

STREAM INVENTORY REPORT

North Fork Wages Creek, 2008

INTRODUCTION

A stream inventory was conducted on August 6, 2008 on North Fork Wages Creek. The survey began at the confluence with Wages Creek and extended upstream 0.4 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in North Fork Wages Creek.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

North Fork Wages Creek is a tributary to Wages Creek, which drains to the Pacific Ocean, located in Mendocino County, California. North Fork Wages Creek's legal description at the confluence with Wages Creek is T21N R17W S26. Its location is 39.6393 north latitude and 123.7146 west longitude, LLID number 1237131396393. North Fork Wages Creek is a first order stream and has approximately 1.9 miles of blue line stream according to the USGS Lincoln Ridge 7.5 minute quadrangle. North Fork Wages Creek drains a watershed of approximately 1.3 square miles. Elevations range from about 200 feet at the mouth of the creek to 1,400 feet in the headwater areas. Mixed hardwood and mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Wages Creek Road.

METHODS

The habitat inventory conducted in North Fork Wages Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Pacific States Marine Fisheries Commission (PSMFC) fisheries technicians that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the

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parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in North Fork Wages Creek to record measurements and observations. There are eleven components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) near the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". North Fork Wages Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In North Fork Wages Creek,

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embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In North Fork Wages Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In North Fork Wages Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or hardwood trees.

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In North Fork Wages Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the

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elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Game. This program processes and summarizes the data, and produces the following ten tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for North Fork Wages Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy

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- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of August 6, 2008 was conducted by D. Wright and W. Holloway (PSMFC). The total length of the stream surveyed was 2,294 feet with an additional 60 feet of side channel.

Stream flow was estimated to be less than 0.5 cfs on North Fork Wages Creek.

North Fork Wages Creek is an E3 channel type for 1,109 feet of the stream surveyed (Reach 1), and a B3 channel type for 1,245 feet of the stream surveyed (Reach 2). E3 channels are low gradient, meandering riffle/pool streams with low width/depth ratio and little deposition. They are very efficient and stable, have a high meander width ratio and have cobble-dominant substrates. B3 channels are moderately entrenched riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width/depth ratios and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 57 degrees Fahrenheit. Air temperatures ranged from 63 to 65 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 43% pool units, 27% riffle units, 25% flatwater units, and 4% dry units (Graph 1). Based on total length of Level II habitat types there were 48% flatwater units, 22% pool units, 20% riffle units, and 11% dry units (Graph 2).

Eleven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 24%; plunge pool units, 22%; and step run units, 20% (Graph 3). Based on percent total length, step run units made up 41%, low gradient riffle units 17%, and dry units 11%.

A total of 22 pools were identified (Table 3). Scour pools were the most frequently encountered at 68% (Graph 4), and comprised 63% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Seven of the 22 pools (32%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 22 pool tail-outs measured, none had a value of 1 (0%); 11 had a value of 2 (50%); 7 had a value of 3 (31.8%); 2 had a value of 4 (9.1%); 2 had a value of 5 (9.1%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was

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assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 13, flatwater habitat types had a mean shelter rating of 12, and pool habitats had a mean shelter rating of 68 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 92. Scour pools had a mean shelter rating of 65 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in North Fork Wages Creek. Graph 7 describes the pool cover in North Fork Wages Creek. Large woody debris is the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 57% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 33% of pool tail-outs.

The mean percent canopy density for the surveyed length of North Fork Wages Creek was 98%. Two percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 73% and 27%, respectively. Graph 9 describes the mean percent canopy in North Fork Wages Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 33%. The mean percent left bank vegetated was 39%. The dominant elements composing the structure of the stream banks consisted of 42% cobble/gravel, 41% sand/silt/clay, 14% bedrock, and 3% boulder (Graph 10). Brush was the dominant vegetation type observed in 69% of the units surveyed. Additionally, 14% of the units surveyed had grass as the dominant vegetation type, and 11% had deciduous trees as the dominant vegetation type (Graph 11).

DISCUSSION

North Fork Wages Creek is an E3 channel type for 1,109 feet of the stream surveyed (Reach 1), and a B3 channel type for the remaining 1,245 feet of the stream surveyed (Reach 2). The suitability of E3 and B3 channel types for fish habitat improvement structures is as follows: E3 channels are good for bank-placed boulders and are fair for opposing wing-deflectors. B3 channels are excellent for plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days August 6, 2008, ranged from 56 to 57 degrees Fahrenheit. Air temperatures ranged from 63 to 65 degrees Fahrenheit. To make any conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

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Flatwater habitat types comprised 48% of the total length of this survey, riffles 20%, pools 22%, and 11% dry units. The pools are relatively shallow, with 7 of the 22 (32%) pools having a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structure that will increase or deepen pool habitat is recommended.

Eleven of the 22 pool tail-outs measured had embeddedness ratings of 1 or 2. Nine of the pool tail-outs had embeddedness ratings of 3 or 4. Two of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in North Fork Wages Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Nineteen of the 21 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 68. The shelter rating in the flatwater habitats was 12. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by large woody debris in North Fork Wages Creek. Large woody debris is the dominant cover type in pools followed by small woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 98%. Reach 1 had a canopy density of 98%, Reach 2 had a canopy density of 98%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 33% and 39%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

- 1) North Fork Wages Creek should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

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- 3) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Position (ft):	Habitat unit #	Comments:
0	0001.00	Start of survey at confluence with Wages Creek.
64	0003.00	Salmonid young-of-the-year (YOY) observed.
400	0007.00	Log debris accumulation (LDA#1) 6' high x 21' wide x 17' long, water flows through and there are visible gaps. LDA causes the channel to split. Retaining sediment ranging in size from silt to gravel, 15' wide x 20' long x 2' deep.
613	0011.00	Old train tracks in the water.
845	0017.00	Left bank landslide with associated LDA #2; 7' high x 21' wide x 51' long, made up of 20 pieces of wood. Water is flowing through and there are visible gaps. Sediment ranging in size from silt to large cobble is being retained, 21' wide x 35' long x 2' deep. Fish were observed above, but may be a barrier in low flows.
1067	0025.00	There is a small LDA.
1833	0047.00	Salmonid YOY observed and a landslide.
2024	0048.00	There is a left bank failure and a landslide.
2055	0049.00	There is a landslide.
2077	0050.00	There is a landslide.
2294	0050.00	End of survey due to dry stream over 400' long.

