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1998 MARK MEETING

Final Minutes

Lewiston, Idaho
April 14-16, 1998

April 14 (Tuesday)

Field Trip to Dworshak and Clearwater Hatcheries

Departed from IDFG Headquarters at 2:00 pm; Red Lion Hotel at 2:45 pm
Toured Dworshak NFH; then crossed the river and toured the Clearwater Hatchery
Returned to Lewiston around 7:30 pm.

April 15 (Wednesday)

Mark Meeting Agenda
(IDFG Myrtle Facility)

8:00 AM

1. General Business Items

A. Welcome/Introductions

Rodney Duke and his staff were roundly thanked for all of their hard work in hosting the Mark Meeting and making the necessary arrangements for the tours and roasted pig barbecue. It was obvious to all that a tremendous amount of preparation had been done to insure the success of the meeting.

Mark Committee members and other meeting participants were introduced at the start of the Mark Meeting **(Attachment 1)**. Marc Hamer (CDFO) has replaced Susan Bates on the Mark Committee. In addition, Bob Kano (CDFG) has replaced Frank Fisher who recently retired because of health reasons.

Two Mark Committee members were not present. Tim Yesaki (BC Environment) was represented by Marc Hamer (CDFO). Jerry Harmon (NMFS-Columbia River) likewise was unable to attend because of duties.

A special tribute was given to Karen Crandall as this is likely her last year as ADFG's representative on the Mark Committee prior to retirement. Ken Johnson noted that she has served effectively since the early 1980's and would be missed as a valued colleague and particularly as a special friend.

B. 1998 Meeting Site and Date

British Columbia will be the host for the 1999 Mark Meeting. The meeting will be held on **April 15-16 (Thursday-Friday), 1999**, with the site to be determined by CDFO staff. However, some committee members expressed an interest in possibly meeting in Nanaimo (Vancouver Island) in order to visit CDFO's Pacific Biological Station.

C. New Agenda Items

The question of how to report blank wire and agency only wire releases was added as a new agenda item (see **Agenda Item 8.D**).

2. Status of CWT Data Files and Reporting Backlogs

As is done each year, the status of the CWT data files was reviewed, with particular attention focused on existing 'holes' and agency plans to report the missing data.

A. CWT Release Data

All of the CWT release data through 1996 and much of the 1997 data (**Table 1, Attachment 2**) are available in PSC format and can be accessed on-line at PSMFC.

Most agencies have not completed their reporting for 1997 but are close to completing the task. Bob Kano submitted a disk containing CDFG's remaining 1997 tag releases. IDFG's 1997 steelhead releases have been reported but their chinook releases remain to be reported. Rodney Duke estimated that the missing tags would be reported within the next month. NMFS-CR apparently did not release CWT marked fish in the Snake River in 1997.

Marianne McClure (CRITFC) noted that the Release Table will need to be expanded next year as CRITFC will be the reporting agency for releases by the Nez Perce Tribe in Idaho.

B. Unmarked Hatchery Production Releases

Only modest progress was again seen during the past year in reporting unmarked hatchery production releases (**Table 2, Attachment 2**). However, Karen Crandall reported that ADFG is very close to reporting all of its unmarked production releases. This will be a major step forward in reporting untagged releases prior to 1996. In addition, Rodney Duke reported that Idaho's 1996-1997 data should be ready in the very near future. The status of the 1996-1997 data for CDFO, ODFW, and MIC was not known, but the mark coordinators agreed to determine why no data or minimal data seem to have been reported to date by their respective agencies.

Marianne McClure (CRITFC) commented that she had the task this past year of putting together the PSC Salmon Enhancement Report. She noted that WDFW staff had questioned why they provided tagged and untagged release data to PSMFC in

PSC format and then had to turn around and provide comparable data in a different format for the PSC Enhancement Report.

Upon further questioning, it was learned that the PSC Salmon Enhancement Report basically consisted of whatever each agency provided in non-standard reports that are then stapled together. The reports provide a variety of additional information (such as egg takes) that is not exchanged in the PSC exchange formats for tagged and untagged release data. As such, Marianne asked if it might be appropriate for PSMFC to upload the data onto its web page to simply the process.

Ken Johnson noted that if the question was one of PSMFC being a vehicle to facilitate reporting, then the Commission was willing to help however it could. However, if the intent was to capture other data exchanged for the PSC Salmon Enhancement Report, then the issue was much more difficult. It would involve working through the PSC Data Sharing and Data Standards committees to add new fields to the PSC release formats. Marianne stated that perhaps PSMFC could facilitate the reporting by providing a single place to get the data for the Salmon Enhancement Report. Ken Johnson therefore suggested that the Mark Center explore the idea with her during the next few months to see what can be done to eliminate the duplication of effort.

C. CWT Recovery and Catch/Sample Data

While not easily seen in **Table 3 (Attachment 2)**, major progress was reported by both Alaska and Idaho. Karen Crandall was very pleased to report that after many years, Alaska's 1976, 1977, and 1979 data have now been processed into PSC format and recently submitted to PSMFC. In addition, the 1978 data are close to final and lack only some limited port data. She further noted that this task has been a personal goal to complete prior to her retirement.

She also explained that the incomplete (I) designation for Alaska's 1995-1997 recoveries is misleading since it only involves catch records and expansion factors for Cook Inlet and Kodiak recoveries which don't impact any other agency's tagging programs. The recovery data for Southeast Alaska is static and essentially final for these three years.

Rodney Duke also reported that Chris Harrington (IDFG) has made excellent progress in developing new software for reporting Idaho's missing recovery data for 1993-1997. Software development should be done by the end of April. In addition, he reported that StreamNet was going to provide some data input assistance in May to accelerate the reporting process. Thus he was confident that most of Idaho's backlogged data would be reported before summer.

Ken Johnson noted that the error (E) designations scattered amongst the years and agencies in **Table 3** are somewhat misleading. A recent upgrade in the Mark Center's data validation checks now catches minor errors that formerly slipped by. Consequently, some data re-submissions are now failing to pass validation when they once were validated.

The CWT catch/sample data sets (**Table 3, Attachment 2**) show a somewhat similar pattern to that discussed for the recovery data sets. Marc Hamer (CDFO) also commented that with the implementation of Format 3.2 in the near future, British Columbia's catch files for 1994-1996 will change and be resubmitted. They discovered that one of their programs had been overlooking some sales slips. As such, the catch will increase a bit for some areas and this will result in new estimation factors.

3. Status of RMPC Operations

A. Platform Upgrade to 'Open Ingres'

In June, 1997, the Mark Center replaced its Ingres 6.4 operating system with 'Open Ingres'. The new operating system is more efficient and takes advantage of the server hardware and operating system architecture (i.e. Sun/Solaris Unix machine) which hosts the Mark Center's databases. Open Ingres also provides better tools for database management, communications, and web-enabled applications.

B. New Prototype Otolith Database

Jim Longwill (PSMFC) reported that the growing use and importance of thermal marking has led to interest in a regional otolith image database that is accessible on the web. On the strong encouragement of ADFG, the Mark Center recently completed development of a prototypical database for otoliths. Kent Scott, a former NMFS employee, was contracted to build the web application using java script and HTML tables. The otolith images will be accessible on the PSMFC's web pages as an addition to the Mark Center's Regional Mark Information System (RMIS). The prototype system provides users with options for browsing, querying and retrieving otolith images and related release information.

The new database is not available to the public at this time as it only contains some limited test data (including otolith images) and is in a review phase by Alaska, Washington and Canada. However, requests have already been received for access to this type of data, indicating the utility of developing a regional otolith database.

Karen Crandall (ADFG) added that while Alaska was very enthusiastic about a regional database for thermal otolith marks, she was unable to get a commitment from Washington and Canada to join forces in this effort. As such, she wondered if perhaps she was working with the wrong staff members as both Canada and Washington have large thermal marking programs.

She also noted that a need already exists for a regional otolith database. NMFS has an on-going high seas sampling program of juvenile salmon off the coast and in the Gulf of Alaska. In 1996, approximately 7,000 pink and chum salmon were sampled and transferred to ADFG's otolith lab. Based on subsampling, ADFG found approximately 1,000 fish with thermal marks. Most were from hatcheries in Alaska. However, there were also Canadian fish present from the Nitinat Hatchery. She

further stressed that this effort had demonstrated the difficulty in looking at sampled thermal marks and determining the origin of the fish without the benefit of a regional database. As such, it is time to move forward and accomplish the task.

C. New 'Users Manual' Available for RMIS

A revised Regional Mark Information System (RMIS) Manual for accessing CWT data was completed in August, 1997 by Jim Longwill and distributed to all users having an RMIS account. The new manual provides key information on a number of significant changes and new reports, plus instructions on use of the web based applications.

D. New Reports and Enhancements

Several new RMIS reports were added to facilitate retrieval of CWT recoveries based on hatchery of origin rather than the traditional tagcode approach. Users are now provided with a query parameter form containing hatchery, species, run, brood year, release type, stock, fishery, state/province, and region. Hatchery and species are required fields. Using this basic query form, users can generate eight hatchery based recovery reports that differ in time periods and levels of aggregation.

Other new reports include a new version of the TS3 report that provides recoveries by statistical week instead of the statistical two week period. A 'Statistical Time Period' report provides users with a breakout of statistical weeks for any year of choice. Lastly, users can now obtain a report of released tagcodes that do not have any recoveries reported in the database.

E. Status of Catch and Effort Database Development

A new PSC Catch and Effort data exchange format was finalized and approved by the Data Sharing Committee in January, 1997. The catch data will include all types of catch back to 1975, including commercial, sport, subsistence, personal use, native, and non-native catch. Data exchange will be in ASCII text with all fields comma delimited. In most cases, the data will be summarized weekly and in the finest area resolution available (using the standard PSC location coding in use for the CWT system). Both weight and number of fish will be included. In addition, six types of effort will be captured, including angler days, boat days, numbers of boats and fishers, net days, and boat trips.

The agreement established the Mark Center as the U.S. exchange point with Canada's Biological Station in Nanaimo. Test data files for 1990-1993 were to be forwarded to the Mark Center for validation testing by June 30, 1997.

Progress to date: A catch and effort database has been created on RMIS, with separate tables for catch and effort. In addition, the necessary data validation software has been developed and tested successfully. Work on a user's query system has been postponed until there is clarification on what types of reports are needed.

Washington and British Columbia have met the goal of providing test files for 1990-1993. However, only two of the six data files (Washington, 1992 and 1993) passed validation. The other four data sets have not been resubmitted at this point. Alaska and Oregon data sets have not been received yet.

F. Publication of CWT Release Report

The annual report on coded wire tag releases (**Pacific Salmonid CWT Releases, 1990-1997**) was produced and distributed. It proved to be a very challenging task this year as several agencies provided their final 1996 and preliminary 1997 data on a piece meal basis that persisted until December, 1997. The delays pushed back the publication six months but also provided the opportunity to provide users with all of the preliminary 1997 data reported to the Mark Center up through December, 1997.

Ken Johnson also noted that this was the second year that the Release Report had to be distributed on a purchase basis because of budget concerns. However, given all of the extra work entailed in the billing and accounting process, he promised to do his best to provide the report next year at no charge to the tagging and recovery agencies.

4. Report on NMFS Tagging Workshop

Ken Johnson reported briefly on the results of a NMFS sponsored tagging workshop that was held January 29-30, 1998 in Annapolis, Maryland. The workshop focused primarily on the need to coordinate a plethora of angler tagging programs (catch, tag and release) being conducted by non-government organizations, including conservation groups, civic groups, sportsmen's clubs, etc, in addition to those being carried out by NMFS and the respective state fisheries agencies. Major concerns involved widespread duplication of external tags (numeric codes and/or color patterns) and the need for a method to exchange both tag release and recovery data. Key species include stripped bass, tarpon and the highly migratory marlins, sailfish, swordfish and tunas.

A cooperative internet-based tagging data registry for angler-based tagging programs was approved, with the initial emphasis on capturing mark information on the eastern seaboard states and the Great Lakes region.

Lee Blankenship asked what the purpose of tagging was by the various programs and individuals. Ken Johnson responded that it appeared that there was a wide-spread conviction among anglers that they were contributing to the management of the fisheries and thus the preservation of the species. However, management biologists have expressed considerable concern that the anglers are actually increasing the mortality of fish marked in the catch and release programs because of inexperienced handling techniques and the associated problems of wounds created by the tagging. In addition, recovery of these tagged fish provides little more than distribution data over time and some information on stock abundance.

Robert Bayley (NMFS) concurred that non-governmental volunteer tagging had limited value. However, he noted that NMFS has carried out an organized tagging program on the

highly migratory species since the early 1950's. This effort has provided invaluable information on abundance, stock structure, and bi-catch.

Stan Moberly (NMT) commented that the angler tagging programs do not exist west of the Mississippi River because of strong opposition by state fisheries agencies. However, the practice is so entrenched on the east coast that the states appear to fear the clout of the sport fishers. Stan Allen (PSMFC) emphasized that the lessons learned from the east coast should further reinforce the determination to not allow angler marking programs on the west coast.

5. Update on Mass Marking and Selective Fisheries

A. Hatchery Coho in Oregon, Washington and British Columbia

1) Oregon:

Christine Mallette (ODFW) reported that Oregon had mass marked 4.8 million hatchery coho (1996 brood). Approximately 1.4 million were coastal and 3.4 million were from the Columbia Basin below Bonneville Dam. This represented about 70% of the total hatchery coho production statewide, with 100% adipose marking below Bonneville Dam (with the exception of the double index tagged groups). Selective fisheries are only projected for Buoy 10 in the mouth of the Columbia River (Aug. 3 - Sept. 24; Quota: 7,000 coho or 1048 chinook, whichever comes first).

2) Washington:

Lee Blankenship (WDFW) stated that Washington's annual coho production is on the order of 36 million fish. Approximately 28 million of the 1996 brood were adipose only marked. No marking was done in north Puget Sound to avoid flooding Georgia Strait with untagged coho. Likewise, no marking was done above Bonneville Dam.

Approximately 33 million of the 1997 brood hatchery coho will be mass marked (**Attachment 3**). This total includes the north Puget Sound production as Canada is also marking its 1997 brood coho. However, no marking is scheduled for above Bonneville Dam. In addition, double indexed groups will not be mass marked.

Washington's proposal for the 1997 brood mass marking includes all tribal and federal coho production. This would increase the total mass marked production to 56 million fish if all available tribal and federal production coho were mass marked.

Because of expected low numbers, selective fisheries on hatchery coho in 1998 will likely be limited to the Buoy 10 Fishery and terminal fisheries in Grays Harbor and Willapa Bay. Additional selective fisheries are expected in 1999 given the higher numbers of hatchery coho marked and assuming that abundance levels are adequate.

3) Washington Tribes

Ron Olson (NWIFC) reported that the Tribes do not have plans to mass mark their 1997 brood hatchery coho at this point in time. However, this could change as discussions

continue with WDFW. As an example, he noted that some cooperative groups were mass marked last year.

4) U.S. Fish and Wildlife Service

David Zajac (USFWS) reported that the Makah NFH and Quilcene NFH mass marked 553,000 fish of the 1996 brood coho production (991,000 fish) with the adipose only mark. Most of the remaining fish were doubled indexed tagged with either the Ad+CWT or CWT only mark. In addition, Quilcene NFH released 161,000 coho with no external mark (**Attachment 4**). In contrast, Quinault NFH (690,000 total production) released 530,000 fish with no mark. The remaining 160,000 fish were double indexed tagged.

Eagle Creek NFH (1,514,000 total production) and Willard NFH (2,324,000 total production) marked the vast majority of the 1996 brood with the adipose only mark, with approximately 100,000 double indexed tagged for each hatchery. In addition, Willard NFH released 380,000 fish with no mark.

The 1997 brood marking plans for the Makah and Quilcene .facilities were undetermined at the time of the Mark Meeting. Quinault NFH does not plan to mass mark its production. Eagle Creek and Willard NFH were expected to mass mark the majority of the production, similar to last year.

5) British Columbia

Marc Hamer (CDFO) stated that approximately 6.5 million 1996 brood coho were mass marked with the adipose only clip, originating from six major hatcheries in southern British Columbia (**Attachment 5, Table 2**). Additional coho smolts were marked from smaller facilities where conservation is not a problem. Returning adults will be available to the fishery in 1999. However, at this time, there are no known plans for selective fisheries. An additional 1.7 million coho smolts from conservation stocks will not be mass marked.

Plans for mass marking the 1997 brood hatchery coho were not known at the time of the Mark Meeting. However, upon returning home, Marc Hamer checked on whether there were any significant changes expected from that carried out for the 1996 brood. He reported back that the 1997 brood mass marking plans were very similar to that for the 1996 brood. Mass marking will be restricted to those Georgia Strait and Fraser River stocks that have hatchery surpluses. No northern stocks will be mass marked. One new change is the addition of mass marking surplus Robertson Creek and Conuma hatchery coho on the West Coast of Vancouver Island for a possible selective fishery.

B. Report on Second Year of Evaluating Electronic Detection

1) Washington's Research

Dan Thompson reported that WDFW sampled 18,488 coho at Marblemount, Voights Creek and George Adams hatchery racks in 1997 using the R-8 CWT tunnel detector

(**Attachment 6**). 4,528 CWTs were recovered with no CWT misses. Gate counting errors were approximately 0.3%. It is expected that the new gates will substantially improve this minor sampling problem.

An additional 5,244 coho and 89 chinook were sampled in the ocean and Puget Sound sport and commercial fisheries using the R-8 CWT detector. A total of 175 CWTs were recovered, with 3 CWT misses in coho taken in the Puget Sound net fishery.

There were a total of 77 false detections (no CWT) for the R-8 CWT detector which represented 1.7% of the total CWTs recovered. In contrast, the average rate of no tags for WDFW hatchery rack sampling using the visual sampling method for the past three years was 10.2%.

Some problems were encountered using the hand wand for detecting CWTs in both chinook and coho sampled in the sport and commercial fisheries. A total of 3,782 chinook were sampled, with 212 CWTs recovered and 12 missed CWTs (5.6% error). Over 13,300 coho were likewise sampled with 1,126 CWT recoveries and 15 missed CWTs (1.3% error rate). The missed tags were believed to be related to inadequate training of the field samplers.

2) CDFO: 1997 Research Results

A copy of Doug Herriott and J.O. Thomas and Associates's excellent report entitled " 1997 Evaluation of Electronic Detection for Coded-Wire Tags (March, 1998)" is not provided with the minutes because of its length. A copy can be obtained by either contacting Doug Herriott in Vancouver, B.C. at telephone number 604-666-6192 or by contacting the Mark Center.

Doug Harriott (CDFO) emphasized that British Columbia's main objectives for the 1997 research were to evaluate support systems for the R-8 CWT detector, further evaluate the R-8 and wand detection equipment, quantify fish handling times, and determine necessary modifications for integrating electronic equipment into the various CWT sampling environments. The general strategy was to increase the number of commercial and escapement (hatchery) test sites and add recreational fisheries (creel surveys) as a new test component.

No sampling was done on Aboriginal fisheries as there is still uncertainty on how to proceed. Wand detection is a likely approach but separate negotiations will be required with each band before sampling could be carried out.

