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

DATE: June 30, 1997

TO: Mark Committee; General Distribution

FROM: Ken Johnson

SUBJECT **Revisions to the Final Minutes of 1997 Mark Meeting**

Enclosed are several pages that contain significant revisions to the "final minutes" of the 1997 Mark Meeting which were distributed earlier on June 13, 1997. I had neglected to put a deadline date for revisions when I sent out the preliminary draft. As a result, several errors were subsequently reported following the distribution of the "final minutes" on June 13th.

Fortunately, all of the corrections were able to be made without changing the pagination. Therefore, I have copied the appropriate pages and their respective backside page so that you can simply replace the pages in your current set of minutes.

Changes (and explanations where necessary) are provided below:

Page 2: Last paragraph. The minutes incorrectly indicated that hatchery catch will also be exchanged in the new PSC Catch and Effort data exchange format. This is incorrect. Hatchery catch will be included only in the sense of hatchery fish taken in cost recovery or terminal area fisheries. Fish returning to the hatcheries will not be reported.

Page 12: Second to last paragraph. The minutes did not correctly reflect Ron Olson's concern about the importance of continuing to carry out interagency coordination on the use of fin marks. His point was that this type of coordination is still needed on a local level even if the Mark Center is no longer involved.

Page 17: Last paragraph. I badly missed the comment (and the year) that Lee Blankenship had made regarding restrictions in ocean salmonid fisheries. While it is true that the ocean fisheries were restricted in 1996, there were still many exceptions, including that for treaty fisheries and recreational fisheries. In addition, Oregon and California had an ocean fishery for chinook in 1996.

The key point is that concerns for impacts on listed species are growing and playing an increasingly prominent role in developing regulations for ocean fisheries.

(Over)

Page 21: Fifth paragraph. Ron Olson's argument was partially countered by Rodney Duke's comment that Idaho was also marking its chinook in the hopes of having a selective fishery in the future.

Page 21: Last Paragraph. The minutes missed Ron Olson's second point that the NMFS had made a new requirement that Idaho mark its hatchery fish in the interval following the Mark Meeting. As such, he argued that the situation was very different at the time of the second meeting.

Page 27: Second to last paragraph, last sentence. Replaced the term 'mortality' with 'survival'.

Please accept my apologies for the errors and the inconvenience of having to reassemble your copy of the final minutes.

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1997 MARK MEETING
Final Minutes

Gastineau Salmon Hatchery
Juneau, Alaska
8:30 AM April 24-25, 1997

1. General Business Items

A. Welcome/Introductions

Mark Committee members and other meeting participants were introduced at the start of the Mark Meeting **(Attachment 1)**. Adrian Celewycz (NMFS-AK) was introduced by Ron Heintz as his replacement for the coming year. Rodney Duke (IDFG) has rejoined the Mark Committee, replacing Greg Mauser. John Leppink (ODFW) attended in the place of Christine Mallette as she is on temporary leave to care for her newborn son.

Several Mark Committee members were not able to be present. Tim Yesaki (BC Environment) was represented by Richard Bailey (CDFO). Steve Leash (MIC) forwarded a letter stating a 'yes' vote on the Idaho/USFWS proposal to mass mark Snake River chinook with the adipose only mark. Jerry Harmon (NMFS-Columbia River) likewise was unable to attend but was represented by Robert Bayley (NMFS-Portland) and Ron Heintz (NMFS-AK). California did not have representation as Frank Fisher (CDFG) was unable to travel because of health reasons.

B. 1998 Meeting Site and Date

The 1998 Mark Meeting will be hosted by Idaho Department of Fish and Game. The meeting will be held in Boise on **April 16-17** (Thursday-Friday).

C. New Agenda Items

Four new agenda items were added. Robert Bayley (NMFS) requested an opportunity to alert the Mark Committee to two NMFS reports recently forwarded to Congress. (See Agenda Item 3).

Per request of Richard Comstock (USFWS), Marianne McClure (CRITFC) distributed for review a new coding scheme that maps PSC location codes to statistical areas and fisheries (gear). (See Agenda Item 4).

Ron Olson (NWIFC) requested a few minutes to update the Mark Committee on ongoing enhancements to the CRAS data retrieval system and possible maintenance plans in the future. (See Agenda Item 7).

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Steve Oura (New West Technologies) was unable to attend and report on progress to date on research and development of the photonic marking system. Likewise, Robert Brown (Elemental Research) had hoped to attend the Mark Meeting and report on progress during the past 12 months on the use of advance laser ablation coupled with mass spectrometry for stock identification. However, at the last moment, he had to cancel because of other business commitments.

2. New PSC Catch and Effort Data Exchange Format Finalized

Scott Johnson (ADFG) reviewed the new PSC Catch and Effort data exchange format that had taken seven years to develop. Rather than go into details of the entire process, he noted that he would focus on what the original task was and progress to date.

According to the terms of reference, the Working Group was to consult with the users of the catch data (i.e. various technical committees) and determine what needs existed, what data sets to include, how to aggregate the data by time and area, etc. Once that was done, file format specifications for data exchange were to be developed, along with a description of the codes being used. Lastly, they were to outline a system for exchanging the data files, with specific instructions not to build a catch and effort data application system. How data users might access the information was not to be the concern of the Working Group, and still isn't today. The intent was to build a data exchange system only.

The catch data to be exchanged will include all types of catch back to 1975, including commercial, sport, subsistence, personal use, native, and non-native catch. In most cases, the catch 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.

Recovery Fields:

Mark Code:	If the fish are marked, it will likely be necessary to add a field to capture this information.
Sampling Technique:	Some of the analysts are interested in knowing if the sampling is visual or electronic.

Catch/Sample Fields:

Mark Code:	The mark code will likely be needed to expand CWT recoveries.
Sampling Technique:	Identify if sampling was visual or electronic.
Fishery Type:	Non-selective or selective using the adipose (or some other mark).
Catch Type:	Census or estimate? Unable to tell now from the format.
No. Fish Caught and Released:	Is it important to report 'catch' and actual harvest (i.e. landings) in selective fisheries?
Coeff. of Variation:	Some analysts would like a coefficient of variation for catch estimates, particularly for escapement.

He concluded his remarks by noting that this discussion was meant to get the Mark Committee thinking about the impact of selective fisheries on the CWT data management system. If we are to see selective fisheries in 1998 and beyond, samplers will obviously have to collect much of these new types of data. However, there currently is no place to put it in the existing format. It usually requires about a year for new formats to be developed and tested before data begins to show up. Hence he stressed that it wasn't too early to be giving serious thought to these parameters and any others that might be relevant. Mark Committee members were asked to either contact him or the Data Sharing Working Group with their comments and suggestions.

9. Fin Mark Allocations for 1997

A. Listing of 1997 Fin Mark Requests

A total of 28 marks by ADFG, CDFG, ODFW and USFWS were requested and approved for release in 1997. The listing was complete for ADFG and USFWS, but only included one request for California, and a handful for Oregon. Canada, Idaho and Washington did not meet the deadline for requesting new marks.

B. Reality Check on Fin Mark Database

Ken Johnson noted that the low number of fin marks requested for 1997 aptly highlighted the growing problem of non-reporting for the fin mark database. In years past, it was

typical to receive 100-200 new mark requests. He further noted that there were several other problems that have limited the usefulness of the database:

1) In addition to being incomplete, reporting has become progressively later.
2) There is no way to monitor the completeness of reporting by an agency.
3) The degree of non-reporting is unknown.
4) Few agencies make the effort to update fin mark requests the following year with actual numbers released or have unused marks deleted.

These problems combine to render the fin mark database very unreliable for anything other than simply giving users an idea of what stocks might be represented in a catch for a given mark seen in the catch. Unreported marks pose a possibility at any time. Yet the presence of the fin mark database gives users the false impression that the data are reliable and complete.

He noted further that:

1) The fin mark database is rarely used.
2) Agencies now coordinate fin mark requests on a regional basis prior to forwarding them to the Mark Center.
3) The expanded PSC format 3.2 for CWT releases will capture relevant fin mark data for mass marked releases, including both CWT associated and non-CWT associated release groups. As such, key fin mark data will be captured in the CWT database.

Given these considerations, he posed the question if the fin mark database has any value to justify its continued existence. And if so, what can be done to fix the existing problems so that the data are reliable.

Discussion: Karen Crandall concurred that the fin mark data had serious problems and emphasized that it was a disservice to provide it to users when it is incomplete. In addition, the new CWT release format (version 3.2) will capture much of the regionally important fin mark information. David Zajac (USFWS), Karen Crandall (ADFG), Lee Blankenship (WDFW), and Rodney Duke (IDFG) emphasized that they did not use the fin mark data base as coordination was done internally. Ron Olson (NWIFC) agreed that the fin mark data would not have much use on a regional basis but the process had been useful to coordinate marks for recoveries in terminal areas. Ron also agreed that fin mark coordination between agencies can be done without the Mark Center but emphasized that the Mark Coordinators would need to insure that the annual coordination still occurs at the local level.

ACTION: The consensus was to terminate the fin mark database. Ken Johnson noted, however, that it would be archived rather than deleted in the event that it is needed in the future. The issue will be revisited next year to see if there have been any problems caused by terminating the fin mark database.

coho in Puget Sound hatcheries, for example, reported total regeneration of the ventral fin in up to 5.7% of returning spawners, while an additional 5-25% (range) of the fish had at least 50% of the fin regenerated.

The variability in ventral mark mortality and fin regeneration may also have significant impacts on the viability of the CWT system. The uncertainty in estimates of marine survival and exploitation rates would increase, for example, because of the variable mortality. In addition, the variability in fin regeneration rates would lead to different rates of mark recognition error, and thus result in unnatural variability in the exploitation rate estimates among stocks. Lastly, the additional mortality and regeneration of fins also reduces the number of hatchery fish available for selective harvest.

Richard Bailey concluded his report by pointing out that the possibility of multiple selective fishery regimes using different mass marks and sampling programs further emphasizes the need for coordination between all affected agencies.

F. Current Thinking on Mass Marking Hatchery Chinook Salmon

Ken Johnson opened the discussion by noting that in a few short years, the region has seen the desequestering of the adipose mark on hatchery coho go from the CWT flag to a mass mark flag. Similar pressures exist to mass mark hatchery chinook in order to have selective fisheries and thus increase fishing opportunities. The pending completion of WDFW's prototype automated fish marking and tagging machine also offers promise of being able to cope for the first time with the staggering logistics of marking millions of chinook smolts in a narrow window of time. Given these developments, it is important to understand long range goals that agencies have regarding mass marking hatchery chinook stocks.

Tom Morse (BPA) commented that there isn't necessarily an intrinsic link between mass marking and selective fisheries. This is particularly true in the Columbia Basin. BPA, for instance, is very interested in mass marking hatchery stocks for reasons very different than harvest opportunities.

Lee Blankenship noted that Washington is very interested in mass marking hatchery chinook. He added that the Legislature initially instructed WDFW to mass mark both chinook and coho. This mandate was subsequently modified once it was shown that the logistics were simply not possible at that point in time. However, the development of the automated fish marking and tagging machine has now changed that picture and WDFW is now evaluating the feasibility of adding chinook to the mass marking list.

He added that the NMFS had recently clarified rules on what constitutes 'take' for ESA stocks. In addition, concerns for impacts on listed species have been playing a more prominent role in developing regulations for ocean fisheries. This is a wake-up call for hatchery programs and illustrates the need to be able to identify both hatchery chinook and coho in the harvest.

Richard Bailey commented that a report had been prepared by the PSC Ad-Hoc Selective Fisheries Evaluation Committee that did not give a very favorable review for selective fisheries on chinook. Lee Blankenship responded that WDFW viewed that report as biased as the same basic arguments had also been raised against mass marking coho. However, the problems raised for coho are now being worked through, and he stressed that the same would be found true for chinook when the time came.

Karen Crandall acknowledged that mass marking of chinook is likely on the way as well. As such, cost considerations are a major issue for Alaska as it would greatly impact their sampling and recovery program. Given that Alaska is not likely to join in the mass marking, it raises questions of who should pay for the financial impact on Alaska, including both hardware (wands and tube detectors) and extra staff for both field sampling and the head lab.

Marianne Johnson (CRITFC) stated that the Columbia Basin tribes' position is that the Mitchell Act funding for hatcheries should be used for restoring wild populations in the upper Columbia River rather than to support selective fisheries via mass marking. Lee Blankenship agreed that this too was important and that it wasn't an 'all or nothing' issue.

12. 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 (fourth year). The 1996 brood fish would be marked this spring for release in 1998.

IDFG's marking proposal (**Attachment 6**) calls for Clearwater Hatchery to mark 837,000 chinook with the adipose only mark and 36,000 with the RV mark. Rapid River Hatchery will release 624,000 with the adipose only mark and 300,000 with the Ad+CWT mark, while McCall Hatchery will release 240,500 adipose only and 125,000 Ad+CWT marked fish. Pahsimeroi and Sawtooth hatcheries are also scheduled to release 75,000 and 45,000 adipose only marked fish, respectively.

USFWS plans (**Attachment 7**) include release of 800,000 adipose only marked chinook from Dworshak NFH, plus 180,000 with the Ad+CWT mark (three 60K groups). Plans for Kooskia NFH are still very tentative but are not expected to exceed 20,000 adipose only marked fish if the mark is required.

Discussion:

Rodney Duke (IDFG) emphasized that this year's marking program was basically the same as last year. Marking is mandatory under NMFS requirements for ESA listed stocks as only marked fish can be brought into the hatcheries. Approximately 525,000 fish will

Lee Blankenship responded that the confusion arose from the first time that Idaho presented its request to mass mark Snake River chinook with the adipose only mark. The Mark Committee had voted it down because of concerns about setting a precedent. However, a subsequent regional meeting of managers overrode the vote on a policy basis and gave Idaho approval to use the mark. As such, policy managers reviewed the technical assessment but chose a different course.

Susan Bates asked if that was why Washington and Oregon didn't bring their coho marking program to the Mark Meeting last year. Lee confirmed that it was viewed as a policy issue and thus didn't require the technical review of the Mark Committee. He noted further that CDFO had in fact done the same thing by not bringing forth the mass marking of Georgia Strait hatchery coho with the ventral mark to the Mark Committee for review as required by the mass marking protocol established several years ago. David Zajac again emphasized that the rules aren't working as intended.

Karen Crandall questioned why anyone would bring mass marking proposals forward for review if the Mark Committee isn't going to vote and thus have no voice. She noted, for example, that some future mass marking proposal could impact Alaska on the technical level even though it would be against established rules. Without having a vote, Alaska would not have any say in the matter. David Zajac's recommendation was that the Mark Committee not vote on mass marking proposals but simply provide a technical assessment of the potential impact as a basis for decisions by policy level managers.

Ron Olson agreed that the Mark Committee was obviously in a difficult position and that the committee was a technical body. However, he pointed out that there is a large difference between the coho mass marking programs now underway and all other mass marking proposals seen to date. The difference is that the coho mass marking has a harvest component and the fish are being marked for selective fisheries. As such, harvest issues are beyond the scope of the Mark Committee's role of responsibility while the marking remains within its purview. Rodney Duke responded that one of the reasons for marking Idaho's chinook was for the potential of a selective fishery.

Lee Blankenship argued that the Mark Committee initially lost the responsibility to control mass marking when it voted no to Idaho's first request in 1992. He emphasized that there were no technical reasons to deny Idaho's proposal since there were virtually no ocean recoveries, and thus no impact on any recovery agency. Rather the no vote was a policy vote based on fears that Pandora's box would be opened if the precedent was established for Idaho.

Ron Olson disagreed and emphasized that it wasn't that simple. Following the no vote on the original proposal, he noted that the proposal went to the policy managers where it was changed by adding 'side board conditions', including annual reviews and representative CWT groups. In addition, the NMFS made a new requirement that the fish had to be marked. As such, the situation had changed between the first and second review, and he argued that the Mark Committee had done its job in rejecting it on the first pass.

