



**COHO SALMON (*ONCORHYNCHUS KISUTCH*) IN PINE GULCH CREEK,
MARIN COUNTY, CA**

2002 MONITORING REPORT



Pine Gulch Creek coho wishing poles - Bolinas School - Pine Gulch Classroom - 1997

PORE-NR-WR-03/01

A report from the
Coho Salmon and Steelhead Trout Restoration Project



May 2003

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Ketcham B.J., and G.G. Brown. 2003. Coho Salmon (*Oncorhynchus kisutch*) in Pine Gulch Creek, Marin County, CA. 2002 Monitoring Report. Coho Salmon and Steelhead Trout Restoration Program. PORE-NR-WR-03/01. 18pp. Plus appendices.

National Park Service
Point Reyes National Seashore

FINAL DRAFT

May 2003

ABSTRACT

Pine Gulch Creek drains a 19.8 square kilometer perennial watershed in coastal Marin County, California, and is the primary freshwater input to Bolinas Lagoon. The watershed supports a population of steelhead (*Oncorhynchus mykiss*) and it is generally accepted that it supported a native self-sustaining population of coho salmon (*O. kisutch*) into the 1970's. Following thirty years without documented coho sightings, recent National Park Service (NPS) monitoring activities have detected the presence of three consecutive cohort year classes in Pine Gulch Creek.

This report includes monitoring results from adult spawner surveys, outmigrant smolt trapping, and a modified Hankin-Reeves coho juvenile population estimate for this newly returned population. Beginning in winter 2000-2001, coho salmon spawners have been observed in low numbers (<5 per year) within the watershed. Modified Hankin-Reeves surveys yielded estimates of 589 ($\pm$ 329) juvenile coho salmon in September 2001 and 1205 ($\pm$ 337) juvenile coho salmon in September 2002. The 2002 survey results indicate higher abundance and wider distribution of coho than the 2001 survey. In response to juvenile presence in 2001, a smolt trap was operated in the spring of 2002 capturing 249 coho smolts. Evaluation of genetic samples indicate that coho salmon captured during summer 2001 in Pine Gulch Creek have a strong genetic affinity to coho in the Redwood Creek watershed, Marin County (Garza personal communication), six miles to the south.

ACKNOWLEDGEMENTS

Many thanks to Jessica Scheeter, Jim Whitlock and Jef Parr for assisting with field surveys for this study. Darren Fong, Aquatic Ecologist at Golden Gate National Recreation Area, provided technical review of the document. Research was conducted under the Endangered Species Act Section 10 Permit #1046 authorization managed by NOAA - Fisheries.

Funding to support spring smolt trapping, index reach monitoring and the Hankin-Reeves juvenile survey is provided through the National Park Service - San Francisco Area Network Inventory and Monitoring Program. Winter 2002-2003 spawner surveys have been supported through the California Department of Fish and Game Fisheries Restoration Grant Program Contract P0130434.

For additional copies or information related to this document, please contact Brannon Ketcham, Water Resources and Restoration Branch Chief at (415) 464-5192 or **brannon_ketcham@nps.gov**.

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1.0 INTRODUCTION

1.1 Background

Pine Gulch Creek drains a 19.8 square kilometer watershed in coastal Marin County, California, and is the primary freshwater input to Bolinas Lagoon (map 1). Pine Gulch Creek is located within the Central California Coast Evolutionary Significant Unit (ESU) where coho salmon (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss*) occur. Coho salmon are listed as threatened by NOAA-Fisheries, and as endangered by the California Department of Fish and Game. Steelhead are listed as threatened by NOAA-Fisheries.

The watershed supports a population of steelhead and it is generally accepted that it supported a native self-sustaining population of coho salmon into the 1970's. The last documented observation of coho salmon is on file at the Yountville office of the California Department of Fish and Game (CDFG). This visual survey conducted in July of 1968 reads, "coho salmon, 20 fish per 100 foot length of stream." The reasons for extirpation of coho salmon in Pine Gulch are uncertain. It is likely that the drought of the late 1970's coupled with in-stream damming during the same period severely depleted multiple year classes and led to unsuitable conditions for continued survival of the species within the Pine Gulch watershed.

The National Park Service – Coho Salmon and Steelhead Trout Restoration Program (CSRP) staff has conducted comprehensive surveys for juvenile and adult salmonids on the 12-kilometer mainstem of Pine Gulch Creek since 1997. A variety of surveys were conducted without finding a single coho salmon individual, including:

- Hankin-Reeves survey (Dolloff et al, 1993) on the lower 8 km in the fall of 1997,
- spawner surveys during the winter of 1997-98;
- outmigrant smolt trapping in spring 1999;
- snorkel survey along the lower 8.5 km in spring 2000;
- index reach electrofishing surveys in summer 2000.

During spawner surveys in January 2001, the partial carcass of an adult female salmonid tentatively identified as a coho was found. Electrofishing surveys of the index sites in August 2001 captured several juvenile coho in index sites 2, 3 and 5, and a single coho in index site 1b (see Map 2). Index site 4 was not electrofished due to property access issues. A follow-up Hankin-Reeves survey (Dolloff 1993) resulted in an estimate of 589 ($\pm$ 329) juvenile coho. This information was reported in the initial Pine Gulch Creek Report (Brown and Ketcham 2002). A smolt trap was operated during spring 2002 and 249 coho smolts were captured, indicating good overwinter survival of the first year class.

A second year class of coho was detected in the Pine Gulch watershed during spawner surveys in January 2002, when a spawning pair of coho was sighted in the mainstem at kilometer 6.7. Electrofishing surveys of the index sites in August 2002 found juvenile coho in all sites except 1a. To further determine the abundance and distribution of this second year class of juvenile

coho in Pine Gulch, a modified Hankin-Reeves type survey was conducted in September 2002 following methods described in Section 2.4.

1.2 Physical Setting

1.2.1 Watershed Description

A perennial watershed, Pine Gulch Creek flows south along the San Andreas Fault (SAF) and represents the largest freshwater inflow to Bolinas Lagoon. The geology of the watershed drives the unique flow and fish habitat characteristics observed within Pine Gulch Creek.

Approximately 75% of the watershed drains from Inverness Ridge, west of the San Andreas Fault. These perennial tributaries provide water to the mainstem, but climb immediately from the valley bottom, providing little to no salmonid habitat. The geologic formations west of the San Andreas Fault include the Santa Cruz Mudstone and Merced Formation (Clark et. al 1984), which support deep soils with high infiltration capacity. The remaining 25% of the watershed drains from Bolinas Ridge east of the SAF. The Franciscan Complex, which supports very thin soils with very low capacity for infiltration, makes up Bolinas Ridge. Tributaries draining from Bolinas Ridge have topography and stream profiles appropriate to support salmonids. Except for McCurdy Creek, all eastern tributaries are intermittent.

1.2.2 Watershed History

Historic land use in the watershed has included intensive livestock agriculture, logging, minor development, and mining. In the late 1800s and into the 1900s, twenty small farms, many of them dairies, used Pine Gulch Creek for the daily disposal of fresh manure. Intensive irrigation was commonplace in the watershed. The last major logging operation occurred near Dogtown in the 1960s.

A significant shift in land use impact began in the 1960s with the establishment of Point Reyes National Seashore, and later Golden Gate National Recreation Area. Approximately 85% of the watershed is included within the boundaries of Point Reyes National Seashore and Golden Gate National Recreation Area. Since National Park Service acquisition, nearly all agricultural operations on federal lands within Pine Gulch Creek watershed have been phased out and are now managed as natural or wilderness area. The exception to this is the Special Use Permit on the Bolinas Mesa that is leased for grazing. The remaining watershed lands are privately held, except for a 73 acre parcel owned by the Bolinas Community Public Utilities District (BCPUD) just to the west of Dogtown.

Historically, Pine Gulch Creek had up to seven permanent and seasonal on-stream dams within the watershed. Water use within Pine Gulch Creek has evolved over the past thirty years from in-stream permanent and seasonal dams in the mid to late 1970s, to the current condition with no diversion dams within the watershed. The last major effort to obtain appropriative water rights resulted in extended protest and the eventual siting of the Bolinas Community Public Utilities District water source within Point Reyes National Seashore and Arroyo Hondo Creek.

Today, agricultural use in the watershed has declined to a fraction of historic use; a few privately held operations south of the Seashore boundary are all that remain of historic agriculture. Both agricultural land use and practices have changed dramatically in the past thirty years, from intensive livestock grazing/flood irrigation to organic crop production using best management practices. The organic farms in this watershed represent a significant new trend in West Marin agriculture, providing the basis for the diversity of production sought by the County to support local sustainability and agricultural viability. At present, five commercial operations (four organic farms and one nursery) derive their water from surface flows of Pine Gulch Creek.

1.2.3 Pine Gulch Creek Discharge

Monthly watershed production presented in Table 1 is based on average daily flow reported by the USGS from June 1967 – September 1970, and the NPS from May 1998 – December 2002. The monitored watershed area is 7.5 square miles. The data show significant seasonal and annual variability in streamflow. The normal annual runoff for the watershed is 9,300 acre-feet for the monitoring period. Approximately 75% of the watershed discharge occurs during the winter season (December 15 through March 31).

Table 1. Monthly Watershed Production for Pine Gulch Creek (acre-feet)

Month		WY67	WY68	WY69	WY70	WY98	WY99	WY00	WY01	WY02	WY03	Normal
October			55	102	63		71	49	88	31	48	63
November			88	160	87		464	44	69	564	74	194
December			155	1759	2578		439	41	78	3923	2714	1461
January			521	3807	8672		923	453	348	2950		2525
February			1387	3674	1252		9056	2985	1359	1589		3043
March			907	1399	938		2794	1719	635	809		1314
April			276	557	243		1299	587	161	228		479
May			128	288	122	403	340	465	48	111		238
June		548	67	155	47	298	198	210	16	70		179
July		116	18	93	31	198	66	119	10	42		77
August		92	18	40	7	106	51	49	14	57		48
September		60	7	41	4	56	47	45	22	37		35
Total			3627	12075	14044		15748	6766	2848	10411		9360
Percent Normal Discharge		NA	39%	129%	150%	NA	168%	72%	30%	111%		

2.0 METHODS

The CSRP monitoring program includes strategies to monitor salmonids at a variety of life stages. This section includes monitoring methods for adult spawner surveys, outmigrant smolt trapping, summer juvenile index reach surveys, and a modified Hankin-Reeves coho juvenile population estimate. Many of the methods associated with the project are consistent with draft California Department of Fish and Game biotic monitoring guidelines (Collins 2003)

2.1 Adult Spawner Surveys

To conduct adult spawner surveys, teams of observers walk upstream through reaches in the stream channel and along the banks. These teams document sightings of live fish, carcasses and new redds. The species, sex and estimated length of live fish are recorded. The fork lengths of carcasses are measured and tissue and scale samples collected. Redds are measured and marked with flagging. Locations of all live fish, carcasses and redds are recorded in reference to permanent tags that mark every 100 meters of stream length. Field sheets are maintained in the Point Reyes National Seashore fisheries office, and data are entered into the fisheries program database.

Because coho return to spawn over a three-month period and residence time on the spawning grounds is variable, live fish may be double counted during repeated surveys. Reported spawning escapement estimates are made using the Peak Live + Cumulative Dead (PLD) index. This index is derived by adding the peak number of live fish observed during a single survey to the number of carcasses recovered on or prior to that date. Redd counts are used to describe spawning density and spatial distribution.

2.2 Outmigrant Smolt Trap

The CSRP conducts outmigrant smolt trapping using the pipe trap method. These pipe traps are designed to minimize impingement under high flows and in-trap predation of fry by larger juvenile salmonids and other fish. Traps are installed in mid-March and removed at the end of May. CSRP outmigrant traps operate by impounding water behind a weir constructed of 13 millimeter square-mesh metal screen, fence posts, rocks, and sand bags that span the entire width of the stream. Flow is directed into a series of 20-centimeter (8-inch) diameter PVC pipes. To decrease water velocity, the pipe empties onto a slanted, perforated metal ramp. The ramp is connected to a 125 x 74 x 50 centimeter live box constructed of plywood and 3 mm metal mesh screen. The live box is situated in a shaded pool, and contains rocks, vegetation, and a 13 mm mesh divider screen to provide cover and refugia for fry. In addition, the weir contains several vents that allow any late spawning adult steelhead to migrate upstream unimpeded during higher flows.

The trap is operated 24 hours per day, flow permitting, and checked once daily. The trap targets salmonid smolts, parr, and fry but the numbers and lengths of all captured species are recorded. The Pine Gulch Creek trap is effective at capturing 1+ aged fish, salmonid and otherwise. A Hobo-brand temperature logger is deployed and left in the trap box for the duration of operation. All 1+ salmonids are anesthetized using AlkaseltzerTM. The fork length is measured to the

nearest mm, and fish are weighed to the nearest 0.1 gram. Anesthetized fish are allowed to recover fully in an aerated “recovery bucket” before release. Fry are identified to species, counted, and a subsample measured.

2.3 Index Reach Surveys

Eight index sites were established in 2000 within the lower 8 km of the Pine Gulch mainstem for long-term annual monitoring of juvenile salmonids and other fish (map 2). Each site consists of a 30-100 meter reach, containing from three to ten contiguous habitat units. In 2000, all sites were sampled by electrofishing in September and early October. In 2001 and 2002 sites were sampled in August and September; index site 4 was sampled by snorkel counts and the other seven sites by electrofishing.

Within each index site, habitat units are isolated with seine nets and electrofished separately using standard multiple pass depletion methods. Most riffle units are sampled with a single pass. Captured fish are sedated using carbon dioxide, identified to species and age class, measured, and weighed. Some individuals are handled to collect fin clips or scale samples for age and/or genetic analysis. Fish are kept in aerated holding buckets before and after handling, and allowed to recover fully before being released.

An electrofishing log is kept of all settings, pertinent environmental conditions, fish response, and total catch for each unit (see Appendix B). Fish population estimates are calculated for each unit using the computer program Microfish (VanDeventer and Platts 1989).

In conjunction with the electrofishing, a habitat survey is conducted for each index site. Length and average width and depth are measured for each unit, and instream shelter complexity values are estimated for pool and flatwater units (using methods outlined in Flosi et al 1998). Additional habitat parameters including bank erosion, riparian cover, and woody debris are then determined for the index site as a whole.

The dive counts in index site 4 consist of two snorkel passes by different divers in each pool unit. Dive lights are used to search under vegetation, woody debris, and undercut banks. Only coho and steelhead were counted in 2001 and 2002, but the presence and relative abundance of other fish and aquatic species, as well as cover, habitat complexity, and general survey conditions were recorded.

2.4 Coho juvenile population estimate

CSRP staff has employed a modified Hankin-Reeves (Dolloff et. al. 1993) survey to estimate juvenile coho salmon populations in September 2001 and 2002. The September 2002 coho survey covered approximately 8.4 km of the Pine Gulch mainstem starting at stream km 0.3, the top of the dredge pool on Marin County Open Space District land (MCOSD), and continuing upstream to stream km 8.7. This was intended to encompass the downstream (index site 1b at stream km 0.4) and upstream (index site 6 at stream km 7.8) extents of coho detected during index site surveys. CSRP staff habitat typed the entire survey area and conducted snorkel counts in a subset of the pool units. A 250-meter section between stream km 7.2 and 7.5 was not surveyed because of limited access and habitat.

2.4.1 Habitat Typing

Starting at the bottom of the coho survey area and working upstream, CSRP staff number, classify, measure the length, and estimate the average width of each habitat unit. Units are classified as pool (scour pool, backwater pool, plunge pool, or mid-channel pool), flatwater, or riffle. The width of each habitat unit is estimated visually. Every fifth pool unit is flagged for snorkeling and several measured widths are taken for the purpose of calibrating the estimated width.

2.4.2 Snorkel Counts

CSRP staff sample each of the previously determined pools with a single pass snorkel count, using a dive light to search under vegetation, woody debris, and undercut banks. Only coho are counted but the presence of steelhead and non-salmonid fish, as well as cover, habitat complexity, and general survey conditions is noted. Although not included in the population estimate, six pools in McCurdy Creek were snorkeled in 2002 to determine the presence or absence of coho in this tributary.

Calibration for the snorkel surveys is conducted using electrofishing results from pools within each index reach, sampled two to six weeks prior to the snorkel survey. All of the index pools are snorkeled and the electrofishing results are used to calibrate the snorkel counts.

2.5 Genetic Analysis

Tissue samples have been collected for genetic analysis by the NOAA - Fisheries Genetics Lab in Santa Cruz, California. Sample collection follows NOAA - Fisheries protocol and is performed as part of the Section 10 permit 1046. Samples are collected mostly from adult carcasses and smolts, though samples from some young of year salmon have been collected.

2.6 Data Analysis

Fish and habitat monitoring data are entered and stored in a Microsoft Access database. Habitat survey, electrofishing, and snorkel survey data are then exported to Microsoft Excel for processing and analysis. Results of 2002 monitoring programs are included as Appendix A.

All calculations and population estimates for the juvenile coho salmon surveys are made using methods outlined in Dolloff et. al. (1993).

3.0 RESULTS

The results of ongoing monitoring within Pine Gulch Creek indicate the presence of three cohort year classes of coho salmon, following thirty years without a documented sighting.

3.1 Adult Spawner Surveys

In the past three winters of spawner surveys, the NPS has observed adult coho salmon within the watershed. This includes a single female carcass found at stream kilometer 4.1 during winter 2000-2001, and a spawning pair was observed on a redd at stream kilometer 6.7 in winter 2001-2002. Results are presented in Table 2.

Table 2. Pine Gulch spawner surveys, winter 2000-2001 thru 2002-2003

Survey Date	Reach	Coho		Steelhead		Unknown		New Redds		
		Live	Carcasses	Live	Carcasses	Live	Carcasses	CO	SH	unknown
Winter 2000-2001										
18 Jan 2001	Km 0.5 to 7.0	0	0	0	0	0	0	0	0	1 ^a
31 Jan 2001	Km 0.5 to 7.0	0	1	0	0	0	0	0	0	6 ^a
16 Feb 2001	Km 0.5 to 7.0	0	0	1	0	0	0	0	4	0
^a Redds located between km 6.0 & 6.4.							2000-2001 Total Redds	0	4	7
Winter 2001-2002										
11 Dec 2001	Km 0.5 to 8.5	2	0	0	0	0	0	2 ^b	0	0
10 Jan 2002	Km 0.5 to 10.0	0	0	2	0	0	0	0	1	0
^b Redds located at stream kilometer 6.6 and 6.7							2001-2002 Total Redds	2	1	0
Winter 2002-2003										
6 Jan 2003	Km 1.7 to 8.0	1 ^c	0	0	0	0	0	1 ^c	0	0
17 Jan 2003	Km 1.7 to 8.0	0	2	0	0	0	0	0	0	0
^c @ downstream end of BPUD pasture (stream km 5.0)							2002-2003 Total Redds	1	0	0

In winter 2002-2003, the PLD index for Pine Gulch was 2, representing the 2 carcasses seen during the January 17 survey covering 6.3 kilometers of stream. One redd with a live female coho was documented during the January 6, 2003 survey at stream kilometer 5.0.

Occasionally, steelhead are observed during spawner surveys. The timing of surveys is not intended to target steelhead and the reported results are not representative of the overall condition and numbers of ocean run steelhead.

3.2 Outmigrant smolt trap

The outmigrant smolt trap was installed on March 23, 2002, although it was not fully operational until March 28. The trap was operated through May 29, 2002 for a total of 62 trapping days. The trap was very effective at trapping 1+ coho and steelhead and other larger fish. On April 10, leaves and debris clogged up the weir to the level of the vents and it is possible that some fish may have gotten through. The trap was not effective at capturing fry. While some fry were counted in the trap, these numbers are not assumed to be representative of any condition or trend.

