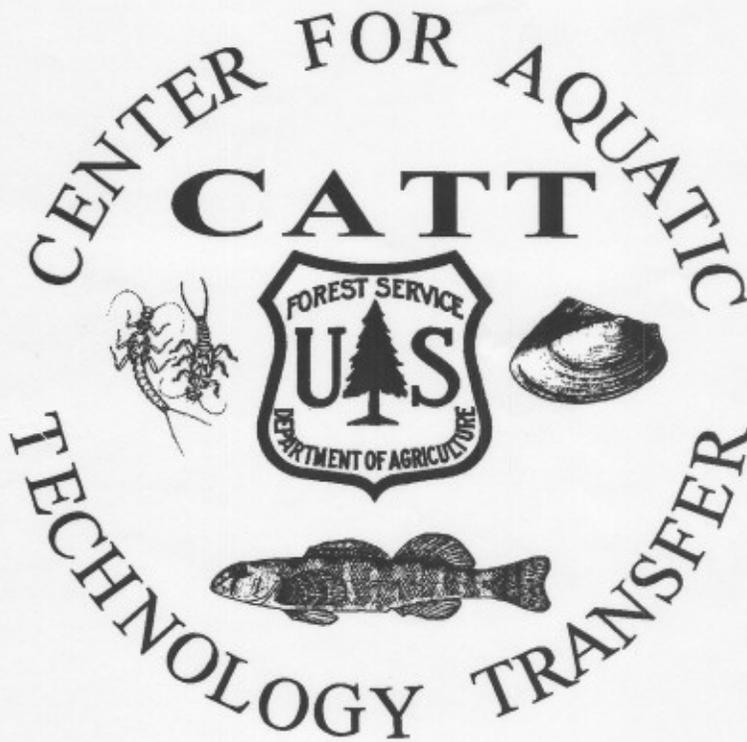


**Current Condition of Streams on the New Castle Ranger District,  
George Washington - Jefferson National Forest, Virginia**



**Center for Aquatic Technology Transfer**  
134 Cheatham Hall  
Virginia Polytechnic Institute and State University  
Blacksburg, VA 24061-0321

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United States Department of Agriculture  
Forest Service  
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Blacksburg, VA 24061-0321

Kevin N. Leftwich  
Lead Fisheries Biologist

Martin K. Underwood  
Fisheries Biologist

and  
C. Andrew Dolloff  
Project Leader  
Coldwater Fisheries Research Unit  
Southern Research Station

Prepared for

Mark Hudy  
Fisheries Biologist  
George Washington - Jefferson National Forest

October 1996

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**Introduction** - In Spring 1996 we began stream habitat surveys on the New Castle Ranger District (NRD), George Washington - Jefferson National Forest (GW - JNF) to quantify current stream conditions. Habitat in over 50 miles of stream (28 streams) was classified and inventoried between 15 May and 15 July 1995 using Basinwide Visual Estimation Techniques (BVET [Dolloff et. al 1993]).

We modified standard BVET methods to measure stream habitat parameters identified in the George Washington (GW) forest plan. Included in the forest plan is an outline of the desired-future-condition (DFC) for all the streams within the GW based on physical habitat. The pertinent DFCs for the GW include woody debris loading of 125 to 300 pieces per mile and 30 to 70 percent of the total stream habitat in pools. The use of BVET allowed us to estimate woody debris loading, percentage of pool and riffle area, and the width of the riparian area of streams in the NRD. Further, we were able to map the distribution of woody debris in all streams surveyed.

The purpose of this report is to describe the current conditions of NRD streams in a format useful to the NRD and the GW-JNF. The inclosed information is intended as a baseline for NRD 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 NRD 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 (an area in the stream with low water velocity, streambed gradient near zero, and a smooth water surface) and riffles (an area in the stream with relatively steep gradient, shallow water, relatively high velocity, and turbulent surface). Surveys began at confluences for streams confined to the NRD and at the downstream USFS boundary for all other streams. Surveys were terminated when we encountered an upstream USFS property boundary or determined the stream to be intermittent.

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, and estimated the average and maximum depth of each 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 0.1-ft increments. The length (0.1 ft) of each habitat unit was measured with a hip chain.

Another crew member classified and inventoried large woody debris (LWD), associated with each habitat unit, within the stream channel and recorded the data on a Husky Hunter field computer. LWD was divided into four classes: 1) less than 15-ft long, less than 14-in diameter, 2) less than 15-ft long, greater than 14-in diameter, 3) greater than 15-ft long, less than 14-in diameter, and 4) greater than 15-ft long, greater than 14-in diameter. All LWD less than 4-ft long and less than 4-in diameter were omitted from the survey.

The first unit of each habitat type selected for intensive sampling (accurate measurement of surface area - second stage sampling) was determined randomly. Additional units were selected systematically (one unit out of 20 for each habitat type). The width of these systematically selected habitat units was measured with a 50-ft measuring tape at intervals ranging from about 5 ft to 15 ft. Interval size was determined by the length and the morphology of the unit (e.g., intervals of measured widths increased with increasing unit length).

The relationship between the estimated surface area and the 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 ( $\hat{Q}$ ), the estimated true total area ( $\hat{M}$ ) and the variance of the area estimator  $\hat{V}(\hat{M})$  were calculated separately for each habitat type and each stream.

In each of the systematically selected riffles we also estimated the stream channel width (ft) at bankfull and riparian width (ft) as described by Harrelson et. al 1994. We used this information to describe the channel and flood plain associated with each stream.

BVET calculations were computed using a Statistical Analysis Systems (SAS) program developed by Dr. Patricia Flebbe (140 Cheatham Hall, VA Tech, Blacksburg, VA 24061-0321). Data were summarized using a Quattro Pro spreadsheet.

**User's Guide** - Stream Summaries are organized alphabetically by U. S. Geological Survey Topographic Quadrangle. Three streams, Barbours Creek, Mill Creek, and Patterson Creek, were divided into sections (i.e. upper, middle, and lower). Data for each stream section were collected, analyzed, and presented separately. Each stream or stream section summary contains: 1) synopsis of stream characteristics, 2) percent pools and riffles graph, 3) LWD size graph, 4) LWD distribution graph, and 5) boxplot of riparian measurements. Streams without riparian boxplots were streams with less than two riparian measurements. GW-JNF DFCs are indicated on all pertinent graphs.

We also included references tables of all streams surveyed which will allow managers to quickly assess the present condition of NRD streams in relation to pertinent DFCs. Streams are arranged by DFC parameters (percent pool habitat and LWD pieces per mile) in ascending 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.

### Acknowledgments

We would like to thank the following people for their contributions to this report: Alicia Brinton, Chris Burcher, Rayna Levin, Steve Quarles, and Mike Robertshaw.

## Reference Tables

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

<b>Stream</b>	<b>LWD per mile</b>	<b>Miles Surveyed</b>
Upper Patterson	15.5	1.1
Trout Creek	33.4	0.3
Trout Branch	42	0.5
Upper Barbours Creek	43.9	3.7
Broad Run	47.3	3.8
Middle Patterson Creek	54	2.2
Upper Mill Creek	56.9	2.9
Tub Run	71.9	3.2
Lower Barbours Creek	74.5	3.2
Lick Branch	80	2.5
Hipes Branch	110.7	1.6
*****		
<b>LWD <math>\leq</math> 125 pieces per mile</b>		
*****		
Roland's Run Branch	140	1.2
West Branch	145.7	1.4
Jones Branch	150.8	1.2
Shawvers Run	172.5	2.4
Lipes Branch	196.5	1.7
Rocky Branch	215.2	1.5
Cove Branch	215.6	2.5
Trib of Cove Branch	224.2	0.7
Roaring Run	235.8	1.7
Lower Patterson Creek	243	1
Big Laurel Branch	343.3	0.3
Red Springs Branch	350	0.3
Hannah Branch	362.5	0.4
Wilson Branch	383.9	0.8
Lower Mill Creek	400	2.2
South Prong Barbours	481.3	2.8
Big Double Branch	498	0.5
Wide Hollow	525	0.2
Trib of Valley Branch	550	0.2
Valley Branch	588.1	1.8
Kale Branch	672.9	0.7

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

Stream	Percent Pool Habitat	Miles Surveyed
Trib of Valley Branch	18.7	0.2
Trout Branch	18.9	0.5
Jones Branch	21.8	1.2
Lipes Branch	22.7	1.7
Kale Branch	24	0.7
Wilson Branch	26.4	0.8
Rocky Branch	28.1	1.5
Valley Branch	28.2	1.8
Upper Barbours Creek	29.1	3.7
Big Double Branch	29.2	0.5
Roaring Run	29.6	1.7
*****		
<b>Pool Habitat <math>\geq</math> 30%</b>		
*****		
Hannah Branch	30.3	0.4
South Prong Barbours	31.8	2.8
Upper Mill Creek	32.2	2.9
West Branch	35.1	1.4
Big Laurel Branch	35.4	0.3
Shawvers Run	36	2.4
Trout Creek	36.5	0.3
Lower Barbours Creek	36.8	3.2
Cove Branch	41.7	2.5
Hipes Branch	43.2	1.6
Trib of Cove Branch	43.3	0.7
Red Springs Branch	45.4	0.3
Tub Run	46.1	3.2
Broad Run	46.5	3.8
Lick Branch	54.2	2.5
Lower Mill Creek	54.8	2.2
Wide Hollow	55	0.2
Roland's Run Branch	61.5	1.2
Middle Patterson Creek	76.6	2.2
Lower Patterson Creek	77.4	1
Upper Patterson Creek	79.8	1.1

## **Stream Summaries**

## Catawba Quadrangle

Stream: Broad Run

District: New Castle

Quadrangle: Catawba

Sample Date: 06/24/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 3.8 miles**

**Percent of Total Area - Pools: 46.5%**

Number of Pools: 182

Number of Pools per mile: 47.8

Total Pool Area: 85,638.1 sq. ft.  $\pm$  29,619.8

Mean Pool Area: 470.5 sq. ft.

Correction Factor: 0.85

Mean Maximum Depth: 1.4'

Mean Average Depth: 0.8'

**Percent of Total Area - Riffles: 53.5%**

Number of Riffles: 142

Number of Riffles per mile: 37.3

Total Riffle Area: 98,626.4 sq. ft.  $\pm$  19,714.8

Mean Riffle Area: 694.6 sq. ft.

Correction Factor: 0.95

Mean Maximum Depth: 0.6'

Mean Average Depth: 0.3'

**Number of Large Woody Debris Pieces per Mile: 47.3**

Wood < 15' and < 14": 25.8

Wood < 15' and > 14": 3.9

Wood > 15' and < 14": 13.9

Wood > 15' and > 14": 3.7

**Mean Channel Width: 28.2'**

**Mean Riparian Width: 86.6'**

Mean Maximum Riparian Distance (either side): 15.0'

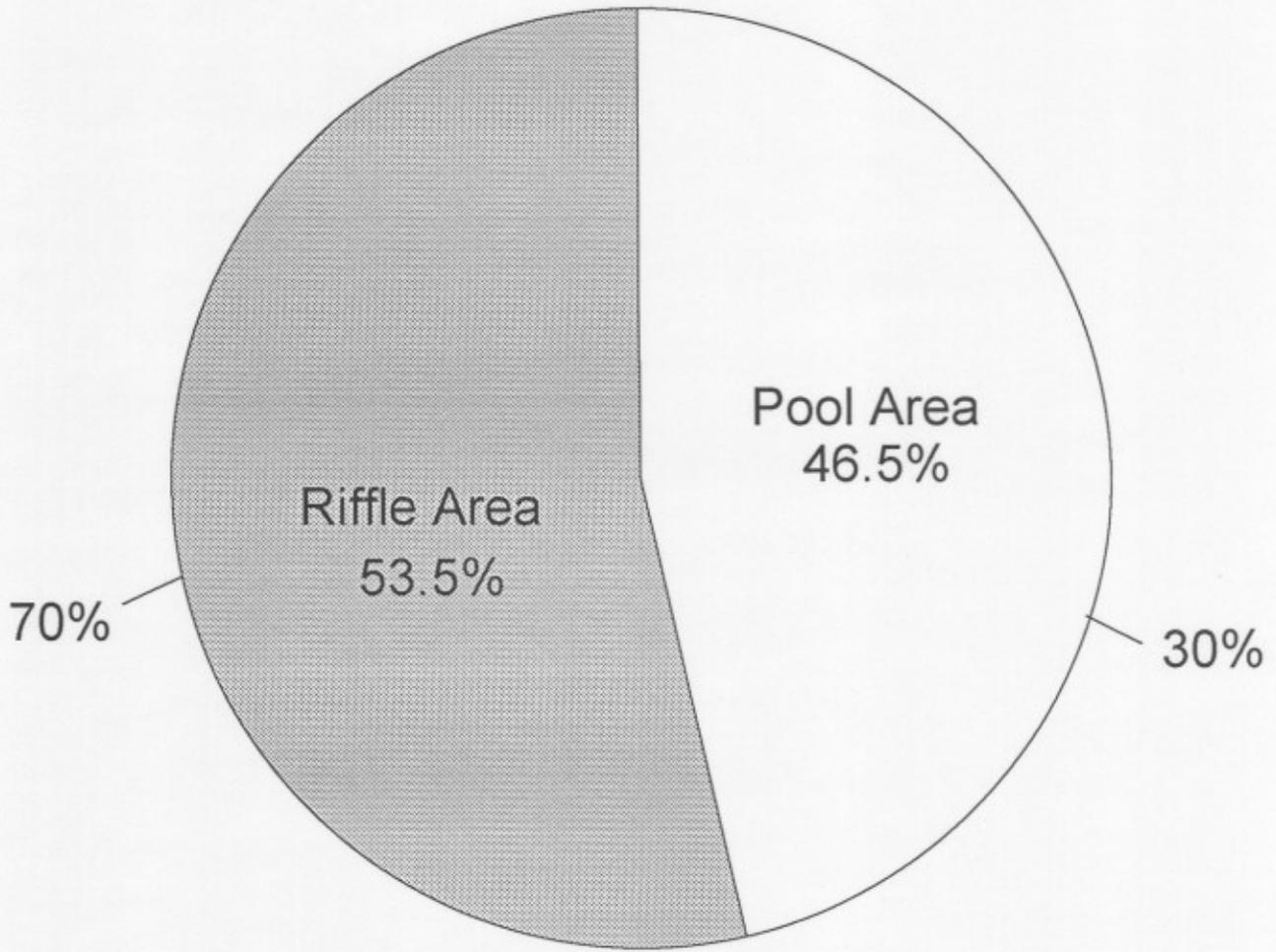
Mean Minimum Riparian Distance (either side): 40.8'

Maximum Riparian Width (Total): 163.4'

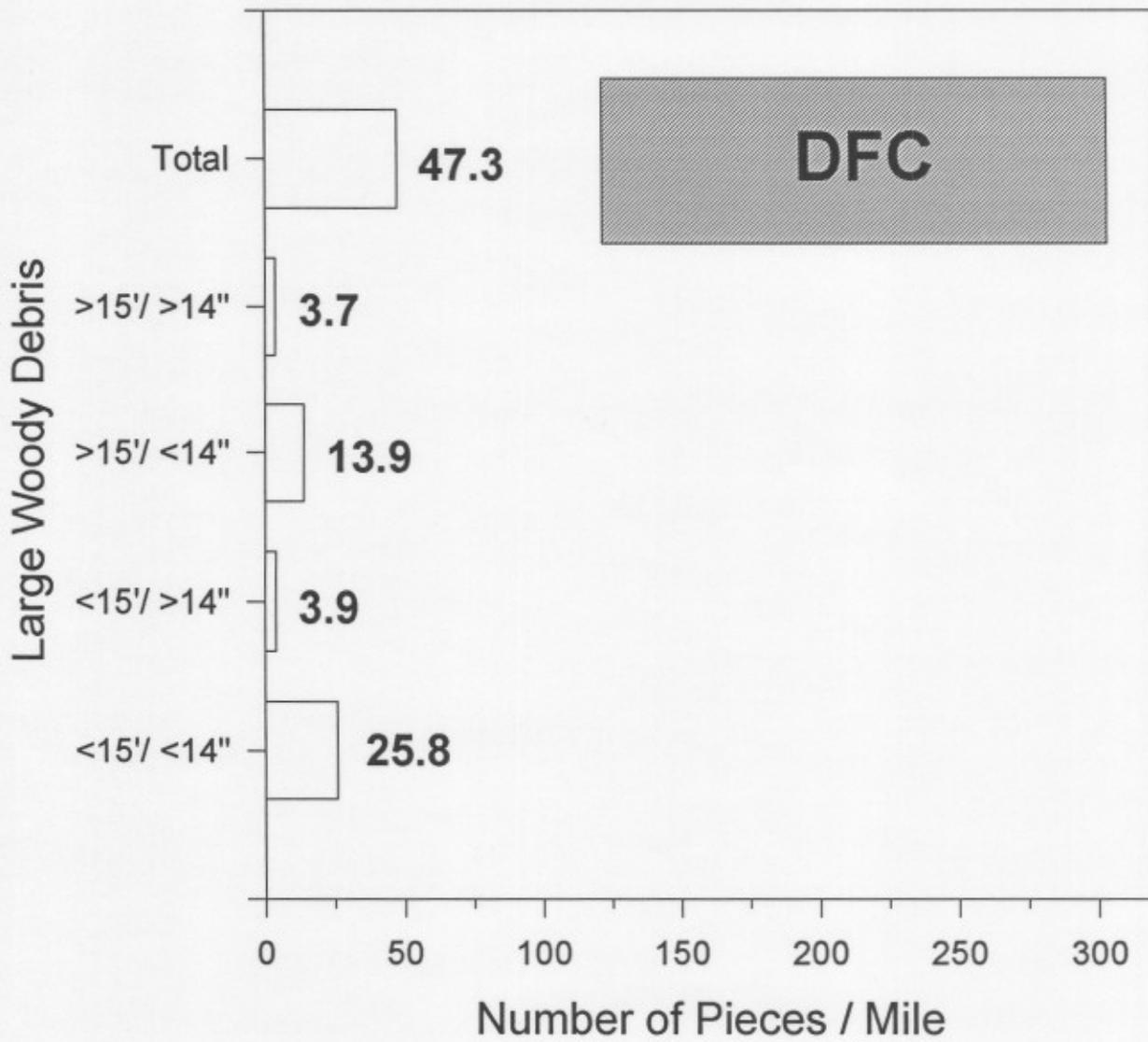
Minimum Riparian Width (Total): 39.5'

### Broad Run

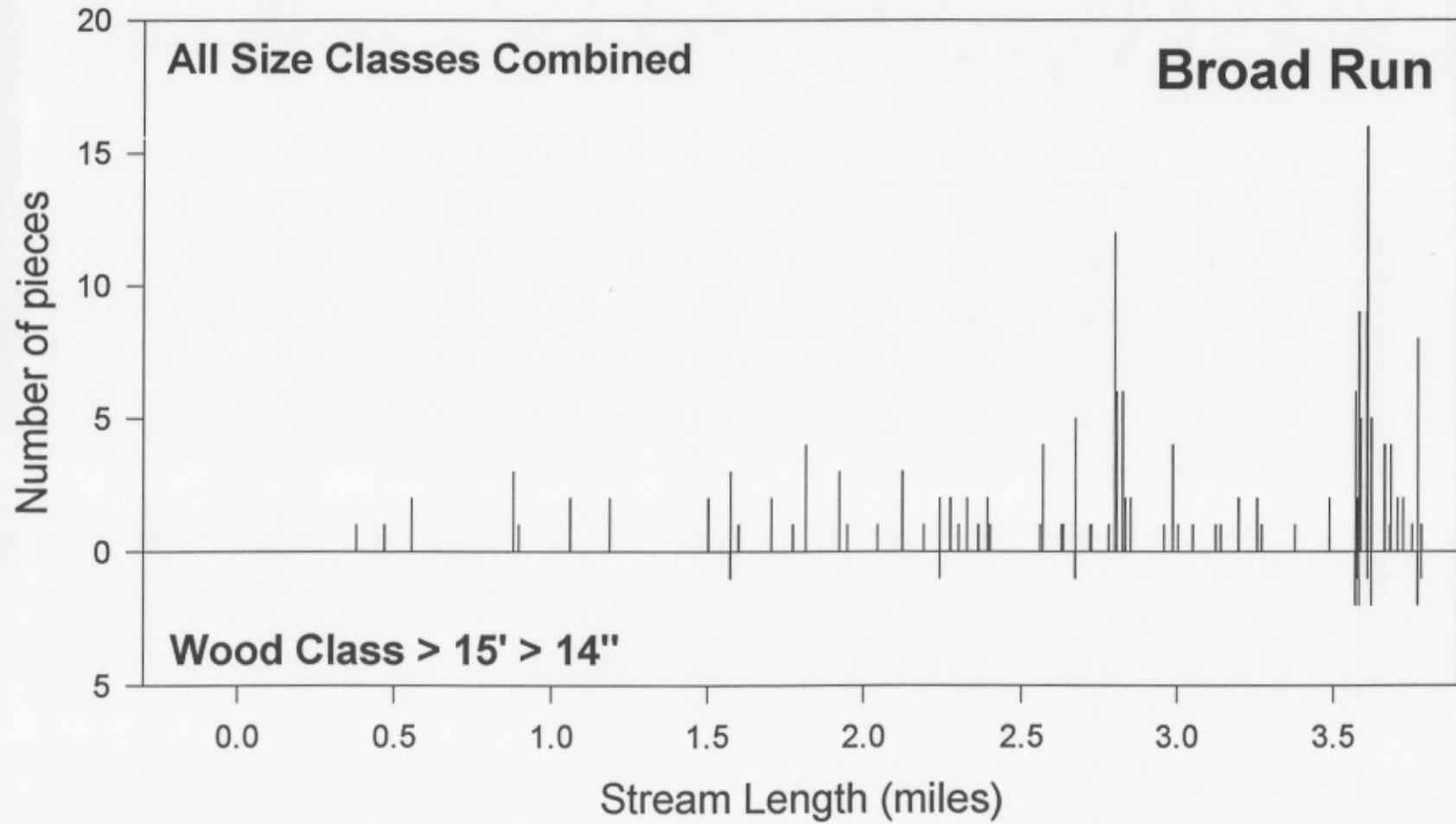
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Broad Run



# Large Woody Debris Distribution



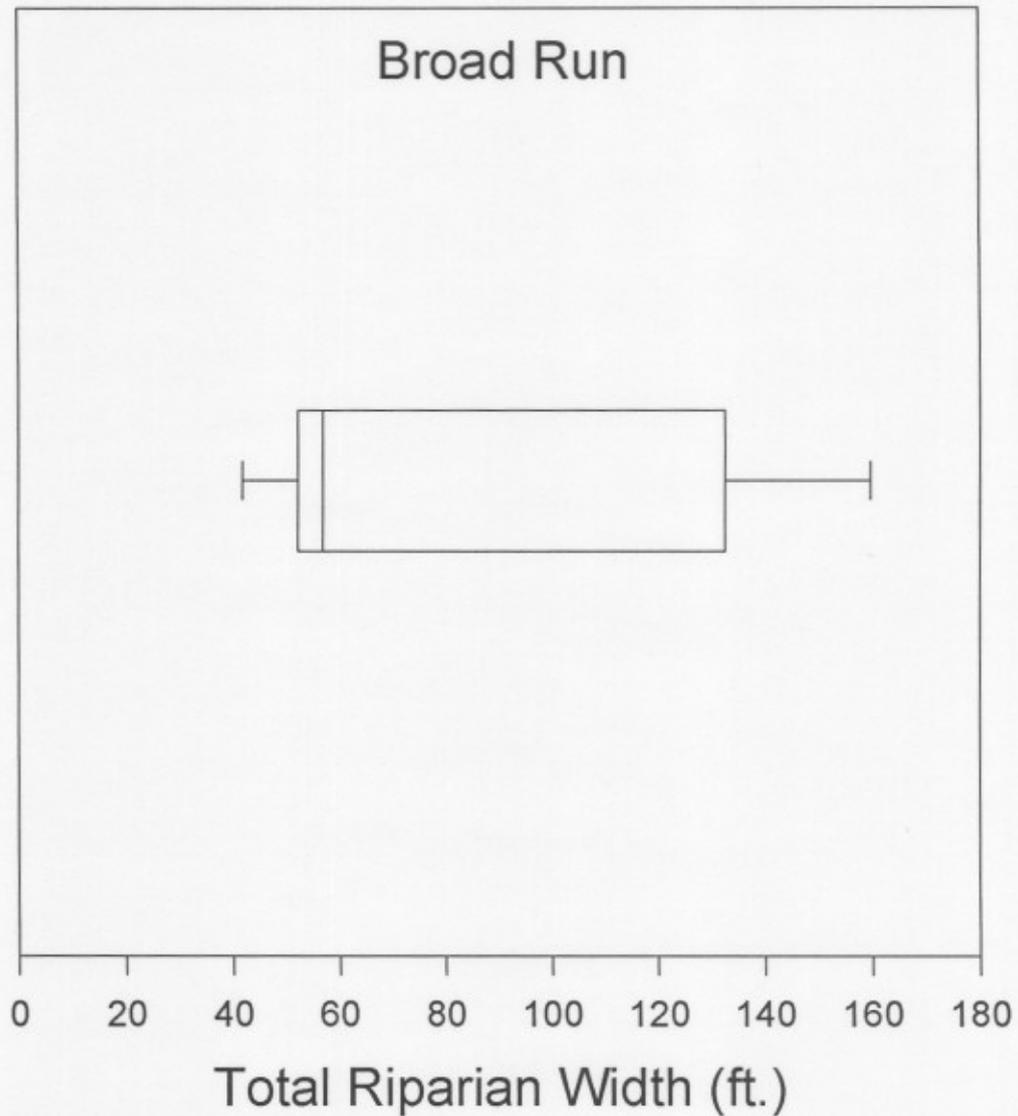
## Riparian Width

Stream: Broad Run

Number of measurements: 7

Mean width: 86.6    Std Dev: 49.5

Max: 163.4            Min: 39.5



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 above and below the box represent the 90% and 10% quantiles.

Stream: Lick Branch

District: New Castle

Quadrangle: Catawba

Sample Date: 06/20/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 2.5 miles**

**Percent of Total Area - Pools: 54.2%**

Number of Pools: 154

Number of Pools per mile: 61.6

Total Pool Area: 68,276.4 sq. ft.  $\pm$  9,920.9

Mean Pool Area: 443.4 sq. ft.

Correction Factor: 0.86

Mean Maximum Depth: 1.4'

Mean Average Depth: 0.7'

**Percent of Total Area - Riffles: 45.8%**

Number of Riffles: 98

Number of Riffles per mile: 39.2

Total Riffle Area: 57,692.7 sq. ft.  $\pm$  11,966.8

Mean Riffle Area: 588.7 sq. ft.

Correction Factor: 0.92

Mean Maximum Depth: 0.5'

Mean Average Depth: 0.2'

**Number of Large Woody Debris Pieces per Mile: 80.0**

Wood < 15' and < 14": 26.8

Wood < 15' and > 14": 2.8

Wood > 15' and < 14": 42.0

Wood > 15' and > 14": 8.4

**Mean Channel Width: 18.9'**

**Mean Riparian Width: 45.8'**

Mean Maximum Riparian Distance (either side): 9.7'

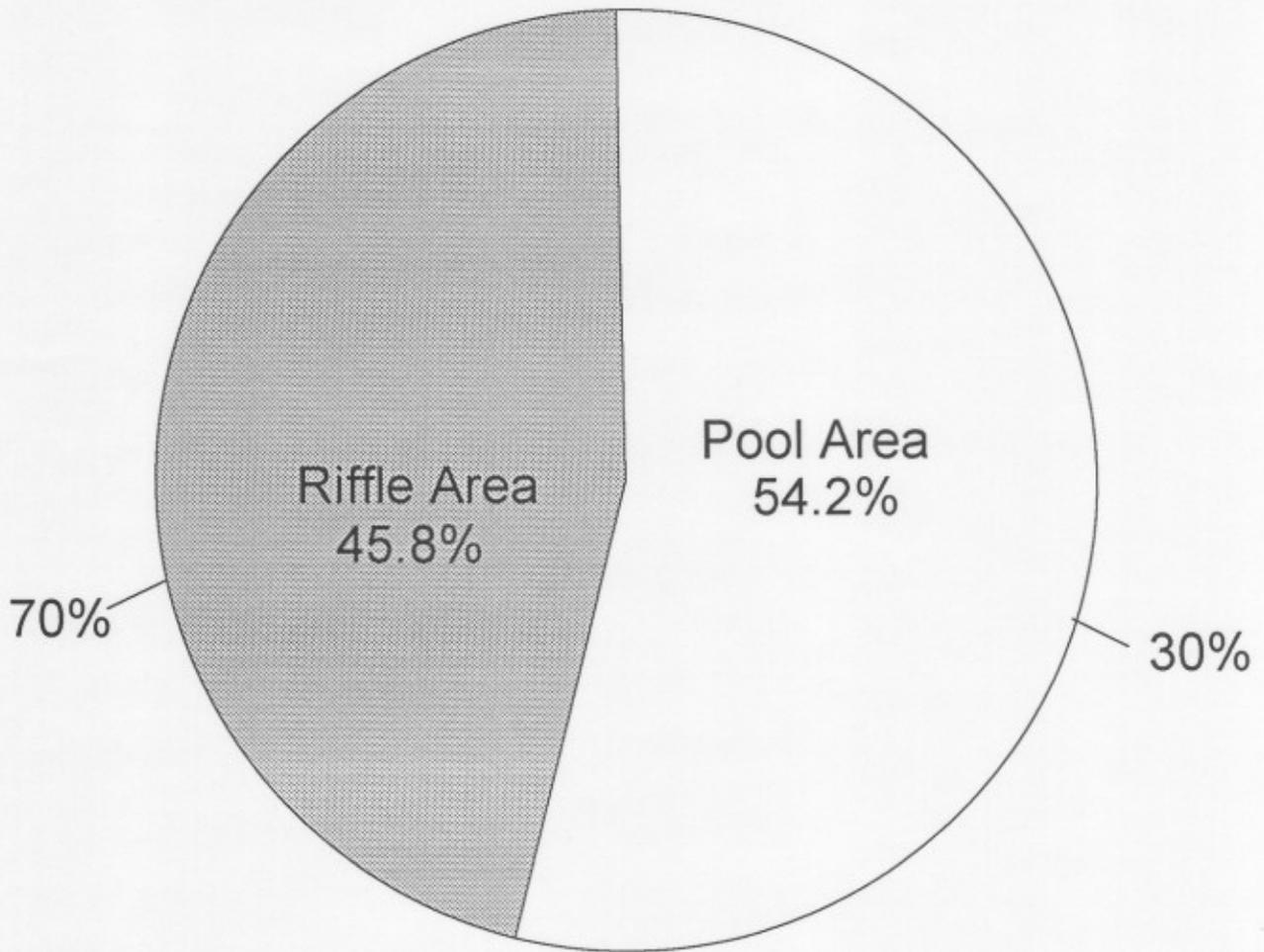
Mean Minimum Riparian Distance (either side): 17.3'

Maximum Riparian Width (Total): 54.5'

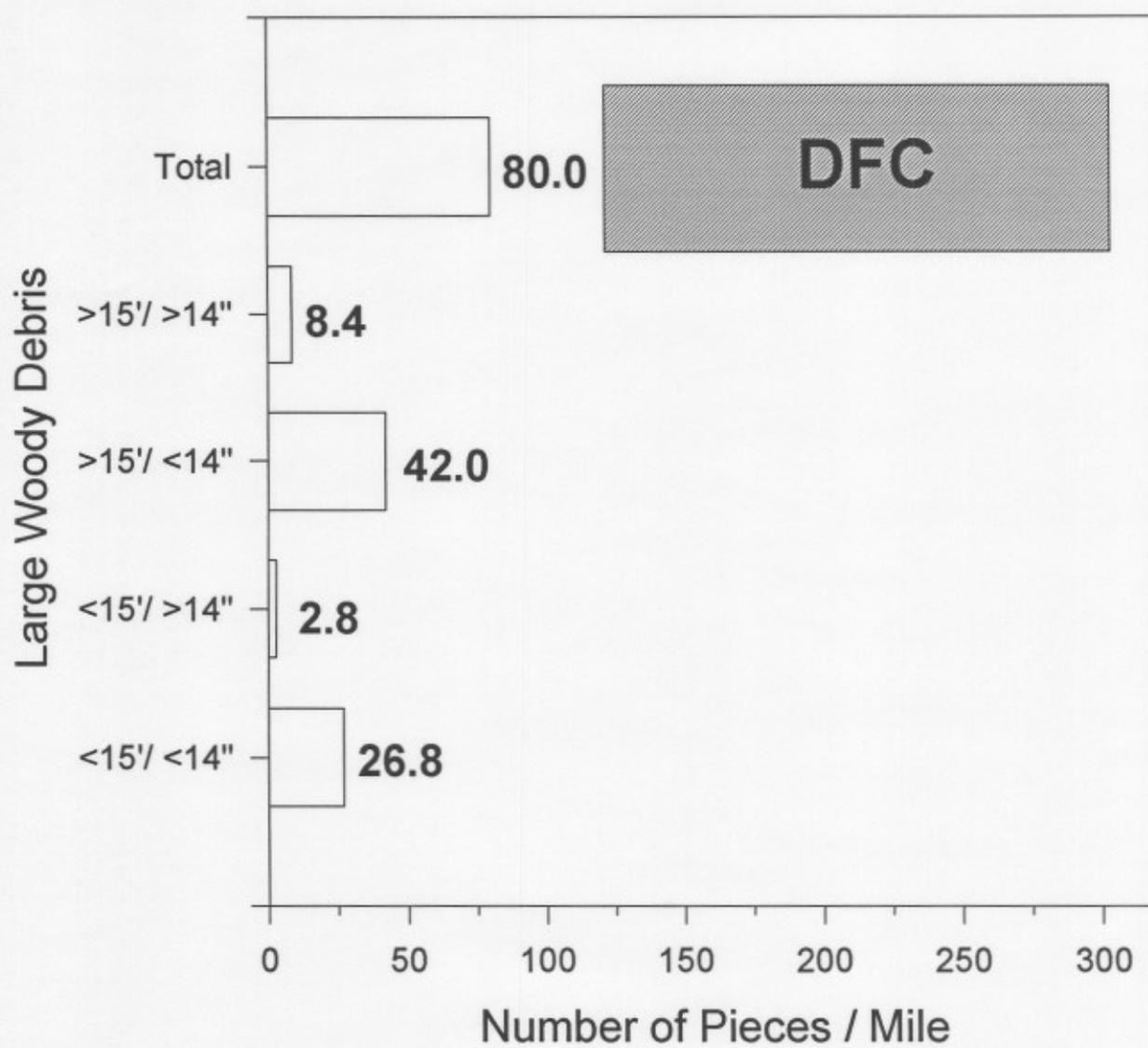
Minimum Riparian Width (Total): 35.8'

### Lick Branch

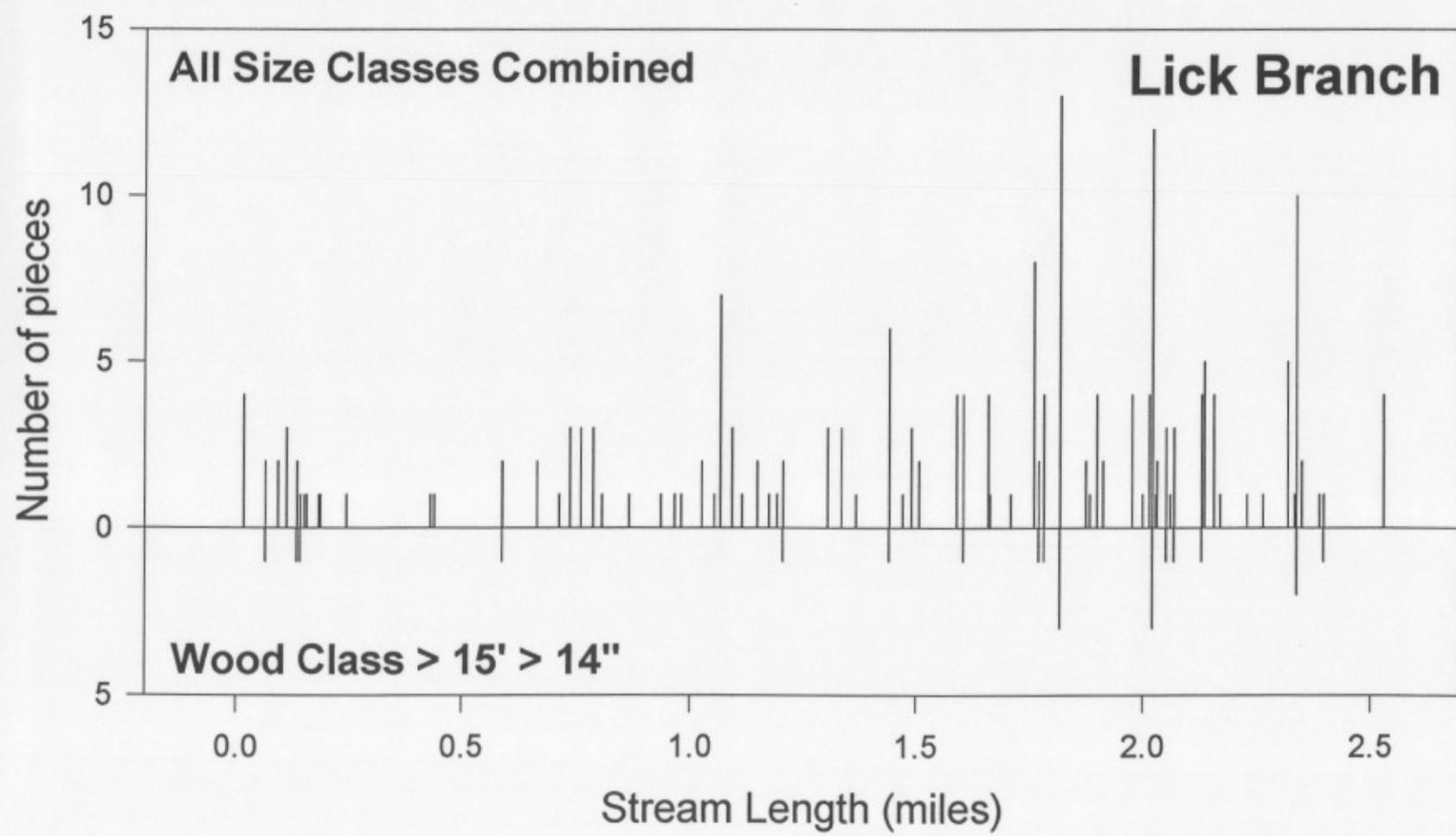
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



## Lick Branch



# Large Woody Debris Distribution



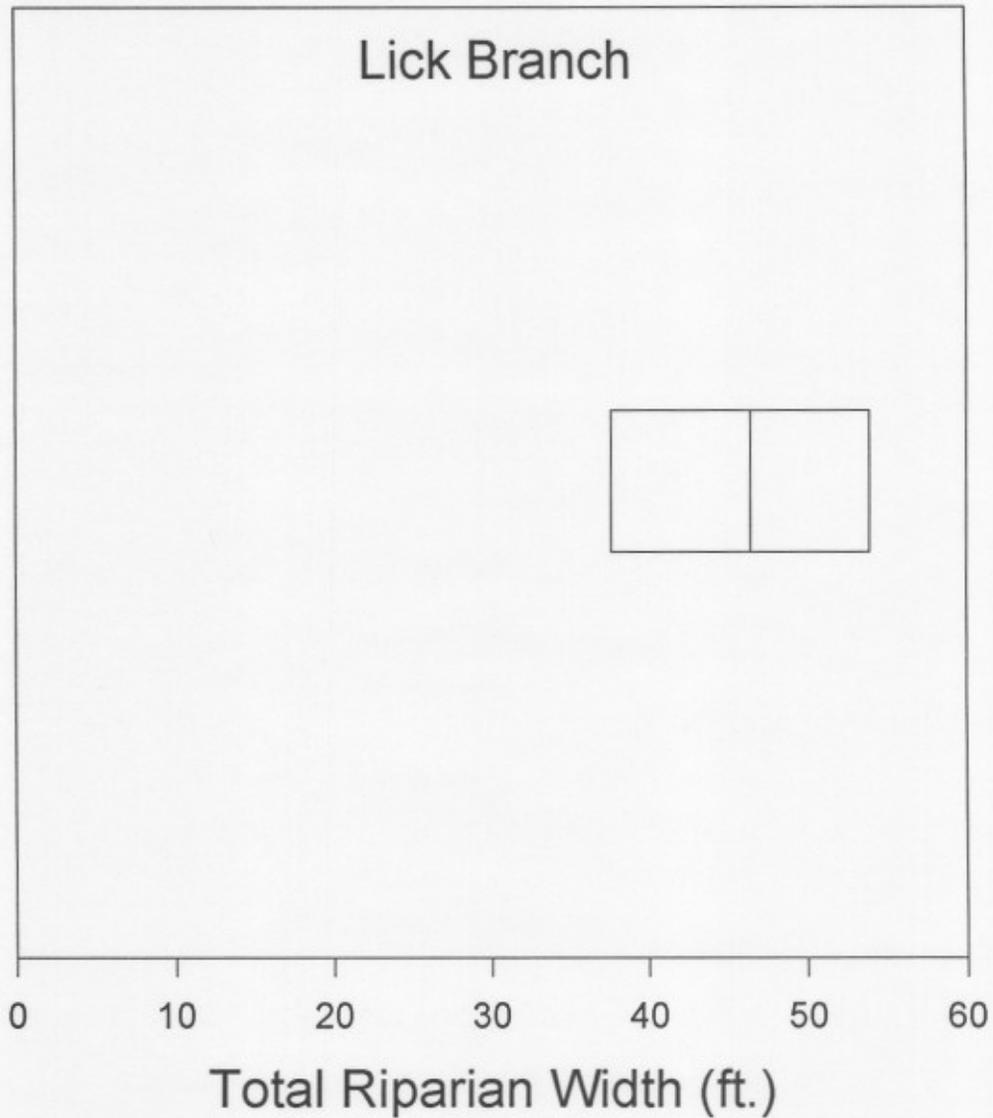
## Riparian Width

Stream: Lick Branch

Number of measurements: 4

Mean width: 45.8      Std Dev: 9.5

Max: 54.5              Min: 35.8



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 above and below the box represent the 90% and 10% quantiles.

## Craig Springs Quadrangle

Stream: Big Double Branch

District: New Castle

Quadrangle: Craig Springs

Sample Date: 06/25/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 0.5 miles**

**Percent of Total Area - Pools: 29.2%**

Number of Pools: 87

Number of Pools per mile: 174.0

Total Pool Area: 5,806.3 sq. ft.  $\pm$  760.5

Mean Pool Area: 66.7 sq. ft.

Correction Factor: 0.93

Mean Maximum Depth: 0.9'

Mean Average Depth: 0.6'

**Percent of Total Area - Riffles: 70.8%**

Number of Riffles: 66

Number of Riffles per mile: 132

Total Riffle Area: 14,049.2 sq. ft.  $\pm$  1,317.0

Mean Riffle Area: 212.9 sq. ft.

Correction Factor: 0.88

Mean Maximum Depth: 0.6'

Mean Average Depth: 0.3'

**Number of Large Woody Debris Pieces per Mile: 498**

Wood < 15' and < 14": 394.0

Wood < 15' and > 14": 10.0

Wood > 15' and < 14": 80.0

Wood > 15' and > 14": 14.0

**Mean Channel Width: 16.0'**

**Mean Riparian Width: 44.9'**

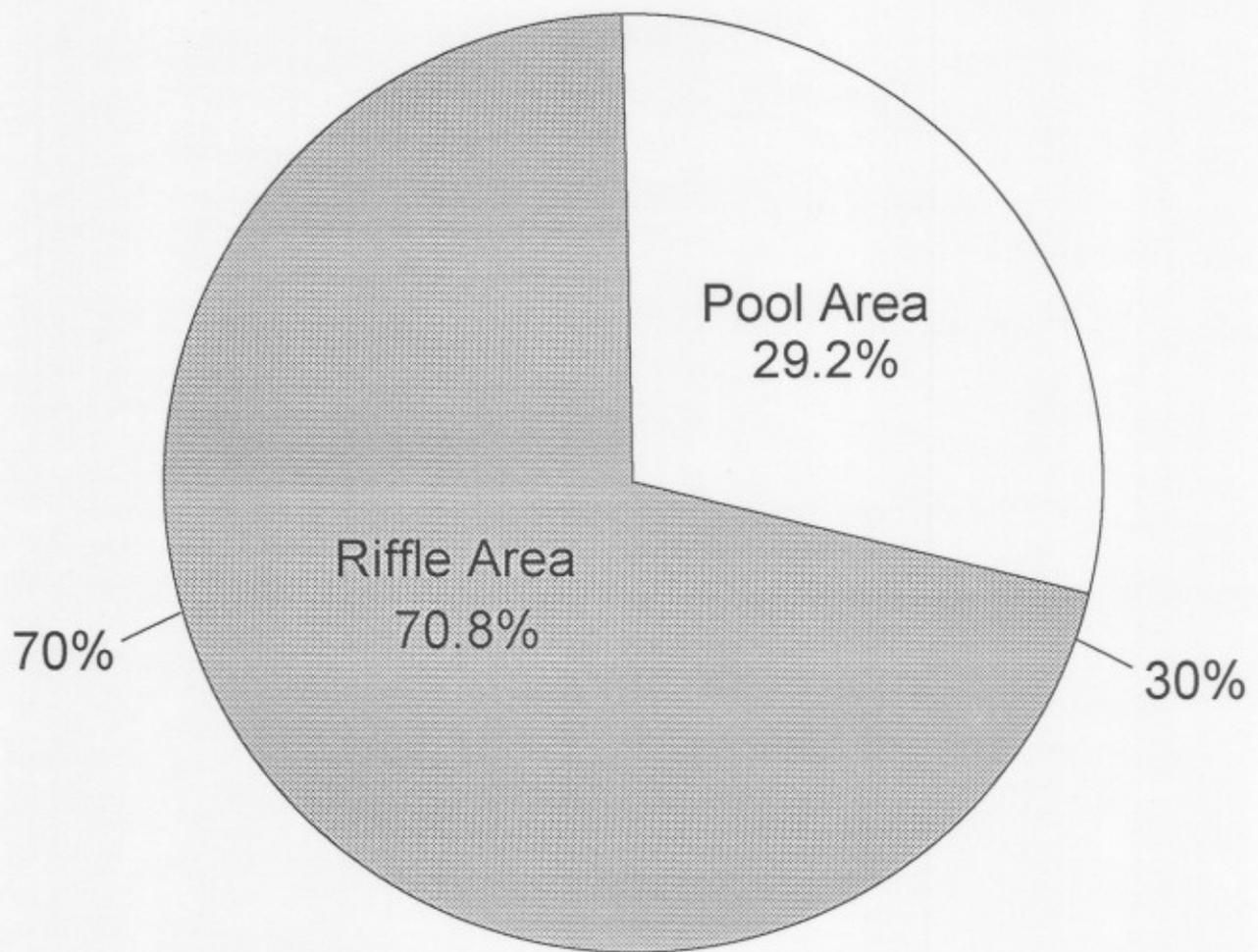
Mean Maximum Riparian Distance (either side): 20.8'

Mean Minimum Riparian Distance (either side): 8.2'

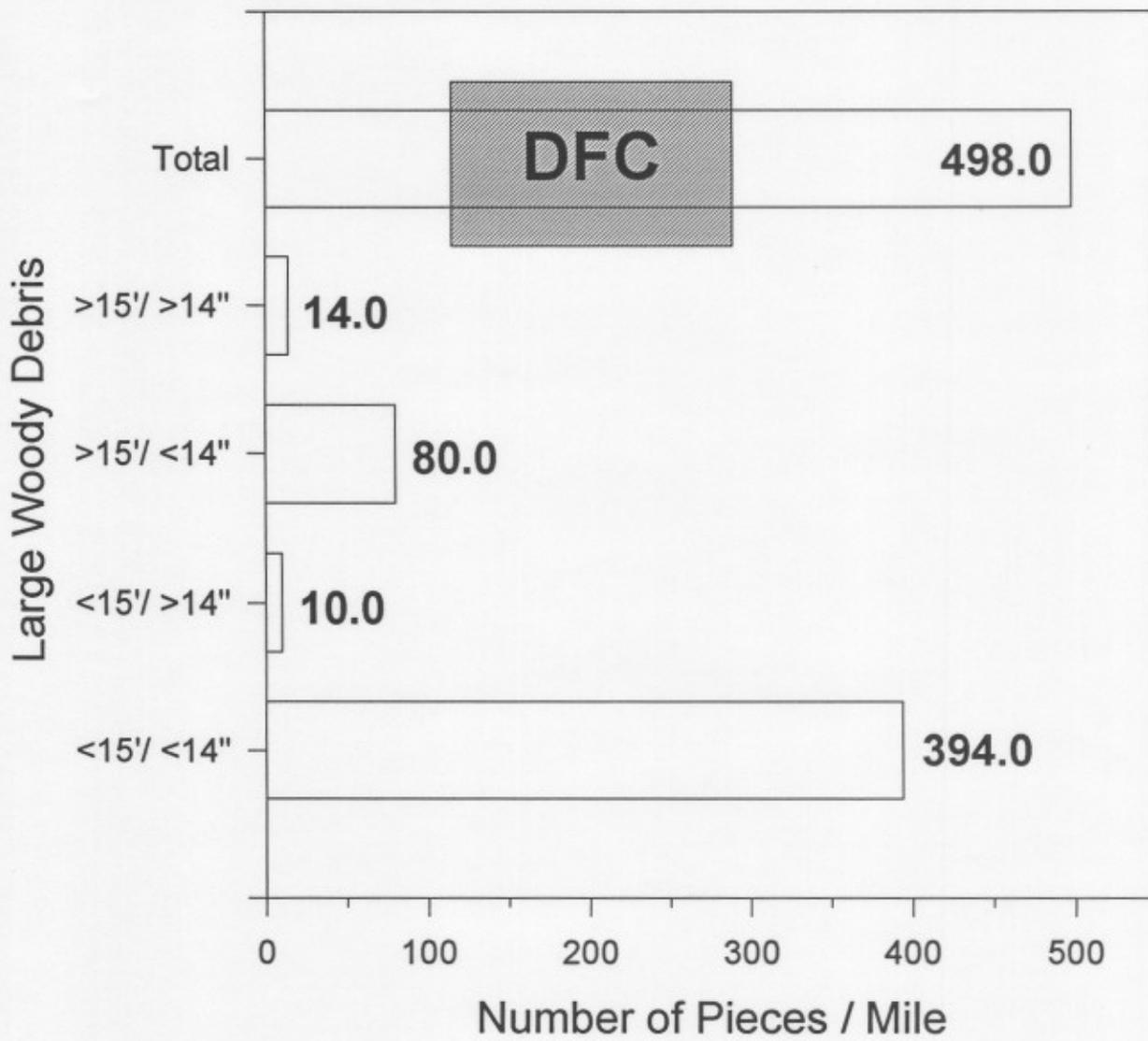
Maximum Riparian Width (Total): 53.9'

Minimum Riparian Width (Total): 34.6'

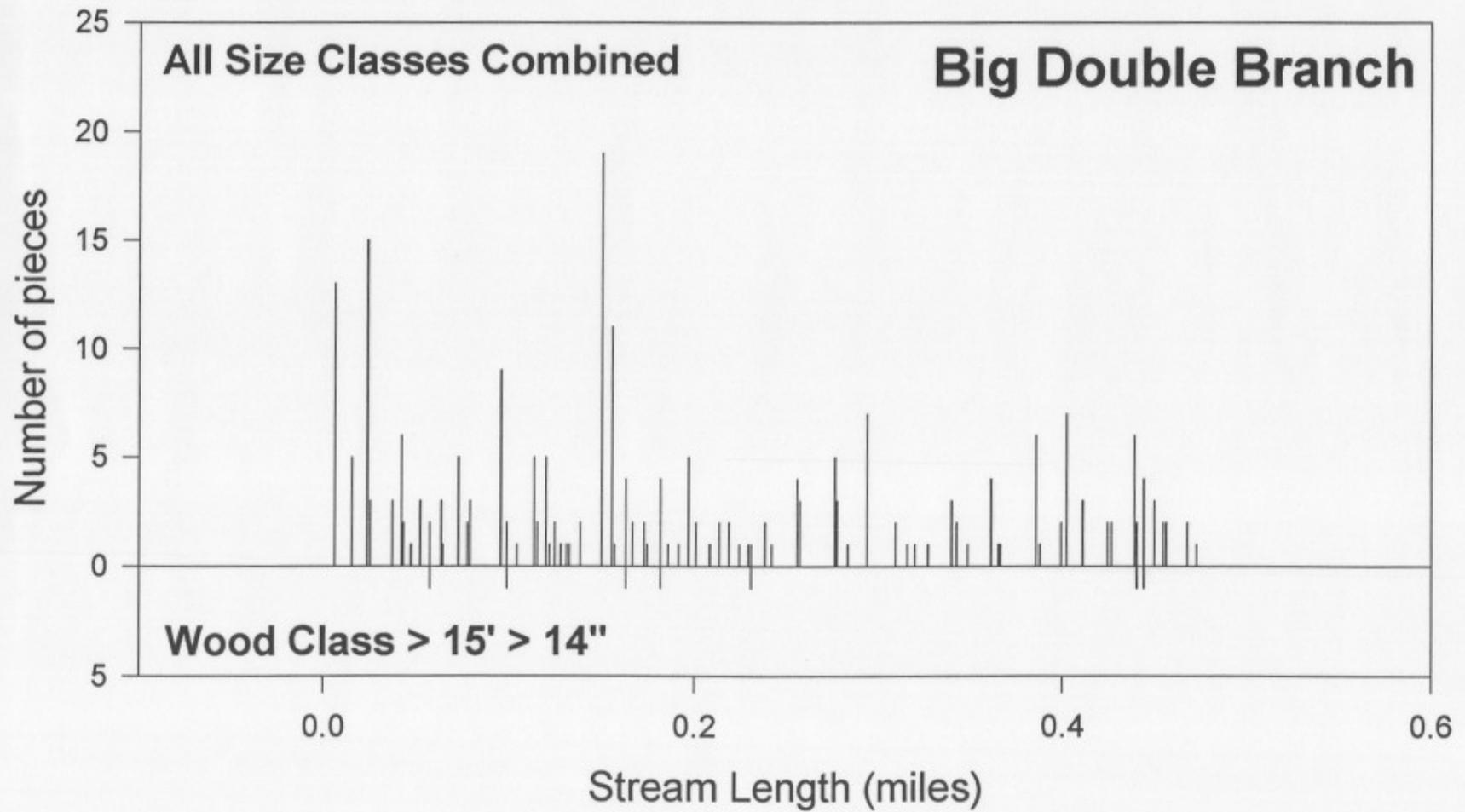
**Big Double Branch**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



## Big Double Branch



# Large Woody Debris Distribution



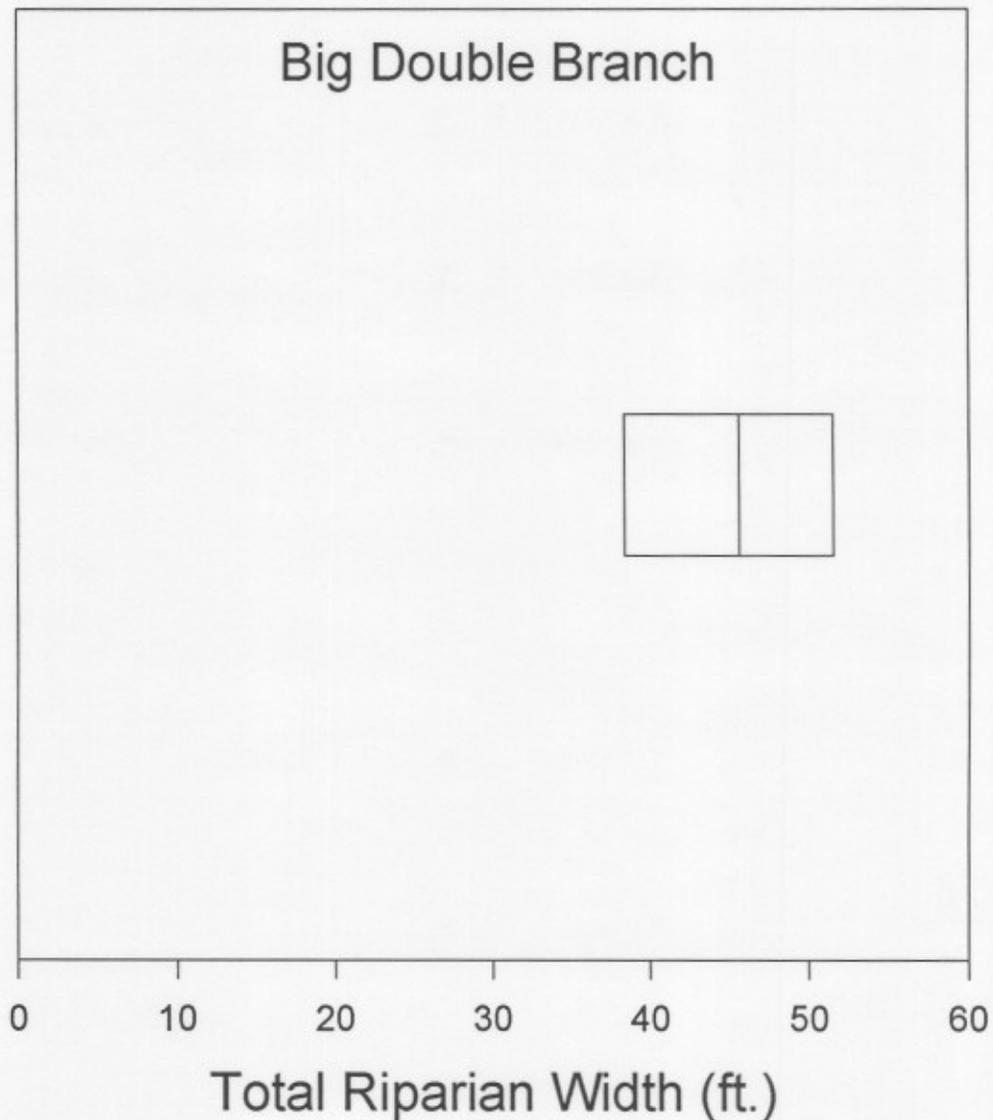
## Riparian Width

Stream: Big Double Branch

Number of measurements: 4

Mean width: 44.9      Std Dev: 8.4

Max: 53.9              Min: 34.6



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 above and below the box represent the 90% and 10% quantiles.

Stream: Hannah Branch

District: New Castle

Quadrangle: Craig Springs

Sample Date: 06/25/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 0.4 miles**

**Percent of Total Area - Pools: 30.3%**

Number of Pools: 72

Number of Pools per mile: 180.0

Total Pool Area: 4,130.2 sq. ft.  $\pm$  309.2

Mean Pool Area: 57.4 sq. ft.

Correction Factor: 1.07

Mean Maximum Depth: 0.8'

Mean Average Depth: 0.5'

**Percent of Total Area - Riffles: 69.7%**

Number of Riffles: 58

Number of Riffles per mile: 145.0

Total Riffle Area: 9,475.9 sq. ft.  $\pm$  3,609.9

Mean Riffle Area: 163.4 sq. ft.

