

# STREAM INVENTORY REPORT

## Kass Creek

### INTRODUCTION

A stream inventory was conducted June 7 to June 22, 2010 on Kass Creek. The survey began at the confluence with the South Fork Noyo River and extended upstream 2.9 miles.

The Kass 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 Kass 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

Kass Creek is a tributary to the South Fork Noyo River, a tributary to Noyo River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Kass Creek's legal description at the confluence with the South Fork Noyo River is T18N R17W S14. Its location is 39.41766 degrees north latitude and 123.72039 degrees west longitude, LLID number 1237193394176. Kass Creek is a second order stream and has approximately 4.0 miles of blue line stream according to the USGS Noyo Hill 7.5 minute quadrangle. Kass Creek drains a watershed of approximately 2.2 square miles. Elevations range from about 50 feet at the mouth of the creek to 350 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 California Division of Forestry and Fire Protection Road 300.

### METHODS

The habitat inventory conducted in Kass 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 Game (DFG). This inventory was conducted by a two-person team.

### SAMPLING STRATEGY

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

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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 Kass 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". Kass 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 Kass 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 unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

### 6. Shelter Rating:

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

### 7. Substrate Composition:

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

### 8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Kass 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 Kass 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 Kass Creek. In addition, underwater observations were made at 37 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 Game. This program processes and summarizes the data, and produces the following ten tables:

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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for Kass 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 7 to June 22, 2010 was conducted by P. Scott and B. Leonard (WSP). The total length of the stream surveyed was 15,340 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.95 cfs on June 9, 2010.

Kass Creek is an E4 channel type for 3,175 feet of the stream surveyed (Reach 1), a B4 channel type for 1,494 feet of the stream surveyed (Reach 2), an F4 channel type for 5,379 feet of the stream surveyed (Reach 3), a C4 channel type for 1,327 feet of the stream surveyed (Reach 4), an F4 channel type for 947 feet of the stream surveyed (Reach 5), and a G4 channel type for 3,018 feet of the stream surveyed (Reach 6). E4 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio and gravel-dominant substrates. B4 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and gravel-dominant substrates. F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. C4 channels are meandering point-bar, riffle/pool, alluvial channels with broad well defined floodplain on low gradients and gravel-dominant substrates. 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 49 to 56 degrees Fahrenheit. Air temperatures ranged from 46 to 68 degrees Fahrenheit.

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Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 47% pool units, 27% flatwater units, and 26% riffle units (Graph 1). Based on total length of Level II habitat types there were 43% flatwater units, 30% pool units, and 26% riffle units (Graph 2).

Twelve Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 39%; low gradient riffle units, 24%; and run units, 14% (Graph 3). Based on percent total length, step run units made up 30%, mid-channel pool units 27%, and low gradient riffle units 25%.

A total of 170 pools were identified (Table 3). Main channel pools were the most frequently encountered at 84% (Graph 4), and comprised 88% 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. Forty-six of the 169 pools (27%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 170 pool tail-outs measured, 88 had a value of 1 (51.8%); 61 had a value of 2 (35.9%); 15 had a value of 3 (8.8%); 2 had a value of 4 (1.2%); 4 had a value of 5 (2.4%) (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 unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 10, flatwater habitat types had a mean shelter rating of 6, and pool habitats had a mean shelter rating of 28 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 30. Scour pools had a mean shelter rating of 20 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Kass Creek. Graph 7 describes the pool cover in Kass Creek. Small woody debris is the dominant pool cover type followed by undercut banks.

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 78% of the pool tail-outs. Small cobble and boulders were the next most frequently observed dominant substrate types, each occurring in 9% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Kass Creek was 94%. Six percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 52% and 48%, respectively. Graph 9 describes the mean percent canopy in Kass Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 84%. The mean percent left bank vegetated was 91%. The dominant elements composing the structure of the

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stream banks consisted of 63% sand/silt/clay, 28% cobble/gravel, 8% bedrock, and 1% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 58% of the units surveyed. Additionally, 37% of the units surveyed had hardwood trees as the dominant vegetation type, and 5% had brush as the dominant vegetation type (Graph 11).

### BIOLOGICAL INVENTORY RESULTS

Survey teams conducted snorkel surveys at 37 sites for species composition and distribution in Kass Creek on June 23, 2010. Water temperatures taken during the survey period of 0840 to 1350 ranged from 52 to 53 degrees Fahrenheit. Air temperatures ranged from 55 to 65 degrees Fahrenheit. The sites were sampled by I. Mikus (DFG).

In reach 1, which comprised the first 3,175 feet of stream, 10 sites were sampled. The reach sites yielded 17 young-of-the-year steelhead/rainbow trout (SH/RT), eight age 1+ SH/RT, two age 2+ SH/RT, six coho salmon, and two three-spine stickleback.

In reach 2, eight sites were sampled starting approximately 3,195 from the confluence with the South Fork Noyo River and continuing upstream 4,095 feet. The reach sites yielded 19 young-of-the-year SH/RT, and two age 1+ SH/RT.

In reach 3, 10 sites were sampled starting approximately 4,152 from the confluence with the South Fork Noyo River and continuing upstream 9,786 feet. The reach sites yielded 48 young-of-the-year SH/RT, two age 1+ SH/RT, and one age 2+ SH/RT.

In reach 6, nine sites were sampled starting approximately 12,391 from the confluence with the South Fork Noyo River and continuing upstream 14,775 feet. The reach sites yielded 23 young-of-the-year SH/RT.

The following chart displays the information yielded from these sites:

2010 Kass Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: E4 Channel Type									
06/23/10	1	006	Pool	245	2	1	0	0	0
	2	009	Pool	362	2	0	0	2	0
	3	012	Pool	507	1	1	0	1	0
	4	017	Pool	1,151	0	3	0	0	0
	5	019	Pool	1,374	2	2	0	0	0
	6	022	Pool	1,558	0	0	0	1	0

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	7	030	Pool	1,877	0	1	0	1	0
	8	037	Pool	2,411	4	0	0	1	0
	9	041	Pool	2,607	1	0	0	0	0
	10	045	Pool	2,861	5	0	0	0	0
Reach 2: B4 Channel Type									
	11	051	Pool	3,194	2	0	0	0	0
	12	053	Pool	3,301	2	1	0	0	0
	13	055	Pool	3,351	3	1	0	0	0
	14	058	Pool	3,465	4	0	0	0	0
	15	062	Pool	3,715	2	0	0	0	0
	16	066	Pool	3,839	0	0	0	0	0
	17	071	Pool	4,015	3	0	0	0	0
	18	074	Pool	4,095	3	0	0	0	0
Reach 3: F4 Channel Type									
	19	077	Pool	4,152	1	0	0	0	0
	20	085	Pool	4,496	0	0	0	0	0
	21	104	Pool	5,501	0	0	0	0	0
	22	111	Pool	5,732	0	0	0	0	0
	23	118	Pool	5,938	0	0	0	0	0
	24	121	Pool	6,014	0	0	0	0	0
	25	211	Pool	9,328	0	0	0	0	0
	26	215	Pool	9,464	1	0	0	0	0
	27	219	Pool	9,613	0	1	0	0	0
	28	227	Pool	9,798	0	0	0	0	0
Reach 6: G4 Channel Type									
	29	294	Pool	12,410	1	0	0	0	0
	30	296	Pool	12,436	4	0	0	0	0
	31	299	Pool	12,515	3	0	0	0	0
	32	304	Pool	12,646	1	0	0	0	0
	33	319	Pool	13,128	2	0	0	0	0
	34	336	Pool	13,827	5	0	0	0	0
	35	343	Pool	14,182	3	0	0	0	0
	36	348	Pool	14,454	4	0	0	0	0
	37	355	Pool	14,775	0	0	0	0	0



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### **DISCUSSION**

Kass Creek is an E4 channel type for the first 3,175 feet of stream surveyed, a B4 channel type for the next 1,494 feet, an F4 channel type for the next 5,379 feet, a C4 channel type for the next 1,327 feet, an F4 channel type for the next 947 feet, and a G4 channel type for the remaining 3,018 feet. The suitability of E4, B4, F4, C4, and G4 channel types for fish habitat improvement structures is as follows: E4 channel types are good for bank-placed boulders and fair for opposing wing-deflectors. B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover. F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. C4 channel types are good for bank placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. 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 June 7 to June 22, 2010 ranged from 49 to 56 degrees Fahrenheit. Air temperatures ranged from 46 to 68 degrees Fahrenheit. To make any 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 26%, and pools 30%. Forty-six of the 169 (27%) pools had a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing large wood structures that will increase or deepen pool habitat is recommended.

