum Riparian Width (Total): 325.1 m

Big Stony (GA) Continued.

**Percent of Pool Habitat Surveyed as Glides:** 10.4%

**Rosgen's Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 0.0%

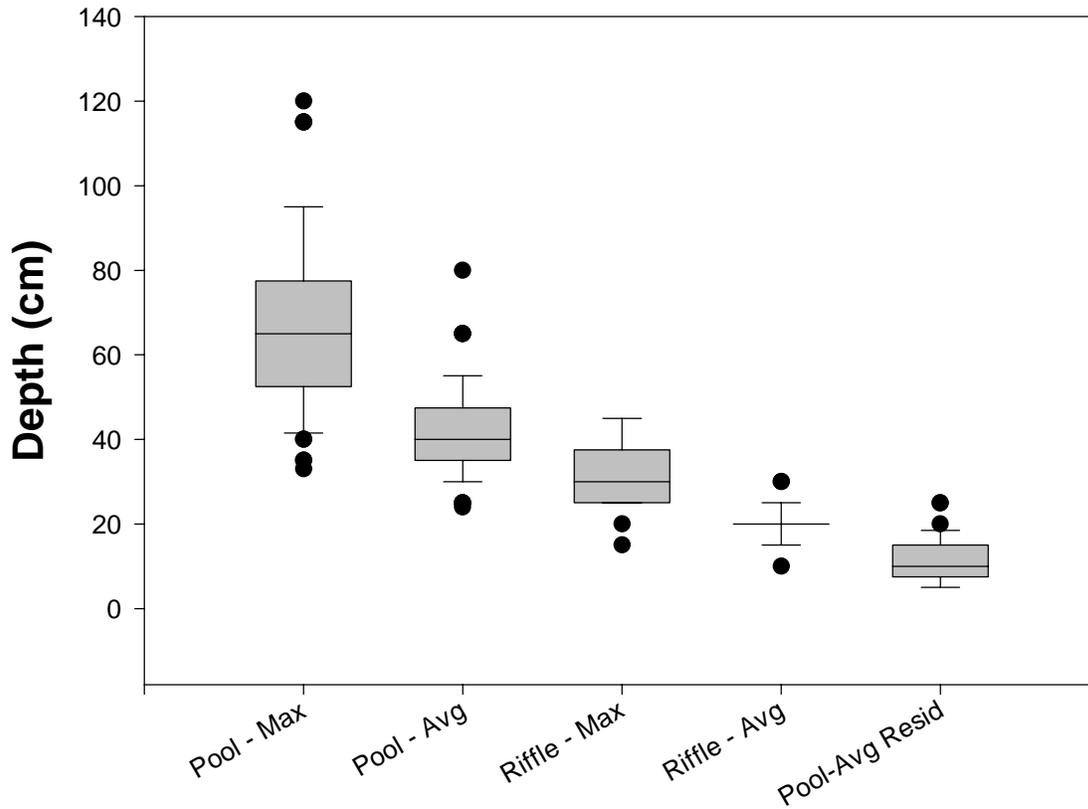
Channel Type C: 100%

Channel Type D: 0.0

**Percent Pools with  $\geq$  35% Embeddedness:** 50%

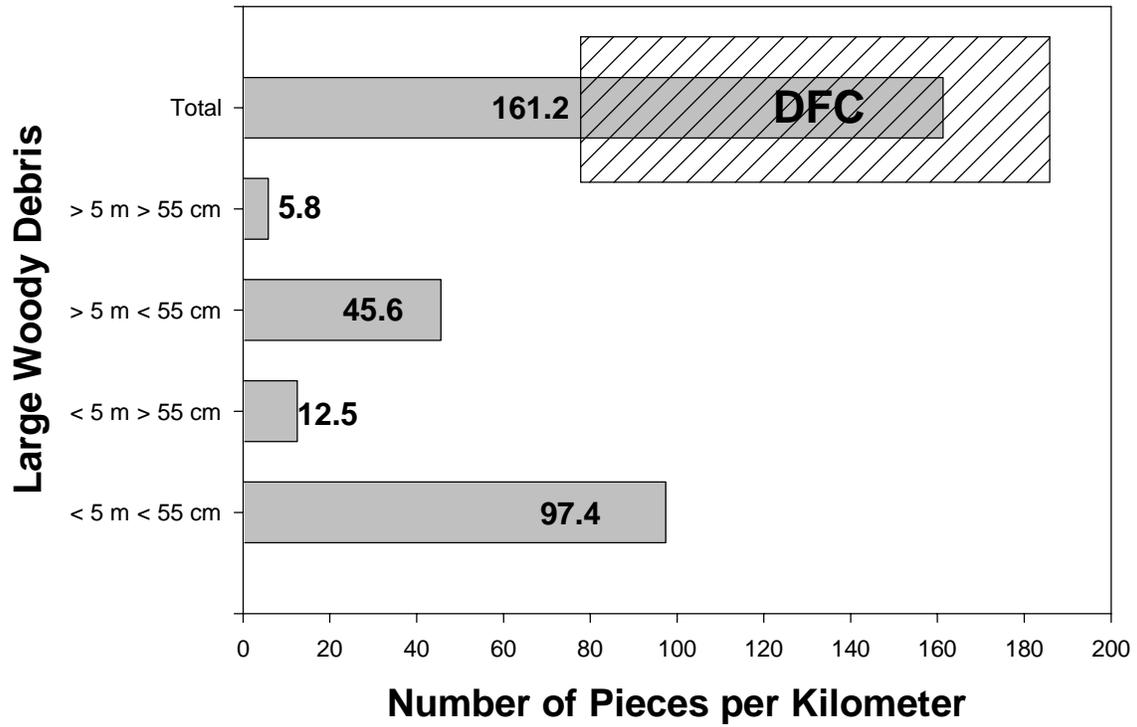
**Average Channel Gradient:** 4.0

# Big Stony Creek (GA)

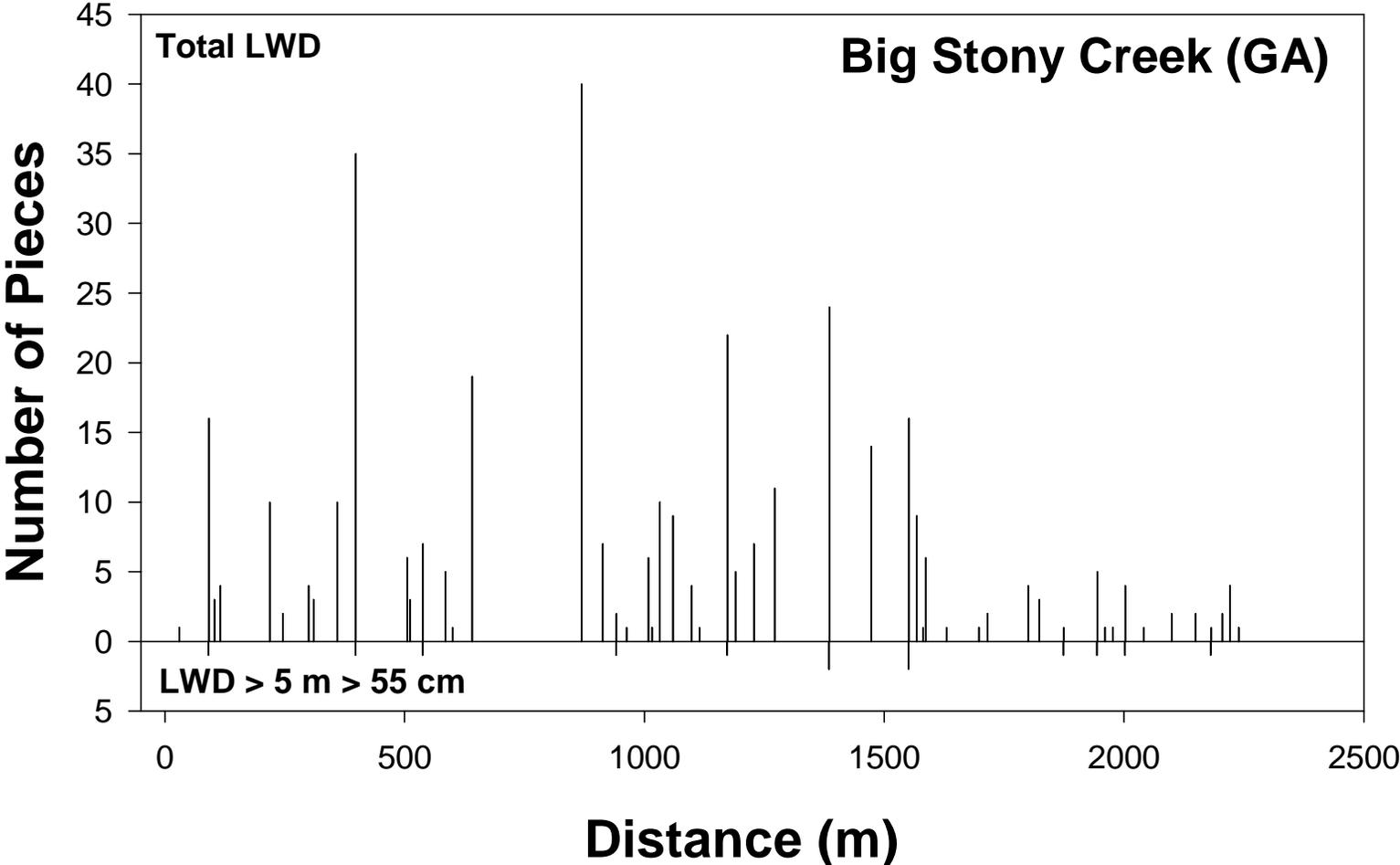


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

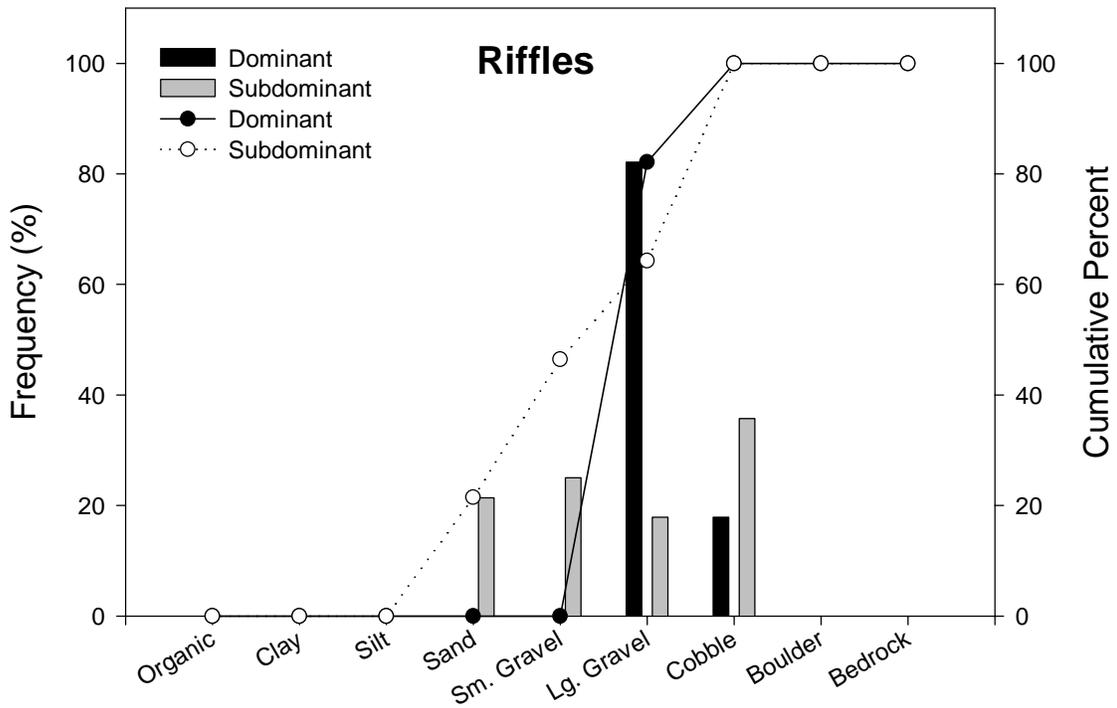
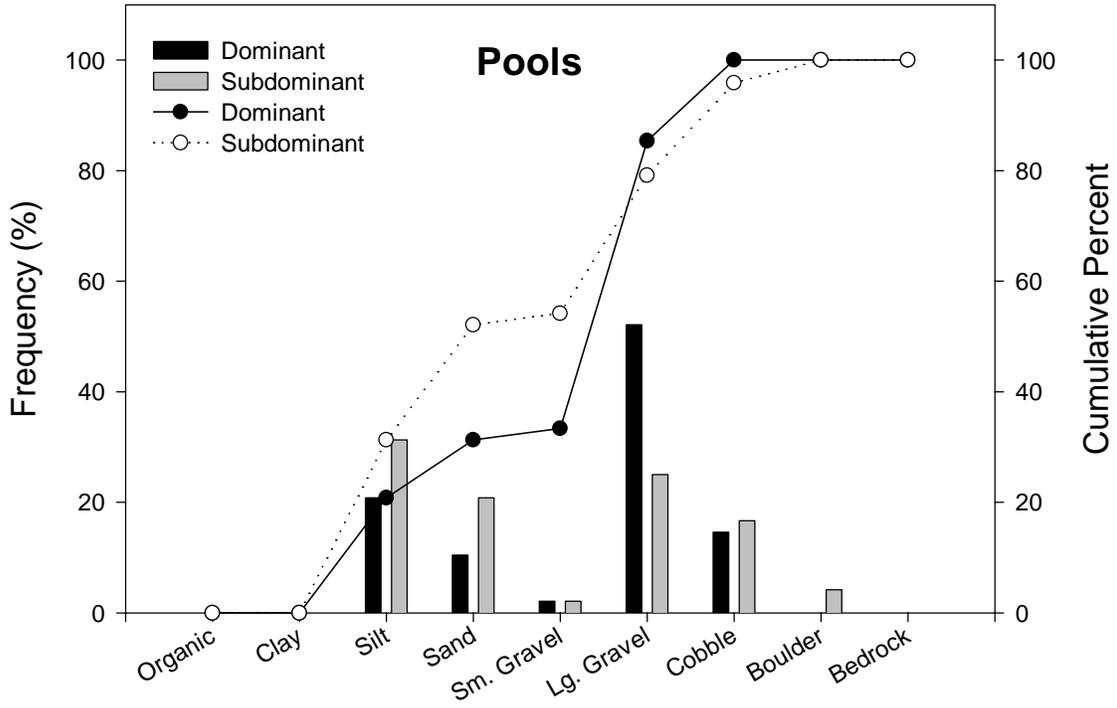
# Big Stony Creek (GA)



# Distribution and Abundance of Large Woody Debris



# Big Stony Creek (GA) Substrate Composition



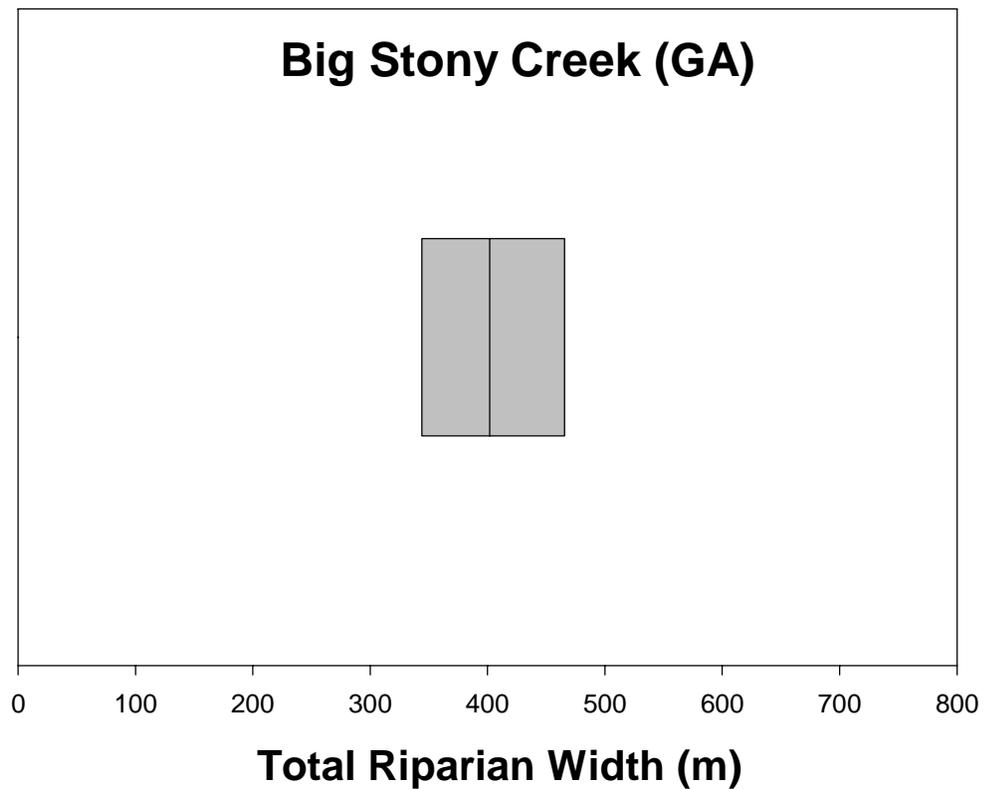
## Riparian Width

Stream: **Big Stony Creek (GA)**

Number of Measurements: **3**

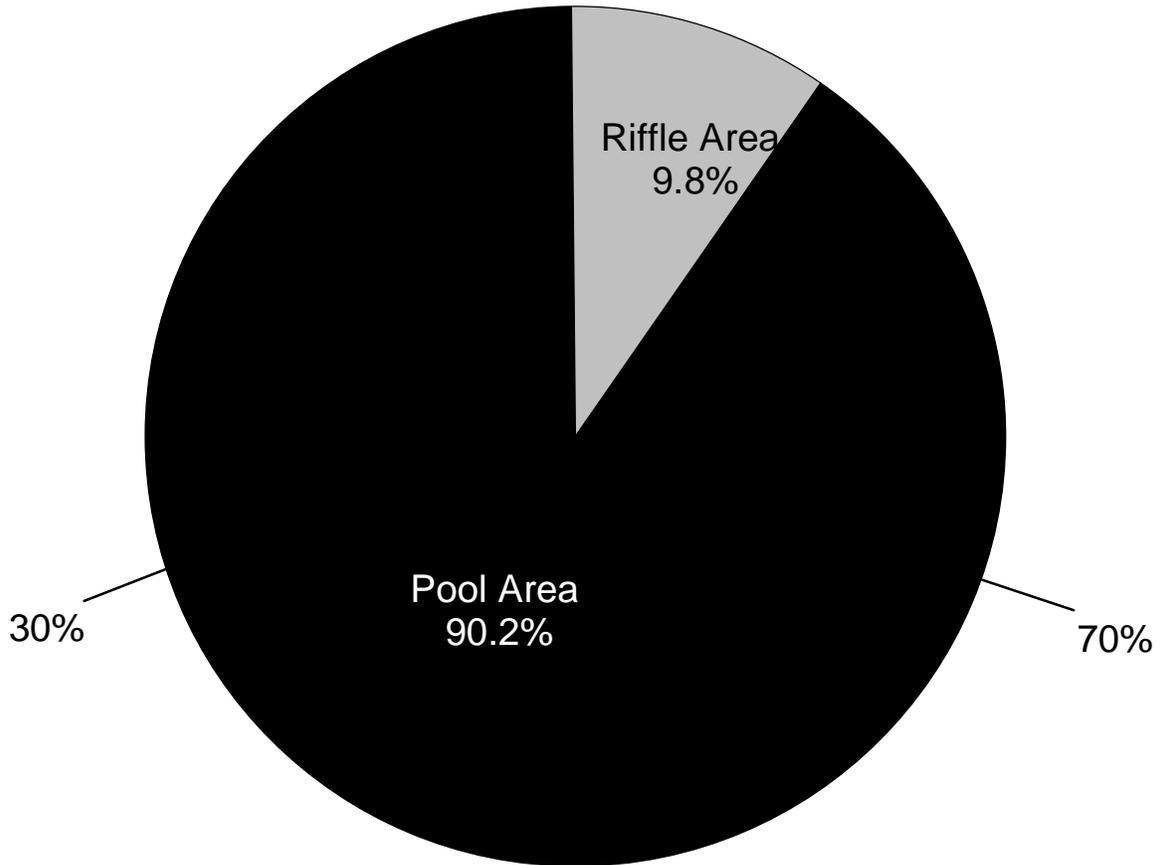
Mean Width: **404.6m** Std Dev: **80.9**

Max: **486.9m** Min: **325.1m**

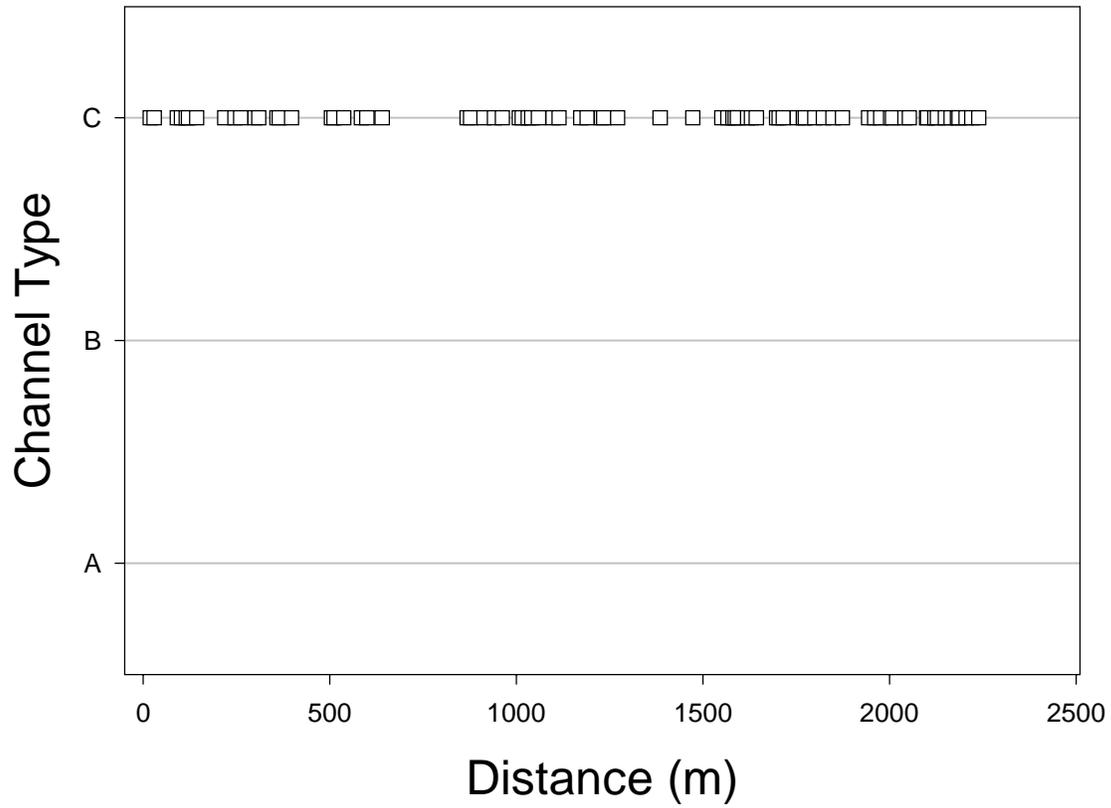


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Big Stony Creek (GA)**  
**Pool:Riffle Ratio**  
**DFC: 30 - 70% of the Stream Area**  
**in Pool Habitat**



# Big Stoney Creek (GA) Rosgen's Channel Type Distribution



**Stream:** Ding Branch

**District:** Blacksburg.

**Quadrangle:** Mechanicsburg

**Sample Date:** 05/30/00

**Downstream Starting Point:** USFS Boundary

**Total Distance Surveyed:** 2.3 kilometers

**Percent of Total Area - Pools:** 33.2%

Number of Pools: 112

Number of Pools per kilometer: 48.7

Total Pool Area: 2523.7 sq. meters  $\pm$  225.4

Mean Pool Area: 22.5 sq. meters

Correction Factor: 1.16

Mean Maximum Depth: 38.3 cm

Mean Average Depth: 20.7 cm

Mean Average Residual Pool Depth: 5.2 cm

**Percent of Total Area - Riffles:** 66.8 %

Number of Riffles: 91

Number of Riffles per kilometer: 39.6

Total Riffle Area: 5080.2 sq. meters  $\pm$  336.6

Mean Riffle Area: 55.8 sq. meters

Correction Factor: 1.15

Mean Maximum Depth: 28.2 cm

Mean Average Depth: 12.2 cm

**Number of Large Woody Debris Pieces per kilometer:** 72.8

Wood < 5 m and < 55 cm: 24.4

Wood < 5 m and > 55 cm: 10.3

Wood > 5 m and < 55 cm: 19.7

Wood > 5 m and > 55 cm: 18.4

**Mean Channel Width:** 4.3 m

**Mean Riparian Width:** 53.6 m

Mean Maximum Riparian Distance (either side): 37.7 m

Mean Minimum Riparian Distance (either side): 11.5 m

Maximum Riparian Width (Total): 120 m

Minimum Riparian Width (Total): 24.5 m

Ding Branch Continued.

**Percent of Pool Habitat Surveyed as Glides:** 0.9%

**Rosgen's Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 13.8%

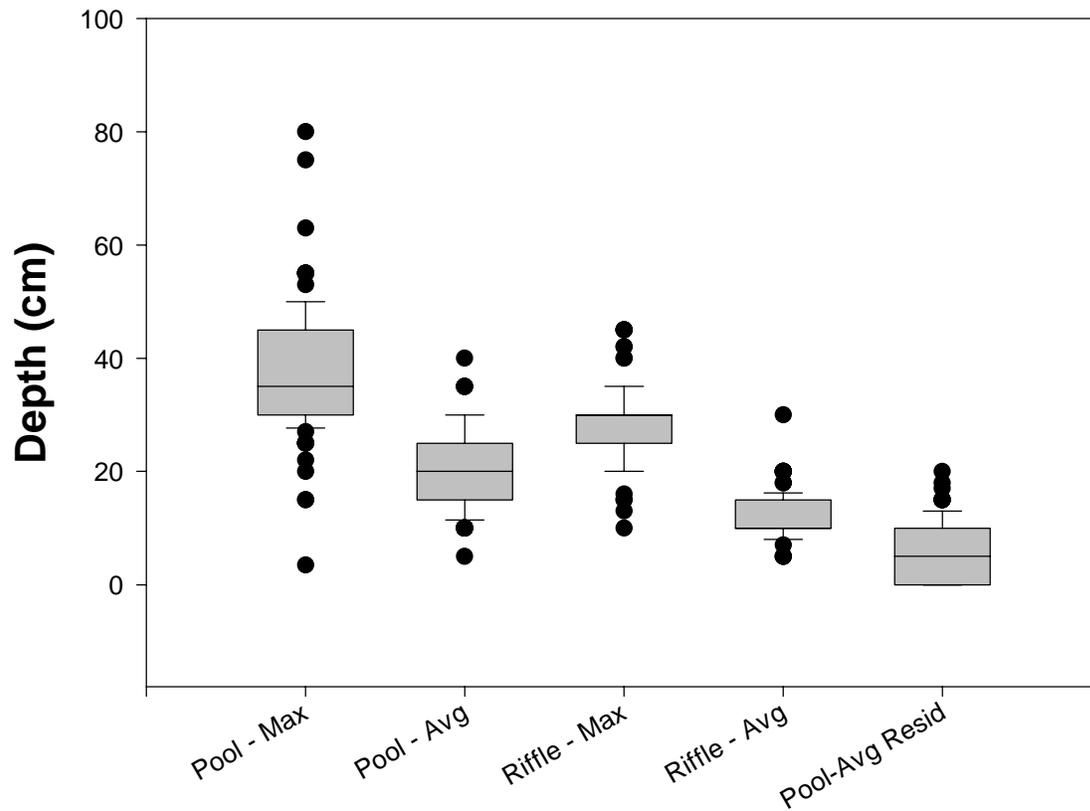
Channel Type C: 86.2%

Channel Type D: 0.0

**Percent Pools with  $\geq$  35% Embeddedness:** 1.8%

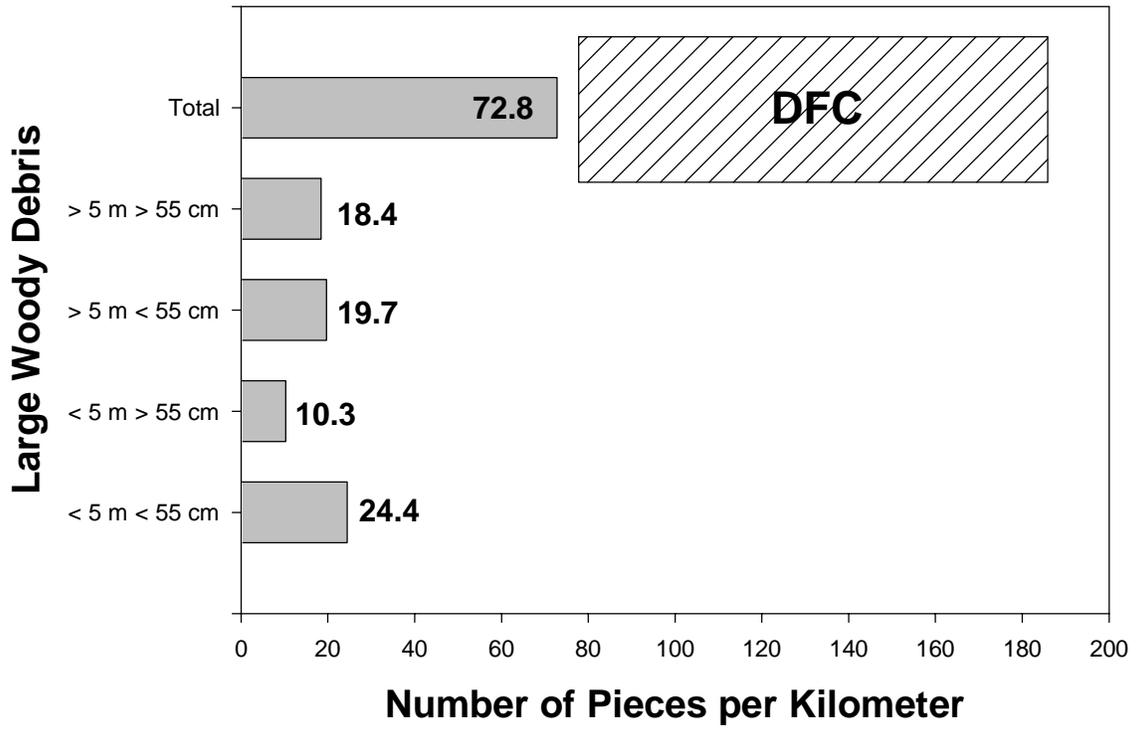
**Average Channel Gradient:** 1.5

# Ding Branch

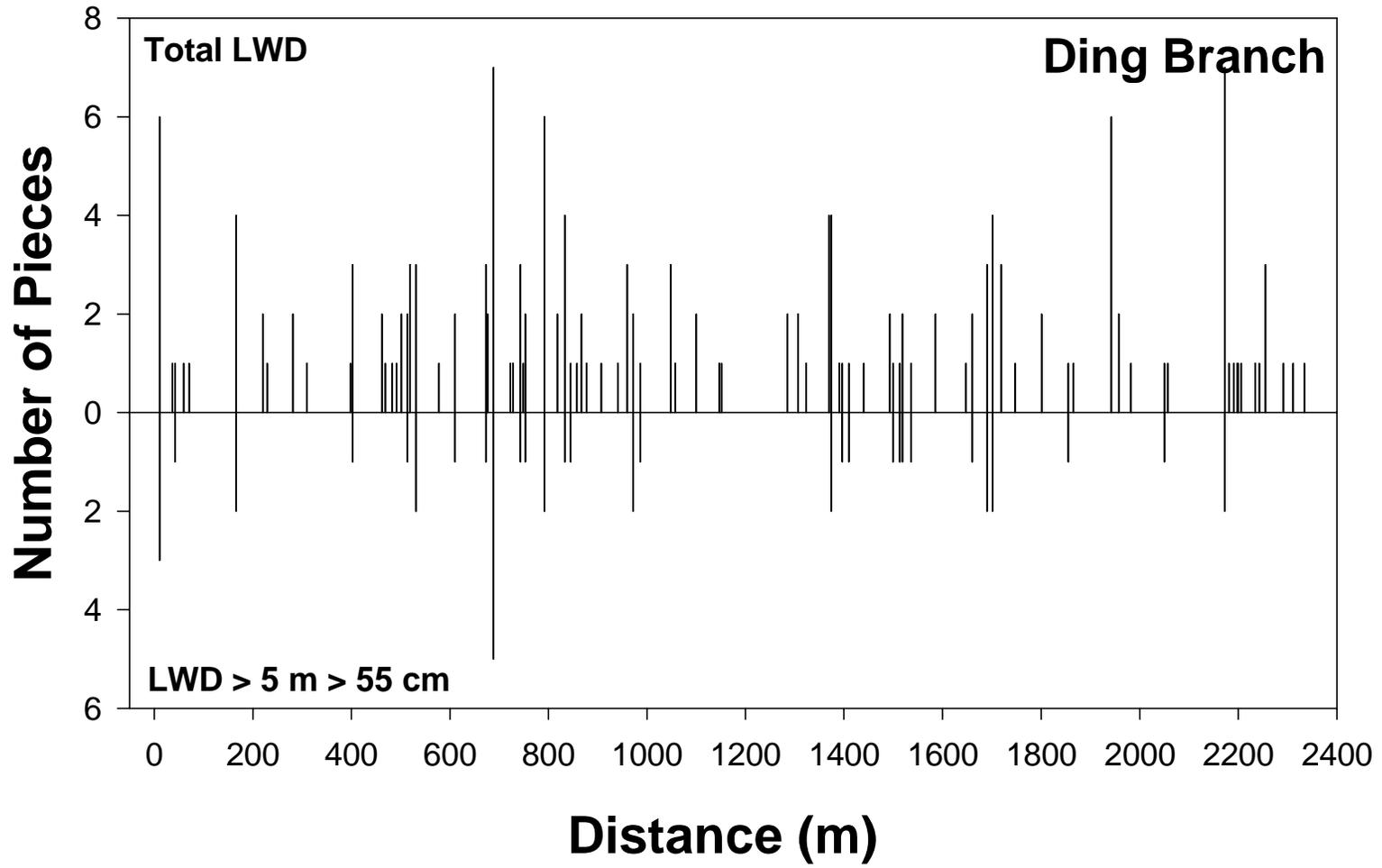


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

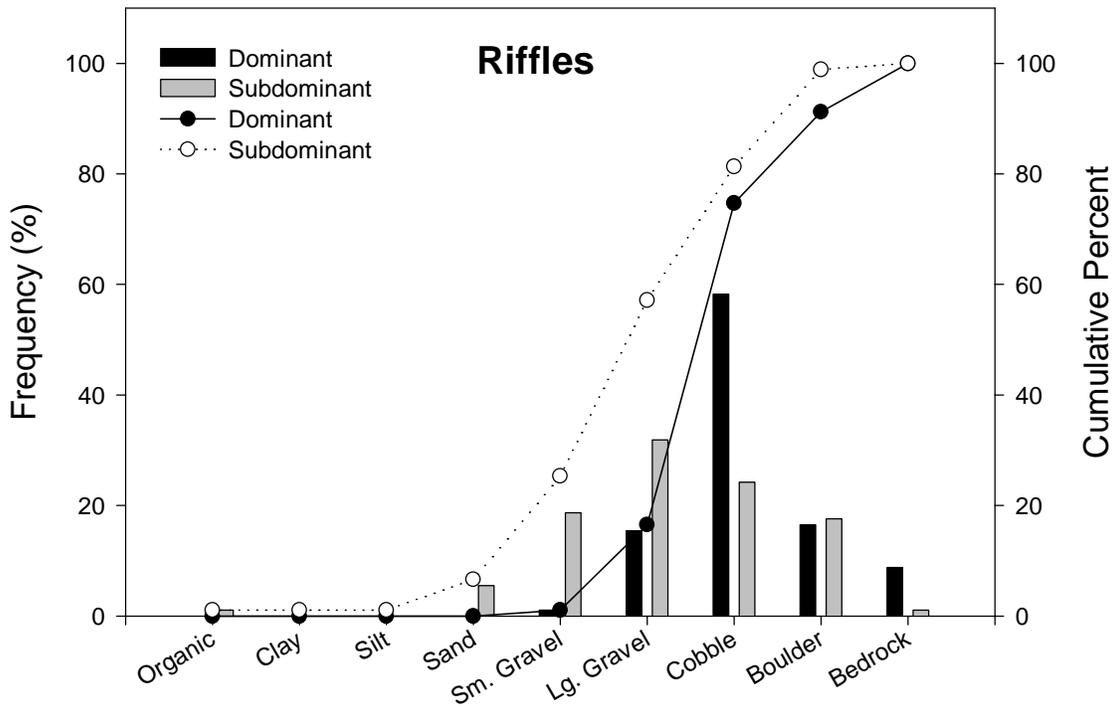
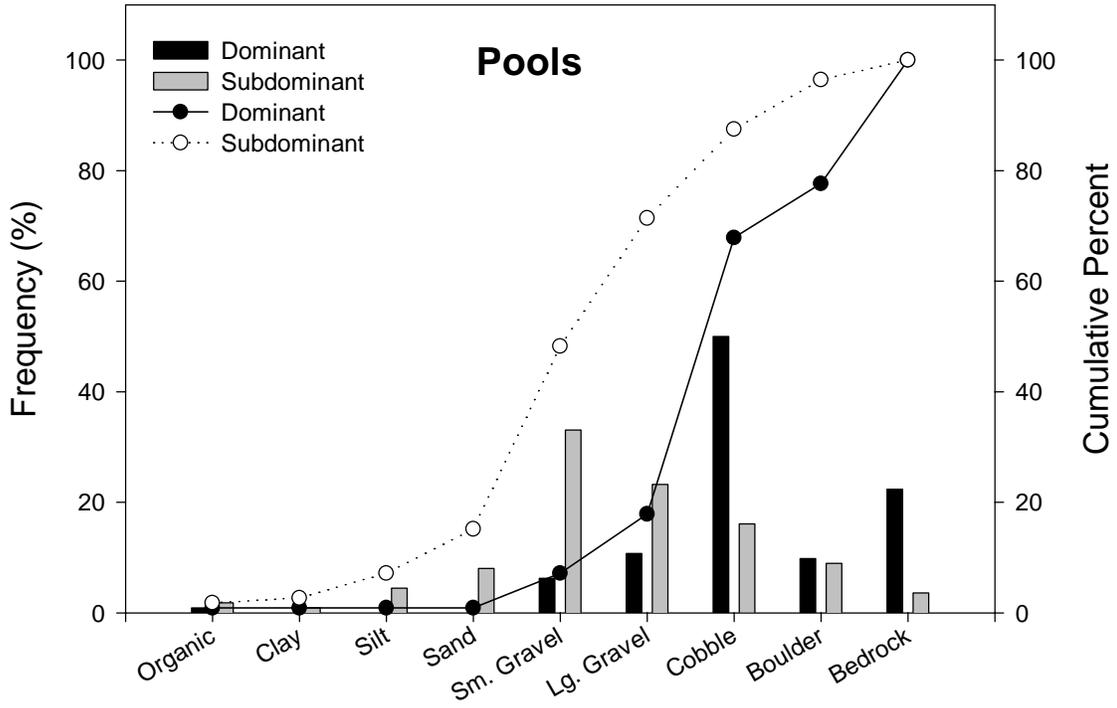
# Ding Branch



# Distribution and Abundance of Large Woody Debris



# Ding Branch Substrate Composition



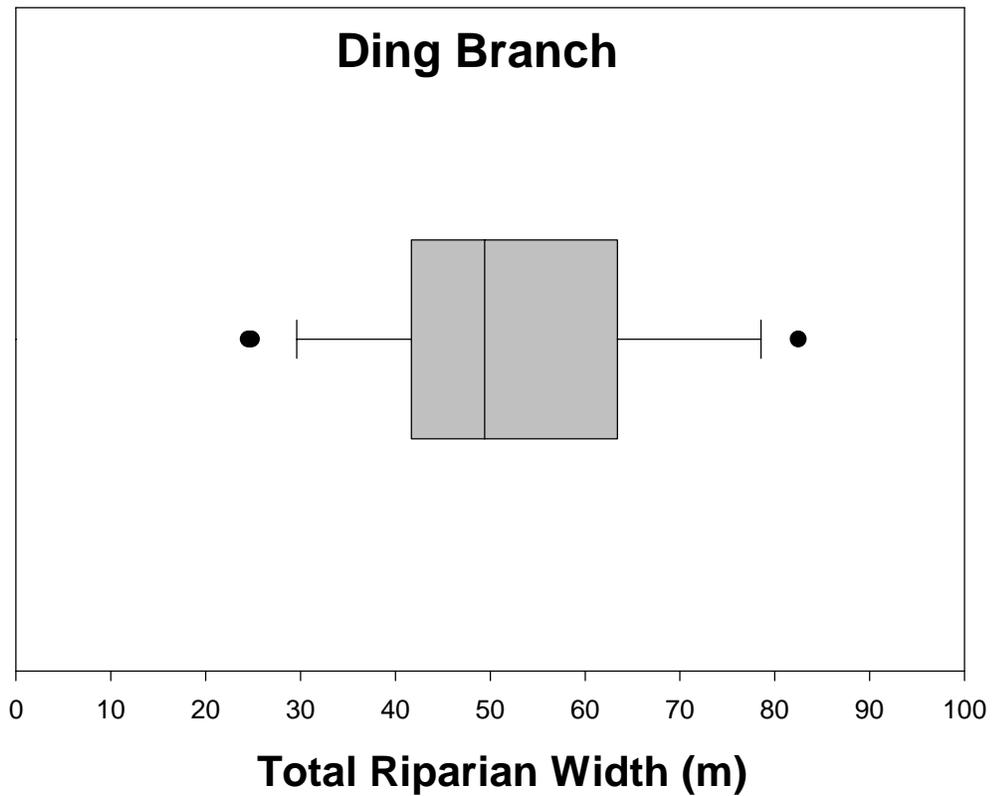
## Riparian Width

Stream: Ding Branch

Number of Measurements: 20

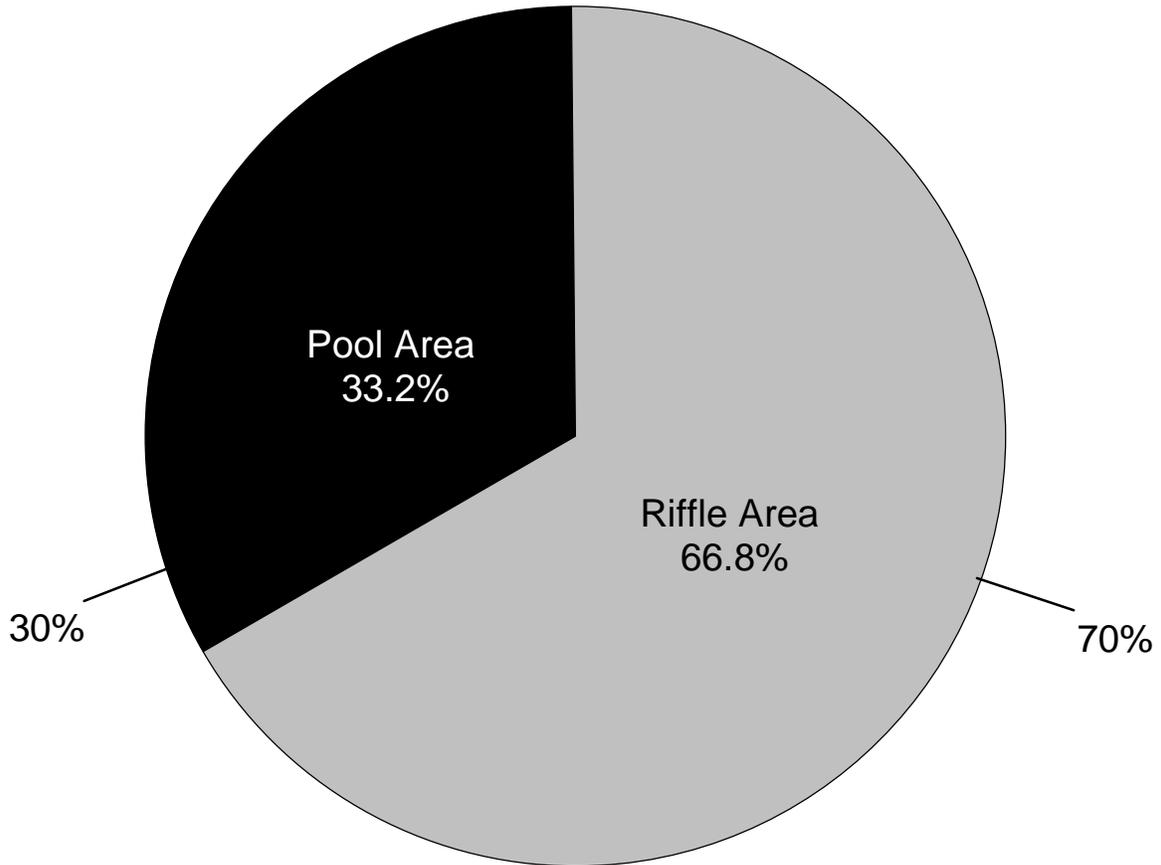
Mean Width: 53.6m Std Dev: 22.1

Max: 120.0m Min: 24.5m

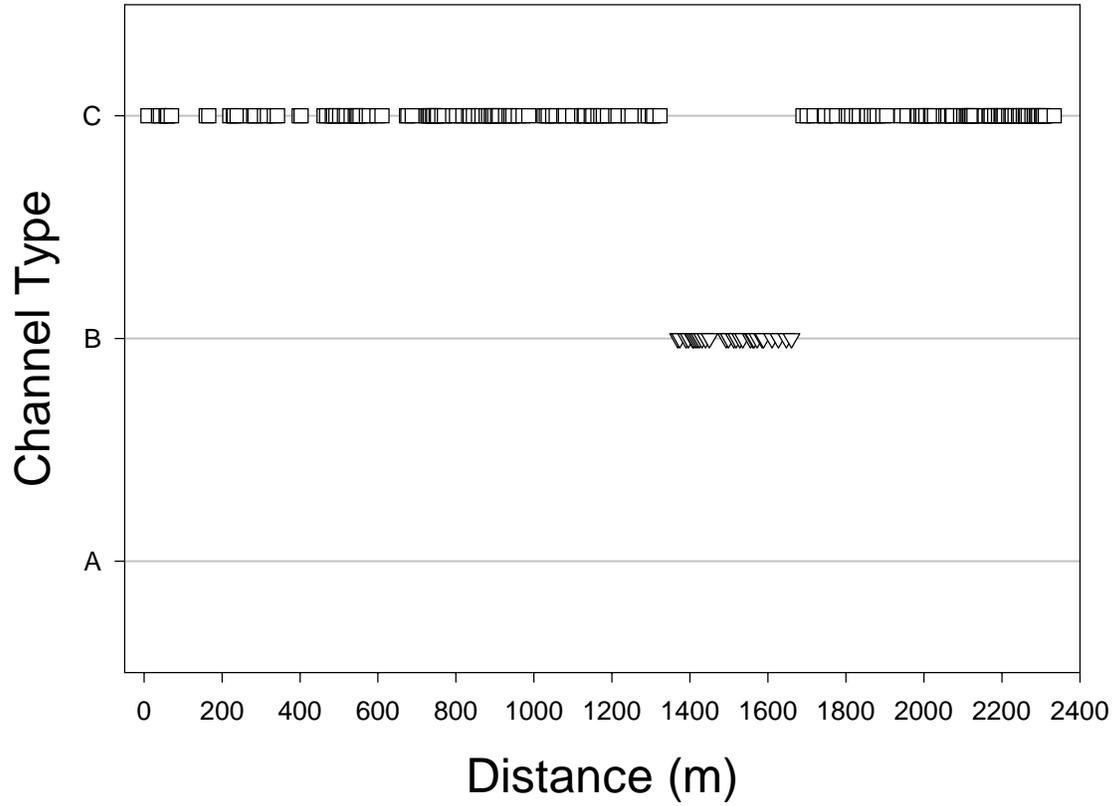


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Ding Branch  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Ding Branch Rosgen's Channel Type Distribution



**Stream:** Kimbalton Branch

**District:** Blacksburg

**Quadrangle:** Lindside

**Sample Date:** 05/30/00

**Downstream Starting Point:** USFS Boundary elev 2040 ft

**Total Distance Surveyed:** 1.7 kilometers

**Percent of Total Area - Pools:** 29.7%

Number of Pools: 143

Number of Pools per kilometer: 84.1

Total Pool Area: 1318.9 sq. meters  $\pm$  109.2

Mean Pool Area: 9.2 sq. meters

Correction Factor: 1.02

Mean Maximum Depth: 39.1 cm

Mean Average Depth: 26.4 cm

Mean Average Residual Pool Depth: 17.6 cm

**Percent of Total Area - Riffles:** 70.3 %

Number of Riffles: 116

Number of Riffles per kilometer: 68.2

Total Riffle Area: 3125.8 sq. meters  $\pm$  421.3

Mean Riffle Area: 27.0 sq. meters

Correction Factor: 0.98

Mean Maximum Depth: 25.0 cm

Mean Average Depth: 12.6 cm

**Number of Large Woody Debris Pieces per kilometer:** 105.2

Wood < 5 m and < 55 cm: 44.1

Wood < 5 m and > 55 cm: 7.1

Wood > 5 m and < 55 cm: 28.2

Wood > 5 m and > 55 cm: 25.9

**Mean Channel Width:** 4.7 m

**Mean Riparian Width:** 10.5 m

Mean Maximum Riparian Distance (either side): 4.5 m

Mean Minimum Riparian Distance (either side): 1.3 m

Maximum Riparian Width (Total): 14.5 m

Minimum Riparian Width (Total): 4.8 m

Kimbalton Branch Continued.

**Percent of Pool Habitat Surveyed as Glides:** 6.9%

**Rosgens Channel Type Frequency:**

Channel Type A: 8.9%

Channel Type B: 91.1%

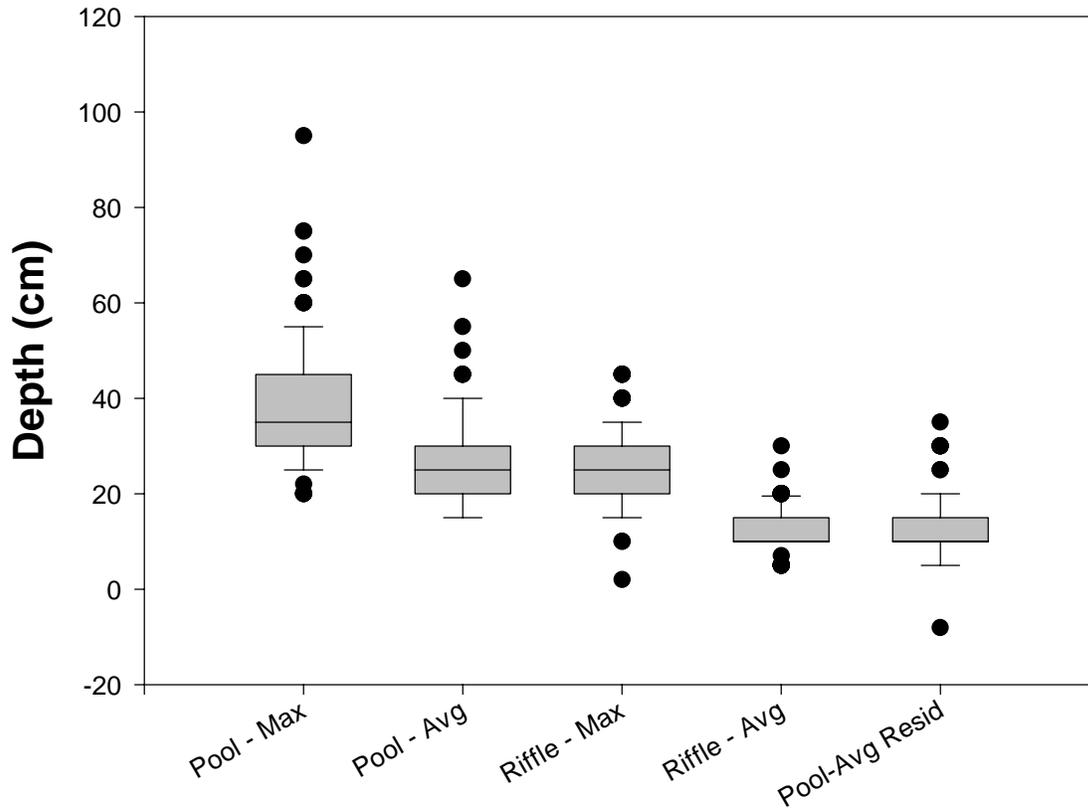
Channel Type C: 0.0%

Channel Type D: 0.0

**Percent Pools with  $\geq$  35% Embeddedness:** 0.0%

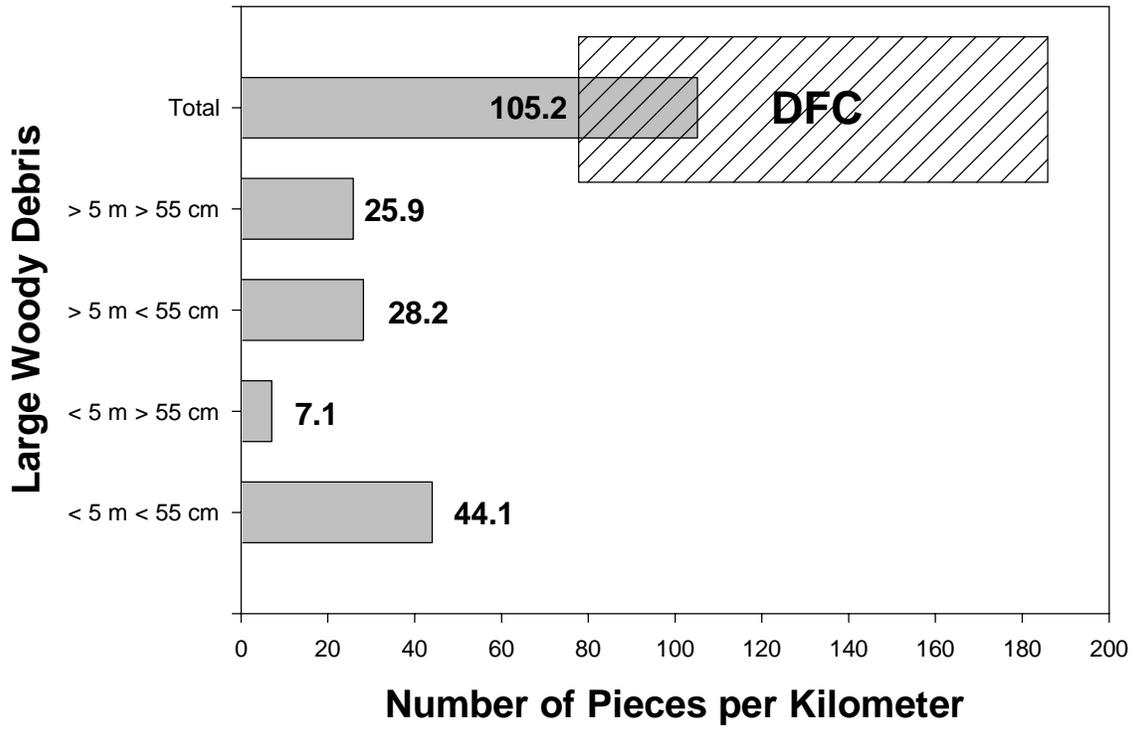
**Average Channel Gradient:** 13.1

# Kimbalton Branch

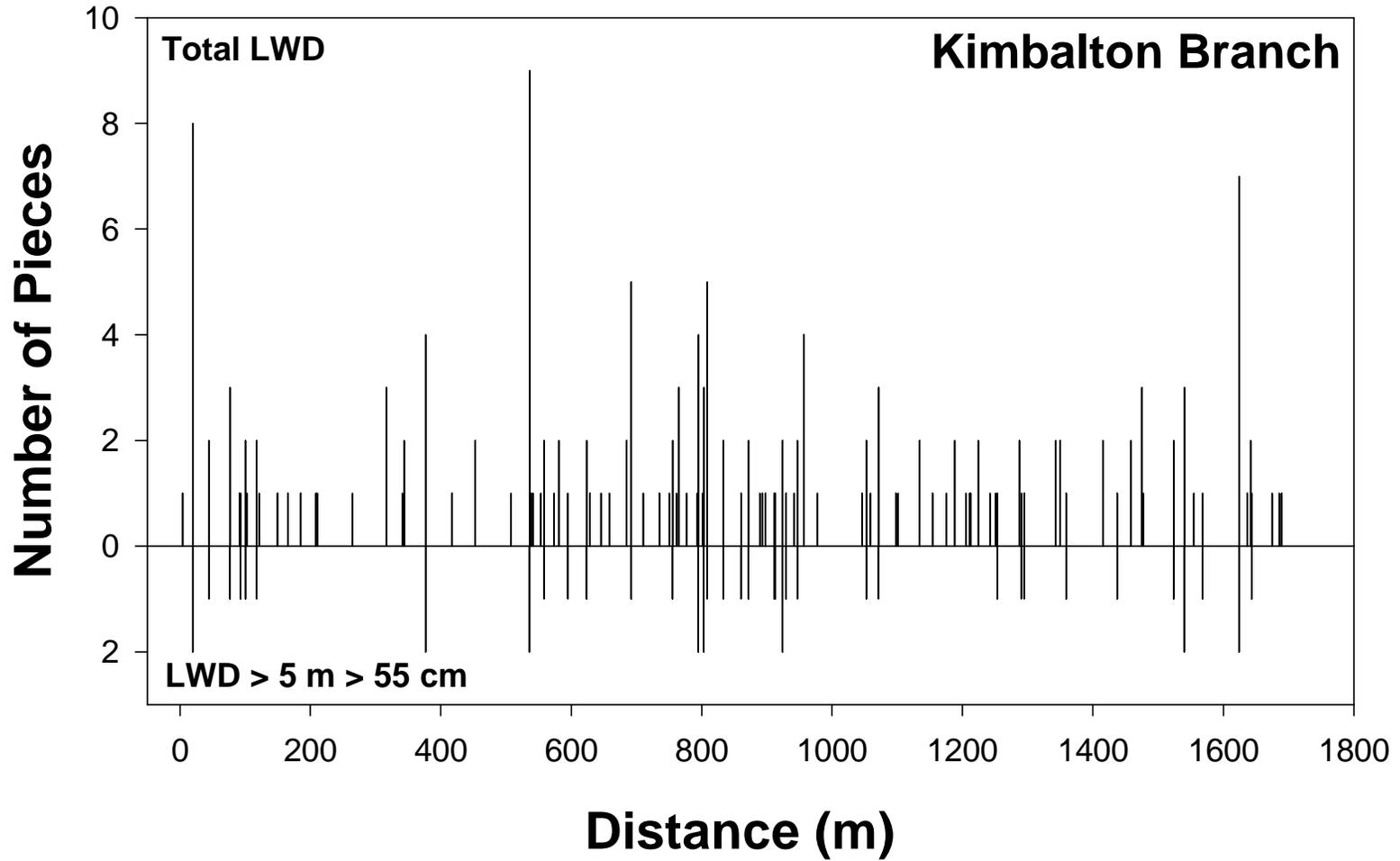


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

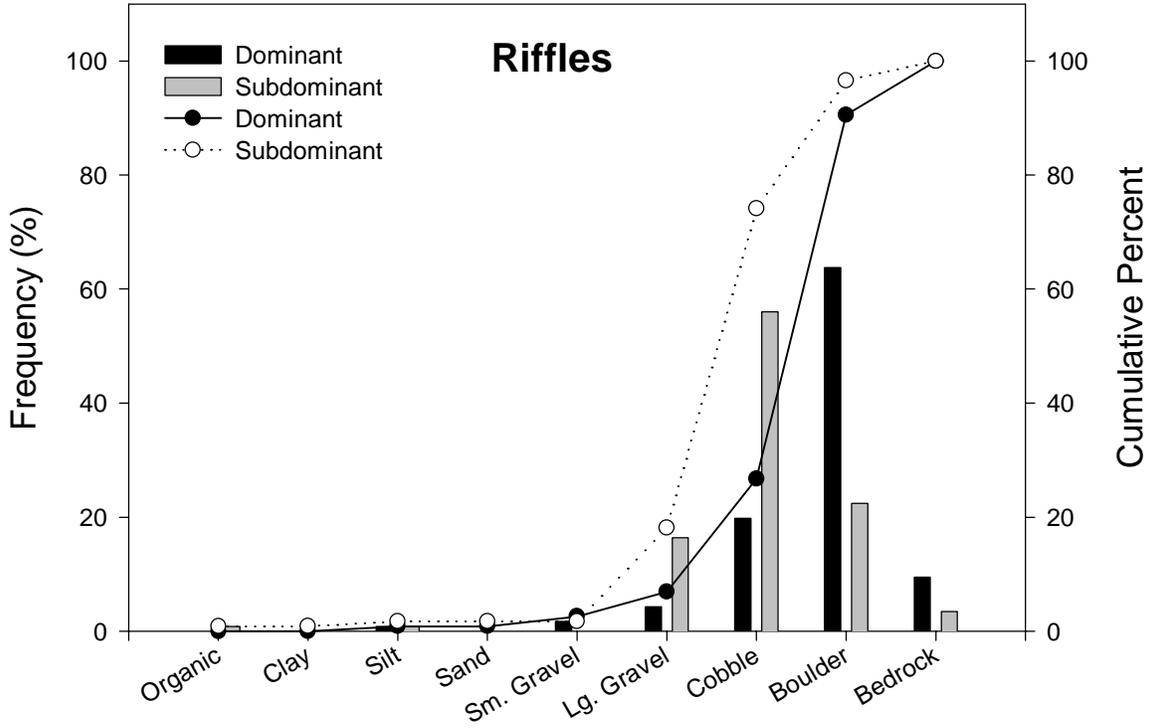
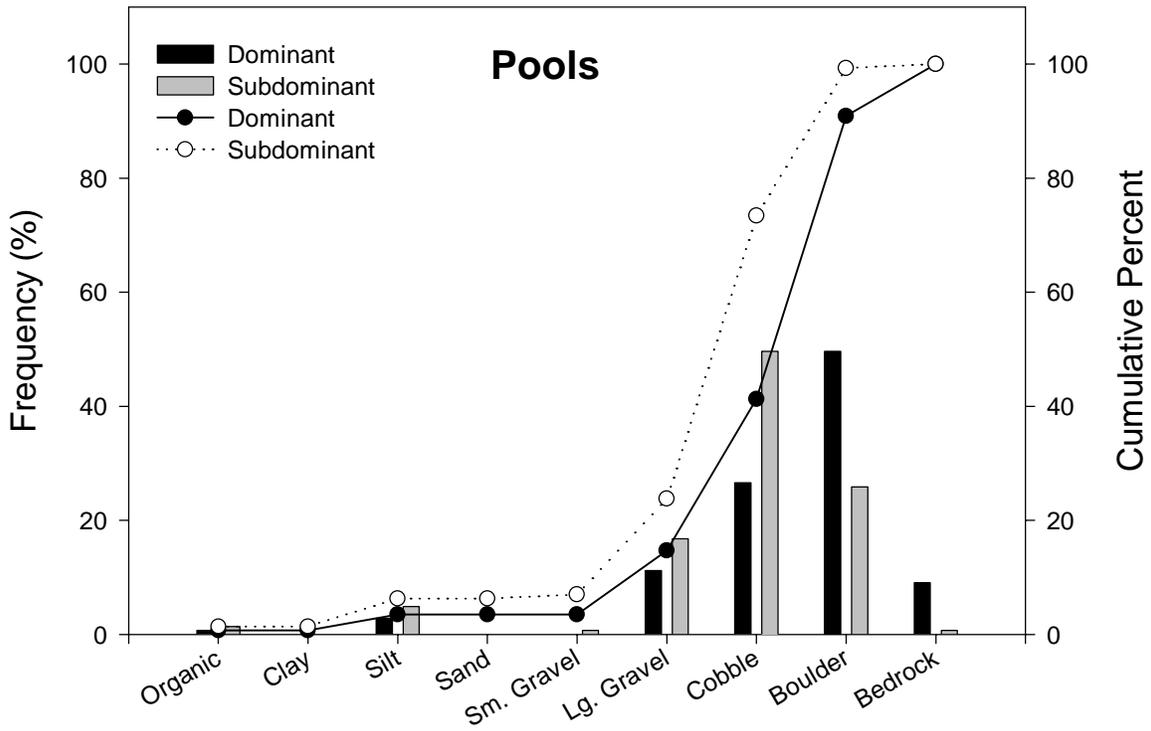
# Kimbalton Branch



# Distribution and Abundance of Large Woody Debris



# Kimbalton Branch Substrate Composition



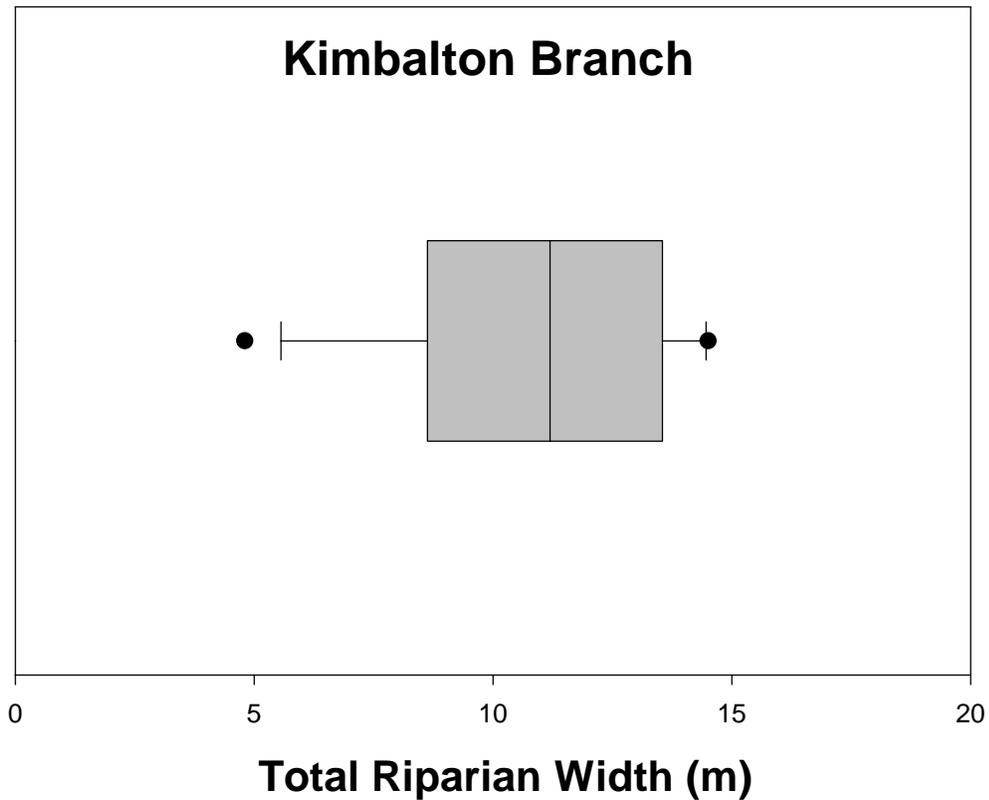
## Riparian Width

Stream: Kimbalton Branch

Number of Measurements: 7

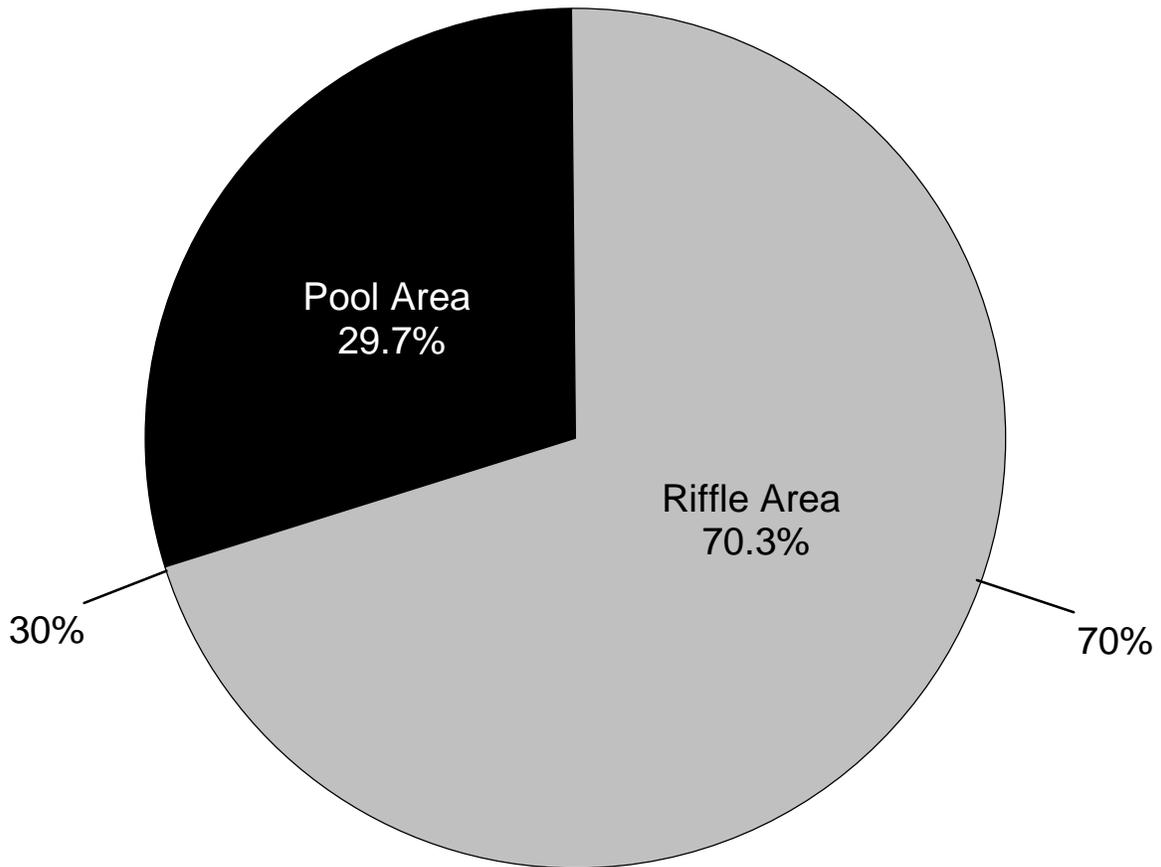
Mean Width: 10.5m Std Dev: 3.4

Max: 14.5m Min: 4.8m

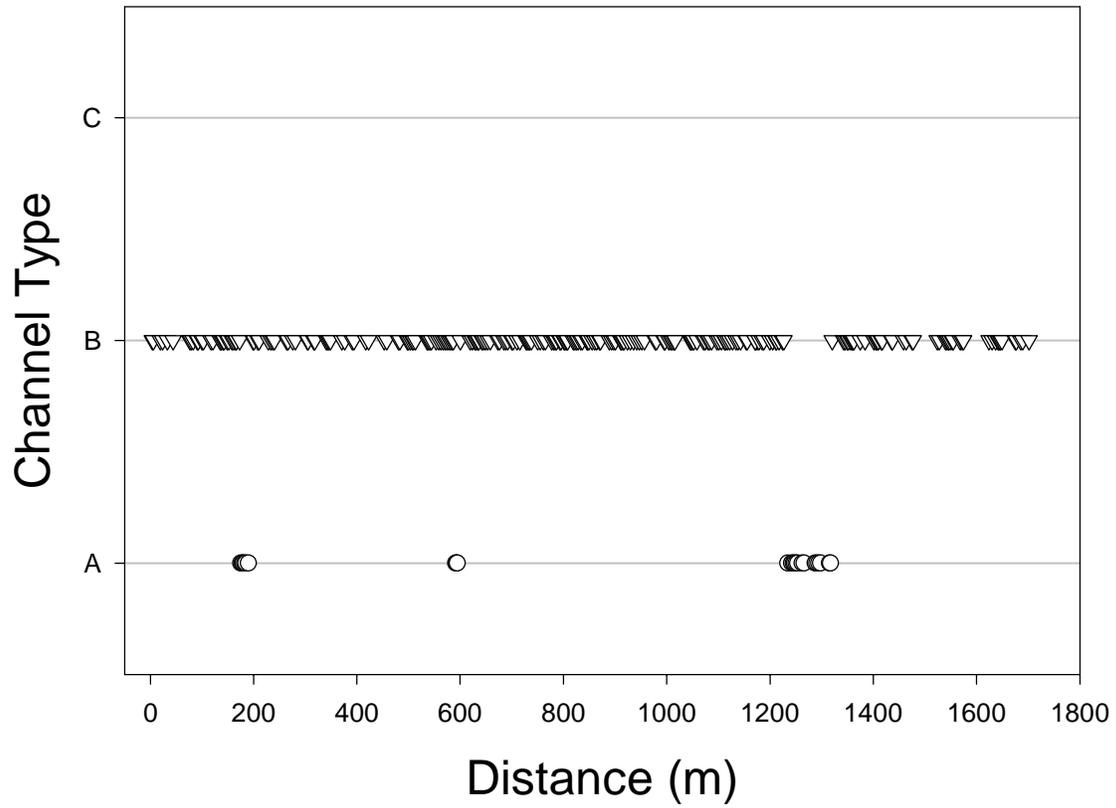


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Kimbalton Branch  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Kimbalton Branch Rosgen's Channel Type Distribution



**Stream:** North Fork Stony Creek (Glen Alton)

**District:** Blacksburg

**Quadrangle:** Interior

**Sample Date:** 05/24/00

**Downstream Starting Point:** Confluence w/ Big Stony

**Total Distance Surveyed:** 1.6 kilometers

**Percent of Total Area - Pools:** 58.2%

Number of Pools: 62

Number of Pools per kilometer: 38.8

Total Pool Area: 6491.3 sq. meters  $\pm$  781.3

Mean Pool Area: 104.7 sq. meters

Correction Factor: 1.00

Mean Maximum Depth: 58.3 cm

Mean Average Depth: 32.0 cm

Mean Average Residual Pool Depth: 5.6 cm

**Percent of Total Area - Riffles:** 41.8 %

Number of Riffles: 42

Number of Riffles per kilometer: 24.7

Total Riffle Area: 4658.1 sq. meters  $\pm$  298.0

Mean Riffle Area: 111.0 sq. meters

Correction Factor: 1.08

Mean Maximum Depth: 41.6 cm

Mean Average Depth: 22.2 cm

**Number of Large Woody Debris Pieces per kilometer:** 37.6

Wood < 5 m and < 55 cm: 9.0

Wood < 5 m and > 55 cm: 3.2

Wood > 5 m and < 55 cm: 17.8

Wood > 5 m and > 55 cm: 7.6

**Mean Channel Width:** 7.0 m

**Mean Riparian Width:** 165.8 m

Mean Maximum Riparian Distance (either side): 130.1 m

Mean Minimum Riparian Distance (either side): 28.7 m

Maximum Riparian Width (Total): 271.3 m

Minimum Riparian Width (Total): 80.0 m

North Fork Stony Creek (GA) Continued.

