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Full report available at this link!

From: Randal Yates
To: dgoding@waterboards.ca.gov
Date: 7/14/05 2:44PM
Subject:

http://www.delta.dfg.ca.gov/afrp/documents/IF_Admin_Report_2004-6.pdf#search='Butte%20and%20Big%20Ch

http://www.delta.dfg.ca.gov/afrp/documents/IF_Admin_Report_2004-6.pdf#search='Butte%20and%20Big%20Chico%20Creeks%20Springrun%20chinook%20salmon,%20Oncorhynchus%20Tshawytscha%20life%20history%20investigation%2020022003'

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State Water Recources Control Board
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SL #21

160

FS # 2260

Allen Harthorn
Friends of Butte Creek
Box 3305
Chico CA 95927

June 14, 2004

Craig J. Wilson
Chief, TMDL Listing Unit
Division of Water Quality
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100
916-341-5550 Fax

11/18/03
complete
1 factsheet

Water body and watershed Name: Upper Butte
USGS Cataloging Unit: 18020120
Geographic extent of the potential water quality limited segment; Lower Centerville Head Dam to Centerville Powerhouse
Pollutant(s) of concern; Temperature, disease organisms

Dear Craig,

The Friends of Butte Creek would like the State Water Resources Control Board to consider listing the above name section of Butte Creek as an impaired water body due to temperature problems which are killing threatened spring run salmon and spreading their disease to other organisms, steelhead in particular. We are somewhat naïve at this process so we thought we could supply you with Department of Fish and Game Reports and PG&E reports detailing the water quality problem. That is the only information we have at this time but it clearly indicates the magnitude of the problem. We hope this will suffice for the time being but would like very much to work with the Regional Board to design future monitoring to further define this disastrous problem.
Thank you for your time.

Sincerely,

Allen Harthorn

Allen Harthorn

Friends of Butte Creek

Applicable water quality objective or criterion; 20 degrees celsius for salmonids

Comparison of results against applicable water quality objective or criterion; 65 days exceeding 20 degrees in 2003.

Designated beneficial use(s) that may be impacted by pollutant(s); fishing, fish survival, endangered species protection

BUTTE AND BIG CHICO CREEKS SPRING-RUN CHINOOK SALMON, ONCORHYNCHUS TSHAWYTSCHA LIFE HISTORY INVESTIGATION 2002-2003[1/]

by

Paul D. Ward[2/]
Tracy R. McReynolds[2/]
and
Clint E. Garman[2/]
Sacramento Valley – Central Sierra Region

ABSTRACT

This report covers the spring-run Chinook salmon (*Oncorhynchus tshawytscha*) monitoring and life history evaluation in Butte and Big Chico Creeks from September 2002 through December 2003.

For Butte Creek, there were 50,936 juvenile Chinook salmon captured near Chico, and 7,448 in the Sutter Bypass. There were 36,415 fish captured near Chico that were coded-wire-tagged, and two of the tagged fish recaptured in the Sutter Bypass trap. The adult spring-run Chinook salmon escapement estimate based upon the snorkel survey methodology used since 1991, was 4,398. An alternate estimate based upon the Schaefer model carcass survey methodology was 6,063. A mark/recapture survey was conducted to evaluate pre-spawning mortality. Based upon the Schaefer model, there were an estimated 11,231 pre-spawn mortalities. The pre-spawn and spawning carcass surveys recovered 38 Butte Creek coded-wire-tagged adults from BY 99 (17) and BY 00 (21). Based upon the tag recoveries, the year 2003 population contained a minimum of 44% age-4 fish, and if adjusted for release group size, 69% were age-4 fish. Comparing the expanded recovery rate of ocean catch and inland escapement of BY 99 catch during 2002-2003 suggest an ocean catch rate of approximately 43%. Additionally, there was one Butte Creek coded-wire tag recovery from Clear Creek (BY 00), and one recovered at the Feather River Hatchery (BY 98). The FRH recovery was from the small release group (393 fish) of BY 98 fish tagged as yearlings, bringing the total recovered to 4 (expanded to 10.34). The limited sample suggests that yearling Butte Creek spring-run survive at a rate significantly higher than YOY emigrants.

