

STREAM INVENTORY REPORT

North Fork Hayworth Creek

INTRODUCTION

A stream inventory was conducted from June 4 to June 5, 2013 on North Fork Hayworth Creek. The survey began at the confluence with Hayworth Creek and extended upstream 0.6 miles.

The North Fork Hayworth Creek inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in North Fork Hayworth Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

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 Hayworth Creek is a tributary to Hayworth Creek, tributary to the North Fork Noyo River, tributary to the Noyo River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). North Fork Hayworth Creek's legal description at the confluence with Hayworth Creek is T19N R15W S26. Its location is 39.4699 degrees north latitude and 123.5020 degrees west longitude, LLID number 1235008394700. North Fork Hayworth Creek is a first order stream and has approximately 1.2 miles of blue line stream according to the USGS Northspur 7.5 minute quadrangle. North Fork Hayworth Creek drains a watershed of approximately 3.2 square miles. Elevations range from about 580 feet at the mouth of the creek to 2,800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Irmulco Road, off Highway 20, approximately seven miles west of Willits.

METHODS

The habitat inventory conducted in North Fork Hayworth Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Project/AmeriCorps (WSP) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Wildlife (CDFW). 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

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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 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 Hayworth 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 Hayworth 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.

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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 Hayworth Creek, 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 not suitable 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. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is classified according to a list of nine cover types. In North Fork Hayworth 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. The shelter rating is then calculated for each fully-described habitat unit by multiplying shelter value and percent 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 Hayworth 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 Hayworth 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.

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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 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.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in North Fork Hayworth Creek. In addition, underwater observations were made at eight sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.18, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Wildlife. 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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for North Fork Hayworth 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
- 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 June 4 to June 5, 2013 was conducted by T. Longley and K. Reddy (WSP). The total length of the stream surveyed was 3,241 feet.

Stream flow was not measured on North Fork Hayworth Creek.

North Fork Hayworth Creek is an F1 channel type for all 3,241 feet of the stream surveyed. F1 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios, very stable with bedrock-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 58 degrees Fahrenheit. Air temperatures ranged from 58 to 65 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 48% riffle units, 29% flatwater units, and 23% pool units (Graph 1). Based on total length of Level II habitat types there were 43% flatwater units, 36% riffle units, and 22% pool units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were high gradient riffle units, 23%; mid-channel pool units, 19%; and low gradient riffle units, 17% (Graph 3). Based on percent total length, step run units made up 28%, high gradient riffle units 18%, and mid-channel pool units 16%.

A total of 16 pools were identified (Table 3). Main channel pools were the most frequently encountered at 94% (Graph 4), and comprised 91% of the total length of all pools (Table 3).

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Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Seven of the 16 pools (44%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 16 pool tail-outs measured, four had a value of 1 (25%); 10 had a value of 2 (63%); one had a value of 3 (6%); one had a value of 5 (6%) (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 assigned to tail-outs deemed not suitable 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 7, flatwater habitat types had a mean shelter rating of 20, and pool habitats had a mean shelter rating of 10 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 20. Main channel pools had a mean shelter rating of 9 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in North Fork Hayworth Creek. Graph 7 describes the pool cover in North Fork Hayworth Creek. Boulders are the dominant pool cover type followed by whitewater.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel and large cobble were the dominant substrates; each was dominant in 31% of the pool tail-outs measured.

The mean percent canopy density for the surveyed length of North Fork Hayworth Creek was 95%. Five percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 66% and 34%, respectively. Graph 9 describes the mean percent canopy in North Fork Hayworth Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 97%. The dominant elements composing the structure of the stream banks consisted of 78% bedrock, 18% cobble/gravel, 2% boulders, and 2% sand/silt/clay (Graph 10). Brush was the dominant vegetation type observed in 74% of the units surveyed. Additionally, 20% of the units surveyed had deciduous trees as the dominant vegetation type, and 6% had coniferous trees as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at eight sites for species composition and distribution in North Fork Hayworth Creek on October 9, 2013. The sites were sampled by B. Leonard (CDFW) and B. Brengettskey (California Conservation Corps).

The reach sites yielded 56 young-of-the-year (YOY) steelhead/rainbow trout (SH/RT), three age 1+ SH/RT, two age 2+ SH/RT, and 13 YOY coho salmon.

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The following chart displays the information yielded from these sites:

2013 North Fork Hayworth Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
F1 Channel Type									
10/09/13	1	007	Pool	331	9	1	0	5	0
	2	011	Pool	444	6	0	0	4	0
	3	014	Pool	524	5	0	1	3	0
	4	017	Pool	640	6	0	0	1	0
	5	019	Pool	723	9	0	0	0	0
	6	031	Pool	1,391	8	1	1	0	0
	7	041	Pool	3,274	7	1	0	0	0
	8	047	Run	3,700	6	0	0	0	0

DISCUSSION

North Fork Hayworth Creek is an F1 channel type. The suitability of F1 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders and fair for single wing-deflectors and log cover.

The water temperatures recorded on the survey days June 4 to June 5, 2013 ranged from 56 to 58 degrees Fahrenheit. Air temperatures ranged from 58 to 65 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 43% of the total length of this survey, riffles 36%, and pools 22%. Seven of the 16 (44%) pools had a maximum residual depth greater than two 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 structures that will increase or deepen pool habitat is recommended.

Fourteen of the 16 pool tail-outs measured had embeddedness ratings of 1 or 2. One of the pool tail-outs had embeddedness ratings of 3 or 4. One of the pool tail-outs had a rating of 5, which is considered not suitable 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.

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Nine of the 16 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 is 10. The shelter rating in the flatwater habitats is 20. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in North Fork Hayworth Creek. Boulders are the dominant cover type in pools followed by whitewater. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 95%. The percentage of right and left bank covered with vegetation was 97% and 97%, respectively.

RECOMMENDATIONS

- 1) North Fork Hayworth 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.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from boulders. Adding high quality complexity with woody cover in the pools is desirable.

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 the confluence with Hayworth Creek. The channel is an F1 for the entire length of the survey.
552	0017.00	There is a 1.5' high plunge from a bedrock sheet. The bedrock sheet measures 10' long and has a total height of 4'.
657	0019.00	There is a 1.4' high plunge over bedrock.
1188	0027.00	Fish observed.

