State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

FINAL REPORT

EVALUATION OF POND REARING OF CHINOOK SALMON

PROJECT NUMBER 91-FR-3
COOPERATIVE AGREEMENT 14-16-0001-91517

by

MARK S. PISANO

Klamath River Project, Inland Fisheries Division

Inland Fisheries

1995

FINAL REPORT

EVALUATION OF POND REARING OF CHINOOK SALMON

PROJECT NUMBER 91-FR-3
COOPERATIVE AGREEMENT 14-16-0001-91517

A. Abstract:

Adipose fin-clipping and coded-wire tagging (Ad+CWT) of fall chinook salmon originating from Iron Gate Hatchery (IGH), and reared at various mid-Klamath ponding locations, was undertaken for four consecutive brood years (BYs): 1988 through 1991. In 1989, 203,585 BY 1988 tagged chinook were distributed to rearing ponds in Indian, Bluff, Elk, Red Cap and Grider creeks. A total of 158,604 effectively tagged chinook was released, along with an additional 75,287 untagged chinook, from these ponds in October 1989. In 1990 and 1991, totals of 119,336 BY 1989 and 122,466 BY 1990 IGH chinook, respectively, were tagged and transported to ponds in Indian, Bluff and Elk creeks. In 1990, totals of 90,474 effectively tagged and 69,149 untagged chinook were released from these rearing ponds. In 1991, 69,462 effectively tagged and 40,642 untagged chinook were released. In 1992, 80,677 effectively tagged BY 1991 chinook were reared in the Indian and Bluff Creek ponds. Totals of 60,719 effectively tagged and 63,949 untagged fish were released in October, 1992.

Currently, complete CWT recovery information is available only for BY 1988 fall chinook salmon released in 1989. Because chinook salmon can return at up to five years of age, complete recovery information for the BY 1990 and 1991 releases will not be available until after the 1995 and 1996 spawning seasons, respectively.

For BY 1988 releases, the greatest overall contribution to the various fisheries was made by Bluff Creek fish followed, in order, by fish released from Indian Creek, Red Cap Creek and Grider Creek. Of these four releases, fish from Bluff Creek contributed the greatest percentage to ocean and in-river harvest while fish from Indian Creek contributed the largest percentage to spawner escapement.

B. Introduction:

The Klamath River basin is the second-most important fall chinook salmon producer in California. Since 1978, the numbers of fall chinook salmon returning to the Klamath system have ranged from a low of about 26,700 adults in 1992 to a high of about 208,800 in 1987. Major chinook salmon spawning tributaries are the Trinity River, Salmon River, Scott River, Shasta River and Bogus Creek. Chinook salmon spawning runs to these and smaller tributaries have

diminished over recent years due to prolonged drought conditions and the affects of various land use practices.

Natural reproduction in the system is augmented by two hatcheries, IGH at the foot of Iron Gate Dam on the Klamath River, and Trinity River Hatchery (TRH), located at the base of Lewiston Dam on the Trinity River.

Since 1979, the California Department of Fish and Game's (DFG) Klamath River Project (KRP) has marked (Ad+CWT) various groups of fingerling and yearling chinook and coho salmon at IGH. These Ad+CWT fish are released with the unmarked chinook production from IGH to evaluate contributions made to the various fisheries and spawning escapements by IGH.

Fall chinook salmon originating from IGH have also been used for a cooperative pond-rearing program, funded by a grant from the Renewable Resources Investment Fund to the Northern California Indian Development Council, Inc. These ponds are located in several smaller Klamath River tributaries, upstream of the Trinity River confluence. The cooperative pond-rearing program was established to facilitate recovery of depressed chinook salmon runs in these sub-drainages. Beginning with the 1988 BY, chinook salmon outplanted to these individual rearing pond locations were marked (Ad+CWT) to help evaluate the contributions these fish make to the ocean commercial and sport, river sport and net fisheries, and to spawning escapements. This evaluation is required for effective management of the Klamath River's salmon resources.

C. Description of Study Area:

The Klamath River system drains approximately 12,000 sq. mi. of northwestern California and southern Oregon. The majority of natural chinook salmon production occurs in Klamath River tributaries such as the Trinity, Salmon, Scott, and Shasta rivers and Bogus Creek. Smaller tributaries, such as Indian, Elk, and Grider creeks and others, also contribute to salmon production. Rearing ponds have been operated by local organizations on several of these smaller tributaries that historically had spawning runs of chinook salmon. The ponds used for this evaluation are located in Bluff Creek at Klamath River mile (KRM) 48.6; Red Cap Creek, KRM 52.7; Elk Creek, KRM 105.5; Indian Creek, KRM 106.7; and Grider Creek, KRM 130.3

D. Methods and Materials:

Under the supervision of permanent KRP biologists, temporary employees each year marked (Ad+CWT) a minimum of 40,000 fall chinook salmon for each rearing location to be used. Fall

chinook salmon from BYs 1988 through 1991 produced at IGH were used. Each year, the marked fish, along with, in some cases, additional, untagged chinook salmon were transferred from IGH to pond-rearing facilities in May or June, as fingerlings. At the time of transfer, the fish ranged in size from about 200-to-70 per pound. The ponded fish were usually reared until mid-to-late October, and released as yearlings at the pond site. The final numbers of fall chinook salmon released from each pond were estimated using the Peterson mark and recapture method approximately three weeks prior to their release. At the same time, we conducted quality control tests, to determine the numbers released that were correctly marked.

Recoveries of marked fish were subsequently made during on-going investigations of the ocean and in-river fisheries, at Project weirs in selected Klamath River tributaries, and at the two basin hatcheries (these activities were not funded by this project). Information on the actual numbers of CWTs collected, as well as estimates of the total number of CWTs recovered in the ocean, in both the sport and commercial fisheries, were provided by the Pacific States Marine Fisheries Commission (PSMFC). Similar data for the in-river Native American net harvest were provided by the U.S. Fish and Wildlife Service (CCFRO-Arcata). Actual and expanded CWT recovery information for the in-river sport harvest and spawner escapement was generated by the KRP and other DFG project personnel operating in the Klamath-Trinity basin.

E. Results and Discussion:

Task 1. Coded-wire tag (CWT) and fin clip all or a portion of the fall chinook salmon production of the Klamath River cooperative ponds located at Elk Creek, Red Cap Creek, Grider Creek, Indian Creek, and Bluff Creek.

Between 1989 and 1992, over 526,000 fall chinook salmon produced at IGH, and representing BYs 1988 through 1991, were marked (Ad+CWT) by KRP personnel. During the four years of this pond-rearing evaluation effort, totals of 379,259 effectively tagged (Ad+CWT) and 249,027 unmarked fall chinook salmon were released from mid-Klamath rearing ponds (Table 1).

During calendar year (CY) 1989, ponds in all five tributaries were used to rear chinook salmon. However, after the first year, use of the ponds in Red Cap Creek and Grider Creek was discontinued. Reductions in funding, combined with increased pond maintenance costs and genetic concerns caused by using IGH stock led to the closure of these ponds (Kim Rushton,

Table 1. Coded-wire tag release information for fall chinook salmon reared and released from various mid-Klamath ponds.