A Schaefer model carcass survey of Butte Creek fall-run Chinook salmon estimated the population to be 3,310. There were 85 CWT recoveries during the fall-run survey, with 84 from fish natal to other watersheds while one was tagged and released as a Butte Creek SRCS during January 2001. The number of out-of-basin CWT recoveries substantiates significant straying.

For Big Chico Creek, there were 173 juvenile salmon captured near Chico, and the adult spring-run Chinook salmon escapement was 81 based upon the snorkel methodology.

---

[1] Inland Fisheries Administrative Report No_____. Edited by Richard L. Dixon, Sacramento Valley-Central Sierra Region, 1701 Nimbus Road, Suite A, Rancho Cordova, California 95670. This study was funded in part by the CALFED Bay-Delta Program and the Federal Aid in Sport Fish Restoration Program, California Grant No. F-51-R-14, Project 19, Job 5.

[2] California Department of Fish and Game, Sacramento Valley-Central Sierra Region, 2545 Zanella Way, Suite F., Chico, California 95928.

Table 5. Recaptures of BY 2002 Butte Creek spring-run Chinook salmon bearing coded-wire tags in the Sutter Bypass at Maddock Rd.

Tag Code	Total no. Captured*	Average FL at Release (mm)	Recovery FL (mm)	Days at Large
06-01-00-03-02	1	35	89	74
06-01-00-04-00	1	35	49	33
Total	2			

* Both fish were from BY 2002 tagged at Baldwin Construction Yard (See Appendix C, Table 1 for detail)

Table 6. Recaptures of Butte Creek juvenile spring-run Chinook salmon bearing coded-wire tags by other research projects during 2003.

Recovery Date	Tag Code*	Recovery FL (mm)	Recapture Location	Days at Large
4/14/03	06-01-00-03-02	92	Chipps Island	84
4/27/03	06-01-00-04-00	83	Chipps Island	79
5/13/03	06-01-00-04-00	96	Chipps Island	92
5/15/03	06-01-00-04-01	85	Sherwood Harbor	85
5/18/03	06-01-00-04-01	90	Antioch	88
5/19/03	06-01-00-04-00	88	Chipps Island	101
5/25/03	06-01-00-04-02	84	Chipps Island	70

* All fish were from BY 2002 and tagged at Baldwin Construction Yard

Juvenile Emigration 2002-2003

As discussed in previous reports (Hill and Webber, 1999; Ward and McReynolds, 2001; Ward, et al., 2002 and 2003a), YOY and yearling juvenile SRCS outmigrants were documented based upon the FL of juvenile salmon captured at PPDD. During this study trapping period, the majority of Butte Creek SRCS that were captured migrated as fry. Emigration appears to have been hastened by high flows during the period December through February (Tables 1 and 2). As observed in previous years, some YOY remained to rear in Butte Creek above PPDD, emigrating later in the spring. During this study trapping period only 14 yearling SRCS were captured. Yearling SRCS were seen as early as October 18, 2002 and the last on May 22, 2003 at a length of 121 mm FL (Table 1 and 2; Appendix B, Figure 1). Length-frequency distributions for the entire period (Appendix B, Figure 1) continue to show a bi-modal, and sometimes tri-modal distribution that generally appear to delineate yearling SRCS.

Adult Escapement 2003

Pre-spawning Mortality Carcass Survey

This was the first year that an intensive mark/recapture survey was conducted during the adult SRCS holding period to assess pre-spawn mortalities (Ward et al., 2003b). From June 19, 2003

through September 18, 2003, a total of 5,556 carcasses was examined (62% female, 38% male), with an estimated total pre-spawning mortality of 11,231. For those carcasses recovered during the SRCS pre-spawn mortality period, an expansion factor of 2.17 was calculated based upon the Schaefer model population estimation methodology. Mortalities were due to high water temperatures and high density of fish which resulted in an outbreak of two pathogens, *Flavobacterium columnare* (columnaris) and the protozoan *Ichthyophthirius multiphilis* (Ich) (Veek, 2003). Additionally, 24 adipose fin-clipped carcasses were collected with 10 age- 4 fish (BY99) and 14 age-3 fish (BY00). Carcasses were identified as pre-spawning mortalities due to immature gametes and lack of any visible spawning activity.

