# STREAM INVENTORY REPORT

## Unnamed Tributary to Parlin Creek

### INTRODUCTION

A stream inventory was conducted from June 28 to June 29, 2010 on an unnamed tributary to Parlin Creek. The survey began at the confluence with Parlin Creek and extended upstream 0.4 miles.

The unnamed tributary 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 the unnamed tributary. 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

The unnamed tributary is a tributary to Parlin Creek, 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). The unnamed tributary's legal description at the confluence with Parlin Creek is T18N R16W S35. Its location is 39.38038 degrees north latitude and 123.62278 degrees west longitude, LLID number 1236215393803. The unnamed tributary is an intermittent stream according to the USGS Northspur 7.5 minute quadrangle. The unnamed tributary drains a watershed of approximately 0.8 square miles. Elevations range from about 390 feet at the mouth of the creek to 1,100 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is located within Jackson Demonstration State Forest and is managed for timber production. Vehicle access exists via California Division of Forestry and Fire Protection Road 340.

### METHODS

The habitat inventory conducted in unnamed tributary 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 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 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". Unnamed tributary 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, 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, 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 unnamed tributary, 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, 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. 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)
- 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 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 28 to June 29, 2010, was conducted by J. Coombes and A. Villalobos (WSP), and I. Mikus and S. McSmith (DFG). The total length of the stream surveyed was 2,302 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.17 cfs on June 30, 2010.

The unnamed tributary is a G4 channel type for 2,302 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 53 to 54 degrees Fahrenheit. Air temperatures ranged from 58 to 64 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 38% riffle units, 33% flatwater units, 28% pool units, and 2% no survey units (Graph 1). Based on total length of Level II habitat types there were 44% flatwater units, 42% riffle units, 11% pool units, and 3% no survey units (Graph 2).

Six Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 23%; mid-channel pool units, 20%; and step run units,

20% (Graph 3). Based on percent total length, step run units made up 37%, low gradient riffle units 25%, and high gradient riffle units 17%.

A total of 18 pools were identified (Table 3). Main channel pools were the most frequently encountered at 72% (Graph 4), and comprised 64% 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 18 pools (17%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 18 pool tail-outs measured, 4 had a value of 1 (22.2%); 8 had a value of 2 (44.4%); 5 had a value of 3 (27.8%); and 1 had a value of 4 (5.6%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst.

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 4, flatwater habitat types had a mean shelter rating of 27, and pool habitats had a mean shelter rating of 19 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 24. Main channel pools had a mean shelter rating of 17 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in the unnamed tributary. Graph 7 describes the pool cover in the unnamed tributary. Large woody debris is the dominant pool cover type followed by boulders.

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 61% of the pool tail-outs. Small cobble and boulders were the next most frequently observed dominant substrate types, each occurring 17% of the pool tail-outs.

The mean percent canopy density for the surveyed length of the unnamed tributary was 90%. Ten percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 9% and 91%, respectively. Graph 9 describes the mean percent canopy in unnamed tributary.

For the stream reach surveyed, the mean percent right bank vegetated was 98%. The mean percent left bank vegetated was 91%. The dominant elements composing the structure of the stream banks consisted of 100% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 73.3% of the units surveyed. Additionally, 21.7% of the units surveyed had brush as the dominant vegetation type, and 5.0% had deciduous trees as the dominant vegetation type (Graph 11).

Unnamed Tributary to Parlin Creek

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 10 sites for species composition and distribution in the unnamed tributary on June 30, 2010. The water temperature taken during the survey period of 0930 hours to 1025 hours was 53 degrees Fahrenheit. Air temperatures ranged from 55 to 57 degrees Fahrenheit. The sites were sampled by S. McSmith and I. Mikus (DFG).

Ten sites were sampled from the confluence with Parlin Creek upstream to above the end of the stream survey, approximately 2,363 feet. The sites yielded 1 young-of-the-year steelhead/rainbow trout (SH/RT), 5 age 1+ SH/RT, and 1 age 2+ SH/RT.

The following chart displays the information yielded from these sites:

2010 Unnamed Tributary underwater observations.

| Date | Survey Site # | Habitat Unit # | Habitat Type | Approx. Dist. from mouth (ft.) | SH/RT | | | Coho | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | YOY | 1+ | 2+ | YOY | 1+ |
| G4 Channel Type | | | | | | | | | |
| 06/30/10 | 1 | 002 | Pool | 40 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 004 | Pool | 154 | 0 | 1 | 0 | 0 | 0 |
| | 3 | 006 | Pool | 212 | 0 | 0 | 1 | 0 | 0 |
| | 4 | 011 | Pool | 436 | 1 | 0 | 0 | 0 | 0 |
| | 5 | 014 | Pool | 557 | 0 | 1 | 0 | 0 | 0 |
| | 6 | 029 | Pool | 1292 | 0 | 1 | 0 | 0 | 0 |
| | 7 | 048 | Pool | 1777 | 0 | 0 | 0 | 0 | 0 |
| | 8 | 060 | Pool | 2199 | 0 | 1 | 0 | 0 | 0 |
| | 9 | 062 | Pool | 2263 | 0 | 1 | 0 | 0 | 0 |
| | 10 | Above Survey | Pool | | 0 | 0 | 0 | 0 | 0 |

DISCUSSION

The unnamed tributary is a G4 channel type for the entire 2,302 feet of stream surveyed. 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 June 28 to June 29, 2010, ranged from 53 to 54 degrees Fahrenheit. Air temperatures ranged from 58 to 64 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 44% of the total length of this survey, riffles 42%, and pools 11%. Three of the 18 (17%) 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 that will increase or deepen pool habitat is recommended.

Twelve of the 18 pool tail-outs measured had embeddedness ratings of 1 or 2. Six of the pool tail-outs had embeddedness ratings of 3 or 4. None 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.

Fourteen of the 18 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 19. The shelter rating in the flatwater habitats is 27. 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 the unnamed tributary. Large woody debris is the dominant cover type in pools followed by boulders. 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 90%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 98% 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) The unnamed tributary should be managed as an anadromous, natural production stream.

