

# **STREAM INVENTORY REPORT**

## **Middle Fork North Fork Noyo River**

### INTRODUCTION

A stream inventory was conducted from July 16 to August 21, 2013 on Middle Fork North Fork Noyo River. The survey began at the confluence with the North Fork Noyo River and extended upstream three miles.

The Middle Fork of North Fork Noyo River 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 Middle Fork of North Fork Noyo River. 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

Middle Fork North Fork Noyo River is a 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). Middle Fork North Fork Noyo River's legal description at the confluence with the North Fork Noyo River is T19N R15W S29. Its location is 39.4703 degrees north latitude and 123.5440 degrees west longitude, LLID number 1235430394703. Middle Fork North Fork Noyo River is a first order stream and has approximately 3.2 miles of blue line stream according to the USGS Northspur 7.5 minute quadrangle. Middle Fork of North Fork Noyo River drains a watershed of approximately three square miles. Elevations range from about 520 feet at the mouth of the creek to 3,000 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, seven miles west of Willits, CA.

### METHODS

The habitat inventory conducted in Middle Fork North Fork Noyo River follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Wildlife (CDFW) personnel and Watershed Stewards Project/AmeriCorps (WSP) members that conducted the inventory were trained in standardized habitat inventory methods by the CDFW. This inventory was conducted by a two-person team.

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### 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 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 Middle Fork North Fork Noyo River 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". Middle Fork North Fork Noyo River 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 Middle Fork North Fork Noyo River, 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 Middle Fork North Fork Noyo River, 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 Middle Fork North Fork Noyo River, 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 Middle Fork North Fork Noyo River, 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 Middle Fork North Fork Noyo River. In addition, underwater observations were made at 14 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 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and 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 Middle Fork North Fork Noyo River 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 July 16 to August 21, 2013 was conducted by M. Scott (CDFW), B. Starks (WSP), R. Iverson (WSP), and R. Spencer (CDFW). The total length of the stream surveyed was 15,907 feet with an additional 56 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.28 cfs on July 18, 2013.

Middle Fork North Fork Noyo River is an F4 channel type for 11,832 feet of the stream surveyed (Reach 1) and an A3 channel type for 4,075 feet of the stream surveyed (Reach 2). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. A3 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 63 degrees Fahrenheit. Air temperatures ranged from 55 to 76 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 36% riffle units, 33% pool units, and 31% flatwater units (Graph 1). Based on total length of Level II habitat types there were 43% flatwater units, 31% riffle units, and 26% pool units (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 32%; low gradient riffle units, 20%; and run units, 16% (Graph 3). Based on percent total length, step run units made up 26%, mid-channel pool units 25%, and low gradient riffle units 18%.

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A total of 151 pools were identified (Table 3). Main channel pools were the most frequently encountered at 97% (Graph 4), and comprised 97% 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. Twenty-six of the 151 pools (17%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 151 pool tail-outs measured, 32 had a value of 1 (21%); 71 had a value of 2 (47%); 46 had a value of 3 (31%); two had a value of 5 (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 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 1, flatwater habitat types had a mean shelter rating of 0, and pool habitats had a mean shelter rating of 26 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 51. Main channel pools had a mean shelter rating of 25 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Middle Fork North Fork Noyo River. Graph 7 describes the pool cover in Middle Fork North Fork Noyo River. Small woody debris is the dominant pool cover type followed by large 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 70% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 21% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Middle Fork North Fork Noyo River was 95%. Five percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 47% and 53%, respectively. Graph 9 describes the mean percent canopy in Middle Fork North Fork Noyo River.

For the stream reach surveyed, the mean percent right bank vegetated was 98%. The mean percent left bank vegetated was 100%. The dominant elements composing the structure of the stream banks consisted of 56% cobble/gravel, 38% sand/silt/clay, 5% boulders, and 1% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 55% of the units surveyed. Additionally, 44% of the units surveyed had deciduous trees as the dominant vegetation type, and 1% had brush as the dominant vegetation type (Graph 11).

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### BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 14 sites for species composition and distribution in Middle Fork North Fork Noyo River on September 9, 2013. The sites were sampled by B. Leonard and M. Groff.

In Reach 1, which comprised the first 11,832 feet of stream, 14 sites were sampled. The reach sites yielded 34 young-of-the-year (YOY) steelhead/rainbow trout (SH/RT), 19 age 1+ SH/RT, five age 2+ SH/RT, 29 YOY coho salmon, and one sculpin.

The following chart displays the information yielded from these sites:

2013 Middle Fork North Fork Noyo River underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: F4 Channel Type									
09/09/13	1	082	Pool	2,891	4	0	0	2	0
	2	086	Pool	3,069	9	2	0	8	0
	3	105	Pool	3,819	0	0	2	0	0
	4	111	Pool	4,082	9	0	0	7	0
	5	195	Pool	7,103	3	0	0	4	0
	6	214	Pool	7,829	4	1	0	7	0
	7	229	Pool	8,274	5	0	0	1	0
	8	278	Pool	9,831	0	2	0	0	0
	9	280	Pool	9,902	0	2	1	0	0
	10	282	Pool	9,946	0	1	0	0	0
	11	290	Pool	10,165	0	1	0	0	0
	12	292	Pool	10,208	0	1	0	0	0
	13	303	Pool	10,559	0	3	2	0	0
	14	305	Pool	10,600	0	6	0	0	0

### DISCUSSION

Middle Fork of North Fork Noyo River is an F4 channel type for the first 11,832 feet of stream surveyed and an A3 channel type for the remaining 4,075 feet. The suitability of F4 and A3 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. A3 channels are generally not suitable for fish habitat improvement projects.

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The water temperatures recorded on the survey days July 16 to August 21, 2013 ranged from 56 to 63 degrees Fahrenheit. Air temperatures ranged from 55 to 76 degrees Fahrenheit. This is a suitable water temperature range for salmonids. However, 60 degrees F, if sustained, is near the threshold stress level 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 31%, and pools 26%. Twenty-six of the 151 (17%) 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.

One hundred three of the 151 pool tail-outs measured had embeddedness ratings of 1 or 2. Forty-six 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 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.

One hundred thirty-eight of the 151 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 26. The shelter rating in the flatwater habitats is 0. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by small woody debris in Middle Fork of North Fork Noyo River. Small woody debris is the dominant cover type in pools followed by large woody debris. 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%. Reach 1 had a canopy density of 95% and Reach 2 had a canopy density of 96%. The percentage of right and left bank covered with vegetation was 98% and 100%, respectively.

