

# STREAM INVENTORY REPORT

## “Gonzo Creek”

### INTRODUCTION

A stream inventory was conducted from June 7 to June 9, 2010 on an unnamed tributary to the North Fork of the South Fork Noyo River commonly known as and hereinafter referred to as Gonzo Creek. The survey began at the confluence with the North Fork of the South Fork Noyo River and extended upstream 0.3 miles.

The Gonzo 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 Gonzo 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

Gonzo Creek is a tributary to the North Fork of the South Fork Noyo River, a tributary to the South Fork Noyo River, a tributary to the Noyo River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Gonzo Creek's legal description at the confluence with the North Fork of the South Fork Noyo River is T18N R16W S19. Its location is 39.40277 degrees north latitude and 123.68454 degrees west longitude, LLID number 1236834394029. Gonzo Creek is an intermittent stream according to the USGS Noyo Hill 7.5 minute quadrangle. Gonzo Creek drains a watershed of approximately 0.53 square miles. Elevations range from about 160 feet at the mouth of the creek to 800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is in the Jackson Demonstration State Forest and is managed by the California Department of Forestry and Fire Protection for timber production. Vehicle access exists via California Division of Forestry and Fire Protection Road 300 to Road 360.

### METHODS

The habitat inventory conducted in Gonzo 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.

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### SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

### HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Gonzo 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". Gonzo 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

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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 Gonzo Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed not suitable for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

### 6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. The shelter rating is calculated for each fully-described habitat unit by multiplying the shelter value by the 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 Gonzo 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 Gonzo 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 Gonzo Creek, the dominant composition type and the dominant

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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 Gonzo Creek. In addition, underwater observations were made at 10 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)

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- 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 Gonzo 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 9, 2010, was conducted by A. Glasgow and B. Ballantine (WSP). The total length of the stream surveyed was 1,539 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.25 cfs on June 8, 2010.

Gonzo Creek is an A4 channel type for 1,539 feet of the stream surveyed. A4 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 53 to 55 degrees Fahrenheit. Air temperatures ranged from 55 to 63 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 32% riffle units, 32% pool units, 27% flatwater units, and 10% no survey units (Graph 1). Based on total length of Level II habitat types there were 46% flatwater units, 30% riffle units, and 24% pool units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 23%; low gradient riffle units, 23%; and step

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run units, 17% (Graph 3). Based on percent total length, step run units made up 34%, low gradient riffle units 24%, and mid-channel pool units 19%.

A total of 19 pools were identified (Table 3). Main channel pools were the most frequently encountered at 74% (Graph 4), and comprised 80% 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. Three of the 19 pools (16%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 19 pool tail-outs measured, 6 had a value of 1 (31.6%); 9 had a value of 2 (47.4%); 2 had a value of 3 (10.5%); and 2 had a value of 5 (10.5%) (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 2, flatwater habitat types had a mean shelter rating of 5, and pool habitats had a mean shelter rating of 44 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 81. Main channel pools had a mean shelter rating of 31 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 74% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 16% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Gonzo Creek was 93%. Seven percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 21% and 79%, respectively. Graph 9 describes the mean percent canopy in Gonzo Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 99%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 53% sand/silt/clay, 26% cobble/gravel, and 21% bedrock (Graph 10). Brush was the dominant vegetation type observed in 45% of the units surveyed. Additionally, 40% of the units surveyed had coniferous trees as the dominant vegetation type, and 12% had deciduous trees as the dominant vegetation type (Graph 11).

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### BIOLOGICAL INVENTORY RESULTS

The survey team conducted a snorkel survey at 10 sites for species composition and distribution in Gonzo Creek on June 10, 2010. The water temperature taken during the survey period of 0855 hours to 1000 hours was 53 degrees Fahrenheit. The air temperature was 53 degrees Fahrenheit. The sites were sampled by S. McSmith (DFG), and A. Glasgow (WSP). No fish were observed.

The following chart displays the information yielded from these sites:

2010 Gonzo Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
A4 Channel Type									
06/10/10	1	005	Pool	117	0	0	0	0	0
	2	007	Pool	138	0	0	0	0	0
	3	009	Pool	153	0	0	0	0	0
	4	012	Pool	198	0	0	0	0	0
	5	021	Pool	395	0	0	0	0	0
	6	026	Pool	521	0	0	0	0	0
	7	031	Pool	612	0	0	0	0	0
	8	043	Pool	969	0	0	0	0	0
	9	053	Pool	1274	0	0	0	0	0
	10	057	Pool	1382	0	0	0	0	0

### DISCUSSION

Gonzo Creek is an A4 channel type for the entire 1,539 feet of stream surveyed. Fish habitat improvement structures are generally not suitable in A4 channel types.

The water temperatures recorded on the survey days June 7 to June 9, 2010, ranged from 53 to 55 degrees Fahrenheit. Air temperatures ranged from 55 to 63 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 46% of the total length of this survey, riffles 31%, and pools 24%. Three of the 19 (16%) 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

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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 not recommended for A4 channel types.

Fifteen of the 19 pool tail-outs measured had embeddedness ratings of 1 or 2. Two of the pool tail-outs had embeddedness ratings of 3 or 4. Two of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

Seventeen of the 19 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 44. The shelter rating in the flatwater habitats is 5. 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 Gonzo Creek. Small woody debris is the dominant cover type in pools followed by large woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 93%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 99% and 99%, 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) Gonzo Creek should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.



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### COMMENTS AND LANDMARKS

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

Position (ft):	Habitat unit #:	Comments:
0	0001.00	Start of survey at the confluence with the North Fork of the South Fork Noyo River.
0	0001.00	The channel type is an A4 for the entire length of the survey. No fish were observed in this stream.
117	0006.00	Right bank seep.
143	0009.00	There is a 2.7 foot high plunge.
198	0013.00	A bedrock sheet with a 22% slope is a possible fish barrier.
424	0023.00	Log debris accumulation (LDA) #01 contains 11 pieces of large woody debris (LWD) and measures 4.5' high x 20' wide x 16' long. Water flows through and there are visible gaps in the LDA. Retained sediment ranges from sand to gravel and measures 6' wide x 10' long x 1' deep. It is a possible velocity barrier to juvenile and adult salmonids. Fish are not present above the LDA.
750	0036.00	LDA #02 contains 19 pieces of LWD and measures 5' high x 30' wide x 55' long. Water flows through and there are visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 20' wide x 30' long x 2' deep. It is a possible barrier to juvenile and adult salmonids.
862	0040.00	LDA #03 contains 20 pieces of LWD and measures 9' high x 28' wide x 35' long. Water flows through and there are no visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 20' wide x 25' long x 2' deep. It is a possible barrier to juvenile and adult salmonids.
1083	0049.00	LDA #04 contains eight pieces of LWD and measures 4' high x 14' wide x 11' long. Water flows through and there are no visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 6' wide x 12' long x 0.5' deep. It is a possible barrier to juvenile and adult salmonids due to a 4' jump over LWD with no jump pool beneath it.

