# 2005 MARK MEETING

**Tofino, British Columbia**

April 20-21, 2005

## In memoriam…Marc Hamer (1950 – 2005).

**For his utmost dedication and considerable contributions over 20+ years to the Mark Recovery Program.**

*Marc was passionate about his work with DFO at the Pacific Biological Station. He was a talented analyst and programmer and enjoyed an international reputation as a creative problem solver. But most of all he was gentle and kind and had great love and respect for all living creatures. He was an avid bird watcher, plane watcher and people watcher and he was happiest when sharing his passions with the people he loved. His curiosity was boundless and his quirky, quick sense of humour was a gift to all of us. He will be deeply missed.*

**(*Tribute from fellow CDFO staff members; *Marc not in picture!*)**

At the start of the Mark Meeting, Ken Johnson also offered a brief tribute in memory of Marc Hamer, former mark coordinator for CDFO, who died on January 22, 2005 after a sudden illness. Ken noted that he felt a very personal loss with Mark's death as he valued him as a wonderful friend in addition to the professional relationship shared over many years in working together on several PSC committees and the Mark Committee. He expressed confidence that he was speaking for everyone on the Mark Committee as Marc had been a friend to all. He added that had the Mark Meeting been held in Marc's home town of Nanaimo, his long shadow would have been felt many times. And even in Tofino, he ventured that many would be thinking of Marc for time to time as the meeting progressed. As such, an invitation was extended to meet in the next door pub after the day's work and there hoist a toast or two in honor of Marc's memory.

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Field trip: Robertson Creek Hatchery (10 AM).
Leave hotel at 8:30 AM.

# 2005 MARK MEETING

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## Preliminary Minutes

### 1. General Business Items

#### A. Welcome/Introductions/Tribute

In the role of chairman, Ken Johnson (PSMFC) welcomed Mark Committee members and other meeting participants. A special thanks was extended Doug Herriott and Canada Department of Fisheries and Oceans (CDFO) for hosting the Mark Meeting in Tofino and making all of the necessary arrangements.

Mark Committee members and other meeting participants were introduced at the start of the Mark Meeting **(Attachment 1)**. Kathy Fraser (CDFO) replaced Marc Hamer on the committee. Three of the 14 Mark Committee members were not present. Tim Yesaki (Freshwater Fisheries Society of British Columbia) was absent and represented by Kathy Fraser (CDFO). Steve Leask (MIC) was not present. Robert Bayley (NMFS-NW Region/Center; Portland Office) could not get travel authorization and was represented by Adrian Celewycz (NMFS-AK).

#### B. 2006 Meeting in Washington: Site and Date

The 2006 Mark Meeting will be jointly hosted by the U.S. Fish and Wildlife Service, NW Indian Fisheries Commission, and Washington Department of Fish and Wildlife. David Zajac (USFWS) announced that the meeting would be held in Port Angeles, Washington on April 26-27 (Weds-Thurs) 2006 . Tentative plans are to meet at the Red Lion Hotel in Port Angeles. While not directly related to the Mark Committee's work, a presentation (and possible site visit) is planned on the interagency "Elwha Fish Committee's work on the removal of the nearby Elwha Dam and subsequent restoration work that will follow. This committee consists of Tribal, State, and Federal agencies.

### 2. Status of Mark Center Operations

#### A. Status of CWT Data Files and RMIS Web Pages (Dan Webb, PSMFC)

1) Annual review of the CWT data files:

Dan Webb reviewed the data status tables for each reporting agency's CWT release, recovery, and catch/sample data files. Particular attention was focused on existing 'holes' and agency

plans to report the missing data. The review was done with a Power Point presentation based on snap shots of the various status tables on PSMFC's RMIS taken on April 18.

Release Data**:** The CWT release data are current for all tagging agencies. There are a few minor holes that crop up from time to time, but the missing release records are typically submitted in a timely basis once their absence is known.

Recovery and Catch/Sample Data**:** The Recovery and Catch/Sample data files are current for all years up through 2004, with the exception of data for IDFG, NWIFC, and QDNR. These latter three agencies typically report later than the other agencies because the bulk of their sampling data is from terminal fisheries or escapement. In addition, CDFO has some partially validated recovery data for 1978 that remains unresolved. Kathy Fraser (CDFO) was not aware of this situation and promised to look into it when she returned to the office.

Catch and Effort Data: At this point, the Catch and Effort database continues to contain only WDFW data for years 1980 through 1995. It was noted that the lack of reporting had been discussed last November at the PSC joint Selective Fisheries Evaluation Committee and Data Standards Working Group meeting. It will likely be forwarded to the Data Sharing Committee to address.

Ken Johnson commended the agencies on their excellent progress and noted that this past year had been the best ever in terms of both timely reporting and quality of release, recovery, and catch/sample data submitted on the first pass.

2) Data Validation of Gear Codes

Dan distributed a table listing approximately 30 gear codes reported for recovery data from 2000 to 2005 but not defined in the Data Specifications 'Fishery Coding' table (chapter 9). As a solution, he asked the 11 reporting agencies to simply let him know what the definitions of the codes are and he would update the Data Specs document. It was also pointed out that the current gear codes are now being validated. Hence Dan is waiting for the agencies to forward the gear code descriptions so that the Specifications can be updated.

3) RMIS Mark Committee Page

As part of the enhancement of RMIS, a new web page has been added to document the membership of the Mark Committee. The participating agencies are grouped by coordinating agency (PSMFC), state agencies, federal agencies, tribal agencies and Canada. A link is provided to each agency's home page where possible

4) Querying BLANK and Agency Only Blank Wire in RMIS

The Mark Center recently learned that a user was not able to retrieve BLANK and Agency BLANK wire recoveries via RMIS even though the recovery data had been submitted and passed validation. A similar problem was encountered in trying to retrieve the release records.

Dan explained that the release and recovery data for BLANK and Agency BLANK wire can be retrieved via RMIS but it isn't straight forward given that these tags are treated as non-tags in the release table and as tags in the recovery table. In order to understand the problem, it is necessary to understand the conflicting rules which are listed below:

Release File: **Release ID or Tag Code must be unique**
Consequently, Blank wire is not a tag code
The record code = N (Non-associated releases: i.e. '!' Bang records)
"Tag type" = '16' (Pseudo tag, blank wire)

Recovery File: **Tagcode reported as 'BLANK' or 'AGBLANK'**
(e.g. 10BLANK for Idaho – agency only wire)
"Tag Status" = '9' (Pseudo tag, blank wire)

Release Database: One can not query for BLANK and Agency BLANK release records using the tagcode field as blank wire is not a unique code. However, one can use the tag type field and select for 'blank wire releases using tag type '16' (pseudo tag, blank wire). **The catch is that no blank wire type releases will be found if using the 'Tagged Releases' query form (Record code = 'T').** This is a very common mistake. Blank wire releases are '!' Bang records (Non Associated Releases: Record code = 'N'). As such, *one must either use the 'Non-Associated Releases' query form or the 'All Releases' query form in conjunction with tag type '16' to retrieve all such blank wire releases.*

Recovery Database: Blank wire recoveries pose a different challenge for RMIS users. In this case, the 'tagcode' field is allowed to carry the 'BLANK' or 'AGBLANK' value. However, the RMIS system will not allow retrievals on these values in the tag code field as the tag code must exist in the release table as a unique tag code. *The present 'work around' simply consists of specifying tag status = '9' (pseudo tag, blank wire) when querying for blank wire recoveries. It is also necessary to use the 'All Recoveries' query form.*

Discussion: It was noted that the PSC Data Standards Working Group did not expect that data users would be particularly interested in blank wire type recoveries. However, that has not proved to be the case. As such, it was recommended that the RMIS recovery query forms allow selection of "BLANK" as tag code in spite of the cross table verification requirements ensuring unique tag codes. Said another way, the recovery records stored in the Recovery table have already passed validation. As such, the verification rules on unique tag codes can be relaxed for retrieval of recovery data by tag code. (Note however that the cross table verification is still necessary to identify non-existent tag codes entered by the user in a recovery query.)

Action: Mark Center staff agreed to implement a more effective solution to retrieving blank wire recoveries.

**B. Implementation of new RMIS Analysis Reporting System** (Jim Longwill, PSMFC)

As a preface, Ken Johnson noted that about five years ago, NWIFC approached the Mark Center about taking over maintenance of their CWT Retrieval and Analysis System (CRAS). And while very interested, this did not happen at that time as the Mark Center wasn't well positioned to do so.

Early in July 2004, the Mark Center again received a proposal from NWIFC that the Mark Center take over ownership and maintenance of CRAS. Several days were spent overlooking documentation on the nature of CRAS reports and the structure of its various tables and data structures. This review was followed by a meeting with NWIFC staff in

Olympia, Washington to discuss the project and begin plans for porting CRAS to the Mark Center' Regional Mark Information System (RMIS). Development work began in earnest in February 2005, with Jim Longwill serving as the project leader.

Presentation: Jim Longwill took the floor at this point and logged onto the RMIS web site to demonstrate progress to date. He noted that RMIS users have been familiar for many years with the Detail and Summary Reporting system which offers CWT data downloads in PSC format and other formats, plus the summary release and recovery reports. However, the Mark Center is now introducing a new application for RMIS which has been named the "RMIS Analysis Reporting" system. It is based almost entirely on the CRAS application developed several years ago at NWIFC.

RMIS Analysis Reporting has some very powerful new capabilities inherited from the CRAS application:

1) Ability to map individual tag recovery locations to actual management area fisheries (e.g. WA Area 4, 4B Troll; WA Area 1 Sport; OR Coos Bay Troll). This mapping of recovery data to management area fisheries is essential for analyses and modeling done by the Pacific Fishery Management Council and the PSC Chinook and Coho Technical Committees.

RMIS has long provided recovery reports partitioned by 'Fishery' but the fisheries differ from the management area fisheries actually used by the agencies and management groups. Rather these fisheries are generic in definition and based totally on PSC data exchange specifications. For example, a fishery in the existing RMIS reports would be defined simply as "Ocean Troll (non Treaty)", "Ocean Troll (Day Boat)" or "Coastal Gillnet", etc.

2) Ability to aggregate data in multiple ways in a single report by using grouped criteria defined by the user (i.e. sets of tag codes or sets of management area fisheries).

Following his overview, Jim then proceeded to demonstrate the prototype RMIS Analysis Reporting system at the RMIS web site. Users will be required to log in using their email address as their user name. This will facilitate return of reports directly to the user's email address. Once logged in, users will encounter a general explanation of the RMIS Analysis Reporting System and a number of options grouped under "CWT Analysis" and a second set under "Management Fishery Analysis". Generally users will move down the set of options in order of activity to get results:

| "CWT Analysis", | "Management Fishery Analysis" |
|---|---|
| Define CWT Criteria | Define Fishery Groupings |
| Edit CWT Criteria | Edit Fishery Groupings |
| Create Tag List | Fishery Recovery Reports |
| Edit Tag List | |
| CWT Recovery Reports | |

An estimated 10 new RC reports will be introduced. This will include reports that provide estimates of fishery contribution and survival rates for given release groups of tagged fish. The new system should be on line by July 2005.

Discussion: There was considerable interest in the new reporting capabilities that RMIS will soon have. However several requests were made for additional features that aren't currently available:

1) Ability to download and/or e-mail the Tag List to the user. This would be a quite useful feature to add. In addition, a user could then use that list and plug it into the RMIS Standard reporting system later.
2) Provide the ability to edit the tag list names.
3) Also provide the ability to edit the 'Criteria Name' in the CWT Criteria Maintenance page.

*(Note: May 2, 2005: All of these recommendations have now been incorporated into the prototype RMIS Analysis Reporting system.)*

**3. Status of PSC (U.S. Section) Funding for Mark Center**

Ken Johnson reported to the Committee that the Mark Center's funding crisis (see note below) had been resolved for FY 2005 but not for 2006 or subsequent years**.** During a meeting of PSMFC's director, Randy Fisher, with top level USFWS leaders in Washington, DC earlier this year, USFWS agreed to fund the $250,000 as stated in the Pacific Salmon Commission - U.S. Section budget for 2005. These funds will be taken out of funding set aside for mass marking salmon in 2005, per agreement with Washington Congressman Norm Dicks. However, USFWS leaders also made it very clear that 2005 would be the last year of support without the Mark Center's budget being re-added to the Congressional Budget. Efforts are continuing to find stable funding for 2006 and out years.

*Note*: September, 2004: A budget crisis continues to loom over the Regional Mark Center as $250,000 in Pacific Salmon Treaty funding for FY 2005 through the U.S. Fish and Wildlife Service was been deleted from the congressional budget on the House side. The $250,000 loss represents 49% of the Mark Center's budget for FY 2005. The Mark Center is already on a very tight budget and simply can not absorb a massive cut of this order without severely restricting operations. At a minimum, this loss of funding will require terminating the employment of two of the Mark Center's three staff members, in addition to other significant cut backs in operations. Treaty obligations of timely data exchange will not be possible to meet.

Discussion: David Zajac (USFWS) verified that the USFWS would provide $250,000 funding for the Mark Center in 2005. However, he also mentioned that there had been some new developments since Randy Fisher had met with leaders in Washington D.C. It was his understanding that in recognizing the role of the Mark Center, the Regional Office in Portland (Region 1) had also requested $250,000 in pass through funding for 2006. *(Note: In a subsequent follow up email, David verified that this action had been taken by the Region 1 office but did not know just how successful the effort might be.*

A suggestion was made that perhaps the Mark Committee should write a letter supporting the funding of the Mark Center. Ken expressed appreciation for the offer but noted it wasn't necessary given that letters had already been sent by David Bedford, Chair of the U.S. Section of the Pacific Salmon Commission (**Attachment 2**) and by Dr. Jeff Koenings, Chair - Pacific States Marine Fisheries Commission on behalf of the five Directors of CDFG, IDFG, ADFG, ODFW, and WDFW (**Attachment 3**).

Action: None needed by the Mark Committee.

