

**CALIFORNIA DEPARTMENT OF FISH AND GAME  
STREAM INVENTORY REPORT**

Porterfield Creek

*Report Revised April 14, 2006*

*Report Completed 2005*

*Assessment Completed 2002*

INTRODUCTION

A stream inventory was conducted during the summer of 2002 on Porterfield Creek, a stream in the Russian River basin. Stream inventories and subsections to this report were also completed for the North and South branches and one tributary. The inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the amount and condition of available habitat to fish, and other aquatic species with an emphasis on anadromous salmonids in Porterfield Creek. The objective of the biological inventory was to document the salmonid and other aquatic species present and their distribution.

The objective of this report is to document the current habitat conditions and, after analyzing historical and recent data, recommend options for the potential enhancement of habitat for Chinook salmon, 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

Porterfield Creek is tributary to Russian River and located in Sonoma County, California (see Porterfield Creek map, page 2). The legal description at the confluence with Russian River is T11N, R10W, S20. Its location is 38°47'23.16"N latitude and 123°00'09.54"W longitude. Access exists on the south side of the city of Cloverdale.

Porterfield Creek and its tributaries drain a basin of approximately 2500.2 acres (3.9 square miles) Porterfield Creek is a maximum third order stream and has approximately 7900.3 feet (1.50 miles) of blue line stream, according to the USGS "Cloverdale" 7.5 minute quadrangles. Major tributaries are the North Branch and South Branch and an un-named tributary. The habitat survey results for these tributaries are included in this report. Elevations range from about 276 feet at the mouth of the creek to 1417 feet in the headwaters. The vegetation is primarily hardwood (25%) and mixed hardwood conifer (14%) with some shrub (6%) and herbaceous vegetation (6%). Thirty percent of the basin is agricultural and 14% is urban. The watershed is 98.7% privately owned. Salmonid fish species present include steelhead trout.

METHODS

The habitat inventory conducted in Porterfield Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi, et al., 1998). The California Department of Fish and Game (DFG) field crew that conducted the inventory was trained in standardized habitat inventory methods by DFG. This inventory was conducted by 2 person teams

and was supervised by Robert Coey, Russian River Planner (DFG).

### 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 Porterfield Creek to record measurements and observations. There are nine components to the inventory form: flow, channel type, air and water temperatures, habitat type, embeddedness, shelter rating, substrate composition, canopy, and bank composition.

#### 1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using standard flow measuring equipment, if available. In some cases flows are estimated. Flows were also measured or estimated at major tributary confluences.

#### 2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1985 rev. 1994). This methodology is described in the California Salmonid Stream Habitat Restoration Manual. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

#### 3. Temperatures:

Water and air temperatures, and time, are measured by crew members with hand held thermometers and recorded at each tenth unit typed. Temperatures are measured in Fahrenheit at the middle of the habitat unit and within one foot of the water surface. Temperatures are also recorded using remote temperature recorders which log temperatures every 1.5 hours, 24 hours/day.

#### 4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1988). 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. Porterfield 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 were in feet to the nearest tenth. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a hip chain, and stadia rod.

#### 5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Porterfield Creek, embeddedness was visually estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3), 76 - 100% (value 4). Additionally, a rating of "not suitable" (value 5) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, or other considerations.

#### 6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide 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. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In Porterfield Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the shelter. The shelter rating is calculated for each habitat unit by multiplying shelter value and percent covered. 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 measured habitat units, dominant and sub-dominant substrate elements were visually estimated using a list of seven size classes which are defined in the California Salmonid Stream Habitat Restoration Manual.

#### 8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the California Salmonid Stream Habitat Restoration Manual. Canopy density relates to the amount of stream shaded from the sun. In Porterfield Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the top 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 visually into percentages of evergreen or deciduous 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 Porterfield Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully measured 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.

### BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. Biological inventory is conducted using one or more of four basic methods: 1) stream bank observation, 2) underwater observation, 3) electro fishing, or 4) seine netting. Methods 1-3 are discussed in the California Salmonid Stream Habitat Restoration Manual. Seine netting is a fish capture technique that involves the use of a one meter square net attached to dowels on two parallel sides. The surveyor pushes the seine through the habitat unit to catch aquatic organisms. At the end of the unit the surveyor scoops up the seine and places all captured organisms in a bucket partially filled with stream water for holding. The water is aerated with a bubbler to maintain dissolved oxygen levels and minimize stress on the organisms. All fish, amphibians, and reptiles in the holding bucket are identified to species, counted and returned to the stream. Data is recorded on an electrofishing field form. Seine netting is used to confirm the presence of a species, particularly salmon and steelhead, and is not intended to quantify a population estimate.

### IMPACT INVENTORY & ANALYSIS

Problems such as migration barriers, streambed erosion, poor water quality or temperatures are noted in the comments and landmarks section. In some cases measurements are taken, an analysis of what caused the problem is made and restoration potential and alternatives are recommended.

### DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat for data storage and analysis. Habitat is a Visual Basic extension to Microsoft Access, developed by Zebulon Young, University of California, Berkeley. This program processes and summarizes the data, and produces the following tables and appendices:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters
- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of shelter by habitat types

- Summary of dominant substrates by habitat types
- Summary of fish habitat elements by stream reach

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Porterfield Creek include:

- Level II habitat types by % occurrence
- Level II habitat types by % total length
- Level IV habitat types by % occurrence
- Level I pool habitat types by % occurrence
- Maximum depth in pools
- Percent embeddedness estimated in pool tail-outs
- Mean percent cover types in pools
- Substrate composition in pool tail-outs
- Mean percent canopy
- Dominant bank composition in survey reach
- Dominant bank vegetation in survey reach

#### HISTORICAL STREAM SURVEYS:

The Department of Fish and Game conducted a previous survey of Porterfield Creek on January 22, 1976. The stream was surveyed from mouth to headwaters in both the North and South Branches by Jerry Marco and Charles Holstine. A brief summary of the survey follows.

At 0930 the air temperature was 58°F and the water temperature was 44°F. The North Branch was well shaded with Douglas fir, alder and bay, while the lower section was moderately shaded by alder and oak. Two hundred yards above the confluence with the South Branch was a two surface acre pond. The upper section of the South Branch was shaded by fir, alder and bay while the lower section, flowing through pasture land, had poor canopy cover of oak and willow. After the North and South Branch convergence, Porterfield Creek flowed through farmland and vineyards, the canopy consisting of willow and oak. Portions of the creek in the farmland area had vertical deep banks which appeared susceptible to erosion. Below Highway 101, the stream flowed through an urbanized area and was channelized. At the railroad bridge the stream disappeared underground and the remaining creek, to the Russian River, was dry with sparse oak, abundant willow and berry bushes as canopy.

Stream flow and the width and depth of pools and riffles were measured. The surveyors visually estimated flows and noted it was an uncharacteristically dry winter. In the lower section flow was 1 cfs and the upper section 0.5 cfs. In the upper section, pool width ranged 2-4' (avg. 4') and depth ranged 1-5' (avg. 3'). Riffle width ranged 1-5' (avg. 2') and depth ranged 1-4" (avg. 2"). In the lower section, the pool width ranged 2-10' (avg 6') and depth ranged 1-4' (avg. 2'). Riffle width ranged 2-12' (avg. 5') and depth ranged 1-8" (avg. 4"). Pools were formed by boulders, undercut banks and a few log jams. Pool shelter in the lower section was provided by undercut banks and terrestrial vegetation. In the upper section shelter consisted mostly of boulders and undercut banks.

Substrate in the upper section consisted of 10% bedrock, 20% boulders, 40% rubble, 20% gravel, and 10% sand/silt/detritus. The lower section substrate consisted of 5% bedrock, 10% boulders, 40% rubble, 30% gravel, and 15% sand/silt/detritus. Barriers included a 10' bedrock falls located on the South Branch three-quarters of a mile upstream from Hwy 101 and the pond a half mile from Hwy 101 on the North Branch. The upper section was considered a valuable steelhead nursery area. Porterfield Creek was deemed a good steelhead spawning and nursery area with approximately 20% of the area available for spawning and 80% pools and sheltered areas.

## HABITAT INVENTORY RESULTS FOR PORTERFIELD CREEK

\* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT \*

The habitat inventory of Porterfield Creek, 9/9/2002 - 9/10/2002, was conducted by Jake Newell (DFG) and Cassie Simons (Americorps) with supervision and analysis by California Department of Fish and Game (DFG). The survey began at the confluence with Russian River and extended up Porterfield Creek to the forks. The total length of stream surveyed was 7965 feet.

Flow was estimated, using surface velocity, to be 0.15 cfs Reach 1 on 9/12/02.

This section of Porterfield Creek has one reach with one distinct channel type: from the mouth to 7965 feet a B4. B4 channel types are moderately entrenched, moderate gradient (2-4%), riffle dominated channels, with infrequently spaced pools, a very stable plan and profile, stable banks and have a predominantly gravel substrate.

Water temperatures ranged from 59°F to 65°F. Air temperatures ranged from 69°F to 83°F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 47% flatwater units, 4% dry units, 17% riffle units, 29% pool units, 3% culvert units, (Graph 1). Based on total **length** of Level II habitat types there were 50% flatwater units, 32% dry units, 4% riffle units, 9% pool units, 5% culvert units, (Graph 2).

Eleven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were 12% Glide units, 4% Dry units, 13% Run units, 14% Low Gradient Riffle units, 15% Mid-Channel Pool units, 3% Culvert units, 23% Step Run units, 6% Lateral Scour Pool - Root Wad Enhanced units, 4% Lateral Scour Pool - Bedrock Formed units, 3% Cascade units, 1% Trench Pool units, 3% Dammed Pool units, (Graph 3). Based on percent total **length**, 9% Glide units, 32% Dry units, 16% Run units, 4% Low Gradient Riffle units, 5% Mid-Channel Pool units, 5% Culvert units, 26% Step Run units, 2% Lateral Scour Pool - Root Wad Enhanced units, 1% Lateral Scour Pool - Bedrock Formed units, 1% Dammed Pool units.

A total of 23 pools were identified (Table 3). Main Channel pools were the most frequently encountered, at 57%, and comprised 58% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Eleven of the 23 pools ( 48% ) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 14 pool tail-outs measured, two had a value of 1 (14.3%); six had a value of 2 (42.9%); six had a value of 3 (42.9%); (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 like bedrock, log sills, boulders.

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. Flatwater habitat types had a mean shelter rating of 42, and pool habitats had a mean shelter rating of 32 (Table 1). Of the pool types, the Main Channel pools had a mean shelter rating of 36, Scour pools had a mean shelter rating of 21, Backwater pools had a mean shelter rating of 50, (Table 3).

Table 5 summarizes mean percent cover by habitat type. Root Mass are the dominant cover types in Porterfield Creek. Graph 7 describes the pool cover in Porterfield Creek. Root Mass is the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. A silt/clay substrate type was observed in 32% of pool tail-outs and small cobble observed in 36% of pool tail-outs.

The mean percent canopy density for the surveyed length of Porterfield Creek was 81%. The mean percentages of hardwood and coniferous trees were 40% and 60%, respectively. Nineteen percent of the canopy was open. Graph 9 describes the mean percent canopy in Porterfield Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 47%. The mean percent left bank vegetated was 52%. The dominant elements composing the structure of the stream banks consisted of 12% boulder, 16% cobble/gravel, 72% sand/silt/clay, (Graph 10). Brush was the dominant vegetation type observed in 28.1% of the units surveyed. Additionally, 50% of the units surveyed had hardwood trees as the dominant vegetation type, and 21.9% had coniferous trees as the dominant vegetation (Graph 11).

#### HABITAT INVENTORY RESULTS FOR PORTERFIELD NORTH BRANCH

*\* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT \**

*The habitat inventory of Porterfield Creek, North Branch, 9/12/2002, was conducted by C. Simons (Americorps) and J. Newell (DFG) with supervision and analysis by California Department of Fish and Game (DFG). The survey began at the confluence with Porterfield Creek and extended up Porterfield Creek, North Branch to the end of survey. The total length of stream surveyed was*

4306 feet.

*Flows were not measured on Porterfield Creek, North Branch.*

*This section of Porterfield Creek, North Branch has 1 reach with 1 distinct channel type: from the mouth to 4306 feet a G3. G3 channel types are characterized as well entrenched "gully" step-pool channels with a low width/depth ratio, a moderate gradient (2-4%) and a predominantly cobble substrate.*

*Water temperatures were 63°F. Air temperatures were 73°F.*

*Table 1a summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 57.1% dry units, 28.6% pool units and 14.3% riffle units (Graph 1a). Based on total length there were 88.8% dry units, 10.9% pool units and 0.3% riffle units (Graph 2a).*

*Eight habitat units were measured and 13% were completely sampled. Four Level IV habitat types were identified. The data is summarized in Table 2a. The most frequent habitat types by percent occurrence were dry at 50%, mid-channel pool at 25%, culvert at 13% and bedrock sheet at 13% (Graph 3a). By percent total length, dry at 88%, mid-channel pool at 11%, and culvert at 1%.*

*Two pools were identified (Table 3a). Mid-channel pools were most often encountered at 25%, and comprised 100% of the total length of pools (Graph 4a).*

*Table 4a is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. One of the 2 pools (50%) had a depth of two feet or greater (Graph 5a). These deeper pools comprised less than 1% of the total length of stream habitat.*

*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. Pools rated 20 (Table 1a). Of the pool types, the Mid-Channel Pool rated 20 (Table 2a).*

*Table 5a summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were Small Wood at 80%, and Undercut Banks at 20%. Graph 7a describes the pool shelter in Porterfield Creek, North Branch.*

*Table 6a summarizes the dominant substrate by habitat type. No Low-Gradient Riffles were surveyed.*

*The depth of cobble embeddedness was estimated at pool tail-outs. The only pool tail-out measured had a value of 3 (100%). None of the riffles rated a 5 (unsuitable substrate type for spawning). On this scale, a value of one is best for fisheries. Small Cobble was the dominant substrate observed at pool tail-outs (Graph 8a). Graph 6a describes percent embeddedness;*



*Table 7a describes percent embeddedness by reach. No mechanical gravel sampling was conducted in 2002 surveys.*

*The mean percent canopy density for the stream reach surveyed was 81%. The mean percentages of deciduous and evergreen trees were 48% and 52%, respectively. Graph 9a describes the canopy for the entire survey and Table 7a describes the canopy by reach.*

*For the entire stream reach surveyed, the mean percent right bank vegetated was 75% and the mean percent left bank vegetated was 95%. For the habitat units measured, the dominant vegetation types for the stream banks were: 50% deciduous trees and 50% brush (Graph 11a). The dominant substrate for the stream banks was: 100% silt, clay & sand (Graph 10a).*

### HABITAT INVENTORY RESULTS FOR PORTERFIELD SOUTH BRANCH

*\* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT \**

*The habitat inventory of Porterfield Creek, South Branch, 9/10/2002 - 9/11/2002, was conducted by C. Simons (Americorps) and J. Newell (DFG), with supervision and analysis by California Department of Fish and Game (DFG). The survey began at the confluence with Porterfield Creek and extended up Porterfield Creek, South Branch to the end of survey. The total length of stream surveyed was 5598 feet, with an additional 36 feet of side channel.*

*Flow was estimated, using surface velocity, to be less than 0.1 cfs in habitat unit 10 on 9/12/02.*

*This section of Porterfield Creek, South Branch has 3 reaches with 3 distinct channel types: from the mouth to 1822 feet a F4, 1219 feet a G3 and 2557 feet a B3. F4 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly gravel substrate. G3 channel types are characterized as well entrenched "gully" step-pool channels with a low width/depth ratio, a moderate gradient (2-4%) and a predominantly cobble substrate. B3 channel types are moderately entrenched, moderate gradient (2-4%), riffle dominated channels, with infrequently spaced pools, a very stable plan and profile, stable banks and have a predominantly cobble substrate.*

*Water temperatures ranged from 60°F to 66°F. Air temperatures ranged from 75°F to 81°F. Summer temperatures were also measured using a remote temperature recorder placed in a pool (see Temperature Summary graphs at end of report). A recorder in Reach 2, approximately 2004 feet upstream from the confluence of North and South Branch Porterfield Creek, logged temperatures every 1.5 hours from July 15 to September 27, 2002. The highest temperature recorded was 67.7°F on September 19 and the lowest was 56.0°F on September 6, 7, 8, 9, and 14. The mean of the daily highs was 63.1°F for the month of July, 62.2°F for August, and 60.8°F for September.*

*Table 1b summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 48.2% flatwater units, 32.1% pool units, 16.1% riffle units and 3.6% dry units (Graph 1b). Based on total length there were 76.5% flatwater units, 15.5% dry units, 4.6%*

pool units and 3.3% riffle units (Graph 2b).

Fifty-eight habitat units were measured and 38% were completely sampled. Twelve Level IV habitat types were identified. The data is summarized in Table 2b. The most frequent habitat types by percent occurrence were step run at 38%, mid-channel pool at 21%, glide at 9%, low gradient riffle at 7%, lateral scour pool - root wad enhanced at 5%, bedrock sheet at 5%, step pool at 3%, high gradient riffle at 3%, dry at 3%, lateral scour pool - bedrock formed at 2%, culvert at 2%, and 2% not surveyed (Graph 3b). By percent total length, step run at 73%, dry at 15%, glide at 3%, mid-channel pool at 3%, low gradient riffle at 2%, bedrock sheet at 1%, step pool at 1%, lateral scour pool - root wad enhanced at 1%, and high gradient riffle at 1%.

Eighteen pools were identified (Table 3b). Mid-channel pools were most often encountered at 21%, and comprised 59% of the total length of pools (Graph 4b).

Table 4b is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Eleven of the 18 pools (61%) had a depth of two feet or greater (Graph 5b). These deeper pools comprised 4% of the total length of stream habitat.

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. Flatwater units rated 8 and pools rated 33 (Table 1b). Of the pool types, lateral scour pool - bedrock formed rated 105, lateral scour pool - root wad enhanced rated 63, step pool rated 35 and mid-channel pool rated 18 (Table 2b). Reach 1 had the highest rating and Reach 3 had the lowest rating.

Table 5b summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were aquatic vegetation at 39%, bedrock at 17%, root mass at 11%, small wood at 11%, undercut banks at 10%, terrestrial vegetation at 8%, and boulders at 3%. Graph 7b describes the pool shelter in Portfield Creek, South Branch.

Table 6b summarizes the dominant substrate by habitat type. In the 4 low-gradient riffles surveyed, the dominant substrate by percent of the area surveyed was: small cobble in 1 riffle.

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 17 pool tail-outs measured, seven had a value of 1 (41%), five had a value of 2 (29%) and one had a value of 3 (6%). Four (24%) of the seventeen riffles rated a 5 (unsuitable substrate type for spawning). On this scale, a value of one is best for fisheries. Gravel was the dominant substrate observed at pool tail-outs (Graph 8b). Graph 6b describes percent embeddedness. No mechanical gravel sampling was conducted in 2002 surveys due to inadequate staffing levels.

The mean percent canopy density for the stream reach surveyed was 82%. The mean percentages of deciduous and evergreen trees were 23% and 76%, respectively. Graph 9b describes the canopy for the entire survey and Table 7b describes the canopy by reach.