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- 1391 0032.00 A logging road crosses the channel. The crossing is a 13.7' wide x 51' long x 15.1' high wooden bridge.
- 1848 0041.00 Tributary #01 enters on the right bank. It contributes less than 1% to North Fork Hayworth Creek's flow. The water temperature of the tributary is 56 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 56 degrees Fahrenheit. A bedrock waterfall at the mouth of the tributary prevents fish access.
- 3159 0069.00 Tributary #02 enters on the right bank. It contributes less than 1% to North Fork Hayworth Creek's flow. The water temperature of the tributary is 58 degrees Fahrenheit, the water temperature downstream of the tributary is 56 degrees Fahrenheit, and the water temperature upstream of the confluence is 59 degrees Fahrenheit. The tributary is not accessible to fish because of its gradient and bedrock substrate.
- 3241 0069.00 End of survey at 18' high bedrock waterfall.

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 Hayworth Creek

LLID: 1235008394700 Drainage: Noyo River

Survey Dates: 6/4/2013 to 6/5/2013

Confluence Location: Quad: SHERWOOD PEAK Legal Description: T19NR15WS26 Latitude: 39:28:12.0N Longitude: 123:30:03.0W

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
20	2	FLATWATER	29.0	69	1388	42.8	9.3	0.5	1.3	985	19691	456	9122		20
16	16	POOL	23.2	44	701	21.6	10.5	0.7	2.2	432	6909	613	9808	386	10
33	7	RIFFLE	47.8	35	1152	35.5	7.8	0.4	0.8	167	5509	69	2271		7
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
69	25				3241					32110			21201		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: North Fork Hayworth Creek

LLID: 1235008394700

Drainage: Noyo River

Survey Dates: 6/4/2013 to 6/5/2013

Confluence Location: Quad: SHERWOOD PEAK Legal Description: T19NR15WS26 Latitude: 39:28:12.0N Longitude: 123:30:03.0W

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	3	LGR	17.4	42	505	15.6	10	0.4	0.9	281	3370	124	1489		12	96
16	1	HGR	23.2	36	577	17.8	12	0.3	0.7	202	3226	60	968		10	96
1	1	CAS	1.4	21	21	0.6	7	0.5	0.9	59	59	29	29		5	100
4	2	BRS	5.8	12	49	1.5	3	0.3	0.6	33	132	10	39		0	94
11	1	RUN	15.9	44	489	15.1	10	0.6	1	623	6850	374	4110		20	98
9	1	SRN	13.0	100	899	27.7	9	0.4	1.6	1346	12118	539	4847		20	96
13	13	MCP	18.8	39	510	15.7	10	0.6	3.1	365	4746	440	5726	232	9	94
2	2	STP	2.9	62	125	3.9	13	1.5	4.9	768	1537	1477	2953	1169	10	96
1	1	PLP	1.4	66	66	2.0	10	1.3	2.7	627	627	1129	1129	815	20	98

Total Units
69

Total Units Fully Measured
25

Total Length (ft.)
3241

Total Area (sq.ft.)
32663

Total Volume (cu.ft.)
21290

Table 3 - Summary of Pool Types

Stream Name: North Fork Hayworth Creek

LLID: 1235008394700

Drainage: Noyo River

Survey Dates: 6/4/2013 to 6/5/2013

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS26

Latitude: 39:28:12.0N

Longitude: 123:30:03.0W

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
15	15	MAIN	94	42	635	91	10.5	0.7	419	6282	357	5357	9
1	1	SCOUR	6	66	66	9	10.0	1.3	627	627	815	815	20

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
16	16	701	6909	6173

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

Stream Name: North Fork Hayworth Creek

LLID: 1235008394700

Drainage: Noyo River

Survey Dates: 6/4/2013 to 6/5/2013

Confluence Location: Quad: SHERWOOD PEAK Legal Description: T19NR15WS26 Latitude: 39:28:12.0N Longitude: 123:30:03.0W

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
13	MCP	81	0	0	9	69	3	23	1	8	0	0
2	STP	13	0	0	0	0	0	0	0	0	2	100
1	PLP	6	0	0	0	0	1	100	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
16	0	0	9	56	4	25	1	6	2	12

Mean Maximum Residual Pool Depth (ft.): 2.2

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: North Fork Hayworth Creek

LLID: 1235008394700

Drainage: Noyo River

Survey Dates: 6/4/2013 to 6/5/2013

Dry Units: 0

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS26

Latitude: 39:28:12.0N

Longitude: 123:30:03.0W

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	3	LGR	0	2	0	0	0	0	3	95	0
16	1	HGR	0	0	0	0	5	0	0	95	0
1	1	CAS	0	0	0	0	0	0	0	100	0
4	2	BRS	0	0	0	0	0	0	0	0	0
33	7	TOTAL RIFFLE	0	1	0	0	1	0	2	96	0
11	1	RUN	0	0	40	0	0	0	0	60	0
9	1	SRN	0	5	0	0	0	0	10	85	0
20	2	TOTAL FLAT	0	3	20	0	0	0	5	73	0
13	13	MCP	2	4	0	0	2	0	8	81	2
2	2	STP	0	8	0	0	3	0	40	50	0
1	1	PLP	0	0	0	0	30	0	30	40	0
16	16	TOTAL POOL	2	4	0	0	4	0	14	74	1
69	25	TOTAL	1	3	2	0	3	0	10	79	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: North Fork Hayworth Creek

LLID: 1235008394700

Drainage: Noyo River

Survey Dates: 6/4/2013 to 6/5/2013

Dry Units: 0

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS26

Latitude: 39:28:12.0N

Longitude: 123:30:03.0W

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	3	LGR	0	0	0	0	0	100	0
16	1	HGR	0	0	0	0	0	100	0
1	1	CAS	0	0	0	0	0	0	100
4	2	BRS	0	0	0	0	0	0	100
11	1	RUN	0	0	0	0	0	100	0
9	1	SRN	0	0	0	0	0	0	100
13	13	MCP	0	0	0	0	0	54	46
2	2	STP	0	0	0	0	0	100	0
1	1	PLP	0	0	0	0	0	100	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: North Fork Hayworth Creek

