

CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Blucher Creek
Report Completed 2005
Assessment Completed 2001

INTRODUCTION

A stream inventory was conducted beginning July 31 and ending August 1, 2001 on Blucher Creek. The survey began at the confluence with Laguna De Santa Rosa Creek and extended upstream 4,116 feet.

The Blucher 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 Blucher 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

Blucher Creek is a tributary to Laguna De Santa Rosa Creek, a tributary to Mark West Creek, a tributary to the Russian River, a tributary to the Pacific Ocean, located in Sonoma County, California (Map 1). Blucher Creek's legal description at the confluence with Laguna De Santa Rosa Creek is T6N R8W S7. Its location is 38.3757419474529° north latitude and 122.781005541377° west longitude. Blucher Creek is a third order stream and has approximately 5.04 miles of solid blue line stream according to the USGS Sebastopol 7.5 minute quadrangle. Blucher Creek drains a watershed of approximately 7.66 square miles. Elevations range from about 69 feet at the mouth of the creek to 728 feet in the headwater areas. Major land uses in the watershed include agriculture and urban. Herbaceous plants dominate the watershed. The watershed is primarily privately owned. Vehicle access exists via Highway 101 to Highway 12 in Santa Rosa. Travel west on Highway 12 to Highway 116, near Sebastopol, to bridge crossing Blucher Creek. By foot, walk to confluence with Laguna De Santa Rosa Creek.

METHODS

The habitat inventory conducted in Blucher Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al., 1998). The Sonoma County Water Agency 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.

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 Blucher 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 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 (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". Blucher 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 Blucher 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 particle size, bedrock, 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 Blucher 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 densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Blucher 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 evergreen or deciduous trees.

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the

ability of stream banks to withstand winter flows. In Blucher 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 Blucher 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 Habitat 8.4, 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 tables:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters
- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of mean percent cover by habitat type
- Summary of dominant substrates by habitat type
- Summary of fish habitat elements by stream reach

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

- Level II habitat types by % occurrence
- Level II habitat types by % total length
- Level IV habitat types by % occurrence
- Level I pool habitat types by % occurrence
- Maximum depth in pools
- Percent embeddedness
- 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
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The habitat inventory of July 31 to August 1, 2001, was conducted by H. Fett and H. Fantacone of the Sonoma County Water Agency. The total length of the stream surveyed was 4,116 feet.

Stream flow was not measured on Blucher Creek.

Blucher Creek is a B6 channel type for 2,911 feet and an A1 for 1,205 feet of the stream surveyed. B6 channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools; very stable plan and profile with stable banks and silt/clay-dominant channels. A1 channels are steep, narrow, cascading, step-pool streams with high energy/debris transport associated with depositional soils; very stable bedrock-dominant channels.

Water temperatures taken during the survey period ranged from 57 to 60 degrees Fahrenheit. Air temperatures ranged from 65 to 68 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of *occurrence* there were 20% riffle units, 43% flatwater units, 34% pool units, and 3% dry units (Graph 1). Based on total *length* of Level II habitat types there were 23% riffle units, 56% flatwater units, 7% pool units, and 13% dry units (Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent *occurrence* were glide, 37%; low gradient riffle, 17%; and root wad enhanced lateral scour pool, 14% (Graph 3). Based on percent total *length*, glide made up 48%, low gradient riffle 16%, and dry 13%.

A total of twelve pools were identified (Table 3). Scour pools were the most frequently encountered, at 67%, and comprised 55% 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 12 measured pools (33%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 12 pool tail-outs measured, one had a value of 1 (8%); two had a value of 2 (17%); one had a value of 4 (8%); and eight had a value of 5 (67%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate. 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. Riffle habitat types had a mean shelter rating of 20, flatwater habitat types had a mean shelter rating of 45, and pool habitats had a mean shelter rating of 64 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 90. Scour pools had a mean shelter rating of 51 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Undercut banks are the

dominant cover types in Blucher Creek. Graph 7 describes the pool cover in Blucher Creek. Undercut banks are 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. Silt/clay was the dominant substrate observed in 67% of pool tail-outs while gravel was the next most frequently observed substrate type, at 25%.