For the entire stream reach surveyed, the mean percent right bank vegetated was 43% and the

mean percent left bank vegetated was 37%. For the habitat units measured, the dominant vegetation types for the stream banks were: 39% deciduous trees, 34% evergreen trees, 14% brush, 11% grass and 2% bare soil (Graph 11b). The dominant substrate for the stream banks were: 41% silt, clay & sand, 32% bedrock, 20% cobble & gravel and 7% boulder (Graph 10b).

#### HABITAT INVENTORY RESULTS FOR PORTERFIELD CREEK, TRIB "Muscat Creek"

*\* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT \**

*The habitat inventory of 9/16/2002 to 9/18/2002, was conducted by A. Livingston (WSP), and J. Newell (DFG). The total length of the stream surveyed was 8,705 feet.*

*Stream flow was not measured on Porterfield Creek, Trib.*

*Porterfield Creek, Trib is a F4 channel type for 4,601 feet of the stream surveyed (Reach 1), a G4 channel type for 2,000 feet of the stream surveyed (Reach 2), a A3 channel type for 770 feet of the stream surveyed (Reach 3), a AA2 channel type for 1,334 feet of the stream surveyed (Reach 4).*

*F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. G4 channels are entrenched "gully" step-pool channels on moderate gradients with low width /depth ratios and gravel dominant substrates. A3 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and cobble dominant substrates. AA2 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and boulder dominant substrates.*

*Water temperatures taken during the survey period ranged from 59 to 65 degrees Fahrenheit. Air temperatures ranged from 69 to 86 degrees Fahrenheit.*

*Table 1d summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 25% dry units, 5% culvert units, 37% flatwater units, 28% pool units, 4% riffle units, (Graph 1c). Based on total **length** of Level II habitat types there were 53% dry units, 5% culvert units, 35% flatwater units, 5% pool units, 1% riffle units, (Graph 2c).*

*Twelve Level IV habitat types were identified (Table 2c). The most frequent habitat types by percent **occurrence** were 25% Dry units, 5% Culvert units, 20% Step Run units, 1% Trench Pool units, 8% Glide units, 5% Lateral Scour Pool - Bedrock Formed units, 13% Mid-Channel Pool units, 3% Lateral Scour Pool - Root Wad Enhanced units, 9% Run units, 3% Plunge Pool units, 3% Step Pool units, 3% Cascade units, 1% Bedrock Sheet units, (Graph 3c). Based on percent total **length**, 53% Dry units, 5% Culvert units, 22% Step Run units, 1% Trench Pool units, 3% Glide units, 1% Lateral Scour Pool - Bedrock Formed units, 2% Mid-Channel Pool units, 11% Run units, 1% Cascade units.*

*A total of 21 pools were identified (Table 3c). Main Channel pools were the most frequently encountered, at 62%, and comprised 67% of the total length of all pools (Graph 4c).*

*Table 4c is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Six of the 21 pools (29%) had a residual depth of two feet or greater (Graph 5c).*

*The depth of cobble embeddedness was estimated at pool tail-outs. Of the 18 pool tail-outs measured, nine had a value of 2 (50%); eight had a value of 3 (44.4%); one had a value of 5 (5.6%); (Graph 6c). 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 like bedrock, log sills, boulders. A value of 6 is given for gravel that is too small for spawning.*

*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 0, flatwater habitat types had a mean shelter rating of 2, and pool habitats had a mean shelter rating of 24 (Table 1c). Of the pool types, the Main Channel pools had a mean shelter rating of 18, Scour pools had a mean shelter rating of 31, (Table 3c).*

*Table 5c summarizes mean percent cover by habitat type. Root Mass are the dominant cover types in Porterfield Creek, Trib. Graph 7c describes the pool cover in Porterfield Creek, Trib. Root Mass is the dominant pool cover type followed by undercut banks.*

*Table 6c summarizes the dominant substrate by habitat type. Graph 8c depicts the dominant substrate observed in pool tail-outs. A gravel observed in 57% of pool tail-outs and small cobble observed in 19% of pool tail-outs.*

*The mean percent canopy density for the surveyed length of Porterfield Creek, Trib was 89%. The mean percentages of hardwood and coniferous trees were 30% and 70%, respectively. Eleven percent of the canopy was open. Graph 9c describes the mean percent canopy in Porterfield Creek, Trib.*

*For the stream reach surveyed, the mean percent right bank vegetated was 30%. The mean percent left bank vegetated was 32%. The dominant elements composing the structure of the stream banks consisted of 21% bedrock, 18% boulder, 12% cobble/gravel, 48% sand/silt/clay, (Graph 10c). Brush was the dominant vegetation type observed in 14.3% of the units surveyed. Additionally, 21.4% of the units surveyed had hardwood trees as the dominant vegetation type, and 53.6% had coniferous trees as the dominant vegetation (Graph 11c).*

## BIOLOGICAL INVENTORY

### JUVENILE SURVEYS:

DFG conducted a survey of Porterfield Creek (North, South and main), on January 22, 1976. Surveyors stated the stream supported a small winter steelhead run. Several rainbow trout were observed below the falls on the South branch. No fish were observed in the North Branch or above the barriers. Steelhead trout, average size of 3", were observed 4 per 100'. Snails, mayfly and stonefly nymphs, dipterans, water striders, and caddis fly larva were collected using a dip net. A variety of aquatic vegetation, plants and algae, was observed throughout the stream and pond area. Other vertebrates observed were stellar and scrub jays, cows, western pond turtle and foothill yellow legged frog.

Species Observed in Historical and Recent Surveys			
YEARS	SPECIES	SOURCE	NATIVE/ INTRODUCED
1976	STEELHEAD TROUT <i>(Oncorhynchus mykiss)</i>	DFG	N
2002	CALIFORNIA OR VENUS ROACH <i>(Hesperoleucus symmetricus)</i>	DFG	N
2002	SACRAMENTO OR WESTERN SUCKER <i>(Catostomus occidentalis)</i>	DFG	N
2002	GREEN SUNFISH <i>(Lepomis cynellus)</i>	DFG	I

On 10/30/02 a biological inventory was conducted at two sites on Porterfield Creek to document fish species presence at the site sampled. The sites were seine netted. Fish from the sites were counted by species, and returned to the stream. Air temperature was 60°F and the water temperature was 55°F. The observers were Cassie Simons and Amy Livingston (Americorps).

The site 1 inventory began at 1125 hours in Reach 1 and ended upstream at West Street Bridge. The distance sampled was approximately 500 feet. Habitat types sampled were glides and mid-channel pools. No salmonids were observed. The site 2 inventory began in Reach 1 and ended upstream. The distance sampled was approximately 500 feet. Habitat types sampled were glides and mid-channel pools. No salmonids were observed. The following table displays the total fish yielded from these sites.

Species Observed	Number recorded at Site 1	Number recorded at Site 2
ROACH	16	0
SUNFISH	2	0

Crayfish and frogs were also observed.

#### DISCUSSION FOR PORTERFIELD CREEK

Porterfield Creek has one channel type: B4. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and shelter. According to the DFG Salmonid Stream Habitat Restoration Manual, B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors and log cover. They are also good for medium-stage plunge weirs. These channel types have suitable gradients and the stable stream banks that are necessary for the installation of instream structures designed to increase pool habitat, trap spawning gravels, and provide protective shelter for fish.

The water temperatures recorded on the survey days 9/9/2002 - 9/10/2002 ranged from 59°F to 65°F. Air temperatures ranged from 69°F to 83°F. The warmest water temperatures were recorded in Reach 1. This temperature regime is favorable to salmonids.

Flatwater habitat types comprised 50% of the total length of this survey, riffles 4%, and pools 9%. The pools are relatively shallow, with only eleven of the twenty three (48%) pools having 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 structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

Eight of the fourteen 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. Sediment sources in Porterfield Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Twelve of the twenty two 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 was 32. The shelter rating in the flatwater habitats was 42. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Root Mass in Porterfield Creek. Root Mass is the dominant cover type in pools followed by small woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover 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 81%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 47% and 52%, 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. However, the riparian buffer is thin in areas with agriculture and urban development. Riparian removal and vineyard development within the riparian corridor could all lead to less stream canopy and channel incision causing bank erosion and higher water temperatures.

Many bridges and culverts were noted which have the potential for becoming barriers or causing erosion.

#### DISCUSSION FOR PORTERFIELD NORTH BRANCH

*Portfield Creek, North Branch has one channel type: G3. According to the DFG Salmonid Stream Habitat Restoration Manual, G3 channel types are good for bank-placed boulders and fair for low-stage weirs, opposing wing-deflectors and log cover.*

*The water temperatures recorded on the survey day, 9/12/2002, were 63°F. Air temperatures were 73°F. This temperature regime is favorable to salmonids.*

*Pools comprised 11% of the total length of this survey. In first and second order streams a primary pool is defined to have a maximum 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. In Porterfield Creek, North Branch, the pools are relatively deep with 50% having a maximum depth of at least two feet. These pools comprised less than 1% of the total length of stream habitat. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.*

*The mean shelter rating for pools was 20. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by small wood at 80% and undercut banks at 20%. Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover*

*provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.*

*No low gradient riffles were measured.*

*The one pool tail-out measured (100%) had an embeddedness rating of either 3. Cobble embeddedness measured to be 25% or less (a rating of 1) is considered best for the needs of salmon and steelhead.*

*The mean percent canopy for the survey was 81%. This is good, since 80% is generally considered desirable. However, the reach before the reservoir had numerous bank erosion problems. This area as well as other areas with bank erosion could benefit from bio-technical re-vegetation techniques using native species.*

### DISCUSSION FOR PORTERFIELD SOUTH BRANCH

*Porterfield Creek, South Branch, has three channel types: F4, G3 and B3. Many site specific projects can be designed within B and F channel types, especially to increase pool frequency, volume and shelter.*

*According to the DFG Salmonid Stream Habitat Restoration Manual, F4 channel types are good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover. Any work considered will require careful design, placement, and construction that must include protection for any unstable banks.*

*G3 channel types are good for bank-placed boulders and fair for low-stage weirs, opposing wing-deflectors and log cover.*

*B3 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors and log cover. They are also good for medium-stage plunge weirs. These channel types have suitable gradients and the stable stream banks that are necessary for the installation of instream structures designed to increase pool habitat, trap spawning gravels, and provide protective shelter for fish.*

*The water temperatures recorded on the survey days 9/10/2002 - 9/11/2002 ranged from 60°F to 66°F. Air temperatures ranged from 75°F to 81°F. The warmest water temperatures were recorded in Reach 1. This temperature regime is favorable to salmonids. Summer temperatures measured using a remote temperature recorder in Reach 2 ranged from 56.0° to 67.7°F. The Temperature Summary graph shows that for much of the summer (July through August) the upper watershed exhibited temperatures at the optimal for salmonids. It is unknown if this thermal regime is typical. To make any further conclusions, temperatures need to be monitored for a longer period of time in more locations through the critical summer months, and extensive biological sampling conducted.*

*Pools comprised 5% of the total length of this survey. In first and second order streams a*



*primary pool is defined to have a maximum 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. In Porterfield Creek, South Branch, the pools are relatively deep with 61% having a maximum depth of at least two feet. These pools comprised 4% of the total length of stream habitat. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.*

*The mean shelter rating for pools was 33. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by aquatic vegetation at 39%, bedrock at 17%, root mass at 11%, small wood at 11%, undercut banks at 10%, terrestrial vegetation at 8%, and boulders at 3%. Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.*

*The one low gradient riffle measured (100%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.*

*Six percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 41% had a rating of 1. Cobble embeddedness measured to be 25% or less (a rating of 1) is considered best for the needs of salmon and steelhead. In a reach comparison, Reach 1 had the best embeddedness rating and Reach 3 had the poorest rating.*

*The mean percent canopy for the survey was 82%. This is good since 80 percent is generally considered desirable.*

#### DISCUSSION FOR PORTERFIELD CREEK, TRIBUTARY “Muscat Creek”

*Porterfield Creek, Trib has 4 reaches: 4601 feet a F4, 2000 feet a G4, 770 feet a A3 and 1334 feet a AA2.*

*There are 4601 feet of F4 channel type in Reach 1. According to the DFG Salmonid Stream Habitat Restoration Manual, F4 channel types are good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and shelter. Any work considered will require careful design, placement, and construction that must include protection for any unstable banks.*

*G4 channel types are good for bank-placed boulders and fair for low-stage weirs, opposing wing-deflectors and log cover.*

*A3 channel types are good for bank-placed boulders and fair for low-stage weirs, opposing wing-deflectors and log cover.*

*The high energy, steep gradient A2 channel types have stable stream banks and poor gravel retention capabilities and are generally not suitable for instream enhancement structures.*

*The water temperatures recorded on the survey days 9/16/2002 - 9/18/2002 ranged from 59°F to 65°F. Air temperatures ranged from 69°F to 86°F. The warmest water temperatures were recorded in Reach 4. This temperature regime is favorable to salmonids. It is unknown if this thermal regime is typical, but our electrofishing samples found steelhead more frequently in the upper\lower, cooler sample sites. To make any further conclusions, temperatures need to be monitored for a longer period of time through the critical summer months, and more extensive biological sampling conducted.*

*Pools comprised 5% of the total **length** of this survey. In third and fourth order streams a primary pool is defined to have a maximum depth of at least three feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. In Porterfield Creek, Trib, the pools are relatively shallow with 5% having a maximum depth of at least three feet. These pools comprised 0% of the total length of stream habitat. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.*

*The mean shelter rating for pools was 24. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by Root Mass at 32%, Undercut Banks at 22%, Small Wood at 16%, Boulders at 8%, Bedrock at 6%, Large Wood at 4%, and Terrestrial Vegetation at 4. Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.*

*No low gradient riffles measured (0%) had either gravel or small cobble as the dominant substrate. This is generally considered poor for spawning salmonids.*

*Thirty eight percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. None had a rating of 1. Cobble embeddedness measured to be 25% or less (a rating of 1) is considered best for the needs of salmon and steelhead.*

*The mean percent canopy for the survey was 83%. This is fair, since 80 percent is generally considered desirable. However, the riparian buffer is thin or nearly absent in areas with livestock/agriculture/urban development. Riparian removal/intensive grazing/vineyard development within the riparian corridor could all lead to less stream canopy and channel incision causing bank erosion and higher water temperatures.*

## GENERAL MANAGEMENT RECOMMENDATIONS

Porterfield Creek and its tributaries should be managed as an anadromous, natural production streams.

Winter storms often bring down large trees and other woody debris into the stream, which increases the number and quality of pools. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Landowners should be sensitive about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

#### PRIORITY FISHERY ENHANCEMENT OPPORTUNITIES

- 1) Access for migrating salmonids is a potential problem in Porterfield Creek, therefore, fish passage should be monitored, and improved where possible. While not the only possible barriers in the stream system, the Cloverdale Boulevard crossings, the North Branch Porterfield Creek reservoir and a culvert crossing at foot 2492 on the South Branch of Porterfield Creek, should be further evaluated for fish passage.
- 2) In Porterfield Creek, active and potential sediment sources related to the road system need to be mapped and treated according to their potential for sediment yield to the stream and its tributaries.
- 3) Map sources of upslope and in-channel erosion, and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream. Near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against agricultural, grazing and urban runoff.
- 4) Increase the canopy on Porterfield Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reach above the survey section should be assessed for planting and treated as well, since water temperatures throughout are effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.
- 5) Spawning gravels on Porterfield Creek are limited to relatively few reaches. Structures to decrease channel incision and recruit spawning gravel (using gravel retention structures), should be installed to trap, sort and expand redd distribution in the stream.
- 6) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Adding high quality complexity with larger woody cover is desirable. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations in the upper reaches. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 7) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank

armor to prevent erosion .

### COMMENTS AND LANDMARKS FOR PORTERFIELD CREEK

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

- 0' Russian River backwater, Sacramento Pike Minnows observed
- 35' Mouth to 1200' is dry. RB dominated by vineyards. Small riparian zone consists of cottonwood, willow, alder; dominant vegetation is blackberry, bamboo, arundo, bay, redwood, and other shrubs. LB levee with paved road stretching across.
- 2715' BRIDGE, dimensions: 17'H x 70'W x 20'L, bridge looks fairly new.
- 3365' Large black pipe, 1 foot diameter crossing stream 10' above. BRIDGE, dimensions: 4'H x 20'W x 59'L.
- 3387' Railroad bridge
- 3576' RB tributary with CULVERT. LB CULVERT
- 3606' Instream CULVERT, dimensions: 318'L x 17'W x 7'H, arch culvert.
- 4261' LOG 1.5' diameter x 6' long with small woody debris.
- 4592' EROSION, dimensions: 25'L x 50'W x 6'D, active RB, high flow influenced.
- 4617' Live Bay 1' diameter, 40' long
- 4792' Sacramento pike minnow and crayfish observed
- 4899' EROSION RB, heavy siltation in pool, bamboo LB.
- 4954' At 200', heavily used road access. Landscape ivy both banks. CULVERT LB, dimensions: 20'L x 1.5'W x 5'H, 5' plunge, LB cemented around culvert, ropes tied to bank for easy creek access.
- 5174' LB - compacted silt acting as bedrock
- 5196' Fig trees on both banks
- 5305' 3' jump caused by DAM, dimensions: H 3', L 8', W(O-spillway) 10', W(D-total structure) 13', downcutting at sill 5', 2.5' plunge, retaining 4' gravel, very old foundation, eroding underneath.
- 5310' 3 old concrete wing deflectors, LB cemented pipes for stabilization
- 5494' Oily water, foul smell
- 5574' Many concrete blocks in channel
- 5659' More concrete blocks in channel
- 5734' Scour enhanced by 2 x 12' wood, scouring from concrete culvert
- 5809' Instream box CULVERT, dimensions: 83'L x 10'W x 10.5'H, downcutting 4.5', 2.5' plunge.
- 5892' A lot of trash in/around creek.
- 6087' Large amount of brush has been cut, LB small cobble dam with non-native grasses growing.
- 6474' oak (L), 2.5' diameter, 30' L
- 6604' BRIDGE, dimensions: 7'H x 21'W x 82'L, natural bottom, new bridge.
- 7187' BRIDGE, dimensions: 5'H x 40'W x 7'L, foot bridge for subdivision. CULVERT LB, dimensions: 45'L x 2'W x 2.5'H, 2.5' plunge, road drainage.

7367' Subdivisions, both banks  
 7684' Bay (L) 1' diameter, 20' long  
 7760' Walking trail LB  
 7900' Bridge  
 7930' END OF SURVEY at the forks. Mainstem Porterfield Creek is highly impacted by donwcutting, non-natives such as blackberry and ivy, low-tech bank revetment structures, and garbage. Algae blooms were abundant. However, native riparian trees such as oak, bay, and ash remain dominant, canopy was good and water temperatures were low. No steelhead were seen and very few rough fish. See separate notes below for North and South Branches.

