

Central Valley Salmon and Steelhead Marking/Coded-wire Tagging Program

Fall-run Chinook Salmon
Spring-run Chinook Salmon
Steelhead

2014 Marking Season



Prepared by:

Braden Buttars
Pacific States Marine Fisheries Commission
bbuttars@psmfc.org

Abstract

The Central Valley Constant Fractional Marking/Tagging Program (CFM) was initiated in the spring of 2007 following the purchase of four automated fish tagging trailers (AutoFish Systems). Planning studies indicated that the optimal marking/tagging rate for the Central Valley CFM program was 25% of the fall-run Chinook production releases. For each production release (fish released at the same time and location), the program therefore targeted marking with an adipose fin-clip and coded-wire tagging a representative 25% of each release of fall-run Chinook salmon from the Central Valley hatcheries in 2007 through 2014. The program was conducted at Coleman National Fish Hatchery, Feather River Fish Hatchery, Feather River Fish Hatchery Annex, Nimbus Fish Hatchery, and Mokelumne River Fish Hatchery in these years.

The AutoFish Trailers were also used in the 2011 through 2014 seasons to adipose fin-clip and coded-wire tag 100% of the spring-run Chinook salmon reared at the Feather River Fish Hatchery, and adipose fin-clip 100% of the steelhead reared at Coleman National Fish Hatchery, Feather River Fish Hatchery, and Mokelumne River Fish Hatchery.. At Nimbus Fish Hatchery, 100% of the steelhead were manually adipose fin clipped due to them receiving a secondary ventral fin clip..

This report includes the marking/tagging activities conducted with the AutoFish Systems at the five Central Valley hatcheries in 2014 (Brood Year 2013 fall-run Chinook salmon, spring-run Chinook salmon, and steelhead). The program successfully processed 100% of the production releases of fall-run Chinook salmon through the automated marking trailers, a total of 27,161,998 fish. Of the fall-run Chinook total, approximately 28.37% were coded-wire tagged and adipose fin-clipped (a total of 7,705,156 fish). In addition, the program marked and coded-wire tagged 100% of the spring-run Chinook salmon produced at the Feather River Fish Hatchery, a total of 2,324,736 fish, and adipose fin-clipped 100% of the steelhead produced at Coleman National Fish Hatchery, Feather River Fish Hatchery, and Mokelumne River Fish Hatchery, a total of 1,320,346 fish. The steelhead at Nimbus Fish Hatchery were manually clipped by hatchery personnel due to them receiving a secondary ventral clip and are not included in this number.

Introduction

In most years, 28-32 million fall-run Chinook salmon are produced at five hatcheries in California's Central Valley, including Coleman National Fish Hatchery, Feather River Fish Hatchery, Feather River Fish Hatchery Annex, Nimbus Fish Hatchery, and Mokelumne River Fish Hatchery (Figure 1). Production from these hatcheries contributes to major sport and commercial fisheries in ocean and inland areas. Until 2007, only experimental releases of fall-run Chinook were externally marked and coded-wire tagged on a regular basis.

In 2004, the CALFED Ecosystem Restoration Program (ERP) funded a study to design a constant fractional marking/coded-wire tagging program for production releases of fall-run Chinook salmon from Central Valley hatcheries, with the goal of estimating in a statistically

valid manner the relative contribution of hatchery production. The study recommended the implementation of a system-wide marking/tagging program for production releases.

In 2006, the ERP Program provided funding to begin implementation of the Central Valley Constant Fractional Marking (CFM) program. The initial contract provided funding to Pacific States Marine Fisheries Commission for the purchase of four automated tagging systems (AutoFish Systems) and the first two years of operating costs for marking/tagging production releases of fall-run Chinook salmon at the five major Central Valley hatcheries (in 2007 and 2008). This program is a cooperative effort of the California Department of Fish and Wildlife, California Department of Water Resources, U.S. Fish and Wildlife Service, Pacific States Marine Fisheries Commission, U.S. Bureau of Reclamation, and East Bay Municipal Utility District. In 2009 through 2014 funding to conduct tagging operations at each hatchery was provided by the following entities: Coleman National Fish Hatchery, U.S. Bureau of Reclamation; Feather River Fish Hatchery, California Department of Water Resources; Feather River Fish Hatchery Annex, California Department of Fish and Wildlife; Mokelumne River Fish Hatchery, East Bay Municipal Utility District; and Nimbus Fish Hatchery, U.S. Bureau of Reclamation.

From 2002 to 2010, 100% of the spring-run Chinook salmon reared at Feather River Hatchery were marked and coded-wire tagged using manual techniques. In 2011 through 2014 the AutoFish Trailers were used for the spring-run Chinook marking/tagging. Funding was provided by the California Department of Water Resources.

The overall objectives of the fall and spring-run Chinook salmon tagging programs are:

1. To evaluate the contribution rates of hatchery fish to Central Valley Chinook salmon populations,
2. To evaluate the Central Valley propagation program's genetic and ecological effects on natural Chinook populations,
3. To estimate exploitation rates of hatchery and natural Central Valley Chinook salmon in ocean and inland fisheries,
4. To evaluate the success of restoration actions designed to increase natural production of Central Valley Chinook salmon,
5. To evaluate the relative impacts of water project operations on hatchery and naturally-produced Chinook salmon,
6. To evaluate the recovery of listed stocks of Chinook salmon.

The majority of the steelhead reared at Central Valley hatcheries were also marked using the AutoFish Trailers in 2014. Marking allows selective harvest of hatchery-reared steelhead in sport fisheries.

This report covers the eighth year of the CFM program's marking/tagging activities at the five major Central Valley hatcheries in the spring/summer of 2014 (Brood Year 2013 fall-run Chinook). The report also includes the marking/tagging of Brood Year 2013 spring-run Chinook salmon reared at the Feather River Fish Hatchery, and marking of steelhead reared at Coleman National Fish Hatchery, Feather River Fish Hatchery, and Mokelumne River Fish Hatchery.

Methods

The coded-wire tag/adipose fin clip is the method agreed to by the Pacific Salmon Treaty (1999) to monitor Chinook salmon in ocean fisheries along the Pacific Coast. It is a cost-effective method to apply a long-term mark that gives data on hatchery origin and release group, and provides for external identification of tagged fish. The coded-wire tag/adipose fin-clip marking method has been used throughout the West Coast of North America since the 1970's. Currently, over 50 million Chinook and coho salmon are coded-wire tagged each year. This Central Valley program is an integral part of this Coast-wide tagging program; tagged fish are recovered in ocean fisheries throughout the West Coast.

Four state-of-the-art automated tagging trailers were purchased for the Central Valley program in late 2006 and early 2007 from Northwest Marine Technology. The trailers incorporated the latest advanced technology for marking and coded-wire tagging fish. The AutoFish System™ has the capacity to mark and implant coded-wire tags very rapidly without any use of anesthetic or human contact. These systems have been in use for many years in the Pacific Northwest, but the Central Valley trailers were the first to be purchased for use in California.

Planning studies indicated that the optimal marking/tagging rate for the Central Valley CFM program was 25% of the fall-run Chinook production releases. For each production release (fish released at the same time and location), the program therefore targeted marking/tagging a representative 25% in 2007 through 2014. Coded-wire tags for the 2014 season were ordered from Northwest Marine Technology in November 2013. Tags used in the program were all 1.1 mm standard length tags.

The program was conducted at Coleman National Fish Hatchery, Feather River Fish Hatchery, Feather River Fish Hatchery Annex, Nimbus Fish Hatchery, and Mokelumne River Fish Hatchery (Figure 1). Fall-run Chinook coded-wire tagged and released for experimental purposes were not included in the program. The Merced River Hatchery therefore was not included in the Constant Fractional Marking Program, as the fall-run Chinook at this hatchery are raised for experimental purposes and were marked and coded-wire tagged using manual techniques in 2014.

