

Monday, May 31, 2021

COUNTING FISH: WHY FISHERIES MONITORING MATTERS



By Devan Archibald, Jennifer Whyte
and Robert Rangeley

OCEANA Protecting the
World's Oceans

Executive Summary

It is impossible to manage the unknown. Yet too often that is exactly how Canada is managing its fisheries: trying to make decisions with an incomplete picture of how many fish are actually caught. Shockingly, we do not have an estimate of the rate at which fish are being harvested (known as fishing mortality) for 80 per cent of Canada's wild marine fish populations. Even for the 20 per cent that do have fishing mortality estimates, we don't have the full picture. These estimates often neglect to include all sources of fishing and commonly ignore recreational fishing, bycatch (the unintended catch of non-target species) and food, social and ceremonial sources of fishing.

Knowing how many fish are caught is crucial for making good management decisions. Without this information, it is easy to overfish stocks, tipping the population toward depletion or collapse. With good monitoring, we can learn about where and when fish harvesting takes place and how much of each species is removed from the population. We need these accurate estimates to preserve both the long-term health of fish populations and the fisheries that communities rely on.

The federal government has called for the "Blue Economy" – the sum of all ocean-based economic activity – to play a key part in Canada's COVID-19 recovery plan and vision for the oceans. Healthy, wild fish populations that support commercial fisheries, our seafood industry, wildlife and tourism must be at the centre of this blue economy. Indeed, they support its biggest sector: the largest driver of Canada's \$32 billion in GDP and 300,000 jobs is seafood.¹ Managing these ocean resources well is only possible with accurate information.

Canada's [Fishery Monitoring Policy](#) was created to address the critical need for dependable data on how much fish is removed from the sea.² The policy was approved in 2019 and lays out how fishery monitoring will be implemented.² It provides clear guidance on objectives, principles, program design, priority setting tools, accountabilities and costs to improve current standards of monitoring across fisheries. Prior to the adoption of this policy, there were no national standards for fishery monitoring in Canada, leading to inconsistencies and data quality issues affecting Canada's ability to sustainably manage fish populations. Once applied, the new policy will ensure monitoring aligns with the risk fisheries pose to fish populations and the ecosystem. Globally, this policy approach is unique and offers the opportunity for Canada to be an international leader.

Unfortunately, Fisheries and Oceans Canada (DFO) has not demonstrated any meaningful progress toward implementing this critical policy. With only a quarter of Canada's fish populations known to be healthy,³ now is the time to act. Without dependable data on how many fish are removed from Canada's three oceans, overfishing and depletion of Canadian fisheries will continue.

DFO urgently needs to implement this policy to ensure that Canada's lucrative and culturally important wild fisheries will be adequately monitored. Oceana Canada recommends that it prioritize the following actions:

1. Provide dedicated operating resources for policy implementation over the next five years to deliver dependable estimates of fishing mortality from all sources for all major fish stocks;
2. Include policy implementation progress in the annual Sustainable Fisheries Framework work plan, prioritizing stocks suspected of having fishery monitoring data quality issues, and including at least five stocks for complete implementation in each DFO Region every year until the policy has been implemented for all major stocks; and
3. Provide performance measurements that evaluate progress to achieve the policy objectives for all major stocks in a published annual report to the Minister with targets and timelines for nationwide implementation starting in 2021.

Introduction

The federal government has made important amendments to the *Fisheries Act*⁴ in an effort to improve Canada's approach to fisheries management. However, by failing to implement its own Fishery Monitoring Policy, these good intentions won't be realized. The *Act* now states that fish populations must be maintained at or above levels necessary to promote sustainability and rebuilding plans are required for critically depleted stocks. The *Act* now also references long-standing policies^{5,6} such as the precautionary approach, which states that the absence of information is not a reason to postpone or fail to take action to avoid potential serious harm.

Regulations supporting the rebuilding provisions of the new *Act* are now being developed and have the potential to provide the path to a brighter future for Canada's fisheries.⁷ But without dependable monitoring, it will be difficult to ensure regulatory compliance and realize the intended benefits of the new regulations.