The trap captured a total of 249 coho smolts (see Table 3). The first coho smolt was recorded on March 29, and most of the coho smolts were captured during weeks 7 and 8 (late April to early May) of trap operation. The daily counts for coho smolts, correlated with the average daily discharge is shown in Figure 1. No clear outmigration pattern is evident, rather there is building and declining number of outmigrants with a peak in early May. No coho fry were captured.

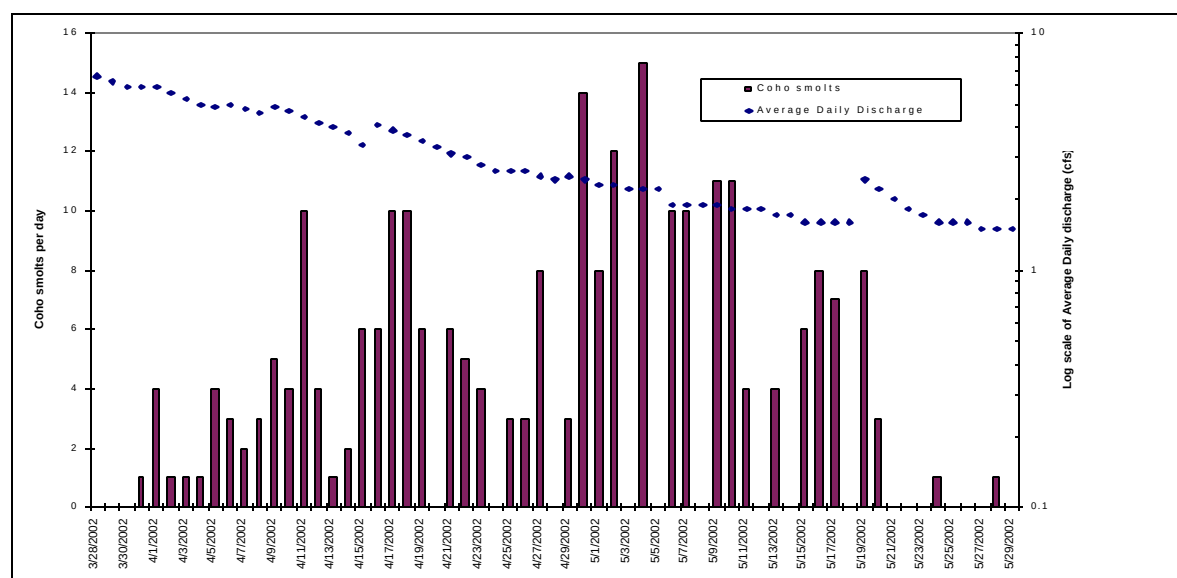


Figure 1: Comparison of daily coho salmon smolt total (bars) and average daily stream discharge on Pine Gulch Creek, Marin County, CA during spring 2002.

Also captured were 240 steelhead fry (including 11 mortalities), 7 steelhead smolts, 20 steelhead presmolts, and 27 steelhead parr. Most of the young of year were captured during week 6.

Table 3. Pine Gulch Smolt Trap Summary, March-June 2002

			SH					CO	
			juvenile				adult		
			smolt	presmolt	parr	fry		Fry	smolt
Week 1	15-Mar	21-Mar	n	n	n	n	n	n	n
Week 2	22-Mar	28-Mar	0	0	0	0	0	0	0
Week 3	29-Mar	4-Apr	5	2	5	7	2	0	8
Week 4	5-Apr	11-Apr	1	7	4	1	3	0	31
Week 5	12-Apr	18-Apr	1	1	7	0	0	0	38
Week 6	19-Apr	25-Apr	0	3	4	87	0	0	24
Week 7	26-Apr	2-May	0	4	5	47	0	0	48
Week 8	3-May	9-May	0	3	0	53	0	0	46
Week 9	10-May	16-May	0	0	1	15	0	0	34
Week 10	17-May	23-May	0	0	0	22	0	0	18
Week 11	24-May	30-May	0	0	1	8	0	0	2
Week 12	31-May	6-Jun	n	n	n	n	n	n	n
TOTALS			7	20	27	240	5	0	249

Totals include mortalities.

n- trap not installed

During the 2002 outmigrant study, a total of 5 adult steelhead were captured in the trap between March 29 and April 7. There were four coho smolt mortalities, resulting in a 1.6% mortality rate (4/250), likely related to predation by sculpin. The mortality rate for steelhead parr was 3.7% (1/27).

Weight and length measurements of coho smolts were made as part of the trap operation. A histogram showing length frequency is included as Figure 2. The histogram indicates a normal size distribution, with the dominant size range between 110mm and 120 mm.

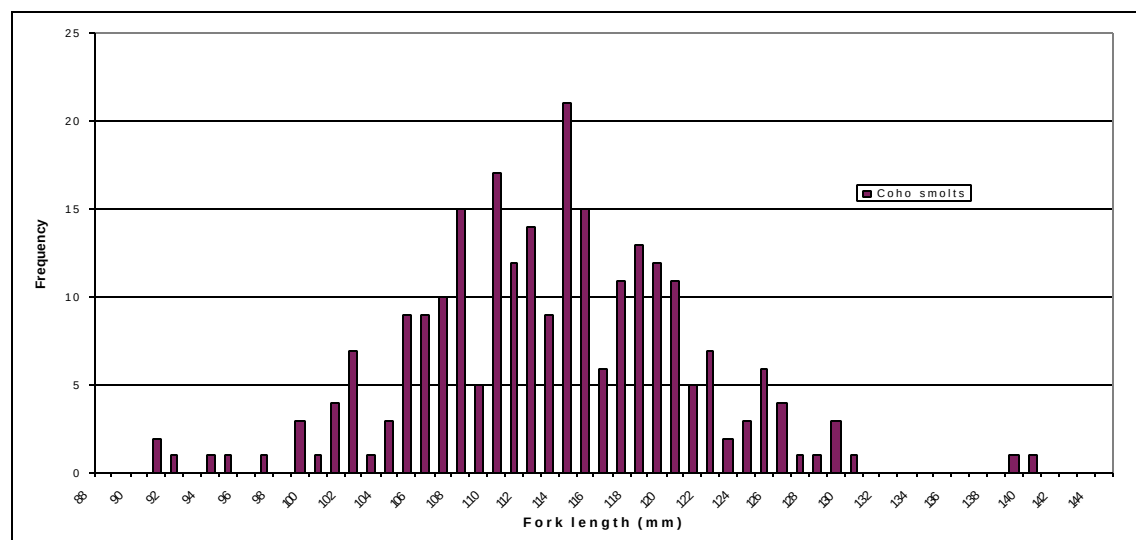


Figure 2: Fork length histogram of coho salmon smolts from Pine Gulch Creek, Marin County, CA during spring 2002.

A comparison of the 2002 Pine Gulch coho weight-length relationship with the John West Fork (tributary of Olema Creek) is shown in Figure 3. The strong weight-length correlation ($r^2=0.93$) for the Pine Gulch Creek coho is indicative of stable and consistent rearing conditions known to occur throughout the watershed. It is speculated that the scatter in the John West Fork data ($r^2=0.62$) are related to more variable (temperature, food supply, dissolved oxygen) rearing conditions associated with the intermittent conditions.

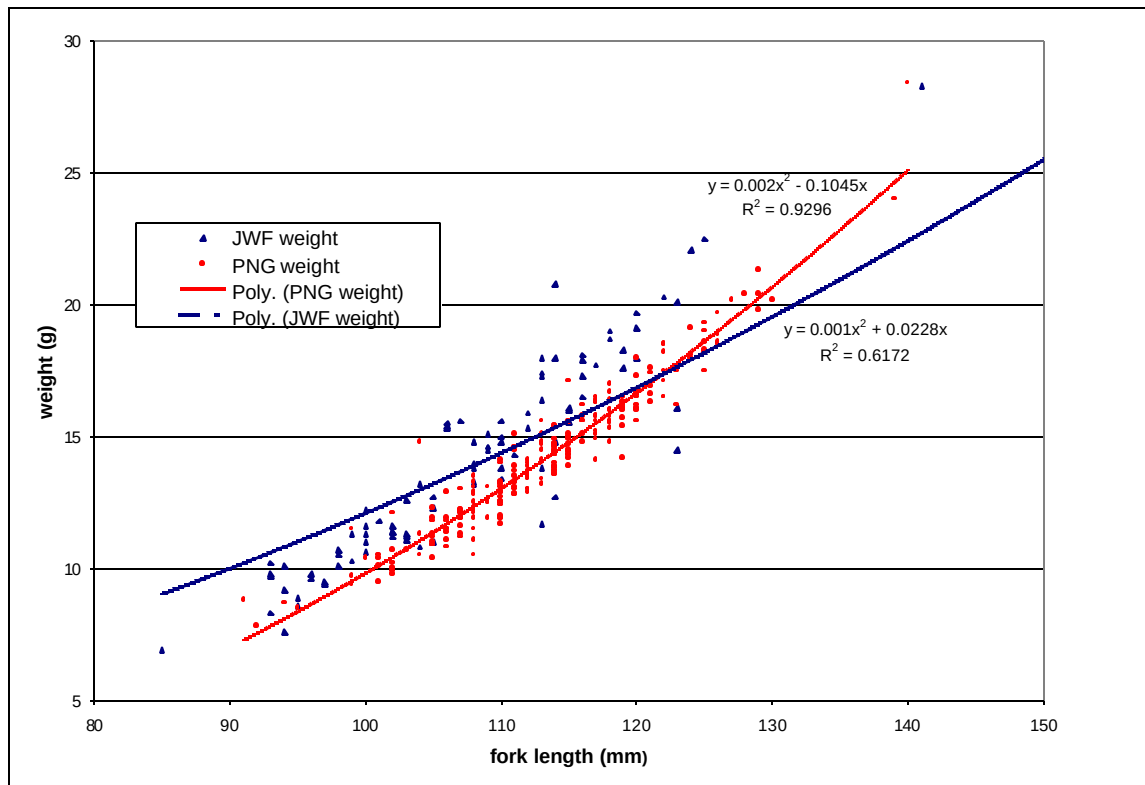


Figure 3: Comparison of coho smolt weight length relationships in Pine Gulch Creek and John West Fork of Olema Creek, Marin County, CA spring 2002.

3.3 Index Reach Surveys

Index reach electrofishing surveys were conducted on Pine Gulch Creek August 12 through September 5, 2002. The results of index reach units were used to calibrate the subsequent snorkel surveys. In 2002, coho salmon were present in all index reach locations except the Marin County Open Space District site, 200 meters upstream of tidal influence. Table 4 shows a summary of coho salmon presence or absence within 8 index sampling reaches located on Pine Gulch Creek during surveys in summers 2000, 2001, and 2002.

Table 4. Index Reach Survey Results

Index Site	Name/Location	Location Stream Km	Sample Dates & Coho Presence					
			2000	coho?	2001	coho?	2002	coho?
1a	MCOSD (Open Space)	0.2	10-4-00	No	8-28-01	No	9-5-02	No
1b	Murch	0.4	9-26-00	No	8-28-01	Yes	9-5-02	Yes
1c	Weber	0.7	10-5-00	No	8-16-01	No	8-29-02	Yes
2	Paradise Valley	2.7	9-7-00	No	8-21-01	Yes	8-27-02	Yes
3	Pine Gulch Gorge	3.9	9-6-00	No	8-20-01	Yes	8-20-02	Yes
4*	BCPUD pasture	5.1	10-12-00	No	9-6-01	No*	9-26-02	Yes*
5	Lower Teixeira	6.8	10-11-00	No	8-14-01	Yes	8-12-02	Yes
6	Upper Teixeira	7.8	10-10-00	No	8-9-01	No	8-14-02	Yes

*snorkeled only, not electrofished

More detailed analysis with the index reach data have not been conducted at this time. The NPS expects to produce a comprehensive index reach monitoring report that will encompass Olema Creek, Cheda Creek, Redwood Creek and Pine Gulch Creek in the near future.

3.4 Coho juvenile population estimate

3.4.1 Habitat Survey

In 2002, a total of 632 habitat units were identified (285 pool, 93 flatwater, and 254 riffle units). Overall habitat composition (45 % pools, 15% flatwater, and 40% riffle) was similar to that documented in the 2001 survey (Table 5). A comparison between visually estimated and measured surface area was conducted for 78 pools to determine a surface area correction factor. The correlation between the estimated surface area and measured surface area was adequate ($R^2=0.91$). Based on this, a calibration ratio of 1.10 was used to correct the estimated surface area of all units (Figure 4).

Table 5. Habitat composition of Pine Gulch coho survey area, September 2001 and 2002

Unit type	2001 number of units	%	2002 number of units	%
Pool	248	48	285	45
Flatwater	83	16	93	15
Riffle	189	36	254	40
Total	520	100	632	100
Survey Length	7.0 km		8.3 km	

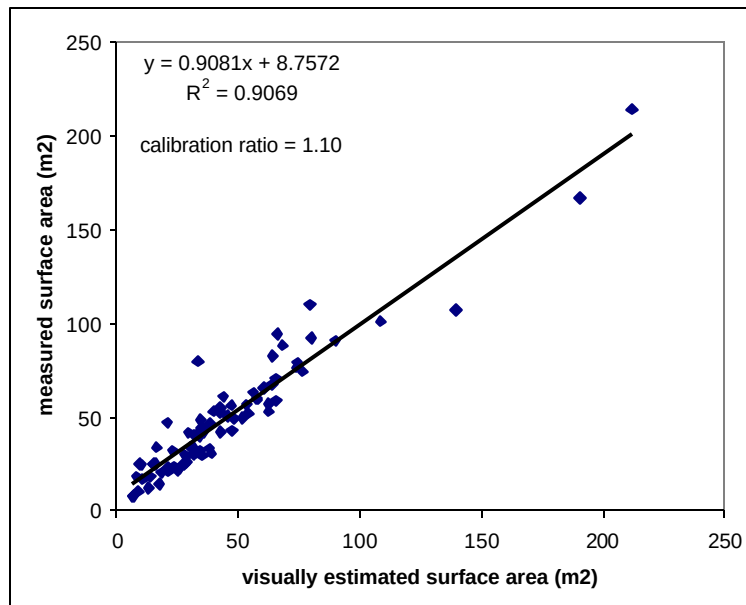


Figure 4. Correlation between measured and visually estimated surface area of 78 pools; Pine Gulch Creek, September 2002

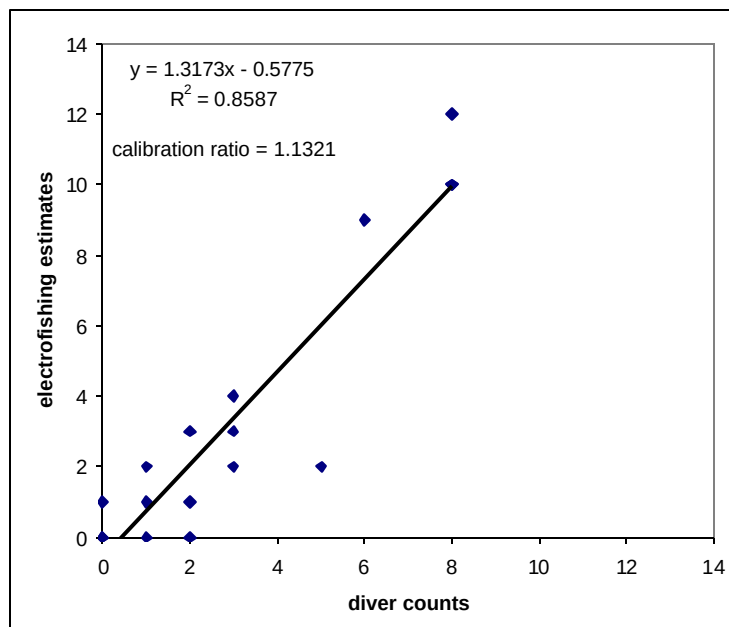


Figure 5. Correlation between electrofishing estimates and snorkel counts for 17 pools; Pine Gulch Creek, September 2002

3.4.2 Snorkel counts

In 2002, CSRP staff dove 64 of the 285 pools, and counted a total of 239 coho in 39 of the pools. Seventeen of the 64 pools had been electrofished in the previous month (Appendix B). *Microfish* population estimates for the electrofished pools were used to calibrate the snorkel counts. Correlation between electrofishing and snorkel counts was adequate ($R^2=0.86$) and a calibration ratio of 1.1321 was used to correct the snorkel counts for all pools (Figure 5). A summary of the snorkel counts is shown in Table 6, along with 2001 results for comparison. Coho densities (by both pool length and calibrated surface area), population estimate, and 95% confidence interval were calculated for the coho survey area as a whole (Table 7). Coho densities from snorkeled pools where coho were present ranged from 0.014 to 0.451 coho/m², compared to 0.017 to 0.358 coho/m² in 2001 (based on calibrated surface area and calibrated snorkel counts).

McCurdy Creek was also sampled. Of the six pools snorkeled in McCurdy Creek, two of the five pools below the State Route One culvert contained a total of 13 coho, and the single isolated pool sampled in the mostly dry section above the culvert contained steelhead but no coho.

Table 6. Summary of coho snorkel counts in Pine Gulch Creek, September 2001 and 2002

Year	Total stream length surveyed (km)	Total number of habitat units	Number of Pools			Coho Counted	
			Total	Snorkeled	w/ Coho	Raw value	Calibrated Value
2001	7.0	520	248	68	28	152	162
2002	8.4	632	285	64	39	239	271

Table 7. Coho density and population estimates; Pine Gulch Creek coho survey area, September 2001 and 2002

Year	Avg. Coho per pool		Density		Population Estimate	Variance	95% confidence Interval
	Raw (coho per pool)	Calibrated (coho per pool)	coho/m	coho/m ²			
2001	2.24	2.38	.1475	.0452	589	24104	± 329
2002	3.73	4.23	.2634	.0786	1205	25232	± 337

The total coho salmon population estimate for Pine Gulch Creek is 1,205 ± 337. This estimate is more than twice that estimated in the 2001 report.

The distribution of coho from the snorkel counts is shown in Figure 6 for the 2002 survey, and Figure 7 for the 2001 survey. Figure 6 shows a more normal distribution of coho throughout the watershed than seen in 2001.

