



**California Department of Fish and Wildlife
Santa Cruz County
Big Basin Coastal Watershed
Stream Habitat Assessment Reports**

Molino Creek

Surveyed 2010

Report Completed in 2013



Molino Creek

STREAM INVENTORY REPORT

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INTRODUCTION

A stream inventory was conducted during 7/19/2010 to 9/2/2010 on Molino Creek. The survey began at the confluence with Pacific Ocean and extended upstream 3.4 miles.

The Molino Creek inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Molino Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for coho salmon and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Molino Creek is a tributary to Pacific Ocean, located in Santa Cruz County, California (Map 1). Molino Creek's legal description at the confluence with Pacific Ocean is T10S R03W S30. Its location is 37°02'14.0" north latitude and 122°13'40.0" west longitude, LLID number 1222277370373. Molino Creek is a first order stream and has approximately 3.67 miles of blue line stream according to the USGS National Hydrology Dataset (NHD) Davenport 7.5 minute quadrangle. Molino Creek drains a watershed of approximately 1.58 square miles. Elevations range from about 26 feet at the mouth of the creek to 1,690 feet in the headwater areas. Evergreen forest, grassland, and shrubland dominate the watershed. The watershed is entirely privately owned and is managed for minimal hay and pasture production. Vehicle access exists via Highway 1.

METHODS

The habitat inventory conducted in Molino Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Wildlife (CDFW). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the

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survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are fully measured. All other habitat unit types encountered for the first time in each reach 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. All pools except step-pools are fully sampled.

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 Molino Creek to record measurements and observations. There are eleven components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) near the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

2. Channel Type:

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

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Molino Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

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5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Molino Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:

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

7. Substrate Composition:

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

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Molino Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or hardwood trees.

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Molino Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

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10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Molino Creek. In addition, 1 site was electrofished using a Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.18, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Wildlife. This program processes and summarizes the data, and produces the following ten tables:

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

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

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

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

The habitat inventory of 7/19/2010 to 9/2/2010 was conducted by Bell, C. Griffin, A. (WSP). The total length of the stream surveyed was 17,777 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.23 cfs on 7/19/2010.

Molino Creek is a NA channel type for 234 feet of the stream surveyed (Reach 1), a F4 channel type for 5,225 feet of the stream surveyed (Reach 2), a B4 channel type for 2,212 feet of the stream surveyed (Reach 3), a NA channel type for 7,070 feet of the stream surveyed (Reach 4), a B4 channel type for 3,036 feet of the stream surveyed (Reach 5)

F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. B4 channels are moderately entrenched riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width /depth ratios and gravel dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 61 degrees Fahrenheit. Air temperatures ranged from 55 to 71 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 1% nosurvey units, 2% culvert units, 39% flatwater units, 41% riffle units, 14% pool units, 2% dry units, (Graph 1). Based on total length of Level II habitat types there were 41% nosurvey units, 2% culvert units, 22% flatwater units, 32% riffle units, 2% pool units,

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1% dry units, (Graph 2).

Fifteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 18% Run units, 14% Glide units, 28% Low Gradient Riffle units (Graph 3). The most frequent habitat types based on percent total length were 41% Not Surveyed units, 11% Run units, 22% Low Gradient Riffle units (Table 2).

A total of 25 pools were identified (Table 3). Main Channel pools were the most frequently encountered, at 60%, and comprised 52% 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. One of the 25 pools (4%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 24 pool tail-outs measured, 8 had a value of 1 (33.3%); 12 had a value of 2 (50%); 2 had a value of 3 (8.3%); 2 had a value of 5 (8.3%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 8, flatwater habitat types had a mean shelter rating of 15, and pool habitats had a mean shelter rating of 21 (Table 1). Of the pool types, the Scour pools had a mean shelter rating of 28, Main Channel pools had a mean shelter rating of 17 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial Vegetation is the dominant cover types in Molino Creek. Graph 7 describes the pool cover in Molino Creek. Large Woody Debris is the dominant pool cover type followed by terrestrial vegetation.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel observed in 75% of pool tail-outs, small Cobble observed in 17% of pool tail-outs.

The mean percent canopy density for the surveyed length of Molino Creek was 87%. The mean percentages of hardwood and coniferous trees were 54% and 46%, respectively. Thirteen percent of the canopy was open. Graph 9 describes the mean percent canopy in Molino Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 76%. The mean percent left bank vegetated was 78%. The dominant elements composing the structure of the stream banks consisted of 4% bedrock, 0% boulder, 3% cobble/gravel, 92% sand/silt/clay, (Graph 10). Hardwood trees were the dominant vegetation type observed in 55.9% of the units surveyed. Additionally, 35.3% of the units surveyed had coniferous trees as the dominant vegetation type, and 8.8% had brush as the dominant vegetation (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

One site was electrofished for species composition and distribution in Molino Creek on October 20, 2010. Water temperature taken during the electrofishing period (13:57, and 14:41) was 58 degrees Fahrenheit. Air temperature was 61 degrees Fahrenheit. The site was sampled by Desiree Dela Vega and Julie Hanson (WSP), and Derek Acomb and Dan Resnik (CDFW).

Reach 2, comprising of 5,225 feet, one site was sampled. The reach site yielded 8 young-of-the-year steelhead/rainbow trout (SH/RT), 3 age 1+ SH/RT and 1 age 2+ SH/RT, 2 rough-skinned newts.

The following chart displays the information yielded from these sites:

2010 Molino Creek e-fish observations

| Date | Site # | Reference Point | Distance From Reference Point (ft.) | Steelhead/Rainbow Trout | | | Non Salmonids Name species |
|------------|--------|-----------------|-------------------------------------|-------------------------|----|----|----------------------------|
| | | | | 0+ | 1+ | 2+ | |
| 10/20/2010 | 1 | Swanton bridge | 50 feet upstream | 8 | 3 | 1 | 2 rough-skinned newts |

DISCUSSION

Molino Creek is a NA channel type for the first 234 feet of stream surveyed and a F4 channel type for the next 5,225 feet and a B4 channel type for the next 2,212 feet and a NA channel type for the next 7,070 feet and a B4 channel type for the remaining 3,036 feet of the stream surveyed. The suitability of B4 channel types for fish habitat improvement structures is as follows: Excellent for structures such as low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover. The suitability of F4 channel types for fish habitat improvement structures is as follows: Although unsuitable for boulder clusters, excellent for bank-placed boulders and occasionally plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days 7/19/2010 to 9/2/2010, ranged from 56 to 61 degrees Fahrenheit. Air temperatures ranged from 55 to 71 degrees Fahrenheit. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 21.9% of the total length of this survey, riffles 31.7%, and pools 2.3%. The pools are relatively shallow, with only 1 of the 25 (4%) 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

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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.

Twenty of the 24 pool tail-outs measured had embeddedness ratings of 1 or 2. Two of the pool tail-outs had embeddedness ratings of 3 or 4. Two of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Molino Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Twenty two of the 24 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 21. The shelter rating in the flatwater habitats was 15. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Terrestrial Vegetation in Molino Creek. Large Woody Debris is the dominant cover type in pools followed by terrestrial vegetation. 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 87%. Reach 2 had a canopy density of 80.1%, Reach 3 had a canopy density of 85.3%, and Reach 5 had a canopy density of 93.4%. 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 76% and 78%, 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.

GENERAL RECOMMENDATIONS

Molino Creek should be managed as an anadromous, natural production stream.

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.