**Percent of Pool Habitat Surveyed as Glides:** 13.0%

**Rosgen's Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 0.0%

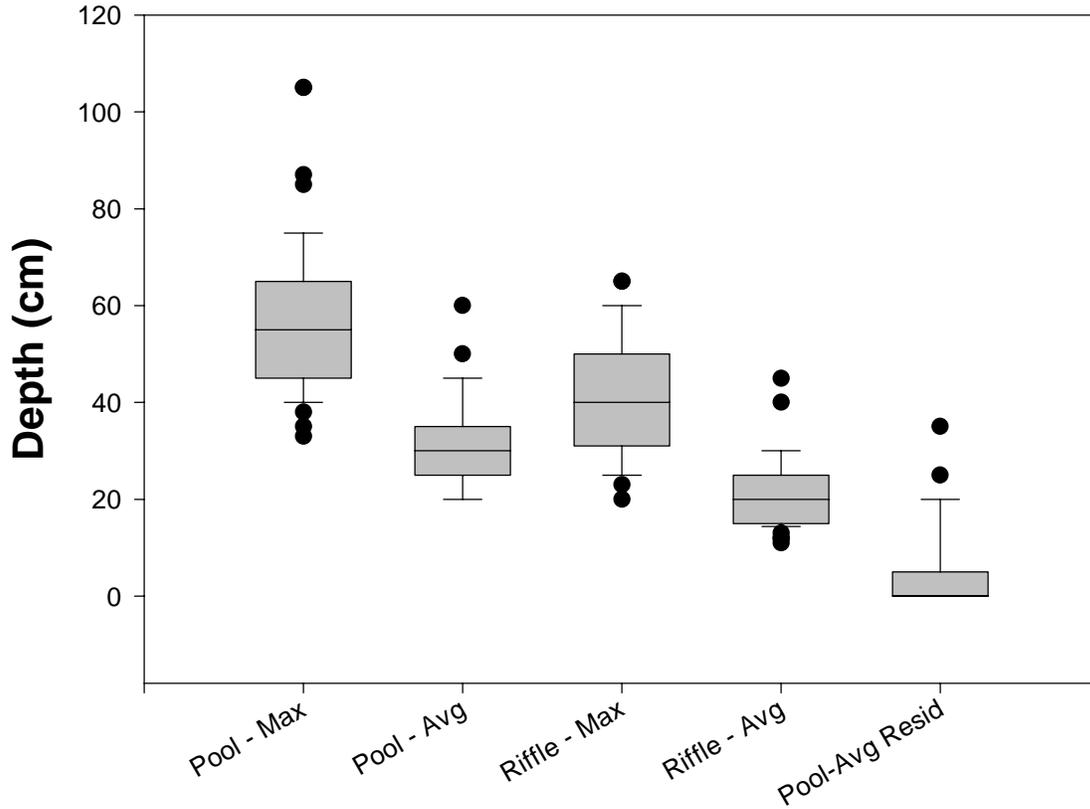
Channel Type C: 100.0%

Channel Type D: 0.0

**Percent Pools with  $\geq$  35% Embeddedness:** 0.0%

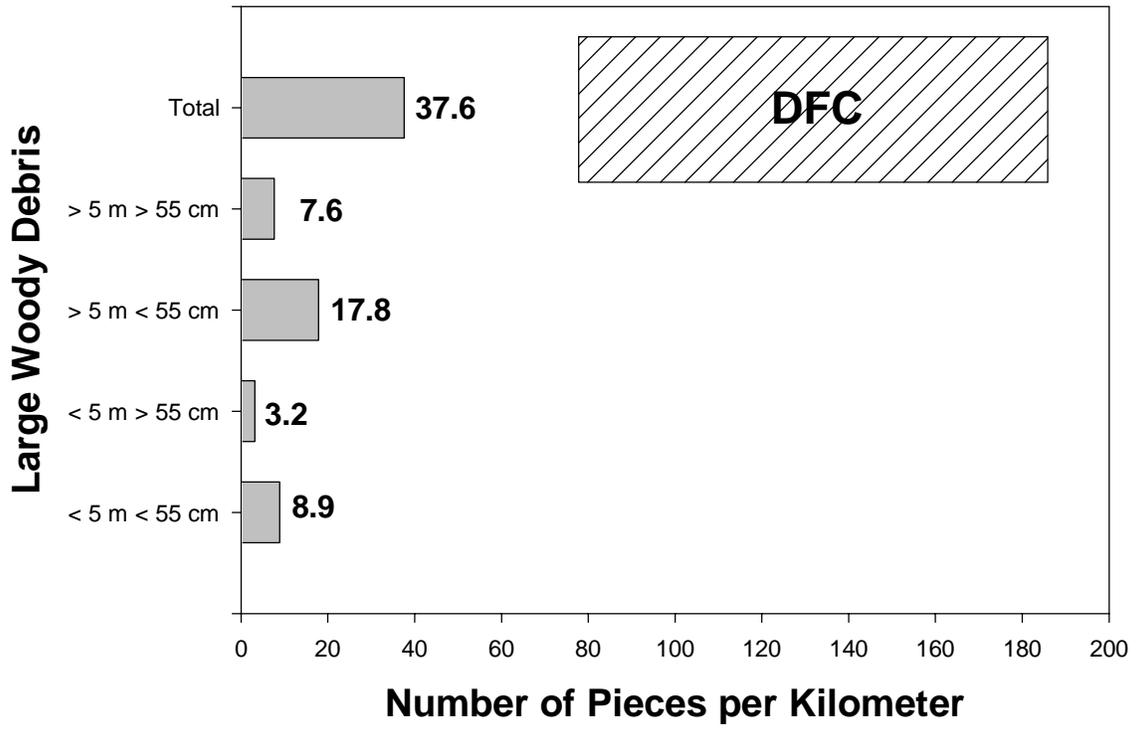
**Average Channel Gradient:** 3.4

# N.F. Stony Creek (GA)

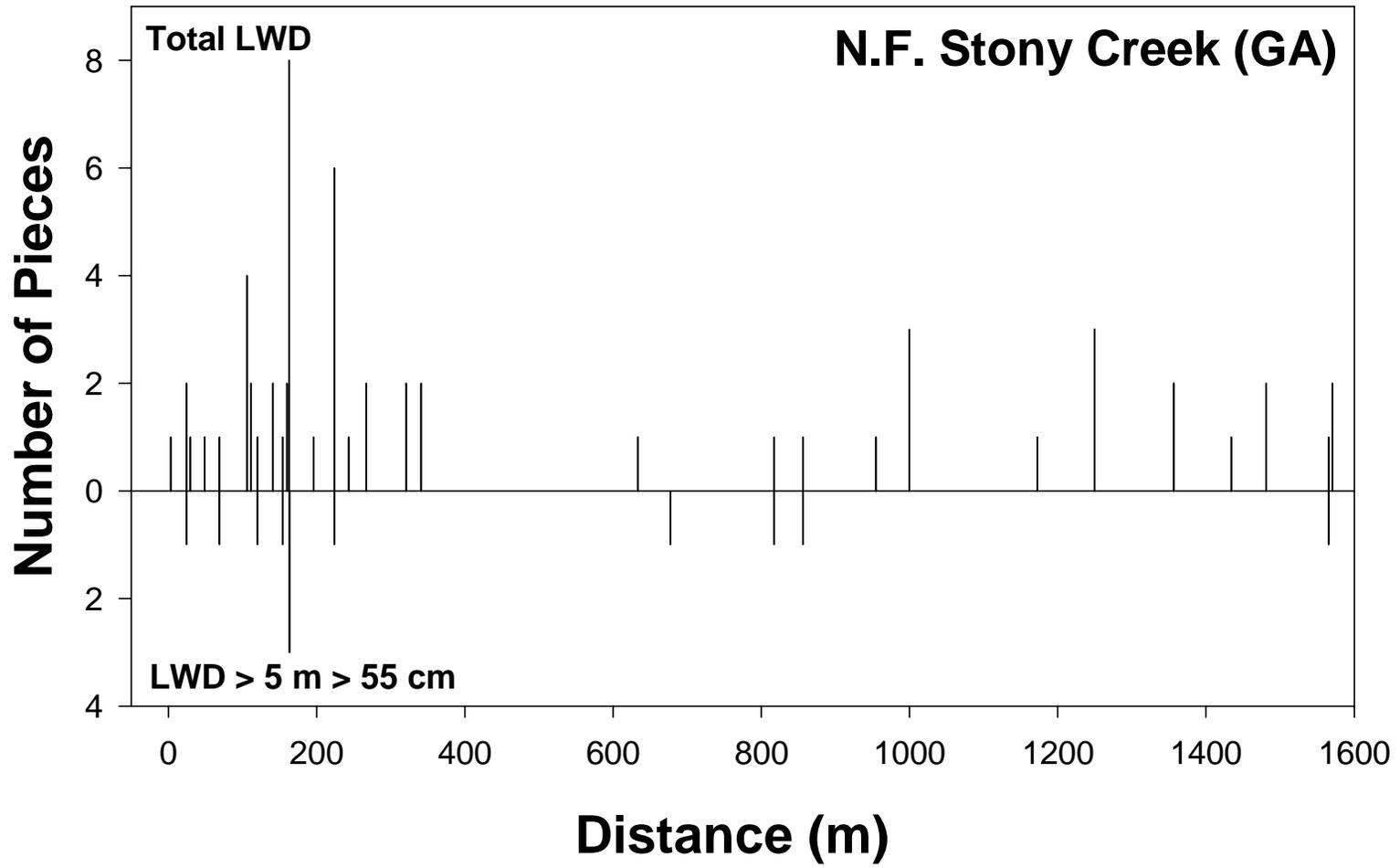


**Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.**

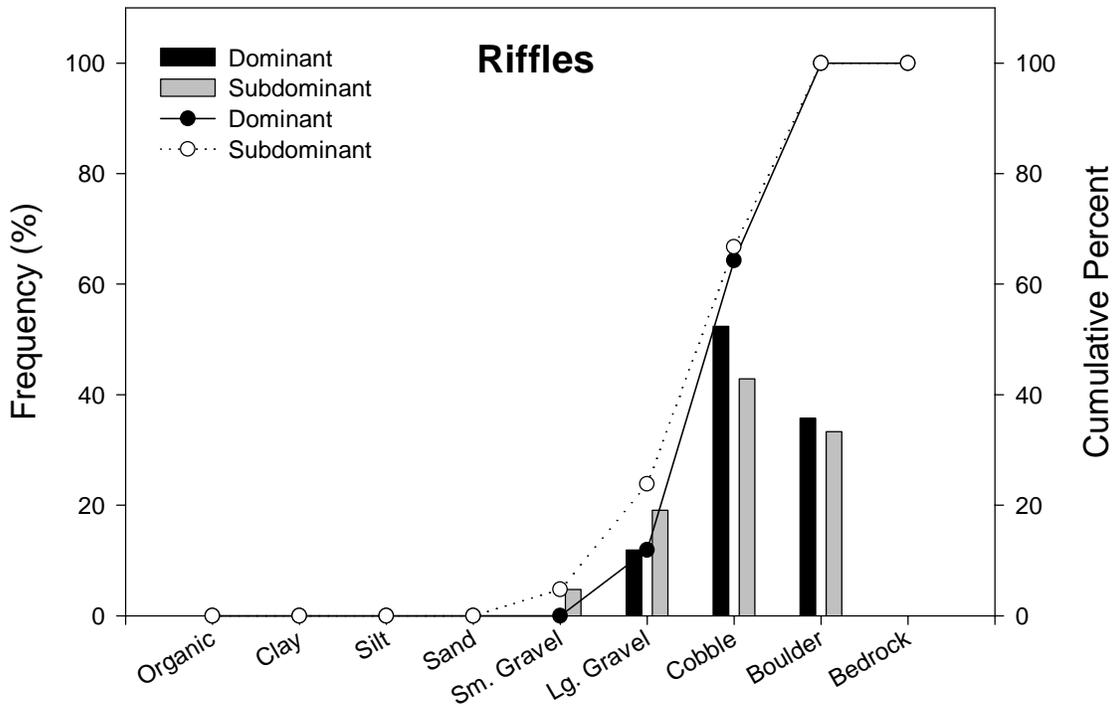
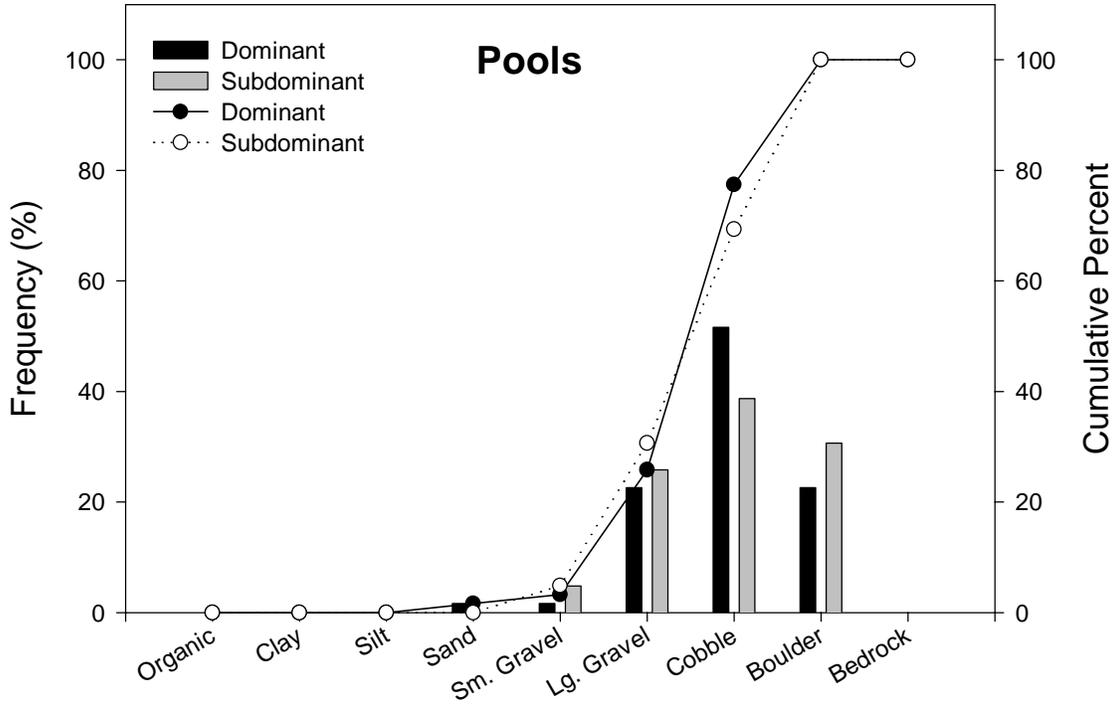
# N.F. Stony Creek (GA)



# Distribution and Abundance of Large Woody Debris



# N.F. Stony Creek (GA) Substrate Composition



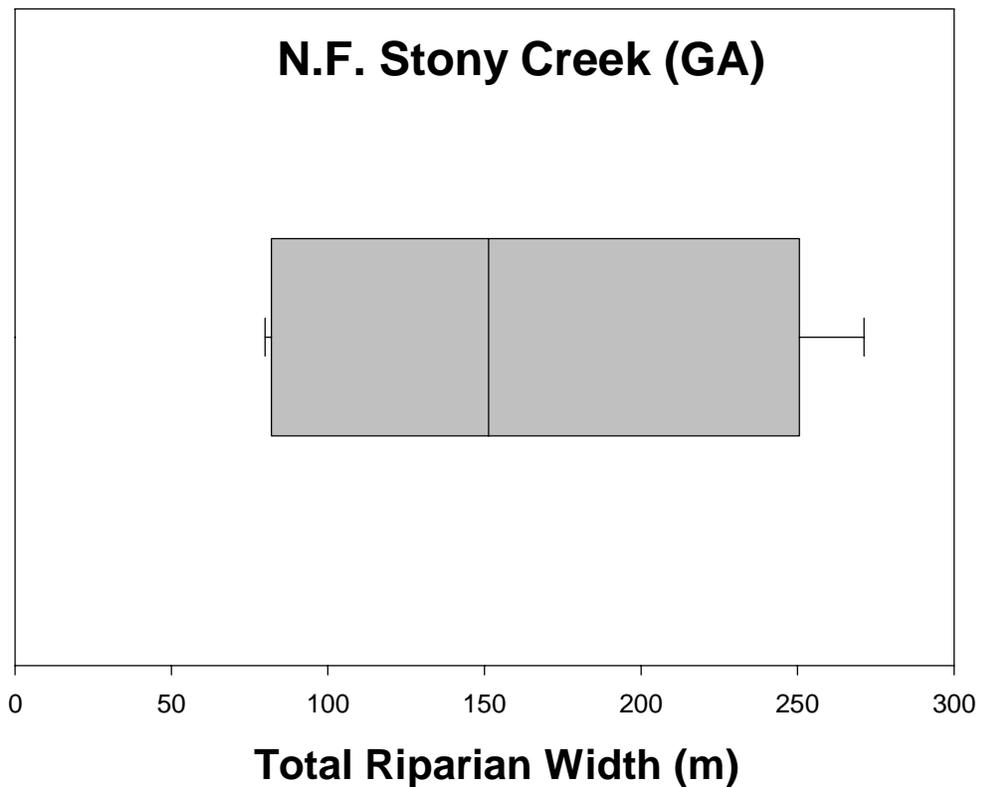
## Riparian Width

Stream: N.F. Stony Creek (GA)

Number of Measurements: 5

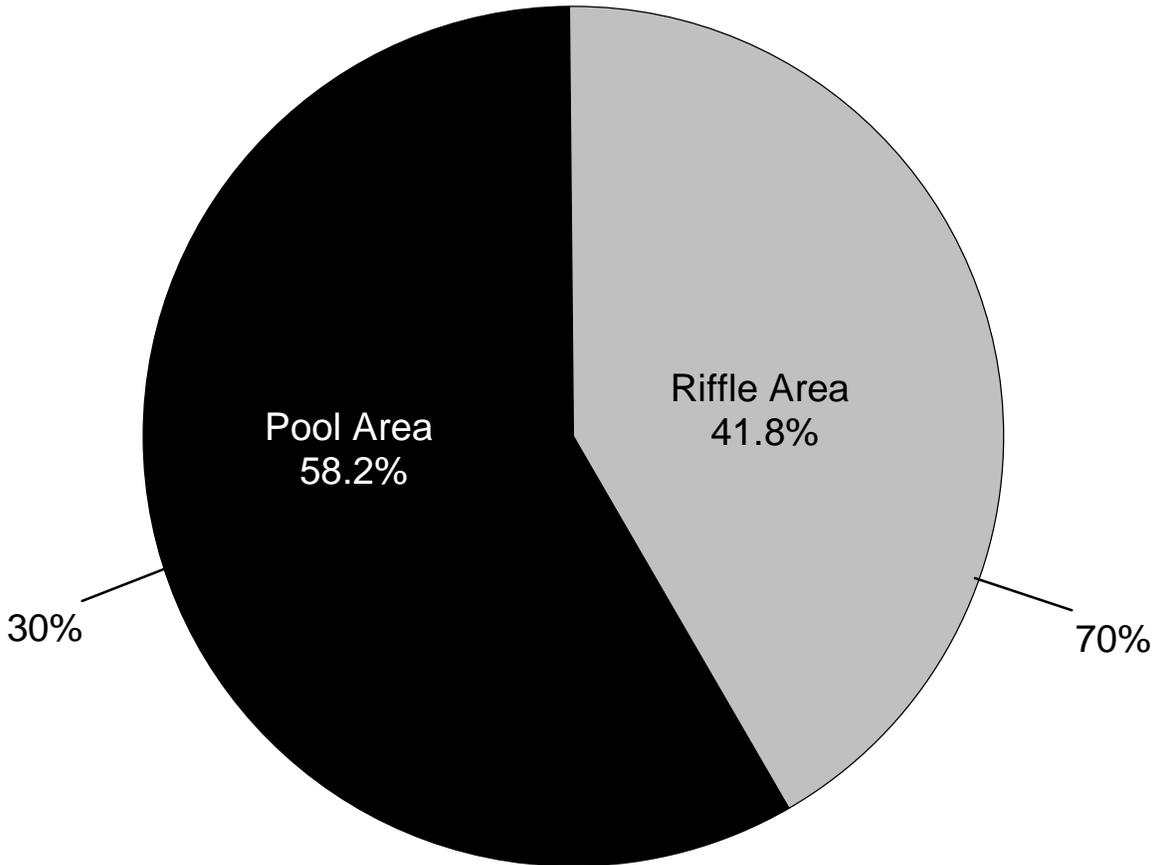
Mean Width: 165.8m Std Dev: 89.1

Max: 271.3m Min: 80.0m

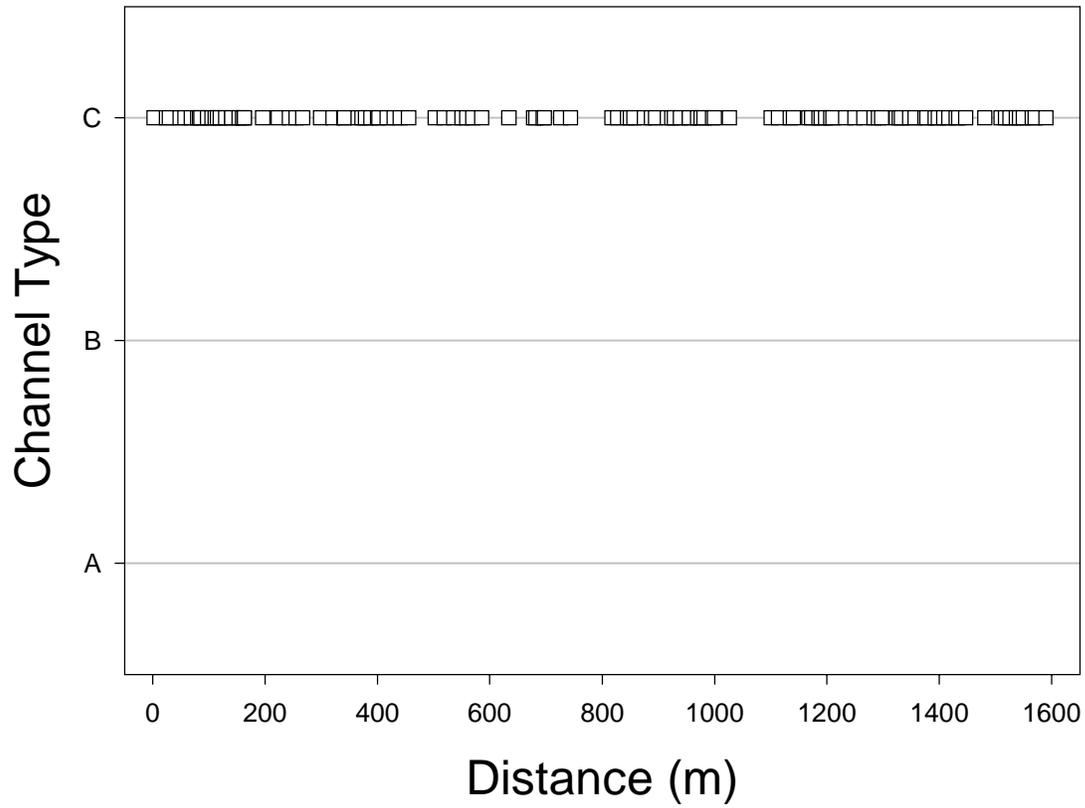


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**N.F. Stony Creek (GA)**  
**Pool:Riffle Ratio**  
**DFC: 30 - 70% of the Stream Area**  
**in Pool Habitat**



# N.F. Stony Creek (GA) Rosgen's Channel Type Distribution



# Pulaski and Long Spur Quadrangles

**Stream:** Mudlick Branch

**District:** Wythe R.D.

**Quadrangle:** Bland

**Sample Date:** 08/04/99

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 2.5 kilometers

**Percent of Total Area - Pools:** 100%

Number of Pools: 47

Number of Pools per kilometer: 18.8

Total Pool Area: 1015.4 sq. meters  $\pm$  203.1

Mean Pool Area: 21.6 sq. meters

Correction Factor: 1.14

Mean Maximum Depth: 16.3 cm

Mean Average Depth: 11.4 cm

Mean Average Residual Pool Depth: NA

**Percent of Total Area - Riffles:** NA

Number of Riffles: NA

Number of Riffles per kilometer: NA

Total Riffle Area: NA sq. meters  $\pm$  NA

Mean Riffle Area: NA sq. meters

Correction Factor: NA

Mean Maximum Depth: NA

Mean Average Depth: NA

**Number of Large Woody Debris Pieces per kilometer:** 99.2

Wood < 5 m and < 55 cm: 53.0

Wood < 5 m and > 55 cm: 7.2

Wood > 5 m and < 55 cm: 24.3

Wood > 5 m and > 55 cm: 14.7

**Mean Channel Width:** 4.3 m

**Mean Riparian Width:** 10.8 m

Mean Maximum Riparian Distance (either side): 5.7 m

Mean Minimum Riparian Distance (either side): 0.9 m

Maximum Riparian Width (Total): 11.3 m

Minimum Riparian Width (Total): 10.3 m

Mudlick Branch Continued.

**Percent of Pool Habitat Surveyed as Glides: 38.3%**

**Rosgen's Channel Type Frequency:**

Channel Type A:

Channel Type B: 100%

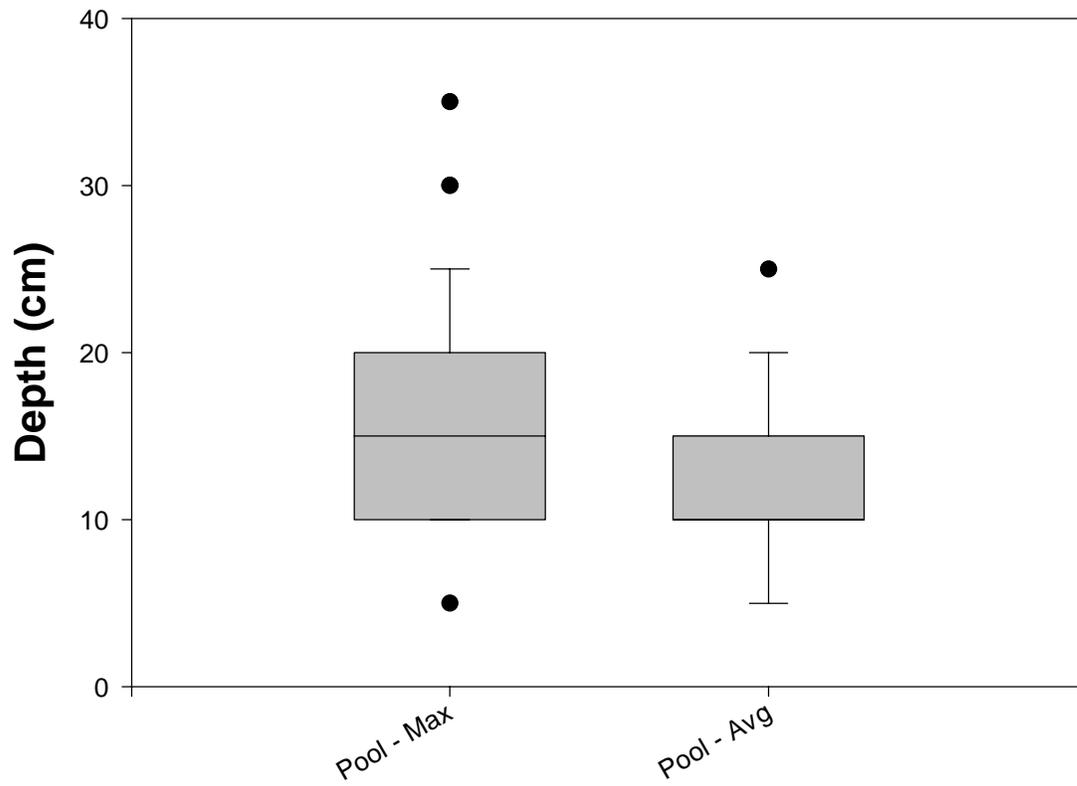
Channel Type C:

Channel Type D:

**Percent Pools with  $\geq$  35% Embeddedness: 6.4%**

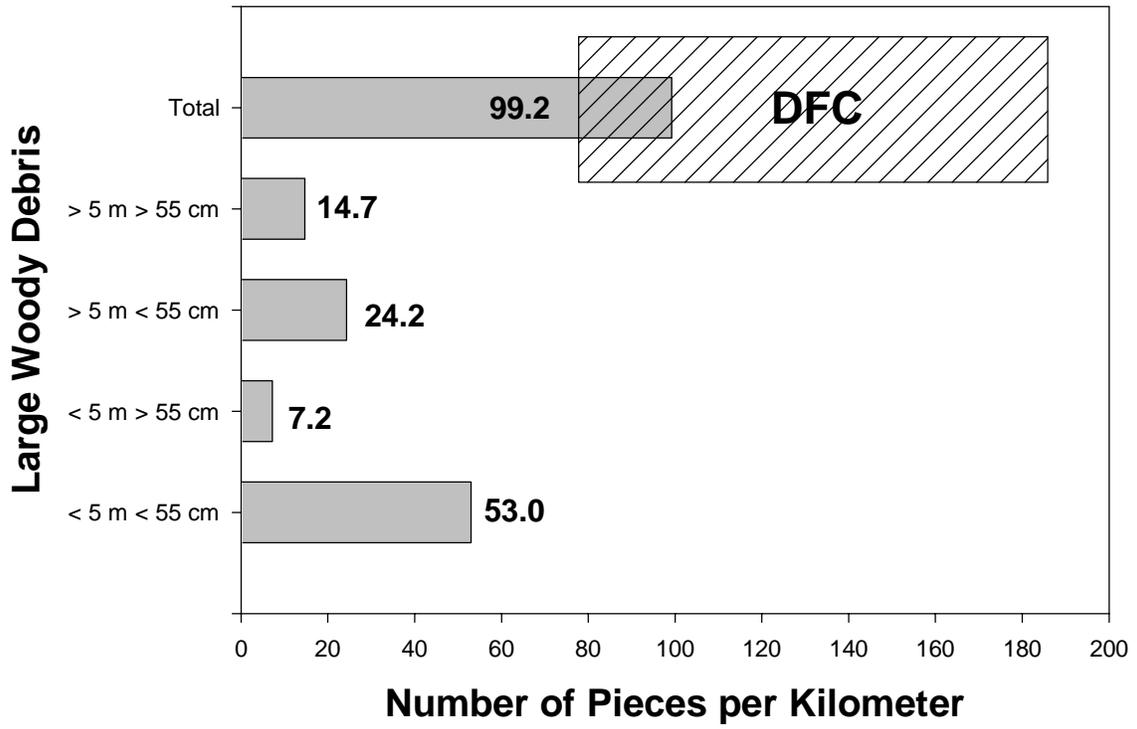
**Average Channel Gradient: 2.5**

# Mudlick Branch

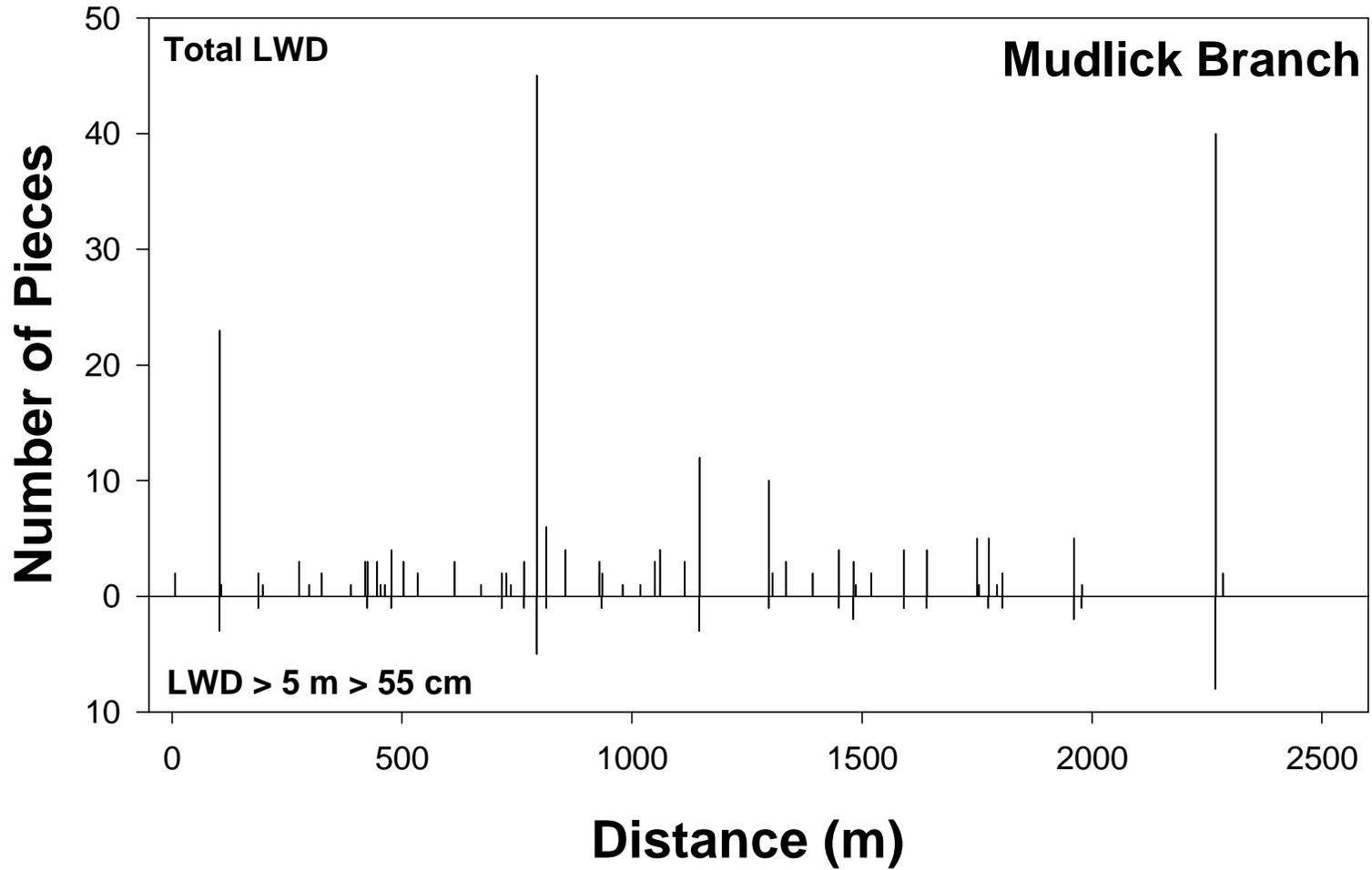


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

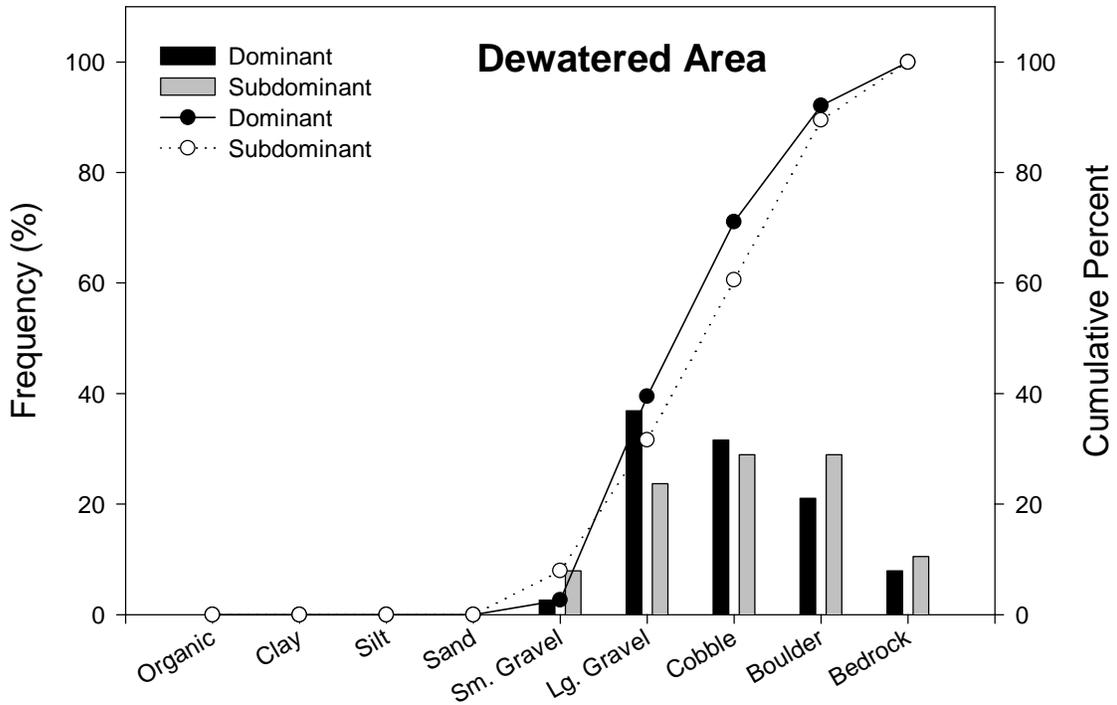
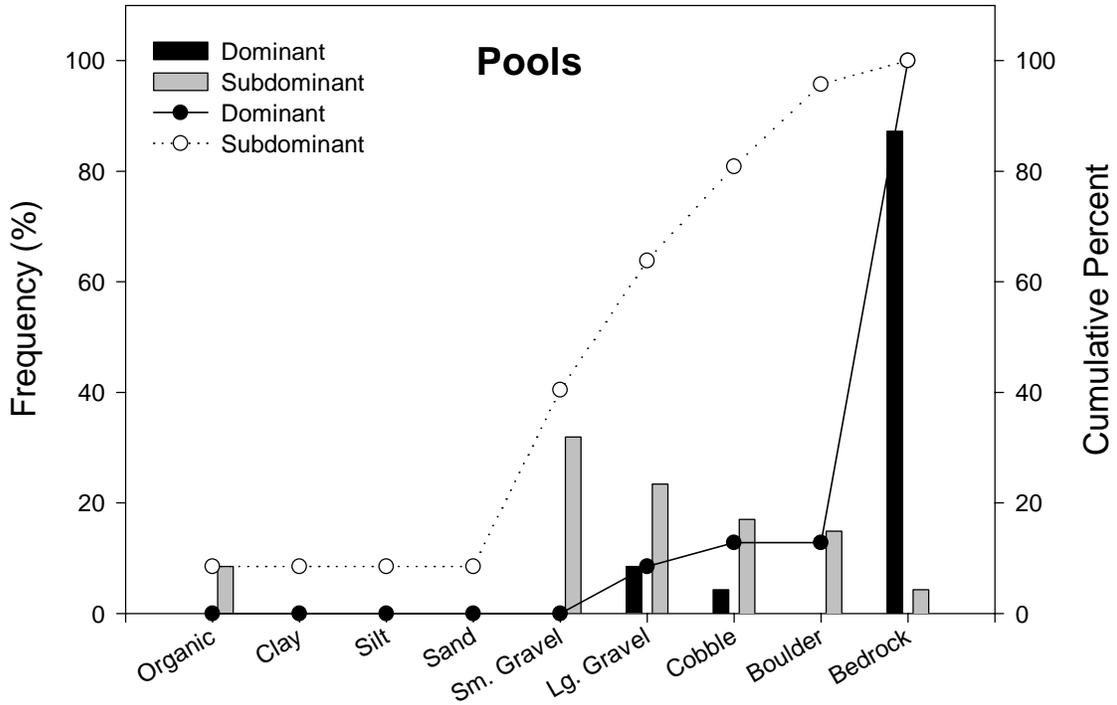
# Mudlick Branch



# Distribution and Abundance of Large Woody Debris



# Mudlick Branch Substrate Composition



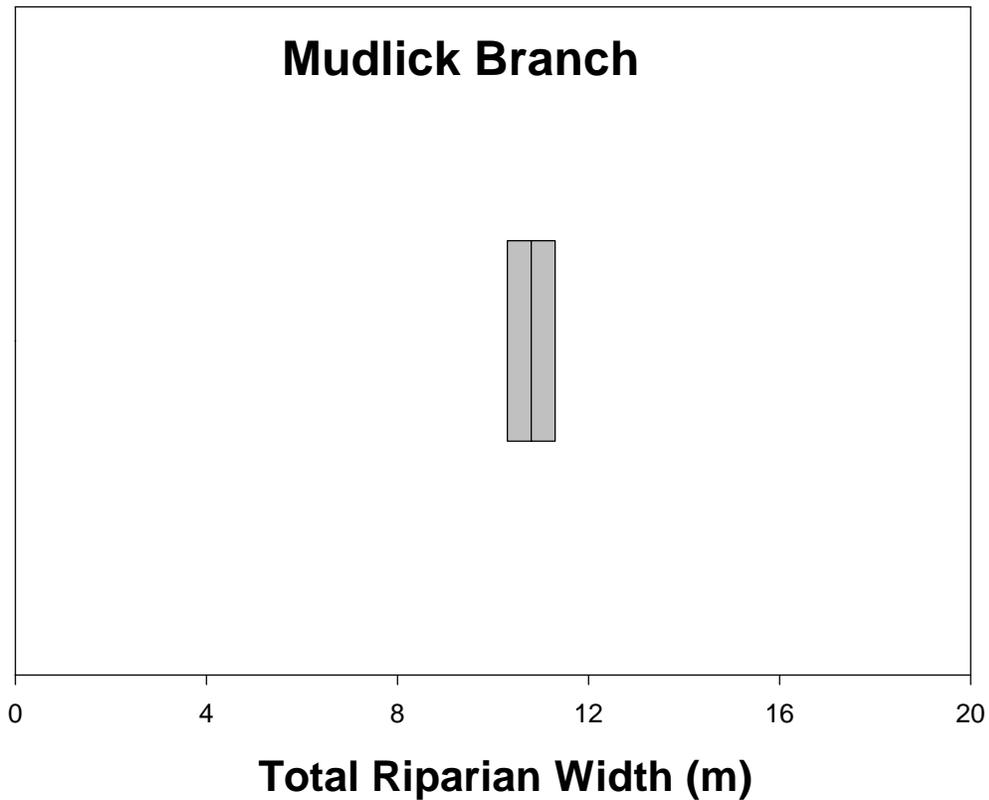
## Riparian Width

**Stream: Mudlick Branch**

**Number of Measurements: 2**

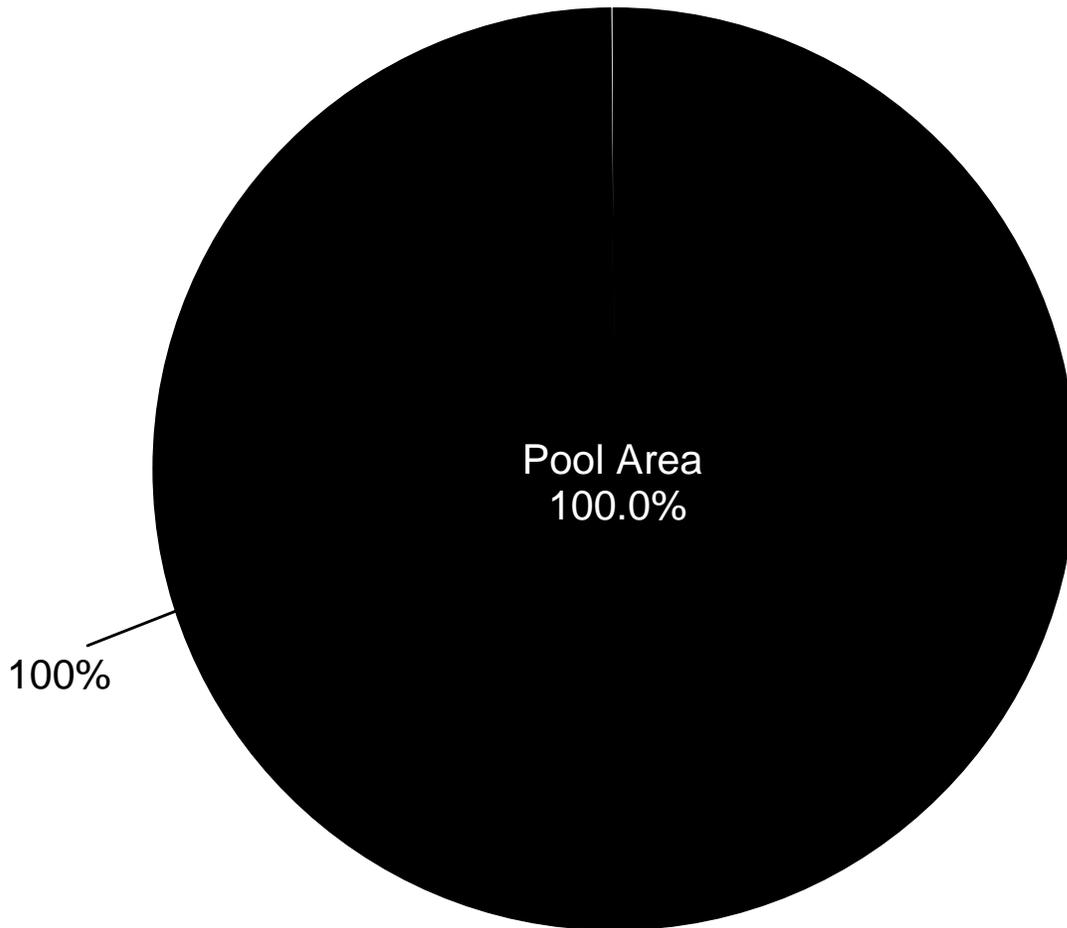
**Mean Width: 10.8m Std Dev: 0.7**

**Max: 11.3m Min: 10.3m**



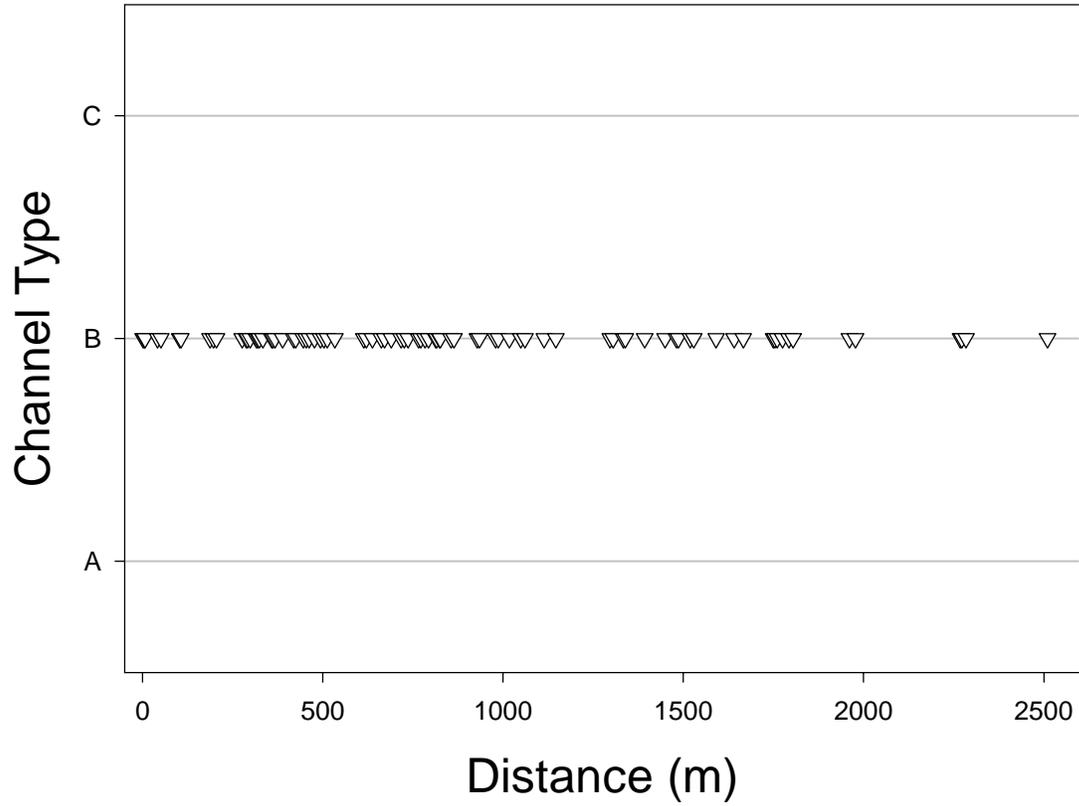
Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Mudlick Branch  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Mudlick Branch

## Rosgen's Channel Type Distribution



**Stream:** Peak Creek

**District:** Wythe R.D.

**Quadrangle:** Long Spur

**Sample Date:** 05/25/00

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 4.9 kilometers

**Percent of Total Area - Pools:** 51.9%

Number of Pools: 146

Number of Pools per kilometer: 29.8

Total Pool Area: 10396.8 sq. meters  $\pm$  791.3

Mean Pool Area: 71.2 sq. meters

Correction Factor: 0.89

Mean Maximum Depth: 47.9 cm

Mean Average Depth: 29.3 cm

Mean Average Residual Pool Depth: 15.4 cm

**Percent of Total Area - Riffles:** 48.1%

Number of Riffles: 126

Number of Riffles per kilometer: 25.7

Total Riffle Area: 9653.2 sq. meters  $\pm$  919.9

Mean Riffle Area: 76.6 sq. meters

Correction Factor: 0.77

Mean Maximum Depth: 23.0 cm

Mean Average Depth: 15.1 cm

**Number of Large Woody Debris Pieces per kilometer:** 36.3

Wood < 5 m and < 55 cm: 30.4

Wood < 5 m and > 55 cm: 0.0

Wood > 5 m and < 55 cm: 5.9

Wood > 5 m and > 55 cm: 0.0

**Mean Channel Width:** 8.2 m

**Mean Riparian Width:** 51.8 m

Mean Maximum Riparian Distance (either side): 36.8 m

Mean Minimum Riparian Distance (either side): 6.8 m

Maximum Riparian Width (Total): 104.0 m

Minimum Riparian Width (Total): 14.1 m

Peak Creek Continued.

**Percent of Pool Habitat Surveyed as Glides: 7.5%**

**Rosgen's Channel Type Frequency:**

Channel Type A:

Channel Type B: 100%

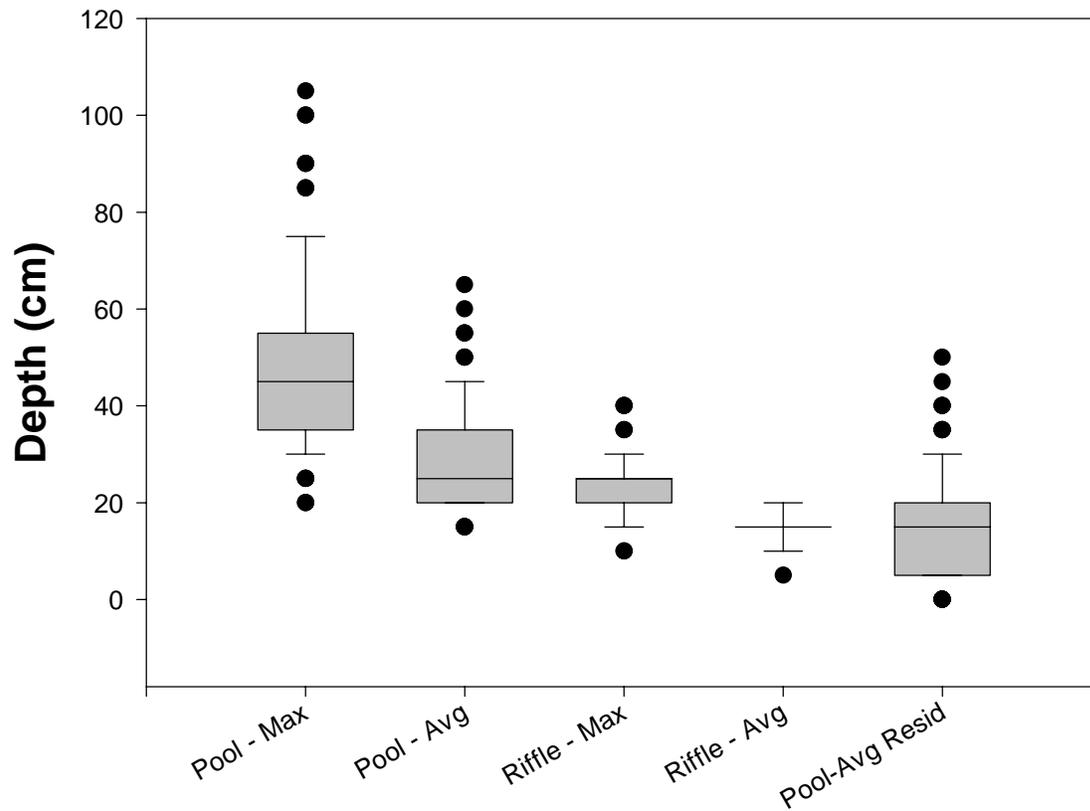
Channel Type C:

Channel Type D:

**Percent Pools with  $\geq$  35% Embeddedness: 1.4%**

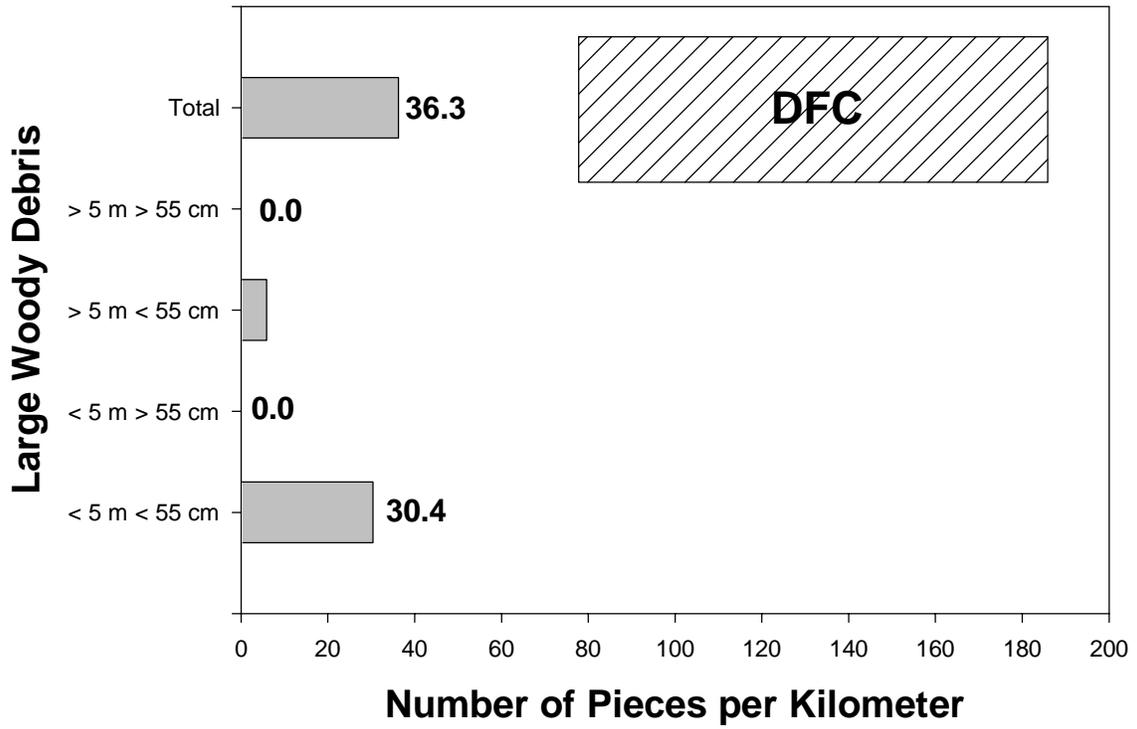
**Average Channel Gradient: 2.0**

# Peak Creek (above Gatewood)

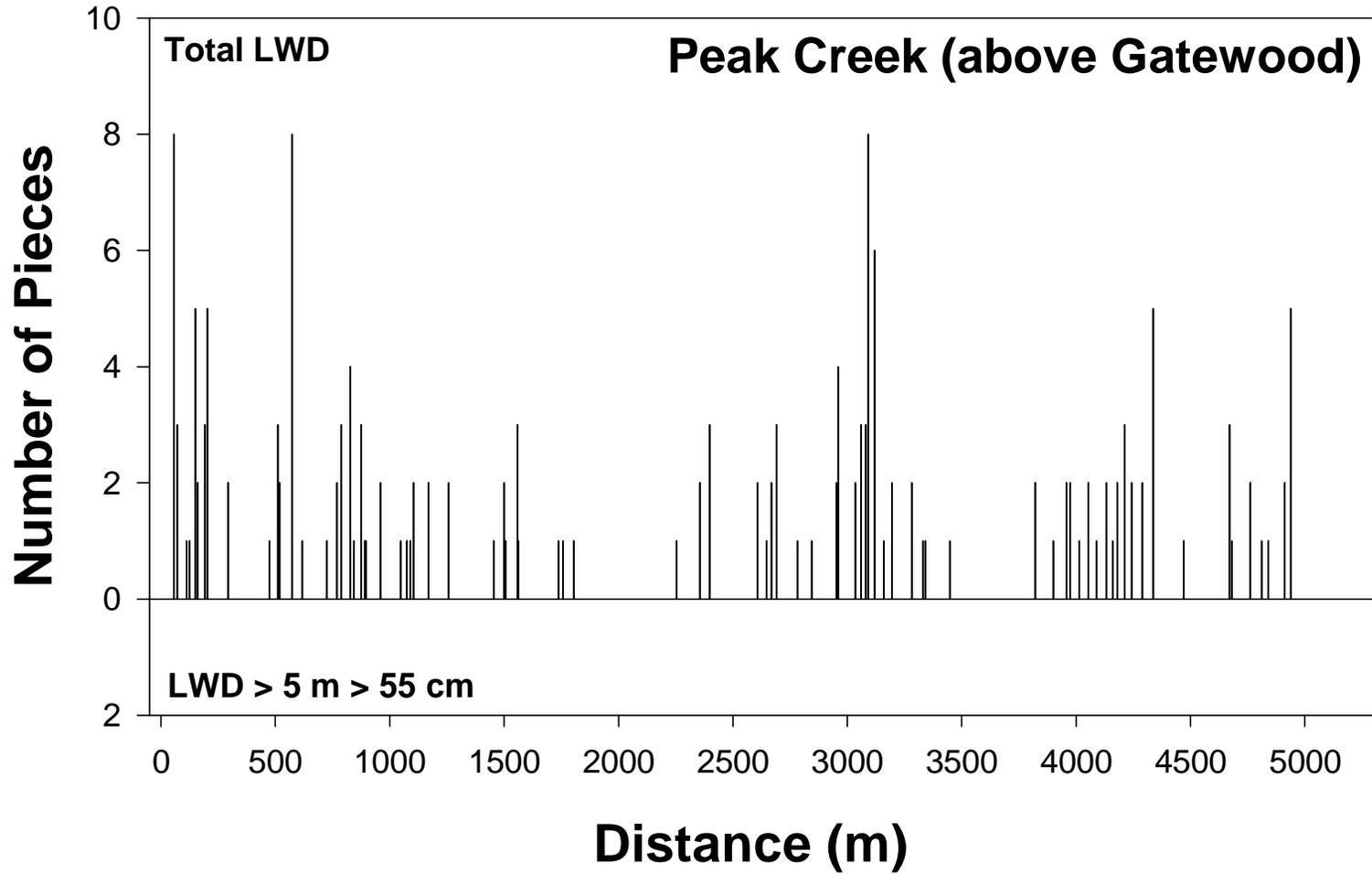


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

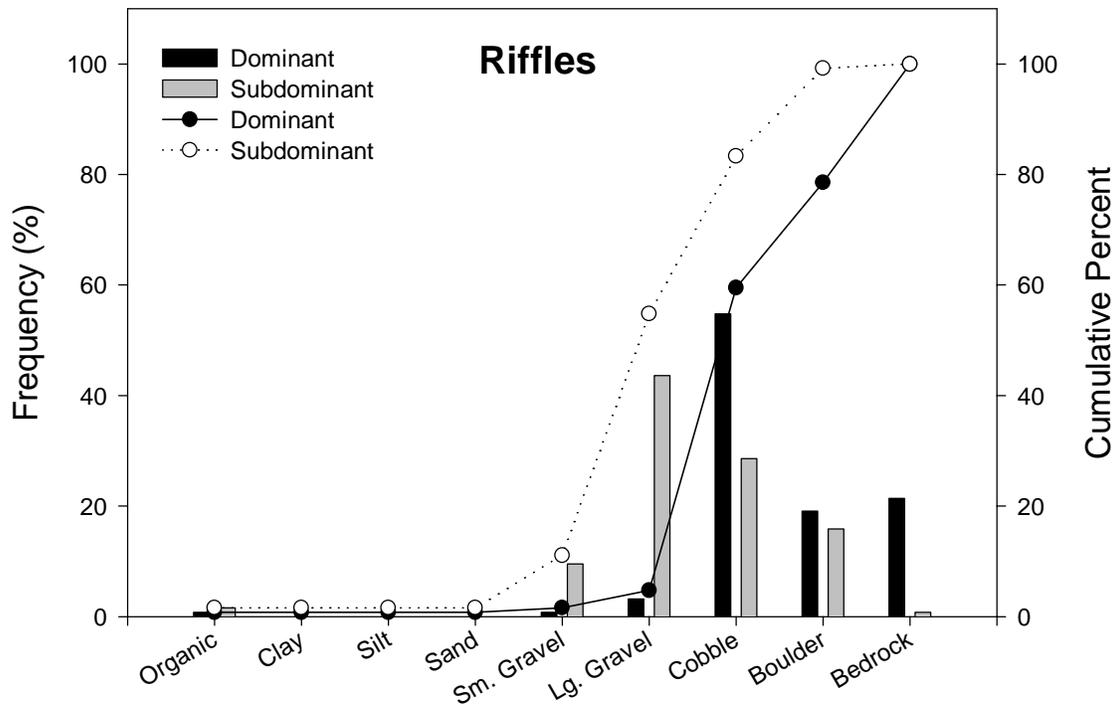
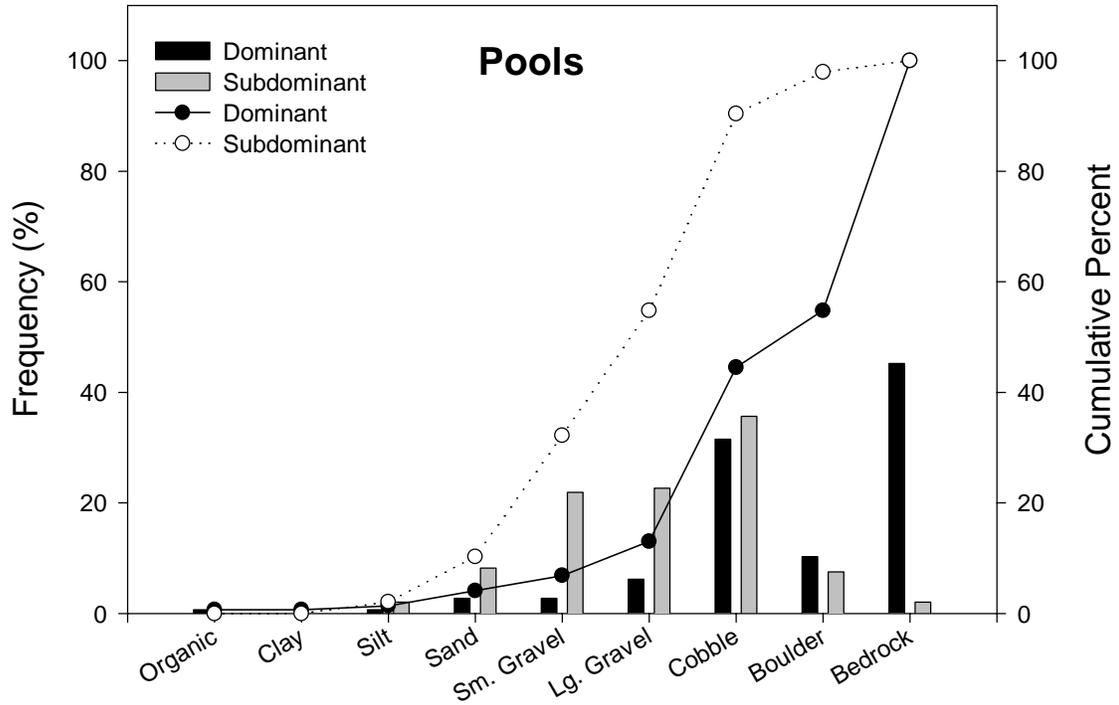
# Peak Creek (above Gatewood)



# Distribution and Abundance of Large Woody Debris



# Peak Creek (above Gatewood) Substrate Composition



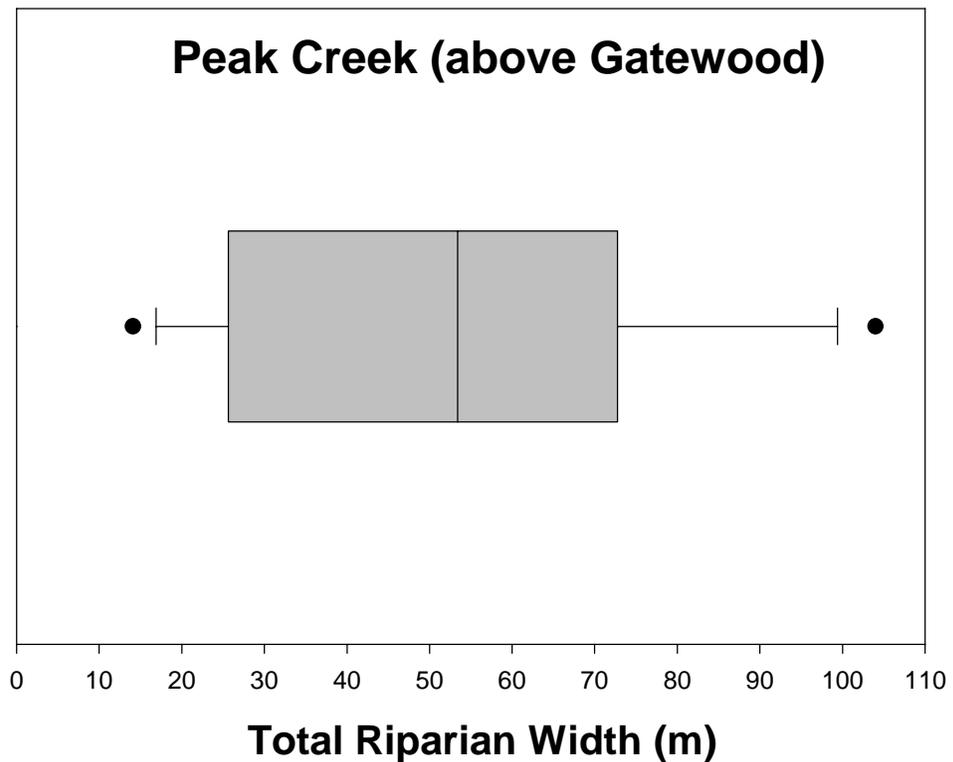
## Riparian Width

Stream: **Peak Creek (above Gatewood)**

Number of Measurements: **12**

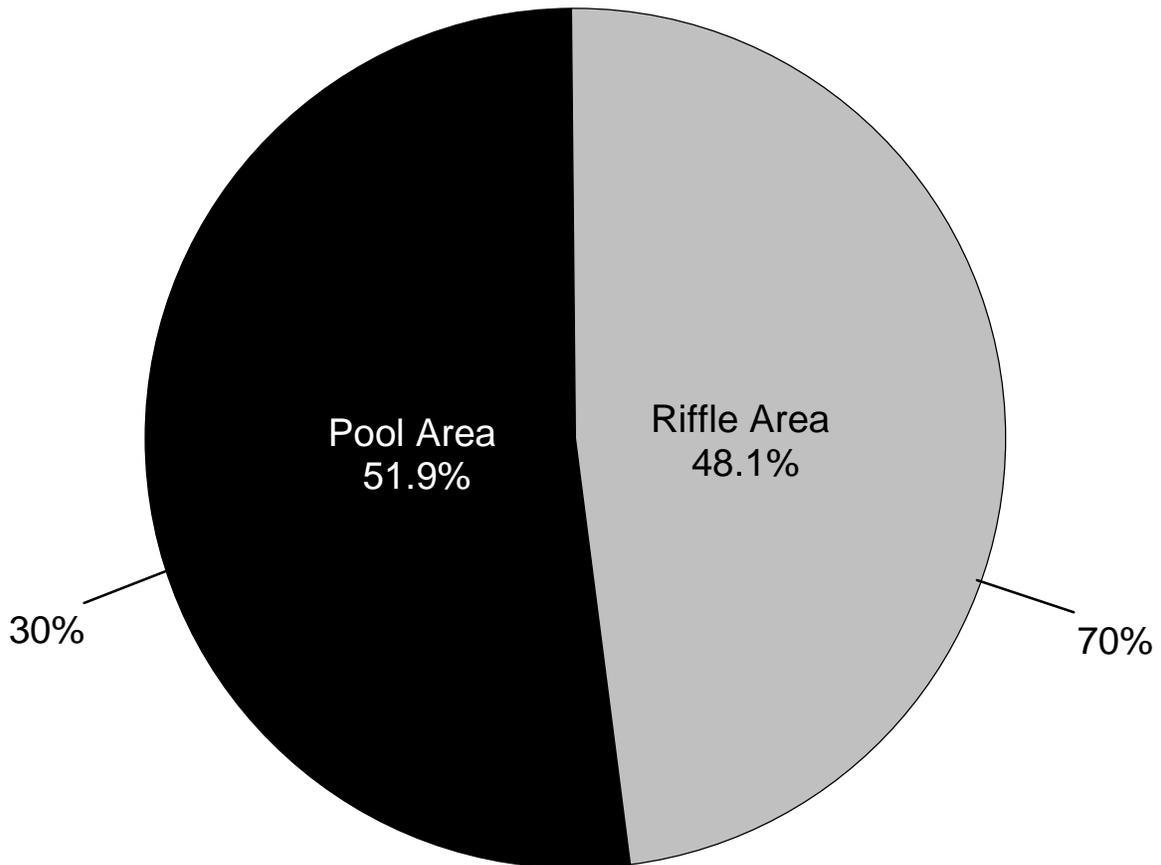
Mean Width: **51.8m** Std Dev: **30.6**

Max: **104.0m** Min: **14.1m**

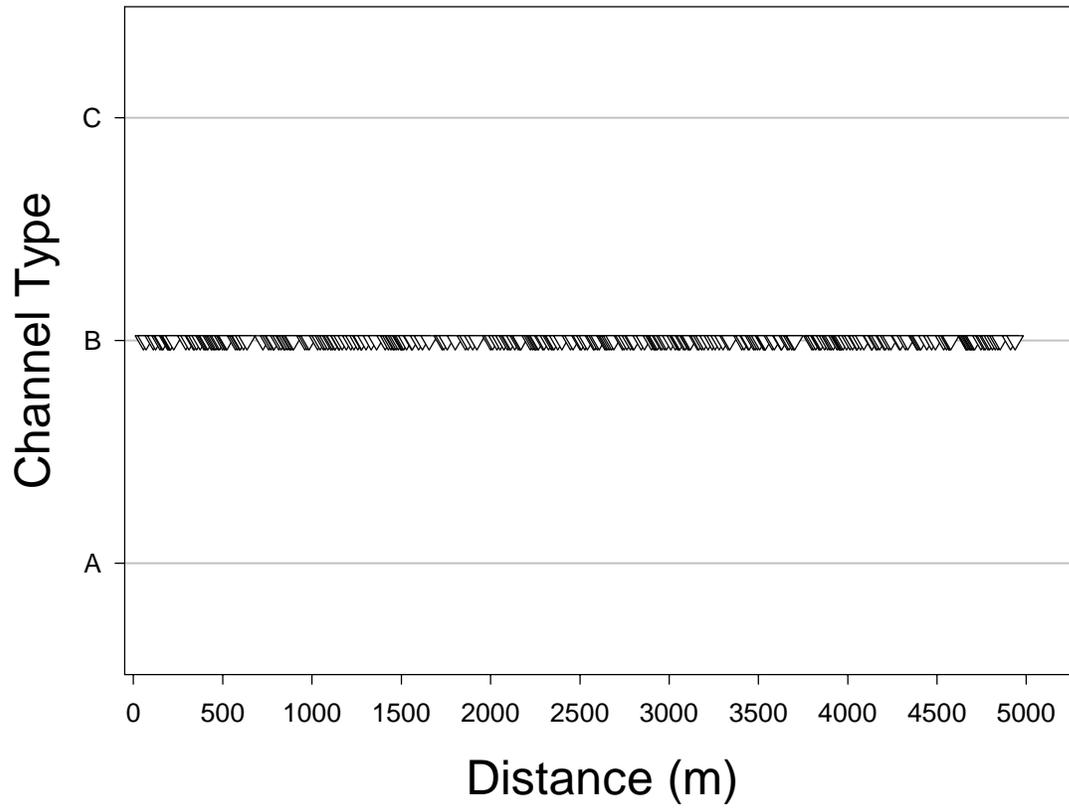


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Peak Creek (above Gatewood)  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Peak Creek (above Gatewood) Rosgen's Channel Type Distribution



**Stream:** Spur Branch

**District:** Wythe R.D.

**Quadrangle:** Long Spur

**Sample Date:** 05/25/00

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 2.2 kilometers

**Percent of Total Area - Pools:** 50.2

Number of Pools: 215

Number of Pools per kilometer: 97.7

Total Pool Area: 2627.8 sq. meters  $\pm$  178.1

Mean Pool Area: 12.2 sq. meters

Correction Factor: 0.90

Mean Maximum Depth: 38.5 cm

Mean Average Depth: 20.0 cm

Mean Average Residual Pool Depth: 13.5 cm

**Percent of Total Area - Riffles:** 49.8%

Number of Riffles: 144

Number of Riffles per kilometer: 65.5

Total Riffle Area: 2611.3 sq. meters  $\pm$ 354.3

Mean Riffle Area: 18.1 sq. meters

Correction Factor:1.02

Mean Maximum Depth: 18.5 cm

Mean Average Depth:10.1 cm

**Number of Large Woody Debris Pieces per kilometer:** 160.5

Wood < 5 m and < 55 cm: 114.8

Wood < 5 m and > 55 cm: 23.5

Wood > 5 m and < 55 cm: 15.7

Wood > 5 m and > 55 cm: 6.5

**Mean Channel Width:** 5.8 m

**Mean Riparian Width:** 27.6 m

Mean Maximum Riparian Distance (either side): 17.9 m

Mean Minimum Riparian Distance (either side): 4.0 m

Maximum Riparian Width (Total): 65.3 m

Minimum Riparian Width (Total): 8.3 m

Spur Branch Continued.

