# STREAM INVENTORY REPORT

## The First Right Bank Tributary to Singley Creek

## INTRODUCTION

**A stream inventory was conducted during the summer of 1999 on the first right bank tributary to Singley Creek. The survey began at the confluence with Singley Creek and extended upstream 1.4 miles. The inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in the first right bank tributary to Singley 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 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

**The first right bank tributary to Singley Creek is a tributary to Singley Creek which is a tributary to the Pacific Ocean located in Humboldt County, California (Map 1). The legal description at the confluence of the first right bank tributary to Singley Creek with Singley Creek is T01N R03W S34. The location is 40°25′42″ north latitude and 124°23′46″ west longitude. The first right bank tributary to Singley Creek is an ephemeral stream according to the USGS Capetown 7.5 minute quadrangle. This tributary to Singley Creek drains a watershed of approximately 2.4 square miles. Elevations range from about 20 feet at the mouth of the creek to 1,600 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production and rangeland. Vehicle access exists via Old Mattole Road to the mouth of Singley Creek near "Ocean House".**

## METHODS

**The habitat inventory conducted in the first right bank tributary to Singley Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al 1998). The Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two person team.**

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## SAMPLING STRATEGY

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

## HABITAT INVENTORY COMPONENTS

**A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used for the survey of the first right bank tributary to Singley Creek to record measurements and observations. There are nine components to the inventory form.**

**1. Flow:**

**Flow is measured in cubic feet per second (cfs) at 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 (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 dimensions are measured using a hip chain, tape measure, hand level, clinometer, and 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.**

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**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". The first right bank tributary to Singley 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. Habitat characteristics were measured using a hip chain, stadia rod, and clinometer.**

**5. Embeddedness:**

**The depth of embeddedness of the cobble in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In the first right bank tributary to Singley 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 bedrock substrate, inappropriate substrate particle size, 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. 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 the first right bank tributary to Singley 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 boulder 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.**

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**8. Canopy:**

**Stream canopy density was estimated using modified hand held spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In the first right bank tributary to Singley 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 ocularly into percentages of coniferous 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 the first right bank tributary to Singley 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 was estimated and recorded.**

## BIOLOGICAL INVENTORY

**Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. In the first right bank tributary to Singley Creek , fish presence was observed from the stream banks. This sampling technique is discussed in the *California Salmonid Stream Habitat Restoration Manual*.**

## DATA ANALYSIS

**Data from the habitat inventory form are entered into Habitat, a dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish and Game. This program processes and summarizes the data, and produces the following six tables:**

- **Riffle, flatwater, and pool habitat types**
- **Habitat types and measured parameters**
- **Pool types**
- **Maximum pool depths by habitat types**
- **Dominant substrates by habitat types**
- **Mean percent shelter by habitat types**

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**Graphics are produced from the tables using Quattro Pro. Graphics developed for first right bank tributary to Singley Creek include:**

- **Riffle, flatwater, pool habitats by percent occurrence**
- **Riffle, flatwater, pool habitats by total length**
- **Total habitat types by percent occurrence**
- **Pool types by percent occurrence**
- **Total pools by maximum depths**
- **Embeddedness**
- **Pool cover by cover type**
- **Dominant substrate in the pool tail-outs**
- **Mean percent canopy**
- **Bank composition by composition type**
- **Bank vegetation by vegetation type**

## HABITAT INVENTORY RESULTS

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

**The habitat inventory of June 8, 9, and 16, 1999, was conducted by Andrea Kudrez and Chris Ramsey (WSP/AmeriCorps). The total length of the stream surveyed was 7,330 feet.**

**Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.1 cfs on June 8, 1999.**

**The first right bank tributary to Singley Creek is an F4 channel type for the first 3,563 feet and an F3 channel type for the remaining 3,767 feet of the surveyed stream section. F channels are low gradient, entrenched, meandering, riffle/pool channels with high width/depth ratios. F3 channels have cobble-dominant substrates while F4 channels have gravel-dominant substrates.**

**Water temperatures taken during the survey period ranged from 53 to 64 degrees Fahrenheit. Air temperatures ranged from 56 to 71 degrees Fahrenheit.**

**Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 38% flatwater units, 37% riffle units, and 25% pool units (Graph 1). Based on total length of Level II habitat types there were 51% flatwater units, 37% riffle units, and 12% pool units (Graph 2).**

**Eleven Level IV habitat types were identified during this habitat inventory (Table 2). The most frequent habitat types by percent occurrence were low gradient riffles, 30%; runs,**