Spawning Carcass Survey

During this study period, the third intensive survey directed at recovering CWTs from previous release groups was conducted. A spawning carcass survey was begun on September 23, and continued through October 30, 2003 and covered the 17.7 km (11 mi.) SRCS spawning area (Figures 1 and 2). During the SRCS spawning carcass survey, 3,721 carcasses were examined. A total of 14 CWT's were recovered: 7 from BY 99 and 7 from BY 00 (Appendix D, Table 1). For those carcasses recovered during the SRCS spawning period, an expansion factor of 1.56 was calculated based upon the Schaefer model population estimation methodology. In addition to the Butte Creek carcass recoveries, eight CWT's were recovered in the ocean fishery, three from California and five from Oregon.

Subsequent to the SRCS carcass survey, a survey of the FRCS spawning area (Figure 1) was conducted from October 20 through December 9, 2003. A total of 85 CWT's was recovered (Appendix D, Table 2) from 1,893 carcasses that were examined. An expansion factor of 1.77 was calculated based upon the Schaefer model population estimation methodology.

Snorkel Escapement Survey

The 2003 SRCS adult escapement estimate based upon the snorkel survey method was 4,398 (Table 7).

Table 7. Estimates of adult spring-run Chinook salmon escapement in Butte Creek from snorkel surveys conducted annually from 1994 through 2003.

Year	Estimate	Survey Dates
1994	474	June 29 – July 1, 1994
1995	7,480	July 24 – July 27, 1995
1996	1,400	August 19 – August 23, 1996
1997	635	August 18 – August 21, 1997
1998	20,259	August 18 – August 24, 1998
1999	3,679	August 23 – August 31, 1999
2000	4,118	August 25 – September 1, 2000
2001	9,605	August 13 – August 16, 2001
2002	8,785	August 12 – August 16,2002
2003	4,398	August 18 – August 20, 2003

Water Temperatures 2002-2003

Thermal recording data loggers installed at the five sites within the SRCS holding and spawning reach of Butte Creek (Figure 1) recorded average daily temperatures which ranged as high as 22.9° C on July 23, at the Cable Bridge location (Table 8; Appendix E, Figures 1 - 5). Summer temperatures at all sites were above 15.0° C until the second week of September.

Table 8. Butte Creek spring-run Chinook salmon holding reach average daily temperature exceedance.

Location	Period of Record	Number Days Equal to or Exceeding		
		15.0 C	17.5 C	20.0 C
Quartz Bowl Pool	6/25/03 to 10/28/03	85	26	7
Chimney Rock	6/25/03 to 10/28/03	91	40	12
Pool 4	6/01/03 to 10/31/03	124	65	16
Centerville Estates	6/01/03 to 10/31/03*	104	62	13
Cable Bridge	6/20/03 to 10/31/03	121	72	17
*Centerville thermograph data lost from 9/11/03 to 10/2/03 due to software error.				

Big Chico Creek

Trapping Season 2002-2003

The 2002-2003 trapping season began November 12, 2002. The 1.5-m rotary screw trap was installed near the Bidwell Park Municipal Golf Course. The trap fished until May 15, 2003. A total of 86 juvenile salmon was captured (Table 9).

Table 9. Semi-monthly catch summary of spring-run Chinook salmon caught in the screw trap at Bidwell Park Municipal Golf Course from November 12, 2002 to May 15, 2003.