Release location	CWT code	Release date	Mean weight (gr/fish)	Number tagged	Number poorly tagged [1/]	Mortality prior to release	Number effectively released	Number untagged
BROOD YEAR 1988								
Indian Creek	062806	24-Oct-89	65	18,453	1,802	1,452	15,199	
	062807			21,761	2,151	1,452	18,158	
			Subtotals	40,214	3,953	2,904	33,357	37,095
Bluff Creek	062808	25-Oct-89	65	21,682	3,362	554	17,766	
	062809			19,124	2,964	489	15,671	
			Subtotals	40,806	6,326	1,043	33,437	38,192
Elk Creek	062810	23-Oct-89	53	31,541	2,362	1,847	21,265	
	062813			9,009	674	527	6,075	
			Subtotals	40,550	3,036	2,374	27,340 [2/]	0
Red Cap Creek	062814	25-Oct-89	63	22,733	4,443	517	17,773	
	062815			17,284	3,378	394	13,512	
			Subtotals	40,017	7,821	911	31,285	0
Grider Creek	062811	23-Oct-89	45	21,145	2,279	2,158	16,708	
	062812			20,853	2,248	2,128	16,477	
			Subtotals	41,998	4,527	4,286	33,185	0
			Totals for year	203,585	25,663	19,318	158,604	75,287
BROOD YEAR 1989								
Indian Creek	066313	23-Oct-90	48	22,523	1,691	5,669	15,163	
	066314			17,484	1,312	4,402	11,770	
			Subtotals	40,007	3,003	10,071	26,933	29,931
Bluff Creek	066311	24-Oct-90	38	22,297	1,987	436	19,874	
	066312			17,971	1,601	352	16,018	
			Subtotals	40,268	3,588	788	35,892	39,218
Elk Creek	066315	23-Oct-90	41	16,710	1,241	3,641	11,828	
	066316			22,351	1,660	4,870	15,821	
			Subtotals	39,061	2,901	8,511	27,649	0
			Totals for year	119,336	9,492	19,370	90,474	69,149
BROOD YEAR 1990								
Indian Creek	066324	21-Oct-91	65	41,272	2,042	1,575	37,655	40,642
Bluff Creek	066328	7-Oct-91	65	40,028	N/D [3/]	N/D	N/D	N/D
Elk Creek	066327	21-Oct-91	65	41,166	4,752	4,607	31,807	0
			Totals for year	122,466	6,794	6,182	69,462	40,642
BROOD YEAR 1991								
Indian Creek	066334	27-Oct-92	45	40,000	1,479	15,357	23,164	24,637
Bluff Creek	066335	28-Oct-92	57	40,677	2,397	725	37,555	39,312
			Totals for year	80,677	3,876	16,082	60,719	63,949
			Grand totals	526,064	45,825	60,952	379,259	249,027

[1/] Includes tags shed and poorly fin-clipped fish.

[2/] Does not include 7,800 tagged fish (6,067 from 06-28-10 and 1,733 from 06-28-13) estimated to have escaped from IGH prior to transfer to Elk Creek.

[3/] N/D = Not determined. Fish released prior to quality control and inventory due to excessive bear predation.

DFG-personal communication). After CY 1990, operation of the Elk Creek facility was also discontinued, for similar reasons.

A portion (7,800 fish) of the BY 1988 chinook intended for rearing at Elk Creek inadvertently escaped from IGH prior to being transferred. No quality control was performed on BY 1990 fish reared at Bluff Creek, because excessive bear predation necessitated an early release of those fish. Excessive predation by bear and otters was noted as the reason for high mortality of BY 1989 fish reared in Indian and Elk creeks.

Task 2. Analyze returns of coded-wire tags and estimate contribution of pond-reared chinook salmon to the harvest and spawning escapement.

Actual and expanded CWT recovery data through the 1993 season, by year and recovery method, are provided in Table 2. The 1988 BY represents the only one for which CWT recovery information is complete. Recoveries of BY 1991, the final BY tagged, will not be complete until after the 1996 season.

For BY 1988, the largest number of CWTs recovered, as well as the greatest expanded number of recoveries were from fish released from Bluff Creek. The group released from Red Cap Creek yielded the lowest actual number of CWTs recovered while the release from Grider Creek produced the lowest expanded number of recoveries.

Due to the inadvertent early release from IGH of approximately 7,800 tagged fish intended for Elk Creek, no further analysis of recovery data for bi-codes 06-28-10 and 06-28-13 was made.

Efforts to rear chinook at both the Red Cap and Grider Creek ponds were discontinued after this first year, due primarily to funding reductions.

The expanded numbers of recoveries from each release group, and the percent contributions (recovery rates) in the various fisheries are presented in Table 3.

For BY 1988, the greatest overall contribution to the various fisheries was made by Bluff Creek fish, followed by fish released from Indian, Red Cap and Grider creeks, in that order. Of the four valid BY 1988 releases, fish from Bluff Creek contributed the most to ocean and in-river

Table 2. Actual and expanded coded-wire tag recovery information for fall chinook salmon reared and released from various mid-Klamath ponds.

Release location	Code	Recovery year	Age at recovery	OCEAN RECOVERIES Sport Actual	Sport Expanded	Commercial Actual	Commercial Expanded	IN-RIVER HARVEST Sport Actual	Sport Expanded	Indian net Actual	Indian net Expanded	ESCAPEMENT Natural Actual	Natural Expanded	Hatchery Actual	Hatchery Expanded	Totals Actual	Totals Expanded
BROOD YEAR 1988																	
Indian Creek	062806	1990	2	0	0	0	0	1	4	0	0	0	0	0	0	1	4
		1991	3	0	0	0	0	1	2	0	0	0	0	0	0	1	2
		1992	4	0	0	2	4	1	2	0	0	4	8	2	2	9	16
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	0	0	2	4	3	8	0	0	4	8	2	2	11	22
	062807	1990	2	0	0	0	0	0	0	1	3	0	0	0	0	1	3
		1991	3	0	0	1	2	0	0	4	11	1	28	0	0	6	41
		1992	4	0	0	1	3	0	0	6	23	3	6	2	2	12	34
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	0	0	2	5	0	0	11	37	4	34	2	2	19	78
			Totals	0	0	4	9	3	8	11	37	8	42	4	4	30	100
Bluff Creek	062808	1990	2	0	0	1	2	0	0	0	0	0	0	0	0	1	2
		1991	3	6	14	4	10	3	5	2	5	1	28	0	0	16	62
		1992	4	0	0	0	0	0	0	4	14	1	2	5	6	10	22
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	6	14	5	12	3	5	6	19	2	30	5	6	27	86
	062809	1990	2	0	0	0	0	3	11	0	0	0	0	0	0	3	11
		1991	3	4	8	1	2	0	0	3	6	0	0	1	1	9	17
		1992	4	1	3	1	3	0	0	4	6	0	0	4	5	10	17
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	5	11	2	5	3	11	7	12	0	0	5	6	22	45
			Totals	11	25	7	17	6	16	13	31	2	30	10	12	49	131
Elk Creek	062810	1990	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1991	3	3	6	3	12	1	3	1	2	0	0	4	4	12	27
		1992	4	1	2	2	4	0	1	4	8	2	4	9	11	18	30
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	4	8	5	16	1	4	5	10	2	4	13	15	30	57
	062813	1990	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1991	3	1	2	1	2	0	0	0	0	0	0	0	0	2	4
		1992	4	0	0	0	0	0	0	0	0	0	0	3	4	3	4
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	1	2	1	2	0	0	0	0	0	0	3	4	5	8
			Totals	5	10	6	18	1	4	5	10	2	4	16	19	35	65
Red Cap Creek	062814	1990	2	0	0	0	0	1	4	0	0	0	0	0	0	1	4
		1991	3	0	0	1	5	1	2	3	8	0	0	0	0	5	15
		1992	4	0	0	1	3	0	0	4	11	0	0	1	1	6	15
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	0	0	2	8	2	6	7	19	0	0	1	1	12	34
	062815	1990	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1991	3	1	2	1	2	1	2	2	7	0	0	0	0	5	13
		1992	4	0	0	1	3	0	0	4	8	0	0	2	2	7	13
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	1	2	2	5	1	2	6	15	0	0	2	2	12	26
			Totals	1	2	4	13	3	8	13	34	0	0	3	3	24	60

Table 2. Actual and expanded coded-wire tag recovery information for fall chinook salmon reared and released from various mid-Klamath ponds (Cont.).

