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State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

JUVENILE SPRING-RUN CHINOOK SALMON EMERGENCE, REARING AND OUTMIGRATION PATTERNS IN DEER AND MILL CREEKS, TEHAMA COUNTY, FOR THE 1994 BROOD YEAR

SPORT FISH RESTORATION ANNUAL PROGRESS REPORT

by

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INTRODUCTION

This annual brood year report documents the length frequency of spring-run chinook salmon smolts emigrating from Mill and Deer creeks and the timing of spring-run yearling outmigration. Juvenile growth patterns are followed from emergence through rearing and emigration. This 1994 brood year (BY) report will cover the 1994 adult spring-run chinook salmon (spring run) population counts, onset and peak of spawning, calculated and actual timing of 94 BY spring-run fry emergence, spring-run juvenile growth rates, spring and fall-run fry emigration and spring-run chinook salmon yearling emigration.

This 94 BY report was funded through the Federal Sport Fish Restoration Act for the purpose of investigating spring-run life history in Mill and Deer creeks. No conclusions can be drawn at this time as to the emigration of spring-run chinook salmon in Mill and Deer creeks.

1994 Adult Population Counts and Spawning Surveys in Mill and Deer Creeks.

An estimated 723 adult spring run entered Mill Creek in 1994. This estimate was derived from electronic and visual counts at Clough Dam, March through June 1994. Spring-run spawning surveys for these adult salmon began in Mill Creek on 11 August (Table 1). The first redds were counted at the Hole-in-the-Ground area on 3 October. Maximum daily water temperatures in the Big Bend area did not drop below 55° F until after 27 September (Appendix Table 1). Therefore, this late spawning time is not unexpected. The peak and termination of spawning and spawning distribution cannot be determined from the limited survey data available.

In Deer Creek, the 1994 adult population was counted by snorkel surveying the adult holding habitat. On 2 August the reach from Upper Falls to Ponderosa Way was surveyed and 485 adult salmon were counted. Spring run spawning surveys in Deer Creek began on 8 August. The first redds were sighted the week of 13 September (Table 1). Maximum daily water temperatures at the onset of spawning at A-Line Road were 58°F. After 21 September, maximum daily water temperature remained less than 55°F (Appendix, Table 2). Due to the Barkley fire, we were unable to survey from Hwy-32 to Ponderosa Way after the first week in October. Therefore, no determinations can be made about the peak or termination of spawning in these reaches.

Egg Incubation, Hatching and Fry Emergence

To calculate fry emergence, daily temperature units (TU) were calculated from the water temperature records on each creek, starting with the onset of spring-run spawning. A TU is defined as the average daily water temperature (in °F) minus 32. From the time of egg fertilization, a cumulative minimum total of 1550 TU are required for the egg to hatch and the fry to emerge. Based on these criteria, the calculated earliest emergence in Deer Creek was 5 February 1995 (Table 2). There is insufficient data to calculate the peak and latest emergence date. Weekly sampling for newly emerged fry in Deer Creek began on 19 January. Sampling occurred at Hwy-32 Bridge, A-line Road and Ponderosa Way. The first fry was captured on 13 March at A-Line Road. Size was 36 mm fork length (FL). Fry in this emergent size range (<=36 mm FL)

TABLE 1. August - October 1994 spring-run spawning records in Mill and Deer creeks. Redd counts are cumulative for the season--all redds are counted in every survey.

Mill Creek spring-run chinook spawning survey counts.

Date	wk #	Area	Live	Carcasses	Redds
08/11/94	32	Black Rock to Ranch House	7	0	0
08/15/94	33	Ranch House to canyon entrance	13	0	0
08/17/94	33	Savercool Place to Black Rock	22	0	0
08/22/94	34	Hole-in-the-Ground to Rocky Gulch	0	0	0
09/07/94	36	Savercool Place to Black Rock	10	0	0
09/08/94	36	Big Bend area	15	0	0
09/12/94	37	Savercool Place to Black Rock	0	0	0
09/21/94	38	Mill Creek Store to Hole-in-the-Ground	1	0	0
09/23/94	38	Camp Tehama to Mill Creek Store	0	0	0
10/03/94	40	Mill Creek Store to Hole-in-the-Ground	17	0	33
10/04/94	40	Hwy-36 to cable crossing	3	0	1
10/05/94	40	cable crossing to Mill Creek Store	5	0	2
10/25/94	43	Hot Springs bridge to Hwy -36	1	6	14
10/25/94	43	Hwy-36 to Mill Creek Store	6	18	23
electronic counter		Clough Dam	723		

Deer Creek spring-run chinook spawning survey counts.

Date	wk #	Area	Live	Carcasses	Redds
08/02/94	31	Upper Falls to Ponderosa Way	485	0	0
08/08/94	32	Lower Falls to A-line Bridge		0	0
08/18/94	33	Lower Falls to Trailhead a/		0	
008/18/94	33	Upper Falls area		0	0
08/18/94	33	Hwy-32 area		0	0
08/23/94	34	Lower Falls to Trailhead		1	0
08/23/94	34	Upper Falls area		0	0
08/29/94	35	Lower Falls to Trailhead		0	0
09/07/94	36	Lower Falls to A-line bridge		0	0
09/08/94	36	Upper Falls to Potato Patch Campground	0	1	0
09/13/94	37	Lower Falls to A-line Bridge	0	2	1
09/15/94	37	Upper Falls to Potato Patch Campground	2	1	9
09/19/94	38	Lower Falls to Trailhead	0	0	1
09/20/94	38	Upper Falls to Potato Patch Campground	7	0	7
09/28/94	39	Lower Falls to A-line Bridge	50	4	34
09/29/94	39	Potato Patch Campground to Hwy-32	4	1	5
10/04/94	40	Lower Falls to Trailhead	32	5	34

a/ Barkly fire prevented the survey from Hwy-32 to Ponderosa Bridge this year.

were captured through late May (Figure 1). Emergence times will vary as spawning times vary within a given year.

Weekly sampling in Mill Creek began 21 February. Sampling occurred at Black Rock. Due to snow conditions, Black Rock is the only sampling station accessible during spring-run fry emergence. A 34 mm FL fry was captured on this first survey. Fry in this emergent size range (33-34 mm FL) were captured through early June (Figure 2).

TABLE 2. Calculated and actual spring run fry emergence times in Deer Creek and Mill Creek.

	Onset of Spawning	Calculated Emergence	Actual Emergence	Size mm FL
Deer Creek at A-line Road	9/13/95	2/5/95	3/13/95	34 mm
Deer Cree at Ponderosa Way	no spawning or temperature records			
Mill Creek at Big Bend	10/3/97	4/17/97	no surveys	
Mill Creek at Black Road	incomplete records		2/21/95	34-37 mm

Juvenile Rearing

In Deer Creek, only 12 fry were captured from March through June during 15 electrofishing surveys. Size ranged from 34 to 38 mm FL (Figure 1). Using an electroshocker, beach sein and minnow trap, weekly surveys continued through early August. No juvenile spring run were captured after early June. High flows in January, February, and March 1995 may have resulted in a spring emigration of these spring-run fry.

In Mill Creek, 51 fry were captured during 16 surveys from mid-February through August. In addition to Black Rock, we started sampling at Hole-in-the-Ground in August. Size ranged from 33 to 43 mm FL from late February through early June. By early August juveniles were 60-64 mm FL (Figure 2).

Both electrofishing and beach seining tend to capture the smaller juveniles residing in edge water and shallow riffle habitats. Therefore, these data may not represent all size ranges of spring run rearing in Mill and Deer creeks.

Fry and Yearling Emigration

Rotary screw traps were placed in Mill and Deer creeks to sample the outmigrants and record size range and timing of emigration (Figures 3, 4 and Tables 3 and 4). In both Mill and Deer creeks, these screw traps are placed in fall-run chinook salmon (fall run) spawning habitat. Since fall-run and spring-run fry emerge during the same time periods, if spring-run fry emigration occurred in the spring of 1995, we would be unable to distinguish the two runs in the trap catches.

FIGURE 1. Length frequency distribution (mm FL) of spring-run chinook salmon rearing in Deer Creek, December 1994-December 1995. Sample size = 14 fish.

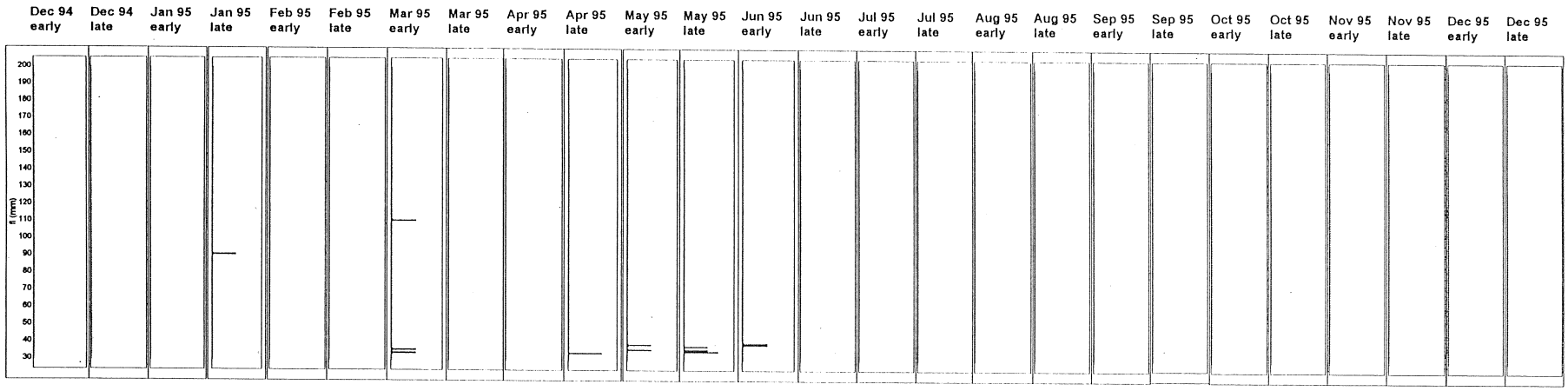
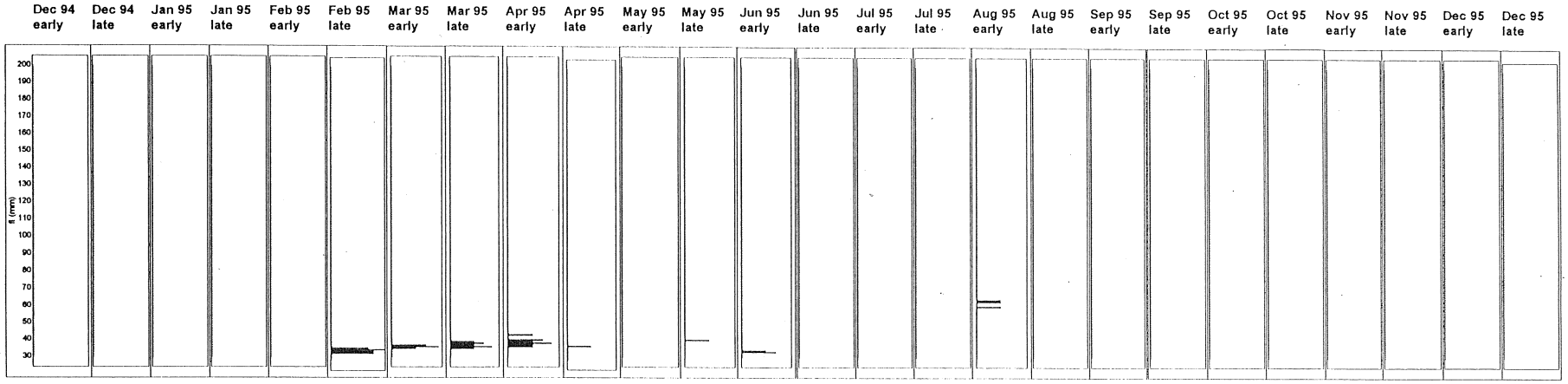