Maintaining fishing at levels that do not threaten the overall health and resilience of fish populations is the goal of sustainable fisheries management, which can be summed up in seven basic steps that should be repeated annually:ⁱ

1. Conduct a science-based survey that provides information to estimate how many fish are in the water;
2. Produce a stock assessment that estimates the current and projected future population level;
3. Calculate the Maximum Sustainable Yield (MSY), or a proxy for it, to determine the number of removals the population can withstand and remain at healthy levels.
4. Consult with Indigenous groups and other stakeholders;
5. Decide on harvest levels and allocate the quota among harvesters;

ⁱ This is a generalized simplification of an annual fisheries management cycle in Canada. Actual practice may differ. For example, a given stock may be on a two-year management cycle instead of annual. Also, note that DFO does not always estimate MSY, or even a proxy for it, but usually, at minimum, science advice is provided in relation to harvest levels provided by management.

6. Monitor fishing catches to estimate how many fish are removed; and
7. Evaluate and repeat.

Dependable fishery monitoring is key; without it the integrity of the entire process is at risk.

What is Fishery Monitoring?

Fishery monitoring involves a range of activities designed to determine the volume, timing and location of fish harvesting. It provides data that is invaluable for making management decisions by helping establish the number of fish that can be caught without depleting the overall population. DFO staff, fishers, fish buyers and independent third-party monitoring companies are all responsible for providing this data. Monitoring tools can include logbooks, at-sea observers and electric monitoring. The method used depends on the fishery and the type of information being collected.⁸

Fishery Monitoring Collects Data On:

- Amount of gear and time spent fishing (catch and effort) for a targeted fishery;
- Retained and discarded bycatch (the non-target catch);
- Habitat impacts and threatened species interactions;
- Length, age, weight and other biological measures (e.g., genetics) important to fisheries science and fish stock assessments; and
- Compliance with the rules, such as gear type and fishing location.

This information is useful for scientific assessments that evaluate fish stock health and for understanding the impacts of proposed management measures, such as setting quotas. It is necessary to ensure quotas (and other management measures) are adhered to by allowing DFO to estimate total removals throughout the fishing season. Fishery monitoring is important for managing bycatch as well as identifying impacts to sensitive habitat and species at risk.

An important consequence of good fishery monitoring is more certainty in fisheries science, and it is also essential for compliance and enforcement. This provides a way to make sure that everyone is following the rules and that new policies are being effectively implemented on the water. Good fishery monitoring has economic impacts too. It can help fisheries meet eco-certification standards, resulting in higher prices to harvesters for their catch. It also facilitates international reporting and helps the fishing industry meet import requirements in other countries, ensuring valuable export markets remain in place or opening the door for new markets to be developed.

Effective fishery monitoring is also necessary for DFO to meet its own policy objectives,⁹ including the Policy on Managing Bycatch (2013)¹⁰ and A Fishery Decision-Making Framework Incorporating the Precautionary Approach (2009).¹¹ Both policies require monitoring of all

fisheries catches (intentionally or as bycatch) to account for total fishing removals from the population.

The Fishery Monitoring Policy

The Fishery Monitoring Policy for the first time provides direction for the design and review of monitoring programs, addressing gaps in data adequacy, quality and consistency for Canada's wild fish populations.¹ It establishes three overall objectives that each program must meet while adhering to four guiding principles during program design or review.

Objectives

1. Dependable, timely and accessible fishery information necessary to help ensure that Canadian fisheries are managed to support the sustainable harvest of aquatic species.
2. Dependable, timely and accessible fishery information necessary to carry out enforcement activities to ensure compliance with the *Fisheries Act*, the *Oceans Act*, the *Species at Risk Act* and their associated regulations.
3. Apply a common set of procedural steps to establish fishery monitoring requirements across fisheries, to ensure consistent application of the policy.

Principles

1. Respect Indigenous and Treaty rights.
2. Respond to the degree of risk associated with the fisheryⁱⁱ and the complexity of the fishery.
3. Achieve the fishery and policy objectives while taking into account cost-effectiveness and practicality of implementation.
4. Shared accountability and responsibility.

ⁱⁱ Risk is defined both in terms of risk the fishery presents to the ecosystem and risk of non-compliance with the rules.

Implementing the Policy

This policy was developed by DFO as a means to improve data quality to the level used in modern fisheries science and management. Once implemented, it will tailor monitoring requirements to the risk levels posed by respective fisheries to fish populations and the ecosystem. The policy can also improve transparency and public confidence in management, while contributing to more stability and better market access for the fishing industry.