The automated marking trailers have the ability to process fish that are a minimum length of 57 mm and a maximum length of 142 mm. With this in mind, timing of AutoFish Trailer operations at each facility was critical to maximize efficiency and productivity while meeting hatchery release deadlines. Double shifts were often used to maximize efficiency and output of the AutoFish Trailers. Trailers were moved as needed when fish at each hatchery reached the appropriate marking size. The fall-run Chinook marking/tagging season began the second week of February at the Feather River Fish Hatchery and ended at Feather River Fish Hatchery the first week of May. Marking/tagging of hatchery-produced fall-run Chinook in 2014 therefore spanned a 12-week period. The spring-run Chinook marking/tagging season began the fourth week of February at the Feather River Fish Hatchery and was completed the fourth week of March for a total of 5 weeks. The Central Valley steelhead marking was conducted intermittently based on the number of fish that were the appropriate size to process through the AutoFish Trailers, from the third week of May through the second week of July.

Throughout the season, fin-clipping rate and tag retention studies were conducted for fall and spring-run Chinook salmon to determine actual marking/tagging rates for each coded-wire tag code. Except as otherwise noted below, approximately 800-900 marked/tagged fish per tag code were retained and held separately for a period of approximately 21 days following the completion of each tag code. At Coleman National Fish Hatchery and Mokelumne River Fish Hatchery, approximately 400 fish were held for retention purposes for each tag code. A lower number of fish was used in studies at these facilities due to the large number of tag codes used. Study fish were sampled from throughout the tagging period for each tag code. Fish were electronically tested for tag retentions and visually inspected for fin-clip quality at the end of the study period. For the quality checks, for a fish to be counted as successfully retaining a tag, 60% or more of the adipose fin must be removed and a coded-wire tag must be present. A partial fin-clip has approximately 10-40% of the adipose fin still present and is counted in the successful clipping rate. If more than 40% of the adipose fin is still intact, fish are classified as unclipped and therefore count against the successful tagging rate (i.e. it likely would not be checked for a CWT since the adipose fin is intact or mostly intact). In some instances fish were held for less than the standard 21-day time period due to specific hatchery release strategies. For some smaller tag codes, tag retention studies were not feasible; for these tag groups, retention rates were extrapolated from larger groups tagged at the same hatchery during similar time periods.

Following the tagging season, coded-wire tag data were summarized for submission to [the Regional Mark Processing Center \(RMPC\)](http://www.rmipc.org), operated by the Pacific States Marine Fisheries Commission (<http://www.rmipc.org>). The RMPC provides regional coordination of salmon tagging and fin marking programs, and maintenance of coastwide databases for coded-wire tag releases, recoveries, and associated catch/sample information, in the Regional Mark Information System (RMIS).

Figure 2 summarizes the annual project work flow.

Results

Daily tagging rates, tag codes, and results of retention studies for the 2014 tagging season are shown in Appendix Tables 1 – 5 for each of the hatcheries. The technology allowed an accurate count of all production fish, and the marking/tagging of an exact percentage of those fish.

The program successfully processed 100% of the 2014 production releases of fall-run Chinook salmon from the Central Valley hatcheries (totaling 27,161,998 fish). The 25% target rate for marking/tagging was achieved for Brood Year 2013 (approximately 28.37% were CWT/ad-clipped, a total of 7,705,156 fish). The AutoFish Trailers also marked and tagged 100% of the Brood Year 2013 spring-run Chinook salmon reared at the Feather River Fish Hatchery, a total of 2,324,736 fish.

The AutoFish Trailers marked 100% of the steelhead reared at Coleman National Fish Hatchery, Feather River Fish Hatchery, and Mokelumne River Fish Hatchery. At Nimbus Fish Hatchery, the steelhead were manually clipped by hatchery personnel due to the steelhead receiving a secondary ventral clip.

Tag retention studies for the fall-run Chinook indicated very high rates of tag/mark retention. Retention rates ranged as follows:

- Coleman National Fish Hatchery: 98.50 - 100% with an average of 99.79%
- Feather River Hatchery: 98.16% - 99.47% with an average of 98.89%
- Mokelumne River Hatchery: 99.50% - 100% with average of 99.83%
- Nimbus Hatchery: 99.53% - 100% with an average of 99.74%

Tag retention studies for the spring-run Chinook also indicated high rates of tag/mark retention. Retention rates ranged as follows:

- Feather River Hatchery: 98.81% – 99.67% with an average of 99.27%

The steelhead from each facility are generally released during the winter months and clip quality will be checked just prior to release.

The numbers of fish included in this report were those processed and returned to the raceways during the tagging process. The actual numbers of fish released may differ. Please refer to the RMIS website, <http://www.rmhc.org>, for the number of fish that were successfully clipped and tagged and then released.

Discussion

Similar to past tagging seasons, finding and retaining qualified technical personnel for program operations continued to be a challenge during the 2014 tagging season. The program had seven Trailer Operators and seven Trailer Assistants employed to start the season and several of the Trailer Assistants left prior to the completion of the marking season.

This report includes all of the anadromous marking/tagging activities in the Central Valley with the exception of the Coleman National Fish Hatchery late-fall-run Chinook and steelhead, Merced River fall-run Chinook, and Livingston Stone National Fish Hatchery winter-run Chinook. These groups of fish are included in separate annual reports. At Feather River Fish Hatchery in the 2014 season, no coho were reared for release into Lake Oroville. A specific group of fall-run Chinook were tagged with a unique tag code and kept separate for release into Lake Oroville.

Acknowledgements

The Constant Fractional Marking Program would not have existed or successfully completed eight years of tagging without significant contributions from a number of people and agencies. I would like to thank the following individuals for their support, dedication and cooperation in this program:

The IEP Central Valley Salmonid Project Work Team provided guidance over the years in the development of the project. Members included Jim Smith (USFWS), Russell Bellmer (CDFW), Kenneth Lentz (USBR retired), John Hannon (USBR), Rich Dixon (CDFW retired), Alice Low (CDFW), Brad Cavallo (formerly DWR), Pete Adams (NOAA Fisheries retired), Stan Allen (PSMFC) and Joseph Miyamoto (EBMUD retired).

Management, administration, problem solving, and the existence of this program would not have been possible without Daniel Kratville and Dave Zezulak, California Department of Fish and Wildlife (CDFW); Stan Allen and Amy Roberts, Pacific States Marine Fisheries Commission (PSMFC); and Kevin Niemela, U.S. Fish and Wildlife Service (USFWS).

In particular, I want to thank the managers and staff working at the hatcheries where we conduct the marking/tagging program. Without your help, cooperation and support, this program would not be possible. Your willingness to work with us in adjusting the agendas and scheduling is critical in meeting the goals of all of the facilities. Kurtis Brown (USFWS - Coleman National Fish Hatchery), Anna Kastner (CDFW - Feather River Fish Hatchery), Paula Hoover (CDFW - Nimbus Fish Hatchery), Gary Novak (CDFW - Nimbus Fish Hatchery), William Smith (CDFW - Mokelumne River Fish Hatchery), and their very professional hatchery staff did a significant amount of work to accommodate the trailers at their hatcheries, and made us feel welcome while we were on-site. I look forward to continuing to work with you all.

I also want to thank Scott Merlette and Mike Memeo (PSMFC) for their work on the data entry and Chad Dale (PSMFC) for all of his maintenance work on the AutoFish Trailers to ensure that everything was operational. I want to thank the rest of the professional and hard working CFM crew that made this eighth season a great success. They each spent many long days away from home to accomplish the goals of this very demanding program. Trailer Operators included Tom Clifford (PSMFC), Chad Dale (PSMFC), Brian Lepping (PSMFC), Paul Lenos (PSMFC), Mike Memeo (PSMFC), Scott Merlette (PSMFC), and Spencer Reno (PSMFC). Tagging Trailer Assistants included seasonal PSMFC staff members Jennifer Deves, Douglas Falkner, Elizabeth Ferris, Charles Graybosch, Alexander Reyer, Dylan Stompe, and Margaret Zee.

