



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

Unnamed Tributary to Noyo River

INTRODUCTION

A stream inventory was conducted from September 14 to October 20, 2016 on Unnamed Tributary to Noyo River. The survey began at the confluence with Noyo River and extended upstream 1.2 miles.

The Unnamed Tributary to 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 Unnamed Tributary to 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

Unnamed Tributary to Noyo River flows into Noyo River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Unnamed Tributary to Noyo River's legal description at the confluence with Noyo River is T18N R15W S17. Its location is 39.4197° north latitude and 123.5573° west longitude, LLID number 1235562394199. Unnamed Tributary to Noyo River is a first order stream and has approximately 0.9 miles of blue line stream according to the USGS Northspur 7.5 minute quadrangle. Unnamed Tributary to Noyo River drains a watershed of approximately 1.8 square miles. Elevations range from about 272 feet at the mouth of the creek to 741 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber harvest. Vehicle access exists via Highway 20 near Fort Bragg.

METHODS

The habitat inventory conducted in Unnamed Tributary to 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.

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 Unnamed Tributary to 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:

Water and air temperatures are measured and recorded at every tenth habitat unit using a hand-held thermometer. Both temperatures are taken in degrees Fahrenheit and the time of the measurement is also recorded. Air temperatures are recorded within one foot of the water surface, while water temperatures are recorded (where possible) in flowing water within the habitat unit.

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". Unnamed Tributary to 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.

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 Unnamed Tributary to 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. 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 Unnamed Tributary to 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. 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 Unnamed Tributary to 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 Unnamed Tributary to 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.

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 Unnamed Tributary to Noyo River. In addition, underwater mask and snorkel observations were made at 20 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

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Unnamed Tributary to 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 IN APPENDIX I *

The habitat inventory of September 14 to October 20, 2016, was conducted by Chantel Moore, Amidia Frederick, Nicole Bejar, Brian Starks, Maddelyn Harden, Ryan Bernstein, Matt Rice (CDFW), Rachel Karlov, and Angela Cruz (WSP). The total length of the stream surveyed was 6,180 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.126 cfs on September 22, 2016.

Unnamed Tributary to Noyo River is a G4 channel type for 6,187 feet of the stream surveyed. G4 channels are entrenched “gully” step-pool channels on moderate gradients with low width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 50° to 56° Fahrenheit. Air temperatures ranged from 44° to 69° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% riffle units, 30% flatwater units, 29% pool units, and 2% dry units (Graph 1). Based on total length of Level II habitat types there were 37% riffle units, 36% flatwater units, 26% pool units, and 1% dry units (Graph 2).

Seventeen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 35%; run units, 23%, and mid-channel pool units, 20% (Graph 3). Based on percent total length, low gradient riffle units made up 29%, run units 21%, and mid-channel pool units 17%.

A total of 90 pools were identified (Table 3). Main channel pools were the most frequently encountered at 74% (Graph 4), and comprised 69% 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 87 pools (8%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 87 pool tail-outs measured, 31 had a value of 1 (35.6%); 36 had a value of 2 (41.4%); 17 had a value of 3 (19.5%); 3 had a value of 5 (3.4%) (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 4, and pool habitats had a mean shelter rating of 17 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating of 55. Main channel pools had a mean shelter rating of 17.

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Unnamed Tributary to Noyo River. Graph 7 describes the pool cover in Unnamed Tributary to Noyo River. 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 most dominant substrate and was observed in 79% of pool tail-outs. Small cobble was the second most commonly observed in 17% of pool tail-outs.

The mean percent canopy density for the surveyed length of Unnamed Tributary to Noyo River was 98%. Two percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 42% and 56%, respectively. Graph 9 describes the mean percent canopy in Unnamed Tributary to Noyo River.

For the stream reach surveyed, the mean percent right bank vegetated was 98%. The mean percent left bank vegetated was 96%. The dominant elements composing the structure of the stream banks consisted of 61% sand/silt/clay, 24% cobble/gravel, 13% bedrock, and 2% boulder (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a mask and snorkel survey at 20 sites for species composition and distribution in Unnamed Tributary to Noyo River on October 26, 2016. The water temperature taken during the survey period ending at 0900 was 54° Fahrenheit.

The survey sites yielded 19 young-of-the-year (YOY) steelhead/rainbow trout (SH/RT), 1 age 1+ SH/RT, 49 YOY coho, 1 age 1+ coho, and 1 sculpin.

During the survey, the upstream-most observation of juvenile coho salmon occurred at 39.4107° north latitude and -123.5593° west longitude. The upstream-most observation of juvenile steelhead occurred at 39.4107° north latitude and -123.5592° west longitude.

Table A. Summary of results for a fish composition and distribution survey within Unnamed Tributary to Noyo River, 2016.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	Steelhead Trout			Coho Salmon		Additional Aquatic Species Observed
					YOY	1+	2+	YOY	1+	
10/26/16	1	9	Pool	125	1	0	0	3	0	
	2	21	Pool	466	5	0	0	8	0	
	3	42	Pool	881	4	1	0	9	0	

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Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	Steelhead Trout			Coho Salmon		Additional Aquatic Species Observed
					YOY	1+	2+	YOY	1+	
	4	43	Pool	899	2	0	0	8	1	
	5	95	Pool	2,262	1	0	0	5	0	
	6	144	Pool	3,183	2	0	0	1	0	
	7	167	Pool	3,737	1	0	0	1	0	
	8	177	Pool	4,057	1	0	0	0	0	
	9	183	Pool	4,241	0	0	0	4	0	1 sculpin spp.
	10	193	Pool	4,401	0	0	0	0	0	
	12	213	Pool	4,671	1	0	0	2	1	
	13	225	Pool	4,817	1	0	0	1	0	
	14	229	Pool	4,892	0	0	0	3	0	
	15	240	Pool	5,146	0	0	0	2	0	
	16	250	Pool	5,291	0	0	0	0	0	
	17	252	Pool	5,335	0	0	0	0	0	
	18	256	Pool	5,381	0	0	0	0	0	
	19	263	Pool	5,479	0	0	0	0	0	
	20	275	Pool	5,650	0	0	0	0	0	

DISCUSSION

Unnamed Tributary to Noyo River is a G4 channel type. The suitability of G4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days September 14 to October 20, 2016, ranged from 50° to 56° Fahrenheit. Air temperatures ranged from 44° to 69° Fahrenheit. This is a suitable water temperature range for salmonids. This is a good 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 36% of the total length of this survey, riffles 37%, and pools 26%. Seven of the 87 (8%) 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.

Sixty-seven of the 87 pool tail-outs measured had embeddedness ratings of 1 or 2. Seventeen of the pool tail-outs had embeddedness ratings of 3 or 4. Three 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.

Eighty-four of the 87 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 17. The shelter rating in the flatwater habitats is 4. 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 Unnamed Tributary to Noyo River. 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 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 98%. The percentage of right and left bank covered with vegetation was 98% and 96%, respectively.

RECOMMENDATIONS

Unnamed tributary to Noyo River should be managed as an anadromous, natural production stream. Recommendations for potential habitat improvement activities are based on target habitat values suitable for salmonids in California's north coast streams. Considering the results from this stream habitat inventory, factors that affect salmonid productivity and CDFW's professional judgment, the following list prioritizes habitat improvement activities in Unnamed tributary to Noyo River. Keep in mind, watershed and stream ecosystem processes, land use alterations, changes in land ownership, and other factors could potentially change the order of these recommendations or create the need to remove/add recommendations in the future.

- 1) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from large woody debris. Adding high quality complexity with woody cover in the pools is desirable.
- 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.

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 Noyo River. Channel type is a G4. Channel type cross-section is located at Habitat Unit (HU) #35.

