



Pacific Salmon  
Strategy Initiative

Initiative de la Stratégie  
relative au saumon du Pacifique

# Salmon Enhancement: Hatcheries

Presentation to CRRI | November 29, 2022



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# Presentation Overview

**Purpose:** To provide background on DFO's current enhancement programming to support broad rebuilding discussions

## **Content:**

- Background on enhancement programming
- Conservation enhancement in action
  - Cowichan Chinook
  - Squamish Chinook
  - Big Bar experience
- PSSI opportunities

# Background on Enhancement Programming



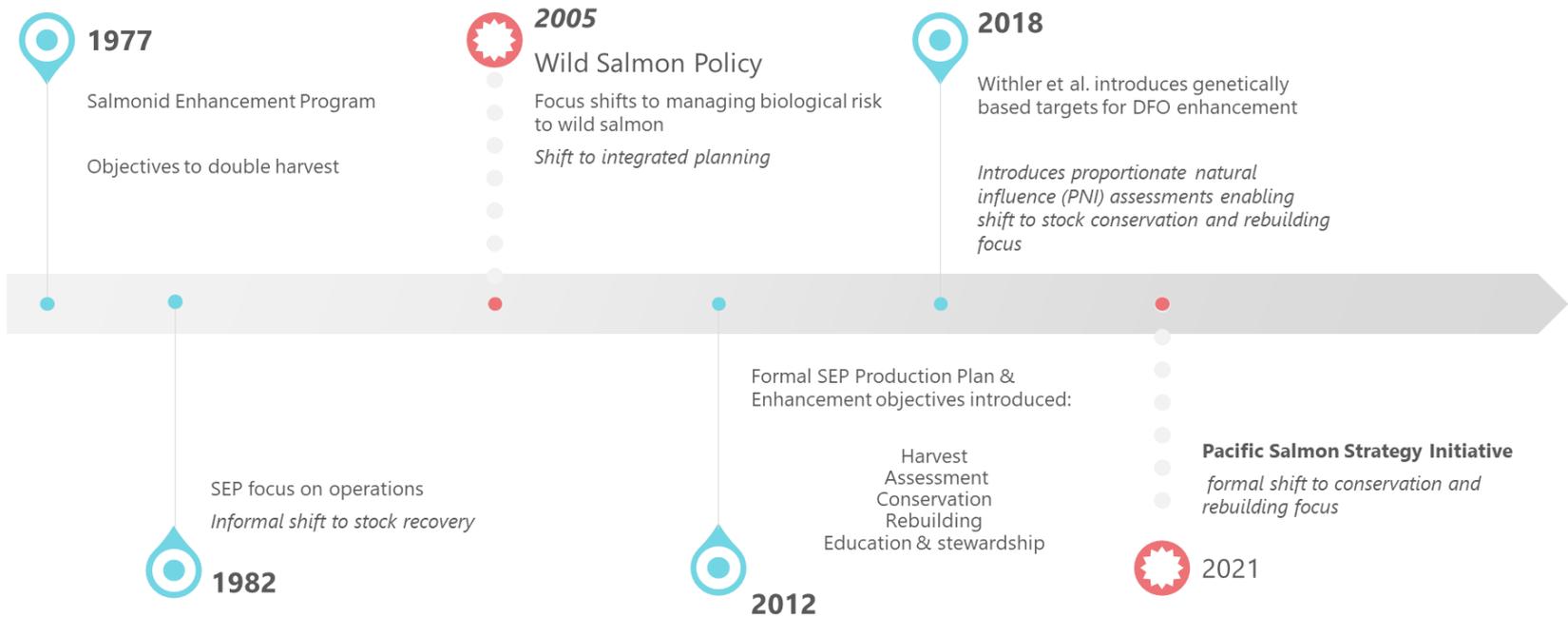


# What is Salmon Enhancement?

- Salmon enhancement in BC typically involves **spawning wild fish and raising the offspring in a hatchery for release back to their natal stream** to supplement salmon generated in the natural ecosystem.
- Enhancement can help address bottlenecks facing wild salmon and support rebuilding.