COMMENTS AND LANDMARKS FOR NORTH BRANCH

*The following landmarks and possible problem sites were noted. All distances are approximate and taken from the confluence with Porterfield Creek.*

0' Confluence with South Branch  
 15' Riparian zone consists of native trees including oak with some buckeye and willow but non-native grasses and shrubs dominate. Erosive banks. BANK EROSION, dimensions: D 5-10', L 10-20', W 30-80', high flow influenced, RB erosive scour, sediment source.  
 765' Dry bedrock 11' vertical drop, potential pool 4'.  
 816' 1-2 acre reservoir, well established cat-tails along edge, willow, oak, cottonwood plentiful, many water birds.  
 1266' Unit not surveyed, length estimated. Drove to Cherry Creek Rd crossing to glance at habitat upstream. Instream CULVERT W 3', L 40', retaining <1' of gravel, no downcutting.  
 2266' Instream culvert, no water  
 2306' Channel measurements. Footbridge: 5'H x 15'W x 8'L, old bridge, no gravel retention, no downcutting. Old burned down cabin on RB (near footbridge). Dirt road crossing, old and out of use, at 1900' into unit. END OF SURVEY 2000' past Cherry Creek Rd culvert. Bankful width 6', dry, no signs of scour pools, fish habitat upstream unlikely.

COMMENTS AND LANDMARKS FOR SOUTH BRANCH

*The following landmarks and possible problem sites were noted. All distances are approximate and taken from the confluence with Porterfield Creek.*

0' Begin survey. South Branch Porterfield Creek is in better shape than the mainstem. It runs through a modern housing development with a hiking trail along the creek. There are fewer non-natives, better pools, and moderate numbers of steelhead trout.  
 1019' Culvert LB, bridge covers most of unit  
 1106' CULVERT RB, dimensions: W 2', H 2', 4' plunge, culvert looks new.

- 1168' 3' vertical jump between pools
- 1270' Active BANK EROSION, dimension: 20'D x 18'L x 18'W, high flow influenced, sedimentation caused by gully from drainage at 250' into unit.
- 1593' Valley oak (L) diameter 1.5', L 30'
- 1650' Native grasses, blackberry, and cattail growing in stream
- 1665' Many birds present
- 1822' CHANNEL CHANGE to G3
- 2004' Hobo temp pool Active bank EROSION, dimensions: 21'D x 45'L x 65'W, upslope, high flow influenced, and debris influenced.
- 2111' Steelhead 0+, 1+, and 2+ observed periodically from 2111' to 4078'.
- 2492' CULVERT instream, 20'L x 4'W x 3'H, downcutting 2', retaining gravel, double culvert, partially blocked with debris, being squashed by road.
- 3041' CHANNEL CHANGE to B3
- 3438' Large trib RB, 300' into unit
- 4078' Bay (L) diameter 1', L 30'
- 4261' DEBRIS ACCUMULATION, dimensions: 5'D x 18'L x 12'W, retaining 4' gravel, downcutting, erosion, no fish observed upstream, dry soon after. Erosion along RB 12' vertical, 20' horizontal jump. CHANNEL CHANGES to AA2
- 4749' RB wet trib, >20% gradient gully. All water flows from this point. Fed by spring – wet gully flows into dry creek. Active bank EROSION, dimensions: 10'D x 30'L x 40'W, high flow influenced. END OF SURVEY
- 4798' The section of creek beyond the end of the survey was also walked, but not surveyed, starting approximately 2600' upstream from the official end of survey. They found the creek to be mostly dry with very good canopy (80-90%), G3, A1 and A3 channel types, and several jumps >10' tall. There was widespread, mild erosion which appeared to be natural. Landowner reported some pools used to contain water year round before installation of the well upstream.

COMMENTS AND LANDMARKS FOR UNNAMED TRIBUTARY “Muscat Creek”

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the confluence with Porterfield Creek.

- 0' Begin survey at confluence with Porterfield. Active bank EROSION in units 1-40, dimensions: 5'D x 10-25'L x 10-30'W, high flow influenced, not debris influenced. Whole stretch has erosive banks due to massive downcutting.
- 15' Instream CULVERT- HWY 101, dimensions: 305'L x 15'W x 8'H, not downcutting, not retaining gravel, no maintenance required, arch culvert, series of 8 boulder/cobble baffles have formed wet low flow channel in upper 1/3 of culvert. Encourage scour/low-flow channel – water present. Lower 2/3 of the culvert flat and dry
- 395' Length estimated
- 949' RB- House and deck
- 1009' Old car RB - causing scour and providing shelter

1065' Bay (L) diameter 0.5', L 30'  
 1094' Intermittent stream. RB old tires from a bank stabilization effort.  
 1182' Concrete block RB- photo  
 1325' Erosive LB  
 1412' Compacted silt, bank providing scour  
 1427' LB concrete blocks  
 1452' Concrete chunks in creek  
 1487' LB wet spring. BRIDGE, H 15', W 45', downcutting 0.5', not retaining gravel, wooden bridge, no major problems.  
 1507' 1' iron pipe crosses creek, sill @ 9' high  
 1702' 3' plunge retaining 4-5' gravel  
 1992' Willow (L) diameter 1.5', L 30'  
 2014' 4' plunge, willow tree growing in channel, 4' gravel retained.  
 2247' Scrap metal revetment, photo  
 2577' Instream CULVERT- Cloverdale Blvd., dimensions: 10.5'W x 9.5'H, downcutting 1', 1' plunge, not retaining gravel.  
 2637' Box Culvert  
 2931' Stream intermittent  
 2978' Oak (L) diameter 2.5', L 30'  
 3186' Large amount of sand in channel, LB some new construction present, some puddles in channel.  
 3686' Stream intermittent, exposed bedrock.  
 3786' LB playground. CULVERT- LB, dimensions: 50'L x 2.5'W x 2.5'H, not downcutting, 3.5' plunge, not retaining gravel,. Culvert associated with new subdivision drainage, rip rap placed @ outflow to reduce erosion.  
 4026' LB baseball diamond, grass not native, trees planted. Active bank EROSION, dimensions: 3.5'D x 8'L x 20'W, high flow influenced, not debris influenced. Erosion caused by concrete culvert support immediately upstream.  
 4276' Instream CULVERT, foot bridge for park, dimensions: 30'L x 8'W x 5.5'H, no downcutting, no gravel retained, natural bottom, downstream edge - concrete/rip rap, erosion potential 20' downstream.  
 4306' EROSION BANK: not active (Estimated potential for erosion in the next few years: 5'D x 8'L x 15'W, photo) not debris influenced, rip rap placed downstream of culvert, is certain to cause erosion here.  
 4516' Instream CULVERT- S. Foothill Blvd., dimensions: 12'W x 4'H, not downcutting, not retaining gravel, maintenance required, rip rap downstream recently certain to cause bank erosion.  
 4601' Channel changes to a G4. CULVERT, LB, dimensions: 30'+L x 2'W x 2'H, not downcutting, 1.5' plunge, not retaining gravel, no maintenance required, presently contributing water, associated with new subdivision. Flashboard dam, small and out of use. Entire unit passes new construction on LB. Water tanks LB at upper end of construction, 42' high, look new.  
 6601' Channel change to A3

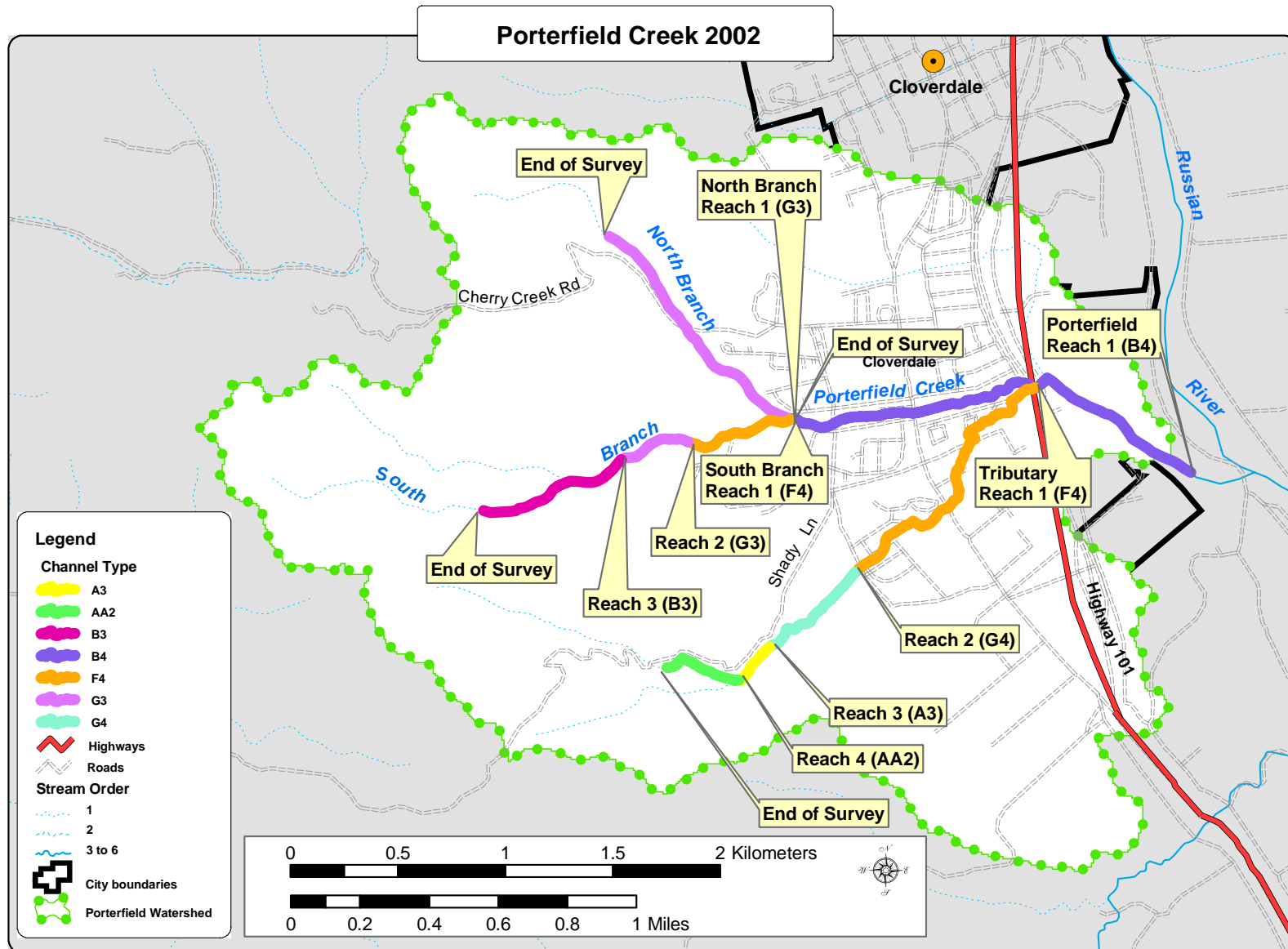
- 6761' *Road crossing. Active bank EROSION, LB, dimensions: 3'D x 7-9'L x 25'W, high flow and debris influenced, caused by debris accumulation upstream. DEBRIS ACCUMULATION, dimension: 5'D x 7'L x 13'W, retaining 3' of gravel, scour pool.*
- 7321' *Road crossing*
- 7371' *Forks, RB Trib. Channel change to an AA2*
- 8056' *5' jump*
- 8086' *Mostly dry 3-5' jumps, >50% gradient.*
- 8254' *7' vertical jump, no pool.*
- 8698' *Instream CULVERT- Hot Springs Rd., dimensions: 50'L x 3'W x 3'H, downcutting 4', 5' plunge, not retaining gravel, no maintenance required, approximately 4% gradient.*  
*END OF SURVEY- steep, 40' long CULVERT and a 7' drop in the midst of a very steep channel about 40%.*

## 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.

Marco, J. and C. Holstine. 1976. A Stream Survey of Porterfield Creek. CDFG, Yountville. 4p.





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

Stream Name: Porterfield Creek

LLID:

1229980387892

Drainage:

Russian River - Middle

Survey Dates: 9/9/2002 to 9/10/2002

Confluence Location:

Quad: CLOVERDALE

Legal Description: T000R000S00

Latitude: 38:47:21.0N

Longitude: 122:59:53.0W

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
2	0	CULVERT	2.6	200	401	5.0									
3	0	DRY	3.8	852	2555	32.1									
37	7	FLATWATER	47.4	108	4014	50.4	6.0	0.5	0.9	578	21383	308	11385		43
23	23	POOL	29.5	30	681	8.5	10.0	1.3	2.1	290	6665	525	11545	403	32
13	2	RIFFLE	16.7	24	314	3.9	34.5	0.2	0.3	552	7170	60	783		
<b>Total Units</b>	<b>Total Units Fully Measured</b>				<b>Total Length (ft.)</b>					<b>Total Area (sq.ft.)</b>			<b>Total Volume (cu.ft.)</b>		
78	32				7965					35218			23713		

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

Stream Name: Porterfield Creek

LLID:

1229980387892 Drainage: Russian River - Middle

Survey Dates: 9/9/2002 to 9/10/2002

Confluence Location: Quad: CLOVERDALE Legal Description: T000R000S00 Latitude: 38:47:21.0N Longitude: 122:59:53.0W

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 (%)
11	2	LGR	14.1	28	306	3.8	34	0.2	0.3	552	6067	60	663			85
2	0	CAS	2.6	4	8	0.1										
9	3	GLD	11.5	77	693	8.7	8	0.7	1.9	770	6930	509	4581		78	73
10	2	RUN	12.8	128	1276	16.0	4	0.3	1	698	6975	270	2695		5	87
18	2	SRN	23.1	114	2045	25.7	4	0.3	0.5	170	3065	44	791		10	80
1	1	TRP	1.3	24	24	0.3	6	2.0	2.9	144	144	374	374	288	60	75
12	12	MCP	15.4	31	371	4.7	11	1.5	4.1	305	3664	617	6786	478	34	81
5	5	LSR	6.4	27	133	1.7	10	1.1	2.2	270	1351	396	1981	287	23	95
3	3	LSBk	3.8	22	66	0.8	9	0.8	2.3	205	616	279	836	169	17	90
2	2	DPL	2.6	44	87	1.1	8	1.4	2.1	445	890	784	1568	690	50	60
3	0	DRY	3.8	852	2555	32.1										76
2	0	CUL	2.6	200	401	5.0										100
<b>Total Units</b>	<b>Total Units Fully Measured</b>				<b>Total Length (ft.)</b>					<b>Total Area (sq.ft.)</b>			<b>Total Volume (cu.ft.)</b>			
78	32				7965					29701			20275			

**Table 3 - Summary of Pool Types**

Stream Name: Porterfield Creek

LLID:

1229980387892

Drainage:

Russian River - Middle

Survey Dates: 9/9/2002 to 9/10/2002

Confluence Location:

Quad: CLOVERDALE

Legal Description:

T000R000S00

Latitude: 38:47:21.0N

Longitude:

122:59:53.0W

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	57	30	395	58	10.4	1.5	293	3808	462	5544	36
8	8	SCOUR	35	25	199	29	9.6	1.0	246	1967	242	1939	21
2	2	BACKWATER	9	44	87	13	8.5	1.4	445	890	690	1380	50

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
23	23	681	6665	8864

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

Stream Name: Porterfield Creek

LLID:

1229980387892

Drainage: Russian River - Middle

Survey Dates: 9/9/2002 to 9/10/2002

Confluence Location: Quad: CLOVERDALE

Legal Description: T000R000S00

Latitude: 38:47:21.0N

Longitude: 122:59:53.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
1	TRP	4	0	0	0	0	1	100	0	0	0	0
12	MCP	52	0	0	6	50	4	33	1	8	1	8
5	LSR	22	0	0	3	60	2	40	0	0	0	0
3	LSBk	13	0	0	2	67	1	33	0	0	0	0
2	DPL	9	0	0	1	50	1	50	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
23	0	0	12	39	1	4	1	4		

Mean Maximum Residual Pool Depth (ft.): 2.1

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

Stream Name: Porterfield Creek LLID: 1229980387892 Drainage: Russian River - Middle  
 Survey Dates: 9/9/2002 to 9/10/2002 Dry Units: 3  
 Confluence Location: Quad: CLOVERDALE Legal Description: T000R000S00 Latitude: 38:47:21.0N Longitude: 122:59:53.0W

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
11	0	LGR									
2	0	CAS									
13	0	TOTAL RIFFLE									
9	2	GLD	25	5	0	20	35	0	0	15	0
10	1	RUN	0	0	0	0	100	0	0	0	0
18	1	SRN	0	20	0	0	80	0	0	0	0
37	4	TOTAL FLAT	13	8	0	10	63	0	0	8	0
1	1	TRP	0	10	0	10	5	75	0	0	0
12	12	MCP	2	13	1	36	16	26	0	5	1
5	5	LSR	10	43	0	21	18	7	0	1	0
3	3	LSBk	0	58	0	0	8	0	0	0	33
2	2	DPL	0	8	0	45	45	0	0	3	0
23	23	TOTAL POOL	3	25	1	28	18	18	0	3	5
2	0	CUL									
78	27	TOTAL	5	22	1	25	24	16	0	4	4

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

Stream Name: Porterfield Creek

LLID:

1229980387892

Drainage: Russian River - Middle

Survey Dates: 9/9/2002 to 9/10/2002

Dry Units: 3

Confluence Location: Quad: CLOVERDALE

Legal Description: T000R000S00

Latitude: 38:47:21.0N

Longitude: 122:59:53.0W

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
11	2	LGR	0	0	100	0	0	0	0
2	0	CAS	0	0	0	0	0	0	0
9	3	GLD	33	0	67	0	0	0	0
10	2	RUN	50	0	50	0	0	0	0
18	2	SRN	50	0	50	0	0	0	0
1	1	TRP	100	0	0	0	0	0	0
12	4	MCP	100	0	0	0	0	0	0
5	2	LSR	0	0	100	0	0	0	0
3	1	LSBk	0	100	0	0	0	0	0
2	1	DPL	0	0	100	0	0	0	0

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

Stream Name: Porterfield Creek

LLID:

1229980387892 Drainage: Russian River - Middle

Survey Dates: 9/9/2002 to 9/10/2002

Confluence Location: Quad: CLOVERDALE

Legal Description: T000R000S00

Latitude: 38:47:21.0N Longitude: 122:59:53.0W

---

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
81	60	40	0	47	52

---

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 9 - Mean Percentage of Dominant Substrate and Vegetation**

Stream Name: Porterfield Creek

LLID:

1229980387892 Drainage: Russian River - Middle

Survey Dates: 9/9/2002 to 9/10/2002

Confluence Location: Quad: CLOVERDALE Legal Description: T000R000S00 Latitude: 38:47:21.0N Longitude: 122:59:53.0W

---

**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	1	3	12.5
Cobble / Gravel	2	3	15.6
Sand / Silt / Clay	13	10	71.9

**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	3	6	28.1
Hardwood Trees	9	7	50.0
Coniferous Trees	4	3	21.9
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 4

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

StreamName: Porterfield Creek LLID: 1229980387892 Drainage: Russian River - Middle  
 Survey Dates: 9/9/2002 to 9/10/2002  
 Confluence Location: Quad: CLOVERDALE Legal Description: T000R000S00 Latitude: 38:47:21.0N Longitude: 122:59:53.0W

