PACIFIC SALMON COMMISSION
SELECTIVE FISHERY EVALUATION COMMITTEE

# REVIEW OF MASS MARKING AND MARK-SELECTIVE FISHERY ACTIVITIES PROPOSED TO OCCUR IN 2022

REPORT SFEC (23)-1

April 2023

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[1] Past committee members who provided input to this report include Ms. Marlene Bellman (previously with NWIFC) and Dr. Kristen Ryding (previously with WDFW).

## LIST OF ACRONYMS AND INITIALISMS WITH DEFINITIONS

| | | | |
|---|---|---|---|
| **ADF&G** | 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 2022. Issues with implications for maintenance of the coastwide coded-wire-tag program are identified and recommendations are proposed.

## *Impacts of the COVID-19 Pandemic*

The impacts from COVID-19 continue to affect coastwide marking, tagging, and sampling activities. Although there were some minor impacts to marking, tagging, and sampling levels in 2021, the biggest challenge is hiring and retaining seasonal staff which is affecting all agencies.

## *Summary of 2022 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-five proposals (8 for Coho and 17 for Chinook) were received for mass marking occurring in 2022 (Appendix A). Of these, one was an expanded proposal from Alaska (AK), four 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).

Two of the proposals were new this year and include Chinook Salmon stocks in Strait of Georgia, BC North Coast, and the Yukon; however, specific information on mass marking was not provided within the proposals. At this time, there has been no decision with respect to marking, e.g., which stocks would be candidates for marking or how many could be marked. Once this information is available, Canadian Department of Fisheries and Oceans (CDFO) will provide updated proposals to the 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). Increased production to benefit SRKWs are included in many of the mass marking proposals received and all of these fish are expected to be released with an adipose fin clip.

***Proposed mass marking of Coho and Chinook salmon in 2021 and 2022***

| | Coho (in millions) | | Chinook (in millions) | |
|---|---|---|---|---|
| **Agency** | **2021** | **2022** | **2021** | **2022** |
| ADF&G | - | - | 1.0 | 2.5 |
| CDFO | 3.8 | 3.4 | 3.2 | 3.2[1] |
| USFWS | 2.0 | 1.9 | 26.5 | 26.3 |
| WDFW/Tribes | 22.4 | 25.3 | 80.7 | 77.3 |
| ODFW/Tribes | 5.3 | 6.5 | 24.9 | 24.1 |
| **Total** | **33.6** | **37.2** | **136.3** | **133.5** |

Approximately 37.2 million Coho are proposed to be mass-marked in 2022 from southern BC and SUS hatcheries, roughly 3.6 million more than proposed in 2021 (Table 2-1). This change in proposed releases reflects for the most part increases 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 (88% of releases). In 2022, 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 2021.

Approximately 128 million Chinook are proposed to be mass marked in 2022 from SUS hatcheries, 2.5 million 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 2022 total level of 133.5 million mass marked fish is roughly 2.8 million less than proposed in 2021. Proposed increases in mass marked releases include 1.6 million in Southern SE Alaska, 700 thousand in the WA Coast, and 2.8 million Columbia River tule fall Chinook Salmon. Proposed decreases in mass marked releases include 2.9 million Puget Sound fall Chinook Salmon, and 5.3 million fewer Columbia River upriver brights (URBs). Most hatchery Chinook

[1] At this time, there has been no decision with respect to marking, e.g., which stocks would be candidates for marking or how many could be marked. Once this information is available, Canadian Department of Fisheries and Oceans (CDFO) will provide updated proposals to the PSC.

production (90% 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 (wild) fish (SFEC 2021). Addressing these gaps and increased 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.

Oregon Department of Fish and Wildlife continues to use visual sampling for fall Chinook and electronic sampling for spring Chinook and Coho in the Columbia River. Beginning in 2011, ODFW initiated electronic sampling of all ocean recreational and commercial salmon fisheries off the coast of Oregon (OR).

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 ADF&G does not sample unmarked Coho Salmon for CWTs and discontinued sampling of unmarked Chinook for CWTs in all fisheries after 2019. To improve tag recovery, tube detectors will be used at one hatchery facility in AK where increased marking and tagging is occurring.

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 2020 (Figure 2-4).

## *Summary of 2022 Mark-Selective Fishery Proposals*

Mark-selective fisheries have been prosecuted for Coho Salmon since 1998 and for Chinook Salmon since 2003. For 2022, the SFEC received 80 MSF proposals for Coho and Chinook salmon in Alaska, Canada, Washington, and Oregon fisheries. The SFEC believes these proposals cover most MSFs planned for 2022 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.

In 2022, 37 proposals were received for Coho Salmon MSFs and 43 proposals were received for Chinook Salmon MSFs. The SFEC received one new Coho proposal for a commercial South of Falcon fishery off the Oregon Coast, and one new Chinook proposals from CDFO for a sport MSF off the West Coast of Vancouver Island. 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, 2021–2022***

| | Coho | | Chinook | |
|---|---|---|---|---|
| **Agency** | **2021** | **2022** | **2021** | **2022** |
| ADF&G | 0 | 0 | 0 | 0 |
| CDFO | 9 | 9 | 2 | 4 |
| WDFW | 16 | 18 | 29 | 29 |
| ODFW | 6 | 7 | 4 | 4 |
| WDFW/ODFW | 3 | 3 | 5 | 5 |
| IDFG | 0 | 0 | 1 | 0 |
| Lummi | 0 | 0 | 1 | 1 |
| **Total** | **34** | **37** | **42** | **43** |

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 2022, that number more than tripled to 43. 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 2022 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 Mark-Selective Fishery Proposals**
It is recommended that the PSC continue to request that agencies submit previously reviewed proposals for all potential 2023 MM and MSF activities by November 2022. 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 2021–2022 should be available by the post-season meeting in 2023. 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 is represents. Significant differences between the marked and unmarked components of a DIT pair in return proportions 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 more than 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 indictor 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 2022. This report summarizes the results of the review of MM and MSF proposals received in November 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 25 MM proposals (8 for Coho, and 17 for Chinook) were received by the PSC for 2022 marking activities (Appendix A). Of the proposals received, one was an expanded proposal from Alaska (AK), four 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 2022 proposals is projected to be approximately 48 million fish. Approximately 37.2 million Coho are proposed to be mass-marked in 2022 from southern BC and SUS hatcheries, roughly 3.6 million more than proposed in 2021 (Table 2-1). This change in proposed releases reflects, in large part, increases in production and marking in the Columbia River. Most hatchery Coho production intended for harvest from SUS hatcheries (not including California) will continue to be ad-clipped (88% of releases). 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 2018, are shown in Figure 2-1A. Geographic details of the Coho Salmon to be marked in 2022, by mark and tag status, are displayed in Figure 2-2A. In 2022 the vast majority of the Coho Salmon production, from southern BC, Washington, and Oregon and essentially all production intended for harvest, will be mass marked. Of the Coho production planned to be released in 2022 that will not be mass marked, approximately 5.5 million will be tagged and marked, 2.9 million will be tagged and unmarked, and approximately 2.3 million will be left untagged and unmarked for stock reintroduction programs.

The total Chinook hatchery production from Southern SE Alaska, the west coast of Vancouver Island, BC; Washington; and Oregon for the area and stocks covered by the 2022 proposals, is projected to be approximately 210 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 2018 are shown in Figure 2-1B. Geographic details of the proposed 2022 marking, by mark and tag status, are displayed in Figure 2-2B.

Approximately 127.7 million Chinook are proposed to be mass marked in 2022 from SUS hatcheries, 2.5 million 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 2022 total level of 133.5 million Chinook proposed to be mass marked is roughly 2.8 million less than proposed in 2021. Proposed increases in mass marked releases include 1.6 million in Southern SE Alaska, 700 thousand in the WA Coast, and 2.8 million Columbia River tule. Proposed decreases in mass marked releases include 2.9 million Puget Sound fall Chinook Salmon, and 5.3 million fewer Columbia River upriver brights (URBs). Most hatchery Chinook production (90% of releases) from SUS hatcheries (not including California) intended for harvest will continue to be ad-clipped. For the production that will not be mass marked in 2022,

approximately 29.3 million will be both tagged and marked, 8.5 million will be tagged and unmarked, and 39.1 million will be intentionally left unmarked.

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). Increased production to benefit SRKWs were included in many of the mass marking proposals received and 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 2021 and 2022 and number of double-index-tagged (DIT) groups proposed for 2022.

| Species | Area | Run | Agency | 2022 Proposed DIT Groups | Mass Marking (millions) | |
|---|---|---|---|---|---|---|
| | | | | | 2021 | 2022 |
| Coho | Strait of Georgia | | CDFO | - | 3.4 | 3.0 |
| | W. Coast of Vanc. Isl. | | CDFO | - | 0.4 | 0.4 |
| | Puget Sound | | USFWS | 1 | 0.6 | 0.5 |
| | | | WDFW/Tribal | 6 | 11.0 | 12.0 |
| | WA Coast | | USFWS | - | 0.6 | 0.6 |
| | | | WDFW/Tribal | 4 | 5.2 | 4.8 |
| | Columbia Basin | | USFWS | 1 | 0.8 | 0.8 |
| | | | WDFW/Tribal | 2 | 6.2 | 8.5 |
| | | | ODFW | - | 5.0 | 6.2 |
| | Oregon Coast | | ODFW | - | 0.3 | 0.3 |
| | **Total Coho** | | | **14** | **33.6** | **37.2** |
| Chinook | Southern SE AK | Summer | ADF&G | - | 0.9 | 2.5 |
| | NW Vancouver Island | Fall | CDFO | - | 2.9 | 2.9 |
| | SW Vancouver Island | Fall | CDFO | - | 0.3 | 0.3 |
| | Puget Sound | Spring | WDFW/Tribal | 2 | 1.7 | 0.8 |
| | | Summer | WDFW/Tribal | 1 | 4.2 | 4.6 |
| | | Fall | WDFW/Tribal | 5 | 33.9 | 31.0 |
| | Washington Coast | All | WDFW/Tribal | 2 | 10.6 | 11.5 |
| | | Fall | USFWS | - | 1.0 | 0.8 |
| | Columbia Basin | Summer | USFWS | - | 0.2 | 0.2 |
| | | Spring | ODFW (Willamette) | - | 4.3 | 3.8 |
| | | | ODFW (Columbia R) | - | 4.0 | 4.0 |
| | | | USFWS | - | 3.7 | 3.5 |
| | | | WDFW/Tribal | 2 | 3.2 | 4.6 |
| | | Fall-Tule | USFWS | 1 | 11.7 | 11.7 |
| | | | WDFW | - | 13.9 | 17.5 |
| | | | ODFW | - | 6.1 | 5.3 |
| | | Fall URB | WDFW | 1 | 7.8 | 6.8 |
| | | | ODFW | - | 4.7 | 5.3 |
| | | | USFWS | 1 | 12.7 | 8.0 |
| | | Snake R. Fall | ODFW | - | 0.8 | 0.8 |
| | | | WDFW | - | 0.5 | 0.5 |
| | | Snake R. Spring | ODFW | - | 0.6 | 0.6 |
| | | | USFWS | - | 2.0 | 2.1 |
| | Oregon Coast | N. Spring | ODFW | - | 0.4 | 0.4 |
| | | S. Spring | ODFW | - | 2.0 | 2.0 |
| | | Fall | ODFW | - | 2.0 | 2.0 |
| | **Total Chinook** | | | **15** | **136.3** | **133.5** |