Electronic sampling of the commercial catch proved to be disappointing. The biggest problems proved to be lack of fish and a malfunctioning diverter gate on the R-8 detector. Fishing restrictions prevented the retention of coho in the 1997 South Coast fisheries. Therefore, it was decided to move the commercial fisheries sampling effort to the North Coast (Prince Rupert and Masset). Unfortunately, the North Coast troll fisheries encountered poor catches of coho. In addition, over half of the troll fleet were freezer trollers that land fish with head off. To further complicate matters, non-retention regulations for seine fisheries reduced the coho landings in the net fisheries.

Consequently, sampling tests at the processing plants were not realistic of typical landing conditions (i.e. 150 fish/boat versus normal levels of 1,200 fish/boat). Even so, valuable experience was gained in the process.

Electronic sampling of hatcheries was planned for five hatcheries but eventually limited to Chilliwack River Hatchery because of timing constraints and problems with the R-8's diverter gate. However, on-site examinations were conducted at all five hatcheries to determine support equipment requirements. Approximately 12,000 of 28,000 returning adults (41%) were sampled at Chilliwack River Hatchery. The R-8 detector worked fine but problems continued with the diverter gate. In addition, CDFO staff tested a photocell counter that had been installed because the existing counter couldn't be seen easily in the given installation. A 10 minute video was shown of the sampling at Chilliwack River Hatchery.

CDFO personnel used wand detectors in the Strait of Georgia and Barkley Sound Creel Surveys to evaluate electronic sampling of the recreational catch. While the wand worked well for tag detection, there was a significant failure rate (15% overall) with the audio signal. In addition, technicians found a need for an integrated tally counter with the hand wand. Technicians also found that the increased time required to sample fish resulted in loss of potential data because of the reduced number of possible interviews during peak landing periods.

Key recommendations include continued R-8 detector evaluation until problems with the diverter gate are resolved. In addition, it is necessary to involve fish plant personnel in integrating electronic sampling in their given plant operations since the configuration of equipment (and available space) varies from plant to plant. Further work is recommended on developing a photocell counter as an independent count of tagged and untagged fish.

CDFO's research plans for 1998 call for expanded electronic sampling at nine hatcheries. In addition, CDFO will expand efforts to sample the commercial fisheries. Selected fish processing plants will be provided with grading tables that are equipped for mounting tube detector equipment in the correct position.

When asked about the cooperation of the processors, Doug Harriott responded that most were very cooperative. However, he had encountered some negative fishermen who complained that CDFO' electronic sampling was slowing down the processing and thus resulting in lower fish quality (and thus price).

3) Discussion about the Reliability of the New Wands

Kent Ball (IDFG) commented that Idaho's old wands were outperforming the new wands . He further explained that Idaho releases 4-5 million steelhead yearly in the Salmon River that are tagged but have no external marks. As such, they rely on the use of hand wands for field detection of tagged fish in the sampled catch. In addition, they sampled approximately 100,000 live chinook at Rapid River Hatchery this year for tags. Tagged fish were transferred to the hatchery pond and untagged fish were returned to the river for access to the fishery.

Idaho's problems with the new wands included apparent susceptibility to cold temperatures, a weaker light, and a weaker buzzer signal. In addition, they experienced lots of problems with new samplers being able to operate the wand correctly.

Guy Thornburgh (NMT) responded that he didn't think that NMT had run any tests on wand performance in extreme cold weather but would be glad to do such a test between old and new wands. However, a new wand had performed properly after having been stored in a freezer. Guy also stressed that the external packaging was the only difference between the new and old wands. The internal components and detection technology are identical. The sound signal is somewhat weaker because it is embedded in a more water proof container, but the signal is directed back towards the handle so that it can be heard by the user. He added that the wand is not always the right tool and that the tube detector is far superior in being able to detect tags.

Christine Mallette (ODFW) noted that she had tested 12 new wands and four R-8 tube detectors and had not found any hardware problems so far. However, she also had encountered poor performance by new samplers and found that there was a definite learning curve in operating the wand correctly. She also found that one on one training was highly effective in improving sampling effectiveness.

Lee Blankenship (WDFW) concurred that training was critical in the use of the wand. He also noted that the PSC report recommended the use of 'length and a half' wire to improve tag detection. In WDFW studies, he noted that the length and a half wire was 'hot' relative to the signal for standard length tags. As such, he suggested that Idaho's detection problem probably could be resolved by going to length and a half tags. Rodney Duke (IDFG) agreed and said that Idaho had already done some double length tagging of sub-yearling steelhead (70/lb) for this purpose, with returning adults expected this year. He added that no differences had been seen in smolt survival between standard and double length tags. Lee stated that WDFW had found the same result when comparing standard and double length tags in coho.

Ron Olson (NWIFC) noted that the field tests in 1996 had shown the wand to work very well on tagged coho carrying standard length tags. However, he expressed concern with the use of the wand for detecting tagged chinook since chinook fingerlings typically are too small for length and a half tags. He also noted that preliminary testing has indicated that the wand may not be satisfactory for detecting tags in large chinook..

Dan Thompson noted that WDFW recently began a study to evaluate this very question. Age-0 and yearling aged chinook fish were marked with length and a half wire or standard length wire at three hatcheries. All were marked as age-0, with a minimum length of 60mm (200/lb). Survival and tag detection rates will be compared between the two types of tags upon adult return. Rod Duke expressed concern that fish at 200/lb were too small for length and a half tags since that was an average weight. Some fish would be as small as 300-350/lb.

4) Discussion about a new Tube Detector Diverter Gate

Guy Thornburgh (NMT) demonstrated a new and more robust diverter gate that will replace the current prototype gate. Among the many new features, the stepper motor has been replaced with a solenoid. In addition, there are now two counters (left and right) for untagged and tagged fish. The counters can be zeroed out or adjusted to correct for known errors (e.g. ice counted as a fish). The gate now opens about one inch to count a fish (formerly about two inches). Minor bounces leading to bogus fish counts have been corrected by delaying the signal one tenth of a second.

C. PSC's Expanded Role in Mass Marking and Selective Fisheries

The Pacific Salmon Commission has taken several steps recently to play a major role in the planning and implementation of mass marking and selective fishery programs. During its annual meeting in February, 1997, the Pacific Salmon Commission agreed to form a Selective Fishery Evaluation Committee (SFEC) to review selective fishery proposals made by either the U.S. or Canada. Co-chairs of the PSC Coho, Chinook and Data Sharing Committees will serve as the Steering Committee.

While not yet finalized, duties of the SFEC are expected to include coordination of mass marking and selective fisheries among the members of the PSC, affected agencies, and existing coastwide and regional committees that monitor activities related to coded-wire tagging. In addition, the SFEC will review mass marking and selective fisheries proposals early in the planning process to determine if the proposed activities will adversely impact the integrity of the existing CWT system.

The SFEC will consist of a steering committee and two working groups. The Selective Fisheries Analysis Work Group is co-chaired by Marianna Alexandersdottir (NWIFC) and Brian Riddell (CDFO). The Regional Coordination Work Group is co-chaired by Sue Lehman (CDFO) and Lee Blankenship (WDFW).

Ken Johnson noted that PSC's involvement in mass marking and selective fisheries will greatly assist the Mark Committee in dealing with political mass marking issues that clearly transcend the historical role of the Mark Committee. He also noted that it would help clarify the scope of the Mark Committee's Charter (see Agenda Item 7).

D. Washington's Intent to Mass Mark Hatchery Chinook

Lee Blankenship stated that WDFW anticipates mass marking hatchery chinook with the adipose only mark in the near future for selective fisheries, similar to that now being done with steelhead and coho. However, coordination with the tribes and other impacted agencies still needs to be worked out. In addition, the sheer logistics of mass marking huge numbers of chinook smolts and multiple age classes in the fisheries continue to pose major challenges for marking and modeling, respectively.

In the interim, faced with curtailing or closing important fisheries, WDFW has opted to mass mark priority groups of hatchery chinook with the Ad+CWT mark. One group is the Puget Sound yearling chinook (**Attachment 7**). These yearling fish tend to remain

longer in residency and enter into the important winter blackmouth fishery. Approximately 3.2 million 1996 brood yearling fish were marked and tagged, with the expectation of a selective fishery on them. Another 3.6 million 1997 brood yearling chinook will also be marked and tagged.

Based on relatively little data from the 1990 brood Hupp Springs yearling release, WDFW estimates the impact on Canadian fisheries to be approximately 40-45 observed recoveries each for the 1996 and 1997 broods. No recoveries are expected in Alaska.

The Lower Columbia spring chinook is the second priority group that will be mass marked with the Ad+CWT mark. WDFW plans to mark 3.1 million brood spring chinook from Cowlitz, Fallert Creek, and Lewis River hatcheries (**Attachment 8**). ODFW will mark 5.8 million Willamette River spring chinook with the Ad+CWT mark.

Based on representative 1990 brood production CWT groups, WDFW estimates 68 and 236 observed recoveries in Alaska and British Columbia fisheries, respectively. The recoveries will occur over three years as 3, 4, and 5 year old fish are harvested.

With respect to the 1998 brood, Lee Blankenship noted that the Washington State legislature recently passed a law that now requires all Washington hatchery chinook to be mass marked.(i.e. adipose only marked). $1.2 million was appropriated yearly for the marking and associated double index tagging. The legislature also made it clear that the alternative would be to cut funding for the hatcheries since there is no justification for rearing fish that can't be accessed because of ESA regulations.

Much work remains to accomplish this directive, including development of new fishery models that incorporate multiple year classes. In addition, Washington produces approximately 100 million hatchery chinook each year, thus requiring automated marking to process the smolts within the narrow time frame available. Lee noted, however, that only those hatchery stocks destined for harvest would be mass marked. Stocks that need protection would not be mass marked (e.g. upper Columbia R. stocks).

Lee Blankenship also stressed that the new legislation requires WDFW to work to reach consensus with the Tribes on hatchery chinook mass marking plans. Should this effort fail, it likely will end up in court as was the case with the hatchery coho mass marking issue. He concluded, however, that if marking doesn't occur, it is clear that the legislature will close hatcheries rather than continue to waste funding.

Ron Olson (NWIFC) expressed concern that a selective fishery on chinook in Puget Sound (marked as yearlings) will negatively impact several other stocks that are in rebuilding programs. The depressed White River chinook stock was cited as an example. These fish are Ad+CWT marked to monitor their status. However, in a selective fishery, they will be subjected to increased harvest rather than being protected.

Ron Olson also noted that selective fisheries on chinook will require double indexing tagging in order to protect the integrity of the CWT system, similar to that now required for mass marked coho stocks. As such, he argued that there was a great deal of coordination and assessment that still needed to be done. Lee Blankenship agreed and

emphasized that there was time to accomplish this as the proposed selective fishery would not begin until late 1999. He also stressed that the PSC committees desperately need people to assist in the modeling of chinook selective fisheries.

E. Update on WDFW's Automated Fish Marking and Tagging Machine

Lee Blankenship reported that the prototype automated fish marking and tagging machine is performing very well in most areas but still has some problems that require further work. The machine is designed to handle the seven standard head mold sizes for smolts ranging from 60 mm (~200/lb) to 150 mm (20/lb). Former problems with fin removal have largely been resolved and adipose fin clips are excellent. In addition, CWT placement is excellent.

Two technological problems remain to be solved. The first involves the need for an automatic size sorting machine that uses length. The current grader now sorts by width and provides relatively good quality of grading (~90%) but isn't adequate for continuous automated operations. The second challenge is to double the speed of the tagging and marking operation. Currently it processes one fish/second. However, the goal has always been to process two fish/second. Lee stressed that both problems would be resolved and that the machine was expected to be available for production work within one year. A short video presentation was then presented to show progress to date.

Guy Thornburgh advised the Mark Committee that NMT had not finalized a pricing schedule for the automated fish marking and tagging machine. He projected a rate of $94/1000 fish for clipping plus tagging and the $20 range for just clipping. He also noted that the trailers were going to cost NMT substantially more than initially expected. However, NMT's price would still remain less expensive than the current tagging system.

He also noted that some remain skeptical of the concept of automated marking and tagging and the coming changes that it will bring. However, the introduction of CWTs in the late 1960's was likewise met by similar doubts and concerns. He predicted that the majority of tagging and marking coastwide would eventually be done by automated machines. As a example, NMT has signed contracts with agencies in California to mass mark approximately 25 million chinook yearly. The mass marking (and substantial tagging) is not for selective fisheries purposes but to evaluate major habitat restoration efforts that are now underway.

6. Special Requests to use the Adipose Only Clip for Mass Marking

A. Mass Mark Snake River Chinook with the Adipose Only Clip

IDFG and USFWS again requested permission to use the adipose only clip to mark a major portion of their Snake River hatchery chinook production (fifth year). The 1997 brood fish will be marked this spring for release in 1998 and 1999.

IDFG's marking proposal for spring and summer chinook (**Attachment 9**) calls for Clearwater Hatchery to mark 2,389,000 fish with the adipose only mark, 150,000 with the Ad+CWT, 464,000 with the CWT only mark, and 80,000 with the LV mark. Rapid River Hatchery will release 2,850,000 fish with the adipose only mark and 300,000 with the Ad+CWT mark. McCall Hatchery will release 760,000 adipose

only, 300,000 Ad+CWT, and 300,000 CWT only marked fish. Sawtooth Hatchery is also scheduled to release 229,000 adipose only and 96,000 CWT only marked fish.

USFWS marking plans for spring chinook (**Attachment 10**) include release of 590,000 adipose only marked chinook from Kooskia NFH. A maximum of 800,000 adipose only marked spring chinook will be released from Dworshak NFH.

Discussion:

Rodney Duke emphasized that Idaho's marking program is basically the same as the last several years. Marking is mandatory under NMFS requirements for ESA listed stocks as only marked fish can be brought into the hatcheries. Likewise, both IDFG and NMFS regulations (Section 10) dictates that a visual mark must be used to manage in-state fisheries.

ACTION: The IDFG/USFWS proposals were approved by consensus. However, Marianne McClure emphasized that CRITFC remained in opposition to the IDFG/USFWS marking plans for the same reasons argued before the Mark Committee for the past several years. In brief, CRITFC's position is that NMFS's definition of species and position on the use of hatchery fish to rebuild runs are both technically flawed. As such, NMFS required marking may actually have a detrimental effect on Snake River chinook populations. Furthermore, the higher mortality associated with marking exacerbates the chronic failure to reach Lower Snake River Compensation Plan mitigation goals.

B. Request to Adipose Only Mark a Small Group of Lake Ozette Sockeye Salmon

Ron Olson (NWIFC) presented the Makah Tribe's proposal to mark a small group of Lake Ozette hatchery sockeye fry salmon with the adipose only mark (**Attachment 11**). This is a repeat of the request granted for the past two years. However, the proposed number of fry to mark has decreased from 200,000 to 50,000. Tagging is not an option as there is no regional CWT sampling for sockeye in the mixed stock fisheries and no terminal fishery.

ACTION: Approved.

C. WDFW Request to Adipose Only Mark Dungeness Pink Fry Release

On February 25, 1998, WDFW requested early approval to mark 35,000 Dungeness River pink fry (1996 brood year) with the adipose only mark (**Attachment 12**). The Dungeness River stock is threatened with possible extinction. Early review was necessary because marking had to start by mid March, 1998.

ACTION: *Review only. Pre-meeting approval granted.

D. USFWS Decision to Adipose Only Mark Quilcene Summer Chum

On December 12, 1997, David Zajac (USFWS) advised the Mark Committee that the Service might initiate mass marking the Quilcene summer chum hatchery production (400,000) with the Ad only mark if the species was listed under ESA (**Attachment 13**).

On March 10, 1998, NMFS proposed that this stock be listed as threatened. Therefore, USFWS commenced marking the stock as proposed. Based on prior CWT tagging studies, the number of expected "observed recoveries" over two years is 45 fish for Canada and 20 for Washington.

ACTION: *Review only. Pre-meeting approval granted.

7. Development of a Formal Charter for the Mark Committee

The past several years have been difficult and confusing ones for the Mark Committee as new policies began to evolve on mass marking and selective fisheries. In the process, much of the decision making process was shifted over to the individual agencies and to the Pacific Salmon Commission. However, there remains a clear need for the Mark Committee to continue its involvement in a wide range of fish identification issues. The challenge therefore is to outline the boundaries under which the Mark Committee will function in the future.

During last year's Mark Meeting, Marianne McClure recommended that the Mark Committee explicitly define its role, a task that had never been formally done since the conception of the Mark Committee in the early 1950's. To this end, a subcommittee was formed and Ken Johnson was assigned the task of drafting a charter for review by the subcommittee prior to the 1998 Mark Meeting. He noted that he had a very hard time getting started on it until the Pacific Salmon Commission's recent decision to become involved in reviewing mass marking and selective fisheries proposals. Given the delay, the draft charter ended up being presented to the full Mark Committee for a first review.

Ken Johnson noted that the Mark Committee's draft charter was developed on the basis of several other PSMFC committee charters, including the Alaska Fisheries Information Network (AKFIN), Recreational Fisheries Information Network (RecFIN), Pacific Coast Fisheries Information Network (PacFIN), and the PIT Tag Steering Committee.

The draft charter contained six basic sections. A **Preamble** defined the need for regional marking of anadromous salmonid stocks and the role of the Mark Committee as a forum for establishing regional marking agreements. The second section, **Purpose**, defined the Mark Committee as primarily a technical committee and provides specific objectives . The third section, **Membership**, provided a list of the Mark Committee's twelve voting member agencies. The fourth section, **Operating Procedures**, outlined the Mark Committee mode of operation, including resolution of issues not reached by consensus. The fifth section, **Relationship to PSMFC**, defined PSMFC's relationship to the Mark Committee as an umbrella organization. The final section, **Agreement**, provided for the signatures of the directors of each of the member agencies.

Discussion:

As the next step, Robert Bayley (NMFS) recommended that the Mark Committee members take the draft charter back to their respective agencies for a limited review period. This was strongly supported by others. He also recommended that the section

on Operating Procedures add language referencing the Mark Committee's ability to create subcommittees.

Lee Blankenship asked Stan Allen (PSMFC) if the other PSMFC charters specified a 75% affirmative vote required to approve new agreements in the absence of consensus. He responded that none of them did. Lee then emphasized that he strongly objected to the 75% rule as being far too restrictive and often unworkable as has been seen in the recent past few years. A far better choice, he argued, would be to base decisions on consensus which would simply a majority opinion.

Robert Bayley concurred that the 75% rule was unreasonable and said that he could live with a consensus approach based on greater than 50% support. However, he stressed that he preferred the approach where non-consensus issues would be discussed further to see if consensus could be achieved. Failing that, it should be mandatory that both the majority and minority positions to be spelled out in detail. He also noted a need for specific language that outlined what constitutes a quorum for voting purposes.

With regard to mass marking issues, Marianne McClure (NWIFC) noted that Objective 3a specifies that the Mark Committee provide a technical review and recommendations for large scale mass marking. However, Objective 3b advocates a voting position on smaller scale mass marking programs that do not have a regional component. She stressed that the two categories weren't mutually exclusive and that tighter language was needed to clarify what constitutes harvest management. In addition, there is potential confusion as how to define the relative size or impact of mass marking programs. Several others concurred with her observations. Ron Olson added that perhaps a better linkage could be made to the Pacific Salmon Commission's role in reviewing mass marking and selective fisheries proposals.