Trapping Period		Mean FL (mm)	Standard Deviation	Range FL (mm)		Total No. Captured	No. Trapping Days
11/1/02	11/15/02	-	-	-	-	0	4
11/16/02	11/30/02	-	-	-	-	0	15
12/1/02	12/15/02	-	-	-	-	0	14
12/16/02	12/31/02	-	-	-	-	0	7
1/1/03	1/15/03	-	-	-	-	0	15
1/16/03	1/31/03	-	-	-	-	0	16
2/1/03	2/15/03	32	0	32	32	1	15
2/16/03	2/28/03	34	1.6	32	37-	8	13
3/1/03	3/15/03	-	-	-	-	0	15
3/16/03	3/31/03	38	0.6	38	39	3	15
4/1/03	4/15/03	53	3.5	47	56	6	15
4/16/03	4/30/03	46	12.4	34	68	49	14
5/1/03	5/15/03	62	15.2	31	79	19	15
					Total:	86	173

DeSabla Hydroelectric Project - FERC 803

Water Temperature Monitoring

KEY DISCUSSION ITEMS:

1. Effect of Philbrook/WBFR releases on temperatures at LCDD.
2. Effect of DeSabla Forebay.

SYSTEM DESCRIPTION (Figure 1)

A. West Branch Feather River

1. Round Valley Reservoir [1,196 ac-ft].
2. WBFR below RVR [0.5/0.1 cfs minimum release]
3. Coon Hollow Creek and the spring complex (unregulated).
4. West Branch above Philbrook Creek confluence.
5. Philbrook Reservoir [5099 ac-ft].
6. Philbrook Creek [2.0 cfs minimum release]
7. West Branch above Hendricks Head Dam. [~8 mile reach between Philbrook confluence and HHD]

B. Canals

1. Hendricks-Toadtown Canals [125 cfs capacity (11.8 miles total length)].
2. Butte Canal. [88.5 cfs capacity (11.5 miles total length)]
3. Combined canal inflow to Forebay [191 cfs total capacity].

C. Upper Butte Creek [below Butte Head Dam (~10 mile bypass reach {16/7 cfs minimum})]

C. DeSabla Forebay [188 ac-ft]

D. DeSabla Powerhouse [18.5 MW]

E. Lower Centerville Diversion Dam [40 cfs minimum release].

F. Lower Butte Creek [~ 6 mile bypass reach]

G. Lower Centerville Canal [~8 miles long (180 cfs maximum capacity)].

H. Centerville Powerhouse [6.4 MW]

DeSabla Hydroelectric Project - FERC 803

Water Temperature Monitoring

Discussion Items (Continued)

5. Figure 6 shows the differential heating effect between canal and creek channel in the lower Butte Creek reach. *[Temperatures in Butte Creek above Centerville Powerhouse averaged 3.1°C warmer {7/1 to 9/15} than LCDD (Average flow of 46.3cfs). Temperatures in Lower Centerville Canal averaged 0.6°C warmer {7/1 to 9/15} than LCDD.] (Average flow of 108 cfs).*

   Stream flows at LCDD were at spill levels through July 6, 2003. Temperature changes were evaluated for the period June 15 though July 6, 2003. During this period the delta-T in the bypass reach of Butte Creek (between LCDD and Butte Creek above Centerville Powerhouse) was +1.5°C, with flow in the creek exceeding 200 cfs. In comparison, the delta-T through Lower Centerville Canal (between LCDD and the Centerville Powerhouse Headworks) was +0.9°C, with an average flow of 77 cfs.