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- 1274      0054.00      LDA #05 contains 15 pieces of LWD and measures 8' high x 17' wide x 10' long. Water flows through and there are visible gaps in the LDA. The LDA is not retaining sediment. It is/is not a possible barrier to juvenile salmonids.
- 1539      0060.00      End of survey due to possible end of anadromy. LDA #06 contains 18 pieces of LWD and measures 5' high x 20' wide x 102' long. Water flows through and there are no visible gaps in the LDA. Retained sediment ranges from silt to cobble and measures 10' wide x 200' long x 0.5' deep. It is a possible barrier to juvenile and adult salmonids. There is a six foot high jump over large woody debris and bedrock with no jump pool beneath. A landslide on the right bank measures 25' long x 30' high and is contributing LWD, fine sediment and gravel to the channel.

## 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]	

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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}
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Step Pool	(STP)	[4.4]	{23}

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Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
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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]	

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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}
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Edgewater	(EDW)	[3.5]	{18}

#### MAIN CHANNEL POOLS

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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: 1236834394029

LLID: 1236834394029 Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/9/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS19 Latitude: 39:24:10.0N Longitude: 123:41:00.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
16	3	FLATWATER	26.7	37	586	45.5	5.3	0.5	1.0	158	2522	69	1100		5
6	0	NOSURVEY	10.0	42	252										
19	19	POOL	31.7	16	304	23.6	6.9	0.7	1.4	106	2011	94	1792	63	44
19	7	RIFFLE	31.7	21	397	30.8	3.9	0.3	0.6	66	1253	23	429		2

Total Units Fully Measured	29	Total Length (ft.)	1539	Total Area (sq.ft.)	5786	Total Volume (cu.ft.)	3321
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**Table 2 - Summary of Habitat Types and Measured Parameters**

Stream Name: 1236834394029

LLID: 1236834394029 Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/9/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS19 Latitude: 39:24:10.0N Longitude: 123:41:00.0W

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 (%)
14	4	LGR	23.3	22	306	23.8	5	0.4	0.7	95	1329	33	467		4	93
3	1	HGR	5.0	20	59	4.6	4	0.3	0.5	49	148	15	44		0	91
2	2	BRS	3.3	16	32	2.5	2	0.3	0.9	16	33	5	10		0	92
6	2	RUN	10.0	24	144	11.2	6	0.6	1.2	160	962	80	482		5	95
10	1	SRN	16.7	44	442	34.3	4	0.3	1	152	1520	46	456		5	96
14	14	MCP	23.3	17	244	19.0	7	0.7	4	115	1604	100	1395	67	31	94
1	1	LSL	1.7	14	14	1.1	7	0.4	1	93	93	65	65	37	45	91
1	1	LSBk	1.7	16	16	1.2	4	0.1	0.9	64	64	38	38	6	5	96
3	3	PLP	5.0	10	30	2.3	8	1.1	2.7	83	250	98	294	75	118	82
6	0	NS	10.0													

Total Units Fully Measured  
60 29

Total Length (ft.)  
1539

Total Area (sq.ft.)  
6003

Total Volume (cu.ft.)  
3251

**Table 3 - Summary of Pool Types**

Stream Name: 1236834394029

LLID: 1236834394029 Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/9/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS19 Latitude: 39:24:10.0N Longitude: 123:41:00.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Residual Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Residual Pool Vol (cu.ft.)	Estimated Total Resid.Vol. (cu.ft.)	Mean Shelter Rating
14	14	MAIN	74	17	244	80	6.8	0.7	115	1604	67	939	31
5	5	SCOUR	26	12	60	20	7.3	0.8	81	407	53	267	81
<b>Total Units</b>	<b>19</b>				<b>Total Length (ft.)</b>	<b>304</b>				<b>Total Area (sq.ft.)</b>	<b>2011</b>	<b>Total Volume (cu.ft.)</b>	<b>1206</b>



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

Stream Name: 1236834394029

LLID: 1236834394029 Drainage: Noyo River

Survey Dates: 6/7/2010 to 6/9/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS19 Latitude: 39;24;10.0N Longitude: 123;41;00.0W

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
14	MCP	74	2	14	10	71	1	7	0	0	1	7
1	LSL	5	0	0	1	100	0	0	0	0	0	0
1	LSBk	5	1	100	0	0	0	0	0	0	0	0
3	PLP	16	1	33	1	33	1	33	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
19	4	21	12	63	2	11	0	0	1	5

Mean Maximum Residual Pool Depth (ft.): 1.4

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

Stream Name: 1236834394029		LLID: 1236834394029		Drainage: Noyo River							
Survey Dates: 6/7/2010 to 6/9/2010		Dry Units: 0		Longitude: 123:41:00.0W							
Confluence Location: Quad: NOYO HILL		Legal Description: T18NR16WS19		Latitude: 39:24:10.0N							
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
14	4	LGR	15	20	20	0	3	3	5	35	0
3	1	HGR	0	0	0	0	0	0	0	0	0
2	2	BRS	0	0	0	0	0	0	0	0	0
19	7	TOTAL RIFFLE	15	20	20	0	3	3	5	35	0
6	2	RUN	0	95	0	0	5	0	0	0	0
10	1	SRN	60	20	0	0	20	0	0	0	0
16	3	TOTAL FLAT	30	57	0	0	12	0	0	0	0
14	14	MCP	8	33	28	1	11	0	14	1	5
1	1	LSL	80	0	0	0	5	0	15	0	0
1	1	LSBk	0	5	0	0	0	0	0	0	95
3	3	PLP	0	12	12	0	0	2	32	7	37
19	19	TOTAL POOL	10	26	22	1	8	0	16	2	16
6	0	NS									
60	29	TOTAL	12	28	20	1	8	0	14	5	13

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

Stream Name: 12368834394029		LLID: 12368834394029		Drainage: Noyo River					
Survey Dates: 6/7/2010 to 6/9/2010		Dry Units: 0							
Confluence Location: Quad: NOYO HILL		Legal Description: T18NR16WS19		Longitude: 123:41:00.0W					
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
14	4	LGR	0	0	75	25	0	0	0
3	1	HGR	0	0	100	0	0	0	0
2	2	BRS	0	0	0	0	0	0	100
6	2	RUN	0	0	100	0	0	0	0
10	1	SRN	0	0	100	0	0	0	0
14	14	MCP	0	0	93	0	0	0	7
1	1	LSL	0	0	100	0	0	0	0
1	1	LSBk	0	0	100	0	0	0	0
3	3	PLP	0	0	100	0	0	0	0

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

Stream Name: 1236834394029 LLLID: 1236834394029 Drainage: Noyo River  
 Survey Dates: 6/7/2010 to 6/9/2010  
 Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS19 Latitude: 39:24:10.0N Longitude: 123:41:00.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
93	79	21	0	99	99