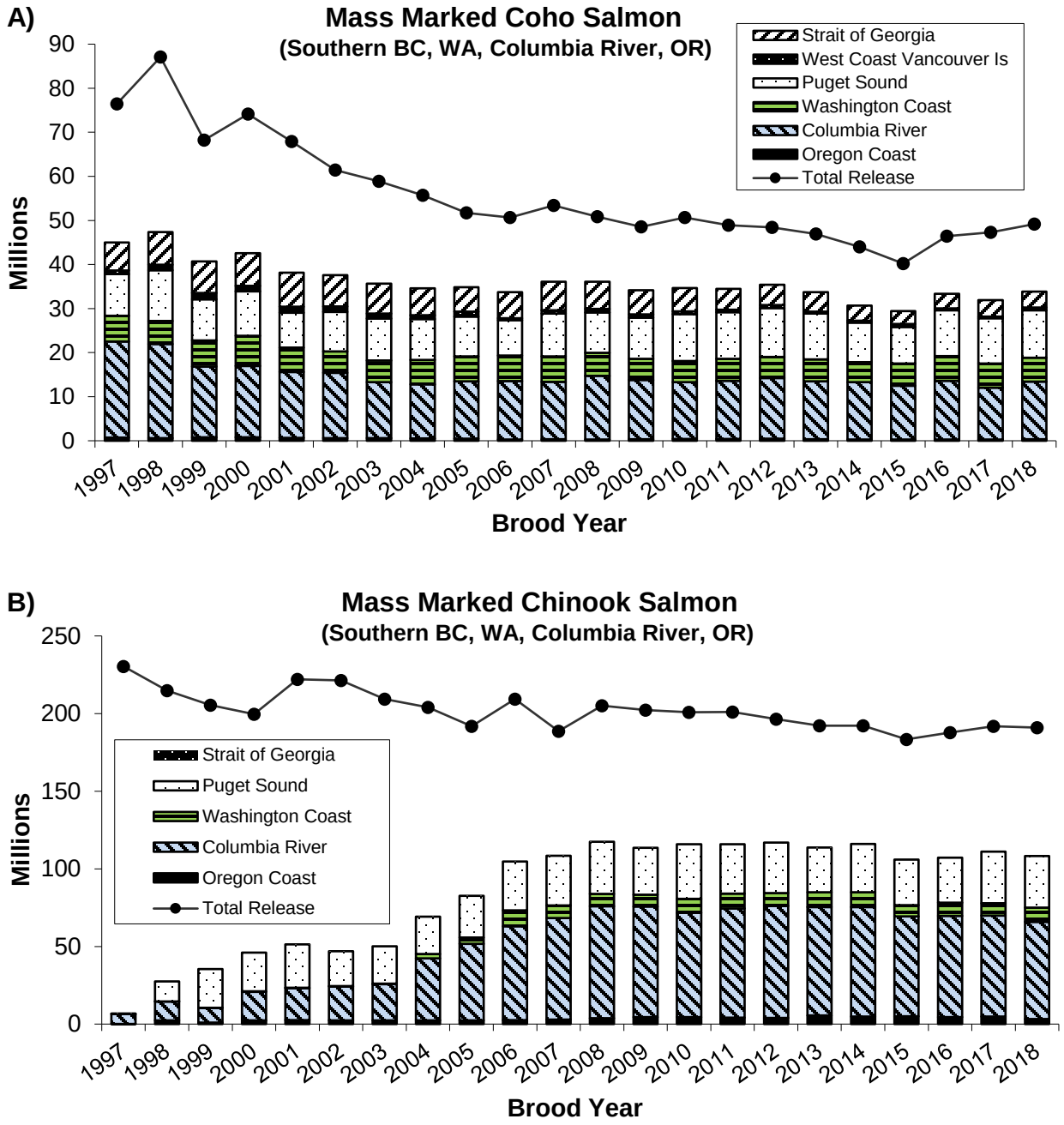


Figure 2-1. Number of mass marked Coho (panel A) and Chinook salmon (panel B) released by region, brood years 1997–2018. The solid line represents total hatchery releases (both marked and unmarked fish) for these same regions by brood year. Data queried from the Regional Mark Information System (RMIS) on January 4, 2023.

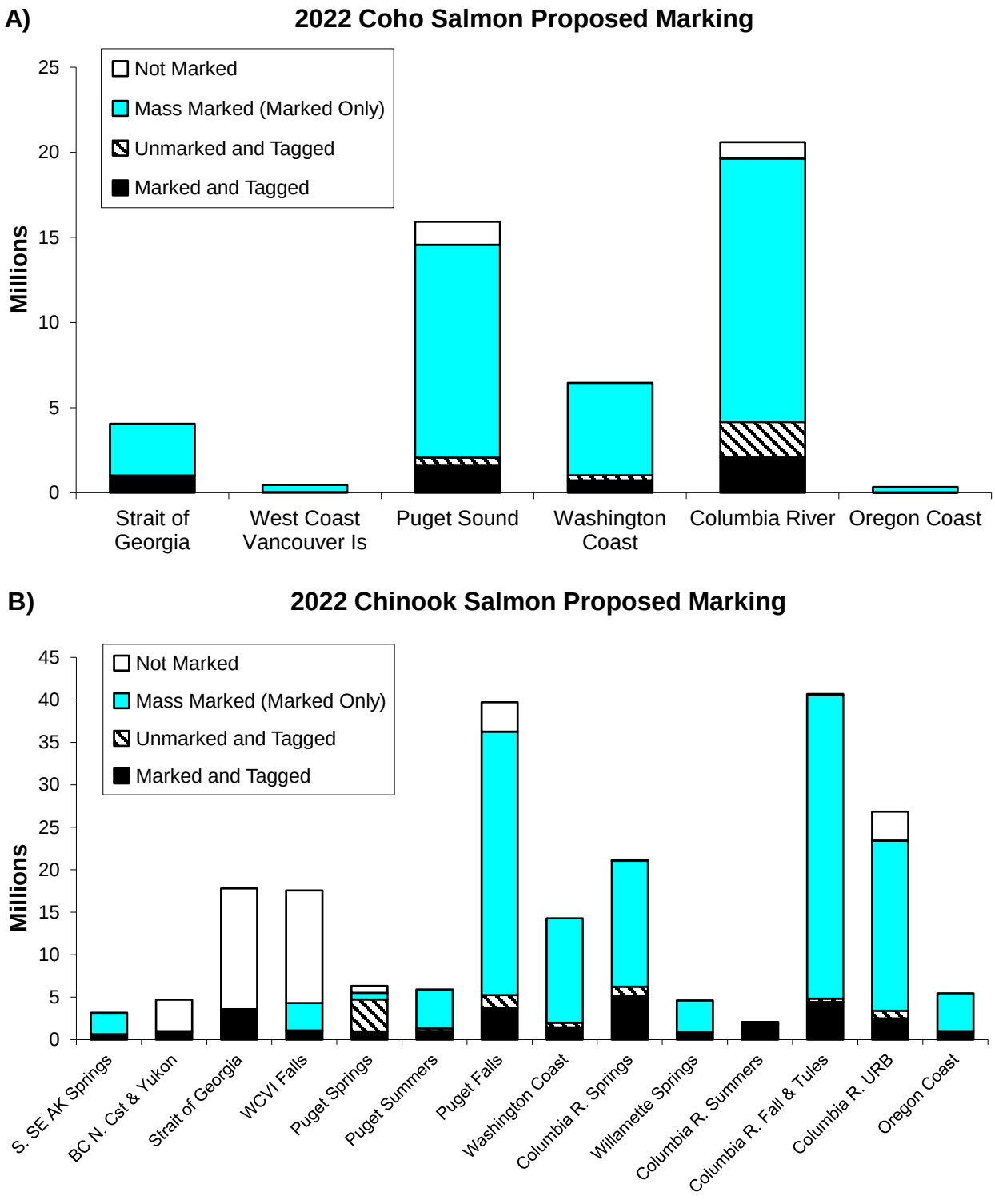


Figure 2-2. Projected Coho and Chinook salmon marking plans, by region and mark status, for 2022.

## *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 five 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.

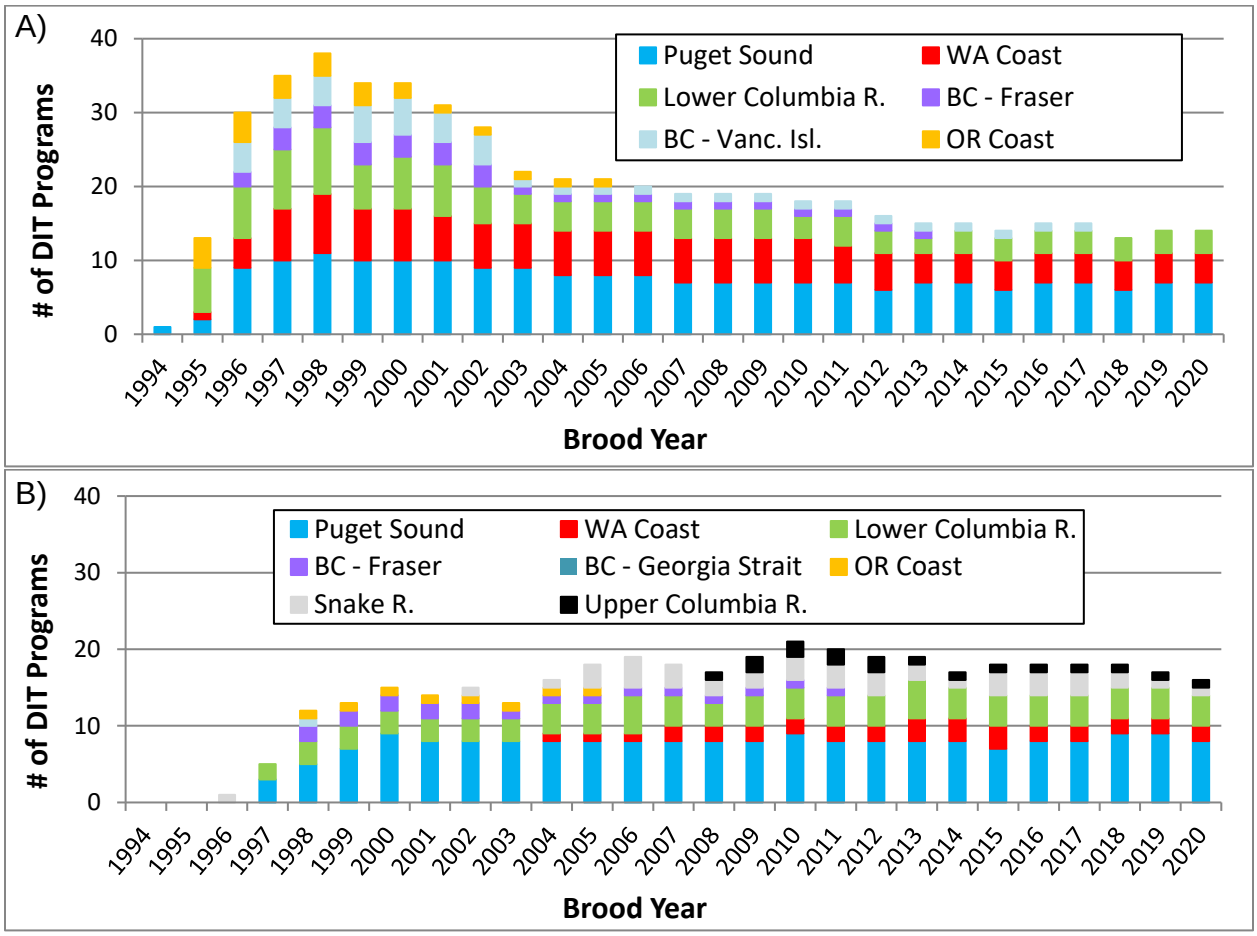


Figure 2-3. Total number of Coho (panel A) and Chinook (panel B) salmon CWT DIT programs released by region, over brood years 1994–2020. Data queried from RMIS January 5, 2023.

