STREAM INVENTORY REPORT

Doe Creek

INTRODUCTION

A stream inventory was conducted from August 9 to August 10, 2005 on Doe Creek. The survey began at the confluence with North Branch North Fork Elk River and extended upstream 0.6 miles.

The Doe 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 Doe Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

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

WATERSHED OVERVIEW

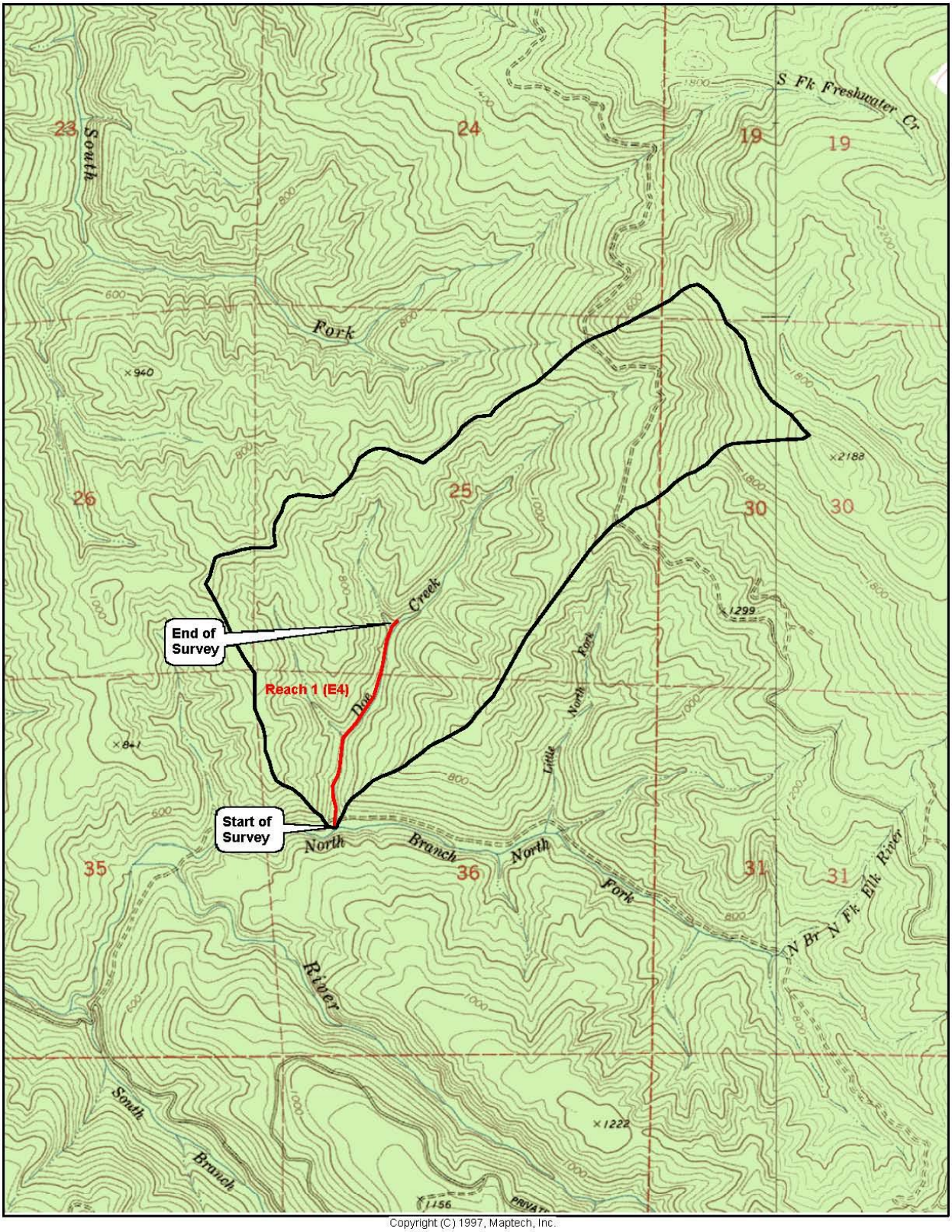
Doe Creek is a tributary to North Branch North Fork Elk River, a tributary to North Fork Elk River, a tributary to Elk River, a tributary to Humboldt Bay, which drains to the Pacific Ocean. It is located in Humboldt County, California (Map 1). Doe Creek's legal description at the confluence with North Branch North Fork Elk River is T04N R01E S36. Its location is 40.6881 degrees north latitude and 124.0228 degrees west longitude, LLID number 1240227406880. Doe Creek is a first order stream and has approximately 1.1 miles of blue line stream according to the USGS McWhinney Creek 7.5 minute quadrangle. Doe Creek drains a watershed of approximately 0.9 square miles. Elevations range from about 475 feet at the mouth of the creek to 2,000 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Elk River Road.

