



Pacific Salmon
Strategy Initiative

Initiative de la Stratégie
relative au saumon du Pacifique

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Mass Marking and Mark-Selective Fisheries Update

Southern BC Chinook Harvest Transformation

Sport Fishing Institute of BC

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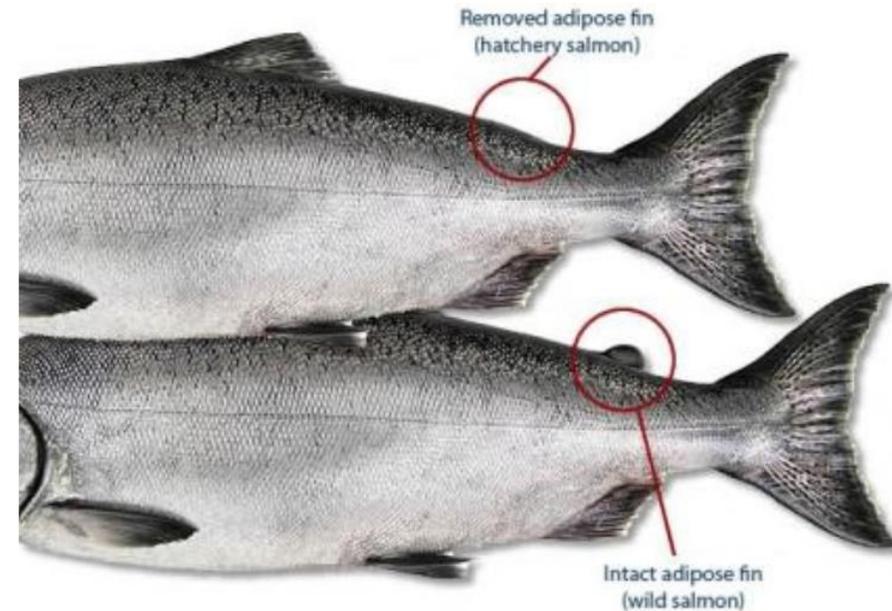
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Overview

This presentation is intended to provide an overview on mass marking (MM) and mark selective fisheries (MSF) as part of the Pacific Salmon Strategy Initiative (PSSI)

- Chinook Status and Conservation Context
- Departmental objectives
- MM and MSF considerations
- Next steps