One hundred forty-nine of the 170 pool tail-outs measured had embeddedness ratings of 1 or 2. Seventeen of the pool tail-outs had embeddedness ratings of 3 or 4. Four 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.

One hundred forty-eight of the 170 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 28. The shelter rating in the flatwater habitats is 6. 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 Kass Creek. Small woody debris is the dominant cover type in pools followed by undercut banks. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

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The mean percent canopy density for the stream was 94%. Reach 1 had a canopy density of 92%, Reach 2 had a canopy density of 92%, Reach 3 had a canopy density of 94%, Reach 4 had a canopy density of 91%, Reach 5 had a canopy density of 94%, and Reach 6 had a canopy density of 95%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 84% and 91%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

## RECOMMENDATIONS

- 1) Kass 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) This survey was conducted prior to the bridge at 51' being replaced and a large wood project being conducted on approximately two miles of Kass Creek. The inventory should be repeated within the next three years to evaluate the effectiveness of the project.
- 4) Fish passage at the culvert at 13,833, should be assessed using FishXing.

## 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 South Fork of the Noyo River. The channel is an E4.
51	0002.00	Road 300 crosses the channel. The bridge measures 17' long x 55' wide x 2.8' high. The bridge consists of redwood logs, one of which has collapsed into the channel. The substrate of the road bed appears to be eroding on the upstream edge of the bridge. The bridge is a possible velocity barrier to adults (Note this bridge was replaced in 2010).

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1151	0018.00	Tributary #01 enters on the left bank. It contributes approximately 5% of Kass Creek's flow. The water temperature downstream and upstream of the tributary is 55 degrees Fahrenheit; the water temperature of the tributary is 54 degrees Fahrenheit. The slope of the tributary is approximately 8%. The tributary is not accessible to fish due to a 15' high bedrock waterfall approximately 100' upstream from the mouth.
2109	0034.00	Culvert on the right bank.
3721	0063.00	The channel changes from an E4 to a B4.
4146	0076.00	Log debris accumulation (LDA) #01 contains one piece of large woody debris (LWD) and measures 5' high x 17' wide x 3' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to small cobble and measures 12' wide x 25' long x 2' deep. Fish are present above the LDA.
4338	0083.00	LDA #02 contains six pieces of LWD and measures 5' high x 12' wide x 27' long. Water flows through the LDA and there are no visible gaps in it. The LDA is not retaining sediment. Fish are present above the LDA.
4576	0087.00	Culvert on left bank.
4669	0089.00	The channel changes from a B4 to an F4.
5707	0111.00	Tributary #02 enters on the left bank. It contributes approximately 20% of Kass Creek's flow. The water temperature downstream of the tributary is 54 degrees Fahrenheit, the water temperature of the tributary is 52 degrees Fahrenheit, and the water temperature upstream of the confluence is 52 degrees Fahrenheit. The slope of the tributary is approximately 4.5%. The tributary is accessible to fish. No fish were observed.
5817	0115.00	Culvert on the right bank.
7721	0159.00	Tributary #03 enters on the left bank. It contributes approximately 15% of Kass Creek's flow. The water temperature downstream of the tributary is 53 degrees Fahrenheit, the water temperature of the tributary is 52 degrees Fahrenheit, and the water temperature upstream of the confluence is 54 degrees Fahrenheit. The slope of the tributary is 7%. It is not accessible to fish.
9840	0229.00	Four foot high plunge.

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10048	0236.00	The channel changes from an F4 to a C4.
10784	0254.00	Tributary #04 enters on the right bank. It contributes approximately 5% of Kass Creek's flow. The water temperature downstream and upstream of the tributary is 51 degrees Fahrenheit; the water temperature of the tributary is 51 degrees Fahrenheit. No fish were observed in the tributary.
11375	0267.00	The channel changes from a C4 to an F4
11998	0281.00	A steel bridge measures 4' wide x 11' high x 11' long.
12322	0291.00	Tributary #05 enters on the left bank. It contributes approximately 15% of Kass Creek's flow. The water temperature downstream and upstream of the tributary is 49 degrees Fahrenheit; the water temperature of the tributary is 50 degrees Fahrenheit. The slope of the tributary is approximately 10%. No fish were observed in the tributary.
12730	0307.00	LDA #03 contains four pieces of LWD and measures 10' high x 24' wide x 14' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to small cobble and measures 8' wide x 24' long x 4' deep. Fish are present above the LDA.
12862	0313.00	LDA #04 contains four pieces of LWD and measures 5' high x 17' wide x 10' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to gravel and measures 3' wide x 5' long. Fish are present above the LDA.
13807	0336.00	Tributary #06 enters on the left bank. The water temperature downstream of the tributary is 53 degrees Fahrenheit, the water temperature of the tributary is 52 degrees Fahrenheit, and the water temperature upstream of the confluence is 52 degrees Fahrenheit. No fish were observed in the tributary.
13833	0337.00	A 3' diameter corrugated metal pipe culvert. It measures 43' long; its slope is less than 2%. The culvert's plunge height is 0.7', and there is a maximum depth of 3.2' within 5' of the culvert outlet. The culvert is in good condition. It is a possible barrier to juvenile salmonids due to the plunge height at the outlet and a possible velocity barrier to adult salmonids.
14535	0350.00	Five foot high plunge with a 1.5 foot deep jump pool.
15013	0361.00	Three foot high plunge with one foot deep jump pool.

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15295	0363.00	Stream becomes marshy.
15340	0364.00	End of survey.

## **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: Kass Creek

LLID: 1237193394176

Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/22/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR17WS14

Latitude: 39:25:03.0N

Longitude: 123:43:09.0

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
1	0	CULVERT	0.3	43	43	0.3									
98	22	FLATWATER	26.9	67	6548	42.7	7.0	0.5	1.0	410	40187	200	19634		6
1	0	NOSURVEY	0.3	22	22	0.1									
170	169	POOL	46.7	28	4675	30.5	9.9	0.8	1.7	266	45177	300	51043	229	29
94	14	RIFFLE	25.8	43	4052	26.4	6.5	0.3	0.6	250	23522	78	7298		10
Total Units 364	Total Units Fully Measured 205			Total Length (ft.) 15340						Total Area (sq.ft.) 108886		Total Volume (cu.ft.) 77975			

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

Stream Name: Kass Creek

LLID: 1237193394176

Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/22/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR17WS14

Latitude: 39:25:03.0N

Longitude: 123:43:09.0W

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 (%)
89	10	LGR	24.5	43	3855	25.1	6	0.3	1.1	287	25562	87	7734		7	95
5	4	HGR	1.4	39	197	1.3	7	0.4	0.9	158	789	54	272		18	96
1	1	GLD	0.3	53	53	0.3	5	0.5	1.2	252	252	126	126		0	97
50	11	RUN	13.7	37	1864	12.2	8	0.5	1.4	287	14348	136	6812		4	95
47	10	SRN	12.9	99	4631	30.2	6	0.5	1.2	561	26382	278	13081		10	95
142	141	MCP	39.0	29	4100	26.7	10	0.8	4.4	282	40028	325	46197	248	30	94
1	1	CCP	0.3	26	26	0.2	14	1.1	3.4	364	364	473	473	400	5	95
2	2	CRP	0.5	35	70	0.5	6	0.6	1.5	235	471	197	394	137	5	94
4	4	LSR	1.1	15	61	0.4	9	0.5	1.5	142	570	100	399	60	13	94
5	5	LSBk	1.4	31	153	1.0	10	0.5	1.5	273	1364	220	1099	130	9	93
2	2	LSBo	0.5	15	30	0.2	14	0.2	0.9	169	337	105	210	62	25	91
14	14	PLP	3.8	17	235	1.5	9	0.8	3.5	147	2060	164	2296	136	28	91
1	0	CUL	0.3	43	43	0.3										
1	0	NS	0.3	22	22	0.1										

Total Units  
364

Total Units Fully Measured  
205

Total Length (ft.)  
15340

Total Area (sq.ft.)  
112526

Total Volume (cu.ft.)  
79093



Stream Name:	Kass Creek	LLID:	1237193394176	Drainage:	Noyo River
Survey Dates:	6/7/2010 to 6/22/2010				
Confluence Location:	Quad: NOYO HILL	Legal Description:	T18NR17WS14	Latitude:	39:25:03.0N
				Longitude:	123:43:09.0W

[illegible]

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

Stream Name: Kass Creek

LLID: 1237193394176

Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/22/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR17WS14