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125	0009.00	West side streambank is entrenched.
170	0011.00	Left bank erosion is 6' high at end of habitat unit.
207	0013.00	Right bank entrenchment continues.
254	0015.00	Left bank erosion height peaks at estimated 95' high.
295	0017.00	Left bank erosion height is 7'.
394	0021.00	Fish observed utilizing bedrock edges.
503	0025.00	There is a 3.0' plunge over bedrock into a 2.1' depth pool.
648	0032.00	There is active erosion on right bank.
911	0044.00	There is a 3' plunge over wood into a 1.6' deep pool.
957	0046.00	Log debris accumulation (LDA) # 1 contains 4 pieces of large woody debris (LWD) and measures 14' x 13' x 2'. Water does not flow through the LDA and there are no visible gaps in it. Retained sediment ranges from gravel to small cobble. Fish were observed above LDA. Subsurface flow with no visible gaps, 4 visible pieces of LWD with accumulated SWD and brush.
1101	0051.00	Less entrenched than downstream channel.
1371	0056.00	There is sediment buildup that creates subsurface flow.
1600	0066.00	Beginning of right bank erosion, which is 7' high.
1721	0069.00	Right bank erosion ends.
1767	0071.00	There is active erosion on the left bank, it measures 6' long x 15' high.
2022	0085.00	Tributary #1 enters on the right bank. The water temperature of the tributary was 55 degrees Fahrenheit, the water temperature downstream of the confluence was 53 degrees Fahrenheit, and the water temperature upstream of the confluence was 53 degrees Fahrenheit. The slope of the tributary is 2%. The tributary is accessible to salmonids due to clear passage upstream. Fish were not observed in the tributary. Right bank erosion is 10' x 7'
2094	0089.00	Right bank entrenchment increases.

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2297	0097.00	There is active erosion on the right bank, it measures 20' long x 9' high.
2592	0111.00	There is active erosion on the left bank, it measures 7' long x 3' high.
2713	0118.00	There is active erosion on the right bank.
2810	0125.00	Natural wood accumulation along the left bank.
2936	0132.00	Flow subsurface above pool.
2991	0134.00	Natural wood accumulation widens stream. Some sediment build-up.
3033	0136.00	LWD beginning to scour a pool.
3304	0150.00	Natural wood accumulation widens the stream. There is flow through the passage but there is also the beginning of sediment buildup.
3558	0162.00	There is active erosion on the left bank, it measures 45' long x 3' high. It is depositing sediment into the stream.
3743	0168.00	There is active erosion on the left bank that is depositing sediment into the stream.
3843	0172.00	Two 2.5' plunges over boulder into 0.2' of water.
3843	0172.00	Active erosion on the right bank.
3922	0174.00	LDA #2 is 9' high x 23' wide x 26' long and contains 19 pieces of large woody debris. Water does not flow through the LDA and there are visible gaps in it. Sediment is being retained and ranges from gravel to small cobble. Fish observed above LDA. Large sediment build up is creating subsurface flow as well.
3985	0177.00	There is active erosion on the right bank for 10' of the Habitat Unit.
4014	0178.00	There is active erosion on the right bank that ends in this Habitat Unit.
4137	0182.00	There is active erosion on both the left and right banks.
4242	0185.00	There is active erosion on the left bank with a height of 4' and a length of 11'.
4385	0197.00	LDA # 3 is 4' high x 15' wide x 4' long and contains 3 pieces of LWD. Water does not flow through it and there are no visible gaps in it. Sediment is being stored in the dimensions 6' wide x 7' long x 2' deep. Sediment ranges from gravel to large cobble.

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4391	0198.00	LDA #4 is 3.5' high x 13' wide x 4' long and contains 2 pieces of LWD. Water does not flow through the LDA and there are no visible gaps in it. Sediment is being retained in the approximate dimensions of 9' wide x 8' long x 1' deep. The sediment ranges in size from gravel to small cobble. There is a subsurface flow created due to sediment.
4623	0215.00	There is a 1' plunge that goes over SWD.
4648	0217.00	LWD with substrate covering channel. There is a pool underneath the LWD.
4770	0227.00	LDA #5 is 8' high x 4' wide x 1.5' long and contains 2 pieces of LWD. Water does not flow through the LDA and there are no visible gaps in it. Sediment is being retained in the approximate dimensions of 6.5' wide x 5' long x 1.5' deep. The sediment ranges in size from sand to small cobble. Fish were observed above the LDA.
4804	0229.00	There is a 1' plunge over LWD.
4820	0230.00	There is a 1' plunge over LWD.
5044	0238.00	LDA #6 is 3.5' high x 10' wide x 1' long and contains two pieces of LWD. Water does not flow through it and there are no visible gaps. Sediment is retained at 9' wide x 9' long x 1' deep and ranges from sand to small cobble. Fish observed above LDA.
5112	0242.00	Area shows many signs of landslides.
5122	0243.00	There is a .5' plunge over LWD/SWD.
5130	0244.00	There is a 2.5' plunge over LWD.
5203	0249.00	LDA #7 is 3.5' high x 13.5' wide x 1.1 long and contains 2 pieces of LWD. Water does not flow and there are no visible gaps. Sediment is retained and size ranges from sand to gravel. There were no fish above the LDA and is possible barrier to juvenile and adult salmonids as there is one large log with 3' plunge into 1' pool.
5220	0251.00	There is a 2' plunge over an LWD.
5397	0262.00	There is a 2.5' plunge over LWD.
5592	0275.01	Isolated pool.
5604	0277.00	Potential LDA open channel on LB, could accumulate more LWD to

form blockage.

5643	0280.00	LDA #8 is 3.6' high x 6' wide x 9' long with 1 piece of LWD. Water does not flow through and there are no visible gaps. No sediment is retained. No fish above LDA and it is possible barrier to juvenile salmonids as there is one large log lengthwise in the channel. Water flows underneath and contributes to an isolated pool that is 3' x 3' and 1.5' deep.
5757	0286.00	LDA#9 is 6' high x 18' wide x 14ft long with 5 pieces of LWD. Water does flow though it and there are visible gaps. No sediment is retained. No fish above LDA and it may be a possible barrier to juvenile salmonids as the LDA blocks channel creating a plunge into a 0.8' pool. There is debris where water could pass through, but fish would have a hard time navigating. The right bank is another channel, but it is very choked and seems like water doesn't go that way often.
5791	0288.00	LDA # 10 is 4.5' high x 11.5' wide x 7' long with 8 pieces of LWD. Water does flow through and there are no visible gaps. Sediment is stored at the dimensions 20' wide x 12' long x 2' deep and ranges in size from sand to small cobble. No fish spotted above LDA. Possible barrier to juvenile and adult salmonids as there is a simple accumulation of LWD.
6032	0301.00	There is a 1.5' plunge over SWD.
6100	0306.00	There is active erosion on the right bank; it measures 3' long x 7' high.
6111	0307.00	Very undercut left bank.
6118	0308.00	There is a 2' plunge over SWD.
6137	0310.00	There is active erosion on the left bank that measures 40' long x 6' high.
6157	0312.00	There is active erosion on the right bank 30' long x 6' high.
6175	0314.00	End of Survey due to LDA#11 as well as diminishing habitat. LDA #11 is 4' high x 8' wide x 8' long with three pieces of LWD. Water does not flow through and there are no visible gaps. Sediment is retained with the dimensions 10' wide x 8' long x 3' deep. Size of sediment ranges from sand to gravel. It may be a possible barrier to juvenile and adult salmonids as there is a plunge into 0.7' of water that is very choked with debris, in a very narrow canyon. There are several more LWDs within the next 500' with few pools remaining. Pools are far apart and very silty, and fish have not been seen since below LDA #6 at HU # 238.

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.