Figure 6. Distribution of coho in snorkeled pools in Pine Gulch Creek, September 2002

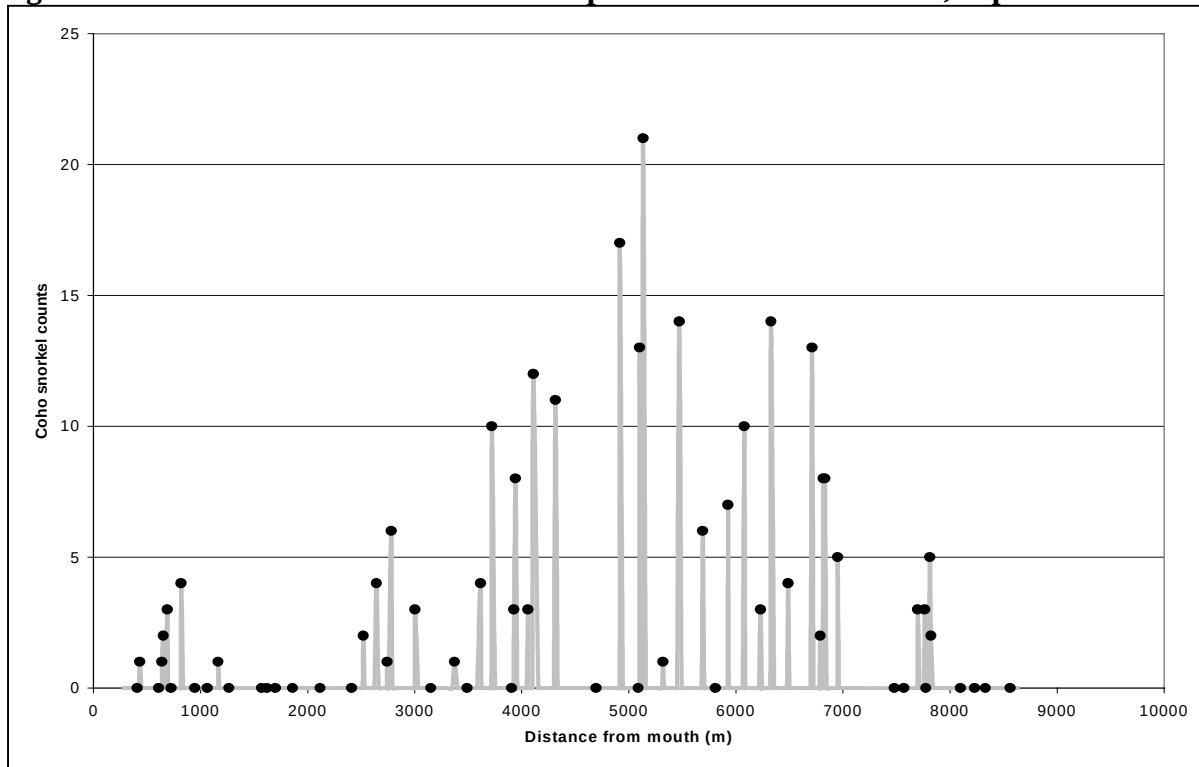
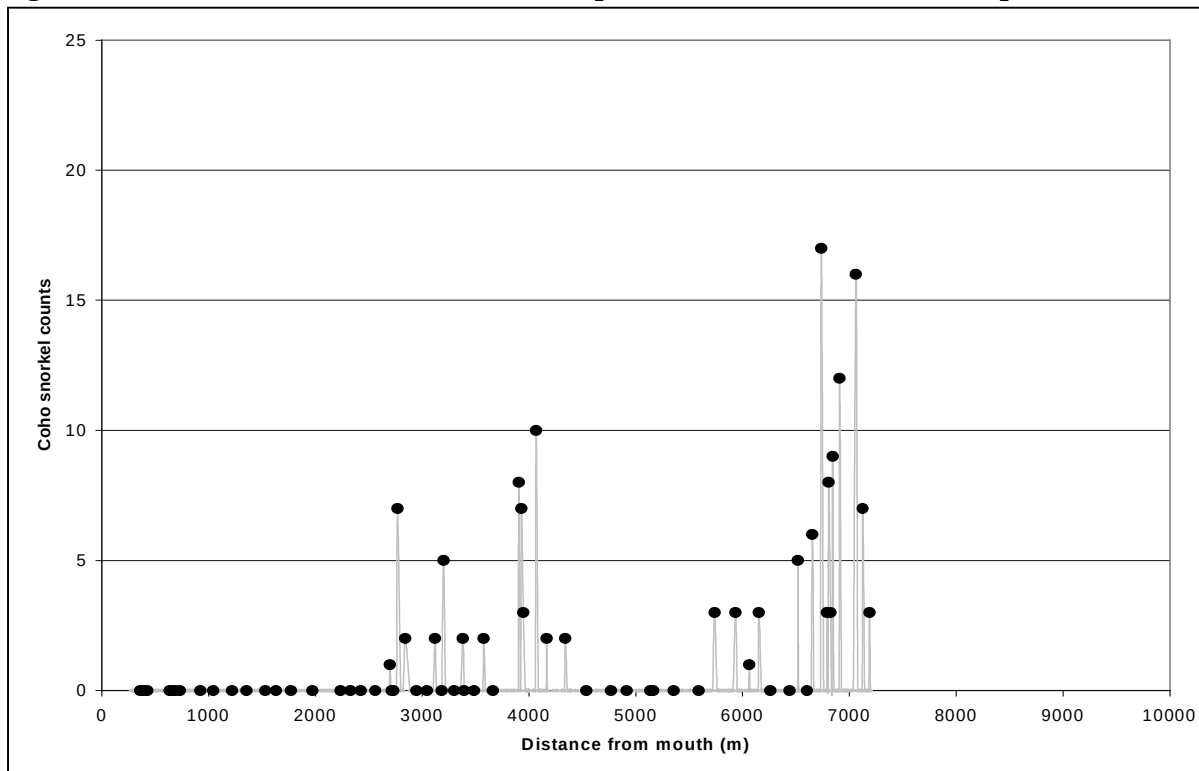


Figure 7. Distribution of coho in snorkeled pools in Pine Gulch Creek, September 2001



3.5 Genetic Analysis

Preliminary results related to analysis of the 15 samples submitted to the NOAA – Fisheries Genetics Lab in Santa Cruz show that the coho salmon sampled in Pine Gulch Creek during summer 2001 show a strong affinity (Garza personal communication) to genetics of coho salmon from the Redwood Creek watershed, 6 miles south of Bolinas Lagoon. Genetic samples collected during spring and summer 2002 have been submitted to the NOAA – Fisheries laboratory for analysis (Appendix C).

Tissue samples from spawner carcasses and juvenile coho, captured during electrofishing, and smolt trapping are undergoing additional genetic analysis that may indicate the degree of relatedness among the coho year classes in Pine Gulch Creek and coho from adjacent watersheds. It is important that this is documented to determine whether these returning individuals are part of a population or an occurrence.

4.0 DISCUSSION

In 2002, coho densities in individual pools were similar or only slightly higher than observed in 2001. However, coho distribution was wider and more consistent, resulting in a 2002 population estimate more than twice that in 2001. The 2002 survey encompassed stream km 0.3 to 8.6, and coho were seen from km 0.4 to 7.8. In 2001 coho were found up to the end of the survey area at km 7.2.

The 2002 coho also followed a more normal distribution pattern, as opposed to the bimodal or clustered distribution found in 2001 (See Figures 6 and 7). The observed 2001 gap in distribution (from approximately km 4.5 to 5.7) occurred in the area that had the highest numbers of juvenile coho in 2002. In addition, an adult female coho on a redd, representing a third year class, was seen in this area at km 5.0 in January 2003. The stream reach from kilometer 4.9 to 5.8 is owned and managed by the Bolinas Community Public Utilities District (BCPUD). This land is currently managed for grazing, without any riparian protection. This parcel lies within the NPS boundaries. While negotiations regarding land acquisition are ongoing, the stream habitat through this reach is significant and protection measures, namely riparian exclusion fence, should be implemented.

In the 2001 monitoring report (Brown and Ketcham 2001), several theories were identified to explain the recent occurrence of three coho year classes in Pine Gulch after so many years of apparent absence. Potential scenarios included relict year classes, planting of coho, and natural strays.

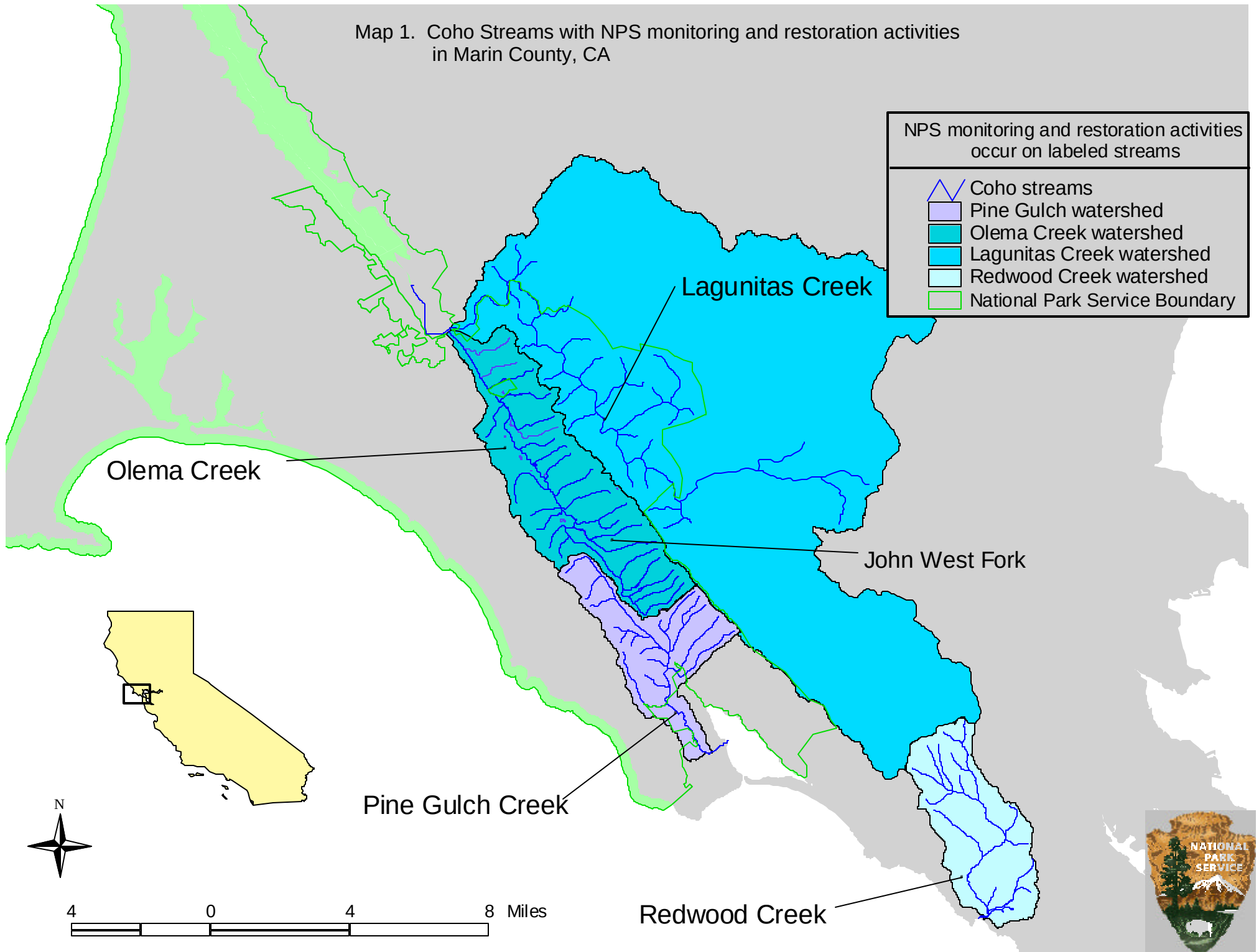
Preliminary results from genetic analysis by the NOAA – Fisheries Lab show that the juveniles captured in summer 2001 have a strong genetic affinity to coho salmon from Redwood Creek (Garza personal communication). The mouth of Redwood Creek is within 6 miles of Bolinas Lagoon and Pine Gulch Creek. Genetic data support the theory that strays from Redwood Creek could have made their way up Pine Gulch to spawn. Based on ocean bathymetry and currents, it is reasonable to assume that coho salmon from the Redwood Creek watershed could easily stray to Bolinas Lagoon and Pine Gulch Creek. Within west Marin County, the 2000-01 and 2001-02 coho spawning runs were the strongest in several years. Considering the strong year class, straying is a likely repopulation scenario in Pine Gulch Creek.

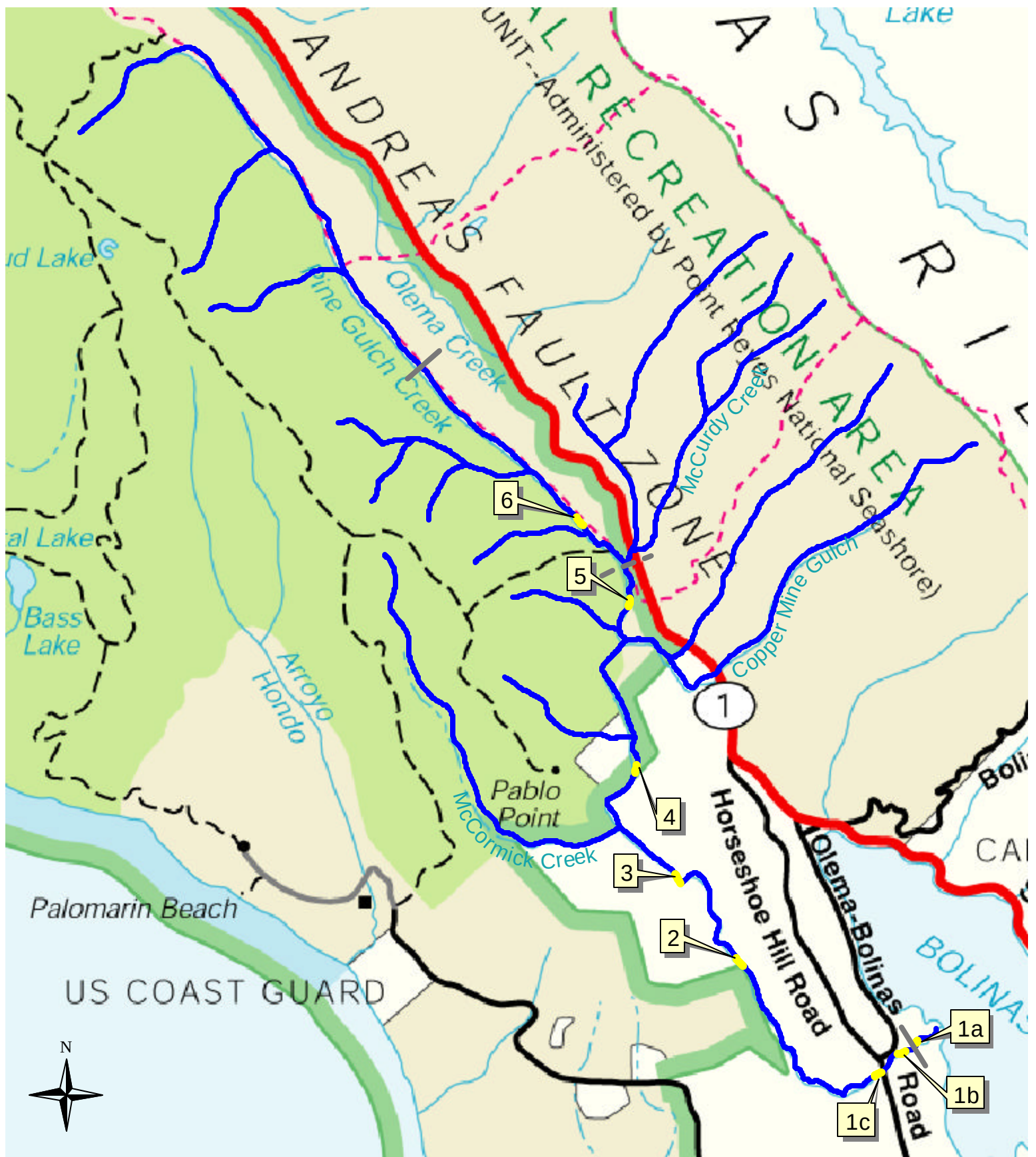
Along with acquisition and restoration efforts on NPS lands, the NPS and other agencies are working with commercial organic farmers in the lower reaches of the watershed to develop sustainable water operations through construction and management of off-stream irrigation storage ponds. This project is still in the planning phases, but completion of permitting and compliance is expected in the next year. In conjunction with inventory and monitoring objectives, the NPS will continue conducting this level of monitoring as long as funding and staffing resources are available.

5.0 REFERENCES

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Map 1. Coho Streams with NPS monitoring and restoration activities
in Marin County, CA





500 0 500 1000 Meters

Map 2. Index site and survey area locations on Pine Gulch;
Aug-Sep 2001 and 2002

- # Index sample site
- 2002 Survey area boundary
- - - 2002 Survey area upstream boundary
- National Park Service Boundary

APPENDICES

Appendix A – Habitat, Snorkel, and Electrofishing Survey Results

Appendix B – Electrofishing Log

Appendix C – Genetic Sample Summary Table

Appendix D – Outmigrant smolt trap operations information

APPENDIX A

HABITAT, SNORKEL, AND ELECTROFISHING SURVEY RESULTS

Pine Gulch coho survey, August-September 2002

Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts				Electrofishing					Comments				
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes		CO	SH YOY	SH 1+	
1	R	0.28	6.4	1.25						8.00		8.82									no	no						1st unit above dredge pool	
2	SC	0.29	21.0	3						63.00		69.49									no	no							
3	SC	0.31	13.8	2.5						34.50		38.05									no	no							
4	FW	0.32	10.1	2						20.20		22.28									no	no						below murch fence	
5	SC	0.33	45.7	3						137.10		151.22									no	no						2001 unit 6	
6	R	0.38	3.0	1.5						4.50		4.96									no	no							
7	FW	0.38	17.8	3.5	3.21					62.30	57.14	68.72		0.21							no	no	09/05/02	2	0	5		4 index 1b	
8	R	0.40	8.4	2.5	2.53					21.00	21.25	23.16									no	no	09/05/02	1	0	3		0 index 1b	
9	MC	0.41	14.0	2.25	2.16					31.50	30.24	34.74	0.05	0.33	0.28	09/19/02	good	shallow/narrow		0	0	yes	no	09/05/02	2	0	6		0 index 1b, murch foot bridge
10	MC	0.42	11.7	3	2.1	2.6	2.9			35.10	29.64	38.71	0.06	0.33	0.27						no	no	09/05/02	2	0	11		0 index 1b, lots of watercress	
11	SC	0.43	18.2	3.5	3.71					63.70	67.52	70.26	0.05	0.78	0.73	09/19/02	good	concrete riprap, complex		1	1.1321	yes	yes	09/05/02	2	1	48		18 index 1b
12	FW	0.45	15.9	2.75						43.73		48.23									no	no							
13	R	0.46	36.2	2.5						90.50		99.82									no	no						below pump and dam	
14	SC	0.50	36.1	4						144.40		159.27									no	no						connected to 15	
15	SC	0.54	18.9	3						56.70		62.54									no	no						below bolinas Rd bridge	
16	R	0.56	13.3	2.5						33.25		36.67									no	no							
17	SC	0.57	26.0	2.5						65.00		71.69									no	no							
18	FW	0.59	12.4	2.5						31.00		34.19									no	no							
19	SC	0.61	28.5	2.25	3.2	3.1	2.4			64.13	82.65	70.73	0.06	0.29	0.23	09/19/02	good	very narrow		0	0	yes	no						
20	R	0.64	3.5	0.75						2.63		2.90									no	no							
21	SC	0.64	13.8	2.5	3.51					34.50	48.44	38.05	0.05	0.84	0.79	09/19/02	good	Deep/Wide		1	1.1321	yes	yes	08/29/02	2	0	13		13 index 1c
22	SC	0.65	20.9	2.25	2.7					47.03	56.43	51.87	0.04	0.67	0.63	09/19/02	good	deep wide turn		2	2.2642	yes	yes	08/29/02	2	0	15		7 index 1c
23	R	0.67	16.3	1	2.08					16.30	33.90	17.98									no	no	08/29/02	2	0	7		0 index 1c	
24	SC	0.69	9.1	3.5	4.5					31.85	40.95	35.13				09/19/02	good	complex cover		3	3.3962	yes	yes	08/29/02	2	2	16		9 index 1c
25	R	0.70	6.1	2						12.20		13.46									no	no							
26	SC	0.70	16.0	2.25						36.00		39.71									no	no							
27	R	0.71	14.3	0.75						10.73		11.83									no	no							
28	SC	0.73	12.7	1.25	1.6	2.3	2			15.88	24.98	17.51	0.03	0.41	0.38	09/19/02	good	narrow undercut		0	0	yes	no						
29	R	0.74	13.2	1.5						19.80		21.84									no	no							
30	SC	0.75	4.3	2						8.60		9.49									no	no							
31	SC	0.75	13.0	2.25						29.25		32.26									no	no							
32	R	0.76	11.8	2.5						29.50		32.54									no	no							
33	SC	0.77	35.0	3						105.00		115.81									no	no							
34	R	0.80	3.3	1						3.30		3.64									no	no							
35	SC	0.80	15.3	2.75						42.08		46.41									no	no							
36	R	0.81	6.7	0.75						5.03		5.54									no	no							
37	SC	0.82	21.8	3	4.2	2.9	2.6			65.40	70.49	72.13	0.06	0.82	0.76	09/19/02	good	basic, 1 SH1+/-7"		4	4.5283	yes	yes						
38	R	0.84	8.5	1						8.50		9.38									no	no							
39	SC	0.84	10.7	4						42.80		47.21									no	no							
40	R	0.85	19.8	3.5						69.30		76.44									no	no							
41	SC	0.87	30.2	4						120.80		133.24									no	no							
42	SC	0.90	20.0	1.75						35.00		38.60									no	no							
43	R	0.91	3.5	1.75						6.13		6.76									no	no							
44	SC	0.92	11.1	2						22.20		24.49									no	no							
45	FW	0.92	24.9	2						49.80		54.93									no	no							
46	R	0.95	2.8	2						5.60		6.18									no	no							
47	SC	0.95	6.7	2.75	2.3	3	3.8			18.43	20.32	20.32	0.07	0.56	0.49	09/19/02	good	log pool		0	0	yes	yes					log bridge	
48	R	0.95	2.7	0.5						1.35		1.49									no	no							
49	SC	0.95	9.2	1						9.20		10.15									no	no						drain	
50	SC	0.96	12.7	1.75						22.23		24.51									no	no							
51	R	0.97	60.0	1						60.00		66.18									no	no							
52	FW	1.03	9.3	2						18.60		20.52									no	no							
53	R	1.03	3.2	1.25						4.00		4.41									no	no							
54	SC	1.03	11.9	5						59.50		65.63									no	no						fallentrees and LWD jam	
55	SC	1.04	4.5	2						9.00		9.93									no	no							
56	FW	1.04	14.8	3						44.40		48.97									no	no							
57	R	1.06	9.4	2.25						21.06		23.23									no	no							
58	SC	1.06	24.7	3	3.7	3.2	2.4			74.10	76.57	81.73	0.06	0.52	0.46	09/19/02	poor, silty	shallow		0	0	no	no						
59	FW	1.09	15.5	3						46.50		51.29									no	no							
60	SC	1.10	13.9	3.5						48.65		53.66									no	no						pipe xing, pump, LB	
61	R	1.11	4.3	1.5						6.45		7.11									no	no							