FIGURE 2. Length frequency distribution (mm FL) of spring-run chinook salmon rearing in Mill Creek, December 1994 - December 1995. Sample size = 51 fish.



Source: DFG, IFD, Red Bluff

FIGURE 3. Length frequency distribution (mm FL) of spring-run and fall-run chinook salmon emigration from Deer Creek, December 1994 - December 1995. Sample size - 107 fish.

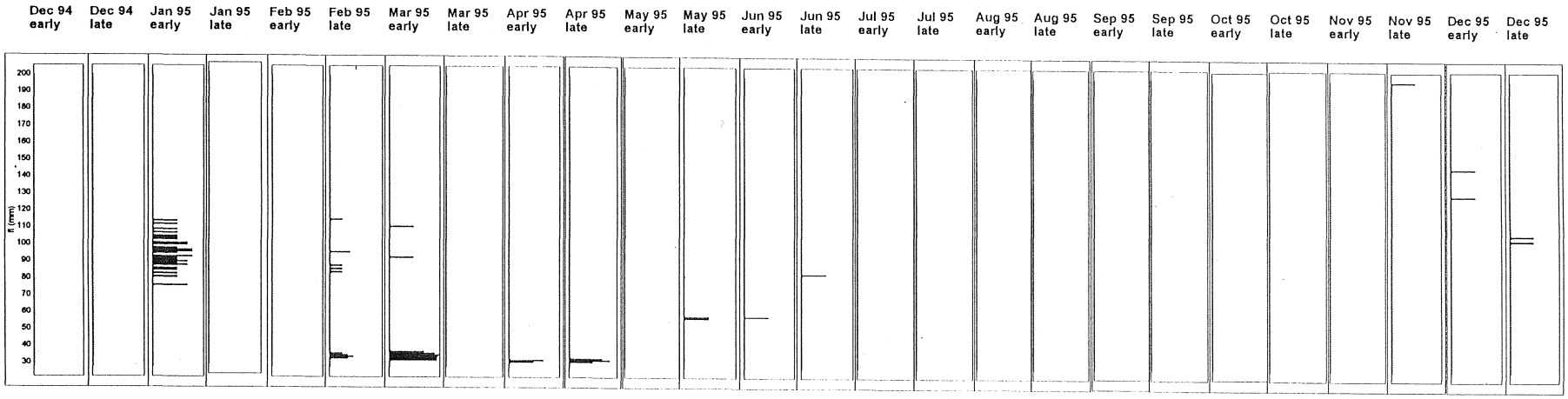
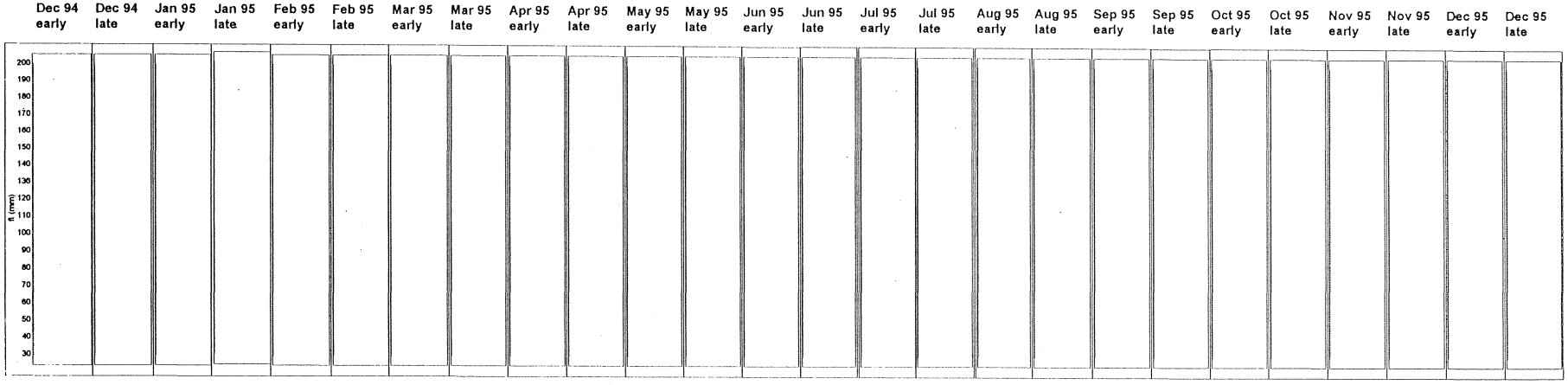


FIGURE 4. Length frequency distribution (mm FL) of spring-run and fall-run chinook salmon emigration from Mill Creek, December 1994 - December 1995. Sample size = 0 fish.



Source: DFG, IFD, Red Bluff

TABLE 3. 1994 BY spring-run and fall-run chinook salmon fry , and 1994 BY spring-run chinook salmon yearling emigration from December 1994 - June 1996 in Deer Creek.

Note: 93 BY yearlings are reported in 93 BY Annual Report, and 95 BY fry will be reported in a 95 BY report.

Deer Creek

Method: 5' rotary screw trap fished at canyon mouth: T25N, R1W, S22.

YEAR	1994	1995										1996					
MONTH	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.	SEP T. 1/	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.
DAY																	
1	0	0		4			0		0	0	0	0	0		0	0	
2	0	0		3			0		0	0	0	0	0		0	0	
3	0	0		9	in		0		0	0	0	0	0		0	0	in
4	0	0		7	0		0		0	0	1	0	0		0	out	0
5	0	0		3	0		0		0	0	1	0	0	in	0		0
6	0	0		0	0		0		0	0	0	0	out	0	0		0
7	0	out		2	3		1		0	0	0	0		0	0		0
8	0			0	0	in	0		0	0	0	0		0	0		0
9	0			out	0	0	0		0	0	0	0		0	0		0
10	0				0	0	0		0	0	0	0		0	0		0
11	0				0	0	0		0	0	0	0		0	0		0
12	0				0	0	0		0	0	0	0		0	0		0
13	0				0	0	0		0	0	0	0		0	0		0
14	0				0	0	0		0	0	0	0		0	0		0
15	0				0	0	0		0	0	out	0	in	0	1		0
16	0				0	0	0		0	0	in	out	1	0	0	in	0
17	0				0	0	0		0	0	0	0	0	0	0	0	0
18	0				0	0	1		0	0	0	0	0	0	0	0	0
19	0				0	0	0		0	0	0	in	out	0	out	0	0
20	0				0	0	0		0	0	0	0		0		0	0
21	0				0	0	0		0	0	0	0		0		0	0
22	0		in		0	0	out	in	0	0	0	1		0	in	0	0
23	0		4		0	0		0	0	0	0	0		0	0	0	0
24	0		2		0	0		0	0	0	0	0		0	0	0	0
25	0		0		0	0		0	0	0	0	0		0	0	0	0
26	0		2		3	1		0	0	0	0	0		0	0	0	0
27	0		0		1	1		0	0	0	0	0		0	0	0	0
28	0		2		1	0		0	0	0	1	0		0	0	0	0
29	0				2	0		0	0	1	0	1		0	0	0	0
30	0				0	0		0	0	0	0	0		0	0	out	out
31	0				out	0			0		1	0		0			
# TRAP DAYS	31	6	11	8	27	23	21	8	31	30	29	29	8	26	26	17	27
# TRAPPED																	
Fry	0	0	10	28	10	2	2	---	---	---	---	---	---	---	---	---	---
Yearling	---	---	---	---	---	---	---	0	0	1	4	2	1	0	1	0	0
SIZE RANGE MM FL																	
Fry	---	---	33-36	34-39	33-35	59-60	70-85	---	---	---	---	---	---	---	---	---	---
Yearling	---	---	---	---	---	---	---	---	---	200	107-149	101-118	105	---	123	---	---
AVERAGE MM FL																	
Fry	---	---	34	36	34	60	78	---	---	---	---	---	---	---	---	---	---
Yearling	---	---	---	---	---	---	---	---	---	200	125	110	105	---	123	---	---

1/ switched to an 8' screw trap.

TABLE 4. 1994 BY spring-run and fall-run chinook salmon fry emigration from December 1995 - June 1996 in Mill Creek.

Mill Creek

Method: 5' rotary screw trap fished at canyon mouth: T25N, R2W, S1.