	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)		13	3
SMALL WOODY DEBRIS (%)		8	25
LARGE WOODY DEBRIS (%)		0	1
ROOT MASS (%)		10	28
TERRESTRIAL VEGETATION (%)		63	18
AQUATIC VEGETATION (%)		0	18
WHITEWATER (%)		0	0
BOULDERS (%)		8	3
BEDROCK LEDGES (%)		0	5

### Appendix C - Fish Habitat Inventory Data Summary

Stream Name: Porterfield Creek LLID: 1229980387892 Drainage: Russian River -  
 Survey Dates: 9/9/2002 to 9/10/2002 Survey Length (ft.): 7965 Main Channel (ft.): 7965 Side Channel (ft.): 0  
 Confluence Location: Quad: CLOVERDALE Legal Description: T000R000S00 Latitude: 38:47:21.0N Longitude: 122:59:53.0W

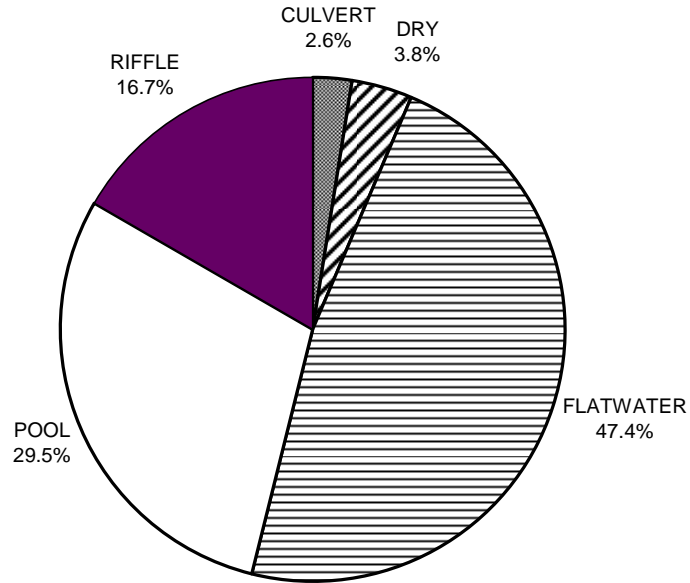
### Summary of Fish Habitat Elements By Stream Reach

**STREAM REACH: 1**

Channel Type: B4	Canopy Density (%): 81.5	Pools by Stream Length (%): 8.5
Reach Length (ft.): 7965	Coniferous Component (%): 59.9	Pool Frequency (%): 29.5
Riffle/Flatwater Mean Width (ft.): 12.3	Hardwood Component (%): 40.1	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 52.2
Range (ft.): to	Vegetative Cover (%): 49.7	2 to 2.9 Feet Deep: 39.1
Mean (ft.):	Dominant Shelter: Root masses	3 to 3.9 Feet Deep: 4.3
Std. Dev.:	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 4.3
Base Flow (cfs): 0	Occurrence of LWD (%): 0.5	Mean Max Residual Pool Depth (ft.): 2.08
Water (F): 59 - 65 Air (F): 69 - 83	LWD per 100 ft.:	Mean Pool Shelter Rating: 32
Dry Channel (ft.): 2555	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 31.8 Sand: 0.0 Gravel: 18.2 Sm Cobble: 36.4 Lg Cobble: 9.1 Boulder: 4.5 Bedrock: 0.0		
Embeddedness Values (%): 1. 9.1 2. 27.3 3. 27.3 4. 0.0 5. 0.0		

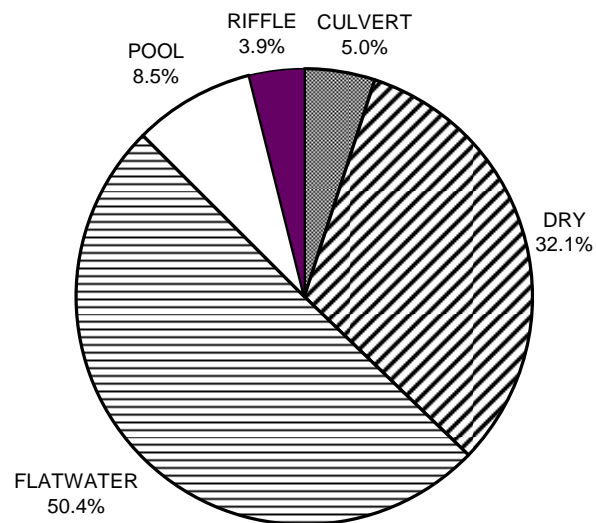
APPENDIX D: GRAPHS  
PORTERFIELD CREEK, MAINSTEM

**PORTERFIELD CREEK 2002  
HABITAT TYPES BY PERCENT OCCURRENCE**



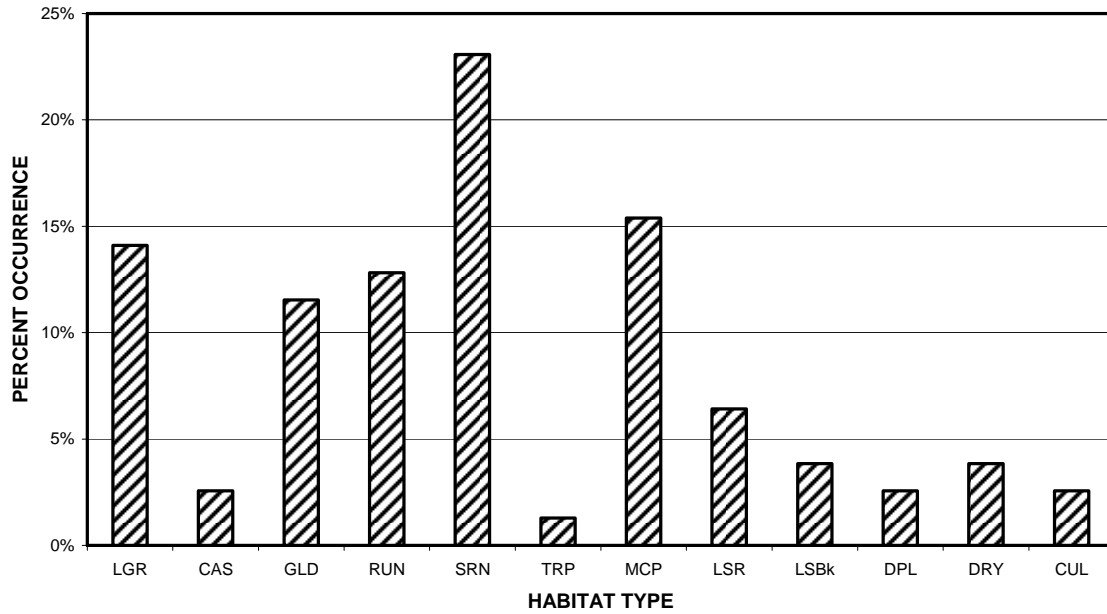
GRAPH 1: Level II habitat types by percent occurrence

**PORTERFIELD CREEK 2002  
HABITAT TYPES BY PERCENT TOTAL LENGTH**



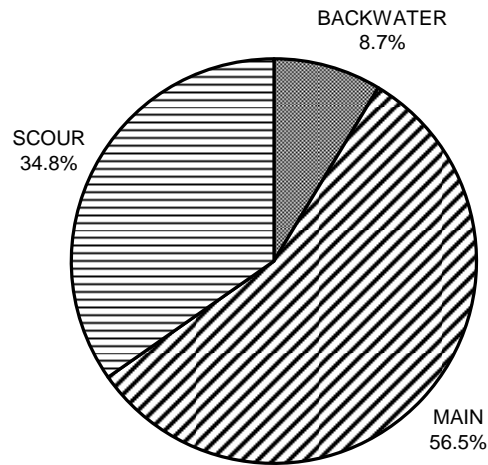
GRAPH 2: Level II habitat types by percent total length

**PORTERFIELD CREEK 2002  
HABITAT TYPES BY PERCENT OCCURRENCE**



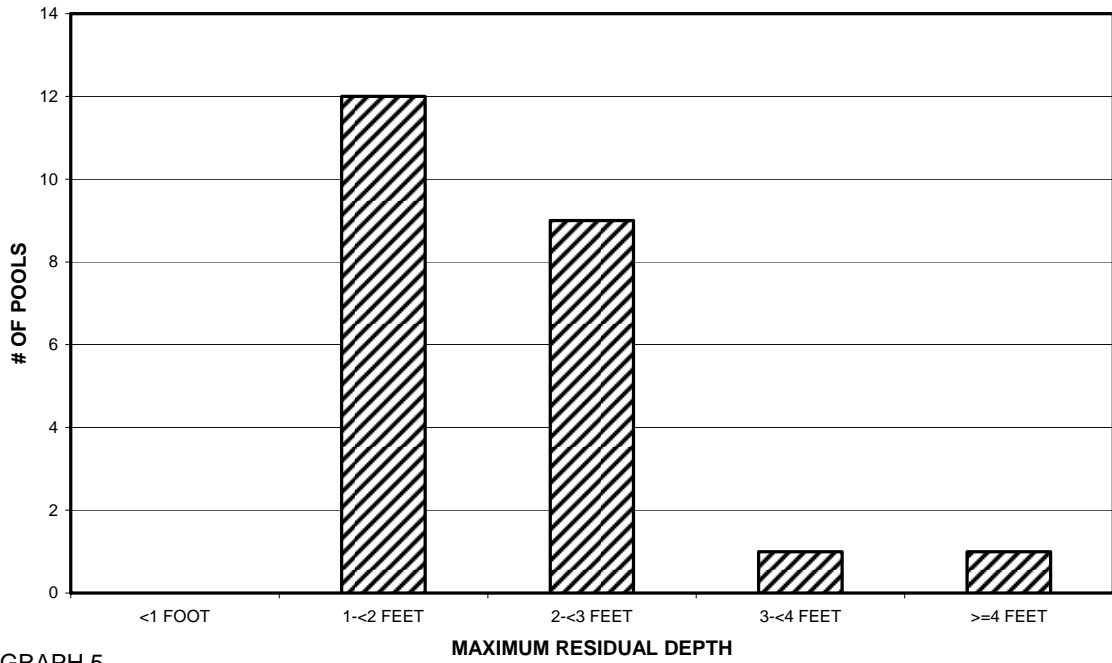
GRAPH 3: Level IV habitat types by percent occurrence

**PORTERFIELD CREEK 2002  
POOL TYPES BY PERCENT OCCURRENCE**



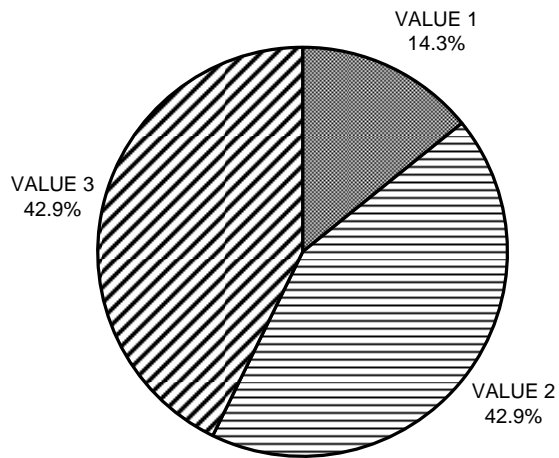
GRAPH 4: Level I pool types by percent occurrence

**PORTERFIELD CREEK 2002  
MAXIMUM DEPTH IN POOLS**



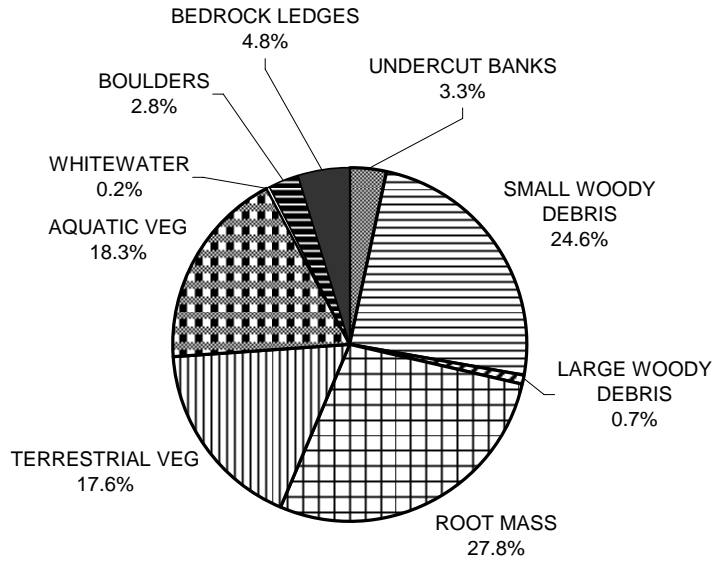
GRAPH 5

**PORTERFIELD CREEK 2002  
PERCENT EMBEDDEDNESS**



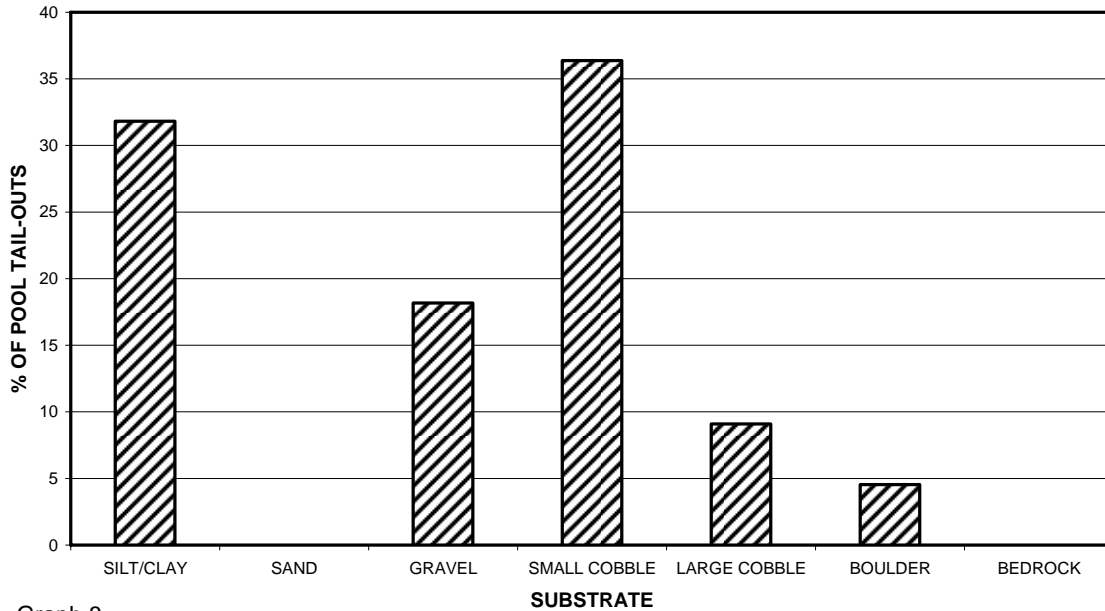
GRAPH 6

**PORTERFIELD CREEK 2002  
MEAN PERCENT COVER TYPES IN POOLS**



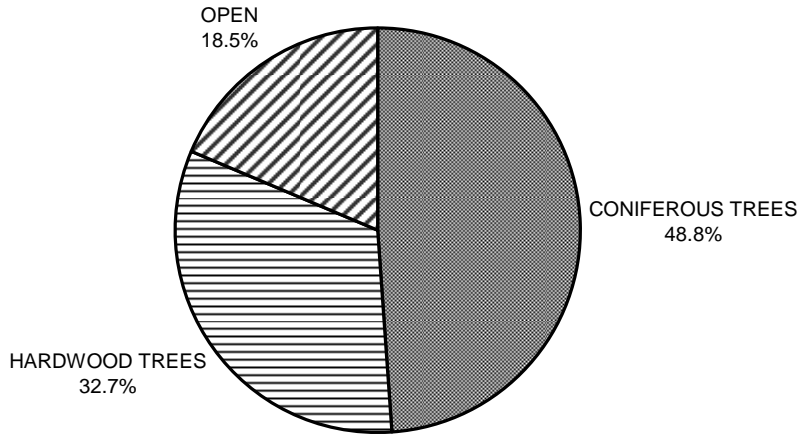
GRAPH 7

**PORTERFIELD CREEK 2002  
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



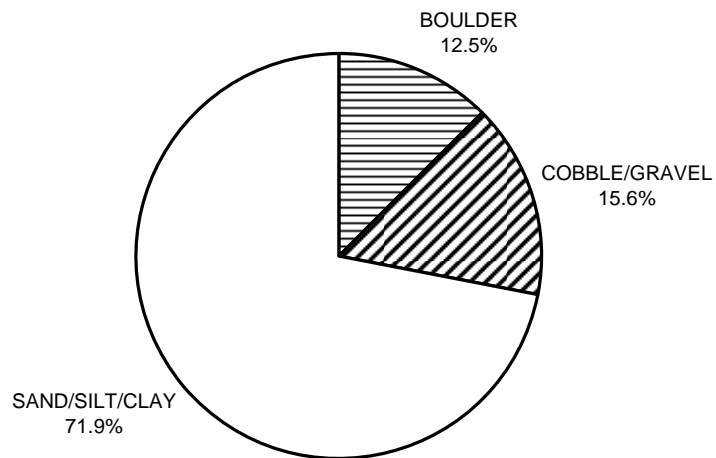
Graph 8

**PORTERFIELD CREEK 2002  
MEAN PERCENT CANOPY**



GRAPH 9

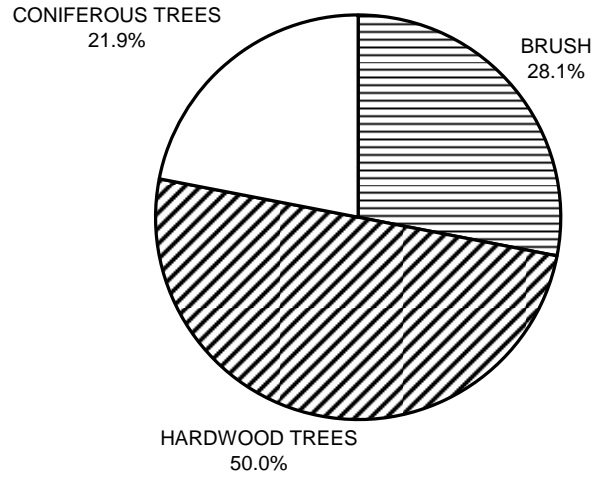
**PORTERFIELD CREEK 2002  
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10



**PORTERFIELD CREEK 2002  
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

**APPENIDIX 2B(NORTH BRANCH TABLES)**

Porterfield Creek, North

Drainage: Russian River Basin

Table 1b - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES

Survey Dates: 9/12/2002

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'27.48"N LONGITUDE: 123°01'22.02"W

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN 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	RIFFLE	13	11	11	0	0.0	0.0	0	0	0	0	0	0
2	1	POOL	25	233	465	11	116.0	1.9	50678	101355	200	399	0	20
4	0	DRY	50	948	3790	88	0.0	0.0	0	0	0	0	0	0
1	0	CULVERT	13	40	40	1	0.0	0.0	0	0	0	0	0	0

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
8	1	4306	101355	399

Porterfield Creek, North

Drainage: Russian River Basin

Table 2b - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 9/12/2002

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'27.48"N LONGITUDE: 123°01'22.02"W