Stan Moberly (NMT) commented that whether it wants it or not, the Mark Committee has a policy element on marking as it is still the only 'game in town' on a coastwide basis. He suggested that the Mark Committee minimize the policy level as much as possible, and also avoid voting on issues. This would allow the committee to come together in group consensus with minority opinions stated without identifying who was for and against it. That leaves the issue standing on its technical merits from the Mark Committee's view. Should it then be overridden by management, it is just a fact of life. However, the Mark Committee would be above reproach as it will have done its job of providing a solid technical assessment of the issues, both pro and con, as input into the system. Tom Morse (BPA) concurred with this assessment and emphasized that a solid technical assessment was far more powerful as policy makers require it and can not escape it.

Susan Bates announced that CDFO has instituted a new policy that no longer requires her to vote no on most mass marking proposals. The new policy calls for a 'no' vote only when there would be damage to the integrity of the CWT program or to any of CDFO's local recovery programs for CWTs or multiple fin clips. In those cases where there is no damage foreseen, Canada will abstain from voting on the grounds that it is an domestic U.S. issue. On the other hand, if there is perceived harm, Canada will vote 'no' and recommend that the proposal be sent to the PSC Selective Fisheries Committee for further resolution.

She also noted that Ron Kadowaki (CDFO; co-chair of the PSC Selective Fisheries Committee) had expressed his opinion that discussions in the Mark Meeting would be very valuable to the deliberations on the PSC side. As such, he is very supportive of the Mark Committee discussing any mass marking proposals that might impact Canada. Susan concluded that perhaps the technical evaluation is the most important, as suggested by Stan Moberly, and that the basic elements of the discussion be recorded rather than relying on a formal vote.

Considerable time was then spent in exploring various suggestions on how best the Mark Committee might handle mass marking proposals, given the dichotomy of having both policy level and technical level aspects of its responsibility. As the somewhat disjointed discussion ebbed and flowed, it became increasingly clear that the basic problem was that the Mark Committee's role was ill defined. As such, this made it impossible to reach resolution on how to handle difficult issues such as large scale mass marking.

As a solution, Marianne McClure recommended that the Mark Committee set aside a time to explicitly define its role. Ken Johnson concurred and noted that the Mark Committee has never had a formal charter, unlike that established for later formed regional steering committees such as PacFIN, RecFIN, StreamNet, and PTAGIS. This hadn't been a problem for the Mark Committee for years as its role was implicit and it proved effective in carrying out that role. However, the situation has now become very blurred with the introduction of mass marking in conjunction with selective fisheries. He therefore suggested that this be a focus of the next Mark Meeting.

A significant difference was seen at Carson NFH where CWT marked adults had a 8.8% lower survival. However, the 1990 and 1991 tagged adult returns were not significantly different from the controls. The oddity in 1989 is related to a high level of BKD prior to tagging, and a subsequent outbreak of IHN during tagging.

Lee Blankenship noted that he will be reporting on the study for the next few years as the last fish complete their return and the tag recovery data is processed. At that point, he expects to have sufficient data for pooling and replication that will allow a clear statement on the effects of coded wire tagging spring chinook.

19. 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 10**). 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 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 only cover two sampling years. The control fish, marked with a CWT only, had the highest survival rate. Ad+CWT marked fish had the next highest survival rate. It was 4.9% lower for the 1993 brood fish. There isn't a comparable number for the 1992 brood as the fish hadn't been treated correctly and the data weren't representative.

The ventral clip (LV+CWT), in turn, had a 64.9% and 54.9% lower survival in the 1992 and 1993 broods, respective relative to no fin mark (i.e. CWT only). and lastly Ad-LV+CWT. Lastly, the Ad-LV+CWT mark resulted in a 75.7% and 59.8% lower survival for the 1992 and 1993 brood years, respectively.

Lee Blankenship added that these results are very significant as they are based on a large number of returned fish. Richard Bailey concurred and stressed that the reduced survival of Ad-LV marked fish against LV marked fish is very significant. It demonstrates that the Ad-LV mark can not be used as a measure to evaluate the survival of LV marked fish in a selective fishery since their survival characteristics are quite different.

Lee Blankenship also emphasized that the PSC reports use an estimate of 0% to 5% mortality associated with the adipose clip. This study resulted in a 4.9% rate. He cited several other recent studies as well in which the adipose clip related mortality was under 5%. He concluded by stressing that the PSC range was correct for adipose clip mortality, and that it killed far fewer fish than the ventral clip.

20. Differential Survival using Standard Length versus Length and a Half Tags

Dan Thompson reported on a WDFW study designed to evaluate the effect on survival and possible straying of salmon tagged with standard length wire versus length and a half wire (**Attachment 11**).

Two groups of approximately 20,000 juveniles were tagged simultaneously. The adipose fin was not removed, thus insuring that recoveries would be only at the hatchery using electronic detection.

Lee Blankenship added the study was done in part because PSC recommended that agencies begin to use length and a half wire for coho if they are going to be harvested in selective fisheries. WDFW, for example, will be using electronic detection to sample its fisheries in 1998. The length and a half wire is thus a safety factor in ensuring maximum detection rates. He therefore strongly urged that all agencies consider switching to length and a half wire if selective fisheries and electronic detection become standard up and down the coast. There is no increase in cost of the tags

Study results demonstrated that there was no difference in survival between the standard length and length and a half tags. Both groups had 4.1% survival to the hatchery (843 recoveries versus 826 recoveries). Dan Thompson also noted that this result matched that seen when comparing the effect of standard length versus double length tags on survival (see last year's Mark Meeting minutes; agenda item 19).

21. Evaluation of Old versus New Hand Wands

Dan Thompson (WDFW) reported on tests done to compare the depth of tag detection found in the older style hand wands versus that for the new model (**Attachment 12**). The tests were run following a NWIFC report that one of their old style wands had a much deeper depth of detection than that for a new wand.

A total of 20 new style wands were compared against eight old style wands in depth of detection at both the bottom of the wand and the side of the wand. Results indicated that the both types of wands had essentially identical detection distance (mean 35.6mm new style; 36.0mm old style) when using the side of the wand. However, the new style wands

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DATE: June 13, 1997

TO: Mark Committee, General Distribution

FROM: Ken Johnson

SUBJECT **Final Minutes of 1997 Mark Meeting**

Enclosed are the final minutes for the 1997 Mark Meeting held in Juneau on April 24-25.

The meeting was productive and dealt with a number of timely issues, including mass marking and selective fisheries. In addition, an expanded PSC release format was introduce that will accommodate mass-marked CWT groups.

The next Mark Meeting is scheduled to be held in Boise, Idaho on April 16-17, 1998.

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1997 MARK MEETING
Final Minutes

Gastineau Salmon Hatchery
Juneau, Alaska
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10. Thermal Marks Database Proposal (page 13)

11. Update on Mass Marking and Selective Fisheries (page 13)

    A. Court Action Forces Changes to WDFW's Mass Marking Program
    B. Canadian Participation in Mass Marking and Selective Fisheries
    C. PSC's New Role in Mass Marking and Selective Fisheries
    D. PSC Report on Reliability and Feasibility of Electronic Detection
    E. PSC Report on Use of the Ventral Fin as a Mass Mark for Coho Salmon
    F. Current Thinking on Mass Marking Hatchery Chinook Salmon

12. Special Requests to use the Adipose Only Clip for Mass Marking (page 18)

    A. Mass Mark Snake River Chinook with the Adipose Only Clip
    B. Request to Adipose Only Mark a Small Group of Lake Ozette Sockeye Salmon
    C. Coop Request to Adipose Only Mark Dungeness River Chinook Fry

13. Questions concerning Future Role of Mark Committee regarding Mass Marks (page 20)

14. Agency Reports on Tagging Plans for 1997 (page 23)

15. Update on 1996 High Seas Sampling Program (page 23)

16. Report on the CWT Applications Workshop (page 24)

17. Update on WDFW's Automated Fish Marking and Tagging Machine (page 25)

18. Effects of Coded Wire Tagging on the Survival of Spring Chinook (WDFW) (page 26)

19. Differential Survival of Ventral Fin and Adipose Fin Clips in Fall Chinook (page 27)

20. Differential Survival using Standard Length versus Length and a Half Tags (page 28)

21. Evaluation of Old versus New Hand Wands (page 28)

22. Update on Photonic Tags and VI Jet Marks (WDFW) (page 29)

23. Advances in CWT Technology (Northwest Marine Technology) (page 30)

1997 MARK MEETING
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The catch data to be exchanged will include all types of catch back to 1975, including commercial, sport, subsistence, personal use, native, non-native, hatchery catch. In most cases, the catch 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 Catch and Effort file format specifications (version 1.0) are provided in **Attachment 2**. Data files will be exchanged as ASCII text with all fields comma delimited. The Mark Center will be the U.S. exchange point with Canada's Biological Station in Nanaimo.

Test data files for 1990-1993 are to be forwarded to the Mark Center for validation testing by June 30, 1997. To date, Oregon has provided test files for 1990-1993. In addition, Washington, Alaska and British Columbia expect to submit test data in May.

Scott Johnson concluded his report by noting that once the test files are validated, the Working Group will write a final report. The Working Group will likely be dissolved at that time, with responsibility for the data formats possibly shifting to the Data Standards Working Group, with oversight by the Data Sharing Committee.

3. NMFS Reports to Congress

Robert Bayley (NMFS) reported that two NMFS reports were recently prepared for Congress that have some relevance to work of the Mark Committee. Robert Z. Smith authored the first report, entitled "Summary of Scientific Studies of the Hatchery System in the Pacific Northwest" (January, 1997). The report was required in the appropriations language for FY1997. It has not been formally released yet but is expected to be in the near future.

The second report was authored by Robert Bayley and is entitled "Methods for Salmonid Stock-Specific Identification in Ocean Fisheries". It deals with the various options for identifying salmon in selective fisheries. *(May, 1997: the report is now available for distribution.)*

Copies of either report can be obtained from either R.Z. Smith at (503) 231-2009 or Robert Bayley at (503) 230-5432.

4. Mapping PSC Location Codes to Statistical Areas and Fisheries

Per request of Richard Comstock (USFWS), Marianne McClure (CRITFC) distributed copies of a mapping of PSC location codes to statistical areas and a second mapping of statistical areas and gear to fisheries. The two mappings are required for various PSC modeling programs now underway there are attempting to evaluate, among other things, the impact of selective fisheries.

ACTION: Mark Committee members were asked to carefully review the given mappings for their respective states and verify that they are correct.

Corrections and comments are to be forwarded to Richard Comstock at (360) 902-2744 or e-mail at 'comstrmc@dfw.wa.gov'.

5. Status of CWT Data Files and Reporting Backlogs

Ken Johnson (PSMFC) noted that the traditional data status tables (**Attachment 3**) have now been ported to the Mark Center's web page and thus have a new look. In addition, there are now a sixth category, 'U', that designates valid data sets that have been updated in the past 30 days (Release data) or 60 days (Recovery data). This serves as an alert to frequent data users that a particular data set has been recently revised.

Future plans are to automate data status updates by using information provided in the expanded data description files (Format 3.2) that are required to accompany any data submission.

A. CWT Release Data

All of the CWT release data through 1995 and much of the 19965 data (**Table 1, Attachment 3**) are available in PSC format and can be accessed on-line at PSMFC. However, ADFG, CDFG, and IDFG releases in 1996 remain to be reported.

Karen Crandall (ADFG) explained that the 1996 Alaska release data are ready to report but they lack the ability to send the data out in correct PSC format now. The reporting problem, also true for recovery and catch/sample data, stems from an ongoing computer system conversion that has taken much longer than hoped. She emphasized, however, that her staff is very close to solving the remaining problems and are now in the testing mode to eliminate remaining errors. She apologized for any inconveniences that this might have caused but stressed that they were working hard to complete the task in the next month or two.

Rodney Duke (IDFG) noted that Idaho has a similar problem in that he simply hasn't had anyone in the CWT lab for the past seven months because of staff reductions. As a result, data management and regional reporting have both suffered. A new staff person is expected to be hired within the next 1-2 months, with data reporting as a high priority.

Ken Johnson reported that California's release data are expected soon. Frank Fisher's medical leave from work has prevented him from forwarding the data on time this year.

B. Unmarked Hatchery Production Releases

Only modest progress was seen during the past year in reporting unmarked hatchery production releases (**Table 2, Attachment 3**). In addition, a sizable portion of the 1996 releases have not been reported. On the positive side, ADFG has been busy during the past two years and will soon be reporting all of its unmarked production releases. This will be a major step forward towards completion of the coastwide data file, with only CDFG (all years) and ODFW (1973-80: incomplete data) remaining to be reported.

C. CWT Recovery and Catch/Sample Data

Nearly all historical CWT recovery data are now reported in PSC format (**Table 3, Attachment 3**). Exceptions include IDFG (1992-1996), NMFS-AK (1995-1996), ADFG (1996), USFWS (1996), and QDNR (1995-1996).

Both ADFG and IDFG recovery data are delayed for the same reasons noted above for problems in reporting release data. The Alaska 1996 data are ready and have been submitted as a test file to PSMFC. However, a number of format errors remain to be resolved. Ron Heintz (NMFS) also noted that work is moving rapidly forward on both the 1995 and 1996 NMFS-Alaska data, with reporting expected in the next few months.

Karen Crandall reported that her staff has been active in working on converting Alaska's 1976-1979 recovery data into PSC format and hope to complete this project in 1997.

The CWT catch/sample data sets (**Table 4, Attachment 3**) show a somewhat similar pattern to that of the recovery data sets. Missing historical data sets include CDFG 1977, WDFW 1974-75, ADFG 1977-79, and QDNR 1995.

6. Status of RMPC Operations

A. Budget Travails

Ken Johnson reported that the Mark Center has had an on-going problem with unstable funding for a portion of its annual budget that is provided by Pacific Salmon Treaty funding (U.S. Section) through the USFWS. In brief, the approved budget for the past several years has been set at $200,000. However, for a variety of reasons, only $150,000 has been made available by the USFWS each year. A primary reason is that the USFWS is now experiencing severe budget cuts of its own and the $200,000 earmarked for the Mark Center has been coming directly out of their budget rather than being new funds provided by Congress. As such, it has created a problem for the USFWS as well.

As a solution, U.S. Section budget committee members have worked out arrangements this year where the remaining $50,000 will be funded through the NMFS. This change will greatly stabilize the Mark Center's operations.

Mark Committee members supported the Mark Center's proposal to continue providing the traditional hard copy CWT Release Reports at cost in order to further reduce expenditures. As such, 2-3 free copies will be provided to each of the tag coordinators, identical to that done in 1996. Additional copies will be made available at cost. Users also will be encouraged to access the data via the free on-line services.

B. Enhancements to Operations

Jim Longwill reviewed a number of enhancements to RMPC operations that have either been completed during the past year or are now in progress. Much of that work has involved use of the Internet/World Wide Web to provide interactive discussion forums and access to the CWT database in the form of downloadable reports.

1) Implementation of a WWW Based Discussion Forum

Last year, Pacific Northwest Laboratories staff under contract to BPA provided the Mark Center with an installation of a web-based discussion forum. It was subsequently modified and customized for CWT related committee work, It has already proven very useful for advance preparation for PSC Data Standards Committee meetings.

The environment is secure and limited to those involved in the respective committee work. However, anyone having a legitimate need to access the forum will be assigned a password. The forum allows for cutting and pasting from the users' existing word processors, etc. In addition, notification of the entire committee is automatic each time a new article or response is posted.

Tom Morse (BPA) agreed that the forum should be primarily designed as a tool for committee work. However, he also note the freedom of information act required ready access to such information. In addition, he stressed that staff in BPA had a need to access the information. He therefore recommended that the forum be made available to the public on a 'read only' basis.