**4. Update on Mass Marking Legislation**

There was no new mass marking legislation since the last Mark Meeting. However Senator Ted Stevens (Alaska) did enter comments into the Congressional Record on December 12, 2004 (**Attachment 4**) that highlighted a number of serious concerns about the federally mandated mass marking program for Washington and Oregon salmonid stocks. In particular, the program "..could have significant financial implications on both the State of Alaska and on the Alaska commercial fishing industry." In addition, it was recommended that if mass marking is implemented, it should be only done for Puget Sound and Columbia River Tule Chinook and not the far north ranging Columbia River Upriver Brights or Washington coastal chinook stocks which contribute a significant portion of the Alaskan salmon harvest. Lastly, it was recommended that the USFWS (and other marking agencies inferred) work with the State of Alaska and the Pacific Salmon Commission to ensure that the mass marking doesn't significantly interfere with "...data collection, salmon management programs, or the implementation of abundance-based management under the treaty."

Discussion: There was little discussion beyond the point that the federally mandated mass marking program (**Attachment 4: first paragraph**) was law while Senator Steven's comments published in the Congressional Record were not. As such, there was general acknowledgement that the mass marking program will continue to move forward, but hopefully with extended efforts to improve coordination and minimize impacts on the State of Alaska's fishing industry and ADFG's CWT sampling program.

**5. Update on Mass Marking and Selective Fisheries on Hatchery Coho and Chinook**

**A. Alaska (ADFG, NMFS, MIC)**

Ron Josephson (ADFG) once again reported that Alaska has not changed its policy. There is no mass marking nor selective fisheries based on hatchery fish with the adipose clip. The same is true for MIC. Adrian Celewycz (NMFS) also indicated that there were no plans to mass mark fish at NMFS rearing facilities in Alaska.

**B. British Columbia (CDFO)**

Sue Lehmann (CDFO) stated that Canada is not mass marking chinook and has no mark selective chinook fisheries. Coho began to be mass marked in 1996 but the numbers released yearly (~ 10 million) have dropped. A total of 9.6 million hatchery coho (2003 brood) were projected to be released in May 2005. However that release will actually be 8.3 million ad clipped and about 1 million unmarked. The reduce marking resulted from a funding shortfall. In

addition, the 2004 brood will be limited to 7 million ad clipped fish by reduced egg take, with the reductions taken at hatcheries having surplus returns.

The coho fisheries are very restricted, and thus the exploitation rates on coho have been very low. There are almost no fisheries inside Georgia Strait, in part because the fish are mainly off the west coast of Vancouver Island right now. And those on the west coast of Vancouver Island are mainly terminal. In addition, there are no mark selective commercial fisheries on coho, and most are non-retention for coho.

### C. Washington (WDFW, Tribes, USFWS)

**WDFW:** Mark Kimbel reported that WDFW's mass marking program for coho has been about the same for the past several years. With the exception of some minor conservation programs and one harvest allocation issue, WDFW is marking essentially 100 percent of the hatchery coho.

With respect to chinook, significant progress has been made in increasing the overall level of mass marking. Most of the production in Puget Sound is now being marked. However there remain a couple of issues being worked though with the Hood Canal Tribes involving about six million fall chinook from George Adams and Hoodsport hatcheries. WDFW remains hopeful that agreement can be reached soon and thus allow 100% marking.

Washington's coastal fall chinook stocks are not being mass marked now but will be in the future once funding is available. At this point, state funds are being used to pay for mass marking Tribal production. Congressman Norm Dicks has been asked to secure federal funding that would allow the Tribes to fund their marking programs. And if those funds are made available for the Tribes, then WDFW will transfer the state funds used by the Tribes over to mark the coastal fall chinook stocks in 2006 or 2007.

In the Columbia River, the spring chinook have been mass marked for a number of years but not the fall chinook. However WDFW expects the additional funding to be made available through the FY 2006 congressional budget and will be mass marking 16.4 million fall chinook in the lower Columbia River. Funding has already been secured for the marking trailers and they will be built and delivered in time for next year's expanding marking program.

With respect to mark selective fisheries, there are no changes for coho from last year. Selective fisheries are open in all ocean areas and areas 5, 6 and 7 in Juan de Fuca Strait. In addition, there is a summer/fall selective fishery in area 13 (lower Puget Sound) and the Buoy 10 fishery at the mouth of the Columbia River.

Chinook mark selective fisheries have a few changes from last year. The fishery in the Juan de Fuca Strait (area 5-6) is the same. However, in working with the Tribes, an additional mark selective winter fishery (Oct-April) was opened on Skagit and Snohomish stocks in areas 8-1 and 8-2. In addition, a new selective fishery on spring chinook was opened in the Skagit River.

**NWIFC:** Ron Olson reported that the Tribes fall under the federal mass marking mandate and have reached agreement to mark almost 100% of production with the exception of conservation groups and DIT groups. Congressman Norm Dicks funded the marking of Tribal fish production

not being currently marked by WDFW. This accounted for an additional 2 million chinook and 2 million coho. There are no Tribal mark selective fisheries.

**USFWS**: David Zajac gave "the short answer" by noting it was the law, and as such USFWS was in full compliance in marking all of its hatchery coho, chinook, and steelhead production, with the minor exceptions of conservation and DIT groups. A major accomplishment was the marking of 15 million spring chinook at Spring Creek NFH.

**D. Oregon (ODFW)**

Christine Mallette distributed a summary report on ODFW's marking program for 2005 (**Attachment 5**). The overall marking level for chinook and coho (brood 2004) and steelhead (brood 2005) was similar to last year's marking program. Counting all species, 27.2 million fish were proposed for marking in 2005. This included other marks with or without the Ad clip. Of these, 6.3 million are to be marked in coastal facilities and 20.8 million in the Columbia River.

Coho: 5.9 million are to be marked, with the lion's share (5 million) being done in the Columbia Basin. Combining Coastal and Columbia Basin marks, 500,000 are Ad+CWT, 4.6 million are Ad only and 700,000 are CWT only (DIT groups). This latter group includes 675,000 fish marked by USFWS at the Cascade Hatchery.

Spring Chinook: A total of 12.1 million spring chinook are to be marked, of which 2.6 million are coastal fish and 9.5 million are primarily from the Willamette River system. Of these 12.1 million fish, only 151,000 will not carry the ad clip and those are DIT release groups.

Fall Chinook: 2.8 million fall chinook will also be marked with the Ad clip, of which all but 600,000 will also carry a CWT.

DIT tagging: Christine noted that ODFW's trend over the past several years has been to reduce the number of DIT groups. The decline has been partially due to insufficient funding and partially due to a desire to increase the proportion of harvestable hatchery releases. At this point, there are only two DIT groups for coho, one being a 25,000 group representing the Rogue River stock, and a 25,000 group from the Sandy River, a tributary to the lower Columbia River below Bonneville Dam.

Spring chinook are represented by a 50,000 DIT group from the Rogue River on the South Coast and two 50,000 DIT groups from the Willamette River (McKenzie River and Clackamas River). Due to current non mass marking policy for fall run Chinook, there are no DIT groups scheduled for the 2004 fall chinook brood.

Selective fisheries: Oregon's proposed 2005 selective fisheries are detailed in **Attachment 6**:

1) Willamette Spring Chinook: The 2005 forecast harvest is 116,900 fish *(*see note)* with a 10% wild and 90% hatchery composition. The expected adipose clip mark rate is projected at 96% on hatchery fish and 86% on the aggregate run. Oregon is implementing the tangle net fishery to allow live capture and release of upriver listed spring chinook stocks. All sport fisheries in the Willamette Basin are restricted to marked fish only, with a 7 day/week selective fishery now underway.

**Note: May 3: While this fishery is continuing, the number of returning spring chinook to the Willamette River is far below normal. See note below for Upriver Spring Chinook.*

2) Upriver Spring Chinook:
A continued strong upriver spring chinook return (254,100) is forecast for 2005 *(*see note)*, with a run of 75% hatchery fish. The expected Ad clip rate is 65% for the total run, thus allowing a potential selective sport fishery on marked fish in both the mainstem and tributaries.

**Note: As of the week of April 15, only 200 adult spring chinook had crossed Bonneville Dam, far below the average 25,289 count for this time of the year. No satisfactory explanation is available to account for the dismal returns. May 3: This picture has not gotten much better with increasing time. It is unlikely that a selective fishery will be held.*

3) Summer Chinook: The 2005 forecast is 62,400 fish, down roughly half of last year's projected run. Plans call for a limited sport selective fishery for adipose fin marked fish, as well as Treaty Indian ceremonial and subsistence fisheries but nothing has been finalized yet.

4) Fall Chinook: The 2005 fishery is currently being negotiated by the parties to 'U.S. vs. Oregon'. There have been no discussions about a mark selective fishery on fall chinook.

5) Coho: The 2005 ocean sport fishery will include a selective fishery on adipose marked hatchery coho. Hatchery coho quotas off the central Oregon coast and off the Columbia River mouth are 40,000 and 60,900 fish, respectively. In addition, the Buoy 10 fishery is expected to harvest about 20,000 marked coho. There may also be Columbia River mainstem and Select Area gill net fisheries focused on marked hatchery coho.

**E. Idaho (IDFG, Tribes, USFWS)**

Rodney Duke noted that IDFG has a long track record of mass marking and will continue to do so in the future. Upper management has become very supportive because the marking has allowed for successful selective fisheries on hatchery stocks in Idaho waters. A proposal is now being discussed on extending the sport fishery in the lower Salmon River all the way upstream to Stanley. However, the recent disappearance of the spring chinook may delay these plans.

Marking plans call for mass marking virtually 100% of Idaho's 2004 brood hatchery chinook, most of those being at the Rapid River and Clearwater facilities **(Attachment 7).** . Out of 11.2 million fish (expected production), 10.7 million will be adipose clipped. And of those, 1.6 million will also be given a CWT. Subsets of fish will also be given a pit tag. Idaho uses 100% electronic sampling in the sport fisheries and returns at the hatcheries.

The Rapid River spring chinook stock was dropped last year as Idaho's PSC indicator stock and replaced by the downstream Oxbow Hatchery fall chinook stock where approximately 100% of 200,000 fall chinook were Ad+CWT marked again this year. The shift in indicator stocks resulted from funding shortfalls, given PSC funding for tagging has been level funded for the past 19 years.

**F. California (CDFG)**

Bob Kano (CDFG) again reported that California has been mass marking its steelhead production for many years now but has no plans to mass mark chinook or coho. Likewise, there are no plans for a selective fishery on salmon.

Only visual sampling is used to recover CWTs in chinook. There is no sampling for tagged coho as coho can not be retained in California's commercial and sport ocean fisheries. This is to protect the Oregon Coast Natural coho stocks (OCN).

**6. Marking Variance Requests for Adipose-Only Marking Studies**

**A. Snake River stocks (IDFG)**

Rodney Duke noted that during last year's Mark Meeting, the Mark Committee decided that Idaho's mass marking plans did not have to be reviewed in the future (*see note*). Even so, Idaho's mass marking plans were reviewed earlier (see Agenda 5.E and **Attachment 7**).

*Note: The Mark Committee's decision was influenced by the fact that the PSC Selective Fisheries Evaluation Committee (SFEC) had reviewed Idaho's mass marking plans for spring and summer chinook and did not see an impact to the coastwide CWT system, due to the lack of marine recoveries. However, SFEC will be reviewing Idaho's fall chinook mass marking program again as these stocks do show up in some marine fisheries.*

Action: None required.

**B. Hells Canyon fall chinook (IDFG)**

Rodney also noted that his request for a marking variance for 2005 brood fall chinook at Oxbow Hatchery (Hells Canyon) was only for informational purposes for the Mark Committee (**Attachment 8**). 10,000 fish will be marked with a PIT and Ad clip and released in 2006 about this time. A companion group of 190,000 Ad+CWT fish will be released at the same time. A similar release group, discussed in last year's Mark Meeting, is scheduled to be released in a few days from Oxbow Hatchery.

Action: None required.

**C. Nez Perce fish marked with OTC**

The marking variance request to mark 300,000 Nez Perce Tribe spring chinook (**Attachment 9**) is also for informational purposes only. Rodney explained that IDFG was marking the tribal fish with an Oxytetracycline (OTC) mark only. The fish are destined for an upper Selway River release and part of the U.S. vs. Oregon agreement. Use of CWTs was not considered practical in terms of recoveries given the release site.

Action: None required.

**7. ODFW Marking Request Involving Use of Blank Wire**

Christine Mallette noted that she had submitted a formal marking variance request this year seeking approval to continue ODFW's blank wire marking program, identical to that approved in the past several years. In specific, 2005 plans call for blank wire tagging 430,000 Upriver Bright fall chinook for release into the Umatilla River (**Attachment 10**). This will be the last year that blank wire will be used for this stock. Starting in 2006, tagging will be done with agency only wire (i.e.: agency code 09).

The sole purpose of the Upriver Bright fall chinook blank wire marking is to identify and prevent straying of Umatilla River releases in the Snake River system. She noted further that they do have associated CWT groups.

Christine Mallette clarified that the ODFW blank wire releases would also be marked with an Adipose clip. She commented further that in the recent past, ODFW used to mark approximately three million Upriver Brights with blank wire for release in the Umatilla River. However in 2001, this was scaled back to the present level of 430,000 fish because of shrinking funds.

Table 2 (**Attachment 10**) provides a summary of observed CWTs and estimated blank wire recoveries from yearling fall chinook released from the Umatilla River and recovered coastwide by the various agencies. Over the past 11 years, Alaska had the highest yearly mean of 137 estimated blank wire recoveries, followed by British Columbia's 87 yearly recoveries.

Action: ODFW's proposal for blank wire tagging in 2005 was approved. This proposal will be reviewed yearly as stipulated in the Regional Agreements. Mark Committee members also expressed appreciation for the analysis of the blank wire marking on recovery agencies.