Correction Factor: 1.08

Mean Maximum Depth: 0.4'

Mean Average Depth: 0.2'

**Number of Large Woody Debris Pieces per Mile: 362.5**

Wood < 15' and < 14": 310.0

Wood < 15' and > 14": 2.5

Wood > 15' and < 14": 50.0

Wood > 15' and > 14": 0.0

**Mean Channel Width: 12.4'**

**Mean Riparian Width: 51.0'**

Mean Maximum Riparian Distance (either side): 33.2'

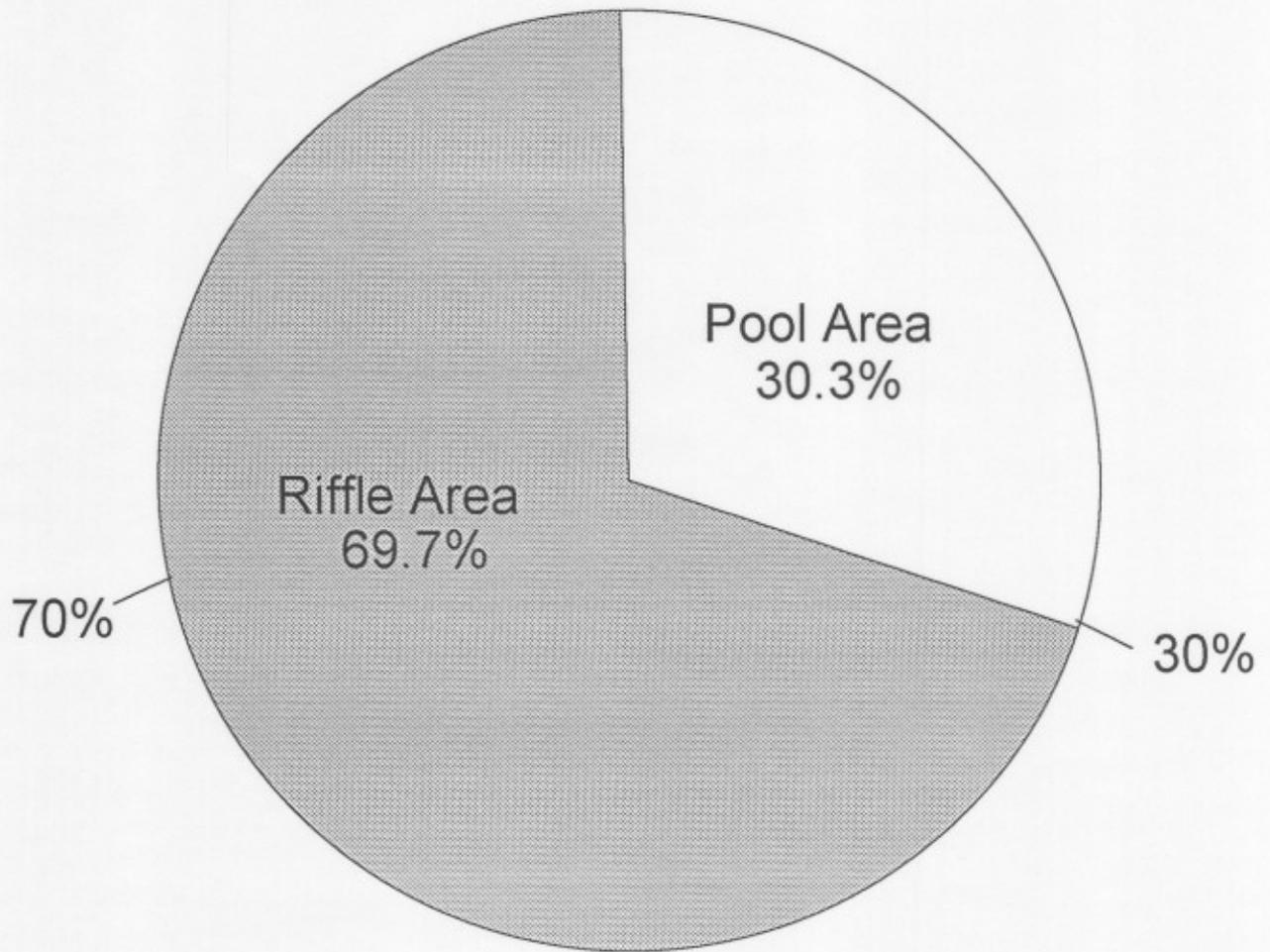
Mean Minimum Riparian Distance (either side): 5.4'

Maximum Riparian Width (Total): 81.5'

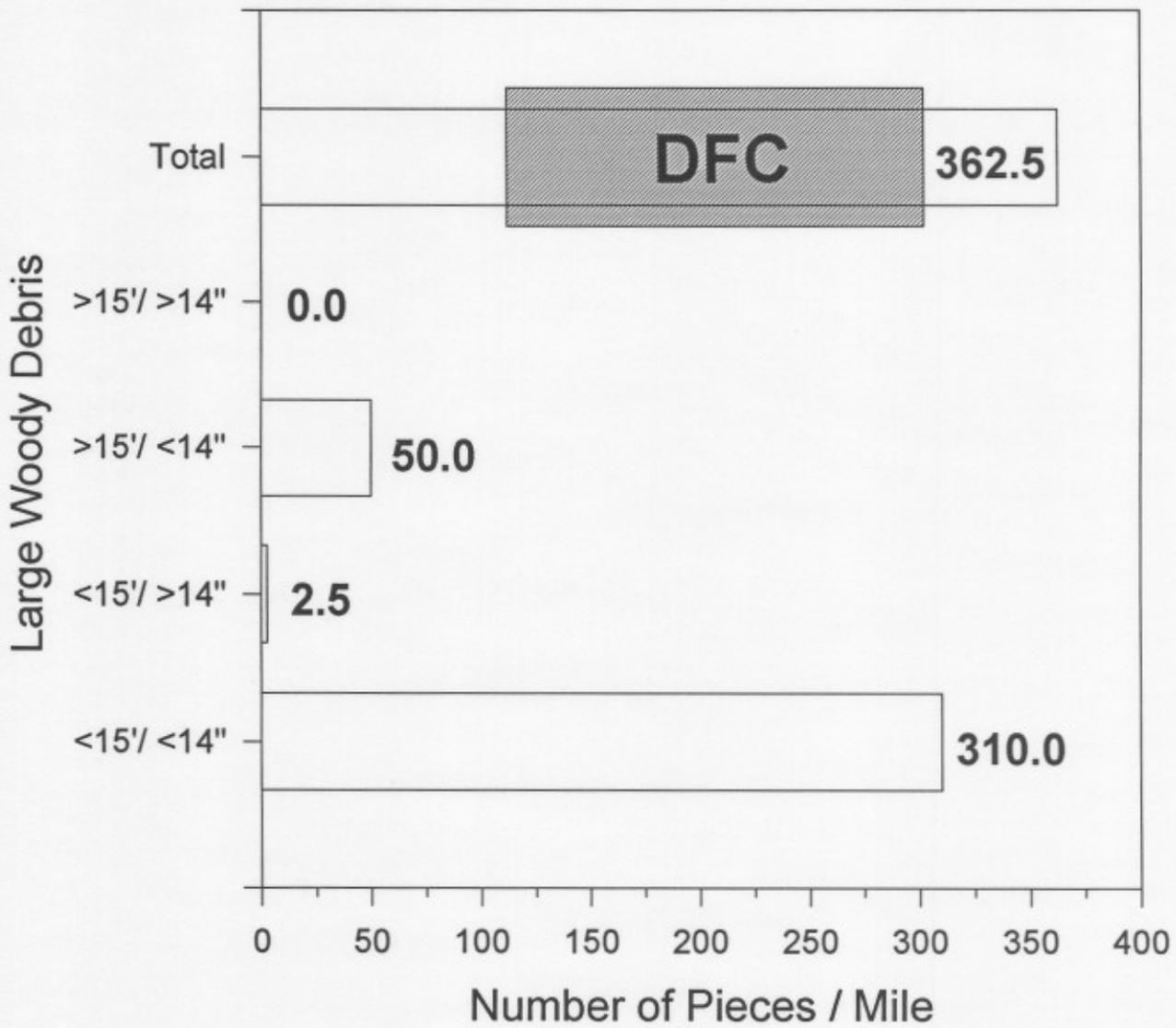
Minimum Riparian Width (Total): 21.8'

### Hannah Branch

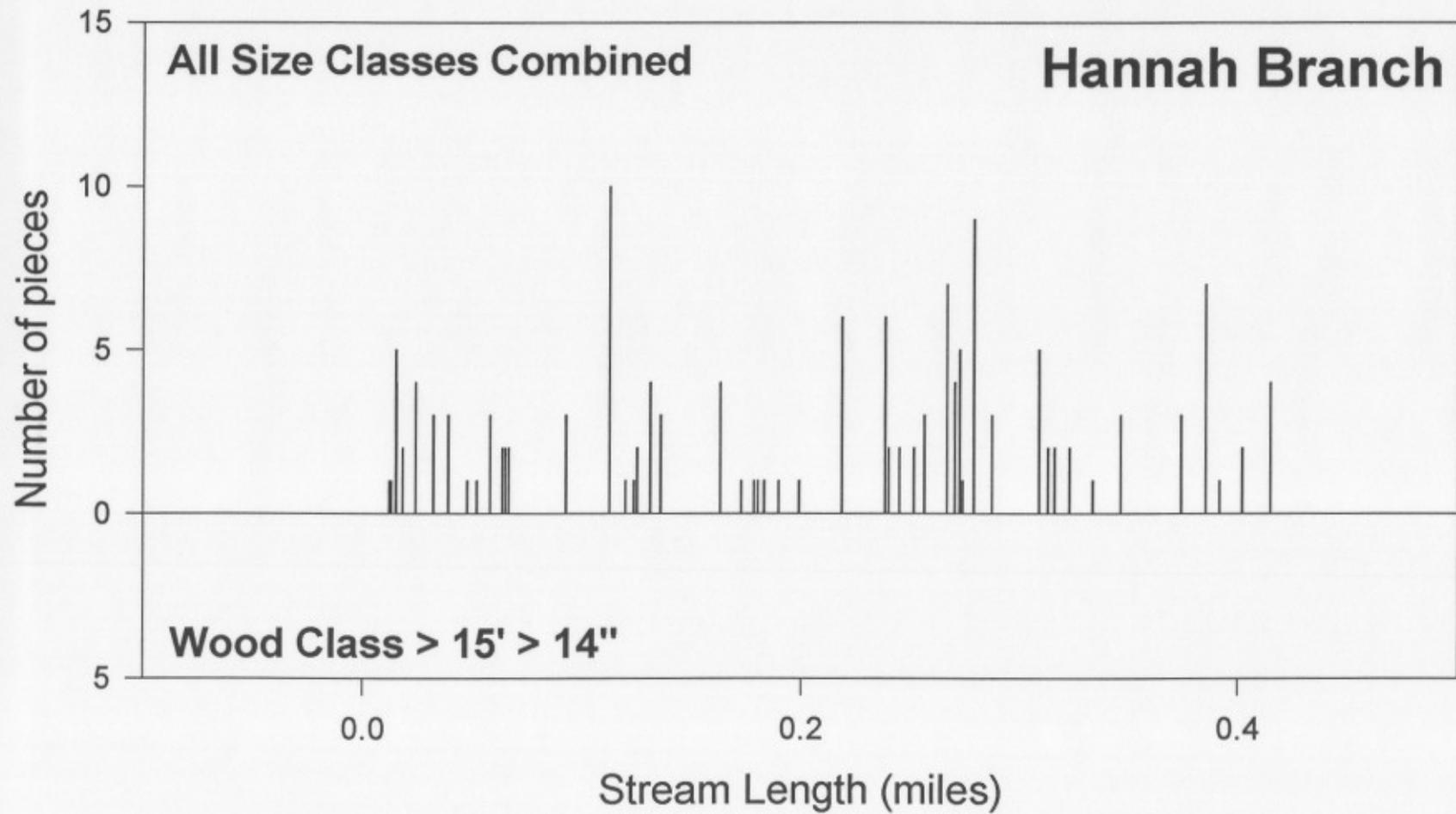
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Hannah Branch



# Large Woody Debris Distribution



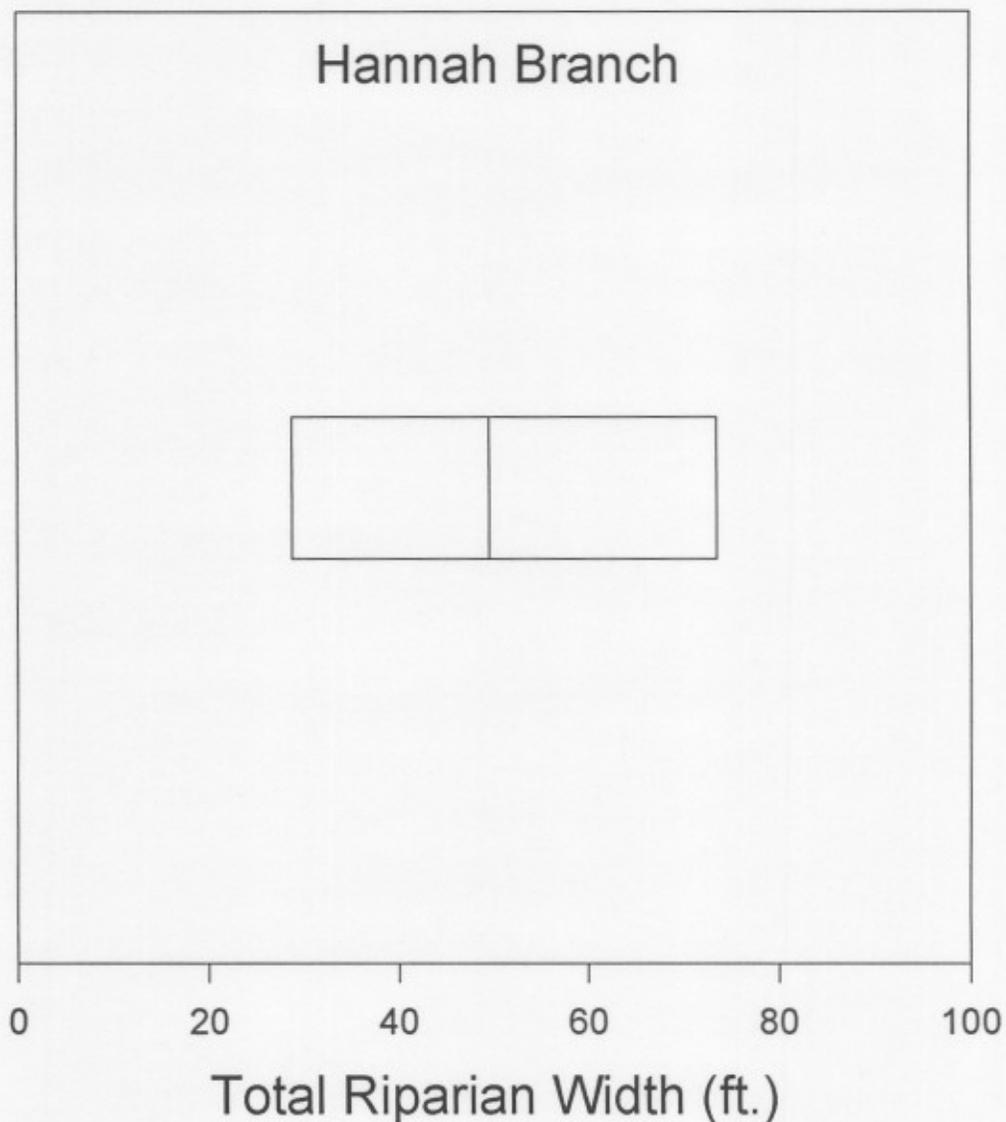
## Riparian Width

Stream: Hannah Branch

Number of measurements: 3

Mean width: 51.0    Std Dev: 29.9

Max: 81.5                    Min: 21.8



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 above and below the box represent the 90% and 10% quantiles.

Stream: Kale Branch

District: New Castle

Quadrangle: Craig Springs

Sample Date: 06/27/96

Downstream Starting Point: USFS Bound. upstream from Rt. 658

**Total Distance Surveyed: 0.7 miles**

**Percent of Total Area - Pools: 24.0%**

Number of Pools: 112

Number of Pools per mile: 160

Total Pool Area: 9,026.3 sq. ft.  $\pm$  737.9

Mean Pool Area: 80.6 sq. ft.

Correction Factor: 0.98

Mean Maximum Depth: 0.8'

Mean Average Depth: 0.5'

**Percent of Total Area - Riffles: 76%**

Number of Riffles: 96

Number of Riffles per mile: 137.1

Total Riffle Area: 28,573.5 sq. ft.  $\pm$  9,250.5

Mean Riffle Area: 297.6 sq. ft.

Correction Factor: 1.02

Mean Maximum Depth: 0.4'

Mean Average Depth: 0.3'

**Number of Large Woody Debris Pieces per Mile: 672.9**

Wood < 15' and < 14": 515.8

Wood < 15' and > 14": 5.7

Wood > 15' and < 14": 140.0

Wood > 15' and > 14": 11.4

**Mean Channel Width: 13.7'**

**Mean Riparian Width: 69.7'**

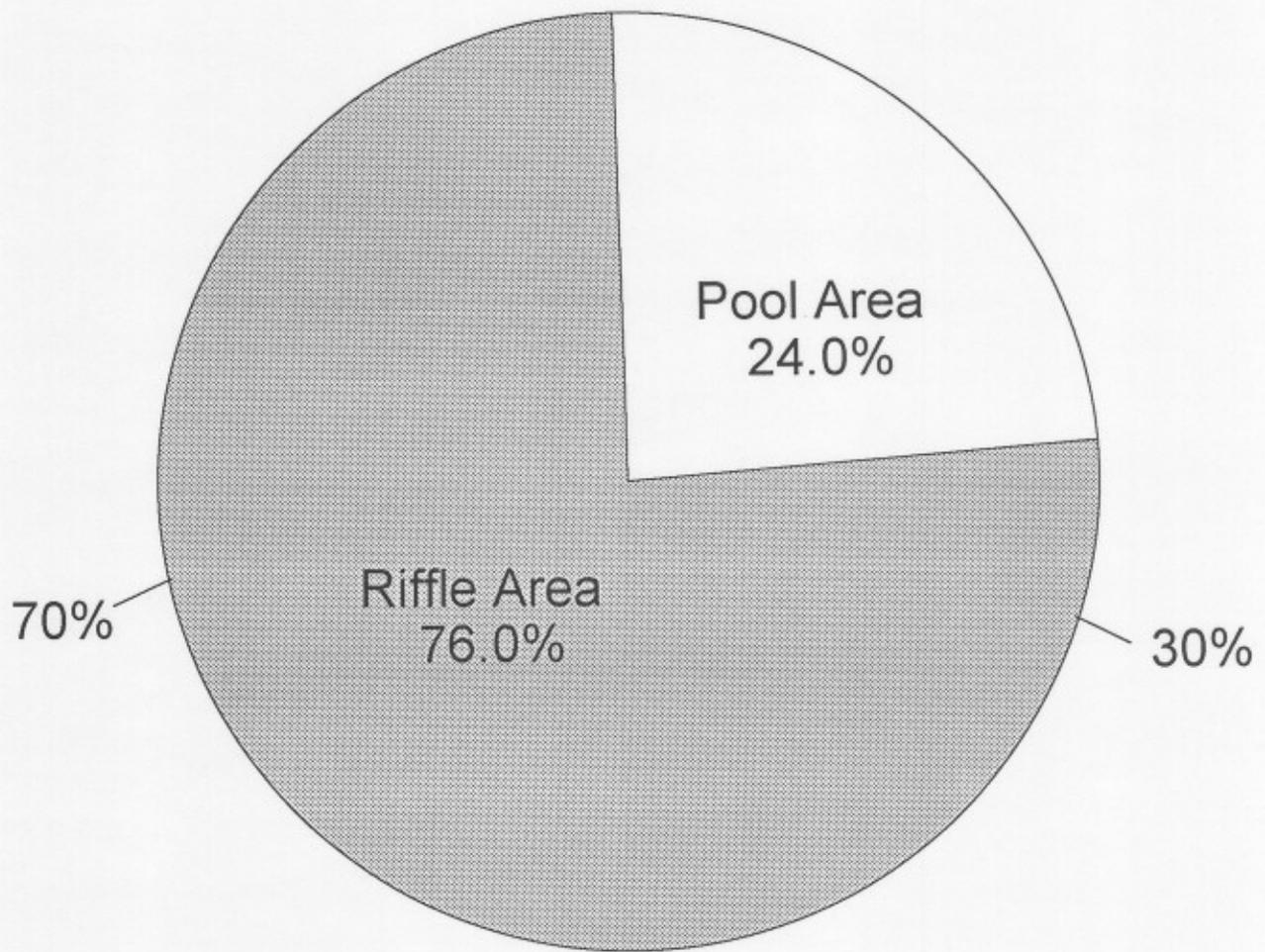
Mean Maximum Riparian Distance (either side): 40.4'

Mean Minimum Riparian Distance (either side): 15.6'

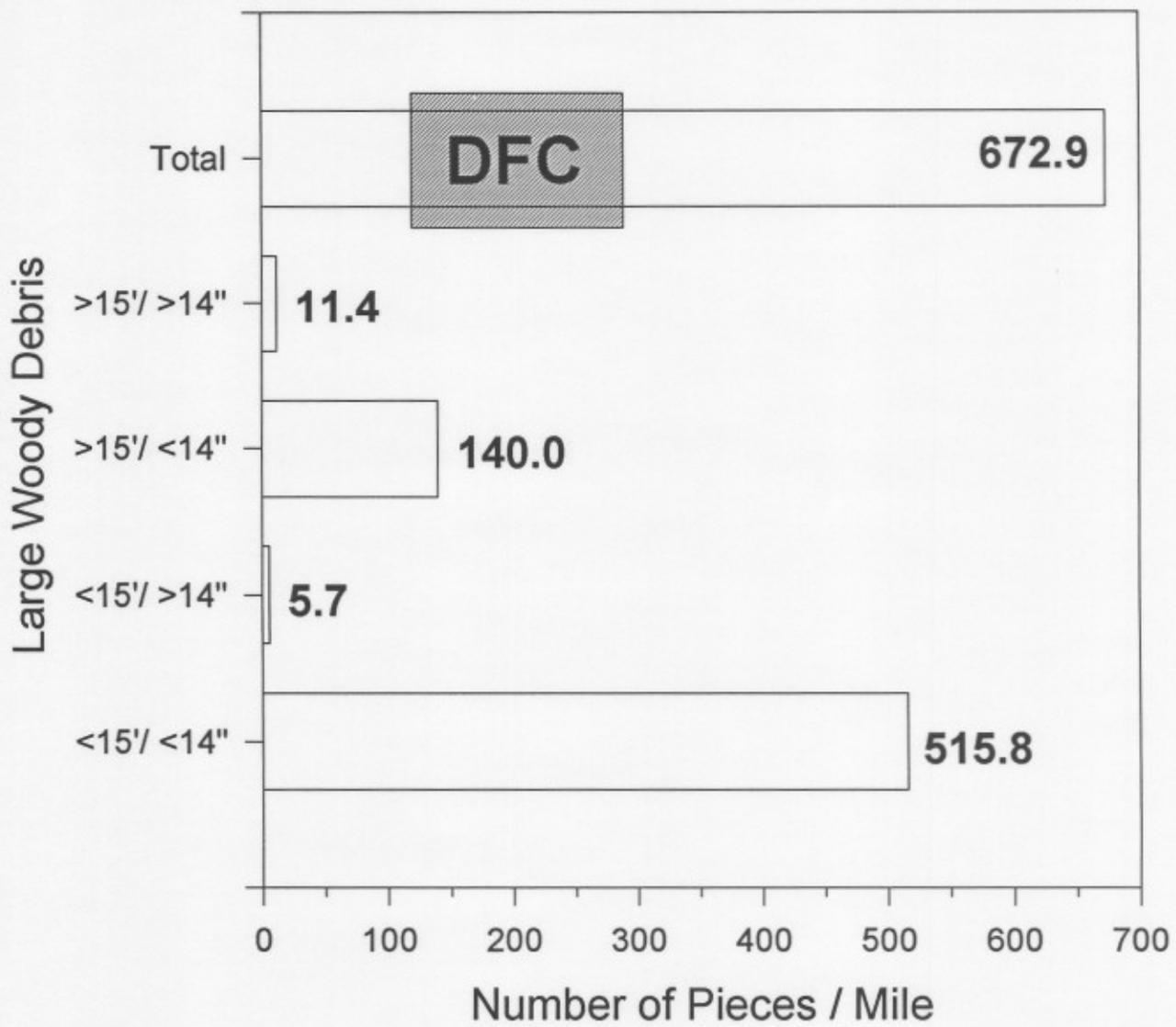
Maximum Riparian Width (Total): 89.0'

Minimum Riparian Width (Total): 60.5'

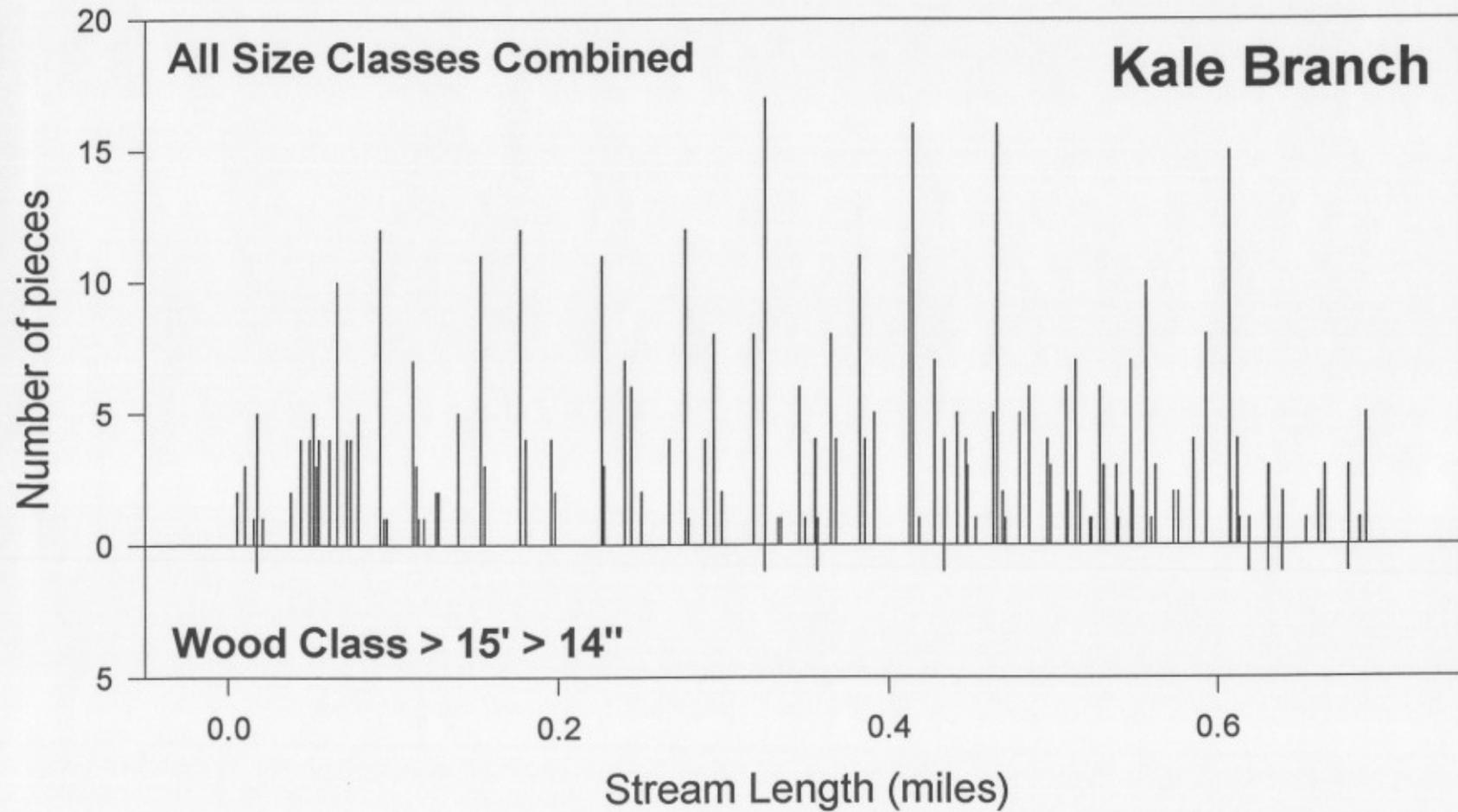
**Kale Branch**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Kale Branch



# Large Woody Debris Distribution



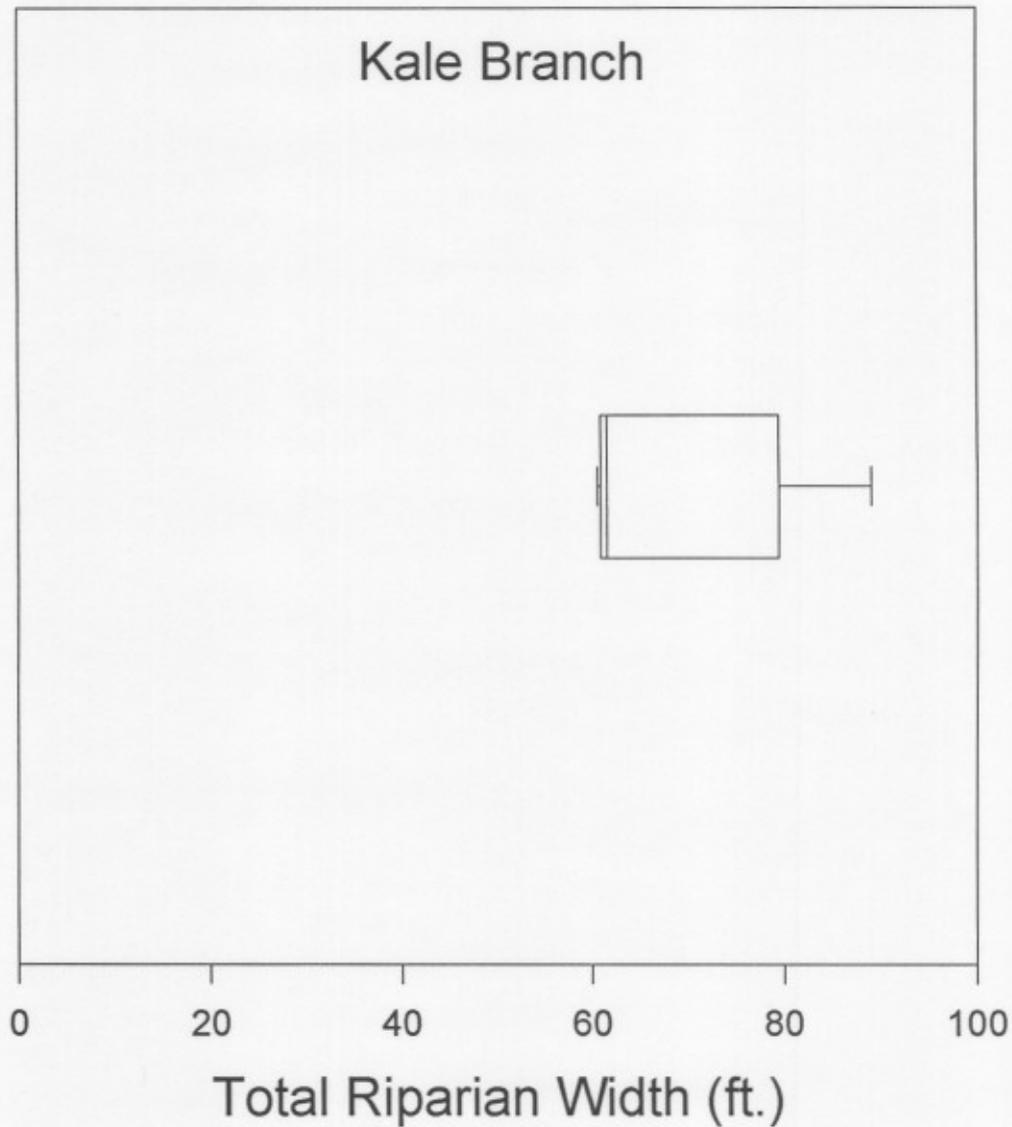
## Riparian Width

Stream: Kale Branch

Number of measurements: 5

Mean width: 69.7      Std Dev: 12.7

Max: 89.0              Min: 60.5



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 above and below the box represent the 90% and 10% quantiles.

Stream: Red Springs Branch

District: New Castle

Quadrangle: Craig Springs

Sample Date: 06/26/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 0.3 miles**

**Percent of Total Area - Pools: 45.4%**

Number of Pools: 51

Number of Pools per mile: 170

Total Pool Area: 4,939.8 sq. ft.  $\pm$  260.2

Mean Pool Area: 96.9 sq. ft.

Correction Factor: 1.06

Mean Maximum Depth: 0.8'

Mean Average Depth: 0.6'

**Percent of Total Area - Riffles: 54.6%**

Number of Riffles: 36

Number of Riffles per mile: 120

Total Riffle Area: 5,946.3 sq. ft.  $\pm$  1,058.7

Mean Riffle Area: 165.2 sq. ft.

Correction Factor: 1.30

Mean Maximum Depth: 0.4'

Mean Average Depth: 0.3'

**Number of Large Woody Debris Pieces per Mile: 350.0**

Wood < 15' and < 14": 196.7

Wood < 15' and > 14": 6.7

Wood > 15' and < 14": 113.3

Wood > 15' and > 14": 33.3

**Mean Channel Width: 10.8'**

**Mean Riparian Width: 38.9'**

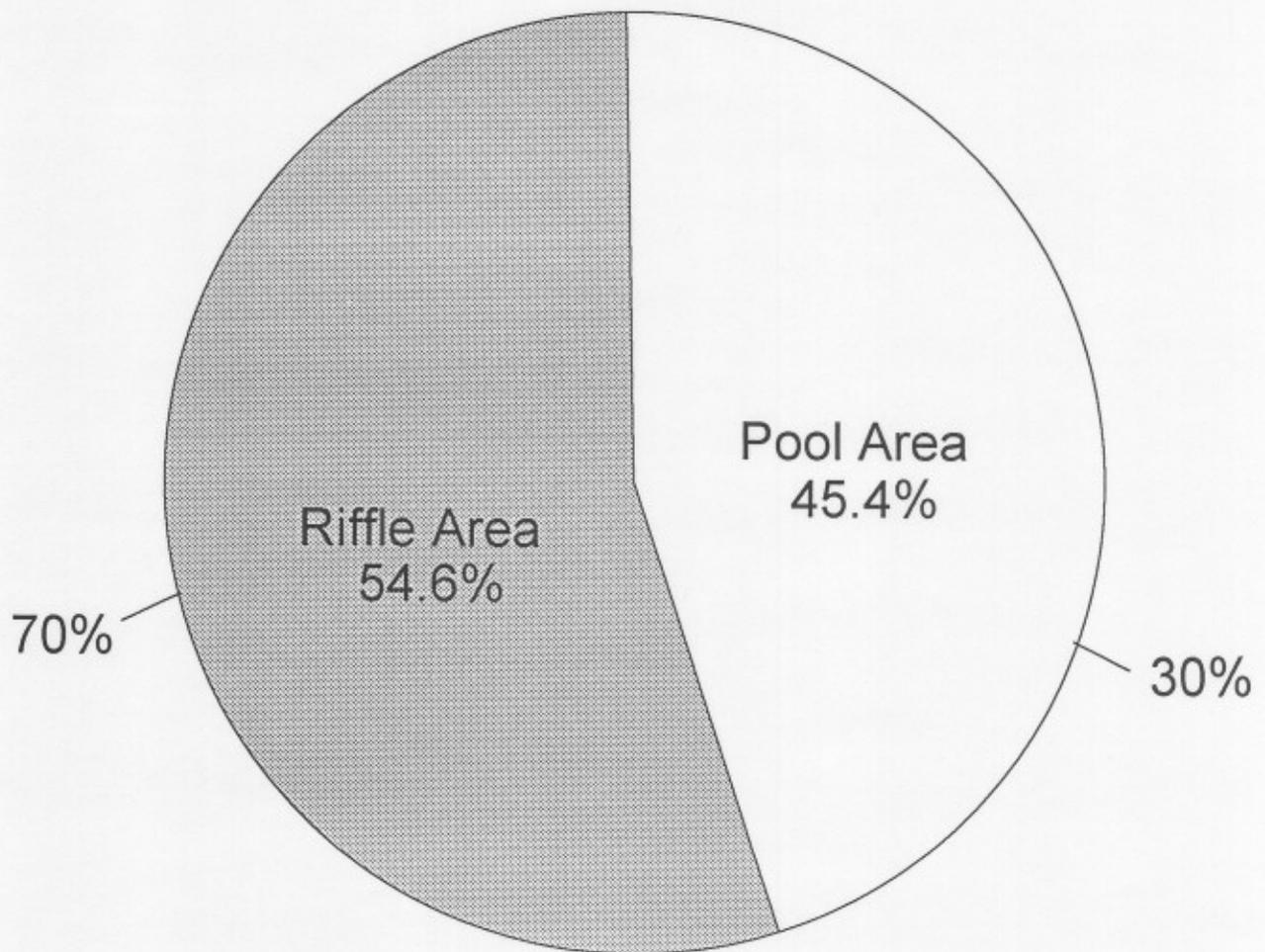
Mean Maximum Riparian Distance (either side): 24.5'

Mean Minimum Riparian Distance (either side): 3.9'

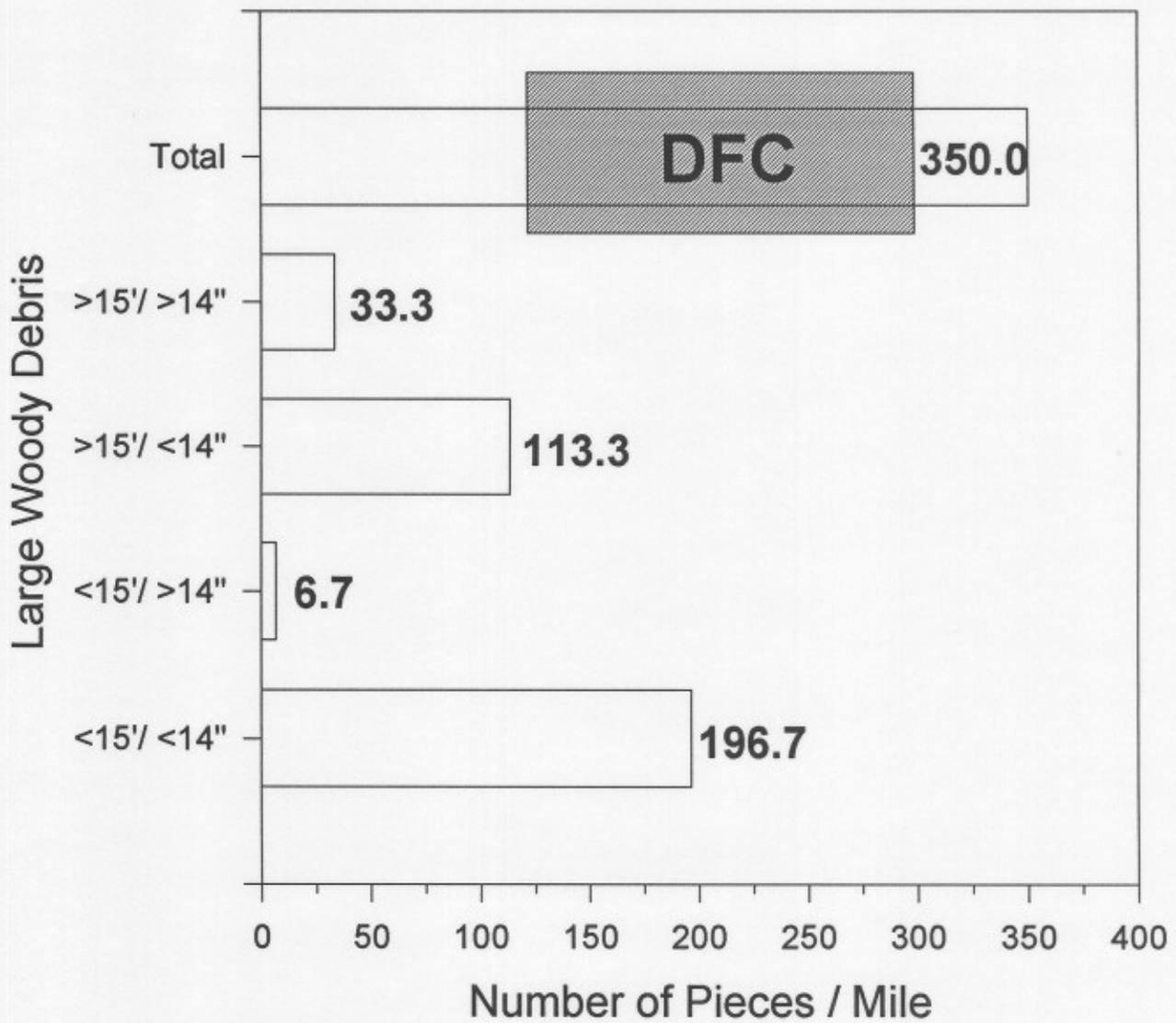
Maximum Riparian Width (Total): 62.4'

Minimum Riparian Width (Total): 15.4'

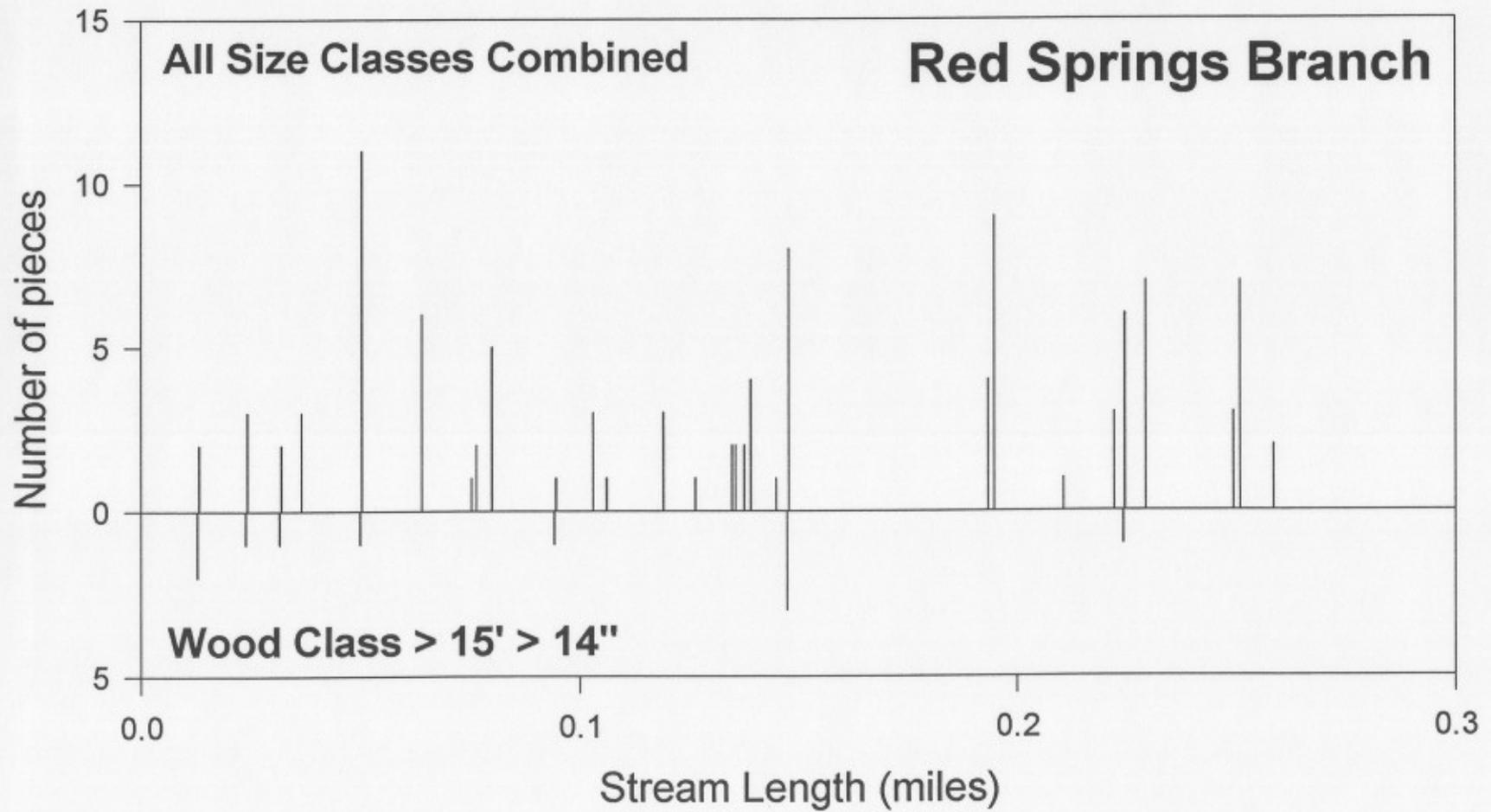
**Red Springs Branch**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Red Springs Branch



# Large Woody Debris Distribution



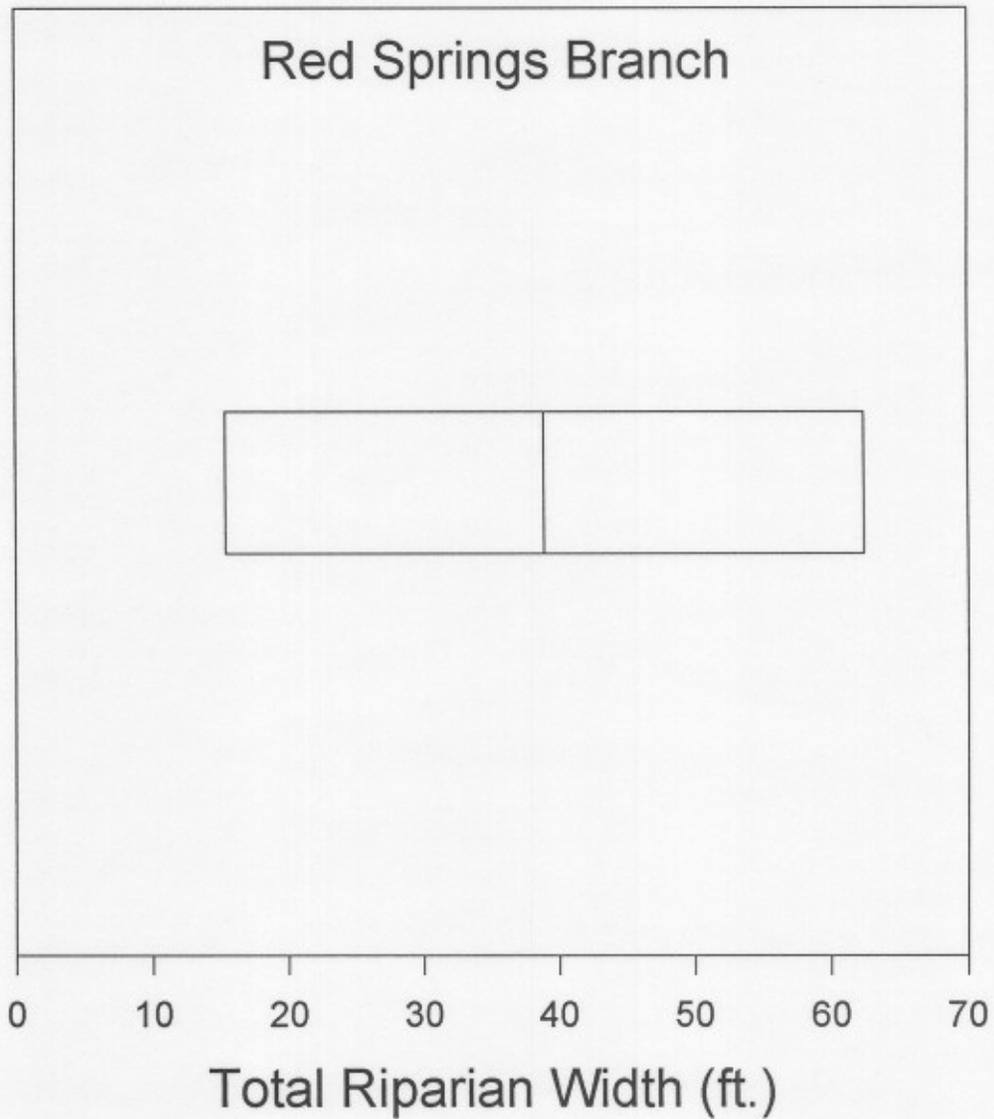
## Riparian Width

Stream: Red Springs Branch

Number of measurements: 2

Mean width: 38.9 Std Dev: 33.2

Max: 62.4 Min: 15.4



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 above and below the box represent the 90% and 10% quantiles.

Stream: West Branch

District: New Castle

Quadrangle: Craig Springs

Sample Date: 6/26/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 1.4 miles**

**Percent of Total Area - Pools: 35.1%**

Number of Pools: 118

Number of Pools per mile: 84.3

Total Pool Area: 18,448.8 sq. ft.  $\pm$  3,093.9

Mean Pool Area: 156.3 sq. ft.

Correction Factor: 0.97

Mean Maximum Depth: 1.0'

Mean Average Depth: 0.8'

**Percent of Total Area - Riffles: 64.9%**

Number of Riffles: 94

Number of Riffles per mile: 67.1

Total Riffle Area: 34,134.1 sq. ft.  $\pm$  13,430.3

Mean Riffle Area: 363.1 sq. ft.

Correction Factor: 1.13

Mean Maximum Depth: 0.6'

Mean Average Depth: 0.4'

**Number of Large Woody Debris Pieces per Mile: 145.7**

Wood < 15' and < 14": 96.4

Wood < 15' and > 14": 2.1

Wood > 15' and < 14": 44.3

Wood > 15' and > 14": 2.9

**Mean Channel Width: 20.8'**

**Mean Riparian Width: 158.1'**

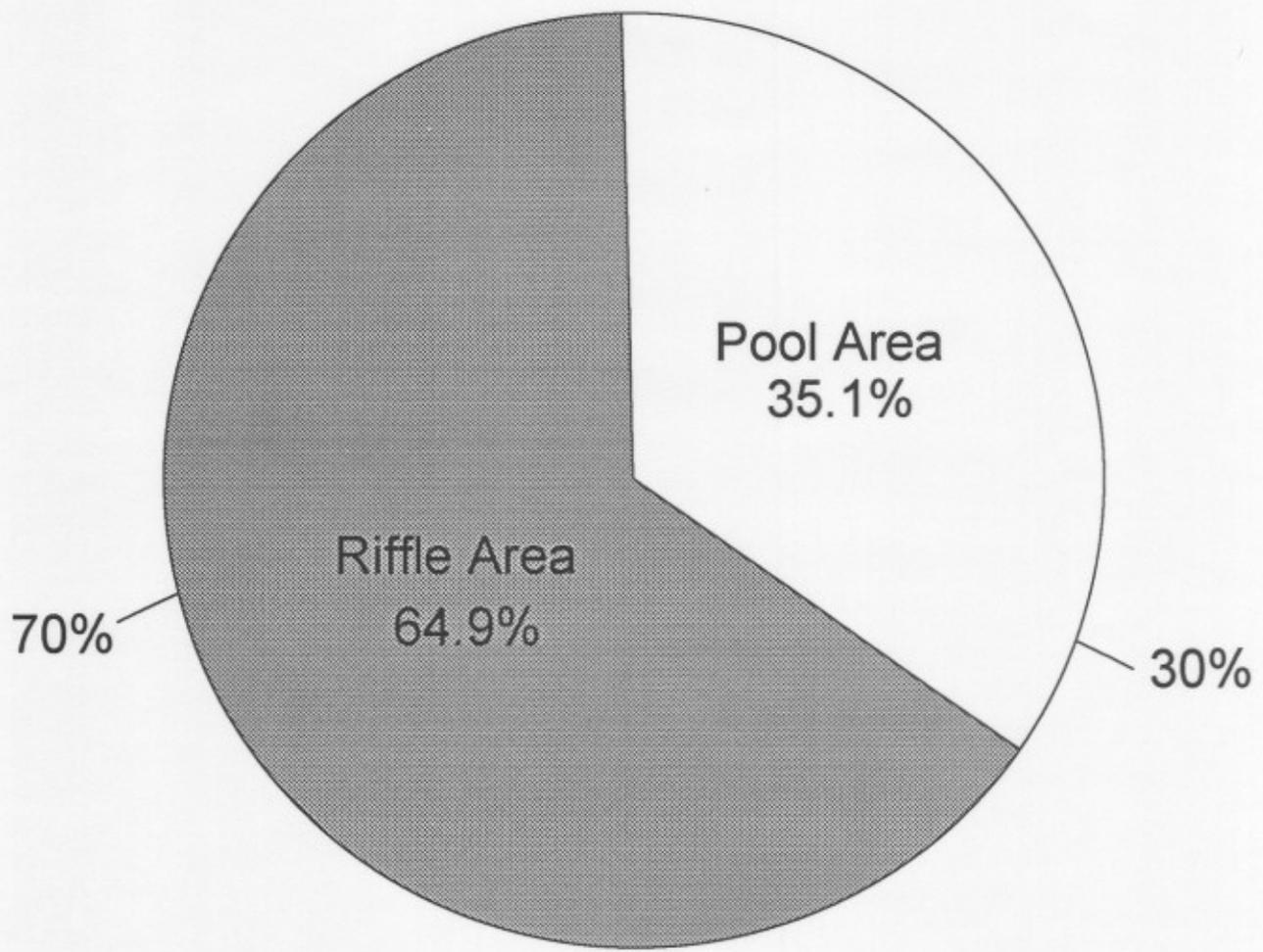
Mean Maximum Riparian Distance (either side): 108.5'

Mean Minimum Riparian Distance (either side): 28.7'

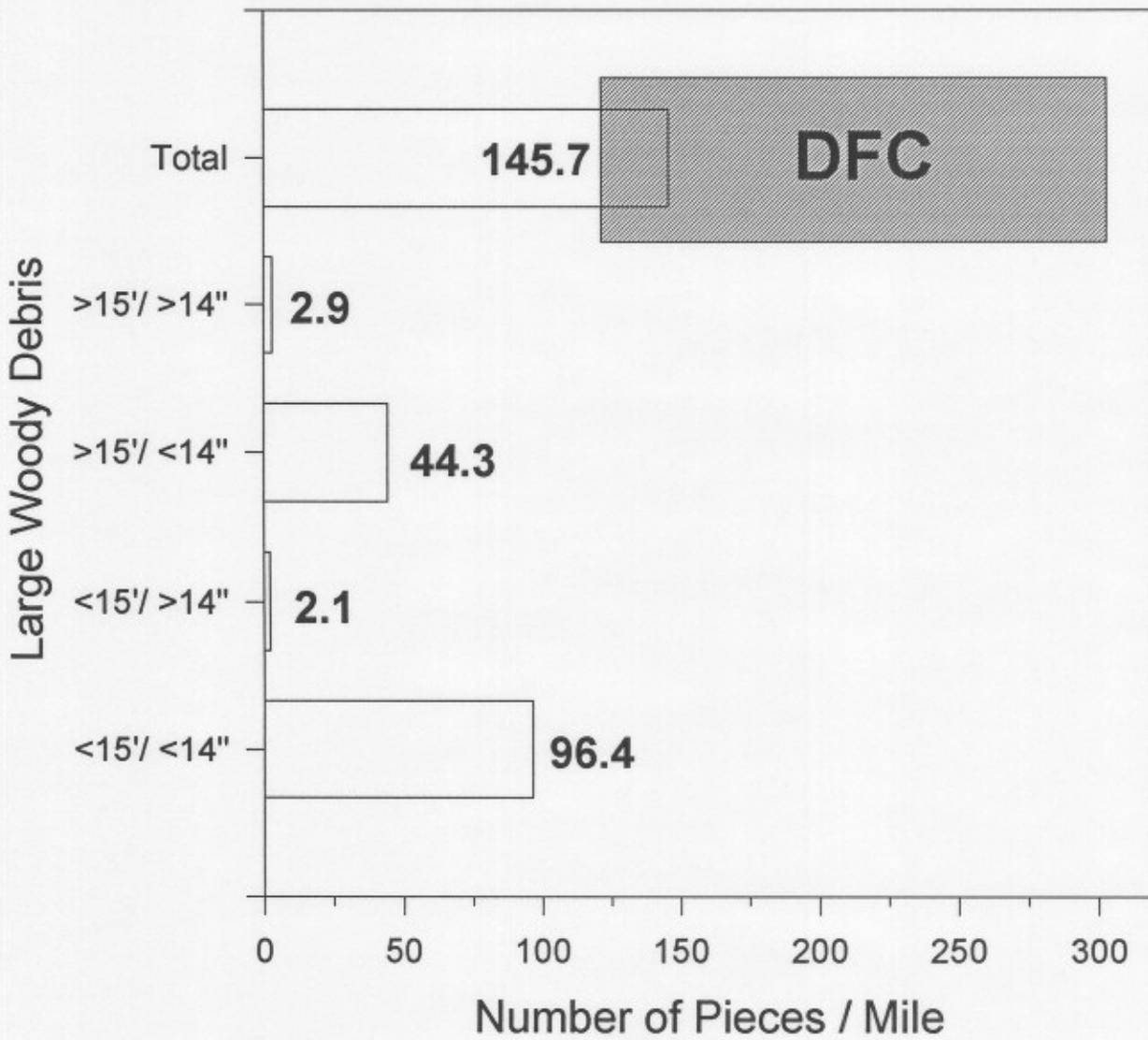
Maximum Riparian Width (Total): 385.2'

Minimum Riparian Width (Total): 42.4'

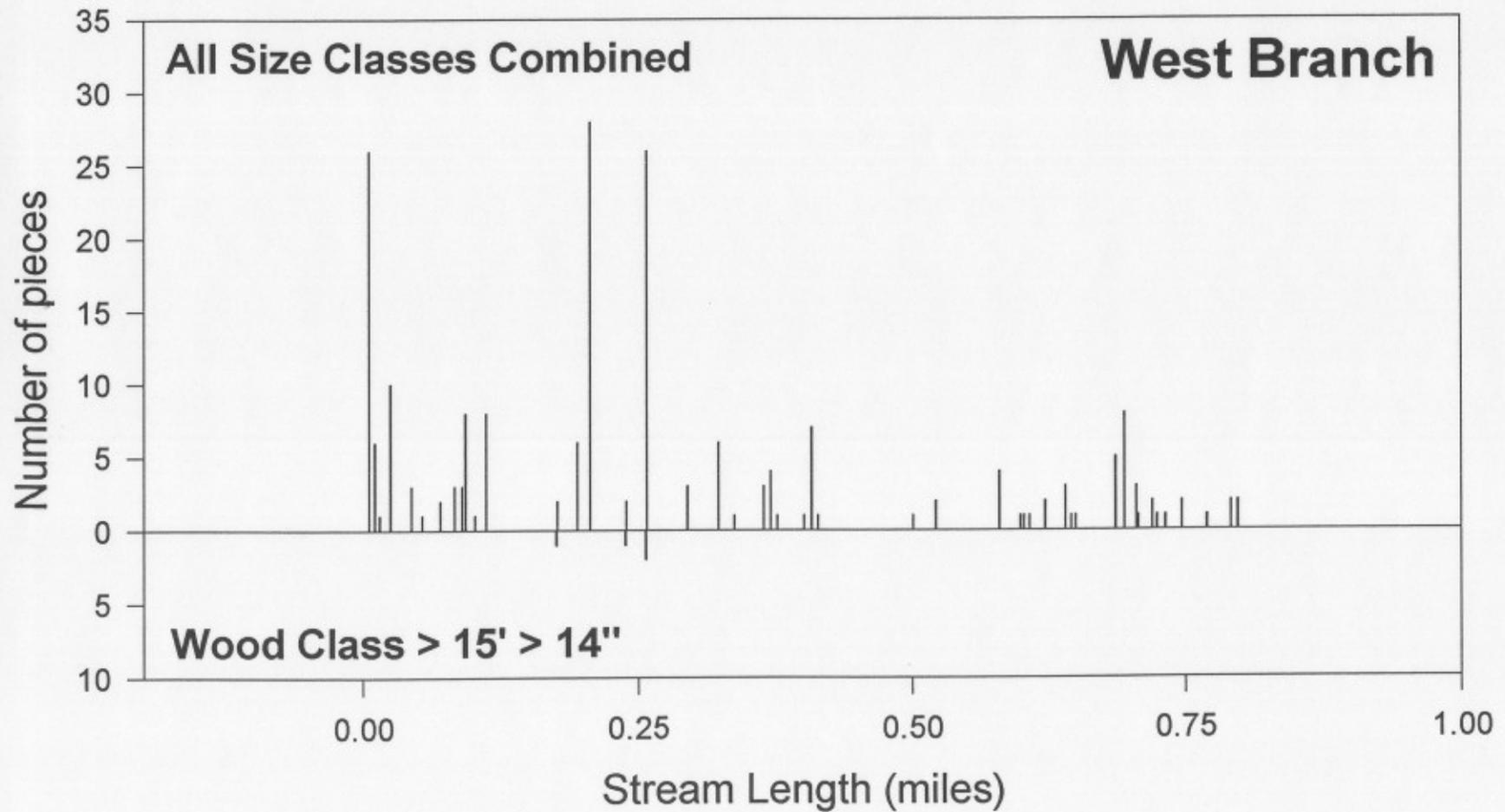
**West Branch**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# West Branch



# Large Woody Debris Distribution



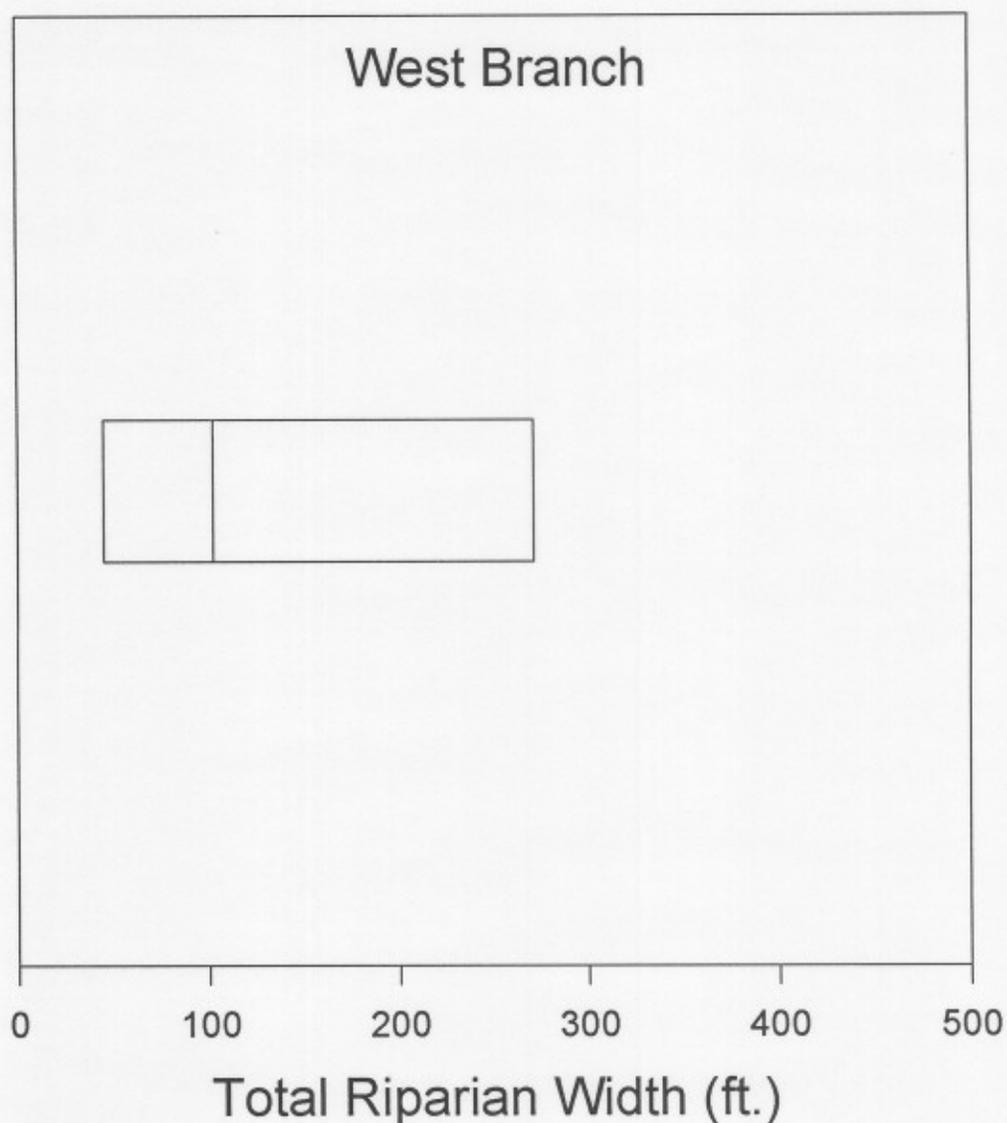
## Riparian Width

Stream: West Branch

Number of measurements: 4

Mean width: 158.1      Std Dev: 160.4

Max: 385.2              Min: 42.4



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 above and below the box represent the 90% and 10% quantiles.

Stream: Wide Hollow

District: New Castle

Quadrangle: Craig Springs

Sample Date: 06/26/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 0.2 miles**

**Percent of Total Area - Pools: 55%**

Number of Pools: 44

Number of Pools per mile: 220.0

Total Pool Area: 4,027.1 sq. ft.  $\pm$  2,935.3

Mean Pool Area: 91.5 sq. ft.

Correction Factor: 1.19

Mean Maximum Depth: 0.8'

Mean Average Depth: 0.6'

**Percent of Total Area - Riffles: 45.0%**

Number of Riffles: 32

Number of Riffles per mile: 160

Total Riffle Area: 3,294.5 sq. ft.  $\pm$  2,279.5

Mean Riffle Area: 103.0 sq. ft.

