STREAM INVENTORY REPORT

Water Gulch

INTRODUCTION

A stream inventory was conducted during the summer of 1997 on Water Gulch and an unnamed tributary to Water Gulch. 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 Water Gulch. 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

Water Gulch is tributary to Chamberlain Creek, tributary to the North Fork Big River, tributary to Big River, tributary to the Pacific Ocean located in Mendocino County, California (Map 1). Water Gulch's legal description at the confluence with Chamberlain Creek is T17N R15W S05. Its location is 39°30′20″ north latitude and 123°33′18″ west longitude. Water Gulch is a first order stream and has approximately 2.0 miles of blue line stream according to the USGS Comptche 7.5 minute quadrangle. Water Gulch drains a watershed of approximately 1.5 square miles. Elevations range from about 360 feet at the mouth of the creek to 1300 feet in the headwater areas. The watershed is dominantly mixed conifer. The watershed is managed by Jackson Demonstration State Forest for timber production. Vehicle access exists via State Route 20.

METHODS

The habitat inventory conducted in Water Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi and Reynolds, 1991 rev. 1994). The California Conservation Corps (CCC) Technical Advisors and 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.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach (Hopelain, 1994). 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, dominant substrate composing the pool tail crest, and embeddedness.

Habitat unit types encountered for the first time are further 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 Water Gulch 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 standard flow measuring equipment, if available. In some cases flows are estimated.

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.

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". Water Gulch 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. Channel dimensions were measured using hip chains, range finders, tape measures, and stadia rods. All units were measured for mean length; additionally, the first occurrence of each unit type and a randomly selected 10% subset of all units were sampled for all features on the sampling form. Pool tail crest depth at each pool unit was measured in the thalweg. All measurements were in feet to the nearest tenth.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Water Gulch, 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 particle size, having a bedrock tail-out, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. 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 Water Gulch, 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 densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Water Gulch, 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 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 Water Gulch, 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 stream inventory is used to determine fish species and their distribution in the stream. In Water Gulch fish presence was observed from the stream banks, and two sites were 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 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

Graphics are produced from the tables using Quattro Pro. Graphics developed for Water Gulch 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
- 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 following results are for main stem Water Gulch. The results and discussion for the unnamed tributary are presented as a subsection following the main body of this report.

The habitat inventory of July 23 and July 24, 1997, was conducted by Lisa Campbell and Mary Fowlkes (AmeriCorps/WSP), and Craig Mesman (CCC). The total length of the stream surveyed was 9,713 feet with an additional 113 feet of side channel.

Flow was measured approximately 250 feet from the confluence with a Marsh-McBirney Model 2000 flowmeter at 0.03 cfs on August 06, 1997.

Water Gulch is a B4 channel type for the first 5,203 feet of stream reach surveyed, and an E4 channel type for the remaining 4,510 feet surveyed. B4 channel types are moderately entrenched channels with moderate gradient, riffle dominated channels with infrequently spaced pools; very stable plan and profile; and stable banks. E4 channel types are channels with low gradient, meandering riffle/pool streams with low width/depth ratio and little deposition; very efficient and stable; and high meander/width ratio.

Water temperatures taken during the survey period ranged from 57 to 68 degrees Fahrenheit. Air temperatures ranged from 59 to 79 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 22% riffle units, 30% flatwater units, and 48% pool units (Graph 1). Based on total **length** of Level II habitat types there were 8% riffle units, 52% flatwater units, and 39% pool units (Graph 2).

Fourteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were mid-channel pools, 36%; lateral scour pools - root wad enhanced, 20%; and step runs, 17% (Graph 3). Based on percent total **length**, runs made up 28%, mid-channel pools 26%, and step runs 24%.

A total of 126 pools were identified (Table 3). Main channel pools were most frequently encountered at 82% and comprised 75% 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. Forty of the 126 pools (31.7%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 126 pool tail-outs measured, 13 had a value of 1 (10.3%); 41 had a value of 2 (32.5%); 25 had a value of 3 (19.8%); 12 had a value of 4 (9.6%) and 35 had a value of 5 (27.8%) (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 Water Gulch, 14 of the 35 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, boulder, bedrock or wood.

