

Technical Briefing

3Ps cod stock assessment
Newfoundland & Labrador
November 2-6, 2020



3Ps Cod Areas

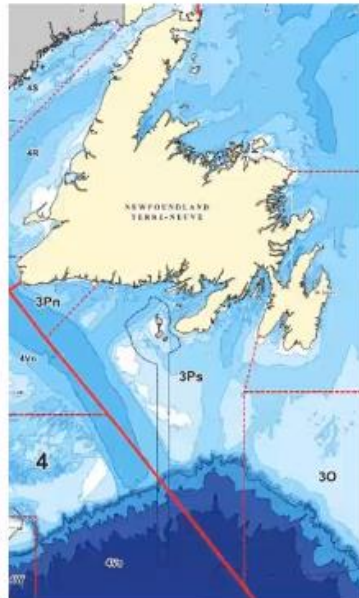
HOW WE ESTIMATE STOCK SIZE

Purpose of this Briefing

- In November 2020, DFO held a Canadian Science Advisory Secretariat (CSAS) regional peer review (RPR) meeting to assess the status of the 3Ps cod stock.
- The peer-reviewed meeting was attended and assessed by an independent, external scientific reviewer.
- This presentation will describe the results of the assessment meeting, as well as the advice provided to fisheries managers. **This stock is co-managed by Canada and France.**

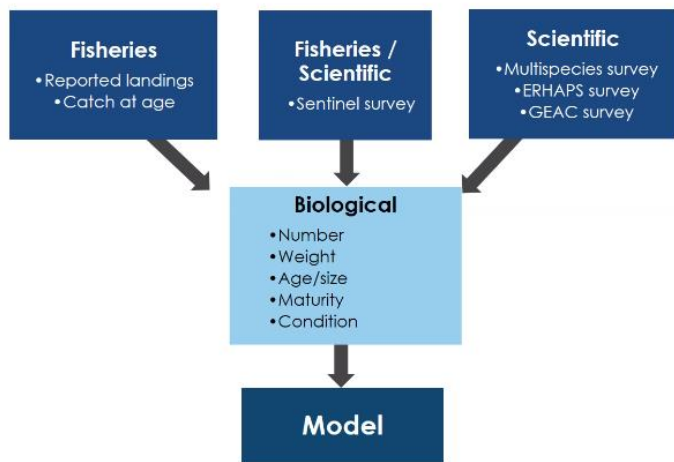
What is CSAS?

A national body that oversees the review and provision of science advice to inform DFO management decisions. Specifically, this group helps organize meetings where DFO scientists, biologists and others, including fish harvesters, university researchers, and other technical experts get together to review scientific information and help inform how commercial fish stocks are managed.



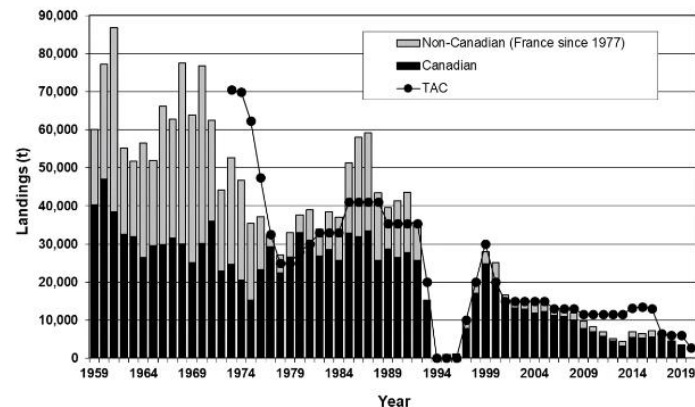
- Stock covers NAFO Subdivision 3Ps – extends from Cape St. Mary's to just west of Burgeo Bank, and over St. Pierre Bank, and most of Green Bank.