YEAR	1994	1995										1996					
MONTH	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.
DAY																	
														0	0	0	0
													in	out	0	0	0
													0		0	0	0
													out		0	0	0
														in	0	0	0
														0	0	0	0
													in	0	0	0	0
											in		0	0	0	0	0
											0		0	0	0	0	0
											0		0	0	0	0	0
											0		0	0	0	0	0
											0		0	0	0	0	0
											0		0	0	0	0	0
											0		0	0	0	0	0
											out		0	0	0	0	0
													0	0	0	0	0
													0	0	0	0	0
													out	0	0	out	0
														0	0		0
														0	0		0
														0	0		0
														0	0		0
														0	0	in	0
														0	0	0	0
														0	0	0	0
													in	0	0	0	0
													0	0	0	0	0
													0	0	0	0	0
													0	0	0	0	0
														0	0	0	out
														0		0	
# TRAP DAYS												6	14	27	30	25	29
# TRAPPED																	
Fry												---	---	---	---	---	---
Yearling												0	0	0	0	0	0
SIZE RANGE MM FL																	
Fry												---	---	---	---	---	---
Yearling												---	---	---	---	---	---

No Sampling

The rotary screw trap in Deer Creek was fished from late February through June 1995. High flows prohibited sampling prior to February and during storms in March and May (Table 3). Fry were captured as soon as the trap started fishing in February, so it is unknown when fry emigration of the 1994 spring-run and fall-run brood years began. From February through April, fry in the 33-35 mm FL size range were trapped. Size increased to 59-60 mm FL by May and 85 mm FL in June (Figure 3 and Table 3). The rotary screw trap was removed in June and reinstalled in September. The first spring-run yearling outmigrant was trapped on 29 November. Only nine yearlings were trapped between November 1995 and April 1996. Size ranged from 101-200 mm FL (Table 3). Rotary screw traps may be biased towards trapping smaller fish, therefore, the size ranges trapped may not be representative of the entire population.

In Mill Creek a rotary screw trap was installed in December 1995. No spring-run yearlings were trapped in Mill Creek (Figure 4 and Table 4).

1993 BY Trapping

Yearling 1993 BY spring-run were also encountered during the rearing and emigration surveys in Deer Creek. Two yearlings were captured during electrofishing surveys at A-line on Deer Creek. A 91 mm FL and a 111 mm FL yearling were captured on 19 January and 13 March 1995, respectively. In the rotary screw trap, 44 yearling emigrants were captured from early January through March 1995. Size ranged from a minimum of 76 mm FL on 5 January to a maximum of 115 mm FL on 22 February 1995. No 93 BY yearlings were captured in Mill Creek during this same time period.

Recommendations

This 1994 BY is the second year that spring-run life history has been followed from adult migration through juvenile emigration. This life-history study is scheduled through four complete brood years. Knowledge of spring-run adult migration timing is crucial in coordinating instream flows with irrigation demands in Mill and Deer creeks. Data showing spring-run fry and yearling outmigration patterns is critical in negotiating Sacramento-San Joaquin Delta flow standards that protect spring-run smolts. Spring-run outmigrants from these tributaries need to be coded-wire tagged (CWT) to identify spring-run from other runs of similar size classes residing in the Delta. Recapturing of tagged smolts would also demonstrate when spring-run enter and exit the Delta. Although preparations were made to CWT fry and yearlings this year, the low sample sizes captured after the apparent fry emigration in the spring of 1995 made tagging impracticable

APPENDIX TABLE 1. Daily water temperature records for Deer Creek at A-Line: July 1994 - December 1995; The A-line Road crossing area is used by spring-run chinook salmon for adult holding and spawning, egg incubation, fry emergence, and juvenile rearing.