2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

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

## COMMENTS AND LANDMARKS

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

| Position (ft): | Habitat unit #: | Comments: |
|---|---|---|
| 0 | 0001.00 | Start of survey at the confluence with Parlin Creek. The channel is a G4 for the entire length of the survey. |
| 122 | 0004.00 | There is a 3.5' high plunge. |
| 196 | 0006.00 | There is a 2.8' high plunge. |
| 1224 | 0028.00 | Log debris accumulation (LDA) #01 contains eight pieces of large woody debris (LWD) and measures 3' high x 7' wide x 28' long. Water flows through the LDA and there are visible gaps in it. The LDA is not retaining sediment. Fish are present above the LDA. |
| 1276 | 0029.00 | There is a 1.3' high plunge. |
| 1487 | 0036.00 | Tributary #01 enters on the right bank. It contributes to approximately 25% of the unnamed tributary's flow. The water temperature downstream and upstream of the tributary is 54 degrees Fahrenheit; the water temperature of the tributary is 53 degrees Fahrenheit. The slope of the tributary is 5%. The first 75' of the tributary are accessible to fish. Salmonids were observed in the tributary. |
| 1911 | 0054.00 | LDA #02 contains three pieces of LWD and measures 5' high x 9' wide x 10' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to gravel and measures 9' wide x 75' long x 2' deep. Fish are present above the LDA. |
| 2016 | 0056.00 | LDA #03 contains three pieces of LWD and measures 3' high x 12' wide x 6' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to gravel and measures 12' wide x 75' long x 2' deep. Fish are present above the LDA. |
| 2022 | 0057.00 | Tributary #02 enters on the right bank. It contributes to approximately 10% of the unnamed tributary's flow. The water temperature |

| | | |
|---|---|---|
| | | downstream and upstream of the tributary is 54 degrees Fahrenheit; the water temperature of the tributary is 54 degrees Fahrenheit. The slope of the tributary is approximately 120%, making it inaccessible to fish. |
| 2263 | 0063.00 | There is a 2' high plunge. |
| 2302 | 0064.00 | End of survey due to an 8' high plunge over an old growth redwood root wad with a water depth of 0.8' below it. |

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] | |

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

Stream Name: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 5 | FLATWATER | 32.8 | 48 | 1013 | 44.0 | 6.0 | 0.4 | 0.8 | 244 | 5117 | 128 | 2686 | | 27 |
| 1 | 0 | NOSURVEY | 1.6 | 71 | 71 | 3.1 | | | | | | | | | |
| 18 | 18 | POOL | 28.1 | 13 | 242 | 10.5 | 7.3 | 0.7 | 1.4 | 100 | 1806 | 94 | 1690 | 75 | 19 |
| 24 | 7 | RIFFLE | 37.5 | 41 | 976 | 42.4 | 4.2 | 0.2 | 0.6 | 183 | 4394 | 46 | 1110 | | 4 |

| Total Units | Total Units Fully Measured | Total Length (ft.) | Total Area (sq.ft.) | Total Volume (cu.ft.) |
|---|---|---|---|---|
| 64 | 30 | 2302 | 11317 | 5487 |

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

Stream Name: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

| 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 (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 5 | LGR | 23.4 | 39 | 584 | 25.4 | 4 | 0.2 | 1.1 | 219 | 3291 | 57 | 861 | | 2 | 91 |
| 9 | 2 | HGR | 14.1 | 44 | 392 | 17.0 | 4 | 0.2 | 0.5 | 92 | 830 | 18 | 166 | | 8 | 90 |
| 8 | 2 | RUN | 12.5 | 21 | 166 | 7.2 | 7 | 0.5 | 1 | 262 | 2093 | 165 | 1319 | | 3 | 92 |
| 13 | 3 | SRN | 20.3 | 65 | 847 | 36.8 | 5 | 0.4 | 1 | 232 | 3013 | 103 | 1342 | | 43 | 91 |
| 13 | 13 | MCP | 20.3 | 12 | 154 | 6.7 | 7 | 0.7 | 2 | 86 | 1115 | 71 | 929 | 57 | 17 | 90 |
| 5 | 5 | PLP | 7.8 | 18 | 88 | 3.8 | 8 | 0.8 | 2 | 138 | 691 | 152 | 761 | 121 | 24 | 87 |
| 1 | 0 | NS | 1.6 | 71 | 71 | 3.1 | | | | | | | | | | |

| Total Units | Total Units Fully Measured | Total Length (ft.) | Total Area (sq.ft.) | Total Volume (cu.ft.) |
|---|---|---|---|---|
| 64 | 30 | 2302 | 11032 | 5379 |

**Table 3 - Summary of Pool Types**

Stream Name: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 13 | MAIN | 72 | 12 | 154 | 64 | 7.2 | 0.7 | 86 | 1115 | 57 | 737 | 17 |
| 5 | 5 | SCOUR | 28 | 18 | 88 | 36 | 7.6 | 0.8 | 138 | 691 | 121 | 607 | 24 |

| Total Units | Total Units Fully Measured | Total Length (ft.) | Total Area (sq.ft.) | Total Volume (cu.ft.) |
|---|---|---|---|---|
| 18 | 18 | 242 | 1806 | 1344 |

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

Stream Name: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

| Habitat Units | Habitat Type | Habitat Occurrence (%) | < 1 Foot Maximum Residual Depth | < 1 Foot Percent Occurrence | 1 < 2 Feet Maximum Residual Depth | 1 < 2 Feet Percent Occurrence | 2 < 3 Feet Maximum Residual Depth | 2 < 3 Feet Percent Occurrence | 3 < 4 Feet Maximum Residual Depth | 3 < 4 Feet Percent Occurrence | >= 4 Feet Maximum Residual Depth | >= 4 Feet Percent Occurrence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | MCP | 72 | 2 | 15 | 10 | 77 | 1 | 8 | 0 | 0 | 0 | 0 |
| 5 | PLP | 28 | 0 | 0 | 3 | 60 | 2 | 40 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 18 | 2 | 11 | 13 | 72 | 3 | 17 | 0 | 0 | 0 | 0 |

Mean Maximum Residual Pool Depth (ft.): 1.4

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

Stream Name: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010 Dry Units: 0