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 10, flatwater habitat types had a mean shelter rating of 15, and pool habitats had a mean shelter rating of 41 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 45. Scour pools had a mean shelter rating of 39 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Water Gulch. Large and small woody debris are lacking in nearly all habitat types. Graph 7 describes the pool cover in Water Gulch.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 8 of the 11 low gradient riffles measured (73%). Gravel was also the dominant substrate observed in 90 of the 126 pool tail outs measured (71%)(Graph 8).

The mean percent canopy density for the stream reach surveyed was 94%. The mean percentages of deciduous and coniferous trees were 4% and 96%, respectively. Graph 9 describes the canopy in Water Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 69.5%. The mean percent left bank vegetated was 57.5%. The dominant elements composing the structure of the stream banks consisted of 23.7% bedrock, 3.8% boulder, 28.7% cobble/gravel, and 43.8% sand/silt/clay (Graph 10). Coniferous trees (including down trees, logs, and root wads) were the dominant vegetation type observed in 67.5% of the units surveyed. Additionally, 17.5% of the units surveyed had brush as the dominant vegetation type, and 8.7% had deciduous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished on September 16, 1997 in Water Gulch. The sites were sampled by Tara Lee Cooper and Craig Mesman (CCC).

The first site sampled included habitat units 94 through 97, a step run and several mid-channel pools approximately 3,075 feet from the confluence with Chamberlain Creek. The site yielded one steelhead and one coho salmon.

The second site included habitat units 204 through 206, a pool / step run sequence located approximately 7,434 feet above the creek mouth. The site yielded 3 steelhead.

DISCUSSION

Water Gulch is a B4 channel type for the first 5,203 feet of stream surveyed and a E4 for the remaining 4,510 feet. The suitability of B4 and E4 channel types for fish habitat improvement structures is as follows: B4 channel types are excellent for weirs, boulder clusters, bank placed boulders, single and opposing wing deflectors and log cover. E4 channel types are good for bank placed boulders; fair for opposing wing-deflectors; and poor for weirs, boulder clusters, and single wing-deflectors.

The water temperatures recorded on the survey days July 23 and 24, 1997 ranged from 57 to 68 degrees Fahrenheit. Air temperatures ranged from 59 to 79 degrees Fahrenheit. This is a suitable 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 52% of the total **length** of this survey, riffles 8%, and pools 39%. The pools are relatively shallow, with 40 of the 126 (31.7%) 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. Adding structure that will increase or deepen pool habitat is recommended.

Thirteen of the 126 pool tail-outs measured had an embeddedness rating of 1. Thirty-seven of the pool tail-outs had embeddedness ratings of 3 or 4. Thirty-five of the pool tail-outs had a rating of 5 or were considered unsuitable for spawning. Fourteen of the 35 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 Water Gulch, 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 low with a rating of 41. The shelter rating in the flatwater habitats was slightly lower at 15. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by boulders in nearly all habitat types. Log and root wad cover structures in the pool and flatwater habitats are needed to improve 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.

Ninety-six of the 126 pool tail outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy density for the stream was 94%. This is a relatively high percentage of canopy. 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 69.5% and 57.5%, 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) Water Gulch should be managed as an anadromous, natural production stream.

2) 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.

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

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.

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 Chamberlain Creek. Channel type is B4. Metal cable and other debris present in channel.
40'	Log stringer bridge, collapsing, 20' long X 6' high X 25' wide. The original bridge stood 15' above water.
157'	Right bank vegetation has been removed from bank.
545'	Bridge 17' high X 14' wide X 15' long. Chamberlain Creek Camp Road.
730'	Concrete dam with a two foot jump onto an apron. The dam forms a reservoir in the summer months.
745'	Concrete apron with 0.1' maximum depth laminar flow.
756'	Greater than 6" steelhead observed in the dammed pool. Approximately 50' maximum width. Less than 10% canopy over the pool.
1002'	Old log stringer bridge, 13' long X 20' wide X 1' high. Not in use. Covered with 1' of sediment.
1659'	Left bank erosion, 4' long X 30' vertical from channel.
2041'	Right bank erosion, 70' high X 50' long.
2075'	Root wad obstructs stream 5 feet high. Retaining five feet sediment.
2801'	Left bank erosion, 8' high X 30' long.
3075'	First electrofishing site.
3935'	Left bank culvert, 1' in diameter. Not accessible to fish. Ten foot high with a flow of less than 0.01 cfs.