Data → Model



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Reported Landings



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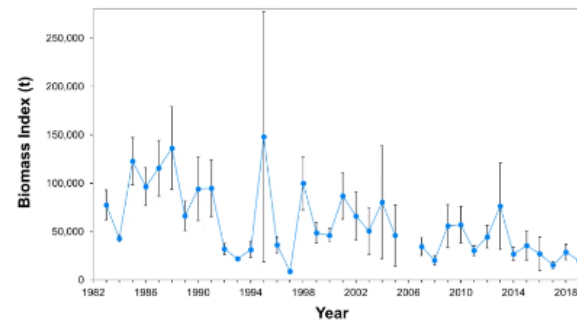
Fishery Data

- Total Allowable Catch (TAC) is shared with France (St. Pierre and Miquelon).
- Total reported landings in 2019-20 were 3,500t compared to 4,700t in 2018-19.
- Only 59% of the TAC was harvested in 2019-20 and only 78%-79% was harvested during the previous two fishing seasons.

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Multispecies Survey

- Number, weight of cod at each tow.
- Also collect otoliths (age), maturity information, diet, etc.
- Forms annual index of abundance and biomass.
- Survey data from 1983 to 2019.



Data Inputs for 2020 Assessment

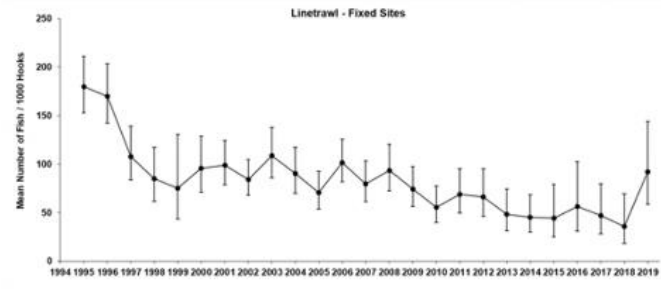
- Due to the ongoing pandemic, the 2020 spring bottom trawl survey did not take place.
- Landings and catch aging data from 2019 were updated and an additional year (2019) of data from the Sentinel survey was added to the model during the 2020 assessment.

OUR FINDINGS

Using the new model: the science behind our advice

Sentinel Index Data – Linetrawl

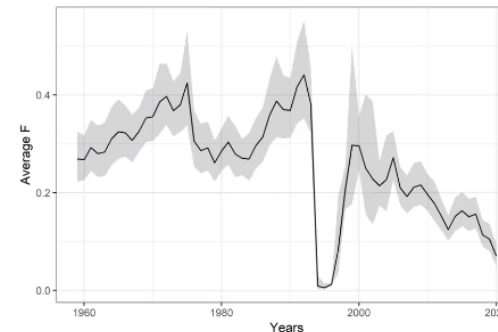
- Catch rates have generally declined over time but the 2019 values were higher than recent values.



- Addition of 2019 data to the model led to an upward revision of the 2020 SSB estimate.

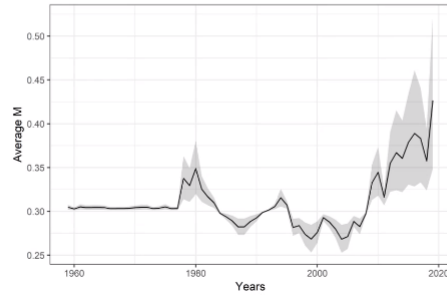
Model results: Fishing mortality

- The estimated fishing mortality rate has been relatively low since 2010. It has been decreasing since 2015.



Model results: Natural mortality

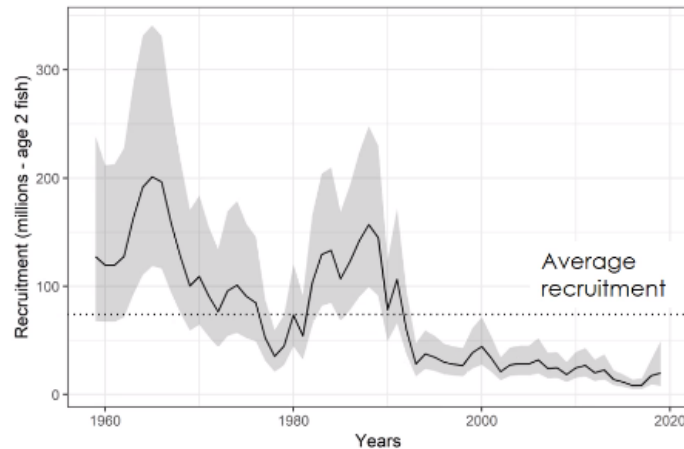
- Natural mortality rates have increased over the last decade and were approximately four times that of fishing mortality in 2019.