2) Expansion of the Prototype WWW Site for Access to CWT Data

About eight months ago, the Mark Center introduced a prototype web forms based querying and reporting tool for access to the CWT release and recovery data. It uses a CGI/Perl program to generate the query forms and run the reports. By necessity, there are limits to both the size of the reports and the number of parameters per query. In addition, some of the standard RMIS reports (such as PSC format reports) are not yet available via the web.

Work is continuing on the expansion of the number of web options available. However, the system has not yet been fully tested and optimized for heavy concurrent usage. In addition, some unresolved problems have occurred in recent weeks during heavy concurrent usage of the present system. The problem appears to be a bug in the operating system architecture of the relational database and is expected to go away with the platform upgrade to 'Open Ingres' (see below).

Future plans are to develop a new web application and possibly incorporate existing applications coastwide (such as NWIFC's CRAS system; see Agenda Item 7) onto the

Mark Center's web pages. This will be done with the new generation of tools and capabilities provided by the database vendor and/or other vendors. Expected features include reports using more modern web features such as tables and graphs, upload or automatic generation of tag codes or other criteria, and auto FTP or auto e-mail of reports. In addition, work will continue on automating the uploading and validation of data sets through the web or e-mail.

3) Platform Upgrade to 'Open Ingres' and Expected Benefits

In early June, the Mark Center will replace its current Ingres operating system with 'Open Ingres'. It is a more efficient operating system that takes advantage of the server hardware and operating system architecture (i.e. Sun/Solaris Unix machine) which hosts the Mark Center's databases. It will also provide better tools for both database management, communications, and web-enabled applications.

4) New 'Users Manual' Nearing Completion

Work is proceeding to replace the current 'Users Manual' (completed August, 1993) for the Mark Center's Regional Mark Information System (RMIS) as it now lacks key information on a number of significant changes, new reports, and all of the new web based applications. It will be available by this fall.

7. NWIFC's Enhancement of CRAS and Proposal for PSMFC Adoption

Ron Olson (NWIFC) reported that substantial time and funds have been recently invested in upgrading the capabilities of CRAS (CWT Retrieval and Analysis System). The old version provided users with CWT release information by hatchery region or basin. In addition, it included 56 chinook fisheries and 66 coho fisheries for PSC cohort analyses. He noted that it was not widely used, in part because the data was limited to CWT releases from Western Washington, and in part because there was a lot of confusion involving the cohort analyses.

The new version of CRAS (also to be renamed) is a windows based application that is very user friendly. The data base will include all releases and recoveries coastwide. In addition, it utilizes a uniform set of 85 fisheries. The greatest resolution at the present time is for Washington fisheries.

When the new version is complete it will be available on the internet. Users will be able to query the system and obtain a wide variety of reports. This will include:

1) CWT release data for all agencies and all species;
2) unmarked hatchery release data for all agencies and all species;
3) summary report of release, recovery, and survival by tag code;
4) detailed fishery contribution by tag code;

5) fishery recovery reports by fishery or user-defined fishery groupings;
6) cluster analysis of recovery patterns; and
7) regression analysis of survival versus release variables.

In addition, users will be able to obtain raw data. The new version will use the standard method of estimating survival (# est. recoveries / # releases) rather than the PSC cohort analyses.

Ron Olson noted that NWIFC had invested in the new version of CRAS to meet some data retrieval and analysis requirements not currently being met by PSMFC's RMIS system. However, he stated that NWIFC would prefer to avoid the annual data maintenance required for a regional CRAS. Rather, NWIFC wanted to propose that the Mark Center investigate the feasibility of adopting CRAS and maintaining it for the regional community. Ken Johnson responded that the Mark Center was indeed very interested in what they had accomplished and would be arranging a meeting to further explore NWIFC's proposal for sharing CRAS.

8. Impact of Mass Marking on CWT Data Exchange Needs

A. Modified Data Exchange Formats

Fields and Codes Added or Updated: Dick O'Connor (WDFW) reported on recent modifications made to Format Version 3.1 by the PSC Working Group on Data Standards. The new format is Version 3.2.

Six new fields were added to the Release File, and one field was modified (see **Attachment 4, pages 1-2** for more complete definition):

Field 15 (Update)	Number Untagged, Unmarked	Total fish unassociated with a CWT study
Field 30 (New)	Release Strategy	Type of release (forced, volitional, transport, mixed)
Field 31 (New)	Mark ID No. 1	External mark on CWT fish
Field 32 (New)	Mark ID No. 2	External mark on non-CWT fish
Field 33 (New)	Number Untagged, Marked	Number released with Mark ID No. 2
Field 34 (New)	Companion CWT Group No. 1	Link to companion CWT group
Field 35 (New)	Companion CWT Group No. 2	Link to second companion CWT group

Fields 31 through 35 were added to added to accommodate mass marked CWT groups of fish. This also required modification of field 15 (formerly Number Untagged) to include only unmarked fish as field 33 now captures the untagged but marked fish.

Coding is presently under development by a subcommittee for Mark ID No. 1 and Mark ID No. 2 (Release fields 31, 32). The present proposal is for a four digit code where 0000 represents no mark, and 0001 through 4999 would be assignable to the various marks (single or in combination) excluding the adipose fin. The code 5000 would be reserved for the adipose only mark, while codes in the 5001-5999 range would be reserved for adipose clips in combination with other marks. This arrangement facilitates data retrieval for any adipose related marking studies. *Once this coding is finalized, Format 3.2 will be ready to be implemented.*

The new release fields added to capture associated mark information will not necessarily be intuitive for those reporting release data in the future. Therefore, Dick O'Connor reviewed four scenarios expected in reporting tagged releases (see table in **Attachment 4, page 4**). These include: 1) no marking, no tagging; 2) mass marking of all fish using a ventral clip, no tagging; 3) mass marking of all fish with the adipose clip, plus mark some fish with the Ad+CWT mark; and 4) double index tagging, including adipose only marks and Ad+CWT mark.

A few new fields were also added to the Catch and Sample, Recovery, and Data Description files. To improved data management, a unique Catch ID (field 33) will be added to each Catch/Sample record by the reporting agency. Each recovery record will also carry the corresponding Catch ID (field 36) in order to expedite linkage between the two files. Lastly, three new fields were added to the Data Description File (Field 2: Submission status; Field 4: File status; Field 7: End File Year). Each of these fields were added to improve the information content about a given data file submission.

A number of new codes were also added for Format Version 3.2. These codes are summarized on **page 3 of Attachment 4**. In addition, the label 'embedded replicate' in Fields 2 and 3 of the Release file was replaced by 'repeating series' to eliminate the incorrect inference that these tags were true replicates.

Special Notes: Dick O'Connor also noted seven items (**see Attachment 4, page 6**) that did not have rules made for them but were of importance:

1) There was a proposal to add a field for 'bad marks' but it was not implemented. However, some agencies do record this information since it gives a measure of how reliable the external mark is as an indicator. Agencies are encouraged to report these data. However, at the present time, this information can only be captured in the Comments field.

2) It is possible to come up with some sort of study where a group of fish are perhaps tagged plus marked with a visual implant (VI+CWT) while the rest of the population are mass marked with the adipose only mark. While it falls within the rules, it is probably not appropriate to report both groups of fish on the same record. The reason is that fish on a single release record are assumed to be 'representative' of each other (i.e. tagged fish

are representative of untagged fish). Hence a cautionary note to be careful when reporting these types of releases.

3) With the **implementation of Version 3.2, agencies will have to resubmit their historical CWT release data** in order to report the Mark ID No. 1 (field 31) and Mark ID No. 2 (field 32). In most cases, a single code will be needed for those CWT releases marked with the adipose clip (possibly code 5000). However, data managers will need to segregate out those CWT releases where multiple marks were applied (e.g. AD+VI) and report the correct code for the respective multiple marks. This requirement is expected in 9-12 months maximum.

4) Double index tagging is required to evaluate the impact of selective fisheries on wild stocks (i.e. marked vs. unmarked). Under this scenario, a representative group of the hatchery production is marked with the Ad+CWT, while another group is marked with the CWT only (no external marks) so that they are treated as wild fish in the fisheries. As such, differential return rates to the hatchery are expected from two such CWT groups if selective fisheries act on the fish.

5) A subcommittee has been working on finalizing a coastwide scheme of region codes (i.e. production areas) that map to hatchery, release site and stock. A final product is expected to be circulated in the very near future. Coastwide agreement on region codes for catch areas and recovery sites will be much more difficult to achieve because perspective varies from one jurisdiction to another. Even so, work is underway to find some common ground that can work for every agency.

6) A number of data validation rules have also been added or tightened up to improve data quality. Special credit was given to Brenda Adkens (CDFO) for her work in finding most of the problem areas.

7) The Data Standards Working Group has agreed to move towards exchanging CWT data in a relational database format, rather than the current fixed-format 'flat' files now in use. This will eliminate the difficult problem of always being restricted by the existing format when required to add new fields or modify fields (e.g. add columns). In addition, Version 4.0 will address the 'four digit year' problem. As such, the committee must act before year 2000. Dick O'Connor has a lead assignment in developing a first draft of Version 4.0 and projected its completion by late summer.

B. Discussion on Related Needs for New Catch/Sample and Recovery Fields

Dick O'Connor noted that mass marked CWT groups and selective fisheries are also expected to require modification to the Catch/Sample and Recovery files for meaningful interpretation of the data. However, to date, there has only been limited discussion and no consensus on what fields may need to be added or modified. Suggestions to date are provided below (see also **Attachment 4, page 7**).

Recovery Fields:

Mark Code:	If the fish are marked, it will likely be necessary to add a field to capture this information.
Sampling Technique:	Some of the analysts are interested in knowing if the sampling is visual or electronic.

Catch/Sample Fields:

Mark Code:	The mark code will likely be needed to expand CWT recoveries.
Sampling Technique:	Identify if sampling was visual or electronic.
Fishery Type:	Non-selective or selective using the adipose (or some other mark).
Catch Type:	Census or estimate? Unable to tell now from the format.
No. Fish Caught and Released:	Is it important to report 'catch' and actual harvest (i.e. landings) in selective fisheries?
Coeff. of Variation:	Some analysts would like a coefficient of variation for catch estimates, particularly for escapement.

He concluded his remarks by noting that this discussion was meant to get the Mark Committee thinking about the impact of selective fisheries on the CWT data management system. If we are to see selective fisheries in 1998 and beyond, samplers will obviously have to collect much of these new types of data. However, there currently is no place to put it in the existing format. It usually requires about a year for new formats to be developed and tested before data begins to show up. Hence he stressed that it wasn't too early to be giving serious thought to these parameters and any others that might be relevant. Mark Committee members were asked to either contact him or the Data Sharing Working Group with their comments and suggestions.

9. Fin Mark Allocations for 1997

A. Listing of 1997 Fin Mark Requests

A total of 28 marks by ADFG, CDFG, ODFW and USFWS were requested and approved for release in 1997. The listing was complete for ADFG and USFWS, but only included one request for California, and a handful for Oregon. Canada, Idaho and Washington did not meet the deadline for requesting new marks.

B. Reality Check on Fin Mark Database

Ken Johnson noted that the low number of fin marks requested for 1997 aptly highlighted the growing problem of non-reporting for the fin mark database. In years past, it was

typical to receive 100-200 new mark requests. He further noted that there were several other problems that have limited the usefulness of the database:

1) In addition to being incomplete, reporting has become progressively later.
2) There is no way to monitor the completeness of reporting by an agency.
3) The degree of non-reporting is unknown.
4) Few agencies make the effort to update fin mark requests the following year with actual numbers released or have unused marks deleted.

These problems combine to render the fin mark database very unreliable for anything other than simply giving users an idea of what stocks might be represented in a catch for a given mark seen in the catch. Unreported marks pose a possibility at any time. Yet the presence of the fin mark database gives users the false impression that the data are reliable and complete.

He noted further that:

1) The fin mark database is rarely used.
2) Agencies now coordinate fin mark requests on a regional basis prior to forwarding them to the Mark Center.
3) The expanded PSC format 3.2 for CWT releases will capture relevant fin mark data for mass marked releases, including both CWT associated and non-CWT associated release groups. As such, key fin mark data will be captured in the reliable CWT database.

Given these considerations, he posed the question if the fin mark database has any value to justify its continued existence. And if so, what can be done to fix the existing problems so that the data are reliable.

Discussion: Karen Crandall concurred that the fin mark data had serious problems and emphasized that it was a disservice to provide it to users when it is incomplete. In addition, the new CWT release format (version 3.2) will capture much of the regionally important fin mark information. Ron Olson agreed that the fin mark data would not have much use on a regional basis but that it still would be useful to coordinate marks for recoveries in terminal areas. This position was not supported. David Zajac (USFWS), Karen Crandall (ADFG), Lee Blankenship (WDFW), and Rodney Duke (IDFG) each emphasized that they did not need nor use the fin mark data base as coordination was done internally.

ACTION: The consensus was to terminate the fin mark database. Ken Johnson noted, however, that it would be archived rather than deleted in the event that it is needed in the future. The issue will be revisited next year to see if there have been any problems caused by terminating the fin mark database.

10. Thermal Marks Database Proposal

Karen Crandall (ADFG) commented that a thermal marks subcommittee had been set up during last year's Mark Meeting but it was not convened for various reasons. However, contact was recently made with Eric Volk (WDFW) and Brent Hargreaves (CDFO) to set up a meeting for later this summer. In addition, Karen noted that she and several of her otolith staff had met with Ken Johnson and Jim Longwill the day before (April 23) to explore treating thermal marks as just another mark for reporting. Interest is high in establishing a regional database that provides access to both thermal mark images and the relevant release information.

One useful option for the Mark Center would be to shift its resources now expended on fin marks to developing an online web-based library for otolith images. That would fill a growing regional need as otolith use continues to expand.

ACTION: None requested; Informational discussion only. (Note: Given the action taken on the fin mark database, the Mark Center will work with the Thermal Marks Subcommittee to determine how best to assist in the development of a thermal mark database.)

11. Update on Mass Marking and Selective Fisheries

A. Court Action Forces Changes to WDFW's Mass Marking Program

Background: Western Washington Treaty Tribes were granted a federal court temporary restraining order by Federal District Court Judge Rothstein (Seattle) against WDFW on October 22, 1996 which blocked all further mass marking of Washington's 1995 brood hatchery coho stocks. The tribal position was that WDFW had proceeded with the mass marking program in violation of specific agreements on coho mass marking and selective fisheries reached in a May 3,1996 Memorandum of Understanding (MOU) between WDFW and ten of the twenty Treaty Tribes.

Current Status: Ron Olson reported that WDFW and the Treaty Tribes have resolved issues of concern during the past few months and have reached agreement in four related areas:

1) Implementation plan for mass marking and selective fisheries
2) Marking schedule for this spring (1996 brood year)
3) Cooperative management agreement
4) Work plan and schedule on 'Comprehensive Coho' (an overall approach to coho management in terms of both fisheries and habitat)

While the legal disagreement appears to be over, Ron Olson noted that a lot of work remains on both modeling and implementation. In addition, the Tribes' cornerstone

concern remains in protecting the CWT system. Hence, Canada's on-going research this summer on electronic detection may either clarify the situation or lead to further reluctance of the Tribes to support mass marking and selective fisheries.

Lee Blankenship added that the marking plans are essentially the same as for last year. As of May 5th, marking crews are scheduled to begin marking 25% of the total state coho hatchery production (1996 brood) Grays Harbor and north, including Puget Sound. Unresolved yet with the Columbia Basin tribes is what will be marked in the lower and upper Columbia basin. Last year, nearly all of Washington's hatchery coho south of Grays Harbor and in the Columbia River were marked.

September will be a decision point for WDFW on whether or not to continue marking the rest of the fish. If Canada opts this fall to join the mass marking, then WDFW will likely continue marking its hatchery coho as outlined in the implementation plan. If the answer is still no, Washington must decide whether or not to force the issue through the courts.