### **RECOMMENDATIONS**

- 1) Middle Fork of North Fork Noyo River 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) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from small woody debris. 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 the North Fork Noyo River. The channel is an F4.
757	0021.00	A logging road crosses the channel. The crossing is a 14' wide x 53' long x 10.7' high railcar bridge.
4379	0121.00	Log debris accumulation (LDA) #01 contains five pieces of large woody debris (LWD) and measures 6' high x 15' wide x 23' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to cobble and measures 15' wide x 30' long x 4' deep. Fish were observed above the LDA.
8234	0227.00	LDA #02 contains three pieces of LWD and measures 5' high x 22' wide x 8' long. The woody debris is accumulating on the remnants of a railroad trestle. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to large cobble and measures 30' wide x 30' long x 3' deep. Fish were observed above the LDA.
8724	0245.00	Left bank seep.
9077	0256.00	Right bank eroding.
9734	0276.00	Landslide on right bank. LDA #03 contains 12 pieces of LWD and measures 8' high x 33' wide x 21' long. Water does not flow through the LDA and there are no visible gaps in it. Retained sediment ranges from sand to gravel and measures 15' wide x 20' long x 3' deep. Fish were observed above the LDA.
9849	0280.00	There is a 2' high plunge over log.
9927	0282.00	There is a 2.5' high plunge over rocks.
10227	0294.00	LDA #04 contains 20 pieces of LWD and measures 9' high x 28' wide x 43' long. Flow is subsurface through the LDA and there are no visible

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		gaps in it. Retained sediment ranges from gravel to large cobble and measures 15' wide x 20' long x 3' deep. Fish were observed above the LDA.
10528	0303.00	LDA #05 may be located at the site of an old road crossing. It contains 18 pieces of LWD and measures 6' high x 50' wide x 48' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from gravel to large cobble and measures 50' wide x 30' long x 3' deep. There is a 6' high plunge over the LDA. Fish were observed above the LDA.
10877	0317.00	Right bank seep.
10970	0324.00	LDA #06 contains 10 pieces of LWD and measures 6' high x 23' wide x 9' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from gravel to small cobble and measures 10' wide x 20' long x 2' deep. There is a 6' high plunge over the LDA. Fish were not observed above the LDA.
11832	0354.00	The channel type changes from an F4 to an A3.
12081	0359.00	Dry left bank tributary.
12261	0363.00	Tributary #01 enters on the left bank. It contributes less than 1% to Middle Fork North Fork Noyo River's flow. The water temperature of the tributary was 50 degrees Fahrenheit, the water temperature downstream of the confluence was 61 degrees Fahrenheit, and the water temperature upstream of the confluence was 62 degrees Fahrenheit. The slope of the tributary is approximately 30%.
12701	0378.00	Dry left bank tributary. Gullied road crossing with failed culvert.
13168	0388.00	Left bank eroding.
13848	0401.00	LDA #07 contains one piece of LWD and measures 6' high x 21' wide x 5' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from sand to boulders and measures 15' wide x 48' long x 3' deep. There is a 3.5' high plunge over the LDA.
13913	0403.00	LDA #08 contains four pieces of LWD and measures 7' high x 20' wide x 10' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from gravel to boulders and measures 10' wide x 20' long x 2' deep. There is a 4' high plunge over the LDA. Tributary #02 enters on the left bank. It contributes less than 1% to Middle Fork North Fork Noyo River's flow. The water temperature of the tributary was 59 degrees Fahrenheit, the water temperature downstream of the confluence was 61 degrees Fahrenheit, and the water

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temperature upstream of the confluence was 61 degrees Fahrenheit. The slope of the tributary is approximately 15%.

14020	0405.00	LDA #09 contains 10 pieces of LWD and measures 8' high x 30' wide x 30' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from gravel to boulders and measures 8' wide x 50' long x 2' deep.
14356	0413.00	There is a 2' high plunge over boulders.
14519	0418.00	There is a 2' high plunge over boulders.
14653	0424.00	There is a 2' high plunge over boulders.
14733	0428.00	LDA #10 contains 11 pieces of LWD and measures 7' high x 45' wide x 16' long. Water flows through the LDA and there are visible gaps in it. The LDA is not retaining sediment.
15037	0434.00	Tributary #03 enters on the right bank. It contributes less than 1% to Middle Fork North Fork Noyo River's flow. The water temperature of the tributary was 61 degrees Fahrenheit, the water temperature downstream of the confluence was 61 degrees Fahrenheit, and the water temperature upstream of the confluence was 62 degrees Fahrenheit. The slope of the tributary is 25-45%.
15299	0443.00	Left bank seep.
15451	0448.00	LDA #11 contains 15 pieces of LWD and measures 8' high x 41' wide x 27' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to boulders and measures 30' wide x 40' long x 4' deep. Right bank eroding around the LDA.
15715	0453.00	LDA #12 contains six pieces of LWD and measures 7' high x 26' wide x 9' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from gravel to boulders and measures 20' wide x 40' long x 3' deep. Right bank eroding around the LDA.
15830	0455.00	LDA #13 contains four pieces of LWD and measures 7' high x 22' wide x 7' long. Water does not flow through the LDA; the channel is dry for 150 feet above it. There are visible gaps in the LDA. Retained sediment ranges from gravel to boulders and measures 20' wide x 30' long x 3' deep. There is a 3' high plunge over the LDA.
15867	0457.00	End of survey due to diminished habitat above LDA #13.

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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.

## Middle Fork North Fork Noyo River

### 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: Middle Fork of North Fork Noyo River

LLID: 1235430394703 Drainage: Noyo River

Survey Dates: 7/16/2013 to 8/21/2013

Confluence Location: Quad: SHERWOOD PEAK Legal Description: T19NR15WS29 Latitude: 39:28:13.0N Longitude: 123:32:35.0W

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
141	17	FLATWATER	30.8	48	6819	42.7	7.9	0.3	0.8	333	47016	108	15278		0
2	0	NOSURVEY	0.4	46	91	0.6									
151	151	POOL	33.0	27	4126	25.8	10.1	0.6	1.4	263	39652	219	33037	157	26
164	17	RIFFLE	35.8	30	4927	30.9	9.8	0.2	0.5	168	27587	38	6186		1
<b>Total Units</b>	<b>Total Units Fully Measured</b>				<b>Total Length (ft.)</b>					<b>Total Area (sq.ft.)</b>			<b>Total Volume (cu.ft.)</b>		
458	185				15963					114254			54502		

**Table 2 - Summary of Habitat Types and Measured Parameters**

Stream Name: Middle Fork of North Fork Noyo River

LLID: 1235430394703

Drainage: Noyo River

Survey Dates: 7/16/2013 to 8/21/2013

Confluence Location: Quad: SHERWOOD PEAK Legal Description: T19NR15WS29 Latitude: 39:28:13.0N Longitude: 123:32:35.0W

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 (%)
92	11	LGR	20.1	31	2858	17.9	10	0.2	1	167	15347	40	3672		1	98
72	6	HGR	15.7	29	2069	13.0	10	0.2	1.4	171	12295	34	2426		2	94
1	0	GLD	0.2	82	82	0.5										
75	11	RUN	16.4	34	2526	15.8	8	0.3	1.3	237	17786	84	6290		0	95
65	6	SRN	14.2	65	4211	26.4	7	0.3	1.2	510	33149	153	9961		0	95
146	146	MCP	31.9	27	4002	25.1	10	0.6	3.8	263	38368	217	31660	155	25	95
1	1	LSL	0.2	29	29	0.2	15	1.3	2.8	435	435	653	653	566	100	97
4	4	PLP	0.9	24	95	0.6	11	0.7	2.9	212	849	181	725	142	39	80
2	0	NS	0.4	46	91	0.6										

Total Units  
458

Total Units Fully Measured  
185

Total Length (ft.)  
15963

Total Area (sq.ft.)  
118230

Total Volume (cu.ft.)  
55387

**Table 3 - Summary of Pool Types**

Stream Name: Middle Fork of North Fork Noyo River

LLID: 1235430394703

Drainage: Noyo River

Survey Dates: 7/16/2013 to 8/21/2013

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS29

Latitude: 39:28:13.0N

Longitude: 123:32:35.0W

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
146	146	MAIN	97	27	4002	97	10.1	0.6	263	38368	155	22577	25
5	5	SCOUR	3	25	124	3	11.8	0.8	257	1284	227	1134	51

