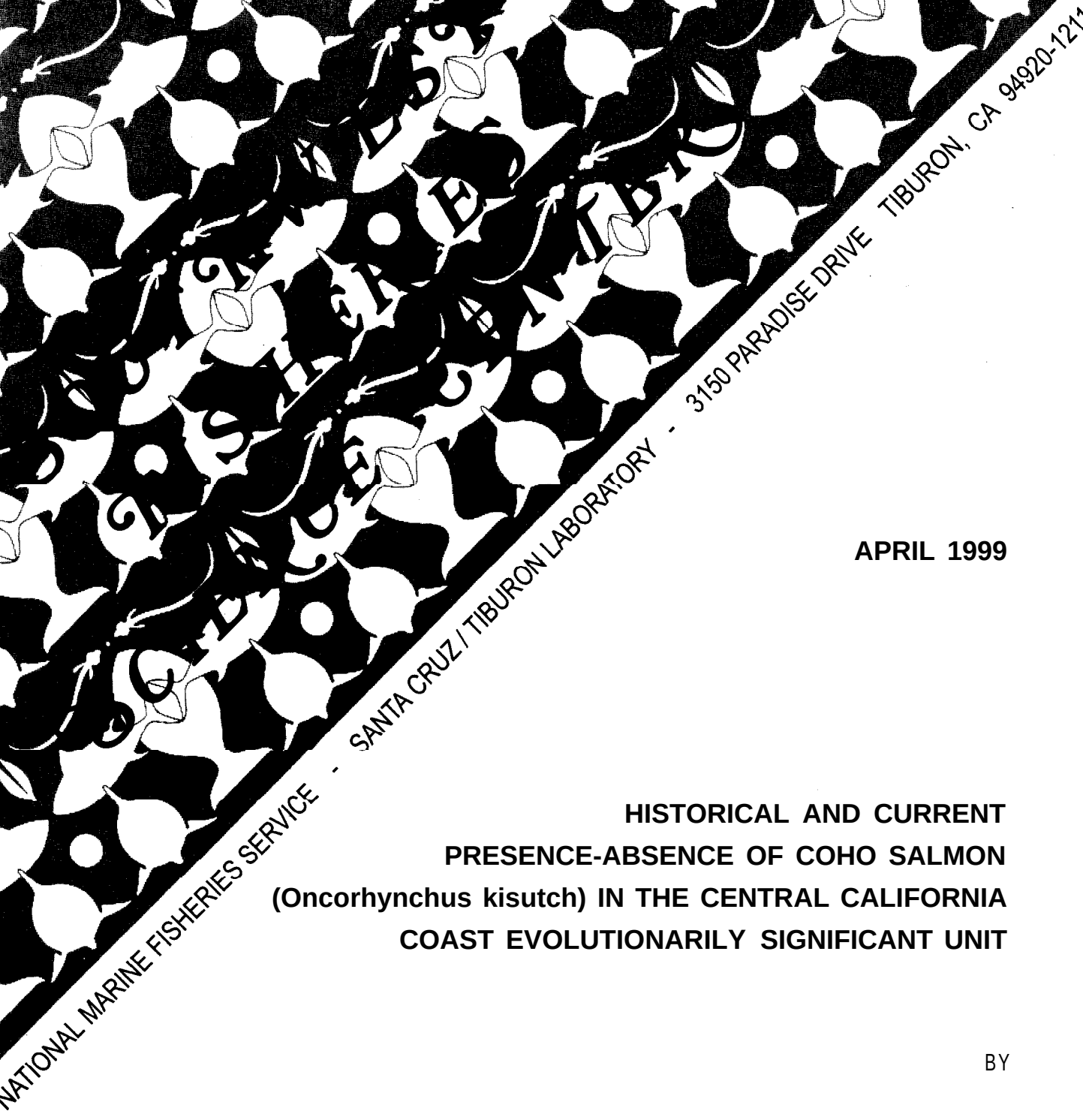

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HISTORICAL AND CURRENT PRESENCE-ABSENCE OF COHO SALMON (Oncorhynchus kisutch) IN THE CENTRAL CALIFORNIA COAST EVOLUTIONARILY SIGNIFICANT UNIT