Pine Gulch coho survey, August-September 2002

Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts					Electrofishing					Comments		
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes	CO		SH YOY	SH 1+
62	SC	1.11	23.4	3.5						81.90		90.33									no	no						LWD
63	R	1.13	7.6	1.25						9.50		10.48									no	no						
64	SC	1.14	18.6	2						37.20		41.03									no	no						
65	R	1.15	3.1	1.5						4.65		5.13									no	no						
66	SC	1.15	10.2	3						30.60		33.75									no	no						
67	R	1.16	2.8	1						2.80		3.09									no	no						
68	SC	1.16	16.2	1.5						24.30		26.80				09/19/02	Poor, murky	long narrow, few deep portions	1	1.1321	yes	no						
69	R	1.18	7.3	1						7.30		8.05									no	no						
70	SC	1.18	8.4	3.25						27.30		30.11									no	no						LWD
71	R	1.19	7.2	1						7.20		7.94									no	no						
72	SC	1.19	24.4	2.5						61.00		67.28									no	no						'01 u73 sc
73	R	1.21	17.9	1						17.90		19.74									no	no						
74	SC	1.23	8.8	2.75						24.20		26.69									no	no						
75	R	1.24	5.7	1.25						7.13		7.86									no	no						
76	SC	1.24	18.1	2.5						45.25		49.91									no	no						
77	R	1.25	12.8	2						25.60		28.24									no	no						
78	MC	1.26	5.0	1.75	2	2.2	2			8.75	10.33	9.65	0.05	0.41	0.36	09/19/02	poor	hvy veg cover	0	0	no	no						
79	FW	1.27	29.9	4						119.60		131.92									no	no						LWD, SC holes
80	FW	1.29	43.6	3.5						152.60		168.31									no	no						
81	FW	1.34	6.0	4.5						27.00		29.78									no	no						road xing
82	R	1.34	5.6	1.5						8.40		9.26									no	no						
83	SC	1.34	24.4	2.5						61.00		67.28									no	no						
84	R	1.36	2.5	2						5.00		5.51									no	no						
85	FW	1.36	17.8	2.25						40.05		44.17									no	no						
86	R	1.38	3.7	1						3.70		4.08									no	no						Connected 88
87	SC	1.38	13.3	3						39.90		44.01									no	no						Connected 87
88	SC	1.51	11.6	2.75						31.90		35.18									no	no						
89	R	1.52	17.8	1						17.80		19.63									no	no						Poak
90	FW	1.54	8.4	2.25						18.90		20.85									no	no						
91	R	1.54	23.8	2.5						59.50		65.63									no	no						
92	SC	1.56	10.0	3.75						37.50		41.36									no	no						
93	R	1.57	2.5	2						5.00		5.51									no	no						
94	SC	1.57	9.0	3.5	3.5	3.7	4			31.50	33.60	34.74	0.04	0.76	0.72	09/19/02	good	SWJ, deep wide murky, bottom	0	0	yes	yes						
95	FW	1.58	7.3	2.5						18.25		20.13									no	no						
96	R	1.58	3.0	0.75						2.25		2.48									no	no						
97	SC	1.58	3.8	3.5						13.30		14.67									no	no						'01 u93
98	R	1.58	2.8	0.5						1.40		1.54									no	no						
99	SC	1.58	10.6	2						21.20		23.38									no	no						
100	R	1.59	2.0	2						4.00		4.41									no	no						
101	SC	1.59	5.5	3.5						19.25		21.23									no	no						
102	R	1.59	15.4	1.5						23.10		25.48									no	no						
103	SC	1.61	15.4	2.75						42.35		46.71									no	no						
104	MC	1.62	11.4	3	3.1	3	2.4			34.20	32.30	37.72	0.08	0.7	0.62	09/19/02	good	decent pool	0	0	yes	yes						
105	R	1.63	16.1	2						32.20		35.52									no	no						
106	SC	1.64	11.4	4.5						51.30		56.58									no	no						
107	FW	1.65	10.1	3						30.30		33.42									no	no						
108	R	1.66	5.5	1						5.50		6.07									no	no						
109	SC	1.66	18.0	2.5						45.00		49.63									no	no						connected 110
110	SC	1.68	8.0	3						24.00		26.47									no	no						
111	R	1.68	9.4	1.25						11.75		12.96									no	no						
112	SC	1.69	11.9	2.25						26.78		29.53									no	no						
113	SC	1.70	15.2	2	2.4	2.3	2			30.40	33.95	33.53	0.05	0.35	0.3	09/19/02	good	shallow, narrow	0	0	yes	no						tag 17 fence
114	R	1.71	11.5	2.25						25.88		28.54									no	no						
115	SC	1.73	7.8	3						23.40		25.81									no	no						connected 116
116	SC	1.73	14.9	2						29.80		32.87									no	no						
117	R	1.75	14.1	1						14.10		15.55									no	no						
118	SC	1.76	21.2	2.75						58.30		64.30									no	no						
119	FW	1.79	10.2	1.75						17.85		19.69									no	no						
120	R	1.80	5.2	1.25						6.50		7.17									no	no						
121	SC	1.80	17.5	3						52.50		57.91									no	no						
122	R	1.82	5.3	1						5.30		5.85									no	no						

Pine Gulch coho survey, August-September 2002

Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts					Electrofishing					Comments			
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes	CO		SH YOY	SH 1+	
123	SC	1.82	30.0	3	2.1	3.2	3.8			90.00	91.00	99.27	0.11	0.7	0.59							no	no						
124	R	1.85	5.7	2.75						15.68		17.29										no	no					water cress	
125	SC	1.86	23.9	2.5						59.75		65.90				09/19/02	good	lots of SH, decent pool	0	0	yes	yes							
126	FW	1.88	25.1	3.25						81.58		89.98										no	no						
127	SC	1.91	4.6	2.75						12.65		13.95										no	no						
128	FW	1.91	43.8	4						175.20		193.24										no	no						
129	SC	1.96	21.1	3.5						73.85		81.45										no	no						
130	SC	1.98	18.2	3.75						68.25		75.28										no	no						
131	FW	2.00	37.8	4						151.20		166.77										no	no						
132	R	2.04	40.1	2.25						90.23		99.52										no	no						
133	SC	2.08	24.7	3						74.10		81.73										no	no						
134	R	2.10	16.7	2						33.40		36.84										no	no						
135	SC	2.12	17.8	3.25	3.2	3.5	3.3			57.85	59.33	63.81	0.07	0.68	0.61	09/19/02		shallow, root trunk	0	0	yes	yes							
136	R	2.14	7.3	4						29.20		32.21										no	no						
137	FW	2.14	24.7	3						74.10		81.73										no	no						
138	FW	2.17	56.9	2						113.80		125.52										no	no						
139	SC	2.22	29.9	3.5						104.65		115.43										no	no						
140	R	2.25	30.0	2.75						82.50		91.00										no	no						
141	SC	2.28	21.5	3.5						75.25		83.00										no	no					'01 u143	
142	SC	2.31	21.2	4						84.80		93.53										no	no						
143	R	2.33	10.6	1						10.60		11.69										no	no						
144	SC	2.34	15.2	3	3.3	2.8	3.9			45.60	50.67	50.30	0.08	0.4	0.32							no	no						
145	R	2.35	57.1	2.25						128.48		141.70										no	no						
146	SC	2.41	12.6	4						50.40		55.59				09/19/02	poor, 1' vis		0	0	no	no					road xing		
147	FW	2.42	17.5	3.5						61.25		67.56										no	no						
148	SC	2.44	26.2	1.75						45.85		50.57										no	no					foot bridge	
149	R	2.47	19.6	1.5						29.40		32.43										no	no						
150	SC	2.49	23.8	2.25						53.55		59.06										no	no						
151	SC	2.51	9.2	1.75						16.10		17.76										no	no					connected to 152	
152	SC	2.52	12.0	4.5	3.5	5.2	4.3			54.00	52.00	59.56	0.09	0.63	0.54	09/19/02	good	wide, complex	2	2.2642	yes	no							
153	R	2.53	11.3	3						33.90		37.39										no	no						
154	SC	2.54	25.7	4						102.80		113.39										no	no					'01 u170	
155	SC	2.57	13.5	3						40.50		44.67										no	no						
156	R	2.58	16.0	1.25						20.00		22.06										no	no						
157	SC	2.60	16.4	4						65.60		72.36										no	no					tag 26	
158	R	2.62	15.4	2.5						38.50		42.46										no	no						
159	SC	2.64	14.8	3.25	3.7	3.5	2.8			48.10	49.33	53.05	0.07	0.48	0.41	09/19/02	good	simple unit	4	4.5283	yes	yes							
160	R	2.66	30.0	4						120.00		132.36										no	no					lone redwood	
161	SC	2.70	25.4	3						76.20		84.05										no	no					tag 27	
162	R	2.72	3.8	1.5						5.70		6.29										no	no						
163	SC	2.73	15.8	3						47.40		52.28										no	no						
164	R	2.74	7.2	2						14.40		15.88										no	no						
165	SC	2.74	14.4	2.75	3.68					39.60	52.99	43.68	0.07	0.47	0.4	09/19/02	good	narrow, undercut	1	1.1321	yes	no	08/27/02	2	2	26	3	index 2	
166	FW	2.76	23.0	1	1.4					23.00	32.20	25.37	0.05	0.27	0.22							no	no	08/27/02	2	0	29	3	index 2, lb
167	R	2.76	25.5	1.5	1.82					38.25	46.41	42.19										no	no	08/27/02	1	0	15	1	index 2, rb
168	SC	2.78	15.3	5	4.88					76.50	74.66	84.38	0.03	0.91	0.88	09/19/02	good	Root wad, SWJ	6	6.7925	yes	yes	08/27/02	2	9	52	7	index 2	
169	FW	2.79	39.3	2.75						108.08		119.20										no	no						
170	R	2.83	7.4	2.25						16.65		18.36										no	no					'01 u190	
171	SC	2.84	11.6	2.5						29.00		31.99										no	no						
172	SC	2.85	27.4	2.5						68.50		75.55										no	no						
173	R	2.88	5.4	2.25						12.15		13.40										no	no						
174	FW	2.88	21.6	2.75						59.40		65.52										no	no					fallen tree across channel	
175	R	2.90	34.7	3						104.10		114.82										no	no						
176	BW	2.93	6.0	2						12.00		13.24										no	no						
177	SC	2.94	11.4	3						34.20		37.72										no	no					'01 u195	
178	R	2.95	22.2	4						88.80		97.94										no	no						
179	FW	2.97	30.0	3						90.00		99.27										no	no						
180	BW	3.00	6.8	2.5						17.00		18.75										no	no						
181	SC	3.00	31.0	3.5	3.5	2.4	3.9			108.50	101.27	119.67	0.07	0.75	0.68	09/19/02	good	complex WD, deep, long	3	3.3962	yes	no							
182	R	3.03	6.3	3						18.90		20.85										no	no						
183	SC	3.04	12.2	3.5						42.70		47.10										no	no						

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Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts					Electrofishing					Comments		
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes	CO		SH YOY	SH 1+
184	R	3.05	13.0	2.5						32.50		35.85									no	no						
185	FW	3.06	14.0	2.75						38.50		42.46									no	no						
186	R	3.07	27.7	3.25						90.03		99.30									no	no						
187	SC	3.10	9.7	4.5						43.65		48.14									no	no						tag 31 '01u207
188	SC	3.11	21.4	2.25						48.15		53.11									no	no						
189	R	3.13	4.0	1						4.00		4.41									no	no						
190	SC	3.13	10.0	4						40.00		44.12									no	no						
191	R	3.14	6.3	1.5						9.45		10.42									no	no						
192	SC	3.15	14.2	2.5	2.6	3	3.3			35.50	42.13	39.16	0.11	0.39	0.28	09/19/02	good	simple		0	0	yes	no					
193	SC	3.17	17.1	2.5						42.75		47.15									no	no						
194	R	3.18	7.8	1.75						13.65		15.06									no	no						
195	SC	3.19	9.8	2						19.60		21.62									no	no						
196	R	3.20	8.6	1.25						10.75		11.86									no	no						tag 32
197	SC	3.22	10.0	2.75						27.50		30.33									no	no						
198	R	3.24	10.9	1.75						19.08		21.04									no	no						
199	SC	3.27	18.6	2						37.20		41.03									no	no						
200	R	3.30	49.9	4						199.60		220.15									no	no						tag 33
201	FW	3.35	25.9	3.75						97.13		107.13									no	no						
202	SC	3.37	27.0	2.75	2.9	3.3	2.6			74.25	79.20	81.90	0.06	0.36	0.3	09/19/02	good	branches in way, long shallow		1	1.1321	yes	no					
203	R	3.40	6.7	3						20.10		22.17									no	no						
204	FW	3.40	24.8	2						49.60		54.71									no	no						
205	SC	3.43	11.3	1.75						19.78		21.81									no	no						Foot bridge
206	SC	3.44	23.3	3.5						81.55		89.95									no	no						'01 u23
207	SC	3.46	13.0	4.5						58.50		64.52									no	no						Pipe
208	R	3.47	7.0	1.5						10.50		11.58									no	no						
209	SC	3.47	14.7	1.5						22.05		24.32									no	no						
210	R	3.49	5.8	1.5						8.70		9.60									no	no						
211	SC	3.49	26.4	2.5	3.4	3.2	3.9	3.8		66.00	94.38	72.80	0.08	0.66	0.58	09/19/02	good	dense cover		0	0	yes	yes					
212	R	3.52	16.8	1						16.80		18.53									no	no						
213	SC	3.53	14.0	3						42.00		46.32									no	no						'01 u26
214	R	3.54	6.9	1.75						12.08		13.32									no	no						
215	SC	3.55	10.6	2						21.20		23.38									no	no						connected to 216
216	SC	3.56	23.2	2.25						52.20		57.58									no	no						
217	R	3.58	7.4	2						14.80		16.32									no	no						
218	SC	3.58	32.0	3.75						120.00		132.36									no	no						
219	SC	3.61	12.4	2.75	2.7	3.2	4			34.10	40.92	37.61	0.05	1.14	1.09	09/19/02	good	LSR-deep, 1co=100mm		4	4.5283	yes	yes					
220	R	3.62	6.1	0.75						4.58		5.05									no	no						
221	FW	3.63	21.5	0.2						4.30		4.74									no	no						
222	R	3.65	10.2	1.5						15.30		16.88									no	no						
223	SC	3.66	14.0	1.5						21.00		23.16									no	no						LWJ
224	BW	3.67	3.4	2						6.80		7.50									no	no						
225	SC	3.67	7.0	2.5						17.50		19.30									no	no						connected to 226
226	SC	3.68	12.2	2						24.40		26.91									no	no						
227	R	3.69	3.7	0.75						2.78		3.06									no	no						
228	SC	3.69	6.5	2.5						16.25		17.92									no	no						
229	R	3.69	3.7	0.5						1.85		2.04									no	no						
230	SC	3.70	21.5	1.75						37.63		41.50									no	no						
231	R	3.72	8.0	3.5						28.00		30.88									no	no						
232	SC	3.72	31.0	4.5	2	5	2.1	4.2	4	139.50	107.26	153.86	0.05	0.91	0.86	09/19/02	good	mod complex		10	11.321	yes	yes					
233	R	3.75	27.2	1.5						40.80		45.00									no	no						road xing
234	SC	3.78	16.3	3						48.90		53.94									no	no						
235	R	3.79	9.4	2						18.80		20.74									no	no						
236	FW	3.80	17.9	2						35.80		39.49									no	no						
237	R	3.81	29.4	1.5						44.10		48.64									no	no						
238	MC	3.84	11.3	2.5						28.25		31.16									no	no						
239	R	3.85	8.6	2						17.20		18.97									no	no						
240	FW	3.86	10.0	2.25						22.50		24.82									no	no						
241	SC	3.87	17.9	4.5						80.55		88.84									no	no						
242	R	3.88	22.7	1.75						39.73		43.82									no	no						
243	SC	3.90	11.8	1.75	3.99					20.65	47.08	22.78	0.11	0.28	2.69	09/19/02				0	0	yes	no	08/20/02	2	1	94	4 index 3
244	FW	3.91	7.7	2	3.21					15.40	24.72	16.99	0.07	0.31	0.24						no	no	08/20/02	2	1	36	0 index 3	