Latitude: 39:25:03.0N

Longitude: 123:43:09.0W

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
141	MCP	83	10	7	88	62	35	25	7	5	1	1
1	CCP	1	0	0	0	0	0	0	1	100	0	0
2	CRP	1	0	0	2	100	0	0	0	0	0	0
4	LSR	2	0	0	4	100	0	0	0	0	0	0
5	LSBk	3	1	20	4	80	0	0	0	0	0	0
2	LSBo	1	2	100	0	0	0	0	0	0	0	0
14	PLP	8	0	0	12	86	1	7	1	7	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
169			13	8	110	65	36	21	9	5	1	1

Mean Maximum Residual Pool Depth (ft.): 1.7

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

Stream Name: Kass Creek

LLID: 1237193394176

Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/22/2010

Dry Units: 0

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR17WS14

Latitude: 39:25:03.0N

Longitude: 123:43:09.0W

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
89	10	LGR	7	64	16	0	10	0	0	3	0
5	4	HGR	0	37	18	0	0	0	0	45	0
94	14	TOTAL RIFFLE	4	54	17	0	6	0	0	19	0
1	1	GLD	0	0	0	0	0	0	0	0	0
50	11	RUN	2	38	31	4	5	7	0	14	0
47	10	SRN	22	37	13	0	11	8	0	10	0
98	22	TOTAL FLAT	12	37	22	2	8	7	0	12	0
142	142	MCP	24	37	19	7	5	2	0	6	0
1	1	CCP	20	80	0	0	0	0	0	0	0
2	2	CRP	65	15	20	0	0	0	0	0	0
4	4	LSR	25	25	0	48	0	3	0	0	0
5	5	LSBk	38	0	0	0	19	6	0	38	0
2	2	LSBo	23	0	0	23	0	0	0	55	0
14	14	PLP	12	48	20	2	6	3	3	5	0
170	170	TOTAL POOL	24	36	18	7	6	2	0	7	0
1	0	CUL									
1	0	NS									
364	206	TOTAL	22	37	18	6	6	2	0	8	0

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

Stream Name: Kass Creek

LLID: 1237193394176

Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/22/2010

Dry Units: 0

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR17WS14

Latitude: 39:25:03.0N

Longitude: 123:43:09.0W

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
89	10	LGR	0	0	100	0	0	0	0
5	4	HGR	0	0	25	75	0	0	0
1	1	GLD	0	0	100	0	0	0	0
50	11	RUN	0	9	91	0	0	0	0
47	10	SRN	0	0	80	20	0	0	0
142	142	MCP	3	18	77	1	0	0	0
1	1	CCP	0	0	100	0	0	0	0
2	2	CRP	0	0	100	0	0	0	0
4	4	LSR	0	0	100	0	0	0	0
5	5	LSBk	0	0	100	0	0	0	0
2	2	LSBo	0	0	100	0	0	0	0
14	14	PLP	7	21	57	7	0	0	7

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

Stream Name: Kass Creek

LLID: 1237193394176

Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/22/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR17WS14

Latitude: 39:25:03.0N

Longitude: 123:43:09.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
94	48	52	0	84	91

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: Kass Creek

LLID: 1237193394176

Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/22/2010

Survey Length (ft.): 15340

Main Channel (ft.): 15340

Side Channel (ft.): 0

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR17WS14

Latitude: 39:25:03.0N

Longitude: 123:43:09.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: E4

Reach Length (ft.): 3175

Riffle/Flatwater Mean Width (ft.): 8.8

BFW:

Range (ft.): 11 to 23

Mean (ft.): 16

Std. Dev.: 4

Base Flow (cfs.): 1.0

Water (F): 53 - 56

Air (F): 54 - 66

Dry Channel (ft): 0

Canopy Density (%): 92.3

Coniferous Component (%): 21.7

Hardwood Component (%): 78.3

Dominant Bank Vegetation: Hardwood Trees

Vegetative Cover (%): 88.5

Dominant Shelter: Large Woody Debris

Dominant Bank Substrate Type: Sand/Silt/Clay

Occurrence of LWD (%): 24

LWD per 100 ft.:

Riffles: 1

Pools: 5

Flat: 1

Pools by Stream Length (%): 21.4

Pool Frequency (%): 40.0

Residual Pool Depth (%):

< 2 Feet Deep: 70

2 to 2.9 Feet Deep: 30

3 to 3.9 Feet Deep: 0

>= 4 Feet Deep: 0

Mean Max Residual Pool Depth (ft.): 1.6

Mean Pool Shelter Rating: 53

Pool Tail Substrate (%): Silt/Clay: 0

Sand: 0

Gravel: 80

Sm Cobble: 5

Lg Cobble: 0

Boulder: 15

Bedrock: 0

Embeddedness Values (%): 1. 70.0

2. 25.0

3. 5.0

4. 0.0

5. 0.0

STREAM REACH: 2

Channel Type: B4

Reach Length (ft.): 1494

Riffle/Flatwater Mean Width (ft.): 10.3

BFW:

Range (ft.): 16 to 18

Mean (ft.): 17

Std. Dev.: 1

Base Flow (cfs.): 1.0

Water (F): 52 - 53

Air (F): 54 - 55

Dry Channel (ft): 0

Canopy Density (%): 92.5

Coniferous Component (%): 23.5

Hardwood Component (%): 76.5

Dominant Bank Vegetation: Hardwood Trees

Vegetative Cover (%): 85.8

Dominant Shelter: Boulders

Dominant Bank Substrate Type: Cobble/Gravel

Occurrence of LWD (%): 18

LWD per 100 ft.:

Riffles: 1

Pools: 5

Flat: 1

Pools by Stream Length (%): 26.4

Pool Frequency (%): 42.1

Residual Pool Depth (%):

< 2 Feet Deep: 63

2 to 2.9 Feet Deep: 31

3 to 3.9 Feet Deep: 6

>= 4 Feet Deep: 0

Mean Max Residual Pool Depth (ft.): 1.8

Mean Pool Shelter Rating: 37

Pool Tail Substrate (%): Silt/Clay: 6

Sand: 0

Gravel: 50

Sm Cobble: 13

Lg Cobble: 0

Boulder: 31

Bedrock: 0

Embeddedness Values (%): 1. 62.5

2. 25.0

3. 6.3

4. 0.0

5. 6.3

## Summary of Fish Habitat Elements By Stream Reach

### STREAM REACH: 3

Channel Type: F4	Canopy Density (%): 94.5	Pools by Stream Length (%): 37.3
Reach Length (ft.): 5379	Coniferous Component (%): 36.3	Pool Frequency (%): 48.3
Riffle/Flatwater Mean Width (ft.): 7.1	Hardwood Component (%): 63.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 76
Range (ft.): 9 to 19	Vegetative Cover (%): 85.3	2 to 2.9 Feet Deep: 18
Mean (ft.): 14	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 6
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 1.0	Occurrence of LWD (%): 13	Mean Max Residual Pool Depth (ft.): 1.6
Water (F): 51 - 54	Air (F): 53 - 62	Mean Pool Shelter Rating: 19
Dry Channel (ft): 0	LWD per 100 ft.:	
	Riffles: 1	
	Pools: 3	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 1	Sand: 4	Gravel: 72
	Sm Cobble: 11	Lg Cobble: 0
	Boulder: 10	Bedrock: 1
Embeddedness Values (%): 1. 46.5	2. 43.7	3. 5.6
	4. 1.4	5. 2.8

### STREAM REACH: 4

Channel Type: C4	Canopy Density (%): 90.9	Pools by Stream Length (%): 36.2
Reach Length (ft.): 1327	Coniferous Component (%): 79.4	Pool Frequency (%): 51.6
Riffle/Flatwater Mean Width (ft.): 6.0	Hardwood Component (%): 20.6	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 63
Range (ft.): 10 to 18	Vegetative Cover (%): 90.3	2 to 2.9 Feet Deep: 25
Mean (ft.): 14	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 6
Std. Dev.: 3	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 6
Base Flow (cfs.): 1.0	Occurrence of LWD (%): 12	Mean Max Residual Pool Depth (ft.): 2.0
Water (F): 51 - 53	Air (F): 56 - 60	Mean Pool Shelter Rating: 24
Dry Channel (ft): 0	LWD per 100 ft.:	
	Riffles: 0	
	Pools: 1	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 0	Gravel: 94
	Sm Cobble: 6	Lg Cobble: 0
	Boulder: 0	Bedrock: 0
Embeddedness Values (%): 1. 81.3	2. 12.5	3. 6.3
	4. 0.0	5. 0.0