**8. Significant Changes in Agency Tagging Levels for 2005**

Only a few agencies noted any changes of substance in their respective marking programs.

| | |
|---|---|
| ADFG: | Stable tagging ( ~ 2 million chinook and 2 million coho); Chum tagging dropped |
| MIC | Stable levels |
| NMFS: | Stable: tagging ( ~ 170,000 chinook) |
| CDFO: | Chinook: decrease of 300,000 down to 2 million. Tagging mainly limited to indicator stocks. Only one DIT group (Chilliwack Hatchery)<br>Coho: down from 830,000 two years ago to 470,000 today (all indicator stocks)<br>DIT groups down from seven to two (Inch Creek and Quinsam)<br>Very limited experimental or production tagging that is not associated with indicator stocks |
| WDFW: | Stable: tagging ( ~ 19 million). Possible decrease of 2 million next year<br>Also will be looking at reducing DIT groups as cost saving measure |
| NWIFC: | Stable: tagging ( ~ 3.5 million chinook and coho) |
| ODFW | Stable: tagging ( ~ 6.3 million chinook, coho, and some steelhead) |
| USFWS | Stable: tagging ( ~ 5 million) |
| IDFG | Stable for CWTs (~1.6 million chinook); Marking up 25% over last year |
| CDFG | Stable: tagging ( ~ 4.5 million chinook and steelhead) |
| CRITFC | Minor increase at Cherry Lane Hatchery (Nez Perce Tribe) |

**9. Electronic Sampling: Results in 2004 and Plans for 2005**

**ADFG**: Ron Josephson presented three brief reports with graphs (**Attachment 11)**.

1) Impact of Mass Marking on Alaska's Sampling Program

Ron first focused on adipose clipped chinook without a CWT. His first graph (see **Attachment 11, page 2**) plotted the percent of adipose clipped chinook without tags taken in their S.E. Alaska winter and summer troll fishery. Pronounced spikes of mass marked chinook have occurred each winter, starting in 2001 and growing in magnitude and duration in 2002 and 2003. The highest percentages occur in the first few weeks of January and peak out at 60% of the landings. Tag recovery data suggests the majority of the clipped but not tagged fish are Willamette River stocks during this period of time. The spike in 2005 was less pronounced and believed due to the reduced presence of the Willamette River stocks.

Graph 2 (**Attachment 11, page 3**) shows the percent of the adipose clipped chinook without tags in the Alaska troll fishery by year. Years 1999 through 2001 ranged from 7-9%. However, in 2002, it jumped to 25%, and then 30% in 2003 and 2004, and then reaching 36% in 2005. This latter data point is artificially high as it represents only the winter fishery and is expected to drop once the summer fishery results are added in.

Graph 3 (**Attachment 11, page 4**) plots the total troll catch by year (vertical bars) against the percent of the landings visually sampled (solid line). For years 1999 through 2001, the sampling percentage ranged between 37 and 44%. However, with the subsequent sharp increase in catch in recent years, visual sampling effort has declined to 26% in year 2004.

Graph 4 (**Attachment 11, page 5**) models the potential impact of Washington and Oregon's expanding mass marking of spring chinook and the expected marking of fall chinook in terms of percent adipose clipped fish in Alaska's troll fisheries. The left most vertical bar shows that from 1990 through 2000, less than 6% of the chinook had adipose clips, and of those, only a very few did not have a tag. This changed from 2001 through 2004, with a four year average (sixth bar from left) of ~5.5% with adipose clips + CWT and another 2% with the adipose only mark.

For 2006-2009, Ron added the projected impact of USFWS tagging of fall chinook, along with that of Washington and Oregon. And finally for 2009 and beyond, another 3% or so was added for further potential impacts expected from mass marking in Oregon and Washington. Hence ADFG can potentially expect to see the rate of adipose clipped fish in the troll fisheries go from the usual 6% to 18%. And in a fishery with about 300,000 fish landed, this will represent handling some 50,000 fish (depending on sampling rates), most of which will not carry a tag (Graph 5: see **Attachment 11; page 6**).

2) ADFG Results from Tests of Tag Detection Wand in SE Alaska (2004-2005)

Ron Josephson presented results on the efficiency of the wand to detect tags in heads sampled in the troll fishery (**Attachment 11; page 7**). During field use in Sitka, a total of 715 fish were wanded. Of these, 424 tags were correctly identified with 6 false positives, and 284 no tags were correctly identified, with one missed half length tag. A similar pattern was seen in the CWT Lab where 2,362 fish were wanded. Of those, 1,407 tags were correctly identified with 1 false positive. Another 952 no tags were correctly identified, with 1 missed full length tag and 1 half length tag. Ron concluded that the wand was almost 100% accurate at finding tags.

*Note: May 5, 2005*: Ron forwarded additional test results to the Mark Committee on the efficiency of the wand. *These new totals were hand entered on the left side of the summary table on **page 7 of Attachment 11.*** He found that his sampler hadn't missed a full length tag until the last week of the fishery. Things were more pressured that last week and the sampler then missed four standard tags as well as one half length tag. The tags were subsequently picked up in the lab with a wand. But it did illustrate how sampling efficiency can be negatively impacted when samplers are under pressure.

Ron also commented that they had initially had a lot of trouble in Sitka where the wand kept beeping. Occasionally they could find pockets in a plant where the wand would work but it was very spotty at best. And yet, when the wand was taken to Ketchikan, it performed well without the random beeping. NMT initially sent a different wand to test with the same results, later Lee Blankenship visited and after consultation with Dr. Keith Jefferts they realized that the wands were responding to a radio signal in town. Accordingly, the wand was retrofitted with a filter to remove the effect of the radio signal and it then worked correctly. Ron also reported that the almost as good of result could be achieved by covering the wand's surface with aluminum foil.

3) Releases of Alaska Coho and Chinook with Thermal Marks

Lastly, Ron summarized total releases of coho and chinook in Alaska (**Attachment 11; page 8**), with releases broken out by:

a) thermal marked only
b) CWT and thermal marked
c) represented by CWT
d) non-thermal marked

The two graphs plot 'Millions of Fry' on the Y axis and 'Brood Year' from 1973 through 2003 on the X axis. Since approximately 1981, coho release groups have been primarily represented by CWTs. However, a low level of thermal marking was introduced in 1991 in conjunction with CWT marking and its use has continued to date. In addition, a small and growing component of the release production is now being represented fully by thermal marking.

Chinook releases show a somewhat different pattern. Like coho, release groups were primarily represented by CWTs throughout the 1980s. However, starting in 1991, a small but rapidly growing percentage of the releases were jointly represented by CWTs and thermal marks. In addition, a significant component of the production is now being released with only a thermal mark.

**CDFO:** Kathy Fraser addressed Canada's sampling programs. She noted that after two years (2002-2003) of attempting to direct sample the recreational fisheries, they reverted back to the voluntary head program in 2004. Fishers are encouraged to drop off heads of adipose clipped fish in receptacles stationed at various marinas, etc. All deposited heads are processed.

All commercial chinook and coho fisheries are direct sampled at the fish processing plants using electronic detection of clipped fish. The only exception is the Northern Troll where coho are visually sampled since so few DIT groups are encountered.

As noted last year, CDFO is not interested in DIT marked chinook, given that they do not have selective fisheries on chinook and are not mass marking them. As a result, the sampling program

in commercial fisheries is not looking for DIT tags in chinook having an intact adipose fin. All of the fish will still be electronically sampled. When an 'adipose intact' chinook goes through the tag detection tube and 'beeps' (i.e. tag present), the pertinent information will be recorded but no attempt will be made to later recover the tag. In the northern fisheries, the head will not be taken at all. However, in the southern fisheries, the 'beeped' heads will be stockpiled per PSC request until a resolution can be worked out. And lastly, in the case of the freezer boats, some DIT recoveries will be made as all heads are electronically sampled and there is no way to know if the fish were adipose clipped or not.

**WDFW:** Mark Kimbel reported that WDFW used electronic sampling for all of its fisheries and escapement, with the exception of visual sampling the fall chinook in the lower Columbia River tributaries. The same plan will be carried out in 2005 with some expansion of sampling made possible with the purchase of additional wands. Approximately 350 wands are now available statewide.

**NWIFC**: Ron Olson noted that the Tribes use electronic sampling everywhere, with the minor exception of a couple of escapement sampling programs on the coast where the fall chinook aren't mass marked yet. That is expected to change in the future.

**USFWS**: David Zajac likewise reported that the Service uses electronic detection everywhere except for those situations in which the fish aren't mass marked yet.

**ODFW:** Christine Mallette commented that ODFW management has undergone substantial changes but she didn't expect any change in the policy to use 100% electronic detection on all stocks except the fall chinook which aren't mass marked yet. And when the fall chinook are mass marked, they too will be electronically sampled.

**IDFG**: Rodney Duke again emphasized that Idaho is committed to 100% use of electronic tag detection.

**CDFG**: Bob Kano emphasized that sampling in California remains 100% visual for chinook landings. In addition, there is no tagging of coho, nor is retention of coho allowed in the fisheries.

**10. Status Report on the 'Future of the CWT Program: Challenges and Options' PSC Workshop (June 2004)**

Marianna Alexandersdottir (NWIFC) was asked to comment on the status of the promised report from the highly focused CWT workshop **"***Future of the CWT Program: Challenges and Options***"** held in Lynnwood, Washington in June 2004. She acknowledged that she has been involved in the subsequent deliberations of the expert panel but was not at liberty to comment on much beyond general plans for completing the report. A first draft is now completed and the eight panelists will be meeting in May to work on revisions. This second draft is then scheduled for distribution to a select number of anonymous reviewers. Once that review process is over, a third draft is targeted for early July, and it will be made available to all that are interested. The final report is then scheduled for the end of 2005.

Ken Johnson noted that he had been able to attend the workshop and thus was aware of the considerable interest shown by some of the panelists in the work by CDFO staff to evaluate the potential use of genetic markers for salmon management purposes. As such, he asked if CDFO was expecting to move strongly in the direction of genetic stock identification and what that might mean for the CWT program. Kathy Fraser replied that she hadn't had the opportunity to talk with staff that were involved in the genetic studies but emphasized that there was no coastwide program in Canada. Rather sampling was opportunistic and limited to the northern part of Vancouver Island. In addition, it is not able to provide age composition. She also noted that funding was not renewed for 2005, though staff involved in the project are clearly interested in continuing the work.

Sue Lehmann also commented that it was important to recognize that the CWT program was successful in spite of some of the current challenges. Marianne McClure then stated that most people seem to think in terms of either GSI (genetic stock identification) or the CWT system. But in reality, it ideally would be both systems being used together to compliment each other's strengths. She added further that with CWT indicator stocks being dropped coastwide because of cost considerations, it doesn't make sense to consider switching fully over to GSI given it is obviously very expensive as well. Ken commented in closing the discussion that answers will have to await the report when it is hopefully made public this July.

## 11. Report on PSC Selective Fisheries Evaluation Committee (SFEC) Activities

### A. Analytical Working Group (Marianna Alexandersdottir, NWIFC)

Marianna Alexandersdottir gave an hour long presentation on the work of SFEC's Analytical Working Group, with special attention to the goals and needs of Double Index Tagging. In addition, she discussed the need for 'Estimates of Mortalities of Unmarked DITs (EMUD) in selective fisheries (**Attachment 12; Slides 1-29**).

1) Goal of Double Indexed Tagging (DIT)

Double Index Tagging was introduced soon after Washington and Oregon began mass marking hatchery coho stocks in 1996 (brood year 1995) with the adipose clip. The mass marking allowed for eventual Mark Selective Fisheries (MSF) on surplus hatchery stocks while allowing release of the unmarked stocks, hatchery and wild. Up to this point, an Ad+CWT hatchery group was assumed to represent the wild stocks (adipose fin present) in fisheries. However, with the introduction of MSFs, the Ad+CWT hatchery fish could no longer represent unmarked stocks since the latter would be released if caught and thus mortalities would not be available to be sampled for a CWT.

This challenge to the indicator stock program was met by the introduction of DIT marking. DIT releases are comprised of two tag groups of identical fish: one is given the normal Ad+CWT mark, while the second group is given a CWT only (i.e. adipose fin left intact). Hence in a MSF, the 'unmarked' CWT only fish will be released and can represent unmarked wild production. The DIT group then provides a tool to evaluate the total impact of MSFs on the unmarked (i.e., natural) stocks (**Slide 2**) and to estimate unmarked mortalities and exploitation rates in MSFs..

The difference in total impact on the marked and unmarked DIT groups is done by comparing the proportions of the marked and unmarked DIT group released that return to the hatchery. The

key assumption is that unmarked DIT fish passing through a MSF are treated different (i.e. released) and thus should have a higher survival rate than the counterpart Ad+CWT fish group and a higher proportion would be expected to return to the hatchery of release.

DIT marking also provides estimates of exploitation rates. To do so, however, requires estimates of unmarked mortalities of unmarked DITs ('EMUDs) in MSFs. The need for EMUD estimates was discussed later in her presentation.

2) Role of the Selective Fishery Evaluation Committee (SFEC)

Marianna also briefly discussed the role of SFEC as a coast wide (excluding California) clearinghouse to facilitate the appropriate level of coordination between agencies involved in mass marking and MSFs. A Regional Coordination Working Group conducts both reviews of procedures and protocols for marking, sampling, and evaluation. The Analysis Working Group (AWG) is tasked with development and evaluation of methods for analyses of CWT data in the presence of MM and MSFs. In addition, AWG is tasked with developing and recommending procedures for estimating and reporting DIT mortalities in consultation with relevant PSC technical committees, and establishing database requirements (**Slide 3**). A summary of coho and chinook MSF proposals for 2005 is presented in **Slides 4-5**. There are 4 coho proposals (1 new) and six chinook proposals (2 new).

3) Analysis of coho DIT data.

The AWG did an analysis of coho DIT data (marked and unmarked) based on return data for 1998 through 2000 for Washington coastal and Puget Sound groups (**Slide 6**). The 1995 brood coho was the first to be mass marked by Washington and Oregon, and a small MSF was held in 1998. From 1999 onward, the MSFs have been approximately the same and held in coastal Washington (Areas 5-6), Strait of Juan de Fuca, north and south Puget Sound, and Hood Canal, as well as in Canadian waters. The analysis found that in non-selective fisheries (NSF), exploitation rates (i.e. total mortality) ranged from 23% to 38% for both marked and unmarked DIT fish. However in MSFs, the exploitation rate on unmarked DIT groups was less than 10%.

*Note: Read subsection 5 below on 'Estimation (or Imputation) of Unmarked Mortalities in MSFs' for procedures used to develop methods of estimation exploitation rates.*

The AWG report on DITs compared the proportion of unmarked to marked releases that came back to the hatchery (**Slide 7**),

$$(\overline{p}_u - \overline{p}_m)^{\wedge} = \frac{\sum_{i=1}^{n} \hat{p}_u}{n} - \frac{\sum_{i=1}^{n} \hat{p}_m}{n}$$

where $P_u$ equals the number of unmarked fish back to the hatchery divided by the number released. The expectation is that large MSFs would have a significant impact on a DIT groups and the difference in proportions returning to the hatchery would be statistically greater than zero. The analysis was done for every DIT marked hatchery stock, with the result that for the majority of stocks there was no detectable difference in impacts from the MSFs. She did note, however, that a significant impact was seen in 2000 (a high survival year) and also when combining the results for the Washington coastal stocks. In the latter case, the results made sense since the large pre-terminal fisheries on these stocks were mark selective.

