# Assessing the climate-readiness of transboundary fishery assessment frameworks under the Pacific Salmon Treaty

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# The Pacific Salmon Treaty (PST)

Governing salmon shared by Canada and the U.S. since 1985



Treaty ratification, 1985

**1985** **Ratified** by Canada and the U.S. after years of negotiation

**3** **Principles:**
- Prevent overfishing
- Ensure equitable catches
- Facilitate bilateral research and enhancement

**5** **Salmon species:**
Chinook, coho, sockeye, pink and chum

**1000s** **Stocks** from Southeast Alaska to the Columbia River

**8** **Treaty chapters:**

1 Transboundary rivers
2 Nass, Skeena sockeye
3 Chinook salmon
4 Fraser sockeye, pink
5 Coho salmon
6 Southern chum
7 General obligations
8 Yukon River

# How **climate-ready** are the assessment and management frameworks under the Pacific Salmon Treaty?

Findings from the **2023 report** of the **PSC Committee on Scientific Cooperation (CSC)**[1]

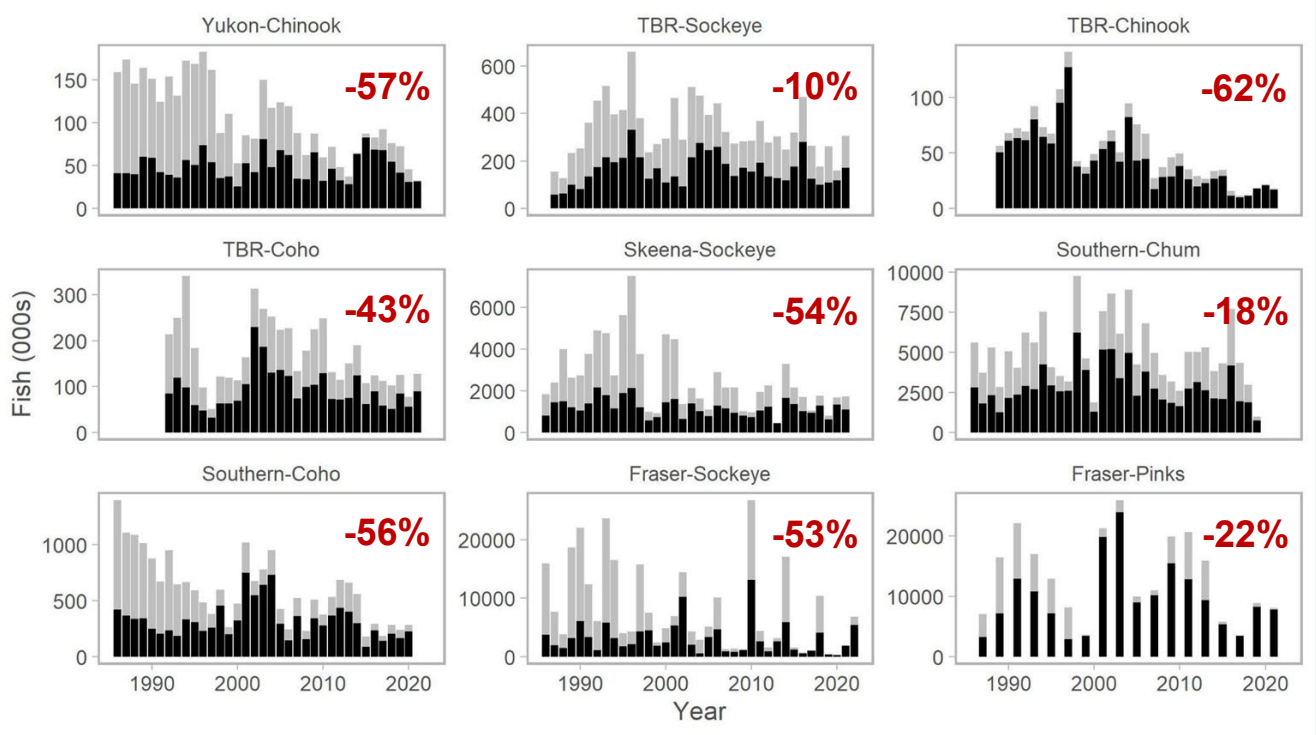


Full report available on the **PSC website**
www.psc.org

1 Standing Committee on Scientific Cooperation. 2023. Assessment and management frameworks of the Pacific Salmon Treaty and their robustness to environmental change. Pacific Salmon Commission, Vancouver, BC.