LLID: 1235008394700

Drainage: Noyo River

Survey Dates: 6/4/2013 to 6/5/2013

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS26

Latitude: 39:28:12.0N

Longitude: 123:30:03.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
95	34	66	0	97	97

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 Hayworth Creek LLID: 1235008394700 Drainage: Noyo River
 Survey Dates: 6/4/2013 to 6/5/2013 Survey Length (ft.): 3241 Main Channel (ft.): 3241 Side Channel (ft.): 0
 Confluence Location: Quad: SHERWOOD PEAK Legal Description: T19NR15WS26 Latitude: 39:28:12.0N Longitude: 123:30:03.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F1	Canopy Density (%): 95.3	Pools by Stream Length (%): 21.6
Reach Length (ft.): 3241	Coniferous Component (%): 34.3	Pool Frequency (%): 23.2
Riffle/Flatwater Mean Width (ft.): 8.1	Hardwood Component (%): 65.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 56
Range (ft.): 9 to 22	Vegetative Cover (%): 97.3	2 to 2.9 Feet Deep: 25
Mean (ft.): 16	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 6
Std. Dev.: 4	Dominant Bank Substrate Type: Bedrock	>= 4 Feet Deep: 13
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 2	Mean Max Residual Pool Depth (ft.): 2.2
Water (F): 56 - 58 Air (F): 58 - 65	LWD per 100 ft.:	Mean Pool Shelter Rating: 10
Dry Channel (ft): 0	Riffles: 1	
	Pools: 1	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 31 Sm Cobble: 25 Lg Cobble: 31 Boulder: 6 Bedrock: 6		
Embeddedness Values (%): 1. 25.0 2. 62.5 3. 6.3 4. 0.0 5. 6.3		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: North Fork Hayworth Creek

LLID: 1235008394700

Drainage: Noyo River

Survey Dates: 6/4/2013 to 6/5/2013

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS26

Latitude: 39:28:12.0N

Longitude: 123:30:03.0W

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	22	17	78.0
Boulder	0	1	2.0
Cobble / Gravel	3	6	18.0
Sand / Silt / Clay	0	1	2.0

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	0	0	0.0
Brush	21	16	74.0
Hardwood Trees	3	7	20.0
Coniferous Trees	1	2	6.0
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