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: 1236834394029      LLLID: 1236834394029      Drainage: Noyo River  
 Survey Dates: 6/7/2010 to 6/9/2010      Survey Length (ft.): 1539      Main Channel (ft.): 1539      Side Channel (ft.): 0  
 Confluence Location: Quad: NOYO HILL      Legal Description: T18NR16WS19      Latitude: 39:24:10.0N      Longitude: 123:41:00.0W

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

<b>STREAM REACH: 1</b>	
Channel Type: A4	Canopy Density (%): 92.5
Reach Length (ft.): 1539	Coniferous Component (%): 79.3
Riffle/Flatwater Mean Width (ft.): 4.3	Hardwood Component (%): 20.7
BFW:	Dominant Bank Vegetation: Brush
Range (ft.): 8 to 16	Vegetative Cover (%): 99.1
Mean (ft.): 13	Dominant Shelter: Small Woody Debris
Std. Dev.: 3	Dominant Bank Substrate Type: Sand/Silt/Clay
Base Flow (cfs.): 0.3	Occurrence of LWD (%): 14
Water (F): 53 - 55      Air (F): 55 - 63	LWD per 100 ft.:
Dry Channel (ft): 0	Riffles: 8
	Pools: 11
	Flat: 9
Pool Tail Substrate (%): Silt/Clay: 0      Sand: 0      Gravel: 74      Sm Cobble: 16      Lg Cobble: 0      Boulder: 0      Bedrock: 11	
Embeddedness Values (%): 1.      31.6      2.      47.4      3.      10.5      4.      0.0      5.      10.5	
	Pools by Stream Length (%): 19.8
	Pool Frequency (%): 31.7
	Residual Pool Depth (%):
	< 2 Feet Deep: 84
	2 to 2.9 Feet Deep: 11
	3 to 3.9 Feet Deep: 0
	>= 4 Feet Deep: 5
	Mean Max Residual Pool Depth (ft.): 1.4
	Mean Pool Shelter Rating: 44

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

Stream Name: 1236834394029      LID: 1236834394029      Drainage: Noyo River  
 Survey Dates: 6/7/2010 to 6/9/2010  
 Confluence Location: Quad: NOYO HILL      Legal Description: T18NR16WS19      Latitude: 39:24:10.0N      Longitude: 123:41:00.0W

**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	6	6	20.7
Boulder	0	0	0.0
Cobble / Gravel	8	7	25.9
Sand / Silt / Clay	15	16	53.4

**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	1	1	3.4
Brush	14	12	44.8
Hardwood Trees	2	5	12.1
Coniferous Trees	12	11	39.7
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:**

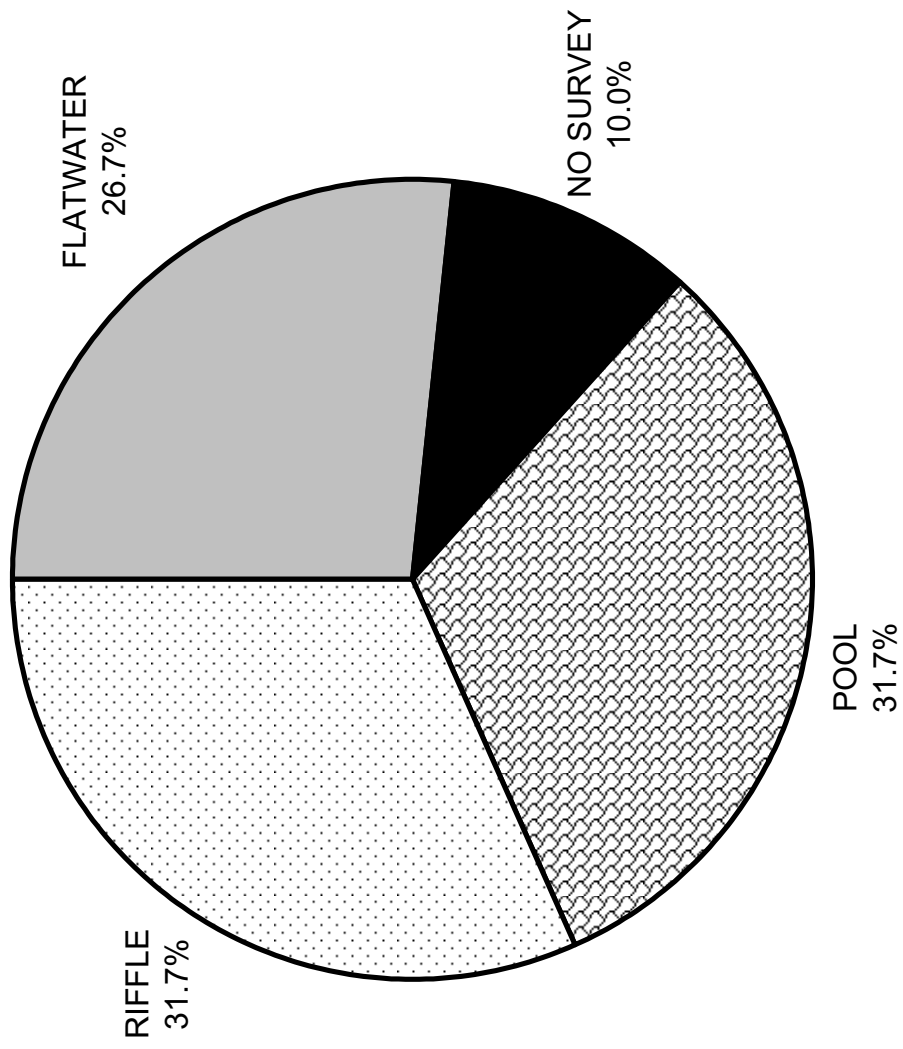
2

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

StreamName: 1236834394029      LLID: 1236834394029      Drainage: Noyo River  
 Survey Dates: 6/7/2010 to 6/9/2010  
 Confluence Location: Quad: NOYO HILL      Legal Description: T18NR16WS19      Latitude: 39:24:10.0N      Longitude: 123:41:00.0W

	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)	15	30	10
SMALL WOODY DEBRIS (%)	20	57	26
LARGE WOODY DEBRIS (%)	20	0	22
ROOT MASS (%)	0	0	1
TERRESTRIAL VEGETATION (%)	3	12	8
AQUATIC VEGETATION (%)	3	0	0
WHITEWATER (%)	5	0	16
BOULDERS (%)	35	0	2
BEDROCK LEDGES (%)	0	0	16