**Percent of Pool Habitat Surveyed as Glides:** 12.1 %

**Rosgen's Channel Type Frequency:**

Channel Type A: 42.8 %

Channel Type B: 52.1 %

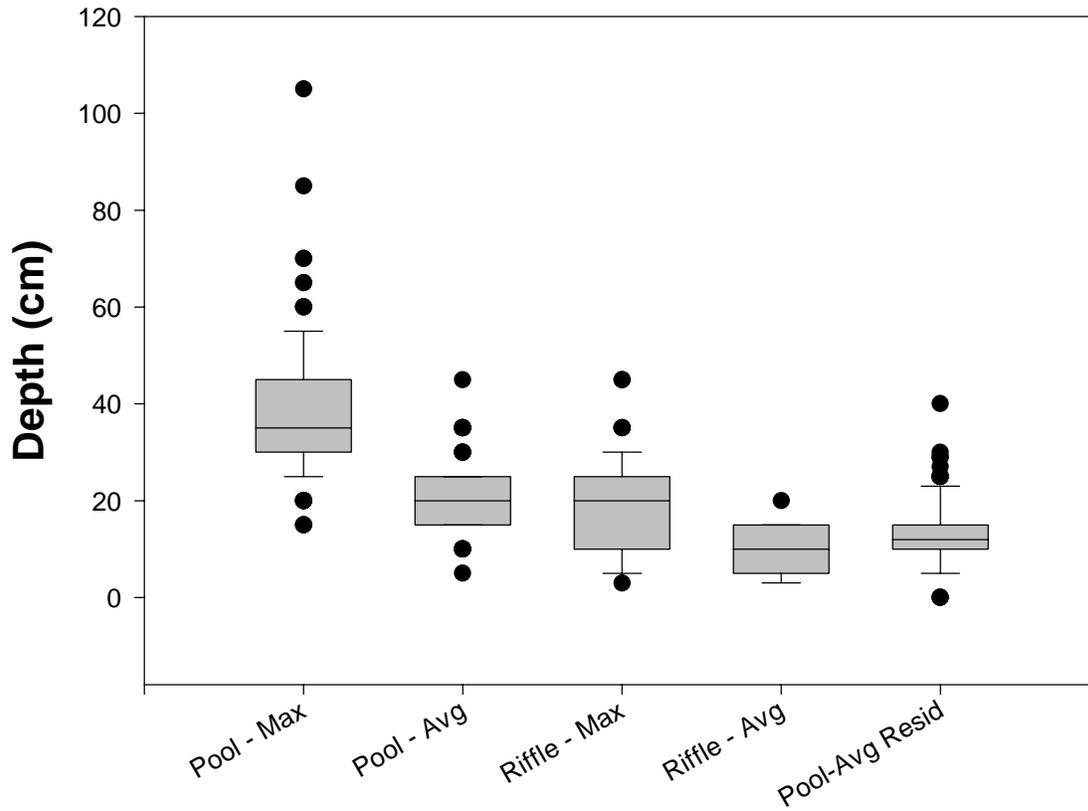
Channel Type C: 5.1 %

Channel Type D: 0.0 %

**Percent Pools with  $\geq$  35% Embeddedness:** 36.7 %

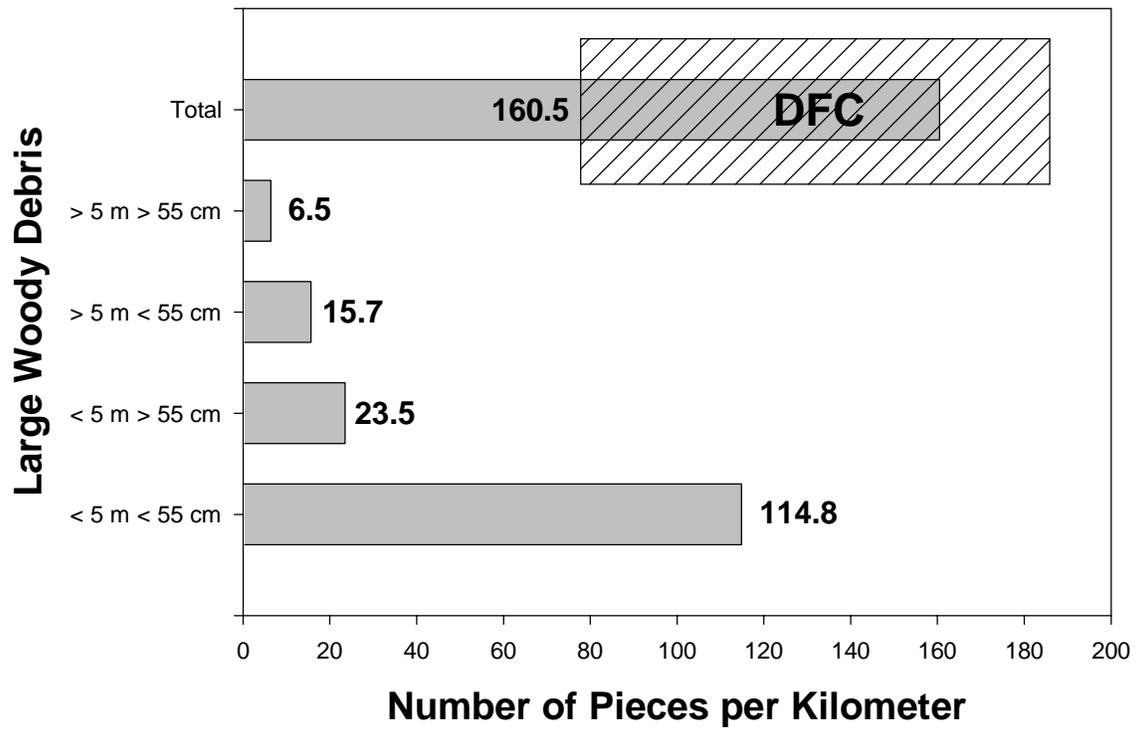
**Average Channel Gradient:** 17.5

# Spur Branch

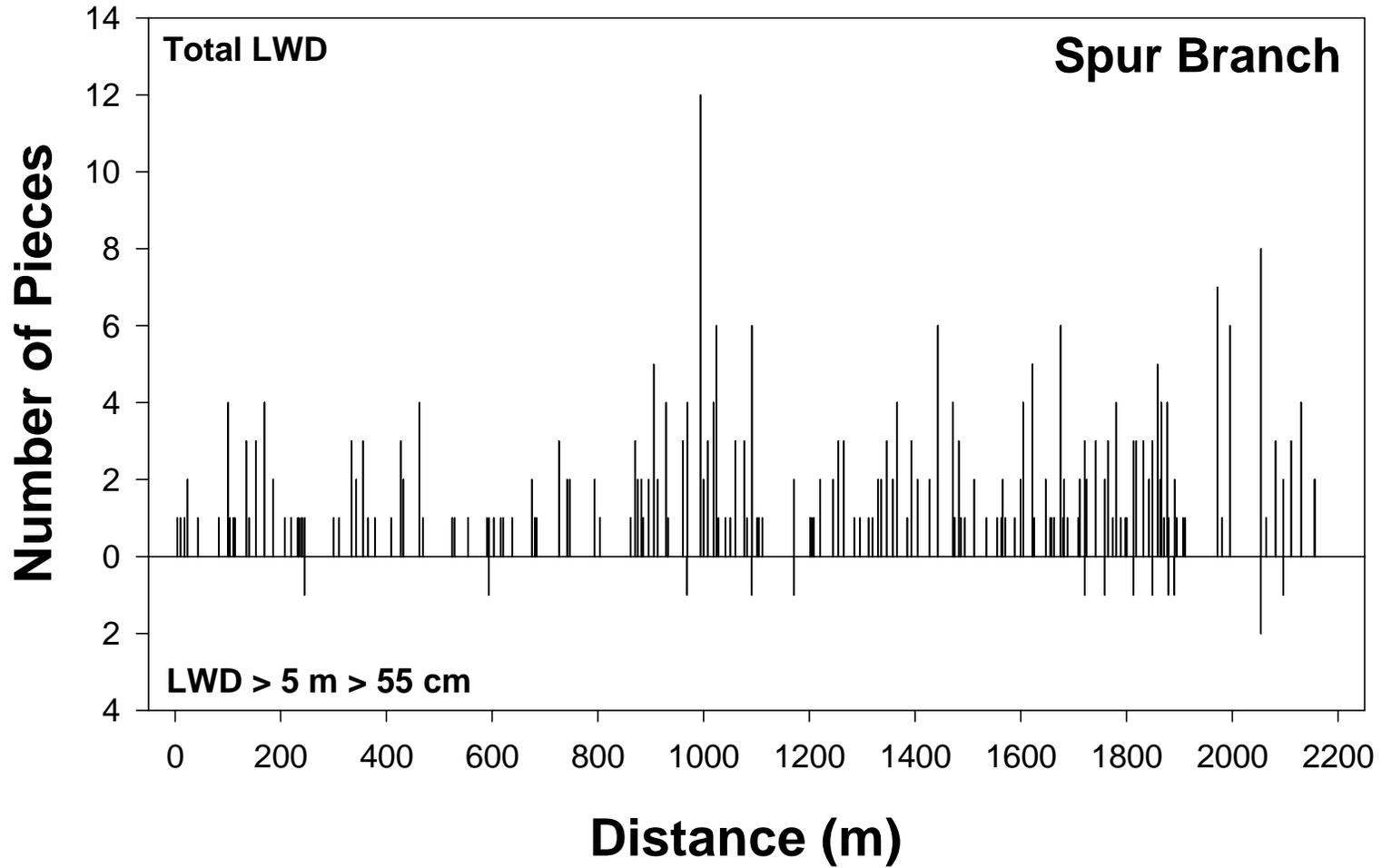


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

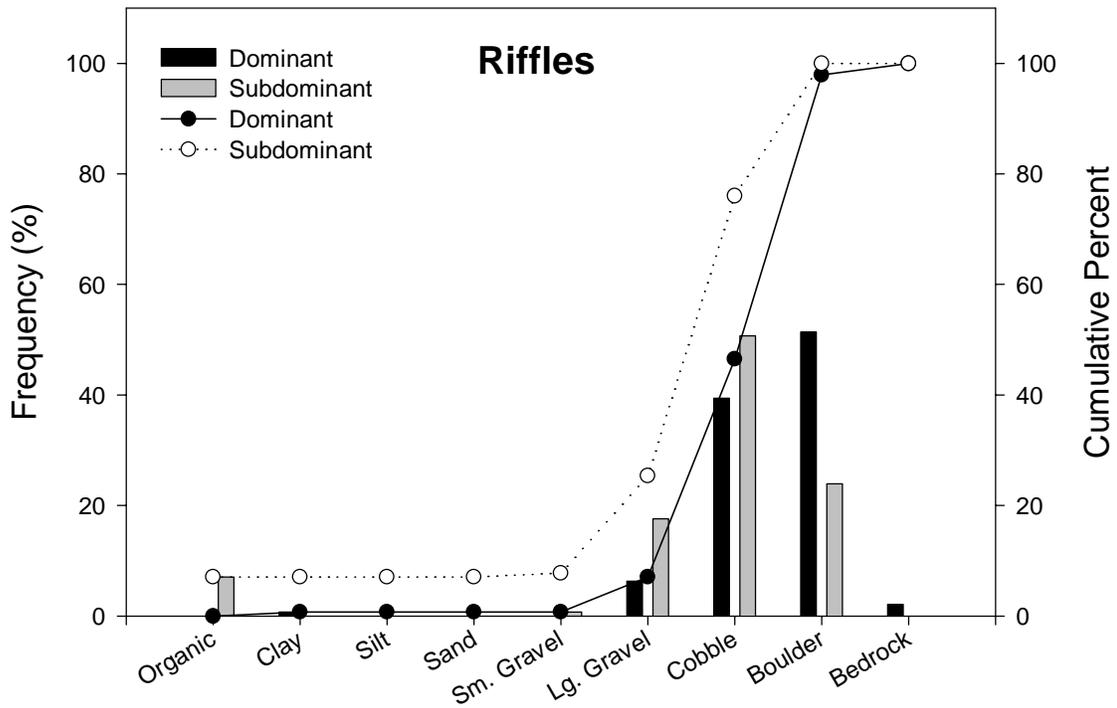
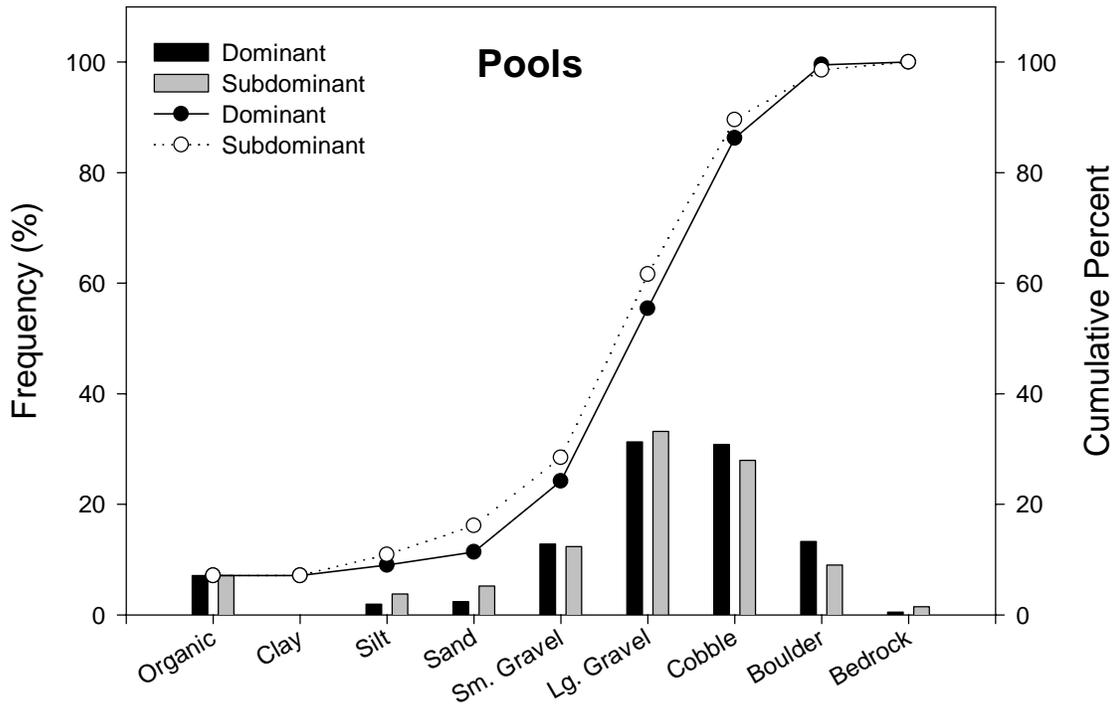
# Spur Branch



# Distribution and Abundance of Large Woody Debris



# Spur Branch Substrate Composition



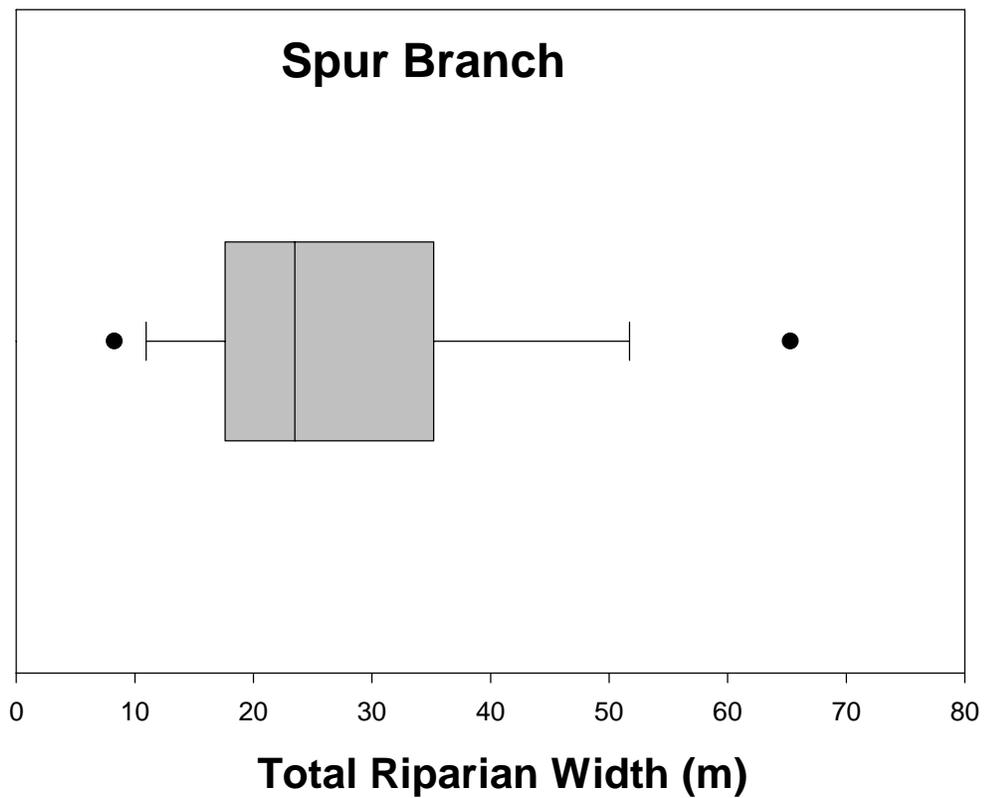
## Riparian Width

Stream: **Spur Branch**

Number of Measurements: **12**

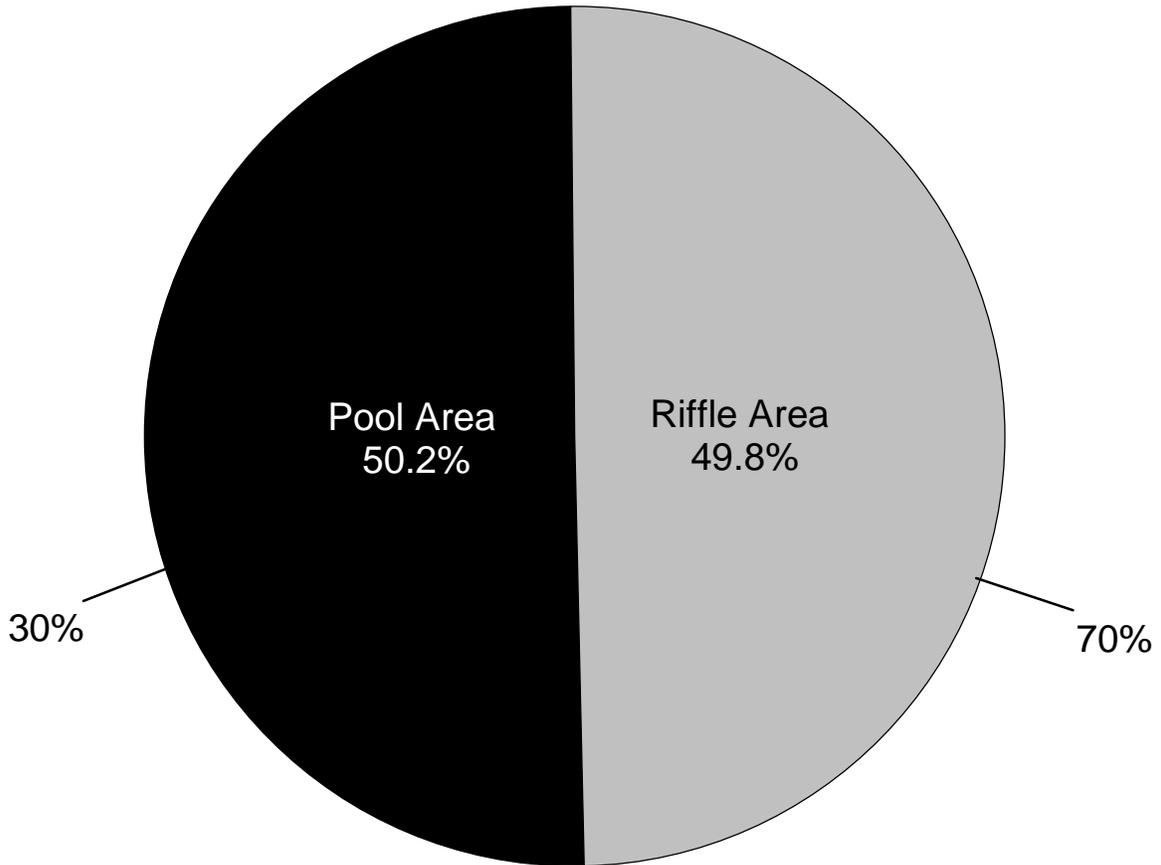
Mean Width: **27.6m** Std Dev: **16.0**

Max: **65.3m** Min: **8.3m**



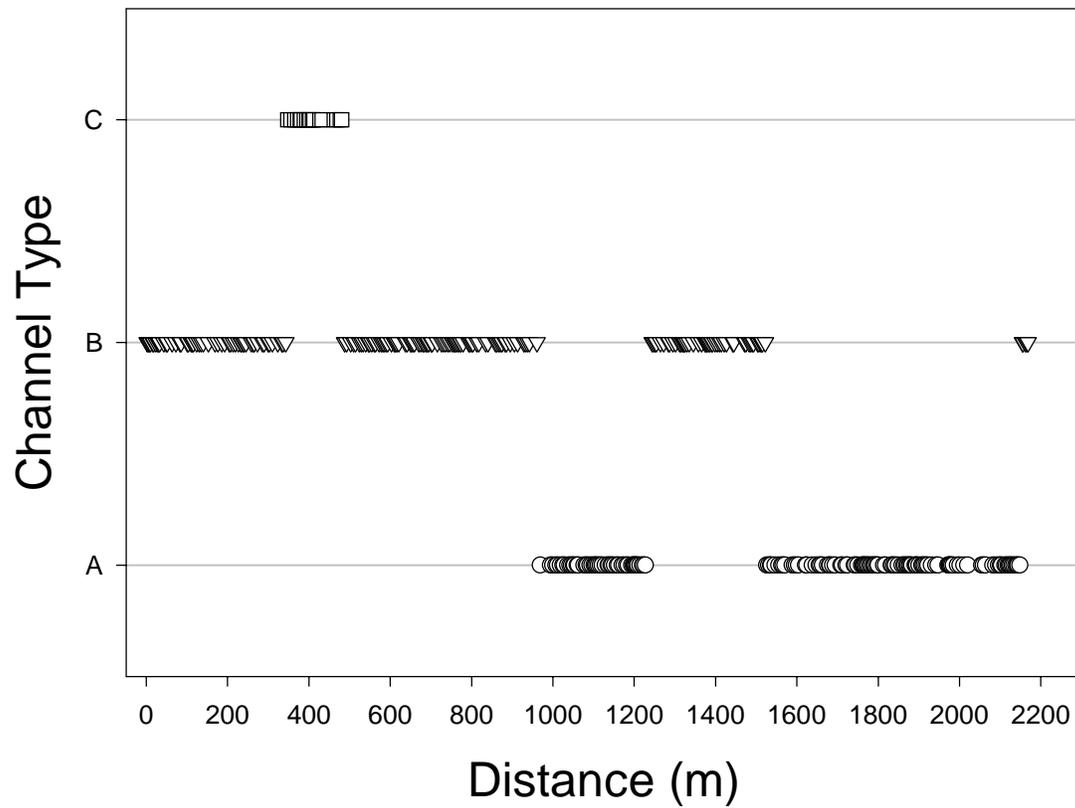
Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Spur Branch  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Spur Branch

## Rosgen's Channel Type Distribution



# Rocky Gap and Bastian Quadrangles

**Stream:** Kimberling Creek

**District:** Wythe

**Quadrangle:** Bastin

**Sample Date:** 08/03/1999

**Downstream Starting Point:** Forest Service boundary

**Total Distance Surveyed:** 5.8 kilometers

**Percent of Total Area – Pools:** 63.6%

Number of Pools: 183

Number of Pools per kilometer: 31.4

Total Pool Area: 5289.2 sq. meters  $\pm$  361.4

Mean Pool Area: 28.9 sq. meters

Correction Factor: 1.03

Mean Maximum Depth: 30.8 cm

Mean Average Depth: 19.4 cm

Mean Average Residual Pool Depth: 33.5 cm

**Percent of Total Area – Riffles:** 36.4%

Number of Riffles: 110

Number of Riffles per kilometer: 18.9

Total Riffle Area: 3029.8 sq. meters  $\pm$  340.6

Mean Riffle Area: 27.5 sq. meters

Correction Factor: 1.01

Mean Maximum Depth: 6.8 cm

Mean Average Depth: 3.2 cm

**Number of Large Woody Debris Pieces per kilometer:** 138.8

Wood < 5 m and < 55 cm: 87.3

Wood < 5 m and > 55 cm: 5.5

Wood > 5 m and < 55 cm: 33.5

Wood > 5 m and > 55 cm: 12.5

**Mean Channel Width:** 6.1 m

**Mean Riparian Width:** 36.4 m

Mean Maximum Riparian Distance (either side): 28.2 m

Mean Minimum Riparian Distance (either side): 4.5 m

Maximum Riparian Width (Total): 70.0 m

Minimum Riparian Width (Total): 1.0 m

Kimberling Creek Continued.

**Percent of Pool Habitat Surveyed as Glides:** 39.7%

**Rosgen=s Channel Type Frequency:**

Channel Type A: 14.3%

Channel Type B: 30.0%

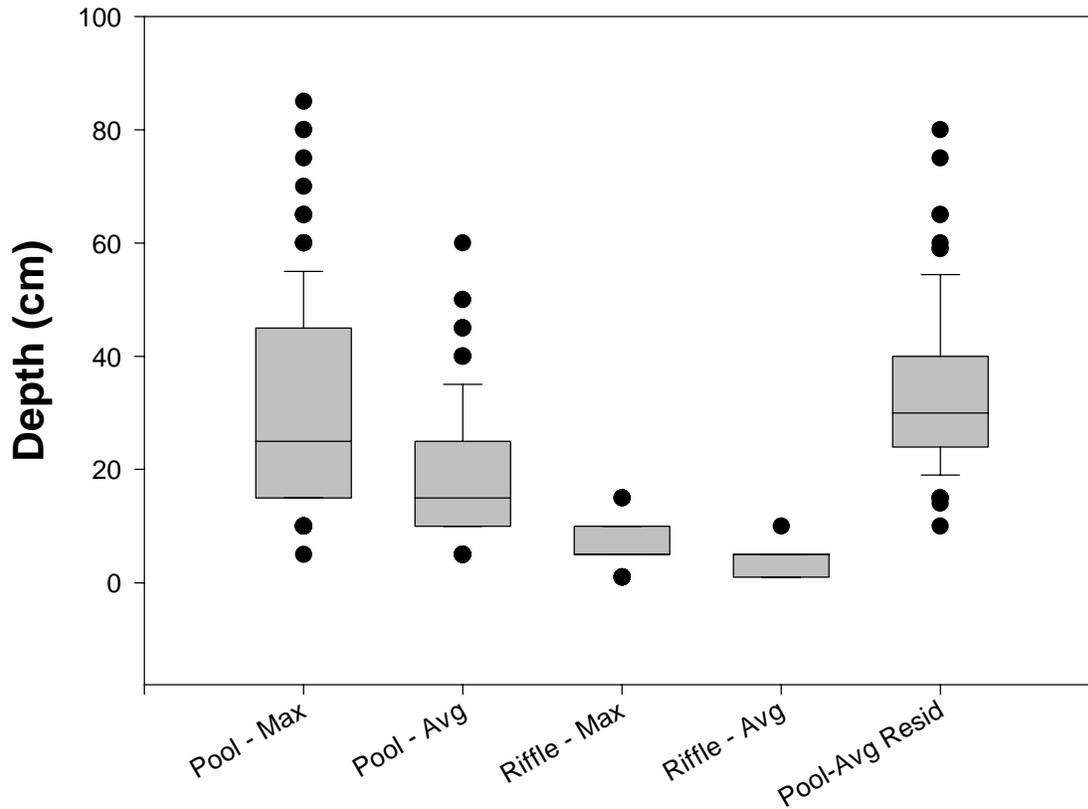
Channel Type C: 55.6%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 0.0%

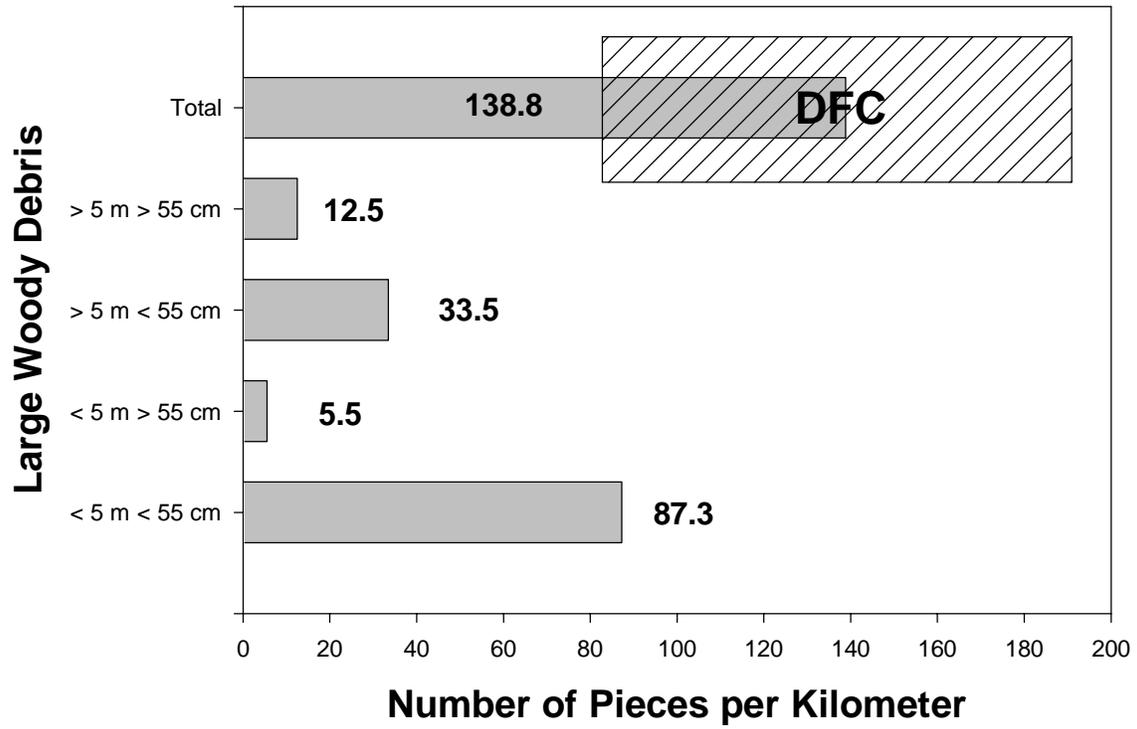
**Average Channel Gradient:** 3.1

# Kimberling Creek

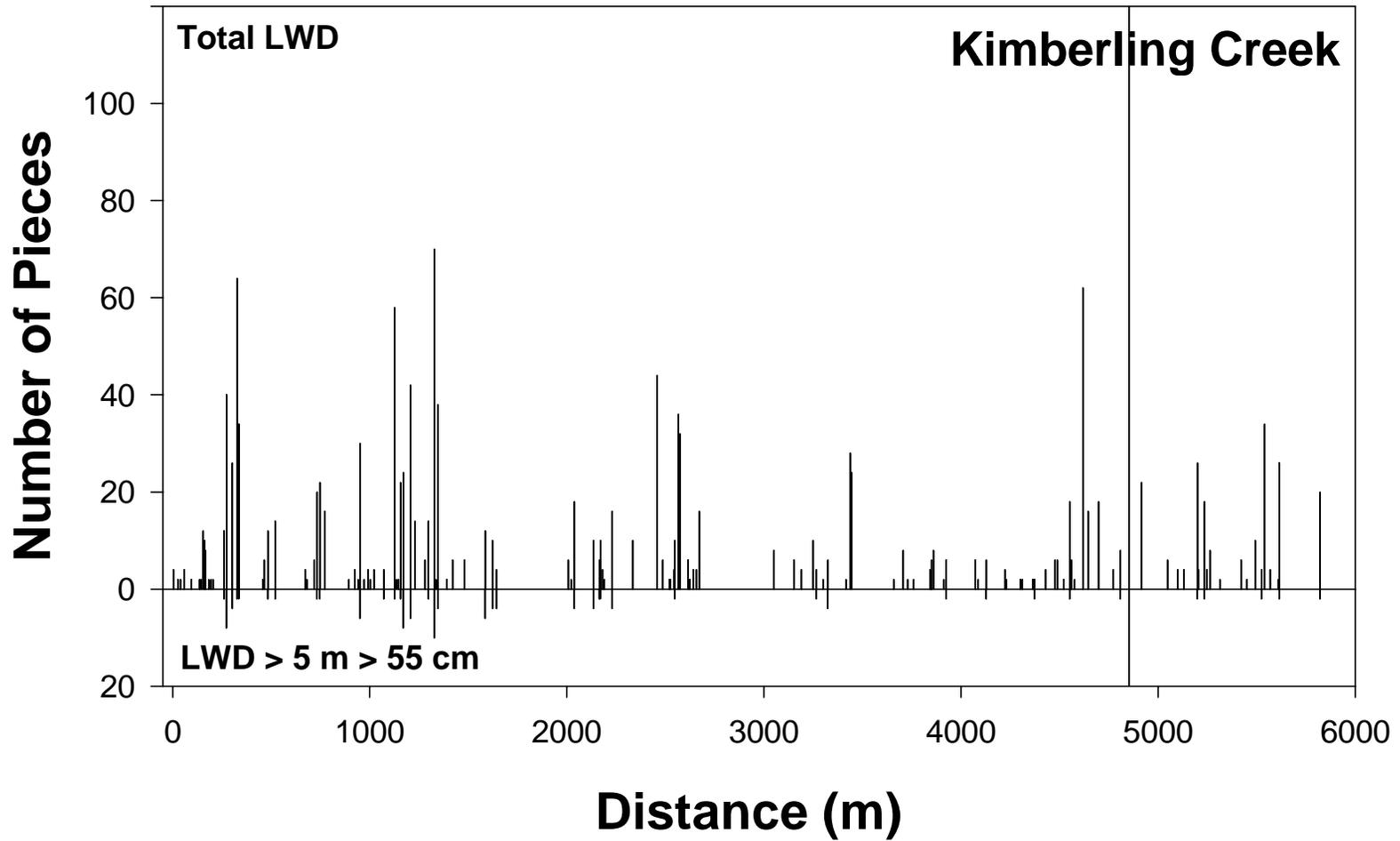


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

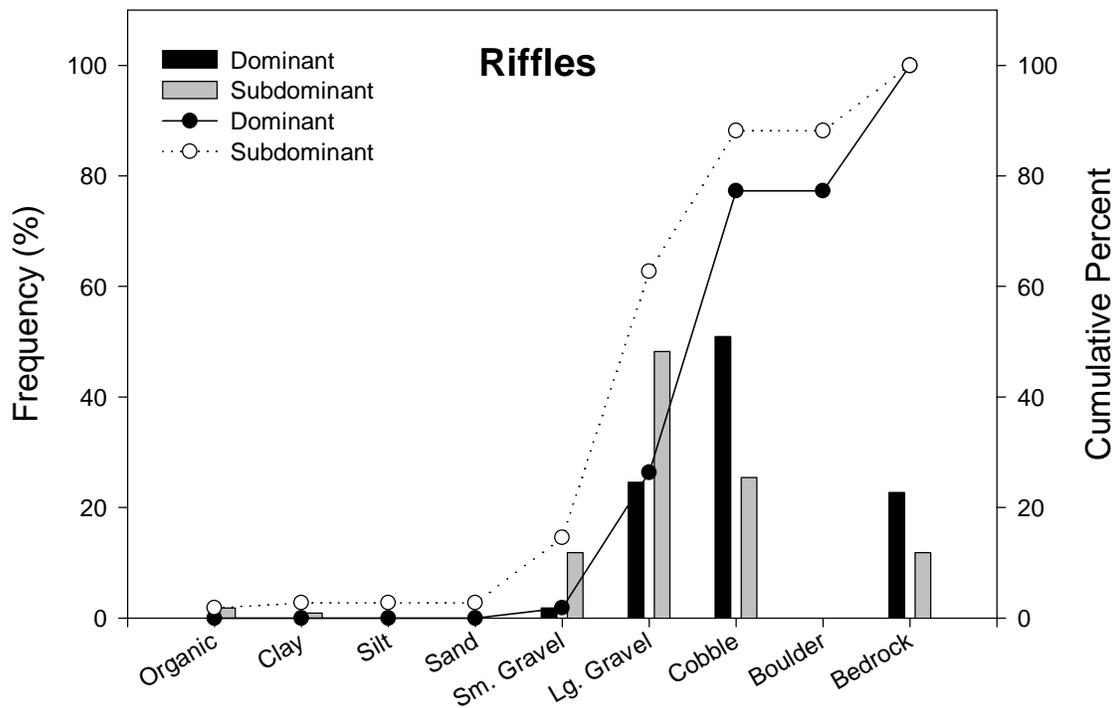
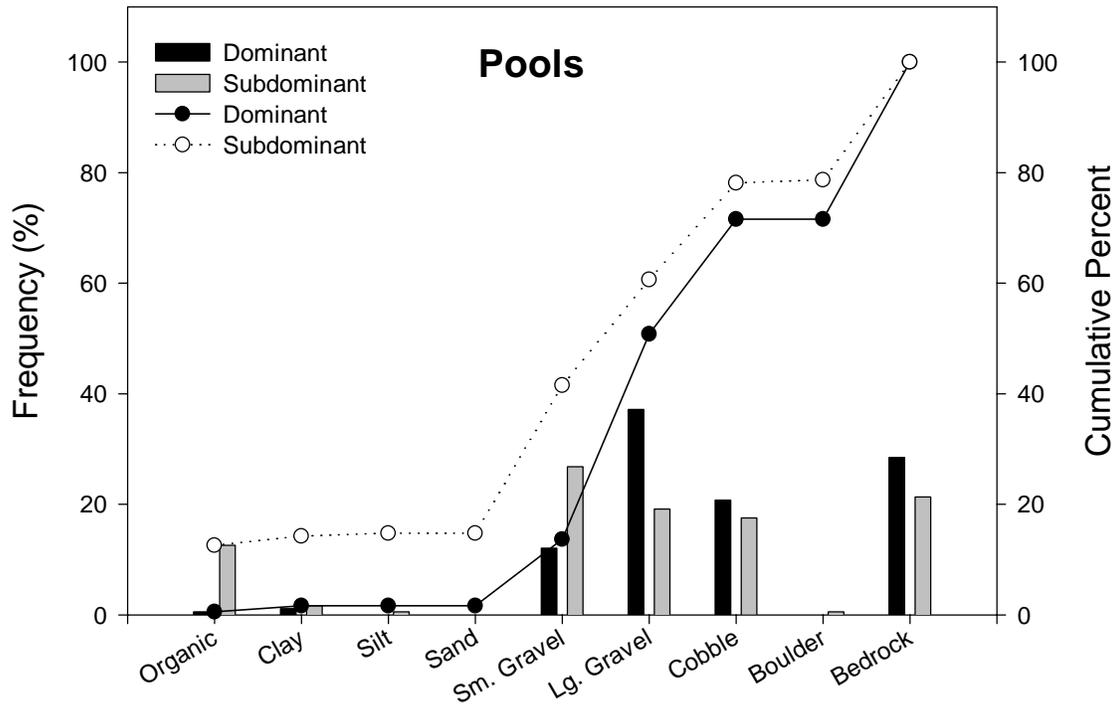
# Kimberling Creek



# Distribution and Abundance of Large Woody Debris



# Kimberling Creek Substrate Composition



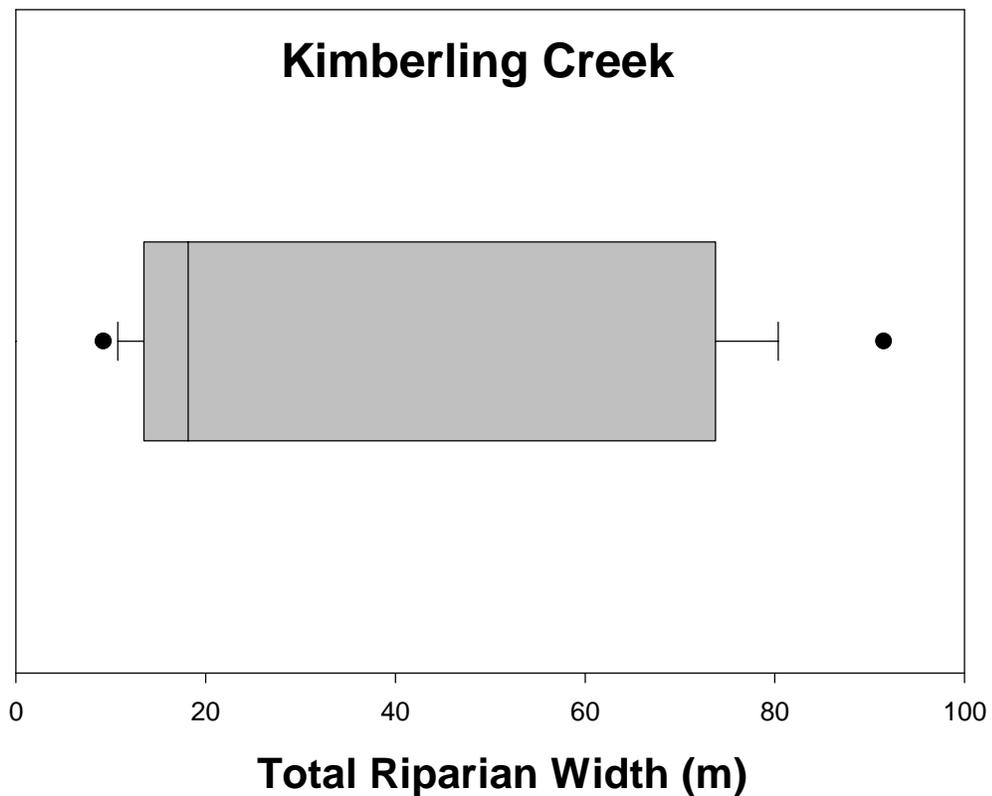
## Riparian Width

Stream: Kimberling Creek

Number of Measurements: 12

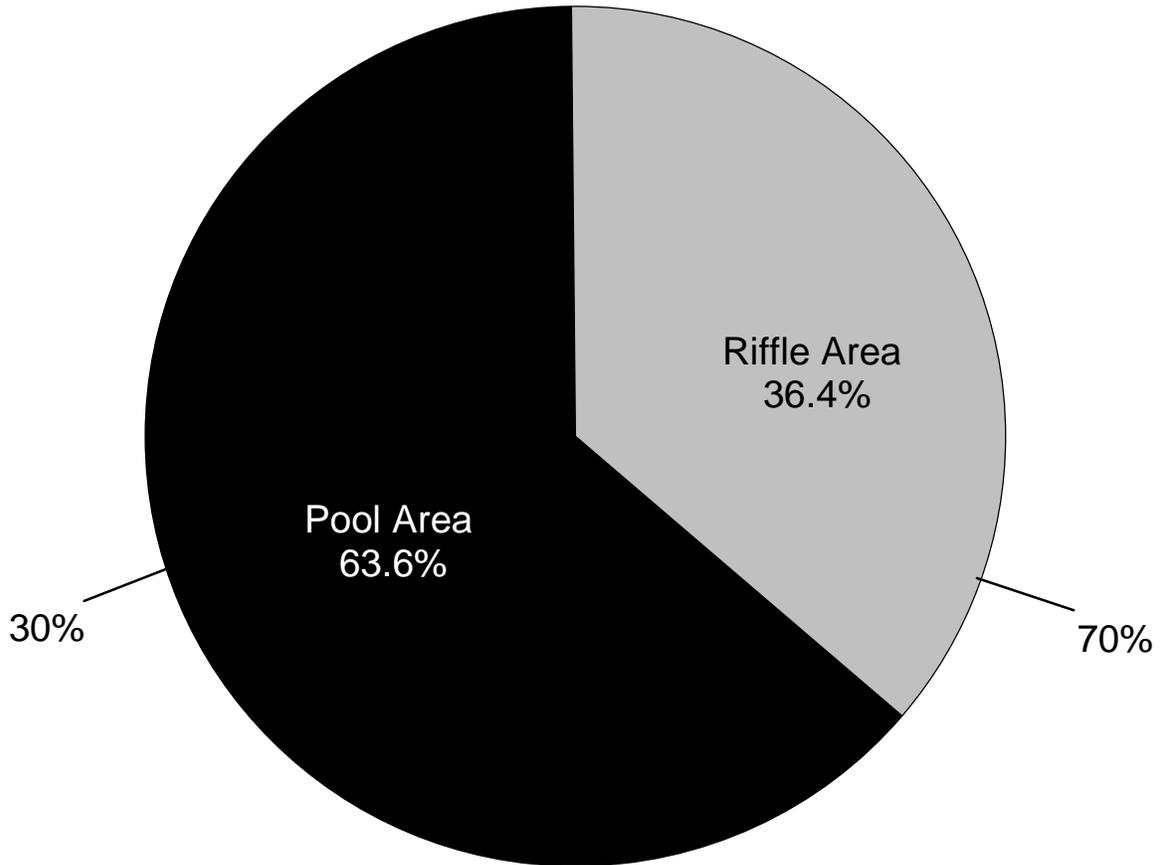
Mean Width: 36.4m Std Dev: 31.7

Max: 91.5m Min: 9.2m

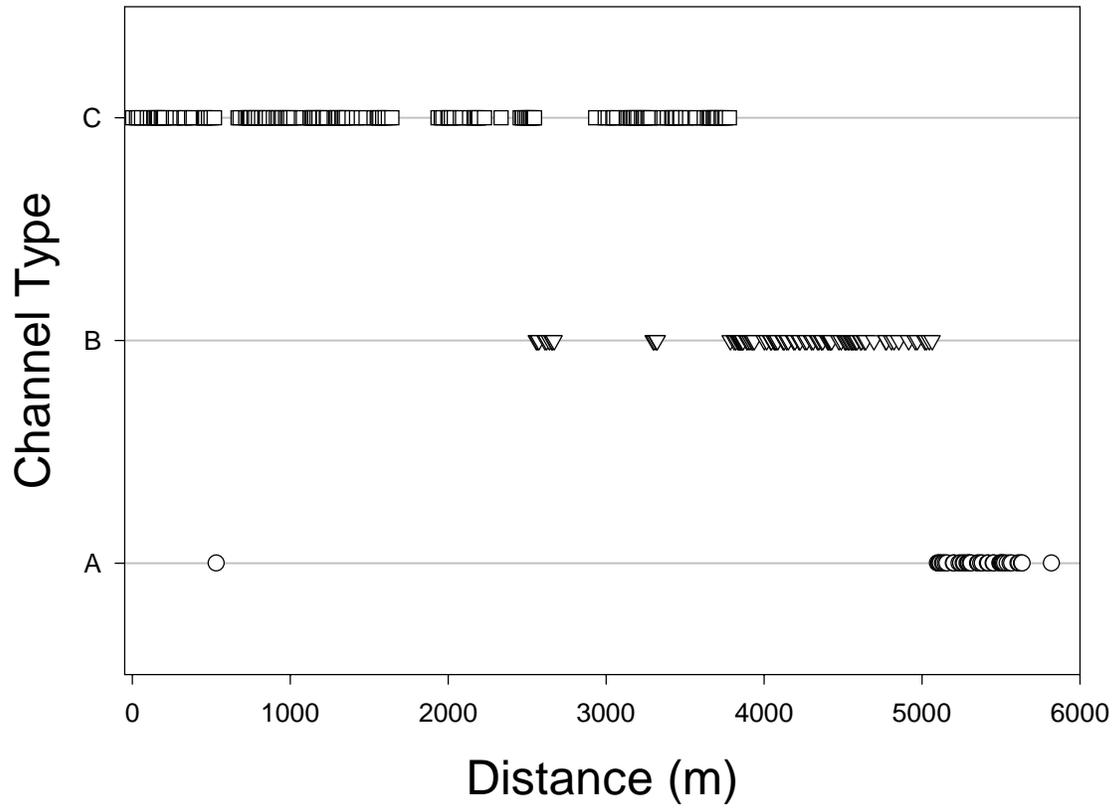


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Kimberling Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Kimberling Creek Rosgen's Channel Type Distribution



**Stream:** North Fork Kimberling Creek

**District:** Wythe

**Quadrangle:** Rocky Gap

**Sample Date:** 07/20/1999

**Downstream Starting Point:** Forest Service boundary

**Total Distance Surveyed:** 4.3 kilometers

**Percent of Total Area – Pools:** 56.1%

Number of Pools: 211

Number of Pools per kilometer: 49.0

Total Pool Area: 4239.4 sq. meters  $\pm$  356.6

Mean Pool Area: 20.1 sq. meters

Correction Factor: 1.00

Mean Maximum Depth: 25.3cm

Mean Average Depth: 11.4 cm

Mean Average Residual Pool Depth: 25.6 cm

**Percent of Total Area – Riffles:** 43.9%

Number of Riffles: 132

Number of Riffles per kilometer: 30.6

Total Riffle Area: 3321.5 sq. meters  $\pm$  513.4

Mean Riffle Area: 25.2 sq. meters

Correction Factor: 1.11

Mean Maximum Depth: 9.5 cm

Mean Average Depth: 3.1 cm

**Number of Large Woody Debris Pieces per kilometer:** 98.4

Wood < 5 m and < 55 cm: 61.8

Wood < 5 m and > 55 cm: 0.9

Wood > 5 m and < 55 cm: 30.2

Wood > 5 m and > 55 cm: 5.6

**Mean Channel Width:** 7.9 m

**Mean Riparian Width:** 65.4 m

Mean Maximum Riparian Distance (either side): 49.5 m

Mean Minimum Riparian Distance (either side): 8.0 m

Maximum Riparian Width (Total): 114.4 m

Minimum Riparian Width (Total): 0.8 m

North Fork Kimberling Continued.

**Percent of Pool Habitat Surveyed as Glides:** 13.4%

**Rosgen=s Channel Type Frequency:**

Channel Type A: 8.9%

Channel Type B: 75.3%

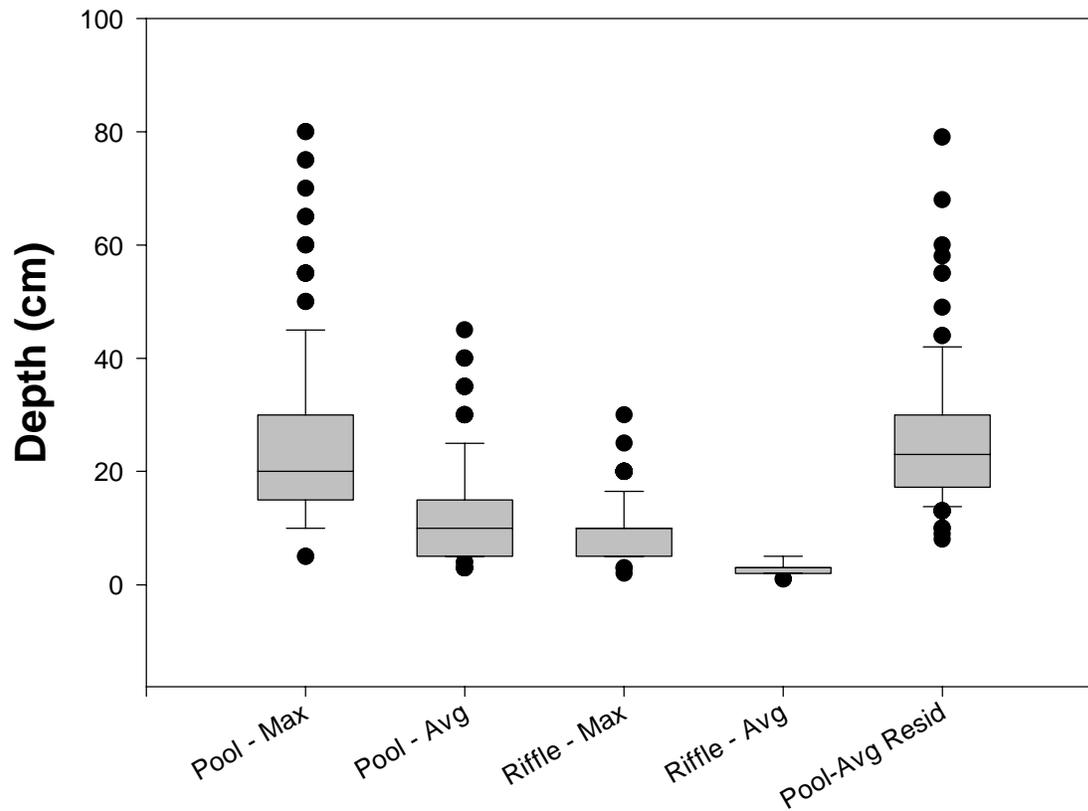
Channel Type C: 15.8%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 0.0%

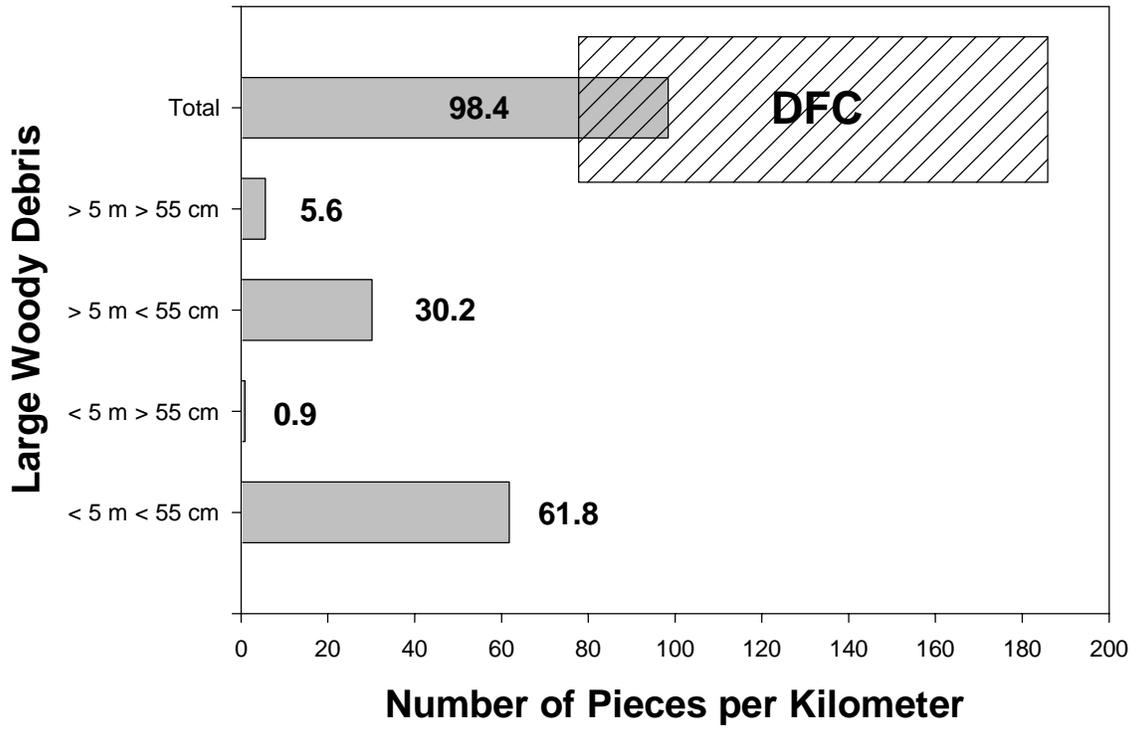
**Average Channel Gradient:** 8.0

# North Fork Kimberling Creek

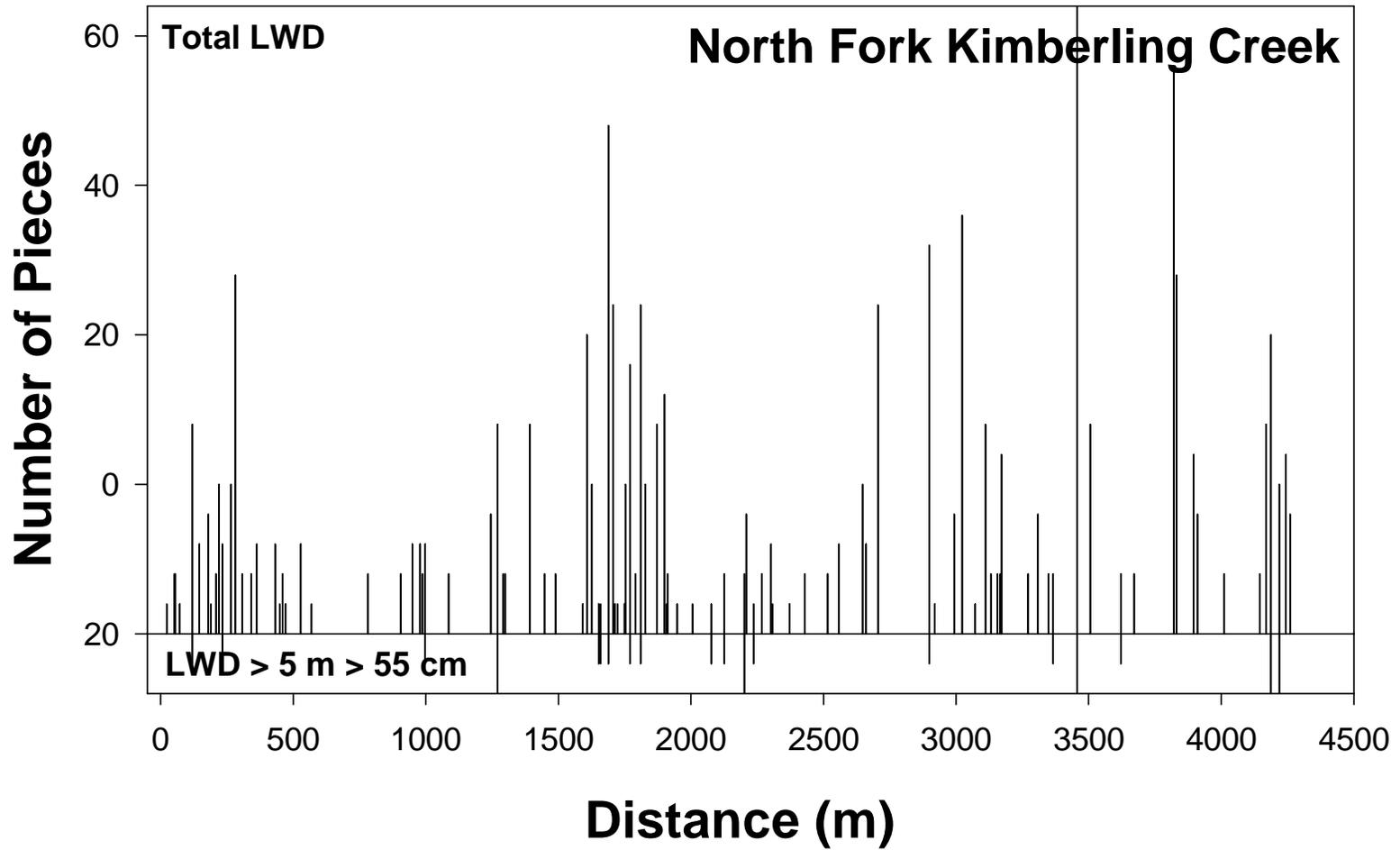


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

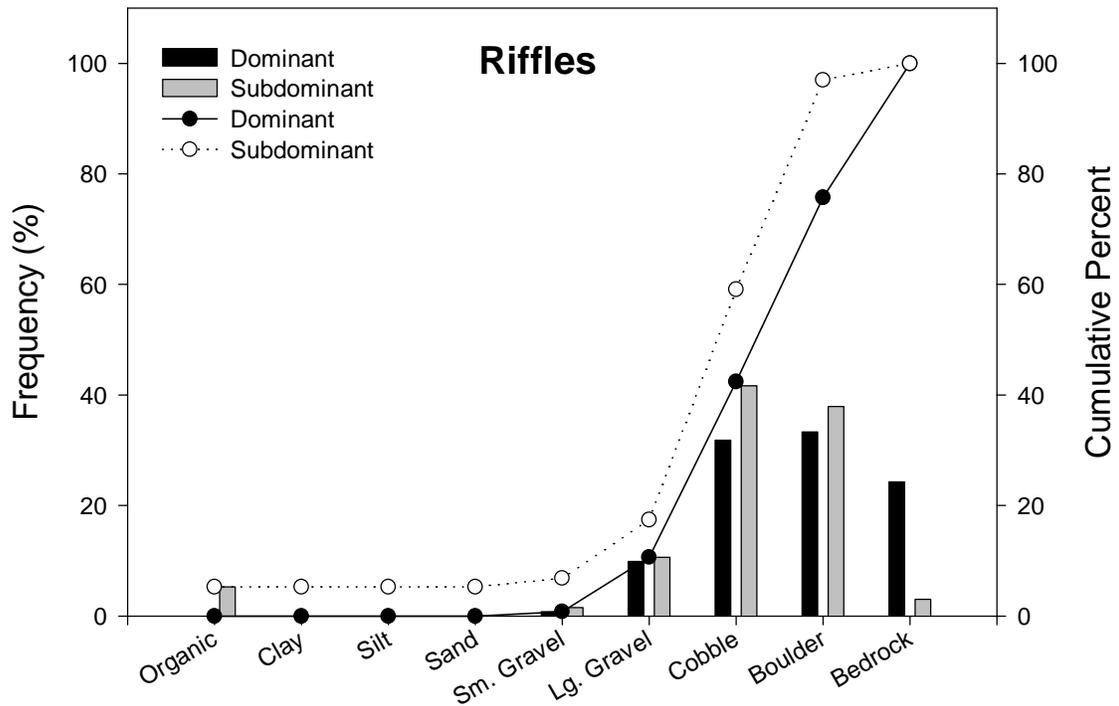
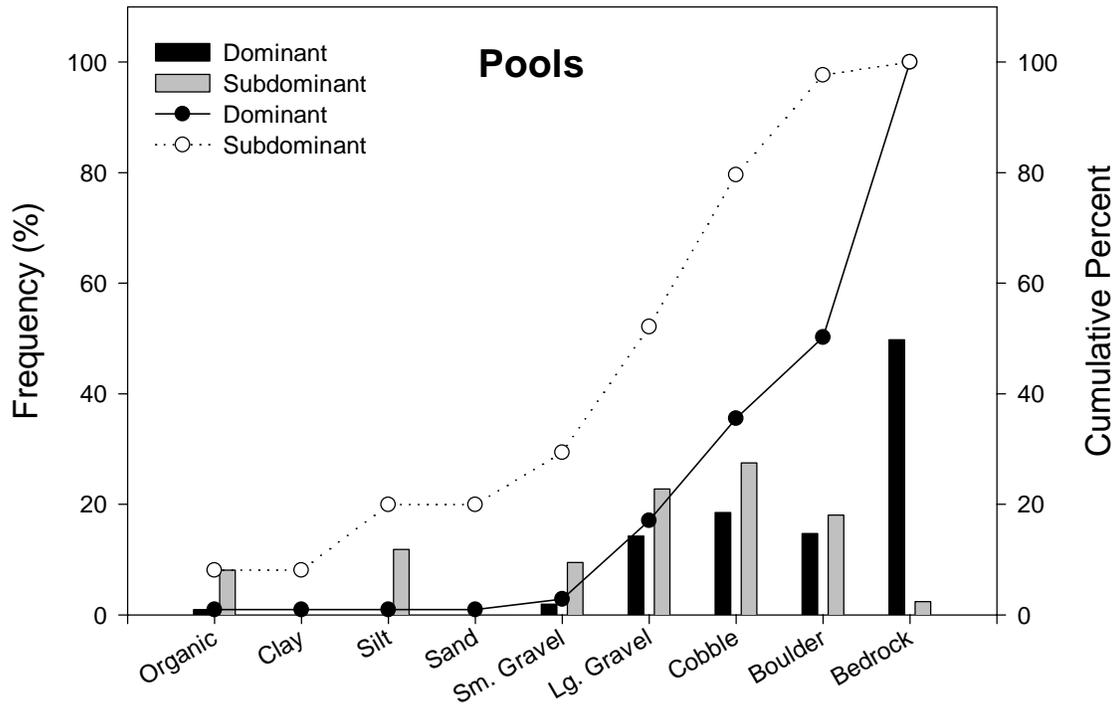
# North Fork Kimberling Creek



# Distribution and Abundance of Large Woody Debris



# North Fork Kimberling Creek Substrate Composition



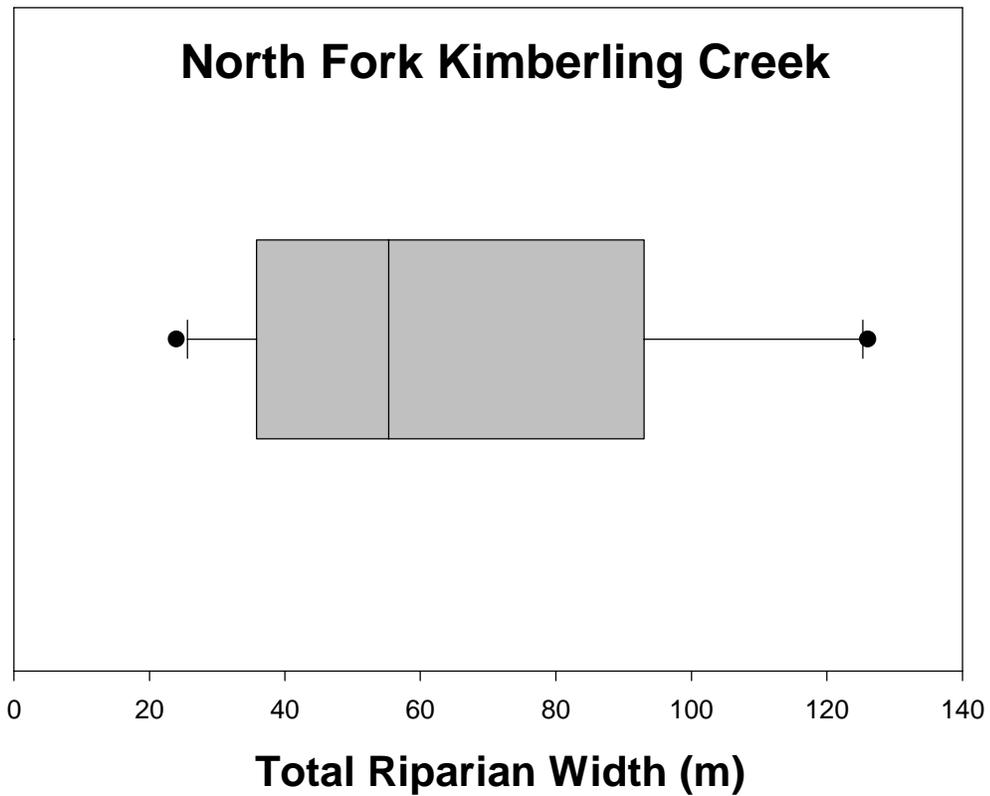
## Riparian Width

Stream: Indian Grave Creek

Number of Measurements: 6

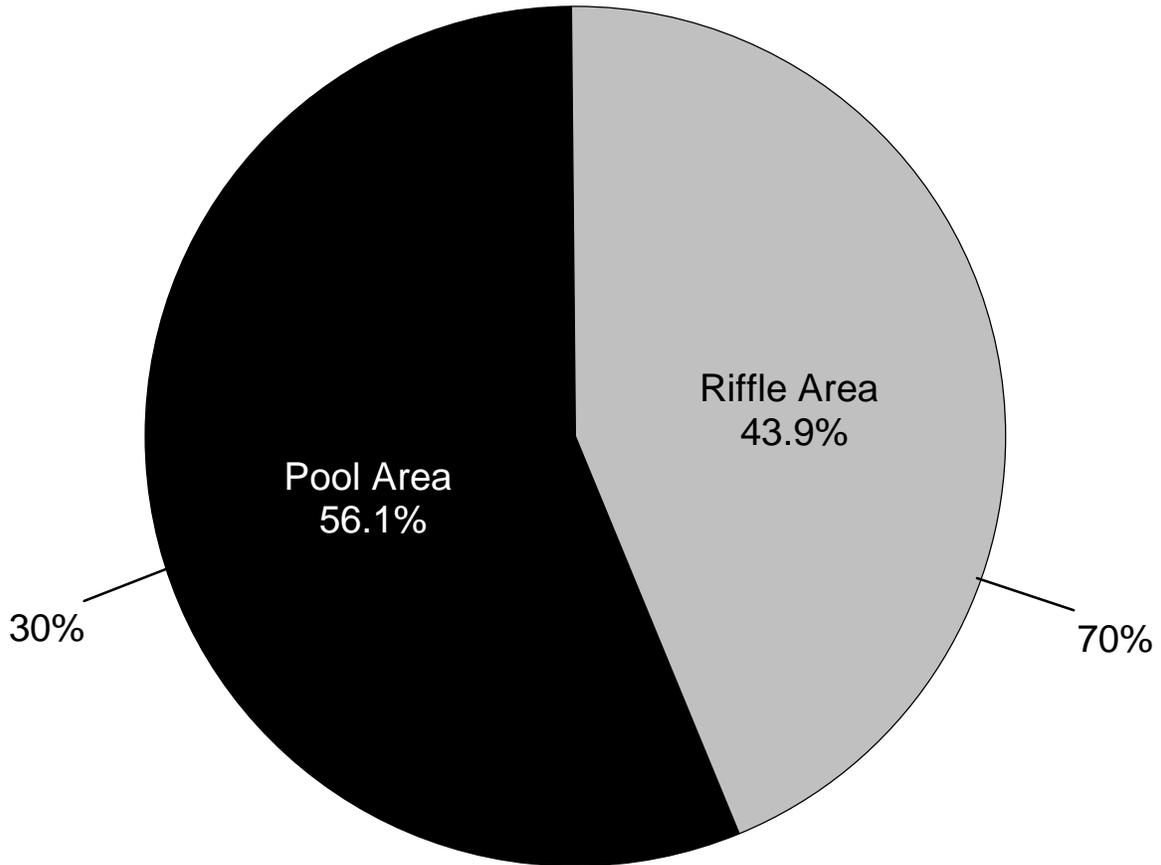
Mean Width: 36.8m Std Dev: 25.9

Max: 67.5m Min: 13.0m

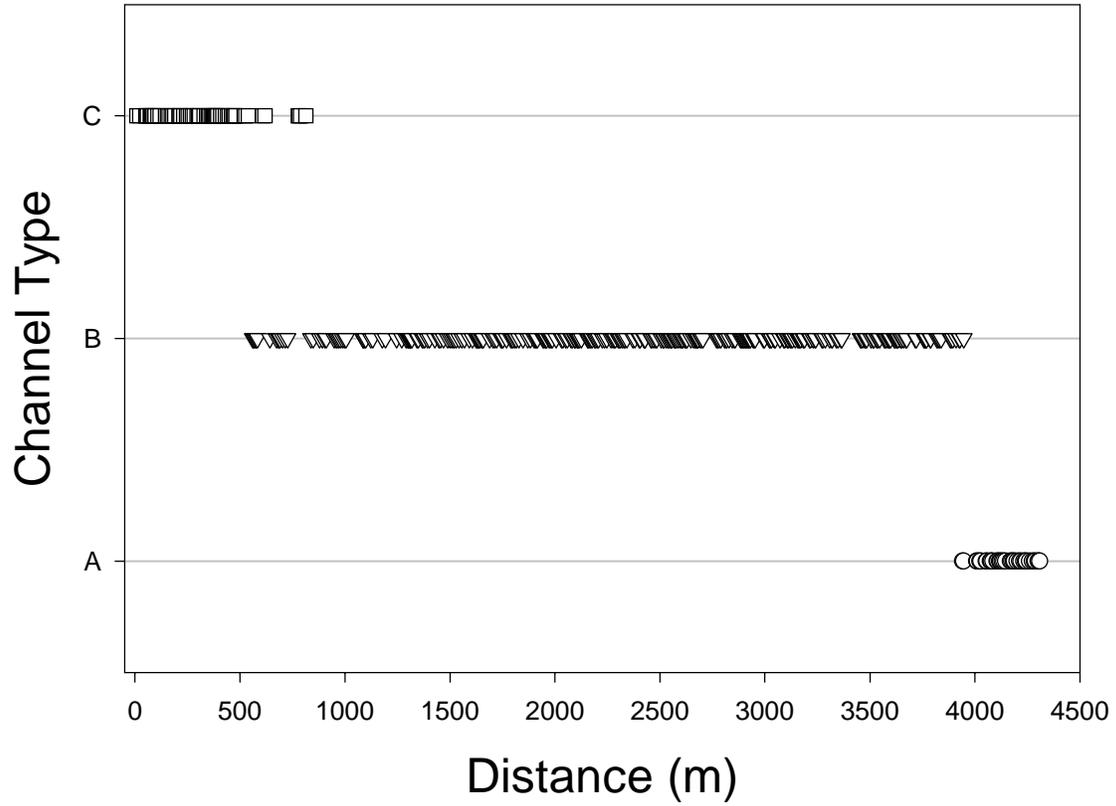


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**North Fork Kimberling Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# North Fork Kimberling Creek Rosgen's Channel Type Distribution



**Stream:** Sulfur Spring Fork

**District:** Wythe

**Quadrangle:** Rocky Gap

**Sample Date:** 07/19/1999

**Downstream Starting Point:** Forest Service boundary, bridge on RT 612

**Total Distance Surveyed:** 0.9 kilometers

**Percent of Total Area – Pools:** 71.6%

Number of Pools: 21

Number of Pools per kilometer: 24.4

Total Pool Area: 639.9 sq. meters  $\pm$  73.6

Mean Pool Area: 30.3 sq. meters

Correction Factor: 1.00

Mean Maximum Depth: 32.6 cm

Mean Average Depth: 13.6 cm

Mean Average Residual Pool Depth: 41.0 cm

**Percent of Total Area – Riffles:** 28.4%

Number of Riffles: 5

Number of Riffles per kilometer: 252.7

Total Riffle Area: 252.7 sq. meters  $\pm$  61.8

Mean Riffle Area: 50.5 sq. meters

Correction Factor: 1.04

Mean Maximum Depth: 10.6 cm

Mean Average Depth: 2.8cm

**Number of Large Woody Debris Pieces per kilometer:** 129.0

Wood < 5 m and < 55 cm: 66.2

Wood < 5 m and > 55 cm: 0.0

Wood > 5 m and < 55 cm: 38.3

Wood > 5 m and > 55 cm: 24.4

**Mean Channel Width:** 6.8 m

**Mean Riparian Width:** 51.8 m

Mean Maximum Riparian Distance (either side): 42.8 m

Mean Minimum Riparian Distance (either side): 2.2 m

Maximum Riparian Width (Total): 76.4 m

Minimum Riparian Width (Total): 0.3 m

Sulfur Spring Fork Continued.