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 5 | LGR | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 50 | 0 |
| 9 | 2 | HGR | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 80 | 0 |
| 24 | 7 | TOTAL RIFFLE | 0 | 0 | 35 | 0 | 0 | 0 | 0 | 65 | 0 |
| 8 | 2 | RUN | 0 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 3 | SRN | 3 | 13 | 67 | 10 | 7 | 0 | 0 | 0 | 0 |
| 21 | 5 | TOTAL FLAT | 3 | 10 | 75 | 8 | 5 | 0 | 0 | 0 | 0 |
| 13 | 13 | MCP | 8 | 14 | 45 | 10 | 0 | 0 | 2 | 15 | 5 |
| 5 | 5 | PLP | 6 | 16 | 59 | 6 | 0 | 0 | 0 | 13 | 0 |
| 18 | 18 | TOTAL POOL | 7 | 14 | 49 | 9 | 0 | 0 | 2 | 15 | 4 |
| 1 | 0 | NS | | | | | | | | | |
| 64 | 30 | TOTAL | 5 | 11 | 51 | 7 | 1 | 0 | 1 | 20 | 3 |

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

Stream Name: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010 Dry Units: 0

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 5 | LGR | 0 | 0 | 60 | 40 | 0 | 0 | 0 |
| 9 | 2 | HGR | 0 | 0 | 0 | 100 | 0 | 0 | 0 |
| 8 | 2 | RUN | 0 | 0 | 50 | 50 | 0 | 0 | 0 |
| 13 | 3 | SRN | 0 | 0 | 67 | 33 | 0 | 0 | 0 |
| 13 | 13 | MCP | 0 | 15 | 62 | 0 | 8 | 15 | 0 |
| 5 | 5 | PLP | 0 | 20 | 60 | 0 | 0 | 20 | 0 |

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

Stream Name: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

| Mean Percent Canopy | Mean Percent Conifer | Mean Percent Hardwood | Mean Percent Open Units | Mean Right Bank % Cover | Mean Left Bank % Cover |
|---|---|---|---|---|---|
| 90 | 91 | 9 | 0 | 98 | 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: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010 Survey Length (ft.): 2302 Main Channel (ft.): 2302 Side Channel (ft.): 0

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

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

**STREAM REACH: 1**

Channel Type: G4
Reach Length (ft.): 2302
Riffle/Flatwater Mean Width (ft.): 5.0
BFW:
Range (ft.): 9 to 13
Mean (ft.): 11
Std. Dev.: 2
Base Flow (cfs.): 0.2
Water (F): 53 - 54 Air (F): 58 - 64
Dry Channel (ft): 0

Canopy Density (%): 90.1
Coniferous Component (%): 91.4
Hardwood Component (%): 8.6
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 94.2
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 42
LWD per 100 ft.:
Riffles: 6
Pools: 14
Flat: 7

Pools by Stream Length (%): 10.5
Pool Frequency (%): 28.1
Residual Pool Depth (%):
< 2 Feet Deep: 83
2 to 2.9 Feet Deep: 17
3 to 3.9 Feet Deep: 0
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.4
Mean Pool Shelter Rating: 19

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 6 Gravel: 61 Sm Cobble: 17 Lg Cobble: 0 Boulder: 17 Bedrock: 0

Embeddedness Values (%): 1. 22.2 2. 44.4 3. 27.8 4. 5.6 5. 0.0

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

Stream Name: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

### 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 | 0 | 0 | 0.0 |
| Boulder | 0 | 0 | 0.0 |
| Cobble / Gravel | 0 | 0 | 0.0 |
| Sand / Silt / Clay | 30 | 30 | 100.0 |

### Mean Percentage of Dominant Stream Bank Vegetation

| Dominant Class of Vegetation | Number of Units Right Bank | Number of Units Left Bank | Total Mean Percent (%) |
|---|---|---|---|
| Grass | 0 | 0 | 0.0 |
| Brush | 10 | 3 | 21.7 |
| Hardwood Trees | 0 | 3 | 5.0 |
| Coniferous Trees | 20 | 24 | 73.3 |
| No Vegetation | 0 | 0 | 0.0 |

**Total Stream Cobble Embeddedness Values:** 2

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

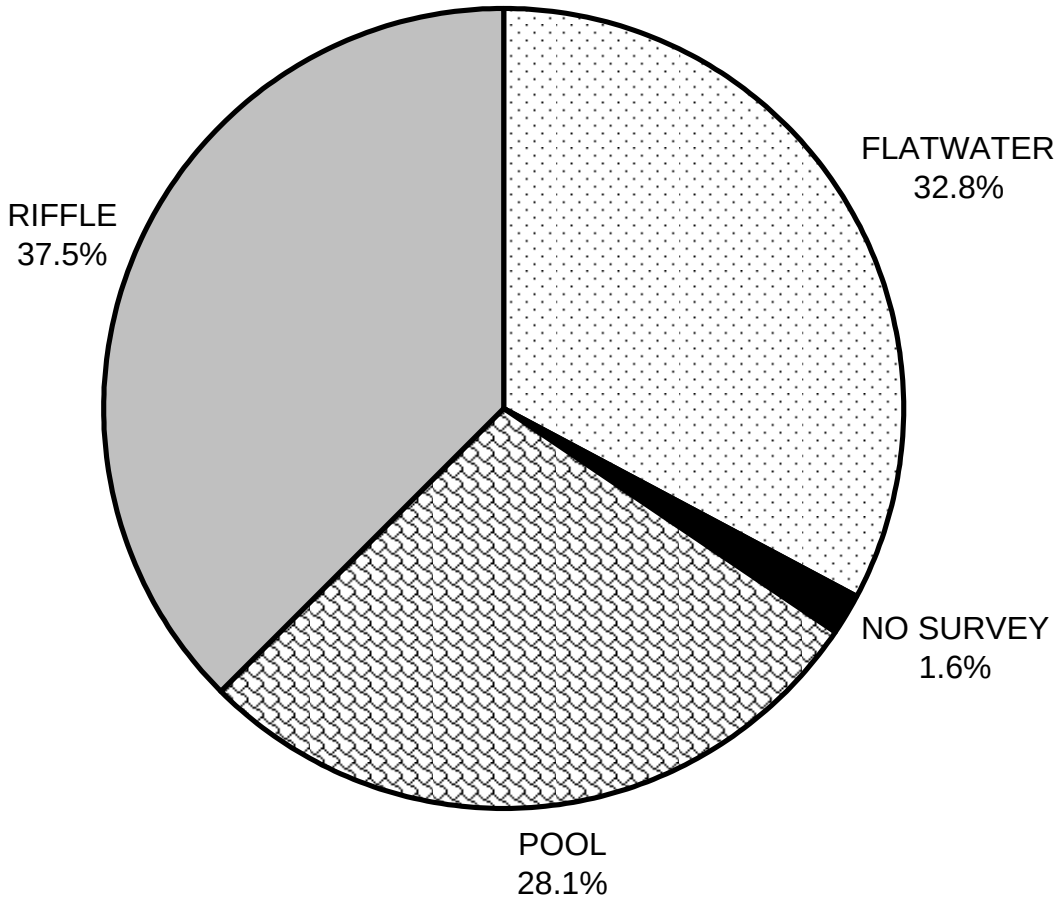
StreamName: 1236215393803 LLID: 1236215393803 Drainage: Noyo River