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RECOMMENDATIONS

- 1) 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.
- 2) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from Terrestrial Vegetation. Adding high quality complexity with woody cover in the pools is desirable.
- 3) Access for migrating salmonids should be assessed at all road crossings and dams. Particular sites of concern include the Highway 1 and Swanton Road culvert, as well as the ford crossing located upstream of the Swanton Road culvert. The flood control culvert for the on-stream diversion pond, was also identified as a barrier, and is located at the end of Reach 2. All fish passage assessments should be done according to Part 9 of the California Salmonid Stream Habitat Restoration Manual (Flosi et al, 1998). Where needed, crossings should be replaced or modified to improve fish passage.
- 4) There are several sections throughout Reach 2 where the stream is being impacted from livestock in the riparian zone. Livestock in streams generally inhibit the growth of new trees, exasperate erosion, and reduce summertime survival of juvenile fish by defecating in the water. Alternatives to limit cattle access, control erosion and increase canopy, should be explored with the landowner, and developed if possible.
- 5) Inventory and map sources of stream bank 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. Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.
- 6) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

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COMMENTS AND LANDMARKS

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

| Position | Habitat Unit # | Comments |
|----------|----------------|---|
| 0 | 0001.00 | Start of Survey at confluence with Pacific Ocean. WP42 N37.03709 W122.22736 |
| 234 | 0002.00 | End of tidal influence. WP43 N37.03699 W122.22620 |
| 234 | 0002.00 | Culvert #1 under Hwy1. Culvert made of concrete box and is in good condition, with a Height=6', a Width=6', and a Length=196'. The maximum depth at outlet=0.9'. The Culvert slope =0%. It is a possible barrier to juvenile or adult salmonids.WP43 N37.03699 W122.22620 |
| 234 | 0002.00 | 10 inch salmonid observed immediately downstream from culvert outlet. |
| 430 | 0003.00 | California Red-legged frog observed, unidentified garter snake observed |
| 525 | 0005.00 | unidentified garter snake observed |
| 1368 | 0024.00 | California Red-legged frog observed. |
| 1411 | 0027.00 | Salmonid young of the year (YOY) observed |
| 1749 | 0031.00 | California Red-legged Frog observed |
| 1955 | 0036.00 | Newts observed |
| 2212 | 0041.00 | Fifty feet into unit an old car is used to stabilize the left bank. |
| 2401 | 0045.00 | Culvert #2 under Swanton rd. is a box culvert and made of concrete with a Height=6', a Width=6', and a Length=31'. Culvert has a plunge height= 4' with a maximum depth at the outlet=2'. The culvert slope is approximately 0%; the 4' sections upstream and downstream are cracked. It is a possible barrier to juveniles and adult salmonids. WP 48 N37.03754 W122.22099 |
| 2432 | 0046.00 | One-hundred feet into unit is 3 log structure secured to the right bank with rebar |
| 2628 | 0047.00 | Ford crossing has a Length=24' and a width=10'. Cattle have access to the creek channel. |
| 2745 | 0049.00 | Newt observed |
| 2913 | 0053.00 | Steelhead YOY observed |
| 3071 | 0056.00 | Cattle have access to stream |
| 3206 | 0057.00 | Barbed wire fence crosses stream at top of the unit. |
| 3430 | 0061.00 | 1+ Salmonid observed |
| 3854 | 0071.00 | Right bank Tributary #1 is unnamed and enters Molino Creek. It is |

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| Position | Habitat Unit # | Comments |
|----------|----------------|--|
| | | flowing with a discharge <1cfs, and contributes 5% of flow to the receiving stream. Water temperatures downstream, upstream, and within the tributary= 56F. The survey crew checked 100' and found it is accessible to fish, with a slope=1%. No fish were observed. WP52 N37.03782 W122.21690 |
| 3939 | 0072.00 | Large alder recently fell in stream 1/2 way into unit |
| 3939 | 0072.00 | Salmonid YOY observed |
| 5099 | 0089.00 | Left bank Tributary #1 is unnamed and enters Molino Creek. It is flowing with a discharge <1, and contributes 1% of flow to the receiving stream. Water temperatures downstream, and upstream= 56F and within the tributary= 55F. The survey crew checked 100' up and found it was accessible to fish, with a slope= 1%. No fish were observed. WP54 N37.03828 W122.21355 |
| 5307 | 0095.00 | 7 foot plunge at bottom of unit created from concrete apron for culvert |
| 5317 | 0096.00 | WP55 N37.03862 W122.21246 Iron Gate at top of culvert controls pond upstream. Gate is open and pond is drained. |
| 5317 | 0096.00 | Culvert #3 is used as flood control for old pond. Culvert is made of CMP with a Height=4', a Width=4', and a Length=142'. The Diameter =4' and creates a plunge height= 7' with a maximum depth at the outlet=0.1'. The culvert slope <1%. The culvert has a dented top and rust lines at 1' of depth. It is a possible barrier to juvenile and adult salmonids. WP55 N37.03862 W122.21246 |
| 6086 | 0105.00 | Six foot headcut at top of unit. Soft soil on left bank has erosion potential. |
| 7043 | 0121.00 | Extremely dense vegetation |
| 7299 | 0124.00 | WP59 N37.04112 W122.20836 Begins no access reach (reach 4) due to extremely dense vegetation; impossible to navigate with hand tools. |
| 7671 | 0125.00 | WP65 N37.05551 W122.19739 End of no access reach (reach 4) |
| 14808 | 0128.00 | Newts Observed |
| 15048 | 0131.00 | Right bank tributary #2 is unnamed and enters Molino Creek. It is no flowing, with discharge= 0, and contributes 0% of flow to the receiving stream. Water temperatures downstream and upstream= 58F. Tributary was dry. Survey crew checked 100' up and found it was not accessible to fish, with a Slope=10%. No fish were observed. WP66 N37.05589 W122.19669 |
| 15385 | 0136.00 | Left bank tributary #2 is unnamed and enters Molino Creek. It is flowing, with discharge <1 cfs, and contributes 5% of flow to the receiving stream. Water temperatures downstream and upstream=58F and the water temperature within the tributary=57F. The survey |

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| Position | Habitat Unit # | Comments |
|----------|----------------|--|
| | | crew checked 50' up and found it was accessible to fish, with a slope= 5%. No fish were observed. |
| 15472 | 0138.00 | Newts Observed. |
| 15887 | 0148.00 | From HU 0125.00 upstream are many fallen and burned redwoods |
| 16256 | 0151.00 | Left bank tributary #3 is unnamed and enters Molino Creek. It is flowing with Discharge <1 cfs. and contributes 1% of flow to the receiving stream. Water temperatures downstream, upstream, and within the tributary=59F. The survey crew checked 75' up and found it was not accessible to fish, with a Slope= 15%. No fish were observed. WP69 N37.05884 W122.19557 |
| 16749 | 0158.00 | Left bank tributary #4 is unnamed and enters Molino Creek. It is flowing with Discharge <1cfs, and contributes 5% of flow to the receiving stream. Water temperatures downstream and upstream= 60F and water temperature within the tributary= 62F. The survey crew checked 50' up and found it was not accessible to fish, with a slope= 50%. No fish were observed.WP71 N37.05990 W122.19535 |
| 17118 | 0164.00 | Garter Snake observed |
| 17777 | 0175.00 | End of Survey. Channel becomes less defined and over-grown with thick vegetation. WP73 N37.06232 W122.19494 |

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.

McCain, M., D. Fuller, L. Decker and K. Overton. 1990. Stream habitat classification and inventory procedures for northern California. FHC Currents. No.1. U.S. Department of Agriculture. Forest Service, Pacific Southwest Region.

Rosgen, D.L., 1994. A Classification of Natural Rivers. *Catena*, Vol 22: 169-199, Elsevier Science, B. V. Amsterdam.

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

| | | | |
|----------------------|-------|-------|-------|
| Low Gradient Riffle | (LGR) | [1.1] | { 1 } |
| High Gradient Riffle | (HGR) | [1.2] | { 2 } |

CASCADE

| | | | |
|---------------|-------|-------|-------|
| Cascade | (CAS) | [2.1] | { 3 } |
| Bedrock Sheet | (BRS) | [2.2] | {24} |

FLATWATER

| | | | |
|--------------|-------|-------|------|
| Pocket Water | (POW) | [3.1] | {21} |
| Glide | (GLD) | [3.2] | {14} |
| Run | (RUN) | [3.3] | {15} |
| Step Run | (SRN) | [3.4] | {16} |
| Edgewater | (EDW) | [3.5] | {18} |

MAIN CHANNEL POOLS

| | | | |
|-------------------------|-------|-------|-------|
| Trench Pool | (TRP) | [4.1] | { 8 } |
| Mid-Channel Pool | (MCP) | [4.2] | {17} |
| Channel Confluence Pool | (CCP) | [4.3] | {19} |
| Step Pool | (STP) | [4.4] | {23} |