## *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.

Proposed 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. Alaska Department of Fish and Game 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.

To assess the use of electronic tag detection methods in recent years we summarized tag data available in RMIS by tag detection methods, region, and year. During catch years 2010 through 2020, most Coho Salmon coded-wire tags sampled in fisheries in WA, OR, and within the Columbia River were obtained using electronic tag detection methods (Figure 2-5A). In contrast, coded-wire-tagged Chinook Salmon were obtained using both electronic and visual sampling methods in most regions (Figure 2-5B).

Table 2-2. Proposed fishery sampling methods for tagged Coho Salmon in 2022.

| 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 | In 2021, a commercial troll fishery from Cape Falcon to the OR/CA border was added establishing mark-selective commercial troll fisheries along the entire Oregon Coast. Tag recoveries from 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-mark 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 2022.

| Region | Fishery | Type of Sampling | Comments |
|---|---|---|---|
| Alaska | Commercial | Visual | ADF&G plans to discontinue sampling of unmarked Chinook for CWTs in all fisheries |
| | Sport | Visual | ADF&G 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 2022.

| 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 | |

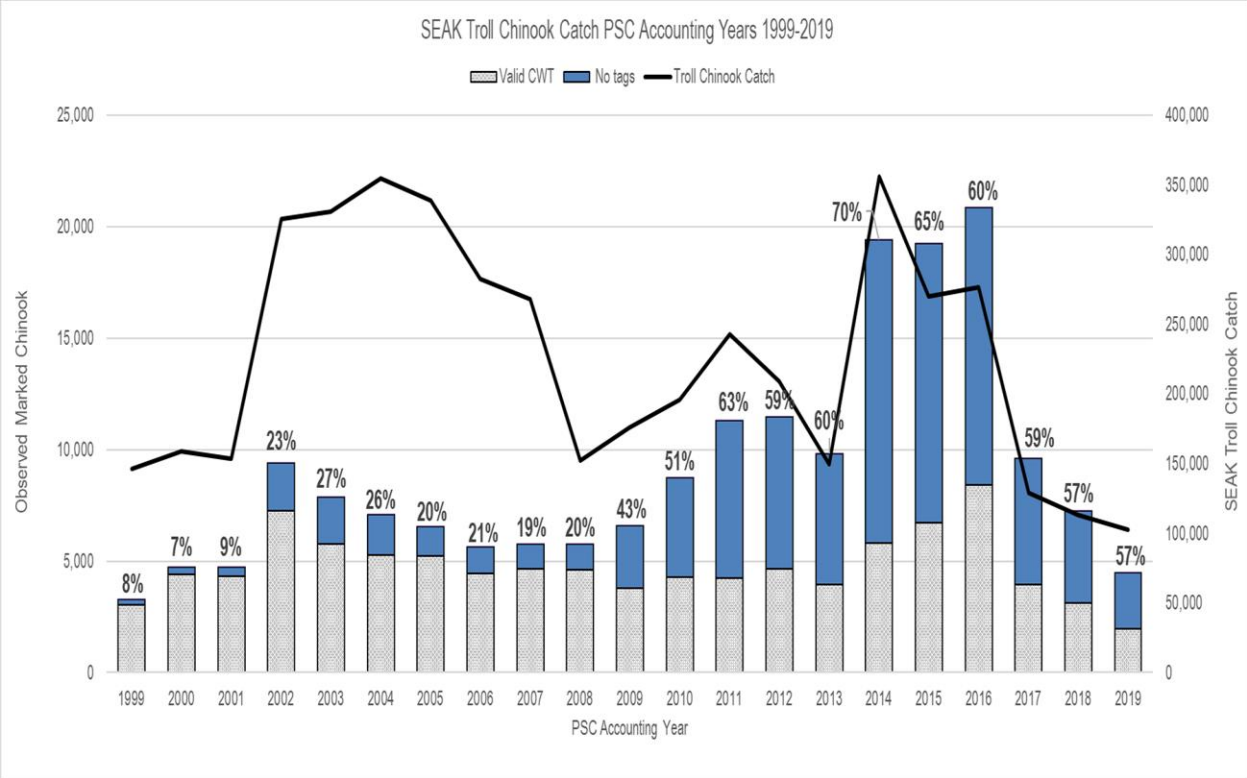


Figure 2-4. Numbers of marked Chinook Salmon sampled in Alaska's troll fishery and annual catch, 1999–2019. The bars represent the untagged (blue) and tagged (gray) marked fish sampled (left vertical axis) and the black line represents the number of fish caught (right vertical axis).

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 Oregon'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 when needed to maximize CWT recovery rates of marked fish.

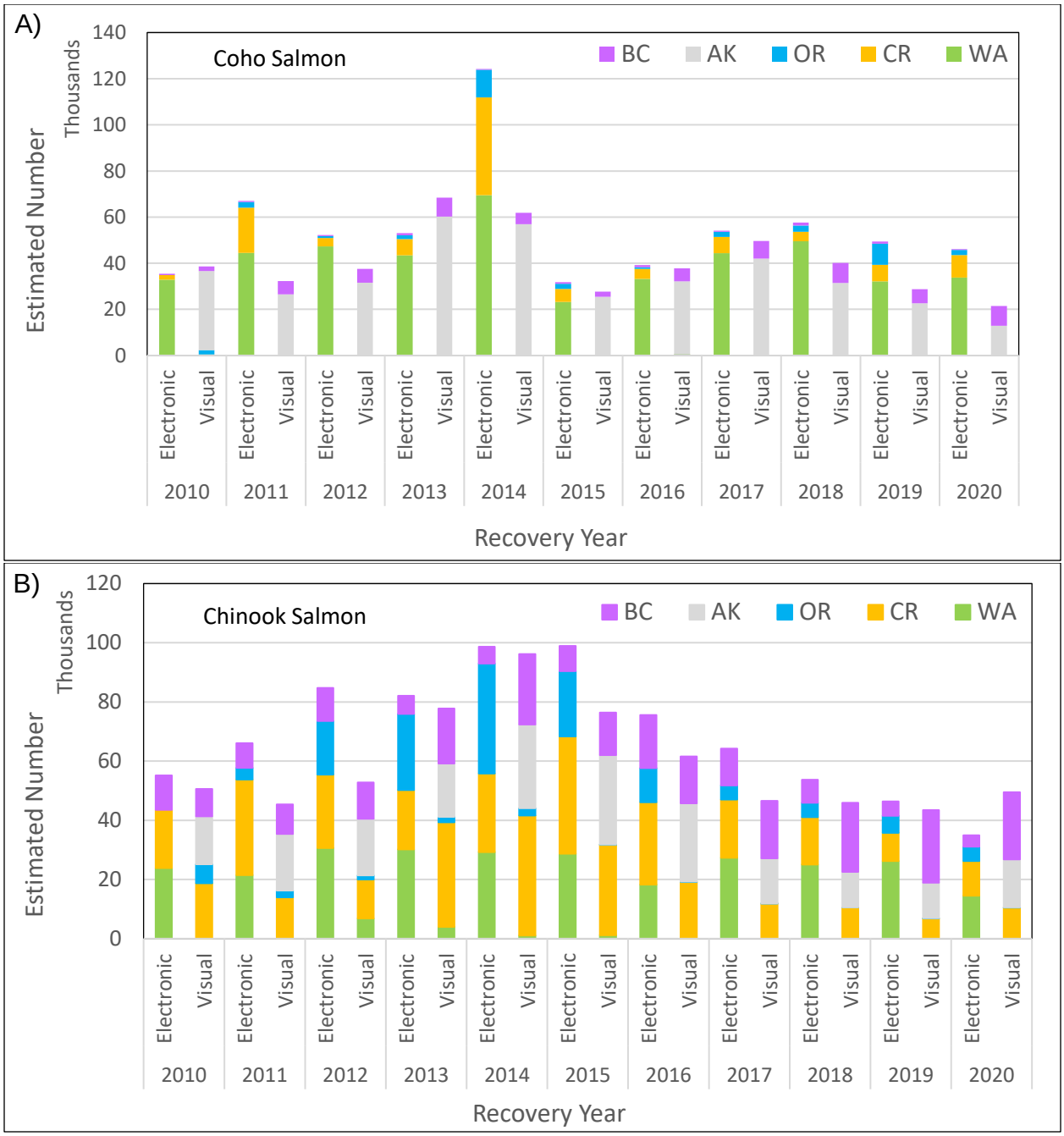


Figure 2-5. Estimated number of coded-wire-tagged Coho and Chinook salmon sampled electronically and visually in fisheries for catch years 2010 through 2020, by region. CR = Columbia River (includes Snake River recoveries). Data queried from RMIS December 22, 2021.

# 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 2022 fishery season, the SFEC received a total of 80 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. Two new MSFs were proposed for 2022, one Chinook and one Coho. 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 2022, 37 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, of which 5 were implemented in 2021. Each of the five proposals contained a variety of fishery openings distinguished by regulation variations. The other four CDFO proposals were for proposed 2021 MSFs that did not occur. A total of 18 Coho Salmon MSF proposals were submitted from WDFW for 2022. All of these fisheries had at least one proposal submitted in the last few years and are therefore not considered new. Of these 18 proposals submitted by WDFW, 13 were for freshwater locations and five for marine waters. Seven Coho proposals were submitted by ODFW for 2022, one of which was a new proposal for a commercial MSF occurring in 2021 with no proposal. The ODFW proposals included three freshwater and four 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 43 proposals for planned Chinook Salmon MSFs in 2022 (Table 3-1; Appendix D). These included four proposals from CDFO, 29 from WDFW, four from ODFW, and five submitted jointly by ODFW and WDFW, and one from the Lummi Nation. No proposals were submitted by Alaska.