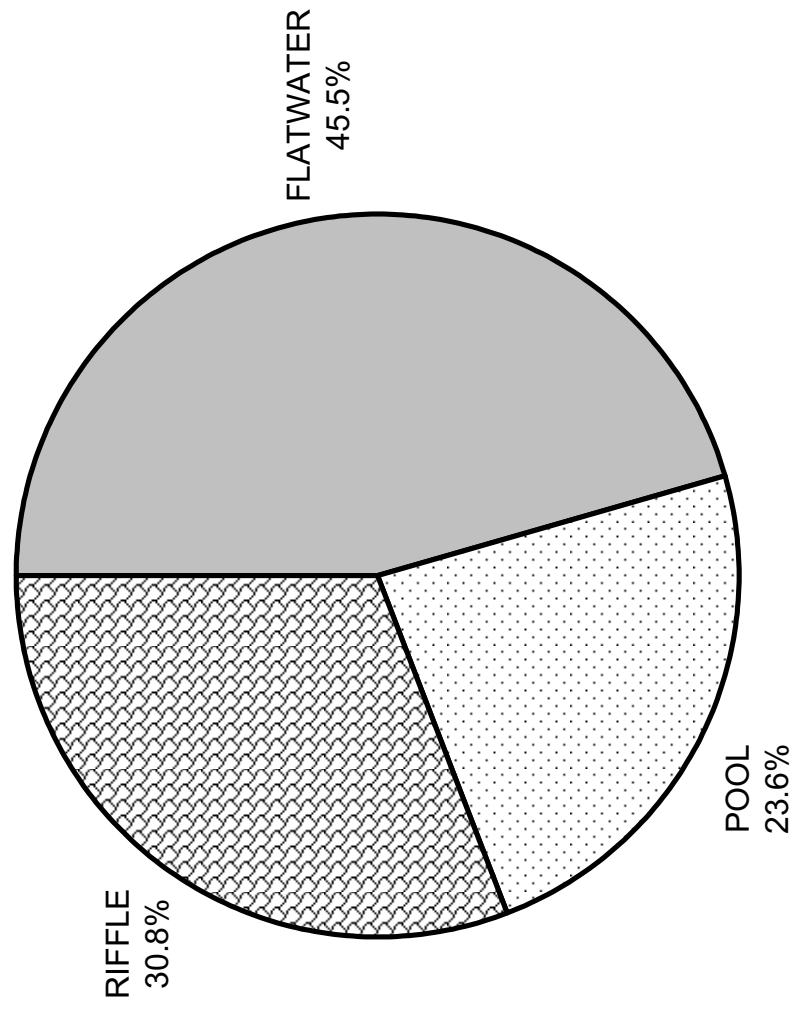
**"Gonzo Creek" 2010  
HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 1