StreamName: North Fork Hayworth Creek

LLID: 1235008394700

Drainage: Noyo River

Survey Dates: 6/4/2013 to 6/5/2013

Confluence Location: Quad: SHERWOOD PEAK

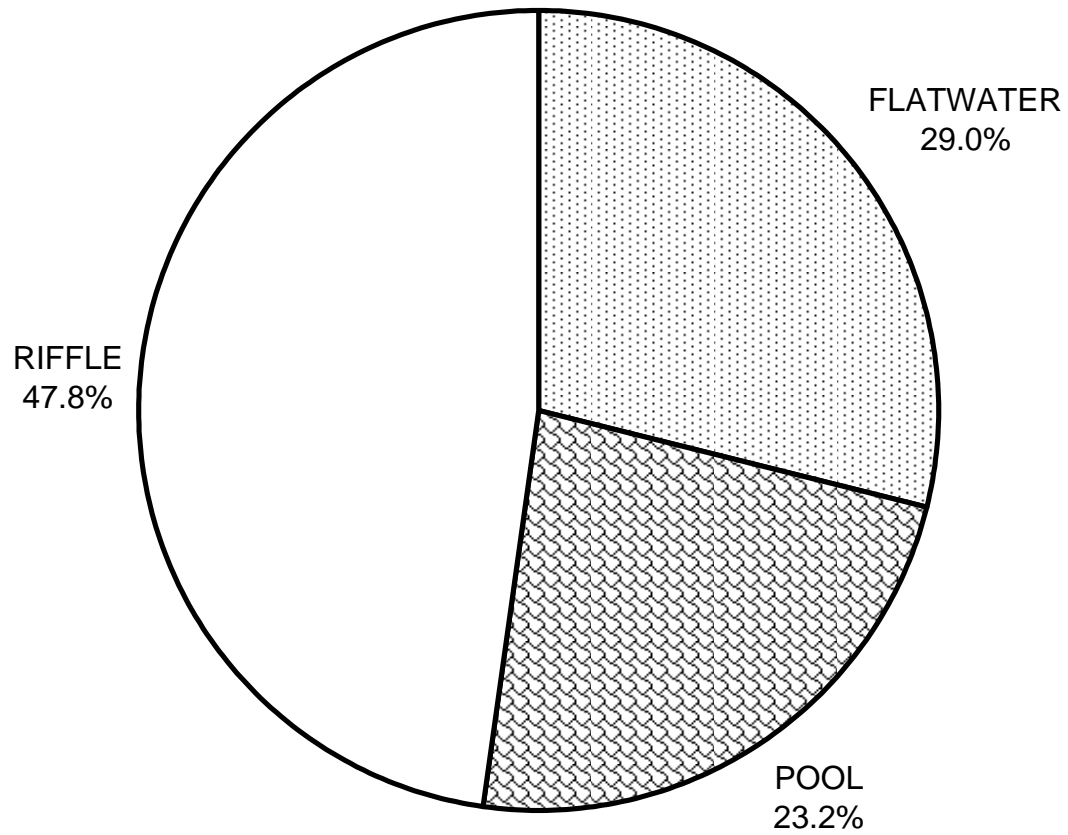
Legal Description: T19NR15WS26

Latitude: 39:28:12.0N

Longitude: 123:30:03.0W

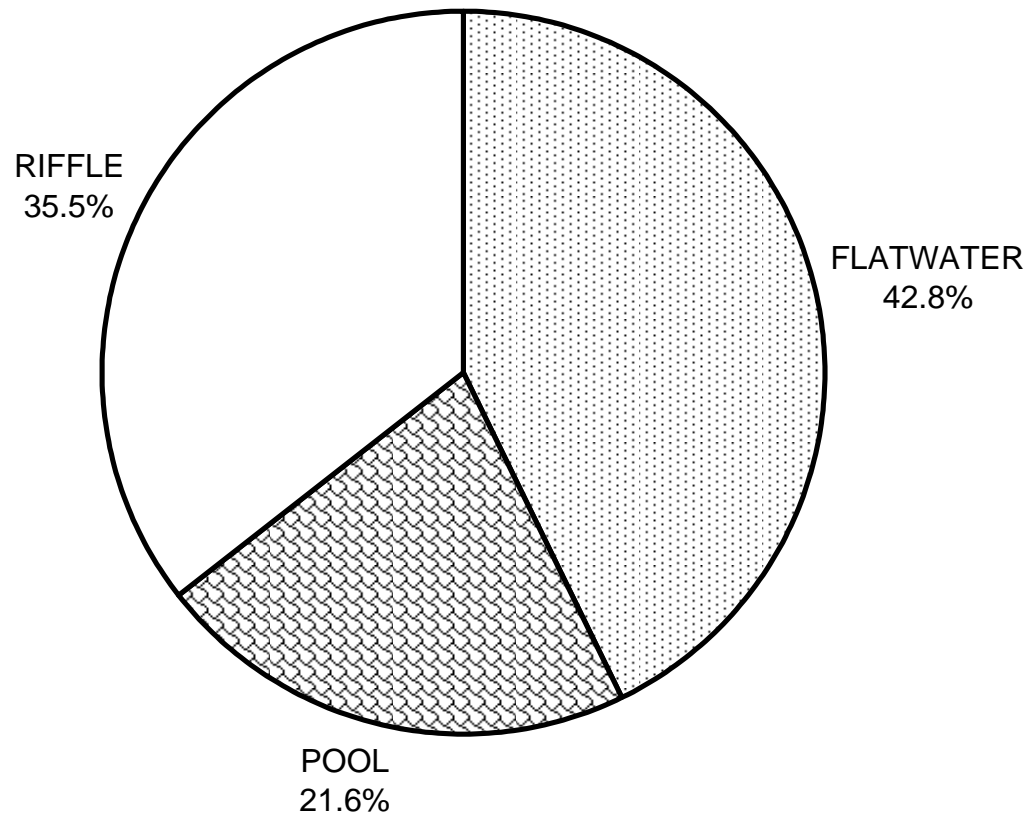
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	2
SMALL WOODY DEBRIS (%)	1	3	4
LARGE WOODY DEBRIS (%)	0	20	0
ROOT MASS (%)	0	0	0
TERRESTRIAL VEGETATION (%)	1	0	4
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	2	5	14
BOULDERS (%)	96	73	74
BEDROCK LEDGES (%)	0	0	1