# Returns fell for all Pacific Salmon stock groups

Labels show % change in run size, 1985–1995 to 2008–2021




Harvest

Spawners

*TBR = transboundary river*

# Climate change may affect every step in salmon management

| Management question | Climate affects… | …which changes |
|---|---|---|
| 1 How many fish should spawn? | **Survival, growth and maturation** | → Population dynamics and reference points |
| 2 How many fish are there? | **Productivity, survival and distribution** | → Pre-season forecasts and in-season run size estimates |
| 3 How many fish can be harvested? | **Survival and distribution at sea** | → Sustainable harvest rates and mixed-stock vulnerability |
| 4 How many fish spawned / were harvested? | **All of the above** | → Counts of spawners and harvest |
| 5 How effective was management? | **Compounding effects** | → Ability of a strategy to meet objectives |

# Pacific Salmon Treaty chapter-specific inventories

Nine topics inventoried for each PST chapter

## The system

1. Salmon species and stocks
2. Fisheries (incl. challenges)
3. Management (incl. objectives and challenges)

## Current assessments

4. Assessments
   - **Annual:** pre- and in-season assessments
   - **Longer-term:** goals, reference points, control rules, MSE
   - Assessment challenges
   - Info to managers

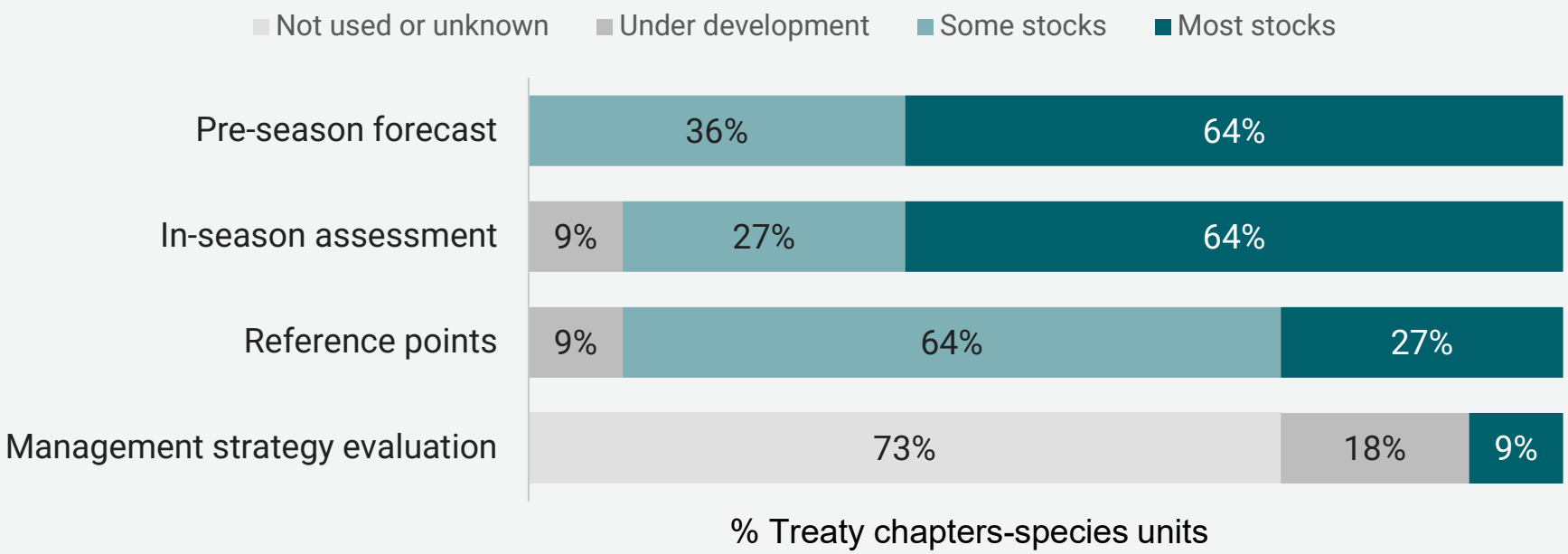
## Climate-readiness

5. Incorporating environmental information (by management tool)
6. Accounting for changes in productivity/survival (by management tool)
7. Accounting for and conveying uncertainty
8. Ability to reach management objectives
9. Planned assessment changes to account for climate change