Canadian Department of Fisheries and Oceans submitted four proposals, with only one being for a new fishery. One proposal was for an ongoing (since 2008) sport fishery located in the Strait of Juan de Fuca subareas. A previous proposal for a recreational MSF in Southern BC was split into two proposals, MSF-FOC-10a for the MSF regulation, and MSF-FOC-10b to cover a mixed bag regulation. The fourth proposal was for a West Coast Vancouver Island sport fishery. All of the 29 WDFW proposals were also submitted in 2021. The number of WDFW proposals per location were as follows: six in the freshwater systems of Puget Sound; two in Puget Sound marine waters (including the Strait of Juan de Fuca); 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; three ongoing MSFs in WA coastal river systems (Hoh, Quillayute, and Humptulips rivers); two in the Snake River and one in the Grand Ronde River, a tributary to the Snake River. A total of ten proposals were received for MSFs in the Columbia River—two for test fisheries in the lower River below Bonneville Dam, two for the area from the mouth to McNary Dam, one between

Priest Rapids and Chief Joseph dams, and one each in the Yakima, Wenatchee, Chelan, and Okanogan/Similkameen rivers, and one for Icicle Creek. An additional five Chinook Salmon MSF proposals were submitted jointly by WDFW and ODFW for fisheries planned in the Columbia River. Oregon submitted five proposals for Chinook Salmon MSFs—two ongoing fisheries in the Willamette River, one in the Sandy River, and two off the OR coast. The Lummi Nation submitted a proposal for a Treaty net fishery in the Nooksack River.

### 3.1.3 New MSF Proposals

Two new MSF proposals were received for 2022; one for a commercial Coho fishery off the Southern Oregon Coast and one for a WCVI recreational Chinook Salmon fishery. The proposed Oregon commercial Coho fishery occurred in 2021. Only marked Coho are retained and the fishery is well sampled with electronic detection methods. The only concern with the proposal, and sampling of the fishery, is that no information on released fish is obtained. Mark rates for the fishery is determined using information from a recreational coho fishery for the same time and area. The fishery will impact Oregon and California stocks almost exclusively.

The 2022 WCVI sport MSF is proposed to occur from April to July, but as of now is tentative. Proposed regulation is for retention of marked fish only, and will impact WCVI, Southern BC, and Southern US Chinook stocks. Sampling methods for CWTs will be in accordance with Canada's voluntary head submission program, which includes visual sampling. Creel surveys will be conducted at key exit points. Canada will estimate mark rates and encounters of marked and unmarked fish from data collected by creel sampling and the Internet Recreational Effort and Catch (iREC) reporting survey, and the estimated number of CWT recoveries based on the voluntary head submission rate.

Table 3-1. Status of mark-selective fishery (MSF) proposals, fishery implementation, and post-fishery reporting for catch years 2018 through 2022.

"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). A "-" in the third character indicates a report that has not yet been received and is not yet overdue. Finally, cells with "/" indicate the MSF was neither proposed nor conducted in a given year.

| Mark-Selective Fishery | | Catch Year | | | | |
|---|---|---|---|---|---|---|
| **Fishery Name** | **SFEC Proposal ID** | **2018** | **2019** | **2020** | **2021** | **2022** |
| ***Coho Salmon*** | | | | | | |
| Sport, Southern BC Marine, MSF | MSF-FOC-02a | PFO | PFO | PFO | PF- | P |
| Sport, Southern BC Marine, Mixed Bag | MSF-FOC-02b | PFO | PFO | PFO | PF- | P |
| FSC, Lower Fraser R. | MSF-FOC-03 | PFO | PFO | PFO | PF- | P |
| Commercial, Southern BC Marine | MSF-FOC-05 | PX | PX | PX | PX | P |
| Sport, BC South Coast Freshwater | MSF-FOC-06 | PFO | PFO | PFO | PF- | P |
| Sport, BC South Coast Freshwater (mixed bag) | MSF-FOC-09 | PFO | PFO | PFO | PF- | P |
| FSC, Southern BC Marine | MSF-FOC-11 | PFO | PFO | PFO | PX | P |
| Commercial Gillnet, Fraser R. mouth | MSF-FOC-12 | / | PFO | PFO | PX | P |
| Commercial Seine, Fraser R. mouth | MSF-FOC-13 | / | PFO | PX | PX | P |
| Sport, WA Areas 1–4 and Buoy 10 | MSF-WDFW-06 | PFO | PFO | PFO | PF- | P |
| Sport, Puget Sound Areas 5–13 | MSF-WDFW-07 | PFO | PFO | PFO | PF- | P |
| Commercial, WA Areas 1–4 | MSF-WDFW-15 | PFO | PFO | PFO | PF- | P |
| Sport, Nooksack R. | MSF-WDFW-18 | PFO | PFO | PFO | PF- | P |
| Sport, Willapa tributaries | MSF-WDFW-22 | PFO | PX | | XF- | P |
| Sport, Grays Harbor Area 2.2 | MSF-WDFW-23 | PFO | PFO | PFO | PF- | P |
| Sport, Grays Harbor tributaries | MSF-WDFW-24a | PFO | PX | / | / | / |
| Sport, Grays Harbor tributaries – Humptulips[7] | MSF-WDFW-24b | / | / | / | PF- | P |
| Sport, Willapa Bay Area 2.1 | MSF-WDFW-29 | PX | PX | PX | / | P |
| Sport, Quillayute R. (Feb–Aug) | MSF-WDFW-31a | PFO | PFO | PFO | PF- | P |
| Sport, Quillayute and Solduc R. (Sept–Nov) | MSF-WDFW-31b | PFO | PFO | PFO | PF- | P |
| Sport, Skagit R. | MSF-WDFW-40 | PFO | PX | PFO | PX | P |
| Sport, Samish R. | MSF-WDFW-41 | PFO | PFO | PFO | PF- | P |
| Test, Columbia R., Cathlamet | MSF-WDFW-52 | XF | PFO | PFO | PX | P |
| Sport, Dungeness River | MSF-WDFW-53 | XF | XF | PFO | PF- | P |
| Sport, Wallace River (Skykomish/Snohomish Trib) | MSF-WDFW-56a | / | / | / | PF- | P |
| Sport, Nisqually R | MSF-WDFW-57 | / | / | / | PF- | P |
| Sport, Clearwater R | MSF-WDFW-58 | / | / | / | PF- | 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 2018 through 2022.

| Mark-Selective Fishery | | Catch Year | | | | |
|---|---|---|---|---|---|---|
| **Fishery Name** | **SFEC Proposal ID** | **2018** | **2019** | **2020** | **2021** | **2022** |
| ***Coho Salmon (continued)*** | | | | | | |
| Sport, Columbia R Tributaries - Mouth to McNary Dam | MSF-WDFW-59 | XF | XF | XF | PF- | P |
| Sport, Willamette River below Falls | MSF-ODFW-05 | PFO | PFO | PFO | PF- | P |
| Sport, Sandy River and tributaries to mouth of Salmon River | MSF-ODFW-06 | PFO | PFO | PFO | PF- | P |
| Commercial, Leadbetter Pt. to Cape Falcon | MSF-ODFW-08 | PFO | PFR | PFO | PF- | P |
| Sport, Cape Falcon to the OR/CA border[3] | MSF-ODFW-10 | PFO | PFR | PFO | PF- | P |
| Sport, Leadbetter Pt. to Cape Falcon[3] | MSF-ODFW-12 | PFO | PFR | PFO | PF- | P |
| Sport, Umpqua R and tributaries | MSF-ODFW-14 | / | / | / | PF- | P |
| Commercial Troll, Cape Falcon to the OR/CA border | MSF-ODFW-15 | / | / | / | PF- | P |
| Sport, Lower Columbia R. | MSF-ODFW/WDFW-04 | PFO | PFO | PFO | PF- | P |
| Commercial, Lower Columbia R. (Buoy 10 to Beacon Rock) tangle net | MSF-ODFW/WDFW-06 | PX | PFO | PFO | PF- | P |
| Commercial, Lower Columbia R. (Buoy 10 to Beacon Rock) seine | MSF-ODFW/WDFW-08 | PX | PX | PX | PX | P |
| ***Chinook Salmon*** | | | | | | |
| Commercial, Coho-directed, SE Alaska | MSF-ADF&G-01 | PX | PX | / | / | / |
| Commercial, Chinook-directed, SE Alaska | MSF-ADF&G-02 | PX | PX | / | / | / |
| Sport, SE Alaska | MSF-ADF&G-03 | PX | PX | / | / | / |
| Sport, Portions of Georgia and Juan de Fuca Straits, BC (Mar. – Jun.) | MSF-FOC-7 | PFO | PFO | PFO | PF- | P |
| Sport, Southern BC marine, MSF regulation (Jan – Dec.) | MSF-FOC-10a | / | PX | PFO | PF- | P |
| Sport, Southern BC marine, Mixed-bag regulation, (Jan – Dec.) | MSF-FOC-10b | / | / | / | / | P |
| Sport, WCVI marine, MSF regulation (Jan – Dec.) | MSF-FOC-15 | / | / | / | / | P |
| Sport, Skykomish R. (summer run) | MSF-WDFW-01 | PFO | PFO | PFO | PF- | P |
| Sport, Yakima R. (spring run) | MSF-WDFW-03 | PFO | PX | PX | PX | P |
| Sport, Lower Snake R. (fall run) | MSF-WDFW-05 | PFO | PFO | PFO | PF- | P |
| Sport, Carbon & Puyallup R. (fall run) | MSF-WDFW-09 | PFO | PFO | PFO | PF- | P |
| Sport, Upper Skagit R. (spring run) | MSF-WDFW-12 | PFO | PFO | PFO | PF- | P |
| Sport, Nooksack R. (fall run) | MSF-WDFW-13 | PFO | PFO | PFO | PF- | 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 2018 through 2022.