She concluded that with this size of small MSFs, it will either require lots more tagging or more sampling in order to get statistically significant results. And since most hatcheries sample at near 100%, the only viable option is to substantially increase the level of tagging. Conversely one may decide that the impact of this size of MSF isn't worth worrying about. If so, then the tougher question is in knowing at what point does one worry about the impact of MSFs on exploitation rates.

Marianna noted that Lambda, $\lambda$, is the ratio of unmarked to marked fish in a DIT group and is the key component of the calculation of the mortality of unmarked DIT fish in MSFs. The challenge is how to get this number as it is not a fixed value. Before entering a mark selective fishery, the $\lambda$ value of the DIT group should be the same as at the time of release. However, once the DIT group later moves through a MSF, $\lambda$ will change given that marked fish will die at a higher rate than the unmarked fish. Since the unmarked fish is the numerator in the ratio, $\lambda$ will get larger as the DIT group moves through MSFs.

As concluded in the coho DIT report, for coho salmon, which largely mature and return to spawn at one age, as 3-year olds, $\lambda$ at the time of release and $\lambda$ at escapement can be expected to define the range of possible values. She also stressed that both values are potentially biased estimates but the size and direction of the bias can be evaluated. However for Chinook salmon, with multiple ages and a more complex geographical distribution and migrational behavior, this pattern cannot be assumed, and so estimation of $\lambda^F$ (see below) needed to estimate mortalities of unmarked DIT groups for Chinook will require a different strategy.

4) <u>SFEC – AWG Issues</u>

Marianna also noted that there are a number of outstanding questions that the SFEC-AWG proposes to address in a technical report over this next year. These questions include the following (**Slides 8-10**):

- Expansion of DIT analyses for coho and Chinook salmon.
- Can the DIT system provide useable estimates of unmarked exploitation rates in mark-selective fisheries for Chinook salmon?
    - The multiple-age and geographical structure of the Chinook salmon stocks complicates the potential for biased estimates of mortalities using DITs.
    - The size of this bias will be relative to the time and geographical location of the MSFs.
- Sampling programs that are being decreased, changed or lost?
- Are natural stocks encountered in MSFs (and other non-sampled fisheries) adequately represented by tagged DIT groups?
- Should DIT be continued?
    - What have we learned from analyses of DITs to date?
    - What are alternatives?
    - What are the technical consequences of each alternative to the management of coho and Chinook salmon natural stocks with MM and MSF?

5) <u>Estimation (or Imputation) of Unmarked Mortalities in MSFs</u>

Marianna then explained what MSF unmarked mortality is, why an estimate is needed, and how estimates are arrived at. In brief, mortalities of unmarked fish in MSFs are a non-landed

mortality that cannot be estimated from tags of the marked DIT group obtained through direct sampling of fisheries (**Slides 11-12**)

She noted that 'Exploitation Rate' and 'Cohort Analysis' mean essentially the same thing, both result in an estimate of the exploitation rate (ER). The Chinook Technical Committee tends to use the first term, while the Coho Technical Committee prefers the second term.

The question of why estimates of unmarked mortality is summarized in **Slide 13**:

Exploitation rate (ER) and cohort analysis -

$$ER = \frac{Mortalities}{Cohort}$$

- Mortalities in fishery(ies) includes landed and non- landed tagged mortalities
- Cohort includes all escapement, landed mortality, non-landed mortalities and natural mortality.
- Need all mortalities of tagged fish due to landed harvest and non-landed mortalities
  - Including mortalities of unmarked tagged fish in mark-selective fisheries

Continuing, Marianna explained that the unmarked mortalities ($\mathbf{U^F}$ ) in MSFs are "imputed" using one of several possible methods, including the 'Paired Ratio' Method (**Slides 14-16**).

$$\hat{U}^F = \hat{M}^F \lambda^F sfm^F$$

- MF is the estimated mortality of marked tags sampled and expanded for the DIT group in the MSF, and can be obtained from RMIS.
- Lambda, λF, is the estimated ratio of unmarked to marked tagged fish for the DIT group in the MSF, and is a function of stock and location of fishery relative to the migration path and other MSFs.
- sfmF represents the release mortality rate and is a function of the fishery, species and size of the fish, and is a value already available and used by technical committees.

Knowing how many marked fish died in a MSF and the unmarked to marked ratio (Lambda, $\boldsymbol{\lambda^F}$) for the DIT group vulnerable to that fishery, one can then multiply the two to get what is defined as "Encounters" of unmarked DIT fish. That value is then multiplied by the Release Mortality Rate, $\mathbf{sfm^F}$, assigned to that fishery to derive the unmarked mortality estimates.

Marianna then listed exactly what is required to estimate these unmarked mortalities (**Slide 17**).

- DIT group information – RMIS release database
  - DIT group number
  - Marked and unmarked tag codes
- Marked tags sampled and expanded – RMIS recovery database
- Estimate of unmarked to marked ratio, λ
  - Release λ – RMIS release database
  - Escapement λ – recovery database
  - Paired fishery λ – recovery database
- Release mortality rate, sfm - ?

- Information on fishery (Regulations database not yet defined)
  - Mark-selective fishery? – recovery database, regulations database
  - All tagged recoveries processed? - ???
  - Sampled electronically? – recovery database, catch-sample file

With respect to the last item, she emphasized that there has always been some none selective fisheries where unmarked tagged fish aren't sampled, generally because CWT sampling is visual only (e.g., Alaska). However, there is a new situation in which a non selective chinook fishery is being electronically sampled but unmarked fish are not being processed. All of these types of information need to be reported and available on RMIS for use by the PSC technical committees.

6) Recommendations

A fair amount of work has already gone into moving forward on the issues highlighted above (**Slides 19-28**). During a Joint Meeting of SFEC, CTC, and CoTC (January 2005), consensus was reached that:

- Estimates of unmarked mortalities or "imputed" mortalities are necessary for exploitation and cohort analysis.
- A joint workgroup should put together a plan for accomplishing the goal of providing these imputed mortalities, what information was necessary, how the estimates should be made, who should make them.
- The SFEC-AWG would provide the methods and algorithms needed to make the estimates.

In addition, during a November 2004 meeting of SFEC and Data Standards, SFEC recommended that recovery agencies would be responsible to provide estimates of unmarked mortalities. The 'Estimated Mortalities of Unmarked DITs' (EMUD) would be stored in a permanent database on RMIS – Option A

Additional discussion since the November 2004 meeting noted that it would be difficult at best for recovery agencies to provide estimates of Lambda at release and/or recovery. So during the Joint meeting of the SFEC, CTC and CoTC another option was recommended, that the estimation program would reside on RMIS for users to make estimates of unmarked mortalities in MSFs and in fisheries where unmarked tagged fish are not sampled or not processed and these would thus automatically include any changes due to changes in release, recovery or regulations tables.– Option B

In both options, the release and recovery agencies would be responsible for providing and updating data on:

- release and recovery information for DITs
- reliable information on MSFs for the fishery regulation database
- sampling methods in recovery database
- whether unmarked fish were processed

In both options the SFEC, CTC and CoTC staff would have to decide on:

- Inputs (fishery, DIT group, $\lambda$, sfm) depending on estimator
- Outputs – EMUD table as one output, other reports

In both options the SFEC-AWG would provide algorithms for estimating the unmarked mortalities but in option A the SFEC-AWG would be fully responsible for all implementation, while in option B the SFEC-AWG would work closely with Mark Center staff in developing RMIS programs and the RMIS staff would provide expertise on how to implement on RMIS

Marianna stressed that these options are still in flux. However, it increasingly appears Option B above is the most logical approach for all concerned. She concluded her presentation by noting that this method for estimating unmarked mortalities should be used in a variety of situations including:

- Mark selective fisheries
- Other fisheries that are non-selective? For example:
  - Fisheries with visual sampling (Alaska, NBC)
  - Recreational fisheries where voluntary recoveries are used
  - Fisheries where unmarked and tagged fish are not processed – Canadian Chinook non-selective fisheries.

Key question for Release and Recovery Agencies: Will your stocks be impacted by MSFs? If so, valuable information will be lost if estimation and reporting of unmarked mortality in MSFs is ignored.

**B. Regional Coordination Working Group (Ron Olson, NWIFC)**

As U.S. co-chair, Ron Olson reported on recent activities of the Regional Coordination Working Group (RCWG). Current membership consists of Sue Lehmann (Co-Chair; CDFO), Ron Olson (Co-Chair; NWIFC), Ken Johnson, Ron Josephson, Marianne McClure, and Mark Kimbel (**Attachment 13; Slides 1-2**). He noted that the group was small and lacked an Oregon representative. However, Christine Mallette has volunteered to fill in until ODFW appoints a replacement. He also thanked David Zajac for his much appreciated help in providing USFWS information as needed.

The RCWG has two basic tasks as assigned by the PSC Commissioners (**Slide 3**). The first is to produce an annual report on mass marking, DIT releases, sampling, and mark selective fisheries. This task has proved more challenging than expected, with the result that the report is both larger than hoped and not timely. However, the 2004 report is now available at PSC's website.

RCWG's second task is to provide an annual review of mass marking proposals to evaluate potential impacts on the CWT system. The remainder of today's presentation is an overview of our evaluation of the 2005 proposals.

With respect to coho, the 2005 mass marking proposals were about the same as in 2004. The total number mass marked is 37 million fish, down 1.5 million from last year because of minor program reductions. There are 23 DIT groups, a slight reduction from previous years (**Slide 4**).

For chinook (**Slides 5-6**), there are 16 DIT groups, of which half come from the Puget Sound area. As such, there is not a very even distribution of these representative groups. Total releases of mass marked chinook are projected at 64 million fish. This represents a substantial increase over 2004, in large part because of three new mass marking proposals to mark 21.5 million fall

chinook on the Washington coast and in the Columbia River. An additional 25 million mass marked fall chinook from the Columbia River are expected to be added in 2006.

Projected fishery encounters of brood year 2004 mass marked chinook (**Slide 7**) were generated by the marking agencies and not standardized in terms of procedure. However, it still gives an excellent idea of the relative impact by State/Province. The highest encounters (130,089), not surprisingly, are expected in the Columbia River, followed by Washington (89.539), Canada (74,337), Alaska (26,940), Oregon (24,008), and California (8,005). The significant increase of encounters for Alaska and Canada will mainly come from the newly mass marked fall chinook.

With respect to sampling methodologies for coho (**Slide 8**), electronic sampling is used in all the southern areas. In Canada, visual sampling is done for the sport fisheries. Ron noted, however, that with the restricted coho fisheries in Canada, it is unlikely that many unmarked DIT coho are being missed. In Alaska, no DIT recoveries are possible since sampling is visual.

Electronic sampling of chinook landings is even less complete (**Slide 9**). Puget Sound, Washington coast and the Columbia River are the only areas where sampling is fully electronic. Sampling is visual in California, the Oregon coast and Alaska. In addition, Canada does use electronic sampling but is not recovering tags from unclipped chinook that appear to be carrying a CWT. As noted earlier in the Mark Meeting, this issue has been elevated to the PSC commissioners because of the funding problems being encountered by CDFO.

Ron summarized by noting that there is a 48% increase in mass marking of chinook, largely because of U.S. Congressional mandates now requiring the mass marking. Unfortunately, the federal language is unclear and conflicting in some cases. It is expected that the mass marking of fall chinook will add about 4,000 addition untagged fish in Alaska's sampling program (up 145%) and 12,800 to Canada's sampling program (up 48%). Lastly, the sampling methodologies continue to differ by agency and DIT marking has also been reduced (**Slide 10**).

Summary of Key Issues and Concerns:

1. MM, DIT programs, and CWT Programs are no longer synchronized between agencies.
    a) The southern U.S. is rapidly expanding MM of northern migrating chinook;
    b) There are proposals to expand the number of Chinook MSFs;
    c) The DIT marking program is shrinking instead of expanding; and
    d) Conservation groups are continuing to be tagged without the ad-mark.
2 Conversely, Alaska has no plans to convert its visual CWT sampling program and Canada (due to budget cuts) is no longer recovering tags from non ad-marked fish.
3. No further agency conversions to ETD are planned because of the high costs.
4. The DIT program is not standardized, and technical consensus is needed on implementation of this program
5. The lack of uniformity of sampling methods continues to raise concern regarding the impact of MM and MSF on the CWT system.
6. These differences will impact analysis by PSC technical committees, the ability to assess MSFs, and impact other evaluation programs (**Slides 11-12**).

Conclusion:

1. The impacts of previous MM programs were generally considered acceptable. The new marking of northern migrating Chinook and the current sampling discrepancies have impacts to sampling programs and analytical programs that have not been resolved.

2. *However, the CWT system remains completely functional for ad-marked CWT fish. It also still remains the only method available to the PST for estimating and monitoring coastwide exploitation rates on individual stocks of coho and Chinook (**Slide 13**)*

**12. November 2004 Meeting of Data Standards Committee**

**A. Proposed changes for new Data Exchange Format 4.1**

Agenda item tabled in the interest of time. Minutes of the Data Standards meeting on November 17-18, 2004 were provided as a handout to meeting attendees.

**B. New file to capture Estimated Mortalities of Unmarked DITs (EMUDs)**

Agenda item covered in full by Marianna Alexandersdottir (see Agenda 11-A).

**C. Proposal to Unroll Tag Code Release Records (Brodie Cox, WDFW)**

As promised at the November 17-18, 2004 meeting, Brodie Cox presented a more detailed WDFW proposal to modify the data exchange specifications for release data to allow unrolling tag code release records. This would allow release agencies to report key data now lost when combining various subgroups that have non-standard releases at different sites, times, sizes, etc.

Brodie began his presentation by asking the question: "How accurate is the Release data on RMIS?" WDFW's proposal to submit unrolled tagged Release data for 2005 would provide a far better picture of their Release data. In addition, it would address a number of concerns raised at both last year's Mark Meeting and the later November 2004 Data Standards Meeting, as well as a number of RMIS end users.