Continued implementation delays risks harming the very industry and fish populations the policy is intended to support. Despite being released two years ago, it has yet to be fully implemented in any fishery. However, there are encouraging signs of progress more recently: this year, for the first time, implementing the policy was included in the 2021/22 Sustainable Fisheries Framework work plan, which outlines priorities for DFO.¹² But this addition only includes a few stocks and none will have the policy completely implemented this year.

The policy requires fishery monitoring programs to have specific monitoring objectives tied to fishery or population-level objectives, aimed at collecting the required data with an acceptable level of dependability, timeliness and accessibility. Specific monitoring objectives currently do not exist for any fishery in Canada.³ It also comes with a companion document outlining a six-step process to guide how to get to consistent national implementation:¹³

1. Prioritize fisheries or fish populations for assessment;
2. For each, assess the existing monitoring program using risk screening and data quality assessment tools. Use the output in a gap analysis to determine if improvements are needed to current monitoring objectives, data requirements and/or the monitoring program;
3. Adjust or set conservation and compliance monitoring objectives;
4. Specify monitoring requirements (i.e., the tools and levels of use);
5. Operationalize the program by outlining and implementing it through the appropriate fishery planning processes already in place; and
6. Review the program against the monitoring objectives and report results.

Recommendations

If the policy is effectively implemented – which experts at DFO continue to recognize and advocate for – Canada will have better science and data-driven fisheries management, which supports rebuilding depleted fish populations. Canada now has national standards and tools for monitoring that, when applied, will ensure monitoring aligns with the risk fisheries pose to fish populations and the ecosystem. Globally, this policy approach is unique and offers the opportunity for Canada to be an international leader.

It will take time to gather enough of the data required to make good use of it. Continued delays in implementation will therefore delay the benefits of rebuilding fish abundance and make other DFO commitments harder to achieve, including the rebuilding mandate outlined in the amended *Fisheries Act*.

To address ongoing weaknesses in monitoring in Canada and to facilitate timely implementation of the Fishery Monitoring Policy, Oceana Canada recommends that DFO prioritize the following actions:

1. Provide dedicated operating resources for policy implementation over the next five years to deliver dependable estimates of fishing mortality from all sources for all major fish stocks;
2. Include policy implementation progress in the annual Sustainable Fisheries Framework work plan, prioritizing stocks suspected of having fishery monitoring data quality issues, and including at least five stocks for complete implementation in each DFO Region every year until the policy has been implemented for all major stocks; and
3. Provide performance measurements that evaluate progress to achieve the policy objectives for all major stocks in a published annual report to the Minister with targets and timelines for nationwide implementation starting in 2021.

Conclusion:

Amending the *Fisheries Act* to include a duty to rebuild depleted fish populations provided an opportunity to restore the abundance of Canada’s wild fisheries. Our ability to realize this potential depends on DFO accurately measuring and managing these fisheries by implementing the Fishery Monitoring Policy.

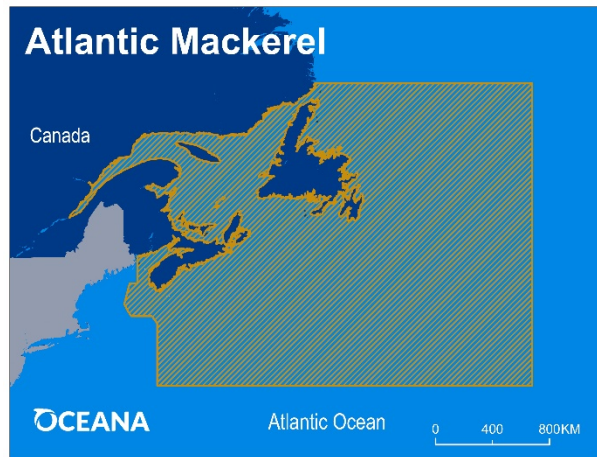
Canada must monitor all sources of fishing mortality to create effective rebuilding plans if healthy wild fisheries are to retain their historically important contribution to communities, to Canada’s Blue Economy and to global food security.

The following pages provide three case studies that illustrate how Canada’s current approach to fishery monitoring is inadequate. Each one highlights how the Fishery Monitoring Policy could support rebuilding and healthy, abundant oceans for the benefit of coastal communities.