#2260

DeSabla Hydroelectric Project - FERC 803

Table 1

Results of 2003 Water Temperature Monitoring

Station	Month	Monthly Water Temperatures [1] Maximum (°C)	Minimum (°C)	Mean (°C)	Daily Range in Temperatures [2] Maximum (°C)	Minimum (°C)	Mean (°C)	Number of Data Days
WBFR above Philbrook Creek	June	15.6	6.0	9.7	6.8	3.4	5.2	19
	July	17.1	8.5	12.5	6.5	3.3	5.3	31
	Aug.	13.9	5.7	8.9	5.1	1.1	4.1	31
	Sept.	10.8	5.0	7.4	4.0	1.2	3.1	30
Philbrook Creek at release from dam	June	7.1	5.0	5.4	1.7	0.4	1.1	19
	July	8.0	5.3	6.3	1.9	0.3	1.1	31
	Aug.	18.8	6.6	11.2	1.3	0.3	0.8	31
	Sept.	22.5	10.8	16.5	9.8	0.2	2.8	30
WBFR at Hendricks Head Dam	June	16.3	9.4	12.7	3.9	1.9	3.0	19
	July	19.0	11.4	15.4	3.3	1.5	2.7	31
	Aug.	16.8	10.9	13.8	2.7	0.8	2.3	31
	Sept.	16.7	9.9	13.0	2.5	1.1	1.9	30
Toadtown Canal at BW-12 [DWR site]	June	16.6	8.4	12.8	3.7	1.7	2.8	30
	July	19.9	12.2	16.1	3.2	1.8	2.4	31
	Aug.	18.7	11.9	14.6	2.9	0.3	2.0	31
	Sept.	17.3	10.7	14.0	2.4	0.9	1.8	30
Inflow to DeSabla Forebay [Headworks]	June	16.6	10.2	13.4	3.2	1.8	2.5	19
	July	17.5	12.1	14.8	3.3	2.1	2.5	18
	Aug.	16.1	12.3	14.4	2.5	0.4	1.8	17
	Sept.	17.0	10.3	13.3	2.4	1.0	1.8	30
DeSabla PH [Internal off of PH tailrace}	June	17.3	11.8	14.5	1.9	1.1	1.6	19
	July	20.4	14.0	17.2	1.7	1.2	1.4	31
	Aug.	19.2	13.6	15.5	2.8	0.9	1.4	31
	Sept.	17.6	11.8	14.3	1.6	0.8	1.1	30
Butte Creek above DeSabla Powerhouse	June	18.8	12.4	15.3	3.5	1.4	2.7	19
	July	22.8	13.4	18.3	3.4	1.5	2.7	31
	Aug.	20.9	15.0	17.7	2.8	0.8	2.2	31
	Sept.	19.5	12.6	15.7	2.3	0.8	1.9	30

1. Based on hourly average data. Monthly maximum equals the maximum hourly temperature measured during the month. Monthly minimum corresponds with the minimum hourly temperature.

2. Calculated as the difference between the daily maximum and daily minimum hourly average temperature. The monthly maximum equals the maximum daily range measured during the month. The monthly minimum is equal to the minimum daily range measured during the month.

excerpts of full report pertaining to temperature

collected. In addition, tissue samples were taken from the first 10 fresh carcasses encountered in each reach. Clean scissors were used to cut a small piece (10-mm sq.) of tissue from the caudal fin. If all fins were eroded or decayed, a small piece of skin was taken. Each sample was placed in a pre-labeled vial containing tris-buffer and placed into a container. Between each sample, scissors were rinsed in fresh water to prevent cross contamination. Heads were removed from adipose fin-clipped carcasses and returned to the Chico office for recovery of the CWT. While removing the CWT's from the heads, otoliths were extracted and archived with the previously taken tissue.

The 2003 FRCS carcass survey was conducted from October 20, 2003 through December 9, 2003. The survey extended from PPDD to the Gorrill Ranch Dam, also covering a ½-mi section near the Western Canal Siphon (Figure 1). The approximately 15.3-km (9.5-mi.) stream section was divided into four reaches. Sampling techniques for the FRCS survey were the same as those used for the SRCS survey.

Water Temperature

Onset, model WTA032, temperature data loggers calibrated to ± 0.2° Celsius (C) were deployed in pools at five sites within the SRCS spawning habitat (Figure 1). Each data logger was placed in a 5 cm x 15.2 cm (2in x 6 in) long galvanized steel pipe and suspended by 0.6 cm (0.25 in) steel cable. Data loggers were set for 1-hour interval readings and recorded in degrees Celsius (C).