WDFW's position is that the current data reporting format is inadequate for relaying the complexities of WDFW marking and tagging combinations. This is particularly true (but not limited to) for their Snake River Lab originated studies. The present Release format is CWT-centric and gives 4 fields in which to portray marks and counts:

# Tagged (Mark1)
# Tagged (Mark2) *(Generally thought of as bad Clip)*
# Untagged (Mark1) (*Thought of as # Shed Tag*)
# Untagged (Mark 2) (*Thought of as # Unmarked and Untagged*).

Version 4.0's established format for release data is very limiting for reporting of actual counts and quality control breakdown for more complex marking schemes. Examples include use of PIT tags, Visual implants, Blank wire, Freeze Brands, etc which are often used in combination with the standard AD+CWT Mark/Tag combination. Other uses include situations where not all fish within a tag group are bearing a consistent combination of marks.

Brodie illustrated a number of releases from the Snake River that had a variety of other marks, etc that aren't easily captured by the present format. This included CWT + VIE

(visual implant), a subset of AD+CWT fish marked with a PIT, accidental Adipose clips, and freeze brands. In addition, he highlighted a number of tag codes that had multiple release sites. As an example, tag code 630470 has three release sites (Rock Island Dam tailrace, Rocky Reach tailrace and Col.R @ Turtle Rock). Tag code 630542 from Washougal Hatchery is more problematic in that four 'plants' were made into the Washougal R 28.0159 and four other plants into the Klickitat R 30.0002. As a third example, tag code 630766 was released from the Elochoman Hatchery into the Elochoman R 25.0236 and also from the Beaver Cr Hatchery into Beaver Cr 25.0247. He concluded that unrolled tagged records would allow for full disclosure of Mark/Tag combinations and quality control issues where known. It would also address a number of other limitations with RMIS release data which are related to the rolling up process.

Besides Mark/ Tag clarification, other benefits would include:

- Eliminate confusing and often inaccurate combination location codes for release sites.
- Elimination of confusing combination location codes for hatchery or rearing sites.
- Greater clarification of release dates.

Unrolled tagging records will also resolve many of the issues brought up in last year's Mark Meeting in Lewiston, Idaho, and discussed further during the November 2004 meeting of the PSC Data Standards Group.

- Interpretation and reporting of Shed tags for fish of differing marks.
  (2004 Mark Mtg agenda #4: Marianne McClure - CRITFC; echoed by NMFS).
- Determination of '% Retention' of various marks where greater than one mark is used
  (2004 Mark Mtg agenda #8-b3: WDFW Snake R Lab - Biologist Debbie Milks)
- Potential answer to Blank Wire use in combination with other marks.
  (2004 Mark Meeting Agenda #8-b2: Chris Harrington - IDFG)

(*Note: Unrolling tag release records would not resolve the issue of more than two marks on fish. This would require a revision to the way marks are reported*).

Brodie concluded by stressing that his presentation was informational only for the Mark Committee. The actual mechanics of unrolling will have to be further addressed within the PSMFC Data Standards Group. He also added that it was his understanding from the SFEC – Data Standards meeting that the Mark Center was supportive of modifying RMIS to handle unrolled release records. In addition, this effort will greatly benefit ongoing data management efforts of the regional StreamNet database system also housed at PSMFC.

Discussion: Sue Lehmann (CDFO) referenced the example given in which tag code 630542 had releases into both the Washougal and Klickitat rivers and noted that this unrolled information wasn't useful to Canada since release sites can't be identified at the time of recovery. She argued that it would be far better to simply use two tag codes to keep the release sites unique. Mark Kimbel explained that these particular fish were placed in an earthen release pond after being tagged and can't be fully moved out, thus resulting in some mixing with a subsequent stock released at a different location. Sue acknowledged the problem but reemphasized that recoveries can't be tracked back to multiple release sites. Hence CDFO only needs one release record for a given release.

Brodie responded that even from the recovery agency's view, it would be important to know what the relative proportion of fish were released at each site. Marianna Alexandersdottir asked why WDFW didn't simply use different tag codes. Brodie agreed it would have helped but that is not what happened. Similar situations crop up all the time and data managers have to try and fit the facts into the reporting format.

Sue suggested that the basic question was whether or not Canada's MRP system and the Mark Center's RMIS system are basically an Adipose and CWT based system or are we now looking at adding in all of these other marks such as VIE's and PIT tags, etc. Kathy Fraser added that from Canada's perspective, the system is indeed CWT – centric as that is what is needed for data exchange between the U.S. and Canada. She also acknowledged that the U.S. perspective may be different because of new needs that the proposal could help meet. However, she argued that the proposed changes represent a significant structural change to the CWT database and thus needs to be evaluated through the PSC established Terms of Reference for data exchange.

Brodie noted that WDFW was indeed planning on submitting a formal proposal for review by either the PSC Data Sharing Committee or Data Standards. He also noted again that his presentation to the Mark Committee was informational only, with the main intent of getting feedback from those present who also serve on Data Standards Committee as well as potential users of unrolled release data.

Rodney Duke commented that the CWT database keeps growing from year to year as new requirements are placed upon it. And in his view, it has now become so complicated that few really understand it anymore. As such, he suggested that perhaps it was time to consider splitting the system into two databases. One should be focused totally on CWT data needs, and the other on all other related mark information. Mark Kimbel concurred with Rodney's viewpoint. Rodney added that the issues aren't going away but only getting more complex. He said that he gets calls almost daily asking for detailed information on Idaho's marking programs, most of which don't directly relate to CWT usage.

Ken Johnson affirmed that the Mark Center was supportive of the WDFW proposal as earlier indicated by Brodie. It is clear that U.S. needs aren't being fully met by the current Version 4.0 data exchange specifications. He also added that the world is rapidly moving towards wide spread use of GIS systems where information is layered. As such, WDFW's proposal would support the Mark Center's gradual movement towards implementation of GIS based applications for CWT and other mark information.

Ken also expressed one key concern that the proposal would not work for the Mark Center unless the release agencies reporting unrolled release data also continue to provide a single composite record. He emphasized that there is no way that the Mark Center could take responsibility for rolling up release records for exchange with those agencies who only want rolled up data. Brodie commented that indeed WDFW's proposal is that they only provide the unrolled records to RMIS, and that RMIS in turn only provide the unrolled records to other agencies. Ken then concluded the discussion with the comment that there obviously was a lot of work yet to be done to reach agreement with all parties.

Action: None required. WDFW will submit a proposal through appropriate PSC channels.

**13. Otoliths as a Mass Marking Tool (Ron Josephson, ADFG)**

Ron Josephson gave a very interesting Power Point presentation entitled "Pacific Salmon Otolith Marking in Alaska". In his talk, he covered the growth of otolith thermal marking in Alaska, the various uses of thermal marking, and a description of ADFG's thermal mark database. The 39 slides are provided in **Attachment 14**. The first slide shows ADFG's otolith lab in Juneau where the otoliths are ground and prepared for reading.

Thermal Marking in Alaska

ADFG got into thermal marking of otoliths in the early 1980s when the agency started to explore possibilities of stocking Turner Lake near Juneau (Attachment 12: **Slide 3**) with sockeye salmon. The barrier lake drains to the north into Taku Inlet where 60,000-100,000 fish are harvested annually from a run of Taku River sockeye. The decision was that the lake could be stocked only if 100% of the fish were marked. This led into developmental research on mass marking of otoliths by exposing juvenile fish to cyclic changes of water temperature in the hatchery rearing facilities. Ironically, the thermal marking technique was found feasible and effective, but Turner Lake was never stocked.

Sockeye salmon hatchery production in Alaska began in the early 1970s (**Slide 4**). Most of the yearly production (40-70 million fry) wasn't marked until the late 1990s. Beginning in1983, CWTs were used to mark a significant portion of the production. Thermal marking began in 1989 and now represents nearly all production. CWTs were discontinued in 2001. A similar pattern is seen for pink salmon (**Slide 5**) where the hatchery production (400-900 million fry) was mainly represented by CWTs from 1987 through 1994. In 1995, thermal marking was introduced on a large scale and coupled with CWT representation. CWTs were discontinued in 1996 and thermal marking now represents roughly 750 million of the total 950 million fry production. A somewhat similar pattern is also seen for marking Alaska's chum salmon (**Slide 6**). CWTs were used extensively from 1981 through 2002. Thermal marking of chum began in 1991 with a crossover year in 2002. Today only a small percentage of the chum hatchery production is not represented by thermal marking.

Uses of Thermal Marking

Thermal marking has proved to be very effective for management of terminal fisheries where massive numbers of wild and hatchery fish are co-mingled and need to be sorted out (**Slide 7**). In addition, hatchery managers use thermal marking to estimate survival rates and contribution rates of the hatchery stocks to the fisheries. Most of the hatcheries in Alaska are run by aquaculture associations. Thus member fishermen of a given 'Coop' want to see that harvest levels of a given hatchery's production justify the costs of running the hatchery.

In summary, thermal marking has several advantages over CWT marking when dealing with large fisheries and excessive numbers of fish, such as the pink salmon production in Prince William Sound (**Slides 8-9**). Thermal marking is less expensive than CWTs and can be used to mark 100% of a hatchery's release. Sampling also is simplified as 100 to 500 representative thermal marked fish are required for the given area/time sampling stratum. In contrast, CWT sampling typically has a goal of checking 20% of the landings.

Thermal marking was also found to give more accurate in-season estimates in the few comparative studies done with the pink salmon fisheries in Prince William Sound. The pink salmon harvest is highly variable, ranging from less than 5 million to 35 million during 1990 through 2003 (**Slide 10**). CWT sampling was done from 1990 through 1996, and the number of fish handled ranged from 0.6 to 4 million (**Slide 11**: white line; scale on right side). With the crossover to thermal mark sampling in 1997, the number of sampled fish dropped precipitously to roughly 10,000 fish (**Slide 12**). The thermal marking sampling is done by treating each tender as a discrete sampling unit. And knowing the approximate number of fish on board, the sampler uses a timer to know when to pull another fish off the conveyor belt. The data are then used to get an in-season estimate of the ratio of hatchery to wild fish in the fishery.

The year 1997 was the only time when both sampling methods were used for the pink salmon fisheries in Prince William Sound. Using the in-season CWT data, the hatchery to wild ratio was estimated at 60%, while the thermal mark estimate was 93% hatchery production (**Slide 14**). (*Note that there are 2 vertical bars for 1997 in this figure!*). And after further post season analyses, the CWT estimate was adjusted upwards to 90% enhanced production.

In Southeast Alaska, the fisheries are smaller but the concerns for wild stocks are just as strong. The 2004 sockeye gillnet fishery in Taku Inlet (District 111) near Juneau provides an excellent example of how otoliths are used by fishery managers (**Slides 16-17**). Snettisham Hatchery production is a major component of the fishery, in addition to wild fish from the fjord. During the fishery, samplers weekly take 400-600 fish from each of the two fishing areas. To get accurate catch location data, they board the tenders and take 40-50 fish from each delivery until their quota is reached. Samples are taken back to the Juneau lab where they are processed and read in a couple of days. The data are then entered into the database and fish managers can use the Mark Summary Report Form (Slide 18) to pull up the latest summary of catch data in terms of hatchery vs wild stocks (e.g. **Slide 19**). Wild fish are first to come through Taku Inlet, followed by a growing dominance of hatchery production in the gillnet harvest (**Slide 21**).

Thermal Mark Labs and ADFG Database

There are at least five thermal mark labs in Alaska, including ADFG's main lab in Juneau, a satellite lab in Cordova, and labs maintained by aquaculture associations (DIPAC, SSRAA, and NSRAA) (**Slides 22-23**).

ADFG's Juneau lab maintains all thermal mark release records for Alaska, including the associated otolith images for each release. In addition, users may obtain thermal mark reports by going to the website www.taglab.org and selecting 'Mark Lab' (**Slides 24-25**). One can also get both CWT and thermal mark release data by selecting the 'Online Tag Reports. Examples of the Hatchery Release Report are provide in **Slides 26-28**, along with an example of an otolith image of a release group from Hidden Falls Hatchery (**Slide 29**).

ADFG also shares its otolith data with an international Thermal Mark Database maintained by the North Pacific Anadromous Fish Commission (NPAFC). Their website is **npafc.taglab.org** (**Slide 30**). Examples of the data retrieval forms and otolith images are provided in **Slides 31-32**. **Slide 33** shows three possible origins of a given otolith pattern (i.e. the same otolith mark used in the same time period for fish released by Russia, Japan and Alaska). Multiple use of a code results from having a limited number of good marks.

**14. Update on Use of Calcein as a Mass Mark (Ron Josephson, ADFG)**

Agenda item tabled. Ron noted that he didn't have any updates since last year's report to the Mark Committee. He did mention that there is a poster describing some recent work with Calcein which can be viewed at:
http://www.afsc.noaa.gov/abl/MarSalm/documents/dm2004postertownsville.pdf

**15. High Seas Sampling Program** (Adrian Celewycz, NMFS)

Adrian Celewycz (NMFS-Alaska) presented his annual review of the high seas sampling program for CWT-marked fish. His complete report is provided below:

**High-seas coded-wire tag (CWT) recoveries in 2003**
By Adrian Celewycz, NOAA Fisheries, Auke Bay Laboratory
Presented to Annual Meeting of the Regional Mark Committee,
Pacific States Marine Fisheries Commission, Tofino, British Columbia, Canada,
April 21, 2005

U.S. Domestic Groundfish Trawl Fisheries: In 2003, observers on US groundfish vessels in two domestic trawl fisheries on the high seas in the Gulf of Alaska and Bering Sea recovered 34 CWTs from a total of over 125,000 salmonids examined for tags. Chinook salmon comprised 94% of tagged fish recovered in these commercial trawl fisheries, with chum salmon comprising the remaining 6%. All salmon are considered prohibited species in these high seas trawl fisheries and are harvested only as bycatch.

1) North Pacific Ocean: In the 2003 trawl fishery targeting whiting in the North Pacific Ocean off Washington-Oregon-California, over 3300 salmon were examined for CWTs: 63% chinook salmon, with coho salmon, pink salmon, and chum salmon comprising the other 37%. In 2002, responsibility for processing and reporting CWTs from the salmon bycatch of the whiting fishery passed from the Alaska Fishery Science Center (AFSC) of NMFS (or NOAA Fisheries) to the Northwest Region (NWR). No CWTs from this fishery have been reported into the PSMFC coastwide database for 2002 or 2003.

