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ADULT STEELHEAD COUNTS IN MILL AND DEER CREEKS, TEHAMA COUNTY, OCTOBER 1993 - JUNE 1994.

by

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ABSTRACT

Counts were made for adult steelhead in Mill and Deer creeks from October 1993 through June 1994. Populations of wild steelhead in these two drainages are at critically low levels. Less than 100 steelhead ascended each of these creeks this season.

1/ Inland Fisheries Administrative Report No. 95-3. Submitted January 1995. Edited by M. Ralph Carpenter. California Department of Fish and Game, 1416 - Ninth Street, Sacramento, California 95814.

2/ Inland Fisheries Division, P.O. Box 578, Red Bluff, California 96080.

INTRODUCTION

In 1990 Mill, Deer, Battle and Antelope creeks (Shasta and Tehama counties) were closed to fishing to protect dwindling stocks of wild steelhead (Oncorhynchus mykiss). To set recovery goals, the current population status of wild steelhead stock in these tributaries needs to be addressed. The last count was made for Mill Creek in 1979. The only count made for Deer Creek was in 1964 and totalled 1006 fish. The average count was 1087 fish for Mill Creek for the years 1953 through 1963 and 1979. Counts were initiated for this study in October 1993 and continued through June 1994.

METHODS

Steelhead trout were counted as they passed through the fish ladder at Clough Dam on Mill Creek and the south-bank fish ladder at Stanford-Vina Dam on Deer Creek. Clough Dam is the second of three diversion dams on Mill Creek, and is located 6.4 km (4 miles) upstream of Mill Creek's confluence with the Sacramento River. Stanford-Vina Dam is the first of three diversion dams on Deer Creek, and is located 6.4 km (4 miles) upstream of Deer Creek's confluence with the Sacramento River.

A 45.7 cm (18 in.) square plexiglass tunnel was submerged at the upstream end of each fish ladder and wired into a Smith Root Model 1100 fish counter. The fish counter is calibrated to count objects 36.8 cm (14.5 in.) or larger passing either upstream or downstream in the counting tunnel. Total upstream passage is derived by subtracting the downstream from the upstream counts. Simultaneous visual counts are made by an experienced observer at a minimum of 2 days per week to verify the counter accuracy and to determine the ratio of adult chinook salmon (O. tshawytscha) to adult steelhead trout migrating upstream of the counting station. The estimated steelhead passage was derived by multiplying the observed chinook salmon-to-steelhead ratio by the total weekly counter counts.

On both Mill and Deer creeks, the electronic counters recorded an upstream count every time a salmon or steelhead was visually observed migrating upstream through the counting tunnel. No other fish species triggered the counter during the visual counting periods. No adult steelhead were observed migrating downstream.

Fish passage estimates for unsampled time periods were calculated using the average electronic counts per hour for the following weeks and applying this to the unsampled time period.

During periods of normal high flows, water turbulence inside the counting tunnels caused excessive upstream and downstream counts to be recorded. To protect the counting frame and electronics

box, the entire counting apparatus was removed during high flow. Since we were not able to determine steelhead passage during high flows no population estimates were made for these periods.

RESULTS

Mill Creek

The fish ladder at Clough Dam was opened on 8 October 1993 and the fish counter was installed 12 October. Before 8 October there was insufficient flow in Mill Creek to attract anadromous fish. The fish counter ran continuously from 12 October until 9 December, except a 12-day period from 20 October through 31 October when a female salmon built a redd at the tunnel exit and resided inside the tunnel. This caused excessively high upstream and downstream counts. The counter was reinstalled on 9 March and ran continuously until 16 June. Storms in December, January and February permitted visual counting for only 15 days. No steelhead or chinook salmon were observed during these visual counts.

We visually counted 696 salmon and 11 steelhead migrating past Clough Dam. An additional 1,162 counts were made by the electronic counter during non-visual counting periods (Table 1). No steelhead were observed migrating after 25 October.

A minimum of 11 adult steelhead migrated past Clough Dam from October 1993 through June 1994 (Table 1). For the first time period (8-11 October), an average seasonal ratio was used to estimate steelhead passage. No population estimates could be made from 9 December through 9 March since no steelhead were observed during this time period.

