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1995 MARK MEETING

Final Minutes

Columbia River Red Lion Hotel,
Portland, Oregon

February 16, 1995

1. General Business Items

A. Welcome/Introductions

The 1995 Mark Meeting was convened at 8:30 AM, February 16th at the Columbia River Red Lion Hotel in Portland, Oregon. Mark Committee members and other meeting participants were introduced at the start of the meeting (see **Attachment 1**). Gregg Mauser was welcomed as the new tag coordinator for Idaho. Vic Palermo (CDFO) and Jerry Harmon (NMFS-Columbia River) were unable to attend and were represented by Richard Bailey and Ken McIntyre, respectively. Bryan Ludwig (BC Environment) likewise was not able to attend but did not have an alternate representative.

B. 1996 Meeting Site and Date

It was agreed that the 1996 Mark Meeting will be held in San Francisco, California. on February 15th (the 3rd Thursday). The meeting will start at 1:00 PM on the 15th and continue on Friday, the 16th.

Note: The two day meeting format resulted from informal discussions with several Mark Committee members after the Mark Meeting. Based on those discussions, the meeting will start at 1:00 PM on Thursday and then continue as long as necessary on Friday. The agendas for the last five or more Mark Meetings have all been jammed full, resulting in limited discussion of some issues in the interest of time. Therefore, this scheduling for the 1996 meeting will provide an extra half day of meeting time while still requiring only one night's lodging since most participants can arrive during the morning of February 15th. It will also allow PSMFC to sponor a no-host reception on Thursday evening to provide an opportunity for valuable informal discussions between meeting participants.

2. Status of CWT Data Files and Reporting Backlogs

As is done each year, the status of the CWT data files was reviewed (**Tables 1-4; updated 3/25/95**). Particular attention was focused on remaining "holes" in the data and agency plans to report the missing data. The status of the 1994 preliminary recovery data was also highlighted.

A. CWT Release Data

All of the release data through 1993 and nearly all of the 1994 data (**Table 1**) are now available in PSC format. The 1990 CWT Release Report (published in July, 1991) provides a cumulative report of all releases through 1990. The 1993 Release Report (June, 1994) lists all releases for 1986 through 1993, plus many of the early 1994 releases. Subsequent release reports will follow this latter pattern and only report releases for the last seven years. Users who need older release data can either retrieve it from the on-line data base or from the cumulative 1990 CWT Release Report.

B. Unmarked Hatchery Production Releases

Additional progress was seen in reporting unmarked hatchery production releases (**Table 2**). Only CDFG, ADFG, and ODFW (1975-1981) have not completed this task. Karen Crandall reported that ADFG has requested funding through the Pacific Salmon Commission in the past to accomplish this task but no funds have ever been received. CDFG has no plans for submitting its unmarked hatchery production data in the near future. ODFW is not currently working on its missing data set.

C. Recovery Data

Nearly all historical recovery data are now reported in PSC format (**Table 3**), including preliminary 1994 data for the major recovery agencies. Changes include revisions to various sets of data by CDFO, WDFW, and NWIFC.

NMFS-AK's recent progress was noteworthy as all recoveries (including high seas data) for 1980-1990 are now reported. Ron Heintz reported that the 1991-1992 data were within a few weeks of being completed, and the 1993 data should be done by April.

Other pre-1994 recovery data sets not yet reported in PSC format include CDFG 1977, ADFG 1977-79, IDFG 1992, NIFC 1993, and WDFW's steelhead data for Columbia River tributaries and Puget Sound. Karen Crandall reported that no significant progress has been made on ADFG's 1977-79 files because of the lack of both staff time and funding. Ron Olson projected that NIFC's 1993 data would be reported this spring, and the preliminary 1994 data during the summer. Gregg Mauser reported that work was continuing on completing Idaho's 1992 data, and also correcting minor errors discovered when the 1993-1994 data were recently reported.

D. Catch/Sample Data

The catch/sample data sets (**Table 4**) show a somewhat similar agency pattern to that of the recovery data sets. Missing data sets include CDFG 1977, WDFW 1973-1977, and ADFG 1977-79. WDFW is working back through the older data sets and expects to report the 1973-1979 data. There were no catch/sample data sets collected for Idaho and NMFS-AK.

3. Status of RMPC Operations

Jim Longwill provided a status report on the Mark Center's operations during 1994.

A. Enhancements of the Regional Mark Information System (RMIS)

Work continued in 1994 on the enhancement of the Regional Mark Information System (RMIS). Some of the new features of RMIS include:

- Ability to automatically build lists of tag codes from the release data, edit the lists, and then use them to retrieve coastwide tag recoveries.
- Ability to select hatcheries and recovery sites by simply entering the geographic location name rather than the code.
- Much faster file downloading speeds.
- User customizable report formats.
- Access to catch/sample data, and some non-CWT release data.
- Ability to upload PSC formatted files electronically via either "Kermit" file-transfer or via "FTP" (File Transfer Protocol) using the Internet.

Further RMIS enhancements are underway. These include file compression prior to downloading to further improve file transfer times, data selection by geographic regions and basins, improved documentation for users, and connection to Internet (see Section C below).

B. Basin and Region Coding Schemes

Further work was completed on establishing regionally agreed upon coding for regions . The coding for basins, however, has proved elusive because there is no single coding that can meet all of the expectations of the various agencies. In addition, PSC's two Technical Committees (Chinook, Coho) each use somewhat different geographic groupings for analyzing CWT data. Once a basin coding scheme is chosen, it will greatly enhance online data retrieval for CWT recovery by area rather than by tagcode.

TABLE 1. Status of CWT Release Data

Reporting Agency 03/25/95

Year	CDFG	ODFW	WDFW	IDFG	CDFO	ADFG	FWS	NMFS (AK)	NMFS (CR)	NIFC	QDNR	MIC
Pre-1976	V	V	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	
1978	V	V	V	V	V	V	V	V	V	V	V	
1979	V	V	V	V	V	V	V	V	V	V	V	
1980	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
1982	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
1984	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
1986	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
1988	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
1990	V	V	V	V	V	V	V	V	V	V	V	V
1991	V	V	V	V	V	V	V	V	V	V	V	V
1992	V	V	V	V	V	V	V	V	V	V	V	V
1993	V	V	V	V	V	V	V	V	V	V	V	V
1994	V	V	V	V	V	V	V	V	V	V	V	V

(S = Submitted; I = Incomplete but Validated Data; V = Validated)

CDFG	=	California Department of Fish and Game
ODFW	=	Oregon Department of Fish and Wildlife
WDFW	=	Washington Department of Fish and 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
NIFC	=	Northwest Indian Fisheries Commission
QDNR	=	Quinault Department of Natural Resources
MIC	=	Metlakata Indian Community - Alaska

TABLE 2. Status of Unmarked Hatchery Production Releases

Reporting Agency 03/25/95

Year	CDFG	ODFW	WDFW	IDFG	CDFO	ADFG	FWS	NIFC	QDNR	MIC
1965-72			V		V		V			
1973			V		V		V		V	
1974			V		V		V	V	V	
1975	-	-	V		V	-	V	V	V	
1976	-	-	V	V	V	-	V	V	V	
1977	-	-	V	V	V	-	V	V	V	
1978	-	-	V	V	V	-	V	V	V	
1979	-	-	V	V	V	-	V	V	V	
1980	-	-	V	V	V	-	V	V	V	
1981	-	-	V	V	V	-	V	V	V	V
1982	-	V	V	V	V	-	V	V	V	V
1983	-	V	V	V	V	-	V	V	V	V
1984	-	V	V	V	V	-	V	V	V	V
1985	-	V	V	V	V	-	V	V	V	V
1986	-	V	V	V	V	-	V	V	V	V
1987	-	V	V	V	V	-	V	V	V	V
1988	-	V	V	V	V	-	V	V	V	V
1989	-	V	V	V	V	-	V	V	V	V
1990	-	V	V	V	V	-	V	V	V	V
1991	-	V	V	V	V	-	V	V	V	V
1992	-	V	V	V	V	-	V	V	V	V
1993	-	V	V	V	V	-	V	V	V	V
1994	-	V	V	V	V	-	V	V	V	V

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

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

TABLE 3. Status of CWT Recovery Data

Reporting Agency 03/25/95

Year	CDFG	ODFW	WDFW	IDFG	CDFO	ADFG	FWS	NMFS (AK)	NIFC	QDNR	MIC
1973			V		V						
1974			V		V						
1975			V		V				V		
1976			V		V				V	V	
1977	-	V	V	V	V	-			V	V	
1978	V	V	V	V	V	-			V	V	
1979	V	V	V	V	V	-	V		V	V	
1980	V	V	V	V	V	V	V	V	V	V	
1981	V	V	V	V	V	V	V	V	V	V	I
1982	V	V	V	V	V	V	V	V	V	V	I
1983	V	V	V	V	V	V	V	V	V	V	I
1984	V	V	V	V	V	V	V	V	V	V	I
1985	V	V	V	V	V	V	V	V	V	V	I
1986	V	V	V	V	V	V	V	V	V	V	I
1987	V	V	V	V	V	V	V	V	V	V	I
1988	V	V	V	V	V	V	V	V	V	V	I
1989	V	V	V	V	V	V	V	V	V	V	I
1990	V	V	V	V	V	V	V	V	V	V	I
1991	V	V	V	V	V	V	V	-	V	V	I
1992	V	V	V	-	V	V	V	-	V	V	I
1993	V	V	V	E	V	V	V	-	-	V	I
1994	I	I	I	E	I	I	S	-	-	-	I

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

Incomplete Data Sets:

1) WDFW's salmon and steelhead recoveries in the main stem Columbia River are reported through ODFW. However, steelhead 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 4. Status of CWT Catch/Sample Data

Reporting Agency 03/25/95

Year	CDFG	ODFW	WDFW	CDFO	ADFG	FWS	NIFC	QDNR	MIC
1973			-						
1974			-						
1975			-	V			V		
1976			-	V			V	V	
1977	-	V	-	V	-		V	V	
1978	V	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	V	V	V	V	V	
1982	V	V	V	V	V	V	V	V	I
1983	V	V	V	V	V	V	V	V	I
1984	V	V	V	V	V	V	V	V	I
1985	V	V	V	V	V	V	V	V	I
1986	V	V	V	V	V	V	V	V	I
1987	V	V	V	V	V	V	V	V	I
1988	V	V	V	V	V	V	V	V	I
1989	V	V	V	V	V	V	V	V	I
1990	V	V	V	V	V	V	V	V	I
1991	V	V	V	V	V	V	V	V	I
1992	V	V	V	V	V	V	V	V	I
1993	V	V	V	V	V	V	-	V	I
1994	I	I	I	I	I	S	-	-	-

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

Note: IDFG and NMFS (AK) do not have catch/sample data to report.

C. Internet Connection

PSMFC is now connected to the Internet as a dedicated full capacity node in order to take full advantage of electronic data transfers at high speeds using a T-1 line. This resource will gain in value as more and more agencies acquire the ability to access InterNet.

Preliminary programming work has been done to provide users with access to high speed file transferring through RMIS's menu system. Users having access to Internet can now pull down large data files and reports using a FTP (file transfer protocol) download option on the menu. Preliminary tests have been very positive in terms of significantly higher data transfer speeds and corresponding reduced phone connect charges for users. Other features include:

1) Anonymous-FTP service to other agencies and to the public. The anonymous-FTP address is: **psmfc.gov**.
2) The user account FTP address is **rmpc0.psmfc.gov**.
3) E-mail communication with RMIS administrators. Ken Johnson's address is **johnsonk@psmfc.gov**. James R Longwill's address is **jamesr@psmfc.gov**.
4) World-Wide-Web service is currently under development. The WWW address will be announced soon for use with the Mosaic network browsing system.

D. New X-Terminal Environment

The Mark Center now has an X-terminal environment for data management purposes. It provides a direct connection to the SUN minicomputer and access to the powerful software "Frame" for publishing documents. The X-terminal, in effect, provides an integrated graphic user interface for Unix systems. It is anticipated that the next version of the RMIS Users' Guide will be prepared using "Frame" instead of the more standard Microsoft "Word" software because of its enhanced features.

4. Request to Mass Mark Snake River Chinook with the Adipose-only Clip

IDFG and USFWS again requested permission to mark a major portion of their Snake River hatchery spring and summer chinook (1994 brood) with the adipose only mark in the spring of 1995 (release in 1996). ODFW did not request to mass mark any of its Snake River chinook stocks this year because of low production. Current plans are to mark all of the hatchery production with a CWT. However, Charlie Corrarino emphasized that ODFW wanted to keep the option open in the event that plans must be changed.

Details of IDFG's mass marking project were similar to that approved for 1993 and 1994 (**Attachment 2**), with the exception that the number of fish to be marked was sharply down from 1994 because of reduced numbers available. A total of 1.2 million chinook (689,000 spring chinook, 515,000 summer chinook) are to be marked in 1995, as compared to 3.5 million in 1994. Of these, only 685,000 are to receive the Ad only mark, while 205,000 and 24,000 will receive the LV and RV marks, respectively. The remaining 290,000 fish will be given the Ad+CWT (240,000) or LV+CWT (50,000) marks.

USFWS's 1995 stock identification plans for Kooskia NFH call for marking 185,000 chinook with the adipose only mark, 50,000 with the LV mark, and 60,000 with a CWT only. All of the production at Dworshak NFH will be marked with the Ad+CWT, with minimum numbers estimated at 100,000 fish.

Several questions were raised as to why IDFG planned to use ventral marks, given the higher associated marking mortality shown for ventral marks and the ESA status of some of the stocks. In response, Gregg Mauser noted that Idaho had need for both hatchery vs wild/natural separation (using the adipose mark) and for hatchery broodstock identification (using ventral marks). Lee Blankenship recommended that Idaho consider using elastomer tags as an alternative to the ventral marks, similar to that being done in the lower Snake River by WDFW with much success.

Marianne Johnson (CRITFC) noted that the Mark Committee was supposed to get a copy of any new marking proposal 30 days in advance of the Mark Meeting but IDFG's full information (**Attachment 2**) wasn't made available until during the meeting. Ken Johnson agreed with her comment but noted that the request for the information had been made to Idaho well in advance of the Mark Meeting. However, Gregg Mauser was subsequently assigned as Idaho's new mark coordinator and he did not learn of the assignment in time to complete the task before the Mark Meeting. While it was true that the specific details were late, the general objectives were essentially the same as those reviewed and approved for 1993 and 1994. In addition, Idaho's general plans were announced well in advance of the Mark Meeting via the preliminary agenda.

Following additional discussion, it was agreed that a formal vote would be taken on the IDFG/USFWS proposals. **The proposal passed by a nine 'yes' to two 'no' vote**. CDFO and CRITFC cast the 'no' votes. BC Environment was not present for the vote. NWIFC voted yes, but stressed that the yes vote was with the expectation that Idaho would continue to follow the guidelines agreed upon for the last two years:

a) include Ad+CWT groups in all marked releases;
b) support other studies on alternate mass marking methods;
c) limit the marking to the specified hatcheries; and
d) the program would be reviewed annually by the Mark Committee.

5. Pending Legislation for Mass Marking

A brief report was given on the status of state and federal legislative initiatives on mass marking of west coast hatchery salmon by Glen Spain, Regional Director, Pacific Coast Federation of Fishermen Association (PCFFA). Details are provided in **Attachment 3**. He stressed that PCFFA does not have an official position on mass marking and selective fisheries. However, the staff recommendation is to support selective fisheries as it presents an obvious way around the restrictions imposed by ESA and other Magnuson Act restrictions.

A. California

California does not have any current legislative bills, and no new movement is expected this year. CDFG probably has the legal authority to carry out mass marking, but there are no extra funds to do so. In addition, there is no agency policy to move forward on mass marking at this time.

B. Oregon

Oregon had two bills and two resolutions on mass marking in the 1993 Legislative Session. Only the two resolutions (House Joint Resolution 35 and House Joint Memorial 11) were passed (See **Attachment 3** for the full texts). House Joint Resolution 35 requested the Governor to encourage cooperation regionwide in marking all hatchery salmon, steelhead, and trout with the adipose clip. In addition, ODFW was instructed to move forward as rapidly as possible to mass mark all hatchery produced salmonids released into state waters, and to report back to the 1995 Legislature on progress in developing a mass marking plan. In effect, this resolution established mass marking as Oregon state policy.

House Joint Memorial 11 urged a region-wide cooperative effort to establish a mass marking program. The resolution also called for full support and cooperation from PSMFC and the Regional Mark Committee in desequestering the adipose clip for use as a mass mark for hatchery salmonids.

The resolutions are not statutory laws but are statements of legislative policy that are binding on the agencies as policy statements.

While Oregon appears now to have the necessary legal authority to progress with a mass marking program, a new proposed bill also has been drafted for the 68th Legislative Assembly. If passed, it will instruct ODFW to rapidly move towards a mass marking program for hatchery salmonids, and to manage fisheries to promote selective harvest of hatchery fish. Progress on the development of the marking plan is to be reported to the 69th Legislative Assembly.

C. Washington

Washington currently has two bills on mass marking. The lead bill (**Attachment 3**) is Senate Bill 5157 would create a state mass marking program for hatchery coho, with implementation starting with the 1994 brood, and full marking by June 30, 1997. (Note: WDFW has lobbied for beginning with the 1995 brood). The House version is House Bill 1482. *April 5 update:* both the House and Senate versions of the bill have been approved, and it is now in House Rules. Funding is expected to be approximately 1.5-2.0 million dollars.

As might be expected, the recreational community testified in support of the bill. The commercial industry, however, was divided and introduced both pro and con testimony. Major concerns of the industry include the potential for all harvest to be selective. Given the present trend towards closing hatcheries and/or decreasing hatchery production, it could lead to sharply curtailed harvest and major financial losses. Another concern is the potential for reallocation of resources away from the industry. The Tribes also testified and voiced concerns that the bill did not require coastwide consensus prior to marking, which could disrupt the current management system.

D. Federal Initiatives

On the federal level, during the last congressional session, Congressman Dan Hamburg (northern California 1st District) proposed a pilot salmon marking program for federal funding through various appropriations riders. This included a NOAA bill and a bill on California's Central Valley Project Restoration Fund.

Neither rider succeeded in having new funds allocated for mass marking issues. However, the Department of Commerce budget encouraged NOAA to "pursue new initiatives and management strategies to reverse the decline of the salmon stock while ensuring survival of the salmon fishery, and also "to support a pilot salmon marking program which would maximize the harvest of hatchery fish while relieving pressure on wild salmon stocks."

In addition, the Bureau of Reclamation was directed to prepare a report on the feasibility of undertaking a pilot salmon marking program in California. *April 5 update:* Per conversations with Ken Lentz, Chief of the Scientific Support Branch, Mid-Pacific Region (located in Sacramento), this Bureau of Reclamation report has now been completed and forwarded to Washington, D.C. It reportedly follows many of the recommendations of the Pacific Salmon Commission's report on selective fisheries and mass marking.

On a related front, the Northwest Emergency Assistance Program will possibly fund some research relative to mass marking issues. A two million dollar grant for the Data Collection Jobs Program portion of the Federal salmon disaster relief funds will be channeled through PSMFC this year. Several of the nine job tasks put out to bid involve studies on encounter rates, hooking mortality, and mass marking. (New gear development, for example, is necessary in order to reduce hooking mortality losses in selective fisheries.) A final decision on the tasks to be funded will be made on May 4, 1995.

In summary, Glen Spain argued that a regional mass marking program is not only legitimate but required for the west coast. The pressures on the commercial and recreational fisheries are now extreme. The role of the Regional Mark Committee is to control that change to ensure that the transition to a full regional mass marking program

and the concurrent desequestering of the adipose clip are consistent with the scientific needs and current research on maintaining the viability of the CWT system.

Questions and Comments:

Marianne Johnson (CRITFC) questioned how mass marking and selective fisheries might work with respective to ESA listings and the issue of incidental take. Bob Smith responded that NMFS is still working on this issue. However, NMFS has allowed incidental take in fisheries that exist now. On such, he argued that the issue was more likely a question of what level of incidental take would be allowed. It will have to be on a case by case basis, depending on the stocks involved.

Richard Bailey (CDFO) asked if the commercial fishing was actively pursuing new gear development to reduce hooking mortality losses. Glen Spain responded by noting that the existing hooking mortality studies are largely based on outdated gear (i.e. barbed hooks), and that new studies are necessary to analyze the effect of both barbless hooks and "mooching" now standard today. Some of these required studies will likely be funded by a portion of the two million dollars of disaster relief funds being channeled through PSMFC this year. In addition, the industry is taking an aggressive approach to reducing by-catch losses.

Ron Olson (NWIFC) commented that he agreed with many of Glen Spain's overview comments and disagreed with others. One area of strong agreement was on the need for regional coordination and agreement. He stressed that the benefits of selective fisheries can't be enjoyed while still maintaining the benefits of the CWT system unless all agencies (particularly all sampling agencies) are on board. Furthermore, implementation in a fragmented way (i.e. one agency opts to mass mark) would ruin the CWT system and with it, the ability to manage salmon. This would be both irresponsible and against both international treaty and regional marking agreements.

His main point of disagreement, however, was with the argued need to proceed with mass marking prior to completing the necessary analyses. He pointed out that there is interagency consensus that we need to complete the modeling on the effects of selective fisheries before committing to expensive mass marking programs. The PSC committee on the evaluation of selective fisheries did an outstanding job but didn't complete what they referred to as "Phase Three" of the analysis. Based on work presented by Richard Comstock (USFWS) and Pete Lawson (ODFW) in PSMFC's Workshop on Selective Fisheries (presented February 15th), this work could be completed in the near future. Their preliminary modeling results for Puget Sound coho revealed very limited increases in escapement at the cost of very large decreases in harvest, even when all hatcheries coastwide participated in the mass marking. He concluded that this final type of analysis should be done before committing to a very expensive and massive marking program.

Glen Spain responded that he definitely was not advocating leaping before looking. However, he argued that we already have a good deal of excellent science available today

that justifies a fairly aggressive regional mass marking program. In that process, one must design in checkpoints and new studies. Lastly, it must meet the very difficult challenge of adequate funding. He concluded by stressing that we can't afford to study the concept to death while we lose our fishing industry and many of the endangered stocks.

6. Proposed Endorsement of the Conclusions and Recommendations of the PSC Study on Selective Fisheries

Ron Olson (NWIFC) proposed that the Mark Committee endorse the PSC study's conclusions and recommendations on selective fisheries and mass marking (**Attachment 4**) that were presented during the previous day's workshop. In addition, he proposed that the Committee also endorse the recommended protocol developed for selective fishery proposals because of the obvious need for coastwide coordination. Copies of the draft protocol procedures (**Attachment 5**) were distributed to the Committee at that time.

It was noted, however, that the PSC committee's recommendations and conclusions on selective fisheries and recommended protocols for new selective fishery proposals were still in the draft stage. As such, it was premature to endorse them. This view was broadly supported and it was agreed that the Mark Committee would wait a few months until the report is final before commenting. A telephone conference will likely be convened to address this issue once the report is final and distributed.

7. Washington and Oregon Proposals to Mass Mark 1995 Brood Coho

Washington and Oregon presented separate proposals to mass mark the 1995 brood coho on a statewide basis. The fish would be marked with an adipose clip in 1996 for release in 1997, and taken in selective fisheries in 1998. Details of the Washington and Oregon proposals are provided in **Attachments 6 and 7**, respectively. The announcement at the Mark Meeting represented a formal notification of intent, consistent with regional recommendations that any selective fisheries proposals involve two years lead time.

A. Washington's Proposal

Lee Blankenship (WDFW) noted that Washington's proposal was sent out in late January, 1995 to ODFW, IDFG, CDFO, USFWS and NWIFC for review and comments. No lengthy analysis had yet been done on the proposal because of the desire to have a broad regional approach. Once other agencies sign on, an indepth cooperative study will then be carried out by all of the agencies involved.

The Washington proposal (**Attachment 6**) calls for hatchery produced coho from Puget Sound, coastal Washington, Columbia River, coastal Oregon, and British Columbia to be marked with the removal of the adipose fin. All marine and freshwater recreational fisheries in Washington would be regulated for selective harvest of the marked coho, starting with the 1998 harvest year.

Current WDFW production of yearling coho is approximately 36 million. Of these, 11.6 million are produced in Puget Sound, 6.8 million in coastal Washington, and 17.6 million in the Columbia Basin. Annual marking and sampling costs are estimated at $690,000 and $380,000, respectively, for a total cost of 1.07 million dollars. An additional 1.63 million dollars would be needed for equipment costs, based on the need for electronic sampling of tagged fish.

B. Oregon's Proposal

Don McIsaac (ODFW) advised the Mark Committee that Oregon is fully committed to marking all hatchery coho in the Oregon Production (OPI) area (Leadbetter Point, WA south to northern California) for a period of at least five years (**Attachment 7**). This plan is consistent with WDFW's proposal to mark all Washington state hatchery coho. ODFW also is committed to pursing this marking program in a manner principally consistent with the recommendations of the PSC Ad-hoc Committee on Selective Fisheries.