The mean percent canopy density for the surveyed length of Blucher Creek was 88%. The mean percentages of evergreen and deciduous trees were 20% and 68%, respectively. Twelve percent of the canopy was open. Graph 9 describes the mean percent canopy in Blucher Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 84%. The mean percent left bank vegetated was 85%. The dominant elements composing the structure of the stream banks consisted of 4% bedrock, 4% boulder, and 88% sand/silt/clay (Graph 10). Brush was the dominant vegetation type observed in 71% of the units surveyed. Additionally, 25% of the units surveyed had deciduous trees as the dominant vegetation type, and 4% had grass as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Due to inadequate staffing levels, there were no biological surveys conducted in Blucher Creek in 2001.

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

DISCUSSION

Blucher Creek is a B6 channel type for the first 2,911 feet of stream surveyed and an A1 channel type for the remaining 1,205 feet. The suitability of B6 and A1 channel types for fish habitat improvement structures are as follows: B6 channel types are excellent for bank-placed boulders and log cover; good for plunge weirs, single and opposing wing-deflectors and channel constrictors, and fair for boulder clusters. A1 channel types are generally not suitable for fish habitat improvement structures.

Flatwater habitat types comprised 56% of the total length of this survey, riffle 23%, and pool 7%. The pools are relatively shallow, with only four of the 12 (33%) measured pools having a maximum 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 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.

Three of the 12 pool tail-outs measured had embeddedness ratings of 1 or 2. One of the pool tail-outs had embeddedness ratings of 3 or 4. Eight 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 Blucher Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Nine of the 12 pool tail-outs measured had silt or sand/large cobble or boulders as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter for flatwater was 45. The mean shelter rating for pools was 64. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by undercut banks in all habitat types.

Additionally, terrestrial vegetation contributes a small amount. 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 88%. Reach 1 had a canopy density of 87% while Reach 2 had canopy density of 95%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was high at 84% and 85%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic trees species, in conjunction with bank stabilization, is recommended.

GENERAL RECOMMENDATIONS

Blucher 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 roads 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. There is at least one section where the stream is being impacted from cattle trampling the riparian zone. Alternatives to limit cattle access, control erosion and increase canopy, should be explored with the landowner, and developed if possible.
4. 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.
5. Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from undercut banks. Adding high quality complexity with log and root wad 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.

0'	Start of survey: 2655 Blucher Valley Rd;
41'	L. Bank has severe erosion at 10ft-83ft.
459'	Crayfish
524'	Culvert at 83 ft.
607'	End due to no access. Stopped at bridge to #2587, Blucher Valley Rd 6"726', RE-START; Discharge pipe at 20 ft.
758'	63ft. of retaining wall on the left 4' high
851'	4' retaining wall on left; Fish present (not Steelhead)
861'	2' discharge pipe on Right -- 10'; 2' discharge pipe at 32' L + R; Bridge.
1133'	4" discharge pipe at 20' + 30' on left; 2' discharge pipe on left w/ cemented bank
1213'	Trib on right 53'; Fish present; Trib on right 116'
1378'	Bridge at 80'
1460'	Stopped due to no access.
1729'	Restart of survey; Blucher Valley Rd. culvert
1754'	Discharge pipe on Right at 20', 0.3; Discharge pipe on Right at 45', 0.6
2109'	Erosion Right 45'; On right 78' discharge 3" at 275' On right in #025; Big Erosion, water coming down hillside, looks like irrigation problem; cement drainage channel on right at 360'
2469'	Deep clay bottom
2686'	160' on Left, cement culvert
2886'	Stopped due to no access
2911'	Re-Start of survey, Land used for Dairy Farm through to headwaters; Banana Slug; 465' Trib on Left; 635 Trib on Left; 605' Trib on Left; CHANNEL TYPE CHANGE (B6 to A1)
3571'	End of survey, 70' old well + pond on Left; Cattle presence.

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.