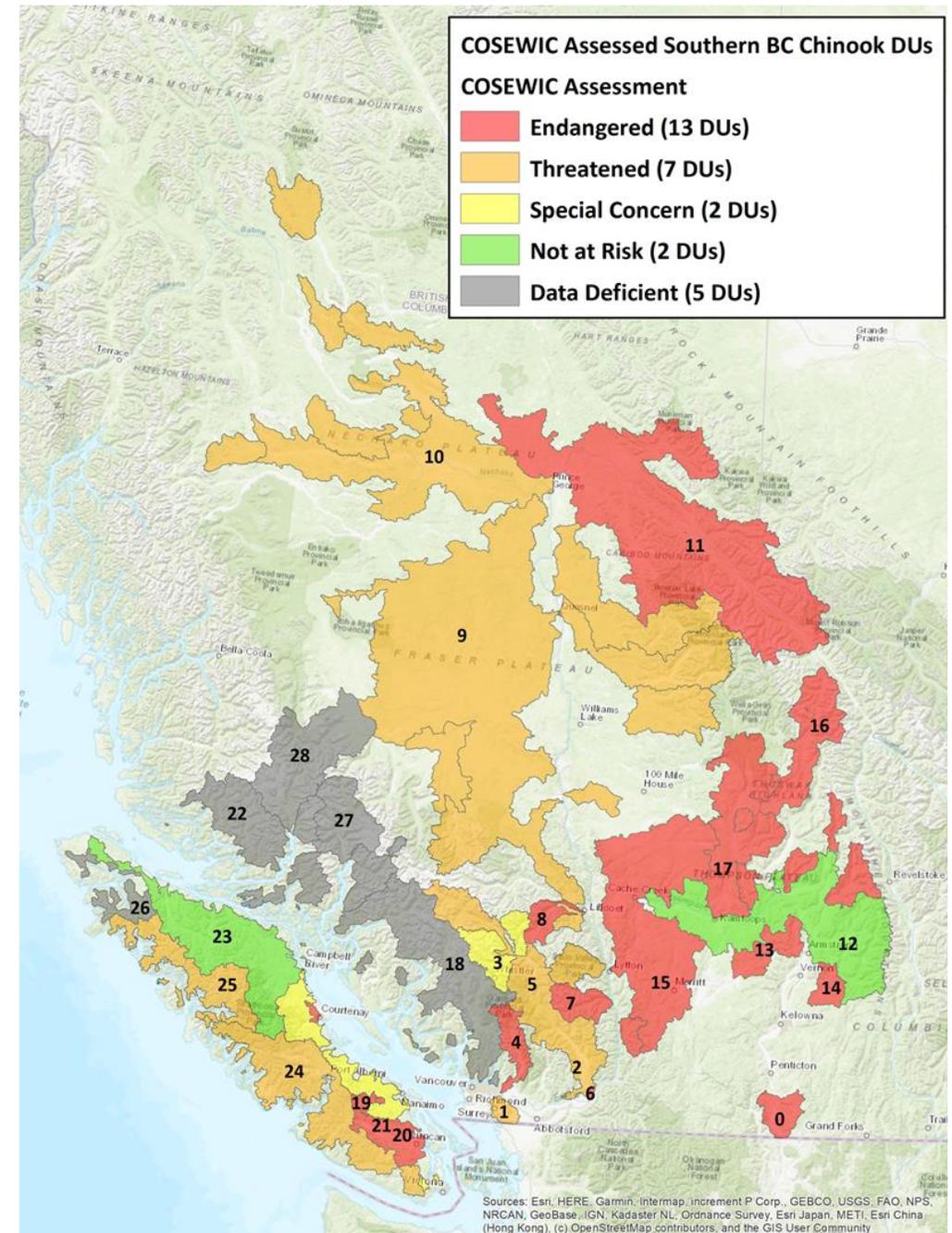


Southern BC Chinook Status

Pressures and threats to salmon stocks are diverse and require significant action through an integrated management approach addressing habitat, harvest, hatcheries and other factors.

A total of **29 Southern BC Chinook populations** have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), with **13 assessed as Endangered**, **seven Threatened**, **two Special Concern**, **two Not at Risk**, and **five Data Deficient**.

These widespread conservation concerns require a **precautionary fisheries management** approach consistent with Departmental Policy and legislation.





Species at Risk Act (SARA) and Fish Stock Provisions

- Key legislation guides recovery of species (Species at Risk Act, SARA) and rebuilding of major fish stocks (Fish Stock Provisions, FSP) under the revised Fisheries Act; number of other policies emphasize conservation priority (e.g. Wild Salmon Policy)

Species At Risk Act

- Minister must make a decision to list or not list all COSEWIC assessed DUs

Fish Stock Provisions – Fisheries Act

- applies to major fish stocks that are prescribed by regulation and require maintenance of prescribed fish stocks at levels necessary to promote their sustainability (s. 6.1); develop and implement rebuilding plans for stocks that have declined to or below their limit reference point, LRP (s. 6.2)
- Three Pacific Salmon stocks (WCVI Chinook, Okanagan Chinook and Interior Fraser River Coho) were included in the Fishery (General) Regulations (FGR) under the Fish Stocks provisions (FSP) in 2022. Feedback on second batch of stocks underway.
 - Work underway to develop rebuilding plans for WCVI Chinook and Okanagan Chinook
- Precautionary approach: for stocks in the Critical Zone (i.e. below LRP), management actions should promote stock growth and keep removals to lowest possible level.



