

PACIFIC SALMON COMMISSION
SELECTIVE FISHERY EVALUATION COMMITTEE

REVIEW OF MASS MARKING AND
MARK-SELECTIVE FISHERY ACTIVITIES
PROPOSED TO OCCUR IN 2021

REPORT SFEC (22)-02

December 2022

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LIST OF ACRONYMS AND INITIALISMS WITH DEFINITIONS

ADFG	Alaska Department of Fish & Game	MSF	Mark-Selective Fishery
AK	Alaska	MU	Management Unit
BC	British Columbia	NFH	National Fish Hatchery
BY	Brood Year	NOAA	National Oceanic and Atmospheric Administration
C&S	Ceremonial and Subsistence	NSF	Non-Selective Fishery
CA	California	NWIFC	Northwest Indian Fisheries Commission
CDFO	Canadian Department of Fisheries and Oceans	ODFW	Oregon Department of Fish and Wildlife
CDFW	California Department of Fish and Wildlife	OR	Oregon
COLR	Columbia River	PS	Puget Sound
CoTC	Coho Technical Committee	PSC	Pacific Salmon Commission
CRC	Catch Record Card	PSMFC	Pacific States Marine Fisheries Commission
CRITFC	Columbia River Inter-Tribal Fish Commission	PST	Pacific Salmon Treaty
CTC	Chinook Technical Committee	QIN	Quinault Indian Nation
CWT	Coded-Wire Tag	RCWG	Regional Coordination Work Group
CWTIT	Coded Wire Tag Implementation	RMIS	Regional Mark Information System
CYER	Calendar Year Exploitation Workgroup	SFAWG	SFEC- Analytical Work Group
DIT	Double-Index Tag	SFEC	Selective Fishery Evaluation Committee
ER	Exploitation Rate	SHRP	Sport Head Recovery Program
ETD	Electronic Tag Detection	SJDF	Strait of Juan de Fuca
FN	First Nations (Canada)	SUS	Southern United States
FOC	Fisheries and Oceans Canada	TERM	Terminal Fishery
FR	Fraser River	ToR	Terms of Reference
FSC	Food, social and ceremonial catch (Canada)	URB	Upriver Bright (Fall Chinook)
GS	Georgia Strait	USFWS	U.S. Fish and Wildlife Service
ID	Idaho	VTR	Voluntary Trip Report
IDFG	Idaho Department of Fish and Game	WA	Washington
MM	Mass Marking	WCVI	West Coast Vancouver Island
MOU	Memorandum of Understanding	WDFW	Washington Department of Fish and Wildlife

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EXECUTIVE SUMMARY

This report provides a summary of the proposed coastwide plans for mass marking (MM) of Coho Salmon (*Oncorhynchus kisutch*) and Chinook Salmon (*O. tshawytscha*) and the conduct of mark-selective fisheries (MSFs) in 2021. Issues with implications for maintenance of the coastwide coded-wire-tag program are identified and recommendations are proposed.

Impacts of the COVID-19 Pandemic, Drought, and Recent Fires

Many of us in the Pacific Northwest have continued to work from home and follow social distancing guidelines while in the field. These guidelines are likely to continue to impact the implementation of tagging, marking, and sampling programs. For example, some agencies have reduced the number of staff in tagging trailers, resulting in decreased output and fewer fish released tagged or marked. This document does not contain summaries of any known changes to-date in marking, tagging, and sampling plans in 2021, rather it focuses on what was included in the proposals.

In addition to COVID-19 impacts, our region experienced a continued drought and a number of extreme fires in 2020. One of the facilities impacted included the near complete loss of Oregon Department of Fish and Wildlife’s (ODFW) Rock Creek Fish Hatchery near Roseburg which burned down in the Archie Creek Fire in September of 2020. ODFW plans to rebuild this facility. Also in Oregon, McKenzie and Leaburg Hatcheries have lost major water sources. Fish are, and may continue to be, raised at other hatcheries. Most of the facilities affected by fires in 2020 will experience brood failures.

Summary of 2021 Mass Marking Proposals

Throughout this report a mass marked fish refers to a fish with an adipose-fin clip (marked) that is not coded-wire tagged. A marked fish that is tagged with a coded-wire tag is not considered mass marked in this report and are referred to as single-index tagged. A double-index-tag (DIT) group includes two coded-wire-tag (CWT) paired-release groups, one marked and one unmarked. The terms ‘marked’ and ‘clipped’, and likewise ‘unmarked’ and ‘unclipped’, are used interchangeably.

Salmon coded-wire tag (CWT) and mark status (marked = adipose fin clipped) for all plausible groups of fish, including those under the definition of mass marked and in double index tag (DIT) paired-release groups.

Mass Marked	
Untagged + marked	
Not Mass Marked	If Double Index Tag Program
CWT + marked (Single Index Tag)	Group A. CWT + marked
CWT + unmarked (Single Index Tag)	Group B. CWT + unmarked
Untagged + unmarked	

Mass Marking and DIT Programs

Twenty-three proposals (8 for Coho and 15 for Chinook) were received for mass marking occurring in 2021 (Appendix A). Of these, one was a new proposal from Alaska (AK), two were from southern British Columbia (BC) and 20 from southern United States (SUS). The Selective Fishery Evaluation Committee (SFEC) believes these proposals cover all MM programs of relevance to the Pacific Salmon Commission (PSC).

The Southern Resident Killer Whale (SRKW) population has declined to abundance levels that prompted the species being listed as endangered under both the U.S. Endangered Species Act and the Canadian Species at Risk Act. The latest science suggests that SRKW have a diet reliant on Chinook Salmon, and to a lesser extent, Chum and Coho salmon. As such, there have been efforts to significantly increase hatchery production to benefit SRKWs (WDFW 2021, NMFS 2019). The increased hatchery production goals range from 20 million (NMFS 2019) to 51 million (WDFW 2021) additional smolts, based on 2018 production levels. Several hatchery facilities in Oregon and Washington have increased salmonid hatchery production using funding from the Washington State legislature and from the U.S. Section of the Pacific Salmon Commission per requirements in the Biological Opinion for Southeast Alaska salmon fisheries (NMFS 2019). All of these fish are expected to be released with an adipose fin clip.

Proposed mass marking of Coho and Chinook salmon in 2020 and 2021

Agency	Coho (in millions)		Chinook (in millions)	
	2020	2021	2020	2021
ADFG	-	-	-	1.0
CDFO	3.8	3.8	3.1	3.2
USFWS	1.9	2.0	22.2	26.5
WDFW/Tribes	24.1	22.4	77.1	80.7
ODFW/Tribes	4.7	5.3	19.6	24.9
Total	34.4	33.6	122.0	136.3

Approximately 33.6 million Coho are proposed to be mass-marked in 2021 from southern BC and SUS hatcheries, roughly 0.9 million less than proposed in 2020 (Table 2-1). This change in proposed releases reflects, in part, decreases in production and marking in the Columbia River. Most hatchery Coho production intended for harvest, from southern BC and SUS hatcheries (not including California) will continue to be ad-clipped (87% of releases). In 2021, there are 14 proposed Coho Salmon DIT groups (Table 2-1; Appendix B), of which seven are from Puget Sound, four from the Washington (WA) coast, and three from the Columbia River Basin. This is unchanged from what was proposed in 2020.

Approximately 132 million Chinook are proposed to be mass marked in 2021 from SUS hatcheries, 980 thousand from Southern SE Alaska, and 3.2 million are proposed to be mass marked and released from Canadian west coast of Vancouver Island hatcheries (Table 2-1). The newly proposed Southern SE Alaska mass marking is to improve in-season management by identifying hatchery stocks in spring troll Chinook terminal fisheries. The 2021 total level of 136 million mass marked fish is roughly 14 million more than proposed in 2020. Increased mass marked releases of 980 thousand in Southern SE Alaska, 4 million in Puget Sound, and 10.9

million Columbia River are proposed. Most hatchery Chinook production (92% of releases) from SUS hatcheries (not including California) intended for harvest will continue to be ad-clipped. Currently there are 15 proposed Chinook Salmon DIT groups (Table 2-1, Appendix C), of which eight are from Puget Sound facilities, two from WA coastal facilities, and five from Columbia River facilities.

Sampling Programs

Prior to MM, the adipose fin clip was employed as a visual indicator for fish containing a CWT. Consequently, visual sampling programs were designed to collect heads from fish with missing adipose fins, resulting in all sampled heads containing 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 fish containing CWTs, regardless of a mark. However, ETD is not employed coastwide because of continuing reservations by some agencies regarding the cost, accuracy, and practical feasibility of incorporating this technology into their sampling programs. Visual sampling programs will not recover the unclipped component of DIT programs required to assess impacts of MSFs. Visual sampling creates gaps and increased uncertainty in the estimated impacts of fisheries on unmarked fish (PSC 2016). Addressing these gaps and uncertainties is time consuming.

Considering sampling programs coastwide, some agencies already implement comprehensive electronic sampling strategies to recover CWTs from sport and commercial fisheries, while other agencies have not fully implemented electronic tag detection. All California Department of Fish and Wildlife (CDFW) fishery sampling programs use visual sampling.

Washington State agencies continue to electronically sample at most locations and report CWT recoveries of the unmarked components of DIT groups in recreational marine and some freshwater MSFs, as well as in non-selective fisheries (NSFs). Washington Department of Fish and Wildlife (WDFW) utilizes electronic sampling for all Chinook and Coho fishery sampling in the Columbia River, except for the non-mark selective Treaty and non-Treaty commercial fisheries which are still visually sampled.

Starting in 2008, Canada committed to full electronic sampling and reporting of all CWTs in all commercial fisheries for Chinook. Coho in Canadian commercial fisheries are electronically or visually sampled, depending on location. Canada continues to rely on the Sport Head Recovery Program (SHRP) to recover CWTs from NSFs and MSFs alike and thus, no unmarked coded-wire-tagged recoveries are available from them. Canada's First Nations (FN) food, social and ceremonial (FSC) fisheries, generally terminal, are sampled visually. Finally, Canada's escapement sampling is also visually sampled with electronic screening of heads to send only tagged heads to the dissection lab.

In 2011, Oregon Department of Fish and Wildlife (ODFW) initiated electronic sampling of all recreational and commercial ocean salmon fisheries off the coast of Oregon (OR). ODFW utilizes electronic sampling for all Chinook and Coho fisheries under their jurisdiction in the Columbia River except for the commercial Chinook fishery which is still visually sampled.

Alaska conducts visual sampling; however, uses electronic screening of heads for commercial fisheries and in most ports for sport fisheries, to send only tagged heads to the dissection lab. ADFG does not sample unmarked Coho Salmon for CWTs and discontinued sampling of unmarked Chinook for CWTs in all fisheries after 2019.

Encounters of large numbers of mass marked Chinook Salmon continue to impact visual catch sampling programs in northern fisheries; for example, approximately 57% of the Chinook sampled in the southeast Alaskan troll fishery with a missing adipose fin did not contain a CWT in 2019 (Figure 2-4). The increased costs to deal with the additional marked fish (e.g., storage, and shipping to and sorting of heads in the dissection laboratories) are not quantified but do have a substantial fiscal impact on these programs.

Summary of 2021 Mark-Selective Fishery Proposals

Mark-selective fisheries have been prosecuted for Coho Salmon since 1998 and for Chinook Salmon since 2003. For 2021, the SFEC received 77 MSF proposals for Coho and Chinook salmon in Canada, Washington, and Oregon fisheries. The SFEC believes these proposals cover most MSFs planned for 2021 of relevance to the PSC. The proposals submitted to the SFEC for review are listed in Table 3-1 (also see Appendix D). Further details describing the proposed MSFs and comments made by the SFEC are provided in Appendix E.

For 2021, 35 proposals were received for Coho Salmon MSFs and 42 proposals were received for Chinook Salmon MSFs. The SFEC received six new Coho proposals and four new Chinook proposals, all for recreational fisheries. MSF proposals for 2021 were again received from Idaho (IDFG) and the Lummi Nation. Agencies provided the majority of the requested information in each of the proposals and the proposals were submitted on time.

***Proposals received by the SFEC for
Coho and Chinook salmon mark-selective fisheries, 2020–2021***

Agency	Coho		Chinook	
	2020	2021	2020	2021
ADFG	0	0	0	0
CDFO	9	9	2	2
WDFW	12	16	27	29
ODFW	5	7	4	4
WDFW/ODFW	3	3	5	5
IDFG	0	0	0	1
Lummi	0	0	0	1
Total	29	35	38	42

Up until 2008, Chinook MSFs were largely restricted to Puget Sound and Columbia River spring Chinook Salmon. Since then, Chinook MSFs have expanded substantially in both marine and freshwater areas. In 2007, 12 Chinook MSFs were prosecuted; in 2018, that number tripled to 36. The combined increase in numbers and geographic distribution of Chinook MSFs increases the likelihood that a larger number of indicator stocks will be encountered in MSFs.

The majority of MSF proposals are for terminal marine or freshwater areas, each of which will impact mature fish of one to several stocks originating from nearby river systems. Multiple MSFs for both Coho and Chinook salmon are also expected to continue to occur in ocean areas during 2021 in BC, WA, and OR. These fisheries will impact many stocks and also multiple broods of Chinook Salmon.

Recommendations and Issues Requiring PSC Direction

Continued Submission of Mass Marking and Mark-Selective Fishery Proposals

It is recommended that the PSC continue to request that agencies submit previously reviewed proposals for all potential 2022 MM and MSF activities by November 2021. New or substantially changed proposals should continue to be requested by June 1 of the year prior to implementation.

Mark-Selective Fishery Reports are Needed

It is recommended that the PSC continue to request that agencies provide SFEC with post-season mark-selective fishery reports (see [PSC website for current templates](#)). The information in these tables should be completed prior to the PSC post-season meeting of the year following the fishery year. For instance, reports on fisheries occurring in 2020–2021 should be available by the post-season meeting in 2022. This information has only been received for some fisheries, such as Puget Sound, Oregon Coastal, Lower Columbia River, and SE Alaska, but not for others.

Post-season reports on MSFs are required for each MSF prosecuted. One of the basic functions of these reports is to provide a record of how fisheries were actually prosecuted (whether they took place) and whether there were any changes in the way the fisheries and sampling programs were conducted relative to the proposal. These reports are to be submitted in the form of tables (see [PSC website for current templates](#)). The first two tables should be submitted by the annual PSC post-season meeting following the year of the fishery. Both United States and Canadian PSC post-season reports continue to be missing SFEC post-season report/tables for most MSFs. Although these SFEC tables are not included in the PSC post-season reports, CDFO and WDFW do provide fishery regulations and preliminary landed catch estimates for mark-selective fisheries in these reports.

SFEC representatives have been stepping up efforts in recent years to coordinate with key staff within the agencies in order to meet these reporting requirements. Although the information may be available in larger agency reports, the SFEC needs agencies to submit the post-season MSF information using the report templates provided (see [PSC website for current templates](#)), which will enable more efficient dissemination of post-season data to PSC's technical committees such as the CTC and CoTC. It is recommended that agencies prioritize this task and work with their SFEC representatives to develop these reports annually and provide them to the PSC in the required time frame.

New Database is Needed to Facilitate Analyses of MSFs

To facilitate analyses by the technical committees, a database housing regulations and impact estimates of MSFs is needed. The Regional Mark Information System (RMIS) does not include all of the necessary data (i.e., regulations) to estimate fishery impacts on unmarked, tagged fish.

In addition, the resulting estimates of impacts of MSFs on unmarked fish are needed for the PSC technical committees to perform cohort analyses on all stocks of concern. A prototype online database with impact estimates and summarized CWT data for Chinook MSFs conducted in WDFW marine areas 1–13 was developed jointly by WDFW and the NWIFC. This database is no longer being maintained. To facilitate compilation and accessibility of post-season MSF data, SFEC recommends the PSC develop and maintain a similar database for both Coho and Chinook MSFs coastwide.

CWT Indicator Programs Need Further Review by Technical Committees

Double index tag groups are one tool useful in evaluating if MSFs were significant enough to impart a difference between the exploitation rate of an indicator stock and the natural stock it represents. Significant differences between the marked and unmarked components of a DIT pair in return rates could be used as a screening tool to determine if further analysis is necessary to estimate the exploitation rates of unmarked fish. Mark-selective fisheries have tripled in number since 2007, with new areas and stocks being fished under mark-selective regulations. It is recommended that agencies review their indicator stock programs in light of the expansion of MSFs and any other new MSFs likely to be proposed in future years and evaluate the need for including additional DIT groups.

All Mixed-Stock Coho and Chinook Salmon Fisheries Need to be Electronically Sampled

Electronic tag detection (ETD) is necessary for detecting unmarked and tagged fish in fisheries and escapement. In order to carry out exploitation rate analysis for unmarked stocks using DIT analytical methods, it is necessary to have estimates of harvest of unmarked and tagged DIT groups in NSFs. This requires electronic sampling be used in NSFs and mixed-bag fisheries, where unmarked and tagged fish are retained, in particular if the stock has been subjected to MSFs in other areas or periods. The SFEC recommends that agencies review their sampling methods with respect to the current expansion of MSFs into coastal fisheries. Electronic sampling should be implemented for all remaining Columbia River fisheries using visual sampling to recover DIT release groups for Chinook and Coho exploitation rate indicator stocks.

Agencies Proposing Mixed-Bag Regulations in MSFs Need to Provide New Analytical Tools to Assess These Fisheries

Regulations to implement MSFs for recreational fisheries have become more complex, making analyses to estimate impacts challenging in a number of ways. We continue to be concerned about monitoring, sampling, and estimation methods keeping pace with increases in regulation complexity. Different types of mixed-bag regulations continue to be proposed by Canada, Washington, and Oregon for recreational fisheries. A mixed-bag fishery is one where an angler may retain different proportions of clipped or unclipped fish, and often may include jacks as well as adults in their daily bag limits. There are no reliable methods for estimating impacts on marked and unmarked fish under mixed-bag regulations. The agencies proposing these mixed-bag regulations should assist in developing the analytical tools to measure the impacts of these fisheries.

1 INTRODUCTION

The Selective Fishery 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 (see [SFEC Feb 2004 Policy Statement and ToR](#)). The SFEC serves as a clearinghouse to facilitate coordination and reporting on MM and MSF programs among the Parties to the Pacific Salmon Treaty (PST), affected agencies, and existing coastwide and regional committees established to monitor activities related to the CWT program. The SFEC continues to review procedures and protocols for MM, fishery sampling plans, and the program evaluations developed by the proponents. Where appropriate, the SFEC develops and recommends alternative procedures in consultation with relevant technical committees of the Pacific Salmon Commission (PSC).

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 agency use in developing proposals and analyzing data. The SFEC includes two working groups: the Regional Coordination Work Group (RCWG) and the Analytical Work Group (SFAWG). The RCWG is tasked with reviewing MM proposals, and the SFAWG is tasked with reviewing MSF proposals and evaluating impacts of MSFs.

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 PSC. Agency proposals for MM plans were requested for all hatchery Coho Salmon (*Oncorhynchus kisutch*) and Chinook Salmon (*O. tshawytscha*) 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* (see [SFEC Feb 2004 Policy Statement and ToR](#)), proposals for continuing MM and MSF programs are requested no later than November 1 of the year prior to implementation. Proposals for new or substantially changed proposals are requested by June 1 of the year prior to implementation. Agencies have been requested to provide their information to the SFEC in provided Microsoft Word™ templates (see [PSC website for current templates](#)). In addition, a Microsoft Excel™ format has been developed as an alternative format for submitting MSF proposals.