Deer Creek

The fish counter on Deer Creek was installed in the south-bank fish ladder at Stanford-Vina Dam on 12 October 1993. Before this date there was insufficient flow in the fish ladder to make it passable to adult steelhead or salmon. The fish counter ran continuously from 12 October to 9 December. From 9 December to 9 March the counter had to be removed due to high flows that caused false readings. High flows during this time period permitted counting on only seven occasions. No steelhead or salmon were observed during the months when only visual counts were made.

We observed 13 chinook salmon migrating through the south-bank ladder at Stanford-Vina Dam. An additional 310 counts were made by the electronic counter during non-visual counting periods (Table 2). No steelhead were observed migrating through the south-bank ladder at Stanford-Vina Dam.

TABLE 1. Estimated adult steelhead migration past Clough Dam on Mill Creek, October 1993–June 1994.

MONTH	PERIOD	OBSERVED COUNTS CS	SH	COUNTER COUNTS	TOTAL COUNTS	RATIO CS TO SH (observed)	ESTIMATED SH
OCT	08–11						5 a_/
	12–17	553	9	255 b_/	817	61:1	13
	18–24	56	1	128	185	56:1	3
	25–31	9	1	(104)	114	9:1	13
NOV	01–07	1	0	(14)	15	1:0	0
	08–14	1	0	5	6	1:0	0
	15–21	0	0	0	0	1:0	0
	22–28	0	0	1	1	0:0	0
	29–05	0	0	8	8	0:0	0
DEC	06–12	0	0	0 c_/	0	0:0	0
	13–19	0	0		0		
	20–26	0	0		0		
	27–02	0	0		0		
JAN	03–09	0	0		0		
	10–16	0	0		0		
	17–23	0	0		0		
	24–30	0	0		0		
	31–06	0	0		0		
FEB	07–13	0	0		0		
	14–20	0	0		0		
	21–27	0	0		0		
	28–06	0	0		0		
MAR	07–13	0	0	0 b_/	0	0:0	0
	14–20	0	0	3	3	0:0	0
	21–27	0	0	0	0	0:0	0
	28–03	0	0	17	17	0:0	0
APR	04–10	1	0	23	24	1:0	0
	11–17	10	0	35	45	1:0	0
	18–24	9	0	100	109	1:0	0
	25–01	0	0	64	64	1:0	0
MAY	02–08	23	0	73	96	1:0	0
	09–15	2	0	75	77	1:0	0
	16–22	14	0	96	110	1:0	0
	23–29	14	0	99	113	1:0	0
	30–05	3	0	34	37	1:0	0
JUN	06–12	0	0	28	28	0:0	0
	13–19	0	0	0 c_/	0	0:0	0
TOTALS		696	11	1162	1169		34

CS : Chinook Salmon SH : Steelhead.

( ) = estimate.

Ladder opened 8 October 1993 counter installed 12 October.

a_/ Estimated using the average seasonal ratio of 42:1.

b_/ Electronic counter on.

c_/ Electronic counter off.

TABLE 2. Estimated adult steelhead migration past Stanford Vina Dam on Deer Creek, October 1993 – January 1994.

MONTH	PERIOD	OBSERVED COUNTS CS	SH	COUNTER COUNTS	TOTAL COUNTS	RATIO CS TO SH (observed)	ESTIMATED SH
OCT	12-17	5	0	8	13	1:0	0
	18-24	1	0	8	9	1:0	0
	25-31	0	0	41	41	0:0	0
	01-07	0	0	1	1	0:0	0
NOV	08-14	0	0	5	5	0:0	0
	15-21	0	0	1	1	0:0	0
	22-28	0	0	1	1	0:0	0
	29-05	0	0	0	0	0:0	0
	06-12	0	0	1	1	0:0	0
DEC	13-19	0	0	0 a/	0	0:0	0
	20-26	0	0		0		
	27-02	0	0		0		
	03-09	0	0		0		
JAN	10-16	0	0		0		
	17-23	0	0		0		
	24-30	0	0		0		
	31-06	0	0		0		
FEB	07-13	0	0		0		
	14-20	0	0		0		
	21-27	0	0		0		
	28-06	0	0		0		
MAR	07-13	2	0	2 b/	4	1:0	0
	14-20	0	0	13	13	0:0	0
	21-27	0	0	5	5	0:0	0
	28-03	2	0	5	7	1:0	0
APR	04-10	3	0	14	17	1:0	0
	11-17	0	0	31	31	0:0	0
	18-24	0	0	36	36	0:0	0
	25-01	0	0	29	29	0:0	0
MAY	02-08	0	0	15	15	0:0	0
	09-15	0	0	65	65	0:0	0
	16-22	0	0	15	15	0:0	0
	23-29	0	0	14	14	0:0	0
	30-05	0	0	0	0	0:0	0
JUN	06-12	0	0	0	0	0:0	0
	13-19	0	0	0 a/	0	0:0	0
TOTALS		13	0	310	323		0