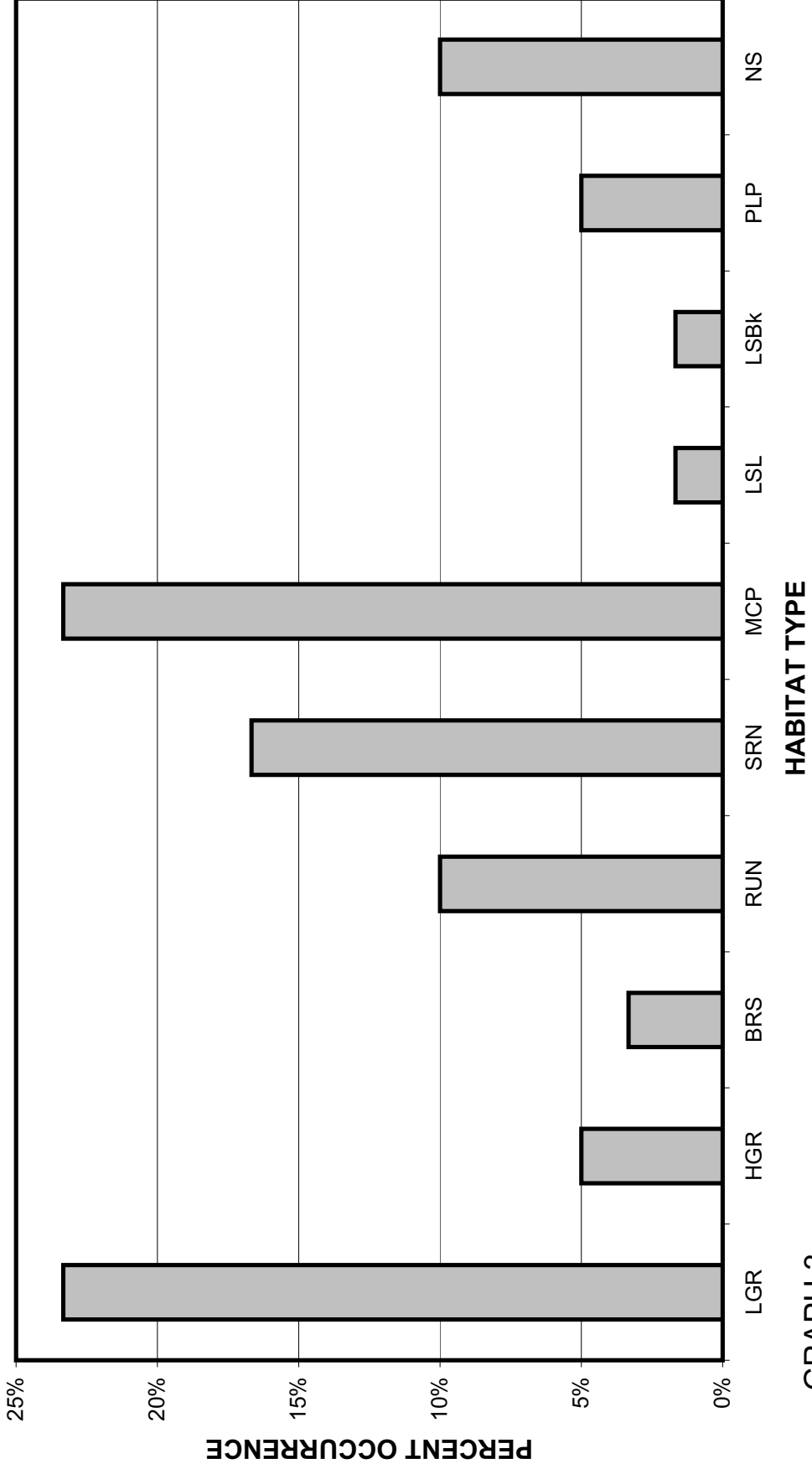


**"Gonzo Creek" 2010  
HABITAT TYPES BY PERCENT TOTAL LENGTH**



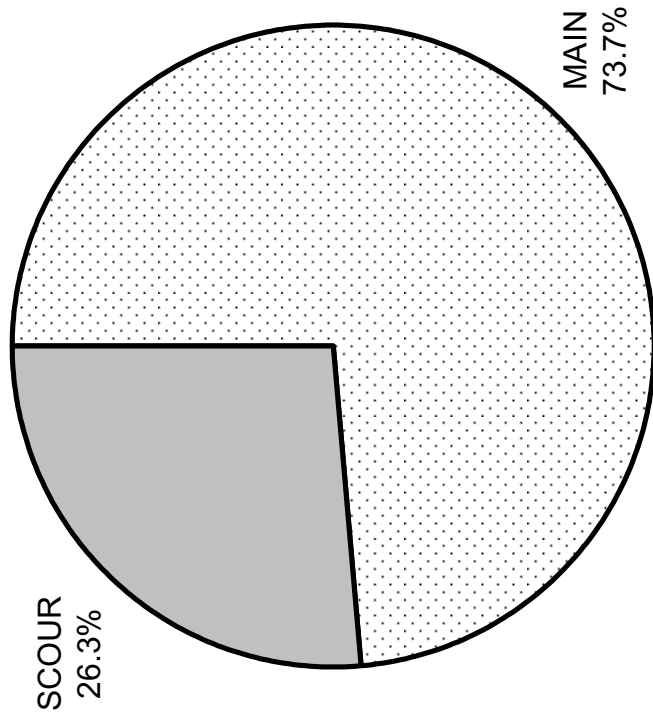
GRAPH 2

# "Gonzo Creek" 2010 HABITAT TYPES BY PERCENT OCCURRENCE



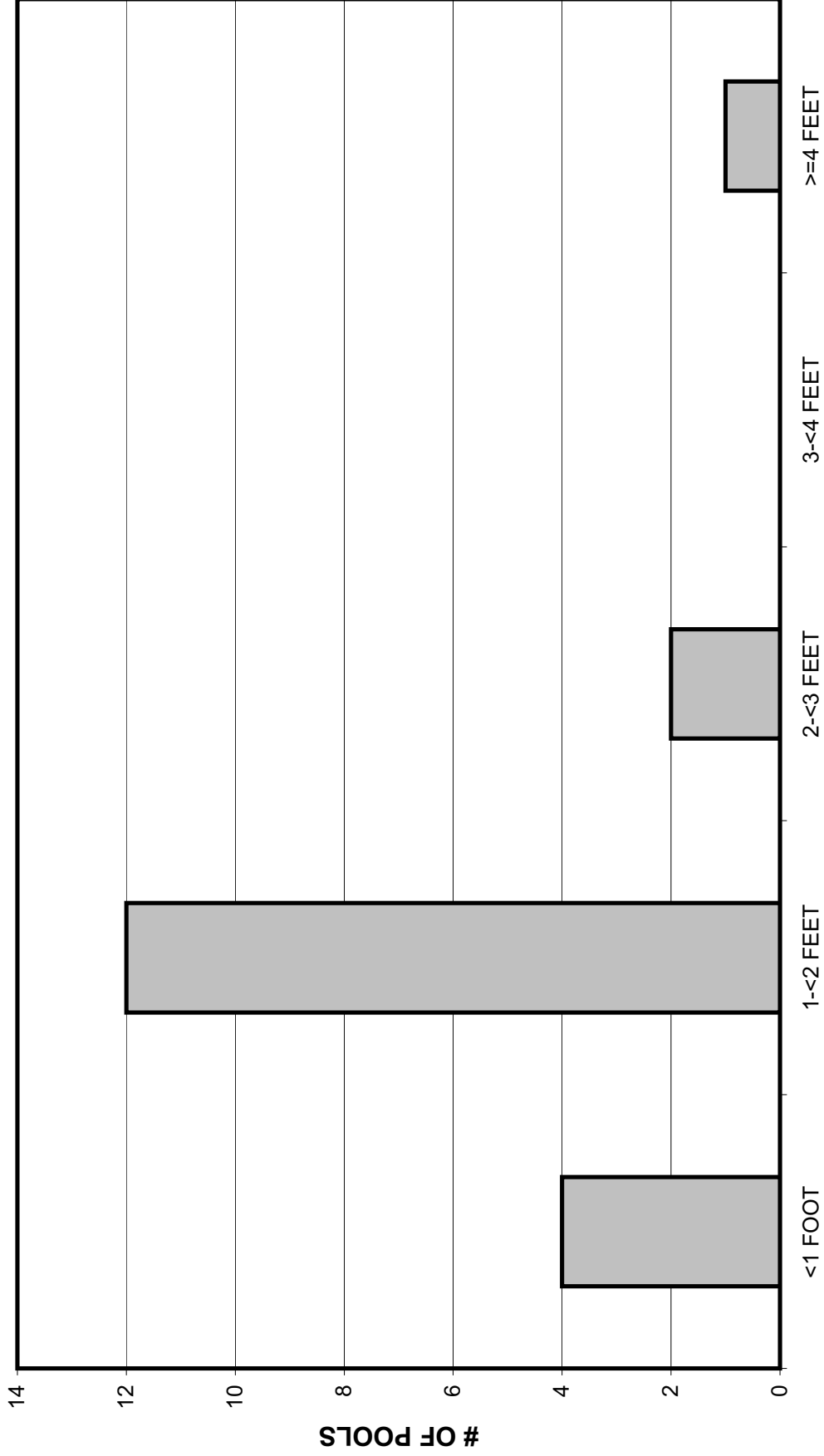
GRAPH 3

