

PACIFIC SALMON COMMISSION  
SELECTIVE FISHERY EVALUATION COMMITTEE

REVIEW OF 2008 MASS MARKING AND  
MARK SELECTIVE FISHERY PROPOSALS  
REPORT SFEC (08-2)

September 2008

## Selective Fishery Evaluation Committee

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## Acronyms

ADFG	Alaska Department of Fish & Game
CDFO	Canadian Department of Fisheries and Oceans
CTC	Chinook Technical Committee
CoTC	Coho Technical Committee
CWT	Coded Wire Tag
DIT	Double Index Tagging
ETD	Electronic Tag Detection
IDFG	Idaho Department of Fish & Game
MM	Mass Marking
MOU	Memorandum of Understanding
MSF	Mark Selective Fishery
ODFW	Oregon Department of Fish & Wildlife
PSC	Pacific Salmon Commission
PST	Pacific Salmon Treaty
SFEC	Selective Fishery Evaluation Committee
SFEC-AWG	SFEC- Analytical Work Group
SFEC-RCWG	SFEC- Regional Coordination Work Group
WDFW	Washington Department of Fish & Wildlife

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## **Executive Summary**

The coast wide coded-wire tag (CWT) system is the only means currently available to obtain data necessary to estimate and monitor coast wide exploitation rates on individual stocks of coho and Chinook salmon, as required for implementation of fishing regimes established by the Pacific Salmon Commission (PSC). The PSC established the Selective Fishery Evaluation Committee (SFEC) to assess impacts of mass marking (MM) and mark-selective fishing (MSF) on the viability of the CWT system.

This report (a) summarizes the results of the SFEC's review process of 2008 proposals for MM and MSF provided to the PSC between October and December 2007, (b) clarifies the oversight function of the SFEC, and (c) presents recommendations for addressing several unresolved issues and concerns.

### ***Summary of 2008 Mass Marking Proposals***

Throughout this report, a mass marked fish refers to an adipose fin clipped fish. and

#### **Marking Programs**

Seventeen MM proposals (8 coho and 9 Chinook) were received in 2008. The SFEC believes these proposals cover all but one MM programs involving Snake River fall Chinook.

Approximately 38 million coho are proposed to be MM'd coast wide in 2008 (Table 1) at a level comparable to that in 2007. The vast majority of hatchery coho production, from southern BC and southern US hatcheries intended for harvest, is now being mass marked (Figure 1A).

Approximately 102 million Chinook are proposed to be MM'd from southern US Chinook hatcheries (Table 1), an increase of 14.7 million (17%) from the 2007 proposals. The increases are primarily due to additional marking of Columbia River fall Chinook by ODFW (Table 1).

#### **Double Index Tagging (DIT)**

Throughout this report, a double index tag (DIT) group includes two groups, one marked and one unmarked, each containing unique CWTs. Fishery impacts on natural stocks are commonly inferred from recoveries of CWT releases of representative hatchery fish. Prior to MSFs, these inferences could be made from a single CWT release. However, with the advent of MSFs, marked and unmarked fish are differentially retained. Total and fishery-specific impacts of MSFs can be estimated by comparing recoveries of DIT groups' releases. DIT requires sampling and recovery programs in all fisheries and escapements where the releases are likely to be encountered.

As MM and the potential for MSFs expand outside of Puget Sound and spring Columbia River stocks, DIT programs will be needed to estimate impacts on a broader suite of stocks.

### **Sampling and DIT Programs**

Assuming recent exploitation rates and sampling programs, the SFEC estimates the proposed MM of southern US Chinook stocks in 2008 will result in annual encounters of untagged marked Chinook in sampling program of approximately 15,400 untagged and marked Chinook in Alaska and 24,300 untagged marked Chinook in Canada.

Prior to MM, the adipose fin clip was employed as a visual indicator for fish containing a CWT. Consequently, sampling programs were designed which collected heads from fish with missing adipose fins and extract CWTs. With MM, a large number of marked fish do not contain CWTs; further, CWTs must be recovered from both marked and unmarked fish to obtain data for DIT releases to estimate fishery impacts. Electronic tag detection (ETD) equipment has been developed as a means to efficiently identify marked and unmarked fish containing CWTs. However, ETD is not employed coast wide because of continuing reservations by some agencies regarding the cost and practical feasibility of incorporating this technology into their sampling programs.

Currently, only Washington (WA) is adequately sampling and reporting CWT recoveries of unmarked DIT releases in mixed stock areas. Lack of ETD results in the inability to recover CWTs from unmarked DIT releases in non-selective fisheries and escapements and in inefficient recovery of CWTs in marked fish (due to extra effort required to process heads from marked fish that do not contain CWTs). These inefficiencies may result in either lower recovery (sampling) rates or higher costs to maintain current recovery rates.

Generally, sampling programs in freshwater sport and escapements need to be improved, particularly in areas where DIT releases are expected to occur.

### ***Summary of 2008 Mark Selective Fishery Proposals***

Seven proposals were received for coho salmon MSFs for 2008. Four of these proposals were for ongoing BC fisheries, and three proposals were for ongoing WDFW marine recreational coho fisheries. Proposals for coho MSFs off the Oregon coast and in the Nooksack River have still not been received.

Nine proposals were received for Chinook salmon MSFs for 2008. Five of these proposals were from WDFW for ongoing MSFs in freshwater in Puget Sound. Three other proposals were from WDFW for Puget Sound MSFs in marine areas, two for summer fisheries and one for a winter fishery. One proposal was received from ODFW for a MSF on Willamette spring Chinook. Last year a new pre-terminal Chinook MSF was proposed for Puget Sound and Strait of Juan de Fuca (WA areas 6-13) for October to April of 2007-8. However, this fishery actually occurred in a smaller region (Areas 7, 8.1 and 8.2, 9 and 10). Last year a proposal was also received for a new summer MSF in Puget Sound. However, this summer MSF fishery actually occurred only in areas 9, 10, 11 and 13 for the period May to September in 2007.

Five proposals were received too late for review (Table 6) including a Columbia River coho sport MSF, three Columbia River Chinook MSFs and an MSF in the Yakima River.

## **Proposals.**

Timeliness: Some proposals were received too late for the committee review .

Missing proposals: MM proposals were received for all but one group, the potential marking of 600,000 Snake River fall Chinook from the IDFG Oxbow Hatchery. Proposals have still not been received for coho MSFs in the Nooksack River or off the Oregon coast.

Completeness: In general all information requested was supplied for MM proposals. The agencies did an improved job of submitting proposals for MSFs in 2008 some proposals were incomplete. Table 5 summarizes the information the information missing from the proposals submitted.

## **Post season reports.**

Every year the SFEC has requested that agencies send post-season reports with information necessary for analysis of tag data. The SFEC views this as a component of the PST requirement for exchange of post-season fishery reports. A template was provided for three post MSF reports in Appendix H but no post-season reports had been provided by any agency in time for SFEC review. The information provided in the first two of these reports (see Appendix H) are necessary for analysis of DIT data and should be submitted in January of the year after the fishery. The first report provides information regarding sampling methods in all fisheries and escapements. The second report provides information regarding the conduct of MSFs. The third provides estimates of stock-specific estimates of MSFs and report should be provided once the fishery data are available and estimates finalized. SFEC members can be consulted by agencies for assistance in completing these reports.

## ***Utility of the CWT system.***

Despite the technical concerns introduced by MM and MSFs, CWTs remain the only method for the Parties of the Pacific Salmon Treaty to estimate and monitor coast wide exploitation rates on individual stocks of coho and Chinook salmon for the near future (Expert Panel, 2005).

## **The future of MSFs and DITs for Chinook.**

MSFs for Chinook have been expanding since they were first instituted in 2003. At this time Chinook, MSFs for Chinook have occurred in Puget Sound or on spring Chinook in the Columbia River basin and the stocks impacted by these fisheries have DIT representation. However, as increasing numbers of Columbia River and coastal fall Chinook are MM, there is a possibility that MSFs on fall Chinook will be proposed for ocean fisheries in the future. If this is the case, the natural stocks that would be impacted are not represented by indicator stock DIT groups with the exception of Spring Creek Tules.

## **Coordination of agency programs**

Synchronization between MM, DIT programs, and CWT sampling programs needs to be improved. For example, the southern US plans to increase MM of far north migrating Chinook, expand the number of Chinook MSFs, implement an extensive DIT program (both coho and Chinook), and continue to tag numerous conservation stocks without an adipose mark. Lack of



Electronic Tag Detection (ETD) in AK and some BC fisheries has the result that all clipped fish, tagged and untagged, must be checked for tags. This may result in either lower recovery (sampling) rates or higher costs to maintain current recovery rates. At the same time, Alaska has no plans to convert from visual to ETD sampling and Canada continues to rely upon voluntary recovery programs for its sport fisheries and does not plan to increase ETD capability or decode CWTs from non adipose-marked fish. These differences in sampling and tagging methodologies will impact analyses by PSC technical committees, eliminate the ability to conduct CWT-only studies, and degrade the ability to assess the impacts of MSFs.

### ***Recommendations and Issues Requiring PSC Direction***

#### **Proposal Review Process**

It is recommended that the Commission request agencies to submit complete proposals for all potential 2009 MM and MSFs in a timeframe necessary for SFEC review, and for agencies to provide both preliminary and final post-season reports on the conduct of MSFs.

#### **DIT Review**

The SFEC, CTC, and CoTC should undertake a review of DIT programs and identify the need for representation for groups of natural stocks that will be exploited in the future MSFs.

#### **Interagency Coordination and Cooperation**

MM, DIT, and CWT sampling programs are not sufficiently coordinated to support analysis by PSC technical committees. The PSC should continue to support technical and policy processes to develop agreements to clarify responsibilities for maintaining a functional CWT system.

# 1 Introduction

The Selective Fisheries Evaluation Committee (SFEC) is charged with evaluating potential impacts of Mass Marking (MM) and Mark-Selective Fisheries (MSFs) on the viability of the Coded Wire Tag (CWT) system (Appendix A). The SFEC serves as a clearing house to facilitate coordination and reporting on MM and MSF programs among the Parties, affected agencies, and existing coast wide and regional committees established to monitor activities related to the coast wide CWT program. The SFEC continues to review procedures and protocols for marking, sampling, and evaluation developed by the proponent(s) and, if appropriate, develop and recommend alternative procedures in consultation with relevant PSC technical committees.

In addition, the SFEC has a role in developing and evaluating methods for analyses of CWT data in the presence of MM and MSFs, establishing database requirements, and developing tools for agencies to use in developing proposals and analyzing data. The SFEC includes two working groups: the Regional Coordination Work Group (RCWG) and the Analytical Work Group (AWG). The RCWG is tasked with reviewing MM proposals, and the AWG is tasked with reviewing MSF proposals.

Beginning in 2002, agencies that intended to engage in MM or MSFs were requested to provide specific information on an annual schedule that would permit the SFEC to provide timely advice to the Pacific Salmon Commission (PSC). Agency proposals for mass marking plans were requested for all hatchery Chinook and coho stocks expected to be encountered in fisheries affected by PSC regimes. As stated in the *Understanding of the PSC concerning Mass Marking and Selective Fisheries* (Appendix A), proposals for continuing programs are requested no later than November 1 of the year prior to implementation. Proposals for new or substantially changed MM proposals are requested by June 1 of the year prior to implementation. Templates for MM and MSF proposals were developed in 2002, and agencies have been annually requested to provide their information to the SFEC in this format (Appendices B and C).

This report (a) summarizes the results of the review process of MM and MSF proposals received between October and December 2007, (b) identifies several unresolved issues and concerns, and (c) provides recommendations.

In this report a MM fish refers to a fish with an adipose fin clip and a double index tag (DIT) group includes two CWT groups, one marked and one unmarked.

## **2 RCWG Review of Mass Marking Proposals**

### ***2.1 Review Process for Mass Mark Proposals***

A total of 17 MM proposals (8 coho and 9 Chinook) were received by the PSC for 2008 activities (Appendix D). These represent all but one MM program with international ramifications and/or sampling impacts on other agencies (no information was provided on the possible marking of Snake River fall Chinook from the Oxbow facility by IDFG).

Proposals were not requested for spring and summer Chinook stocks from the upper Columbia and Snake River Basins. This is based on the lack of marine CWT recoveries from these groups in PSC managed fisheries as identified in previous reviews.

In order to evaluate the impacts of MM proposals on coast-wide sampling programs, marking agencies are requested to provide projected fishery encounters of MM fish in the proposals. The standardized method of estimating fishery encounters is described in the MM proposal template in Appendix B.

The RCWG used the criteria developed in 2002 for reviewing the MM proposals (Appendix E). Proposals were reviewed, discussed, and evaluated by RCWG members in December 2007 and January 2008. The proposals are summarized in Table 1.

### ***2.2 Results of Review***

#### **2.2.1 Mass Marking Levels**

Approximately 38 million coho are proposed to be mass marked coast wide (Table 1, Figure 1A). There are no significant changes to marking levels. A regional summary of this marking is displayed in Figure 1. The vast majority of coho production intended for harvest from Southern BC and Southern US hatcheries is being mass marked.

Approximately 102 million Chinook are proposed to be mass marked from southern US Chinook hatcheries (Table 1). This is an increase of 14.7 million (17%) from the 2007 proposals. The increases are primarily due to additional marking of Columbia River fall Chinook by ODFW (Table 1). The US Chinook hatchery production from Washington and Oregon, the area and stocks covered by the 2008 proposals, is projected at approximately 145 million released fish. For the production that is not MM, approximately 18 million are both CWTd and marked, approximately 7.5 million are tagged and unmarked, and approximately 12.5 million are intentionally left unmarked for restoration programs (Figure 2B). This leaves approximately 4.8 million Columbia River fall Chinook available for potential future mass marking (Priest Rapids Hatchery).

Table 1. Proposed mass marking for coho and Chinook.