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REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }

CASCADE

Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{24}

FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

MAIN CHANNEL POOLS

Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

SCOUR POOLS

Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }

BACKWATER POOLS

Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}

ADDITIONAL UNIT DESIGNATIONS

Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: North Fork Wages Creek

LLID: 1237131396393 Drainage: Rockport

Survey Dates: 8/6/2008 to 8/6/2008

Confluence Location: Quad: LINCOLN RIDGE Legal Description: T21NR17WS26 Latitude: 39:38:21.0N Longitude: 123:42:47.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
2	0	DRY	3.9	124	248	10.5									
13	4	FLATWATER	25.5	86	1119	47.5	6.5	0.6	1.1	371	4827	189	2459		13
22	22	POOL	43.1	23	514	21.8	9.4	1.0	1.7	191	4211	254	5580	215	68
14	6	RIFFLE	27.5	34	473	20.1	5.6	0.2	0.5	207	2901	56	785		13
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
51	32				2354					11939			8824		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: North Fork Wages Creek

LLID: 1237131396393

Drainage: Rockport

Survey Dates: 8/6/2008 to 8/6/2008

Confluence Location: Quad: LINCOLN RIDGE

Legal Description: T21NR17WS26

Latitude: 39:38:21.0N

Longitude: 123:42:47.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
12	5	LGR	23.5	33	398	16.9	6	0.2	0.7	191	2287	44	528		6	98
2	1	HGR	3.9	38	75	3.2	6	0.4	0.9	291	581	116	233		50	99
3	1	RUN	5.9	48	145	6.2	7	0.7	1.2	182	546	127	382		15	97
10	3	SRN	19.6	97	974	41.4	6	0.5	1.1	434	4344	210	2098		12	98
4	4	MCP	7.8	24	98	4.2	7	0.9	2.2	163	652	188	753	161	66	99
1	1	STP	2.0	50	50	2.1	8	1.3	3.2	380	380	570	570	494	195	100
3	3	LSL	5.9	27	81	3.4	8	0.6	1.2	198	594	157	472	112	190	98
1	1	LSBk	2.0	34	34	1.4	5	0.7	1.2	162	162	145	145	113	20	99
11	11	PLP	21.6	19	209	8.9	11	1.2	3.3	182	2002	281	3091	247	35	99
2	2	BPL	3.9	21	42	1.8	10	1.0	2.1	211	421	274	549	212	33	100
2	0	DRY	3.9	124	248	10.5										92

Total Units
51

Total Units Fully Measured
32

Total Length (ft.)
2354

Total Area (sq.ft.)
11969

Total Volume (cu.ft.)
8821

Table 3 - Summary of Pool Types

Stream Name: North Fork Wages Creek

LLID: 1237131396393

Drainage: Rockport

Survey Dates: 8/6/2008 to 8/6/2008

Confluence Location: Quad: LINCOLN RIDGE

Legal Description: T21NR17WS26

Latitude: 39:38:21.0N

Longitude: 123:42:47.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Residual Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Residual Pool Vol (cu.ft.)	Estimated Total Resid.Vol. (cu.ft.)	Mean Shelter Rating
5	5	MAIN	23	30	148	29	7.4	1.0	206	1032	228	1138	92
15	15	SCOUR	68	22	324	63	9.9	1.0	184	2758	211	3162	65
2	2	BACKWATER	9	21	42	8	10.5	1.0	211	421	212	423	33
Total Units	Total Units Fully Measured				Total Length (ft.)				Total Area (sq.ft.)			Total Volume (cu.ft.)	
22	22				514				4211			4724	

Table 4 - Summary of Maximum Residual Pool Depths By Pool Habitat Types

Stream Name: North Fork Wages Creek

LLID: 1237131396393

Drainage: Rockport

Survey Dates: 8/6/2008 to 8/6/2008

Confluence Location: Quad: LINCOLN RIDGE

Legal Description: T21NR17WS26

Latitude: 39:38:21.0N

Longitude: 123:42:47.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
4	MCP	18	1	25	2	50	1	25	0	0	0	0
1	STP	5	0	0	0	0	0	0	1	100	0	0
3	LSL	14	0	0	3	100	0	0	0	0	0	0
1	LSBk	5	0	0	1	100	0	0	0	0	0	0
11	PLP	50	1	9	6	55	2	18	2	18	0	0
2	BPL	9	0	0	1	50	1	50	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
22	2	9	13	59	4	18	3	14	0	0

Mean Maximum Residual Pool Depth (ft.): 1.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: North Fork Wages Creek

LLID: 1237131396393

Drainage: Rockport

Survey Dates: 8/6/2008 to 8/6/2008

Dry Units: 2

Confluence Location: Quad: LINCOLN RIDGE

Legal Description: T21NR17WS26

Latitude: 39:38:21.0N

Longitude: 123:42:47.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
12	5	LGR	10	21	4	0	26	0	0	39	0
2	1	HGR	15	0	0	0	0	0	0	85	0
14	6	TOTAL RIFFLE	11	18	3	0	22	0	0	47	0
3	1	RUN	30	70	0	0	0	0	0	0	0
10	3	SRN	0	53	30	7	0	0	0	10	0
13	4	TOTAL FLAT	8	58	23	5	0	0	0	8	0
4	4	MCP	35	25	35	0	0	0	0	5	0
1	1	STP	0	20	80	0	0	0	0	0	0
3	3	LSL	7	37	57	0	0	0	0	0	0
1	1	LSBk	0	20	0	70	10	0	0	0	0
11	11	PLP	25	20	42	3	8	0	0	2	0
2	2	BPL	20	10	70	0	0	0	0	0	0
22	22	TOTAL POOL	22	22	45	5	5	0	0	2	0
51	32	TOTAL	18	26	34	4	7	0	0	11	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: North Fork Wages Creek

LLID: 1237131396393

Drainage: Rockport

Survey Dates: 8/6/2008 to 8/6/2008

Dry Units: 2

Confluence Location: Quad: LINCOLN RIDGE

Legal Description: T21NR17WS26 Latitude: 39:38:21.0N

Longitude: 123:42:47.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
12	5	LGR	0	0	40	0	60	0	0
2	1	HGR	0	0	0	0	0	100	0
3	1	RUN	0	0	0	0	100	0	0
10	3	SRN	0	0	0	33	33	33	0
4	4	MCP	0	0	25	25	0	50	0
1	1	STP	0	0	0	0	100	0	0
3	3	LSL	0	33	0	33	33	0	0
1	1	LSBk	0	0	100	0	0	0	0
11	11	PLP	0	0	45	36	18	0	0
2	2	BPL	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: North Fork Wages Creek