BY

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ADMINISTRATIVE REPORT SC-99-02

Southwest Fisheries Science Center Administrative Report SC-99-02

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ABSTRACT

This report is a summary of the presence and absence of coho salmon, Oncorhynchus *kisutch,* in streams in the Central California Coast Evolutionarily Significant Unit (ESU). Only streams with historical records of coho occupancy are considered. It has been prepared to assist in Endangered Species Act activities. Presence-absence data were used because of 1) the short time frame dictated by the listing activities, 2) the use of presence-absence data in pre-listing documents, and 3) the need for geographical assessment to plan further research. Presence-absence data used here come from surveys conducted for this study and from data collected by other researchers. A preliminary report of this data, which included only approximately one-half of these streams, was published earlier (Adams et al. 1996) to meet earlier listing requirements,

Coho salmon were present in 5 1% of where they were historical present. The percentage of historical record streams with coho salmon present was lowest in the highly urbanized San Francisco Bay (0%) and highest in Santa Cruz County (83%), Mendocino County (64%), and coastal Mar-in County (54%). Presence was very low (28%) in Sonoma County.

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INTRODUCTION

Coho salmon, Oncorhynchus kisutch, in the Central California Coast Evolutionarily Significant Unit (ESU) were listed as a threatened species under the Endangered Species Act (ESA) in October 1996. Despite large numbers of salmon surveys, including substantial field survey effort by state agencies, university investigators, and private parties (such as a major effort by a consortium of lumber companies), there are no area-wide data on the status of coho salmon in this ESU. The first step in an ESU-wide assessment was to determine in which streams coho still occurred.

This report summarizes data collected both by the Santa Cruz/Tiburon Laboratory and other sources on coho salmon in the Central California Coast ESU. These data have been gathered and organized originally to aid in the species listing process and also in future recovery planning. Originally, this report was to cover only surveys conducted by the Santa Cruz/Tiburon Laboratory personnel, but as additional data from other sources became available, they were incorporated to increase its usefulness.

Coho salmon presence-absence data are used in this report. Presence-absence data are criticized on two points: 1) that presence-absence data are inferior to abundance data and 2) that presence-absence data has an inherent problem with "false absences", a designation of an absence when the species were present. Coho salmon presence-absence data were used primarily because of the short time frame available to collect and analyze data. Abundance estimates would require much more time and effort and therefore could have been accomplished only over a very restrictive geographical scope. Abundance estimate also have high variances; precluding detection of all but very large differences in abundance. Finally, presence-absence data figured prominently in the reports used in supporting the threatened status for coho in the Central California Coast ESU (Brown and Moyle 1991, Brown et al. 1994). The same presence-absence data were also used in the listing announcement (NMFS 1995), and the coastwide Status *Review of Coho Salmon* (Weitkamp et al. 1995). The Brown and Moyle (1991) report recommended the use of presence-absence surveys as a tool to assess coho salmon status. The limitations of presence-absence data were acknowledged by the authors, but their use were justified as "the best available data."

The use of presence-absence data has the inherent problem of "false absences," the designation of an absence when fish are in fact present. The problem with presence-absence data was examined more closely at a workshop on sampling coastal salmonids held by the National Marine Fisheries Service (NMFS) in Santa Rosa in December 1995. Fish presence is an absolute and can be defined by the single occurrence of a fish. Fish absence can be only an estimate unless the entire stream is sampled. A sampling effort this extensive would defeat the purpose of a quick, exploratory study for which presence-absence data are intended. Absence can be defined only as coho salmon not occurring in a stream or stream segment sampled under a defined sampling protocol. Ideally, an absence protocol would be defined as sampling a constant fraction of appropriate habitat of each stream, so there would be a constant probability of detection over all streams. However, this requires having knowledge of how many habitat units

units a stream or stream segment has and this is rarely the case. The original Brown and Moyle report and a preliminary report of this data (Adams et al. 1996) are framed in terms of number of stream where coho are absent. Here, we discuss the number of streams where coho are present, since presence is an absolute, and is an absolute minimum measure of coho occupancy. Finally, it should be noted that the problems of a "false absence" are also a problem with abundance sampling; it is just the binary nature of presence-absence data and binning all non-zero data complicate statistical analysis. The low abundance situations that give rise to "false absences" are statistical indistinguishable from zero due to the size of the variances associated with the estimates.