Release location	Code	Recovery year	Age at recovery	OCEAN RECOVERIES Sport Actual	Sport Expanded	Commercial Actual	Commercial Expanded	IN-RIVER HARVEST Sport Actual	Sport Expanded	Indian net Actual	Indian net Expanded	ESCAPEMENT Natural Actual	Natural Expanded	Hatchery Actual	Hatchery Expanded	Totals Actual	Totals Expanded
BROOD YEAR 1988 con't																	
Grider Creek	062811	1990	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1991	3	0	0	1	3	0	0	3	8	0	0	2	2	6	13
		1992	4	0	0	2	6	0	0	2	3	1	2	2	2	7	13
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	0	0	3	9	0	0	5	11	1	2	4	4	13	26
	062812	1990	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1991	3	1	2	0	0	3	7	0	0	0	0	4	4	8	13
		1992	4	0	0	0	0	0	0	0	0	1	2	5	6	6	8
		1993	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	1	2	0	0	3	7	0	0	1	2	9	10	14	21
			Totals	1	2	3	9	3	7	5	11	2	4	13	14	27	47
BROOD YEAR 1989																	
Indian Creek	066313	1991	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1992	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1993	4	0	0	2	13	0	0	1	4	4	13	0	0	7	30
			Subtotals	0	0	2	13	0	0	1	4	4	13	0	0	7	30
	066314	1991	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1992	3	0	0	0	0	0	0	0	0	1	2	0	0	1	2
		1993	4	0	0	0	0	0	0	0	0	0	0	1	1	1	1
			Subtotals	0	0	0	0	0	0	0	0	1	2	1	1	2	3
			Totals	0	0	2	13	0	0	1	4	5	15	1	1	9	33
Bluff Creek	066311	1991	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1992	3	0	0	0	0	1	2	0	0	0	0	0	0	1	2
		1993	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Subtotals	0	0	0	0	1	2	0	0	0	0	0	0	1	2
	066312	1991	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1992	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1993	4	0	0	0	0	1	2	3	10	0	0	0	0	4	12
			Subtotals	0	0	0	0	1	2	3	10	0	0	0	0	4	12
			Totals	0	0	0	0	2	4	3	10	0	0	0	0	5	14
Elk Creek	066315	1991	2	0	0	0	0	1	3	0	0	0	0	0	0	1	3
		1992	3	0	0	0	0	1	2	0	0	0	0	3	4	4	6
		1993	4	0	0	1	3	0	0	4	13	1	3	4	4	10	23
			Subtotals	0	0	1	3	2	5	4	13	1	3	7	8	15	32
	066316	1991	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1992	3	0	0	0	0	0	0	0	0	0	0	1	1	1	1
		1993	4	1	4	0	0	0	0	3	10	1	3	1	1	6	18
			Subtotals	1	4	0	0	0	0	3	10	1	3	2	2	7	19
			Totals	1	4	1	3	2	5	7	23	2	6	9	10	22	51
BROOD YEAR 1990																	
Indian Creek	066324	1992	2	0	0	0	0	0	0	0	0	1	2	0	0	1	2
		1993	3	3	8	5	28	5	9	4	14	19	63	3	3	39	125
			Totals	3	8	5	28	5	9	4	14	20	65	3	3	40	127

Table 2. Actual and expanded coded-wire tag recovery information for fall chinook salmon reared and released from various mid-Klamath ponds (Cont.).

Release location	Code	Recovery year	Age at recovery	OCEAN RECOVERIES Sport Actual	Sport Expanded	Commercial Actual	Commercial Expanded	IN-RIVER HARVEST Sport Actual	Sport Expanded	Indian net Actual	Indian net Expanded	ESCAPEMENT Natural Actual	Natural Expanded	Hatchery Actual	Hatchery Expanded	Totals Actual	Totals Expanded
BROOD YEAR 1990 con't																	
Bluff Creek	066328	1992	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1993	3	1	1	3	9	2	4	4	15	1	3	5	5	16	37
			Totals	1	1	3	9	2	4	4	15	1	3	5	5	16	37
Elk Creek	066327	1992	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1993	3	4	11	8	49	6	11	5	23	14	46	10	10	47	150
			Totals	4	11	8	49	6	11	5	23	14	46	10	10	47	150
BROOD YEAR 1991																	
Indian Creek	066334	1993	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bluff Creek	066335	1993	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[1/] CWT data for ocean recoveries were obtained from the Pacific States Marine Fisheries Commission. CWT recovery information from the Indian Net harvest was obtained from the U.S. Fish and Wildlife Service. Similar data for recoveries in the river sport harvest and escapement from CDFG.

Table 3. Estimated numbers of recoveries and percent contributions to fisheries for marked (Ad+CWT) fall chinook salmon reared and released from various mid-Klamath ponds.

Release location	CWT code	Number CWT effectively released[1/]	Number untagged	Production multiplier[2/]	Ocean sport expanded	Total estimated recoveries[3/]	Percent contribution	Ocean commercial expanded	Total estimated recoveries[3/]	Percent contribution	In-river sport expanded	Total estimated recoveries[3/]	Percent contribution
BROOD YEAR 1988													
Indian Creek	062806	15,199			0			4			8		
	062807	18,158			0			5			0		
		33,357	37,095	2.112	0	0	0.00%	9	19	0.03%	8	17	0.02%
Bluff Creek	062808	17,766			14			12			8		
	062809	15,671			11			5			11		
		33,437	38,192	2.142	25	54	0.07%	17	36	0.05%	19	41	0.06%
Red Cap Creek	062814	17,773			0			8			6		
	062815	13,512			2			5			2		
		31,285	0	1.000	2	2	0.01%	13	13	0.04%	8	8	0.03%
Grider Creek	062811	16,708			0			9			0		
	062812	16,477			2			0			7		
		33,185	0	1.000	2	2	0.01%	9	9	0.03%	7	7	0.02%
BROOD YEAR 1989[4/]													
Indian Creek	066313	15,163			0			13			0		
	066314	11,770			0			0			0		
		26,933	29,931	2.111	0	0	0.00%	13	27	0.05%	0	0	0.00%
Bluff Creek	066311	19,874			0			0			2		
	066312	16,018			0			0			2		
		35,892	39,218	2.093	0	0	0.00%	0	0	0.00%	4	8	0.01%
Elk Creek	066315	11,828			0			3			5		
	066316	15,821			4			0			0		
		27,649	0	1.000	4	4	0.01%	3	3	0.01%	5	5	0.02%
BROOD YEAR 1990[5/]													
Indian Creek	066324	37,655	40,642	2.079	8	17	0.02%	28	58	0.07%	9	19	0.02%
Bluff Creek	066328	N/D[6/]	N/D	N/D	1			9			4		
Elk Creek	066327	31,807	0	1.000	11	11	0.03%	49	49	0.15%	11	11	0.03%
BROOD YEAR 1991[7/]													
Indian Creek	066334	23,164	24,637	2.064	0	0	0.00%	0	0	0.00%	0	0	0.00%
Bluff Creek	066335	37,555	39,312	2.047	0	0	0.00%	0	0	0.00%	0	0	0.00%

Table 3. Estimated numbers of recoveries and percent contributions to fisheries for marked (Ad+CWT) fall chinook salmon reared and released from various mid-Klamath ponds (Cont.).