Pacific Salmon Strategy Initiative

- Strategy aims to stem the steep decline of many Pacific salmon populations and to protect and rebuild stocks where possible by implementing a series of immediate and long-term solutions that focus on 4 key areas: ***Conservation and Stewardship, Salmon Enhancement, Harvest Transformation, and Integration and Collaboration.***
- As part of ***Harvest Transformation***, PSSI provides new investments to support potential implementation of Chinook **mass marking (MM)** and **mark-selective fisheries (MSF)** as part of integrated management approach.
- MM and MSF are additional tools that can be used independently or together to help support DFO's objectives to conserve wild Chinook Salmon and to sustainably manage fisheries.



Why consider MM and MSF as tools?

Departmental objectives:

- 1. Improve the conservation of wild salmon by reducing the genetic influence of hatchery production.**
 - Use MM to maximize the inclusion of natural-origin fish in hatchery broodstock.
 - Use MM to reduce the numbers of hatchery fish spawning in the natural environment through removals prior to arrival on spawning grounds (e.g., MSFs).
- 2. Maintain and create potential for sustainable fishery opportunities.**
 - Allow mark selective fishery opportunities (MSFs) for retention of marked hatchery fish when the expected incidental mortality on stocks of concern is within acceptable limits.
 - Improve the cost-effectiveness and benefits of hatchery programs by increasing the proportion of hatchery fish caught.



Why consider MM and MSF as tools? (continued)

3. Use the best available scientific information to inform decision-making.

- Implement marking and monitoring measures to track hatchery genetic influence and other relevant parameters in the natural and hatchery environments through cost-effective sampling methods.
- More accurate estimates of the number of hatchery versus natural origin fish in population assessments (e.g. improved assessment and monitoring of natural and wild salmon in systems influenced by enhancement).
- Capitalize on increased biological understanding (e.g., habitat capacity) of the contributions of hatchery and wild origin salmon and adapt management response.



How can MM improve hatchery management?

Mass marking can be a foundational tool for improved hatchery management to meet multiple objectives, including:

- Monitoring and managing hatchery genetic effects in wild populations (Proportionate Natural Influence, PNI, and stray management)
- Improving effectiveness of hatchery programs (harvest and rebuilding)
- Increased ability to assess wild and hatchery populations
- Enabling harvest access to hatchery fish where appropriate





Mass Marking Considerations

- Current scale of hatchery production: approx. 30M Chinook released annually from DFO facilities in Southern BC, <15% marked
- Mass marking and MSF can but don't always need to be used in tandem; but MM is useful to better meet genetic management objectives.
- There is a time lag in MSF harvest opportunity from new mass marking which is > 3 years from brood year as marked age classes return
- New marking programs require investments and upgrades in infrastructure, training, and staffing