## Summary of Fish Habitat Elements By Stream Reach

### STREAM REACH: 5

Channel Type:	F4	Canopy Density (%):	94.0	Pools by Stream Length (%):	31.9
Reach Length (ft.):	947	Coniferous Component (%):	77.3	Pool Frequency (%):	45.8
Riffle/Flatwater Mean Width (ft.):	3.0	Hardwood Component (%):	22.7	Residual Pool Depth (%):	
BFW:		Dominant Bank Vegetation:	Coniferous Trees	< 2 Feet Deep:	82
Range (ft.):	8 to 13	Vegetative Cover (%):	91.9	2 to 2.9 Feet Deep:	18
Mean (ft.):	10	Dominant Shelter:	Small Woody Debris	3 to 3.9 Feet Deep:	0
Std. Dev.:	2	Dominant Bank Substrate Type:	Sand/Silt/Clay	>= 4 Feet Deep:	0
Base Flow (cfs.):	1.0	Occurrence of LWD (%):	13	Mean Max Residual Pool Depth (ft.):	1.7
Water (F):	49 - 53	LWD per 100 ft.:		Mean Pool Shelter Rating:	33
Air (F):	46 - 60	Riffles:	0		
Dry Channel (ft):	0	Pools:	4		
		Flat:	0		
Pool Tail Substrate (%):	Silt/Clay: 0	Sand: 0	Gravel: 91	Sm Cobble: 9	Lg Cobble: 0
Embeddedness Values (%):	1. 54.5	2. 45.5	3. 0.0	4. 0.0	5. 0.0

### STREAM REACH: 6

Channel Type:	G4	Canopy Density (%):	94.8	Pools by Stream Length (%):	26.9
Reach Length (ft.):	3018	Coniferous Component (%):	72.1	Pool Frequency (%):	48.6
Riffle/Flatwater Mean Width (ft.):	5.0	Hardwood Component (%):	27.9	Residual Pool Depth (%):	
BFW:		Dominant Bank Vegetation:	Coniferous Trees	< 2 Feet Deep:	74
Range (ft.):	6 to 8	Vegetative Cover (%):	89.1	2 to 2.9 Feet Deep:	17
Mean (ft.):	7	Dominant Shelter:	Small Woody Debris	3 to 3.9 Feet Deep:	9
Std. Dev.:	1	Dominant Bank Substrate Type:	Sand/Silt/Clay	>= 4 Feet Deep:	0
Base Flow (cfs.):	1.0	Occurrence of LWD (%):	19	Mean Max Residual Pool Depth (ft.):	1.7
Water (F):	49 - 53	LWD per 100 ft.:		Mean Pool Shelter Rating:	32
Air (F):	50 - 68	Riffles:	2		
Dry Channel (ft):	0	Pools:	6		
		Flat:	2		
Pool Tail Substrate (%):	Silt/Clay: 3	Sand: 0	Gravel: 89	Sm Cobble: 8	Lg Cobble: 0
Embeddedness Values (%):	1. 33.3	2. 38.9	3. 22.2	4. 2.8	5. 2.8



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

Stream Name: Kass Creek

LLID: 1237193394176

Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/22/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR17WS14

Latitude: 39:25:03.0N

Longitude: 123:43:09.0W

**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	11	20	7.5
Boulder	4	2	1.5
Cobble / Gravel	59	56	27.9
Sand / Silt / Clay	132	128	63.1

**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	14	7	5.1
Hardwood Trees	83	70	37.1
Coniferous Trees	109	129	57.8
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 2

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

StreamName: Kass Creek

LLID: 1237193394176

Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/22/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR17WS14

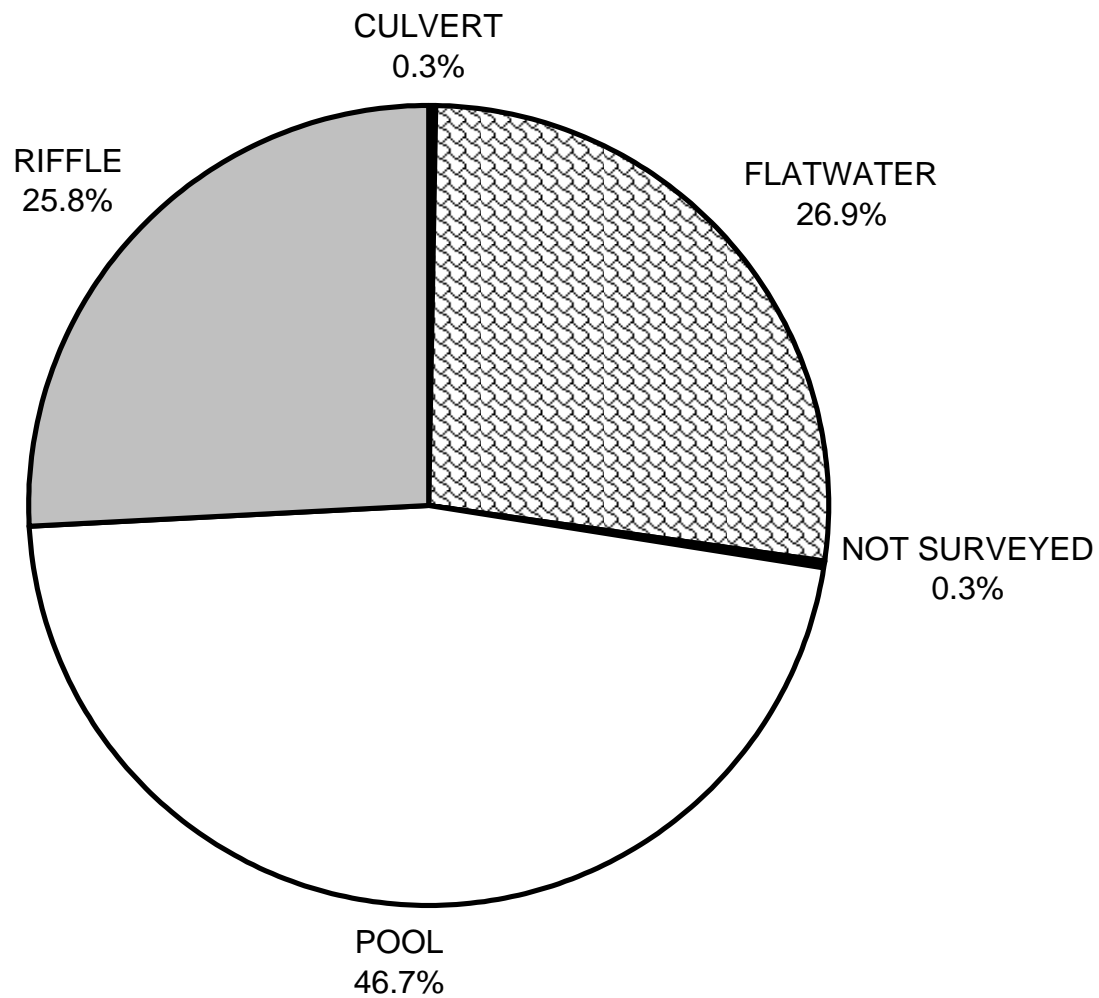
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Longitude: 123:43:09.0W

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	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	4	12	24
SMALL WOODY DEBRIS (%)	54	37	36
LARGE WOODY DEBRIS (%)	17	22	18
ROOT MASS (%)	0	2	7
TERRESTRIAL VEGETATION (%)	6	8	6
AQUATIC VEGETATION (%)	0	7	2
WHITEWATER (%)	0	0	0
BOULDERS (%)	19	12	7
BEDROCK LEDGES (%)	0	0	0