Release location	CWT code	Indian Net expanded	Total estimated recoveries[3]	Percent contribution	Natural expanded	Total estimated recoveries[3]	Percent contribution	Hatchery expanded	Total estimated recoveries[3]	Percent contribution	Total expanded	Total estimated recoveries[3]	Overall percent contribution
BROOD YEAR 1988													
Indian Creek	062806	0			8			2			22		
	062807	37			34			2			78		
		37	78	0.11%	42	89	0.13%	4	8	0.01%	100	211	0.30%
Bluff Creek	062808	19			30			6			89		
	062809	12			0			6			45		
		31	66	0.09%	30	64	0.09%	12	26	0.04%	134	287	0.40%
Red Cap Creek	062814	19			0			1			34		
	062815	15			0			2			26		
		34	34	0.11%	0	0	0.00%	3	3	0.01%	60	60	0.19%
Grider Creek	062811	11			2			4			26		
	062812	0			2			10			21		
		11	11	0.03%	4	4	0.01%	14	14	0.04%	47	47	0.14%
BROOD YEAR 1989													
Indian Creek	066313	4			13			0			30		
	066314	0			2			1			3		
		4	8	0.01%	15	32	0.06%	1	2	0.00%	33	70	0.12%
Bluff Creek	066311	0			0			0			2		
	066312	10			0			0			12		
		10	21	0.03%	0	0	0.00%	0	0	0.00%	14	29	0.04%
Elk Creek	066315	13			3			8			32		
	066316	10			3			2			19		
		23	23	0.08%	6	6	0.02%	10	10	0.04%	51	51	0.18%
BROOD YEAR 1990													
Indian Creek	066324	14	29	0.04%	65	135	0.17%	3	6	0.01%	127	264	0.34%
Bluff Creek	066328	15			3			5			37		
Elk Creek	066327	23	23	0.07%	46	46	0.14%	10	10	0.03%	150	150	0.47%
BROOD YEAR 1991													
Indian Creek	066334	0	0	0.00%	0	0	0.00%	0	0	0.00%	0	0	0.00%
Bluff Creek	066335	0	0	0.00%	0	0	0.00%	0	0	0.00%	0	0	0.00%

1/ Number tagged minus number poorly tagged (shed) and estimated mortality prior to release.

2/ Number of effectively tagged fish plus number released untagged/number effectively tagged.

3/ Production multiplier times expanded recoveries.

4/ One additional year of recovery information required for complete analysis.

5/ Two additional years of recovery information required for complete analysis.

6/ N/D = Not determined. Fish released prior to quality control due to bear predation.

7/ Three additional years of recovery information required for complete analysis.

harvests, while fish from Indian Creek contributed the most to spawner escapements (Table 4).

Although recoveries are not yet complete, the greatest overall contribution thus far from BY 1989 releases has come from fish reared in Elk Creek. Fish released from Indian Creek have contributed the most to ocean harvest, while fish from Elk Creek have contributed the most to the in-river harvest. Indian Creek and Elk Creek have contributed at the same rate to spawner escapements (Table 4).

Based on only two years of returns, BY 1990 releases from Indian and Elk creeks have the highest overall contribution rates of any release made during this four year tagging effort. However, two additional years of return data are required for a complete analysis of this BY. No pond fish from BY 1991 have been recovered thus far (Table 4).

For comparison purposes, contribution rates, based on CWT return information, were calculated in the same manner as for the pond reared fish, for groups of yearling chinook salmon reared and released from IGH. Table 5 presents release information for BYs 1988 through 1991 IGH yearling release groups. During 1990, no BY 1989 chinook salmon were held for the IGH yearling program, due to budget constraints. An estimated 10,000 tagged BY 1990 chinook died shortly after release from IGH in November of 1991. The cause of this mortality was not determined.

For BY 1988 releases, average contribution to the fisheries and spawner escapements of fish from the four pond locations was approximately 2.6 times greater than that for same BY IGH yearlings. Early CWT return information from BY 1990 releases indicates IGH and mid-Klamath rearing pond fish are contributing at about the same overall rates (Table 6).

For BY 1988, IGH yearlings contributed more to hatchery escapements than did pond reared fish. However, pond reared fish outperformed hatchery fish in all other categories (Figure 1). Similar results have been observed for BY 1990 releases as well (Figure 2).

Overall contribution rates for BY 1988 releases from both the rearing ponds and IGH represent dismal survival for these yearlings when compared to earlier IGH yearling releases. For brood years 1979 through 1984, the average overall contribution rate for IGH yearling releases was 2.72% (range 0.8% to 4.4%) (preliminary estimates from Alan Baracco, CDFG Ocean Salmon Project). Overall contribution rates from the BY 1988 IGH yearling release and the average pond contribution rate was well below this (Figure 3). Reasons for the poor performance of BY 1988 yearlings have

Table 4. Percent contributions to various fisheries from yearling released fall chinook salmon reared at various mid-Klamath ponds.

Release location	Ocean harvest			In-river			Spawner escapement			Overall
	Sport	Commercial	Total	Sport	Indian net	Total	Natural	Hatchery	Total	
BROOD YEAR 1988										
Indian Creek	0.00%	0.03%	0.03%	0.02%	0.11%	0.13%	0.13%	0.01%	0.14%	0.30%
Bluff Creek	0.07%	0.05%	0.13%	0.06%	0.09%	0.15%	0.09%	0.04%	0.13%	0.40%
Red Cap Creek	0.01%	0.04%	0.05%	0.03%	0.11%	0.13%	0.00%	0.01%	0.01%	0.19%
Grider Creek	0.01%	0.03%	0.03%	0.02%	0.03%	0.05%	0.01%	0.04%	0.05%	0.14%
Average	0.02%	0.04%	0.06%	0.03%	0.09%	0.12%	0.06%	0.02%	0.08%	0.26%
BROOD YEAR 1989[1/]										
Indian Creek	0.00%	0.05%	0.05%	0.00%	0.01%	0.01%	0.06%	0.00%	0.06%	0.12%
Bluff Creek	0.00%	0.00%	0.00%	0.01%	0.03%	0.04%	0.00%	0.00%	0.00%	0.04%
Elk Creek	0.01%	0.01%	0.03%	0.02%	0.08%	0.10%	0.02%	0.04%	0.06%	0.18%
Average	0.00%	0.02%	0.02%	0.01%	0.04%	0.05%	0.03%	0.01%	0.04%	0.12%
BROOD YEAR 1990[2/]										
Indian Creek	0.02%	0.07%	0.10%	0.02%	0.04%	0.06%	0.17%	0.01%	0.18%	0.34%
Elk Creek	0.03%	0.15%	0.19%	0.03%	0.07%	0.11%	0.14%	0.03%	0.18%	0.47%
Average	0.03%	0.11%	0.14%	0.03%	0.05%	0.08%	0.16%	0.02%	0.18%	0.40%
BROOD YEAR 1991[3/]										
Indian Creek	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Bluff Creek	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

[1/] One additional year of recovery required for complete analysis.

[2/] Two additional years of recovery required for complete analysis.

[3/] Three additional years of recovery required for complete analysis.

Table 5. Coded-wire tag release information for fall chinook salmon reared and released from Iron Gate Hatchery.

Release location	CWT code	Release date	Mean weight (gr/fish)	Number tagged	Number poorly tagged [1]	Mortality prior to release	Number effectively released	Number untagged
BROOD YEAR 1988								
IGH	065962	15-Nov-89	57	103,236	4,717	236	98,283	708,787
BROOD YEAR 1989[2]								
BROOD YEAR 1990								
IGH	065703	17-Nov-91	57	100,569	3,620	11,069[3]	85,880	894,120
BROOD YEAR 1991								
IGH	065702	25-Nov-92	53	50,030	2,902	2,007	45,121	
	066337			51,032	3,164	2,007	45,861	
			Subtotals	101,062	6,066	4,014	90,982	832,356
			Grand totals	304,867	14,403	15,319	275,145	2,435,263

[1] Includes tags shed and poorly fin-clipped fish.

[2] No brood year 1989 chinook were coded-wire tagged for the IGH yearling program in 1990, due to budget constraints.

[3] Includes an estimated 10,000 additional mortalities which occurred at release.