LLID: 1237131396393

Drainage: Rockport

Survey Dates: 8/6/2008 to 8/6/2008

Confluence Location: Quad: LINCOLN RIDGE

Legal Description: T21NR17WS26

Latitude: 39:38:21.0N

Longitude: 123:42:47.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
98	27	73	0	33	39

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: North Fork Wages Creek LLID: 1237131396393 Drainage: Rockport
 Survey Dates: 8/6/2008 to 8/6/2008 Survey Length (ft.): 2354 Main Channel (ft.): 2294 Side Channel (ft.): 60
 Confluence Location: Quad: LINCOLN RIDGE Legal Description: T21NR17WS26 Latitude: 39:38:21.0N Longitude: 123:42:47.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: E3	Canopy Density (%): 98.4	Pools by Stream Length (%): 25.3
Reach Length (ft.): 1049	Coniferous Component (%): 17.1	Pool Frequency (%): 41.7
Riffle/Flatwater Mean Width (ft.): 6.3	Hardwood Component (%): 82.9	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 80
Range (ft.): 8 to 8	Vegetative Cover (%): 45.7	2 to 2.9 Feet Deep: 0
Mean (ft.): 8	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 20
Std. Dev.: 0	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 27	Mean Max Residual Pool Depth (ft.): 1.5
Water (F): 57 - 57 Air (F): 65 - 65	LWD per 100 ft.:	Mean Pool Shelter Rating: 69
Dry Channel (ft): 0	Riffles: 1	
	Pools: 11	
	Flat: 5	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 50 Sm Cobble: 30 Lg Cobble: 10 Boulder: 0 Bedrock: 10		
Embeddedness Values (%): 1. 0.0 2. 40.0 3. 40.0 4. 10.0 5. 10.0		

STREAM REACH: 2

Channel Type: B3	Canopy Density (%): 98.4	Pools by Stream Length (%): 18.7
Reach Length (ft.): 1245	Coniferous Component (%): 35.8	Pool Frequency (%): 44.4
Riffle/Flatwater Mean Width (ft.): 5.5	Hardwood Component (%): 64.2	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 58
Range (ft.): 7 to 8	Vegetative Cover (%): 26.3	2 to 2.9 Feet Deep: 33
Mean (ft.): 7	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 8
Std. Dev.: 0	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 42	Mean Max Residual Pool Depth (ft.): 1.8
Water (F): 56 - 56 Air (F): 63 - 65	LWD per 100 ft.:	Mean Pool Shelter Rating: 68
Dry Channel (ft): 248	Riffles: 1	
	Pools: 20	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 64 Sm Cobble: 36 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 0.0 2. 58.3 3. 25.0 4. 8.3 5. 8.3		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: North Fork Wages Creek

LLID: 1237131396393

Drainage: Rockport

Survey Dates: 8/6/2008 to 8/6/2008

Confluence Location: Quad: LINCOLN RIDGE

Legal Description: T21NR17WS26

Latitude: 39:38:21.0N

Longitude: 123:42:47.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	5	4	14.1
Boulder	0	2	3.1
Cobble / Gravel	14	13	42.2
Sand / Silt / Clay	13	13	40.6

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	4	5	14.1
Brush	23	21	68.8
Hardwood Trees	3	4	10.9
Coniferous Trees	2	1	4.7
No Vegetation	0	1	1.6