Regional coordination will be give top priority. To this end, ODFW will be meeting with all agencies involving in releasing coho in the OPI area, including WDFW, USFWS, and CDFG, plus the Clatsop Economic Development Council (Astoria) and the Port of Newport in Oregon. In addition, the marking program will be implemented in a way consistent with the Columbia River Fish Management Plan under "U.S. vs Oregon". Accordingly, ODFW will soon be contacting the Columbia River Treaty Tribes to initiate discussions of this proposal.

The estimated annual production of coho to be marked in Oregon is 16 million. This total includes the STEP programs. The annual costs are estimated at $503,00 for marking and $100,000 for sampling, for a total of $603,000. Equipment costs are estimated at $180,000 for marking and $388,000 for sampling (primarily electronic detection hardware), for a total of $568,000. The total cost for the first year would be 1.171 million dollars, with successive years significantly less expensive because of the 5-10 year life expectancy of the equipment.

C. Additional Letters of Support for the Washington Proposal:

USFWS and IDFG have forwarded letters regarding the Washington proposal.

USFWS acknowledged the intuitive appeal of selective harvest fisheries for hatchery stocks (**Attachment 8**) but stressed that there are also very high costs and logistic problems that must be first resolved satisfactorily before a program can be implemented. A careful analysis of the costs and benefits of the program is also necessary before making a final decision. In addition, the agencies must work with NMFS to clarify the legal implications of "taking" coho and other species listed under ESA.

With the above comments in mind, USFWS has expressed a willingness to join WDFW providing that an interagency team is formed and charged to:

a) Estimate and assess the expected benefits of selective fisheries; and
b) Explore funding options, including how the program will be funded, what programs will be impacts by fund transfers, and ultimately, if selective harvest fisheries will be adequately funded.

IDFG's letter expressed full support for selective harvest programs that allow the take of healthy stocks while protecting weak ones (**Attachment 9**). Some concern was expressed, however, that necessary changes in harvest management to adequately harvest hatchery coho stocks could eventually result in additional harvest of endangered chinook stocks. As such, Idaho urged that an adaptive management approach be taken to minimize any potential for adverse effects.

Questions and Comments:

Marianne Johnson (CRITFC) noted that selective fisheries on coho will definitely impact the Columbia River fisheries. Therefore, she questioned why this major new policy was not first discussed with the Tribes in the context of the Compact since it is also a co-management issue. Don McIsaac responded that Oregon was formally announcing its intentions at this time to keep within the recommended two year requirement. However, Oregon intended on pursuing this coordination with the Tribes in the very near future, and that implementation would be consistent with "U.S. vs Oregon".

Marianne Johnson followed with a second question noting the high cost of a mass marking program and asked whether or not this would mean reprogramming of existing funds into mass marking. Don McIsaac answered that ODFW was not in favor of curtailing production or re-prioritizing existing internal funding to pay for mass marking costs. Lee Blankenship added that habitat remains WDFW's highest priority. He also noted that the legislative bills include five million dollars for funding the program *(April 5 update: apparently now reduced to 1.5-2.0 million)*. However, he would not preclude the possibility of some hatchery production cuts.

As a third point, Marianne Johnson noted that the PSC analysis indicated that it would be impossible to identify incidental "morts" under a selective fisheries scenario. As such, it would be much harder to equitably allocate fish to the tribes because of this unknown source of mortality. She then asked if WDFW knew which tribal fisheries would be impacted. Lee Blankenship responded that the WDFW proposal was still very general in nature and did not address this question as it depended on the regional scale of the mass marking program. Therefore, once the participants are known, questions such as this will be addressed in great detail.

Ron Olson (NWIFC) added that there was a compounding effect on the CWT system as the regional extent of selective fisheries expands. On one hand, the larger the region involved in mass marking and selective fisheries, the greater the benefits of the program. However, as the regional scale expands, the impact on the CWT system also grows. As was pointed out in yesterday's workshop, the more selective fisheries there are, the more uncertainty there is in assigning incidental mortality. Therefore, he suggested, there must a point at which the loss in precision of recovery data results in the loss of the ability to use CWT data to assess wild stocks and manage fisheries. As such, he wished to issue a warning that one can't have both the current CWT system and total selective fisheries coastwide.

As a second point, Ron Olson stated that the Western Washington Tribes have no consensus position on mass marking and selective fisheries at this time. In general, the Tribes are not opposed. However, they are not promoting selective fisheries either. One reason for the neutrality at this time is that the Tribes have not seen any proposal with a cost benefit analysis. Likewise, the Tribes have not seen any analysis of impacts on tribal fisheries.

He also pointed out that it was clear that the marking program would be very expensive and the Tribes do not have any funds to mark their coho. In addition, the Tribes are not actively seeking funding for any proposed program. Major costs to the Tribes will be sampling hardware, while marking costs would be secondary. He also cautioned that it was unrealistic to assume all Tribes would mark their hatchery fish. This marking has been assumed in all of the modeling that has been done to date. He thought that the Tribes might need some convincing as to why they should mark their hatchery fish so that they would be caught by other user groups in mixed stock fisheries. Many of the tribal hatchery programs were initiated to support terminal fisheries, and most of these programs were needed because of decreased natural production from the associated rivers. He concluded his remarks by stating his appreciation to WDFW for their willingness to coordinate with the Tribes on their marking proposal.

Marianne Johnson asked if Washington expected to see a large increase in effort, and if there was an intent to increase the recreational take. Lee Blankenship replied that WDFW did expect to see an increase in effort, and that the policy focus is to increase the sport take of coho. He also stressed that there has been a recent paradigm shift in thinking since it is clear that the old methods simply aren't working to restore the coho and chinook runs. As the bottom line, WDFW is committed to restoration of the resource first.

Richard Bailey (CDFO) also commented on Canada's view of Washington's proposal to mass mark all coho in the region, including those in British Columbia. He said that CDFO's support was likely in some form but that it was still under internal review. He added that Tom Bird, head of CDFO's recreational fisheries division, is very supportive of selective fisheries.

8. Report on the PSC Workshop on Hatchery CWT Methodology

Norma Jean Sands (ADFG) reported on a productive three day PSC sponsored workshop on hatchery CWT methodology which was held in Seattle on January 10-12, 1995. Panel sessions were consecutive and included: 1) Mark and release estimation procedures (moderator: Gary Freitag, SSRAA); 2) Experimental design and data analysis (Rich Comstock, USFWS); 3) Adult sampling (Ron Olson, NWIFC); and 4) Utilizing and sharing hatchery data (Dick O'Connor, WDFW). The successful workshop was attended by 40-60 people each day, with approximately 100 people total from the entire west coast plus the Yukon Territory participating over the three days. Proceedings of the workshop will be later published by the Pacific Salmon Commission.

The last half of the third day consisted of four panel workshops with participation from both panel members and interested audience members. The objective was to continue the discussions and formulate summary statements, conclusions and recommendations. An excellent summary of these conclusions and recommendations of the four panels was prepared by Norma Jean Sands (see **Attachment 10**).

*A few of the key conclusions and recommendations of the workshop are repeated below. However, the reader is urged to refer to **Attachment 10** for all of the conclusions and recommendations of each panel.*

One common concern was that communications were very poor coastwide between the analytical users of CWT data and those responsible for hatchery operations, including CWT tagging and release procedures. It was recommended that this problem could be helped by establishing regional teams with representation from individuals knowledgeable in biometrics, local fishery management, fish culture, and data usage. The teams would function by identifying both hatchery needs and restraints and regional fishery needs and restraints, including data quality needs for PSC applications. Biometric and technical support would also be provided to hatchery operators on a case by case basis as needed.

A second general theme was that the Pacific Salmon Commission's technical Data Sharing Committee or its parent Research and Statistics Committee should evaluate the existing PSC coded wire tag database to identify existing deficiencies, and then develop sampling standards and data standards needed for PSC analyses.

9. Coordination of Otolith Marking Programs

Karen Crandall (ADFG) noted that the Mark Committee had first discussed regional coordination of otolith marking during the 1991 Mark Meeting. At that time, ADFG, CDFO and WDFW had agreed to maintain coordination rather than establish formal procedures under the Mark Committee's direction. She pointed out, however, that this informal coordination had not happened, at least with respect to ADFG, while otolith

marking has continued to grow in importance since 1991. As such, she expressed concern that some kind of procedure was needed, not necessarily formal, to insure that agencies have a record of their otolith marking programs that could be accessed by other agencies.

Richard Bailey (CDFO) commented that Canada is very willing to share otolith data for its chinook and coho marking programs. All of the Robertson Creek Hatchery production, for example, is now receiving an otolith mark. He also noted that Canada has some interest in a coastwide repository for thermal induced otolith marks. Lee Blankenship also expressed WDFW's continued interest in coordination. In addition, Ron Olson pointed out that NWIFC has a minor otolith marking program now underway.

Following further discussion, it was decided that CDFO, ADFG, WDFW, and NWIFC would continue to exchange otolith information on a informal basis for at least this coming year. **The issue will be readdressed during the 1996 Mark Meeting**.

10. Severe Budget Cuts in California and Impacts on CDFG's CWT Programs

Reports have been circulating for some time of California Department of Fish and Game's (CDFG) growing budget crisis, coupled with dwindling federal funding support for CDFG's coded wire tag (CWT) programs. Because of the coastwide concern, CDFG's tag coordinator, Frank Fisher, was asked to brief the Mark Committee on CDFG's current situation and probable future. His report was not optimistic, especially with respect to CDFG's ability to maintain its invaluable CWT program at even minimal tagging and recovery levels because of severe funding problems.

Frank began his report by quipping, "The Golden State has run out of gold". All of CDFG's coded wire tag programs have been impacted, include the following:

- No more CDFG tagging on the Klamath River
- Last year for CDFG tagging on the Trinity River
- Last year for CDFG's coho tagging
- Central Valley tagging being turned over to private industry
- Loss of biologist positions involving CDFG's tagging programs
- Central Valley Improvement Act funds available but no matching State funds
- Some reduced ocean sampling this year, and more likely in the coming year
- Severe cut back in escapement sampling

Because of the seriousness of the report and the coastwide ramifications, the Mark Committee unanimously endorsed forwarding *a letter of coastwide support* urging continued federal support of CDFG's CWT program at the highest possible funding level in the face of budget realities. **(This letter was forwarded on March 30, 1995; see Attachment 11).**

11. Update on Experiments to Evaluate Potential Mass Marks

A. Laser Marking

WDFW has continued to explore the laser as a tool for mass marking salmon. Lee Blankenship noted that the project had been funded two years ago by BPA, and early efforts produced beautiful marks. Unfortunately, the laser marks quickly faded within two to twelve months. The second year of the project was therefore switched to evaluating the laser as an excision tool for removal of the adipose fin, as the original project's purpose was to develop a mass marking system using lasers. WDFW also started work on a conceptual design of a mass marking system during the second year (see Item 11.B below).

The third (current) year of laser research was switched from BPA to Sea Grant funding. A cellular biologist has now been hired to try and find out how to maintain the beautiful laser marks. The cellular research project is funded to two years.

B. Automated System for Mass Marking

WDFW subcontracted with Northwest Marine Technology, Inc. in 1994 to start development of a prototype mass marking delivery system for fish under the BPA project mentioned above. More recently, Stratos, an engineering firm in Seattle, was subcontracted to assist in developing a prototype machine.

The design specified a system in which the fish would self-orient themselves to the machine head first in single file. The fish would then be seized and automatically positioned for receiving an adipose clip and/or a CWT before being released. No anesthetics were to be used. Lee Blankenship further emphasized that there were three key specifications for the mass marking delivery system:

a) The device would mark fish at the rate of two per second;
b) The fish would not be handled at any point; and
c) A single unit would cost less than $100,000.

Progress to date has been extremely encouraging as all three specifications have been met in prototype research. A single unit will cost less than $100,000 because nearly all of the component hardware is "off of the shelf" and thus does not require additional development. The rate of two fish/second is achievable by having four parallel marking units integrated as part of a single marking machine. (That is a rate of approximately 50,000 fish marked per eight hour shift). Lastly, they have been able to seize the fish, insert a CWT, and then release it unharmed with virtually no scale damage and zero post-handling mortality. A three minute video was presented, showing the prototype and its operation, plus a demonstration of fish staging.

C. Ventral Clips as Potential Mass Marks

1) WDFW Study

Lee Blankenship reported on the second year results of WDFW's ventral mark evaluation study involving coho returns at the Puyallup, Green River, and Skagit hatcheries, and also harvest in the Puyallup River and Green/Duwamish River commercial fisheries (**Attachment 12**). Comparable numbers were released with either the Ad+CWT, LV+CWT, or Ad-LV+CWT mark.

Using the Ad+CWT as the control, differential survival of the LV+CWT marked fish returning to the Puyallup, Green River, and Skagit (added during the second year) hatcheries was 19%, 15%, and 32% lower, respectively. In contrast, in 1993, the differential survival of returning LV+CWT marked fish observed at the Puyallup, Green River, and George Adams hatcheries was 6%, 19%, and 12%, respectively. **The results reaffirm that the ventral mark is not a reliable mark for mass marking because of variable mortality. In this study, the variability extended across both hatcheries and years.**

The Ad-LV+CWT group was added during the second year of the study and produced some very surprising results. In all three hatcheries, the Ad-LV+CWT group had higher survival rates (i.e. more fish returned) than the LV+CWT group. The same pattern was observed in the terminal fisheries. This result was contrary to expectations of increased mortality because of the additional mark. Lee Blankenship added that he had seen the same thing reported in the literature but had assumed that it was caused by an inadequate study design or perhaps sampling errors, etc. However, given WDFW's comprehensive study design and the large numbers of recoveries for each mark, he is now convinced that the unexpected and unexplained result is real.

Fin clip quality also showed some interesting trends. During the first year, 20-25% of the returning fish had bad or marginal ventral fin clips due to significant fin regeneration. The study was repeated a second year at Green River and Puyallup hatcheries, and the number of bad marks dropped to 1-5%. In contrast, the number of bad marks seen at the Skagit Hatchery (first year) was 32%, similar to that seen at Green River and Puyallup hatcheries during the first year. This implies a learning curve for marking crews.

The adipose fin clips, on the other hand, showed less than 1% regeneration at all three hatcheries. However, the study also demonstrated that regeneration does exist and approximately 0.5% of the tagged fish could not be visually recognized as having been tagged. This explains why electronic detection can recover tags in a very low percentage of adult fish having a "complete" adipose fin.

Fish recovered at the hatchery rack were significantly smaller than those taken immediately before in the terminal commercial fisheries (**Attachment 12**). For example, fish returning to the Puyallup Hatchery were 4 cm smaller than those taken in the Puyallup commercial fishery (49 cm vs 53 cm). With no growth differential between the two sets of recoveries, the size differences confirm Ricker's observations some 20 years ago that harvest selectively reduces size. However, Ricker did not have the advantage of CWT marked fish to track unique populations.

In a related study at one of the three hatcheries, WDFW evaluated whether the use of the bright red colored elastomer tags on the sides of the fish increased predation. Three groups were used: Elastomer (filament)+CWT, Elastomer (injection)+CWT, and Ad+CWT. **Results revealed no difference in return rates to the hatchery between the three groups, thus indicating no additional mortality attributable to the elastomer tags.**

Lee Blankenship cautioned that he saw approximately 50% tag loss with the elastomer filament tag in coho and that it shouldn't be used on 30/lb coho because the target area simply wasn't large enough. The retention rate for the elastomer injection was 85% and is expected to be much higher as the equipment continues to improve and as tagging personnel become more skilled.

2) USFWS Study

David Zajac reported that the USFWS stock identification study at Warm Springs NFH involving ventral clips is now completed for hatchery returns(**Attachment 13**). Fishery recoveries have not yet been He cautioned, however, that it was designed as a diet study and not for evaluating the ventral fin as a mass mark. He also noted that the only difference from hatchery return data presented during last year's Mark Meeting was the addition of two age five recoveries of ventral marked fish for the 1989 brood.

The total hatchery returns of Ad+CWT and Ventral clipped fish were very comparable for the 1987 and 1988 broods (32 vs 33; and 56 vs 61). However, twice the number of ventral clipped fish returned for the 1989 brood (10 Ad+CWT vs 21 Ventral), suggesting potentially lower mortality seen with the Ventral clip. **Given the original design of the study to evaluate diets and the very low numbers of returns, the study seems best viewed as additional evidence confirming the widely held belief that the Ventral clip has a variable mortality rate, as also seen in the WDFW study.**

12. Depth and Location Placement of CWTs in Large Chinook

Richard Bailey (CDFO), Lee Blankenship (WDFW), and Karen Crandall (ADFG) reported on independent studies of tag placement (location and depth) in large chinook. The focus of the research was to determine what percentage of tags might be missed by electronic

detection with the hand wand, with the expectation that the deeper, misplaced tags are hardest to detect. Previous WDFW and CDFO studies on tag depth and placement in coho, reported during last year's Mark Meeting, demonstrated that the maximum detectable depth using the hand wand was 31 mm for standard length new wire, and 41 mm for length and a half new wire.

A. CDFO Study

CDFO staff examined approximately 250 large chinook (age 4 and 5) for tag depth at Robertson Creek and Nitinat hatcheries on the west coast of Vancouver Island (see **Attachment 14, Figure 2**). Mean tag depth at Robertson Creek Hatchery was 22.2 mm, with a maximum of 42 mm. Mean tag depth at Nitinat Hatchery was 18.4 mm, with a maximum depth of 28 mm. Of these, 18.4% of the tags at Nitinat Hatchery were found in non-standard sites (e.g. nares, palette, eye orbits, skin, lower jaw, and brain) as compared to 40.2% at Robertson Creek Hatchery.

He concluded that all properly placed tags would be well within the range of detection by the hand wand for standard length wire, and that more attention must be given to correct tag placement.

B. WDFW Study

Lee Blankenship reported that his study was essentially a mirror image of the CDFO results. A total of 481 large spring chinook (mean length: 780 mm) were measured at three hatcheries for tag depth and placement (**Attachment 15**). The mean depth was 20.6 mm, with a maximum depth of 39 mm. Approximately 7% of the tags were placed deep between the eyes and were the most difficult to detect.

C. ADFG Study

Karen Crandall reported that her staff had looked at 374 large winter caught chinook (mean length: 815 mm) with a hand wand and were able to find tags in all but eight of the tagged fish (**Attachment 16**). The remaining eight tags were detected by a Field Sampling Device. Mean tag depth was 15.7 mm, with a maximum of 32.3 mm.

Similar to WDFW's experience, the eight undetectable tags (when using the wand) were all found placed near the eyes. Mean depth was 25.3 mm, with a range of 19.8-30.9 mm. She also noted that the study was done in the lab with frozen heads that might have suffered some deformation during shipment, and thus possibly impacted the tag depth in some cases. In addition, all of the wire was of the "old old" variety (i.e. least detectable because of its lower magnetic moment as compared to the improved "new" and superior "new new" wire).

Discussion:

The results of the three studies are seen as very encouraging as it had been feared that tag detection by hand wand would be much more difficult in the much larger chinook. Frank Fisher (CDFG), however, pointed out that California uses a great number of half length tags to mark their chinook because of a much smaller size when the fish are ready to leave the hatchery. As such, electronic detection by hand wand is not likely to be very practical for recovering half length tags in the California fisheries and elsewhere.

13. Agency Reports on Tagging Plans for 1995

Minimal changes were projected for 1995 tagging levels as compared to 1994. CDFO was an exception in that tagging levels will decline approximately 30%. Overall tagging is expected to be again in the range of 43-48 million tagged fish released.

14. Update on 1994 High Seas Sampling Program

Ron Heintz (NMFS-Alaska) reviewed the status of the high seas sampling program for CWT marked fish. His report is given below:

> "In 1993, observers on U.S. Domestic groundfish vessels recovered 170 coded wire tags; 14 were recovered from the whiting fishery off the coast of Washington and Oregon, 163 were recovered in the Gulf of Alaska, and 13 from the Bering Sea/Aleutian Island fisheries. All the tags recovered were chinook salmon except for 2 chums from the Bering Sea. The chum salmon were 1988 and 1990 brood from Stave Creek and the Chehalis River, respectively.
>
> Japanese research vessels recovered only 3 coded wire tags: 2 from coho, and 1 from chinook. There were no coded wire tags recovered from steelhead.
>
> Expansion values for 1991 and 1992 recovery reports will be limited to only chinook recoveries. Changes in the observer program budget have eliminated the ability to project by-catch of species other than chinook salmon in annual reports.
>
> Future changes may occur in the number of tag recoveries. The Auke Bay Lab has recently begun a long term research program to estimate the carrying capacity of the North Pacific for salmon. Many transects leading from the coast of Alaska into the near-shore areas of the EEZ will be surveyed. We anticipate an increase in the tag recovery rate of approximately 15%."

15. Update on Activities of PSC Working Group on Data Standards

The PSC Data Standards Working Group recently upgraded the CWT data exchange formats from PSC Format Version 3.0 to Version 3.1. Jim Longwill (PSMFC) briefly reviewed the changes to the Recovery, Release, Catch/Sample, and Location file formats,

along with a discussion of the new Description Data file. New fields were added to the end of the records to minimize the impact on existing computer programs.

The new changes approved for PSC Format Version 3.1 are summarized below.

A. Release File:

1. Add new Field 29: 'Reporting Agency'
2. Add new code 'M' to Release Stage for 'Multiple release stages'
3. Changes to Release Field 11: 'Rearing Type'
   a) Add new code 'U' (Unknown) to handle situations when rearing type is unknown.
   b) Expand the definition for code 'M' (Mixed) to include both downstream migrants or *marine tagging*.

B. Recovery File

1. Add new Field 35 'Run Year'
2. Modified definitions of Sampling Types '1' and '5' (Recovery Field 25)
3. Add new Sample Type '7' for adult "selective" (pass-through) sampling
4. New policy on handling recoveries of reused tagcodes (*1, *2 , etc)
5. Add new codes to 'Sampling Period Type' (Recovery Field 5) to accommodate weekend and weekday sampling.
6. Standard established for handling expansions for recoveries having Tag Status 3 (lost tag), 4 (unreadable tag), and 8 (no snout taken): "The estimated number should be blank if the recoveries have already been used to adjust the estimated number of other tag recoveries."

C. Catch/Sample File

1. Add new Field 32: 'Escapement Estimation Method'
2. Add new codes to 'Sampling Period Type' (Catch/Sample File Field 8) to accommodate weekend and weekday sampling.
3. Change 'File Creation Date' (Field 5) in the Catch/Sample file to 'Record Creation Date'.

D. Locations File

1. Add new Field 7: 'PSC Region Code' (coding now formalized)
2. Add new Field 8: 'PSC Basin Code' (coding in preliminary development stage)
3. Add new Field 9: 'EPA Reach' (coding available for all freshwater areas in California, Oregon, Idaho, and Washington)
4. Add new Field 10: 'Latitude'
5. Add new Field 11: 'Longitude'
6. Solution developed for preventing orphaned location codes in the database.

E. PSC Fishery Codes

1. Add Fishery Code '57' for 'Mixed Wild Broodstock and Hatchery Returns'

F. New 'Description Data File'

A new 'Description Data File' was added as a required file accompanying any file submitted to the Mark Center. The intent of the file is to provide a concise summary of the data file. Fields include:

'Submission Date'
'File Type'
'Reporting Agency'
'File Year'
'Line Number'
'Data Description'

The new file is designed to allow up to 99 lines of text in the 'Data Description' field. This will provide users with a clear idea of file contents, as well as significant changes from an earlier data set if it has been resubmitted.

Copies of the new PSC Format Version 3.1 are available from PSMFC's Regional Mark Center.

16. Regeneration of the Adipose Fin

Lee Blankenship reported on results of a study carried out at Simpson Salmon Hatchery to evaluate the incidence of regeneration of the adipose fin. The study consisted of three groups of groups of adipose clipped coho (**Attachment 17**). The control group (79,328 fish) had perfectly excised adipose fins. The second group (Treatment 1; 10,584 fish) had the back 2/3 of the adipose fin removed. The third group (Treatment 2; 10,716 fish) had the top 2/3 of the adipose fin removed. Diagrams of the partial cuts are given in Attachment 17.

The juvenile fish were checked for tag loss and clip quality at 28-32 days after tagging. No regeneration was seen in the control group with 100% of the fin removed or the group that had the top 2/3 of the adipose fin excised. However, the group with the back 2/3 of the adipose removed showed definite regeneration of the adipose fin. The fin had not fully regenerated but the new translucent tissue was clearly growing back into the normal shape of an adipose fin.

Adult sampling again showed no regeneration of the adipose in the control group. However, Treatment 1 (back 2/3 of the adipose fin removed) had 6 adult fish recovered with a totally regenerated adipose fin, while Treatment 2 (top 2/3 removed) had 7 fish with

a full adipose fin. This represented 23% of the returning fish for both treatments in which the fish could not be recognized as having been adipose clipped and given a CWT.

Lee Blankenship concluded that there is no fin regeneration in coho salmon when the adipose fin is fully excised. However, poor adipose clips will result in missed tags when the fish are sampled in the fisheries because of the regeneration problem. He therefore recommended that "When in doubt, take the snout!".