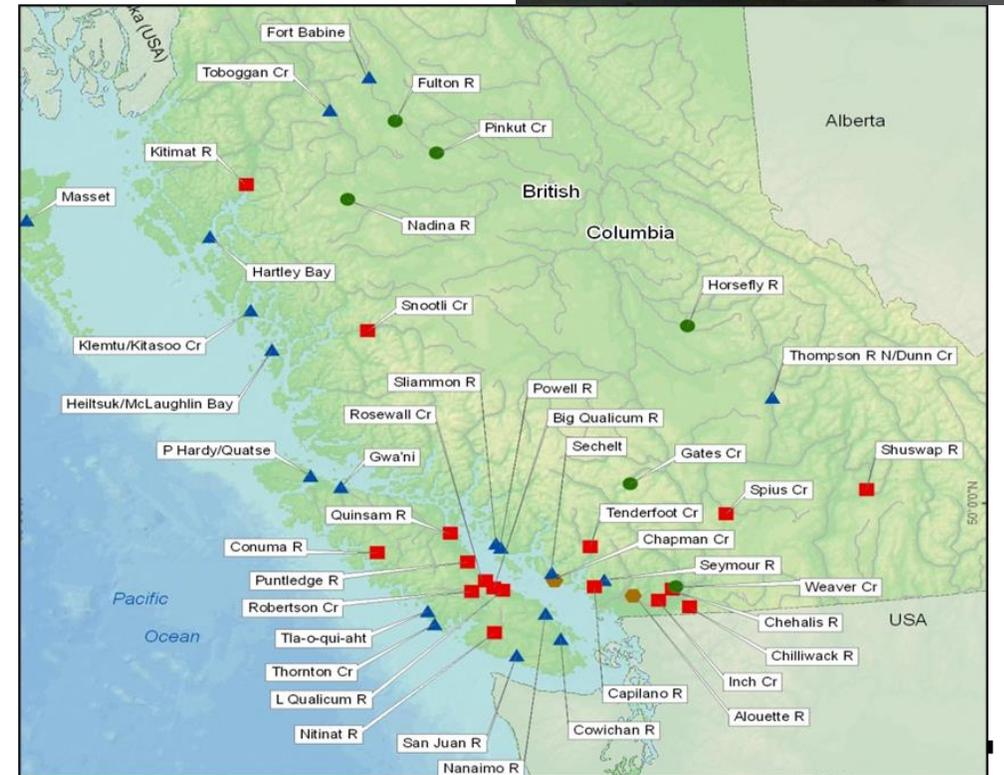
Mass Marking Logistics

Key logistic considerations

- Time (small window of 4 – 7 weeks) to tag/clip 0+ juveniles)
- Geographically dispersed facilities
- Expertise

Infrastructure upgrades to various facilities:

- To accommodate expanded marking and/or marking trailer operation
- for modified escapement/brood sampling





What factors should be considered in using MSF Regulations?

1. Fisheries for which MSF measures can improve access to the benefits of hatchery production while effectively limiting harvest impacts on wild stocks of concern to allowable levels. The expected fishing mortality on non-target stocks is a function of:
 - Stock composition – hatchery composition, mark rate
 - Fishing effort
 - Fishing related incidental mortality (FRIM)
2. The effectiveness of other management measures including gear restrictions, catch limits, size limits, effort limits, etc.
3. Fisheries for which additional MSF opportunities are consistent with salmon allocation priorities and Canada's constitutional obligations to First Nations.
4. Fisheries for which there is adequate monitoring and sampling to provide the information needed to evaluate the risk of MSFs.
5. Fisheries where hatchery fish contribute a large portion of the stock composition and for which the 'mark-rate' is relatively high.



Selective Fishing Principles

Policy for Selective Fishing in Canada's Pacific Fisheries

- **Principle 1** – Conservation of Pacific fisheries stocks is the primary objective and will take precedence in managing the resource.
- **Principle 2** – All Pacific recreational and commercial fisheries will adhere to selective fishing standards within set timelines.
- **Principle 3** – In fisheries where selective harvesting standards are not met within prescribed timelines and bycatch is prevent achievement of conservation objectives fishing opportunities will be curtailed.
- **Principle 4** – *Four fundamental strategies in fishing selectivity to minimize mortalities and maximize chances of for survival of non target fish, invertebrates, seabirds, and marine mammals will be adopted through increased knowledge of fishing gear and practices.*
- **Principle 5** – First Nations and the recreational and commercial fishing sectors will be responsible for continuous learning and skills development and transfer of responsible and selective harvesting practices.





Selective Fishing Mitigation strategies

Avoidance and/or release with minimal harm

- Mitigation strategies were based on selective fishing principles listed in order of importance
 - 1) Avoidance of non target species and stocks through time and area restrictions (most preferred)
 - 2) Avoidance through gear design
 - 3) Release alive and unharmed before being brought aboard or ashore, through gear design
 - 4) Release alive and unharmed from deck of vessel or landing site (least preferred)