Survey Dates: 6/28/2010 to 6/29/2010

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR16WS35 Latitude: 39:22:49.0N Longitude: 123:37:17.0W

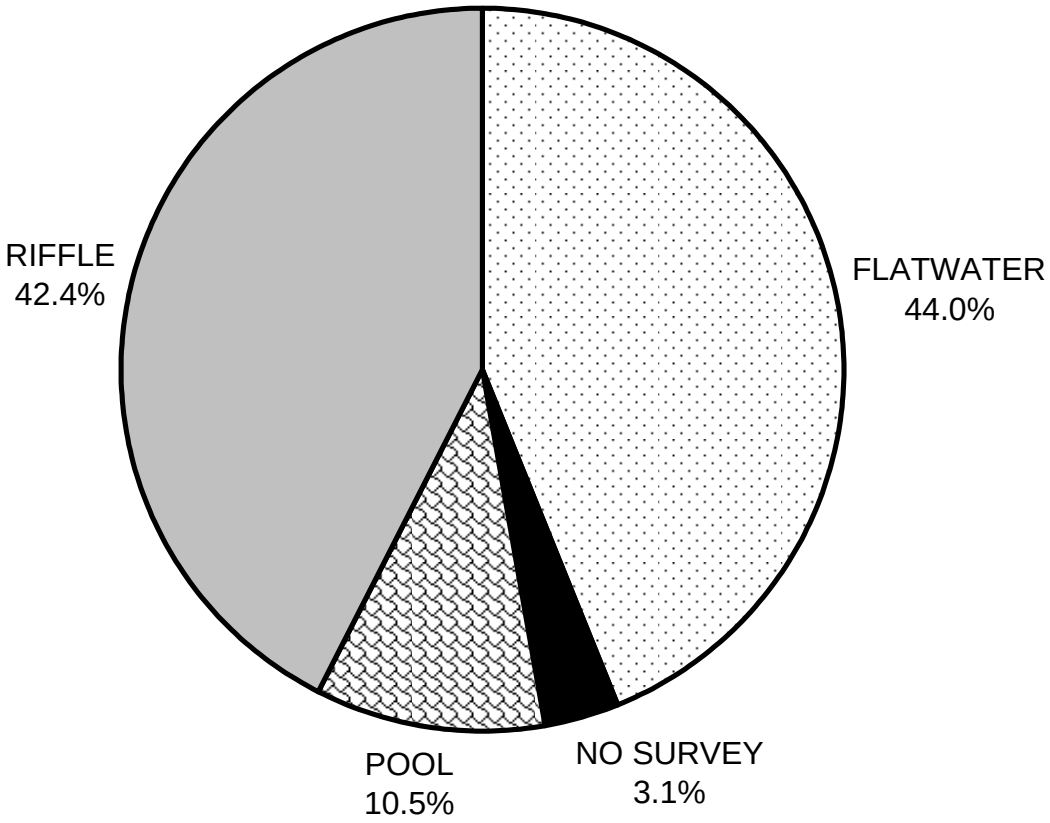
| | Riffles | Flatwater | Pools |
|---|---|---|---|
| UNDERCUT BANKS (%) | 0 | 3 | 7 |
| SMALL WOODY DEBRIS (%) | 0 | 10 | 14 |
| LARGE WOODY DEBRIS (%) | 35 | 75 | 49 |
| ROOT MASS (%) | 0 | 8 | 9 |
| TERRESTRIAL VEGETATION (%) | 0 | 5 | 0 |
| AQUATIC VEGETATION (%) | 0 | 0 | 0 |
| WHITEWATER (%) | 0 | 0 | 2 |
| BOULDERS (%) | 65 | 0 | 15 |
| BEDROCK LEDGES (%) | 0 | 0 | 4 |