Total Stream Cobble Embeddedness Values: 3

Table 10 - Mean Percent of Shelter Cover Types For Entire Stream

StreamName: North Fork Wages Creek

LLID: 1237131396393

Drainage: Rockport

Survey Dates: 8/6/2008 to 8/6/2008

Confluence Location: Quad: LINCOLN RIDGE

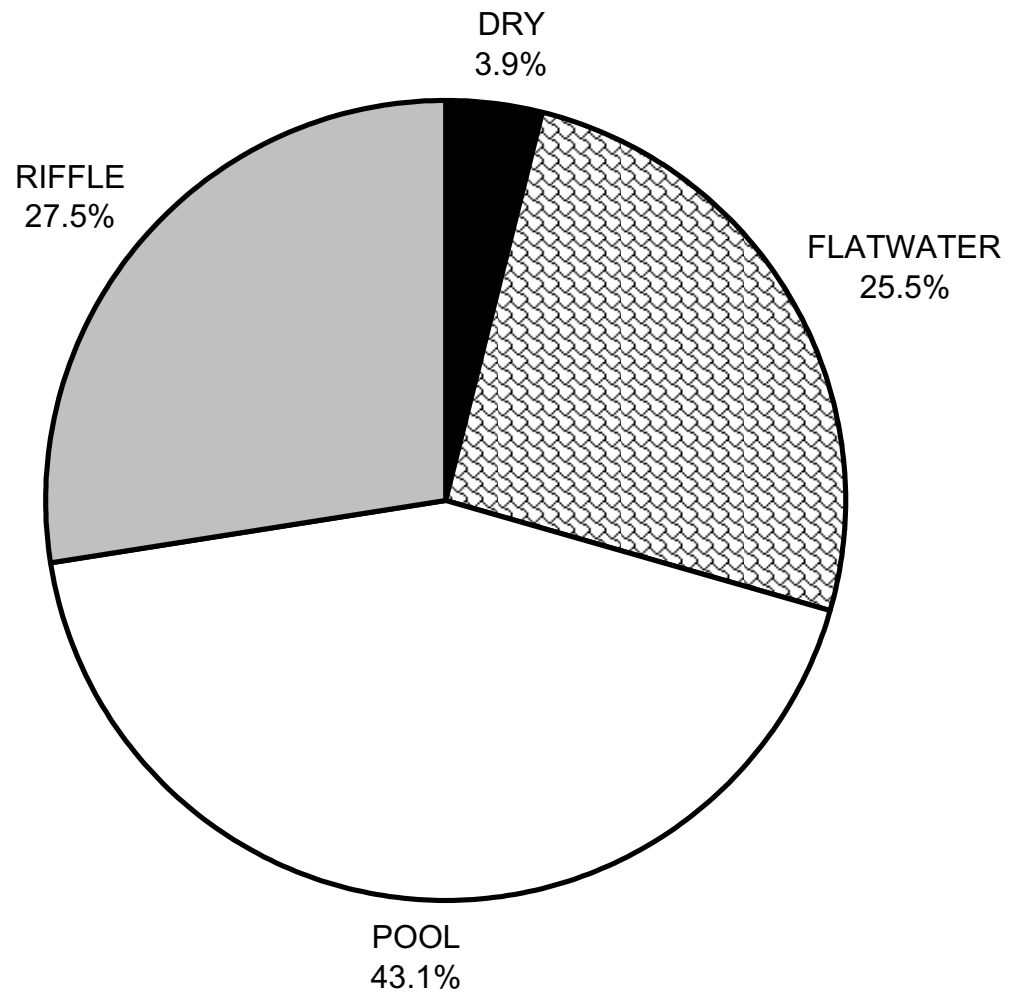
Legal Description: T21NR17WS26

Latitude: 39:38:21.0N

Longitude: 123:42:47.0W

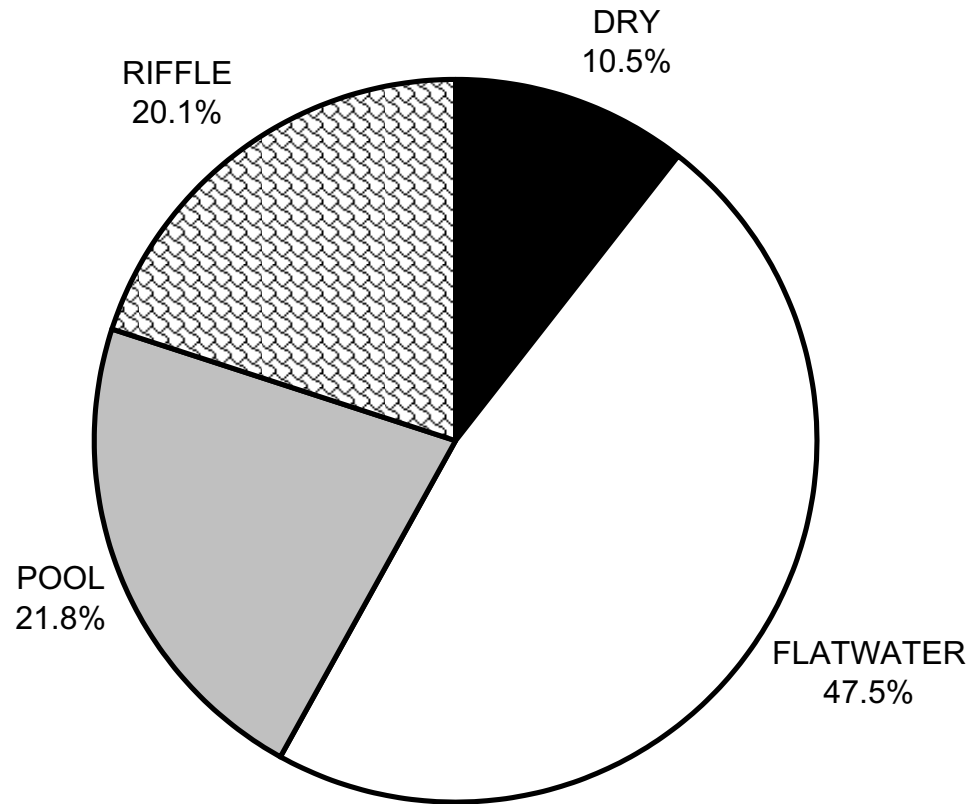
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	11	8	22
SMALL WOODY DEBRIS (%)	18	58	22
LARGE WOODY DEBRIS (%)	3	23	45
ROOT MASS (%)	0	5	5
TERRESTRIAL VEGETATION (%)	22	0	5
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	47	8	2
BEDROCK LEDGES (%)	0	0	0