ACTION: A new 'Subcommittee on the Mark Committee Charter" was formed, with Karen Crandall, Marianne McClure, Lee Blankenship, Ron Olson, David Zajac and Ken Johnson as members. A chairperson was not designated.

It was also agreed that the Mark Committee members would take the draft document home for a **30 day agency review period.** Recommended changes are to be forwarded to Ken Johnson who will make a second draft for review by the subcommittee. **The final product is to be distributed to the Mark Committee by mid July.**

8. Impact of Mass Marking on CWT Data Exchange Needs

A. Modified Format Version 3.2 for Data Exchange

Susan Markey (WDFW) briefly reviewed the major data format changes that the PSC Data Standards Committee (DSC) recently adopted for Format Version 3.2 to capture the necessary release, recovery, and catch/sample information associated with mass marking, double index tagging, and selective fisheries.

Two new fields were added to the Release data format to reflect what type of mark was placed on both tagged fish (field 31) and untagged fish (field 32). A new coding scheme

was also developed for those marks (see next agenda item). In addition, two fields were added to indicate if there was double index tagging (field 33) and linkage to other related release groups (field 34).

The Recovery and Catch/Sample data formats now share a new field which is the Catch/Sample Id number. This will facilitate linkage of the recovery data to the correct catch and sample information. In addition, a new Recovery field (37) was added to record the external mark found on the fish when sampled.

The Catch/Sample data format has three new fields to capture the 'Number Adipose Clipped and Tagged' (field 36), 'Number not Tagged, Sampled for Adipose Clip' (field 37), and 'Number not Tagged, Adipose Clipped" (field 38). The PSC Committee on Selective Fisheries Evaluation determined that these three fields were needed in order to evaluate mass marking and selective fisheries.

In addition, both the Recovery and Catch/Sample data formats had a new field added to capture the 'CWT Detection Method'(i.e. visual vs. electronic). Any recoveries prior to 1998 would be listed as 'Visual Detection'. However, coho CWT recoveries in 1998 and onward could be either electronic or visual detection.

Susan Markey stressed that both sampling crews and sampling supervisors need to be aware that two of the new Catch/Sample data fields (#37, 38) have to do with counting fish that are not tagged (i.e. the fish don't 'beep' in the field!) and then separating those fish into separate totals for adipose marked and unmarked fish. **This applies only to coho at this time**. As such, she advised that sampling supervisors will likely need to modify their data sampling forms to capture this new information needed to evaluate mass marking and selective fisheries.

(Note: A copy of the PSC Format 3.2 specifications can be obtained from PSMFC's Mark Center. Please call Jim Longwill at 503.650.5400.)

B. New Coding Scheme to Capture Mass Marks

Ken Johnson reviewed a numeric coding scheme adopted by the PSC Data Standards Committee to capture external mark information on fish groups releases and on fish sampled in the harvest (**Attachment 14**). The primary goal was to provide a means of reporting external mass marks that are used for fishery management purposes. These key marks included only the left and right ventral marks plus the universal adipose clip (whether single or in combination with other marks).

The coding scheme uses a four character numeric code for the various marks. No external mark is coded '0000', while the left and right ventral marks are coded '0001' and '0002', respectively. The adipose clip is coded '5000' and the adipose clip in combination with any other mark is also coded in the 5000 series. This allows easy data retrieval for any adipose mark. The other fin marks are organized in terms of importance as marks rather than in the traditional 'clockwise' rotation scheme used to report marks in the now defunct 'Mark List'.

Data Standards Committee recognized that the coding scheme might be useful to report other external marks (other than mass marks) at the time of release, regardless of whether the fish had a CWT or not. As such, an expanded range of codes was provided based primarily on the fin marks reported in the Mark List. In addition, generic codes were provided for visual implant type of marks and freeze brands. Data Standards Committee requested input from the Mark Committee on whether or not this scheme might be useful to capture mark information that was once provided in the 'Mark List'.

Discussion:

Karen Crandall acknowledged that the scheme would be useful for reporting other mark release information but expressed concern about the valid of the data. If the field was only optional, not all agencies would likely report their mark information. As such, data users would never be able to rely fully on what was in the data base. Lee Blankenship agreed but stated that he would not support mandatory reporting since most of his agency's marking was still experimental in nature. Several other committee members concurred that the marking scheme would be very useful but felt that reporting should be optional.

Rodney Duke (IDFG) encouraged reporting of all marks and said that he has found that such data has become increasingly valuable with the passage of time for a variety of reasons, including those associated with ESA issues. He argued that most agencies probably track the data internally anyway and that the benefits would far outweigh the minimum efforts required to add associated mark information to the release records

A question was raised about whether or not the coding scheme was limited to external marks. Marc Hamer and Susan Markey confirmed that this was the original intent as Data Standards Committee was focused on capturing only those external marks used for mass marking and potential selective fisheries management. However, as discussion continued, it became apparent that the Mark Committee favored the option of adding new codes to the list that included internal marks such as freeze brands, otolith marks and perhaps pit tags in a generic sense. **It was therefore recommended that the new mark related fields in Format Version 3.2 be modified to simply specify reporting 'marks' rather than 'external marks'. This suggestion was approved by those in attendance who also serve on the Data Standards Committee (more than half of the DSC members were present).**

Marianne McClure also raised the question if a new field was needed to capture the type of fishery. She noted that a lot of harvest management analyses will need some indication if a fishery is selective or not. Ken Johnson commented that Gary Morishima had raised the same issue in an earlier Data Standards meeting. Susan Markey noted that it had been discussed by Data Standards but it wasn't coded into Version 3.2 for a variety of reasons. One of the problems was that it opens a whole range of associated issues. For example, a given fishery may be selective for a few weeks and then be switched back to non-selective. Ron Olson also commented that there was a lot of different connotations as to what constitutes a selective fishery. Tom Kane (USFWS) advised that the issue be referred back to the Data Standards Committee for further work. This recommendation was approved.

ACTION: The new coding scheme for reporting mark releases was approved. **Reporting is mandatory for any adipose mark but optional for all other marks (including those in combination with the adipose mark).** Data users will need to be advised that the database will be incomplete for marks other than the adipose clip.

Agencies may request codes added for new marks, including internal marks. Marks having many potential combinations (e.g. elastomers, pit tags, otolith marks) will only be identified as a generic mark (example: otolith mark rather than specific otolith codes). Jim Longwill will serve as manager of the mark coding scheme.

C. Question on Reporting of Bad Adipose Clips

Some agencies have coped with poor adipose clips by adjusting the number tagged (Release field 15) downward. However, with the advent of electronic detection, tags will be recovered regardless of the presence of a bad clip. Furthermost, the number of adipose clips is required for some of the recovery expansion calculations involving mass marking and selective fisheries.

Data Standards Committee discussed but did not approve a proposal to add a new field in the Release file to capture the percent of bad adipose clips in a release group. Input was requested from both the oversight PSC Data Sharing Committee and the Mark Committee as to whether this information is deemed important enough to add a new field or is it relatively inconsequential in the overall variation of the data.

Discussion:

Lee Blankenship and Karen Crandall concurred that the Mark Committee had recommended (not recorded in the Regional Agreements) that all agencies adjust their numbers tagged for poor clips. However, not all agencies have done this. Lee also noted that with the advent of electronic sampling for coho, there was no need to make that adjustment for coho. However, WDFW will continue to correct for bad clips in their chinook releases.

David Zajac noted that there had been studies on regeneration of the adipose fin clip. However, the Mark Committee has never been able to agree what just what a poor clip is. As such, the real problem is that there is no standard.

Karen Crandall commented that Data Standards Committee had initially considered adding a field that recorded the percentage of bad adipose clips, and that the number of releases would not be adjusted., regardless of the species. Marianne McClure pointed out, however, that the historical data are already confused since there is no way for data users to know for certain if releases have or haven't been adjusted for bad clips.

Lee Blankenship also noted that it is common to view the CWT data as sacrosanct but significant variability exists that is generally ignored. Research has shown, for example, that bad clips can regenerate to the point of being unrecognizable. He argued that the data are only as good as adjustments can be made where known problems exist.

Ron Olson commented that without a standard for what constitutes a bad mark, it makes little sense to add a new field to the Release data file to capture messy information. He also agreed with Lee's position that adjustments not longer made sense for coho (given electronic sampling) but supported continuing adjustments for chinook releases. He also stressed that the impact is relatively minor, regardless of how it is handled.

Dan Thompson (WDFW) added that approximately 1% of their adipose marks are bad clips (i.e. defined as more than 1/3 of the fin is present). However, volunteer marking efforts have resulted in rates as high as 10%. Ron Olson reported finding comparable results for bad clips, with average rates around 0.3% but occasionally as high as 12%. Christine Mallette (ODFW) likewise confirmed that she saw variable rates in marking quality, particularly during mass marking operations. ODFW's solution was to increase quality control checks by 100%. In addition, **all three agencies adjusted for the bad clips by reporting them as unmarked and in a separate release record.**

ACTION: The Mark Committee concurred with Data Standards Committee that **no new field was necessary to capture the percent of bad adipose clips**. However, with the exception of coho, it was again recommended that bad clips be adjusted for in the Release file.

D. Reporting 'Tag Codes' for Blank and Agency Only Wire

A brief discussion was held on how to report releases of fish tagged with either blank wire or agency only wire. Ken Johnson noted that the CWT release data base carries a few release records for blank wire that have tag codes coded as '00000*1', '000000*2', '000000*3', etc. The need for a unique tag code necessitated the addition of the '*1', '*2', etc convention. If these types of releases are to be treated as legitimate codes, the '*' convention will quickly become unworkable. However, he argued that since blank and agency only wire really don't have tag codes, the releases should be simply reported as unmarked releases using the traditional leading '!' character in the first column.

This position was fully supported even though the fish technically do carry a mark by virtue of being tagged with a CWT. It was also noted that there is no tag type for blank or agency only wire.

ACTION: Fish marked with either blank or agency only wire are to be reported as an untagged release. Any blank wire releases currently in the CWT Release file with a tag code '00000*..' are to be deleted and resubmitted as untagged releases.

9. Agency Reports on Tagging and Marking Plans for 1998

California is in the process of greatly expanding its marking and tagging program. Guy Thornburgh reported that NMT now has a contract to clip and tag an additional five million chinook at five Central Valley hatcheries, beginning in February, 1999. This will bring the overall tagging level to approximately eight million fish. In addition, NMT has been asked to submit a proposal for marking 10 million fish for five years, starting in 2000. This would bring the total to 13 million fish (~ 50% of the annual production in the Central Valley).

Other significant changes include WDFW and ODFW's expanded spring chinook tagging programs (up three million and six million tagged fish, respectively) in the lower Columbia River for selective fishery purposes. IDFG will also expand marking of its spring and summer chinook by 5-6 times to an overall level of 1.5 million fish because of favorable returns for the first time in many years.

Marianne McClure also noted that CRITFC will be reporting tag releases for the first time on behalf of the Nez Perce Tribe in Idaho. Agency code 61 will be used . Ron Olson volunteered NWIFC's assistance as CRITFC will need to develop the necessary software for reporting the release data.

10. Update on 1996 High Seas Sampling Program

Adrian Celewycz (NMFS-Alaska) reviewed the 1996 high seas sampling program for CWT marked fish, including fisheries sampled and new range extensions for North American salmonid species. His full report is provided below.

High-Seas CWT Recoveries in 1996
by Adrian Celewycz, NMFS, Auke Bay Laboratory

In 1996, observers on US domestic groundfish vessels on the high seas in the North Pacific Ocean, Gulf of Alaska, and Bering Sea recovered a total of 87 cwts from 57,638 salmonids examined for a cwt occurrence rate of 0.15% (or 1 cwt/662 fish examined). Chinook salmon comprised the majority of tagged fish recovered in the commercial trawl fishery, accounting for 85 of the 87 cwts recovered.

In the 1996 trawl fishery targeting whiting in the North Pacific Ocean off of Washington, Oregon, and California, chinook salmon was the only species with cwt recoveries. Of the total of 609 salmon examined for cwts, 89% were chinook salmon, with coho salmon and chum salmon comprising the other 11%. Of the 543 chinook salmon examined, 38 cwts were recovered, for a tag occurrence rate of 7%. The 38 cwt chinook salmon recovered in this fishery in 1996 represented a 63% decrease from the 104 cwt chinook that were recovered in this fishery in 1995. Six of the 38 cwt chinook salmon originated from the Snake River drainage. No cwts were recovered from species other than chinook salmon. No tag expansions are available for this fishery.

In the 1996 trawl fishery in the Gulf of Alaska, once again, chinook salmon was the only species with cwt recoveries. Of the total of 4577 salmonids examined for cwts, 53% were chum salmon, 46% were chinook salmon, and the remaining 1% were pink, coho, and sockeye salmon. Of the 2128 chinook salmon examined, 23 cwts were recovered, for a tag occurrence rate of 1% for chinook salmon. Because the total harvest of chinook in this fishery was 15,761, an expansion rate of 7.4 can be applied to the 23 cwt recoveries to come up with an expanded catch of 170 cwt chinook salmon in the Gulf of Alaska in 1996.

In the 1996 trawl fishery in the Bering Sea-Aleutian Islands, chinook salmon comprised 92% of the cwt recoveries, with chum salmon comprising the other 8%. Of the 52,452 salmon examined for tags, 52% were chum salmon, 47% were chinook salmon, with pink, coho, and sockeye salmon comprising the remaining 1%. Although over 9 times as many chinook salmon where examined for cwts in the Bering Sea-Aleutian Islands trawl fishery than in the North

Pacific and Gulf of Alaska trawl fisheries, only 28% of the total cwt chinook salmon were recovered from the Bering Sea-Aleutian Islands. Of the 24,962 chinook salmon examined, 24 cwts were recovered for a tag occurrence rate of 0.1%. Because the total harvest of chinook salmon in this fishery was 63,179, an expansion rate of 2.5 can be applied to the 24 cwt recoveries to come up with an expanded cwt catch of 61 chinook salmon in the Bering Sea-Aleutian Islands trawl fishery. Two cwt chum salmon were also recovered out of the 27,445 examined, for a tag occurrence rate of 0.007%. An expansion rate for chum salmon could not be calculated, because the total harvest of chum salmon in this fishery is not known.

Tagged salmonids were also sampled on the high seas by Fisheries Agency of Japan (FAJ) gill-net and longline research, with steelhead comprising 71% of the cwts recovered. Most (75%) of the salmonids captured were pink and chum salmon. Of the 17,937 salmonids examined, 7 cwts were recovered. One cwt coho salmon was recovered out of 1940 examined for a tag occurrence rate of 0.05%. One cwt sockeye salmon was recovered out of 2296 examined for a tag occurrence rate of 0.04%. Five cwt steelhead were recovered out of a total of 128 examined for a tag occurrence rate of 4%. Interestingly, the Japanese researchers identified 47 steelhead with missing adipose fins, but only 5 cwts were recovered. Of the 5 cwt steelhead, 2 originated in Idaho, and 3 originated in Washington.

Tagged salmonids (juveniles, immatures, and adults) were also captured in the Gulf of Alaska in 1996 by the Ocean Carrying Capacity (OCC) program, cooperative research between the National Marine Fisheries Service (NMFS), the Canadian Department of Fisheries and Oceans (CDFO), and the Fisheries Research Institute (FRI). Two cwt sockeye salmon were recovered out of 1957 examined for a tag occurrence rate of 0.1%, 2 cwt chinook salmon were recovered out of 147 examined for a tag occurrence rate of 1.4%, 4 cwt pink salmon were recovered out of 6139 examined for a tag occurrence rate of 0.06%, and 10 cwt coho salmon were recovered out of 1575 examined for a tag occurrence rate of 6.4%. No cwt steelhead or chum salmon were recovered.

Preliminary analysis of 1997 data has yielded some interesting recoveries. First, a group of Robertson Creek, BC cwt coho salmon was released at the mouth of Alberni Inlet, Vancouver Island in mid-May 1997 at 12 cm mean length. One of these cwt coho was recovered in late July in an OCC research trawl in the Gulf of Alaska near Prince William Sound at a size of 26 cm length. This fish traveled a straight-line distance of 1791 km in 73 days, a rate of 28.4 cm/s or 1.5 body length/s! Second, a Umatilla River stream-type (or spring) chinook salmon smolt was recovered in an OCC research trawl off Icy Pt. in the Gulf of Alaska. This fish traveled 1800 km in 91 days after being released in late March, 1997, and is believed to be the earliest recorded recovery in Alaska of a stream-type chinook salmon from the Columbia River Basin during its first summer at sea. Finally, an immature cwt chinook salmon from the Kenai River, Alaska was recovered in the commercial trawl fishery for whiting off the south-central Oregon coast in 1997. This fish represents the southernmost recovery of an Alaskan origin chinook salmon on the Pacific Coast.

11. Effects of Coded Wire Tagging on the Survival of Spring Chinook (WDFW)

Lee Blankenship summarized the final results of a 10 year study (funded by BPA) to evaluate the combined effects of handling, anesthesia, adipose clipping, and CWT application on the survival and growth of spring chinook (**Attachment 15**). The study was conducted at Cowlitz, Carson, and South Santiam hatcheries in the Columbia Basin using the 1989, 1990, and 1991 brood years. The entire production at each hatchery was otolith marked so that strays (other facilities or wild fish) could be identified and removed from the

production returning control group. In addition, one third of the production was given an adipose clip and CWT using normal procedures. The ratio of marked to unmarked smolts at the time of tagging with returning adults provided an estimate of differential survival.

The number of returning adult tagged fish at Cowlitz Hatchery was equal or slightly higher than when they left as juveniles At Santiam Hatchery, all three broods of tagged adults returned at slightly lower rates than the controls (3.3%, 6.3%, and 4.0%) but the differences were not significant at the 95% level. Carson NFH likewise had no significant difference for returning tagged fish of the 1990 and 1991 broods (0.6% and 6.6% lower). The 1989 brood tagged fish returned at 8.9% lower survival which was significant. However, this reduced rate was expected as the fish had a high level of BKD prior to tagging and IHN broke out during the tagging.

In addition, no significant differences were seen in growth between controls and treat groups at any of the hatcheries. Lee concluded that the 10 year study conclusively demonstrates that coded wire tagging does not have a detrimental impact on fish. Given the current coastwide tagging levels of 45 million fish annually, this is welcomed information.

12. Differential Survival of Ventral Fin and Adipose Fin Clips in Fall Chinook

Dan Thompson presented results to date for a long term WDFW/USFWS study designed to measure the effect on survival following removal of the ventral and adipose fin on fall chinook (**Attachment 16**). The study was conducted at Spring Creek NFH on the Columbia River, using the 1992, 1993, and 1994 brood years.

For each brood year, four groups of approximately 200,000 chinook were marked and tagged with unique codes. The four groups included: CWT only, Ad+CWT, LV+CWT, and Ad-LV+CWT. The 0-age fish were approximately 70mm FL when tagged. Quality control checks were performed on all groups to evaluate tag loss and fin clip quality. All returning adults were sampled electronically with an R-10 tube detector for the presence of a CWT. If a CWT was detected, the fish was checked for missing fins and then graded for fin mark quality if a fin was missing.

