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EXECUTIVE DIRECTOR
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1992 MARK MEETING

MINUTES

Vancouver, British Columbia February 18, 1992

I. General Business

1. Welcome/Introductions

The annual 1992 Mark Meeting was convened at 9:00AM, February 18 at the Pacific Salmon Commission in Vancouver, British Columbia. Mark Committee members and other meeting participants were introduced at the start of the meeting. Steven Leash was introduced as the new tag coordinator for Metlakatla Indian Community, replacing David Houseworth.

Several members of the Pacific Salmon Commission's Data Sharing Committee were in attendance and welcomed:

Marc Hamer ((CDFO) - (co-chair)
John Clark (ADFG) - (co-chair)
Mike Matylewich (CRITFC)

A list of meeting participants is provided in **Attachment 1.**

2. Agenda

Following a review of the agenda, it was agreed that a report on current studies on mass marking would be added to the agenda. The report by Lee Blankenship (WDF) was inserted after Agenda Item 7.

3. Agreement to Fix Annual Meeting Date for Mark Meeting

Karen Crandall (ADFG) proposed that the annual Mark Meeting be fixed to a certain date in order to facilitate travel authorization requests and long term calendar planning. This proposal was readily agreed to by all. After some discussion, it was agreed that the annual

Mark Meeting will be held on the **3rd Tuesday of every February**. This will fall on **February 16th in 1993**.

It was recognized that this may pose some problems for continuing to meet back to back with the PSC Data Sharing Committee. However, Mark Committee members were confident that the long range planning would also benefit the Data Sharing Committee and thus facilitate back to back meetings.

II. Agenda Items

1. Status of CWT Data Files and Reporting Problems

Another year has past without achieving a complete conversion of all historical CWT data files (release, recovery, catch/sample) to the PSC format. Therefore the status of each agency was reviewed in some detail. This information is summarized in **Tables 1-4** (updated 3/18/92).

a) CWT Release Data

The last of the release data (**Table 1**) were converted into PSC format during the past year. This accomplishment was followed by the publication of the 1991 CWT Release Report (cumulative through 1990). It was noted, however, that in spite of exceptional efforts by all tag coordinators, the report contains at least 20 known errors. These will be corrected in the next release report which will include only the last 10 years of releases.

b) Recovery and Catch/Sample Data

Significant progress was achieved during the past year in converting the last of the recovery data sets into PSC format (**Tables 2-3**). WDF's 1973--83 data were reported and validated. The 1973-76 data sets were a major accomplishment for WDF since the data had not been reported previously in old format. The Quinault recovery data for 1980-89 were also reported and passed validation.

Data sets still remaining in old format include CDFG's 1977 data, ADFG's 1977-79 data, IDFG's data (all years), and NMFS-AK's data (all years). Karen Crandall (ADFG) reported that no significant progress had been made on ADFG's 1977-79 files. However, she was exploring the options of simply mapping over the existing data as is, or waiting until the catch samples can be reanalyzed.

With respect to NMFS -AK's data, Ron Heintz was pleased to report that funding had been found and that bids would be soon requested for the data conversion. Completion of the task is expected by mid-summer.

TABLE 1. Status of Conversion to PSC Format

3/18/92

CWT Release Data

'72 BY Started Tagged

Reporting Agency

Year	CDFG	ODFW	WDF	WDW	IDFG	CDFO	ADFG	FWS	NMFS (AK)	NMFS (CR)	NWIFC	QDNR	MIC
PRE-1975	V	V	V			V	V	V	V				
1975	V	V	V			V	V	V	V	V			
1976	V	V	V		V	V	V	V	V	V	V	V	
1977	V	V	V	V	V	V	V	V	V	V	V	V	
1978	V	V	V	V	V	V	V	V	V	V	V	V	
1979	V	V	V	V	V	V	V	V	V	V	V	V	
1980	V	V	V	V	V	V	V	V	V	V	V	V	V
1981	V	V	V	V	V	V	V	V	V	V	V	V	V
1982	V	V	V	V	V	V	V	V	V	V	V	V	V
1983	V	V	V	V	V	V	V	V	V	V	V	V	V
1984	V	V	V	V	V	V	V	V	V	V	V	V	V
1985	V	V	V	V	V	V	V	V	V	V	V	V	V
1986	V	V	V	V	V	V	V	V	V	V	V	V	V
1987	V	V	V	V	V	V	V	V	V	V	V	V	V
1988	V	V	V	V	V	V	V	V	V	V	V	V	V
1989	V	V	V	V	V	V	V	V	V	V	V	V	V
1990	V	V	V	V	V	V	V	V	V	V	V	V	V
1991	V	V	-	-	V	-	-	-	V	V	✓	✓	-

(S = In Mail; I = Mid Year Only; V = Validated)

CDFG	=	California Department of Fish and Game
ODFW	=	Oregon Department of Fish and Wildlife
WDF	=	Washington Department of Fisheries
WDW	=	Washington Department of Wildlife
IDFG	=	Idaho Department of Fish and Game
CDFO	=	Canada Department of Fisheries and Oceans
ADFG	=	Alaska Department of Fish and Game
FWS	=	U.S. Fish and Wildlife Service
NMFS(AK)	=	National Marine Fisheries Service - Alaska
NMFS(CR)	=	National Marine Fisheries Service - Columbia River
NWIFC	=	Northwest Indian Fisheries Commission
QDNR	=	Quinault Department of Natural Resources
MIC	=	Metlakata Indian Community - Alaska

TABLE 2. Status of Conversion to PSC Format 3/18/92

CWT Recovery Data

Reporting Agency

Year	CDFG	ODFW	WDF	WDW	IDFG	CDFO	ADFG	FWS	NMFS (AK)	NWIFC	QDNR	MIC
1973			V									
1975			V									
1975			V			V				V	?	
1976			V			V				V	?	
1977	-	V	V		-	V	-		-	V	V	
1978	V	V	V		-	V	-		-	V	?	
1979	V	V	V		-	V	-	V		V	V	
1980	V	V	V		-	V	V	V	-	V	V	
1981	V	V	V	I	-	V	V	V	-	V	V	I
1982	V	V	V	I	-	V	V	V	-	V	V	I
1983	V	V	V	I	-	V	V	V	-	V	V	I
1984	V	V	V	I	-	V	V	V	-	V	V	I
1985	V	V	V	I	-	V	V	V	-	V	V	I
1986	V	V	V	I	-	V	V	V	-	V	V	I
1987	V	V	V	I	-	V	V	V	S	V	V	I
1988	V	V	V	I	-	V	V	V	-	V	V	I
1989	V	V	V	I	-	V	V	V	-	V	V	I
1990	V	V	V	I	-	V	V	V	-	V	V	I
1991	I	I	I	I	-	I	I	-	-	-	-	I

(I = Incomplete but Valid Data Sets; V = Validated)
(S = Submitted; Dash = Not Yet Reported)

Incomplete Data Sets:

1. WDW's recoveries in the main stem Columbia River have been reported through ODFW. However, recoveries in Columbia River basin tributaries and Puget Sound are unreported.

2. Metlakatla (MIC) has reported recoveries for its fisheries through ADFG. However, hatchery returns are unreported at this time.

TABLE 3. Status of Conversion to PSC Format 3/18/92

CWT Catch/Sample Data

Reporting Agency

Year	CDFG	ODFW	WDF	WDW	IDFG	CDFO	ADFG	FWS	NMFS (AK)	NWIFC	QDNR	MIC
1973			-									
1974			-									
1975			-			V				S		
1976			-			V				S		
1977	-	V	-		-	V	-		-	S		
1978	V	V	-		-	V	-		-	S		
1979	V	V	-		-	V	-	V	-	S		
1980	V	V	-		-	V	V	V	-	S		
1981	V	V	-	I	-	V	V	V	-	S		
1982	V	V	-	I	-	V	V	V	-	S		I
1983	V	V	-	I	-	V	V	V	-	S	-	I
1984	V	V	V	I	-	V	V	V	-	S	-	I
1985	V	V	V	I	-	V	V	V	-	S	-	I
1986	V	V	V	I	-	V	V	V	-	S	-	I
1987	V	V	V	I	-	V	V	V	S	S	-	I
1988	V	V	V	I	-	V	V	V	-	S	-	I
1989	V	V	V	I	-	V	V	V	-	S-	-	I
1990	V	V	V	I	-	-	V	-	-	S-	-	I
1991	S	S	S	I	-	S	S				-	I

(I = Incomplete but Valid Data Sets; V = Validated)
(S = Submitted; Dash = Not Yet Reported)