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 }

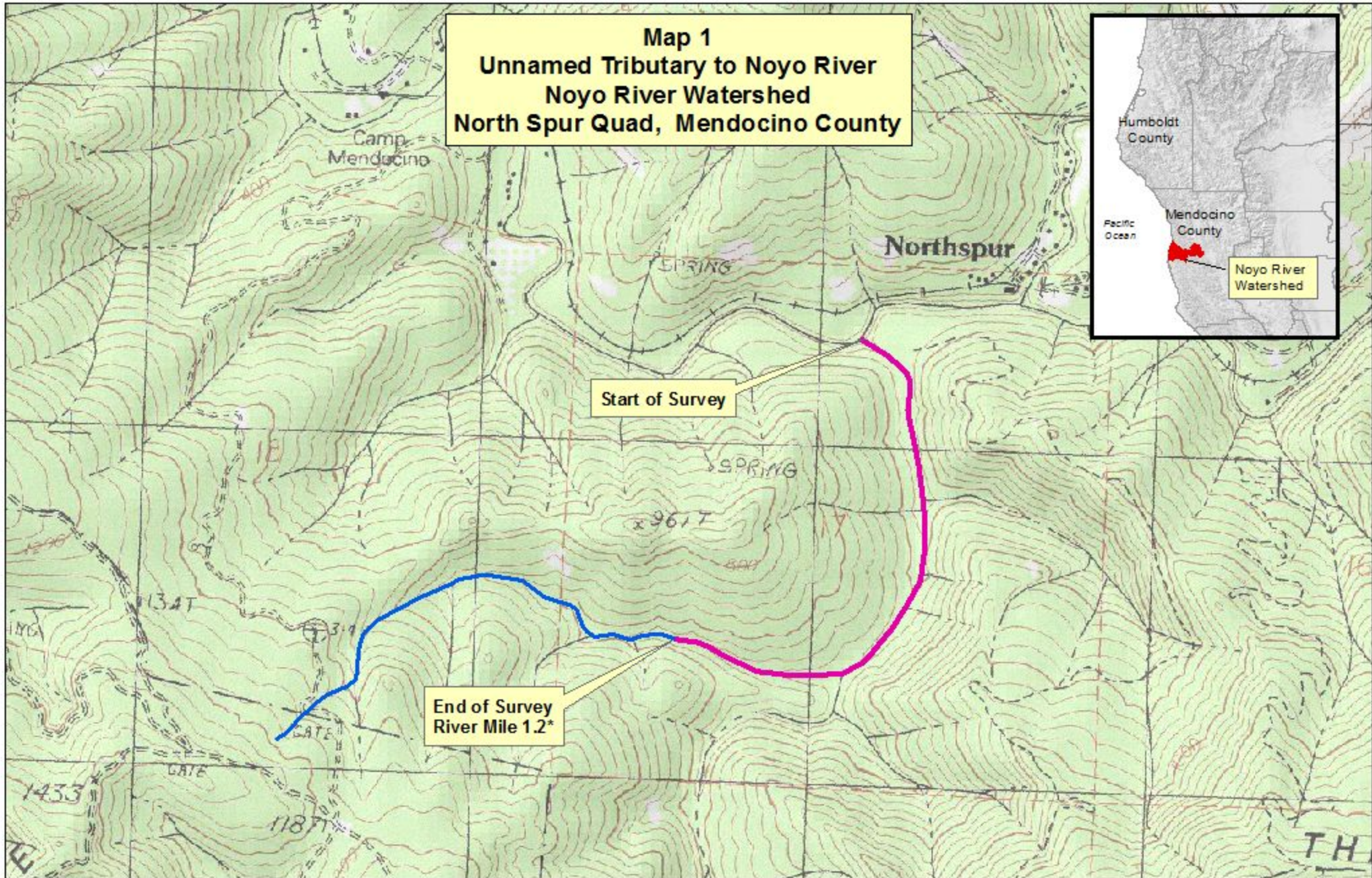
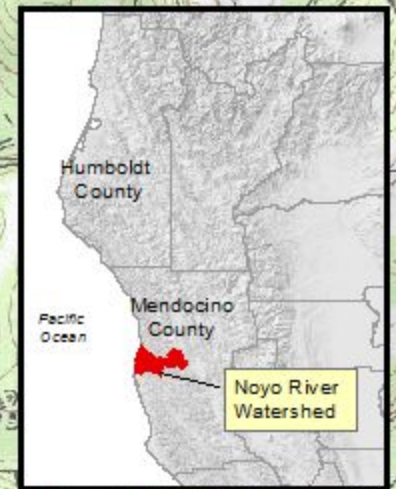
BACKWATER POOLS

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}

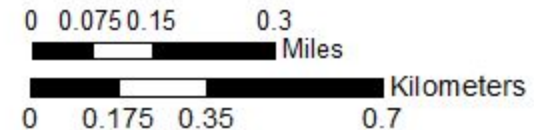
ADDITIONAL UNIT DESIGNATIONS

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

Map 1
Unnamed Tributary to Noyo River
Noyo River Watershed
North Spur Quad, Mendocino County



- Reach 1: G4 Channel Type
- Unnamed Tributary to Noyo River



APPENDIX I

TABLES AND GRAPHS

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

Stream Name: 1235562394199

LLID: 1235562394199

Drainage: Noyo River

Survey Dates: 9/14/2016 to 10/20/2016

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS17

Latitude: 39:25:12.0N

Longitude: 123:33:22.0

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
6	0	DRY	1.9	8	48	0.8									
95	16	FLATWATER	30.2	23	2231	36.1	6.2	0.4	0.8	121	11476	58	5515		4
90	88	POOL	28.6	18	1613	26.1	7.5	0.6	1.3	142	12809	121	10793	87	17
124	15	RIFFLE	39.4	19	2295	37.1	6.1	0.2	0.5	111	13743	32	4005		1
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
315	119				6187					38027			20312		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: 1235562394199

LLID: 1235562394199

Drainage: Noyo River

Survey Dates: 9/14/2016 to 10/20/2016

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS17

Latitude: 39:25:12.0N

Longitude: 123:33:22.0W

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 (%)
109	12	LGR	34.6	17	1818	29.4	5	0.2	1.2	87	9463	23	2477		0	98
14	2	HGR	4.4	33	459	7.4	10	0.4	0.8	259	3626	80	1123		8	98
1	1	CAS	0.3	18	18	0.3	6	0.5	1	103	103	51	51		0	96
73	13	RUN	23.2	18	1287	20.8	6	0.4	1.9	121	8837	56	4057		5	98
22	3	SRN	7.0	43	944	15.3	6	0.4	1.1	120	2633	69	1513		3	99
1	1	TRP	0.3	18	18	0.3	3	0.7	1	54	54	43	43	38	0	97
63	62	MCP	20.0	16	1035	16.7	7	0.6	2.4	127	7991	111	6975	82	18	99
1	1	CCP	0.3	9	9	0.1	8	0.4	1	68	68	41	41	27	0	100
2	2	STP	0.6	29	58	0.9	15	0.8	1.8	365	729	419	837	273	5	99
3	3	CRP	1.0	22	67	1.1	8	0.4	1	163	489	84	253	55	8	99
7	6	LSL	2.2	19	135	2.2	9	0.5	2	171	1195	95	663	65	21	98
4	4	LSR	1.3	20	79	1.3	8	0.5	1.9	155	621	155	464	105	10	99
6	6	LSBk	1.9	30	178	2.9	8	0.6	2.1	241	1448	212	1272	150	0	100
1	1	LSBo	0.3	17	17	0.3	10	0.6	1.7	170	170	170	170	102	10	100
2	2	SCP	0.6	8	17	0.3	4	0.7	1.9	29	58	20	40	20	55	96
6	0	DRY	1.9	8	48	0.8										

Total Units
315

Total Units Fully Measured
119

Total Length (ft.)
6187

Total Area (sq.ft.)
37484

Total Volume (cu.ft.)
19980

Stream Name: 1235562394199	LLID: 1235562394199	Drainage: Noyo River
Survey Dates: 9/14/2016 to 10/20/2016		
Confluence Location: Quad: NORTHSPUR	Legal Description: T18NR15WS17	Latitude: 39:25:12.0N Longitude: 123:33:22.0W

[illegible]

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

Stream Name: 1235562394199

LLID: 1235562394199

Drainage: Noyo River

Survey Dates: 9/14/2016 to 10/20/2016

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS17

Latitude: 39:25:12.0N

Longitude: 123:33:22.0W

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
1	TRP	1	0	0	1	100	0	0	0	0	0	0
62	MCP	71	17	27	40	65	5	8	0	0	0	0
1	CCP	1	0	0	1	100	0	0	0	0	0	0
2	STP	2	0	0	2	100	0	0	0	0	0	0
3	CRP	3	1	33	2	67	0	0	0	0	0	0
6	LSL	7	3	50	2	33	1	17	0	0	0	0
3	LSR	3	0	0	3	100	0	0	0	0	0	0
6	LSBk	7	0	0	5	83	1	17	0	0	0	0
1	LSBo	1	0	0	1	100	0	0	0	0	0	0
2	SCP	2	0	0	2	100	0	0	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
87			21	24	59	68	7	8	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.3

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Unnamed Tributary to Noyo

LLID: 1235562394199

Drainage: Noyo River

Survey Dates: 9/14/2016 to 10/20/2016

Dry Units: 6

Confluence Location:

Quad: NOYO HILL

Legal Description: T18NR15WS17

Latitude: 39:25:12.0N

Longitude: 123:33:22.0W

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
109	13	LGR	0	0	0	0	100	0	0	0	0
14	2	HGR	0	10	10	80	0	0	0	0	0
1	1	CAS	0	10	0	90	0	0	0	0	0
124	16	TOTAL RIFFLE	0	5	5	58	32	0	0	0	0
72	12	RUN	9	29	24	12	26	0	0	0	0
22	3	SRN	0	0	50	0	0	0	0	50	0
96	15	TOTAL FLAT	9	24	27	9	22	0	0	9	0
1	1	TRP	0	0	0	0	0	0	0	0	0
63	63	MCP	20	18	43	15	4	0	0	0	0
1	1	CCP	0	0	0	0	0	0	0	0	0
2	2	STP	0	0	0	0	7	0	93	0	0
3	3	CRP	50	0	5	45	0	0	0	0	0
7	7	LSL	0	32	65	3	1	0	0	0	0
4	4	LSR	0	1	7	91	1	0	0	0	0
6	6	LSBk	0	0	0	0	0	0	0	0	100
1	1	LSBo	0	0	20	0	0	0	0	80	0
2	2	SCP	50	50	0	0	0	0	0	0	0
90	90	TOTAL POOL	17	18	40	17	3	0	2	2	1
315	121	TOTAL	15	19	36	19	6	0	2	1	2

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: 1235562394199

LLID: 1235562394199

Drainage: Noyo River

Survey Dates: 9/14/2016 to 10/20/2016

Dry Units: 6

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS17

Latitude: 39:25:12.0N

Longitude: 123:33:22.0W

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
109	13	LGR	0	0	46	46	0	8	0
14	2	HGR	0	0	50	0	50	0	0
1	1	CAS	0	0	0	0	0	100	0
73	13	RUN	0	0	54	31	8	0	8
22	3	SRN	0	0	33	67	0	0	0
1	1	TRP	0	0	100	0	0	0	0
63	62	MCP	5	10	45	23	10	2	6
1	1	CCP	0	0	0	100	0	0	0
2	2	STP	0	0	0	50	0	0	50
3	3	CRP	0	0	100	0	0	0	0
7	7	LSL	14	0	71	0	0	0	14
4	4	LSR	0	0	75	25	0	0	0
6	6	LSBk	0	0	67	33	0	0	0
1	1	LSBo	0	0	0	100	0	0	0
2	2	SCP	0	0	50	0	50	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: 1235562394199

LLID: 1235562394199

Drainage: Noyo River

Survey Dates: 9/14/2016 to 10/20/2016

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS17

Latitude: 39:25:12.0N

Longitude: 123:33:22.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
98	56	42	0	98	96

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.

Stream Name: 1235562394199	LLID: 1235562394199	Drainage: Noyo River
Survey Dates: 9/14/2016 to 10/20/2016	Survey Length (ft.): 6187	Main Channel (ft.): 6180
		Side Channel (ft.): 7
Confluence Location: Quad: NORTHSPUR	Legal Description: T18NR15WS17	Latitude: 39:25:12.0N
		Longitude: 123:33:22.0W

STREAM REACH: 1										
Channel Type:	G4					Canopy Density (%):	98.4		Pools by Stream Length (%):	26.1
Reach Length (ft.):	6180					Coniferous Component (%):	57.2		Pool Frequency (%):	28.6
Riffle/Flatwater Mean Width (ft.):	6.2					Hardwood Component (%):	42.8		Residual Pool Depth (%):	
BFW:						Dominant Bank Vegetation:	Coniferous Trees		< 2 Feet Deep:	92
Range (ft.):	4	to	17			Vegetative Cover (%):	96.7		2 to 2.9 Feet Deep:	8
Mean (ft.):	11					Dominant Shelter:	Large Woody Debris		3 to 3.9 Feet Deep:	0
Std. Dev.:	3					Dominant Bank Substrate Type:	Sand/Silt/Clay		>= 4 Feet Deep:	0
Base Flow (cfs.):	0.1					Occurrence of LWD (%):	19		Mean Max Residual Pool Depth (ft.):	1.3
Water (F):	50 - 56	Air (F):	44 - 69			LWD per 100 ft.:			Mean Pool Shelter Rating:	17
Dry Channel (ft):	48					Riffles:	2			
						Pools:	10			
						Flat:	3			
Pool Tail Substrate (%):	Silt/Clay: 0	Sand: 1	Gravel: 79	Sm Cobble: 17	Lg Cobble: 0	Boulder: 1	Bedrock: 1			
Embeddedness Values (%):	1. 35.6	2. 41.4	3. 19.5	4. 0.0	5. 3.4					

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: 1235562394199

LLID: 1235562394199

Drainage: Noyo River

Survey Dates: 9/14/2016 to 10/20/2016

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS17

Latitude: 39:25:12.0N

Longitude: 123:33:22.0W

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	25	8	13.4
Boulder	2	2	1.6
Cobble / Gravel	26	34	24.4
Sand / Silt / Clay	70	79	60.6

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	20	18	15.4
Hardwood Trees	51	49	40.7
Coniferous Trees	52	56	43.9
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

Stream Name: 1235562394199

LLID: 1235562394199

Drainage: Noyo River

Survey Dates: 9/14/2016 to 10/20/2016

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS17

Latitude: 39:25:12.0N

Longitude: 123:33:22.0W

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
---------------	--------------	------------------------	---------------------------------	-----------------------------	-----------------------------------	-------------------------------	-----------------------------------	-------------------------------	-----------------------------------	-------------------------------	----------------------------------	------------------------------

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
87	21	24	59	68	7	8	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.3

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

Stream Name: Unnamed Tributary to Noyo

LLID: 1235562394199

Drainage: Noyo River

Survey Dates: 9/14/2016 to 10/20/2016

Confluence Location:

Quad: NOYO HILL

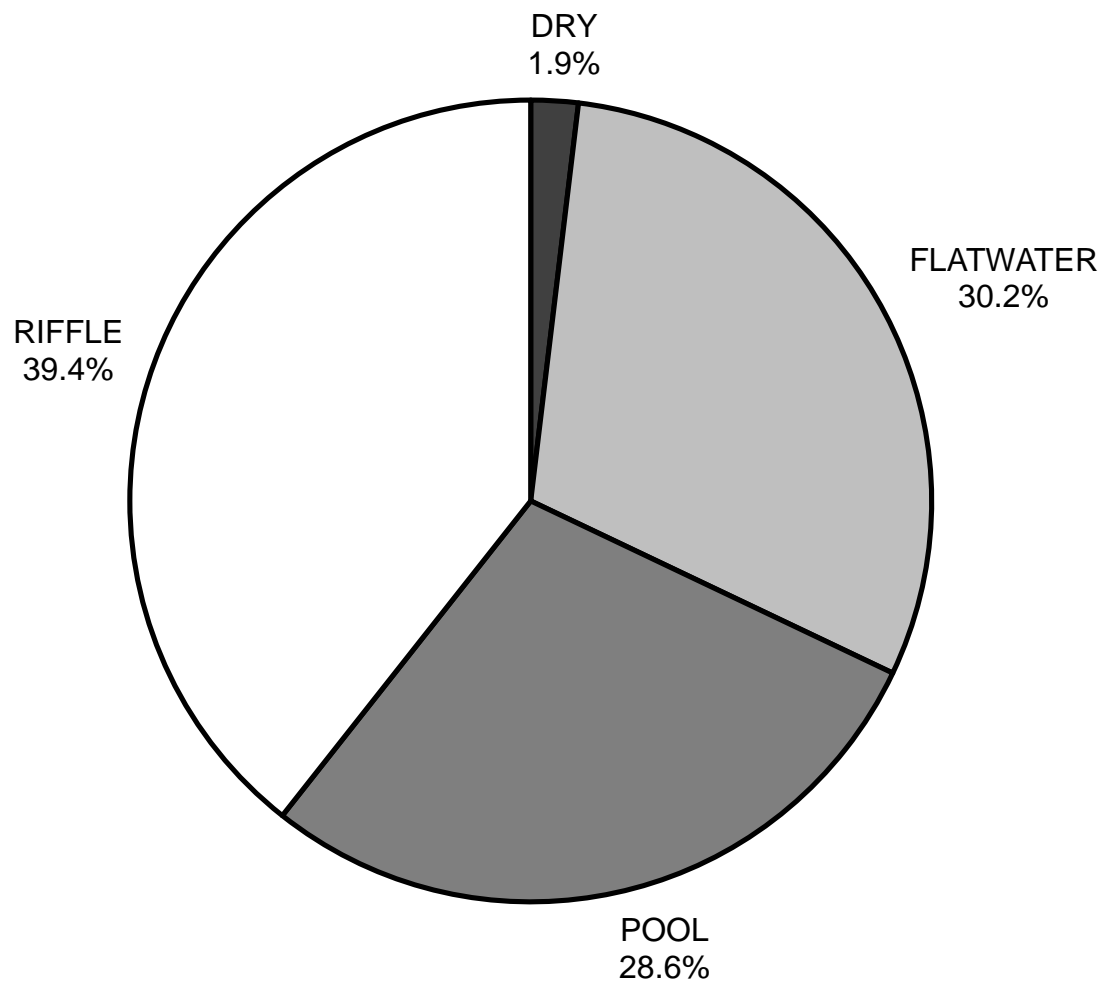
Legal Description: T18NR15WS17

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Longitude: 123:33:22.0W

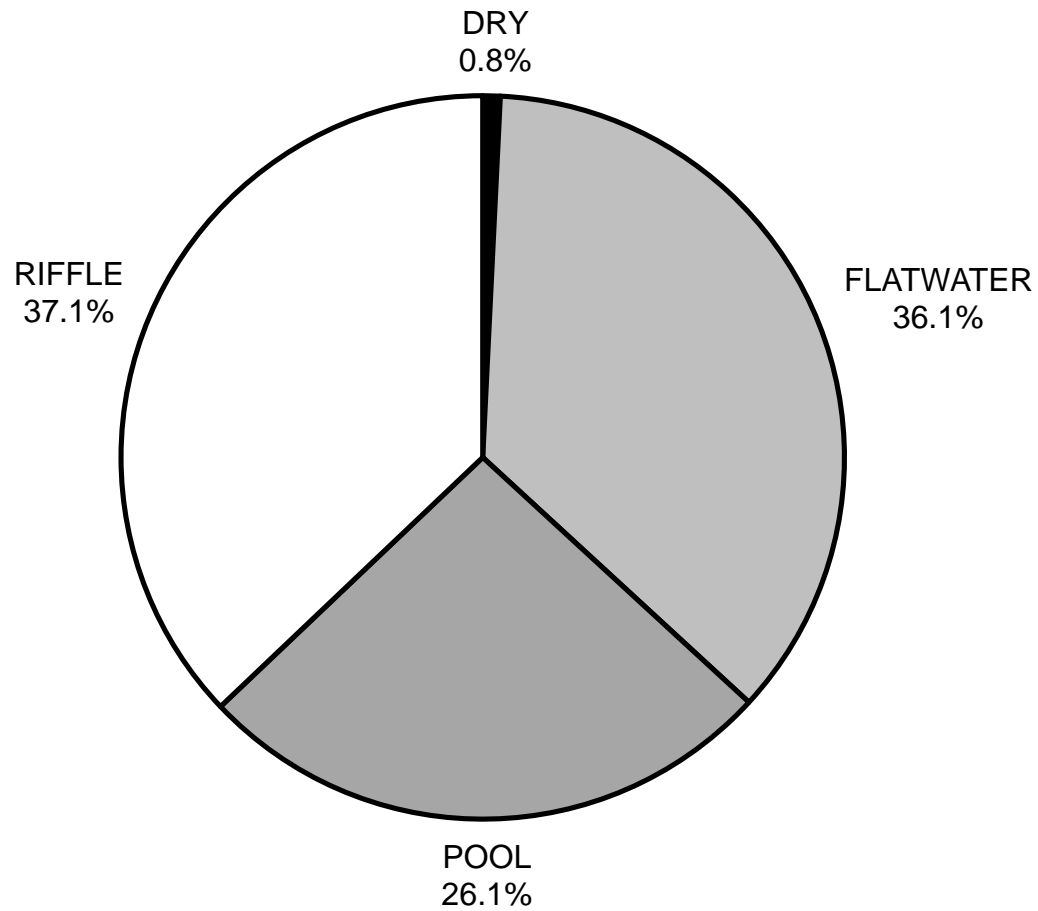
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	9	17
SMALL WOODY DEBRIS (%)	5	24	18
LARGE WOODY DEBRIS (%)	5	27	40
ROOT MASS (%)	58	9	17
TERRESTRIAL VEGETATION (%)	32	21	3
AQUATIC VEGETATION (%)	0	0	0
WHITewater (%)	0	0	2
BOULDERS (%)	0	10	2
BEDROCK LEDGES (%)	0	0	1