Results remain preliminary as the recoveries cover only three sampling years but the trends are consistent across brood years and marks. The control fish, marked with a CWT only, had the highest survival rate. Ad+CWT marked fish had the next highest survival rate. The ventral clip (LV+CWT) was next in survival, followed by the Ad-LV+CWT mark with the lowest survival rates.

Dan noted that while there are clear trends, the number of recoveries is too low to demonstrate statistical significance. Rodney Duke commented that similar results had been seen in Idaho's marking efforts and that more marks represented more stress for the fish. Consequently, one would expect decreasing survival as the number of marks increased. Lee Blankenship concurred but noted that research in the literature appears to demonstrate that it is a compounding effect rather than a simple additive effect.

13. Update on Visual Implant Marks (WDFW)

Dan Thompson also reported on WDFW's evaluation of the long term retention, visibility and functionality of visual implant marking (**Attachment 17**). Studies were conducted at Voights Creek and Marblemount hatcheries, with comparable results. The VI Jet marks were injected into the anal fin using a needle-less injector.

Using the Marblemount Hatchery as the example, Dan noted that there was no difference in survival between the 100,000 fish marked with the adipose clip (control group) and 100,000 fish marked with the adipose plus VI jet mark in the anal fin. However, the VI Jet mark retention and visibility were very poor, with the marks detected on only 50% of the returning adults. The VI Jet material was still present but the fins had darken too much for either visual or ultraviolet detection.

The studies clearly demonstrated that the VI Jet mark is not suitable for long term use such as identifying returning adults. However, Dan noted that there may be short term applications where the marks could prove very useful. He also reported that they have begun to investigate the use of elastomers in the jaw area of fish. Preliminary results indicate some hope for much better success in mark retention.

Rodney Duke also commented that IDFG had marked approximately 27,000 fish at McCall Hatchery with elastomer material in both the jaw and the eye tissue. The fish were marked last fall at 120-130/lb. Results at nine months indicate that the jaw mark is far superior in retention and easily visible in the clear unpigmented tissue of the jaw. It remains to be seen how easily the mark can be seen in returning adults.

14. Northwest Marine Technology

A. Overview of Research and Development

Guy Thornburgh briefly outlined NMT's current research and development efforts. Work on the elastomer tags has slowed down considerably as research has demonstrated problems in long term detection. In addition, NMT may phase out its archival tag in interest of focusing on other areas more related to NMT's basic involvement in large scale fish marking. The automated fish marking and tagging machine is one such effort. In addition, he noted that NMT also is developing an electronic sizing and sorting machine that will have a variety of uses for normal hatchery operations in addition to use with the 'mass marking machine'. A third area of active research and development involves NMT's electronic tag detection hardware. Three full time staff and several part-time engineers are involved in this project. Lastly, NMT is focusing a major effort on development of decimal tags under the supervision of Ray Glaze, senior software developer.

B. The Decimal Tag

Ray Glaze commented that development of the decimal tag was guided by three design goals: 1) data reliability; 2) easy of use, and 3) integrity with the existing binary CWT coding scheme that has worked well for nearly 30 years. He added that he was able to all of the goals with the minor exception of half length tags where the data capacity had to be

scaled down somewhat. With respect to data integrity, NMT will not re-issue tag codes in decimal form that already exist as binary codes.

Five new formats are proposed for the various types of CWT wire (i.e. standard length, half length, length and a half, sequential, and agency only tags. The decimal tag will use a flag character to the left of the agency code to orient the reader. Digits will be displayed in a 5x7 dot matrix. *(Note: A copy of NMT's proposal outlining the various formats can be obtained from the Mark Center.)*

The new decimal tags have a much greater code capacity than the binary tags. Standard length tag code capacity increased from 262,144 codes to a total capacity of 1,000,000 codes. There are now 100 possible agency codes (00-99) instead of 64, and the data portion of the code increased from 4,096 to 10,000 unique codes. Half length tags offer a mixed bag in that the code capacity per agency is 10,000 instead of 32,768. However, as there are 100 agency codes instead of only 16, the total capacity is increased from 524,288 to 1,000,000.

NMT's goal is to provide the decimal tags to users by January, 1999. No price changes are envisioned at this time. The tags will be made using the 'new, new' wire as it has come to be informally known.

Discussion:

1) Possible Confusion between Standard Binary and Six Word Half Length Decimal Tags

Karen Crandall noted that the new scheme for half length tags could present a problem. Under the binary coding scheme, a six word half length code for Agency = 04, Data 1 = 2, Data 2 = 4, Data 3 = 3, and Data 4= 1 is actually represented by convention as 0402020201 in the data base. In comparison, the new decimal scheme also uses a two character Agency code but has only one character for Data 1 through D4. Hence, this code would be read directly off the wire as 042221, and thus could be confused with standard length binary tag codes already in the data base.

Given that her head lab staff doesn't report tag type at the time of decoding the tag, Karen expressed concern that half length decimal codes would introduce confusion into the data base. As a possible solution, Karen recommended that a rule be established that half length decimal codes have a leading zero added to the D1 through D4 fields, similar to the convention now used for binary half tags. Ray Glaze agreed that confusion could result and that the existing procedure of adding an leading zero would be good to maintain.

2) Problem with Coding for Sequential Tags

Karen Crandall raised a second data concern that involves coding for the sequential tags. Under the binary system, recoveries of sequential tags are not translated to the actual sequence number. Rather, only the column and row of the sequential table is reported (see Recovery fields 33 and 34). In contrast, the decimal coding scheme will provide the correct sequence number. This would necessitate going back into the data base and converting the binary column and row information into the correct sequence number to prevent confusion

between the old and new data. Ray Glaze agreed that it would be a good idea to revise the historical data. However, he noted that it wasn't too hard to do and that NMT had software that converts the column and row to the sequence number.

(Note: Although not discussed during the meeting, it became apparent during the preparation of the minutes that this is a larger problem than initially thought. The basic problem is that the field width for both the Sequential Table Row No. and Sequential Table Column No. is three characters each. However, the sequence number may be as large as five characters. Hence, there is no way that the data base can accommodate conversion of the table row and column values to the actual sequence number. Either a new field would have to be added at the end of the Recovery file format or the two fields could be redefined and collapsed into a new single field of six characters. This probably would be preferable at the present time but would still require a new format revision which is not a trivial task.)

3) Clarity of Coding

Lee Blankenship noted that several Mark Committee members had expressed concerns that MicroMark's laser tags were not etched deep enough and that readability should be improved. NMT was therefore asked to provide samples of the proposed formats in order that the user community might get a better idea of quality. This request was readily agreed to. Guy Thornburgh also emphasized that the quality would be superior to that seen on MicroMark's tags as NMT would be using a more powerful laser that MicroMark used, and the application of the laser on the wire would be very different. He also expressed confidence that users will be pleased with the improvement in clarity as laser technology has improved dramatically in the past two years.

Rodney Duke also expressed some concern that the coding as shown in the diagrams might be too busy under the microscope to sort out the dots. Ray Glaze responded that one would only see one row under the microscope and that it should be very readable. However, if there are problems, he noted that he had other solutions in mind to improve readability.

4) Overall Reaction to the Decimal Tags

While several problems and concerns were raised, there was strong support for NMT's efforts to move to the decimal tag. Features noted favorably included the great increase in available codes, the mirroring of the existing system, continuation of unique, one time only use of codes whether binary or decimal, and general ease of use.

ACTION: No formal action was required on NMT's decimal tag proposal pending distribution of samples of etched wire. However, the general consensus was that the proposal was sound and needed only minor modifications to meet regional marking needs.

15. Proposed Smith-Root Alphanumeric Wire Tags

David Smith, company president, noted that Smith-Root took out a patent about six year ago for doing alpha-numeric micro-tags. The process used a laser to expose a resistant layer and then the code was chemically etched. Development was terminated for a variety of reasons. However, Smith-Root is now getting back into the field as the new lasers have higher

frequencies and shorter wave lengths that allow smaller dot sizes and can etch very small and distinct characters.

Smith-Root's proposed alphanumeric tags are basically similar to NMT's decimal tags. However, there are some significant differences. The characters occupy an 8x10 dot matrix as compared to NMT's 5x7 matrix. A second difference is that two rows of characters are proposed as compared to NMT's four rows. The characters in the two rows would be staggered to ensure code readability regardless of where the wire is cut. The start character would be a chevron, similar to that used by MicroMark.

A single alpha character is proposed for the agency, with the remaining numeric digits (three for half length tags; six digits for standard length tags) for the unique code. Half length tags would be limited to 1,000 numeric codes, while standard length tags would have 1,000,000 possible codes. David Smith noted that the number of code combinations could easily be expanded by using additional character and symbol arrangements.

Smith-Root hopes to distribute sample wire by mid-June and limited numbers of production tags by July, 1998. Pricing has not be established but would be competitive with the market.

(Note: A copy of Smith-Root's proposal can be obtained from the Mark Center.)

Discussion:

1) Questions on Magnetic Quality of Wire

Lee Blankenship cited Karen Crandall's earlier comment to NMT staff that given the move to electronic sampling, the ability to detect the tags is critical and even a higher priority than ease of decoding. As such, he noted that NMT has a long proven track record in using quality wire and questioned how Smith-Root planned to deal with that issue. David Smith answered that his engineers had built an accelerometer type of device to move wire at pre-determined rates for measuring magnetic moment. He noted that it took considerable work at alloy selection but Smith-Root's wire compares very favorable with NMT wire.

Lee responded that similar concerns had been voiced to MicroMark and that they had assured the Mark Committee that they had high quality wire. This later proved to be not true. He also noted that someone in WDFW had recently purchased wire from Smith-Root and it had not been high quality. David Smith responded he fully understood the concerns and planned to soon provide samples of their new wire for testing by the agencies. He also explained that the wire sold to the WDFW employee was not the high quality alloy wire that would be used for the laser tags but rather was some surplus wire that was available. He noted that the individual had indicated that he was going to use it for length and a half tagging, and therefore the magnetic moment was considered to be adequate.

2) Tissue Compatibility of the Alloy

A question was raised about the inertness of the alloy in biological tissue. David responded that the alloy has certain other additive alloys in limited quantities that improves its magnetic moment but it was still viewed as biologically inert.

3) Concerns about Coding Scheme

Karen Crandall expressed some concern that the propose format of seven characters (one alpha agency code and six numeric) would conflict with her existing data processing system. Her problem, she noted, was that the software was hard coded for four, six or 10 character tag codes. As such, the proposed seven character standard length tag codes would require a major revision of her programs. David Smith replied that the codes could be shortened to a total of six characters but it would be at the cost of reducing the tag code capacity.

Rodney Duke questioned if a single alpha character was adequate for agency as it would only allow 24 tagging agencies. David answered that any number of characters could be used in addition to the alphabet. However, there was also concern that characters such as chevrons, etc, aren't very friendly for data processing or report generation.

The question was then raised as to how many agency codes are actually used today. Ken Johnson responded by noting that the binary system provides for 64 agencies (00-63). There are also some 50 agencies and organizations involved in tagging. However, there are only 14 tag coordinators. In addition, many smaller tagging entities use either a multiple use agency code such as agency 00 or 62, or arrange to use the agency code of the state or province in which they reside. Consequently, the single agency code doesn't seem critical to Smith-Root's coding proposal. In addition, the agency code could also be numeric, thus adding 10 more agencies.

Ken Johnson also noted that in fairness to Smith-Root's proposal, it was important to recognize that it is essentially the same alphanumeric scheme that the Mark Committee earlier approved for MicroMark. The latter scheme had a one or two alpha character for agency, followed by a numeric code. The key difference was that MicroMark's codes were six characters in length rather than seven. David Smith agreed that changes could be made and that he was willing to work with the Mark Committee as necessary. However, he expressed reluctance to reduce the length of the half tags because of the impact on the number of available codes.

ACTION: No formal action was taken on Smith-Root's proposal pending distribution of sample wire and resolution of the coding scheme. **The consensus of the Mark Committee, however, was that the standard length alphanumeric tag code should be shorten from seven to six characters** in order to be more compatible with the existing data management software now in place of binary tags.

April 16 (Thursday)

Lower Granite and Little Goose Dams Tour
(Fish Bypass and Transportation Program)

Attachment 1

Mark Committee Meeting -- April 14-15, 1998

Name	Agency	Mailing Address/Telephone/E-Mail/
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* Mark Committee member

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Status of CWT Release Data

by Release Year and Reporting Agency as of Apr 13, 1998

Key:

N = Not yet reported to the RMPC

S = Submitted OR re-submitted/ Not yet validated

E = Unresolved Errors (may be new OR resubmitted dataset)

I = Valid/ Incomplete

V = Valid/ Complete & Static

U = Valid/ Updated in the last 30 days (may still be incomplete)

Years	CDFG	ODFW	WDFW	IDFG	CDFO	ADFG	FWS	NMFS (AK)	NMFS (CR)	NIFC	MIC
Pre-1996	V	V	V	V	V	V	V	V	V	V	V
1996	V	V	V	U	V	V	V	V	V	V	V
1997	I	I	V	I	I	I	I	I	N	V	I

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Last updated: Mon Apr 13 17:00:00 PDT 1998
Regional Mark Processing Center

Status of Untagged Release Data

by Release Year and Reporting Agency as of Apr 13, 1998

Key:

N = Not yet reported to the RMPC

S = Submitted OR re-submitted/ Not yet validated

E = Unresolved Errors (may be new OR resubmitted dataset)

I = Valid/ Incomplete

V = Valid/ Complete & Static

U = Valid/ Updated in the last 30 days (may still be incomplete)

Years	CDFG	ODFW	WDFW	IDFG	CDFO	ADFG	FWS	NIFC	MIC
1952-1955			V						
1956-1972			V		V				
1973-1975		I	V		V		V	V	
1976-1980	N	I	V	V	V	N	V	V	
1981-1995	N	V	V	V	V	N	V	V	V
1996	N	N	V	N	V	N	V	V	N
1997	N	N	V	N	N	N	I	V	I

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Last updated: Mon Apr 13 17:00:00 PDT 1998
Regional Mark Processing Center

Status of CWT Recovery Data

by Run Year and Reporting Agency as of Apr 13, 1998

Key:

N = Not yet reported to the RMPC

S = Submitted OR re-submitted/ Not yet validated

E = Unresolved Errors (may be new OR resubmitted dataset)

I = Valid/ Incomplete

V = Valid/ Complete & Static

U = Valid/ Updated in the last 60 days (may still be incomplete)

Years	CDFG	ODFW	WDFW	IDFG	CDFO	ADFG	FWS	NMFS (AK)	NIFC	QDNR
1973-1974			V		V					
1975			V		E				V	
1976			V		V	E			V	V
1977	N	V	V	V	V	U			V	V
1978	V	V	V	V	V	N			V	V
1979	V	V	V	V	V	E	V		V	V
1980-1986	V	V	V	V	V	V	V	V	V	V
1987-1991	V	V	V	V	V	V	V	V	U	V
1992	V	V	V	S	V	V	V	V	U	V
1993-1994	V	V	V	E	V	V	V	V	U	V
1995	V	S	V	N	V	I	V	N	U	N
1996	V	E	V	N	V	I	U	N	V	N
1997	I	I	I	N	E	I	N	N	N	N

Status of CWT Catch/Sample Data

by Catch Year and Reporting Agency as of Apr 13, 1998

Key:

N = Not yet reported to the RMPC

S = Submitted OR re-submitted/ Not yet validated

■ = Unresolved Errors (may be new OR resubmitted dataset)

I = Valid/ Incomplete

V = Valid/ Complete & Static

U = Valid/ Updated in the last 60 days (may still be incomplete)

Years	CDFG	ODFW	WDFW	CDFO	ADFG	FWS	NMFS (AK)	NIFC	QDNR
1973				V					
1974			N	V					
1975			N	V				V	
1976			V	V	U			V	V
1977	N	V	V	V	U			V	V
1978	V	V	V	V	N			V	V
1979	V	V	V	V	S	V		V	V
1980-1986	V	V	V	V	V	V		V	V
1987-1990	V	V	V	V	V	V		U	V
1991-1994	V	V	V	V	V	V	■	U	V
1995	V	V	V	V	I	V	N	U	N
1996	V	■	I	V	I	V	N	U	N
1997	■	■	U	I	I	N	N	N	N

ATTACHMENT 3

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

February 5, 1998

Puget Sound and Washington Coastal Treaty Indian Tribes, National Marine Fisheries Service, and U. S. Fish and Wildlife Service:

Consistent with the Implementation Plan Agreement of April 1997, the Washington Department of Fish and Wildlife (WDFW) forwards this proposal for mass marking the 1997 brood of hatchery coho. Planned production of 1997 brood coho from all regions of Washington and Oregon is similar to the 1996 brood levels, but we are proposing a change to the marking plan that is extremely important. The proposal for 1997 brood mass marking is extended to include all state, federal, and tribal production (Tables 1-A, B, C, & D, attached). WDFW extends this proposal with the understanding that the state and tribes will need to have significant discussions concerning each production unit in order to reach agreement on the proposal. This letter serves as notice of our intention to seek agreement on the marking plan with the appropriate tribal governments, based on the merit of technical and policy issues.

We also want to ensure that the tribes and federal managers are aware of the WDFW program for tagging and marking Puget Sound chinook salmon. Total fall chinook yearling production of the 1996 brood, scheduled for release this spring, is approximately 3.25 million, primarily the product of the Puget Sound Enhancement Program. Plans for production of the 1997 brood are unchanged at this time (Table attached). The 1996 brood chinook have been 100 percent adipose fin-clipped and 100 percent coded-wire tagged. We are proceeding with the same plan for the 1997 brood.

WDFW intends to submit, at a later date, a detailed proposal for conducting future selective fisheries targeting the marked hatchery chinook that will include an assessment of the potential costs and benefits.

Please contact Tony Floor (360-902-2236) if you have specific questions about the Puget Sound Enhancement Program, or Pat Pattillo (360-902-2705) if you need clarification of our proposal.

Sincerely,

Bruce Crawford
Assistant Director
Fish Management Program

BC:PP:cmd

cc: Bern Shanks, Director
Curt Smitch, Governor's Office
Jim Anderson, NWIFC
Doug Dehart, ODFW, Portland
Virgil Moore, IDFG, Boise
Paul Sprout, CDFO

Table 1-A. Planned adipose fin-clipping and "double index" coded-wire tagging for 1997 brood yearling coho in the Puget Sound region.