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE %	MEAN LENGTH ft.	TOTAL LENGTH ft.	TOTAL LENGTH %	MEAN WIDTH ft.	MEAN DEPTH ft.	MEAN MAXIMUM DEPTH ft.	MEAN AREA sq.ft.	TOTAL AREA sq.ft.	MEAN VOLUME cu.ft.	TOTAL VOLUME cu.ft.	MEAN RESIDUAL POOL VOL cu.ft.	MEAN SHELTER RATING	MEAN CANOPY %
1	0	BRS	13	11	11	0	0	0.0	0.0	0	0	0	0	0	0	0
2	1	MCP	25	233	465	11	116	1.9	2.3	50678	101355	200	399	0	20	75
4	0	DRY	50	948	3790	88	0	0.0	0.0	0	0	0	0	0	0	65
1	0	CUL	13	40	40	1	0	0.0	0.0	0	0	0	0	0	0	100

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
8	1	4306	101355	399

Porterfield Creek, North

Drainage: Russian River Basin

Table 3b - SUMMARY OF POOL TYPES

Survey Dates: 9/12/2002

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'27.48"N LONGITUDE: 123°01'22.02"W

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
2	1	MAIN	100	233	465	100	116.0	1.9	50678	101355	200	399	0	20
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)			
2	1				465				101355		399			

Porterfield Creek, North

Drainage: Russian River Basin

Table 4b - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES

Survey Dates: 9/12/2002

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'27.48"N LONGITUDE: 123°01'22.02"W

UNITS MAX DPTH MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH	<1 FOOT PERCENT OCCURRENCE	1-<2 FT. MAXIMUM DEPTH	1-<2 FT. PERCENT OCCURRENCE	2-<3 FT. MAXIMUM DEPTH	2-<3 FT. PERCENT OCCURRENCE	3-<4 FT. MAXIMUM DEPTH	3-<4 FT. PERCENT OCCURRENCE	>=4 FT. MAXIMUM DEPTH	>=4 FT. PERCENT OCCURRENCE
1	MCP	50	0	0	0	0	1	100	0	0	0	0
TOTAL UNITS												
1												

Porterfield Creek, North

Drainage: Russian River Basin

Table 5b - Summary of Shelter by Habitat Type

Survey Dates: 9/12/2002

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'27.48"N LONGITUDE: 123°01'22.02"W

UNITS MEASURED	UNITS SHELTER MEASURED	HABITAT TYPE	% TOTAL UNDERCUT BANKS	% TOTAL SWD	% TOTAL LWD	% TOTAL ROOT MASS VEGETATION	% TOTAL TERR. VEGETATION	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
	1	0 BRS	0	0	0	0	0	0	0	0	0
	2	1 MCP	20	80	0	0	0	0	0	0	0
	4	0 DRY	0	0	0	0	0	0	0	0	0
	1	0 CUL	0	0	0	0	0	0	0	0	0
ALL HABITAT TYPES	8	1	20	80	0	0	0	0	0	0	0
POOLS ONLY	2	1	20	80	0	0	0	0	0	0	0

Porterfield Creek, North

Drainage: Russian River Basin

Table 6b - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 9/12/2002

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'27.48"N LONGITUDE: 123°01'22.02"W

TOTAL HABITAT UNITS	UNITS SUBSTRATE MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
	1	0 BRS	0	0	0	0	0	0	0
	2	1 MCP	100	0	0	0	0	0	0
	4	0 DRY	0	0	0	0	0	0	0
	1	0 CUL	0	0	0	0	0	0	0

APPENDIX 2C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Porterfield Creek, North Branch

SAMPLE DATES: 09/12/2002 to 09/12/2002

SURVEY LENGTH:

MAIN CHANNEL: 4306 ft.

SIDE CHANNEL: 0 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map: Cloverdale

Latitude: 38°47'27.48"N

Legal Description: T11N R10W S19

Longitude: 123°01'22.02"W

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01 (Units 1-8)

Channel Type: G3

Mean Canopy Density: 80 %

Main Channel Length: 4306 ft.

Evergreen Component: 47 %

Side Channel Length: 0 ft.

Deciduous Component: 53 %

Riffle/Flatwater Mean Width: ft.

Pools by Stream Length: 90 %

Pool Mean Depth: 1.9 ft.

Pools >=2 ft. Deep: 50 %

Base Flow: cfs

Pools >=3 ft. Deep: 0 %

Water: 63-63°F Air: 73-73°F

Mean Pool Shelter Rtn: 20

Dom. Bank Veg.: Deciduous Trees

Dom. Shelter: Small Woody  
Debris

Bank Vegetative Cover: 85 %

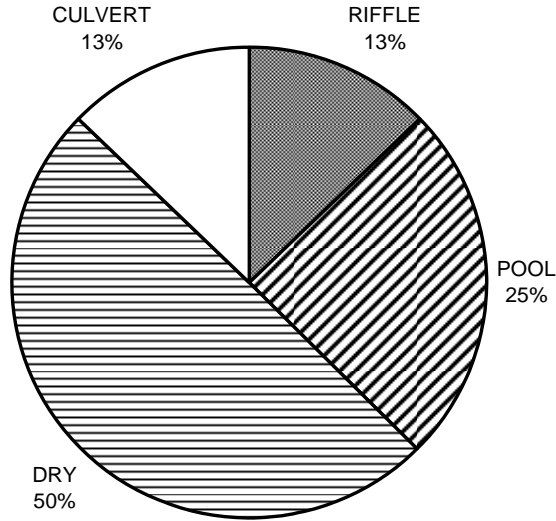
LOD Pool Shelter: 0 %

Dom. Bank Substrate: Silt/Clay/Sand

Dry Channel: 3790 ft.

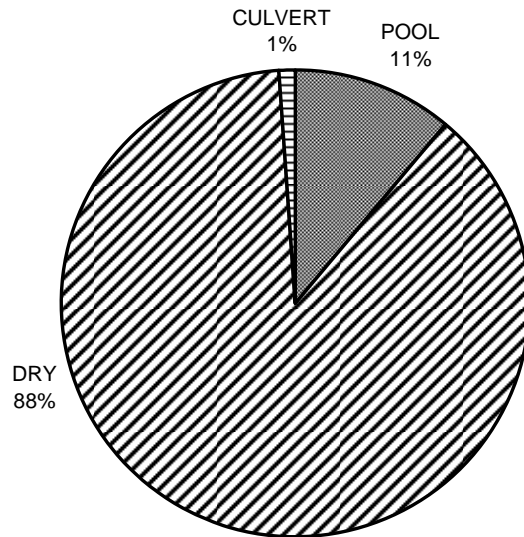
Embeddedness: 1. 0 % 2. 0 % 3. 100 % 4. 0 % 5. 0 %

## NORTH BRANCH, PORTERFIELD CREEK HABITAT TYPES BY PERCENT OCCURRENCE



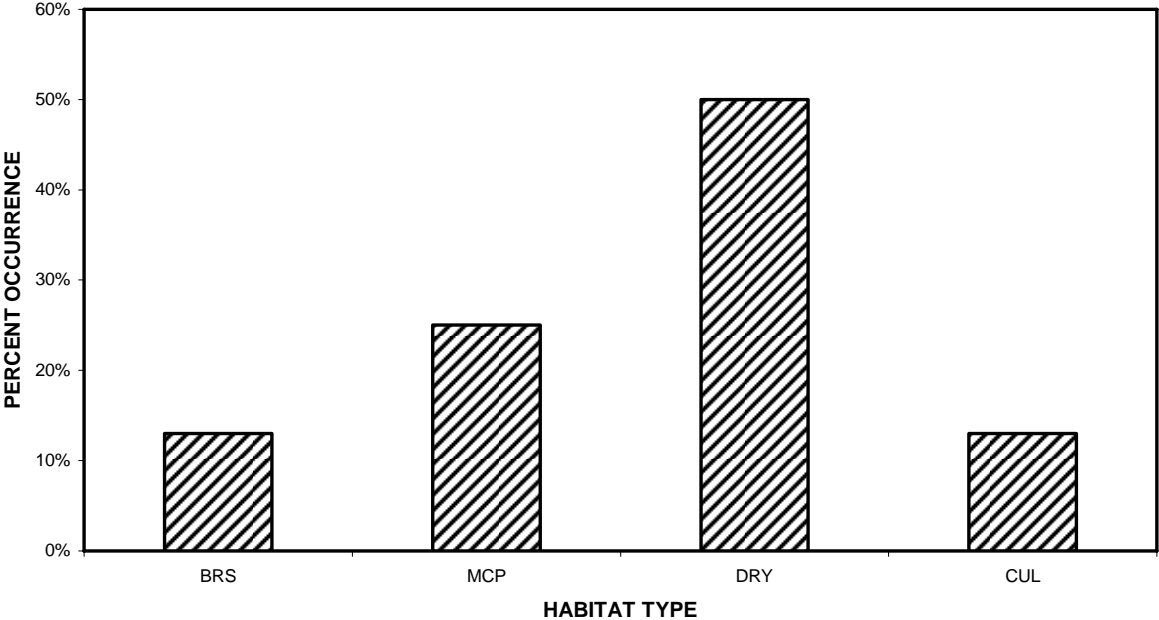
GRAPH 1a. Level II habitat types by percent occurrence.

## NORTH BRANCH, PORTERFIELD CREEK HABITAT TYPES BY PERCENT TOTAL LENGTH



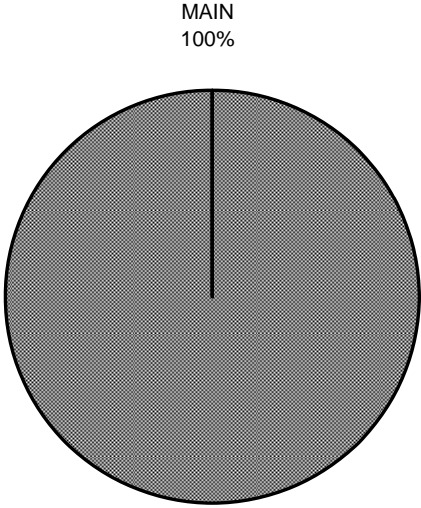
GRAPH 2a. Level II habitat types by percent total length.

**NORTH BRANCH, PORTERFIELD CREEK  
HABITAT UNIT TYPES BY PERCENT OCCURRENCE**



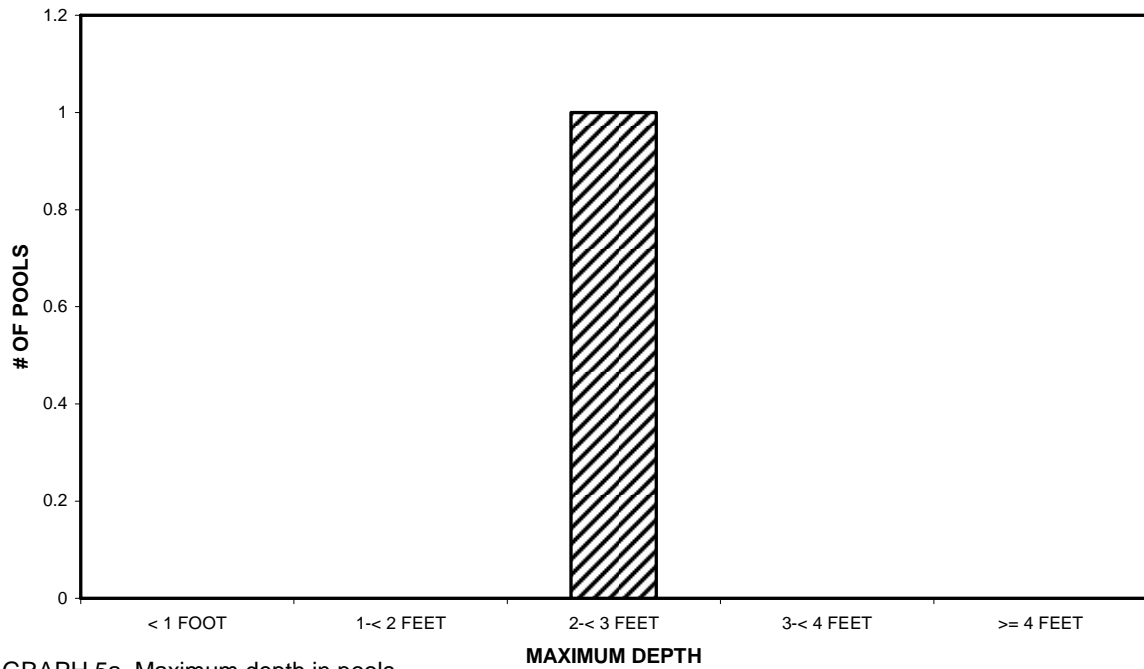
GRAPH 3a. Level IV habitat unit types by percent occurrence.

**NORTH BRANCH, PORTERFIELD CREEK  
POOL HABITAT TYPES BY PERCENT OCCURRENCE**



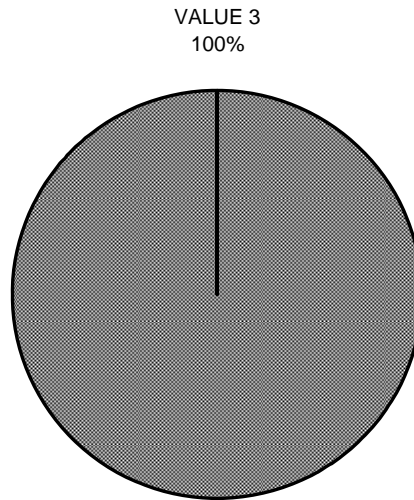
GRAPH 4a. Level I pool habitat types by percent occurrence.

## NORTH BRANCH, PORTERFIELD CREEK MAXIMUM DEPTH IN POOLS



GRAPH 5a. Maximum depth in pools.

## NORTH BRANCH, PORTERFIELD CREEK PERCENT EMBEDDEDNESS

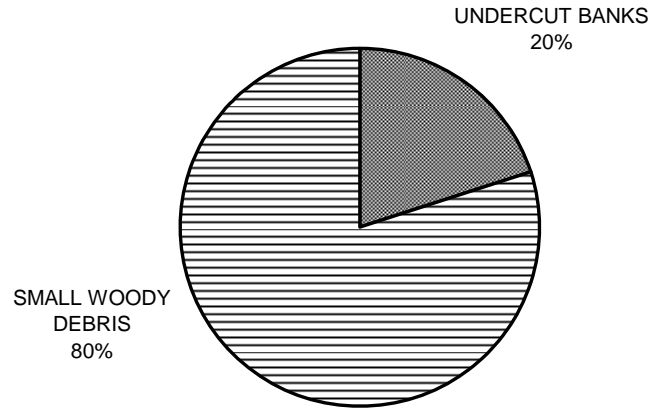


GRAPH 6a. Percent embeddedness estimated at pool tail-outs.



# NORTH BRANCH, PORTERFIELD CREEK

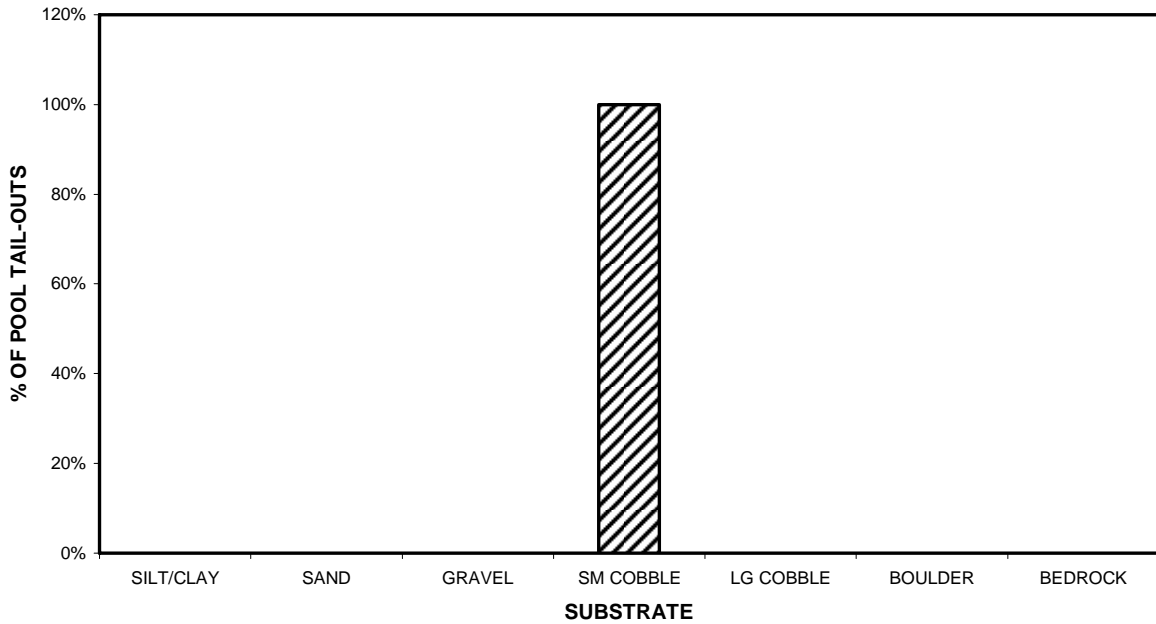
## MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7a. Mean percent cover types in pools.

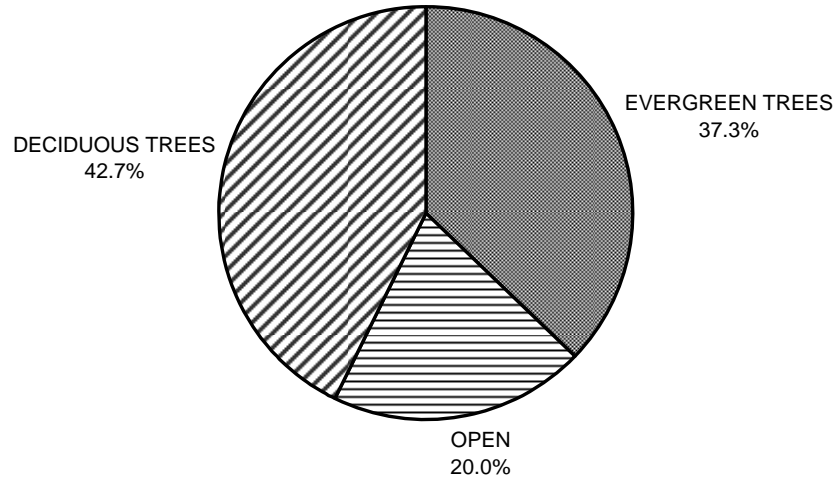
# NORTH BRANCH, PORTERFIELD CREEK

## SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



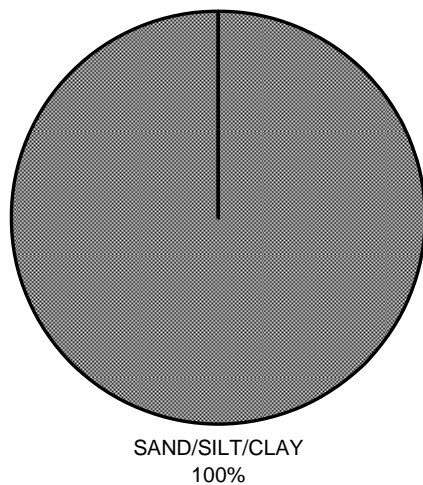
GRAPH 8a. Substrate composition in pool tail-outs.