B. Canadian Participation in Mass Marking and Selective Fisheries

Canada has repeatedly declined requests to participate in mass marking its coho stocks with the adipose only mark because of concerns about costs as well as the impact on the integrity of the coastwide CWT system. Richard Bailey (CDFO) noted, however, that sport fisheries groups in British Columbia have created tremendous political pressure to implement mass marking for conservation of southern B.C. coho salmon. Given the hard choice of no fisheries or the potential for selective fisheries, Canada has chosen to mass mark the 1995 brood hatchery coho production in Georgia Strait, using the ventral fin mark to protect the CWT program.

Seven hatcheries are involved (Big Qualicum, Capilano, Chehalis, Chilliwack, Inch, Puntledge, and Quinsam), with a combined production release of 7.9 million coho. Of these, 5.4 million are marked with the ventral mark. In addition, three production groups are double indexed marked (Ad-Ventral+CWT; Ad+CWT) to evaluate release mortalities.

Richard Bailey further explained that a proposal to mass mark the 1996 brood hatchery coho in Georgia Strait has also been approved but there is no funding at this time. In addition, the mass mark has not been selected yet. The ventral mark is not the preferred mark for many in CDFO because of the well known problems of increased mortality (see Agenda Item 11.E). However, the mark will hinge on the results of CDFO's on-going research on sampling with electronic detectors.

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

Ken Johnson reported that Canada emphasized on several occasions during the past few years that it shared the view that mass marking and selective fisheries have a great potential and therefore deserve serious consideration. However, given the disruption that

can be inflicted on its management capabilities through unilateral implementation, Canada has maintained that this fishery management initiative should be brought more fully within the Pacific Salmon Commission's process. Accordingly, CDFO presented a formal proposal to this end (**Attachment 5**) to PSC for discussion during the mid January, 1997 meeting in Vancouver, B.C.

PSC agreed on January 15, 1997 that it would play a strong policy role in the planning and implementation of mass marking and selective fishery programs. The Ad-Hoc Selective Fishery Evaluation Committee (ASFEC) was reestablished as a permanent committee and authorized to meet as necessary to complete assigned tasks. In addition, the ASFEC was instructed to present a technical briefing on selective fisheries to the PSC during its February 1997 meetings in Portland, Oregon. Subcommittees on electronic detection and use of ventral marks were organized and instructed to likewise report (see Agenda Items 11.D,E).

Discussion: Susan Bates (CDFO) hastened to stress that the Canadian proposal only addressed basic concepts. As such it was viewed as a starting point and expected to take awhile for the entire process to play out.

Lee Blankenship added that WDFW is supportive of the PSC process. However, he emphasized that WDFW remains in disagreement with Canada over the issue of authority vested in the PSC with respect to selective fisheries. The basic question concerns the potential for veto power by either country. He likewise concluded that the issue was still a long ways from resolution.

D. PSC Report on Reliability and Feasibility of Electronic Detection

Susan Bates (CDFO) reported that studies on the feasibility and reliability of electronic detection were carried out by CDFO, NWIFC, and WDFW in the summer of 1996. In addition, IDFG and USFWS carried out an independent study on the detection rates seen in steelhead returning to Dworshak NFH in Idaho.

Reliability was assessed for both the hand wand and the R-8 tube detector in a variety of coho fisheries and at hatchery rates. Key objectives were:

1) Estimate accuracy of CWT detection under field conditions,
2) Estimate level of false detection,
3) Evaluate equipment durability.

Feasibility was similarly assessed for the hand wand and the R-8 tube detector. Key objectives were:

1) Identify conditions most suited for the hand wand or the R-8 tube detector,
2) Evaluate sampling time and effort relative to the traditional visual method,
3) Evaluate logistic problems.

Results of those studies were summarized by the ASFEC's Electronic Detection Work Group and presented to the Pacific Salmon Commission on February 10, 1997. The report, entitled *Reliability and Feasibility of Using Electronic Detection for Recovery of Coded-Wire Tags in Coho Salmon*, can be obtained from either the Pacific Salmon Commission or the Mark Center.

The electronic wand and tube equipment reliably detected CWTs in coho salmon at mean detection rates of 97% and 98% across all samples, respectively. These rates are believed to be at least as good as those for visual detection. False detection rates were 1.1% and 1.5% for the wand and tube equipment, respectively, and comparable to those for visual detection.

With respect to feasibility, electronic detection will involve significant increases in sampling time and effort, particularly in high volume commercial and recreational fisheries. The R-8 tube detector had throughput rates ranging from 450-900 fish/hour, with detection rates approximately double that of visual sampling. The hand wand had a throughput rate of 550-600 fish/hour, approximately triple that of visual sampling. As such, increases in sampling staff will be required in many situations in order to maintain current levels of commercial sampling.

Some modifications to the equipment are required, including improvements to the essential diverter gate. The wand detector is more suited for sampling low volume situations, while the tube detector is well suited for fisheries having high volume landings.

Susan Bates also noted that Canada will continue its evaluation of the feasibility of electronic sampling this summer. Sampling will be evaluated at 10 commercial fisheries landing sites, five hatcheries, and two creel surveys (West Coast Vancouver Island and Georgia Strait). Canada will then make a decision in late August, 1997 on whether or not it will implement electronic sampling for CWT marked fish.

E. PSC Report on Use of the Ventral Fin as a Mass Mark for Coho Salmon

Richard Bailey (CDFO) reported that the PSC Selective Fishery Evaluation Committee recently established a Ventral Mark Working Group to analyze and summarize the existing information on the ventral fin clip as a potential mass mark for coho salmon. Their report, entitled: *An Update on the Implications of the Use of the Ventral Fin Clip as a Mass Mark for Coho Salmon,* focused on the additional mortality associated with excision of the fin and the regeneration of the fin following clipping. Copies of the report can be obtained from either the Pacific Salmon Commission or the Mark Center.

In brief, the ventral fin clip was found to be a poor mass mark because of high mortality rates and regeneration problems. Mortality rates ranged from approximately 15% to 68% and also varied widely between both facilities and years. Similarly, regeneration was prevalent in a significant percentage of returning marked coho. Studies by WDFW on

coho in Puget Sound hatcheries, for example, reported total regeneration of the ventral fin in up to 5.7% of returning spawners, while an additional 5-25% (range) of the fish had at least 50% of the fin regenerated.

The variability in ventral mark mortality and fin regeneration may also have significant impacts on the viability of the CWT system. The uncertainty in estimates of marine survival and exploitation rates would increase, for example, because of the variable mortality. In addition, the variability in fin regeneration rates would lead to different rates of mark recognition error, and thus result in unnatural variability in the exploitation rate estimates among stocks. Lastly, the additional mortality and regeneration of fins also reduces the number of hatchery fish available for selective harvest.

Richard Bailey concluded his report by pointing out that the possibility of multiple selective fishery regimes using different mass marks and sampling programs further emphasizes the need for coordination between all affected agencies.

F. Current Thinking on Mass Marking Hatchery Chinook Salmon

Ken Johnson opened the discussion by noting that in a few short years, the region has seen the desequestering of the adipose mark on hatchery coho go from the CWT flag to a mass mark flag. Similar pressures exist to mass mark hatchery chinook in order to have selective fisheries and thus increase fishing opportunities. The pending completion of WDFW's prototype automated fish marking and tagging machine also offers promise of being able to cope for the first time with the staggering logistics of marking millions of chinook smolts in a narrow window of time. Given these developments, it is important to understand long range goals that agencies have regarding mass marking hatchery chinook stocks.

Tom Morse (BPA) commented that there isn't necessarily an intrinsic link between mass marking and selective fisheries. This is particularly true in the Columbia Basin. BPA, for instance, is very interested in mass marking hatchery stocks for reasons very different than harvest opportunities.

Lee Blankenship noted that Washington is very interested in mass marking hatchery chinook. He added that the Legislature initially instructed WDFW to mass mark both chinook and coho. This mandate was subsequently modified once it was shown that the logistics were simply not possible at that point in time. However, the development of the automated fish marking and tagging machine has now changed that picture and WDFW is now evaluating the feasibility of adding chinook to the mass marking list.

He added that the NMFS had recently changed rules on what constitutes 'take' for ESA stocks. As a result, there are now no coastal commercial fisheries for chinook in 1997 off of California, Oregon, and Washington. This is a wake-up call for hatchery programs and illustrates the need to be able to identify both hatchery chinook and coho in the harvest.

Richard Bailey commented that a report had been prepared by the PSC Ad-Hoc Selective Fisheries Evaluation Committee that did not give a very favorable review for selective fisheries on chinook. Lee Blankenship responded that WDFW viewed that report as biased as the same basic arguments had also been raised against mass marking coho. However, the problems raised for coho are now being worked through, and he stressed that the same would be found true for chinook when the time came.

Karen Crandall acknowledged that mass marking of chinook is likely on the way as well. As such, cost considerations are a major issue for Alaska as it would greatly impact their sampling and recovery program. Given that Alaska is not likely to join in the mass marking, it raises questions of who should pay for the financial impact on Alaska, including both hardware (wands and tube detectors) and extra staff for both field sampling and the head lab.

Marianne Johnson (CRITFC) stated that the Columbia Basin tribes' position is that the Mitchell Act funding for hatcheries should be used for restoring wild populations in the upper Columbia River rather than to support selective fisheries via mass marking. Lee Blankenship agreed that this too was important and that it wasn't an 'all or nothing' issue.

12. 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 (fourth year). The 1996 brood fish would be marked this spring for release in 1998.

IDFG's marking proposal (**Attachment 6**) calls for Clearwater Hatchery to mark 837,000 chinook with the adipose only mark and 36,000 with the RV mark. Rapid River Hatchery will release 624,000 with the adipose only mark and 300,000 with the Ad+CWT mark, while McCall Hatchery will release 240,500 adipose only and 125,000 Ad+CWT marked fish. Pahsimeroi and Sawtooth hatcheries are also scheduled to release 75,000 and 45,000 adipose only marked fish, respectively.

USFWS plans (**Attachment 7**) include release of 800,000 adipose only marked chinook from Dworshak NFH, plus 180,000 with the Ad+CWT mark (three 60K groups). Plans for Kooskia NFH are still very tentative but are not expected to exceed 20,000 adipose only marked fish if the mark is required.

Discussion:

Rodney Duke (IDFG) emphasized that this year's marking program was basically the same as last year. Marking is mandatory under NMFS requirements for ESA listed stocks as only marked fish can be brought into the hatcheries. Approximately 525,000 fish will

be Ad+CWT marked, and 1.5 million marked with the adipose only mark. He also pointed out the Rapid River and McCall production were being marked as U.S./Canada indicator stocks.

Marianne McClure asked why only two of the six stocks reared at Clearwater Hatchery were marked with a representative Ad+CWT group. Rodney answered actually the Clearwater system is well represented by tagged groups. He noted that the Clearwater Hatchery is located next to Dworshak NFH and stocks released from Dworshak are representative of the lower Clearwater system. The upper Clearwater system is represented by the Powell stock tagged group, while the south fork of the Clearwater is represented by the Crooked River tagged group. He noted further that the Clearwater Hatchery releases no fish and has no returning fish. It is operated as a 'mother plant' for early rearing of fish which are then transferred to the Red River, Crooked River and Powell satellite facilities.

Ron Olson asked why only 125,000 fish were to be tagged at McCall Hatchery instead of marking the entire group of 249,000 plus. Rodney responded that IDFG was not willing to put more than 50% of the fish at risk because of fish health concerns. He also noted that the Sawtooth and Pahsimeroi Hatchery groups were not tagged because there simply wasn't enough fish to justify the expense as returns are less than 1/4 of one percent.

Given that the IDFG/USFWS programs were basically the same as last year, Ken Johnson asked if the issues might be determined by consensus rather than having a formal vote. Several committee members responded that a vote was wanted. Karen Crandall questioned, for example, that if these exemptions are not voted on, why are they then brought before the Mark Committee. She also noted that some of the 'side board' stipulations from approvals in prior years required that the proposals be brought before the committee each year for review and a new vote.

David Zajac (USFWS) changed the course of the discussion by raising Agenda Item 13 and questioned why the Mark Committee was critically reviewing Idaho's proposal when the same rules hadn't been applied to the Washington and Oregon's large scale coho mass marking programs. He noted that it appeared that the rules only apply for small projects. *This portion of the discussion is presented under Agenda Item 13.*

ACTION: Following completion of Agenda Item 13, a vote was taken on the IDFG/USFWS proposals. **The proposals were approved** by a vote of seven 'Yes' votes (ADFG, IDFG, MIC, NMFS, ODFW, USFWS, and WDFW), one 'No' vote (CRITFC), and three abstentions (CDFO, BC Environment, and NWIFC). Idaho was also asked to look at the possibility of marking representative groups at Rapid River and Lookingglass Hatcheries and to have their marking proposal also reviewed by the U.S./Canada forum.

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

Ron Olson presented the Makah Tribe proposal to again mark a small group of Lake Ozette hatchery sockeye fry salmon with the adipose only mark (**Attachment 8**). Coded wire tagging was not considered an option because there is no regional CWT sampling for sockeye in the mixed stock fisheries and no terminal fishery. Given no information on fishery impacts, there is no justification for the cost of tagging the fish. In addition, the fry would be marked at the 450-550/lb size, raising concerns about increased mortality as well as increased tag loss and related low precision in tagged release estimates.

ACTION: The **proposal was approved**. Robert Bayley made a motion to approve the proposal by consensus. The motion was seconded by Lee Blankenship, with CRITFC noting that it abstained from taking a position.

C. Coop Request to Adipose Only Mark Dungeness River Chinook Fry

Lee Blankenship introduced the WDFW and the Jamestown S'Klallam Tribe proposal to mass mark 600,000 summer chinook fry (1996 brood) with the adipose only mark (**Attachment 9**). The distressed Dungeness River stock is a candidate for possible ESA listing. Low survival is expected. Marking will take place in June.

Karen Crandall stated that she didn't object to the proposal but noted that she would be if there were 15-20 different groups that were requesting exemptions. The problem is that the cumulative effect of a number of small marking projects is hard to assess but could have a very significant impact on CWT recovery programs coastwide.

ACTION: The **proposal was approved** by consensus. Karen Crandall made a motion to grant the exemption, and David Zajac seconded the motion. There were no dissenting positions noted.

It was also recommended and approved that next year's proposal include a reference to this year's project to account for overlapping age groups, observed impacts, etc. Upon further discussion, **this requirement was extended to all future proposals that are on-going for two or more years**.

13. Questions concerning Future Role of Mark Committee regarding Mass Marks

David Zajac (USFWS) noted that several years ago, the Mark Committee established a mass mark request protocol that required details of the marking, management and research objectives, expected regional impacts on CWT programs, and expected benefits. This protocol has been consistently followed for small marking projects. However, recent decisions on WDFW, ODFW and CDFO's large scale mass marking of hatchery coho have been done at the policy level and not formally reviewed by the Mark Committee. This would imply that two sets of rules are in force.

Lee Blankenship responded that the confusion arose from the first time that Idaho presented its request to mass mark Snake River chinook with the adipose only mark. The Mark Committee had voted it down because of concerns about setting a precedent. However, a subsequent regional meeting of managers overrode the vote on a policy basis and gave Idaho approval to use the mark. As such, policy managers reviewed the technical assessment but chose a different course.

Susan Bates asked if that was why Washington and Oregon didn't bring their coho marking program to the Mark Meeting last year. Lee confirmed that it was viewed as a policy issue and thus didn't require the technical review of the Mark Committee. He noted further that CDFO had in fact done the same thing by not bringing forth the mass marking of Georgia Strait hatchery coho with the ventral mark to the Mark Committee for review as required by the mass marking protocol established several years ago. David Zajac again emphasized that the rules aren't working as intended.

Karen Crandall questioned why anyone would bring mass marking proposals forward for review if the Mark Committee isn't going to vote and thus have no voice. She noted, for example, that some future mass marking proposal could impact Alaska on the technical level even though it would be against established rules. Without having a vote, Alaska would not have any say in the matter. David Zajac responded that his recommendation would be that the Mark Committee not vote on mass marking proposals but simply provide a technical assessment of the potential impact as a basis for decisions by policy level managers.