TABLE 4. Status of Conversion to PSC Format 3/18/92

Unmarked Hatchery Production Releases

Reporting Agency

Year	CDFG	ODFW	WDF	WDW	IDFG	CDFO	ADFG	FWS	NMFS [1](AK)	NWIFC	QDNR	MIC
1965 - 72						V		V				
1973						V		V				
1974						V		V				
1975	-	U	-	-		V	-	V	NA			
1976	-	U	-	-	V	V	-	V	NA	-	-	
1977	-	U	-	-	V	V	-	V	NA	-	-	
1978	-	U	-	-	V	V	-	V	NA	-	-	
1979	-	U	-	-	V	V	-	V	NA	-	-	
1980	-	U	-	-	V	V	-	V	NA	-	-	-
1981	-	U	-	-	V	V	-	V	NA	-	-	V
1982	-	V	-	-	V	V	-	V	NA	-	-	V
1983	-	V	-	-	V	V	-	V	NA	-	-	V
1984	-	V	-	-	V	V	-	V	NA	-	-	V
1985	-	V	-	-	V	V	-	V	NA	-	-	V
1986	-	V	-	-	V	V	-	V	NA	-	-	V
1987	-	V	-	-	V	V	-	V	NA	-	-	V
1988	-	V	-	-	V	V	-	V	NA	I	-	V
1989	-	V	-	-	V	V	-	V	V	V	V	V
1990	-	V	-	-	V	V	-	V	-	V	V	V
1991	-	I	-	-	V	-	-	-	-	-	-	-

(U = Unavailable; I = Incomplete but Validated Data Sets; V = Validated)
(NA = Not Applicable; S = Submitted; Dash = Not Yet Reported)

[1]Note: With the exception of 1989, all NMFS-AK's hatchery production has been represented by CWT studies.

Pete Hassemer (IDFG) also reported very favorable news in that the Idaho recovery data were within a few weeks of completion. He noted that this might be extended somewhat as he had concerns with the accuracy of the early data.

c) Unmarked Hatchery Production Releases

Modest progress was seen in reporting unmarked hatchery production releases during 1991 (**Table 4**). IDFG and USFWS became the 4th and 5th agencies to report all available years of unmarked hatchery production releases. However, there are still seven agencies that have not completed this task.

2. Status of RMPC Operations

a) Software Development

Ken Johnson (PSMFC) reported that the Mark Center had ported the CWT database over to a Sequent computer (Unix system) built locally in the Portland area. The operating system currently in use is "Uni-Verse", a PICK product marketed by V-Mark, Inc. Data processing speed on the new system is approximately 3-5 times faster than that seen on the former DEC MicroVax system.

Work is also well underway on software development in preparation for moving the CWT database onto Ingres, a relational database management system. Once this work is completed, users will have a much greater range in data retrieval capabilities. Migration onto Ingres is planned for August-September, 1992.

Johnson also noted that NWIFC has implemented an exceptional CWT retrieval and analysis system ("CRAS") on their Sun workstation that also uses Ingres as the relational database management system. In addition to typical CWT recovery reports, CRAS has the capability to provide cluster analysis reports (SPSS statistical package) and survival rate analysis reports. PSMFC and NWIFC are currently exploring options to port a version of CRAS onto the Mark Center's computer in order to include all CWT data coastwide.

b) RMPC Funding Review

The Mark Center's funding for FY 1992 did not materialize as hoped in 1991. The U.S. Section Budget Committee (PSC) had approved $200,000 for the Mark Center in FY 1992. However, for various reasons, the monies were not added to USFWS's budget by Congressional action. This critical shortfall was made up by assistance from USFWS ($20,000) and Bonneville Power Administration ($180,000). BPA added an additional $54,000 as its fair share of data processing costs for FY 1992. Other sources of funding for FY 1992 included Anadromous Grant (NMFS pass through: $67,750) and PSFMC's 2:1 matching funds (33,500) for a total budget of $355,000.

Efforts are continuing to get Congress to add the approved PSC funding ($200,000) to USFWS's budget for FY 1993 for pass through to the RMPC.

3. Report on PSC's Working Group on Data Standards

The Working Group on Data Standards met only once (Nov. 5-6th) in 1991 but accomplished a great deal in that meeting. The focus of the meeting was to correct a number of deficiencies found in PSC Format Version 2.0. One of the problems corrected, for example, was that Format 2.0 was very vague on which fields were required to be filled with values and which were optional. Therefore, the committee standardized required and optional fields for both historical data and for data submissions from 1992 onward **(Attachment 2)**.

The Working Group also spent approximately one day on reviewing and updating data validation specifications for exchanging the Release, Recovery, Catch/Sample, and Location files. This included the definition of what constituted an acceptable dataset for exchange. The definitions differed, depending on whether the data were being reported to the RMPC by all agencies, of if the data flow was from the RMPC to British Columbia.

The Mark Committee was reassured that all of the changes were made to the "old" Format 2.0 without changing existing fields or adding new fields. This was purposely done in order to minimize any impact on current software programs for exchanging CWT data in PSC format. The new format has been designated as Format Version 3.0.

4. Mortality Associated with Ventral Fin Marks

Most fishery biologists associate ventral fin clips on juvenile salmonids with significant mortality rates that range between 20% and 60%. This view is reinforced by a large variety of miscellaneous fish marking studies on a variety of different salmonid species, including trout. However, critics argue that few of these studies appear to have been statistically well designed. Another common problem is the bias introduced by fin regeneration. Failure to detect these latter fish in the sampled population leads to estimates of higher than actual mortality of the clipped fish.

CDFO has been evaluating the mortality associated with ventral clips on coho for a number of years now, and has found very low mortality as a general rule. Vic Palermo (CDFO) reported on a paper by Ken Wilson (PSARC Working Paper S88-12) that assesses CDFO's massive "Expo" coho production experiment that done for the 1986 World Exposition in Vancouver. To protect wild stocks from over exploitation and also provide ample sport fishing opportunities in Georgia Straits for visitors, a total of 8.5 million ventral clipped coho smolts (1983 brood) were released from six hatcheries in 1985 in anticipation of the 1986 summer harvest.

Effects of ventral fin clipping were assessed by also marking a number of the fish with the Adipose+CWT and the Adipose+CWT+Ventral marks. Resultant survival estimates were found to be somewhat variable between the six hatcheries, possibly because of differing levels of handling. In addition, it was concluded that the experimental design was inadequate to fully assess the effects of ventral clipping of survival. However, even with these experimental design problems, the general result was that survival estimates for ventral clips were statistically similar to CWT survival rates.

During the subsequent discussion, questions were raised about maintaining quality control when mass marking that many fish, and about biases introduced from fin regeneration. Another major concern was the mortality associated with handling (e.g. high temperatures, diseases), and from the stress of marking. As such, there was strong consensus for the need of further well designed studies to resolve these important questions about fin clipping.

Jerry Bauer (BPA) commented that he had had years of experience with fin marking (including ventral, pectoral, maxillary, anal, jawbone, etc.) and had personally used up to five marks on a fish. He reported that the fish with 5 marks had a 4% survival rate that was as good or better than that for other spring chinook along the coast. He concluded that there are ways and times to clip fish, and that there are also ways and times not to clip fish. To some degree, this will vary from facility to facility. It was his strong opinion, however, that high mortality doesn't go hand in hand with fin clipping if the necessary precautions in handling and reduced stress are taken.

5. ODFW, IDFG, and USFWS Appeal of Mark Committee Decision

The Mark Committee agreed to reconsider the IDFG, ODFW, and USFWS proposals to mass mark Snake River hatchery chinook with the adipose only mark. The proposals had initially been introduced and debated during a special Mark Meeting on September 19th, 1991. During a subsequent telephone conference on December 16th, 1991, the proposals were rejected by an 8 to 2 vote (ODFW, IDFG voted yes, NMFS abstained). The primary reason for the denial was that most agencies were very concerned about setting a precedent for desequestering the adipose clip that could eventually destroy the integrity of the coastwide CWT program.

The resultant discussion was again very spirited, with similar arguments as before offered in behalf of both the pro and con positions. In the end, however, the proposals were defeated by a similar vote of 8 to 3 (ODFW, IDFG, and USFWS voted yes). Approval of the proposals would have required a 75% or greater affirmative vote.

As before, the primary concern of the agencies voting no continued to be one of precedence. Regardless of proposed strict limitations, there was a common conviction that approval to adipose clip the Snake River spring and summer hatchery chinook would in the end set a precedent for other similar proposals to follow. Given the great importance of

CWT data to research and fisheries management, the majority of the agencies were unwilling to take the risk of undercutting the integrity of the CWT program.

The strong no vote was also based in part on the belief that there are other suitable mass marks available to identify hatchery fish. The previously discussed CDFO study on ventral marks on coho was cited as one example that ventral marks may have comparable mortality to that of the Adipose+CWT mark. Preliminary USFWS data from a ventral clip mortality study on chinook at the Warm Springs NFH was also cited as supporting the contention that there may be no or little difference in mortality between returns of Adipose+CWT and Adipose+CWT+Ventral marked fish.