# NORTH BRANCH, PORTERFIELD CREEK MEAN PERCENT CANOPY



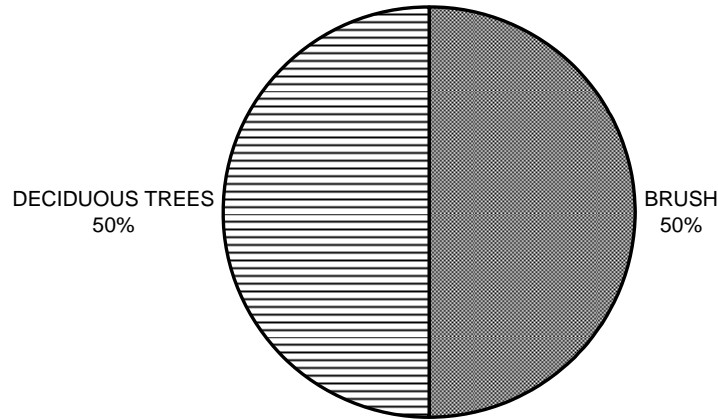
GRAPH 9a. Mean percent canopy.

# NORTH BRANCH, PORTERFIELD CREEK DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10a. Dominant bank composition in survey reach.

# NORTH BRANCH, PORTERFIELD CREEK DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11a. Dominant bank vegetation in survey reach.

## APPENDIX 3B (SOUTH BRANCH TABLES)

Porterfield Creek, South

Drainage: Russian River Basin

Table 1b - SUMMARY OF RIPPLE, FLATWATER, AND POOL HABITAT TYPES

Survey Dates: 09/10/02 to 09/11/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R11W S24 LATITUDE: 38°47'16.4"N LONGITUDE: 123°02'05.9"W

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN 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
9	5	RIPPLE	16	21	187	3	3.0	0.1	39	354	6	57	0	0
27	7	FLATWATER	47	159	4286	76	4.8	0.4	380	10247	156	4221	0	6
18	9	POOL	31	14	258	5	6.8	1.3	92	1656	127	2281	111	33
2	0	DRY	3	434	868	15	0.0	0.0	0	0	0	0	0	0
1	0	CULVERT	2	20	20	0	0.0	0.0	0	0	0	0	0	0
1	0	NOT SURVE	2	15	15	0	0.0	0.0	0	0	0	0	0	0
<b>TOTAL UNITS</b>	<b>TOTAL UNITS</b>				<b>TOTAL LENGTH (ft.)</b>				<b>TOTAL AREA (sq. ft.)</b>			<b>TOTAL VOL. (cu. ft.)</b>		
58	21				5634				12257			6559		

Porterfield Creek, South

Drainage: Russian River Basin

Table 2b - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 09/10/02 to 09/11/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R11W S24 LATITUDE: 38°47'16.4"N LONGITUDE: 123°02'05.9"W

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE	MEAN LENGTH	TOTAL LENGTH	TOTAL LENGTH	MEAN WIDTH	MEAN DEPTH	MEAN MAXIMUM DEPTH	MEAN AREA	TOTAL AREA	MEAN VOLUME	TOTAL VOLUME	MEAN RESIDUAL EST. POOL VOL	MEAN SHELTER RATING	MEAN CANOPY
#			%	ft.	ft.	%	ft.	ft.	ft.	sq.ft.	sq.ft.	cu.ft.	cu.ft.	cu.ft.		%
4	1	LGR	7	22	87	2	7	0.2	0.3	140	560	28	112	0	0	55
2	1	HGR	3	16	32	1	4	0.2	0.4	22	44	3	7	0	0	95
3	3	BRS	5	23	68	1	1	0.1	0.7	17	52	1	3	0	0	81
5	3	GLD	9	33	164	3	6	0.5	1.2	244	1220	101	504	0	8	77
22	4	SRN	38	187	4122	73	4	0.4	5.0	481	10585	198	4356	0	5	82
12	4	MCP	21	13	153	3	7	1.3	2.8	92	1106	129	1543	117	18	69
2	2	STP	3	24	48	1	4	1.2	2.3	91	183	105	210	92	35	73
3	2	LSR	5	14	42	1	7	1.5	2.3	92	277	143	429	126	63	72
1	1	LSEk	2	15	15	0	6	1.1	2.0	90	90	99	99	45	105	79
2	0	DRY	3	434	868	15	0	0.0	0.0	0	0	0	0	0	0	95
1	0	CUL	2	20	20	0	0	0.0	0.0	0	0	0	0	0	0	0
1	0	NS	2	15	15	0	0	0.0	0.0	0	0	0	0	0	0	0
TOTAL UNITS	TOTAL UNITS			LENGTH (ft.)						AREA (sq.ft)		TOTAL VOL. (cu.ft)				
58	21			5634						14117		7263				

Porterfield Creek, South

Drainage: Russian River Basin

Table 3b - SUMMARY OF POOL TYPES

Survey Dates: 09/10/02 to 09/11/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R11W S24 LATITUDE: 38°47'16.4"N LONGITUDE: 123°02'05.9"W

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
14	6	MAIN	78	14	201	78	6.8	1.3	92	1289	125	1753	112	21
4	3	SCOUR	22	14	57	22	6.5	1.4	92	367	132	528	106	74
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)			
18	9				258				1656		2281			

Porterfield Creek, South

Drainage: Russian River Basin

Table 4b - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES

Survey Dates: 09/10/02 to 09/11/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R11W S24 LATITUDE: 38°47'16.4"N LONGITUDE: 123°02'05.9"W

UNITS MAX DPTH MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH	<1 FOOT PERCENT OCCURRENCE	1-<2 FT. MAXIMUM DEPTH	1-<2 FT. PERCENT OCCURRENCE	2-<3 FT. MAXIMUM DEPTH	2-<3 FT. PERCENT OCCURRENCE	3-<4 FT. MAXIMUM DEPTH	3-<4 FT. PERCENT OCCURRENCE	>=4 FT. MAXIMUM DEPTH	>=4 FT. PERCENT OCCURRENCE
12	MCP	67	0	0	6	50	6	50	0	0	0	0
2	STP	11	0	0	0	0	2	100	0	0	0	0
3	LSR	17	0	0	1	33	2	67	0	0	0	0
1	LSBk	6	0	0	0	0	1	100	0	0	0	0
TOTAL UNITS												
18												

Porterfield Creek, South

Drainage: Russian River Basin

Table 5b - Summary of Shelter by Habitat Type

Survey Dates: 09/10/02 to 09/11/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R11W S24 LATITUDE: 38°47'16.4"N LONGITUDE: 123°02'05.9"W

UNITS MEASURED	UNITS SHELTER MEASURED	HABITAT TYPE	% TOTAL UNDERCUT BANKS	% TOTAL SWD	% TOTAL LWD	% TOTAL ROOT MASS VEGETATION	% TOTAL TERR. VEGETATION	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
4	1	LGR	0	0	0	0	0	0	0	0	0
2	2	HGR	0	0	0	0	0	0	0	0	0
3	3	BRS	0	0	0	0	0	0	0	0	0
5	3	GLD	16	16	0	43	0	0	0	13	12
22	4	SRN	16	21	0	0	16	11	0	35	0
12	11	MCP	2	1	0	5	3	59	0	4	25
2	2	STP	29	0	0	25	8	21	0	0	18
3	3	LSR	11	51	0	5	24	9	0	0	0
1	1	LSBk	40	5	0	50	0	0	0	0	5
2	0	DRY	0	0	0	0	0	0	0	0	0
1	0	CUL	0	0	0	0	0	0	0	0	0
1	0	NS	0	0	0	0	0	0	0	0	0
ALL HABITAT TYPES	58	30	12	14	0	11	9	31	0	10	13
POOLS ONLY	18	17	10	11	0	11	8	39	0	3	17

Porterfield Creek, South

Drainage: Russian River Basin

Table 6b - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 09/10/02 to 09/11/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R11W S24 LATITUDE: 38°47'16.4"N LONGITUDE: 123°02'05.9"W

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TOTAL HABITAT UNITS	UNITS SUBSTRATE MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
4	1	LGR	0	0	0	100	0	0	0
2	2	HGR	0	0	0	0	100	0	0
3	3	BRS	0	0	0	0	0	0	100
5	3	GLD	33	0	67	0	0	0	0
22	4	SRN	0	0	25	50	25	0	0
12	4	MCP	25	0	50	0	0	0	25
2	2	STP	50	0	0	0	0	0	50
3	2	LSR	0	0	100	0	0	0	0
1	1	LSEk	0	0	100	0	0	0	0
2	0	DRY	0	0	0	0	0	0	0
1	0	CUL	0	0	0	0	0	0	0
1	0	NS	0	0	0	0	0	0	0

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APPENDIX 3C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Porterfield Creek, South Branch

SAMPLE 09/10/2002 to 09/11/2002

SURVEY LENGTH:

MAIN 5598 ft.

SIDE CHANNEL: 36 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map: Cloverdale

Latitude: 38°47'16.4"N

Legal Description: T11N R11W S24

Longitude: 123°02'05.9"W

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01 (Units 1-21)

Channel Type: F4	Mean Canopy Density: 69 %
Main Channel 1822 ft.	Evergreen 73 %
Side Channel Length: 36 ft.	Deciduous 21 %
Riffle/Flatwater Mean 5.5 ft.	Pools by Stream 7 %
Pool Mean Depth: 1.3 ft.	Pools >=2 ft. Deep: 100 %
Base Flow: cfs	Pools >=3 ft. Deep: 0 %
Water: 60-66°F Air: 77-81°F	Mean Pool Shelter 72
Dom. Bank No Vegetation	Dom. Shelter: Root Masses
Bank Vegetative Cover: 36 %	LOD Pool Shelter: 15 %
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.
Embeddedness 1. 67 % 2. 33 % 3. 0 % 4. 0 % 5. 0 %	

STREAM REACH 02 (Units 22-37)

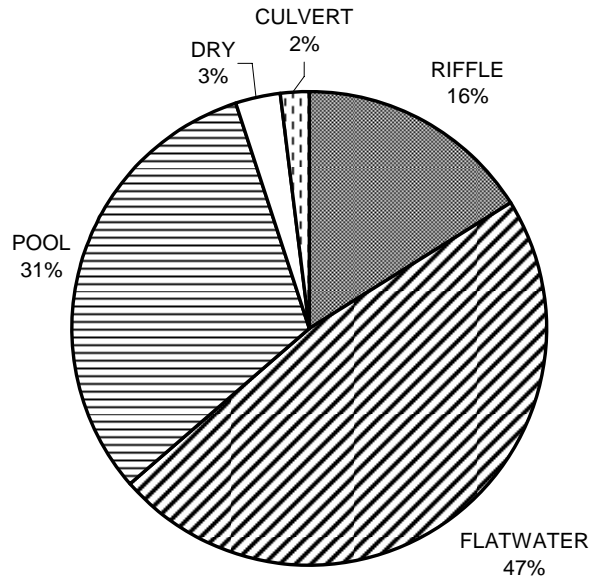
Channel Type: G3	Mean Canopy Density: 82 %
Main Channel 1219 ft.	Evergreen 87 %
Side Channel Length: 0 ft.	Deciduous 14 %
Riffle/Flatwater Mean 2.8 ft.	Pools by Stream 7 %
Pool Mean Depth: 1.5 ft.	Pools >=2 ft. Deep: 57 %
Base Flow: cfs	Pools >=3 ft. Deep: 0 %
Water: 60-60°F Air: 76-81°F	Mean Pool Shelter 17
Dom. Bank Deciduous Trees	Dom. Shelter:
Bank Vegetative Cover: 28 %	LOD Pool Shelter: 6 %
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.
Embeddedness 1. 50 % 2. 50 % 3. 0 % 4. 0 % 5. 0 %	

STREAM REACH 03 (Units 38-55)

Channel Type: B3	Mean Canopy Density: 85 %
Main Channel 2557 ft.	Evergreen 61 %
Side Channel Length: 0 ft.	Deciduous 39 %
Riffle/Flatwater Mean 3.1 ft.	Pools by Stream 2 %
Pool Mean Depth: 1.2 ft.	Pools >=2 ft. Deep: 25 %
Base Flow: cfs	Pools >=3 ft. Deep: 0 %
Water: 62-64°F Air: 75-80°F	Mean Pool Shelter 11
Dom. Bank Coniferous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 28 %	LOD Pool Shelter: 0 %
Dom. Bank Substrate: Bedrock	Dry Channel: 868 ft.
Embeddedness 1. 33 % 2. 33 % 3. 33 % 4. 0 % 5. 0 %	

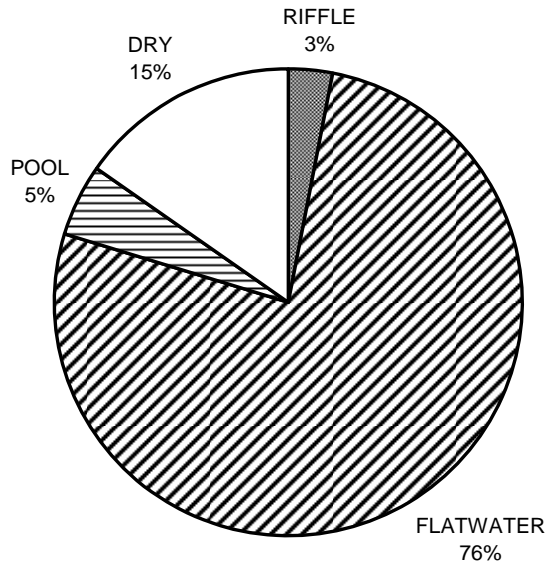


### SOUTH BRANCH, PORTERFIELD CREEK HABITAT TYPES BY PERCENT OCCURRENCE



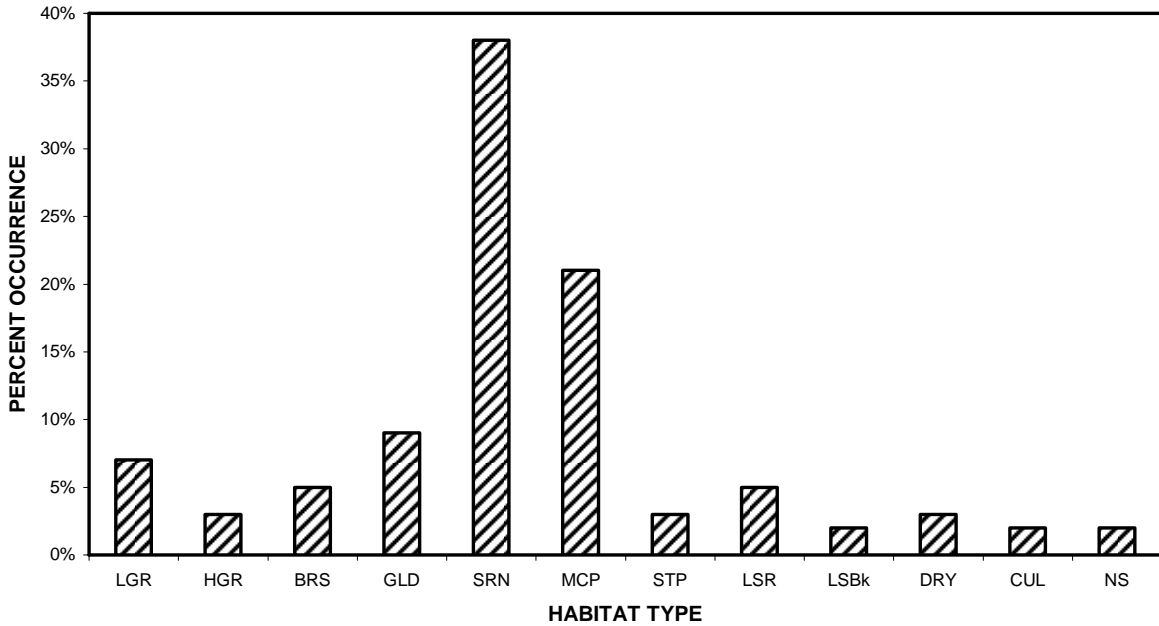
GRAPH 1b. Level II habitat types by percent occurrence.

### SOUTH BRANCH, PORTERFIELD CREEK HABITAT TYPES BY PERCENT TOTAL LENGTH



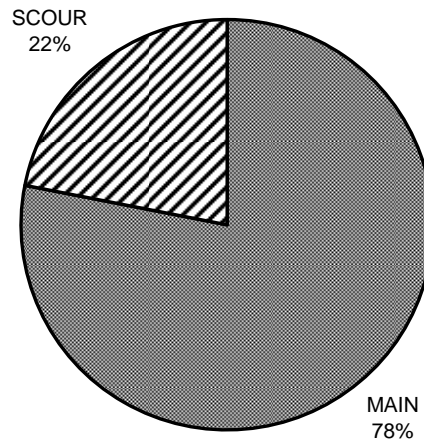
GRAPH 2b. Level II habitat types by percent total length.

## SOUTH BRANCH, PORTERFIELD CREEK HABITAT UNIT TYPES BY PERCENT OCCURRENCE



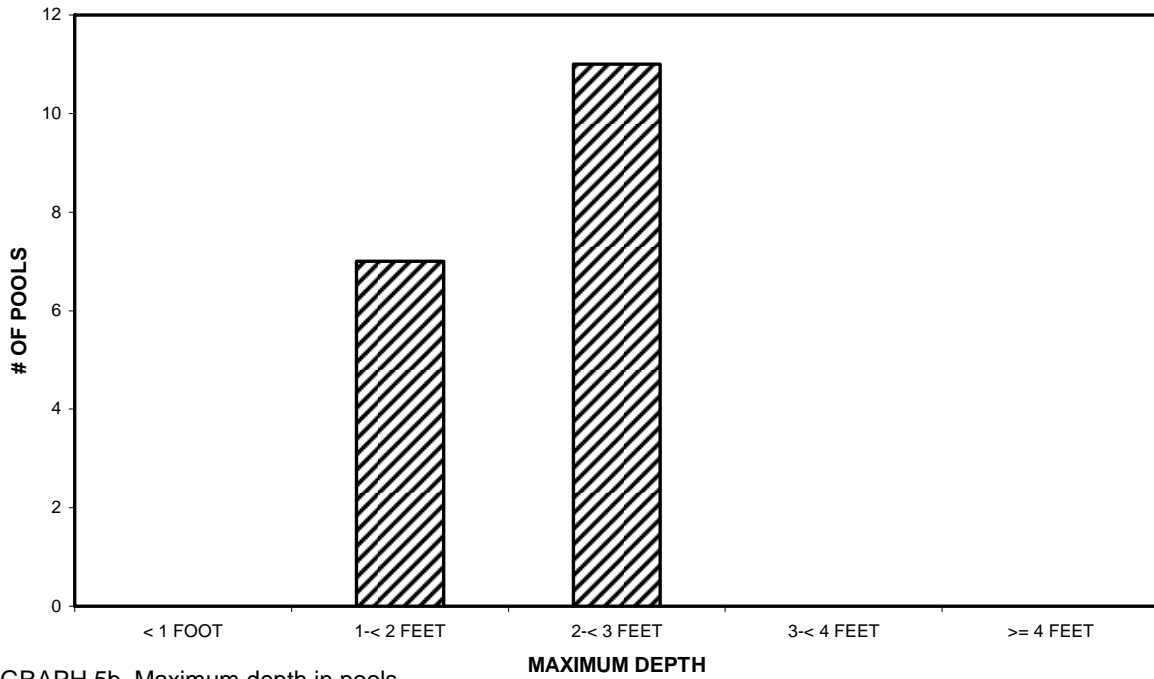
GRAPH 3b. Level IV habitat unit types by percent occurrence.