This is the final data report on historical and current coho salmon presence-absence data from the Central California Coast ESU, containing data from all of the streams with historical records of coho occurrence. A preliminary draft of this report was prepared to provide data to meet the October 1996 listing deadline (Adams et al. 1996) which contained data for just over one half of the historical streams. A more through analysis of this data will be prepared for publication.

METHODS

Study Area

The Central California Coast ESU ranges from Punta Gorda, Humboldt County, in northern California to the San Lorenzo River in Santa Cruz, California, and includes tributaries to San Francisco Bay, but excludes the Sacramento-San Joaquin River system (Weitkamp et al. 1995). The northern limit, Punta Gorda, was selected primarily because of the clear shift in terrestrial and marine environment that occurs there. Coho salmon populations in the Mattole River, just north of Punta Gorda, were considered to be more similar to populations in the north than to populations in the south (ibid.). The San Lorenzo River is thought to mark the current southern boundary of coho salmon on the Pacific coast.

Historical Presence-Absence

The list of streams with historical records of coho occupancy were drawn from a large number of literature sources (Appendix), The four principle sources were Brown and Moyle (1991), Hassler et al. (1991), Wahle and Pearson (1987), and Atkinson et al. (1967). Various other literature sources cited in the reference section of the Appendix were also used. Streams are listed in geographical order from north to south by county, and within a drainage from closest to the ocean to the headwaters. Historical presence-absence data were taken from Brown and Moyle (1991). One difference from Brown and Moyle is that mainstem river systems are not used in the comparisons. While coho must pass through the mainstem Russian River, for example, coho are present only for a short period of time and would probably not be found by sampling. Due to this ambiguity, major mainstem rivers were not used and the numbers of streams are different than in the earlier report. The East Fork of the Russian River was also

removed since it is now a short raceway for releasing water from Lake Mendocino. Four streams listed in the Brown and Moyle (1991) report that are south of the ESU boundary were surveyed, but were not included in the analysis.

Current Presence-Absence

Current presence-absence data were gathered using a variety of methods and from an even larger variety of sources (Appendix). Most streams included had a historical record of the presence of coho salmon, but streams were found with coho salmon that had no historical reference. Sampling methodology for snorkel surveys of juveniles conducted by the Santa Cruz/Tiburon Laboratory personnel is described below. The methods used to collect other current presence-absence data include electrofishing, spawner surveys, snorkel surveys, and hatchery planting records since we were unable to differentiate these fish from natural production. In a few instances, there are numbers from different methods for estimating current abundance in the same year. The actual sampling protocols that produced these data were usually not available beyond the general sampling method.

Data from a single three-year span (1995-1997) were used since coho salmon have a three-year life cycle. Ideally, there should be data for all three life cycle years, but this is not common. In some instances when data from the last three years were available, coho salmon were both present and absent in the three-year cycle. In those instances, data from years with most recent coho salmon presence were included. Similarly, if coho are absent in all years of data, data from only the most recent year are included. When streams are found to have coho that have no historical records, they are included in the appendix, but are not included in the analysis.

For historical coho streams in the Central California Coast ESU without data from other sources, snorkel surveys were conducted between 1995 and 1997. Since there was no way to sample a fixed portion of the habitat, a fixed maximum number of ten sampling units per stream was chosen. An ideal sampling unit was a shaded low-velocity pool with large woody debris. The actual sampling units matched the ideal as well as possible. The ten units were divided among lower, middle, and upper reaches of the stream. At each unit, one of the divers monitored the pool by entering on the downstream side to avoid disturbance and recorded the species, numbers, and size of the fish, along with any comments, such as visibility. The alternate diver estimated pool size and recorded habitat characteristics. If presence was determined, sampling was terminated at the end of the individual sampling unit. Otherwise, sampling continued until ten sampling units were completed. If a stream was dry, it was recorded as coho absent.

