

STATE OF CALIFORNIA
THE RESOURCE AGENCY
DEPARTMENT OF FISH AND GAME

ANNUAL REPORT
MERCED RIVER HATCHERY
2003-2004

BY

MICHAEL D. COZART
SAN JOAQUIN VALLEY and SOUTHERN SIERRA REGION

LANDS AND FACILITIES BRANCH
ADMINISTRATIVE REPORT NO. _____

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ABSTRACT

This report summarizes the operation of the Merced River Hatchery (MRH) from July 1, 2003 through June 30, 2004. The hatchery was constructed to rehabilitate the fall run chinook salmon (*Oncorhynchus tshawytscha*) in the Merced River.

A total of 872,851 chinook salmon smolts (2003 brood year) were produced.

In the fall of 2003, 549 chinook salmon (301 males, 248 females) entered the hatchery. The 248 females artificially spawned produced 1,249,075 eggs in 12 spawnings.

1/ Inland Fisheries Administrative Report No. _____

INTRODUCTION

The Merced River Hatchery, formerly Merced River Fish Facility, is located immediately downstream from the Crocker-Huffman Dam on the Merced River, a tributary to the San Joaquin River, about 15 miles northeast of Merced. It is the terminal point for the salmon spawning on the Merced River.

The facility was built by the Merced Irrigation District (MID) with Davis-Grunsky Act funds. Operation began in the fall of 1970.

In 1991 Merced River Hatchery underwent modernization funded by the Department of Water Resources (DWR). Modernization included 1000 linear feet of concrete raceways consisting of ten 100 foot ponds. A bird enclosure was constructed to eliminate fish eating birds. Ultraviolet units were placed at the water inlet of each raceway and into the water supply line to the hatchery building. A new water line from Crocker-Huffman Dam supplies more consistent volume to the raceways and an increased volume to the hatchery building. A permanent hatchery building houses 14 double stacks of Heath type incubator trays and hatch jars capable of incubating and hatching approximately three million chinook salmon eggs. Twelve nursery tanks, two with the capability to start feeding of approximately 100,000 swim-up size salmon each, and 10 that will hold 90,000 fingerlings each are located adjacent to the hatchery building. The adult salmon trapping facility, located in the fish ladder of the spawning channel, consists of a fyke trap entrance, holding pen and a hydraulic basket hoist. The adjoining spawning building houses an anesthetic tank with hydraulic basket hoist, a sorting table and spawning table. The spawning building was constructed in 1995 by funds from the Salmon Stamp Account. The hatchery is also comprised of one effluent settling basin and a 4,372 ft long spawning channel (the Reuben E. Schmidt Spawning Channel), which is no longer in operation. The installation is operated by the California Department of Fish and Game with partial funding assistance for operational costs by DWR.

PRODUCTION SUMMARY

The Merced River Hatchery trap was in operation on October 14, 2003. The first chinook salmon entered the trap on October 14, 2003. Trapping was terminated for the season on December 13, 2003. The combined production of chinook salmon for M.R.H. 2003-2004 is summarized in Table 1. Chinook salmon smolts planted from M.R.H in 2004, (Table 2). Smolts provided for net efficiency and vulnerability tests totaled 147,265 (Table 3). A total of 549 adult fish entered the trap and are recorded in Appendix Table 1. The number of returning chinook salmon since 1970 are shown in Appendix Table 2. Fork length of marked salmon trapped at Merced River Hatchery (Appendix Table 3). Chinook Salmon Code Wire Tag recoveries at Merced River Hatchery (Appendix Table 4). Appendix Figure 1 provides water temperatures for the production

year.

Table 1. Production Summary, Merced River Fish Facility, 2003-2004

SPECIES	NUMBER TRAPPED	NUMBER FEMALE SPAWNED	NUMBER EGGS INTO PRODUCTION	NUMBER FINGERLING PLANTED **	YEARLINGS PLANTED	POUNDS PLANTED **	ON HAND JUNE 30, 2002
CHINOOK 2003 BY							
MRFF	549	248	1,249,075	872,851	-00-	13,736	0
TOTAL	549	248	1,249,075	872,851	-00-	13,736	0

** 147,265 BY 03, XXXXX pounds were used for net efficiency and vulnerability tests for the South Delta Study.

Table 2. 2003 BY Merced River strain chinook salmon smolts planted from Merced River Hatchery, 2004.

RELEASED DATE	CODED WIRE TAG CODE	NUMBER TAGGED	NUMBER UNTAGGED	SIZE NUMBER/LB	RELEASE SITE
04-19-04	06-45-92 06-45-93	51,651	0	63.5	SHAFFER BRIDGE MERCED R.
04-20-04	06-45-94 06-45-95	51,614	0	65.6	HATFIELD ST PARK MERCED R.
04-22-04	06-27-52	26,368	0	66.3	DURHAM FERRY SAN JOAQUIN R.
04-22-04	06-27-53	26,354	0	66.6	DURHAM FERRY SAN JOAQUIN R.
04-22-04	06-27-54	26,863	0	66.5	DURHAM FERRY SAN JOAQUIN R.
04-22-04	06-27-55	26,006	0	66.6	DURHAM FERRY SAN JOAQUIN R.