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
151	151	4126	39652	23711



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

Stream Name: Middle Fork of North Fork Noyo River

LLID: 1235430394703

Drainage: Noyo River

Survey Dates: 7/16/2013 to 8/21/2013

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS29

Latitude: 39:28:13.0N

Longitude: 123:32:35.0W

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
146	MCP	97	29	20	95	65	21	14	1	1	0	0
1	LSL	1	0	0	0	0	1	100	0	0	0	0
4	PLP	3	0	0	1	25	3	75	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
151	29	19	96	64	25	17	1	1	0	0

Mean Maximum Residual Pool Depth (ft.): 1.4

**Table 5 - Summary of Mean Percent Cover By Habitat Type**

Stream Name: Middle Fork of North Fork Noyo River

LLID: 1235430394703

Drainage: Noyo River

Survey Dates: 7/16/2013 to 8/21/2013

Dry Units: 0

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS29

Latitude: 39:28:13.0N

Longitude: 123:32:35.0W

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
92	11	LGR	0	0	50	50	0	0	0	0	0
72	6	HGR	0	100	0	0	0	0	0	0	0
164	17	TOTAL RIFFLE	0	50	25	25	0	0	0	0	0
1	0	GLD									
75	11	RUN	0	0	0	0	0	0	0	0	0
65	6	SRN	0	0	0	0	0	0	0	0	0
141	17	TOTAL FLAT	0	0	0	0	0	0	0	0	0
146	146	MCP	18	34	33	4	0	0	3	8	0
1	1	LSL	0	60	40	0	0	0	0	0	0
4	4	PLP	0	13	8	0	0	0	58	23	0
151	151	TOTAL POOL	17	34	33	3	0	0	5	8	0
2	0	NS									
458	185	TOTAL	17	34	33	4	0	0	5	8	0

**Table 6 - Summary of Dominant Substrates By Habitat Type**

Stream Name: Middle Fork of North Fork Noyo River

LLID: 1235430394703

Drainage: Noyo River

Survey Dates: 7/16/2013 to 8/21/2013

Dry Units: 0

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS29

Latitude: 39:28:13.0N

Longitude: 123:32:35.0W

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
92	11	LGR	0	0	64	36	0	0	0
72	6	HGR	0	0	33	33	33	0	0
1	0	GLD	0	0	0	0	0	0	0
75	11	RUN	0	0	64	36	0	0	0
65	6	SRN	0	0	67	33	0	0	0
146	146	MCP	1	3	63	20	10	0	2
1	1	LSL	0	0	100	0	0	0	0
4	4	PLP	0	0	50	0	50	0	0

**Table 7 - Summary of Mean Percent Canopy for Entire Stream**

Stream Name: Middle Fork of North Fork Noyo River

LLID: 1235430394703

Drainage: Noyo River

Survey Dates: 7/16/2013 to 8/21/2013

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS29

Latitude: 39:28:13.0N

Longitude: 123:32:35.0W

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Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
95	53	47	0	98	100

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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: Middle Fork of North Fork Noyo River LLID: 1235430394703 Drainage: Noyo River  
 Survey Dates: 7/16/2013 to 8/21/2013 Survey Length (ft.): 15963 Main Channel (ft.): 15907 Side Channel (ft.): 56  
 Confluence Location: Quad: SHERWOOD PEAK Legal Description: T19NR15WS29 Latitude: 39:28:13.0N Longitude: 123:32:35.0W

**Summary of Fish Habitat Elements By Stream Reach**

**STREAM REACH: 1**

Channel Type: F4	Canopy Density (%): 94.5	Pools by Stream Length (%): 29.7
Reach Length (ft.): 11832	Coniferous Component (%): 49.3	Pool Frequency (%): 34.2
Riffle/Flatwater Mean Width (ft.): 8.7	Hardwood Component (%): 50.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 83
Range (ft.): 12 to 21	Vegetative Cover (%): 98.5	2 to 2.9 Feet Deep: 16
Mean (ft.): 16	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 1
Std. Dev.: 3	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.3	Occurrence of LWD (%): 23	Mean Max Residual Pool Depth (ft.): 1.5
Water (F): 56 - 62 Air (F): 55 - 74	LWD per 100 ft.:	Mean Pool Shelter Rating: 28
Dry Channel (ft): 0	Riffles: 3	
	Pools: 7	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 76 Sm Cobble: 19 Lg Cobble: 3 Boulder: 0 Bedrock: 2		
Embeddedness Values (%): 1. 22.3 2. 45.5 3. 30.6 4. 0.0 5. 1.7		

**STREAM REACH: 2**

Channel Type: A3	Canopy Density (%): 96.0	Pools by Stream Length (%): 14.7
Reach Length (ft.): 4075	Coniferous Component (%): 68.4	Pool Frequency (%): 28.8
Riffle/Flatwater Mean Width (ft.): 9.3	Hardwood Component (%): 31.6	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 80
Range (ft.): 14 to 19	Vegetative Cover (%): 99.8	2 to 2.9 Feet Deep: 20
Mean (ft.): 17	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0
Std. Dev.: 2	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.3	Occurrence of LWD (%): 18	Mean Max Residual Pool Depth (ft.): 1.4
Water (F): 60 - 63 Air (F): 64 - 76	LWD per 100 ft.:	Mean Pool Shelter Rating: 18
Dry Channel (ft): 0	Riffles: 3	
	Pools: 8	
	Flat: 5	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 47 Sm Cobble: 30 Lg Cobble: 20 Boulder: 3 Bedrock: 0		
Embeddedness Values (%): 1. 16.7 2. 53.3 3. 30.0 4. 0.0 5. 0.0		

**Table 9 - Mean Percentage of Dominant Substrate and Vegetation**

Stream Name: Middle Fork of North Fork Noyo River

LLID: 1235430394703

Drainage: Noyo River

Survey Dates: 7/16/2013 to 8/21/2013

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS29

Latitude: 39:28:13.0N

Longitude: 123:32:35.0W

**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	2	3	1.3
Boulder	9	10	5.1
Cobble / Gravel	115	93	55.9
Sand / Silt / Clay	60	80	37.6

**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	0	0	0.0
Brush	2	1	0.8
Hardwood Trees	82	80	43.5
Coniferous Trees	101	104	55.1
No Vegetation	1	0	0.3