Table 6. Percent contributions to various fisheries from fall chinook salmon reared and released from mid-Klamath and Iron Gate Hatchery.

Release location	Ocean sport contribution	Ocean commercial contribution	Total ocean harvest contribution	In -river sport contribution	Indian net contribution	Total in-river harvest contribution	Natural spawner contribution	Hatchery spawner contribution	Total spawner escapement contribution	Overall contribution
BROOD YEAR 1988										
Pond average	0.02%	0.04%	0.06%	0.03%	0.09%	0.12%	0.06%	0.02%	0.08%	0.26%
IGH	0.01%	0.01%	0.02%	0.01%	0.01%	0.02%	0.00%	0.06%	0.06%	0.10%
BROOD YEAR 1989[1/]										
Pond average	0.00%	0.02%	0.02%	0.01%	0.04%	0.05%	0.03%	0.01%	0.04%	0.12%
IGH		None tagged								
BROOD YEAR 1990[2/]										
Pond average	0.03%	0.11%	0.14%	0.03%	0.05%	0.08%	0.16%	0.02%	0.18%	0.40%
IGH	0.01%	0.03%	0.04%	0.03%	0.03%	0.06%	0.00%	0.34%	0.34%	0.44%
BROOD YEAR 1991[3/]										
Pond average	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
IGH	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

[1/] One additional year of recovery required for complete analysis.

[2/] Two additional years of recovery required for complete analysis.

[3/] Three additional years of recovery required for complete analysis.

Figure 1. Contribution rates to various fisheries from BY 1988 chinook salmon released as yearlings from IGH and several mid-Klamath ponds.

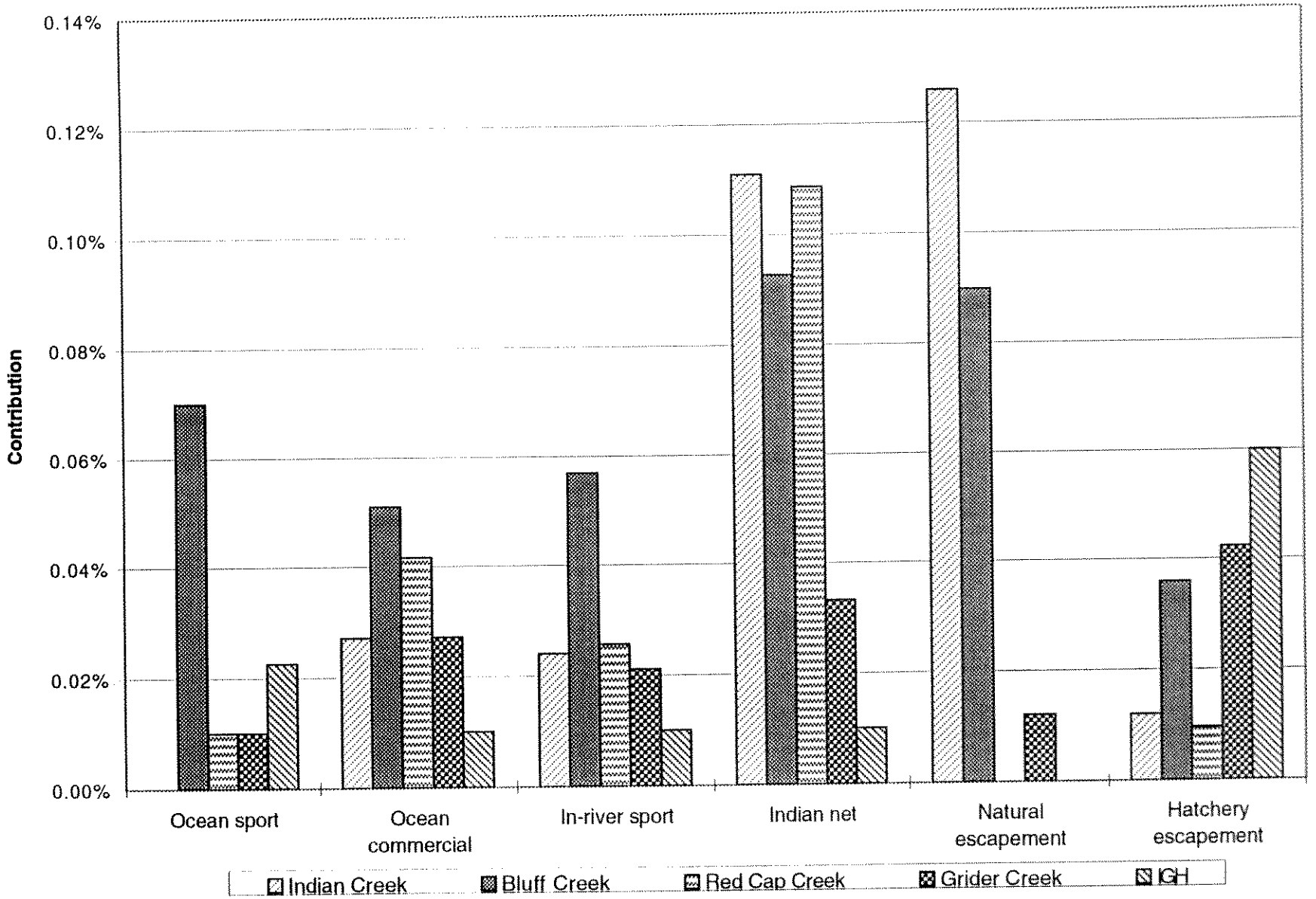


Figure 2. Contribution rates to various fisheries from BY 1990 chinook salmon released as yearlings from IGH and several mid-Klamath ponds.