METHODS

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

Doe Creek

Map 1



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

1. Flow:

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

2. Channel Type:

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

3. Temperatures:

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

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Doe 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 Doe 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 not suitable 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 Doe Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

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

8. Canopy:

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

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Doe 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.

10. Large Woody Debris Count:

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

11. Average Bankfull Width:

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

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Doe Creek. In addition, 6 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 Stream Habitat 2.0.19, 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 Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

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

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

HABITAT INVENTORY RESULTS

The habitat inventory of August 9 to August 10, 2005 was conducted by I. Mikus (WSP) and S. McSmith (WSP). The total length of the stream surveyed was 3,192 feet.

Stream flow was not measured on Doe Creek.

Doe Creek is an E4 channel type for 3,192 feet of the stream surveyed. E4 channels are low gradient, meandering riffle/pool stream channels with low width/depth ratios and little deposition, they are very efficient and stable with a high meander width ration, and are gravel dominated.

Water temperatures taken during the survey period ranged from 55 to 58 degrees Fahrenheit. Air temperatures ranged from 56 to 63 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 36% flatwater units, 32% pool units, 24% riffle units, 6% dry units, and 2% unsurveyed units (Graph 1). Based on total length of Level II habitat types there were 52% flatwater units, 17% pool units, 16% riffle units, 14% dry units, and 1% unsurveyed units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 28%; run units, 20%; and low gradient riffle units, 20% (Graph 3). Based on percent total length, step run units made up 34%, run units 17%, and mid-channel pool units 15%.

A total of 29 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 86%, and comprised 87% of the total length of all pools (Graph 4).

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Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Seven of the 29 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 29 pool tail-outs measured, two had a value of 1 (7%); 10 had a value of 2 (35%); 15 had a value of 3 (52%); one had a value of 4 (3%); one had a value of 5 (3%); (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed not suitable for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 3, flatwater habitat types had a mean shelter rating of 41, and pool habitats had a mean shelter rating of 52 (Table 1). Of the pool types, the scour pools had a mean shelter rating of 125 and main channel pools had a mean shelter rating of 40 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover types in Doe Creek. Graph 7 describes the pool cover in Doe Creek. For pools, large woody debris is the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was observed in 90% of pool tail-outs, and small cobble was observed in 7% of pool tail-outs.

The mean percent canopy density for the surveyed length of Doe Creek was 96%. The mean percentages of hardwood and coniferous trees were 23% and 77%, respectively. Four percent of the canopy was open. Graph 9 describes the mean percent canopy in Doe Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 97%. The dominant elements composing the structure of the stream banks consisted of 54% cobble/gravel, 39% sand/silt/clay, and 8% boulders (Graph 10). Coniferous trees were the dominant vegetation type observed in 78% of the units surveyed. Additionally, 16% of the units surveyed had hardwood trees as the dominant vegetation type, and 5% had brush as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Six sites were electrofished for species composition and distribution in Doe Creek on October 26, 2005. The water temperature taken during the electrofishing period was 52 degrees Fahrenheit, while the air temperature was 50 degrees Fahrenheit. The sites were sampled by C. Pollastrini, T. Fisher (WSP), and P. Divine (DFG). The sample sites yielded three young-of-the-year steelhead/rainbow trout (SH/RT), six age 1+ SH/RT, two age 2+ SH/RT, and one young-of-the-year coho salmon.