The SFEC reviewed proposals for MM activities and MSFs anticipated by agencies to occur in 2021. This report summarizes the results of the review of MM and MSF proposals received in November 2020 and June 2021. Issues and concerns identified during the review, and recommended further actions, are also provided in this report. Throughout this report a mass marked fish refers to a fish with an adipose-fin clip (marked) which is not coded-wire tagged. A marked fish that is tagged with a coded-wire tag is not considered mass marked in this report, and are referred to as single-index tagged. A double-index-tag (DIT) group includes two coded-wire-tag (CWT) paired-release groups, one marked and one unmarked. The terms ‘marked’ and ‘clipped’, and likewise ‘unmarked’ and ‘unclipped’, are used interchangeably.

2 PROPOSED MASS MARKING AND FISHERY SAMPLING

2.1 Mass Marking Proposals Received

A total of 23 MM proposals (8 for Coho, and 15 for Chinook) were received by the PSC for 2021 marking activities (Appendix A). Of the proposals received, one was a new proposal from Alaska (AK), two were from southern British Columbia (BC), and 20 from southern United States (SUS). All proposals are summarized in Table 2-1. These proposals represent all known MM programs that have international ramifications and/or sampling impacts on other agencies. Proposals were not requested for spring and summer Chinook stocks from the Snake River Basin, because, as identified in previous reviews, there is a lack of marine recoveries from these groups.

2.2 Mass Marking Levels

The total Coho hatchery production for the areas and stocks covered by the 2021 proposals is projected to be approximately 44 million fish. Of this, 33.6 million Coho Salmon are proposed to be mass marked in 2021 from southern BC, Washington, and Oregon (Table 2-1). Although there has been a gradual decline in coastwide Coho Salmon hatchery production since brood year 1997, there have been no significant changes to proposed marking levels from brood year (BY) 2001 to BY 2020. Annual trends in Coho Salmon released as mass marked and the total Coho production from the regions covered by mass marking proposals, for BYs 1997 to 2017, are shown in Figure 2-1A. Geographic details of the Coho Salmon to be marked in 2021, by mark and tag status, are displayed in Figure 2-2A. In 2021 the vast majority of the Coho Salmon production, from southern BC, Washington, and Oregon and essentially all production intended for harvest, will be ad-clipped (87% of all releases). Of the Coho production planned to be released in 2021 that will not be mass marked, approximately 4.5 million will be tagged and marked, 3.8 million will be tagged and unmarked, and approximately 1.9 million will be left untagged and unmarked for stock reintroduction programs.

The total Chinook hatchery production from the southern SE Alaska; west coast of Vancouver Island, BC; Washington; Oregon; and the Snake River in Idaho for the area and stocks covered by the 2021 proposals, is projected to be approximately 188 million fish. Annual trends in Chinook Salmon released as mass marked and the total Chinook production from the regions covered by mass marking proposals for BYs 1997 to 2017 are shown in Figure 2-1B. Chinook released from WCVI hatcheries are not included in the figure because brood years 1997 to 2017 were not mass marked. Geographic details of the proposed 2021 marking, by mark and tag status, are displayed in Figure 2-2B.

Approximately 135 million Chinook Salmon are proposed to be mass marked from SUS (not including California) and Canadian west coast of Vancouver Island hatcheries in 2021 (Table 2-1). An additional 980 thousand from Southern SE Alaska are proposed to be mass marked in 2021. The 2021 total of 136 million mass marked fish is approximately 14 million more than what was proposed to be marked in 2020. This increase is due mainly to the newly proposed releases of 980 thousand in Southern SE Alaska and increases of 4 million in Puget Sound, and 10.9 million released into the Columbia River. For the production that will not be mass marked in 2021, approximately 25.8 million will be both tagged and marked, 9.3 million will be tagged and unmarked, and 17.1 million will be intentionally left unmarked, of which 3.2

million are intended for restoration programs in Puget Sound and 13.4 million are from segregated enhancement programs on WCVI in Canada. (Figure 2-2B). In 2021 86% of the Chinook Salmon production covered by the proposals will be ad-clipped.

The Southern Resident Killer Whale (SRKW) population has declined to abundance levels that prompted the species being listed as endangered under both the U.S. Endangered Species Act and the Canadian Species at Risk Act. The latest science suggests that SRKW have a diet reliant on Chinook salmon, and to a lesser extent, Chum and Coho salmon. As such, there have been efforts to significantly increase hatchery production to benefit SRKWs (WDFW 2021, NMFS 2019). The increased hatchery production goals range from 20 million (NMFS 2019) to 51 million (WDFW 2021) additional smolts, based on 2018 production levels. Several hatchery facilities in Oregon and Washington have increased salmonid hatchery production using funding from the Washington State legislature and from the U.S. Section of the Pacific Salmon Commission per requirements in the Biological Opinion for Southeast Alaska salmon fisheries (NMFS 2019). All of these fish are expected to be released with an adipose fin clip.

Table 2-1. Mass marking of Coho and Chinook salmon proposed for 2020 and 2021 and number of double-index-tagged (DIT) groups proposed for 2021.

Species	Area	Run	Agency	2021 Proposed DIT Groups	Mass Marking (millions)	
					2020	2021
Coho	Strait of Georgia		CDFO	-	3.5	3.4
	W. Coast of Vanc. Isl.		CDFO	-	0.3	0.4
	Puget Sound		USFWS	1	0.5	0.6
			WDFW/Tribal	6	10.8	11.0
	WA Coast		USFWS	-	0.6	0.6
			WDFW/Tribal	4	4.8	5.2
	Columbia Basin		USFWS	1	0.8	0.8
			WDFW/Tribal	2	8.5	6.2
ODFW			-	4.3	5.0	
Oregon Coast		ODFW	-	0.3	0.3	
Total Coho				14	34.4	33.6
Chinook	Southern SE AK	Summer	ADFG	-	-	0.9
	NW Vancouver Island	Fall	CDFO	-	2.9	2.9
	SW Vancouver Island	Fall	CDFO	-	0.3	0.3
	Puget Sound	Spring	WDFW/Tribal	1	0.9	1.7
		Summer	WDFW/Tribal	1	3.6	4.2
		Fall	WDFW/Tribal	6	31.2	33.9
	Washington Coast	All	WDFW/Tribal	2	11.0	10.6
		Fall	USFWS	-	2.0	1.0
	Columbia Basin	Summer	USFWS	-	0.2	0.2
		Spring	ODFW (Willamette)	-	4.2	4.3
			ODFW (Columbia R)	-	2.8	4.0
			USFWS	-	3.4	3.7
			WDFW/Tribal	2	3.2	3.2
		Fall-Tule	USFWS	1	9.7	11.7
			WDFW	-	13.9	13.9
			ODFW	-	5.4	6.1
		Fall URB	WDFW	1	12.7	7.8
	ODFW		-	0.9	4.7	
	USFWS		1	4.9	12.7	
	Snake R. Fall	ODFW	-	1.0	0.8	
		WDFW	-	0.5	0.5	
	Snake R. Spring	ODFW	-	0.6	0.6	
		USFWS	-	2.0	2.0	
Oregon Coast	N. Spring	ODFW	-	0.4	0.4	
	S. Spring	ODFW	-	1.9	2.0	
	Fall	ODFW	-	2.5	2.0	
Total Chinook				15	122.0	136.3

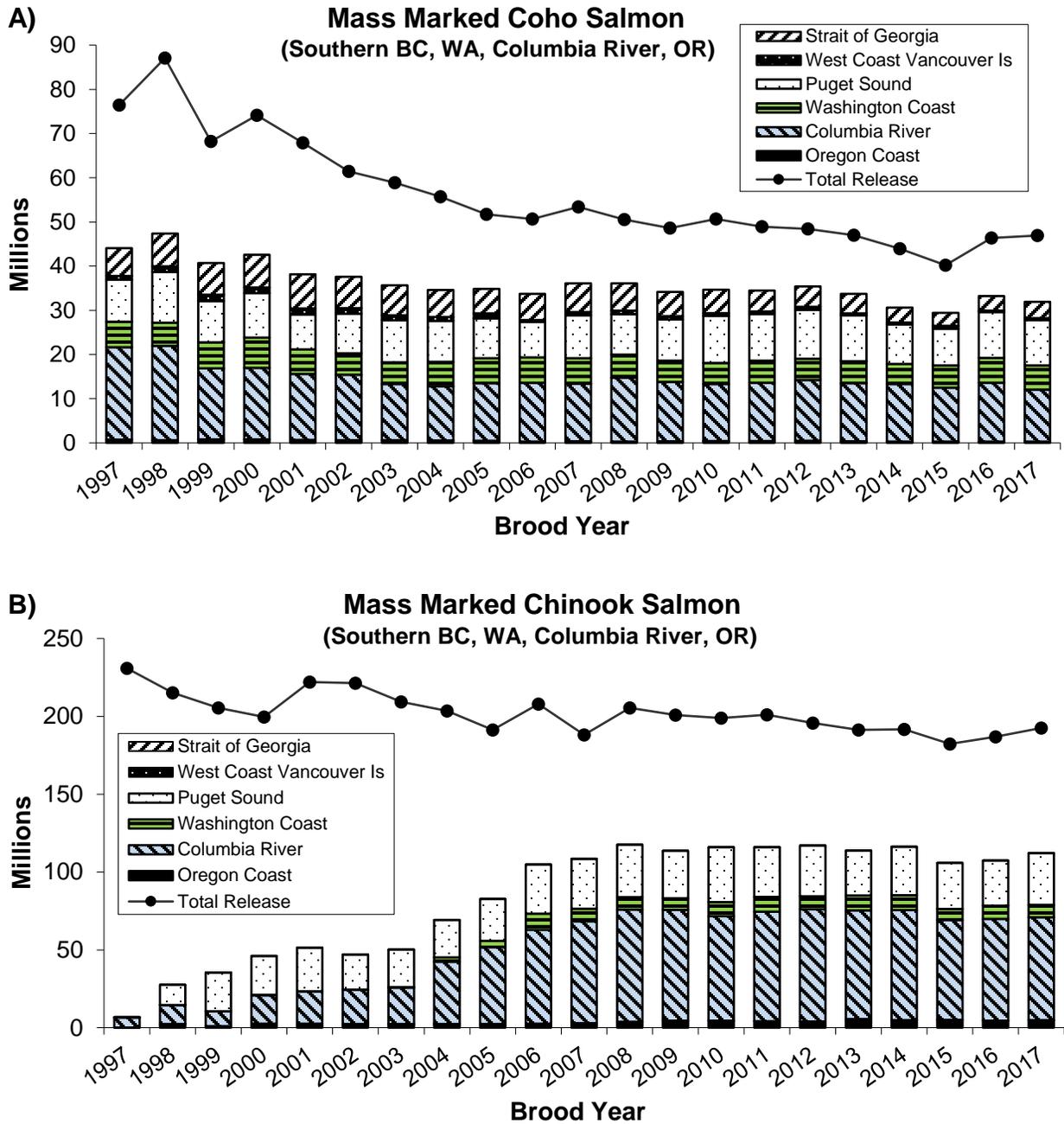


Figure 2-1. Number of mass marked Coho (panel A) and Chinook salmon (panel B) released by region, brood years 1997–2017. The solid line represents total hatchery releases (both marked and unmarked fish) for these same regions by brood year. No mass marked Chinook were released from WCVI hatcheries for these brood years. Data queried from the Regional Mark Information System (RMIS) on November 16, 2020.

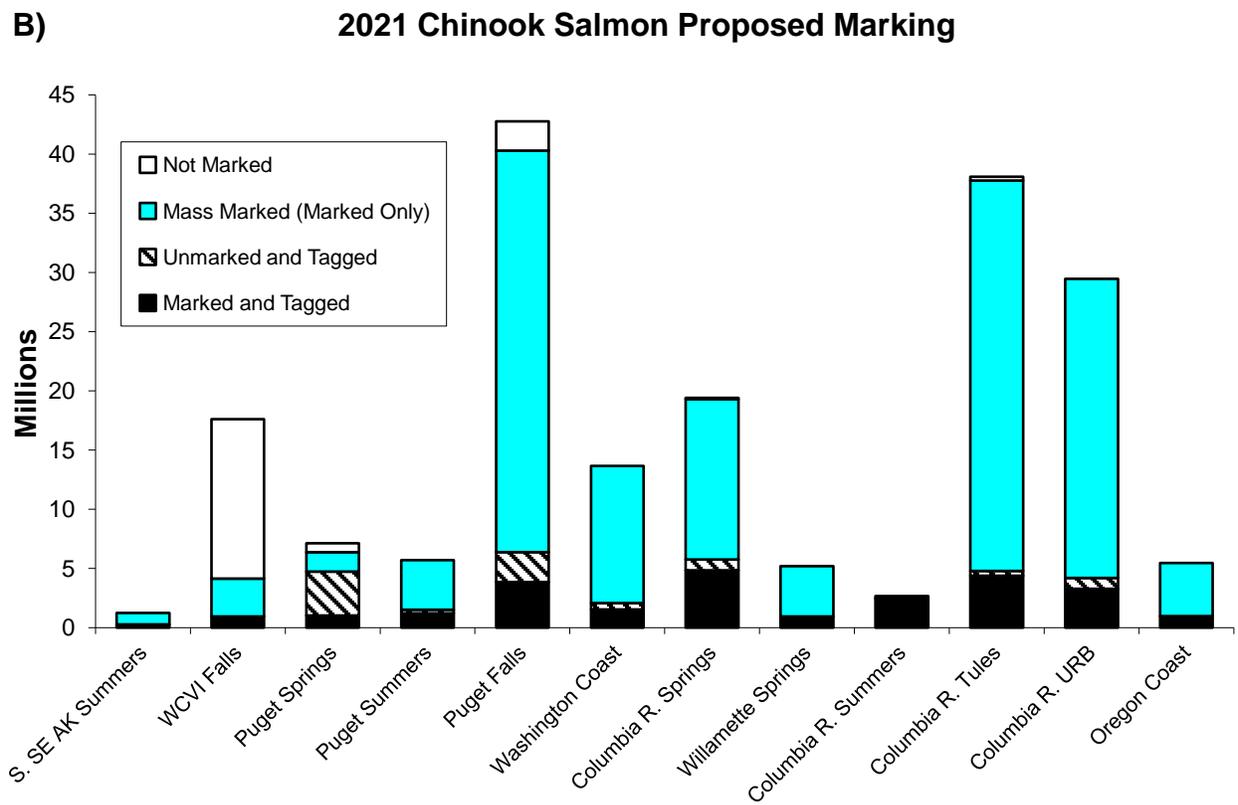
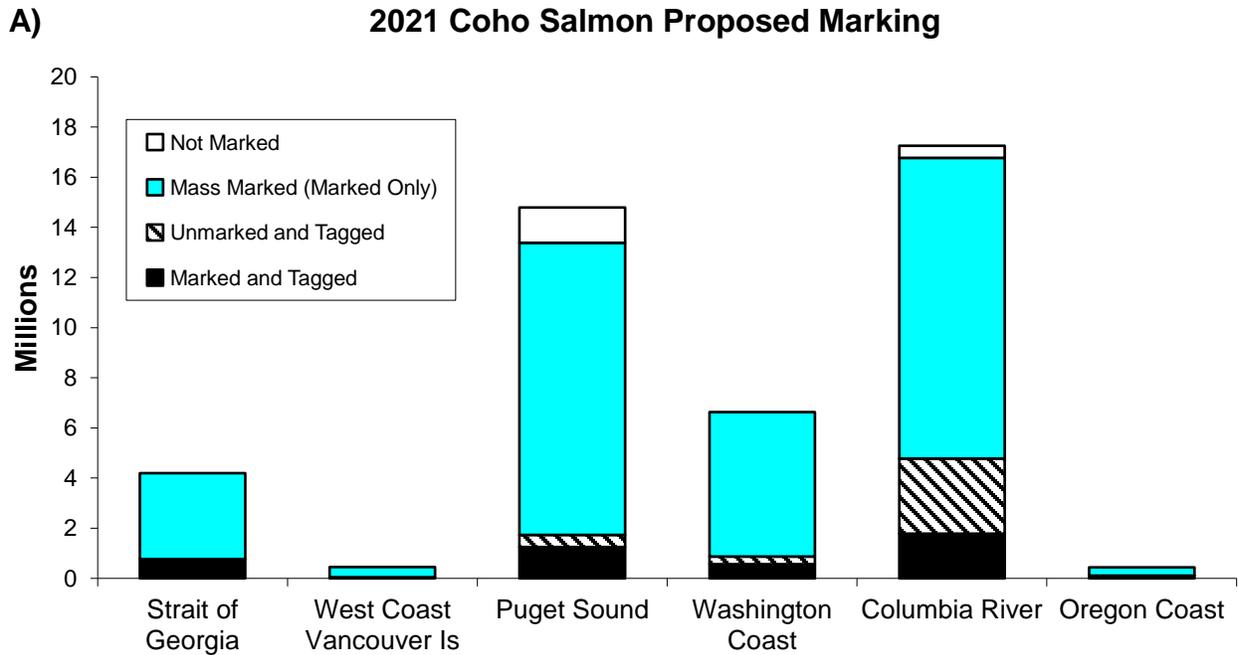


Figure 2-2. Projected Coho and Chinook salmon marking plans, by region and mark status, for 2021.

2.3 Double-Index-Tag Groups

Double-index-tag groups provide information necessary for direct estimation of total MSF impacts on unmarked fish. Appendix B and Appendix C list the Coho and Chinook salmon PSC indicator stocks, including those that are DIT groups. Currently, there are 14 proposed Coho Salmon DIT groups (Table 2-1), of which seven will be released from Puget Sound (PS), four from the Washington (WA) coast, and three from the Columbia River Basin. Fifteen Chinook Salmon DIT groups are proposed (Table 2-1), of which eight are from Puget Sound facilities, two from WA coastal facilities, and two spring and three fall stocks from Columbia River facilities.

Washington Department of Fish and Wildlife has maintained most DIT groups for both species, but the number of DIT groups outside WA has declined over the years (Figure 2-3) for various reasons, including budget constraints. Canada discontinued all Coho DIT groups because of low CWT recoveries resulting in inadequate precision, in addition to problems with fishery and escapement sampling for unmarked tagged Coho leading to inaccurate recovery information. Re-evaluation of DIT programs is needed and currently in progress.