Species	Area	Run	Agency	DIT Groups	2007 MM (millions)	2008 MM (millions)	Significant Changes	
Coho	Southern BC		CDFO	2	7.5	7.1		
	Puget Sound		WDFW/Tribal	7	10.7	10.6		
			USFWS	1	0.3	0.5		
	WA Coast		USFWS	2	0.7	0.5		
			WDFW/Tribal	4	5.3	5.2		
	Columbia Basin		USFWS	1	0.5	0.3		
			WDFW	2	8.7	8.7		
			ODFW	1	4.0	4.2		
OR Coast		ODFW	0	0.5	0.5	DIT dropped		
<b>Total Coho</b>					<b>38.2</b>	<b>37.6</b>		
Chinook	Puget Sound	Spring	WDFW	2	0.4	0.4		
		Summer	WDFW & Tribal	1	2.0	2.0		
		Fall	WDFW/Tribal	6	29.4	29.9		
	WA Coast	Spring	WDFW	0	0.2	0.4		
		Fall	USFWS	0	2.1	2.3		
			WDFW/Tribal	1	8.7	9.3		
	N. OR Coast	Spring	ODFW	0	0.4	0.3		
	S. OR Coast	Spring	ODFW	0	1.9	2.0	DIT dropped	
	Columbia Basin	Spring		ODFW	2	5.3	5.3	
				WDFW	1	3.0	3.0	
		Fall Tule		USFWS	2	14.2	14.2	
				WDFW	0	17.9	18.0	
				ODFW	1		5.3	New proposal
		Fall URB		ODFW	0		7.7	New proposal
				USFWS	0	1.6	1.6	
Snake R. Fall		IDFG	0	0.0	NA			
<b>Total Chinook</b>					<b>87.0</b>	<b>101.7</b>		

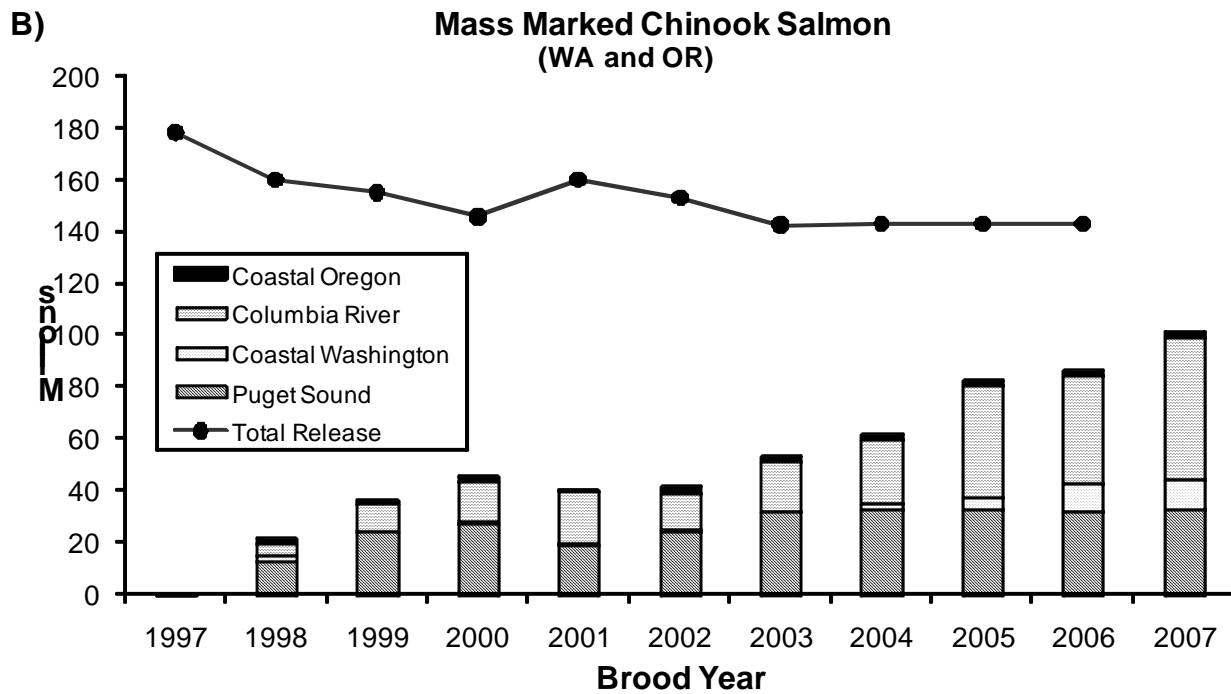
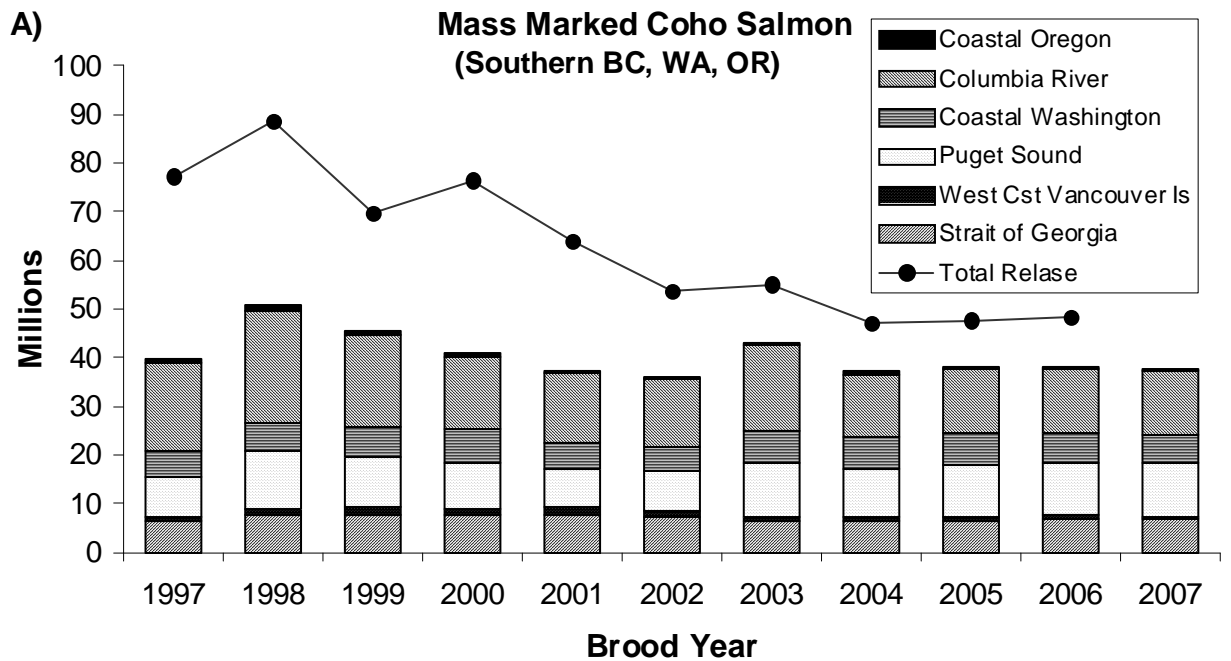


Figure 1. Number of coho and Chinook salmon mass marked (ad clip only) and released, by regions and brood year; 2005-2007 broods are proposed numbers. The solid line represents total hatchery releases, by brood year (proposed release numbers for 2003-2007).

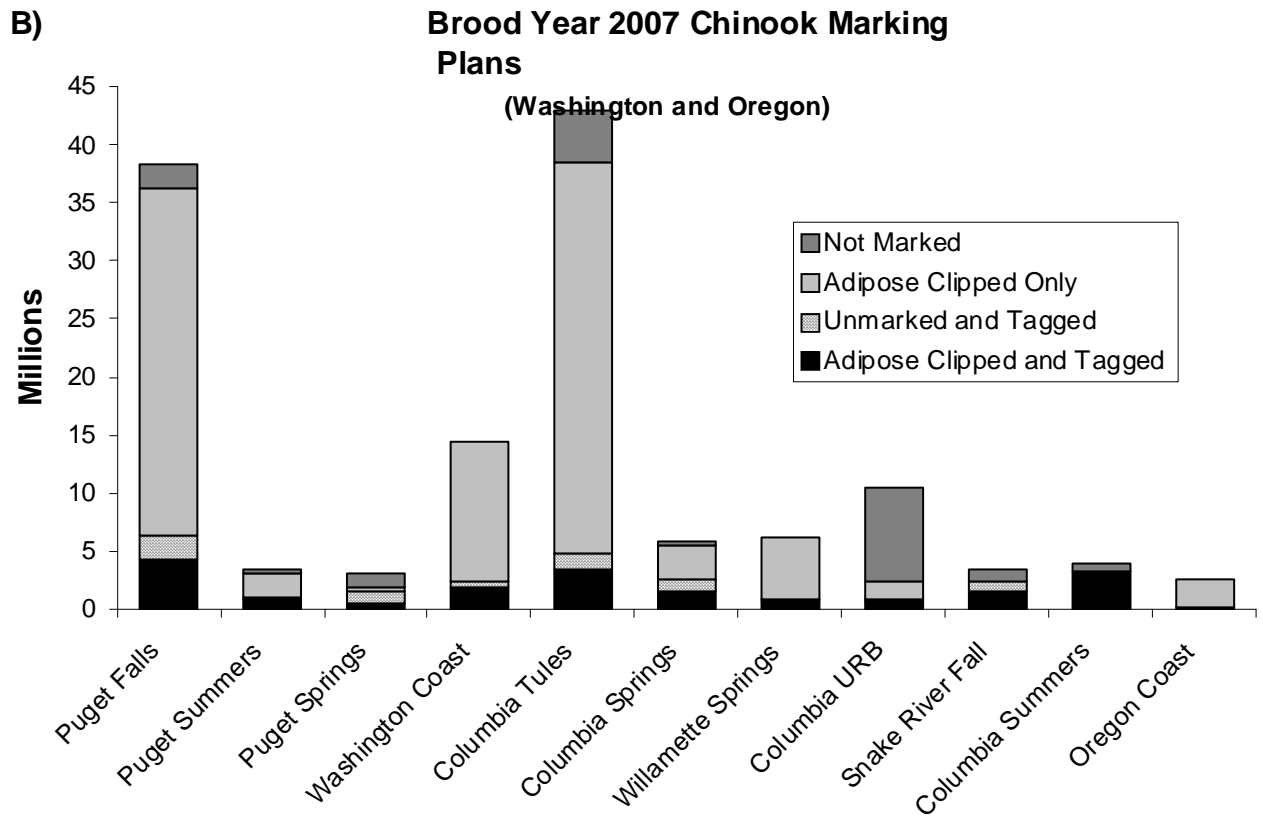
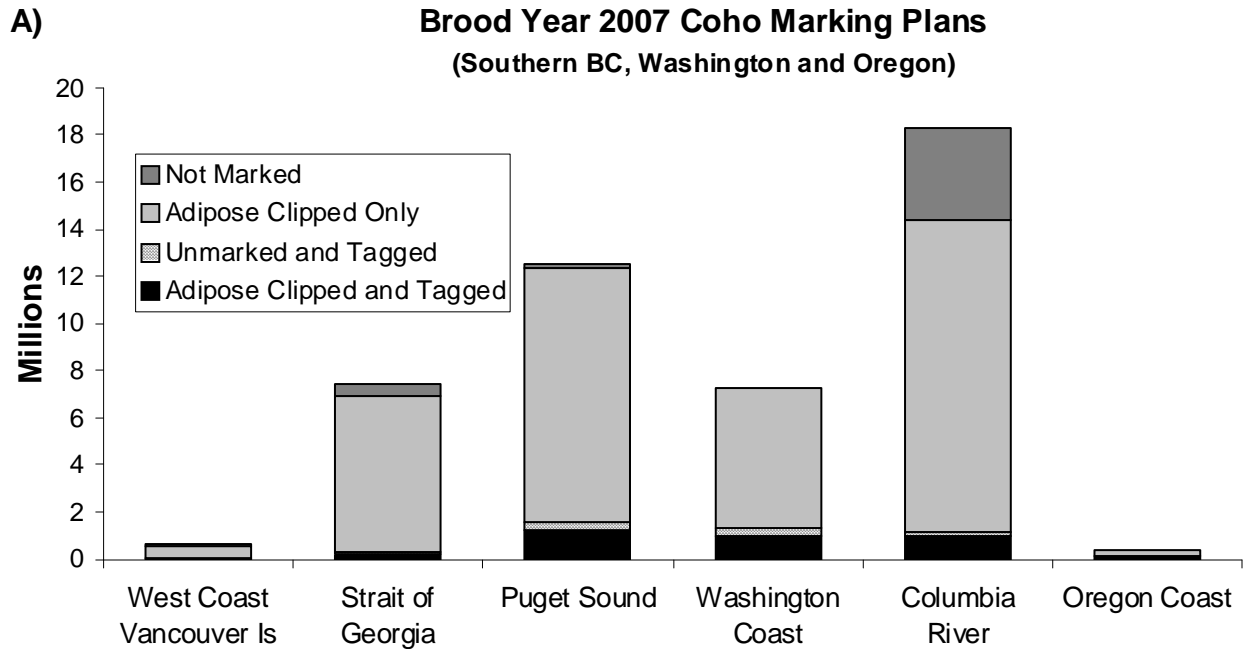


Figure 2. Projected coho and Chinook releases for brood year 2007, by region and mark status.

### 2.2.2 Current Agency Sampling Methods

Two methods are currently used to detect fish containing CWTs. The traditional visual sampling uses the adipose fin clip as an indicator for a CWT. When visual sampling is used, only CWTs from clipped fish will be detected. Electronic tag detection (ETD) uses electronic gear (wand or tube) to detect CWTs in marked and unmarked fish<sup>1</sup>.