Missed adipose clips in a sample because of regeneration of the adipose fin introduces serious biasing as it leads to underestimation of contribution and escapement. Lee Blankenship noted that one can recognize bad tagging and adjust for its biases. However, missed marks are simply unknown and of unknown magnitude. Lee also hypothesized that the larger the fish are when clipped, the less the chance of having bad clips and potential regeneration.

Proposal for a CWT Workshop

The results of the adipose regeneration study led into a discussion of the need to hold another CWT workshop on tagging procedures. Dennis Isaac (ODFW) emphasized that the prior workshops (Asilomar, CA; 1978; Silver Creek Fall, OR, 1982) were extremely helpful and productive in bringing together the collective experience of all of the major agencies involved in CWT use. He therefore argued that there was a great deal of new information (such regeneration of the adipose) that warranted another workshop.

Several tag coordinators expressed strong support for holding a workshop. However, Karen Crandall also cautioned that care would have to be taken to be certain that the "right people" actually attend the workshop. She noted that in many cases, senior level people will attend such conferences (sometimes as "perks") when the real need is to reach those in the trenches actually doing the work. Marianne Johnson (CRITFC) also suggested including users of the data to help bridge the communication gap between hatchery programs and fishery management discussed earlier (Item 8) by Norma Jean Sands (ADFG).

It was agreed that an ad-hoc committee would be set up to organize a CWT workshop. Agencies volunteering to provide someone for the planning included ADFG, CDFO, ODFW, and WDFW.

17. Quality Control Issues of CWT Marking and Sampling

A. Correlation between 'No Tags' and Poor Tag Placement

Richard Bailey (CDFO) introduced his remarks by noting that Thomas and Associates, Ltd (CDFO's tag recovery program contractors) have stressed for some time that there is a correlated problem with 'no tags' in the recovery sampling and poor tag placement during tagging. He noted further that Thomas and Associates records the location of all non-

standard placement of tags recovered in both rack surveys and ocean fisheries sampling. As such, the data exist to be able to look at the relationship of poor tag retention and poor tag placement, and to identify, from Canada's viewpoint, which hatcheries are the offending ones in terms of poor tagging programs.

As a first step, CDFO surveyed CWT rack recoveries at its enhancement facilities for 'no tag' rates. Three ranges of 'no tags' were observed: a) 4-6% - good tagging; b) 9-15% - 'middle of the road'; and c) greater than 20% - poor tagging. The latter category typically was seen with inexperienced tagging crews.

Nare placement was found to be the most common non-standard placement. A correlation analysis was then carried out on 'no tag rate' vs 'nare placement' in both chinook and coho using data on 1993 rack returns at 16 Canadian facilities (**Attachment 14**). Figure 1 in Attachment 14 shows a definite correlation ($r = 0.70$) between the two parameters. This correlation is even stronger when the analysis is done on a single species basis.

Richard Bailey emphasized that this is not just a Canadian problem. For example, they saw an average 10-15% 'no tag' rate in the West Vancouver Island troll fishery for the entire summer, and this is a fishery that only has a 30-50% contribution of Canadian stocks. He concluded that this represents a 10-15% inefficiency in the CWT program. He further argued that the 'no tags' are in effect unreported catch, and thus are not included in a lot of the analyses being done for stock rebuilding programs for the PSC. As such, there is a strong possibility that the actual hatchery contributions may actually be significantly underestimated in many cases.

Dennis Isaac (ODFW) agreed that the problem was serious and added that he had seen tag loss rates of 20-25% at some of Oregon's hatcheries during the last few years but was not able to clearly identify the reasons for it. One possible factor, he noted, was the tremendous pressure to tag large numbers of fish in a very short time, thus leading to operator fatigue and poor placement. Oregon, for example, tagged 12 million salmon last year, and that high tag loss was seen even with experienced crews. He also emphasized that "mechanic error" (i.e. dull injectors, poor head molds, etc) could be a significant factor as well.

Frank Fisher (CDFG) added that California also had a serious problem with occasional high tag loss rates and that it was often related to the practice of using inexperienced volunteers to help tag. Lee Blankenship replied that Washington does not allow volunteers to do the tagging for that very reason. He further emphasized that anytime tag loss exceeds 5%, it has to be a red flag that something is wrong with the tagging operation. Ron Olson (NWIFC) added that it is often very hard to keep trained tagging crews on because of the wages and nature of the job. Dennis Isaac responded that ODFW didn't have that problem too often. He emphasized, however, that **regardless of the source of the problem of poor tag retention, dedicated supervisors and quality checks thorough out each tagging day are critical to achieving and maintaining quality tagging. This point was strongly supported by other tag coordinators.**

Ron Olson noted that NWIFC had also looked at the problem of seeing higher rates of fish without tags than expected. They had noticed that tag loss rates of 10-15% kept cropping up in returning adults back at the rack while tag retention rates measured in smolts before release were on the order of 5-6%. Results of a study on missing tags in chinook were presented at the recent PSC Workshop on Hatchery CWT Methodology. The study found a bias significantly different from zero at all four hatcheries examined. On average, the number of fish missing an adipose fin and with no CWT expected to return to these hatcheries was 52% lower than the number actually observed. He therefore concurred that there was a significant problem with missing marks, and that it definitely leads to underestimation of survival rates, return rates, and fishery contribution rates.

B. Problem with Reused CWT Tagcodes and Naturally Occurring "Ad Clips"

Richard Bailey also reported on a problem of finding reused tagcodes in Skagit River coho that had initially been tagged and released with the adipose fin intact. A total of 17 Skagit River coho have been recovered to date from samples recovered in CDFO's 1994 fisheries (**Attachment 18**). Based on information provided by WDFW, a variety of reused tagcodes (all previously used in 1991 or 1992 broods of coho, chinook and sockeye) were also used to tag 1992 brood coho at Simpson Hatchery with the adipose fin likewise not removed (**Attachment 18, page 4**).

CDFO's primary concern was the reuse of tagcodes that are still being recovered in the marine fisheries, particularly when the phenomenon of naturally missing adipose clips is known to occur in low rates at some hatcheries, . At a minimum, it squanders valuable resources of the tag recovery agencies in trying to resolve species conflicts or correct brood year.

In those cases where the recovery can be determined to have originated from a 'reused tag/no Ad clip given' release, it must simply be classified as status 2 (No Tag) since there will be no release information available. The possibility also exists that the tag recovery could be incorrectly assigned to a previous release group and thus bias the recovery data.

Lee Blankenship acknowledged the problem and said that he wasn't certain how it had happened. However, steps have been taken to prevent the problem from happening again.

The Committee also agreed that reused wire should never be used in any release of fish with the adipose fin intact where there was a potential for recoveries of a previous release group that had been adipose clipped. Care should also be taken to change species and to insure an adequate lapse in time between the releases.

19. Advances in Coded Wire Tag Technology

Guy Thornburgh reviewed NMT's research and development results during the past year and outline plans for the future.

a) Multi-Shot Hand Tag Injector

The hand tag injector has been redesigned to make it much easier to handle. In addition, it can handle length and a half wire, and can accommodate a counter. It will be available in May.

b) Hand Held Wand

The hand held wand has been repackaged to make it truly waterproof (to 30 meters). In addition, the signal is louder and the LED has been enlarged. No changes were made to its sensitivity level in detecting tags. The cost is $3,900.

c) Tube Detectors

NMT has substantially expanded and upgraded its family of tube detectors from the original circular model. The new models are rectangular and thus able to accommodate larger sized fish. Several models are either in the planning stage or prototype stage, including 4x8, 5x10 (now in prototype), 6x12, and 7x14 inch versions. In addition, the tube detectors are designed in such a way that they can accommodate a conveyor belt plus flapper valves to shunt tagged fish off the belt for sampling.

d) Visual Implant Elastomer Tags

NWT is continuing to work on finding a single component for the injection material. Currently two components are required. NMT also has developed a small hand-held motor driven prototype mechanical injector that is much more effective than delivery by air. The goal is to provide users with "pre-fills" to substantially improve the process of the tagging operation.

e) New Staff

NMT recently added some physicists to its staff, and they have come in with a host of new ideas. One area of research that is now going forth involves development of a very small tag (1 mm diameter) that can carry a large range of codes and potentially be optically scanned. It will be approximately two years before anything is introduced.

The new staff are currently working on a small hand held light detector that can be used to detect elastomer tags and possible decode them as well. There are now five colors available on the market. The goal is to eventually provide approximately 20 colors. This will necessitate automated detection.

f) Archival Tag

NMT's new archival tag records water temperature, body temperature, light, and depth of dive. It is now being marketed and NMT has an order from Japan for 250 units. Work will continue on decreasing its size plus incorporate detection of the earth's magnetic field in order to record latitude as well.

19. Fin Mark Allocation for 1995

This item was deleted in the interest of time. A listing of 1995 fin mark requests will be later provided for review and approval.

Mark Committee Meeting - 1995 - February 16, 1995

	Name	Agency	Mailing Address
1.	Allen, Stan	PSMFC	45 SE 82nd Dr., Gladstone, OR 97027-2522
2.	Anderson, Lynn	WDFW	600 N. Capitol Way, Olympia, WA 98501-1091
3.	Bailey, Richard	CDFO	Pacific Bio. Stn., Nanaimo, B.C. V9R 5K6 Canada
4.	Bauer, Jerry	BPA	PO Box 3621, Portland, OR 97208-3621
5.	Blankenship, Lee	WDFW	600 N. Capitol Way, Olympia, WA 98501-1091
6.	Burner, Mike	ODFW	17330 SE Evelyn St., Clackamas, OR 97015-9514
7.	Corrarino, Charlie	ODFW	PO Box 59, Portland, OR 97207
8.	Crandall, Karen	ADFG	PO Box 25526, Juneau, AK 99802-5526
9.	Croci, Steve	USFWS	P.O. Box 667, Red Bluff, CA 96080
10.	DeLong, Jay	NWIFC	6730 E. Martin Way, Olympia, WA 98506
11.	Fisher Frank	CDFG	PO Box 578, Red Bluff, CA 96080
12.	Graham, Paul	WDFW	5720 Boston Harbor, Olympia, WA 98506
13.	Hammer, Stan	WDFW	901 E. Wright, Tacoma, WA 98404
14.	Heintz, Ron	NMFS	11305 Glacier Hwy., Juneau, AK 99801-8626
15.	Hooff, Julie	WDFW	600 N. Capitol Way, Olympia, WA 98501-1091
16.	Isaac, Dennis	ODFW	17330 SE Evelyn St., Clackamas, OR 97015-9514
17.	Johnson, Marianne	CRITFC	4210 NE 7th Ave. #C, Seattle, WA 98105
18.	Kane, Tom	USFWS	2625A Parkmont Ln., Olympia, WA 98502
19.	Leask, Steven D.	MIC	PO Box 410, Metlakatla, AK 99926
20.	Ledgerwood, Dick	NMFS	PO Box 155, Hammond, OR 97121
21.	Longwill, James R.	PSMFC	45 SE 82nd Dr., Gladstone, OR 97027-2522
22.	Markey, Susan	WDFW	600 N. Capitol Way, Olympia, WA 98501-1091
23.	Mauser, Gregg	IDFG	600 S. Walnut, Boise, ID 83707
24.	McIntyre, Kenneth	NMFS	RT 3 Box 53, Pomeroy, WA 99347
25.	McIsaac, Don	ODFW	PO Box 59, Portland, OR 97207
26.	Murray, Bill	ODFW	17330 SE Evelyn St., Clackamas, OR 97015-9514
27.	O'Connor, Dick	WDFW	600 N. Capitol Way, Olympia, WA 98501-1091
28.	Olhausen Steve	USFWS	9317 Hwy. 99, Suite. I, Vancouver, WA 98665
29.	Olson, Ron	NWIFC	6730 Martin Way E., Olympia, WA 98506

30.	Pastor, Steve	USFWS	9317 Hwy 99, Suite I, Vancouver, WA 98665
31.	Phillipson, Ken	NWIFC	6730 Martin Way, Olympia, WA 98506
32.	Roseberg, Ralph B.	USFWS	Box 18, Ahsahka, ID 83520
33.	Sands, Norma Jean	ADFG	PO Box 240020, Douglas, AK 99824-0020
34.	Smith, R.Z.	NMFS	525 NE Oregon, Rm. 500, Portland, OR 97232
35.	Spain, Glen	PCFFA	PO Box 11170, Eugene, OR 97440-3370
36.	Thompson, Dan	WDFW	600 N. Capitol Way, Olympia, WA 98501-1091
37.	Thornburgh, Guy	NMT	P.O. Box 427, Ben Nevis Road, Shaw Island, WA 98286
38.	Townsend, Rich	UW	Center for Quantative Sciences, 3737 NE 15th Ave., Seattle, WA 98195
39.	Webster, Jim	NMT	2401 SW Bristol Ct., Olympia, WA 98502
40.	Zajac, David	USFWS	2625 Parkmont Ln, Bldg. A, Olympia, WA 98502

IDFG FISH MARKING SUMMARY - Outmigration Year 1996
Chinook Salmon: Broodyear 1994

Species	Facility	CWT and Fin Clip			Fin Clip Only			Hatchery Totals
		Adipose	LV	RV	Adipose	LV	RV	
Spring Chinook	Clearwater	120,000			130,000		24,000	274,000
	Rapid Riv	60,000	50,000		280,000			390,000
	Sawtooth				25,000			25,000
Summer Chinook	McCall	60,000			250,000	205,000		515,000
Mark/Clip Total		240,000	50,000		685,000	205,000	24,000	1,204,000

ATTACHMENT 2

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PROPOSAL TO ADIPOSE-CLIP-ONLY CLEARWATER HATCHERY SPRING CHINOOK

==========

AGENCY: Idaho Department of Fish and Game ***DATE:*** February 14, 1995

COORDINATOR: Gregg Mauser

MARK REQUESTED: Adipose clip, no accompanying CWT

DETAILS OF MARKING

NUMBER OF FISH: 130,000

SPECIES/RUN: Chinook Salmon, Spring Run

BROOD YEAR: 1994

STOCKS: Clearwater River

HATCHERIES: Clearwater Anadromous

GEOGRAPHIC AREA: Clearwater River Drainage

RELEASE DATE: Spring 1996

MANAGEMENT/RESEARCH OBJECTIVES:

Management objectives for Clearwater Anadromous Fish Hatchery spring chinook, as identified in the Idaho Department of Fish and Game's 1991-1996 Anadromous Fisheries Management Plan, are to maximize harvest and fishing opportunity on hatchery produced spring chinook without impacting naturally spawning populations. CAFH will also produce fry, parr, and smolts needed for Clearwater basin supplementation studies, and participate in the Selway River captive broodstock program.

All production releases from CAFH will be outplants of pre-smolts. Adult broodstock will be collected at tributary collection sites.

IMPACT ON COAST WIDE CWT PROGRAMS:

PREDICTED RECOVERIES:

OCEAN: Based on the combined brood year 1985 spring chinook release from Dworshak Hatchery (Rapid River stock) and the brood year 1983 release from Kooskia Hatchery (Carson stock), no recoveries in ocean fishery samples are anticipated.

COLUMBIA RIVER: Columbia River recoveries include those from the sport, non-treaty gill net, treaty ceremonial and subsistence, and test net fisheries. Based on the combined brood year 1985 spring chinook release from Dworshak Hatchery (Rapid River stock) and the brood year 1983 release from Kooskia Hatchery (Carson stock), a total of 1 adipose-clip-only fish would be sampled from the Columbia River fisheries.

CHANGES TO CURRENT SAMPLING PROGRAM:

No changes to the current sampling program are anticipated. All marked fish collected at the outplant sites will be examined for CWT's. In-season management of Columbia River spring chinook fisheries is based on GSI sampling, not recovery of CWT'd fish.

OTHER:

An estimated total of 274,000 brood year 1994 smolts will be released from Clearwater Anadromous Fish Hatchery. In addition to the 130,000 adipose clipped fish, 120,000 will be adipose-clipped and coded-wire-tagged, 24,000 will be marked with a right ventral clip (for supplementation studies).

EXPECTED BENEFITS:

The expected benefits of this marking program are to achieve the management objectives of maximizing fishing and harvest opportunity on hatchery produced spring chinook without impacting naturally produced fish and to maintain the existing natural spawning chinook populations.

PROPOSAL TO ADIPOSE-CLIP-ONLY RAPID RIVER HATCHERY SPRING CHINOOK

==========

AGENCY: Idaho Department of Fish and Game ***DATE:*** February 13, 1995

COORDINATOR: Gregg Mauser

MARK REQUESTED: Adipose clip, no accompanying CWT

DETAILS OF MARKING

NUMBER OF FISH: 280,000

SPECIES/RUN: Chinook Salmon, Spring Run

BROOD YEAR: 1994

STOCKS: Rapid River (Snake River)

HATCHERIES: Rapid River

GEOGRAPHIC AREA: Little Salmon River Drainage, tributary to Salmon River Hells Canyon, Snake River

RELEASE DATE: Spring 1996

MANAGEMENT/RESEARCH OBJECTIVES:

Management objectives for Rapid River spring chinook, as identified in the Idaho Department of Fish and Game's 1991-1996 Anadromous Fisheries Management Plan, are to maximize harvest and fishing opportunity on hatchery produced spring chinook while maintaining the existing natural spawning summer chinook population.

In years when spring chinook returns are predicted to exceed hatchery escapement needs, a sport fishery occurs on the Little Salmon River. Tribal fisheries are conducted in the lower portion of Rapid River. A weir and trap facility is located on Rapid River below the hatchery site. A naturally produced summer chinook population is maintained upstream of the hatchery facility. Marking all hatchery produced spring chinook would allow the exercise of the sport fishery while minimizing potential impacts to naturally produced summer chinook, and the separation of hatchery spring and natural summer chinook at the trap.

IMPACT ON COAST WIDE CWT PROGRAMS:

PREDICTED RECOVERIES:

OCEAN: Based on the brood years 1983-85 spring chinook releases from Rapid River Hatchery, one (1) adipose-clip-only fish would be sampled in the Canadian troll fishery. The number of recoveries in all other ocean fishery samples is estimated to be zero.

COLUMBIA RIVER: Columbia River recoveries include those from the sport, non-treaty gill net, treaty ceremonial and subsistence, and test net fisheries. Based on the brood years 1983-85 spring chinook releases from Rapid River Hatchery, a total of 50 adipose-clip-only fish would be sampled from the Columbia River fisheries.

CHANGES TO CURRENT SAMPLING PROGRAM:

No changes to the current sampling program are anticipated. All marked fish returning to the trap will be examined for CWT's. In-season management of Columbia River spring chinook fisheries is based on GSI sampling, not recovery of CWT'd fish.

OTHER:

An estimated total of 390,000 brood year 1994 smolts will be released from Rapid River Hatchery. In addition to the 280,000 adipose clipped fish, 60,000 adipose-clipped and coded-wire-tagged and 50,000 right ventral-clipped and coded-wire-tagged smolts will be released.

EXPECTED BENEFITS:

The expected benefits of this marking program are to achieve the management objectives of maximizing fishing and harvest opportunity on hatchery produced spring chinook and to maintain the existing natural spawning summer chinook population.

PROPOSAL TO ADIPOSE-CLIP-ONLY SAWTOOTH HATCHERY SPRING CHINOOK

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AGENCY: Idaho Department of Fish and Game ***DATE:*** February 13, 1995

COORDINATOR: Gregg Mauser

MARK REQUESTED: Adipose clip, no accompanying CWT

DETAILS OF MARKING

NUMBER OF FISH: 25,000

SPECIES/RUN: Chinook Salmon, Spring Run

BROOD YEAR: 1994

STOCKS: Upper Salmon River (Sawtooth Hatchery)

HATCHERIES: Sawtooth

GEOGRAPHIC AREA: Upper Salmon River Basin

RELEASE DATE: Spring 1996

MANAGEMENT/RESEARCH OBJECTIVES:

The management objective, as identified in the Idaho Department of Fish and Game's 1991-1996 Anadromous Fisheries Management Plan, is to maintain existing natural spawning populations of chinook salmon. Natural production will be utilized to sustain existing naturally produced populations. Outplanting of hatchery produced fish into natural production areas will be used only to support supplementation research and to introduce fish to areas devoid of natural populations. Hatchery produced fish will be released into the mainstem Salmon River for harvest augmentation and brood returns to maintain the program.

A weir and trap facility is located on the upper main Salmon River at the Sawtooth Hatchery. Naturally produced populations are maintained upstream of the hatchery. It is necessary to mark all hatchery produced fish to allow separation of adults returning to the trap for broodstock management, and to allow for a selective fishery, targeting on hatchery produced fish when surpluses occur.

IMPACT ON COAST WIDE CWT PROGRAMS:

PREDICTED RECOVERIES:

OCEAN: Based on the 1985 release of Salmon River stock from Sawtooth Hatchery, no observed recoveries from ocean fishery samples are anticipated.

COLUMBIA RIVER: Columbia River recoveries include those from the sport, non-treaty gill net, treaty ceremonial and subsistence, and test net fisheries. Based on the 1985 release of Salmon River stock from Sawtooth Hatchery, one (1) recovery of adipose-clip-only fish from Sawtooth Hatchery stocks is anticipated in the fishery samples.

CHANGES TO CURRENT SAMPLING PROGRAM:

No changes to the current sampling program are anticipated. All marked fish returning to the facilities will be examined for CWT's.

OTHER:

No other brood year 1994 smolts will be marked.

EXPECTED BENEFITS:

The overall management goal is to provide for the long term existence of the natural populations. The expected benefits of this marking program are to achieve the management objectives of maintaining existing natural spawning populations and to preserve the genetic resources of the natural populations, and to meet mitigation objectives of selective harvest when surpluses occur.

PROPOSAL TO ADIPOSE-CLIP-ONLY McCALL HATCHERY SUMMER CHINOOK

==========

AGENCY: Idaho Department of Fish and Game ***DATE:*** February 14, 1995

COORDINATOR: Gregg Mauser

MARK REQUESTED: Adipose Clip, no accompanying CWT

DETAILS OF MARKING

NUMBER OF FISH: 250,000

SPECIES/RUN: Chinook Salmon, Summer Run

BROOD YEAR: 1994

STOCKS: South Fork Salmon River

HATCHERIES: McCall

GEOGRAPHIC AREAS: South Fork Salmon River basin

RELEASE DATE: Spring 1996

MANAGEMENT/RESEARCH OBJECTIVES:

Management objectives for South Fork Salmon River summer chinook, as identified in the Idaho Department of Fish and Game's 1991-96 Anadromous Fisheries Management Plan, are to maintain existing natural spawning populations, minimize harvest impacts to naturally produced chinook salmon, and maximize harvest and fishing opportunity on hatchery produced salmon while protecting the genetic integrity of naturally produced fish. Natural production will be utilized to sustain existing naturally produced populations. Outplanting of hatchery produced fish into natural production areas will be used only to support supplementation research and to introduce fish to areas devoid of natural populations. Hatchery produced fish will be released into the South Fork Salmon River for harvest augmentation and brood returns to maintain the program.

A weir and trap facility is located on the main South Fork Salmon River. Naturally produced populations are maintained upstream of the trap. It is necessary to mark all hatchery produced fish to allow separation of adults returning to the trap for broodstock management, and to allow for a selective fishery targeting on hatchery produced fish when surpluses occur.

IMPACT ON COAST WIDE CWT PROGRAMS:

PREDICTED RECOVERIES:

OCEAN: Based on the brood years 1983-85 releases from McCall Hatchery, one (1) adipose-clip-only fish would be sampled in each of the Oregon and Washington troll fisheries. The number of recoveries in all other ocean fishery samples is estimated to be zero.

COLUMBIA RIVER: Columbia River recoveries include those from the sport, non-treaty gill net, treaty ceremonial and subsistence, and test net fisheries. Based on the brood years 1983-85 releases from McCall Hatchery, a total of eleven (9) adipose-clip-only fish would be observed in samples from Columbia River fisheries.

CHANGES TO CURRENT SAMPLING PROGRAM:

No changes to the current sampling program are anticipated. All marked fish returning to the trap will be examined for CWT's.

OTHER:

An estimated total of 515,000 brood year 1994 smolts will be released from the McCall Hatchery, In addition to the 250,000 adipose-clipped fish. 60,000 will be adipose clipped and coded wire tagged, and 205,000 will be marked with a left ventral clip and released as part of the Idaho supplementation studies.

EXPECTED BENEFITS:

The overall management goal is to provide for the long term existence of the natural populations. Expected benefits of this marking program are to maintain existing natural spawning populations, preserve genetic resources of natural populations, and to allow selective sport fisheries targeting hatchery stocks in the terminal area.

PACIFIC COAST FEDERATION
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PCFFA

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CURRENT STATUS OF LEGISLATION FOR MASS MARKING OF HATCHERY SALMON

Prepared by:
Glen H. Spain, PCFFA Northwest
Joe Rohleder (Vice-President, Oregon Guides & Packers)
February 16, 1995

California: No current bills. California Fish & Game probably has legal authority to proceed with mass marking, but has no policy establishing a mass marking program and no budget. Budget is the primary barrier.