**Percent of Pool Habitat Surveyed as Glides:** 5.0%

**Rosgen=s Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 94.6%

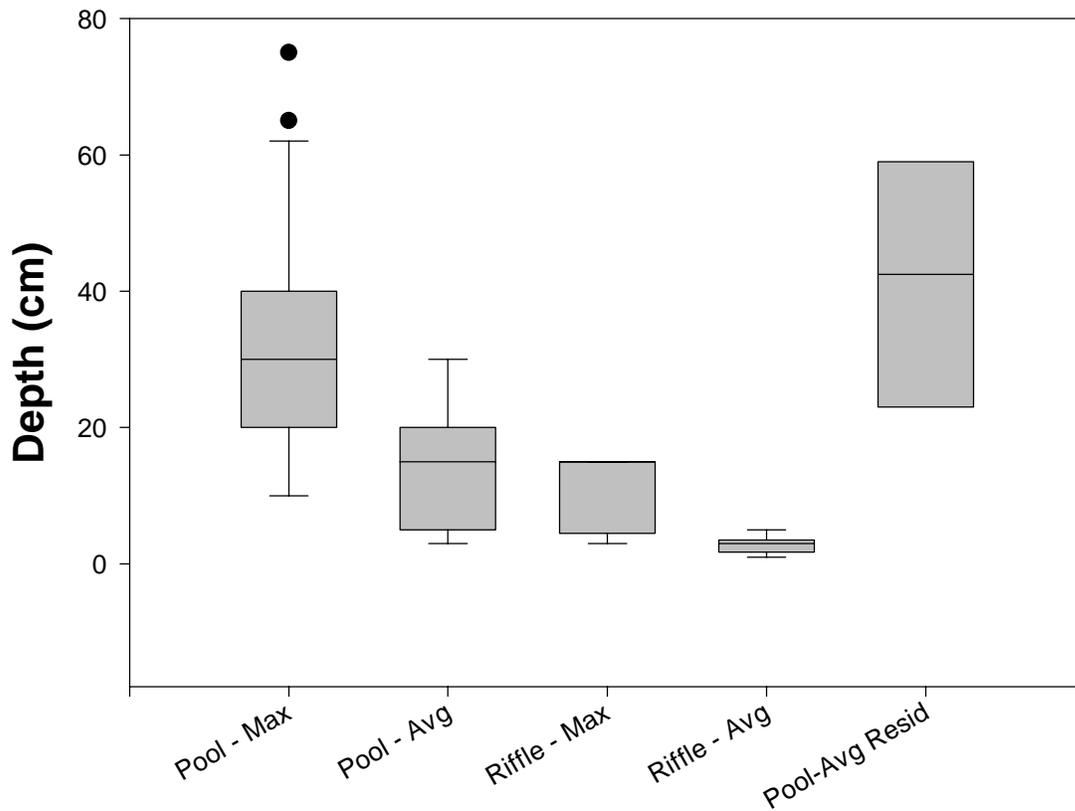
Channel Type C: 5.4%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 0.0%

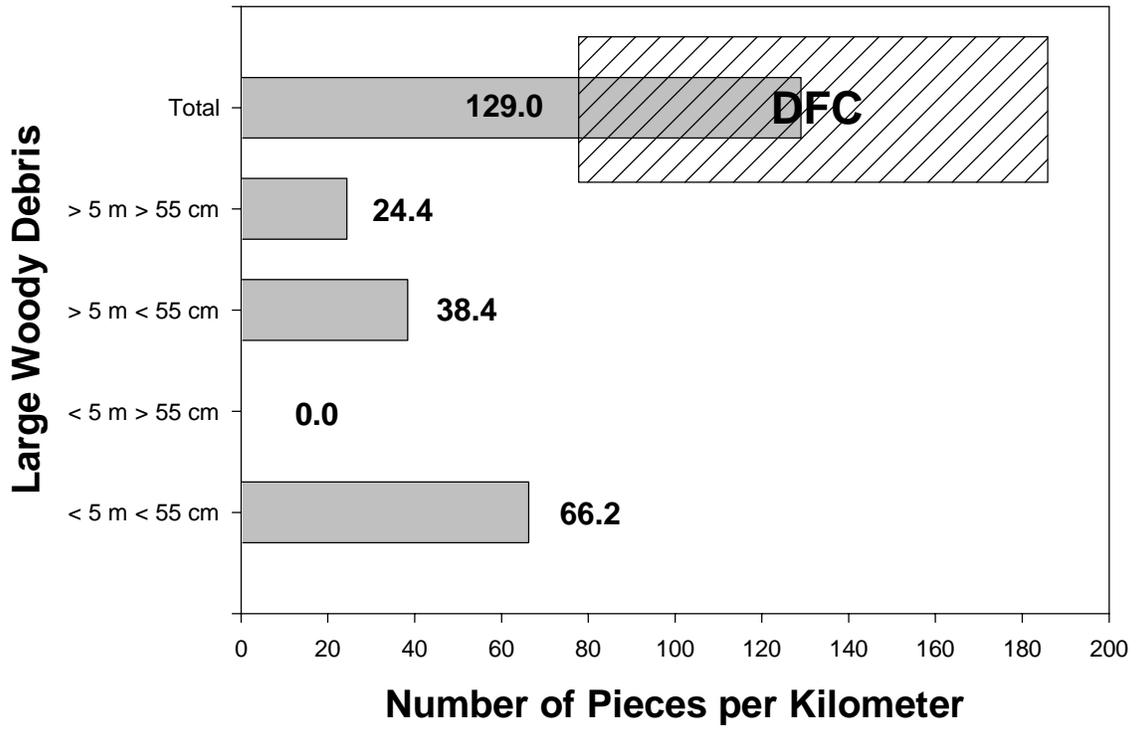
**Average Channel Gradient:** 12.0

# Sulfur Spring Fork

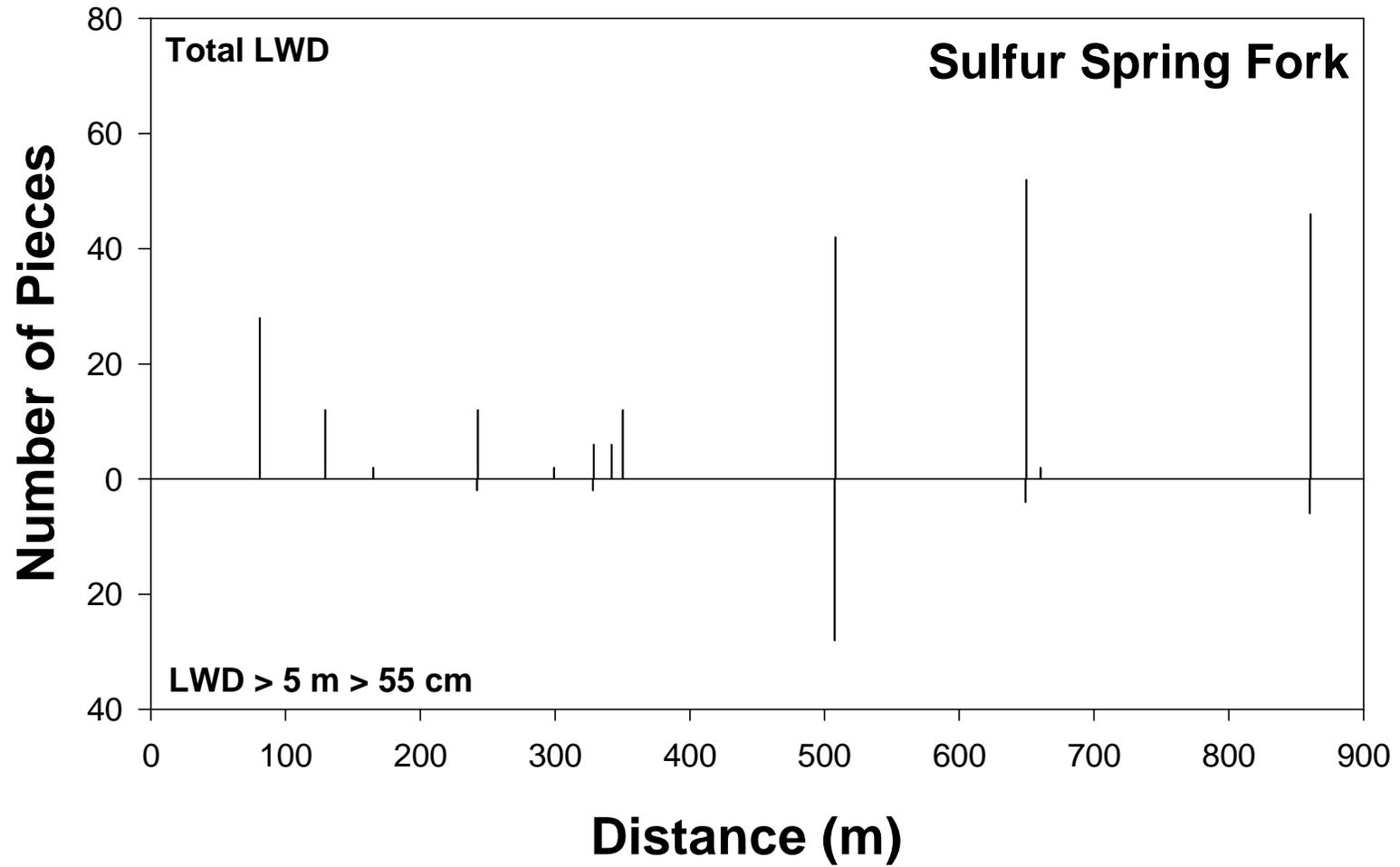


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

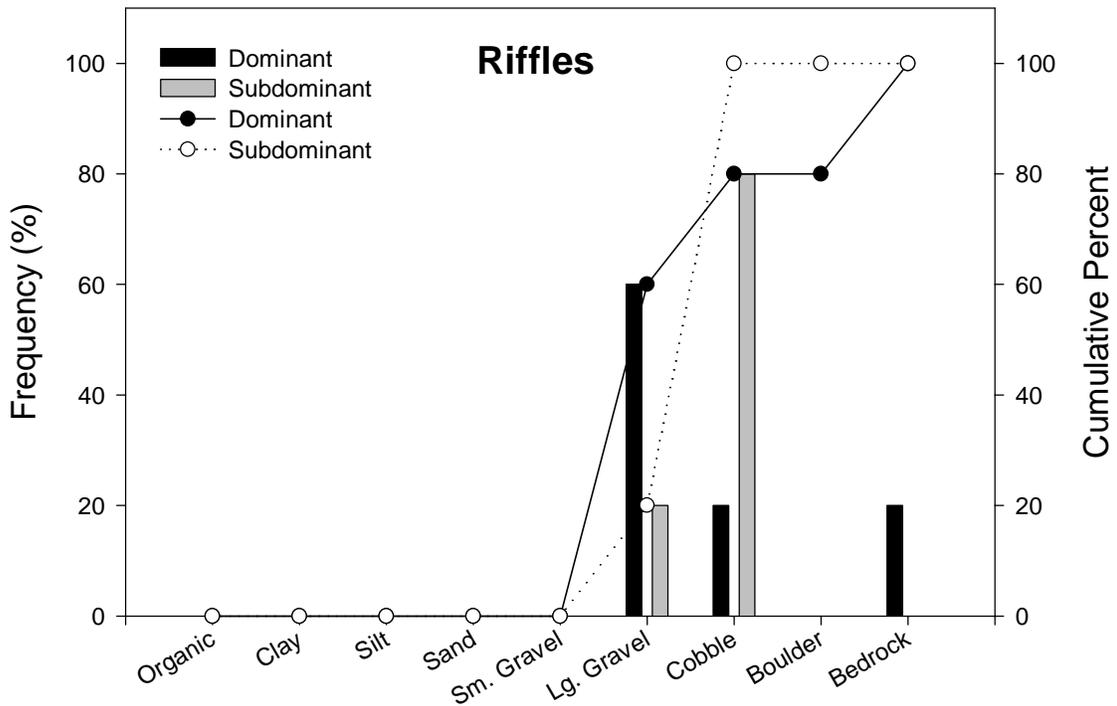
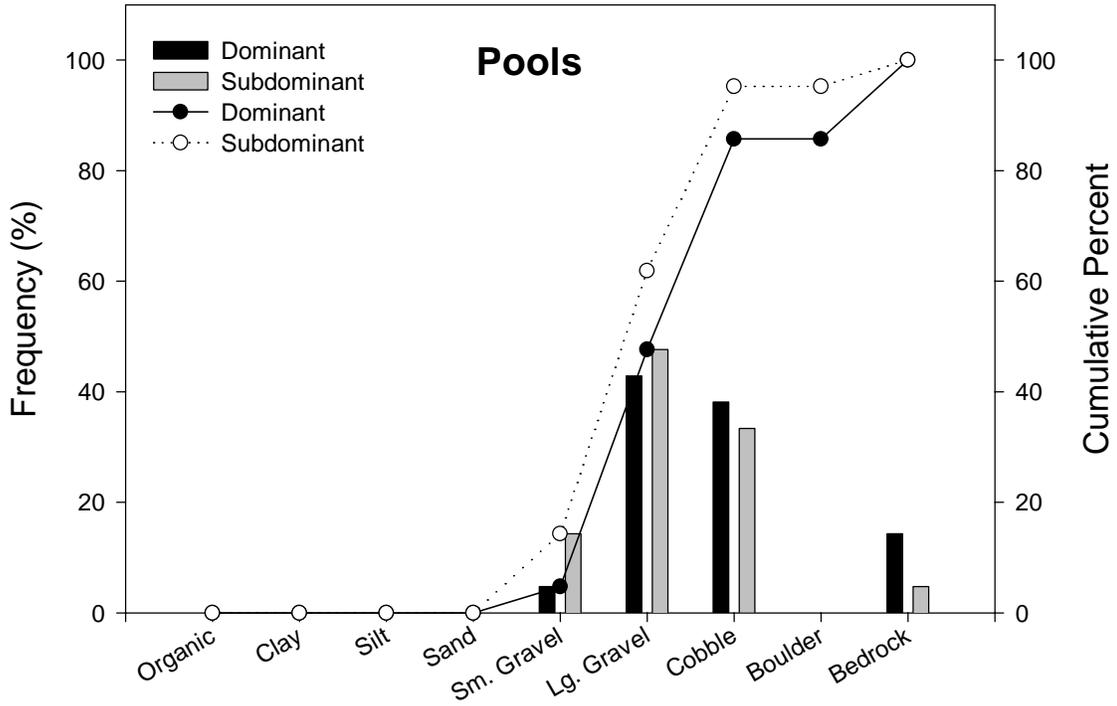
# Sulfur Spring Fork



# Distribution and Abundance of Large Woody Debris



# Sulfur Spring Fork Substrate Composition



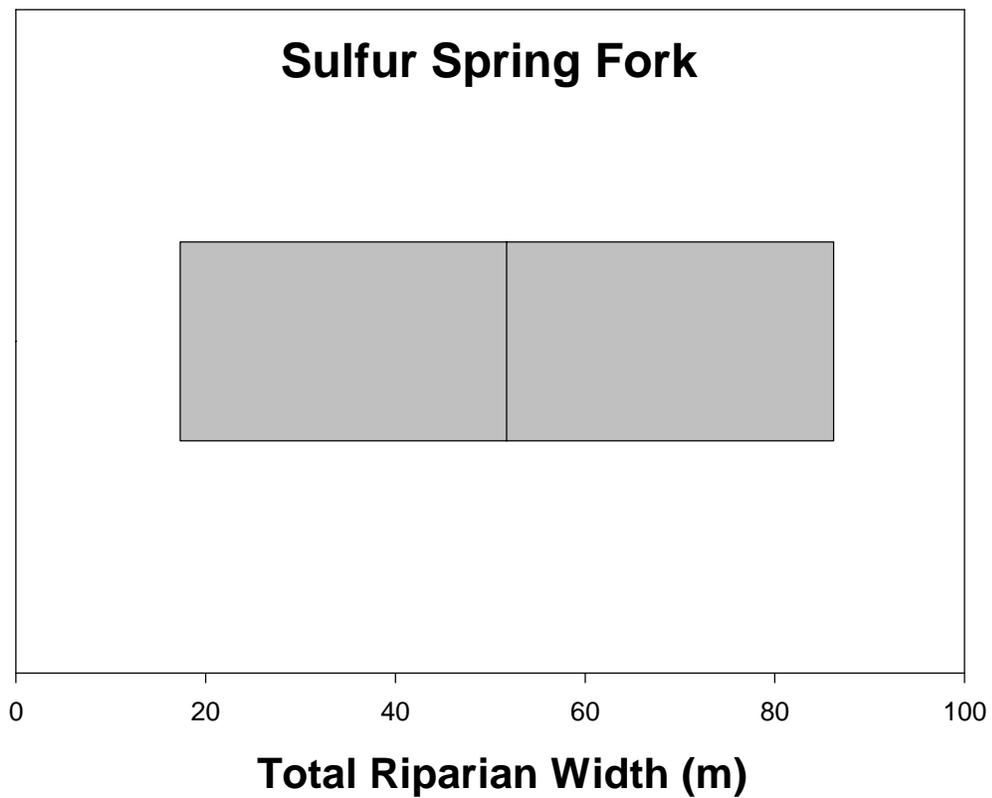
## Riparian Width

Stream: Sulfur Spring Fork

Number of Measurements: 2

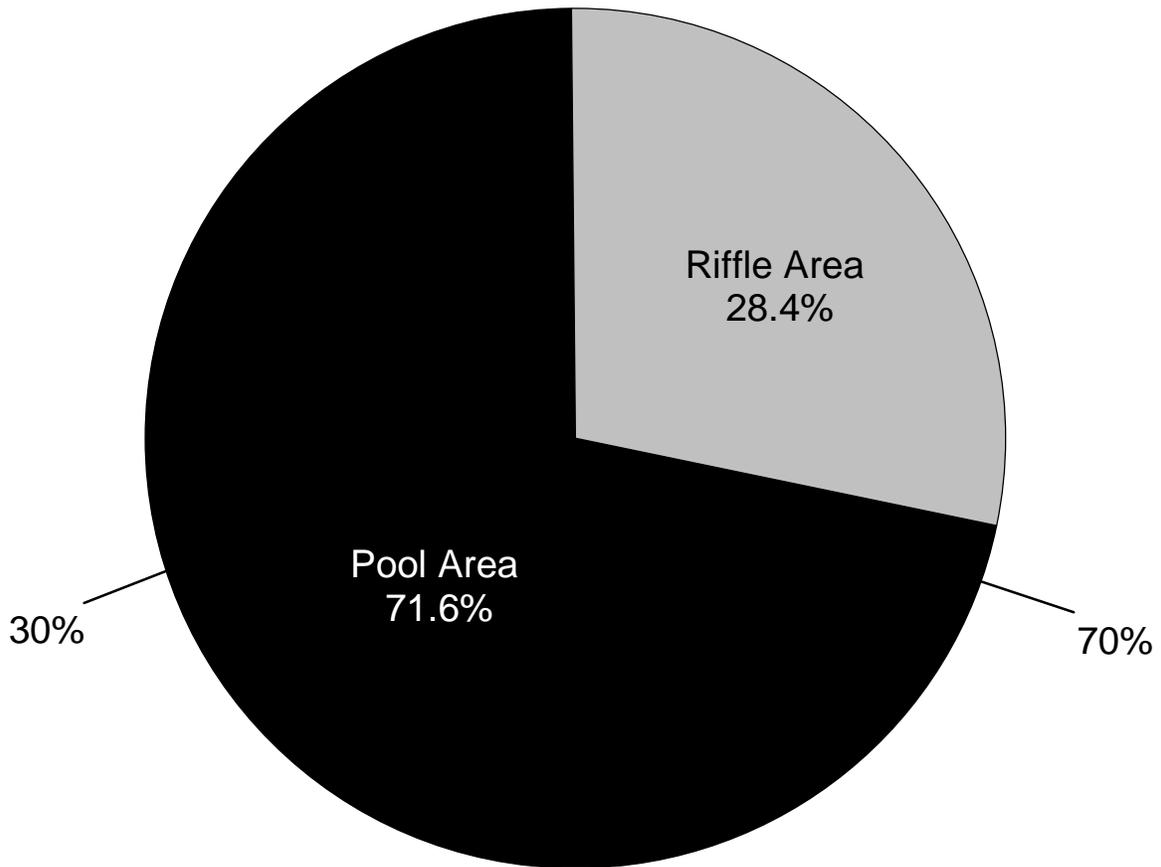
Mean Width: 51.8m Std Dev: 48.7

Max: 86.2m Min: 17.3m

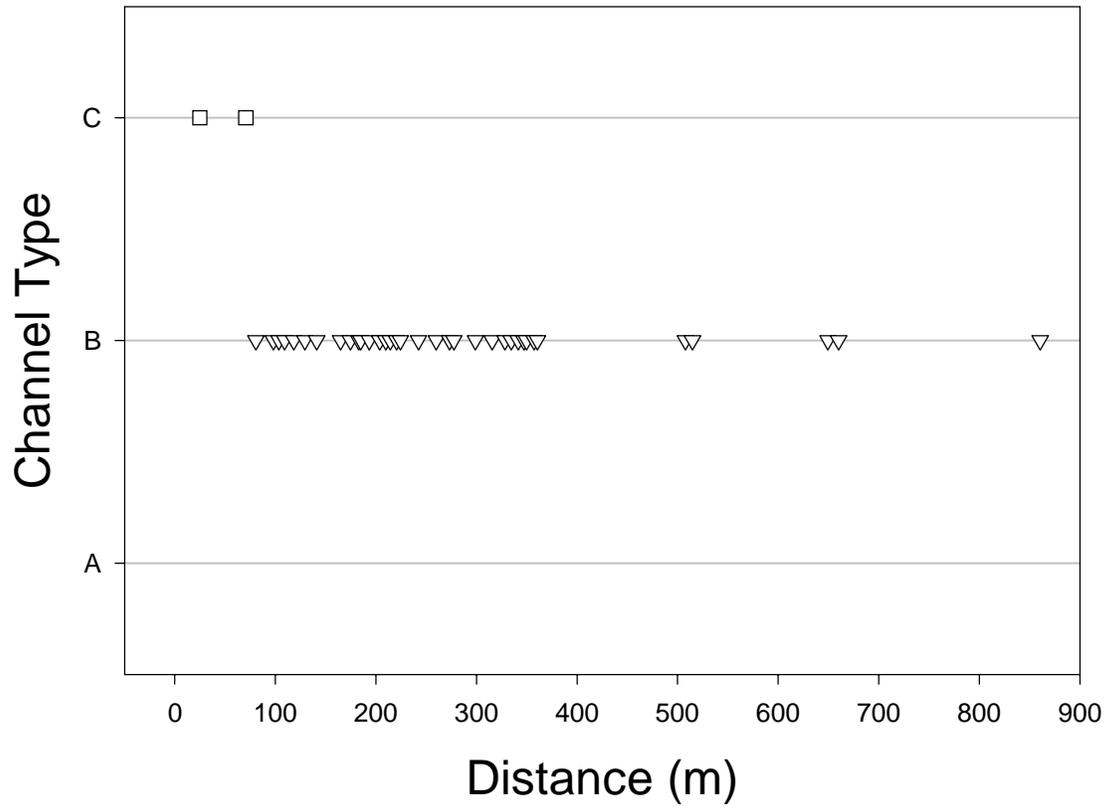


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Sulfur Spring Fork  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Sulfur Spring Fork Rosgen's Channel Type Distribution



**Stream:** Wolf Creek

**District:** Wythe

**Quadrangle:** Bastian

**Sample Date:** 07/19/1999

**Downstream Starting Point:** Forest Service boundary

**Total Distance Surveyed:** 1.8 kilometers

**Percent of Total Area – Pools:** 60.7%

Number of Pools: 30

Number of Pools per kilometer: 16.6

Total Pool Area: 15357.7 sq. meters  $\pm$  3057.6

Mean Pool Area: 511.9 sq. meters

Correction Factor: 0.88

Mean Maximum Depth: 49.3cm

Mean Average Depth: 26.8 cm

Mean Average Residual Pool Depth: 36.2 cm

**Percent of Total Area – Riffles:** 39.3%

Number of Riffles: 17

Number of Riffles per kilometer: 9.4

Total Riffle Area: 9944.2 sq. meters  $\pm$  1512.6

Mean Riffle Area: 585.0 sq. meters

Correction Factor: 1.11

Mean Maximum Depth: 27.6 cm

Mean Average Depth: 14.7 cm

**Number of Large Woody Debris Pieces per kilometer:** 23.8

Wood < 5 m and < 55 cm: 3.9

Wood < 5 m and > 55 cm: 0.6

Wood > 5 m and < 55 cm: 16.0

Wood > 5 m and > 55 cm: 3.3

**Mean Channel Width:** 19.4 m

**Mean Riparian Width:** 188.2 m

Mean Maximum Riparian Distance (either side): 129.3 m

Mean Minimum Riparian Distance (either side): 39.6 m

Maximum Riparian Width (Total): 175.0 m

Minimum Riparian Width (Total): 5.7 m

Wolf Creek Continued.

**Percent of Pool Habitat Surveyed as Glides:** 42.9%

**Rosgen=s Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 0.0%

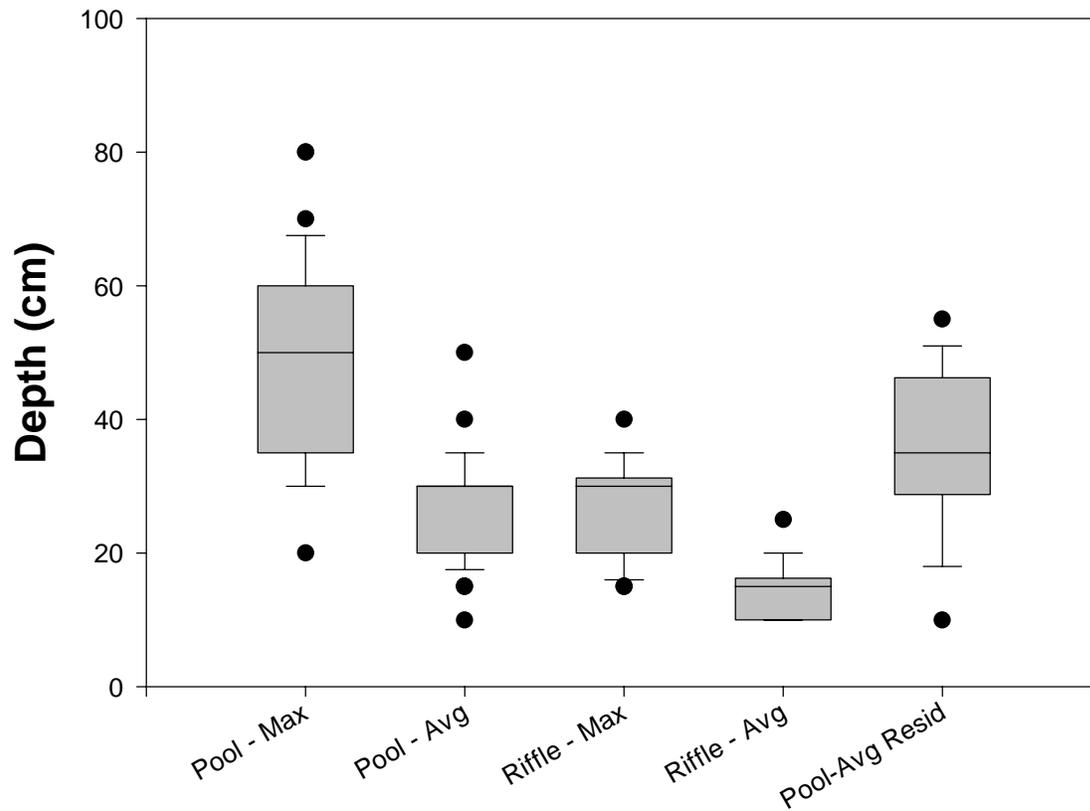
Channel Type C: 100.0%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 3.3%

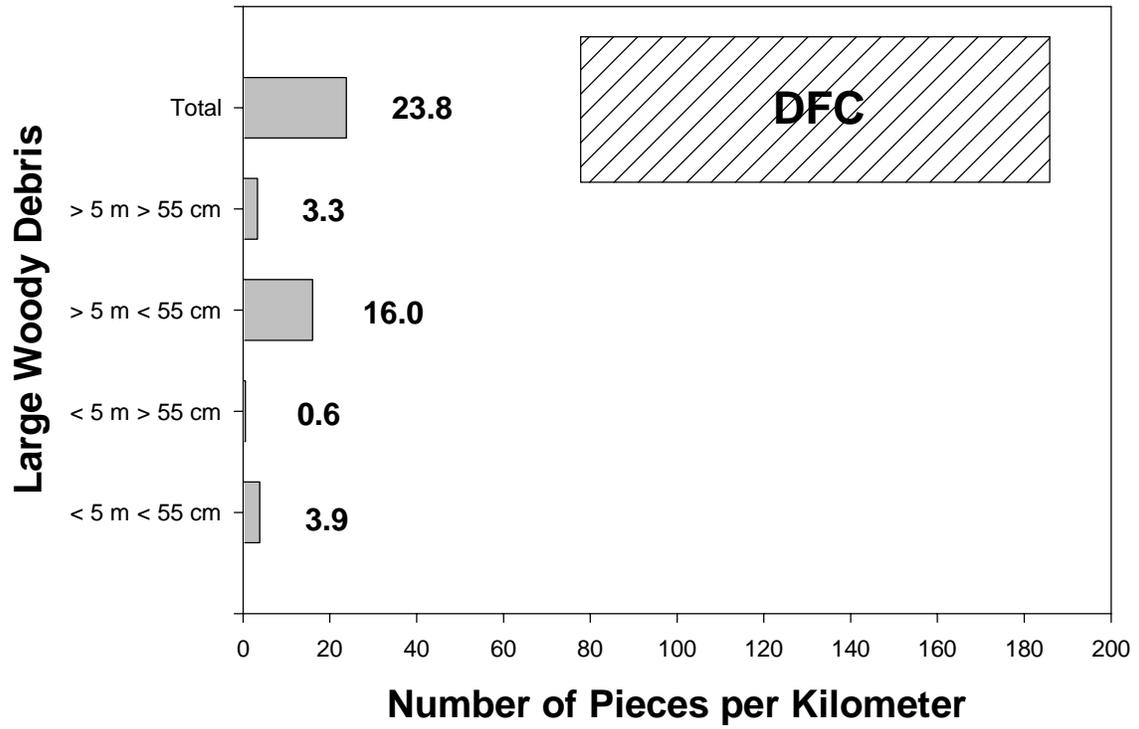
**Average Channel Gradient:** 1.7

# Wolf Creek

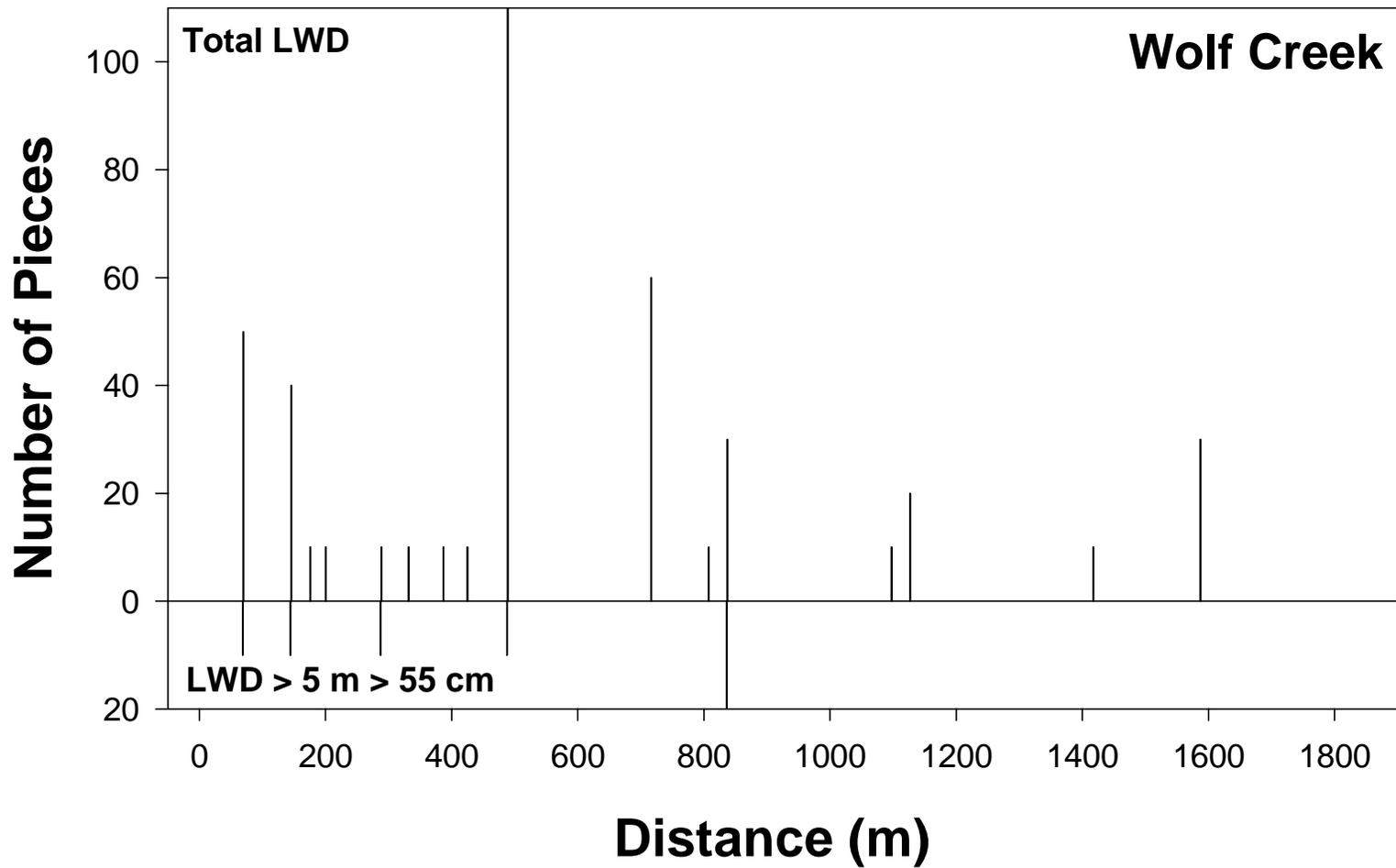


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

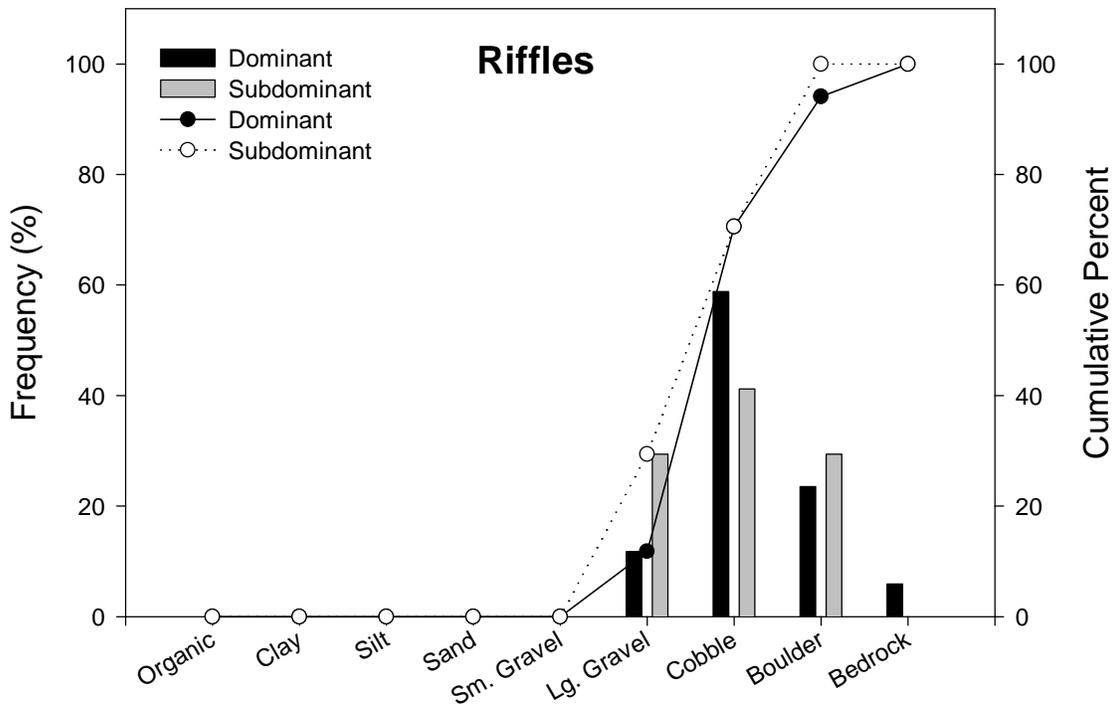
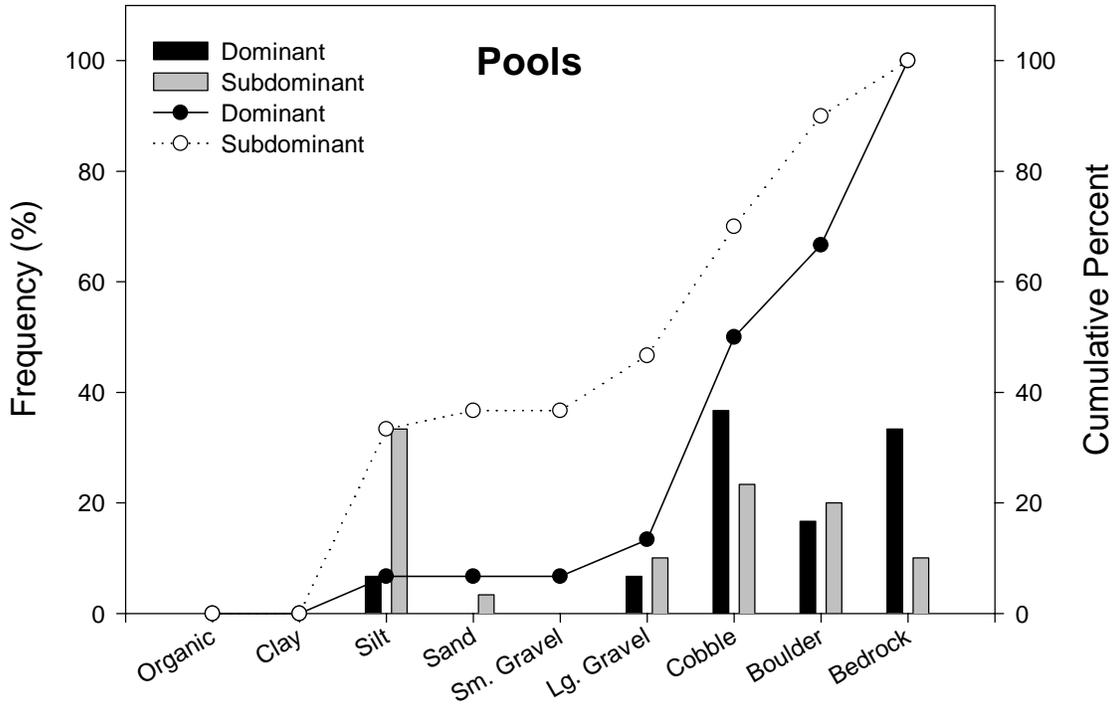
# Wolf Creek



# Distribution and Abundance of Large Woody Debris



# Wolf Creek Substrate Composition



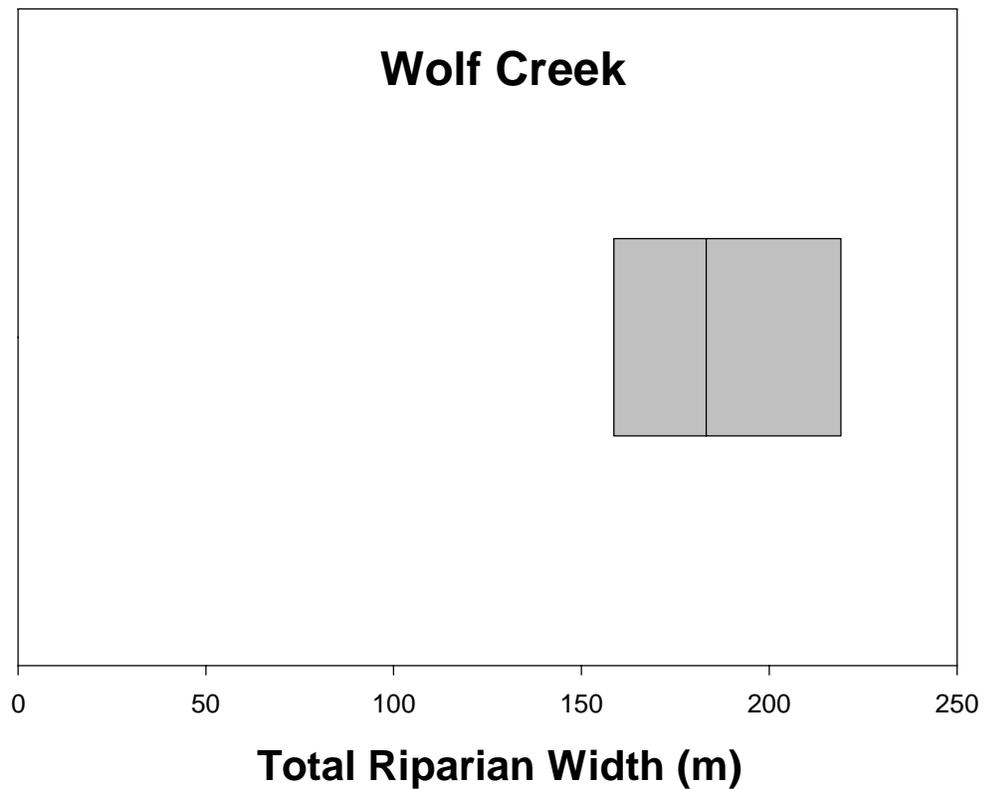
## Riparian Width

Stream: Wolf Creek

Number of Measurements: 3

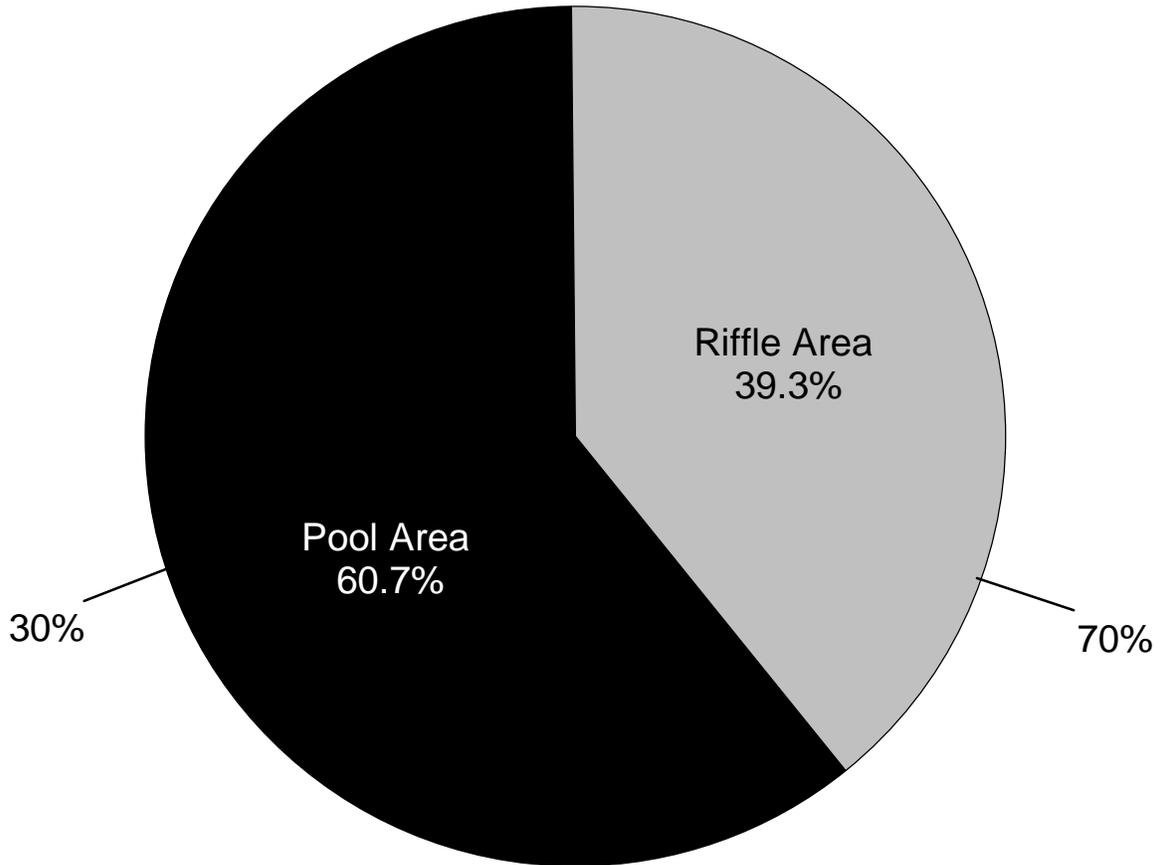
Mean Width: 188.2m Std Dev: 40.5

Max: 231.0m Min: 150.5m

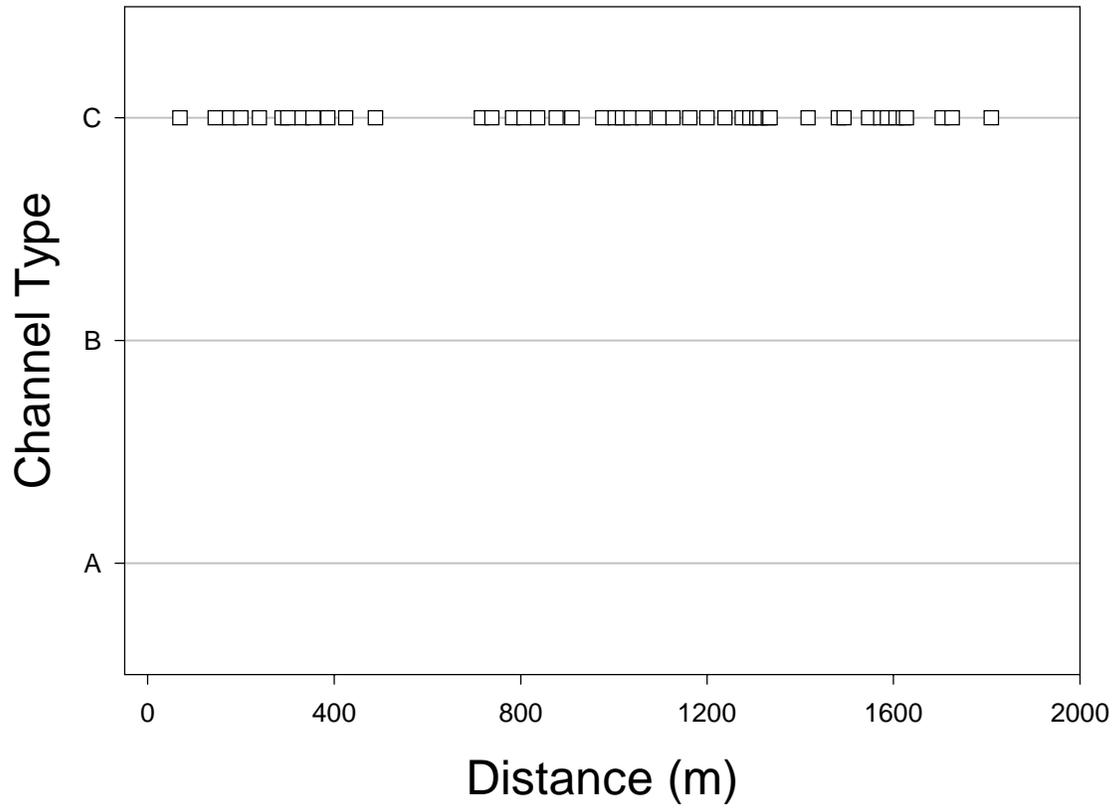


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Wolf Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Wolf Creek Rosgen's Channel Type Distribution



**Stream:** Wolfpen Branch

**District:** Wythe R.D.

**Quadrangle:** Rocky Gap

**Sample Date:** 06/01/00

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 0.87 kilometers

**Percent of Total Area - Pools:** 30.5

Number of Pools: 38

Number of Pools per kilometer: 2.3

Total Pool Area: 507.0 sq. meters  $\pm$  18.1

Mean Pool Area: 13.3 sq. meters

Correction Factor: 1.0

Mean Maximum Depth: 26.3 cm

Mean Average Depth: 13.3 cm

Mean Average Residual Pool Depth: 10.4 cm

**Percent of Total Area - Riffles:** 69.5%

Number of Riffles: 35

Number of Riffles per kilometer: 40.2

Total Riffle Area: 1154.5 sq. meters  $\pm$ 89.6

Mean Riffle Area: 33.0 sq. meters

Correction Factor: 1.26

Mean Maximum Depth: 11.4 cm

Mean Average Depth: 4.4 cm

**Number of Large Woody Debris Pieces per kilometer:** 79.0

Wood < 5 m and < 55 cm: 56.1

Wood < 5 m and > 55 cm: 5.7

Wood > 5 m and < 55 cm: 9.2

Wood > 5 m and > 55 cm: 8.0

**Mean Channel Width:** 4.7 m

**Mean Riparian Width:** 19.7 m

Mean Maximum Riparian Distance (either side): 13.7 m

Mean Minimum Riparian Distance (either side): 1.3 m

Maximum Riparian Width (Total): 30.7 m

Minimum Riparian Width (Total): 8.2 m

Wolfpen Branch Continued.

**Percent of Pool Habitat Surveyed as Glides:** 10.5 %

**Rosgen=s Channel Type Frequency:**

Channel Type A: 0.0 %

Channel Type B: 100 %

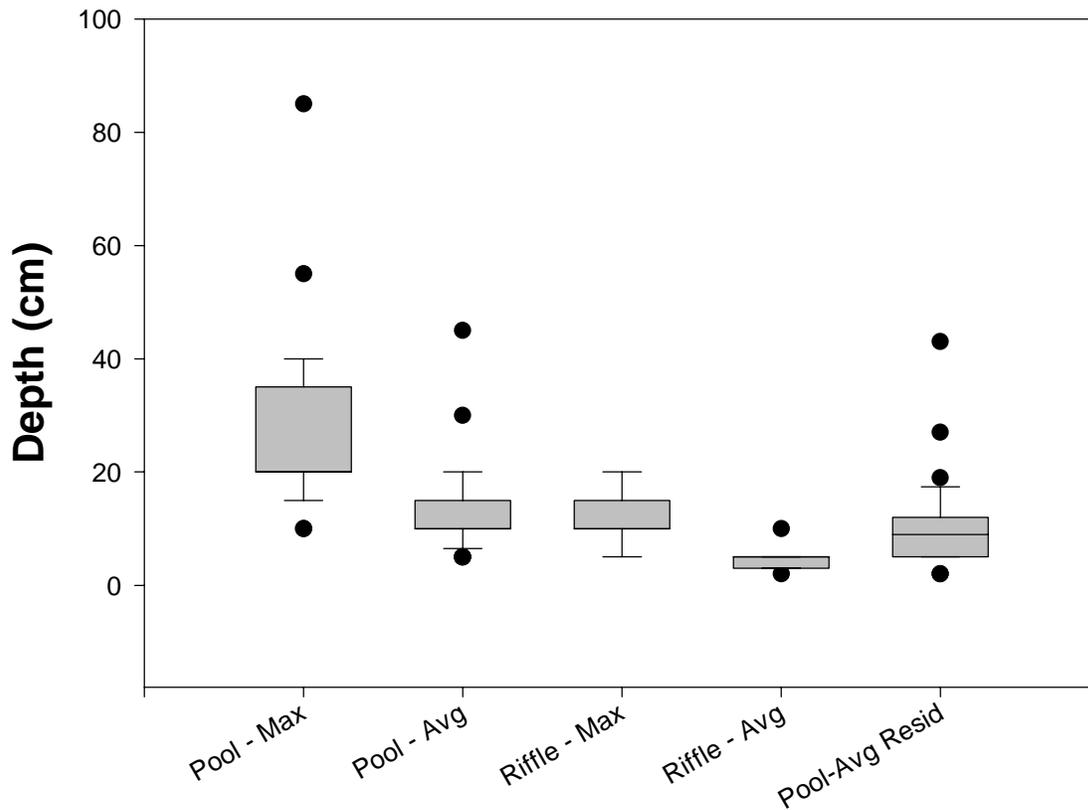
Channel Type C: 0.0 %

Channel Type D: 0.0 %

**Percent Pools with  $\geq$  35% Embeddedness:** 2.6 %

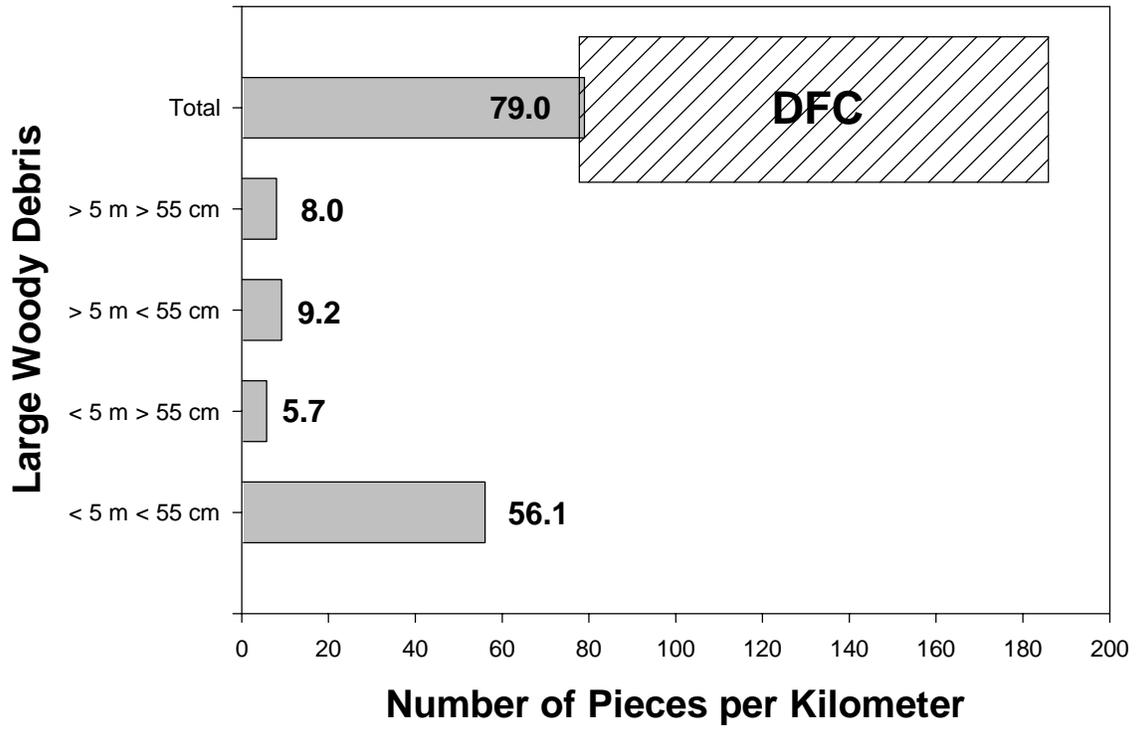
**Average Channel Gradient:** 5

# Wolfpen Branch

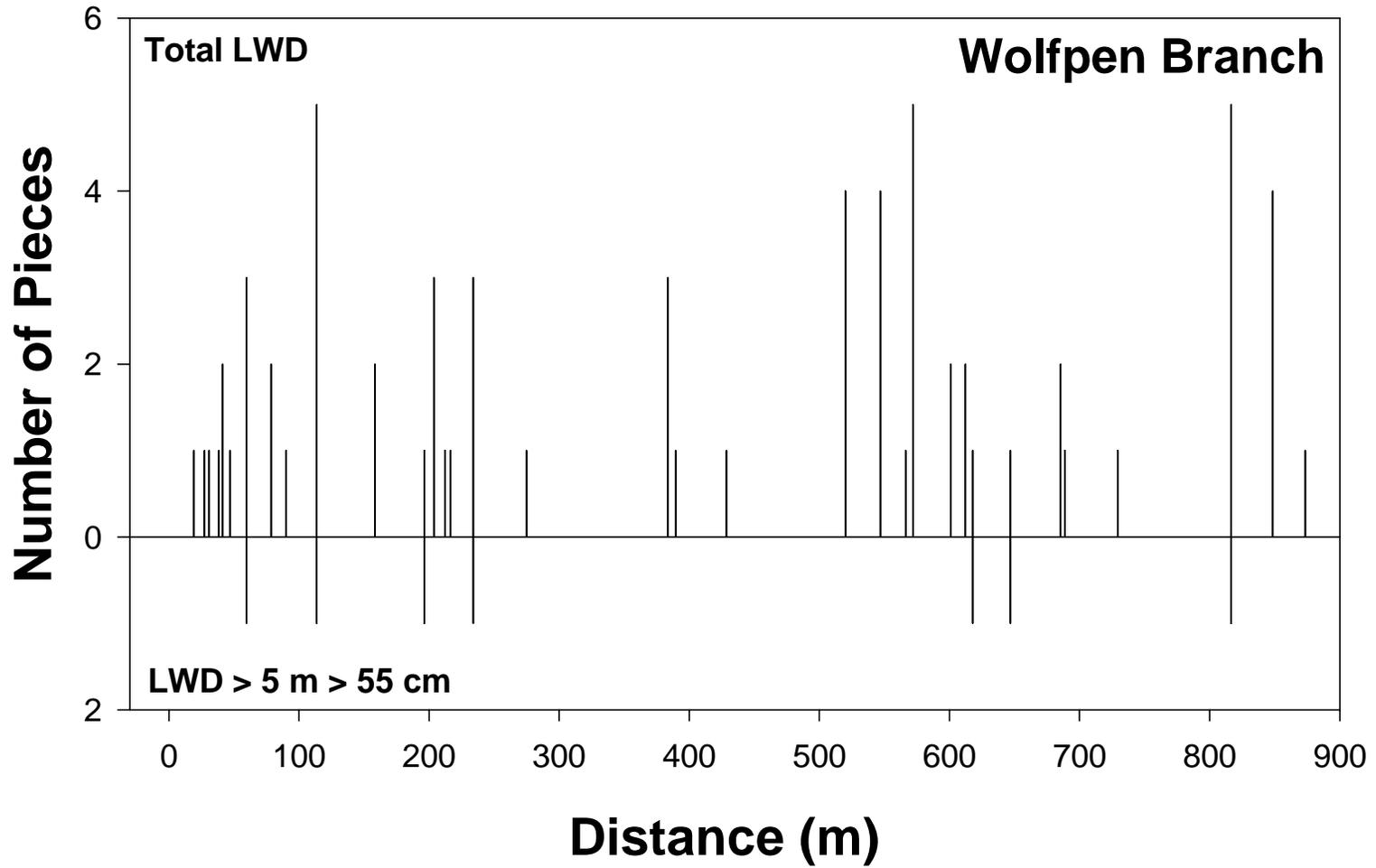


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

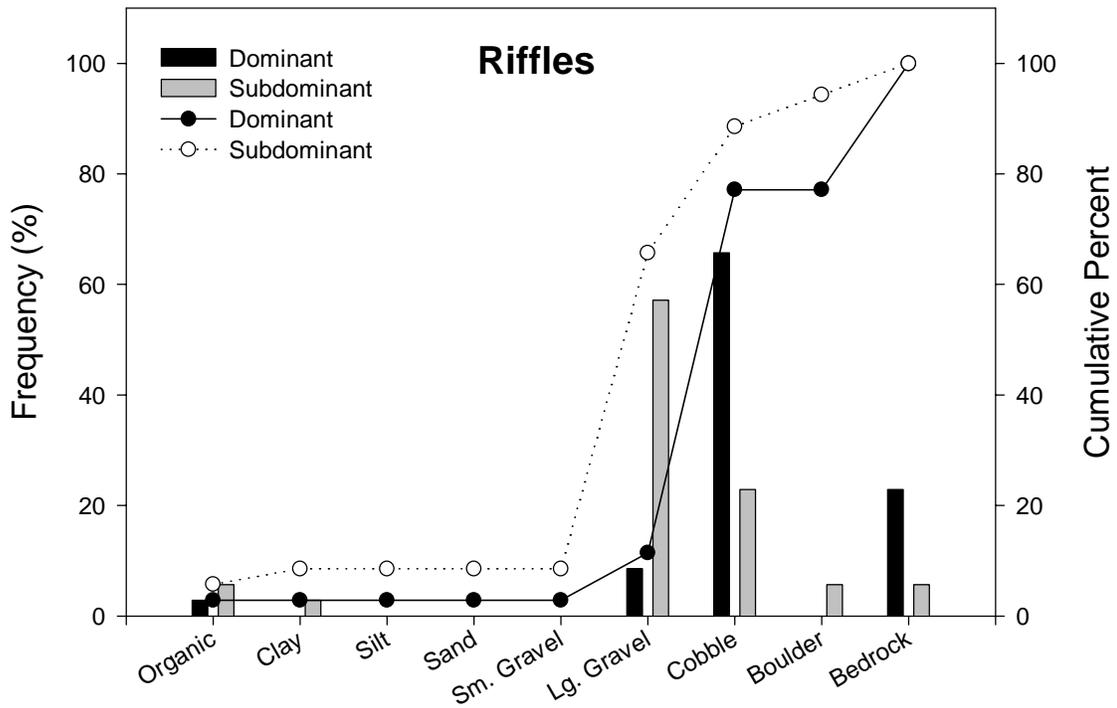
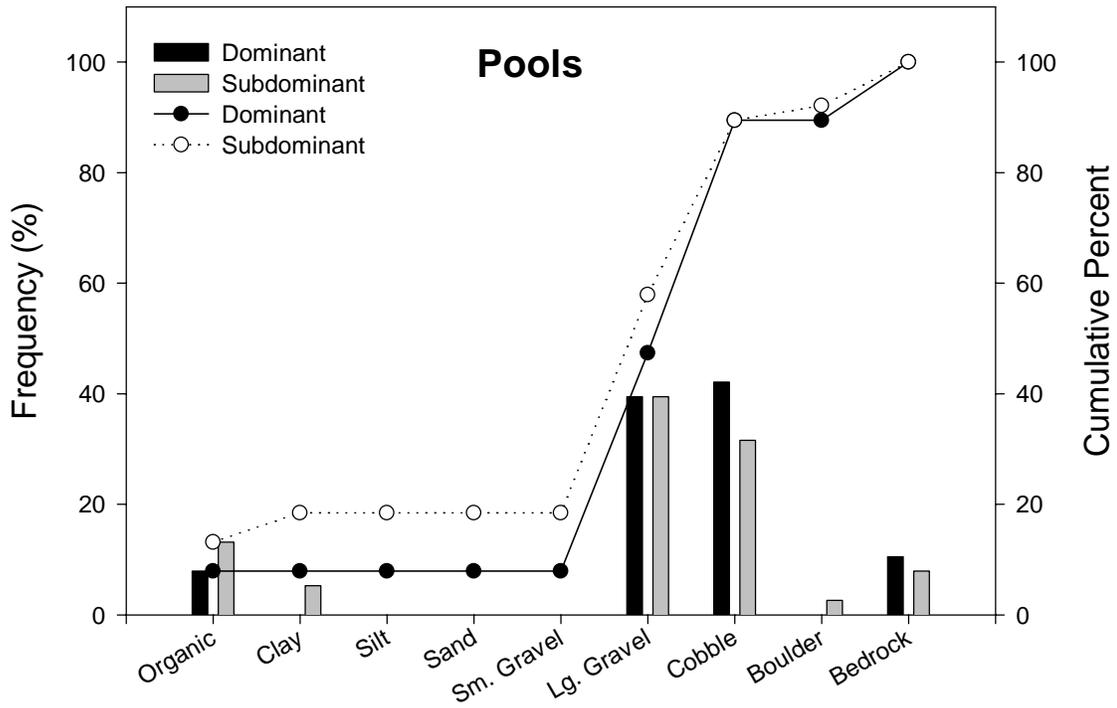
# Wolfpen Branch



# Distribution and Abundance of Large Woody Debris



# Wolfpen Branch Substrate Composition



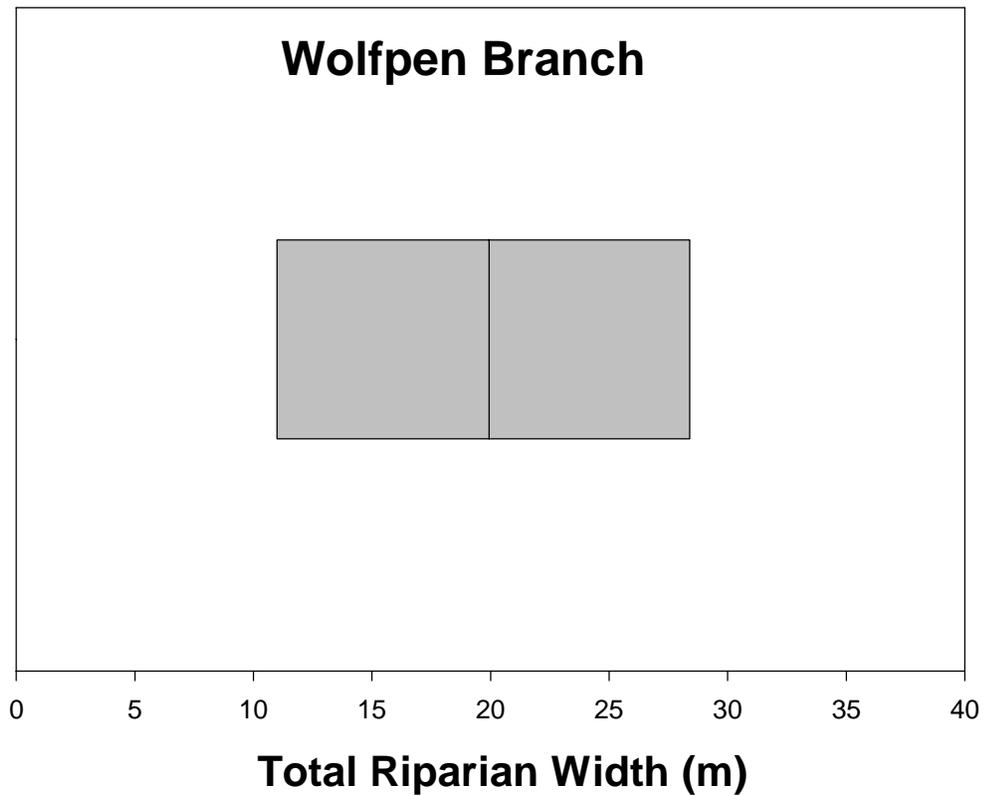
## Riparian Width

Stream: **Wolfpen Branch**

Number of Measurements: **4**

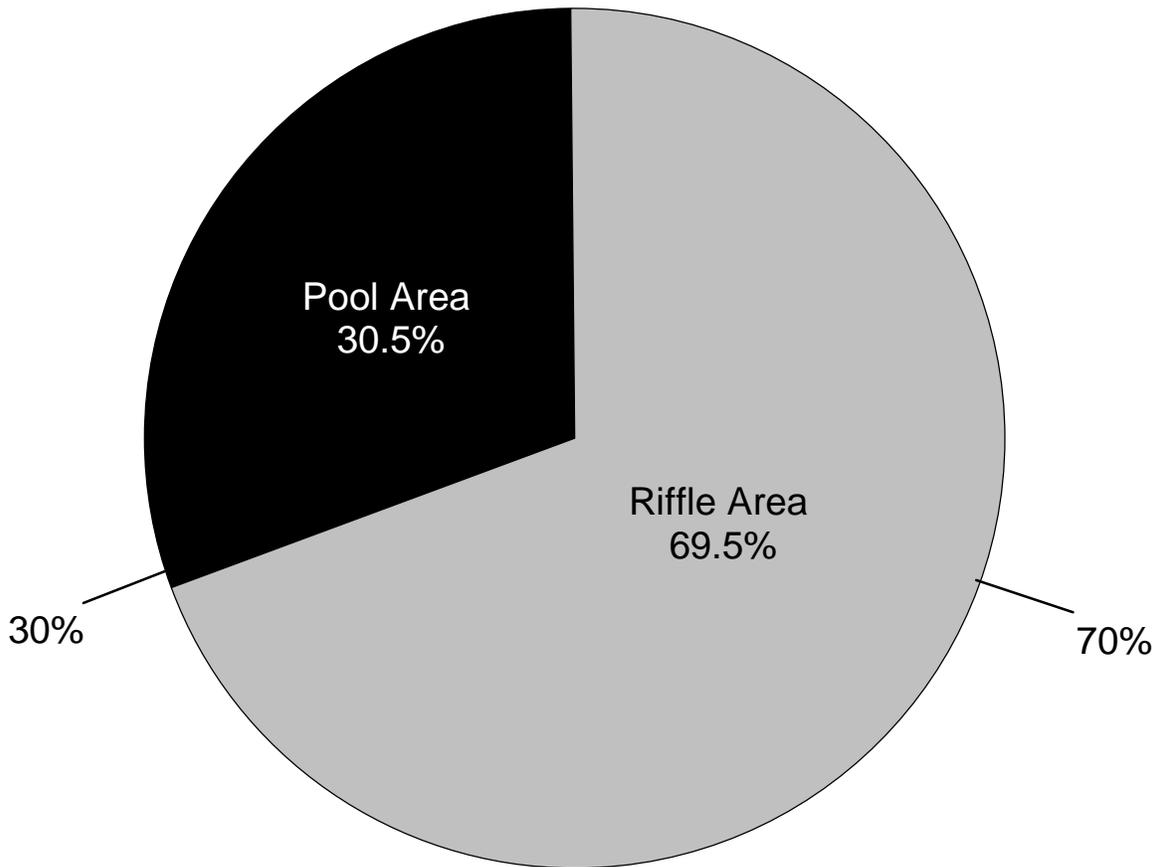
Mean Width: **19.7m** Std Dev: **10.5**

Max: **30.7m** Min: **8.2m**

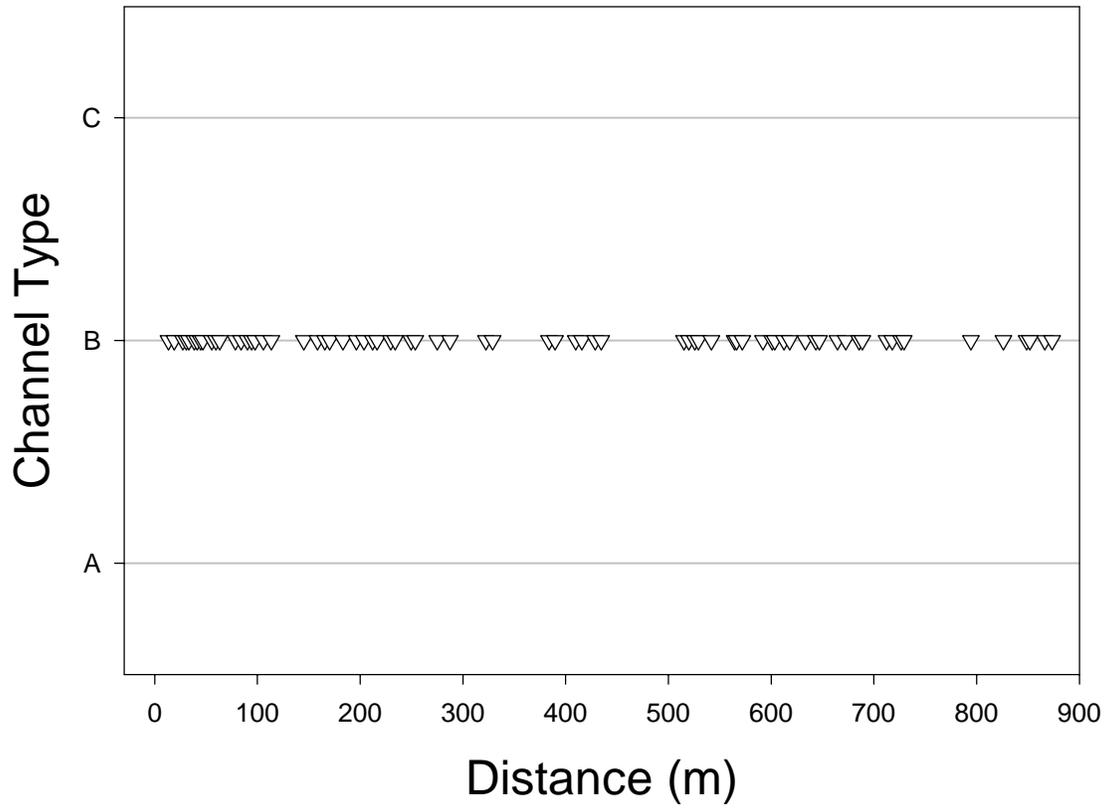


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Wolfpen Branch  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Wolfpen Branch Rosgen's Channel Type Distribution



# **Big Bend and Garden Mountain Quadrangles**

**Stream:** Crab Orchard

**District:** Wythe

**Quadrangle:** Big Bend

**Sample Date:** 07/22/1999

**Downstream Starting Point:** Forest Service boundary

**Total Distance Surveyed:** 3.8 kilometers

**Percent of Total Area – Pools:** 45.3%

Number of Pools: 122

Number of Pools per kilometer: 31.7

Total Pool Area: 3763.8 sq. meters  $\pm$  332.8

Mean Pool Area: 30.9 sq. meters

Correction Factor: 0.99

Mean Maximum Depth: 28.7 cm

Mean Average Depth: 21.7 cm

Mean Average Residual Pool Depth: 28.2 cm

**Percent of Total Area – Riffles:** 54.7%

Number of Riffles: 103

Number of Riffles per kilometer: 26.8

Total Riffle Area: 4553.3 sq. meters  $\pm$  463.6

Mean Riffle Area: 44.2 sq. meters

Correction Factor: 1.1

Mean Maximum Depth: 9.9 cm

Mean Average Depth: 5.2 cm

**Number of Large Woody Debris Pieces per kilometer:** 145.6

Wood < 5 m and < 55 cm: 77.2

Wood < 5 m and > 55 cm: 6.2

Wood > 5 m and < 55 cm: 45.5

Wood > 5 m and > 55 cm: 16.6

**Mean Channel Width:** 7.3 m

**Mean Riparian Width:** 25.6 m

Mean Maximum Riparian Distance (either side): 16.4 m

Mean Minimum Riparian Distance (either side): 1.9 m

Maximum Riparian Width (Total): 28.3 m

Minimum Riparian Width (Total): 0.8 m

Crab Orchard Continued.