SCOUR POOLS

| | | | |
|--|--------|-------|-------|
| Corner Pool | (CRP) | [5.1] | {22} |
| Lateral Scour Pool - Log Enhanced | (LSL) | [5.2] | {10} |
| Lateral Scour Pool - Root Wad Enhanced | (LSR) | [5.3] | {11} |
| Lateral Scour Pool - Bedrock Formed | (LSBk) | [5.4] | {12} |
| Lateral Scour Pool - Boulder Formed | (LSBo) | [5.5] | {20} |
| Plunge Pool | (PLP) | [5.6] | { 9 } |

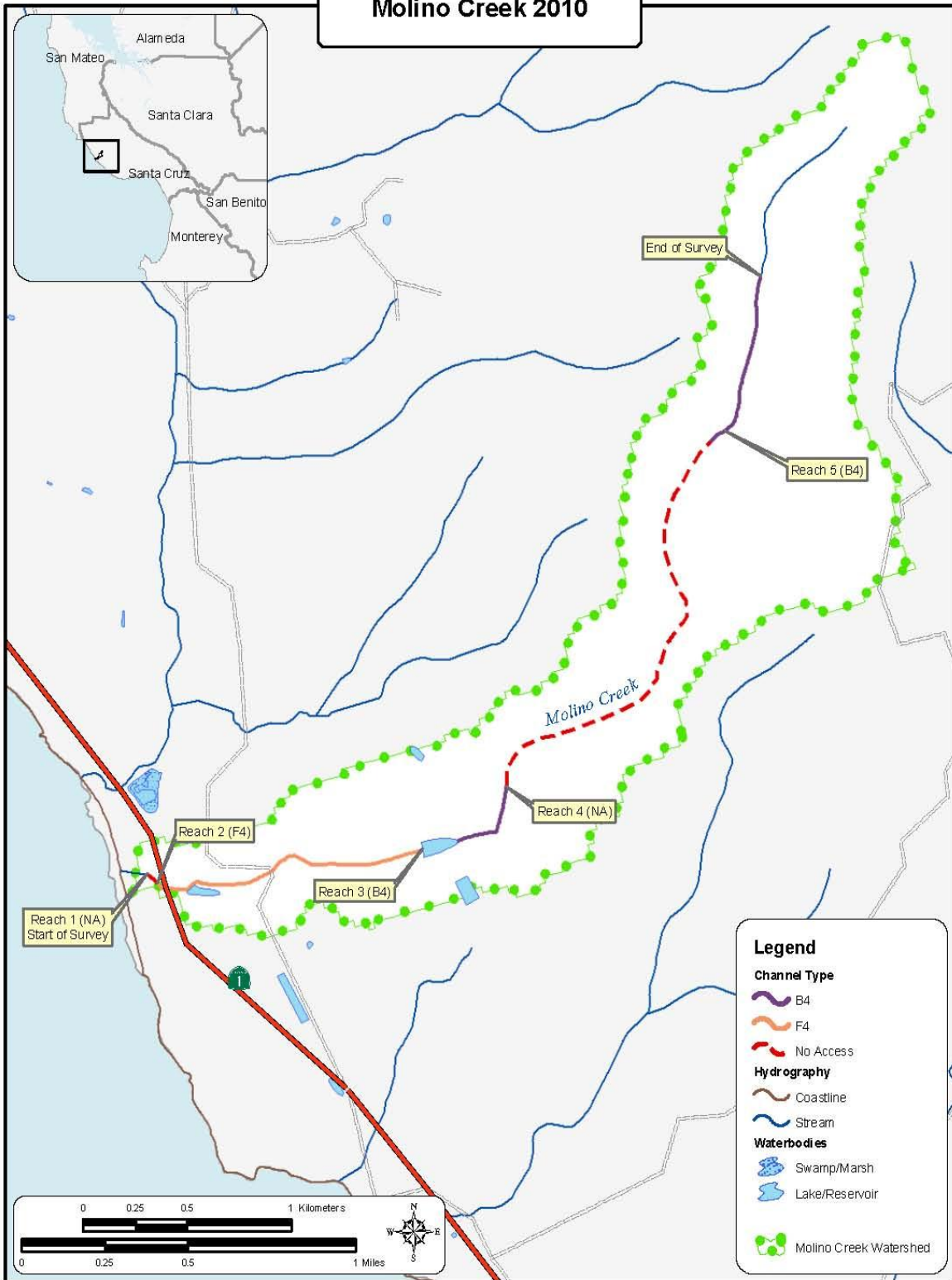
BACKWATER POOLS

| | | | |
|----------------------------------|-------|-------|-------|
| Secondary Channel Pool | (SCP) | [6.1] | { 4 } |
| Backwater Pool - Boulder Formed | (BPB) | [6.2] | { 5 } |
| Backwater Pool - Root Wad Formed | (BPR) | [6.3] | { 6 } |
| Backwater Pool - Log Formed | (BPL) | [6.4] | { 7 } |
| Dammed Pool | (DPL) | [6.5] | {13} |

ADDITIONAL UNIT DESIGNATIONS

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

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Molino Creek

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

| Stream Name: | | Molino Creek | | | | | | | | | | LLID: | | 1222277370373 | | | Drainage: | | Santa Cruz | | | | | | | | |
|---------------------|-----------------------------------|-----------------------|------------------------|-------------------|---------------------------|------------------|------------------|------------------|----------------------|--------------------|-------------------------------|-----------------------------|---------------------------------|---------------------------------|---------------------|---------------------------|------------------|-------------|------------|------------------|--|-------------|--|-------------------|--|--------------|--|
| Survey | | 7/19/2010 to 9/2/2010 | | | | | | | | | | Confluence Location: | | Quad: DAVENPORT | | Legal Description: | | T10SR03WS30 | | Latitude: | | 37:02:14.0N | | Longitude: | | 122:13:40.0W | |
| 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 | | | | | | | | | | | | |
| 4 | 0 | CULVERT | 2.3 | 98 | 393 | 2.2 | | | | | | | | | | | | | | | | | | | | | |
| 4 | 0 | DRY | 2.3 | 32 | 130 | 0.7 | | | | | | | | | | | | | | | | | | | | | |
| 68 | 68 | FLATWATER | 38.9 | 57 | 3893 | 21.9 | 5.3 | 0.4 | 0.6 | 270 | 18365 | 90 | 6148 | | 15 | | | | | | | | | | | | |
| 2 | 0 | NOSURVEY | 1.1 | 3652 | 7304 | 41.1 | | | | | | | | | | | | | | | | | | | | | |
| 25 | 25 | POOL | 14.3 | 17 | 416 | 2.3 | 6.6 | 0.6 | 1.2 | 107 | 2687 | 84 | 2105 | 68 | 21 | | | | | | | | | | | | |
| 72 | 72 | RIFFLE | 41.1 | 78 | 5641 | 31.7 | 5.4 | 0.2 | 0.5 | 374 | 26953 | 98 | 7078 | | 8 | | | | | | | | | | | | |
| Total Units | Total Units Fully Measured | | | | Total Length (ft.) | | | | | | Total Area (sq.ft.) | | Total Volume (cu.ft.) | | | | | | | | | | | | | | |
| 175 | 165 | | | | 17777 | | | | | | 48005 | | 15330 | | | | | | | | | | | | | | |