| Mark-Selective Fishery | | Catch Year | | | | |
|---|---|---|---|---|---|---|
| **Fishery Name** | **SFEC Proposal ID** | **2018** | **2019** | **2020** | **2021** | **2022** |
| ***Chinook Salmon (continued)*** | | | | | | |
| Sport, Nisqually R. (fall run) | MSF-WDFW-14 | PFO | PFO | PFO | PF- | 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 | PF- | P |
| Sport, Willapa Bay Area 2.1 | MSF-WDFW-26 | PFO | PFO | PFO | PF- | P |
| Sport, Willapa Bay tributaries (fall run) | MSF-WDFW-27 | PFO | PFO | PFO | PF- | P |
| Sport, Snake R. (spring/summer run) | MSF-WDFW-28 | PFO | PFO | PFO | PF- | P |
| Sport, Quillayute R. (spring/summer run) | MSF-WDFW-32 | PFO | PFO | PFO | PF- | P |
| Sport, Hoh R. | MSF-WDFW-33 | PFO | PFO | PX | PX | P |
| Sport, Puget Sound Areas 5–13, summer[4] | MSF-WDFW-35 | PFO | PFO | PFO | PF- | P |
| Sport, Puget Sound Areas 5–13, winter[5] | MSF-WDFW-36 | PFO | PFO | PFO | PF- | P |
| Sport, Snohomish R. (summer run) | MSF-WDFW-37 | PFO | PFO | / | / | / |
| Commercial, Grays Harbor Areas 2A–2D | MSF-WDFW-38 | PFO | PFO | PFO | PF- | 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 | PF- | P |
| Sport, Wenatchee R., mouth to Leavenworth (summer run) | MSF-WDFW-43 | PFO | PX | PX | PX | P |
| Sport, Entiat R., mouth to Entiat NFH (summer run) | MSF-WDFW-44 | PFO | PX | / | / | / |
| Sport, Chelan R., mouth to powerhouse (summer run) | MSF-WDFW-45 | PFO | PFO | PFO | PF- | P |
| Sport, Grays Harbor | MSF-WDFW-46 | PX | PFO | PFO | PF- | P |
| Sport, Grays Harbor tributaries (Humptulips only in 2019 and 2021) | MSF-WDFW-47 | PFO | PFO | / | XF- | / |
| Sport, Green R. (fall run) | MSF-WDFW-48 | PX | X | / | / | / |
| Test Fishery, Columbia R., Cathlamet (fall run) | MSF-WDFW-49 | XF | PFO | PFO | PX | P |
| Test Fishery, Columbia R., mouth to Bonneville Dam (spring run) | MSF-WDFW-50 | XF | PFO | PFO | PF- | P |
| Test Fishery, Columbia R., Cathlamet (spring run) | MSF-WDFW-51 | XF | PX | / | / | / |
| Sport, Icicle Creek (May-June) | MSF-WDFW-54 | / | XFO | PFO | PF- | P |
| Sport, Okanogan/Similkameen R. (Jul-Sept) | MSF-WDFW-55 | / | / | PX | PX | P |
| Sport, Columbia River Tributaries, mouth to McNary Dam (Spring) | MSF-WDFW-60 | XFO | XFO | XFO | PF- | P |

~continued~

Table 3-1. (Page 4 of 4) Status of mark-selective fishery (MSF) proposals, fishery implementation, and post-fishery reporting for catch years 2018 through 2022.

| Mark-Selective Fishery | | Catch Year | | | | |
|---|---|---|---|---|---|---|
| **Fishery Name** | **SFEC Proposal ID** | **2018** | **2019** | **2020** | **2021** | **2022** |
| ***Chinook Salmon (continued)*** | | | | | | |
| Sport, Columbia River Tributaries, mouth to McNary Dam (Fall) | MSF-WDFW-61 | XFO | XFO | XFO | PF- | P |
| Sport, Oregon coast (fall run) | MSF-ODFW-02 | PFO | PX | PX | PX | P |
| Sport, Willamette R. above Willamette Falls (spring run)[6] | MSF-ODFW-04 | PFO | PFO | PFO | PF- | P |
| Sport, Sandy R (spring run) | MSF-ODFW-07 | PFO | PFO | PFO | PF- | P |
| Commercial, Oregon coast (spring run) | MSF-ODFW-09 | PFR | / | / | / | / |
| Sport, Oregon coast (spring run) | MSF-ODFW-11 | PX | / | / | / | / |
| Sport, Willamette R. below Willamette Falls (including Multnomah Ch.) and tributaries[6] | MSF-ODFW-13 | PFO | PFO | PFO | PF- | P |
| Sport, Lower Columbia R (spring run) | MSF-ODFW/WDFW-01 | PFO | PFO | PFO | PF- | P |
| Sport, Columbia R (summer run) | MSF-ODFW/WDFW-02 | PFO | PFO | PFO | PF- | 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 | PX | PX | PX | PF- | P |
| Commercial, Lower Columbia R (Buoy 10 to Beacon Rock) seine | MSF-ODFW/WDFW-07 | PX | PX | PX | PX | P |
| Sport, Snake R (fall run) | MSF-IDFG-04 | XFO | PX | / | / | / |
| Treaty Net, Nooksack R. (Spring Run) | MSF-LUMM-01 | PFO | / | / | PF- | P |

[1] Catch year 2003 was the first year SFEC received requested MSF proposals from agencies. Some Coho MSFs began as early as 1998.

[2] Summary of MSFs are available for many of these fisheries for catch years 2005–2009 in SFEC 2012 (http://www.psc.org/pubs/SFEC12-1.pdf).

[3] MSF-ODFW-10 and MSF-ODFW-12 replaced proposal MSF-ODFW-03 in 2015.

[4] MSF-WDFW-35; combines proposals MSF-WDFW-02 and -11 as of 2012.

[5] 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.

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

[7] Split from MSF-WDFW-24 because of location and regulations.

### 3.1.4 Expected Encounters of CWT Indicator Stocks in MSFs

In 2022, 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.

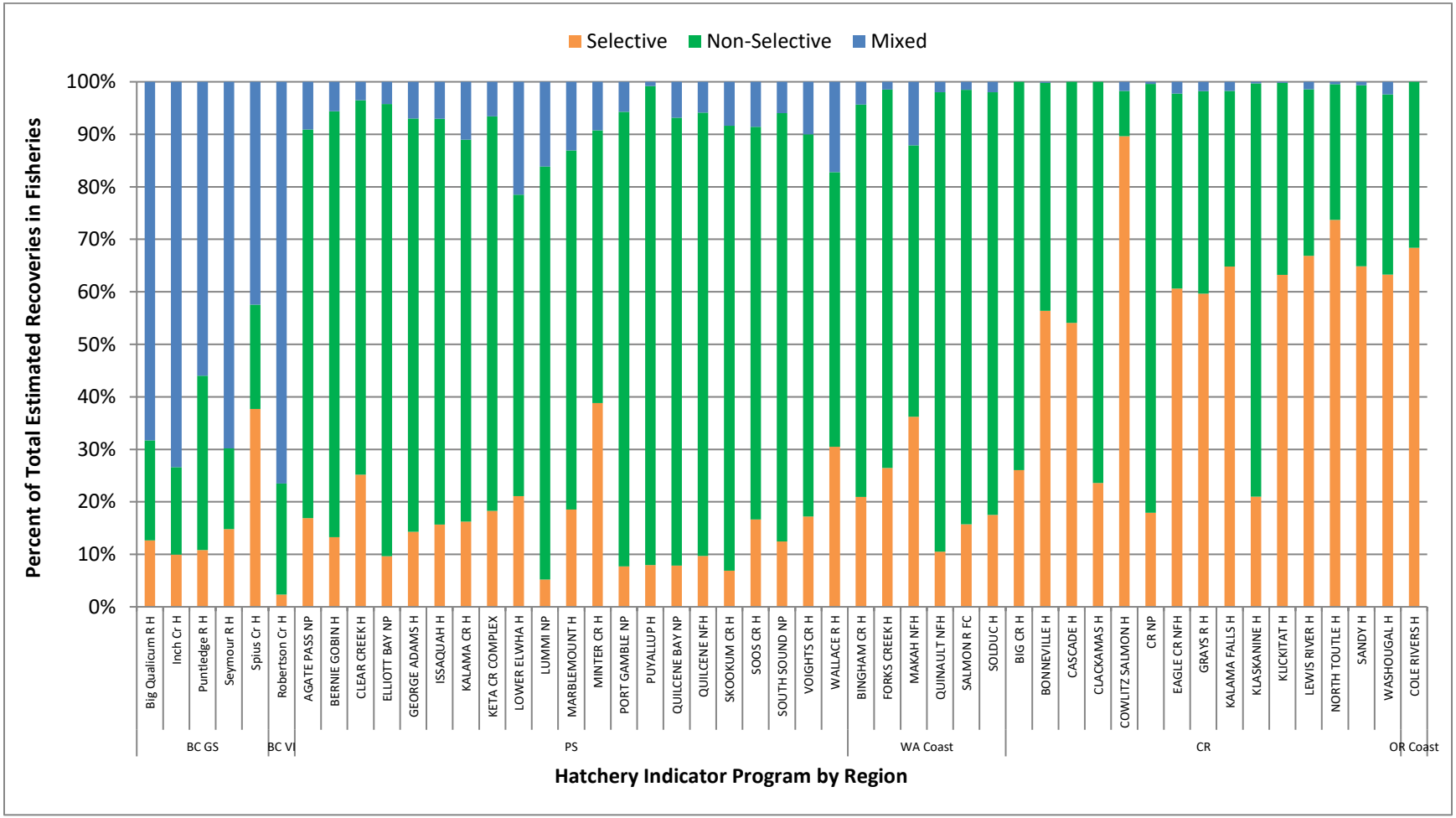


Figure 3-1. Proportion of total estimated CWT recoveries in fisheries from the marked component of a Coho Salmon indicator group by release hatchery that occurred in mark-selective fisheries (MSF), mixed-bag regulation fisheries (Mixed), and non-selective fisheries (NSF), return years 2009–2018.