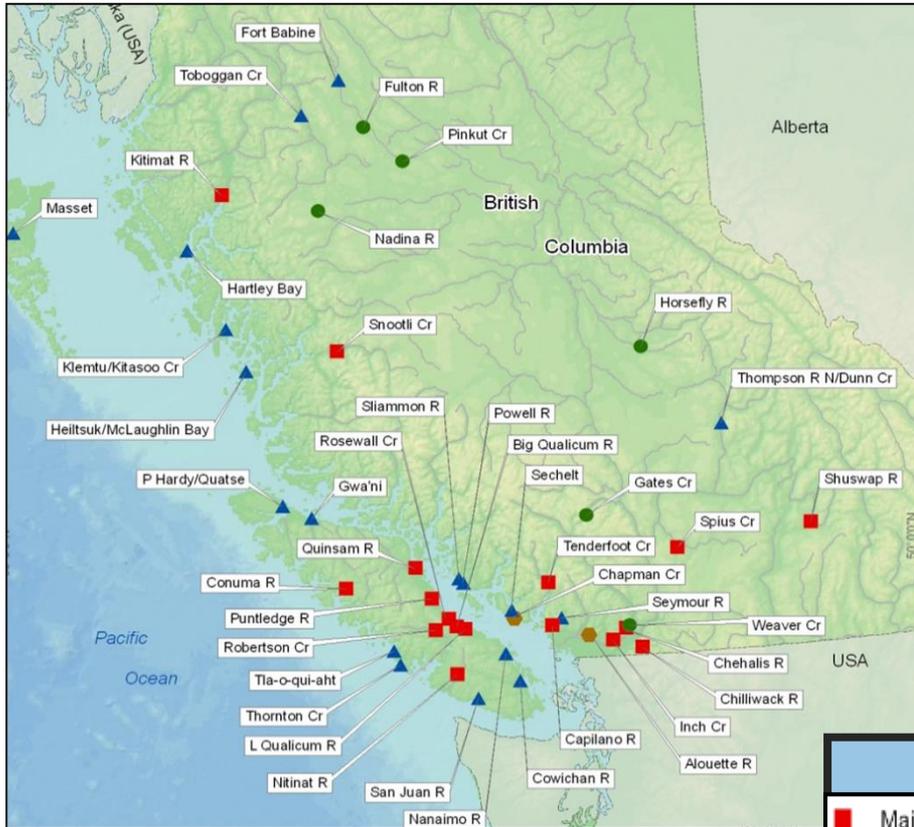
# DFO's Hatchery Objectives Have Changed Over Time



The relative importance of harvest vs. conservation / rebuilding / managing genetic and other risks has shifted over time.



# Enhancement Physical Infrastructure



Currently, DFO's Salmonid Enhancement Program is responsible for:

- 23 DFO operated hatchery and spawning channel facilities
- 17 partner facilities funded through contribution agreements
- 66 volunteer run Public Involvement Program facilities

## LEGEND

- Major SEP Hatchery
- Spawning Channel
- ▲ Community Economic Development Project
- Designated Public Involvement Site\*





# How are activities measured?

## Conservation & Rebuilding

- Support for recovery & stock rebuilding
- Maintain at-risk populations & genetic diversity

## Harvest

- Support for fishing opportunities

## Stock Assessment

- International stock assessment & Pacific Salmon Treaty commitments
- Enumerating adult returns & assess survival rates

## Community Involvement

- Community partnerships
- Building public awareness through engagement & education

Each project must be directed towards at least one of these objectives.

These activities are then assessed to make sure they are meeting their goals.

Activities can be adjusted or eliminated over time to address objectives that have been set.

Objectives are set based on an integrated production planning process.