Molino Creek

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Molino Creek

LLID: 1222277370373

Drainage: Santa Cruz

Survey 7/19/2010 to 9/2/2010

Confluence Location: Quad: DAVENPORT

Legal Description: T10SR03WS30

Latitude: 37:02:14.0N

Longitude: 122:13:40.0W

| 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 | Mean Canopy (%) |
|--------------------|-----------------------------------|--------------|------------------------|-------------------|---------------------------|------------------|------------------|------------------|----------------------|--------------------|-------------------------------|----------------------|---------------------------------|---------------------------------|---------------------|-----------------|
| 49 | 49 | LGR | 28.0 | 78 | 3844 | 21.6 | 6.0 | 0.3 | 0.8 | 411 | 20143 | 109 | 5320 | | 7 | 83 |
| 14 | 14 | HGR | 8.0 | 112 | 1572 | 8.8 | 5.0 | 0.3 | 1.0 | 420 | 5880 | 106 | 1478 | | 8 | 93 |
| 2 | 2 | CAS | 1.1 | 20 | 39 | 0.2 | 2.0 | 0.1 | 0.3 | 46 | 92 | 5 | 9 | | 0 | 97 |
| 7 | 7 | BRS | 4.0 | 27 | 186 | 1.0 | 5.0 | 0.3 | 1.1 | 120 | 838 | 39 | 270 | | 17 | 90 |
| 25 | 25 | GLD | 14.3 | 27 | 684 | 3.8 | 6.0 | 0.4 | 1.0 | 159 | 3976 | 61 | 1529 | | 15 | 85 |
| 32 | 32 | RUN | 18.3 | 59 | 1892 | 10.6 | 5.0 | 0.3 | 1.1 | 268 | 8584 | 89 | 2850 | | 14 | 80 |
| 11 | 11 | SRN | 6.3 | 120 | 1317 | 7.4 | 5.0 | 0.3 | 1.0 | 528 | 5805 | 161 | 1769 | | 20 | 89 |
| 1 | 1 | TRP | 0.6 | 19 | 19 | 0.1 | 2.0 | 0.9 | 1.4 | 38 | 38 | 38 | 38 | 34 | 10 | 91 |
| 13 | 13 | MCP | 7.4 | 13 | 173 | 1.0 | 6.0 | 0.6 | 2.0 | 86 | 1122 | 65 | 843 | 54 | 12 | 89 |
| 1 | 1 | STP | 0.6 | 26 | 26 | 0.1 | 5.0 | 0.5 | 1.1 | 130 | 130 | 117 | 117 | 65 | 90 | 98 |
| 4 | 4 | LSL | 2.3 | 24 | 95 | 0.5 | 6.0 | 0.4 | 1.4 | 139 | 554 | 84 | 335 | 60 | 40 | 92 |
| 1 | 1 | LSR | 0.6 | 18 | 18 | 0.1 | 6.0 | 0.2 | 0.9 | 108 | 108 | 32 | 32 | 22 | 40 | 84 |
| 1 | 1 | LSBk | 0.6 | 27 | 27 | 0.2 | 3.0 | 0.4 | 0.6 | 81 | 81 | 65 | 65 | 32 | 10 | 90 |
| 4 | 4 | PLP | 2.3 | 14 | 58 | 0.3 | 11.0 | 0.8 | 1.9 | 164 | 654 | 169 | 675 | 150 | 18 | 86 |
| 4 | 0 | DRY | 2.3 | 32 | 130 | 0.7 | | | | | | | | | | 95 |
| 4 | 0 | CUL | 2.3 | 98 | 393 | 2.2 | | | | | | | | | | |
| 2 | 0 | NS | 1.1 | 3652 | 7304 | 41.1 | | | | | | | | | | |
| Total Units | Total Units Fully Measured | | | | Total Length (ft.) | | | | | | Total Area (sq.ft.) | | Total Volume | | | |
| 175 | 165 | | | | 17777 | | | | | | 48005 | | 15330 | | | |

Molino Creek

Table 3 - Summary of Pool Habitat Types

Stream Name: Molino Creek

LLID: 1222277370373

Drainage: Santa Cruz

Survey 7/19/2010 to 9/2/2010

Confluence Location: Quad: DAVENPORT

Legal Description: T10SR03WS30

Latitude: 37:02:14.0N

Longitude: 122:13:40.0W

| 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 |
|--------------------|-----------------------------------|--------------|------------------------|-------------------|---------------------------|------------------|------------------|---------------------------|--------------------|-------------------------------|---------------------------------|-------------------------------------|---------------------|
| 15 | 15 | MAIN | 60 | 15 | 218 | 52 | 6.0 | 0.7 | 86 | 1290 | 53 | 795 | 17 |
| 10 | 10 | SCOUR | 40 | 20 | 198 | 48 | 7.6 | 0.6 | 140 | 1397 | 89 | 895 | 28 |
| Total Units | Total Units Fully Measured | | | | Total Length (ft.) | | | | | Total Area (sq.ft.) | | Total Volume (cu.ft.) | |
| 25 | 25 | | | | 416 | | | | | 2687 | | 1690 | |

Molino Creek

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

Stream Name: Molino Creek **LLID:** 1222277370373 **Drainage:** Santa Cruz
Survey: 7/19/2010 to 9/2/2010

Confluence Location: Quad: DAVENPORT **Legal Description:** T10SR03WS30 **Latitude:** 37:02:14.0N **Longitude:** 122:13:40.0W

| 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 | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | MCP | 52 | 3 | 23 | 9 | 69 | 1 | 8 | 0 | 0 | 0 | 0 |
| 1 | STP | 4 | 0 | 0 | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | LSL | 16 | 1 | 25 | 3 | 75 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | LSR | 4 | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | LSBk | 4 | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | PLP | 16 | 0 | 0 | 4 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Units | | | Total < 1 Foot Max Resid. Depth | Total < 1 Foot % Occurrence | Total 1 < 2 Feet Max Resid. Depth | Total 1 < 2 Feet % Occurrence | Total 2 < 3 Feet Max Resid. Depth | Total 2 < 3 Feet % Occurrence | Total 3 < 4 Feet Max Resid. Depth | Total 3 < 4 Feet % Occurrence | Total >= 4 Feet Max Resid. Depth | Total >= 4 Feet % Occurrence |
| 25 | | | 6 | 24 | 18 | 72 | 1 | 4 | 0 | 0 | 0 | 0 |

Mean Maximum Residual Pool Depth (ft.): 1

Table 5 - Summary of Mean Percent Cover By Habitat

Stream Name: Molino Creek **Dry Units:** 4 **LLID:** 1222277370373 **Drainage:** Santa Cruz
Survey: 7/19/2010 to 9/2/2010

Molino Creek

| Confluence Location: Quad: DAVENPORT | | | Legal Description: T10SR03WS30 | | | | Latitude: 37:02:14.0N | | Longitude: 122:13:40.0W | | |
|--------------------------------------|----------------------|--------------|--------------------------------|------------|------------|------------------|-------------------------|---------------------------|-------------------------|-----------------|-----------------------|
| 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 |
| 49 | 49 | LGR | 0 | 6 | 9 | 2 | 9 | 0 | 0 | 19 | 0 |
| 14 | 14 | HGR | 0 | 14 | 58 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2 | CAS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 7 | BRS | 0 | 1 | 27 | 0 | 0 | 0 | 0 | 0 | 0 |
| 72 | 72 | TOTAL RIFFLE | 0 | 7 | 20 | 2 | 6 | 0 | 0 | 13 | 0 |
| 25 | 25 | GLD | 2 | 22 | 0 | 4 | 36 | 0 | 0 | 3 | 0 |
| 32 | 32 | RUN | 3 | 13 | 5 | 7 | 30 | 0 | 0 | 11 | 1 |
| 11 | 11 | SRN | 0 | 10 | 20 | 0 | 25 | 0 | 1 | 8 | 0 |
| 68 | 68 | TOTAL FLAT | 2 | 16 | 6 | 5 | 31 | 0 | 0 | 8 | 0 |
| 1 | 1 | TRP | 10 | 0 | 0 | 90 | 0 | 0 | 0 | 0 | 0 |
| 13 | 13 | MCP | 0 | 10 | 32 | 6 | 17 | 0 | 0 | 12 | 0 |
| 1 | 1 | STP | 0 | 30 | 0 | 30 | 0 | 0 | 20 | 20 | 0 |
| 4 | 4 | LSL | 25 | 35 | 13 | 10 | 18 | 0 | 0 | 0 | 0 |
| 1 | 1 | LSR | 30 | 20 | 0 | 20 | 30 | 0 | 0 | 0 | 0 |
| 1 | 1 | LSBk | 0 | 0 | 0 | 60 | 0 | 0 | 0 | 0 | 40 |
| 4 | 4 | PLP | 0 | 5 | 0 | 0 | 13 | 0 | 43 | 15 | 0 |
| 25 | 25 | TOTAL POOL | 6 | 14 | 19 | 13 | 15 | 0 | 8 | 9 | 2 |
| 4 | 0 | CUL | | | | | | | | | |
| 2 | 0 | NS | | | | | | | | | |
| 175 | 165 | TOTAL | 2 | 12 | 14 | 5 | 18 | 0 | 1 | 10 | 0 |

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Molino Creek **Dry Units:** 4 **LLID:** 1222277370373 **Drainage:** Santa Cruz
Survey 7/19/2010 to 9/2/2010