# LLID #1236215393803 2010
# HABITAT TYPES BY PERCENT OCCURRENCE



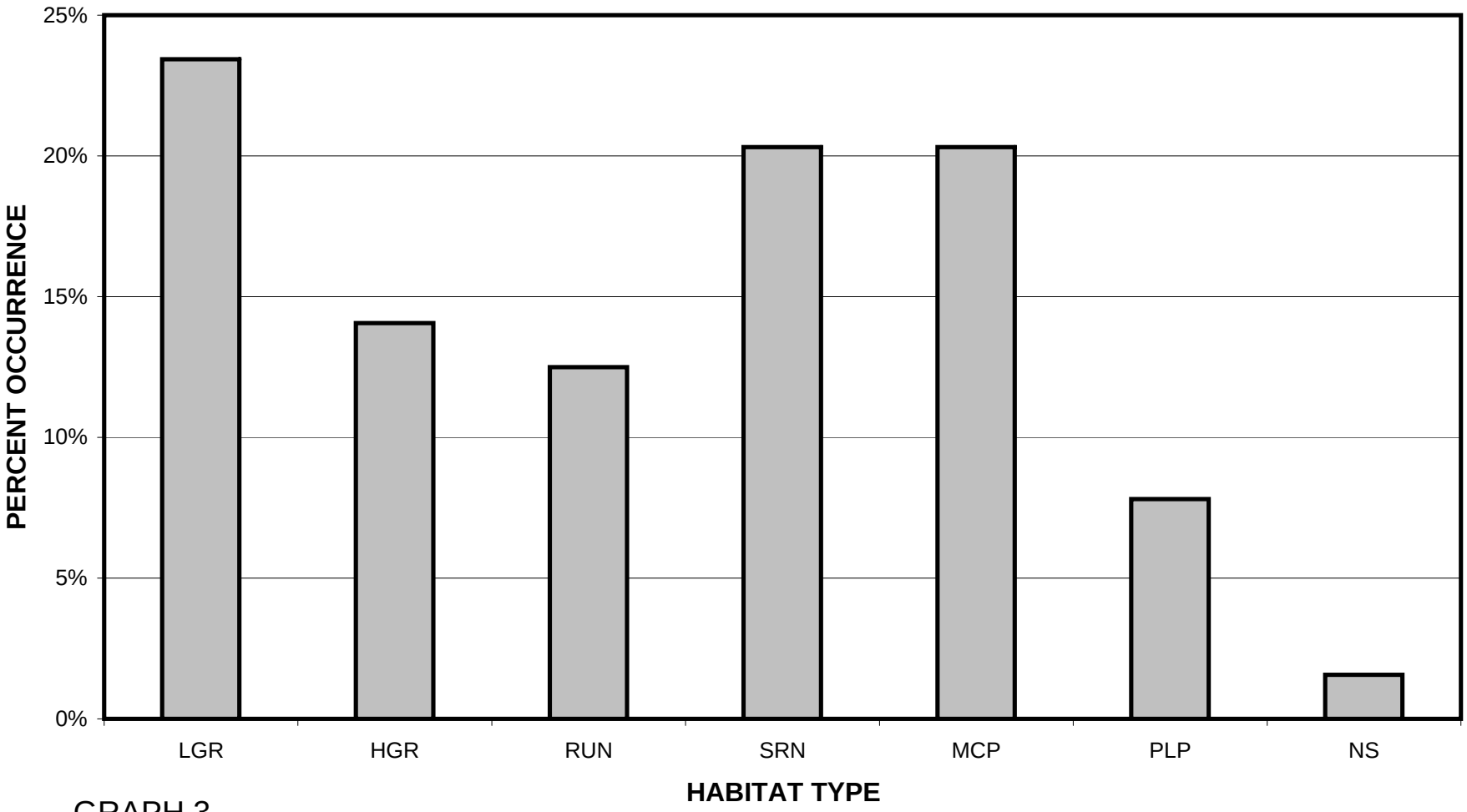

GRAPH 1

# LLID #1236215393803 2010
# HABITAT TYPES BY PERCENT TOTAL LENGTH



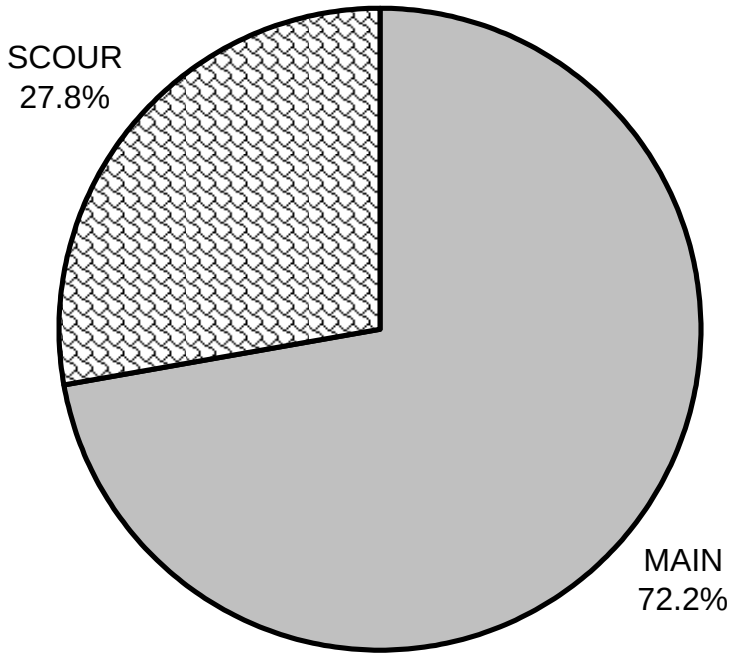

GRAPH 2

# LLID #1236215393803 2010
# HABITAT TYPES BY PERCENT OCCURRENCE