Figure 1. Hatchery Locations: Central Valley Constant Fractional Marking Program (2014)

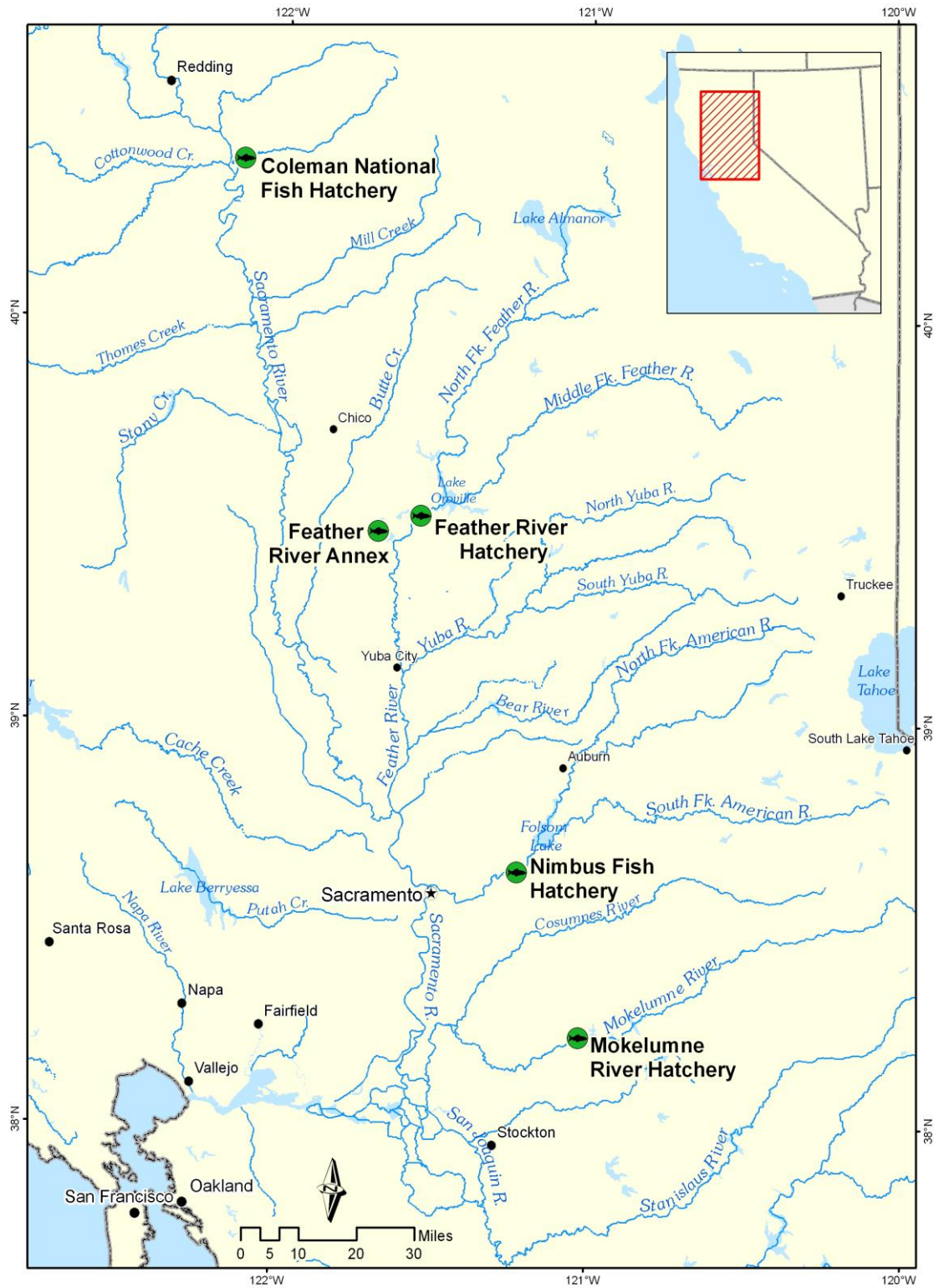
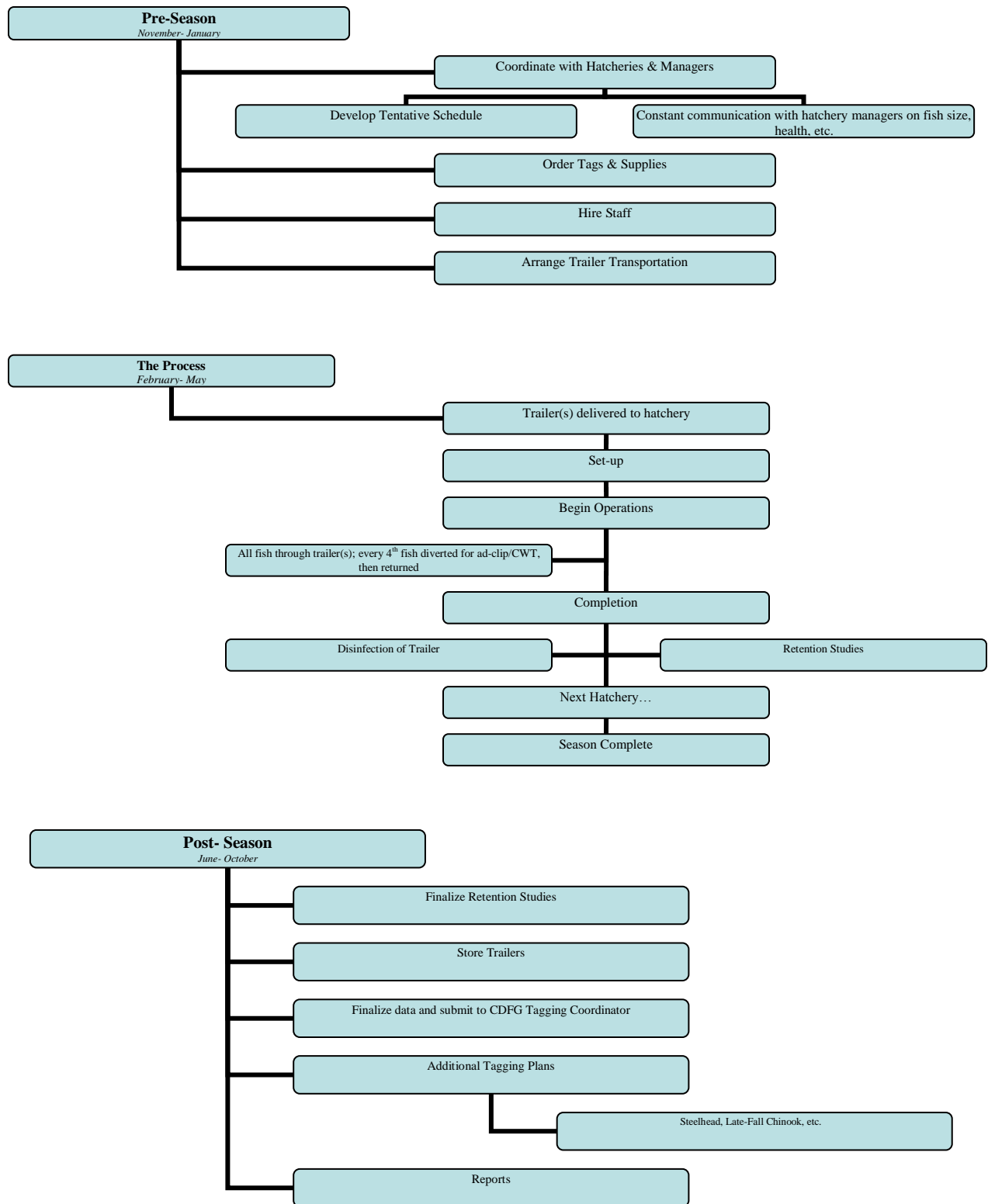