# What is Integrated Production Planning?



Hatchery production numbers & strategies are confirmed each year through an Annual Integrated Production Planning Process

Plans consider aim to:

- Minimize risks to wild salmon
- Advance defined objectives for each population
- Advance regional, departmental, and program priorities
- Meet Wild Salmon Policy and other GoC Policy goals

Impacts of production changes are seen in fisheries 2 – 5 years later (when hatchery salmon return as adults)

# Conservation Enhancement in Action



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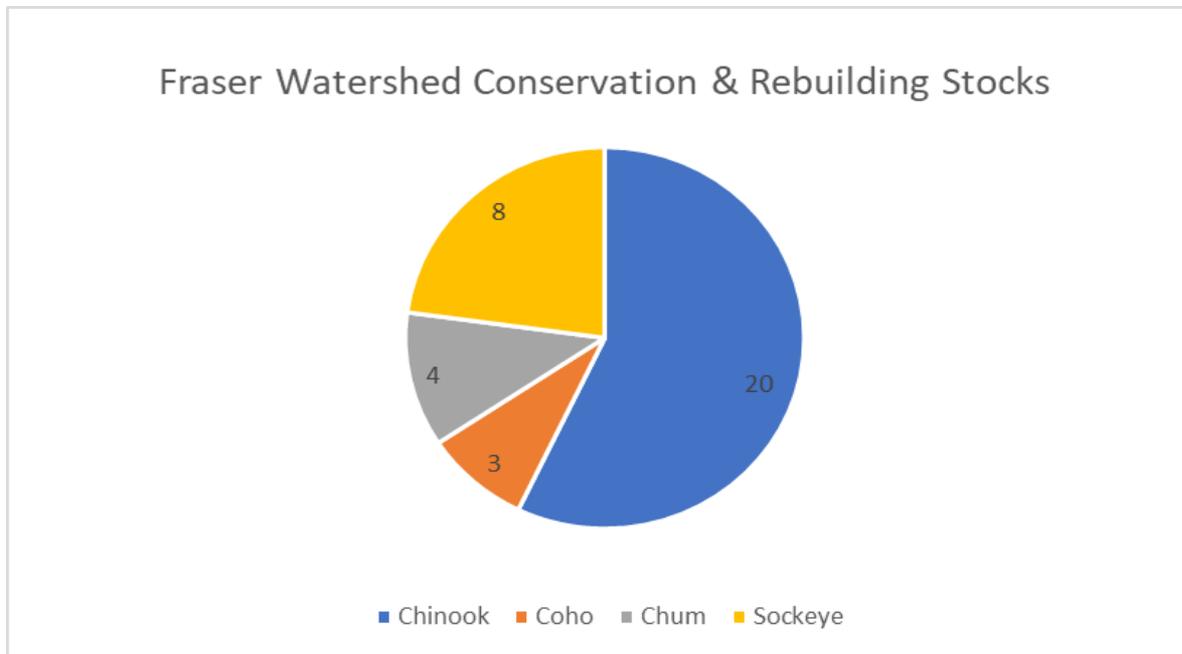
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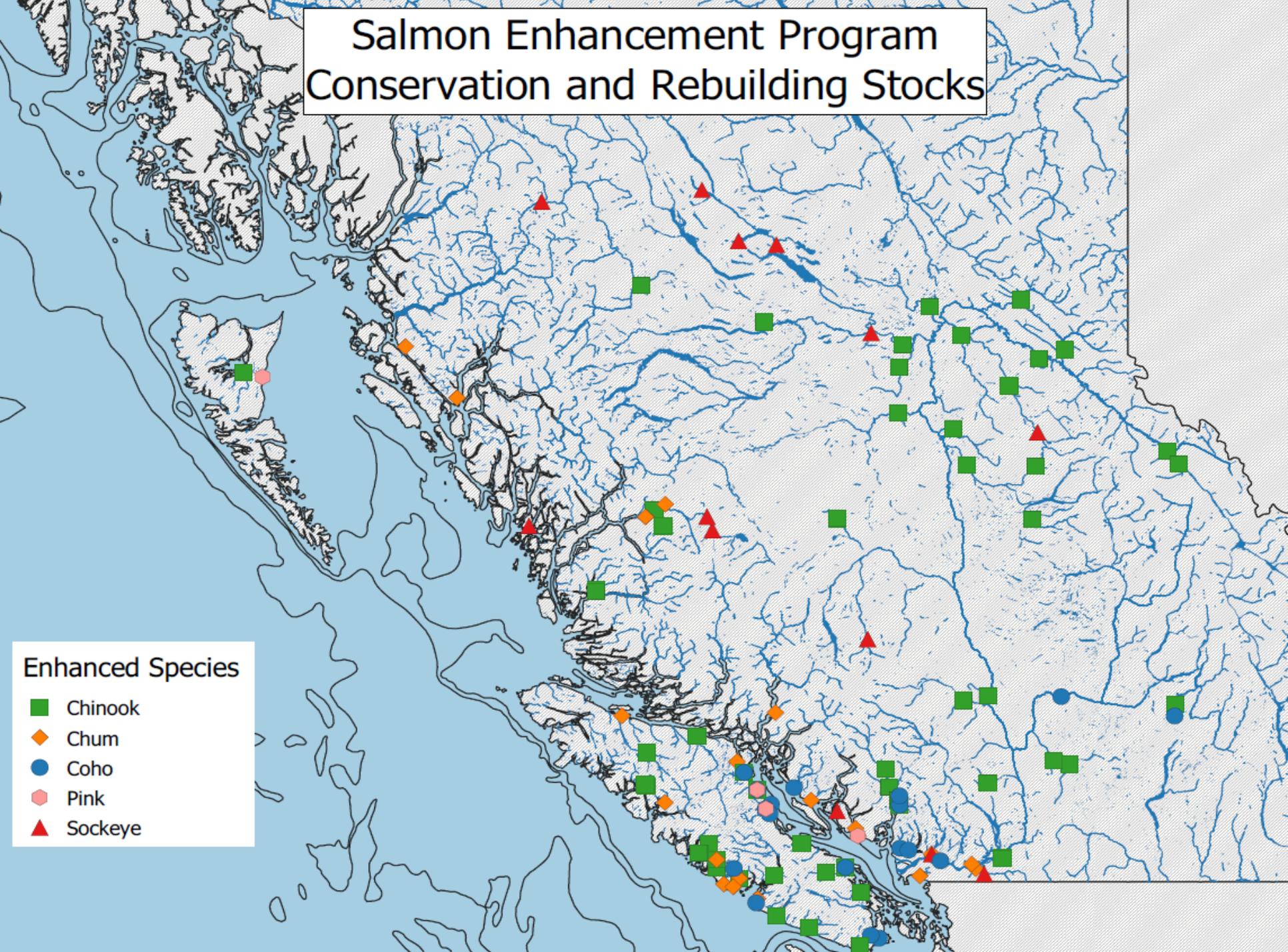
# Conservation & Rebuilding