**Percent of Pool Habitat Surveyed as Glides:** 47.0%

**Rosgen's Channel Type Frequency:**

Channel Type A: 37.2%

Channel Type B: 62.8%

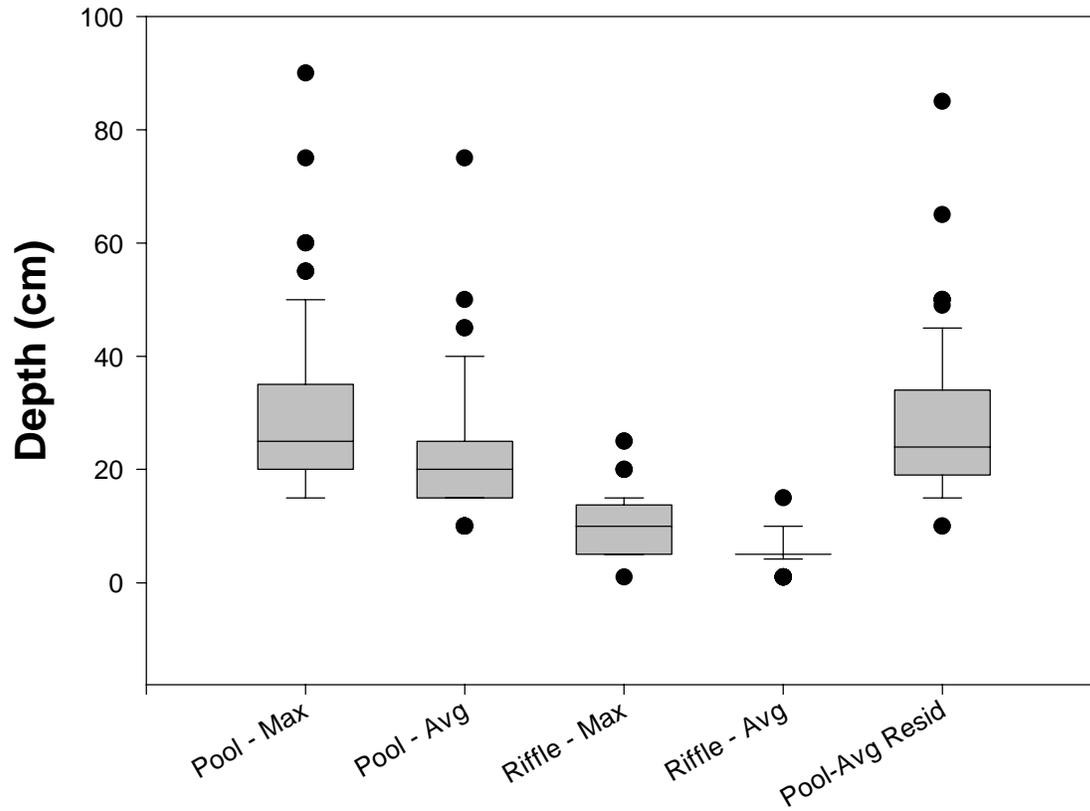
Channel Type C: 0.0%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 14.8%

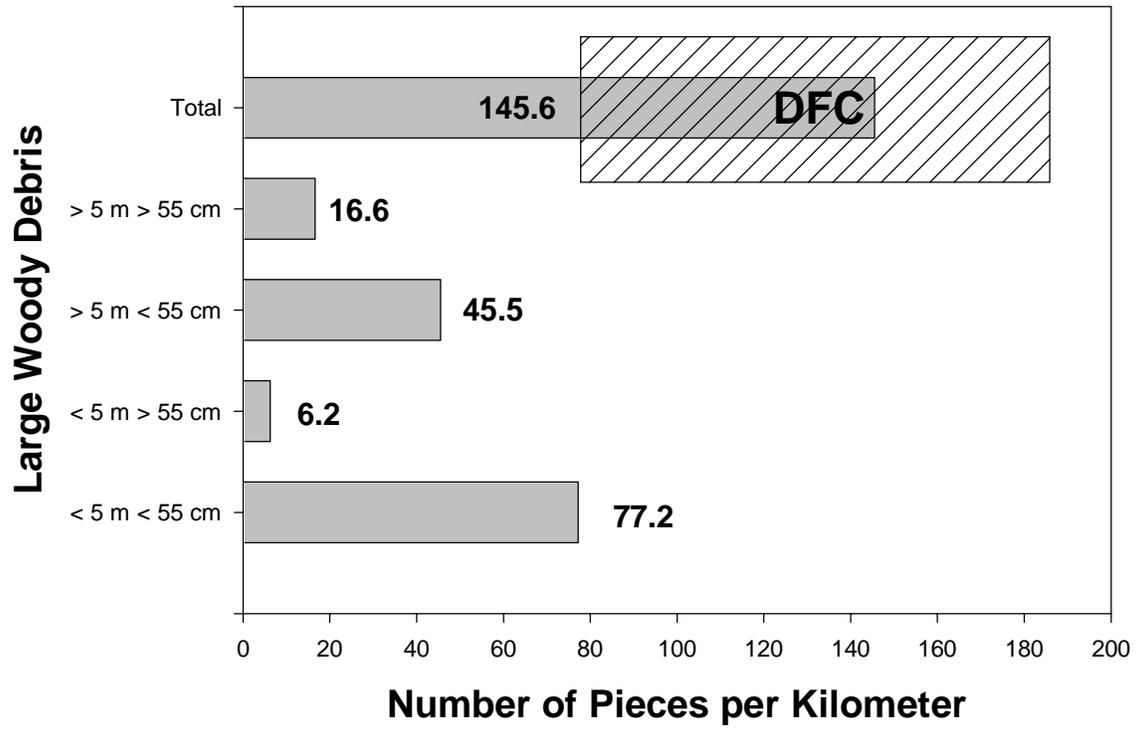
**Average Channel Gradient:** 3.9

# Crab Orchard

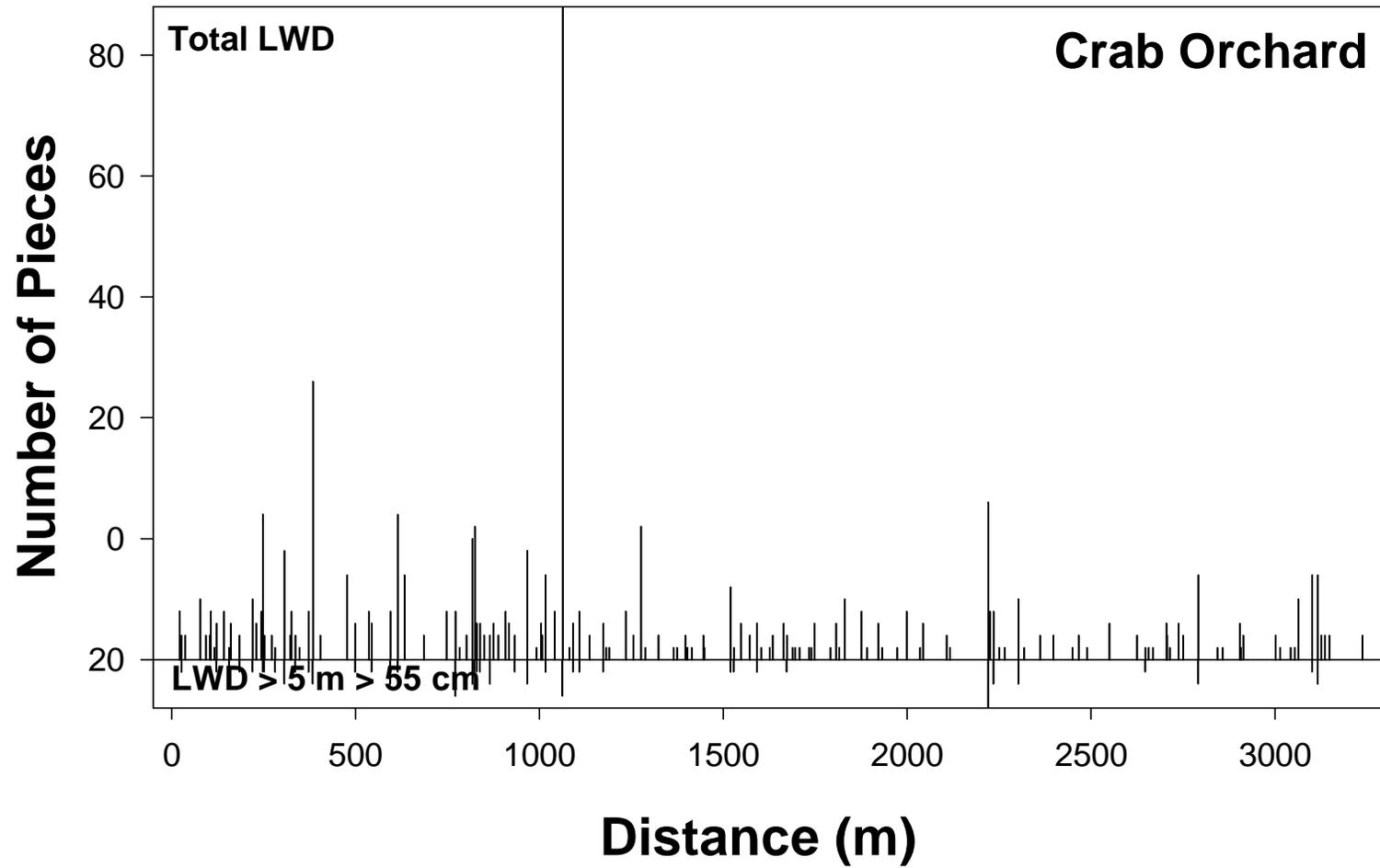


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

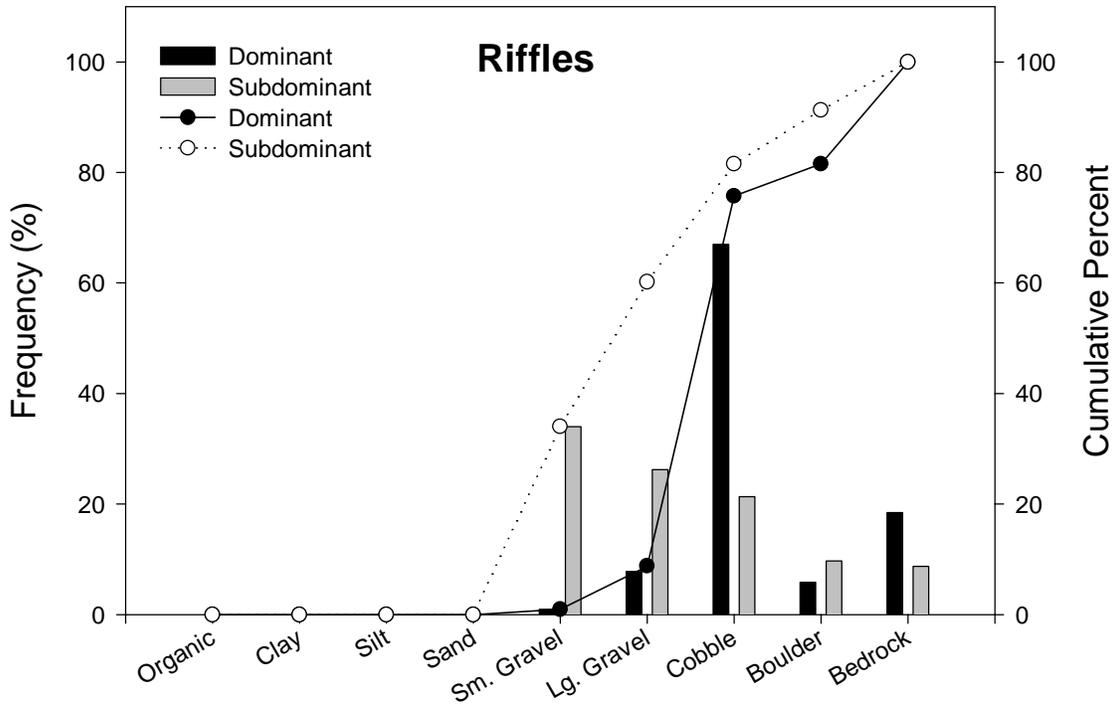
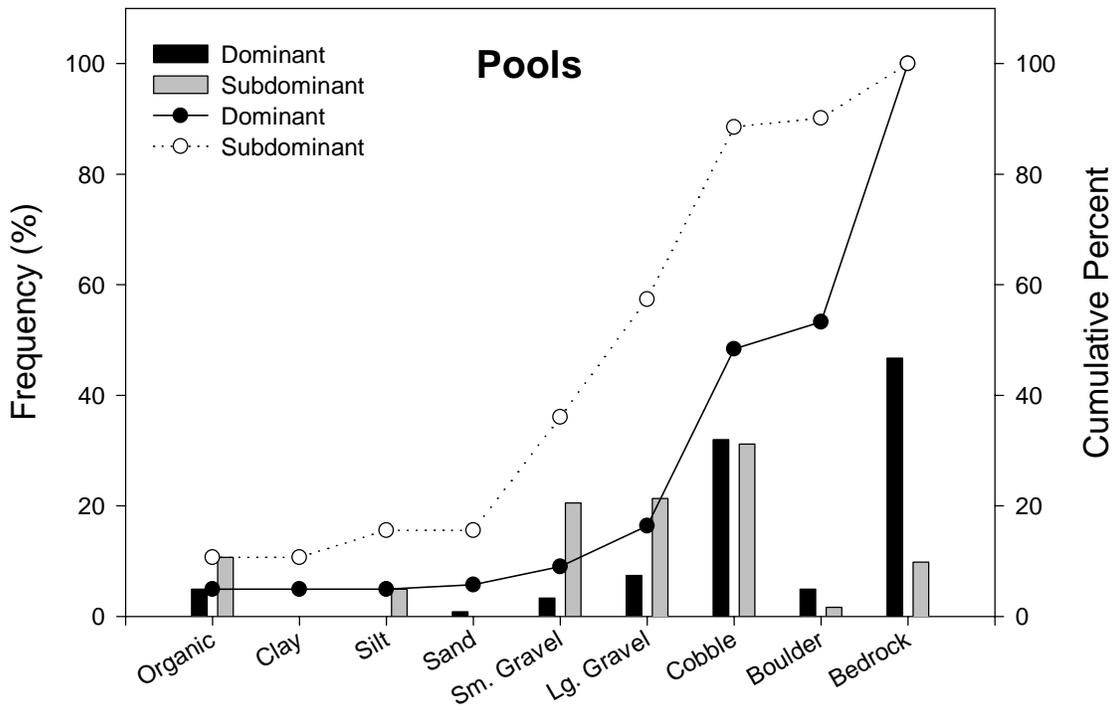
# Crab Orchard



# Distribution and Abundance of Large Woody Debris



# Crab Orchard Substrate Composition



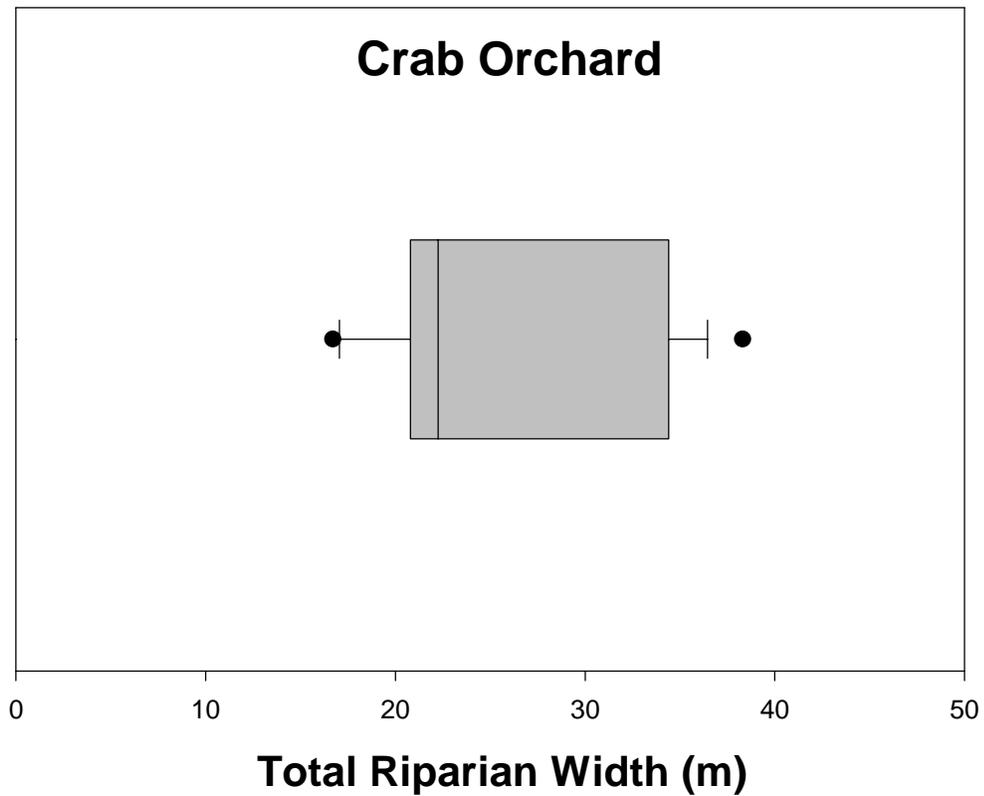
## Riparian Width

Stream: Indian Grave Creek

Number of Measurements: 6

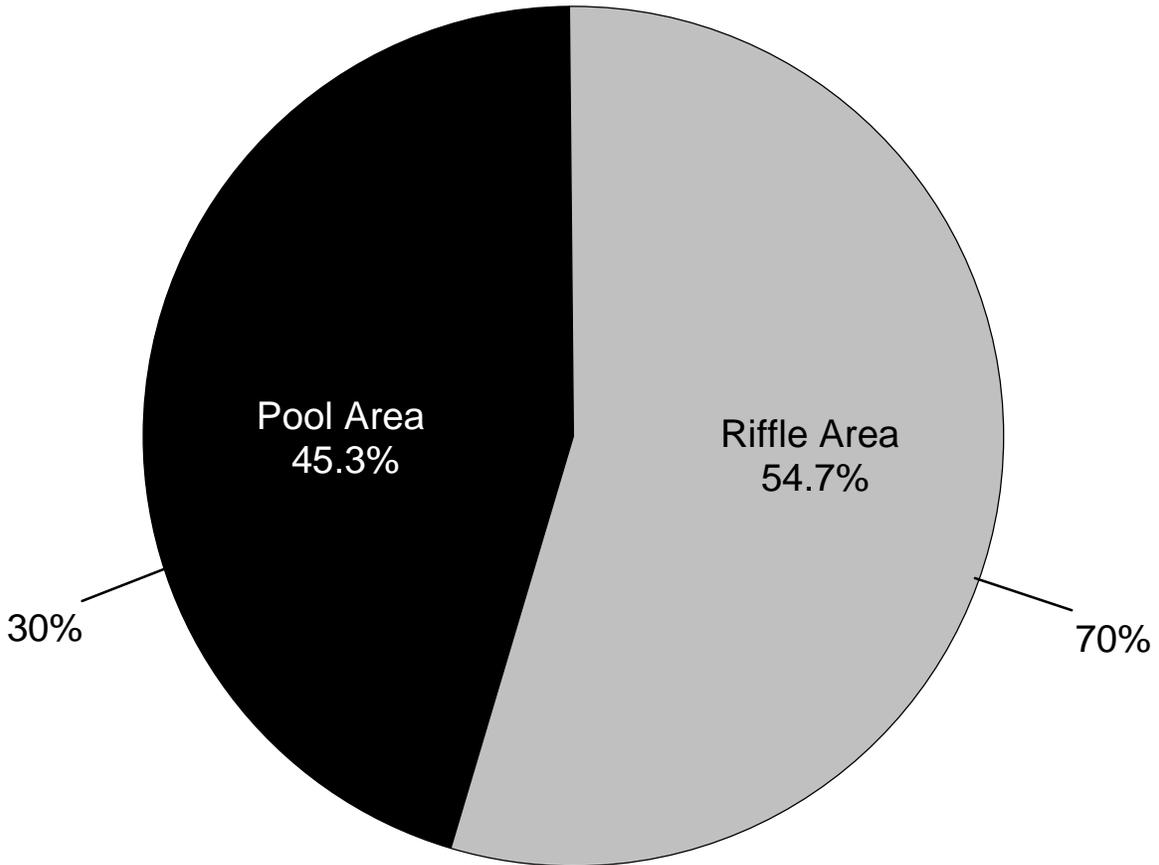
Mean Width: 36.8m Std Dev: 25.9

Max: 67.5m Min: 13.0m

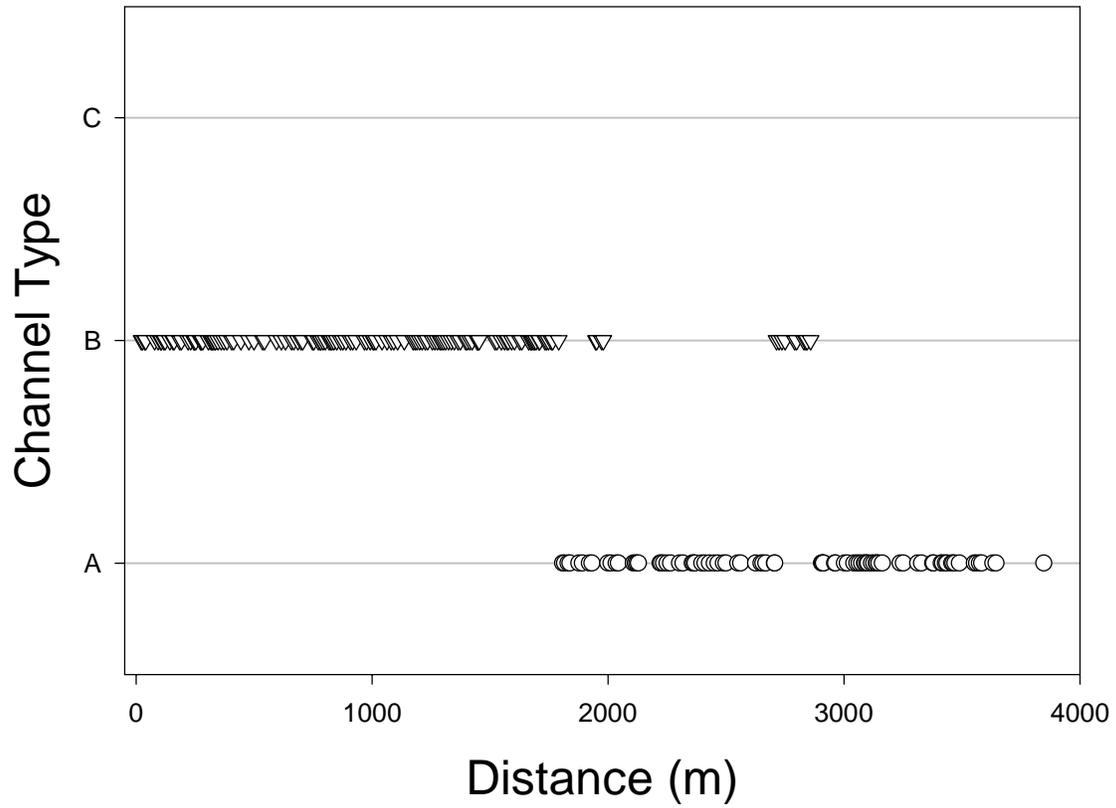


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Crab Orchard  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Crab Orchard Rosgen's Channel Type Distribution



**Stream:** East Fork Stony Fork Creek

**District:** Wythe

**Quadrangle:** Bend/Bland

**Sample Date:** 07/19/1999

**Downstream Starting Point:** Forest Service boundary

**Total Distance Surveyed:** 8.1 kilometers

**Percent of Total Area – Pools:** 77.6%

Number of Pools: 281

Number of Pools per kilometer: 34.5

Total Pool Area: 19680.0 sq. meters  $\pm$  2933.4

Mean Pool Area: 70.0 sq. meters

Correction Factor: 1.09

Mean Maximum Depth: 37.2 cm

Mean Average Depth: 23.6 cm

Mean Average Residual Pool Depth: 35.6 cm

**Percent of Total Area – Riffles:** 22.4%

Number of Riffles: 147

Number of Riffles per kilometer: 18.1

Total Riffle Area: 5670.3 sq. meters  $\pm$  1142.2

Mean Riffle Area: 38.6 sq. meters

Correction Factor: 0.96

Mean Maximum Depth: 9.0 cm

Mean Average Depth: 4.4 cm

**Number of Large Woody Debris Pieces per kilometer:** 194.9

Wood < 5 m and < 55 cm: 96.8

Wood < 5 m and > 55 cm: 8.6

Wood > 5 m and < 55 cm: 66.8

Wood > 5 m and > 55 cm: 22.7

**Mean Channel Width:** 6.7 m

**Mean Riparian Width:** 59.7 m

Mean Maximum Riparian Distance (either side): 45.6 m

Mean Minimum Riparian Distance (either side): 8.2 m

Maximum Riparian Width (Total): 122.7 m

Minimum Riparian Width (Total): 1.1 m

East Fork Stony Fork Creek Continued.

**Percent of Pool Habitat Surveyed as Glides:** 2.6%

**Rosgen=s Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 0.0%

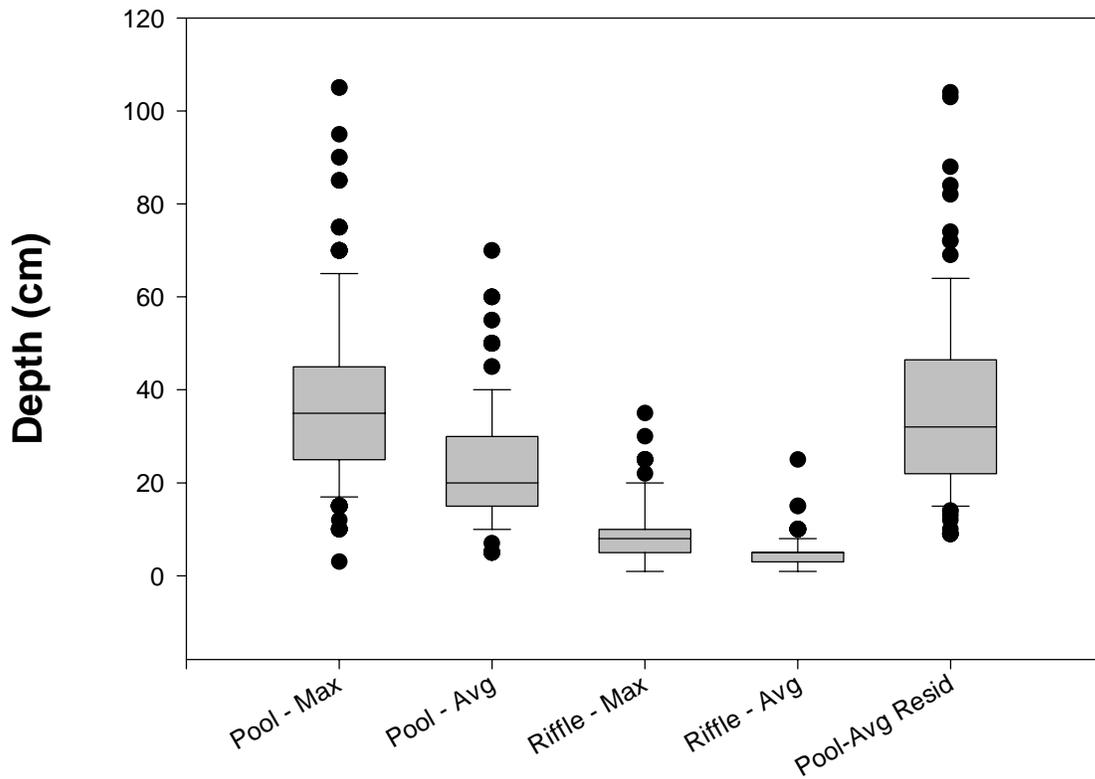
Channel Type C: 100.0%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 3.6%

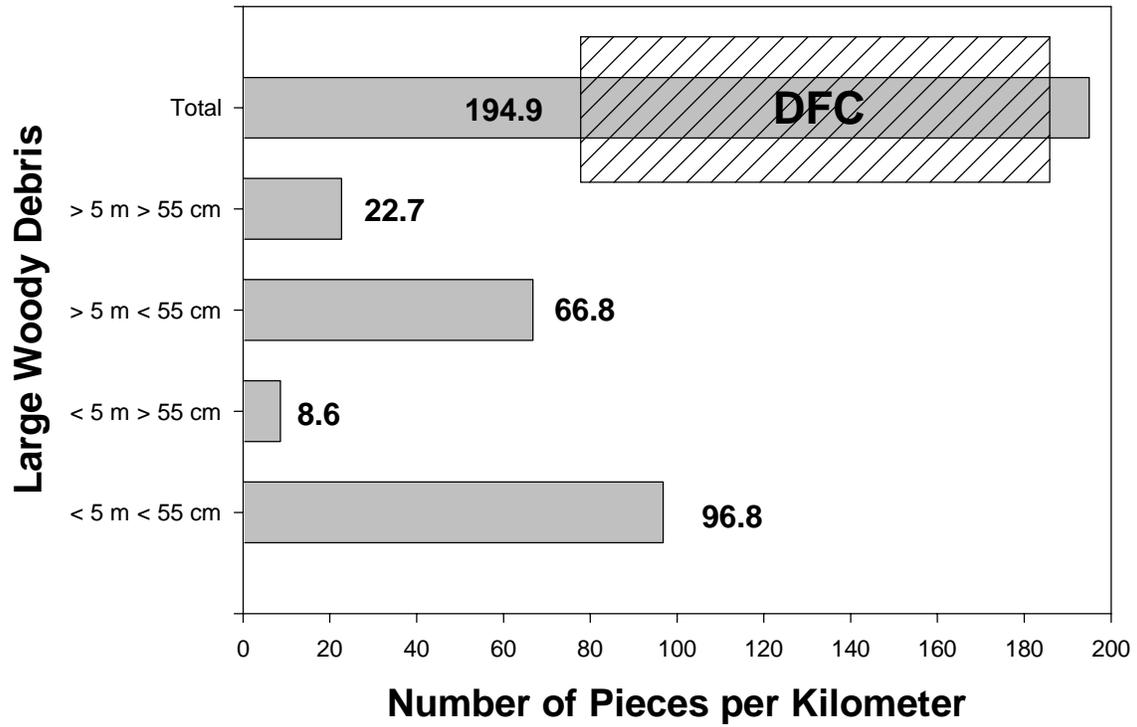
**Average Channel Gradient:** 4.3

# East Fork Stony Creek

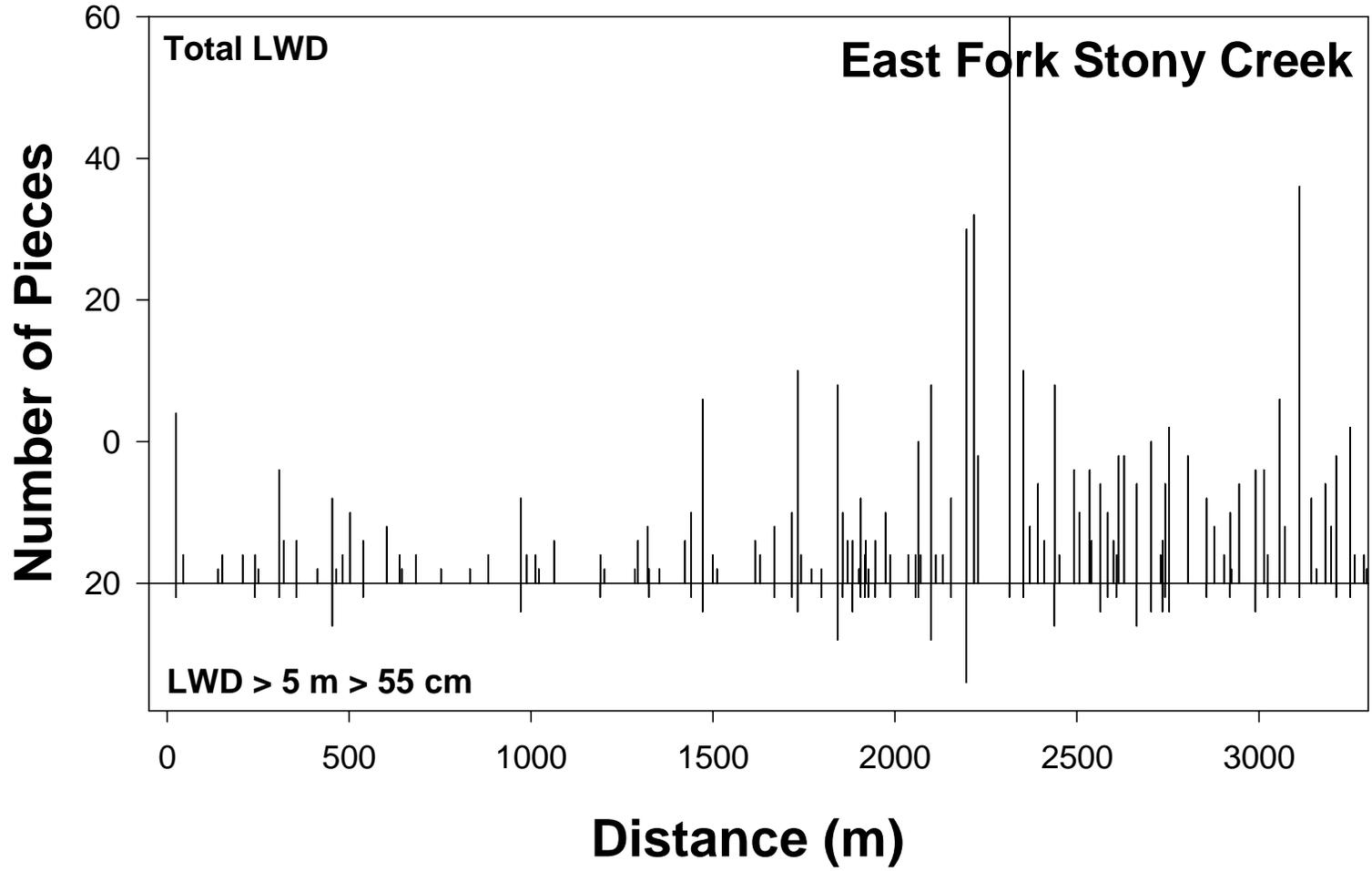


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

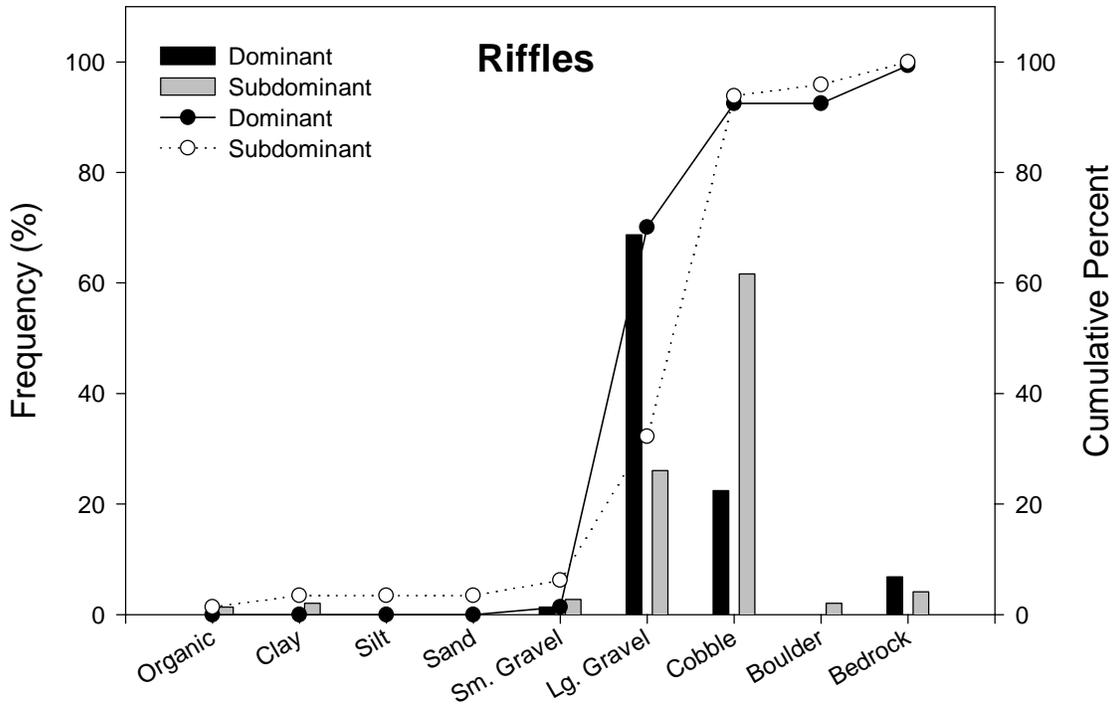
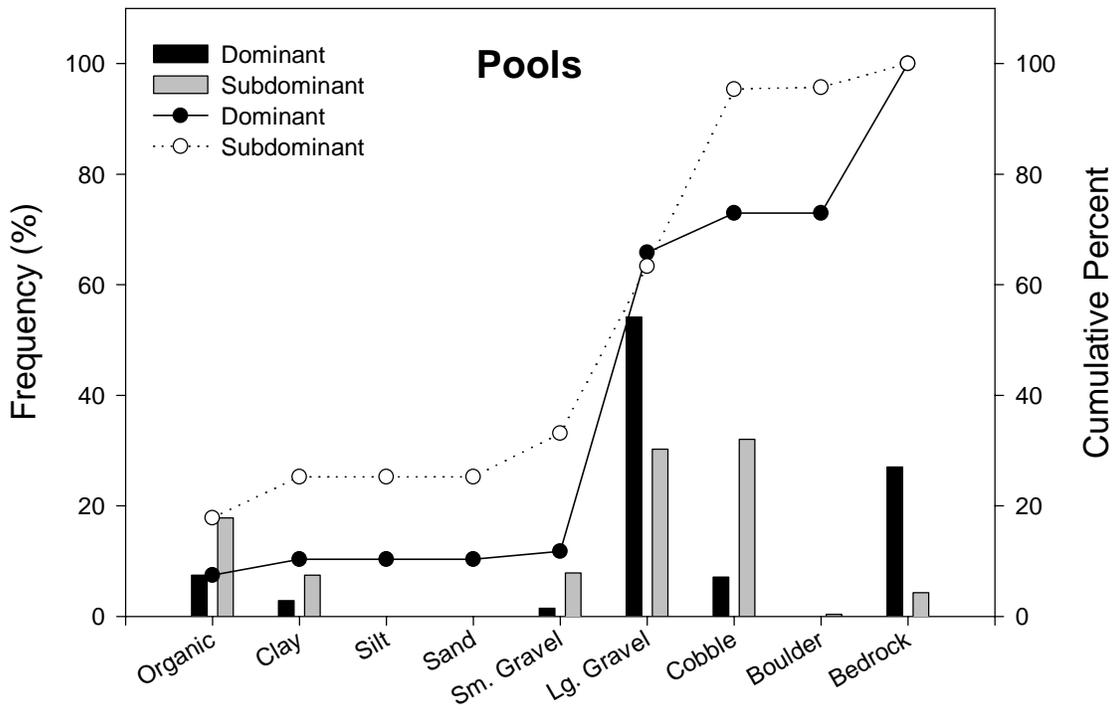
# East Fork Stony Creek



# Distribution and Abundance of Large Woody Debris



# East Fork Stony Creek Substrate Composition



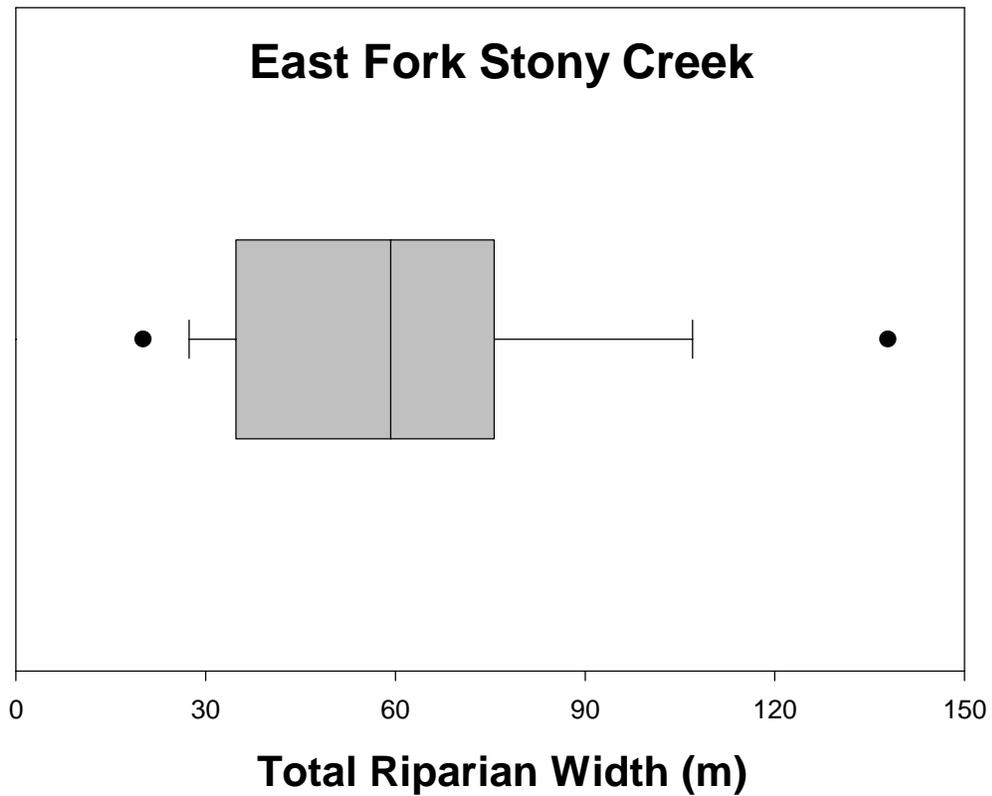
## Riparian Width

Stream: East Fork Stony Creek

Number of Measurements: 11

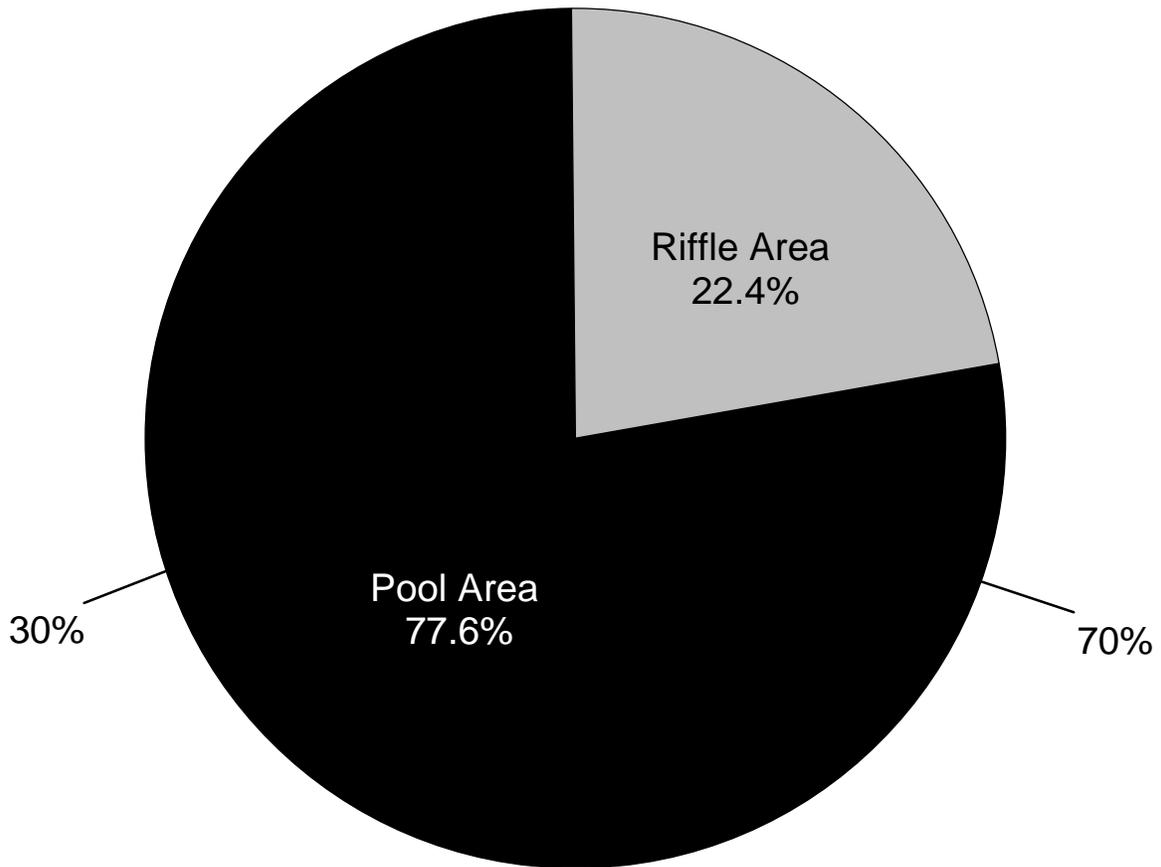
Mean Width: 59.7m Std Dev: 33.2

Max: 137.9m Min: 20.1m

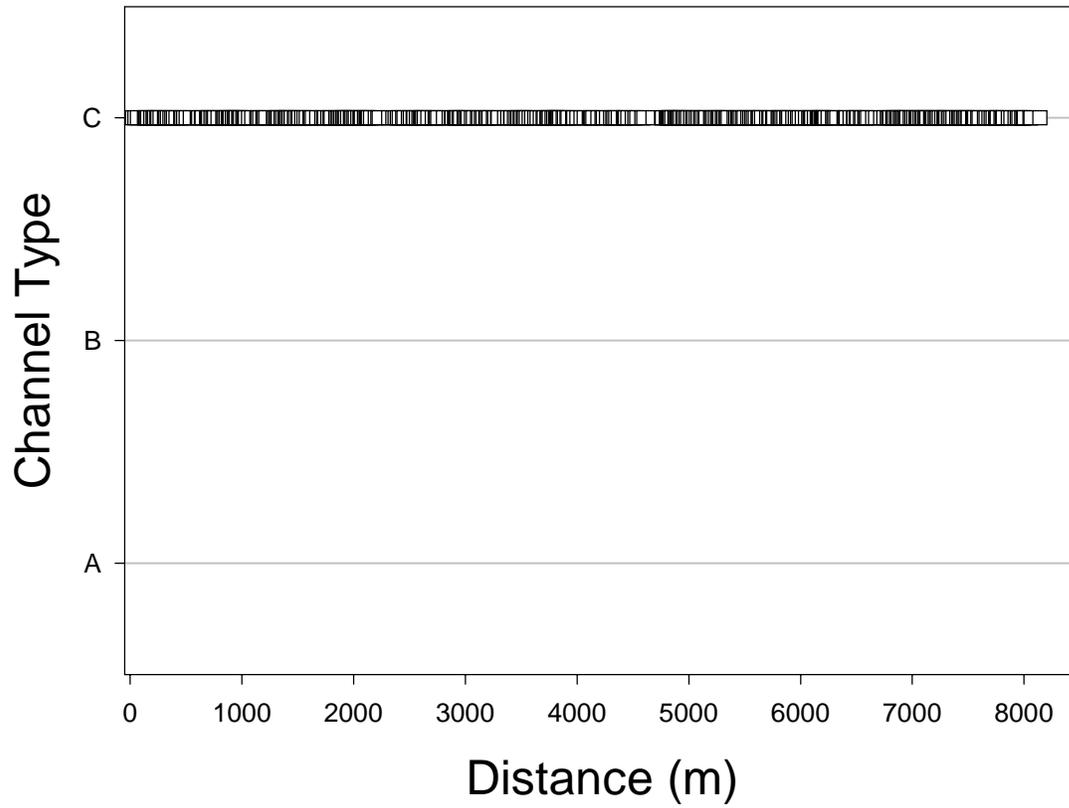


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**East Fork Stony Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# East Fork Stony Creek Rosgen's Channel Type Distribution



**Stream:** Hunting Camp Creek

**District:** Wythe R.D.

**Quadrangle:** Big Bend

**Sample Date:** 06/01/00

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 3.2 kilometers

**Percent of Total Area - Pools:** 51.8%

Number of Pools: 68

Number of Pools per kilometer: 21.3

Total Pool Area: 7439.0 sq. meters  $\pm$  769.2

Mean Pool Area: 109.4 sq. meters

Correction Factor: 1.11

Mean Maximum Depth: 44.6 cm

Mean Average Depth: 28.2 cm

Mean Average Residual Pool Depth: 14.3 cm

**Percent of Total Area - Riffles:** 48.2%

Number of Riffles: 60

Number of Riffles per kilometer: 18.8

Total Riffle Area: 6921.6 sq. meters  $\pm$  1204.2

Mean Riffle Area: 115.4 sq. meters

Correction Factor: 0.84

Mean Maximum Depth: 24.0 cm

Mean Average Depth: 16.0 cm

**Number of Large Woody Debris Pieces per kilometer:** 27.0

Wood < 5 m and < 55 cm: 24.0

Wood < 5 m and > 55 cm: 0.0

Wood > 5 m and < 55 cm: 3.0

Wood > 5 m and > 55 cm: 0.0

**Mean Channel Width:** 7.9 m

**Mean Riparian Width:** 39.4 m

Mean Maximum Riparian Distance (either side): 21.8 m

Mean Minimum Riparian Distance (either side): 9.7 m

Maximum Riparian Width (Total): 52.5 m

Minimum Riparian Width (Total): 26.9 m

Hunting Camp Creek Continued.

**Percent of Pool Habitat Surveyed as Glides:** 7.4%

**Rosgen=s Channel Type Frequency:**

Channel Type A:

Channel Type B: 100%

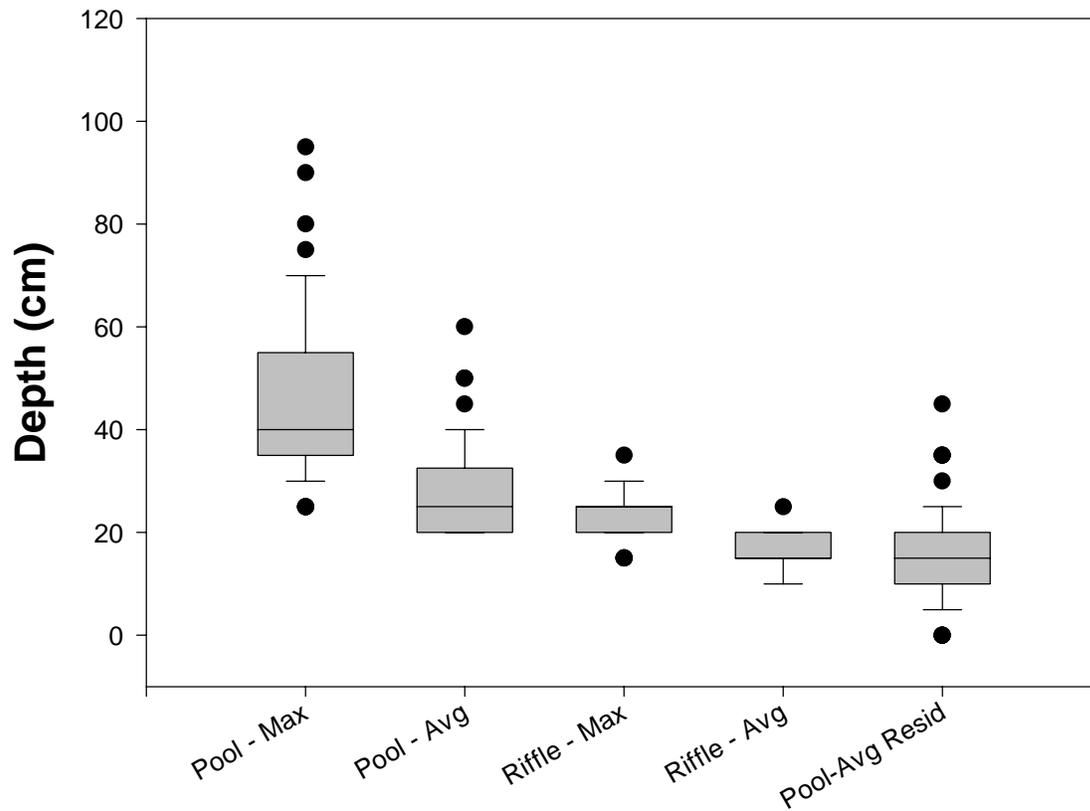
Channel Type C:

Channel Type D:

**Percent Pools with  $\geq$  35% Embeddedness:** 0.0%

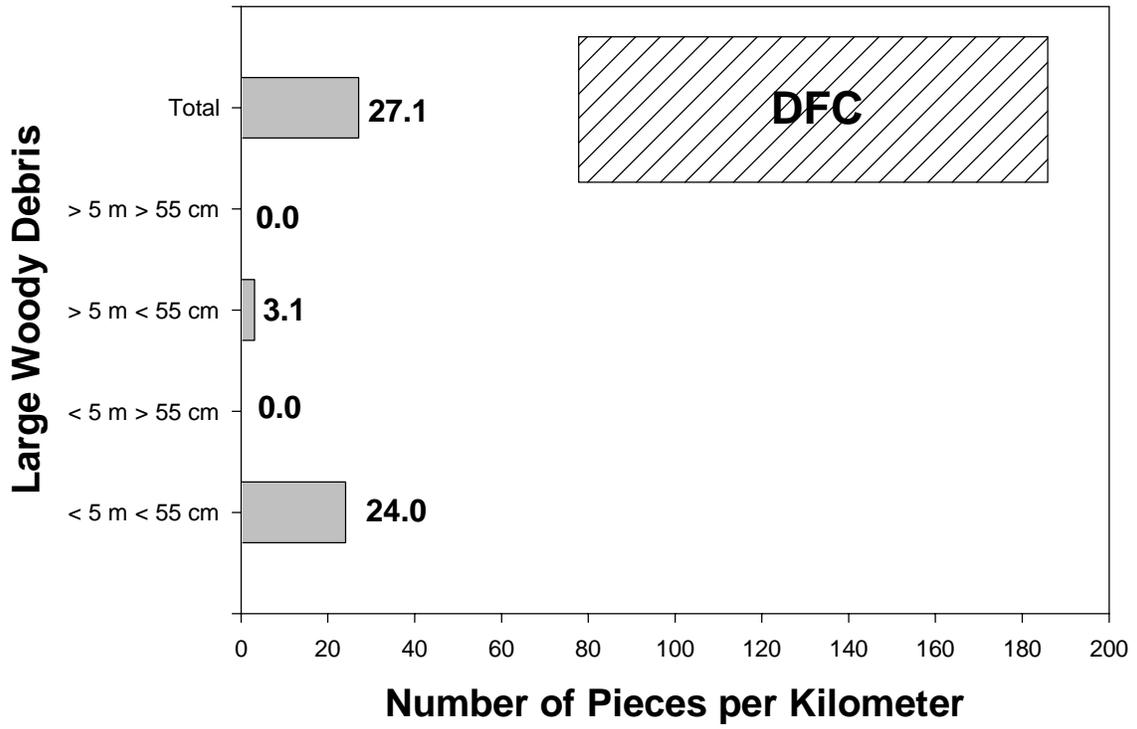
**Average Channel Gradient:** 1.0

# Hunting Camp Creek

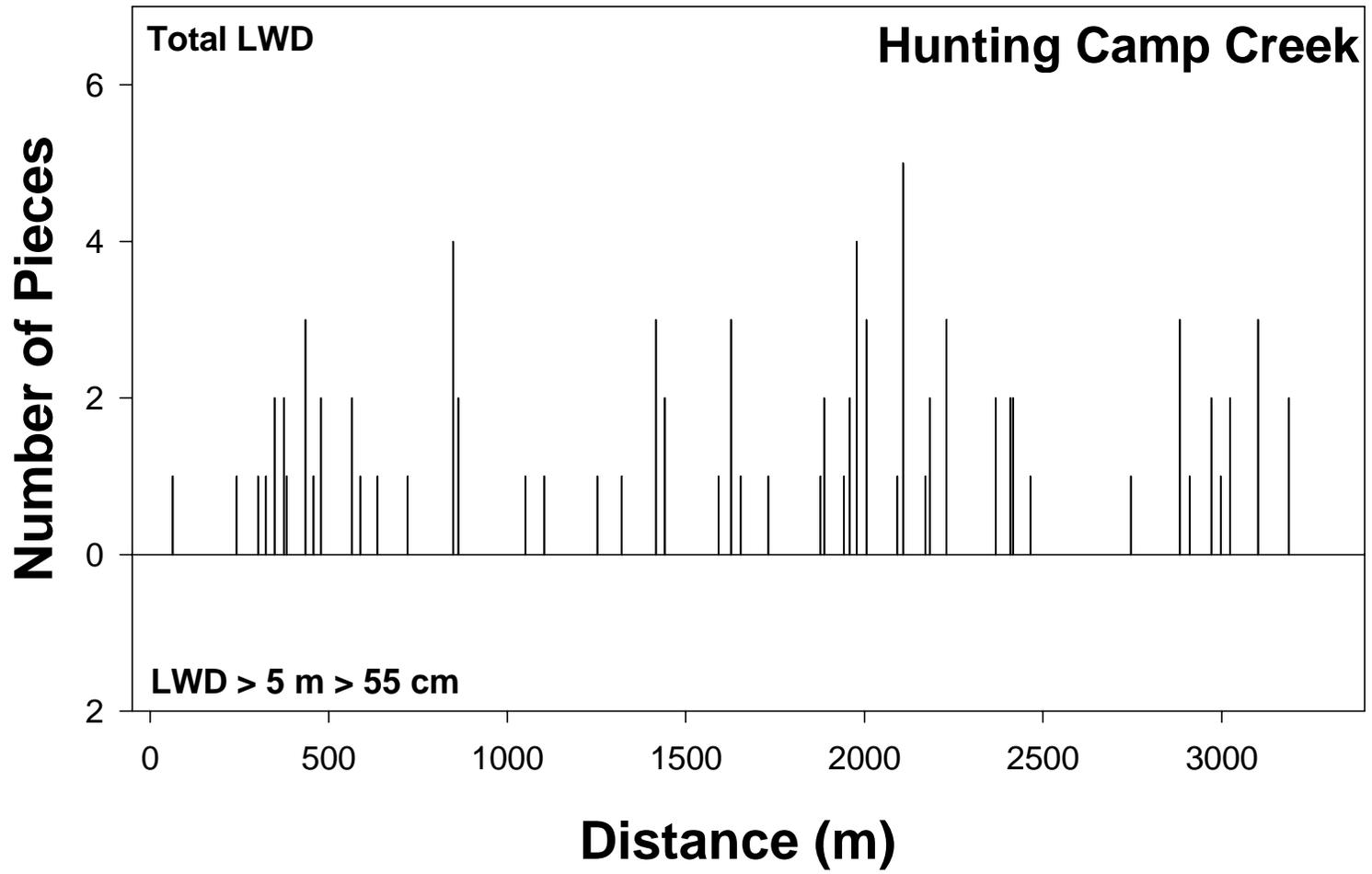


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

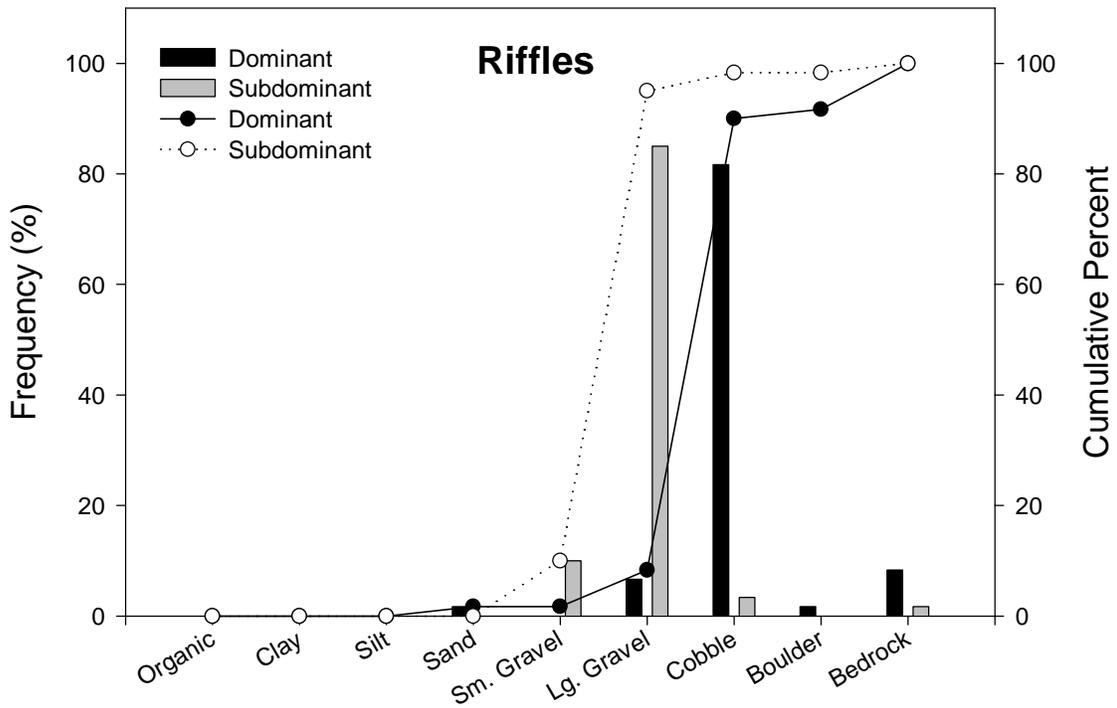
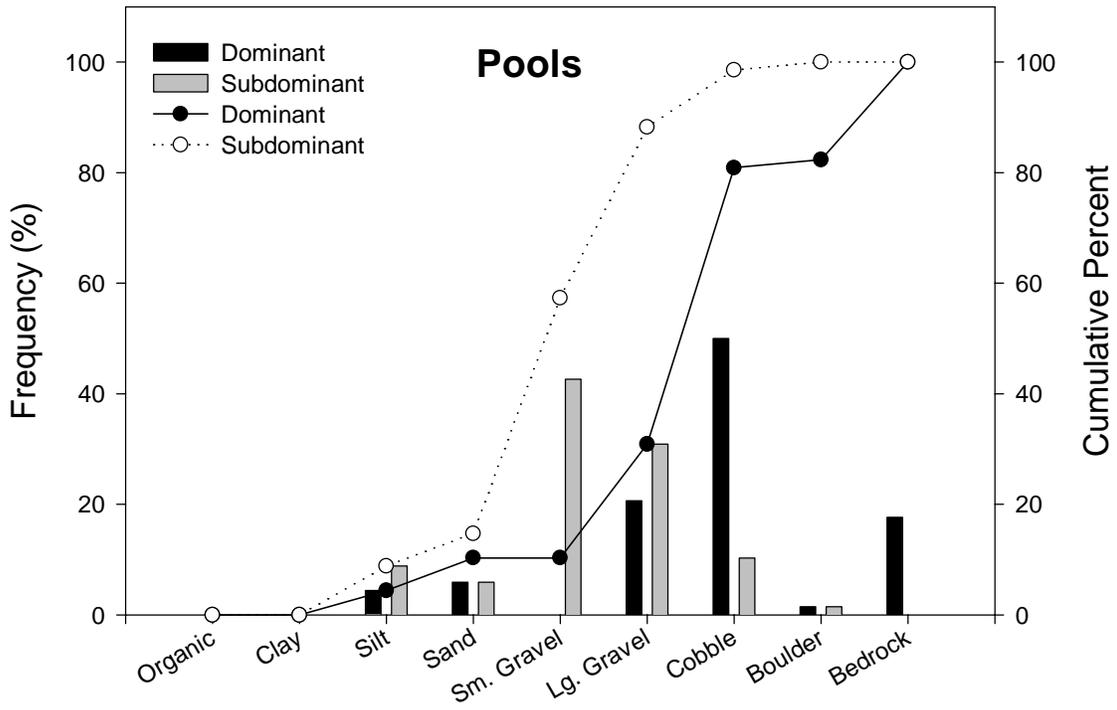
# Hunting Camp Creek



# Distribution and Abundance of Large Woody Debris



# Hunting Camp Creek Substrate Composition



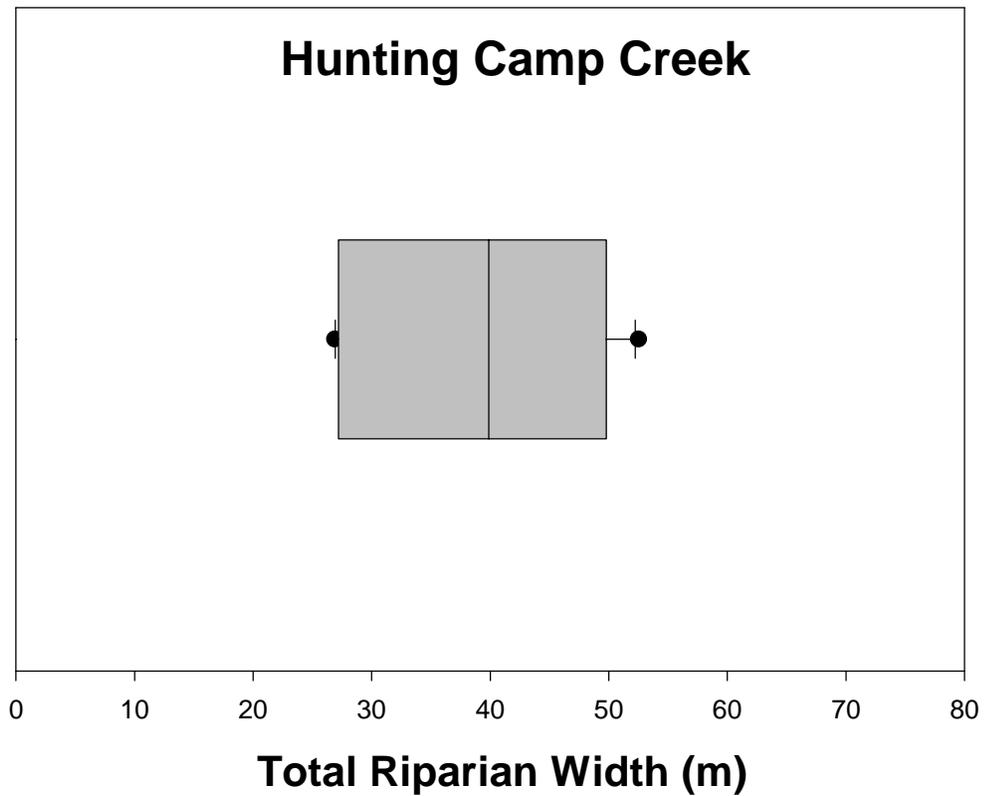
## Riparian Width

Stream: **Hunting Camp Creek**

Number of Measurements: **6**

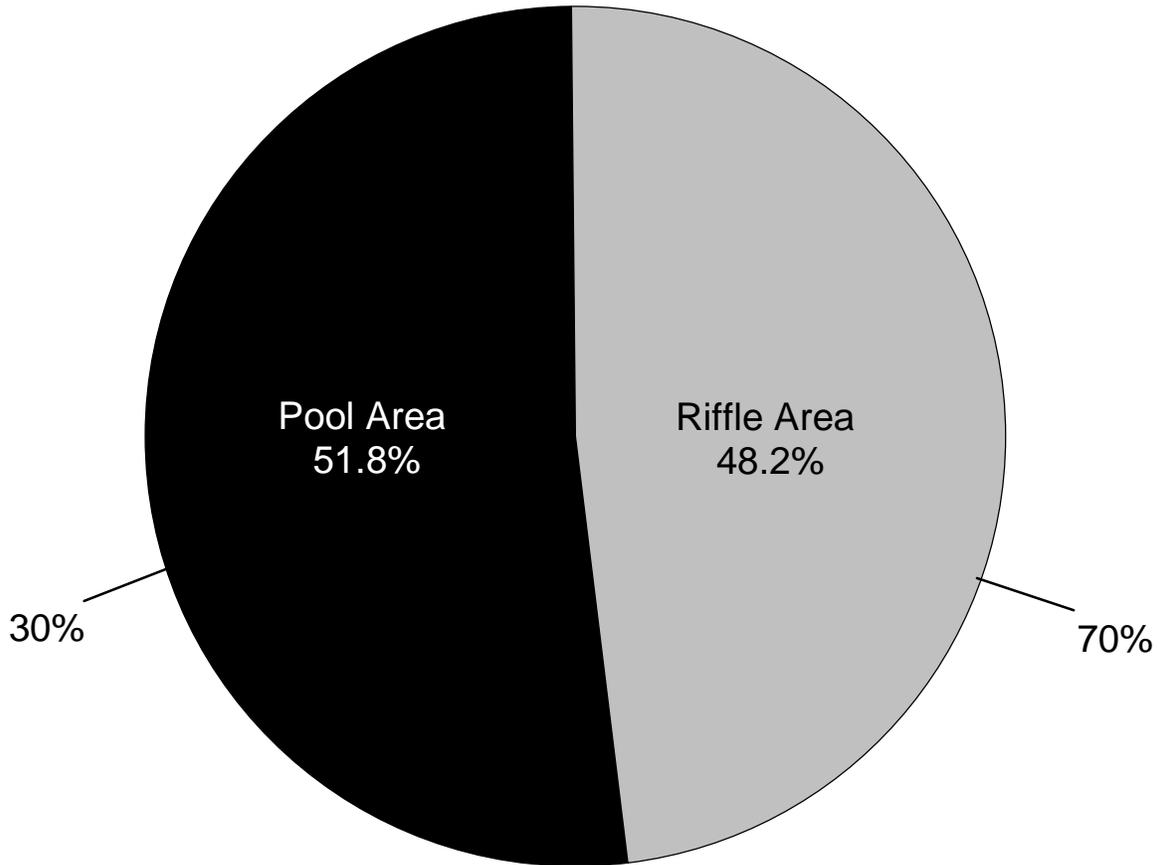
Mean Width: **39.4m** Std Dev: **11.3**

Max: **52.5m** Min: **26.9m**

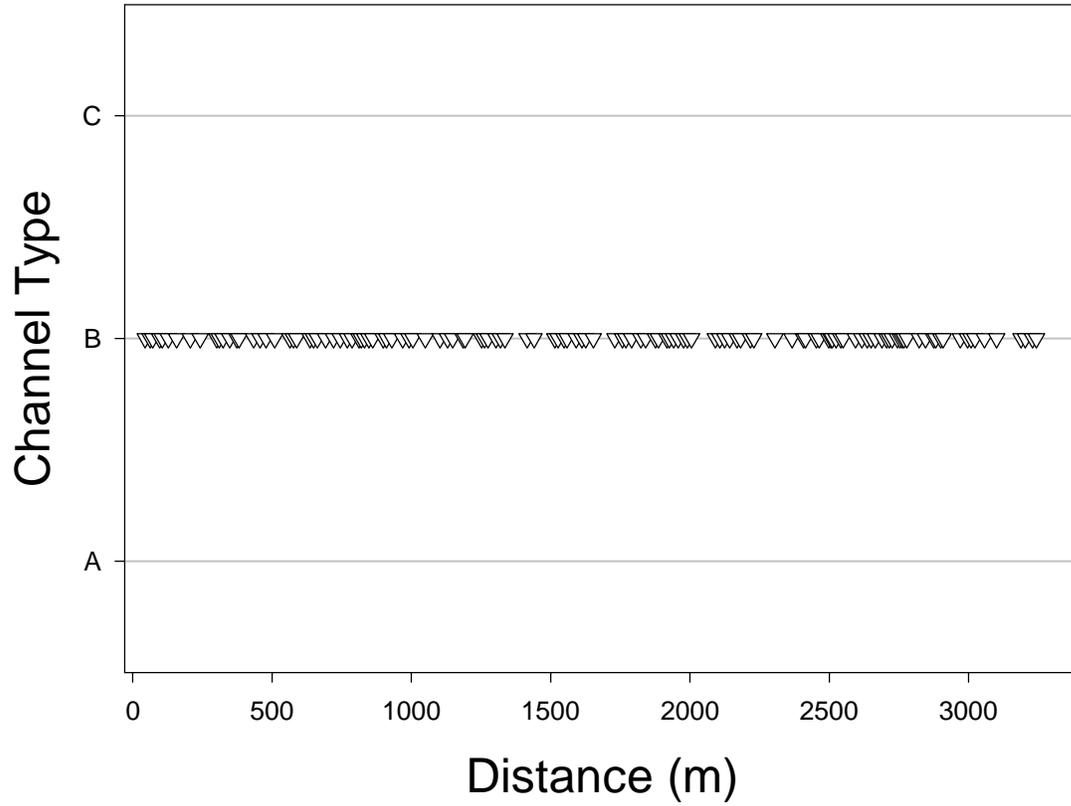


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Hunting Camp Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Hunting Camp Creek Rosgen's Channel Type Distribution



**Stream:** Laurel Creek

**District:** Wythe

**Quadrangle:** Big Bend

**Sample Date:** 07/19/1999

**Downstream Starting Point:** Forest Service boundary

**Total Distance Surveyed:** 3.6 kilometers

**Percent of Total Area – Pools:** 45.2%

Number of Pools: 145

Number of Pools per kilometer: 40.1

Total Pool Area: 5793.9 sq. meters  $\pm$  263.3

Mean Pool Area: 40.0 sq. meters

Correction Factor: 1.00

Mean Maximum Depth: 32.2 cm

Mean Average Depth: 24.1 cm

Mean Average Residual Pool Depth: 33.9 cm

**Percent of Total Area – Riffles:** 54.8%

Number of Riffles: 116

Number of Riffles per kilometer: 32.1

Total Riffle Area: 7036.2 sq. meters  $\pm$  433.2

Mean Riffle Area: 60.7 sq. meters

Correction Factor: 1.01

Mean Maximum Depth: 15.3 cm

Mean Average Depth: 8.4 cm

**Number of Large Woody Debris Pieces per kilometer:** 183.3

Wood < 5 m and < 55 cm: 120.0

Wood < 5 m and > 55 cm: 2.2

Wood > 5 m and < 55 cm: 46.7

Wood > 5 m and > 55 cm: 14.4

**Mean Channel Width:** 7.6 m

**Mean Riparian Width:** 24.5 m

Mean Maximum Riparian Distance (either side): 15.6 m

Mean Minimum Riparian Distance (either side): 2.6 m

Maximum Riparian Width (Total): 58.0 m

Minimum Riparian Width (Total): 0.5 m

Laurel Creek Continued.

**Percent of Pool Habitat Surveyed as Glides:** 76.8%

**Rosgen=s Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 80.8%

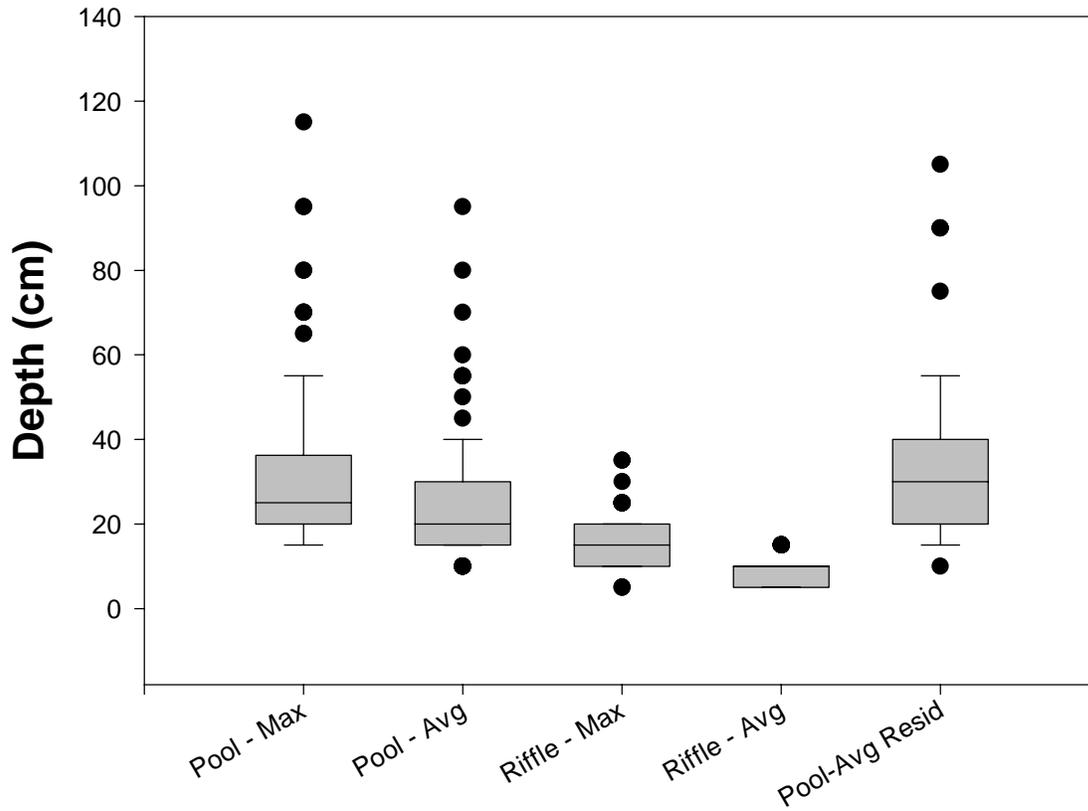
Channel Type C: 19.2%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 15.9%

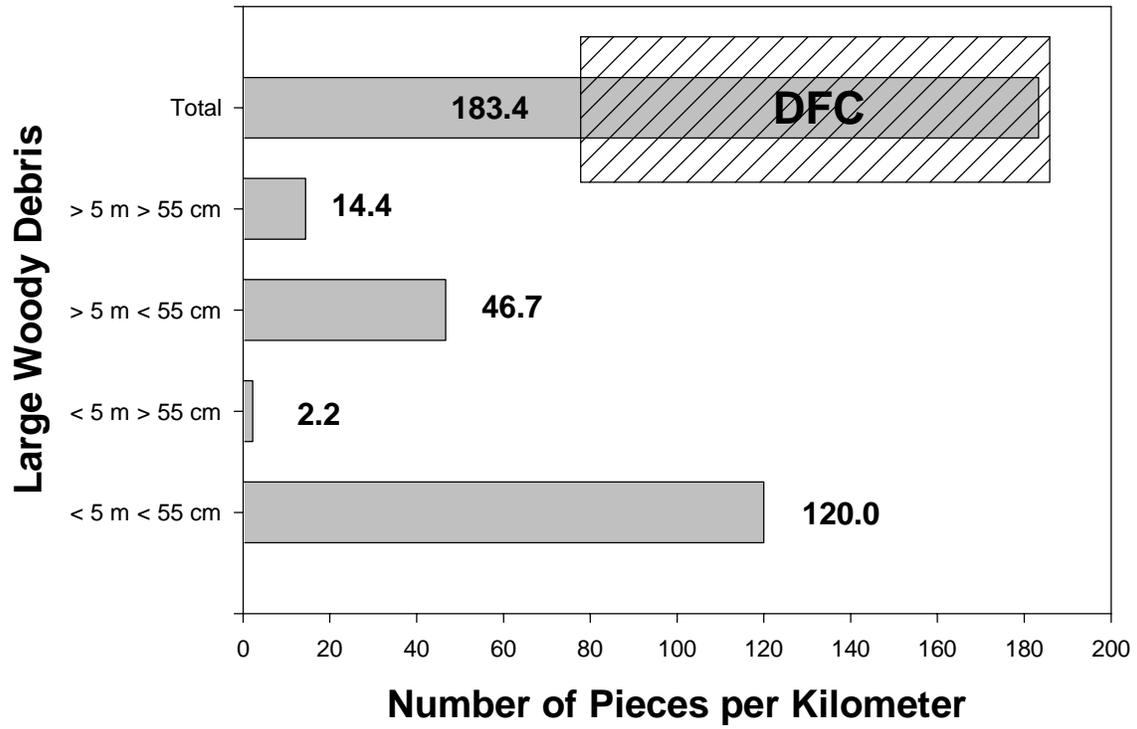
**Average Channel Gradient:** 4.4

# Laurel Creek

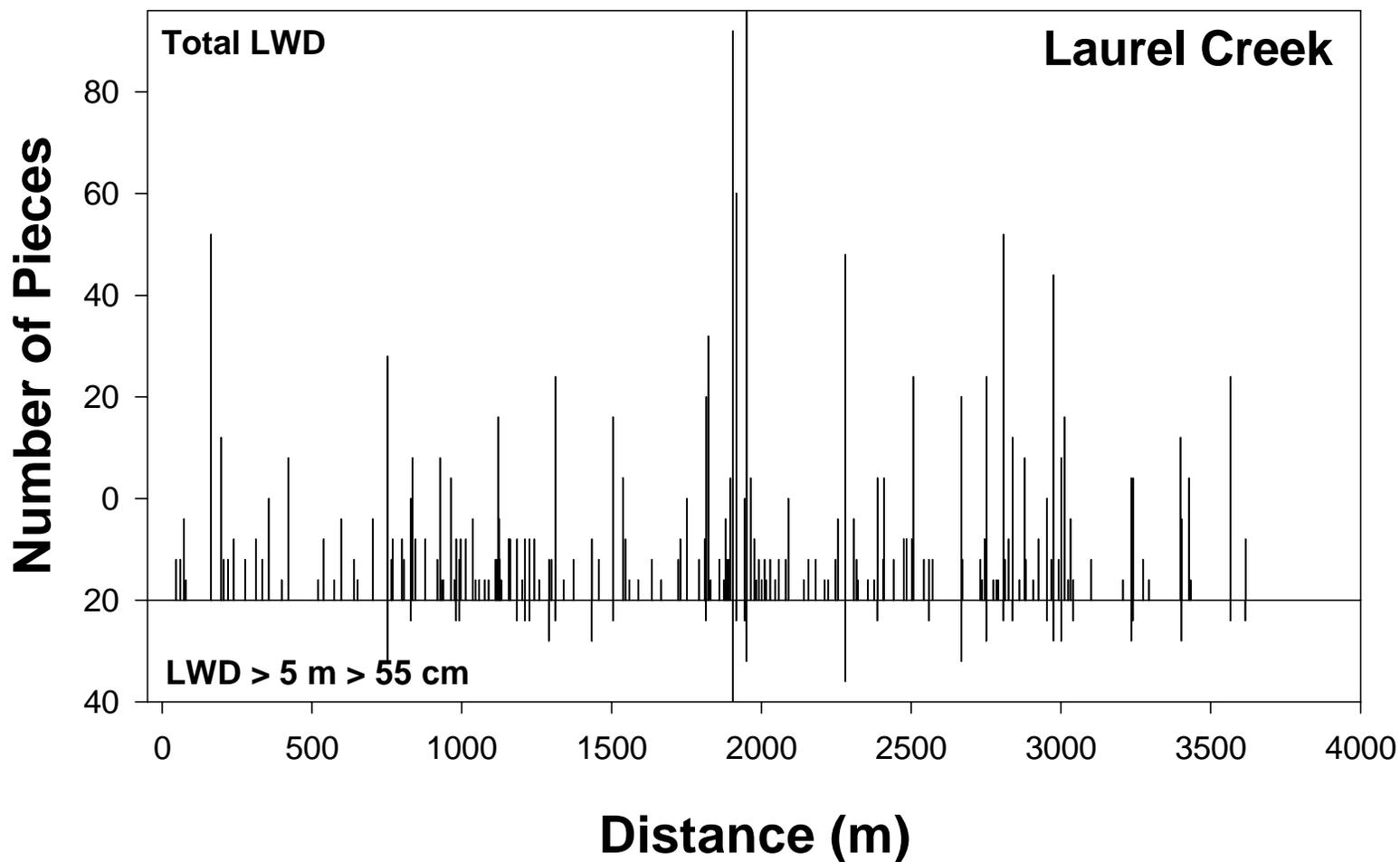


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

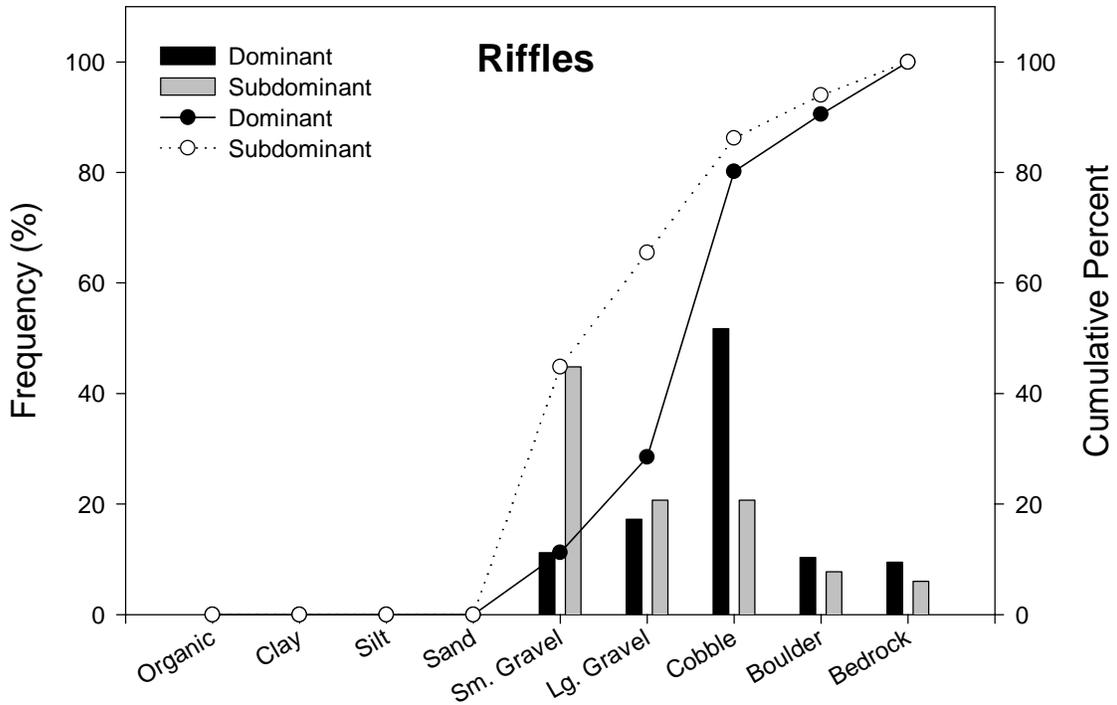
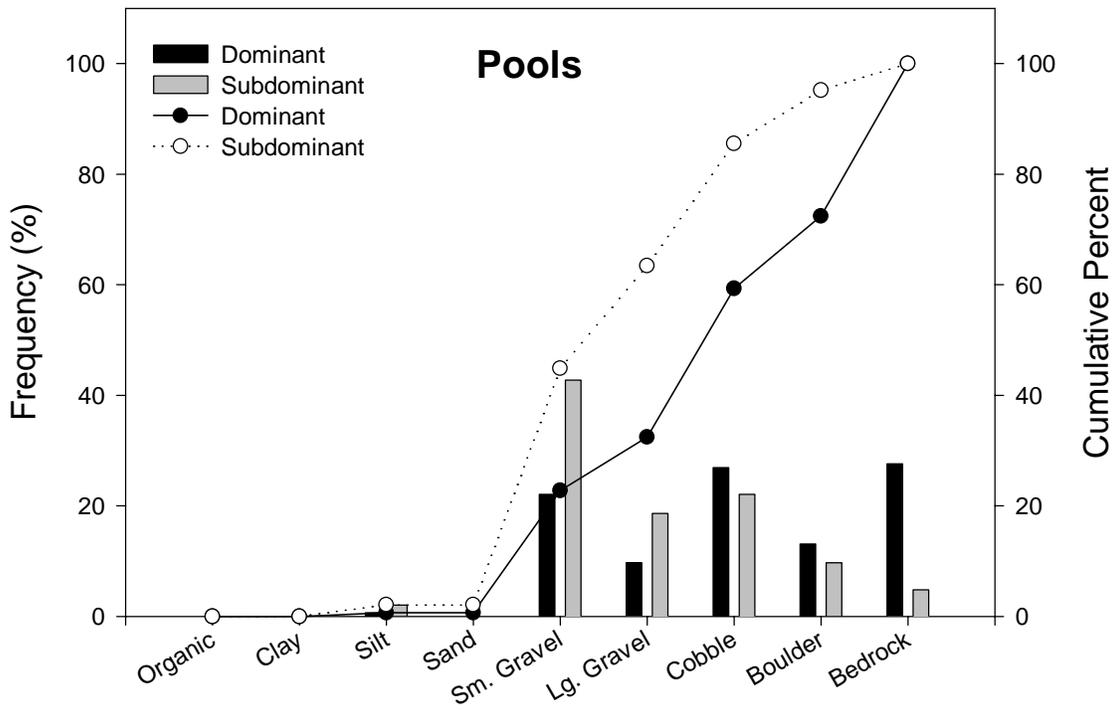
# Laurel Creek