NORTH FORK HAYWORTH CREEK 2013 HABITAT TYPES BY PERCENT OCCURRENCE



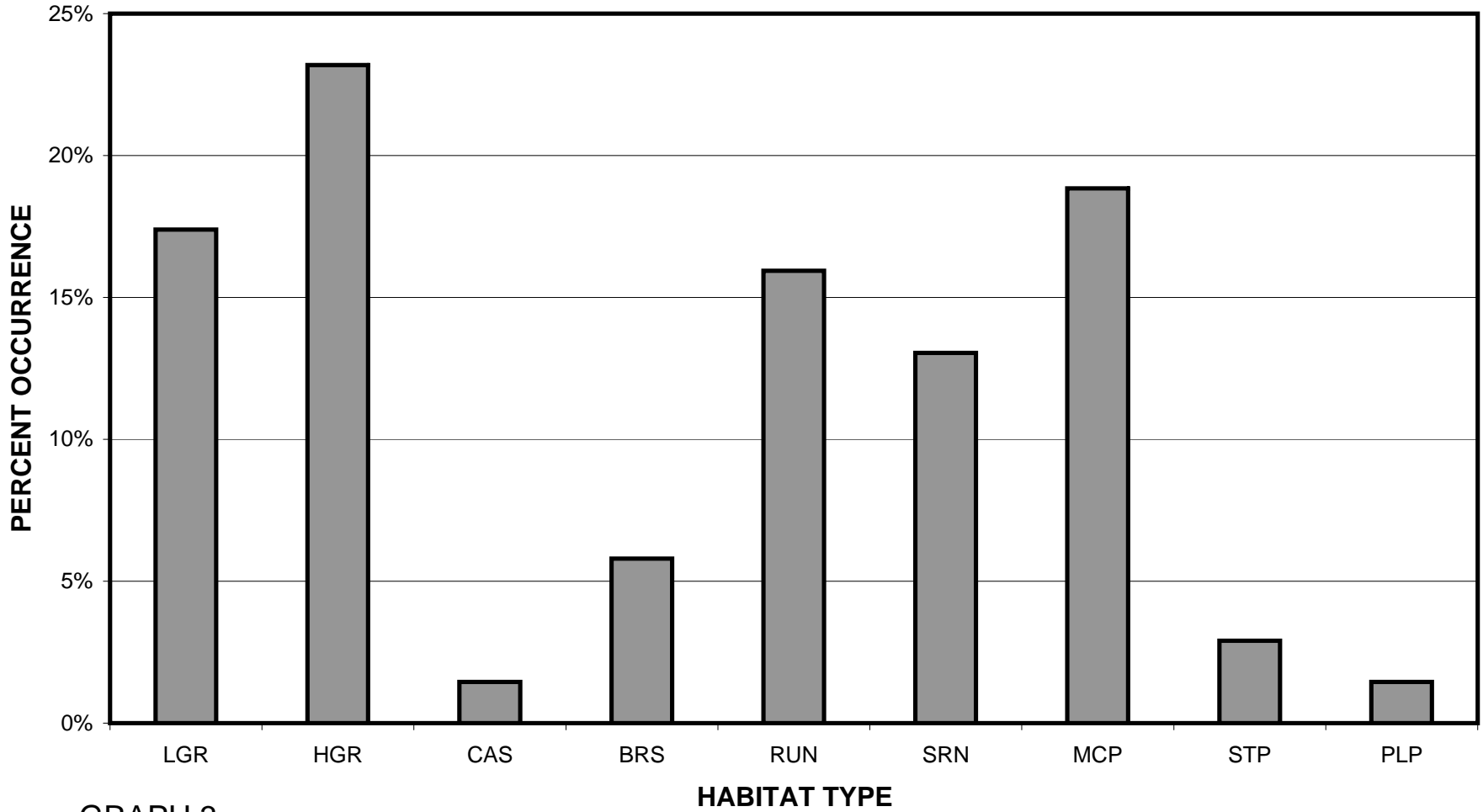
GRAPH 1

NORTH FORK HAYWORTH CREEK 2013 HABITAT TYPES BY PERCENT TOTAL LENGTH



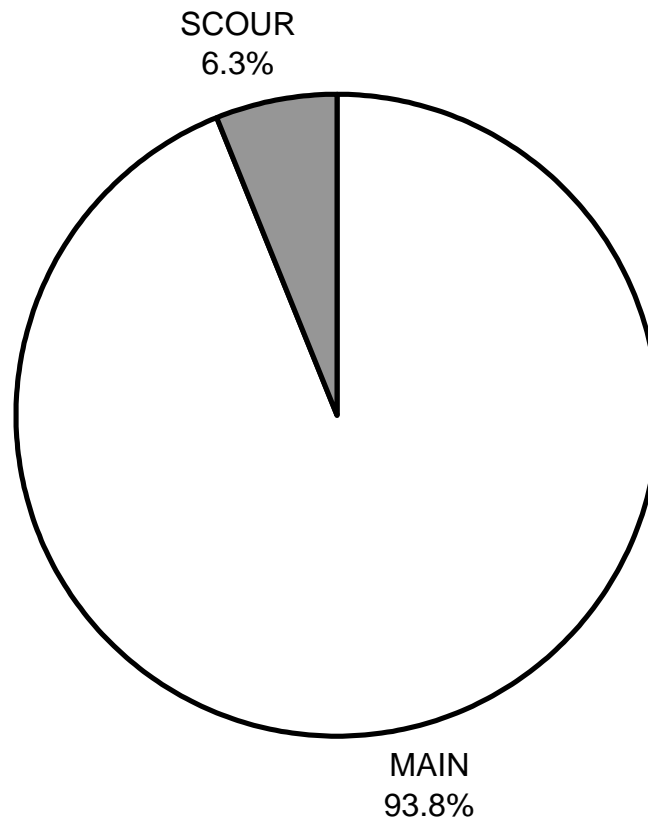
GRAPH 2

NORTH FORK HAYWORTH CREEK 2013 HABITAT TYPES BY PERCENT OCCURRENCE