ETD has not been implemented for all fisheries encountering MM fish. A summary of CWT sampling methods for coho and Chinook are listed in Table 2 and Table 3, respectively. In general, ETD has become the standard CWT sampling method in Washington, Idaho, and Oregon (except for Oregon coast fall Chinook fisheries, where fish are sampled visually). Visual CWT sampling (using the adipose fin clip as an external sign of the presence of a tag) remains the standard method in Alaska and California. In BC the situation is more complex, where sampling methods depend on species, location, and the type of fishery.

Alaska has no plans to convert to electronic sampling and is concerned about the large numbers of adipose-clipped fish without tags in their sampling programs. There has been an increase from approximately 7% to 30% of marked and untagged Chinook caught in the troll fishery since the implementation of mass marking. The increased costs to deal with the additional marked fish are not quantified, but will impact the program.

Canada relies on voluntary recoveries of marked coho and Chinook in recreational fisheries, while the current restricted commercial fisheries are electronically or visually sampled depending on species and location. As in Alaska, the program has seen an increase in the submission of heads without tags as well as a decrease in the rate of head returns as fewer anglers turn in heads. Coho commercial fisheries in northern BC are sampled visually and Chinook commercial fisheries are sampled electronically. South of Cape Caution, electronic sampling is used for both species for the current commercial fisheries.

California does not employ ETD. However, some MM Oregon south coast spring Chinook are projected to be recovered in California (Table 4), which could impact California's sampling program and the recovery of Oregon DIT Chinook salmon.

#### Estimated Sampling Encounters

A summary of projected MM Coho that may occur in agency sampling programs is provided in Table 4. This will result in estimated encounters of approximately 1,742 untagged and marked recoveries in Alaska and approximately 23 untagged and marked recoveries in California – the two geographical areas where coho are not MM'd or electronically sampled. It is also projected that approximately 15,200 untagged and marked coho recoveries will occur in Canadian fisheries that rely on visual sampling methods.

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<sup>1</sup> Note that when clipped fish are first separated in the sample and then electronic gear are used to detect tags in these clipped fish this must be defined as **visual sampling, as only clipped and tagged fish are detected.**

A summary of projected MM Chinook that may occur in agency sampling programs is provided in Table 4. The proposed MM of southern US Chinook stocks will result in estimated encounters of approximately 15,400 untagged and marked Chinook in Alaska and 24,300 untagged marked Chinook in Canadian sampling assuming recent exploitation rates and sampling programs. We emphasize these regions because agencies in these two areas rely on visual sampling to recover coded-wire tags. These increases are due to the migratory patterns of the stocks in the new proposals – Washington Coast and Columbia River fall Chinook. Some of these stocks are classified as “far-north” migrating (Washington coast fall Chinook and Columbia River Up-River Brights) and contribute heavily to both Alaskan and Canadian fisheries (Table 4).

Table 2. Fishery sampling methods for tagged coho.

<b>Region</b>	<b>Fishery</b>	<b>Type of Sampling</b>	<b>Comments</b>
Alaska	Commercial	Visual	
	Sport	Visual	
Northern BC	Commercial	Visual	Some terminal areas are unsampled
	Sport	Voluntary (Visual)	Anglers encouraged to turn in heads from marked coho only; therefore tag recoveries of unmarked coho are not expected.
West Coast Vancouver Island	Commercial	Electronic	Incidental recoveries in fisheries on other species; non-retention of unmarked coho
	Sport	Voluntary (Visual)	Anglers encouraged to turn in heads from marked coho only; therefore tag recoveries of unmarked coho are not expected.
Strait of Georgia	Commercial	Electronic	Incidental recoveries in fisheries on other species; non-retention of unmarked coho
	Sport	Voluntary (Visual)	Anglers encouraged to turn in heads from marked coho only; therefore tag recoveries of unmarked coho are not expected.
Puget Sound	Commercial	Electronic	
	Sport	Electronic	
Washington Coast	Commercial	Electronic	
	Sport	Electronic	
Oregon Coast	Commercial	Electronic	
	Sport	Electronic	
Columbia River	Commercial	Electronic	
	Sport	Electronic	
California	Commercial	Visual	
	Sport	Visual	



Table 3. Fishery sampling methods for tagged Chinook

<b>Region</b>	<b>Fishery</b>	<b>Type of Sampling</b>	<b>Comments</b>
Alaska	Commercial	Visual	
	Sport	Visual	
Northern BC	Commercial	Electronic	Tags from unmarked fish, except those recovered from freezer boats, are not decoded.
	Sport	Voluntary (Visual)	Anglers encouraged to turn in heads from marked Chinook only; therefore tag recoveries of unmarked Chinook are not expected.
West Coast Vancouver Island	Commercial	Electronic	Tags from unmarked fish, except those recovered from freezer boats, are not decode
	Sport	Voluntary (Visual)	Anglers encouraged to turn in heads from marked Chinook only; therefore tag recoveries of unmarked Chinook are not expected.
Strait of Georgia	Commercial	Electronic	Unmarked tags not decoded
	Sport	Voluntary (Visual)	Anglers encouraged to turn in heads from marked Chinook only; therefore tag recoveries of unmarked Chinook are not expected.
Puget Sound	Commercial	Electronic	
	Sport	Electronic	
Washington Coast	Commercial	Electronic	
	Sport	Electronic	
Oregon Coast	Commercial	Visual	Marine fisheries target fall Chinook, which are not MM in Oregon. CWTs from unmarked Chinook from other regions will not be recovered.
	Sport	Visual	
Columbia River	Commercial	Electronic	
	Sport	Electronic	
California	Commercial	Visual	
	Sport	Visual	

Table 4. Projected numbers of sampled fish in fishery CWT sampling programs, from brood year 2007 MM coho and Chinook releases (actual number of fish encountered in samples will depend upon sampling rates). For this analysis the following brood years were used: 1997-1999 all Chinook; 2001-2003 CDFO coho; 1999-2001 WDFW coho; 2000-2002 ODFW coho; 1999-2003 USFWS coho.

Species	Area	Run	Agency	DIT Gps	Mass Marked and Released (BY 2007)	Projected Encounters in Future Fisheries													
						Alaska		NBC		SBC		WA (CST/PS)		Columbia River		OR Coast		California	
						Com	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Spt
Coho	S. BC		CDFO	2	7,102,500	1,046	110	507	1,631	1,318	11,491	3,272	3,444				89		
	Puget Sound		WDFW	9	10,585,000	437		134	67	48	923	64,530	25,657		186	326	2,270		
			USFWS	1	320,000						31	746	706			3	60		
	Wa. Coast		USFWS	2	660,000	5		10	3	3	45	2,067	860	1	9	16	202		
			WDFW	4	5,205,000	144		107			128	8,008	5,353	29	95	169	2,398		
	Columbia		USFWS	1	300,000							1	40	36	22	1	31		
		WDFW	2	8,732,500			12			58	813	16,124	16,007	6,278	1,192	10,406			
		ODFW	1	4,197,000						8	107	3,457	10,088	2,174	99	3,728	4	15	
Or Coast		ODFW	1	275,000							8	87	1	3	9	122		4	
			<b>Total</b>	<b>37,377,000</b>		1,742		2,471		14,054		135,280		34,929		21,120		23	
Chinook	Puget Sound	Spring	WDFW	1	350,000	encounters included with falls													
		Summer	WDFW	1	2,030,000	encounters included with falls													
	Wa Coast	Fall	WDFW	7	29,851,000	415		201	67	6,247	2,330	25,067	4,569	10		572	18	9	
		Spring	WDFW	0	400,000	20		46	2	8	8	42	6			8			
	N. Or Coast	Fall	USFWS	0	2,340,000	480	63	193	30	22	13	699	10					2	
			WDFW	2	9,250,000	2,233	367	1,771	330	172	285	1,115	892	274	279		271		
	S. Or Coast	Spring	ODFW	0	288,000	212	6	91	10	60		39	11	1	1	70	56	1	
	Columbia	Spring	ODFW	1	1,990,000	4		4		35	8	72	60	4		1,228	231	1,155	91
			ODFW	2	5,261,000	1,583	81	390	16	693	8	201	131	1,919	2,322	134	3		
	Fall Tules		WDFW	1	2,972,000	530	9	153		190	18	111	149	342	445	133	24		
			USFWS	2	14,200,000	977	61	34	17	3,708	300	3,490	2,227	14,964	955	3,496	461	10	28
			WDFW	2	17,957,500	2,616	393	682	374	2,012	326	2,349	2,022	1,422	1,153	1,399	365		
	URBs		ODFW	1	5,300,000					717	99	700	1,529	8,939	2,061	4,913	853	928	38
			ODFW	0	7,694,000	4,788	214	778	68	1,761		914	847	6,769	2,945	644			
		USFWS	0	1,600,000	347	8	8		24	16	8	8	379		8				
		Snake	IDFG	0	n/a	n/a													
			<b>Total</b>	<b>101,483,500</b>		15,407		5,265		19,060		47,269		45,183		14,888		2,262	

### **2.2.3 Double Index Tagging (DIT) Programs**

With the advent of MSF using the adipose clip as a mass mark, tagged and marked groups no longer represent unmarked groups and cannot be used to estimate exploitation of natural or unmarked stocks in the presence of MSFs. DIT releases were introduced to try to overcome this problem. Differences in recovery patterns of DIT release groups provide a means to estimate impacts of unmarked fish in MSFs.

With unbiased and sufficient sampling in escapement or in an extreme terminal fishery, differences between escapement rates of marked and unmarked DIT groups enable us to estimate the total cumulative impact of MSFs. Differences in the ratio of unmarked to marked for the DITs enable us to estimate encounters of unmarked fish in MSFs. Estimation of fishery specific exploitation rates depends on estimation of unmarked encounters in MSFs and on complete sampling of all tagged fish in all fisheries and escapement.

Several factors compromise the ability to utilize DIT to determine the impact of MSF on unmarked stocks, which will impact analyses by PSC technical committees and other evaluation programs. Lack of complete sampling of all tagged fish in all fisheries and escapement is one of these factors. Another factor is coverage of DIT programs. Once an indicator stock is encountered in MSFs a marked and tagged group will not provide representation of natural stocks.

The list of DIT groups was reduced by two in the 2008 proposals. ODFW is planning on eliminating the coho and spring Chinook DIT groups (both Rogue R. stocks) from the Cole River Hatchery. The current list of DIT groups is not comprehensive with respect to geographic distribution (Table 1, Appendices F and G). The list of DIT groups has not been reviewed by the PSC CTC and CoTC to ensure that all stocks potentially encountered in proposed MSFs are adequately represented by DIT groups.

### **3 AWG Review of the Mark Selective Fisheries Proposals**

#### ***3.1 Review Process***

In 2006, the SFEC simplified the format of the template for MSF proposals to focus on the description of the fishery and the sampling plan and to identify the stocks impacted by the fishery (Appendix C.). The information to be provided in the proposal template is required by analysts to estimate mortalities of unmarked from DITs.

##### **3.1.1 2008 MSF Proposals**

The due date for MSF proposals is November 1 (Appendix A). MSF proposals received after November 31, 2007, were not reviewed by the SFEC as they were received too late. Seven proposals were received for coho salmon MSFs for 2008 by the end of November. Four proposals were received for B.C. fisheries and three WDFW proposals were received for ongoing marine recreational coho fisheries (Table 5). Coho MSFs occurred in 2003-2006 for Nooksack River coho salmon, but no proposals have been received for this fishery. A proposal was submitted late for a coho sport fishery in the Lower Columbia River. Sport and commercial coho MSFs have occurred on the Oregon coast since before 2003, but no proposals have been received for these fisheries (Table 6).

Nine proposals were received for Chinook salmon MSFs for 2008 (Table 5). Five of these proposals were from WDFW for ongoing MSFs in freshwater in Puget Sound. Three other proposals were from WDFW for Puget Sound MSFs in marine areas, two for summer fisheries and one for a winter fishery. One proposal was received from ODFW for a MSF on Willamette spring Chinook. Proposals were submitted late for sport and commercial fisheries in the Lower Columbia River and in the Yakima River (Table 6).

No new MSF proposals were received for 2008. Last year, a new pre-terminal Chinook MSF was proposed for Puget Sound and Strait of Juan de Fuca (WA areas 6-13) for October to April of 2007-8. However, this fishery actually occurred in a smaller region (Areas 7, 8.1 and 8.2, 9 and 10). Last year, a proposal was also received for a new summer MSF in Puget Sound, but this MSF fishery actually occurred only in areas 9, 10, 11 and 13 for the period May to September in 2007.

Table 5. Mark Selective Fishery (MSF) proposals for 2008 submitted to PSC SFEC in time for the annual review.

Location	Agency & Proposal No.	Fishery Type and Period	Regulation	Indicator stocks impacted	Comments and Concerns about 2008 proposal
<b>Coho MSF proposals</b>					
BC statistical areas 11-29, outer areas of 121-127.	FOC 02	Recreational  Coastal waters June 1-December 31.  Fraser River Mid-October to December 31.	Daily bag limit of 2 (may be up to 4) marked coho greater than 30 cm fork length. Barbless hooks  Further regulations depend on maximum ER for interior Fraser River coho. May have mixed bags.	Lists tagged coho recoveries in 1986-1991. Good table provided in this proposal, but could benefit from indication of DIT groups.	There is a table identifying which tagged stocks are encountered and with some work it is possible to identify which are DIT stocks.  There is no direct creel sampling of CWTs. Catch is estimated by creel survey methods and CWT recoveries will be estimated from CWTs obtained via a voluntary head recovery program and an awareness factor estimated from creel survey data.  Voluntary recovery programs will not provide recoveries of unmarked and tagged fish in any fishery. If there is wild coho retention, any unmarked tagged fish landed will not be sampled.  Mixed bag fishery will likely be prosecuted.
BC statistical areas 11-29, outer areas of 121-127.	FOC 05	Commercial  September-October	Retention of marked coho allowed in a Chinook targeted fishery.	Tagged stocks and DIT groups listed	New proposal, but fishery is continuing from previous years.  Direct sampling with ETD and processing all heads, marked and unmarked (mark recognition error).
Fraser River	FOC 03	First Nations	Chum targeted fishery. Marked coho can be	List of stocks does not indicate which are tagged and if there are	No sampling for CWTs is planned. Numbers of clipped and unclipped coho is reported. Visual identification only.