Oregon: In the 1993 Legislative Session (67th) there were two bills and two resolutions proposed. Of these only the resolutions passed and were adopted. These measures were as follows:

Failed bills: HB 2986 -- Required removal of adipose fin from all hatchery salmon, trout and steelhead released into state waters after July 1, 1997.

HB 3621 -- To create a Hatchery Management Board to establish policy for coastal fish hatcheries, including for marking programs.

Measures adopted: House Joint Resolution 35 -- (a) Requested Governor to encourage cooperation of other states, Tribal governments and British Columbia to establish regionwide marking of all hatchery salmon, trout and steelhead by removal of the adipose fin before release, and; (b) directed ODFW to move as rapidly as possible toward marking all hatchery salmon, trout and steelhead introduced into state waters. This measure established mass marking as Oregon state policy. It also required ODFW to report back to the 1995 Legislature on progress in developing a fin clip plan. (SEE ATTACHMENT A)

House Joint Memorial 11 -- Urged a region-wide effort to create a mass marking program. Among other provisions the Legislature stated:

"*The Pacific States Marine Fisheries Commission and the Regional Mark Committee are urged to cooperate fully with the state and provincial governments to desequester the adipose fin clip and thereby enable full marking of hatchery salmon, trout and steelhead.*"

For full text, see ATTACHMENT B.

Oregon has a marking bill in draft form (ATTACHMENT C). However, ODFW probably has full authority under HJM 11 and HJR 35 to proceed with a mass marking program on its own. The primary consideration is that it be a regional effort and budget.

Washington: Currently there is a bill (SB 5157) which would create a state mass marking program to be in full swing by June 30, 1997. This bill is undergoing hearings and committee markups at the present time (SEE ATTACHMENT D), with a good chance of passage. A companion bill (HB 1482) will probably be reconciled with SB 5157 later, and has had no hearings.

Federal Legislation: There are no plans for federal legislation at this time. In the 103rd Congress, Representative Dan Hamburg had proposed a "pilot salmon marking program" to be funded from various appropriations, including as part of the Central Valley Project Restoration Fund (contained in H.R. 4506), for California federally funded hatcheries. A copy of his testimony is included as ATTACHMENT E. For various reasons he was not successful.

SUMMARY: Mass marking is perceived to be absolutely essential to maintaining a selective fishery in the face of many weak stock problems, closures required under the ESA for coho and chinook, and closures due to salmon depletion in the Columbia and Sacramento River Basins. California, Oregon and Washington all have the legal authority to create such mass marking programs on their own, and Oregon's Legislature has already given ODFW specific direction to do so. Current proposed legislation in Washington which is likely to pass into law would do the same. Without such marking programs, the potential losses to the commercial fishing industry could be astronomical.

Enrolled

House Joint Resolution 35

Introduced and printed pursuant to House Rule 13.01

Whereas the preservation and enhancement of Oregon's wild fish populations are vital to their use and enjoyment by present and future generations of Oregonians; and

Whereas harvest and utilization of hatchery fish releases are important to the maintenance of the social and economic values of Oregon's fisheries; and

Whereas the avoidance of petitions for Oregon's wild fish under the Endangered Species Act is essential to the economic development of the state; and

Whereas the ability to fully harvest hatchery fish is precluded by the inability to differentiate between wild and hatchery fish in mixed stock fisheries; and

Whereas hatchery-produced salmon, trout and steelhead can be safely and effectively marked by the removal of their adipose fin; and

Whereas removal of the adipose fin on salmon is sequestered by the Regional Mark Committee of the Pacific States Marine Fisheries Commission for the identification of coded-wire-tag implants for research and gathering of management data, and is therefore not available for use without the consent of all Pacific Northwest fish management entities, including British Columbia; and

Whereas other marking techniques for identification of coded-wire-tag implants are now available to the Regional Mark Committee; and

Whereas the cooperation of all parties to the management of Pacific Northwest salmon and steelhead is essential to successful wild fish management in the Northwest; now, therefore,

Be It Resolved by the Legislative Assembly of the State of Oregon:

That we, the members of the Sixty-seventh Legislative Assembly, respectfully request that the Governor of the State of Oregon encourage the cooperation of the States of Alaska, California, Idaho and Washington, the Province of British Columbia and the Northwest Indian Treaty Tribes in establishing regionwide marking of all hatchery salmon, trout and steelhead by removal of the adipose fin before release; and be it further

Resolved, That the Sixty-seventh Legislative Assembly directs the State Department of Fish and Wildlife:

(1) To move as rapidly as possible toward marking all hatchery salmon, trout and steelhead in order to monitor achievement of escapement goals and wild fish policy compliance;

(2) To manage fisheries in a manner to promote the selective harvest of hatchery fish and productive wild stocks, while protecting weak wild stocks to achieve escapement goals;

(3) To work to restore wild fish to selectively harvestable levels wherever possible;

(4) To work with other Northwest fish management agencies to develop and implement as quickly as possible a plan to clip the adipose fin of all hatchery salmon, trout and steelhead in order to meet conservation goals and develop selective fisheries; and

(5) To report progress in the development of a fin clip plan to the Sixty-eighth Legislative Assembly.

ATTACHMENT A

Enrolled
House Joint Memorial 11

Introduced and printed pursuant to House Rule 13.01

To the Governors of the States of Alaska, California, Idaho and Washington, the Premier of the Province of British Columbia, the Executive Director of the Pacific States Marine Fisheries Commission, the administrator of the National Marine Fisheries Service and the Northwest Indian Treaty Tribes:

We, your memorialists, the Sixty-seventh Legislative Assembly of the State of Oregon, in legislative session assembled, respectfully represent as follows:

Whereas the preservation and enhancement of Pacific wild fish populations are vital to their use and enjoyment by present and future generations; and

Whereas harvest and utilization of hatchery fish releases are important to the maintenance of the social and economic values of Pacific fisheries; and

Whereas the health and future viability of wild salmon and steelhead runs are threatened by mixed-stock harvesting; and

Whereas hatchery-produced salmon, trout and steelhead can be safely and effectively marked by the removal of their adipose fin; and

Whereas removal of the adipose fin on salmon is sequestered by the Regional Mark Committee of the Pacific States Marine Fisheries Commission for identification of coded-wire-tag implants for research and gathering of management data, and is therefore not available for use without the consent of all Pacific Northwest fish management entities, including British Columbia; and

Whereas other marking techniques for identification of coded-wire-tag implants are now available to the Regional Mark Committee; and

Whereas the cooperation of all parties to the management of Pacific salmon and steelhead is essential to successful wild fish management; now, therefore,

Be It Resolved by the Legislative Assembly of the State of Oregon:

(1) The States of Alaska, California, Idaho and Washington, the Province of British Columbia and the Northwest Indian Treaty Tribes are urged to join the State of Oregon in the effort to fully mark hatchery salmon, trout and steelhead.

(2) The National Marine Fisheries Service is urged to cooperate fully with the state and provincial governments to desequester the adipose fin clip and thereby enable full marking of hatchery salmon, trout and steelhead.

(3) The Pacific States Marine Fisheries Commission and the Regional Mark Committee are urged to cooperate fully with the state and provincial governments to desequester the adipose fin clip and thereby enable full marking of hatchery salmon, trout and steelhead.

(4) The States of Alaska, California, Idaho and Washington, the Province of British Columbia, the Northwest Indian Treaty Tribes, the National Marine Fisheries Service and the United States Fish and Wildlife Service are urged to join the State of Oregon to work to restore fully wild fish populations to selectively harvestable levels wherever possible.

(5) Copies of this memorial shall be sent to the Governors of the States of Alaska, California, Idaho and Washington, to the Premier of the Province of British Columbia, to the Chiefs of the Northwest Indian Treaty Tribes, to the Executive Director of the Pacific States Marine Fisheries Commission and to the administrator of the National Marine Fisheries Service.

ATTACHMENT B

DRAFT

Whereas the preservation and enhancement of Oregon's wild fish populations are vital to their use and enjoyment by present and future generations of Oregonians; and

Whereas harvest and utilization of hatchery fish releases are important to the maintenance of the social and economic values of Oregon's fisheries; and

Whereas the avoidance of petitions for Oregon's wild fish under the Endangered Species Act is essential to the economic development of the state; and

Whereas the ability to fully harvest hatchery fish is precluded by the inability to differentiate between wild and hatchery fish in mixed stock fisheries; and

Whereas hatchery-produced salmon and steelhead can be safely and effectively marked by the removal of their adipose fin; and

Whereas removal of the adipose fin on salmon is sequestered by the Regional Mark Committee of the Pacific States Marine Fisheries Commission for the identification of coded-wire-tag implants for research and gathering of management data, and is therefore not available for use without the consent of all Pacific Northwest fish management entities, including British Columbia; and

Whereas the cooperation of all parties to the management of Pacific Northwest salmon and steelhead is essential to successful wild fish management in the Northwest; now, therefore,

Be It Resolved by the Legislative Assembly of the State of Oregon:

That we, the members of the Sixty-eighth Legislative Assembly, respectfully request that the Governor of Oregon encourage the cooperation of the States of Alaska, California, Idaho and Washington, the Province of British Columbia and the Northwest Indian Treaty Tribes, U.S. Fish and Wildlife Service and National Marine Fisheries Service in establishing regionwide marking of all hatchery salmon and steelhead by removal of the adipose fin before release, or through the use of another equally effective visual mark; and be it further

Resolved, That the Sixty-eighth Legislative Assembly directs the State Department of Fish and Wildlife:

ATTACHMENT C

Post-it™ Fax Note 7671	Date 2/14/95	# of pages ▶ 2
To JOE ROBLEDER GLEN SPAIN	From KAY BROWN	
Co./Dept.	Co.	
Phone # 503-563-6206 503-689-2500	Phone #	
Fax #	Fax #	

(1) To move as rapidly as possible toward marking all hatchery salmon and to continue to mark all hatchery steelhead in order to monitor achievement of escapement goals and wild fish policy compliance;

(2) To manage fisheries in a manner to promote the selective harvest of hatchery fish and productive wild stocks, while protecting weak wild stocks to achieve escapement goals;

(3) To work to restore wild fish to selectively harvestable levels wherever possible;

(4) To work with other Northwest fish management agencies to develop and implement as quickly as possible a plan to clip the adipose fin of all hatchery salmon and steelhead in order to meet conservation goals and develop selective fisheries, or to develop and implement alternative marking techniques that would allow visible means of identifying all hatchery fish from wild fish; and

(5) To report progress in the development of a marking plan to the Sixty-ninth Legislative Assembly.

(6) In developing a marking plan, to recognize an exemption to required marking may be appropriate for hatchery fish reared and released to rehabilitate natural populations, such as a Salmon-Trout Enhancement (STEP) Projects.

11/18/94

kb

WASHINGTON STATE LEGISLATURE
History of SB 5157

SB 5157 S Providing for conspicuous external marking of hatchery produced chinook salmon and coho salmon.

Sponsors: Committee on Natural Resources

-- 1995 REGULAR SESSION --

Feb 10 NAT - Majority; 1st substitute bill be substituted, do pass.
And refer to Ways & Means.
Feb 13 Referred to Ways & Means.

SB 5157 Providing for conspicuous external marking of hatchery produced chinook salmon and coho salmon.

Sponsors: Senators Owen; Drew; Sutherland; Hargrove; Oke; Haugen

Companion Bill(s): HB 1482

-- 1995 REGULAR SESSION --

Jan 12 First reading, referred to Natural Resources.
Feb 10 NAT - Majority; 1st substitute bill be substituted, do pass.
And refer to Ways & Means.
Feb, 13 Referred to Ways & Means.

ATTACHMENT D

SENATE BILL REPORT
SB 5157
As Reported By Senate Committee On:
Natural Resources, February 10, 1995

Title: An act relating to conspicuous external marking of hatchery produced chinook salmon and coho salmon.

Brief Description: Providing for conspicuous external marking of hatchery produced chinook salmon and coho salmon.

Sponsors: Senators Owen, Drew, Sutherland, Hargrove, Oke and Haugen.

Brief History:
Committee Activity: Natural Resources: 1/26/95, 2/10/95 [DPS].

SENATE COMMITTEE ON NATURAL RESOURCES

Majority Report: That Substitute Senate Bill No. 5157 be substituted therefor, and the substitute bill do pass and be referred to Committee on Ways & Means.
Signed by Senators Drew, Chair; A. Anderson, Hargrove, Haugen, Morton, Owen, Snyder, Strannigan and Swecker.

Staff: Ross Antipa (786-7413)

Background: Protection of endangered salmon species is a primary tenet of modern fishery management. Mixed stock salmon fisheries will harvest hatchery origin salmon, which can tolerate a high harvest rate, and natural origin (sometimes endangered) salmon, which cannot withstand a high harvest rate, in an indiscriminate manner.

If hatchery origin salmon could be easily identified by marking, then mixed stock fisheries could be conducted in such a manner as to allow harvest of hatchery origin salmon, and release of unmarked salmon of naturally spawning origin.

Summary of Substitute Bill: Coho salmon and chinook salmon produced in salmon hatcheries are marked for the purpose of identification in mixed stock fisheries.

Substitute Bill Compared to Original Bill: References to commercial fisheries are removed. The marking of all appropriate coho and chinook salmon will be fully implemented by

June 30, 1997.

Appropriation: $5 million.

Fiscal Note: Requested on January 18, 1995.

Effective Date: Ninety days after adjournment of session in which bill is passed.

Testimony For: The mass marking program is the future of the recreational fishery and the state of Washington must move forward to enact the program.

Testimony Against: Commercial fishermen are concerned that the mass marking program could reduce their opportunity to harvest salmon.

Testified: Bob Lake, Willpa Bay Gillnetters; Les Clark, NW Gillnettters Assn.; PRO: Don Collen, Wildcat Steelhead Club; Bruce Crawford, WDFW; Shari Stoican; David Holdsworth, All Points Maritime Services; Frank Urabeck, Trout Unlimited; Bruce Ferguson; Herbert Shepard, Charter Boat Assn. of Puget Sound; Jack Swanberg, NW Marine Trade Assn.; Don Stuart, Salmon For WA; Vernon Young, Federation of Fly Fishers; Ross Warren, President, Puget Sound Anglers; John Sayre, Long Live the Kings; Tom Bennett, Geoff Grillo, Westport Charter Boat Assn.; CON: Pat Hamilton, Pacific County Commission; Richard Good, WA Trollers Assn.

S-1130.2

SUBSTITUTE SENATE BILL 5157

State of Washington 54th Legislature 1995 Regular Session

By Senate Committee on Natural Resources (originally sponsored by Senators Owen, Drew, Sutherland, Hargrove, Oke and Haugen)

Read first time 02/13/95.

AN ACT Relating to conspicuous external marking of hatchery produced chinook salmon and coho salmon; adding new sections to Title 75 RCW; and making an appropriation.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF WASHINGTON:

{+ NEW SECTION. +} Sec. 1. The legislature declares that the state has a vital interest in the continuation of recreational fisheries for chinook salmon and coho salmon in mixed stock areas, and that the harvest of hatchery origin salmon should be encouraged while wild salmon should be afforded additional protection when required. A program of selective harvest shall be developed utilizing hatchery salmon that are externally marked in a conspicuous manner, regulations that promote the unharmed release of unmarked fish, when and where appropriate, and a public information program that educates the public about the need to protect depressed stocks of wild salmon.

{+ NEW SECTION. +} Sec. 2. The department shall mark appropriate coho salmon that are released from department operated hatcheries and rearing ponds in such a manner that the fish are externally recognizable as hatchery origin salmon by fishers for the purpose of maximized catch while sustaining wild and hatchery reproduction.

The department shall mark all appropriate chinook salmon targeted for contribution to the Washington catch that are released from department operated hatcheries and rearing ponds in such a manner that the fish are externally recognizable as hatchery origin salmon by fishers.

The goal of the marking program is the annual marking by June 30, 1997, of all appropriate hatchery origin chinook and coho salmon produced by the department with marking to begin with the 1994 Puget Sound coho brood. The department may experiment with different methods for marking hatchery salmon with the primary objective of maximum

survival of hatchery marked fish, maximum contribution to fisheries, and minimum cost consistent with the other goals.

The department shall coordinate with other entities that are producing hatchery chinook and coho salmon for release into public waters to enable the broadest application of the marking program to all hatchery produced chinook and coho salmon. The ultimate goal of the program is the coast-wide marking of appropriate hatchery origin chinook and coho salmon, and the protection of all wild chinook and coho salmon, where appropriate.

{+ NEW SECTION. +} Sec. 3. The department shall adopt rules to control the mixed stock chinook and coho fisheries of the state so as to sustain healthy stocks of wild salmon, allow the maximum survival of wild salmon, allow for spatially separated fisheries that target on hatchery stocks, foster the best techniques for releasing wild chinook and coho salmon, and contribute to the economic viability of the fishing businesses of the state.

{+ NEW SECTION. +} Sec. 4. The sum of five million dollars, or as much thereof as may be necessary, is appropriated for the biennium ending June 30, 1997, from the general fund to the department of fish and wildlife for the purposes of section 2 of this act.

{+ NEW SECTION. +} Sec. 5. Sections 1 through 3 of this act are each added to Title 75 RCW.

--- END ---

DAN HAMBURG
1ST DISTRICT, CALIFORNIA

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Congress of the United States
House of Representatives
Washington, DC 20515

ECONOMIC DEVELOPMENT
SURFACE TRANSPORTATION
WATER RESOURCES AND ENVIRONMENT

MERCHANT MARINE AND FISHERIES
ENVIRONMENT AND NATURAL RESOURCES
FISHERIES MANAGEMENT

Testimony of Representative Dan Hamburg
Appropriations Subcommittee on Energy and Water Development
April 12, 1994

Mr. Chairman, thank you for the opportunity to address you regarding the investment needs in the energy and water resources of California's First District.

The West Coast salmon fisheries are in crisis. Stocks in Northern California and the Pacific Northwest are in decline and numerous petitions for listings under the Endangered Species Act have been filed. The most restrictive salmon fishery regulations in history were adopted last week by the Pacific Fisheries Management Council.

River spawning habitat problems created by federally licensed dams and agricultural and forest practices have been agagravated by seven years of drought and two years of El Nino ocean conditions. We must pursue new initiatives to reverse the salmon's decline. I ask your support for a **pilot salmon marking program** to maximize commercial and recreational harvest of hatchery fish while relieving pressure on wild stocks. Marked hatchery fish will be harvested and wild stocks released to allow their recovery.

Marking costs in FY95 (estimated $2.05 million) include a one time cost of $750,000 for equipment acquisition. In addition to marking the hatchery fish, studies to evaluate hooking mortality and gear modification associated with the ocean troll fishery, in-river sport and gill net fisheries, and an alternative terminal fishery must be funded to enable reliable evaluation and utilization of the selective fishery (estimated FY 95 cost $570,000). Annual program evaluation costs are estimated at $220,000.

Electronic equipment will need to be purchased to preserve and expand data collection through detection of coded wire tags currently implanted in a small percentage of hatchery fish (estimated FY 95 cost $430,000). Enhancement of the State of California's sampling of the ocean fishery (estimated FY 95 cost $200,000) and assistance from the Pacific States Marine Fisheries Commission (estimated FY 95 cost $15,000) will be necessary to fully implement the program.

The total cost for FY 95, the first year of this five year program is $3.4 million. (Estimated cost for each of the next four years is $1.52 million.) This pilot project will mark all of the approximately 60 million hatchery-produced chinook salmon in S. Oregon and California.

The Central Valley project and other Reclamation activities have had a direct impact on Central Valley and Trinity River salmon stocks. Approximately 50% of the fish to be marked are produced at Trinity, Nimbus, and Coleman hatcheries built to mitigate CVP effects. I am asking that 50% of the pilot project's costs, **$1.7 million,** be funded from the Bureau's accounts. The **Central Valley Project Restoration Fund,** which has a goal of doubling wild stocks of anadromous fishes, **General Investigations** with its increased focus

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ATTACHMENT E

on ecosystem management and fish and wildlife resource protection and enhancement, and **Operations and Maintenance** which funds hatcheries should all be considered together with an increase of the **Bureau's baseline budget** to offset project costs.

This hatchery marking pilot program is important for the salmon fishery all up and down the Pacific coast. It is the best hope for preserving a commercial and sports fishery and restoring salmon runs. Without a selective fishery, either the fish or the fishing economy may disappear before critical watershed restoration work to rebuild salmon spawning habitat is completed.

Mr. Chairman, I also wish to draw your attention to the **Winter-run Chinook Salmon Captive Broodstock Program** designed to reverse the decline of this endangered Sacramento River stock through captive breeding. Recovery of this run is a critical element of rebuilding the commercial fishery in California. No funds were recommended for this program this year. It makes no sense to discontinue this two year old program which was supported in FY 93 and FY 94 with $300,000 from the Bureau of Reclamation. Bureau funding of **$400,000** from the **CVP Restoration Fund** is necessary for this critical program in FY95.

I would also like to stress the importance of full funding for all habitat restoration, improvement, and acquisition projects through the Central Valley Project Restoration Fund, and the **Trinity River Restoration Program** for which the President seeks **$5 million** in FY 95. The hatchery and broodstock programs can succeed only if habitat restoration is pursued aggressively.

EXECUTIVE SUMMARY

DRAFT

Conservation concerns for wild salmon have increased interest in exploring alternative management approaches that permit harvest while reducing impacts on stocks needing protection. One such approach is the implementation of selective fisheries which would allow retention of marked hatchery fish while requiring release of unmarked fish. Although conceptually attractive, little is known about the potential impacts of selective fisheries on wild stocks or current management tools. Because of the importance of conservation and potential implications of selective fisheries for the coastwide coded-wire-tag (CWT) system, the Pacific Salmon Commission (PSC) established an ad-hoc committee in October, 1993, to complete an assessment of selective fisheries. The assessment focused on two general questions:

Can selective fishery regulations reduce harvest rates on unmarked salmon and can total exploitation rates be reduced and spawning escapements increase as a result?,

Can the viability of the existing coastwide CWT program for stock assessment and management planning be maintained if selective fisheries are implemented?

More specific questions related to the two general questions and other potential, selective fishery implementation issues are used to frame the information presented in this Executive Summary.

1. Can selective fisheries be applied to both chinook and coho salmon?

At this time, selective fisheries are only considered feasible for coho salmon. The logistics of marking chinook salmon are more difficult than for coho because of the large numbers of juvenile chinook salmon that would have to be marked, the smaller size of fish at release, the limited time for marking, and the necessity of handling the fish shortly before release. The complex life history of chinook, involving migration over multiple seasons and extensive geographic areas, greatly increases the difficulty of selective fishery assessment. Further, impacts of selective fisheries on chinook salmon would likely extend coastwide, increasing both costs and the difficulty of coordinating implementation. Because of these factors, our assessment focuses on evaluation of selective fisheries for coho salmon.

Recommendation:

1) **Selective fisheries should not be considered for chinook salmon at this time.**

2. What external mark should be used to identify a hatchery fish?

Under selective fisheries, fish that can be retained must be easily distinguished from fish that are to be released. The adipose fin clip and ventral fin clip were evaluated as the two most feasible mass marks for selective removal on the basis of five criteria: ease of application; cost of application; ease of recognition by an untrained observer; mark induced

mortality; and stability over the life of the fish. The adipose fin is superior across all criteria.

A Selective Fishery Model (SFM), was developed and used to evaluate the effectiveness of various selective fishing scenarios involving stocks with different patterns of exploitation. Based on assumed lower mark induced mortality and marked recognition error rates, escapements of unmarked fish and catch levels were higher with adipose clips than with ventral clips. Also, biases in CWT-based cohort analysis were lower for adipose clips than for ventral clips for the same reasons.

Recommendations:

2) **The adipose fin should be used as the mass mark for hatchery coho if selective fisheries are implemented.**

3) **Research should be undertaken to provide improved estimates of mark induced mortality and marked recognition error rates for adipose-clipped fish.** Definitive data are not yet available to enable reliable estimation of these critical factors.

3. Can a selective fishery reduce harvest rates on unmarked stocks?

A fishery harvest rate is defined as the proportion of a total population available to a fishery that is killed by that fishery, whether as landed catch or incidental mortality. Harvest rates are assumed to be identical for all groups of fish available to the fishery.

Results from the SFM indicate that harvest rates on unmarked fish in selective fisheries can be substantially reduced. However, the magnitude of the reduction was variable, ranging from 10% to 80% and increased as release mortality of the gear decreased. Recreational gear, traps, and beach seines are believed to have the lowest release mortality rates. Gillnets and purse seine fisheries in which a large number of fish are caught per set are believed to have the highest release mortality rates. Troll and purse seine fisheries in which a small number of fish are caught per set are believed to have intermediate release mortality rates. The size of harvest rate reductions also depends to a lesser degree on the encounter rate of unmarked fish, marked recognition error (the probability that a marked fish will be inadvertently released), and the probability of multiple recapture of released fish.