	JUL 94			AUG 94			SEP 94			OCT 94			NOV 94			DEC 94			JAN 95			FEB 95			MAR 95			APR 95			MAY 95			JUN 95			JUL 95			AUG 95			SEP 95			OCT 95			NOV 95			DEC 95		
DAY	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean
1	55.8	64.6	60.1	56.5	64.4	60.6	53.6	59.0	56.5	50.5	54.5	52.6	43.0	44.8	44.0	38.5	40.8	39.7	36.3	37.9	37.0	39.4	40.8	40.2	41.9	43.9	42.7	42.1	45.3	43.7	42.1	44.8	43.4	48.4	55.6	52.1	54.1	59.7	57.4	56.3	61.3	58.8	52.9	57.0	54.8	48.9	51.4	50.1	45.9	47.3	46.6	45.5	47.5	46.8
2	56.1	65.3	60.8	55.6	63.3	59.7	53.2	57.9	55.8	50.9	54.0	52.5	40.5	43.9	41.9	40.1	41.5	40.8	36.3	37.6	37.0	39.2	41.9	40.2	41.4	43.0	41.7	40.6	46.0	43.3	41.2	46.9	43.7	49.6	56.1	52.9	55.0	60.3	58.1	57.0	61.7	59.3	53.2	57.0	55.0	49.6	52.3	50.6	45.0	46.4	45.6	43.5	46.4	45.6
3	57.4	68.2	61.8	56.1	64.2	60.3	52.0	57.9	55.2				38.5	40.1	39.3	38.1	41.2	39.0	37.0	38.3	37.5	39.4	42.3	40.6	39.6	41.4	40.4	41.2	47.5	44.3	40.6	48.0	44.3	49.3	56.1	52.9	55.4	60.3	58.4	57.0	61.7	59.2	53.8	57.0	55.2	49.6	52.0	50.7	43.2	44.6	44.1	43.0	43.9	43.4
4	58.5	66.6	62.4	56.5	64.6	60.8	52.7	58.5	55.8	47.3	49.6	47.9	38.7	41.0	39.8	38.1	40.1	39.2	37.6	38.8	38.3	39.4	42.1	40.7	38.3	42.3	40.1	41.5	47.5	44.6	42.6	47.3	44.9	49.1	55.6	52.6	54.7	60.1	57.8	56.1	61.3	58.7	51.1	54.7	53.0	47.3	49.6	49.0	41.7	43.7	42.6	44.5	46.2	43.9
5	57.7	65.5	61.5	57.0	64.4	60.8	53.2	58.1	55.9	46.0	49.5	47.8	38.7	40.1	39.2	39.6	41.2	40.3	38.5	40.1	39.1	39.2	42.3	40.6	39.4	42.6	40.9	42.4	46.0	44.3	42.4	44.4	43.4	48.6	53.6	50.8	54.7	60.6	58.1	57.2	62.2	59.6	51.1	55.0	53.0	46.4	49.6	47.9	41.9	44.2	43.0	46.2	48.0	47.2
6	56.3	64.9	60.8	55.8	63.5	59.8	52.5	57.9	55.4	46.6	50.0	48.3	39.2	40.6	40.0	38.7	40.6	39.8	38.5	40.1	39.1	39.6	42.6	41.1	37.2	41.9	39.6	43.0	45.9	44.1	41.5	48.2	44.7	44.8	49.6	47.3	56.1	60.1	58.6	57.0	61.3	59.0	52.2	55.9	53.9	46.6	49.3	48.0	42.1	44.1	43.2	46.6	48.0	47.0
7	57.4	66.4	61.9	55.8	63.3	59.8	52.0	57.4	54.9	46.4	49.8	48.3	39.2	41.4	40.4	36.9	38.7	37.6	38.5	40.1	39.2	39.6	42.6	41.0	37.2	42.4	39.9	40.8	43.3	41.9	41.5	48.0	44.9	45.1	50.2	47.7	54.7	59.5	57.7	55.6	60.1	57.7	52.5	56.3	54.4	46.6	48.9	47.8	43.5	45.3	44.4	44.8	46.6	45.9
8	58.5	67.6	63.0	56.1	62.8	59.7	51.3	56.1	54.0	47.3	50.5	48.9	39.2	42.3	40.6	35.1	36.5	35.7	39.7	40.6	40.3	40.3	42.3	41.4	40.5	42.3	41.3	38.7	40.1	39.3	42.8	48.6	45.8	44.8	52.3	48.6	55.2	58.8	56.8	53.6	59.0	56.3	52.9	56.3	54.4	46.6	48.6	47.5	44.2	46.8	45.8	44.1	45.3	44.8
9	57.9	66.7	62.3	54.7	61.7	58.5	52.3	56.5	54.2	46.9	50.5	49.0	34.7	41.5	39.2	34.0	35.4	34.9	38.7	41.0	40.2	39.2	41.7	40.5	38.7	42.6	40.5	37.2	44.2	40.5	43.5	46.6	44.9	46.6	54.5	50.7	54.7	57.9	56.6	54.9	59.5	57.1	52.9	56.3	54.4	46.4	48.9	47.6	46.9	48.9	47.9	43.5	45.0	44.6
10	58.5	67.3	62.8	54.3	61.7	58.1	50.0	54.0	52.2	47.5	50.5	49.1	34.9	38.3	36.8	34.5	35.8	35.2	39.0	40.8	40.0	37.9	41.4	39.8	38.7	40.5	39.7	38.7	47.1	42.7	42.8	49.1	46.0	48.6	54.7	52.0	53.8	57.0	55.7	54.9	58.6	56.6	52.5	56.1	54.3	47.5	50.0	48.7	44.8	47.3	45.9	43.0	44.8	43.8
11	58.5	67.3	62.9	53.6	61.7	57.8	49.5	54.1	51.8	45.9	49.1	47.7	37.2	40.1	38.7	35.6	37.6	36.8	39.6	40.6	40.0	37.6	42.1	39.8	39.4	41.2	40.1	41.9	48.2	44.9	44.4	47.7	46.0	48.7	55.0	52.3	51.8	56.3	54.5	52.9	57.6	55.2	53.2	57.4	55.2	47.3	49.8	48.7	44.2	45.9	45.2	44.8	46.4	45.5
12	59.2	67.3	63.2	53.8	61.2	57.7	49.1	53.6	51.4	46.4	49.6	48.0	37.9	40.1	39.2	36.1	37.0	36.6	40.6	41.5	41.2	40.3	42.3	41.1	39.6	43.0	41.1	41.9	45.5	43.8	41.2	44.1	42.5	47.5	54.9	51.7	51.8	56.3	54.3	53.2	57.9	55.5	54.7	57.9	56.1	47.8	49.5	48.7	45.5	48.0	46.8	44.1	46.6	45.9
13	58.3	66.9	62.6	53.8	61.7	58.1	48.4	53.2	50.9	45.9	48.4	47.3	36.3	37.8	37.1	36.9	39.0	38.0	39.0	41.5	40.4	36.9	41.2	38.4	39.2	41.5	40.4	38.7	44.2	40.7	40.8	47.8	43.9	48.4	54.0	51.7	52.3	57.9	55.4	54.0	57.6	55.9	54.7	58.1	56.3	46.6	49.1	47.8	46.4	47.5	46.9	42.3	43.9	43.0
14	58.6	67.3	63.1	55.0	62.1	58.7	48.7	54.1	51.7	46.4	48.6	47.4	35.6	37.2	36.5	37.6	38.7	38.3	38.7	40.3	39.4	34.7	37.6	36.2	40.8	42.3	41.4	38.1	45.1	41.3	42.6	48.2	45.2	49.3	53.1	50.6	54.7	59.7	57.5	54.5	59.5	56.9	55.6	59.0	57.0	47.1	49.3	48.1	45.5	47.3	46.5	41.0	42.8	42.0
15	59.4	67.8	63.8	54.7	61.7	58.3	50.5	55.6	53.2	43.5	46.0	44.8	36.3	37.2	36.9	37.6	39.4	38.6	38.7	40.1	39.4	34.7	38.5	36.6	39.0	44.1	41.3	39.2	42.1	40.3	43.7	46.6	44.7	47.7	50.5	48.5	56.1	61.2	58.8	55.9	60.6	58.0	54.3	57.4	56.0	47.5	49.5	48.4	45.5	46.9	46.3	40.5	43.2	41.8
16	60.6	68.4	64.7	54.7	61.9	58.4	51.3	56.1	53.8	42.6	46.2	44.5	38.7	38.7	37.6	38.7	40.3	39.6	38.1	39.4	38.8	37.2	39.4	38.4	40.3	46.0	42.5	39.0	45.9	41.9	43.5	50.7	46.8	46.0	50.4	47.8	56.1	61.3	59.1	55.6	57.9	56.8	53.6	56.5	54.9	47.3	49.1	48.2	46.2	48.4	47.2	39.6	40.5	40.0
17	60.6	68.5	64.5	54.9	61.7	58.6	52.0	56.5	54.4	43.9	46.4	45.1	35.6	37.2	36.5	38.7	40.6	39.8	36.3	39.4	37.9	38.3	41.5	39.9	40.3	46.0	42.8	40.3	43.5	42.0	45.5	52.5	49.1	48.4	50.4	49.3	57.2	60.6	59.2	52.9	57.0	54.9	52.5	55.6	54.1	47.8	49.8	48.6	45.9	47.1	46.4	38.5	40.1	39.4
18	59.0	67.3	63.3	54.7	61.3	58.2	52.3	56.3	54.5	43.3	46.4	45.0	34.2	35.6	35.0	39.4	41.5	40.7	38.7	40.3	39.5	39.6	42.1	40.9	41.7	43.7	42.7	39.4	45.7	42.4	45.3	53.4	49.4	48.6	52.0	50.3	57.9	61.9	59.7	52.2	57.0	54.5	53.2	56.3	54.6	47.8	49.8	48.8	46.4	48.6	47.6	39.9	41.5	40.7
19	59.4	67.8	63.8	55.0	61.7	58.6	52.2	56.1	54.3	43.5	46.4	45.1	33.3	35.6	34.5	38.5	40.1	39.2	38.3	39.8	39.0	39.4	41.7	40.9	40.5	43.7	42.0	39.7	46.0	42.9	45.9	53.8	49.8	47.8	53.8	51.0	56.5	59.7	58.0	53.2	58.1	55.6	53.6	56.5	55.0	47.8	49.6	48.7	44.8	46.4	45.5	38.7	40.3	39.6
20	61.7	69.8	65.9	54.1	60.6	57.6	52.2	56.7	54.6	43.3	46.0	44.7	35.6	39.4	37.7	38.1	39.4	38.8	38.1	40.5	39.4	39.4	42.3	40.9	38.7	41.9	40.8	39.9	44.2	42.3	45.3	53.6	49.5	47.3	54.1	51.0	54.7	60.3	57.6	54.7	59.2	56.7	53.8	56.8	55.1	47.1	48.7	48.0	44.6	45.3	44.9	38.1	39.6	38.7
21	62.1	69.4	65.7	53.8	60.1	57.1	52.2	56.5	54.5	42.8	46.0	44.4	37.9	39.6	38.7	37.2	39.2	38.1	39.0	40.8	40.0	39.4	42.6	41.1	37.9	40.8	39.3	39.4	46.6	43.0	46.2	53.1	49.8				55.8	60.8	58.4	55.6	60.1	57.6	53.8	55.8	54.7	45.7	48.2	47.4	44.6	46.4	45.4	37.8	38.3	38.0
22	62.1	67.8	64.6	53.1	59.7	56.6	52.2	55.2	53.9	43.3	46.2	44.8	35.8	37.4	36.6	37.2	38.5	37.7	39.9	41.4	40.7	39.4	42.8	41.3	34.0	39.0	35.7	41.7	49.1	45.2	47.3	52.3	49.7				54.7	59.7	57.4	56.5	59.0	57.5	52.3	54.9	53.5	43.7	45.5	44.7	44.8	46.6	45.5	37.8	38.8	38.5
23	60.3	67.8	64.1	52.9	59.5	56.4	51.6	55.8	53.8	43.5	46.4	45.0	34.9	36.9	36.0	38.3	38.3	37.3	40.1	41.9	40.9	39.9	43.3	41.7	36.3	38.3	37.3	42.8	50.2	46.6	46.0	53.2	49.7	52.9	59.5	56.5	54.1	59.5	57.0	56.1	60.8	58.2	51.3	54.0	52.5	43.2	45.1	44.0	44.2	45.3	44.9	37.2	38.3	37.8
24	59.0	66.6	62.7	52.7	59.2	56.1	52.7	55.6	54.2	43.7	46.8	45.2	36.3	40.1	38.3	37.2	39.0	38.1	40.6	41.5	41.2	39.4	43.0	41.4	36.7	40.3	38.1	43.5	51.1	47.4	46.4	52.2	49.4	54.1	60.3	57.6	54.7	60.1	57.4	55.9	59.0	57.4	51.6	54.0	52.7	42.6	44.4	43.5	43.5	44.8	44.4	36.5	37.4	37.1
25	56.3	64.8	60.6	52.5	59.0	56.1	52.7	56.7	54.9	44.1	46.9	45.6	37.0	38.8	37.8	36.7	37.9	37.3	40.3	41.5	41.0	38.7	42.8	41.1	36.3	41.4	38.7	43.2	50.7	47.3	46.0	53.2	49.6	54.9	60.8	58.2	54.3	59.2	56.9	53.4	57.6	55.5	51.6	53.8	52.6	42.3	44.4	43.2	43.5	46.2	45.0	36.3	37.8	37.2
26	56.5	64.9	61.0	53.1	58.3	55.9	52.9	56.7	54.9	45.0	48.4	46.8	36.3	37.2	36.8	37.2	40.8	39.1	37.2	41.4	39.4	39.4	43.5	41.7	36.9	42.3	39.3	42.8	49.5	46.5	46.4	54.1	50.4	55.6	61.5	58.9	53.2	59.0	56.4	51.6	55.9	53.8	51.4	53.6	52.4	43.5	46.6	45.0	42.1	45.7	43.7	36.7	38.7	37.9
27	57.4	63.5	60.7	52.9	59.4	56.3	52.5	55.6	54.4	46.0	48.4	47.4	36.3	37.8	37.0	38.5	40.3	39.4	37.2	40.1	38.9	40.6	43.9	42.4	37.9	42.6	40.2	42.4	47.1	43.8	48.2	53.1	50.6	55.0	61.2	58.6	54.0	59.5	56.9	51.1	55.2	53.3	51.4	53.6	52.4	45.9	48.0	47.0	41.0	42.6	41.7	38.7	40.3	39.5
28	57.7	66.0	61.8	52.9	58.5	55.8	53.2	55.4	54.4	48.0	49.8	48.8	36.1	37.2	36.5	36.9	38.7	37.5	39.7	41.5	40.7	40.5	44.1	42.1	38.7	43.5	41.2	42.1	44.8	43.3	46.6	54.7	50.6	55.0	61.0	58.3	56.5	61.7	59.1	51.1	55.2	53.1	49.3	51.3	50.6	47.1	48.7	47.7	41.7	44.1	43.1	38.7	40.3	39.6
29	58.5	64.2	61.4	52.0	58.1	55.3	51.4	54.1	53.2	44.4	47.5	45.4	35.8	37.9	36.7	36.0	37.0	36.5	40.8	42.8	41.8				38.7	43.9	41.3	40.8	44.2	42.5	46.6	55.0	51.1	54.5	60.8	58.1	56.5	60.6	58.8	51.3	55.8	53.4	48.0	50.4	49.3	46.9	48.4	47.6	42.8	43.5	43.1	40.3	41.5	41.1
30	57.0	65.1	61.3	52.9	59.5	56.4	50.0	53.6	51.9	41.9	44.2	43.3	37.2	40.1	38.4	34.7	36.5	35.5	41.5	42.6	41.9				39.2	44.2	42.0	40.6	45.5	42.9	47.8	54.7	51.4	55.0	60.4	58.3	60.1	61.0	56.7	51.4	55.9	53.7	48.2	50.9	49.4	46.2	48.0	47.2	42.8	45.7	44.5	41.4	42.1	41.7
31	57.0	64.9	61.0	54.1	59.9	57.1				41.9	44.8	43.3				35.1	37.0	36.1	40.3	41.5	41.0				40.3	44.8	42.7				47.8	55.0	51.5				56.1	61.2	58.6	51.8	56.1	53.8				46.6	48.6	47.6				40.8	42.3	41.4
	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean
	55.8	69.8	62.6	52.0	64.6	58.0	48.4	59.0	54.0	41.9	54.5	46.8	33.3	44.8	38.1	34.0	41.5	38.2	36.3	42.8	39.7	34.7	44.1	40.4	34.0	46.0	40.5	37.2	51.1	43.3	40.6	55.0	47.3	44.8	61.5	52.7	51.8	61.9	57.5	51.1	62.2	56.4	48.0	59.0	53.9	42.3	52.3	47.6	41.0	48.9	45.1	36.3	48.0	41.9

Source: Dept. Fish & Game, IFD, Red Bluff

APPENDIX TABLE 2. Daily water temperature records for Deer Creek at Ponderosa Way: July 1994 - December 1995; The Ponderosa Way area is used by spring-run chinook salmon for adult holding and spawning, egg incubation, fry emergence, and juvenile rearing.