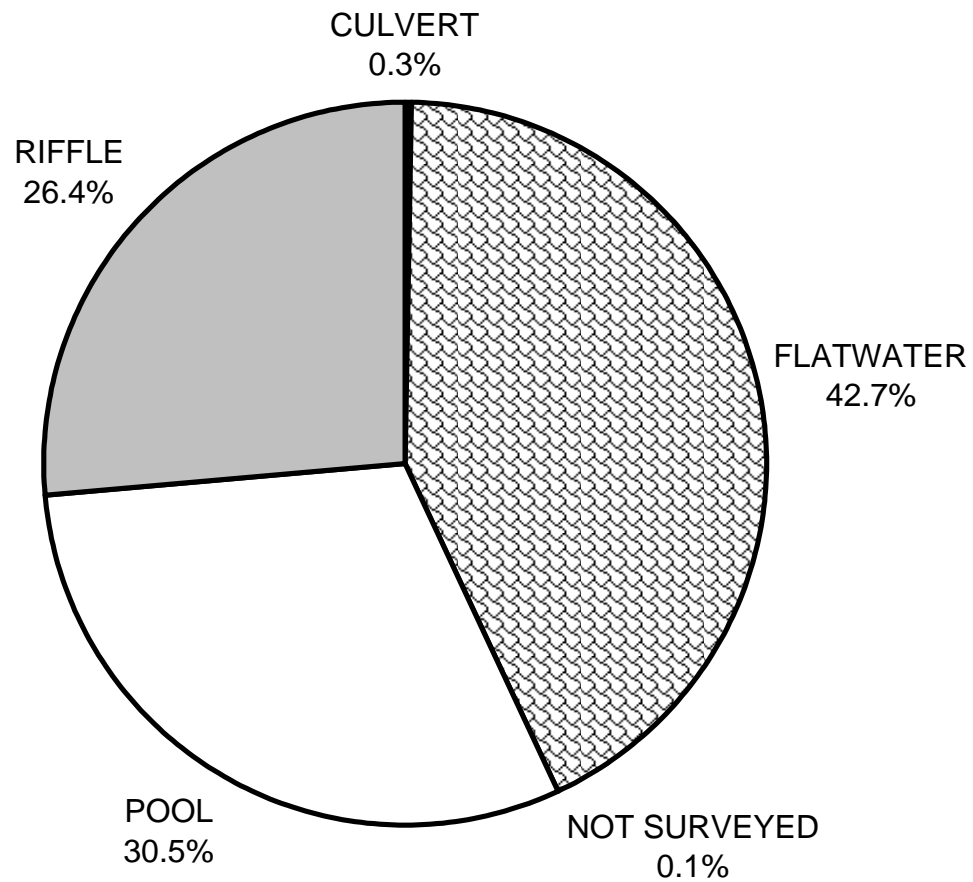
# KASS CREEK 2010 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

# KASS CREEK 2010

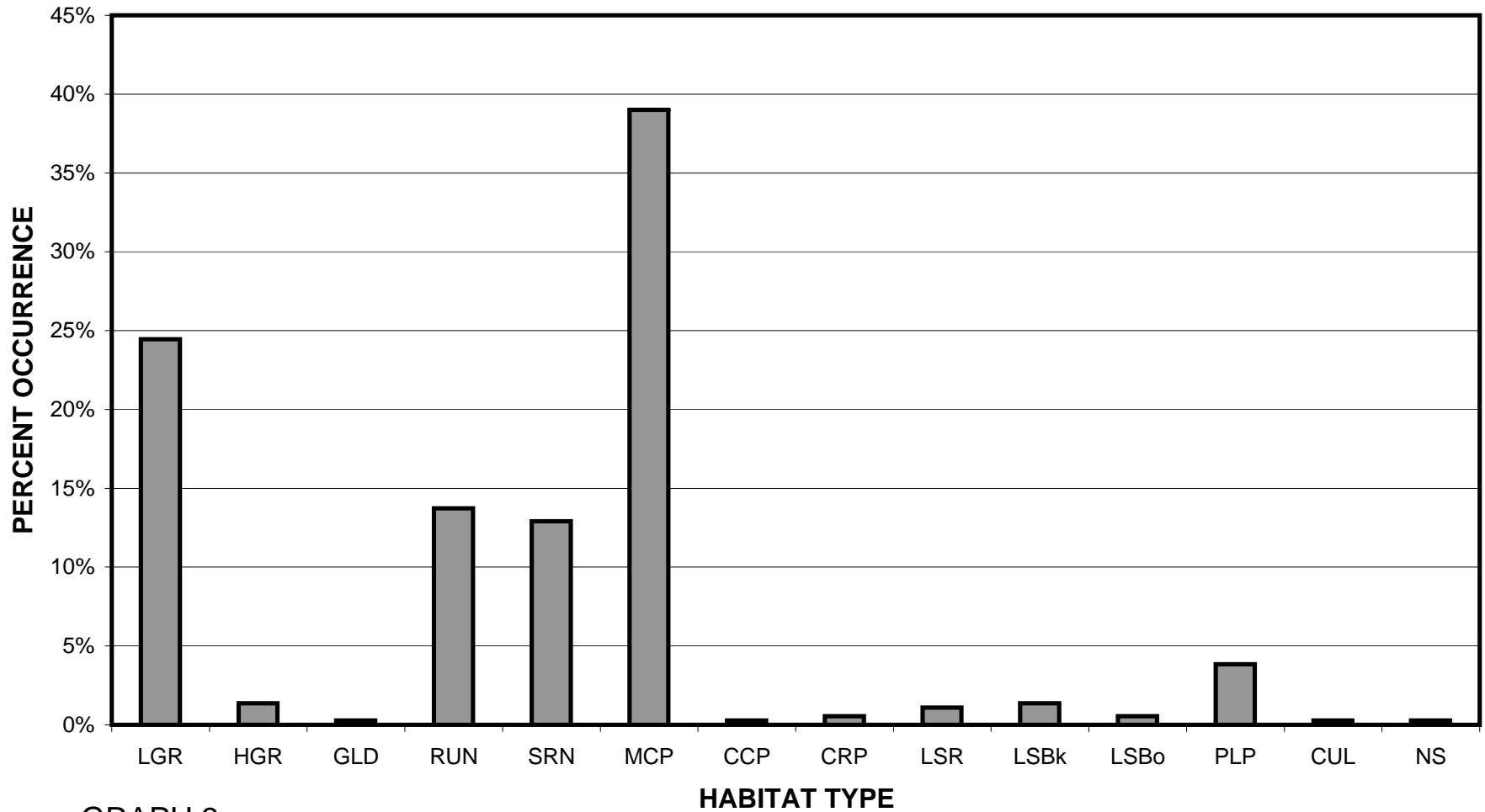
## HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