Region	Release	Source	Number	Marked	Mark %	Schedule[1]	Index	Double
Nooksack - Samish	Kendall	State	300,000	Yes		June or	45,000	45,000
	other	Tribal	3,785,000	Yes		July	50,000	0
	Orcas Island	State	75,000	Yes				
	Subtotal		4,885,000		100%			
Skagit	Marblemount	State	735,000[2]	Yes		July	45,000	45,000
Stillaguamish - Snohomish	Wallace	State	800,000[2]	Yes		October-	45,000	45,000
	Tulalip	State	1,000,000	Yes		Dec	45,000	0
	Stillaguamish	Tribal	35,000	Yes				
	Subtotal		1,385,000		100%			
South Sound	Issaquah	State	450,000	Yes		December		
	Soos	State	600,000	Yes		December	45,000	45,000
	Voights	State	1,200,000	Yes		(May)	45,000	45,000
	Minter	State	1,500,000	Yes		May		
	SsndPens	State	2,500,000	Yes		after June		
	AgatePens	S-T Coop	600,000	Yes		May	50,000	0
	other misc.	State	395,000	Yes		May-June	50,000	0
	Crisp	S-T Coop	600,000	Yes		April		
	Nisqually	Tribal	900,000	Yes				
	ElliotBay	Tribal	200,000	Yes			50,000	0
	Subtotal		9,470,000		100%			
Hood Canal	George Adams	State	500,000	Yes		May or Nov	45,000	45,000
	Quilcene Pens	S-T-F Coop	360,000	Yes				
	Pt Gamble Pen	S-T Coop	450,000	Yes		May or Nov	50,000	0
	Big Quilcene R	Federal	410,000	Yes				
	Subtotal		1,720,000		100%			
Strait of Juan de Fuca	Dungeness	State	800,000	Yes		July		
	L. Elwha	Tribal	800,000	Yes			50,000	0
	Subtotal		1,600,000		100%			
Puget Sound Total Release			**19,795,000**					
Total Marked Release			**19,795,000**		**100%**			

[1] Subject to change
[2] Includes coop net pen production

Table 1-B. Planned adipose fin-clipping and "double index" coded-wire tagging for 1997 brood yearling coho in the Washington Coastal region.

Region	Release	Source	Number	Marked	Mark %	Schedule	Index	Double
North Coast	Makah NFH	Federal	60,000	Yes				
	Sol Duc	S-T Coop	800,000	Yes		May	75,000	75,000
	Salmon R	Tribal	500,000	Yes				
	Quinalt NFH	Federal	1,133,000	Yes				
	Subtotal		2,493,000		100%			
Grays Harbor	Humptulips	State	1,650,000	Yes		May	80,000	80,000
	Westport Pens	State	250,000	Yes		May		
	Satsop	State	500,000	Yes		June		
	Bingham	State	900,000	Yes		June	75,000 (2 X)	75,000 (2 X)
	Subtotal		3,300,000		100%			
Willapa Bay	Naselle	State	1,000,000	Yes		June		
	Naman	State	600,000	Yes		June		
	Forks Creek	State	650,000	Yes		June	75,000	75,000
	Subtotal		5,550,000		100%			
Washington Coastal Total Release			**13,836,000**					
Total Marked Release			**13,836,000**		**100%**			

Table 1-C. Planned adipose fin-clipping and "double index" coded-wire tagging for 1997 brood yearling coho in the Columbia River region.

Region	Release	Source	Number	Marked	Mark %	Schedule	Index	Double
Above Bonneville	Yakima River	State (Cascade)	700,000	Yes		July	75,000	25,000
	Willard	Federal	2,500,000	Yes			50,000	0
	Umatilla River	State (Cascade)	1,500,000	Yes		July	75,000	25,000
	Klickitat	State (Washougal)	2,500,000	Yes		May or Oct-Nov		
	Klickitat	State (Klickitat)	1,350,000	Yes		May-July		
	general	State (Lewis)	1,000,000	Yes		May-JUne		
Above Bonneville Total			9,550,000					
Marked Release Subtotal			7,000,000		100%			
Below Bonneville	Washougal	State	500,000	Yes		May or Oct-Nov		
	Grays River	State	140,000	NA				
	Elokomin	State	1,200,000[1]	Yes		June	75,000	75,000
	Cowlitz	State	4,200,000	Yes		July		
	Toutle	State	1,100,000	Yes		Sept		
	L Kalama	State	525,000	Yes		Oct-Dec		
	Kalama Falls	State	900,000	Yes		Oct-Dec	75,000	75,000
	Lewis River	State	3,000,000	Yes		May-June	(2X)	(2X)
						June	50,000	0
	Bonneville	State	1,175,000	Yes			75,000	50,000
	Big Creek	State	595,000	Yes		August	25,000	25,000
	NFKlaskanine	State	1,000,000	Yes		August	200,000	25,000
	SFKlaskanine	State	650,000	Yes		June	125,000	25,000
	Sandy	State	700,000	Yes		June	25,000	
	Youngs Bay (Casc-Oxb,Sandy)	State	3,500,000	Yes		December June		
	Eagle Creek	Federal	1,900,000	Yes				
Below Bonneville Total Release			**21,945,000**					
Total Marked Release			**21,945,000**		**100%**			

[1] Includes Deep River net pens

Table 1-D. Planned adipose fin-clipping and "double index" coded-wire tagging for 1997 brood yearling coho in the Oregon Coastal region.

Region	Release	Source	Number	Marked	Mark %	Schedule	Index	Double
	Alsea	Oregon	1,150,000	Yes		May	100,000	50,000
	Salmon R	Oregon	950,000	Yes		May	100,000	50,000
	Butte Falls	Oregon	170,000	Yes		July-Aug	75,000	75,000
	Cole Rivers	Oregon	260,000	Yes		August	50,000	50,000
	Rock Creek	Oregon	140,000	Yes		October	50,000	25,000
	Trask	Oregon	200,000	Yes		November	25,000	25,000
	Nehalem River	Oregon	605,000	Yes		May	50,000	25,000
	Coastal STEP	Oregon	55,000	Yes		May		
Oregon Coastal Total Release			**3,530,000**					
Total Marked Release			**3,230,000**		**92%**			

Table. Puget Sound Recreational Enhancement Program planned production of 1997 brood year fall chinook, in numbers of yearlings released, by release site.

Facility or Release Site	Yearling Production
Samish River	102,000
Icy Creek	320,000
Endicott Pond	100,000
Lilliwapp	100,000
McAllister Creek	257,000
Clear Creek	210,000
Orcas Island	100,000
University of Washington	180,000
Allison Springs	28,000
Wallace River	510,000
Percival Cove Net Pens	130,000
Fox Island Net Pens	255,000
Fish Pro Farms	55,000
Hoodsport	251,000
Sund Rock Net Pens	169,000
Union Net Pens	13,000
Pleasant Harbor Net Pens	15,000
North Sound Net Pens	366,000
Total	3,200,000

USFWS COHO MASS MARKING
BROOD YEAR 1996

HATCHERY	RELEASE SITE	TOTAL PROD	# AD CLIP	# CWT/AD CLIP	# CWT/NO CLIP	NO TAG/CLIP
Makah	Sooes R. (Wa)	250,000	178,000	36,000	36,000	0
	Waatch R. (Wa)	50,000	20,000	30,000	0	0
Quinault	Cook Cr. (Wa)	690,000	0	80,000	80,000	530,000
Quilcene	Quilcene R. (Wa)	450,000	269,000	45,000	40,000	96,000
	Quilcene Bay (Wa)	241,000	86,000	45,000	45,000	65,000
Eagle Cr.	Eagle Cr. (Or)	1,020,000	918,000	51,000	51,000	0
	Youngs Bay (Or)	512,000	412,000	50,000	50,000	0
Willard	L. W. Salmon R (Wa)	1,824,000	1,722,000	52,000	50,000	0
	Clearwater R (Id)	500,000	0	0	120,000	380,000

ATTACHMENT 4

Canadian Coho Mass Marking Proposal - 1997

1. Elements

1.1. Problem

Strait of Georgia coho have been a conservation concern since the late 1980s. Until recently, high fishery exploitation rates and habitat degradation were cited as the primary causes of declining spawning escapements. More recently however, evidence has been gathered which indicates that marine survival of Strait of Georgia stocks has declined significantly, leading to significant reductions in catches and escapement.

Despite the implementation of significant conservation measures in 1995 and 1996, marine survival, catch and escapement levels for wild coho populations on the south coast of British Columbia declined sharply in 1996. Consequently, even more stringent conservation measures were implemented in commercial and recreational fisheries in 1997.

Scientists studying changes in climate and fish stocks in the Strait of Georgia, and more globally, have differing views on the long-term outlook for coho. Some believe that we have undergone a "regime shift" or change in the ecosystem of the Strait of Georgia, as a result of increased ocean temperatures. Others believe that recent conditions are part of longer-term cycles that will eventually see a return to the cooler, more productive conditions that typified the middle decades of this century. Scientific differences over the long-term trends and effects of climatic change aside, there is consensus that the short-term outlook for coho is very poor.

Fishing for coho is a highly prized activity in B.C. The expectation of catching coho attracts millions of tourist dollars each year. Angler activity in the Strait of Georgia has generated significant employment and income in the surrounding communities. A selective harvesting program may provide the opportunity to sustain the value of recreational coho fishing in the Straits of Georgia and Juan de Fuca during periods of low marine survival.

Benefits to the commercial sector may include the ability to retain incidentally caught marked coho in fisheries directed at other species. This, and other opportunities will be the subject of consultation with stakeholders

1.2. Objective

Sustaining fisheries for southern B.C. coho stocks in the face of current low abundance and poor marine survival presents a tremendous challenge. The Department of Fisheries and Oceans (DFO) is currently considering fishery management options that would enable the department to meet conservation objectives for valuable wild coho stocks while maintaining the economic benefits realized from the various fisheries. A selective mark fishery for hatchery coho in the Straits of Georgia and Juan de Fuca may, under certain levels of abundance, permit selective harvesting of hatchery coho while protecting wild stocks. Decisions on implementation of selective fisheries for coho will be determined through consultation with stakeholders.

2. Description

2.1. Marking Program

In 1997, approximately 5 million 1995 brood coho from Strait of Georgia hatcheries were released with a ventral clip. These fish will be available to the fishery in 1998. Details of the stocks marked are presented in Table 1.

Table 1: 1995 Brood Coho Mass Marking Program

Project	Total Release	Ventral Marks	Coded-Wire Tags	
			Ad-CWT	AdLV-CWT
BQ	1,278,697	964,532	38925	39,365
Capilano	526,150	363,464	10659	79,327
Chehalis	886,578	794,069	49123	43,386
Chilliwack	1,943,959	1,631,785	74814	39,644
Inch	477,089	395,671	40420	40,998
Puntledge	695,186	609,696	42529	41,190
Total	5,807,659	4,759,217	256,470	283,910

In 1997/98, approximately 6.5 million 1996 brood coho smolts from 7 major southern B.C. hatcheries are being mass marked. Additional coho smolts may also be marked from smaller facilities where stock conservation is not a concern. The fish will be identified with an adipose clip and returning adults will be available to the fishery in 1999. Details of the planned marking program are presented in Table 2. Due to the timing of the decision to mark, all fish cannot be accessed from rearing containers for marking. Actual numbers marked will depend on numbers which can be removed for marking without compromising fish health.

Decisions on continuing the program for 1997 brood coho will depend on the results of consultation with stakeholders.

Table 2: 1996 Brood Coho Mass Marking Program

Area	Project	Stock	Target Release	Adipose Clipped	Coded-Wire Tags	
					Ad-CWT	CWT
Stocks Which Will Be Mass Marked:						
GSMN	Bedwell Bay	Seymour River	10,000	10,000		
GSMN	Capilano River	Capilano River	525,000	485,000	40,000	
GSMN	Chapman Creek	Chapman Creek	75,000	75,000		
GSMN	Horseshoe Bay PIP	Capilano River	10,000	10,000		
GSMN	Noons Creek PIP	Noons Creek	10,000	10,000		
GSMN	Powell River CDP	Lang Creek	55,000	35,000	20,000	
GSMN	Reed Point/Ioco	Capilano River	10,000	10,000		
GSMN	Sechelt CDP	Maclean Bay	17,000	17,000		
GSMN	Seymour River CDP	Seymour River	70,000	40,000	30,000	
GSMN	Sliammon River CDP	Sliammon River	30,000	0	30,000	
GSMN	Trans Mountain PIP	Capilano River	10,000	10,000		
GSMS	L. Campbell R PIP	Little Campbell R	30,375	375	30,000	
GSMS	Serpentine Enh PIP	Serpentine R	13,500	13,500		
GSVI	Big Qualicum River	Big Qualicum River	1,250,000	819,000	40,000	40,000
GSVI	Puntledge River	Puntledge River	800,000	760,000	40,000	
JNST	Quinsam River	Quinsam River	1,200,000	800,000	40,000	40,000
LWFR	Chehalis River/BC	Chehalis River/BC	1,007,000	967,000	40,000	
LWFR	Chilliwack River	Chilliwack River	1,950,000	1,870,000	40,000	40,000
LWFR	Inch Creek	Inch Creek	200,000	120,000	40,000	40,000
LWFR	Inch Creek	Stave River	430,000	400,000	30,000	
NWVI	Nitinat *	Nitinat	100,000	0	40,000	
SWVI	Conuma *	Conuma	100,000	0	40,000	
SWVI	Robertson *	Robertson	800,000	0	40,000	40,000
			8,702,875	**6,451,875**	**540,000**	**200,000**

* West Coast stocks were not included for mass marking of 1996 brood, but could be included in the future if desired by Stakeholders

Area	Project	Stock	Target Release	Adipose Clipped	Coded-Wire Tags	
					Ad-CWT	CWT
Conservation Stocks (will not be mass marked)						
GSMN	Anderson Cr PIP	Mixal Creek	20,000			
GSMN	Nelson Creek PIP	Nelson Creek	10,000			
GSMN	Powell River CDP	Kelly Creek	10,100			
GSMN	Tenderfoot Creek	Ashlu Creek	35,000			
GSMN	Tenderfoot Creek	Mamquam R	35,000			
GSMN	Tenderfoot Creek	Squamish River	35,000			
GSMN	Tenderfoot Creek	Tenderfoot Creek	110,000		40,000	
GSMN	Terminal Creek PIP	Terminal Creek	15,000			
GSVI	Baynes Snd Str.SPU	Baynes Snd Streams	50,625			
GSVI	Goldstream R PIP	Goldstream	81,000		30,000	30,000
GSVI	Little River	Little River	20,250			
GSVI	Malaspina Coll PIP	Chase River	16,875			
GSVI	Nanaimo River CDP	Nanaimo River	150,000		30,000	**
GSVI	Oyster River PIP	Oyster River	33,750			
LWFR	Alouette River SPU	Alouette River	100,000		20,000	**
LWFR	Brunette River PIP	Brunette River	33,750			
LWFR	Centre Creek PIP	Elk Creek	15,000			
LWFR	Chehalis River/BC	Trout Creek/LWFR	34,400			
LWFR	Coquitlam R PIP	Coquitlam River	25,000			
LWFR	Hyde Creek PIP	Hyde Creek	8,100			
LWFR	Inch Creek	Nicomen Slough	60,000			
LWFR	Inch Creek	Norrish Creek	60,000			
LWFR	Kanaka Creek PIP	Kanaka Creek	80,000			
LWFR	Lttl Chilliwack PIP	Chilliwack River	18,000			
LWFR	Silvermere Lk PIP	Silvermere Lk	36,000			
TOMF	Thompson R CDP	Dunn Creek	20,000			
TOMF	Thompson R CDP	Lemieux Cr	20,000		6,000	**
TOMF	Thompson R CDP	Louis Cr	20,000			
TOMM	Deadman R CDP	Deadman R	30,000		30,000	**
TOMM	Spius Creek	Coldwater R - fry rel	225,000		30,000	**
TOMM	Spius Creek	Salmon R - fry rel	150,000			
TOMM	Spius Creek	Spius Creek	80,000		40,000	***
			1,637,850		**226,000**	**70,000**

** normally conservation stocks would be CWT only, but due to timing of decision to mark, some stocks were Ad-CWT.

*** Spius stock was not DIT for 1996 brood due to timing of decision to mark

2.2. CWT Tagging Program

Six Strait of Georgia hatchery indicator stocks have been identified for Double Index Tagging (DIT) as recommended by the PSC Ad-Hoc Selective Fishery Evaluation Committee. One West Coast Vancouver Island stock has been identified for DIT. This stock was marked for 1996 brood to enable analysis if selective fisheries are extended to outside fisheries. Two wild stocks will be marked with CWT only during smolt migration programs in the spring of 1998. Other CWT marking for hatchery evaluation and fishery management purposes will continue as in the past. Details of the 1997 CWT smolt marking program for Strait of Georgia stocks, including DIT tagging, are included in Table 2.

Due to the timing of the decision to mark, Spius Creek stock could not be Double Index Tagged for 1997. Also, Alouette, Nanaimo, and Thompson River stocks which are of conservation concern and would normally not be adipose clipped during coded-wire tagging, had already received an Adipose-CWT. If the program is continued for 1997 brood, these discrepancies would be rectified.

2.3. Sampling Program

Use of the adipose fin as an indicator of hatchery coho will have an impact on the coded wire tag (CWT) program which currently provides much of the assessment and management information for chinook and coho. This will necessitate a number of changes to the existing program if viability is to be maintained.

Since the adipose fin clip currently indicates the presence of a CWT, an alternative means of recognizing the presence of a CWT is required. This will involve the use of electronic detection for catch sampling in commercial and recreational fisheries at primary off-loading sites. Existing creel surveys would have to be expanded in time, area and proportion of anglers contacted. Interviewers would be required to identify tagged fish using wand detectors, and remove and process the heads of fish with tags. Marking rates may also have to be increased on indicator chinook stocks to ensure adequate recovery of tags. Electronic detection equipment would also be required to sample escapements returning to hatcheries and wild streams and to sample First Nations fisheries in the Fraser River.

The states of Washington and Oregon embarked upon a 1995 brood coho marking program in the spring of 1996 with the intention of implementing a selective fishery for hatchery coho in 1998. These fish will be caught in Canadian fisheries and will require electronic monitoring in Canadian catch. Mass marked Canadian coho with adipose clips will not be available to the fisheries until 1999. Therefore, electronic sampling programs for 1998 will be in areas expected to receive the greatest number of U.S. origin coho.

The following sampling plan assumes that coho will be landed in all traditional southern B.C. fisheries in 1998. Fishing plans to be developed by the spring of 1998 may necessitate adjustments to this plan. For 1998, the sampling plan calls for processing plants on the West

Coast of Vancouver Island and in Port Hardy to be equipped with tube detectors for sampling southern troll catches. Net fishery catches are to be sampled with tube detectors at plants in Vancouver, Steveston and possibly Prince Rupert. The Juan de Fuca recreational fishery is to be electronically sampled through an expanded creel survey program. The sampling goal for recreational fisheries under electronic detection is to double the creel survey interview rate to 10% and to provide sampling coverage from April to October for both chinook and coho. Jack escapements to participating Canadian hatcheries will be electronically sampled in 1998.

Funding is currently confirmed for 1998, with funding for future years the subject of consultations with stakeholders.

2.4. Assessment Program

Specific criteria for evaluating the effectiveness of this management approach in addressing conservation and socio-economic objectives will be developed in consultation with the stakeholder groups. Spawning escapement and exploitation rate levels will, however, be among the criteria for assessing the conservation benefits of the program.

2.5. General Management Activities

The selective fishery being considered for southern B.C. is defined as one in which hatchery coho with an identifying mark are harvested at a higher rate than unmarked, wild coho. All, or some of the unmarked fish would be released. The two essential components of a selective fishery are:

- mass marking of hatchery fish for identification purposes; and
- implementation of regulations defining the catch limits for marked and unmarked fish. This could include different daily limits for marked or unmarked fish in recreational fisheries or retention limits for unmarked fish in commercial fisheries.