Table 5. Mark Selective Fishery (MSF) proposals for 2008 submitted to PSC SFEC in time for the annual review.

<b>Location</b>	<b>Agency &amp; Proposal No.</b>	<b>Fishery Type and Period</b>	<b>Regulation</b>	<b>Indicator stocks impacted</b>	<b>Comments and Concerns about 2008 proposal</b>
		October-November	retained.	any DIT stocks included	Approximately 1,100 coho were retained in these fisheries in 2007. At least two stocks encountered, Inch and Coldwater are tagged. The Inch is a DIT program. ETD sampling should be considered.
Fraser River	FOC 06	Recreational  Table provided showing periods by specific area	Table provided showing bag limits by specific area	List of stocks does not indicate which, if any, are tagged and if there are any DIT stocks included.	Creel surveys conducted, but there is no CWT sampling. Awareness factors are estimated if there is a creel survey. Voluntary returns of CWTs.
Washington ocean coho sport fishery	WDFW 06	Recreational  July-September	2 salmon per day unmarked coho.	Most CWT indicator stocks listed in Appendix F are likely to be encountered	Ocean sampling monitoring plan is attached to proposal. Indicates that sampling uses ETD.
Washington Puget Sound Areas 5,6, 7 and 13	WDFW 07	Recreational  July-September	Release unmarked coho, no minimum size limit	All CWT indicator stocks from Puget Sound and southern BC	Sampling program described in monitoring programs for Puget Sound Chinook. This includes ETD sampling for CWTs.
Washington Ocean Areas 1-4	WDFW 15	Commercial  July-September	Release unmarked coho, minimum size 16 inches.	All CWT indicator stocks from Washington and southern BC are likely to be encountered in this fishery.	Sampling program is described in monitoring plan for recreational fishery in WDFW-06.

Table 5. Mark Selective Fishery (MSF) proposals for 2008 submitted to PSC SFEC in time for the annual review.

Location	Agency & Proposal No.	Fishery Type and Period	Regulation	Indicator stocks impacted	Comments and Concerns about 2008 proposal
<b>Chinook MSF proposals</b>					
Washington Areas 7, 8-1, 8-2, 9 and 10.	WDFW 16.  Replaces previous proposal WDFW-08	Recreational  October 2008 to April 2009	Daily bag limit of 2 marked salmon. Chinook minimum size limit of 22 inches, 18-20 inches being considered. Other species follow normal structure for areas/months.	The proposal template requests that all tagged and DIT stocks likely to be impacted be listed. This proposal, and the proposals for the last two years have only included the Puget Sound tagged stocks	This fishery will impact CTC indicator stocks of concern that are not clipped or DIT: White River tag groups being the main concern.  All tagged stocks likely to be impacted should be reviewed and listed.  Sampling plans for Areas 7, 9 and 10 are attached to proposal. Assume 8.1 and 8.2 sampling will be similar.
Washington Areas 5 and 6	WDFW 02	Recreational  July-August 2008	Daily bag limit of 2 marked salmon. Chinook minimum size limit of 22 inches, 18-20 inches being considered.	Tagged list includes stocks from Puget Sound, BC and Columbia River	Sample plan is attached to proposal.
Puget Sound areas 9, 10, 11 and 13	WDFW 11	Recreational  May to September	Daily bag limit of 2 marked salmon.	The proposal template requests that all tagged and DIT stocks likely to be impacted be listed. This proposal, and the proposals for the last two years have	Sampling plan is attached to proposal.

Table 5. Mark Selective Fishery (MSF) proposals for 2008 submitted to PSC SFEC in time for the annual review.

Location	Agency & Proposal No.	Fishery Type and Period	Regulation	Indicator stocks impacted	Comments and Concerns about 2008 proposal
				only included the Puget Sound tagged stocks	
Nooksack River	WDFW 13	Recreational September 1 - December 31, 2008	2 marked adults	Indicates Samish fall as possible strays.	<p>The description of regulation is inadequate. Complete regulation will probably be: Daily bag limit of 2 marked adults. Release wild (unmarked) Chinook and coho. Minimum size 12 inches.</p> <p>The description of tagged stocks that could be encountered is inadequate. See Table 9 for a complete list of tagged stocks encountered in sampling in the river.</p> <p>Information on sampling incorrect. There was a creel survey in 2005 and 2006 with angler interviews and CWT sampling.</p> <p>Need more detailed sampling plans (general comment for freshwater MSFs)</p>
Skykomish River	WDFW 01	Recreational June 1 – July 31	Daily bag limit of 2 marked Chinook only, 12 inch minimum size.	Description of local marked and tagged hatchery Chinook	<p>The description of regulation is inadequate. Complete regulation will probably be: Daily bag limit of 2 marked adults. Release wild (unmarked) Chinook and coho. Minimum size 12 inches.</p> <p>The description of tagged stocks that could be encountered is inadequate. See Table 9 for a complete list of tagged stocks encountered in</p>



Table 5. Mark Selective Fishery (MSF) proposals for 2008 submitted to PSC SFEC in time for the annual review.

Location	Agency & Proposal No.	Fishery Type and Period	Regulation	Indicator stocks impacted	Comments and Concerns about 2008 proposal
					<p>sampling in the river.</p> <p>Need more detailed sampling plans (general comment for freshwater MSFs)</p>
Upper Skagit River	WDFW 12	Recreational	Daily bag limit of 2 marked Chinook only	Description of local marked and tagged hatchery Chinook	<p>New proposal, but fishery occurred last year</p> <p>The description of regulation is inadequate. Complete regulation will probably be: Daily bag limit of 2 marked adults. Release wild (unmarked) Chinook and coho. Minimum size 12 inches.</p> <p>The description of tagged stocks that could be encountered is inadequate. See Table 9 for a complete list of tagged stocks encountered in sampling in the river.</p> <p>Need more detailed sampling plans (general comment for freshwater MSFs)</p>
Washington Puyallup & Carbon Rivers	WDFW 09	Recreational Puyallup River: Aug 1-Dec 31  Carbon	2 adult salmon	No CTC indicator stocks likely to be impacted, but there is a tagged Voights River group.	<p>Regulation description has been over-simplified. Complete description should be given, including minimum limits and mixed bag information.</p> <p>SFEC is aware that the Puyallup regulation states: “Daily bag limit of 6 salmon, 2 adult salmon, release unmarked adult Chinook “</p> <p>Carbon River regulation states: “Daily bag limit</p>

Table 5. Mark Selective Fishery (MSF) proposals for 2008 submitted to PSC SFEC in time for the annual review.

Location	Agency & Proposal No.	Fishery Type and Period	Regulation	Indicator stocks impacted	Comments and Concerns about 2008 proposal
		River Aug/Sep 1- Nov 30			<p>of 6 salmon, 4 adults, no more than 2 marked Chinook. Release chum and wild adult Chinook”</p> <p>Explanation from WDFW biologist: “An adult fish is one over 24 inches. Under 24 inches the fish is a jack and all jacks, marked and unmarked, may be kept”.</p> <p>The description of tagged stocks that could be encountered is inadequate. See Table 9 for a complete list of tagged stocks encountered in sampling in the river.</p> <p>Sampling description implies a sampling of fishery for CWTs and possibly a creel survey. More information is required.</p>
Nisqually River	WDFW 14	Recreational  Jul 1, 2008 to Jan 31, 2009	Daily bag limit of 2 marked Chinook.	Description of local marked and tagged hatchery Chinook	<p>Fishery ongoing for 2005 thru 2007.</p> <p>Need to be more specific about regulations, i.e. describe total bag and mixed bag and marked adults vs. marked jacks.</p> <p>The description of tagged stocks that could be encountered is inadequate. See Table 9 for a complete list of tagged stocks encountered in sampling in the river.</p> <p>Need more detailed sampling plans (general</p>

Table 5. Mark Selective Fishery (MSF) proposals for 2008 submitted to PSC SFEC in time for the annual review.

Location	Agency & Proposal No.	Fishery Type and Period	Regulation	Indicator stocks impacted	Comments and Concerns about 2008 proposal
					comment for freshwater MSFs)
Columbia River: Willamette River and tributaries	ODFW 01	Recreational Jan-July	Daily bag limit of 2 marked Chinook (>24 inches total length) and 5 marked jack Chinook (15-24 inches).	Proposal lists tagged hatchery fish with tag codes for broods 1997-2002, DIT status and number released.  Willamette tagged fish are the only tagged fish encountered in this fishery.	Evaluation of the Willamette MSF using the Willamette DIT groups by CTC in 2006 revealed that escapement of unmarked and tagged fish was not properly sampled. This should be reviewed by ODFW.  Used old proposal template again. Need to use the new (revised) template for future proposals.

Table 6. Mark selective fisheries proposals (P) received, occurrence of fishery (F), and post season report (R) received for MSFs that occurred 2003-2007 or are expected to occur in 2008. A “√” indicates that a proposal or report was submitted or a fishery occurred and a “x” that no fishery occurred or no proposal or report was received as of November 2007. A “L” indicates that a proposal was submitted late for the current year (after December 2007) and so was not reviewed. Blank cells indicate that no MSF was planned.

Fishery and Location	Proposal ID assigned by PSC	2003			2004			2005			2006			2007			2008
		P	F	R	P	F	R	P	F	R	P	F	R	P	F	R	P
<b>Targeting Hatchery Coho</b>																	
Sport, Southern BC	MSF-FOC-02	√	√	√	√	√	√	√	√	x	√	√	x	√	√	x	√
Commercial, Southern BC	MSF-FOC-05				√	x		√	√	x	√	√	x	x	√	x	√
Sport, Lower Fraser freshwater	MSF-FOC-06	x	√	√	x	√	√	x	√	x	√	√	x	√	√	x	√
FSC, Lower Fraser freshwater	MSF-FOC-03										√	√	x	√	√	x	√
Sport, Washington coast	MSF-WDFW-06	√	√	x	√	√	x	√	√	x	√	√	x	x	√	x	√
Commercial, WA areas 1-4	MSF-WDFW-15	x	√	x	x	√	x	x	√	x	x	√	x	x	√	x	√
Sport, Puget Sound	MSF-WDFW-07	x	√	x	√	√	x	√	√	x	√	√	x	x	√	x	√
Sport, Nooksack River		x	√	x	x	√	x	x	√	x	x	√	x	x	√	x	x
Sport, Lower Columbia River (since 1999)	MSF-ODFW/WDFW-04	x	√	√	x	√	√	x	√	x	x	√	x	x	√	x	L
Commercial troll, Oregon coast (since 1999)		x	√	√	x	√	√	x	√	x	x	√	x	x	√	x	x
Sport, Oregon coast		x	√	√	x	√	√	x	√	x	x	√	x	x	√	x	x
Total number for coho		2	9	5	4	9	5	4	10	0	6	11	0	3	11	0	7
<b>Targeting Hatchery Chinook</b>																	
Sport summer, WA area 5&6	MSF-WDFW-02	√	√		√	√	x	√	√	x	√	√	x	√	√	x	√
Sport summer, WA area 9,10,11,13	MSF-WDFW-11													√	√	x	√
Sport winter, WA area 5-13, (actual areas vary with year)	MSF-WDFW-16 replaces 08							√	√	x	√	√	x	√	√	x	√
Sport, Nooksack River	MSF-WDFW-13				√-1	√	x	√	√	x	√	√	x	√	√	x	√
Sport, Skykomish River	MSF-WDFW-01	√	√	x	√	√	x	x	√	x	x	√	x	√	√	x	√
Sport, Carbon & Puyallup River	MSF-WDFW-09	x	√	x	x	√	x	√	√	x	√	√	x	√	√	x	√
Sport, Upper Skagit River	MSF-WDFW-12							x	√	x	x	√	x	√	√	x	√
Sport, Nisqually River, Jul-Jan	MSF-WDFW-14							x	√	x	x	√	x	√	√	x	√
Sport, Columbia River (on summer run)	MSF-ODFW/WDFW-02	√	√	x	√-1	√	x	√	√	x	x	√	x	x	√	x	L
Sport, Lower Columbia River (on	MSF-	√	√	x	√-1	√	x	√	√	x	x	√	x	x	√	x	L

Table 6. Mark selective fisheries proposals (P) received, occurrence of fishery (F), and post season report (R) received for MSFs that occurred 2003-2007 or are expected to occur in 2008. A “√” indicates that a proposal or report was submitted or a fishery occurred and a “x” that no fishery occurred or no proposal or report was received as of November 2007. A “L” indicates that a proposal was submitted late for the current year (after December 2007) and so was not reviewed. Blank cells indicate that no MSF was planned.

Fishery and Location spring run)	Proposal ID assigned by PSC ODFW/WDFW-01	2003			2004			2005			2006			2007			2008
		P	F	R	P	F	R	P	F	R	P	F	R	P	F	R	P
Commercial, Lower Columbia River (on spring run with tangle net)	MSF- ODFW/WDFW-03	√	√	x	√-1	√	x	√	√	x	x	√	x	x	√	x	L
Commercial, Lower Columbia River (on spring run with large net)	MSF- ODFW/WDFW-03	x	√	x	x	√	x	x	√	x	x	√	x	x	√	x	L
Sport, Yakima River (on spring run)	MSF-WDFW-17				√	√	x	x	x		x	x		x	x		L
Sport, Willamette River on spring run)	MSF-ODFW-01	√	√	√	√	√	√	√	√	x	√	√	x	x	√	x	√
<b>Total number for Chinook</b>		6	8	1	8	10	1	8	12	0	5	12	0	8	13	0	9
<b>Total</b>		8	17	6	12	19	6	12	22	0	11	23	0	11	24	0	16

1 Submitted in 2004 as a multi-year proposal for fisheries. Continuing fisheries, since 2006, are required to have annual proposals.