Correction Factor: 1.01

Mean Maximum Depth: 0.4'

Mean Average Depth: 0.3'

**Number of Large Woody Debris Pieces per Mile: 525.0**

Wood < 15' and < 14": 335.0

Wood < 15' and > 14": 20.0

Wood > 15' and < 14": 160.0

Wood > 15' and > 14": 10.0

**Mean Channel Width: 12.9'**

**Mean Riparian Width: 113.2'**

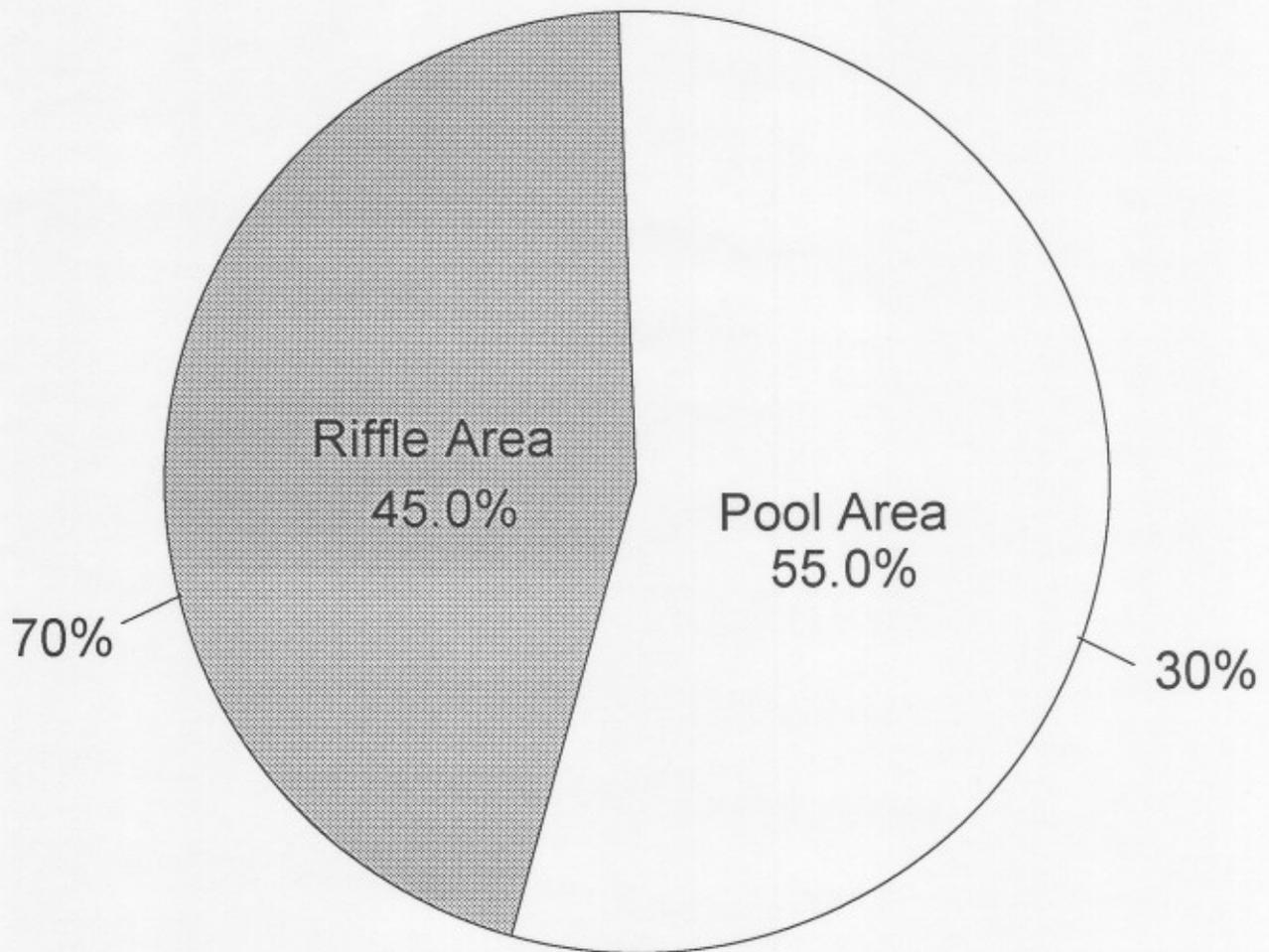
Mean Maximum Riparian Distance (either side): 74.6'

Mean Minimum Riparian Distance (either side): 25.8'

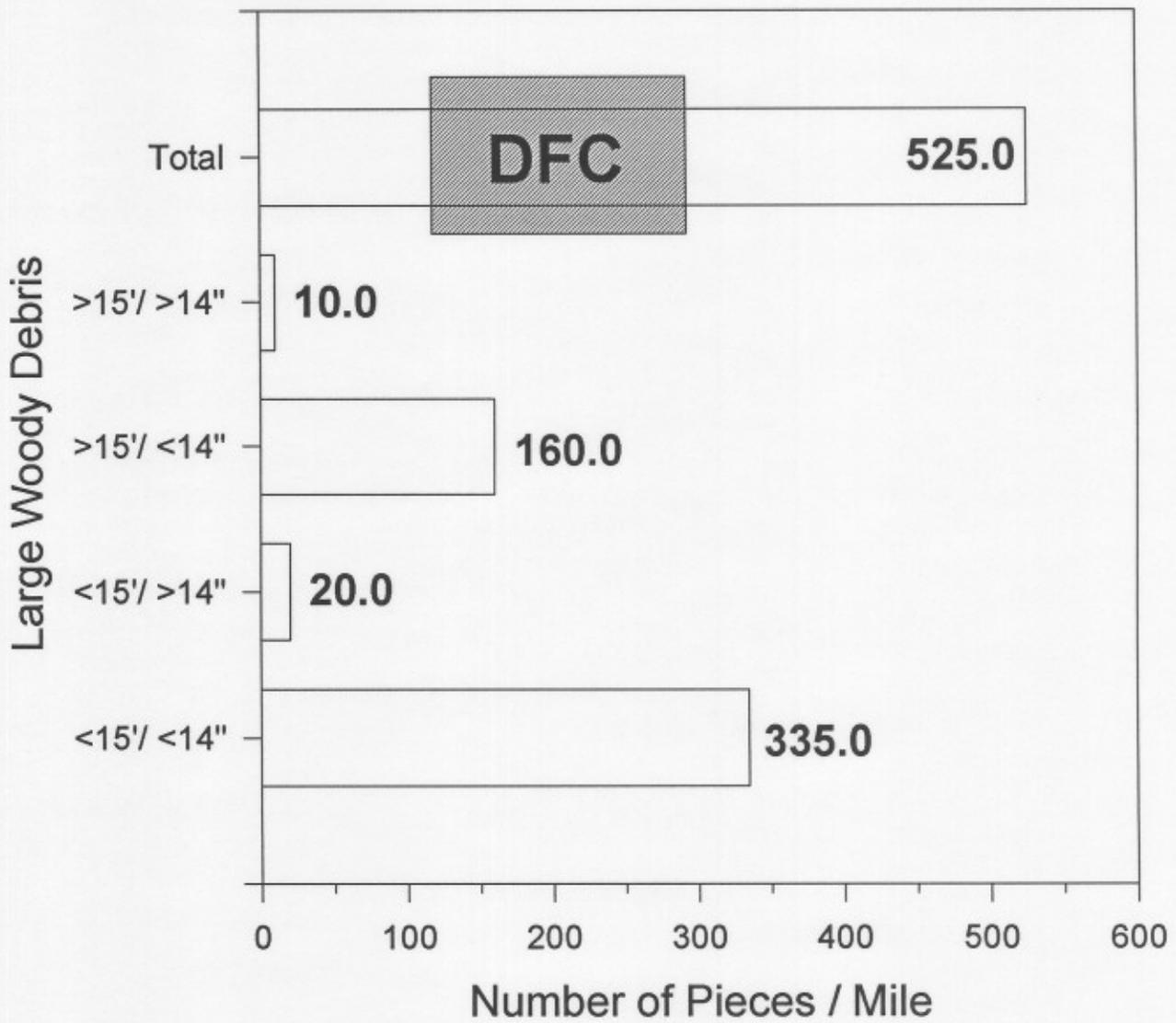
Maximum Riparian Width (Total): 129.5'

Minimum Riparian Width (Total): 96.8'

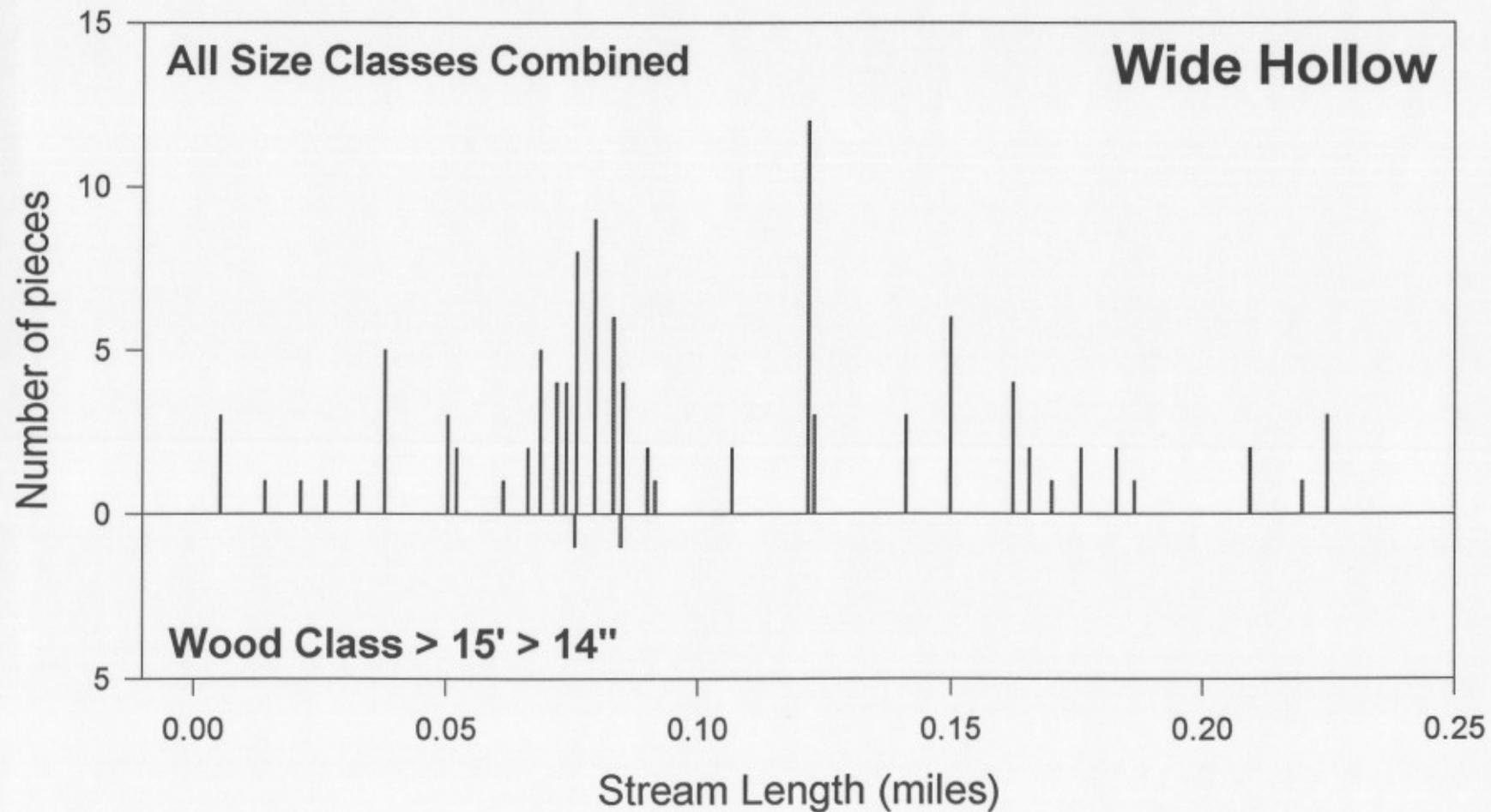
**Wide Hollow**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Wide Hollow



# Large Woody Debris Distribution



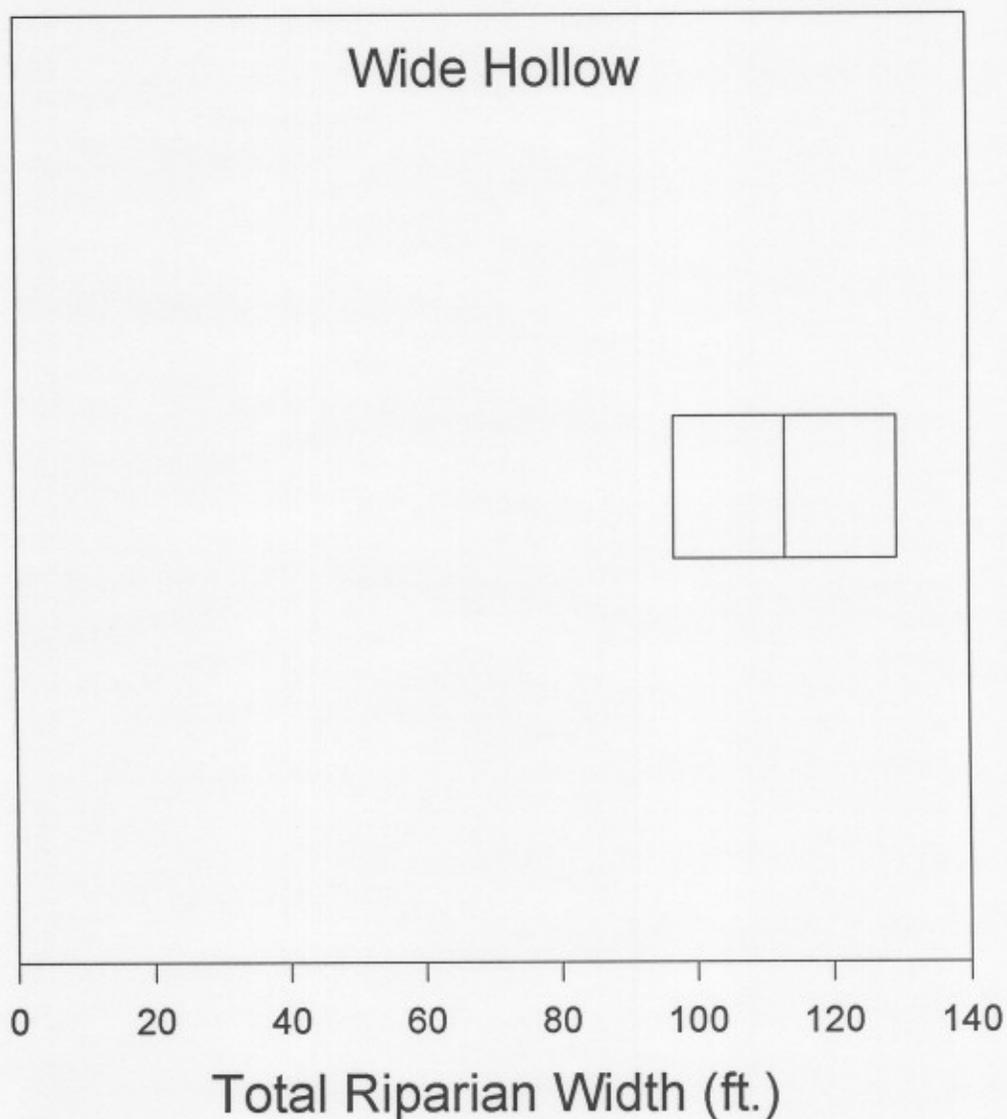
## Riparian Width

Stream: Wide Hollow

Number of measurements: 2

Mean width: 113.2      Std Dev: 23.1

Max: 129.5              Min: 96.8



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 above and below the box represent the 90% and 10% quantiles.

# Eagle Rock and Oriskany Quadrangles

Stream: Lower Patterson Creek

District: New Castle

Quadrangle: Eagle Rock

Sample Date: 06/26/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 1.0 miles**

**Percent of Total Area - Pools: 77.4%**

Number of Pools: 26

Number of Pools per mile: 26

Total Pool Area: 101,221.7 sq. ft.  $\pm$  8,875.7

Mean Pool Area: 3893.1 sq. ft.

Correction Factor: 1.08

Mean Maximum Depth: 1.8'

Mean Average Depth: 1.0'

**Percent of Total Area - Riffles: 22.6%**

Number of Riffles: 18

Number of Riffles per mile: 18

Total Riffle Area: 29,508.6 sq. ft.  $\pm$

Mean Riffle Area: 1639.4 sq. ft.

Correction Factor: 1.26

Mean Maximum Depth: 0.8'

Mean Average Depth: 0.4'

**Number of Large Woody Debris Pieces per Mile: 243.0**

Wood < 15' and < 14": 186.0

Wood < 15' and > 14": 4.0

Wood > 15' and < 14": 42.0

Wood > 15' and > 14": 11.0

**Mean Channel Width: 58.0'**

**Mean Riparian Width: 140.0'**

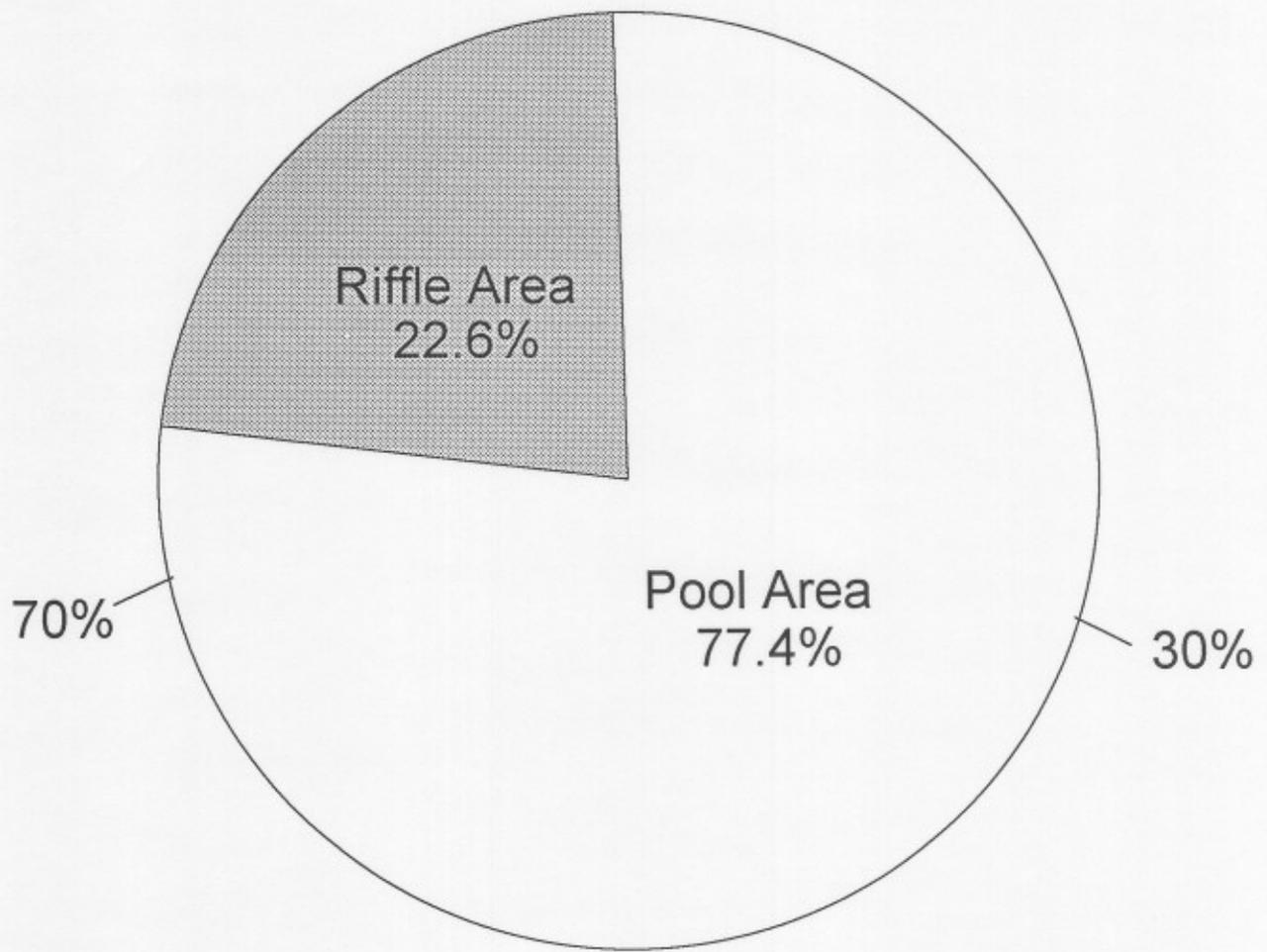
Mean Maximum Riparian Distance (either side): 65.0'

Mean Minimum Riparian Distance (either side): 17.0'

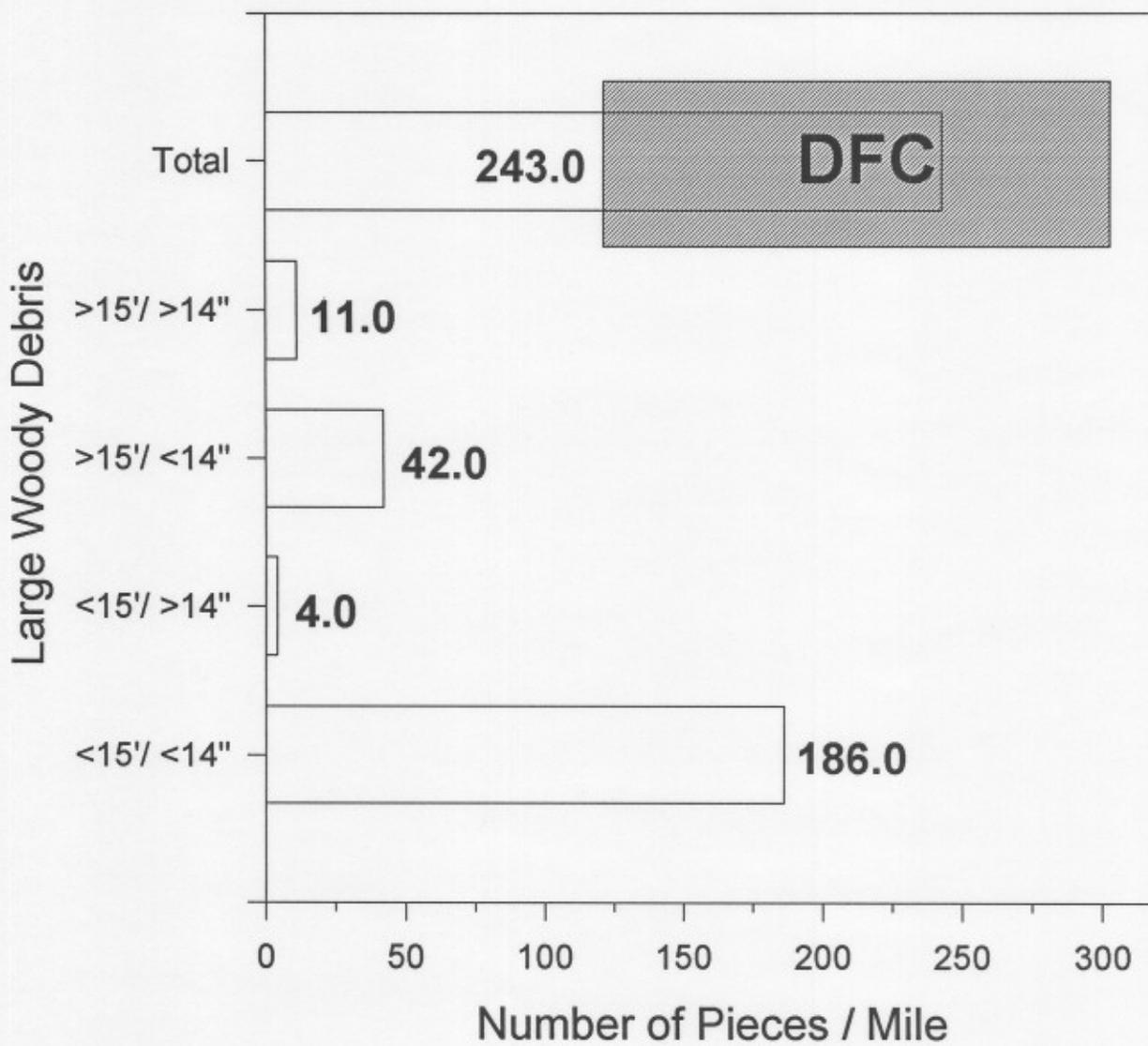
Maximum Riparian Width (Total): 140.0'

Minimum Riparian Width (Total): 140.0'

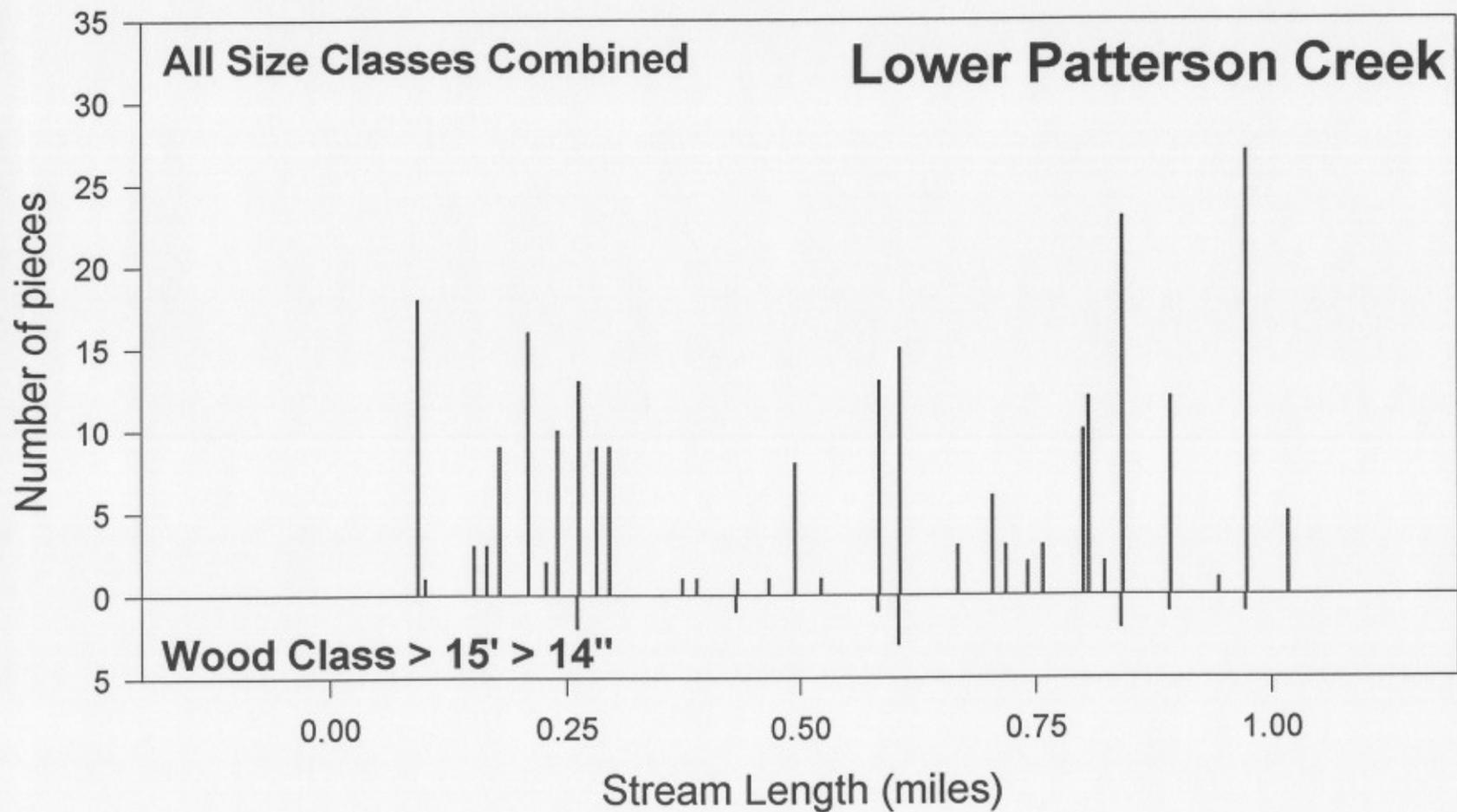
**Lower Patterson Creek**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Lower Patterson Creek



# Large Woody Debris Distribution



Stream: Middle Patterson Creek

District: New Castle

Quadrangle: Eagle Rock/Oriskany/Strom

Sample Date: 07/09/96

Downstream Starting Point: At second USFS Bound. (upstream)

**Total Distance Surveyed: 2.2 miles**

**Percent of Total Area - Pools: 76.6%**

Number of Pools: 47

Number of Pools per mile: 21.3

Total Pool Area: 127,409.5 sq. ft.  $\pm$  11,285.7

Mean Pool Area: 2,710.8 sq. ft.

Correction Factor: 1.07

Mean Maximum Depth: 1.8'

Mean Average Depth: 1.1'

**Percent of Total Area - Riffles: 23.4%**

Number of Riffles: 29

Number of Riffles per mile: 13.1

Total Riffle Area: 38,909.6 sq. ft.  $\pm$  35,882.0

Mean Riffle Area: 1,341.7 sq. ft.

Correction Factor: 1.29

Mean Maximum Depth: 0.7'

Mean Average Depth: 0.4'

**Number of Large Woody Debris Pieces per Mile: 54.0**

Wood < 15' and < 14": 26.8

Wood < 15' and > 14": 2.7

Wood > 15' and < 14": 20.0

Wood > 15' and > 14": 4.5

**Mean Channel Width: 54.0'**

**Mean Riparian Width: 225.0'**

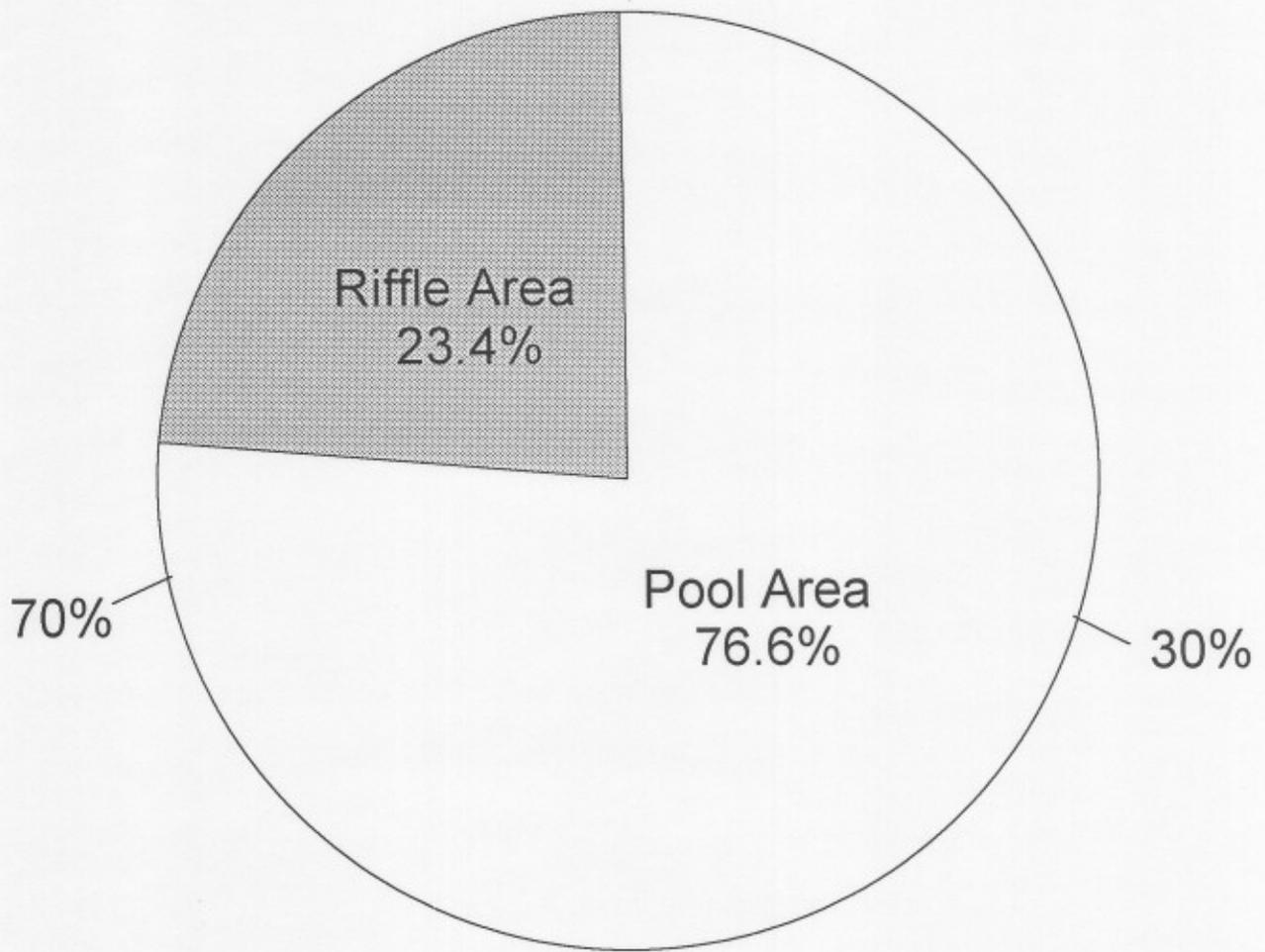
Mean Maximum Riparian Distance (either side): 144.0'

Mean Minimum Riparian Distance (either side): 27.0'

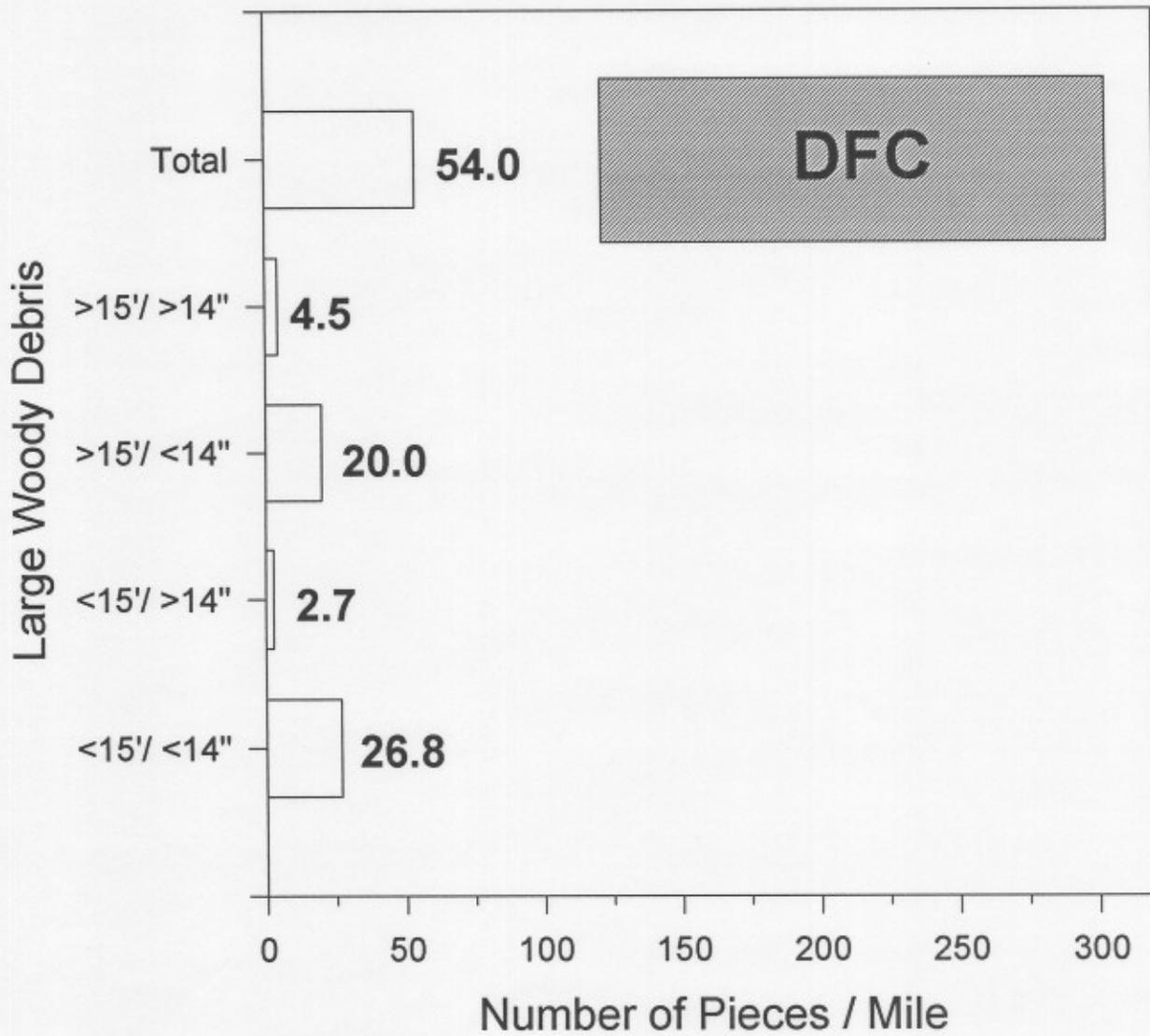
Maximum Riparian Width (Total): 267.0'

Minimum Riparian Width (Total): 183.0'

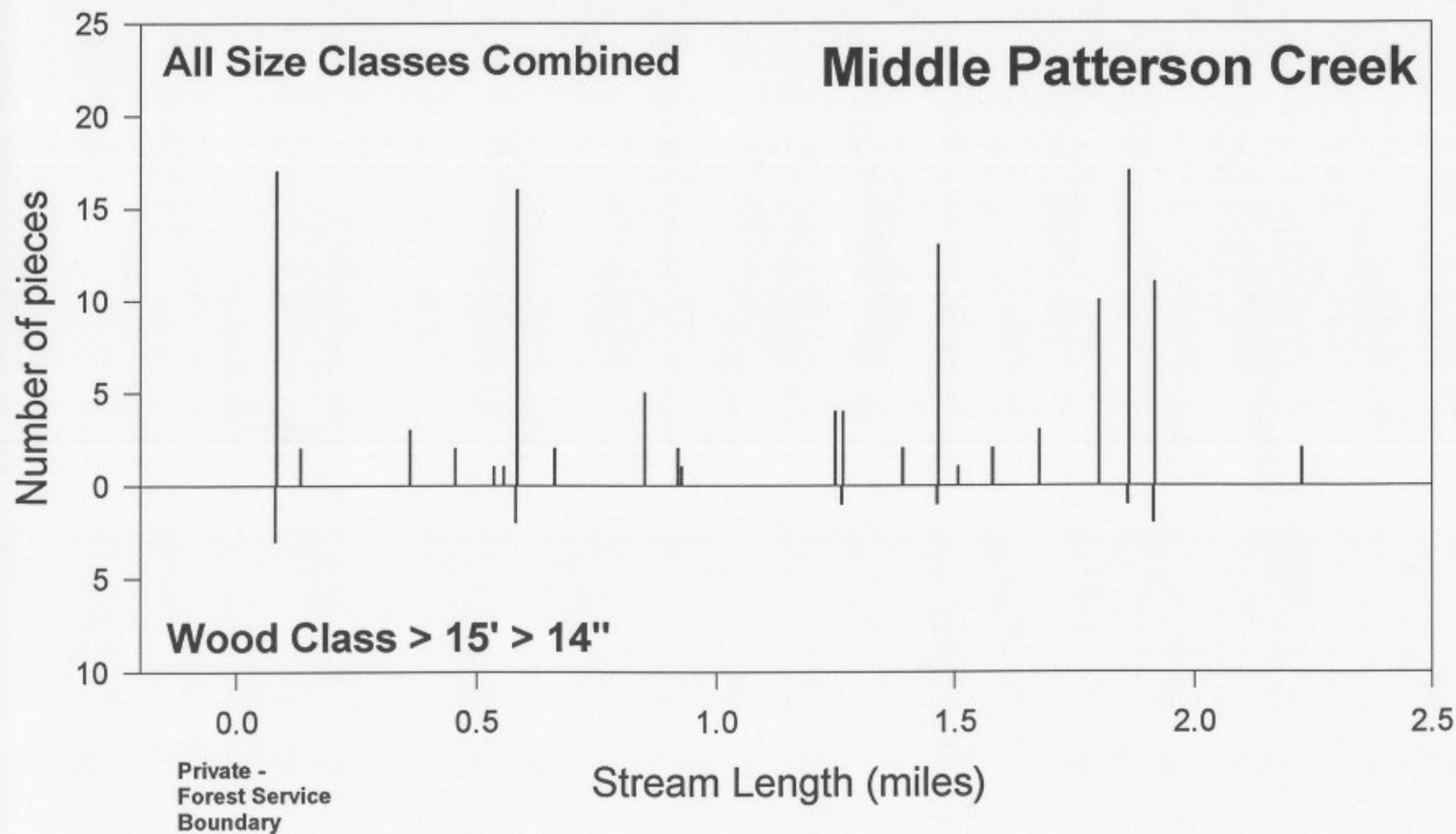
**Middle Patterson Creek**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



## Middle Patterson Creek



# Large Woody Debris Distribution



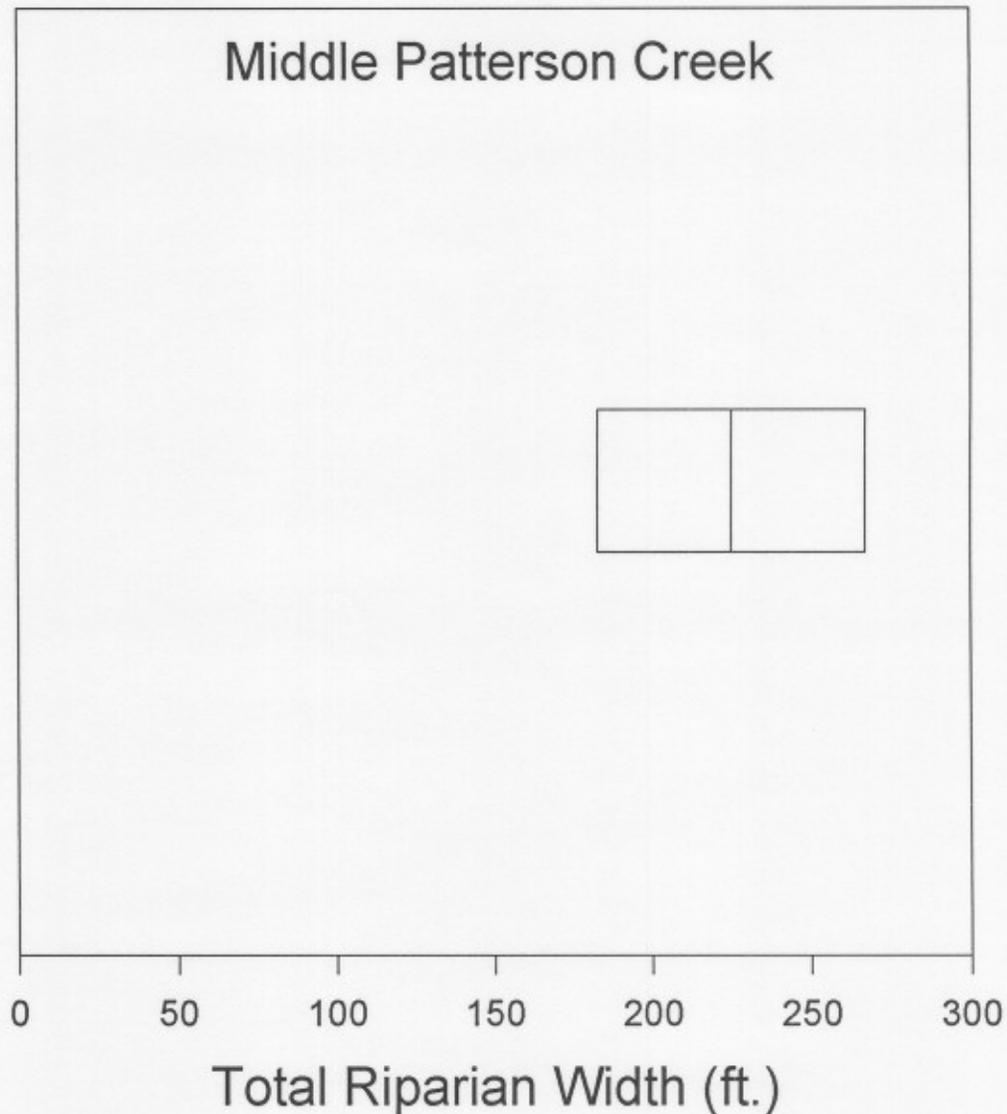
## Riparian Width

Stream: Middle Patterson Creek

Number of measurements: 2

Mean width: 225.0      Std Dev: 59.4

Max: 267.0              Min: 183.0



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 above and below the box represent the 90% and 10% quantiles.

Stream: Upper Patterson Creek

District: New Castle

Quadrangle: Oriskany

Sample Date: 07/03/96

Downstream Starting Point: At third USFS Bound. (upstream)

**Total Distance Surveyed: 1.1 miles**

**Percent of Total Area - Pools: 79.8%**

Number of Pools: 36

Number of Pools per mile: 32.7

Total Pool Area: 66,156.9 sq. ft.  $\pm$  30,546.1

Mean Pool Area: 1,837.7 sq. ft.

Correction Factor: 1.22

Mean Maximum Depth: 1.7'

Mean Average Depth: 0.9'

**Percent of Total Area - Riffles: 20.2%**

Number of Riffles: 21

Number of Riffles per mile: 19.0

Total Riffle Area: 16,766.7 sq. ft.

Mean Riffle Area: 798.4 sq. ft.

Correction Factor: 1.11

Mean Maximum Depth: 0.5'

Mean Average Depth: 0.2'

**Number of Large Woody Debris Pieces per Mile: 15.5**

Wood < 15' and < 14": 8.2

Wood < 15' and > 14": 0.9

Wood > 15' and < 14": 5.5

Wood > 15' and > 14": 0.9

**Mean Channel Width: 36.5'**

**Mean Riparian Width: 118.0'**

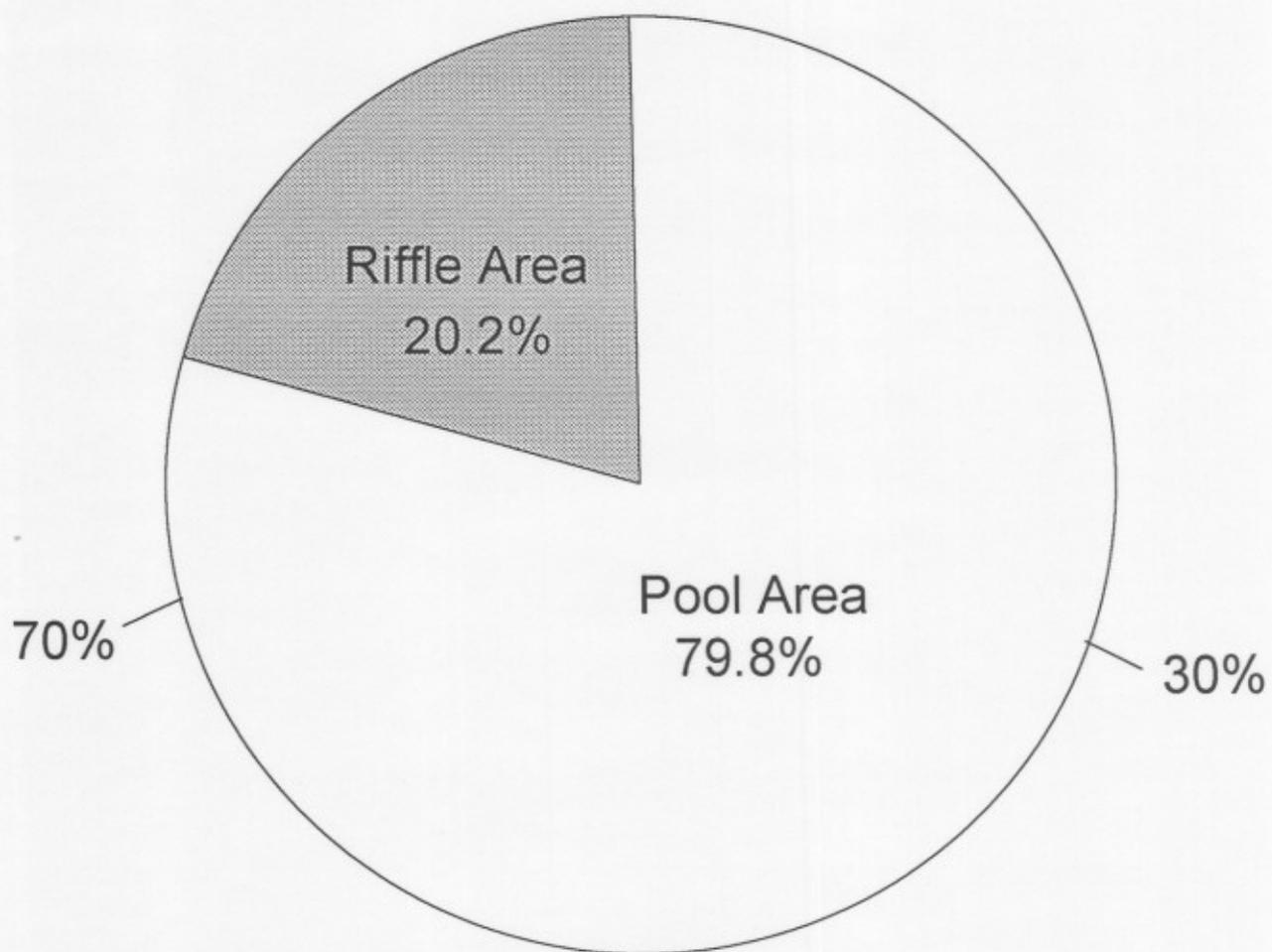
Mean Maximum Riparian Distance (either side): 58.5'

Mean Minimum Riparian Distance (either side): 23.0'

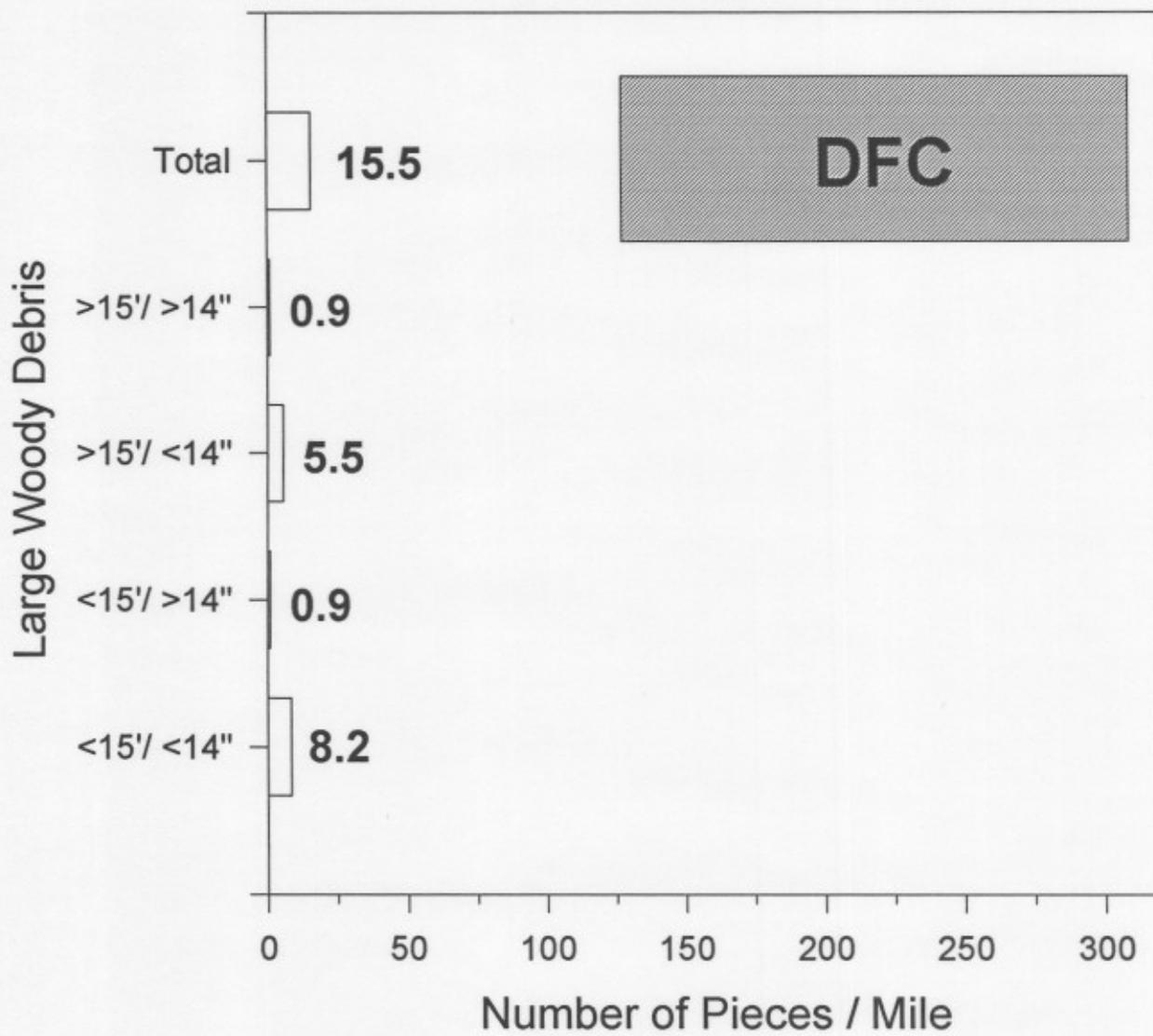
Maximum Riparian Width (Total): 118.0'

Minimum Riparian Width (Total): 118.0'

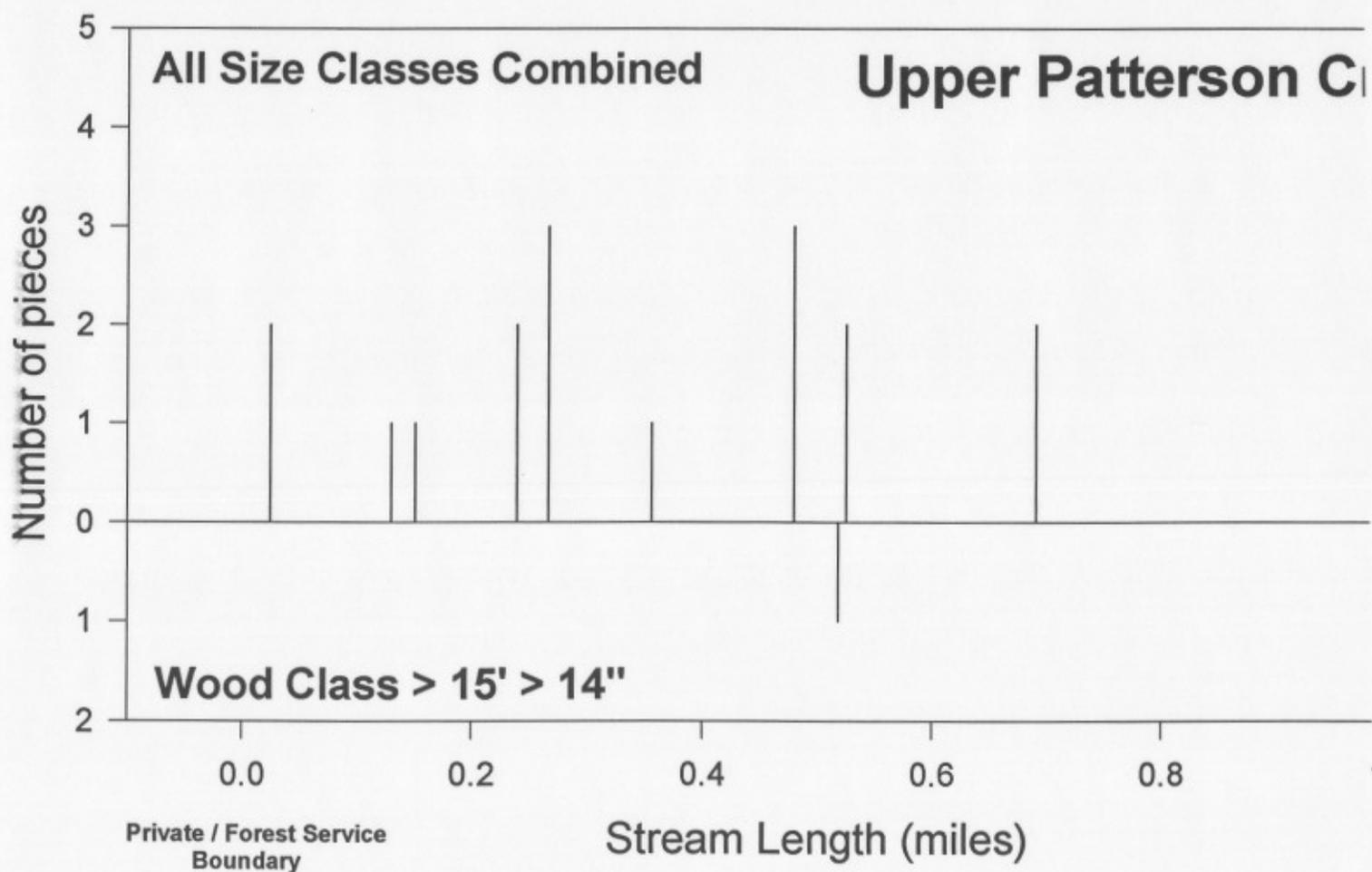
**Upper Patterson Creek**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Upper Patterson Creek



# Large Woody Debris Distributio



## Looney Quadrangle

Stream: Trout Creek

District: New Castle

Quadrangle: Looney

Sample Date: 6/26/96

Downstream Starting Point: USFS Bound. adjacent to Rt. 620

**Total Distance Surveyed: 0.3 miles**

**Percent of Total Area - Pools: 36.5%**

Number of Pools: 15

Number of Pools per mile: 50

Total Pool Area: 12,540.0 sq. ft.

Mean Pool Area: 836.0 sq. ft.

Correction Factor: 0.80

Mean Maximum Depth: 1.7'

Mean Average Depth: 1.2'

**Percent of Total Area - Riffles: 63.5%**

Number of Riffles: 10

Number of Riffles per mile: 33.3

Total Riffle Area: 21,799.3 sq. ft.

Mean Riffle Area: 2,179.9 sq. ft.

Correction Factor: 1.27

Mean Maximum Depth: 1.2'

Mean Average Depth: 0.6'

**Number of Large Woody Debris Pieces per Mile: 33.4**

Wood < 15' and < 14": 16.7

Wood < 15' and > 14": 0.0

Wood > 15' and < 14": 16.7

Wood > 15' and > 14": 0.0

**Mean Channel Width: 32.0'**

**Mean Riparian Width: 83.3'**

Mean Maximum Riparian Distance (either side): 39.0'

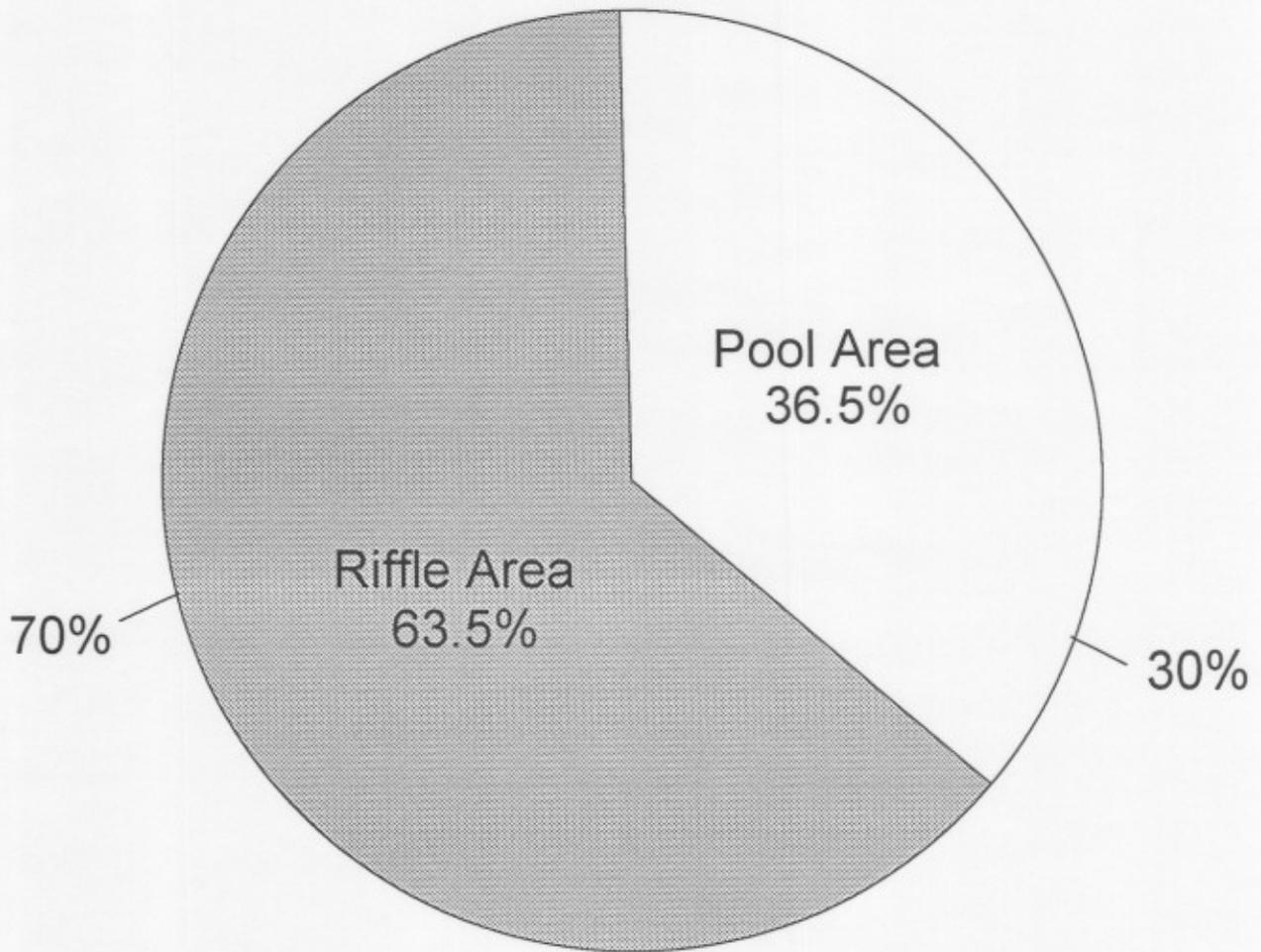
Mean Minimum Riparian Distance (either side): 12.3'

Maximum Riparian Width (Total): 83.3'

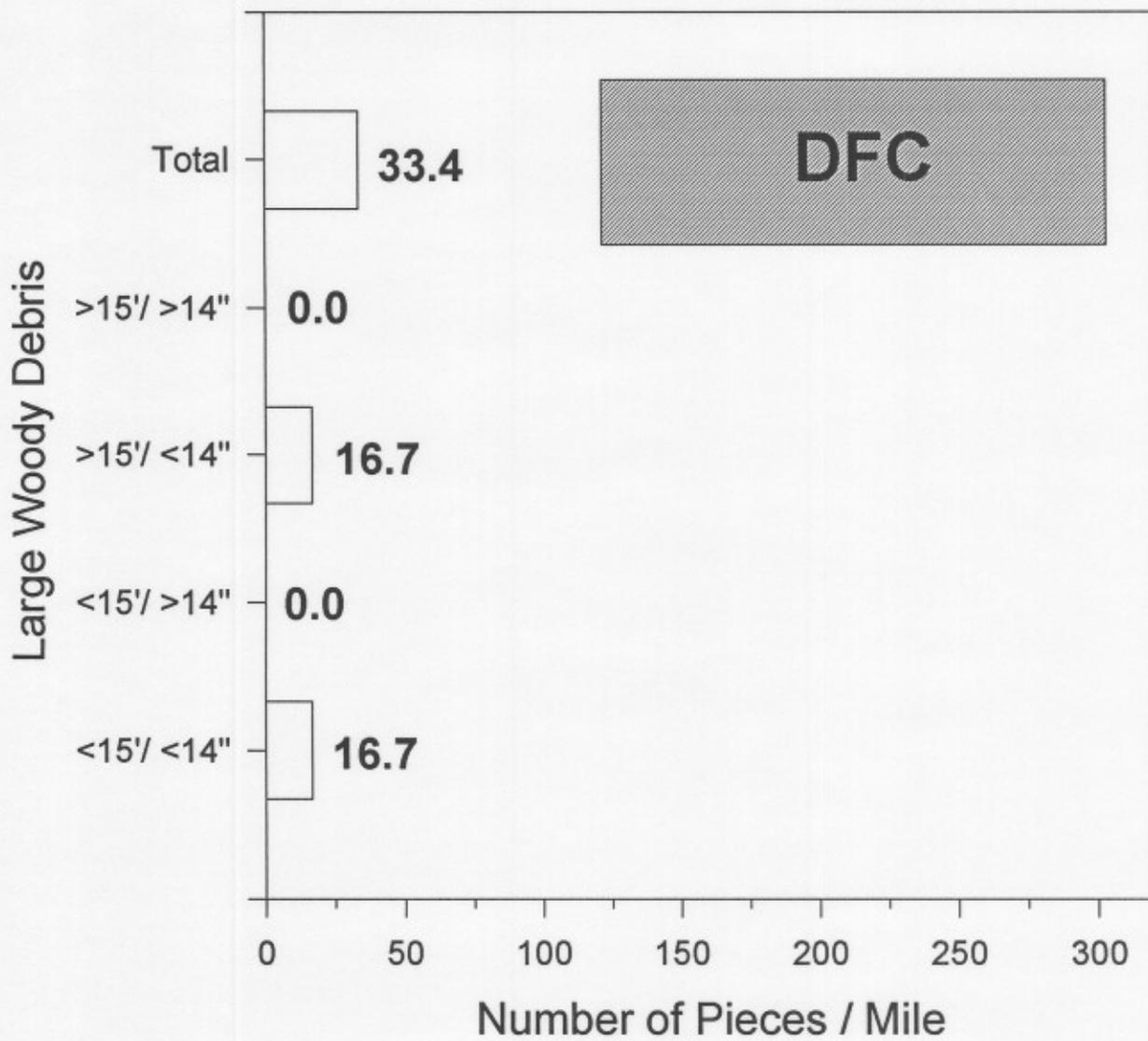
Minimum Riparian Width (Total): 83.3'

### Trout Creek

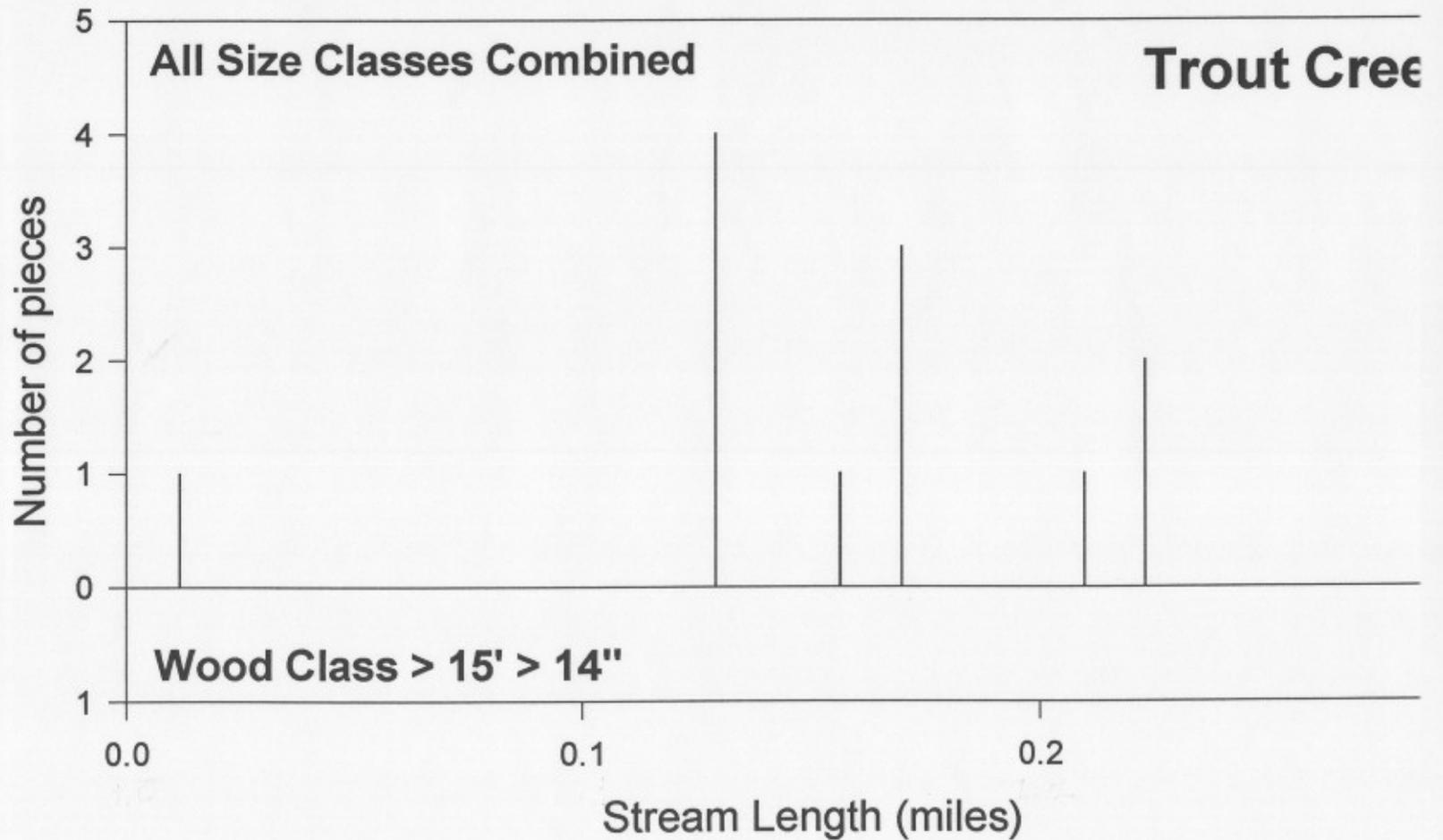
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Trout Creek



# Large Woody Debris Distribution



Stream: Tub Run

District: New Castle

Quadrangle: Looney

Sample Date: 6/26/96

Downstream Starting Point: USFS Bound. adjacent to Rt. 257

**Total Distance Surveyed: 3.2 miles**

**Percent of Total Area - Pools: 46.1%**

Number of Pools: 195

Number of Pools per mile: 60.9

Total Pool Area: 61,509.8 sq. ft.  $\pm$  8,522.3

Mean Pool Area: 315.4 sq. ft.