RESULTS

Butte Creek

Trapping Season 2002-2003

The 2002-2003 trapping season began at the PPDD when the diversion trap was installed on September 23, 2002. The rotary screw trap was installed on October 31, 2002. Both traps were operated until May 30, 2003. During the trapping season, there were occasions when one or both of the traps were removed due to high stream flows or excessive debris. A total of 50,936 juvenile salmon, including yearlings, was captured in both traps; 21,150 in the diversion screen trap and 29,786 in the screw trap (Tables 1 and 2). Of the total captured, 36,415 were tagged and released at the BCY (Table 3). Since the diversion screen trap is located off-stream in the diversion canal, trapping data continue to demonstrate the benefit of the PPDD fish screen; any fish captured in the trap would have been lost into the canal if the structure did not exist. Approximately 43,701 (84%) juvenile SRCS (Table 1 and 2) of the entire PPDD salmon catch occurred between December 1, 2002 and February 28, 2003. Trapping was suspended for 14 days during December and January due to high flows (Tables 1, 2, and Appendix A, Figure 1).

Water Temperatures 2002-2003

Thermal recording data loggers installed at the five sites within the SRCS holding and spawning reach of Butte Creek (Figure 1) recorded average daily temperatures which ranged as high as 22.9° C on July 23, at the Cable Bridge location (Table 8; Appendix E, Figures 1 - 5). Summer temperatures at all sites were above 15.0° C until the second week of September.

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Pool 4	6/01/03 to 10/31/03 153	124	65	16
Centerville Estates	6/01/03 to 10/31/03* 153	104	62	13
Cable Bridge	6/20/03 to 10/31/03 123	121	72	17
*Centerville thermograph data lost from 9/11/03 to 10/2/03 due to software error.				