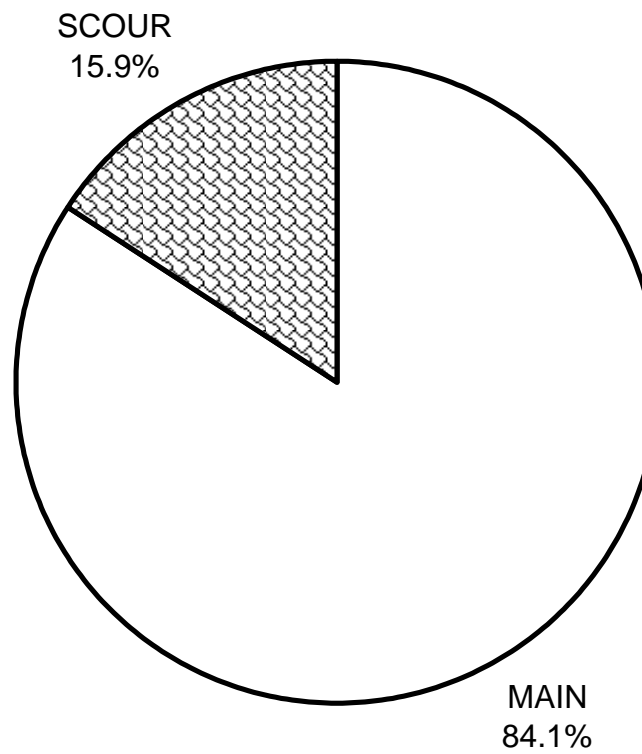
# KASS CREEK 2010

## HABITAT TYPES BY PERCENT OCCURRENCE



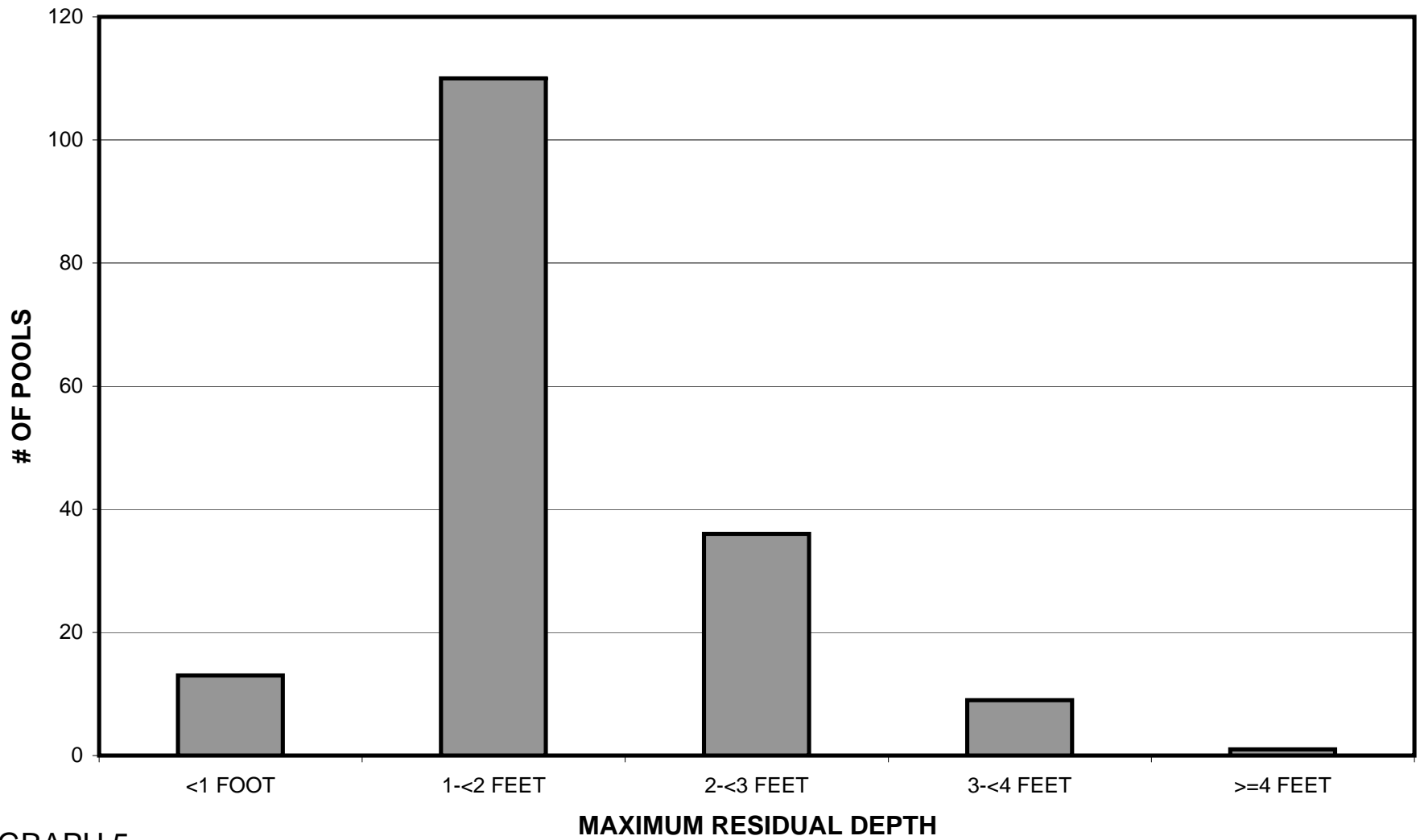
GRAPH 3

**KASS CREEK 2010  
POOL TYPES BY PERCENT OCCURRENCE**



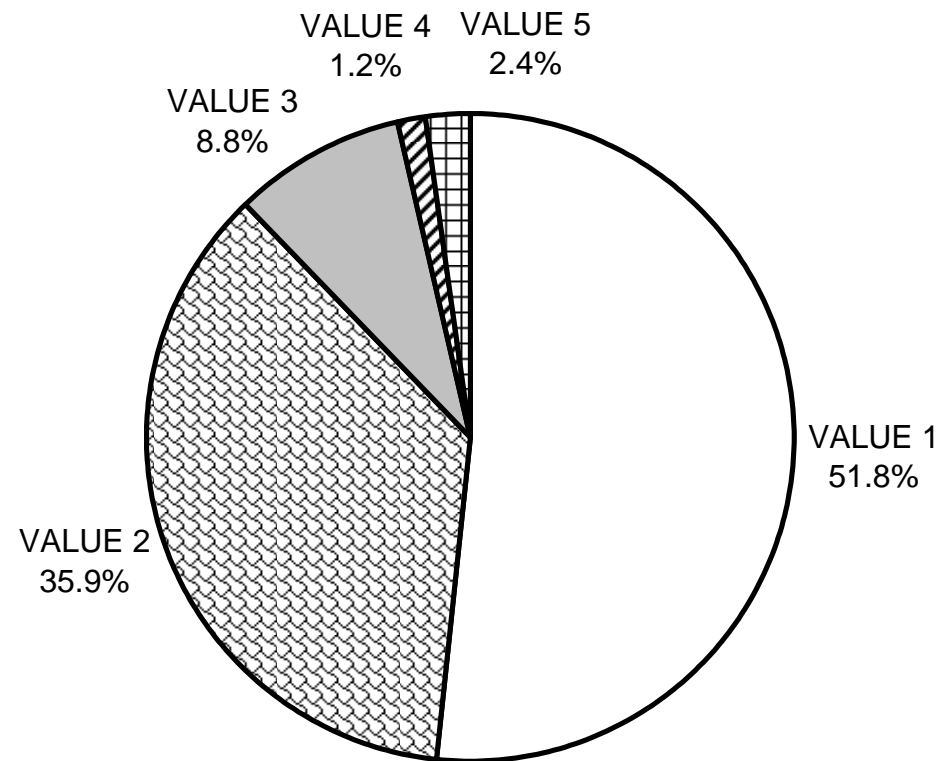
GRAPH 4