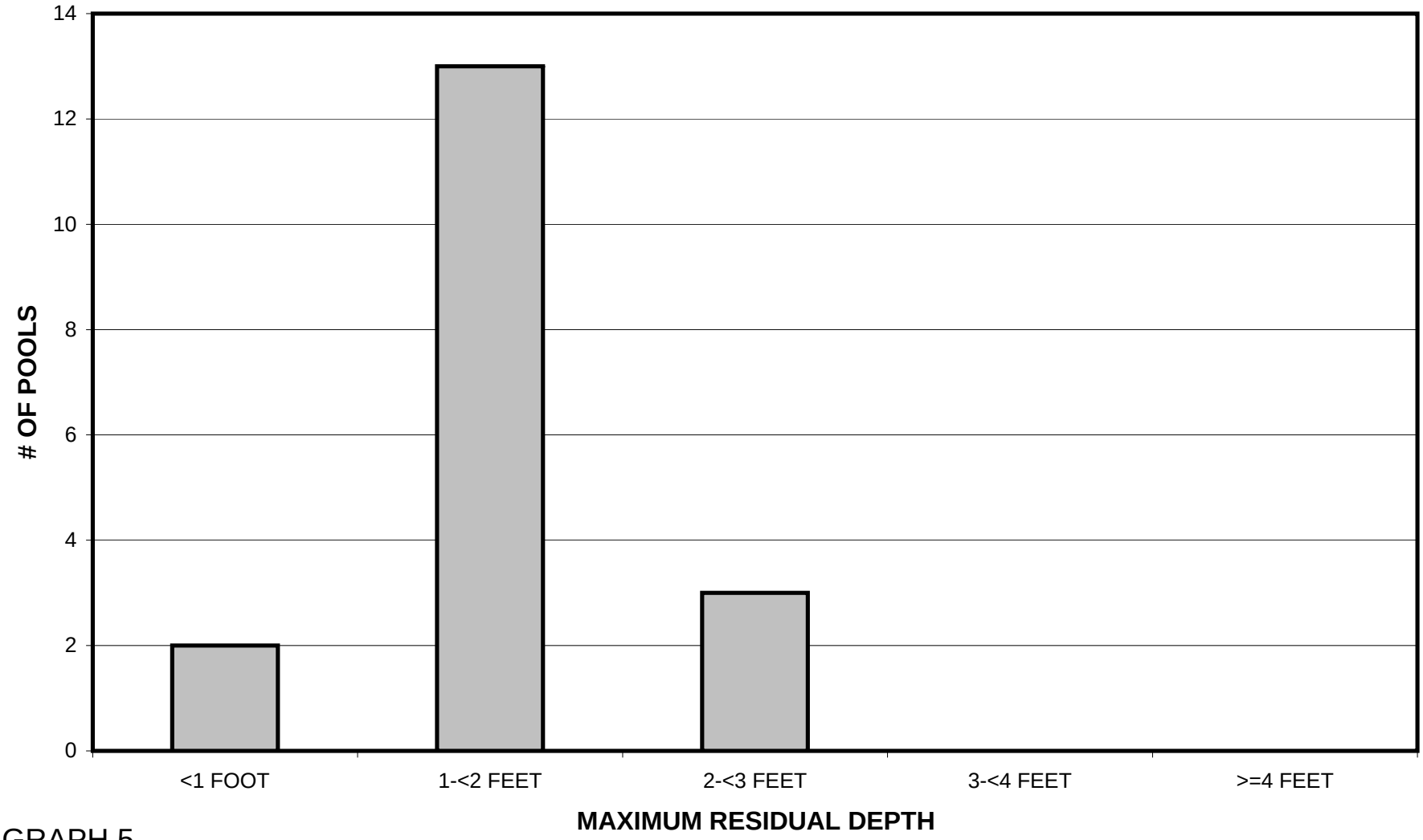

GRAPH 3

# LLID #1236215393803 2010
# POOL TYPES BY PERCENT OCCURRENCE



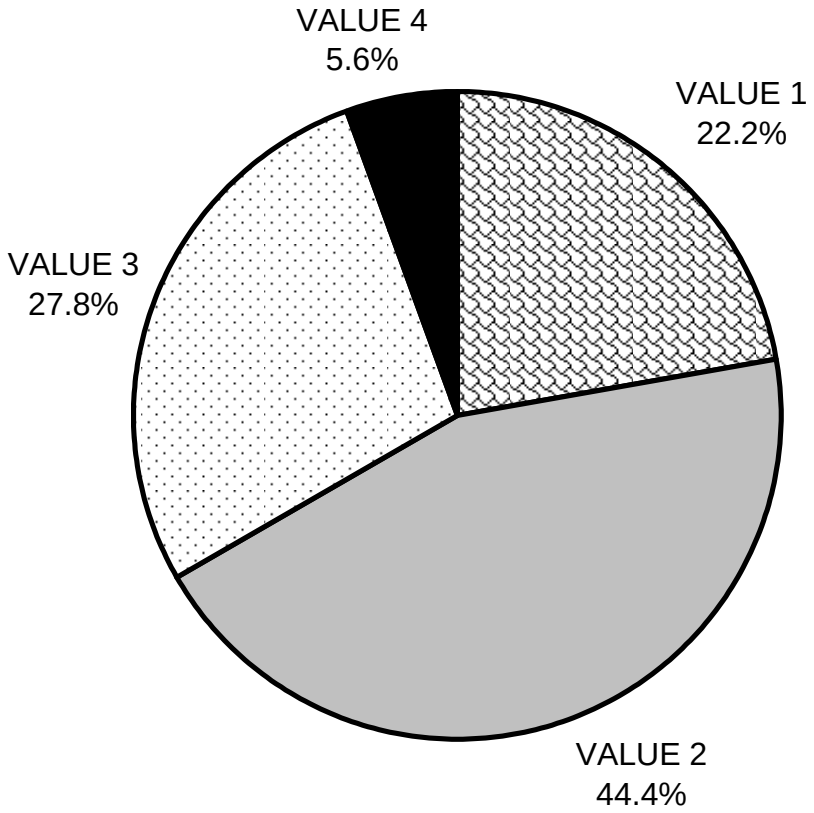

GRAPH 4

# LLID #1236215393803 2010
# MAXIMUM DEPTH IN POOLS



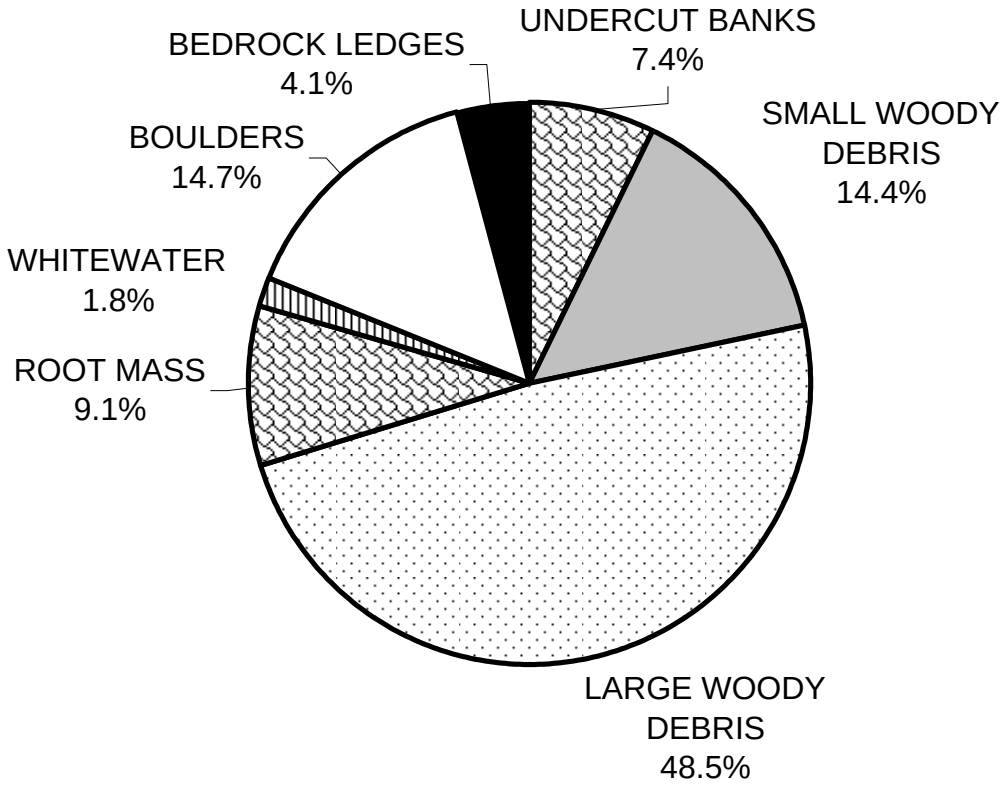

GRAPH 5