04-23-04	06-46-70	26,324	0	73.0	MOSSDALE SAN JOAQUIN R.
04-23-04	06-45-82	25,850	0	72.4	MOSSDALE SAN JOAQUIN R.
04-23-04	06-45-83	25,804	0	73.4	MOSSDALE SAN JOAQUIN R.
04-26-04	06-45-80	25,591	0	64.3	JERSEY POINT SAN JOAQUIN R.
04-27-04	06-46-64 06-46-65	52,032	0	66.3	SHAFFER BRIDGE MERCED R.
04-28-04	06-44-66 06-44-67	51,003	0	64.3	HATFIELD ST PARK MERCED R.
05-05-04		0	29,547	60.3	HATCHERY OUTLET MERCED R.
05-05-04		0	9,156	56.0	HATCHERY OUTLET MERCED R.
05-05-04		0	44,012	50.3	HATCHERY OUTLET MERCED R.
05-09-04	06-46-68 06-46-69 06-45-96 06-45-97	103,242	0	57.8	HATCHERY OUTLET MERCED R.
05-12-04	06-45-81 06-45-98 06-45-99	45,030	0	57.0	HATFIELD ST PARK MERCED R.
05-13-04	06-45-81 06-45-98 06-45-99	31,595	0	57.0	HATFIELD ST PARK MERCED R.
05-18-04			24	59.3	LAB-NOAA
05-18-04			30	69.4	LAB-NOAA
05-19-04			36,088	69.4	HATCHERY OUTLET MERCED R.
05-19-04			11,402	59.2	HATCHERY OUTLET MERCED R.
TOTAL		595,327	130,259		

Table 3. Chinook salmon smolts provided by Merced River Hatchery for net efficiency and vulnerability test in the Merced, Stanislaus, Tuolumne and San Joaquin Rivers in 2004.

Merced River Salmon Habitat Enhancement Project Smolt Survival Studies.

MERCED RIVER HATCHERY				
RELEASE DATE	PANJET MARK	NUMBER RELEASED	SIZE NUMBER/LB	RELEASE LOCATION
04-05-04	BISMARK BROWN	10,200	104.0	HATCHERY OUTLET
04-19-04	BISMARK BROWN	10,200	65.6	HATCHERY OUTLET
05-03-04	BISMARK BROWN	10,200	84.0	HATCHERY OUTLET
05-17-04	BISMARK BROWN	10,200	59.3	HATCHERY OUTLET
TOTAL		40,800		
ROBINSON RANCH				
04-07-04	BLUE UPPER CAUDAL	3,000	103.8	ROBINSON RANCH
04-21-04	BLUE LOWER CAUDAL	3,003	64.3	ROBINSON RANCH
05-05-04	BLUE DORSAL	3,027	56.0	ROBINSON RANCH
05-19-04	BLUE ANAL	3,017	59.3	ROBINSON RANCH
TOTAL		12,047		

HENDERSON PARK				
04-06-04	ORANGE UPPER CAUDAL	5,000	104.0	HENDERSON PARK
04-20-04	ORANGE LOWER CAUDAL	5,016	65.5	HENDERSON PARK
05-04-04	ORANGE ANAL	5,010	56.0	HENDERSON PARK
05-18-04	ORANGE DORSAL	5,017	59.3	HENDERSON PARK
TOTAL		20,043		
RATZLAFF				
04-07-04	PINK LOWER CAUDAL	3,128	104.0	RATZLAFF
04-21-04	PINK UPPER CAUDAL	3,057	64.3	RATZLAFF
05-05-04	PINK ANAL	3,032	56.0	RATZLAFF
05-19-04	PINK DORSAL	3,003	59.3	RATZLAFF
TOTAL		12,220		
GALLO RANCH DFG				
04-07-04	RED LOWER CAUDAL	2,000	104.0	GALLO RANCH
04-21-04	GREEN ANAL	2,032	64.3	GALLO RANCH
05-05-04	GREEN DORSAL	2,010	56.0	GALLO RANCH
05-19-04	GREEN UPPER CAUDAL	2,000	59.3	GALLO RANCH
TOTAL		8,042		

GRAND TOTAL		93,152		

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DFG STUDY Tuolumne River Rotary Screw Trap vulnerability tests