**"Gonzo Creek" 2010  
POOL TYPES BY PERCENT OCCURRENCE**



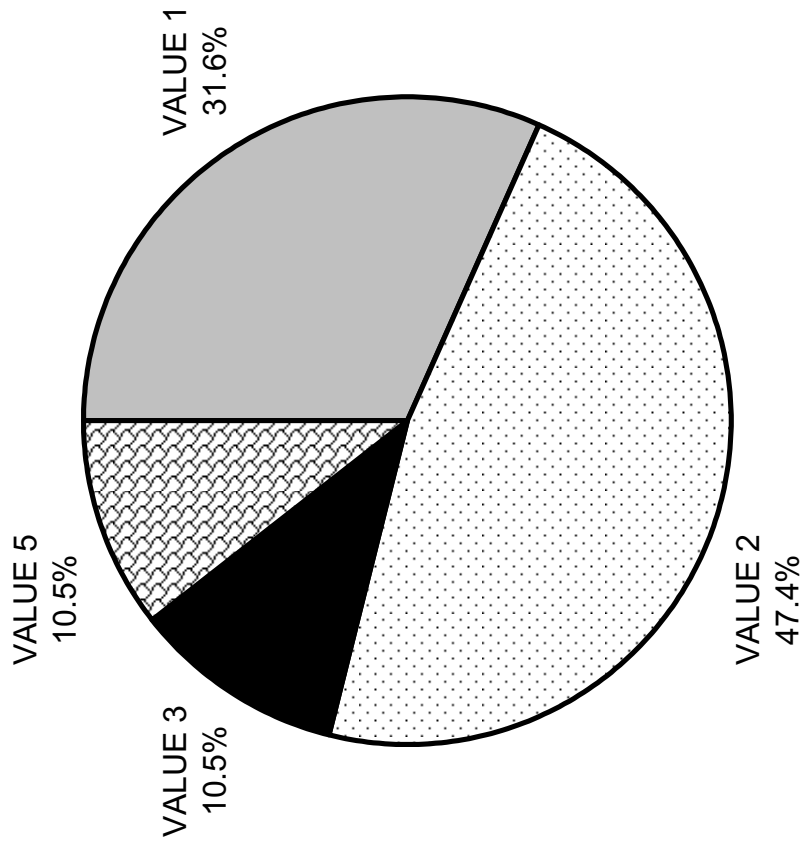
GRAPH 4

# "Gonzo Creek" 2010 MAXIMUM DEPTH IN POOLS



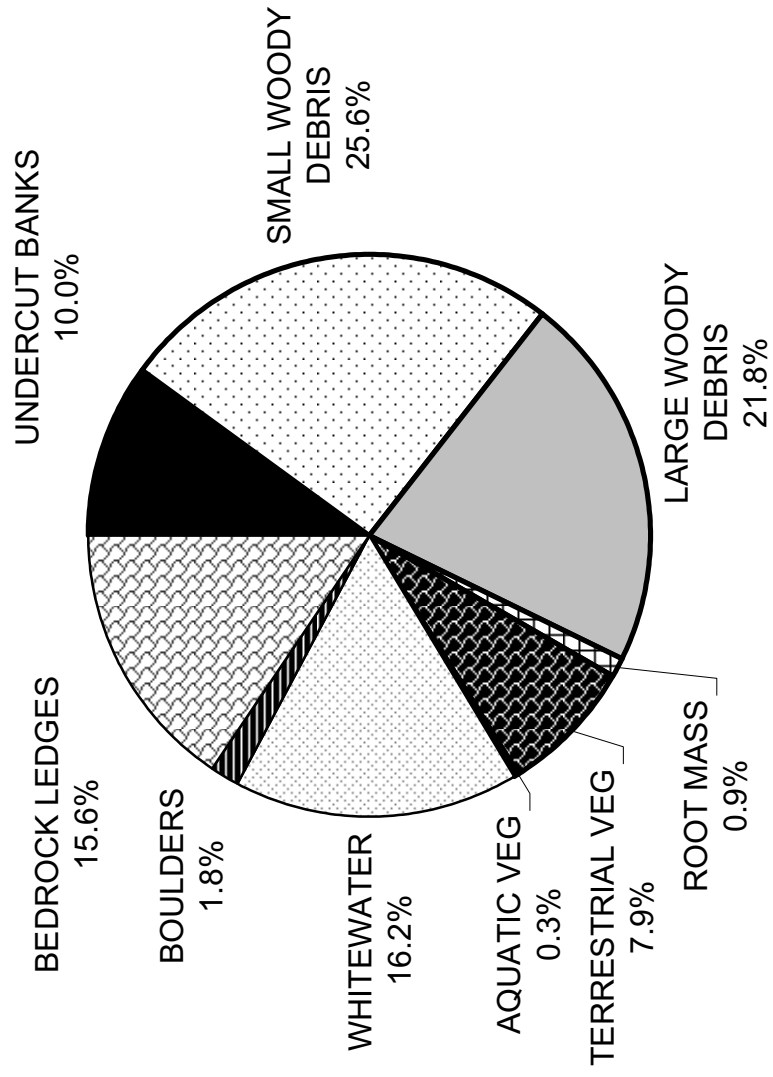
GRAPH 5

**"Gonzo Creek" 2010  
PERCENT EMBEDDEDNESS**



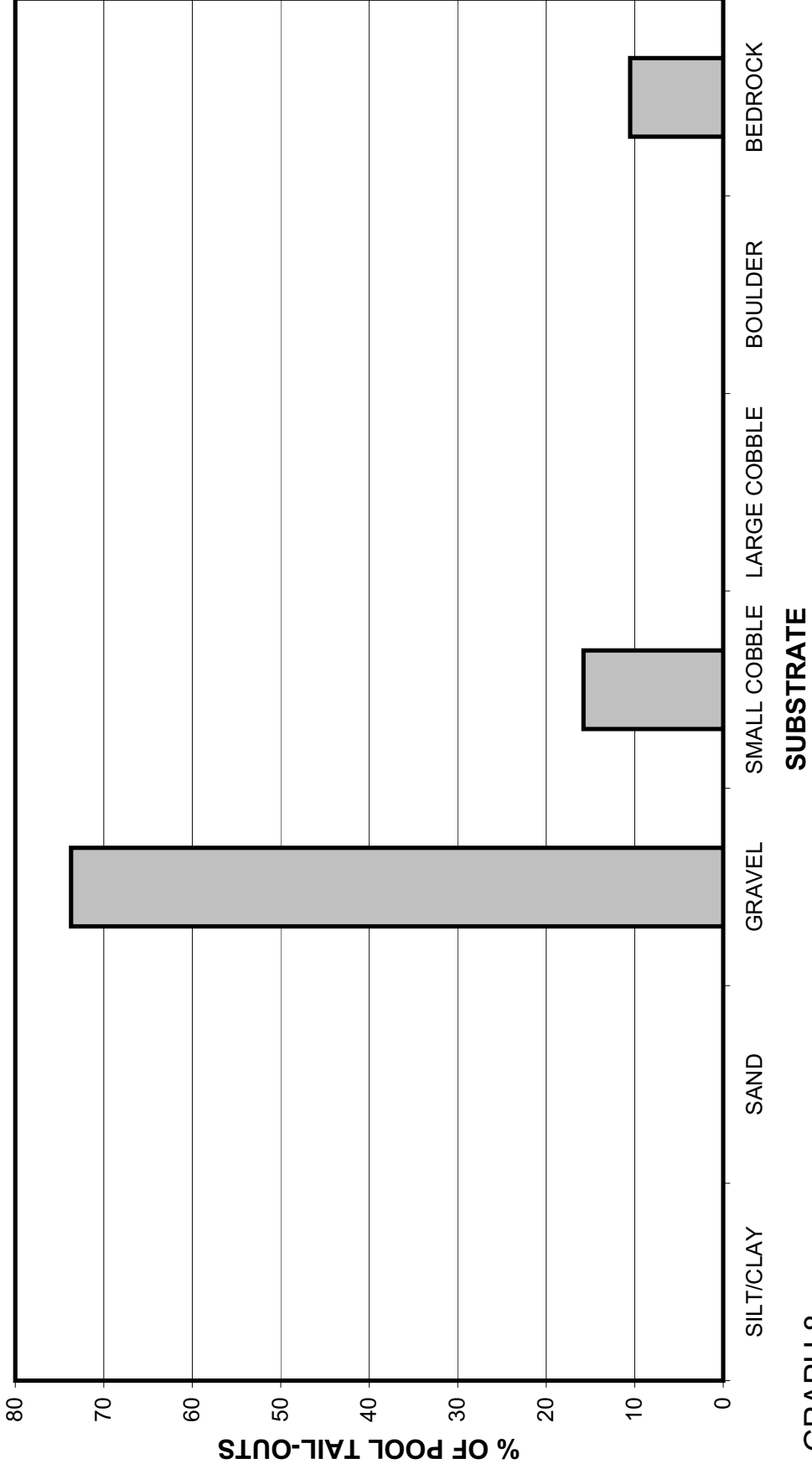
GRAPH 6