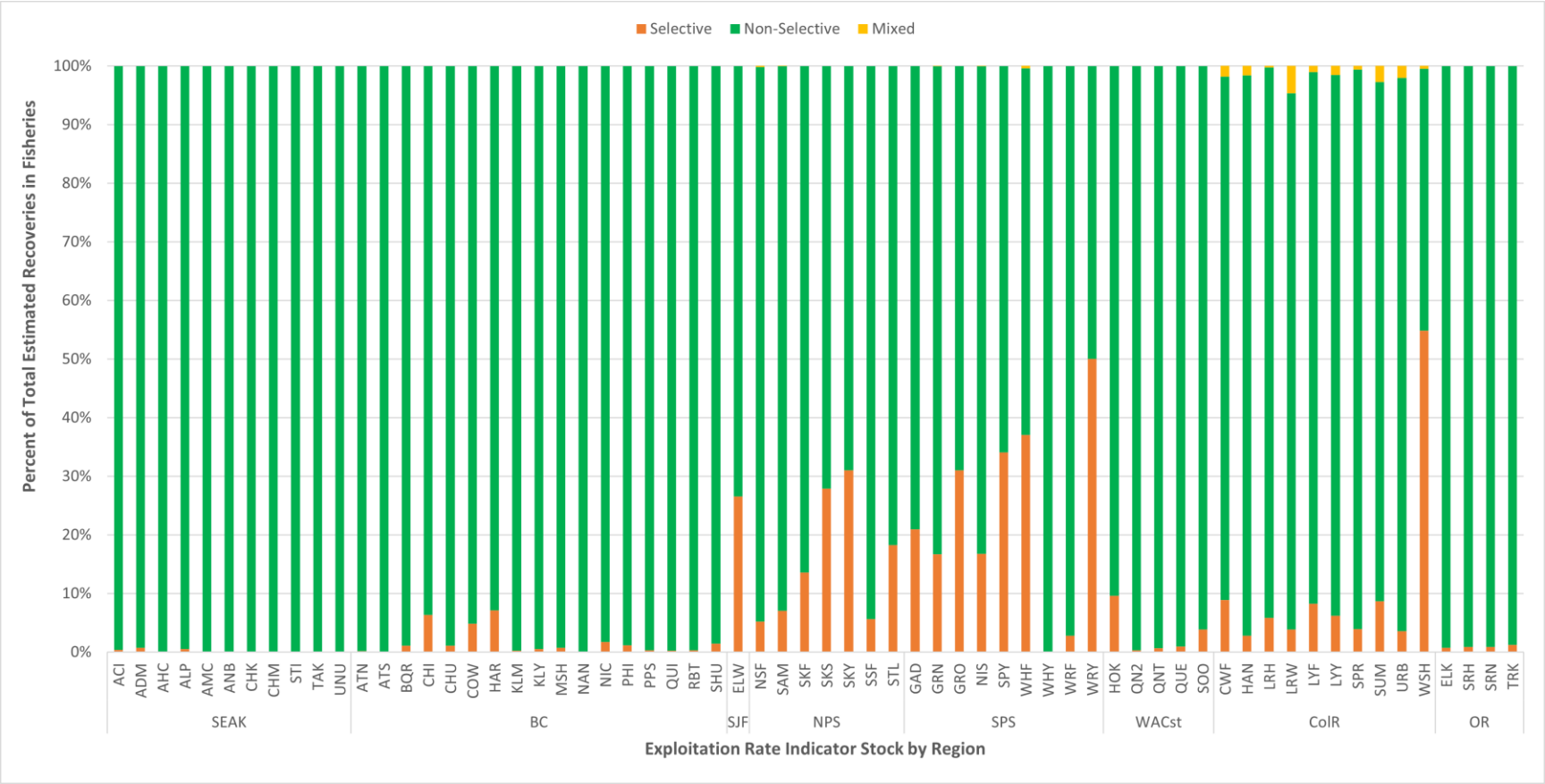


Figure 3-2. Proportion of total estimated CWT recoveries from the marked component of a Chinook Salmon indicator group that occurred in mark-selective fisheries (MSF), mixed-bag regulation fisheries (Mixed), and non-selective fisheries (NSF) for return years 2009–2018. See Appendix C for indicator stock 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 Updates on Mass Marking and Mark-Selective Fishery Plans for 2021 and Early Notice of Future Activities*

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

1. Finalized fishing plans for MSFs proposed the previous November,
2. One-year prior notice of new or substantially changed MM or MSF project proposals 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 PCS Understanding Concerning Mass Marking and Selective Fisheries. The following information was received by the PSC in 2021. Below includes a summary of updates for 2021 fisheries and planned future activities that are known as of July 2021 (Table 4-1).

Canada (DFO) provided minor changes to proposed fisheries such as bag limits, time, and area modification for sport fisheries, and gear changes for commercial Coho fisheries. Proposed Canadian sport fisheries that will not occur in 2021 are listed in Table 4-1. Changes to WDFW proposals included nine proposed 2021 MSF that would not occur, and minor proposal changes such as time, area, and bag limits. ODFW notification included regulation changes to the sport Spring Chinook fishery below Willamette Falls and the addition of a commercial troll Coho fishery from Cape Falcon, OR to Humbug Mt. The late addition was adopted during the annual PFMC salmon season setting process in April of 2021. Alaska does not plan to conduct MSFs anytime in the near future.

Table 4-1. A summary of major changes to proposed 2021 MSFs

| Species | Agency | Proposal | Change |
|---|---|---|---|
| Coho | CDFO | MSF-FOC-12 | Commercial Gill Net, lower Fraser River and Fraser River mouth, did not occur. |
| Chinook | CDFO | MSF-DFO-15 | Sport fishery, WCVI, will not occur. |
| Chinook | WDFW | MSF-WDFW-19 | Ocean Area 1-4 recreational Chinook fishery will not occur. |
| Chinook | WDFW | MSF-WDFW-33 | Recreational fishery in the Hoh River will not occur. |
| Chinook | WDFW | MSF-WDFW-49 | Test/research fishery in the Lower Columbia River will not occur. |
| Coho | WDFW | MSF-WDFW-52 | Test/research fishery in the Lower Columbia River will not occur. |
| Chinook | WDFW | MSF-WDFW-47 | Recreational Chinook fishery in the Humptulips River will occur and was not proposed in fall 2020. |

~continued~

Table 4-1. (Page 2 of 2). A summary of major changes to proposed 2021 MSFs

| Species | Agency | Proposal | Change |
|---|---|---|---|
| Chinook | ODFW/ WDFW | MSF-ODFW/WDFW-03 | Commercial spring tangle net fishery in Lower Columbia River will not occur. |
| Chinook | ODFW/ WDFW | MSF-ODFW/WDFW-05 | Fall recreational MSF fishery planned to occur in Buoy 10 from August 1-10 only. |
| Chinook | ODFW/ WDFW | MSF-ODFW/WDFW 07 | Commercial pound net fishery in Lower Columbia River will not occur, except a placeholder in October only. |
| Coho | ODFW/ WDFW | MSF-ODFW/WDFW 08 | Commercial pound net fishery in Lower Columbia River will not occur, except a placeholder in October only. |
| Chinook | WDFW | MSF-WDFW 19 | Sport fishery in Marine Areas (MA) 1-4 will not occur |
| Coho | WDFW | MSF-WDFW 29 | Sport fishery in Willapa Bay (MA 2.1) will not occur |
| Chinook | WDFW | MSF-WDFW 33 | Sport fishery in the Hoh River will not occur |
| Chinook | WDFW | MSF-WDFW 46 | Sport fishery in Grays Harbor (MA 2.2) will not occur |
| Chinook | WDFW | MSF-WDFW 49 | Test/research fishery will not occur |
| Coho | WDFW | MSF-WDFW 52 | Test/research fishery will not occur |
| Coho | WDFW | MSF-WDFW 58 | Sport fishery in Clearwater River will not occur |
| Chinook | ODFW | MSF-ODFW-02 | Sport fishery, Ocean, Terminal (Elk River) will not occur. |
| Chinook | ODFW | MSF-ODFW-13 | Sport fishery below Willamette Falls, regulation changed to allow barbed hooks and two rods |
| Coho | ODFW | MSF-ODFW-15 | Commercial ocean troll fishery added in April 2021, Cape Falcon, OR to Humbug Mt, OR |

## *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, 2022 for fisheries proposed to occur in 2023. Although final decisions on fisheries are generally made by agencies after this time period (e.g., January–April of 2023 for 2023 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 2021–2022 should be available by the post-season meeting in 2023. 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 three 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 on changes to DIT programs.

### 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 2022 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.

# 5 REFERENCES


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# 6 APPENDICES

## *Appendix A. Status of Mass Marking Proposals Received in 2021 for Mass Marking to Occur in 2022.*

| Description of Proposal and Agency | New or Continuation Proposal | SFEC Proposal Number |
|---|---|---|
| ***Coho Salmon*** | | |
| Southern BC Coho – CDFO | Continuation | MM-FOC-01-2022 |
| Puget Sound Coho – WDFW/Tribal | Continuation | MM-WDFW-01-2022 |
| Washington Coast Coho – WDFW/Tribal | Continuation | MM-WDFW-04-2022 |
| Washington Columbia River Coho – WDFW/Tribal | Continuation | MM-WDFW-05-2022 |
| Columbia River Coho – USFWS | Continuation | MM-USFWS-04-2022 |
| Puget Sound and WA Coast Coho – USFWS | Continuation | MM-USFWS-18-2022 |
| Columbia River Coho – ODFW | Continuation | MM-ODFW-04-2022 |
| Oregon Coast Coho – ODFW | Continuation | MM-ODFW-05-2022 |
| ***Chinook Salmon*** | | |
| S. Southeast Summer Chinook – ADF&G | Continuation | MM-ADF&G-01-2022 |
| WCVI Chinook – CDFO | Continuation | MM-FOC-02-2022 |
| Columbia River Chinook – USFWS | Continuation | MM-USFWS-17-2022 |
| WA Coast Fall Chinook – USFWS | Continuation | MM-USFWS-19-2022 |
| Willamette River Spring Chinook – ODFW | Continuation | MM-ODFW-01-2022 |
| OR North Coast Spring Chinook – ODFW | Continuation | MM-ODFW-02-2022 |
| OR South Coast Spring Chinook – ODFW | Continuation | MM-ODFW-03-2022 |
| Columbia River Fall Chinook – ODFW | Continuation | MM-ODFW-06-2022 |
| OR Coast Fall Chinook – ODFW | Continuation | MM-ODFW-07-2022 |
| Mid-Columbia R Spring Chinook – ODFW | Continuation | MM-ODFW-08-2022 |
| Snake River Fall Chinook – ODFW | Continuation | MM-ODFW-09-2022 |
| Snake River Spring Chinook – ODFW | Continuation | MM-ODFW-10-2022 |
| Puget Sound Chinook – WDFW/Tribal | Continuation | MM-WDFW-02-2022 |
| Columbia R. Chinook – WDFW/CRITFC | Continuation | MM-WDFW-03-2022 |
| Washington Coastal Chinook – WDFW/Tribal | Continuation | MM-WDFW-06-2022 |

## *Appendix B. 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)<br>Eagle River | <br>(1997–2002) |
| Georgia Basin | East Coast Vancouver Island | Big Qualicum<br>Goldstream River | (1996–2002)<br>(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<br>Skookum Creek H.<br>Lummi Bay Ponds | (1996–2007) |
| | Skagit | Skagit (Marblemount H.)<br>Baker River Wild | (1994–current) |
| | Stillaguamish/Snohomish | Skykomish (Wallace River)<br>Tulalip Bay (Bernie Gobin) | (1996–current) |
| | Mid Puget Sound | Green River (Soos Creek H.) | (1996–current) |
| | South Puget Sound | Puyallup (Voights Creek H.)<br>Peale Pass (Squaxin Net Pens)<br>Nisqually (Kalama Creek H.) | (1997–current) |
| | Hood Canal Wild | Big Beef Creek | |
| | North Hood Canal | Quilcene NFH<br>Quilcene Net Pens<br>Port Gamble Net Pens | (1996–current)<br>(1996–2001)<br>(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<br>Solduc (fall run) | (1996–2010)<br>(1996–current) |
| | North Central Coast | Queets Wild (Salmon River H.)<br>Queets (Salmon R. Fish Culture) | <br>(1995–current) |
| | Quinault | Quinault NFH | (1996–2012) |
| | Grays Harbor | Chehalis R. Wild<br>Satsop Springs Ponds<br>Satsop (Bingham Cr. H, late)<br>Satsop (Bingham Cr. H., early) | <br><br><br>(1997–current) |
| | Willapa Bay | Forks Creek H. (late fall run)<br>Forks Creek H.<br>Nemah River. H. | <br>(1997–current) |
| Columbia Basin | Lower Columbia River | Lewis River (Type N & Type S)<br>Eagle Creek<br>Sandy River<br>Bonneville/Tanner Cr.<br>Youngs Bay Net Pens<br>Willard NFH | (1994/98–current)<br>(1995–current)<br>(1995–2008)<br>(1996–2011)<br>(1997–2001)<br>(1996–2002) |
| Oregon Coast | Oregon South Coast | Rogue River (Cole Rivers)<br>Rock Creek H. | (1995–2005)<br>(1995–1999) |
| | Oregon North Coast | Nehalem H. | (1995–2000) |