CS: Chinook Salmon SH: Steelhead.

( ) = estimate.

Counter installed 12 October, 1993.

a/ Electronic counter off.

b/ Electronic counter on.

From March through June 1994, visual counts were also made on the north-bank ladder of Stanford-Vina Dam. Before this year, it was falsely assumed that most of the migrating fish used the south-bank ladder. By comparing electronic counts on the south-bank ladder to concurrent visual counts on the north-bank ladder, I determined that 56% of the salmon used the north ladder during high and normal flows. During low flows when water stops flowing over the dam face, most of the flow is through the south-bank ladder although some flow is though the north-bank ladder. Since no steelhead were observed using the south-bank ladder with better flow, it follows that no steelhead used the north-bank ladder during low flows.

DISCUSSION

According to historical records of cumulative percentage of steelhead passing Clough Dam during a 10-year time span (Van Woert unpublished), there are two peaks of adult steelhead migration in Mill Creek. The largest peak occurred the last week in October and into the first two weeks in November, and accounts for approximately 30% of the run. A smaller peak occurred the first two weeks in February and accounts for approximately 11% of the run (Table 3).

All steelhead were sighted during the last three weeks in October 1993. No steelhead were observed after 25 October.

An estimated 34 adult steelhead migrated past Clough Dam in 1993-94. For the years of record the average is 1,087 steelhead. These historical counts were made between 1953 and 1979 and ranged from 2,269 to 280 (Table 4).

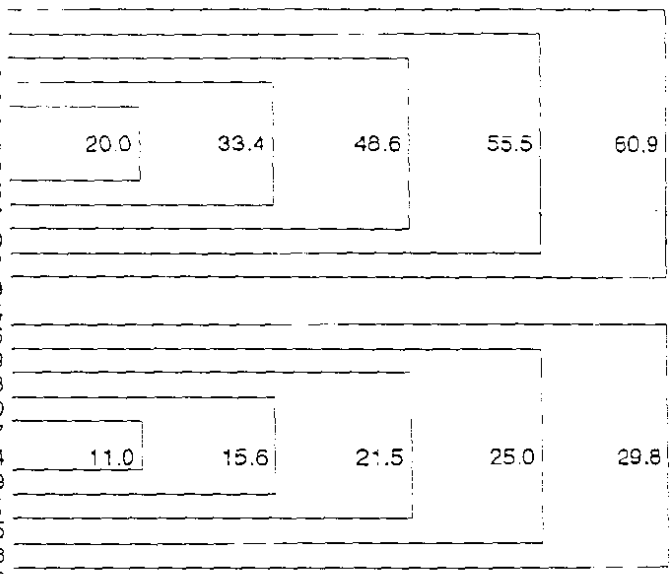
Historically, 51% of the steelhead run in Mill Creek occurred from September through November. This year 34 steelhead migrated during this period. Using this historical run-timing criterion, an estimated 67 steelhead migrated into Mill Creek in the fall of 1993 and winter of 1994.

Complete steelhead counts are available for only one year in Deer Creek. In 1963, 1,006 steelhead were counted (Table 4). Partial counts for the spring of 1942 and 1943 were 145 and 109 steelhead, respectively (Needham, Hanson, and Parker 1943). A partial count in the spring of 1963 was 53 steelhead (Dept. Fish and Game, 1967). Since no steelhead were observed in Deer Creek during time periods when steelhead were counted in Mill Creek, I assumed that the steelhead population in Deer Creek is at least as small as in Mill Creek.