# Distribution and Abundance of Large Woody Debris



# Laurel Creek Substrate Composition



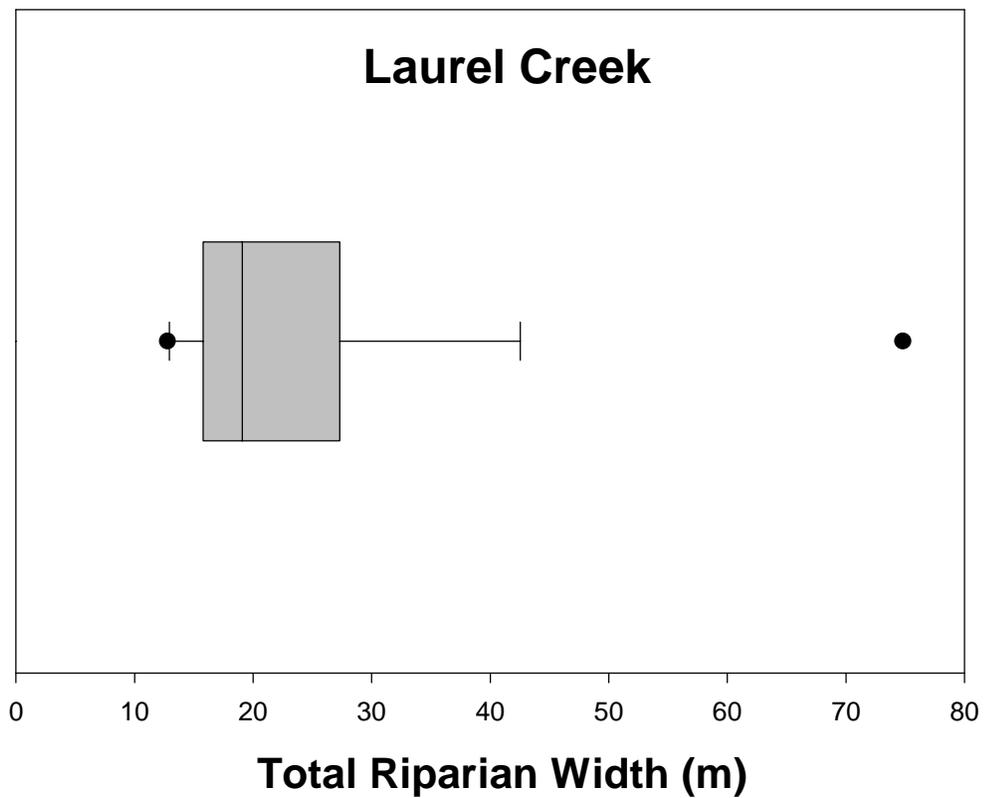
## Riparian Width

Stream: Laural Creek

Number of Measurements: 12

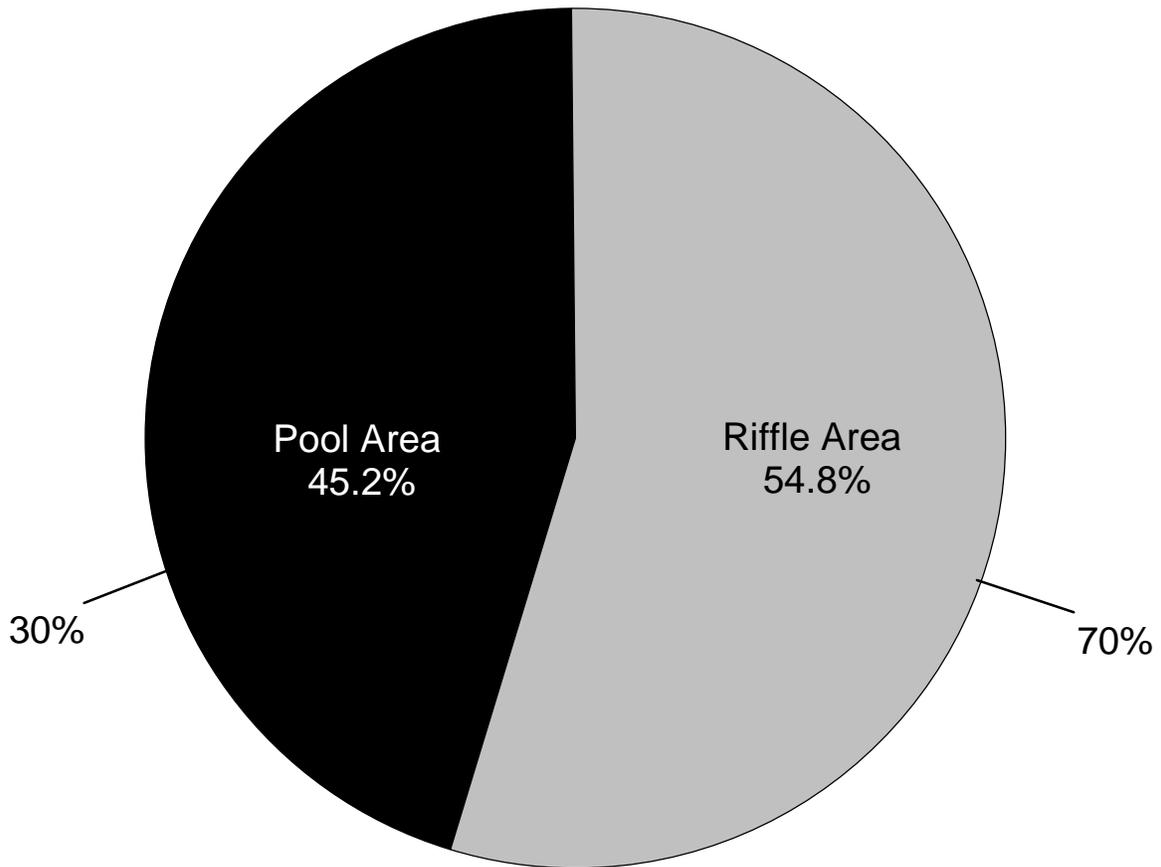
Mean Width: 24.5m Std Dev: 16.8

Max: 74.8m Min: 12.8m

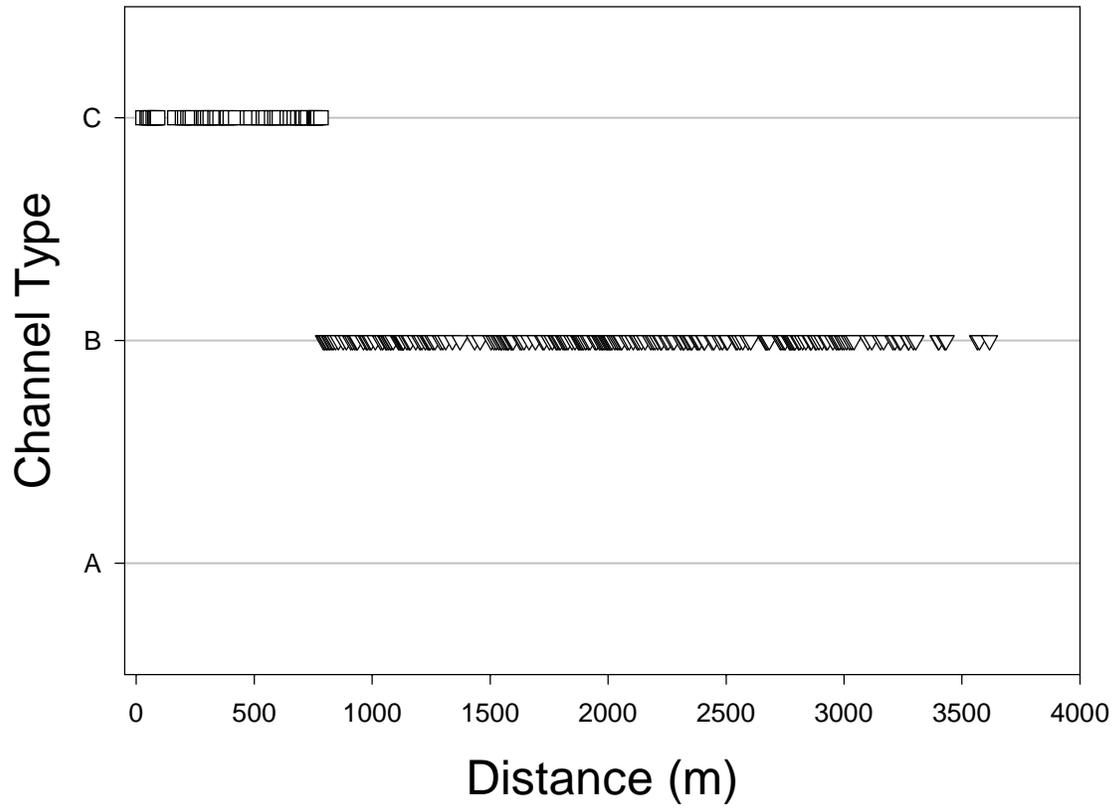


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Laurel Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Laurel Creek Rosgen's Channel Type Distribution



**Stream:** Lick Cr. (upper reach)

**District:** Wythe R.D.

**Quadrangle:** Garden Mtn.

**Sample Date:** 06/06/00

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 3.5 Kilometers

**Percent of Total Area - Pools:** 61.0%

Number of Pools: 159

Number of Pools per kilometer: 45.4

Total Pool Area: 10399.8 sq. meters  $\pm$  515.8

Mean Pool Area: 65.4 sq. meters

Correction Factor: 1.03

Mean Maximum Depth: 34.6 cm

Mean Average Depth: 19.0 cm

Mean Average Residual Pool Depth: 10.0 cm

**Percent of Total Area - Riffles:** 39.0%

Number of Riffles: 124

Number of Riffles per kilometer: 35.4

Total Riffle Area: 4055.7 sq. meters  $\pm$  270.2

Mean Riffle Area: 32.7 sq. meters

Correction Factor: 1.14

Mean Maximum Depth: 15.9 cm

Mean Average Depth: 8.7 cm

**Number of Large Woody Debris Pieces per kilometer:** 122.0

Wood < 5 m and < 55 cm: 87.1

Wood < 5 m and > 55 cm: 2.3

Wood > 5 m and < 55 cm: 31.4

Wood > 5 m and > 55 cm: 1.2

**Mean Channel Width:** 5.7 m

**Mean Riparian Width:** 35.0 m

Mean Maximum Riparian Distance (either side): 23.9 m

Mean Minimum Riparian Distance (either side): 5.4 m

Maximum Riparian Width (Total): 75.1 m

Minimum Riparian Width (Total): 16.7 m

Lick Creek (upper reach) Continued.

**Percent of Pool Habitat Surveyed as Glides:** 13.3%

**Rosgen=s Channel Type Frequency:**

Channel Type A:

Channel Type B: 90.5%

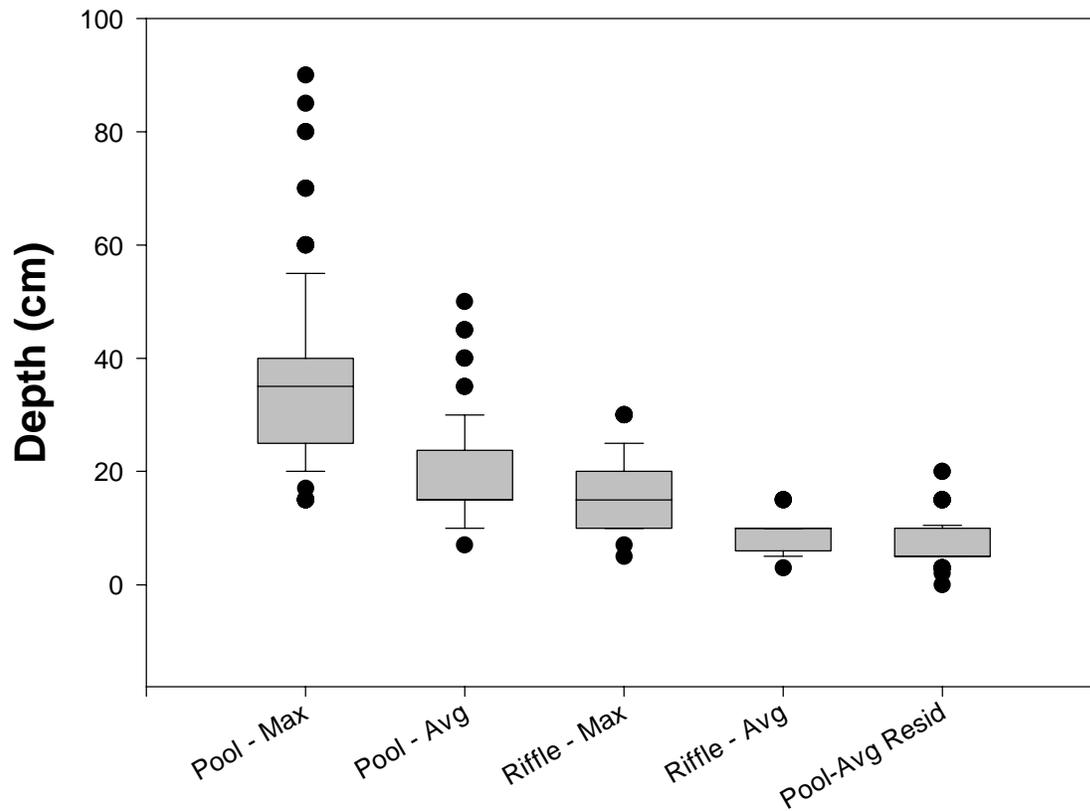
Channel Type C: 9.5%

Channel Type D:

**Percent Pools with  $\geq$  35% Embeddedness:** 17.0%

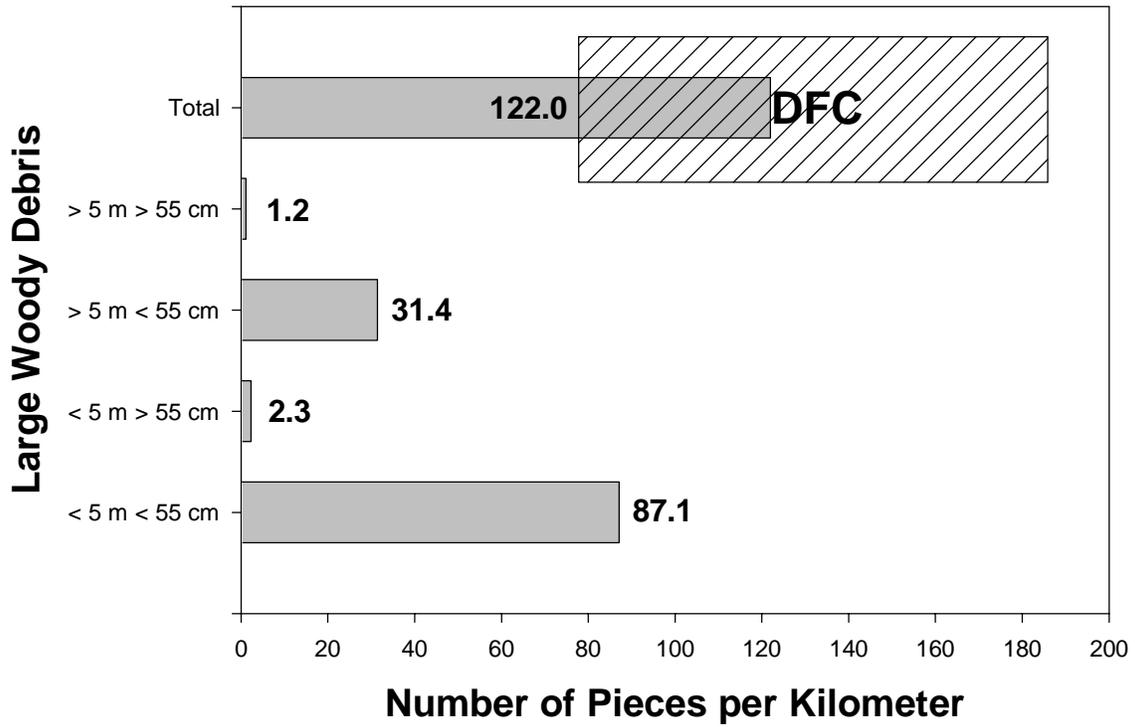
**Average Channel Gradient:** 2.4

# Lick Creek (upper section)

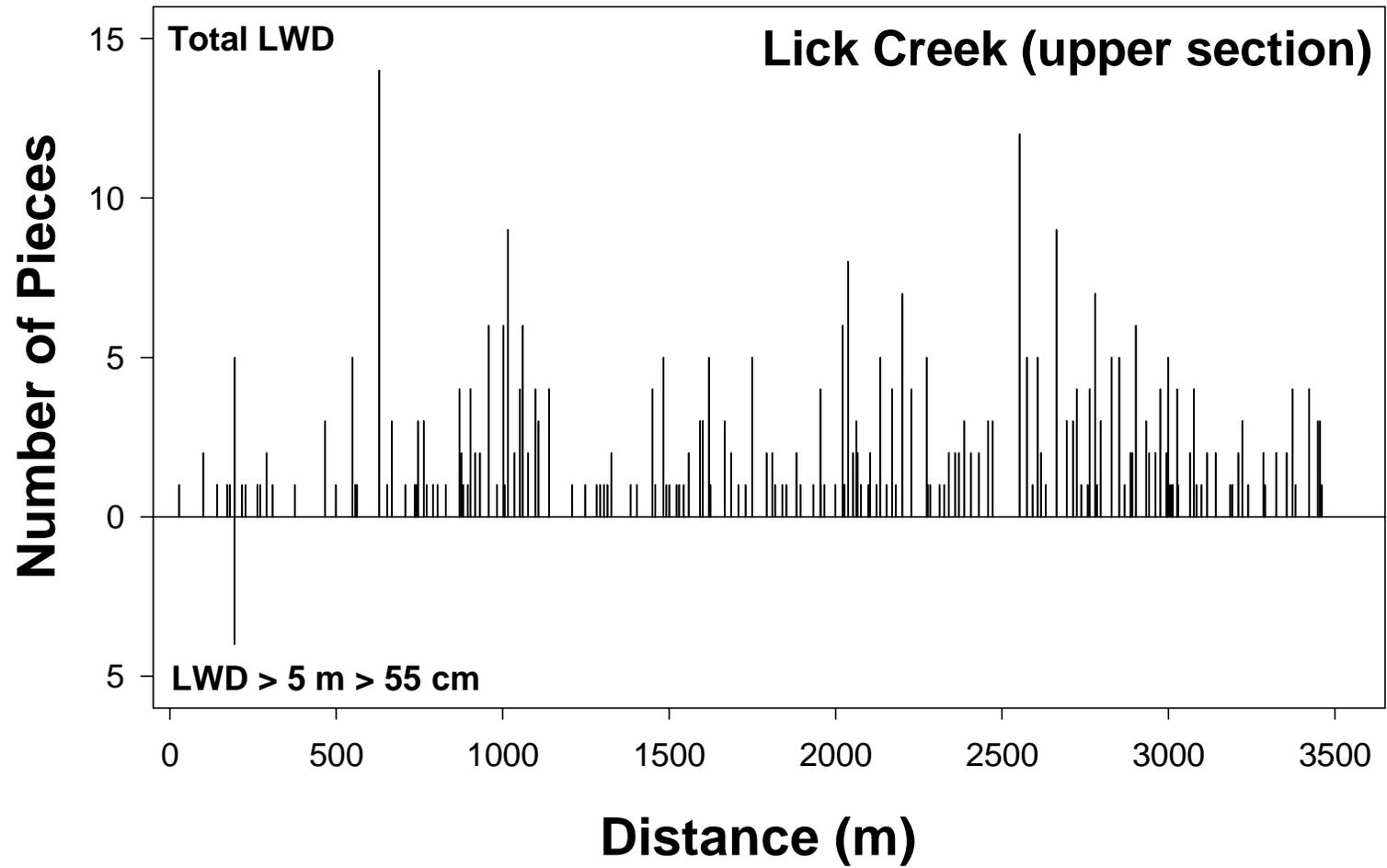


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

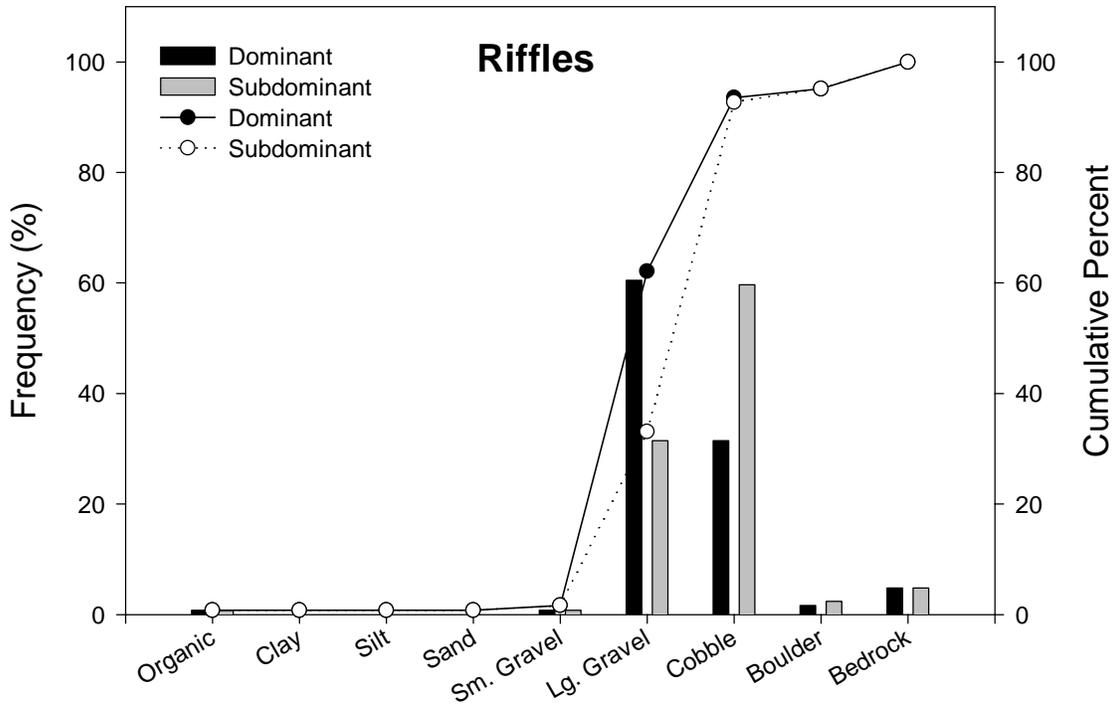
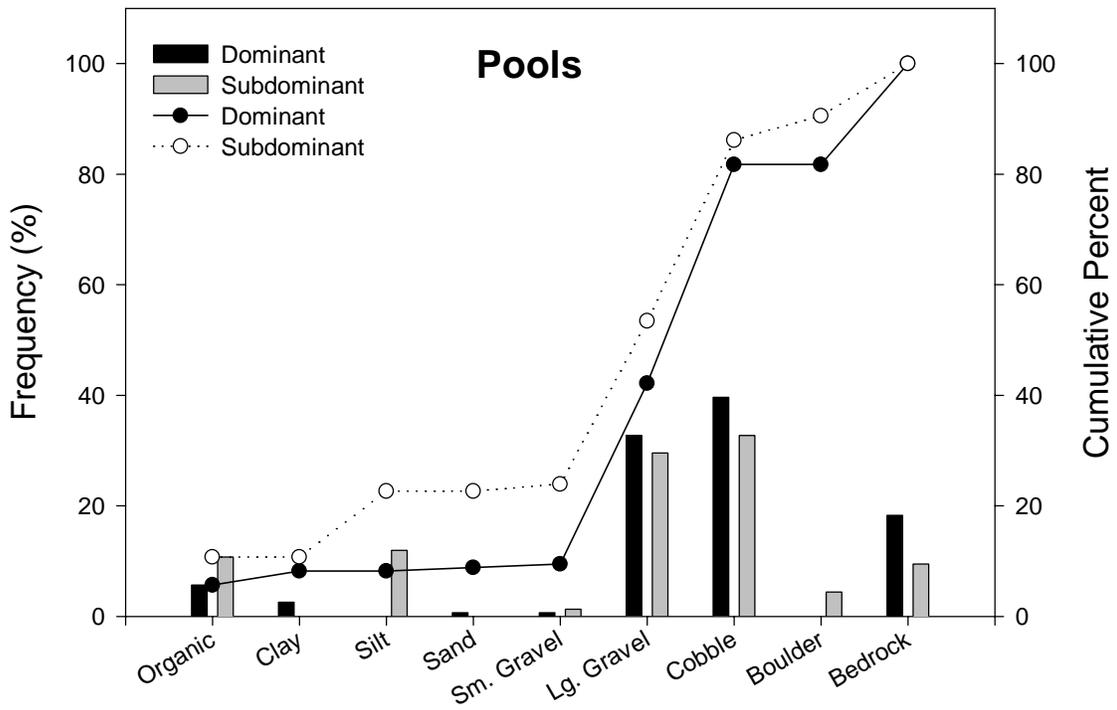
# Lick Creek (upper section)



# Distribution and Abundance of Large Woody Debris



# Lick Creek (upper section) Substrate Composition



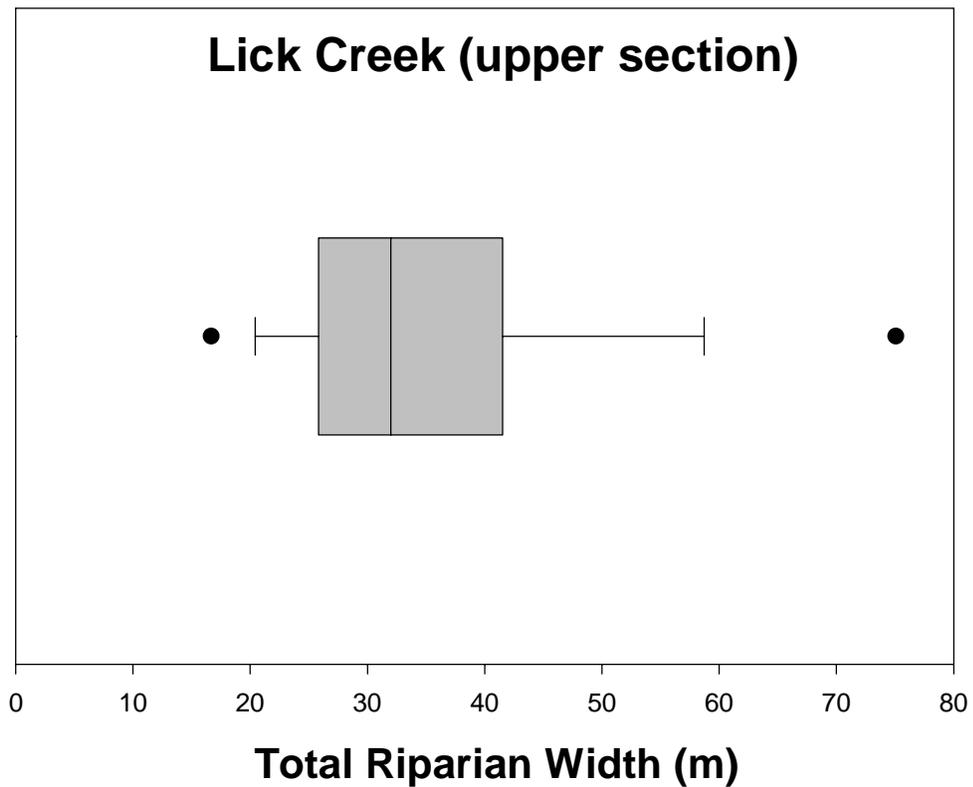
## Riparian Width

Stream: Lick Creek (upper section)

Number of Measurements: 11

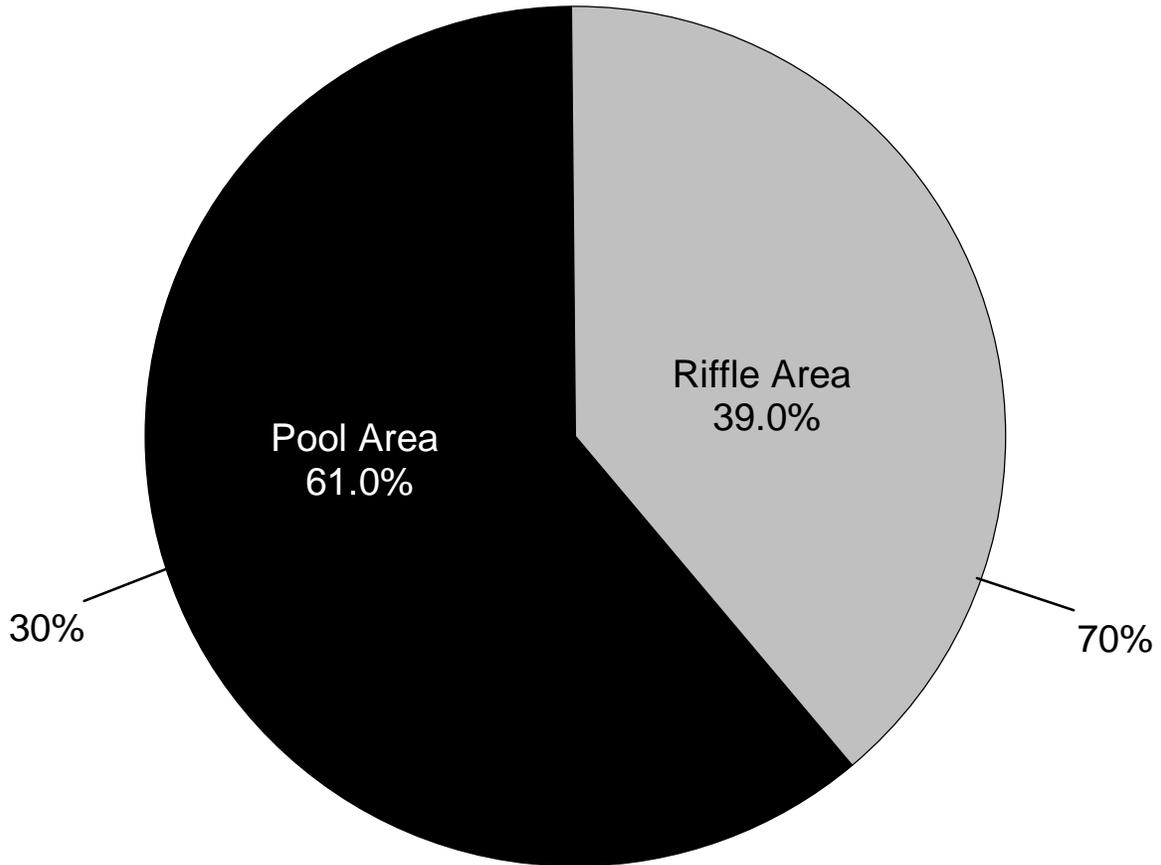
Mean Width: 35.0m Std Dev: 16.0

Max: 75.1m Min: 16.7m

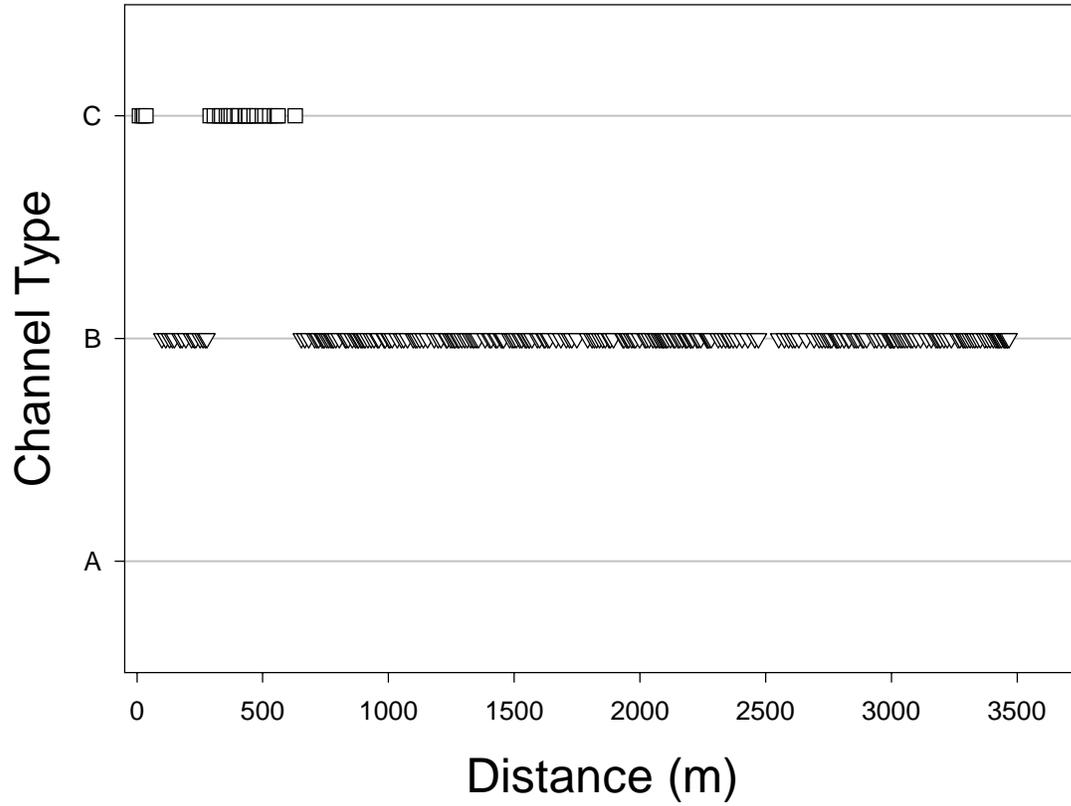


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Lick Creek (upper section)  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Lick Creek (upper section) Rosgen's Channel Type Distribution



**Stream:** Little Wolf Creek

**District:** Wythe

**Quadrangle:** Big Bend

**Sample Date:** 09/04/1999

**Downstream Starting Point:** Confluence with Laurel Creek

**Total Distance Surveyed:** 5.6 kilometers

**Percent of Total Area – Pools:** 63.1%

Number of Pools: 274

Number of Pools per kilometer: 49.3

Total Pool Area: 11311.5 sq. meters  $\pm$  498.2

Mean Pool Area: 41.3 sq. meters

Correction Factor: 1.01

Mean Maximum Depth: 30.2 cm

Mean Average Depth: 21.3 cm

Mean Average Residual Pool Depth: 26.3 cm

**Percent of Total Area – Riffles:** 36.9%

Number of Riffles: 210

Number of Riffles per kilometer: 37.8

Total Riffle Area: 6613.9 sq. meters  $\pm$  525.0

Mean Riffle Area: 31.5sq. meters

Correction Factor: 0.93

Mean Maximum Depth: 13.0 cm

Mean Average Depth: 6.9 cm

**Number of Large Woody Debris Pieces per kilometer:** 427.2

Wood < 5 m and < 55 cm: 334.3

Wood < 5 m and > 55 cm: 2.9

Wood > 5 m and < 55 cm: 86.7

Wood > 5 m and > 55 cm: 3.4

**Mean Channel Width:** 5.5 m

**Mean Riparian Width:** 25.4 m

Mean Maximum Riparian Distance (either side): 18.3 m

Mean Minimum Riparian Distance (either side): 2.5 m

Maximum Riparian Width (Total): 45.0 m

Minimum Riparian Width (Total): 0.5 m

Little Wolf Creek Continued.

**Percent of Pool Habitat Surveyed as Glides:** 43.5%

**Rosgen=s Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 86.6%

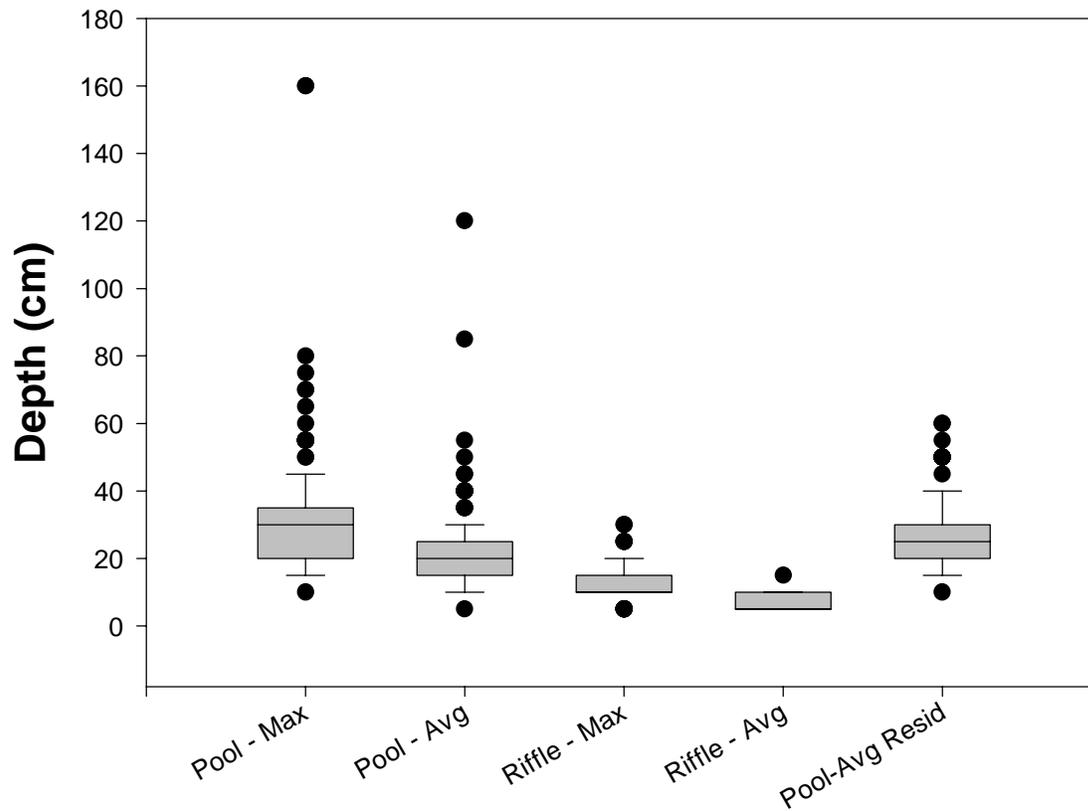
Channel Type C: 13.4%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 0.7%

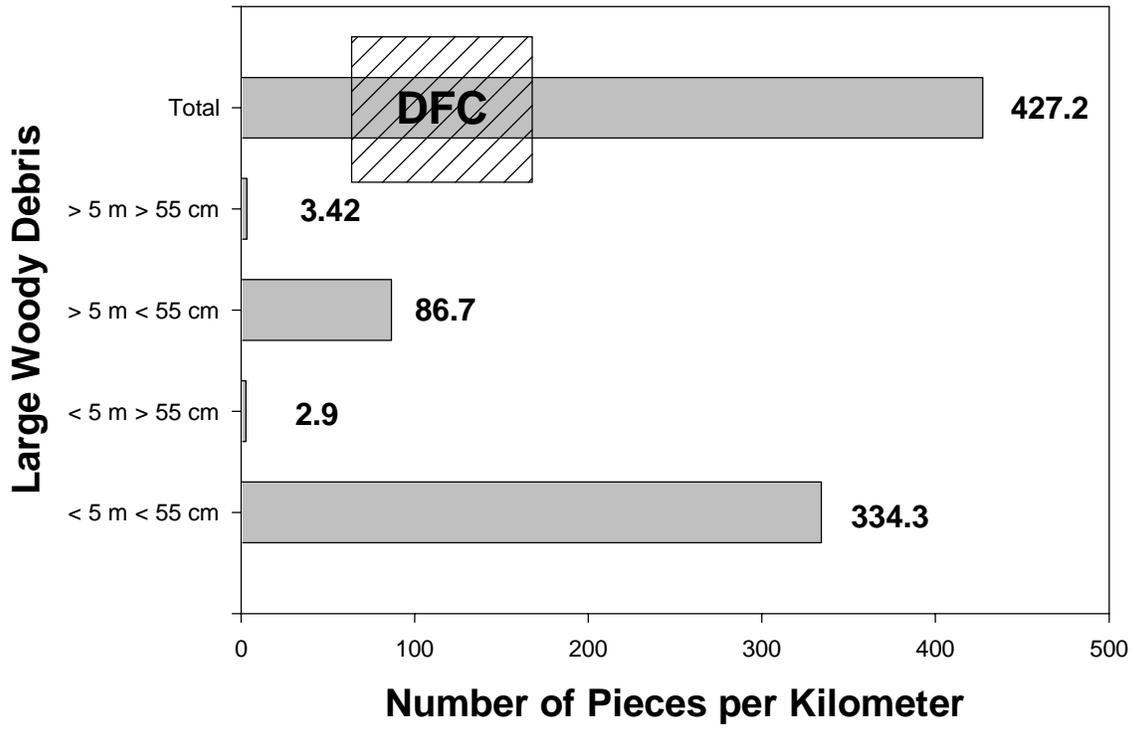
**Average Channel Gradient:** 4.9

# Little Wolf Creek

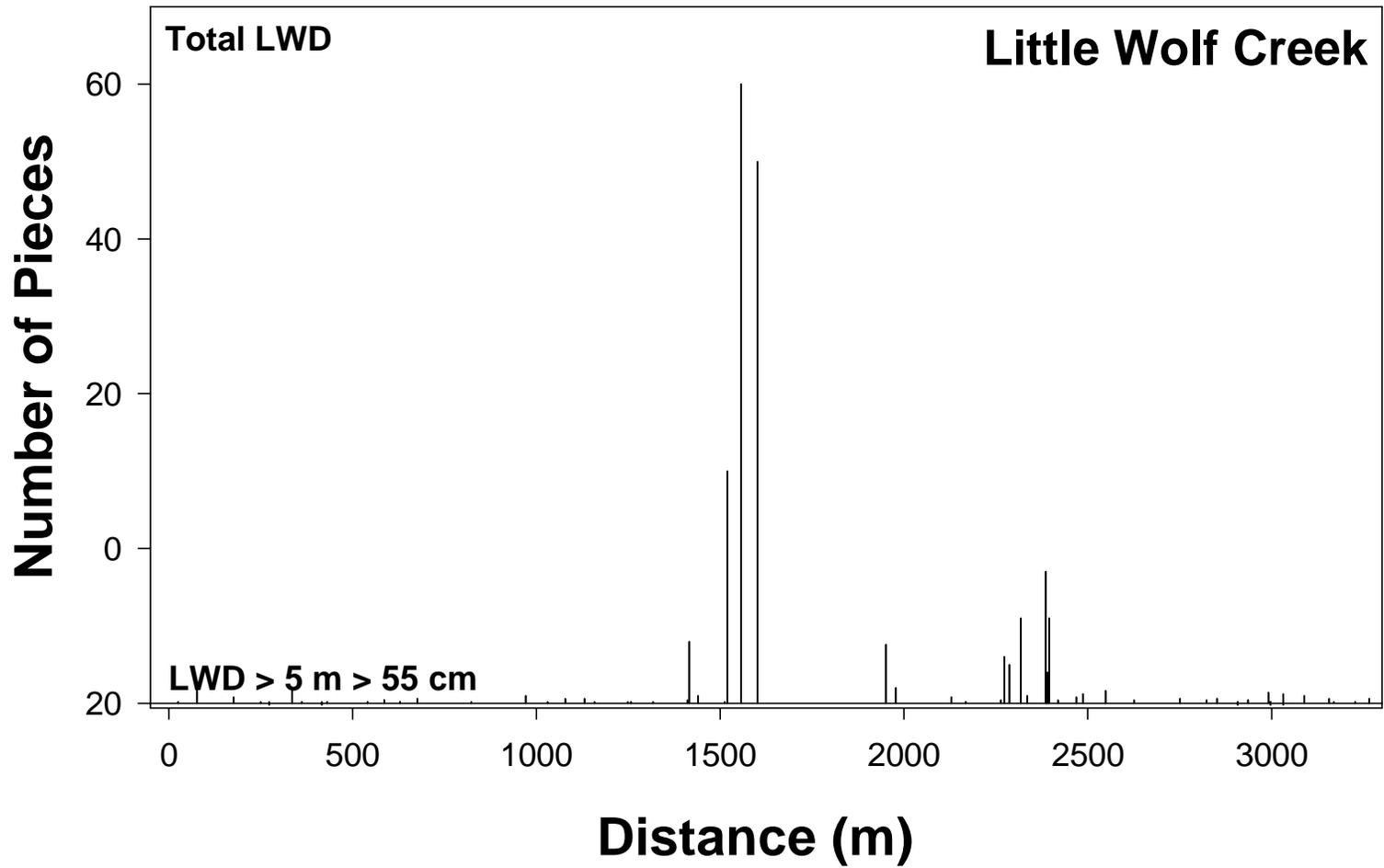


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

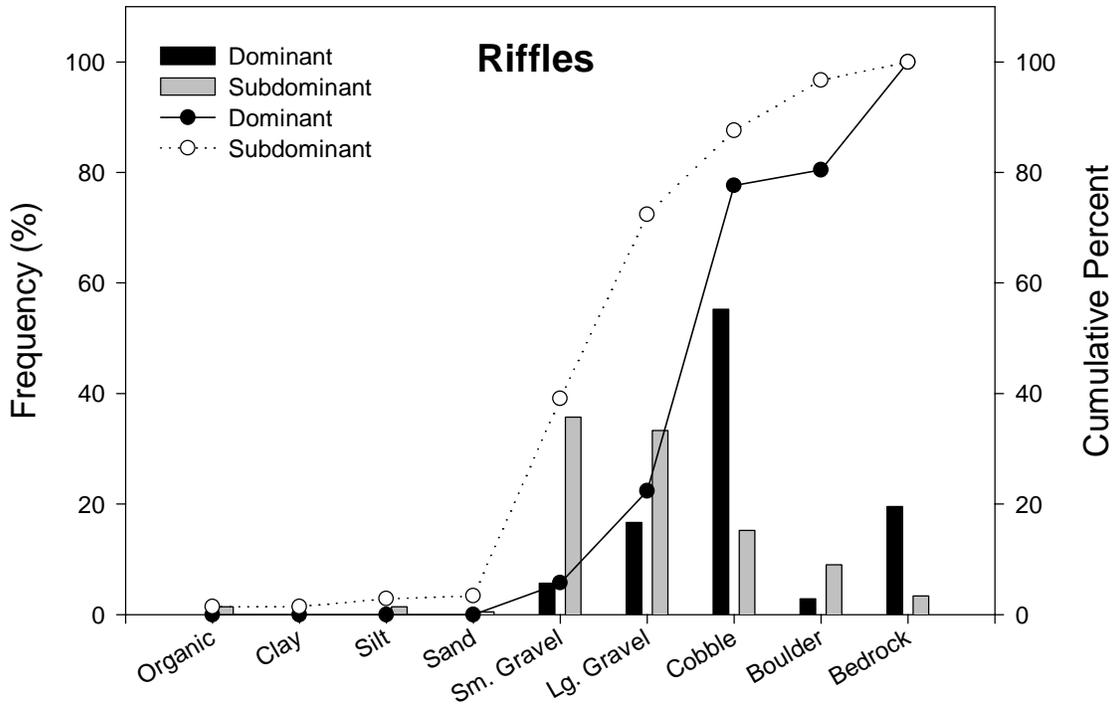
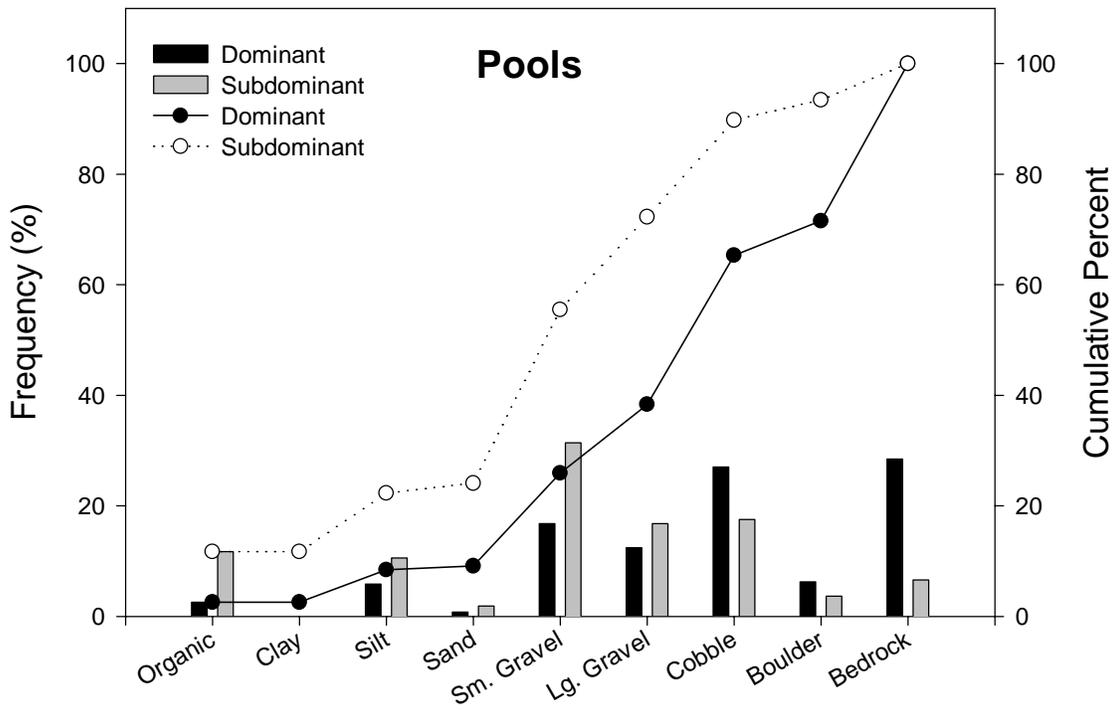
# Little Wolf Creek



# Distribution and Abundance of Large Woody Debris



# Little Wolf Creek Substrate Composition



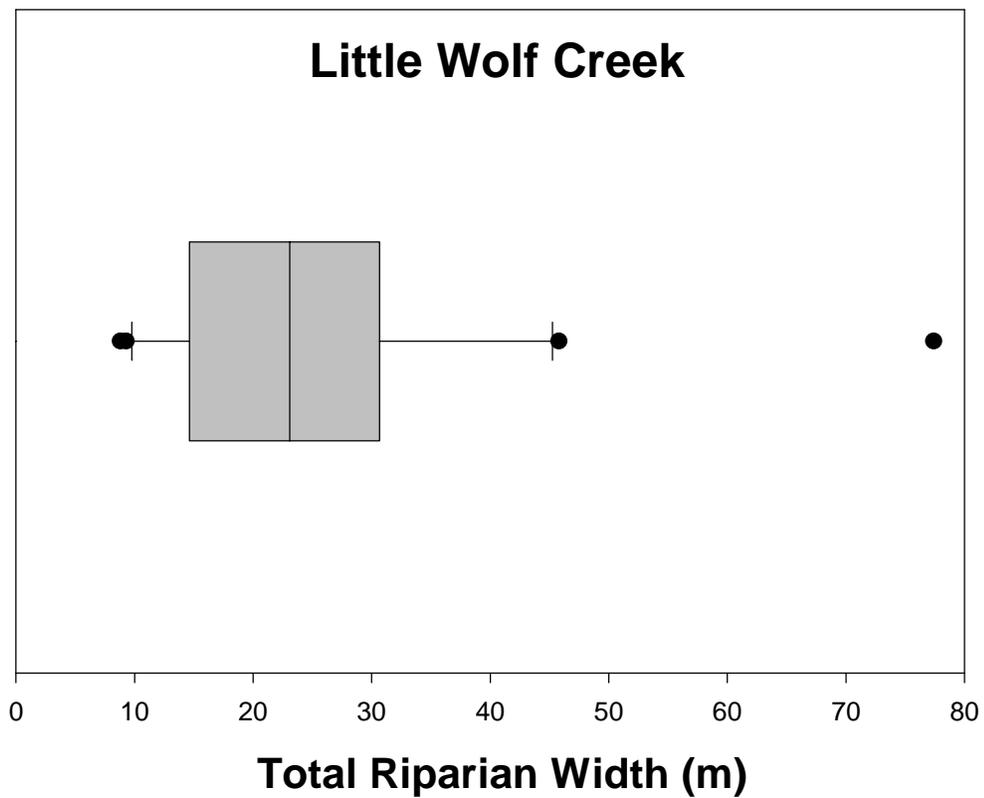
## Riparian Width

Stream: Little Wolf Creek

Number of Measurements: 21

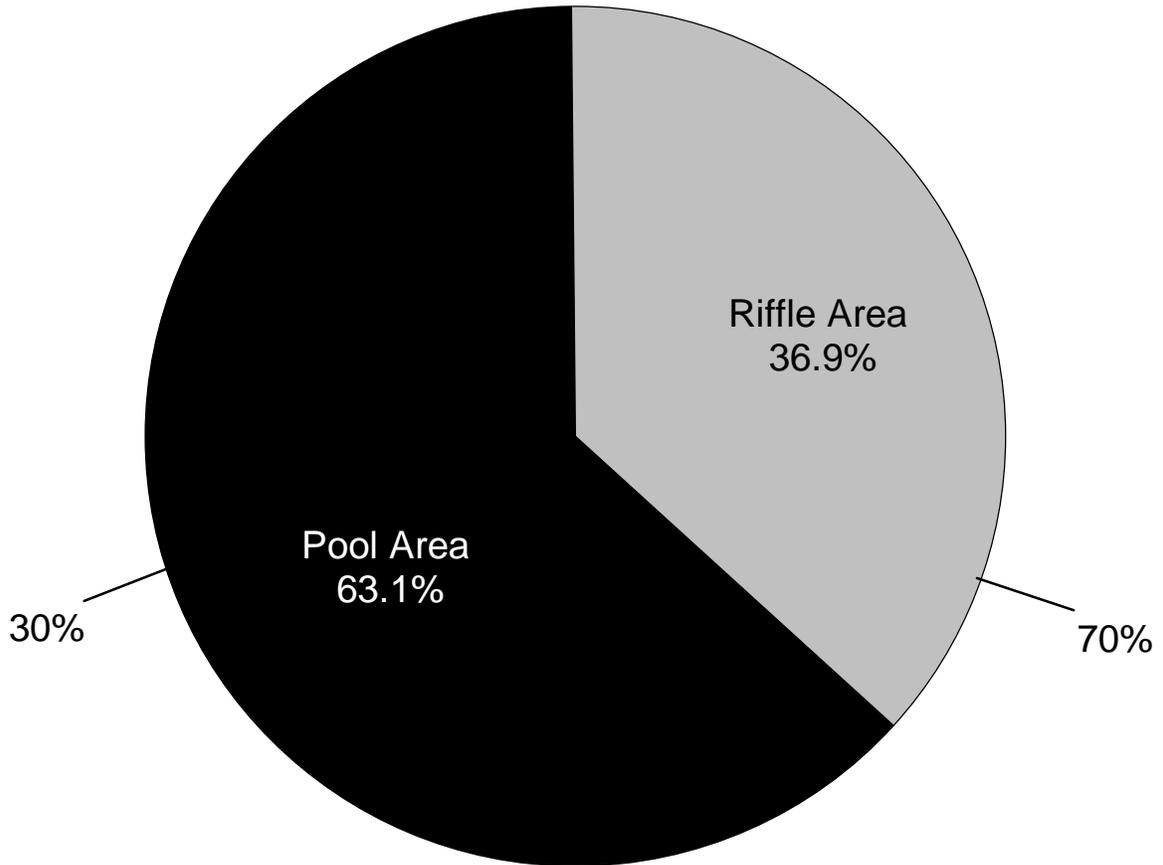
Mean Width: 25.4m Std Dev: 16.1

Max: 77.4m Min: 8.8m

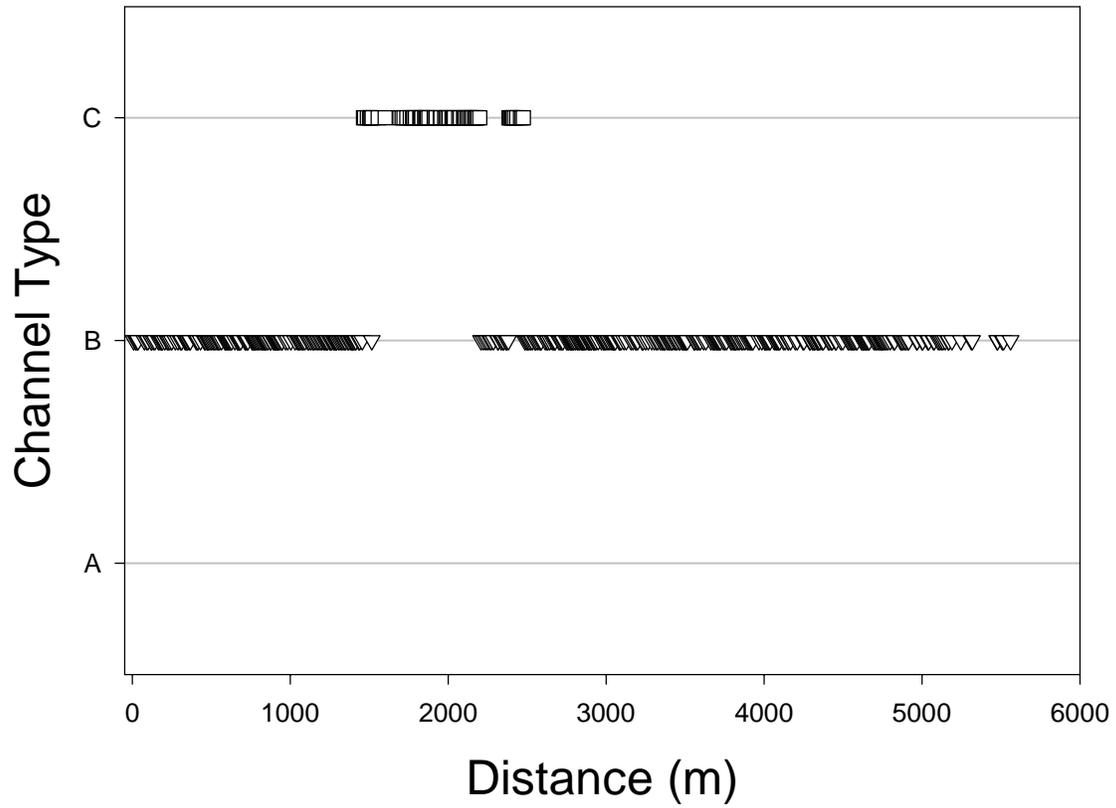


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Little Wolf Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Little Wolf Creek Rosgen's Channel Type Distribution



# Rural Retreat and Nebo Quadrangles

**Stream:** Bear Creek

**District:** Wythe

**Quadrangle:** Noles

**Sample Date:** 08/04/1999

**Downstream Starting Point:** Forest Service boundary

**Total Distance Surveyed:** 5.9 kilometers

**Percent of Total Area – Pools:** 83.3%

Number of Pools: 227

Number of Pools per kilometer: 38.5

Total Pool Area: 19470.6 sq. meters  $\pm$  813.4

Mean Pool Area: 85.8 sq. meters

Correction Factor: 0.95

Mean Maximum Depth: 37.0 cm

Mean Average Depth: 24.1 cm

Mean Average Residual Pool Depth: 39.9 cm

**Percent of Total Area – Riffles:** 16.7%

Number of Riffles: 141

Number of Riffles per kilometer: 23.9

Total Riffle Area: 3891.5 sq. meters  $\pm$  265.3

Mean Riffle Area: 27.6 sq. meters

Correction Factor: 1.06

Mean Maximum Depth: 9.3 cm

Mean Average Depth: 4.9 cm

**Number of Large Woody Debris Pieces per kilometer:** 303.5

Wood < 5 m and < 55 cm: 204.3

Wood < 5 m and > 55 cm: 10.1

Wood > 5 m and < 55 cm: 64.4

Wood > 5 m and > 55 cm: 24.8

**Mean Channel Width:** 7.2 m

**Mean Riparian Width:** 57.2 m

Mean Maximum Riparian Distance (either side): 40.0 m

Mean Minimum Riparian Distance (either side): 10.0 m

Maximum Riparian Width (Total): 110.0 m

Minimum Riparian Width (Total): 1.0 m

Bear Creek Continued.

**Percent of Pool Habitat Surveyed as Glides:** 33.5

**Rosgen=s Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 35.6%

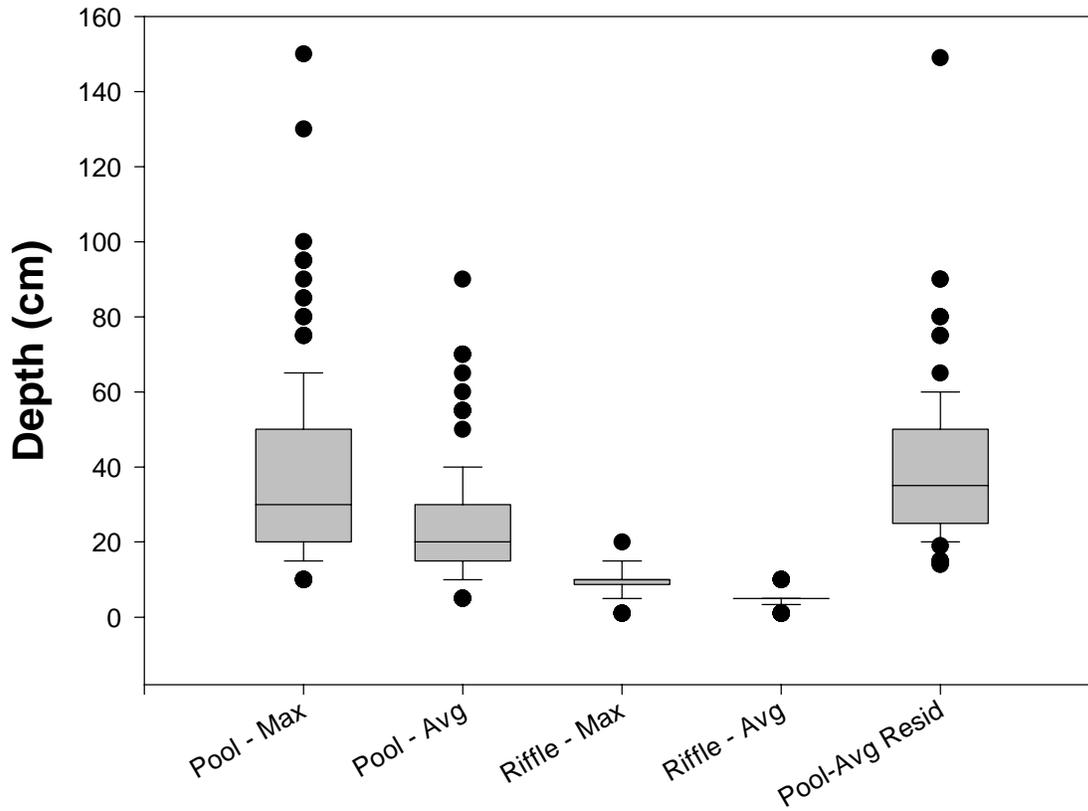
Channel Type C: 64.7%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 0.9%

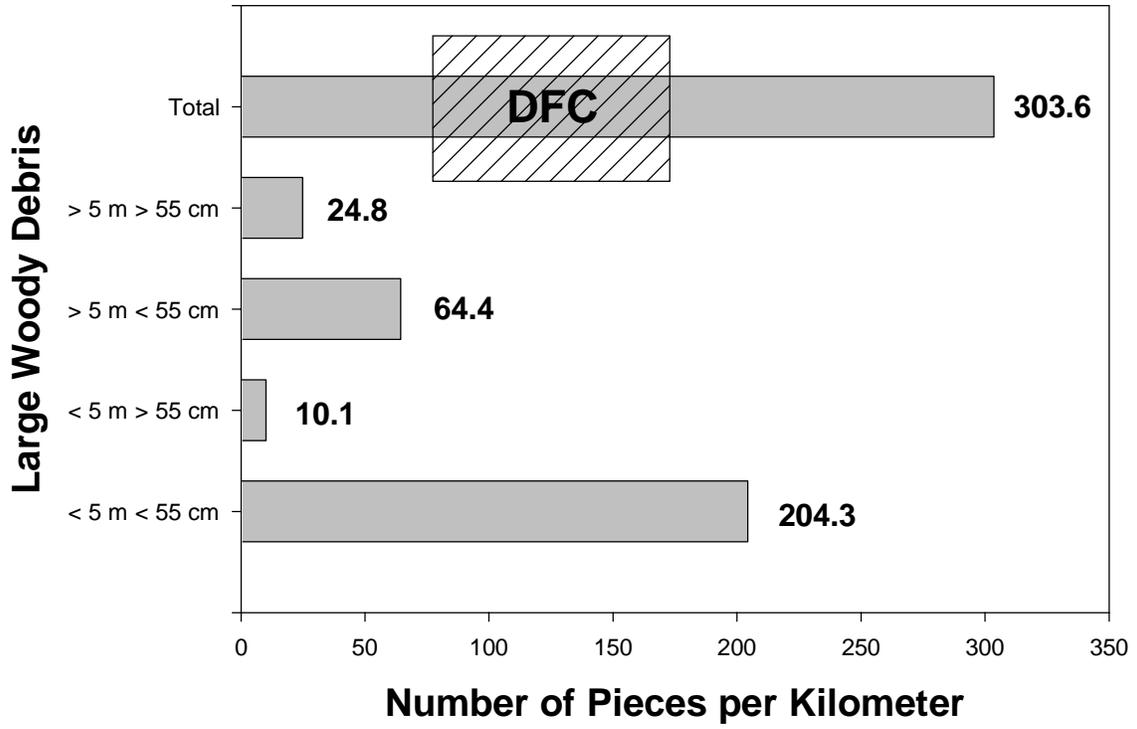
**Average Channel Gradient:** 2.2

# Bear Creek

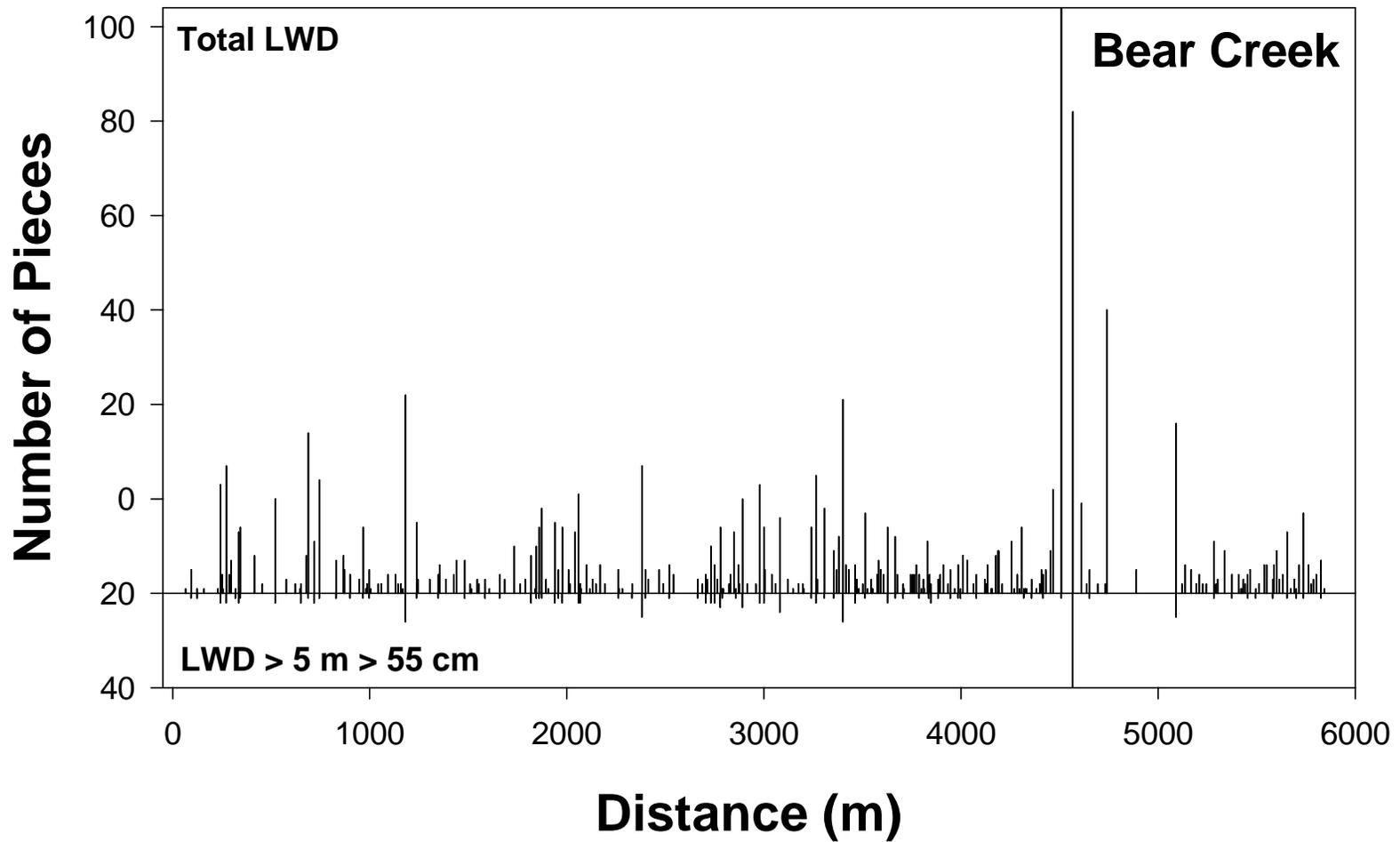


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

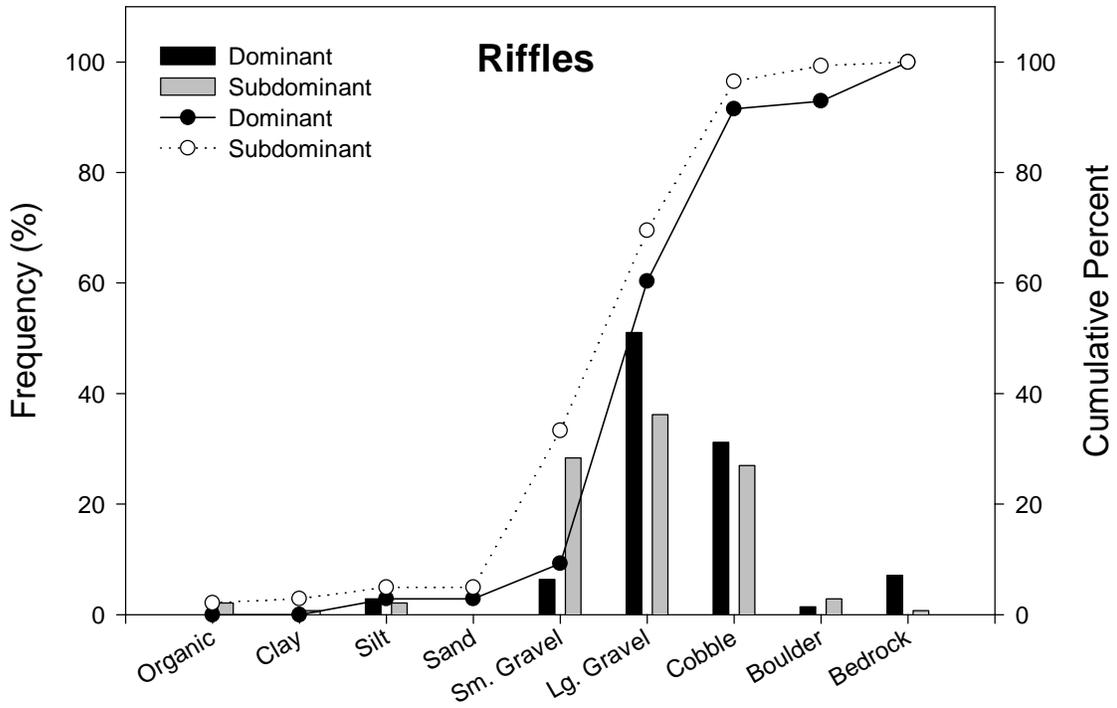
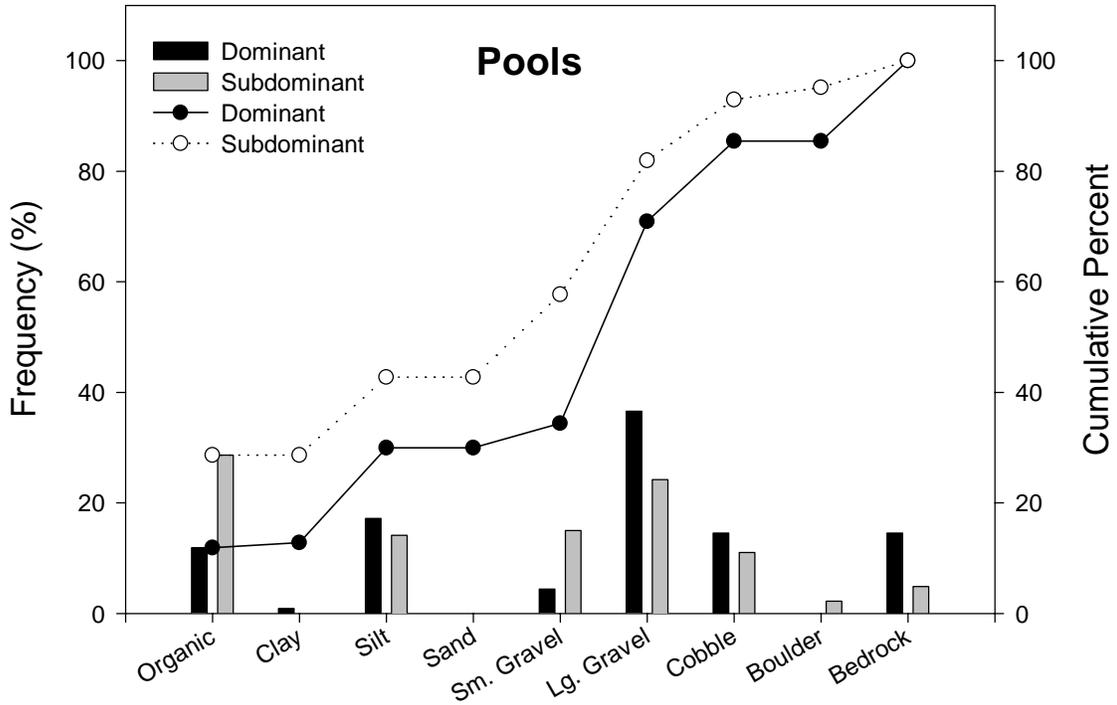
# Bear Creek



# Distribution and Abundance of Large Woody Debris



# Bear Creek Substrate Composition



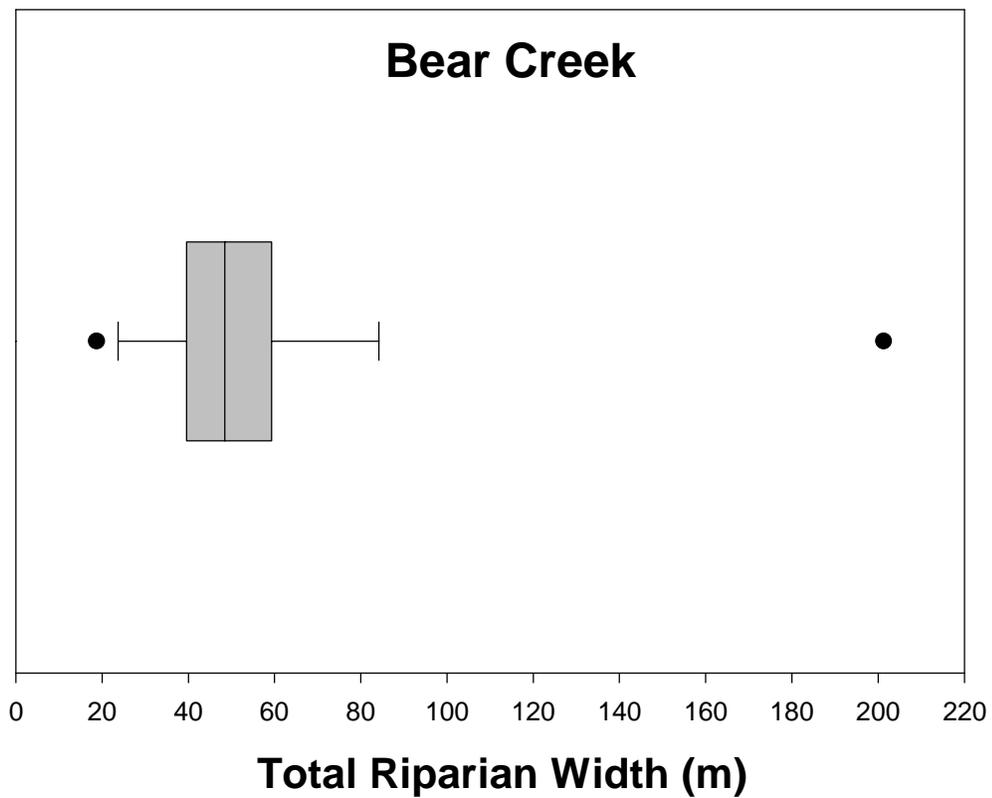
## Riparian Width

Stream: Bear Creek

Number of Measurements: 15

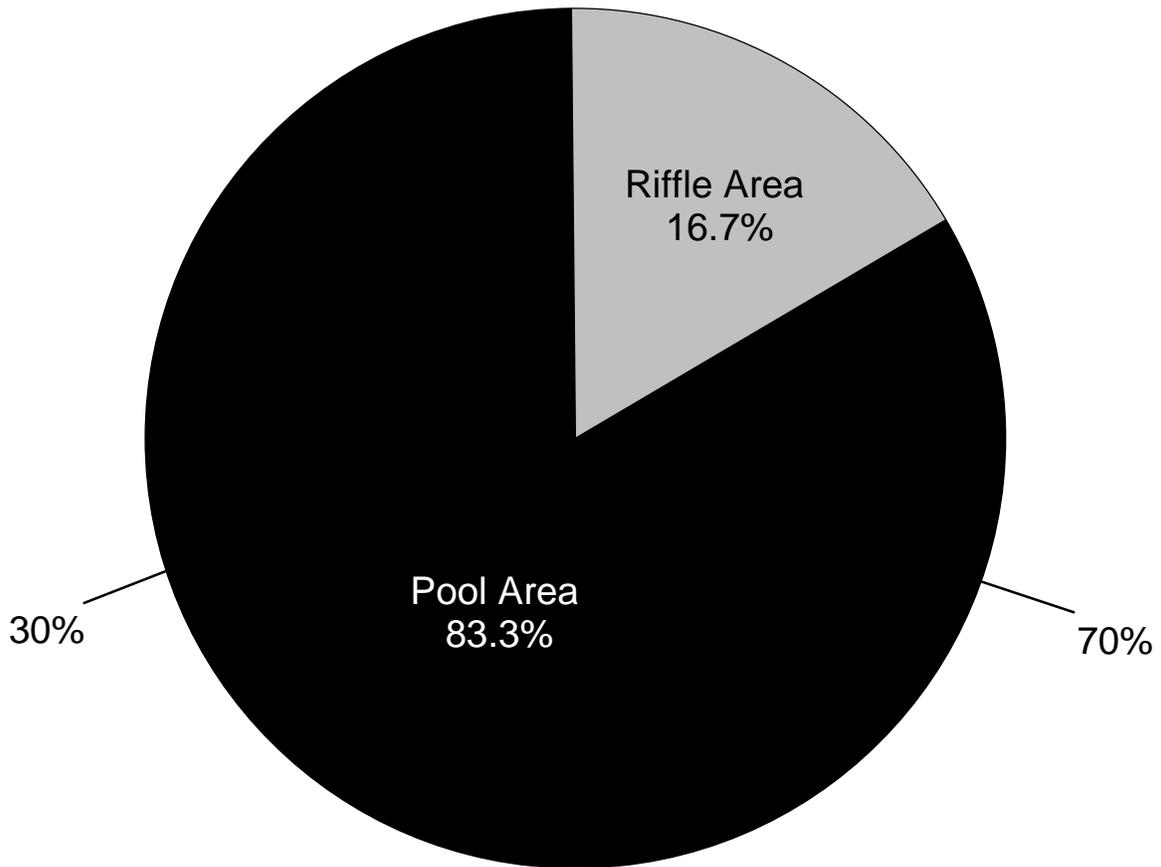
Mean Width: 57.2m Std Dev: 43.3

Max: 201.3m Min: 18.7m



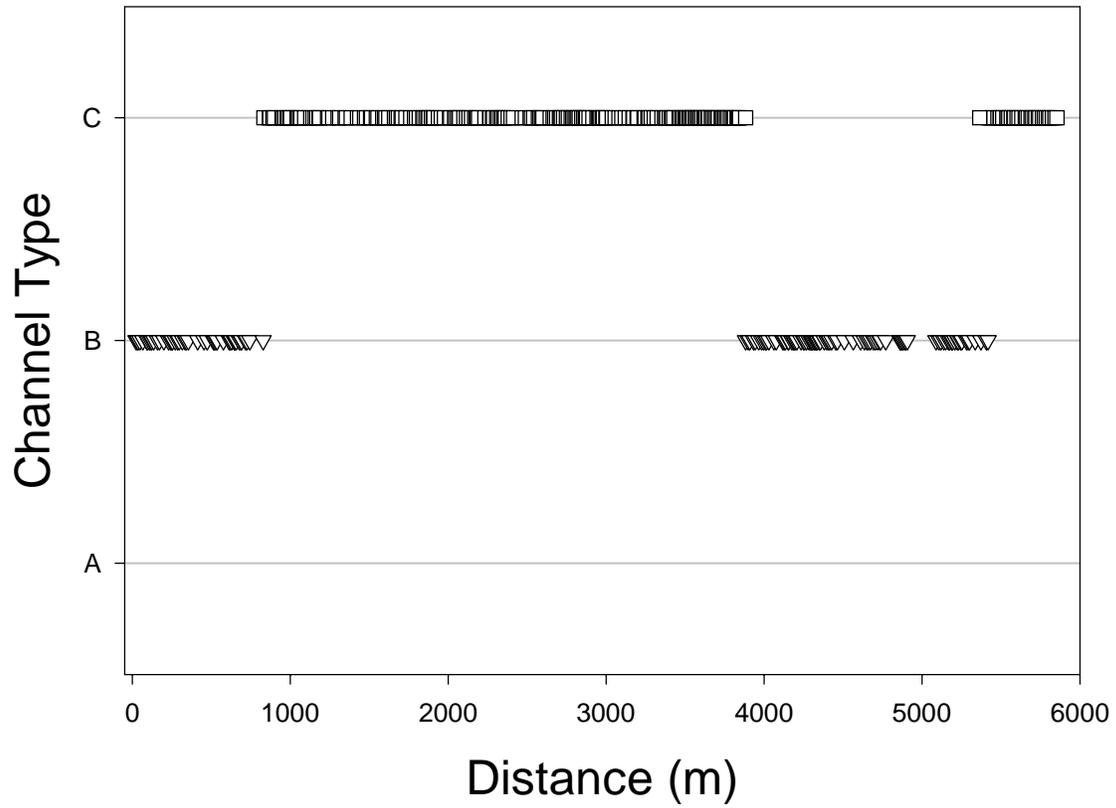
Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Bear Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Bear Creek

## Rosgen's Channel Type Distribution



**Stream:** Gullion Fork

**District:** Wythe

**Quadrangle:** Rural Retreat

**Sample Date:** 09/21/1999

**Downstream Starting Point:** Confluence with Reed Creek

**Total Distance Surveyed:** 6.5 kilometers

**Percent of Total Area – Pools:** 80.3%

Number of Pools: 237

Number of Pools per kilometer: 36.2

Total Pool Area: 20831.03 sq. meters  $\pm$  3235.6

Mean Pool Area: 87.9 sq. meters

Correction Factor: 1.22

Mean Maximum Depth: 35.6 cm

Mean Average Depth: 20.2 cm

Mean Average Residual Pool Depth: 32.4 cm

**Percent of Total Area – Riffles:** 19.7%

Number of Riffles: 102

Number of Riffles per kilometer: 15.6

Total Riffle Area: 5102.5 sq. meters  $\pm$  728.9

Mean Riffle Area: 50.0 sq. meters

Correction Factor: 1.43

Mean Maximum Depth: 8.6 cm

Mean Average Depth: 3.4 cm

**Number of Large Woody Debris Pieces per kilometer:** 226.5

Wood < 5 m and < 55 cm: 153.4

Wood < 5 m and > 55 cm: 7.3

Wood > 5 m and < 55 cm: 55.9

Wood > 5 m and > 55 cm: 9.8

**Mean Channel Width:** 7.5 m

**Mean Riparian Width:** 101.2 m

Mean Maximum Riparian Distance (either side): 69.5 m

Mean Minimum Riparian Distance (either side): 24.2 m

Maximum Riparian Width (Total): 145.3 m

Minimum Riparian Width (Total): 7.4 m

Gullion Fork Continued.