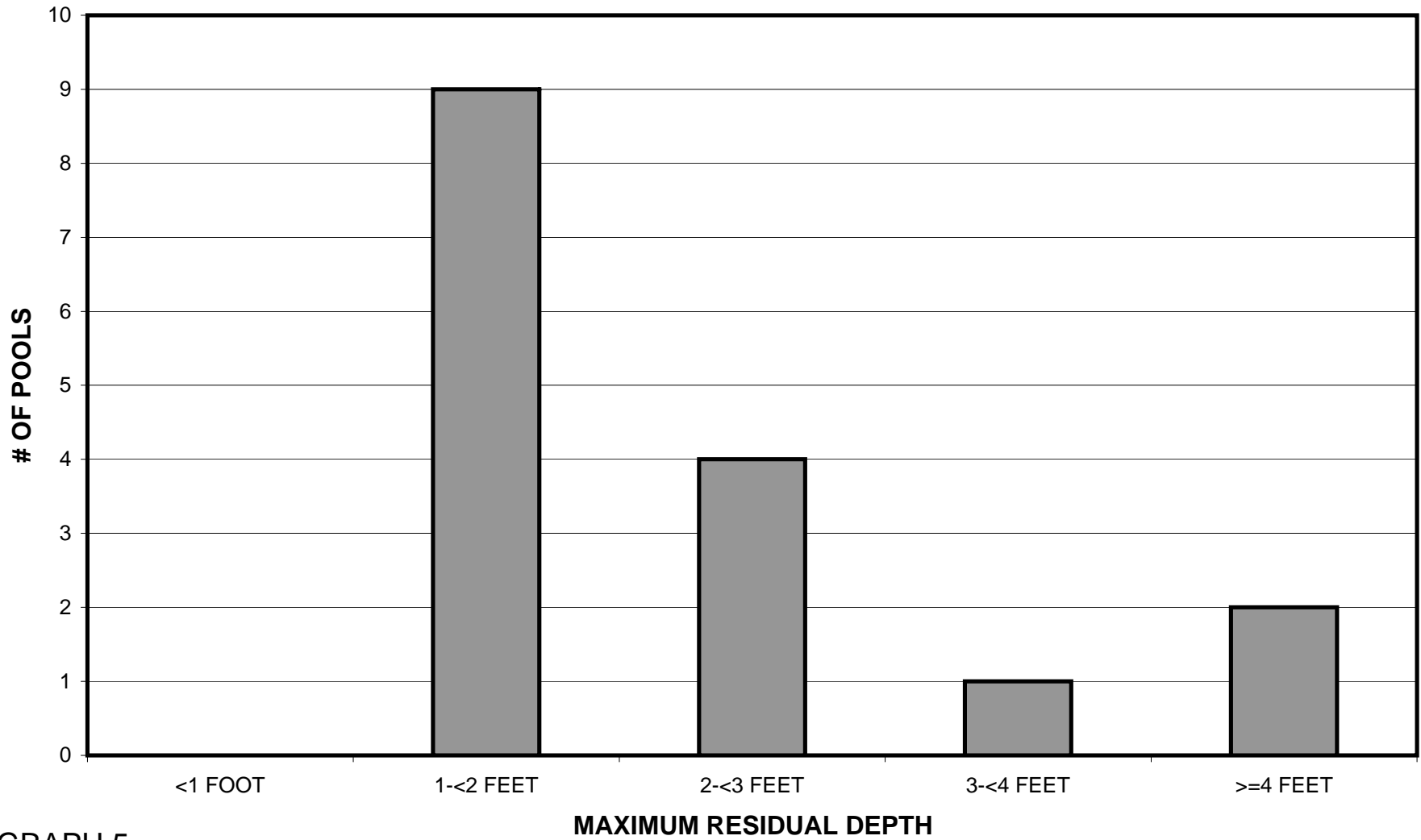
GRAPH 3

NORTH FORK HAYWORTH CREEK 2013 POOL TYPES BY PERCENT OCCURRENCE



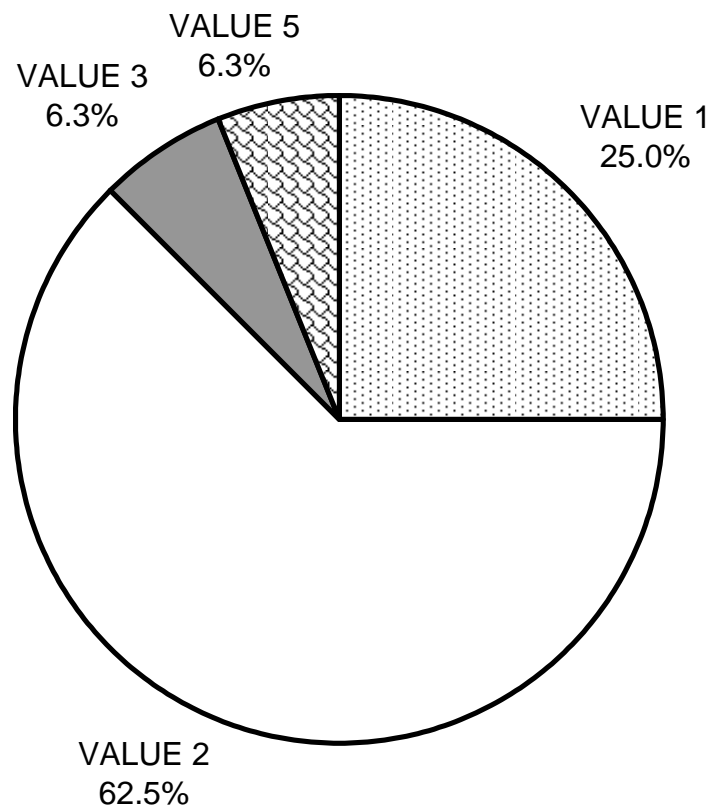
GRAPH 4

NORTH FORK HAYWORTH CREEK 2013 MAXIMUM DEPTH IN POOLS



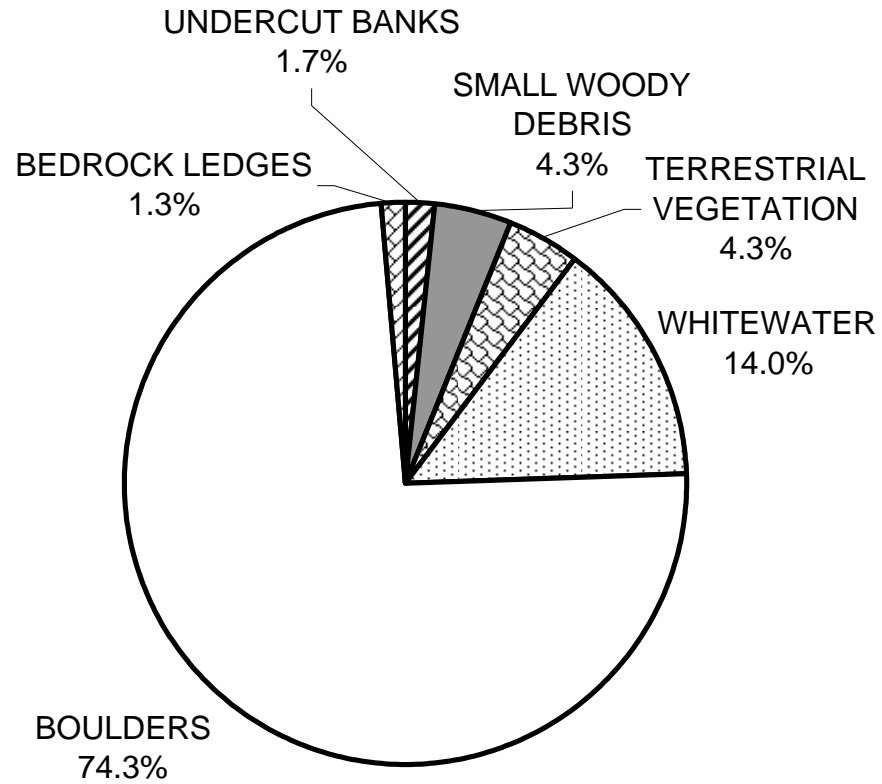
GRAPH 5