- Currently, there are 112 Conservation & Rebuilding lines of Production in the Pacific Region
  - Of these, 35 are located in the Fraser Watershed



# Salmon Enhancement Program Conservation and Rebuilding Stocks

- Enhanced Species
- Chinook
  - ◆ Chum
  - Coho
  - Pink
  - ▲ Sockeye





# Enhancement as Part of Integrated Stock Recovery Work: Cowichan Chinook

- Cowichan Chinook, an important coastal population, began to decline in 1994, with an all-time low of 1000 spawners in 2009.
- Decline attributed to poor in-river and estuary rearing habitat.
- DFO, in partnership with Cowichan Tribes, used hatchery production to maintain the population of Cowichan Chinook while habitat issues were addressed. Restoration activities began in the mid 2000s.
- The combination of hatchery and habitat efforts was a great success, in 2021 over 8000 Chinook returned to the river.
- DFO now continues enhancement of Cowichan Chinook solely for the purpose of Pacific Salmon Treaty Assessment.



# Improving Hatchery Effectiveness by Understanding Wild Stocks: Squamish Chinook

- Historically, Tenderfoot Hatchery collected broodstock without consideration of the genetic diversity of the multiple populations in the Squamish system.
- This mixed stock production was intended to support harvest opportunities; however, the wild stocks continued to decline, harvest opportunities were limited, and evidence indicated the enhancement strategy did not match the natural life cycle.
- In 2014, DFO initiated a discrete stock rebuilding program for four populations within the Squamish system, with multiple juvenile release strategies that better reflected the wild stock life history.
- Though more labor intensive, success of the improved practices has allowed the hatchery to decrease enhancement activities and refocus resources on other high-risk stocks in the region.