Figure 2. Constant Fractional Marking Program Annual Work Flow Summary



Appendix

Coleman National Fish Hatchery



Table 1a. Daily Tagging Rates at Coleman National Fish Hatchery

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/56/97			Size: 210K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/3/2014	10	10	23,019	-	69,156	-	92,175
3/4/2014	10	10	35,703	58,722	107,202	176,358	235,080
3/4/2014	10	10	38,520	97,242	115,728	292,086	389,328
3/5/2014	10	10	9,893	107,135	29,721	321,807	428,942
3/5/2014	9	9	57,283	-	171,954	-	229,237
3/6/2014	9	9	44,739	102,022	134,289	306,243	408,265
Tag Code Totals:			-	209,157	-	628,050	837,207

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/57/08			Size: 315K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/6/2014	4	4	20,361	-	61,299	-	81,660
3/7/2014	4	4	65,800	86,161	197,640	258,939	345,100
3/10/2014	4	4	12,511	98,672	37,620	296,559	395,231
3/10/2014	3	3	56,162	-	168,663	-	224,825
3/11/2014	3	3	43,041	99,203	129,228	297,891	397,094
3/11/2014	2	2	20,272	-	60,879	-	81,151
3/12/2014	2	2	42,741	63,013	128,295	189,174	252,187
3/12/2014	2	2	41,791	104,804	125,448	314,622	419,426
3/13/2014	2	2	1,700	106,504	5,166	319,788	426,292
Tag Code Totals:			-	304,379	-	914,238	1,218,617

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/56/98			Size: 210K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/13/2014	1	1	65,147	-	195,621	-	260,768
3/14/2014	1	1	30,012	95,159	90,138	285,759	380,918
3/17/2014	15	15	37,648	-	113,055	-	150,703
3/17/2014	15	15	38,059	75,707	114,222	227,277	302,984
3/18/2014	15	15	25,781	101,488	77,421	304,698	406,186
Tag Code Totals:			-	196,647	-	590,457	787,104

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/56/99			Size: 210K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/18/2014	16	16	48,434	-	145,380	-	193,814
3/19/2014	16	16	40,524	88,958	121,659	267,039	355,997
3/19/2014	16	16	23,246	112,204	69,792	336,831	449,035
3/20/2014	17	17	40,365	-	121,191	-	161,556
3/20/2014	17	17	39,896	80,261	119,874	241,065	321,326
3/21/2014	17	17	23,162	103,423	69,570	310,635	414,058
Tag Code Totals:			-	215,627	-	647,466	863,093

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/56/91			Size: 105K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
2/25/2014	14	14	27,172	-	81,726	-	108,898
2/26/2014	14	14	39,877	67,049	119,757	201,483	268,532
2/27/2014	14	14	37,190	104,239	111,654	313,137	417,376
2/28/2014	14	14	64	104,303	231	313,368	417,671
Tag Code Totals:			-	104,303	-	313,368	417,671

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/57/07			Size: 315K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
2/28/2014	13	13	45,284	-	135,912	-	181,196
3/3/2014	13	13	35,437	80,721	106,395	242,307	323,028
3/3/2014	13	13	12,251	92,972	36,822	279,129	372,101
3/3/2014	12	12	6,742	-	20,226	-	26,968
3/4/2014	12	12	41,751	48,493	125,289	145,515	194,008
3/4/2014	12	12	34,892	83,385	104,733	250,248	333,633
3/5/2014	12	12	32,115	115,412	96,174	346,422	461,834
3/5/2014	11	11	45,181	-	135,591	-	180,772
3/6/2014	11	11	38,126	83,307	114,492	250,083	333,390
3/6/2014	11	11	24,653	107,960	74,031	324,114	432,074
Tag Code Totals:			-	316,344	-	949,665	1,266,009

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/57/09			Size: 420K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/7/2014	8	8	25,576	-	76,782	-	102,358
3/7/2014	8	8	35,443	61,019	106,365	183,147	244,166
3/10/2014	8	8	24,942	85,961	75,000	258,147	344,108
3/10/2014	8	8	14,415	100,376	43,290	301,437	401,813
3/10/2014	7	7	20,560	-	61,725	-	82,285
3/11/2014	7	7	38,245	58,805	114,804	176,529	235,334
3/11/2014	7	7	34,204	93,009	102,648	279,177	372,186
3/12/2014	7	7	10,338	103,347	31,053	310,230	413,577
3/12/2014	6	6	46,977	-	140,985	-	187,962
3/13/2014	6	6	37,769	84,746	113,385	254,370	339,116
3/13/2014	6	6	18,337	103,083	55,071	309,441	412,524
3/13/2014	5	5	6,287	-	18,885	-	25,172
3/14/2014	5	5	45,069	51,356	135,366	154,251	205,607
3/14/2014	5	5	31,373	82,729	94,317	248,568	331,297
3/17/2014	5	5	20,724	103,453	62,241	310,809	414,262
Tag Code Totals:			-	410,259	-	1,231,917	1,642,176

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/57/04			Size: 210K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/18/2014	19	19	30,114	-	90,483	-	120,597
3/18/2014	19	19	36,692	66,806	110,223	200,706	267,512
3/19/2014	19	19	37,533	104,339	112,701	313,407	417,746
3/19/2014	18	18	29,674	-	89,295	-	118,969
3/20/2014	18	18	37,161	66,835	111,564	200,859	267,694
3/20/2014	18	18	34,147	100,982	102,651	303,510	404,492
3/21/2014	18	18	11,530	112,512	34,653	338,163	450,675
Tag Code Totals:			-	216,851	-	651,570	868,421

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/57/05			Size: 210K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/21/2014	20	20	37,100	-	111,375	-	148,475
3/24/2014	20	20	38,394	75,494	115,254	226,629	302,123
3/24/2014	20	20	37,356	112,850	112,398	339,027	451,877
3/25/2014	21	21	34,926	-	104,880	-	139,806
3/25/2014	21	21	36,037	70,963	108,213	213,093	284,056
3/26/2014	21	21	27,598	98,561	82,872	295,965	394,526
Tag Code Totals:			-	211,411	-	634,992	846,403

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/57/06			Size: 210K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/26/2014	22	22	32,134	-	96,597	-	128,731
3/27/2014	22	22	39,301	71,435	118,008	214,605	286,040
3/27/2014	22	22	38,603	110,038	116,337	330,942	440,980
3/28/2014	23	23	19,482	-	58,515	-	77,997
3/28/2014	23	23	11,948	31,430	35,847	94,362	125,792
3/28/2014	23	23	39,024	70,454	117,267	211,629	282,083
3/31/2014	23	23	34,607	105,061	103,950	315,579	420,640
Tag Code Totals:			-	215,099	-	646,521	861,620

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/56/92			Size: 105K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/31/2014	24	24	21,924	-	65,859	-	87,783
4/1/2014	24	24	41,859	63,783	125,733	191,592	255,375
4/1/2014	24	24	40,173	103,956	120,621	312,213	416,169
4/2/2014	24	24	4,769	108,725	14,373	326,586	435,311
Tag Code Totals:			-	108,725	-	326,586	435,311

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/56/93			Size: 105K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/2/2014	25	25	26,320	-	79,008	-	105,328
4/2/2014	25	25	36,552	62,872	109,743	188,751	251,623
4/3/2014	25	25	43,428	106,300	130,362	319,113	425,413
Tag Code Totals:			-	106,300	-	319,113	425,413