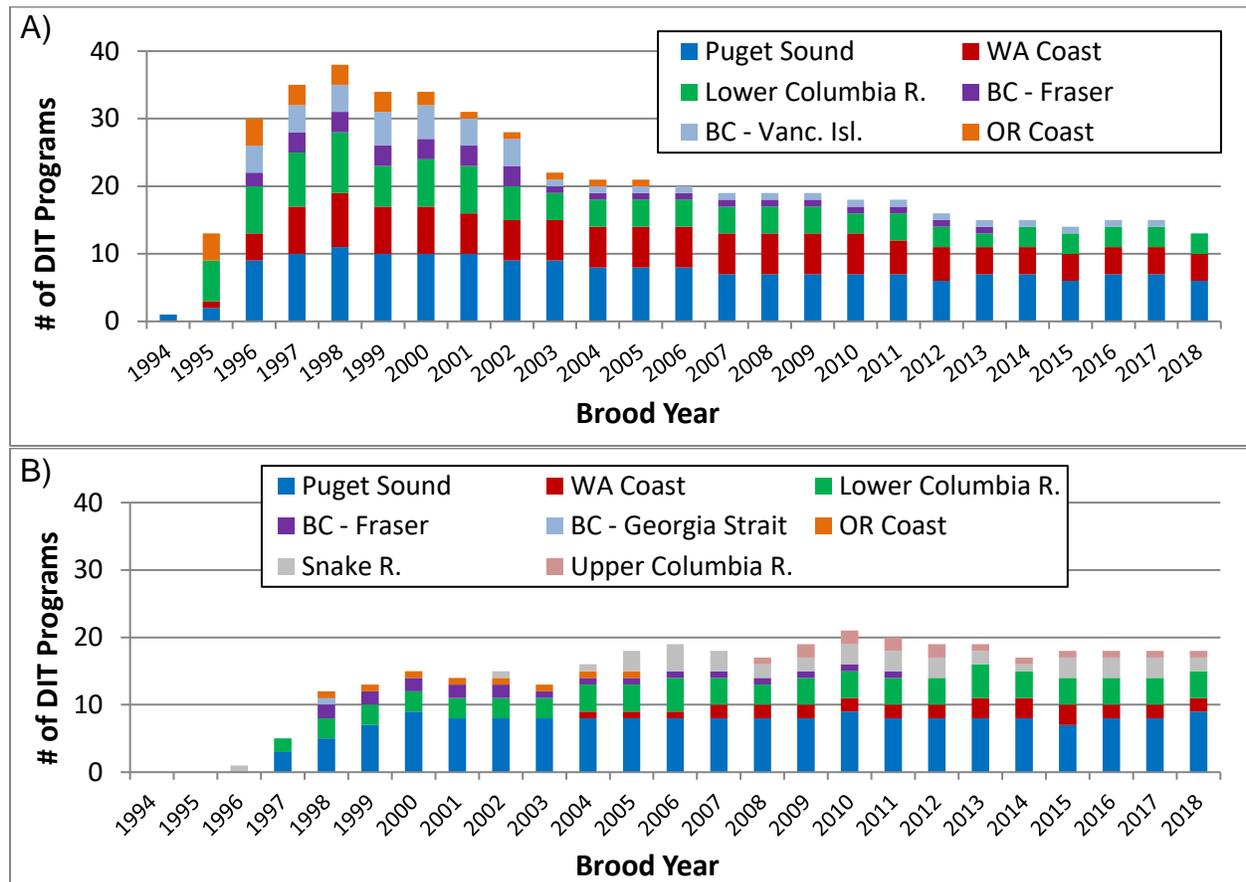


Figure 2-3. Total number of Coho (panel A) and Chinook (panel B) salmon CWT DIT programs released by region, over brood years 1994–2018. Data queried from RMIS November 17, 2020.

2.4 Fishery Sampling Methods

Two methods are currently used to detect fish containing CWTs. The traditional visual sampling method relies upon the adipose-fin clip as a visual indicator for a CWT. When visual sampling is used, only CWTs from marked fish will be detected and large numbers of heads without tags will be processed unnecessarily. Electronic tag detection (ETD) uses electronic gear (hand-held wand or fixed-position tube) to detect CWTs in marked and unmarked fish. When marked fish are first visually separated in the sample and electronic gear is then used to detect tags in the marked fish, this is considered visual sampling because tags are only recovered from marked and tagged fish. Visual sampling results in a lack of recovery of the unmarked component of DIT release groups, creating data gaps in the analysis of CWT data and increased uncertainty in the estimated impacts on unmarked (wild) fish. These gaps also require indirect estimation procedures to complete them thus making analyses more time consuming and the results more uncertain.

Current CWT sampling methods for Coho and Chinook salmon are summarized in Table 2-2 and Table 2-3, respectively. Electronic tag detection has not been implemented for all fisheries encountering mass marked fish. In general, ETD has become the standard CWT sampling method in WA and ID. Visual CWT sampling remains the standard method in AK and CA. ADFG does not sample unmarked Coho and has discontinued sampling of unmarked Chinook for CWTs in all fisheries. In BC, OR, and the Columbia River the situation is complex, where sampling methods depend on species, location, and the type of fishery.

Alaska Department of Fish and Game continues to be concerned about the large numbers of marked fish without CWTs encountered in sampling programs. Of the marked Chinook caught in Alaska's troll fishery since the implementation of MM, the proportion of marked fish with no tags has ranged from approximately 7% in 1995 to a high of 70% in 2014, but has decreased in recent years to approximately 57% (Figure 2-4). The increased cost to deal with the additional marked fish is not quantified, but impacts the Alaska CWT program. Costs to ship all the heads, including those with no CWTs, from sampling locations to the dissection lab are substantial. To remedy this situation and reduce sampling costs, Alaska has implemented the electronic screening of marked fish encountered in their sampling programs. Currently this method is being employed in the commercial troll Chinook fisheries and has recently been expanded to include the sport fishery and approximately half of the seine and gillnet fisheries.

Table 2-2. Proposed fishery sampling methods for tagged Coho Salmon in 2021.

Region	Fishery	Type of Sampling	Comments
Alaska	Commercial	Visual	
	Sport	Visual	
Northern BC	Commercial	Electronic/ Visual	Freezer troll is sampled electronically; other catches are sampled visually.
	Sport	Visual (Voluntary)	Anglers turn in heads from marked Coho only; therefore, tags will not be recovered from unmarked Coho (fisheries are non-selective).
West Coast Vancouver Island	Commercial	Electronic	Incidental recoveries in fisheries targeting other species.
	Sport	Visual (Voluntary)	Anglers turn in heads from marked Coho only; therefore, tags will not be recovered from unmarked Coho (however, fisheries are mostly mark-selective).
	FSC	Visual	Incidental catch in FN net fisheries for other salmon species is visually sampled.
Strait of Georgia	Commercial	Electronic	Incidental recoveries in fisheries on other species; non-retention of unmarked Coho.
	Sport	Visual (Voluntary)	Anglers turn in heads from marked Coho only; therefore, tags will not be recovered from unmarked Coho (however, fisheries are mostly mark-selective).
	FSC	Visual	Incidental catch in FN net fisheries for other salmon species is visually sampled.
Puget Sound	Commercial	Electronic	
	Sport	Electronic	
Washington Coast	Commercial	Electronic	
	Sport	Electronic	
Oregon Coast	Commercial	Electronic	The only commercial Coho fishery on the Oregon coast proposed to occur is North of Cape Falcon and is mark-selective; therefore, recoveries of unmarked Coho are not expected.
	Sport	Electronic	The ocean sport fishery is mark-selective except for a non-selective season during the first few weeks of September. Tag recoveries from unmarked Coho are anticipated in September.
Columbia River	Commercial	Electronic/ Visual	Coho tangle net fisheries are electronically sampled. Non-marked selective Coho fisheries are visually sampled by Oregon and Washington; therefore, tags will not be recovered from unmarked Coho.
	Sport	Electronic	
California	Commercial	Visual	
	Sport	Visual	

Table 2-3. Proposed fishery sampling methods for tagged Chinook Salmon in 2021.

Region	Fishery	Type of Sampling	Comments
Alaska	Commercial	Visual	ADFG plans to discontinue sampling of unmarked Chinook for CWTs in all fisheries
	Sport	Visual	ADFG plans to discontinue sampling of unmarked Chinook for CWTs in all fisheries
Northern BC	Commercial	Electronic	All Chinook are electronically sampled and all tags are decoded (this has been the case since 2007).
	Sport	Visual (Voluntary)	Anglers turn in heads from marked Chinook only; therefore, tags will not be recovered from unmarked Chinook.
West Coast Vancouver Island Offshore	Commercial	Electronic	Offshore fisheries are electronically sampled.
	Sport	Visual (Voluntary)	Anglers turn in heads from marked Chinook only; therefore, tags will not be recovered from unmarked Chinook.
West Coast Vancouver Island Inshore	Commercial	Visual	Terminal gillnet fisheries are visually sampled.
	FSC	Visual	Terminal gillnet fisheries and fisheries in inside areas are visually sampled.
	Sport	Visual (Voluntary)	Anglers turn in heads from marked Chinook only; therefore, tags will not be recovered from unmarked Chinook.
Strait of Georgia	Commercial	Electronic	
	FSC	Visual	Terminal area fisheries are visually sampled.
	Sport	Visual (Voluntary)	Anglers turn in heads from marked Chinook only; therefore, tags will not be recovered from unmarked Chinook.
Puget Sound	Commercial	Electronic	
	Sport	Electronic	
Washington Coast	Commercial	Electronic	
	Sport	Electronic	
Oregon Coast	Commercial	Electronic	
	Sport	Electronic	
California	Commercial	Visual	
	Sport	Visual	

~Continued~

Table 2-3. (Page 2 of 2) Proposed fishery sampling methods for tagged Chinook Salmon in 2021.

Region	Fishery	Type of Sampling	Comments
Columbia River	Commercial	Electronic/ Visual	Chinook fisheries are electronically sampled, except non-mark selective Chinook fisheries are visually sampled by Oregon and Washington; therefore, tags will not be recovered from unmarked Chinook.
	Sport	Electronic	Spring, summer, and fall Chinook fisheries are electronically sampled by Oregon and Washington.
California	Commercial	Visual	
	Sport	Visual	

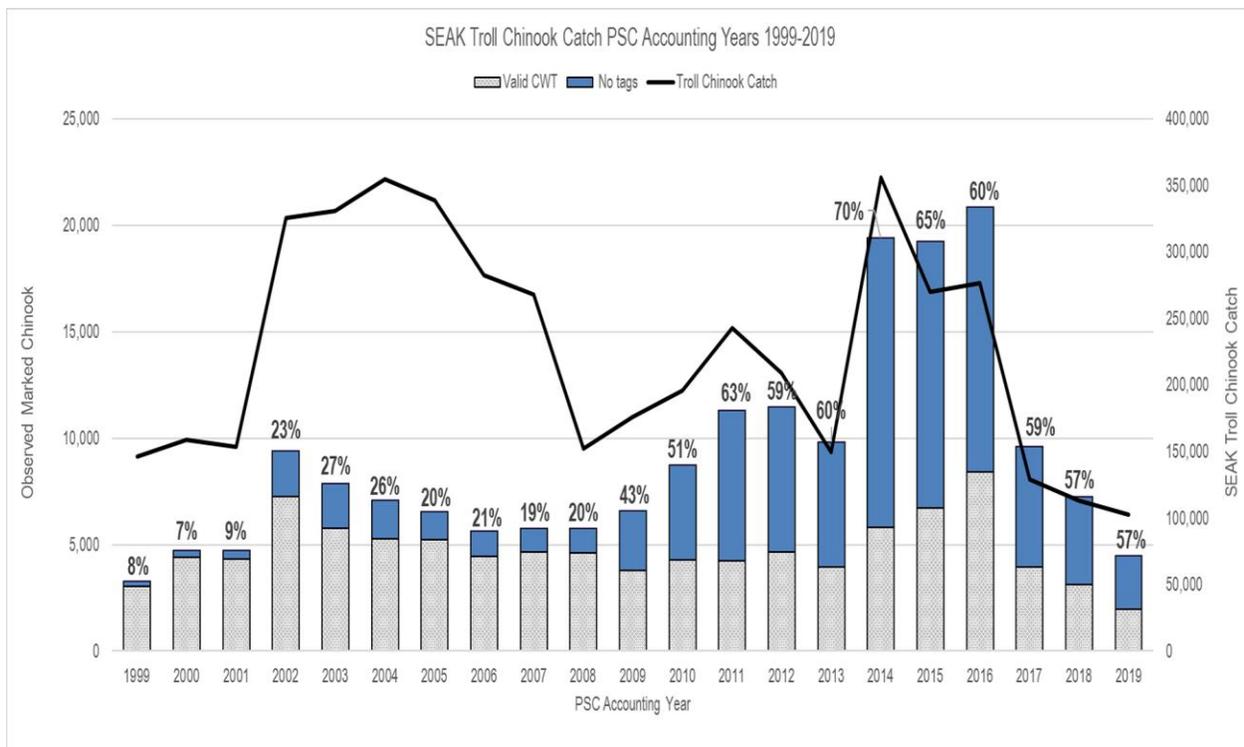


Figure 2-4. Numbers of marked Chinook Salmon sampled in Alaska’s troll fishery and annual catch, 1999–2019. The bars represent the untagged (blue) and tagged (gray) marked fish sampled (left vertical axis) and the black line represents the number of fish caught (right vertical axis).

Canada relies on voluntary recoveries of marked Coho and Chinook salmon in recreational fisheries (regardless of whether mark-selective or non-selective regulations are used), while the current restricted commercial fisheries are electronically or visually sampled depending on species and location (Table 2-2 and Table 2-3). As in AK, the CDFO Sport Head Recovery Program (SHRP) program has observed an increase in the submission of heads without tags as well as a decrease in the submission rate of heads as fewer anglers turn in heads. Since 2008, Coho Salmon landed by ice or day boats in the northern BC troll fishery are not subject to electronic sampling. In that fishery, Coho Salmon are sampled visually; therefore, CWTs will not be recovered from unmarked fish. Electronic sampling is being used for both species in commercial fisheries South of Cape Caution, located just northward of the northern tip of Vancouver Island on the mainland coastline. Allocation of Chinook and Coho catch in Canada is prioritized first to First Nations (FN) after conservation requirements are met, then to sport and lastly to the commercial sector. As more populations are managed to meet conservation objectives, commercial and sport catch is being constrained, resulting in a greater proportion of the total catch being taken by FN, in food, social and ceremonial fisheries (FSC) and new Economic Opportunity fisheries, that may have immature sampling programs. These FN fisheries are generally terminal in nature, or in inside waters on WCVI. Similarly, as Canada mass marks more Chinook released from hatcheries, use of ETD in escapement sampling is necessary to recover CWTs, either from the returning population or from tagged strays into a system that doesn't release tagged fish.

Within the Columbia River, sampling methods depend on species, location, and the type of fishery. Columbia River spring, summer and fall sport, including Buoy 10 in the estuary, and spring and summer commercial fisheries are electronically sampled for spring Chinook and Coho salmon. However, non-selective mark commercial fisheries are only visually sampled (only adipose-fin clipped fish are electronically screened to determine if CWT are present). All sport fisheries in the Columbia River are now electronically sampled.

The Oregon ocean salmon sampling program samples both the recreational and commercial troll fisheries. California stocks make up a large portion of the harvest on the southern Oregon coast. Catch is sampled electronically and the sampling program sets a sample rate goal of 20–30% of all catch. In years when large returns of California hatchery Chinook are anticipated, sampling may be affected because of the agency's limited resources. California's Fractional-Marking Program specifies that 25% of the production be ad-clipped and all clipped fish will be coded wire tagged. Therefore, should a greater proportion of the catch be unclipped fish, visual sampling may be implemented occasionally in order to maximize CWT recovery rates of marked fish.

3 STATUS AND REVIEW OF MARK-SELECTIVE FISHERY PROPOSALS

3.1 Mark-Selective Fishery Proposals Received

Mark-selective fisheries have been prosecuted for Coho Salmon since 1998 and for Chinook Salmon since 2003. For the 2021 fishery season, the SFEC received a total of 77 MSF proposals for Coho and Chinook salmon (Table 3-1). Agencies provided the majority of the requested information in each of the proposals and the proposals were submitted in time for the annual review meeting by the SFEC. Ten new MSFs proposals were received for 2021— 6 Coho and 4 Chinook. Mixed-bag regulations were again proposed for several of the MSFs (e.g., Oregon recreational marine and freshwater fisheries, WDFW recreational freshwater fisheries, and Canadian marine recreational fisheries).

3.1.1 Coho Salmon MSFs

For 2021, 35 proposals for Coho salmon MSFs were received (Table 3-1; Appendix D). The SFEC received nine proposals from CDFO for ongoing MSFs in Canadian waters — five in the lower Fraser River and four in southern BC marine waters. Each of the nine proposals contained a variety of fishery openings distinguished by regulation variations. A total of 16 Coho Salmon MSF proposals were submitted from WDFW for 2021 including five new sport fishery proposals. Of these 16 proposals submitted by WDFW, twelve were for freshwater locations and four for marine waters. Seven Coho proposals were submitted by ODFW for 2021, including three freshwater and four for marine fisheries. Three ODFW/WDFW joint Coho Salmon MSF proposals for the Columbia River were also received.

3.1.2 Chinook Salmon MSFs

The SFEC received 42 proposals for Chinook Salmon MSFs occurring in 2021 (Table 3-1; Appendix D). These included, two proposals from CDFO, 29 from WDFW, four from ODFW, five submitted jointly by ODFW and WDFW, and one proposal each from Idaho (IDFG) and the Lummi Nation.

Canadian Department of Fisheries and Oceans submitted two proposals — one for an ongoing (since 2008) sport fishery located in the Strait of Juan de Fuca subareas and one for selected portions of the Straits of Georgia, Johnstone, and Juan de Fuca. Of the 29 WDFW proposals, two were new proposals for on-going sport fisheries in Washington tributaries of the Columbia River below McNary Dam. The number of WDFW proposals per location were as follows: six in the freshwater systems of Puget Sound; two in Puget Sound marine waters; one in the marine waters off the WA coast; three in Willapa Bay or its tributaries; one commercial and one sport MSF in Grays Harbor; two ongoing MSFs in WA coastal river systems (Hoh and Quillayute rivers); two in the Snake River; three in the Columbia River—two in the lower River below Bonneville Dam and one between Priest Rapids and Chief Joseph dams; two in the Washington tributaries to the Columbia River below McNary Dam; and one each in the Yakima, the lower Grand Ronde, Wenatchee, Icicle Creek, Chelan, and Okanogan/Similkameen rivers. An additional five Chinook Salmon MSF proposals were submitted jointly by WDFW and ODFW for fisheries planned in the Columbia River. Oregon submitted four proposals for Chinook Salmon MSFs – two ongoing fisheries in the Willamette River and two off the OR coast. Two previously submitted coastal

Chinook fisheries have been discontinued. Idaho (IDFG) submitted one proposal for the Snake River, and the Lummi Nation submitted one proposal for Nooksack spring Chinook.

3.1.3 New MSF Proposals

Ten new MSF proposals were received for 2021, nine for recreational fisheries and one for a commercial troll fishery. Of the six new Coho proposals, four are new fisheries. One of the new Coho proposals was for an MSF that occurred in the Nisqually River in 2020 with no prior proposal. One new Coho proposal and the two new Chinook proposals are for MSFs in Washington tributaries to the Columbia River fisheries that have been prosecuted since 2017. Two additional Coho fishery proposals were submitted by ODFW in 2021. One is for a mitigation fishery on the lower Umpqua River which has occurred for years, but is newly proposed this year, and the other is a commercial troll MSF proposed in June of 2021.

There are minor concerns with proposed Coho fisheries on the Nisqually, Wallace, and Clearwater Rivers. There are no mixed bag regulations in these fisheries, and all Coho will be returning to hatchery proximal to the fisheries. Landed catch will be electronically sampled for CWTs, however catch estimates will come from WDFW's catch record card system (CRC), and expansions made accordingly. The major concern about the proposed Humptulips MSF is that no direct sampling of CWTs will occur. Catch estimates will come from WDFW's CRC program. There are no mixed bag regulations in the fishery, and stock composition estimates will come from hatchery sampling.