4. Can the reduced mortality of unmarked stocks in a selective fishery be translated into reductions in total stock exploitation rates and increases in escapement?

A total stock exploitation rate is defined as the proportion of the initial cohort size that is killed by fishing, whether through landed catch or incidental harvest. The effectiveness of selective fisheries in reducing total stock exploitation rates and increasing escapements of unmarked fish varies depending upon the exploitation pattern of individual stocks as well as the regulations, placement, and size of the selective fishery.

Compared to the current situation where no fisheries are selective, we estimate that total stock exploitation rates of most unmarked stocks can be expected to be reduced by less than 5% under scenarios involving only a single selective fishery. If all fisheries were to operate under selective regulations, total stock exploitation rates of unmarked fish can be expected to be reduced from 20% to 60%.

Changes in wild salmon spawning escapements were found to depend upon the proportion of a stock available to the selective fishery, the harvest rate reduction in the selective fishery, and the harvest of unmarked fish in nonselective fisheries.

5. How would the catches and incidental mortality in the fisheries be affected?

In our assessment, landed catch declined significantly in all cases for selective fisheries, compared to nonselective regulation. Across the range of selective fisheries simulated, landed catches in the selective fisheries were reduced by between 30% and 70%. Declines in catch levels varied with the proportion marked, the degree of marked recognition error, reduced abundance of marked fish due to mark induced mortality, and the proportion of the harvested population that is marked. The total catch in nonselective fisheries generally increased. This results from the reduced harvest rate on the unmarked fish and the marked recognition error in the selective fishery which creates greater abundance in subsequent fisheries. Incidental mortalities due to release mortality increased significantly (100% to 400%) in all selective fishery scenarios examined.

6. Can the viability of the CWT program be maintained?

Because the CWT is central to management of chinook and coho salmon, the viability of the CWT program is of vital concern. For this assessment, the viability of the CWT system is defined as:

- The ability to use CWT data for assessment and management of wild stocks of coho and chinook salmon;
- Maintaining the program such that the uncertainty in stock and fishery assessments and their applications does not unacceptably increase management risk; and
- The ability to estimate stock-specific exploitation rates by fishery and age.

Based upon our analysis, it is apparent that the viability of the CWT program will be impaired if selective fisheries are implemented on a broad scale. Substantial changes to tagging and recovery programs will be needed to minimize the potential loss of management information. Interagency coordination in research and management methods must be increased to reduce the risk to the CWT system. Further, during transition periods when selective fisheries are either implemented or terminated, there is a higher risk that management capabilities would be degraded.

To minimize the loss of information if selective fisheries are implemented, the CWT program should be modified as follows:

Recommendations:

4) **Implement double index tagging of marked (ad-clip + CWT) and unmarked (CWT only) hatchery groups.** Double index tagging involving the use of paired replicates will be required regardless of which mass mark type is finally chosen. This will approximately double the numbers of tags released for indicator stocks.

5) **Employ electronic detection of CWTs and random sampling of all fisheries and the spawning escapement. CWTs of 1-1/2 length should be used to increase the reliability of electronic detection.** Voluntary recovery of tags in recreational fisheries based on visual identification would no longer be possible so random sampling of recreational fisheries would be required.

6) **Maintain "adequate" levels of tagging and recovery sampling.** Our ability to generate useful estimates from the CWT system depends upon the recovery of a sufficient number of CWTs. Specific levels of tagging and sampling will depend upon the objectives of the CWT program and selective fisheries.

7) **Ensure extensive inter-agency cooperation and coordination of mass marking, CWT recovery programs, and selective fishing.** Unilateral implementation would affect multiple jurisdictions and severely disrupt the viability of the CWT program. The viability of the CWT program can be a matter of concern to managers who do not conduct selective fisheries within their own jurisdictions because tagging studies that produce fish that enter the fishery may be significantly impacted.

8) **Associate wild fish tagging programs with a representative hatchery marking program within the same production area for stocks that are significantly impacted by selective fisheries.** Wild fish survivals and production cannot be evaluated without paired CWT experiments.

Even with these efforts, however, some information and aspects of the present CWT program will be compromised or lost.

- The independence of tag groups, particularly of wild tagging programs will be lost. Unmarked hatchery and wild tag groups must now be associated with marked and tagged hatchery groups in order to maintain all the present information.

- Uncertainty in our estimates and assessments based on CWT's will increase due to a requirement for additional assumptions.

- We will not be able to correctly allocate incidental mortalities when multiple selective fisheries occur. This loss would become increasingly important for assessment of wild stocks, fisheries management, and allocation as incidental mortalities increase.

- Our ability to estimate catch compositions and interceptions may be compromised. The size of the problem would be directly related to the scale of the marking program and selective fisheries.

On the other hand, in some ways, selective fisheries can improve the basis for fisheries management. For example, electronic detection of CWTs and random sampling of recreational catch could improve the precision of estimates that currently rely on voluntary tag recoveries. In addition, the marking of all hatchery fish would increase the accuracy of accounting for this production in fisheries or in escapement.

7. What are the costs associated with implementing a selective fishery program?

The monetary costs of selective fisheries are substantial. The table below summarizes some of the costs associated with implementing selective fisheries in the Strait of Georgia and Puget Sound. These costs represent the minimum for establishment of a selective fishery for coho in the Southern Panel area. Cost estimates do not include expenses associated with evaluation, or implementation in other areas of the U.S. whose stocks or recovery programs may be affected, or revisions to analytical tools and management models.

Country	Capital Investment (US$)	Annual Operation (marking, tagging & sampling) (US$)
United States	1.446 million	0.844 million
Canada	1.219 million	0.893 million

The implementation cost for establishing the first selective fishery would be high since major changes to the sampling programs and management would be required. The costs of implementing additional selective fisheries would be lower since the major modifications would already be in place.

There are also costs associated with reduced catches, the loss of fish due to mark induced mortalities and increased incidental mortalities during selective fisheries. These costs could be large, depending on the selection of mass mark, the gear, the scale of the selective fisheries, and the ratio of marked to unmarked fish in the fishery.

8. How should selective fisheries be evaluated?

Considerable uncertainty exists around the outcomes predicted by our assessment, due to our limited experience with selective fisheries and the inherent variability in the many factors and processes defining selective fisheries. Given the uncertainty of expected outcomes, assessment of the effectiveness of any selective fishery implemented will rely heavily on observation and measurement of actual outcomes. Spawning escapement, total fishing mortality, exploitation rate, fishery opportunity and economic benefits and costs, are outcomes that can be monitored and used to assess the effectiveness of management programs involving selective fisheries.

Recommendation:

9) **Selective fishery programs should not be implemented without specific, measurable criteria to provide an objective basis for performance evaluation.**

10) **Differences in exploitation or escapement rates between paired replicate, double index tag groups should be the primary means of evaluating the impact of selective fishery regimes on individual stocks.**

9. Where to from here?

Ultimately, decisions about selective fisheries will rest upon value judgements contrasting wild stock conservation and fishing opportunities against the loss of information essential for management and the financial costs of implementation. While selective fisheries may prove to be a useful tool in achieving certain management objectives, alternative means exist which would be less costly to implement and pose less risk to management capabilities; e.g. time and area closures, catch ceilings, bag limits, etc.. These alternatives should be fully considered and evaluated when considering implementation of selective fisheries.

To implement selective fisheries while maintaining a viable CWT program will require a full and coordinated effort by all marking and affected sampling agencies, allocation of funds for new equipment and sampling programs, and modification of management models to incorporate selective fisheries.

Recommendations:

11) **Establish and adopt a protocol for selective fishery proposals to provide for effective review and concurrence of all jurisdictions that would be substantially impacted.**

12) **A minimum lead time of two years prior to implementation of selective fisheries should be provided for interagency coordination and installation of necessary changes in catch sampling technology and monitoring programs.**

13) Mass marking of hatchery fish by removing adipose fins should not be permitted until interagency coordination has occurred and assurances are received from affected jurisdictions that the capability to recovery CWTs through electronic sampling will be in place. If poorly implemented, selective fisheries could incur high costs while producing few benefits to fisheries and, at least temporarily, the loss of management capabilities.

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Draft 02/14/95)

Appendix 1. Protocol For Selective Fishery Proposals

The Ad Hoc Selective Fishery Evaluation Committee is aware that specific proposals for marking hatchery produced coho and chinook, and for the implementation of selective fisheries, are under consideration by several management agencies. Although these proposals are likely to be generated by individual management entities, the effects of selective fishery programs are not likely to be contained to the local or regional level. Recognizing the interjurisdictional nature of selective fisheries, and the importance of coordination or cooperation in realizing management success, the Committee recommends that initiating organizations include the following key elements in their proposals:

1) Problem statement;

2) objective;

3) description of the proposal;

4) implementation;

5) costs;

6) analysis and estimation of effects;

7) alternatives to the selective fishery proposal; and

8) evaluation.

These key elements will facilitate effective and complete assessment of a selective fishery proposal.

1.1 Problem Statement

Since selective fisheries require major changes to current management and tagging practices, a stock or fishery management condition must exist that compels managers to undertake these changes. A description of the current condition, including a statement that defines the need for change, will provide the context for the proposal. The statement may address a changing resource condition, an inability to affect necessary protection using existing management actions, or fishery outcomes that are considered unacceptable.

1.2 Objective

Implementing a selective fishery program should result in a specific outcome that remedies the existing problem defined above. Success of the program is dependent upon the

ability to evaluate achievement of a specific and measurable outcome.

If the problem is related to a resource condition, the objective will reflect desired changes in the status of the resource. A review of the current status of the species, stock or population, preferably in quantitative terms, would clarify the concern. For example, the objective may be to increase escapement of wild fish by reducing the rate of exploitation relative to levels measured in recent years. If the objective is to increase spawning escapement, then the statistic to be used in evaluating success must be specified (e.g., average percent increase over a base period).

The objective may address fishery objectives, such as stable fishing opportunity, in terms of season length or the number of anglers participating in the fishery. Again, the desired outcome must be specified in measurable terms. For example, if the objective is to increase harvest, then specification must include the magnitude of the effect in direct terms (e.g., average 200,000 angler trips over a three year period) or relative terms (e.g., a 10% increase over a base period average).

1.3 Description of the Proposal

The scope of the selective fishery program is defined by subprograms for marking, tagging, sampling, assessment, and management, as well as a description of the selective fisheries involved.

Marking. The marking regime enabling selective fishing is defined by:

1) The stocks to be marked;

2) the portion of the production to be marked; and

3) the type of mark to be employed.

Logistical considerations, such as schedules and costs, are delineated in another section of the proposal description.

Tagging. The tagging subprogram should be described in terms of the design to be employed for coded-wire tagging and recovery, particularly for the purpose of estimating stock specific fishery effects of interest to the evaluation of the selective fisheries program. A description of the existing program will provide perspective for understanding the degree of change necessitated by implementation of the selective fishery program. A description of hatchery stock and wild stock tagging design should include the number of tagged fish and the proportion of the stock to be tagged.

Sampling. The sampling subprogram description should identify changes to existing programs necessitated by the introduction of selective fishery. This subprogram is obviously tied to design of the tagging subprogram. Recognizing the interjurisdictional nature of coho

and chinook salmon management, in particular with regard to the CWT program, a description of sampling program changes is incomplete if it does not include implications to sampling of fisheries beyond the region in which the selective fishery proposal originates.

Important elements of the sampling subprogram description include plans for collection of information within the selective fisheries such as CWT's, encounters of marked/unmarked fish, catches and effort. Sampling of nonselective fisheries should be included as well as the description of selective fishery activities.

The design of escapement sampling programs, which are likely to change with the implementation of a hatchery marking program, should be included.

Assessment. The assessment subprogram is a description of the quantitative management tools to be employed in estimating the expected outcomes of the program as well as those used for analyzing actual outcomes. Stock impact assessment methods or procedures to be described include:

1) Fishery simulation models used in management planning;

2) postseason stock contribution methods and models (e.g., stock composition models); and

3) inseason fishery management procedures (e.g., terminal area runsize estimators).

Changes anticipated in the methods used to control impacts of the fisheries, such as harvest quotas, should also be included.

General Management. General management activities requiring description include (1) enforcement and (2) public education. These are essential components of a successful selective fishery considering the degree of change to the conduct of fisheries from the perspective of participating fishers.

Selective Fisheries. A description of the fisheries to be selective must include definition of gear type (e.g., recreational, hook-and-line), time (e.g., seasons), and areas for which the selective regulations apply. Regulations defining the selection process can vary and must be specified. For example, limited retention of unmarked fish may be allowed as an alternative to a complete selective fishery. For recreational fisheries, selectivity is regulated by the daily bag limit and commercial fishery selectivity options may include landing limits (e.g., percentage of total landings or daily limit).

1.4 Implementation

In order to provide potentially affected management entities and fishery participants an opportunity to respond to a selective fishery proposal, activity schedules and decision processes of the program must be defined.

A specific time-line for activities is important since marking and tagging projects will be initiated approximately two years in advance of the actual selective fishery. Any selective fishery program that is implemented will likely be conducted over an extended period. For the purpose of program evaluation, the proposal should specify the period of time required to effectively assess actual outcomes.

If the proposal affects management agreements, compacts, laws, policies or plans existing between the initiator of a proposal and potentially affected parties, then the process required for modification of those management structures must be described. For example, it is likely that selective fisheries will result in modification of harvest sharing or hatchery production levels and will require changes to programs for collection of information vital to the management of wild salmon (e.g., the CWT program). If these issues are important elements of existing management agreements or plans, then the process for modification of those agreements needs to be specified.

1.5 Costs

To appreciate the net benefit of a selective fishery program, some detail of the cost must be included with a proposal. Direct costs to be detailed include capital outlays (equipment) and annual expenditures for the marking, tagging, and sampling subprograms. New expenses for managing the program, such as for enforcement or public education, should be included. Given that selective fisheries are not contained to the initiating management jurisdiction, estimates for likely costs incurred by other management entities should be included (although it is recognized that these estimates would most appropriately be provided by the affected management entities).

1.6 Analysis and Estimation of Effects

Benefits of a proposal are described by the expected changes in fishery impacts caused by implementation of selective fisheries and a comparison of those outcomes with the objective of the program. The Committee has developed procedures for estimating such effects, employing computer simulation of the interaction of stocks and fishing processes. This selective fishery simulation model is available for application to particular proposals but development of alternative approaches is encouraged. Estimation of expected effects is sensitive to the input data describing stock and fishery characteristics, and assumptions related to processes such as release mortality, migration, effort changes in the fishery and mortality caused by marking. To be interpreted, the proposal must include a full description of input data sources and assumptions.

1.7 Alternatives to the Selective Fishery Proposal

Management actions to address a problem, such as the need to reduce impacts on wild fish, are obviously not limited to selective fisheries. The problem may also be addressed by regulating fisheries by seasonal closures and area restrictions, daily bag and other catch limitations. In order to judge the effectiveness of selective fisheries, a proposal should

include comparison to alternative approaches.

1.8 Evaluation

Uncertainty about outcomes of a selective fishery program make it important to plan for direct measurement of actual effects. If the problem statement addresses the status of wild fish, then what wild fish characteristics must be measured to evaluate the program's success? How will outcomes be analyzed and for how many years must data be collected to effectively conclude a change is attributable to the selective fishery? If fishery outcomes are important to the definition of success, then what statistic will be used to gauge improvement in the current condition? Are angler surveys planned to address angler satisfaction with the changes in fishing practices expected with selective fisheries? How do the actual costs of the program compare with the costs expected when the proposal was developed? All expected outcomes have actual counterparts that should be measured and analyzed in order to provide accountability for management actions.

SELECTIVE FISHERY MANAGEMENT FOR COHO SALMON IN THE PACIFIC NORTHWEST REGION

The Problem

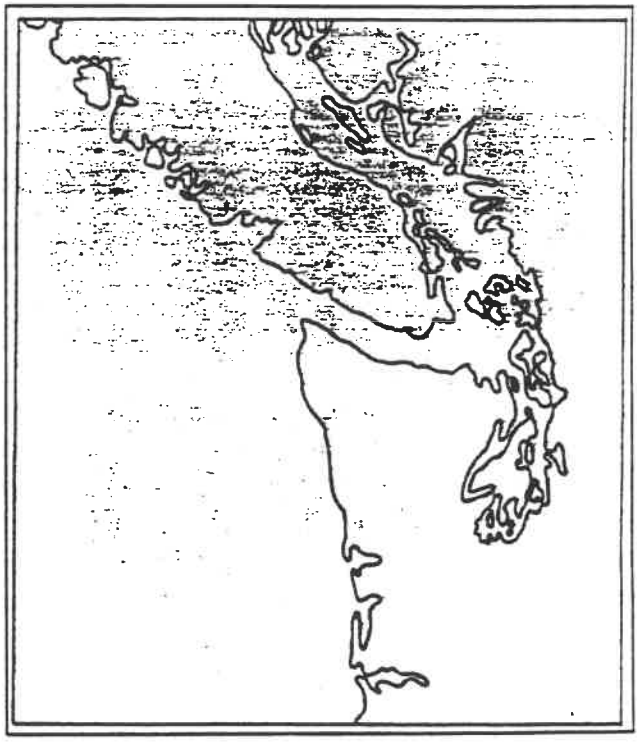
One fishery management response to poor status of wild salmonid populations in the Pacific Northwest region has been severe curtailment of fishing activity, including total closure of most southern U.S. recreational fisheries harvesting coho and chinook salmon in waters of the Pacific Ocean, Columbia River and Puget Sound. Without new management approaches that improve the efficiency of taking harvestable hatchery fish in these mixed-stock fisheries, citizens of Washington could face continued loss of curtailed fishing opportunity and loss of economic benefits associated with these fisheries.

The Objective

Enhance existing fishery management effectiveness in reducing fishery exploitation rates on wild coho salmon by applying conspicuous marks to hatchery coho salmon and regulating fisheries for selective harvest of these fish, requiring release of unmarked and wild fish. Maximize the benefit of hatchery produced coho by increasing recreational fishery opportunity in mixed-stock marine fishing areas. Achieve reduced fishery exploitation rates and fishery objectives in a manner consistent with Indian Treaty obligations.

Description of the Proposal

A selective marking program is proposed for hatchery **coho** that maximizes the proportion of marked fish throughout the region, enabling selective fisheries to operate in <u>all</u> Washington waters at the earliest possible date: **1998**. Success of the proposal requires that marking, fishery management and evaluation be conducted in coordination with state, federal and tribal management and hatchery producing entities from Washington, Oregon and Canada. Failure to proceed as a coordinated, coastwide program will result in a low number of marked fish available to mixed-stock fisheries, loss of information critical to management of wild salmon, and a general erosion of the cooperative management environment essential to achievement of common conservation and allocation objectives.



A selective fishery program will not

replace or reduce the need for regulating fisheries with existing techniques. Objectives for rebuilding depressed wild coho runs cannot be achieved solely through selective harvest by Washington's recreational fisheries. Also, the need for aggressive conservation actions in other resource management areas, such as habitat protection, are not at all diminished by implementation of selective fisheries. This selective fishery program is intended to complement management plans, agreements and processes that currently exist or that will be adopted.

This initial coho proposal program will not address conservation issues associated with chinook salmon. Existing technology for marking hatchery production cannot be applied successfully to fall chinook, due to the large number and small size of releases. Research and development on this capability is in progress.

The Marking- Hatchery produced coho from Puget Sound, Coastal Washington, Columbia River, Coastal Oregon and Canada are to be marked with excision of the adipose fin. Adipose fin removal is currently the most effective, least costly process for conspicuously marking hatchery fish, although research and development of alternatives continues.

Success of selective fisheries is directly related to the proportion of the fish marked and available for harvest. Since many hatchery coho are produced by entities other than the WDFW, cooperation with federal, tribal, Oregon and Canadian management entities is essential to ensuring that the proportion of fish marked and available for harvest in Washington fisheries will achieve desirable levels. For example, the majority of Columbia River coho production is funded from federal sources, while approximately one-third of Puget Sound production originates from tribal facilities. WDFW is aggressively seeking cooperation with the other coho producing entities. Current WDFW production of yearling coho is approximately 36 million.

REGION	YEARLING COHO
Puget Sound	11,565,000
Coast	6,800,000
Columbia River	17,595,000
TOTAL	35,960,000

The Fisheries- All marine and freshwater recreational fisheries in Washington would be regulated for selective harvest of hatchery coho. Success of this selective fishery proposal depends on marking hatchery fish from all regions. If, for example, production from the Columbia River is not marked, the selective fisheries in ocean waters may not be conducted. Specific regulations for the 1998 season will be developed as part of public process. Bag limits defining the number of marked fish that may be retained (and in special cases the number of unmarked fish that may be retained) depend upon relative abundance of marked and unmarked fish as well as the abundance and status of coho stocks in a particular year.

Non-Indian commercial fisheries have the potential to utilize conspicuous marking for selectiv fishery purposes and specific applications will be considered, consistent with the objective of

maximizing value of coho and chinook salmon utilization. WDFW plans to work with the commercial industry to modify and develop gear to enable relatively benign capture and release methods.

The distribution of coho catches under the selective fishery management regimes being considered is expected to differ from patterns observed in recent years. Greater numbers of wild fish escaping selective fisheries could provide for increased opportunities to harvest hatchery fish in terminal areas. Alternatively, a larger proportion of hatchery fish might be taken in fisheries that are selective. It is expected that some reduction in the survival of hatchery fish will result from the marking process. The affects of catch changes will be evaluated prior to adoption of specific fishing plans and regulations and Indian Treaty sharing objectives will be accomplished through adjustment of the number of fish marked and fishing controls.

Evaluation- Information about the stock specific impact of fisheries is the foundation of effective Pacific Salmon management. The single, most important source of this information is the Coded Wire Tagging (CWT) program. The CWT program for Pacific Salmon is a coordinated and long-term information collection system, cooperatively conducted by all management entities in the region. Importance of the CWT program is reflected in the Pacific Salmon Treaty, in which the Parties define the necessity of maintaining a coast-wide stock assessment and management data system. CWT data are the basis for estimates of abundance, harvest allocation estimates, and the measurement of effectiveness of the selective fishery program itself.

Success of the selective fisheries program proposed here relies on use of the adipose fin as the conspicuous marking method. This requirement could potentially result in loss of information considered critical to management of wild coho. Modification to existing tagging and sampling procedures of the CWT program can offset many of the negative effects of the selective fishery program, but these modifications will have a high cost.

Modification to procedures for detecting CWTs in coho, whether they are caught in selective or non-selective fisheries, involves application of new technology. Electronic detection equipment must be installed or available for use at all hatcheries and for sampling recreational and commercial fisheries as well as wild salmon spawning areas. The design of tagging and sampling programs must also be modified in order to be able to estimate the specific effect of selective fishing on wild coho salmon. Equipment and design modification must be made in concert with the coast-wide management community to avoid loss of vital information.

Evaluation of selective fishery effects is necessarily a long-term process. Annual variation in abundance and distribution of coho, the variation in fishery regulations, patterns and conduct, and measurement errors, mean that the true effectiveness of selective fishing as a management tool can only be evaluated over a long-period. Investment in the information collection system described by this proposal is for a minimum of ten years.

Schedule- To be implemented effectively at the earliest possible date, the program must be initiated immediately. Design modification and coordination of marking, tagging and sampling, as well as additional testing of new procedures and equipment can be accomplished prior to actual planning of fisheries for 1998.

Actual marking of WDFW statewide coho production is planned to start in the spring of 1996, with release of marked coho occurring in the spring of 1997. These fish will enter the fishery in 1988.

Costs- Estimated annual ($1,070,000) and one-time, equipment ($1,631,000) costs for adipose marking and sampling of WDFW hatchery coho for selective fisheries are presented in the following table. Cost estimates are based on electronic detection for CWTs and include additional tagging associated with evaluation. Sampling costs include fishery and hatchery rack activities.

ANNUAL COSTS				
Activity	**PUGET SOUND**	**COAST**	**COLUMBIA RIVER**	**TOTAL**
Marking	$234K	$133K	$323K	$690K
Sampling	$300K	$40K	$40K	$380K
Total Costs	$534K	$173K	$363K	$1,070K
EQUIPMENT COSTS				
Activity	**PUGET SOUND**	**COAST**	**COLUMBIA RIVER**	**TOTAL**
Marking	$240K	$120K	$360K	$720K
Sampling	$585K	$126K	$200K	$911K
Total	$825K	$246K	$560K	$1,631K

Oregc

DEPARTMENT
FISH AND
WILDLIFE

February 16, 1995

Mr. Bruce Crawford
Assistant Director
Fish Management Program
Washington Department of
Fish and Wildlife
600 Capitol Way N.
Olympia, WA 98501-1091

Dear Mr. Crawford:

In response to your January 23 letter to Jim Martin regarding mass marking hatchery coho salmon, I have attached the talking points we spoke from at today's annual meeting of the Regional Mark Committee. In summary, Oregon's proposal to mass mark hatchery coho in the Oregon Production (OPI) area is consistent with your proposal to mark all Washington State hatchery coho. Our announcement at today's meeting represents a formal notification of intent, consistent with regional recommendations that any such decision involve two years' lead time.