# LLID #1236215393803 2010
# PERCENT EMBEDDEDNESS



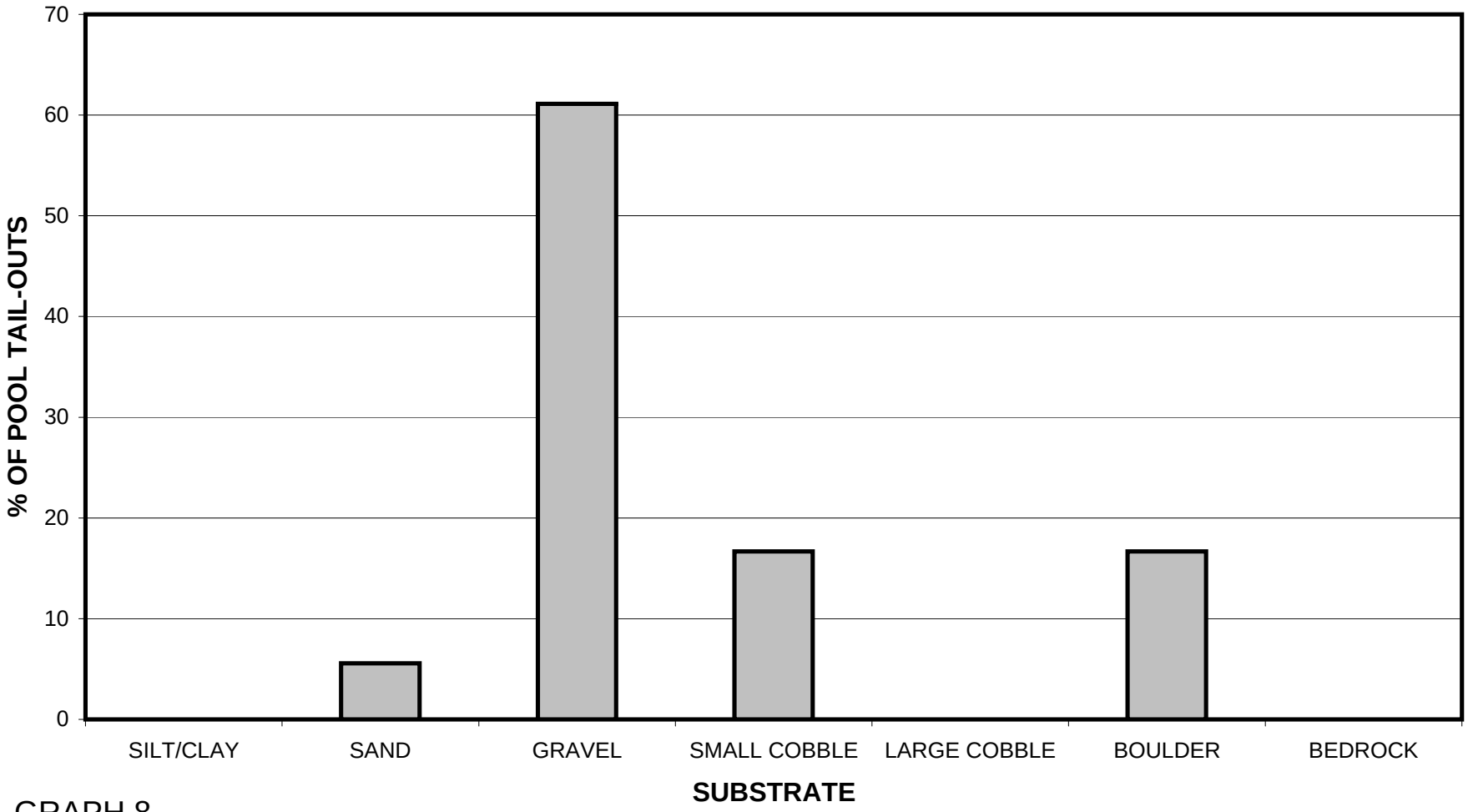

GRAPH 6

# LLID #1236215393803 2010
# MEAN PERCENT COVER TYPES IN POOLS



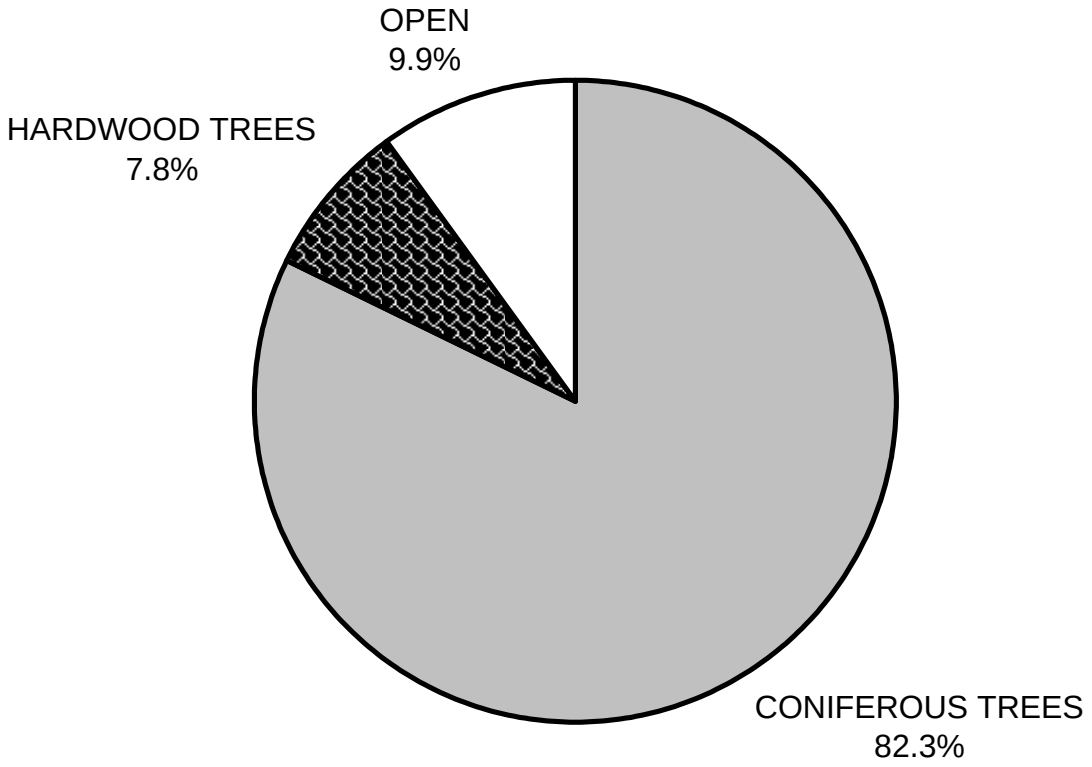

GRAPH 7

# LLID #1236215393803 2010
# SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



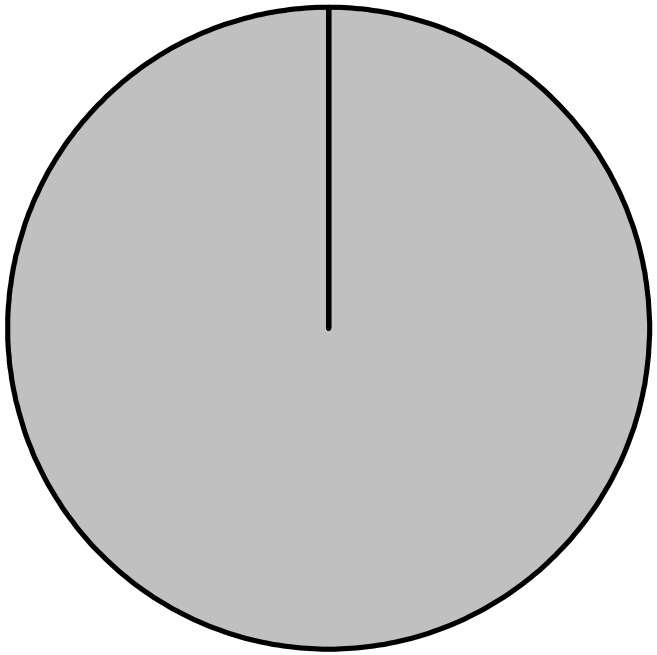