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Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts				Electrofishing					Comments				
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes		CO	SH YOY	SH 1+	
245	R	3.92	9.3	1	2.7					9.30	25.11	10.26									no	no	08/20/02	1	0	8	0	index 3	
246	SC	3.93	16.7	2	4.78					33.40	79.83	36.84	0.09	0.69	0.6	09/19/02	good	simple SC,		3	3.3962	yes	yes	08/20/02	2	4	42	5	index 3
247	SC	3.94	17.5	2.5	3.48					43.75	60.90	48.26	0.34	0.62	0.28	09/19/02	good	Deep, boulder cover		8	9.0566	yes	yes	08/20/02	2	10	75	9	index 3
248	MC	3.96	15.3	2.5						38.25		42.19									no	no							
249	R	3.97	11.4	2						22.80		25.15									no	no							
250	MC	3.98	8.0	1.75						14.00		15.44									no	no							
251	R	3.99	4.8	0.5						2.40		2.65									no	no							
252	SC	3.99	10.8	2.25						24.30		26.80									no	no							
253	R	4.00	32.0	1						32.00		35.30									no	no							Tag 40
254	SC	4.03	5.8	1						5.80		6.40									no	no							
255	R	4.03	9.6	1						9.60		10.59									no	no							
256	SC	4.03	15.3	3						45.90		50.63									no	no							LWJ
257	R	4.05	18.4	1.25						23.00		25.37									no	no							
258	SC	4.06	7.0	2	2	3.2	2.6			14.00	18.20	15.44	0.11	0.66	0.55	09/26/02	good	simple pool		3	3.3962	yes	yes						connected to 259
259	SC	4.06	14.2	2.75						39.05		43.07									no	no							
260	R	4.07	9.5	1						9.50		10.48									no	no							
261	FW	4.08	9.2	2.25						20.70		22.83									no	no							
262	SC	4.08	6.2	2.5						15.50		17.10									no	no							
263	SC	4.08	6.9	1.5						10.35		11.42									no	no							
264	R	4.09	14.1	1.25						17.63		19.44									no	no							
265	SC	4.10	9.3	2						18.60		20.52									no	no							
266	R	4.10	11.9	3						35.70		39.38									no	no							
267	SC	4.11	53.0	4	3.7	2.5	3.8	5.2	5	212.00	214.12	233.83	0.1	1	0.9	09/26/02	good	wide/deep, good scour, LWD		12	13.585	yes	no						
268	R	4.16	22.5	1.25						28.13		31.02									no	no							
269	FW	4.17	30.0	1.5						45.00		49.63									no	no							
270	R	4.20	11.7	1.5						17.55		19.36									no	no							
271	SC	4.21	30.0	3						90.00		99.27									no	no							
272	R	4.23	15.2	1.25						19.00		20.96									no	no							
273	SC	4.24	20.3	3.25						65.98		72.77									no	no							
274	SC	4.26	33.0	2.75						90.75		100.09									no	no							
275	R	4.29	17.1	1						17.10		18.86									no	no							
276	SC	4.30	15.3	1.5						22.95		25.31									no	no							Tag 43
277	SC	4.31	22.7	3	2.5	3.8	4.7	4.6		68.10	88.53	75.11	0.06	0.75	0.69	09/26/02	good	large boulder in middle,		11	12.453	yes	yes						
278	R	4.34	5.2	1.25						6.50		7.17									no	no							
279	FW	4.34	16.0	2.75						44.00		48.53									no	no							
280	R	4.36	36.2	1.5						54.30		59.89									no	no							
281	MC	4.39	26.0	2.5						65.00		71.69									no	no							
282	R	4.41	30.5	1.5						45.75		50.46									no	no							
283	SC	4.44	35.9	2.5						89.75		98.99									no	no							
284	R	4.48	20.7	1.5						31.05		34.25									no	no							
285	FW	4.50	12.3	1.75						21.53		23.74									no	no							
286	R	4.51	27.8	1.5						41.70		45.99									no	no							RB Trib
287	SC	4.54	11.4	2.25						25.65		28.29									no	no							
288	R	4.55	24.7	1.25						30.88		34.05									no	no							
289	FW	4.57	28.1	2.5						70.25		77.48									no	no							
290	R	4.60	9.0	3.25						29.25		32.26									no	no							
291	FW	4.61	15.3	2.75						42.08		46.41									no	no							
292	SC	4.62	11.7	2.5						29.25		32.26									no	no							
293	R	4.63	8.6	2						17.20		18.97									no	no							
294	FW	4.64	17.8	1.75						31.15		34.36									no	no							LWJ
295	R	4.65	41.5	1						41.50		45.77									no	no							
296	SC	4.69	10.1	1.5	2.5	3	2			15.15	25.25	16.71	0.06	0.48	0.42	09/26/02	good	tag was chewed up, small, fairly deep		0	0	yes	no					cowsign	
297	FW	4.70	7.0	2.5						17.50		19.30									no	no							connected to 298
298	SC	4.71	15.7	2.75						43.18		47.62									no	no							
299	R	4.72	6.8	3						20.40		22.50									no	no							
300	FW	4.73	12.2	2						24.40		26.91									no	no							
301	R	4.74	16.8	1						16.80		18.53									no	no							
302	FW	4.76	10.6	1.25						13.25		14.61									no	no							
303	SC	4.77	13.4	2.75						36.85		40.64									no	no							
304	R	4.78	23.4	2.5						58.50		64.52									no	no							
305	FW	4.80	20.0	1.75						35.00		38.60									no	no							

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Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts					Electrofishing					Comments										
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes	CO		SH YOY	SH 1+								
306	SC	4.82	9.4	2.5						23.50		25.92																								
307	R	4.82	12.3	1.75						21.53		23.74																								
308	FW	4.83	9.3	1.25						11.63		12.82																								
309	R	4.84	26.0	1.25						32.50		35.85																								
310	FW	4.86	36.0	1.5						54.00		59.56																								
311	R	4.90	21.3	1						21.30		23.49																								
312	PL	4.91	5.6	3.5						19.60		21.62																								
313	SC	4.92	31.8	2.5	2.6	3.3	3.4	4.1	3.9	79.50	110.03	87.69	0.05	0.59	0.54	09/26/02	good	big log in creek.		17	19.245	yes	yes													
314	R	4.94	27.5	2						55.00		60.66																								
315	SC	4.97	24.0	2.5						60.00		66.18																								
316	R	4.99	4.9	2						9.80		10.81																								
317	FW	4.99	10.9	1.75						19.08		21.04																								
318	SC	5.00	10.1	3.5						35.35		38.99																								
319	FW	5.01	6.2	1.25						7.75		8.55																								
320	R	5.01	12.3	1						12.30		13.57																								
321	FW	5.02	10.5	2.5						26.25		28.95																								
322	R	5.03	9.2	1						9.20		10.15																								
323	MC	5.04	20.3	2.75						55.83		61.57																								
324	R	5.06	10.1	2.25						22.73		25.07																								
325	FW	5.07	12.0	2.25						27.00		29.78																								
326	PL	5.08	8.6	2.75						23.65		26.09																								
327	R	5.09	4.0	1.5						6.00		6.62																								
328	SC	5.09	12.4	2.75	3.4	4.5	2	3		34.10	39.99	37.61	0.07	0.58	0.51	09/26/02	good	med depth		0	0	yes	no													
329	R	5.10	2.7	1						2.70		2.98																								
330	SC	5.10	16.9	1.75	2.2	2.6	2.7	2.4		29.58	41.83	32.62	0.08	0.98	0.9	09/26/02	good	thick rootwad in center		13	14.717	yes	no												index 4	
331	R	5.12	5.4	2.25						12.15		13.40																								index 4
332	FW	5.12	12.1	3						36.30		40.04																								index 4
333	SC	5.13	24.6	3.25	2.8	2.9	4.7	4.6		79.95	92.25	88.18	0.08	0.63	0.55	09/26/02	ok	simple, big undercut.		21	23.774	yes	yes													index 4
334	R	5.16	4.4	1.25						5.50		6.07																								
335	FW	5.16	25.5	2.25						57.38		63.28																								
336	R	5.19	9.6	1.25						12.00		13.24																								
337	SC	5.20	17.8	2.75						48.95		53.99																								
338	R	5.21	16.4	0.75						12.30		13.57																								
339	SC	5.23	11.1	2.75						30.53		33.67																								
340	FW	5.24	7.4	1.25						9.25		10.20																								
341	SC	5.25	22.2	2.25						49.95		55.09																								
342	R	5.27	4.9	1.25						6.13		6.76																								
343	SC	5.28	32.0	2.5						80.00		88.24																								water line xing
344	R	5.31	11.0	1						11.00		12.13																								
345	SC	5.32	10.6	4	5.2	6.3	4			42.40	54.77	46.77	0.1	0.6	0.5	09/26/02	good	narrow/shallow, side pool		1	1.1321	yes	no													
346	R	5.33	6.5	1.5						9.75		10.75																								
347	FW	5.33	7.8	2.25						17.55		19.36																								
348	R	5.34	6.4	0.75						4.80		5.29																								
349	MC	5.35	8.0	3.25						26.00		28.68																								
350	R	5.36	23.2	1						23.20		25.59																								
351	SC	5.38	8.3	2						16.60		18.31																								
352	R	5.36	15.8	2.5						39.50		43.57																								
353	SC	5.37	10.3	1.25						12.88		14.20																								
354	R	5.38	17.0	1.5						25.50		28.13																								
355	FW	5.40	8.4	2.75						23.10		25.48																								
356	FW	5.41	6.5	1.25						8.13		8.96																								
357	SC	5.42	16.2	2.25						36.45		40.20																								
358	R	5.43	16.0	1.5						24.00		26.47																								
359	SC	5.45	20.4	2.5						51.00		56.25																								P oak
360	SC	5.47	23.8	2.75	2	2.9	2.1	2	3.4	65.45	59.02	72.19	0.05	0.82	0.77	09/26/02				14	15.849	no	no													
361	R	5.49	21.3	1.5						31.95		35.24																								
362	FW	5.52	9.7	2						19.40		21.40																								
363	SC	5.53	8.2	2.25						18.45		20.35																								RB trib
364	R	5.53	31.5	2.5						78.75		86.86																								
365	SC	5.57	42.4	3.5						148.40		163.68																								
366	MC	5.61	22.6	2.5						56.50		62.32																								</

Pine Gulch coho survey, August-September 2002

Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts					Electrofishing					Comments																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes	CO		SH YOY	SH 1+																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
367	R	5.63	32.0	1.5						48.00		52.94																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

Pine Gulch coho survey, August-September 2002

Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts					Electrofishing					Comments		
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes	CO		SH YOY	SH 1+
428	FW	6.42	5.6	2						11.20		12.35									no	no						
429	SC	6.43	10.5	1						10.50		11.58									no	no						copper mine cr
430	R	6.44	4.1	0.5						2.05		2.26									no	no						
431	R	6.42	4.3	0.5						2.15		2.37									no	no						
432	FW	6.43	18.2	1						18.20		20.07									no	no						
433	R	6.45	6.0	1						6.00		6.62									no	no						
434	SC	6.46	8.1	1.5						12.15		13.40									no	no						
435	R	6.47	10.9	1.75						19.08		21.04									no	no						
436	FW	6.48	9.8	2.5						24.50		27.02									no	no						
437	SC	6.49	9.9	2.5	2	2.3	2.3			24.75	21.78	27.30	0.11	0.58	0.47	09/26/02	good	undercut, rootmass at bottom of pool	4	4.5283	yes	yes						
438	FW	6.50	11.5	2.75						31.63		34.88									no	no						
439	R	6.51	5.3	1.75						9.28		10.23									no	no						
440	SC	6.51	12.3	1.5						18.45		20.35									no	no						
441	SC	6.52	9.6	3						28.80		31.77									no	no						
442	R	6.53	8.3	2						16.60		18.31									no	no						
443	SC	6.54	15.8	3.5						55.30		60.99									no	no						
444	R	6.55	19.1	2						38.20		42.13									no	no						
445	SC	6.57	22.5	2.75						61.88		68.25									no	no						
446	R	6.59	16.2	1.25						20.25		22.34									no	no						
447	SC	6.60	10.0	3.25	3	3.2	3.1	3.2		32.50	31.25	35.85	0.06	0.47	0.41					no	no						flagged as u507	
448	R	6.61	17.0	2.5						42.50		46.88									no	no						
449	FW	6.63	10.3	2.25						23.18		25.56									no	no						
450	R	6.64	4.3	1						4.30		4.74									no	no						
451	SC	6.64	17.6	3.25						57.20		63.09									no	no						
452	R	6.66	8.5	4						34.00		37.50									no	no						
453	SC	6.66	15.1	2.75						41.53		45.80									no	no						
454	R	6.68	4.4	2						8.80		9.71									no	no						
455	SC	6.68	7.2	2.25						16.20		17.87									no	no						
456	MC	6.69	7.3	3.5						25.55		28.18									no	no						
457	R	6.70	14.8	1.5						22.20		24.49									no	no						
458	MC	6.71	14.6	3.25	2.6	2.8	3.4			47.45	42.83	52.34	0.07	0.59	0.52	09/26/02	good		13	14.717	yes	yes					flagged as u518	
459	R	6.73	7.5	1.5						11.25		12.41									no	no						
460	PL	6.73	4.9	2.75						13.48		14.86									no	no						
461	SC	6.74	25.2	2.5						63.00		69.49									no	no						
462	R	6.76	4.3	3						12.90		14.23									no	no						
463	SC	6.76	13.4	3						40.20		44.34									no	no						
464	SC	6.78	11.0	2.5						27.50		30.33									no	no						
465	SC	6.79	8.5	3.25	2.95					27.63	25.08	30.47	0.25	0.61	0.36	09/26/02	good	i5,	2	2.2642	yes	no	08/12/02	2	3	5	5	index 5, flagged as u525
466	FW	6.80	14.0	2	2.15					28.00	30.10	30.88	0.08	0.26	0.18						no	no	08/12/02	2	1	14	2	index 5
467	R	6.81	6.7	1.5	3.7					10.05	24.79	11.08									no	no	08/12/02	1	0	2	0	index 5
468	SC	6.82	17.3	3.5	3.8					60.55	65.74	66.79	0.16	0.56	0.4	09/26/02	good	a lot of woody debris.	8	9.0566	yes	yes	08/12/02	2	10	40	10	index 5, flagged as u528
469	SC	6.83	15.3	3.5	3.7					53.55	56.61	59.06		0.55		09/26/02	good	i5, two consecutive sc	8	9.0566	yes	no	08/12/02	2	12	37	8	index 5, flagged as u529
470	R	6.85	37.2	2						74.40		82.06									no	no						
471	SC	6.88	8.8	4.75						41.80		46.10									no	no						
472	R	6.89	5.0	1.5						7.50		8.27									no	no						
473	SC	6.90	12.3	2.25						27.68		30.52									no	no						
474	R	6.91	8.4	1.75						14.70		16.21									no	no						
475	SC	6.92	16.4	2.75						45.10		49.74									no	no						
476	R	6.93	6.1	1.5						9.15		10.09									no	no						
477	SC	6.94	7.3	2.25						16.43		18.12									no	no						
478	R	6.95	3.1	1						3.10		3.42									no	no						
479	SC	6.95	3.7	1.75						6.48		7.14									no	no						
480	SC	6.95	10.7	4	3.5	5	3.3			42.80	42.09	47.21	0.1	0.92	0.82	09/26/02	good	boulder, average complexity.	5	5.6604	yes	yes						as 540
481	R	6.96	5.9	2.5						14.75		16.27									no	no						
482	SC	6.97	15.7	2.75						43.18		47.62									no	no						
483	R	6.98	18.0	3						54.00		59.56									no	no						Tag 70
484	SC	7.00	8.6	2.5						21.50		23.71									no	no						
485	R	7.01	3.6	1.5						5.40		5.96									no	no						
486	SC	7.01	10.5	2.25						23.63		26.06									no	no						
487	R	7.02	13.5	1.75						23.63		26.06									no	no						
488	SC	7.03	22.5	3.5						78.75		86.86									no	no						

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Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts					Electrofishing					Comments		
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes	CO		SH YOY	SH 1+
489	R	7.05	5.0	2.75						13.75		15.17									no	no						
490	SC	7.05	17.0	3						51.00		56.25									no	no						
491	R	7.07	31.5	2.25						70.88		78.17									no	no						
492	FW	7.10	6.9	2						13.80		15.22									no	no						Tag 71
493	R	7.11	4.9	2						9.80		10.81									no	no						'01 u109
494	SC	7.12	14.0	2.5	3	4	3.2	2.6		35.00	44.80	38.60	0.11	0.39	0.28			skipped, didn't find			no	no						as u554
495	R	7.14	13.5	1.75						23.63		26.06									no	no						
496	FW	7.15	10.2	2						20.40		22.50									no	no						
497	R	7.17	15.9	0.5						7.95		8.77									no	no						
498	FW	7.18	5.1	1						5.10		5.63									no	no						
499		7.19	100.0																		no	no						overgrown-TeX channel
500		7.29	150.0																		no	no						overgrown-TeX channel
501	SC	7.44	7.6	1.75						13.30		14.67									no	no						
502	SC	7.44	9.2	2						18.40		20.29									no	no						
503	R	7.45	5.8	1.5						8.70		9.60									no	no						
504	SC	7.46	7.4	1.25						9.25		10.20									no	no						
505	R	7.46	2.5	2						5.00		5.51									no	no						
506	SC	7.47	7.8	2						15.60		17.21									no	no						
507	R	7.47	7.3	1.25						9.13		10.06									no	no						
508	SC	7.48	11.7	2	2.7	2	1.6	1.8		23.40	23.69	25.81	0.12	0.68	0.56	09/26/02	good	skinny, narrow undercut, 90' turn	0	0	yes	no						RB trib
509	R	7.49	15.2	2.25						34.20		37.72									no	no						
510	FW	7.51	8.7	2.5						21.75		23.99									no	no						
511	SC	7.51	3.1	1.75						5.43		5.98									no	no						
512	R	7.52	4.4	1.5						6.60		7.28									no	no						
513	SC	7.52	8.4	3						25.20		27.79									no	no						
514	R	7.53	10.1	1.5						15.15		16.71									no	no						
515	SC	7.54	10.6	2						21.20		23.38									no	no						
516	FW	7.55	3.2	1.25						4.00		4.41									no	no						
517	R	7.55	10.6	1.75						18.55		20.46									no	no						
518	SC	7.56	8.8	1.5						13.20		14.56									no	no						
519	R	7.57	2.4	1.75						4.20		4.63									no	no						
520	SC	7.57	12.7	2.25	1.6	2.5	2.6	2.4		28.58	28.89	31.52	0.08	0.45	0.37	09/26/02	ok	too shallow for good snorkel.	0	0	yes	no						
521	R	7.58	2.7	2						5.40		5.96									no	no						
522	SC	7.58	16.5	3.5						57.75		63.70									no	no						
523	R	7.60	30.0	2.5						75.00		82.72									no	no						tag 76
524	SC	7.63	13.5	2.5						33.75		37.23									no	no						
525	R	7.65	9.3	1.75						16.28		17.95									no	no						
526	SC	7.66	14.1	2.25						31.73		34.99									no	no						rb trib
527	R	7.67	3.9	2.25						8.78		9.68									no	no						
528	SC	7.67	10.1	3						30.30		33.42									no	no						
529	R	7.69	2.5	1.5						3.75		4.14									no	no						
530	FW	7.69	5.2	1.75						9.10		10.04									no	no						
531	R	7.69	4.1	2						8.20		9.04									no	no						
532	SC	7.70	19.2	3.25	2.4	3	2.9			62.40	53.12	68.83	0.07	0.71	0.64	09/26/02	mod	pool split by root mass	3	3.3962	yes	no						tag 77
533	R	7.72	10.8	1						10.80		11.91									no	no						
534	SC	7.72	8.8	2.25						19.80		21.84									no	no						
535	R	7.73	15.7	1.5						23.55		25.98									no	no						
536	SC	7.74	18.2	3.25						59.15		65.24									no	no						
537	R	7.76	10.3	2						20.60		22.72									no	no						
538	SC	7.76	13.0	3.5	3.65					57.40	59.86	63.31	0.05	0.59	0.54	09/26/02	ok	simple	3	3.3962	yes	yes	08/14/02	2	3	17	6	index 6
539	FW	7.77	6.4	2						12.80		14.12									no	no						index 6
540	SC	7.78	14.3	2	2.5					34.60	43.25	38.16	0.19	0.49	0.3	09/26/02	good	narrow scour	0	0	yes	yes	08/14/02	2	0	20	3	index 6
541	R	7.79	16.6	0.5	1.1					8.30	18.26	9.15									no	no	08/14/02	1	0	6	0	index 6
542	R	7.80	10.7	1	1.56					10.70	16.69	11.80									no	no	08/14/02	1	0	0	0	tag 78, index 6
543	SC	7.81	11.5	2.5	2.28					28.75	26.22	31.71	0.13	0.85	0.72	09/26/02			5	5.6604	no	no	08/14/02	2	2	15	5	index 6
544	SC	7.82	17.3	3	2.87					51.90	49.65	57.24				09/26/02	mod	lots shallower than when efished	2	2.2642	yes	no	08/14/02	2	1	22	4	index 6
545	R	7.84	7.4	2.5						18.50		20.41									no	no						
546	SC	7.85	11.0	2						22.00		24.27									no	no						
547	R	7.86	4.8	1.5						7.20		7.94									no	no						
548	FW	7.86	4.9	1						4.90		5.40									no	no						
549	SC	7.87	7.3	2						14.60		16.10									no	no						