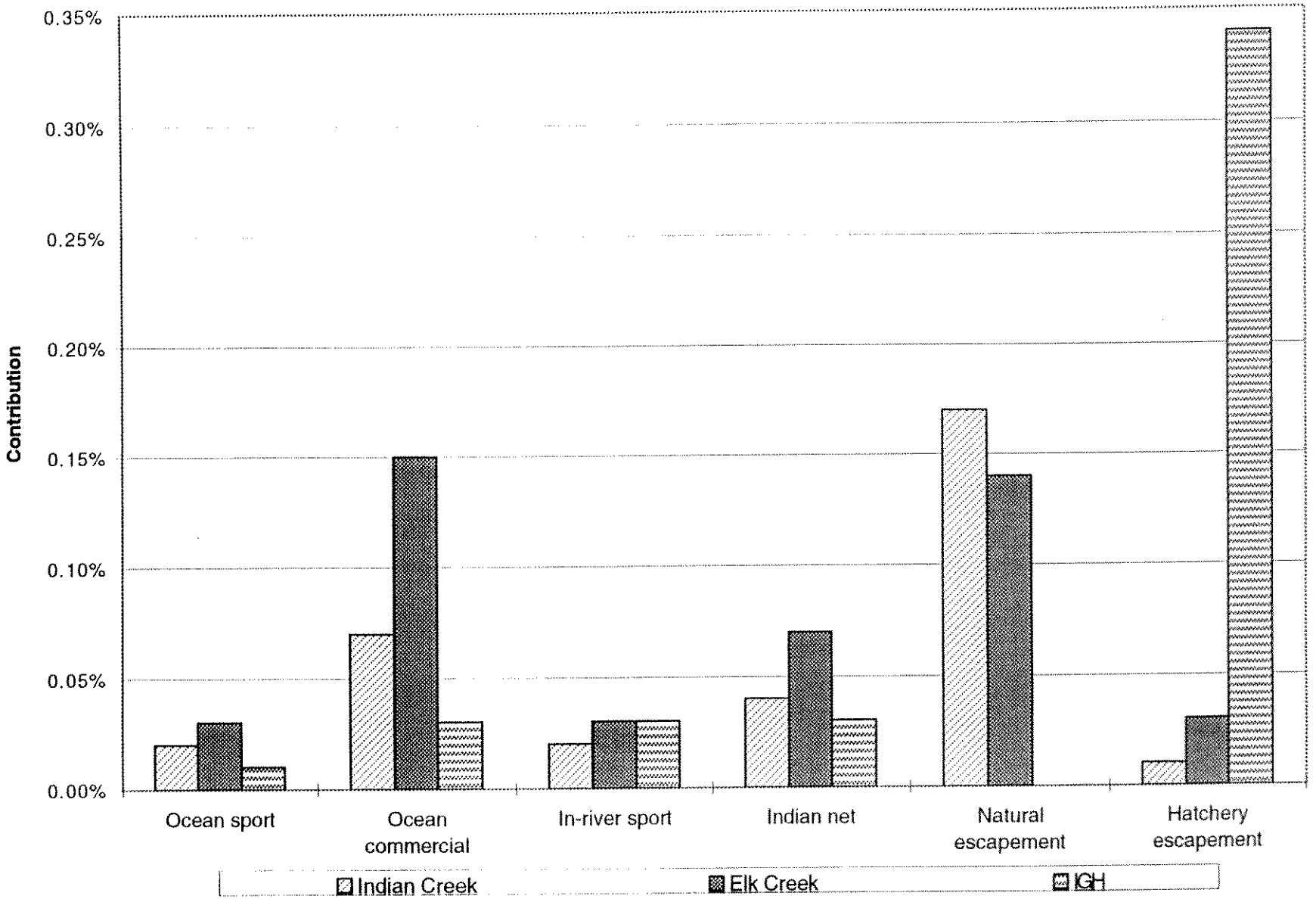
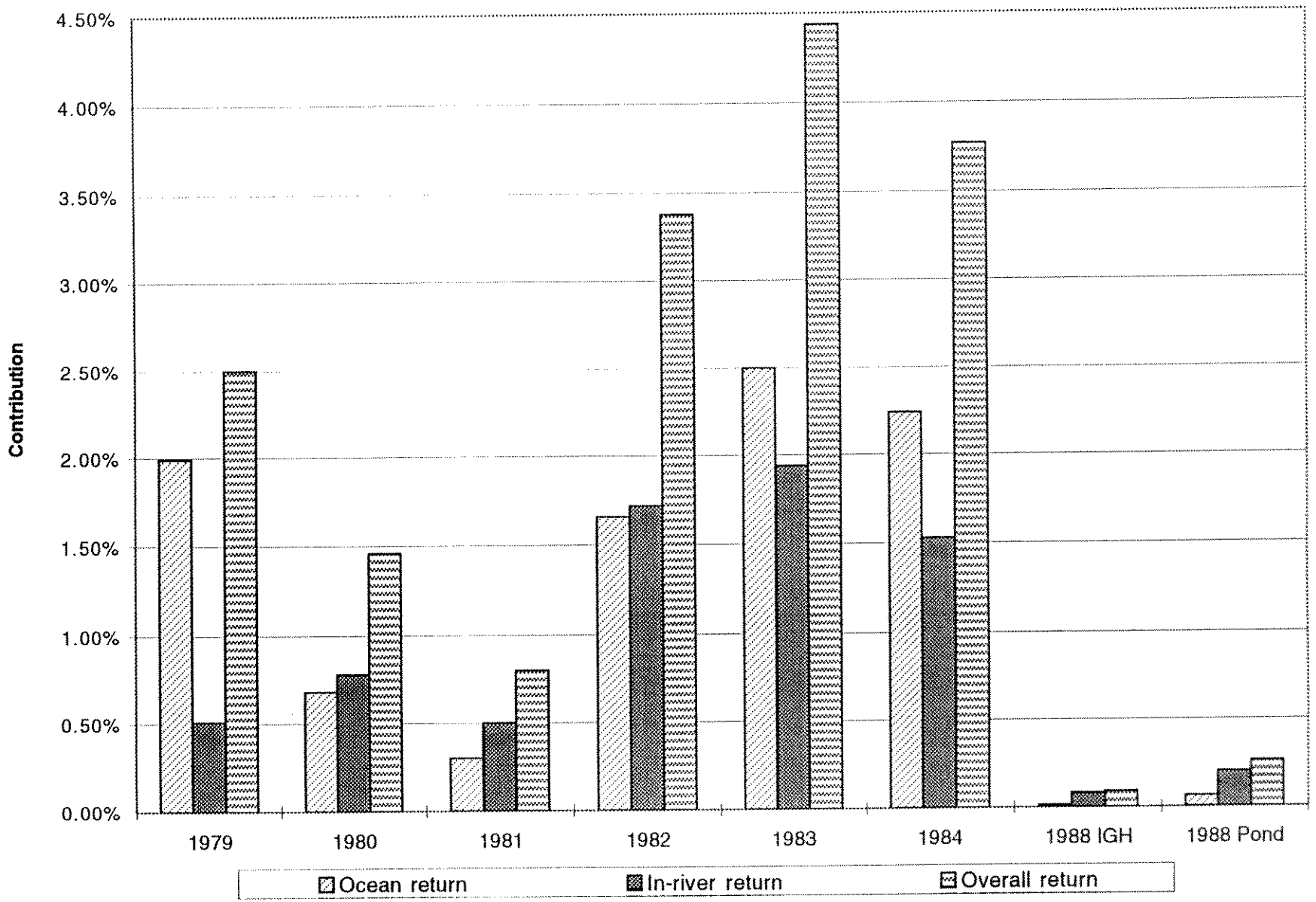


Figure 3. Contribution rates of yearling chinook salmon reared and released from IGH, BYs 1979 - 1984 and 1988.



not been specifically identified. However, drought conditions and poor ocean conditions are believed to be factors contributing to the poor showing.

F. Summary and Conclusions:

Coded-wire tagging of fall chinook salmon produced at IGH and reared at various mid-Klamath ponding locations was undertaken for four consecutive BYs: 1988 through 1991. A total of 526,064 salmon was tagged and distributed to rearing ponds in Indian, Bluff, Elk, Red Cap and Grider creeks. A total of 379,259 effectively tagged chinook was released with 249,027 untagged fish from these ponds between 1989 and 1992.

Complete CWT recovery information is available only for BY 1988 fall chinook salmon reared and released from the mid-Klamath ponds. The average overall recovery rate for this BY from four of the five rearing ponds used was only 0.26%. No attempt was made to determine recovery rates for BY 1988 fish reared at the fifth location, Elk Creek, due to an early release from IGH of a portion of the marked fish prior to their transfer there. Pond reared chinook from this BY out-performed the yearling release from IGH. However, the average overall recovery rate of 0.26% is well below the 1978 through 1984 average recovery rate of 2.72% for IGH yearling releases.

Complete recovery information for the final releases (BY 1991) will not be available until after the 1996 spawning season has concluded. Recovery of CWTs in the ocean and in-river fisheries should continue during on-going harvest and escapement monitoring programs.

Given the relatively low number of CWTs recovered thus far from the pond-reared fish, predation problems at the ponds, relatively high maintenance costs, and genetic concerns arising from using IGH fish as brood stock, consideration should be given to permanently discontinuing this program.

G. Estimated funds expended:

Salary and wages	$5,256
Tags	9,500
Cutter bar and solenoid	1,210
MS 222	300
Fiberglass trough	1,700
Misc. supplies	790
Travel	2,000
Vehicle operations	1,065
Admin. overhead	5,779
Total	$27,600

H. Supplemental Data:

Supplemental data are contained in Appendix A, attached.