**Unnamed Tributary to the Noyo River 2016
HABITAT TYPES BY PERCENT OCCURRENCE**



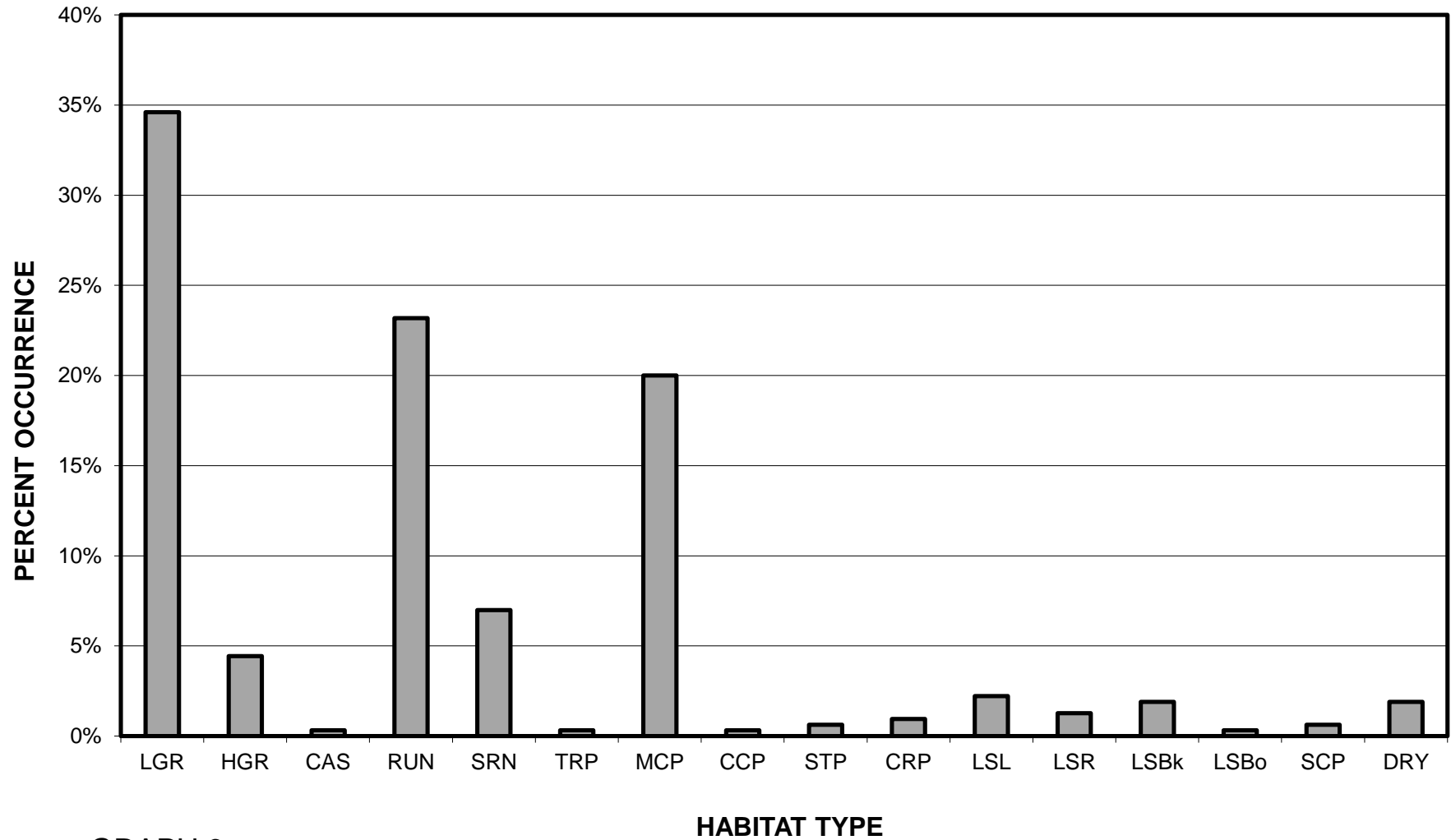
GRAPH 1

Unnamed Tributary to the Noyo River 2016
HABITAT TYPES BY PERCENT TOTAL LENGTH



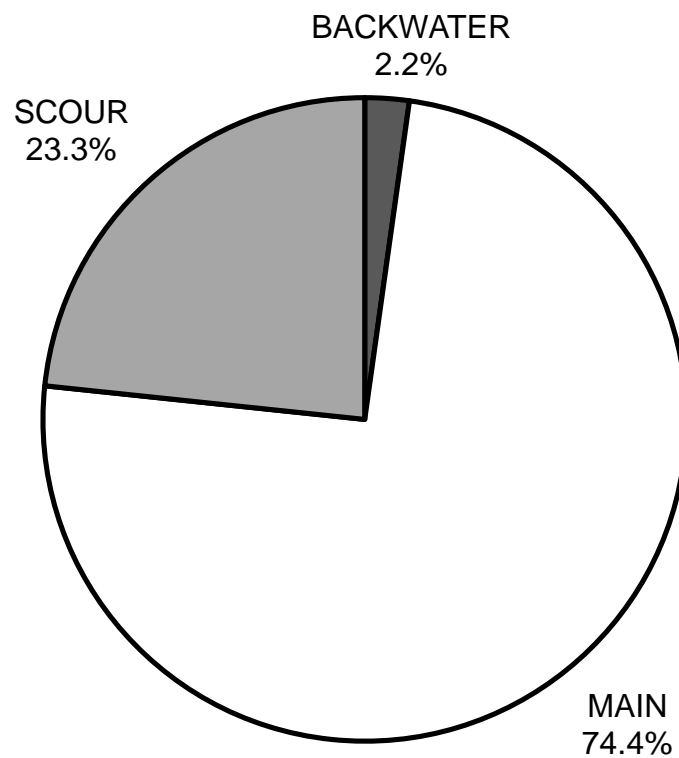
GRAPH 2

Unnamed Tributary to the Noyo River 2016
HABITAT TYPES BY PERCENT OCCURRENCE



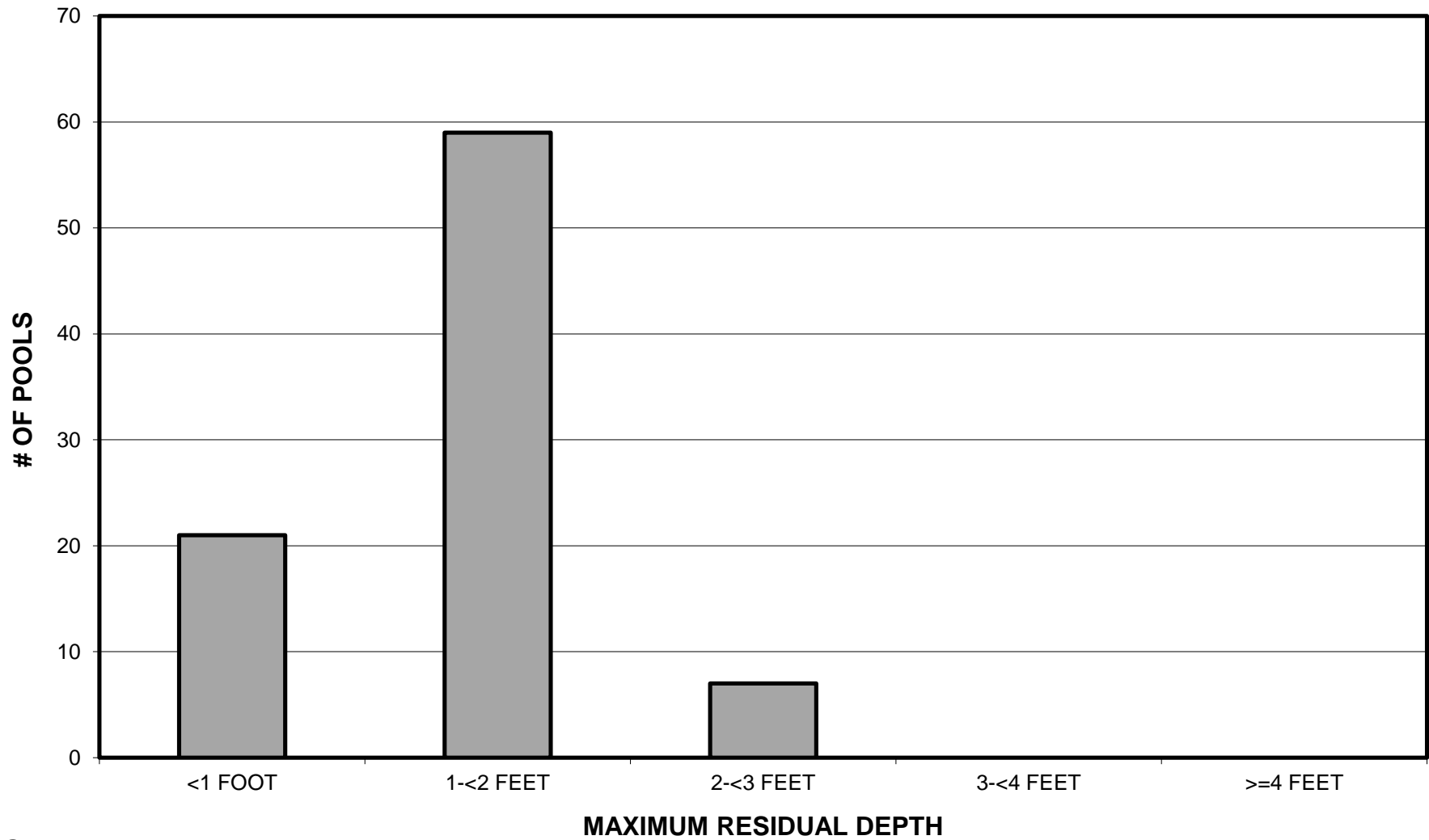
GRAPH 3

Unnamed Tributary to the Noyo River 2016