# Assessment tools across PST chapters

Forecasts and in-season tools are common; management strategy evaluation is rare

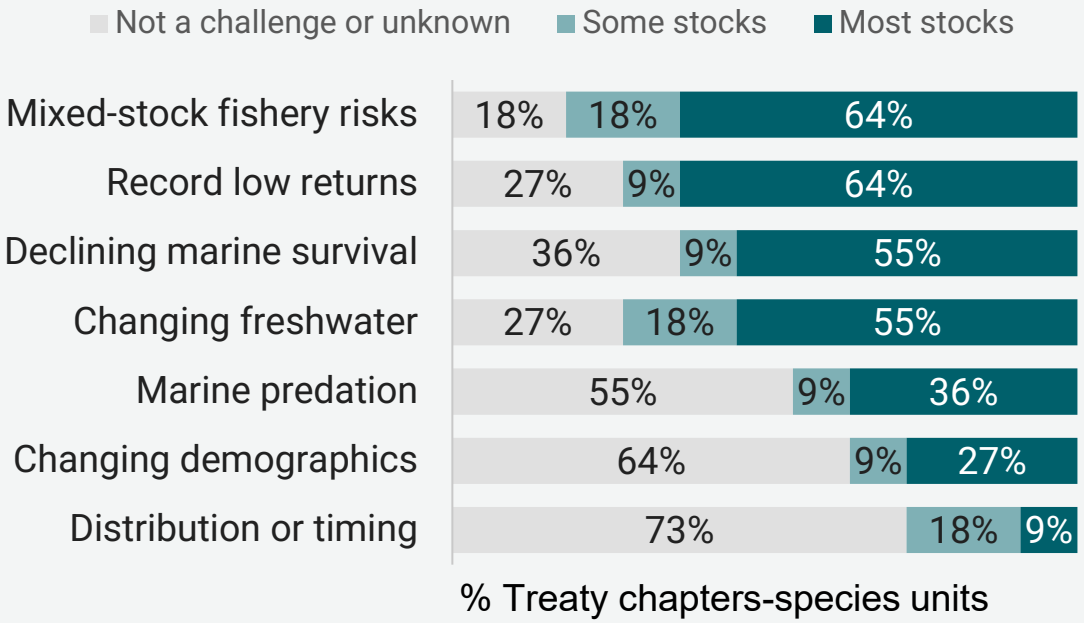
**Share of PST chapter-species units using each assessment tool**



# Assessment and management challenges

## Mixed-stock risks and record low returns affect most stocks

**Share of PST chapter-species units facing various challenges**



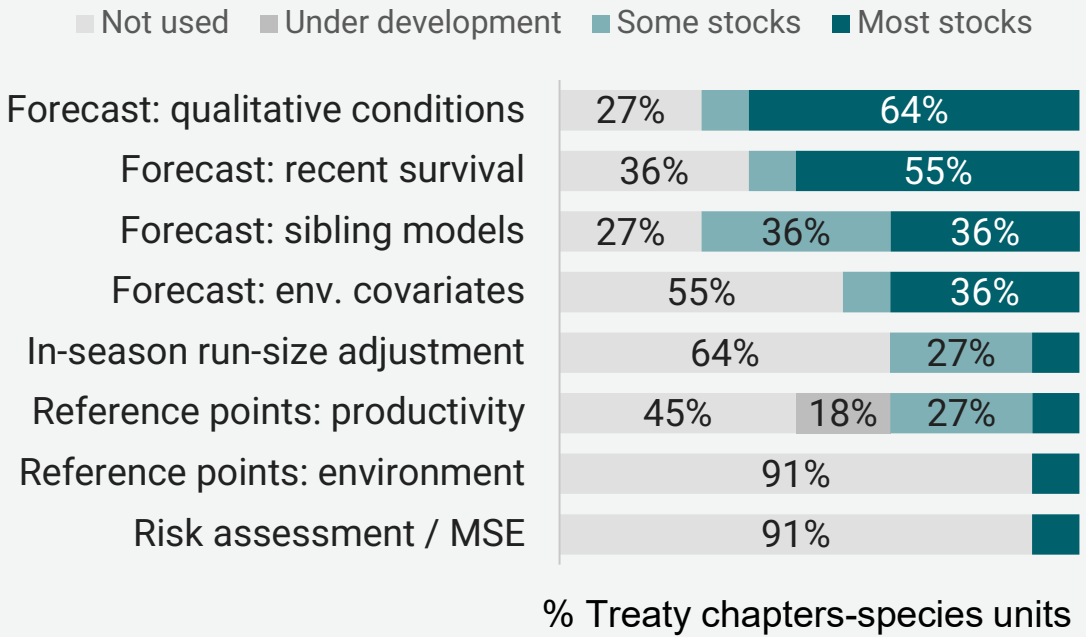

**Why escapement goals were missed?**

- Low productivity and returns
- En-route losses in warm rivers
- Competition at sea
- By-catch in other fisheries
- Overfishing