**Total Stream Cobble Embeddedness Values:** 2

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

StreamName: Middle Fork of North Fork Noyo River

LLID: 1235430394703

Drainage: Noyo River

Survey Dates: 7/16/2013 to 8/21/2013

Confluence Location: Quad: SHERWOOD PEAK

Legal Description: T19NR15WS29

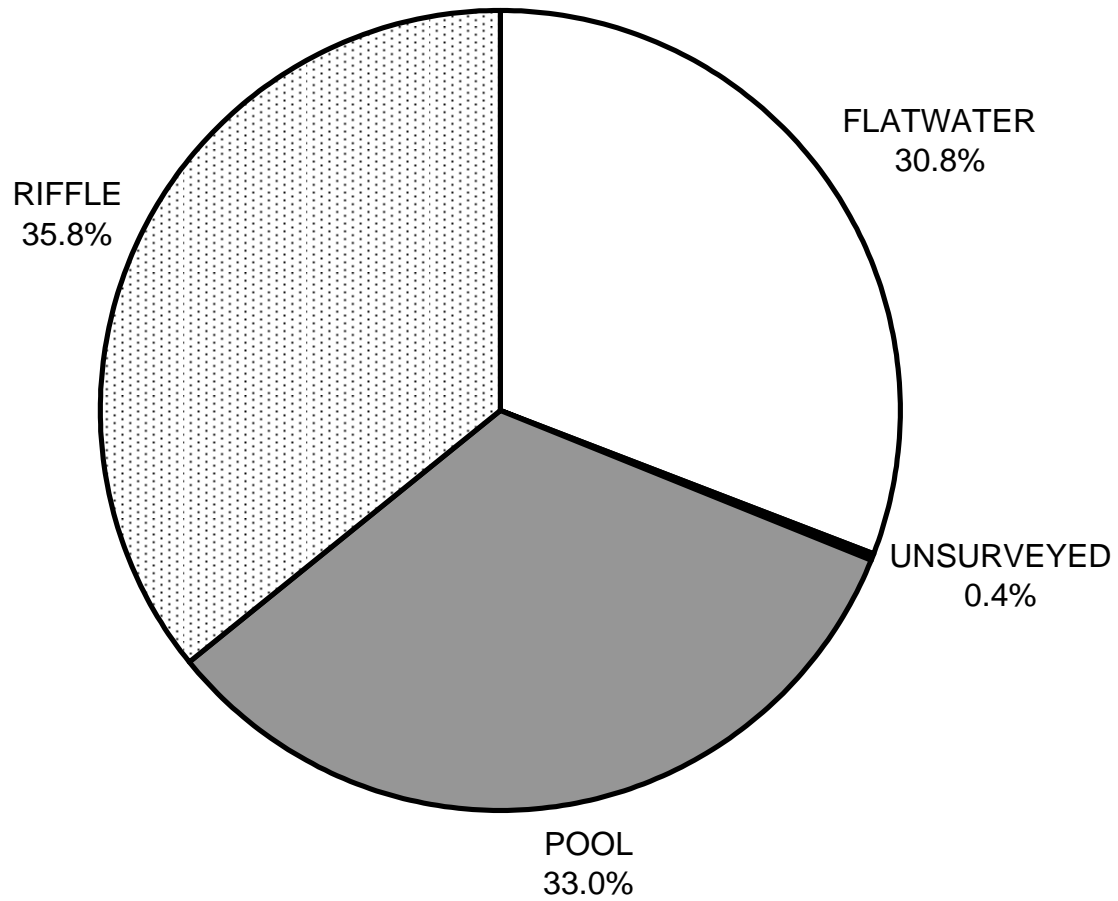
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Longitude: 123:32:35.0W

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	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)	0	0	17
SMALL WOODY DEBRIS (%)	50	0	34
LARGE WOODY DEBRIS (%)	25	0	33
ROOT MASS (%)	25	0	3
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	5
BOULDERS (%)	0	0	8
BEDROCK LEDGES (%)	0	0	0

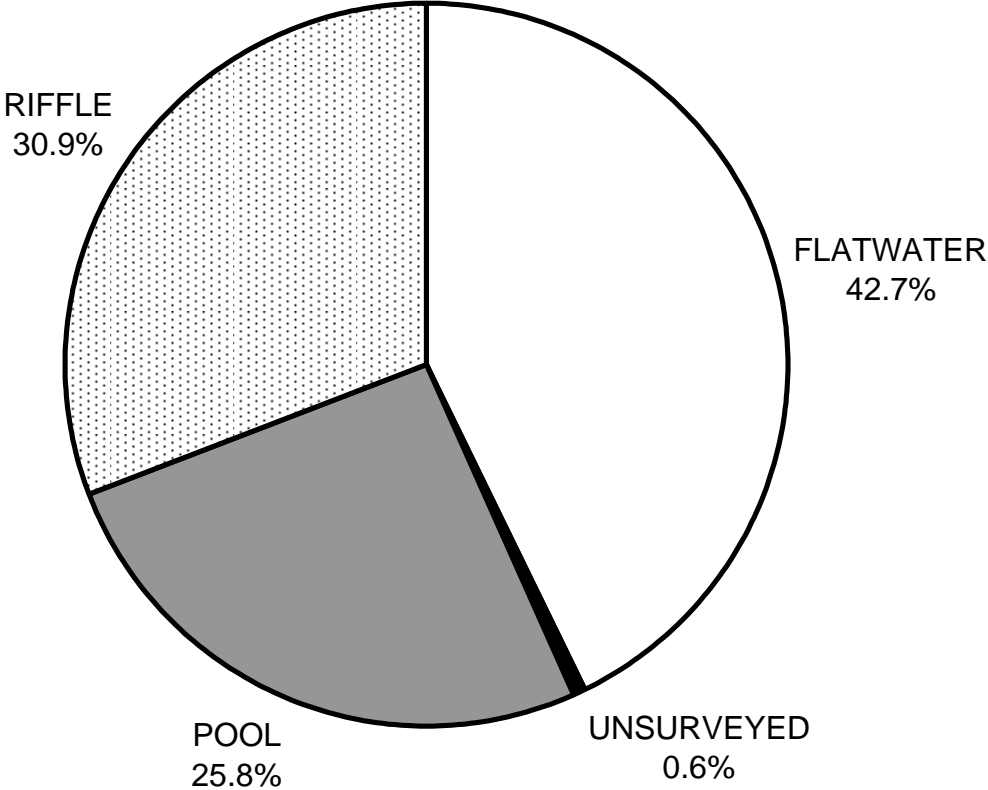
# MIDDLE FORK OF NORTH FORK NOYO RIVER 2013 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