RESULTS

Central California Coast ESU coho salmon for the period from 1995 until 1997 were present in 51% (98 of 191) of the streams where they were historically present (Table 1). There were also twenty-three streams in which coho salmon were found for which there were no

Table 1. Summary statistics of historical and current presence-absence for coho salmon, Oncorhynchus kisutch, from the Central California Coast Evolutionarily Significant Unit (See Appendix for a complete list of historical and current data). Historical data were determined from literature, current data from surveys conducted from 1995 to 1997, and other sources (see Methods). Historical presence percentage from Brown et al. (1994) are also included.

Area	Historical Streams	Current Number Present	Current Percent Present	Brown et al. Percent Present
Mendocino County	110	70	64	59
Sonoma County	54	15	28	15
Coastal Marin County	11	6	54	100
San Mateo County	4	2	50	
Santa Cruz County	6	5	83	49
San Francisco Bay	6	0	0	0
Total	191	98	51	47

historical records. Of these twenty-three streams, eighteen of them contained coho in the 1995 1997 time period.

Coho salmon were present in 64% (70 of 110) of the Mendocino County streams for where they were historically present (Table 1). Of coastal California counties, Mendocino County had the largest number of streams with historical records of coho salmon (110). Furthermore, we found coho salmon in an additional eighteen Mendocino County streams with no historical records during the 1995-l997 period.

In Sonoma County, coho salmon were present only in 28% (15 of 54) of the streams where they were historically present (Table 1). The two largest river systems, the Russian and Gualala River drainages, contained all but ten of the Sonoma County streams with coho presences and both of these systems actually extend into Mendocino County. The Warm Springs Hatchery, the only major coho hatchery in the ESU is located on Dry Creek of the Russian River system. Coho salmon were found in an additional five streams with no historical records.

In coastal Marin County, we found coho salmon in 54% (6 of 11) of the streams where they were historically present. Only streams in the Lagunitas and Redwood stream systems had coho. We found no streams with coho salmon that did not have historical records.

In San Mateo County, there were only four streams where coho salmon were historically present and we found coho in only two (50%) of them. We found no additional streams with coho.

Of all the coastal California counties surveyed, Santa Cruz County had the highest percentage of streams with coho salmon 83% (5 of 6). In addition, coho salmon were not found in any streams that did not have historical records.

Coho salmon were not found in any of the six San Francisco streams where they were historically present, and no other streams were found where coho salmon were present in San Francisco Bay.

Four streams are listed in Brown and Moyle (1991) as having historical records of coho are south of the boundary of the Central California ESU; two Santa Cruz County streams, Aptos and Soquel Creeks, and two Monterey rivers, Carmel River and Big Sur River. None of these had coho nor were coho found south of the Central California Coast ESU.

While abundances found by different sampling methodologies are not directly comparable, they do provide some rough measure how large populations are in the different areas. This is intended only to be a rough measure of scale beyond what simple presence can provide. Numbers of coho salmon were highest in Mendocino County and coastal Marin County, and to a much lesser degree Santa Cruz County. No coho salmon were found in San Francisco Bay or south of the ESU.

There does appear to be some ESU-wide correspondence in year-class strength, although there are very few data. The 1996 year-class was the strongest in 17 of 19 streams for which we have data for all three years (1995 through 1997). However, the 1993 year-class (the same lineage three years previous) does not appear to be strong for the few streams for which there are data.

DISCUSSION

The percentages of historically occupied streams where coho salmon are present is remarkably similar to earlier published numbers by Brown et al. (1994) for streams in the Central California Coast ESU. Their 47% presence is very close to the 51% presence found here. It should also be noted that coho were present in twenty-three streams where they had no historical record of presence. Actually, one would expect the percentage of presence to be lower in this study than in Brown et al. (1994), since this study used much stricter rules for establishing presence and absence (actual numbers vs. informed opinion) and a much more restrictive time span (1995 to 1997 vs. 1980s up to 1991).