**"Gonzo Creek" 2010  
MEAN PERCENT COVER TYPES IN POOLS**



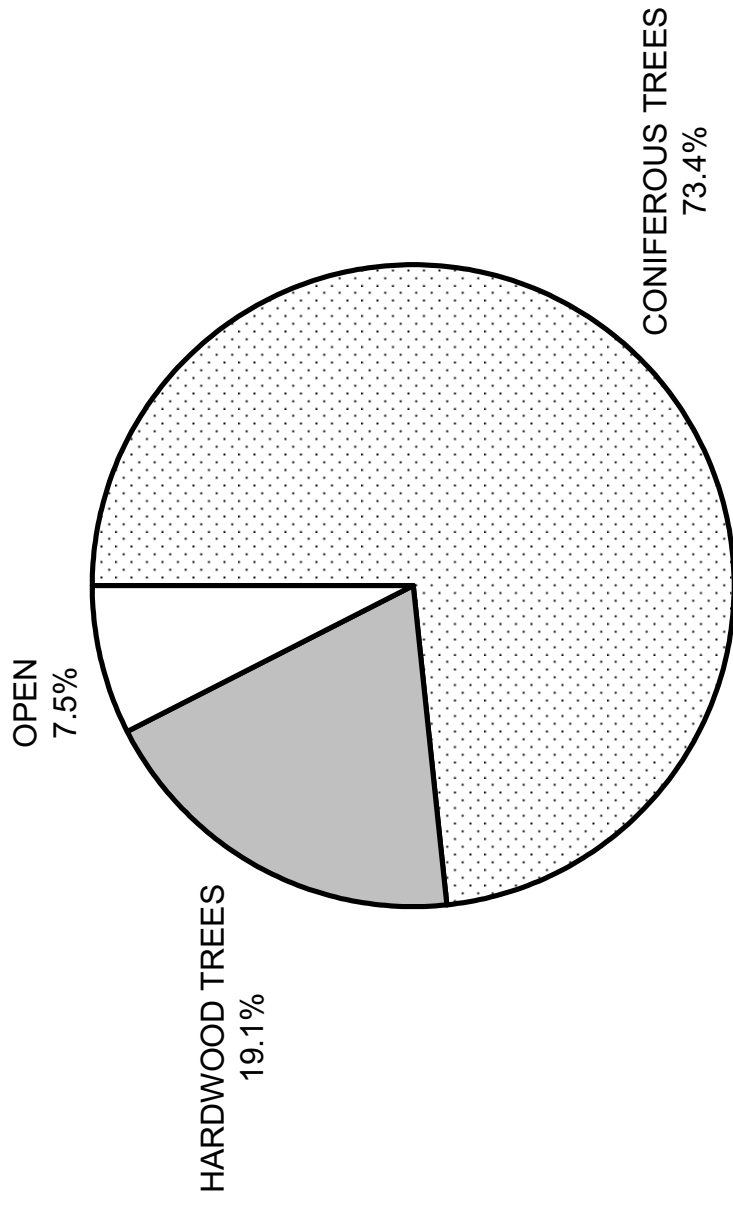
GRAPH 7

**"Gonzo Creek" 2010  
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



**GRAPH 8**

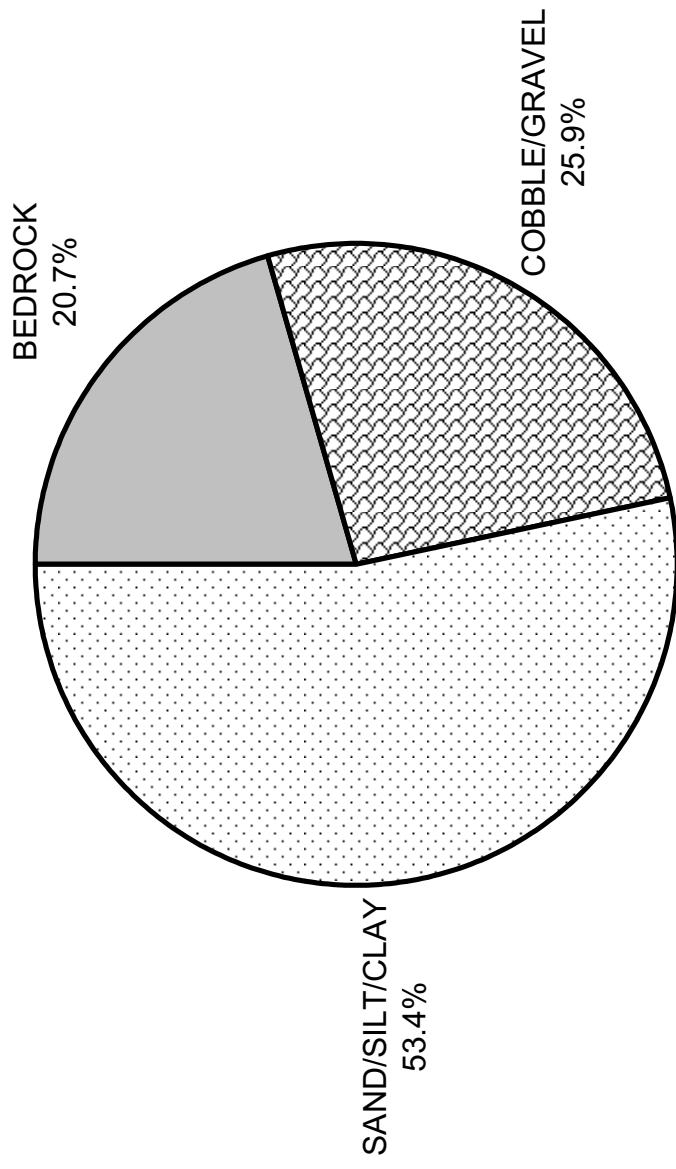
**"Gonzo Creek" 2010  
MEAN PERCENT CANOPY**