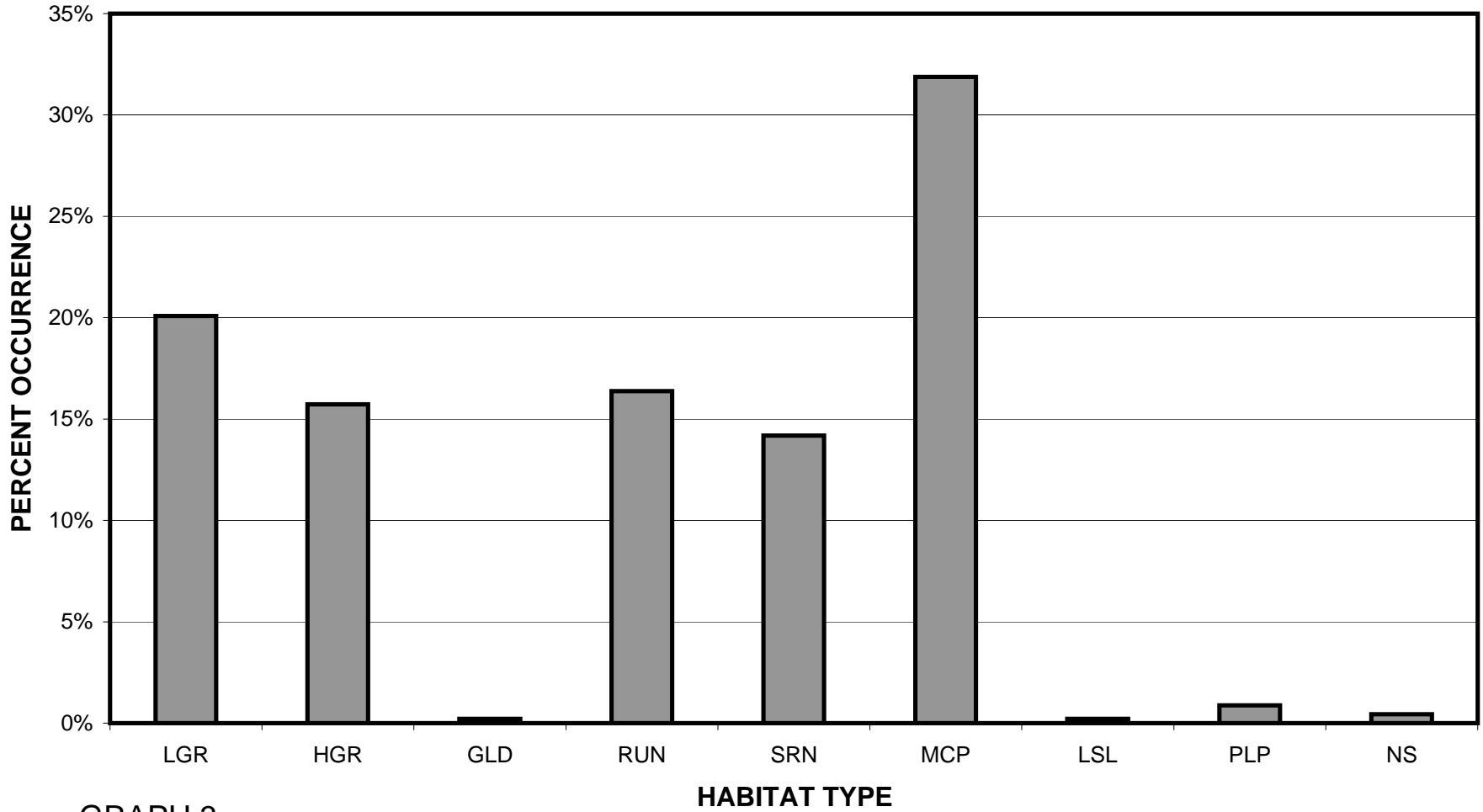


**MIDDLE FORK OF NORTH FORK NOYO RIVER 2013  
HABITAT TYPES BY PERCENT TOTAL LENGTH**



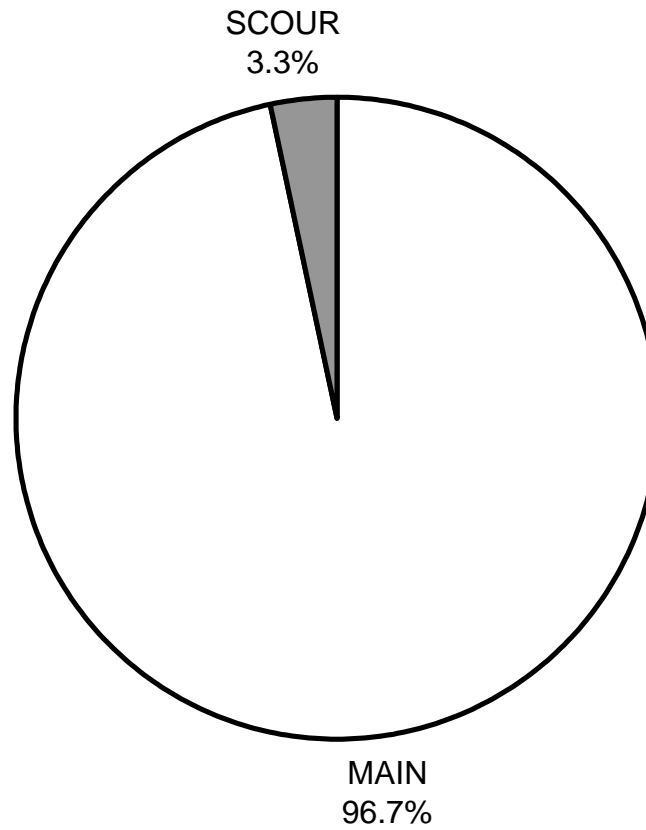
GRAPH 2

# MIDDLE FORK OF NORTH FORK NOYO RIVER 2013 HABITAT TYPES BY PERCENT OCCURRENCE



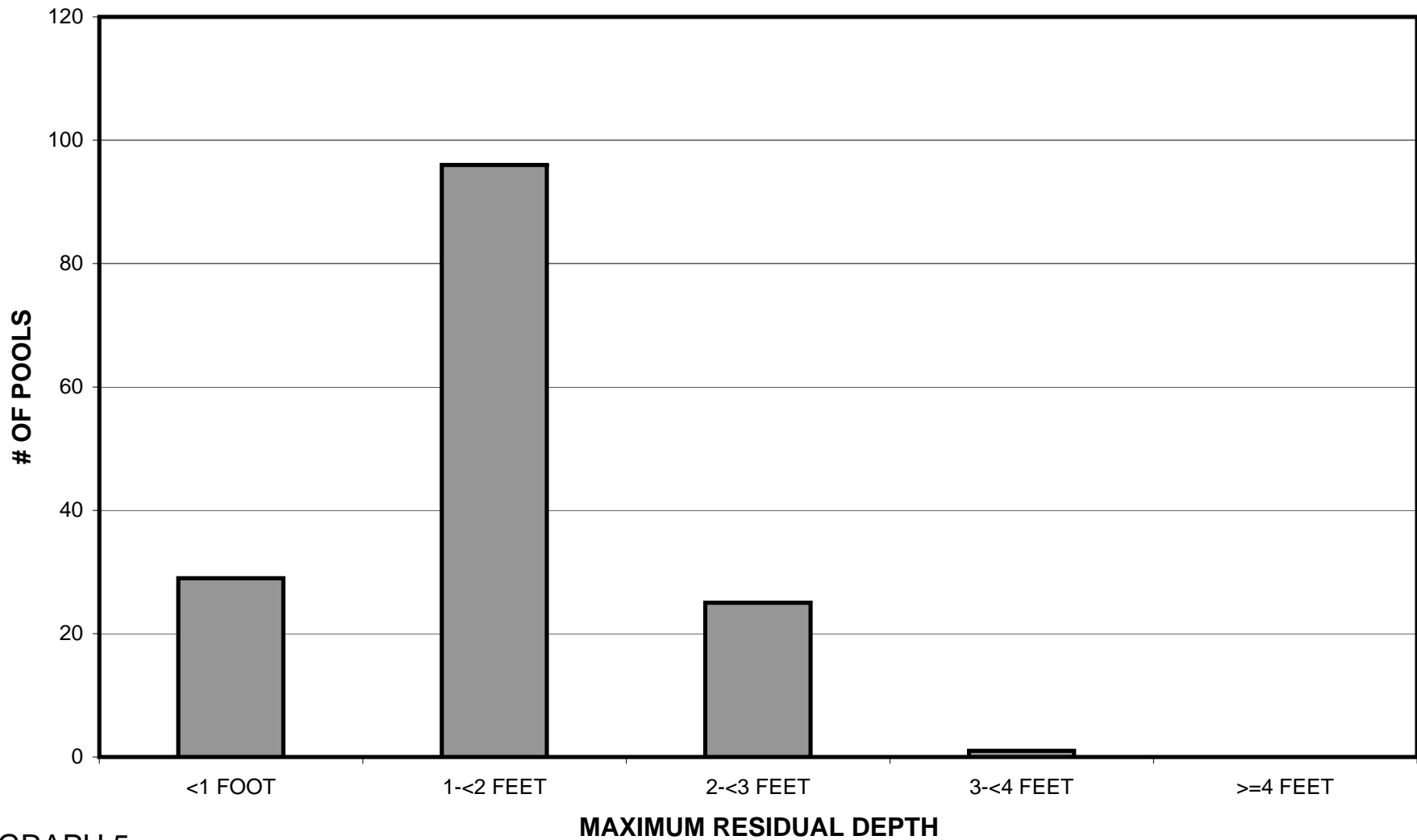
GRAPH 3

**MIDDLE FORK OF NORTH FORK NOYO RIVER 2013  
POOL TYPES BY PERCENT OCCURRENCE**