The Mark Committee did not want to deny the Snake River proposals and give the false impression that they were totally unsympathetic to the need to mass mark hatchery stocks for the protection of endangered and threatened wild stocks. Therefore, rather than just say no, the Committee developed the following recommendation:

PSMFC Mark Committee Position on Mass Marking Techniques

PSMFC's Mark Committee recognizes the need for maintaining the integrity of the CWT for ocean management purposes, and at the same time, recognizes the need for a mass mark for brood stock management. The Mark Committee has soundly rejected the use of the adipose mark as a mass mark.

Recent paired experiments indicate that ventral marks may not be any more detrimental than the Ad+CWT mark. Because of this, the Committee recognizes that the ventral mark may be the best available mass mark at this time due to cost considerations. The Committee plans to have an on-going evaluation of this position and will further sponsor joint-agency proposals for research to evaluate the ventral mark and other potential mass marks. It is recommended that this coordinated effort be given funding support from Bonneville Power Administration.

February 18, 1992
Vancouver, B.C.

6. Consideration of Voting Protocol for Appeals

The protocol for handling appeals was reviewed to ensure that it is adequate for any future situations. The consensus was that the existing agreements were adequate. Any appeal in the future will simply be treated as a new proposal since there may be additional information or arguments presented the second time.

7. Report by the Sub-Committee on Mass Marking

Lee Blankenship (WDF) reviewed the progress of the Sub-Committee on Mass Marking for the entire Mark Committee. He noted that several meetings had already been held and that a skeleton report was beginning to take form. A key table which compares the various features of 13 potential mass marks (i.e. application rate & size, mark characteristics, and direct costs) was briefly discussed.

Completion of the report on "Mass Marking Anadromous Salmonids: Techniques and Options" is expected in June-July, 1992. The plan will be forwarded to the Mark Committee for review prior to making it available for general distribution.

7A. Report on Current Mass Marking Studies

Lee Blankenship reported that WDF and other agencies had a number of studies underway to evaluate various marks as potential mass marks. These projects are summarized below:

Agency	Species	BrYr	#Repl	Group Size	Objectives and Method
WDF	Coho	90	3	45,000	Survivability between Ad+CWT and Ventral+CWT (3 Puget Sound hatcheries) (Contact: Lee Blankenship)
WDF	Coho	89	0	4,000	Survivability between Ad+CWT and V.I. fluorescent filament+CWT (Dungeness Hatchery) (Contact: Lee Blankenship)
WDF	Fall Chin	90	0	350,000	Group 1: Ad+CWT cheek tag Group 2: Ad+CWT + V.I. filament (Lyons Ferry; no true control (Contact: Lee Blankenship)
WDF	Coho	90	0	600,000	V.I. filament and elastomer tagging. Evaluate tag retention, fisherman awareness and production tagging feasibility (Grays Harbor) (Contact: Lee Blankenship)

WDF ODFW USFWS	Spring Chin	89-91	3 hat. + 3 broods	400,000- 600,000	Evaluate effect of CWT; includes Adipose clip (Cowlitz, Willamette, & Carson) (Contact: Lee Blankenship)
ODFW	Fall Chin	90-93	4 yrs	140,000	Survivability between body tag, LV + body tag, RV (3 million total), Ad+CWT, and Ad+CWT+RV (Upriver Brights, Umatilla Hatchery) (Contact: Rich Carmichael)
USFWS	Spring Chin	87-89	3 yrs~	100,000	Survivability between Ventral clip and Ad+CWT (2 groups/year: study nested within dry vs moist diet study) (Warm Springs NFH) (Contact: Doug Olson)
WDW	Sthd	91	0	120,000	V.I. fluorescent filament + Ad clip, Evaluate short-term retention, angler awareness, and production feasibility (Cowlitz Hatchery) (Contact: Jack Tipping)
WDF	Chin	90-91	0	250	Initial laser study research Coho (Contact: Lee Blankenship)

While the on-going marking studies listed above are impressive and certainly a positive step in identifying suitable mass marks, they can only provide a partial answer. The Committee agreed that additional studies are needed that are specially designed to evaluate the various potential mass marks.

8. Request for Mark Committee Representation by CRITFC

Member tribes of the Columbia River InterTribal Fish Commission (Nez Perce, Umatilla, Warm Springs, and Yakima) requested formal representation on the PSMFC Mark Committee because of CRITFC's growing role in fisheries management, hatchery management, fish production, and tagging programs (see **Attachment 3**). The proposal generated limited discussion as it was generally acknowledged that CRITFC representation would fill a major hole for coastwide coordination. In addition, the recent emphasis on mass marking in the Snake River gives further weight for improving inter-agency coordination within the entire Columbia Basin.

Action: CRITFC was granted representation on the Mark Committee effective February 18, 1992. Marianne Johnson was recognized as the tag coordinator for CRITFC.

9. Update on 1991 High Seas Sampling Program

Ron Heintz (NMFS-AK) reported that 154 CWT 's were recovered by NMFS from January 1990 to September 1991.

a) Most of the recoveries were from the Joint Venture hake fishery off the coasts of Washington, Oregon, and California. A total of 99 tags were recovered: 98 chinook, 1 coho.

b) U.S. domestic fisheries observers recovered 50 CWT's: 6 in the hake fishery; 41 in the Gulf of Alaska; and 3 in the Bering Sea. The reduction in the number of CWT recoveries is mostly related to increased effort in the Bering Sea. Fewer tags were recovered even though greater numbers of salmon were sampled. Presumably, the salmon are predominately from western Alaskan stocks.

c) High seas research vessels recovered 5 CWT's in 1990. All tags were steelhead from Dworshak Hatchery in Idaho.

In 1991, U.S. and Canadian observers recovered 3 tagged coho salmon from the high seas squid driftnet fishery. These resulted in a western range extension from 44 30'N, 177 33'E to 43 36'N 173 47'E. The southern range was also extended from 44 0'N, 157 57'W to 42 11'N, 159 15'W.

Observers in the land based Japanese driftnet salmon fishery recovered 20 adipose clipped steelhead, one with a CWT. This fish was recovered on June 21, 1991 at 48 02'N, 171 55'E. It was released into the Salmon River (Washington) by the Quinault Indian Tribe in the spring of 1988.

Release and recovery information for the above CWT recoveries in all of 1990 and January through October 15, 1991 are provided with these minutes (**Attachment 4**).

10. Agency Reports on Tagging Plans for 1992

As requested, each tag coordinator provided a summary table of projected tagging plans for 1992, and actual tags released in 1991 for comparison. These tagging summaries were exchanged during the meeting and are not provided herein. However, **Table 5** below provides an overview of all tagging projected for 1992.

Overall tagging levels projected for 1992 total 56.7 million fish. This represents a 27% increase over 1991 when 44.6 million fish were tagged. Most agencies projected minor increases from 1991 tagging levels. However, IDFG is a notable exception with the 1992 tagging level increasing by approximately three million fish. USFWS and NMFS programs in the upper Columbia Basin also expect to substantially increase tagging. The increased tagging reflects the growing concern over the status of the stocks in the upper Columbia. (Note: There is a possibility that NMFS will only mark 93,000 sockeye and 104,000 steelhead in the Columbia River).

Table 5. Comparison of Agency Tagging Levels (X 1000)

State/Region	Reporting Agency	1991	1992
Alaska			
	ADFG (+PNP)	5,460	5,980
	Metlakatla	660	750
	NMFS-AK	301	390
British Columbia			
	CDFO	10,321	9,500
	CDFR	233	290
	BCFW	17	0
Washington			
	WDF	11,200	11,900
	WDW	360	260
	NWIFC	2,805	3,205
Idaho			
	IDFG	1,387	4,500
Oregon			
	ODFW	6,130	7,560
California			
	CDFG	1,850	3,070
Regional			
NMFS	Columbia Basin	93	2,904
USFWS	Columbia River	3,330	4,860
	Puget Sound + Washington Coast	650	830
	California	360	750
TOTAL:		45,157	56,749

1992 Mark Meeting Minutes

11. Advances in Marking Technology

a) Elemental Marks

1) Elemental Research, Inc. (Robert Brown)

Robert Brown (Elemental Research, Inc.) provided a brief update on progress using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) for identifying fish marked with extremely low levels of either rare earth elements (lanthanides) or strontium. He noted that there had been tremendous progress in the last year, with 100% success in detecting all lanthanide elements in scales, vertebrae, and otoliths at concentration levels in the range of 4 parts per billion (ppb). The actual limit of detection, however, is 100 times greater (0.04 ppb)! The extremely low detection levels have been achieved using a new "electrothermal vaporization" ICP-MS system that is 100-1000 times more sensitive than other ICP-MS systems.

In other advances, Mr. Brown noted that upon his request, the manufacturer had developed a window of 4 microns to look at an absolute area of scale being laid down. He reported that the window worked exceptionally well and provided a spatial resolution of 30 microns on the target area. As such, it is possible to shoot directly at the focus of the scale and then work out to the outer portions of the freshwater growth portion of the scale. This can provide an X-Y-Z spatial distribution plot of the concentration levels of the marker element.