## SOUTH BRANCH, PORTERFIELD CREEK POOL HABITAT TYPES BY PERCENT OCCURRENCE



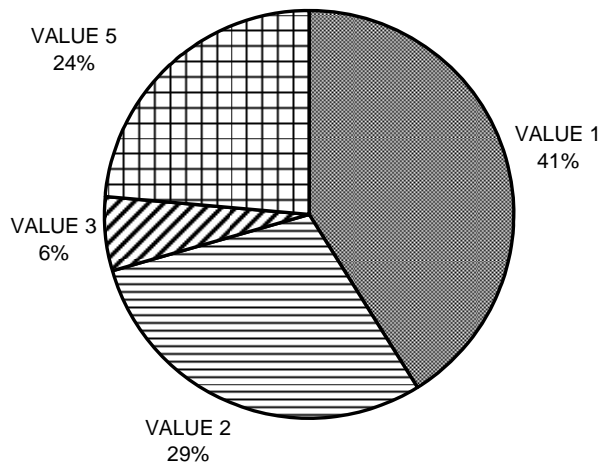
GRAPH 4b. Level I pool habitat types by percent occurrence.

## SOUTH BRANCH, PORTERFIELD CREEK MAXIMUM DEPTH IN POOLS



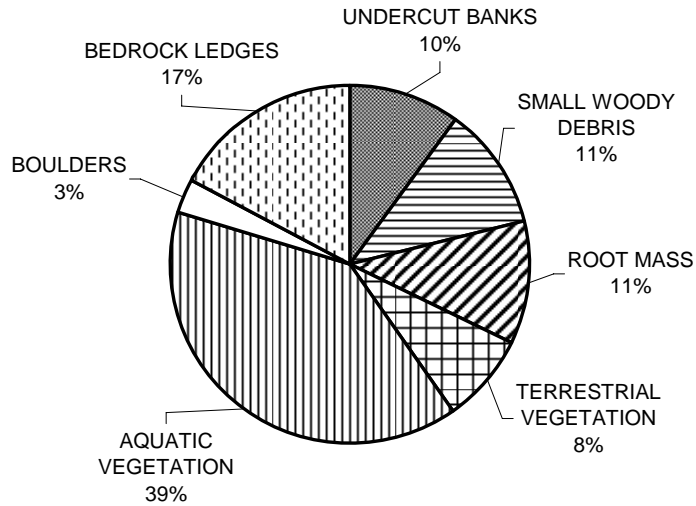
GRAPH 5b. Maximum depth in pools.

## SOUTH BRANCH, PORTERFIELD CREEK PERCENT EMBEDDEDNESS



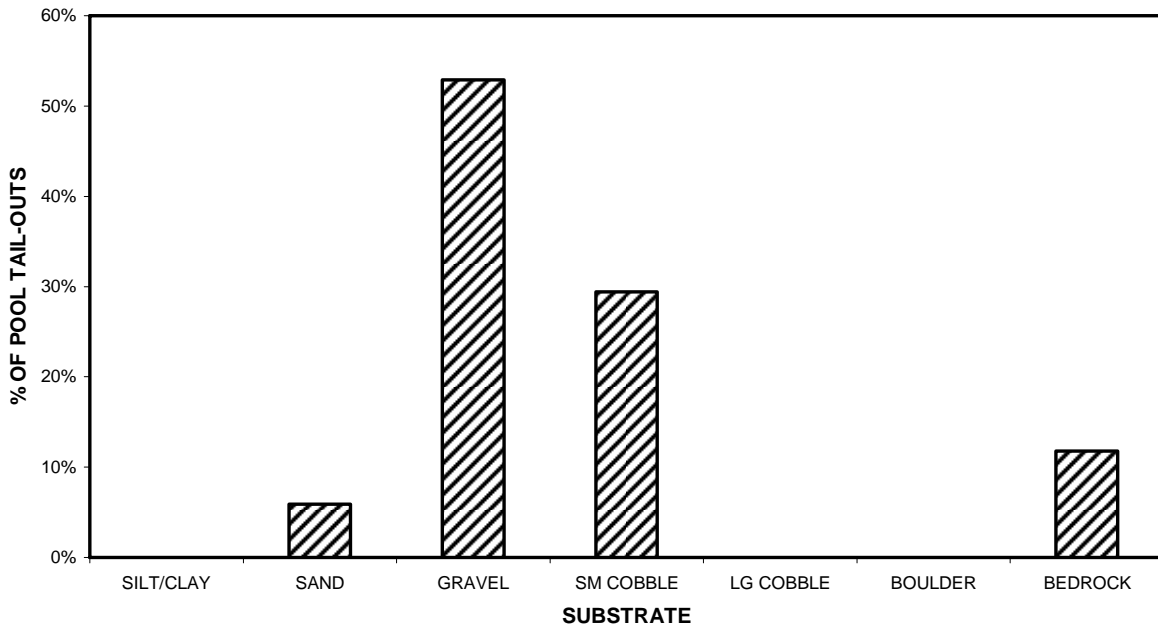
GRAPH 6b. Percent embeddedness estimated at pool tail-outs.

## SOUTH BRANCH, PORTERFIELD CREEK MEAN PERCENT COVER TYPES IN POOLS



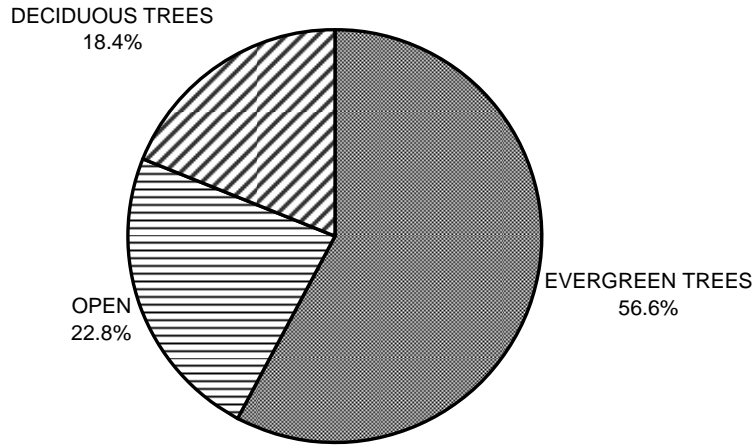
GRAPH 7b. Mean percent cover types in pools.

## SOUTH BRANCH, PORTERFIELD CREEK SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



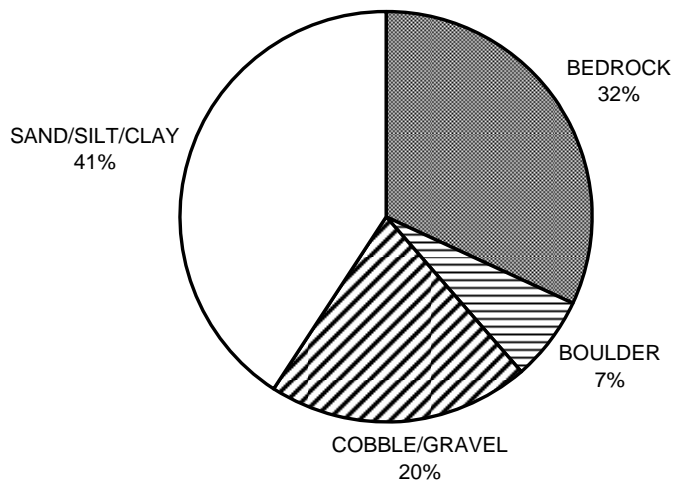
GRAPH 8b. Substrate composition in pool tail-outs.

## SOUTH BRANCH, PORTERFIELD CREEK MEAN PERCENT CANOPY



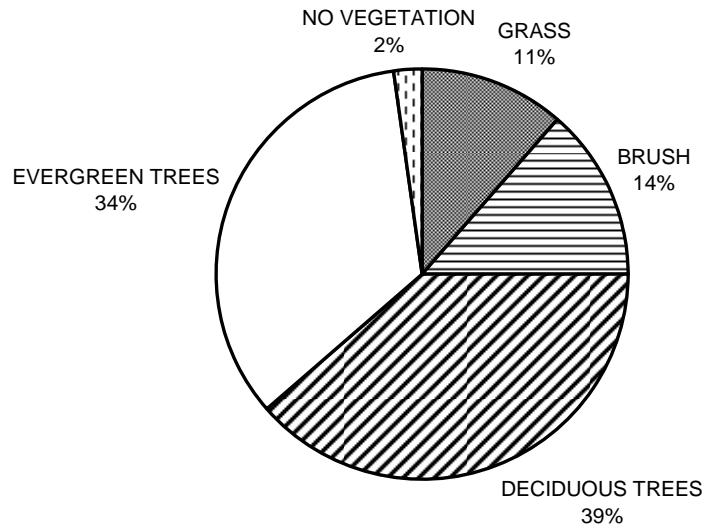
GRAPH 9b. Mean percent canopy.

## SOUTH BRANCH, PORTERFIELD CREEK DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10b. Dominant bank composition in survey reach.

# SOUTH BRANCH, PORTERFIELD CREEK DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11b. Dominant bank vegetation in survey reach.

**APPENDIX 4C (TRIB TABLES)**

Porterfield Creek, Trib A

Drainage: Russian River Basin

Table 1c - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES

Survey Dates: 09/16/02 to 09/18/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'30.7"N LONGITUDE: 123°00'45.53"W

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN DEPTH (ft.)	MEAN ESTIMATED AREA (sq.ft.)	TOTAL ESTIMATED AREA (sq.ft.)	MEAN ESTIMATED VOLUME (cu.ft.)	TOTAL ESTIMATED VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
3	2	RIFFLE	4	39	117	1	0.8	***.*		21	62	1	3	0	0
28	8	FLATWATER	37	110	3089	35	2.6	0.3		149	4164	48	1355	0	3
21	13	POOL	28	19	395	5	5.1	1.2		94	1976	125	2626	118	24
19	0	DRY	25	244	4629	53	0.0	0.0		0	0	0	0	0	0
4	2	CULVERT	5	119	475	5	1.0	0.1		27	107	4	15	0	0
<b>TOTAL UNITS</b>	<b>TOTAL UNITS</b>				<b>TOTAL LENGTH (ft.)</b>					<b>TOTAL AREA (sq. ft.)</b>		<b>TOTAL VOL. (cu. ft.)</b>			
75	25				8705					6309		4000			

Porterfield Creek, Trib A

Drainage: Russian River Basin

Table 2c - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 09/16/02 to 09/18/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'30.7"N LONGITUDE: 123°00'45.53"W

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE	MEAN LENGTH	TOTAL LENGTH	TOTAL LENGTH	MEAN WIDTH	MEAN DEPTH	MEAN DEPTH	MEAN DEPTH	MEAN EST. AREA	TOTAL EST. AREA	MEAN EST. VOLUME	TOTAL EST. VOLUME	MEAN RESIDUAL POOL VOL	MEAN SHELTER RATING	MEAN CANOPY
#			%	ft.	ft.	%	ft.	ft.	ft.	ft.	sq.ft.	sq.ft.	cu.ft.	cu.ft.	cu.ft.		%
2	1	CAS	3	54	107	1	1	0.1	0.1		40	80	2	4	0	0	90
1	1	BRS	1	10	10	0	1	***.*	0.1		2	2	0	0	0	0	85
6	1	GLD	8	44	264	3	3	0.5	0.7		53	315	26	158	0	0	93
7	1	RUN	9	135	947	11	3	0.2	0.3		48	336	10	67	0	5	83
15	6	SRN	20	125	1878	22	3	0.3	0.8		182	2723	59	878	0	3	85
1	1	TRP	1	55	55	1	5	1.5	2.3		248	248	371	371	347	40	70
10	5	MCP	13	17	174	2	6	1.5	4.3		99	992	151	1514	70	18	91
2	1	STP	3	19	37	0	4	0.9	1.3		39	79	35	71	0	5	85
2	1	LSR	3	19	37	0	4	1.0	1.6		116	232	81	162	0	40	95
4	3	LSBk	5	19	76	1	5	1.0	2.2		88	352	93	373	99	20	93
2	2	PLP	3	8	16	0	6	1.0	1.8		48	96	46	92	0	45	88
19	0	DRY	25	244	4629	53	0	0.0	0.0		0	0	0	0	0	0	88
4	2	CUL	5	119	475	5	1	0.1	0.5		27	107	4	15	0	0	98
<b>TOTAL UNITS</b>	<b>TOTAL UNITS</b>				<b>LENGTH (ft.)</b>						<b>AREA (sq.ft)</b>		<b>TOTAL VOL. (cu.ft)</b>				
75	25				8705						5560		3705				

Porterfield Creek, Trib A

Drainage: Russian River Basin

Table 3c - SUMMARY OF POOL TYPES

Survey Dates: 09/16/02 to 09/18/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'30.7"N LONGITUDE: 123°00'45.53"W

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
13	7	MAIN	62	20	266	67	5.2	1.4	101	1317	150	1956	125	18
8	6	SCOUR	38	16	129	33	4.9	1.0	81	645	78	623	99	31
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)			
21	13				395				1962		2579			

Porterfield Creek, Trib A

Drainage: Russian River Basin

Table 4c - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES

Survey Dates: 09/16/02 to 09/18/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'30.7"N LONGITUDE: 123°00'45.53"W

UNITS MAX DPTH MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH	<1 FOOT PERCENT OCCURRENCE	1-<2 FT. MAXIMUM DEPTH	1-<2 FT. PERCENT OCCURRENCE	2-<3 FT. MAXIMUM DEPTH	2-<3 FT. PERCENT OCCURRENCE	3-<4 FT. MAXIMUM DEPTH	3-<4 FT. PERCENT OCCURRENCE	>=4 FT. MAXIMUM DEPTH	>=4 FT. PERCENT OCCURRENCE
1	TRP	5	0	0	0	0	1	100	0	0	0	0
10	MCP	48	0	0	5	50	4	40	0	0	1	10
2	STP	10	0	0	2	100	0	0	0	0	0	0
2	LSR	10	0	0	2	100	0	0	0	0	0	0
4	LSBk	19	0	0	3	75	1	25	0	0	0	0
2	PLP	10	0	0	2	100	0	0	0	0	0	0
TOTAL UNITS												
21												



Porterfield Creek, Trib A

Drainage: Russian River Basin

Table 5c - Summary of Shelter by Habitat Type

Survey Dates: 09/16/02 to 09/18/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'30.7"N LONGITUDE: 123°00'45.53"W

UNITS MEASURED	UNITS SHELTER MEASURED	HABITAT TYPE	% TOTAL UNDERCUT BANKS	% TOTAL SWD	% TOTAL LWD	% TOTAL ROOT MASS VEGETATION	% TOTAL TERR. VEGETATION	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
	2	1 CAS	0	0	0	0	0	0	0	0	0
	1	1 BRS	0	0	0	0	0	0	0	0	0
	6	1 GLD	0	0	0	0	0	0	0	0	0
	7	1 RUN	0	0	0	0	0	0	0	100	0
	15	6 SRN	30	11	0	0	8	0	0	50	0
	1	1 TRP	38	25	13	0	25	0	0	0	0
	10	10 MCP	28	13	6	38	0	0	0	15	0
	2	1 STP	0	0	0	0	0	0	0	80	20
	2	2 LSR	0	20	0	80	0	0	0	0	0
	4	4 LSBk	16	4	0	46	0	0	0	0	34
	2	2 PLP	23	49	0	28	0	0	0	0	0
	19	2 DRY	0	0	0	0	0	0	0	0	0
	4	2 CUL	0	0	0	0	0	0	0	0	0
ALL HABITAT TYPES	75	34	24	16	4	29	5	0	0	16	5
POOLS ONLY	21	20	23	18	5	35	4	0	0	8	6

Porterfield Creek, Trib A

Drainage: Russian River Basin

Table 6c - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 09/16/02 to 09/18/02

Confluence Location: QUAD: Cloverdale LEGAL DESCRIPTION: T11N R10W S19 LATITUDE: 38°47'30.7"N LONGITUDE: 123°00'45.53"W

TOTAL HABITAT UNITS	UNITS SUBSTRATE MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
2	1	CAS	0	0	0	0	0	100	0
1	1	BRS	0	0	0	0	0	0	100
6	1	GLD	100	0	0	0	0	0	0
7	1	RUN	100	0	0	0	0	0	0
15	6	SRN	17	0	0	33	0	50	0
1	1	TRP	100	0	0	0	0	0	0
10	6	MCP	83	0	17	0	0	0	0
2	2	STP	0	100	0	0	0	0	0
2	1	LSR	100	0	0	0	0	0	0
4	4	LSBk	100	0	0	0	0	0	0
2	2	PLP	50	0	0	50	0	0	0
19	2	DRY	0	0	0	50	50	0	0
4	2	CUL	0	0	100	0	0	0	0

APPENDIX 4C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Porterfield Creek, Trib A  
 SAMPLE 09/16/2002 to 09/18/2002  
 SURVEY LENGTH:

MAIN 8705 ft.