NORTH FORK WAGES CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



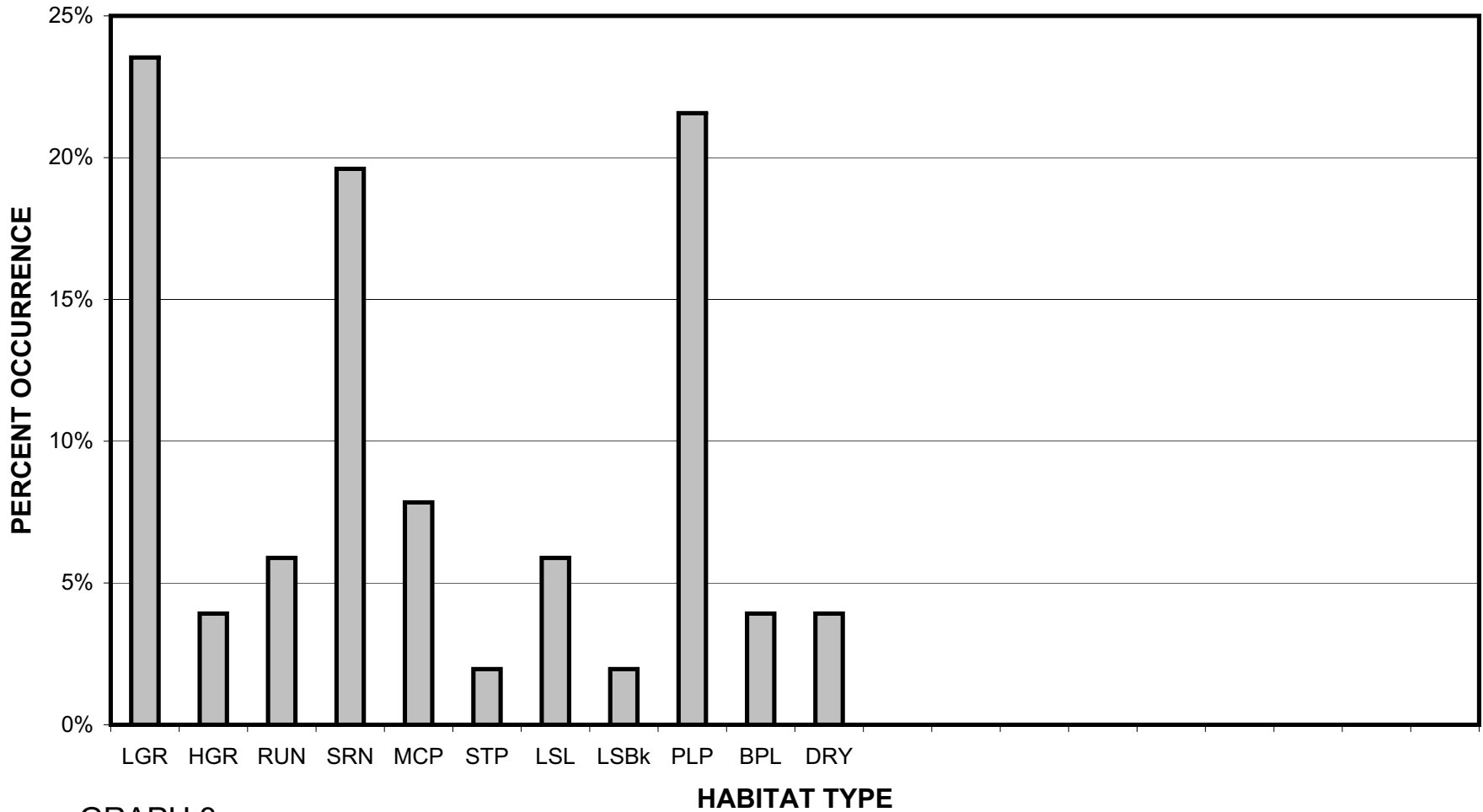
GRAPH 1

NORTH FORK WAGES CREEK 2008 HABITAT TYPES BY PERCENT TOTAL LENGTH



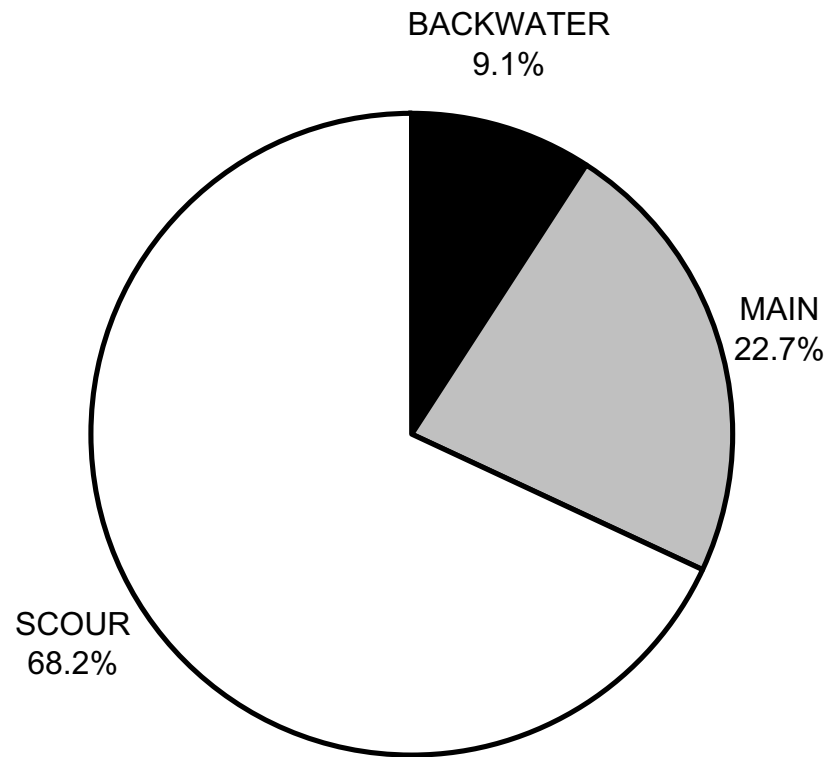
GRAPH 2

NORTH FORK WAGES CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