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/56/94			Size: 105K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/3/2014	26	26	7,404	-	22,278	-	29,682
4/4/2014	26	26	35,216	42,620	105,702	127,980	170,600
4/4/2014	26	26	37,262	79,882	111,882	239,862	319,744
4/7/2014	26	26	28,387	108,269	85,239	325,101	433,370
Tag Code Totals:			-	108,269	-	325,101	433,370

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/56/95			Size: 105K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/7/2014	27	27	24,155	-	72,771	-	96,926
4/8/2014	27	27	34,300	58,455	103,008	175,779	234,234
4/8/2014	27	27	32,903	91,358	99,201	274,980	366,338
4/9/2014	27	27	17,202	108,560	51,690	326,670	435,230
Tag Code Totals:			-	108,560	-	326,670	435,230

Coleman National Fish Hatchery - Fall Run Chinook Salmon							
Tag Code: 05/56/96			Size: 105K			Trailer # CA4	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/9/2014	28	28	23,953	-	72,576	-	96,529
4/10/2014	28	28	24,630	48,583	73,950	146,526	195,109
4/10/2014	28	28	30,920	79,503	93,003	239,529	319,032
4/11/2014	28	28	34,502	114,005	103,668	343,197	457,202
Tag Code Totals:			-	114,005	-	343,197	457,202

Hatchery Totals:

2,945,936

8,848,911

11,794,847

Retention Range: 98.50 - 100%

Retention Average: 99.78%

Table 1b. Summary of Hatchery Tag Codes and Tag Retention Study

Coleman National Fish Hatchery- Fall Run Chinook										
Tag Code Size and Location			Tag Code Totals			Retention Calculations				
Tag Code	Size	Raceway	Total Tagged	Number Untagged	Total Processed	# of Fish Held	Days Held	% Retention	# Retaining Tags	Calculated Untagged
05/56/97	210K	10/9	209,157	628,050	837,207	404	15	100.00%	209,157	628,050
05/57/08	315K	4/3/2	304,379	914,238	1,218,617	430	20	100.00%	304,379	914,238
05/56/98	210K	1/15	196,647	590,457	787,104	399	15	100.00%	196,647	590,457
05/56/99	210K	16/17	215,627	647,466	863,093	397	13	100.00%	215,627	647,466
05/56/91	105K	14	104,303	313,368	417,671	411	21	99.76%	104,053	313,618
05/57/07	315K	13/12/11	316,344	949,665	1,266,009	443	15	100.00%	316,344	949,665
05/57/09	420K	8/7/6/5	410,259	1,231,917	1,642,176	415	16	100.00%	410,259	1,231,917
05/57/04	210K	19/18	216,851	651,570	868,421	413	31	100.00%	216,851	651,570
05/57/05	210K	20/21	211,411	634,992	846,403	400	26	98.50%	208,240	638,163
05/57/06	210K	22/23	215,099	646,521	861,620	409	22	99.51%	214,045	647,575
05/56/92	105K	24	108,725	326,586	435,311	402	20	99.75%	108,453	326,858
05/56/93	105K	25	106,300	319,113	425,413	394	19	100.00%	106,300	319,113
05/56/94	105K	26	108,269	325,101	433,370	401	15	99.75%	107,998	325,372
05/56/95	105K	27	108,560	326,670	435,230	393	44	100.00%	108,560	326,670
05/56/96	105K	28	114,005	343,197	457,202	412	42	99.51%	113,446	343,756
Hatchery Totals			2,945,936	8,848,911	11,794,847	Retention Average		99.78%	2,940,359	8,854,488

Feather River Fish Hatchery



Table 2a. Daily Tagging Rates at Feather River Hatchery

Feather River Fish Hatchery - Fall Run Chinook Salmon - 100% Mark/Tag					
Tag Code: 06/05/24		Size: 90K		Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/11/2014	F2	A .5	16,632	-	16,632
3/12/2014	F2	A .5	34,457	51,089	51,089
3/13/2014	F2	A .5	50,044	101,133	101,133
Tag Code Totals			-	-	101,133

Feather River Fish Hatchery - Fall Run Chinook Salmon - 100% Mark/Tag					
Tag Code: 06/05/72		Size: 90K		Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/14/2014	F2	A 1.5	45,520	-	45,520
3/17/2014	F2	A 1.5	41,957	87,477	87,477
3/18/2014	F2	A 1.5	12,681	100,158	100,158
Tag Code Totals			-	-	100,158

Feather River Fish Hatchery - Fall Run Chinook Salmon - 100% Mark/Tag					
Tag Code: 06/05/25		Size: 90K		Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/18/2014	F2	A1	28,668	-	28,668
3/19/2014	F2	A1	53,852	82,520	82,520
3/20/2014	F2	A1	17,775	100,295	100,295
Tag Code Totals			-	-	100,295

Feather River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/65			Size: 345K			Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/20/2014	F2	Channel 1	15,799	-	47,421	-	63,220
3/21/2014	F2	Channel 1	18,176	33,975	54,600	102,021	135,996
3/24/2014	F3	Channel 1	19,022	52,997	57,162	159,183	212,180
3/25/2014	F3	Channel 1	22,004	75,001	66,060	225,243	300,244
3/27/2014	F3	Channel 1	15,977	90,978	47,991	273,234	364,212
3/31/2014	F3	Channel 1	60,309	151,287	180,996	454,230	605,517
4/1/2014	F3	Channel 1	57,791	209,078	173,481	627,711	836,789
4/2/2014	F3	Channel 1	53,238	262,316	159,813	787,524	1,049,840
4/3/2014	E2	Channel 1	62,709	325,025	188,214	975,738	1,300,763
4/4/2014	E2/E3	Channel 1	56,553	381,578	169,773	1,145,511	1,527,089
4/7/2014	E3	Channel 1	15,455	397,033	46,491	1,192,002	1,589,035
Tag Code Totals:			-	397,033	-	1,192,002	1,589,035
Feather River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/66			Size: 345K			Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/7/2014	E3	Channel 2	29,743	-	89,286	-	119,029
4/8/2014	E3	Channel 2	65,436	95,179	196,386	285,672	380,851
4/9/2014	E3/D3	Channel 2	67,349	162,528	202,128	487,800	650,328
4/10/2014	D3	Channel 2	44,901	207,429	134,778	622,578	830,007
4/11/2014	D3	Channel 2	58,237	265,666	174,777	797,355	1,063,021
4/14/2014	D3/C3	Channel 2	65,821	331,487	197,589	994,944	1,326,431
4/15/2014	C3	Channel 2	57,101	388,588	171,438	1,166,382	1,554,970
Tag Code Totals:			-	388,588	-	1,166,382	1,554,970

Feather River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/64			Size: 460K			Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/16/2014	C3	D6	28,803	-	86,466	-	115,269
4/16/2014	D2	D6	35,074	63,877	105,291	191,757	255,634
4/17/2014	D2	D6/D4	29,311	93,188	88,002	279,759	372,947
4/17/2014	D2	D4	38,843	132,031	116,556	396,315	528,346
4/18/2014	D2/C2	D4/D2	61,653	193,684	185,064	581,379	775,063
4/21/2014	C2	D2	30,442	224,126	91,416	672,795	896,921
4/21/2014	C2	D2	40,301	264,427	120,993	793,788	1,058,215
4/22/2014	C2/B2	D2/C6	64,305	328,732	193,002	986,790	1,315,522
4/23/2014	B2	C6	31,293	360,025	93,948	1,080,738	1,440,763
4/23/2014	B2	C6/C4	31,765	391,790	95,349	1,176,087	1,567,877
4/24/2014	B2	C4	27,641	419,431	82,986	1,259,073	1,678,504
4/24/2014	B2/B3	C4	20,167	439,598	60,579	1,319,652	1,759,250
4/25/2014	B3	C4/C2	28,267	467,865	84,885	1,404,537	1,872,402
4/28/2014	B3	C2	62,323	530,188	187,095	1,591,632	2,121,820
Tag Code Totals:			-	530,188	-	1,591,632	2,121,820