Molino Creek

| Confluence Location: Quad: DAVENPORT | | | Legal Description: T10SR03WS30 | | | | Latitude: 37:02:14.0N | | Longitude: 122:13:40.0W | |
|--------------------------------------|----------------------|--------------|--------------------------------|-----------------------|-------------------------|-------------------------------|-------------------------------|--------------------------|--------------------------|--|
| 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 | |
| 49 | 49 | LGR | 0 | 0 | 86 | 14 | 0 | 0 | 0 | |
| 14 | 14 | HGR | 0 | 0 | 71 | 14 | 0 | 7 | 7 | |
| 2 | 2 | CAS | 0 | 0 | 0 | 0 | 0 | 0 | 100 | |
| 7 | 7 | BRS | 0 | 0 | 0 | 0 | 0 | 0 | 100 | |
| 25 | 25 | GLD | 4 | 28 | 68 | 0 | 0 | 0 | 0 | |
| 32 | 32 | RUN | 0 | 3 | 78 | 19 | 0 | 0 | 0 | |
| 11 | 11 | SRN | 0 | 0 | 36 | 55 | 0 | 0 | 9 | |
| 1 | 1 | TRP | 0 | 0 | 100 | 0 | 0 | 0 | 0 | |
| 13 | 13 | MCP | 8 | 38 | 54 | 0 | 0 | 0 | 0 | |
| 1 | 1 | STP | 0 | 0 | 100 | 0 | 0 | 0 | 0 | |
| 4 | 4 | LSL | 25 | 50 | 0 | 25 | 0 | 0 | 0 | |
| 1 | 1 | LSR | 0 | 100 | 0 | 0 | 0 | 0 | 0 | |
| 1 | 1 | LSBk | 0 | 100 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 4 | PLP | 0 | 50 | 25 | 0 | 25 | 0 | 0 | |
| 4 | 0 | CUL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 2 | 0 | NS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Molino Creek
Survey 7/19/2010 to 9/2/2010

LLID: 1222277370373 **Drainage:** Santa Cruz

Molino Creek

Confluence Location: **Quad:** DAVENPORT **Legal Description:** T10SR03WS30 **Latitude:** 37:02:14.0N **Longitude:** 122:13:40.0W

| Mean Percent Canopy | Mean Percent Conifer | Mean Percent Hardwood | Mean Percent Open Units | Mean Right Bank % Cover | Mean Left Bank % Cover |
|---------------------------|----------------------------|-----------------------------|-------------------------------|-------------------------------|------------------------------|
| 87 | 46 | 54 | 0 | 76 | 78 |

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.

Molino Creek

Table 8 - Fish Habitat Inventory Data Summary

| | | | | |
|----------------------|-----------------------|----------------------|-------------|---------------------------|
| Stream | Molino Creek | LLID: 1222277370373 | Drainage | Santa Cruz |
| Survey Dates: | 7/19/2010 to 9/2/2010 | Survey Length (ft.): | 17777 | Main Channel (ft.): 17777 |
| Channel (ft.): | 0 | Side | | |
| Confluence Location: | Quad DAVENPORT | Legal Description: | T10SR03WS30 | Latitude: 37:02:14.0N |
| Longitude: | 122:13:40.0W | | | |

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

| | | | | | |
|------------------------------------|--------------|---------------------------|---------|--------------------------|------------|
| Channel Type: | NA | Canopy Density (%): | | Pools by Stream Length | 0.0 |
| Reach Length (ft.): | 234 | Coniferous Component (%): | | Pool Frequency (%): | 0.0 |
| Riffle/Flatwater Mean Width (ft.): | | Hardwood Component | | Residual Pool Depth (%): | |
| BFW: | | Dominant Bank | | < 2 Feet Deep: | |
| Range (ft.): | 9.00 to 9.00 | Vegetative Cover (%): | 0.0 | 2 to 2.9 Feet Deep: | |
| Mean (ft.): | 9.00 | Dominant | | 3 to 3.9 Feet Deep: | |
| Std. Dev.: | 0.00 | Dominant Bank Substrate | | >= 4 Feet Deep: | |
| Base Flow (cfs): | 0.23 | Occurrence of LWD (%): | | Mean Max Residual Pool | |
| Depth | | LWD per 100 ft.: | | Mean Pool Shelter | |
| Water (F): | 61 - 61 | Air (F): | 68 - 68 | | |
| Dry Channel (ft.): | 0 | Riffles: | | | |
| | | Pools: | | | |
| | | Flat: | | | |
| Pool Tail Substrate (%): | Silt/Clay: | Sand: | Gravel: | Sm Cobble: | Lg Cobble: |
| Bedrock: | | | | | Boulder |
| Embeddedness Values (%): | 1. | 2. | 3. | 4. | 5. 0.0 |

STREAM REACH: 2

| | | | | | |
|------------------------------------|---------------|---------------------------|------------------|--------------------------|----------------|
| Channel Type: | F4 | Canopy Density (%): | 80.1 | Pools by Stream Length | 4.7 |
| Reach Length (ft.): | 5225 | Coniferous Component (%): | 2.3 | Pool Frequency (%): | |
| 13.7 | | Hardwood Component | 97.8 | Residual Pool Depth (%): | |
| Riffle/Flatwater Mean Width (ft.): | 5.9 | Dominant Bank | Hardwood Trees | < 2 Feet Deep: | 100.0 |
| BFW: | | Vegetative Cover (%): | 81.5 | 2 to 2.9 Feet Deep: | 0.0 |
| Range (ft.): | 7.00 to 13.00 | Dominant | Terrestrial Veg. | 3 to 3.9 Feet Deep: | 0.0 |
| Mean (ft.): | 10.16 | Dominant Bank Substrate | Sand/Silt/Clay | >= 4 Feet Deep: | 0.0 |
| Std. Dev.: | 1.78 | Occurrence of LWD (%): | 1.6 | Mean Max Residual Pool | |
| Base Flow (cfs): | 0.23 | LWD per 100 ft.: | | Mean Pool Shelter | 32 |
| Depth | 1.10 | Riffles: | 0 | | |
| Water (F): | 56 - 61 | Pools: | 0 | | |
| Dry Channel (ft.): | 13 | Flat: | 0 | | |
| | | Pool Tail Substrate (%): | Silt/Clay: 0.0 | Sand: 0.0 | Gravel: 69.2 |
| | | Bedrock: | 0.0 | Sm Cobble: 30.8 | Lg Cobble: 0.0 |
| | | Embeddedness Values (%): | 1. 46.2 | 2. 53.8 | 3. 0.0 |
| | | | 4. 0.0 | 5. 0.0 | |

Molino Creek

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

| | | | | | |
|------------------------------------|----------------|---------------------------|----------------|--------------------------|----------------|
| Channel Type: | B4 | Canopy Density (%): | 85.3 | Pools by Stream Length | 1.6 |
| Reach Length (ft.): | 2212 | Coniferous Component (%): | 13.3 | Pool Frequency (%): | |
| | 10.7 | | | | |
| Riffle/Flatwater Mean Width (ft.): | 4.8 | Hardwood Component | 86.7 | Residual Pool Depth (%): | |
| BFW: | | Dominant Bank | Hardwood Trees | < 2 Feet Deep: | 100.0 |
| Range (ft.): | 7.00 to 11.00 | Vegetative Cover (%): | 72.1 | 2 to 2.9 Feet Deep: | 0.0 |
| Mean (ft.): | 8.21 | Dominant | Boulders | 3 to 3.9 Feet Deep: | 0.0 |
| Std. Dev.: | 1.32 | Dominant Bank Substrate | Sand/Silt/Clay | >= 4 Feet Deep: | 0.0 |
| Base Flow (cfs): | 0.23 | Occurrence of LWD (%): | 0.0 | Mean Max Residual Pool | |
| Depth | 1 | LWD per 100 ft.: | | Mean Pool Shelter | 7 |
| Water (F): | 56 - 56 | Riffles: | 0 | | |
| Air (F): | 56 - 60 | Pools: | 0 | | |
| Dry Channel (ft.): | 0 | Flat: | 0 | | |
| | | | | | |
| Pool Tail Substrate (%): | Silt/Clay: 0.0 | Sand: 0.0 | Gravel: 100. | Sm Cobble: 0.0 | Lg Cobble: 0.0 |
| Bedrock: | 0.0 | | | | Boulder 0.0 |
| Embeddedness Values (%): | 1. 33.3 | 2. 66.7 | 3. 0.0 | 4. 0.0 | 5. 0.0 |