We are committed to aggressively pursuing marking all hatchery coho in the OPI area, beginning with the 1995 brood and continuing for at least five years. We are also committed to pursuing this in a manner principally consistent with the recommendations of the Pacific Salmon Commission Committee on Selective Fisheries. We intend to meet with representatives from agencies responsible for releasing OPI hatchery coho, including your agency, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. We are anxious to work with the Washington Department of Fish and Wildlife and other pertinent parties in refining a regional joint proposal, as you alluded to in your letter. We also intend that any implementation arrangement be consistent with the Columbia River Fish Management Plan under U.S. v Oregon, and will contact the Columbia River Treaty Tribes in the near future to initiate discussion of our proposal. Finally, we will coordinate our planning with other important hatchery coho producers in Oregon, specifically the Clatsop Economic Development Committee and the Port of Newport.

We realize that significant problems are unresolved at this time. Funding stability remains as a challenge that we hope can be jointly solved. A truly operational strategy that achieves the expected protection of wild coho has yet to be agreed to. However, we feel the conceptual framework in place will allow for these and other problems to be resolved.

2501 SW First Aven
PO Box 59
Portland, OR 97207
(503) 229-5400
TDD (503) 229-5459

Should you have any questions regarding this matter, or wish to schedule follow-up meetings, please contact myself, Kay Brown, or Charlie Corrarino at the above address. We appreciate the efforts that the Washington Department of Fish and Wildlife has taken on this issue over the past 12 months, and look forward to working with you in developing a workable implementation strategy.

Sincerely,

D. O. McIsaac, Ph.D.
Salmon Fishery Manager

dmw
Attachment
c Rosen
Martin
DeHart
Bohn
Berry
Corrarino
Brown
King - Columbia Region
Kaiser - Marine Region
Bill Shake - USFWS, Portland
Gary Smith - NMFS, Seattle
L. B. Boydston - CFG, Sacramento
Ted Strong - CRITFC
Mike Matelevich - CRITFC
Pat Pattillo - WDFW, Olympia
Lee Blankenship - WDFW, Olympia
Guy Norman - WDFW, Battleground
Ken Johnson - PSMFC
Regional Mark Committee (via PSMFC meeting minutes)

WP

ODFW Proposal to Mass Mark Coho Salmon

Purpose:

- To allow selective sport and commercial fisheries on hatchery coho.
- Assessment of wild and hatchery components in escapement areas.

Highlights:

- Estimated annual production is 16 million coho (includes STEP).
- Begin marking the 1995 brood coho in fall 1996.
- Minimum five year commitment
- Mass mark will be removal of the adipose fin.
- Marked coho will enter the fishery as jacks in 1997 and adults in 1998.
- Washington state, the federal government, California and Oregon should work cooperatively in marking fish.
- Implementation will be consistent with US vs Oregon.
- Will formally notify other states, tribes and Canada in February 1995.

Equipment cost for Oregon hatcheries is about $568K for marking trailers and coded-wire tag detection gear. Life expectancy of equipment is between five and 10 years.

- $180K prior to marking in fall 1996.
- $388K prior to sampling in fall 1997.

Annual cost to fin mark in Oregon state hatcheries is about $503K:

- $453K prior to marking in fall 1996.
- $50K for decoding additional coded wire tags in fall 1997.

Evaluation cost about $100K annually beginning in 1997, when 1995 brood jacks return.

Total cost is about $1,171,000:

- $633K prior to marking in fall 1996.
- $538K prior to start of fishery in fall 1997.

Funding

- Not in favor of curtailing production or reprioritizing existing internal funding to pay for mass marking costs.
- Apparent federal obligation.

ATTACHMENT 8

United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE. 11th Avenue
Portland, Oregon 97232-4181

IN REPLY REFER TO:

FEB 13 1995

Mr. Bruce Crawford
State of Washington Department of Fish and Wildlife
600 Capitol Way N
Olympia, Washington 98501-1091

Dear Mr. Crawford: Bruce

This letter pertains to your draft proposal to mark coho salmon for use in selective fisheries for the 1998 season for the Columbia River, Coast, and Puget Sound. At your request, we have reviewed the draft document and offer the following comments.

We understand the intuitive appeal of selective harvest fisheries and support the general concept. We appreciate the potential benefits of selective fisheries. However, there are very substantial costs, operational difficulties, and impacts to management capabilities that must be analyzed in detail before such a program should be implemented. The cost of implementation is very high and could well mean shifting funds from other valuable programs, let alone a cut in coho production. Careful consideration of costs and the true benefits of selective fisheries on coho salmon is necessary before the agencies make their final decisions on implementing this proposal. In addition, the agencies must work with the National Marine Fisheries Service to clarify the legal implications of "taking" coho salmon and other species listed under the Endangered Species Act.

The Service would be willing to join the WDFW in this proposal, if the proposal included the following stiplations:

1) The formation of an interagency technical team charged with the responsibility to estimate and assess the expected benefits of selective fisheries. With available analytical tools, the group could complete its analysis in a few days.

2) The formation of an interagency group of managers to explore funding options. We need to fully understand how the agencies will fund this mass marking effort, what programs will likely to impacted in order to provide adequate funding, and ultimately if selective harvest fisheries will be adequately funded.

3) Approval comes forth the National Marine Fisheries Service supporting the selective fisheries.

Sincerely,

Bill Shake
Assistant Regional Director,
Fisheries Resources

ATTACHMENT 9

IDAHO FISH & GAME
600 South Walnut / Box 25
Boise, Idaho 83707-0025

Phil Batt / Governor
Jerry M. Conley / Director

March 1, 1995

Mr. Bruce Crawford
Washington Department of Wildlife
600 Capital Way N
Olympia, WA 98501-1091

Dear Mr. Crawford:

This is a belated response to your letter of January 23, 1995 concerning marking strategies that promote selective fishery opportunities for coho salmon in 1998. We are fully supportive of selective harvest programs to allow the take of healthy stocks while protecting weak runs. Your proposal embraces this concept and will help the region move forward on important weak stock management issues.

It appears existing mixed stock fisheries will continue to contribute to deterioration of economically important salmon and steelhead by overharvesting wild/natural runs in the Pacific Northwest. As you know, the only alternative in mixed-stock situations is to underharvest the very hatchery stocks reared to provide fishing opportunity.

We have some concern that shifts in fishing effort, or increased effort necessary to adequately harvest hatchery coho stocks, could eventually result in additional harvest of endangered chinook salmon. Hopefully, an adaptive management approach as well as eventual selective fisheries for chinook will minimize any potential for undue adverse effects.

Though Idaho salmon stocks and associated marking programs are currently managed strictly for preservation, we look forward to providing selective harvest of hatchery fish in the future should passage conditions in the lower Snake and Columbia hydrosystem allow recovery. Selective fisheries for hatchery steelhead have occurred in Idaho since the late 1970s.

Please let me know if there is anything else we can do to support your proposal.

Sincerely,

Steven M. Huffaker, Chief
Bureau of Fisheries

c: Jim Martin (ODFW)
Bill Shake (USFWS)
Al Petrovich (CDFG)
Dave Hanson (PSMFC)

PSC Workshop on Hatchery CWT Methodology
January 10-12, 1995
Seattle, WA

a preliminary summary edited and condensed by
Norma Jean Sands
Alaska Department of Fish and Game

This workshop on hatchery coded-wire-tag (CWT) methodology was sponsored by the Pacific Salmon Commission (PSC); its purpose was to compare methods currently used in producing CWT data, to review uses of the data, and to make recommendations for standardizing and improving technologies where possible. The workshop was attended by between 40 and 60 people each day with almost 100 different people in total, coming from Alaska, the Yukon, B.C., Washington, Oregon, Idaho, and California. A schedule of the meeting is attached.

The last half of the third day consisted of panel workgroups with participation by interested audience members as well as panel participants. There were spirited discussions in all workgroups and each workgroup put together a summary of findings, discussions, and recommendations. These summaries, along with summaries of each panel talk, will be will be compiled in a workshop proceedings which will be published through the PSC. A preliminary summary of each workgroup discussion follows.

A. Mark and Release Estimation Procedures: Moderator: Gary Freitag

1. Communication between the analytical users of the coded-wire-tag data and those responsible for developing tagging and release procedures at the hatcheries has been poor coast wide. It is recommended that definite lines of communication between all parties involved with the CWT programs be developed through the use of regional teams that should include representation by individuals from the region familiar with biometrics, local fishery management, fish culture and PSC data usage. The team should be responsible for identifying: a) hatchery requirement and restraints relative to tagging, b) regional fishery management requirements and restraints, and c) data quality needs of the PSC with respect to numbers of fish marked for index stocks. The teams should provide biometric and technical support for hatchery operators, taking into account that each hatchery will have its own set of logistical problems that will require its own specific procedures.

2. Specific procedures to help resolve problems in tagging programs were identified:

a) tag retention estimates should be made from a minimum sample size of 500 fish held for at least 30 days;

b) fish in the tag retention samples need to be representative of the entire tagged population;

c) procedures using weight sampling methods to estimate average fish or egg counts should be based on statistical analyses that take population variability and representation into account;

d) agencies should review tagging programs to determine if tagged fish represent the reported released population;

e) agencies should review the effects of the quality of the adipose clip marks on the accuracy of estimates based on cwt data; and

f) tagging programs should consider the environmental conditions that fish are being exposed to at the time of tagging with respect to reducing stress related tagging mortality.

B. Experimental Design and Data Analysis: Moderator: Rich Comstock

1. There is a need for improved consistency in indicator stock tagging programs. While such changes as broodstock source and time of release may be necessary for maintaining or improving hatchery production, they greatly compromise the data for management purposes. Compromise between fisheries management needs and hatchery programming may be instigated through enhanced communication between the two groups. To facilitate communication, the workgroup recommends:

a) the PSC Standing Committee for Research and Statistics (R&S) should provide consistency requirements required by PSC analyses and provide them to evaluators and hatchery managers;

b) agencies responsible for indictor stock tagging should submit to the R&S annual program plans for each indicator stock that include information on tagging levels, broodstock selection, pond replication, time of release, size of release, etc.;

c) PSC technical committees should review the program plans and discuss any concerns with the appropriate agency and hatchery programmer; and

d) PSC technical committees should provide an annual report of adequacy of indictor stock tagging programs.

2. Provision of accurate chinook escapement data was identified as a critical need of analysts for fishery exploitation rate estimation. The need for improved escapement estimates has been discussed numerous times by PSC technical committees during the past few years. The principal limitation in acquiring escapement data appears to be funding since essential estimation methodology is available. In times of current mass-marking scenarios calling for increased expenditures on code wire tagging and sampling programs, the current lack of accurate and precise escapement data may imply that agencies are already underfunded for fisheries management.

3. Replication of tag codes between ponds was shown to vastly increase the power of simple hatchery evaluation experiments. The use of at least four tag code replicates is recommended and these should be assigned to different ponds or pond groups.

4. Determining appropriate tagging levels for hatchery evaluation experiments is often quite difficult; the wide variety in types of analyses adds to the complexity. A general quideline for a wide variety of experiments that has been accepted by a number of PSC technical committees suggests that tagging levels should be adjusted so that at least 30 tags from each group will be recovered in the minimum recovery strata of interest. This workgroup recommends that R&S take on the further task of enumerating and clarifying methodologies available for aiding in the design and analysis of cwt experiments.

5. This workgroup emphasizes the need to publish confidence intervals associated with parameter estimates and hypothesis test results along with parameter comparisons. Although this recommendation has long been acknowledged, many reports still contain only point estimates.

6. If selective fisheries are implemented, double index tagging should be utilized to preserve as much usability of the cwt database as possible.

7. The existing PSC database, used in PSC analyses, should be evaluated by the R&S and, if deficiencies are found, the PSC commissioners should be notified of the problem and its impact on PSC activities.

8. PSC analysts have long expressed concerns abut bias in estimates generated from the PSC database. For example, the "book method" of estimating hatchery releases is thought to overestimated the actual number released. This workgroup believes that a thorough analysis of bias is over and recommend that the R&S begin a project to assess the overall bias with in PSC database.

9. Many of the problems identified here are the result of underfunding of data acquisition and analysis programs. The workgroup recommends that the PSC commissioners inform member PSC agencies that funding increases are needed to complete, update, and improve the PSC CWT database.

C. Adult Sampling: Moderator: Ron Olson

1. The scope of this panel and workgroup discussion was limited to hatchery rack sampling and escapement sampling. The inclusion of spawning ground sampling was to account for hatchery strays, i.e., those hatchery fish that spawn naturally rather than returning to their release facility. While sampling of fisheries was considered beyond the scope of this workshop, for many Alaskan enhancement facilities, fish caught in the terminal area harvest are included tin their hatchery sampling process.

2. The recovery data generated from hatchery rack sampling is relatively straight forward. The total population being sampled and expansion factors for the recoveries generally don't have to be estimated. In summary it was found that:

a) hatchery rack sampling for tagged fish is routine and comprehensive for all agencies throughout the region;

b) for the vast majority of hatcheries, sampling is conducted at the 100% level when tagged fish are expected (subsampling occurs at some facilities that handle large numbers of returning fish);

c) sampling accuracy is an issue of concern (CDFO has found that the mean undetected mark rate exceeds 10% at some of their facilities) and needs to be reviewed by all agencies; and

d) undetected marks lead to underestimation of survival rates and production and to overestimation of exploitation rates of the fish represented by the tag code.

Recommendations for improving sampling quality at hatchery facilities includes:

a) define the sampling responsibility for the facility and simplify the sampling tasks wherever possible;

b) sample all ad-clipped fish whenever possible, if subsampling is necessary, incorporate a statistically sound design;

c) double check every batch of fish for undetected marks and double check mark tallies at the end of each activity period, i.e., incorporate formal re-examination into sampling procedures;

d) monitor the sampling efficiency of personnel, i.e., conduct spot checks on accuracy;

e) in regards to questionable fin marks - "when in doubt, take the snout;" and

f) review the counting accuracy of escapements at facilities.

3. Spawning ground data involve more complexities in sampling and reporting of the recoveries. Estimating the population size, calculating the appropriate sampling expansions, and physically obtaining the carcasses for sampling will involve statistical and logistical challenges. The importance of accounting for this component will vary greatly between facilities and will depend on such things as the release strategy. In summary:

a) it is recognized that accurate estimates of escapement are needed for PSC indicator stocks as incomplete estimates of escapement will lead to biased estimates of exploitation and survival rates for the CWT stocks;

b) in S.E. Alaska, hatchery straying has not been found to be significant where it has been investigated;

c) in British Columbia, most PSC chinook indicator stocks have associated stream sampling and/or test fishery programs to estimate the escapement of the CWT group, expanded estimates are maintained in an internal database, however, because of questions with the precision of these estimates, recoveries are not reported in an expanded manner;

d) in Washington, most PSC chinook indicator stocks have associated stream sampling and escapement estimation programs and the reported recoveries are expanded based on the escapement estimate; however, a variety of escapement estimation methods are used and many do not have estimates of precision;

e) coho salmon present difficult sampling problems with spawning occurring in small tributaries dispersed throughout the watershed, the spawning season being protracted in duration, stream conditions not being conducive to recovering carcasses, and water conditions affecting visual methods of escapement estimation throughout the spawning period; and

f) most agencies do not report expanded estimates of natural escapement for coho CWT groups and most PSC hatchery coho indicator stocks do not have adequate escapement estimation programs.

To address these problems, the following recommendations are made:

a) hatcheries should consider a thorough investigation of straying to see if they have a problem;

b) escapement estimation and sampling programs for CWT stock groups should be statistically designed, preferably allowing for estimation of variance; escapement estimation and CWT recovery involve different sampling considerations and it may not be appropriate t incorporate the two types of data gathering into one spawning ground sampling program;

c) possible biological biases in the sampling design should be considered;

d) for coho, test fisheries should be considered as a potential method of obtaining random samples from the escapement for estimating tagged/untagged and/or hatchery/wild ratios;

e) the R&S or its Data Sharing Committee should develop guidelines on methods/standards for reporting escapement data (e.g., when to report expanded versus nonexpanded data and should there be a maximum acceptable expansion factor); and

f) the PSC should sponsor a workshop on escapement estimation for indictor stocks.

4. The proposed electronic detection of coded-wire tags by the selective fisheries program could solve some of the ambiguity currently found in mark recognition and could also improve general sampling quality.

5. The PSC indicator stock program is recognized to need high quality escapement data for its indicator stocks. However, communication between the PSC analysts and hatchery managers has apparently been poor. Recommendations to improve communications include:

a) specific data needs by the PSC from the hatcheries need to be clearly defined by the PSC technical committees;

b) R&S should develop PSC guidelines on acceptable levels of data precision for spawning escapement estimation; and

c) a suggested method of increasing the communication flow is development of video presentations such as of the presentation given by Brian Riddell at this workshop that can be circulated to hatcheries.

D. Utilizing and Sharing Hatchery Data: Moderator: Dick O'Connor

1. Users of PSMFC's regional Mark Processing Center are impressed with its services but expressed the need for several additional pieces of information, including age of CWT recoveries, tag codes with zero recoveries, and basin-region-hatchery codes for easy grouping of results. Although this last idea is "coming soon" to RMIS, it is available now through CRAS, the Coded-Wire-Tag Recovery Analysis System maintained by the NWIFC. CRAS also contains standard routines for performing cohort analyses that were derived from PSC technical committee work, but a version of CRAS absent these routines could be made available to PSMFC. NWIFC apparently would be happy to let PSMFC take over maintenance of this system, including the useful basin and region identifiers they have added to the standard PSC exchange format. One advantage to such an enhancement to RMIS is the ability of PSMFC to make its system widely available to data users coast wide due to its dialup and Internet accessibility. A recommendation was made:

that the Data Sharing Committee pool its members to see if the CRAS enhancements are useful enough to warrant their official adoption by PSMFC's Regional Mark Processing Center.

2. Data providers within this workgroup wanted to convey a message to the Data Sharing Committee abound the tendency for new fields of data to be "requested" of agencies from the Data Standards Work Group. Such fields are often called "optional," but peer pressure and the desirability for standardized data make "optional" a misnomer. A recommendation was made:

that the Data Sharing Committee require specific benefit statements from those who wish to add fields to existing exchange data files and that the cost of such new initiatives be examined.

3. Access to CWT data by hatchery managers was a concern. Questions arose about the systems we use to provide data to hatchery mangers; are they too cumbersome? Is there adequate access, especially to centralized collections of data. Is this really the information hatchery managers want, or do they want biological and analytical results from work on their CWT fish? A recommendation, again relating to communication between hatchery managers and analysts, was made:

that the Data Sharing Committee take the lead in identifying what hatchery mangers and regional hatchery operations managers need to know about their fish; the results can be referred to the Data Standards Work Group for further recommendations on how to provide for such needs.

4. A topic that generated a lot of discussion was that of data "ownership." PSMFC has been asked to provide copies of their entire CWT database to other parties. who then add capabilities or additional data and distribute it to others. The concerns expressed arose not so much from tight-fisted "ownership" of the data but from issues such as change control, adequate documentation of caveats. and user training. A lot of frustration was expressed by data managers in the workgroup. but all agreed that little can or should be done to stifle the free flow of exchanged CWT data. Some proposed that other parties who "add value" to such datasets be encouraged to share copies of their "enhancements" as a good-will gesture, thus extending the availability of their work to users coastwide. Others felt that coastwide users should always use the two official data exchange points (CDFO-Nanaimo and PSMFC-Gladstone). One way to encourage would be to implement electronic notification of database changes for all "subscribers" to these data exchange points. It was recommended:

> that the Data Sharing Committee continue to publicize the data and services available at the two official PSC data exchange points at every opportunity and that it should encourage all PSC committees, work groups and teams to obtain their data from one of these two official sxsources to ensure that analyses are performed with the most current, official, validated data.

The workshop was successful at bringing together people working in hatcheries and those working in agencies analyzing the CWT data produced by the hatcheries. A common concern was lack of communication between hatchery folks and analysts about data needs and analytical results and it was felt that workshops such as this were productive. A recommendation heard in several of the discussions was the formation of some kind of team to facilitate communication on identification of indicator stocks, tagging and sampling requirements, and analytical results between hatcheries and PSC technical analysts. Another was the utilization of R&S to develop and convey sampling and data standards need for PSC analyses to agencies and hatcheries.

PSC Workshop on Hatchery CWT Methodology

January 10-12, 1995
NMFS Sand Point Auditorium (BLDG 9)
Seattle, WA
telef. 206-526-6632

SCHEDULE

Tuesday, January 10

9:30 - 11:30 am — Opening Session

A. Welcome	Don Bailey & Norma Jean Sands, workshop coordinators
B. Keynote Talk	Kathryn Brigham, PSC Commissioner
C. Producing hatchery data	Don Buxton, Chilliwack Hatchery, BC Bruce Bachan, Medvejie Hatchery, AK Darrell Mills, Garrison Springs Hatchery, WA
D. Using hatchery data	Brian Riddell, cochair of Chinook Technical Committee

1:00 - 5:00 pm — Panel Session I - Mark and Release Estimation Procedures

A. Moderator: Gary Freitag (SSRAA)
B. Panel
1. Mark Lewis (ODFW) - Estimation of the number of fish per raceway using truck displacement methods.
2. Frank Thrower (NMFS, AK) - Survey of hatchery estimation techniques used in southeast Alaska enhancement programs.
3. Chris Beggs (SEP) - Survey of hatchery estimation techniques used in Canadian enhancement programs.
4. Don Bailey (SEP) - How SEP came to use book counts for juvenile enumeration.
5. Andy Appleby (WDFW) - Survey of hatchery estimation techniques used in Washington enhancement programs.

C. Discussion

5:00 - 7:00 pm — No Host Reception

Wednesday, January 11

8:00 - 12:00 pm — Panel Session II - Experimental Design and Data Analysis

A. Moderator: Rich Comstock (USFWS)
B. Panel
1. Rich Comstock (USFWS) - Experimental design and sample size considerations for hatchery evaluation experiments.
2. John E. Clark (ADF&G) - Determining appropriate tagging and sampling rates for management of mixed wild and hatchery stock fishery.
3. -
4. Jim Scott (NWIFC) - Uses of hatchery data by Pacific Salmon Commission Chinook Technical Committee.
5. Marianna Alexandersdottir (WDFW) - Hatchery data needs for indicator stock tagging programs if selective harvest fisheries were implemented.

C. Discussion

printed December 22, 1994

1:00 - 5:00 pm — Panel Session III - Adult Sampling

A. Moderator: Ron Olson (NWFIC)

B. Panel

1. Ron Josephson (ADF&G) - Overview of adult sampling methods for Southeast Alaska enhancement projects.
2. Ken Pitre (CDFO) - Overview of escapement sampling for Canadian coded-wire-tag studies.
3. Stan Hammer (WDFW) - Overview of adult coded-wire-tag sampling at Washington Department of Fish and Wildlife hatcheries.
4. Bill Tweit (WDFW) - Overview of spawning ground coded-wire-tag sampling by Washington Department of Fish and Wildlife.
5. Ken Phillipson (NWIFC) - Overview of escapement sampling for Western Washington tribal coded-wire-tag studies.
5. Robert Conrad (NWIFC) - A comparison of the number of hatchery chinook salmon returning with missing adipose fins and no coded-wire tags to the number expected.
6. Lee Blankenship (WDFW) - Electronic sampling technology for adult fish.

C. Discussion

Thursday, January 12

8:00 - 12:00 am — Panel Session IV - Utilizing and Sharing Hatchery Data

A. Moderator: Dick O'Connor (WDFW)

B. Panel:

1. Karen Crandall (ADF&G) - The PC-based CWT ASSIST Program for hatchery managers.
2. Mark Kimbel (WDFW) - "FOOTNOTES" - Setting up a coded-wire-tag database.
3. Ken Johnson (PSMFC) & John E. Clark (ADF&G) - Overview of the Regional Mark Information System (RMIS) with emphasis on coded-wire-tag release data - A case study.
4. Anne Kling (CDFO) - Hatchery Information Databases at CDFO
5. Susan L. Markey (WDFW) - Cleaning the coded-wire-tag recovery data stream.
6. Duane Anderson (PSMFC) - A "Distributed System" of summary information: One handy way to review straying of coded-wire-tagged fish.
7. Jay Delong (NWIFC) - "CRAS" - A standardized method for analyzing coded-wire-tag data.

C. Discussion

1:00 - 4:00 pm — **Four Concurrent Workgroup Sessions**

The moderator, panel members, and invited audience members from each panel session will meet in workgroup format to continue the discussion from their session and to develop summary statements, conclusions, and recommendations.