**Percent of Pool Habitat Surveyed as Glides:** 1.3%

**Rosgen=s Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 0.0%

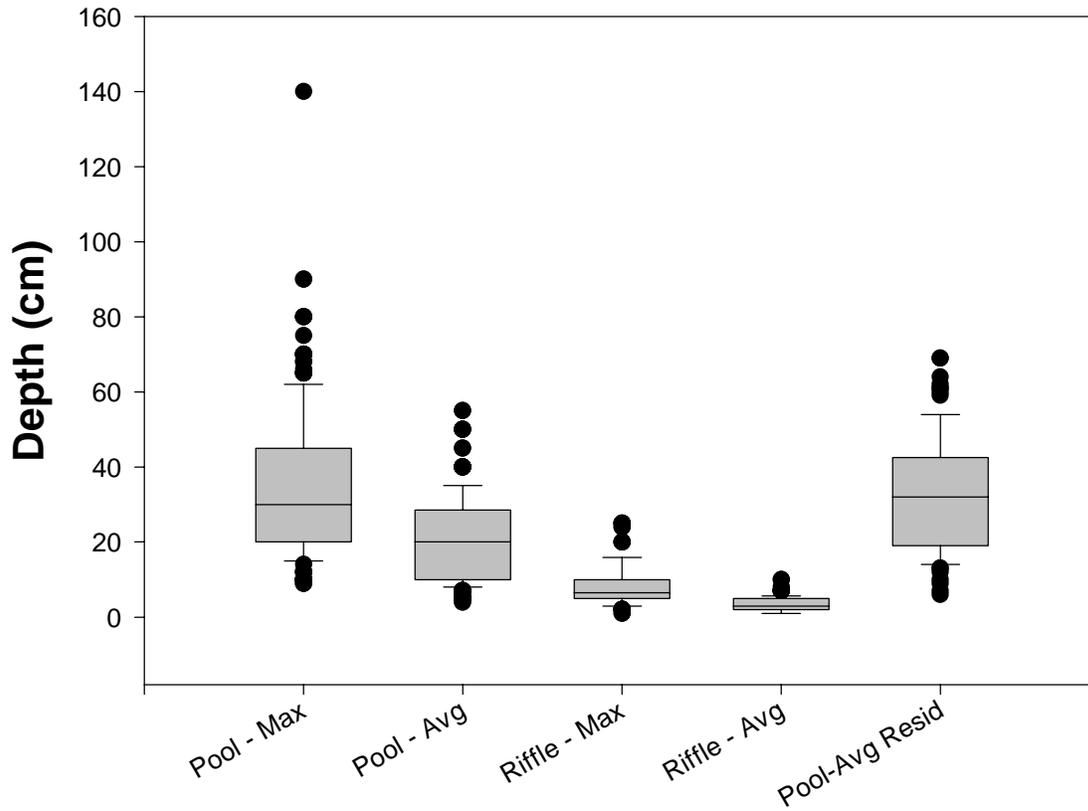
Channel Type C: 100.0%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 8.4%

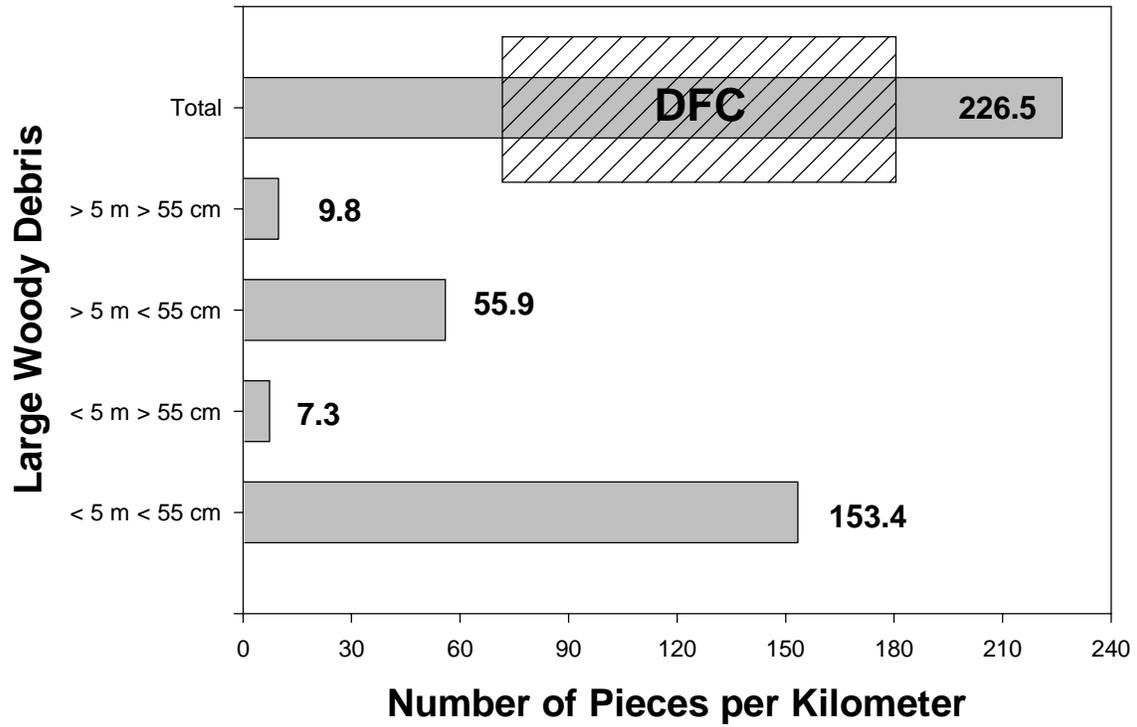
**Average Channel Gradient:** 2.3

# Gullion Fork

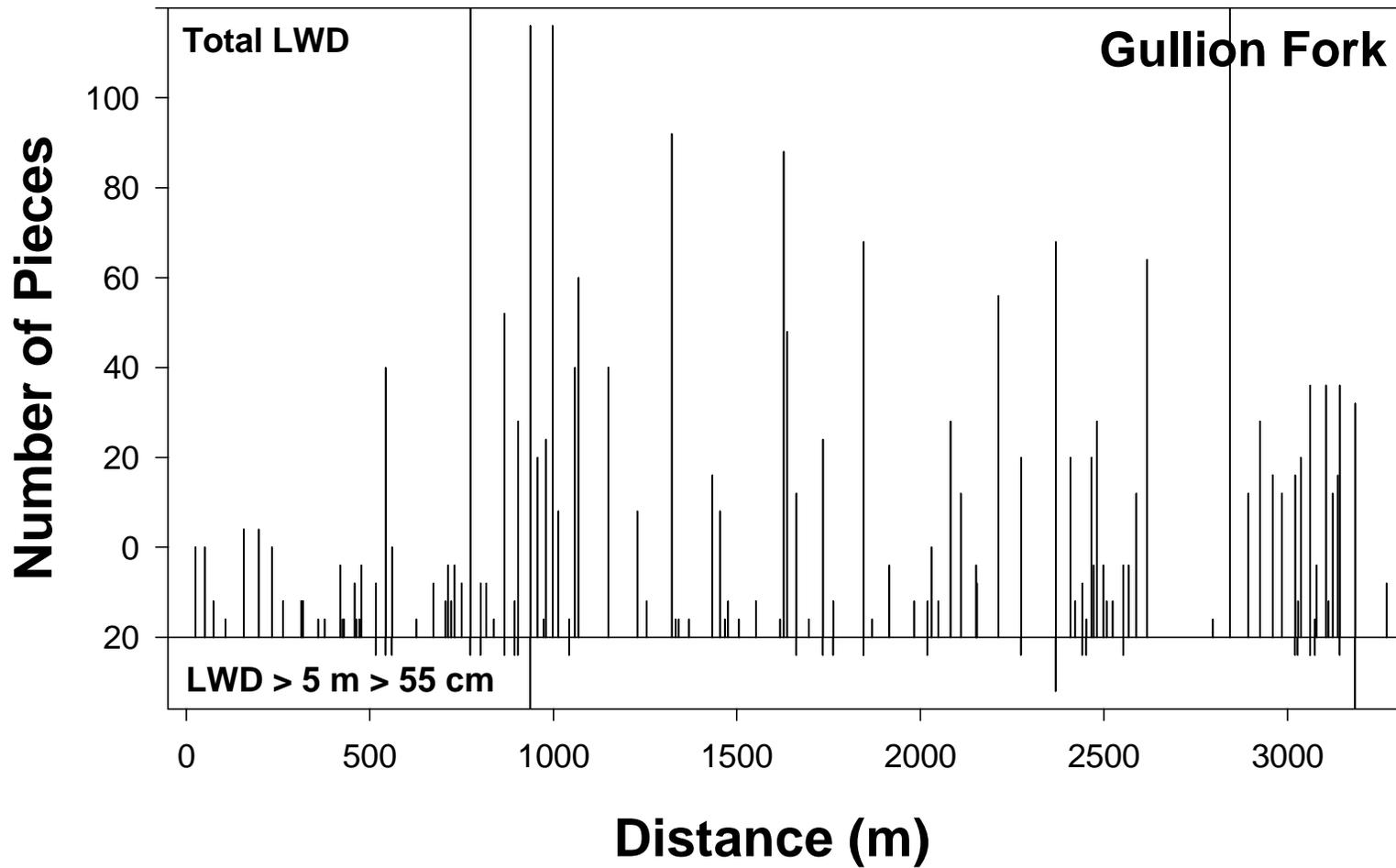


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

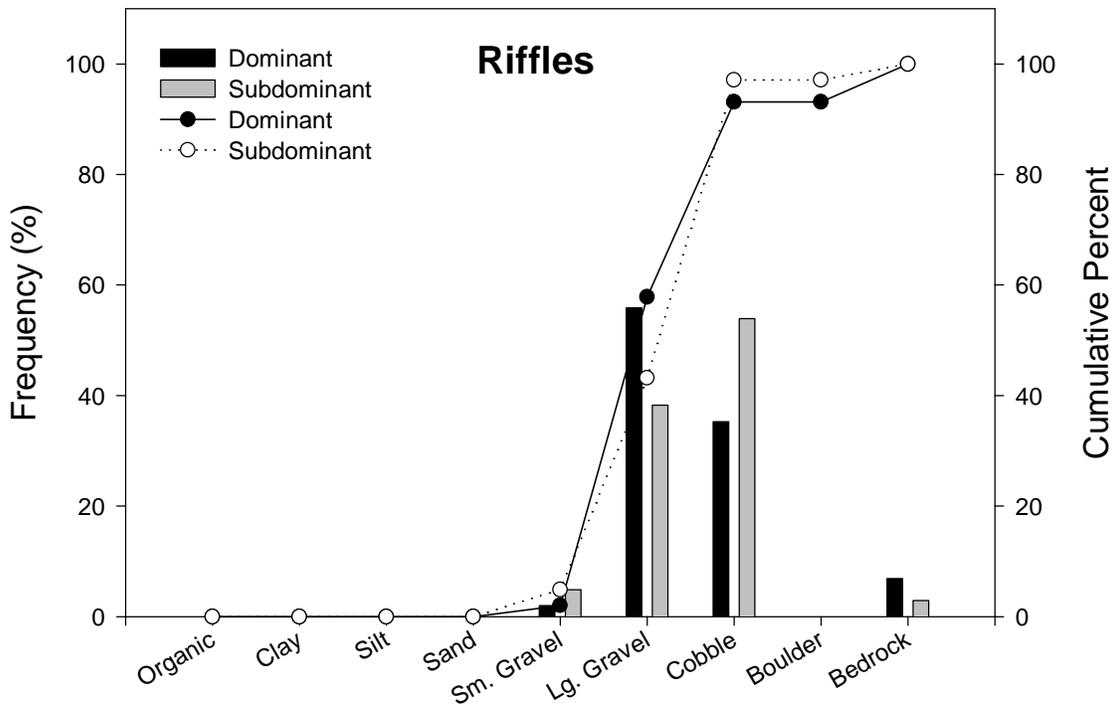
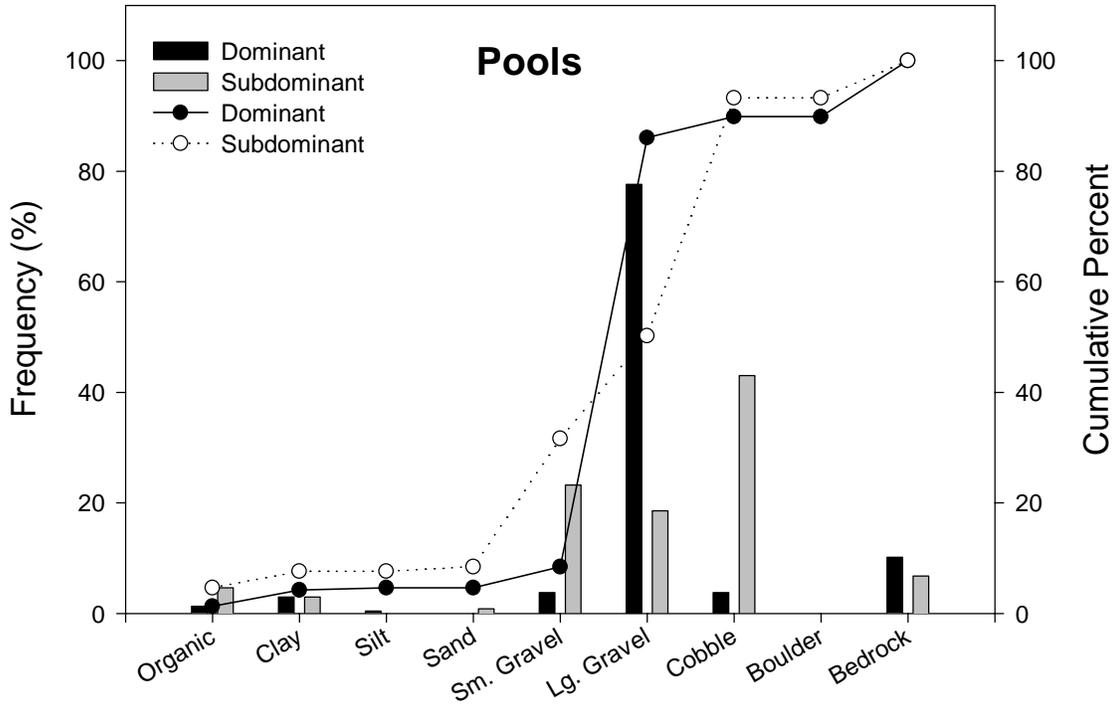
# Gullion Fork



# Distribution and Abundance of Large Woody Debris



# Gullion Fork Substrate Composition



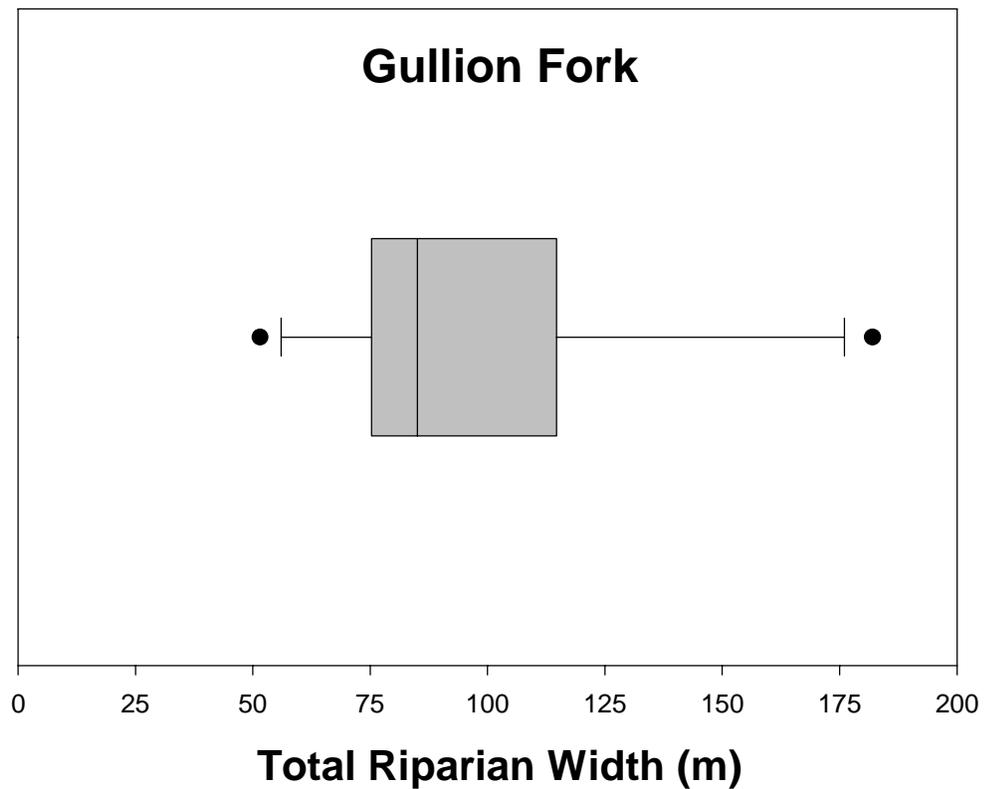
## Riparian Width

Stream: Gullion Fork

Number of Measurements: 10

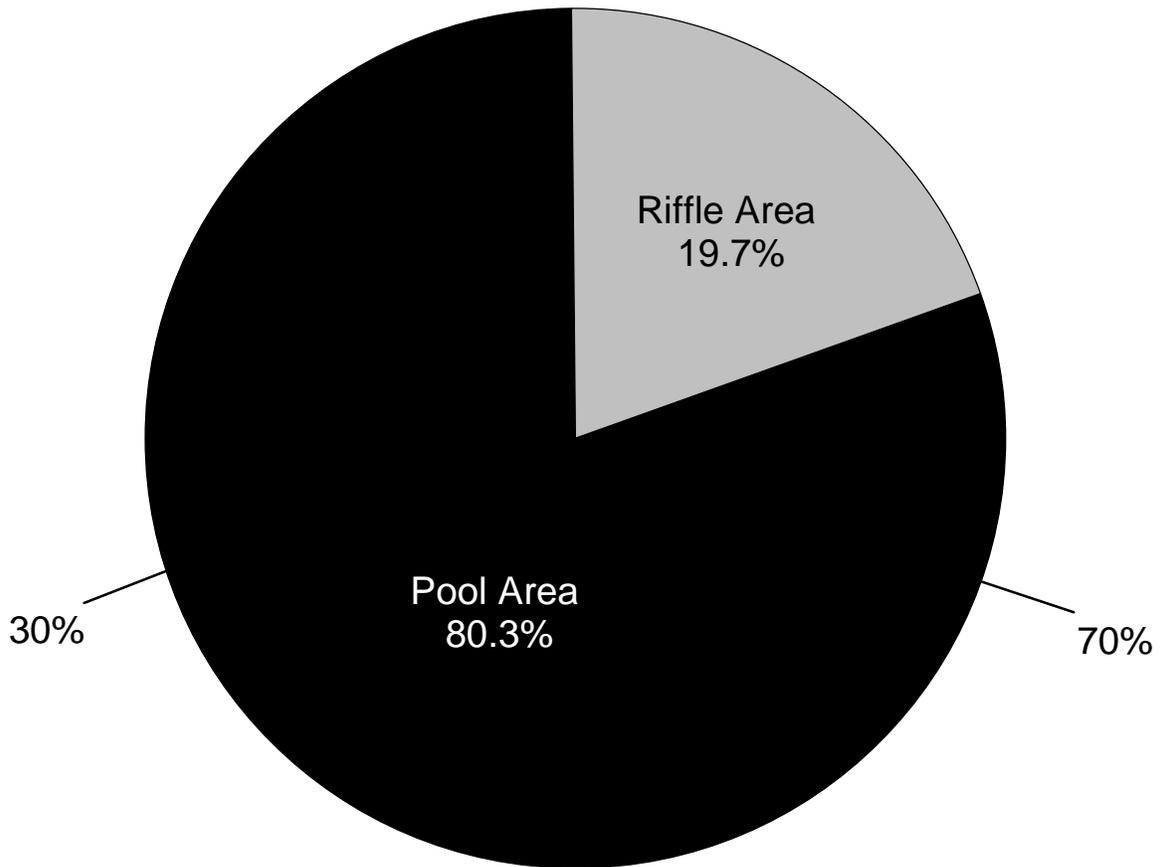
Mean Width: 101.2m Std Dev: 43.8

Max: 182.0m Min: 51.6m

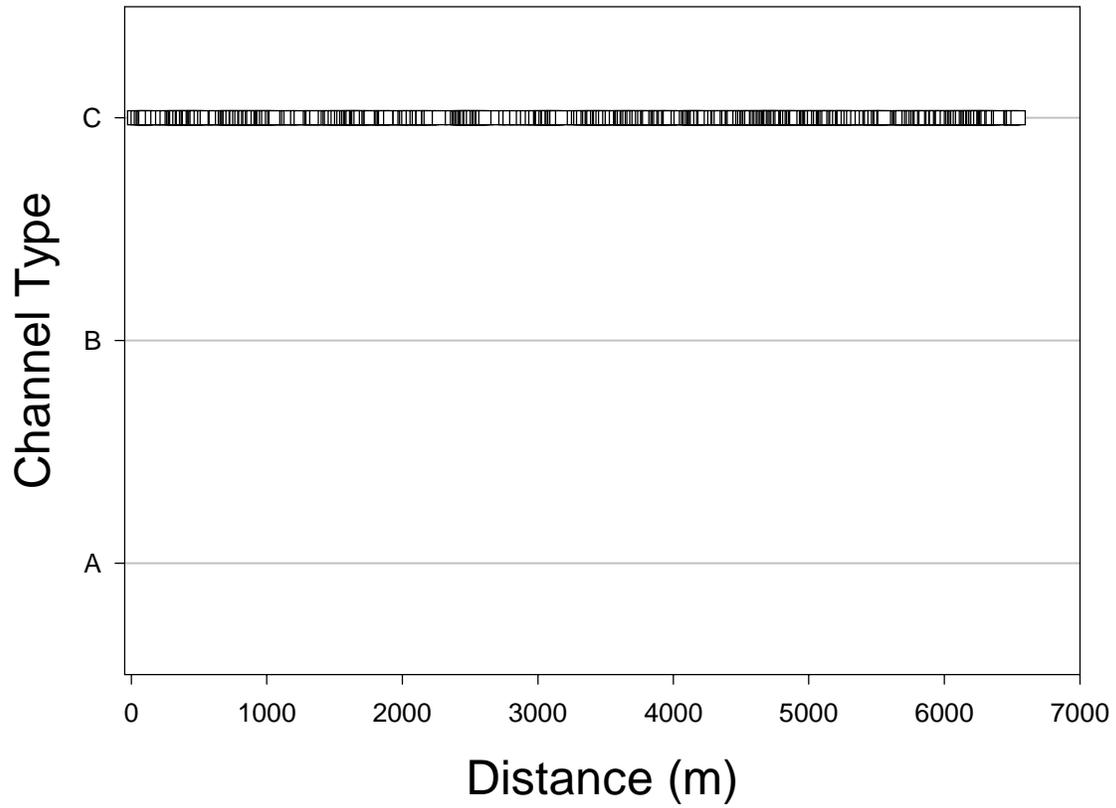


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Gullion Fork  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Gullion Fork Rosgen's Channel Type Distribution



**Stream:** Hungry Mother Creek

**District:** Wythe R.D.

**Quadrangle:** Nebo

**Sample Date:** 06/0700

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 1.9 kilometers

**Percent of Total Area - Pools:** 48.1%

Number of Pools: 65

Number of Pools per kilometer: 34.2

Total Pool Area: 4062.8 sq. meters  $\pm$  117.7

Mean Pool Area: 62.5 sq. meters

Correction Factor: 0.95

Mean Maximum Depth: 44.4 cm

Mean Average Depth: 24.8 cm

Mean Average Residual Pool Depth: 12.7 cm

**Percent of Total Area - Riffles:** 51.9%

Number of Riffles: 57

Number of Riffles per kilometer: 30.0

Total Riffle Area: 4389.1 sq. meters  $\pm$  458.8

Mean Riffle Area: 77.0 sq. meters

Correction Factor: 1.24

Mean Maximum Depth: 19.3 cm

Mean Average Depth: 9.8 cm

**Number of Large Woody Debris Pieces per kilometer:** 85.7

Wood < 5 m and < 55 cm: 25.1

Wood < 5 m and > 55 cm: 2.7

Wood > 5 m and < 55 cm: 33.8

Wood > 5 m and > 55 cm: 24.1

**Mean Channel Width:** 4.7 m

**Mean Riparian Width:** 68.4 m

Mean Maximum Riparian Distance (either side): 53.7 m

Mean Minimum Riparian Distance (either side): 10.0 m

Maximum Riparian Width (Total): 119.3 m

Minimum Riparian Width (Total): 38.8 m

Hungry Mother Creek Continued.

**Percent of Pool Habitat Surveyed as Glides: 12.3%**

**Rosgen=s Channel Type Frequency:**

Channel Type A:

Channel Type B: 84.4%

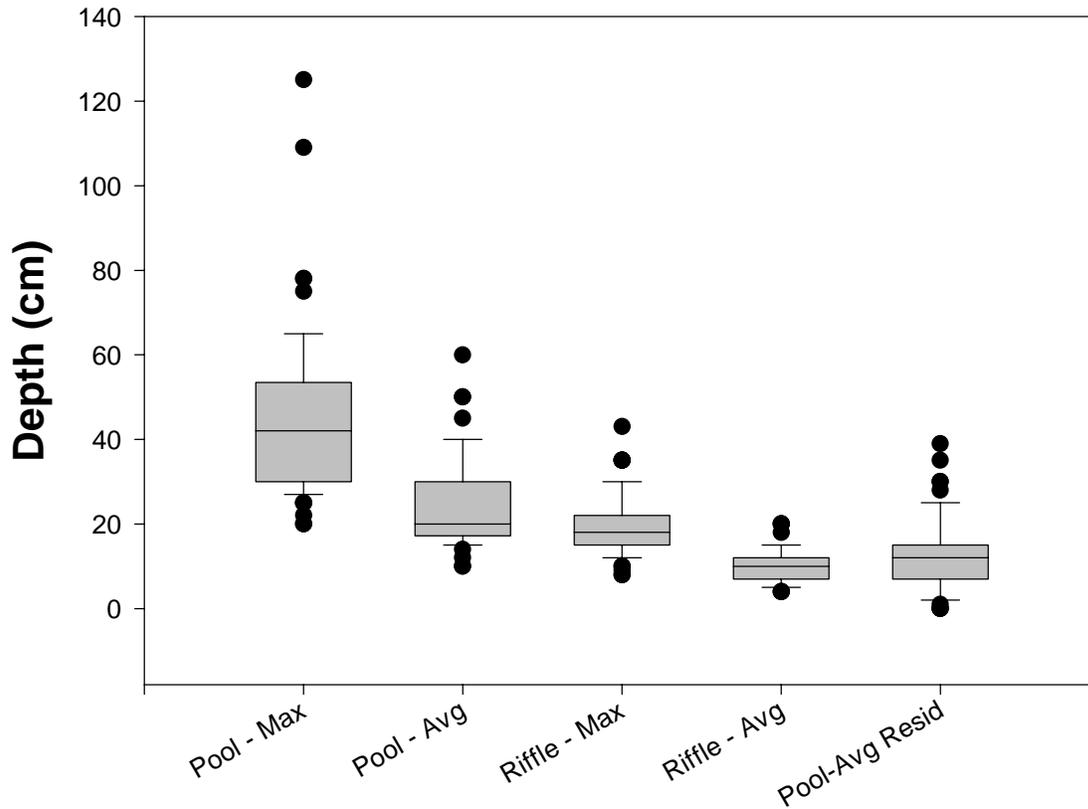
Channel Type C: 15.6%

Channel Type D:

**Percent Pools with  $\geq$  35% Embeddedness: 7.7%**

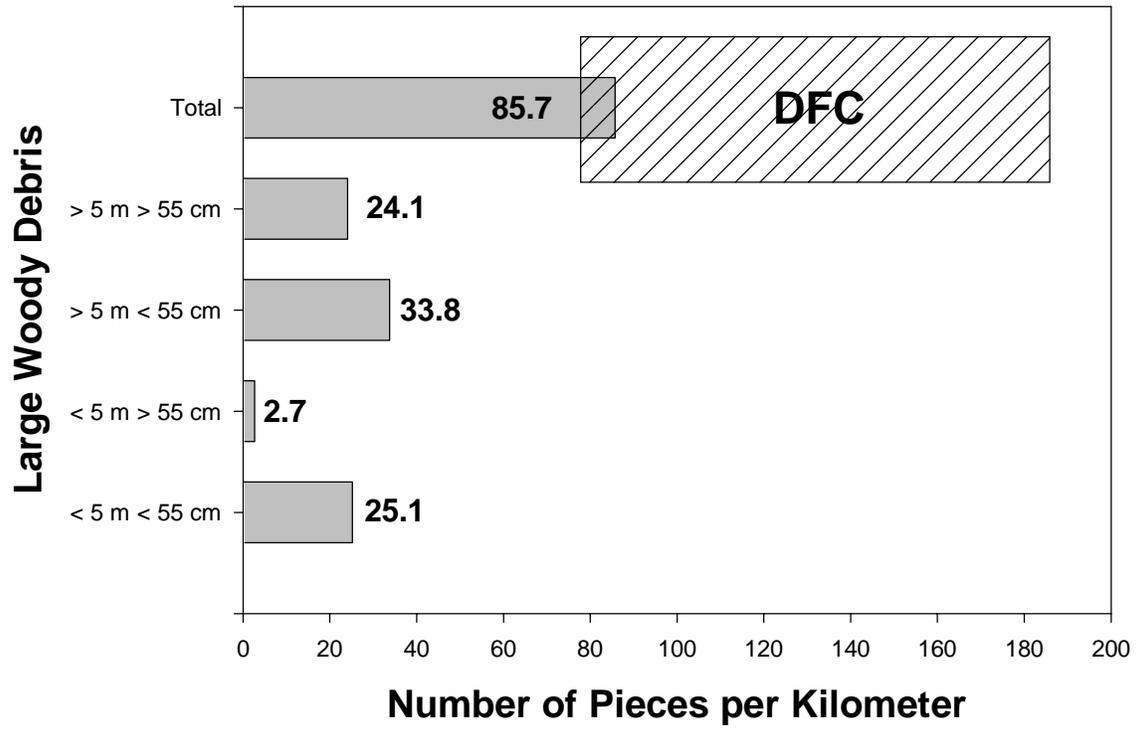
**Average Channel Gradient: 2.0**

# Hungry Mother Creek

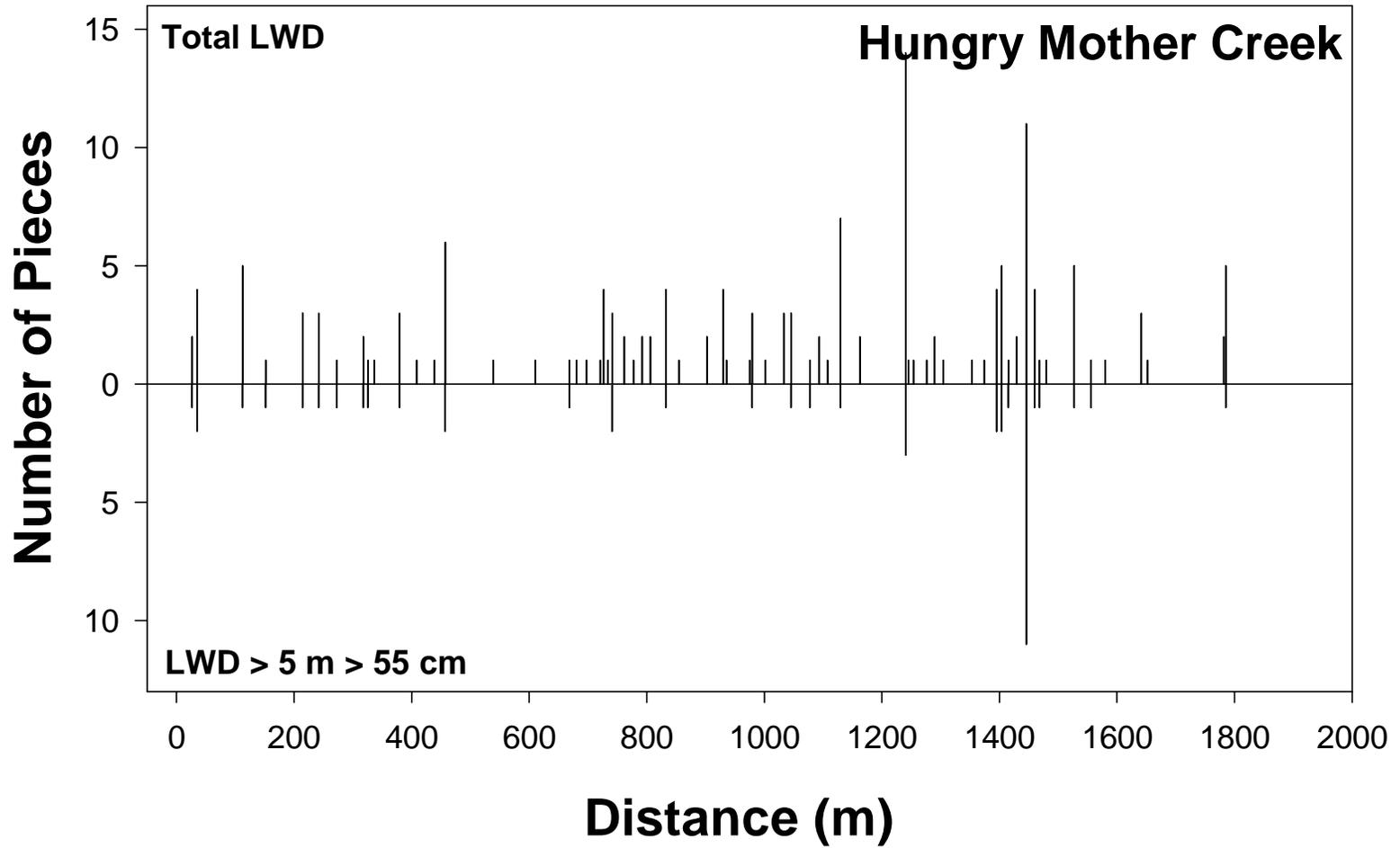


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

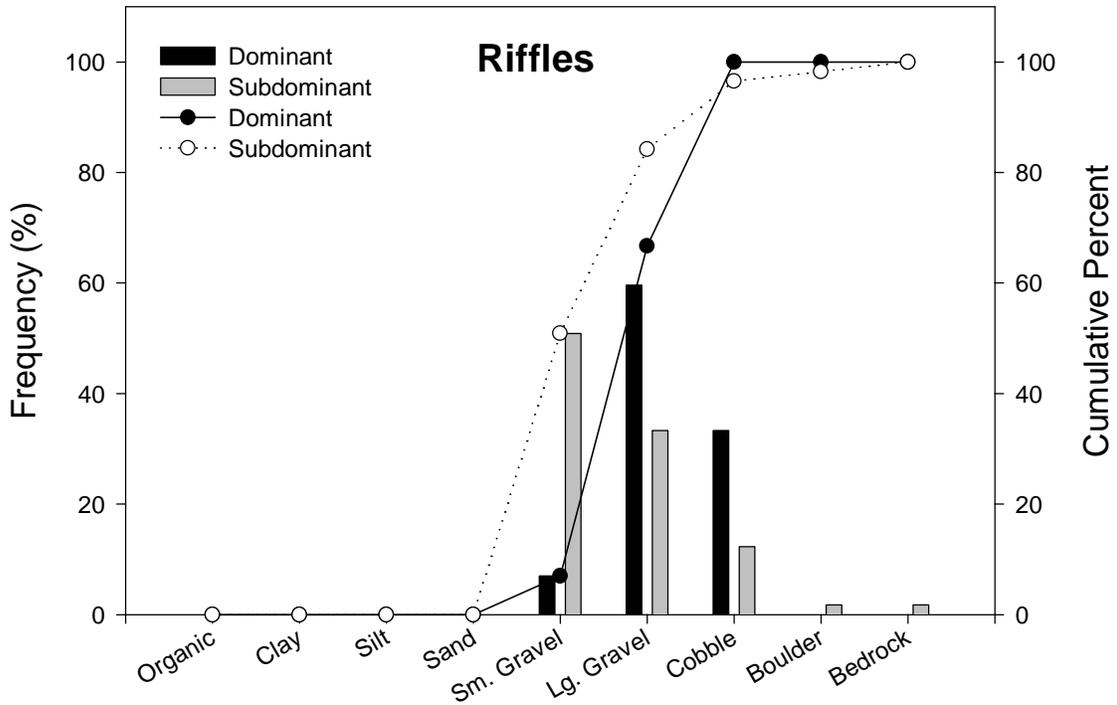
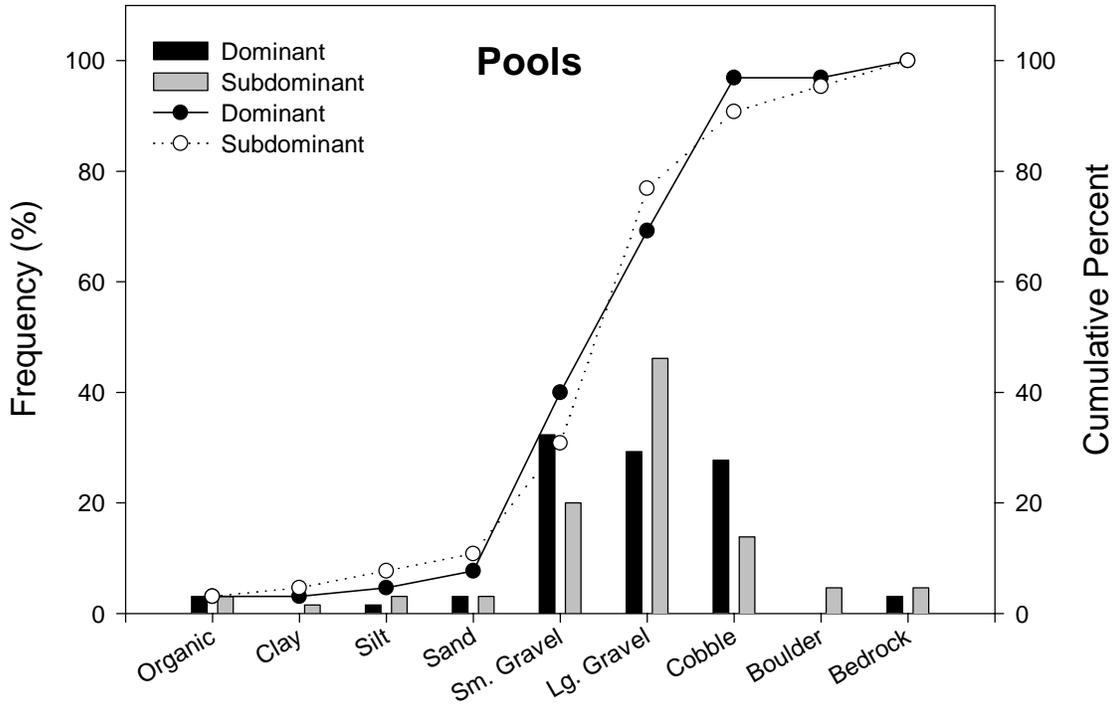
# Hungry Mother Creek



# Distribution and Abundance of Large Woody Debris



# Hungry Mother Creek Substrate Composition



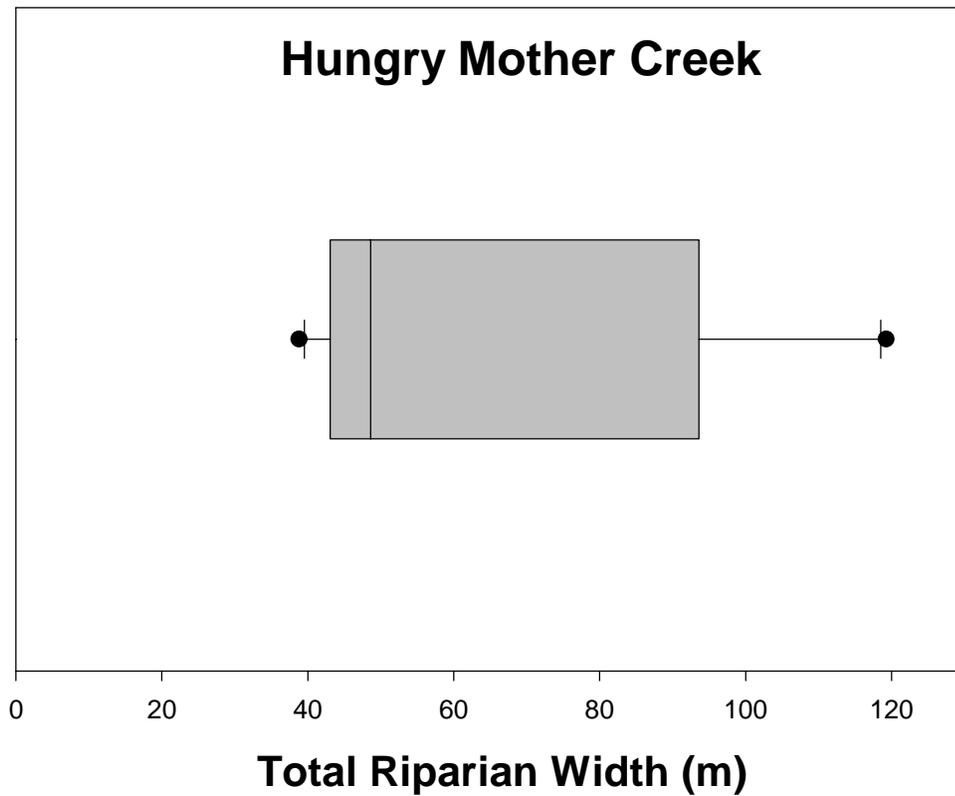
## Riparian Width

Stream: **Hungry Mother Creek**

Number of Measurements: **9**

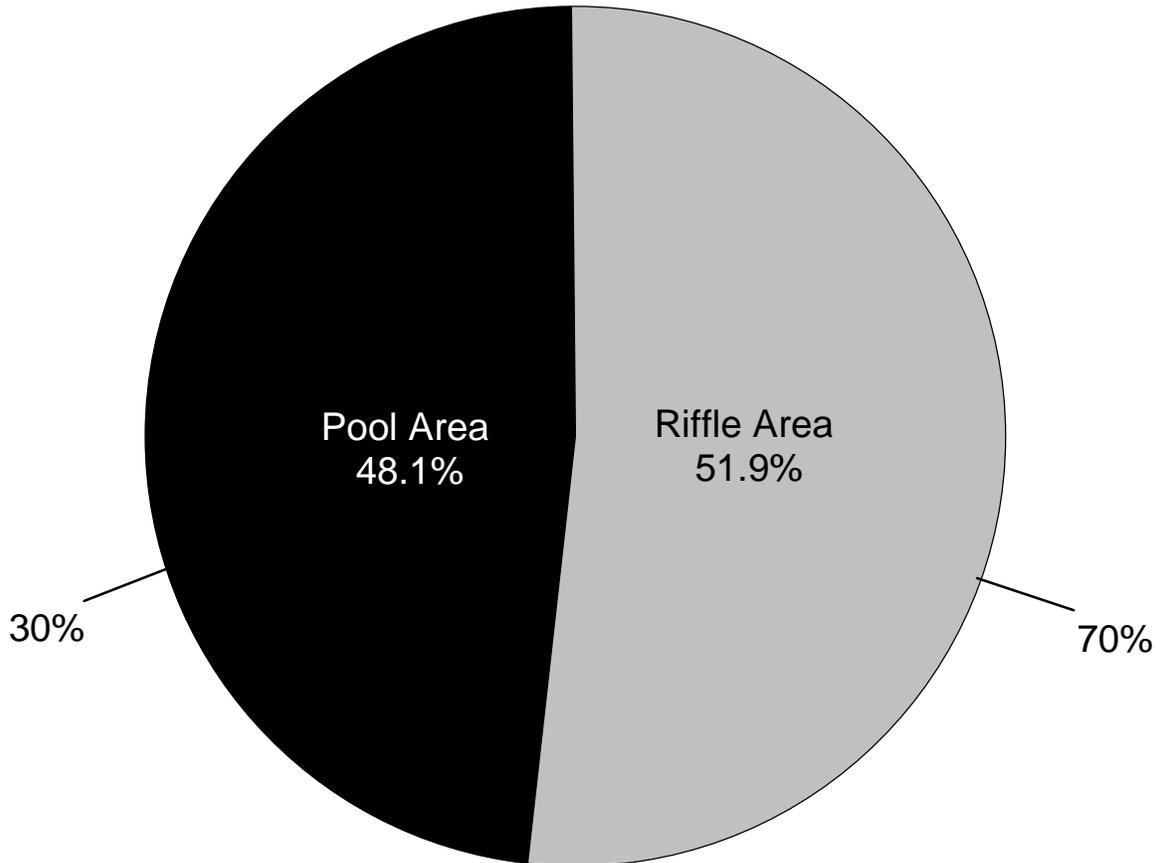
Mean Width: **68.4m** Std Dev: **32.7**

Max: **119.3m** Min: **38.8m**

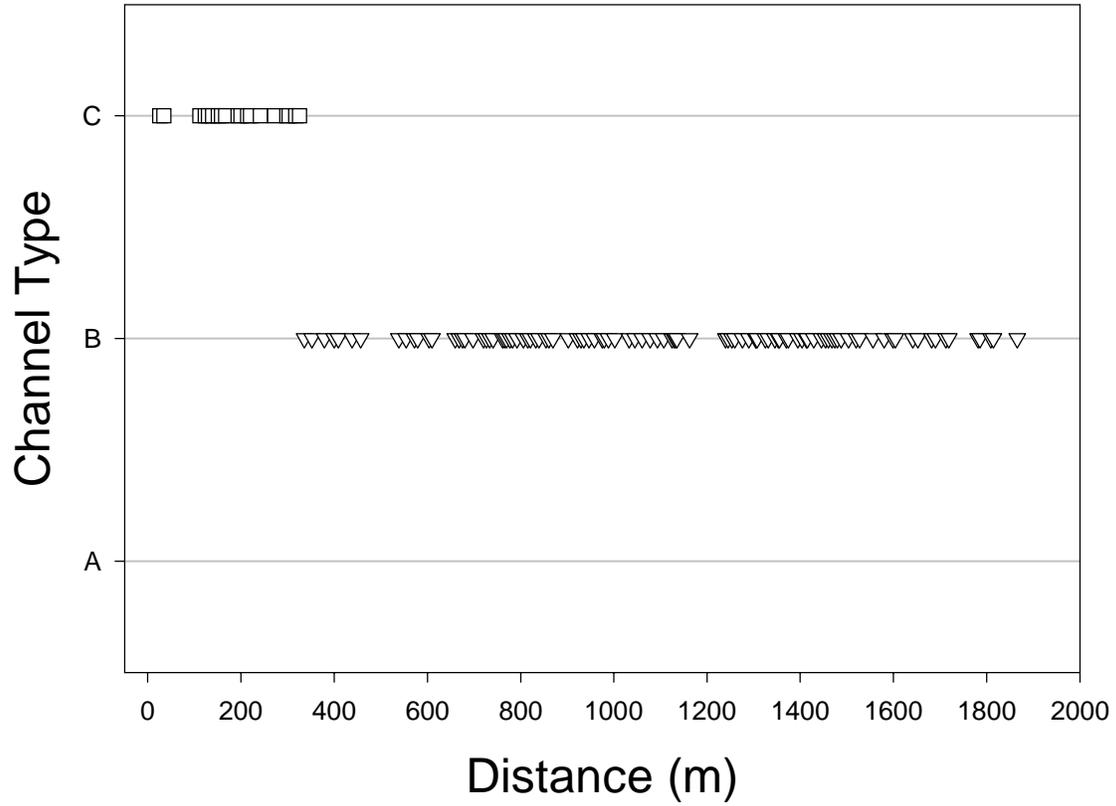


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Hungry Mother Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Hungry Mother Creek Rosgen's Channel Type Distribution



**Stream:** Laurel Branch

**District:** Wythe R.D.

**Quadrangle:** Nebo

**Sample Date:** 06/07/00

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 0.4 kilometers

**Percent of Total Area - Pools:** 29.5%

Number of Pools: 27

Number of Pools per kilometer: 67.5

Total Pool Area: 263.7 sq. meters  $\pm$  166.8

Mean Pool Area: 9.8 sq. meters

Correction Factor: 0.65

Mean Maximum Depth: 23.7 cm

Mean Average Depth: 16.9 cm

Mean Average Residual Pool Depth: 8.2 cm

**Percent of Total Area - Riffles:** 70.5%

Number of Riffles: 24

Number of Riffles per kilometer: 60

Total Riffle Area: 629.1 sq. meters  $\pm$  288.9

Mean Riffle Area: 26.2 sq. meters

Correction Factor: 1.00

Mean Maximum Depth: 16.5 cm

Mean Average Depth: 10.8 cm

**Number of Large Woody Debris Pieces per kilometer:** 11.3

Wood < 5 m and < 55 cm: 11.3

Wood < 5 m and > 55 cm:

Wood > 5 m and < 55 cm:

Wood > 5 m and > 55 cm:

**Mean Channel Width:** 5.5 m

**Mean Riparian Width:** 14.9 m

Mean Maximum Riparian Distance (either side): 3.9 m

Mean Minimum Riparian Distance (either side): 5.5 m

Maximum Riparian Width (Total): 15.7 m

Minimum Riparian Width (Total): 13.6 m

Laurel Branch Continued.

**Percent of Pool Habitat Surveyed as Glides:** 0.0%

**Rosgen=s Channel Type Frequency:**

Channel Type A: 100%

Channel Type B:

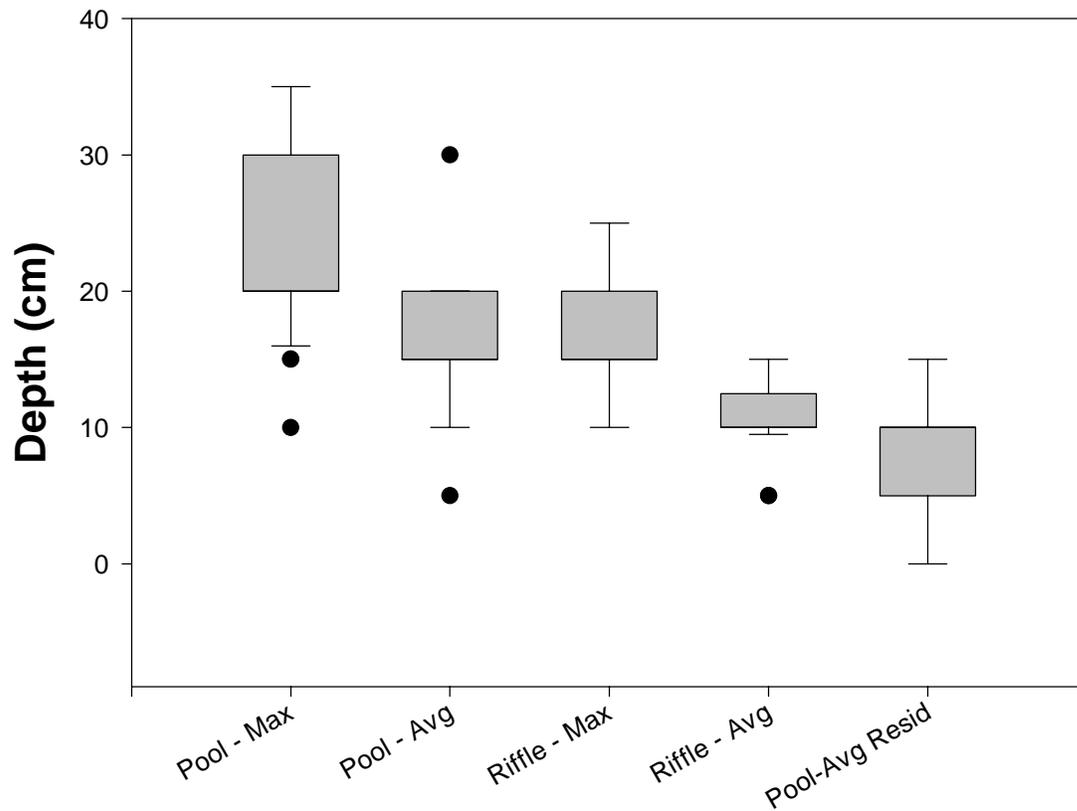
Channel Type C:

Channel Type D:

**Percent Pools with  $\geq$  35% Embeddedness:** 0.0%

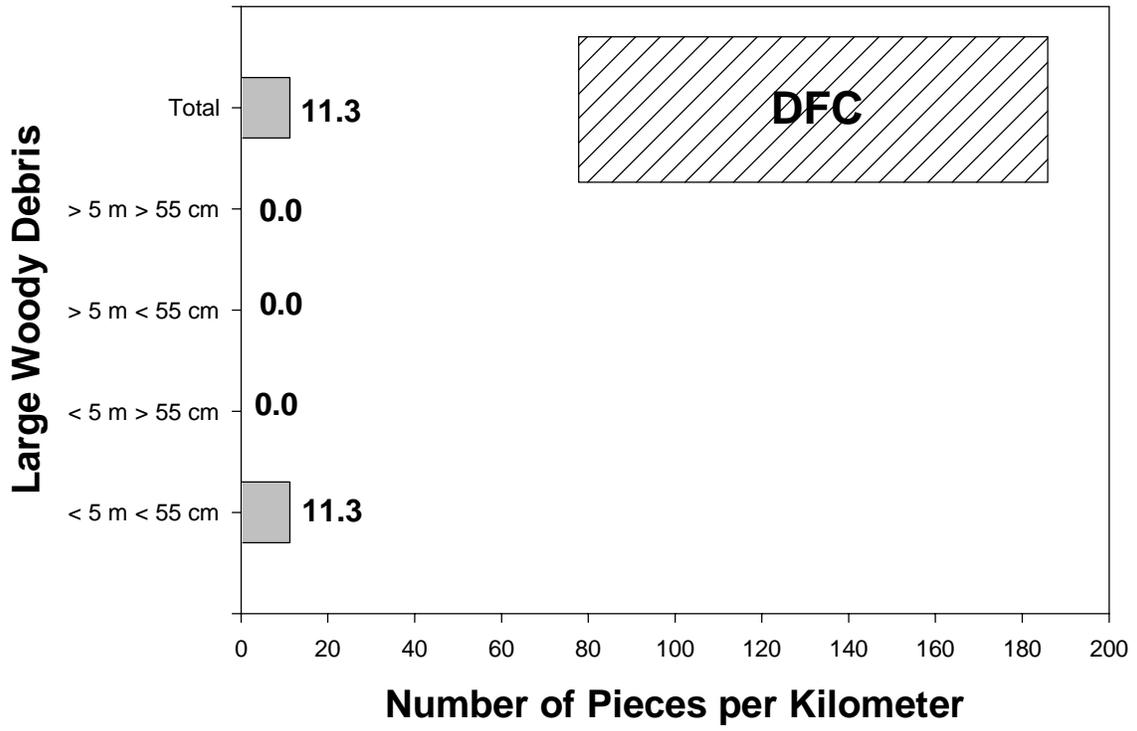
**Average Channel Gradient:** 4.6

# Laurel Branch

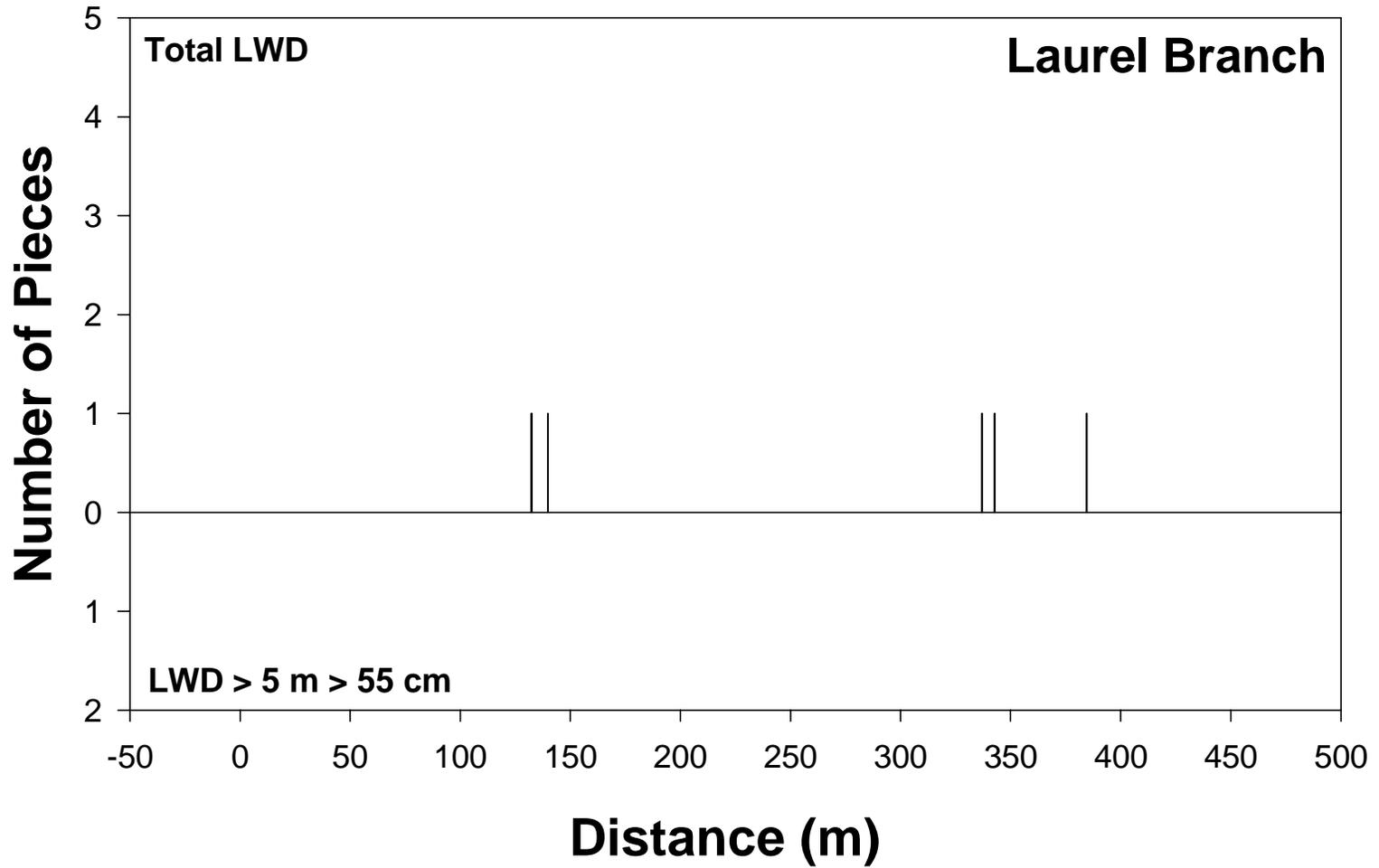


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

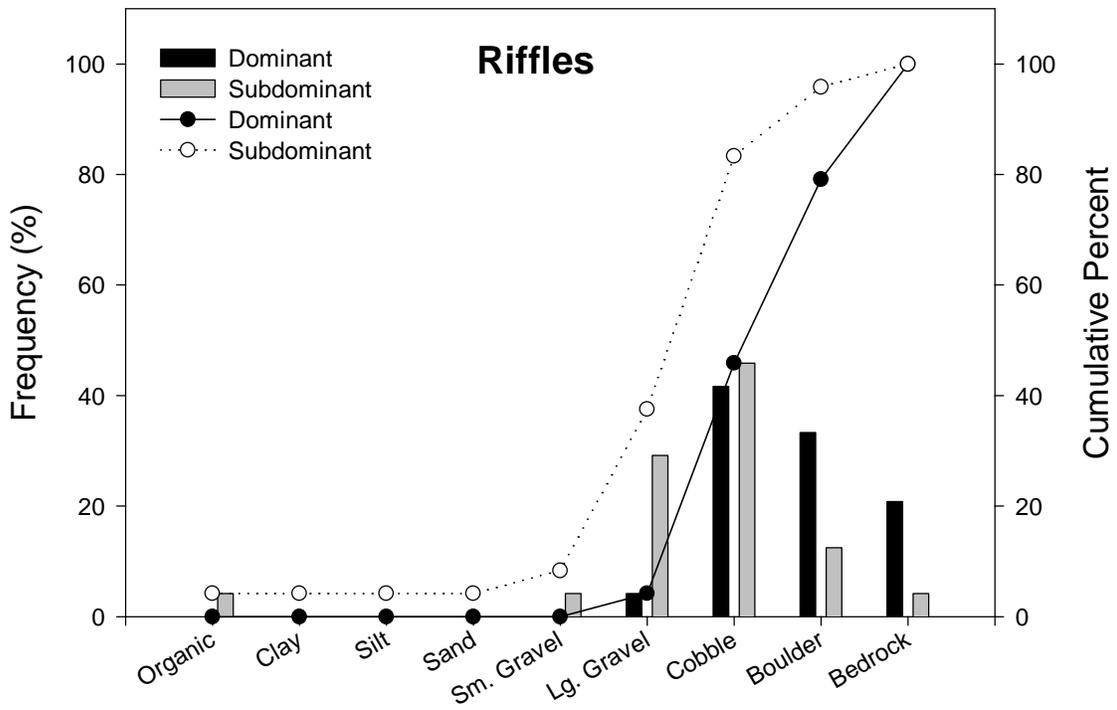
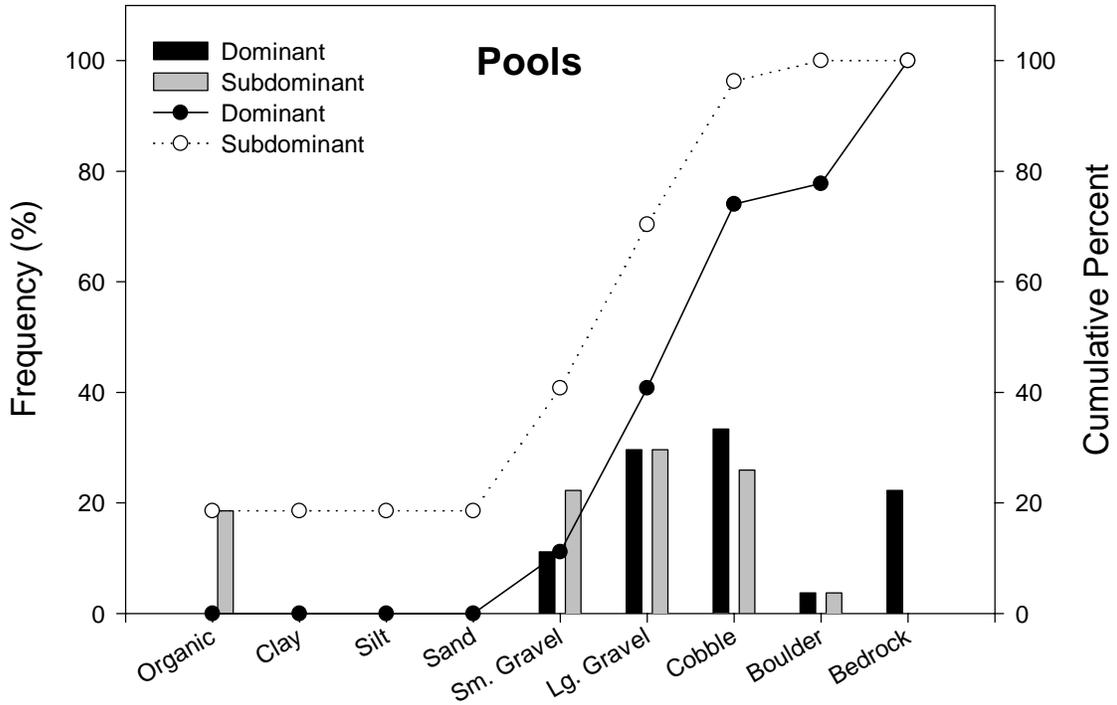
# Laurel Branch



# Distribution and Abundance of Large Woody Debris



# Laurel Branch Substrate Composition



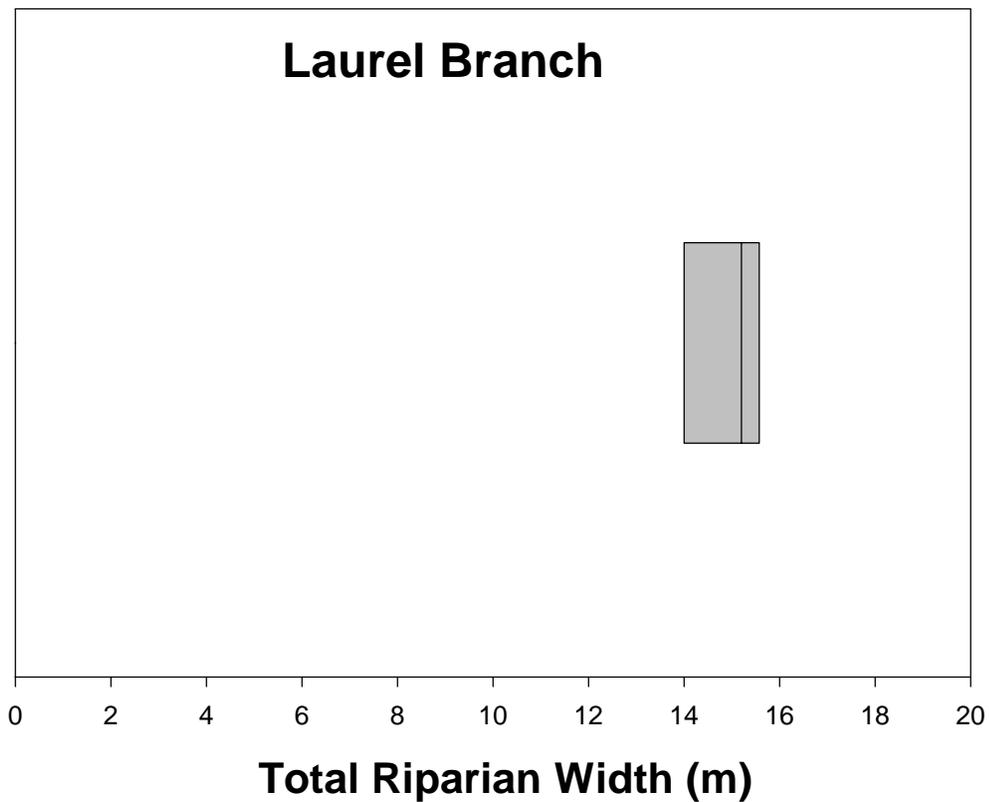
## Riparian Width

Stream: Laurel Branch

Number of Measurements: 3

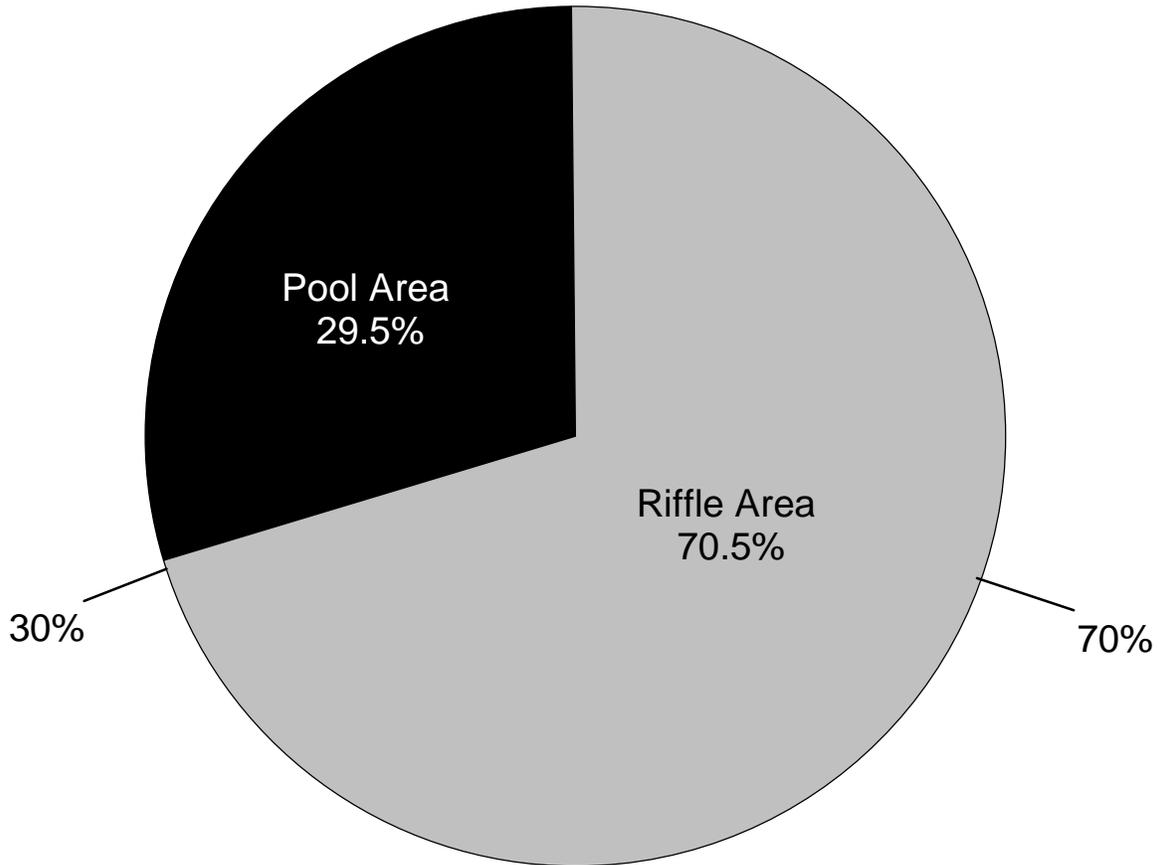
Mean Width: 14.8m Std Dev: 1.1

Max: 15.7m Min: 13.6m

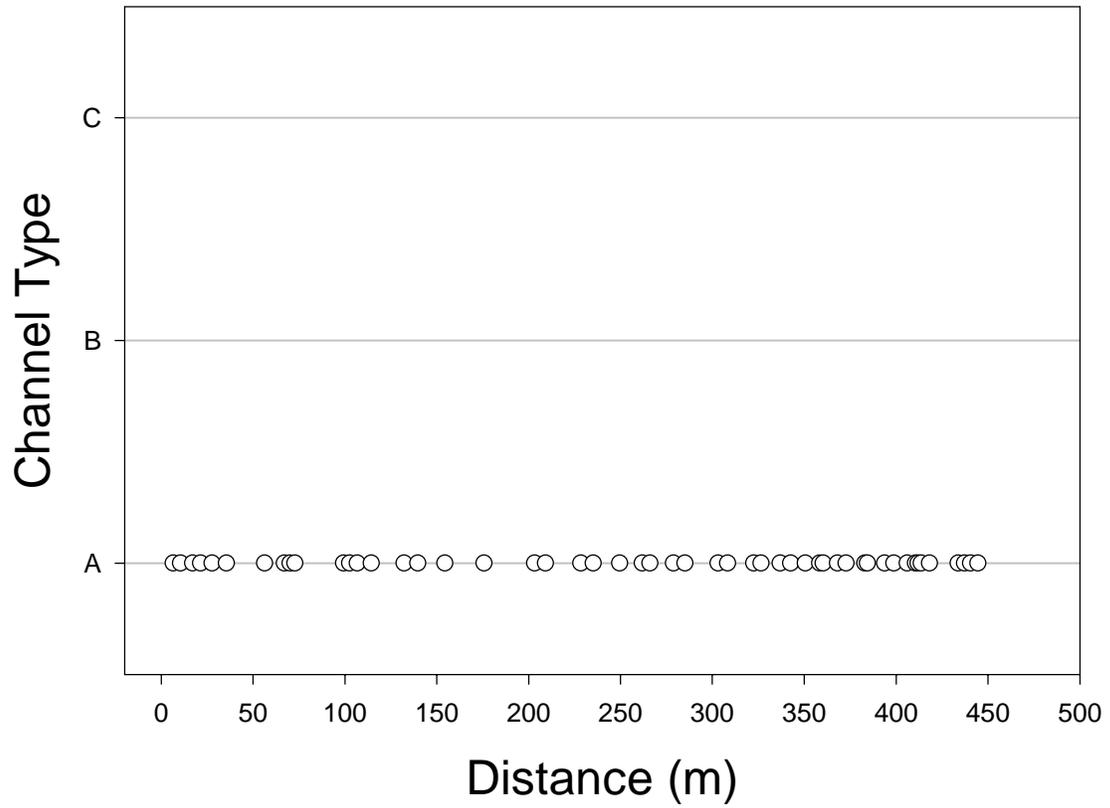


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Laurel Branch  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Laurel Branch Rosgen's Channel Type Distribution



**Stream:** Reed Creek

**District:** Wythe

**Quadrangle:** Rural Retreat

**Sample Date:** 08/04/1999

**Downstream Starting Point:**

**Total Distance Surveyed:** 10.7 kilometers

**Percent of Total Area – Pools:** 49.1%

Number of Pools: 300

Number of Pools per kilometer: 28.0

Total Pool Area: 20286.2 sq. meters  $\pm$  6018.1

Mean Pool Area: 67.6 sq. meters

Correction Factor: 0.97

Mean Maximum Depth: 47.0 cm

Mean Average Depth: 29.7 cm

Mean Average Residual Pool Depth: 48.1 cm

**Percent of Total Area – Riffles:** 50.9%

Number of Riffles: 129

Number of Riffles per kilometer: 12.0

Total Riffle Area: 21046.6 sq. meters  $\pm$  819.0

Mean Riffle Area: 163.2 sq. meters

Correction Factor: 1.03

Mean Maximum Depth: 8.6 cm

Mean Average Depth: 4.4 cm

**Number of Large Woody Debris Pieces per kilometer:** 105.2

Wood < 5 m and < 55 cm: 67.0

Wood < 5 m and > 55 cm: 6.6

Wood > 5 m and < 55 cm: 17.7

Wood > 5 m and > 55 cm: 13.9

**Mean Channel Width:** 10.6 m

**Mean Riparian Width:** 178.0 m

Mean Maximum Riparian Distance (either side): 130.1 m

Mean Minimum Riparian Distance (either side): 37.3 m

Maximum Riparian Width (Total): 300.0 m

Minimum Riparian Width (Total): 1.2 m

Reed Creek Continued.