Case study: Atlantic Mackerel – Monitoring Failures Undermine Rebuilding This Valuable and Depleted Species

Atlantic mackerel (*Scomber scombrus*) is a critically depleted forage fish that serves as important prey in the ecosystem. It is fished in the Maritimes, Newfoundland and Labrador, and Quebec (NAFO subareas 3-4).^{14,15}

Monitoring failures have created large uncertainties for this critically depleted stock: as DFO attempts to rebuild the population, it simply does not know how much is being fished.¹⁶ Stronger monitoring, particularly for the bait and recreational fisheries, will provide the information needed to rigorously manage and limit all sources of fishing mortality on this vulnerable and valuable species.



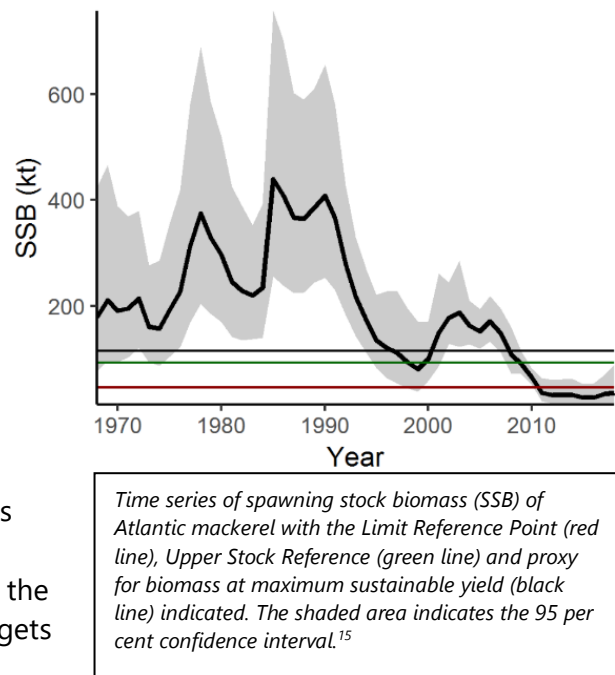
Atlantic mackerel has been fished recreationally, commercially, for bait and by Indigenous Peoples since time immemorial. It is mostly an inshore fishery that catches Atlantic mackerel during its annual migration to shore. It is fished using hook-and-line, gillnets, hand lines, seines and traps; with gear type varying by region and the time of year.

Atlantic mackerel is depleted to approximately one-twentieth of the levels observed in the 1980s, and has been below its Limit Reference Point (LRP) and in the critical zone since 2011.¹⁷ Fishing mortality was recently estimated to be almost *double* what the population can withstand,

equal to an annual exploitation rate of 68 per cent of the population.^{15,16} However, this estimate is highly uncertain because scientists must rely on creative methods to estimate how much is removed each year from *all sources* of fishing due to a lack of adequate monitoring.

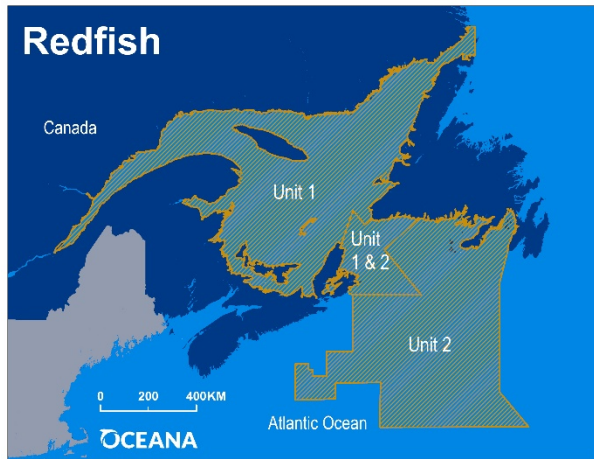
Despite the cultural importance of Atlantic mackerel as a food, social and ceremonial fishery for First Nations, as a recreational fishery in the Maritimes and its value as bait in lucrative lobster fisheries, landings for Atlantic mackerel from these fisheries are unknown – although the recreational and bait fisheries are suspected to be substantial, in the thousands of tonnes.^{15,17,18}