RELEASE DATE	CWT/PANJET MARK	NUMBER RELEASED	SIZE NUMBER/LB	RELEASE LOCATION
04-01-04	GREEN UPPER CAUDAL	100	104.0	GRAYSON
04-01-04	GREEN UPPER CAUDAL	100	104.0	GRAYSON
04-06-04	GREEN lower CAUDAL	2,007	104.0	GRAYSON
04-12-04	GREEN DORSAL	2,014	78.8	GRAYSON
04-19-04	GREEN ANAL	2,021	65.5	GRAYSON
04-26-04	GREEN UPPER CAUDAL	2,010	64.2	GRAYSON
05-03-04	GREEN LOWER CAUDAL	2,020	56.0	GRAYSON
05-10-04	GREEN ANAL	2,023	67.2	GRAYSON
05-17-04	GREEN DORSAL	2,003	59.3	GRAYSON
05-24-04	GREEN LOWER CAUDAL	2,026	59.2	GRAYSON
TOTAL		16,324		

Stanislaus River Rotary Screw Trap vulnerability tests

RELEASE DATE	CWT/PANJET MARK	NUMBER RELEASED	SIZE NUMBER/LB	RELEASE LOCATION
04-06-04	SP CRAMMER MARKED ON SITE	1,200	218.0	OAKDALE REC
04-13-04	MARKED ON SITE	2,295	104.3	OAKDALE REC
04-20-04	MARKED ON SITE	1,000	85.4	OAKDALE REC
04-27-04	MARKED ON SITE	2,000	85.1	OAKDALE REC
05-04-04	MARKED ON SITE	1,000	84.0	OAKDALE REC
05-11-04	MARKED ON SITE	1,176	84.0	OAKDALE REC
05-18-04	MARKED ON SITE	2,000	69.4	OAKDALE REC
05-18-04	ORANGE UPPER CAUDAL	2,000	69.4	OAKDALE REC
TOTAL		12,671		

San Joaquin River

MOSSDALE Kodiak Trawl vulnerability test

RELEASE DATE	CWT/PANJET MARK	NUMBER RELEASE	SIZE NUMBER/LB	RELEASE LOCATION
04-09-04	PURPLE UPPER CAUDAL	2,010	80.8	MOSSDALE

04-16-04	PURPLE LOWER CAUDAL	5,016	79.6	MOSSDALE
04-21-04	PURPLE DORSAL	2,007	64.3	MOSSDALE
04-29-04	PURPLE ANAL	5,009	64.2	MOSSDALE
05-07-04	PURPLE UPPER CAUDAL	2,039	56.0	MOSSDALE
05-13-04	PURPLE LOWER CAUDAL	5,008	67.2	MOSSDALE
05-20-04	PURPLE DORSAL	2,029	59.3	MOSSDALE
05-28-04	PURPLE ANAL	2,000	59.2	MOSSDALE
TOTAL		28,118		

HATCHERY OPERATION

Brood Year 2003 fish, Lots 1 through 5, were reared on a diet of Bio Diet starter and grower. A total of 11,170 lbs of food produced 8,470 lbs of fish, yielding a conversion rate of 1.32.

Brood Year 2003 fish, Lots 6 through 12, were reared on a diet of EWOS starter and grower. A total of 4,206 lbs of food produced 5,266 lbs of fish, yielding a conversion rate 0.8.

The facility had 2,107 visitors in fiscal year 2003-2004.

Approximately 6,540 eyed MRH chinook salmon eggs were supplied to 65 teachers, representing 56 different elementary and high schools that participated in the 2004 "Salmonids-In-The-Classroom" program for the San Joaquin River Basin area. Approximately 59,700 chinook salmon green eggs were supplied to Kevin Williamson PhD, UC Davis Genomic Variation Lab, for genetic studies.

CHINOOK SALMON MAINTENANCE PROGRAM

History of the 2003 Run

The first chinook salmon entered the MRH trap on October 14, 2003. Of the 549 salmon trapped, 169 were adult males, 223 adult females and 157 Grilse (132 males and 25 females). A total of 1,249,075 eggs were taken from 248 females during 12

spawnings, for an average fecundity of 5,036 eggs. The average fertility of eggs was 80.6 percent. Spawning was terminated December 13, 2003. Production Goals for Merced River Hatchery are set at 2 million eggs and 1.4 million smolts. Based on previous 10 year egg production records, a percentage from each egg lot are selected for production. Spawning procedures for 2001 were as follows: Single adult female eggs were divided into three or four pans, depending on egg volume, and each pan was fertilized with a different 3 year or older male. Grilse females were spawned in the same procedure using 3 year or older males for fertilization. When a shortage of adult 3 year or older males occurs grilse males are used with 3 year old or older females. Genetic concerns regarding out-of-basin chinook salmon smolt releases in the past years for the South Delta Study were not addressed this year. Biological data collection: CWT heads, scales, otoliths, length frequency, ovarian fluids and DNA samples. Approximately 59,700 eggs and an appropriate quantity of milt was collected from selected spawning days by Dr. Kevin Williamson PhD, UC Davis, Genomic Variation Laboratory, Davis, California. These samples were used for the Sex-reversal of male chinook salmon in the Central Valley study.