**24%; and mid-channel pools, 17% (Graph 3). Based on percent total length, low gradient riffles made up 31%, step runs 30%, and runs 21%.**

**A total of 52 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 65%, and comprised 71% of the total length of all pools (Graph 4).**

**Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Four of the 52 pools (8%) had a depth of two feet or greater (Graph 5).**

**The depth of cobble embeddedness was estimated at pool tail-outs. Of the 52 pool tail-outs measured, 0 had a value of 1 (0.0%); thirteen had a value of 2 (25.0%); seven had a value of 3 (13.5%); one had a value of 4 (1.9%); and 31 had a value of 5 (59.6%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate and a value of 5 indicates the tail-out is not suitable for spawning. In the first right bank tributary to Singley Creek, 13 of the 31 pool tail-outs which were valued at 5 had silt/clay/sand or gravel too small to be suitable for spawning as the substrate. The other tail-outs were unsuitable for spawning due to the tail-outs being comprised of large cobble or 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. Riffle habitat types had a mean shelter rating of 12, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 22 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 48. Scour pools had a mean shelter rating of 30 (Table 3).**

**Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in the first right bank tributary to Singley Creek. Large and small woody debris are lacking in nearly all habitat types. Graph 7 describes the pool cover in first right bank tributary to Singley Creek.**

**Table 6 summarizes the dominant substrate by habitat type. Gravel or small cobble was the dominant substrate observed in 34 of the 52 pool tail-outs measured (65%). Large cobble was the dominant substrate in 17% of the pool tail-outs (Graph 8).**

**The mean percent canopy density for the stream reach surveyed was 63%. The mean percentages of deciduous and coniferous trees were 15% and 85%, respectively. Graph 9 describes the mean percent canopy in the first right bank tributary to Singley Creek.**

**For the stream reach surveyed, the mean percent right bank vegetated was 67%. The mean percent left bank vegetated was 75%. The dominant elements composing the structure of the stream banks consisted of 1.4% bedrock, 42.9% boulder, 45.7%**

**cobble/gravel, and 10.0% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 43% of the units surveyed. Additionally, 38.6% of the units surveyed had grass as the dominant vegetation type, and 12.9% had brush as the dominant vegetation (Graph 11).**

## BIOLOGICAL INVENTORY RESULTS

**Electrofishing was not performed on the first right bank tributary to Singley Creek. The stream was dry by the end of August. Fish were not observed during the habitat inventory.**

## DISCUSSION

**The first right bank tributary to Singley Creek is an F4 channel type for the first 3,563 feet of stream surveyed and an F3 channel type for the remaining 3,767 feet. The suitability of F3 channel types for fish habitat improvement structures is as follows: good for bank placed boulders, single and opposing wing-deflectors; fair for plunge weirs, boulder clusters, channel constrictors, and log cover. The suitability of F4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders; fair for plunge weirs, single and opposing wing-deflectors, channel constrictors and log cover; poor for boulder clusters.**

**The water temperatures recorded on the survey days June 8, 9, and 16, 1999, ranged from 53 to 64 degrees Fahrenheit. Air temperatures ranged from 56 to 71 degrees Fahrenheit. This is an acceptable water temperature range for salmonids. 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 51% of the total length of this survey, riffles 37%, and pools 12%. The pools are shallow, with 4 of the 52 pools having a maximum 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 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.**

**None of the 52 pool tail-outs measured had an embeddedness rating of 1. Eight of the pool tail-outs had embeddedness ratings of 3 or 4. Thirty-one of the pool tail-outs had a rating of 5 or were considered unsuitable for spawning. Thirteen of the 31 were unsuitable for spawning due to the dominant substrate being silt/sand/clay or gravel being too small to be suitable. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. In the first right bank**

**tributary to Singley Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures should be taken.**

**The mean shelter rating for pools was 22. The shelter rating in the flatwater habitats was 8. A pool shelter rating of approximately 100 is desirable. The cover that now exists is being provided primarily by boulders in all habitat types. Log and root wad cover 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 63%. Reach 1 had a canopy density of 50% while Reach 2 had a canopy density of 76%. In general, revegetation projects are considered when canopy density is less than 80%.**

**The percentage of right and left bank covered with vegetation was 67% and 75%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.**

## RECOMMENDATIONS

1) **The first right bank tributary to Singley Creek should be managed as an anadromous, natural production stream.**