	JUL 94			AUG 94			SEP 94			OCT 94			NOV 94			DEC 94			JAN 95			FEB 95			MAR 95			APR 95			MAY 95			JUN 95			JUL 95			AUG 95			SEP 95			OCT 95			NOV 95			DEC 95		
DAY	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean
1	thermograph stolen																		39.7	41.2	40.4	42.8	45.1	44.2	41.9	44.2	43.2	45.0	49.1	47.0	44.1	49.8	46.9	54.1	57.7	56.1	59.0	64.4	61.5	60.3	66.9	63.5	55.6	61.7	58.6	50.9	55.2	52.9	48.6	50.7	49.7	47.3	49.1	48.2
2																			40.3	41.5	40.9	43.0	44.8	44.2	40.8	43.0	42.1	45.7	49.1	47.6	46.0	49.1	47.7	55.0	57.4	56.2	59.5	65.1	62.1	60.8	67.3	64.0	56.3	62.1	59.0	51.1	55.8	53.4	47.3	49.1	48.2	47.3	49.6	48.6
3																			41.2	42.8	41.9	42.4	44.6	43.8	42.1	44.6	43.1	46.6	48.6	47.5	45.5	48.6	46.2	52.0	56.3	54.2	59.9	65.5	62.4	61.2	67.3	64.1	56.8	61.9	59.0	52.0	56.3	53.9	45.9	48.6	46.9	45.9	47.3	46.4
4																			42.1	42.8	42.5	42.8	45.0	44.3	40.5	43.2	41.8	46.6	48.4	47.4	45.0	49.1	46.7	49.5	52.0	50.3	59.5	65.1	61.9	60.4	66.9	63.6	54.9	60.1	57.3	50.5	54.1	52.2	43.7	46.0	45.1	46.0	47.8	47.0
5																			42.8	43.9	43.4	43.0	44.8	44.1	40.8	42.8	41.9	44.1	46.0	45.3	45.5	49.1	47.8	49.1	51.8	50.2	59.0	65.5	62.1	61.2	67.3	64.1	54.1	59.9	56.8	49.3	53.2	51.1	44.1	46.8	45.2	47.8	50.0	49.0
6																			43.9	45.5	44.5	43.5	45.0	44.4	42.4	45.9	43.7	41.5	44.2	42.2	46.8	49.8	48.4	48.9	53.2	51.1	60.4	65.7	62.7	61.3	66.9	63.8	54.7	60.6	57.4	48.9	53.2	50.9	43.7	46.6	45.1	48.7	50.0	49.4
7																			44.8	46.8	45.8	42.1	44.1	43.2	42.8	47.1	45.4	40.3	44.8	42.6	46.9	49.5	47.7	51.3	55.4	53.4	59.2	64.9	61.8	60.1	65.5	62.4	55.6	61.2	58.2	48.6	52.5	50.5				47.7	49.5	48.5
8																			43.7	45.3	44.5	41.2	43.0	42.3	43.2	45.3	44.2	42.1	47.7	44.9	46.0	50.5	48.2	53.6	57.0	55.0	59.4	63.3	61.0	58.1	64.2	61.0	55.8	61.3	58.4	48.4	52.2	50.2	45.9	49.1	47.7	46.4	48.4	47.4
9																			43.5	44.2	43.9	41.0	43.2	42.3	43.3	44.4	43.7	45.9	49.1	47.5	47.8	50.4	48.8	53.8	57.9	55.4	58.5	63.9	60.8	58.5	64.6	61.4	55.8	61.2	58.4	48.6	52.3	50.3	48.7	50.7	49.7	46.2	47.5	46.8
10																			44.4	46.0	45.2	42.8	44.4	43.5	43.5	45.7	44.5	46.0	48.7	47.0	44.1	47.3	44.9	53.2	57.0	54.9	57.0	61.5	59.1	58.8	63.9	61.0	55.8	61.2	58.3	49.1	53.2	51.1	48.2	50.2	49.2	45.3	46.9	46.0
11																			44.6	46.0	45.3	40.1	42.8	41.9	43.5	45.3	44.3	42.3	47.3	44.0	44.1	48.6	45.8	53.4	56.3	54.7	55.2	59.9	57.6	56.8	62.8	59.5	56.1	61.9	58.9	49.6	52.9	51.3	46.6	49.1	47.9	46.8	49.8	48.0
12																			42.8	44.6	43.3	37.4	39.6	38.4	45.0	46.0	45.5	41.2	45.7	43.3	46.0	49.1	47.2	52.0	54.3	53.3	54.9	59.0	56.7	56.3	62.8	59.4	57.6	63.1	60.1	49.6	52.9	51.1	47.3	50.0	48.7	47.8	50.7	49.3
13																			42.3	43.3	42.7	37.6	40.1	38.6	42.1	46.6	44.6	42.1	44.8	42.7	46.6	49.1	47.4	50.2	52.3	51.4	54.9	62.2	58.6	57.2	62.8	59.9	57.9	63.1	60.3	49.3	53.1	50.9	48.2	51.1	49.6	45.1	48.0	46.5
14																			41.2	42.3	41.8	38.3	41.7	40.0	43.5	47.3	45.6	41.5	46.0	43.8	46.6	51.3	49.0	49.5	50.5	50.0	57.7	64.9	61.2	57.9	64.4	61.0	58.8	63.7	60.9	49.6	53.6	51.4	48.6	50.5	49.4	43.7	46.0	44.7
15																			39.7	41.7	40.7	40.1	43.5	41.9	43.9	48.0	46.0	43.5	45.5	44.5	49.8	53.2	51.4	50.9	52.3	51.6	59.5	66.6	62.8	59.5	65.5	62.3	57.7	62.8	60.2	49.5	53.2	51.3	48.0	50.0	49.1	44.1	47.3	46.4
16																			41.5	42.8	42.1	42.1	45.3	43.6	45.3	47.8	46.1	42.8	46.0	44.7	50.4	53.8	52.3	51.4	54.1	52.6	59.9	66.7	63.3	60.1	63.9	61.6	57.4	61.9	59.4	49.5	52.9	51.0	48.7	50.9	49.8	42.1	43.5	42.7
17																			40.8	42.6	41.7	42.3	46.0	43.9	43.5	45.9	44.8	43.2	46.6	45.1	50.9	54.1	52.8				60.8	66.2	63.4	56.8	61.7	59.1	55.8	60.8	58.1	49.1	53.2	51.1	48.6	50.7	49.7	41.0	42.8	42.1
18																replaced			41.2	42.8	42.0	42.6	46.0	44.0	42.6	45.3	44.2	43.9	46.0	45.0	50.5	54.0	52.5				61.7	67.6	64.5	55.6	61.9	58.6	55.8	61.3	58.3	49.8	53.6	51.6	49.8	51.1	50.4	42.3	43.5	42.9
19																39.6	41.0	40.3	42.4	43.7	42.8	42.8	45.9	44.0	41.0	42.8	42.0	42.3	47.8	45.0	50.9	54.0	52.7				60.6	66.6	63.3	56.5	63.1	59.6	56.5	61.7	59.0	50.5	53.8	51.9	48.0	49.8	49.0	40.8	42.4	41.7
20																39.0	41.0	40.0	42.8	44.4	43.5	43.2	46.0	44.3	38.3	42.1	39.5	45.0	50.0	47.5	51.3	54.0	52.8				59.2	65.5	62.3	57.9	64.0	60.8	57.0	62.1	59.3	49.6	52.9	51.2	46.4	48.6	47.7	39.7	41.4	40.6
21																38.5	40.3	39.5	43.9	45.5	44.6	43.3	46.6	44.5	39.6	40.8	40.2	46.9	51.4	49.2	50.5	53.6	52.6	53.2	58.1	55.3	59.5	66.2	62.7	59.2	65.1	62.0	57.0	60.8	58.8	49.1	52.0	50.3	46.9	48.6	47.8	39.2	41.2	39.9
22																39.6	40.8	40.2	44.2	45.3	44.8	43.5	46.0	44.4	39.6	42.4	41.0	48.6	52.0	50.4	50.9	53.6	52.0	55.2	60.4	57.6	58.6	64.9	61.8	60.1	64.4	62.0	56.3	59.5	58.0	46.0	49.1	47.5	46.9	48.9	48.0	39.2	41.2	40.0
23																37.9	39.9	38.9	43.7	45.1	44.4	42.8	45.3	43.8	39.7	42.8	41.4	48.6	51.4	50.3	50.4	54.0	52.5	57.2	62.6	59.6	57.9	64.6	61.0	60.4	66.2	63.0	54.7	59.2	56.8	45.1	48.6	46.7	46.6	48.7	47.6	38.8	40.5	39.8
24																39.0	41.9	40.4	41.9	44.6	43.7	43.3	46.0	44.4	40.1	44.1	42.0	48.6	50.9	49.4	51.4	54.7	53.4	58.8	63.9	61.1	58.3	64.9	61.5	60.4	64.9	62.2	54.5	57.9	56.1	44.2	47.7	45.7	46.2	48.2	47.2	37.8	39.4	38.6
25																40.3	41.7	41.0	41.5	43.7	42.6	44.2	46.6	45.3	40.8	44.8	42.8	46.0	49.6	47.5	52.9	55.0	53.8	59.9	65.5	62.1	58.3	64.4	61.3	57.6	62.8	60.0	54.5	58.6	56.2	43.7	46.9	45.3	46.6	48.4	47.4	38.1	39.7	38.9
26																39.6	41.2	40.7	43.5	45.3	44.4	44.2	45.7	44.8	41.7	46.0	43.7	45.3	46.8	45.9	51.1	55.0	53.3	60.6	66.0	62.8	57.4	63.9	60.7	55.6	61.2	58.3	54.3	58.3	56.1	44.8	48.6	46.7	44.2	47.7	46.2	37.9	40.3	39.4
27																37.8	39.6	38.5	44.6	46.6	45.5	44.4	46.0	45.3	41.7	46.0	43.9	43.9	47.5	46.0	52.0	55.6	54.2	61.2	66.0	63.1	57.6	64.4	61.0	54.7	60.4	57.4	54.1	58.1	55.9	46.6	50.4	48.4	42.8	44.4	43.6	39.9	41.9	40.9
28																37.0	38.5	37.8	45.9	46.8	46.1	44.1	45.3	44.8	42.4	46.8	44.7	43.5	48.6	45.7	53.2	55.6	54.5	61.0	65.5	62.8	59.5	66.7	63.1	54.5	59.9	57.0	53.2	55.8	54.3	48.2	51.1	49.7	42.6	45.7	44.3	40.8	42.1	41.6
29																36.9	39.0	37.9	44.2	46.0	45.1				43.7	46.6	45.3	45.9	48.4	47.1	53.1	55.8	54.6	60.1	65.1	62.3	60.6	65.7	63.1	54.1	60.1	57.0	50.9	55.0	52.8	48.6	51.4	50.0	44.4	46.4	45.3	42.1	44.4	43.2
30																38.5	40.5	39.4	43.3	44.6	44.2				45.7	47.8	46.5	44.6	48.7	46.5	53.8	56.5	55.3	60.4	64.9	62.3	59.9	66.2	62.8	54.5	60.6	57.3	50.5	54.7	52.5	48.4	51.1	49.7	45.1	47.7	46.5	44.4	45.3	44.9
31																38.8	40.3	39.5	42.1	44.8	43.5				43.9	48.0	45.8				54.7	57.2	56.1				60.6	66.9	63.4	54.7	60.6	57.6				48.9	51.1	50.0				42.8	45.1	44.4
	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean
																36.9	41.9	39.5	39.7	46.8	43.5	37.4	46.6	43.4	38.3	48.0	43.7	40.3	52.0	46.1	44.1	57.2	50.6	48.9	66.0	56.1	54.9	67.6	61.7	54.1	67.3	60.8	50.5	63.7	57.8	43.7	56.3	50.3	42.6	51.1	47.6	37.8	50.7	44.3