-Disease-

Enteric redmouth, *Yersinia ruckeri*, was not diagnosed in 2004. All fish were immersed vaccinated with Ermogen (Enteric Redmouth/Yersiniosis), Bacterins, Aqua Health USA, Buhl, Idaho, as a preventive treatment. . A fish health assessment by personnel from Ca-NV Fish Health Center, Coleman Fish Hatchery, was preformed on the BY03 VAMP post release fish groups. *Tetracapsula bryosalmonae* (the cause of Proliferative Kidney Disease) was clinically identified in fish post released groups and therefore in our production fish also. No bacterial or viral pathogens No bacterial or viral pathogens were detected during production period. "Fish Health Assessment of VAMP Release Groups - 2004", CA-NV Fish Health Center, 24411 Coleman Fish Hatchery Rd, Anderson, California 96007.

Appendix Table 1. Weekly adult chinook salmon trapping data for Merced River Hatchery 2003-2004

Week of	Adults	Grilse	Total
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OCT 12-03	1	0	1
OCT 19-03	2	0	2
OCT 26-03	50	28	78
Nov 02-03	68	26	94
Nov 09-03	122	43	165
NOV 16-03	78	37	115
NOV 23-03	36	15	51
NOV 30-03	26	8	34
DEC 07-03	9	0	9
DEC 13-03		TRAP CLOSED	
TOTAL	392	157	549

Appendix Table 2. Summary of chinook salmon run to Merced River Hatchery.
^{1/} ^{2/}

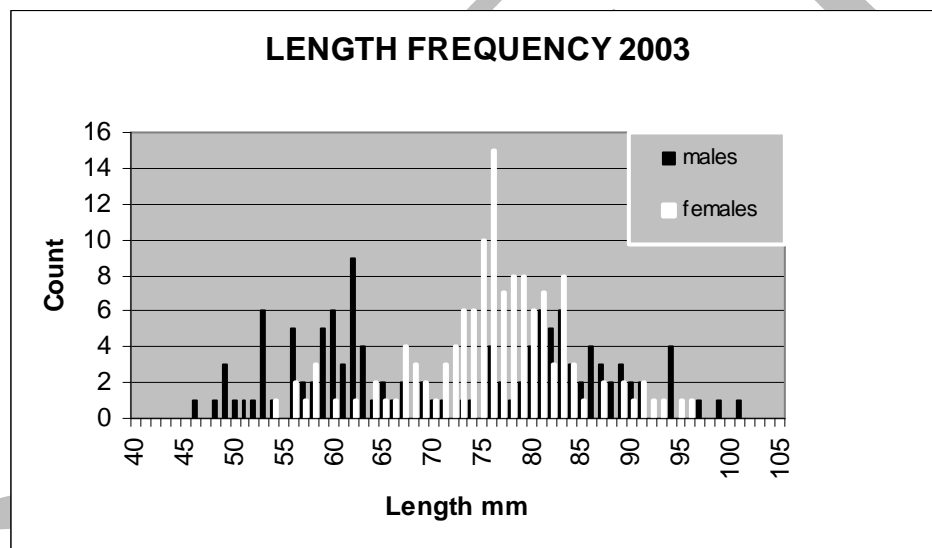
FISCAL YEAR	MALES	FEMALES	GRILSE ^{2/}	TOTAL
1970-71	59	40	^{1/}	99
1971-72	54	94	^{1/}	148
1972-73	14	51	^{1/}	65
1973-74	13	150	^{1/}	163
1974-75	24	400	^{1/}	424
1975-76	99	300	^{1/}	399
1976-77	86	260	^{1/}	346
1977-78	44	200	^{1/}	244
1978-79	14	45	^{1/}	61
1979-80	143	86	120	349
1980-81	43	106	8	157
1981-82	326	278	319	923
1982-83	90	67	32	189
1983-84	30	178	1587	1795

1984-85	713	858	167	1738
1985-86	514	610	87	1211
1986-87	271	217	162	650
1987-88	401	90	467	958
1988-89	165	250	42	457
1989-90	33	33	16	82
1990-91	17	11	18	46
1991-92	24	8	9	41
1992-93	97	24	245	368
1993-94	114	120	175	409
1994-95	359	240	344	943
1995-96	204	107	291	602
1996-97	464	275	402	1141
1997-98	451	365	86	946
1998-99	239	186	374	799
1999-00	396	234	1,007	1,637
2000-01	683	932	331	1,946
2001-02	473	657	533	1,663
2002-03	598	652	588	1,838
2003-04	169	223	157	549

¹/. From 1970-71 through 1978-79, the annual run of adult female chinook salmon was estimated by using redd counts and carcass recoveries in the spawning channel. The number of male salmon shown are actual counts of recovered carcasses. Beginning in fiscal year 1979-80, an adult trap has been operated at the facility throughout each spawning season and actual counts are made. There are no records of number of grilse prior to 1978.