SIDE CHANNEL: 0 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map: Cloverdale

Latitude: 38°47'30.7"N

Legal Description: T11N R10W S19

Longitude: 123°0'45.53"W

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01 (Units 1-55)

Channel Type: F4	Mean Canopy Density: 90 %
Main Channel: 4601 ft.	Evergreen: 64 %
Side Channel Length: 0 ft.	Deciduous: 36 %
Riffle/Flatwater Mean: 2.9 ft.	Pools by Stream 13 %
Pool Mean Depth: 1.3 ft.	Pools >=2 ft. Deep: 33 %
Base Flow: cfs	Pools >=3 ft. Deep: 7 %
Water: 59-62°F Air: 69-80°F	Mean Pool Shelter: 22
Dom. Bank: No Vegetation	Dom. Shelter: Root Masses
Bank Vegetative Cover: 32 %	LOD Pool Shelter: 41 %
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 2179 ft.
Embeddedness: 1. 0 % 2. 50 % 3. 50 % 4. 0 % 5. 0 %	

STREAM REACH 02 (Units 56-56)

Channel Type: G4	Mean Canopy Density: 75 %
Main Channel: 2000 ft.	Evergreen: 60 %
Side Channel Length: 0 ft.	Deciduous: 40 %
Riffle/Flatwater Mean: ft.	Pools by Stream: %
Pool Mean Depth: ft.	Pools >=2 ft. Deep: %
Base Flow: cfs	Pools >=3 ft. Deep: %
Water: 63-63°F Air: 86-86°F	Mean Pool Shelter
Dom. Bank:	Dom. Shelter: Root Masses
Bank Vegetative Cover: %	LOD Pool Shelter: 0 %
Dom. Bank Substrate:	Dry Channel: 2000 ft.
Embeddedness: 1. 0 % 2. 0 % 3. 0 % 4. 0 % 5. 0 %	

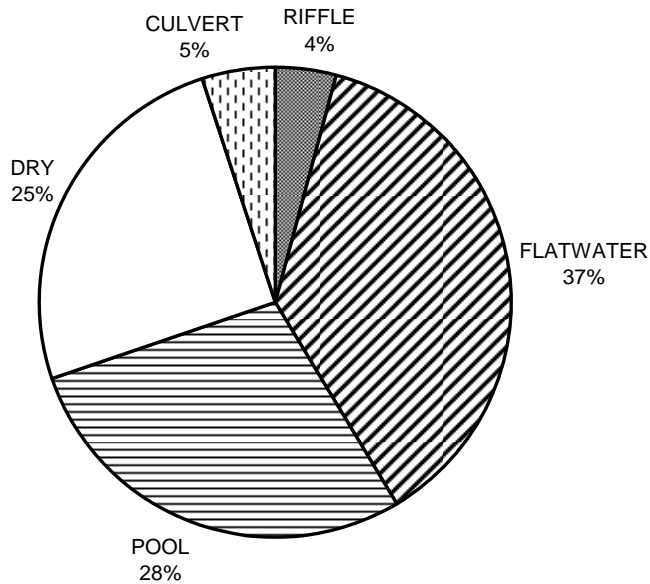
STREAM REACH 03 (Units 57-60)

Channel Type: A3	Mean Canopy Density: 85 %
Main Channel: 770 ft.	Evergreen: 90 %
Side Channel Length: 0 ft.	Deciduous: 10 %
Riffle/Flatwater Mean: 2.5 ft.	Pools by Stream: %
Pool Mean Depth: ft.	Pools >=2 ft. Deep: %
Base Flow: cfs	Pools >=3 ft. Deep: %
Water: 63-63°F Air: 86-86°F	Mean Pool Shelter:
Dom. Bank: Coniferous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 27 %	LOD Pool Shelter: 0 %
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 450 ft.
Embeddedness: 1. 0 % 2. 0 % 3. 0 % 4. 0 % 5. 0 %	

STREAM REACH 04 (Units 61-75)

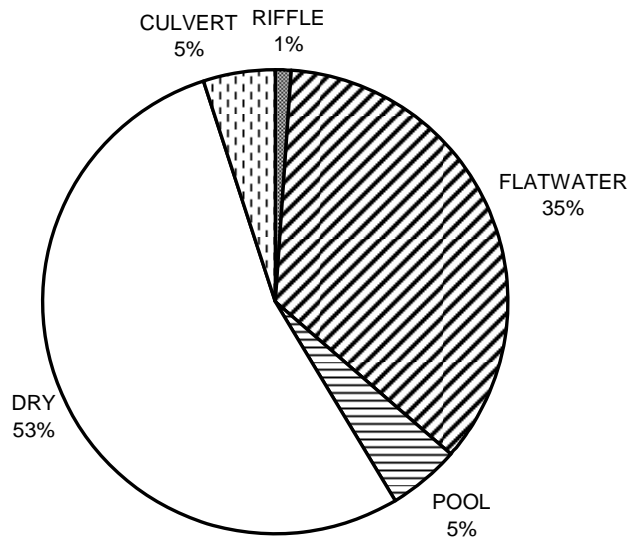
Channel Type: AA2	Mean Canopy Density: 87 %
Main Channel: 1334 ft.	Evergreen: 86 %
Side Channel Length: 0 ft.	Deciduous: 15 %
Riffle/Flatwater Mean: 1.5 ft.	Pools by Stream: 6 %
Pool Mean Depth: 1.2 ft.	Pools >=2 ft. Deep: 33 %
Base Flow: cfs	Pools >=3 ft. Deep: 0 %
Water: 60-65°F Air: 75-86°F	Mean Pool Shelter: 29
Dom. Bank: Coniferous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 31 %	LOD Pool Shelter: 15 %
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.
Embeddedness: 1. 0 % 2. 50 % 3. 33 % 4. 0 % 5. 17 %	

### PORTERFIELD CREEK, TRIB HABITAT TYPES BY PERCENT OCCURRENCE



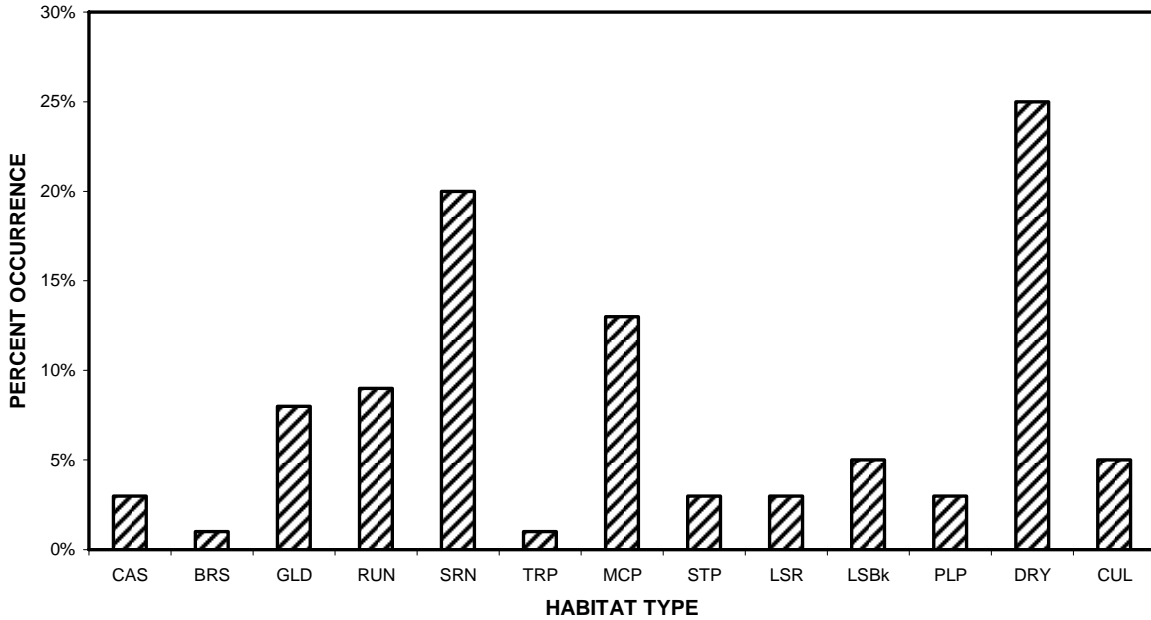
GRAPH 1c. Level II habitat types by percent occurrence.

### PORTERFIELD CREEK, TRIB HABITAT TYPES BY PERCENT TOTAL LENGTH



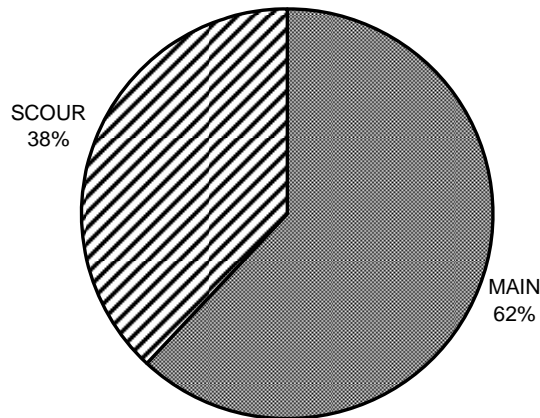
GRAPH 2c. Level II habitat types by percent total length.

**PORTERFIELD CREEK, TRIB  
HABITAT UNIT TYPES BY PERCENT OCCURRENCE**



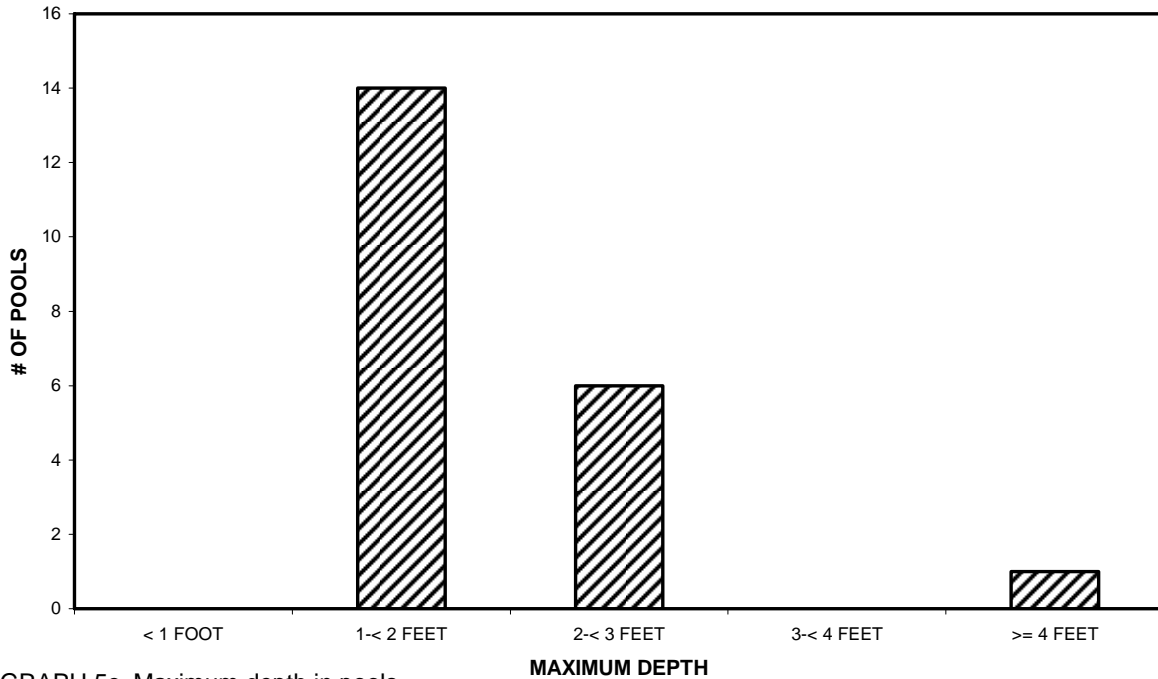
GRAPH 3c. Level IV habitat unit types by percent occurrence.

**PORTERFIELD CREEK, TRIB  
POOL HABITAT TYPES BY PERCENT OCCURRENCE**



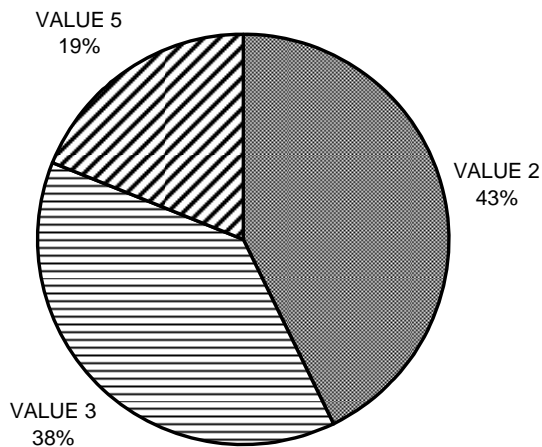
GRAPH 4c. Level I pool habitat types by percent occurrence.

## PORTERFIELD CREEK, TRIB MAXIMUM DEPTH IN POOLS



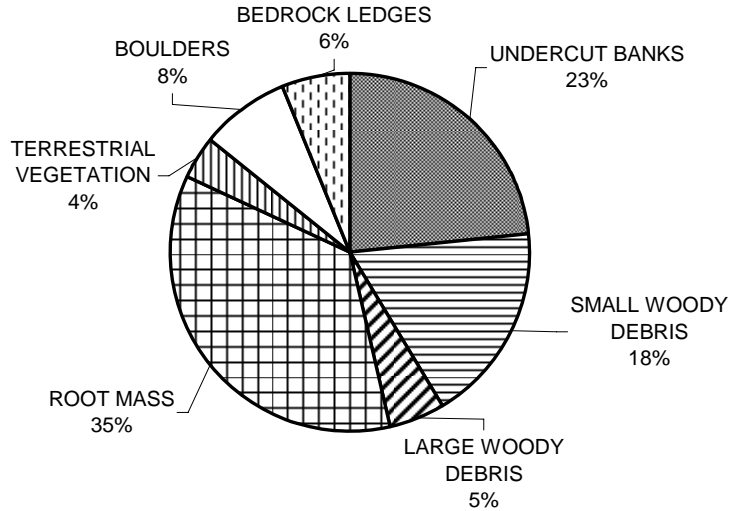
GRAPH 5c. Maximum depth in pools.

## PORTERFIELD CREEK, TRIB PERCENT EMBEDDEDNESS



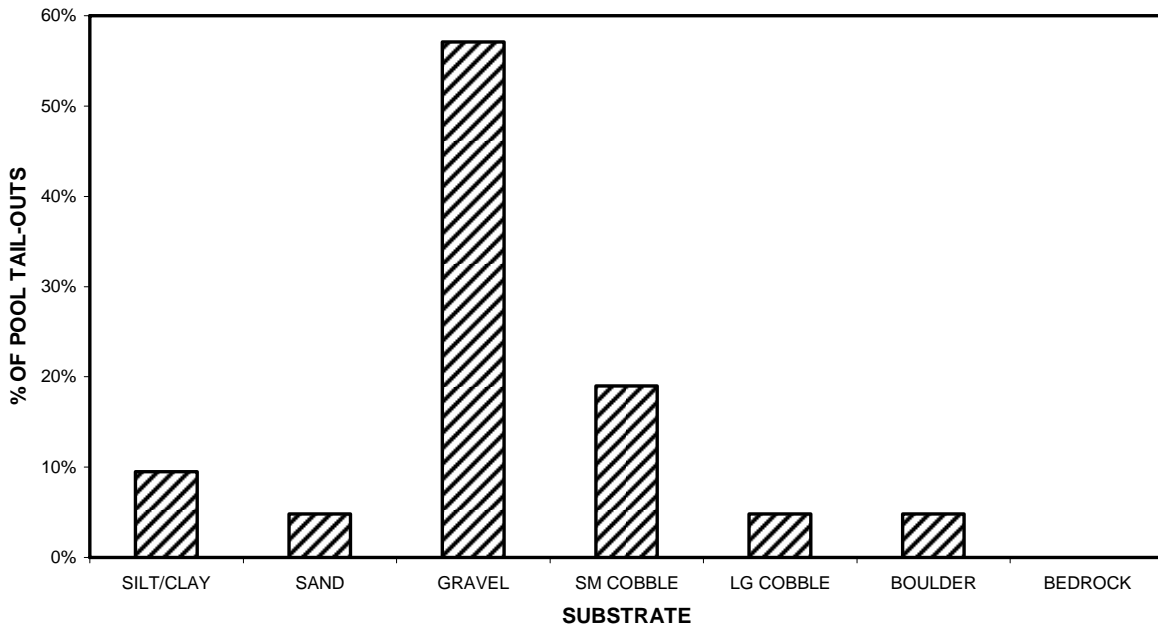
GRAPH 6c. Percent embeddedness estimated at pool tail-outs.

## PORTERFIELD CREEK, TRIB MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7c. Mean percent cover types in pools.

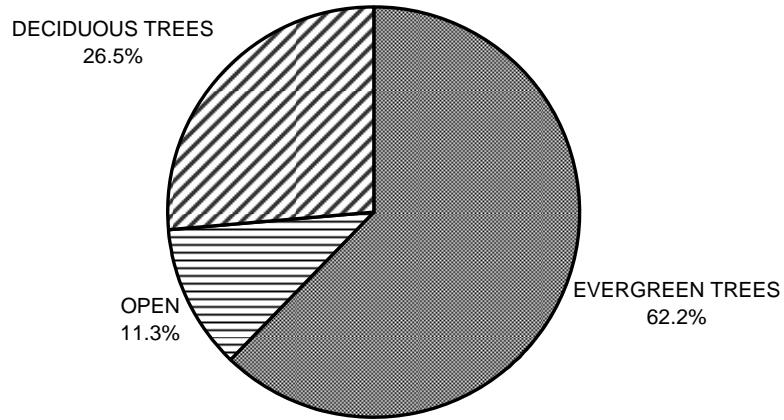
## PORTERFIELD CREEK, TRIB SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



GRAPH 8c. Substrate composition in pool tail-outs.

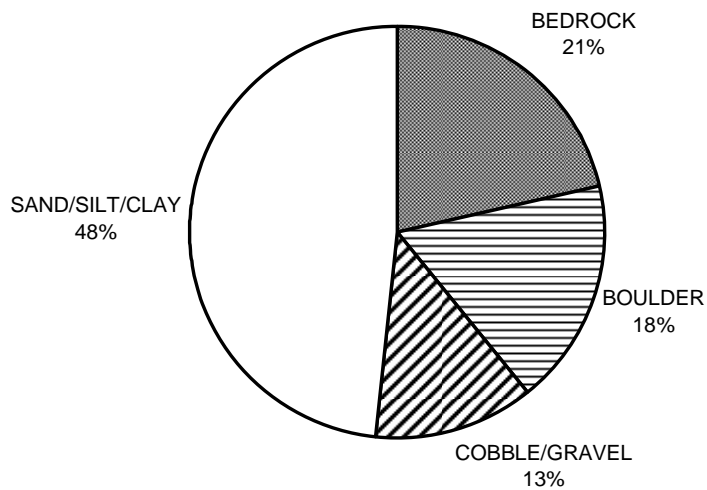


## PORTERFIELD CREEK, TRIB MEAN PERCENT CANOPY



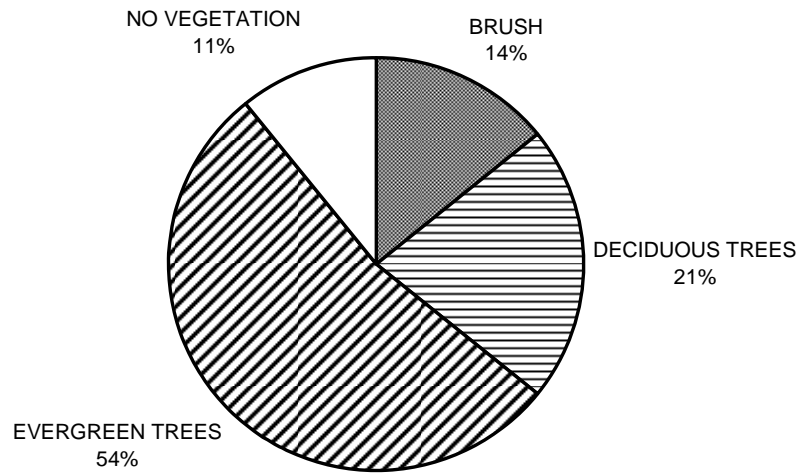
GRAPH 9c. Mean percent canopy.

## PORTERFIELD CREEK, TRIB DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10c. Dominant bank composition in survey reach.

# PORTERFIELD CREEK, TRIB DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11c. Dominant bank vegetation in survey reach.

**Porterfield Creek Water Temperature 2002  
(South Branch - Reach 2)**