# KASS CREEK 2010 MAXIMUM DEPTH IN POOLS



GRAPH 5

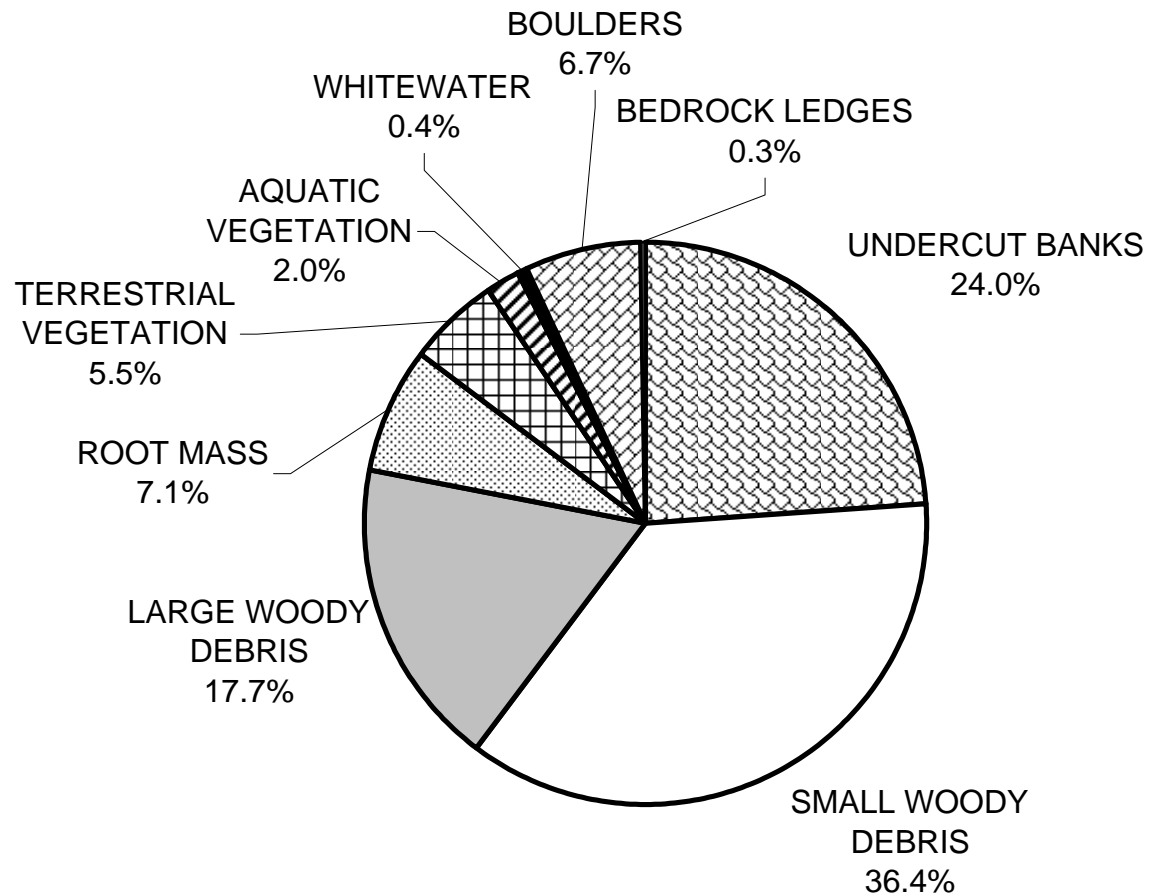
# KASS CREEK 2010 PERCENT EMBEDDEDNESS



GRAPH 6



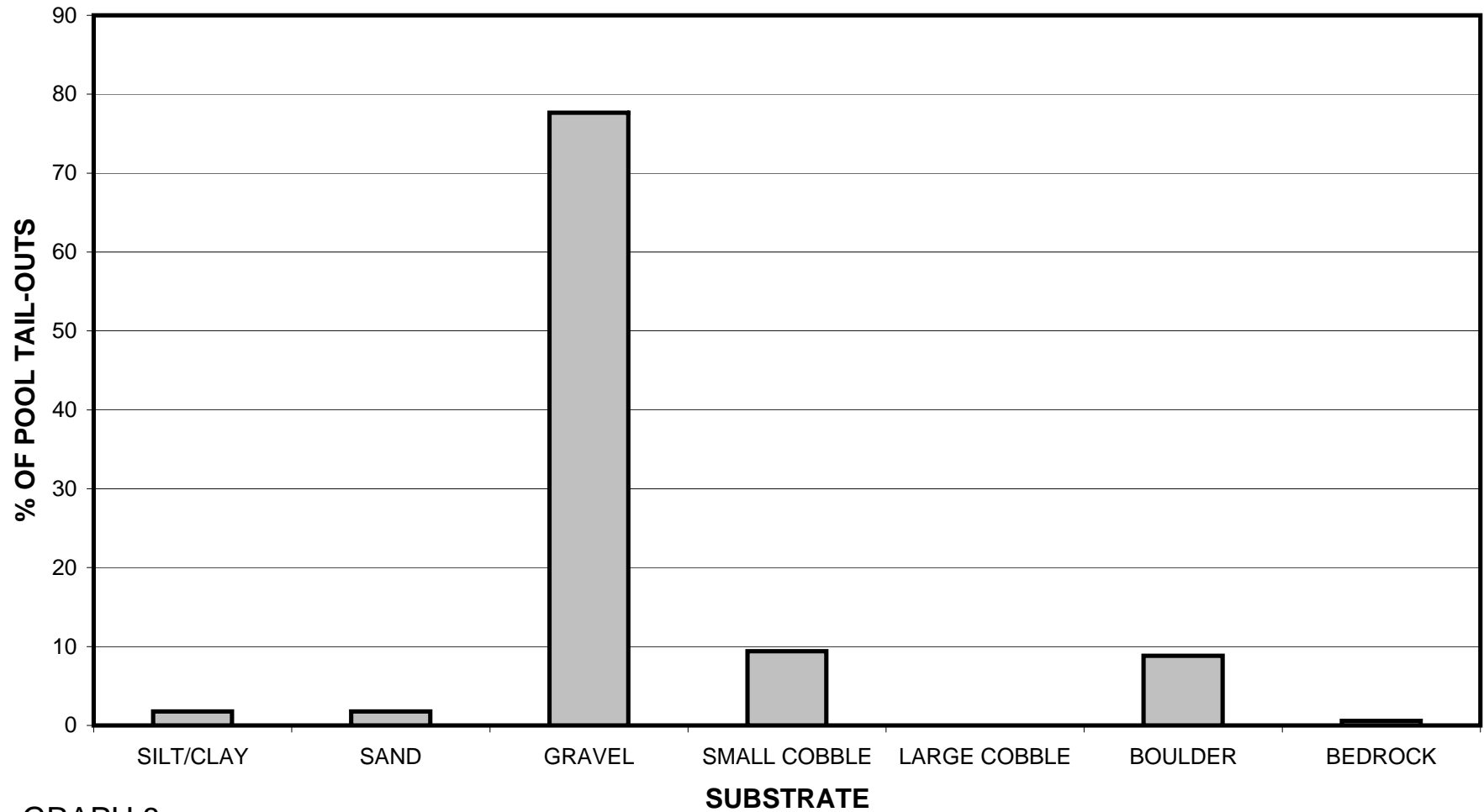
# KASS CREEK 2010 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