Concerns about the one proposed Coho and two Chinook MSFs in Washington Columbia River tributaries include a lack of stock composition estimates for landed fish. Harvest estimates will be provided by WDFW's CRC program. There are, however, no mixed bag regulations in these fisheries.

The proposed Coho MSF on the Umpqua River on the OR coast is mostly in tidewater areas, on fish returning primarily to the weir at the currently destroyed Rock Creek Hatchery. There are no mixed bag regulations for the fishery. Although the MSF has a low mark rate, the fishery exists to mitigate for the loss of a pre-existing Coho fishery due to dam construction. SFEC's concern for this fishery is the lack of direct sampling for CWT recoveries. In June 2021, ODFW submitted a proposal for coastal commercial troll fishery South of Cape Falcon, OR. The fishery is a quota-based mixed bag fishery and Chinook and Coho are sampled concurrently at time of landing.

Table 3-1. Status of mark-selective fishery (MSF) proposals, fishery implementation, and post-fishery reporting for catch years 2017 through 2021.

“P” indicates the MSF proposal was submitted to the PSC-SFEC by the requested deadline. “F” indicates the MSF was conducted. “R” indicates the post-season report summarizing MSF results was submitted to the PSC-SFEC. An “O” (third character) indicates that the post-season MSF report is still outstanding (i.e., SFEC has not yet received the report). An “X” indicates that a MSF proposal was not submitted to SFEC (first character) or the MSF was not conducted (second character). Finally, blank cells indicate the MSF was neither proposed nor conducted in a given year.

Mark-Selective Fishery		Catch Year				
Fishery Name	SFEC Proposal ID	2017	2018	2019	2020	2021
<i>Coho Salmon</i>						
Sport, Southern BC Marine, MSF	MSF-FOC-02a	PFO	PFO	PFO	PFO	P
Sport, Southern BC Marine, Mixed Bag	MSF-FOC-02b	PFO	PFO	PFO	PFO	P
FSC, Lower Fraser R.	MSF-FOC-03	PFO	PFO	PFO	PFO	P
Commercial, Southern BC Marine	MSF-FOC-05	PFO	PX	PX	PX	P
Sport, BC South Coast Freshwater	MSF-FOC-06	PFO	PFO	PFO	PFO	P
Sport, BC South Coast Freshwater (mixed bag)	MSF-FOC-09	PFO	PFO	PFO	PFO	P
FSC, Southern BC Marine	MSF-FOC-11		PFO	PFO	PFO	P
Commercial Gillnet, Fraser R. mouth	MSF-FOC-12			PFO	PFO	P
Commercial Seine, Fraser R. mouth	MSF-FOC-13			PFO	PX	P
Sport, WA Areas 1–4 and Buoy 10	MSF-WDFW-06	PFR	PFO	PFO	PFO	P
Sport, Puget Sound Areas 5–13	MSF-WDFW-07	PFO	PFO	PFO	PFO	P
Commercial, WA Areas 1–4	MSF-WDFW-15	PX	PFO	PFO	PFO	P
Sport, Nooksack R.	MSF-WDFW-18	XFO	PFO	PFO	PFO	P
Sport, Willapa tributaries	MSF-WDFW-22	PFO	PFO	PX	X	
Sport, Grays Harbor Area 2.2	MSF-WDFW-23	PFO	PFO	PFO	PFO	P
Sport, Grays Harbor tributaries	MSF-WDFW-24a	PFO	PFO	PFO	PX	P
Sport, Grays Harbor tributaries – Humptulips ⁵	MSF-WDFW-24a					P
Sport, Willapa Bay Area 2.1	MSF-WDFW-29	PFO	PX	PX	PX	X
Sport, Quillayute R. (Feb–Aug)	MSF-WDFW-31a	PFO	PFO	PFO	PFO	P
Sport, Quillayute and Solduc R. (Sept–Nov)	MSF-WDFW-31b	PFO	PFO	PFO	PFO	P
Sport, Skagit R.	MSF-WDFW-40	PX	PFO	PX	PFO	P
Sport, Samish R.	MSF-WDFW-41	PFO	PFO	PFO	PFO	P
Test, Columbia R., Cathlamet	MSF-WDFW-52		XF	PFO	PFO	P
Sport, Dungeness River	MSF-WDFW-53	XF	XF	XF	PFO	P
Sport, Wallace River (Skykomish/Snohomish Trib)	MSF-WDFW-56					P
Sport, Nisqually R	MSF-WDFW-57				XFO	P
Sport, Clearwater R	MSF-WDFW-58					P

~continued~

Table 3-1. (Page 2 of 4) Status of mark-selective fishery (MSF) proposals, fishery implementation, and post-fishery reporting for catch years 2017 through 2021.

Mark-Selective Fishery		Catch Year				
Fishery Name	SFEC Proposal ID	2017	2018	2019	2020	2021
<i>Coho Salmon (continued)</i>						
Sport, Columbia R Tributaries - Mouth to McNary Dam	MSF-WDFW-59	XFO	XFO	XFO	XFO	P
Sport, Willamette River below Falls	MSF-ODFW-05	PFR	PFO	PFO	PFO	P
Sport, Sandy River and tributaries to mouth of Salmon River	MSF-ODFW-06	PFR	PFO	PFO	PFO	P
Commercial, Leadbetter Pt. to Cape Falcon	MSF-ODFW-08	PFR	PFO	PFR	PFO	P
Sport, Cape Falcon to the OR/CA border ¹	MSF-ODFW-10	PFR	PFO	PFR	PFO	P
Sport, Leadbetter Pt. to Cape Falcon ¹	MSF-ODFW-12	PFR	PFO	PFR	PFO	P
Sport, Umpqua R and tributaries	MSF-ODFW-14	XFO	XFO	XFO	XFO	P
Commercial, Cape Falcon to the OR/CA border	MSF-ODFW-15					P
Sport, Lower Columbia R.	MSF-ODFW/WDFW-04	PFO	PFO	PFO	PFO	P
Commercial, Lower Columbia R. (Buoy 10 to Beacon Rock) tangle net	MSF-ODFW/WDFW-06	PX	PX	PFO	PFO	P
Commercial, Lower Columbia R. (Buoy 10 to Beacon Rock) seine	MSF-ODFW/WDFW-08	PX	PX	PX	PX	P
<i>Chinook Salmon</i>						
Commercial, Coho-directed, SE Alaska	MSF-ADFG-01	PFR	PX	PX	X	
Commercial, Chinook-directed, SE Alaska	MSF-ADFG-02		PX	PX	X	
Sport, SE Alaska	MSF-ADFG-03		PX	PX	X	
Sport, Strait of Juan de Fuca subareas, BC	MSF-FOC-07	PFO	PFO	PFO	PFO	P
Sport, Straits of Georgia, Johnstone, and Juan de Fuca portions, BC (Jan – Dec.)	MSF-FOC-10			PX	PFO	P
Sport, Skykomish R. (summer run)	MSF-WDFW-01	PFO	PFO	PFO	PFO	P
Sport, Yakima R. (spring run)	MSF-WDFW-03	PFO	PFO	PX	PX	P
Sport, Lower Snake R. (fall run)	MSF-WDFW-05	PFO	PFO	PFO	PFO	P
Sport, Carbon & Puyallup R. (fall run)	MSF-WDFW-09	PFO	PFO	PFO	PFO	P
Sport, Upper Skagit R. (spring run)	MSF-WDFW-12	PFO	PFO	PFO	PFO	P
Sport, Nooksack R. (fall run)	MSF-WDFW-13	PFO	PFO	PFO	PFO	P
Sport, Nisqually R. (fall run)	MSF-WDFW-14	PFO	PFO	PFO	PFO	P
Sport, WA areas 1–4	MSF-WDFW-19	PX	PX	PX	PX	P
Sport, Skokomish R. (fall run)	MSF-WDFW-20	PX	PX	PX	PX	P
Commercial, Willapa Bay	MSF-WDFW-25	PFO	PFO	PFO	PFO	P
Sport, Willapa Bay Area 2.1	MSF-WDFW-26	PFO	PFO	PFO	PFO	P

~continued~

Table 3-1. (Page 3 of 4) Status of mark-selective fishery (MSF) proposals, fishery implementation, and post-fishery reporting for catch years 2017 through 2021.

Mark-Selective Fishery		Catch Year				
Fishery Name	SFEC Proposal ID	2017	2018	2019	2020	2021
<i>Chinook Salmon (continued)</i>						
Sport, Willapa Bay tributaries (fall run)	MSF-WDFW-27	PFO	PFO	PFO	PFO	P
Sport, Snake R. (spring/summer run)	MSF-WDFW-28	PFO	PFO	PFO	PFO	P
Sport, Quillayute R. (spring/summer run)	MSF-WDFW-32	PFO	PFO	PFO	PFO	P
Sport, Hoh R.	MSF-WDFW-33	PX	PFO	PFO	PX	P
Sport, Puget Sound Areas 5–13, summer ²	MSF-WDFW-35	PFR	PFO	PFO	PFO	P
Sport, Puget Sound Areas 5–13, winter ³	MSF-WDFW-36	PFR	PFO	PFO	PFO	P
Sport, Snohomish R. (summer run)	MSF-WDFW-37	PX	PFO	PFO	X	
Commercial, Grays Harbor Areas 2A–2D	MSF-WDFW-38	PFO	PFO	PFO	PFO	P
Sport, L. Grand Ronde R. (spring/summer run)	MSF-WDFW-39	PX	PX	PX	PX	P
Sport, Columbia R., Priest Rapids Dam upstream to Chief Joseph Dam (summer run)	MSF-WDFW-42	PFO	PFO	PFO	PFO	P
Sport, Wenatchee R., mouth to Leavenworth (summer run)	MSF-WDFW-43	PFO	PFO	PX	PX	P
Sport, Entiat R., mouth to Entiat NFH (summer run)	MSF-WDFW-44	PFO	PFO	PX	X	
Sport, Chelan R., mouth to powerhouse (summer run)	MSF-WDFW-45	PFO	PFO	PFO	PFO	P
Sport, Grays Harbor	MSF-WDFW-46	PX	PX	PFO	PFO	P
Sport, Grays Harbor tributaries (Humptulips only in 2019)	MSF-WDFW-47	PFO	PFO	PFO	X	
Sport, Green R. (fall run)	MSF-WDFW-48	PX	PX	X		
Test Fishery, Columbia R., Cathlamet (fall run)	MSF-WDFW-49		XF	PFO	PFO	P
Test Fishery, Columbia R., mouth to Bonneville Dam (spring run)	MSF-WDFW-50	XFO	XF	PFO	PFO	P
Test Fishery, Columbia R., Cathlamet (spring run)	MSF-WDFW-51	XFO	XF	PX	X	
Sport, Icicle Creek (May-June)	MSF-WDFW-54			XFO	PFO	P
Sport, Okanogan/Similkameen R. (Jul-Sept)	MSF-WDFW-55				PX	P
Sport, Columbia River Tributaries, mouth to McNary Dam (Spring)	MSF-WDFW-60	XFO	XFO	XFO	XFO	P
Sport, Columbia River Tributaries, mouth to McNary Dam (Fall)	MSF-WDFW-61	XFO	XFO	XFO	XFO	P
Sport, Oregon coast (fall run)	MSF-ODFW-02	PFR	PFO	PX	PX	P
Sport, Willamette R. above Willamette Falls (spring run) ⁴	MSF-ODFW-04	PFO	PFO	PFO	PFO	P
Sport, Sandy R (spring run)	MSF-ODFW-07	PFO	PFO	PFO	PFO	P
Commercial, Oregon coast (spring run)	MSF-ODFW-09	PFO	PFR	X		

~continued~

Table 3-1. (Page 4 of 4) Status of mark-selective fishery (MSF) proposals, fishery implementation, and post-fishery reporting for catch years 2017 through 2021.

Mark-Selective Fishery		Catch Year				
Fishery Name	SFEC Proposal ID	2017	2018	2019	2020	2021
<i>Chinook Salmon (continued)</i>						
Sport, Oregon coast (spring run)	MSF-ODFW-11	PX	PX	X		
Sport, Willamette R. above Willamette Falls (spring run) ⁴	MSF-ODFW-04	PFO	PFO	PFO	PFO	P
Sport, Sandy R (spring run)	MSF-ODFW-07	PFO	PFO	PFO	PFO	P
Commercial, Oregon coast (spring run)	MSF-ODFW-09	PFO	PFR	X		
Sport, Oregon coast (spring run)	MSF-ODFW-11	PX	PX	X		
Sport, Willamette R. below Willamette Falls (including Multnomah Ch.) and tributaries ⁴	MSF-ODFW-13	PFR	PFR	PFO	PFO	P
Sport, Lower Columbia R (spring run)	MSF-ODFW/WDFW-01	PFO	PFO	PFO	PFO	P
Sport, Columbia R (summer run)	MSF-ODFW/WDFW-02	PFO	PFO	PFO	PFO	P
Commercial, Lower Columbia R (spring run)	MSF-ODFW/WDFW-03	PX	PX	PX	PX	P
Sport, Columbia R (fall run)	MSF-ODFW/WDFW-05	PFO	PX	PX	PX	P
Commercial, Lower Columbia R (Buoy 10 to Beacon Rock) seine	MSF-ODFW/WDFW-07	PFR	PX	PX	PX	P
Sport, Snake R (fall run)	MSF-IDFG-04	XFO	XFO	PFO	X	P
Treaty Net, Nooksack R. (Spring Run)	MSF-LUMM-01	XFO	PFO	X		P

¹ MSF-ODFW-10 and MSF-ODFW-12 replaced proposal MSF-ODFW-03 in 2015.

² MSF-WDFW-35; combines proposals MSF-WDFW-02 and -11 as of 2012.

³ MSF-WDFW-36; replaces MSF-WDFW-16 as of 2012; old proposal 08 [Area 8-1/8-2 Winter MSF] included in 16 in 2007.

⁴ Proposals MSF-ODFW-13 and MSF-ODFW-04 replaced MSF-ODFW-01 in 2015 because of differing regulations above and below Willamette Falls.

⁵ New proposal, split from MSF-WDFW-24 because of location and regulations.

3.1.4 Expected Encounters of CWT Indicator Stocks in MSFs

In 2021, ongoing MSFs for both Coho and Chinook are expected to continue to occur in BC, WA, and OR. Chinook MSFs have not been proposed for any southeast AK fisheries. PSC fishery regimes are dependent on CWT analyses of Chinook and Coho indicator stocks (PSC-CWTW 2008). Should the number and geographic distribution of MSFs continue to increase at a rate similar to what occurred in the past decade, so will encounters of indicator stocks in those fisheries.

Most, if not all, Coho Salmon indicator stocks from Southern BC, WA, OR, and the Columbia River are expected to be caught in proposed MSFs. For example, Figure 3-1 presents historical information on recoveries of marked Coho Salmon indicator stocks that have been encountered in MSFs for return years 2009–2018. Mark-selective fisheries in terminal areas largely exploit local stocks. However, tagged fish from all regions are encountered in MSFs in the Strait of Juan de Fuca, southern BC, and WA and OR coastal areas.

In recent years, Chinook Salmon MSFs have occurred in the marine waters of southeast AK, BC, PS, WA, and OR coastal areas, and freshwater areas in Puget Sound and in the Columbia River; thus, a large number of indicator stocks are likely to be encountered in fisheries proposed for 2021. Figure 3-2 presents a summary of CWT recoveries of marked Chinook Salmon indicator stocks in MSFs for return years 2009–2018. Chinook stocks from Puget Sound and the Columbia River had the highest rate of CWT recoveries in MSFs, on average.

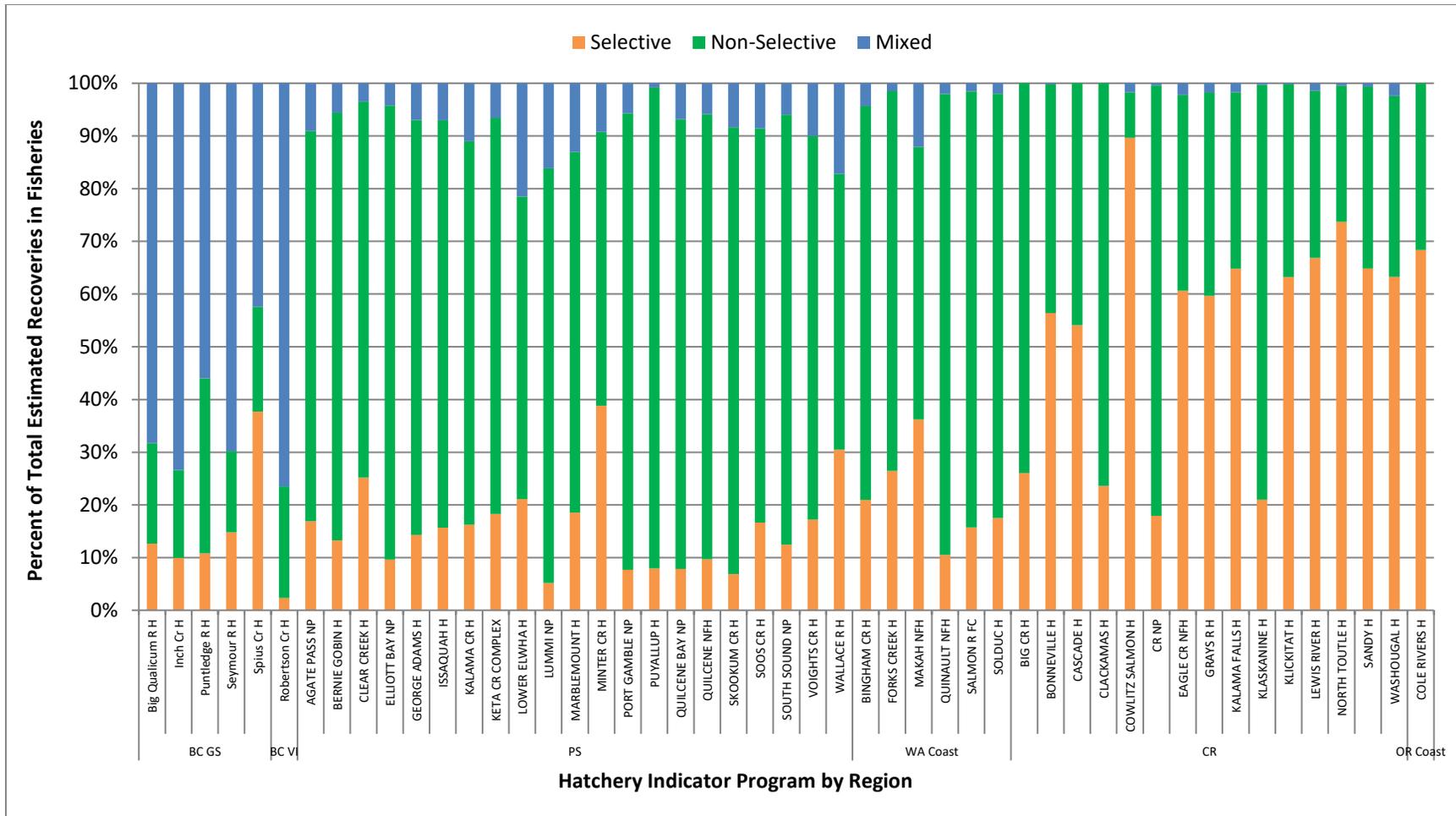


Figure 3-1. Proportion of total estimated CWT recoveries in fisheries from the marked component of a Coho Salmon indicator group by release hatchery that occurred in mark-selective fisheries (MSF), mixed-bag regulation fisheries (Mixed), and non-selective fisheries (NSF), return years 2009–2018.