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Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts					Electrofishing					Comments			
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes	CO		SH YOY	SH 1+	
550	R	7.88	10.5	1.25						13.13		14.48										no	no						
551	SC	7.89	8.4	2						16.80		18.53										no	no						
552	R	7.89	5.3	2.5						13.25		14.61										no	no						
553	FW	7.90	10.1	2.5						25.25		27.85										no	no						tag 79
554	R	7.91	4.6	1						4.60		5.07										no	no						
555	FW	7.92	10.2	2.5						25.50		28.13										no	no						
556	R	7.93	11.3	2						22.60		24.93										no	no						
557	SC	7.94	15.0	2.5						37.50		41.36										no	no						
558	R	7.96	10.2	1.5						15.30		16.88										no	no						
559	FW	7.97	9.3	1.75						16.28		17.95										no	no						
560	R	7.98	6.8	0.75						5.10		5.63										no	no						
561	FW	7.99	9.5	1.5						14.25		15.72										no	no						
562	R	8.00	19.6	2						39.20		43.24										no	no						tag 80
563	FW	8.02	8.7	2.5						21.75		23.99										no	no						
564	R	8.03	12.9	2.25						29.03		32.01										no	no						
565	FW	8.04	12.8	2						25.60		28.24										no	no						
566	R	8.05	11.2	2						22.40		24.71										no	no						
567	PL	8.06	5.2	4						20.80		22.94										no	no						
568	R	8.06	14.0																			no	no						huge logjam
569	R	8.07	22.8	1.5						34.20		37.72										no	no						
570	SC	8.10	4.0	2						8.00		8.82										no	no						
571	R	8.10	3.3	1						3.30		3.64										no	no						
572	SC	8.10	3.8	1.75	2.1	2.6	1.4			6.65	7.73	7.33	0.08	0.35	0.27	09/26/02	good	small and simple.		0	0	yes	yes						Tag 81
573	R	8.11	12.9	0.75						9.68		10.67										no	no						
574	SC	8.12	9.3	2						18.60		20.52										no	no						
575	FW	8.14	9.6	1.75						16.80		18.53										no	no						
576	R	8.15	11.9	2.5						29.75		32.81										no	no						LWJ
577	SC	8.16	7.7	2.25						17.33		19.11										no	no						
578	R	8.17	8.4	1						8.40		9.26										no	no						
579	SC	8.19	11.1	1.5						16.65		18.36										no	no						
580	R	8.20	14.2	1						14.20		15.66										no	no						
581	SC	8.21	12.2	2.5						30.50		33.64										no	no						
582	R	8.22	6.0	0.5						3.00		3.31										no	no						
583	SC	8.23	8.8	1.5	1.1	1.5	1.3	1.7		13.20	12.32	14.56	0.08	0.5	0.42	09/26/02	mod	narrow		0	0	yes	no						flagged as u523
584	R	8.24	16.0	2.5						40.00		44.12										no	no						
585	SC	8.25	10.6	1.5						15.90		17.54										no	no						
586	R	8.26	12.9	1.5						19.35		21.34										no	no						
587	SC	8.27	12.6	1.75						22.05		24.32										no	no						
588	R	8.29	4.7	1.75						8.23		9.07										no	no						
589	SC	8.29	6.9	2.25						15.53		17.12										no	no						
590	R	8.30	5.3	0.75						3.98		4.38										no	no						
591	SC	8.30	5.6	4						22.40		24.71										no	no						tag 83 LWJ
592	R	8.31	15.1	1.75						26.43		29.15										no	no						
593	SC	8.32	4.4	2						8.80		9.71										no	no						
594	SC	8.33	9.3	2.25	1.7	2.6	3.2	2.4		20.93	23.02	23.08	0.04	0.65	0.61	09/26/02	mod	deep side sc		0	0	yes	no						flagged as u534
595	R	8.34	13.8	2						27.60		30.44										no	no						
596	SC	8.36	8.1	2.75						22.28		24.57										no	no						
597	R	8.37	2.0	1						2.00		2.21										no	no						
598	SC	8.37	5.6	4						22.40		24.71										no	no						redwood root-LWJ
599	R	8.38	9.1	1.5						13.65		15.06										no	no						
600	SC	8.39	12.3	1.75						21.53		23.74										no	no						RB trib
601	R	8.40	7.9	1						7.90		8.71										no	no						tag 84
602	SC	8.41	6.2	1						6.20		6.84										no	no						
603	R	8.41	6.2	2						12.40		13.68										no	no						
604	SC	8.42	11.7	3.25	2.4	2.5	3.2	3.3		38.03	33.35	41.94	0.05	0.81	0.76							no	no						flagged as u544
605	R	8.43	8.0	1.5						12.00		13.24										no	no						
606	PL	8.44	2.0	3						6.00		6.62										no	no						
607	R	8.44	2.2	1						2.20		2.43										no	no						
608	MC	8.44	6.1	1.75						10.68		11.77										no	no						
609	R	8.45	10.7	2.5						26.75		29.50										no	no						
610	FW	8.46	14.7	2.25						33.08		36.48										no	no						

Pine Gulch coho survey, August-September 2002

Unit #	Unit Type	Stream km	Length (m)	Est. Width (m)	Measured Widths (m)					Surface Area (sq. m)			Depth (m)			Snorkel Counts					Electrofishing					Comments				
					1	2	3	4	5	Est.	Measured	Corrected	Crest	Max	Residual	Date	Visibility	Comments	CO	cal co	SH YOY	SH 1+	Date	# Passes	CO		SH YOY	SH 1+		
611	R	8.48	8.0	2.5						20.00		22.06										no	no							
612	FW	8.48	4.1	1.25						5.13		5.65										no	no							
613	MC	8.49	4.7	2						9.40		10.37										no	no							
614	R	8.49	14.0	1.75						24.50		27.02										no	no							
615	SC	8.51	5.2	1.75						9.10		10.04										no	no							
616	R	8.51	16.4	1.5						24.60		27.13										no	no							
617	SC	8.53	8.7	7						60.90		67.17										no	no						Redwood LWJ	
618	R	8.54	26.4	1.5						39.60		43.68										no	no							
619	MC	8.56	4.6	1.5	1.6	2.2	1.4			6.90	7.97	7.61	0.08	0.38	0.3	09/26/02 ok	really small.		0	0	yes	yes						flagged as u557		
620	R	8.57	5.7	0.75						4.28		4.72										no	no							
621	FW	8.57	4.3	2						8.60		9.49										no	no							
622	R	8.58	2.7	0.5						1.35		1.49										no	no							
623	FW	8.58	7.9	2.5						19.75		21.78										no	no							
624	R	8.59	9.7	1.75						16.98		18.72										no	no							
625	SC	8.60	4.2	1.5						6.30		6.95										no	no							
626	R	8.60	4.4	1.5						6.60		7.28										no	no							
627	SC	8.61	5.4	2						10.80		11.91										no	no						SWJ	
628	R	8.61	5.6	1						5.60		6.18										no	no							
629	SC	8.62	4.9	3						14.70		16.21										no	no							
630	R	8.62	3.8	1.25						4.75		5.24										no	no							
631	FW	8.63	4.6	2						9.20		10.15										no	no							
632	FW	8.63	2.7	2						5.40		5.96										no	no							
Totals			8810							20493		22604							239	271					62	679	126			

APPENDIX B

ELECTROFISHING LOG



Stream Pine Gulch **Site** Lower Teixeira **Index Site #** 5 **Date** 8/12/2002

Description stream km 6.8

Unit # 1 **Unit Type** LSR **Temp °C** 14.2 **Conductivity (µS/cm)** 208.3

Comments Pass 1 AM2,

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	691	P16	200	2	5	5	CO 0
Pass 2	571	P16	200	1	0	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Lower Teixeira **Index Site #** 5 **Date** 8/12/2002

Description stream km 6.8

Unit # 2 **Unit Type** GLD **Temp °C** 14.2 **Conductivity (µS/cm)** 208.3

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	414	P16	200	0	14	2	CO 0
Pass 2	325	P16	200	1	0	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Lower Teixeira **Index Site #** 5 **Date** 8/12/2002

Description stream km 6.8

Unit # 3 **Unit Type** LGR **Temp °C** 14.2 **Conductivity (µS/cm)** 208.3

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	321	P16	200	0	2	0	CO 0
Pass 2							SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Lower Teixeira **Index Site #** 5 **Date** 8/12/2002

Description stream km 6.8

Unit # 4 **Unit Type** LSR **Temp °C** 14.22 **Conductivity (µS/cm)** 208.3

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	796	P16	200	9	30	8	CO 0
Pass 2	609	P16	200	1	8	2	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							



Stream Pine Gulch **Site** Lower Teixeira **Index Site #** 5 **Date** 8/12/2002**Description** stream km 6.8**Unit #** 5 **Unit Type** LSR **Temp °C** 14.2 **Conductivity (µS/cm)** 208.3**Comments**

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	824	P16	200	6	21	8	CO 0
Pass 2	673	P16	200	4	10	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Upper Teixeira **Index Site #** 6 **Date** 8/14/2002**Description** stream km 7.8**Unit #** 1 **Unit Type** LSR **Temp °C** 14.4 **Conductivity (µS/cm)** 191.3**Comments**

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	925	P16	200	3	14	5	CO 0
Pass 2	713	P16	200	0	3	1	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Upper Teixeira **Index Site #** 6 **Date** 8/14/2002**Description** stream km 7.8**Unit #** 2 **Unit Type** LSR **Temp °C** **Conductivity (µS/cm)****Comments**

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	511	P16	200	0	10	2	CO 0
Pass 2	400	P16	200	0	6	1	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Upper Teixeira **Index Site #** 6 **Date** 8/14/2002**Description** stream km 7.8**Unit #** 3 **Unit Type** LGR **Temp °C** **Conductivity (µS/cm)****Comments** Units 3 and 4 are opposite sides of a split channel. Unit 3 is the Right Fork and Unit 4 is the left.

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	229	P16	100	0	0	0	CO 0
Pass 2							SH YOY 0
Pass 3							SH 1+ 0
Pass 4							



Stream Pine Gulch

Site Upper Teixeira

Index Site # 6

Date 8/14/2002

Description stream km 7.8

Unit # 4

Unit Type LGR

Temp °C

Conductivity (µS/cm)

Comments Left Fork. (See unit 3 datasheet)

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	430	P16	100	0	6	0	CO 0
Pass 2							SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch

Site Upper Teixeira

Index Site # 6

Date 8/14/2002

Description stream km 7.8

Unit # 5

Unit Type LSR

Temp °C

Conductivity (µS/cm)

Comments scu16, w60.1g

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	562	P16	200	1	12	3	CO 0
Pass 2	430	P16	200	1	3	2	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch

Site Upper Teixeira

Index Site # 6

Date 8/14/2002

Description stream km 7.8

Unit # 6

Unit Type LSR

Temp °C

Conductivity (µS/cm)

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	594	P16	200	1	20	4	CO 0
Pass 2	425	P16	200	0	2	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch

Site Gorge

Index Site # 3

Date 8/20/2002

Description stream km 3.9

Unit # 1

Unit Type LSL

Temp °C

Conductivity (µS/cm)

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	580	P16	200	1	83	4	CO 0
Pass 2	509	P16	200	0	10	0	SH YOY 1
Pass 3							SH 1+ 0
Pass 4							



Stream Pine Gulch **Site** Gorge **Index Site #** 3 **Date** 8/20/2002**Description** stream km 3.9**Unit #** 2 **Unit Type** FW **Temp °C** **Conductivity (µS/cm)****Comments**

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	325	P16	200	1	33	0	CO 0
Pass 2	252	P16	200	0	3	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Gorge **Index Site #** 3 **Date** 8/20/2002**Description** stream km 3.9**Unit #** 3 **Unit Type** LGR **Temp °C** **Conductivity (µS/cm)****Comments**

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	366	P16	100	0	8	0	CO 0
Pass 2							SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Gorge **Index Site #** 3 **Date** 8/20/2002**Description** stream km 3.9**Unit #** 4 **Unit Type** LSBk **Temp °C** **Conductivity (µS/cm)****Comments**

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	719	P16	200	3	28	5	CO 0
Pass 2	591	P16	200	1	10	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Gorge **Index Site #** 3 **Date** 8/20/2002**Description** stream km 3.9**Unit #** 5 **Unit Type** LSBk **Temp °C** **Conductivity (µS/cm)****Comments**

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	930	P16	200	10	52	9	CO 0
Pass 2	820	P16	200	0	17	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							



Stream Pine Gulch **Site** Paradise Valley **Index Site #** 2 **Date** 8/27/2002

Description stream km 2.7

Unit # 1 **Unit Type** LSR **Temp °C** **Conductivity (µS/cm)**

Comments upper 3 m blocked by fallen tree, unable to fish.

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	627	P16	200	1	23	3	CO 0
Pass 2	504	P16	200	1	3	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Paradise Valley **Index Site #** 2 **Date** 8/27/2002

Description stream km 2.7

Unit # 2 **Unit Type** LSR **Temp °C** **Conductivity (µS/cm)**

Comments L B side of split channel. Channel split by small plunge-log.

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	484	P16	200	0	25	3	CO 0
Pass 2	407	P16	200	0	4	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Paradise Valley **Index Site #** 2 **Date** 8/27/2002

Description stream km 2.7

Unit # 3 **Unit Type** LGR **Temp °C** **Conductivity (µS/cm)**

Comments LB side of split channel. no fish.

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	74	P16	100	0	0	0	CO 0
Pass 2							SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Paradise Valley **Index Site #** 2 **Date** 8/27/2002

Description stream km 2.7

Unit # 4 **Unit Type** LGR **Temp °C** **Conductivity (µS/cm)**

Comments RB side of split channel, small scour hole in middle.

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	609	P16	100	0	15	1	CO 0
Pass 2							SH YOY 0
Pass 3							SH 1+ 0
Pass 4							



Stream Pine Gulch

Site Paradise Valley

Index Site # 2

Date 8/27/2002

Description stream km 2.7

Unit # 5

Unit Type LSR

Temp °C

Conductivity (µS/cm)

Comments huge unit with large log jam/ root wad. Hard to fish.

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	1122	P16	200	9	26	5	CO 0
Pass 2	760	P16	200	0	14	2	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch

Site Weber's

Index Site # 1c

Date 8/29/2002

Description stream km 0.7

Unit # 1

Unit Type LSR

Temp °C 15.2

Conductivity (µS/cm 241.4)

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	772	P16	200	0	10	13	CO 0
Pass 2	594	P16	200	0	3	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch

Site Weber's

Index Site # 1c

Date 8/29/2002

Description stream km 0.7

Unit # 2

Unit Type LSR

Temp °C

Conductivity (µS/cm)

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	680	P16	200	0	12	7	CO 0
Pass 2	624	P16	200	0	3	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch

Site Weber's

Index Site # 1c

Date 8/29/2002

Description stream km 0.7

Unit # 3

Unit Type LGR

Temp °C

Conductivity (µS/cm)

Comments Small scour pocket in middle; lots of leaves and small debris- hard to fish.

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	429	P16	200	0	6	0	CO 0
Pass 2	351	P16	200	0	1	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							



Stream Pine Gulch **Site** Weber's **Index Site #** 1c **Date** 8/29/2002

Description stream km 0.7

Unit # 4 **Unit Type** LSR **Temp °C** **Conductivity (µS/cm)**

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	485	P16	200	1	8	8	CO 0
Pass 2	492	P16	200	1	8	1	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Open Space **Index Site #** 1a **Date** 9/5/2002

Description stream km 0.2

Unit # 1 **Unit Type** LGR **Temp °C** 14.2 **Conductivity (µS/cm)** 237.2

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	217	P16	100	0	0	0	CO 0
Pass 2							SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Open Space **Index Site #** 1a **Date** 9/5/2002

Description stream km 0.2

Unit # 2 **Unit Type** LSR **Temp °C** 14.2 **Conductivity (µS/cm)** 237.2

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	383	P16	200	0	3	2	CO 0
Pass 2	303	P16	200	0	0	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Open Space **Index Site #** 1a **Date** 9/5/2002

Description stream km 0.2

Unit # 3 **Unit Type** GLD **Temp °C** 14.2 **Conductivity (µS/cm)** 237.2

Comments MCOSD Index I a. SCU mass weight= 14.5.