3949'	Left bank road, 20' high.
4530'	Right bank tributary, dry, dominant substrate is silt, channel is not distinct.
5203'	Marshy area. Substrate is very silty. Aquatic vegetation present. Average depth is 0.3' and the channel is approximately 40-50' wide. Channel type changes to E4.
6624'	Large marsh. The units between this and the last marsh have also been very marsh-like habitat.
6711'	Two unidentified fish seen, approximately 2" long.
7434'	Second electrofishing site.
7474'	Marshy area ends.
7805'	Channel is braided for 12'.
7992'	Left bank tributary (See sub-section report).
8069'	Footbridge, 5' high X 2'long X 6' wide.
8087'	Marsh-pond area, approximately 50' wide.
8918'	Log debris accumulation (LDA), 8' long X 4' high X 4' wide, retains 1' of sediment.
8991'	Left bank culvert, one foot in diameter. Not accessible to fish.
9059'	Large marsh unit. Numerous puddles exist between dry units in last 200 feet of marsh. No evident channel above marsh. The stream becomes the forest floor.
9134'	Culvert, 3' diameter with a 3' jump and no baffles.
9713'	End of survey. Left bank tributary, intermittent.

REFERENCES

Flosi, G., and F. Reynolds. 1994. California salmonid stream habitat restoration manual, 2nd edition. California Department of Fish and Game, Sacramento, California.

Hopelain, J. 1995. Sampling levels for fish habitat inventory, unpublished manuscript. California Department of Fish and Game, Inland Fisheries Division, Sacramento, California.

LEVEL III and LEVEL IV HABITAT TYPE KEY

HABITAT TYPE	LETTER	NUMBER
RIFFLE		
Low Gradient Riffle	[LGR]	1.1
High Gradient Riffle	[HGR]	1.2
CASCADE		
Cascade	[CAS]	2.1
Bedrock Sheet	[BRS]	2.2
FLATWATER		
Pocket Water	[POW]	3.1
Glide	[GLD]	3.2
Run	[RUN]	3.3
Step Run	[SRN]	3.4
Edgewater	[EDW]	3.5
MAIN CHANNEL POOLS		
Trench Pool	[TRP]	4.1
Mid-Channel Pool	[MCP]	4.2
Channel Confluence Pool	[CCP]	4.3
Step Pool	[STP]	4.4
SCOUR POOLS		
Corner Pool	[CRP]	5.1
Lateral Scour Pool - Log Enhanced	[LSL]	5.2
Lateral Scour Pool - Root Wad Enhanced	[LSR]	5.3
Lateral Scour Pool - Bedrock Formed	[LSBk]5.4	
Lateral Scour Pool - Boulder Formed	[LSBo]	5.5
Plunge Pool	[PLP]	5.6
BACKWATER POOLS		
Secondary Channel Pool	[SCP]	6.1
Backwater Pool - Boulder Formed	[BPB]	6.2
Backwater Pool - Root Wad Formed	[BPR]	6.3
Backwater Pool - Log Formed	[BPL]	6.4
Dammed Pool	[DPL]	6.5

STREAM INVENTORY REPORT

Unnamed Water Gulch Tributary

WATERSHED OVERVIEW

The unnamed Water Gulch tributary is tributary to Water Gulch, tributary to Chamberlain Creek, tributary to North Fork Big River, tributary to Big River, tributary to Pacific Ocean located in Mendocino County, California (Map 1). Unnamed Water Gulch tributary's legal description at the confluence with Water Gulch is T17N R15W S06. Its location is 39°20′05″ north latitude and 123°34′33″ west longitude. Unnamed Water Gulch tributary is an ephemeral stream according to the USGS Comptche 7.5 minute quadrangle. Unnamed Water Gulch tributary drains a watershed of approximately 0.36 square miles. Elevations range from about 480 feet at the mouth of the creek to 1300 feet in the headwater areas. Grass and mixed conifer forest dominates the watershed. The watershed is entirely within the Jackson Demonstration State Forest and is managed for timber production. Vehicle access exists via state route 20.