Correction Factor: 0.905

Mean Maximum Depth: 1.1'

Mean Average Depth: 0.7'

**Percent of Total Area - Riffles: 53.9%**

Number of Riffles: 140

Number of Riffles per mile: 43.75

Total Riffle Area: 71,895.4 sq. ft.  $\pm$  5,886.7

Mean Riffle Area: 513.5 sq. ft.

Correction Factor: 1.04

Mean Maximum Depth: 0.5'

Mean Average Depth: 0.2'

**Number of Large Woody Debris Pieces per Mile: 71.9**

Wood < 15' and < 14": 38.4

Wood < 15' and > 14": 3.8

Wood > 15' and < 14": 22.5

Wood > 15' and > 14": 7.2

**Mean Channel Width: 18.7'**

**Mean Riparian Width: 51.1'**

Mean Maximum Riparian Distance (either side): 23.7'

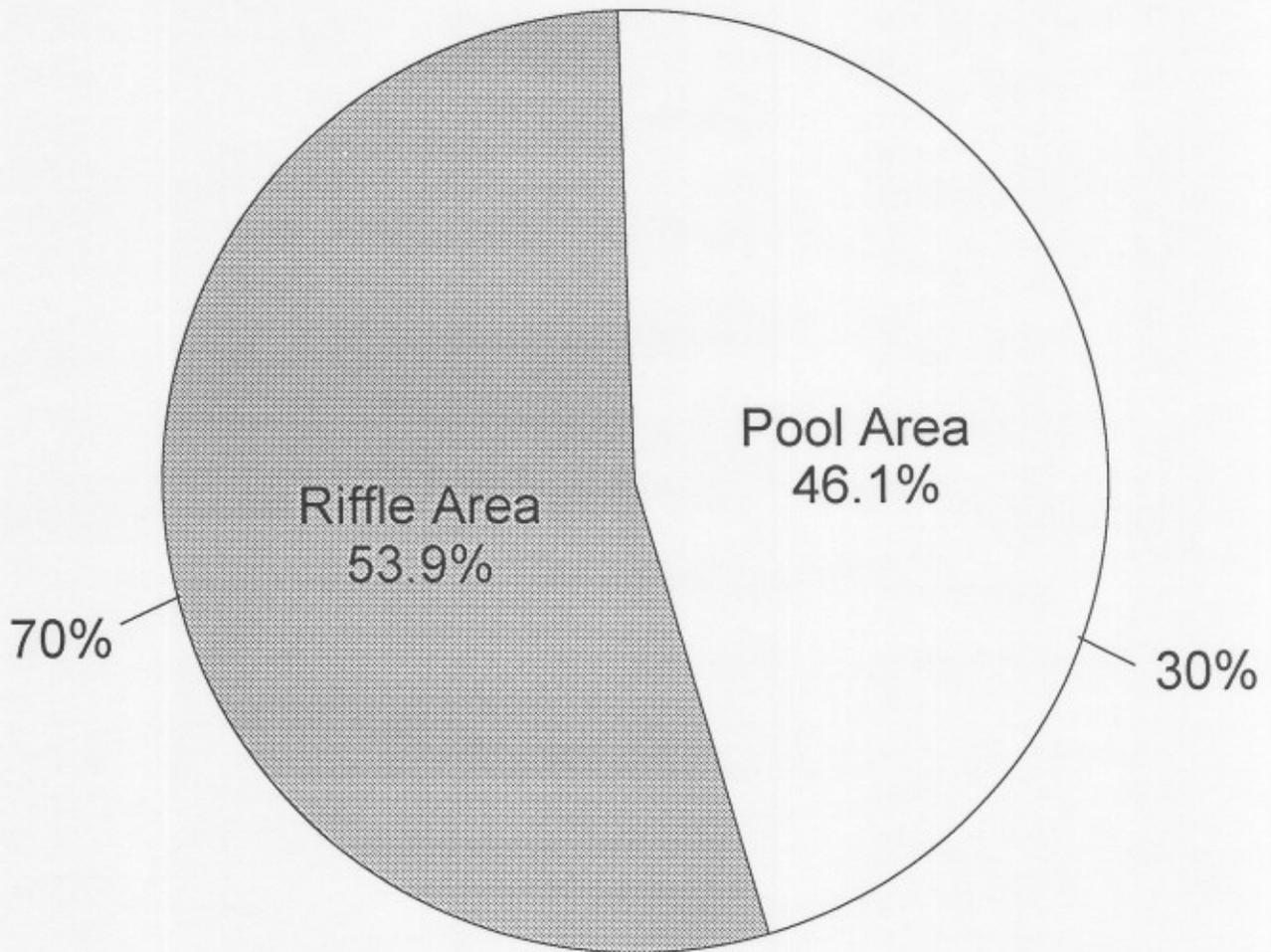
Mean Minimum Riparian Distance (either side): 8.7'

Maximum Riparian Width (Total): 70.3'

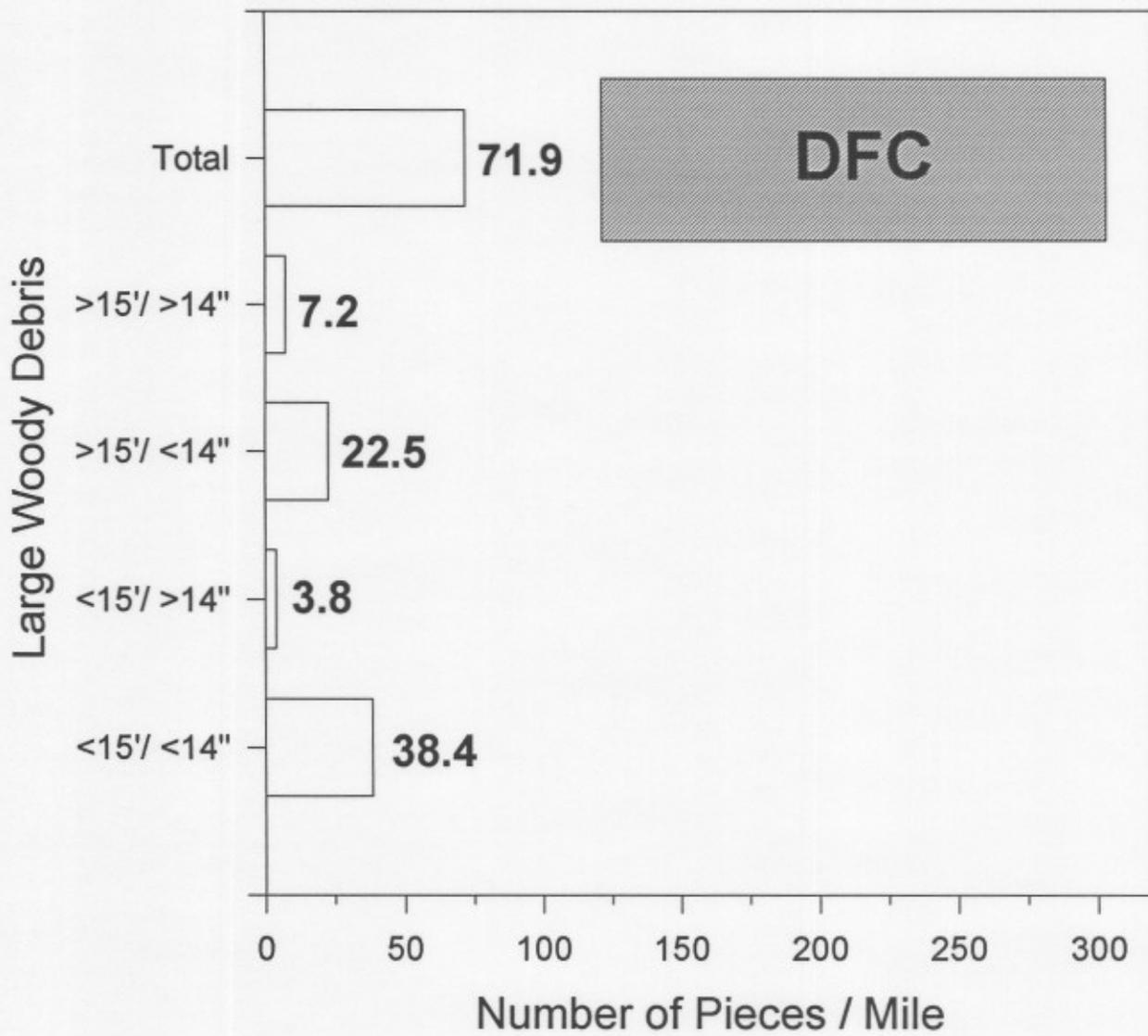
Minimum Riparian Width (Total): 35.0'

## Tub Run

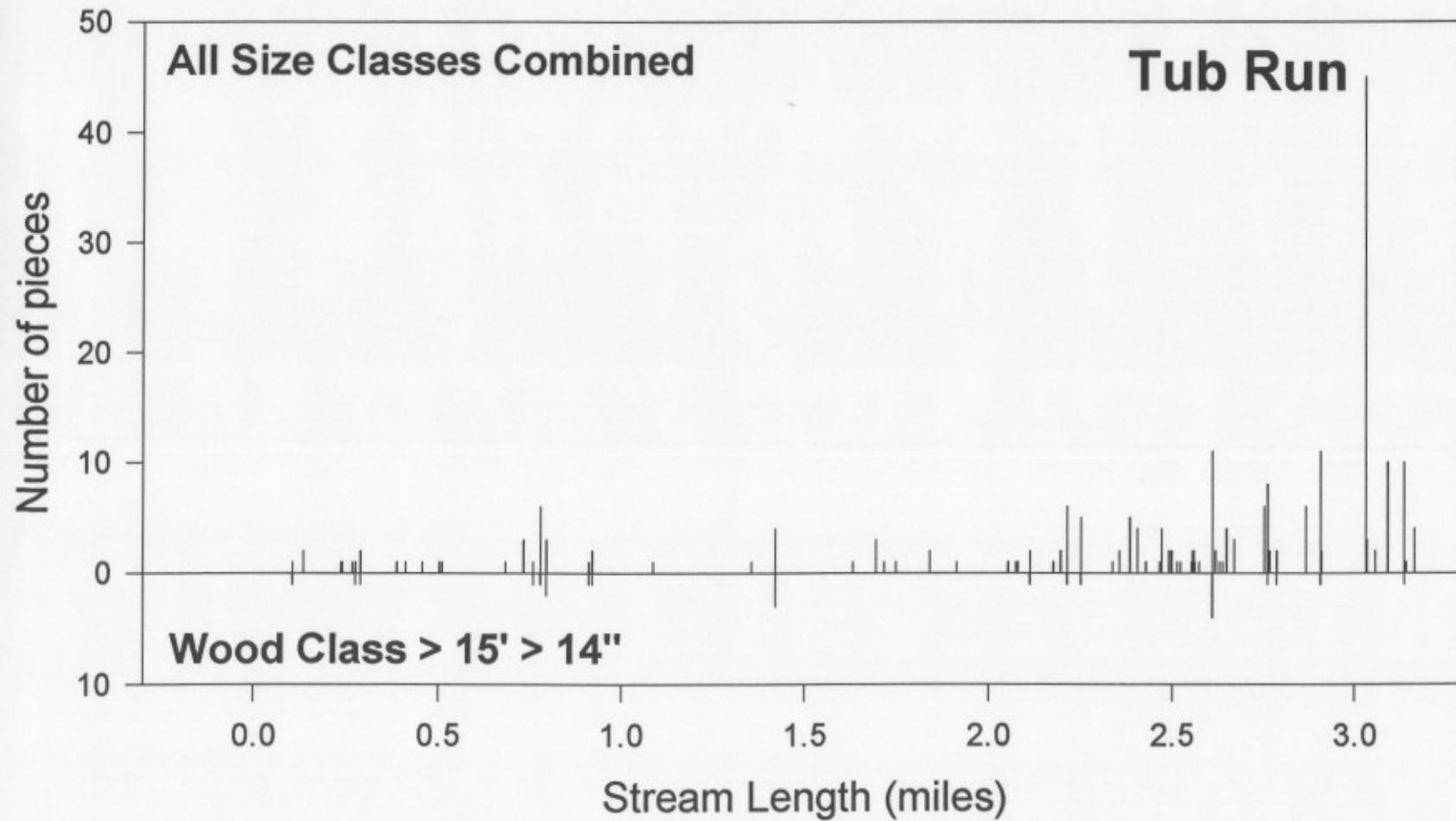
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Tub Run



# Large Woody Debris Distribution



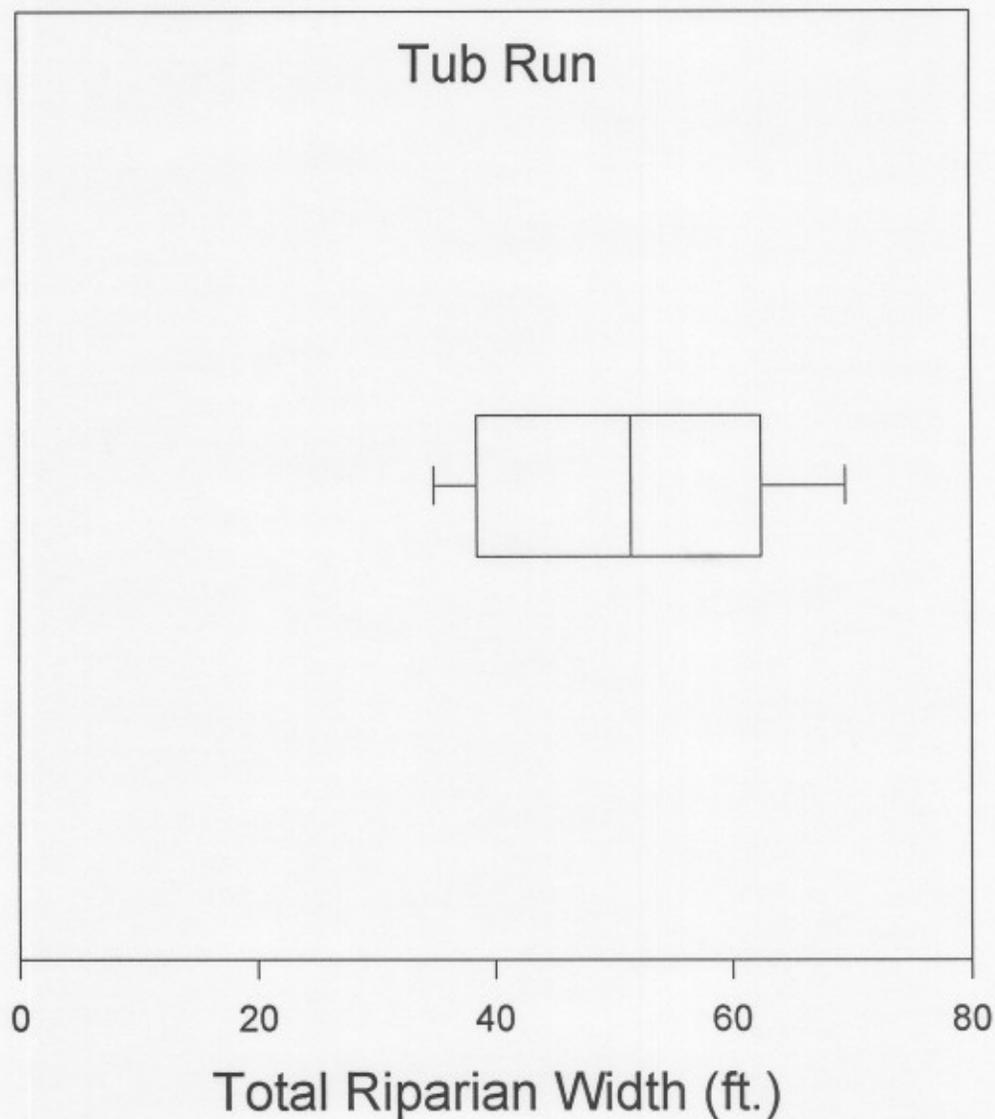
## Riparian Width

Stream: Tub Run

Number of measurements: 7

Mean width: 51.1      Std Dev: 13.7

Max: 70.3              Min: 34.8



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 above and below the box represent the 90% and 10% quantiles.

## **New Castle Quadrangle**

Stream: Lower Barbours Creek

District: New Castle

Quadrangle: New Castle

Sample Date: 07/02/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 3.2 miles**

**Percent of Total Area - Pools: 36.8%**

Number of Pools: 80

Number of Pools per mile: 25.0

Total Pool Area: 131,709.5 sq. ft.  $\pm$  7,170.1

Mean Pool Area: 1,646.4 sq. ft.

Correction Factor: 1.03

Mean Maximum Depth: 2.3'

Mean Average Depth: 1.5'

**Percent of Total Area - Riffles: 63.2%**

Number of Riffles: 74

Number of Riffles per mile: 23.1

Total Riffle Area: 226,065.7 sq. ft.  $\pm$  26,990.8

Mean Riffle Area: 3054.9 sq. ft.

Correction Factor: 0.99

Mean Maximum Depth: 1.1'

Mean Average Depth: 0.6'

**Number of Large Woody Debris Pieces per Mile: 74.5**

Wood < 15' and < 14": 29.4

Wood < 15' and > 14": 3.4

Wood > 15' and < 14": 24.4

Wood > 15' and > 14": 16.3

**Mean Channel Width: 35.1'**

**Mean Riparian Width: 346.0'**

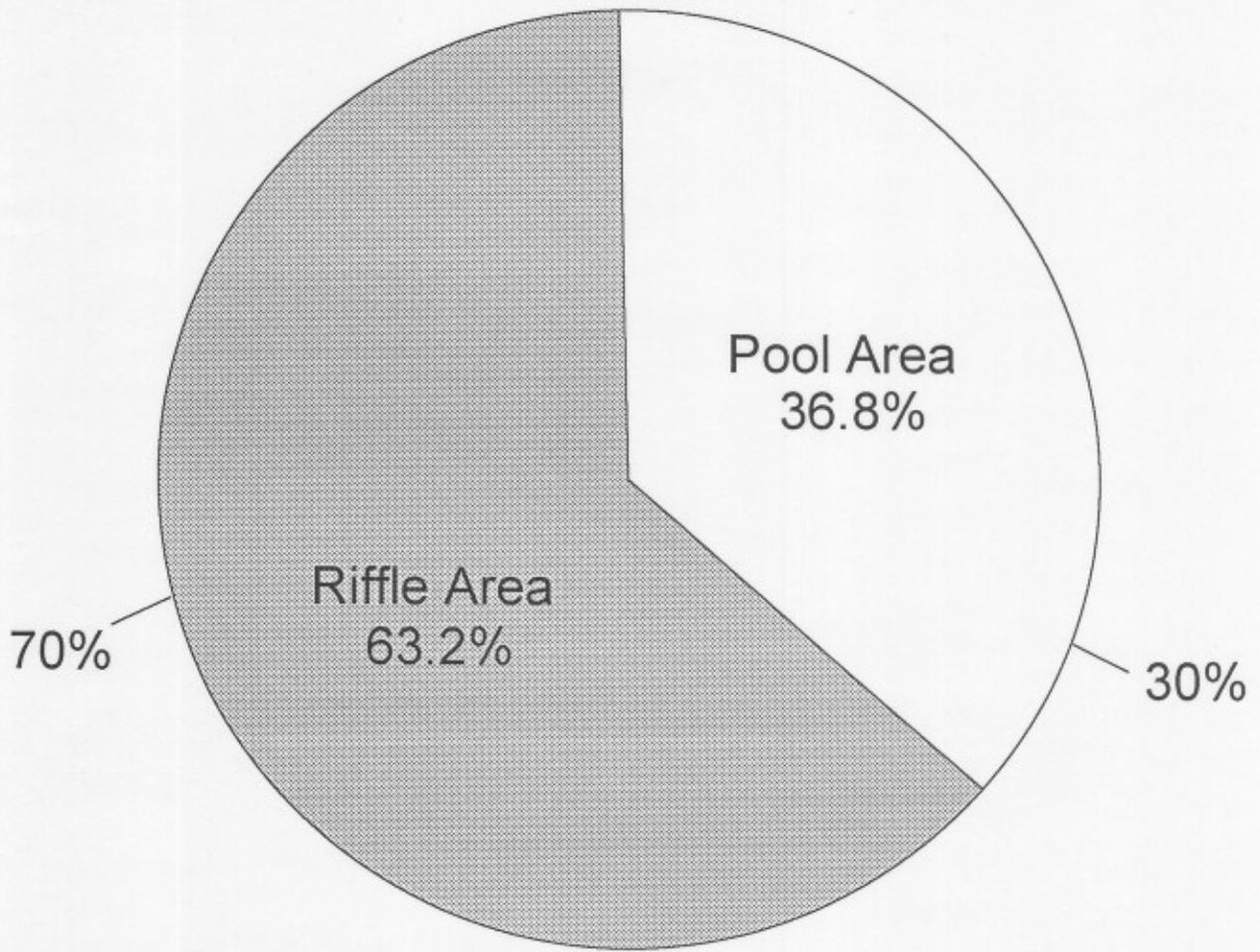
Mean Maximum Riparian Distance (either side): 232.8'

Mean Minimum Riparian Distance (either side): 78.1'

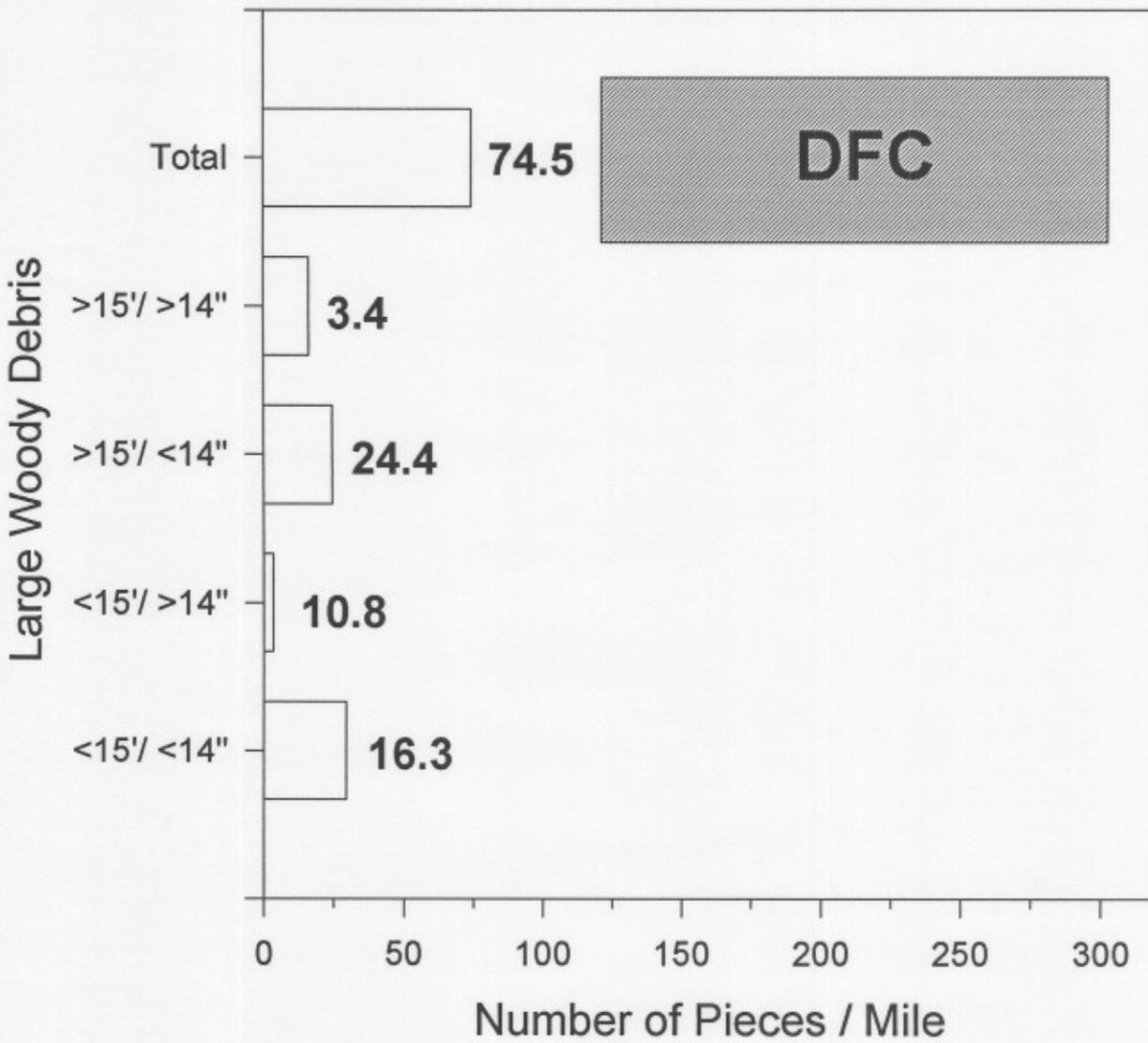
Maximum Riparian Width (Total): 744.5'

Minimum Riparian Width (Total): 168.0'

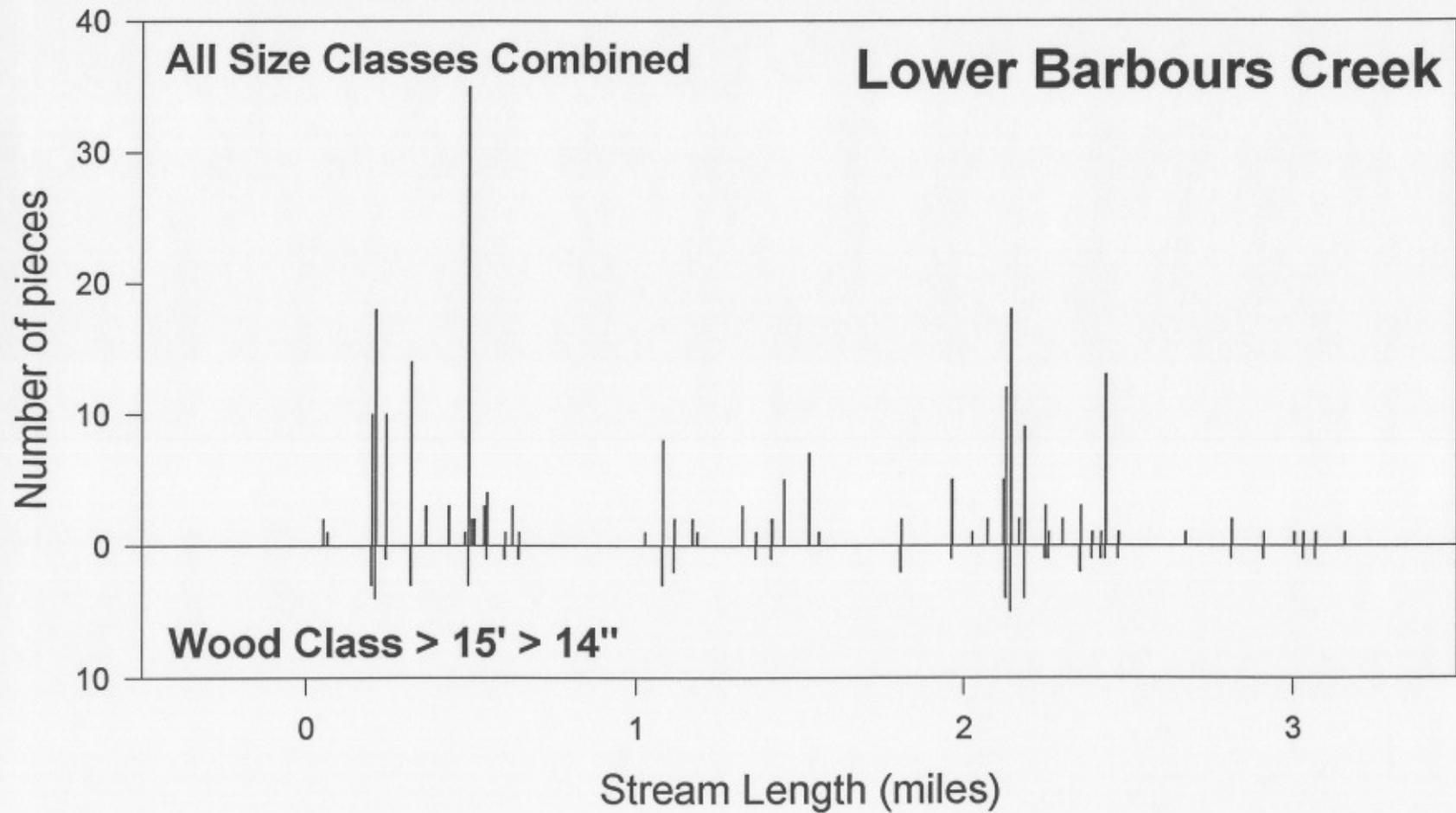
**Lower Barbours Creek**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Lower Barbours Creek



# Large Woody Debris Distribution



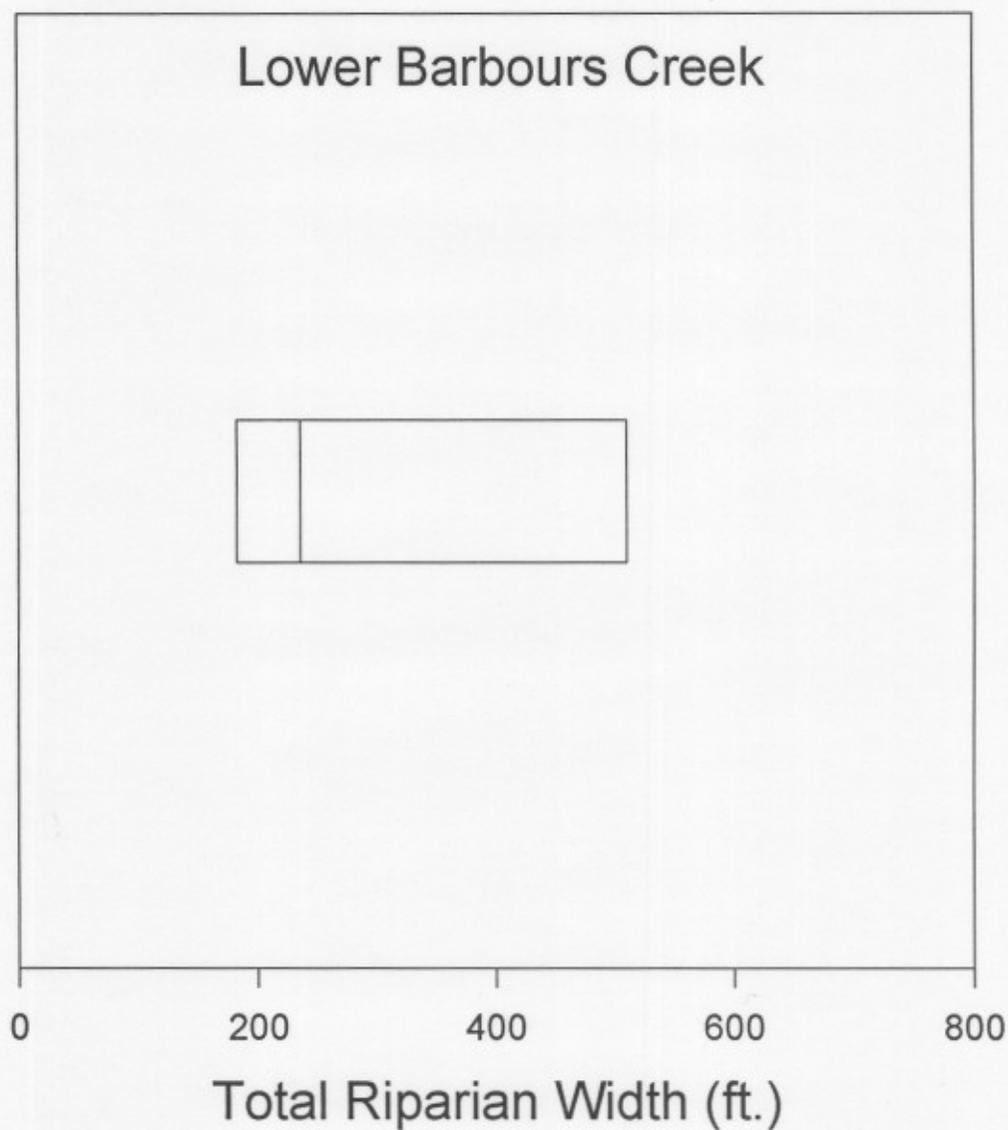
## Riparian Width

Stream: Lower Barbours Creek

Number of measurements: 4

Mean width: 346.0      Std Dev: 269.6

Max: 744.5              Min: 168.0



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 above and below the box represent the 90% and 10% quantiles.

Stream: Upper Barbours Creek

District: New Castle

Quadrangle: New Castle

Sample Date: 07/02/96

Downstream Starting Point: Confluence with Lipes Branch

**Total Distance Surveyed: 3.7 miles**

**Percent of Total Area - Pools: 29.1%**

Number of Pools: 282

Number of Pools per mile: 76.2

Total Pool Area: 81,255.9 sq. ft.  $\pm$  7,807.5

Mean Pool Area: 288.1 sq. ft.

Correction Factor: 0.99

Mean Maximum Depth: 1.5'

Mean Average Depth: 1.0'

**Percent of Total Area - Riffles: 70.9%**

Number of Riffles: 210

Number of Riffles per mile: 56.7

Total Riffle Area: 197,685.7 sq. ft.  $\pm$  47,364.3

Mean Riffle Area: 941.4 sq. ft.

Correction Factor: 1.13

Mean Maximum Depth: 0.9'

Mean Average Depth: 0.4'

**Number of Large Woody Debris Pieces per Mile: 43.9**

Wood < 15' and < 14": 17.6

Wood < 15' and > 14": 20.0

Wood > 15' and < 14": 4.9

Wood > 15' and > 14": 1.4

**Mean Channel Width: 14.1'**

**Mean Riparian Width: 65.0'**

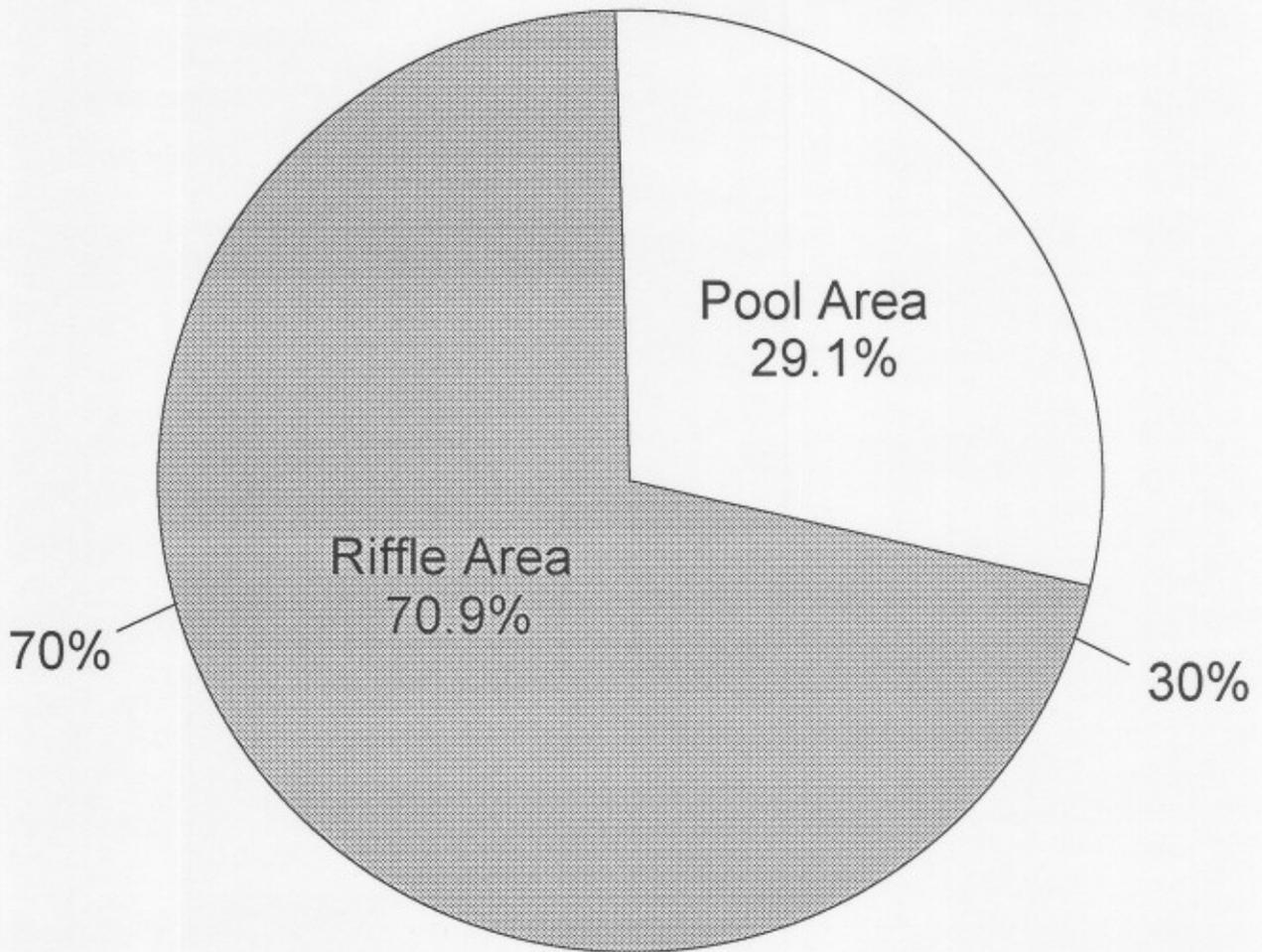
Mean Maximum Riparian Distance (either side): 39.8'

Mean Minimum Riparian Distance (either side): 11.1'

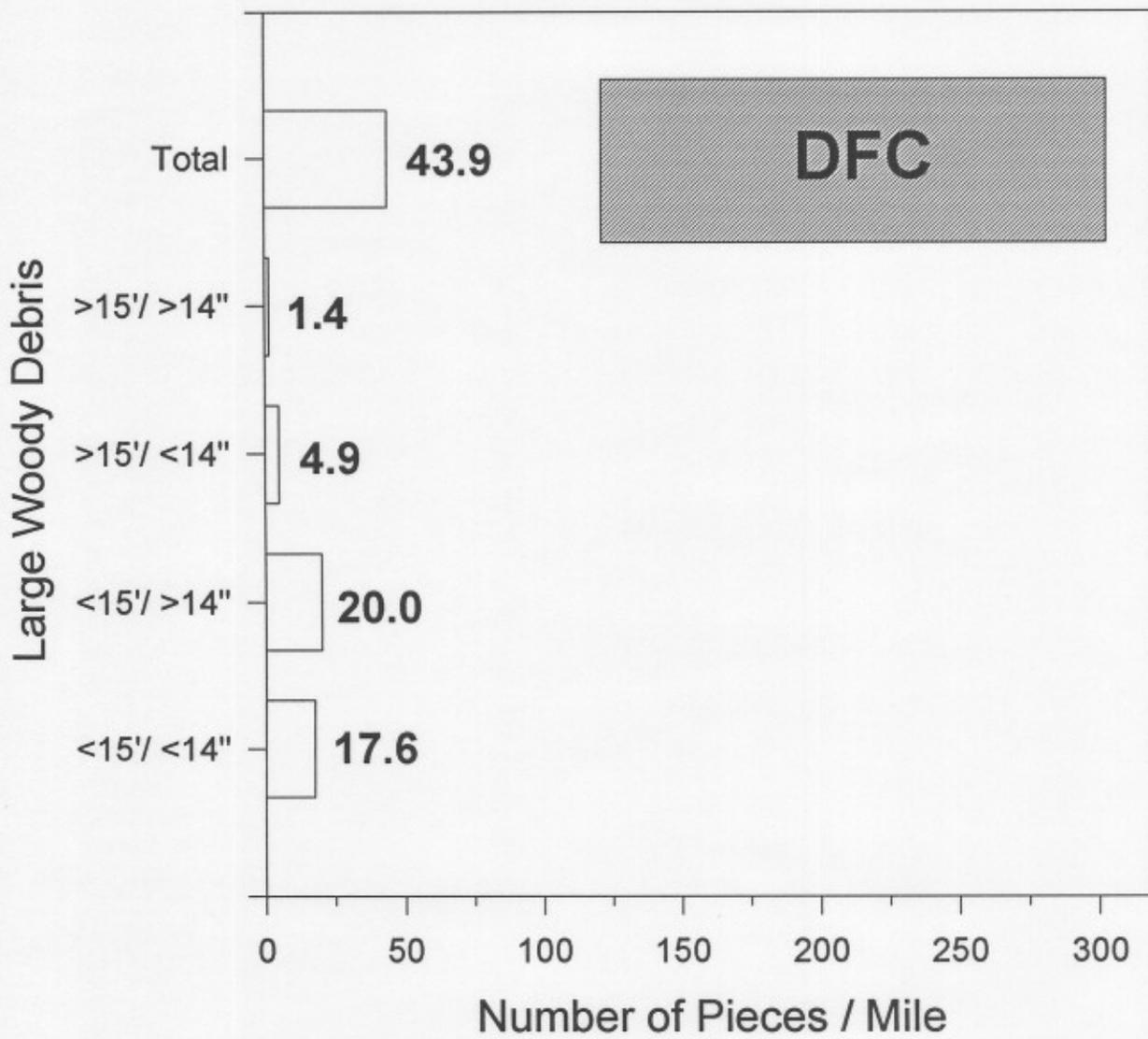
Maximum Riparian Width (Total): 207.0'

Minimum Riparian Width (Total): 16.4'

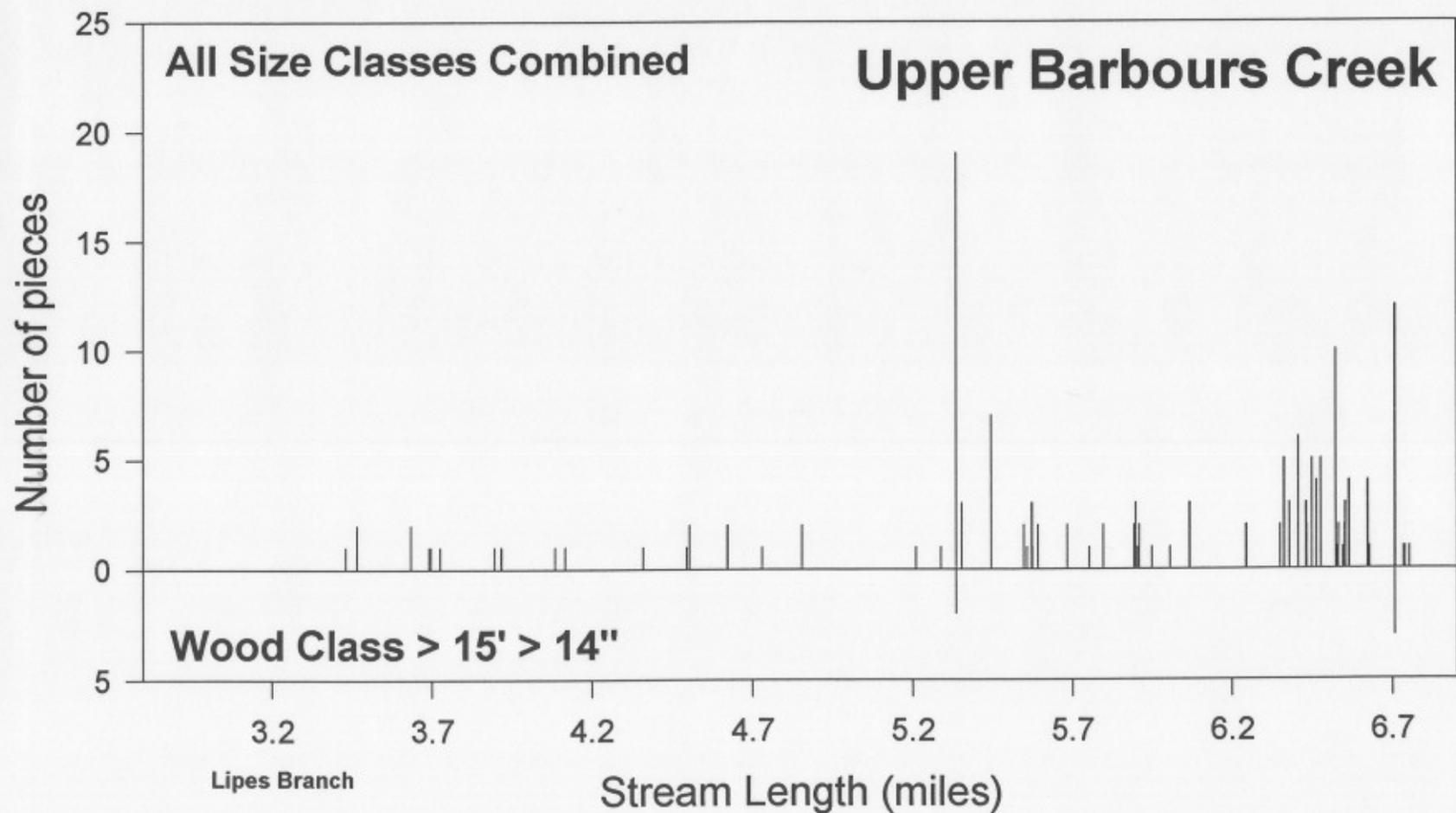
**Upper Barbour's Creek**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Upper Barbours Creek



# Large Woody Debris Distribution



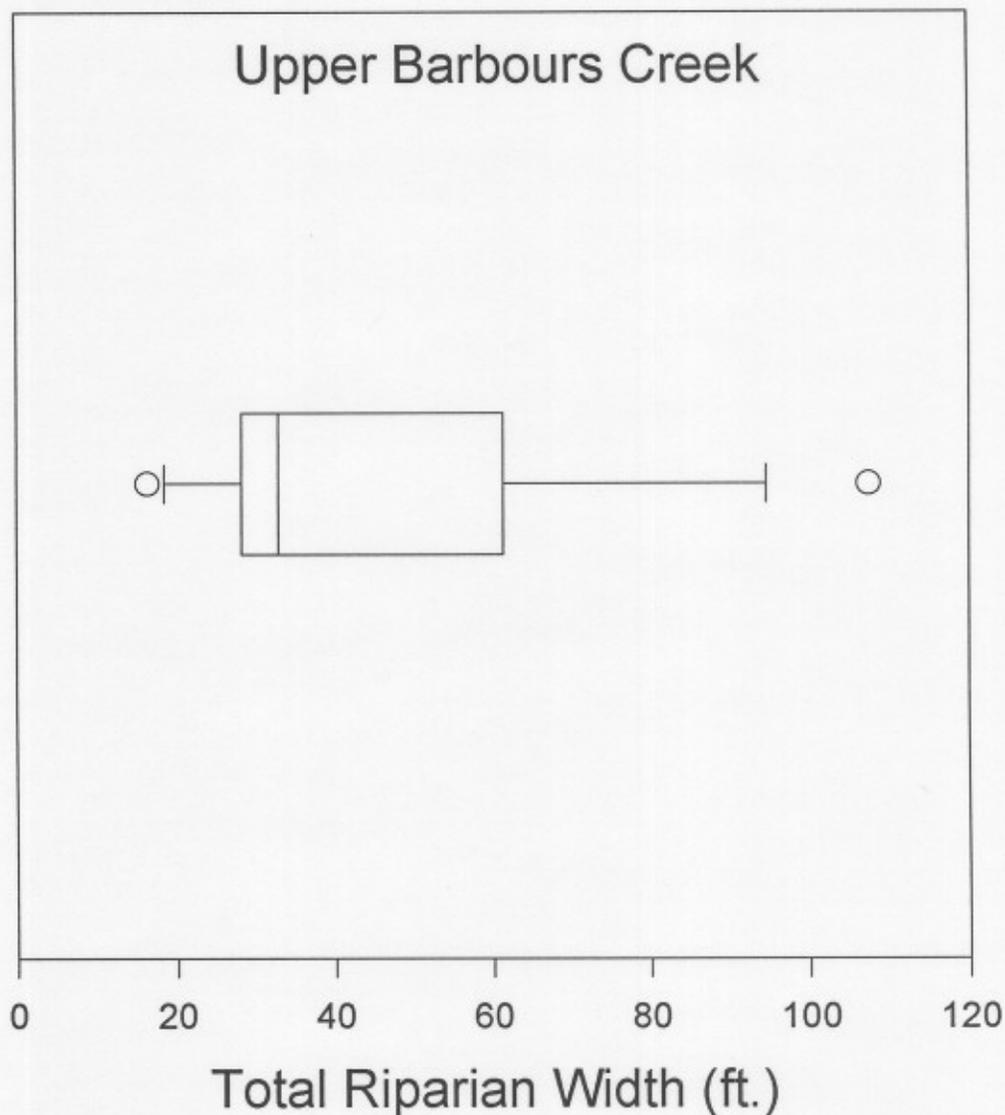
## Riparian Width

Stream: Upper Barbours Creek

Number of measurements: 10

Mean width: 46.4      Std Dev: 29.4

Max: 107.5      Min: 16.4



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 above and below the box represent the 90% and 10% quantiles.

Stream: Lipes Branch

District: New Castle

Quadrangle: New Castle

Sample Date: 06/12/96

Downstream Starting Point: Confluence with Barbours Creek

**Total Distance Surveyed: 1.7 miles**

**Percent of Total Area - Pools: 22.7%**

Number of Pools: 140

Number of Pools per mile: 82.3

Total Pool Area: 19,482.3 sq. ft.  $\pm$  1,742.1

Mean Pool Area: 139.2 sq. ft.

Correction Factor: 1.00

Mean Maximum Depth: 1.3'

Mean Average Depth: 0.9'

**Percent of Total Area - Riffles: 77.3%**

Number of Riffles: 110

Number of Riffles per mile: 64.7

Total Riffle Area: 66,237.3 sq. ft.  $\pm$  4,174.2

Mean Riffle Area: 602.2 sq. ft.

Correction Factor: 1.11

Mean Maximum Depth: 0.8'

Mean Average Depth: 0.4'

**Number of Large Woody Debris Pieces per Mile: 196.5**

Wood < 15' and < 14": 85.9

Wood < 15' and > 14": 15.3

Wood > 15' and < 14": 70.6

Wood > 15' and > 14": 24.7

**Mean Channel Width: 14.7'**

**Mean Riparian Width: 88.0'**

Mean Maximum Riparian Distance (either side): 13.3'

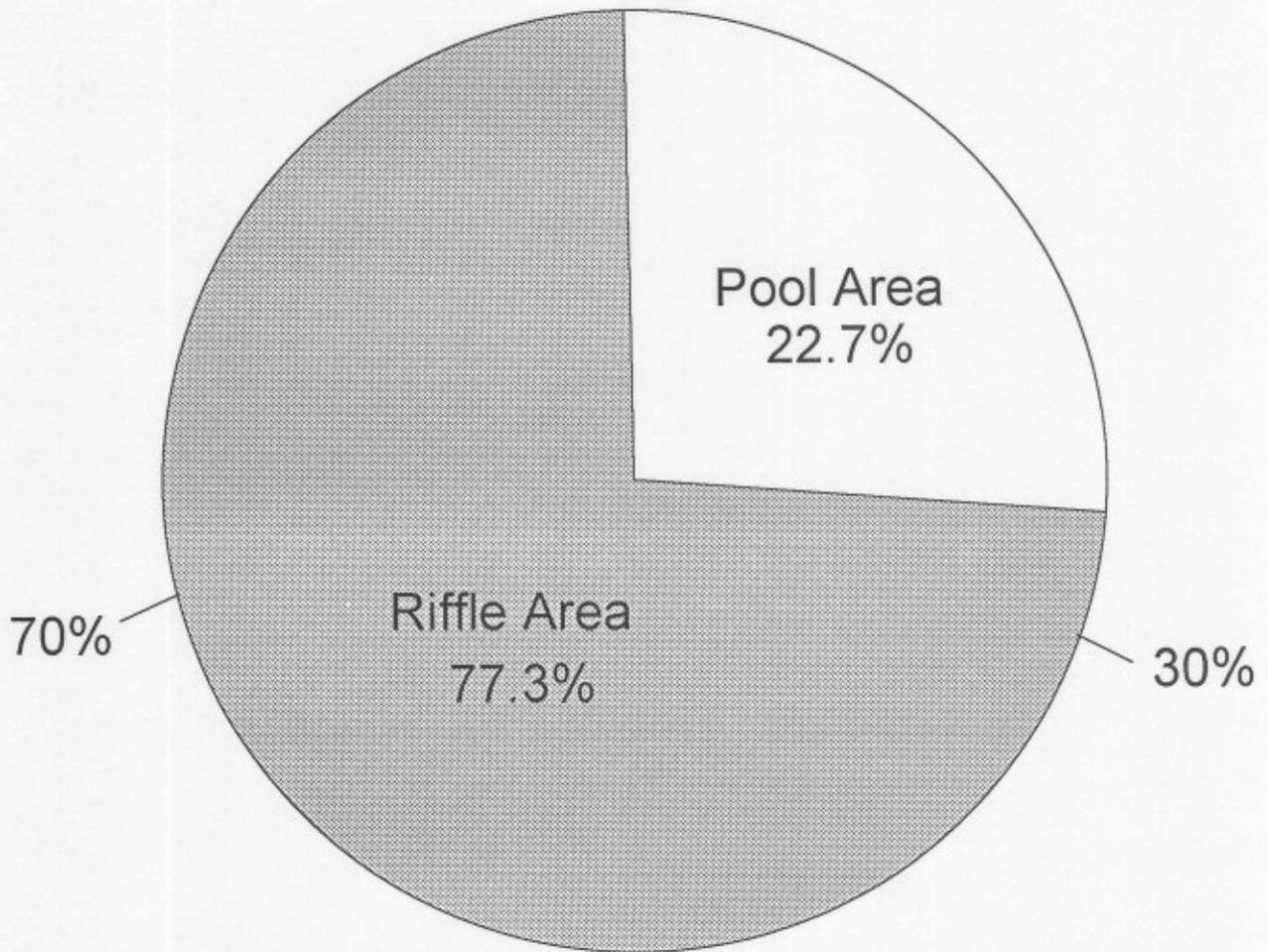
Mean Minimum Riparian Distance (either side): 60.0'

Maximum Riparian Width (Total): 305.4'

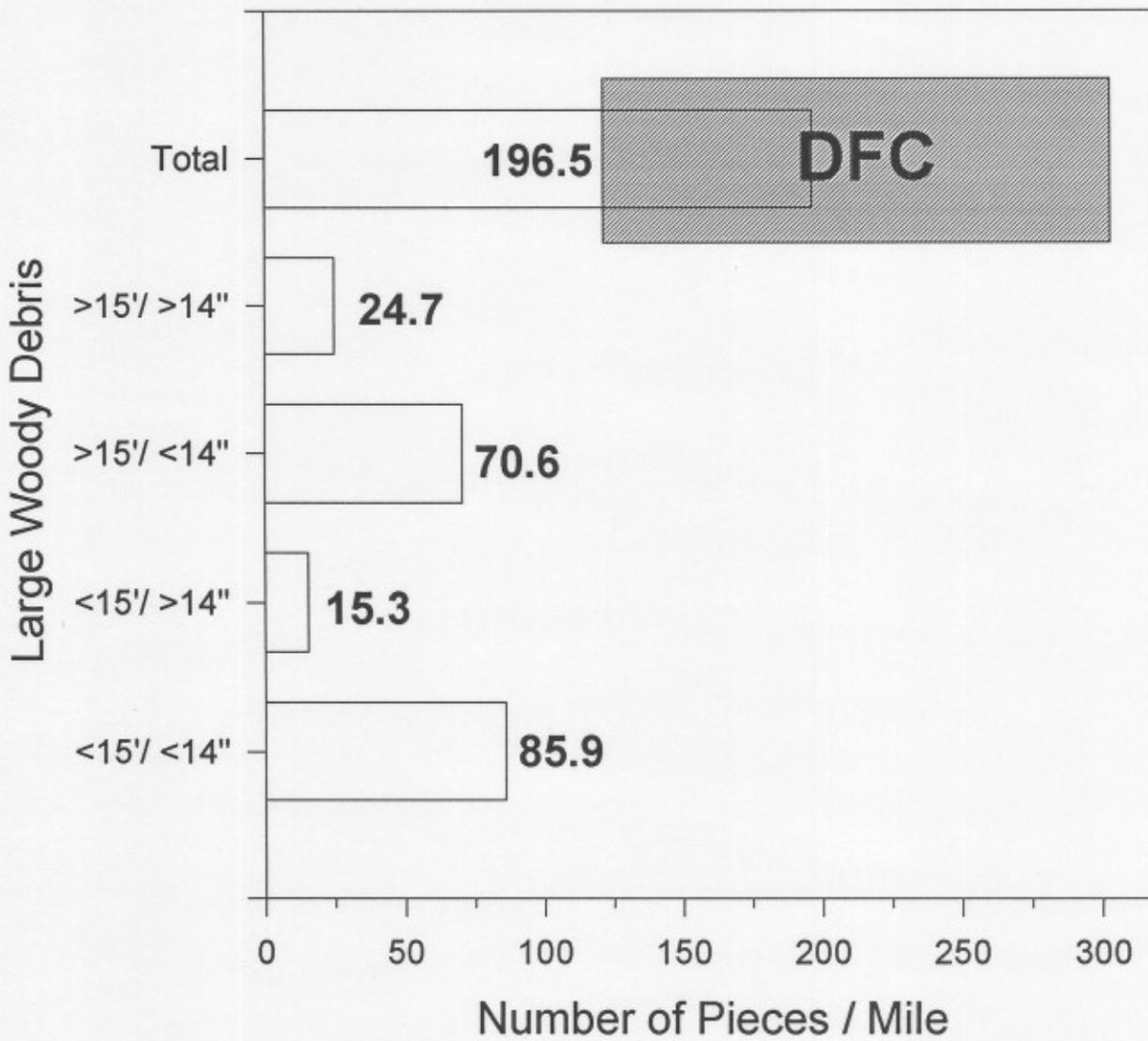
Minimum Riparian Width (Total): 40.0'

## Lipes Branch

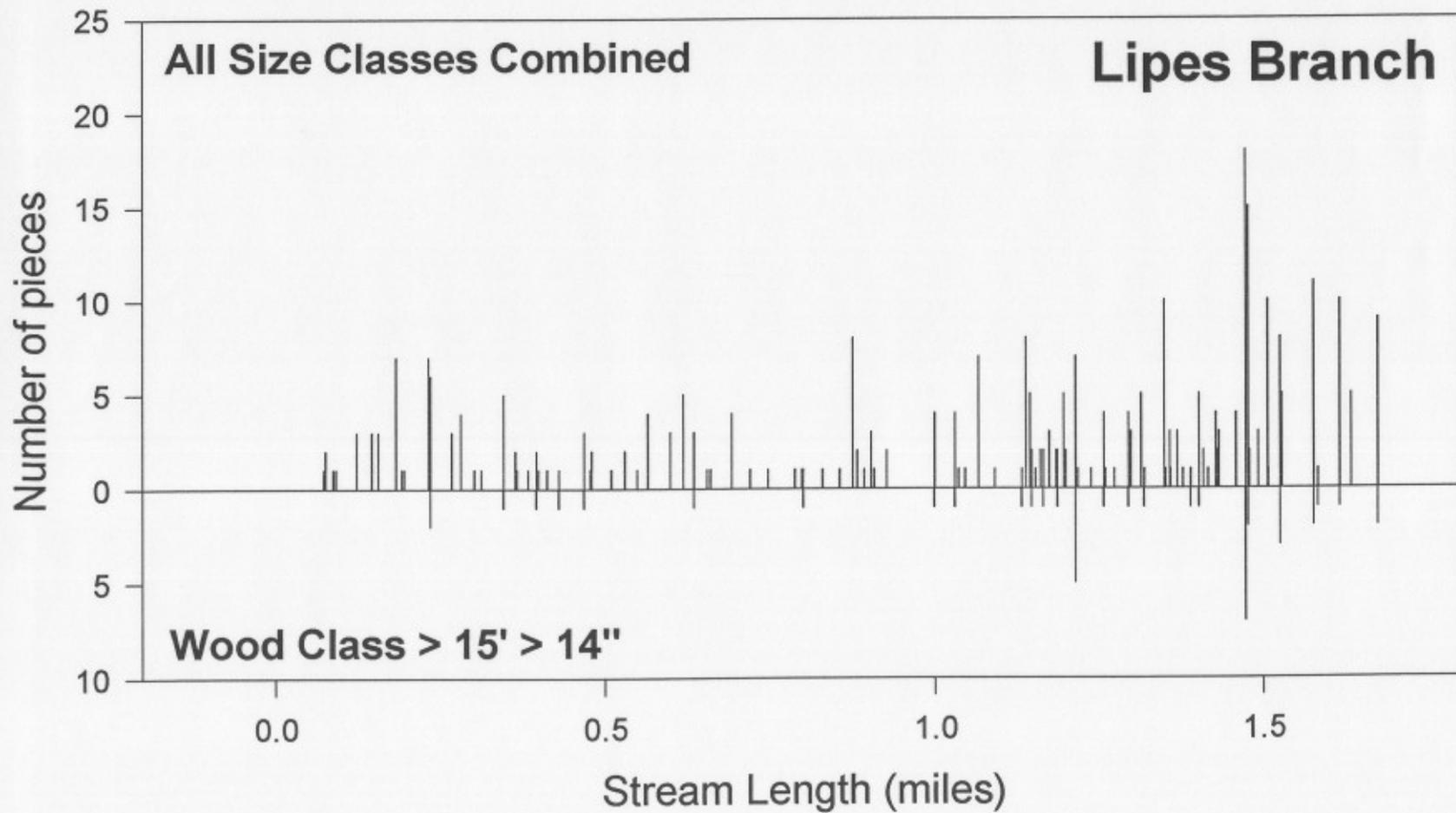
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Lipes Branch



# Large Woody Debris Distribution



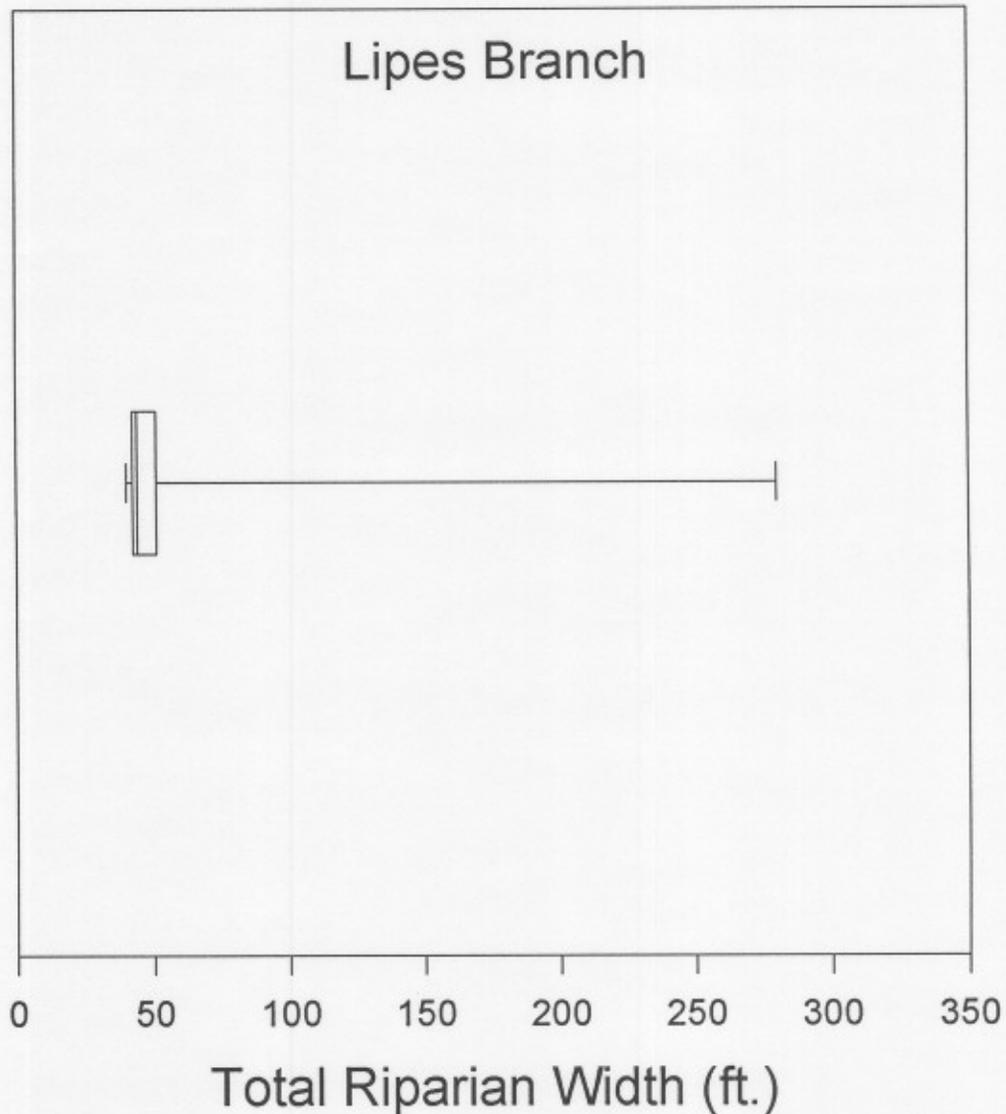
## Riparian Width

Stream: Lipes Branch

Number of measurements: 6

Mean width: 87.9    Std Dev: 106.6

Max: 305.4            Min: 40.0



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 above and below the box represent the 90% and 10% quantiles.