GRAPH 8

# LLID #1236215393803 2010
# MEAN PERCENT CANOPY



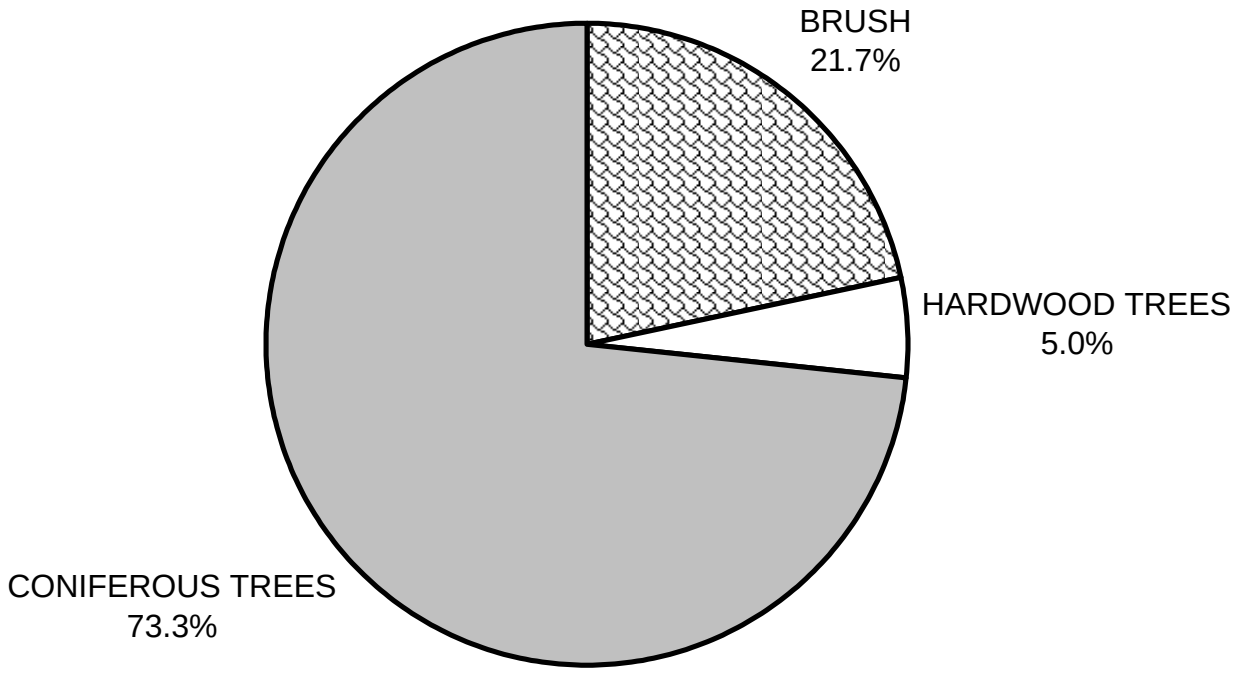

GRAPH 9

# LLID #1236215393803 2010
# DOMINANT BANK COMPOSITION IN SURVEY REACH




GRAPH 10

# LLID #1236215393803 2010
# DOMINANT BANK VEGETATION IN SURVEY REACH




GRAPH 11