Prepared by: Mark S. Pisano Date: 5/12/1995

Mark S. Pisano

State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

ATTACHMENT A
SUPPLEMENTAL DATA
EVALUATION OF POND REARING OF CHINOOK SALMON

PROJECT NUMBER 91-FR-3
COOPERATIVE AGREEMENT 14-16-0001-91517

CWT Release Report

Coded-wire tag code 06 - 28 - 06 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Indian Creek
4. Dates Group Released: First 10 / 24 / 89 (MM / DD / YY)
   Last 10 / 24 / 89 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 18,453
8. Number of Shed Tags: 1,632 + 170 = 1,802
9. Mortality Prior to Release: 1,452
10. Number Correctly Tagged: 15,199
11. Unmarked Release Number: 37,095
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 7/lb
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Indian Creek Rearing Ponds
18. Stock of Release Group: Klamath River
*19. Comments: CWT Code 06 28 07 included with this production group

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 28 - 07 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Indian Creek
4. Dates Group Released: First 10 / 24 / 89 (MM / DD / YY)
   Last 10 / 24 / 89 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 21,761
8. Number of Shed Tags: 1,949 + 203 = 2,151
9. Mortality Prior to Release: 1,452
10. Number Correctly Tagged: 18,158
11. Unmarked Release Number: Ø
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 7/lb
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Indian Creek Rearing Ponds
18. Stock of Release Group: Klamath River
*19. Comments: CWT Code 06 28 06 included with this production group

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 28 - 08 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Bluff Creek
4. Dates Group Released: First 10 / 25 / 89 (MM / DD / YY)
   Last 10 / 25 / 89 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 21,682
8. Number of Shed Tags: 2,169 + 1,193 = 3,362
9. Mortality Prior to Release: 554
10. Number Correctly Tagged: 17,766
11. Unmarked Release Number: Ø
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 7.0/lb
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Bluff Creek Rearing Ponds
18. Stock of Release Group: Klamath River
*19. Comments: CWT code 06 28 09 included in this release

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 28 - 09 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack A. Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Bluff Creek
4. Dates Group Released: First 10 / 25 / 89 (MM / DD / YY)
   Last 10 / 25 / 89 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 19,124
8. Number of Shed Tags: 1,912 + 1,052 = 2,964
9. Mortality Prior to Release: 489
10. Number Correctly Tagged: 15,671
11. Unmarked Release Number: 38,192
12. Method for determining unmarked number released:
    - X Book Estimates
    - ____ Actual Count
    - ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 7.0/lb
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    - ____ Destroyed
    - ____ Problem at Release
17. Rearing Location: Bluff Creek Rearing Ponds
18. Stock of Release Group: Klamath River Project
*19. Comments: CWT Code 06 28 08 included with this release group

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 28 - 10 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Elk Creek
4. Dates Group Released: First 10 / 23 / 89 (MM / DD / YY)
   Last 10 / 23 / 89 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 31,541
8. Number of Shed Tags: 1,181 + 1,181 = 2,362
9. Mortality Prior to Release: 7,914*
10. Number Correctly Tagged: 21,265
11. Unmarked Release Number: Ø
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 135
14. Number/lb at Release: 8.5/lb
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Elk Creek Rearing Ponds
18. Stock of Release Group: _____
*19. Comments: *Includes approximately 6,067 fish that escaped from IGH before transfer making this release group unsuitable for analysis. Includes CWT code 062813.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 28 - 13 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Elk Creek
4. Dates Group Released: First 10 / 23 / 89 (MM / DD / YY)
   Last 10 / 23 / 89 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 9,009
8. Number of Shed Tags: 337 + 337 = 674
9. Mortality Prior to Release: 2,260 *
10. Number Correctly Tagged: 6,075
11. Unmarked Release Number: Ø
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 135
14. Number/lb at Release: 8.5 lb
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Elk Creek Rearing Ponds
18. Stock of Release Group: Klamath River
*19. Comments: *Includes approximately 1,733 fish that escaped from IGH before transfer making this release group unsuitable for analysis. Includes CWT code 062313.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 28 - 14 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Red Cap Creek
4. Dates Group Released: First 10 / 25 / 89 (MM / DD / YY)
   Last -- / -- / -- (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 22,733
8. Number of Shed Tags: 4,443 (includes poorly-marked fish)
9. Mortality Prior to Release: 517
10. Number Correctly Tagged: 17,773
11. Unmarked Release Number: Ø
12. Method for determining unmarked number released:
    ____ Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 170
14. Number/lb at Release: 7.2
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Red Cap Creek Rearing Ponds
18. Stock of Release Group: Klamath River
*19. Comments: CWT 06 28 15 part of this release group

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 -28 -15 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Red Cap Creek
4. Dates Group Released: First 10 / 25 / 89 (MM / DD / YY)
   Last -- / -- / -- (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 17,284
8. Number of Shed Tags: 3,378
9. Mortality Prior to Release: 394
10. Number Correctly Tagged: 13,512
11. Unmarked Release Number: Ø
12. Method for determining unmarked number released:
    ____ Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 170
14. Number/lb at Release: 7.2
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Red Cap Creek Rearing Ponds
18. Stock of Release Group: Klamath River
*19. Comments: CWT 06 28 14 part of this release group