2.6. Implementation

Preliminary discussions on a Selective Mark Fishery for Strait of Georgia hatchery coho were initiated late in 1996. Decisions on implementation of selective fisheries for coho will be determined through consultations with stakeholders which will take place between January, 1998 and May, 1999.

2.7. Costs

DFO currently budgets approximately $10.6 million for the enhancement and assessment of coho in the Pacific Region. Estimated incremental costs required to implement selective fisheries in the Strait of Georgia would include start-up costs of approximately $2.4 million and annual operating costs of approximately $1.5 million. Costs will be firmed up over the next year as preparations for possible selective fisheries continue.

Implementation of a selective fishing program will depend upon the willingness of fishers and their communities to support the marking and monitoring programs. Lodge owners, anglers and communities may be able to contribute labour and resources to support the on-site sampling that would be required. Identifying and exploring other avenues and creative partnerships would be an important part of the proposed program.

2.8. Analysis and Estimation of Effects

Provided there are no large-scale shifts in fishing patterns, harvest rates on unmarked fish in selective recreational fisheries could be reduced by 70% to 80% (PSC Ad-Hoc Selective Fishery Evaluation Committee). This estimate allows for hooking mortality and angler error in identifying marked fish. The degree to which escapement for a given wild stock would increase is highly dependent upon the mark rate in the selective fishery, the proportion of the stock present in the fishery and the harvest rate in non-selective fisheries that occur subsequent to the selective fishery. In the case of the Strait of Georgia recreational fisheries, the catch of wild coho in subsequent fisheries is very small, which means that a high proportion of unmarked fish would escape to the spawning grounds.

However, the proportion of Strait of Georgia coho stocks present in the Strait of Georgia is highly variable. The proportion has been low for four out of the last six years but was very high in 1993. In years when a high proportion of marked coho are outside the Strait during the fishing season there would be minimal benefits from a selective, recreational fishery in the Strait.

It should be noted that there is still some mortality on released fish. Under conditions of extremely low abundance, this release mortality may be significant enough to preclude a selective-mark fishery. This risk increases as the ratio of marked to unmarked fish decreases. It is also higher in commercial fisheries, particularly in net fisheries.

2.9. Alternatives

The management of coho salmon is directed at achieving targets for sustainable exploitation rates. The present strategy includes catch ceilings and regulated season length and area in troll fisheries, bag and size limits in recreational fisheries, and restrictions to reduce the incidental coho catch in net fisheries.

Recent conservation concerns led to management actions to significantly reduce the exploitation rates (the proportion of the adult coho population caught in all fisheries) on coho stocks in 1995 and 1996. Despite the implementation of these measures, marine survival, catch and escapement levels for wild coho on the south coast of British Columbia declined sharply in 1996.

In 1997, strict conservation measures were implemented in commercial and recreational fisheries in southern B.C. The exploitation rate target was reduced from 60% to between 20 and 25%.

In the commercial fishery, measures implemented included:

- no directed fishery for coho in southern B.C.
- non-retention of coho in the WCVI troll fishery
- closure of coho-sensitive areas
- restrictions on net fisheries in the South Coast to reduce coho mortality in directed fisheries for sockeye, chum and pink salmon including fishing boundary changes to avoid coho concentrations and non-retention in seine fisheries in Juan de Fuca and Johnstone Strait.

Measures implemented in the recreational fishery included:

- reduction of the daily catch and possession limit in Juan de Fuca Strait
- reduction of the daily catch and possession limit on the WCVI
- non retention of coho in the Fraser mainstem
- existing closures in the majority of Vancouver Island, Sunshine Coast and southern mainland streams were maintained
- the daily bag limit in the Strait of Georgia remained at two per day.

In the face of poor wild stock abundance, a selective mark fishery program could mean the difference between sustaining a recreational fishery at near current levels of effort and substantial declines in fishing effort due to a complete non-retention fishery. The total catch would be more than a non-retention fishery or an angling closure would allow, however, there would be some mortality due to the catch and release of unmarked fish. The recreational sector has expressed considerable interest in a selective fishery for Strait of Georgia hatchery coho and has indicated that management alternatives which would further reduce bag limits or close recreational fisheries will meet with considerable resistance from the recreational community.

2.10. Evaluation

Economic evaluation of various fishing scenarios may be carried out in partnership with Stakeholders. The overall value of the recreational fishery is understood, but the potential impact of a non-retention fishery, or the relief provided by a selective mark fishery, is not. Consultations on an evaluation framework are planned.

Washington Department of Fish and Wildlife

1997 Electronic Sampling Tests

R-8 Detector Sampling of Coho Hatchery Rack

Methods

Coho hatchery rack sampling using the R-8 CWT detector was conducted at three Washington Department of Fish and Wildlife (WDFW) hatcheries; Marblemount, Voights Creek, and George Adams. Sampling was designed to test the throughput (fish/person/hour), accuracy of coded wire tag (CWT) detection and reliability of the diverter gate. At each hatchery tests were performed identically except at Marblemount where the throughput was not measured due to the exceptionally high rate of CWT returns and time constraints. At George Adams and Marblemount hatcheries CWT coho returned with and without adipose fin clips. If a CWT was detected the snout was taken regardless of the presence or absence of an adipose fin.

Throughput was measured as processing time of individual totes of coho. The technique used to test throughput was tote to tote sampling using a fiberglass funnel with a water bath attached to the R-8. During sampling, coho were separated into tagged and non-tagged totes using the diverter gate attached to the R-8. When testing, two samplers fed coho through the R-8, two samplers were monitoring the counters on the diverter gate and assuring coho were diverted into the correct tote, and one sampler was timing and watching for adipose clips which did not beep. Only the two samplers supplying coho to the R-8 were used to determine throughput.

When a coho was diverted into the wrong tote or the gate did not count correctly it was recorded for each tote. Adipose clipped non CWT coho were sampled and the snout taken to determine if the R-8 missed the CWT. The snout was subsequently run through a Northwest Marine Technology 6 inch omni-directional CWT detector. If no CWT was detected it was considered a no tag. All snouts were processed in the WDFW coded wire tag recovery lab.

Wand and R-8 Detector Sampling in Recreational and Commercial Fisheries

The primary focus was to increase commercial and recreational fishery samplers experience level and awareness of capabilities and limitations of Wand and R-8 detectors. Wand detectors were used to sample Coastal, Columbia River, and Puget Sound Recreational fisheries for coho and chinook. All adipose fin clipped coho and chinook electronically sampled

were identified with an individual snout label and the head removed regardless of the CWT detection status. The type of electronic detection equipment used and CWT detection status was recorded for each fish on the snout label.

R-8 CWT detectors were used in Coastal and Puget Sound Net fisheries. Again, the main focus was for samplers to familiarize themselves with the electronic detection equipment. Sampling was conducted at fish processing plants and individual buyers for commercial fisheries using mainly tote to tote sampling with the diverter gate and funnel attached. All adipose fin clipped chinook and coho electronically sampled using the R-8 were identified with an individual snout label and the head removed regardless of the CWT detection status. The type of electronic detection equipment used and CWT detection status was recorded for each fish on the snout label.

Results

The results presented in table 1 shows a total of 18,488 coho were sampled using the R-8 at three hatcheries for the presence of a CWT. A total of 4,528 CWT's were recovered. The R-8 did not miss a single coded wire tag. There were a total of 77 false detections (no tags) from the R-8 which was 1.7% of the total CWT's recovered. The average rate of no tags for WDFW hatchery rack for the past three years was 10.2% using the visual sampling method. There was a gate counting error rate of 0.3% during the hatchery rack tests. There were two types of errors associated with gate counting errors: 1)gate not counting small fish (door didn't open far enough) and, 2)non-tagged fish diverted to tagged tote (not enough lag time between fish). Tagged fish never ended up in the non-tagged tote.

The results presented in tables 2 and 3 shows in excess of 19,000 coho and 4,000 chinook were electronically sampled in recreational and commercial fisheries during the 1997 season using Wand and R-8 CWT detectors. There were 175 CWT's recovered using the R-8 detector in commercial fisheries. The R-8 missed 3 CWT's for the season. Wands detected 1,338 CWT's during the sampling season missing a total of 49 CWT's.

Results from these trials will be used to structure training, sampling effort and equipment needs for 1998 Washington recreational and commercial fisheries to achieve a sampling rate of 20%.

Table 1. 1997 R-8 Electronic Sampling for Marblemount, Voights Creek, and George Adams Coho Hatchery Rack

Hatchery	Total Sampled	CWT's Detected	False Detections	CWT's Missed	AD Clip No CWT	Gate Counting Errors
Marblemount	3,381	2,254	8	0	44	no data
Voights Cr.	4,185	187	13	0	8	9/3,690
George Adams	10,922	1,794	56	0	68	35/7,438
Totals	18,488	4,528	77	0	120	44/11,128 = 0.3%

Average Processing Time of 1,482 fish per hour per person

Table 2. 1997 R-8 electronic sampling data for chinook and coho salmon in commercial fisheries.

Species	Fishery	Total Sampled	CWT's Detected	False Detections	CWT's Missed	AD Clip No CWT
Chinook	Puget S. Net	89	3	0	0	0
Coho	Puget S. Net	5,155	172	32	3	4
	Coastal Net	NA	0	10	0	0
	TOTALS	5,244	175	42	3	4

NA: not available

Table 3. 1997 Wand electronic sampling data for chinook and coho salmon in sport and commercial fisheries.

Species	Fishery	Total Sampled	CWT's Detected	False Detections	CWT's Missed	AD Clip No CWT
Chinook	Ocean Sport	1,787	170	2	12	10
	Puget S. Net	1,995	34	4	0	0
	Puget S. Sport	NA	8	0	0	1
	TOTALS	3,782	212	6	12	11
Coho	Coastal Net	NA	4	0	0	2
	Col. R. Sport	87	7	1	0	10
	Ocean Sport	5,851	556	14	9	62
	Puget S. Net	7,371	234	10	4	17
	Puget S. Sport	NA	325	18	2	18
	TOTALS	13,309	1,126	43	15	109

NA: not available

EXPECTED CANADIAN RECOVERIES OF MASS MARKED (ADIPOSE FIN AND CODED WIRE TAG) YEARLING CHINOOK SALMON

The Washington Department of Fish and Wildlife (WDFW) anticipates mass marking hatchery chinook salmon with the adipose fin for selective fishery in the near future just as we are presently doing with steelhead and coho salmon. We also realize the need for coordination and working with the tribal, Canadian, and other state agencies to maintain the integrity of the coded-wire tag (CWT) program. We expect this coordination to take at least one year. At the same time however, we are faced with closing or at least greatly curtailing some very important fisheries because we can't harvest available surplus hatchery stocks while trying to protect weak wild stocks.

Consequently we have decided to mass mark priority groups of fish with the adipose mark and CWT. One of these groups is Puget Sound yearling chinook salmon. WDFW marked and tagged approximately 3,200,000 1996 brood Puget Sound yearling and plans to do 3,600,000 1997 brood.

The expanded chinook yearling program is a result of recent legislation intended to increase year-round fishing opportunity in Puget Sound. Previous studies have shown a greater tendency for residency in Puget Sound from extended rearing. About 30 different yearling release groups are involved. They range in size from 20,000 to 500,000 fish. Based on relatively little data from 1990 brood Hupp Springs yearling release, WDFW estimates the impact to Canadian fisheries to be about 40 observed recoveries from the 1996 tagging and 45 observed recoveries from the 1997 brood. The recoveries will be primarily as 4 year olds and we don't expect any recoveries from Alaskan fisheries.

Two-thirds of these fish were already scheduled to be adipose fin marked and CWT'd for four years as part of the legislation for evaluation of yearling releases. The remaining on-third were marked when it became evident Puget Sound chinook salmon were candidates for listing under the Endangered Species Act. Consequently, only one-third of the expected Canadian recoveries will be a result of 100% yearling marking.

EXPECTED ALASKAN AND CANADIAN RECOVERIES OF MASS MARKED (ADIPOSE AND CODED-WIRE TAG) LOWER COLUMBIA RIVER SPRING CHINOOK SALMON

The Washington Department of Fish and Wildlife (WDFW) anticipates mass marking hatchery chinook salmon with the adipose fin for selective fishery in the near future just as we are presently doing with steelhead and coho salmon. We also realize the need for coordination and working with the tribal, Canadian, and other state agencies to maintain the integrity of the coded-wire tag (CWT) program. We expect this coordination to take at least one year. At the same time however, we are faced with closing or at least greatly curtailing some very important fisheries because we can't harvest available surplus hatchery stocks while trying to protect weak wild stocks.

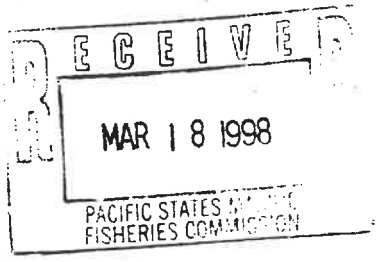
Consequently we have decided to mass mark priority groups of fish with the adipose mark and CWT. One of these groups is Lower Columbia River spring chinook. WDFW plans to mark approximately 3,085,000 1997 brood spring chinook salmon from Cowlitz (1,525,000), Fallert Creek (500,000), and Lewis River (1,060,000).

Based on representative 1990 brood production CWT groups, WDFW estimates total CWT recoveries to increase from 12 observed 1990 brood recoveries in Alaska to 68 observed recoveries for 1997 brood Canadian CWT. Recoveries are expected to increase from 41 - 1990 brood observed recoveries to 236 - 1997 brood recoveries. The increased recoveries will occur over a span of three years as represented in the table below.

Age at Recovery	Alaskan Recoveries		Canadian Recoveries	
	1990 Brood Observed	1997 Brood Estimated	1990 Brood Observed	1997 Brood Estimated
3	2	8	23	92
4	7	35	22	113
5	3	25	6	31
Total	**12**	**68**	**41**	**236**

ATTACHMENT 9

State of Idaho
Department of Fish and Game
Boise, Idaho



March 16, 1998

MEMORANDUM

TO: Ken Johnson, PSMFC

FROM: Sharon W. Kiefer, IDFG

SUBJECT: BY97 spring/summer chinook salmon summary for Mark Committee

CC: Duke, Mauser

Attached is our BY97 mark summary for the Mark Committee. Due to a considerable number of fish and lack of space, we began marking subsmolts at Clearwater Fish Hatchery in early March in order to move fish to outside raceways. Marking will continue through the fall.

CHANGES TO CURRENT SAMPLING PROGRAM:

No changes to the current sampling program are anticipated. Marked fish collected at weir sites or sampled from in-state fisheries 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.

EXPECTED BENEFITS:

The expected benefits of this marking program are to maximize hatchery production of spring and summer chinook without adversely affecting naturally produced fish. A mark on hatchery-produced chinook is required by the National Marine Fisheries Service (NMFS) as a condition of the Biological Opinion and Section 10 permits pertaining to salmon hatchery programs in the Snake River Basin. Idaho Department of Fish and Game management and the NMFS Section 10 permit for fisheries dictates a visual mark must be used to manage in-state sport fisheries. Visual marks are also used to define broodstock for fishery and supplementation programs.

PLAN TO ADIPOSE-CLIP HATCHERY SPRING/SUMMER CHINOOK SALMON

AGENCY: Idaho Department of Fish and Game Date: March 16, 1998

COORDINATOR: Rodney Duke

MARK REQUESTED: Adipose clip, including 750,000 CWT at Clearwater, Rapid River, and McCall hatcheries. An additional 860,000 CWT with no adipose clip will be utilized at Clearwater and McCall hatcheries.

DETAILS OF MARKING

			with Ad-clip
NUMBER OF FISH MARKED:	smolts -	6,800,000	6,109,000
	presmolts -	728,000	335,000
	parr -	574,000	384,000
	Total -	8,102,000	6,828,000

With Ad-clip column a subset of the number of fish marked.

SPECIES/RUN:	Chinook Salmon, Spring and Summer Run
BROOD YEAR:	1997
STOCKS:	Clearwater, Rapid River, Sawtooth, Pahsimeroi, McCall
GEOGRAPHIC AREA:	Clearwater, Snake, and Salmon River Drainages
RELEASE DATES:	Summer 1998, Fall 1998, Spring 1999

MANAGEMENT/RESEARCH OBJECTIVES:

Short-term objectives are to maintain runs of spring/summer chinook to Idaho hatcheries supporting current stock structure. Programs also produce subsmolts and smolts for supplementation studies. Long-term management objectives are to return enough adult fish to provide harvest and fishing opportunity on hatchery produced spring/summer chinook without adversely affecting naturally spawning populations. Fisheries were provided in the Clearwater and Salmon drainages in 1997.

IMPACT ON COAST WIDE CWT PROGRAMS:

PREDICTED RECOVERIES:

Ocean: Until 1997, there was a lack of ocean CWT recoveries. From zero to 5 recoveries are anticipated dependent on strength of adult return.

Columbia River: An estimated total of 118 adipose-clip-only spring chinook and 4 summer chinook would be sampled in Columbia River fisheries.

Brood year 1997 chinook production - DRAFT for planning - (last revised March 16, 1998) 2 pages

Stat-us	Hatchery	Stock	Ad Only	Ad/CWT	Other Mark	PIT	Mainstem PIT	Release/Comment
U	Rapid R.	Rapid R.	2,700,000	300,000			45,000	Rapid R, Oxbow; IPC
U	Clearwater/ Rapid R.	Rapid R.	150,000			TBD		Little Salmon River upstream of Rapid River
U	Clearwater	Rapid R.	300,000			TBD		Meadow Cr.(Selway); NPTH; **NPT clip**
U	Clearwater	Rapid R.	285,000	50,000		TBD		Powell pond; LSRCP
U	Clearwater	South Fork	700,000			TBD		Crooked R. pond; LSRCP
U	Clearwater	South Fork	335,000			TBD		Red River pond; LSRCP
U	Clearwater	South Fork			150,000 100% CWT, no finclip	TBD		Lolo Cr.; NPTH
U	Clearwater	Rapid River			75,000 100% CWT, no finclip	TBD		Newsome; NPTH
U	Clearwater	South Fork			40,000 100% CWT, no finclip	TBD		Mill; NPTH
U	Clearwater	South Fork			158,000 RV	TBD		Crooked R. pond; ISS; presmolt
U	Clearwater	South Fork			80,000 LV	TBD		Red R. pond; ISS; presmolt
U	Clearwater	Powell			84,000 100% CWT, no finclip	TBD		Boulder Cr.; NPTH
U	Clearwater	Powell			20,000 100% CWT, no finclip	TBD		Warm Springs Cr.;NPTH
U	Clearwater	Powell			50,000 100% CWT,no finclip	TBD		Papoose Cr.; ISS
U	Clearwater	Powell Rapid River	80,000 155,000	100,000 (Powell only)		TBD		Powell pond; LSRCP; presmolt
U	Clearwater	Powell	300,000			TBD		Whitesand Cr.;ISS; parr
U	Clearwater	Powell	84,000			TBD		Boulder; NPTH; parr
U	Clearwater	Powell			20,000 100% CWT, no finclip	TBD		Warm Springs;NPTH;parr

Stat-us	Hatchery	Stock	Ad only	Ad/CWT	Other Mark	PIT	Mainstem PIT	Release/Comment
U	Clearwater	Powell			12,000 100% CWT, no finclip	TBD		Squaw Cr; ISS; parr
U	Clearwater	Powell			13,000 100% CWT, no finclip	TBD		Pete King Cr; ISS; parr
U	McCall	SFSR	760,000	300,000			45,000	Knox Br.; LSRCP
L	McCall	SFSR			176,000 LV	TBD		Knox Br.; ISS
L	McCall	SFSR			50,000 100%CWT no finclip	0		Stolle Pond; ISS; parr
L	McCall	SFSR			TBA 45,000 100% CWT,no finclip	0		Buckhorn Cr.; NPT; parr
L	McCall	SFSR			TBA 50,000 100% CWT, no finclip	0		TBA; NPT; parr
L	McCall	SFSR			TBA 155,000 100%CWT, no finclip	TBD		scatter mainstem weir to Mirror Cr.; NPT; presmolt
U	Sawtooth	USR	104,000	if research need		TBD		Sawtooth; LSRCP
L	Sawtooth	USR			TBA 96,000 100% CWT, no finclip	TBD		Sawtooth; ISS
L	Saw/Pah	Pahsimeroi	125,000	if research need		TBD		Pahsimeroi;IPC

Notes:
TBD means numbers for a mark/tag have not been finalized.