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The following chart displays the information yielded from these sites:

2005 Doe Creek e-fish observations

Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 1 E4 Channel Type									
10/26/05	1	20	4.2	604	1	0	0	1	0
10/26/05	2	42	4.2	1,326	0	0	2	1	0
10/26/05	3	47	4.2	1,442	0	0	0	0	0
10/26/05	4	51	4.2	1,688	0	0	1	1	1
10/26/05	5	64	4.2	2,162	0	0	0	1	0
10/26/05	6	65	5.6	2,182	0	0	0	2	1

DISCUSSION

Doe Creek is an E4 channel type for the entire 3,192 feet of stream surveyed. The suitability of E4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders, fair for opposing wing deflectors, and poor for plunge weirs, boulder clusters and single wing-deflectors.

The water temperatures recorded on the survey days August 9 to August 10, 2005 ranged from 55 to 58 degrees Fahrenheit. Air temperatures ranged from 56 to 63 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 52% of the total length of this survey, riffles 16%, and pools 17%. The pools are relatively shallow, with only seven of the 29 (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.

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Twelve of the 29 pool tail-outs measured had embeddedness ratings of 1 or 2. Sixteen of the pool tail-outs had embeddedness ratings of 3 or 4. One of the pool tail-outs had a rating of 5, which is considered not suitable 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 Doe Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Twenty-eight of the 29 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 52. The shelter rating in the flatwater habitats was 41. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by small woody debris in Doe Creek. Large woody debris is the dominant cover type in pools followed by small woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 96. In general, revegetation projects are considered when canopy density is less than 80%. The percentage of right and left bank covered with vegetation was 97% and 97%, respectively.

RECOMMENDATIONS

1) Doe Creek 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 in the pools is from large woody debris. Adding high quality complexity with woody cover in the pools is desirable.

4) There are several log debris accumulations present on Doe Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.

COMMENTS AND LANDMARKS

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

Position (ft):	Habitat unit #:	Comments:
0	001	Start of survey at the confluence with North Branch North Fork Elk River.
40	004	2.3’ high plunge.
118	009	Old Humboldt crossing that has blown-out. Logs remaining parallel to the channel and are embedded in the bank.
604	020	First electrofishing site.
787	025	Log debris accumulation (LDA) measures 3’ high x 14’ wide x 2.5’ long. The LDA is composed of two pieces of large wood. It is retaining sediment measuring 3’ high.
891	029	Left bank erosion site measures 7' high x 20' long.
1,326	042	Second electrofishing site.
1,363	044	LDA measures 7’ high x 24’ long x 10’ long. The LDA is composed of 13 pieces of large wood. It is retaining sediment measuring 4.5’ high.
1,442	047	Third electrofishing site. No fish captured.
1,688	051	Fourth electrofishing site.
2,162	064	Fifth electrofishing site.
2,182	065	Sixth electrofishing site. 1.6' high plunge.
2,197	066	LDA measures 4.8’ high x 8’ wide x 13’ long. The LDA is composed of 10 pieces of large wood. It is retaining sediment measuring 4’ high. No fish observed above this LDA.
2,758	079	End of NRM habitat typing survey.
2,758	079	LDA measures 8.4’ high x 23’ wide x 12’ long. The LDA is composed of 15 pieces of large wood. It is retaining sediment measuring 4’ high.