APPENDIX TABLE 3. Daily water temperature records for Mill Creek at Big Bend: July 1994 - December 1995; The Big Bend area is used by spring-run chinook salmon for adult holding and spawning, egg incubation, fry emergence and juvenile rearing.

	JUL 94			AUG 94			SEP 94			OCT 94			NOV 94			DEC 94			JAN 95			FEB 95			MAR 95			APR 95			MAY 95			JUN 95			JUL 95			AUG 95			SEP 95			OCT 95			NOV 95			DEC 95		
DAY	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean
1	52.5	63.3	58.0	53.2	63.3	58.1	51.1	59.5	54.8	48.9	54.5	51.4	43.2	44.1	43.8	39.6	40.8	40.2	36.1	37.9	37.0	38.7	39.9	39.2	40.8	42.8	42.0	40.6	44.8	42.5	39.7	41.9	40.9	43.3	54.1	47.7	45.0	56.5	50.2	48.6	61.5	55.0	47.8	57.2	53.2	45.3	51.8	49.0	43.7	48.0	46.1	46.2	47.1	46.5
2	53.2	63.7	58.7	52.3	62.1	57.2	50.7	58.5	54.3	48.7	54.9	51.4	39.0	42.8	40.7	39.9	40.8	40.3	36.0	37.2	36.8	38.5	41.7	39.5	39.9	41.7	40.5	38.5	45.9	42.1	39.7	45.3	41.9	43.9	54.5	48.1	45.9	58.3	51.2	49.1	61.7	55.5	48.0	57.4	53.3	45.5	52.3	49.3	41.9	46.6	44.5	43.7	46.9	44.8
3	54.5	64.4	59.5	53.2	63.5	58.0	50.0	58.3	53.8	46.2	51.4	48.8	36.5	39.9	38.0	32.5	39.9	34.8	36.9	37.9	37.4	38.7	42.3	40.0	38.1	40.3	39.4	38.8	47.1	42.9	39.6	47.1	42.7	43.0	52.9	47.5	46.4	58.5	51.2	48.9	61.3	55.2	49.1	57.4	53.5	46.0	52.3	49.7	39.2	44.8	42.0	40.8	43.5	42.0
4	55.2	63.9	59.8	53.2	63.7	58.4	50.0	58.8	54.2	44.8	48.0	46.2	37.8	40.8	39.1	34.0	38.5	35.9	37.6	38.5	38.1	38.8	41.9	40.1	38.7	42.1	40.2	39.6	47.3	43.4	41.2	46.0	43.2	43.2	54.7	47.8	45.7	58.5	51.1	48.2	61.9	55.2	45.3	54.5	50.9	43.9	50.2	47.2	38.5	42.6	41.0	41.5	45.7	43.4
5	54.1	63.5	58.9	53.8	63.9	58.5	51.3	57.9	54.7	44.2	49.8	46.9	35.8	38.7	37.2	38.5	40.3	39.4	37.2	38.3	37.9	38.7	42.1	40.1	39.2	42.8	40.7	40.8	44.8	42.8	40.8	43.0	41.9	43.0	50.7	46.1	46.0	59.5	51.6	49.8	61.9	56.1	46.4	55.6	51.6	43.5	49.3	46.7	40.3	43.9	42.0	45.3	47.7	46.2
6	52.0	63.3	57.9	52.9	63.0	57.8	50.0	58.6	54.1	44.8	50.9	47.5	35.8	39.2	37.4	37.0	39.6	38.2	35.6	38.3	37.0	39.2	42.3	40.5	36.3	42.4	39.5	40.3	42.8	42.2	40.8	46.0	43.2	40.8	48.6	44.2	46.8	58.1	51.6	49.6	60.6	55.3	47.5	56.1	52.6	43.7	49.5	47.0	39.4	43.7	42.2	44.4	47.7	46.0
7	53.8	64.8	59.5	52.7	62.8	57.6	49.3	57.9	53.4				38.5	42.8	40.0	35.2	37.2	36.1	33.3	36.9	35.3	38.7	42.3	40.5	36.7	42.8	39.8	38.7	41.2	39.9	39.9	46.2	43.2	41.9	50.0	45.3	46.0	58.5	51.4	48.6	59.5	54.1	47.8	56.7	52.9	43.0	49.1	46.6	42.3	46.0	44.0	43.9	46.4	45.1
8	55.0	66.2	60.5	53.2	62.2	57.4	48.7	56.7	52.4	44.4	51.1	47.7	37.8	40.5	39.5	33.3	35.4	34.3	35.4	37.0	36.4	39.6	43.5	41.0	39.6	40.6	40.2	37.8	39.6	38.6	41.4	48.2	44.5	41.5	52.3	46.7	46.8	56.1	50.8	45.5	58.6	52.5	48.0	56.5	53.0	43.0	49.1	46.4	43.2	47.3	44.9	41.7	44.8	43.5
9	54.1	64.9	59.7	51.1	61.3	56.0	51.4	56.5	53.2	45.7	51.1	48.3	31.6	41.0	35.5	32.7	34.9	33.7	34.9	38.5	36.8	38.3	42.1	40.0	37.0	40.8	38.5	36.1	43.3	39.7	41.5	44.8	43.1	42.3	54.3	47.8	47.8	55.6	51.2	48.0	59.5	54.2	48.4	56.3	53.0	43.2	49.3	46.7	46.9	48.4	47.6	42.8	45.3	44.0
10	55.0	65.5	60.3	51.1	61.0	55.8	48.0	55.0	51.1	46.2	51.4	48.4	32.7	37.8	34.8	33.1	35.4	34.2	36.3	38.5	37.7	37.6	41.7	39.6	37.8	40.1	38.6	37.6	46.4	41.7	40.8	48.9	44.6	43.3	54.9	48.4	45.7	55.6	50.1	48.4	58.5	53.6	48.0	56.5	53.0	44.8	50.9	48.0	42.4	46.6	44.5	40.8	43.7	42.5
11	55.0	65.5	60.4	50.5	61.0	55.5	47.5	54.3	50.6	44.1	49.8	46.9	36.9	39.7	38.2	34.9	37.2	36.3	36.5	38.1	37.3	37.8	42.3	39.9	38.3	39.6	38.9	40.3	46.9	43.3	41.5	46.4	43.8				44.2	55.8	49.6	46.4	57.6	52.4	49.5	57.6	54.1	45.0	49.8	47.9	41.5	45.7	43.7	43.5	45.3	44.8
12	55.2	65.5	60.4	50.4	60.8	55.4	46.6	52.2	49.4	46.0	49.5	47.4	36.7	40.3	38.7	33.1	36.3	34.5	37.9	39.4	38.7	39.4	40.8	40.2	37.6	41.7	39.6	40.8	43.5	42.2	39.4	43.2	41.0				44.8	54.7	49.5	46.6	58.1	53.0	50.4	58.5	54.8	43.9	49.8	47.3	45.3	48.6	46.7	42.4	45.3	44.3
13	54.0	64.8	59.6	50.5	61.3	55.8	45.3	53.2	49.0	43.0	49.1	45.8	34.0	37.2	35.6	36.5	38.3	37.4	36.0	39.2	37.5	35.4	39.2	37.1	36.9	40.1	38.7	37.2	41.4	39.6	39.4	47.5	43.3				45.1	58.8	51.5	47.8	57.9	53.5	50.5	58.5	54.9	43.3	49.1	46.3	43.7	47.5	45.9	40.8	43.2	42.0
14	55.0	65.5	60.2	52.0	61.7	56.5	46.9	55.6	50.8	45.9	48.6	46.9	33.8	37.0	35.4	34.9	38.3	36.6	35.8	37.9	37.4	33.8	38.7	36.2	39.4	40.3	39.8	37.0	43.5	40.3	40.8	47.5	44.0				47.1	60.1	53.1	48.9	60.4	55.0	51.3	58.5	55.2	42.8	49.1	46.3	43.0	46.6	45.5	40.1	42.8	41.2
15	55.8	66.0	61.0	51.1	61.5	56.1	48.6	56.5	52.1	42.1	46.6	44.0	32.0	36.9	34.4	36.1	38.5	37.4	37.2	39.0	38.2	34.3	40.1	37.1	37.9	42.8	40.0	37.6	40.8	39.1	41.9	44.1	43.1	43.2	45.1	43.9	47.7	60.8	53.5	50.0	60.6	56.0	49.6	57.2	54.1	44.1	49.8	47.4	43.5	46.6	45.4	36.9	42.6	39.1
16	57.0	66.7	61.9	51.4	61.5	56.2	48.9	56.5	52.5	41.4	46.8	43.6	33.6	37.2	35.6	37.8	39.0	38.3	37.2	38.1	37.6	36.3	40.3	38.5	39.0	44.2	41.2	37.4	45.3	41.3	42.1	49.6	45.5	43.0	49.6	45.5	47.3	61.0	53.6	50.9	57.7	54.5	49.5	56.5	53.4	44.1	49.6	47.3	45.7	47.8	46.8	38.7	40.1	39.3