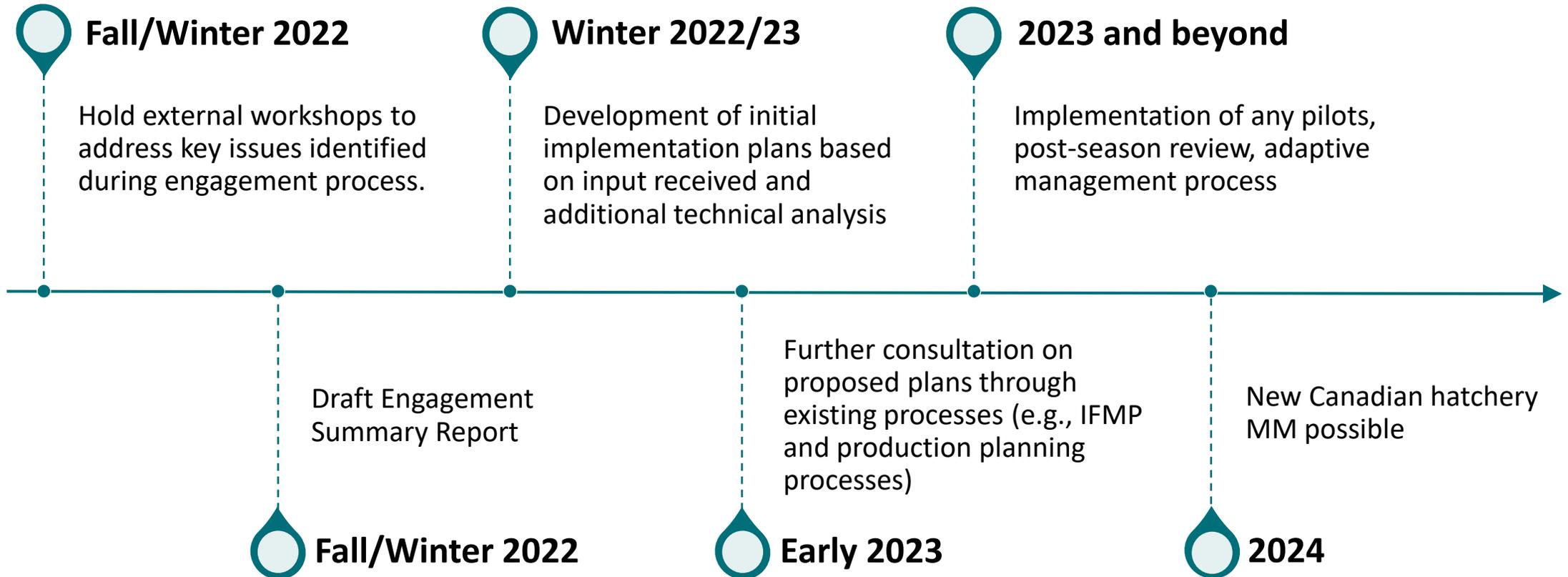


What are the implications for monitoring and assessment programs?

1. When MSF measures are in place, exploitation rate (ER) estimates on Coded-Wire Tagged (CWT) Indicator stocks no longer represent the exploitation on unmarked wild-origin stocks. (Currently, Canada is only adipose clipping Chinook carrying CWTs*)
2. There are significant Pacific Salmon Treaty (PST) implications; however, given the longstanding implementation of MSFs in the southern US, work is already underway through the PST's technical review process to address challenges – e.g. double index tagging and GSI (genetic stock identification) methods are among the tools under review.
3. Fishery-related incidental mortality (FRIM) rates are poorly estimated and may underestimate the real-world rates.
4. Uncertainty in estimates of released catch (e.g. stock composition).
5. The additional cost of enhanced monitoring and sampling programs associated with collecting additional information required to estimate fishery impacts. Some of these costs may not be ongoing



Next steps





Questions?



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Key Definitions

Mass Marking (MM)

- Is the removal of all or a portion of a fin (usually the adipose fin) from most or all hatchery-produced juvenile salmon prior to their release into the natural environment. This 'mark' enables visual detection of hatchery-origin fish and can be used for improved genetic management of hatchery programs. Mass marking also enables the selective harvest or removal of hatchery-origin marked fish where it might be beneficial to do so.

Mark Selective Fisheries (MSF)

- Is a fishery in which regulations permit retention of marked fish and the full or partial release of unmarked fish. The intention is to create a fishing opportunity that imparts a conservation benefit to unmarked, often wild, fish. MSF regulations may be one of many tools used on their own or together with other regulations to manage harvest impacts.