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 -28 - 11 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Grider Creek
4. Dates Group Released: First 10 / 23 / 89 (MM / DD / YY)
   Last 10 / 23 / 89 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 21,145
8. Number of Shed Tags: 1,709 + 570 = 2,279
9. Mortality Prior to Release: 2,158
10. Number Correctly Tagged: 16,708
11. Unmarked Release Number: Ø
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 135
14. Number/lb at Release: 10/lb
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Grider Creek Rearing Pond
18. Stock of Release Group: Klamath River
*19. Comments: CWT Code 06 28 12 included with this release group.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 28 - 12 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1988
3. Release Location: Grider Creek
4. Dates Group Released: First 10 / 23 / 89 (MM / DD / YY)
   Last 10 / 23 / 89 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 20,853
8. Number of Shed Tags: 1,686 + 562 = 2,248
9. Mortality Prior to Release: 2,128
10. Number Correctly Tagged: 16,477
11. Unmarked Release Number: Ø
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 135
14. Number/lb at Release: 10/lb
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Grider Creek
18. Stock of Release Group: Klamath River
*19. Comments: CWT Code 06 28 11 included with this release group.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 63 - 13 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1989
3. Release Location: Indian Creek (Ilamath River)
4. Dates Group Released: First 10 / 22 / 90 (MM / DD / YY)
   Last 10 / 23 / 90 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 22,523
8. Number of Shed Tags: 1,691
9. Mortality Prior to Release: 5,670
10. Number Correctly Tagged: 15,163
11. Unmarked Release Number: 29,931
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 9.5
*15. Average Length in mm FL: 150 mm
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Indian Creek Rearing Ponds
18. Stock of Release Group: IGH
*19. Comments: Total release include 17,484 CWT 06-63-14 fish, and 1,312 with shed tags.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 63 - 14 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1989
3. Release Location: Indian Creek (Klamath River)
4. Dates Group Released: First 10 / 22 / 90 (MM / DD / YY)
   Last 10 / 23 / 90 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 17,484
8. Number of Shed Tags: 1,312
9. Mortality Prior to Release: 4,401
10. Number Correctly Tagged: 11,770
11. Unmarked Release Number: 0
12. Method for determining unmarked number released:
    ____ Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 9.5
*15. Average Length in mm FL: 150
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Indian Creek Rearing Ponds
18. Stock of Release Group: IGH
*19. Comments: Total release included 15,163 fish CWT'd with 06-63-13, 1,691 wit shed tags, and 29,931 unmarked fish.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 -63 -11 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1989
3. Release Location: Bluff Creek (Klamath River)
4. Dates Group Released: First 10 / 24 / 90 (MM / DD / YY)
   Last 10 / 24 / 90 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 22,297
8. Number of Shed Tags: ~~1,987~~
9. Mortality Prior to Release: 436
10. Number Correctly Tagged: 19,874
11. Unmarked Release Number: 39,218
12: Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 11.8
*15. Average Length in mm FL: 148
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Bluff Creek Rearing Ponds
18. Stock of Release Group: IGH
*19. Comments: Total release included 16,018 fish with CWT 06-63-12 and 1,601 with shed tags.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 63 - 12 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1989
3. Release Location: Bluff Creek (Klamath River)
4. Dates Group Released: First 10 / 24 / 90 (MM / DD / YY)
   Last 10 / 24 / 90 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 17,971
8. Number of Shed Tags: 1,601
9. Mortality Prior to Release: 352
10. Number Correctly Tagged: 16,018
11. Unmarked Release Number: 0
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 11.8
*15. Average Length in mm FL: 148
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Bluff Creek Rearing Ponds
18. Stock of Release Group: IGH
*19. Comments: Total release included 19,874 fish CWT'd with 06-63-11, 1,987 with shed tags, and 39,218 unmarked fish.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 63 - 15 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1989
3. Release Location: Elk Creek (Klamath River)
4. Dates Group Released: First 10 / 23 / 90 (MM / DD / YY)
   Last 10 / 23 / 90 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 16,710
8. Number of Shed Tags: 1,241
9. Mortality Prior to Release: 3,641
10. Number Correctly Tagged: 11,828
11. Unmarked Release Number: 0
12. Method for determining unmarked number released:
    ____ Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 11
*15. Average Length in mm FL: 140
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Elk Creek Rearing Ponds
18. Stock of Release Group: IGH
*19. Comments: Total release included 15,821 fish CWT'd with 06-63-16 and 1,660 tag shed fish.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 63 - 16 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project (Project/Facility)
2. Species: Chinook salmon *Race: Fall
   *Egg Lot No.: _____ Brood Year: 1989
3. Release Location: Elk Creek (Klamath River)
4. Dates Group Released: First 10 / 23 / 90 (MM / DD / YY)
   Last 10 / 23 / 90 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 22,351
8. Number of Shed Tags: 1,660
9. Mortality Prior to Release: 4,870
10. Number Correctly Tagged: 15,821
11. Unmarked Release Number: 0
12. Method for determining unmarked number released:
    ____ Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 150
14. Number/lb at Release: 11
*15. Average Length in mm FL: 140
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Elk Creek Rearing Ponds
18. Stock of Release Group: IGH
*19. Comments: Total release includes 11,828 fish CWT'd 06-63-15 and 1,241 with shed tags.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 63 - 24 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project DF&G (Project/Facility)
2. Species: chinook salmon *Race: fall
   *Egg Lot No.: _____ Brood Year: 1990
3. Release Location: Indian Creek, Klamath River
4. Dates Group Released: First 10 / 21 / 91 (MM / DD / YY)
   Last 10 / 21 / 91 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 41,272
8. Number of Shed Tags: 938 + 1,104 poor clip = 2,042
9. Mortality Prior to Release: 1,575
10. Number Correctly Tagged: 37,655
11. Unmarked Release Number: 40,642
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 158
14. Number/lb at Release: 7/16
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Indnan Creek Rearing Pond
18. Stock of Release Group: Iron Gate Hatchery
*19. Comments: _____

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 63 - 28 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project CDFG (Project/Facility)
2. Species: chinook salmon *Race: fall
   *Egg Lot No.: _____ Brood Year: 1990
3. Release Location: Bluff Creek, Klamath River
4. Dates Group Released: First 10 / 07 / 91 (MM / DD / YY)
   Last 10 / 07 / 91 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 40,028
8. Number of Shed Tags: -
9. Mortality Prior to Release: -
10. Number Correctly Tagged: -
11. Unmarked Release Number: -
12. Method for determining unmarked number released:
    ____ Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: -
14. Number/lb at Release: 7/lb
*15. Average Length in mm FL: -
16. Expected Survival: ____ Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Bluff Creek Rearing Pond
18. Stock of Release Group: Iron Gate Hatchery
*19. Comments: These fish were released on an emergency due to bear predation. We were unable to conduct a quality control check or inventory the pond.

* Optional information, all other fields must be completed.

CWT Release Report

Coded-wire tag code 06 - 63 - 27 has been assigned to your project/facility. This form must be completed and returned to IFD, 1701 NImbus Rd., Suite B, Rancho Cordova, CA 95670, Attention: Alan Baracco, after the tag group has been released.

1. Assigned to: Jack Hanson (Person) of Klamath River Project CDFG (Project/Facility)
2. Species: chinook salmon *Race: fall
   *Egg Lot No.: _____ Brood Year: 1990
3. Release Location: Elk Creek Klamath River
4. Dates Group Released: First 10 / 21 / 91 (MM / DD / YY)
   Last 10 / 21 / 91 (MM / DD / YY)
5. Rearing Type: X Hatchery ____ Wild ____ Mixed
6. Purpose of Release Group: Production
7. Total Number Tagged: 41,166
8. Number of Shed Tags: 731 shed + 4,021 poor clip = 4,752
9. Mortality Prior to Release: 4,607
10. Number Correctly Tagged: 31,807
11. Unmarked Release Number: Ø
12. Method for determining unmarked number released:
    X Book Estimates
    ____ Actual Count
    ____ Weight Sample Method
13. Quality Control Days: 158
14. Number/lb at Release: 7/lb
*15. Average Length in mm FL: _____
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Elk Creek Rearing Ponds
18. Stock of Release Group: Iron Gate Hatchery
*19. Comments: _____

* Optional information, all other fields must be completed.

CWT RELEASE REPORT

Coded-wire tag code 06-63-35

1. Assigned to: Mark Pisano of Klamath River Project (CDFG)
2. Species: Chinook salmon *Race: fall-run
   *Egg Lot No.: _____ Brood Year: 1991
3. Release Location: Bluff Creek
4. Date Group Released: First (mm/dd/yy): 10/28/92
   Last (mm/dd/yy): 10/28/92
5. Rearing Type: X Hatchery ____ Wild ____ Mixed ____
6. Purpose of Release Group: Production
7. Total Number Tagged: 40,677
8. Number of Shed Tags: 2,397
9. Mortality Prior to Release: 725
10. Number Correctly Tagged: 37,555
11. Unmarked Release Number: 39,312
12. Method for determining unmarked number released:
    ____ Book Estimates
    ____ Actual Count
    X Weight Sample Method
13. Quality Control Days: 26
14. Number/lb. at Release: 8.0/lb
*15. Average Length in mm FL: 149
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Bluff Creek Rearing Pond
18. Stock of Release Group: Iron Gate Hatchery
*19. Comments: _____

*Optional information, all other fields must be completed.

CWT RELEASE REPORT

Coded-wire tag code 06-63-34

1. Assigned to: Mark Pisano of Klamath River Project (CDFG)
2. Species: Chinook salmon *Race: fall-run
   *Egg Lot No.: _____ Brood Year: 1991
3. Release Location: Indian Creek
4. Date Group Released: First (mm/dd/yy): 10/27/92
   Last (mm/dd/yy): 10/27/92
5. Rearing Type: X Hatchery ____ Wild ____ Mixed ____
6. Purpose of Release Group: Production
7. Total Number Tagged: 40,000
8. Number of Shed Tags: 1,479
9. Mortality Prior to Release: 15,357
10. Number Correctly Tagged: 23,164
11. Unmarked Release Number: 24,637
12. Method for determining unmarked number released:
    ____ Book Estimates
    ____ Actual Count
    X Weight Sample Method
13. Quality Control Days: 26
14. Number/lb. at Release: 10.0/lb
*15. Average Length in mm FL: 145
16. Expected Survival: X Normal
    ____ Destroyed
    ____ Problem at Release
17. Rearing Location: Indian Creek Rearing Pond
18. Stock of Release Group: Iron Gate Hatchery
*19. Comments: _____

*Optional information, all other fields must be completed.