When asked about the cost per sample, Mr. Brown indicated that there were too many unknowns yet to be able to give accurate price information. However, he offered a "guesstimate" of less than $20 per sample if large numbers of samples were being processed and the machine could be dedicated strictly to the project. Costs obviously would be considerably higher if the machine had to be shared with other types of research. (Note: recent charges were in the range of 50-60$ to provide a spatial distribution analysis for one element).

2) CDFO Research Results

Ken Pitre (CDFO) reported that CDFO would like the ability to identify each hatchery fish and had funded research by Brigete Ennevor (Univ. B.C.) to explore the potential of using rare elements as a mass marking tool for chinook and coho. He further noted that the lanthanides are particularly attractive since:

a) Application is by water
b) Elements are bone seeking

c) Storage is long term
d) Detection is at very low levels
e) Natural levels in water are extremely low and do not pose "background" problems
f) Poorly absorbed from the intestinal tract
g) Application costs are relatively inexpensive.

Research results indicate that all 11 elements tested were taken up in the bones and scales. However, toxicity was found to occur when initial concentrations were too high in the water. Chinook accumulated the elements much more than coho and were found to be more sensitive than coho to toxicity. It was also found that low constant levels of the "marker" element over longer duration worked much better than short exposure to high concentration levels.

Ken Pitre also reported that CDFO is continuing with a variety of research projects to determine optimal time for marking and levels of concentration, etc. Combinations of the 14 elements are also possible, suggesting that all hatcheries on the coast could conceivably be identified by a specific "multi-element" mark.

b) Fluorescent Marks - Northwest Marine Technology, Inc.

Northwest Marine Technology staff presented an updated video on the use of fluorescent filament tags and fluorescent elastomer injections as potential marks. Following the video, a marked juvenile coho was exhibited to illustrate the ease of detection. The use of a black light made the fluorescent tags really stand out in a darkened room. However, ultraviolet light isn't necessary as the filament tags are readily observed without special enhancement.

The filament tags and elastomer injections come in a variety of different colors. In addition, the marks could be placed in anywhere from 12 to 25 different locations on a fish. As such, Dr. Keith Jefferts suggested that there could be a sizeable number of different combinations available.

The filament tags and elastomer injection tags are currently being tested for rate of application, tag retention, minimum size restriction, and visibility in returning fish. The minimum size of fish for filament tags at this point is approximately 90mm fork length (60/lb). Elastomer injections can be done in slightly smaller fish (70mm, 150/lb). Application rate for both marks is approximately 400/person/hr.

As would be expected, some problems were reported with both the filament tags and the elastomer injections. Tag retention was a problem for some projects and believed to be possibly related to the experience of the tagging crew. Some

problems were also found with jamming of the tag injectors. The elastomer injections, on the other hand, posed a problem in pinching off the liquid beneath the surface of the skin so that a "tail" didn't follow the needle as it is backed out, thus leaving a potential opening for infection. Dr. Jefferts commented, however, that NMT was working hard on these problems and he was confident that they would be resolved in the near future.

Costs for the new filament tags are variable, depending on the quantity ordered. In very large quantities, the cost is 2.1 cents per tag. No other special costs exist since the tags are applied with the Mark IV tag injector.

The costs for elastomer injections are somewhat more complicated since a specialized injector unit is required. Rather than have the agencies buy the injector units, NMT is considering the option of leasing the equipment. The agencies would be charged "per injection", much like "owning" a photocopy machine. That would place all maintenance responsibility on NWT. The cost (all equipment covered) was tentatively estimated at 3.2 cents per injection.

Attachment 1

1992 Mark Meeting Attendees

February 18, 1992

	Lynn Anderson	WDF - Olympia, WA
	Don Bailey	CDFO - Vancouver, BC
	Richard Bailey	CDFO - Nanaimo, BC
	Jerry Bauer	BPA - Portland, OR
	Pete Bergman	NMT - Shaw Island, WA
*	Lee Blankenship	WDF - Olympia, WA
**	John Clark	ADFG - Juneau, AK
	Rich Comstock	USFWS - Olympia, WA
*	Charlie Corrarino	ODFW - Portland, OR
*	Karen Crandall	ADFG - Juneau, AK
*	Rich Dixon	CDFG - Rancho Cordova, CA
	Robert Donnelly	Univ. of Wash. - Seattle, WA
	Phil Ekstrom	NMT - Shaw Island, WA
**	Marc Hamer	CDFO - Nanaimo, BC
*	Pete Hassemer	IDFG - Boise, ID
	Frank Haw	NMT - Shaw Island, WA
*	Ron Heintz	NMFS - Auke Bay, AK
	Doug Herriott	CDFO - Vancouver, BC
	David Houseworth	MIC - Metlakatla, AK
*	Dennis Isaac	ODFW - Clackamas, OR
	Keith Jefferts	NMT - Shaw Island, WA
*	Ken Johnson	PSMFC - Portland, OR
*	Marianne Johnson	CRITFC - Portland, OR
	Tom Kane	USFWS - Olympia, WA
*	Steve Leash	MIC - Metlakatla, AK
	James Longwill	PSMFC - Portland, OR
*	Bryan Ludwig	BC Environment - Victoria, BC
	Mike Matylewich	CRITFC - Portland, OR
	Stan Moberly	NMT - Shaw Island, WA
*	Charles Morrill	WDW - Olympia, WA
	Dick O'Connor	WDF - Olympia, WA
	Steven Olhausen	USFWS - Vancouver, WA
*	Ron Olson	NWIFC - Olympia, WA
*	Vic Palermo	CDFO - Vancouver, BC
	Ken Phillipson	NWIFC - Olympia, WA
	Ralph B. Roseberg	USFWS - Orofino, ID
*	Robert Z. Smith	NMFS - Portland, OR
	Jim Thomas	Thomas & Assoc. - Vancouver, BC
	Neil Williscroft	CDFO - Vancouver, BC
*	David Zajac	USFWS - Olympia, WA

* Mark Committee Member ** PSC Data Sharing Committee Member

Following considerable discussion, committee members agreed that a number of other fields should be required for all historical data. A few additional fields were required for data submissions in 1992 and thereafter. These required fields are summarized by file type below for the newly adopted PSC Format Version 3.0:

REQUIRED FIELDS (PSC FORMAT VERSION 3.0)

A. Release File

Historical Data

Release Group
1) Tag Code (or)
2) Release Identifier
Species
Brood Year
Release Agency
Rearing Type
Tag Coordinator Code
Format Version Number

Additional Requirements
1992 Onward

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B. Recovery File

Historical Data

Reporting Agency
Item ID
Recovery Date..(Year at min.)
Species
Status of Tag
Recovery Site Code
Fishery Code
Sample Type
Format Version Number

Additional Requirements
1992 Onward

Nature of Recovery Date
Sampling Agency

C. Catch/Sample File

Historical Data

Reporting Agency
Catch Year
Status of Record
Date of File Creation
Species
Sampling Period Type
Sampling Period Number
Fishery Code
Catch Area Code
Sample Type
Format Version Number

Additional Requirements
1992 Onward

Sampling Agency

D. Location Codes File

Historical Data

Location Code
Location Type
Description
File Creation Date
Format Version Number
Short Description

Additional Requirements
1992 Onward

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Note: Conditional requirements are indicated in the validation specifications document.

Attachment 3

COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

729 N.E. Oregon, Suite 200, Portland, Oregon 97232

Telephone (503) 238-0667
Fax (503) 235-4228

February 18, 1992

Ken Johnson, Regional Mark Coordinator
Pacific States Marine Fisheries Commission
2501 SW First Avenue, Suite 200
Portland, OR 97201

FEB 26 1992

Dear Mr. Johnson:

Recent events concerning evaluation of mass marking proposals and the proposed expansion of tribal production programs has prompted the member tribes of the Columbia River Inter-Tribal Fish Commission (Nez Perce, Umatilla, Warm Springs and Yakima) to seek formal representation on the PSMFC Mark Committee.

The representation of our tribes is important because the committee is an inter-agency forum for evaluating tagging issues which can affect data that we rely on in carrying out our management responsibilities. Because the data are very important to our management, we need to be well informed and involved in items such as those appearing on your recent agenda: status of recovery files, database access and reports, mass marking proposals, high seas tag recoveries, and agency tagging plans.

In addition, our member tribes, as co-managers of the resource, expect to have increased involvement in hatchery management, fish production and tagging. Representation will allow us input into the inter-agency coordination process for tagging plans. Our tribes believe that innovative management of fish production is key in restoring depressed populations.

As proposals to restore populations involving fish identification are developed, the Mark Committee may be called upon to review them. The recent consideration of mass marking hatchery fish in the Snake River Basin is an example. We actively support research and development of fish identification techniques which will complement recovery actions and do not significantly impact current programs.

Thank you for consideration of this proposal.