NORTH FORK HAYWORTH CREEK 2013 PERCENT EMBEDDEDNESS



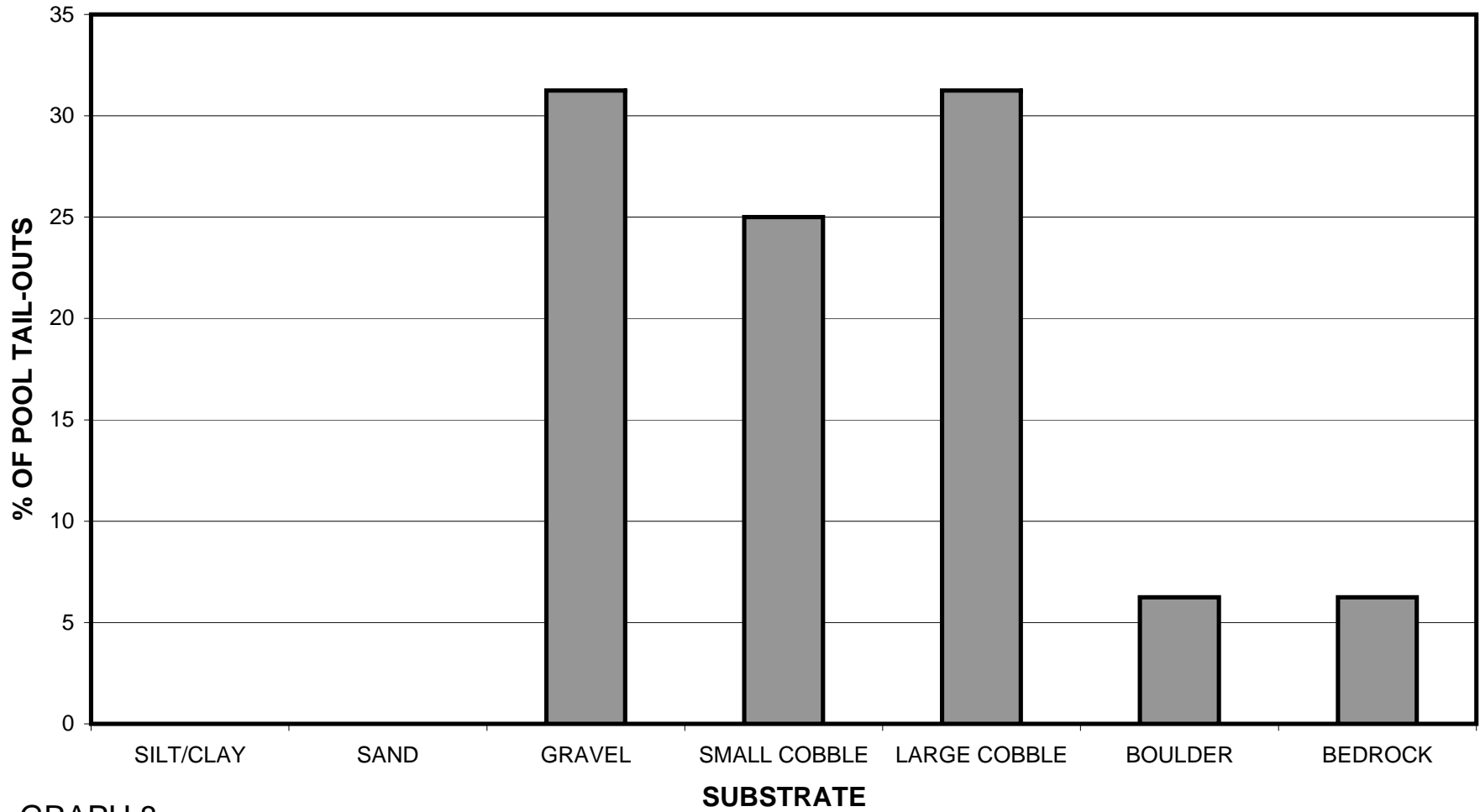
GRAPH 6

NORTH FORK HAYWORTH CREEK 2013 MEAN PERCENT COVER TYPES IN POOLS



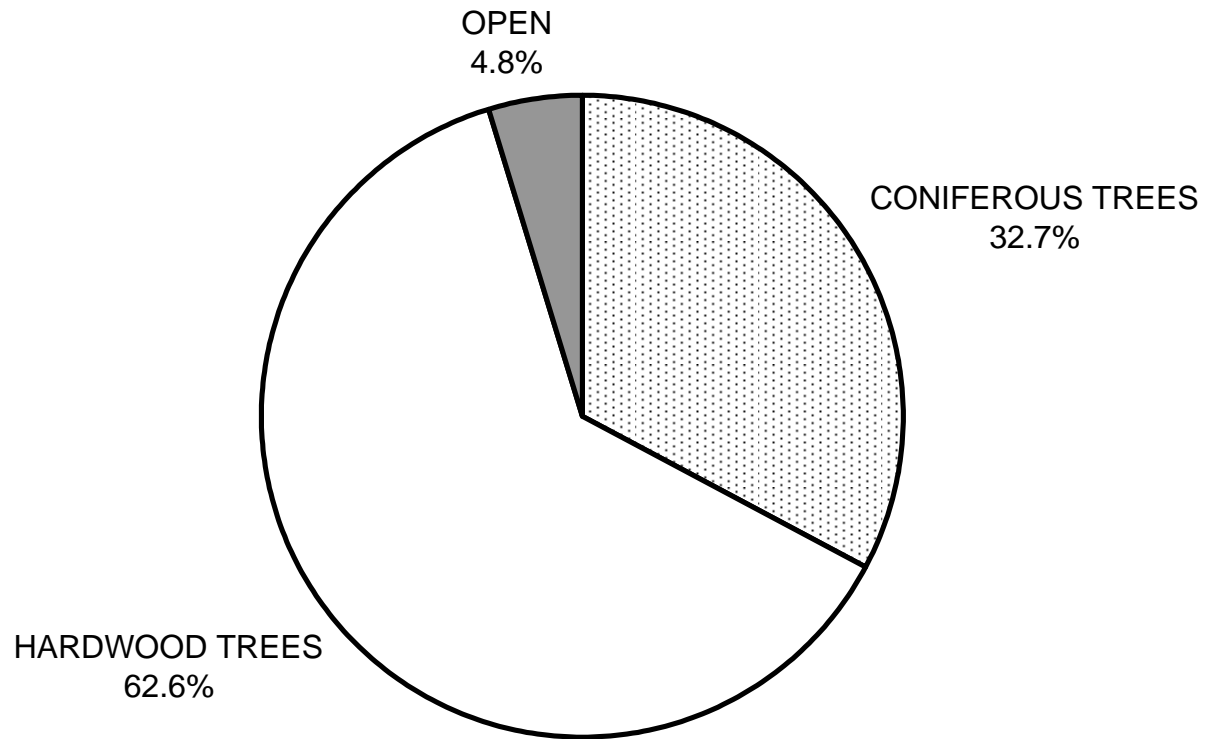
GRAPH 7

NORTH FORK HAYWORTH CREEK 2013 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