Feather River Fish Hatchery - Fall Run Chinook Salmon- 100% Mark/Tag					
Tag Code: 06/06/18		Size: 360K		Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
4/29/2014	A2	B2	89,282	-	89,282
4/30/2014	A2	B2	61,054	150,336	150,336
4/30/2014	A2	B2	54,957	205,293	205,293
5/1/2014	A2	B2	58,470	263,763	263,763
5/1/2014	A2	B2	59,784	323,547	323,547
5/2/2014	A2	B2	45,105	368,652	368,652
Tag Code Totals			-	-	368,652

Feather River Fish Hatchery - Fall Run Chinook Salmon - 100% Mark/Tag					
Tag Code: 06/04/48		Size: 15K		Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
4/2/2014	B4	A1	11,833	-	11,833
Tag Code Totals			-	-	11,833

Feather River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/86/81			Size: 125K			Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
5/5/2014	B4	B6	49,703	-	149,265	-	198,968
5/6/2014	B4	B6	25,342	75,045	76,095	225,360	300,405
5/6/2014	A4	B4	24,010	99,055	72,084	297,444	396,499
5/7/2014	A4	B4	29,994	129,049	90,054	387,498	516,547
5/7/2014	A4	B4	8,418	137,467	25,278	412,776	550,243
Tag Code Totals:			-	137,467	-	412,776	550,243

Feather River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/80/42			Size: 25K			Trailer # CA2	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
5/7/2014	A4	B4	16,093	-	48,297	-	64,390
5/8/2014	A4	B4	10,266	26,359	30,846	79,143	105,502
Tag Code Totals:			-	26,359	-	79,143	105,502

Hatchery Totals: 2,161,706 4,441,935 6,603,641

Retention Range: 98.16 - 99.47%

Retention Average: 98.89%

Table 2b. Summary of Hatchery Fall-run Tag Codes and Tag Retention Study

Feather River Fish Hatchery- Fall Run Chinook										
Tag Code Size and Location			Tag Code Totals			Retention Calculations				
Tag Code	Size	Raceway	Total Tagged	Number Untagged	Total Processed	# of Fish Held	Days Held	% Retention	# Retaining Tags	Calculated Untagged
06/05/24	90K	A.5	101,133	-	101,133	947	22	99.47%	100,597	536
06/05/72	90K	A1.5	100,158	-	100,158	950	20	99.26%	99,417	741
06/05/25	90K**	A1	100,295	-	100,295	-	-	98.89%	99,182	1,113
06/05/65	345K	Channel 1	397,033	1,192,002	1,589,035	910	18	98.24%	390,045	1,198,990
06/05/66	345K	Channel 2	388,588	1,166,382	1,554,970	922	13	98.16%	381,438	1,173,532
06/05/64	460K**	C/D	530,188	1,591,632	2,121,820	-	-	98.89%	524,303	1,597,517
06/06/18	360K	B2	368,652	-	368,652	912	13	99.34%	366,219	2,433
06/04/48	15K**	A1	11,833	-	11,833	-	-	98.89%	11,702	131
06/86/81	125K**	B4/B6	137,467	412,776	550,243	-	-	98.89%	135,941	414,302
06/80/42	25K**	B4	26,359	79,143	105,502	-	-	98.89%	26,066	79,436
Hatchery Totals			2,161,706	4,441,935	6,603,641	Retention Average		98.89%	2,134,910	4,468,731

** = Retention fish not checked. Used CFM average to obtain retention rate.

Feather River Fish Hatchery - Spring Run - 100% Mark/Tag					
Tag Code: 06/05/63		Size: 900K		Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
2/24/2014	H2	H6	67,708	-	67,708
2/25/2014	H2	H6	88,512	156,220	156,220
2/26/2014	H2	H6	106,268	262,488	262,488
2/27/2014	H2	H6	55,758	318,246	318,246
2/27/2014	H2	H1	57,960	-	57,960
2/28/2014	H2	H1	115,783	173,743	173,743
3/3/2014	H3	H2	97,005	270,748	270,748
3/4/2014	H3	H2	106,974	377,722	377,722
3/5/2014	H3	H2	51,945	429,667	429,667
3/5/2014	H3	H4	54,651	-	54,651
3/6/2014	H3	H4	114,657	169,308	169,308
3/7/2014	H3	H4	79,003	248,311	248,311
3/10/2014	H3	H4	37,614	285,925	285,925
Tag Code Totals			-	-	1,033,838

Feather River Fish Hatchery - Spring Run - 100% Mark/Tag					
Tag Code: 06/05/58		Size: 60K		Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/10/2014	Vat 1	G1	33,892	-	33,892
3/11/2014	Vat 2	G1	26,350	60,242	60,242
Tag Code Totals			-	-	60,242

Feather River Fish Hatchery - Spring Run - 100% Mark/Tag					
Tag Code: 06/05/69		Size: 90K		Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/11/2014	H3	G6	58,879	-	58,879
3/12/2014	H3	G6	43,473	102,352	102,352
Tag Code Totals			-	-	102,352

Feather River Fish Hatchery - Spring Run - 100% Mark/Tag					
Tag Code: 06/05/62		Size: 900K		Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/12/2014	H3/G2	G6	41,480	-	41,480
3/13/2014	G2	G6	85,611	127,091	127,091
3/14/2014	G2	G6	49,236	176,327	176,327
3/14/2014	G2	G6	39,349	215,676	215,676
3/17/2014	G2	G1	85,722	-	85,722
3/18/2014	G2	G1	100,606	186,328	186,328
3/19/2014	G2	G1	49,855	236,183	236,183
3/19/2014	G2	G1	40,074	276,257	276,257
3/20/2014	G2	G1	46,069	322,326	322,326
3/20/2014	G3	G2	44,119	366,445	366,445
3/21/2014	G3	G4	68,135	-	68,135
3/24/2014	G3	G4	91,806	159,941	159,941
3/25/2014	G3	G4	56,849	216,790	216,790
3/25/2014	G3	G4	60,940	277,730	277,730
3/26/2014	G3	G4	84,405	362,135	362,135
3/27/2014	G3	G4	80,999	443,134	443,134
3/28/2014	G3	G4	15,634	458,768	458,768
Tag Code Totals			-	-	1,040,889

Feather River Fish Hatchery - Spring Run - 100% Mark/Tag					
Tag Code: 06/86/96		Size: 70K		Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/27/2014	G3	G4	9,660	-	9,660
3/28/2014	G3	G4	69,861	79,521	79,521
Tag Code Totals			-	-	79,521

Feather River Fish Hatchery - Spring Run - 100% Mark/Tag					
Tag Code: 06/80/08		Size: 10K		Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/28/2014	G3	G4	7,894	-	7,894
Tag Code Totals			-	-	7,894

Hatchery Totals: **2,303,393**

Retention Range: 98.91 - 99.67%

Retention Average: 99.27%

Table 2c. Summary of Hatchery Spring-Run Tag Codes and Retention Study

Feather River Fish Hatchery- Spring Run Chinook										
Tag Code Size and Location			Tag Code Totals			Retention Calculations				
Tag Code	Size	Raceway	Total Tagged	Number Untagged	Total Processed	# of Fish Held	Days Held	% Retention	# Retaining Tags	Calculated Untagged
06/05/63	900K	H	1,033,838	-	1,033,838	920	23	98.91%	1,022,569	11,269
06/05/58	60K	G1	60,242	-	60,242	933	27	99.57%	59,983	259
06/05/69	90K	G6	102,352	-	102,352	918	22	99.67%	102,014	338
06/05/62	900K*	G	1,040,889	-	1,040,889	950	12	99.16%	1,032,146	8,743
06/86/96	70K*	G4	79,521	-	79,521	950	12	99.16%	78,853	668
06/80/08	10K*	G4	7,894	-	7,894	950	12	99.16%	7,828	66
Hatchery Totals			2,324,736	-	2,324,736	Retention Average		99.27%	2,303,393	21,343

* = Fish held with other tag code fish from same raceway. Retention percentage applied to all tag codes in one raceway.