POOL TYPES BY PERCENT OCCURRENCE



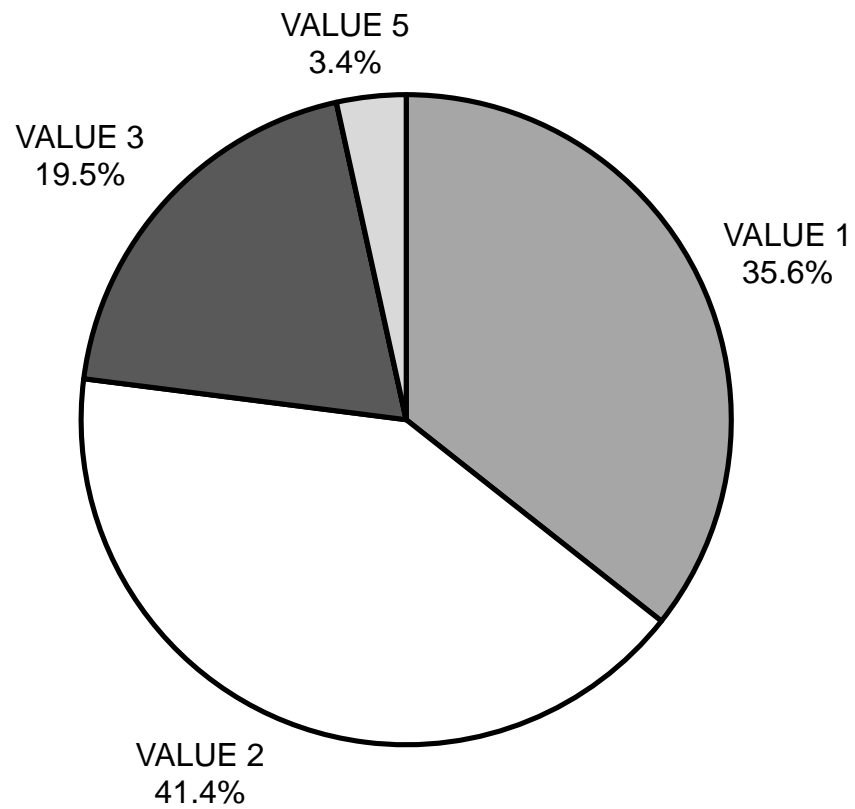
GRAPH 4

Unnamed Tributary to the Noyo River 2016
MAXIMUM DEPTH IN POOLS



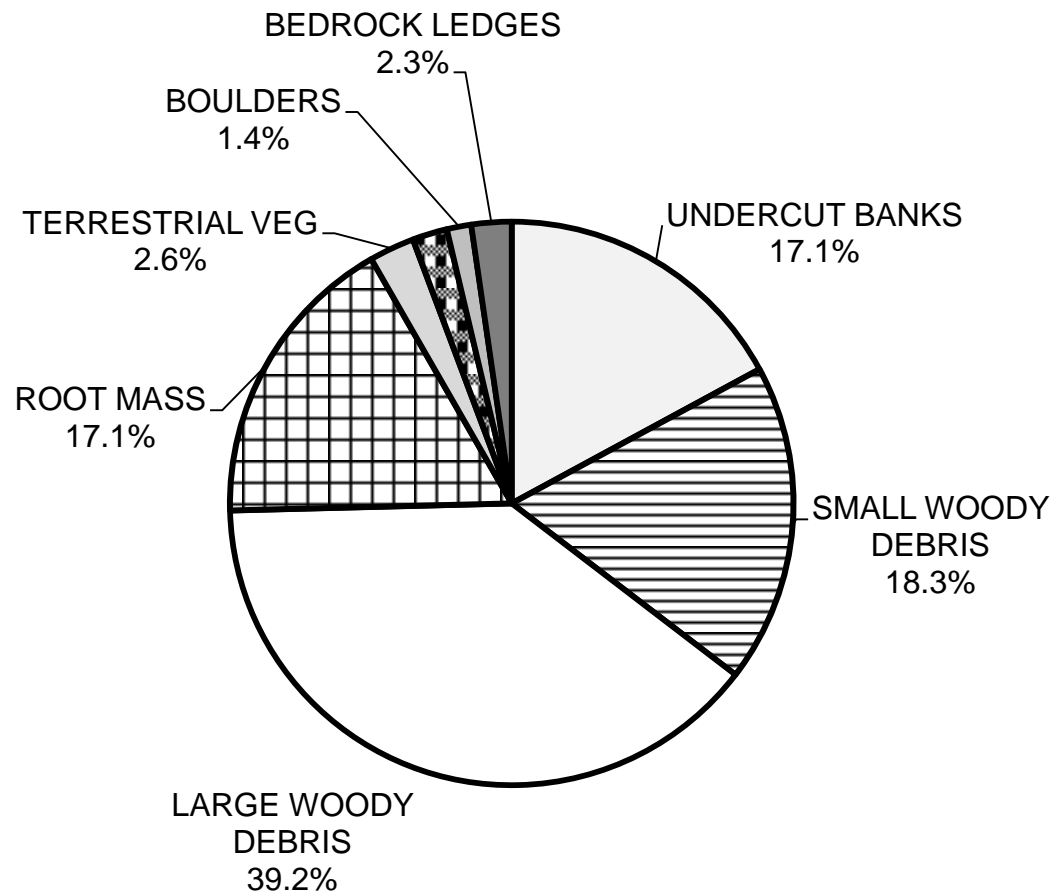
GRAPH 5

Unnamed Tributary to the Noyo River 2016 PERCENT EMBEDDEDNESS



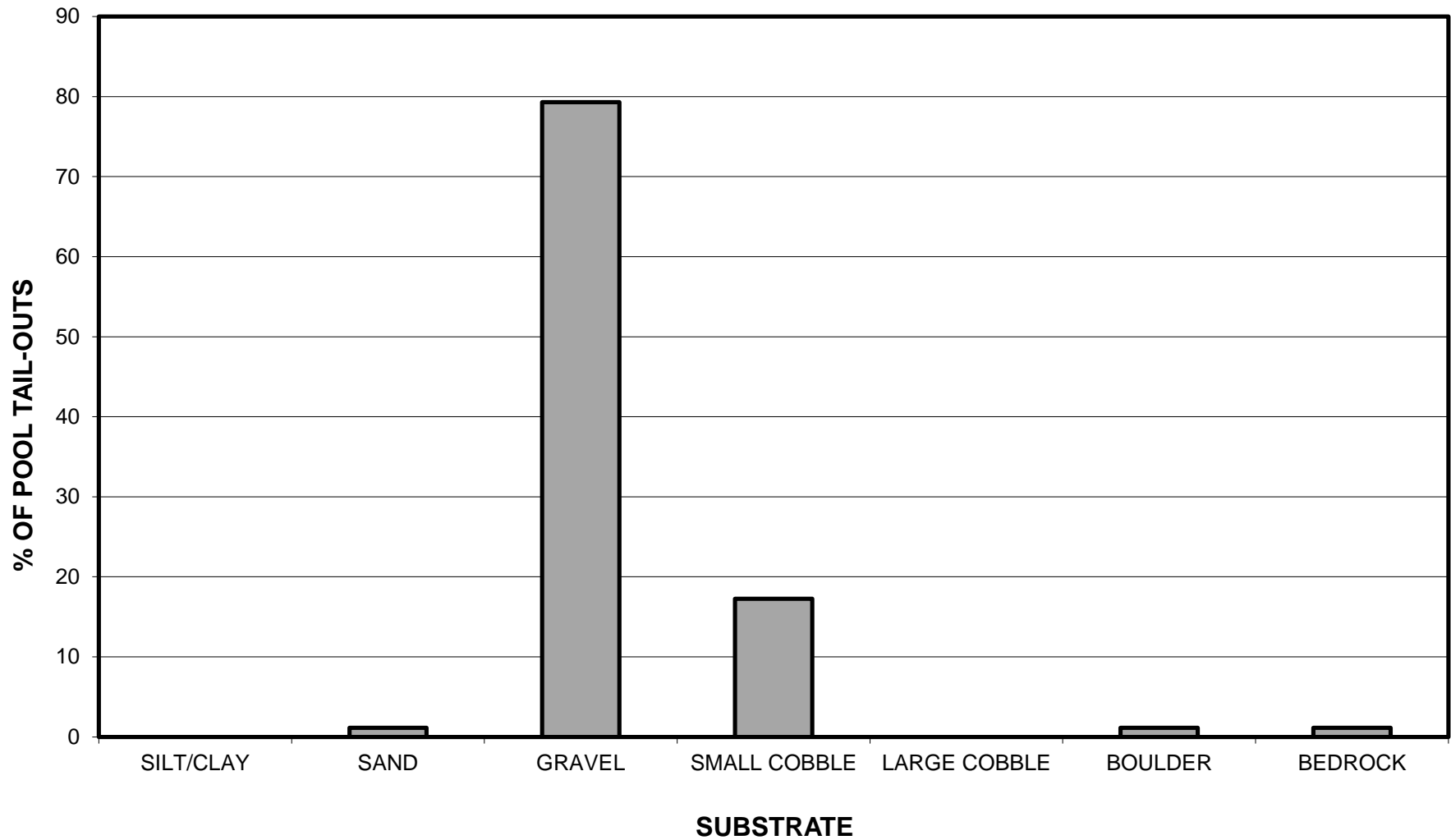
GRAPH 6

Unnamed Tributary to the Noyo River 2016 MEAN PERCENT COVER TYPES IN POOLS



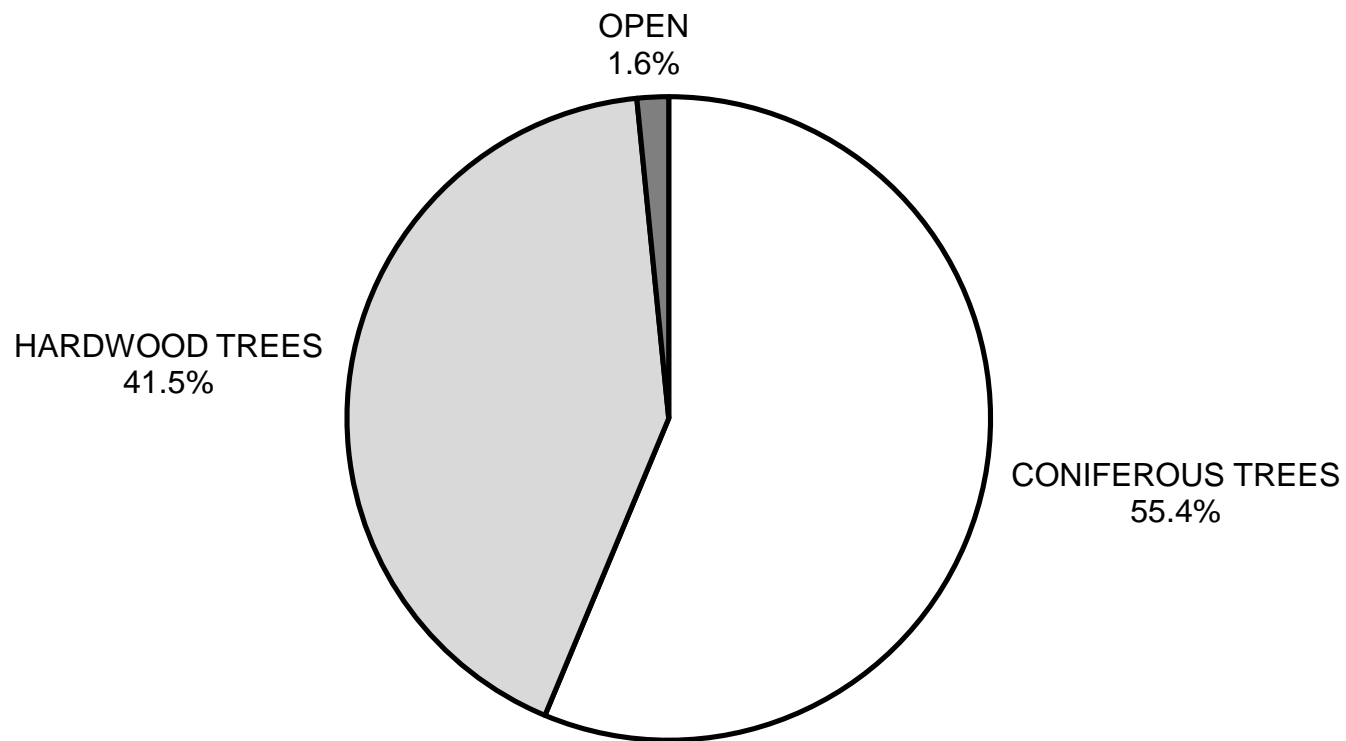
GRAPH 7