**Percent of Pool Habitat Surveyed as Glides:** 13.2%

**Rosgen's Channel Type Frequency:**

Channel Type A: 0.0%

Channel Type B: 0.0%

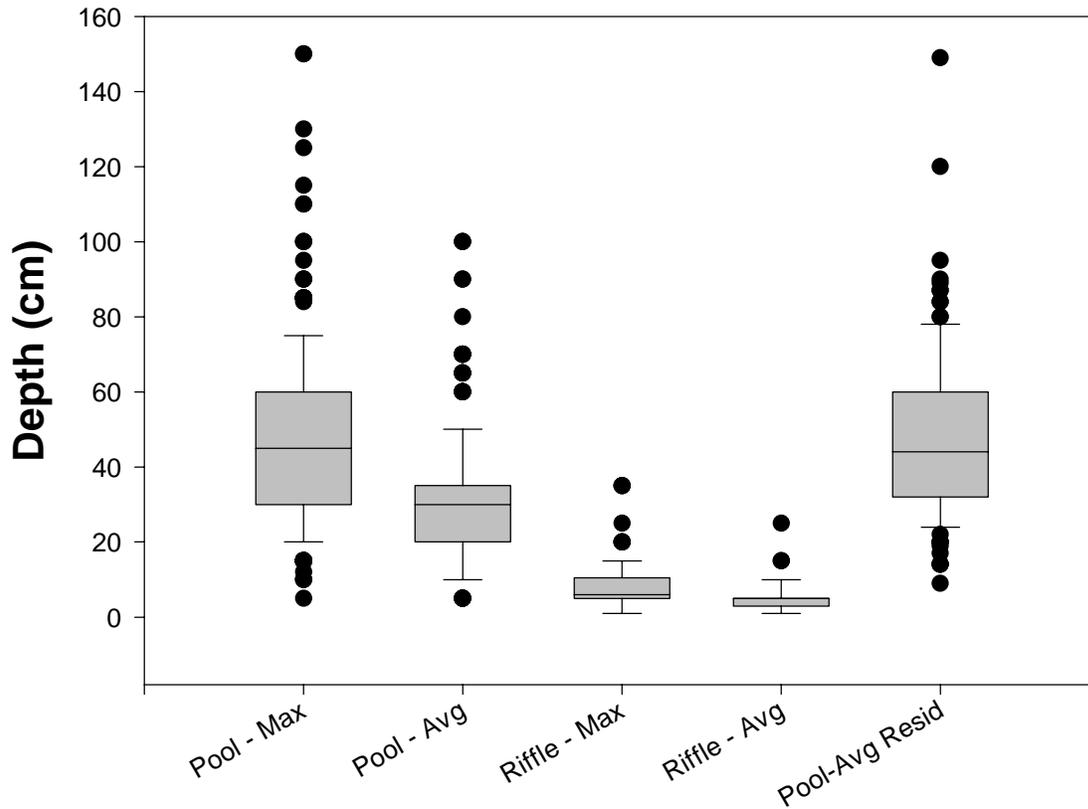
Channel Type C: 100.0%

Channel Type D: 0.0%

**Percent Pools with  $\geq$  35% Embeddedness:** 3.3%

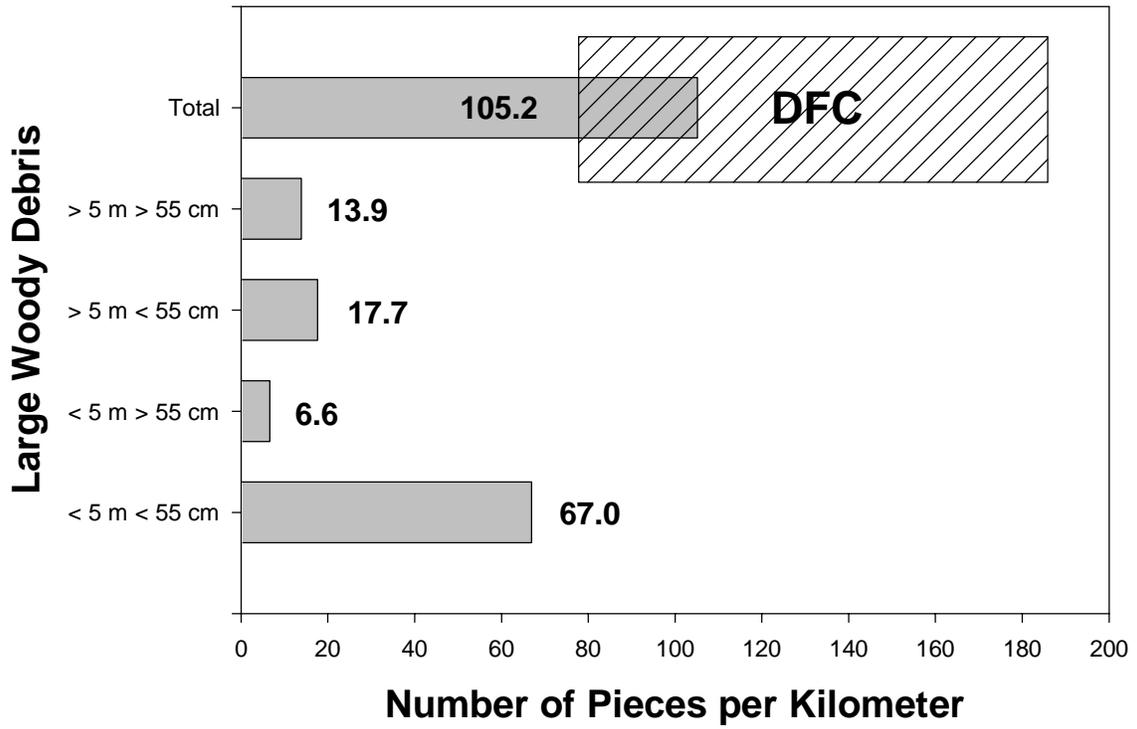
**Average Channel Gradient:** 3.2

# Reed Creek

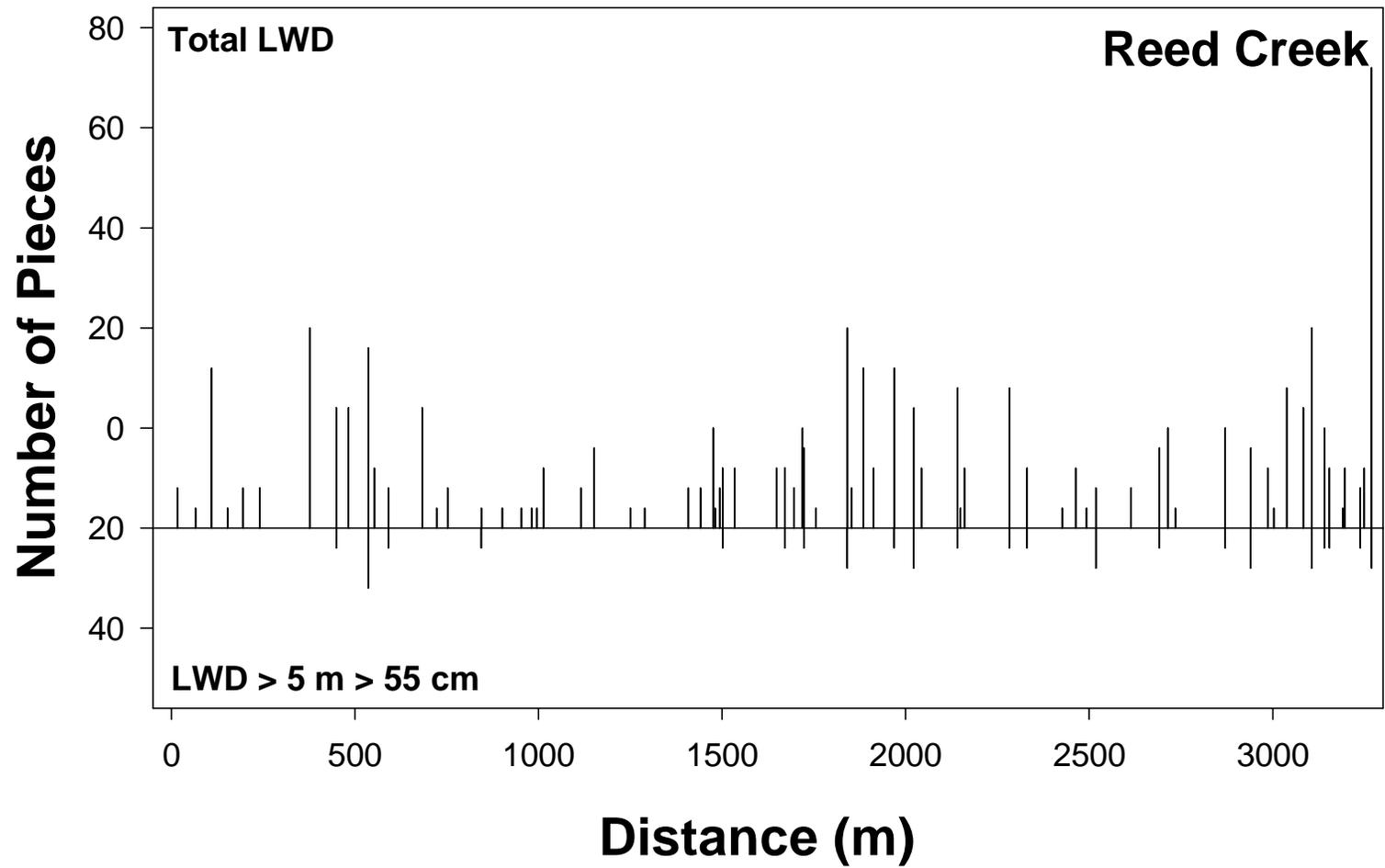


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

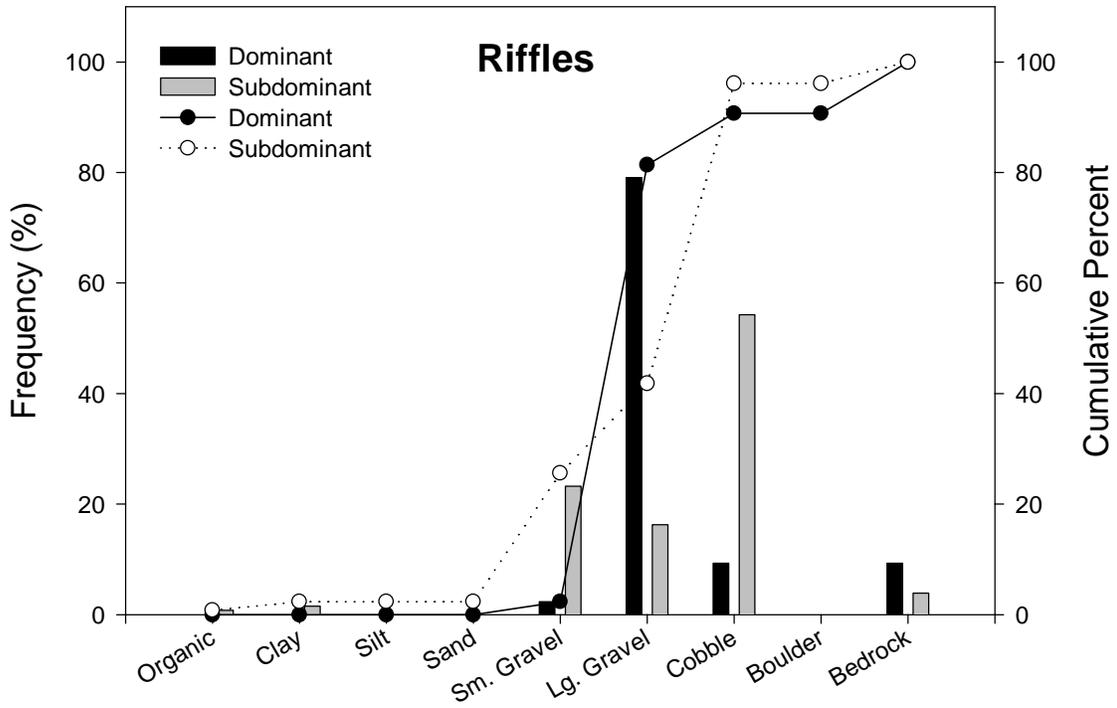
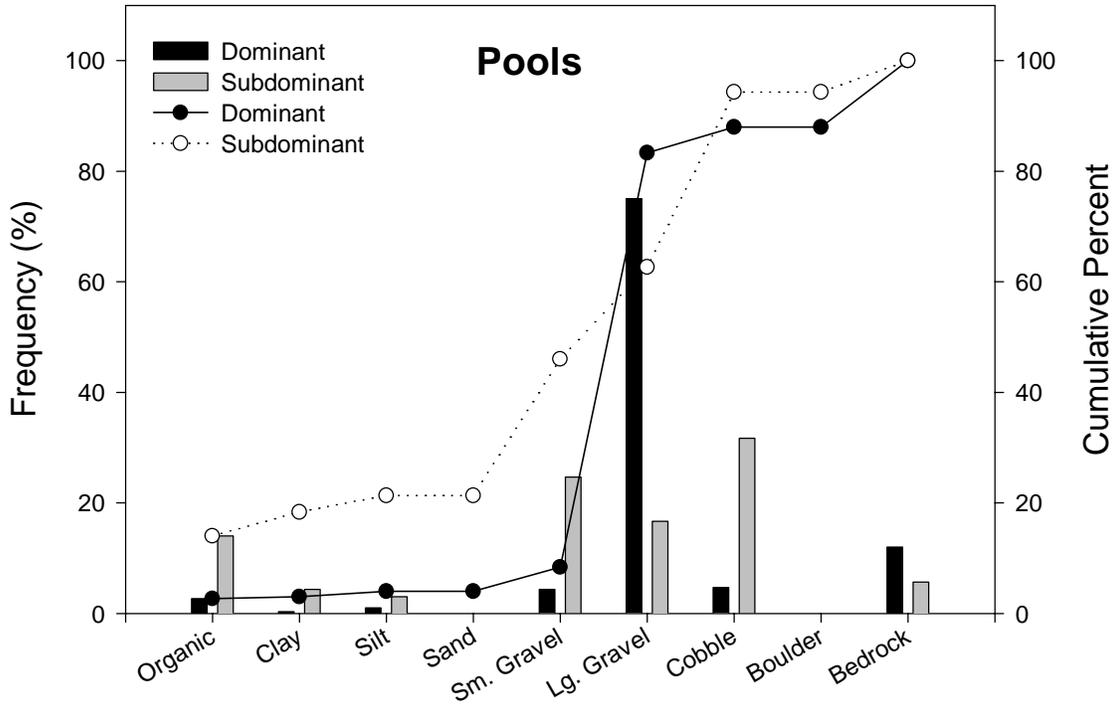
# Reed Creek



# Distribution and Abundance of Large Woody Debris



# Reed Creek Substrate Composition



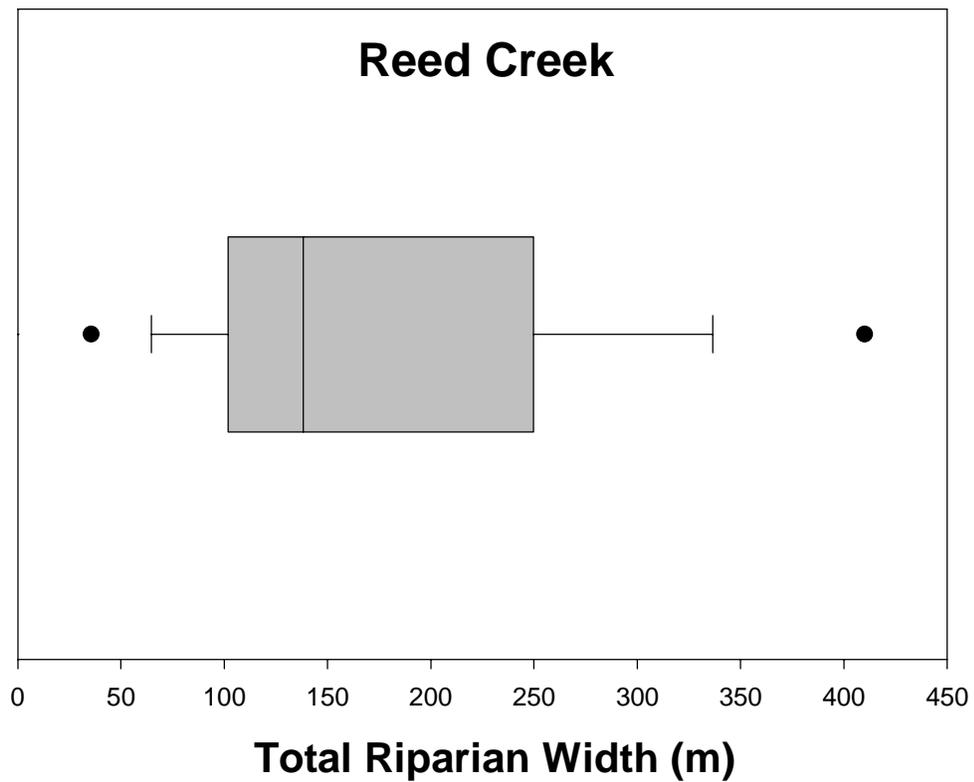
## Riparian Width

Stream: Reed Creek

Number of Measurements: 11

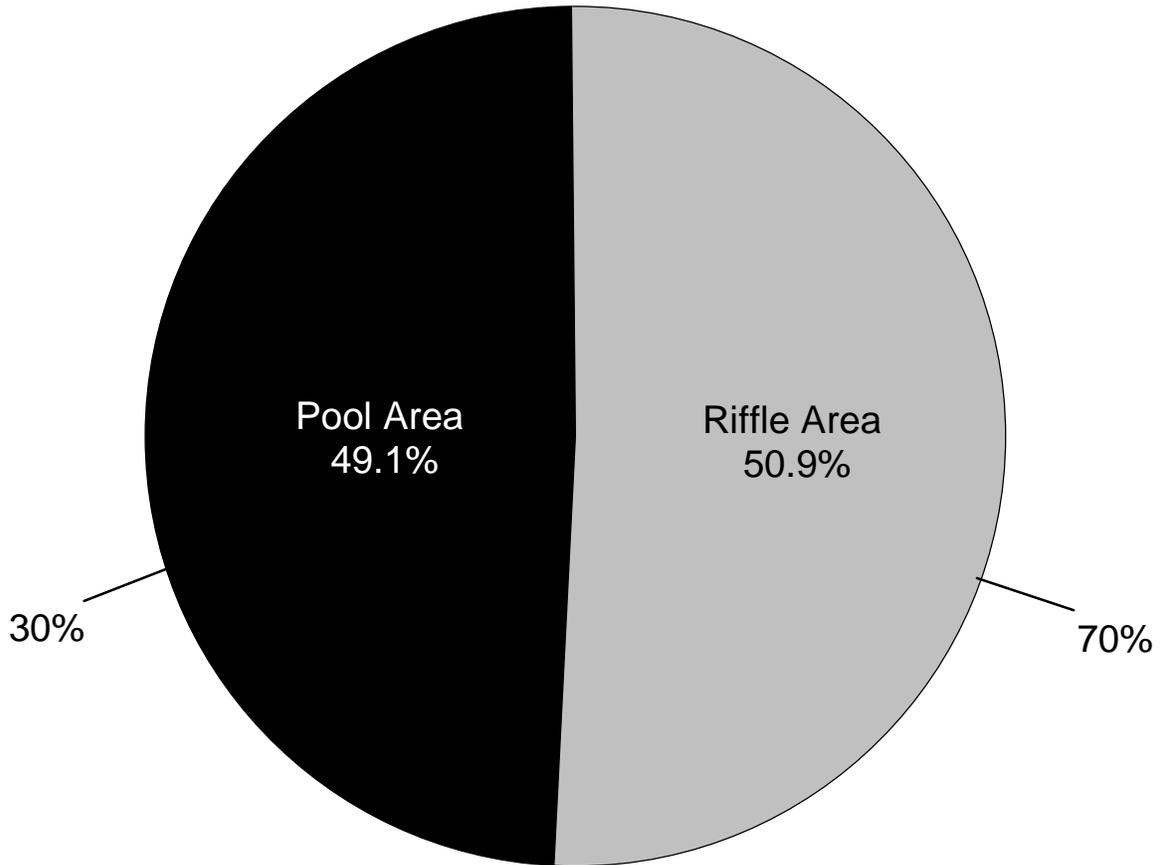
Mean Width: 178.0m Std Dev: 110.2

Max: 410.2m Min: 35.7m

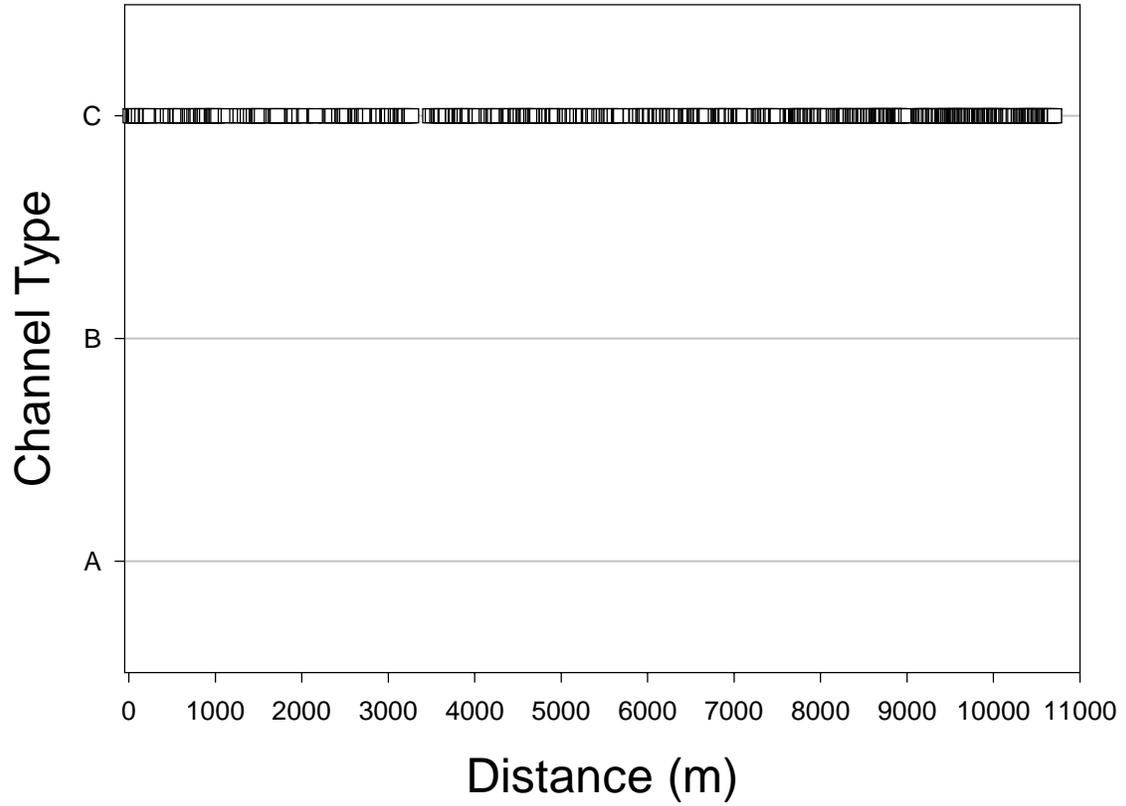


Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Reed Creek  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Reed Creek Rosgen's Channel Type Distribution



# Hutchinson Rock and Chatham Hill Quadrangles

**Stream:** Baker Branch

**District:** Wythe R.D.

**Quadrangle:** Chatham Hill/Nebo

**Sample Date:** 06/05/00

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 0.3 kilometers

**Percent of Total Area - Pools:** 21.1%

Number of Pools: 16

Number of Pools per kilometer: 53.3

Total Pool Area: 105.2 sq. meters  $\pm$  48.5

Mean Pool Area: 6.6 sq. meters

Correction Factor: 1.11

Mean Maximum Depth: 23.8 cm

Mean Average Depth: 14.7 cm

Mean Average Residual Pool Depth: 11.9 cm

**Percent of Total Area - Riffles:** 78.9%

Number of Riffles: 15

Number of Riffles per kilometer: 50.0

Total Riffle Area: 393.8 sq. meters  $\pm$  221.4

Mean Riffle Area: 26.3 sq. meters

Correction Factor: 1.27

Mean Maximum Depth: 12.8 cm

Mean Average Depth: 6.1 cm

**Number of Large Woody Debris Pieces per kilometer:** 175.3

Wood < 5 m and < 55 cm: 107.6

Wood < 5 m and > 55 cm: 21.5

Wood > 5 m and < 55 cm: 46.1

Wood > 5 m and > 55 cm:

**Mean Channel Width:** 3.5 m

**Mean Riparian Width:** 11.7 m

Mean Maximum Riparian Distance (either side): 2.3 m

Mean Minimum Riparian Distance (either side): 5.9 m

Maximum Riparian Width (Total): 16.6 m

Minimum Riparian Width (Total): 8.8 m

Baker Branch Continued.

**Percent of Pool Habitat Surveyed as Glides:** 0.0%

**Rosgen=s Channel Type Frequency:**

Channel Type A:

Channel Type B: 100%

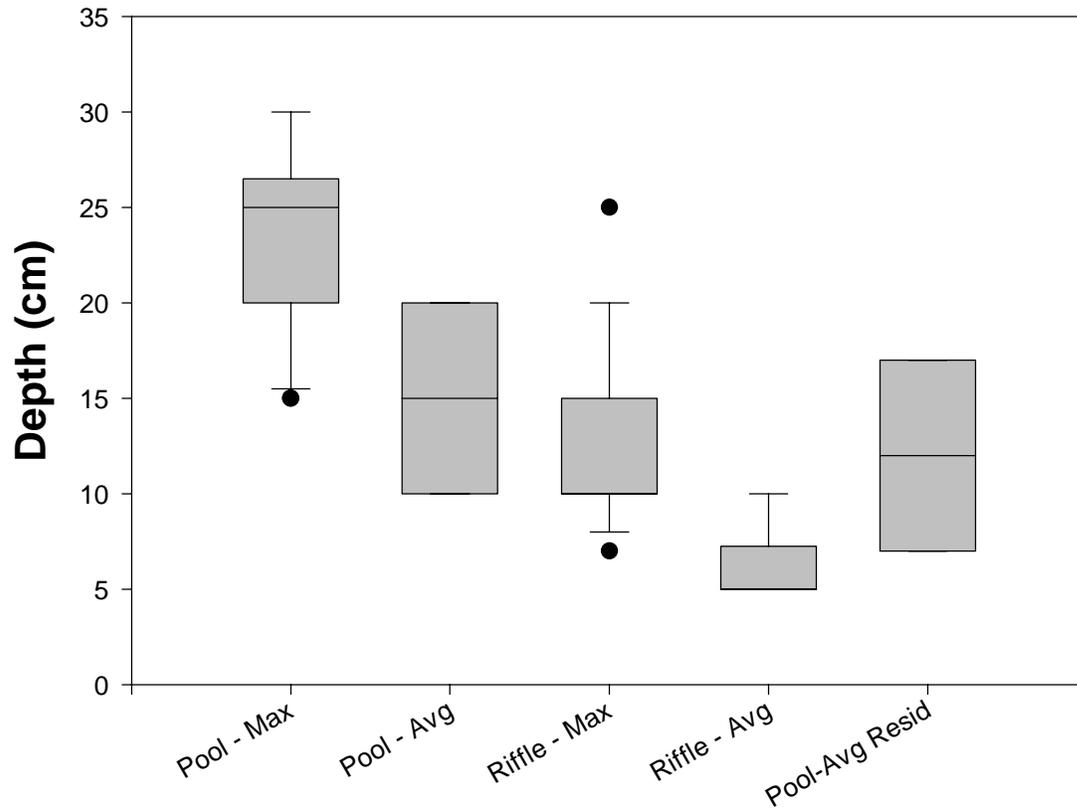
Channel Type C:

Channel Type D:

**Percent Pools with  $\geq$  35% Embeddedness:** 93.8%

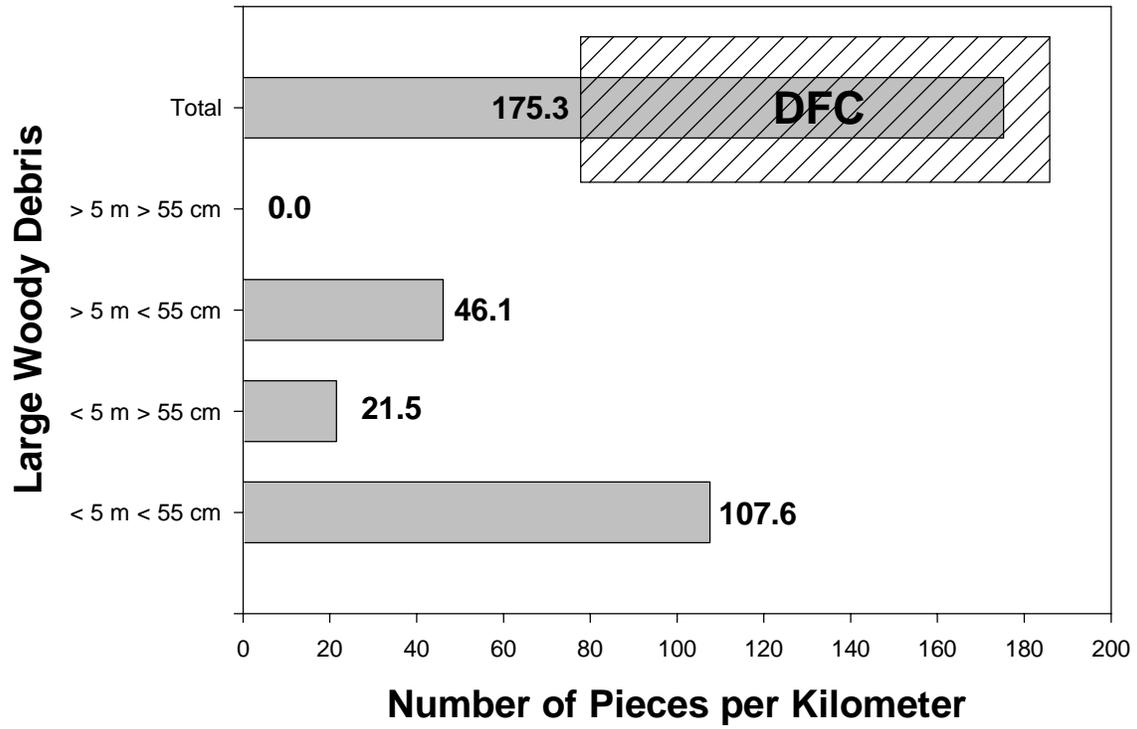
**Average Channel Gradient:** 5.7

# Baker Branch

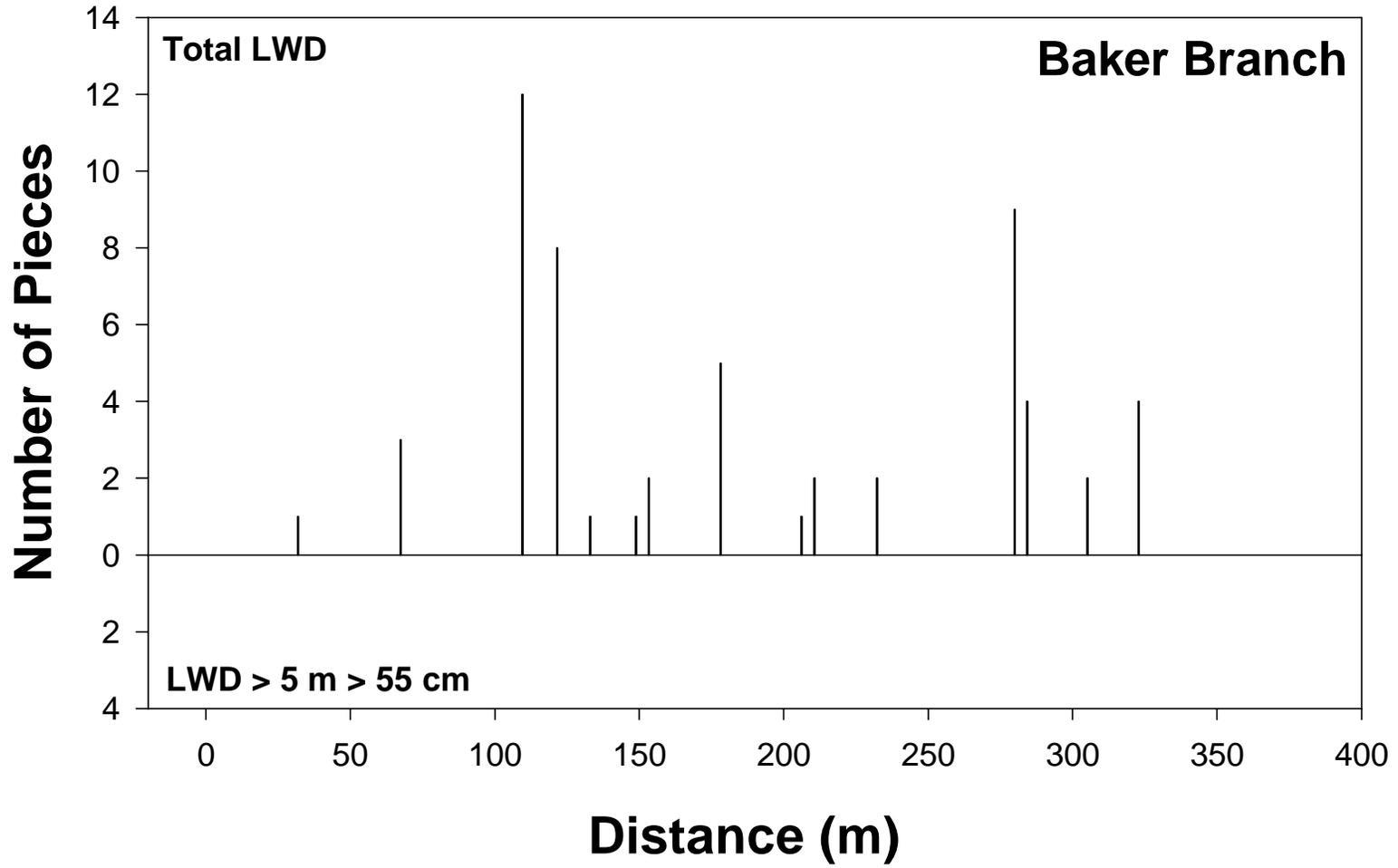


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

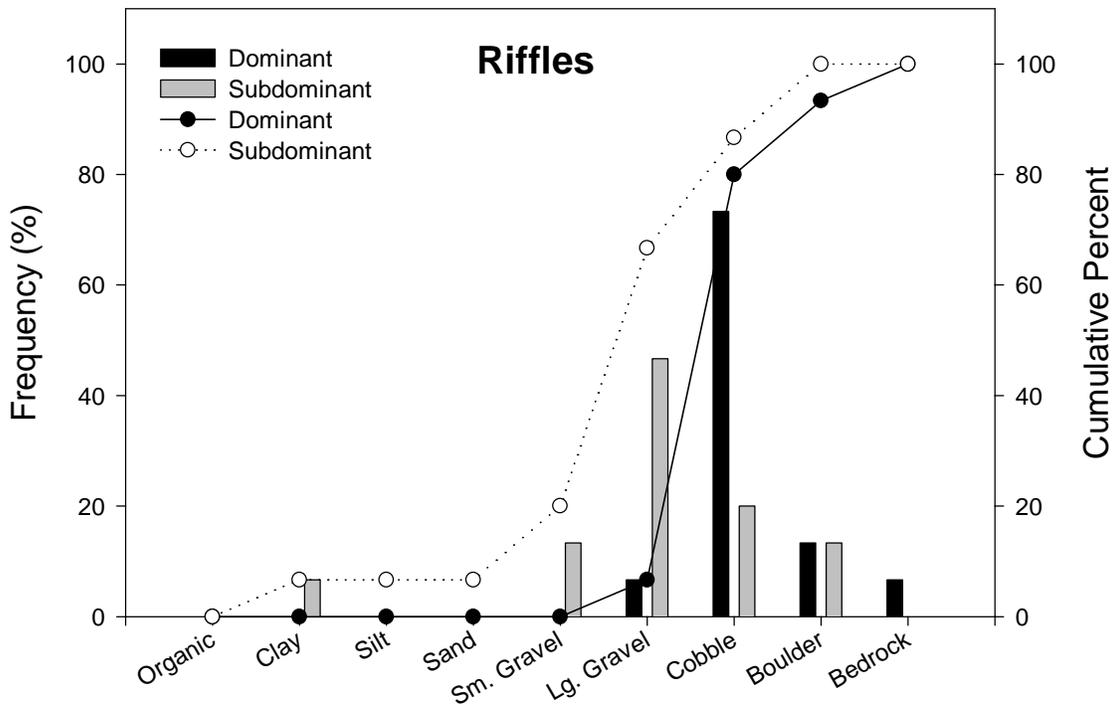
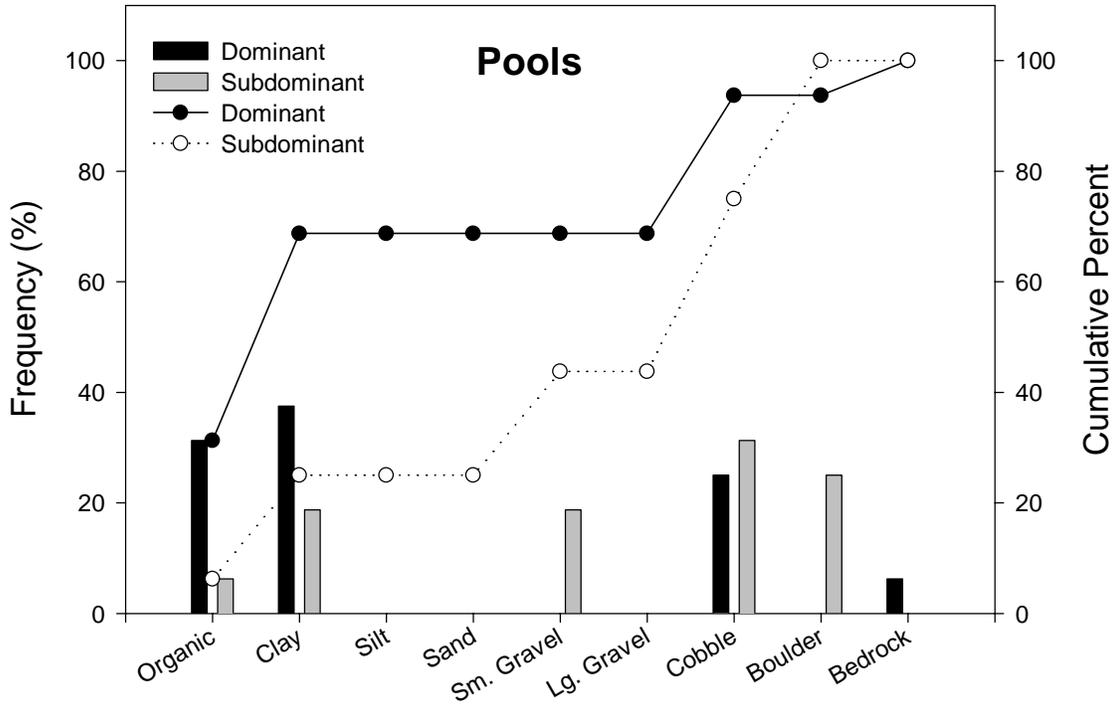
# Baker Branch



# Distribution and Abundance of Large Woody Debris



# Baker Branch Substrate Composition



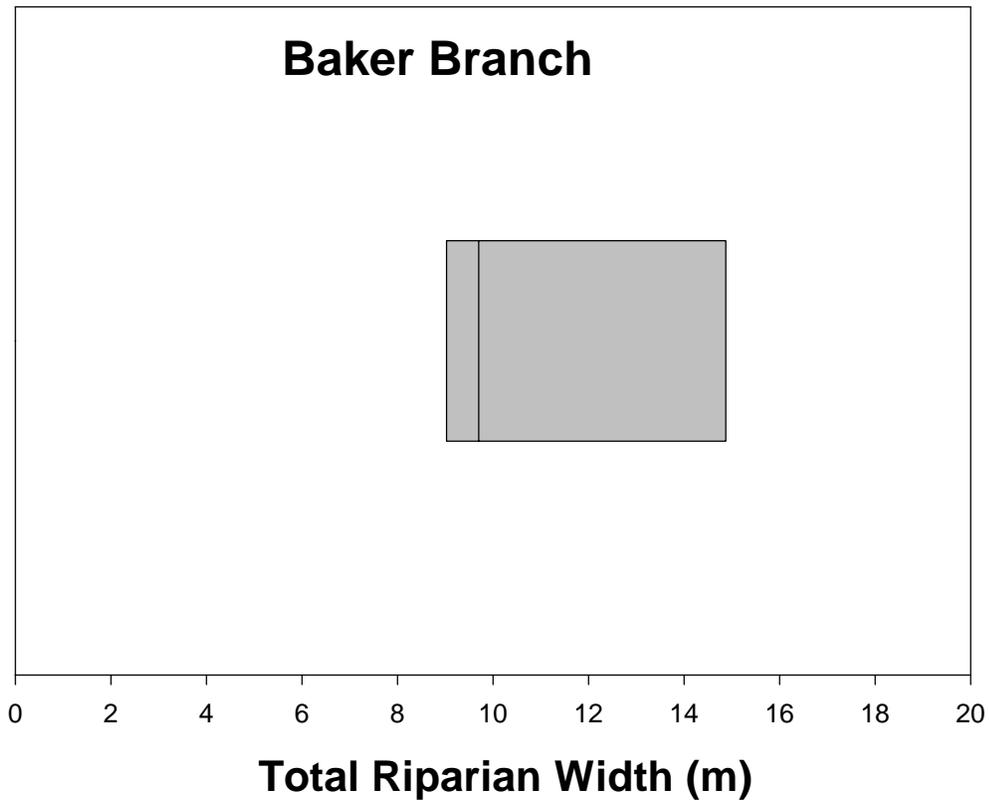
## Riparian Width

Stream: Baker Branch

Number of Measurements: 3

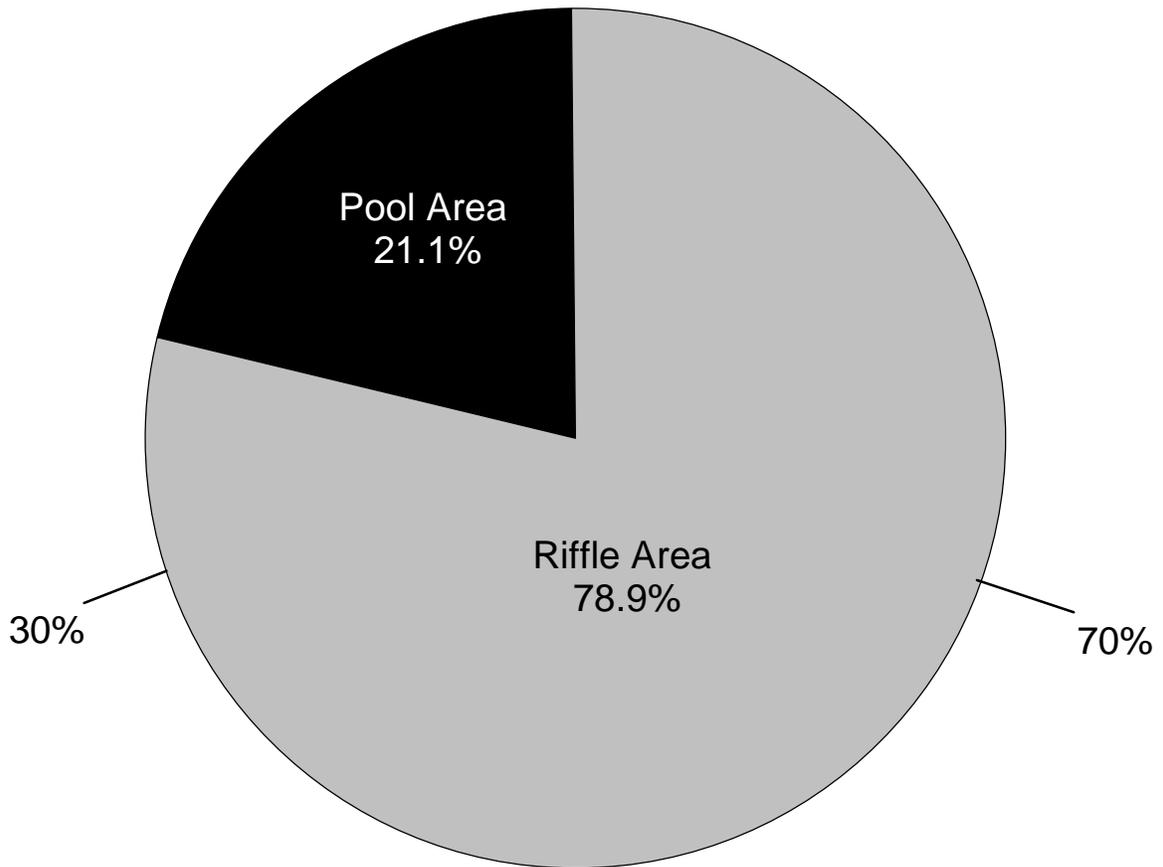
Mean Width: 11.7m Std Dev: 4.3

Max: 16.6m Min: 8.8m



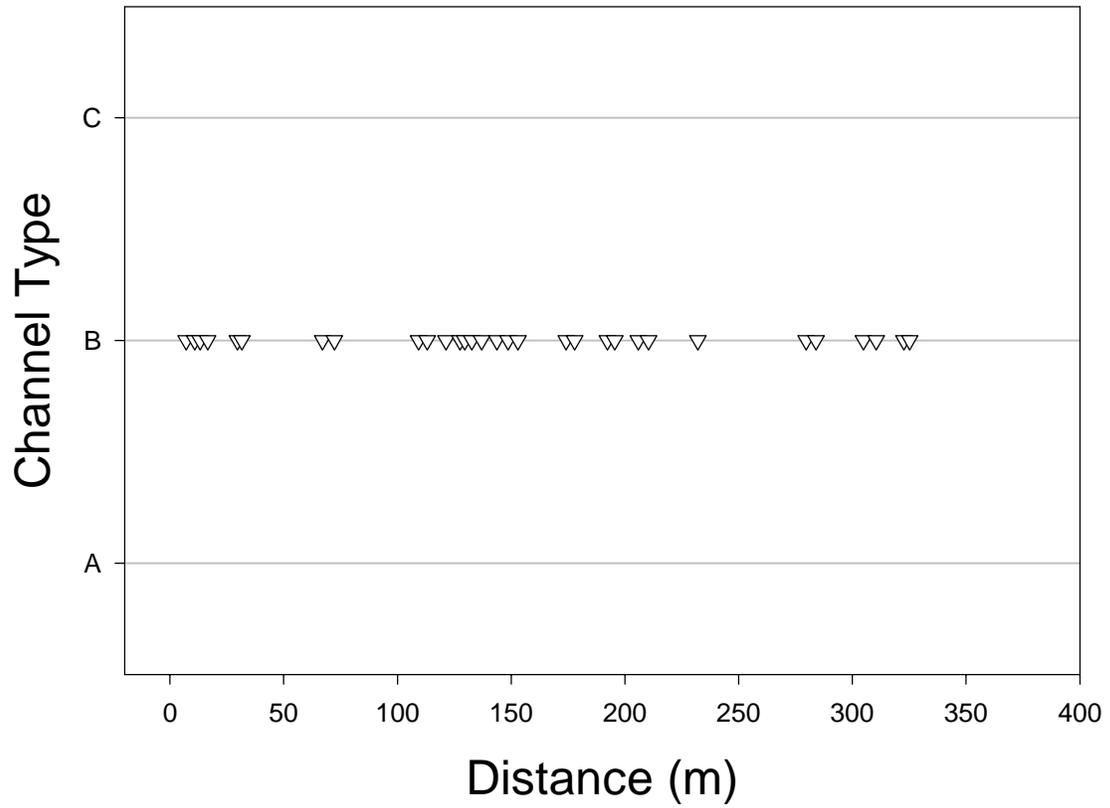
Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Baker Branch  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Baker Branch

## Rosgen's Channel Type Distribution



**Stream:** Roaring Fork

**District:** Wythe R.D.

**Quadrangle:** Hutchinson Rock

**Sample Date:** 06/07/00

**Downstream Starting Point:** Forest Service Boundary

**Total Distance Surveyed:** 6.5 kilometers

**Percent of Total Area - Pools:** 29.6

Number of Pools: 290

Number of Pools per kilometer: 44.6

Total Pool Area: 10941.91 sq. meters  $\pm$  821.2

Mean Pool Area: 37.7 sq. meters

Correction Factor: 0.80

Mean Maximum Depth: 51.3 cm

Mean Average Depth: 25.0 cm

Mean Average Residual Pool Depth: 5.51 cm

**Percent of Total Area - Riffles:** 70.4%

Number of Riffles: 211

Number of Riffles per kilometer: 32.5

Total Riffle Area: 25981.41 sq. meters +3992.9

Mean Riffle Area: 123.1 sq. meters

Correction Factor: 1.07

Mean Maximum Depth: 35.6 cm

Mean Average Depth: 16.2 cm

**Number of Large Woody Debris Pieces per kilometer:** 258.1

Wood < 5 m and < 55 cm: 174.2

Wood < 5 m and > 55 cm: 30.5

Wood > 5 m and < 55 cm: 36.7

Wood > 5 m and > 55 cm: 16.7

**Mean Channel Width:** 8.5 m

**Mean Riparian Width:** 35.4 m

Mean Maximum Riparian Distance (either side): 23.7 m

Mean Minimum Riparian Distance (either side): 3.2 m

Maximum Riparian Width (Total): 93 m

Minimum Riparian Width (Total): 13.6 m

Roaring Fork Continued.

**Percent of Pool Habitat Surveyed as Glides:** 4.1 %

**Rosgen's Channel Type Frequency:**

Channel Type A: 8.0 %

Channel Type B: 92.0 %

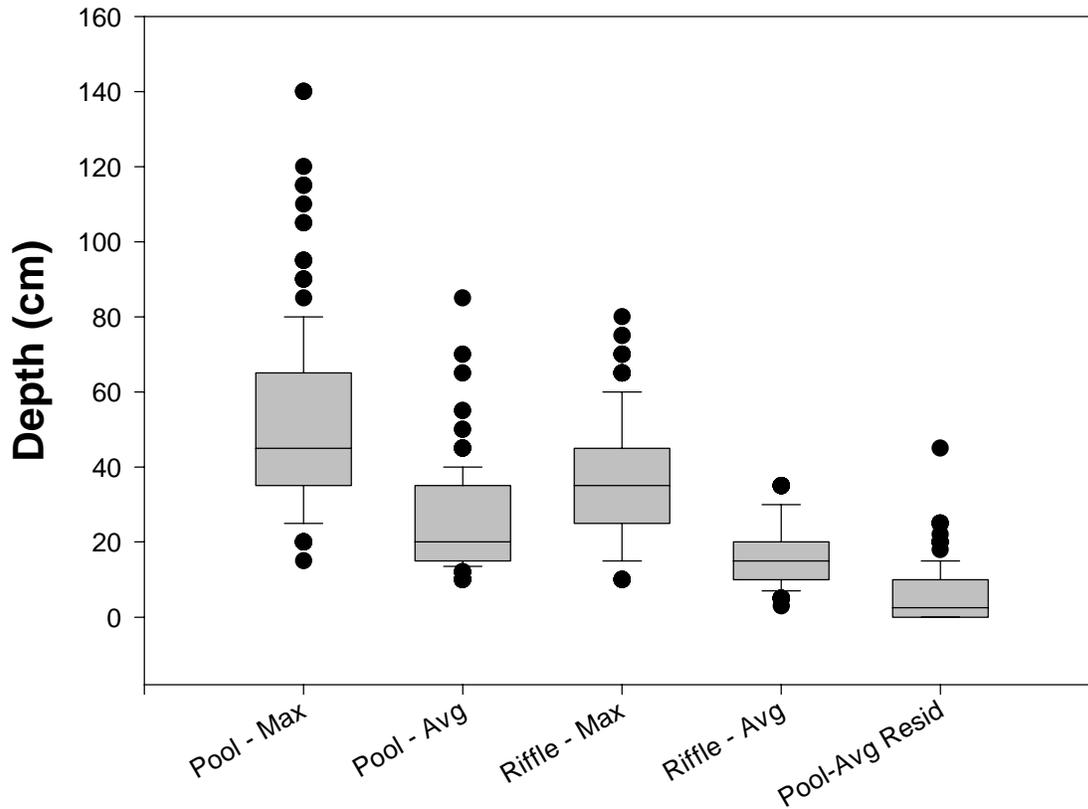
Channel Type C: 0.0 %

Channel Type D: 0.0 %

**Percent Pools with  $\geq$  35% Embeddedness:** 25.9 %

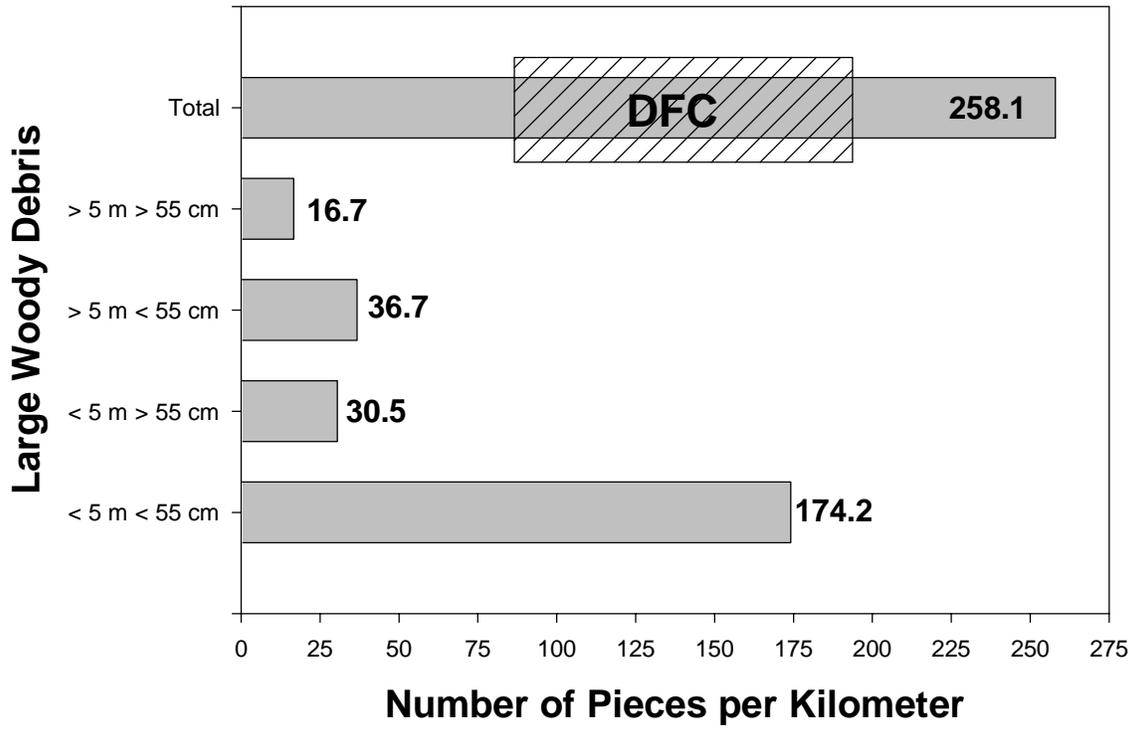
**Average Channel Gradient:** 10.3

# Roaring Fork

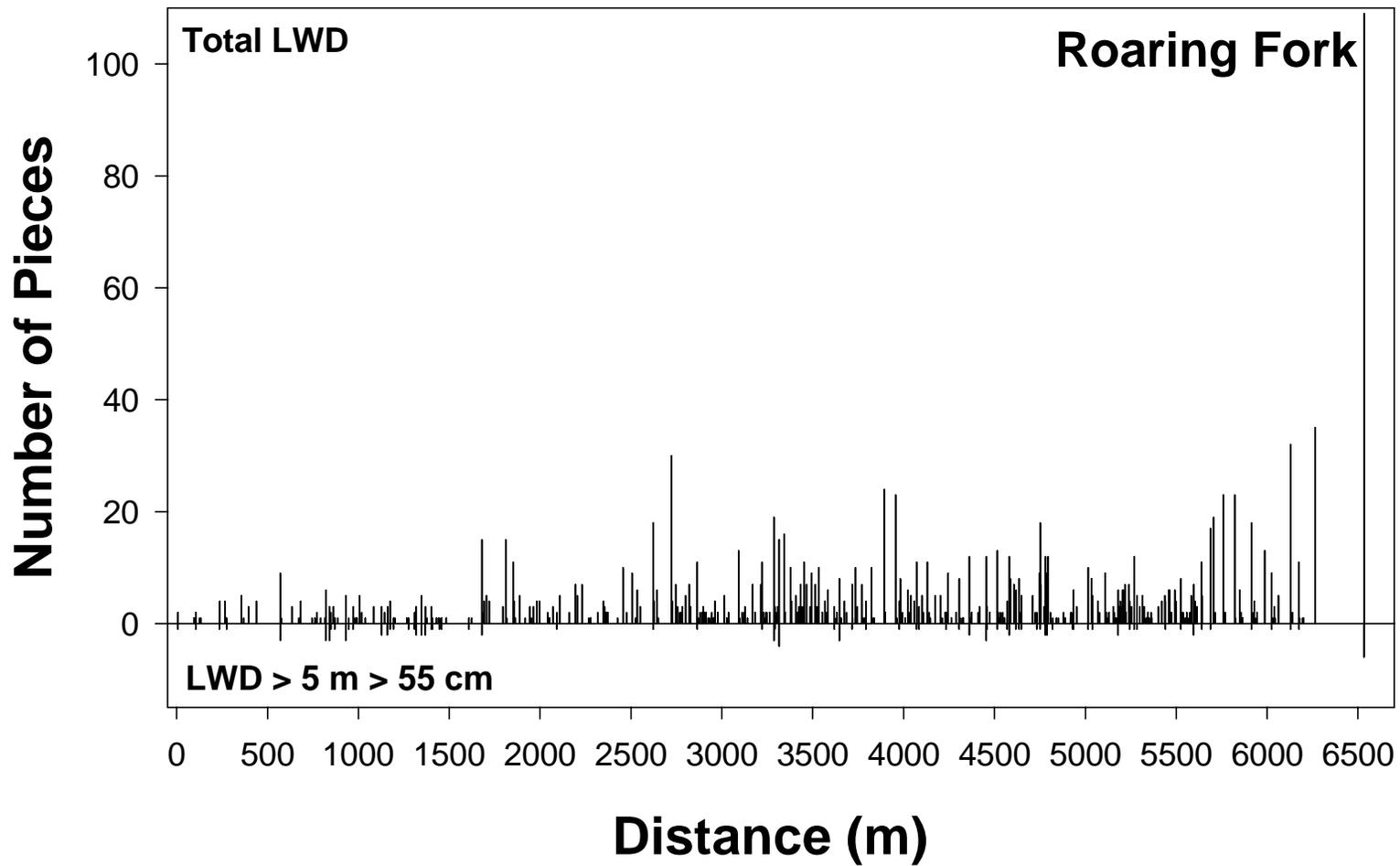


Box plots representing maximum and average depths for pools and riffles, and average residual pool depths for this stream. The boxes enclose the middle 50% of the observations, the bar in the center of the boxes represent the median, and the capped lines extending above and below the boxes represent the 90% and 10% quantiles.

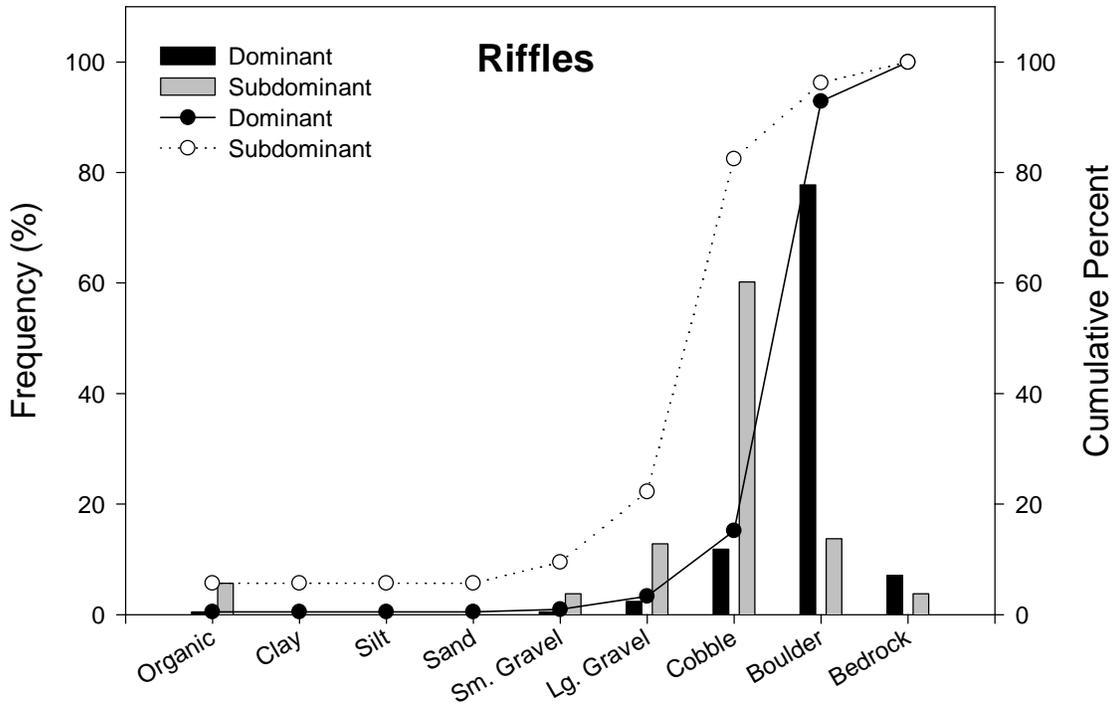
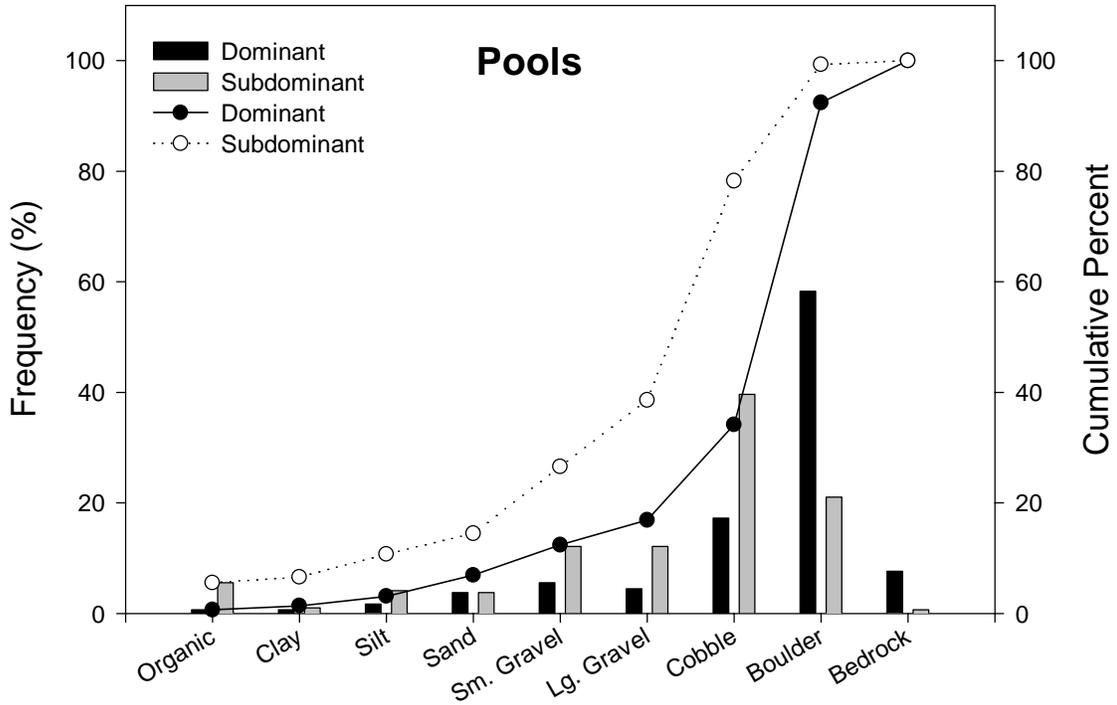
# Roaring Fork



# Distribution and Abundance of Large Woody Debris



# Roaring Fork Substrate Composition



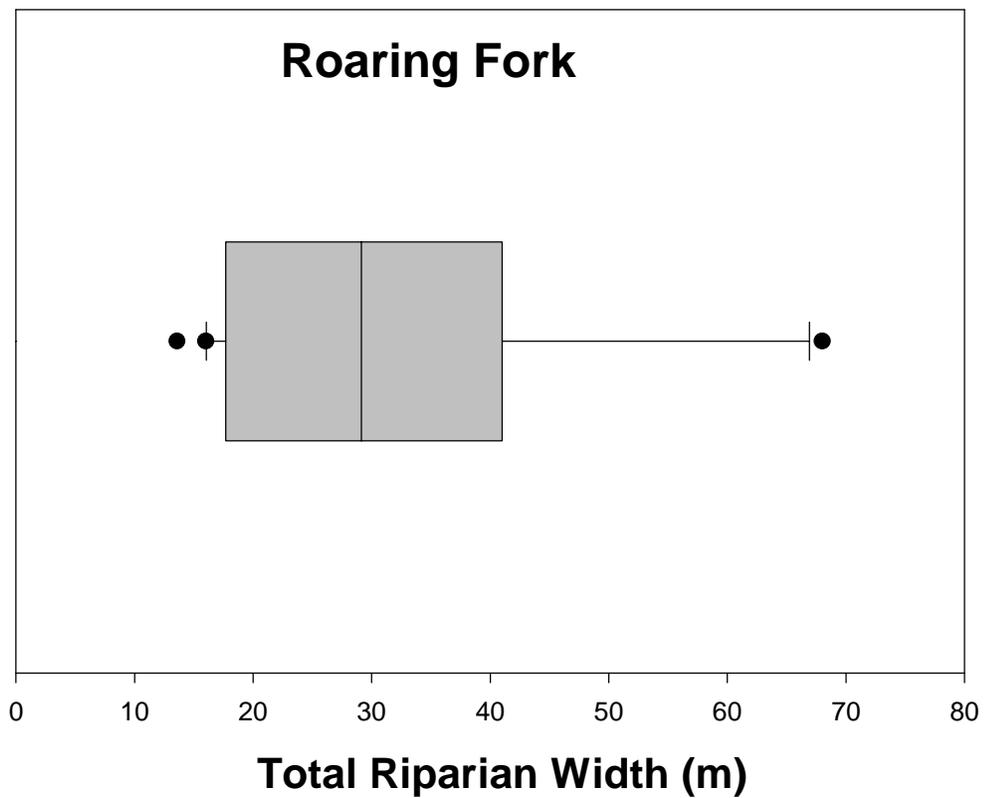
## Riparian Width

Stream: Roaring Fork

Number of Measurements: 18

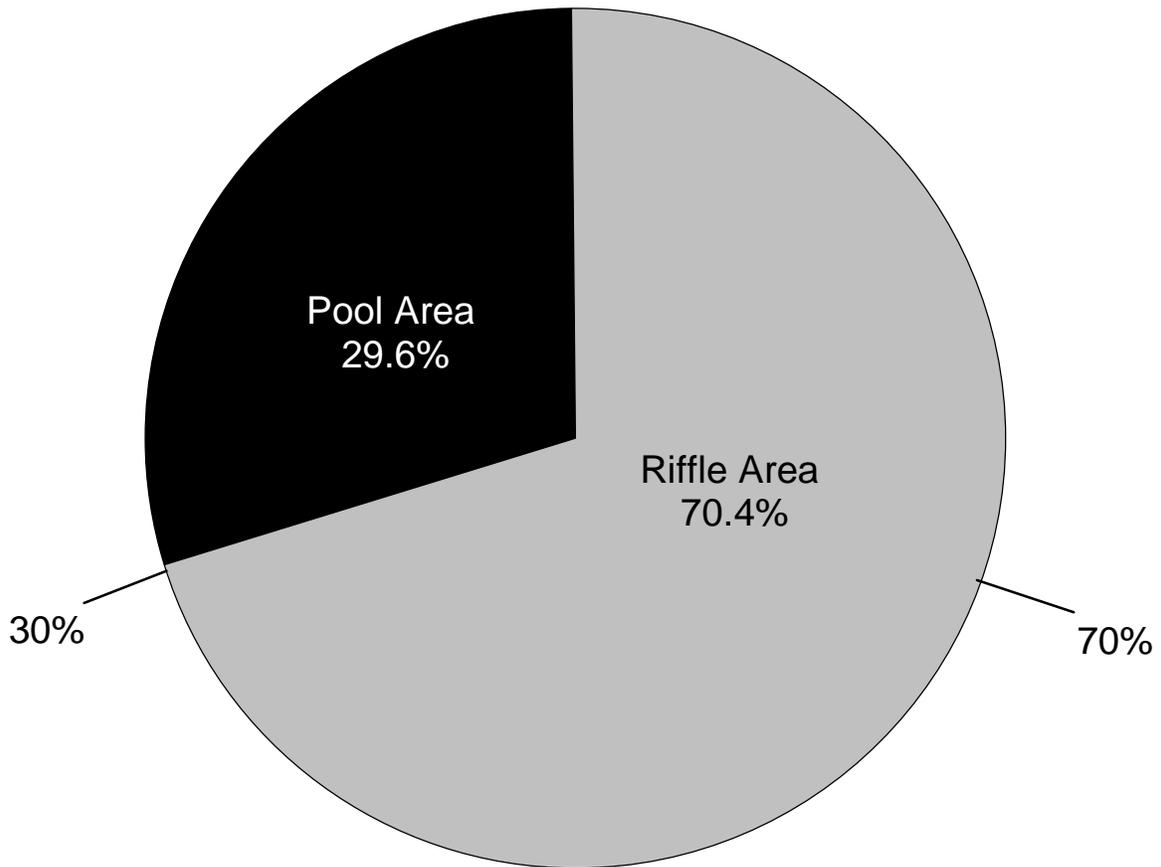
Mean Width: 35.5m Std Dev: 22.1

Max: 93.0m Min: 13.6m



Box plot of total riparian width. The box encloses the middle 50% of the observations, the bar in the center of the box represents the median, and the capped lines extending to the right and to the left of the box represent the 90% and 10% quantiles.

**Roaring Fork  
Pool:Riffle Ratio  
DFC: 30 - 70% of the Stream Area  
in Pool Habitat**



# Roaring Fork Rosgen's Channel Type Distribution