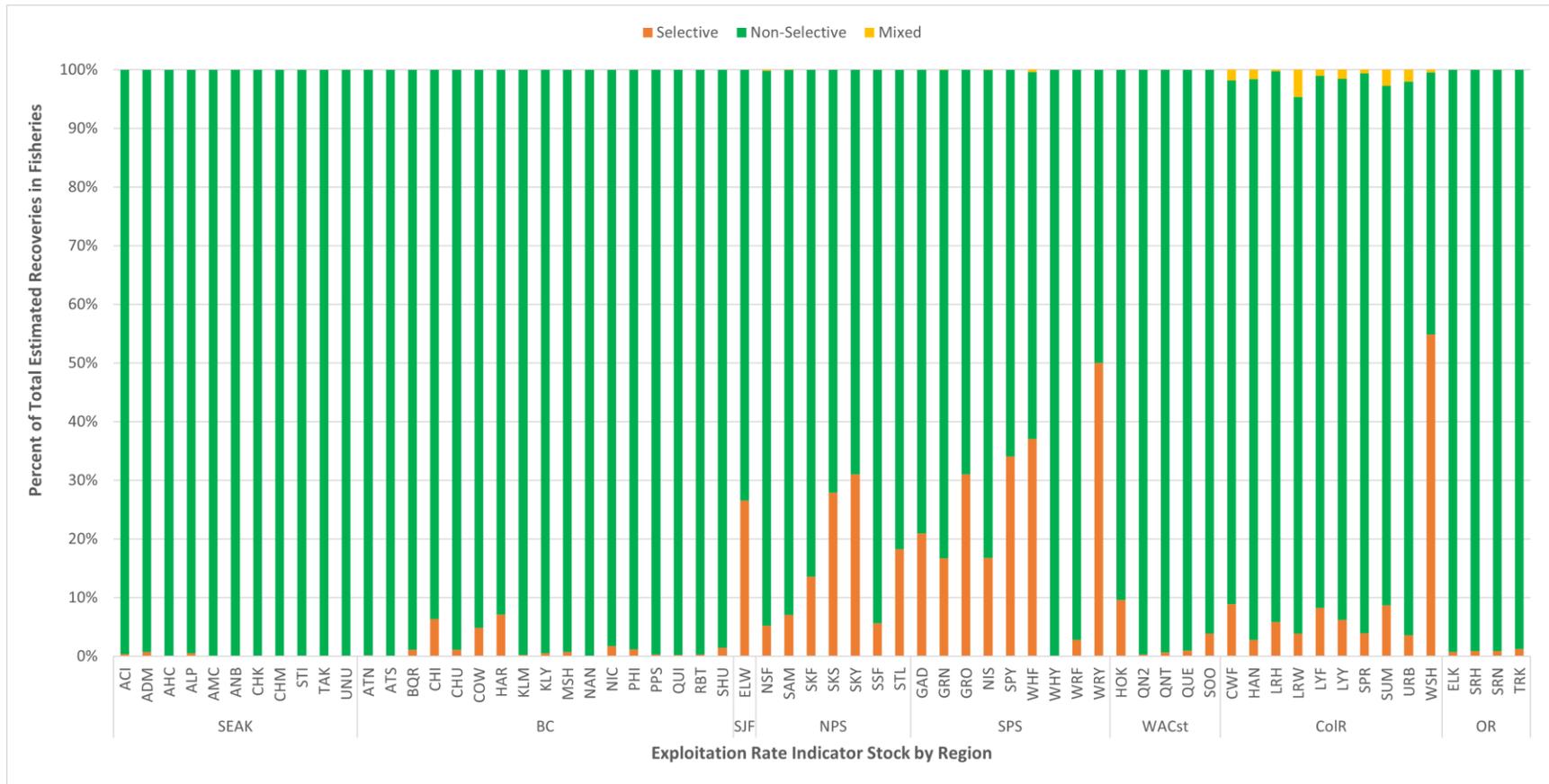


Figure 3-2. Proportion of total estimated CWT recoveries from the marked component of a Chinook Salmon indicator group that occurred in mark-selective fisheries (MSF), mixed-bag regulation fisheries (Mixed), and non-selective fisheries (NSF) for return years 2009–2018. See Appendix C for indicator stock names.

3.2 Evaluation of MSF Proposals

The SFEC-AWG evaluates MSF proposals against standardized criteria in the following eight categories:

(refer to Appendix E Table E-1)

- 1) Fishery regulation
- 2) CWT sampling method
- 3) CWT detection method
- 4) CWT composition estimation method
- 5) Alignment of time/area strata boundaries of regulations and catch estimation and CWT sampling programs
- 6) Catch estimation by size/mark/retention status
- 7) Indicator stocks expected to be impacted by the fishery
- 8) DIT release groups expected to be impacted by the fishery

Alternative characteristics for each category are listed by codes and described in Appendix E Table E-1. For example, Table E-1 lists three possible characteristics for the first category (Fishery Regulation) including “MSF”, “Mark-mixed bag”, and “Mark and size-mixed bag”. Second, each MSF proposal is assigned a Green-Yellow-Red level of concern for each characteristic (green — no concern, yellow — moderate concern, red — major concern).

Appendix E Table E-2 and Table E-3 present the results of the evaluation for Coho and Chinook salmon, respectively. Each colored cell contains codes referencing the descriptions of characteristics provided in Table E-1. For instance, if a particular proposal involved a Mark-mixed bag fishery, then for the category Fishery Regulation, the numeric index for that characteristic (2) was entered in the column labeled Fishery Regulation. Further, since Mark-mixed bag fisheries generally pose challenges for estimation of fishery impacts, the cell would be colored yellow or red, the chosen color depending on other qualifiers such as the magnitude of the fishery. Table E-2 and Table E-3 also include narrative columns to provide additional information regarding the nature of concerns identified by SFEC.

4 ISSUES, CONCERNS, AND RECOMMENDATIONS

4.1 Updated Mass Marking and Mark-Selective Fishery Plans for 2020 and Early Notice of Future Activities were Received

In the spring of each year the Pacific Salmon Commission requests information that complements the annual submission of MM and MSF proposals and are:

1. Finalized fishing plans for MSFs proposed the previous November;
2. A one-year prior notice of new or substantially changed MM or MSF project proposals and; and,
3. Early notice of agency's plans to consider conducting MSFs over the next 3–5 years.

These information requests are stated as part of the February 2004 PSC Understanding Concerning Mass Marking and Selective Fisheries. Because requested information is received by the PSC during the summer, after the SFEC annual report is usually submitted, we include a summary of the information for 2020 fisheries and planned future activities here.

Responses to request for updates on planned activities were for MSFs. Changes to proposed 2020 MSFs are summarized in Table 4-1. Canada (DFO) reported minor changes to sport fisheries, noting bag limits for Southern Coastal Coho MSFs and specifications on timing for Chinook MSFs. Changes to WDFW proposals included five proposed 2020 MSF that would not occur, and minor proposal changes such as time, area, and bag limit changes. ODFW added a Coho MSF and noted changes to anticipated mark rates in their MSFs. Alaska does not plan to conduct MSFs in 2021, or anytime in the near future. Canada (DFO) submitted plans for four potential new MSFs in 2021 in Southern BC, in Areas 12, 13, 15, and 20. In addition, there were plans to increase mass marking of WCVI Chinook stocks from 3,110,000 in 2020 to 3,610,000 in 2021. There were no other changes to proposed 2020 MM plans or advance notice of new MM programs.

Table 4-1. A summary of major changes to proposed 2020 MSFs.

Species	Agency	Proposal	Change
Coho	CDFO	MSF-FOC-02b	Sport, Mixed-bag, BC Areas 11-29 will not occur
Coho	CDFO	MSF-FOC-12	Fisheries targeting Chum and Sockeye, intercepting Coho will not occur
Coho	WDFW	MSF-WDFW-52	Test fishery below Bonneville Dam will not occur
Chinook	CDFO	No number	Sport MSF, WCVI will not occur.
Chinook	ODFW/ WDFW	MSF- ODFW/WDFW 03	Commercial tanglenet, below Bonneville Dam will not occur (spring run Chinook)
Chinook	WDFW	MSF WDFW-19	Sport, Ocean Areas 1-4 will not occur
Chinook	WDFW	MSF-WDFW-33	Sport, Hoh River will not occur
Chinook	WDFW	MSF-WDFW-47	Sport, Humptulips River (Grays Harbor Tributary) reported as occurring. No proposal in fall of 2020.
Chinook	WDFW	MSF WDFW-50	Commercial tanglenet below Bonneville Dam will not occur (spring run Chinook)

4.2 Continued Submission of Mark-Selective Fishery Proposals is Recommended

Proposals are due by November 1 of the year before the MSFs being proposed; e.g., November 1, 2021 for fisheries proposed to occur in 2022. Although final decisions on fisheries are generally made by agencies after this time period (e.g., January–April of 2022 for 2022 fisheries), agencies should continue to submit MSF proposals for any fisheries that are planned and should include information or options known at that point in time. SFEC believes that most MSFs now being implemented are represented by proposals. Timely submission of proposals allows for timely identification of issues which can be conveyed to the PSC and to agencies while the annual fishery planning activities are occurring.

4.3 Mark-Selective Fishery Reports are Needed

The PSC has requested that management agencies provide SFEC with two tables on MSFs (see [PSC website for current table templates](#)). The first table should include information on sampling methods used to recover CWTs in all fisheries and escapement locations, not just in the MSFs. This table has not typically been received. Information on sampling procedures is needed because estimating impacts for the unmarked group encountered in MSFs depends on the method of sampling (electronic or visual) and the CWT processing protocol (i.e., are all tagged fish sampled also processed for CWT extraction in the lab). The second table includes post-fishery information on MSFs that have occurred, including where and when they occurred, fishery regulations, what sampling occurred, final estimates of both retained and released catch by mark status and size class, and assumed release mortality rates by size class. The information in these tables should be completed prior to the PSC post-season meeting of the year following the fishery year. For instance, reports on fisheries occurring in 2020–2021 should be available by the post-season meeting in 2022. This information has only been received for some fisheries, such as Puget Sound, Oregon Coastal, Lower Columbia River, and SE Alaska.

Total fish retained and total mortalities by stock, fishery, and age are needed for estimating stock-specific impacts of MSFs. These data are also required by the Pacific Salmon Treaty’s MOU (see [SFEC Feb 2004 Policy Statement and ToR](#)) and have been requested each year for MSFs. Currently, annual post-season MSF data are only available directly from agencies and final estimates for past years are only being published for a few MSFs (e.g., Chinook MSFs in WA Marine Areas 1–13 and Coho MSFs in Marine Areas 1–4).

SFEC representatives have been stepping up efforts in recent years to coordinate with key staff within the agencies in order to meet these reporting requirements. Although the information may be available in larger agency reports, the SFEC needs agencies to submit the post-season MSF information using the report templates provided (see [PSC website for current table templates](#)), which will enable more efficient dissemination of post-season data to PSC’s technical committees such as the CTC and CoTC. It is recommended that agencies prioritize this task and work with their SFEC representatives to develop these reports annually and provide them to the PSC in the required time frame. Failure to report this information to SFEC in the proper format and time frame results in incomplete and delayed cohort analyses and other stock assessments. There is also a need to make information on fish retained and mortalities by stock, fishery, and age in MSFs more readily available to analysts. A prototype online database with impact estimates and summarized CWT data for Chinook MSFs conducted in WDFW Marine Areas

1–13 was developed jointly by WDFW and the NWIFC. This database is no longer being maintained. To facilitate compilation and accessibility of post-season MSF data, SFEC recommends the PSC develop and maintain a similar database for both Coho and Chinook MSFs coastwide.

4.4 CWT Indicator Programs Need Further Review by Technical Committees

A DIT group is needed for each critical PSC indicator stock in order to evaluate the impacts of MSFs on natural stocks. Comparison of the escapement of the unmarked and marked components of a DIT group provides a measure of the total impact of MSFs. Mark-selective fisheries have tripled in number since 2007, with new areas and stocks being fished under mark-selective regulations. It is recommended that agencies review their indicator stock programs in light of the expansion of MSFs and any other new MSFs likely to be proposed in future years and evaluate the need for including additional DIT groups.

4.4.1 Coho Salmon Double-Index-Tag Groups

At present, the utility of the DIT program and the CWT program in general for Coho Salmon is reduced due to low tagging rates, insufficient Management Unit (MU) CWT representation, low recovery rates, and incomplete coastwide coverage of electronic sampling programs (PSC-CWTW 2008; CoTC 2013). Several Coho Salmon MUs do not have DIT groups to permit independent estimation of impacts of MSFs on unmarked fish (Appendix B). Canada currently has no DIT programs for the four MUs in the treaty and Oregon has not released a Coho DIT group since 2013. Indicator stocks that have been encountered in recent mark-selective fisheries are included in Figure 3-1. Some of these DIT programs are no longer implemented. Coho DIT programs have recently been analyzed and reviewed by SFEC and a report was finalized in 2021 (SFEC 2021). The next step is to work with CoTC on formalizing recommendations for the DIT program.

4.4.2 Chinook Salmon Double-Index-Tag Groups

Chinook Salmon indicator stocks that have been encountered in mark-selective fisheries are illustrated in Figure 3-2. Many of the stocks encountered are currently double-index tagged (Appendix C). However, with the expansion of MSFs, additional DIT CTC indicator stock representation may be needed. A preliminary analysis of data from Chinook DIT programs was initiated as part of the work of the Calendar Year Exploitation Workgroup (CYER). The purpose of the analysis was twofold:

1. If return data on fish tagged as a cohort could be analyzed on a calendar year basis; and,
2. To determine if differences in the return proportions of the marked and unmarked components of Chinook DIT pairs was detectable.

Analyzing calendar year returns of Chinook DIT pairs is consistent with evaluation of PSC fisheries in the 2019 Agreement. Rates of return of the unmarked component of DIT pairs were significantly different from the marked component in Puget Sound and the Columbia River where Chinook returning to hatcheries were subject to terminal MSFs. An important characteristic of the Chinook DIT pairs is consistent release sizes across brood years, which

facilitates analyzing Chinook returns on a calendar year basis. This work is still under review by the CYER workgroup and CTC.

4.5 All Mixed-Stock Chinook Salmon Fisheries Need to be Electronically Sampled

Electronic tag detection (ETD) is necessary for detecting unmarked and tagged fish in fisheries and escapement. In order to carry out exploitation rate analysis for unmarked stocks, aside from estimation of unmarked mortalities in MSFs, it is necessary to have estimates of harvest of unmarked and tagged DIT groups in NSFs and mixed-bag fisheries. This requires ETD be used in NSFs, where unmarked and tagged fish are present, in particular if the stock has been subjected to MSFs in other areas or periods. Until 2008, MSFs for Chinook Salmon were largely implemented in Puget Sound where ETD is used for all fisheries. Electronic tag detection was not used consistently by CDFO in northern fisheries until 2007 and is not being used consistently currently in terminal fisheries or First Nations fisheries. In 2020, Alaska discontinued sampling unmarked fish from all fisheries for CWTs. As Puget Sound DIT groups were historically unlikely to have been subject to preceding MSFs (either the same year or at younger ages), indirect methods (other than direct sampling with ETD) could be used for achieving unbiased estimates of unmarked encounters from marked landings. However, with widespread MSFs these indirect methods are no longer as reliable. Sampling methods proposed for 2021 fisheries are listed in Table 2-2 and Table 2-3. The SFEC recommends that agencies review their sampling methods with respect to the current expansion of MSFs into coastal fisheries. In the Columbia River it is specifically recommended that ETD be implemented for non-mark selective commercial fisheries to recover DIT release groups for Chinook and coho exploitation rate indicator stocks.

4.6 Agencies Proposing Complex, Mixed-Bag Regulations in MSFs Need to Provide New Analytical Tools to Assess These Fisheries

Regulations to implement MSFs for recreational fisheries have become more complex. We continue to be concerned about monitoring, sampling, and estimation methods keeping pace with increases in regulation complexity. Mark-selective fisheries continue to be proposed for much finer time/area strata than are being used for CWT expansions which will result in an inability to separate impacts in MSFs and NSFs. Different types of mixed-bag regulations also continue to be proposed (see fishery regulation details in Appendix E). These mixed-bag regulations present a problem in estimating mortalities of unmarked DIT groups and associated wild stocks. The agencies proposing these mixed-bag regulations should assist in developing the analytical tools to measure the impacts of these fisheries.

4.7 COVID-19 and Fire Impacts

Many of us in the Pacific Northwest have continued to work from home and follow social distancing guidelines while in the field. These guidelines are likely to continue to impact the implementation of tagging, marking, and sampling programs. For example, some agencies have reduced the number of staff in tagging trailers, resulting in decreased output and fewer fish released tagged or marked.

In addition to COVID-19 impacts, our region experienced a continued drought and a number of extreme fires in 2020. One of the facilities impacted included the near complete loss of the Rock Creek Fish Hatchery (ODFW) near Roseburg which burned down in the Archie Creek Fire in September of 2020. ODFW [plans](#) to rebuild this facility. Also in Oregon, McKenzie and Leaburg Hatcheries have lost major water sources. Fish are, and may continue to be, raised at other hatcheries. Most of the facilities affected by fires in 2020 will experience brood failures.

Information on COVID impacts to the CTC indicator stocks may be found in a memo (Subject: COVID-19 Impacts on Chapter 3 of the Pacific Salmon Treaty) dated 30 September 2020 to the Chinook Interface Group and Pacific Salmon Commission from the CTC.

The following list contains some of the actions taken in response to COVID-19 in 2020:

ADFG

- AK crews were on-site when COVID hit, safety protocols were put in place, and no infections were noted.
- Switching crews out was very rare and no visitors were allowed on-site.
- A NOAA research site was unable to tag their fish, but they obtained genetic information on the fish.

CDFO

- All marking and tagging was shut down in the spring of 2020; NMT was not allowed to cross the border and train staff on the use of the new Autofish trailers.
- Coho released in 2020 were marked in 2019.
- Most indicator stock tagging (sub-yearlings) was not implemented in the spring. Hoping to mark and tag yearlings in the fall and winter, but much uncertainty remains.
- Tagging and marking under COVID is much more expensive due to increased travel costs and disinfection costs.

WDFW

- Much of the tagging is done with the use of manual trailers. COVID protocols included no more than 4 people in manual trailers (normally 12), double shifts, and tagging through the weekends.
- Some groups of fish were released partially done.
- Hanford URB wild and Yakima URB were not completed.
- A new Autofish trailer arrived in 2020; another one expected in 2021.
- WDFW used RV rentals as a cost-effective means for safe travel.

Western Washington Tribes

- Tribes considered it essential work to mark and tag fish
- Approximately 95% of the designated Chinook and Coho were marked and tagged.
- Clippers were limited to one person at the back of the trailer.
- Trailer operators spent more time commuting to avoid staying in hotels.
- A new Autofish trailer is arriving in 2021.