17	57.2	66.7	61.9	52.0	61.7	56.5	50.0	57.2	53.3	42.1	46.0	43.9	33.8	35.6	34.9	38.3	40.3	39.2	34.9	38.7	37.0	37.6	42.3	39.9	39.2	45.1	41.8	38.5	42.6	40.6	42.6	51.4	46.6	44.1	47.5	45.7	48.2	60.1	53.1	46.8	56.1	52.1	48.2	56.1	52.6	43.7	49.3	47.1	42.8	47.3	45.3	37.2	40.1	38.7
18	55.0	65.5	60.4	51.4	61.2	56.2	50.2	55.9	53.1	41.5	47.3	44.2	32.5	35.4	33.8	39.0	40.8	39.9	38.1	39.7	38.9	37.9	42.6	40.8	39.9	42.4	41.2	37.9	45.5	41.4	41.5	52.3	46.6	44.4	49.6	46.3	49.1	58.5	53.0	46.2	57.7	52.3	49.1	56.5	53.3	44.8	49.8	47.7	45.7	49.6	47.0	39.8	41.5	40.3
19	55.8	66.0	61.1	52.5	61.5	56.7	49.8	57.2	53.4	42.1	47.3	44.4	32.5	35.1	33.4	37.8	39.2	38.5	37.2	39.6	38.4	38.3	42.4	40.6	39.6	43.5	41.0	37.2	46.0	41.8	42.3	52.9	47.0	43.5	51.4	46.8	48.0	57.0	51.9	47.5	59.0	53.8	49.6	56.8	53.7	43.9	49.1	47.1	42.1	46.6	44.3	37.2	40.8	39.0
20	58.6	68.4	63.4	51.3	60.6	55.6	49.8	57.2	53.3	41.5	46.8	43.9	35.6	39.4	38.1	36.9	38.5	37.7	37.2	40.1	38.7	37.9	42.6	40.5	38.3	40.3	39.4	37.6	43.9	40.6	41.5	52.3	46.3	42.3	53.8	47.3	46.9	59.7	52.8	49.3	59.5	55.0	49.6	57.0	53.8	43.7	48.6	46.5	41.5	45.0	43.5	36.5	39.6	38.1
21	58.5	68.0	63.1	51.1	60.4	55.3	49.6	57.0	53.0	41.2	46.8	43.7	37.0	39.9	38.5	35.8	37.9	37.1	38.5	40.3	39.4	37.6	43.2	40.8	37.4	40.1	38.5	37.4	47.1	42.2	42.4	51.4	46.5	42.8	55.6	48.5	47.3	59.5	53.2	50.2	60.4	55.8	49.6	55.0	52.8	43.9	48.2	46.6	43.7	46.0	44.6	36.0	39.0	37.3
22	58.5	65.5	61.8	50.5	60.1	55.0	49.5	55.4	52.4	42.1	47.3	44.3	34.0	36.9	35.6	35.6	37.6	36.6	38.8	39.9	39.2	38.3	43.5	41.0	32.0	37.2	34.0	38.8	49.6	44.0	42.6	50.9	46.3	43.9	57.0	49.6	46.4	59.2	52.6	51.3	57.7	54.9	48.2	54.5	51.9	40.5	45.7	43.2	42.3	45.3	43.8	37.2	38.3	37.7
23	58.5	66.7	61.3	50.4	59.7	54.7	50.0	54.7	52.4	42.1	47.3	44.4	33.3	36.1	34.9	35.1	37.2	36.3	38.3	41.5	39.6	38.8	44.1	41.4	35.2	37.0	36.3	39.9	50.4	45.1	41.9	52.2	46.3	44.8	57.4	50.1	45.9	59.0	52.5	52.2	61.5	56.8	47.1	53.8	51.2	39.7	44.8	42.4	41.4	44.8	43.2	35.6	38.5	37.0
24	55.6	64.8	59.9	50.0	59.5	54.5	50.9	54.7	52.9	42.3	47.3	44.7	36.1	39.2	38.1	36.3	38.5	37.5	39.6	40.3	40.0	38.7	44.6	41.2	35.6	40.1	37.7	40.8	50.9	45.7	42.3	51.1	46.1	44.8	57.6	50.1	46.4	59.5	53.0	50.2	58.6	55.0	48.9	53.8	51.6	39.4	44.2	42.3	42.1	44.4	43.4	34.0	37.2	35.9
25	52.2	62.8	57.6	50.0	59.5	54.5	51.1	57.0	53.9	43.2	47.7	45.5	33.3	34.7	34.2	35.2	37.0	36.2	39.4	41.4	40.3	38.3	43.7	41.0	35.6	41.5	38.5	40.6	51.1	45.4	42.3	53.2	46.9	45.3	57.4	49.8	45.5	58.8	52.4	47.8	57.2	53.1	49.1	54.9	51.7	39.6	44.2	42.2	43.0	46.6	44.1	34.9	37.0	36.1
26	52.9	63.5	58.3	50.5	57.7	54.3	50.5	57.0	53.6	45.5	49.1	47.0	33.8	36.3	35.0	37.0	39.6	38.2	34.9	40.5	37.8	39.0	44.6	41.6	35.6	42.1	39.0	40.3	49.6	44.5	41.5	53.2	46.9	45.7	57.4	50.3	46.0	59.5	52.6	45.9	55.9	51.7	47.7	53.1	50.9	42.3	47.7	44.8	41.5	46.6	43.6	35.4	38.3	36.7
27	54.1	61.9	58.6	50.4	59.5	54.6	50.7	55.9	53.4	45.1	49.6	47.2	35.4	37.0	36.1	37.4	38.8	38.5	36.9	39.0	38.4	39.6	45.3	42.2	36.9	42.8	39.9	38.7	42.4	40.5	43.2	51.1	46.8	45.3	55.6	49.4	45.9	60.3	53.1	45.3	55.4	51.3	48.6	54.1	51.1	43.5	47.8	46.3	38.7	41.2	40.2	37.4	39.6	38.4
28	54.7	64.6	59.5	50.0	58.5	54.1	52.2	54.3	53.1	46.0	50.9	48.5	34.5	37.0	35.7	36.3	38.5	37.3	39.0	40.1	39.6	39.7	45.0	42.3	37.4	43.9	40.5	40.5	43.9	42.0	42.3	53.8	47.1	45.7	57.4	50.3	48.7	62.8	55.4	45.9	55.2	51.2	46.6	51.3	49.2	43.9	48.2	46.5	40.8	44.1	42.3	38.3	39.6	38.8
29	55.6	63.1	59.4	49.1	58.3	53.6	50.0	52.9	51.2	41.0	45.7	43.5	34.9	37.2	36.2	34.0	37.2	35.2	39.4	42.3	40.6				36.9	44.1	40.6	38.7	41.5	40.5	41.9	54.5	47.3	44.8	56.8	50.2	48.7	59.2	54.2	46.0	56.1	51.8	44.1	50.2	47.7	44.1	48.4	46.6	40.6	44.1	42.5	39.4	40.6	39.9
30	54.1	64.4	59.2	50.9	59.7	55.0	47.1	53.6	50.2	39.9	44.4	41.9	37.2	39.7	38.3	33.1	34.9	34.1	39.7	41.0	40.4				37.6	44.4	41.1	39.4	43.5	41.4	42.8	53.4	47.3	45.7	56.1	50.1	48.0	60.6	54.1	46.4	56.1	52.0	44.2	51.1	48.2	43.5	47.8	46.1	42.3	46.0	43.6	40.3	41.9	40.8
31	53.6	63.7	58.6	51.6	60.1	55.5				40.6	45.7	42.9				33.8	36.7	35.1	38.1	40.3	39.7				38.7	44.8	41.8				42.6	54.1	47.4				47.8	61.0	54.4	46.6	56.1	52.3				45.3	49.1	47.1				39.7	41.7	40.9
	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean
	52.0	68.4	60.0	49.1	63.9	56.0	45.3	59.5	52.6	39.9	54.9	46.0	31.6	44.1	36.9	32.5	40.8	36.9	33.3	42.3	38.2	33.8	45.3	40.1	32.0	45.1	39.6	36.1	51.1	41.9	39.4	54.5	44.9	40.8	57.6	47.8	44.2	62.8	52.2	45.3	61.9	53.9	44.1	58.5	52.4	39.4	52.3	46.5	38.5	49.6	44.1	34.0	47.7	41.0

Source: Dept. Fish & Game, IFD, Red Bluff

APPENDIX TABLE 4. Daily water temperature records for Mill Creek at Black Rock; July 1994 - December 1995; Adult holding and spawning, egg incubation, fry emergence, and juvenile rearing.