30
31
31
30

Big Chico Creek

Trapping Season 2002-2003

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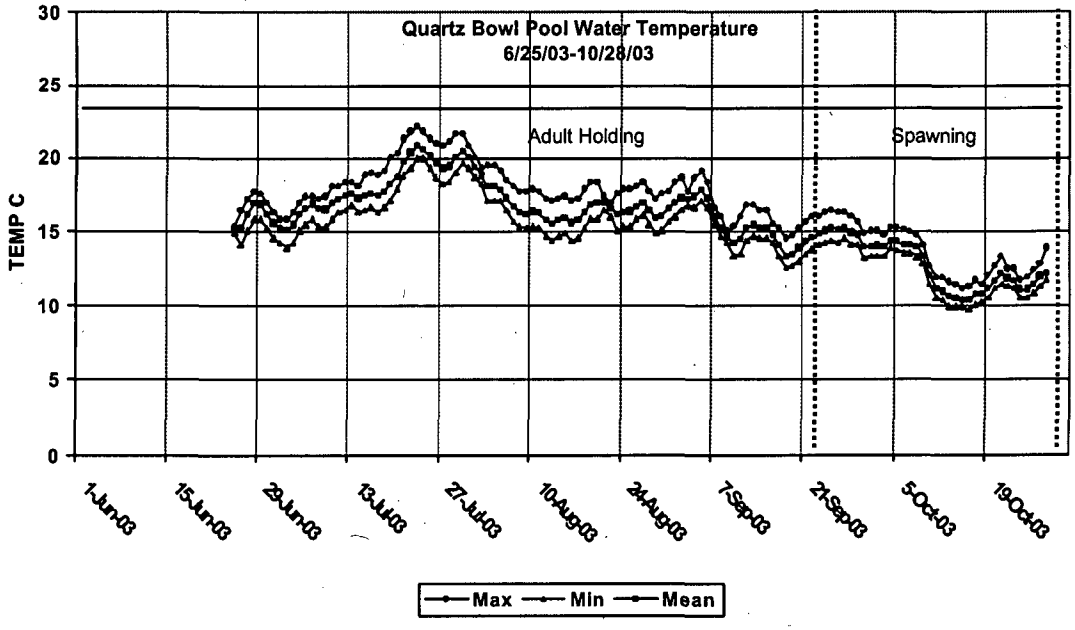
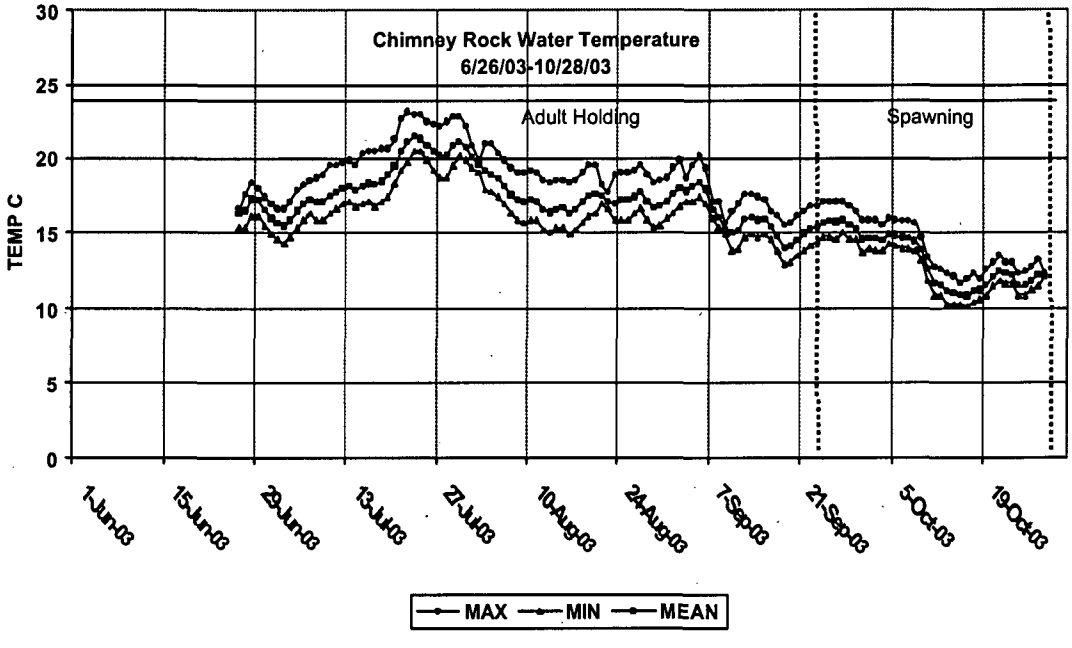
11/16/02	11/30/02	-	-	-	-	0	15
12/1/02	12/15/02	-	-	-	-	0	14
12/16/02	12/31/02	-	-	-	-	0	7
1/1/03	1/15/03	-	-	-	-	0	15
1/16/03	1/31/03	-	-	-	-	0	16
2/1/03	2/15/03	32	0	32	32	1	15
2/16/03	2/28/03	34	1.6	32	37-	8	13
3/1/03	3/15/03	-	-	-	-	0	15
3/16/03	3/31/03	38	0.6	38	39	3	15
4/1/03	4/15/03	53	3.5	47	56	6	15
4/16/03	4/30/03	46	12.4	34	68	49	14
5/1/03	5/15/03	62	15.2	31	79	19	15
					Total:	86	173