Stream: Lower Mill Creek

District: New Castle

Quadrangle: New Castle

Sample Date: 6/3/96

Downstream Starting Point: confl. with Craig Creek

**Total Distance Surveyed: 2.2 miles**

**Percent of Total Area - Pools: 54.8%**

Number of Pools: 132

Number of Pools per mile: 60

Total Pool Area: 101,570.5 ± 18,299.3 sq. ft.

Mean Pool Area: 769.5 sq. ft.

Correction Factor: 1.11

Mean Maximum Depth: 2.0'

Mean Average Depth: 1.4'

**Percent of Total Area - Riffles: 45.2%**

Number of Riffles: 114

Number of Riffles per mile: 52

Total Riffle Area: 83,540.2 ± 16903.3 sq. ft.

Mean Riffle Area: 732.8 sq. ft.

Correction Factor: 0.94

Mean Maximum Depth: 1.4'

Mean Average Depth: 0.9'

**Number of Large Woody Debris Pieces per Mile: 400.0**

Wood < 15' and < 14": 271.8

Wood < 15' and > 14": 13.2

Wood > 15' and < 14": 98.2

Wood > 15' and > 14": 16.8

**Mean Channel Width: 26.1'**

**Mean Riparian Width: 214.1'**

Mean Maximum Riparian Distance(either side): 139.8'

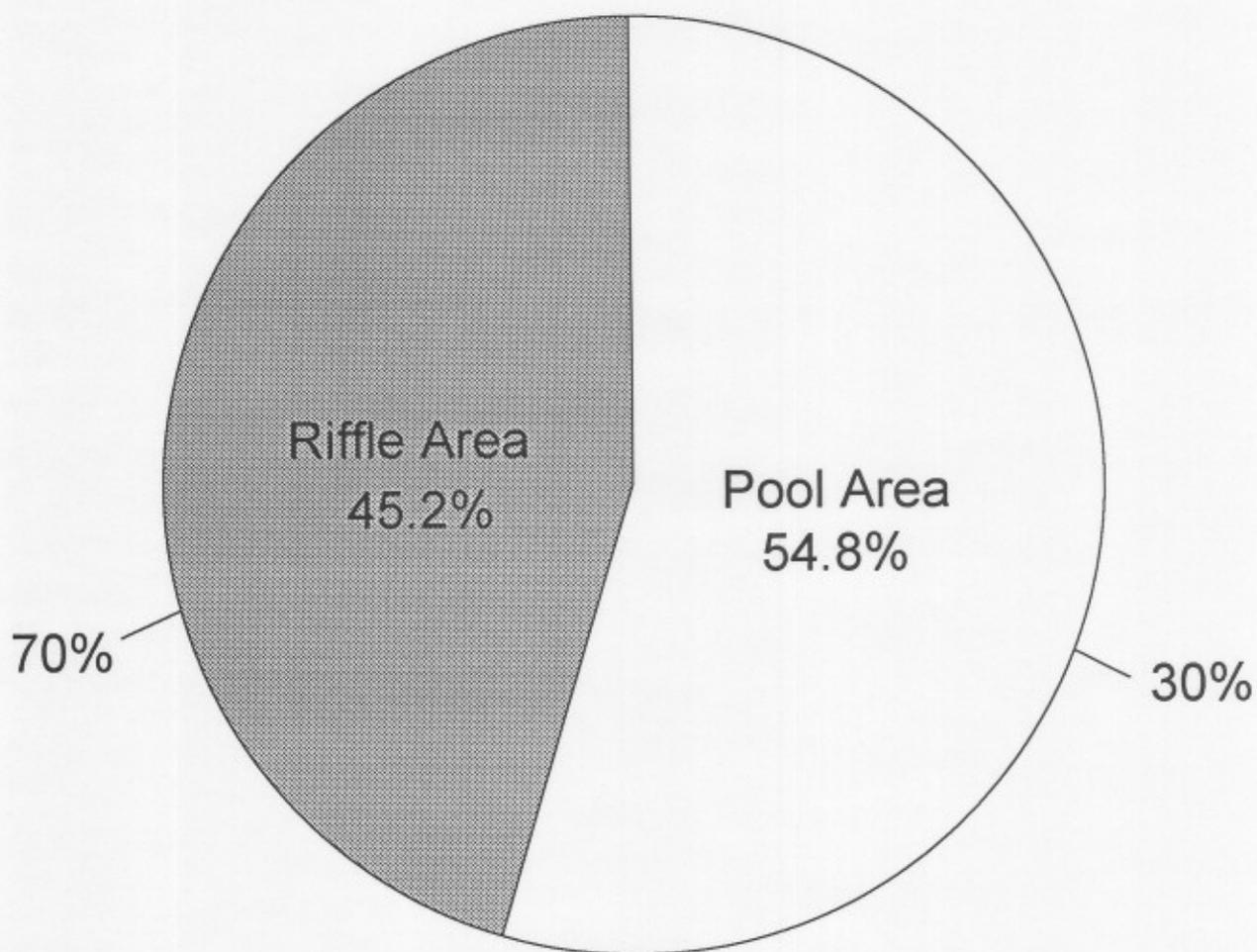
Mean Minimum Riparian Distance(either side): 48.3'

Maximum Riparian Width (Total): 625.3'

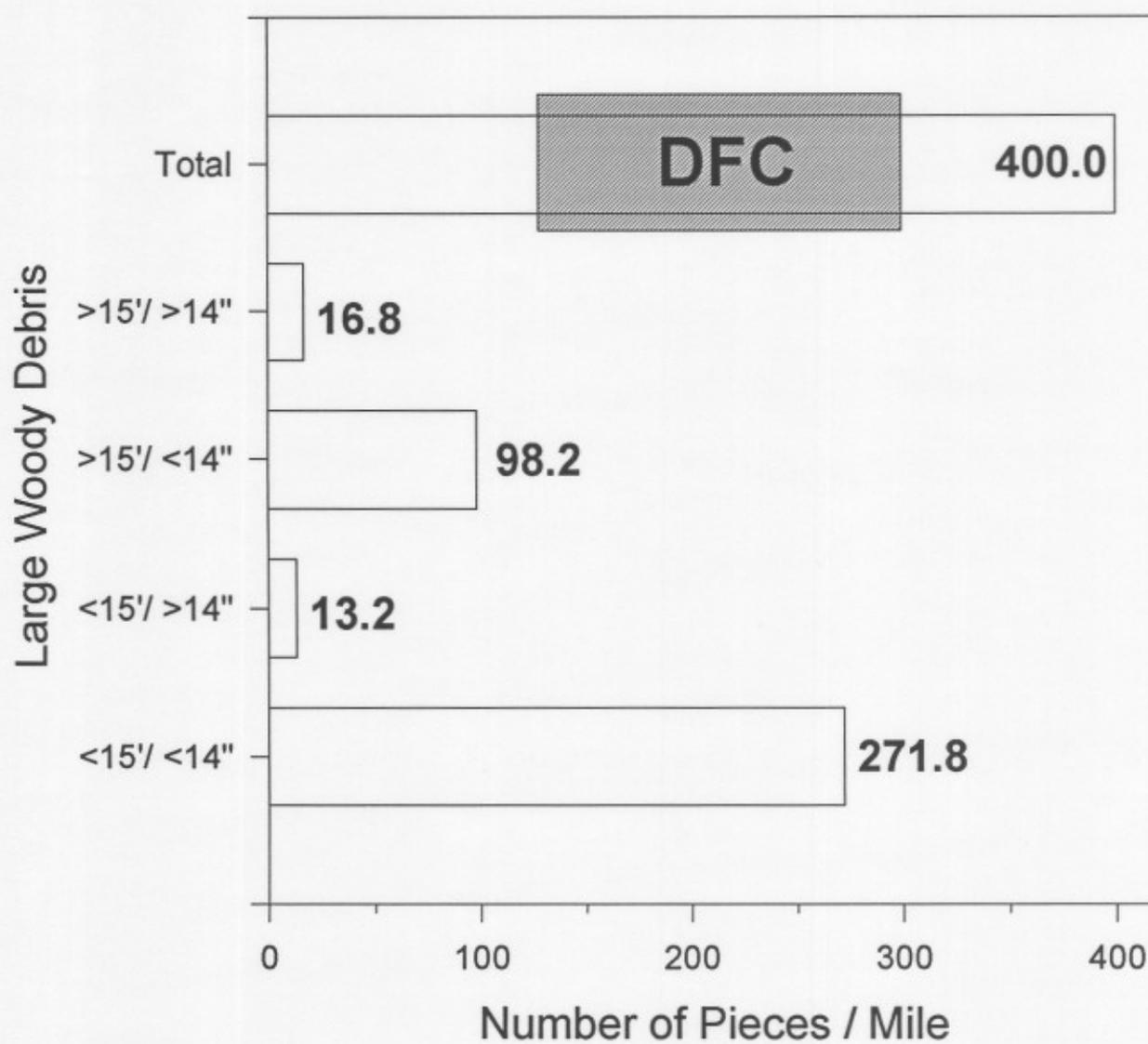
Minimum Riparian Width (Total): 69.2'

### Lower Mill Creek

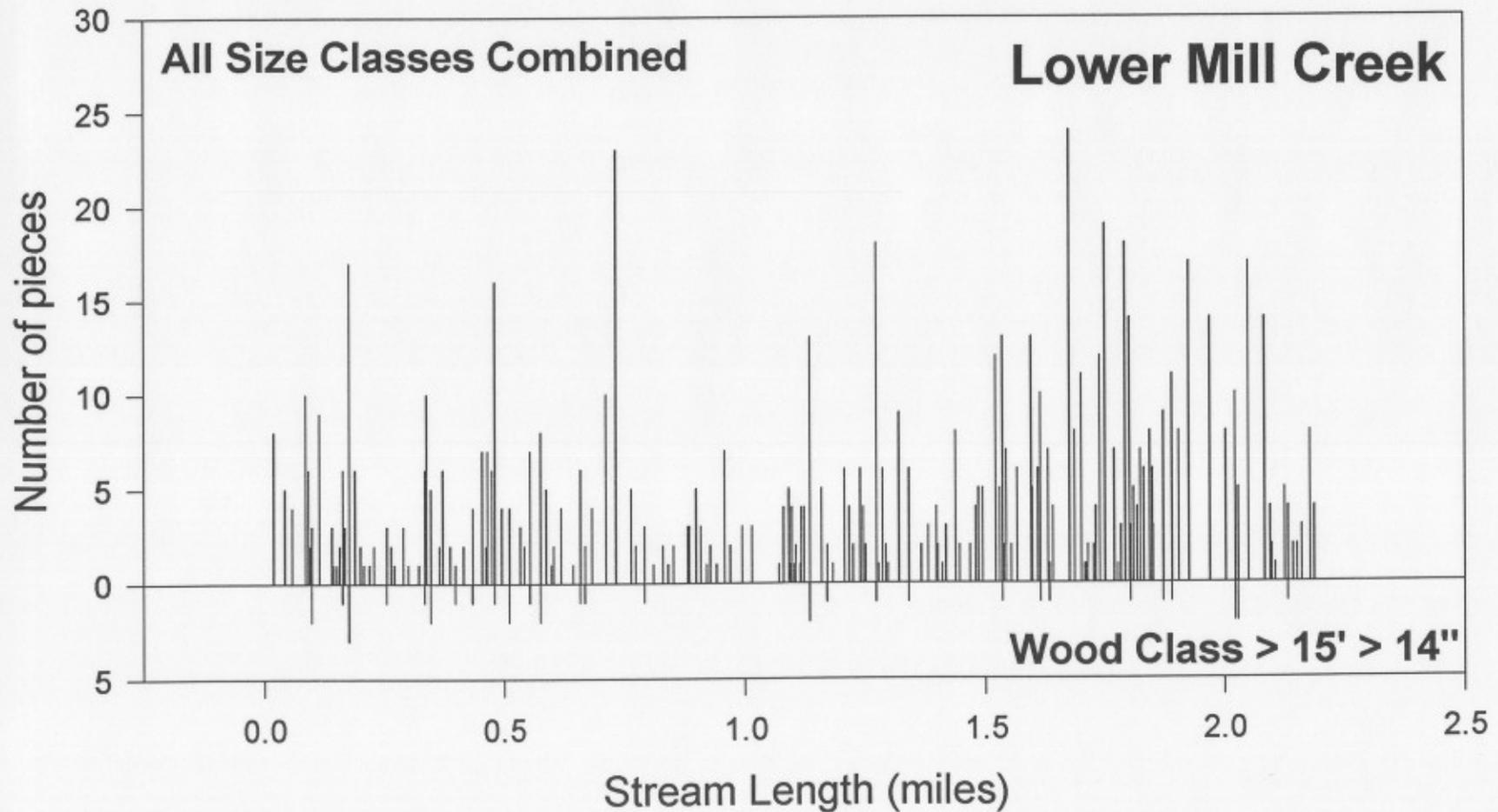
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



## Lower Mill Creek



# Large Woody Debris Distribution



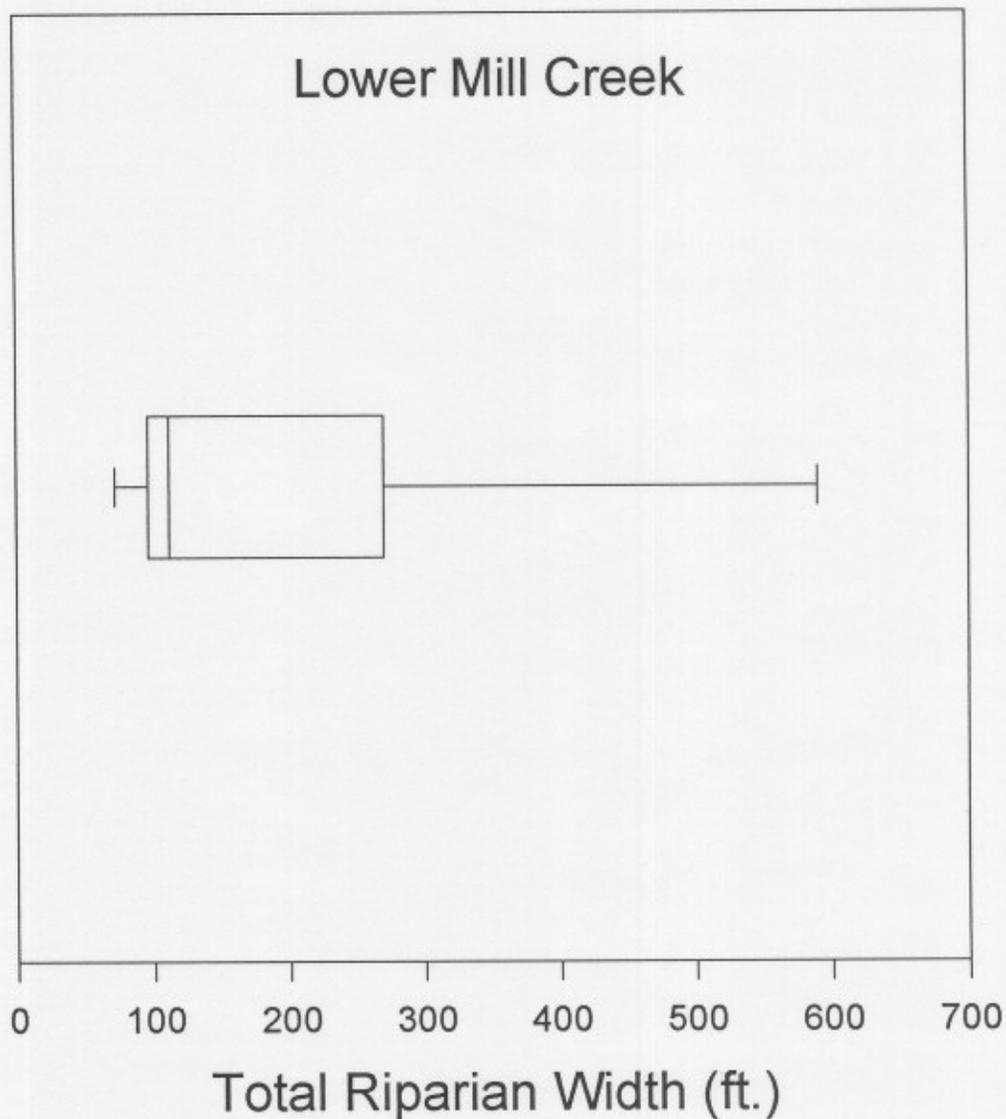
## Riparian Width

Stream: Lower Mill Creek

Number of measurements: 6

Mean width: 214.1 Std Dev: 213.7

Max: 625.3 Min: 69.2



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 above and below the box represent the 90% and 10% quantiles.

Stream: Upper Mill Creek

District: New Castle

Quadrangle: New Castle

Sample Date: 6/3/96

Downstream Starting Point: First parking lot on USFS rt.181

**Total Distance Surveyed: 2.9 miles**

**Percent of Total Area - Pools: 32.2%**

Number of Pools: 232

Number of Pools per mile: 80

Total Pool Area: 45,335.9 ± 3,664.4 sq. ft.

Mean Pool Area: 195.4 sq. ft.

Correction Factor: 1.01

Mean Maximum Depth: 1.4'

Mean Average Depth: 1.0'

**Percent of Total Area - Riffles: 67.8%**

Number of Riffles: 191

Number of Riffles per mile: 66

Total Riffle Area: 95,392.9 ± 10,854.2 sq. ft.

Mean Riffle Area: 499.4 sq. ft.

Correction Factor: 0.99

Mean Maximum Depth: 1.0'

Mean Average Depth: 0.6'

**Number of Large Woody Debris Pieces per Mile: 56.9**

Wood < 15' and < 14": 40.0

Wood < 15' and > 14": 3.1

Wood > 15' and < 14": 11.0

Wood > 15' and > 14": 2.8

**Mean Channel Width: 11.8'**

**Mean Riparian Width: 161.5'**

Mean Maximum Riparian Distance(either side): 105.6'

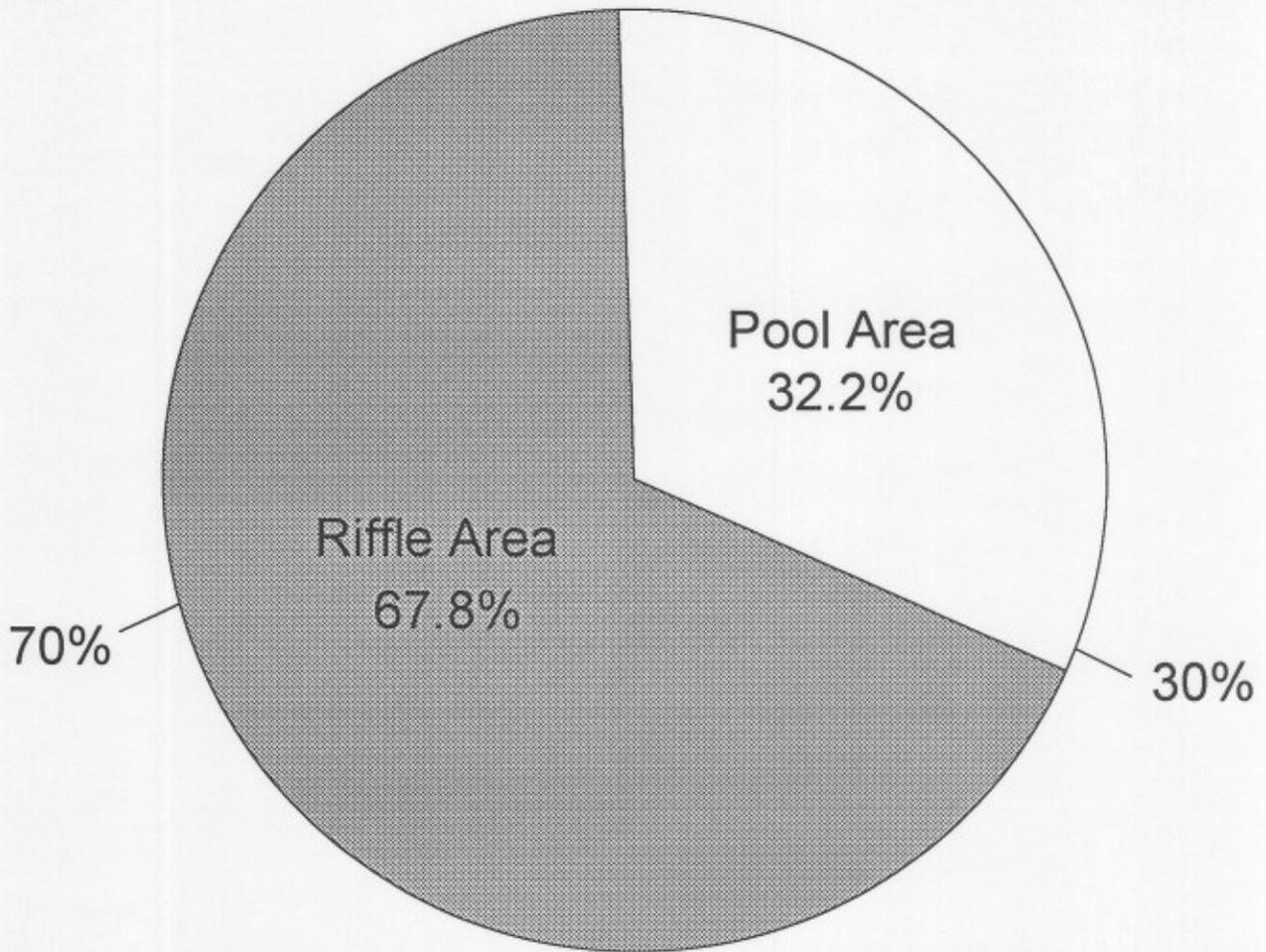
Mean Minimum Riparian Distance(either side): 44.1'

Maximum Riparian Width (Total): 553.4'

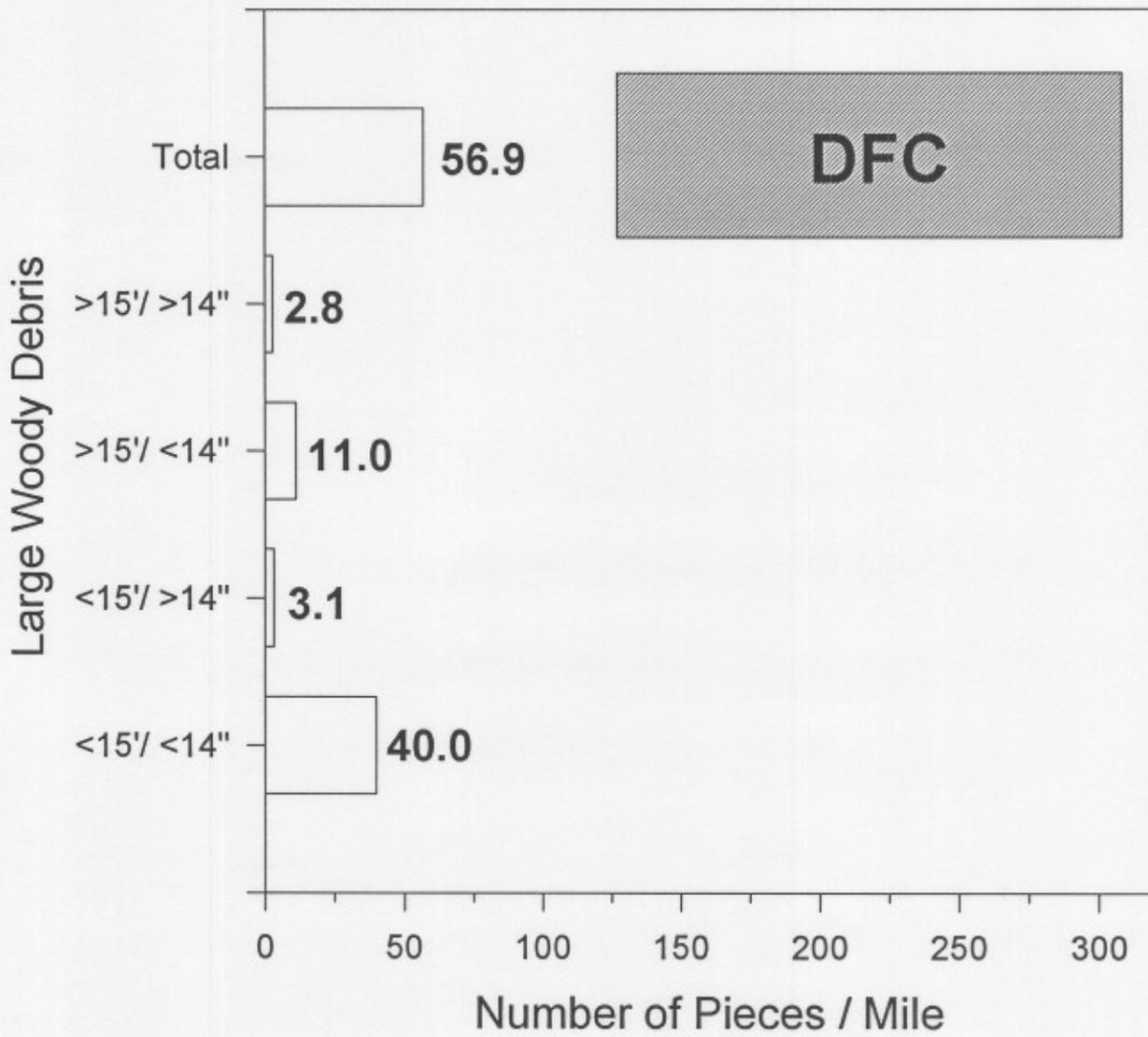
Minimum Riparian Width (Total): 58.7'

### Upper Mill Creek

DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Upper Mill Creek





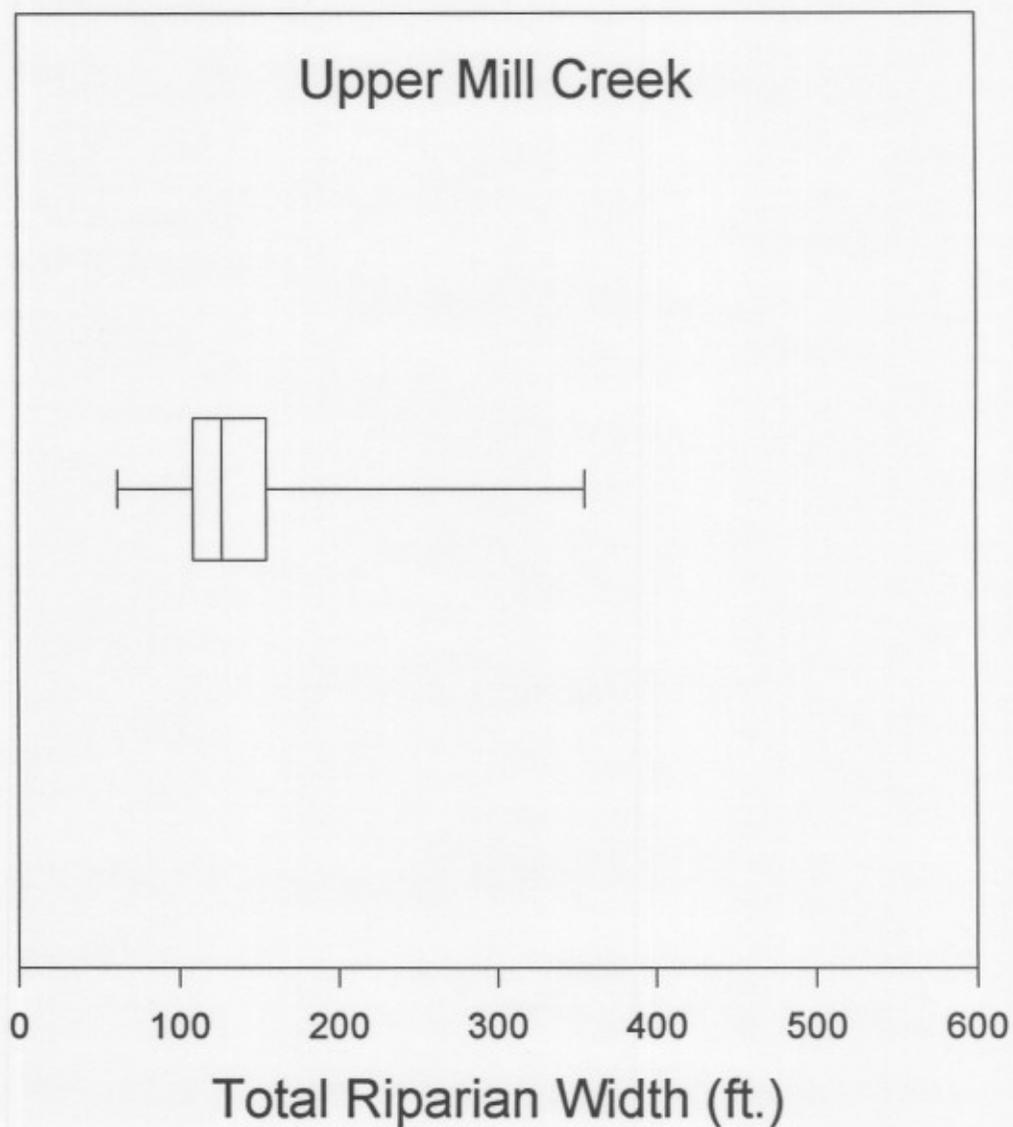
## Riparian Width

Stream: Upper Mill Creek

Number of measurements: 10

Mean width: 161.5 Std Dev: 141.9

Max: 553.4 Min: 58.7



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 above and below the box represent the 90% and 10% quantiles.

Stream: Roland's Run Branch

District: New Castle

Quadrangle: New Castle

Sample Date: 06/19/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed:** 1.2 miles

**Percent of Total Area - Pools:** 61.5%

Number of Pools: 68

Number of Pools per mile: 56.6

Total Pool Area: 44,969.2 sq. ft.  $\pm$  10,536.4

Mean Pool Area: 661.3 sq. ft.

Correction Factor: 1.10

Mean Maximum Depth: 1.0'

Mean Average Depth: 0.5'

**Percent of Total Area - Riffles:** 38.5%

Number of Riffles: 46

Number of Riffles per mile: 38.3

Total Riffle Area: 28,141.0 sq. ft.  $\pm$  7,331.0

Mean Riffle Area: 611.8 sq. ft.

Correction Factor: 1.26

Mean Maximum Depth: 0.5'

Mean Average Depth: 0.2'

**Number of Large Woody Debris Pieces per Mile:** 140.0

Wood < 15' and < 14": 47.5

Wood < 15' and > 14": 10.0

Wood > 15' and < 14": 65.8

Wood > 15' and > 14": 16.7

**Mean Channel Width:** 22.8'

**Mean Riparian Width:** 216.1'

Mean Maximum Riparian Distance (either side): 161.0'

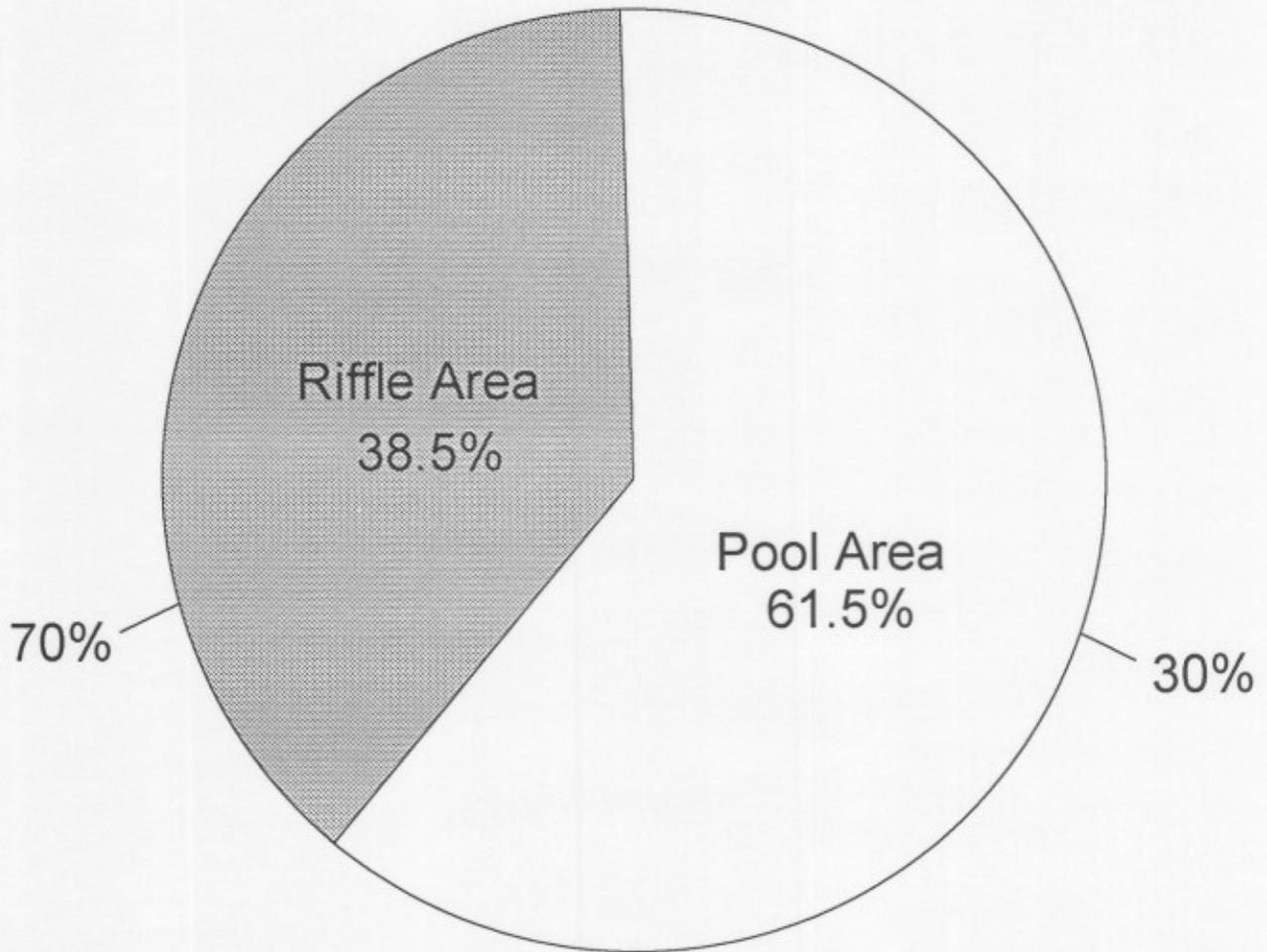
Mean Minimum Riparian Distance (either side): 32.3'

Maximum Riparian Width (Total): 352.0'

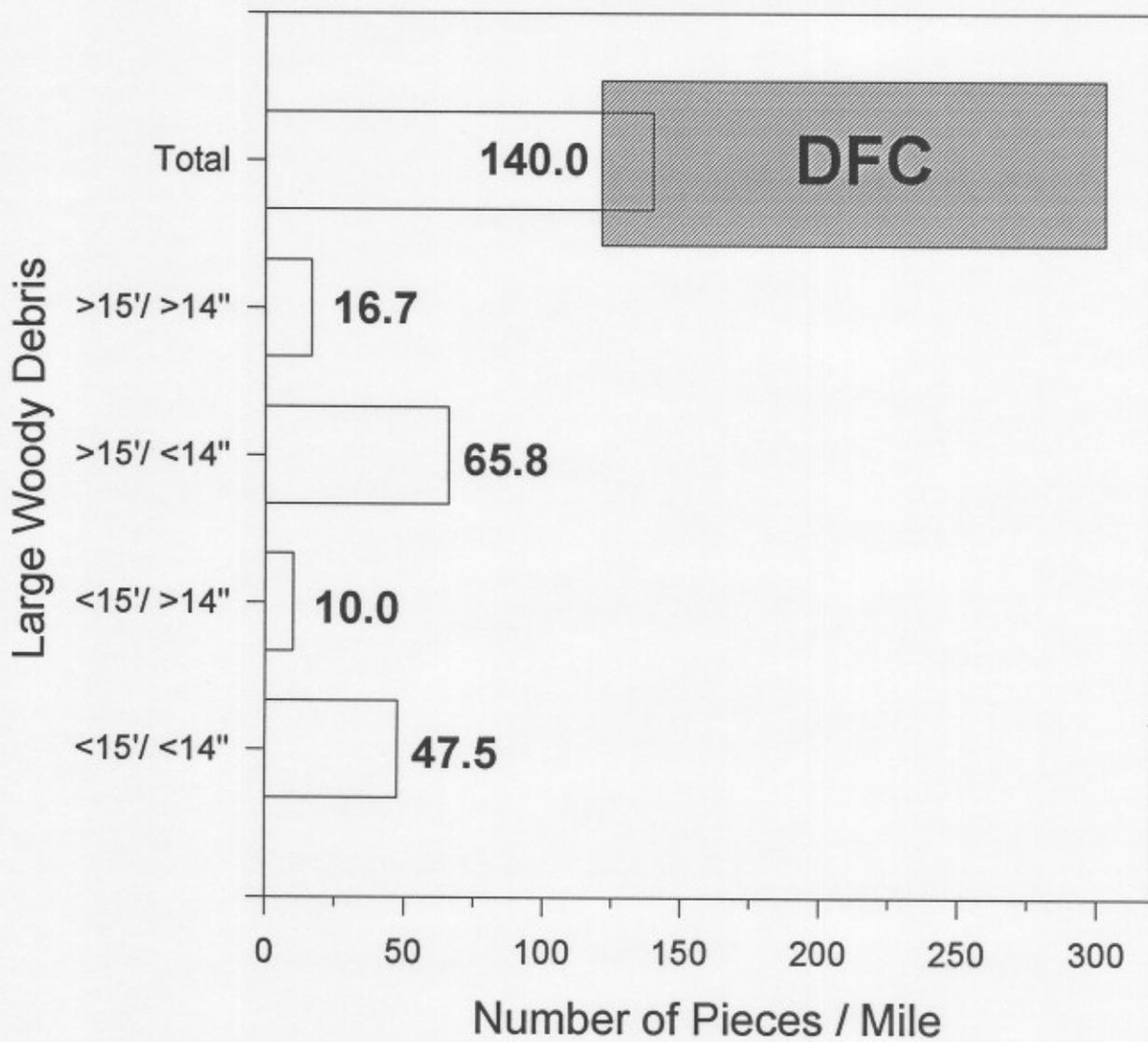
Minimum Riparian Width (Total): 144.5'

### Roland's Run Branch

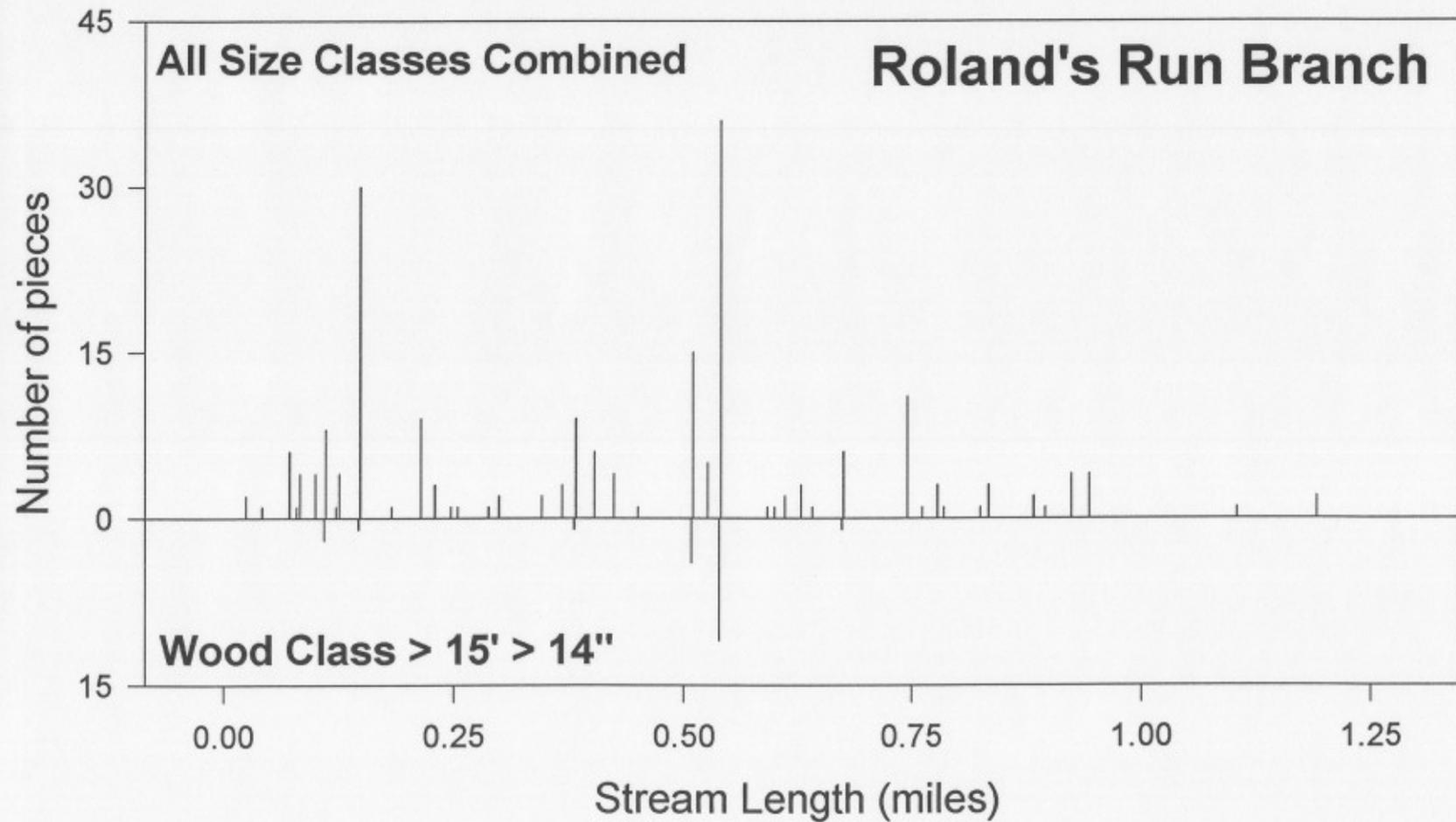
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Rolands Run Branch



# Large Woody Debris Distribution



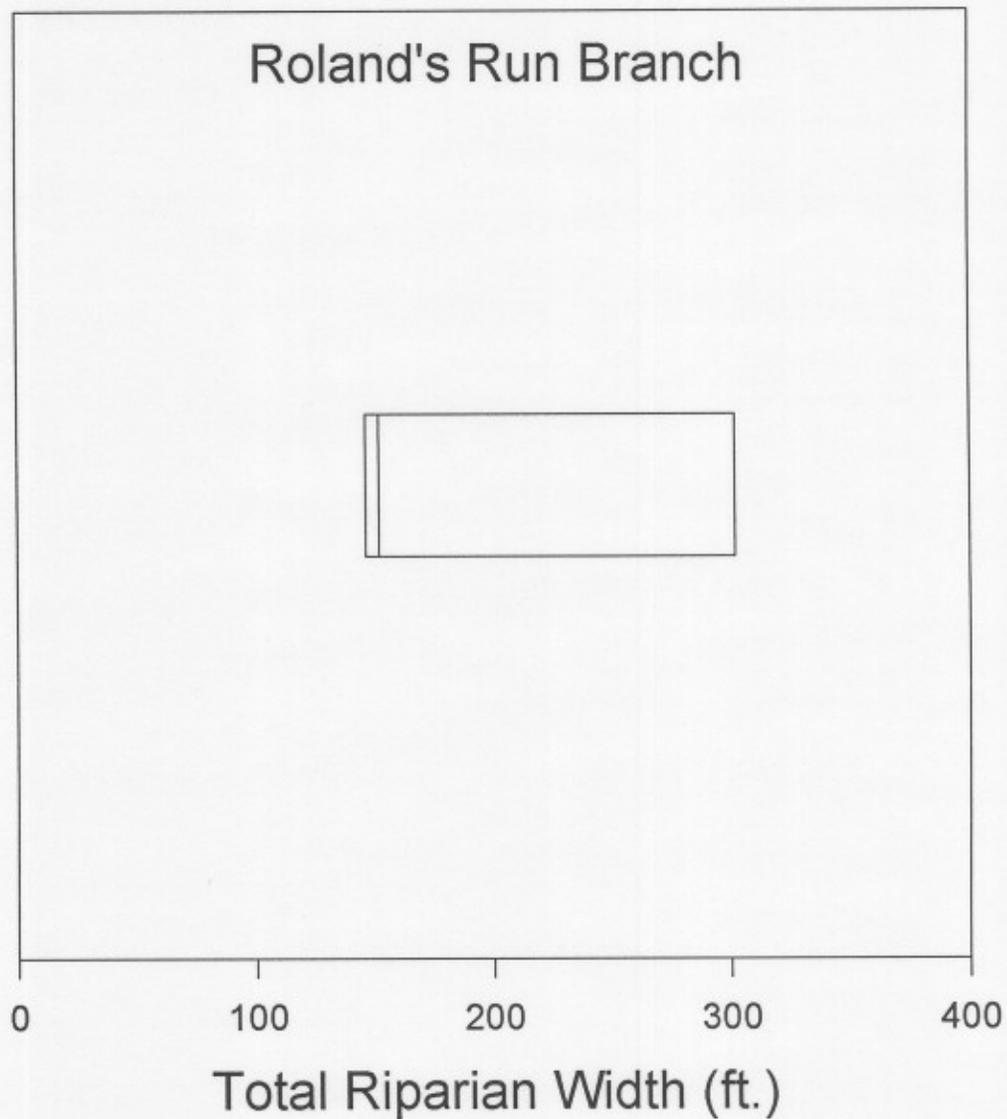
## Riparian Width

Stream: Roland's Run Branch

Number of measurements: 3

Mean width: 216.1    Std Dev: 117.7

Max: 352.0            Min: 144.5



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 above and below the box represent the 90% and 10% quantiles.

Stream: South Prong Barbours Creek

District: New Castle

Quadrangle: New Castle

Sample Date: 06/03/96

Downstream Starting Point: Confluence with Barbours Creek

**Total Distance Surveyed: 2.8 miles**

**Percent of Total Area - Pools: 31.8%**

Number of Pools: 271

Number of Pools per mile: 96.7

Total Pool Area: 77,010.5 sq. ft.  $\pm$  15,126.3

Mean Pool Area: 284.2 sq. ft.

Correction Factor: 0.88

Mean Maximum Depth: 1.8'

Mean Average Depth: 1.1'

**Percent of Total Area - Riffles: 68.2%**

Number of Riffles: 227

Number of Riffles per mile: 81.0

Total Riffle Area: 165,181.4 sq. ft.  $\pm$  15,078.5

Mean Riffle Area: 727.7 sq. ft.

Correction Factor: 0.97

Mean Maximum Depth: 1.2'

Mean Average Depth: 0.6'

**Number of Large Woody Debris Pieces per Mile: 481.3**

Wood < 15' and < 14": 343.9

Wood < 15' and > 14": 21.4

Wood > 15' and < 14": 96.4

Wood > 15' and > 14": 19.6

**Mean Channel Width: 27.6'**

**Mean Riparian Width: 70.8'**

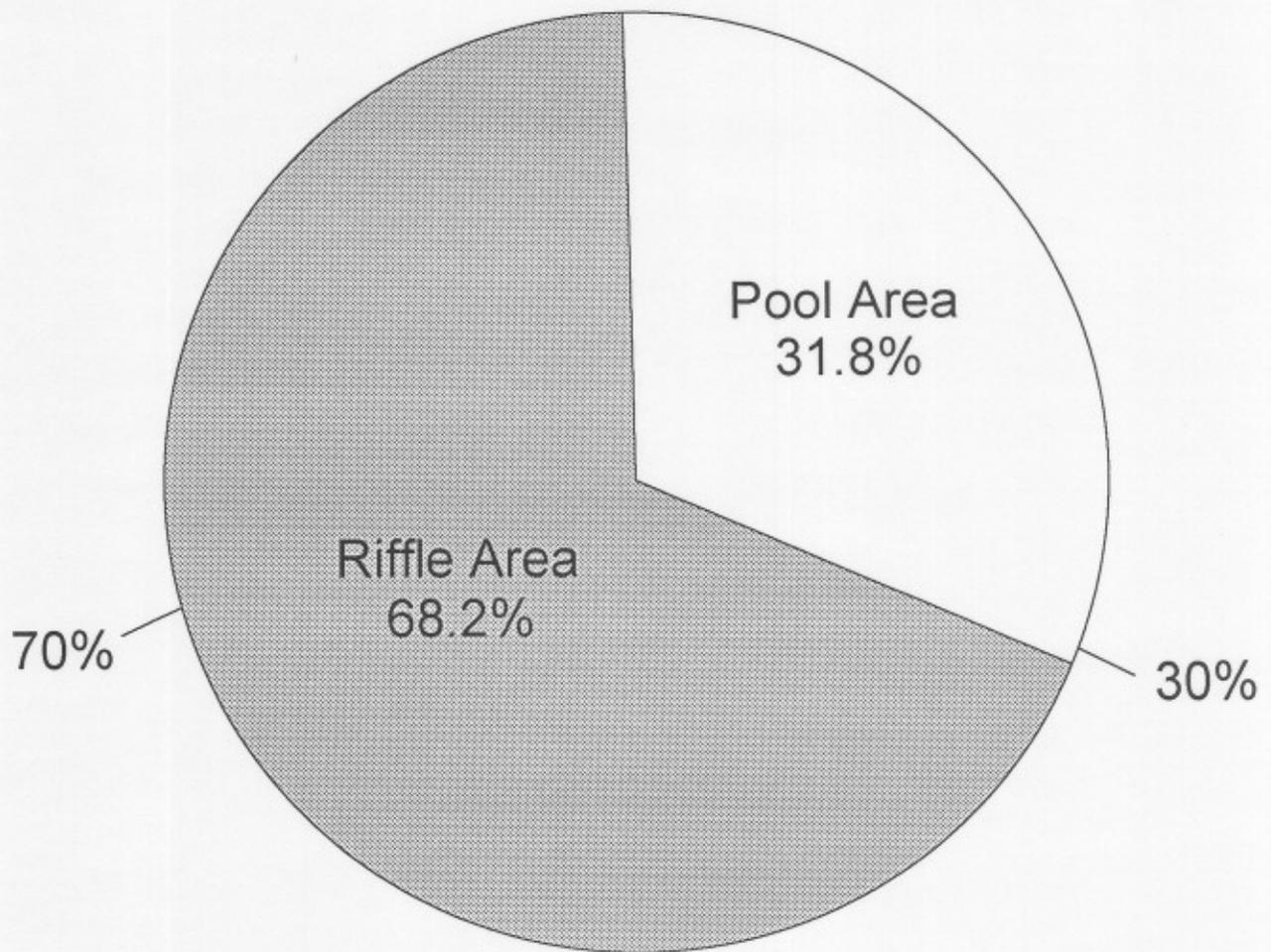
Mean Maximum Riparian Distance (either side): 32.6'

Mean Minimum Riparian Distance (either side): 10.7'

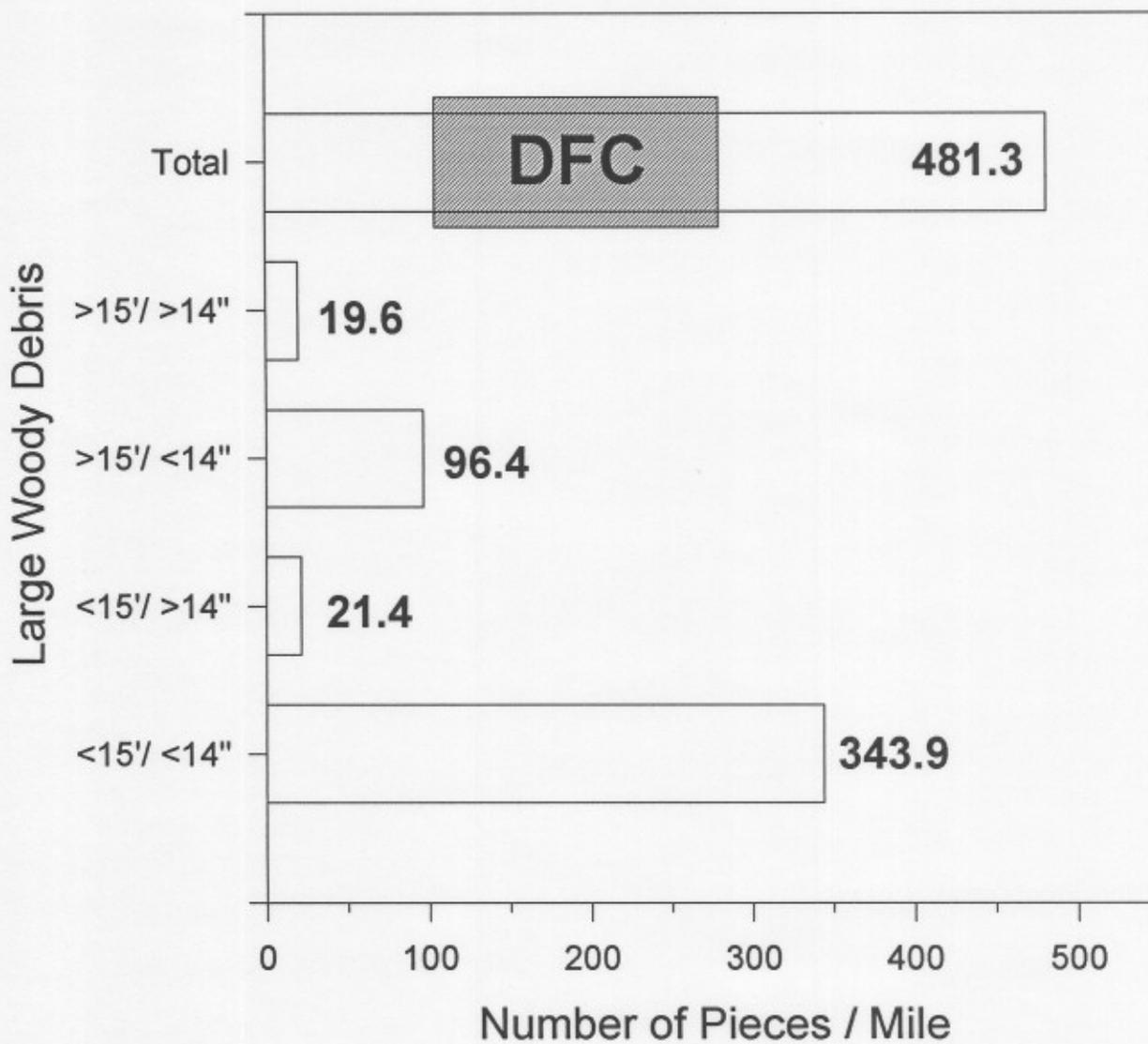
Maximum Riparian Width (Total): 119.8'

Minimum Riparian Width (Total): 37.9'

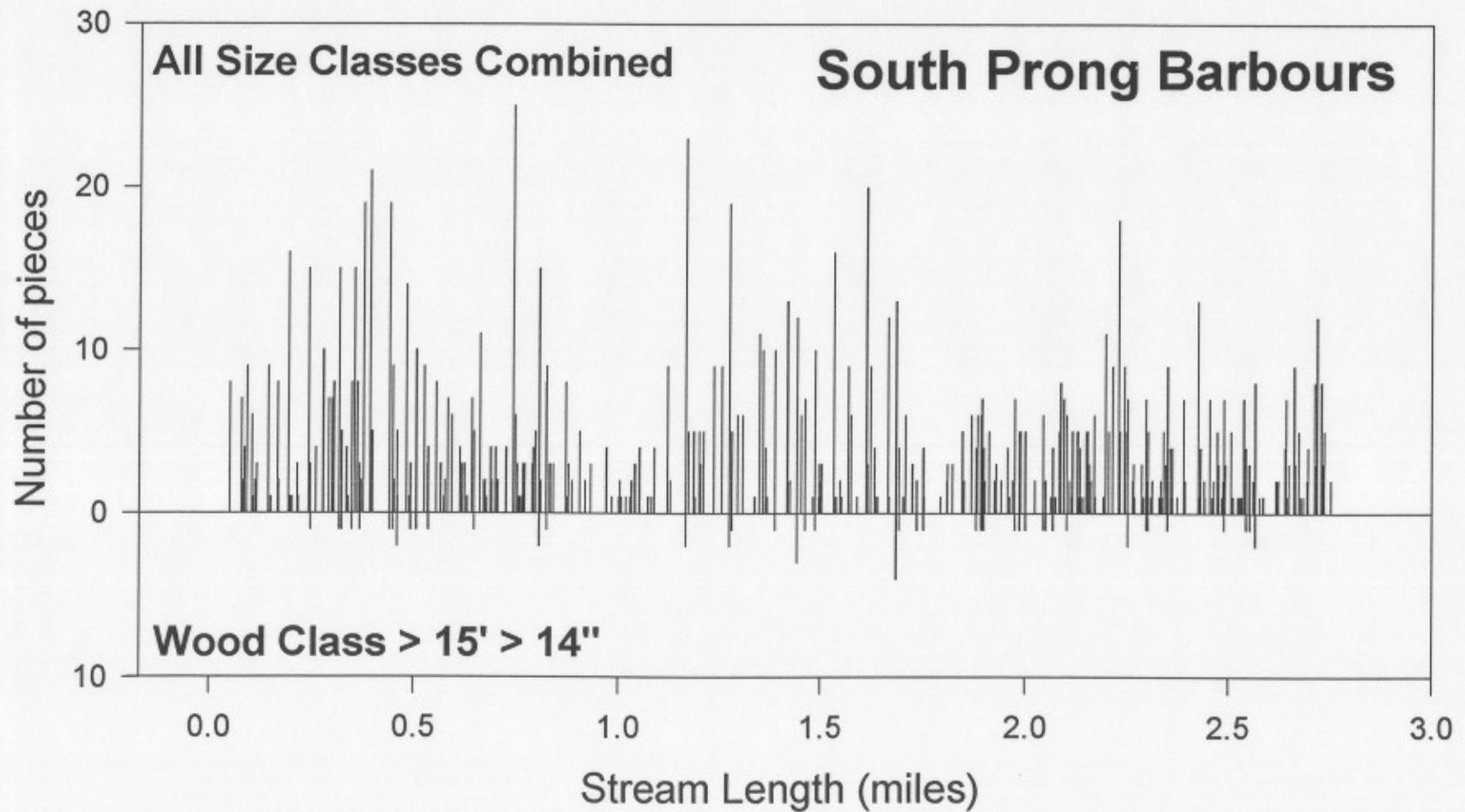
**South Prong of Barbours**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



## South Prong Barbours Creek



# Large Woody Debris Distribution



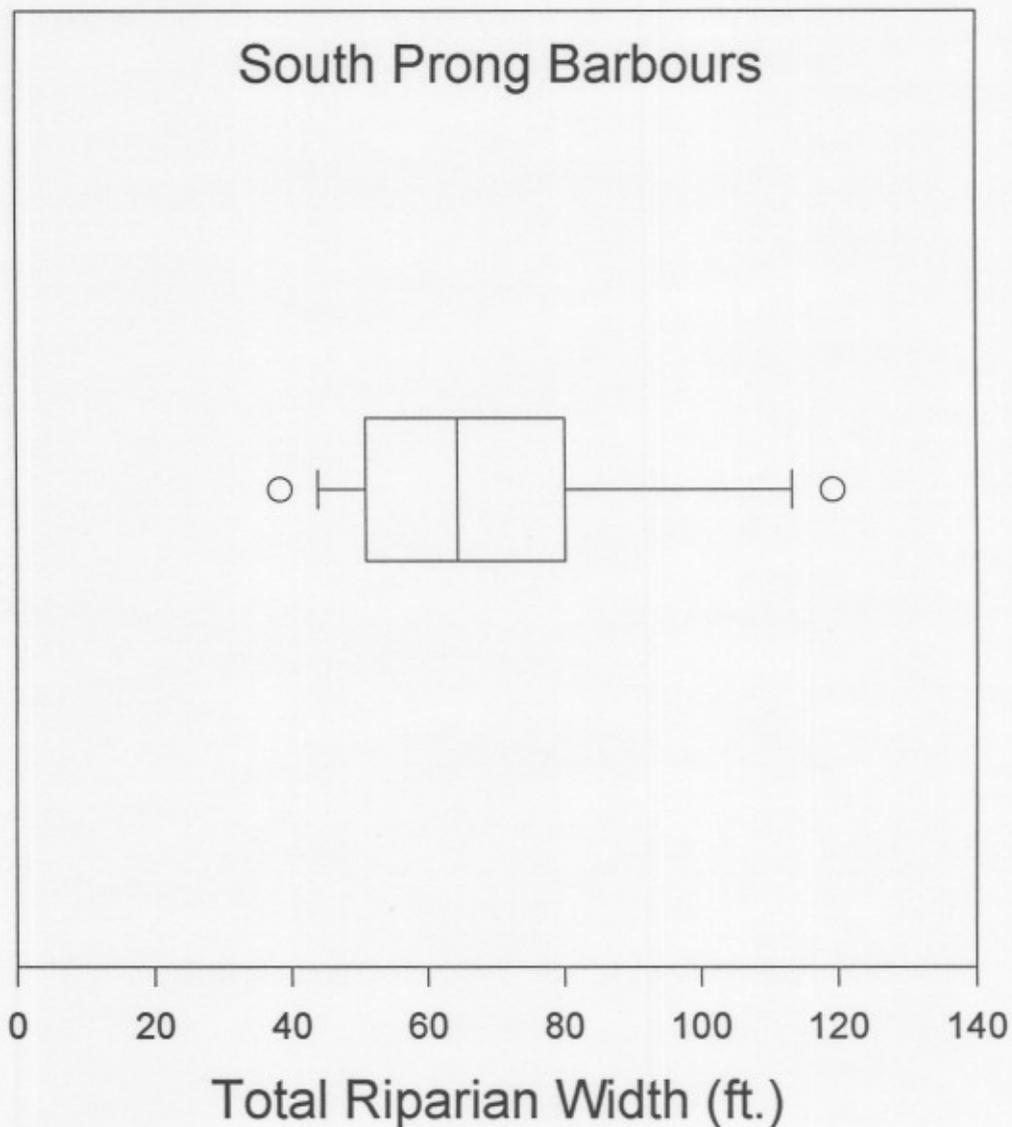
## Riparian Width

Stream: South Prong Barbours

Number of measurements: 11

Mean width: 70.8    Std Dev: 25.4

Max: 119.8            Min: 37.9



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 above and below the box represent the 90% and 10% quantiles.