### ***3.2 Fishery Interactions.***

Multiple MSFs are expected to occur in 2008 in British Columbia, Washington and Oregon. Tables 7 through 9 were constructed using historical information on encounters of tagged fish in the fishery areas and time periods of the MSFs to identify coho and Chinook tagged stocks that were historically encountered in these areas with MSFs.

In 2008, Southern B.C. and Puget Sound Chinook stocks will potentially be impacted by two MSFs, the Area 5/6 fishery, which will be in its fourth year (Table 6), and the winter MSF in Puget Sound, which occurs from October 2007 to April 2008. The winter fishery impacts Chinook stocks that are present in Puget Sound throughout the year (Table 8). The freshwater fisheries in Puget Sound can be expected to largely encounter tagged fish from local hatcheries, but evaluation of tagged fish encountered in sampling of fisheries and escapement over the past five years in these rivers show that non-local strays can also be expected to be encountered (Table 9).

Table 7. Coho salmon representative tag groups that are expected to be present in mark-selective fisheries proposed for 2008, based on presence of tag groups in past years and availability of tag groups in 2008.

Region	Hatchery or Release Site	Wild Tagging*	DIT	Marked Selective Fishery Areas						
				WA Areas 5,6,7,13	WA Area 1	Col R. Buoy 10	WA Area 2	WA Area 3	WA Area 4	SBC
British Columbia	BIG QUALICUM RIVER			x			x	x	x	x
	CHILLIWACK R (discontinued)									
	GOLDSTREAM RIVER		√	x	x	x	x	x	x	x
	INCH CREEK		√	x	x		x	x	x	x
	PUNTLEDGE R (discontinued)									
	QUINSAM RIVER		√	x	x		x	x	x	x
	ROBERTSON CREEK			x	x		x	x	x	x
SPIUS CREEK				x	x	x	x	x	x	
Puget Sound	BAKER RIVER	√		x					x	x
	BERNIE GOBIN HATCH			x	x	x	x	x	x	x
	ELLIOTT BAY TRIBAL NP			x	x		x	x	x	x
	LUMMI SEA PONDS			x	x	x	x	x	x	x
	MARBLEMOUNT HATCHERY		√	x	x	x	x	x	x	x
	MINTER HATCHERY			x	x				x	x
	NISQUALLY HATCHERY		√	x	x				x	
	SKOOKUM CR HATCHERY			x	x	x	x	x	x	x
	SOOS CREEK HATCHERY		√	x	x		x	x	x	x
	SOUTH SOUND NET PENS			x	x	x	x	x	x	
VOIGHTS CR HATCHERY			x	x		x	x	x	x	
WALLACE R HATCHERY		√	x	x	x	x	x	x	x	
Hood Canal	BIG BEEF CREEK	√		x			x	x	x	x
	GEORGE ADAMS HATCHRY		√	x	x		x	x	x	x
	PORT GAMBLE BAY PENS		√	x	x		x	x	x	x
	QUILCENE BAY SEA PEN		√	x	x		x	x	x	x
	QUILCENE NFH		√	x	x		x	x	x	x
Washington Coast	BINGHAM CR HATCHERY		√	x	x	x	x	x	x	x
	BINGHAM CREEK	√						x		
	FORKS CREEK HATCHERY		√	x	x	x	x	x	x	x
	MAKAH NFH ON SOOES R		√	x	x	x	x	x	x	x
	QUINAULT NFH -COOK C		√	x	x	x	x	x	x	x
	SALMON R FISH CULTUR		√	x	x	x	x	x	x	x
	SOLDUC HATCHERY		√	x	x	x	x	x	x	x

Table 7. Coho salmon representative tag groups that are expected to be present in mark-selective fisheries proposed for 2008, based on presence of tag groups in past years and availability of tag groups in 2008.

Region	Hatchery or Release Site	Wild Tagging*	DIT	Marked Selective Fishery Areas						SBC
				WA Areas 5,6,7,13	WA Area 1	Col R. Buoy 10	WA Area 2	WA Area 3	WA Area 4	
	QUEETS-SNAHAPISH RIVER UPPER CHEHALIS	√ √						X X	X X	
Columbia River	BIG CR HATCHERY			X	X	X	X	X	X	
	CASCADE HATCHERY			X	X	X	X	X		
	CEDC YOUNGS BAY NET				X	X	X	X		
	COWLITZ SALMON HATCH			X	X	X	X	X	X	X
	DEEP R NP – LOWER				X	X	X	X	X	
	DEEP R NP – UPPER				X	X	X		X	
	EAGLE CR NFH		√	X	X	X	X	X	X	
	ELOCHOMAN HATCHERY				X					
	FALLERT CR HATCHERY				X	X	X		X	
	GRAYS RIVER HATCHERY				X	X	X	X		
	KALAMA FALLS HATCHRY			X	X	X	X	X	X	X
	KLICKITAT HATCHERY			X	X	X	X	X	X	
	NORTH TOUTLE HATCHRY				X					
	ROCK CR HATCHERY				X	X	X	X		
	RUSHINGWATER AC POND			X	X		X	X	X	X
	STEAMBOAT SL NETPENS				X	X	X	X		
	WASHOUGAL HATCHERY			X	X	X	X	X	X	X
	WILLARD NFH		√		X	X	X		X	
	WINTHROP NFH				X	X	X		X	
Oregon Coast	NEHALEM HATCHERY				X	X	X	X		
	SALMON R HATCHERY				X		X	X	X	
	TRASK R HATCHERY				X	X	X		X	

\*Wild stock tagged fish are not ad-clipped



Table 8. Chinook tagged stocks that have been encountered in marine areas contained within proposed Chinook MSFs for 2008. Based on a summary of tagged groups encountered in fisheries. A check (√) indicates that on average two or more tags have been encountered annually in samples, while a \* indicates that a single tag has been recovered. S=summer fishery, W=winter fishery.

Release Region	Hatchery	Run	DIT	Puget Sound Area													
				5/6		7		8.1/8.2		9		10		11		13	
				S	W	S	W	S	W	S	W	S	W	S	W	S	W
BC	H-CAPILANO R	Fall		*					*			*	*	*			
	H-CHEHALIS R	Fall		√								√		*			
	H-CHEMAINUS R	Fall		*	*	*	*										
	H-CHILLIWACK R	Fall	√	√	*	√	*	*	√		√	√	√	√	√	*	
	H-COWICHAN R	Fall	√	√	*	*	*		*					*			
	H-INCH CR	Fall		√				*	√			√		√		*	
	H-L QUALICUM R	Fall		*													
	H-NANAIMO R	Summer					*										
	H-NANAIMO R	Fall		√		*	*										
	H-SHUSWAP R	Summer	√	*													
	H-TENDERFOOT CR	Summer					*										
	MERCED R FISH FACIL.	Fall		*													
	MOKELUMNE R FISH INS	Fall		*													
NOOK	FIDALGO BAY NET PENS	Fall		*	*	*					√						
	GLENWOOD SPRINGS	Fall				*	√				√			*		*	
	KENDALL CR HATCHERY	Spring	√	*	√		√				*	*			*		
	LUMMI SEA PONDS	Fall				*	*		√					*			
	SAMISH HATCHERY	Fall	√	√	√	√	√		*		√	*	√	*	*	*	
	WHATCOM CR HATCHERY	Fall		*													
SKAG	COUNTY LINE PONDS	Summer		*													
	MARBLEMOUNT HATCHERY	Spring	√	√	√	√	√	*	√		√	√	√	√	*	*	
	MARBLEMOUNT HATCHERY	Fall		*	*	*	√	*	*		√	*	√				
	OAK HARBOR NET PENS	Fall			*			*	*				*	*	*		
STIL-SNO	BATTLE CR HATCHERY	Spring			*		√	*	√		√		*		√		
	BERNIE GOBIN HATCH	Summer		√	√		√	√	√				*				

Table 8. Chinook tagged stocks that have been encountered in marine areas contained within proposed Chinook MSFs for 2008. Based on a summary of tagged groups encountered in fisheries. A check (√) indicates that on average two or more tags have been encountered annually in samples, while a \* indicates that a single tag has been recovered. S=summer fishery, W=winter fishery.

Release Region	Hatchery	Run	DIT	Puget Sound Area													
				5/6		7		8.1/8.2		9		10		11		13	
				S	W	S	W	S	W	S	W	S	W	S	W	S	W
	BERNIE GOBIN HATCH	Spring			*		*	√	√		*	√	*	√	*		
	BERNIE GOBIN HATCH	Fall		*		*	*	√	*			*	√				
	LANGLEY NET PENS	Fall			*	*								*			
	WALLACE R HATCHERY	Summer	√	√	√	√	√	√	√		√	√	√	√	√	√	√
	WHITEHORSE POND	Summer		*	√	*	√	*	*		*	*	*	√	*		
JUAN	DUNGENESS HATCHERY	Spring												*			
	HURD CR HATCHERY	Spring				*	*	*		*							
	HOKO FALLS HATCHERY	Fall		*													
MPS	COWSKL & RUSHWTR PDS	Fall		√								*		√			
	COWSKULL ACCLIM POND	Fall										*	*		*		
	GORST CR REAR.POND	Fall										*	*		*		
	GROVERS CR HATCHERY	Fall	√	√	√	*	√	√	√	√	√	√	√	√	√	*	*
	ICY CR HATCHERY	Fall			√	*	√	*	√	*	√	√	√	√	√	√	√
	ISSAQUAH HATCHERY	Fall										*	*				
	PORTAGE BAY HATCHERY	Fall			√	*	√	*	√		√	√	√	√	*		
	PUYALLUP TRIBAL HATCHERY	Fall		√	√		*		*		*	√		√			
	SOOS CREEK HATCHERY	Fall	√	√	*	*	√		√		√	√	√	√	√		
	VOIGHTS CR HATCHERY	Fall		*	√		*		√	*	√	*		√			
	WHITE RIVER HATCHERY	Spring			√		*	*	√		√	√	√	√	√	*	
HOOD	BIG BEEF CR HATCHERY	Fall										*					
	GEORGE ADAMS HATCHRY	Fall	√	√	*	*	√		*		√	√	√	√	*		
	HOOD CANAL MARINA NP	Fall												*	*	*	
	HOODSPORT HATCHERY	Fall		*	√	√	√		√		√	√	√	√	√	√	*
	LITTLE BOSTON CR HAT	Fall			*												
	PLEASANT HARBOR NP	Fall											*	√	*		
	SUND ROCK NET PENS	Fall		*	√		√		√	*	√	√	√	√	√	*	*

Table 8. Chinook tagged stocks that have been encountered in marine areas contained within proposed Chinook MSFs for 2008. Based on a summary of tagged groups encountered in fisheries. A check (√) indicates that on average two or more tags have been encountered annually in samples, while a \* indicates that a single tag has been recovered. S=summer fishery, W=winter fishery.

Release Region	Hatchery	Run	DIT	Puget Sound Area													
				5/6		7		8.1/8.2		9		10		11		13	
				S	W	S	W	S	W	S	W	S	W	S	W	S	W
SPS	CHAMBERS CR + GARRISON	Fall						*									
	CHAMBERS CR HATCHERY	Fall			*							*		*		*	*
	FOX ISLAND NET PENS	Fall			√	*	√	*	√	*	√	√	√	√	√	√	√
	HUPP SPRINGS REARING	Spring	√		√		*		√	*	√	√	√	√	√	√	√
	KALAMA CR HATCHERY	Fall		√	*		*		*			√	*	√	*	√	√
	MCALLISTER HATCHERY	Fall			*		*	*	√		√	√	√	√	√	√	√
	NISQUALLY HATCHERY	Fall	√	√	√	*	√		√	√	√	√	√	√	√	√	√
	PERCIVAL COVE NET PN	Fall							*		√	*		√	*	√	*
	SOUTH SOUND NET PENS	Fall					√		*	*	√	√	√	√	√	√	√
	TUMWATER FALLS HATCH	Fall	√	√	*		*				*	√	√	√			
NWC	MAKAH NFH ON SOOES R	Fall		*													
COLR	BIG CR HATCHERY	Fall		√	*												
	BONNEVILLE HATCHERY	Fall												*			
	BONNEVILLE HATCHERY	Fall		*													
	BONNEVILLE HATCHERY	Fall		*													
	CARLTON REARING POND	Summer		√													
	CLACKAMAS HATCHERY	Spring	√	*	*												
	COWLITZ SALMON HATCH	Spring		*													
	COWLITZ SALMON HATCH	Fall		*													
	DRYDEN POND	Summer		√	*												
	EASTBANK HATCHERY	Summer		√													
	ELOCHOMAN HATCHERY	Fall		*													
	FALLERT CR HATCHERY	Fall		*													
	FEATHER R HATCHERY	Spring		*													
	FEATHER R HATCHERY	Fall												*			
FRIENDS OF COWLITZ	Spring		*														

Table 8. Chinook tagged stocks that have been encountered in marine areas contained within proposed Chinook MSFs for 2008. Based on a summary of tagged groups encountered in fisheries. A check (√) indicates that on average two or more tags have been encountered annually in samples, while a \* indicates that a single tag has been recovered. S=summer fishery, W=winter fishery.