HABITAT INVENTORY RESULTS AND DISCUSSION

The habitat inventory of July 25 and August 05, 1997, was conducted by Craig Mesman and Tara Cooper (CCC), and Mary Fowlkes and Lisa Campbell (WSP\AmeriCorps). The total length of the stream surveyed was 2,037 feet.

Flow was measured approximately 200 feet from the confluence with Water Gulch with a Marsh-McBirney Model 2000 flowmeter at 0.13 cfs on June 20, 1997.

Unnamed Water Gulch tributary is a B4 channel type for the entire 2,037 feet of stream surveyed. The suitability of B4 channel types for fish habitat improvement structures is described in the main body of this report.

The water temperatures recorded on the survey dates ranged from 55 to 60 degrees Fahrenheit. Air temperatures ranged from 58 to 75 degrees Fahrenheit. This is a suitable 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.

Based on the total **length** of this survey, Level II habitat units consisted of 55% flatwater units, 24% pool units, and 16% riffle units (Table 1). The pools are extremely shallow, with only 1 of the 34 pools having a maximum depth greater than 2 feet (Table 4).

Thirteen of the 34 pool tail-outs measured had embeddedness ratings of 3 or 4. Three had a 1 rating. Cobble embeddedness of 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In unnamed Water Gulch tributary, 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 low with a rating of 10. The shelter rating in the flatwater habitats was 5. A pool shelter rating of approximately 100 is desirable. Log and root wad cover structures in the pool and flatwater habitats are needed to improve both summer and winter salmonid habitat.

Twenty-eight of the 34 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy density for the stream was 97%. This is a relatively high percentage of canopy. 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 84.7% and 87.5%, 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.

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished on August 8, 1995, in unnamed Water Gulch tributary. The units were sampled by Tara Cooper and Craig Mesman (CCC).

The first site sampled included habitat units 17 through 20, a series of pools, runs, and a riffle 442 feet from the confluence with Water Gulch. This site had an approximate length of 117 feet. The site yielded four steelhead, and 6 Pacific giant salamanders.

The second site included habitat units 73 through 82, a series of pools, runs, and riffles 1,728 feet above the creek mouth. This site had a length of approximately 184 feet. No fish were sampled, but at least 3 Pacific giant salamanders were observed.

RECOMMENDATIONS

1) Unnamed Water Gulch tributary should be managed as an anadromous, natural production stream.

2) Increase woody cover in the pools and flatwater habitat units. Adding high quality complexity with woody cover is desirable.