Feather River Fish Hatchery - Inland-Lake Oroville - 100% Mark/Tag					
Tag Code: 06/05/68		Size: 90K		Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
2/14/2014	Vat 1	X1	9,373	-	9,373
2/18/2014	Vat 2/3	X1	33,527	42,900	42,900
2/19/2014	Vat 4/5	X1	57,817	1,007,171	100,717
Tag Code Totals			-	-	100,717

Feather River Fish Hatchery - Inland-Lake Oroville - 100% Mark/Tag					
Tag Code: 06/04/52		Size: 30K		Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
2/19/2014	Vat 5/6/7	X1	24,893	-	24,893
2/20/2014	Vat 8	X1	6,507	31,400	31,400
Tag Code Totals			-	-	31,400

Feather River Fish Hatchery- Steelhead- 100% Mark only						
Trailer # CA3						
Marking Date	Raceway Prior to Marking	Raceway Following Marking	Daily Marked Total MATS	Daily Marked Total Manual	Cumulative Marked Total	Raceway Total
6/10/2014	A2	A1	24,707	4,600	29,307	29,307
6/11/2014	A2	A1	38,683	6,255	44,938	74,245
6/12/2014	A2	A1	40,706	6,080	46,786	121,031
6/13/2014	A2	A1	41,608	4,823	46,786	167,462
6/16/2014	A2	A1	42,475	5,105	47,580	215,042
6/17/2014	A2	A1	31,968	4,280	36,248	251,290
6/23/2014	B2	A1	7,986	1,530	9,516	260,806
6/24/2014	B2/B3	A1	37,930	7,047	44,977	305,783
6/25/2014	B3	B1	43,852	7,249	51,101	356,884
6/26/2014	B3	B1	41,062	8,355	49,417	406,301
6/27/2014	B3	B1	32,548	5,986	38,534	444,835
6/30/2014	B3	B1	27,438	6,099	33,537	478,372
7/1/2014	B3	B1	18,364	6,226	24,590	502,962
Totals			-	-	-	502,962

Mokelumne River Hatchery



Table 4a. Daily Tagging Rates at Mokelumne River Hatchery

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/84			Size: 100K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/24/2014	B	A	38,416	-	115,503	-	153,919
3/25/2014	B/C	A	33,365	71,781	100,149	215,652	287,433
3/25/2014	C	A	33,455	105,236	100,491	316,143	421,379
3/26/2014	C	A	7,119	112,355	21,423	337,566	449,921
Tag Code Totals:			-	112,355	-	337,566	449,921

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/85			Size: 100K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
3/26/2014	C/D	B	48,469	-	145,512	-	193,981
3/27/2014	D	B	41,402	89,871	124,290	269,802	359,673
3/27/2014	D	B	22,708	112,579	68,178	337,980	450,559
Tag Code Totals:			-	112,579	-	337,980	450,559

Mokelumne River Fish Hatchery- Fall Run Chinook- 100% Mark/Tag					
Tag Code: 06/05/70		Size: 90K		Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/27/2014	D	C1	7,323	-	7,323
3/28/2014	D	C1	75,538	82,861	82,861
3/31/2014	D	C1	18,469	101,330	101,330
Tag Code Totals:			-	-	101,330

Mokelumne River Fish Hatchery- Fall Run Chinook- 100% Mark/Tag					
Tag Code: 06/05/92		Size: 90K		Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
3/31/2014	D	C2	5,775	-	5,775
4/1/2014	D/E	C2	70,591	76,366	76,366
4/2/2014	E	C2	24,372	100,738	100,738
Tag Code Totals:			-	-	100,738

Mokelumne River Fish Hatchery- Fall Run Chinook- 100% Mark/Tag					
Tag Code: 06/05/93		Size: 90K		Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
4/2/2014	E	C3	66,635	-	66,635
4/3/2014	E	C3	35,090	101,725	101,725
Tag Code Totals:			-	-	101,725

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/86			Size: 100K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/3/2014	E	D	38,141	-	114,498	-	152,639
4/4/2014	E/F	D	38,975	77,116	117,024	231,522	308,638
4/7/2014	F	D	31,852	108,968	95,682	327,204	436,172
Tag Code Totals:			-	108,968	-	327,204	436,172

Mokelumne River Fish Hatchery- Fall Run Chinook- 100% Mark/Tag					
Tag Code: 06/06/17		Size: 240K		Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Raceway Total
4/7/2014	F	E	14,779	-	14,779
4/8/2014	F	E	49,733	64,512	64,512
4/8/2014	F	E	49,787	114,299	114,299
4/9/2014	F	E	50,890	165,189	165,189
4/9/2014	F	E	50,496	215,685	215,685
4/10/2014	F/G	E	25,102	240,787	240,787
Tag Code Totals:			-	-	240,787

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/87			Size: 100K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/10/2014	G	F	44,523	-	133,605	-	178,128
4/11/2014	G	F	49,578	94,101	148,776	282,381	376,482
4/14/2014	G/H	F	18,327	112,428	55,053	337,434	449,862
Tag Code Totals:			-	112,428	-	337,434	449,862

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/88			Size: 100K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/14/2014	H	G	18,290	-	54,927	-	73,217
4/15/2014	H	G	32,283	50,573	96,927	151,854	202,427
4/15/2014	H	G	30,852	81,425	92,805	244,659	326,084
4/16/2014	H/I	G	31,354	112,779	94,149	338,808	451,587
Tag Code Totals:			-	112,779	-	338,808	451,587

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/89			Size: 100K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/16/2014	I	H	24,791	-	74,484	-	99,275
4/17/2014	I	H	30,004	54,795	90,063	164,547	219,342
4/17/2014	I	H	35,998	90,793	108,303	272,850	363,643
4/18/2014	I/J	H	21,393	112,186	64,278	337,128	449,314
Tag Code Totals:			-	112,186	-	337,128	449,314

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/90			Size: 100K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/18/2014	J	I	3,072	-	9,258	-	12,330
4/21/2014	J	I	15,715	18,787	47,202	56,460	75,247
4/21/2014	J	I	28,216	47,003	85,029	141,489	188,492
4/22/2014	J	I	32,950	79,953	98,892	240,381	320,334
4/22/2014	J/K	I	17,493	97,446	52,812	293,193	390,639
4/23/2014	K	I	14,823	112,269	44,526	337,719	449,988
Tag Code Totals:			-	112,269	-	337,719	449,988

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/91			Size: 100K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/23/2014	K	J	14,101	-	42,321	-	56,422
4/23/2014	K	J	31,451	45,552	94,566	136,887	182,439
4/24/2014	K	J	27,702	73,254	83,151	220,038	293,292
4/24/2014	K	J	38,380	111,634	115,401	335,439	447,073
Tag Code Totals:			-	111,634	-	335,439	447,073

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/95			Size: 80K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/25/2014	K/L	K	32,765	-	98,550	-	131,315
4/28/2014	L	K	43,649	76,414	131,244	229,794	306,208
4/29/2014	L	K	13,543	89,957	40,665	270,459	360,416
Tag Code Totals:			-	89,957	-	270,459	360,416

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/96			Size: 80K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/29/2014	L/M	L	41,067	-	123,762	-	164,829
4/30/2014	M/N	L	50,195	91,262	151,035	274,797	366,059
Tag Code Totals:			-	91,262	-	274,797	366,059