Unnamed Tributary to the Noyo River 2016
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



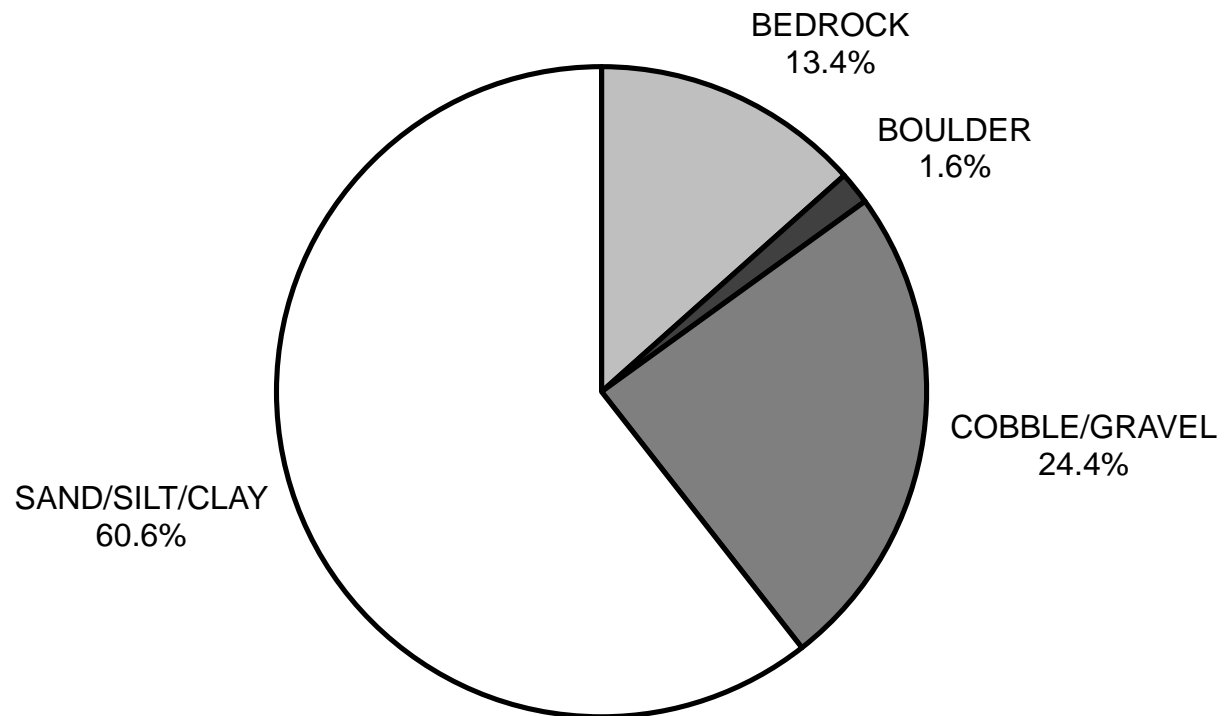
GRAPH 8

Unnamed Tributary to the Noyo River 2016
MEAN PERCENT CANOPY



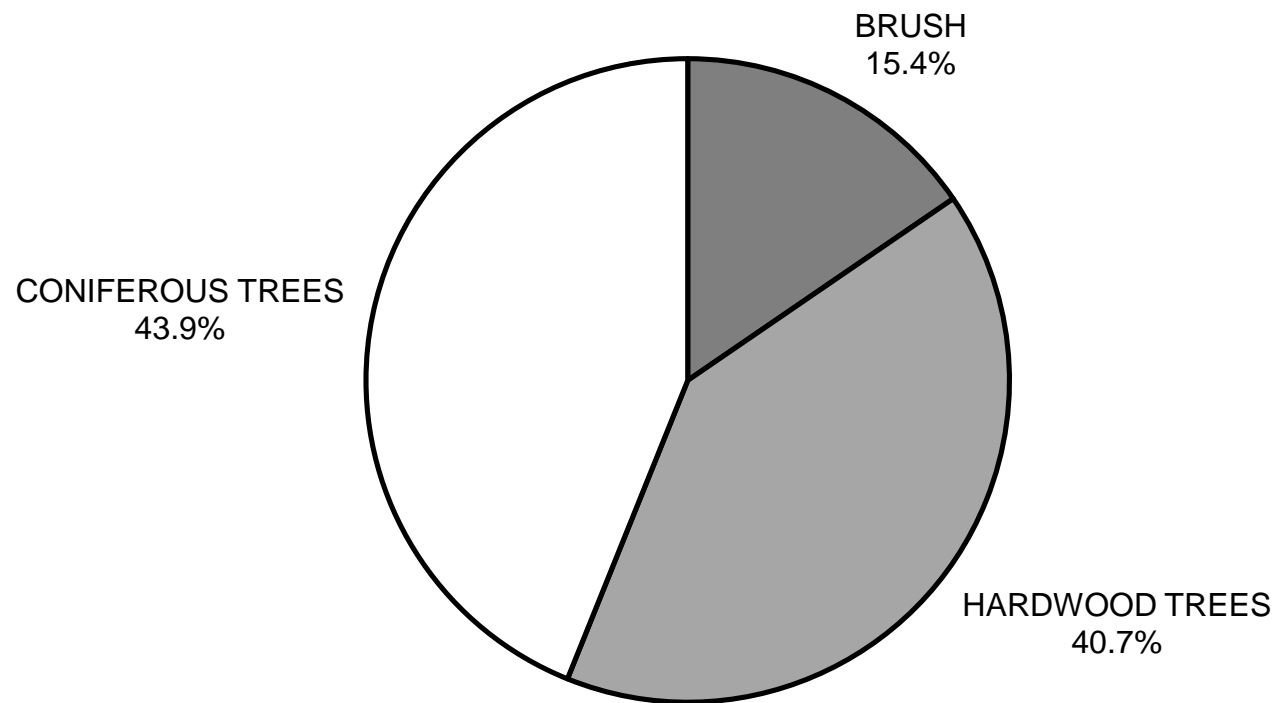
GRAPH 9

**Unnamed Tributary to the Noyo River 2016
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

Unnamed Tributary to the Noyo River 2016
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11