4:00 - 5:00 pm — **Concluding Remarks**

A. Gary Freitag
B. Rich Comstock
C. Ron Olson
D. Dick O'Connor
E. Norma Jean Sands & Don Bailey

printed December 22, 1994

PACIFIC STATES MARINE FISHERIES COMMISSION
45 S.E. 82ND DRIVE. SUITE 100. GLADSTONE. OREGON 97027-2522
PHONE (503) 650-5400 FAX (503) 650-5426

Hilda Diaz-Soltero, Regional Director
S.W. Region, National Marine Fisheries Service
501 West Ocean Boulevard
Suite 4200
Long Beach, CA 90802-4213

March 30, 1995

Dear Ms. Diaz-Soltero,

Reports have been circulating for some time of California Department of Fish and Game's (CDFG) growing budget crisis, coupled with dwindling federal funding support for CDFG's coded wire tag (CWT) programs. Because of the coastwide concern, CDFG's tag coordinator, Frank Fisher, was asked to brief the Regional Mark Committee on the current situation and probable future during the Mark Meeting in Portland (February 16, 1995). The report was not optimistic, especially with respect to CDFG's ability to maintain its invaluable CWT program at even minimal tagging and recovery levels. Because of this, the Mark Committee unanimously endorsed forwarding *a letter of coastwide support* urging continued federal support of CDFG's CWT program at the highest possible funding level in the face of budget realities. Continued federal funding is critical to this end.

The CWT program is currently, and in the near future, the **only** stock identification tool capable of providing essential assessment and management information for both natural stocks and hatchery stocks of chinook and coho salmon. This is true coastwide. Some of the major applications of CWT data are: 1) Hatchery evaluations; 2) Cohort analysis (including exploitation rates, cohort size, marine survival estimates, and stock maturation rates); 3) Stock composition and interception estimates; 4) Modeling and abundance forecasting; 5) Post season evaluation and allocation assessments; and 6) Pacific Salmon Treaty indicator stock programs. Again, no other stock identification tool is presently capable of meeting all of these informational needs.

Quality CWT derived information depends on quality tagging programs and on adequate sampling rates and sampling coverage. Given the years of experience of CDFG's tagging and recovery sampling crews, CDFG is by far the very best suited for maintaining a quality CWT program in California. Furthermore, CDFG is best suited for insuring statewide standards are maintained in order that the data are accurate, archived, and results are repeatable.

Adequate ocean sampling in California also is critical for providing quality CWT information. The coastwide agreement for ocean CWT sampling is 20% of the catch. Tagging agencies use this rate for determining how many tagged fish to release in order to have adequate numbers of recoveries for statistically valid analyses. Given the extensive migratory patterns of chinook and coho salmon, reduced ocean sampling in California waters could therefore negatively impact tagging programs in the Columbia River ("south turning" stocks), ODFW tagging programs on the Oregon coast, plus USFWS programs in the Sacramento and Klamath systems.

As a case in point, a reduction in California's ocean sampling could jeopardize evaluations currently underway by the U.S. Fish and Wildlife Service as tagging levels for groups released in 1993, 1994, and early 1995 are likely not high enough to offset any reduction in sampling. This also would likely be true for many of CDFG tag groups released in the last few years. Even more critical, a sampling reduction could preclude collection of any data from the USFWS's endangered winter-run chinook salmon tagging program because tagging levels cannot be increased enough to offset reduced sampling. In addition, some agencies may not have the option of increasing tagging levels to offset reduced sampling. As a consequence, tagging levels could be increased in some groups, while other planned tagged fish releases would have to be terminated.

It is imperative that the quality of CDFG's tagging and recovery programs be maintained in order to insure the integrity of the data for researchers and fishery managers , both within California and regionally. Therefore, the Mark Committee strongly recommends that full federal funding support be continued for CDFG's invaluable coded wire tag program.

Sincerely,

J. Kenneth Johnson
Chairman
Regional Mark Committee

Identical letters addressed to:

Roger Patterson, Regional Director
Bureau of Reclamation, Mid-Pacific Region
Will Stelle, Regional Director
Northwest Region, National Marine Fisheries Service
Michael J. Spear, Regional Director
U.S. Fish and Wildlife Service

(copy list: next page)

copies: Boyd Gibbons, Director, California Department Fish and Game
Dr. Rudolph Rosen, Director, Oregon Department Fish and Wildlife
Robert Turner, Director, Washington Department of Fish and Wildlife
Jerry Conley, Director, Idaho Department of Fish and Game
Carl Rosier, Commissioner, Alaska Department of Fish and Game
Larry Six, Executive Director, Pacific Fishery Management Council
LB Boydstun, California Department of Fish and Game
Mark Committee

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
PUYALLUP HATCHERY
MASS MARK EVALUATION
1994 Coho Hatchery Rack Sampling

Total Adults Sampled

Males	Females	Total
33,937	19,220	53,157

2,015 Adipose Clip Recoveries	x-forklength = 49.4 cm Std.Dev. = 4.5 cm
1,624 Left Ventral Clip Recoveries	x-forklength = 49.7 cm Std.Dev. = 4.6 cm
1,937 Adipose/Left Vent. Clip Recoveries	x-forklength = 49.4 cm Std.Dev. = 4.3 cm

	% Return
Adipose Clip Recoveries	= 4.54%
Left Ventral Clip Recoveries	= 3.68%
Adipose/Left Ventral Clip Recoveries	= 4.29%

	Differential Survival
Differential Survival Left Ventral Clip vs Adipose Clip	= 18.9%
Differential Survival Adipose\Left Ventral Clip vs. Adipose Clip	= 5.5%

Clip Quality

Adipose Clips		Left Ventral Clips		Adipose/Left Ventral Clips		Adipose/Left Ventral Clips	
Good	= 97.9%	Good	= 86.0%	Good	= 99.1%	Good	= 88.1%
Bad	= 0.7%	Bad	= 6.3%	Bad	= 0.3%	Bad	= 4.8%
Marginal	= 1.0%	Marginal	= 7.1%	Marginal	= 0.5%	Marginal	= 7.0%
No Mark	= 0.4%	No Mark	= 0.5%	No Mark	= 0.1%	No Mark	= 0.1%
Unknown	= 0.05%	Unknown	= 0.1%	Unknown	= 0.0%	Unknown	= 0.0%

Release Information

Adipose Clips	Left Ventral Clips	Adipose/Left Ventral Clips
44,404 Released	44,092 Released	45,122 Released
33.2% of Study Released	33.0% of Study Released	33.8% of Study Released
995,974 Unmarked Released	0 Unmarked Released	0 Unmarked Released
1.6% Tag loss at Release	1.1% Tag loss at Release	1.0% Tag loss at Release
27 Natural Ads	NA Natural Vents	11 Natural Ads, NA Natural Vents
1.2% Bad Marks at Release	1.5% Bad Marks at Release	0.5% Bad Ad Marks at Release
		1.1% Bad Vent Marks at Release

DRAFT

PUYALLUP RIVER COMMERCIAL FISHERY
MASS MARK EVALUATION
1994 Coho Sampling

964 Fish Sampled

407 Adipose Recoveries	x-forklength = 53.6 cm	Std.Dev. = 3.8 cm
241 Left Ventral Recoveries	x-forklength = 53.4 cm	Std.Dev. = 3.8 cm
316 Adipose/Left Vent. Recoveries	x-forklength = 52.9 cm	Std.Dev. = 3.7 cm

	% Return
Adipose Clip Recoveries	= 0.92%
Left Ventral Clip Recoveries	= 0.55%
Adipose/Left Ventral Clip Recoveries	= 0.70%

	Differential Survival
Differential Survival Left Ventral Clip vs Adipose	= 40.2%
Differential Survival Adipose\Left Ventral vs. Adipose	= 23.9%

Clip Quality

Adipose Clips		Left Ventral Clips		Adipose/Left Ventral Clips			
Good	= 96.8%	Good	= 85.1%	Good	= 98.1%	Good	= 84.5%
Bad	= 1.7%	Bad	= 5.4%	Bad	= 1.3%	Bad	= 4.8%
Marginal	= 1.0%	Marginal	= 7.5%	Marginal	= 0.6%	Marginal	= 10.8%
No Mark	= 0.5%	No Mark	= 2.1%	No Mark	= 0.0%	No Mark	= 0.0%

DRAFT

GREEN RIVER HATCHERY
MASS MARK EVALUATION
1994 Coho Hatchery Rack Sampling

Total Adults Sampled

Males	Females	Total
20,601	19,220	39,821

1,569 Adipose Recoveries	x-forklength = 55.8 cm Std.Dev. = 4.7 cm
1,429 Left Ventral Recoveries	x-forklength = 55.5 cm Std.Dev. = 4.6 cm
1,419 Adipose/Left Vent. Recoveries	x-forklength = 55.1 cm Std.Dev. = 4.5 cm

	% Return
Adipose Recoveries	= 3.45%
Left Ventral Recoveries	= 2.93%
Adipose/Left Ventral Recoveries	= 3.14%

	Differential Survival
Differential Survival Left Ventral vs Adipose	= 15.1%
Differential Survival Adipose\Left Ventral vs. Adipose	= 9.0%

Clip Quality

Adipose Clips		Left Ventral Clips		Adipose/Left Ventral Clips			
Good	= 93.6%	Good	= 81.0%	Good	= 96.6%	Good	= 69.1%
Bad	= 1.5%	Bad	= 8.8%	Bad	= 0.5%	Bad	= 18.2%
Marginal	= 4.2%	Marginal	= 9.5%	Marginal	= 2.8%	Marginal	= 12.5%
No Mark	= 0.6%	No Mark	= 0.8%	No Mark	= 0.07%	No Mark	= 0.07%
Unknown	= 0.6%	Unknown	= 0.0%	Unknown	= 0.07%	Unknown	= 0.07%

Release Information

Adipose Clips	Left Ventral Clips	Adipose/Left Ventral Clips
45,421 Released	48,805 Released	45,153 Released
32.6% of Study Released	35.0% of Study Released	32.4% of Study Released
458,841 Unmarked Released	0 Unmarked Released	0 Unmarked Released
2.1% Tag loss at Release	1.8% Tag loss at Release	1.5% Tag loss at Release
94 Natural Ads	NA Natural Vents	37 Natural Ads, NA Natural Vents
4.6% Bad Marks at Release	NA% Bad Marks at Release	3.4% Bad Ad Marks at Release
		0.9% Bad Vent Marks at Release

DRAFT

GREEN/DUWAMISH RIVER COMMERCIAL FISHERY
MASS MARK EVALUATION
1994 Coho Sampling

1,112 Fish Sampled

423 Adipose Recoveries	x-forklength = 57.1 cm Std.Dev. = 4.1 cm
351 Left Ventral Recoveries	x-forklength = 56.7 cm Std.Dev. = 4.3 cm
338 Adipose/Left Vent. Recoveries	x-forklength = 56.7 cm Std.Dev. = 4.1 cm

	% Return
Adipose Recoveries	= 0.93%
Left Ventral Recoveries	= 0.72%
Adipose/Left Ventral Recoveries	= 0.75%

	Differential Survival
Differential Survival Left Ventral vs Adipose	= 22.6%
Differential Survival Adipose\Left Ventral vs. Adipose	= 19.3%

Clip Quality

Adipose Clips		Left Ventral Clips		Adipose/Left Ventral Clips			
Good	= 94.3%	Good	= 67.8%	Good	= 96.1%	Good	= 56.1%
Bad	= 4.0%	Bad	= 13.2%	Bad	= 2.7%	Bad	= 25.4%
Marginal	= 1.0%	Marginal	= 17.7%	Marginal	= 1.2%	Marginal	= 18.5%
No Mark	= 0.7%	No Mark	= 1.4%	No Mark	= 0.0%	No Mark	= 0.0%

DRAFT

SKAGIT HATCHERY
MASS MARK EVALUATION
1994 Coho Hatchery Rack Sampling

Total Adults Sampled

Males	Females	Total
12,930	9,337	22,267

Results presented represents 8,467 heads processed (61%) of 13,884 CWT recoveries.

1,672	Coded Wire Tag Only Recoveries	x-forklength = 59.5 cm	Std.Dev. = 5.2 cm
1,614	Adipose Clip Recoveries	x-forklength = 59.4 cm	Std.Dev. = 5.0 cm
1,105	Left Ventral Clip Recoveries	x-forklength = 59.0 cm	Std.Dev. = 5.1 cm
1,190	Adipose/Left Ventral Clip Recoveries	x-forklength = 58.9 cm	Std.Dev. = 5.1 cm
1,382	Visual Implant Filament Recoveries	x-forklength = 59.7 cm	Std.Dev. = 4.9 cm
1,504	Visual Implant Elastomer Recoveries	x-forklength = 59.4 cm	Std.Dev. = 5.1 cm

	% Return
Coded Wire Tag Only	= 3.31%
Adipose Clip Recoveries	= 3.25%
Left Ventral Clip Recoveries	= 2.21%
Adipose/Left Ventral Clip Recoveries	= 2.42%
Visual Implant Filament Recoveries	= 2.96%
Visual Implant Elastomer Recoveries	= 3.01%

	Differential Survival
Differential Survival Adipose Clip vs No Mark	= 1.8%
Differential Survival Left Ventral Clip vs Adipose Clip	= 32.0%
Differential Survival Adipose\Left Ventral Clip vs. Adipose Clip	= 25.5%
Differential Survival Visual Implant Filament vs Adipose Clip	= 9.0%*
Differential Survival Visual Implant Elastomer vs Adipose Clip	= 0.0%*

*Calculated from the number of recoveries with a visible mark.

Clip Quality

Adipose Clips		Left Ventral Clips		Adipose/Left Ventral Clips			
Good	= 98.1%	Good	= 60.5%	Good	= 97.7%	Good	= 68.4%
Bad	= 0.2%	Bad	= 18.3%	Bad	= 0.5%	Bad	= 16.4%
Marginal	= 0.7%	Marginal	= 15.1%	Marginal	= 1.1%	Marginal	= 14.6%
No Mark	= 0.5%	No Mark	= 5.6%	No Mark	= 0.3%	No Mark	= 0.3%
Unknown	= 0.5%	Unknown	= 0.5%	Unknown	= 0.4%	Unknown	= 0.3%

V.I. Filament Detection Method		V.I. Elastomer Detection Method	
Sampler (field)	= 64.4%	Sampler (field)	= 66.6%
Eye (Lab)	= 8.6%	Eye (Lab)	= 5.[illegible]%
Blk. Lt. (Lab)	= 27.0%	Blk. Lt. (Lab)	= 14.[illegible]%
No Mark	= 55.4%	No Mark	= 14.4%

Skagit 1991 Brood Coho Release Information

Adipose Clips
49,721 Released
16.8% of Study Released
0 Unmarked Released
0.8% Tag loss at Release
326 Natural Ads
0.2% Bad Marks at Release

Left Ventral Clips
49,924 Released
16.9% of Study Released
0 Unmarked Released
0.5% Tag loss at Release
NA Natural Vents
NA% Bad Marks at Release

Adipose/Left Ventral Clips
49,179 Released
16.6% of Study Released
0 Unmarked Released
0.8% Tag loss at Release
268 Natural Ads, 0 Natural Vents
0.9% Bad Ad Marks at Release
NA% Bad Vent Marks at Release

Coded Wire Tag Only
50,557 Released
17.1% of Study Released
0 Unmarked Released
1.1% Tag loss at Release

Visual Implant Filament
46,613Released
15.8% of Study Released
0 Unmarked Released
% CWT loss at Release
24.3% Filament loss at Release

Visual Implant Elastomer
50,025 Released
16.9% of Study Released
0 Unmarked Released
0.2% CWT loss at Release
3.5% Elastomer loss at Release

DRAFT

Testing of Northwest Marine Technology's Wand Detector on Chinook Salmon, 1994

In the spring of 1994, the Alaska Department of Fish and Game's Coded Wire Tag Processing Lab processed heads from 395 adipose clipped chinook salmon caught in the winter troll fishery using a Northwest Marine Technology Wand Detector purchased in May 1992. We used the Wand Detector to initially determine if the head bore a tag. If a tag was not found with the Wand Detector the head was remagnetized and tested again with Wand Detector. If a tag was still not detected it was re-tested with the standard field sampling detector and with omni-directional tube detector. Technicians used sampling detectors (FSD) to locate the tag once dissection began. All work was done in the Juneau lab. For each head tested we recorded:

- if the head did not signal with the wand detector
- if the head did not signal with FSD
- if the head signaled with the FSD only
- the location of the tag in the head
- distance of the tag from nearest external skin

The following results were found.

Fork length and tag depth:

Heads from 395 adipose clipped troll caught chinook were checked for tags with Wand Detector

Fork-length		
Mean	=	816.0 mm
Std.Dev.	=	61.2 mm
Minimum	=	667.0 mm
Maximum	=	977.0 mm

Of these, 374 were found to have tags (either with Wand and/or FSD)

Fork-length			Distance to nearest external skin		
Mean	=	815.3 mm	Mean	=	15.70 mm
Std.Dev.	=	60.9 mm	Std.Dev.	=	5.37 mm
Minimum	=	667.0 mm	Minimum	=	0.77 mm
Maximum	=	977.0 mm	Maximum	=	32.31 mm

Of these, 366 were found with Wand Detector

Fork-length			Distance to nearest external skin		
Mean	=	815.4 mm	Mean	=	15.49 mm
Std.Dev.	=	61.3 mm	Std.Dev.	=	5.20 mm
Minimum	=	667.0 mm	Minimum	=	0.77 mm
Maximum	=	977.0 mm	Maximum	=	32.31 mm

8 tags could not be found with the Wand Detector but were found with FSD

Fork-length			Distance to nearest external skin		
Mean	=	811.0 mm	Mean	=	25.31 mm
Std.Dev.	=	45.3 mm	Std.Dev.	=	3.98 mm
Minimum	=	710.0 mm	Minimum	=	19.78 mm
Maximum	=	844.0 mm	Maximum	=	30.90 mm

Testing of Northwest Marine Technology's Wand Detector on Chinook Salmon, 1994

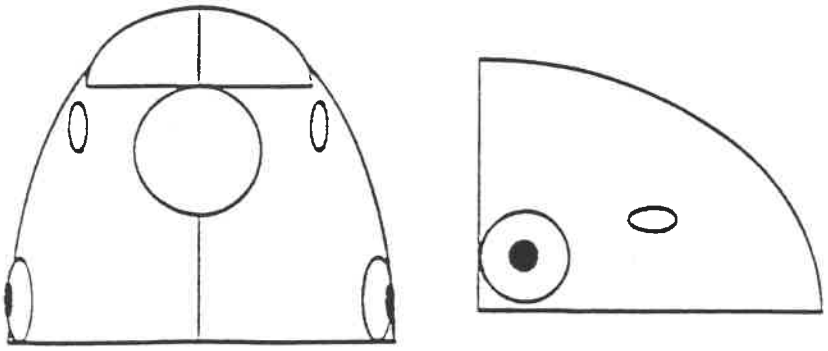
Tag Placement:

Tag Location										
	Betw. nares	Med.-> Rt.nares	Med.-> left nares	Cntr Snout	Cntr.Betw eyes	Front of rt.eye	Med.-> rt.eye	Front of left eye	Med.-> left eye	Total
Tags found with Wand and/or FSD										
# observed	156	58	52	53	19	7	10	9	10	374
%	41.7%	15.5%	13.9%	14.2%	5.1%	1.9%	2.7%	2.4%	2.7%	
Tags found with Wand										
# observed	156	58	52	53	15	6	8	9	9	366
%	42.6%	15.8%	14.2%	14.5%	4.1%	1.6%	2.2%	2.5%	2.5%	
Tags not found with Wand										
# observed	0	0	0	0	4	1	2	0	1	8
%	0.0%	0.0%	0.0%	0.0%	50.0%	12.5%	25.0%	0.0%	12.5%	

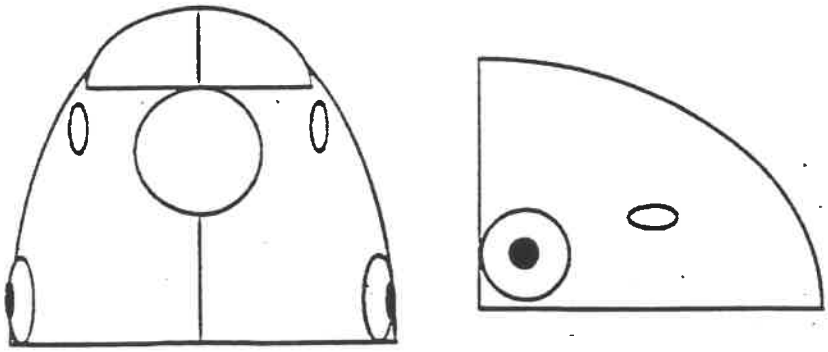
DIAGRAMMATIC SALMON HEAD VIEW OF TAG PLACEMENT

The following description of tag placement is not to scale. The tag depth is the distance from the tag to the nearest external skin. Heads were systematically sectioned and distances measured by a caliper. Due to freezing/thawing, head compression due to the fish being struck when killed, and lack of a stereoscopic view the distances in millimeters should not be considered precise.

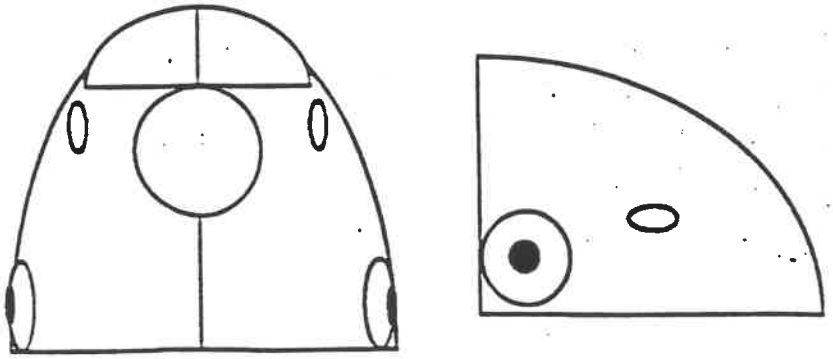
Head Number:_____; Species:_____; Date:____/____/_94_.
Depth:_____mm; Location:_____.
Comments:



Head Number:_____; Species:_____; Date:____/____/_94_.
Depth:_____mm; Location:_____.
Comments:



Head Number:_____; Species:_____; Date:____/____/_94_.
Depth:_____mm; Location:_____.
Comments:



DORSAL VIEW LATERAL VIEW

Table 1. 1987 brood spring chinook salmon returns to Warm Springs NFH for the ventral fin clip study.

Study Group	Marked Release	Jack Returns	Age Four Returns	Age Five Returns	Total Return	Percent Return
AdCWT	89,047	1	21	10	32	0.036%
Ventral	97,397	7	23	3	33	0.034%

Table 2. 1988 brood spring chinook salmon returns to Warm Springs NFH for the ventral fin clip study.

Study Group	Marked Release	Jack Returns	Age Four Returns	Age Five Returns	Total Return	Percent Return
AdCWT	93,290	4	43	9	56	0.060%
Ventral	102,962	2	49	10	61	0.059%

Table 3. 1989 brood spring chinook salmon returns to Warm Springs NFH for the ventral fin clip study.

Study Group	Marked Release	Jack Returns	Age Four Returns	Age Five Returns	Total Return	Percent Return
AdCWT	95,260	0	10	0	10	0.010%
Ventral	101,291	0	19	2	21	0.021%

FN:VENSUM.WK1 01/27/95

SOURCE: Doug Olson, USFWS, Lower Columbia River Fisheries Resource Office, 9317 Highway 99, Suite I, Vancouver, Washington 98665 (206) 696-7605.

Quality Control Issues: CWT Application and No Tags

As part of an ongoing effort to improve the quality of the data associated with coded-wire tags, CDFO has started an investigation into factors influencing long term tag loss. CWT recoveries at the racks of CDFO enhancement facilities have been surveyed for no tag rates. Three ranges of no tags were commonly observed: The best ranged from 4-6%; others ranged from 9-15%; while some facilities had no tag rates in excess of 20%. These were often associated with volunteer or inexperienced markers.

No tag rates were then compared against non standard placements. Non standard pin placements are an indication of poor tagging, or improper head mold design. Non standard placements included tags placed in the nares, palette, eye orbits, skin, lower jaw and brain. CDFO's tag recovery contractor notes all non standard placements, so we were able to do a correlation between these and no tag rates at the hatchery rack.

Nares placements were found to be the most common non-standard placement, with eye orbits being the next most common. No tag rates were correlated with nares placements for chinook and coho when examined for 16 CDFO recovery sites ($r = 0.70$) (Fig. 1).

Depth of placement with respect to the nearest surface is an issue that affects the success of electronic detection using wand detectors. Poor choice of head molds and / or inadequate sorting routines may lead to tags placed both too shallow and too deep in the same tagging operation. Figure 2 illustrates placements observed in large chinook for two West coast of Vancouver Island CDFO hatcheries. For each facility, over 80 4-ocean and 5-ocean adults were examined. Note that the range of depth at Nitinat was 8-28 mm (mean = 18.43), while the range for Robertson Creek was 5-42 mm (mean = 22.2). The non-standard placement rates were 18.4% for Nitinat and 40.2 % for Robertson and there were considerably mor no-tags at Robertson. These data indicate that some Robertson fish were tagged with improperly selected head molds or were not sorted for size at tagging.

The reasons for concern are many. Firstly, if we experience a 10-15% no tag rate throughout the system, that is a serious loss of efficiency. However, that in itself is not the major concern. Because no tag recoveries are not expanded, and tag loss rates may vary significantly among facilities, we may not be able to compare survival rates among facilities.