AGENCY: U.S. Fish and Wildlife Service **DATE:** March 10, 1998

COORDINATOR: William H. Miller

MARK REQUESTED: Adipose clip only

DETAILS OF MARKING

NUMBER OF FISH: 590,000 maximum.

SPECIES/RUN: Chinook Salmon, Spring

BROOD YEAR: 1997

STOCK: Kooskia

HATCHERY: Kooskia NFH

GEOGRAPHICAL AREA: Clearwater River, Idaho

RELEASE DATE: April 1999

MANAGEMENT AND/OR RESEARCH OBJECTIVES:

Management objectives for upriver chinook are to rebuild wild/natural stocks while providing harvest opportunities on hatchery stocks. In order to accomplish these objectives, hatchery and wild/natural stocks need to be separated. Therefore the hatchery stocks need to be marked so we may identify them. Also, it is important to be able to monitor and evaluate the rebuilding of wild/natural stocks under various proposed rebuilding scenarios. The ESA requires that we know the numbers of fish and impacts associated with the take of any listed wild/natural stock of chinook. Take would include any incidental harvest, hatchery straying or planned wild broodstock production. Interactions between hatchery and wild/natural stocks will be evaluated under any ESA listing. Hatchery related adverse impacts to ESA listed wild/natural stocks need to be identified, quantified, and minimized.

IMPACT ON COAST WIDE CWT PROGRAMS:

PREDICTED RECOVERIES:

Ocean: None. No ocean recoveries of Kooskia NFH fish were in PSMFC databases at the time of this request.

Columbia River: Based on Kooskia NFH CWT return rates we would expect a range of 0 to 50 ad clipped only fish to be sampled in the gillnet and sport fisheries. The occurrence of significant numbers of recoveries in the gillnet or sport fisheries is very unusual.

CHANGES TO CURRENT SAMPLING PROGRAM:

No changes in the present sampling program are expected. We already check all returning fish for tags or marks of any kind.

OTHER: Actual releases are at normal production levels for the first time since 1995. This situation may change for brood year 1998 since indications are that adult returns will decrease appreciably. There will be a representative CWT release group.

EXPECTED BENEFITS:

1. Downstream Migrant Benefits

a. Provide timing and numerical estimation of downstream passage success of hatchery and wild stocks separately for both Columbia and Snake River fish.

b. Would permit evaluation of passage success at least down to McNary for both Columbia and Snake River wild stocks.

c. Would permit monitoring of recovery efforts on wild stocks associated with improving downstream passage, i.e., lowering reservoir levels, increased water release.

d. Would provide flexibility in transportation and spill scenarios to benefit primarily wild stocks, i.e., timing spills for those periods when wild stocks are arriving at COE + PUD projects.

2. Adult Management Benefits

a. Would permit identifying wild stock and hatchery stock at all COE fish counting projects and PUD projects from Bonneville upstream, in both mid Columbia and Snake rivers.

b. Would provide opportunity to improve harvest management and allow targeting of hatchery stocks. Management agencies could implement selective harvest programs by non-lethal gear above Bonneville, i.e., Zone 6 and sport fisheries.

c. Would permit documentation of straying of hatchery fish to wild/natural production areas.

d. Would permit documentation of straying of wild fish to hatcheries.

e. It would permit better hatchery genetic management at satellite stations or hatcheries where percentages of runs are used for broodstock. Would allow passing wild adults over weir or rearing wild and hatchery broodstock separate for outplanting or supplementation. This could be quite important when working with any listed ESA species at hatcheries. Especially for supplementation to wild stocks.

AGENCY: U.S. Fish and Wildlife Service **DATE:** March 10, 1998

COORDINATOR: William H. Miller

MARK REQUESTED: Adipose clip only

DETAILS OF MARKING:

NUMBER OF FISH: 800,000 maximum

SPECIES/RUN: Chinook Salmon, Spring

BROOD YEAR: 1997

STOCK: Dworshak, a Rapid River derivative

HATCHERY: Dworshak NFH

GEOGRAPHICAL AREA: Clearwater River, Idaho

RELEASE DATE: April 1999

MANAGEMENT AND/OR RESEARCH OBJECTIVES:

Management objectives for upriver chinook are to rebuild wild/natural stocks while providing harvest opportunities on hatchery stocks. Hatchery stocks and wild/natural stocks need to be separated. Therefore the hatchery stocks need to marked so we may identify them. Also, it is important to be able to monitor and evaluate the rebuilding of wild/natural stocks under various proposed rebuilding scenarios. The ESA requires that we know the numbers of fish and impacts associated with the take of any listed wild/natural stock of chinook. Take would include any incidental harvest, hatchery straying or planned wild broodstock production. Interactions between hatchery and wild/natural stocks will be evaluated under any ESA listing. Hatchery related adverse impacts to ESA listed wild/natural stocks need to be identified, quantified, and minimized.

IMPACT ON COAST WIDE CWT PROGRAMS:

PREDICTED RECOVERIES:

Ocean: Based on Dworshak NFH CWT return rates we would expect from 0 to 32 ad clipped only fish to be sampled in ocean fisheries. The maximum (32) is based on one recovery in 1990, expanded for both sample rate and for marked/unmarked fish ratio. This has been the only ocean recovery of Dworshak SCS stock available in the PSMFC database.

Columbia River: Based on Dworshak NFH CWT return rates we would expect from 0 to 202 ad clipped only fish to be sampled in the sport fisheries and 0 to 256 in the gillnet fisheries. The occurrence of significant numberies of recoveries in the gillnet or sport fisheries is very unusual.

CHANGES TO CURRENT SAMPLING PROGRAM:

No changes in the present sampling program are expected. We already check all returning fish for tags or marks of any kind. All locally sport harvested fish (if there is a sport season) will be checked also.

OTHER: Expected releases will be at nearly normal production levels for the second consecutive year. There will be a representative CWT release group.

EXPECTED BENEFITS:

1. Downstream Migrant Benefits

a. Provide timing and numerical estimation of downstream passage success of hatchery and wild stocks separately for both Columbia and Snake River fish.

b. Would permit evaluation of passage success at least down to McNary for both Columbia and Snake River wild stocks.

c. Would permit monitoring of recovery efforts on wild stocks associated with improving downstream passage, i.e., lowering reservoir levels, increased water release.

d. Would provide flexibility in transportation and spill scenarios to benefit primarily wild stocks, i.e., timing spills for those periods when wild stocks are arriving at COE + PUD projects.

2. Adult Management Benefits

a. Would permit identifying wild stock and hatchery stock at all COE fish counting projects and PUD projects from Bonneville upstream, in both mid Columbia and Snake rivers.

b. Would provide opportunity to improve harvest management and allow targeting of hatchery stocks. Management agencies could implement selective harvest programs by non-lethal gear above Bonneville, i.e., Zone 6 and sport fisheries.

c. Would permit documentation of straying of hatchery fish to wild/natural production areas.

d. Would permit documentation of straying of wild fish to hatcheries.

e. It would permit better hatchery genetic management at satellite stations or hatcheries where percentages of runs are used for broodstock. Would allow passing wild adults over weir or rearing wild and hatchery broodstock separate for outplanting or supplementation. This could be quite important when working with any listed ESA species at hatcheries. Especially for supplementation to wild stocks.

ATTACHMENT 11

Northwest Indian Fisheries Commission

6730 Martin Way E., Olympia, Washington 98516-5540
Phone (360) 438-1180 FAX # 753-8659

To: **PSMFC Mark Committee**

From: **Ron Olson, NWIFC Mark Coordinator**

Date: **March 11, 1998**

Subj.: **Request For Fin Mark Exemption**

****

I'm writing on behalf of the Makah Tribe to request the use of the adipose-only fin mark on a group of sockeye fry. As requested by our committee, I am sending you this information prior to the Mark Meeting. This is a repeat of the request that was granted the last two years, only the proposed number of fry to mark has decreased from 200,000 to 50,000. Background information is provided below and specific details of the marking proposal are described on the attached form

Background: NMFS has classified the stock as its own ESU, and has proposed listing the ESU as *Threatened* under the ESA. The Makah Tribe operates a small hatchery on Umbrella Cr. for sockeye fry supplementation. Prior to last year, fry were marked with ventral clips or combinations of adipose & ventral fin clips. Although the adipose-only clip would have been the preferred mark, the other fin marks were used to conform with the regional marking agreements. Restoration plans are currently being developed for the population, and several biologists involved with the restoration effort have been critical of the use of ventral fin marking on this stock - due to the probable decrease in survival. Coded wire tagging is not being considered for the following reasons:

1) *No additional information would be gained:* There is no regional CWT sampling for sockeye in mixed stock fisheries, and no terminal fishery on the stock, so no information on fishery impacts would be obtained.

2) *Cost:* If no additional information would be gained, there is no rationale for the increased cost of tagging.

3) *Problems with tagging fry:* Fry would have to be marked at the 450-550/lb. size range, raising concern with handling mortality. Tag loss may also be high, resulting in low precision of the tagged release estimate.

Feel free to contact me if you would like any additional information prior to the Mark Meeting.

Agency: Makah Fisheries

Coordinator: Ron Olson, Northwest Indian Fisheries Commission

Mark Requested: Adipose-only fin clip

Detail of Marking:

Number of fish:	50,000
Species/Run:	Sockeye
Brood Year:	1997
Stock:	Ozette
Hatchery:	Umbrella Creek (fry release into this Lake Ozette tributary)
Geographical Area:	Ozette Lake, NW coast of Washington
Release Date:	June 1998 (fish at 400/lb)

Management and/or Research Objective:
The objective of this marking study is to assess the contribution of supplementation production (fry plants) to the Lake Ozette sockeye population. Monitoring opportunities occur at the smolt outmigration and in adult brood stock removals.

Impact on Coast-Wide CWT Programs:

Predicted Recoveries:

Sockeye are not marked-sampled in Canadian or Washington mixed-stock marine waters, so no regional recoveries are expected. Few to no recoveries would be predicted outside of the regional area.

Changes to current sampling program:

No changes in the present sampling program are expected.

Expected Benefits:

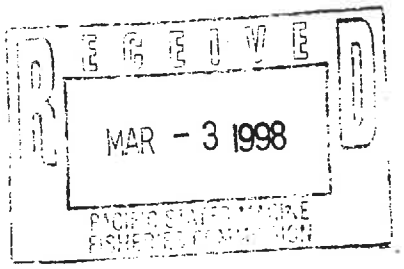
A visual mark of the fry will allow assessment of supplementation activities directed at the rebuilding of the Lake Ozette sockeye population. The adipose-only mark is requested to minimize marking mortality on this depressed stock.

ATTACHMENT 12

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

February 25, 1998



Dr. Ken Johnson
Pacific States Marine Fisheries Commission
45 SE 82nd Drive, Suite 100
Portland, Oregon 97027-2522

Dear Dr. ~~Johnson~~ Ken:

As the enclosed memo explains in greater detail, I am requesting permission to adipose mark without a coded-wire tag (CWT), a group of 35,000 pink fry. The fry will be released too small for a standard length CWT and do not warrant the expense or mortality associated with half-length CWTs. This small group of fish is a desperation attempt to avoid extinction of a unique group of late returning pink salmon to the Dungeness River.

The Dungeness River is located at the eastern end of Juan de Fuca Strait. I do not expect anyone to recover any of these pink salmon in a fishery being sampled for pink salmon CWTs. These fish are scheduled to be marked and released by late March, which is prior to our April meeting. Please send the request to the other mark coordinators and ask for consensus so that marking may proceed by March 15, 1998.

Sincerely,

Lee Blankenship

Lee Blankenship
Research Scientist
Resource Assessment Division
Fish Management Program

LB:cmd

Enclosure

Memo

To: Lee Blankenship

From: Steve Evans

Subject: Fin clipping Dungeness Fall Pinks

Date: February 18, 1998

CC: Larry Peck, Ross Fuller

As you know, the Department launched a recovery program for Dungeness Fall-run pink salmon in 1995. This action was based on the fact that the population size for Fall pinks had dropped to less that 300 fish in the previous two cycles, and the threat of extinction was deemed eminent.

Due to highly unstable habitat conditions throughout its spawning range, a decision was made to remove all returning adults from the river and place them at the Hurd Cr. facility and held for spawning , and release of the progeny back to the lower river.

As there is somewhat of an overlap in river entry timing between the summers and falls, it was necessary to differentiate the two through DNA sampling to ensure stock integrity. This type of sampling is very expensive, approaching $55.00 per sample, costing the project approximately $18,000.00 this last season. In order to abate some of this expense, and visually identify project adults in the 1999 capture operations, the pink recovery TAC is requesting an AD-only fin clip be placed on the 1997 brood being reared at Hurd Cr.

The SASSI document indicates that Fall-run Dungeness pink salmon are harvested incidentally in Canadian and US fisheries directed at Fraser River sockeye and pink salmon. Preterminal incidental harvest may occur in Johnstone Strait, Georgia Strait, the west coast of Vancouver Island, the Strait of Juan de Fuca (areas 4B, 5 and 6C) and the San Juan Islands (Areas 6, 7, and 7A). No terminal area fishery was occurred on either stock in recent years.

Please advise the PSMFC Sub-committee for fish marking of our recovery effort and request an exemption for AD-only fin clip on the 35,000 (+/-) falls to be released in late March of this year.

Should you have any questions, or need further information on the recovery effort, please call me at (360) 902-2677. Thank you in advance for your assistance in this matter.

ATTACHMENT 13

MASS MARK REQUEST

(USFWS - for 1998)

U.S. Fish and Wildlife Service
Dave Zajac

December 12, 1997

1) Mark Requested - Adipose Clip

   a) Alternatives considered

      1) Otolith banding
      2) Coded - wire tags

      Rejected both alternatives because ***terminal area external identification*** is all that is required for estimating hatchery/wild composition and stray rates.

2) Marking Details

a)	Number of Fish:	400,000
b)	Species/Run:	summer chum
c)	Brood Year:	97
d)	Stock:	Quilcene Bay (Big and Little Quilcene Rivers)
e)	Hatchery:	Quilcene National Fish Hatchery
f)	Geographic Area:	Washington State, Puget Sound, Hood Canal, Big Quilcene River
g)	Release Date:	April 1, 1998

3) Specific Management and/or Research Objectives:

   a) Identification/estimation of hatchery contribution to future Big Quilcene River returns.
   b) Allows for potential spawning procedure changes.
   c) Identify stray rates to neighboring streams thus indicating potential impact of the hatchery program on other wild stocks.

4) Impact on Coastwide CWT Programs:

a) Predicted number of observed recoveries: Canada - 45 (over two years, 00 and01)
Washington - 20 (over same years)

b) Changes to current CWT program: None

5) Expected Benefits:

This marking will allow us to assess the impact of the hatchery program on wild stocks and determine the success of the restoration effort. This assessment will allow us to make informed decisions regarding the continuation, modification, or discontinuation of the hatchery program.

CODING FOR MARKS

VI. CODING FOR MARKS

In general, updating the definitions of fields requires a formal format revision. The process of format revision, which requires multilateral concurrence, is time consuming and expensive. The fields addressed in this chapter have been identified as being especially dynamic. New values are needed on a regular basis; therefore, the requirement for format revision is waived for these fields for purposes of adding new values. This chapter may be updated after informal review and consent from the overseeing body. However, changes of substance such as new field sizes, formats, or meanings are still subject to the formal format revision process.*

Non-Adipose Mark Code	Mark Description	Adipose Mark Code	Mark Description
0000	No external marks	5000	Adipose clip (Ad)
0001	Left Ventral	5001	Ad + Left Ventral
0002	Right Ventral	5002	Ad + Right Ventral
0050	Left Ventral Right Ventral	5050	Ad + Left Ventral Right Ventral
0051	Left Ventral Left Pectoral	5051	Ad + Left Ventral Left Pectoral
0052	Left Ventral Right Pectoral	5052	Ad + Left Ventral Right Pectoral
0053	Left Ventral Left Maxillary	5053	Ad + Left Ventral Left Maxillary
0054	Left Ventral Right Ventral Left Maxillary	5054	Ad + Left Ventral Right Ventral Left Maxillary
0055	Left Ventral Right Ventral Right Maxillary	5055	Ad + Left Ventral Right Ventral Right Maxillary
0056	Left Ventral Right Maxillary	5056	Ad + Left Ventral Right Maxillary
0057	Left Ventral Dorsal	5057	Ad + Left Ventral Dorsal
0058	Left Ventral Anal	5058	Ad + Left Ventral Anal
0059	Left Ventral Caudal	5059	Ad + Left Ventral Caudal
0070	Right Ventral Left Pectoral	5070	Ad + Right Ventral Left Pectoral
0071	Right Ventral Right Pectoral	5071	Ad + Right Ventral Right Pectoral
0072	Right Ventral Left Maxillary	5072	Ad + Right Ventral Left Maxillary
0073	Right Ventral Right Maxillary	5073	Ad + Right Ventral Right Maxillary
0074	Right Ventral Dorsal	5074	Ad + Right Ventral Dorsal
0075	Right Ventral Anal	5075	Ad + Right Ventral Anal
0076	Right Ventral Caudal	5076	Ad + Right Ventral Caudal
0090	Left Pectoral	5090	Ad + Left Pectoral
0091	Left Pectoral Left Maxillary	5091	Ad + Left Pectoral Left Maxillary
0092	Left Pectoral Right Maxillary	5092	Ad + Left Pectoral Right Maxillary
0093	Left Pectoral Right Maxillary Anal	5093	Ad + Left Pectoral Right Maxillary Anal
0094	Left Pectoral Dorsal	5094	Ad + Left Pectoral Dorsal
0095	Left Pectoral Anal	5095	Ad + Left Pectoral Anal

ATTACHMENT 14

*. To obtain a current list of values for this chapter, contact:
PSMFC/RMPC at e-mail: "rmpc.admin@psmfc.org", WWW site: "ftp://www.psmfc.org/pub/cwt/documents/"
or Dept. Fisheries & Oceans, Canada at e-mail: "MRPUNIT@pbs.dfo.ca".