The percent of streams with historical records where coho salmon are not now present is the highest in San Francisco Bay, the most urbanized area, and followed by Sonoma County. Coho had the highest percent presence in Santa Cruz County, followed by Mendocino County, and coastal Marin County. Trends in abundance were somewhat different, having highest abundance in Mendocino County and coastal Marin County, bearing in mind that the numbers from different methods are not directly comparable. An area-by-area comparison of this study and Brown et al. (1994) show that percentages of presence are very similar. The differences are due to the total stream coverage used here and the 138 streams used by Brown et al. (1994). It is paradoxical that San Francisco Bay streams had no presence and coastal Marin streams had high-percentage presence, because for some Marin County streams, the headwaters of these two groups are on adjacent east and west facing watersheds of the same mountains.

Weitkamp et al. (1995) in the coastwide coho salmon Status Review found the presence-absence data from Brown et al. (1994) compelling enough to conclude that coho salmon in the Central California Coast ESU are presently in danger of extinction, the most ominous assessment of any of the ESUs This was later followed by an actual listing of coho in this ESU as threatened in October 1996. This study finds similar numbers to those reported by Brown et al. (1994) further supporting the assessment in the coastwide Status Review.

ACKNOWLEDGEMENTS

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Appendix. List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995 1997) of presence-absence . Data included are stream name, historical reference, current abundance, year of current abundance, method for estimating current abundance, and current reference. Current abundance is either the absolute number found during sampling, P for presence, A for absence, R for restocked, or U for unavailable to sampling. Method is either E for electrofishing, A for adult spawner survey, S for snorkel survey, N for seine net survey, T for trapping, or H for hatchery planting. When there is no current reference, data are collected by this study.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
		Mendocino County			
Whale Gulch	10	A	1996	S	
Jackass Creek	39	A	1997	S	
Usal Creek	10,26	1	1996	E	25
Cottaneva Creek	8,53	P	1995	E	42
South Fork	10, 29	P	1995	E	42
Slaughterhouse Gulch	48	A	1995	E	42
Middle Fork		P	1995	E	42
North Fork	29	P	1995	E	42
Hardy Creek	10	A	1995	E	42
Juan Creek	10	A	1995	E	42
Little Juan Creek	10	A	1995	E	42
Howard Creek	49	R,A	95,95	H,E	27, 30
DeHaven Creek	9,10,29	A	1995	E	30

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995 1997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Wages Creek	29	R,P	95,97	H,E	27,30
Abalobadiah Creek		A	1997	S	
Seaside Creek	10	A	1997	S	
Frazer Creek	10	A	1997	S	
Ten Mile River	10	P	95,95/6	E,A	34
South Fork	3, 10	24, P	95/6,96	A,E	34,2 1
Smith Creek	10	P,4	96,96/7	E,A	21,35
Campbell Creek	10	P,24	96,96/7	E,A	21,35
Churchman Creek	10	2,P	95/6,96	A,E	34,21
Redwood Creek	40	A	1996	E	21
Mill Creek	10	A	1996	E	21
North Fork	3,10	P	1996	E	21
Little North Fork	10,29	P,23	96,95/6	E,A	21,34
Buckhom Creek		P	1996	E	21
Bald Hill Creek		P	1996	E	21
Middle Fork (Clark Fork)	10	10,P	95/6,96	A,E	34,2 1
Bear Haven Creek		9	95/6	A	34
Little Bear Haven Creek	10	A	1996	E	21
Pudding Creek	3,10,29	22	1996	E	30
Little Valley Creek	10	30	1996	S	