USFWS

- In 2020 the marking program was shut down for 5 weeks to develop safety protocols.
- Greater dependency on Autofish trailers to complete marking and tagging due to staffing shortages and adherence to safety protocol.
- Marking efficiency using in the trailers was reduced to allow for social distancing (3–4 people instead of 10–12 people in manual trailers; 1 person in back marking instead of 2 people in the Autofish trailers).
- Experienced a shortage of trailer operators and markers. Also had to run more double shifts to accommodate social distancing.
- Did not mark or tag any Coho or Chinook in the spring of 2020 at Makah NFH because the Reservation was closed due to COVID. Those fish were released without being marked or tagged.
- In 2020, 100% of the coded-wire tagging was completed, but only 50% of mass marking of the URB fall Chinook at Little White Salmon and Willard NFHs was completed. At Spring Creek NFH, 67% of the mass marking goal and 75% of the tagging goal of the Tule fall Chinook program was achieved. Spring Creek NFH marking was also halted before completion of marking due to the pandemic.

Columbia River Tribes

- Hanford Chinook were not tagged this year. Yakama tagging is unchanged from last year.

ODFW

- The numbers of tagged and marked fish to be released in 2021 are expected to be about the same as previous year.
- A new Autofish trailer arrived in 2020 - which helped.

5 REFERENCES

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- [WDFW](#) (Washington Department of Fish and Wildlife). 2021. Hatchery improvement master plan – southern resident killer whale prey enhancement. Washington Department of Fish and Wildlife. Olympia, Washington. Available from: report (January 2021)

6 APPENDICES

Appendix A. Status of Mass Marking Proposals Received in 2020 for Mass Marking to Occur in 2021.

Description of Proposal and Agency	New or Continuation Proposal	SFEC Proposal Number
<i>Coho Salmon</i>		
Southern BC Coho – CDFO	Continuation	MM-FOC-01-2021
Puget Sound Coho – WDFW/Tribal	Continuation	MM-WDFW-01-2021
Washington Coast Coho – WDFW/Tribal	Continuation	MM-WDFW-04-2021
WA Columbia River Coho – WDFW/Tribal	Continuation	MM-WDFW-05-2021
Columbia River Coho – USFWS	Continuation	MM-USFWS-04-2021
Puget Sound and WA Coast Coho – USFWS	Continuation	MM-USFWS-18-2021
Columbia River Coho – ODFW	Continuation	MM-ODFW-04-2021
Oregon Coast Coho – ODFW	Continuation	MM-ODFW-05-2021
<i>Chinook Salmon</i>		
S. Southeast Summer Chinook – ADFG	NEW	MM-ADFG-01-2021
WCVI Chinook – CDFO	Continuation	MM-FOC-02-2021
Columbia River Chinook – USFWS	Continuation	MM-USFWS-17-2021
WA Coast Fall Chinook – USFWS	Continuation	MM-USFWS-19-2021
Willamette River Spring Chinook – ODFW	Continuation	MM-ODFW-01-2021
OR North Coast Spring Chinook – ODFW	Continuation	MM-ODFW-02-2021
OR South Coast Spring Chinook – ODFW	Continuation	MM-ODFW-03-2021
Columbia River Fall Chinook – ODFW	Continuation	MM-ODFW-06-2021
OR Coast Fall Chinook – ODFW	Continuation	MM-ODFW-07-2021
Mid-Columbia R Spring Chinook – ODFW	Continuation	MM-ODFW-08-2021
Snake River Fall Chinook – ODFW	Continuation	MM-ODFW-09-2021
Snake River Spring Chinook – ODFW	Continuation	MM-ODFW-10-2021
Puget Sound Chinook – WDFW/Tribal	Continuation	MM-WDFW-02-2021
Columbia R. Chinook – WDFW/CRITFC	Continuation	MM-WDFW-03-2021
Washington Coastal Chinook – WDFW/Tribal	Continuation	MM-WDFW-06-2021

Appendix B. Historical and Current PSC Coho Salmon CWT Exploitation Rate Indicator Stocks and DIT Groups.

Region	Stock Representation	Indicator Stocks	DIT (BY)
BC North Coast	North Coast Wild	Zolzap	
	Skeena	Toboggan	
Interior Fraser	Thompson River	Coldwater (Spius Hatchery) Eagle River	(1997–2002)
Georgia Basin	East Coast Vancouver Island	Big Qualicum Goldstream River	(1996–2002) (1996–2002)
	Lower Fraser	Chilliwack River (not indicator)	(1996–2002)
		Inch Creek	(1996–2013)
	North Vancouver Island	Quinsam River	(1996–2017)
	North Vancouver Island Wild	Keogh	
West Coast Van Island	West Coast Vancouver Island	Robertson Creek	(1996–2002)
Puget Sound	North Fork Nooksack R	Kendall Creek H Skookum Creek H. Lummi Bay Ponds	(1996–2007)
	Skagit	Skagit (Marblemount H.) Baker River Wild	(1994–current)
	Stillaguamish/Snohomish	Skykomish (Wallace River) Tulalip Bay (Bernie Gobin)	(1996–current)
	Mid Puget Sound	Green River (Soos Creek H.)	(1996–current)
	South Puget Sound	Puyallup (Voights Creek H.) Peale Pass (Squaxin Net Pens) Nisqually (Kalama Creek H.)	(1997–current)
	Hood Canal Wild	Big Beef Creek	
	North Hood Canal	Quilcene NFH Quilcene Net Pens Port Gamble Net Pens	(1996–current) (1996–2001) (1996–2003)
	South Hood Canal	George Adams H.	(1997–current)
	Dungeness	Dungeness H.	
	Strait of Juan de Fuca	Lower Elwha H.	(1995–current)
Washington Coast	North Coast	Makah NFH Solduc (fall run)	(1996–2010) (1996–current)
	North Central Coast	Queets Wild Queets (Salmon R. Fish Culture)	(1995–current)
	Quinalt	Quinalt NFH	(1996–2012)
	Grays Harbor	Chehalis R. Wild Satsop Springs Ponds Satsop (Bingham Cr. H, late) Satsop (Bingham Cr. H., early)	(1997–current)
	Willapa Bay	Forks Creek H. (late fall run) Forks Creek H. Nemah River. H.	(1997–current)
Columbia Basin	Lower Columbia River	Lewis River (Type N & Type S) Eagle Creek Sandy River Bonneville/Tanner Cr. Youngs Bay Net Pens Willard NFH	(1994/98–current) (1995–current) (1995–2008) (1996–2011) (1997–2001) (1996–2002)
Oregon Coast	Oregon South Coast	Rogue River (Cole Rivers) Rock Creek H.	(1995–2005) (1995–1999)
	Oregon North Coast	Nehalem H.	(1995–2000)

Appendix C. Historical and Current PSC Chinook Salmon CWT Exploitation Rate Indicator Stocks and DIT Groups.¹

Area	Natural/Unmarked Stock Representation	Exploitation Rate Indicator Stocks (CTC code)	Run Type	DIT (BY)
S.E. Alaska	Southeast Alaska	Taku (TAK) Stikine (STI) AK Hatcheries (AKS) Chilkat (CHK) Unuk (UNU)	Spring Spring Spring Spring Spring	
British Columbia	North/Central BC	Kitsumkalum (KLM) Atnarko (ATN)	Summer Summer	
	West Coast Vancouver Is.	Robertson Creek (RBT)	Fall	
	Upper Georgia Strait	Quinsam (QUI) Phillips River (PHI)	Fall Fall	
	Lower Georgia Strait	Cowichan (COW) Nanaimo (NAN) Big Qualicum (BQR) Puntledge (PPS)	Fall Fall Fall Summer	(1998)
	Fraser River Early	Middle Shuswap (MSH) Lower Shuswap (SHU) Nicola (NIC) Dome (DOM)	Summer Summer Spring Spring	(1998–2002)
	Fraser River Late	Chehalis (Harrison Stock) ² (HAR) Chilliwack (Harrison Stock) (CHI)	Fall Fall	(1998–2011)
Puget Sound	North Puget Sound	Nooksack Spring Fingerling (NSF)	Spring	(1998–2010)
		Nooksack Spring Yearling (NKS)	Spring	
		Samish Fall Fingerling (SAM)	Summer/Fall	(1999–current)
		Skagit Spring Fingerling (SKF)	Spring	(1998–current)
	Skagit Spring Yearling (SKS)	Spring	(1998–2010, 2018–current)	
	Skagit Summer Fingerling (SSF)	Summer		
Skykomish Summer Fingerlings ³ (SKY)	Summer	(2000–current)		
Stillaguamish Fall Fingerling (STL)	Fall			
Central Puget Sound	Green River Fall Fingerling (GRN)	Fall	(1997–current)	
Hood Canal	George Adams Fall Fingerling (GAD)	Fall	(1998–current)	
South Puget Sound	South Puget Sound Fall Fingerling (SPS)	South Puget Sound Fall Fingerling (SPS)	Fall	(1999–current)
		South Puget Sound Fall Yearling (SPY)	Fall	
		White River Spring Yearling ⁴ (WRY)	Spring	
Nisqually Fall Fingerling (NIS)	Fall	(1998–current)		
Juan de Fuca	Juan de Fuca	Hoko Fall Fingerling (HOK)	Fall	
Washington Coast	North Washington Coast	Tsoo-Yess Fall Fingerling (SOO)	Fall	
		Queets Fall Fingerling (QUE)	Fall	
		Quinault Lake Fall Fingerling ²	Fall	(2004–current)
Willapa Bay	Forks Creek Fall Fingerlings ²	Forks Creek Fall Fingerlings ²	Fall	(2007–2014)
		Naselle River ²	Fall	(2013–2015)
		Nemah River ²	Fall	(2016–current)

~Continued~

¹ New Chinook Salmon indicators were recently identified, but have not been published and are not included in this list.

² These stocks are CWT-tagged, but there is no quantitative CWT escapement data, useful for distribution only.

³ DIT group not currently a CTC indicator stock.

⁴ No longer adipose-fin clipped.

**Appendix C. (Page 2 of 2) Current PSC Chinook Salmon CWT
Exploitation Rate Indicator Stocks and DIT Groups.**

Area	Natural/Unmarked Stock Representation	Exploitation Rate Indicator Stocks (CTC code)	Run Type	DIT (BY)
Columbia Basin	Falls	Cowlitz Tule (CWF)	Fall Tule	(2004–current)
		Spring Creek Tule (SPR)	Fall Tule	
		Little White Salmon ²	Fall Bright	(2005–current)
		Lewis River Wild (LRW)	Fall Bright	
Lower River Hatchery (LRH)		Fall Tule	(2006–2013)	
Mid-Columbia Brights (MCB)		Fall Bright		
Lyons Ferry Fingerling (LYF)		Fall Bright	(2004–2017)	
Lyons Ferry Yearling (LYY)		Fall Bright		
Hanford Wild (HAN)		Fall Bright	(2009–current)	
Priest Rapids H (URB)		Fall Bright		
	Summers	Columbia Summers (SUM)	Summer	
	Springs	Willamette Spring (WSH)	Spring	(1997–2006)
		Lewis River Spring ²	Spring	(1998–current)
Oregon Coast	North Oregon Coast	Salmon River (SRH)	Fall	
	Mid-Oregon Coast	Elk River Hatchery (ELK)	Fall	

Appendix D. Status of Annual Pre-season Proposals for Mark-Selective Fisheries.

Fishery, Location, Target Species by Agency¹	Proposal ID²	Most Recent Proposal³	Years with MSF since 2003⁴
Alaska Department of Fish and Game			
Commercial, SE Alaska, Coho-directed	MSF-ADFG-01	2019	2016–2017
Commercial, SE Alaska, Chinook-directed	MSF-ADFG-02	2019	None
Sport, SE Alaska, Chinook-directed	MSF-ADFG-03	2019	None
Fisheries and Oceans Canada			
Sport, Southern BC, Coho	MSF-FOC-02a	2021	2003–2020
Sport, Southern BC, Coho, Mixed Bag	MSF-FOC-02b	2021	2017–2020
FSC, Lower Fraser freshwater, Coho	MSF-FOC-03	2021	2006–2020
Commercial, Troll, Southern BC, Coho	MSF-FOC-05	2021	2005–2008, 2010–2017
Sport, Southern BC freshwater, Coho	MSF-FOC-06	2021	2003–2020
Sport, Strait of Juan de Fuca, Chinook	MSF-FOC-07	2021	2008–2020
Sport, WCVI, selected subareas, mainly inside, Chinook	MSF-FOC-08	2011	none
Sport, BC South Coast Freshwater, Coho	MSF-FOC-09	2021	2014–2020
Sport, Straits of Georgia, Johnstone, and Juan de Fuca, selected portions, Chinook	MSF-FOC-10	2021	2020
FSC, Southern BC, Coho	MSF-FOC-11	2021	2018–2020
Commercial, Gillnet, Fraser River Mouth, Coho	MSF-FOC-12	2021	2019–2020
Commercial, Seine, Fraser River Mouth, Coho	MSF-FOC-13	2021	2019
Washington Department of Fish and Wildlife			
Sport, Skykomish River, Chinook	MSF-WDFW-01	2021	2003–2014, 2016–2020
Sport, Yakima River, spring Chinook	MSF-WDFW-03	2021	2004, 2008–2018
Sport, Lower Snake River, fall Chinook	MSF-WDFW-05	2021	2008–2020
Sport, Washington coast areas 1–4 & Col R Buoy 10, Coho	MSF-WDFW-06	2021	2003–2020
Sport, Puget Sound, Coho	MSF-WDFW-07	2021	2003–2020

Fishery, Location, Target Species by Agency¹	Proposal ID²	Most Recent Proposal³	Years with MSF since 2003⁴
Sport, Carbon & Puyallup R, Chinook	MSF-WDFW-09	2021	2003–2020
Sport, Puget Sound Areas 9–13, summer Chinook	MSF-WDFW-11	2011	2007–2011
Sport, Upper Skagit R summer Chinook	MSF-WDFW-12	2021	2005–2020
Sport, Nooksack R, Chinook	MSF-WDFW-13	2021	2004–2020
Sport, Nisqually R, Chinook, Jul–Jan	MSF-WDFW-14	2021	2005–2019
Commercial troll, WA areas 1–4, Coho	MSF-WDFW-15	2021	2003–2015, 2018–2020
Sport, Nooksack River, Coho	MSF-WDFW-18	2021	2003–2011, 2016–2020
Sport, WA Coast Area 1–4, fall Chinook	MSF-WDFW-19	2021	2010–2015
Sport, Skokomish River, Chinook	MSF-WDFW-20	2021	2010–2015
Troll, WA areas 1–4, Chinook	MSF-WDFW-21	2010	none
Sport, Willapa Bay, tributaries, Coho	MSF-WDFW-22	2019	2003–2018
Sport, Grays Harbor, Marine Area 2.2, Coho	MSF-WDFW-23	2021	2007–2020
Sport, Grays Harbor, tributaries, Coho	MSF-WDFW-24a	2019	2003–2018
Sport, Grays Harbor, tributaries - Humptulips, Coho	MSF-WDFW-24b	2021	New
Commercial, Willapa Bay, Chinook	MSF-WDFW-25	2021	2010–2020
Sport, Willapa Bay, Marine Area 2.1, Chinook	MSF-WDFW-26	2021	2010–2020
Sport, Willapa Bay, tributaries, Chinook	MSF-WDFW-27	2021	2010–2020
Sport, Snake River, spring Chinook	MSF-WDFW-28	2021	2010–2020
Sport, Willapa Bay, Marine Area 2.1, Coho	MSF-WDFW-29	2020	2010–2017
Commercial, Grays Harbor, Marine Area 2C, Coho	MSF-WDFW-30	2011	2009–2010
Sport, Quillayute River system, (MSF regulation, Feb. - Aug.), Coho	MSF-WDFW-31a	2021	2009–2011, 2014–2020
Sport Solduc R., (Mixed-bag, Sept. - Nov.), Coho	MSF-WDFW-31b	2021	2003–2013, 2017–2020
Sport, Quillayute River system, spring/summer Chinook	MSF-WDFW-32	2021	2003–2020
Sport, Hoh River, spring Chinook	MSF-WDFW-33	2021	2008–2015, 2018–2019

Fishery, Location, Target Species by Agency¹	Proposal ID²	Most Recent Proposal³	Years with MSF since 2003⁴
Sport summer, WA areas 5–13, Chinook ⁵	MSF-WDFW-35	2021	2003–2020 ⁶
Sport winter, WA areas 5–13, Chinook ⁷	MSF-WDFW-36	2021	2005–2020 ⁸
Sport, Snohomish River, Chinook	MSF-WDFW-37	2019	2018–2019
Commercial, Grays Harbor areas 2A–2D, Chinook	MSF-WDFW-38	2021	2013–2020
Sport, Lower Grand Ronde, spring Chinook	MSF-WDFW-39	2021	none
Sport, Skagit River, Coho	MSF-WDFW-40	2021	2014–2016, 2018, 2020
Sport, Samish River, Coho	MSF-WDFW-41	2021	2009–2011, 2015–2020
Sport, Columbia River Priest Rapids Dam to Chief Joseph Dam, summer Chinook	MSF-WDFW-42	2021	2016–2020
Sport, Wenatchee River, mouth to Leavenworth, summer Chinook	MSF-WDFW-43	2021	2016–2018
Sport, Entiat River, mouth to ENFH, summer Chinook	MSF-WDFW-44	2019	2016–2018
Sport, Chelan River, mouth to powerhouse, summer Chinook	MSF-WDFW-45	2021	2016–2020
Sport, Grays Harbor, fall Chinook	MSF-WDFW-46	2021	2019–2020
Sport, Grays Harbor tributaries (Humptulips only in 2019 and 2020), fall Chinook	MSF-WDFW-47	2020	2017–2019
Sport, Green River, fall Chinook	MSF-WDFW-48	2019	none
Test, Columbia River, mouth to Bonneville Dam, fall Chinook	MSF-WDFW-49	2021	2018–2020
Test, Columbia River, mouth to Bonneville Dam, spring Chinook	MSF-WDFW-50	2021	2006–2020
Test, Columbia River, Cathlamet, spring Chinook	MSF-WDFW-51	2019	2013–2018
Test, Columbia River, mouth to Bonneville Dam, Coho	MSF-WDFW-52	2021	2018–2020
Sport, Dungeness River, Coho	MSF-WDFW-53	2021	2016–2020
Sport, Icicle Creek, spring Chinook	MSF-WDFW-54	2021	2019–2020
Sport, Okanogan/Similkameen R. summer Chinook	MSF-WDFW-55	2021	none