2) **The first right bank tributary to Singley Creek should be biologically surveyed in late spring or early summer to determine steelhead utilization.**

3) **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.**

4) **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.**

5) **Increase the canopy in the first right bank tributary to Singley Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels.**

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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.**

**0' Begin survey at confluence with Singley Creek, approximately 2200' from the Pacific Ocean.**

**1,001' Right bank tributary, dry.**

**1,828' Left bank tributary, 72 degrees F.**

**2,667' Right bank failure, 30' high x 33' long.**

**3,208' Left bank failure, 39' long x 40' high, with associated log debris accumulation, 35' long x 10' high x 50' wide.**

**3,344' Left and right bank failure. Log debris accumulation retaining 5' of sediment.**

**3,673' Bank failure, 177' long, retaining 9' of sediment.**

**3,796' Log debris accumulation, retaining sediment.**

**4,050' Log debris accumulation, 6' long x 5' high x 50' wide.**

**4,918' Jump 1.8' high, retaining sediment.**

**5,907' Right bank tributary, high gradient.**

**5,993' Wire fence 6' above water.**

**7,234' Right bank tributary, 57 degrees F.**

**7,291' Boulder cascade. End of survey, walked 200' of channel with no fish observed above.**

## REFERENCES

**Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. California salmonid stream habitat restoration manual, 3rd edition. California Department of Fish and Game, Sacramento, California.**

## LEVEL III and LEVEL IV HABITAT TYPES

| | | | | |
|---|---|---|---|---|
| **RIFFLE** | | | | |
| **Low Gradient Riffle** | **(LGR)** | **[1.1]** | **{ 1}** | |
| **High Gradient Riffle** | **(HGR)** | **[1.2]** | **{ 2}** | |
| **CASCADE** | | | | |
| **Cascade** | **(CAS)** | **[2.1]** | | **{ 3}** |
| **Bedrock Sheet** | **(BRS)** | **[2.2]** | | **{24}** |
| **FLATWATER** | | | | |
| **Pocket Water** | **(POW)** | **[3.1]** | **{21}** | |
| **Glide** | **(GLD)** | **[3.2]** | **{14}** | |
| **Run** | **(RUN)** | **[3.3]** | **{15}** | |
| **Step Run** | **(SRN)** | **[3.4]** | | **{16}** |
| **Edgewater** | **(EDW)** | **[3.5]** | | **{18}** |
| **MAIN CHANNEL POOLS** | | | | |
| **Trench Pool** | **(TRP)** | **[4.1]** | | **{ 8}** |
| **Mid-Channel Pool** | **(MCP)** | **[4.2]** | **{17}** | |
| **Channel Confluence Pool** | **(CCP)** | **[4.3]** | | **{19}** |
| **Step Pool** | **(STP)** | **[4.4]** | | **{23}** |
| **SCOUR POOLS** | | | | |
| **Corner Pool** | **(CRP)** | **[5.1]** | | **{22}** |
| **Lateral Scour Pool - Log Enhanced** | **(LSL)** | **[5.2]** | | **{10}** |
| **Lateral Scour Pool - Root Wad Enhanced** | **(LSR)** | **[5.3]** | **{11}** | |
| **Lateral Scour Pool - Bedrock Formed** | **(LSBk)** | **[5.4]** | | **{12}** |
| **Lateral Scour Pool - Boulder Formed** | **(LSBo)** | **[5.5]** | | **{20}** |
| **Plunge Pool** | **(PLP)** | **[5.6]** | | **{ 9}** |
| **BACKWATER POOLS** | | | | |
| **Secondary Channel Pool** | **(SCP)** | **[6.1]** | | **{ 4}** |
| **Backwater Pool - Boulder Formed** | **(BPB)** | **[6.2]** | | **{ 5}** |
| **Backwater Pool - Root Wad Formed** | **(BPR)** | **[6.3]** | | **{ 6}** |
| **Backwater Pool - Log Formed** | **(BPL)** | **[6.4]** | | **{ 7}** |
| **Dammed Pool** | **(DPL)** | **[6.5]** | | **{13}** |
| **ADDITIONAL UNIT DESIGNATIONS** | | | | |
| **Dry** | **(DRY)** | **[7.0]** | | |
| **Culvert** | **(CUL)** | **[8.0]** | | |
| **Not Surveyed** | **(NS)** | **[9.0]** | | |
| **Not Surveyed due to a marsh** | **(MAR)** | **[9.1]** | | |