GRAPH 9

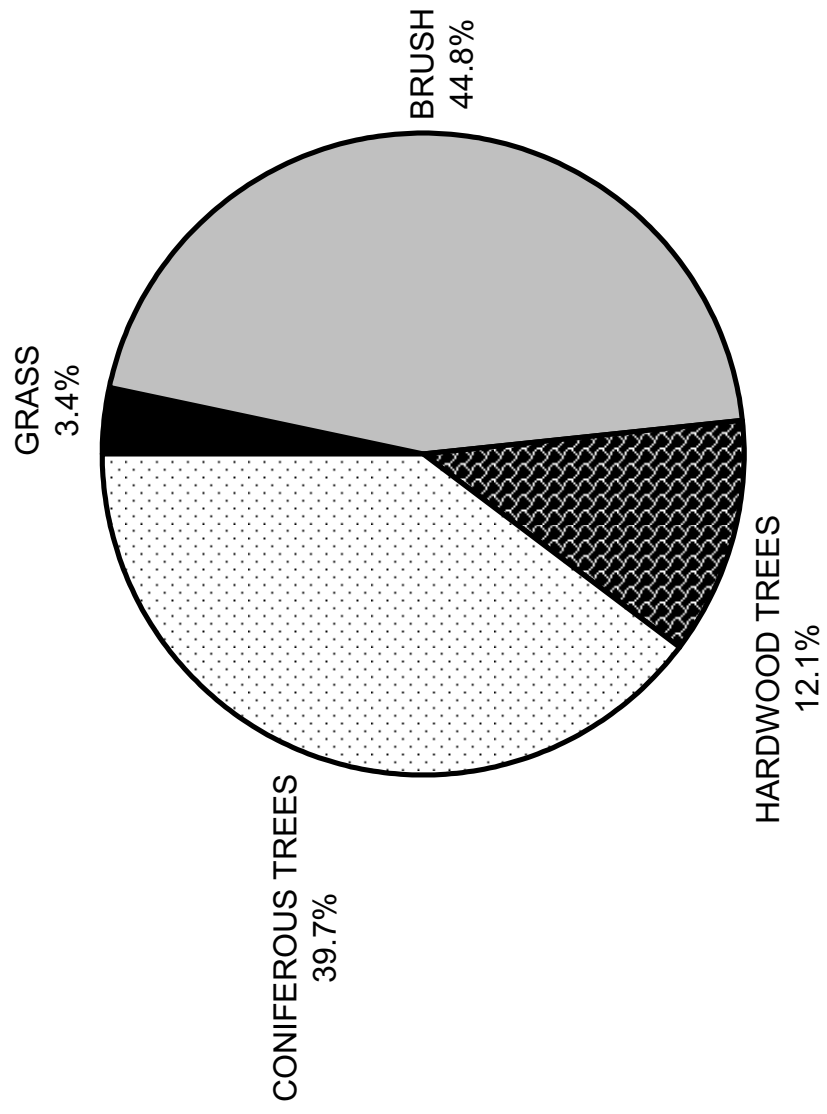


**"Gonzo Creek" 2010  
DOMINANT BANK COMPOSITION IN SURVEY REACH**



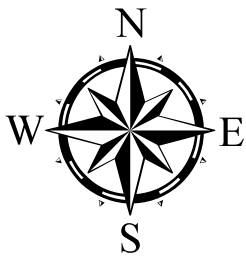
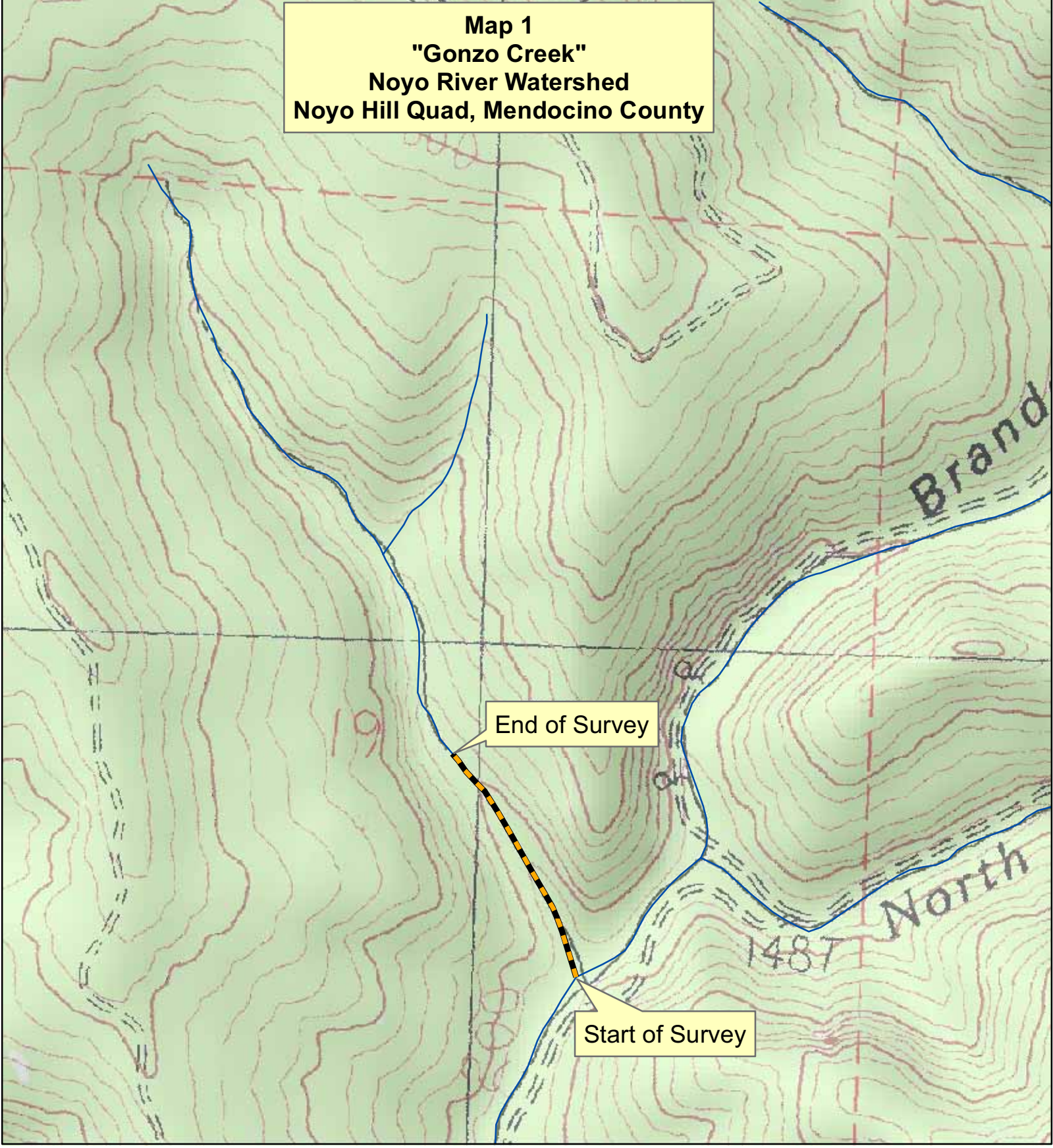
GRAPH 10

**"Gonzo Creek" 2010  
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

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



**Legend**

 Reach 1, Channel Type A4