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	229	P16	200	0	0	0	CO 0
Pass 2							SH YOY 0
Pass 3							SH 1+ 0
Pass 4							



Stream Pine Gulch **Site** Open Space **Index Site #** 1a **Date** 9/5/2002

Description stream km 0.2

Unit # 4 **Unit Type** LSR **Temp °C** 14.2 **Conductivity (µS/cm)** 237.2

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	333	P16	200	0	6	4	CO 0
Pass 2	264	P16	200	0	2	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Murch's **Index Site #** 1b **Date** 9/5/2002

Description stream km 0.4

Unit # 1 **Unit Type** FW **Temp °C** 15.1 **Conductivity (µS/cm)** 243.3

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	646	P16	200	0	5	4	CO 0
Pass 2	575	p16	200	0	0	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Murch's **Index Site #** 1b **Date** 9/5/2002

Description stream km 0.4

Unit # 2 **Unit Type** LGR **Temp °C** 15.1 **Conductivity (µS/cm)** 243.3

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	265	P16	100	0	3	0	CO 0
Pass 2							SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Murch's **Index Site #** 1b **Date** 9/5/2002

Description stream km 0.4

Unit # 3 **Unit Type** MCP **Temp °C** 15.1 **Conductivity (µS/cm)** 243.3

Comments

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	331	P16	200	0	6	0	CO 0
Pass 2	265	P16	200	0	0	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							



Stream Pine Gulch **Site** Murch's **Index Site #** 1b **Date** 9/5/2002**Description** stream km 0.4**Unit #** 4 **Unit Type** MCP **Temp °C** 15.1 **Conductivity (µS/cm)** 243.3**Comments**

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	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	376	P16	200	0	10	0	CO 0
Pass 2	321	P16	200	0	1	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

Stream Pine Gulch **Site** Murch's **Index Site #** 1b **Date** 9/5/2002**Description** stream km 0.4**Unit #** 5 **Unit Type** LSBo **Temp °C** 15.1 **Conductivity (µS/cm)** 243.3**Comments**

2 Green Sunfish captured.

	Time	Setting	Volts	CO	SH YOY	SH 1+	Total Mortality
Pass 1	943	P16	200	1	40	18	CO 0
Pass 2	807	P16	200	0	8	0	SH YOY 0
Pass 3							SH 1+ 0
Pass 4							

APPENDIX C

GENETIC SAMPLE SUMMARY TABLE

Sample ID Code	Reach/ Location	Stream Km				Fork Length (mm)					
			Date Collected	Collector	Species		Weight (g)	Sex	Age	tissue type	# collected
PG-02-004	Trap	2.0	31-Mar-02	BK	CO	140	28.4	Unk	smolt	caudal fin clip	1
PG-02-005	Trap	2.0	01-Apr-02	GB	CO	108	12.3	Unk	smolt	caudal fin clip	1
PG-02-006	Trap	2.0	01-Apr-02	GB	CO	126	18.5	Unk	smolt	caudal fin clip	1
PG-02-007	Trap	2.0	01-Apr-02	GB	CO	121	17.6	Unk	smolt	caudal fin clip	1
PG-02-008	Trap	2.0	01-Apr-02	GB	CO	129	19.8	Unk	smolt	caudal fin clip	1
PG-02-009	Trap	2.0	02-Apr-02	JS	CO	130	20.2	Unk	smolt	caudal fin clip	1
PG-02-012	Trap	2.0	03-Apr-02	JS	CO	114	14.6	Unk	smolt	caudal fin clip	1
PG-02-015	Trap	2.0	04-Apr-02	JS	CO	119	16.5	Unk	smolt	caudal fin clip	1
PG-02-018	Trap	2.0	05-Apr-02	JS	CO	119	16.3	Unk	smolt	caudal fin clip	1
PG-02-019	Trap	2.0	05-Apr-02	JS	CO	120	16.7	Unk	smolt	caudal fin clip	1
PG-02-021	Trap	2.0	06-Apr-02	JS	CO	126	19.7	Unk	smolt	caudal fin clip	1
PG-02-022	Trap	2.0	06-Apr-02	JS	CO	113	15.1	Unk	smolt	caudal fin clip	1
PG-02-025	Trap	2.0	07-Apr-02	JS	CO	113	14.8	Unk	smolt	caudal fin clip	1
PG-02-026	Trap	2.0	07-Apr-02	JS	CO	125	19.0	Unk	smolt	caudal fin clip	1
PG-02-027	Trap	2.0	08-Apr-02	GB	CO	108	12.1	Unk	smolt	caudal fin clip	1
PG-02-028	Trap	2.0	08-Apr-02	GB	CO	129	21.3	Unk	smolt	caudal fin clip	1
PG-02-030	Trap	2.0	08-Apr-02	GB	CO	124	18.1	Unk	smolt	caudal fin clip	1
PG-02-031	Trap	2.0	09-Apr-02	JS	CO	125	18.3	Unk	smolt	caudal fin clip	1
PG-02-032	Trap	2.0	09-Apr-02	JS	CO	106	11.8	Unk	smolt	caudal fin clip	1
PG-02-033	Trap	2.0	09-Apr-02	JS	CO	129	20.4	Unk	smolt	caudal fin clip	1
PG-02-034	Trap	2.0	09-Apr-02	JS	CO	115	14.9	Unk	smolt	caudal fin clip	1
PG-02-035	Trap	2.0	09-Apr-02	JS	CO	104	14.8	Unk	smolt	caudal fin clip	1
PG-02-037	Trap	2.0	11-Apr-02	GB	CO	113	14.5	Unk	smolt	caudal fin clip	1
PG-02-039	Trap	2.0	11-Apr-02	GB	CO	115	17.1	Unk	smolt	caudal fin clip	1
PG-02-040	Trap	2.0	11-Apr-02	GB	CO	110	12.5	Unk	smolt	caudal fin clip	1
PG-02-041	Trap	2.0	11-Apr-02	GB	CO	109	12.6	Unk	smolt	caudal fin clip	1
PG-02-042	Trap	2.0	11-Apr-02	GB	CO	113	14.7	Unk	smolt	caudal fin clip	1
PG-02-043	Trap	2.0	11-Apr-02	GB	CO	119	16.2	Unk	smolt	caudal fin clip	1
PG-02-044	Trap	2.0	11-Apr-02	GB	CO	105	11.9	Unk	smolt	caudal fin clip	1
PG-02-045	Trap	2.0	11-Apr-02	GB	CO	110	12.9	Unk	smolt	caudal fin clip	1
PG-02-046	Trap	2.0	11-Apr-02	GB	CO	118	15.5	Unk	smolt	caudal fin clip	1
PG-02-047	Trap	2.0	11-Apr-02	GB	CO	118	15.6	Unk	smolt	caudal fin clip	1
PG-02-048	Trap	2.0	12-Apr-02	JS	CO	119	16.1	Unk	smolt	caudal fin clip	1
PG-02-050	Trap	2.0	12-Apr-02	JS	CO	114	13.8	Unk	smolt	caudal fin clip	1
PG-02-051	Trap	2.0	12-Apr-02	JS	CO	121	16.9	Unk	smolt	caudal fin clip	1
PG-02-052	Trap	2.0	12-Apr-02	JS	CO	110	14.1	Unk	smolt	caudal fin clip	1

Sample ID Code	Reach/ Location	Stream Km				Fork Length (mm)					
			Date Collected	Collector	Species		Weight (g)	Sex	Age	tissue type	# collected
PG-02-053	Trap	2.0	13-Apr-02	BK	CO	117	16.4	Unk	smolt	caudal fin clip	1
PG-02-054	Trap	2.0	14-Apr-02	BK	CO	122	16.5	Unk	smolt	caudal fin clip	1
PG-02-055	Trap	2.0	14-Apr-02	BK	CO	108	12.3	Unk	smolt	caudal fin clip	1
PG-02-056	Trap	2.0	15-Apr-02	GB	CO	125	18.2	Unk	smolt	caudal fin clip	1
PG-02-057	Trap	2.0	15-Apr-02	GB	CO	107	12.2	Unk	smolt	caudal fin clip	1
PG-02-060	Trap	2.0	15-Apr-02	GB	CO	117	14.9	Unk	smolt	caudal fin clip	1
PG-02-062	Trap	2.0	15-Apr-02	GB	CO	110	12.5	Unk	smolt	caudal fin clip	1
PG-02-063	Trap	2.0	17-Apr-02	GB	CO	112	12.9	Unk	smolt	caudal fin clip	1
PG-02-064	Trap	2.0	17-Apr-02	GB	CO	112	14.1	Unk	smolt	caudal fin clip	1
PG-02-065	Trap	2.0	17-Apr-02	GB	CO	121	16.3	Unk	smolt	caudal fin clip	1
PG-02-066	Trap	2.0	17-Apr-02	GB	CO	128	20.4	Unk	smolt	caudal fin clip	1
PG-02-067	Trap	2.0	17-Apr-02	GB	CO	126	18.6	Unk	smolt	caudal fin clip	1
PG-02-068	Trap	2.0	17-Apr-02	GB	CO	117	15.1	Unk	smolt	caudal fin clip	1
PG-02-069	Trap	2.0	17-Apr-02	GB	CO	115	14.5	Unk	smolt	caudal fin clip	1
PG-02-070	Trap	2.0	17-Apr-02	GB	CO	120	16.6	Unk	smolt	caudal fin clip	1
PG-02-071	Trap	2.0	17-Apr-02	GB	CO	122	18.2	Unk	smolt	caudal fin clip	1
PG-02-072	Trap	2.0	18-Apr-02	JS	CO	115	15.0	Unk	smolt	caudal fin clip	1
PG-02-073	Trap	2.0	18-Apr-02	JS	CO	106	11.5	Unk	smolt	caudal fin clip	1
PG-02-074	Trap	2.0	18-Apr-02	JS	CO	124	18.0	Unk	smolt	caudal fin clip	1
PG-02-075	Trap	2.0	18-Apr-02	JS	CO	115	14.3	Unk	smolt	caudal fin clip	1
PG-02-076	Trap	2.0	18-Apr-02	JS	CO	119	16.1	Unk	smolt	caudal fin clip	1
PG-02-077	Trap	2.0	18-Apr-02	JS	CO	120	16.7	Unk	smolt	caudal fin clip	1
PG-02-079	Trap	2.0	18-Apr-02	JS	CO	117	15.8	Unk	smolt	caudal fin clip	1
PG-02-080	Trap	2.0	18-Apr-02	JS	CO	116	15.1	Unk	smolt	caudal fin clip	1
PG-02-081	Trap	2.0	18-Apr-02	JS	CO	124	19.1	Unk	smolt	caudal fin clip	1
PG-02-082	Trap	2.0	18-Apr-02	JS	CO	106	11.5	Unk	smolt	caudal fin clip	1
PG-02-083	Trap	2.0	19-Apr-02	JS	CO	108	11.5	Unk	smolt	caudal fin clip	1
PG-02-084	Trap	2.0	19-Apr-02	JS	CO	114	13.6	Unk	smolt	caudal fin clip	1
PG-02-085	Trap	2.0	19-Apr-02	JS	CO	125	19.3	Unk	smolt	caudal fin clip	1
PG-02-086	Trap	2.0	19-Apr-02	JS	CO	105	11.0	Unk	smolt	caudal fin clip	1
PG-02-087	Trap	2.0	19-Apr-02	JS	CO	112	13.5	Unk	smolt	caudal fin clip	1
PG-02-089	Trap	2.0	19-Apr-02	JS	CO	117	15.6	Unk	smolt	caudal fin clip	1
PG-02-091	Trap	2.0	21-Apr-02	JS	CO	118	16.7	Unk	smolt	caudal fin clip	1
PG-02-092	Trap	2.0	21-Apr-02	JS	CO	110	13.2	Unk	smolt	caudal fin clip	1
PG-02-093	Trap	2.0	21-Apr-02	JS	CO	108	13.1	Unk	smolt	caudal fin clip	1
PG-02-094	Trap	2.0	21-Apr-02	JS	CO	112	13.7	Unk	smolt	caudal fin clip	1

Sample ID Code	Reach/ Location	Stream Km				Fork Length (mm)					
			Date Collected	Collector	Species		Weight (g)	Sex	Age	tissue type	# collected
PG-02-095	Trap	2.0	21-Apr-02	JS	CO	107	11.6	Unk	smolt	caudal fin clip	1
PG-02-096	Trap	2.0	21-Apr-02	JS	CO	111	12.8	Unk	smolt	caudal fin clip	1
PG-02-097	Trap	2.0	22-Apr-02	GB	CO	112	13.5	Unk	smolt	caudal fin clip	1
PG-02-098	Trap	2.0	22-Apr-02	GB	CO	122	16.5	Unk	smolt	caudal fin clip	1
PG-02-099	Trap	2.0	22-Apr-02	GB	CO	112	13.7	Unk	smolt	caudal fin clip	1
PG-02-100	Trap	2.0	22-Apr-02	GB	CO	92	7.8	Unk	smolt	caudal fin clip	1
PG-02-101	Trap	2.0	22-Apr-02	GB	CO	110	14.0	Unk	smolt	caudal fin clip	1
PG-02-102	Trap	2.0	23-Apr-02	JS	CO	118	16.4	Unk	smolt	caudal fin clip	1
PG-02-103	Trap	2.0	23-Apr-02	JS	CO	113	15.6	Unk	smolt	caudal fin clip	1
PG-02-104	Trap	2.0	23-Apr-02	JS	CO	108	13.5	Unk	smolt	caudal fin clip	1
PG-02-105	Trap	2.0	23-Apr-02	JS	CO	114	15.4	Unk	smolt	caudal fin clip	1
PG-02-106	Trap	2.0	25-Apr-02	JS	CO	118	15.6	Unk	smolt	caudal fin clip	1
PG-02-107	Trap	2.0	25-Apr-02	JS	CO	107	13.0	Unk	smolt	caudal fin clip	1
PG-02-109	Trap	2.0	25-Apr-02	JS	CO	115	15.0	Unk	smolt	caudal fin clip	1
PG-02-110	Trap	2.0	26-Apr-02	JS	CO	114	14.0	Unk	smolt	caudal fin clip	1
PG-02-112	Trap	2.0	26-Apr-02	JS	CO	107	11.7	Unk	smolt	caudal fin clip	1
PG-02-113	Trap	2.0	26-Apr-02	JS	CO	108	12.9	Unk	smolt	caudal fin clip	1
PG-02-114	Trap	2.0	27-Apr-02	JS	CO	111	12.8	Unk	smolt	caudal fin clip	1
PG-02-115	Trap	2.0	27-Apr-02	JS	CO	122	17.5	Unk	smolt	caudal fin clip	1
PG-02-116	Trap	2.0	27-Apr-02	JS	CO	122	18.5	Unk	smolt	caudal fin clip	1
PG-02-117	Index 2	2.7	27-Aug-02	JP	CO	86	8.0	Unk	YOY	caudal fin clip	1
PG-02-118	Index 2	2.7	27-Aug-02	JP	CO	85	6.6	Unk	YOY	caudal fin clip	1
PG-02-119	Index 2	2.7	27-Aug-02	JP	CO	86	7.1	Unk	YOY	caudal fin clip	1
PG-02-120	Index 2	2.7	27-Aug-02	JP	CO	83	6.3	Unk	YOY	caudal fin clip	1
PG-02-121	Index 2	2.7	27-Aug-02	JP	CO	88	8.0	Unk	YOY	caudal fin clip	1
PG-02-122	Index 2	2.7	27-Aug-02	JP	CO	85	6.6	Unk	YOY	caudal fin clip	1
PG-02-123	Index 2	2.7	27-Aug-02	JP	CO	82	5.9	Unk	YOY	caudal fin clip	1
PG-02-124	Index 2	2.7	27-Aug-02	JP	CO	95	8.9	Unk	YOY	caudal fin clip	1
PG-02-125	Index 2	2.7	27-Aug-02	JP	CO	87	7.4	Unk	YOY	caudal fin clip	1
PG-02-126	Index 2	2.7	27-Aug-02	JP	CO	86	7.4	Unk	YOY	caudal fin clip	1
PG-02-127	Index 2	2.7	27-Aug-02	JP	CO	105	12.8	Unk	YOY	caudal fin clip	1
PG-02-128	Index 1c	0.7	29-Aug-02	GB	CO	87	7.8	Unk	YOY	caudal fin clip	1
PG-02-129	Index 1c	0.7	29-Aug-02	JP	CO	94	9.4	Unk	YOY	caudal fin clip	1
PG-02-130	Index 1b	0.4	05-Sep-02	GB	CO	92	8.8	Unk	YOY	caudal fin clip	1
PG-03-001		3.8	17-Jan-03	OW, GB	CO	650		F	adult	tail punch	2

APPENDIX D

OUTMIGRANT SMOLT TRAP OPERATIONS INFORMATION

Pine Gulch 2002 pipe trap daily trap info

Date	Weather	Water	Trap Status
		Temp °C	
3/23/2002			Trap installed 3/21 but still not working right--pipe needs to be raised. 5 huge sculpin in trap but no other fish
3/28/2002	foggy/partly cloudy	9.5	working trap although weir may not be 100% fish proof. Great Blue Heron hanging out around ramp.
3/29/2002	clear, warm	11.5	Working
3/30/2002	clear (fog in morning)		Working. SH fry in pool around the box approx. 40mm. Trap is truly a smolt trap, not catching fry
3/31/2002	sunny, clear	12	Working
4/1/2002	partly foggy		Working
4/2/2002	overcast	11	working. Dead stickleback stuck against weir screen.
4/3/2002	overcast	11	working. Found 1 SH parr mortality at bottom of trap near "separator" screen. Also, 2 YOY morts, most likely SH (Note large SH live smolt in trap).
4/4/2002	overcast	10.5	Working
4/5/2002	overcast	11	working. 2 adult SH spawners in trap (~700mm and ~610mm) Sandy and Dennis have video/photos
4/6/2002	patchy sun (rain last night)	11.5	Working
4/7/2002	sunny, warm	12	Working
4/8/2002	overcast	11	Working
4/9/2002	light rain	10.5	Working
4/10/2002	clear, warm	13	working. Screen clogged with leaves and water up to bottom of vents. Some fish may have gotten through.
4/11/2002	partly cloudy	11	Working
4/12/2002	partly cloudy	11.5	Working
4/13/2002	clear, hot	14	lots of coho smolts in pool above pipe, holding there (5+). 1 sunfish in trap, taken, approx. 60mm.
4/14/2002	clear, windy	14	Dead sculpin in upper screen above piping. 175mm.
4/15/2002	clear and windy	1	Working
4/16/2002	overcast	10.5	Working
4/17/2002	mostly clear	11	working. Adult lamprey in trap.
4/18/2002	partly cloudy	9	working. Took digital photos of adult lamprey.
4/19/2002	clear	10	Working
4/21/2002	clear	11	Working. Large 1+ SH with lower half of body missing lying upstream of weir in shallow water, still alive.
4/22/2002	clear, hot	12.5	Working
4/23/2002	clear, warm	10.5	Working
4/25/2002	clear	11	Working
4/26/2002	cloudy, cold	10	Working
4/27/2002	patchy sun	11	Working
4/29/2002	mostly clear	11.5	working. Rained last night ~0.05"
4/30/2002	overcast, cold	9	Working
5/1/2002	overcast		Working
5/2/2002	overcast	9	Working
5/3/2002	overcast	9.5	Working
5/4/2002	sun	11	Working
5/6/2002	clear, warm	12	Working
5/7/2002	clear	10	Working
5/9/2002	clear	10	Working
5/10/2002	clear, windy	10	Working
5/11/2002	sunny	11	Working. A smolt was found with tail sticking out of sculpins mouth. Later regurgitated, a mortality.
5/13/2002	clear, windy	12.5	Working
5/15/2002	clear	11	working. Dead smolt in trap.
5/16/2002	sunny		working. Pacific Giant Salamander in trap, approx 55-60mm
5/17/2002	sun, windy	11.5	working. Took rocks/screen out of trap on 5/16/02 to prevent surprise attacks by Sculpin.
5/19/2002	hours	11	2 roach? Left in box ~120mm each
5/20/2002	rain, overcast	11.5	Working
5/21/2002	mostly sunny	12	Working
5/22/2002	sun	10.5	Working
5/23/2002	sun	11	Working
5/24/2002	sun	11.5	Working
5/26/2002	windy, partly cloudy	11.5	Working
5/28/2002	sunny	14.5	Working
5/29/2002	sunny	14	working. Removed pipe section of trap.