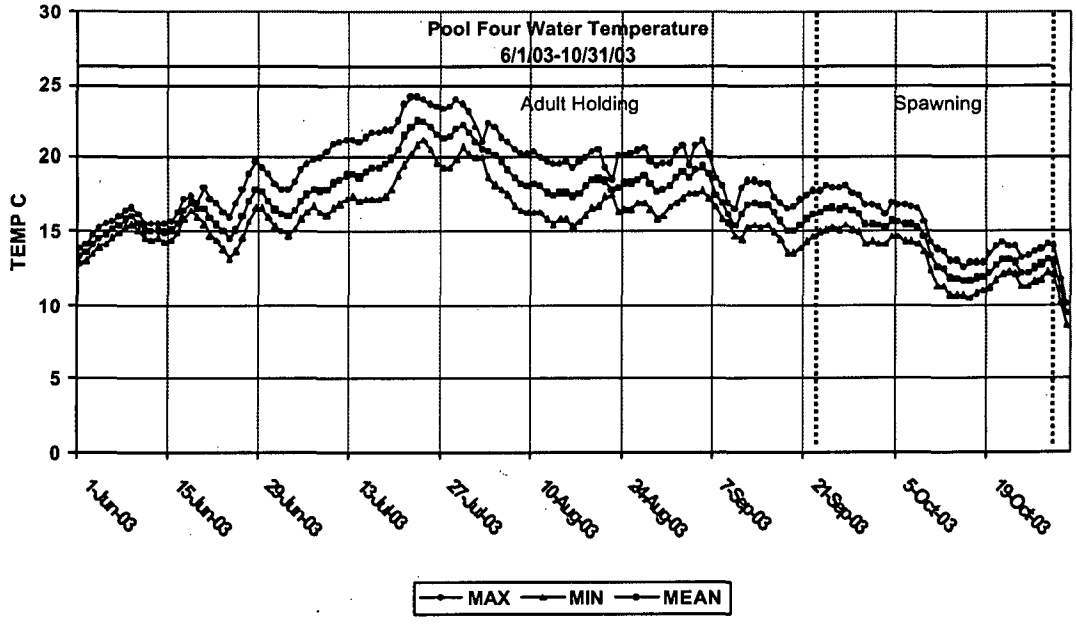
APPENDIX E, Figure 1. Butte Creek water temperature at Quartz Bowl pool.



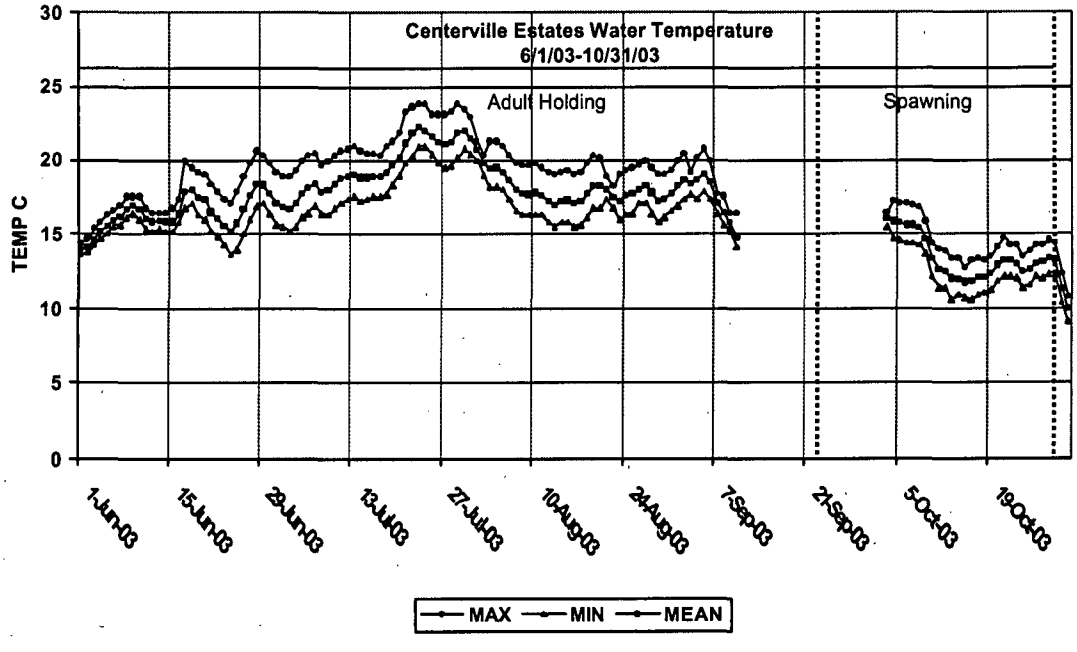
APPENDIX E, Figure 2. Butte Creek water temperature at Chimney Rock pool.



APPENDIX E, Figure 3. Butte Creek water temperature at Pool 4.



APPENDIX E, Figure 4. Butte Creek water temperature at Centerville Estates pool.



APPENDIX E, Figure 5. Butte Creek water temperature at Cable Bridge pool.