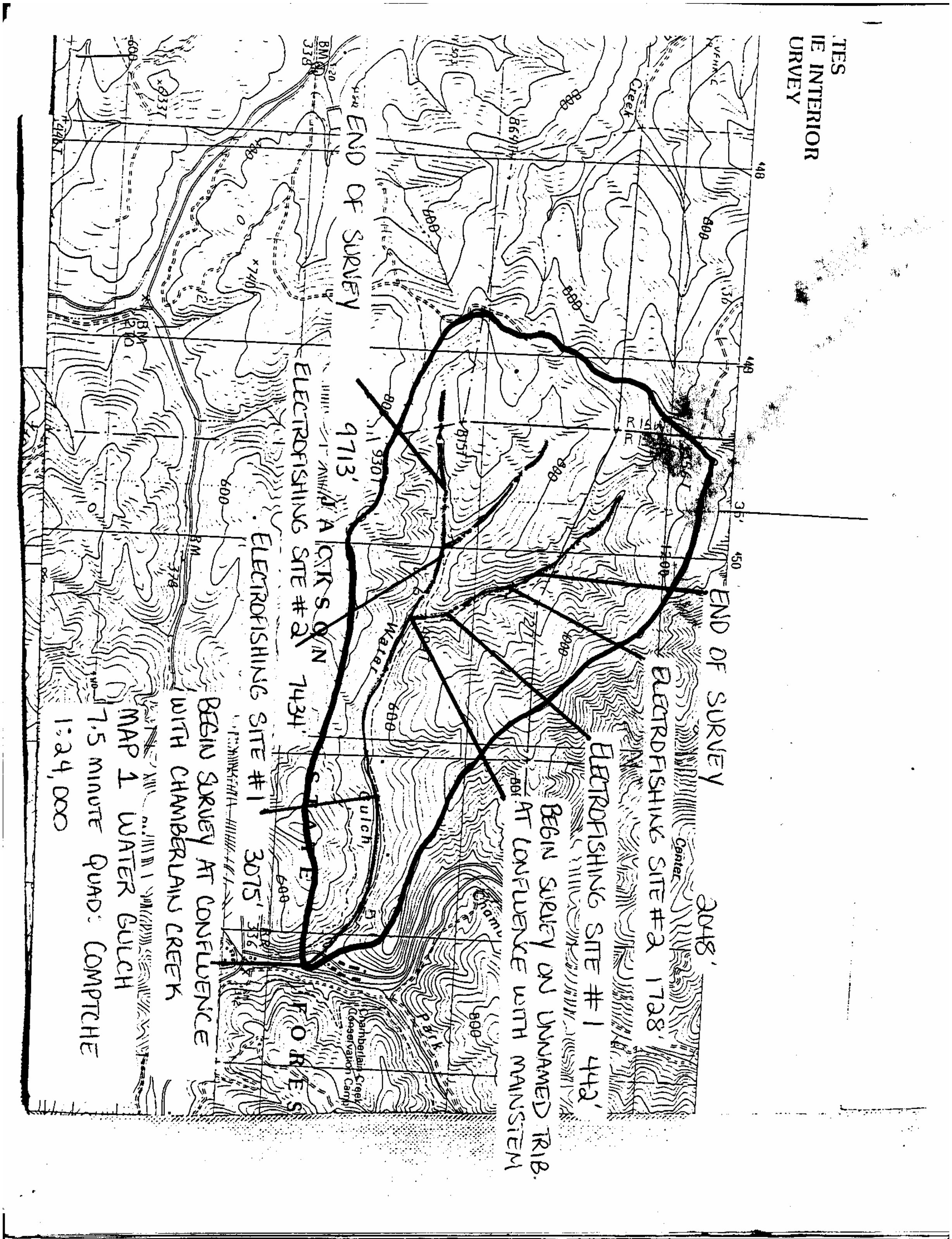
3) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

4) The limited water temperature available suggests that the 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.

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 the confluence with Water Gulch (approximately 7,992 feet from the confluence of Water Gulch and Chamberlain Creek). Channel type is a B4. There is a three foot jump over embedded wood at the confluence.
183'	Four foot diameter culvert in good condition, set at a low gradient. The culvert is under road number 220.
442'	First electrofishing site.
603'	Left bank erosion, 8 feet high and 36 feet long.
656'	Four foot diameter log lodged lengthwise in the channel creating a 5.5 foot jump.
824'	Steelhead observed.
1,047'	Log debris accumulation (LDA), 4.5' high x 10' wide x 5' long, retaining sediment 4.5' high.
1,237'	Salmonids observed.
1,531'	Well-entrenched channel with woody debris completely clogging channel for a distance of 50 feet.
1,663'	Two, 6' diameter logs down across channel. Not a barrier.
1,728'	Second electrofishing site.
1,799'	Four foot high jump, retaining gravel 4' deep. Probable barrier.
1,872'	Six foot diameter log embedded in channel.
2,048'	End of survey. Channel gets narrower and steeper. The substrate becomes larger in size, mostly large cobble and boulders. No fish observed after 1,237'.


TES
IE INTERIOR
URVEY
END OF SURVEY
ELECTROFISHING SITE #2 1728'
2048'
ELECTROFISHING SITE #1 442'
BEGIN SURVEY ON UNNAMED TRIB.
AT CONFLUENCE WITH MAINSTEM
END OF SURVEY
9713'
ELECTROFISHING SITE #2 7434'
ELECTROFISHING SITE #1 3075'
BEGIN SURVEY AT CONFLUENCE
WITH CHAMBERLAIN CREEK
MAP 1 WATER GULCH
7.5 MINUTE QUAD: COMPTCHE
1:24,000