STREAM REACH: 4

| | | | | | |
|------------------------------------|----------------|---------------------------|---------|--------------------------|------------|
| Channel Type: | NA | Canopy Density (%): | | Pools by Stream Length | 0.0 |
| Reach Length (ft.): | 7070 | Coniferous Component (%): | | Pool Frequency (%): | 0.0 |
| | | | | | |
| Riffle/Flatwater Mean Width (ft.): | | Hardwood Component | | Residual Pool Depth (%): | |
| BFW: | | Dominant Bank | | < 2 Feet Deep: | |
| Range (ft.): | 11.00 to 11.00 | Vegetative Cover (%): | 0.0 | 2 to 2.9 Feet Deep: | |
| Mean (ft.): | 11.00 | Dominant | | 3 to 3.9 Feet Deep: | |
| Std. Dev.: | 0.00 | Dominant Bank Substrate | | >= 4 Feet Deep: | |
| Base Flow (cfs): | 0.23 | Occurrence of LWD (%): | | Mean Max Residual Pool | |
| Depth | | LWD per 100 ft.: | | Mean Pool Shelter | |
| Water (F): | 56 - 56 | Riffles: | | | |
| Air (F): | 56 - 56 | Pools: | | | |
| Dry Channel (ft.): | 0 | Flat: | | | |
| | | | | | |
| Pool Tail Substrate (%): | Silt/Clay: | Sand: | Gravel: | Sm Cobble: | Lg Cobble: |
| Bedrock: | | | | | Boulder |
| Embeddedness Values (%): | 1. | 2. | 3. | 4. | 5. 0.0 |

Molino Creek

Summary of Fish Habitat Elements By Stream Reach

| | | | | | | | | |
|------------------------------------|-----------------|---------------------------|--------------------|--------------------------|----------------|-------------------|----|--|
| STREAM REACH: 5 | | | | | | | | |
| Channel Type: | B4 | Canopy Density (%): | 93.4 | Pools by Stream Length | 4.3 | | | |
| Reach Length (ft.): | 3036 | Coniferous Component (%): | 91.0 | Pool Frequency (%): | | | | |
| | 18.0 | | | | | | | |
| Riffle/Flatwater Mean Width (ft.): | 4.6 | Hardwood Component | 9.0 | Residual Pool Depth (%): | | | | |
| BFW: | | Dominant Bank | Coniferous Trees | < 2 Feet Deep: | 88.9 | | | |
| Range (ft.): | 9.00 to 13.00 | Vegetative Cover (%): | 71.9 | 2 to 2.9 Feet Deep: | 11.1 | | | |
| Mean (ft.): | 11.80 | Dominant | Large Woody Debris | 3 to 3.9 Feet Deep: | 0.0 | | | |
| Std. Dev.: | 1.47 | Dominant Bank Substrate | Sand/Silt/Clay | >= 4 Feet Deep: | 0.0 | | | |
| Base Flow (cfs): | 0.23 | Occurrence of LWD (%): | 46.2 | Mean Max Residual Pool | | | | |
| Depth | 1.45 | | | | | | | |
| Water (F): | 57 - 61 | Air (F): | 66 - 71 | LWD per 100 ft.: | | Mean Pool Shelter | 11 | |
| Dry Channel (ft.): | 117 | | | Riffles: | 3 | | | |
| | | | | Pools: | 7 | | | |
| | | | | Flat: | 2 | | | |
| Pool Tail Substrate (%): | Silt/Clay: 12.5 | Sand: 12.5 | Gravel: 75.0 | Sm Cobble: 0.0 | Lg Cobble: 0.0 | Boulder: 0.0 | | |
| Bedrock: | 0.0 | | | | | | | |
| Embeddedness Values (%): | 1. 12.5 | 2. 37.5 | 3. 25.0 | 4. 0.0 | 5. 25.0 | | | |

Molino Creek

Table 9 -Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Molino Creek **LLID:** 1222277370373 **Drainage:** Santa Cruz
Survey: 7/19/2010 to 9/2/2010
Confluence Location: Quad: DAVENPORT **Legal Description:** T10SR03WS30 **Latitude:** 37:02:14.0N **Longitude:** 122:13:40.0W

Mean Percentage of Dominant Stream Bank Substrate

| Dominant Class of Substrate | Number of Units Right Bank | Number of Units Left Bank | Total Mean Percentage (%) |
|-----------------------------|----------------------------|---------------------------|---------------------------|
| Bedrock | 5 | 7 | 4.4 |
| Boulder | 0 | 1 | 0.4 |
| Cobble/Gravel | 3 | 5 | 2.9 |
| Sand/Silt/Clay | 128 | 123 | 92.3 |

Mean Percentage of Dominant Stream Bank Vegetation

| Dominant Class of Vegetation | Number of Units Right Bank | Number of Units Left Bank | Total Mean Percentage |
|------------------------------|----------------------------|---------------------------|-----------------------|
| Grass | 0 | 0 | 0.0 |
| Brush | 14 | 10 | 8.8 |
| Hardwood | 74 | 78 | 55.9 |
| Coniferous | 48 | 48 | 35.3 |
| No Vegetation | 0 | 0 | 0.0 |

Total Stream Cobble Embeddedness Values: 2

Molino Creek

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

Stream Name: Molino Creek

LLID: 1222277370373

Drainage: Santa Cruz

Survey 7/19/2010 to 9/2/2010

Confluence Location: Quad: DAVENPORT

Legal Description: T10SR03WS30

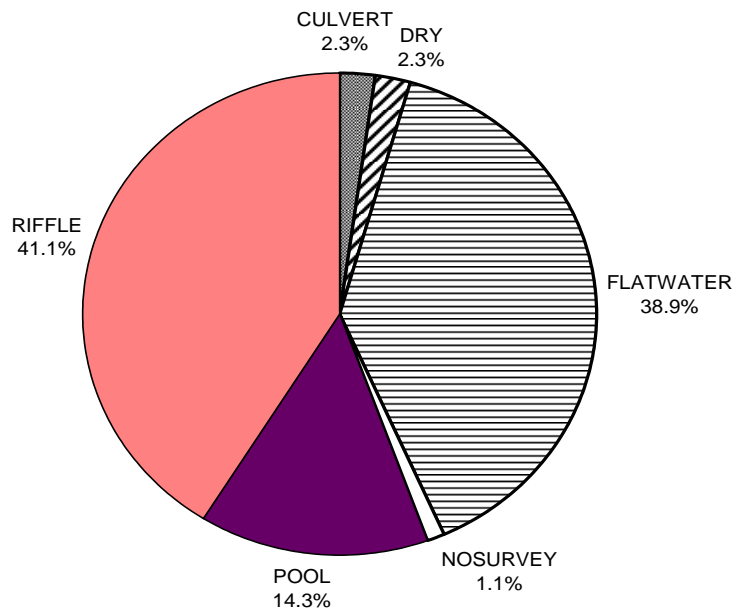
Latitude: 37:02:14.0N

Longitude: 122:13:40.0W

| | Riffles | Flatwater | Pools |
|------------------------|----------------|------------------|--------------|
| UNDERCUT BANKS (%) | 0 | 2 | 6 |
| SMALL WOODY DEBRIS (%) | 7 | 16 | 14 |
| LARGE WOODY DEBRIS (%) | 20 | 6 | 19 |
| ROOT MASS (%) | 2 | 5 | 13 |
| TERRESTRIAL VEGETATION | 6 | 31 | 15 |
| AQUATIC VEGETATION (%) | 0 | 0 | 0 |
| WHITEWATER (%) | 0 | 0 | 8 |
| BOULDERS (%) | 13 | 8 | 9 |
| BEDROCK LEDGES (%) | 0 | 0 | 2 |