²/. The criteria for grilse was changed from 21 inches F.L. and less to 22 inches F.L. and less in 1983-84, to 23 inches F.L. and less in 1984-85, and to 24 inches F.L. and less in 1985-86.

Appendix Table 3. Length Frequency Distribution (to nearest whole centimeter) of Coded Wire Tagged chinook salmon trapped at Merced River Hatchery 2003.



Based on Code Wire Tag carcass recoveries in the San Joaquin River basin the cut off length for 2 year old fish since 1997 has been 67cm (26.5 in) for males and 64cm (25 in) for females.

Appendix Table 4. Chinook salmon coded wire tag (CWT) recoveries, Merced River Hatchery (MRH), 2003.

CWT CODE	NUMBER RECOVERED	BROOD YEAR	HATCHERY OF ORIGIN	RELEASE SITE	RELEASE DATE
06-01-06-09-14	1	99	MRFF	DURHAM FERRY SAN JOAQUIN R.	4-28-00
06-01-06-10-01	1	99	MRFF	JERSEY POINT SAN JOAQUIN R.	5-01-00
06-44-01	1	99	MRFF	MOSSDALE SAN JOAQUIN R.	4-18-00
06-44-02	2	99	MRFF	MOSSDALE SAN JOAQUIN R.	4-18-00
06-44-03	1	99	MRFF	JERSEY POINT SAN JOAQUIN R.	4-20-00
06-44-04	1	99	MRFF	JERSEY POINT SAN JOAQUIN R.	4-20-00
06-44-15	5	00	MRFF	HATFIELD ST PARK MERCED R.	4-21-01
06-44-16	3	00	MRFF	HATFIELD ST PARK MERCED R.	4-21-01
06-44-17	4	00	MRFF	HATFIELD ST PARK MERCED R.	4-21-01
06-44-18	4	00	MRFF	HATFIELD ST PARK MERCED R.	4-21-01
06-44-19	1	00	MRFF	HATFIELD ST PARK MERCED R.	4-24-01
06-44-20	6	00	MRFF	HATFIELD ST PARK MERCED R.	4-26-01
06-44-21	9	00	MRFF	HATFIELD ST PARK MERCED R.	4-26-01
06-44-22	1	00	MRFF	HATCHERY OUTLET MERCED R.	5-08-01
06-44-23	3	00	MRFF	HATCHERY OUTLET MERCED R.	5-08-01
06-44-24	2	00	MRFF	HATCHERY OUTLET MERCED R.	5-08-01
06-44-27	1	00	MRFF	HATFIELD ST PARK MERCED R.	5-11-01
06-44-28	1	00	MRFF	HATFIELD ST PARK MERCED R.	5-13-01
06-44-29	3	00	MRFF	DURHAM FERRY SAN JOAQUIN R.	4-30-01
06-44-30	3	00	MRFF	DURHAM FERRY SAN JOAQUIN R.	4-30-01

06-44-31	2	00	MRFF	DURHAM FERRY SAN JOAQUIN R.	4-30-01
06-44-32	4	00	MRFF	MOSSDALE SAN JOAQUIN R.	5-01-01
06-44-33	5	00	MRFF	MOSSDALE SAN JOAQUIN R.	5-01-01
06-44-34	17	00	MRFF	JERSEY POINT SAN JOAQUIN R.	5-04-01
06-44-35	19	00	MRFF	JERSEY POINT SAN JOAQUIN R.	5-04-01
06-44-36	2	00	MRFF	DURHAM FERRY SAN JOAQUIN R.	5-07-01
06-44-38	2	00	MRFF	DURHAM FERRY SAN JOAQUIN R.	5-07-01
06-44-39	1	00	MRFF	MOSSDALE SAN JOAQUIN R.	5-08-01
06-44-40	1	00	MRFF	MOSSDALE SAN JOAQUIN R.	5-08-01
06-44-41	6	00	MRFF	JERSEY POINT SAN JOAQUIN R.	5-11-01
06-44-42	4	00	MRFF	JERSEY POINT SAN JOAQUIN R.	5-11-01
06-44-43	3	00	MRFF	OLD FISHERMAN CLUB SAN JOAQUIN R.	4-28-01
06-44-44	2	00	MRFF	OLD FISHERMAN CLUB SAN JOAQUIN R.	4-26-01
06-44-49	1	02	MRFF	HATCHERY OUTLET MERCED R.	5-04-03
06-44-51	2	01	MRFF	HATFIELD ST PARK MERCED R.	4-03-02
06-44-53	4	00	MRFF	MOSSDALE SAN JOAQUIN R.	5-08-01
06-44-54	1	00	MRFF	JERSEY POINT SAN JOAQUIN R.	5-11-01
06-44-57	2	01	MRFF	MOSSDALE SAN JOAQUIN R.	4-19-02
06-44-58	1	01	MRFF	MOSSDALE SAN JOAQUIN R.	4-19-02
06-44-59	6	00	MRFF	OLD FISHERMAN CLUB TUOLUMNE R.	4-26-01
06-44-60	3	01	MRFF	JERSEY POINT SAN JOAQUIN R.	4-22-02