Fishery, Location, Target Species by Agency¹	Proposal ID²	Most Recent Proposal³	Years with MSF since 2003⁴
Sport, Wallace River (Skykomish/Snohomish Trib)	MSF-WDFW-56	2021	New
Sport, Nisqually R, Coho ¹²	MSF-WDFW-57	2021	2020
Sport, Clearwater R, Coho	MSF-WDFW-58	2021	New
Sport, Columbia R Tributaries - Mouth to McNary Dam, Coho ¹²	MSF-WDFW-59	2021	2017–2020
Sport, Columbia River Tributaries, mouth to McNary Dam (Spring), Chinook	MSF-WDFW-60	2021	2017–2020
Sport, Columbia River Tributaries, mouth to McNary Dam (Fall), Chinook	MSF-WDFW-61	2021	2017–2020
Oregon and Washington Departments of Fish and Wildlife (jointly for Columbia River)			
Sport, Lower Columbia River, spring Chinook	MSF-ODFW/WDFW-01	2021	2003–2020
Sport, Columbia River, summer Chinook	MSF-ODFW/WDFW-02	2021	2003–2020
Commercial, Lower Columbia River, spring Chinook (large & tangle net)	MSF-ODFW/WDFW-03	2021	2003–2016
Sport, Lower Columbia R, Coho (since 1999)	MSF-ODFW/WDFW-04	2021	2003–2020
Sport, Columbia River, fall Chinook	MSF-ODFW/WDFW-05	2021	2011–2017
Commercial, Lower Columbia River tanglenet (from Buoy 10 upstream to Beacon Rock), Coho ⁹	MSF-ODFW/WDFW-06	2021	2013–2016, 2019–2020
Commercial, Lower Columbia River seine (from Buoy 10 upstream to Beacon Rock), fall Chinook (Coho, secondarily) ¹⁰	MSF-ODFW/WDFW-07	2021	2014–2016
Commercial, Lower Columbia R seine (Buoy 10 to Beacon Rock), Coho	MSF-ODFW/WDFW-08	2021	2015–2016
Oregon Department of Fish and Wildlife			
Sport, Willamette River, Willamette spring Chinook ¹¹	MSF-ODFW-01	2014	2003–2014
Sport, Oregon Coast, fall Chinook	MSF-ODFW-02	2021	2008–2018
Sport, Oregon coast, Coho	MSF-ODFW-03	2014	2003–2014
Sport, upstream of Willamette Falls, spring Chinook	MSF-ODFW-04	2021	2003–2013, 2015–2020
Sport, downstream of Willamette Falls, Coho	MSF-ODFW-05	2021	2003–2020

Fishery, Location, Target Species by Agency¹	Proposal ID²	Most Recent Proposal³	Years with MSF since 2003⁴
Sport, Sandy River to mouth of Salmon River, Coho	MSF-ODFW-06	2021	2003–2020
Sport, Sandy R, spring Chinook	MSF-ODFW-07	2021	2003–2020
Commercial, Leadbetter Pt., WA to Cape Falcon, OR, Coho	MSF-ODFW-08	2021	2010–2020
Commercial, Leadbetter Pt., WA to Cape Falcon, OR, spring Chinook	MSF-ODFW-09	2018	2008–2018
Sport, Cape Falcon, OR to the OR/CA border, Coho	MSF-ODFW-10	2021	2003–2020
Sport, Leadbetter Pt., WA to Cape Falcon, OR, spring Chinook	MSF-ODFW-11	2018	2010–2015
Sport, From Leadbetter Pt., WA to Cape Falcon, OR, Coho	MSF-ODFW-12	2021	2003–2020
Sport, Willamette R. below Willamette Falls, Chinook	MSF-ODFW-13	2021	2016–2020
Sport, Umpqua River and Tributaries, Coho ¹²	MSF-ODFW-14	2021	2014–2020
Commercial, Cape Falcon, OR to the OR/CA border, Coho	MSF-ODFW-15	2021	New
Idaho Department of Fish and Game			
Sport, Snake River, on fall Chinook	MSF-IDFG-04	2021	2009–2019
Lummi Nation			
Treaty net, Nooksack R. (Spring Run), Chinook	MSF-LUMM-01	2021	2014–2018
Nisqually Indian Tribe			
Treaty net, Puget Sound Area 13	-	-	2015
Treaty net, Nisqually River	-	-	2014–2015

1. Fishery, location, target stock for each Agency: Name of fishery, its location, and which stock is targeted under mark-selective fishery regulations.
2. Proposal ID: The proposal number assigned by the PSC secretariat on receipt of pre-season MSF proposal from agency. This ID number remains the same for MSFs that are conducted with little change every year.
3. Most recent MSF proposal: Most recent catch year that a proposal was received from the agency for this particular MSF.
4. This indicates the years (after 2002, the year SFEC began requested proposals from agencies) that each MSF actually occurred and, therefore, a post-season report is required to be submitted to SFEC. Some Coho Salmon MSFs began as early as 1998.

5. Proposals **MSF-WDFW-02** (Areas 5 and 6) and **MSF-WDFW-11** (Areas 9, 10, 11 and 13) were both incorporated into **MSF-WDFW-35** in 2012. This proposal covers all summer sport MSFs for Puget Sound (Areas 5-13).
6. Actual implementation of summer MSFs for Chinook Salmon in Puget Sound was step-wise over time, with areas added over the years as follows: Areas 5 and 6 summer sport MSF began in 2003 (proposal ID: **MSF-WDFW-02**); Areas 9, 10, 11, and 13 began in summer 2007 (proposal ID: **MSF-WDFW-11**). Each of these MSFs has continued each summer thereafter.
7. Proposal **MSF-WDFW-36** beginning in 2012 covers all sport MSF areas of Puget Sound (Areas 5-13) during the winter time period (October–April); whereas, in previous years (2005–2011) of WDFW’s equivalent winter sport MSF proposal for Puget Sound (proposal ID number: **MSF-WDFW-16**), fewer marine areas were included – i.e., limited to areas 6, 7, 8-1, 8-2, 9 & 10.
8. Actual implementation of winter MSFs for Chinook Salmon in Puget Sound was step-wise over time, with areas added over the years as follows: Areas 8-1 and 8-2 winter sport MSF began in October 2005–April 2006 (proposal ID: **MSF-WDFW-08**); Area 10 began in December 2007–January 2008; Area 7 began in February 2008; and Area 9 began in January 16–April 15, 2008. Each of these MSFs has continued each winter thereafter.
9. Proposal **MSF-ODFW/WDFW-06** was originally submitted as **MSF-ODFW-05** in 2013 but the proposal ID was changed to continue the joint proposal numbering sequence
10. Proposal **MSF-ODFW/WDFW-07** was originally submitted as **MSF-ODFW-04** in 2013 but the proposal ID was changed to continue the joint proposal numbering sequence.
11. Proposal **MSF-ODFW-01** (spring Chinook Salmon) originally included the entire Willamette River, both below and above Willamette Falls. The proposal was split into two MSF proposals for 2015, **MSF-ODFW-04** upstream of Willamette Falls and **MSF-ODFW-13** downstream of Willamette Falls.
12. Proposal MSF-WDFW-57, MSF-WDFW-59, and MSF-ODFW-14 are new MSF proposals but not new fisheries.

Appendix E. Evaluation of Coho and Chinook Salmon MSF Fishery Proposals

Table E-1	List of characteristics that describe proposed MSFs, organized by Subject Category.....	41
Table E-2	Summary of SFEC’s evaluation of proposed Coho Salmon MSFs.....	45
Table E-3.	Summary of SFEC’s evaluation of proposed Chinook Salmon MSFs.....	54

Table E-1 List of characteristics that describe proposed MSFs, organized by Subject Category. This table is used as a reference for ratings in Table E-2 and Table E-3.

Subject Category	Characteristic	How the Characteristic Influences Evaluation of MSF Impacts	Concern for Evaluation of Fishery Impacts on Indicator Stocks
1. Fishery Regulation: mark-bag limit type	1) MSF (i.e., for mark-selective species, only marked fish can be retained)	The regulation influences what method needs to be used to estimate mortalities by size and mark status.	Note that SFEC has not been able to develop direct means to allocate non-landed mortalities under mixed-bag regulations.
	2) Mark-mixed bag limit (i.e., for mark-selective species, a portion of total bag limit can be unmarked)		
	3) Mark- and size-mixed bag limit (size-range-specific allowances for retention of unmarked fish)		
2. CWT Sampling Method	1) Direct sample in creel surveys and dockside sampling programs.	Direct sampling programs are statistically designed programs in which technicians collect information.	If sample expansions are not available due to lack of total catch estimates in direct sampling no estimate of CWTs recovered by fishery can be made.
	2) Voluntary Recovery Program - fishers submit heads, e.g., in BC sport fishers send in heads from clipped fish.	For the voluntary recovery program it is necessary to estimate the total CWT recoveries from an estimated submission rate.	Submission rate estimation depends on a catch estimation program that estimates total clipped catch. If this is unavailable, submission rates from other areas or periods have to be used, potentially biasing estimates of CWT recoveries.
	3) No CWT sampling	Proxy will be needed.	

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Table E-1 (Page 2 of 4). List of characteristics that describe proposed MSFs, organized by Subject Category. This table is used as a reference for ratings in Table E-2 and Table E-3.

Subject Category	Characteristic	How the Characteristic Influences Evaluation of MSF Impacts	Concern for Evaluation of Fishery Impacts on Indicator Stocks
3. CWT Detection Method	1) Electronic detection will be implemented. All fish (marked and unmarked) will be checked for CWT using electronic gear (wands, tube detectors)	Electronic detection will result in recoveries of all tagged fish in the sample, both unclipped and clipped.	
	2) Visual detection will be implemented. All adipose-fin clipped (marked) fish in sample are checked for tags, but unmarked fish in the sample are not.	Visual detection results in recoveries of tagged and marked fish only. Any unmarked and tagged fish will not be detected.	Unmarked and tagged fish in the fishery will not be sampled and estimates of total CWT recoveries will be biased. (Affects recoveries of both unmarked but tagged DIT and conservation groups).
4. CWT Composition Estimation Method	1) Standard method using CWTs sampled from fishery.	Estimates of CWT recoveries in fisheries and escapement are used for cohort analysis, estimation of exploitation rates and other stock parameters	
	2) Non-standard or Indirect, using CWT ratios from proxy (i.e., hatchery or fishery, where relationship has been established)		If estimates of total CWT recoveries are biased all CWT based estimates will also be biased
	3) Non-standard or Indirect, with poorly or unestablished proxy		
	4) None proposed		If no CWT estimates are made all CWT based estimates will be biased.

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Table E-1 (Page 3 of 4). List of characteristics that describe proposed MSFs, organized by Subject Category. This table is used as a reference for ratings in Table E-2 and Table E-3.

Subject Category	Characteristic	How the Characteristic Influences Evaluation of MSF Impacts	Concern for Evaluation of Fishery Impacts on Indicator Stocks
5. Alignment of time/area strata boundaries of regulations and catch estimation and CWT sampling programs	1) Common strata boundaries across fishery regulations and catch estimation and CWT sampling programs.	Estimating total catch and sampling fractions require that sampling strata and regulation strata align. Without such alignment, estimates of CWT recoveries will be biased. Information on strata employed enables interpretation of the extent of such biases.	For example, if one sample stratum includes both NSF and MSF regulations in different areas and/or periods, then separate estimates of CWTs recovered in the different regulations cannot be made without additional assumptions.
	2) Lack of alignment between fishery regulation and sampling/catch estimation strata boundaries.		
	3) Strata boundaries are unclear or undefined for the sampling program and/or fishery regulations.		
6. Catch estimation by size / mark / retention status.	1) Will provide separate estimates of catch in all size category-clip status combinations for both kept and released catch. May include bias correction (e.g., Conrad and McHugh 2008) method for estimating encounters, if applicable.	Need to estimate exploitation rate by stock using CWT indicators, which requires estimates of fishery-total encounters and associated impacts, including landed mortalities as well as handling-and-release mortalities by size/mark category.	SFEC postseason reports request that total retained and released fish in MSFs are estimated and reported by size (legal or sublegal) and mark category (marked [adipose-fin clipped] or unmarked [adipose-fin intact])
	2) Will provide separate estimates of catch for all size category-clip status combinations for kept catch but not released catch.		
	3) Did not describe catch estimation.		
	4) No catch estimates will be made.		

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Table E-1 (Page 4 of 4). List of characteristics that describe proposed MSFs, organized by Subject Category. This table is used as a reference for ratings in Table E-2 and Table E-3.

Subject Category	Characteristic	How the Characteristic Influences Evaluation of MSF Impacts	Concern for Evaluation of Fishery Impacts on Indicator Stocks
7. Are CWT indicator stocks expected to be impacted in the fishery?	0) No, CWT indicator stocks are not expected.	Estimate anticipated stock-age-specific encounters of coded-wire-tagged fish in the fishery. Determine potential significance of MSF to indicator stocks.	Lack of information to determine potential significance of MSF to indicator stocks.
	1) Yes, CWT indicator stocks are expected, and a <u>complete</u> list of indicator stocks was provided.		
	2) Yes, CWT indicator stocks are expected, and an <u>incomplete</u> list of indicator stocks was provided.		
	3) Yes, CWT indicator stocks are expected, but a list of indicator stocks was <u>not</u> provided.		
8. Are double-index-tagged (DIT) fish expected to be impacted in the fishery?	0) No, DIT stocks are not expected.	Estimate anticipated stock-age-specific encounters of DIT fish in the fishery. Determine potential significance of MSF to DIT stocks.	Lack of information to determine potential significance of MSF to DIT indicator stocks.
	1) Yes, DIT stocks are expected, and a <u>complete</u> list of DIT stocks was provided.		
	2) Yes, DIT stocks are expected, and an <u>incomplete</u> list of DIT stocks was provided.		
	3) Yes, DIT stocks are expected, but a list of DIT stocks was <u>not</u> provided.		

Table E-2 Summary of SFEC’s evaluation of proposed 2021 Coho Salmon MSFs (see Table E-1 for definitions of numeric codes).

Color coding key:

- # Of least concern to SFEC as an issue in the MSF proposal
- # Of moderate concern to SFEC as an issue in the MSF proposal
- # Of most concern to SFEC as an issue in the MSF proposal

Table E-2. Evaluation of proposed 2021 Coho Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-FOC-02a	BC Management Areas 11–29, outer areas of 121–127	Pre-terminal and Terminal Sport (MSF)	0.1 to 1.6	1	2	2	1	2	2,4	1	1	Voluntary recovery program will not provide recoveries of unmarked and tagged fish in any fishery. Low CWT submission rates.	Total catch using creel surveys in some areas and times and log books from lodges. No catch estimate for area/times with no creel or lodge logbook.
MSF-FOC-02b	BC Management Areas 11–29	Pre-terminal and Terminal Sport (Mixed-bag)	0.1 – 0.5	2	2	2	1	2	2,4	1	1	Voluntary recovery program will not provide recoveries of unmarked and tagged fish in any fishery. This is an issue in mixed-bag fisheries where unmarked fish can be retained. Low CWT submission rates.	Total catch using creel surveys in some areas and times and log books from lodges. No catch estimate for area/times with no creel or lodge logbook.

Table E-2. Evaluation of proposed 2021 Coho Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-FOC-03	Lower Fraser River	Terminal, First Nations (Mixed-bag)	No	2	3	2	4	1	2	1	0,1	This fishery is mixed bag because unmarked Coho that are non-viable can be retained. Low CWT submission rates. Numbers of ad-clipped and unclipped Coho are reported in some fisheries.	Total catch estimate using creel survey or census.
MSF-FOC-05	BC Management Areas 23–27, 121–127	Pre-terminal Commercial Troll (MSF)	No	1	1	2	1	1	1	1	1		Total catch is from fisher reported log books and phone-in catch reports.
MSF-FOC-06	BC Lower Fraser R	Sport	No	1	2	2	1	1	2,4	1	0,1	Voluntary submission of samples from clipped fish, but fishery is fully mark-selective. Creel surveys and awareness factors for some times and areas. Low CWT submission rates.	Total catch using creel surveys in some areas and times. No catch estimate for area/times with no creel.
MSF-FOC-09	BC South Coast Freshwater	Sport	No	3	2	2	1	1	2,4	1	1	Voluntary recovery program will not provide recoveries of unmarked and tagged fish in any fishery. This is an issue in mixed-bag fisheries where unmarked fish can be retained. Low CWT submission rates.	Total catch using creel surveys in some areas and times. No catch estimate for area/times with no creel.

Table E-2. Evaluation of proposed 2021 Coho Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-FOC-11	Southern BC, Marine	FSC (Mixed bag)	No	3	2	2	1	2	2	1	1	Voluntary recovery program will not provide recoveries of unmarked and tagged fish in any fishery. This is an issue in mixed-bag fisheries where unmarked fish can be retained. Low CWT submission rates.	Catch estimates based on fisher catch reports.
MSF-FOC-12	Fraser River Mouth	Pre-terminal Commercial, Gillnet (MSF)	No	1	1	1	1	1	1	1	1		Total catch is from fisher reported log books and phone-in catch reports.
MSF-FOC-13	Fraser River Mouth	Pre-terminal Commercial, Seine (MSF)	No	1	1	1	1	1	1	1	1		Total catch is from fisher reported log books and phone-in catch reports.
MSF-WDFW-06	Ocean Areas 1-4	Sport	1.1	1	1	1	1	1	1	1	1		Catch estimate from creel surveys, based on an effort/CPUE survey with boat exit counts and exit interviews. Stratified by boat type (private or charter boats) and day type (weekend or weekdays). On-water encounter rates and mark rates obtained from charter ride-along trips and voluntary trip reports (VTRs).

Table E-2. Evaluation of proposed 2021 Coho Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-07	Puget Sound Areas 5–13	Sport	1.3	1	1	1	1	1	1	1	1		Total catch estimates from CRCs, and creel surveys in some areas. On-water encounter rates and mark rates obtained from VTRs and dockside samplers.
MSF-WDFW-15	Ocean Areas 1–4	Commercial Troll	1.0	1	1	1	1	1	2	1	1	No direct estimates of encounters or mark rate, but the sport fishery estimates are used instead	Catch estimates from fish tickets.
MSF-WDFW-18	Nooksack R	Sport	3.5	1	3	NA	3	2	2	1	0	Indirect CWT sampling via electronic sampling of escapement.	Total retained catch is estimated using CRCs. Mark rates obtained from estimates of total escapement. CWT estimates depend on tag ratios and total escapement estimates.
MSF-WDFW-23	Grays Harbor, Marine Area 2.2	Sport	1.0	1	1,3	1	3	1	2	1	1	Dockside biological sampling Sept–Oct but none in Nov–Jan. CRC for effort estimates.	Total retained catch is estimated from CRCs. Estimate mark rate from VTRs and commercial fishery. CWT estimates depend on tag ratios from commercial fishery.

Table E-2. Evaluation of proposed 2021 Coho Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-24b	Grays Harbor tributaries - Humptulips	Sport	1.1	1	3	1	3	1	2	1	1	CWT composition of mortalities via indirect methods. CWT sampling via electronic sampling of escapement.	Total retained catch is estimated using CRCs. Mark rates obtained from estimates of total escapement. CWT estimates depend on tag ratios and total escapement estimates.
MSF-WDFW-31a	Quillayute R system (Bogachiel, Calawah, Dickey, Quillayute, Sol Duc)	Sport February through August	1.4	1	3	1	3	3	2	1	1	There will be a problem in estimating CWT composition of mortalities due to size-mixed bag regulation. Lack of direct sampling; instead, CWT composition from electronic sampling in tribal net fishery and hatchery is used.	Total catch is estimated using CRCs. Mark rate estimates obtained from tribal net fishery.
MSF-WDFW-31b	Quillayute and Sol Duc	Sport September through November (Mixed-bag)	1.1	3	3	1	3	3	2	1	1	There will be a problem in estimating CWT composition of mortalities due to mark- and size-mixed bag regulation. Lack of direct sampling; instead CWT composition from electronic sampling in tribal net fishery and hatchery is used.	Total catch is estimated using CRCs. Mark rate estimates obtained from tribal net fishery.