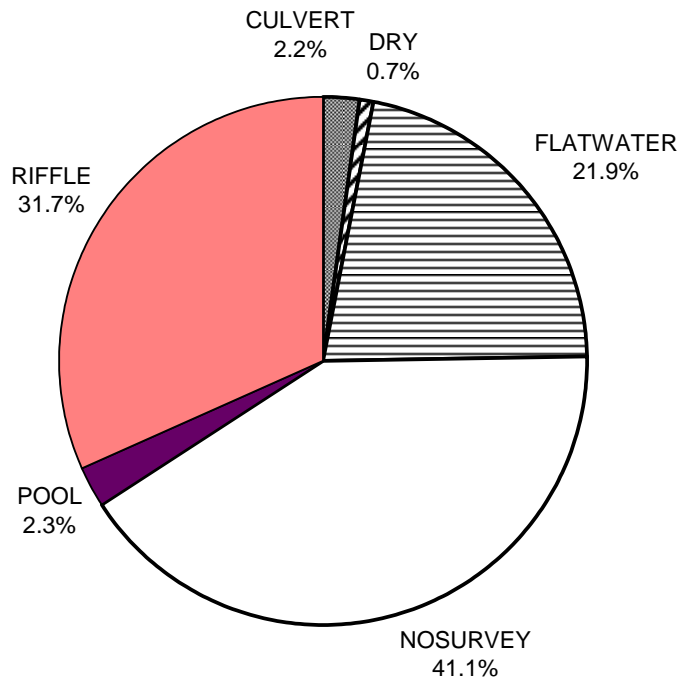
Molino Creek

MOLINO CREEK 2010 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

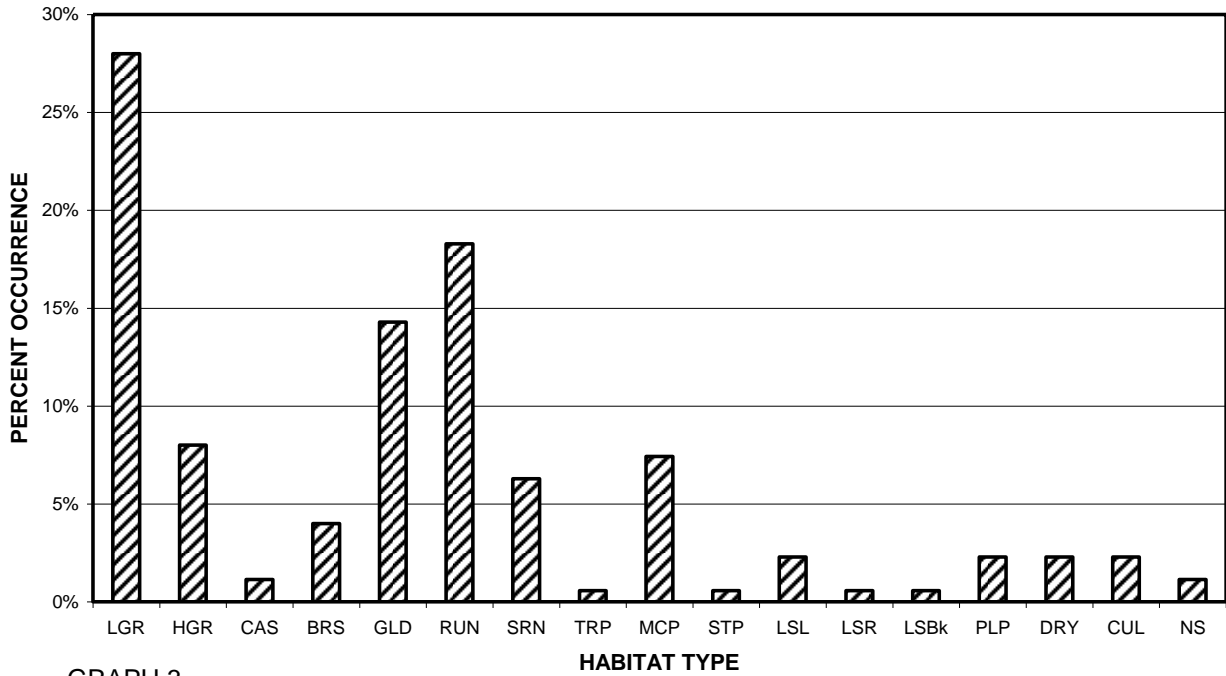
MOLINO CREEK 2010 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

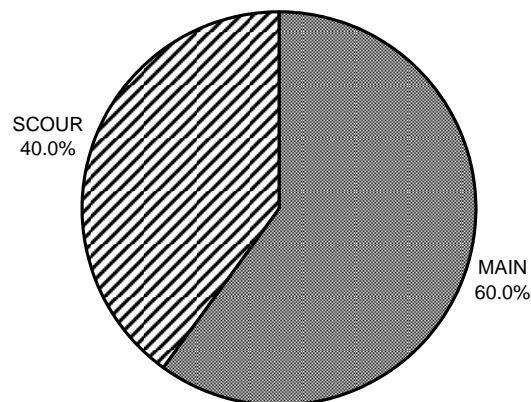
Molino Creek

**MOLINO CREEK 2010
HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 3

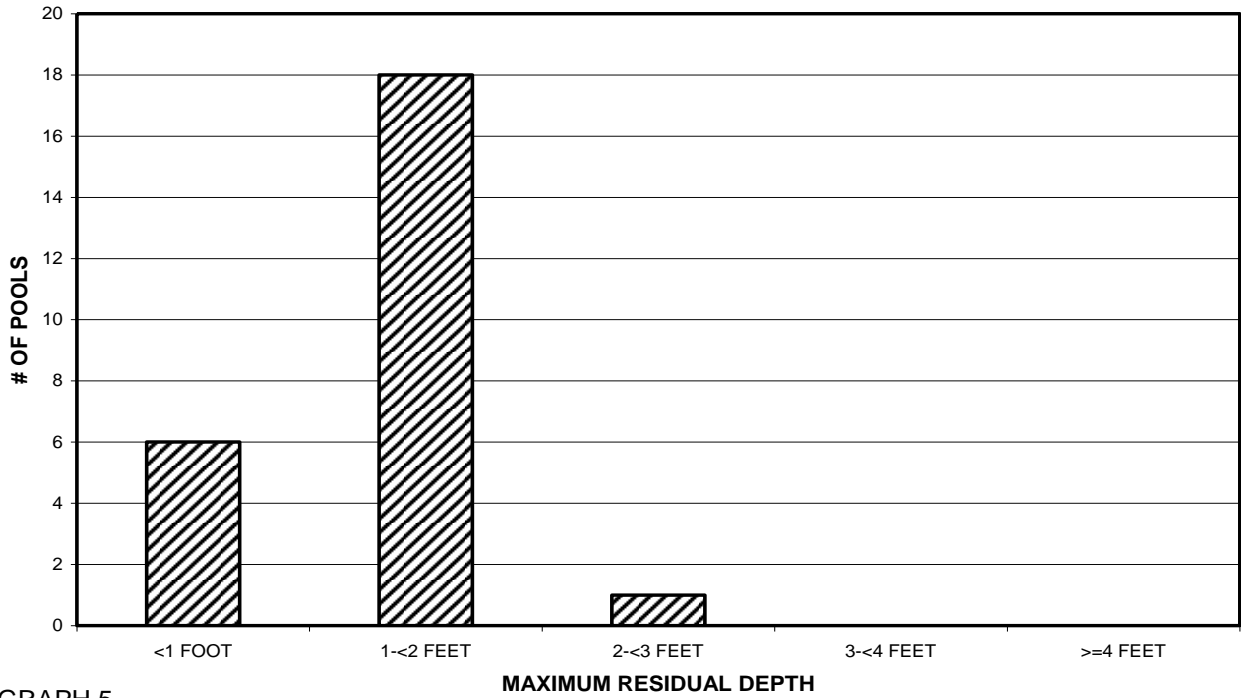
**MOLINO CREEK 2010
POOL TYPES BY PERCENT OCCURRENCE**