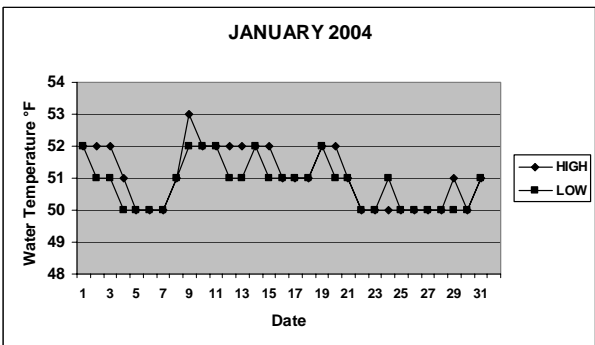
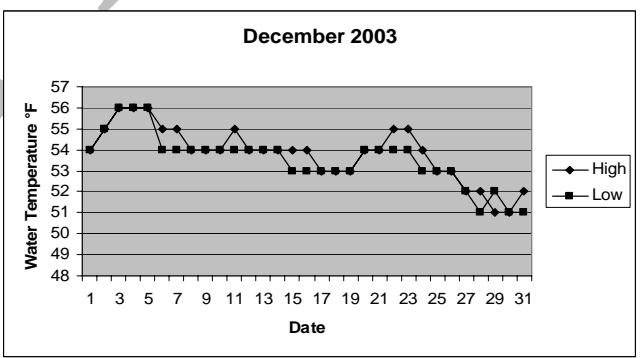
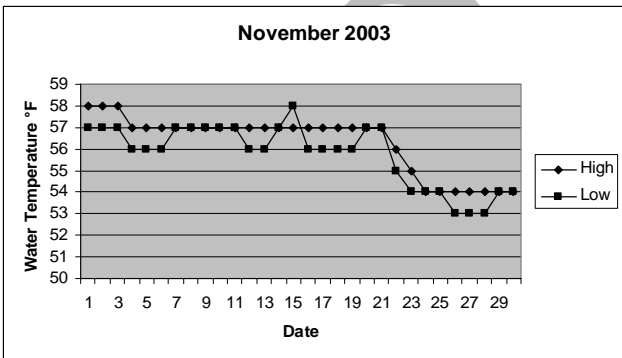
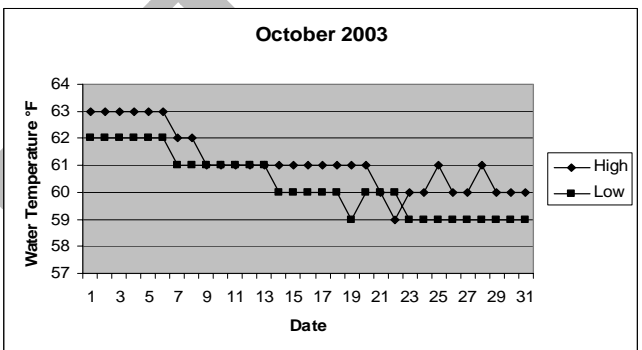
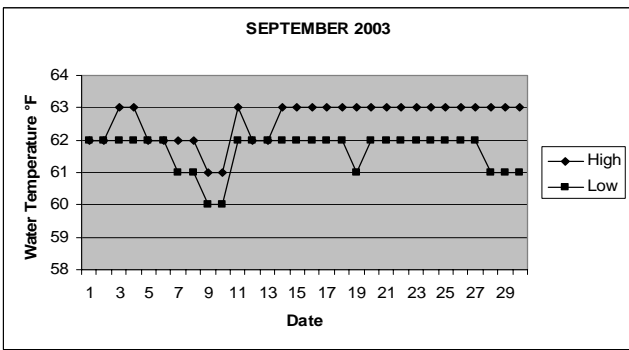
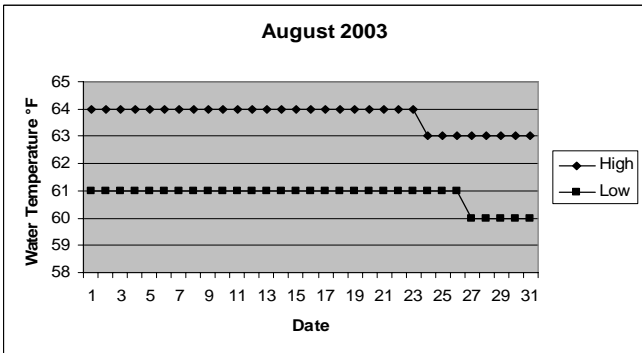
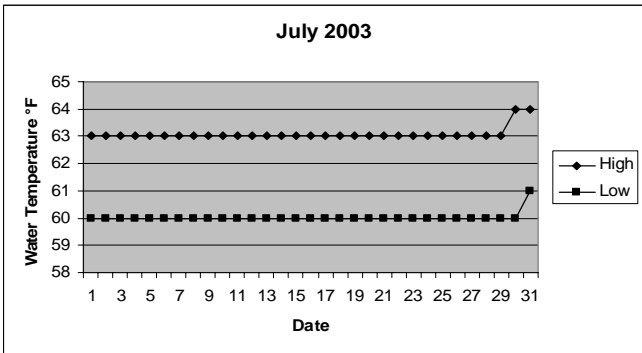
06-44-61	1	01	MRFF	OLD FISHERMAN CLUB SAN JOAQUIN R.	4-26-02
06-44-62	0	01	MRFF	GRAYSON TUOLUMNE R.	4-02-02 5-22-02
06-44-69	2	01	MRFF	OLD FISHERMAN CLUB SAN JOAQUIN R.	4-29-02
06-44-70	0	01	MRFF	DURHAM FERRY SAN JOAQUIN R.	4-25-02
06-44-71	1	01	MRFF	DURHAM FERRY SAN JOAQUIN R.	4-18-02
06-44-72	1	01	MRFF	DURHAM FERRY SAN JOAQUIN R.	4-18-02
06-44-73	1	01	MRFF	DURHAM FERRY SAN JOAQUIN R.	4-18-02
06-44-74	1	01	MRFF	DURHAM FERRY SAN JOAQUIN R.	4-18-02