2002 Pine Gulch pipe trap daily fish totals

Date	avg daily ft	Co Smolts		CO Presmolts/ Parr Total	SH Smolts Total	SH Presmolt Total	SH Parr		YOY CO			YOY SH		
		Total	Comments				Total	Comments	Live	Dead	Total	Live	Dead	Total
3/23/2002	9.6	0		0	0	0	0		0	0	0	0	0	0
3/28/2002	6.6	0		0	0	0	0		0	0	0	0	0	0
3/29/2002	6.2	0		0	1	0	0		0	0	0	0	0	0
3/30/2002	5.9	0		0	0	0	2		0	0	0	0	0	0
3/31/2002	5.9	1		0	0	0	2		0	0	0	0	0	0
4/1/2002	5.9	4		0	0	0	0		0	0	0	1	0	1
4/2/2002	5.6	1		0	0	1	0		0	0	0	4	0	4
4/3/2002	5.3	1		0	1	0	1 mortality. See comments above		0	0	0	0	2 partly eaten and picked at; unidentifiable, but most likely SH due to size	2
4/4/2002	5	1		0	3	1	0		0	0	0	0	0	0
4/5/2002	4.9	4		0	0	1	0		0	0	0	0	0	0
4/6/2002	5	3		0	1	1	0		0	0	0	0	0	0
4/7/2002	4.8	2		0	0	1	0		0	0	0	0	0	0
4/8/2002	4.6	3		0	0	0	1		0	0	0	0	0	0
4/9/2002	4.9	5		0	0	0	0		0	0	0	1	0	1
4/10/2002	4.7	4		0	0	1	2		0	0	0	0	0	0
4/11/2002	4.4	10		0	0	3	1		0	0	0	0	0	0
4/12/2002	4.2	4		0	0	1	1		0	0	0	0	0	0
4/13/2002	4	1		0	0	0	0		0	0	0	0	0	0
4/14/2002	3.8	2		0	0	0	0		0	0	0	0	0	0
4/15/2002	3.4	6 including 1 mortality		0	1	0	0		0	0	0	0	0	0
4/16/2002	4.1	6		0	0	0	1		0	0	0	0	0	0
4/17/2002	3.9	10		0	0	0	4		0	0	0	0	0	0
4/18/2002	3.7	10		0	0	0	1		0	0	0	0	0	0
4/19/2002	3.5	6		0	0	1	1		0	0	0	3	0	3
4/20/2002	3.3	n Not checked												
4/21/2002	3.1	6		0	0	0	0		0	0	0	3	0	3
4/22/2002	3	5		0	0	2	0		0	0	0	31	6 5 regurgitated by SH presmolt	37
4/23/2002	2.8	4		0	0	0	0		0	0	0	43	0	43
4/24/2002	2.6	n Not checked												
4/25/2002	2.6	3		0	0	0	3		0	0	0	1	0	1
4/26/2002	2.6	3		0	0	0	1		0	0	0	0	0	0
4/27/2002	2.5	8		0	0	0	0		0	0	0	0	0	0
4/28/2002	2.4	n Not checked												
4/29/2002	2.5	3		0	0	0	0		0	0	0	3	0	3
4/30/2002	2.4	14		0	0	0	1		0	0	0	9	0	9
5/1/2002	2.3	8		0	0	1	3		0	0	0	14 unmeasured fry: 25-30mm	0	14
5/2/2002	2.3	12		0	0	3	0		0	0	0	20 unmeasured fry: 25-30mm	1	21
5/3/2002	2.2	0		0	0	2	0		0	0	0	32 unmeasured fry: 25-30mm	2 1 likely regurg by SH presmolt, 1 against screen	34
5/4/2002	2.2	15		0	0	0	0		0	0	0	6 unmeasured fry: 25-30mm	0	6
5/5/2002	2.2	n Not checked												
5/6/2002	1.9	10		0	0	0	0		0	0	0	7 unmeasured fry: 25-30mm	0	7
5/7/2002	1.9	10		0	0	1	0		0	0	0	6	0	6
5/8/2002	1.9	n Not checked												
5/9/2002	1.9	11		0	0	0	0		0	0	0	0	0	0
5/10/2002	1.8	11		0	0	0	0		0	0	0	5	0	5
5/11/2002	1.8	4 including 1 mortality, collected.		0	0	0	1		0	0	0	3	0	3
5/12/2002	1.8	n Not checked												
5/13/2002	1.7	4		0	0	0	0		0	0	0	0	0	0
5/14/2002	1.7	n Not checked												
5/15/2002	1.6	6		0	0	0	0		0	0	0	4	0	4
5/16/2002	1.6	8 not including smolt likely in SCU belly		0	0	0	0		0	0	0	3	0	3
5/17/2002	1.6	7		0	0	0	0		0	0	0	2	0	2
5/18/2002	1.6	n Not checked												
5/19/2002	2.4	8		0	0	0	0		0	0	0	0	0	0
5/20/2002	2.2	3 including 1 mortality		0	0	0	0		0	0	0	0	0	0
5/21/2002	2	0		0	0	0	0		0	0	0	8	0	8
5/22/2002	1.8	0		0	0	0	0		0	0	0	6	0	6
5/23/2002	1.7	0		0	0	0	0		0	0	0	6	0	6
5/24/2002	1.6	1		0	0	0	0		0	0	0	1	0	1
5/25/2002	1.6	n Not checked												
5/26/2002	1.6	0		0	0	0	0		0	0	0	1	0	1
5/27/2002	1.5	n Not checked												
5/28/2002	1.5	1		0	0	0	1		0	0	0	3	0	3
5/29/2002	1.5	0		0	0	0	0		0	0	0	3	0	3
Total		249		0	7	20	27		0	0	0	229	11	240

outlined cells are totals from 2 trapping days

Date	Species	Life Stage	Fork Length (mm)	Weight (g)	Comments
3/31/2002	CO	Smolt	140	28.4	scales, Tissue (1st ever PNG co smolt, Sandy has photos)
4/1/2002	CO	Smolt	108	12.3	Scales, Tissue
4/1/2002	CO	Smolt	121	17.6	Scales, Tissue
4/1/2002	CO	Smolt	126	18.5	Scales, Tissue
4/1/2002	CO	Smolt	129	19.8	Scales, Tissue
4/2/2002	CO	Smolt	130	20.2	Scales, Tissue
4/3/2002	CO	Smolt	114	14.6	Scales, Tissue
4/4/2002	CO	Smolt	119	16.5	Scales, Tissue
4/5/2002	CO	Smolt	115	15.1	
4/5/2002	CO	Smolt	118	15.6	
4/5/2002	CO	Smolt	119	16.3	Scales, Tissue
4/5/2002	CO	Smolt	120	16.7	Scales, Tissue
4/6/2002	CO	Smolt	112	14	
4/6/2002	CO	Smolt	113	15.1	Scales, Tissue
4/6/2002	CO	Smolt	126	19.7	Scales, Tissue
4/7/2002	CO	Smolt	113	14.8	Scales, Tissue
4/7/2002	CO	Smolt	125	19	Scales, Tissue
4/8/2002	CO	Smolt	108	12.1	Scales, Tissue
4/8/2002	CO	Smolt	124	18.1	Scales, Tissue
4/8/2002	CO	Smolt	129	21.3	Scales, Tissue
4/9/2002	CO	Smolt	104	14.8	Scales, Tissue
4/9/2002	CO	Smolt	106	11.8	tissue
4/9/2002	CO	Smolt	115	14.9	Scales, Tissue
4/9/2002	CO	Smolt	125	18.3	Scales, Tissue
4/9/2002	CO	Smolt	129	20.4	Scales, Tissue
4/10/2002	CO	Smolt	99	9.7	
4/10/2002	CO	Smolt	107	12.1	
4/10/2002	CO	Smolt	117	16.5	
4/10/2002	CO	Smolt	118	15.5	
4/11/2002	CO	Smolt	105	11.9	Scales, Tissue
4/11/2002	CO	Smolt	109	12.6	tissue
4/11/2002	CO	Smolt	110	12.5	Scales, Tissue
4/11/2002	CO	Smolt	110	12.9	tissue
4/11/2002	CO	Smolt	113	14.7	tissue
4/11/2002	CO	Smolt	113	14.5	tissue
4/11/2002	CO	Smolt	115	17.1	tissue
4/11/2002	CO	Smolt	118	15.5	tissue
4/11/2002	CO	Smolt	118	15.6	tissue
4/11/2002	CO	Smolt	119	16.2	tissue
4/12/2002	CO	Smolt	110	14.1	tissue
4/12/2002	CO	Smolt	114	13.8	tissue
4/12/2002	CO	Smolt	119	16.1	Scales, Tissue
4/12/2002	CO	Smolt	121	16.9	Scales, Tissue
4/13/2002	CO	Smolt	117	16.4	Scales, Tissue
4/14/2002	CO	Smolt	108	12.3	Scales, Tissue
4/14/2002	CO	Smolt	122	16.5	Scales, Tissue
4/15/2002	CO	Smolt	107	12.2	Scales, Tissue
4/15/2002	CO	Smolt	110	12.5	tissue
4/15/2002	CO	Smolt	111	15.1	mortality. Scales and body
4/15/2002	CO	Smolt	117	14.9	tissue
4/15/2002	CO	Smolt	119	16	scales
4/15/2002	CO	Smolt	125	18.2	Scales, Tissue
4/16/2002	CO	Smolt	101	10.4	
4/16/2002	CO	Smolt	106	11.5	
4/16/2002	CO	Smolt	110	12.7	
4/16/2002	CO	Smolt	118	17	
4/16/2002	CO	Smolt	119	15.7	
4/16/2002	CO	Smolt	120	16.6	
4/17/2002	CO	Presmolt	97	8.8	counted as smolt in totals
4/17/2002	CO	Smolt	112	12.9	tissue
4/17/2002	CO	Smolt	112	14.1	tissue
4/17/2002	CO	Smolt	115	14.5	Scales, Tissue
4/17/2002	CO	Smolt	117	15.1	tissue
4/17/2002	CO	Smolt	120	16.6	Scales, Tissue
4/17/2002	CO	Smolt	121	16.3	Scales, Tissue
4/17/2002	CO	Smolt	122	18.2	Scales, Tissue
4/17/2002	CO	Smolt	126	18.6	Scales, Tissue

Date	Species	Life Stage	Fork Length (mm)	Weight (g)	Comments
4/17/2002	CO	Smolt	128	20.4	Scales, Tissue
4/18/2002	CO	Smolt	106	11.5	tissue
4/18/2002	CO	Smolt	106	11.5	Scales, Tissue
4/18/2002	CO	Smolt	115	14.3	tissue
4/18/2002	CO	Smolt	115	15	Scales, Tissue
4/18/2002	CO	Smolt	116	15.1	tissue
4/18/2002	CO	Smolt	117	15.8	tissue
4/18/2002	CO	Smolt	119	16.1	tissue
4/18/2002	CO	Smolt	120	16.7	tissue
4/18/2002	CO	Smolt	124	19.1	Scales, Tissue
4/18/2002	CO	Smolt	124	18	Scales, Tissue
4/19/2002	CO	Smolt	105	11	Scales, Tissue
4/19/2002	CO	Smolt	108	11.5	tissue
4/19/2002	CO	Smolt	112	13.5	Scales, Tissue
4/19/2002	CO	Smolt	114	13.6	tissue
4/19/2002	CO	Smolt	117	15.6	tissue
4/19/2002	CO	Smolt	125	19.3	Scales, Tissue
4/21/2002	CO	Smolt	107	11.6	tissue. Tail fin looks evenly clipped already
4/21/2002	CO	Smolt	108	13.1	Scales, Tissue
4/21/2002	CO	Smolt	110	13.2	tissue
4/21/2002	CO	Smolt	111	12.8	tissue
4/21/2002	CO	Smolt	112	13.7	Scales, Tissue
4/21/2002	CO	Smolt	118	16.7	tissue
4/22/2002	CO	Smolt	92	7.8	Scales, Tissue
4/22/2002	CO	Smolt	110	14	tissue
4/22/2002	CO	Smolt	112	13.5	Scales, Tissue
4/22/2002	CO	Smolt	112	13.7	Scales, Tissue
4/22/2002	CO	Smolt	122	16.5	Scales, Tissue
4/23/2002	CO	Smolt	108	13.5	Scales, Tissue
4/23/2002	CO	Smolt	113	15.6	tissue
4/23/2002	CO	Smolt	114	15.4	Scales, Tissue
4/23/2002	CO	Smolt	118	16.4	tissue
4/25/2002	CO	Smolt	107	13	Scales, Tissue
4/25/2002	CO	Smolt	115	15	Scales, Tissue
4/25/2002	CO	Smolt	118	15.6	tissue
4/26/2002	CO	Smolt	107	11.9	tissue
4/26/2002	CO	Smolt	108	12.9	Scales, Tissue
4/26/2002	CO	Smolt	114	14	Scales, Tissue
4/27/2002	CO	Smolt	101	10.5	
4/27/2002	CO	Smolt	105	11.8	
4/27/2002	CO	Smolt	111	13.7	
4/27/2002	CO	Smolt	111	12.8	Scales, Tissue
4/27/2002	CO	Smolt	115	14.4	
4/27/2002	CO	Smolt	121	16.6	
4/27/2002	CO	Smolt	122	17.5	Scales, Tissue
4/27/2002	CO	Smolt	122	18.5	Scales, Tissue
4/29/2002	CO	Smolt	106	11.9	
4/29/2002	CO	Smolt	108	13.3	
4/29/2002	CO	Smolt	112	13.4	
4/30/2002	CO	Smolt	94	8.7	
4/30/2002	CO	Smolt	102	10.2	
4/30/2002	CO	Smolt	108	12.5	fin looks clipped already
4/30/2002	CO	Smolt	109	13.1	
4/30/2002	CO	Smolt	110	12.5	
4/30/2002	CO	Smolt	110	12	
4/30/2002	CO	Smolt	111	14.5	
4/30/2002	CO	Smolt	112	13.5	
4/30/2002	CO	Smolt	115	14.9	
4/30/2002	CO	Smolt	116	15.8	
4/30/2002	CO	Smolt	116	15.6	
4/30/2002	CO	Smolt	117	15.2	
4/30/2002	CO	Smolt	118	16	
4/30/2002	CO	Smolt	121	17.4	
5/1/2002	CO	Smolt	105	11.3	
5/1/2002	CO	Smolt	105	10.4	
5/1/2002	CO	Smolt	106	11.1	
5/1/2002	CO	Smolt	113	14	

Date	Species	Life Stage	Fork Length (mm)	Weight (g)	Comments
5/1/2002	CO	Smolt	114	14.4	
5/1/2002	CO	Smolt	115	14.2	
5/1/2002	CO	Smolt	116	14.8	
5/1/2002	CO	Smolt	125	18.6	
5/2/2002	CO	Smolt	102	10.2	
5/2/2002	CO	Smolt	111	14.6	
5/2/2002	CO	Smolt	114	14.6	
5/2/2002	CO	Smolt	114	14.7	
5/2/2002	CO	Smolt	115	15.6	
5/2/2002	CO	Smolt	115	15.5	
5/2/2002	CO	Smolt	116	16.2	
5/2/2002	CO	Smolt	118	15.8	
5/2/2002	CO	Smolt	118	15.3	
5/2/2002	CO	Smolt	120	17.3	
5/2/2002	CO	Smolt	122	18.5	
5/2/2002	CO	Smolt	127	20.2	
5/4/2002	CO	Smolt	99	9.4	
5/4/2002	CO	Smolt	104	10.5	
5/4/2002	CO	Smolt	105	12.3	
5/4/2002	CO	Smolt	110	12.9	
5/4/2002	CO	Smolt	111	13.3	
5/4/2002	CO	Smolt	111	13.5	
5/4/2002	CO	Smolt	111	13.9	
5/4/2002	CO	Smolt	112	13.5	
5/4/2002	CO	Smolt	114	14.9	
5/4/2002	CO	Smolt	117	16.3	approx. weight
5/4/2002	CO	Smolt	119	14.2	
5/4/2002	CO	Smolt	119	16.5	
5/4/2002	CO	Smolt	120	18	approx. weight
5/4/2002	CO	Smolt	120	16.1	
5/4/2002	CO	Smolt	125	17.5	
5/6/2002	CO	Smolt	95	8.5	
5/6/2002	CO	Smolt	102	10.7	
5/6/2002	CO	Smolt	105	10.9	
5/6/2002	CO	Smolt	107	11.3	
5/6/2002	CO	Smolt	107	12.1	
5/6/2002	CO	Smolt	111	13	
5/6/2002	CO	Smolt	112	13.9	
5/6/2002	CO	Smolt	114	14.3	
5/6/2002	CO	Smolt	119	16.1	
5/6/2002	CO	Smolt	123	16.2	
5/7/2002	CO	Smolt	104	11.3	
5/7/2002	CO	Smolt	105	11.2	
5/7/2002	CO	Smolt	108	10.5	
5/7/2002	CO	Smolt	112	13	
5/7/2002	CO	Smolt	113	14.1	
5/7/2002	CO	Smolt	114	14.5	
5/7/2002	CO	Smolt	114	15.4	
5/7/2002	CO	Smolt	115	14.3	
5/7/2002	CO	Smolt	118	14.8	
5/7/2002	CO	Smolt	120	16.2	
5/9/2002	CO	Smolt	101	10.1	
5/9/2002	CO	Smolt	102	9.8	
5/9/2002	CO	Smolt	105	10.9	
5/9/2002	CO	Smolt	108	11.9	
5/9/2002	CO	Smolt	109	11.9	
5/9/2002	CO	Smolt	110	11.7	
5/9/2002	CO	Smolt	114	14.9	
5/9/2002	CO	Smolt	119	15.4	
5/9/2002	CO	Smolt	120	15.6	
5/9/2002	CO	Smolt	120	16	
5/9/2002	CO	Smolt	123	17.5	
5/10/2002	CO	Smolt	102	9.9	
5/10/2002	CO	Smolt	106	11.4	
5/10/2002	CO	Smolt	107	11.9	
5/10/2002	CO	Smolt	108	12.8	
5/10/2002	CO	Smolt	111	13.1	

Date	Species	Life Stage	Fork Length (mm)	Weight (g)	Comments
5/10/2002	CO	Smolt	111	13.3	
5/10/2002	CO	Smolt	114	14.7	
5/10/2002	CO	Smolt	114	14.4	
5/10/2002	CO	Smolt	114	13.7	
5/10/2002	CO	Smolt	114	14.3	
5/10/2002	CO	Smolt	120	16.5	
5/11/2002	CO	Smolt	106	12.9	mortality. Killed/regurgitated by 146mm Sculpin
5/11/2002	CO	Smolt	107	12.2	
5/11/2002	CO	Smolt	108	12.3	
5/11/2002	CO	Smolt	110	13.3	
5/13/2002	CO	Smolt	106	10.8	
5/13/2002	CO	Smolt	110	12.4	
5/13/2002	CO	Smolt	115	13.9	
5/13/2002	CO	Smolt	117	16.3	approximate weight
5/15/2002	CO	Smolt	99	11.5	
5/15/2002	CO	Smolt	110	12.9	
5/15/2002	CO	Smolt	110	13.1	
5/15/2002	CO	Smolt	112		mortality
5/15/2002	CO	Smolt	113	13.4	
5/15/2002	CO	Smolt	115	14.7	
5/16/2002	CO	Smolt	100	10.4	
5/16/2002	CO	Smolt	102	10	
5/16/2002	CO	Smolt	108	12.2	
5/16/2002	CO	Smolt	108	11.1	
5/16/2002	CO	Smolt	110	11.9	
5/16/2002	CO	Smolt	113	13.2	
5/16/2002	CO	Smolt	114	13.6	
5/16/2002	CO	Smolt	118	16	
5/17/2002	CO	Smolt	107	11.2	
5/17/2002	CO	Smolt	110	11.9	
5/17/2002	CO	Smolt	112	13	
5/17/2002	CO	Smolt	114	13.7	
5/17/2002	CO	Smolt	114	13.7	
5/17/2002	CO	Smolt	114	13.9	
5/17/2002	CO	Smolt	122	17.1	
5/19/2002	CO	Presmolt	91	7.6	counted as smolt in totals
5/19/2002	CO	Smolt	109	12.5	
5/19/2002	CO	Smolt	109	12.5	
5/19/2002	CO	Smolt	116	15.6	
5/19/2002	CO	Smolt	117	15.8	
5/19/2002	CO	Smolt	117	14.1	
5/19/2002	CO	Smolt	126	18.9	
5/19/2002	CO	Smolt	139	24	
5/20/2002	CO	Smolt	102	12.1	mortality
5/20/2002	CO	Smolt	103	10.7	
5/20/2002	CO	Smolt	119	16.1	
5/24/2002	CO	Smolt	101	9.5	
5/28/2002	CO	Smolt	91	8.8	