Release Region	Hatchery	Run	DIT	Puget Sound Area													
				5/6		7		8.1/8.2		9		10		11		13	
				S	W	S	W	S	W	S	W	S	W	S	W	S	W
	GNAT CR HATCHERY	Spring			*												
	GRANT COUNTY PUD	Spring		*													
	KALAMA FALLS HATCHRY	Fall		*													
	KLICKITAT HATCHERY (YKFP)	Fall														*	
	MARION FORKS HATCH	Spring			√												
	MCKENZIE HATCHERY	Spring			√												
	NIMBUS FISH HATCHERY	Fall		√													
	NORTH TOUTLE HATCHRY	Spring		*													
	PRIEST RAPIDS HATCHERY	Fall		*													
	SIMILKAMEEN HATCHERY	Summer		*										*			
	SPRING CR NFH	Fall		√	*								*				
	TRINITY R HATCHERY	Spring		*													
	TURTLE ROCK HATCHERY	Summer		√	√		*										
	UMATILLA HATCHERY	Spring			*												
	WASHOUGAL HATCHERY	Fall		*													
	WELLS HATCHERY	Summer		√											*		
SNAK	LYONS FERRY HATCHERY	Fall		√			*										
	SNAKE R@PITT. LNDG	Fall		*													
OREG	BUTTE FALLS HATCHERY	Fall												*			
	COLE RIVERS HATCHERY	Fall		*													

Table 9. Chinook CWT stocks that have been encountered in freshwater areas contained within proposed Chinook MSFs for 2008. Based on summary of tagged groups encountered in fisheries and escapement for 2000-2004. A star (\*) indicates one tag has been encountered in samples for all fisheries and years summarized. A check (√) indicates that two or more tags have been encountered in samples.

Hatchery	Run Type	Release Region	DIT	Fishery Locations in Freshwater Areas					
				Nisqually	Skykomish	Upper Skagit	Nooksack	Puyallup	
H-SHUSWAP R	Summers	BC		√		*	*		
H-CHEMAINUS R	Fall								
H-COWICHAN R	Fall								
H-L QUALICUM R	Fall								
H-NANAIMO R	Fall								
KENDALL CR HATCHERY	Springs	NOOK	√		*	√	√		
LUMMI SEA PONDS	Fall					√			
FIDALGO BAY NET PENS	Fall	SAM	√			√			
SAMISH HATCHERY	Fall					√			
MARBLEMOUNT HATCHERY	Springs	SKAG	√		√	√	√	*	
COUNTY LINE PONDS	Summers					√			
MARBLEMOUNT HATCHERY	Summers					√			
MARBLEMOUNT HATCHERY	Fall					√			
OAK HARBOR NET PENS	Fall					√			
BATTLE CR HATCHERY	Springs	STILL-SNO	√		√				
BERNIE GOBIN HATCH	Springs								√
WALLACE R HATCHERY	Summers								√
WHITEHORSE POND	Summers								√
BERNIE GOBIN HATCH	Summers								√
NWSSC-MUKILTEO N PEN	Fall								√
BERNIE GOBIN HATCH	Fall								√
KALAMA CR HATCHERY	Fall	NISQ	√					*	
MCALLISTER HATCHERY	Fall								√
NISQUALLY HATCHERY	Fall								√
CLEARWATER + CRIPPLE	Springs	PUYA						√	

Table 9. Chinook CWT stocks that have been encountered in freshwater areas contained within proposed Chinook MSFs for 2008. Based on summary of tagged groups encountered in fisheries and escapement for 2000-2004. A star (\*) indicates one tag has been encountered in samples for all fisheries and years summarized. A check (√) indicates that two or more tags have been encountered in samples.

Hatchery	Run Type	Release Region	DIT	Fishery Locations in Freshwater Areas				
				Nisqually	Skykomish	Upper Skagit	Nooksack	Puyallup
WHITE RIVER HATCHERY	Springs				√			√
CLARKS CRK HATCHERY	Fall							√
COWSKL & RUSHWTR PDS	Fall							√
COWSKULL ACCLIM POND	Fall							√
PUYALLUP TRIBAL HATCHERY	Fall				*			√
VOIGHTS CR HATCHERY	Fall							√
HUPP SPRINGS REARING	Springs	MID&SPS	√	*				*
CHAMBERS CR + GARRISON	Fall							√
CHAMBERS CR HATCHERY	Fall							√
FOX ISLAND NET PENS	Fall			√				√
GARRISON HATCHERY	Fall				*			
GROVERS CR HATCHERY	Fall		√	√				√
ICY CR HATCHERY	Fall							*
ISSAQUAH HATCHERY	Fall							*
SOOS CREEK HATCHERY	Fall		√		√			√
SOUTH SOUND NET PENS	Fall			√				
TUMWATER FALLS HATCH	Fall							*
GEORGE ADAMS HATCHERY	Fall	HOOD CANAL	√	√				√
HOODSPORT HATCHERY	Fall			*				*
LYONS FERRY HATCHERY	Fall	COLR						*
SALMON R FISH CULTURE	Fall	WACST						*

## **4 Issues, Concerns and Recommendations**

### ***4.1 Mass Marking Proposal Review Process***

In general, all information requested in the 2008 MM proposal template was supplied. Mass marking proposals were received for all but one MM group (potential marking of up to 600,000 Snake River fall Chinook from the IDFG Oxbow Hatchery). A new proposal was received from ODFW for mass marking 13 million fall Chinook from the Columbia River, including 7.7 million fish from far-north migrating stocks (Up-river Brights).

### ***4.2 Mark Selective Fishery Proposal Review Process***

In general, agencies did an improved job of submitting proposals for MSF fisheries in 2008. ODFW has not submitted a proposal for the ocean coho salmon MSF since 2003 and, although it has submitted the Willamette spring Chinook MSF proposal annually, it has not used the correct proposal template that changed after the first year. WDFW has not submitted a proposal concerning an ongoing MSF for coho salmon in the Nooksack River (Table 6).

#### **4.2.1 Late proposals**

Five proposals were submitted late, that is after November 30<sup>th</sup>, 2007 from ODFW and WDFW for Columbia River fisheries and from WDFW for a Yakima fishery (Table 6). As the SFEC met for review of proposals in early December, these were not reviewed by the committee as a whole.

#### **4.2.2 Proposal format**

A new, simplified format was instituted for 2007 MSF proposals. However, in some cases the information provided for 2008 fisheries was further simplified by agencies. Descriptions of regulation, tag groups impacted by fisheries and of sampling plans were inadequate for evaluation of monitoring and reporting. The information required is described in the proposal template in Appendix C.

### ***4.3 Post-fishery monitoring and summary table***

The SFEC has requested that agencies provide post-season reports for MSFs prosecuted in 2006 and 2007 and templates are provided in Appendix H. The SFEC intends that these report tables be incorporated in the PSC annual report for reporting of MSFs, and it was requested that they be provided each year prior to the PSC post-season meeting in January.

The first table requested (Appendix Table H1) provides information on CWT sampling in all fishery and escapement locations, not just the MSFs. This is needed as the estimation of impacts in non-selective fisheries using DIT data depends on the method of sampling (electronic or visual) and the CWT processing protocol. The second table (Appendix Table H2) provides further information on monitoring in mark-selective fisheries for CWTs, mark rates and compliance. These tables should be completed and submitted in January of the year following the fishery, i.e., for 2007 fisheries in January of 2008. The information needed is available once the fishery has been prosecuted. The third table (Appendix Table H3)

requests information from estimation of total harvest and release and mark rates in the MSFs. This information would not be expected to be available until the second year, i.e., in January of 2009 for the 2007 fisheries. They should be submitted once final results are available for the MSFs.

#### **4.4 Utility of the CWT System**

Despite the technical concerns introduced by MM and MSFs, the coast wide CWT system currently remains the only method for the Parties of the Pacific Salmon Treaty to estimate and monitor coast wide exploitation rates on individual stocks of coho and Chinook salmon for the near future (Expert Panel, 2005). The current CWT system continues to provide the data necessary for a variety of fisheries management needs including the following: evaluating enhancement programs, conducting comparative experiments, monitoring variations in ocean survival, providing data for fishery models, and evaluating numerous parameters of domestic fishery management.

##### **4.4.1 When do you need DITs and how do you use them?**

Indicator or representative stocks are used by the PSC CTC and CoTC committees to evaluate the impacts of fisheries on natural stocks and for estimation of exploitation rates. With MM and MSFs it becomes necessary to use DITs for this purpose as the unmarked and tagged group in the DIT is a representative of the unmarked natural production. The DIT is a paired set of CWT groups; including a marked and an unmarked component. The marked component will be sampled in all fisheries and escapement, but the unmarked component is only recovered in fisheries that are not selective (NSF) and in escapement. The relationship between the two sets of tag groups, measured by the unmarked to marked ratio provides the statistic that is used to measure the differential mortality between the two sets of CWT groups which is assumed to be due to MSFs. It is also the statistic that allows the estimation of encounters of unmarked fish in MSFs when it is applied to the encounters of the marked fish from the DITs.

DIT groups should be employed for indicator stocks whenever there is an expectation that the stock will be encountered in an MSF. Since 2003, MSFs have been prosecuted in Puget Sound, and currently eight of the Puget Sound Chinook indicators are DITs and one southern BC stock. The DIT data have enabled us to estimate total impacts on these stocks in MSFs and to test the hypothesis that there is no significant difference in impact between the marked and unmarked DIT groups. Initial results for the Puget Sound stocks are available in the Annual CTC report for 2006 (TCCHINOOK, 2007).

There have also been MSFs in the Columbia River for spring Chinook, of which only the Willamette spring Chinook are a PSC Chinook indicator stock with a DIT group. Due to the inconsistency of sampling for marked and unmarked tagged fish in escapement it has not been possible to measure the total impact of the Willamette MSF using the DITs. Other indicator stocks impacted by MSFs in the Columbia River have not had DITs and consequently, information necessary to quantify impacts of MSFs on these stocks is not available.



The difference between the escapement rates of marked and unmarked DIT groups provides an estimate of the cumulative impact of MSFs. This comparison requires that both DIT groups (marked and unmarked) are treated identically both in the hatchery as juveniles, during release and at sampling in escapement. If this is not the case, then the impacts cannot be estimated using DITs. The SFEC is working on two reports evaluating the efficacy of DIT for evaluating the total impact of MSFs on natural stocks, allocating the impacts to individual fisheries, one for coho and the second for Chinook, and determining tagging and sampling requirements. These reports will be completed in 2008/2009.

#### **4.4.2 The future of MSFs and DITs for Chinook**

There is some concern whether there is adequate DIT coverage for the mass marking of Chinook, which has expanded rapidly in recent years. This question should be reviewed as a joint project of the SFEC and the CTC and CoTC. MSFs have been expanding since they were first instituted in 2003. At this time MSFs have occurred either in Puget Sound or on spring Chinook in the Columbia River basin and the stocks impacted by these fisheries have DIT representation. However, as increasing numbers of Columbia River and coastal fall Chinook are mass marked, there is a possibility that additional MSFs on fall Chinook will be proposed for ocean fisheries in the future. If this is the case, the natural stocks that would be impacted are not adequately represented by DIT groups.

#### **4.5 Coordination of agencies**

MM, DIT releases, and CWT sampling programs are not adequately synchronized between agencies. For example, the southern U.S. plans to increase the mass marking of far north migrating Chinook, expand the number of Chinook MSFs, implement an extensive DIT program (both coho and Chinook), and tag numerous conservation stocks without an adipose mark. At the same time, Alaska has no plans to convert from visual sampling to electronic sampling and Canada does not plan to increase ETD capability. These differences in sampling and tagging methodologies will impact analyses by PSC technical committees, eliminate the ability to conduct CWT-only studies, and degrade the ability to assess the impacts of MSFs.

A CWT workgroup was established in 2006 by the PSC to work on a review of the CWT system in response to the first four recommendations of the Expert Panel report, specifically focusing on data quality assurance and control and issues of sample design and uncertainty. This report provides recommendations on where agencies can address the issue of coordination and how best to maintain the quality of the CWT system for meeting management needs (PSC CWT Workgroup, 2008).

#### **4.6 Recommendations and Issues Requiring PSC Direction**

##### **4.6.1 Proposal Review Process**

It is recommended that the Commission request agencies to submit complete proposals for all potential 2009 MM and MSFs in a timeframe necessary for SFEC review, and for agencies to provide both preliminary and final post-season reports on the conduct of MSFs

#### **4.6.2 DIT Review**

The SFEC, CTC, and CoTC should undertake a review of DIT programs and identify the need for representation for groups of natural stocks that will be exploited in the future MSFs.

#### **4.6.3 Interagency Coordination and Cooperation**

MM, DIT, and CWT sampling programs are not sufficiently coordinated to support analysis by PSC technical committees. The PSC should continue to support technical and policy processes to develop agreements to clarify responsibilities for maintaining a functional CWT system.

## 5 References

- Expert Panel, 2005. *Report of the expert panel on the future of the coded wire tag recovery program for pacific salmon*. Prepared for the Pacific Salmon Commission, November 2005.
- PSC-CWT Workgroup, 2008. *An action plan in response to coded wire tag (CWT) Expert Panel recommendations*. Pacific Salmon Commission Technical Report No. 25, March 2008.
- TCCHINOOK, 2007. *Annual report on catch, escapement, exploitation rate analysis and model calibration of Chinook salmon under Pacific Salmon Commission Jurisdiction, 2006*. PSC Technical Report. TCCHINOOK (07)-1 January, 2007.

## **Appendix A. Understanding of the Pacific Salmon Commission Concerning Mass Marking and Selective Fisheries (Revised February 2004).**

### **Understanding of the Pacific Salmon Commission concerning Mass Marking and Mark Selective Fisheries**

#### **February 2004 Policy Statement**

The Pacific Salmon Treaty's Memorandum of Understanding (MOU) obliges the Parties to, among other things, "maintain a coded-wire-tag and recapture program designed to provide statistically reliable data for stock assessment and fishery evaluation." The Pacific Salmon Commission (PSC) recognizes that the selective fisheries for marked hatchery coho and chinook salmon can impact the coastwide coded-wire-tag (CWT) program. For the sole purpose of fulfilling this MOU obligation, the PSC has established the following policies and procedures. This policy does not preclude the PSC from evaluating the impacts of, and making recommendations concerning, mass marking or selective fishery plans as they affect the negotiation and establishment of Treaty annex provisions.