06-44-78	2	01	MRFF	MOSSDALE SAN JOAQUIN R.	4-26-02
06-44-80	8	01	MRFF	JERSEY POINT SAN JOAQUIN R.	4-30-02
06-44-81	11	01	MRFF	JERSEY POINT SAN JOAQUIN R.	4-30-02
06-44-87	1	01	MRFF	HATFIELD ST PARK MERCED R.	4-26-02
06-44-88	1	01	MRFF	HATFIELD ST PARK MERCED R.	4-29-02
06-45-45	1	99	MRFF	HATFIELD ST PARK MERCED R.	4-13-00 4-14-00
06-45-48	1	01	MRFF	HATFIELD ST PARK MERCED R.	4-03-02 4-05-02
06-45-52	2	99	MRFF	HATCHERY OUTLET MERCED R.	4-24-00
06-45-53	3	99	MRFF	HATFIELD ST PARK MERCED R.	4-27-00
06-45-54	1	99	MRFF	HATFIELD ST PARK MERCED R.	4-27-00
06-45-55	1	99	MRFF	HATFIELD ST PARK MERCED R.	4-28-00
06-02-54	2	99	MOKE	SHERMAN ISLAND SAN JOAQUIN R.	2000
06-02-57	1	99	MOKE	NEW HOPE LANDING MOKELUMNE R.	2000