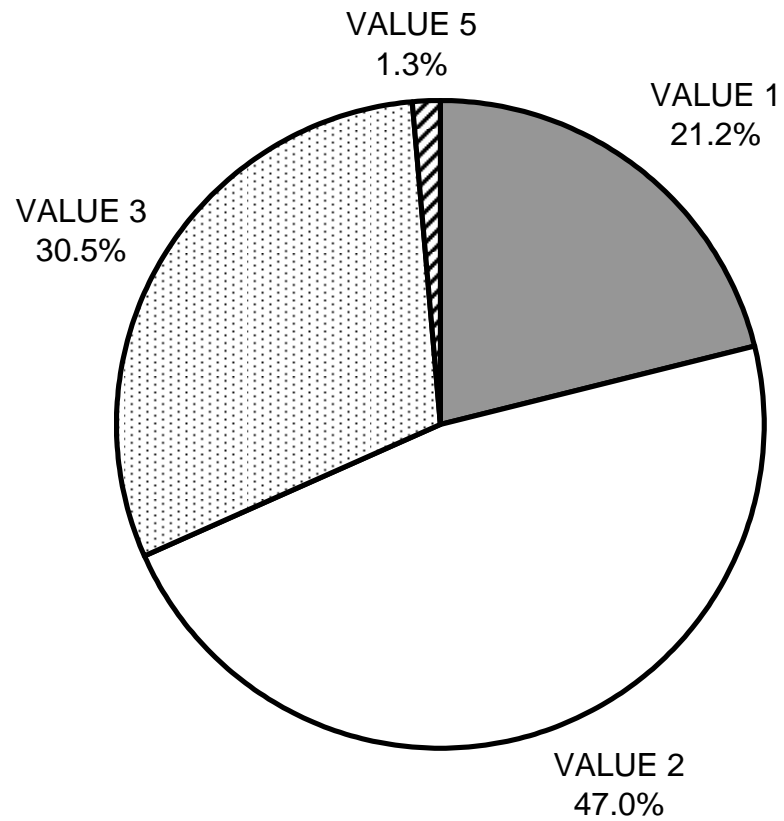
GRAPH 4

# MIDDLE FORK OF NORTH FORK NOYO RIVER 2013 MAXIMUM DEPTH IN POOLS



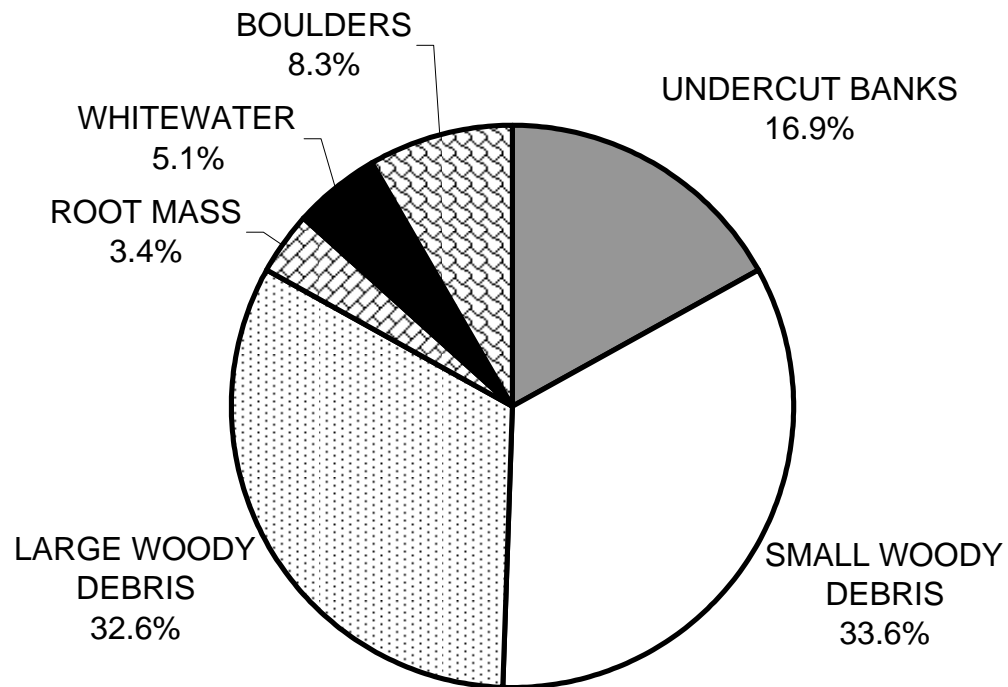
GRAPH 5

# MIDDLE FORK OF NORTH FORK NOYO RIVER 2013 PERCENT EMBEDDEDNESS



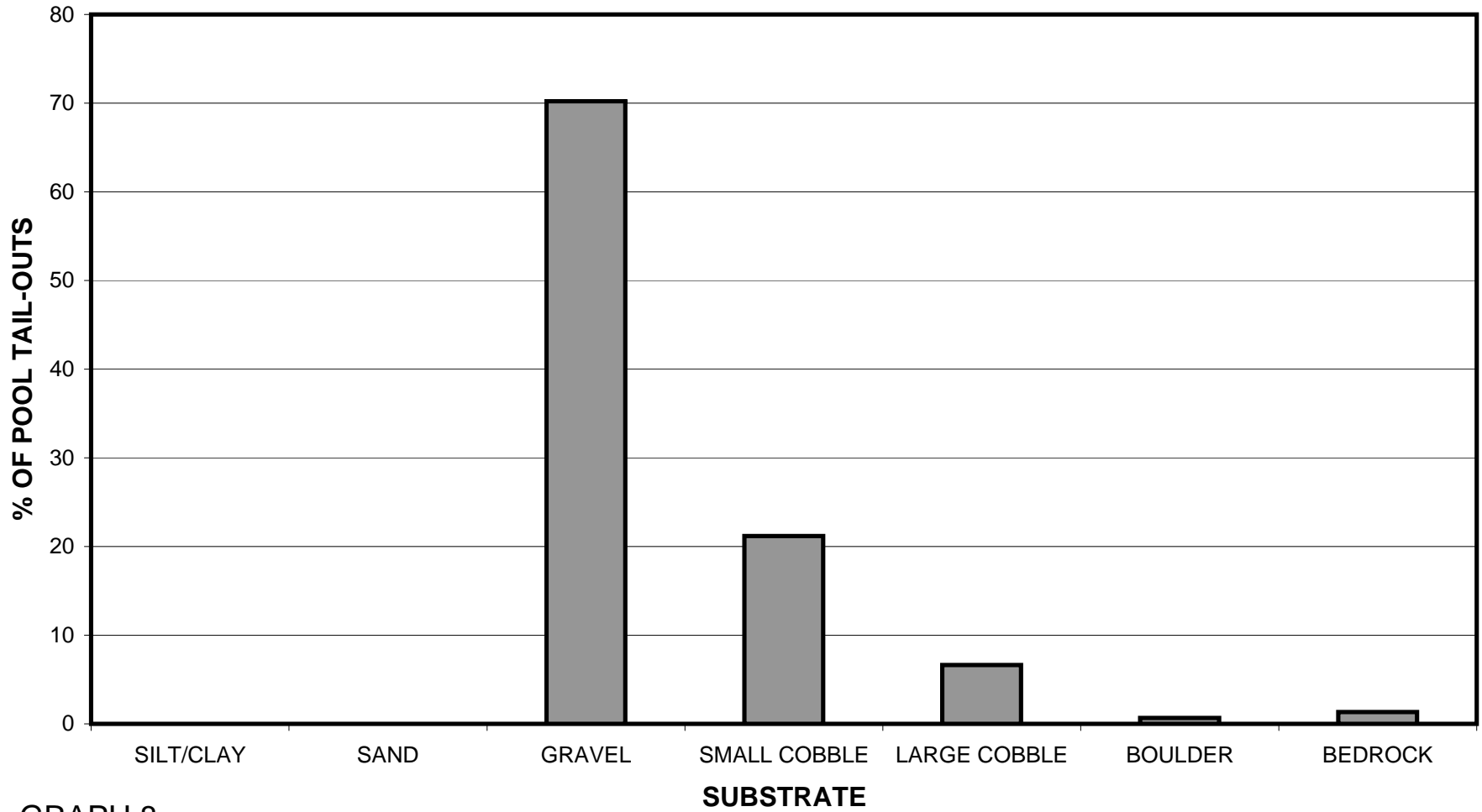
GRAPH 6

# MIDDLE FORK OF NORTH FORK NOYO RIVER 2013 MEAN PERCENT COVER TYPES IN POOLS



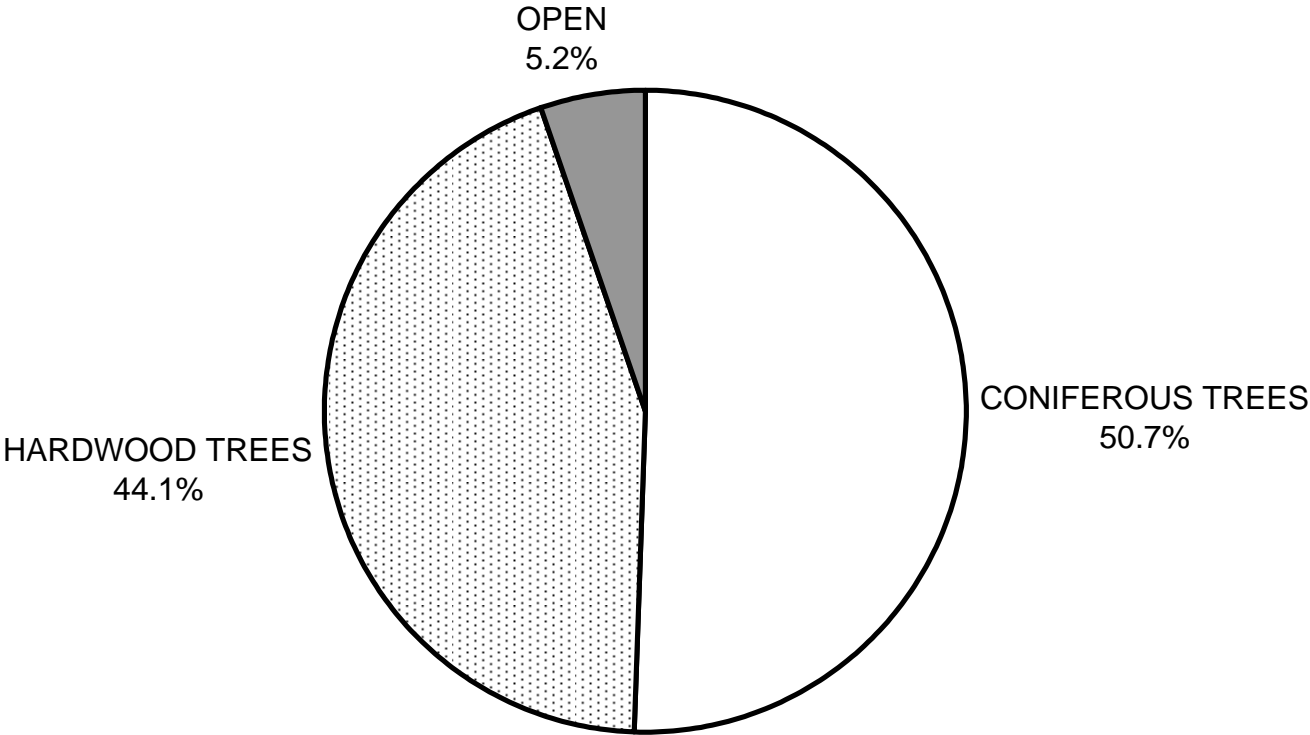