Mokelumne River Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/26			Size: 70K			Trailer # CA1	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
5/2/2014	N	M	76,365	-	229,200	-	305,565
Tag Code Totals:			-	76,365	-	229,200	305,565

Hatchery Totals: 1,697,362 3,463,734 5,161,096

Retention Range: 99.50-100%

Retention Average: 99.83%

Table 4b. Summary of Hatchery Tag Codes and Tag Retention Studies

Mokelumne River Fish Hatchery- Fall Run Chinook										
Tag Code Size and Location			Tag Code Totals			Retention Calculations				
Tag Code	Size	Raceway	Total Tagged	Number Untagged	Total Processed	# of Fish Held	Days Held	% Retention	# Retaining Tags	Calculated Untagged
06/05/84	100K	A	112,355	337,566	449,921	410	23	100.00%	112,355	337,566
06/05/85	100K	B	112,579	337,980	450,559	406	29	99.75%	112,298	338,261
06/05/70	90K	C1	101,330	-	101,330	400	25	99.75%	101,077	253
06/05/92	90K	C2	100,738	-	100,738	400	23	99.50%	100,234	504
06/05/93	90K	C3	101,725	-	101,725	400	22	99.75%	101,471	254
06/05/86	100K	D	108,968	327,204	436,172	401	11	100.00%	108,968	327,204
06/06/17	240K	E	240,787	-	240,787	400	19	99.50%	239,583	1,204
06/05/87	100K	F	112,428	337,434	449,862	406	32	100.00%	112,428	337,434
06/05/88	100K	G	112,779	338,808	451,587	400	14	100.00%	112,779	338,808
06/05/89	100K	H	112,186	337,128	449,314	400	12	100.00%	112,186	337,128
06/05/90	100K	I	112,269	337,719	449,988	415	9	100.00%	112,269	337,719
06/05/91	100K	J	111,634	335,439	447,073	407	22	99.75%	111,355	335,718
06/05/95	80K	K	89,957	270,459	360,416	405	17	99.51%	89,516	270,900
06/05/96	80K	L	91,262	274,797	366,059	403	16	100.00%	91,262	274,797
06/05/26	70K	M	76,365	229,200	305,565	408	14	100.00%	76,365	229,200
Hatchery Totals			1,697,362	3,463,734	5,161,096	Retention Average		99.83%	1,694,145	3,466,951

Mokelumne River Fish Hatchery- Steelhead- 100% Mark only						
Trailer # CA1						
Marking Date	Raceway Prior to Marking	Raceway Following Marking	Daily Mark Total MATS	Daily Mark Total Manual	Cumulative Marked Total	Raceway Total
6/30/2014	Hatchery	K	3,325	2,577	5,902	5,902
7/1/2014	Hatchery	K	19,407	4,850	24,257	30,159
7/1/2014	Hatchery	L	5,833	2,180	8,013	8,013
7/2/2014	Hatchery	L	19,060	3,060	22,120	30,133
7/2/2014	Hatchery	M	10,005	2,796	12,801	12,801
7/3/2014	Hatchery	M	15,009	4,130	19,139	31,940
7/7/2014	Hatchery	N	13,746	3,873	17,619	17,619
7/8/2014	Hatchery	N	3,283	1,191	4,474	22,093
Hatchery Totals			-	-	-	114,325

Nimbus Hatchery



Table 5a. Daily Tagging Rates at Nimbus Hatchery

Nimbus Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/81			Size: 305K			Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/2/2014	A4	A2	26,311	-	79,080	-	105,391
4/3/2014	A4	A2	35,515	61,826	106,629	185,709	247,535
4/4/2014	A4	A2	26,354	88,180	79,107	264,816	352,996
4/7/2014	A4	A2	15,251	103,431	45,807	310,623	414,054
4/8/2014	A4	A2	33,364	136,795	100,173	410,796	547,591
4/9/2014	A4	A2	9,510	146,305	28,532	439,328	585,633
4/9/2014	B4	B2	15,197	161,502	45,640	484,968	646,470
4/10/2014	B4	B2	36,292	197,794	108,924	593,892	791,686
4/11/2014	B4	B2	26,700	224,494	80,172	674,064	898,558
4/14/2014	B4	B2	50,712	275,206	152,199	826,263	1,101,469
4/15/2014	B4	B2	27,260	302,466	81,828	908,091	1,210,557
Tag Code Totals:			-	302,466	-	908,091	1,210,557

Nimbus Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/80			Size: 245K			Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/15/2014	C4	C2	40,001	-	120,057	-	160,058
4/16/2014	C4	C2	40,446	80,447	121,386	241,443	321,890
4/16/2014	C4	C2	41,302	121,749	123,978	365,421	487,170
4/17/2014	C4	C2	33,146	154,895	99,477	464,898	619,793
4/17/2014	D4	D2	35,823	190,718	107,514	572,412	763,130
4/18/2014	D4	D2	26,244	216,962	78,789	651,201	868,163
4/18/2014	D4	D2	20,793	237,755	62,397	713,598	951,353
4/21/2014	D4	D2	42,257	280,012	126,927	840,525	1,120,537
Tag Code Totals:			-	280,012	-	840,525	1,120,537

Nimbus Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/79			Size: 245K			Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
4/22/2014	D4	E2	24,752	-	74,295	-	99,047
4/22/2014	D4	E2	11,238	35,990	33,750	108,045	144,035
4/22/2014	E4	E2	22,431	58,421	67,299	175,344	233,765
4/23/2014	E4	E2	37,668	96,089	113,073	288,417	384,506
4/23/2014	E4	E2	40,558	136,647	121,740	410,157	546,804
4/24/2014	E4	E2	29,385	166,032	88,206	498,363	664,395
4/28/2014	F4	F2	7,580	173,612	22,809	521,172	694,784
4/29/2014	F4	F2	38,863	212,475	116,682	637,854	850,329
4/30/2014	F4	F2	39,311	251,786	117,987	755,841	1,007,627
5/1/2014	F4	F2	30,557	282,343	91,773	847,614	1,129,957
Tag Code Totals:			-	282,343	-	847,614	1,129,957

Nimbus Fish Hatchery- Fall Run Chinook Salmon							
Tag Code: 06/05/75			Size: 40K			Trailer # CA3	
Tagging Date	Raceway Prior to Tagging	Raceway Following Tagging	Daily Tagged Total	Cumulative Tagged Total	Daily Untagged Total	Cumulative Untagged Total	Raceway Total
5/1/2014	F4	F2	4,851	-	14,553	-	19,404
5/2/2014	F4	F2	30,480	35,331	91,479	106,032	141,363
Tag Code Totals:			-	35,331	-	106,032	141,363

Hatchery Totals: 900,152 2,702,262 3,602,414

Retention Range: 99.53 - 100%

Retention Average: 99.74%

Table 5b. Summary of Hatchery Tag Codes and Tag Retention Studies

Nimbus Fish Hatchery- Fall Run Chinook										
Tag Code Size and Location			Tag Code Totals			Retention Calculations				
Tag Code	Size	Raceway	Total Tagged	Number Untagged	Total Processed	# of Fish Held	Days Held	% Retention	# Retaining Tags	Calculated Untagged
06/05/81	305K	A/B	302,466	908,091	1,210,557	946	17	99.89%	302,133	908,424
06/05/80	245K	C/D	280,012	840,525	1,120,537	857	25	100.00%	280,012	840,525
06/05/79	245K*	E/F	282,343	847,614	1,129,957	851	15	99.53%	281,016	848,941
06/05/75	40K*	F2	35,331	106,032	141,363	851	14	99.53%	35,165	106,198
Hatchery Totals			900,152	2,702,262	3,602,414	Retention Average		99.74%	898,326	2,704,088

* = Fish held with other tag code fish from same raceway. Retention percentage applied to all tag codes in one raceway.