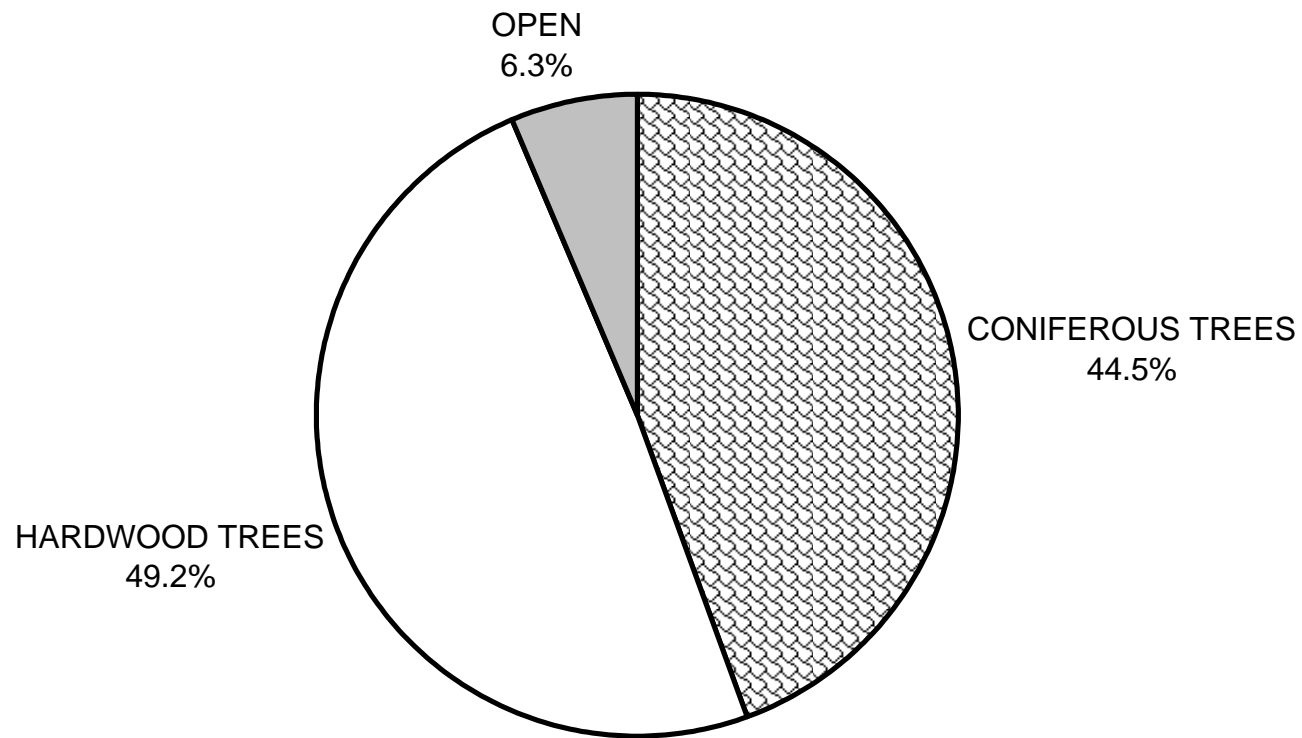
# KASS CREEK 2010

## SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



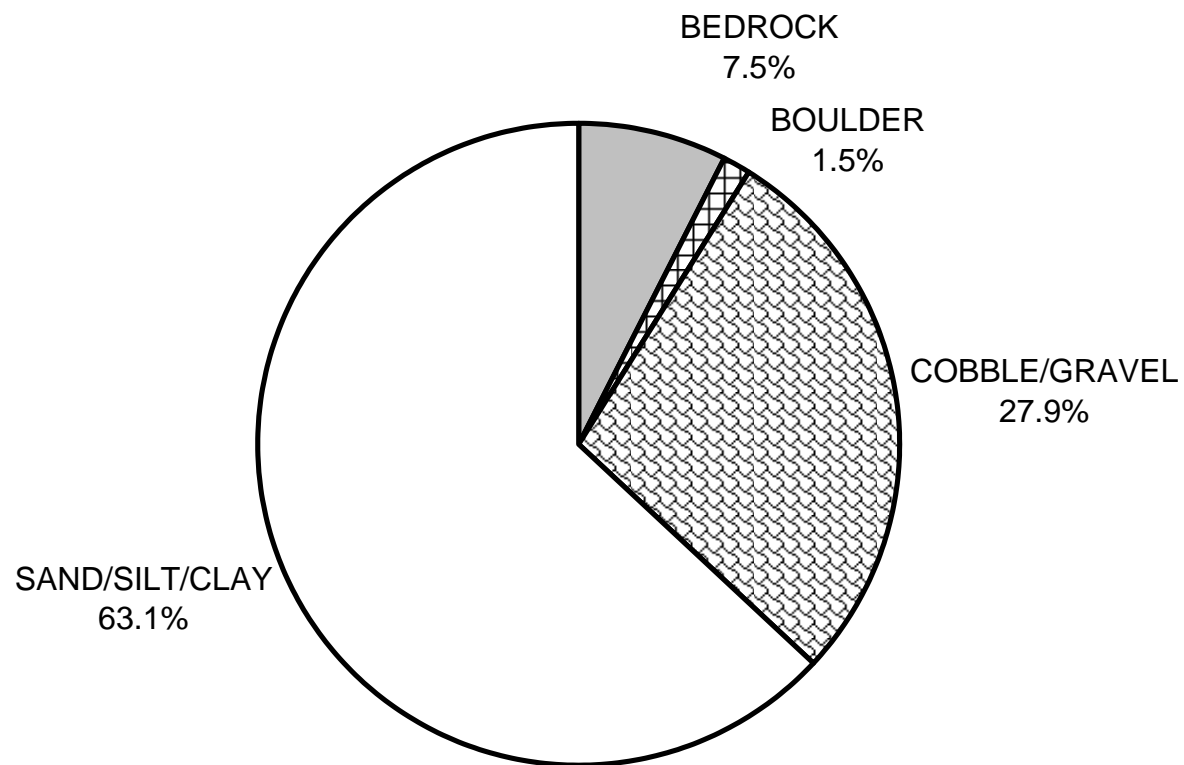
GRAPH 8

# KASS CREEK 2010 MEAN PERCENT CANOPY



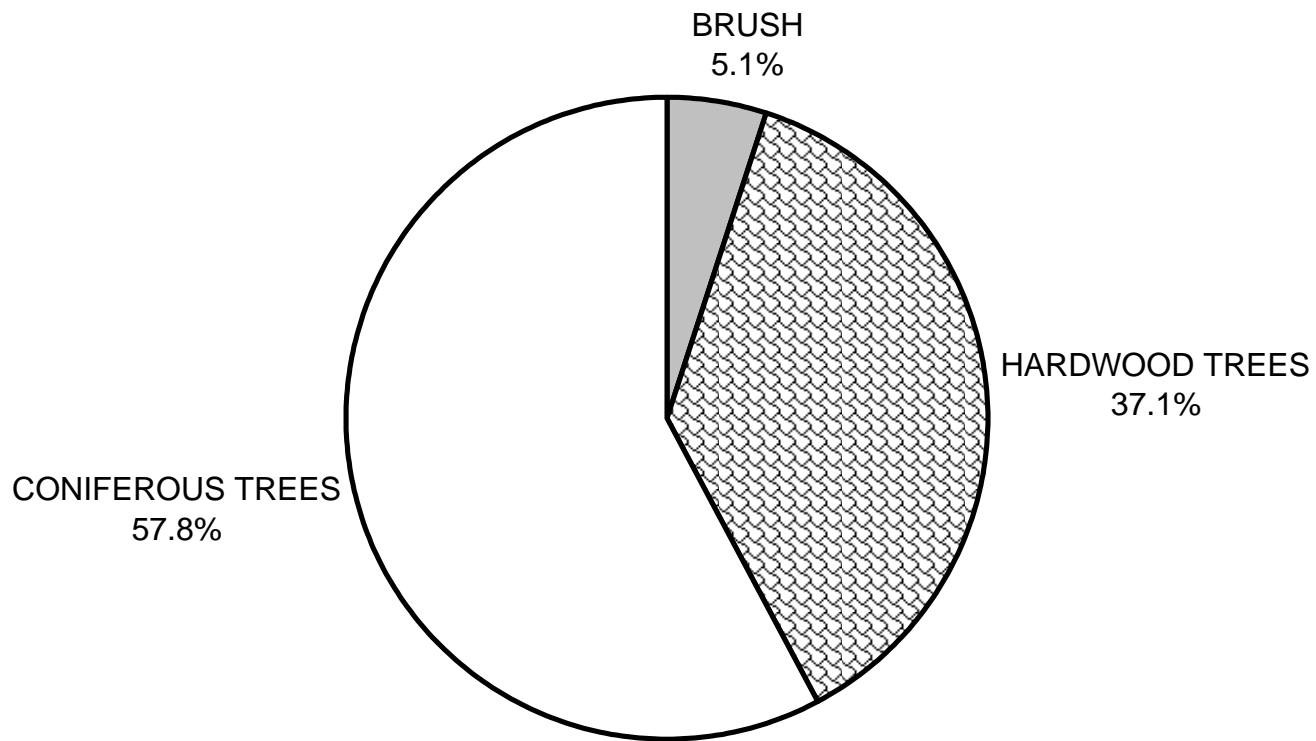
GRAPH 9

**KASS CREEK 2010  
DOMINANT BANK COMPOSITION IN SURVEY REACH**



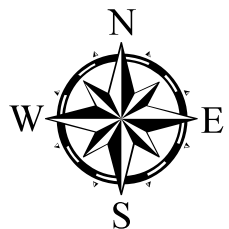
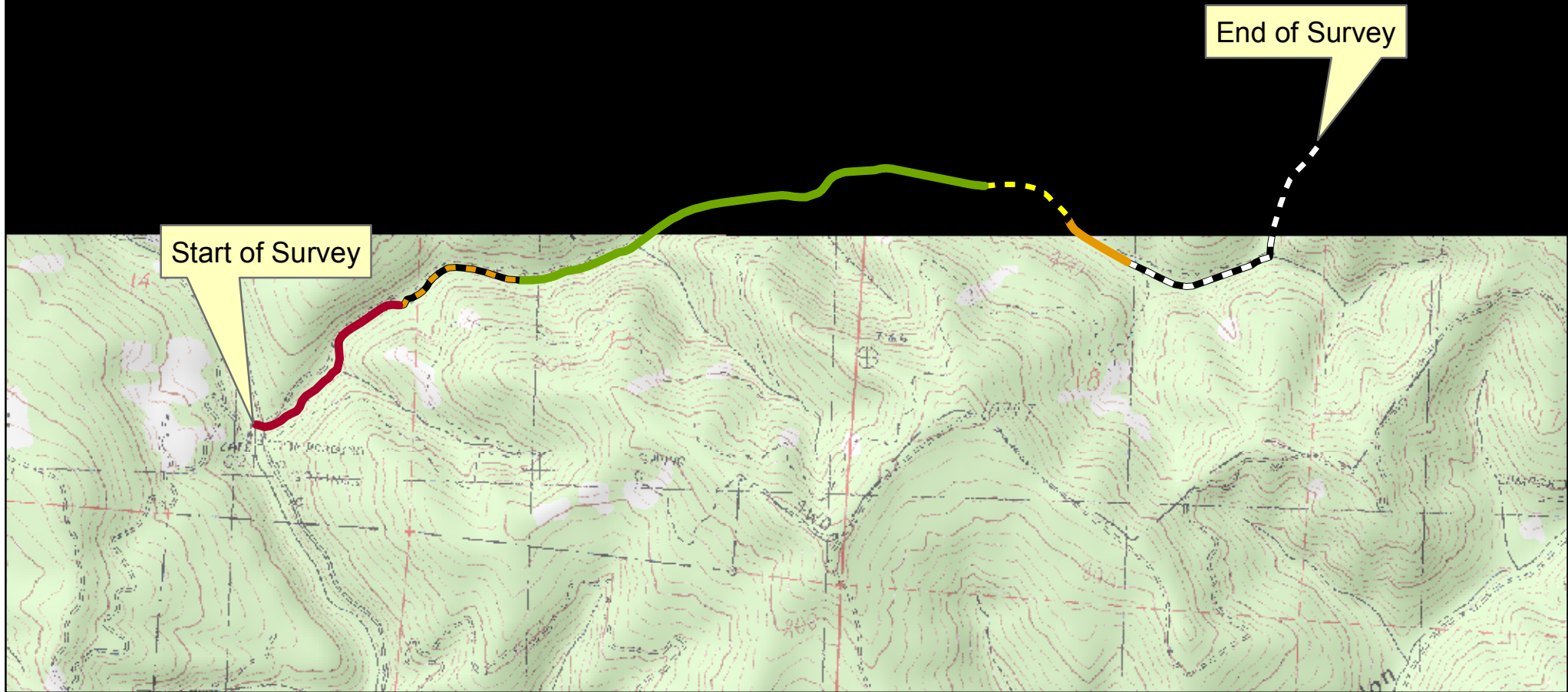
GRAPH 10

**KASS CREEK 2010  
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

**Map 1**  
**Kass Creek**  
**Noyo River Watershed**  
**Noyo Hill Quad, Mendocino County**



**Legend**

- |                                                                                                              |                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|  Reach 1, Channel Type E4 |  Reach 4, Channel Type C4 |
|  Reach 2, Channel Type B4 |  Reach 5, Channel Type F4 |
|  Reach 3, Channel Type F4 |  Reach 6, Channel Type G4 |

0 1,000 2,000 Feet

