CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Castellini Creek
Report Revised April 14, 2006
Report Completed 2005
Assessment Completed 2001

INTRODUCTION

A stream inventory was conducted on 7/5/2001 on Castellini Creek. The survey began at the confluence with the Pacific Ocean and extended upstream 0.8 mile.

The Castellini 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 Castellini 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

Castellini Creek is a tributary to Pacific Ocean, located in Sonoma County, California (Map 1). Castellini Creek's legal description at the confluence with Green Valley Creek is T7N R9W S19. Its location is 38.4337958557797° north latitude and 122.906349801505° west longitude, LLID number 1229063384338. Castellini Creek is a first order stream and has approximately .79 miles of blue line stream according to the USGS Camp Meeker 7.5 minute quadrangle. Castellini Creek drains a watershed of approximately .54 square miles. Elevations range from about 151 feet at the mouth of the creek to 705 feet in the headwater areas. Mixed hardwood/conifer forest, agriculture, and conifer forest dominate the watershed. The watershed is entirely privately owned. Endangered'/Threatened/Sensitive species present in the Castallini Creek watershed include; Bakers manzanita (Arctostaphylos bakeri ssp. Bakeri), California freshwater shrimp (Syncaris pacifica), narrow-leaved daisy (Erigeron angustasus), and Sonoma alopecurus (Alopecurus aequalis var. sonomensis). Vehicle access exists via Hwy 101 to Route 116 west to Green Valley Road to Bones Road. Park by bridge over Green Valley Creek and walk downstream 100 yards to mouth of Castellini Creek.

METHODS

The habitat inventory conducted in Castellini 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 were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

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

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 Castellini 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) 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 Castellini 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 visually estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Castellini 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 visually 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 Castellini 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.

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 Castellini Creek. 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 2.0.16, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Game. This program processes and summarizes the data, and produces the following Ten tables:

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

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

- Level II Habitat Types by Percent Occurrence
- Level II Habitat Types by Total Length
- Level IV Habitat Types by Percent Occurrence
- Level I Pool Types by Percent Occurrence
- Maximum Depth in Pools
- Percent Embeddedness
- 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

HABITAT INVENTORY RESULTS

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

The habitat inventory of 7/5/2001 was conducted by L.MacTague (DFG) and J.Facendini (DFG). The total length of the stream surveyed was 4,114 feet.

Stream flow was not measured on Castellini Creek.

Castellini Creek is a C4 channel type for 2,578.2 feet of the stream surveyed (Reach 1), a B3 channel type for 400.6 feet of the stream surveyed (Reach 2), and an A2 channel type for 1,134.8 feet of the stream surveyed (Reach 3). C4 channels are meandering point-bar riffle/pool alluvial channels with broad well defined floodplain on low gradients and gravel dominant substrates. B3 channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools; very stable plan and profile, stable banks and cobble dominant substrates. A2 channels are steep, narrow, cascading, step-pool streams with high energy/debris transport associated with depositional soils and boulder dominated substrates.

Water temperatures taken during the survey period ranged from 50 to 54 degrees Fahrenheit. Air temperatures ranged from 56 to 70 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of *occurrence* there were 39% flatwater units, 33% pool units, and 28% dry units (Graph 1). Based on total *length* of Level II habitat types there were 47% dry units, 44% flatwater units, and 9% pool units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent *occurrence* were Dry units 28%, Step Run units 19%, and Plunge Pool and Run units each 13% (Graph 3). Based on percent total *length*, Dry units made up 47%, Step Runs 23%, and Runs 15%.

A total of 18 pools were identified (Table 3). Scour pools were the most frequently encountered, at 72%, and comprised 74% 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. Four of the 17 pools (24%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 17 pool tail-outs measured, eight had a value of 1 (47.1%); six had a value of 2 (35.3%); and three had a value of 3 (17.6%), (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 5 and pool habitats had a mean shelter rating of 31 (Table 1). Of the pool types, the Scour pools had a mean shelter rating of 31, Main Channel pools had a mean shelter rating of 30 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Root Mass is the dominant pool cover type followed by boulders. Graph 7 describes the pool cover in Castellini Creek.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 53% of pool tail-outs while small cobble was the next most frequently observed substrate type at 24%.

The mean percent canopy density for the surveyed length of Castellini Creek was 100%. The mean percentages of hardwood and coniferous trees were 23% and 70%, respectively. Graph 9 describes the mean percent canopy in Castellini Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 60%. The mean percent left bank vegetated was 62%. The dominant elements composing the structure of the stream banks consisted of 97% sand/silt/clay and 3% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 47% of the units surveyed. Additionally, 33% of the units surveyed had brush as the dominant vegetation type, and 13% had hardwood trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Due to inadequate staffing levels, biological inventory surveys were not conducted on Castellini Creek in 2001.