Table E-2. Evaluation of proposed 2021 Coho Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-40	Skagit River	Sport (Mixed-bag)	0.4	2	3	1	3	1	2	1	1	Due to mark-mixed bag regulations, current methods of CWT estimation do not apply. Proposal proposes to use CWT composition estimated from hatchery to estimate CWT impacts in fishery. No evaluation has been performed for this method for Coho.	Catch estimates from CRCs. Indirect estimates of CWTs via electronic sampling at hatchery.
MSF-WDFW-41	Samish River	Sport	0.1	1	3	NA	4	1	2	0	0	No sampling for CWTs is planned and estimates of CWT impacts will not be made. There will be no opportunity to estimate mark rates or CWT impacts.	
MSF-WDFW-52	Columbia R., Mouth upstream to Bonneville Dam	Test (pound net trap)	4.7	1	1	2	1	1	1	1	1		
MSF-WDFW-53	Dungeness River	Sport	6.7	1	3	1	2	1	2	1	0	Small fishery, no mixed bag.	Catch estimates from CRCs.
MSF-WDFW-56	Wallace River	Sport	3.6	1	1	1	1	1	2	1	1	New proposal 2021	Catch estimates from CRCs.
MSF-WDFW-57	Nisqually	Sport	5.3	1	1	1	1	1	2	1	1	New proposal 2021	Catch estimates from CRCs.

Table E-2. Evaluation of proposed 2021 Coho Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-58	Clearwater R	Sport	0.9	1	1	1	1	1	2	1	1	New proposal 2021	Catch estimates from CRCs.
MSF-WDFW-59	Columbia R. Tributaries – Mouth to McNary Dam	Sport	1.4	1	1	1	1	1	2	1	1	New proposal 2021	Catch estimates from CRCs.
MSF-ODFW-05	Willamette R. below Willamette Falls (including Multnomah Ch.) and tributaries	Sport	0.4	1	3	0	4	1	2	1	0	No creel or CWT sampling conducted in the fall.	Catch estimates from CRCs. No estimate of number released and total encounters
MSF-ODFW-06	Sandy River and tributaries up to mouth of Salmon River	Sport	1.9	1	3	2	2	2	2	1	0	No creel. CWT recoveries occur at Sandy River Hatchery.	Catch estimates from CRCs. No estimate of number released and total encounters
MSF-ODFW-08	Leadbetter Pt., WA to Cape Falcon, OR	Commercial Troll	1.9 to 2.9	1	1	1	1	1	2	1	1	Sampled at port of landing. No information on released fish is collected.	Fish tickets for total catch estimates.
MSF-ODFW-10	From Cape Falcon, OR to the OR/CA border.	Sport	0.7 to 2.1	1	1	1	1	1	2	1	1	Coho sampled at boat docks for CWTs and total landed catch estimated from surveys. Assume all releases unmarked and legal size (over 16") to estimate mark rate in fishery.	Effort estimated from boat counts and CPUE estimates from angler interviews. Number released used to determine mark rate.

Table E-2. Evaluation of proposed 2021 Coho Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-ODFW-12	From Leadbetter Pt, WA to Cape Falcon, OR	Sport	2.9 to 4.3	1	1	1	1	1	1	1	1	Coho sampled at boat docks for CWTs and total landed catch estimated from surveys. Assume all releases unmarked and legal size (over 16") to estimate mark rate in fishery.	Effort estimated from boat counts and CPUE estimates from angler interviews. Number released used to determine mark rate.
MSF-ODFW-14	Umpqua Lower River and Bay, mostly tidewater.	Sport	0.05	1	3	0	2	2	2	1	1	Lack of direct CWT sampling. CWT's collected from fish sampled at Rock Creek Hatchery and collected at Gallesville Dam (Cow Cr, tributary of S. Umpqua). Very low mark rate--mitigation fishery.	Catch estimates from CRC's. No estimate of the number of fish released or total encounters.
MSF-ODFW-15	From Cape Falcon, OR to the OR/CA border.	Commercial Troll	0.7 to 2.1	1	1	1	1	1	2	1	1	Coho sampled at boat docks for CWTs. Quota fishery set based on coho harvest management limitations. No information on released fish is collected.	Fish tickets for total catch estimates.
MSF-ODFW / WDFW-04	Columbia R, Mouth upstream to Hood R Bridge, includes Buoy 10	Sport	4.0	1	1	1	1	1	1	1	1		Creel survey and CRCs provide estimates of catch. Aerial surveys provide effort counts. Standard methods used for CWT estimates. Observed mark rates at Bonneville Dam for upriver stocks.

Table E-2. Evaluation of proposed 2021 Coho Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-ODFW / WDFW-06	Columbia R, Mouth upstream to Bonneville Dam	Commercial Tanglenet	3.1	1	1	1	1	1	2	1	1	There is a question of how total releases are estimated and where reported.	Random onboard monitoring will record encounters by mark and size status. Retained catch estimates from fish tickets.
MSF-ODFW / WDFW-08	Columbia R, Mouth upstream to Bonneville Dam	Commercial Purse seine, Beach seine, & Pound net	0.7	1	1	1	1	1	1	1	1	Directed MSF Chinook fishery with incidental MSF Coho retention.	

Table E-3. Summary of SFEC’s evaluation of proposed 2021 Chinook Salmon MSFs (see Table E-1 for definitions of numeric codes).

Color coding key:

#	Of least concern to SFEC as an issue in the MSF proposal
#	Of moderate concern to SFEC as an issue in the MSF proposal
#	Of most concern to SFEC as an issue in the MSF proposal
	Indicates an MSF that was not proposed for the upcoming year

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.													
Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-FOC-07	BC, Portions of Juan de Fuca and Georgia Straits (Mar. – Jun.)	Pre-terminal Sport (Mixed-bag)	2.3	3	2	2	1	2	2,4	1	1	Voluntary recovery program will not provide recoveries of unmarked and tagged fish in any fishery. Low CWT submission rates. Fishery is typically small.	Total catch using creel surveys in some areas and times and log books from lodges. No catch estimate for area/times with no creel or lodge logbook
MSF-FOC-10a	Southern BC marine	Pre-terminal Sport (MSF)	1.1-3.3	1	2	2	1	2	2,4	1	1	Voluntary recovery program will not provide recoveries of unmarked and tagged fish in any fishery. Fishery details as described in proposal are vague. Recommend a second review when details are refined.	Total catch using creel surveys in some areas and times and log books from lodges. No catch estimate for area/times with no creel or lodge logbook

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-FOC-10b	Southern BC marine	Pre-terminal Sport (Mixed-bag)	0.1-5.7	2	2	2	1	2	2,4	1	1	Voluntary recovery program will not provide recoveries of unmarked and tagged fish in any fishery. Fishery details as described in proposal are vague. Recommend a second review when details are refined.	Total catch using creel surveys in some areas and times and log books from lodges. No catch estimate for area/times with no creel or lodge logbook
MSF-WDFW-01	Skykomish River (mouth to Wallace River)	Sport	5.9	1	3	1	3	1	2	1	1	The indirect method using hatchery tag compositions to estimate CWTs caught in the MSFs was evaluated by CWTIT funding. Results indicate that the direct estimates made using fishery sampling were significantly different from the indirect estimates. Recommend a sampling program which samples CWTs.	Catch estimates from catch record cards. Indirect estimates of CWTs via electronic sampling at hatchery & associated tribal net fisheries.
MSF-WDFW-03	Yakima River (Spring)	Sport	0.7	1	1	1	1	1	1	NA	NA	This is a MSF impacting Yakima R. experimental tag groups in the Yakima R.	Catch is estimated using creel survey information and standard methods used for CWTs.
MSF-WDFW-05	Lower Snake River (Fall)	Sport	0.8	1	1	1	1	1	1	1	1		Catch and mark rate estimated using creel survey. Sampling for CWTs using electronic tag detection; standard CWT estimation methods.

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-09	Puyallup / Carbon River	Sport	10.1	1	3	1	2	1	2	NA	NA	Lack of direct sampling; only indirect CWT estimates, via electronic sampling at hatchery. These are substantial Chinook freshwater sport fisheries, averaging 1,000 and 400 fish in Puyallup and the Carbon.	Catch estimates from catch record cards. Indirect estimates of CWTs via electronic sampling at hatchery & associated tribal net fisheries.
MSF-WDFW-12	Upper Skagit River	Sport (Spring)	1.8	1	3	1	2	1	2	1	1	Due to lack of direct sampling CWT, ETD sampling at hatchery will be used for indirect estimates of CWTs impacted. If CWTs are surveyed in the fishery, then a direct estimate would be made using CRC estimates. Release by anglers interviewed available to estimate mark rate and total encounters.	Catch estimates from catch record cards. Some angler interviews for CWT sampling and biological data.
MSF-WDFW-13	Nooksack River	Sport	24	1	3	1	3	1	2	1	1	Lack of direct sampling. This is a small fishery, with a five year average of 50 fish kept.	Catch estimates from CRCs. Estimate number of Samish fall Chinook using % hatchery from spawning grounds and tag rate from hatchery.
MSF-WDFW-14	Nisqually River	Sport	9.0	1	1	1	2	1	2	1	1	Electronic sampling of catch for CWTs. As this is an indicator and a DIT it is recommended that CWT sampling continue, even if the creel survey for total estimates is not implemented.	Catch estimates from CRC.

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-19	Ocean Areas 1-4	Sport	1.7	1	1	1	1	1	1	1	1		Catch estimate from creel survey, based on an effort/CPUE survey with boat exit counts and exit interviews. Stratified by boat type (private or charter) and day type (weekend or weekdays). On-water encounter rates (by mark status/size) obtained from charter ride-along trips and VTRs.
MSF-WDFW-20	Skokomish River	Sport	12.0	1	3	1	1	1	2	1	1	Creel surveys were conducted for 3 years but are no longer funded. CWT sampling is conducted in the Skokomish MSF. As this is an indicator and a DIT it is recommended that CWT sampling continue, even if the creel survey for total estimates is not implemented.	Catch estimates from CRC.
MSF-WDFW-25	Willapa Bay 2K,2M,2N,2R,2T,2U	Commercial	3.0	1	1	1	1	1	1	1	1	Live boxes are used and the condition of released unmarked and marked Chinook and Coho are recorded by observers.	Catch from fish tickets. Standard CWT estimates.

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-26	Willapa Bay MA 2.1	Sport	3.9	1	1,3	1	3	3	2	1	2	There will be a problem in estimating CWT composition of mortalities due to size-mixed-bag regulation. There is a mismatch between fishery regulation and sampling/catch estimation strata boundaries.	Catch estimates from CRCs. Angler surveys provide data needed to estimate CWT ratios and mark rates; additionally, VTRs provide data to estimate size/mark status of encounters. Sampling will not cover the whole period of the fishery
MSF-WDFW-27	Willapa Tributaries (Willapa, Niawiakum, Palix, Nemah, Naselle, Bear)	Sport	1.9	1	3	1	3	3	2	1	1	There will be a problem in estimating CWT composition of mortalities due to size-mixed-bag regulation.	Catch estimates from CRC. Mark rates and tag ratios from hatchery and spawning ground data.
MSF-WDFW-28	Lower Snake R (Spring)	Sport	5.7	1	1	1	1	1	1	1	1		Catch and mark rate estimated using creel survey. Sampling for CWTs using electronic tag detection; standard CWT estimation methods.
MSF-WDFW-32	Quillayute River system (Bogachiel, Calawah, Dickey, Quillayute, and Sol Duc)	Sport (Mixed-bag)	6.1	3	3	1	3	3	2	NA	NA	There will be a problem in estimating CWT composition of mortalities due to mark- and size-mixed bag regulation. Indirect methods of CWT estimation using hatchery return information.	Catch estimates from CRC. CWT ratios and mark rates from tribal net fishery.

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-33	Hoh River system	Sport	0.04	1	3	1	3	3	2	NA	NA	There will be a problem in estimating CWT composition of mortalities due to size-mixed bag regulation.	Catch estimates from CRC. CWT ratios and mark rates from tribal net fishery.
MSF-WDFW-35	All Puget Sound Areas 5-13 (Summer)	Sport	5.3	1	1	1	1	1	1	1	1		Total catch estimates from creel surveys and CRCs. On-water Chinook encounter rates, estimated via test fisheries and/or VTRs, provide estimates of encounters by size and mark status.
MSF-WDFW-36	All Puget Sound Areas 5-13	Sport (winter)	4.6	1	1	1	1	1	1	1	1		Total catch estimates from creel surveys and CRCs. On-water Chinook encounter rates, estimated via test fisheries and/or VTRs, provide estimates of encounters by size and mark status.
MSF-WDFW-38	Grays Harbor Marine Area	Commercial	0.2	1	1	1	1	1	1	1	1	Live boxes are used. Onboard observers record the species, mark status and the condition of released fish as well as the retained catch by species.	Catch from fish tickets. Standard CWT estimation methods.

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-39	Lower Grande Ronde R.	Sport	No	1	1	1	1	1	1	1	NA		Catch and mark rate estimated using creel survey. Sampling for CWTs using ETD; standard CWT estimation methods.
MSF-WDFW-42	Columbia R., Priest Rapids Dam upstream to Chief Joseph Dam (Summer)	Sport (Mixed bag)	1.5	3	1	1	1	1	1	1	NA	There will be a problem in estimating CWT composition of mortalities due to mark and size-mixed-bag regulation. Fishery was previously contained in MSF-WDFW/ODFW-02	Mark rate to be determined based upon a proxy at Bonneville and Wells Dam. Creel survey and CRC provide estimate of catch and CWT recoveries in fishery.
MSF-WDFW-43	Wenatchee R., mouth to Leavenworth (Summer)	Sport (Mixed bag)	0.4	3	1	1	1	1	1	NA	NA	There will be a problem in estimating CWT composition of mortalities due to mark and size-mixed-bag regulation.	Mark rate to be determined based upon a proxy at Wells Dam. Creel survey and CRC provide catch estimates.
MSF-WDFW-45	Chelan R., mouth to powerhouse (Summer)	Sport (Mixed bag)	2.5	3	1	1	1	1	2	NA	NA	There will be a problem in estimating CWT composition of mortalities due to mark and size-mixed-bag regulation.	Mark rate to be determined based upon a proxy at Bonneville and Wells Dam. Creel survey and CRC provide catch estimates.

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-WDFW-46	Grays Harbor Marine Area 2.2	Sport	1.4	1	3	1	3	1	2	0	0	Indicator stock encounters not expected.	Escapement for CWT. CRC harvest. From last 3 year average, adjusted by hatchery release mark rate. VTR for estimating sub-legal proportions.
MSF-WDFW-49	Columbia R., Mouth to Bonneville Dam (fall run)	Test (pound net trap)	0.8	1	1	1	1	1	1	1	1		Estimate mark rate from observers.
MSF-WDFW-50	Columbia R., mouth to Bonneville Dam (spring run)	Test (tangle net)	2.5	1	1	1	1	1	1	1	1		Estimate mark rate from observers.
MSF-WDFW-54	Icicle Creek (May-June)	Sport	19.0	1	1	1	1	1	1	0	0		Creel surveys and CRC for catch estimation.
MSF-WDFW-55	Okanogan/Similkameen R. (Jul-Sept)	Sport (Mixed Bag)	0.7	3	1	1	1	1	1	0	0	Mixed bag to mark and size, however no indicator stocks are expected to be encountered.	
MSF-WDFW-60	Columbia R. Tributaries – Mouth to McNary Dam (Spring)	Sport	17.7	1	1	1	1	1	2	1	1	New proposal 2021	Catch estimates from CRCs.
MSF-WDFW-61	Columbia R. Tributaries – Mouth to McNary Dam (Fall)	Sport	1.7	1	1	1	1	1	2	1	1	New proposal 2021	Catch estimates from CRCs.

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-ODFW-02	Ocean Terminal, within 3 miles of Elk River mouth	Sport (fall run)	1.3	2	1	1	1	2	2	1	1	Mark-mixed bag regulations present problems in estimating CWT mortalities. Fishery proposed for several years but not implemented.	At landing all fish are sampled as one stratum, MSF terminal and NSF cannot be separated.
MSF-ODFW-04	Willamette River and tributaries upstream of Willamette Falls to Dexter Dam	Sport (spring run)	9	1	3	2	3	2	2	1	1	No creel conducted above the falls, hatchery recoveries used for proxy. Sublegal proportions based on window counts.	Catch estimates from CRCs used upstream of the falls.
MSF-ODFW-07	Sandy River and tributaries up to mouth of Salmon River	Sport (spring run)	0.5	1	3	NA	3	1	3	1	NA	No CWT sampling, no creel, no count of released fish.	Catch estimates from CRCs. CWT composition from hatchery.
MSF-ODFW-13	Willamette R. below Willamette Falls (including Multnomah Ch.) and tributaries	Sport (spring run)	4.0	1	1	1	1	1	1	1	1	Released fish all assumed to be unclipped.	Catch estimates from creel/angler interviews.

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-ODFW / WDFW-01	Columbia R, Mouth upstream to McNary Dam, and Ringold Hatchery Area	Sport (spring run)	4.7	1	1	1	1	1	1	1	1		Creel survey and CRC provide estimates of catch. Aerial surveys provide effort counts. Standard methods used for CWT estimates. Mark rates are observed at Bonneville Dam, after the lower river fishery.
MSF-ODFW / WDFW-02	Columbia R, Mouth upstream to Priest Rapids Dam	Sport (summer run)	1.3	1	2	1	1	1	2	1	1	Creel survey above McNary is incomplete; therefore, effort estimate will be underestimated. There is no information on whether and how release number, mark and size status will be obtained above McNary Dam.	Creel survey and CRC provide estimates of retained catch. Aerial surveys provide effort counts. Standard methods used for CWT estimates. Mark rates are observed at Bonneville Dam, after the lower river fishery.
MSF-ODFW / WDFW-03	Columbia R, Mouth upstream to Bonneville Dam	Commercial Tangle net (spring run)	2.5	1	1	1	1	1	1	1	1		Catch from fish tickets. Biological sampling of landed catch at processing plants, plus random on-board monitoring. Standard methods used for CWT estimates. Mark rates are observed at Bonneville Dam, after the lower river fishery.

Table E-3. Evaluation of proposed 2021 Chinook Salmon MSFs.

Proposal ID	Location	Fishery Type	Marked/Unmarked (No = not provided)	Regulations	CWT Sampling Method	CWT Detection Method	CWT Composition Estimation Method	Alignment	Catch Estimation	Indicator Stocks	DIT Stocks	Comments and Concerns	Methods of Estimation
MSF-ODFW / WDFW-05	Columbia R, Mouth upstream to McNary Dam, includes Buoy 10	Recreational (fall run)	0.7	1	1	1	1	1	2	1	1	Creel survey above McNary is incomplete; therefore, effort estimate will be underestimated. There is no information on whether and how release number, mark and size status will be obtained above McNary Dam.	Creel survey and CRC provide estimates of catch. Aerial surveys provide effort counts. Standard methods used for CWT estimates. Mark rates are observed at Bonneville Dam, after the lower river fishery.
MSF-ODFW / WDFW-07	Columbia R, Mouth upstream to Bonneville Dam. (Fall)	Commercial Purse seine, Beach seine, & Pound net	0.8	1	1	1	1	1	1	1	1		
MSF-Lummi-01	Nooksack River	Gillnet C&S (spring run)		1	1	1	1	1	1	1	1	Fishery has not been proposed since 2018 (2017 submission). Fishery was not conducted in 2019 and 2020.	