Ron Olson agreed that the Mark Committee was obviously in a difficult position and that the committee was a technical body. However, he pointed out that there is a large difference between the coho mass marking programs now underway and all other mass marking proposals seen to date. The difference is that the coho mass marking has a harvest component and the fish are being marked for selective fisheries. As such, harvest issues are beyond the scope of the Mark Committee's role of responsibility while the marking remains within its purview.

Lee Blankenship argued that the Mark Committee initially lost the responsibility to control mass marking when it voted no to Idaho's first request in 1992. He emphasized that there were no technical reasons to deny Idaho's proposal since there were virtually no ocean recoveries, and thus no impact on any recovery agency. Rather the no vote was a policy vote based on fears that Pandora's box would be opened if the precedent was established for Idaho.

Ron Olson disagreed and emphasized that it wasn't that simple. Following the no vote on the original proposal, he noted that the proposal went to the policy managers where it was changed by adding 'side board conditions', including annual reviews and representative CWT groups. As such, the information changed between the first and second review, and he argued that the Mark Committee had done its job in rejecting it on the first pass.

Stan Moberly (NMT) commented that whether it wants it or not, the Mark Committee has a policy element on marking as it is still the only 'game in town' on a coastwide basis. He suggested that the Mark Committee minimize the policy level as much as possible, and also avoid voting on issues. This would allow the committee to come together in group consensus with minority opinions stated without identifying who was for and against it. That leaves the issue standing on its technical merits from the Mark Committee's view. Should it then be overridden by management, it is just a fact of life. However, the Mark Committee would be above reproach as it will have done its job of providing a solid technical assessment of the issues, both pro and con, as input into the system. Tom Morse (BPA) concurred with this assessment and emphasized that a solid technical assessment was far more powerful as policy makers require it and can not escape it.

Susan Bates announced that CDFO has instituted a new policy that no longer requires her to vote no on most mass marking proposals. The new policy calls for a 'no' vote only when there would be damage to the integrity of the CWT program or to any of CDFO's local recovery programs for CWTs or multiple fin clips. In those cases where there is no damage foreseen, Canada will abstain from voting on the grounds that it is an domestic U.S. issue. On the other hand, if there is perceived harm, Canada will vote 'no' and recommend that the proposal be sent to the PSC Selective Fisheries Committee for further resolution.

She also noted that Ron Kadowaki (CDFO; co-chair of the PSC Selective Fisheries Committee) had expressed his opinion that discussions in the Mark Meeting would be very valuable to the deliberations on the PSC side. As such, he is very supportive of the Mark Committee discussing any mass marking proposals that might impact Canada. Susan concluded that perhaps the technical evaluation is the most important, as suggested by Stan Moberly, and that the basic elements of the discussion be recorded rather than relying on a formal vote.

Considerable time was then spent in exploring various suggestions on how best the Mark Committee might handle mass marking proposals, given the dichotomy of having both policy level and technical level aspects of its responsibility. As the somewhat disjointed discussion ebbed and flowed, it became increasingly clear that the basic problem was that the Mark Committee's role was ill defined. As such, this made it impossible to reach resolution on how to handle difficult issues such as large scale mass marking.

As a solution, Marianne McClure recommended that the Mark Committee set aside a time to explicitly define its role. Ken Johnson concurred and noted that the Mark Committee has never had a formal charter, unlike that established for later formed regional steering committees such as PacFIN, RecFIN, StreamNet, and PTAGIS. This hadn't been a problem for the Mark Committee for years as its role was implicit and it proved effective in carrying out that role. However, the situation has now become very blurred with the introduction of mass marking in conjunction with selective fisheries. He therefore suggested that this be a focus of the next Mark Meeting.

Lee Blankenship strongly endorsed the concept but recommended that a subcommittee be set up to work on the project during the year. Tom Morse added that the subcommittee also needed to provide ideas on what the parameters (i.e. acceptable levels of error) are for evaluating the impact of a mass marking project on the 'integrity of the coastwide CWT system'. He further emphasized that a non-subjective process would add credibility and weight to the Mark Committee's evaluation.

ACTION: A **'Subcommittee on the Mark Committee Charter' was established** with the assignment **to develop a formal charter** and then report at the next Mark Meeting. Members assigned to the subcommittee were Marianne McClure (CRITFC), Susan Bates (CDFO), Karen Crandall (ADFG), Ron Olson (NWIFC), and Lee Blankenship (WDFW), Ken Johnson (PSMFC) and David Zajac (USFWS).

14. Agency Reports on Tagging Plans for 1997

Minimal changes were projected by most agencies for tagging levels in 1997 as compared to 1996. Two exceptions were noted. Lee Blankenship reported that WDFW's yearly fall chinook production of Puget Sound stocks would increase from approximately 10 million to 12 million fish. John Leppink also noted that Oregon's overall tagging level would decrease from 11.9 million to 9.2 million fish because of decreased production. However, selective marking will increase in the Willamette system in response to a directive from the Oregon legislature to mark McKenzie and North Santiam stocks. Approximately 1.4 million of these two stocks are scheduled to be marked.

15. Update on 1996 High Seas Sampling Program

Ron Heintz (NMFS-Alaska) reviewed the high seas sampling program for CWT marked fish, including fisheries sampled and new range extensions for North American salmonid species. The 1995 high seas tag recovery data are now complete but work is still in progress for the 1996 sampling. In the past, NMFS kept track of recoveries for each salmon species. However, there are only two categories maintained now, that for chinook and a second for all other species lumped together. As most of the latter recoveries are for chum, the information for the combined species is listed below as chum recoveries.

Species	Fishery	Sampled	CWTs	Est. ByCatch
Chinook	Hake (OR, WA, CA)	2,805	104	
	Gulf of Alaska	1,323	29	14,650
	Bering Sea/ Aleutians	4,318	0	18,279
Chum	Hake (OR,WA, CA)	50	0	
	Gulf of Alaska	18,926	0	64,792
	Bering Sea/Aleutians	7,073	0	31,780

The 104 chinook tags recovered in the hake fishery was approximately double that recovered in 1994. Of those, six fish were from the Snake River. The number of adipose clipped chinook observed and tag recoveries in the Gulf of Alaska and the Bering Sea/Aleutians went down from 1994.

The bycatch of chum in the Bering Sea was substantially higher than that for chinook in 1995. However, with changes in harvest management, it was down considerably from 1993 when the Bering Sea fishery intercepted 250,000 chum. Most of the chum catch occurs in the pollock fishery which lands **1.2 million metric tons** of fish every year.

NMFS began a study in 1994-1995 to evaluate the distribution of stocks located in the Bering Sea as the huge harvest of chum in 1993 coincided with a major decrease in chum escapement in western Alaska. Most of the fish are caught during August, September and October just north of the Aleutian chain on the continental shelf. In 1995, stock distribution was stratified by age (immature vs. mature) and time.

Researchers found that 50% of the mature chum taken in the pollock fishery were Canadian stocks based on genetic stock identification. Another 25% were from Washington. The expected Alaskan and Asian stocks were in much lower fractions. In contrast, and as expected, the immature fish were represented primarily by Asian stocks (Russian: 32%; Japanese: 10%) and Alaskan stocks (51%). The surprising result, however, was that the Alaskan stocks were not from western Alaskan streams. Consequently, the huge chum harvest in 1993 in the pollock fishery did not contribute to the poor returns seen later in western Alaska.

In summary, the proportion of immature North America chum stocks decreases as the season progresses, while the proportion of immature Asian stocks increases. NMFS is continuing to study the stock distribution of chum in the Bering Sea and now has 10 years of genetic baseline stock data in conjunction with cooperative research by Japan and Russia. That type of genetic baseline information doesn't exist yet for chinook stocks.

16. Report on the CWT Applications Workshop

David Zajac (USFWS) reported on the recently completed CWT Applications Workshop and discussed the request of a large number of participants for similar workshops in the near future. He noted that Ken Phillipson (NWIFC) had recommended that a subcommittee be set up to organize additional workshops.

The Mark Committee was very supportive of additional workshops. However, opinions varied on what should be covered in successive workshops and how often they should be held. It was therefore decided that the task would be assigned to a subcommittee.

ACTION: A **'Subcommittee on CWT Workshops' was organized** to select the topic, location, and date for the next CWT workshop. The plan will be reviewed during the 1998 Mark Meeting, with a tentative date in January-February, 1999. Those assigned to the subcommittee include Dan Thompson (WDFW), Rodney Duke (IDFG), and an un-named representative from Canada.

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

Lee Blankenship reported that work on WDFW's automated fish marking and tagging machine has progressed largely on schedule. A prototype machine is now available that can fin clip and coded-wire tag juvenile salmon at a high rate. A video was presented showing the system in action, including the use of a pesculator to move fish from the pond to the trailer without any human handling.

Field tests have shown that the prototype machine properly tags 95+% of the fish. However, the success rate is 60% for removal of the adipose fin. Successful fin removal is actually much higher but problems with water spray, excised fins hanging by a tiny piece of tissue, etc. are seen by the camera as a reject. Consequently, a number of modifications are required to make it fully operationally for field use.

During the past several years, BPA has proved 1.7 million dollars in funding assistance. Another $800,000 has been funded by WDFW, NWT, and Stratos, an engineering firm in Seattle. However, an estimated $550,000 will be needed to make the necessary modifications to complete the machine. As funding through BPA is now much more restricted, WDFW has been actively seeking funding assistance from other agencies. To date, the US Fish and Wildlife Service in California has pledged $300,000 because of the high interest in being able to quickly mark approximately 24 million hatchery fish in the Sacramento system for reasons other than selective fisheries.

WDFW's goal is to complete the machine by October, 1997 if the remaining $250,000 in funding can be obtained. It will then be tested this fall and next spring on coho. Once fully functional, the machine will be turned over to NMT to begin producing for general use.

Tom Morse (BPA) stressed that the automated fish marking and tagging system is a major technological advancement for identification and separation of salmonid stocks. Once the final phase of development is completed, agencies will be able to mark and tag large quantities of fish (60-150mm size range) at the rate of two fish/second without the stress of human handling or the use of anesthetics. That represents 50,000 fish per eight hour shift, with only two staff required to run the operation. It is economically viable, even under today's current marking situations. Furthermore, if managers elect to implement mass marking for one or more species of salmon, this machine would greatly assist in reaching that goal.

In response to expected cost of the machine, Guy Thornburgh (NMT) stated that the underlying and guiding premise has always been that it will cost less per fish than the current tagging system. To this end, NMT is proposing to make the capital investment to build the expensive systems ($400,000 plus) and then go to the hatchery sites to clip, tag, and possibly inoculate the fish on a 'per fish' basis. This frees the agency from the heavy capital investment and the need to buy expensive component upgrades. In addition, this allows project managers to budget an operational expense based on numbers of fish, similar to buying fish food. Lee Blankenship added that the estimated savings at this point are 20% over the current system of marking and tagging.

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

Lee Blankenship reported on the 8th year results of a nine year study funded by BPA to evaluate the combined effects of handling, anesthesia, adipose clipping, and CWT marking on the survival and/or growth of spring chinook. The study was done at Cowlitz, Carson, and South Santiam hatcheries in the Columbia River using three consecutive brood years (1989,1990,1991). Spring chinook were selected because of their known difficulty to handle in the hatchery.

The null hypothesis of the study was that juvenile spring chinook which had been anesthetized, fin clipped and coded-wire tagged return do not return as adults in lower proportions than adults from unhandled juvenile controls. The one assumption that had to be made was that the unhandled fish were no more stressed when swimming through an electronic counter than those fish in a normal pond split which happens routinely in a hatchery. This assumption has since been verified in a study that was done by jointly by WDFW and Dr. Carl Scheck and will soon be published.

The entire production of each hatchery was otolith marked with thermal banding patterns so that straying adults from either other facilities or wild fish could be identified. In addition, approximately one third of each group was CWT marked and adipose clipped by standard procedures. Control and untagged juveniles were precisely counted with a wet counter. Approximately 1.5 million juveniles were CWT marked each year (Carson: ~500,000; South Santiam: ~350,000; Cowlitz: ~1,000,000).

Completed returns are now available for the 1989 and 1990 broods. No significant difference was found in growth between tagged and untagged adult returns. However, there were differences seen in survival between the three hatcheries. At Cowlitz Hatchery, CWT marked and untagged adults returned in the same ratio as they left the hatchery, indicating no difference in survival.

Tagged adults at South Santiam Hatchery likewise returned at rates not significantly different than the controls in 1989 and 1990. However, incomplete returns in 1991 had a 19.1% lower survival rate. This result is inconclusive, however, as most of these fish return as five year olds and are due next year.

A significant difference was seen at Carson NFH where CWT marked adults had a 8.8% lower survival. However, the 1990 and 1991 tagged adult returns were not significantly different from the controls. The oddity in 1989 is related to a high level of BKD prior to tagging, and a subsequent outbreak of IHN during tagging.

Lee Blankenship noted that he will be reporting on the study for the next few years as the last fish complete their return and the tag recovery data is processed. At that point, he expects to have sufficient data for pooling and replication that will allow a clear statement on the effects of coded wire tagging spring chinook.

19. 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 10**). 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 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 only cover two sampling years. The control fish, marked with a CWT only, had the highest survival rate. Ad+CWT marked fish had the next highest survival rate. It was 4.9% lower for the 1993 brood fish. There isn't a comparable number for the 1992 brood as the fish hadn't been treated correctly and the data weren't representative.

The ventral clip (LV+CWT), in turn, had a 64.9% and 54.9% lower survival in the 1992 and 1993 broods, respective relative to no fin mark (i.e. CWT only). and lastly Ad-LV+CWT. Lastly, the Ad-LV+CWT mark resulted in a 75.7% and 59.8% lower mortality for the 1992 and 1993 brood years, respectively.

Lee Blankenship added that these results are very significant as they are based on a large number of returned fish. Richard Bailey concurred and stressed that the reduced survival of Ad-LV marked fish against LV marked fish is very significant. It demonstrates that the Ad-LV mark can not be used as a measure to evaluate the survival of LV marked fish in a selective fishery since their survival characteristics are quite different.

Lee Blankenship also emphasized that the PSC reports use an estimate of 0% to 5% mortality associated with the adipose clip. This study resulted in a 4.9% rate. He cited several other recent studies as well in which the adipose clip related mortality was under 5%. He concluded by stressing that the PSC range was correct for adipose clip mortality, and that it killed far fewer fish than the ventral clip.

20. Differential Survival using Standard Length versus Length and a Half Tags

Dan Thompson reported on a WDFW study designed to evaluate the effect on survival and possible straying of salmon tagged with standard length wire versus length and a half wire (**Attachment 11**).

Two groups of approximately 20,000 juveniles were tagged simultaneously. The adipose fin was not removed, thus insuring that recoveries would be only at the hatchery using electronic detection.

Lee Blankenship added the study was done in part because PSC recommended that agencies begin to use length and a half wire for coho if they are going to be harvested in selective fisheries. WDFW, for example, will be using electronic detection to sample its fisheries in 1998. The length and a half wire is thus a safety factor in ensuring maximum detection rates. He therefore strongly urged that all agencies consider switching to length and a half wire if selective fisheries and electronic detection become standard up and down the coast. There is no increase in cost of the tags

Study results demonstrated that there was no difference in survival between the standard length and length and a half tags. Both groups had 4.1% survival to the hatchery (843 recoveries versus 826 recoveries). Dan Thompson also noted that this result matched that seen when comparing the effect of standard length versus double length tags on survival (see last year's Mark Meeting minutes; agenda item 19).

21. Evaluation of Old versus New Hand Wands

Dan Thompson (WDFW) reported on tests done to compare the depth of tag detection found in the older style hand wands versus that for the new model **(Attachment 12)**. The tests were run following a NWIFC report that one of their old style wands had a much deeper depth of detection than that for a new wand.