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995- 1997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Noyo River	3,8,29				
Hayshed Gulch	10	36	1996	E	25
South Fork	10,29	13	1996	S	
Kass Creek	10,29	20	1995	E	25
North Fork	10,29	5	1996	S	
Parlin Creek	10	2	1995	E	52
Bear Gulch	10	8	1996	E	30
Peterson Gulch		4	1995	E	52
Duffy Gulch	10	2	1995	E	25
North Fork	10	P	1995	E	42
Marble Gulch	10	1	1996	S	
Hayworth Creek	10	P	1995	E	42
Little North Fork	10,29,48	1	1996	E	30
Middle Fork	10	P	1995	E	42
Olds Creek	10	P	1995	E	42
Redwood Creek	10,48	P	1995	E	42
Hare Creek	29	24	1996	S	
Covington Gulch	29	A	1996	S	
Bunker Gulch	10,29	13	1995	E	52
South Fork	10	20	1996	S	
Jug Handle Creek	10	A	1996	E	30

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995 1997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Caspar Creek	6,10,29	25,75	95,95/6	E,A	34,30
North Fork	53	6,P	95/6,97	A,T	30,35
South Fork	53	l,P	96/97,97	A,T	30,35
Doyle Creek	10,29	A	1995	E	42
Russian Gulch	7	5	1996	S	
Big River	3,8,10,29				
Railroad Gulch		21	1996	E	30
Little North Fork	10	11	1995	E	52
East Branch	10,29,48	63	1997	S	
Berry Gulch	29	14	1995	E	30
North Fork	48	P	1996	E	18
Two Log Creek	29,48	P	1995	E	42
Tramway Gulch	10	A	1995	E	42
North Fork	10	1	1995	E	30
Chamberlain Creek	10,29	4	1996	S	
West Chamberlain		15	1996	E	30
Water Gulch		5	1996	E	30
Arvola Gulch	10	A	1996	E	18
James Creek	10,48	P	1996	E	30
North Fork	10	2	1996	S	
South Fork	10	A	1995	E	42
Ramon Creek	40	P	1995	E	42

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995 1997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Big River (continued)					
Daugherty Creek	10	A	1995	E	42
Gates Creek		P	1996	E	30,42
Johnson Creek	48	A	1995	E	42
Little River	10,29	52	1996	E	30
Buckhorn Creek	10	A	1996	E	42
Albion River	10,29	19	1996	E	30
Railroad Gulch	10	P	1995	E	42
Pleasant Valley Creek		P	1995	E	42
Tom Bell Creek		P	1995	E	42
South Fork	10	P	1995	E	42
North Fork	10	P	1995	E	42
Soda Springs		21	1996	E	30
Marsh Creek	10	6	1997	S	
Big Salmon Creek	10,29	24	1996	E	30
Little Salmon Creek	10	A	1997	S	
Donnelly Creek		20	1995	E	25
Hazel Gulch	10	28	1995	E	25
West Branch	10	A	1996	S	

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995- 1997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Navarro River	**3,8,29**				
Marsh Gulch		1	1996	E	42
Murray Gulch		P	1995	E	42
North Fork	10	4	1994	E	30
Dead Horse Gulch		1	1996	E	30
Tramway Gulch	48	P	1995	E	42
Flynn Creek	29	26	1996	E	30
Camp 16 Gulch		9	1996	E	19
Tank 4 Gulch		7	1996	E	30
South Branch	10	P	1995	E	42
Bridge Creek	10	A	1996	S	
North Branch	10	P	1996	E	43
Cook Creek		P	1995	E	42
Little North Fork	10	P	1995	E	42
John Smith	10,29	P	1996	E	43
Mill Creek	10	A	1997	S	
Indian Creek	10	4	1997	S	
North Fork	10	A	1996	E	43
Gut Creek	10	A	1997	S	
Ham Canyon (Big Canyon)	10	A	1996	E	19
Rancheria Creek (Big Canyon)	10	P	1995	E	42
Horse Creek	10	A	1996	E	19
Minnie Creek	10	5	1996	S	
Camp Creek	10	A	1996	S	
German Creek	10	A	1996	S	