**Paint Bank Quadrangle**

Stream: Rocky Branch

District: New Castle

Quadrangle: Paint Bank

Sample Date: 06/17/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 1.5 miles**

**Percent of Total Area - Pools: 28.1%**

Number of Pools: 115

Number of Pools per mile: 76.6

Total Pool Area: 18,610.1 sq. ft.  $\pm$  2,105.4

Mean Pool Area: 161.8 sq. ft.

Correction Factor: 0.99

Mean Maximum Depth: 1.5'

Mean Average Depth: 1.0'

**Percent of Total Area - Riffles: 71.9%**

Number of Riffles: 99

Number of Riffles per mile: 66.0

Total Riffle Area: 47,688.6 sq. ft.  $\pm$  3,607.6

Mean Riffle Area: 481.7 sq. ft.

Correction Factor: 0.98

Mean Maximum Depth: 0.8'

Mean Average Depth: 0.4'

**Number of Large Woody Debris Pieces per Mile: 215.2**

Wood < 15' and < 14": 81.3

Wood < 15' and > 14": 21.3

Wood > 15' and < 14": 77.3

Wood > 15' and > 14": 35.3

**Mean Channel Width: 10.9'**

**Mean Riparian Width: 70.4'**

Mean Maximum Riparian Distance (either side): 45.7'

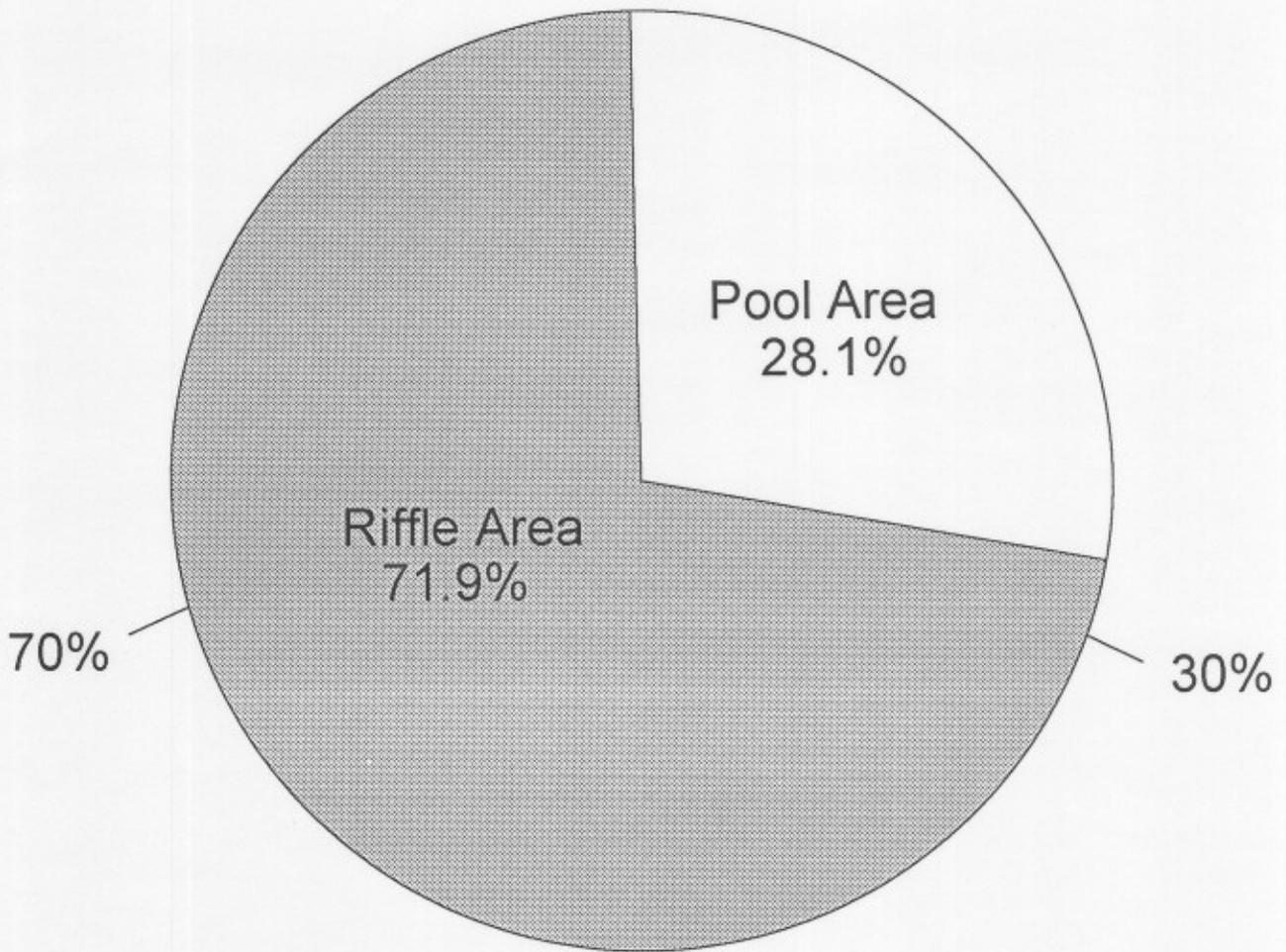
Mean Minimum Riparian Distance (either side): 13.8'

Maximum Riparian Width (Total): 155.0'

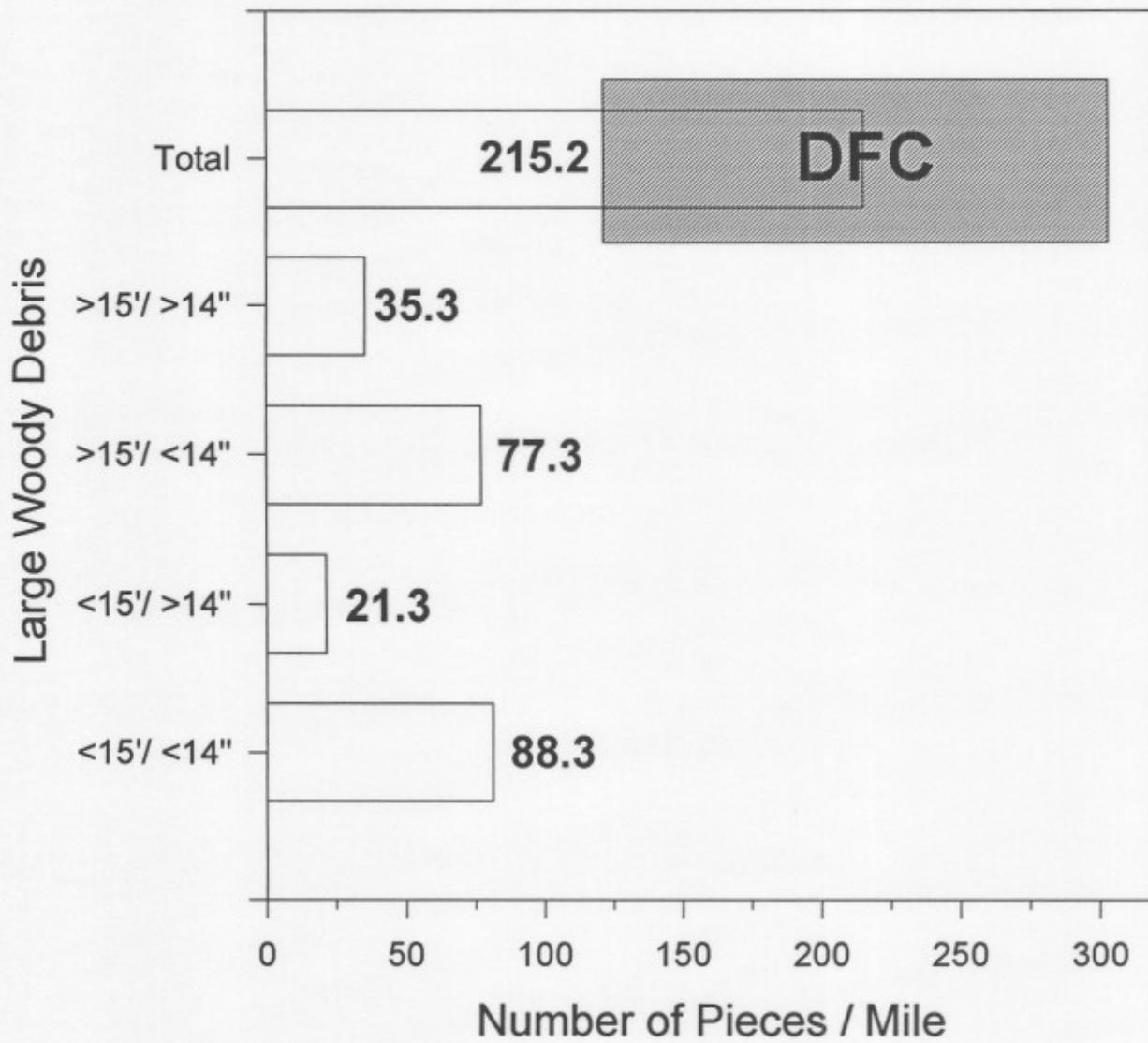
Minimum Riparian Width (Total): 24.9'

## Rocky Branch

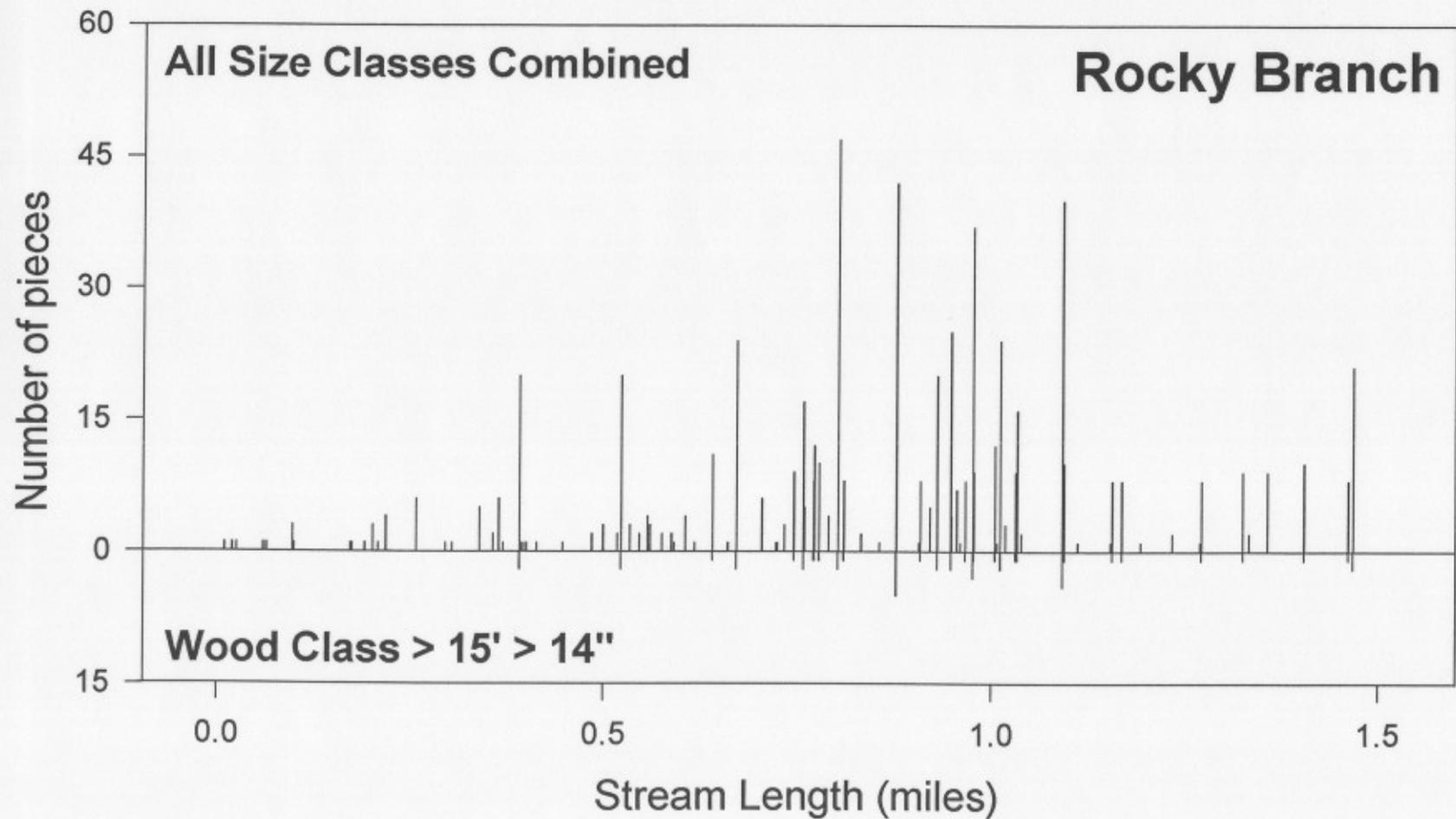
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



## Rocky Branch



# Large Woody Debris Distribution



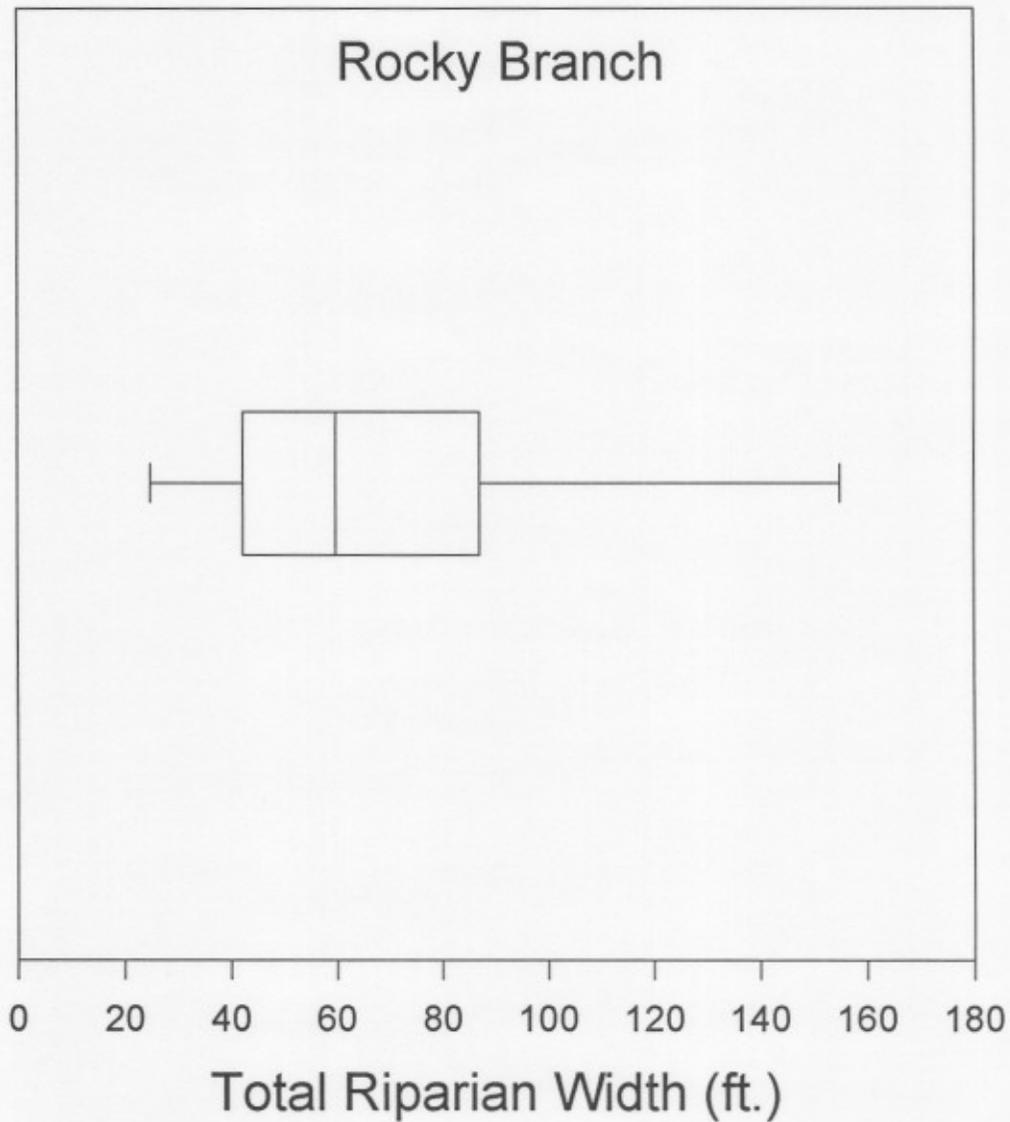
## Riparian Width

Stream: Rocky Branch

Number of measurements: 5

Mean width: 70.4    Std Dev: 49.7

Max: 155            Min: 24.9



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 above and below the box represent the 90% and 10% quantiles.

Stream: Trout Branch

District: New Castle

Quadrangle: Paint Bank

Sample Date: 5/13/96

Downstream Starting Point: USFS Bound. adjacent to Rt. 20

**Total Distance Surveyed:** 0.5 miles

**Percent of Total Area - Pools:** 18.9%

Number of Pools: 34

Number of Pools per mile: 68

Total Pool Area: 6,296.8 sq. ft.  $\pm$  8,983.1

Mean Pool Area: 185.2 sq. ft.

Correction Factor: 0.87

Mean Maximum Depth: 1.5'

Mean Average Depth: 0.9'

**Percent of Total Area - Riffles:** 81.1%

Number of Riffles: 34

Number of Riffles per mile: 68

Total Riffle Area: 27,021.8 sq. ft.  $\pm$  79,977.9

Mean Riffle Area: 794.8 sq. ft.

Correction Factor: 1.22

Mean Maximum Depth: 0.9'

Mean Average Depth: 0.6'

**Number of Large Woody Debris Pieces per Mile:** 42.0

Wood < 15' and < 14": 28.0

Wood < 15' and > 14": 12.0

Wood > 15' and < 14": 0.0

Wood > 15' and > 14": 2.0

**Mean Channel Width:** 19.3'

**Mean Riparian Width:** 114.5'

Mean Maximum Riparian Distance (either side): 88.5'

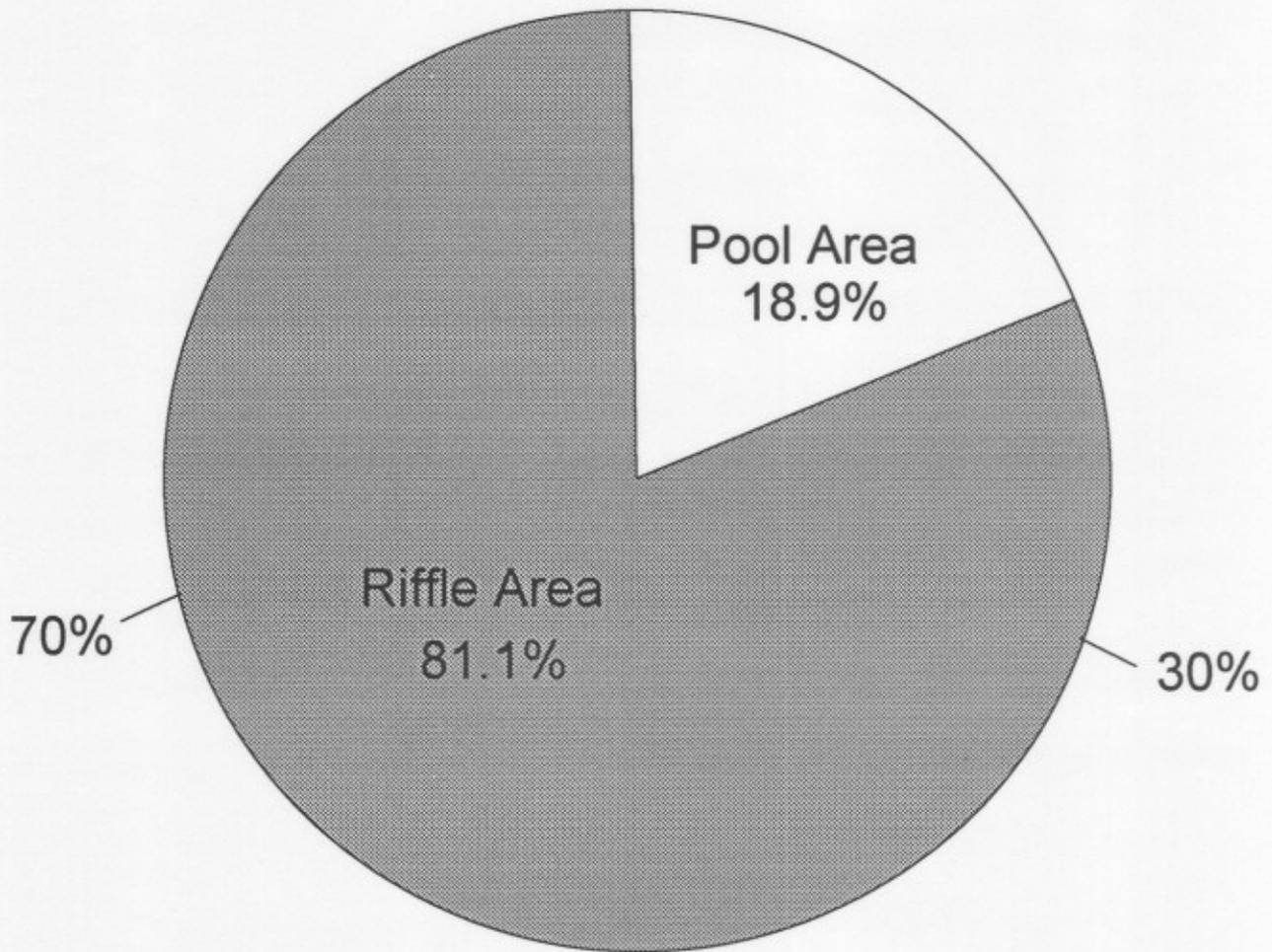
Mean Minimum Riparian Distance (either side): 6.8'

Maximum Riparian Width (Total): 120.8'

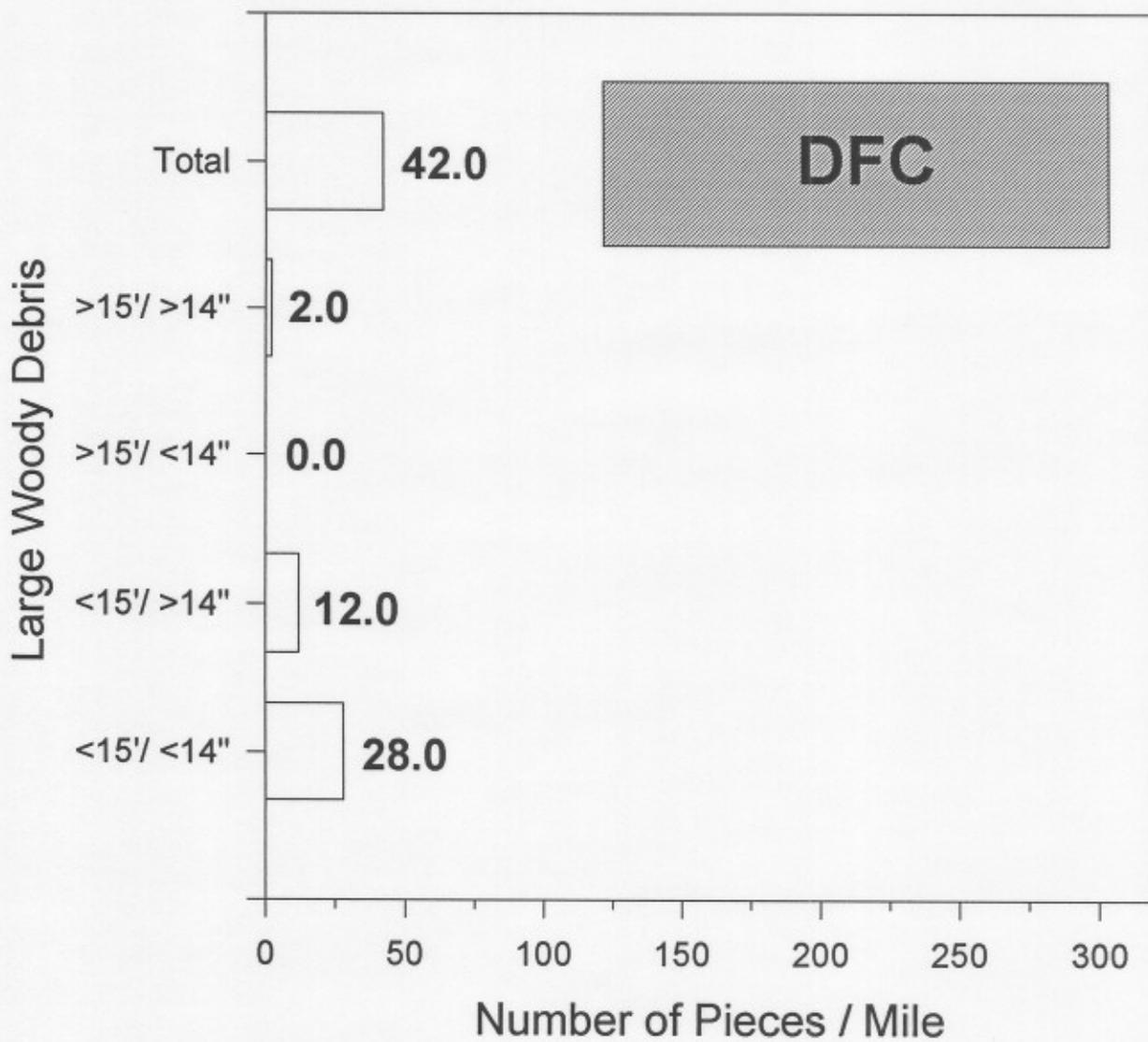
Minimum Riparian Width (Total): 108.1'

### Trout Branch

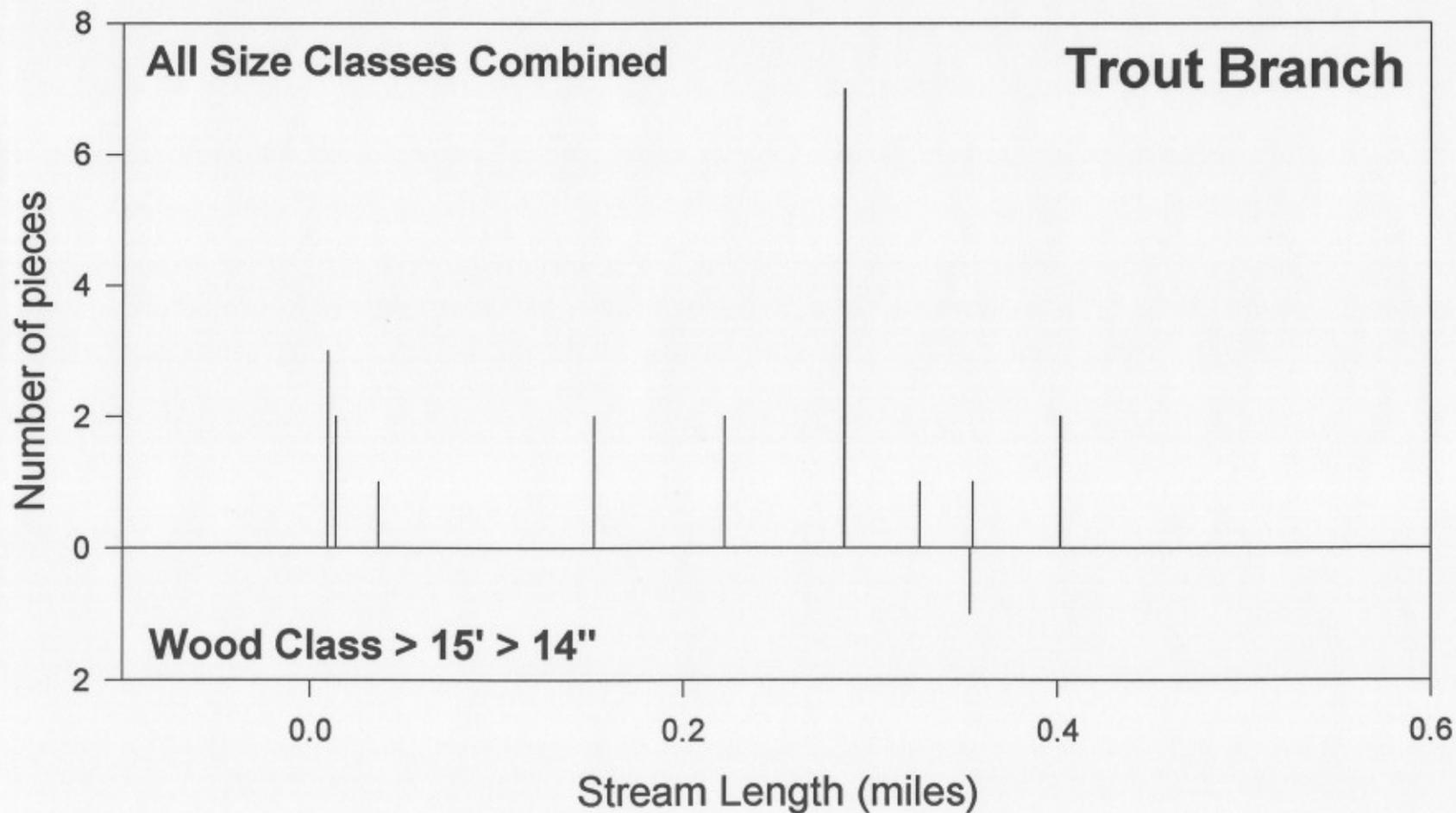
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Trout Branch



# Large Woody Debris Distribution



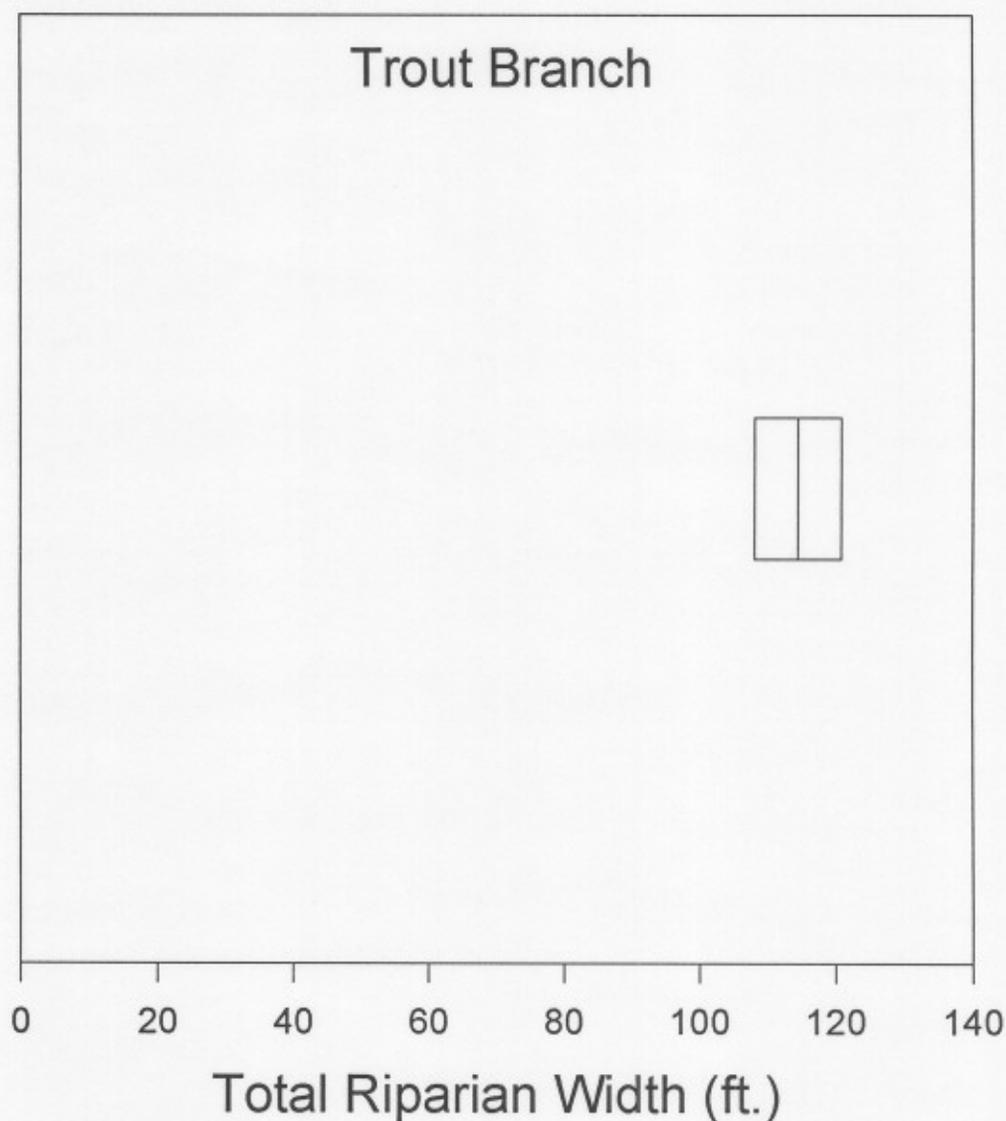
## Riparian Width

Stream: Trout Branch

Number of measurements: 2

Mean width: 114.5      Std Dev: 9.0

Max: 120.8              Min: 108.1



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 above and below the box represent the 90% and 10% quantiles.

## Potts Creek Quadrangle

Stream: Cove Branch

District: New Castle

Quadrangle: Potts Cove

Sample Date: 06/05/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 2.5 miles**

**Percent of Total Area - Pools: 41.7%**

Number of Pools: 179

Number of Pools per mile: 71.6

Total Pool Area: 81,829.0 sq. ft.  $\pm$  17,903.5

Mean Pool Area: 457.1 sq. ft.

Correction Factor: 0.97

Mean Maximum Depth: 2.2'

Mean Average Depth: 1.4'

**Percent of Total Area - Riffles: 58.3%**

Number of Riffles: 142

Number of Riffles per mile: 56.8

Total Riffle Area: 114,600.4 sq. ft.  $\pm$  16,506.9

Mean Riffle Area: 807.0 sq. ft.

Correction Factor: 0.94

Mean Maximum Depth: 1.3'

Mean Average Depth: 0.7'

**Number of Large Woody Debris Pieces per Mile: 215.6**

Wood < 15' and < 14": 131.6

Wood < 15' and > 14": 10.8

Wood > 15' and < 14": 46.8

Wood > 15' and > 14": 26.4

**Mean Channel Width: 23.3'**

**Mean Riparian Width: 69.7'**

Mean Maximum Riparian Distance (either side): 36.4'

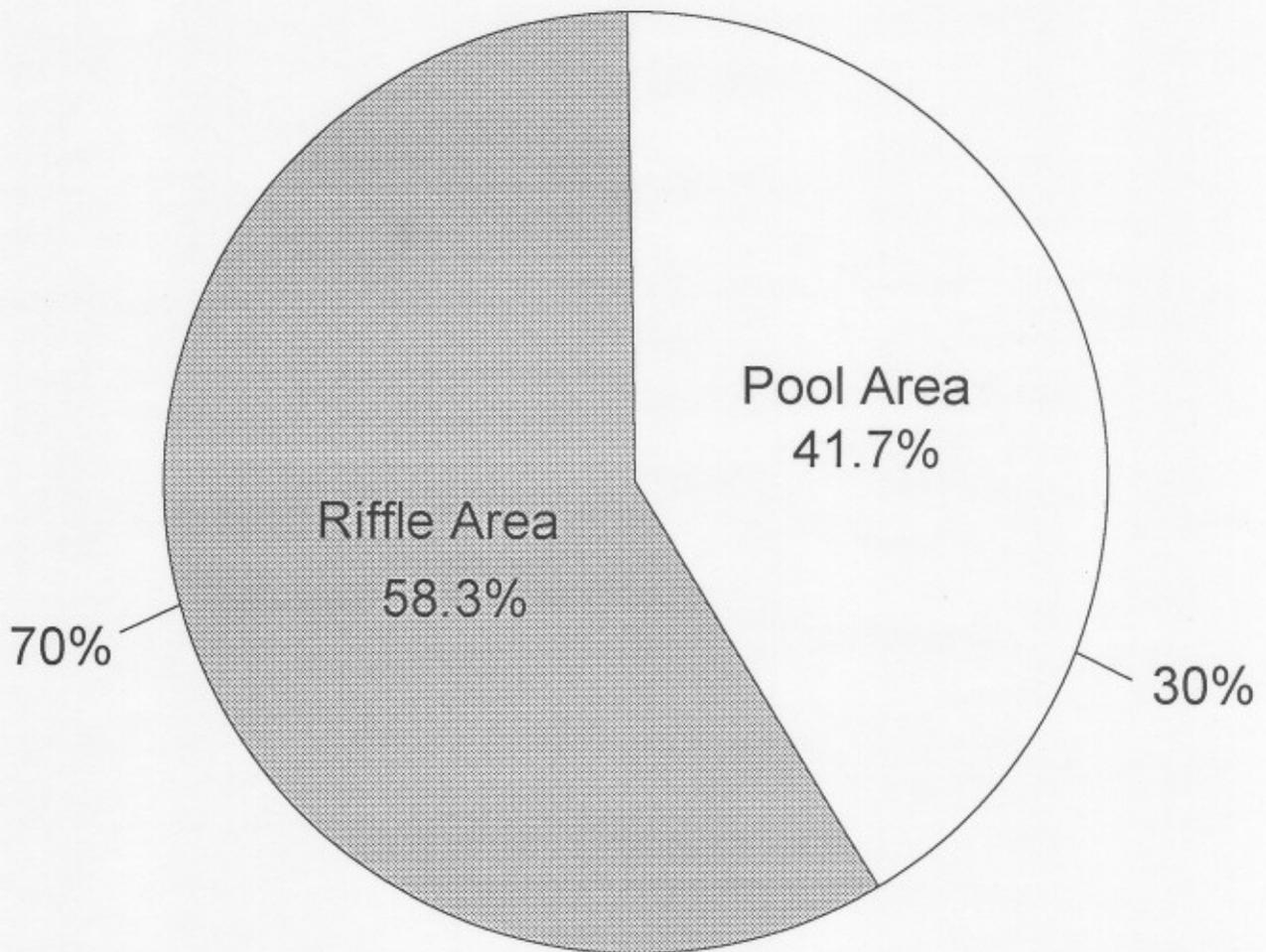
Mean Minimum Riparian Distance (either side): 10.0'

Maximum Riparian Width (Total): 109.3'

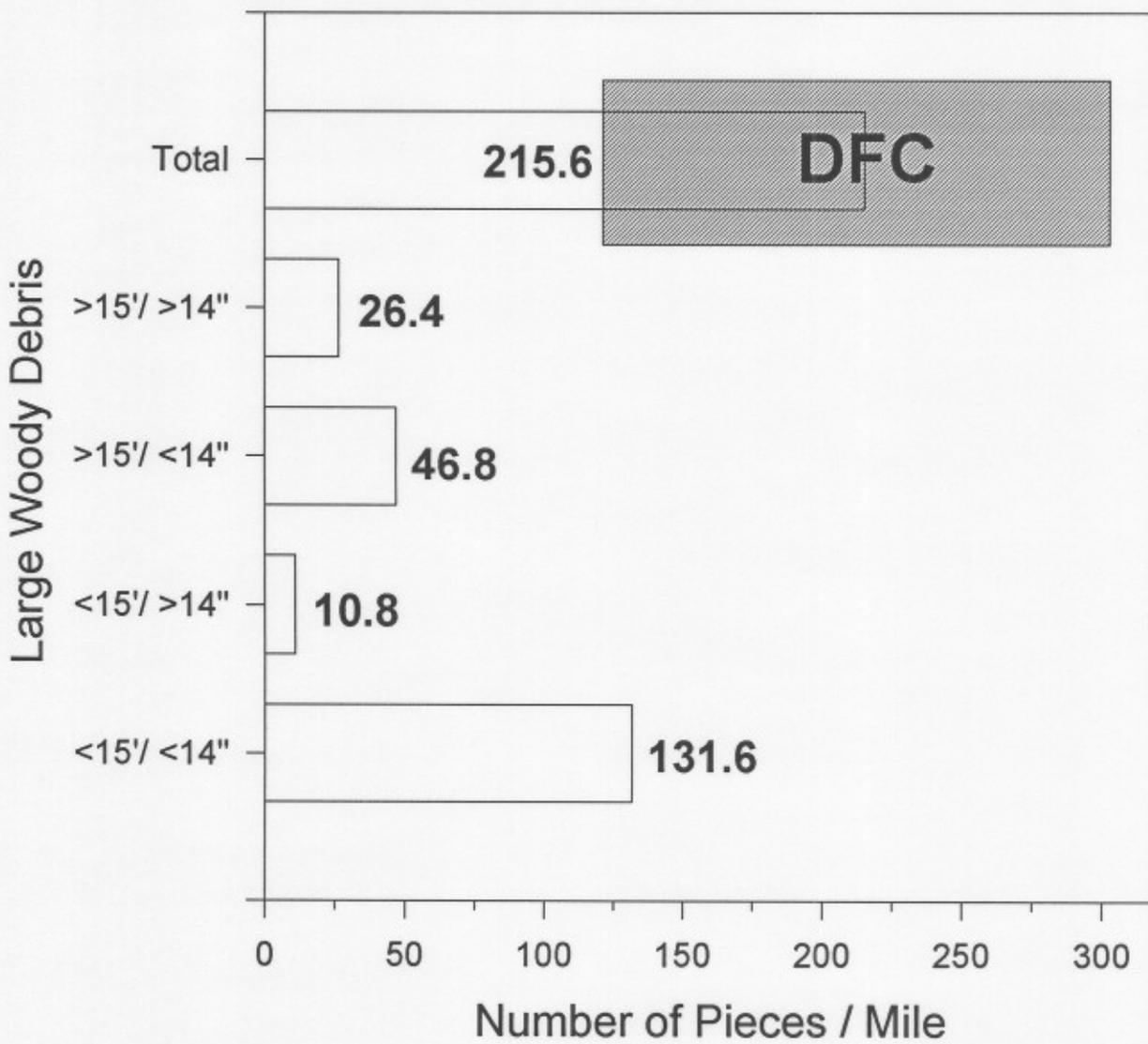
Minimum Riparian Width (Total): 26.3'

### Cove Branch

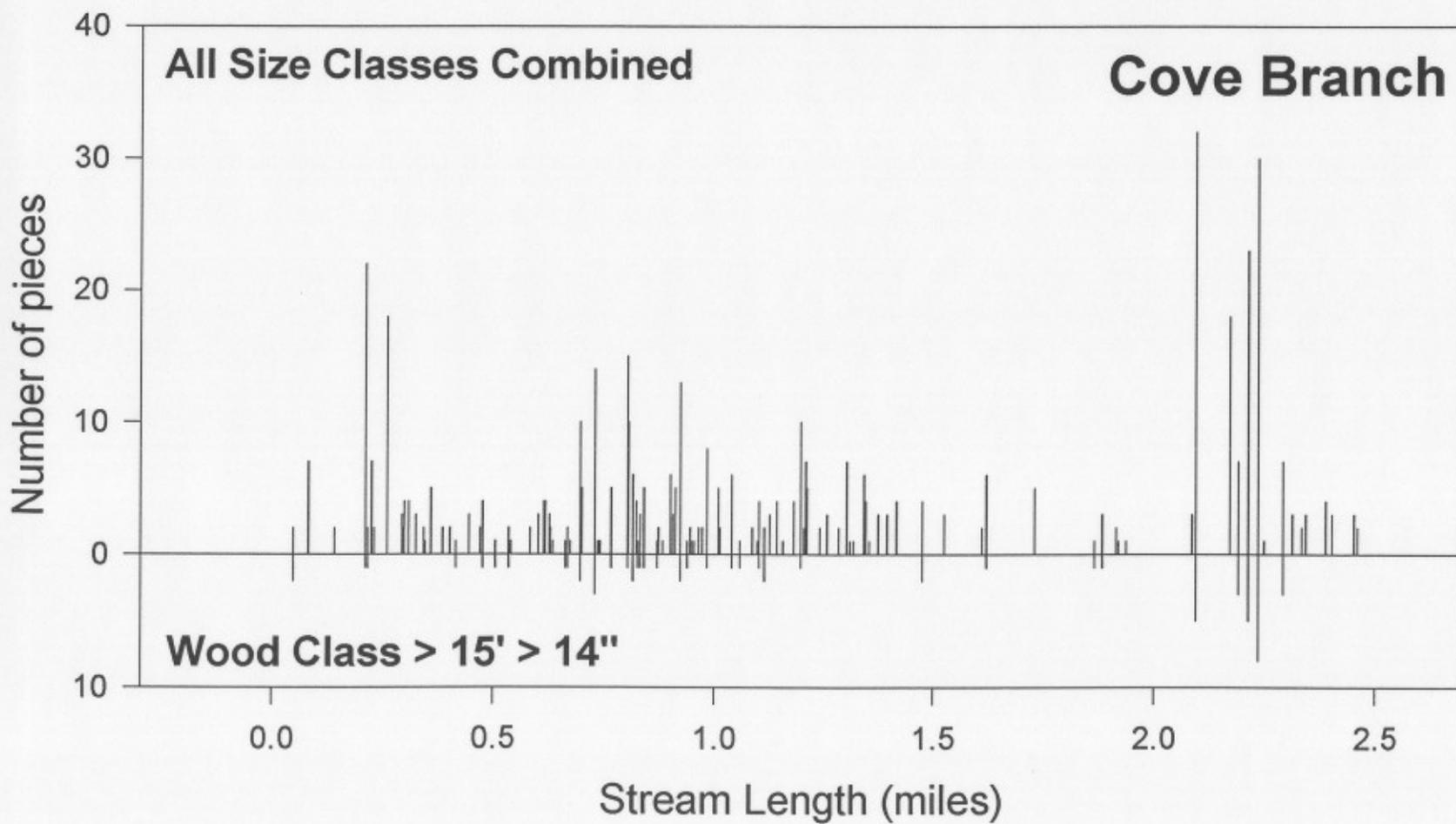
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Cove Branch



# Large Woody Debris Distribution



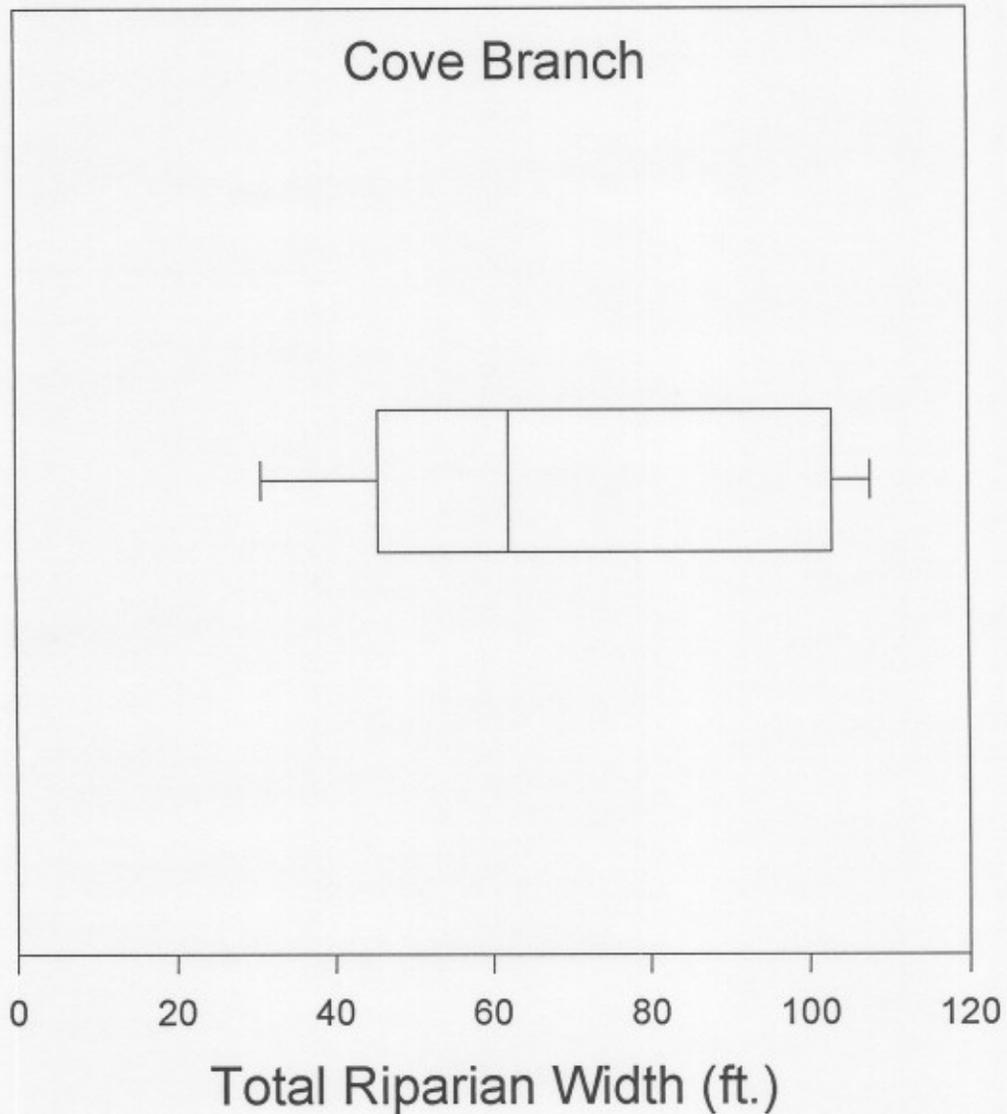
## Riparian Width

Stream: Cove Branch

Number of measurements: 8

Mean width: 69.7    Std Dev: 31.8

Max: 109.3            Min: 26.3



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 above and below the box represent the 90% and 10% quantiles.

Stream: Jones Branch

District: New Castle

Quadrangle: Potts Creek

Sample Date: 06/19/96

Downstream Starting Point: USFS Bound. upstream from Rt. 154

**Total Distance Surveyed: 1.2 miles**

**Percent of Total Area - Pools: 21.8%**

Number of Pools: 81

Number of Pools per mile: 67.5

Total Pool Area: 11,787.6 sq. ft.  $\pm$  2,387.0

Mean Pool Area: 145.5 sq. ft.

Correction Factor: 1.11

Mean Maximum Depth: 1.1'

Mean Average Depth: 0.7'

**Percent of Total Area - Riffles: 78.2%**

Number of Riffles: 75

Number of Riffles per mile: 62.5

Total Riffle Area: 42,208.3 sq. ft.  $\pm$  23,880.3

Mean Riffle Area: 562.8 sq. ft.

Correction Factor: 1.22

Mean Maximum Depth: 0.6'

Mean Average Depth: 0.3'

**Number of Large Woody Debris Pieces per Mile: 150.8**

Wood < 15' and < 14": 99.2

Wood < 15' and > 14": 5.8

Wood > 15' and < 14": 37.5

Wood > 15' and > 14": 8.3

**Mean Channel Width: 14.3'**

**Mean Riparian Width: 80.1'**

Mean Maximum Riparian Distance (either side): 21.0'

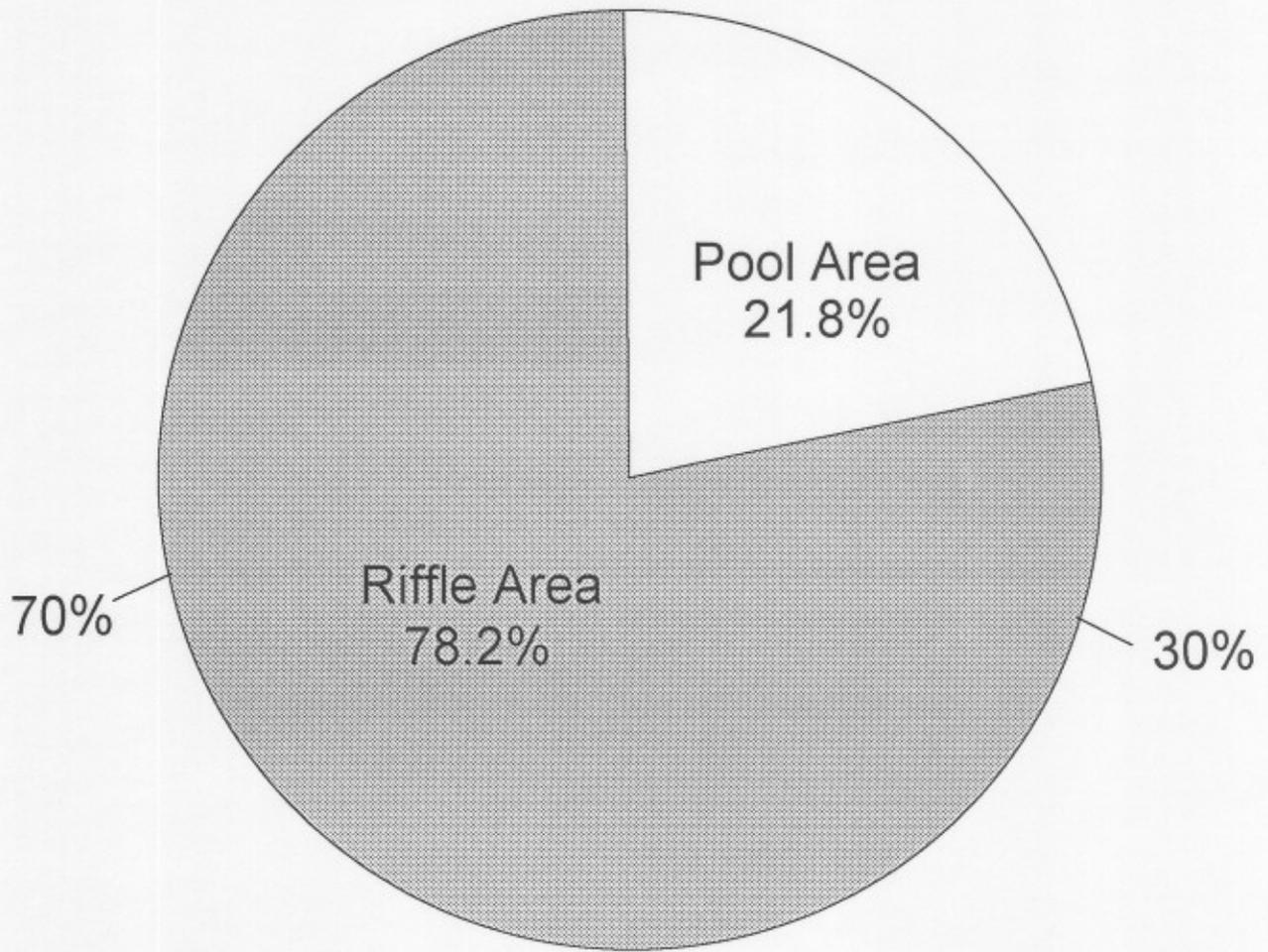
Mean Minimum Riparian Distance (either side): 45.0'

Maximum Riparian Width (Total): 162.7'

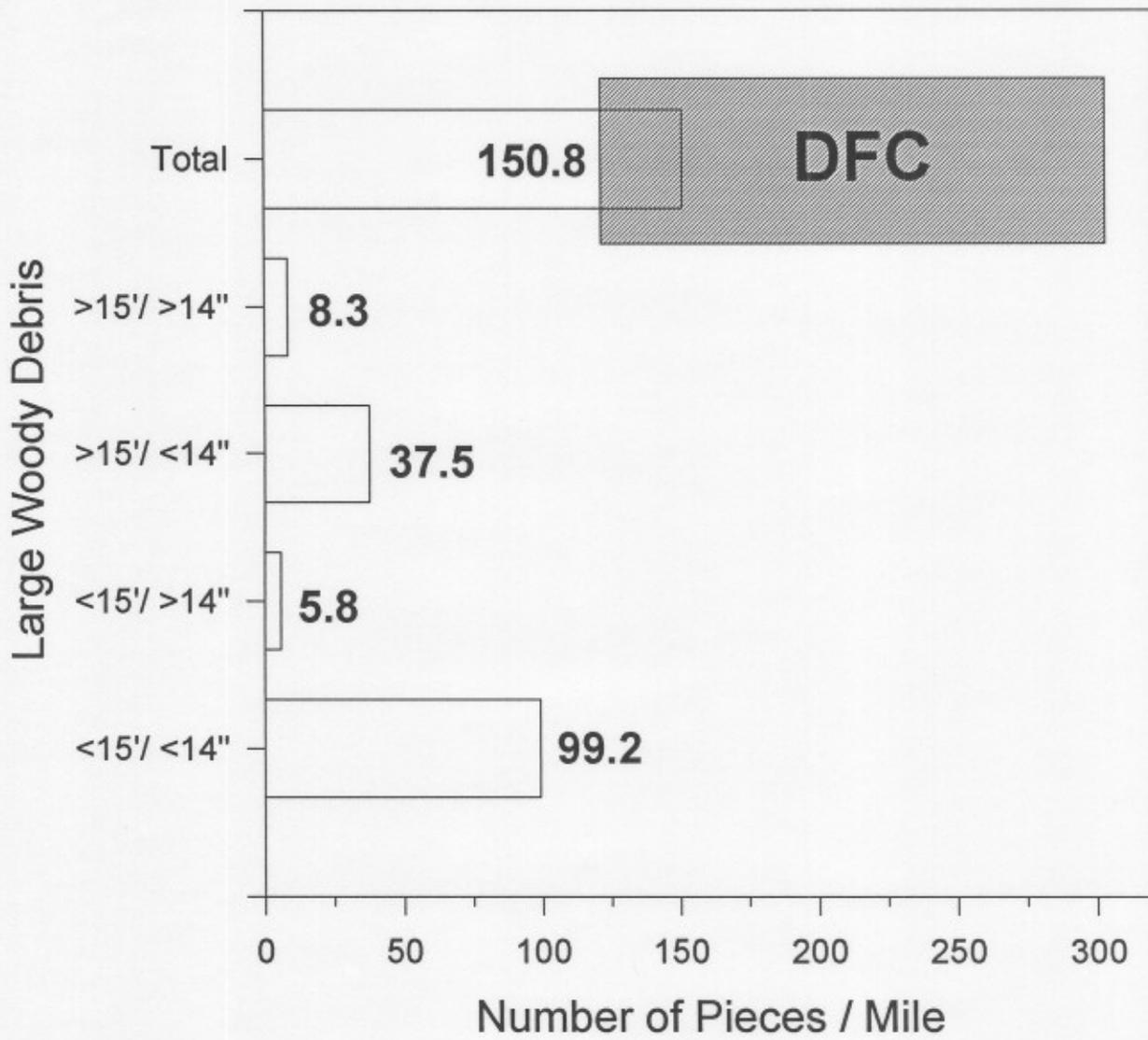
Minimum Riparian Width (Total): 37.6'

## Jones Branch

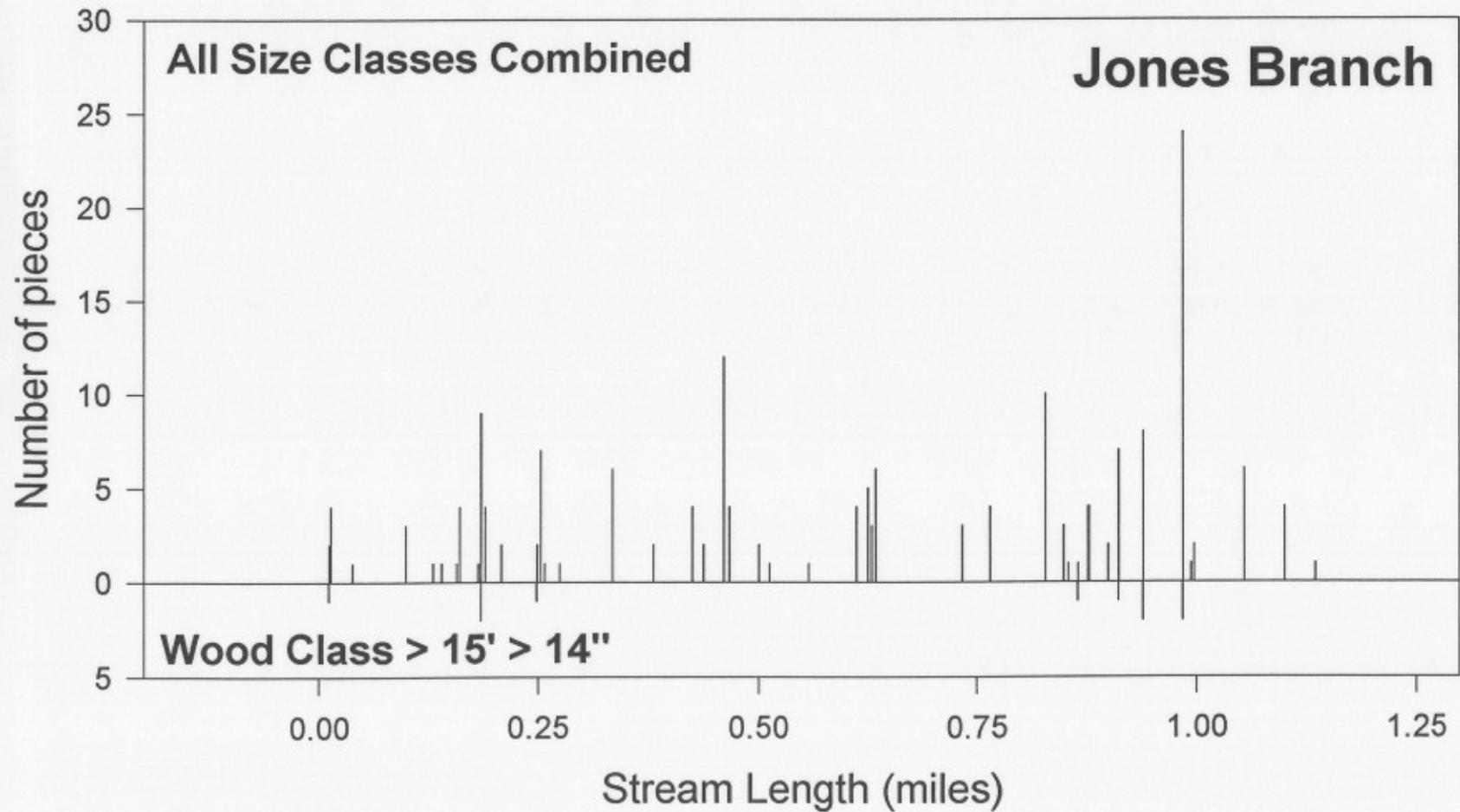
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Jones Branch



# Large Woody Debris Distribution



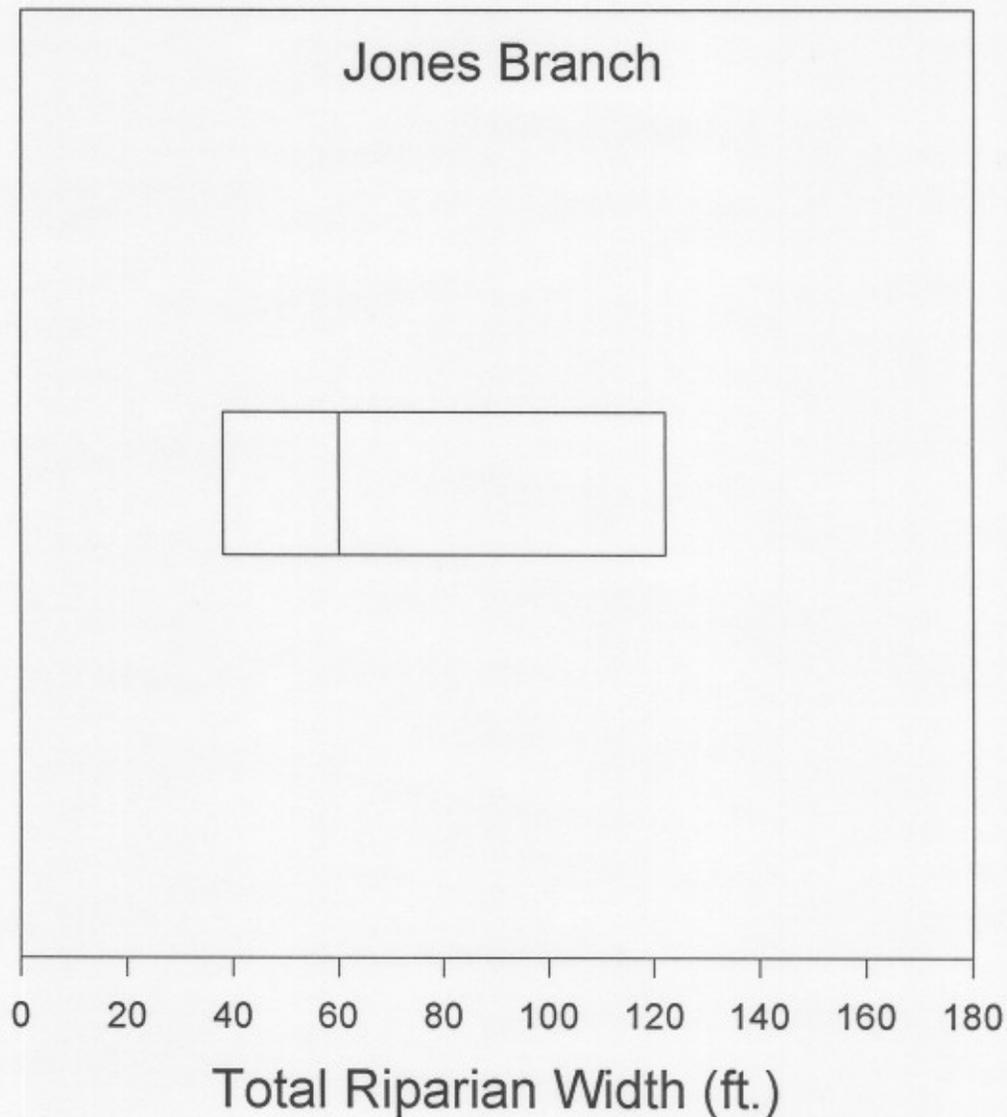
## Riparian Width

Stream: Jones Branch

Number of measurements: 4

Mean width: 80.1      Std Dev: 58.7

Max: 162.7              Min: 37.6



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 above and below the box represent the 90% and 10% quantiles.