A total of 20 new style wands were compared against eight old style wands in depth of detection at both the bottom of the wand and the side of the wand. Results indicated that the both types of wands had essentially identical detection distance (mean 35.6mm new style; 36.0mm old style) when using the side of the wand. However, the new style wands

did substantially better (mean 35.3mm vs. 31.8 mm) when using the bottom of the wand. Curiously enough, the old style wand that led to the study proved to have the highest sensitivity of both types of wands.

Guy Thornburgh (NMT) added that NMT has just discovered that one does get a better reading when using the side of the wand. The reason for this involves the orientation of the detection unit inside. In addition, he recommended that the wand always be kept touching the fish to maximize the likelihood of detecting deep tags. Rodney Duke also noted that his head lab routinely uses the wand now to speed tag recovery from snouts. Upon splitting the snout, the wand accurately pin points where the tag is.

Conclusion: The new style wands are as reliable or more so than the old style.

22. Update on Photonic Tags and VI Jet Marks (WDFW)

Lee Blankenship reported on WDFW's three studies to evaluate the long term retention, visibility and functionality of the fluorescent Photonic Tag marks (New West Technologies) and visual implant Jet Marks (Northwest Marine Technology, Inc.) **(Attachment 13)**.

Cowlitz Salmon Hatchery (1993 brood)

Photonic marks were applied to the anal fin of 10,080 juvenile coho (27 g fish) in December, 1994. The group was also adipose clipped and given a unique CWT. A quality control check on day 133 post marking of 500 fish indicated that the Photonic mark retention was 99.5%. Of those marks, 3.7% were considered poor with only a small dot remaining.

Survival conditions were very low in the Columbia Basin last year when the adults returned and only eight fish were recovered. Each of these fish were tagged but no visible Photonic marks were found using a black light.

Puyallup Salmon Hatchery (1993 brood)

Photonic marks were also applied to the anal fin of 1,106 juvenile coho (10 g fish) reared at the Puyallup Salmon Hatchery in February, 1995. Similar to the Cowlitz study, these fish were also adipose clipped and given a unique CWT. The anal fin mark retention on day 62 post tagging was 93.9%.

A total of 25 returning adults were recovered with the unique tag code in the fall of 1996. However, as in the case of the Cowlitz study, none of the fish had a visible Photonic mark when checked with a black light.

Simpson Salmon Hatchery (1994 brood)

Photonic marks (New West Technologies) and VI Jet marks (NW Marine Technology) were applied to seven groups of 300 juvenile coho (13.3 g fish) in February, 1996 in the anal, ventral and pectoral fins. Two of the groups were injected with either the green or yellow Photonic mark. The other five groups were injected with NMT's green, yellow, red, orange, or blue VI Jet mark. Each of the seven groups also received a unique CWT code. The fish were then transferred to the Manchester saltwater net pens for rearing.

After eight months, a random check of 370 fish in the net pens was performed using a black light to check on mark retention and visibility. The anal fin proved to have the highest retention rate for both the Photonic mark and the VI Jet mark. However, the difference in retention between the two marks was profound. Fish marked with the green and yellow Photonic colors had a 18.9% and 2.1% retention rate. In contrast, the lowest retention rate for the VI Jet mark was seen for the fluorescent color blue at 84.6%. The other four colors had a retention rate ranging between 98.7% and 100%.

Discussion:

Lee Blankenship acknowledged that New West Technologies' has modified its Photonic mark product several times. However, WDFW's experimental results on retention to date show that it is not a reliable mark over the life of a coho.

Ken Johnson commented that Stephen Oura had recently informed him that they now have some adult fish returns in California that had been marked with the Photonic mark. Similar to WDFW's studies, he reported that visibility was very low when using the standard black light to check the adult fish. However, the marks were visible once they switched to a much more powerful black light.

Dan Thompson noted that WDFW has two other coho experiments out with the VI Jet mark. One involves 100,000 coho from the Skagit that will be returning this fall. The second group is from the Puyallup Salmon Hatchery and will also be returning this fall.

Ron Olson expressed a great interest in the experimental results and noted that the fluorescent type of marks are one of the few remaining potential mass marks still available. Lee Blankenship wholeheartedly agreed and stressed that it has great potential as a mark. Even though there are still problems with the approach, research has come a long ways towards resulting those problems.

23. Advances in CWT Technology (Northwest Marine Technology)

Guy Thornburgh noted that NMT was celebrating its 26th anniversary this year and was very proud of its long commitment to fisheries and fishery scientists. He added that people often come to NMT asking for help in resolving a particular problem. About six years ago, there was considerable interest in NMT resuming development on its archival

tag to address problems with the highly migratory tuna and shark populations. At the same time, researchers on the east coast asked for a hand held way to detect CWTs in striped bass. There was also interest from many nations in developing a hand held tag injector. At about the same time, NMT was asked to begin work on an automated mass marking machine.

Coincident to all of this activity, people on NMT staff proposed using laser technology to make binary CWTs. However, since NMT was a small company, management chose to delay the work on the laser application. Given the recent events, that may not have been the best choice. However, in December 1996, the federal court arbitrated a binding settlement between MicroMark and NMT. Three important things have come out of that settlement:

1) There were millions of dollars in savings to the agencies because of the price war between NMT and MicroMark.
2) MicroMark is no longer a company in the tag or fisheries business.
3) The laser technology is now fully owned by NMT .

Laser alpha tags have become a top priority for NMT, with the expectation that they will replace binary coded tags. NMT hopes to enhance that technology to get a much clearer image on the tag. In addition, NMT is looking at many alternative coding schemes and will work with the Mark Committee in that process. Work is expected to begin this summer.

Electronic detection is another high priority. Guy stressed that the technology is still new and thanked CDFO, NWIFC, and WDFW for their research and patience in evaluating the R-8 tube detector last summer. Those findings are being used to upgrade the equipment. He also reported that 10 newly revised R-8 units have been promised to WDFW by June, 1997. These units will also have a substantially improved diverter gate. In addition, NWT is exploring alternative methods for the detection of magnetic wire.

NMT also has a whole family of visible implant tags that remain a high priority of development. The elastomer has been worked on for years and NMT feels that it is now a mature high quality product. In addition, work has progressed on the air injection system and a good solution has been found to resolve problems experienced with the injector unit. He added that NMT feels that electronic detection of colored fluorescent material is possible. However, research is not moving in that direction presently because it is a major task. Likewise, the decoding of colored fluorescent material in fish for detection underwater isn't believed to technologically feasible. However, he encouraged New West Technologies in their attempts to find a way to accomplish it.

The VI Jet material has proved to be long lasting in fish as evidenced in several of WDFW's studies reported earlier. NMT is also planning on marketing a hand held injector very soon that is used for marking small numbers of fish. Work will continue

with WDFW and others on developing a more automated air injection system for marking large numbers of fish.

NMT is also introducing a new version of the VI alphanumeric tag It is much softer and have fluorescent material in it to improve detection and read. It is also hoped that retention rates will be higher because of the change in material.

The automated mass marking machine is an exciting development and was reviewed earlier by Lee Blankenship. The machine will be able to mark fish at a lower cost than the current system and will have a lower impact on the fish because of the absence of anesthetics and human handling. In addition, it will be able to quickly process large numbers of fish that are logistically impossible to do by hand. If the final development continues on pace, NMT will be in production two years from now. NMT expects to have 10 trailers working in Oregon, Washington and California, and processing approximately 60 million fish the first year.

As a final priority, NMT is continuing its work on the archival tag. The second version is shorter, lighter, more memory, bigger battery, and much more sophisticated on board processing. In addition, NMT is confident that a much smaller third generation archival tag can be developed as electronic technology continues to evolve. The goal is to develop a tag that can be placed in salmon. Both the U.S. government and individuals in Japan are helping fund this development.

Guy also noted that there have been some concerns about correct tag placement of length and a half wire because of the high magnetic moment on the tag. WDFW and others have experienced some problems with the tags backing out adhered to the needle following injection. However, NMT has not been able to replicate the problem in the lab. Therefore, research has moved to WDFW's tagging trailers to isolate and resolve the problem.

With respect to parts inventory, NMT no longer has parts for repairing the Mark II injectors. The only exceptions are those parts such as needles, cutter bars, drive rollers, etc, that also fit into the Mark IV injector.

Lastly, NMT now has a web site that is being maintained by Jim Webster in the Olympia office. The address is: **http://www.nmt-inc.com**.

Attachment 1

Mark Committee Meeting -- April 24-25, 1997

Name	Agency	Mailing Address/Telephone/E-Mail/
Allen, Stan	PSMFC	45 SE 82nd Dr., Gladstone, OR 97027-2522 Tel: (503) 650-5400 E-Mail: stan_allen@psmfc.org
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Bates, Susan	CDFO	Pacific Biol. Station, Hammond Bay Road, Nanaimo, B.C. V9R 5K6 Tel: (604) 756-7079 E-Mail: Batess@pbs.dfo.ca
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* Mark Committee member

Pacific Salmon Commission Catch and Effort Data Exchange
File Specifications
Version 1.0, September 10, 1996

Fld. No.	Field Name	Reqd	Rec. Type	Format	Description / Validation
1	Reporting Agency	Yes	C, E	Alpha-numeric	Code for the agency holding and reporting the landing receipts
				"ADFG"	Alaska Department of Fish and Game
				"CDFG"	California Department of Fish and Game
				"CDFO"	Canada Department of Fisheries and Ocean
				"FWS"	U.S. Fish and Wildlife Service
				"IDFG"	Idaho Department of Fish and Game
				"MIC"	Metlakatla Indian Community (AK)
				NIFC"	Northwest Indian Fisheries Commission
				"NMFC"	National Marine Fisheries Service (Columbia River)
				"NMFS"	National Marine Fisheries Service (AK)
				"ODFW"	Oregon Department of Fish and Wildlife
				"QDNR"	Quinault Department of Natural Resources
				"WDFW"	Washington Dept of Fisheries & Wildlife
				"CRFC"	Columbia River InterTribal Fish Commission
				"1"	= Alaska Dept. of Fish & Game
				"3"	= Fisheries & Oceans Canada
				"4"	= Washington Dept. of Fisheries
				"5"	= Oregon Dept. of Fish & Wildlife
				"6"	= National Marine Fisheries Service
				"8"	= California Dept. of Fish & Game
				"9"	= British Columbia Fish & Wildlife
				"10"	= Idaho Dept. of Fish & Game
				"11"	= Washington Dept. of Wildlife
				"14"	= Northwest Indian Fisheries Commission
				"15"	= Columbia River Intertribal Fish Commission
				"16"	= Quinault Dept. of Natural Resources
				"17"	= Washington Dept. of Fish & Wildlife
2	Year	Yes	C, E	Alpha-numeric	Year of landing Must be 4 digits
3 year	Record Identifier	Yes	C, E	Alpha-numeric	Must be distinct within any reporting agency
4	Record Type	Yes	C, E	Alpha-numeric	Must be one of the following:
				"C"	= Catch
				"E"	= Effort
5	Format Version	Yes	C, E	Alpha-numeric	One decimal position (Example: "1.0")
6	Last Update	Yes	C, E	Alpha-numeric	Date of last update for any records in the file Must be 8 digits in format YYYYMMDD

Fld. No.	Field Name	Reqd	Rec. Type	Format	Description / Validation
7	Status	Yes	C, E	Alpha-numeric	Indicates completeness of record: data is considered final when all expected data has been collected, revisions are done, and the agency does not expect changes.
				"P"	= Preliminary
				"F"	= Final
8	Fisher	Yes	C, E	Alpha-numeric	Must match one of the following:
				"0"	= Unknown
				"1"	= Native - treaty
				"2"	= Native - nontreaty
				"3"	= Native - unspecified
				"99"	= Unspecified, includes non-native
					The sum of codes 1+2+3 equals total known native catch or effort
9	Harvest	Yes	C, E	Alpha-numeric	Must match one of the following:
				"0"	= Unknown
				"1"	= Commercial
				"2"	= Recreational - unspecified
				"3"	= Recreational - charter
				"4"	= Recreational - noncharter
				"5"	= Subsistence, ceremonial, or personal use
					Catch or effort from codes 2+3+4 equals total known recreational value
10	Landing Status	Yes	C, E	Alpha-numeric	Must match one of the following:
				"0"	= Unknown
				"1"	= Standard
				"2"	= Test
				"3"	= Seized
				"4"	= Hatchery, cost recovery
				"5"	= Hatchery, terminal area fishery
				"6"	= Experimental
				"99"	= Unspecified
11	Location	Yes	C, E	Alpha-numeric	Hierarchical 19 character location code used to identify catch area; Must exactly match the Location field (field of Location Type '2' in the PSC Location file. All location codes are standardized within a given State or Province, and coordinated by the State/Province (e.g. ADFG, CDFO, WDFW).
	a. Level 0				
12	Period Type	Yes	C, E	Alpha-numeric	Time period type used to report catch or effort Must match one of the following:
				"1"	= Annual (calendar year)

Fld. No.	Field Name	Reqd	Rec. Type	Format	Description / Validation
				"4"	= Statistical month
				"5"	= Calendar month
				"6"	= Statistical week (Monday - Sunday)
				"7"	= Statistical week (Sunday - Saturday)
					The finest resolution for time period is week.
13	Period	Yes	C, E	Alpha-numeric	Time period number. Possible range:
				n = "1"	= Annual
				n = "1" - "12"	= Statistical or calendar month
				n = "1" - "54"	= Statistical week
14	Agency Gear	Yes	C, E	Alpha-numeric	Gear code, specific to reporting agency See Appendix A: Gear Codes
15	Gear Group	Yes	C, E	Alpha-numeric	PSC code for gear group See Appendix A: Gear Codes
16	Species	Yes	C	Alpha-numeric	Catch record must match one of the following:
				"1"	= Chinook
				"2"	= Coho
				"3"	= Steelhead
				"4"	= Sockeye
				"5"	= Chum
				"6"	= Pink
				"7"	= Masu
				"8"	= Cutthroat
				"9"	= Atlantic
17	Grade	Yes	C	Alpha-numeric	Size or flesh-color of chinook. Must match one of the following and must be blank if Species (field #16) is not equal to 1:
				"S"	= Small (1 - 3.6 kilograms, 1 - 7.9 pounds)
				"M"	= Medium (3.7 - 5.6 kilograms, 8 - 12 pounds)
				"L"	= Large (more than 5.6 kilograms or 12 pounds)
				"J"	= Jack
				"W"	= White chinook
				"99"	= Unspecified
18	Number of Tickets	No	C, E	Numeric	Number of Tickets is blank if catch or effort data is not derived from the reporting agency's master fish ticket file. For catch records, this is the count of tickets used to derive the catch data in this record. For effort records, this is the

Fld. No.	Field Name	Reqd	Rec. Type	Format	Description / Validation
					count of tickets used to derive the effort data in this record.
19	Weight of Catch	No	C	Numeric	Total round weight in kilograms. If Harvest (field # 9) is '1' (commercial), weight is required; otherwise, weight may be blank. Weight of Catch (field #19) or Number of Fish (field # 20) must be greater than zero in each catch record.
20	Number of Fish	No	C	Numeric	Blank if unknown. Weight of Catch (field #19) or Number of Fish (field # 20) must be greater than zero in each catch record.
21	Effort Type	No	E	Alpha-numeric "A" "B" "C" "D" "E" "F"	Non-blank value must match one of the following: = Angler days = Boat days or permit days = Boats (no. of distinct boats participating) = Fishers (no. of distinct persons participating) = Net days = Boat trips If Effort Quantity (field # 22) is greater than zero, this field cannot be blank.
22	Effort Quantity	No	E	Numeric	Number of effort units

Notes:

1. Data files will be exchanged as ASCII text with all fields comma-delimited and text fields quote-delimited. All fields are text except fields 18, 19, 20 and 22. Valid exchange transfer media are described in the CWT data exchange document, "CWT Data Set Definition, Specification, & Validation."