2) Gulf of Alaska: In the 2003 trawl fishery in the Gulf of Alaska, Chinook salmon was the only species with CWT recoveries. Of the total of 2273 salmonids examined for CWTs, 60% were Chinook salmon, and 40% were chum salmon. Of the 1341 Chinook salmon examined, 9 CWTs were recovered for a tag occurrence rate of 0.7% for Chinook salmon. This tag occurrence rate was about a third of the tag occurrence rate of 2.0% in 2002. Because the total bycatch of chinook in this fishery was 15,652, a rate of 11.7 can be applied to the 9 CWT recoveries to come up with an approximation of 105 CWT Chinook salmon in the total bycatch of Chinook salmon in the trawl fishery in the Gulf of Alaska in 2003. This approximation of 105 CWT Chinook salmon is 41% of the approximate number of 255 CWT Chinook salmon in this fishery in 2002. This approximation should not be considered an "expansion", however, because a true expansion would be calculated on a vessel-by-vessel basis in this fishery and would take into account the ratio of marked-to-unmarked fish released for each tag code. This approximation is calculated simply by multiplying the number of CWT chinook recovered by the ratio of total chinook captured over the number of chinook examined for CWTs.

3) Bering Sea-Aleutian Islands: In the 2003 trawl fishery in the Bering Sea-Aleutian Islands, Chinook salmon and chum salmon were the only species with CWT recoveries. Of the 123,607 salmon examined for tags, 80% were chum salmon, with Chinook salmon comprising the

remaining 20%. Of the 24,768 chinook salmon examined, 23 CWTs were recovered for a tag occurrence rate of 0.09 %, less than a quarter of the tag occurrence rate of 0.4% in 2002. Because the total bycatch of chinook salmon in this fishery was 44,706, a rate of 1.8 can be applied to the 23 CWT recoveries to come up with an approximation of 41 CWT chinook salmon in the total bycatch of chinook salmon in the trawl fishery in the Bering Sea-Aleutian Islands in 2003, about one quarter of the approximate number of 153 CWT chinook in 2002.

Abundance of ESA-Listed Chinook Salmon Stocks: Information was presented on the historical (1981-2003) abundance of ESA (Endangered Species Act) listed chinook salmon in these high seas trawl fisheries. Historically, most of the high seas bycatch of the current ESA-listed ESUs (Evolutionarily Significant Units) has occurred in the North Pacific whiting fishery off Washington-Oregon-California, with the highest bycatch occurring mostly in the mid-1980s, when foreign vessels dominated this fishery. Bycatch of current ESA-listed ESUs has generally decreased since these fisheries became 100% domestic in the early 1990s. In 2000, however, bycatch of ESA-listed ESUs in the whiting fishery off Washington-Oregon-California increased to the highest level yet. Because CWTs from the North Pacific whiting fishery have not been reported into the PSMFC coastwide database since 2001, bycatch of ESA-listed ESUs in this fishery off Washington-Oregon-California is unknown for 2002 and 2003.

Of the ESA-listed ESUs, only the Upper Willamette River chinook have a predominantly northward migration pattern that typically leads to the majority of bycatch being harvested in the Gulf of Alaska trawl fishery rather than the whiting fishery off Washington-Oregon-California. Historically, other ESA-listed ESUs such as Snake River Fall and Spring/Summer Chinook, Lower Columbia River Chinook, Puget Sound Chinook, California Central Valley Spring Chinook, and California Coastal Chinook recovered on the high seas are captured predominantly in the North Pacific whiting fishery off Washington-Oregon-California. The proportion of chinook salmon from each of the ESA-listed ESUs captured in the 3 high seas trawl fisheries from 1995 to 2001 was less than 2% of the total harvest of these ESUs in all other non-hatchery fisheries

High Seas Research Programs: Recovery of CWTs in 2 high seas research programs was also described. First, juvenile salmon were captured in trawl surveys in the Gulf of Alaska and the Bering Sea by the Ocean Carrying Capacity (OCC) program, cooperative research conducted by NMFS and the University of Washington School of Aquatic and Fishery Science, and supported by the North Pacific Anadromous Fish Commission (NPAFC). No CWT salmon were recovered out of over 10,000 salmon examined for tags in both the Gulf of Alaska and Bering Sea. Second, in Fisheries Agency of Japan trawl research on the high seas; 1 CWT Chinook salmon originating from Idaho was recovered.

For more specific information on high seas CWT recoveries, see:
Myers, K.W., A.G. Celewycz, and E.V. Farley, Jr. 2004. High seas salmonid coded-wire tag recovery data, 2004. (NPAFC Doc. 804.) SAFS-UW-04. School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA. 22 p.

## 16. CDFO's Mark Recovery Program

### Salmonid Catch Sampling & Mark Recovery Program (MRP)
**A History of Design, Operation and Challenge in British Columbia**

Presented by
Jim Thomas (President), J.O. Thomas and Associates, Ltd.

Kathy Fraser introduced Jim Thomas and noted that he began his career with MRP as a student biologist in during the summer of 1974. He continued working summers until he graduated. He then worked six months for CDFO before resigning to form his company and contracting with CDFO to carry out the MRP.

**1) Historical Overview**:
Jim noted that the Canadian Salmonid Catch Sampling and Mark Recovery Program completed its' 32nd year in 2004 (**Attachment 15; Slide 2**). Substantial changes have occurred during that time. Jim then gave a brief history of key milestones to give some perspective of these changes:

- Began in **1973** – Sampling restricted to Georgia Strait for both commercial and sport salmon fisheries. Large chinook and coho fisheries existed in Georgia Strait then.
- **1974** – Sampling expanded to include all commercial salmon troll and net fisheries, an effort that continues today.

  This expansion was done in concert with a U.S. request to join in a coastwide fin mark sampling program for adipose fin clips. A massive fin marking program in the Columbia River (Roy Wahle et al.) had just concluded and samplers were looking for pectoral, ventral, anal, maxillary and partial dorsal fin marks at that time.
- **1979** – Voluntary sport sampling expanded to all coastal fisheries in BC in concert with the rapidly expanding sport fisheries.
- **Mid 1990's to present** – Mass-marking release strategies required commercial/sport sampling to employ electronic sampling equipment and methods.

Canada's Catch Sample and Mark Recovery Program's components (**Slide 4**) include:

- Sampling
  - Commercial fisheries
  - Recreational fisheries
  - Test and Selective fisheries beginning in the late 1990s

    The latter are selective commercial gear designed to target sockeye, pink or chum salmon while releasing chinook and coho. This also resulted in a sampling challenge to get adequate tag recovery data for chinook and coho in these gear selective fisheries.
- First Nations fisheries

  These fisheries are for purposes of food, social and ceremonial. In addition, there are new and expanding economical opportunities for First Nations fishers.
- Centralized Dissection Lab
- Centralized Data Processing Center

**2) Commercial Fisheries**

Sampling objectives have remained consistent from 1973 to the present time (**Slide 5**):

- The primary objective is to obtain random, stratified samples from all commercial marine catches in BC waters where CWT tagged chinook, coho, and steelhead could potentially be recovered.
- The program also collects heads submitted through a voluntary angler CWT recovery program for recreational catches.
- Samples (heads) from test fisheries, aboriginal fisheries, hatchery returns and escapement surveys are also submitted to the program by various inter-departmental agencies. As such, there is a growing need for better coordination of sampling and data collection within Canada.

- All heads are dissected at the Dissection Lab to locate and decode CWTs
- Catch sample and recovery data is then entered into the Mark Recovery database system

Turning to CDFO's commercial fisheries, the study design for sampling is based on (**Slide 6**):

- **Random** and **representative** sampling of catches stratified by gear, area, period and species/grade (10-12 grades for both chinook and coho salmon)
- **Sample goal** is to examine **20%** of the catch
- **Gears**: Troll (Ice: 4-7 days, Day: 1 day only, and Freezer: up to 30 days), Gillnet, Seine
- **Areas**: Catch Region, DFO Statistical Area (Pacific Fishery Management Area), Subarea
- Periods: DFO Statistical week (begins on Sunday and ends on Saturday).
- **Species/Grades**: Chinook includes flesh colour, size and quality; coho includes size and quality. Up to 12 grades are used for both species.
- An elaborate **data coding system** has evolved to capture and report this information

To acquire representative samples, sampling crews are required to go to a wide variety of ports in British Columbia (**Slide 7**). Most of these ports have unique requirements, depending on the fisheries. Most of the ports have 2-3 processors, while Prince Rupert has 9 and Vancouver has 25. This often poses a problem for the samplers as the processors tend to parse the catch by grade, fishery and gear type. In such situations, the samplers must go to 2-3 processors to get a representative sample for one fishery.

Jim then presented two graphs (**Slide 8**) which plotted the number of fish sampled and the number of marks recovered for chinook and coho in the commercial fisheries during the period of 1974 to 2004. The top graph shows the dramatic collapse of the commercial fisheries, beginning in the mid 1990s. The lower graph shows a parallel collapse in the number of marks recovered. This has resulted in a major problem in getting enough recoveries to adequately evaluate what is happening in the fisheries.

Continuing, Jim noted that there is no longer a troll fishery in Georgia Strait for either chinook or coho. And on a side note, he pointed out that prior to the 1985 Pacific Salmon Treaty, Canada had an allocation of 1.8 million coho. Most of those fish were landed in Tofino, making it a very busy port. Not surprisingly, there has also been a parallel sharp reduction in the number of active commercial MRP sampling sites. Prior to the 1990s, there were active sites through Vancouver Island and much of the mainland in Georgia Strait, as well as sites in the Queen Charlotte Islands and the Skeena River area (**Slide 10**: not easily seen). Today, the northern sites largely remain active. However the southern sampling sites are only active in two areas of Vancouver Island (Ucluelet/Tofino - west side and Campbell River area - east side) and the Vancouver area.

CDFO has partitioned British Columbia's marine waters and associated freshwater basins into about 25 statistical areas (**Slide 12**). The troll, seine, and gillnet fisheries are identified in terms of catch region and typically include a number of statistical areas (**Slide 13**). However each of the statistical areas may support various fisheries during a year, with fisheries averaging about 20 weeks in duration. Jim explained further than one must also layer in the three gear types (troll, seine, and gillnet) (**Slide 11**) and the three types of troll (Ice, Day, Freezer Boat as separate fisheries. For the whole season, he estimated that CDFO must sample up to 1,500 individual fisheries, each having a unique suite of requirements with respect to sample sizes and other issues being looked at.

**Note**: Subsequent to the meeting, Jim was asked to further explain the estimate of 1,500 fisheries per year. He answered that it is based on three key components: gear, statistical area and weekly catch period. The sample design and CWT sample/recovery mandate is based upon collecting data from a matrix which comprises these three primary 'fishery' components. When considering the number of gears, sub areas which support these gears and weekly openings, the total of fisheries that must sample is about 1,500. Of course, the sample data from each of these elements is then amalgamated into the catch region format (e.g. Georgia Strait Troll). He added that his intent in his presentation was to identify that the sampling program has an obligation to acquire samples from unique gears and areas (including sub areas of statistical areas in certain jurisdictions) to deliver a representative sample of the overall catch region. As such, the distinct character of fisheries involving CWT composition, species size/age and their change over time warrants this approach.

Commercial fishery sampling requires advanced sample size planning (**Slide 14**).

- Each fishery is unique with regard to fleet and catch size, species/grade structure, processor distribution and the related strategy required to achieve the study design.
- Information on fleet size or catch to set the benchmark of a 20% sample originates from overflights, fleet call-ins or discussions with the fishery manager.
- Sample crews are mobilized and distributed to the ports and/or processors necessary to meet sample design of that particular fishery.

Jim strongly stressed the importance of maintaining a positive connection with the fishermen. They know a great deal about the fish and are a great resource. In addition, the samplers are able to educate the fishermen in a variety of ways. He then reemphasized the importance of never losing sight of the key role the fishing industry plays in supporting fishery data collection that hopefully will in turn help them keep fishing.

Catch sample methods for the commercial fisheries include (**Slide 15**):

- Weekly catch sample quotas established by fishery.
- Vessels, packers or trucks landing to specific processing plants sampled to count all chinook and coho, recover CWT marked fish and biologically process each fish.
- Sample crews complete a variety of data forms which identify the specific details of each vessel sample.
- Each recovery is identified to species, grade, sex (if round), length, weight and scale age.
- Data forms and head recoveries (**Slide 17**) are submitted weekly for dissection and data processing.

In addition, vessel masters are interviewed by MRP samplers to gather information about where the fish were caught and how many days were fished (**Slide 16**).

### 3) Recreational fisheries

CDFO's Sport Sampling Program is very different from the Commercial Fisheries MRP and depends on *voluntary angler participation* (**Slide 18**):

- Anglers requested to recover heads from adipose clipped chinook, coho, and steelhead.

- A network of head recovery depots 1st established throughout the Strait of Georgia basin. Expanded in 1979 to include the west coast of Vancouver Island, Queen Charlotte Islands, northern mainland and BC interior.
- Depots located at marinas, tackle shops, resorts, hatcheries and DFO offices.
- Depots supplied with materials enabling the identification and recovery of tagged heads and preservative solution or freezers.
- 235 depots are active coastwide.
- Depots in the Strait of Georgia, Johnstone Strait, and along the west side of Vancouver Island are serviced weekly by program samplers.
- More remote depots in northern BC and the Interior are sampled approximately monthly by hatchery personnel, fishery officers, commercial samplers and sport lodge staff.

Direct sampling has also been implemented for monitoring the recreational harvest (**Slide 19**) with varying degrees of effectiveness:

- "Awareness" or participation rates of anglers in the voluntary program were established and inset into CWT estimation models. For Georgia Strait, 20-23% of the heads were being submitted to the sampling program.
- When mass marking usage came up, substantive debates developed over perturbing these "Awareness" values via direct sampling and specific requests to have anglers submit heads of adipose clipped fish.
- Tidal and freshwater creel surveys in the mid 1990s began to actively identify adipose fin clip marked salmon for anglers and solicit the recovery of heads.
- Mass-marking has created far reaching problems for both voluntary and direct sampling components of the Sport Head Recovery Program.
- Public participation and support has been challenged by escalating "no-pin" rates and confusion over the utility of voluntary recoveries compared to direct sampling.