Stream: Shawvers Run

District: New Castle

Quadrangle: Potts Creek

Sample Date: 06/18/96

Downstream Starting Point: USFS Boundary at Rt. 18 bridge

**Total Distance Surveyed: 2.4 miles**

**Percent of Total Area - Pools: 36.0%**

Number of Pools: 267

Number of Pools per mile: 111.2

Total Pool Area: 63,019.2 sq. ft.  $\pm$  9,086.0

Mean Pool Area: 236.0 sq. ft.

Correction Factor: 0.95

Mean Maximum Depth: 1.5'

Mean Average Depth: 1.1'

**Percent of Total Area - Riffles: 64.0%**

Number of Riffles: 210

Number of Riffles per mile: 87.5

Total Riffle Area: 112,003.3 sq. ft.  $\pm$  7,151.8

Mean Riffle Area: 533.3 sq. ft.

Correction Factor: 1.00

Mean Maximum Depth: 1.1'

Mean Average Depth: 0.8'

**Number of Large Woody Debris Pieces per Mile: 172.5**

Wood < 15' and < 14": 102.1

Wood < 15' and > 14": 3.3

Wood > 15' and < 14": 58.8

Wood > 15' and > 14": 8.3

**Mean Channel Width: 21.8'**

**Mean Riparian Width: 64.4'**

Mean Maximum Riparian Distance (either side): 35.8'

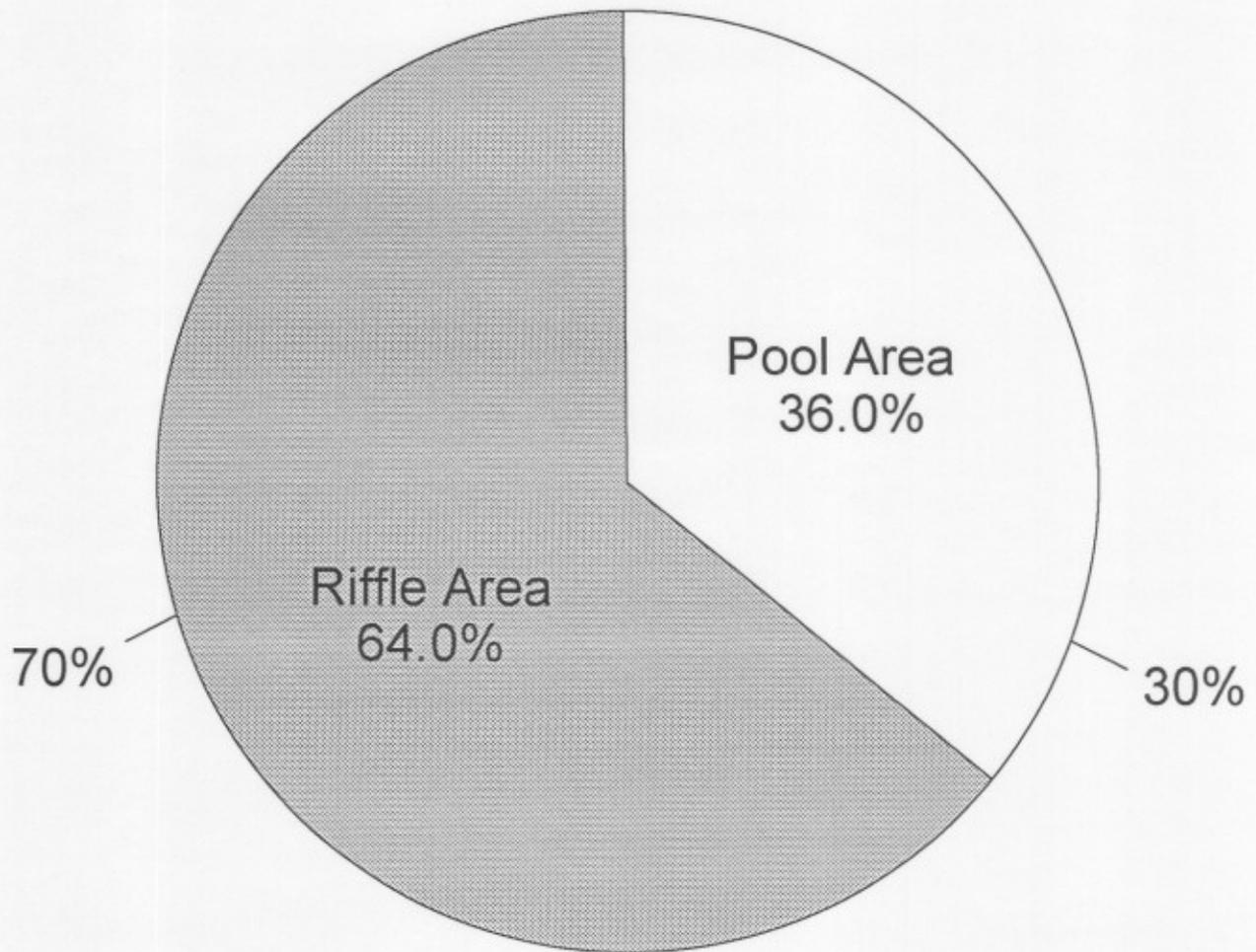
Mean Minimum Riparian Distance (either side): 6.8'

Maximum Riparian Width (Total): 108.2'

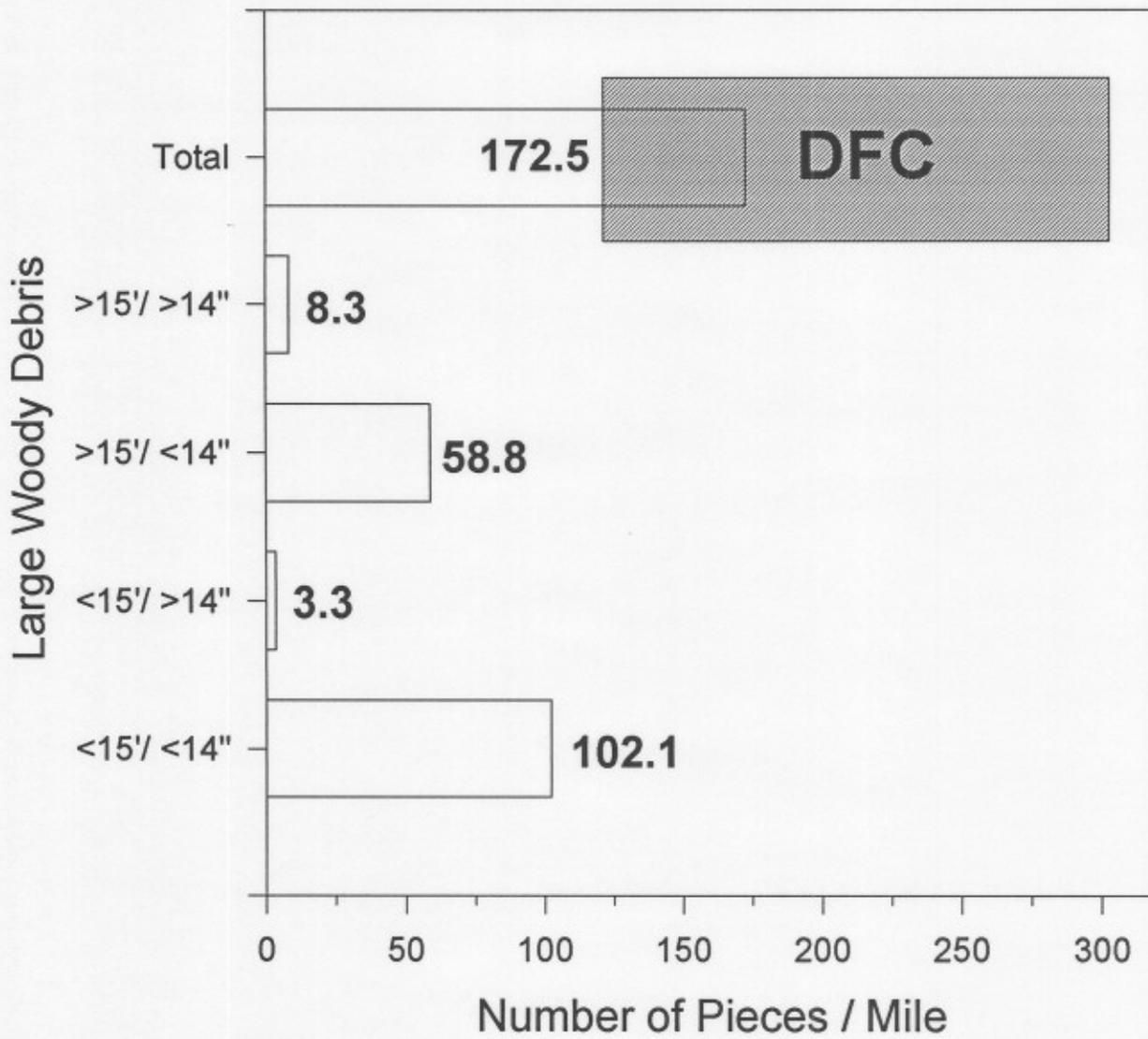
Minimum Riparian Width (Total): 31.5'

### Shawvers Run

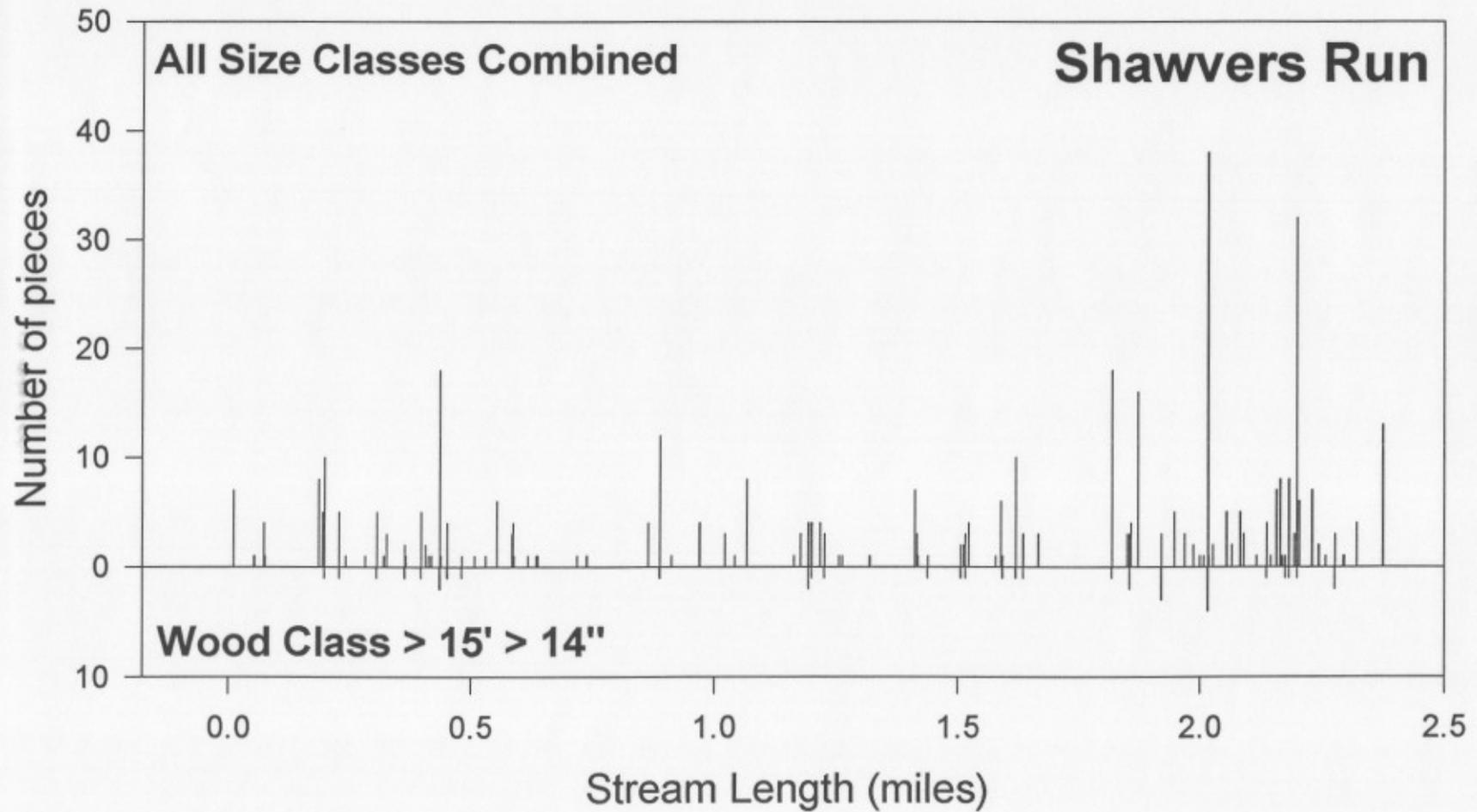
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Shawvers Run



# Large Woody Debris Distribution



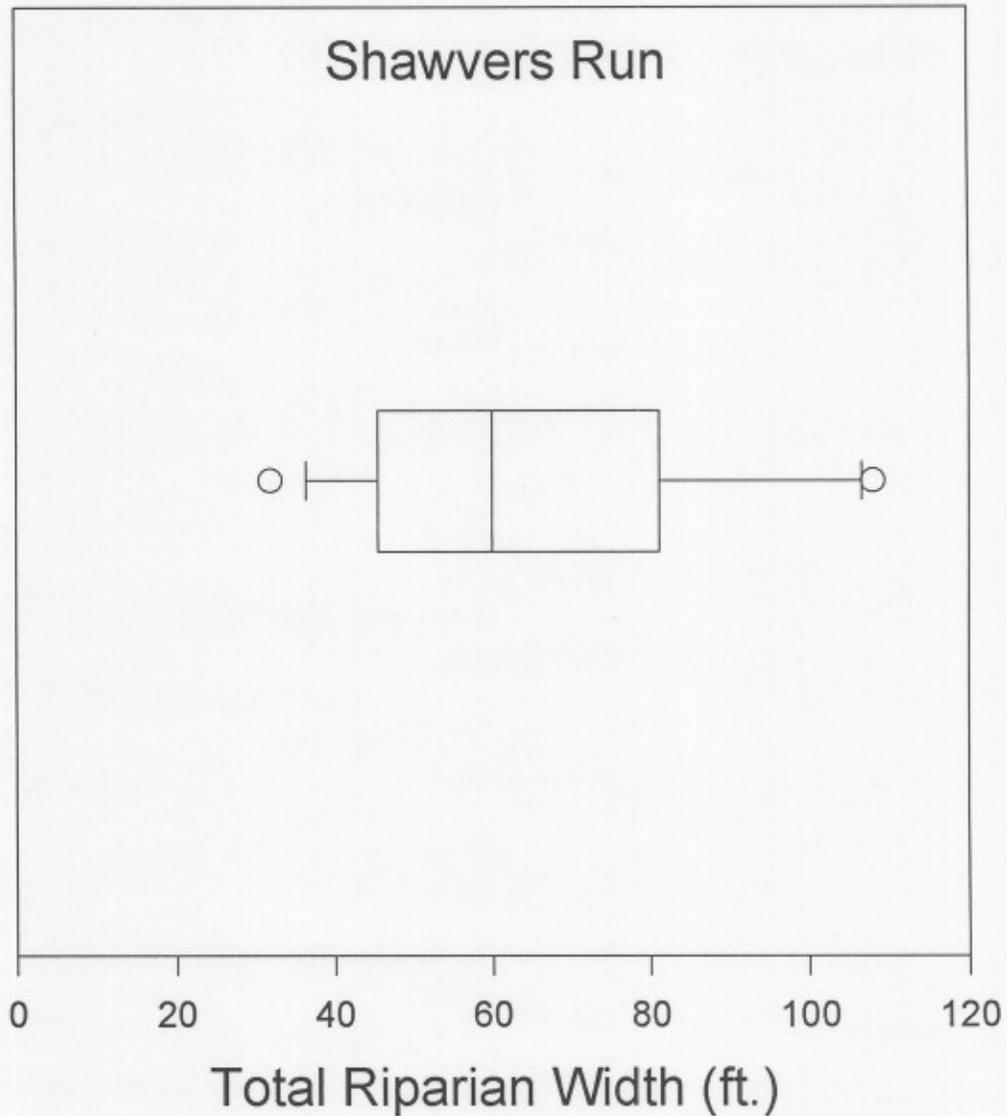
## Riparian Width

Stream: Shawvers Run

Number of measurements: 11

Mean width: 64.3    Std Dev: 25.6

Max: 108.2            Min: 31.5



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 above and below the box represent the 90% and 10% quantiles.

Stream: Tributary of Cove Branch

District: New Castle

Quadrangle: Potts Cove

Sample Date: 06/06/96

Downstream Starting Point: Confluence with Cove Branch

**Total Distance Surveyed: 0.7 miles**

**Percent of Total Area - Pools: 43.3%**

Number of Pools: 44

Number of Pools per mile: 62.8

Total Pool Area: 15,089.9 sq. ft.  $\pm$  3,587.8

Mean Pool Area: 343.0 sq. ft.

Correction Factor: 1.10

Mean Maximum Depth: 1.4'

Mean Average Depth: 0.9'

**Percent of Total Area - Riffles: 56.7%**

Number of Riffles: 35

Number of Riffles per mile: 50.0

Total Riffle Area: 19,733.4 sq. ft.  $\pm$  4,658.0

Mean Riffle Area: 563.8 sq. ft.

Correction Factor: 1.07

Mean Maximum Depth: 1.4'

Mean Average Depth: 0.9'

**Number of Large Woody Debris Pieces per Mile: 224.2**

Wood < 15' and < 14": 141.4

Wood < 15' and > 14": 15.7

Wood > 15' and < 14": 47.1

Wood > 15' and > 14": 20.0

**Mean Channel Width: 13.4'**

**Mean Riparian Width: 207.3'**

Mean Maximum Riparian Distance (either side): 100.4'

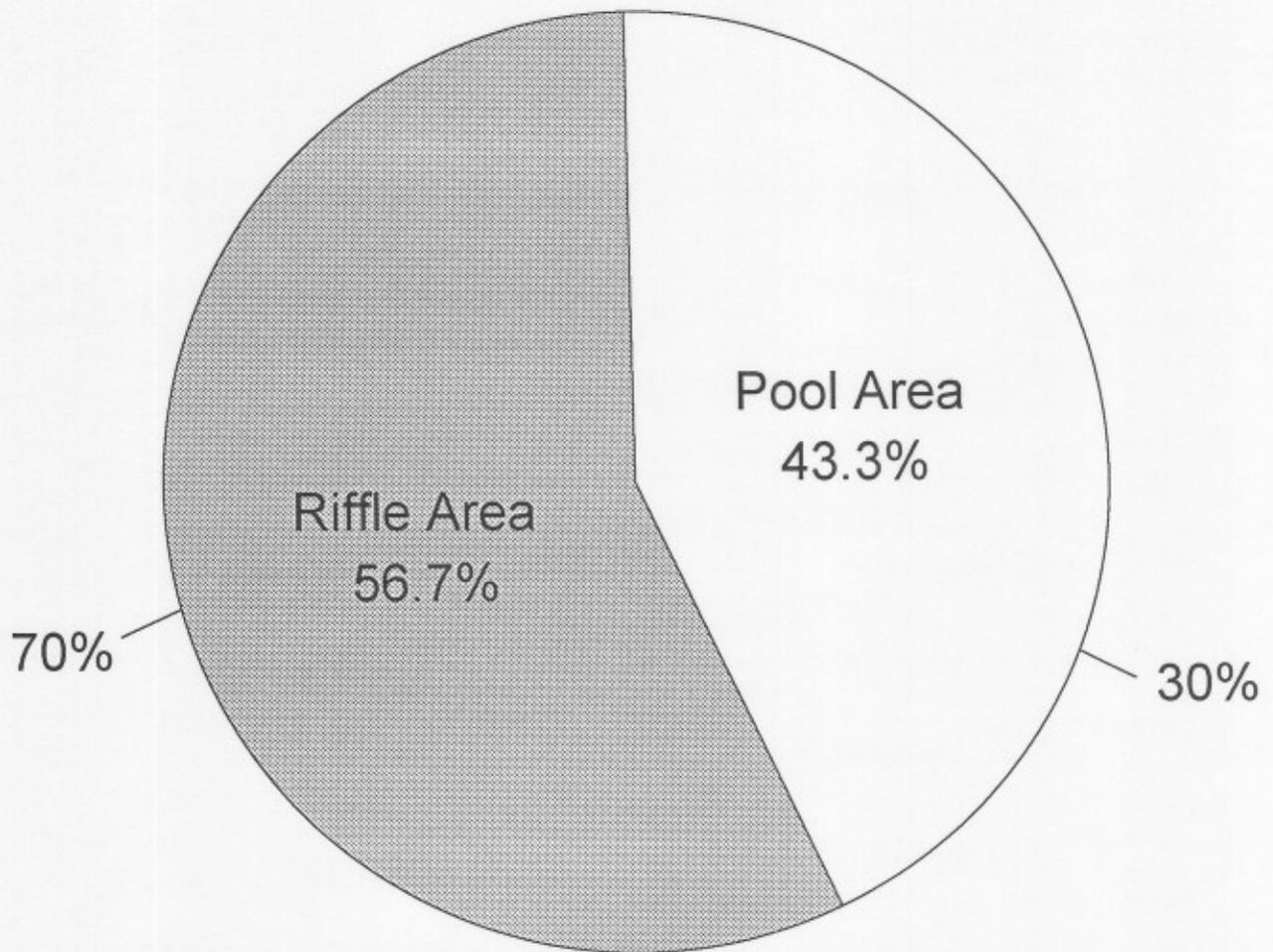
Mean Minimum Riparian Distance (either side): 93.5'

Maximum Riparian Width (Total): 385.3'

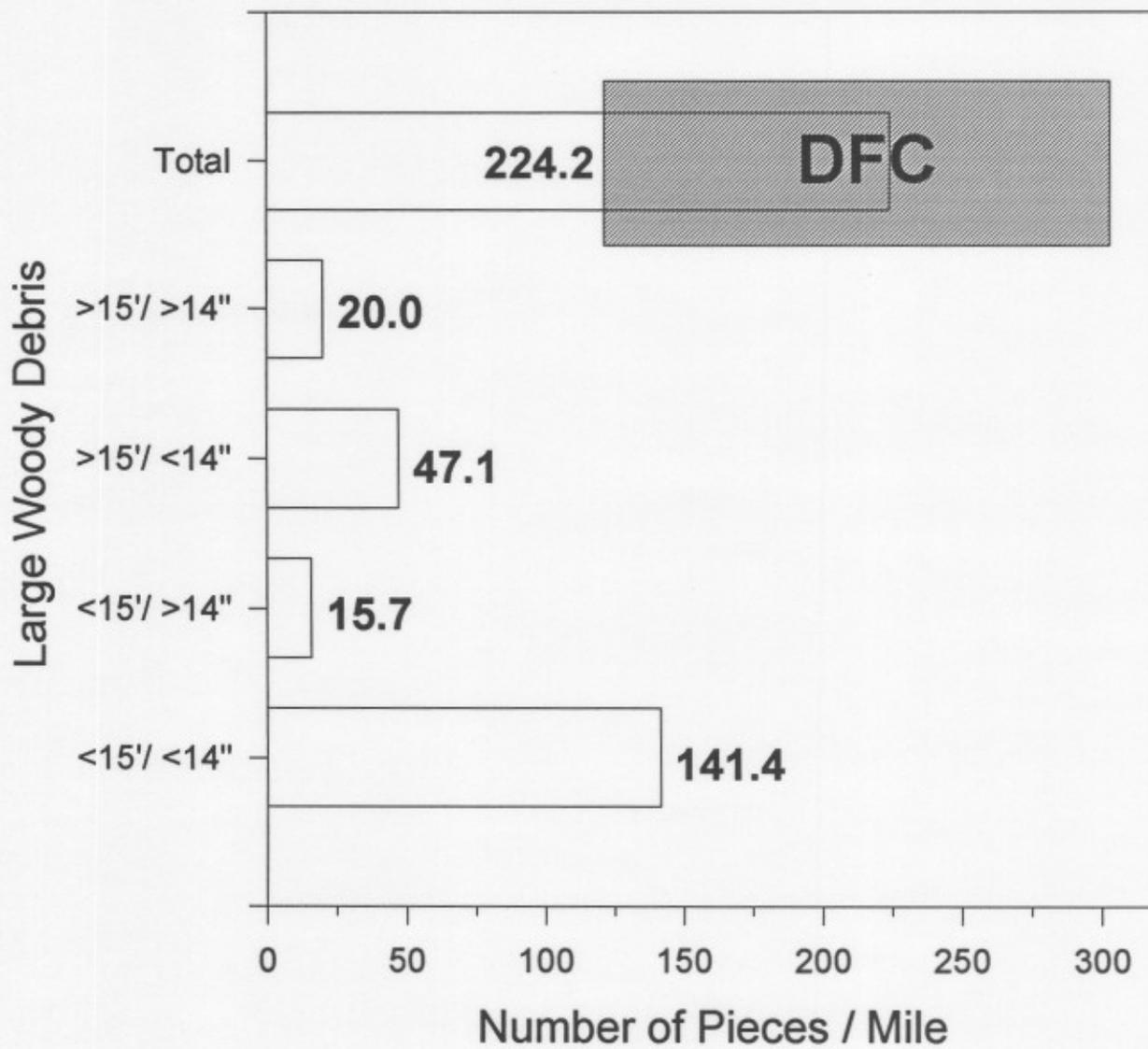
Minimum Riparian Width (Total): 29.3'

### Trib. of Cove Branch

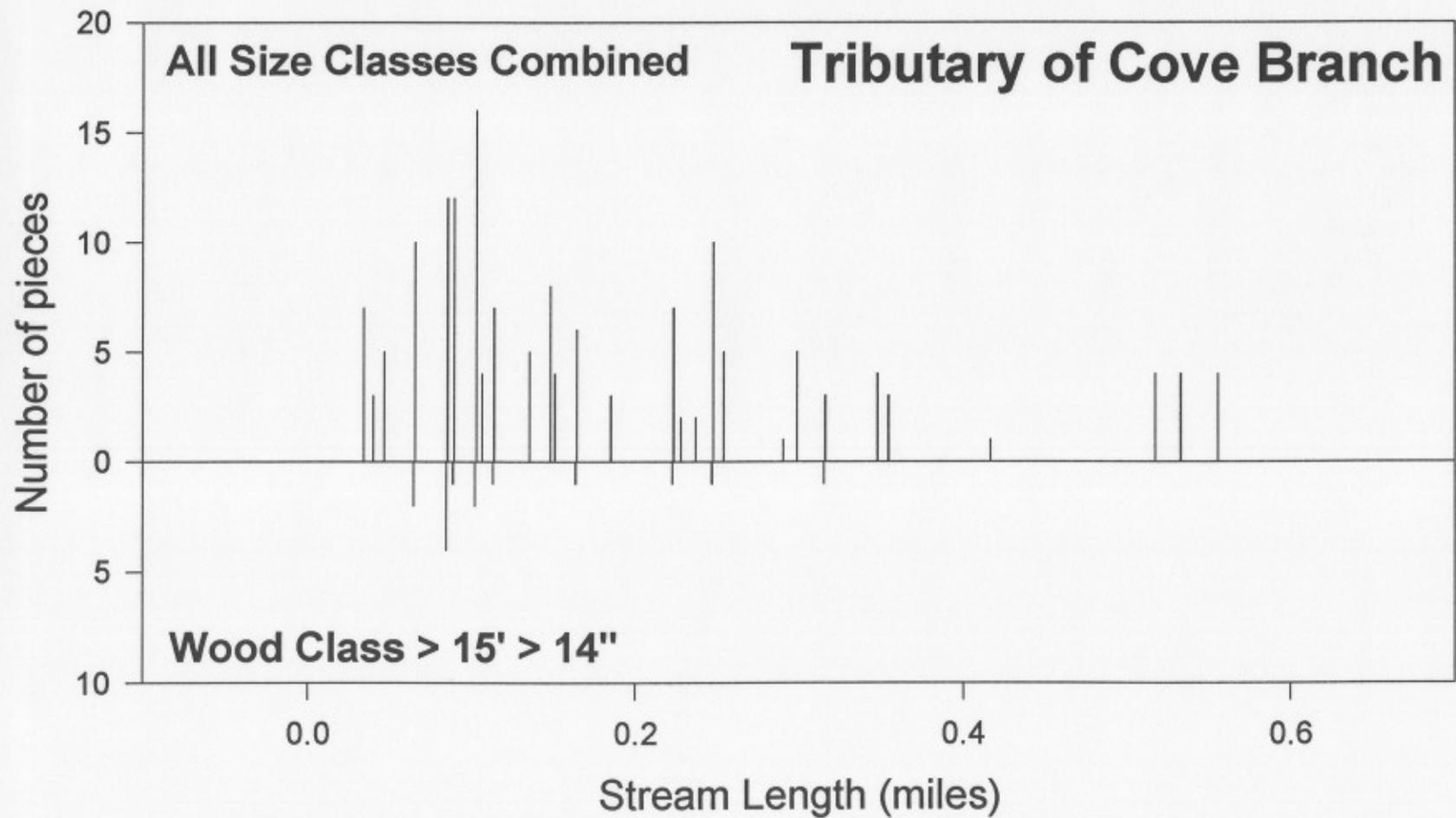
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



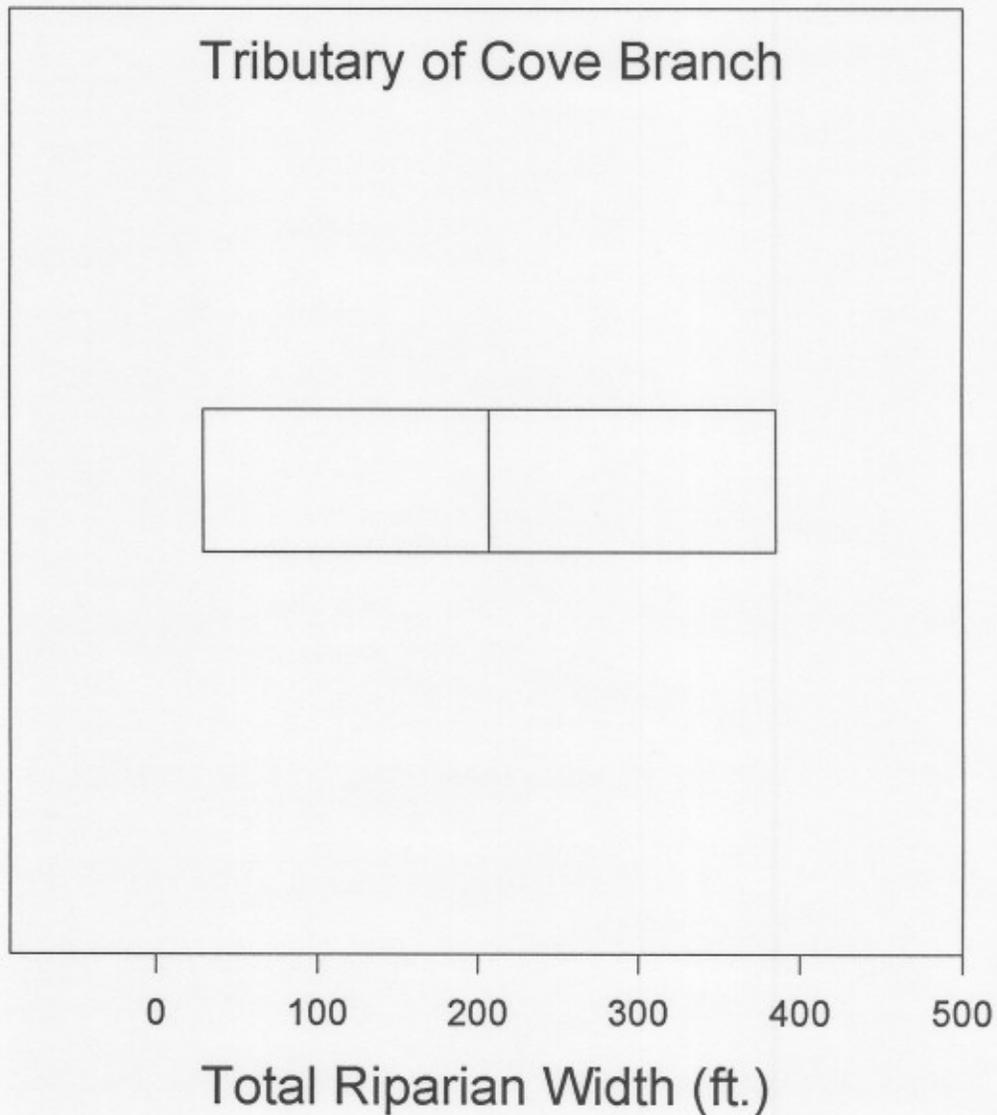
## Tributary of Cove Branch



# Large Woody Debris Distribution



## Riparian Width



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 above and below the box represent the 90% and 10% quantiles.

Stream: Tributary of Valley Branch

District: New Castle

Quadrangle: Potts Creek

Sample Date: 6/18/96

Downstream Starting Point: Confluence with Valley Branch  
(Third tributary on right once in Shawvers Wilderness)

**Total Distance Surveyed: 0.2 miles**

**Percent of Total Area - Pools: 18.7%**

Number of Pools: 21

Number of Pools per mile: 105

Total Pool Area: 1,979.3 sq. ft.

Mean Pool Area: 94.3 sq. ft.

Correction Factor: 1.08

Mean Maximum Depth: 1.1'

Mean Average Depth: 0.9'

**Percent of Total Area - Riffles: 81.3%**

Number of Riffles: 20

Number of Riffles per mile: 100

Total Riffle Area: 8,578.8 sq. ft.

Mean Riffle Area: 428.9 sq. ft.

Correction Factor: 1.07

Mean Maximum Depth: 1.0'

Mean Average Depth: 0.7'

**Number of Large Woody Debris Pieces per Mile: 550.0**

Wood < 15' and < 14": 295.0

Wood < 15' and > 14": 5.0

Wood > 15' and < 14": 225.0

Wood > 15' and > 14": 25.0

**Mean Channel Width: 21.6'**

**Mean Riparian Width: 44.9'**

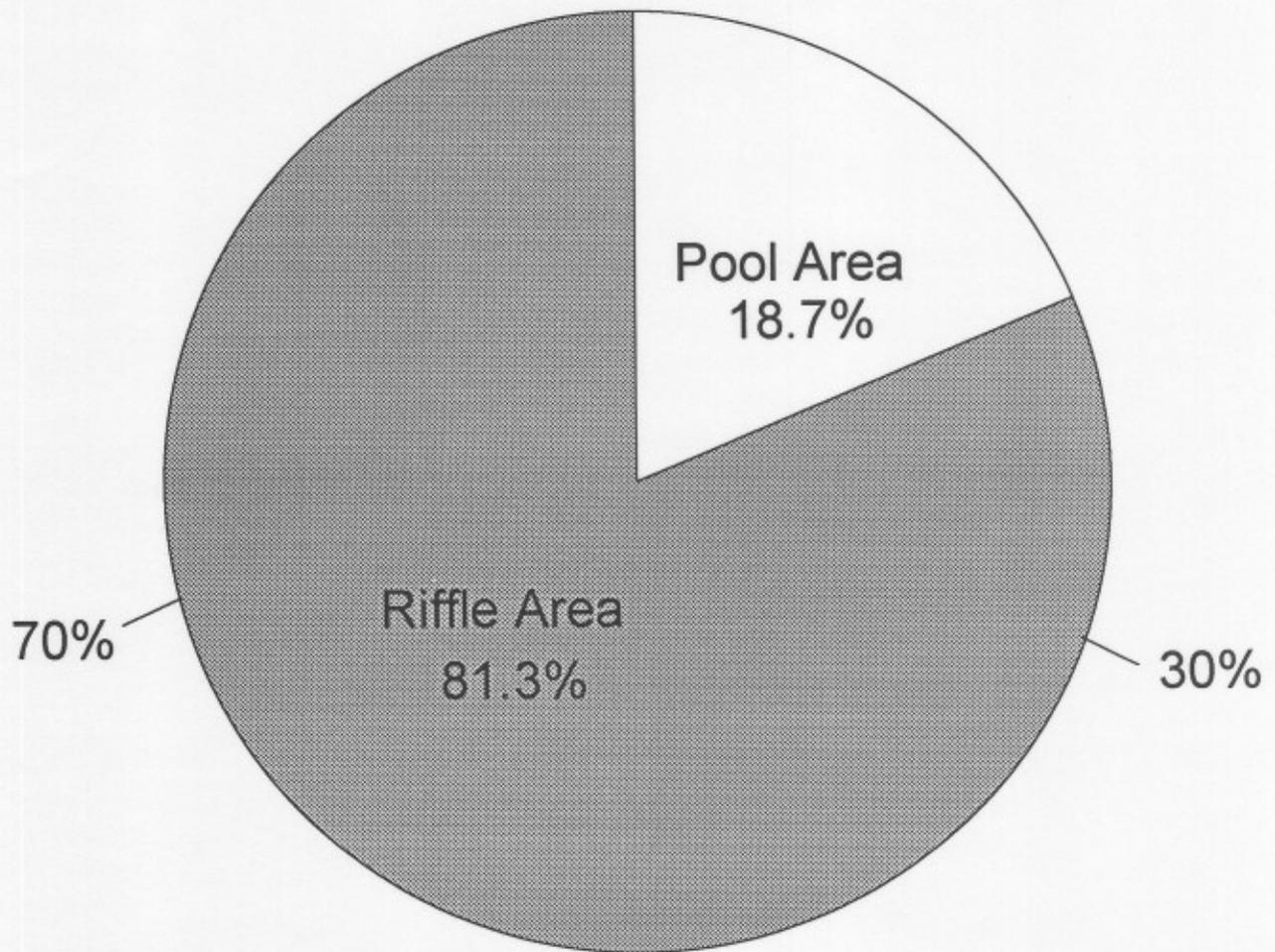
Mean Maximum Riparian Distance (either side): 13.4'

Mean Minimum Riparian Distance (either side): 9.9'

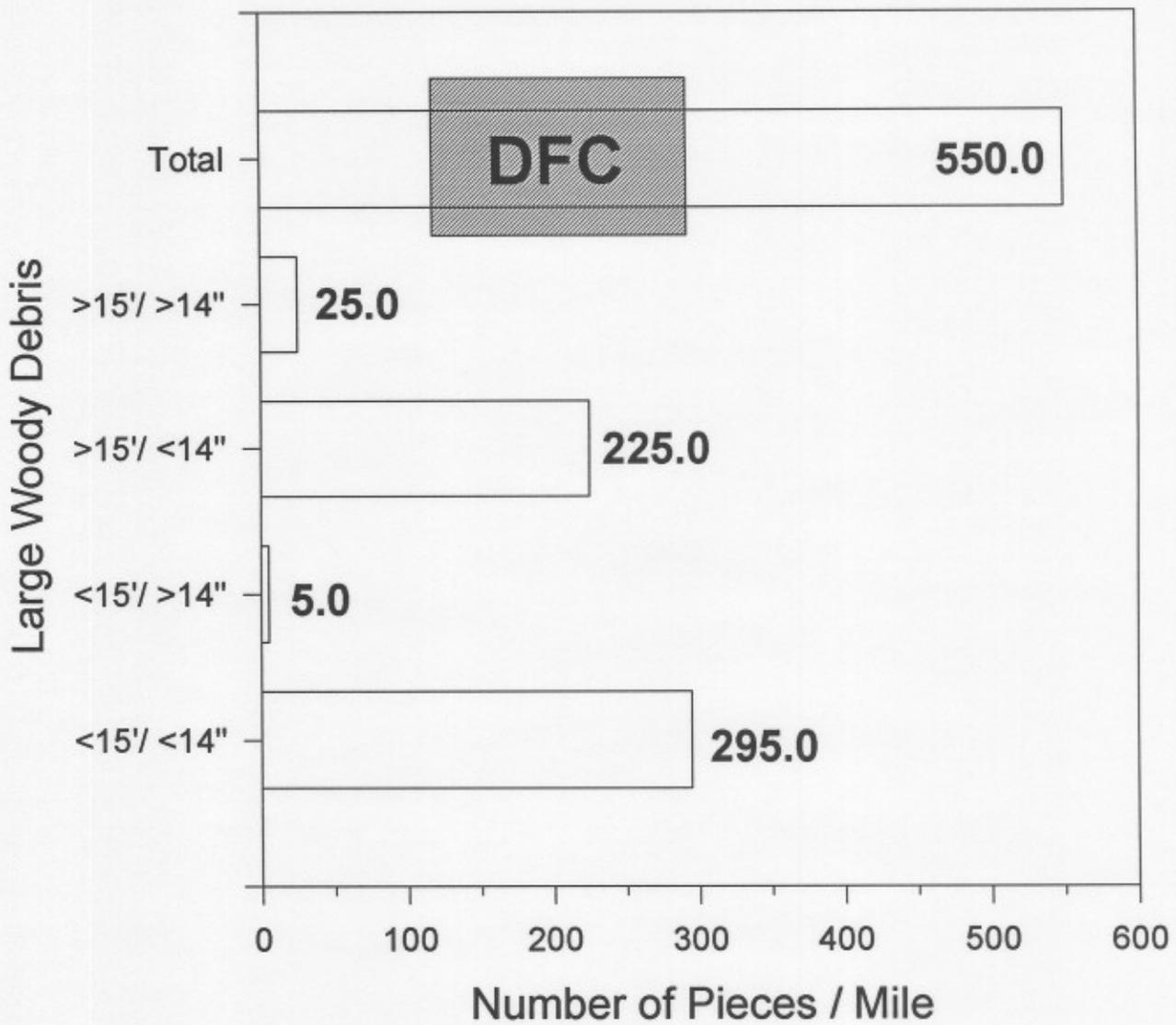
Maximum Riparian Width (Total): 44.9'

Minimum Riparian Width (Total): 44.9'

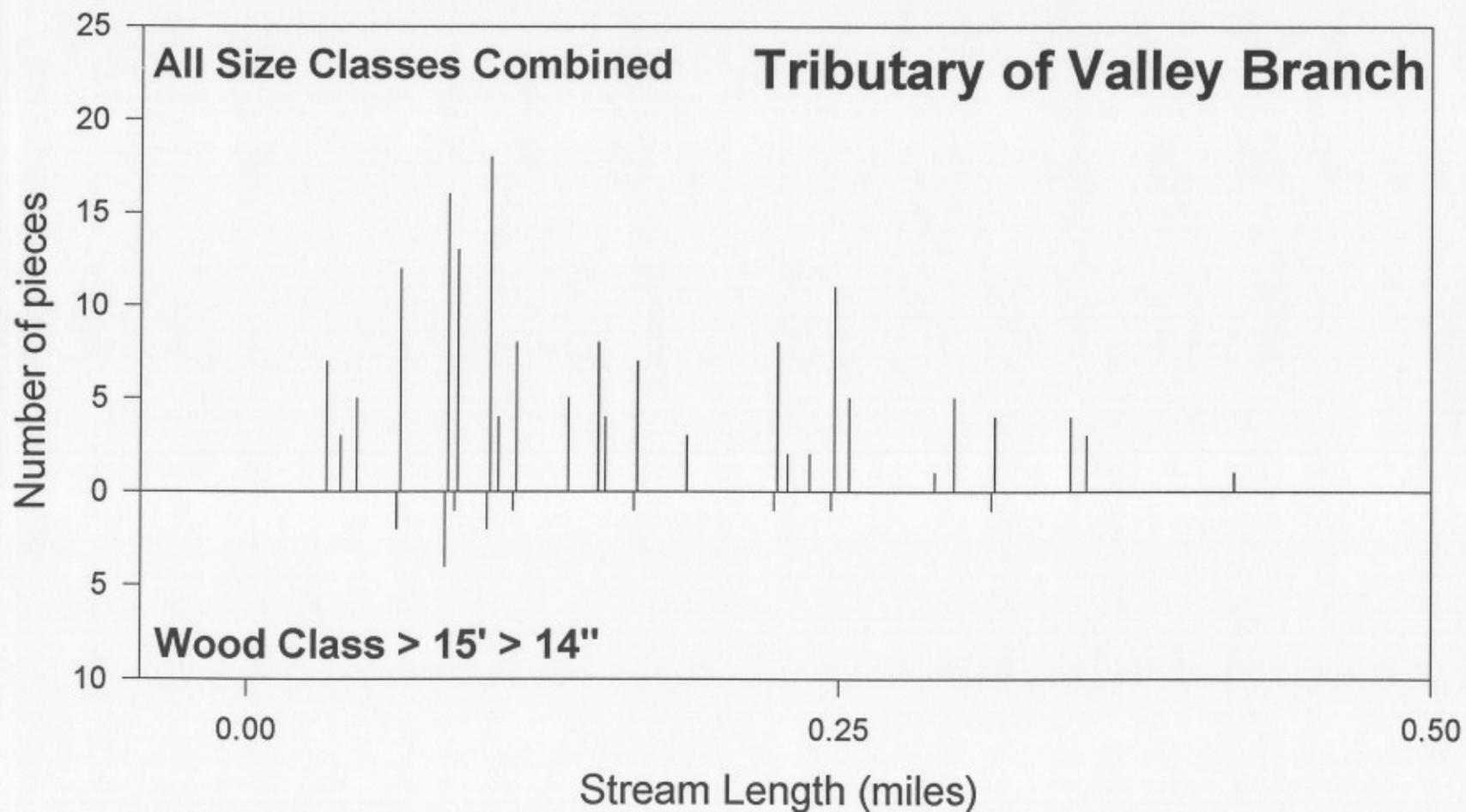
**Tributary of Valley Branch**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



## Tributary of Valley Branch



# Large Woody Debris Distribution



Stream: Valley Branch

District: New Castle

Quadrangle: Potts Creek

Sample Date: 06/06/96

Downstream Starting Point: Confluence with Potts Creek

**Total Distance Surveyed: 1.8 miles**

**Percent of Total Area - Pools: 28.2%**

Number of Pools: 195

Number of Pools per mile: 108.3

Total Pool Area: 42,990.3 sq. ft.  $\pm$  6,418.0

Mean Pool Area: 220.5 sq. ft.

Correction Factor: 1.03

Mean Maximum Depth: 1.4'

Mean Average Depth: 1.1'

**Percent of Total Area - Riffles: 71.8%**

Number of Riffles: 173

Number of Riffles per mile: 96.1

Total Riffle Area: 109,567.0 sq. ft.  $\pm$  12,861.8

Mean Riffle Area: 633.3 sq. ft.

Correction Factor: 1.17

Mean Maximum Depth: 1.0'

Mean Average Depth: 0.7'

**Number of Large Woody Debris Pieces per Mile: 588.1**

Wood < 15' and < 14": 326.1

Wood < 15' and > 14": 11.7

Wood > 15' and < 14": 205.9

Wood > 15' and > 14": 44.4

**Mean Channel Width: 26.9'**

**Mean Riparian Width: 88.0'**

Mean Maximum Riparian Distance (either side): 50.0'

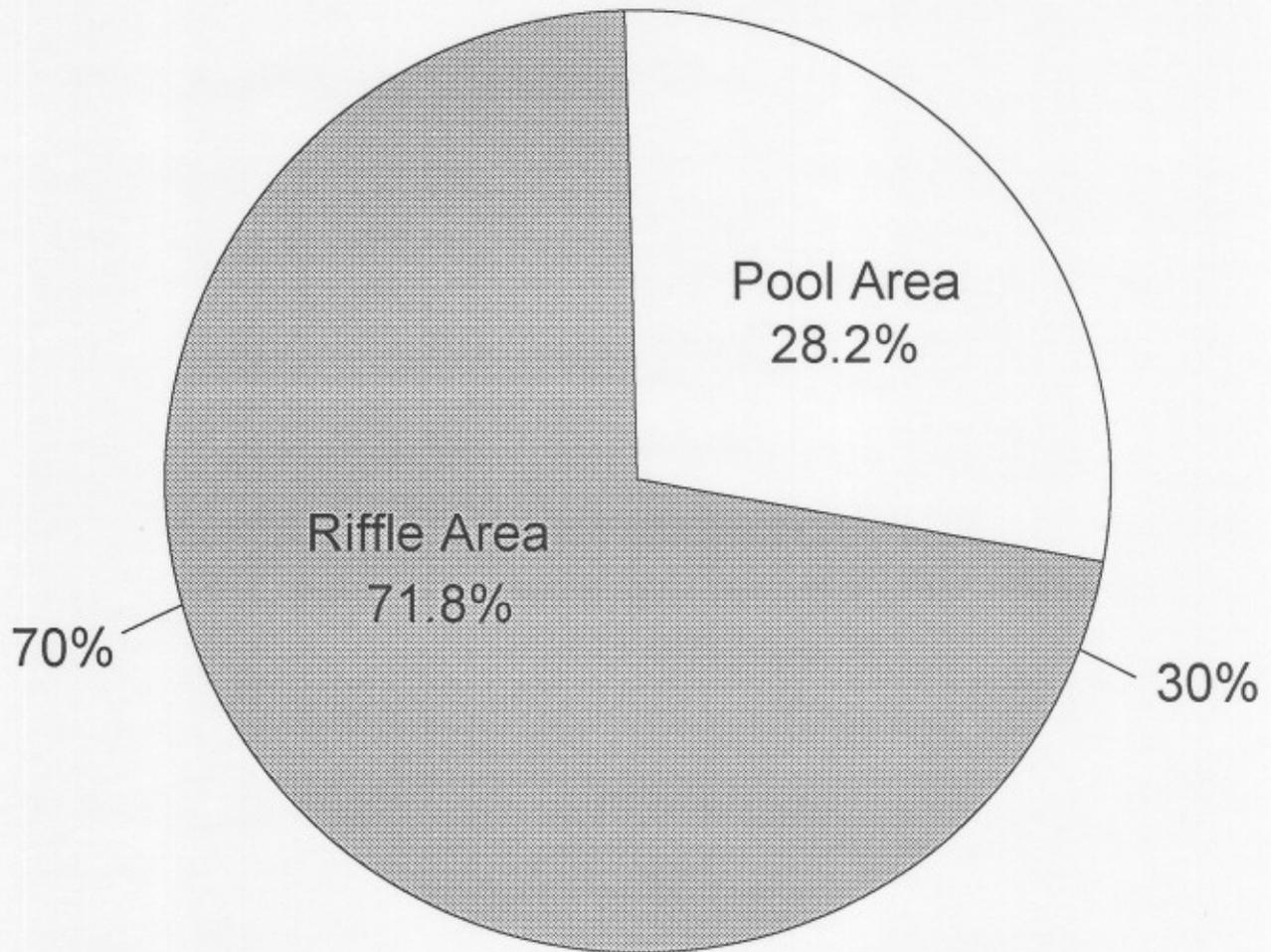
Mean Minimum Riparian Distance (either side): 11.1'

Maximum Riparian Width (Total): 169.7'

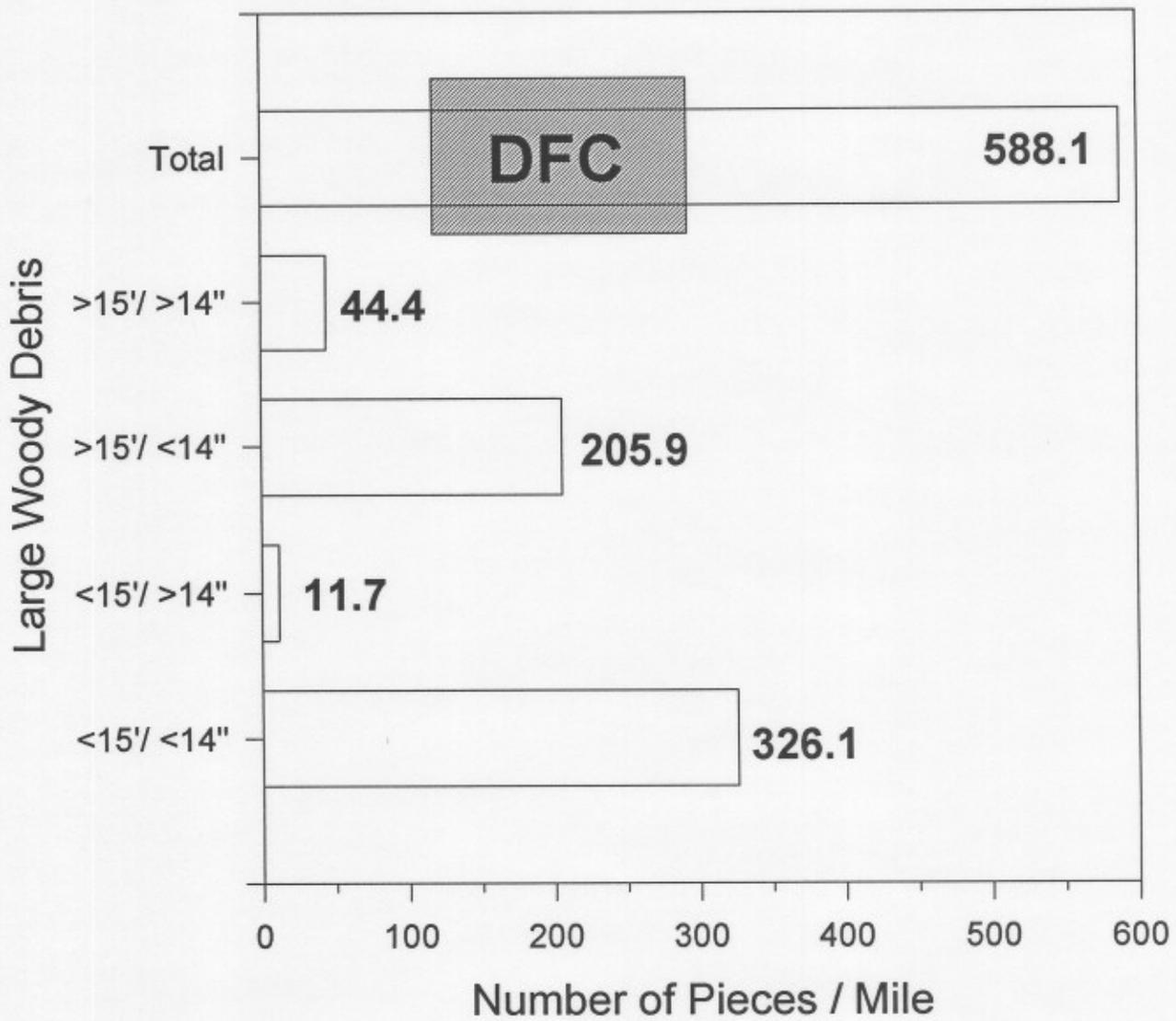
Minimum Riparian Width (Total): 42.2'

## Valley Branch

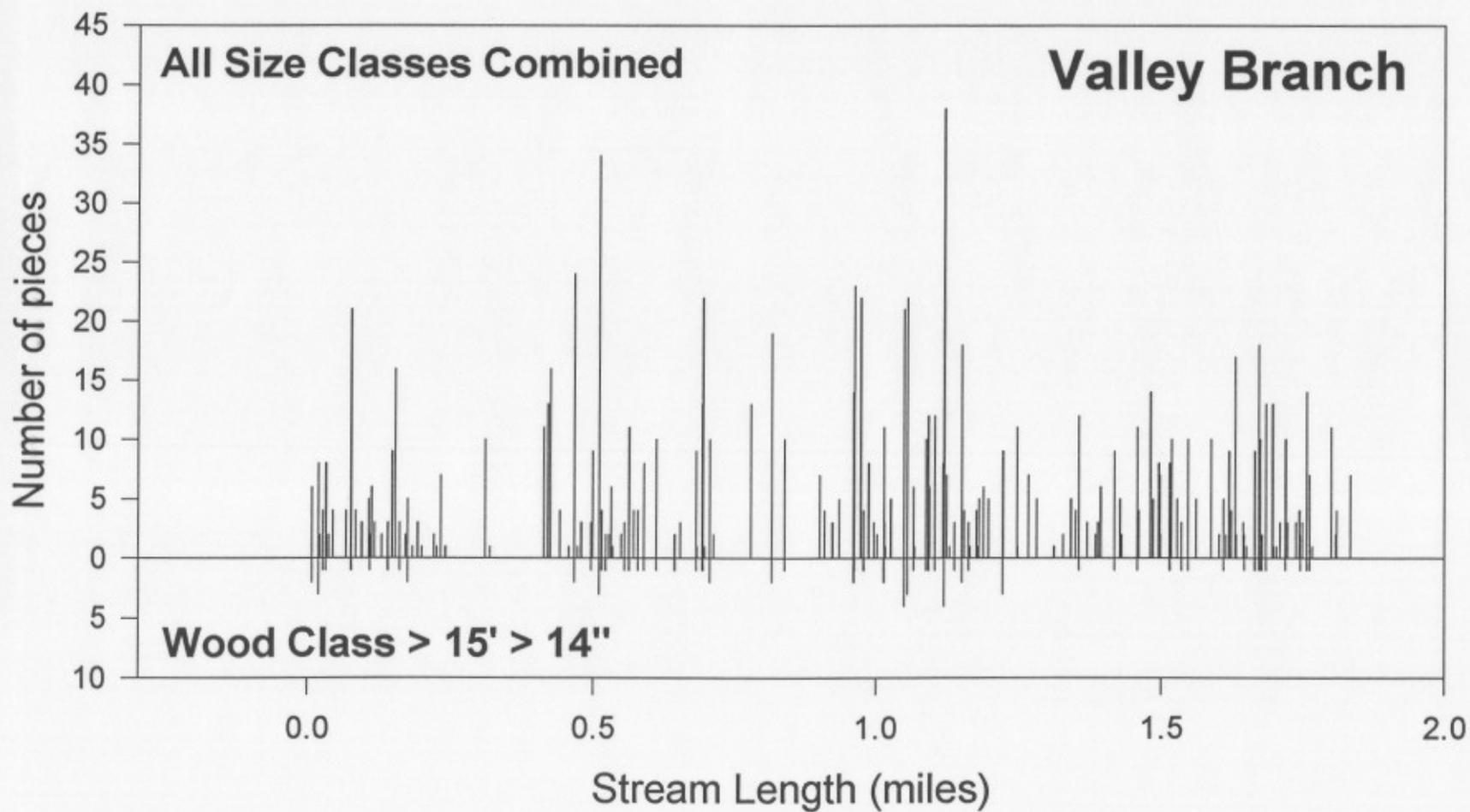
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Valley Branch



# Large Woody Debris Distribution



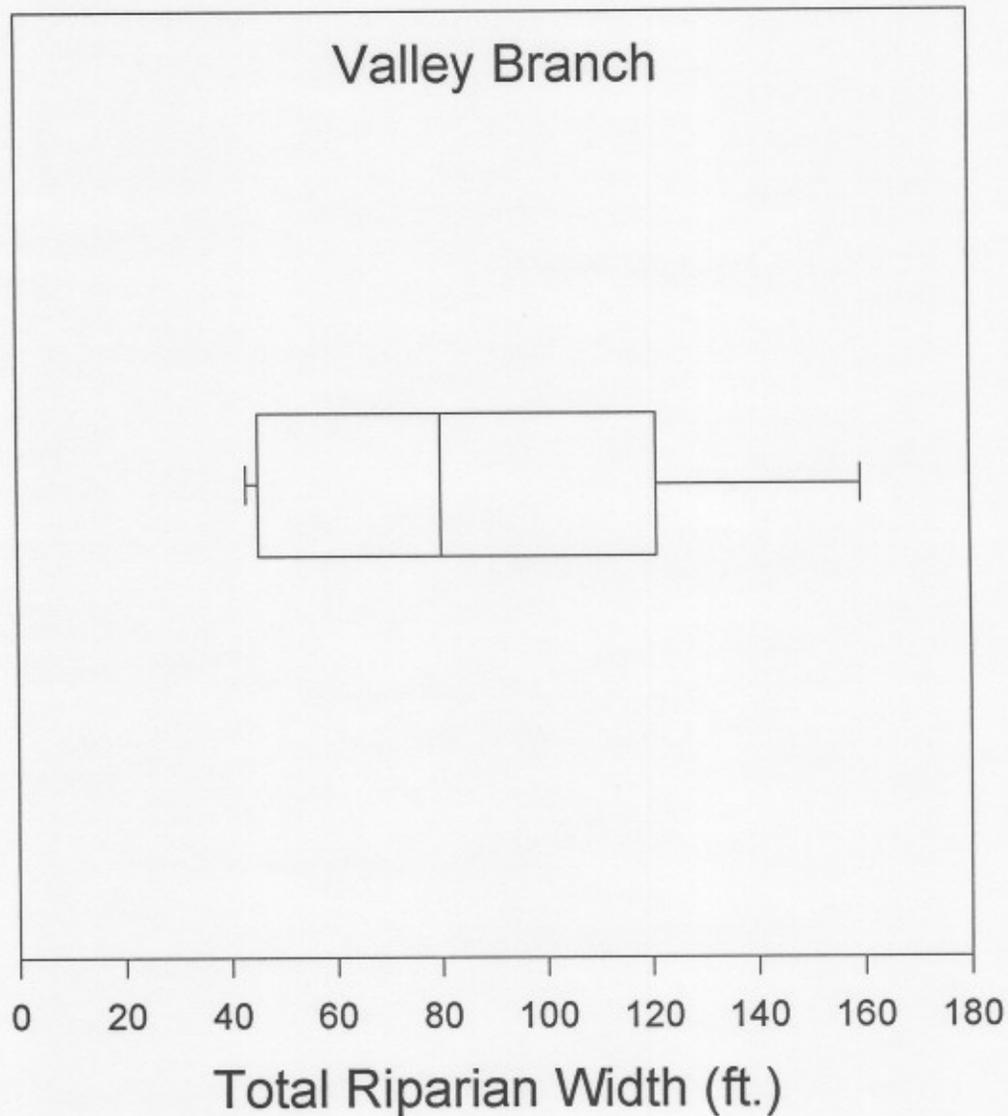
## Riparian Width

Stream: Valley Branch

Number of measurements: 9

Mean width: 88.0      Std Dev: 46.5

Max: 169.7              Min: 42.2



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 above and below the box represent the 90% and 10% quantiles.

## Strom Quadrangle

Stream: Hipes Branch

District: New Castle

Quadrangle: Strom

Sample Date: 7/1/96

Downstream Starting Point: USFS Boundary off Rt. 615

**Total Distance Surveyed: 1.6 miles**

**Percent of Total Area - Pools: 43.2%**

Number of Pools: 121

Number of Pools per mile: 75.6

Total Pool Area: 36,940.8 sq. ft.  $\pm$  3,288.2

Mean Pool Area: 305.3 sq. ft.

Correction Factor: 1.18

Mean Maximum Depth: 1.7'

Mean Average Depth: 1.1'

**Percent of Total Area - Riffles: 56.8%**

Number of Riffles: 97

Number of Riffles per mile: 60.6

Total Riffle Area: 48,541.7 sq. ft.  $\pm$  6,158.8

Mean Riffle Area: 500.4 sq. ft.