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Model Results: Recruitment

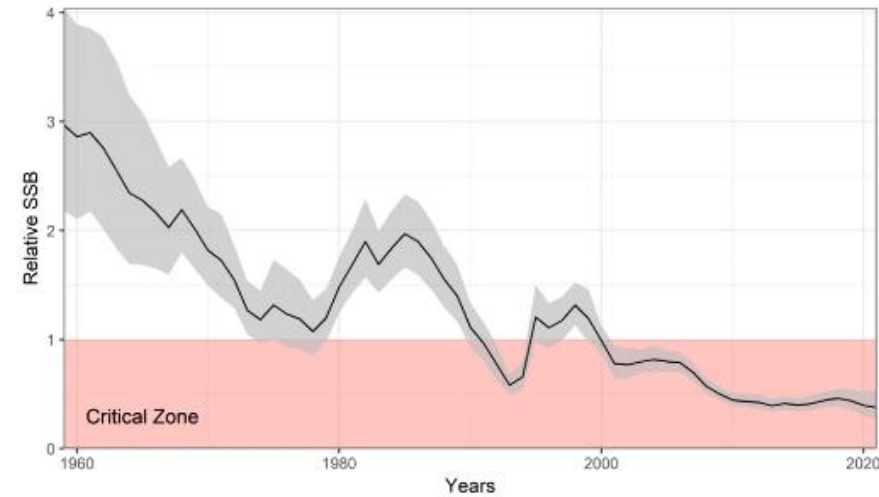
- Recruitment is the number of two-year-old fish that will contribute to the stock in the future.
- Estimates have been below the long-term average since the mid-1990s.



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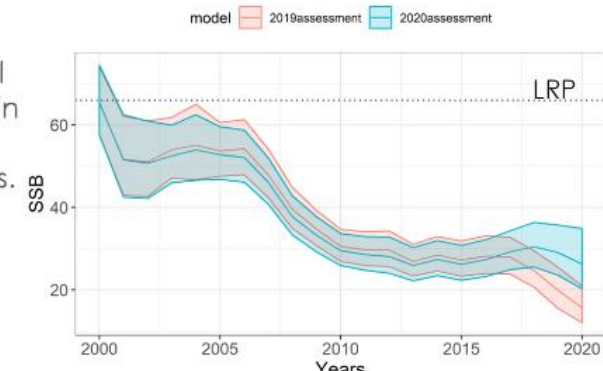
Model results: stock status

- The 3Ps cod stock is in the critical zone (at 38% of the limit reference point).



Revised SSB

- Increase in Sentinel linetrawl catch rates in 2019 caused a considerable increase in the 2020 SSB estimate.
- Many more older fish were caught during the 2019 Sentinel Survey.
- No 2020 bottom trawl survey. Model inputs in terminal year differ between assessments.

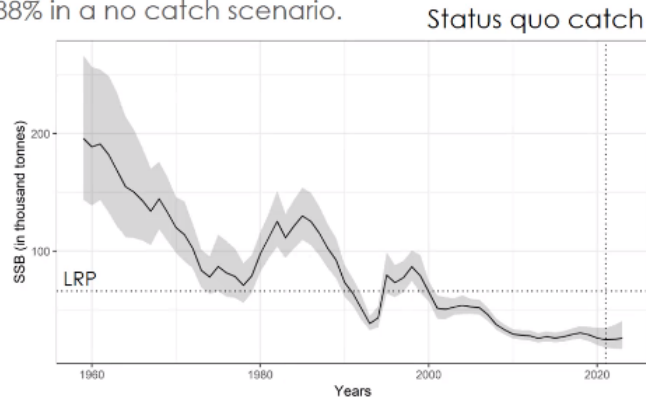


A Changing Ecosystem

- Various factors suggest that the 3Ps ecosystem is undergoing structural changes such as:
 - Increase in proportion of cod in poor condition.
 - Ongoing warming trends.
 - An increase in the biomass of warm water fishes (e.g. silver hake).

Projections to 2023

- Under various fishing scenarios, there is a high probability that the stock will remain in the critical zone between 2021 and the beginning of 2023.
- The probability of stock growth increases as removals decrease:
 - It is 58% in a scenario with status quo catch.
 - It is 88% in a no catch scenario.