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995- 1997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Navarro River (continued)					
Robinson Creek (Anderson-Mills)	10	A	1996	S	
Greenwood Creek	10	P	1995	E	42
Elk Creek	10	P	1995	E	42
Three Springs Creek	10	A	1995	E	42
Soda Fork	10	A	1995	E	42
Sulphur Fork	10	A	1995	E	42
Mallo Pass Creek	10	A	1995	E	42
Brush Creek	10	20	1996	S	
Garcia River	3,8,10,29	A	1996	E	30
South Fork	29	P,R	95,95	E,H	42,27
Fleming Creek	29	A	1995	E	42
Schooner Gulch	10	A	1995	E	42
North Fork	10	A	1996	S	
Fish Rock Gulch	10	A	1996	S	

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995- 1997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Sonoma County					
Gualala River	3,10,11,16,29				
Little North Fork	29	R,P	95,97	H,S	27,24
Doty Creek	10	P	1997	S	24
South Fork	11,16,29	A	1996	S	
Buckeye Creek	11	A	1995	E	30
Franchini Creek	11	A	1995	E	30
Marshall (Sproule) Creek	11	A	1996	S	
Wheatfield Fork	11,16	A	1995	E	42
Fuller Creek	11,16	A	1995	E	42
North Fork	11,16	A	1996	S	
South Fork	11,16	A	1996	S	
Haupt Creek	11	A	1995	E	42
House Creek	11,16	A	1996	S	
Fort Ross Creek	11,16	A	1996	S	
Russian Gulch	9,10,16,29	2	1996	S	
Middle Branch	10	20	1996	S	
East Branch	10				
Russian River	3,8,10,11,16				
Jenner Gulch		A	1997	S	
Willow Creek	11,16	A	1995	E	15
Sheephouse Creek	11,16	P	1996	E	15

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995 1997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Russian River (continued)					
West Fork	10	A	1995	S	
York Creek	10	A	1997	S	
Forsythe Creek	29	A	1997	S	
Seward Creek	29	A	1995	S	
Eldridge Creek	29	A	1997	S	
Jack Smith Creek	29	A	1997	S	
Salt Hollow Creek	10	A	1997	S	
Rocky Creek	10	A	1997	S	
Mariposa Creek	10	A	1997	S	
Fisher Creek	10	A	1997	S	
Corral Creek	10	A	1997	S	
Scotty Creek	11,16	A	1996	S	
Salmon Creek	3,11,16	A	1995	S	
Finley Creek	11,16	A	1996	S	
Coleman Valley Creek	11,16	A	1996	S	
Fay Creek	11,16	A	1995	S	
Tannery Creek	16	A	1996	S	
Coastal Marin County					
Walker Creek	12,16	A	1996	S	
Salmon Creek	12	A	1996	S	

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995-l 997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Walker Creek (Continued)					
Arroyo Sausal Creek	12				
Lagunitas Creek	3,8,12,16,22	62	1995	E	50
Haggerty Gulch Creek	12	A	1996	S	
Olema Creek	16	47	1995	S	
Nicasio Creek	12	29	1996	S	
Devil Gulch Creek	12,16	64	1995	E	50
San Geronimo Creek	12,16	87	1995	E	50
Bolinas Lagoon					
Pine Gulch Creek	16	A	1995	E,S	
Redwood Creek	12,16	214	1996	E	47
San Mateo County					
San Gregorio Creek	51	A	1995	S	
Pescadero Creek	13,14,45,51	18	1995	S	
Butano Creek	51	A	1995	S	
Gazos Creek	13	1	1995	S	

Appendix (continued). List of streams with historical records of coho salmon for the Central California Coast ESU with current records (1995 1997) of presence-absence.

Stream	Historical Reference	Current Abundance	Year	Method	Current Reference
Santa Cruz County					
Waddell Creek	44	9	1995	E	46
East Branch	3,14,45,51	24	1995	E	46
Scott Creek	3,14,51	222	1995	E,H	46
San Vicente Creek	14	2	1996	E	41
San Lorenzo River	28	3	1995/96	T	37
Hare Creek	3,14,45,51	A	1997	S	
San Francisco Bay					
Alameda Creek	33	A	1995	E	1
San Pablo Creek	33	A	1995	S	
Walnut Creek	32	A	1995	S	
Corte Madera Creek	33	A	1995	S	
San Anselmo Creek	20	A	1995	S	
Mill Creek	33	A	1995	S	

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