2. For every catch stratum (defined by field numbers 2, 7, 8, 9, 10, 11, 12-13, 14), a corresponding effort record is submitted, even if the effort statistics are missing.

3. Missing data (text or numeric) are indicated by consecutive commas (i.e., no blank) unless otherwise specified.

Pacific Salmon Commission Catch and Effort Data Exchange

Version 1.0, September 10, 1996

Appendix A: Gear Codes

PSC Code	PSC Gear	Agency	Code	Gear Name
85	Trawl	NMFS(AK)	80	Groundfish Observer (CA/OR/WA)
			81	Groundfish Observer (Gulf of Alaska)
			82	Groundfish Observer (Bering Sea/Aleutians)
			86	Land Based Salmon
			87	Squid Gill Net By-Catch
			90	Japanese Research Vessel
			91	Japanese Mother Ship
		ODFW	30	Ocean Trawl By-Catch
			33	Pacific High Seas
94	Trap	ADFG	00	Trap
		WDFW	51	Treaty Trap
95	Hand Held	ADFG	12	Hand Picked/Diving
		CDFO	41	Jigging (Indian)
			83	Gaff
			85	Spear/Arrow/14arpoon
		WDFW	02	Gaff
			10	Hook & Line (Outside Juan de Fuca)
		ODFW	27	Hook & Line
99	Other	ADFG	99	Unknown
		CDFO	00	Unknown

Pacific Salmon Commission Catch and Effort Data Exchange

Version 1.0, September 10, 1996

Appendix A: Gear Codes

PSC Code	PSC Gear	Agency	Code	Gear Name
10	Troll	ADFG	05	Hand Troll
		CDFO	30	Salmon Troll
			31	Salmon Troll Freezer
		NMFS(AK)	73	Terminal Troll
		ODFW	12	Ocean Troll
		WDFW	10	Hook & Line (Juan de Fuca only)
			41	Troll
20	Gill Net	ADFG	03	Drift Gill Net
			04	Set Gill Net
		CDFO	10	Gill Net
			11	Other Net
			13	Dnft Net
		ODFW	21	Columbia River Gill Net
			23	Columbia River Set Net
		WDFW	05	Pole Net
			14	Drift Gill Net
			16	Set Gill Net
25	Seine	ADFG	01	Purse Seine
			02	Beach Seine
		CDFO	20	Purse Seine
			70	Beach Seine
		NMFS(AK)	77	Terminal Seine
		VMFW	12	Beach Seine
			19	Purse Seine
28	Other Net	ADFG	13	Dip Net
		CDFO	14	Drag Net/Bag Net (Indian)
			15	Mixed or Unspecified
		WDFW	11	Dip Bag Net
			15	Round Haul Net
			20	Reef Net
		ODFW	24	Dip Net
40	Sport	ADFG	20	Sport
		CDFO	07	Ocean Sport
			47	Freshwater Sport
		NMFS(AK)	76	Terminal Sport
		ODFW	11	Ocean Sport
			27	Freshwater Sport (for recreational catch)
			32	Estuary Sport
		WDFW	95	Marine Sport
			96	Freshwater Sport
			97	Freshwater Sport Snag

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Status of CWT Release Data

by Release Year and Reporting Agency as of April 22, 1997

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-1980	V	V	V	V	V	V	V	V	V	V	
1980-1994	V	V	V	V	V	V	V	V	V	V	V
1995	V	V	V	V	V	V	V	V	V	V	V
1996	N	I	I	N	U	N	U	U	V	V	V

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Last updated: Tue Apr 22 11:27:32 PDT 1997
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Status of Untagged Release Data

by Release Year and Reporting Agency as of April 22, 1997

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
1956-1959					V				
1960-1972			V		V				
1973-1975		I	V		V		V	V	
1976-1980	N	I	V	V	V	N	V	V	
1981-1994	N	V	V	V	V	N	V	V	V
1995	N	V	V	V	V	N	V	V	V
1996	N	N	I	N	I	N	U	V	N

Last updated: Tue Apr 22 14:15:17 PDT 1997
Regional Mark Processing Center

Status of CWT Recovery Data

by Run Year and Reporting Agency as of April 17, 1997

Years	CDFG	ODFW	WDFW	IDFG	CDFO	ADFG	FWS	NMFS (AK)	NIFC	QDNR
1973-1974			V		V					
1975			V		V				V	
1976			V		V				V	V
1977	N	V	V	V	V	N			V	V
1978	V	V	V	V	V	N			V	V
1979	V	V	V	V	V	N	V		V	V
1980-1984	V	V	V	V	V	V	V	V	V	V
1985	V	V	V	V	V	V	V	V	U	V
1986	V	V	V	V	V	V	V	V	V	V
1987	V	V	V	V	V	V	V	V	U	V
1988-1989	V	V	V	V	V	V	V	V	V	V
1990	V	V	V	V	V	V	V	V	U	V
1991	V	V	V	V	V	V	V	V	V	V
1992	V	V	V	N	V	V	V	V	V	V
1993-1994	V	V	V	P	V	V	V	V	V	V
1995	V	V	V	N	I	I	I	N	S	N
1996	I	I	I	N	U	N	N	N	N	N

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Last updated: Thu Apr 17 11:42:28 PDT 1997
Regional Mark Processing Center

Status of CWT Catch/Sample Data

by Catch Year and Reporting Agency as of April 10, 1997

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	CDFO	ADFG	FWS	NMFS (AK)	NIFC	QDNR
1973				N					
1974			N	N					
1975			N	V				V	
1976			V	V				V	V
1977	N	V	V	V	N			V	V
1978	V	V	V	V	N			V	V
1979	V	V	V	V	N	V		V	V
1980-1990	V	V	V	V	V	V		V	V
1991-1993	V	V	V	V	V	V	E	V	V
1994	V	V	V	I	V	V	E	V	V
1995	V	V	V	I	I	I	N	N	N
1996	I	E	I	I	N	N	N	N	N

Last updated: Thu Apr 10 17:07:40 PDT 1997
Regional Mark Processing Center

PSC Format Version 3.2
FIELDS UPDATED OR ADDED
April 23, 1997

RELEASE

Field 15	UPDATE	Number Untagged, Unmarked	Total fish associated with a CWT study that have no CWT and did not shed a CWT
Field 30	NEW	Release Strategy	Forced release Volitional release Transport-barge Transport-truck Mixed release strategies
Field 31	NEW	Mark ID No. 1	External mark used on CWT fish reported in field 13 (Number Released With CWT)
Field 32	NEW	Mark ID No. 2	External mark used on non-CWT fish reported in field 33 (Number Untagged, Marked)
Field 33	NEW	Number Untagged, Marked	Number released with Mark ID No. 2. Represents either marked, never tagged fish associated with a CWT (Tag code in columns 1-12) **OR** the total release of marked fish unassociated with a CWT study (! in column 1).
Field 34	NEW	Companion CWT Group No. 1	Link to companion CWT group in multiple index study or other related CWT group
Field 35	NEW	Companion CWT Group No. 2	Link to second companion CWT group in multiple index study or other related CWT group

CATCH/SAMPLE

Field 33	NEW	Catch Sample ID	Unique ID associated to each catch/sample record by the reporting agency. Must be unique by agency and year.

RECOVERY

Field 36	NEW	Catch Sample ID	ID matching the corresponding

PSC Format Version 3.2
NEW CODES ADDED
April 23, 1997

Release Field 2	Number of Replicates	New label: "Number in Repeating Series"
Release Field 3	Tag Type	New label for '9': "Repeating Series"
Release Field 3	Tag Type	Add type 11 :Length-and-a-half wire" (No codes added for MSW I, MSW II, MSW III wire)
Release Field 10	Release Stage	Z (for eyed egg releases; "Z"ygotes)
Release Field 16	Counting Method	Feed conversion, Volumetric
Release Field 30	Release Strategy	Volitional, Forced Release, Transport-Barge, Transport-Truck, Mixed
Release Fields 31, 32	Mark ID #1, #2	(under development by CDFO) Proposal is a four-digit code where 0000 is no mark, 0001 is LV, ... and 5000 is Adipose, 5001 is AD-LV.
Recovery Field 17	Replicate Number	New label: "Repeating Series Number"
Recovery Field 23, C:S Field 11	Fishery Code	Add Aboriginal Troll, Aboriginal Seine, Aboriginal Gillnet, Aboriginal Mixed Net (CDFO request)

Note: Some new codes were added to some fields in the Data Description file, which is normally only of interest to those directly involved in data exchanging.

Notes: The CWT groups in Example D should use field 34 to report each other as "companion" groups.

PSC Format Version 3.2
NEW POSSIBLE FIELDS RELATED TO MASS MARKING
April 23, 1997

RECOVERY FIELDS

* Mark Code
* Sampling Technique (electronic, visual)
* ???

CATCH/SAMPLE FIELDS

* Mark Code ? (how to stratify CWT expansions?)
* Sampling Technique (electronic, visual)
* Fishery type (regular, selective for adipose,...)
* Catch type (census, estimate?)
* Number of fish caught and released ("catch" versus "harvest")
* Coefficient of Variation of catch estimate
* ???

ATTACHMENT 5

CANADIAN DISCUSSION PAPER February 12, 1997

PACIFIC SALMON COMMISSION POLICY FOR MASS MARKING AND SELECTIVE FISHERIES

The Pacific Salmon Treaty's Memorandum of Understanding obligates the Parties "to maintain a coded-wire tagging and recapture program designed to provide statistically reliable data for stock assessments and fishery evaluations".

In view of the importance of the bilateral coded-wire tagging (cwt) program for conservation and management of chinook and coho, and the potential for mass marking and selective fisheries to adversely impact the reliability of this program, the Parties agree to the following role for the Pacific Salmon Commission:

1) Receive all proposals by the Parties for mass marking/selective fisheries.

2) Establish protocols on marking and sampling, including mechanisms for implementation, in order to ensure that agreed technical requirements to maintain the integrity of the cwt program are carried out by the Parties.

3) Establish a bilateral technical evaluation process that will:

   a) review assessments conducted by the proponent(s) of the impacts of any proposed mass marking/selective fisheries on the bilateral cwt program,

   b) review procedures developed by the proponent(s) and, if necessary, develop alternate procedures to mitigate any adverse impacts on the cwt program,

   c) at agreed intervals, technically evaluate active mass marking/selective fishery programs in order to ensure that the reliability of bilateral cwt

program is being maintained, and

d) report the results of a) through c) to the Commission and Parties in a timely manner.

4) Approve proposals to implement mass marking and selective fisheries in order to ensure that the impact on the cwt program is within acceptable levels with respect to the Parties' obligations under the MOU to the Pacific Salmon Treaty.

ATTACHMENT 6

PROPOSAL TO ADIPOSE-CLIP HATCHERY SPRING/SUMMER CHINOOK

AGENCY: Idaho Department of Fish and Game **DATE:** April 9, 1997

COORDINATOR: Rodney Duke

MARK REQUESTED: Adipose clip, including 525,000 CWT at Clearwater, Rapid River, and McCall hatcheries

DETAILS OF MARKING

NUMBER OF FISH: 2,222,979

SPECIES/RUN: Chinook Salmon, Spring and Summer Run

BROOD YEAR: 1996

STOCKS: Clearwater, Rapid River, Upper Salmon, South Fork Salmon, Pahsimeroi

HATCHERIES: Clearwater, Rapid River, Sawtooth, Pahsimeroi, McCall

GEOGRAPHIC AREA: Clearwater and Salmon River Drainages

RELEASE DATE: Spring 1998

MANAGEMENT/RESEARCH OBJECTIVES:

Short-term objectives are to maintain runs of spring/summer chinook to Idaho hatcheries. Programs will also produce fry, parr, and smolts for supplementation studies, and participate in captive broodstock programs when enough production is available. Long-term management objectives are to return enough adult fish to provide harvest and fishing opportunity on hatchery produced spring/summer chinook without impacting naturally spawning populations.

IMPACT ON COAST WIDE CWT PROGRAMS:

PREDICTED RECOVERIES:

OCEAN: Based on the recent lack of ocean CWT recoveries, none are anticipated.

COLUMBIA RIVER: A total of 37 adipose-clip-only spring chinook and 1 summer chinook would be sampled in Columbia River fisheries.

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 impacting naturally produced fish. A visual mark on hatchery chinook smolts is required by the National Marine Fisheries Service as a condition of the Biological Opinion and Section 10 permits pertaining to salmon hatchery programs in the Snake River Basin.

c:\agency\psmfc\97doc.wpd

Brood year 1996 chinook mark plan [IDFG] - preliminary - (April 9, 1997)
(mostly January inventory)

ESA Status	Hatchery	Stock	Number (A)	Proposed mark	Proposed Ad/CWT (A)
U	Clearwater	Powell	195,478	Ad	50,000 (B)
U	Clearwater	Crooked River	189,644	Ad	50,000 (B)
U	Clearwater	Red River	34,067	RV	
U	Clearwater	Selway	9,280	Ad	
U	Clearwater	Rapid River	158,539	Ad	
U	Clearwater	Lookingglass	162,008	Ad	
U	Rapid River	Rapid River	609,906	Ad	300,000 (C)
U	Rapid River	Lookingglass	13,854	Ad	
U	McCall	SFSR reserve	249,606	Ad	125,000 (C)
L	McCall	SFSR suppl.	25,000	RV	
			24,873	green elastomer, left eye	
U	Pahsimeroi	Pahsimeroi reserve	65,141	Ad	
L	Sawtooth	Upper Salmon R. suppl.	44,523	Ad	

U=unlisted, L=listed
NA = Not Applicable
(A) "Number" and "Ad/CWT" columns are additive when there are numbers in both colums
(B) Purpose is for research
(C) Purpose is for U.S. Canada

c:\agency\psmfc\97mark.wpd
c:chinook\markcom.96

ATTACHMENT 7

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Western Washington Fishery Resource Office
2625 Parkmont Lane Bldg. A
Olympia, Washington 98502
telephone (360) 753-9460 Fax (360) 753-9407

IN REPLY REFER TO:

April 7, 1997

Mark Committee

Dear Coordinators:

Enclosed find our standard mass mark requests(2) for Dworshak and Kooskia spring chinook. Both stocks will be represented by coded-wire tag groups.

If you have questions please call.

Sincerely,

Dave

Dave Zajac
Mark Coordinator

Enclosure

Copies: Mark Committee

AGENCY: U.S. Fish and Wildlife Service **DATE:** March 28, 1997

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: 1996

STOCK: Dworshak, a Rapid River derivative

HATCHERY: Dworshak NFH

GEOGRAPHICAL AREA: Clearwater River, Idaho

RELEASE DATE: April 1998

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 7 ad clipped only fish to be sampled in ocean fisheries. The maximum (7) is based on one recovery in 1990. This has been the only ocean recovery of Dworshak SCS stock available in the PSMFC database at this time.

Columbia River: Based on Dworshak NFH CWT return rates we would expect from 0 to 3 ad clipped only fish to be sampled in the sport fisheries and 0 to 248 in the gillnet fisheries. The occurrence of significant recoveries in the gillnet fishery 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 normal production levels for the first time in three years. 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 management 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 any 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 or use for supplementation to wild stocks.

AGENCY: U.S. Fish and Wildlife Service DATE: March 28, 1997

COORDINATOR: William H. Miller

MARK REQUESTED: Adipose clip only

DETAILS OF MARKING

NUMBER OF FISH: 20,000 maximum.

SPECIES/RUN: Chinook Salmon, Spring

BROOD YEAR: 1996

STOCK: Kooskia

HATCHERY: Kooskia NFH

GEOGRAPHICAL AREA: Clearwater River, Idaho

RELEASE DATE: April 1998

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.

Columbia River: Based on Dworshak NFH CWT return rates we would expect a range of 0 to 3 ad clipped only fish to be sampled in the sport and gillnet fisheries.

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 substantially lower than the normal production levels. This situation may change for brood year 1997 since indications are that adult returns will increase 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 management 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 any 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 or use for supplementation to wild stocks.