# Accounting for environmental change

Mostly done in pre-season forecasts; reference points rarely adjust for it

**Share of PST chapter-species units accounting for environmental change**




EXCEPTION

## Fraser River sockeye

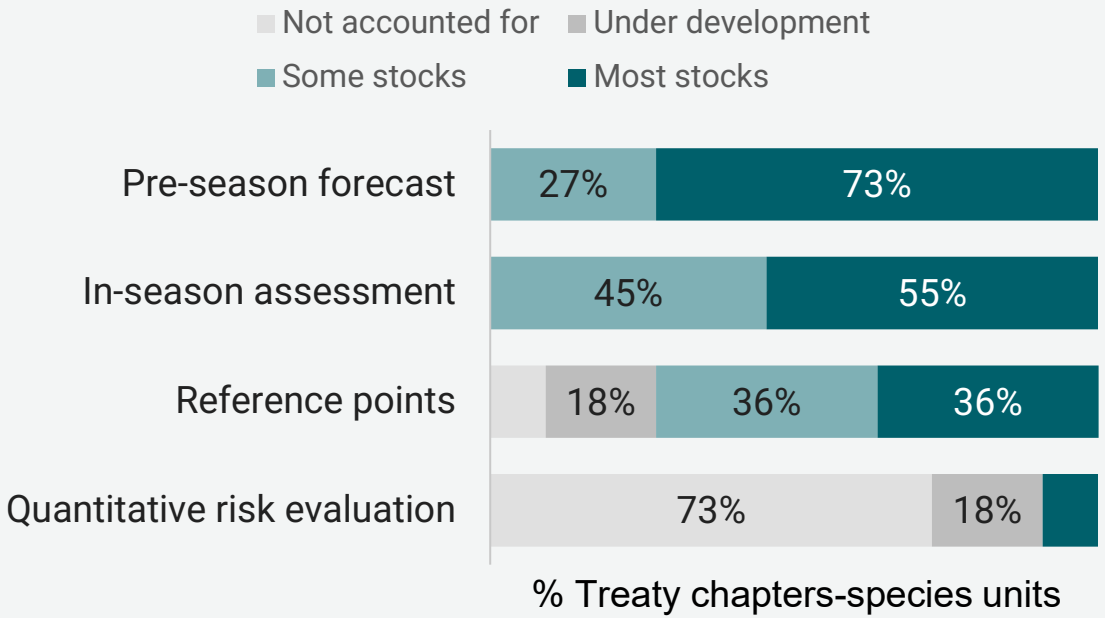
Harvest rules cap **total allowable mortality**, not fishing mortality alone.

When river conditions are forecast to raise en-route mortality, **allowable harvest is reduced**.

# Accounting for, and conveying, uncertainty

Quantified in annual forecasts and assessments, rarely in formal risk evaluation

**Share of PST chapter-species units accounting for uncertainty**




Climate change adds to **all four sources** of uncertainty: natural variation, observation error, model structure and outcomes.

## Emerging best practices

1. **Communicate risk formally** through decision tables, risk matrices
2. **Test procedures for robustness** using simulation, MSE

# Conclusions and next steps

Annual management adapts to changing survival; longer-term goals do not yet

## Working well (with some exceptions)

Annual management goals are met by accounting for changing survival through:

- In-season assessments
- Pre-season forecasts using survival or environmental data

## Needs improvement

- Goals that reflect changing survival
- Reference points for shifting productivity
- Prospective testing of management tools
- Communicating climate-driven risk

**Completed 2024–26:** Committee on Scientific Cooperation (CSC) workshops and info sessions

- **Climate resilience:** workshop
- **Demographic change:** workshop
- **Scenario planning:** workshop
- **Non-stationarity:** workshop and training
- **Info sessions:** feedback, shared approaches
- **Next:** CSC report as a resource

*Workshops and information sessions facilitated by ESSA Technologies Ltd.*

# Questions and **discussion seeds**

We would like to hear from you:

**Data sharing**

What data would you most want shared across borders?

**Reference points**

How have you adapted reference points for shared stocks?

**Risk communication**

How do you convey climate-driven risk to decision-makers?

## Comments

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**FULL REPORT**

*Assessment and management frameworks of the Pacific Salmon Treaty and their robustness to environmental change*

Standing Committee on Scientific Cooperation, Pacific Salmon Commission, 2023