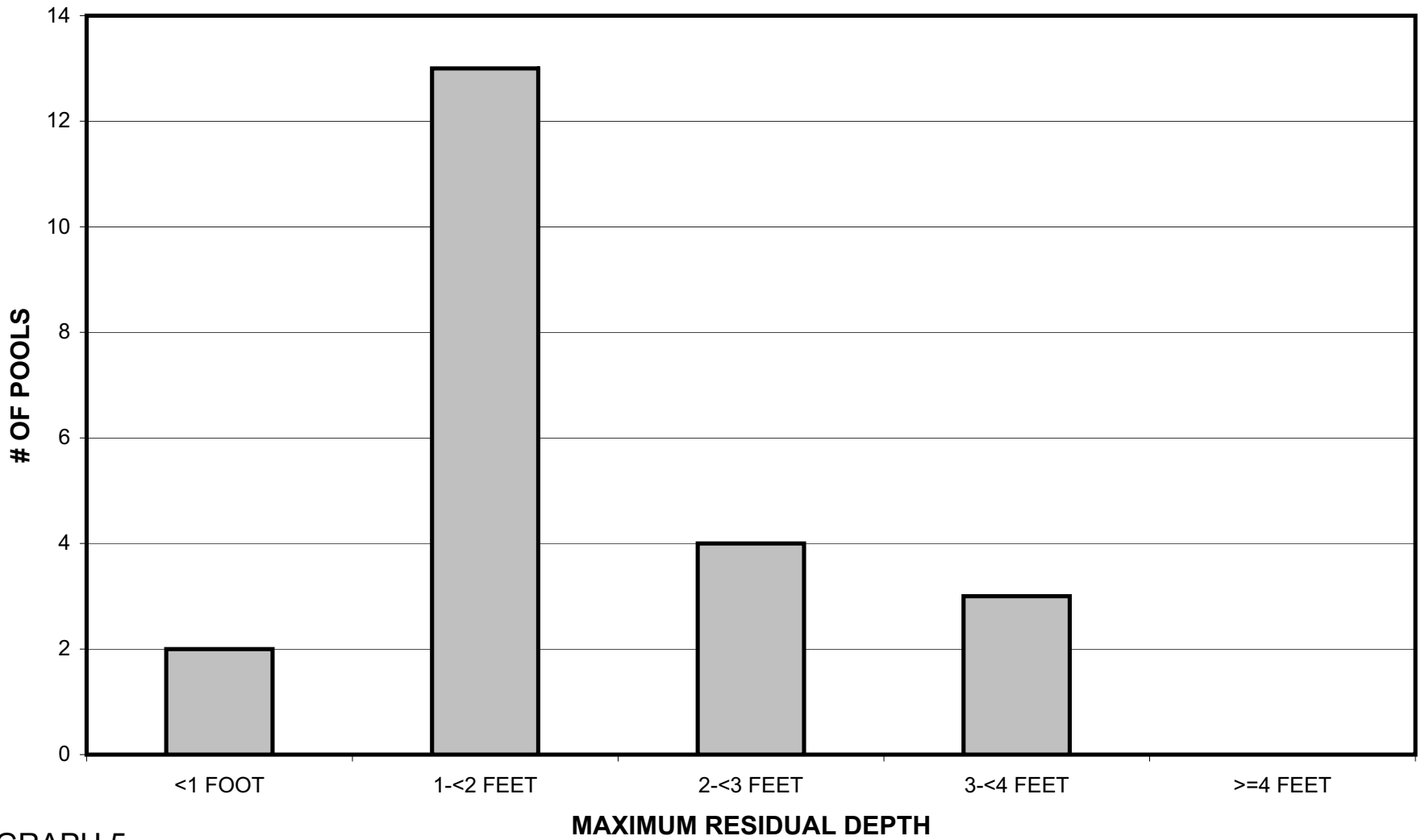
GRAPH 3

NORTH FORK WAGES CREEK 2008 POOL TYPES BY PERCENT OCCURRENCE



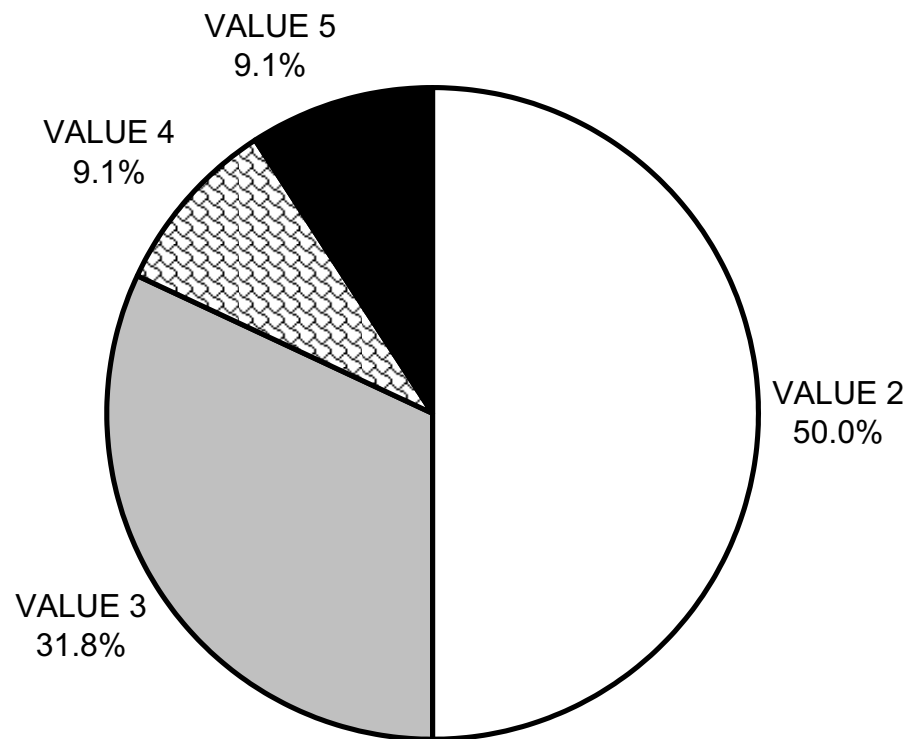
GRAPH 4

NORTH FORK WAGES CREEK 2008 MAXIMUM DEPTH IN POOLS



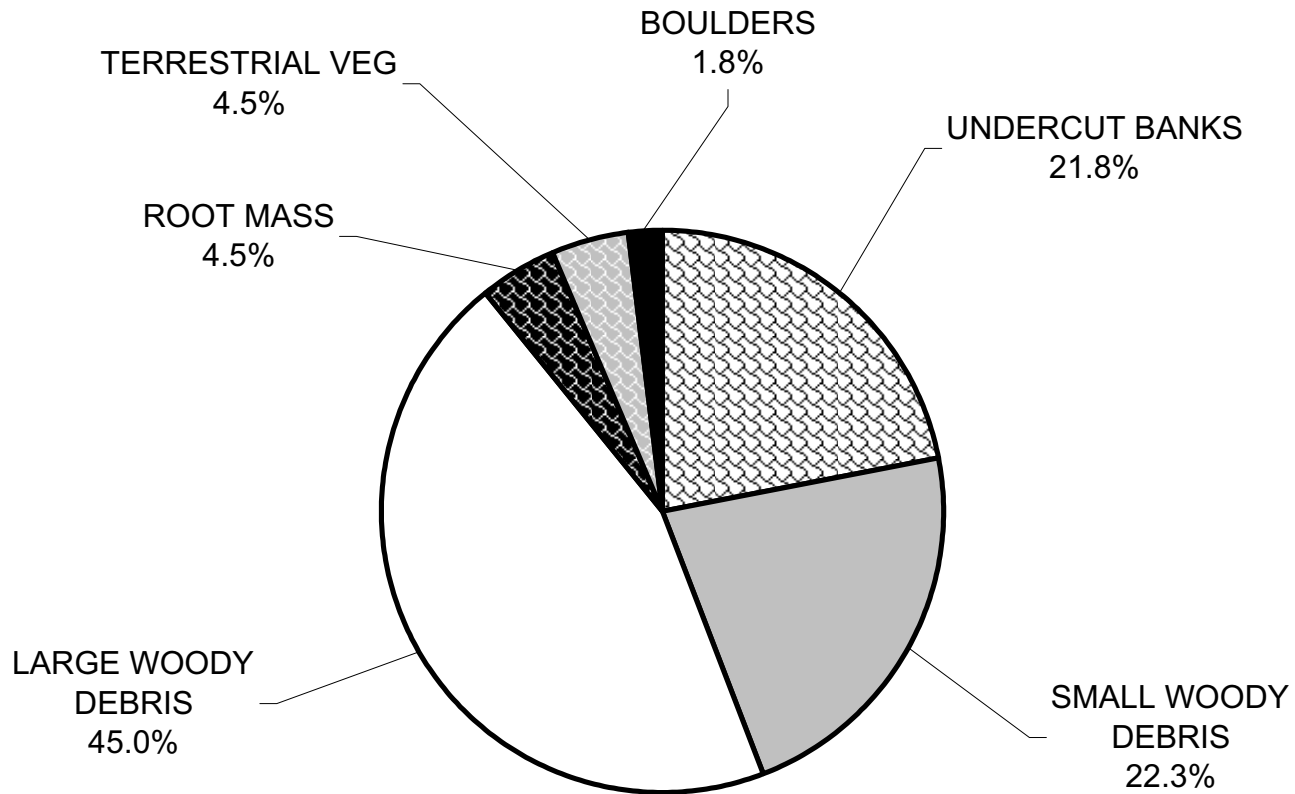
GRAPH 5