It shall be the policy of the PSC to review proposals for mass marking and selective fisheries to determine consistency with the Parties' commitment to the MOU provisions regarding the reliability of data needed for management of salmon fisheries within the jurisdiction and management area of the Treaty, including whether they impose substantial cost increases for agencies to conduct required data collecting programs.

The PSC shall establish a Selective Fishery Evaluation Committee (SFEC) to perform the activities set forth in the attached Terms of Reference.

To facilitate the SFEC review, the Parties shall do their utmost to ensure that their domestic managers submit all proposals for mass marking (MM) and mark selective fisheries (MSF) which could potentially affect stocks or fisheries of concern to the PSC in accordance with the following schedule:

1. Not later than June 1 of each year. Provide early notice containing the agency's plans to consider conducting MSFs over the next 3-5 years.
2. Not later than June 1 of the year prior to implementation. Provide new or substantially changed MM or MSF project proposals.
3. Not later than November 1 of the year prior to implementation. Provide proposals for MM or MSF programs that are anticipated to continue annually without substantive change.

4. Upon completion of domestic fishery planning processes, agencies conducting MSFs are to provide final selective fishery plans.
  5. Upon completion of MM programs, agencies are to report the number of fish that were actually mass marked and the extent to which releases are (single and double index) tagged for assessment.
  6. Agencies shall report results of MSFs conducted during a season in the annual post-season report provided, using a format specified by the SFEC.
  7. Not later than November 30 of the year following conduct of MSFs. Agencies are to report fishery and stock-age-specific estimates of mortalities for unmarked fish impacted by MSFs to the PSC technical committees
- The PSC shall consider, by the annual February PSC meeting, the SFEC reviews of proposals for MM and MSFs and discuss potential actions to address concerns related to any MM or MSF proposals that the SFEC determines will significantly and adversely affect the CWT program.
  - The Parties will do their utmost to ensure that MM and MSF proposals are developed in consultation with domestic co-management agencies or processes, and that proposing agencies or entities provide information required by the SFEC and adhere to reporting requirements to enable the PSC technical committees to complete their assignments in a timely manner.

After the occurrence of a selective fishery and when the data are available, the PSC shall review the management agency report on the actual conduct of the fishery with respect to its impact on the CWT program, and recommend changes and improvements.

#### **Terms of Reference for the Selective Fishery Evaluation Committee**

- I. **Reporting and Committee Structure: The Selective Fishery Evaluation Committee (SFEC) will report to the PSC and will be comprised of a Steering Committee and two working groups: the Regional Coordination Working Group (RCWG) and the Analytical Working Group (AWG). All official members of the Steering Committee and working groups will be considered members of the SFEC.**
  - A. **Steering Committee: The Steering Committee will be comprised of:**
    1. **the co-chairs of the PSC Coho Technical Committee, Chinook Technical Committee, and Data Sharing Technical Committee;**
    2. **the co-chairs of the two working groups;**
    3. **agency mass-marking/selective-fishery coordinators; and**
    4. **additional agency representatives approved by the responsible Party.**

- B. Regional Coordination Working Group (RCWG): The RCWG may be comprised of members of the Steering Committee and other PSC technical committees and of the agency representatives approved by the responsible Party. All RCWG members should contribute actively to the work of this group.**
- C. Selective Fishery Analysis Working Group (SFAWG): The SFAWG may be comprised of members of the Steering Committee and other PSC technical committees and of the agency representatives approved by the responsible Party. All SFAWG members should contribute actively to the work of this group.**

## **II. Duties of the SFEC**

- A. Serve as a coastwide clearinghouse to facilitate the appropriate level of coordination and reporting on MM and MSF programs among the Parties, affected agencies, and existing coastwide and regional committees established to monitor activities related to the coastwide CWT program;**
- B. Provide advice to the PSC regarding potential adverse impacts of MM and MSFs on the CWT program;**
- C. Assess and monitor the cumulative impacts of MSFs on stocks of concern to the PSC;**
- D. Provide MM or MSF project proponents with information regarding concerns for potential impacts of their projects on the CWT program.**
- E. Receive and review MM and MSF proposals from the proponent(s) as early in the planning process as possible to identify potential issues and concerns regarding impacts on the CWT program.**
- F. Establish a technical evaluation process that will:**
  - 1. Review proposed mass-marking/selective-fisheries initiatives developed by the proponent(s) and identify potential impacts on other jurisdictions and the CWT program;**
  - 2. Review, in consultation with relevant PSC technical committees, procedures and protocols for marking, sampling, and evaluation developed by the proponent(s) and, if appropriate, develop and recommend alternative procedures to address potential concerns or measures that could be taken to mitigate for adverse impacts on the CWT program;**

- 3. Establish standard formats and reporting requirements for agencies conducting MSFs to use when providing post-season information. Review post-season agency evaluations of the performance of MSFs and their estimates of mortalities on stocks of concern to the PSC;**
  - 4. Identify information needs or request modifications of proposals to meet concerns regarding impacts on the CWT program; and**
  - 5. Conduct, at agreed intervals, technical evaluations of mass marking and selective fishery programs in order to assist the Parties to maintain the integrity of the CWT program.**
- G. Work with PSC Technical Committees to establish formal standards and objectives for a viable CWT program to enable more precise evaluation of potential impacts of MM and MSFs on the viability of the coastwide CWT program and to guide the development of mitigation measures.**
- H. Specific duties of the Steering Committee include being responsible for overall coordination and prioritization of the activities for the working groups and being the focal point for reporting to the PSC. The agency mass-marking/selective-fishery coordinators should ensure that mass marking and selective fishery proposals are provided to the SFEC in a timely manner.**

**III. Specific duties of the RCWG, among other related activities, include:**

- A. Coordinate and report on continuing research on electronic detection and mass marking technologies;**
- B. Collate and share information on CWT sampling procedures and programs; suggest modifications to sampling and monitoring programs to proponents;**
- C. Review MM proposals to determine potential impacts on sampling and tagging programs;**
- D. Provide agencies with a list of MM and MSF proposals received by the SFEC;**
- E. Provide the necessary liaison with the Data Standards Working Group of the Data Sharing Technical Committee to ensure that necessary modifications are made to PSC data exchange formats to maintain the integrity of the CWT system; and**
- F. Prepare an annual report summarizing mass marking statistics, index tag groups, and sampling programs for marks and CWTs.**

**IV. Specific duties of the SFAWG, among other related activities, include:**

- A. Design marking and sampling strategies that will achieve desired precision for CWT-based estimates;**
- B. Develop analytical tools for the evaluation, by the SFEC and MSF proponents, of MM programs and MSFs and their potential impacts on the coastwide CWT program;**
- C. Provide the necessary technical liaison with agencies and other coastwide committees working on selective fishery evaluation models;**
- D. Review and recommend parameter values for assessing impacts of MSFs;**
- E. Develop analytical tools for estimating the impacts of MSFs on escapements and exploitation rates for naturally spawning coho and chinook stocks based on post-season information;**
- F. Review MSF proposals and provide advice to the proponents regarding the design of MSFs and the conduct of sampling and monitoring programs; and**
- G. Recommend guidelines, procedures, and/or time frames necessary to evaluate the success of MSFs in conserving naturally spawning stocks.**

**L. Cassidy  
Chair**

**J. Davis  
Chair**



## Appendix B. Mass Marking Proposal Template

Mass Marking Proposal ID #
Date Received

### TEMPLATE FOR ADIPOSE FIN MASS MARKING PROPOSALS

This template is intended for proposals to mass mark any release group of more than 100,000 fish from a hatchery complex or area that involves the following:

- 1) Chinook or coho salmon,
- 2) mass marked with an adipose clip, but untagged, and
- 3) expected to be intercepted in Pacific Salmon Commission fisheries.

#### PROPOSAL TITLE:

Contact information

Proposing Agency:	
Contact Person:	
Mailing Address:	
Phone Number:	
Fax:	
Email:	

Is the proposal:

new \_\_\_\_\_  
 substantially changed \_\_\_\_\_  
 or a continuation of a previous proposal \_\_\_\_\_

#### Proposed Marking and Tagging

##### 1. Purpose of mass marking:

- a. Provide a brief description of the goals and objectives of the proposal (e.g. to obtain more information on hatchery straying to wild spawning grounds, to increase fishing opportunities, or to identify hatchery/wild compositions in fisheries).
- b. If the proposal is not a new proposal, list the Mass Marking Proposal ID number(s) (assigned by the PSC Executive Secretary) corresponding to the previous proposal. In addition, describe any significant differences from previous proposals (i.e., additions or deletions of mass marked stocks or DIT groups).
- c. Identify potential mark-selective fisheries targeting the proposed mass marked stocks that your agency might pursue in the future.

- List all proposed mass marking and DIT plans (see example format below), including the following fields: area/region, hatchery, stock, number of fish to be tagged with and without fin clip, number of fish to be untagged with and without fin clip, and prior marking status.

*Example format for proposed mass marking and tagging plans. DIT groups identified with an asterisk (\*).*

*Species:*

*Brood:*

*Release Year:*

<i>Area or Region</i>	<i>Hatchery</i>	<i>Stock</i>	<i>Number to be Tagged</i>		<i>Number Untagged</i>		<i>Proposed to be Marked This Brood Year (Y/N)</i>	<i>Marked Last Brood Year (Y/N)</i>
			<i>Ad Clipped</i>	<i>Unclipped</i>	<i>Ad Clipped</i>	<i>Unclipped</i>		
		<i>Total</i>						

- List any known reviews of the mass marking proposal that have been conducted (e.g., by the Mark Committee) and the outcome of those reviews. List any marking programs/agreements that this proposal may conflict with and briefly describe the possible conflict.
- List any issues of concern previously identified by the SFEC related to this mass marking proposal and describe how those concerns have been addressed.

### **FISHERY DISTRIBUTION AND CWT SAMPLING**

- Provide estimates of the anticipated number of mass marked fish that will be encountered in fishery CWT sampling programs using the format below. In order to standardize estimates between agencies, we would prefer the following methods be used:
  - Use actual CWT recoveries from representative CWT groups (e.g. key or indicator stocks from each region) as basis of estimate
  - Calculate the average recovery rate of tags ( $\# \text{ recoveries} / \# \text{ releases}$ ), using the following three brood years: Coho = BYs 1999-2001, Chinook = BYs 1997-1999
  - Multiply the  $\#$  of proposed MM fish, by production region, by this recovery rate, for the appropriate indicator stock
  - Apportion the MM fish to the region/fisheries (see table below) based on the average distribution for the indicator codes
  - The PSMFC RMIS will provide a standardized report that summarizes recoveries in the requested region/fisheries. Simply provide them with a vertical text listing of the tag codes.

<b>Region</b>	<b>Fishery</b>	<b>Estimated number of marked fish that will be encountered in fishery sampling programs.</b>	<b>Electronic sampling currently in place Y/N?</b>
Alaska	Commercial		
	Sport		
Northern BC	Commercial		
	Sport		
Southern BC	Commercial		
	Sport		
Washington (Coast & PS)	Commercial		
	Sport		
Columbia Basin	Commercial		
	Sport		
Oregon Coast	Commercial		
	Sport		
California	Commercial		
	Sport		

Describe the source/data and methods used to make the estimates – if different than the preferred method. Provide other information, if relevant, on the distribution, run timing and migration routes of the stocks proposed for marking and/or tagging.

**Appendix C. Revised template for mark-selective fishery proposals.**

Mark-Selective Fishery Proposal ID #
Date Received

**TITLE FOR MARK-SELECTIVE FISHERY PROPOSALS**

**Contact information**

Proposing Agency:	
Contact Person:	
Mailing Address:	
Phone Number:	
Fax:	
Email:	

Is the proposal:

new or not yet reviewed by PSC-SFEC \_\_\_\_\_  
substantially changed \_\_\_\_\_

**Purpose/management objective**

Describe the management objective of the proposed mark-selective fishery.

**Location and time of the proposed mark-selective fishery**

Please include any information when there are breaks or changes in regulations that might impact sampling stratification (see Question 7b below)

1. Location of the fishery:
2. Year and month(s) when the fishery is proposed to occur:

**Other information about the fishery:**

3. Target species/stocks (including nontarget PSC species/stocks of concern):
4. Gear to be used:
5. Other regulation details (e.g., size restrictions, bag limits, mixed bag information):

## **Projected impacts BY the fishery**

6. Identify all (coast wide) CWT stocks likely to be encountered in this fishery (including individual tag codes if available), whether those stocks were Double Index Tagged (DIT). Appendices F and G provide tables of tagged indicator stocks for coho and chinook for your convenience. Please note we are interested in tagged impacts alone, untagged hatchery production should not be included.

## **In-season management**

7. Describe your sampling program for sampling for: CWTs, marks and estimation of total catch. Attach your sampling plan if available. At a minimum, include descriptions for the following:
  - a. CWT recoveries.
    - i. Will there be *random* sampling of CWTs (i.e., fishers exiting fisheries contacted for biological sampling of harvest) or will you be using voluntary programs?
    - ii. If *random* will there be ETD or visual identification of tagged fish?
    - iii. If ETD in *random* samples, will all tagged fish (marked and unmarked) be processed?
    - iv. If *random* what is the expected sample rate for CWTs?
    - v. If voluntary programs are used, how is the awareness factor estimated?
  - b. Monitoring for retained catch by sample strata for sample expansions. The sample strata and the strata of catch estimation must match the location/time/regulation strata (i.e., whenever there is a change in regulation such as from MSF to non-selective, or change in bag limits, the sampling strata should also change).
  - c. Monitoring of mark rate in the MSF (this is the total mark rate, percent marked in the harvest from the fishery).
  - d. Other information, e.g., retained unmarked fish (mixed bag fisheries, or mark recognition error in MSF)

## **Other information.**

8. Please include any other information that will be useful for estimation of unmarked tagged mortalities in your MSF. For instance, sources of estimates of unmarked to marked ratios for DIT tagged groups (e.g., in a test fishery, nearby hatchery, non-selective fishery). Please provide any input you wish on approach to estimate the unmarked tagged mortalities for DIT groups, or for appropriate release mortality rates to be used.