Correction Factor: 1.04

Mean Maximum Depth: 0.7'

Mean Average Depth: 0.4'

**Number of Large Woody Debris Pieces per Mile: 110.7**

Wood < 15' and < 14": 60.6

Wood < 15' and > 14": 6.3

Wood > 15' and < 14": 33.8

Wood > 15' and > 14": 10.0

**Mean Channel Width: 20.1'**

**Mean Riparian Width: 52.6'**

Mean Maximum Riparian Distance (either side): 27.4'

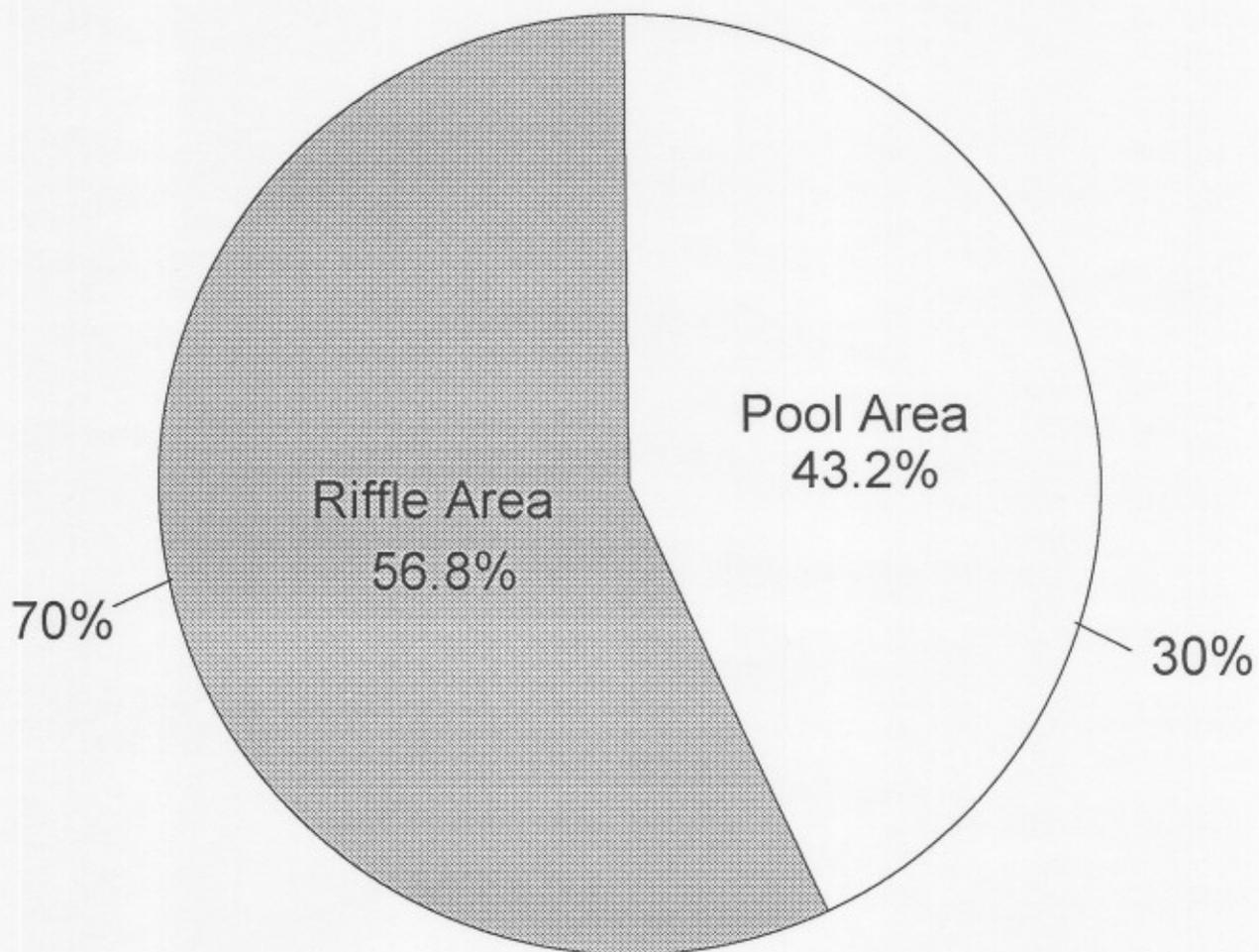
Mean Minimum Riparian Distance (either side): 5.2'

Maximum Riparian Width (Total): 75.8'

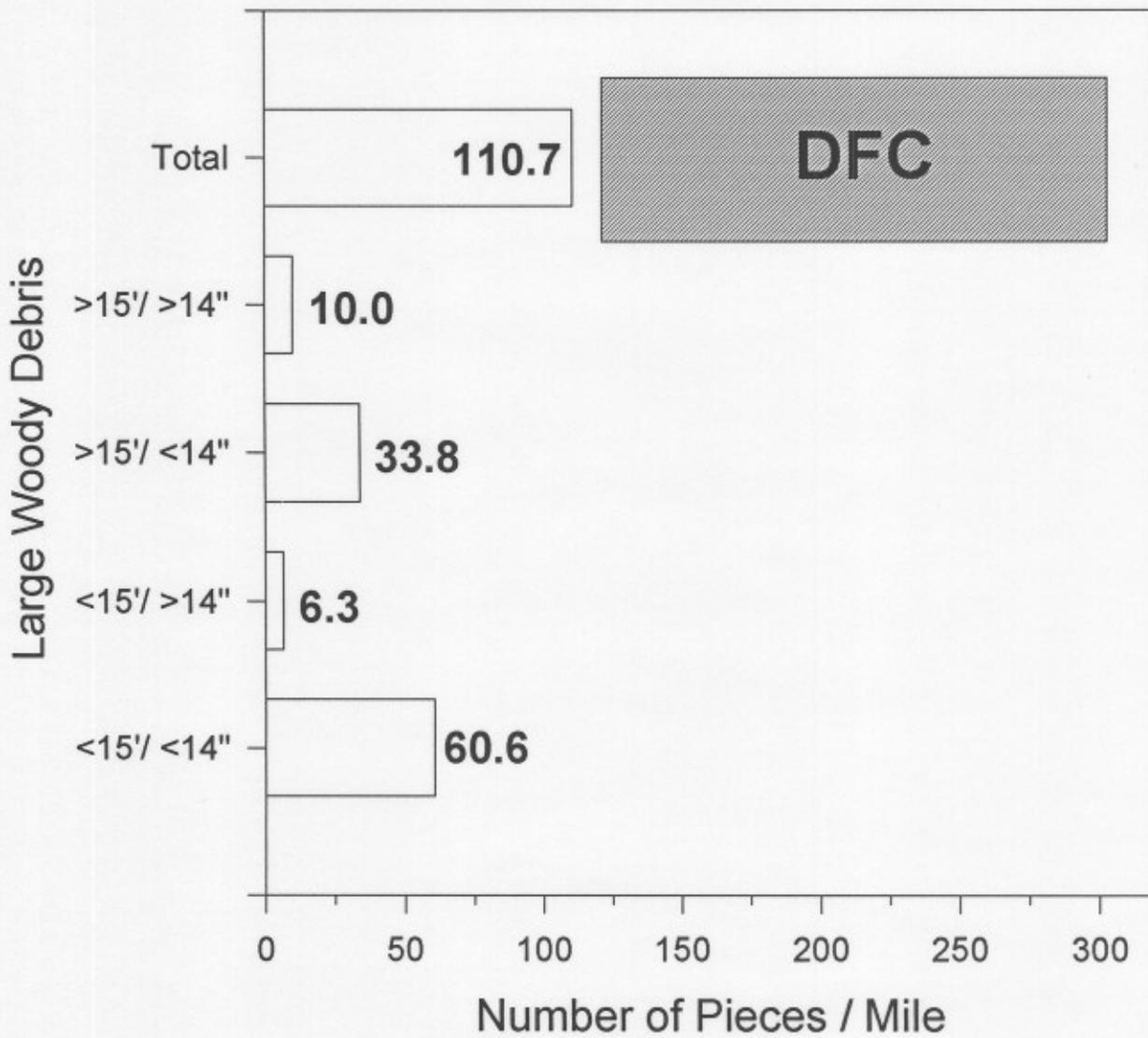
Minimum Riparian Width (Total): 33.2'

### Hipes Branch

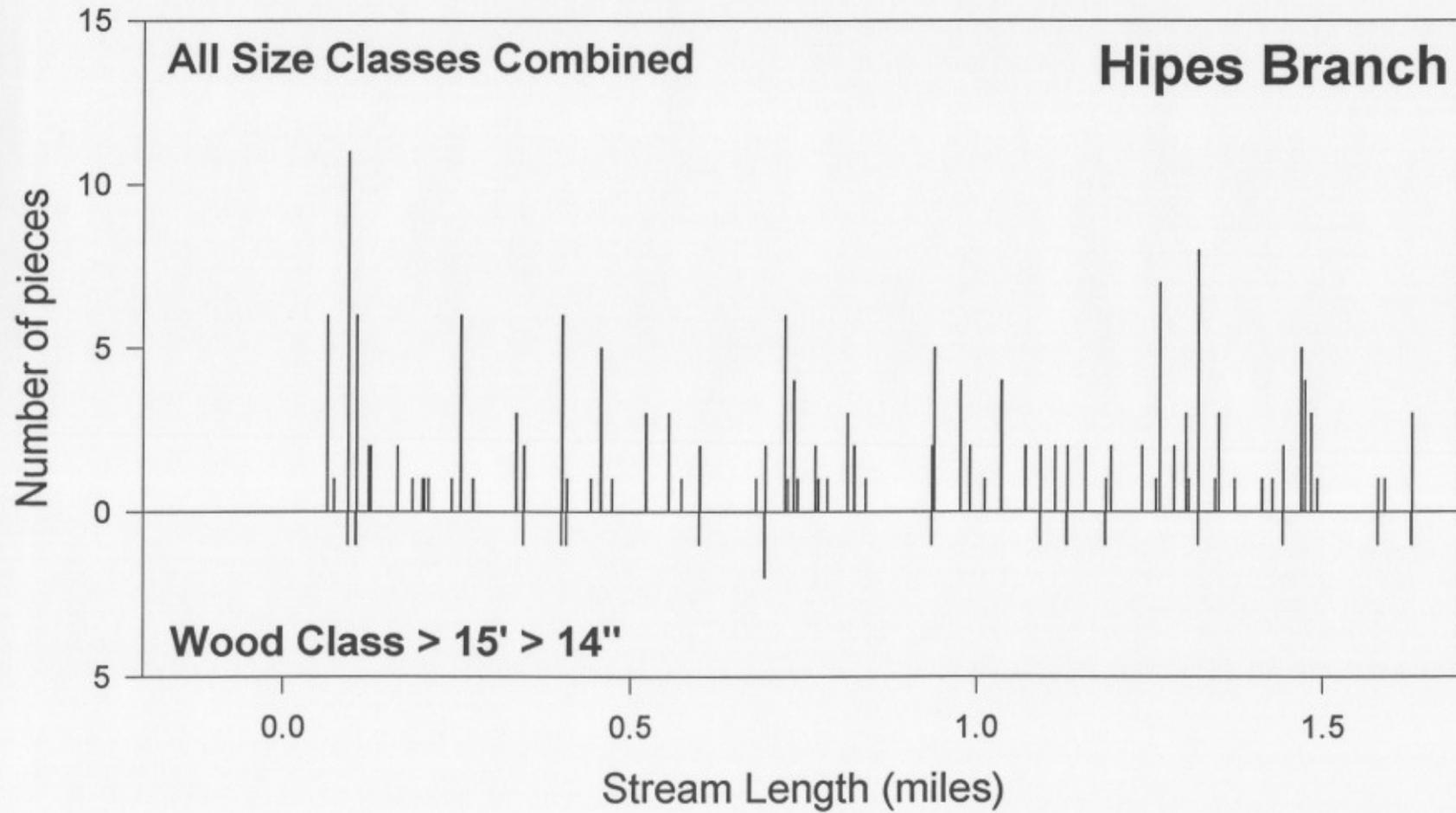
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Hipes Branch



# Large Woody Debris Distribution



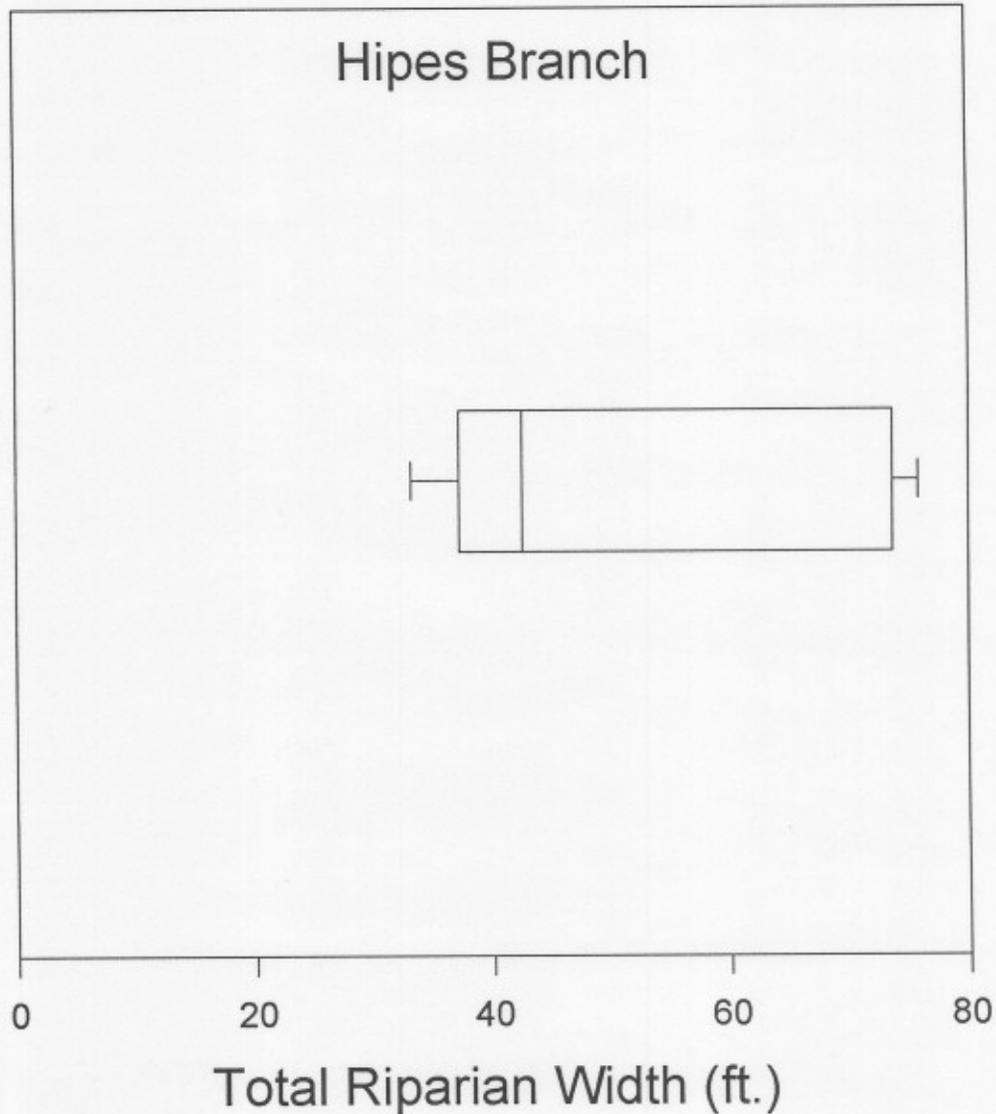
## Riparian Width

Stream: Hipes Branch

Number of measurements: 5

Mean width: 52.6      Std Dev: 20.2

Max: 75.8              Min: 33.2



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 above and below the box represent the 90% and 10% quantiles.

Stream: Roaring Run

District: New Castle

Quadrangle: Strom

Sample Date: 07/01/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 1.7 miles**

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

Number of Pools: 132

Number of Pools per mile: 77.6

Total Pool Area: 60,977.6 sq. ft.  $\pm$  7,603

Mean Pool Area: 462.0 sq. ft.

Correction Factor: 1.13

Mean Maximum Depth: 2.4'

Mean Average Depth: 1.8'

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

Number of Riffles: 119

Number of Riffles per mile: 70.0

Total Riffle Area: 145,138.0 sq. ft.  $\pm$  18,261.6

Mean Riffle Area: 1,219.6 sq. ft.

Correction Factor: 1.14

Mean Maximum Depth: 1.4'

Mean Average Depth: 0.9'

**Number of Large Woody Debris Pieces per Mile: 235.8**

Wood < 15' and < 14": 108.8

Wood < 15' and > 14": 29.4

Wood > 15' and < 14": 70.0

Wood > 15' and > 14": 27.6

**Mean Channel Width: 33.9'**

**Mean Riparian Width: 64.4'**

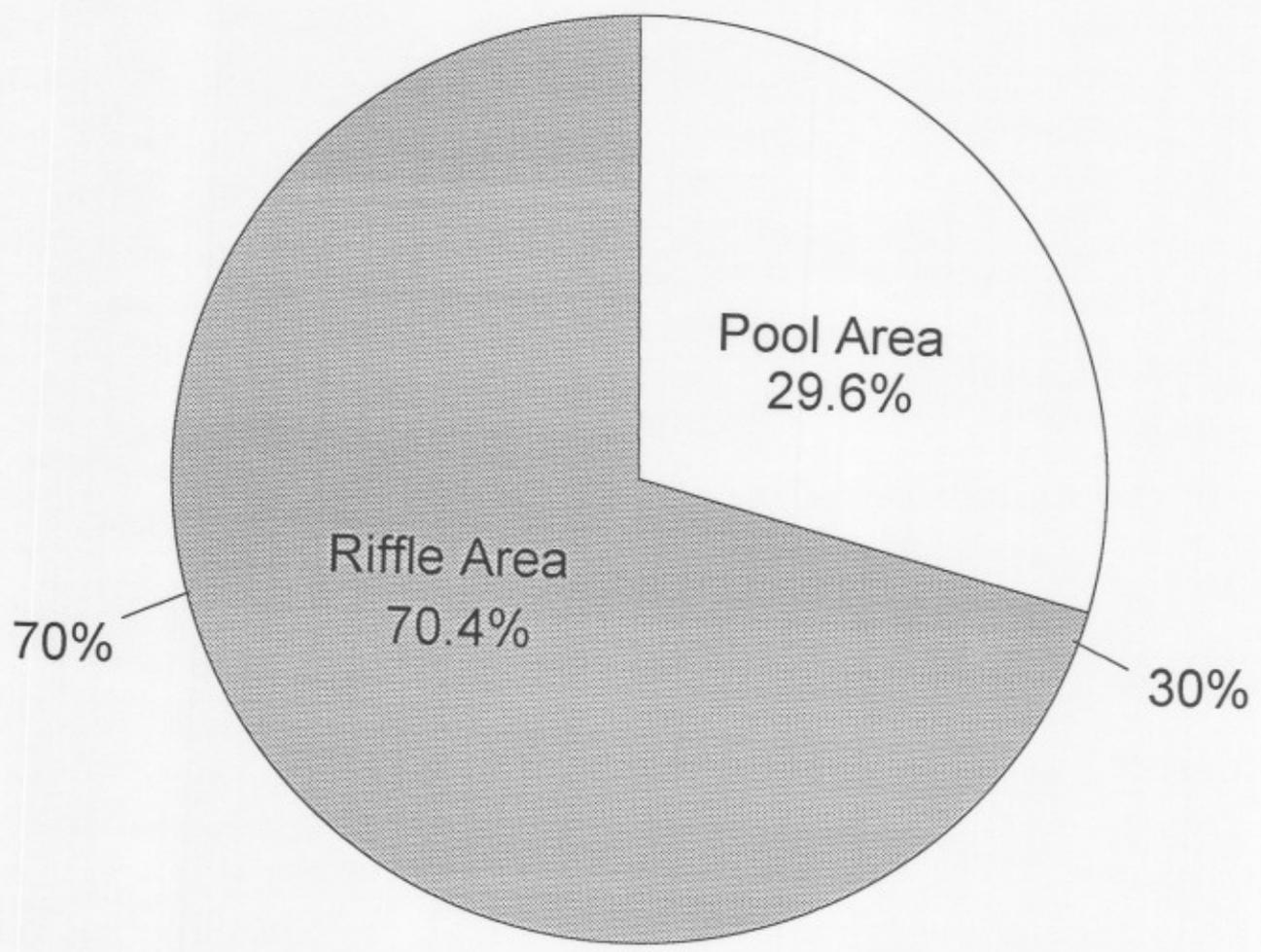
Mean Maximum Riparian Distance (either side): 23.1'

Mean Minimum Riparian Distance (either side): 7.4'

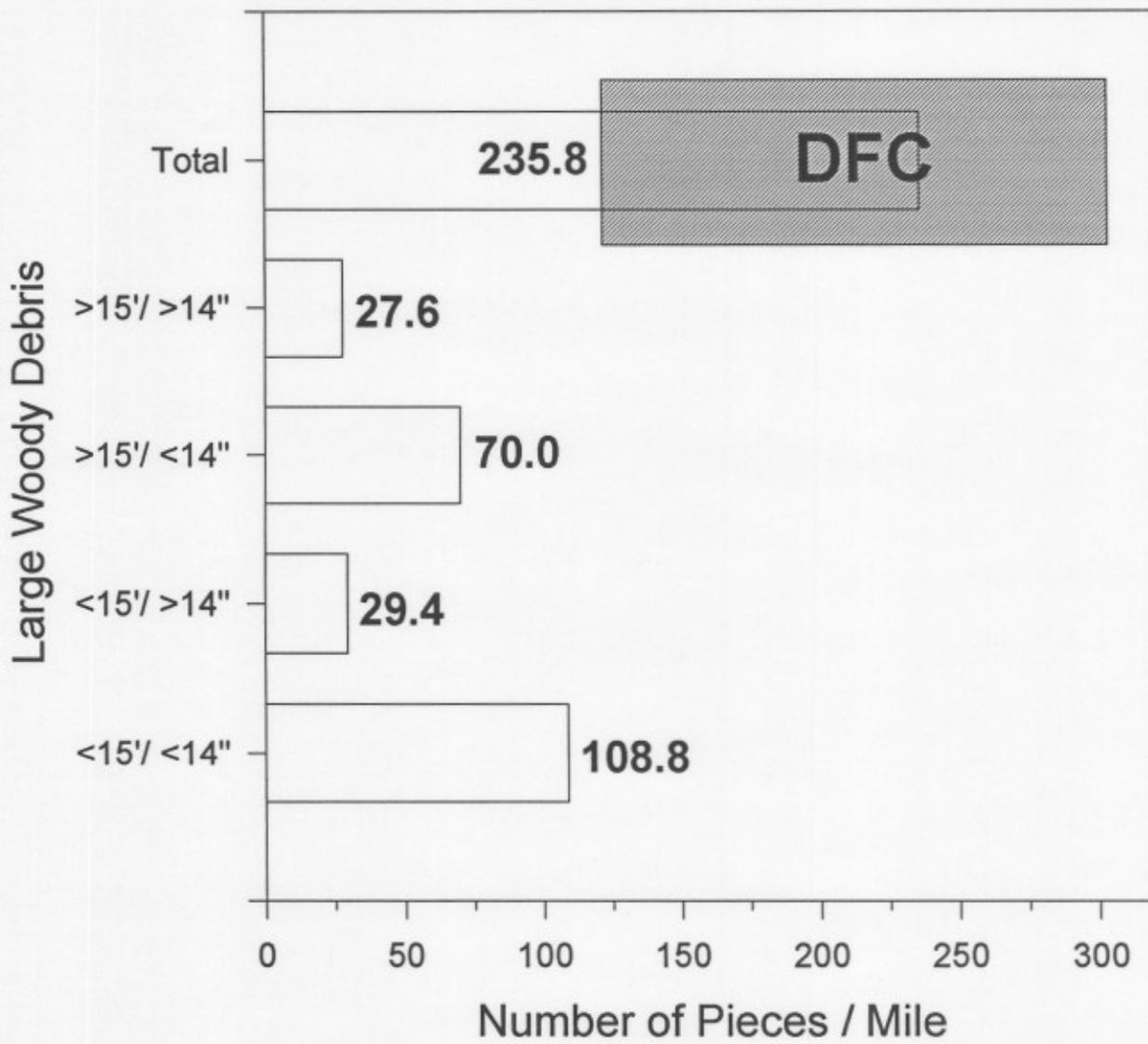
Maximum Riparian Width (Total): 134.9'

Minimum Riparian Width (Total): 26.5'

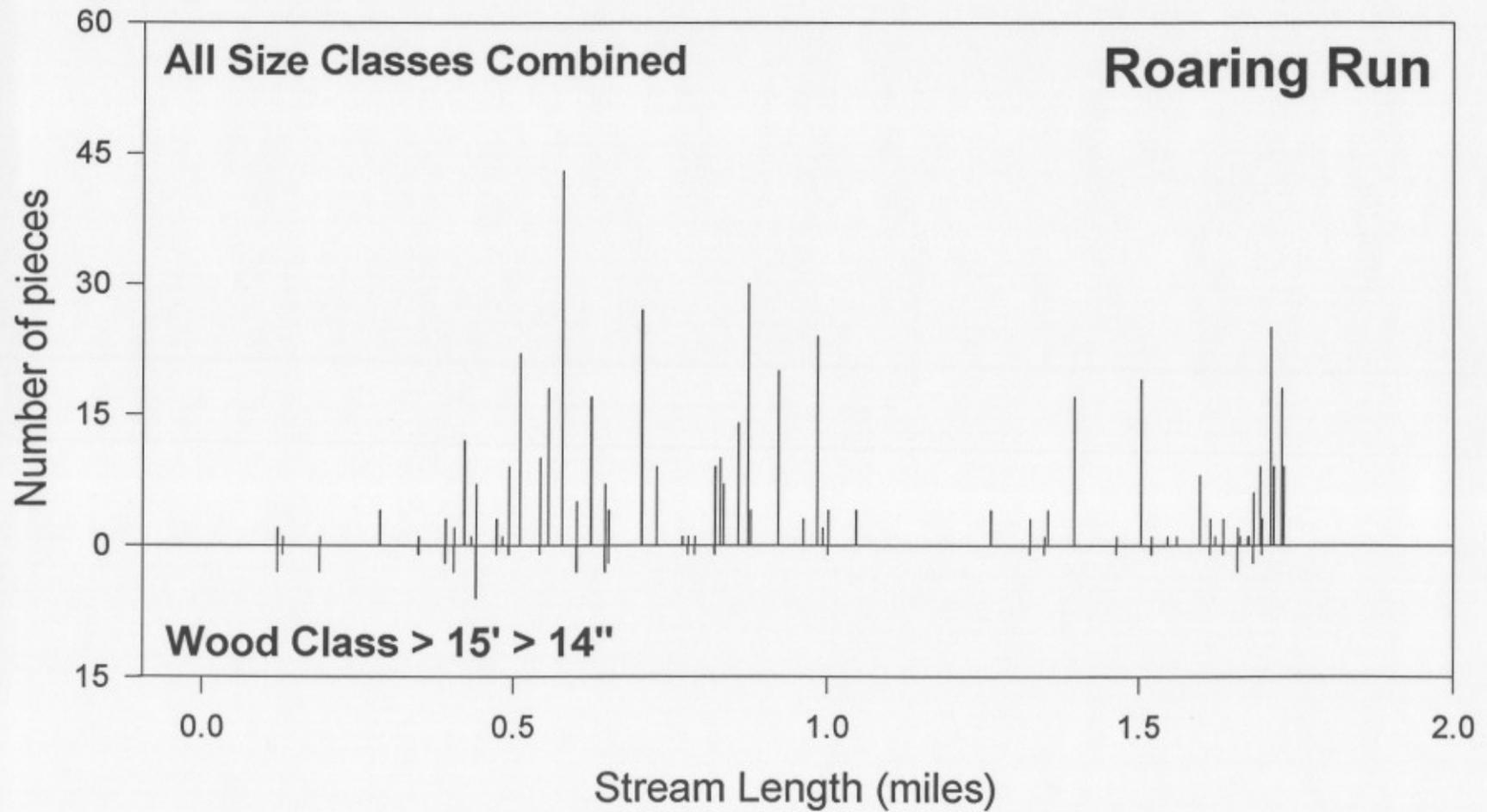
**Roaring Run**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Roaring Run



# Large Woody Debris Distribution



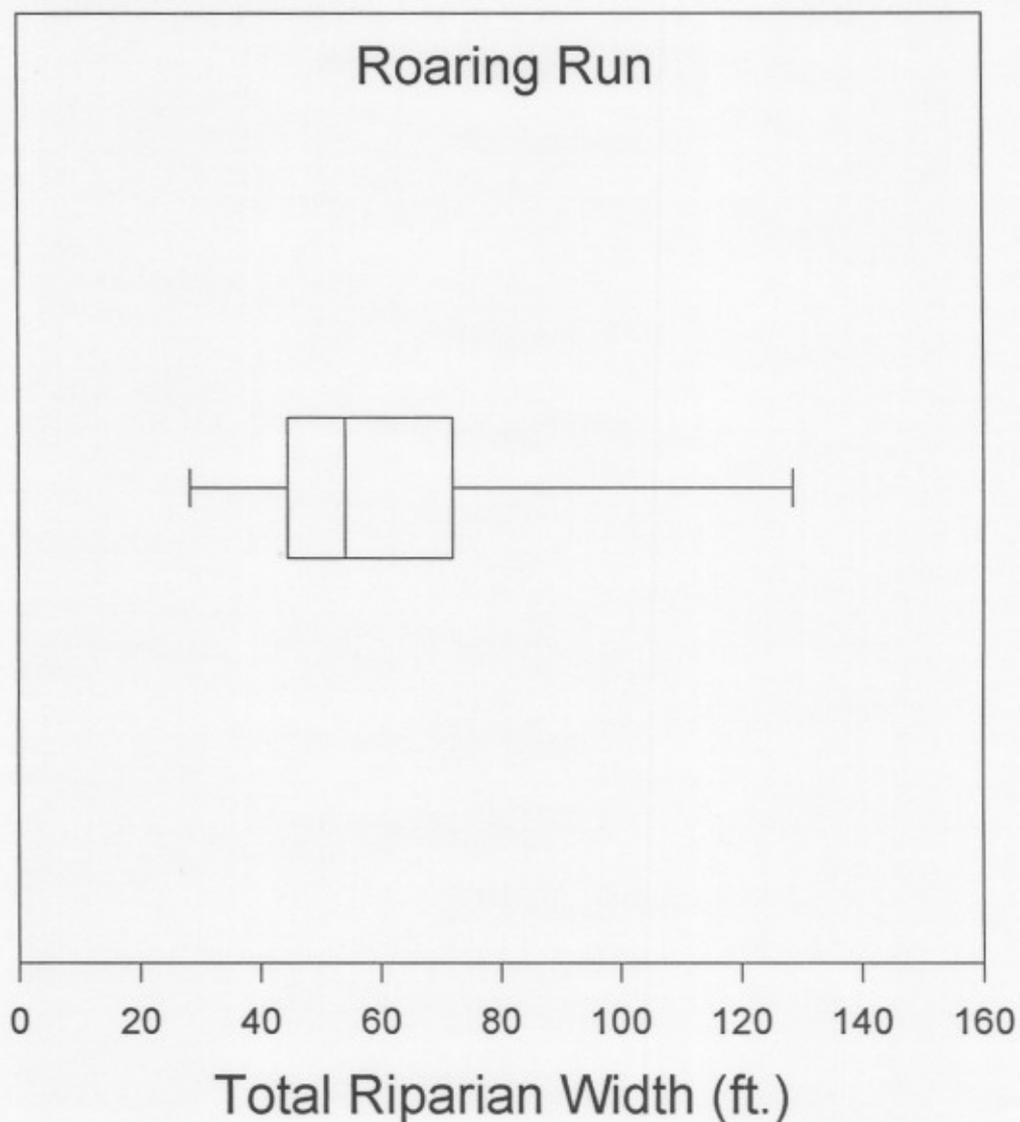
## Riparian Width

Stream: Roaring Run

Number of measurements: 6

Mean width: 64.4 Std Dev: 37.6

Max: 134.9 Min: 26.5



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 above and below the box represent the 90% and 10% quantiles.

## Waiteville Quadrangle

Stream: Big Laurel Branch

District: New Castle

Quadrangle: Waiteville

Sample Date: 06/24/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 0.3 miles**

**Percent of Total Area - Pools: 35.4%**

Number of Pools: 41

Number of Pools per mile: 136.6

Total Pool Area: 3,507.0 sq. ft.  $\pm$  6,372.6

Mean Pool Area: 85.5 sq. ft.

Correction Factor: 1.03

Mean Maximum Depth: 0.9'

Mean Average Depth: 0.5'

**Percent of Total Area - Riffles: 64.6%**

Number of Riffles: 26

Number of Riffles per mile: 86.6

Total Riffle Area: 6,406.0 sq. ft.  $\pm$  2,947.1

Mean Riffle Area: 246.4 sq. ft.

Correction Factor: 1.10

Mean Maximum Depth: 0.5'

Mean Average Depth: 0.3'

**Number of Large Woody Debris Pieces per Mile: 343.3**

Wood < 15' and < 14": 270.0

Wood < 15' and > 14": 3.3

Wood > 15' and < 14": 66.7

Wood > 15' and > 14": 3.3

**Mean Channel Width: 12.8'**

**Mean Riparian Width: 32.0'**

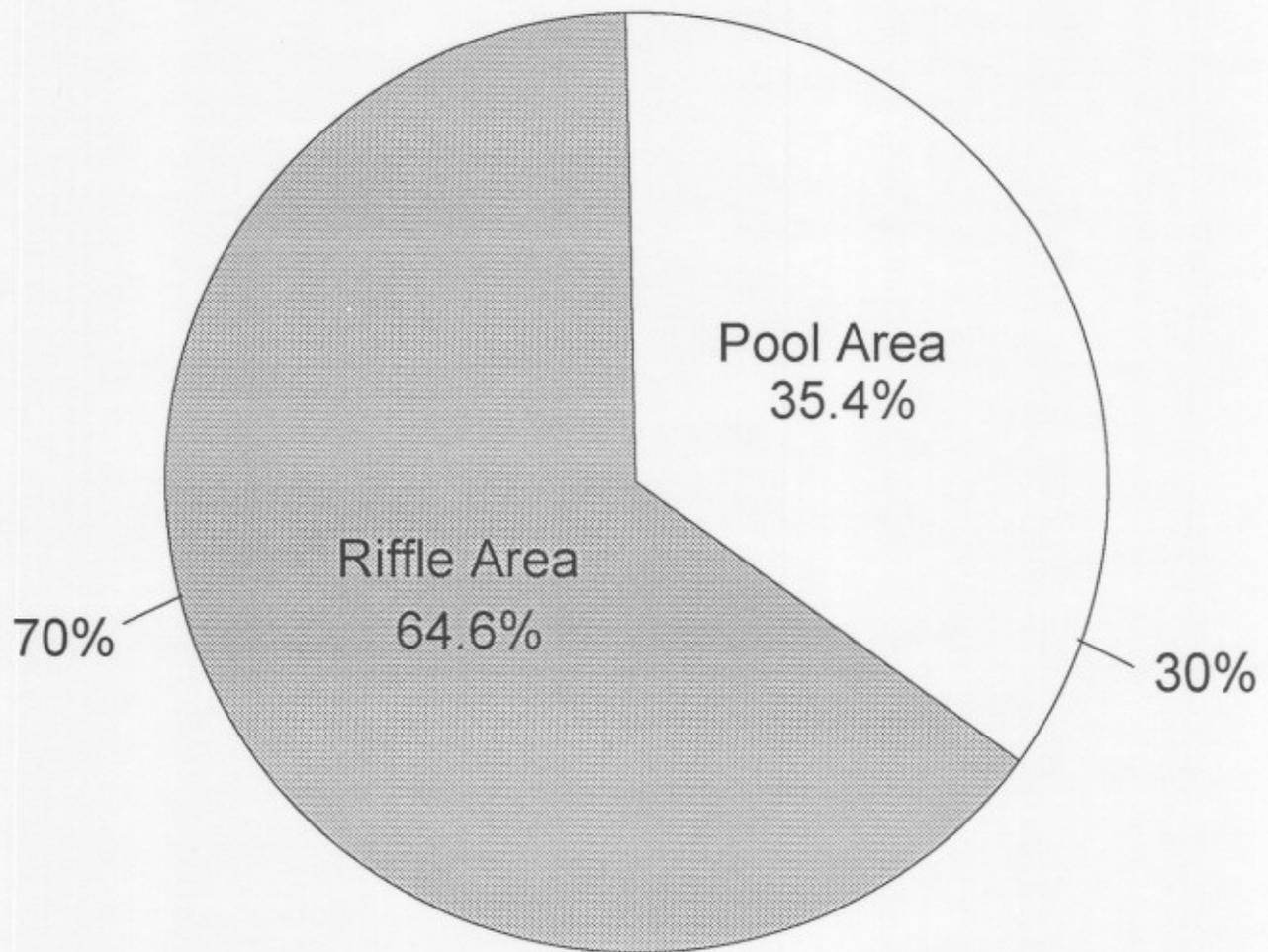
Mean Maximum Riparian Distance (either side): 12.1'

Mean Minimum Riparian Distance (either side): 7.2'

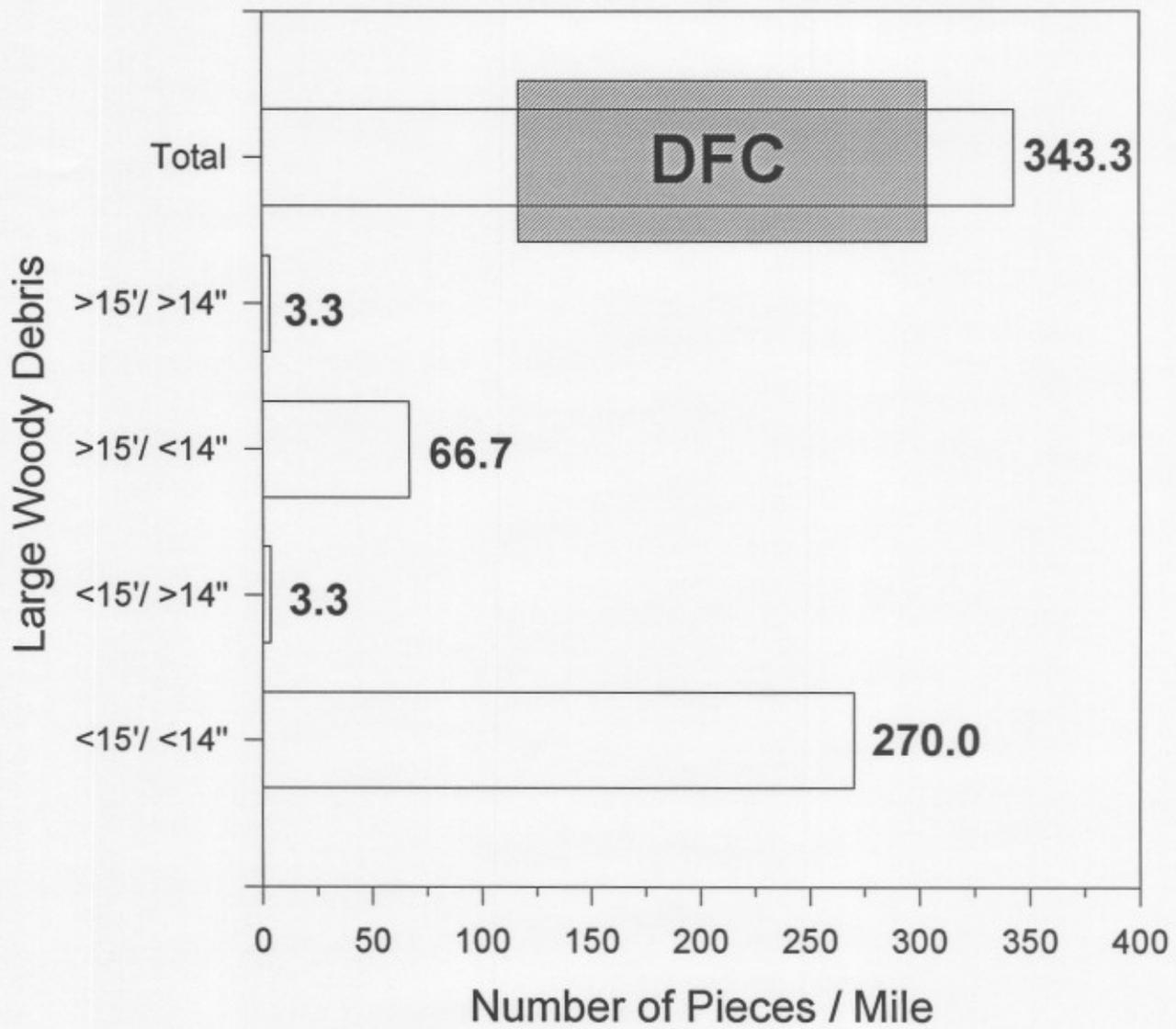
Maximum Riparian Width (Total): 41.5'

Minimum Riparian Width (Total): 22.4'

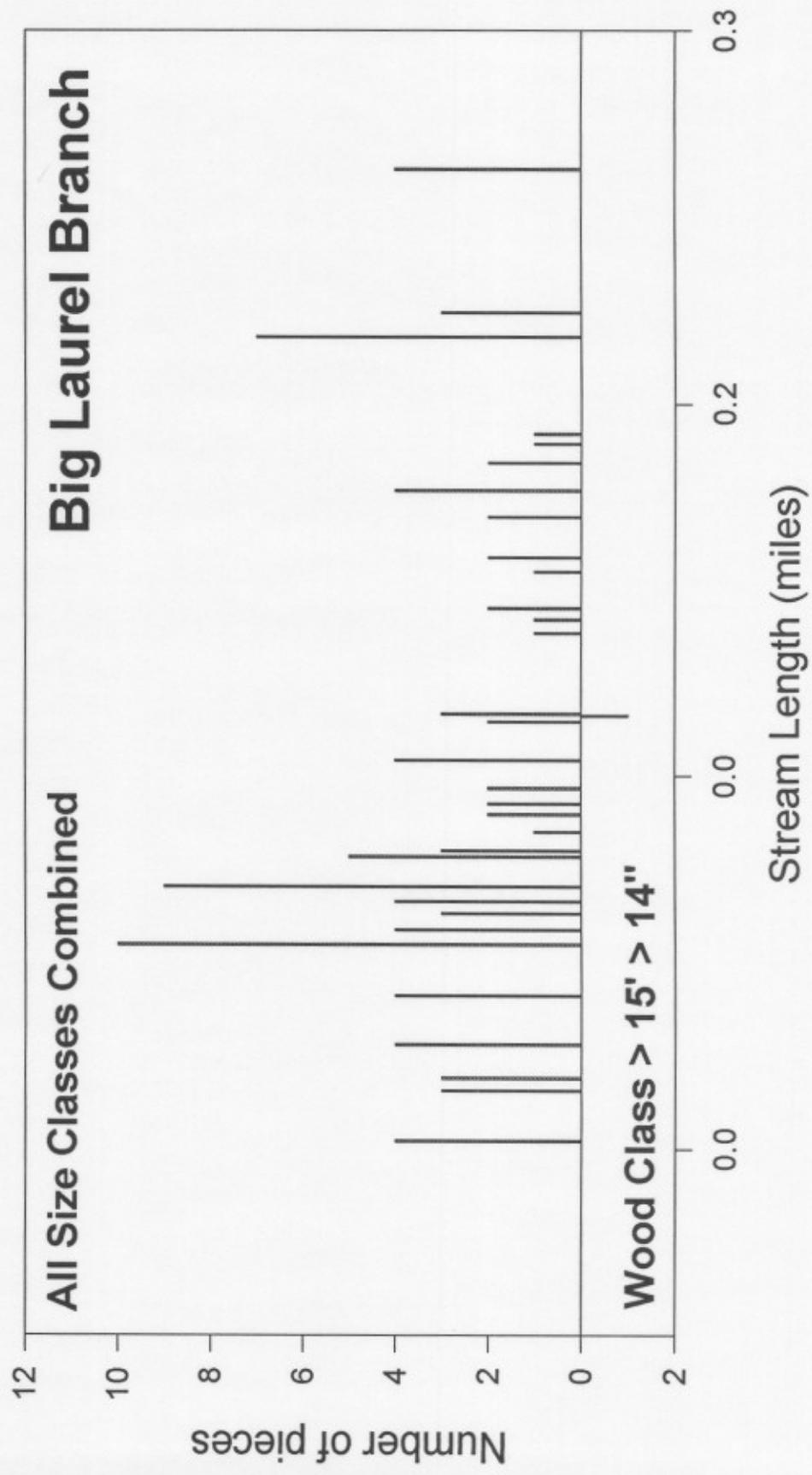
**Big Laurel Branch**  
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Big Laurel Branch



# Large Woody Debris Distribution



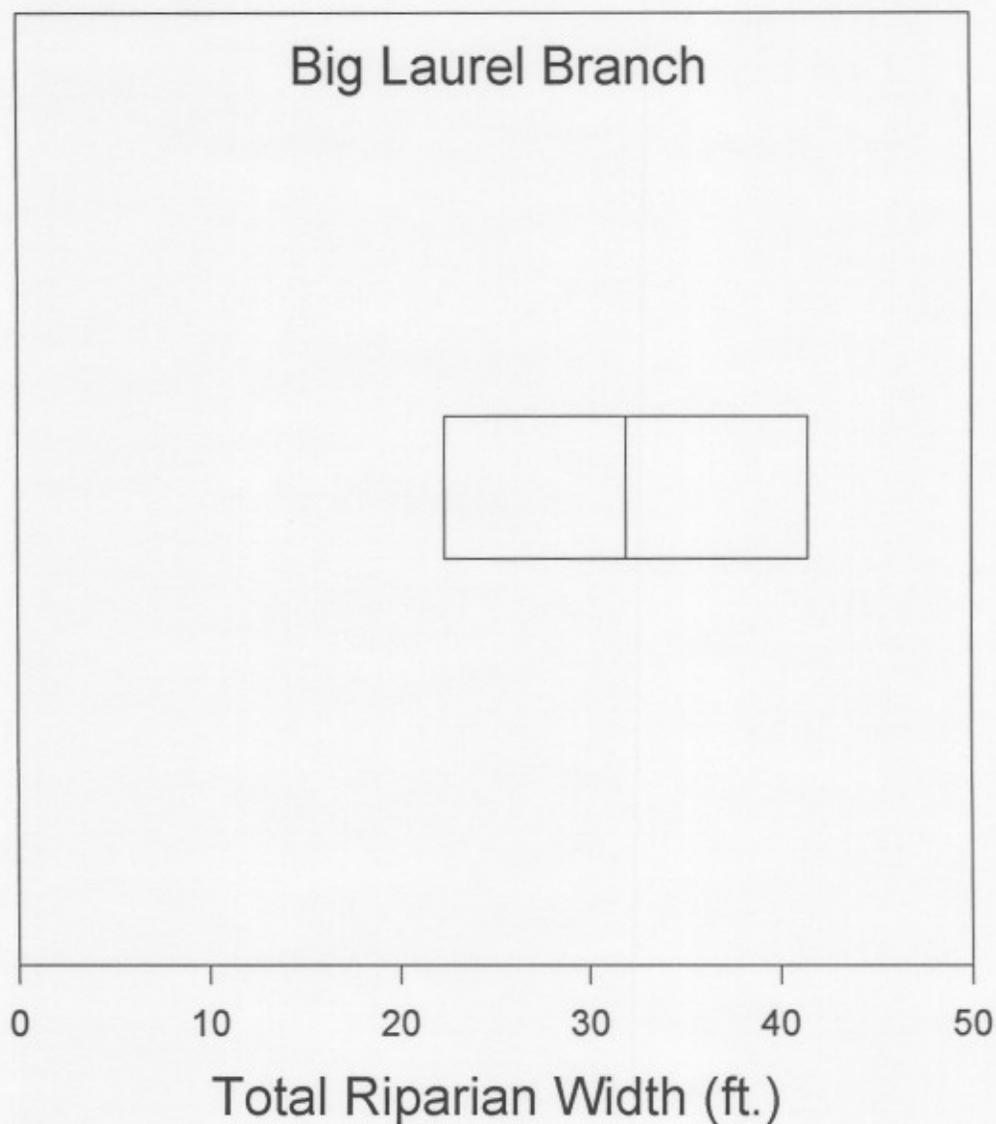
## Riparian Width

Stream: Big Laurel Branch

Number of measurements: 2

Mean width: 32.0      Std Dev: 13.5

Max: 41.5              Min: 22.4



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 above and below the box represent the 90% and 10% quantiles.

Stream: Wilson Branch

District: New Castle

Quadrangle: Waiteville

Sample Date: 6/24/96

Downstream Starting Point: USFS Boundary

**Total Distance Surveyed: 0.8 miles**

**Percent of Total Area - Pools: 26.4%**

Number of Pools: 86

Number of Pools per mile: 107.5

Total Pool Area: 11,107.0 sq. ft.  $\pm$  2,068.4

Mean Pool Area: 129.2 sq. ft.

Correction Factor: 0.99

Mean Maximum Depth: 1.1'

Mean Average Depth: 0.7'

**Percent of Total Area - Riffles: 73.6%**

Number of Riffles: 71

Number of Riffles per mile: 88.75

Total Riffle Area: 31,041.0 sq. ft.  $\pm$  10,053.5

Mean Riffle Area: 437.2 sq. ft.

Correction Factor: 1.08

Mean Maximum Depth: 0.6'

Mean Average Depth: 0.4'

**Number of Large Woody Debris Pieces per Mile: 383.9**

Wood < 15' and < 14": 308.8

Wood < 15' and > 14": 13.8

Wood > 15' and < 14": 53.8

Wood > 15' and > 14": 7.5

**Mean Channel Width: 18.7'**

**Mean Riparian Width: 48.9'**

Mean Maximum Riparian Distance (either side): 18.8'

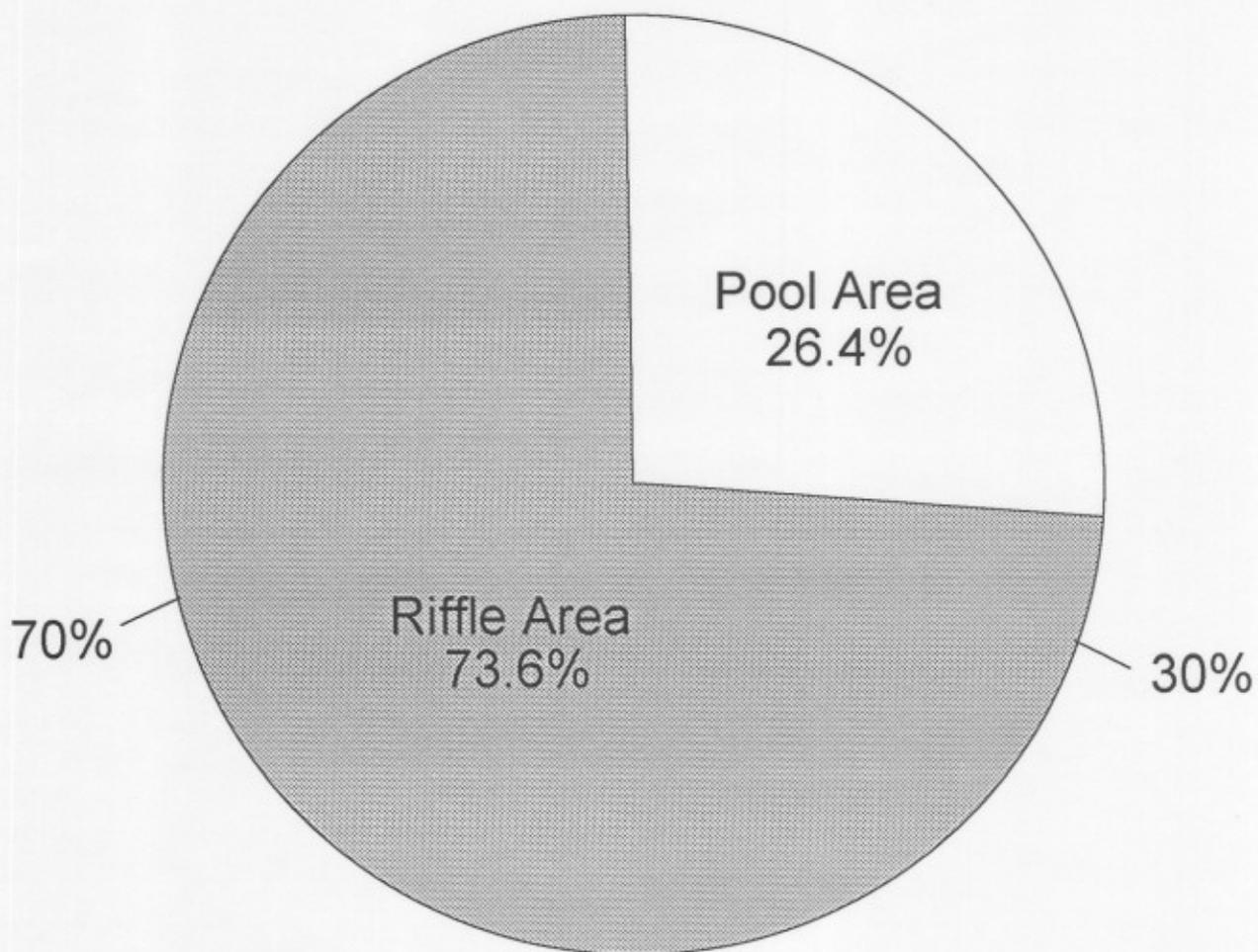
Mean Minimum Riparian Distance (either side): 11.4'

Maximum Riparian Width (Total): 62.2'

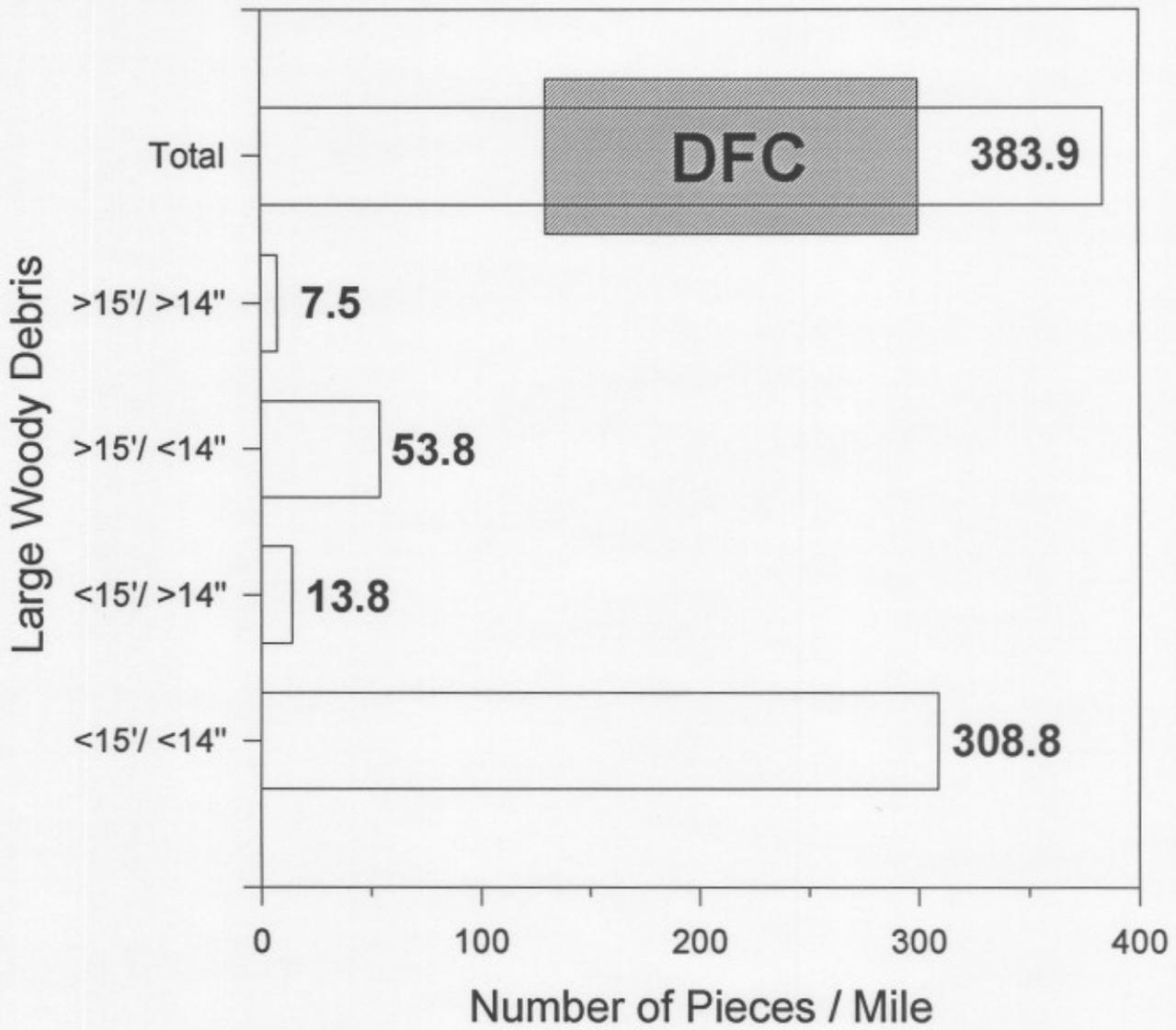
Minimum Riparian Width (Total): 40.3'

### Wilson Branch

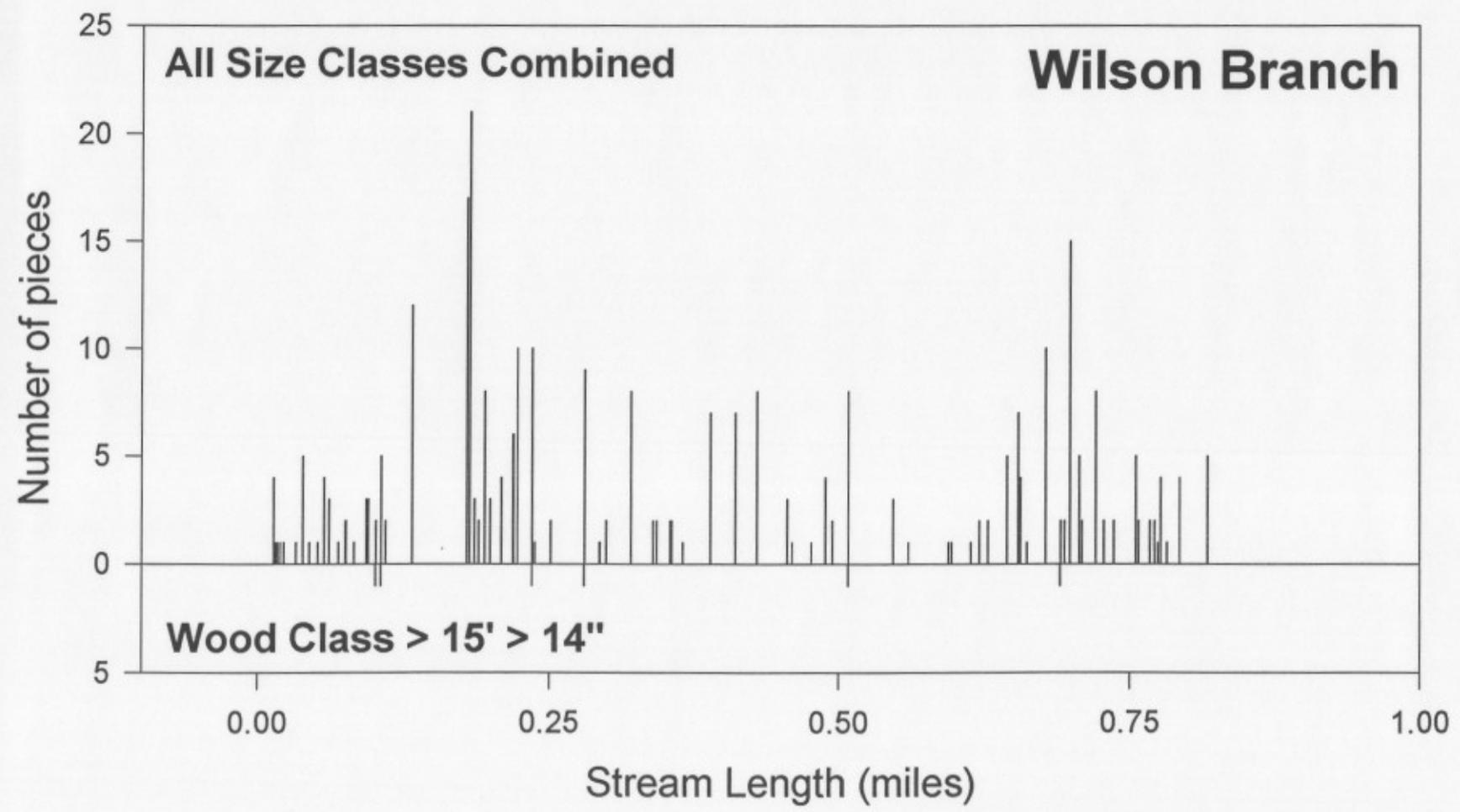
DFC: 30 - 70% of the Total Stream Area  
in Pool Habitat



# Wilson Branch



# Large Woody Debris Distribution



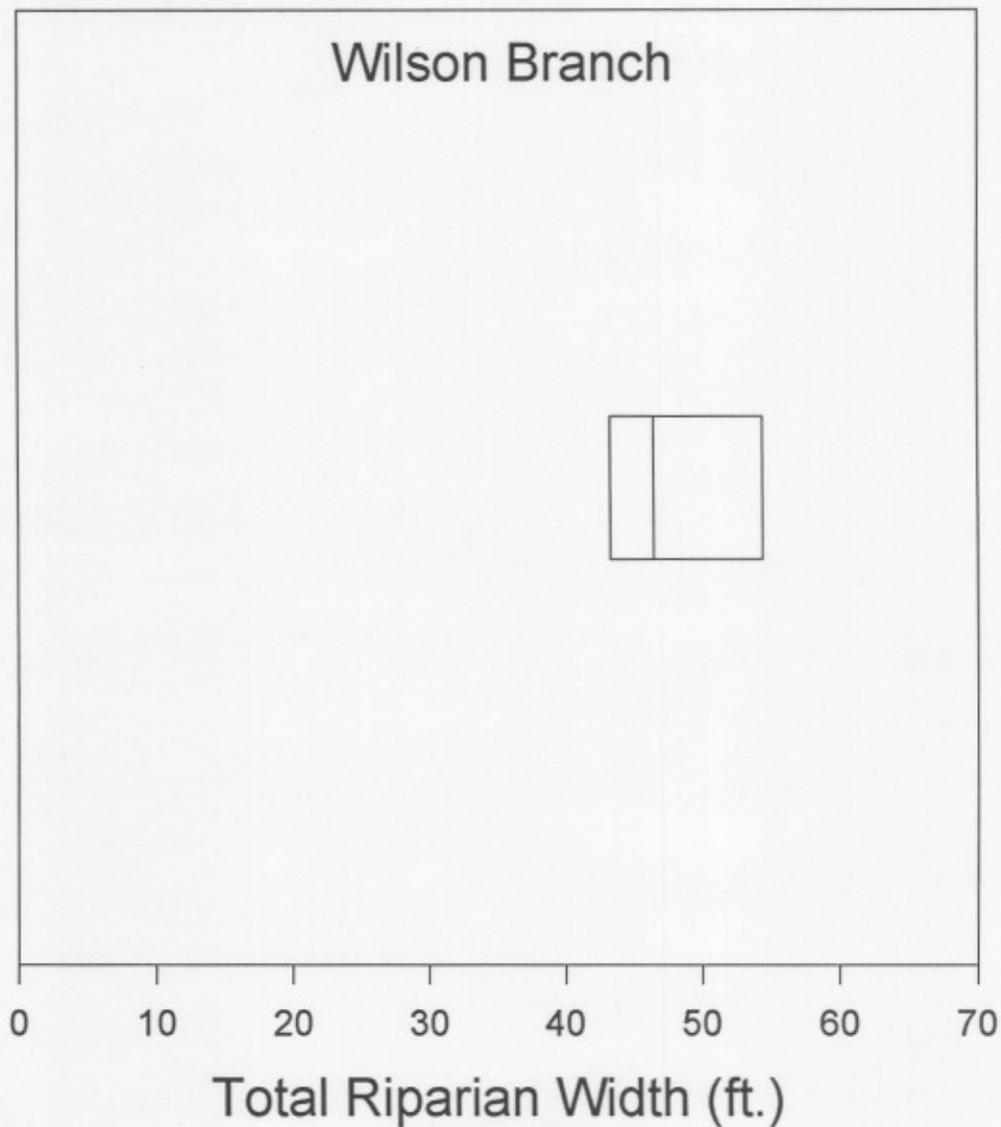
## Riparian Width

Stream: Wilson Branch

Number of measurements: 4

Mean width: 48.9      Std Dev: 9.4

Max: 62.2              Min: 40.3



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 above and below the box represent the 90% and 10% quantiles.