## *Appendix C. 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) | Spring | |
| | | Stikine (STI) | Spring | |
| | | AK Hatcheries (AKS) | Spring | |
| | | Chilkat (CHK) | Spring | |
| | | Unuk (UNU) | Spring | |
| British Columbia | North/Central BC | Kitsumkalum (KLM) | Summer | |
| | | Atnarko (ATN) | Summer | |
| | West Coast Vancouver Is. | Robertson Creek (RBT) | Fall | |
| | Upper Georgia Strait | Quinsam (QUI) | Fall | |
| | | Phillips River (PHI) | Fall | |
| | Lower Georgia Strait | Cowichan (COW) | Fall | (1998) |
| | | Nanaimo (NAN) | Fall | |
| | | Big Qualicum (BQR) | Fall | |
| | | Puntledge (PPS) | Summer | |
| | Fraser River Early | Middle Shuswap (MSH) | Summer | (1998–2002) |
| | | Lower Shuswap (SHU) | Summer | |
| | | Nicola (NIC) | Spring | |
| | | Dome (DOM) | Spring | |
| | Fraser River Late | Chehalis (Harrison Stock)[2] (HAR) | Fall | |
| | | Chilliwack (Harrison Stock) (CHI) | 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) | 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] | 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 | |
| | | Spring Creek Tule (SPR) | Fall Tule | (2004–current) |
| | | 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 | |
| | | Lyons Ferry Yearling (LYY) | Fall Bright | (2004–2017) |
| | | Hanford Wild (HAN) | Fall Bright | |
| | | Priest Rapids H (URB) | Fall Bright | (2009–current) |
| | 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 Proposals for Mark-Selective Fisheries. Years indicate the proposed fishing year.*

| Fishery, Location, Target Species by Agency[1] | Proposal ID[2] | Most Recent Proposal[3] | Years with MSF since 2003[4] |
|---|---|---|---|
| **Alaska Department of Fish and Game** | | | |
| Commercial, SE Alaska, Coho-directed | MSF-ADF&G-01 | 2019 | 2016–2017 |
| Commercial, SE Alaska, Chinook-directed | MSF-ADF&G-02 | 2019 | None |
| Sport, SE Alaska, Chinook-directed | MSF-ADF&G-03 | 2019 | None |
| **Fisheries and Oceans Canada** | | | |
| Sport, Southern BC, Coho, MSF | MSF-FOC-02a | 2022 | 2003–2021 |
| Sport, Southern BC, Coho, Mixed Bag | MSF-FOC-02b | 2022 | 2017-2021 |
| FSC, Lower Fraser freshwater, Coho | MSF-FOC-03 | 2022 | 2006–2021 |
| Commercial, Troll, Southern BC, Coho | MSF-FOC-05 | 2022 | 2005-2008, 2010–2017 |
| Sport, Southern BC freshwater, Coho | MSF-FOC-06 | 2022 | 2003–2021 |
| Sport, Strait of Juan de Fuca, Chinook (Mar – Jun) | MSF-FOC-07 | 2022 | 2008–2021 |
| Sport, WCVI, selected subareas, mainly inside, Chinook | MSF-FOC-08 | 2011 | none |
| Sport, BC South Coast Freshwater, Coho | MSF-FOC-09 | 2022 | 2014–2021 |
| Sport, Southern BC marine, Chinook, MSF | MSF-FOC-10a | 2022 | 2020–2021 |
| Sport, Southern BC marine, Chinook, Mixed | MSF-FOC-10b | 2022 | New |
| FSC, Southern BC, Coho | MSF-FOC-11 | 2022 | 2018-2020 |
| Commercial, Gillnet, Fraser River Mouth, Coho | MSF-FOC-12 | 2022 | 2019-2020 |
| Commercial, Seine, Fraser River Mouth, Coho | MSF-FOC-13 | 2022 | 2019 |
| Sport, WCVI marine, MSF regulation (Jan – Dec.) | MSF-FOC-15 | 2022 | New |
| **Washington Department of Fish and Wildlife** | | | |
| Sport, Skykomish River, Chinook | MSF-WDFW-01 | 2022 | 2003–2014, 2016–2021 |
| Sport, Yakima River, spring Chinook | MSF-WDFW-03 | 2022 | 2004, 2008–2018 |
| Sport, Lower Snake River, fall Chinook | MSF-WDFW-05 | 2022 | 2008–2021 |

| Fishery, Location, Target Species by Agency[1] | Proposal ID[2] | Most Recent Proposal[3] | Years with MSF since 2003[4] |
|---|---|---|---|
| Sport, Washington coast areas 1–4 & Col R Buoy 10, Coho | MSF-WDFW-06 | 2022 | 2003–2021 |
| Sport, Puget Sound, Coho | MSF-WDFW-07 | 2022 | 2003–2021 |
| Sport, Carbon & Puyallup R, Chinook | MSF-WDFW-09 | 2022 | 2003–2021 |
| Sport, Puget Sound Areas 9–13, summer Chinook | MSF-WDFW-11 | 2011 | 2007–2011 |
| Sport, Upper Skagit R summer Chinook | MSF-WDFW-12 | 2022 | 2005–2021 |
| Sport, Nooksack R, Chinook | MSF-WDFW-13 | 2022 | 2004–2021 |
| Sport, Nisqually R, Chinook, Jul–Jan | MSF-WDFW-14 | 2022 | 2005–2021 |
| Commercial troll, WA areas 1–4, Coho | MSF-WDFW-15 | 2022 | 2003–2015, 2018–2021 |
| Sport, Nooksack River, Coho | MSF-WDFW-18 | 2022 | 2003–2011, 2016–2021 |
| Sport, WA Coast Area 1–4, fall Chinook | MSF-WDFW-19 | 2022 | 2010–2015 |
| Sport, Skokomish River, Chinook | MSF-WDFW-20 | 2022 | 2010–2015 |
| Troll, WA areas 1–4, Chinook | MSF-WDFW-21 | 2010 | none |
| Sport, Willapa Bay, tributaries, Coho | MSF-WDFW-22 | 2022 | 2003–2018, 2021 |
| Sport, Grays Harbor, Marine Area 2.2, Coho | MSF-WDFW-23 | 2022 | 2007–2021 |
| Sport, Grays Harbor, tributaries, Coho | MSF-WDFW-24a | 2019 | 2003–2018 |
| Sport, Grays Harbor, tributaries - Humptulips, Coho | MSF-WDFW-24b | 2022 | 2021 |
| Commercial, Willapa Bay, Chinook | MSF-WDFW-25 | 2022 | 2010–2021 |
| Sport, Willapa Bay, Marine Area 2.1, Chinook | MSF-WDFW-26 | 2022 | 2010–2021 |
| Sport, Willapa Bay, tributaries, Chinook | MSF-WDFW-27 | 2022 | 2010–2021 |
| Sport, Snake River, spring Chinook | MSF-WDFW-28 | 2022 | 2010–2021 |
| Sport, Willapa Bay, Marine Area 2.1, Coho | MSF-WDFW-29 | 2022 | 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 | 2022 | 2009–2011, 2014–2021 |
| Sport Solduc R., (Mixed-bag, Sept. - Nov.), Coho | MSF-WDFW-31b | 2022 | 2003–2013, 2017–2021 |

| Fishery, Location, Target Species by Agency[1] | Proposal ID[2] | Most Recent Proposal[3] | Years with MSF since 2003[4] |
|---|---|---|---|
| Sport, Quillayute River system, spring/summer Chinook | MSF-WDFW-32 | 2022 | 2003–2021 |
| Sport, Hoh River, spring Chinook | MSF-WDFW-33 | 2022 | 2008–2015, 2018–2019 |
| Sport summer, WA areas 5–13, Chinook[5] | MSF-WDFW-35 | 2022 | 2003–2021[6] |
| Sport winter, WA areas 5–13, Chinook[7] | MSF-WDFW-36 | 2022 | 2005–2021[8] |
| Sport, Snohomish River, Chinook | MSF-WDFW-37 | 2019 | 2018–2019 |
| Commercial, Grays Harbor areas 2A–2D, Chinook | MSF-WDFW-38 | 2022 | 2013–2021 |
| Sport, Lower Grand Ronde, spring Chinook | MSF-WDFW-39 | 2022 | none |
| Sport, Skagit River, Coho | MSF-WDFW-40 | 2022 | 2014–2016, 2018, 2020 |
| Sport, Samish River, Coho | MSF-WDFW-41 | 2022 | 2009–2011, 2015–2021 |
| Sport, Columbia River Priest Rapids Dam to Chief Joseph Dam, summer Chinook | MSF-WDFW-42 | 2022 | 2016–2021 |
| Sport, Wenatchee River, mouth to Leavenworth, summer Chinook | MSF-WDFW-43 | 2022 | 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 | 2022 | 2016–2021 |
| Sport, Grays Harbor, fall Chinook | MSF-WDFW-46 | 2022 | 2019–2021 |
| Sport, Grays Harbor tributaries (Humptulips only in 2021), fall Chinook | MSF-WDFW-47 | 2019 | 2017–2019, 2021 |
| Sport, Green River, fall Chinook | MSF-WDFW-48 | 2018 | none |
| Test, Columbia River, mouth to Bonneville Dam, fall Chinook | MSF-WDFW-49 | 2022 | 2018–2020 |
| Test, Columbia River, mouth to Bonneville Dam, spring Chinook | MSF-WDFW-50 | 2022 | 2006–2021 |
| Test, Columbia River, Cathlamet, spring Chinook | MSF-WDFW-51 | 2019 | 2013–2018 |
| Test, Columbia River, mouth to Bonneville Dam, Coho | MSF-WDFW-52 | 2022 | 2018–2020 |
| Sport, Dungeness River, Coho | MSF-WDFW-53 | 2022 | 2016–2021 |

| Fishery, Location, Target Species by Agency[1] | Proposal ID[2] | Most Recent Proposal[3] | Years with MSF since 2003[4] |
|---|---|---|---|
| Sport, Icicle Creek, spring Chinook | MSF-WDFW-54 | 2022 | 2019–2021 |
| Sport, Okanogan/Similkameen R. summer Chinook | MSF-WDFW-55 | 2022 | none |
| Sport, Wallace River (Skykomish/Snohomish Trib) | MSF-WDFW-56a | 2022 | 2021 |
| Sport, Nisqually R, Coho | MSF-WDFW-57 | 2022 | 2021 |
| Sport, Clearwater R, Coho | MSF-WDFW-58 | 2022 | 2021 |
| Sport, Columbia R Tributaries - Mouth to McNary Dam, Coho | MSF-WDFW-59 | 2022 | 2017–2021 |
| Sport, Columbia River Tributaries, mouth to McNary Dam (Spring), Chinook | MSF-WDFW-60 | 2022 | 2017–2021 |
| Sport, Columbia River Tributaries, mouth to McNary Dam (Fall), Chinook | MSF-WDFW-61 | 2021 | 2017–2021 |
| **Oregon and Washington Departments of Fish and Wildlife (jointly for Columbia River)** | | | |
| Sport, Lower Columbia River, spring Chinook | MSF-ODFW/WDFW-01 | 2022 | 2003–2021 |
| Sport, Columbia River, summer Chinook | MSF-ODFW/WDFW-02 | 2022 | 2003–2021 |
| Commercial, Lower Columbia River, spring Chinook (large & tangle net) | MSF-ODFW/WDFW-03 | 2022 | 2003–2016 |
| Sport, Lower Columbia R, Coho (since 1999) | MSF-ODFW/WDFW-04 | 2022 | 2003–2021 |
| Sport, Columbia River, fall Chinook | MSF-ODFW/WDFW-05 | 2021 | 2011–2017 |
| Commercial, Lower Columbia River tangle net (from Buoy 10 upstream to Beacon Rock), Coho[9] | MSF-ODFW/WDFW-06 | 2022 | 2013–2016, 2019–2021 |
| 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 | 2022 | 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 | 2022 | 2008–2018 |
| Sport, Oregon coast, Coho | MSF-ODFW-03 | 2014 | 2003–2014 |