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2,852	082	2.5' high plunge.
2,917	085	Blown out LDA.
3,017	087	LDA measures 7’ high x 21’ wide x 5’ long. The LDA is composed of nine pieces of large wood. It is retaining sediment measuring 3’ high.
3,178	090	Right bank erosion site measures 12' long x 4' high. End of survey due to numerous LDA’s and no fish observed since the LDA at 2,197.

REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

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

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

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]	

Appendix A

California Department of Fish & Game

Large Woody Debris (LWD) Riparian Inventory

Doe Creek
Humboldt County
August 2005

BACKGROUND

The importance of large woody debris (LWD) in the development of a stream's morphological and biological productivity has been well documented. It strongly influences stream habitat characteristics and biotic composition. Large woody debris is often the structural element associated with pool formation and is considered one of the major elements that create complex fish habitat vital for juvenile salmonid survival. Habitat complexity is particularly important for coho salmon and steelhead trout juveniles because these salmonids remain in the stream for at least one year before migrating to the ocean.

Large woody debris inventories describe the present relative abundance of LWD elements providing, or with the potential to provide, fish habitat within the stream channel. Large woody debris inventories also describe the relative abundance of "recruitable" LWD. Recruitable LWD is the large wood existing out of the stream channel that has a high potential of entering the stream channel in the future.

METHODS

Prior to conducting the LWD inventory, the stream was habitat typed employing the methods described by Flosi, et al (1998). The Doe Creek habitat typing survey delineated 1 stream reach. The start and end points for the LWD inventory reaches correspond to stream reach start and end points of the habitat survey.

Large woody debris inventory methods, data recording forms, and database structure are described in Flosi, et al (1998). Large woody debris minimum size criteria was 12-inches in diameter and 6 feet in length. Root wads had the 12-inch minimum diameter criteria but had no minimum length requirement. Diameter and length categories consisted of the following:

Diameter Category	**Length Category**
1. 1-2 feet	1. 6-20 feet
2. 2-3 feet	2. Over 20 feet
3. 3-4 feet	
4. Over 4 feet	

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Condition or status categories included:

a) dead and down
b) dead and standing
c) perched for imminent delivery to the stream channel
d) live coniferous trees
e) live broadleaf trees (a.k.a. deciduous/hardwood)

The sampling strategy consisted of selecting a random starting point near the beginning of the LWD survey reach, and then systematically sampling 200 foot sections out of every 1,000 feet of stream length surveyed. The first 1,200 feet of the LWD survey reach was segmented into 200 foot sections and consecutively numbered 1 through 6. One of these six 200 foot sections was randomly selected as the beginning of the *first* sample section. After conducting the inventory survey in the initial 200 foot section, surveyors proceeded upstream 800 feet and surveyed the next 200 feet as the *second* sample section. The *third* sample section began 800 feet upstream of the end of the second sample section and the next 200 feet were surveyed, and so on. Systematic sampling continued upstream until the end of the LWD survey reach. This method produced a sampling level of approximately 20 percent. For channel type reaches that were less than 1,000 feet, the entire reach was surveyed.

RESULTS

*Tables 1 and 2 are located at the end of this report.

STREAM	REACH	CHANNEL TYPE	TOTAL LENGTH	DEAD DOWN	DEAD STANDING	--LIVE TREES-- PERCHED	CONIFER	BROADLEAF	TOTAL
				Number of pieces per 100 linear feet of stream out of channel on right and left banks					
Doe Creek	1	E4	3192	4	0.2	0.2	15.3	1.2	20.9
				Number of pieces per 100 linear feet of stream within the bankfull channel					
Doe Creek	1	E4	3192	5.7	0.5		0	0	6.2
				Number of pieces per 100 linear feet of stream out of channel on right and left banks and within the bankfull channel					
Doe Creek	1	E4	3192	9.7	0.7	0.2	15.3	1.2	27.1
				Percentage of LWD pieces found out of channel on right and left banks					
Doe Creek	1	E4	3192	19.13876	0.956937799	0.9569378	73.20574163	5.741626794	100
				Percentage of LWD pieces found within the bankfull channel					
Doe Creek	1	E4	3192	91.9	8.1	0.0	0.0	0.0	100
				Percentage of LWD pieces found out of channel on right and left banks and within the bankfull channel					
Doe Creek	1	E4	3192	35.8	2.6	0.7	56.5	4.4	100