Sincerely,

Ted Strong

Ted Strong
Executive Director

Table 5.--Release and recovery information for coded-wire tagged chinook salmon recovered from the North Pacific Ocean. Gonad weight less than 100 coded as 1; blank = not available.

RELEASE								RECOVERY										
ADDR BR GAAE RO ETTP OO NAA DD C C Y 12D YR	SITE	STATE	AGENCY	NUMBER TAGGED	DATE	DATE	LAT D M	LONG D M	LENGTH TSFT (mm)	BODY WT (g)	GONAD WT (g)	SEX	GEAR	SPECIES
1991 RECOVERIES SORTED BY SPECIES TAGCODE														
024261 86	BIG QUALICIM R	BC	CDFO	26822	0687	910328	58 1 N	148 53 W	960	11900	100	F	TRAWL	CHINOOK
024833 87	BULKLEY R	BC	CDFO	10624	0489	910111	57 10 N	152 24 W	550	2200		F	TRAWL	CHINOOK
024921 87	KENNEDY R LWR SWVI	BC	CDFO	21332	0688	910219	55 7 N	165 2 W	720	5400			TRAWL	CHINOOK
024925 87	KENNEDY R LWR SWVI	BC	CDFO	21028	0688	910306	54 42 N	160 27 W	580	3200		M	TRAWL	CHINOOK
025014 88	ROBERTSON CR	BC	CDFO	25393	0589	910131	57 42 N	154 4 W	510	1550		F	TRAWL	CHINOOK
025163 87	NICOLA R THOM	BC	CDFO	24107	0588	910109	57 8 N	152 28 W	700	5600		F	TRAWL	CHINOOK
025646 88	STAMP R	BC	CDFO	9723	0589	910203	57 52 N	153 52 W	450	1200		F	TRAWL	CHINOOK
025658 88	POET'S NOOK	BC	CDFO	9882	0589	910129	56 58 N	152 23 W	622	2000		M	TRAWL	CHINOOK
025704 88	CHINA CR	BC	CDFO	9730	0589	910130	57 58 N	153 23 W	520	2000		M	TRAWL	CHINOOK
025808 88	NITINAT R	BC	CDFO	24080	0589	910112	54 26 N	163 49 W	530	2000		M	TRAWL	CHINOOK
025809 88	NITINAT R	BC	CDFO	26348	0589	910112	57 5 N	152 38 W	470	1500		M	TRAWL	CHINOOK
025838 88	ROBERSTON CR	BC	CDFO	24734	0689	910112	57 5 N	152 38 W	520	1900		M	TRAWL	CHINOOK
026056 88	ROBERTSON CR	BC	CDFO	25079	0689	910110	57 10 N	152 42 W	490	1600		F	TRAWL	CHINOOK
026056 88	ROBERTSON CR	BC	CDFO	25079	0689	910606	54 42 N	165 4 W	480	1500		F	TRAWL	CHINOOK
043107R2 86	CARROLL INLET 101-45	AK	ADFG	52353	0588	910327	58 0 N	148 55 W	790	5850	90	F	TRAWL	CHINOOK
062809 88	BLUFF CR	CA	CDFG	15671	1089	910507	41 15 N	124 25 W	700	5400		M	TRAWL	CHINOOK
062810 88	ELK R	CA	CDFG	21265	1089	910504	40 28 N	124 51 W	580	2600	2	M	TRAWL	CHINOOK
062811 88	GRIDER CR	CA	CDFG	16708	1089	910422	41 1 N	124 25 W	490	2000		F	TRAWL	CHINOOK
065414 88	BENECIA	CA	CDFG	49848	0689	910511	40 46 N	124 30 W	630	4000	220	F	TRAWL	CHINOOK
065619 84	LIME POINT	CA	CDFG	94100	0685	910513	41 1 N	124 29 W	860	7500		M	TRAWL	CHINOOK
065632 88	TRINITY R, HATCHERY	CA	CDFG	97569	1089	910427	40 53 N	124 37 W	480	1600	50	F	TRAWL	CHINOOK
065936 87	IRON GATE HATCHERY	CA	CDFG	57600	1088	910520	40 47 N	124 30 W	660	4300		F	TRAWL	CHINOOK
073556 86	ROCK CR (N UMPQUA R)	OR	ODFW	23503	0288	910413	40 47 N	124 27 W	820	8700		M	TRAWL	CHINOOK
073643 88	ROGUE R-4	OR	ODFW	9949	1089	910416	40 49 N	124 38 W	410	1700		F	TRAWL	CHINOOK
074151 87	TRASK R	OR	ODFW	10480	0788	910422	41 8 N	124 23 W	500	2500		M	TRAWL	CHINOOK
074204 88	BIG CR	OR	ODFW	10452	0889	910520	40 49 N	124 29 W	630	3500		F	TRAWL	CHINOOK
074227 88	ROGUE R	OR	ODFW	10097	0989	910517	43 35 N	124 37 W	550	1800	5	F	TRAWL	CHINOOK
074230 88	ROGUE R-4	OR	ODFW	9770	0989	910517	40 50 N	124 28 W	540	4100		M	TRAWL	CHINOOK
074417 87	CHETCO R	OR	ODFW	26957	0988	910501	40 9 N	124 15 W	725	4400	15	F	TRAWL	CHINOOK
074417 87	CHETCO R	OR	ODFW	26957	0988	910510	40 53 N	124 25 W	620	4200		M	TRAWL	CHINOOK
074616 87	ROGUE R-4	OR	ODFW	9850	0988	910513	41 7 N	124 31 W	610	3200		F	TRAWL	CHINOOK
074805 88	PISTOL R	OR	ODFW	8244	0789	910520	40 49 N	124 29 W	560	3000		F	TRAWL	CHINOOK
075140 88	ROGUE R-1	OR	ODFW	25193	0889	910513	41 7 N	124 31 W	590	2950		M	TRAWL	CHINOOK
075140 88	ROGUE R-1	OR	ODFW	25193	0889	910519	40 51 N	124 30 W	540	2100		M	TRAWL	CHINOOK
075207R2 88	WILLAMETTE R, MID FK	OR	ODFW	30570	1189	910502	56 6 N	153 59 W	540	2500		M	TRAWL	CHINOOK
212549R1 88	QUINAULT R	WA	QDNR	147936	0689	910111	57 10 N	152 24 W	450	1400		M	TRAWL	CHINOOK
603938 88	SOUTH BEACH	OR	OAF	14258	0789	910520	40 49 N	124 29 W	530	2400		F	TRAWL	CHINOOK
603952 88	SOUTH BEACH	OR	OAF	14679	0989	910510	45 11 N	124 12 W	530	1900		F	TRAWL	CHINOOK
630231 89	LYONS FERRY	WA	WDW	17914	0490	910510	45 20 N	124 16 W	480	1000		M	TRAWL	CHINOOK
632842 85	STEVENS CR	WA	WDF	133358	0786	910327	58 0 N	148 55 W	920	11400	150	F	TRAWL	CHINOOK
635247R3 88	LEWIS R	WA	WDF	113890	0490	910621	46 24 N	124 24 W	550	3700		M	TRAWL	CHINOOK
B60906 87	BOGUS CR	CA	CDFG	26336	0388	910520	40 49 N	124 29 W	630	3700		F	TRAWL	CHINOOK
B61413 88	IRON GATE HATCHERY	CA	CDFG	38222	0489	910417	40 52 N	124 28 W				F	TRAWL	CHINOOK
052259 88	EDUCKET CR	WA	MAKA	47936	0490	910712	42 11 N	159 15 W	785			F	SQDGILL	COHO
075128 88	KLASKANINE R, S FK	OR	CEDC	27126	0590	910807	44 44 N	175 3 W					SQDGILL	COHO

630437R3	88	ABERDEEN NET PENS	WA	WDF	26011	0590	910820	43	36	N	173	47	E	720			M	SQDGILL	COHO
052044	89	CLEARWATER R, N FK	ID	FWS	20016	0590	910620	44	31	N	179	30	E	592	2060	1	M	SALGILL	STEELHEAD
052048	89	CLEARWATER R, N FK	ID	FWS	20888	0590	910621	44	30	N	177	30	E	566	1820	6	F	SALGILL	STEELHEAD
104058	89	SALMON R, E FK	ID	IDFG	40905	0490	910708	46	31	N	177	30	E	548	1620	7	M	SALGILL	STEELHEAD
104144	88	SALMON R, E FK	ID	IDFG	15624	0489	910620	45	30	N	179	30	W	680	3000	7	M	SALGILL	STEELHEAD
104222	89	PAHSIMEROI TRAP	ID	IDFG	14339	0490	910620	46	59	N	177	22	E	570	2000	3	M	SALGILL	STEELHEAD
104229	89	SALMON R (SHOUP BR)	ID	FWS	15104	0490	910628	44	55	N	177	42	W	542	1700	3	F	SALGILL	STEELHEAD
104236	89	SALMON R, E FK	ID	IDFG	15474	0490	910622	44	30	N	175	30	E	544	1600	8	F	SALGILL	STEELHEAD
122334	88	ROBERTSON CR	BC	BCFW	33626	0489	910622	47	30	N	179	30	W	704	3590	42	F	SALGILL	STEELHEAD
211746	87	SALMON R (MF SALMON)	WA	COOP	23815	0588	910621	48	2	N	171	55	E	908			M	SALGILL	STEELHEAD
213519R2	89	CHALAAT CR	WA	HOH	43523	0490	910619	44	30	N	179	30	W	574	1780	25	M	SALGILL	STEELHEAD
213526R2	89	COOK CR (QUIN)	WA	FWS	26317	0590	910617	43	30	N	175	40	E	540	1420	8	F	SALGILL	STEELHEAD
631421R1	89	LYONS FERRY	WA	WDW	17914	0490	910622	44	30	N	175	30	E	534	1360	6	F	SALGILL	STEELHEAD
633907	89	DAYTON COND. PONDS	WA	WDW	19602	0490	910629	44	49	N	177	41	W	560	1760	1	M	SALGILL	STEELHEAD
633912	89	CURL LK	WA	WDW	19672	0490	910619	44	30	N	179	30	W	521	1330	5	F	SALGILL	STEELHEAD

Table 2.--1990 recoveries. Gonad weight less than 100 coded as 1; blank = not available.