Due to the record low numbers of spring-run chinook salmon and steelhead in Mill and Deer creeks, fishing regulations were

TABLE 3. Adult steelhead counted upstream through the fishway at Clough Dam during ten seasons 1953–54 through 1962–63. a/

Period	Cumulative Number of Steelhead	1962–63 Number	1962–63 Percent	Cumulative Percentage b/
Sep 17–23	9	0		0.08
Sep 24–30	52	0		0.45
Oct 01–07	102	0		0.88
Oct 08–14	225	0		1.94
Oct 15–21	369	0		3.18
Oct 22–28	1315	810	35.7	11.33
Oct 29–Nov 04	822	477	21.0	7.08
Nov 05–11	1088	161	7.1	9.38
Nov 12–18	609	61	2.7	5.25
Nov 19–25	625	34	1.5	5.39
Nov 26–Dec 02	737	82	3.6	6.35
Dec 03–09	438	102	4.5	3.77
Dec 10–16	441	81	3.6	3.80
Dec 17–23	403	21	0.9	3.47
Dec 24–30	80	5	0.2	0.69
Dec 31–Jan 06	74	6	0.3	0.64
Jan 07–13	238	2	0.1	2.05
Jan 14–20	103	0		0.89
Jan 21–27	282	0		2.43
Jan 28–Feb 03	278	0		2.40
Feb 04–10	577	258	11.4	4.97
Feb 11–17	701	18	0.8	6.04
Feb 18–24	254	41	1.8	2.19
Feb 25–Mar 03	407	12	0.5	3.51
Mar 04–10	296	6	0.3	2.55
Mar 11–17	322	8	0.4	2.78
Mar 18–24	221	21	0.9	1.90
Mar 25–31	208	5	0.2	1.79
Apr 01–07	119	4	0.2	1.02
Apr 08–14	82	3	0.1	0.71
Apr 15–21	26	0		0.22
Apr 22–28	16	3	0.1	0.14
Apr 29–May 05	13	6	0.3	0.11
May 06–12	17	5	0.2	0.15
May 13–19	32	25	1.1	0.28
May 20–26	14	12	0.5	0.12
May 27–Jun 02	1	1		0.01
Jun 03–09	2	0		0.02
Jun 10–16	1	0		0.01
Jun 17–23	2	0		0.02
Jun 24–30	4	0		0.03
Totals	11605	2270		



a/ From Van Woert, unpublished.
b/ brackets indicate two run peaks.

TABLE 4. Steelhead Counts at Mill and Deer Creeks from 1953 through 1992.

Year	Mill Creek	Deer Creek
1953	715[1]	
1954	1,492	
1955	1,213	
1956	1,443	
1957	1,301	
1958	790	
1959	417	
1960	742	
1961	1,222	
1962	2,269	
1963	1,158	
1964		1,006[2]
1965		
1966		
1967		
1968		
1969		
1970		
1971		
1972		
1973		
1974		
1975		
1976		
1977		
1978		
1979	280[3]	
1980		
1981		
1982		
1983		
1984		
1985		
1986		
1987		
1988		
1989		
1990		
1991		
1992		
Mean Count	1,087	
Years of Record	12	1

1/ Van Woert unpublished.
2/ Department of Fish and Game 1967.
3/ U.S. Fish and Wildlife Service unpublished.

further restricted to artificial lures with barbless hooks and a zero bag limit of salmon and trout for sections of these drainages used by anadromous fish. Starting in the spring of 1994, these sections of Mill and Deer creeks will no longer be planted with hatchery trout. The direct positive effects of these regulations on anadromous fish would be difficult to measure because of the numerous factors that may be contributing to the decline of the anadromous runs in these two creeks. Similar population declines are being observed for wild spring-run chinook salmon populations in Mill and Deer creeks (Harvey in preparation). The timing of adult steelhead immigration and juvenile emigration in these drainages coincides with natural high flows that afford passage to the Sacramento River for adult and juvenile steelhead. The holding and rearing habitats in Mill and Deer creeks have remained unaltered since population counts began for salmon and steelhead in the 1940's. Because of the pristine nature of these watersheds and available flows during key migration times, the obvious failure in stock recruitment is due to excessive mortality occurring outside Mill and Deer creeks.

ACKNOWLEDGEMENTS

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