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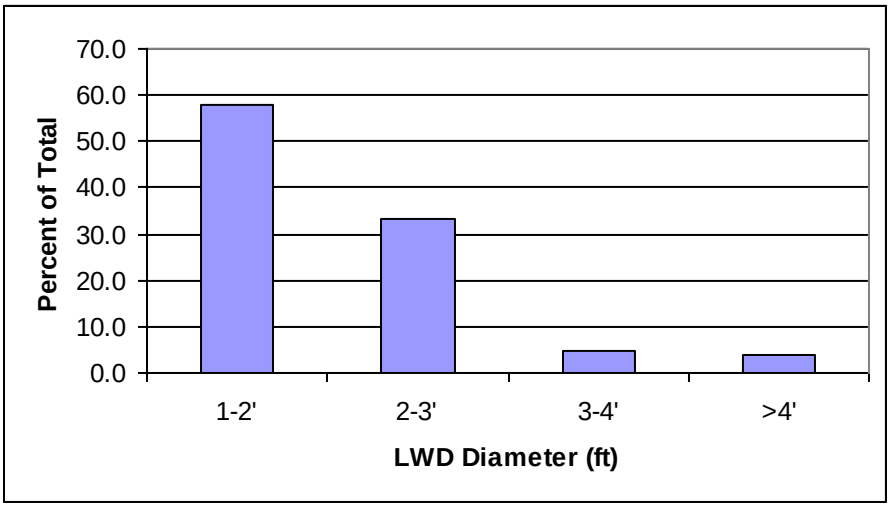
The Doe Creek LWD inventory consisted of 1 inventory reaches.
Reach 1, an E4 channel type extended upstream approximately 0 feet from the mouth. This reach contained 20.9 pieces of LWD on both the right and the left banks per 100 linear feet of stream. In descending proportions, the condition of the pieces were 73.2% live coniferous, 19.1% dead and down, 5.7% live broadleaf, 0.96% dead and standing, and 0.96% perched (Figure 1). Within the bankfull channel, Reach 1 contained 6.2 pieces of LWD per 100 linear feet of stream. The conditions of the pieces were 91.9% dead and down, 8.1% dead and standing, 0% live coniferous, 0% live broadleaf and 0% perched. The total number of pieces per 100 linear feet for both the banks and bankfull channel were 27.1, of which 56.5% were live coniferous, 35.8% were dead and down, 4.4% live broadleaf, 2.6% dead and standing and 0.7% perched. Of the pieces in Reach 1, 58% were in LWD size category of 1-2 foot in diameter, 33.3% were in the 2-3 foot category, 4.9% were in the 3-4 foot category and, 3.7% were in the >4 foot category (Figure 2).

Figure 2: Percent of LWD according to diameter size class and stream reach



DISCUSSION

One goal of conducting LWD inventories is to provide data that, along with fish population and habitat type data, will enable resource managers to characterize the quality of available and potential fish habitat. Although, the relationship between the number, size, and type of LWD pieces per 100 feet, and quality of fish habitat has not been fully established, it is generally accepted that LWD in the stream channel plays a vital role in contributing to the quality of fish habitat. Large woody debris within the bank zone is the source for future instream LWD and addresses the issue of LWD recruitment to the stream channel. Information in this report will enable resource managers to identify areas lacking in LWD, subsequently leading to planning and prioritizing prescriptions for improvement. This information will also be useful in detecting changes in LWD relative abundance with relation to land use practices or riparian zone restoration projects.