| Fishery, Location, Target Species by Agency[1] | Proposal ID[2] | Most Recent Proposal[3] | Years with MSF since 2003[4] |
|---|---|---|---|
| Sport, upstream of Willamette Falls, spring Chinook | MSF-ODFW-04 | 2022 | 2003–2013, 2015–2021 |
| Sport, downstream of Willamette Falls, Coho | MSF-ODFW-05 | 2022 | 2003–2021 |
| Sport, Sandy River to mouth of Salmon River, Coho | MSF-ODFW-06 | 2022 | 2003–2021 |
| Sport, Sandy R, spring Chinook | MSF-ODFW-07 | 2022 | 2003–2021 |
| Commercial, Leadbetter Pt., WA to Cape Falcon, OR, Coho | MSF-ODFW-08 | 2022 | 2010–2021 |
| 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 | 2022 | 2003–2021 |
| 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 | 2022 | 2003–2021 |
| Sport, Willamette R. below Willamette Falls, Chinook | MSF-ODFW-13 | 2022 | 2016–2021 |
| Sport, Umpqua R. and Tributaries, Coho | MSF-ODFW-14 | 2022 | 2014–2021 |
| Commercial Troll, Cape Falcon to the OR/CA border, Coho | MSF-ODFW-15 | 2022 | 2021 |
| **Idaho Department of Fish and Game** | | | |
| Sport, Snake River, on fall Chinook | MSF-IDFG-04 | 2019 | 2009–2018 |
| **Lummi Nation** | | | |
| Treaty net, Nooksack R. (Spring Run), Chinook | MSF-LUMM-01 | 2022 | 2014–2018, 2021 |
| **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.

## *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. 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. | |

~continued~

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. | | |

~continued~

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 complete list of indicator stocks was provided. | | |
| | 2) Yes, CWT indicator stocks are expected, and an incomplete list of indicator stocks was provided. | | |
| | 3) Yes, CWT indicator stocks are expected, but a list of indicator stocks was not 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 complete list of DIT stocks was provided. | | |
| | 2) Yes, DIT stocks are expected, and an incomplete list of DIT stocks was provided. | | |
| | 3) Yes, DIT stocks are expected, but a list of DIT stocks was not provided. | | |

Table E-2 Summary of SFEC's evaluation of proposed 2022 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 2022 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 2022 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 | 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 | No unclipped fish retained to sample. | 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 2022 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 2022 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 | 1.4 | 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 | 1.1 | 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 | 2 | 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-22 | Willapa Tributaries including North, Smith Creek, Willapa, Niawiakum, Palix, Nemah, Naselle, Bear | Sport (MSF) | 1.8 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | There will be a problem in estimating CWT composition of mortalities due to mark and size-mixed bag regulation. Indirect CWT sampling via electronic sampling of escapement. Release information may not be complete | 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. |

**Table E-2. Evaluation of proposed 2022 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-23 | Grays Harbor, Marine Area 2.2 | Sport | 0.5 | 1 | 1,3 | 1 | 3 | 1 | 2 | 1 | 1 | There will be a problem in estimating CWT composition of mortalities due to mark and size-mixed bag regulation. 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. |
| MSF-WDFW-24b | Grays Harbor tributaries - Humptulips | Sport | 2.8 | 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-29 | Willapa Bay, Marine Area 2.1 | Sport (MSF) | 2.8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | CWT estimation issues are similar to those of MSF regular. | Angler surveys and VTRs to get mark rate and sublegal proportion. Direct electronic sampling for CWTs. |
| MSF-WDFW-31a | Quillayute R system (Bogachiel, Calawah, Dickey, Quillayute, Sol Duc) | Sport February through August | 2.2 | 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. |

**Table E-2. Evaluation of proposed 2022 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-31b | Quillayute and Sol Duc | Sport September through November (Mixed-bag) | 1.3 | 3 | 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-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) | 1.9 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | Test fishery. All retained fish are marked and electronically sampled. Unclipped fish released. Numbers of released fish known by mark and size status. | |

**Table E-2. Evaluation of proposed 2022 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-53 | Dungeness River | Sport | 9 | 1 | 3 | 1 | 2 | 1 | 2 | 1 | 0 | Indirect CWT estimation in retained catch. | Catch estimates from CRCs. Indirect estimates of CWTs via electronic sampling at hatchery. . |
| MSF-WDFW-56 | Wallace River | Sport | 3.6 | 1 | 3 | 1 | 2 | 1 | 2 | 1 | 1 | | Catch estimates from CRCs. Indirect estimates of CWTs via electronic sampling at hatchery. |
| MSF-WDFW-57 | Nisqually River | Sport | 5.3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Direct sampling of creel. | Catch estimates from CRCs. Indirect estimates of CWTs via electronic sampling at hatchery. . |
| MSF-WDFW-58 | Clearwater R | Sport | 0.9 | 1 | 3 | 1 | 2 | 1 | 2 | 1 | 0 | | Catch estimates from CRCs. |
| MSF-WDFW-59 | Columbia R. Tributaries – Mouth to McNary Dam | Sport | 1.4 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | CWTs directly sampled. | Catch estimates from CRCs, which provides information on expansions for sampled fish. Releases by mark status not available because effort is not estimated. |

**Table E-2. Evaluation of proposed 2022 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-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. |
| 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. |

**Table E-2. Evaluation of proposed 2022 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-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 | 1.6-1.4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | Sampled at port of landing. No information on released fish is collected. Size information collected only on retained sampled catch. | Fish tickets for total catch estimates. Mark rate determined using the recreational Coho fishery sampling mark rate for the same time and area. |
| MSF-ODFW / WDFW-04 | Columbia R, Mouth upstream to Hood R Bridge, includes Buoy 10 | Sport | 1.93 | 1 | 1 | 1 | 1 | 1 | 1,2 | 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. |
| MSF-ODFW / WDFW-06 | Columbia R, Mouth upstream to Bonneville Dam | Commercial Tangle net | 3.49 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | There is a question of how total releases are estimated and where they are reported. | Random onboard monitoring will record encounters by mark and size status. Retained catch estimates from fish tickets. |

**Table E-2. Evaluation of proposed 2022 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-08 | Columbia R, Mouth upstream to Bonneville Dam | Commercial Purse seine, Beach seine, & Pound net | 1.93 | 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 2022 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 | 11 | 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 2022 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 | 3 | 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-FOC-15 | Sport, WCVI, BC, Marine (Jan to Dec) | Pre-terminal Sport | > 0.67 | 1 | 2 | 2 | 1 | 2 | 2, 4 | 1 | 1 | **New proposal for 2022**, fishery is tentative. | |
| 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 and 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. |

| Table E-3. Evaluation of proposed 2022 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-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. |
| 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. |

| Table E-3. Evaluation of proposed 2022 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-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. |
| MSF-WDFW-19 | Ocean Areas 1–4 | Sport | 1.3 | 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. |

| Table E-3. Evaluation of proposed 2022 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-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 | Commercial | 5.3 | 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. |
| MSF-WDFW-26 | Willapa Bay MA 2.1 | Sport | 6.1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | As currently proposed, Willapa Bay and Ocean fisheries are MSFs. There should be no overlap of catch with non-MSF fisheries | 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 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | CWTs directly sampled | Catch estimates from CRC. |

| Table E-3. Evaluation of proposed 2022 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-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 | 0 | 0 | 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. |
| MSF-WDFW-33 | Hoh River system | Sport | 0.04 | 1 | 3 | 1 | 3 | 3 | 2 | 0 | 0 | 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. |

| Table E-3. Evaluation of proposed 2022 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-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. |
| MSF-WDFW-39 | Lower Grande Ronde R. | Sport | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | | 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. |

| Table E-3. Evaluation of proposed 2022 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-43 | Wenatchee R., mouth to Leavenworth (Summer) | Sport (mixed bag) | 0.4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 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. |
| 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 | Test (pound net trap; fall run) | 0.8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | Estimate mark rate from observers. |
| MSF-WDFW-50 | Columbia R., mouth to Bonneville Dam | Test (tangle net; spring run) | 0.4 | 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. | |

| Table E-3. Evaluation of proposed 2022 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-60 | Columbia R. Tributaries – Mouth to McNary Dam | Sport (spring run) | 17.7 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | Only opportunistic sampling for CWTs. | Catch estimates from CRCs. |
| MSF-WDFW-61 | Columbia R. Tributaries – Mouth to McNary Dam | Sport (fall run) | 1.7 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | Only opportunistic sampling for CWTs. | Catch estimates from CRCs. |
| 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 | 1 | 4 | 2 | 2 | 1 | 0 | No creel conducted above the falls, hatchery recoveries could be however are not currently 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 | 0 | 3 | 1 | 3 | 1 | 0 | No CWT sampling, no creel, no count of released fish. Hatchery location makes it a poor proxy. | Catch estimates from CRCs. CWT composition and sublegal proportions from hatchery. |

| Table E-3. Evaluation of proposed 2022 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-13 | Willamette R. below Willamette Falls (including Multnomah Ch.) and tributaries | Sport (spring run) | 3.5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Released fish all assumed to be unclipped. | Catch estimates from creel/angler interviews. |
| MSF-ODFW / WDFW-01 | Columbia R, Mouth upstream to McNary Dam, and Ringold Hatchery Area | Sport (spring run) | 3.6 | 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) | 2.3 | 1 | 1 | 1 | 2 | 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. |

| Table E-3. Evaluation of proposed 2022 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-03 | Columbia R, Mouth upstream to Bonneville Dam | Commercial Tangle net (spring run) | 3.6 | 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. |
| MSF-ODFW / WDFW-05 | Columbia R, Mouth upstream to McNary Dam, includes Buoy 10 | Sport (fall run) | 0.3 | 3 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | Proposal unclear if fishery will be mark-selective or mixed bag by size and mark status. 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. |

| Table E-3. Evaluation of proposed 2022 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-07 | Columbia R, Mouth upstream to Bonneville Dam. | Commercial Purse seine, Beach seine, & Pound net (fall run) | 0.8 | 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. |
| MSF-Lummi-01 | Nooksack River | Gillnet C&S (spring run) | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | All retained fish sampled electronically sampled for CWTs | |