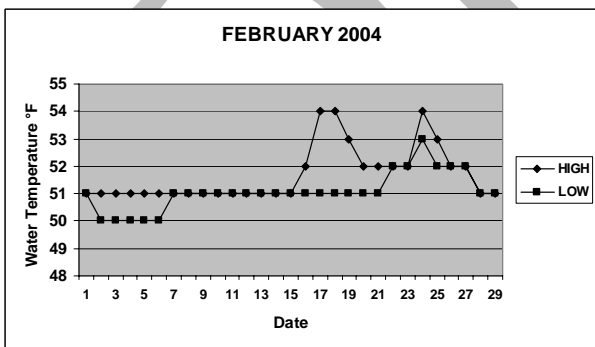
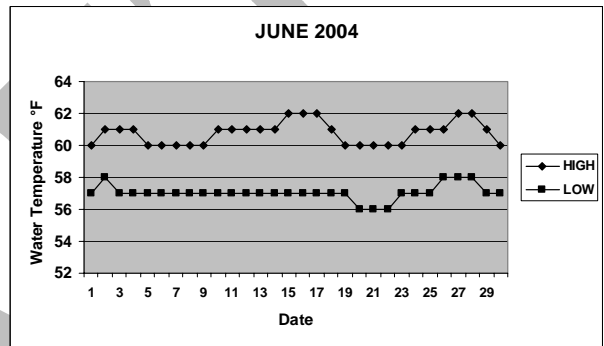
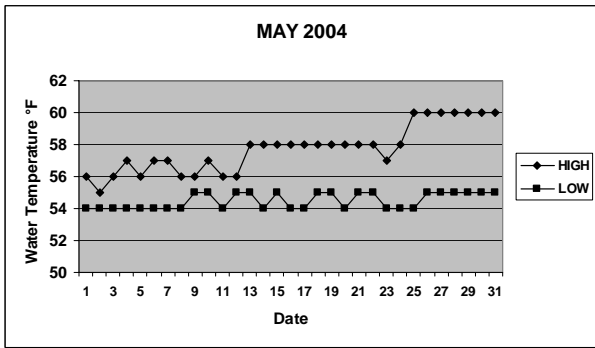
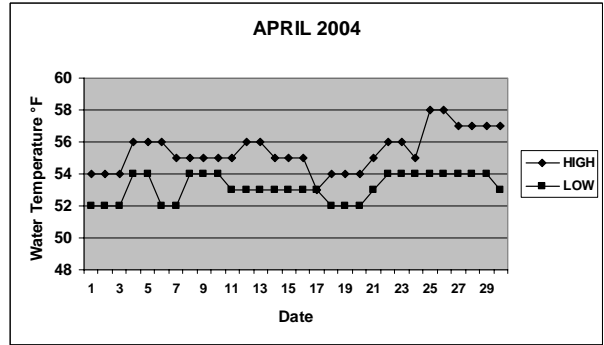
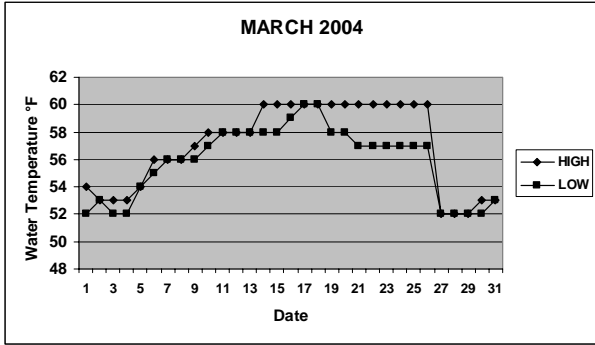
06-02-68	1	00	MOKE	NORTH FORK MOKE R. MOKELUMNE R.	2001
06-02-69	1	00	MOKE	NORTH FORK MOKE R. MOKELUMNE R.	2001
06-02-70	2	00	MOKE	JERSEY POINT SAN JOAQUIN R.	2001
06-02-71	6	00	MOKE	JERSEY POINT SAN JOAQUIN R.	2001
06-20-90	5	01	FEATHER	WICKLAND OIL NET PENS	2002
06-20-91	1	01	FEATHER	WICKLAND OIL NET PENS	2002
06-26-64	9	00	FEATHER	WICKLAND OIL NET PENS	2001
06-26-65	1	00	FEATHER	WICKLAND OIL NET PENS	2001
06-26-66	1	01	NIMBUS	WICKLAND OIL NET PENS	2002
06-26-70	1	00	FEATHER	WICKLAND OIL NET PENS	2001
06-27-17	2	00	MOKELUMNE	WEST SACRAMENTO	2001
06-27-23	1	01	MOKELUMNE	JERSEY POINT SAN JOAQUIN R.	2002
06-27-38	1	01	FEATHER	WICKLAND OIL NET PENS	2002
06-29-41	1	00	FEATHER	TIBURON NET PENS	2001
06-49-28	2	01	MOKELUMNE	SHERMAN ISLAND SAN JOAQUIN R.	2002
06-49-29		01	MOKELUMNE	SHERMAN ISLAND SAN JOAQUIN R.	2002
06-49-30	2	01	MOKELUMNE	SHERMAN ISLAND SAN JOAQUIN R.	2002
06-49-31	1	01	MOKELUMNE	SHERMAN ISLAND SAN JOAQUIN R.	2002
06-54-56	2	00	NIMBUS	WICKLAND OIL NET PENS	2001
06-54-57	2	00	NIMBUS	WICKLAND OIL NET PENS	2001
06-54-60	1	00	NIMBUS	WICKLAND OIL NET PENS	2001
06-58-53	1				

06-58-63	5	01	MOKELUMNE	JERSEY POINT SAN JOAQUIN R.	2002
05-24-18	1	99	MRFF	H.O.R.B. SAN JOAQUIN R.	5-10-01
NO TAGS FOUND	17				
TOTAL	250				

Appendix Figure 1. Daily water temperature for Merced River Hatchery from July 1, 2003 through June 30, 2004.

DAILY WATER TEMPERATURES BY MONTH





DRAFT

DRAFT

October