## Portage Creek Chinook

- Vulnerable single-site conservation unit.
- Chinook population declines over last decade + widespread habitat damage
- In 2016, DFO Stock Assessment proposed strategic enhancement pending further work to assess and address factors limiting the population.
- Initial objective is to preserve unique genetics while limiting factors are identified and addressed - this preliminary goal has been successful.
- Enhancement objectives will be adapted as more is learned about the stock.



## Big Bar Experience

- Following the 2019 discovery of the Big Bar landslide and the near total blockage of salmon migration, initiatives were undertaken to:
  - restore passage
  - implement extensive biological, hydrological and geomorphic monitoring and assessment programs
  - implement biological mitigation strategies consisting primarily of
    - assisted transport
    - emergency conservation enhancement
    - gamete cryopreservation.
- All work was conducted under the leadership of a Joint Executive Steering Committee consisting of 3 levels of government
- The program has conducted 4 years of emergency enhancement which is now transitioning into a middle and upper Fraser rebuilding program, tied to long term Upper Fraser recovery objectives.



## Big Bar Experience

- The program is presently enhancing 11 Chinook and 3 sockeye populations. All COSEWIC listed as Endangered or Threatened.
- 4 DFO facilities and 4 non-DFO facilities are contributing to these enhancement efforts.
  - DFO – Cultus Lake Lab, Inch Creek, Chehalis & Shuswap
  - Non DFO- Quesnel River Research Centre, Takla, Nak'azdli & Spruce City
- Challenges include:
  - remote access
  - large geographical dispersion
  - adult, gamete and fry/smolt release transport distances
- To manage the process, a multi-disciplinary team was assembled consisting of DFO, First Nation and external expert representatives.
- This team oversees all aspects of planning and operations.
- Operations are also a combination of DFO and First Nations biologists and technicians.



## Conservation Enhancement isn't Appropriate Everywhere

- Hatcheries can contribute to stock conservation, but can't do so on their own
- Need to understand stock objectives & limiting factors, and confirm that a hatchery program can help.
- Need to assess operational feasibility (e.g. water, power, workforce, physical infrastructure)
- Enhancement is a technically complex and multi-stage process. It can pose significant risks, particularly in the cases of weak stocks.
  - need clear and robust strategies to address risks in all parts of enhancement operations
  - technical, biological, assessment and administrative capacity required a sustained & ongoing basis

# The PSSI Opportunity



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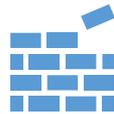
# PSSI presents a significant opportunity to modernize enhancement activities

## Salmon Enhancement Investments



### Modernization

Modernize production towards a focus on conservation, rebuilding and supporting selective fisheries



### Infrastructure

Build new, and update existing, DFO and partner infrastructure



### Expertise

Augment technical, scientific, and policy expertise



### Tools

Improve guidance and decision-making



### Accountability

Increase accountability through transparency and engagement



# Salmon Enhancement

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## **Themes:** Conservation & Harvest focused Enhancement

As part of integrated habitat, hatcheries and harvest (3H) planning, increased capacity to conserve, restore, and enhance priority salmon populations through:

- Construction of new DFO and community-based hatcheries to enable conservation and rebuilding of populations in areas without significant hatchery capacity e.g., Upper Fraser river
- Investment in DFO and community hatchery programs
- Expanded mass marking capacity to allow for improved hatchery genetic conservation outcomes
- Augmented science and fish health capacity and expertise
- Increased policy support and new policy guidance to inform enhancement activities; greater emphasis on conservation-based objectives and approaches





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## Engagement look-ahead for PSSI / Salmon Enhancement

- Regional topics
  - Salmon Enhancement Program Overview (Winter 2022-2023)
  - Hatchery Modernization (Winter 2022-2023)
  - Interim DFO Policy Framework (Winter 2022-2023)
  - Advice for future Enhancement Communication, Engagement & Collaboration (Winter 2022-2023)

### Targeted engagement (localized interest, targeted engagement)

- Community Economic Development Program (CEDP) Phase 1 Investment (Fall 2022 - Ongoing)
- Hatchery Production Alignment with Transformed Fisheries – linked to IFMP process (Winter 2022-2023 & ongoing)