  Part of the problem is that participants in the program receive a letter telling them where their fish came from. The public has responded very favorably to these letters. But with the high rate of 'no pins' seen in the past several years, most program participants are now getting letters indicating that CDFO does not know the fish's origin given there was no tag. This has led the public to question what they are contributing to and has created a major public relations problem. Jim added a very strong caution that there are far reaching consequences. Fishery managers need to tread very carefully where the program is taken in the future in order to maintain respect for what they are doing as scientists and that useful information can continue to be gathered.

Advertising and public relations play a key role in the success of this program (**Slide 20**):

- The primary success of the Sport Head Recovery Program depends on how effectively the program is publicized.
- Advertising media includes posters, Tidal & Freshwater Fishing Regulations and sport fishing magazines.
- Participation incentives in the form of cash and fishing equipment prizes have been organized for anglers and head recovery depot operators.

  Jim also pointed out that Weigh West Resort is an active supporter of the sampling program, and yearly provides a paid week end fishing trip for two based on a drawing.

Jim also showed pictures of various sport harvest scenes at Prince Rupert (**Slide 21**). Creel samplers often see a wide range of species in the harvest and lots of public interest in their work. They typically take a tissue punch sample and scale samples, along with recording present or absence of the adipose fin, length, weight, species, location and date of catch, etc. Chinook and coho are also wanded for a CWT if the adipose fin is missing. Substantial tidal fisheries also exist and are regularly sampled (**Slide 22**).

The number of marks recovered in the Sport Fisheries for chinook has been fairly consistent since 1974, averaging around two thousand most years (**Slide 23**). Marks recovered from coho were far more cyclic and ranged from highs of 12-14 thousand down to 2,000 up through 1994. Since then, however, coho marks have ranged from near zero (1999) to the present level of around 2,500 marks, again highlighting the problems MRP faces in getting adequate numbers of recoveries to assess the stocks and fisheries.

**4) Test and Selective Fisheries**

- Test fisheries harvesting chinook and coho occur in the Skeena River, Johnstone Strait, Nootka Sound, Juan de Fuca Strait and the Fraser River (**Slide 24**).
- **Catch sampling originates primarily from test fishery personnel** and so **the challenge is to ensure continuity to sample methods and data recording.**
  **R**egardless of who is collecting the data, the sampling program needs to be seamless.
- Pacific Salmon Treaty sponsored sockeye and pink fisheries in Juan de Fuca and the Fraser River are not sampled for MRP attributes (i.e. CWTs) on chinook and coho.
  Jim noted that this is more a policy decision than an ability issue.
- Selective fisheries (where chinook or coho are released) are the standard in most net fisheries. Onboard observers and dockside samplers contribute data on mark incidence and CWTs for mortalities only.
- Chinook bycatch originating from the large commercial hake fishery off SW Vancouver Island is sampled by onboard observers for CWTs. The CWTs do enter the system but probably don't reside in the formal MRP database.

There are currently a number of on-going selective fishery projects. One study involves the use of seine grid panels to minimize by-catch of juvenile chinook and coho salmon (**Slide 25**). Tests have shown that up to 75% of the coho juveniles escape through the grid panels, thus making it possible to conduct fisheries in areas of conservation concern responsibly. In addition, the seine and net fisheries are required to release live chinook and coho over the side. Information is collected on presence or absence of the adipose fin prior to release. However, no CWT samples are obtained unless the fish is already dead. Jim also emphasized that his staff have been involved in a number of mortality studies up and down the coast for both commercial and recreational fisheries.

Seine boats can no longer bring their catch over the stern but rather must brail the catch on board, thus allowing for live removal of non-targets species (**Slide 26**). Fish are quickly sorted into bins on deck and any by-catch chinook and coho are quickly put into revival tanks with running water. Jim remarked that it was amazing how quickly most of the fish will respond to the tank treatment and are ready to be released again to continue their migration. Prior to release, some of these fish have a tissue sample removed for DNA studies.

In terms of the troll fisheries, observers are often put on board the troll vessels (**Slide 27**). This requires the sampler to approach the vessel from the stern, coming up through the "pigs" (rigger boards), tie up, and then jump onto the stern. This can be quite adventurous in 3 meter seas! But the pay off is excellent on-board data which further enhances the MRP system.

A new problem has developed in the seine fisheries where many by-catch coho will be directly released even before the catch is brailed on board. Coho are now viewed as a pariah by the seine fleet since too many coho on board can shut down the seine fishery. Hence even if an observer on board, it is often impossible to see if the fish have an adipose mark or not. As such, this is another disconnect in being able to get valuable information.

**5) First Nations Fisheries**

These fisheries are growing in importance but are not being sampled for CWT marks (**Slide 28**).

- **Disconnect** from seamless collection of catch sample and CWT data currently originating from commercial and sport fisheries.
- **CWT sampling needs to become a priority in First Nations/DFO fisheries agreements**.
- Program must address cultural concerns to sample collection.
  Jim stressed that sensitivity is required. However there still remains a critical need to collect harvest information.
- **Fisheries of concern**: **Nass, Skeena, Fraser River and Alberni Inlet chinook**.

As a case in point, Jim noted that First Nations fishers are allowed to take in excess of 30,000 chinook in just the lower Fraser River (tidewater to Fraser Canyon). Slide 29 shows use of a beach seine in the lower Fraser River. Another 4,000 are allocated to the recreational fishers, and 7,000 as by-catch by the commercial in-river fishery. Only the recreational and commercial landings are sampled.

The issue is highly political these are large fisheries and the bands fear that any information provided to CDFO will then be used against them. Likewise, up-river bands don't work well with lower river bands for fear that their respective allocation might be reduced. This has been a problem for the past 15 or so years and doesn't look like there will be much improvement. However, Jim emphasized that it is a Canadian problem with no impact on U.S. stocks since these First Nation fisheries are terminal.

**6) Electronic Detection of CWTs**

The advent of mass marking significantly increased the complexities of CWT sampling for Canada. With visual sampling, Jim noted that samplers could minimize their 'foot print' on the operations of processor plants. However, electronic sampling eliminated that ability because of the need for sorting tables and large electronic tube detectors on the docks or in the plants, depending on site operations. This led to extensive testing in several areas (**Slide 30**):

- Extensive testing of wands and tube detectors between 1996 and 2000 in commercial, sport, and hatchery escapement environments.
- Testing investigated the precision of wands and tubes to detect CWTs.
- Testing investigated the offload and catch sampling environment employing the detection equipment.

- A suite of customized fish grading tables aligned with tube detectors were designed to efficiently interface with industry.

The grading tables proved to be a major challenge as they had to be designed in a way that the grader (the sampler's best friend!) was able to do his job efficiently while also meeting the electronic sampling needs of the MRP program. In addition, the tables had to be ergonomically designed so that samplers could still stand up after handling fish for a full day. Jim showed slides of several table designs which met the requirements of the given sampling site (Slides 31-36). Considerable ingenuity was obviously required to fit the tables onto the docks or in the plants and still meet all the requirements of the sampler and the grader. Jim concluded that while it was a complicate array of equipment, at the end of the day, it works!

Turning to the evaluation results for tube detectors and wands also confirmed that they worked very well, with only some minor problems. Over 100,000 chinook and coho were used in the tests over the period between 1996 and 2000.

Tube Detectors (**Slide 37**):

- CWT Detection Capability: 99.8%
- Unmarked Positive "Recoveries": 0.54%
- **Side Mounted Detector Tables** capable of handling **1200 – 1600 salmon per hour**.
- **Front Mounted Detector Tables** handle **less than 800 salmon per hour and potentially compromise fully representative samples**.
  Jim also emphasized that the slower rate may also wear out the welcome mat at the processing plants.
- **16%** of Northern Troll (**NTR) chinook will not fit through R95 aperture**.
  These large fish have to be wanded and thus there may be missed tags as evidenced by other agencies research results.
- **Problems experienced** with the veracity of electronic counter:
  - Belly ice: chunks of ice moving through the tube can be counted as a fish.
  - Fish succession: successive fish thrown down the tube too close together will be seen as a single fish. Hence samplers need to pace themselves to avert undercounting.
  - Diverter gate bounce back: This one is being (or has been) addressed.
- **Technical aptitude** of sample personnel is **crucial**.
  Jim stressed that with the declining numbers of recoveries, it is very challenging for samplers to maintain technical competency with both commercial fishery samples and with Industry staff .

Wand Detectors (**Slide 38**):

- CWT Detection Capability: 99.6%
- Unmarked Positive "Recoveries": 0.7%
- Sample Coverage:
  - Troll Coho - 80%
  - Troll Chinook - 85%
  - Net Coho -100%
  - Net Chinook - 100%
  - Recreational - 100%

**7) Herring CWT Sampling**

The same electronic gear used for salmon is also being used to evaluate British Columbia's herring stocks (**Slides 39-40**).

- 2000-2004 study and continuing in 2005.
- 39,943 tons of herring (287 million fish) conveyed through R95 tube detectors
- 30 tons/hour processed through the R95.
- 355,439 herring wanded
- 6,119 CWTs recovered
- Wands and tube detectors are checked every hour with a known tag.

Jim added that it is hard to imagine the overwhelming numbers of herring being processed each hour. However, the system works wonderfully well. At the detection of a CWT, a 'sweeper' comes out and moves a bunch of herring off the belt and into a container. The sampler must then individually wand each fish until the tag is found. He also pointed out that with over six thousand tags recovered, they have never experienced a sweep without a tag being present.

He also added that the prevailing wisdom was that British Columbia's herring stocks were localized and did not migrate far. This was found to not be true as herring tagged in the Queen Charlotte Islands were subsequently recovered in Central British Columbia.

**8) Program Challenges**

Canada's MRP for CWTs has a number of challenges to content with (**Slide 41):**

- Freezer troll sampling:
  There is a large troll fleet off the west coast of Vancouver Island, of which 25% are freezer boats. On the North Coast, the troll fleet consists of 70% freezer boats. These vessels remove the heads at sea and then freeze the catch, thus being able to remain at sea for 30 days. Recovery locations are difficult at best to associate with the heads if sampled.
- Cash buying – dispersal of catch:
  This is a situation in which a fisher sells his catch for cash to a number of buyers. As examples, in the Fraser or Skeena rivers, a gillnetter may sell his pink and sockeye catch to one buyer, the small chinook to a second buyer, and the larger chinook to a third buyer. This requires that all three buyers must be contacted and the respective fish sampled in order to have a valid sample.
- Custom processing:
  With the declining fisheries, the remaining fishers are consummate businessmen and moving more and more to custom processing. As a result, this makes it harder for MRP to have access to their catch for sampling purposes.
- Mass-marking:
  At a minimum, mass marking has introduced a new complexity into the coastwide CWT system. However, as noted earlier by Ron Olson, the CWT system still anchors what the PSC is trying to do in terms of fisheries management and resource allocations. As such, we need to proceed carefully down this road and think through all choices. The CWT is truly a coastwide system that works successfully. As such it is a precious resource that is worth protecting.
- First Nations fisheries:

Canada must do more with its First Nations fisheries. Substantial numbers of fish are being harvested without being sampled.

- Funding:
  Like so many other agencies today, CDFO is struggling with reduced levels of funding. This in turn has limited what can be done with the challenges facing MRP.
- Maintaining program excellence in the face of declining catches of chinook and coho:
  Jim stressed again that we can't allow the reduced catches in this current time impact the quality of data being collected. He noted further that this was a particularly important priority to him.

**9) Additional Sampling Program Contributions**

Jim also briefly touched on several other contributions made by CDFO's MRP (Slide 42):

- Biological sampling for age/size data (chinook and salmon).
- DNA tissue sampling and otolith collection; both independent of and correlated to CWT stock identification.
- Chum fishery fin clip mark sampling.
- Sockeye and pink troll fishery catch per effort sampling and in-season catch monitoring.
- Dockside monitoring of salmon landings, in particular, bycatch accounting of chinook and coho in net fisheries.
- By-catch documentation of Atlantic salmon escapement from fish farms contributing to commercial fisheries.
- Average weight sampling for use in refining Fish Slip data.
- Sampled catch vessel interviews used to correct or refine Fish Slip data.
- North America Free Trade Agreement (FTA) Export Program catch sampling.
  The very first FTA dispute involved salmon. The hearing was held in Ottawa with arbitrators from the U.S. and Canada. Through that process, the U.S. was able to garner access to 20% of the Canadian commercial catch. CDFO was very concerned about the potential impact on MRP. Therefore they literally exported their sampling program on board the boats going to U.S. ports. The effort proved successful, with the result that seamless nature of MRP was able to continue.

**10) Centralized Dissection Lab** (**Slide 43**):

- Dissects, decodes and data reports recoveries from all commercial, recreational and escapement sampling programs.
- Provides quality assurance to commercial sample locations.
- Maintains tag placement (in snout) database for all CWT recoveries.
- Collects otolith samples in tandem with target fishery CWT recoveries.

**11) Centralized Data Processing (Slide 44):**

- Catch sample and recovery data from all fishery sources is entered into the Mark Recovery database
- Control centre to audit and edit data records to MRP standards
- Provides feedback and direction to sampling crews in regional sampling locations
- Provides feedback on CWT results to participating sport anglers
- Responsible to return United States CWTs to originating agency

**12) Sampling Issue Regarding Retention of Heads**

Jim concluded his presentation with a comment on sampling concerns regarding retention of heads (**Slide 45**). CDFO requested the onboard retention of all adipose clip heads from 2000 through 2003. Then in 2004, CDFO revised the request to include on-board retention of all heads (adipose clipped or not). This came about because of U.S. concerns about missing DIT tags in unclipped fish.

He noted that this sent a very mixed message to the fishing fleet. In addition, there is no consensus on sample and recovery procedures involving Double Index Tagged (DIT) fish. He emphasized how difficult it was to work with independent trollers, and the new request simply introduces confusion from their view point. This could have major implications for the fleet as a whole, particularly since there is a valuable 'Heads On' market for freshly landed salmon. In addition, the freezer boats haven't shown much willingness to retain all heads on their vessels.