0100	Right Pectoral
0101	Right Pectoral Left Maxillary
0102	Right Pectoral Right Maxillary
0103	Right Pectoral Right Maxillary Anal
0104	Right Pectoral Dorsal
0105	Right Pectoral Anal
0110	Left Maxillary
0111	Left Maxillary Right Maxillary
0112	Left Maxillary Dorsal
0113	Left Maxillary Anal
0120	Right Maxillary
0121	Right Maxillary Dorsal
0122	Right Maxillary Anal
0130	Dorsal
0140	Anal
0150	Caudal
0200	Visual Implant Alpha-numeric
0201	Visual Implant Elastomer Injection
0202	Visual Implant Fluorescent Filament
0203	Elastomer Injection Left Eye Blue
0204	Elastomer Injection Right Eye Blue
0205	Elastomer Injection Left Eye Red
0206	Elastomer Injection Right Eye Red
0300	Freeze Brand

CODING FOR MARKS

5100	Ad + Right Pectoral
5101	Ad + Right Pectoral Left Maxillary
5102	Ad + Right Pectoral Right Maxillary
5103	Ad + Right Pectoral Right Maxillary Anal
5104	Ad + Right Pectoral Dorsal
5105	Ad + Right Pectoral Anal
5110	Ad + Left Maxillary
5111	Ad + Left Maxillary Right Maxillary
5112	Ad + Left Maxillary Dorsal
5113	Ad + Left Maxillary Anal
5120	Ad + Right Maxillary
5121	Ad + Right Maxillary Dorsal
5122	Ad + Right Maxillary Anal
5130	Ad + Dorsal
5140	Ad + Anal
5150	Ad + Caudal
5200	Ad + Visual Implant Alpha-numeric
5201	Ad + Visual Implant Elastomer Injection
5202	Ad + Visual Implant Fluorescent Filament
5203	Ad + Elastomer Injection Left Eye Blue
5204	Ad + Elastomer Injection Right Eye Blue
5205	Ad + Elastomer Injection Left Eye Red
5206	Ad + Elastomer Injection Right Eye Red
5300	Ad + Freeze Brand

Effects of Coded-Wire Tagging on the Survival of Spring Chinook Salmon

H. Lee Blankenship, Daniel A. Thompson and Eric Volk

The Washington Department of Fish and Wildlife began conducting a study in 1989 with Bonneville Power Administration funds to determine if there was a combined effect on survival and/or growth from handling, anesthesia, adipose fin clipping and coded-wire tagging salmonids. Three hatcheries (Cowlitz, Carson and South Santiam) on the Columbia River were chosen as test sites. Three consecutive brood years (1989, 1990, and 1991) of spring chinook were chosen as the test species.

The entire production at each hatchery each brood year was otolith marked with thermal banding patterns. The otolith marks were applied so that straying adults from non-facility or wild fish could be separated from the returning control adults. Approximately 33% of each brood was coded-wire tagged and adipose marked using normal procedures. Control or untagged juveniles were put through a wet counter for precise enumeration.

Adult hatchery rack returns have been analyzed for all three brood years. No significant differences in growth was found between tagged and untagged adult returns. Tagged adults at Cowlitz hatchery returned at exactly the same ratio or slightly higher than they left the hatchery as juveniles (Table 1). The three broods of tagged adults at South Santiam hatchery returned at 3.3%, 6.3% and 4.0% lower rate than the un-handled controls but non of these were significant (Table 2). A significant difference was observed at Carson hatchery where there was 8.9% lower survival for the 1989 brood coded wire tagged fish (Table 3). At Carson, records show that the 1989 brood juveniles had a high level of *Renibacterium salmoninarum* (BKD) prior to tagging and infectious hematopoietic necrosis (IHN) broke out during the time of tagging. The latter two broods of tagged fish returned at a rate of 0.6% and 6.6% less than the un-handled fish but neither was significant.

Table 1. Numbers of coded wire tagged and non-coded wire tagged 1989-91 brood spring chinook returning to the Cowlitz hatchery.

1989 Brood Totals		Age at Return				
		2 Year	3 Year	4 Year	5 Year	6 Year
Tagged	= 3,106	1,370	317	1,154	240	25
Un-tagged	= 6,338	2,633	711	2,564	409	21
Total Sampled	= 9,444	4,003	1,028	3,718	649	46

Coded wire tag return = 32.9%
Coded wire tag release = 32.3%

Coded wire tagged fish survived 1.9% higher than non-coded wire tagged.

1990 Brood Totals		Age at Return				
		2 Year	3 Year	4 Year	5 Year	6 Year
Tagged	= 1,920	1,424	52	205	230	9
Un-tagged	= 4,010	3,061	86	476	376	11
Total Sampled	= 5,930	4,485	138	681	606	20

Coded wire tag return = 32.4%
Coded wire tag release = 32.4%

Coded wire tagged fish survived equal to non-coded wire tagged.

1991 Brood Totals		Age at Return			
		2 Year	3 Year	4 Year	5 Year
Tagged	= 531	102	25	297	107
Un-tagged	= 1,018	182	66	548	222
Total Sampled	= 1,549	284	91	845	329

Coded wire tag return = 34.3%
Coded wire tag release = 33.1%

Coded wire tagged fish survived 3.5% higher than non-coded wire tagged.

Table 2. Numbers of coded wire tagged and non-coded wire tagged 1989-91 brood spring chinook returning to the South Santiam Hatchery.

1989 Brood Totals		Age at Return		
		4 Year	5 Year	6 Year
Tagged	= 628	394	228	6
Un-tagged	= 1,338	861	475	2
Total Sampled	= 1,966	1,255	703	8

Coded wire tag return = 31.9%
Coded wire tag release = 33.0%

Coded wire tagged fish survived 3.3% lower than non-coded wire tagged.*
*Adjustment made for otolith thermal mark reading errors

1990 Brood Totals		Age at Return			
		3 Year	4 Year	5 Year	6 Year
Tagged	= 631	22	293	309	7
Un-tagged	= 1,398	44	777	572	5
Total Sampled	= 2,029	66	1,070	881	12

Coded wire tag return = 31.1%
Coded wire tag release = 33.2%

Coded wire tagged fish survived 6.3% lower than non-coded wire tagged.

1991 Brood Totals		Age at Return		
		3 Year	4 Year	5 Year
Tagged	= 574	1	249	324
Un-tagged	= 1,240	3	687	550
Total Sampled	= 1,814	4	936	874

Coded wire tag return = 31.6%
Coded wire tag release = 32.9%

Coded wire tagged fish survived 4.0% lower than non-coded wire tagged.

Table 3. Numbers of coded wire tagged and non-coded wire tagged 1989-91 brood spring chinook returning to the Carson National Fish Hatchery.

1989 Brood Totals		Age at Return 4 Year	5 Year
Tagged	= 499	424	75
Un-tagged	=1,703	1,459	244
Total Sampled	=2,202	1,883	319

Coded wire tag return = 22.7%
Coded wire tag release = 24.9%

Coded wire tagged fish survived 8.9% lower than non-coded wire tagged.

1990 Brood Totals		Age at Return 4 Year	5 Year
Tagged	= 194	161	33
Un-tagged	= 395	333	62
Total Sampled	= 589	494	95

Coded wire tag return = 32.9%
Coded wire tag release = 32.7%

Coded wire tagged fish survived 0.6% higher than non-coded wire tagged.

1991 Brood Totals		Age at Return 4 Year	5 Year
Tagged	= 125	101	24
Un-tagged	= 280	234	46
Total Sampled	= 405	335	70

Coded wire tag return = 30.9%
Coded wire tag release = 33.1%

Coded wire tagged fish survived 6.6% lower than non-coded wire tagged.

Differential Survival of Ventral Fin and Adipose Fin Clips in fall chinook salmon (Oncorhynchus tshawytscha)

H. Lee Blankenship, Daniel A. Thompson and Steve Olhausen

The Washington Department of Fish and Wildlife (WDFW) and the United States Fish and Wildlife Service (USFWS) began conducting a study in March 1993 to determine the effect on survival of removing the adipose and ventral fin on fall chinook salmon (Oncorhynchus tshawytscha). The study was conducted at Spring Creek National Fish hatchery on the Columbia River for three consecutive brood years beginning with 1992 brood.

For each brood year four groups of chinook were marked and coded wire tagged (CWT) with distinct codes. The four groups included CWT only, CWT/adipose clip, CWT/left ventral clip, and CWT/adipose clip/left ventral clip. The chinook ranged in size from 4.0 g per fish (72 mm FL) for 1992 brood to 2.9 g per fish (65 mm FL) for 1993 and 1994 broods. The fish were reared in the same raceways until their release as 0 age chinook in April-June of each year. One exception to this occurred with the 1992 brood CWT/adipose clip group which was inadvertently released early. Consequently this group was dropped from the analysis.

Quality Control Checks

Quality control checks were performed for each group and brood year to determine CWT loss and poor fin marks. The quality control checks were performed between 18 and 33 days post tagging for the groups and the number of viable CWT's released were adjusted accordingly.

Adult Sampling

During the fall of 1995, '96 and '97 all chinook returning to the Spring Creek hatchery were electronically sampled for the presence of a CWT using a Northwest Marine Technology R-10 CWT detector. If a CWT was detected the chinook was examined to determine which fin(s)(if any) were removed and fin clip quality. Each fish was given an individual head label with the fin clip quality and fork-length recorded. The snout was then removed to retrieve the CWT. Once the CWT was decoded the fish was assigned to the proper treatment. Fin clip quality was defined as "Good" (none to 1/4 of the fin present), "Marginal" (1/4 to 1/2 of the fin present), "Bad" (more than 1/2 of the fin present), and "No Mark" (no apparent fin mark).

Results

The results presented in Table 1 show the number of returning adults by clip type and clip quality for 1992, 93, and 1994 brood years returning in 1995, '96, and 1997. A summary of the differential survival between fin clips for 1992, '93, and '94 brood years is presented in Table 2.

Table 1. Numbers of chinook returning to the Spring Creek hatchery in 1995 and 1996 by fin clip and fin clip quality. Fin clip quality was defined as "Good" (none to 1/4 fin present), "Marginal" (more than 1/4 to 1/2 fin present), "Bad" (greater than 1/2 fin present) and "No Mark" (no apparent fin mark).

1992 Brood Recoveries in 1995 and 1996

Fin Clip	# Recoveries	Survival to Rack	Average fork-length (1996)	Standard Deviation
Coded Wire Tag Only	74	0.037%	80.7 cm	5.8 cm
Left Ventral	26	0.013%	80.1 cm	5.6 cm
Adipose/ Left Ventral	18	0.009%	76.2 cm	6.2 cm

Difference in Survival

Left Ventral clips survived 64.9% less than Coded wire tag only

Left Ventral/Adipose clips survived 75.7% less than Coded wire tag only

Clip Quality

Adipose Clip		Left Ventral		Adipose/Left Ventral			
Good	= 96.4% (54)	Good	= 34.6% (9)	Good	= 77.8% (14)	Good	= 22.2% (4)
Marginal	= 1.8% (1)	Marginal	= 30.8% (8)	Marginal	= 11.1% (2)	Marginal	= 16.7% (3)
Bad	= 1.8% (1)	Bad	= 30.8% (8)	Bad	= 5.5% (1)	Bad	= 44.4% (8)
No Mark	= 0.0%	No Mark	= 3.8% (1)	No Mark	= 5.5% (1)	No Mark	= 16.7% (3)

1993 Brood Recoveries in 1995, '96, and '97

Fin Clip	# Recoveries	Survival to Rack	Average fork-length (1997)	Standard Deviation
Coded Wire Tag Only	220	0.11%	87.1 cm	6.2 cm
Adipose	195	0.10%	87.2 cm	7.9 cm
Left Ventral	112	0.05%	86.5 cm	6.4 cm
Adipose/ Left Ventral	88	0.04%	85.8 cm	7.7 cm

Difference in Survival

Coded wire tag only survived 9.1% higher than adipose clips

Coded wire tag only survived 54.6% higher than left ventral clips

Coded wire tag only survived 63.7% higher than left ventral/adipose clips

Clip Quality

Adipose Clip		Left Ventral		Adipose/Left Ventral			
Good	= 94.4%(184)	Good	= 59.8% (67)	Good	= 83.0% (73)	Good	= 65.9% (58)
Marginal	= 1.5% (3)	Marginal	= 24.1% (27)	Marginal	= 2.2% (2)	Marginal	= 25.9% (21)
Bad	= 3.1% (6)	Bad	= 16.1% (18)	Bad	= 8.0% (7)	Bad	= 6.8% (6)
No Mark	= 1.0% (2)	No Mark	= 0.0%	No Mark	= 6.8% (6)	No Mark	= 3.4% (3)

Table 1. cont.

1994 Brood Recoveries in 1996, and 1997

Fin Clip	# Recoveries	Survival to Rack	Average fork-length (1997)	Standard Deviation
Coded Wire Tag Only	76	0.038%	77.4 cm	6.2 cm
Adipose	76	0.039%	76.1 cm	6.3 cm
Left Ventral	46	0.023%	74.7 cm	6.1 cm
Adipose/ Left Ventral	44	0.022%	74.4 cm	5.4 cm

Difference in Survival

Coded wire tag only survived 2.6% lower than adipose clips

Adipose clips survived 41.1% higher than left ventral clips

Adipose clips survived 43.6% higher than adipose/left ventral clips

Clip Quality

Adipose Clip		Left Ventral		Adipose/Left Ventral			
Good	= 89.5% (68)	Good	= 56.5% (26)	Good	= 88.6% (39)	Good	= 54.5% (24)
Marginal	= 6.6% (5)	Marginal	= 17.4% (8)	Marginal	= 2.3% (1)	Marginal	= 18.2% (8)
Bad	= 3.9% (3)	Bad	= 23.9% (11)	Bad	= 6.8% (3)	Bad	= 18.2% (8)
No Mark	= 0.0%	No Mark	= 2.2% (1)	No Mark	= 2.3% (1)	No Mark	= 9.1% (4)

Table 2. Differential survival of fin clipped and coded-wire tagged fall chinook from Spring Creek hatchery

Brood Year	Mark Applied	# Marked	Rack Recoveries				Return to Escapement	Differential Survival
			Age 2	Age 3	Age 4	Total		Vs CWT Only
1992	CWT Only	198,823	Not Sampled	71	3	74	0.037%	
1992	CWT Ventral	194,496	Not Sampled	23	3	26	0.013%	- 64.9%
1992	CWT Ad/LV	195,497	Not Sampled	16	2	18	0.009%	- 75.7%
1993	CWT Only	194,489	27	133	60	220	0.11%	
1993	CWT Adipose	185,575	28	116	51	195	0.10%	- 9.1%
1993	CWT Ventral	193,745	16	56	40	112	0.05%	- 54.6%
1993	CWT Ad/LV	191,405	15	48	25	88	0.04%	- 63.7%
1994	CWT Only	197,347	12	64	--	76	0.038%	
1994	CWT Adipose	190,205	8	68	--	76	0.039%	+ 2.6%
1994	CWT Ventral	194,127	8	38	--	46	0.023%	- 39.5%
1994	CWT Ad/LV	196,529	3	41	--	44	0.022%	- 42.2%

Long-Term Retention and Survival of Coho Salmon Marked with Fluorescent Red Visible Implant Jet and Elastomer

Daniel A. Thompson and H. Lee Blankenship

The Washington Department of Fish and Wildlife (WDFW) began conducting a study in January 1996 to determine long term retention and survival of coho salmon (Oncorhynchus kisutch) tagged with a fluorescent red Visible Implant Jet (VI Jet) and Visible Implant Elastomer (VIE). The study was conducted at the WDFW Voights Creek and Marblemount hatcheries using 1994 brood coho salmon. At Voights Cr. and Marblemount hatcheries the coho averaged 10 g (96 mm FL) and 13 g (104 mm FL) respectively at the time of marking.

At Voights Creek hatchery five groups of coho were coded wire tagged (CWT)/adipose fin clipped and VI marked simultaneously in a WDFW mobile tagging unit to ensure random specimens for each group. The five groups consisted of: control group (N= 12,044), VIE in adipose eyelid (N=11,770), VI Jet in pectoral fin (N=12,144), VI Jet in the ventral fin (N=12,040), and VI Jet in the anal fin (N=12,046). Each group was given a distinct tag code.

At Marblemount hatchery two groups were tagged simultaneously in a WDFW mobile tagging unit to ensure random specimens for each group. The control group (N= 103,063) consisted of coho with a CWT and adipose fin clip, and the treatment group consisted of coho with a CWT/adipose fin clip and VI Jet in the anal fin (N= 102,880).

The VI Jet fluorescent red solution is injected between the fin rays using a needle-less injector. The VI Elastomer is injected into the adipose eyelid using a 29 gauge hypodermic needle with the Northwest Marine Technology Elastomer Tagging system. Tagging rates for the VI Jet marking averaged 500 fish per hour per injector. The VIE marking averaged 400 fish per hour per injector. Both materials when injected become cohesive in the fin or adipose eyelid.

Adult Sampling

During the fall of 1997 all adipose fin clipped adult coho returning to the Voights Creek and Marblemount hatcheries were visually inspected for the presence of a VI mark. The coho were first examined under ambient light and if no mark detected interrogated under UV light. For each coho the presence or absence of a VI mark and mark location was recorded on the individual head label. The coho were measured to the nearest centimeter and the snout removed to retrieve the CWT. Once the CWT's were decoded they were assigned to the proper group.

Results and Discussion

The results presented in table 1 show survival, retention and visibility of the VI Jet and elastomer recoveries for 1997 coho hatchery rack at Voights creek and Marblemount.

VI Jet marks caused no significant difference in survival compared to the unmarked controls. The long term retention and visibility of the VI Jet marks was low with only 50% visible on returning adult coho. Examination of the base of the anal fins on Marblemount coho revealed the VI Jet material was present but was not visible due to the dark pigmentation on maturing adults.

Although the VI Jet mark was not successful for long term brood stock identification, it could be successfully used for short term applications. The VI Elastomer mark did not have as high retention as seen in previous studies (74.6%). We attribute this to inexperienced markers and a small tag group.

Table 1. Survival, retention and visibility of coho hatchery rack recoveries for Visible Implant Jet and Elastomer marks.

Voights Creek

Mark Applied	# Released	# Recoveries	# VI Recoveries	VI Retention	% Survival
Adipose Clip	12,044	93	--	--	0.0077
VIE Adipose Eye	11,770	83	62	74.6%*	0.0071
VI Jet Anal Fin	12,046	94	23	24.4%	0.0078
VI Jet Ventral Fin	12,040	81	32	39.5%	0.0067
VI Jet Pectoral Fin	12,144	85	16	18.8%	0.0069

*90.7% Visible to Naked Eye

Marblemount

Mark Applied	# Released	# Recoveries	# VI Recoveries	VI Retention	% Survival
Adipose Clip VI Jet	102,880	995	498	50.1%*	0.0096
Adipose Clip	103,063	993	--	--	0.0096
CWT Only	47,153	477	--	--	0.010

*All Ultra Violet light only