There are no fishery monitoring or reporting requirements, or estimates of removals for the recreational fishery, and only recently have harvesters been required to submit landings records for the bait fishery in some, but not all, areas.¹⁶ The uncertainty this creates around total removals from the population limits the ability to set timelines and targets for rebuilding the stock.¹⁶



Case study: Redfish – Weak Monitoring is the Bottleneck to Realizing the Potential for a Large and Sustainable Fishery

Redfish Units 1 and 2 in the Gulf of St. Lawrence and Laurentian Fan need improved monitoring. Implementing the policy for this population would support good fisheries management, contributing to an expanded and rebuilt redfish fishery that could provide benefits to coastal communities well into the future. If this fishery is expanded without adequate monitoring, there is the potential it could inadvertently contribute to the local extinction of critically depleted and commercially important species like Atlantic cod or white hake. It could also negatively impact existing lucrative fisheries for Atlantic and Greenland halibut.¹⁹ Failure to strengthen fisheries monitoring must not be the bottleneck for a future redfish fishery.



There are two species of redfish in Units 1 and 2 that are so similar in appearance that they are frequently lumped together as one species. Deepwater redfish (*Sebastes mentella*) and Acadian redfish (*Sebastes fasciatus*) are both long-lived (45-65 years) and slow-growing species that inhabit deeper water.¹⁹ A fishery for redfish began in the 1950s in the Gulf of St. Lawrence with landings peaking at more than 160,000 tonnes in 1973. Throughout the 1980s and early 1990s, landings averaged around 60,000 t until they dropped precipitously, and in 1995 a moratorium on fishing was put in place

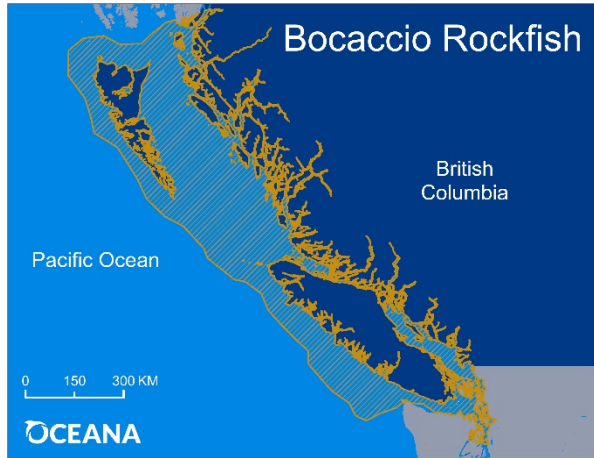
in Unit 1.²⁰ Both species are depleted but they have shown strong signs of recovery thanks to an unexpected population boom from 2011 to 2013, in particular for Deepwater redfish.^{19,21}

This growth presents an incredible opportunity for a re-emerging and expanded redfish fishery. But fishery monitoring improvements are needed to ensure it is done in ways that do not harm the population or adversely impact the ecosystem. DFO must also make sure the fishery can accurately separate the proportion of each redfish species in the catch, something that has not been done in the past, to enable management of both species and allow for the possibility of higher catches of the more abundant Deepwater redfish.²¹



Case study: Bocaccio rockfish – An Excellent Model for Fisheries Monitoring has Enabled Strong Recovery and Requires only Modest Improvements

Similar to redfish, growth in biomass for Bocaccio rockfish is already occurring: now this fishery needs the Fishery Monitoring Policy implemented to support the sustained growth of this population. Bocaccio (*Sebastes paucispinis*) is one of several dozen species of rockfish found in Pacific waters off the coast of British Columbia, and one of the largest, capable of reaching nearly one meter in length.²²



Like many other rockfish species, Bocaccio rockfish are long-lived, about 55 years, and adults inhabit deep offshore waters. The Bocaccio population experienced a nearly continuous decline that led to its designation as Endangered by the Committee on the Status of Endangered Species in Canada (COSEWIC) in 2013.²² However, something unexpected recently occurred: A large number of young Bocaccio were born in 2016, 44 times more than any other year on record.²³ Although Bocaccio currently remains in DFO's critical zone, they grow so fast early in life (up to 24

cm in their first year), that this large cohort of fish born in 2016 are expected to rebuild the stock biomass (weight of fish) into the healthy zone in just a few years.^{22,23} Their growth in abundance and size puts them at risk of being caught more often as bycatch in the multi-species groundfish fishery.