GRAPH 7

# MIDDLE FORK OF NORTH FORK NOYO RIVER 2013 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



GRAPH 8

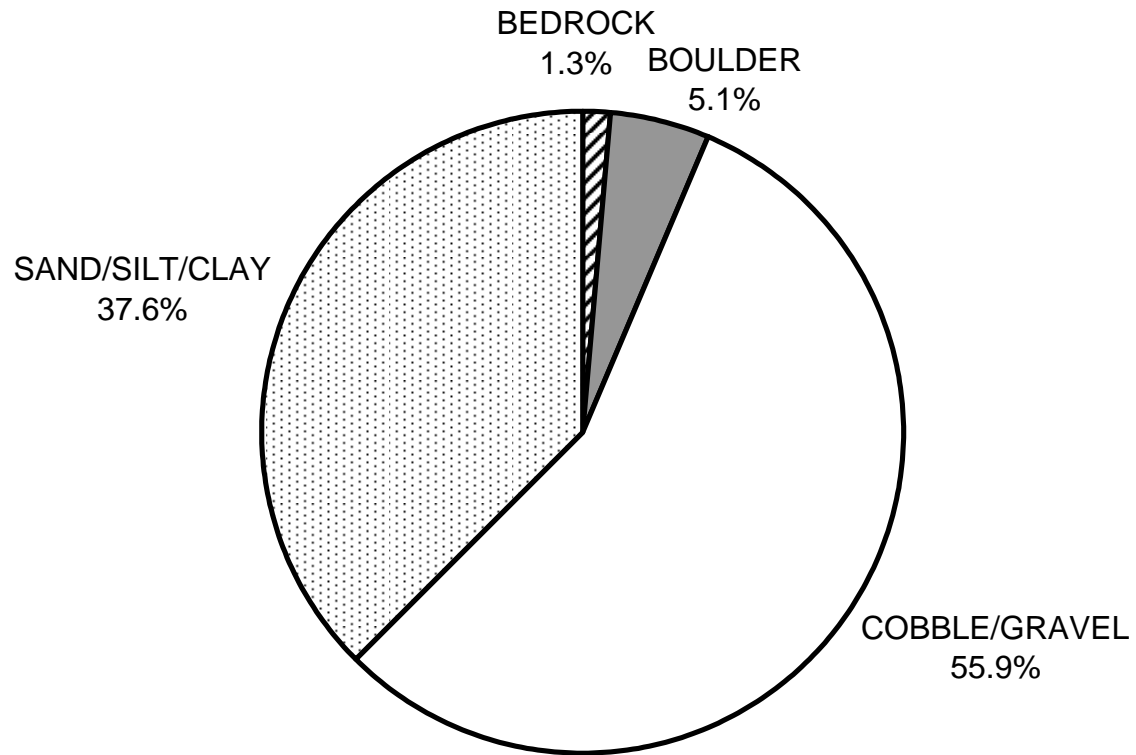
**MIDDLE FORK OF NORTH FORK NOYO RIVER 2013  
MEAN PERCENT CANOPY**



GRAPH 9

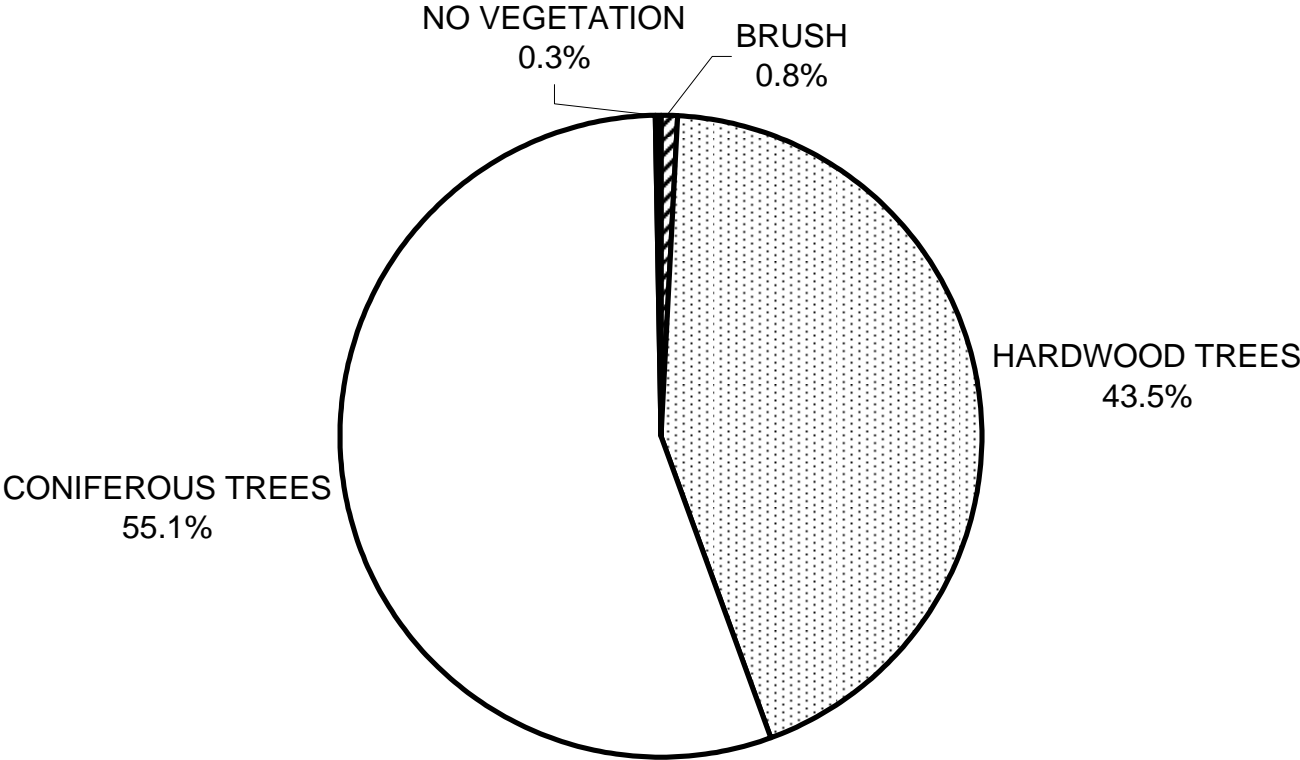


**MIDDLE FORK OF NORTH FORK NOYO RIVER 2013  
DOMINANT BANK COMPOSITION IN SURVEY REACH**