NORTH FORK WAGES CREEK 2008 PERCENT EMBEDDEDNESS



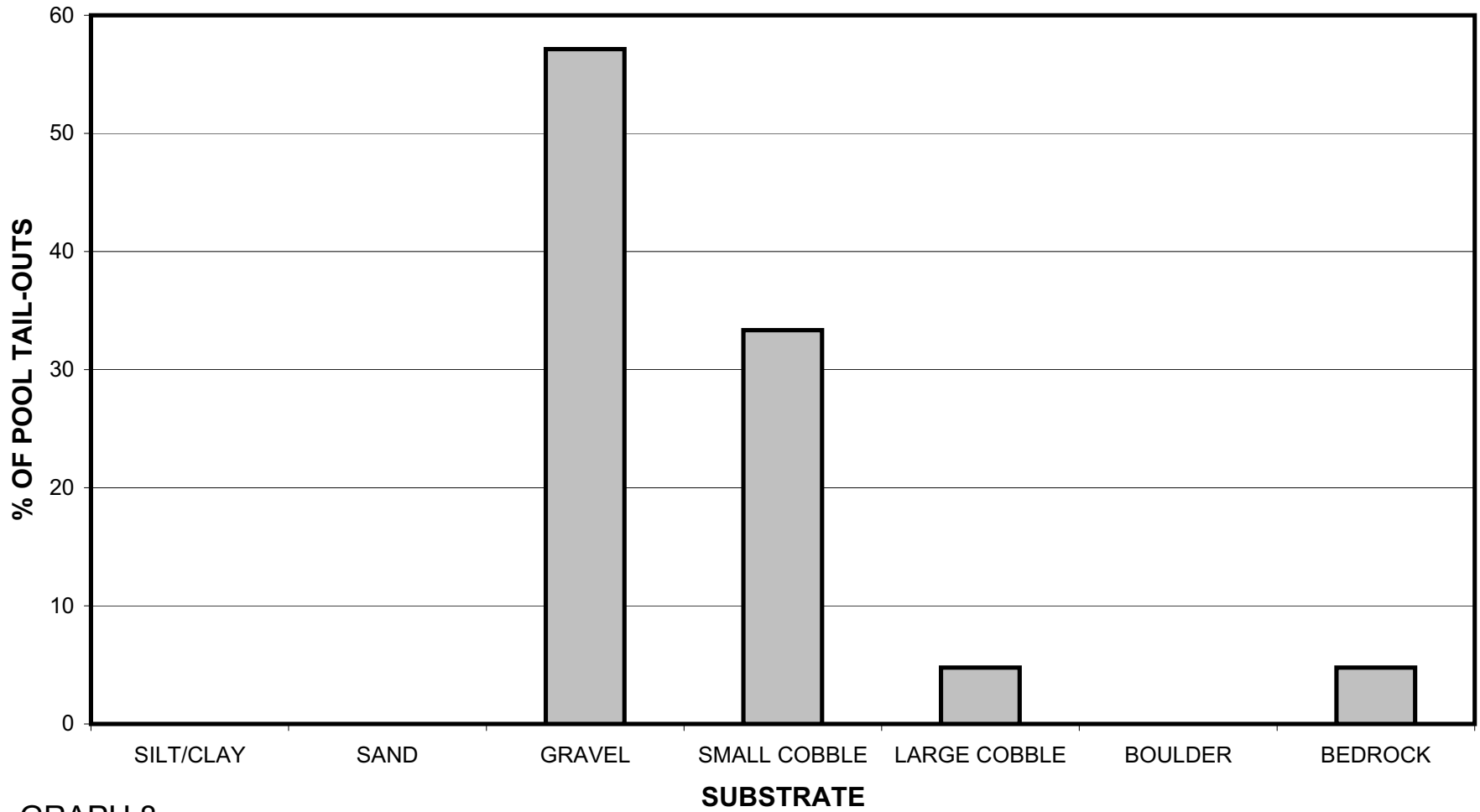
GRAPH 6

NORTH FORK WAGES CREEK 2008 MEAN PERCENT COVER TYPES IN POOLS



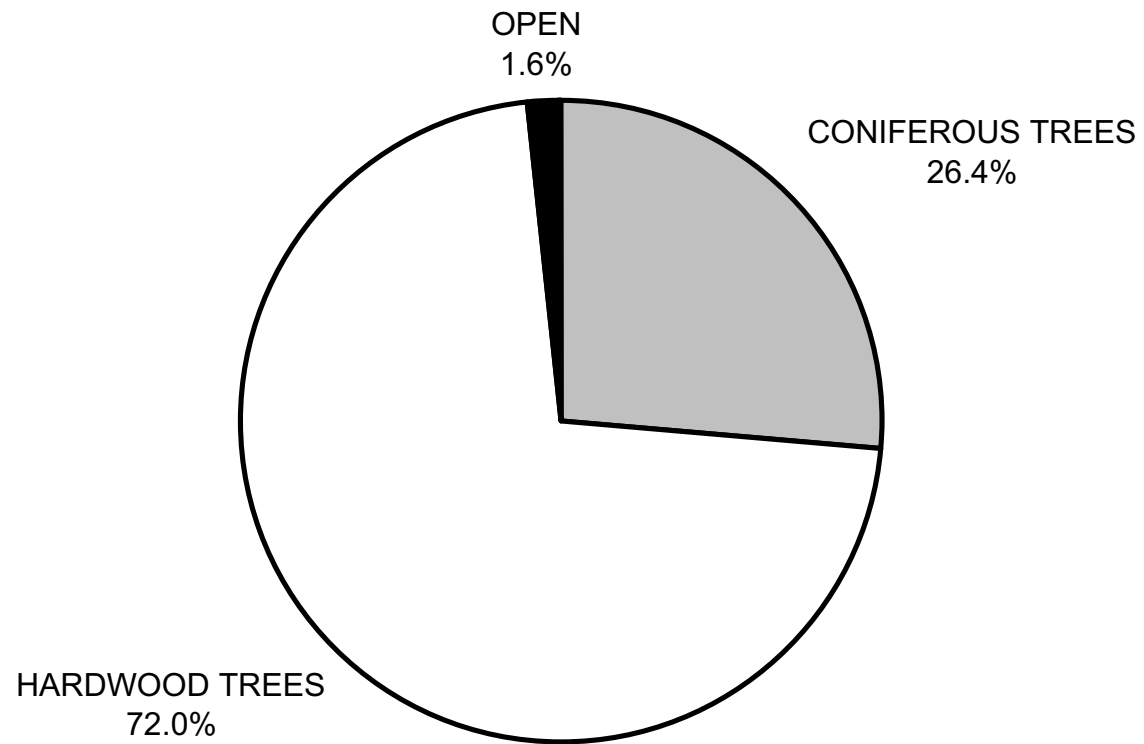
GRAPH 7

NORTH FORK WAGES CREEK 2008 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