GRAPH 4

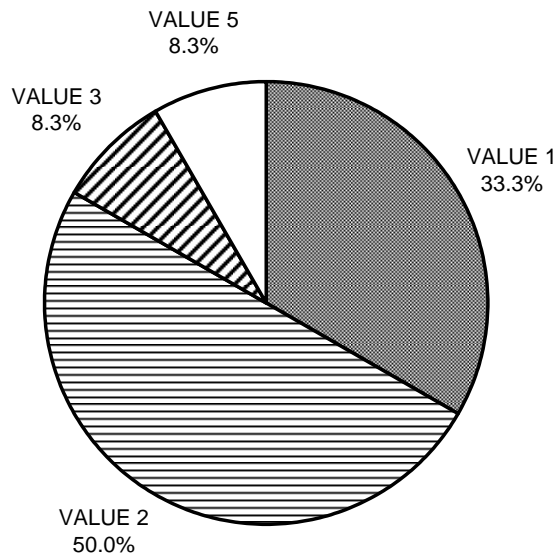
Molino Creek

**MOLINO CREEK 2010
MAXIMUM DEPTH IN POOLS**



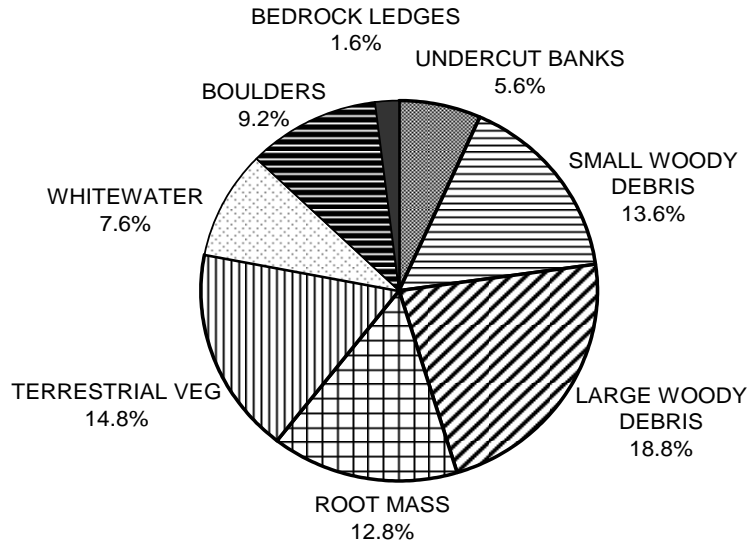
GRAPH 5

**MOLINO CREEK 2010
PERCENT EMBEDDEDNESS**



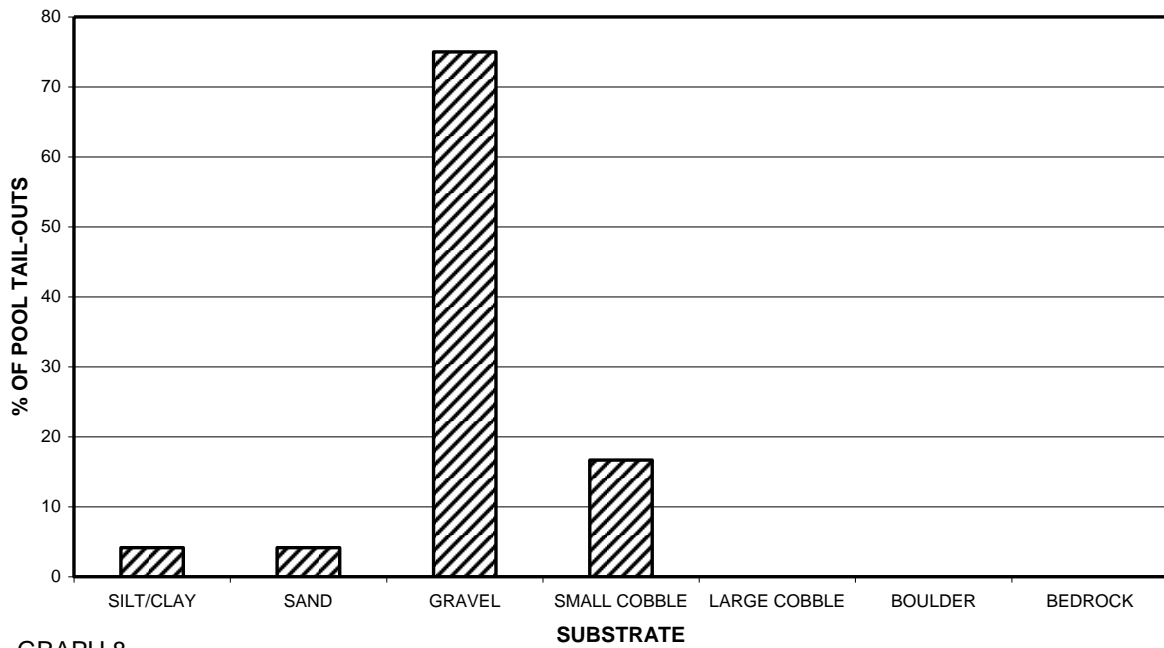
GRAPH 6

**MOLINO CREEK 2010
MEAN PERCENT COVER TYPES IN POOLS**



GRAPH 7

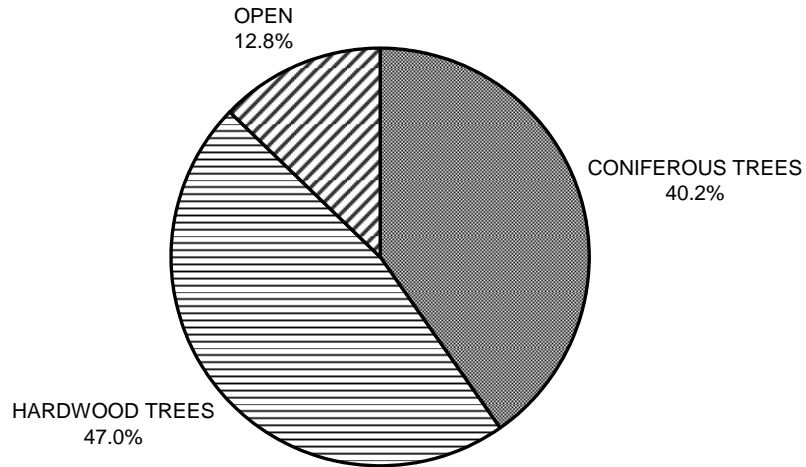
**MOLINO CREEK 2010
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



GRAPH 8

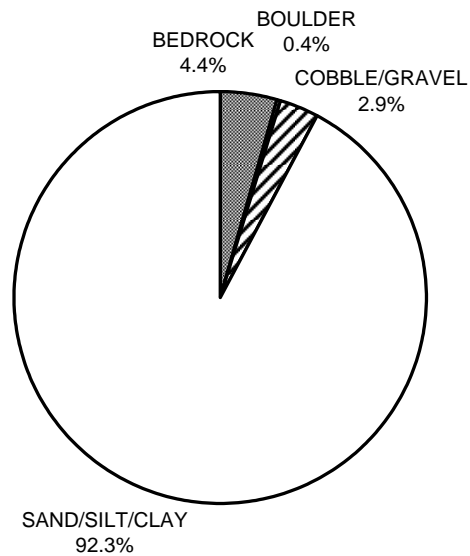
Molino Creek

**MOLINO CREEK 2010
MEAN PERCENT CANOPY**



GRAPH 9

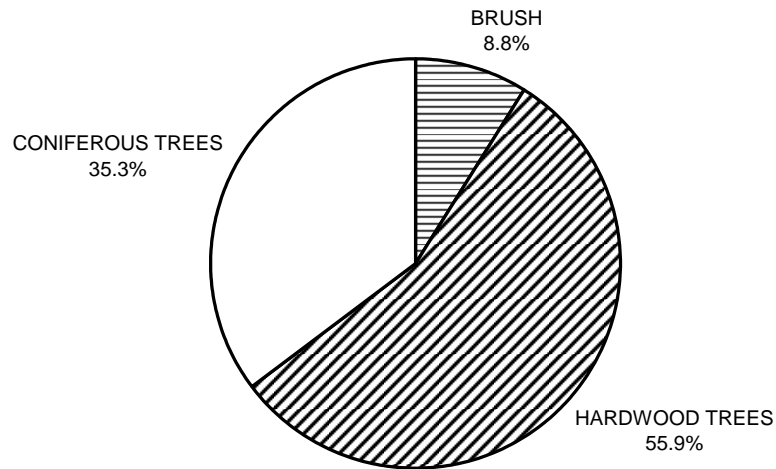
**MOLINO CREEK 2010
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

Molino Creek

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



GRAPH 11