Advice

- The DFO decision-making framework incorporating the precautionary approach requires that removals from all sources must be kept at the lowest possible level until the stock clears the critical zone.

Key Takeaways

- The 3Ps cod stock is in the critical zone.
- Natural mortality is a significant factor in current stock status. Data show that natural mortality rates have been increasing over the last decade and is at their highest recorded levels.
- The stock is unlikely to clear the critical zone by early 2023.
- The precautionary approach requires that removals be kept at the lowest possible levels.

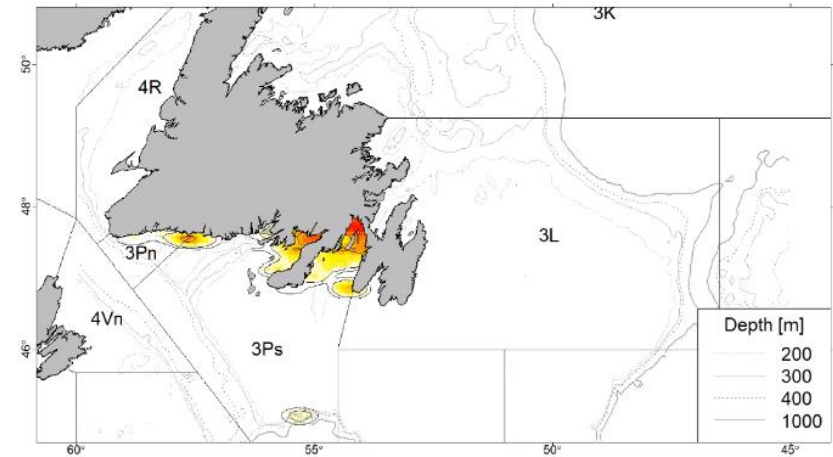
2020 cod tagging and telemetry update

Annual numbers of cod released in 3Ps with low reward (\$10) or high reward (\$100) tags

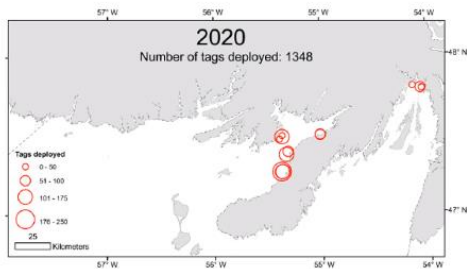


Release Year	Reward		Total
	Low	High	
2007	3410	480	3890
2008	315	80	395
2009	2006	504	2510
2010	817	205	1022
2011	767	196	963
2012	1869	471	2340
2013	3153	798	3951
2014	790	200	990
2015	994	256	1250
2016	401	101	502
2017	1587	405	1990
2018	283	76	359
2019	1927	466	2393
2020	1077	271	1348

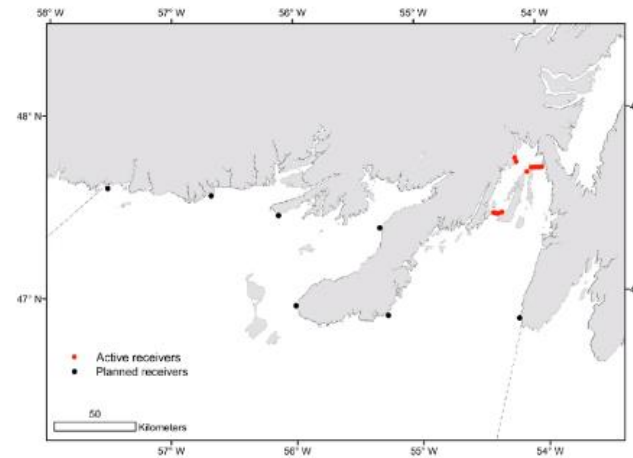
Locations of tag recoveries for 3Ps Cod 2007-2019



Distribution of tagging in 2020



Telemetry projects



Ongoing
 Inner Placentia Bay -
 2019-present (red
 dots)
 - 43 of 65 tagged
 cod recorded.

Planned
 Coastal monitoring
 (black dots)
 - receivers to be
 deployed this month