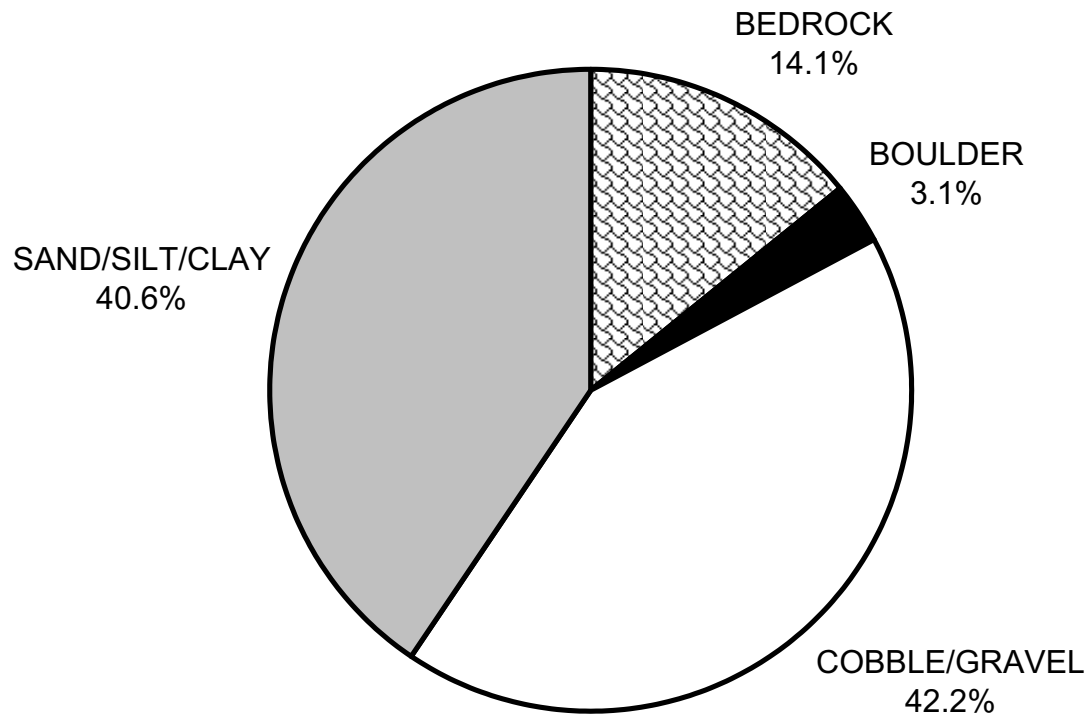
GRAPH 8

NORTH FORK WAGES CREEK 2008 MEAN PERCENT CANOPY



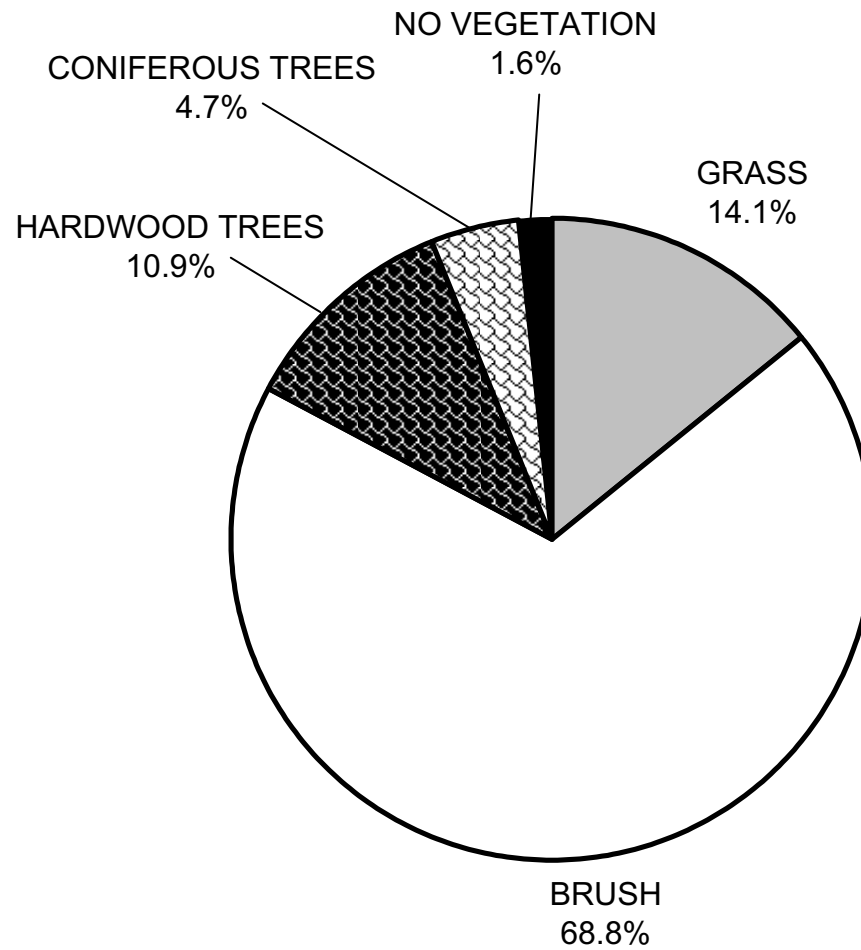
GRAPH 9

**NORTH FORK WAGES CREEK 2008
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

NORTH FORK WAGES CREEK 2008 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