ATTACHMENT 8

Northwest Indian Fisheries Commission

6730 Martin Way E., Olympia, Washington 98516-5540
Phone (360) 438-1180
FAX #753-8659
Phone 360) 753-9010

To: PSMFC Mark Committee:

From: Ron Olson, NWIFC Mark Coordinator Ron

Date: March 21, 1997

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 last year. with a slight increase in the number of fry. Background information is provided below and specific details of the marking proposal are described on the attached form

Background: The status of the Lake Ozette sockeye population is "depressed" (SASSI. 1992). NMFS has classified the stock as its own ESU, and is considering listing the ESU 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:	200,000
Species/Run:	Sockeye
Brood Year:	1996
Stock:	Ozette
Hatchery:	Umbrella Creek (fry release into Lake Ozette)
Geographical Area:	Ozette Lake, NW coast of Washington
Release Date:	June, 1997 (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 Lk. 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 Lk. Ozette sockeye population. The adipose-only mark is requested to minimize marking mortality on this depressed stock.

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE
FISH MANAGEMENT PROGRAM
Resource Assessment Division

April 21, 1997

TO: PSMFC Mark Committee

FROM: Lee Blankenship

SUBJECT: **WDFW/JAMESTOWN S'KLALLAM TRIBE ADIPOSE ONLY REQUEST**

I am writing on behalf of Washington Department of Fish and Wildlife and the Jamestown S'Klallam Tribe to request the use of the adipose-only fin mark for two groups (600,000 total) of Dungeness chinook. Background information and specific details are described below.

Background: The Dungeness River enters the eastern end of the Strait of Juan de Fuca near the town of Sequim, Washington. Chinook salmon in the Dungeness are considered a prime candidate for listing under the Endangered Species Act (ESA).

To recover the stock, avoid ESA listing, and possible extinction, a Dungeness Chinook Recovery Plan was started in 1992. A captive broodstock program with adults returning in 1992 resulted in 1.5 million 1996 brood juveniles. These juveniles have been split into 5 groups for different release strategies and locations. All of the groups are otolith marked and 400,000 are scheduled to be adipose fin marked and coded wire tagged. Another 500,000 will be coded wire tagged in the cheek without an adipose fin mark. This adipose fin mark only proposal is for one group of 400,000 that will be put into an acclimation pond at 1.0 grams and then released at about 1.8 grams. The second group of proposed adipose fin only marks will be scatter-planted in the upper watershed at 1.8 grams. This group consists of 400,000 in total. Half of the 400,000 will be adipose fin marked and coded-wire tagged, and the other half are proposed to be adipose fin marked only group.

The overall study design for the release of 1.5 million progeny of captive brood adults is very complex. All of the fish will be released at a small size (1.0-2.0 grams) to avoid as much hatchery genetic selection and domestication as possible. A variety of release sites are being used and will be evaluated in terms of downstream migrants and adult returns. Consequently a variety of benign markings are needed to separate the different groups and hence the need and request for the adipose fin mark only exemption request.

Mark Impact on Coast-Wide CWT Recovery Programs: The Dungeness chinook stock has not been used as a hatchery stock. An adjacent stock, the Elwha River chinook has been propagated in hatcheries. Migration patterns for the two stocks are thought to be similar. Elwha chinook were a PSC indicator stock at one time, but were dropped due to inability to get accurate escapement figures. Table 1 shows the Canadian and Alaskan recoveries from the three broods that were coded-wire tagged.

The Elwha chinook were released at a size of 6-8 grams. The Dungeness chinook will be released at 1-2 grams. Other restoration studies (Nooksack and White River) leads us to believe that we can expect a 38-75 percent lower survival for the fish being released at the smaller size.

If the Dungeness had the same survival and distribution as the combined Elwha brood years, (Table 1) then the 600,000 adipose only marks with this request would result in 15 Alaskan recoveries and 63 Canadian recoveries. The number of recoveries would be substantially less if our assumptions about lower survival due to small release size are accurate.

TABLE 1. Actual Coded-Wire Tag Recoveries from Alaskan and Candian Fisheries for Elwha Chinook

BROOD YEAR	NUMBER RELEASED	ALASKA RECOVERIES	CANADA RECOVERIES
1985	153,609	10	31
1986	141,900	0	11
1988	191,895	2	9
Total	487,404	12	51

LB:dht

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

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 (FWS) 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 tschawytscha). 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 (72mm FL) for 1992 brood to 2.9 g per fish (65mm 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 and 1996 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) 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. The results presented in Table 1. show the number of returns, clip quality and average fork-length for each 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 and 1996. A summary of the differential survival between fin clips for 1992 and 1993 brood years is presented in Table 2.

Table 1. Numbers of chinook returning to the Spring Creek hatchery by brood year, 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	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

Adipose/left ventral 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 and 1996

Fin Clip	# Recoveries	Survival to Rack	Average fork-length	Standard Deviation
Coded Wire Tag Only	160	0.082%	77.3 cm	5.6 cm
Adipose	144	0.078%	78.0 cm	6.5 cm
Left Ventral	72	0.037%	77.3 cm	5.4 cm
Adipose/ Left Ventral	63	0.033%	75.9 cm	5.0 cm

Difference in Survival

Adipose clips survived 4.9% less than Coded Wire Tag Only

Left ventral clips survived 54.9% less than Coded Wire Tag Only

Adipose/left ventral clips survived 59.8% less than Coded Wire Tag Only

Clip Quality

Adipose Clip		Left Ventral			Adipose/Left Ventral		
Good	= 94.4% (136)	Good	= 58.3% (42)	Good	= 82.5%(52)	Good	= 69.8% (44)
Marginal	= 2.1% (3)	Marginal	= 23.6% (17)	Marginal	= 3.2% (2)	Marginal	= 22.2% (14)
Bad	= 3.5% (5)	Bad	= 18.1% (13)	Bad	= 7.9% (5)	Bad	= 4.8% (3)
No Mark	= 0.0%	No Mark	= 0.0%	No Mark	= 6.4% (4)	No Mark	= 3.2% (2)

Table 1. cont.

1994 Brood Recoveries in 1996

Clip	# Recoveries	Survival to Rack	Average fork-length	Standard Deviation
Coded Wire Tag Only	12	0.0006%	61.1 cm	8.6 cm
Adipose	8	0.0004%	57.5 cm	3.4 cm
Left Ventral	8	0.0004%	54.1 cm	3.2 cm
Adipose/ Left Ventral	3	0.0002%	57.7 cm	2.5 cm

Difference in Survival

Coded wire tag only vs adipose clip	= 33.4%
Coded wire tag only vs left ventral	= 33.4%
Coded wire tag only vs adipose/left ventral	= 66.7%

Clip Quality

Adipose Clip		Left Ventral		Adipose/Left Ventral			
Good	= 87.5% (7)	Good	= 75.0% (6)	Good	= 100% (3)	Good	= 66.7% (2)
Marginal	= 0.0%	Marginal	= 25.0% (2)	Marginal	= 0.0%	Marginal	= 0.0%
Bad	= 12.5% (1)	Bad	= 0.0%	Bad	= 0.0%	Bad	= 33.3% (1)
No Mark	= 0.0%	No Mark	= 0.0	No Mark	= 0.0%	No Mark	= 0.0%

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		
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	175,897	27	133	--	160	0.082%	
1993	CWT Adipose	185,575	28	116	--	144	0.078%	- 4.9%
1993	CWT Ventral	193,745	16	56	--	72	0.037%	- 54.9%
1993	CWT Ad/LV	191,405	15	48	--	63	0.033%	- 59.8%

Washington Department of Fish and Wildlife
1996 Puyallup Hatchery Rack Electronic Detection Evaluation
and Survival of Standard Length vs 1.5 Length Coded Wire Tags

Adults Sampled by Wand = 24,559
CWT's detected by Wands = 1,676
Adults Sampled by R-8 = 24,695
CWT's detected by R-8 = 1,584
CWT's missed by Wand = 3 = 0.1%
CWT's missed by R-8 = 0 = 0.0%
False positives by R-8 = 219 = 0.8%
False positives by Wand = 46 = 0.1%

63 43 33 External Marks: Adipose Clip, Photonic (Adipose Eye, Anal fin, Caudal fin)
25 Recoveries with no visible Photonic marks using UV light box

detected by Wand = 15
detected by R-8 = 10
missed by Wand = 0

63 50 05 External Mark: None CWT Type: Standard Length CWT
843 Recoveries = 4.1% survival to rack mean forklength = 45.8 cm SD = 5.2 cm

Revised Area

detected by Wand = 433
detected by R-8 = 408
missed by Wand = 1

63 58 25 External Mark: None CWT Type: 1.5 Length CWT
826 Recoveries = 4.1% survival to rack mean forklength = 46.0 cm SD = 5.2cm

Recoveries not reported in database

detected by Wand = 417
detected by R-8 = 406
missed by Wand = 0

Difference in Survival of Standard Length CWT vs 1.5 Length CWT = 0.0%

63 54 51 External Mark: Adipose Clip CWT Type: Standard Length (Index Group)
1,575 Recoveries

detected by Wand = 811
detected by R-8 = 760
missed by Wand = 2
Sampling Times
R-8 = 15 fish/minute/sampler
Wand = 8 fish/minute/sampler

Washington Department of Fish and Wildlife
1996 Skykomish Hatchery Rack Electronic Detection Evaluation

# Adults Sampled by Wand	= 5,898		
# CWT's Detected by Wand	= 699		
# CWT's Sampled by R-8	= 2,595		
# CWT's Detected by R-8	= 345		
# CWT's missed by Wand	=	6	= 0.8%
# CWT's missed by R-8	=	0	= 0.0%
# False positives by R-8	=	51	= 1.9%
# False positives by Wand	=	9	= 0.1%

Processing Time:
R-8 = 13 fish/minute/sampler
Wand = 5 fish/minute/sampler

Evaluation of Wand Coded Wire Tag Detectors

Daniel A. Thompson and H. Lee Blankenship

As part of the study of the feasibility and reliability of Wand coded wire tag (CWT) detectors for electronic sampling during mass marking and selective fisheries, the Washington Department of Fish and Wildlife (WDFW) tested the detection distance of 20 new style and 8 old style Wand CWT detectors. The purpose was to determine the distance a 1.5 length CWT could be detected with the Wands and to determine variability between Wands.

The experiment was carried out in the WDFW CWT lab by the same person. A 1.5 length CWT was cut from a Mark IV injector using the newest type of tag wire available. The tag was taped to the surface of a piece of plywood. A glass plate 15 cm x 30 cm was placed over the tag and 1 mm thick plastic strips were added on each side of the plate to lift it a uniform distance from the plywood until the Wand would no longer detect the tag consistently. The Wand was passed back and forth in parallel strokes along the length of the coded wire tag.

There was also a test to determine whether the side of the Wands were more sensitive than the bottom surface which is normally used.

The results presented in Table 1 shows the detection distance for the bottom and side for each of the 8 old and 20 new style Wands.

Northwest Marine Technology guarantee their Wands will detect a 1.5 length CWT tag from a distance of 30 mm. All twenty new style Wands surpassed this distance.

Table 1. Detection distance of a 1.5 length coded wire tag using 28 Wand coded wire tag detectors.

NEW STYLE Distance in millimeters

Wand #	Bottom of Wand	Side of Wand
10206	32	35
10186	35	37
10194	33	35
10216	34	35
10196	37	37
10208	34	35
10176	34	35
10214	34	35
10218	34	34
10185	34	34
10217	33	34
10212	37	35
10195	39	39
10203	36	36
10213	34	34
10211	38	37
10205	35	35
10189	37	37
10207	38	35
10187	38	37
Average=	35.3	35.6
SD =	1.9	1.3

OLD STYLE Distance in millimeters

Wand #	Bottom of Wand	Side of Wand
1	41	37
2	31	37
3	30	36
4	31	37
5	31	35
6	30	35
7	30	36
8	30	35
Average =	31.8	36.0
SD =	3.5	0.9

LONG TERM RETENTION AND VISIBILITY OF A FLUORESCENT PHOTONIC AND VI JET FISH MARKING TECHNIQUE INJECTED INTO THE FINS OF COHO SALMON

H. Lee Blankenship and Daniel A. Thompson

The Washington Department of Fish and Wildlife (WDF&W) conducted three studies to determine the long term retention and visibility of Photonic fluorescent marks (NEW WEST Technologies) and VI JET fluorescent (Northwest Marine Technology) fish marks in coho salmon (Oncorhynchus kisutch). The Photonic and VI JET fish marking system uses a needle-less injector (air pressure) to blast in an aqueous solution of fluorescent particles. WDFW injected the Photonic and VI JET material into the anal, ventral, and pectoral fin rays.

Cowlitz Salmon Hatchery

Photonic marks were applied on 15 December, 1994 to the anal fin (N=10,080) of 1993 brood coho averaging 27 g per fish (130 mm forklength). The marking rates for the Photonic mark averaged 600 to 800 fish per hour. The group was also adipose clipped and coded wire tagged with a unique code. The group was released in the spring of 1995. On 27 April, 1995 a quality control check was conducted on the Cowlitz coho 133 d post marking to determine final Photonic mark retention prior to release. The coho were checked for mark loss using a black light box to avoid direct sunlight. There were 500 fish checked from each of the four rearing tanks and the Photonic mark retention averaged 99.5%. An additional 3.7% of the Photonic marks were considered poor with only a small dot remaining.

During the fall of 1996 all adipose clipped adult coho returning to the Cowlitz hatchery were checked with a black light box to determine Photonic mark retention and visibility. There were 8 recoveries with the unique tag code but no visible Photonic marks were observed.

Puyallup Salmon Hatchery

Photonic marks were applied on 7 February, 1995 to 1,106 1993 brood coho. The mark was injected into the anal fin rays on each fish. The average size of coho marked was 10 g per fish (96 mm forklength). This group was also adipose clipped and coded wire tagged with a unique code. On 14 April, 1995 quality control checks were performed on the Photonic marks 62 d post tagging. The anal fin Photonic mark retention was 93.9%. The fish were released during the spring of 1995.

During the fall of 1996 all adipose clipped returning adult coho to the Puyallup hatchery were checked with a black light box to determine Photonic mark retention and visibility. There were 25 recoveries with the unique tag code but no visible Photonic marks were observed.

Simpson Salmon Hatchery

Photonic (NEW WEST Technologies) and VI JET (Northwest Marine Technology) marks were applied on 8 February, 1996 to seven groups of 300 coho salmon averaging 13.3 g/fish (105 mm forklength). Two colors of visible fluorescent Photonic marks (green and yellow) and five colors of visible fluorescent VI JET marks (red, yellow, orange, green and blue) were injected into the anal, ventral and pectoral fins of each coho to determine long term retention and visibility of the two different marks on adult coho. All seven groups were coded wire tagged with a distinct tag code. In addition, the NEW WEST specimens were adipose clipped to distinguish between NMT and NEW WEST groups The coho were transferred to the Manchester saltwater net pens for rearing.

During the fall of 1996, eight months after marking a quality control check was performed at the Manchester net pens on 370 random specimens using a black light box to determine mark retention and visibility. The results are presented in table 1. During the fall of 1997 the coho will be checked with a black light box for a final time and sacrificed to retrieve the coded wire tags and assigned to the proper group.

Table 1. Results from quality control checks performed 8 months after marking at the Manchester Net Pens showing mark type and retention.

NEW WEST Technologies			**% Retention**	
Fluorescent Color	# Sampled	Anal Fin	Ventral Fin	Pectoral Fin
Green	58	18.9	5.2	15.5
Yellow	47	2.1	2.1	2.1

Northwest Marine Technology			**% Retention**	
Fluorescent Color	# Sampled	Anal Fin	Ventral Fin	Pectoral Fin
Green	74	98.7	86.5	98.6
Yellow	17	100	88.2	94.1
Red	67	100	95.5	89.6
Orange	54	100	88.9	92.6
Blue	53	84.6	92.5	96.2