RELEASE								RECOVERY									
ADDITIONAL TAG CODE	BROOD YR	SITE	STATE	AGENCY	NUMBER TAGGED	DATE	DATE	LAT D	LAT M	LONG D	LONG M	LENGTH TSFT (mm)	BODY WT (g)	GONAD WT (g)	SEX	GEAR	SPECIES
1990 RECOVERIES SORTED BY SPECIES TAGCODE																	
023639	85	NITINAT R	BC	CDFO	26238	0586	900313	56	38 N	151	52 W	880	9850	10	M	TRAWL	CHINOOK
023758	85	CHEHALIS R	BC	CDFO	25498	0686	900420	43	48 N	124	40 W	900	8500	20	F	TRAWL	CHINOOK
023912	85	BABINE R	BC	CDFO	31388	0487	901016	53	21 N	160	20 W	830	7470	100	M	TRAWL	CHINOOK
024257	86	ROBERTSON CR	BC	CDFO	22396	0587	900520	58	19 N	151	8 W	780	6000		F	TRAWL	CHINOOK
024362	86	ROBERTSON CR	BC	CDFO	26805	0587	900125	57	8 N	152	29 W	640	4550	1	F	TRAWL	CHINOOK
024515	86	ROBERTSON CR	BC	CDFO	19981	0587	900214	57	8 N	152	36 W	690	4500		M	TRAWL	CHINOOK
024740	87	CHEHALIS R	BC	CDFO	27006	0588	900615	43	22 N	124	42 W	630	3180	5	M	TRAWL	CHINOOK
024804	87	ROBERTSON CR SWVI	BC	CDFO	28912	0588	901025	56	43 N	153	29 W	650	4900		M	TRAWL	CHINOOK
024806	87	ROBERTSON CR	BC	CDFO	32201	0588	900420	55	1 N	160	21 W	490	1400		F	TRAWL	CHINOOK
024809	87	ROBERTSON CR SWVI	BC	CDFO	29554	0588	900405	57	59 N	152	21 W	460	1250		M	TRAWL	CHINOOK
024816	87	THOMPSON R	BC	CDFO	51189	0488	901007	56	55 N	152	35 W	750	7000		F	TRAWL	CHINOOK
024921	87	KENNEDY R LWR SWVI	BC	CDFO	21332	0688	900417	56	38 N	167	14 W	460	1200		F	TRAWL	CHINOOK
024924	87	KENNEDY R LWR SWVI	BC	CDFO	21102	0688	901025	56	43 N	153	29 W	590	3900		F	TRAWL	CHINOOK
024948	87	CHINA CR SWVI	BC	CDFO	24137	0588	901021	56	27 N	155	35 W	660	4400		F	TRAWL	CHINOOK
025209	87	DOME CR UPPER	BC	CDFO	10406	0489	901031	57	8 N	151	27 W	560	2600		M	TRAWL	CHINOOK
025328	87	ROBERTSON CR SWVI	BC	CDFO	25640	0588	900313	58	3 N	153	31 W	480	1150		F	TRAWL	CHINOOK
025328	87	ROBERTSON CR SWVI	BC	CDFO	25640	0588	900326	58	4 N	151	52 W	480	1300		M	TRAWL	CHINOOK
025329	87	ROBERTSON CR SWVI	BC	CDFO	25951	0588	900313	58	3 N	153	31 W	540	1650		F	TRAWL	CHINOOK
025503	87	CONUMA ESTUARY	BC	CDFO	31410	0588	900420	55	1 N	160	21 W	490	1400		F	TRAWL	CHINOOK
025542R3	87	CHILLIWACK R LW FK	BC	CDFO	49911	0688	900509	45	46 N	124	12 W	600	2600		M	TRAWL	CHINOOK
042612	86	MONTANA CR 111-50	AK	ADFG	28681	0588	900326	58	4 N	151	52 W	560	2100		M	TRAWL	CHINOOK
042761	85	SITKA SOUND 113-41	AK	SJ	10004	0587	901022	56	28 N	155	35 W	800	6800		F	TRAWL	CHINOOK
043149R1	87	NEETS BAY	AK	SSRA	21460	0489	901022	58	19 N	150	59 W	590	3000		M	TRAWL	CHINOOK
052013	88	SPRING CR	WA	FWS	48276	0389	900505	47	43 N	124	55 W	410	750		M	TRAWL	CHINOOK
052015	88	SPRING CR	WA	FWS	48798	0389	900507	45	45 N	124	13 W	460	1000		M	TRAWL	CHINOOK
052032	88	SPRING CR	WA	FWS	24540	0489	900528	46	42 N	124	33 W	450	1000		F	TRAWL	CHINOOK
062808	88	BLUFF CR	CA	CDFG	17766	1089	900610	40	46 N	124	27 W	390	650		M	TRAWL	CHINOOK
063101	87	RYDE-KOKET	CA	CDFG	52741	0588	900507	45	43 N	124	11 W	550	1800		F	TRAWL	CHINOOK
063101	87	RYDE-KOKET	CA	CDFG	52741	0588	900507	45	51 N	124	16 W	560	1950		M	TRAWL	CHINOOK
065207	87	MILL CR	CA	HVT	17564	1288	900405	39	13 N	123	51 W	500	1600	1	M	TRAWL	CHINOOK
065409	87	BENECIA	CA	CDFG	46829	0688	900408	39	2 N	123	55 W	110	270		M	TRAWL	CHINOOK
065414	88	NIMBUS FISH HATCHERY	CA	CDFG	49848	0689	900508	43	4 N	124	44 W	410	750		M	TRAWL	CHINOOK
065623	85	TRINITY R	CA	CDFG	196249	0686	900608	43	45 N	124	38 W	780	6100		M	TRAWL	CHINOOK
065627	86	TRINITY R	CA	CDFG	100320	0987	900521	46	20 N	124	22 W	800	6240	10	M	TRAWL	CHINOOK
065631	87	AMBROSE PONDS	CA	CDFG	92300	1088	900604	44	9 N	124	29 W	430	1000		F	TRAWL	CHINOOK
065631	87	AMBROSE PONDS	CA	CDFG	92300	1088	900610	40	46 N	124	27 W	480	1500		F	TRAWL	CHINOOK
065631	87	AMBROSE PONDS	CA	CDFG	92300	1088	900611	40	52 N	124	25 W	550	1750			TRAWL	CHINOOK
065632	88	TRINITY R	CA	CDFG	97569	1089	900610	40	46 N	124	27 W	340	500		M	TRAWL	CHINOOK
065929	85	KLAMATH R, IRON GATE	CA	CDFG	95296	1186	900605	44	37 N	124	35 W	580	2350		M	TRAWL	CHINOOK
066147	87	SAWMILL PONDS	CA	CDFG	185718	0588	900610	40	46 N	124	27 W	480	1300		F	TRAWL	CHINOOK
066260	87	COURTLAND	CA	CDFG	51904	0688	900512	44	44 N	124	34 W	610	2700		F	TRAWL	CHINOOK
066332	86	KLAMATH R, IRON GATE	CA	CDFG	23770	1187	900603	44	5 N	124	23 W	770	6000		M	TRAWL	CHINOOK
072922	85	ELK R	OR	ODFW	24650	0986	900410	57	59 N	149	16 W	825	8600	50	F	TRAWL	CHINOOK
072922	85	ELK R	OR	ODFW	24650	0986	900614	43	21 N	124	40 W	810	7540	50	F	TRAWL	CHINOOK
073342	86	SALMON R	OR	ODFW	31811	0887	900426	55	22 N	155	59 W	750	5600	60	F	TRAWL	CHINOOK
073459	86	BIG CR	OR	ODFW	10880	1087	900506	45	34 N	124	25 W	585	2550		F	TRAWL	CHINOOK
073462	86	BIG CR	OR	ODFW	10493	1087	900529	40	46 N	124	29 W	810	7400		F	TRAWL	CHINOOK
073501	86	BIG CR	OR	ODFW	10483	0887	900509	45	47 N	124	11 W	780	6200		F	TRAWL	CHINOOK
073504	86	BIG CR	OR	ODFW	10704	0887	900507	44	29 N	124	38 W	640	3100	1	F	TRAWL	CHINOOK
073542	85	FERRY CR	OR	ODFW	26741	0986	900715	58	24 N	148	30 W	810	7600	400	M	TRAWL	CHINOOK
073556	87	BIG CR	OR	ODFW	9730	0588	900529	44	3 N	124	20 W	650	3400		M	TRAWL	CHINOOK
073562	86	ELK R	OR	ODFW	23686	1087	900513	44	52 N	124	31 W	640	3000		F	TRAWL	CHINOOK
073562	86	ELK R	OR	ODFW	23686	1087	900529	46	1 N	124	19 W	670	4100	9	M	TRAWL	CHINOOK