Bottom line. No tags are the same type of problem as unreported catch. They may seriously jeopardize many kinds of studies.

Figure 1.

No pin rate (%) vs nares placement (%)

for selected DFO facilities

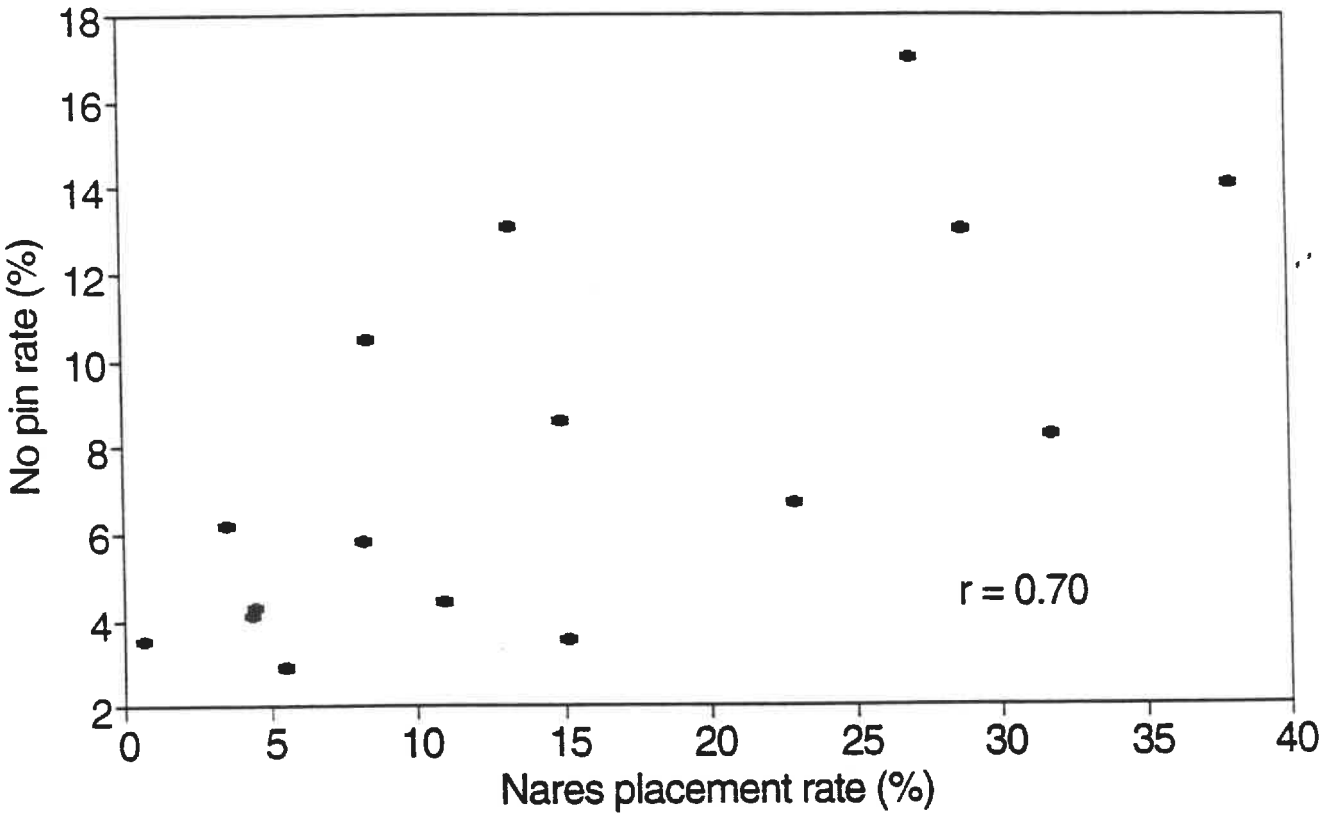
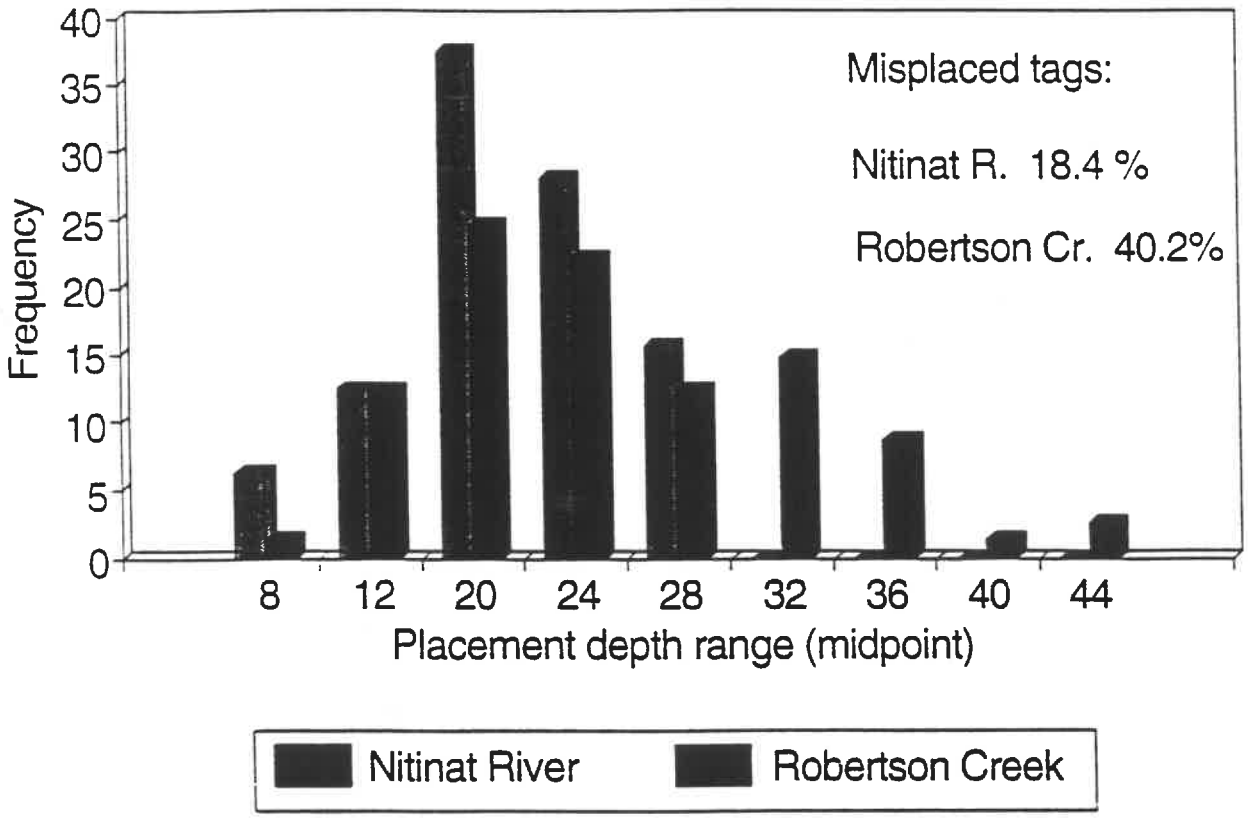


Figure 2.

Frequency of Tag Depths for Lg. Chinook

Robertson Creek and Nitinat River Rack



Nitinat River	Robertson Creek
mean = 18.43 mm	mean = 22.2 mm
min = 8 mm	min = 5 mm
max = 28 mm	max = 42 mm

CODED WIRE TAG DEPTH AND PLACEMENT FOR WASHINGTON DEPARTMENT OF FISH & WILDLIFE HATCHERY RACK SPRING CHINOOK

481 Spring Chinook Hatchery Rack Returns Measured for Tag Depth and Placement

Fork-Length		Tag Depth	
mean	= 77.9 cm	mean	= 20.6 mm
Std. Dev.	= 7.3 cm	Std. Dev.	= 5.2 mm
Minimum	= 62 cm	Minimum	= 3 mm
Maximum	= 103 cm	Maximum	= 39 mm

Tag Placement

Between Nares n = 397 = 82.5%

Fork-length		Tag Depth	
mean	= 77.5 cm	mean	= 20.9 mm
Std. Dev.	= 7.2 cm	Std. Dev.	= 4.2 mm
Minimum	= 62 cm	Minimum	= 9 mm
Maximum	= 100 cm	Maximum	= 32 mm

) of Nose n = 51 = 10.6%

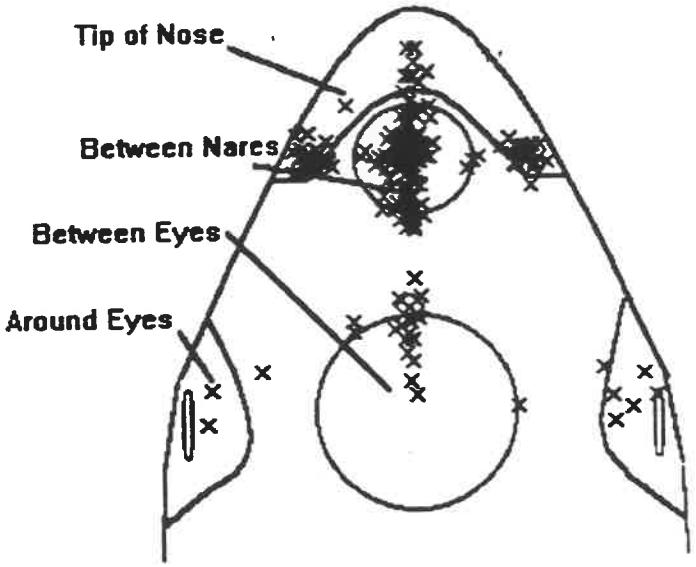
Fork-length		Tag Depth	
mean	= 77.4 cm	mean	= 14.6 mm
Std. Dev.	= 7.1 cm	Std. Dev.	= 6.1 mm
Minimum	= 66 cm	Minimum	= 3 mm
Maximum	= 103 cm	Maximum	= 32 mm

Between Eyes n = 28 = 5.8%

Fork-length		Tag Depth	
mean	= 83.0 cm	mean	= 26.8 mm
Std. Dev.	= 7.0 cm	Std. Dev.	= 5.9 mm
Minimum	= 69 cm	Minimum	= 14 mm
Maximum	= 98 cm	Maximum	= 39 mm

Around Eyes n = 5 = 1.1%

Fork-length		Tag Depth	
mean	= 87.8 cm	mean	= 23.0 mm
Std. Dev.	= 4.5 cm	Std. Dev.	= 7.5 mm
Minimum	= 81 cm	Minimum	= 18 mm
Maximum	= 95 cm	Maximum	= 38 mm



1995 Mark Meeting Minutes

ATTACHMENT 17

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

SIMPSON HATCHERY

ADIPOSE FIN REGENERATION EVALUATION

Due to discussions among various fishery agencies as to what constitutes a "bad" adipose clip and whether clipped adipose fins regenerate, the Washington Department of Fish and Wildlife (WDF&W) began conducting a study to determine if poorly excised adipose fins regenerate.

Methods

Coded Wire Tagging

The study was conducted at the WDF&W Simpson Salmon Hatchery located on the East Fork Satsop River at river mile 17.6 using 1991 brood coho salmon (Oncorhynchus kisutch). A WDF&W coded wire tagging trailer (Schurman and Thompson 1990) was used for the tagging and marking procedure.

The study comprised of three groups. The control group consists of 79,328 coho with perfectly excised adipose fins. Treatment group 1 has 10,584 fish with the back 2/3 of the adipose fin excised. Treatment group 2 has 10,716 juveniles with the top 2/3 of the adipose fin excised (Figure 1). All three groups were coded wire tagged with unique codes.

To ensure maximum quality control for this study, every fish was double checked for the quality of adipose clip. For each group, temporary fish markers would make the original excision and experienced WDF&W biologists would double check the adipose clip. For the control group biologists would clean up a clip that was not perfect. For Treatment group 1 biologists would determine if the back 2/3 of the fin had been removed. If the fin had not been excised properly, the biologist would either make the precise cut or remove the rest of the fin and tag the fish with the control group tag code. For Treatment group 2 biologists would determine if the top 2/3 of the fin had been removed. Again, if the fin had not been excised properly, the biologist would either mark the fin correctly or remove the remaining fin and tag the fish with the control group tag code.

Adult Sampling

During the fall of 1994 100% of the Simpson coho hatchery rack was sampled for the presence of a coded wire tag using a Northwest Marine Technology field sampling detector. If a coded wire tag was detected, the fish was measured, the snout removed and the adipose clip quality was recorded. Adipose fin clip quality was defined as "Good" = none to 1/4 of the fin present, "Marginal" = greater than 1/4 to 1/2 of the fin present, "Bad" greater than 1/2 of the fin present, and "No Mark" = no apparent fin mark.

Results

Quality Control Checks

From the control group, 561 fish were checked for coded wire tag loss and clip quality at 32 days from the end of tagging. Coded wire tag loss was 0.3% and there were 0.0% bad or regenerated clips. From Treatment group 1 (back two-thirds of adipose fin excised), 445 fish were checked at 29 days and tag loss was 0.0% and there was definite adipose fin regeneration. The adipose fin had not completely regenerated but the newly regenerated portion of the fin was translucent and growing into the normal or expected shape of an adipose fin.

From Treatment group 2 (top two-thirds of the adipose fin excised), 457 fish were sampled after 28 days and coded wire tag loss was 0.3% and there was no evidence of adipose fin regeneration.

Adult Sampling

The results presented in Figure 2. shows no regeneration in the control group which contained 226 recoveries. There were no recoveries with clip quality listed as marginal, bad or no mark.

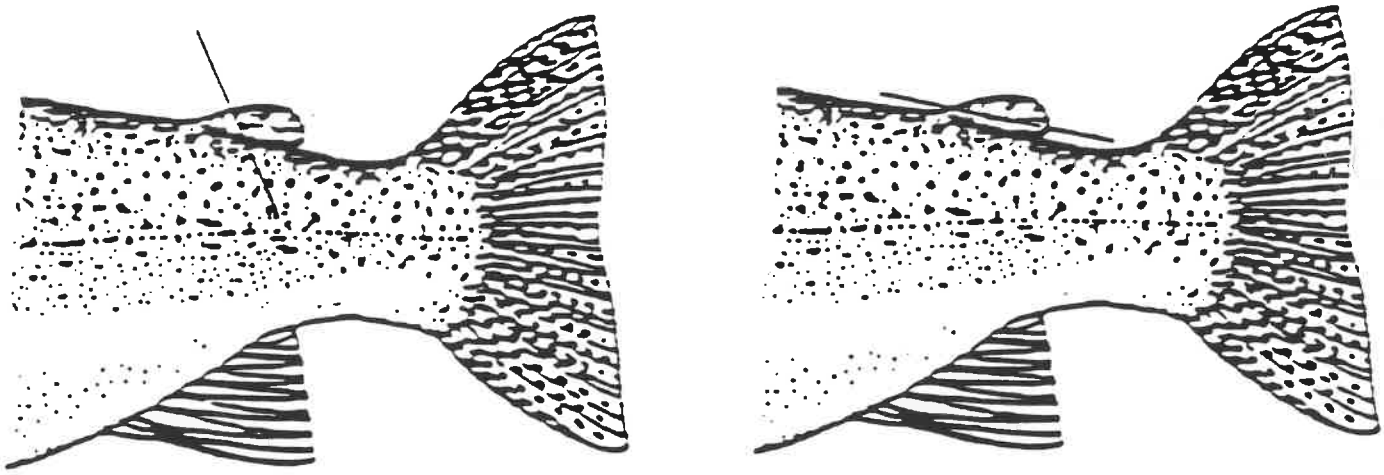
Treatment group 1 (back 2/3 removed) showed 6 fish with total fin regeneration. In two of these fish the adipose fin appeared slightly smaller than normal but the shape was normal in appearance. Due to variability in the size of adipose fins on adult coho this could have been normal variability. Treatment

group 2 (top 2/3 removed) showed 7 fish with total fin regeneration. In one of these fish the adipose fin appeared slightly smaller than normal but the shape was normal in appearance. Again, due to variability in the size of adipose fins this could have been normal.

Discussion

The results show there is no fin regeneration in properly excised adipose fins in coho salmon. The results also show there is fin regeneration in poorly excised adipose fins. There are two surprising results from the experiment. When the two treatment groups were originally marked, they would have been classified as marginal clips. In treatment group 1, 42.3% of the clips improved to a clip quality of good. In Treatment group 2, 13.3% improved to a clip quality of good.

Both treatment groups contained fish with totally regenerated adipose fins. With these results it would be expected that there would be a transitional stage of bad clips. In Treatment group 1, there was only 1 transitional clip of bad, and in Treatment group 2, there were none.



Treatment 1 Treatment 2

Figure 1. Examples of The Adipose Clips Used

Control group (Perfect Clips) Tag Code 63 47/33
226 Recoveries
Mean Fork-length = 75.0 cm.
Std. Deviation = 5.4 cm.

# of Recoveries by Clip Quality

Good	Marginal	Bad	No Mark
226 = 100%	0 = 0.0%	0 = 0.0%	0 = 0.0%

Treatment 1. (Back 2/3 Removed) Tag Code 63 48/38
26 Recoveries
Mean Fork-length = 74.3 cm.
Std. Deviation = 5.3 cm.

# of Recoveries by Clip Quality

Good	Marginal	Bad	No Mark
11 = 42.3%	8 = 30.8%	1 = 3.9%	6 = 23.1%

Treatment 2. (Top 2/3 Removed) Tag Code 63 48/39
30 Recoveries
Mean Fork-length = 75.0 cm.
Std. Deviation = 5.9 cm.

# of Recoveries by Clip Quality

Good	Marginal	Bad	No Mark
4 = 13.3%	19 = 63.3 %	0 = 0.0%	7 = 23.3%

Figure 2. Coded Wire Tag Recoveries and Clip Quality.

J.O. THOMAS AND ASSOCIATES LTD.

COPY

M E M O R A N D U M

DATE: February 7, 1995

TO: Doug Herriott

FROM: Jim Thomas

RE: Recovery of Re-Used Coded-Wire Tags

CC: V. Palermo, S.Bates, B. Adkins, H. Tom

A total of seventeen (17) Skagit River coho adipose fin clip mark / re-used c.w.t.'s have been recovered to date from the sampling of 1994 British Columbia fisheries. These recoveries (Attachment I) are significant for the fact : 1) they were apparently not adipose fin clip marked, and ; 2) on the basis of life history, three of the original wire releases (chinook) are or could be coincidentally contributing to tidal fisheries. Clearly from the MRP perspective these coho recoveries will be relegated as **No Data** in the absence of release data. Please note that the tag code readings have been verified as they have triggered species conflict protocols within data processing.

The quality of the adipose fin clip "marks" was surprisingly good, as evidenced by the adjudication of 11(65%) as a full and clean clip. Obviously the accepted regenerated adipose fins also yielded tags. Each of the re-used tags was accompanied by a secondary mark represented by either a visual implant or ventral fin clip. Commercial samplers were unaware of these marks and accordingly solely recovered Skagit coho tags by keying on the adipose fin.

We have two concerns to these recoveries. First, the re-use of wire involving another species still actively contributing to tidal fisheries should not be occurring. There should be a reasonable lag introduced between the time of re-use and that of the initial tagging which assures no possible overlap in fisheries. The re-use of 1978 brood Grays River chinook tags by example is biologically appropriate. As a minimum, cwt re-use must be sensitive to ensuring that species-specific biological attributes (size/age) are designed which enable concise data processing adjudication of any resulting species conflicts. Indeed coho recoveries involving fish of 650 mm or less will confound an easy conflict resolution, particularly when the associated original cwt release involved stream-type chinook (arrested adult size) and where scale data are absent as a secondary speciation source.

[illegible] KOOTENAY STREET, VANCOUVER, B.C. V5K 4R1 TEL: (604) 291-6340 FAX: (604) 291-6496

Second, supporting documentation of this tagging venture supplied by Washington (Attachment II) reference additional re-used cwt tagging involving 1992 brood Simpson Hatchery coho. This tagging has employed wire previously used on chinook, sockeye and coho, and all initial tags originate from either 1991 or 1992 brood years. Clearly species conflicts can be anticipated between chinook and coho in 1995 fisheries should the frequency of natural adipose lose exhibited in 1994 for Skagit coho persist or accelerate at the Simpson facility.

Substantive time and personnel resources are squandered by the associated conflict resolution procedures. Voluntary sport recoveries are also subject to classification as No Data, a fate which does not embellish MRP public relations with anglers informed that cwt recoveries provide definitive stock identification.

We recommend an agreement to establishing a lag benchmark schedule between the original and re-used tag releases be adopted. Caution to re-using cwt's is warranted for systems exhibiting any history of natural adipose fin loss.

SKAGIT RIVE.. CWT'S

c	vessel	rhead	cwt	rpl	rd/drs	lgth	lcode	rep	grade	sex	fm	vtp	reg	area	sub	gear	sday	smon	syy	sweek
	FEELIN FREE	D452087	63-19-39		2	575	1	115	0000	5	33	2	02	114	000	30	13	07	94	073
	FEELIN FREE	D452095	63-13-50	R1	2	479	1	115	0000	5	01	2	02	114	000	30	13	07	94	073
	KELTIE C	D502803	63-40-41		2	576	1	115	0005	5	33	1	02	021	518	33	29	07	94	075
	MONA A	D503814	63-19-39		2	588	1	115	0507	5	33	1	02	023	059	33	31	08	94	091
4	SWEET CHANGES	D531370	63-13-50	R3	2	556	1	115	0507	5	33	1	01	027	000	33	28	07	94	075
	PROGRESSOR	D542403	63-40-41		1	570	1	115	0000	5	01	1	11	013	000	20	23	08	94	084
	VIKING LEADER	D542582	63-40-41		1	520	1	115	0000	5	01	1	13	020	104	20	18	08	94	083
	FEELIN FREE	D545968	63-13-50	R1	2	556	1	115	0005	5	01	2	02	114	000	30	13	07	94	073
	WANDERER II	D551595	63-40-41		2	633	1	115	0507	5	01	1	01	052	000	33	25	08	94	084
	PACIFIC SUNS	D551783	63-19-39		2	596	1	115	0005	5	01	1	02	024	062	33	5	09	94	092
	HYSON II	D562038	63-13-50	R2	2	553	1	115	0507	5	01	1	02	024	064	32	3	07	94	072
	HYSON II	D562480	63-13-50	R1	2	520	1	115	0000	5	01	1	02	024	064	32	3	07	94	072
	REVA J	D562865	63-40-41		2	508	1	115	0005	5	01	1	02	024	240	33	17	07	94	074
2	AHOUSAT	D564162	63-40-41		2	555	1	115	0000	5	33	2	02	024	000	30	14	07	94	073
1	SOOKE	D565625	63-40-41		2	530	1	115	0000	5	01	2	02	111	000	30	29	08	94	091
8	GUNNIE II	D560069	63-19-39		2	491	1	115	0005	5	01	1	02	021	052	33	4	07	94	072
2	AHOUSAT	D564162	63-40-41		2	555	1	115	0005	5	33	2	02	024	000	30	14	07	94	073

Attachment I

Attachment II

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE
PLANNING, RESEARCH AND HARVEST MANAGEMENT

May 10, 1994

TO: Lynn Anderson \ All Tag Recovery Personnel

FROM: Dan Thompson

SUBJECT: Re-used Tag Codes

You may get some coho recoveries during 1994 with tag codes that were previously used in chinook. The recoveries should be minor since the adipose fin was not removed. The incidence of naturally missing adipose fins for 1991 brood coho at the Skagit Hatchery was 0.6%. The following list shows all tag codes which have been re-used for various studies.

Lynn and Susan Markey have determined that any recoveries from sport or commercial fisheries will be entered as status 2 or No Tags.

Skagit Hatchery	Tag Code	Previous Use
CWT + Visual Implant (Filament)	* 63 13/50	89'Fall Lewis R
CWT + Visual Implant (Elastomer)	* 63 40/41	90'Spr. Carson
CWT Only	63 46/02	91'Spr. Carson
CWT + Left Ventral	* 63 19/39	78'Fall Grays R

Simpson Hatchery 92'Brood Coho Captive Brood Stock Held at Manchester	Tag Code	Previous Use
CWT Only	63 45/37	91'Fall Sund Ro.
CWT Only	63 46/19	92'Spr. Hupp Sp
CWT Only	63 46/30	91'Fall Toutle Coho
CWT Only	• 63 46/59	91'Fall Lyons F.
CWT Only	63 47/33	91'Coho Simpson
CWT Only	63 48/10	92'Fall Lyons F.
CWT Only	• 63 48/19	91'Fall Fox Isl.
CWT Only	63 48/37	92'Sock Baker R.
CWT Only	63 48/38	91'Coho Simpson
CWT Only	63 49/05	92'Fall Lyons F.
CWT Only	63 50/05	92'Summ Wells
CWT Only	63 50/24	92'Spr. Hood Can.
CWT Only	63 51/19	92'Spr. Hupp Spr.
CWT Only	63 51/56	92'Summ Eastbank