There is no record of hatchery stocking or fish rescue/transfer operations in Castellini Creek.

DISCUSSION

Castellini Creek is a C4 channel type for 2,578 feet of the stream surveyed (Reach 1), a B3 channel type for 401 feet of the stream surveyed (Reach 2), and an A2 channel type for 1,135 feet of the stream surveyed (Reach 3). The suitability of C4, B3 and A2 channel types for fish habitat improvement structures is as follows: C4 channel types are good fro bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors and log cover. B3 channel types are excellent for plunge weirs, boulder clusters and bank placed boulders; single and opposing wing-deflectors and log cover. A2 channel types are generally not suitable for fish habitat improvement structures.

The water temperatures recorded on the survey day 7/5/2001, ranged from 50 to 54 degrees Fahrenheit. Air temperatures ranged from 56 to 70 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 44% of the total length of this survey, riffles 0%, and pools 9%. The pools are relatively shallow with only four of the 17 (24%) pools having a maximum residual depth greater than two 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.

Fourteen of the 17 pool tail-outs measured had embeddedness ratings of 1 or 2. Three 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 Castellini Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Thirteen of the 17 pool tail-outs had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 31. The shelter rating in the flatwater habitats was 5. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by root mass and boulders. 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 100%. Reach 1 had a canopy density of 100%, Reach 2 had a canopy density of 98.75%, and Reach 3 had a canopy density of 99.62%. 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 60% and 62%, 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 MANAGEMENT RECOMMENDATIONS

Castellini 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.

RECOMMENDATIONS

1. 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.

2. 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.

3. 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.

4. Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from root mass and boulders. Adding high quality complexity with woody cover is desirable.

COMMENTS AND LANDMARKS

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

Castellini Creek

Position (ft.)	Habitat Unit #	Comments:
0	0001.00	YOY in mainstem near confluence
144.3	0007.00	Debris accumulation at bottom of unit-SEE FORM; CL. Type taken here; LWD PROTOCOL(BA/.5/15/B/3)
189.3	0009.00	RB erosion fencing for gravel road at 200'. Rip Rap at 330' 40' L x 15' H
557.4	0010.00	Fish of multiple age classes; WP 014(F4)/N38°25'58.4"/W122°54'27.7"
576.4	0011.00	Bridge at 20'-SEE FORM; YOY in micro pool under bridge

853.3	0015.00	Old dirt road xing at bottom of unit; LB small dry gully at about 50'; LB small dry gully at 185'; LB small dry gully at 210'; LB small dry gully at 302'
1088.1	0016.00	Bullfrogs(BF)
1168.7	0017.00	Road xing at 47'
1242	0018.00	RB maintained foot path at top of bank for this and next two units; Actually a debris accumulation scour pool-SEE FORM; LWD PROTOCOL(AL/1/10/B/6); BF
1257.4	0019.00	Salmonids; Sculpin; LB 1 acre pond in this and next unit about 200' up.
1343.9	0020.00	P.T.; Sculpin;BF; twin 2" pipes over creek at 80'; WP 016(F4)/N38°25'51.1"/W122°54'32.4"; Pond on LB, this and last unit
1500.4	0021.00	Many BF; LWD PROTOCOL(AL/2/10)
1775.6	0028.00	RB Dry Trib at top of unit; Historically pools in summer
1813.2	0029.00	Dirt road xing at 780'; Debris Accumulation at 690'-SEE FORM; LWD PROTOCOL(BA/2/15/C/6); Dirt road xing at 635; LB well at 200'(20' upslope); LB two dry tribs/erosion gullies at 100'; Accumulation at 150'-SEE FORM
2578.2	0030.00	Channel Type Change(C4--------->B3); YOY; WP 018(F4)/N38°25'42.7"/W122°54'44.2"
2778.2	0031.00	RB-Bedroom; LB-Dirt Road upslope
2787.2	0032.00	PGSL; RB Wet Trib 54°
2826	0033.00	LB-Dirt Rd
2942.3	0034.00	RB-Dirt Rd; Dirt rd xing at 25'
2978.8	0035.00	Channel Type Change(B3------->A2)

3192.2	0040.00	RB end of dirt road; WP 019(F4)/N38°25'42.2"/W122°54'50.2"
3211.3	0041.00	Accumulation at top of unit-SEE FORM; LWD PROTOCOL(BA/1/6/B/3)
3221.3	0042.00	RB-Dry Trib at 31'
3282.8	0044.00	RB small Dry Trib at 33'---->Locals say it usually runs
3389.1	0046.00	LB Dry Trib at 36.5', has tiny pools
3733.9	0049.00	8' Bedrock cascade at 25'.
3989.4	0053.00	7' vertical jump
3996.4	0054.00	WP 020(F4)/N38°25'42.0"/W122°54'59.6". -->>>>>> END OF ACCESS <<<<<<<<<<

REFERENCES

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