	JUL 94			AUG 94			SEP 94			OCT 94			NOV 94			DEC 94			JAN 95			FEB 95			MAR 95			APR 95			MAY 94			JUN 95			JUL 95			AUG 95			SEP 95			OCT 95			NOV 95			DEC 95		
DAY	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean
1																			38.1	40.6	39.4	42.1	43.5	42.7	44.6	46.4	45.2	44.2	48.0	45.7	43.7	46.0	44.8	46.6	55.4	50.9	48.9	58.5	53.5	54.5	60.6	58.0	53.8	57.7	55.6	50.0	53.4	51.3	47.5	49.6	48.4	47.3	49.1	48.4
2																			38.8	40.3	39.5	41.5	44.4	42.9	43.0	45.3	44.1	42.6	47.1	45.0	43.2	47.7	45.1	47.3	55.6	51.2	49.8	59.0	54.3	55.2	60.8	58.5	54.0	57.9	55.8	50.2	53.8	51.6	46.0	48.0	47.0	45.7	48.6	47.4
3				Thermograph stolen after 12/9/93;															39.4	40.5	40.0	42.3	46.0	43.7	41.5	45.0	42.7	43.5	48.6	46.2	42.6	49.1	45.8	46.4	55.0	50.7	50.0	59.0	54.5	55.2	60.6	58.3	54.7	57.9	56.0	50.7	54.1	52.0	43.9	46.2	45.1	44.1	44.8	44.4
4				replaced December 1994.															39.9	41.2	40.6	42.6	47.5	44.0	41.0	48.9	43.3	43.7	48.7	46.7	44.8	48.0	46.2	46.6	55.8	50.9	49.6	59.0	54.0	54.7	60.6	58.0	52.0	55.2	53.6	48.6	51.3	49.7	42.6	44.8	43.7	44.2	47.5	45.9
5																			40.5	42.1	41.3	42.3	47.3	43.8	42.3	46.9	43.6	44.8	47.5	46.4	44.1	46.0	44.9	46.4	51.6	49.0	49.6	60.1	54.8	56.1	60.6	58.9	52.0	56.1	53.8	46.9	50.9	48.7	43.2	46.0	44.5	47.7	48.9	48.4
6																			40.8	41.7	41.2	42.6	45.3	44.1	39.7	48.6	42.7	44.2	46.6	45.7	43.7	48.0	45.9	43.5	49.6	46.7	50.7	58.8	54.9	55.9	60.6	58.5	53.2	57.0	54.8	47.8	51.1	49.2	43.5	45.9	44.6	47.8	49.1	48.3
7																			41.5	42.8	42.1	42.4	45.9	43.9	40.3	46.0	42.8	42.6	44.2	43.3	43.5	49.3	46.6	44.4	50.5	47.5	50.0	59.0	54.3	54.3	58.8	57.0	53.8	57.2	55.4	47.5	50.7	48.9	45.0	47.5	46.0	46.0	48.0	47.0
8																			42.4	43.7	42.9	43.3	45.7	44.1	43.0	44.1	43.5	40.8	42.1	41.4	44.8	49.8	47.4	44.8	53.2	49.1	50.9	57.2	53.8	52.3	57.2	55.3	53.8	57.2	55.4	47.3	50.5	48.8	46.0	48.9	47.6	45.3	46.8	46.0
9																			41.7	44.4	43.2	41.5	47.3	43.4	40.6	44.8	42.2	39.6	45.1	42.2	45.0	47.3	46.2	46.2	54.9	50.6	51.6	57.0	54.3	54.5	58.5	56.8	53.8	57.4	55.4	47.3	50.9	48.9	48.6	50.5	49.4	45.0	46.6	45.8
10																			42.1	43.3	42.7	40.8	45.3	42.8	41.5	43.0	42.2	40.8	48.0	44.4	44.4	50.0	47.3	47.5	55.2	51.4	50.0	55.9	53.0	54.5	57.9	56.5	53.8	57.2	55.4	48.7	52.3	50.1	45.7	49.1	47.1	44.2	46.0	45.2
11																			42.3	42.8	42.4	40.5	46.4	43.0	41.5	43.5	42.5	44.1	48.9	46.6	44.8	48.2	46.8	46.6	55.6	51.2	48.4	55.8	52.1	52.7	56.3	55.0	54.1	58.6	56.2	48.9	51.6	50.1	45.3	47.8	46.5	46.0	48.2	47.3
12																			42.6	44.2	43.7	42.4	44.2	43.4	42.1	44.4	43.3	44.4	46.8	45.6	42.6	44.4	43.5				48.9	54.7	52.2	53.2	57.0	55.5	55.6	59.5	57.2	48.6	50.9	49.4	46.8	50.0	48.3	44.8	48.2	46.6
13																			41.5	44.1	43.1	38.7	42.3	40.9	41.7	44.1	43.0	41.5	45.3	43.0	42.6	48.9	45.6				49.6	58.5	54.0	54.7	57.0	56.1	55.6	59.5	57.2	47.3	50.7	48.9	48.2	50.4	49.0	44.1	45.0	44.6
14																			41.2	42.1	41.7	36.9	45.0	38.8	42.8	44.1	43.7	40.3	45.0	42.6	44.1	48.9	46.3				52.0	59.9	56.1	55.2	58.8	57.2	56.1	60.1	57.6	48.0	51.1	49.4	47.3	49.6	48.3	42.3	44.8	43.5
15																			41.0	42.8	41.9	37.9	46.6	39.8	41.4	45.5	43.4	40.8	43.0	41.8	45.0	47.3	46.0				52.7	60.3	56.8	56.5	59.7	58.5	54.9	58.6	56.6	48.6	51.8	49.9	46.8	49.3	48.1	42.1	45.3	43.6
16																			40.3	41.9	41.0	39.7	44.2	41.1	42.8	46.8	44.7	40.6	46.8	43.6	45.0	50.5	48.2				52.2	61.2	56.6	56.5	59.0	57.5	54.7	57.9	56.0	48.6	51.4	49.7	48.0	50.5	49.1	41.2	42.1	41.7
17																			39.0	41.4	40.3	40.8	46.0	42.9	42.8	47.5	45.3	41.5	44.4	43.3	46.6	52.3	49.6				52.9	60.6	56.5	52.5	56.3	54.6	53.2	57.0	54.9	48.7	51.8	50.0	47.3	49.3	48.2	40.6	41.5	41.3
18																			41.0	42.8	41.9	42.8	52.0	44.7	44.1	45.7	44.9	41.0	46.8	43.8	45.9	53.6	50.0				52.9	59.5	56.4	52.7	56.3	54.6	54.1	57.9	55.7	48.9	52.2	50.2	48.2	50.2	49.0	41.5	43.0	42.3
19																			40.8	43.7	41.7	42.8	52.3	44.8	43.2	45.1	44.1	41.0	46.0	44.0	46.4	54.1	50.3				52.0	58.3	55.0	54.3	57.6	56.2	54.7	58.5	56.2	48.9	51.4	49.9	45.9	48.2	47.1	40.3	41.7	41.1
20																39.9	42.3	40.8	41.0	42.6	42.0	42.8	52.3	44.8	41.4	43.9	42.9	41.5	45.3	43.4	45.7	53.4	49.6	45.7	54.5	50.0	51.6	59.7	55.6	55.8	58.8	57.4	54.7	58.5	56.3	48.2	51.1	49.5	45.3	47.8	46.2	39.9	41.2	40.3
21																39.6	41.7	40.4	41.7	43.5	42.6	42.8	52.0	45.0	40.8	42.3	41.5	40.8	48.0	44.4	46.2	53.2	49.7	46.6	56.1	51.3	52.5	59.5	56.4	56.7	59.7	58.3	54.7	57.0	55.7	46.8	50.4	48.9	45.9	48.4	46.9	39.0	40.1	39.6
22																39.6	41.2	40.1	42.4	43.5	42.8	43.2	51.8	45.2	36.3	40.5	37.5	43.3	49.6	46.8	46.6	52.3	49.4	48.0	57.6	52.7	51.6	58.6	55.5	57.0	59.5	58.2	53.2	56.1	54.5	44.4	46.8	45.5	46.0	48.2	46.7	39.0	40.5	39.9
23																38.1	41.2	39.6	42.4	43.9	43.2	43.0	51.3	45.4	37.9	39.7	39.2	44.6	50.9	48.2	45.7	53.2	49.4	48.7	58.5	53.5	51.4	58.5	55.3	57.2	61.3	58.9	52.2	55.8	53.7	43.9	46.6	44.8	45.5	47.3	46.2	38.3	40.1	39.1
24																38.5	41.0	40.1	43.0	44.2	43.5	42.8	50.4	45.1	38.8	42.1	40.3	45.7	52.0	49.2	45.9	52.3	49.0	49.1	59.0	53.6	52.0	58.8	55.9	56.8	59.5	57.9	52.3	55.6	53.7	43.3	46.2	44.5	45.3	47.5	46.1	37.8	38.8	38.2
25																37.9	40.1	39.0	42.8	44.8	43.6	41.7	49.1	44.5	38.8	43.0	41.1	45.0	51.6	48.7	46.0	54.1	49.8	49.1	59.0	53.4	51.8	58.5	55.4	54.1	57.2	55.7	52.5	56.1	53.8	42.8	45.9	44.4	45.7	48.6	46.9	37.9	39.4	38.4
26																39.6	42.8	41.2	40.3	43.7	42.3	42.6	49.1	45.1	39.8	43.7	41.7	44.6	50.2	47.7	46.0	54.5	50.2	49.6	59.0	53.7	51.4	58.5	55.3	52.5	55.8	54.2	52.2	55.0	53.4	44.8	48.6	46.6	42.8	46.9	45.0	37.9	40.5	39.4
27																40.3	42.3	41.3	40.3	43.2	41.9	43.3	48.9	45.7	40.3	44.2	42.5	42.8	47.8	44.5	46.9	52.7	49.9	49.1	58.8	53.3	52.0	59.5	55.8	52.0	55.6	53.8	52.2	55.2	53.3	47.8	50.4	48.9	41.5	43.5	42.4	40.1	41.9	41.0
28																39.0	41.2	39.9	42.8	44.1	43.6	43.5	46.4	44.8	40.8	45.1	43.3	43.0	46.0	44.7	46.0	55.0	50.4	49.6	59.5	53.8	54.3	61.9	58.1	52.0	55.2	53.7	50.5	53.2	51.9	48.0	50.5	49.1	42.8	46.0	44.5	40.1	41.9	41.1
29																37.4	39.6	38.7	43.5	45.9	44.6				40.8	45.3	43.4	42.8	45.7	44.2	45.9	55.6	50.5	49.1	58.5	53.4	54.1	61.9	57.4	52.2	55.9	54.0	48.9	52.3	50.3	48.0	50.7	49.1	44.2	46.0	45.0	41.7	43.5	42.7
30																36.9	38.8	37.7	44.1	44.8	44.6				42.1	46.0	44.1	42.6	46.8	44.8	46.2	54.7	50.4	49.1	57.7	53.5	53.8	59.7	57.1	52.5	56.3	54.4	48.7	52.3	50.5	47.7	50.2	48.8	44.6	47.7	46.3	43.5	44.6	43.9
31																36.9	39.6	38.4	42.3	44.2	43.6				42.6	46.0	44.7				46.4	55.2	50.6				53.8	60.1	57.3	52.5	56.7	54.6				48.0	50.9	49.3				42.8	44.2	43.5
	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean	min	max	mean
																36.9	42.8	39.8	38.1	45.9	42.2	36.9	52.3	43.6	36.3	48.9	42.9	39.6	52.0	44.9	42.6	55.6	47.9	43.5	59.5	51.4	48.4	61.9	55.2	52.0	61.3	56.5	48.7	60.1	54.8	42.8	54.1	48.9	41.5	50.5	46.6	37.8	49.1	43.4