Jim then discussed a sampling example of freezer versus ice troll (**Slide 46**). The two vessel types fish side by side in the same waters. However, based on prior experience, the ice boats do a much better job at retaining heads than the freezer boats. Consequently, in order to get a 20% sample of the landings, a much greater proportion of fish must be taken from the ice boat landings. He explained further that they had looked hard but failed to find a statistical difference between the catches of the two types of boats. Even so, he cautioned that this still could be a problem that is not yet well understood.

In closing, he noted that with CDFO's request last year, approximately 15,000 heads were turned in (**Slide 47**). This response created some challenging logistics in both collecting the heads, storing them, and then processing them for the presence of a tag. He added that it was a pretty hectic time trying to stay abreast of the situation but it all worked out for the best.

Lastly, Jim ended his presentation with a slide of the Three Stooges that Marc Hamer especially enjoyed for its wacky resemblance to the Head Recovery Program (**Slide 48**). He then read the accompanying tribute from fellow CDFO staff members acknowledging Marc as a dear friend and colleague who will be deeply missed. It was also very evident that as Jim read their tribute, he too, in his words "..would deeply, deeply miss him." The picture and tribute to Marc were 'borrowed' for the cover page of the minutes.

**17. Agency Updates on the Performance of MATS Trailers**

Both USFWS and NWIFC recently acquired new MATS trailers that have a number of new features, including a back station for manually clipping fish that aren't within the appropriate sizes for machine tagging. Ken Phillipson gave a short 'progress' report rather than a performance report on NWIFC's new trailer, noting that they have only had it for six weeks and used it at two hatcheries. As such, he presented a number of photos (**Attachment 16**) that focused on differences in the new trailers, such as an additional tagging machine for a total of six (**Slide 1**).

First and foremost, he stressed that the trailers were monster sized, being 44 feet in length with a cab-over design and three axles (**Slide 2**). The weight distribution is excellent, such that a half

ton pickup can easily move the trailer around at the hatchery sites, though not recommended for highway travel. The trailer shell is exceptionally durable, originally designed to haul automobiles, and manufactured by the Amish in Indiana. Welded aluminum is used throughout the trailer (no wood), resulting in the light weight noted earlier. In addition, aluminum fold up stairs are provided that can be mounted on any of three sides (**Slide 3**). Monster jacks (likely rated to 10,000 lbs, easily lift the trailer. Both electric and propane heat is provided for heating the trailer.

Going inside the trailer, Ken commented on the utility of a mechanical 'crowder' (**Slide 6**) that worked very well to move fish into the sorter tray located above. A camera mounted above the tank is used to determine when more fish are needed in the sorter tray. At the appropriate times, a 'scupper valve (**Slide 7**) opens in the bottom of the crowder tank and fish are then pumped out (**Slide 8**) and up into the sorter tray. In the older trailers, it required someone to dedicate most of their day moving the fish into the upper tray. They have had some issues with this valve in terms of the rubber flange being sucked underneath, and in terms of 'forgetting' where home is and having to be reset when the tank still had fish in the bottom area. In addition, they have noticed that a very small amount of fish have circular marks on them. While not sure, the suspicion is that the marks are related to the valve and pumping. NMT has been advised of these concerns and is working on them.

As the pumped fish exit from the water line, they slide across a sloping 'dewatering' grate (**Slides 9-10**) and then enter the sorting tray (**Slide 11**). The new sorter is actually a double sorter (**Slide 12**), making it possible to support 16 lines instead of the 8 lines seen in the older trailers. In addition, fish can be sent to the back table for manual clipping as necessary. There are 12 monitor screens at various places for the staff to track all automatic activities (**Slide 13**).

The back portion of the trailer is also very well designed for manually clipping fish. Ken noted that the anesthetized fish are kept in an inner tank that is surrounded by flowing freshwater (**Slides 15-16**). As such, the crew members are able to keep their hands in freshwater. There hasn't been an effort to use the clipping station at full production yet as they haven't done any mass marking to date. However there is adequate room to use 4-5 people and up to six if needed on the clipping station. Manual clipping rates ranged from 800 to 4000 fish per hour, based on 800 fish per hour per clipper.

Six tagging machines are used instead of five in the older trailers (**Slide 17**). Machine tagging rates ranged from 5,000 to 8,000 fish per hour based on a DIT tagging project at Nisqually Hatchery at Clear Creek (**Slide 19**). Some of the variability was attributed to differences seen over the course of the day in the willingness of the fish to enter the machines. Tag retention rates were excellent and ranged from 99.42 to 99.61%.

When asked if he would recommend the new trailers, his answer was a very enthusiastic yes. However Ken did qualify his answer in that he wouldn't recommend using the trailers for marking small lots of fish (e.g. 40,000) at a hatchery as the set up time was significant. The trailers are really designed for handling large volumes of fish, such as in mass marking a hatchery's production.

**18. Northwest Marine Technology (Geraldine Vander Haegen, Ken Molitor)**

Geraldine Vander Haegen was able to give only a very brief update on NMT's research and development efforts given the meeting had run overtime and committee members had other schedules to meet. Even so, she was able to report on several items.

Small Tube Detector: Geraldine reported that work had progressed well on NMT's 'little' 4 inch tube detector (see minutes from 2004 Mark Meeting; page 29). It will be ready for sale this summer. One unit is already in use in the Great Lakes area on a lamprey project.

13 Inch Tube Detector: Work is also continuing on porting the advanced technology used for the four inch to a larger 13 inch by 7 inch tube detector. It will be a large unit and not easily moved. It is designed for production hatcheries such as Cowlitz Hatchery where mobility is not an issue.

Electronic Detection Workshops: NMT sponsored several workshops in 20004 to help train field samplers and hatchery staff in the use of electronic detection equipment. Geraldine noted that NMT learned much in the process as some workshops worked better than others. Based on that experience, NMT is again offering free workshops in the future to those agencies that are interested. About 15 participants is recommended as an optimal workshop size, and NMT will come to the selected site to give the training. Please contact Geraldine for further information and to schedule the training. Her phone number and email address are listed in **Attachment 1**.

Improvements in the Hand Wand: Ken Molitor addressed NMT's efforts to reduce the problems encountered with wand instability (**Attachment 17**).

a) Radio Frequency Interference (RFI): The erratic wand problem ADFG experienced in Sitka (discussed earlier in the meeting) turned out to be from RFI from a local radio station. RFI can result in erratic beeping, hypersensitivity to movement, or beeping during nearby radio transceiver use. To alleviate this problem, all wands are now being fitted with a filter to reduce RFI. All wands sent in for repair will be retrofitted for free.

b) Water Intrusion: Ken noted that water intrusion also gives either a constant beeping, hypersensitivity to movement, or a drift in sensitivity over time. Problems associated with water intrusion were addressed by a total redesign of the bulkhead between the battery compartment and the nose of the wand. NMT is fairly confident that the changes will eliminate this type of problem. Again, all wands sent in for repairs will be retrofitted for free.

c) Physical Shock: Wands can be damaged from the shock of a fall, etc. Symptoms include an immediate change in sensitivity, failure to turn on, or damage to the external housing. NMT has substantially resolved this problem for new wands by using new techniques to protect sensitive key components from physical shock.

**19. OBT Company (Jan Kallshian)**

Jan Kallshian did not attend the Mark Meeting but forwarded comments to Ken Johnson explaining his absence. Given permission to do so, Ken read the email for the benefit of those at the meeting. In brief, Jan noted that he hadn't gotten much response from the agencies following his announcement that he would be offering parts (refurbished cutter bars, etc). He also noted that his other businesses had really taken off about the time that he tossed his hat back into the CWT market. As such, he hasn't been pushing forward on the CWT front and doesn't expect to

do so for some time yet. However, he still remains very interested in the whole CWT world and may yet return as events unfold in the market place.

**20. Report of Prototype Wand from Australian Firm**

Prototype Hand Wand: Ken Johnson reported that Jack Tipping (WDFW) had recently received a prototype electronic hand wand from 'Innovative Marine Products' in Australia for evaluation purposes. No field sampling information is available at this point in time. However, a series of pictures are presented in **Attachment 18**. The device consists of a small battery pack (**Slide 1**) that attaches to the upper part of the forearm (**Slide 2**). The battery is connected to the sampling device by a heavy duty flattened cable. Lastly, viewing the hand in an upward cupping form, the small sampling unit sits in the cup of the hand on top of the largest two or three fingers which are wrapped in a sheath of sorts, with the thumb and little finger exposed (**Slides 3-6**). The company has reported that tag detection range was 3 cm. However, when encasing the detection unit with enamel for protection, the detection range dropped to 1.5 cm. Work reportedly is continuing on this latter problem. Projected price is about $3,500.

Snout Removal Device: Jack Tipping is also evaluating the 'Auto Snout Snipper' product being marketed by Innovative Marine Products. It is designed to speed the sampling of snouts at hatcheries. A fish is placed in position for removal of the head. Then with both hands on the keyboard, the sampler types in the label and hits the print key to generate the label. At this point, a bag is automatically inflated as the head is removed, dropped into the bag with the label, and then tied off, ready for the next fish. A field test is scheduled at Cowlitz Hatchery in May.

Fish Killer Machine: Mark Kimbel also reported that WDFW is now testing another device that is humane in dispatching fish as well as reducing injuries to co-workers often experienced when using clubs. The fish goes into the machine and a plate comes down and delivers a shock that kills the fish without all the associated blood and tissue normally seen. The price is ~ $9,000 U.S.

**Attachment 1**

# Mark Committee Meeting Attendees -- April 20-21, 2005

| Name | Agency | Mailing Address/ Telephone/E-mail Address |
|---|---|---|
| Alexandersdottir, Marianna | NWIFC | 6730 Martin Way NE, Olympia, WA 98516-5540<br>Tel: (360) 438-1180 E-mail: malexand@nwifc.org |
| *Celewycz, Adrian | NMFS | NMFS-Auke Bay Lab, 11305 Glacier Hiway, Juneau, AK 99801<br>Tel: (907) 789-6032 E-mail: adrian.celewycz@noaa.gov |
| Cox, Brodie | WDFW | 600 Capitol Way, North; Olympia, WA 98501-1091<br>Tel: (360) 902-2776 E-mail: coxpbc@dfw.wa.gov |
| *Duke, Rodney | IDFG | 1540 Warner Ave, Lewiston, ID 83501<br>Tel: (208) 799-3475 ext 4 E-mail: rduke@idfg.idaho.gov |
| *Fraser, Kathy | CDFO | Pacific Biol. Station, Hammond Bay Road, Nanaimo, B.C. V9R 5K6<br>Tel: (250) 756-7371 E-mail: fraserka@pac.dfo-mpo.gc.ca |
| Herriott, Doug | CDFO | Pacific Biol. Station, Hammond Bay Road, Nanaimo, B.C. V9R 5K6<br>Tel: (250) 756-7383 E-mail: herriottd@pac.dfo-mpo.gc.ca |
| Johnson, Bill | ADFG | ADFG Tag Lab, P.O Box 25526, Juneau, AK 99802-5526<br>Tel: (907) 465-3493 E-mail: william_johnson@fishgame.state.ak.us |
| *Johnson, Ken | PSMFC | 205 SE Spokane St., Suite 100, Portland, OR 97202-6413<br>Tel: (503) 595-3144 E-mail: ken.johnson@psmfc.org |
| *Josephson, Ron | ADFG | ADFG Tag Lab, P.O Box 25526, Juneau, AK 99802-5526<br>Tel: (907) 465-4088 E-mail: ron_josephson@fishgame.state.ak.us |
| *Kano, Robert | CDFG | 830 S Street, Sacramento, CA 95814<br>Tel: (916) 327-8758 E-mail: bkano@dfg.ca.gov |
| *Kimbel, Mark | WDFW | 600 Capitol Way, North; Olympia, WA 98501-1091<br>Tel: (360) 902-2406 E-mail: kimbemak@dfw.wa.gov |
| Lehmann, Sue | CDFO | 200 – 401 Burrard Street, Vancouver, B.C. V6C 3S4<br>Tel: (250) 666-0179 E-mail: lehmanns@pac.dfo-mpo.gc.ca |
| Longwill, Jim | PSMFC | 205 SE Spokane St., Suite 100, Portland, OR 97202-6413<br>Tel: (503) 595-3146 E-mail: longwill@psmfc.org |
| *Mallette, Christine | ODFW | 17330 SE Evelyn Street, Clackamas, OR 97015<br>Tel: (503) 657-2000 ext 307 E-mail: christine.mallette@state.or.us |
| *McClure, Marianne | CRITFC | 729 NE Oregon St., Suite 200, Portland, OR 97232<br>Tel: (503) 731-1254 E-mail: mccm@critfc.org |
| Molitor, Ken | NMT | P.O. Box 427, Ben Nevis Loop Road, Shaw Island, WA 98286<br>Tel: (360) 468-3375 E-mail: ken.molitor@nmt.us |
| *Olson, Ron | NWIFC | 6730 Martin Way NE, Olympia, WA 98516-5540<br>Tel: (360) 438-1181 ext 335 E-mail: rolson@nwifc.org |
| Phillipson, Ken | NWIFC | 6730 Martin Way NE, Olympia, WA 98516-5540<br>Tel: (360) 438-1180 E-mail: kphillipson@nwifc.org |
| Ridgway, Brenda | CDFO | Pacific Biol. Station, Hammond Bay Road, Nanaimo, B.C. V9R 5K6<br>Tel: (250) 756-7094 E-mail: ridgwayb@pac.dfo-mpo.gc.ca |
| Thomas, Jim | J.O. Thomas Associates | 1370 Kootenay Street, Vancouver, B.C. V5K 4R1<br>Tel: (604) 291-6340 E-mail: thomasj@jothomas.com |
| Vander Haegen, Geraldine | NMT | 955 Malin Lane SW, Tumwater, WA 98501<br>Tel: (360) 596-9400 E-mail: geraldine.vanderhaegen@nmt.us |
| Webb, Dan | PSMFC | 205 SE Spokane St., Suite 100, Portland, OR 97202-6413<br>Tel: (503) 595-3147 E-mail: dan.webb@psmfc.org |
| *Zajac, David | USFWS | 510 Desmond Drive, Lacey, WA 98503<br>Tel: (360) 753-9547 E-mail: dave_zajac@fws.gov |

* Mark Committee member