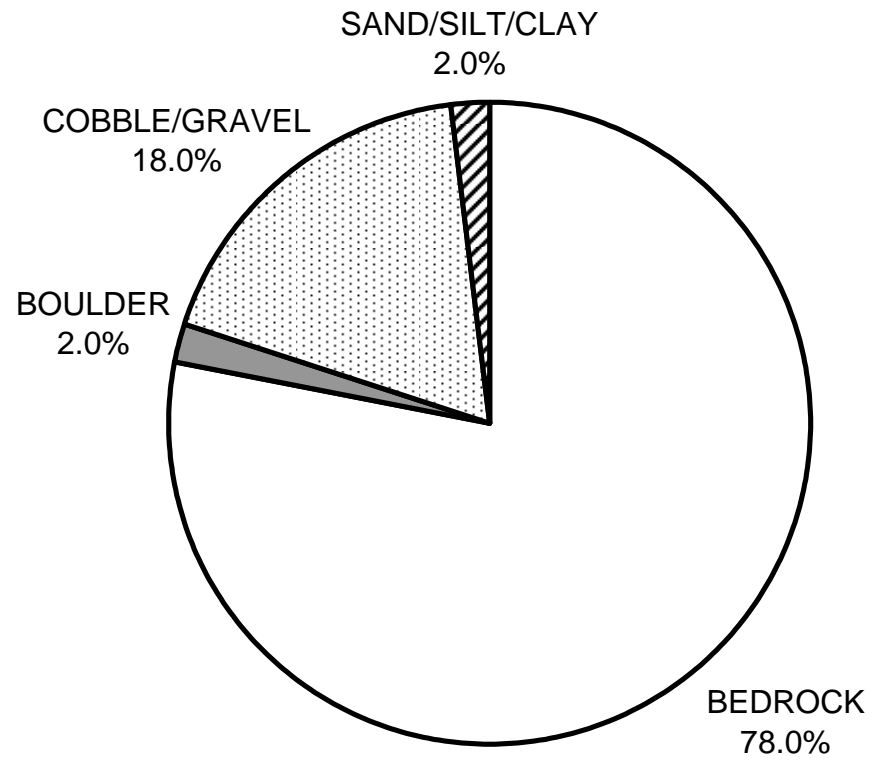
GRAPH 8

NORTH FORK HAYWORTH CREEK 2013 MEAN PERCENT CANOPY



GRAPH 9

NORTH FORK HAYWORTH CREEK 2013 DOMINANT BANK COMPOSITION IN SURVEY REACH



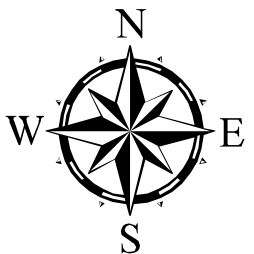
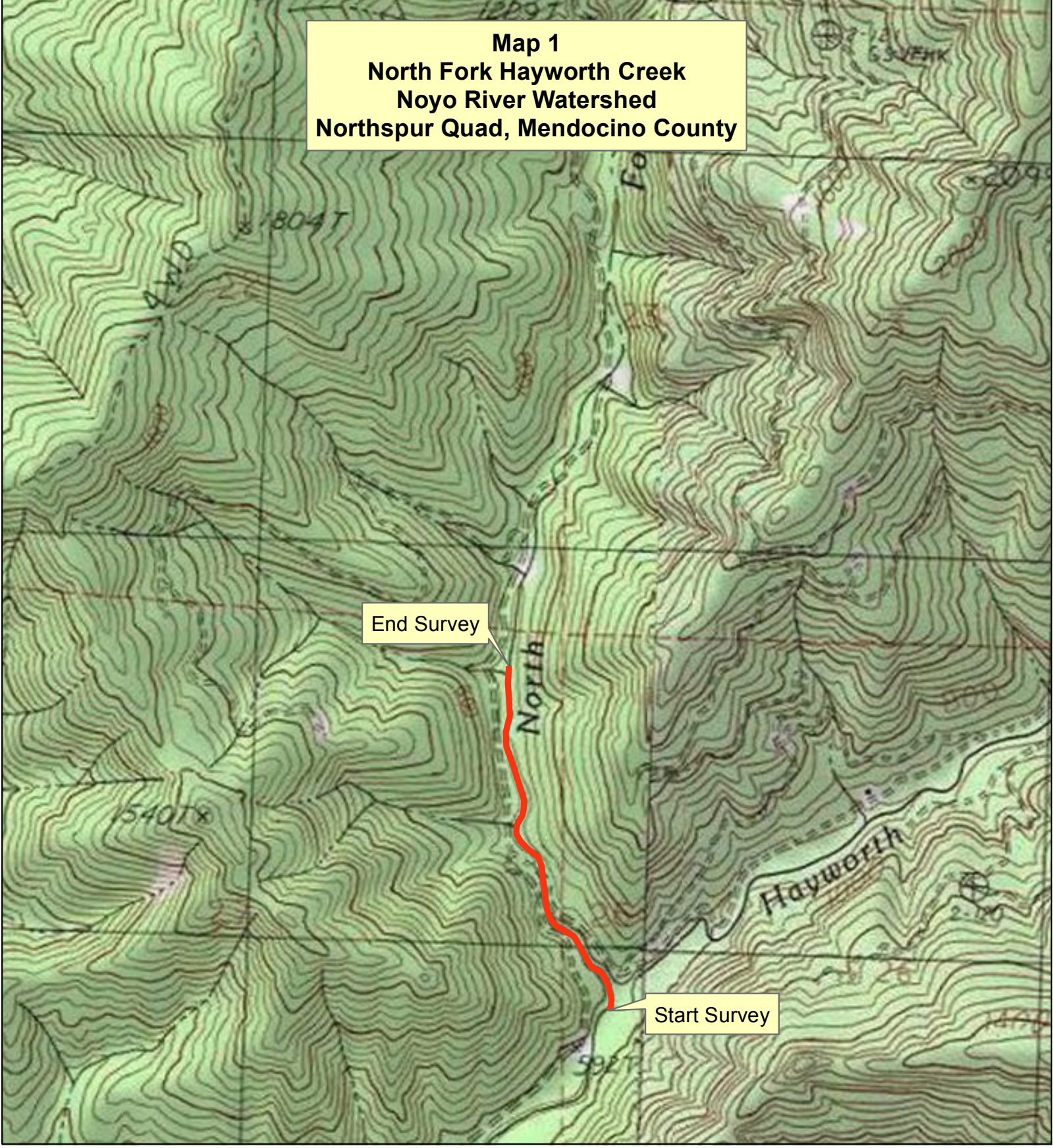
GRAPH 10

NORTH FORK HAYWORTH CREEK 2013 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Map 1
North Fork Hayworth Creek
Noyo River Watershed
Northspur Quad, Mendocino County



— Channel Type F1