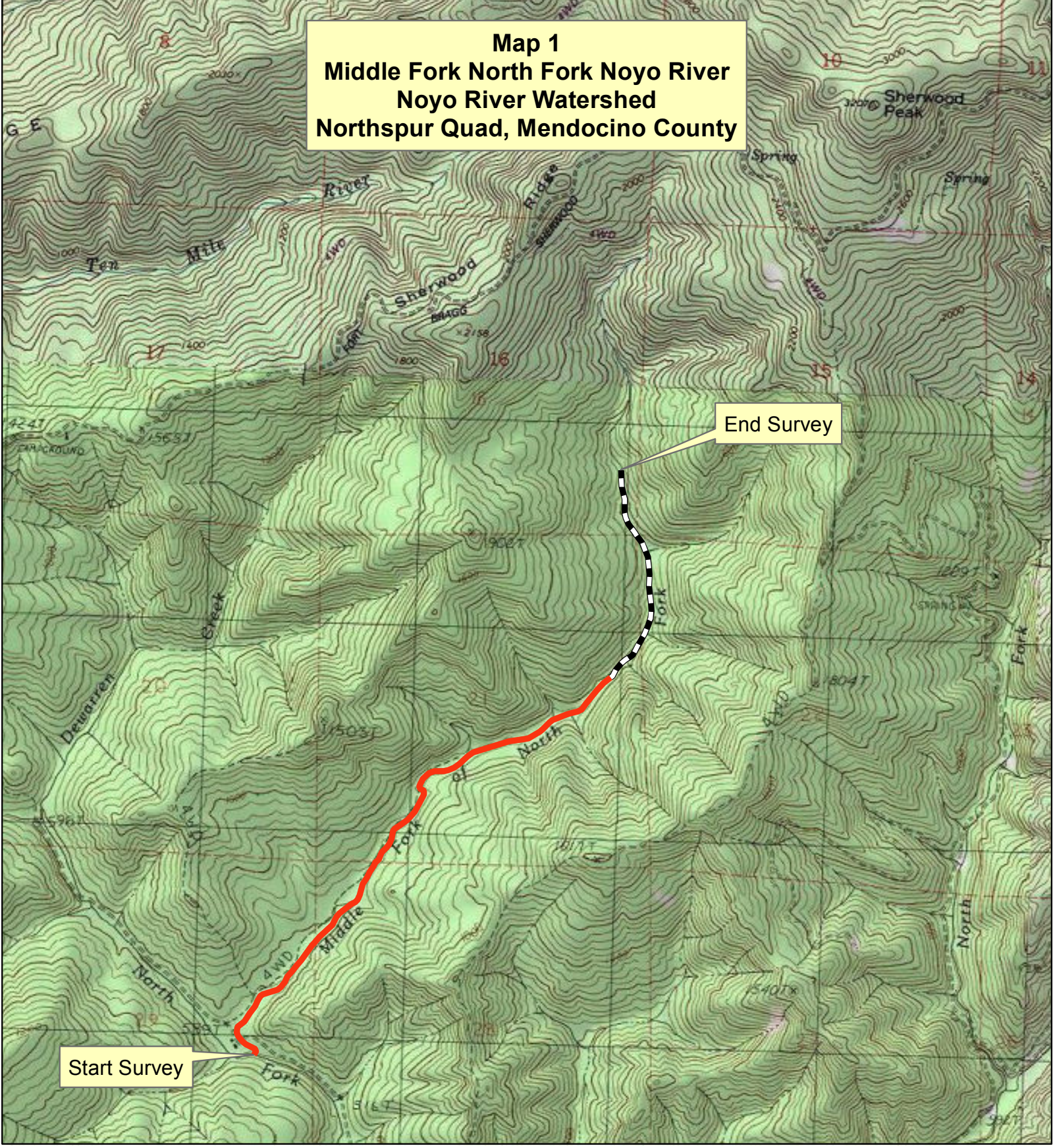
GRAPH 10

**MIDDLE FORK OF NORTH FORK NOYO RIVER 2013  
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

**Map 1**  
**Middle Fork North Fork Noyo River**  
**Noyo River Watershed**  
**Northspur Quad, Mendocino County**



Start Survey

End Survey



- Reach 1, Channel Type F4
- - - Reach 2, Channel Type A3