073562	86	ELK R	OR	ODFW	23686	1087	900615	44	22	N	124	35	W	610	2900		F	TRAWL	CHINOOK
073635	85	TANNER CR	OR	ODFW	46852	1086	900315	57	17	N	154	52	W	760	7700		M	TRAWL	CHINOOK
073725	86	TRASK R	OR	ODFW	12912	1087	900426	55	22	N	155	59	W	680	3950	25	F	TRAWL	CHIN
073934	85	ELK R	OR	ODFW	13282	0986	900505	47	39	N	124	55	W	800	6800		F	TRAWL	CHIN
073938	85	ELK R	OR	ODFW	13475	0986	900428	55	22	N	156	5	W	700	4350	1	F	TRAWL	CHINOOK
074038	86	UMATILLA R	OR	ODFW	42068	0388	900507	45	51	N	124	14	W	700	4100		F	TRAWL	CHINOOK
074057	86	ROGUE R	OR	ODFW	27449	0987	900514	41	4	N	124	23	W	800	7400	500	F	TRAWL	CHINOOK
074136	87	BIG CR	OR	ODFW	9433	1088	900507	45	51	N	124	11	W	490	1400		M	TRAWL	CHINOOK
074136	87	BIG CR	OR	ODFW	9433	1088	900512	44	49	N	124	49	W	520	1850		F	TRAWL	CHINOOK
074136	87	BIG CR	OR	ODFW	9433	1088	900513	44	54	N	124	28	W	540	1930	10	F	TRAWL	CHINOOK
074138	87	BIG CR	OR	ODFW	9244	0488	900507	44	31	N	124	40	W	510	1850		M	TRAWL	CHINOOK
074138	87	BIG CR	OR	ODFW	9244	1088	900603	44	6	N	124	26	W	410	940		M	TRAWL	CHINOOK
074139	87	BIG CR	OR	ODFW	9225	1088	900513	44	54	N	124	27	W	500	1600		M	TRAWL	CHINOOK
074139	87	BIG CR	OR	ODFW	9225	1088	900607	44	39	N	124	34	W	560	2300	2	M	TRAWL	CHINOOK
074140	87	BIG CR	OR	ODFW	9046	1088	900507	45	43	N	124	11	W	610	2200		M	TRAWL	CHINOOK
074141	87	BIG CR	OR	ODFW	10350	0888	900611	43	23	N	124	35	W	570	2850		F	TRAWL	CHINOOK
074142	87	BIG CR	OR	ODFW	10088	0888	900506	45	52	N	124	16	W	600	2500		M	TRAWL	CHINOOK
074143	87	BIG CR	OR	ODFW	10052	0888	900607	44	47	N	124	29	W	610	3000		M	TRAWL	CHINOOK
074143	87	BIG CR	OR	ODFW	10052	0888	900615	43	19	N	124	32	W	610	2900		F	TRAWL	CHINOOK
074143	87	BIG CR	OR	ODFW	10052	0888	900615	43	19	N	124	32	W	610	2900		M	TRAWL	CHINOOK
074144	87	BIG CR	OR	ODFW	10143	0888	900511	44	59	N	124	23	W	560	2180		F	TRAWL	CHINOOK
074144	87	BIG CR	OR	ODFW	10143	0888	900530	43	53	N	124	34	W	530	1920	20	F	TRAWL	CHINOOK
074145	87	BIG CR	OR	ODFW	9982	0888	900611	43	23	N	124	35	W	710	5400		M	TRAWL	CHINOOK
074163	88	BIG CR	OR	ODFW	10779	0889	900605	44	15	N	124	30	W	390	750		M	TRAWL	CHINOOK
074202	88	BIG CR	OR	ODFW	10808	0889	900611	43	26	N	124	36	W	450	1110		M	TRAWL	CHINOOK
074206	88	BIG CR	OR	ODFW	9635	0889	900619	45	19	N	124	10	W	420	1100	1	M	TRAWL	CHINOOK
074230	88	COLE R	OR	ODFW	9770	0989	900611	43	30	N	124	33	W	420	1000		F	TRAWL	CHINOOK
074245	87	KLASKANINE R, S FK	OR	ODFW	26481	0888	900419	44	36	N	124	39	W	520	1900			TRAWL	CHINOOK
074245	87	KLASKANINE R, S FK	OR	ODFW	26481	0888	900512	44	47	N	124	31	W	580	3200		M	TRAWL	CHINOOK
074245	87	KLASKANINE R, S FK	OR	ODFW	26481	0888	900512	44	50	N	124	34	W	560	2100		F	TRAWL	CHINOOK
074245	87	KLASKANINE R, S FK	OR	ODFW	26481	0888	900513	45	24	N	124	10	W	790	5700		F	TRAWL	CHINOOK
074245	87	KLASKAMINE R, S FK	OR	ODFW	26481	0888	900513	44	53	N	124	25	W	530	2050		M	TRAWL	CHINOOK
074245	87	KLASKANINE R, S FK	OR	ODFW	26481	0888	900527	42	39	N	124	34	W	570	2250		F	TRAWL	CHINOOK
074245	87	KLASKANINE R, S FK	OR	ODFW	26481	0888	900615	43	19	N	124	36	W	600	3350		F	TRAWL	CHINOOK
074245	87	KLASKANINE R, S FK	OR	ODFW	26481	0888	900615	43	22	N	124	39	W	620	3100	5	M	TRAWL	CHI
074333	87	ROCK CR	OR	ODFW	25027	0389	900419	44	41	N	124	38	W	490	1400		M	TRAWL	CHIN
074333	87	ROCK CR	OR	ODFW	25027	0389	900507	45	53	N	124	13	W	510	1400		M	TRAWL	CHINOOK
074333	87	ROCK CR	OR	ODFW	25027	0389	900611	43	27	N	124	32	W	510	1650		M	TRAWL	CHINOOK
074417	87	CHETCO R	OR	ODFW	26957	0988	900507	44	29	N	124	39	W	540	1700	1	M	TRAWL	CHINOOK
074417	87	CHETCO R	OR	ODFW	26957	0988	900513	44	48	N	124	31	W	480	1350	3	M	TRAWL	CHINOOK
074417	87	CHETCO R	OR	ODFW	26957	0988	900610	40	46	N	124	27	W	540	2000		F	TRAWL	CHINOOK
074417	87	CHETCO R	OR	ODFW	26957	0988	900614	41	5	N	124	23	W	540	1750		F	TRAWL	CHINOOK
074418	87	TRASK R	OR	ODFW	24066	0988	900507	45	46	N	124	11	W	530	2000		F	TRAWL	CHINOOK
074702R2	86	CHETCO R	OR	ODFW	25860	0887	900529	40	45	N	124	28	W	670	4800		M	TRAWL	CHINOOK
074711R2	86	CHETCO R	OR	ODFW	24241	0887	900531	45	52	N	124	37	W	620	2600		M	TRAWL	CHINOOK
074838	88	COQUILLE R	OR	ODFW	26442	0989	900610	40	46	N	124	27	W	420	1000		M	TRAWL	CHINOOK
075001R1	86	SANTIAM R, S FK	OR	ODFW	25600	0388	900219	57	49	N	154	5	W	580	2800	1	F	TRAWL	CHINOOK
075031R3	87	WILLAMETTE R MID FK	OR	ODFW	32420	1088	900304	58	4	N	150	42	W	580	2600		M	TRAWL	CHINOOK
075031R3	87	WILLAMETTE R M FK-1	OR	ODFW	32420	1088	901023	56	22	N	155	44	W	690	5100		M	TRAWL	CHINOOK
075041R2	87	SANTIAM R, S FK	OR	ODFW	24640	1188	901022	56	28	N	155	35	W	670	4800		M	TRAWL	CHINOOK
075042R1	87	WILLAMETTE R	OR	ODFW	251778	1188	900507	45	42	N	124	13	W	550	2300		F	TRAWL	CHINOOK
211904R2	85	COOK CR	WA	QDNR	201209	0786	900410	57	59	N	149	16	W	750	5800		M	TRAWL	CHINOOK
211904R4	85	COOK CR	WA	QDNR	201209	0786	900410	57	59	N	149	16	W	730	4800	25	F	TRAWL	CHINOOK
211962R4	86	KALAMA CR	WA	NISQ	194459	0687	900504	47	40	N	124	59	W	740	4500		M	TRAWL	CHINOOK
231942	85	COL. R BELOW BNVILLE	WA	NMFS	9887	0886	905014	44	57	N	124	27	W	950	9500		M	TRAWL	CHINOOK
231960	86	COL. R BELOW BNVILLE	WA	NMFS	9146	0687	900315	57	8	N	154	52	W	680	6300		M	TRAWL	CHINOOK
232139	86	BONNEVILLE	WA	NMFS	17803	0787	900122	57	1	N	152	23	W	770	6500		F	TRAWL	CHINOOK
232209	86	BONNEVILLE	WA	NMFS	18711	0787	900518	46	58	N	124	35	W	780	5800		F	TRAWL	CHINOOK
311759	87	MONTANA CR 247-41	AK	ADFG	21588	0788	901023	56	22	N	155	44	W	510	2000		F	TRAWL	CHINOOK
311760	88	DECEPTION CR	AK	ADFG	19851	0589	901022	56	28	N	155	35	W	440	1100		F	TRAWL	CHINOOK
311805	87	CROOKED CR 244-30	AK	ADFG	25502	0688	901107	52	20	N	172	44	W	590	4720		F	TRAWL	CHINOOK
311820	88	CROOKED CR	AK	ADFG	25371	0689	901023	56	22	N	155	44	W	350	1200		F	TRAWL	CHINOOK
603908	86	YAQUINA BAY	OR	OAF	22967	0987	900618	43	1	N	124	47	W	650	3750		M	TRAWL	CHI
603923	87	SOUTH BEACH	OR	OAF	14841	0788	900506	45	58	N	124	19	W	550	2100		F	TRAWL	CHINOOK
603958	88	SOUTH BEACH	OR	OAF	19630	0889	900605	44	15	N	124	30	W	420	1000		F	TRAWL	CHINOOK
604001	88	SOUTH BEACH	OR	OAF	22424	0989	900529	44	3	N	124	20	W	240	600		F	TRAWL	CHINOOK
604003	88	SOUTH BEACH	OR	OAF	24723	0989	900603	44	5	N	124	25	W	620	4200		F	TRAWL	CHINOOK
604003	88	SOUTH BEACH	OR	OAF	24723	0989	900616	43	13	N	124	38	W	440	1220		F	TRAWL	CHINOOK
604004	88	SOUTH BEACH	OR	OAF	23209	0989	900513	45	24	N	124	10	W	390	830		M	TRAWL	CHINOOK