## Appendix D. List of 2008 Mass Marking Proposals.

Description	New <sup>1</sup> or Continuation Proposal	SFEC Proposal Number
Southern BC Coho - CDFO	Cont.	MM-FOC-01-2007
Puget Sound Coho – WDFW/Tribal	Cont.	MM-WDFW-04-2007
Washington Coast Coho – WDFW/Tribal	Cont.	MM-WDFW-01-2007
Washington Col. R. Coho - WDFW	Cont.	MM-WDFW-05-2007
Makah, Quilcene, Quinault NFH Coho - USFWS	Cont.	MM-USFWS-018-2007
Eagle Creek NFH Coho - USFWS	Cont.	MM-USFWS-04-2007
Columbia River Coho - ODFW	Cont.	MM-ODFW-04-2007
Oregon Coast Coho - ODFW	Cont.	MM-ODFW-05-2007
L. White Salmon R. and Spring Cr. NFH Fall Chinook - USFWS	Cont.	MM-USFWS-17-2007
Makah and Quinault NFH Fall Chinook – USFWS	Cont.	MM-USFWS-19-2007
Willamette Spring Chinook - ODFW	Cont.	MM-ODFW-01-2007
Oregon North Coast Spring Chinook - ODFW	Cont.	MM-ODFW-02-2007
Oregon South Coast Spring Chinook - ODFW	Cont.	MM-ODFW-03-2007
Oregon Columbia River Fall Chinook - ODFW	New	MM-ODFW-06-2007
Puget Sound Spring, Summer, Fall Chinook – WDFW/Tribal	Cont.	MM-WDFW-02-2007
Columbia R. Spring, Summer, Fall Chinook - WDFW	Cont.	MM-WDFW-03-2007
Washington Coast, Fall, Spring Chinook – WDFW/Tribal	Cont.	MM-WDFW-06-2007

<sup>1</sup> New proposal for SFEC review

## **Appendix E. Criteria for evaluating mass marking proposals.**

### *PROPOSED MARKING AND TAGGING*

- 1) *Has the purpose of the mass-marking proposal been adequately described? If increasing fishing opportunities is an objective of the mass-marking proposal, have future potential mark-selective fisheries been identified?*
- 2) *DIT coverage*
  - a) *Does the proposal contain a list of relevant DIT groups previously identified by the SFEC for that agency?*
  - b) *Are there additional groups that should be DITed, if there is an associated MSF?*
- 3) *Coordination*
  - a) *Does the proposed marking comply with the other regional agreements on marking (from PSMFC Mark Committee and agency mark coordinators)?*
  - b) *Are there any unresolved regional marking policy issues associated with this proposal?*
- 4) *Technical Issues*
  - a) *Have previously identified issues with this marking been resolved?*
  - b) *Do the proposed changes raise any new issues?*

### *FISHERY DISTRIBUTION AND CWT SAMPLING*

- 5) *Fisheries*
  - a) *Is the information provided on distribution of the marked stocks, and their occurrence in fisheries, adequately described?*
  - b) *Is electronic sampling adequate in all these fisheries?*
  - c) *If not, identify the impacts on the current assessment methods or programs and methods to eliminate or mitigate for those impacts.*

### *SUMMARY*

*Summarize concerns related to the mass-marking proposal and its effect on the viability of the CWT system.*

### *RECOMMENDATIONS*

*What additional information is required to evaluate the mass-marking proposal.*

*Provide recommendations for program modifications that might avoid, or mitigate for negative impacts on the viability of the CWT system.*

## Appendix F. Current PSC Coho CWT exploitation rate indicator stocks and DIT groups.

Region	Exploitation Rate Indicator Stocks	Natural/Unmarked Stock Representation	DIT
North Coast	Lachmach	North Coast Wild	
	Toboggan	Skeena	
Interior Fraser	Coldwater	Thompson River	
	Salmon	Thompson River	
	Dunn/Louis/Lemieux	Thompson River	
Georgia Basin	Big Qualicum	East Coast Vancouver Island	
	Goldstream River	East Coast Vancouver Island	
	Black Creek	East Coast Vancouver Island Wild	
	Inch Creek	Lower Fraser	√
	Salmon River	Lower Fraser Wild	
	Quinsam River	North Vancouver Island	√
West Coast Van Is.	Robertson Creek	West Coast Vancouver Island	
Puget Sound	Nooksack	Nooksack	√
	Skookum Creek	Nooksack	
	Lummi Bay Ponds	Nooksack	
	Skagit	Skagit	√
	Skykomish	Stillaguamish/Snohomish	√
	Bernie Gobin	Stillaguamish/Snohomish	
	Green River	Mid Puget Sound	√
	Puyallup	South Puget Sound	√
	Kalama Creek (Nisqually)	South Puget Sound	
	Quilcene	North Hood Canal	√
	Quilcene	Quilcene Net Pens (Hood Canal)	√
	Quilcene	Port Gamble Net Pens (Hood Canal)	√
	George Adams	South Hood Canal	√
	Elwha	Strait of Juan de Fuca	√
Washington Coast	Makah <sup>1</sup>	North Coast	√
	Solduc	North Coast	√
	Queets Wild <sup>2</sup>	North Central Coast	√
	Quinault	Quinault	√
	Satsop	Grays Harbor	√
	Forks Creek	Willapa Bay	√
Columbia Basin	Lewis River	Lower Columbia River	√
	Sandy River	Lower Columbia River	√
Oregon Coast	Salmon River	Oregon North Coast	
	Rogue River	Oregon South Coast	

<sup>1</sup> DIT group not currently an indicator stock

<sup>2</sup> DIT group for Queets Wild is from Salmon River Hatchery



## Appendix G. Current PSC Chinook CWT exploitation rate indicator stocks and DIT groups.

Area	Exploitation Rate Indicator Stocks	Natural/Unmarked Stock Representation	Run Type	DIT
S.E. Alaska	Alaska Spring	Southeast Alaska	Spring	
British Columbia	Kitsumkalum	North/Central BC	Summer	
	Robertson Creek	West Coast Vancouver Is	Fall	
	Quinsam	Georgia Strait	Fall	
	Puntledge	Georgia Strait	Summer	
	Big Qualicum	Georgia Strait	Fall	
	Cowichan	Georgia Strait	Fall	
	Chehalis (Harrison Stock) <sup>1</sup>	Lower Fraser River	Fall	
	Chilliwack (Harrison Stock)	Lower Fraser River	Fall	√
Puget Sound	Skagit Spring Fingerling	Central Puget Sound	Spring	
	Skagit Spring Yearling	Central Puget Sound	Spring	√
	Nooksack Spring Fingerling	North Puget Sound	Spring	√
	White River Spring Yearling <sup>3</sup>	South Puget Sound	Spring	
	Skagit Summer Fingerling	Central Puget Sound	Summer	
	Skykomish Summer Fingerlings <sup>2</sup>	Central Puget Sound	Summer/Fall	√
	Stillaguamish Fall Fingerling	Central Puget Sound	Summer/Fall	
	George Adams Fall Fingerling	Hood Canal	Summer/Fall	√
	Samish Fall Fingerling	North Puget Sound	Summer/Fall	√
	Green River Fall Fingerling	South Puget Sound	Summer/Fall	√
	Grover Creek Fall Fingerling	South Puget Sound	Summer/Fall	√
	Nisqually Fall Fingerling	South Puget Sound	Summer/Fall	√
	South Puget Sound Fall Yearling	South Puget Sound	Summer/Fall	
	Elwha Fall Fingerling	Strait of Juan de Fuca	Summer/Fall	
Hoko Fall Fingerling	Strait of Juan de Fuca	Summer/Fall		
Washington Coast	Sooes Fall Fingerling	North Wash. Coast	Fall	
	Queets Fall Fingerling	North Wash. Coast	Fall	
	Quinalt Fall Fingerling <sup>2</sup>	North Wash. Coast	Fall	√
Columbia River	Cowlitz Tule	Columbia R. (WA)	Fall Tule	
	Spring Creek Tule	Columbia R. (WA)	Fall Tule	√
	Little White Salmon <sup>2</sup>	Columbia R. (WA)	Fall Bright	√
	Columbia Lower River Hatchery	Columbia River (OR)	Fall Tule	
	Columbia Upriver Bright	Upper Columbia R.	Fall Bright	
	Hanford Wild	Upper Columbia R.	Fall Bright	
	Lewis River Wild	Lower Columbia R.	Fall Bright	
	Lyons Ferry	Snake River	Fall Bright	
	Willamette Spring	Lower Columbia R.	Spring	√
	Lewis River Spring <sup>2</sup>	Lower Columbia R.	Spring	√
	Columbia Summers	Columbia R. (WA)	Summer	
Oregon Coast	Salmon River	North Oregon Coast	Fall	

<sup>1</sup> These stocks are CWT-tagged, but there is no quantitative CWT escapement data, useful for distribution only.

<sup>2</sup> DIT group not currently an indicator stock

<sup>3</sup> No longer adipose fin clipped.

## Appendix H. Post season Report Templates

The SFEC has requested that management agencies provide three reports on MSFs. Two of these would be provided by the post-season meeting following the fishery year for inclusion in the PSC post-season annual report. The first table (Appendix Table H1) provides information on CWTs sampling in all fisheries and escapement locations not just the MSFs. This is needed as the estimation of impacts in non-selective fisheries for the unmarked group depends on the method of sampling (electronic or visual) and the processing protocol (all tagged fish sampled, just clipped fish sampled, only males processed). The second table (Appendix Table H2) provides information on mark-selective fisheries that have occurred, where and when they occurred, what the regulations were and what sampling occurred. This table provides information on whether fisheries that were proposed did actually occur and how these fisheries were sampled. These first two tables should be completed by November 1 of the year following the fishery year. For instance fisheries occurring in 2007-2008 should be available by the post-season meeting in 2009. The third table (Appendix Table H3) should be provided once final results are available for the mark-selective fisheries, total harvest and mark rate, so for instance fisheries occurring in 2007-2007 would have this information available for inclusion in the 2009 post-season report.

Templates with examples are provided below in Appendix Tables H1, H2 and H3.

Appendix Table H1. Sampling methods and processing of tags in all fisheries and escapement locations. Required for choice of estimation of impacts on unmarked fish.

Region	Sampling Location	CWT Sample Method	Detection Method	Tags Processed
North	Net	Direct	Electronic	All
	Troll	Direct	Electronic	All
	Sport	Voluntary	Visual	All
Outside	Net	Direct	Electronic	All
	Troll	Direct	Electronic	All
	Sport	Voluntary	Visual	All
Inside	Net	Direct	Electronic	All
	Troll	Direct	Electronic	All
	Sport	Voluntary	Visual	All

Appendix Table H2. Information on MSFs that have occurred, locations, periods and locations and what sampling and monitoring was conducted to recover CWTs and estimate total encounters and unmarked mortality and compliance in these MSFs. Compliance includes estimation of mark recognition error (marked fish released) and unmarked retention error (unmarked fish retained and landed). Provides information on actual implementation of MSFs proposed for season.

Region	Fishery Area	Fishery Period	Regulations	Sampling and Monitoring Conducted to Estimate:			
				CWTs	Encounters	Unmarked Mortality	Compliance
<b>Species</b>							
Alaska	No MSF						
Canada	St of Georgia Sport						
	WCVI sport			Creel & voluntary	Creel, guide logbook, test fishing	No	No
Puget Sound	Area 5,6 sport coho			Creel & voluntary	Creel, guide logbook, test fishing	No	No
	Area 7 sport coho			Creel @ 22.6%	Creel, test fishing	no	yes
	Area 7 Reefnet coho			Creel @ 15.2%	Creel	no	yes
	Area 13 sport coho			Creel @ 0%	No	no	yes
Coastal Washington	Area 1 sport coho			Creel @ 11.3%	Creel	no	yes
	Area 2 sport coho			Creel @ 47%	Creel, observers	no	yes
	Area 3 sport coho			Creel @ 45%	Creel, observers	no	yes
	Area 4 sport coho			Creel @ 73%	Creel, logbooks	no	yes
	Area 1 troll coho			Creel # 42%	Creel, test fishing, observers	no	yes
Coastal Oregon	Sport Troll			Creel @ 42%	Creel	no	yes
Columbia R	Columbia R			Electronic Electronic	Observer & Creel	yes no	yes no
Columbia River	Buoy 10 sport coho			Electronic	Creel	yes	yes
				Creel @ 38%	Creel , observer	no	yes

Appendix Table H3. Estimated catch and mark rate in MSF.

Region	Fishery	Fishery Period	Regulations	Estimated Catch (retention)	Estimated Mark Rate*
<b>Species</b>					
West Coast Vancouver Island	Westcoast Vancouver Island (Area 21, outer portions of 23-27, Area 121, Areas 123-127)	Effective July 1	2 clipped coho		
	Northern Alberni Inlet (23A)	Effective August 1	4 coho, x may be unclipped		
East Coast Vancouver Island	Queen Charlotte Snd, Queen Charlotte St & Johnstone St (11-1, 11-2, 12-1:12-19, 12-21, 12-22, 12-24, 12-26, 12-38:12-41, 13-1:13-20, 13-23:13-36, 13-39:13-41)	Effective July 1	2 clipped coho		
	St of Georgia (14-19, 28,29) excl Fraser	Effective July 1	2 clipped coho		
	Juan de Fuca (20)	July 1	2 clipped coho		
	Terminal Georgia StST (portions of 14, 16, 29)	Jun 1-Dec 31	2 clipped coho		

\* mark rate from total legal sized coho encountered