604004	88	SOUTH BEACH	OR	OAF	23209	0989	900513	45	27	N	124	13	W	390	800		M	TRAWL	CHINOOK
632842	85	STEVENS CR	WA	WDF	133358	0786	900410	57	59	N	149	16	W	920	11200		M	TRAWL	CHINOOK
632842	85	STEVENS CR	WA	WDF	133358	0786	900425	55	22	N	155	59	W	790	6400		F	TRAWL	CHINOOK
632842	85	STEVENS CR	WA	WDF	133358	0786	900425	55	21	N	155	57	W	760	6100	1	F	TRAWL	CHINOOK
633230	84	STEVENS CR	WA	WDF	58133	0685	900410	57	59	N	149	16	W	1010	16200		M	TRAWL	CHINOOK
633322	86	SOLEDUCK R	WA	WDF	66759	0588	900505	47	39	N	124	55	W	560	3300		F	TRAWL	CHINOOK
633322	86	SOLEDUCK R	WA	WDF	66759	0588	900505	47	36	N	124	53	W	660	3800		F	TRAWL	CHINOOK
633322	86	SOLEDUCK R	WA	WDF	66759	0588	900529	45	57	N	124	19	W	620	2750	20	F	TRAWL	CHINOOK
634125R3	86	FORK CR	WA	WDF	211092	0587	901021	56	27	N	155	35	W	700	4600		F	TRAWL	CHINOOK
634161R2	86	COWLITZ R	WA	WDF	1864	0687	900507	45	45	N	124	13	W	640	3200		F	TRAWL	CHINOOK
634161R2	86	COWLITZ R	WA	WDF	1864	0687	900510	45	50	N	124	11	W	650	3600		F	TRAWL	CHINOOK
634204R1	87	COWLITZ R	WA	WDF	147638	0489	900507	45	48	N	124	12	W	490	1750		M	TRAWL	CHINOOK
634204R1	87	COWLITZ R	WA	WDF	147638	0489	900518	46	45	N	124	26	W	500	1900		M	TRAWL	CHINOOK
634204R2	87	COWLITZ R	WA	WDF	147638	0489	900506	45	59	N	124	18	W	440	1000		M	TRAWL	CHINOOK
634204R2	87	COWLITZ R	WA	WDF	147638	0489	900507	45	59	N	124	18	W	480	1450		M	TRAWL	CHINOOK
634259R2	86	SNAKE R	WA	WDF	126076	0687	900505	47	39	N	124	54	W	670	3700		F	TRAWL	CHINOOK
634402R6	86	COLUMBIA R	WA	WDF	59849	0488	900507	45	45	N	124	13	W	630	3450		M	TRAWL	CHINOOK
634750R4	87	SNAKE R	WA	WDF	59608	0489	900507	45	46	N	124	11	W	470	1200		F	TRAWL	CHINOOK
634750R4	87	SNAKE R	WA	WDF	59608	0489	900511	44	50	N	124	33	W	450	1200		M	TRAWL	CHINOOK
634750R4	87	SNAKE R	WA	WDF	59608	0489	900526	46	24	N	124	31	W	570	2700		F	TRAWL	CHINOOK
634755R4	87	SNAKE R	WA	WDF	59609	0489	900518	46	5	N	124	18	W	460	1230		F	TRAWL	CHINOOK
634755R6	87	SNAKE R	WA	WDF	59609	0489	900522	46	21	N	124	23	W	500	1400	4	F	TRAWL	CHINOOK
B61403	87	COURTLAND	CA	CDFG	55861	0588	900513	44	48	N	124	31	W	620	2750	5	M	TRAWL	CHINOOK
B61501	86	REDWOOD CR	CA	CDFG	21298	0587	900513	40	45	N	124	34	W	640	3400	250	F	TRAWL	CHINOOK
B61502	86	REDWOOD CR	CA	CDFG	25847	0587	900608	43	40	N	124	35	W	750	5900		F	TRAWL	CHINOOK
024616	86	PUNTLEDGE R	BC	CDFO	14835	0587	900908	55	0	N	165	39	W	610	2600		M	TRAWL	CHUM
630152R1	87	BIG SOOS CR	WA	WDF	37021	0489	900504	47	58	N	125	18	W	530	1600		M	TRAWL	COHO
051851	87	CLEARWATER R, N FK	ID	FWS	19873	0588	900802	44	08	N	158	06	W	850		15	M	SQDGILL	STEELHEAD
051851	87	CLEARWATER R, N FK	ID	FWS	19873	0588	900811	45	46	N	152	6	W	940	6130			SQDGILL	STEELHEAD
051853	87	CLEARWATER R, N FK	ID	FWS	18835	0588	900616	43	33	N	175	40	E	720	3600	3	M	RESLLINE	STEELHEAD
051945	88	CLEARWATER R, N FK	ID	FWS	20339	0589	900811	45	46	N	152	6	W	640	2750			SQDGILL	STEELHEAD
052043	88	CLEARWATER R, N FK	ID	FWS	20497	0589	900716	47	30	N	170	0	E	580	1740	3	M	RESGILL	STEELHEAD
052043	88	CLEARWATER R, N FK	ID	FWS	20497	0589	900816	45	36	N	160	14	W	670	4000		M	SQDGILL	STEELHEAD
122318	87	ROBERTSON CR	BC	BCFW	24536	0488	900711	55	54	N	142	4	W	658	2900	60	F	RESGILL	STEELHEAD
122319	87	ROBERTSON CR	BC	BCFW	24536	0488	900706	53	4	N	152	0	W	590	2200	20	M	RESGILL	STEELHEAD
212519R3	87	QUINAULT R	WA	QDNR	25396	0488	900614	44	29	N	175	29	E	758	4700	9	M	RESLLINE	STEELHEAD

RELEASE DATA WERE OBTAINED FROM PACIFIC MARINE FISHERIES COMMISSION REGIONAL MARK PROCESSING CENTER.
SEE TABLE 1 FOR TAGGING AGENCIES.