The recovery of this population has been supported by two decades of rockfish conservation efforts,²⁴ including one of the most rigorous fishery monitoring programs in the world²⁵ and a rebuilding plan for Bocaccio that reduced catches to very low levels. These measures were possible because of an individual quota-based management system that is accountable and flexible, combined with a strong fishery monitoring program.



Monitoring for Bocaccio tracks all commercial catches using 100 per cent at-sea-observer or electronic video monitoring and 100 per cent dockside monitoring.^{24,26} While the monitoring of this stock provides a model to replicate in other fisheries, challenges remain. At-sea observers have been subjected to intimidation and harassment, resulting in the underreporting of catches from bottom-trawl fishing.^{27,28} Sadly, this is not surprising. A federal report on behalf of the Auditor General of Canada in 2016 found systemic problems in DFO's management of third-party fishery monitoring programs that called into question the reliability and usefulness of the data these programs provide.²⁹

There are encouraging signs that most of the fishing industry sees the value of robust monitoring. For instance, the Pacific trawl fishery recently led the charge to accelerate pilot programs using electronic video monitoring in the bottom trawl sector when COVID-19 disrupted at-sea observer programs.³⁰

References:

1. Fisheries and Oceans Canada (2021) Blue economy strategy: engagement paper: your oceans, your voice, your future.
2. Fisheries and Oceans Canada (2019) Fishery Monitoring Policy. Available: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/fishery-monitoring-surveillance-des-peches-eng.htm>. Accessed Mar 16, 2021.
3. Archibald, Devan, McIver, Reba and Rangeley, Robert (2020) Fishery Audit 2020. doi: 10.5281/ZENODO.4266773
4. Legislative Services Branch (2019) Consolidated federal laws of Canada, Fisheries Act. Available: <https://laws-lois.justice.gc.ca/eng/acts/f-14/FullText.html>. Accessed Apr 20, 2021.
5. Fisheries and Oceans Canada (2009) Sustainable fisheries framework. Available: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/overview-cadre-eng.htm>. Accessed May 14, 2021.
6. Legislative Services Branch (2019) Consolidated federal laws of Canada, Fisheries Act. Available: <https://laws-lois.justice.gc.ca/eng/acts/f-14/page-1.html#h-1175155>. Accessed May 14, 2021.
7. Public Works and Government Services Canada (2021) Canada Gazette, Part 1, Volume 155, Number 1: Regulations Amending the Fishery (General) Regulations. Government of Canada, Public Works and Government Services Canada, Integrated Services Branch, Canada Gazette. Available: <https://canadagazette.gc.ca/rp-pr/p1/2021/2021-01-02/html/reg1-eng.html>. Accessed Feb 25, 2021.
8. Beauchamp B, Benoît HP and Duprey N (2019) Review of catch monitoring tools used in Canadian fisheries. DFO Can. Sci. Advis. Sec. Res. Doc. 2019/010. vi + 49 p.
9. Fisheries and Oceans Canada (2009) Sustainable fisheries framework. Available: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/overview-cadre-eng.htm>. Accessed Sep 29, 2020.
10. Fisheries and Oceans Canada (2013) Guidance on implementation of the policy on managing bycatch. Available: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/bycatch-guide-prise-access-eng.htm>. Accessed Apr 20, 2021.
11. Fisheries and Oceans Canada (2009) A fishery decision-making framework incorporating the precautionary approach. Available: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/precaution-eng.htm>. Accessed Sep 29, 2020.
12. Fisheries and Oceans Canada (2020) Sustainable Fisheries Framework Work Plan. Available: <https://www.dfo-mpo.gc.ca/about-notre-sujet/publications/work-plan-travail/index-eng.html>. Accessed Sep 30, 2020.
13. Fisheries and Oceans Canada (2019) Introduction to the procedural steps for implementing the Fishery Monitoring Policy. Available: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/fmp-implementation-psp-mise-en-oeuvre-eng.htm>. Accessed Apr 20, 2021.
14. Oceana Canada (2016) Atlantic Mackerel. In: *Marine Life Encyclopedia*. Available: <https://www.oceana.ca/fr/atlantic-mackerel>. Accessed Mar 16, 2021.
15. DFO (2018) Assessment of the Atlantic Mackerel stock for the Northwest Atlantic (Subareas 3 and 4) in 2018. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2019/035: 14.

16. Fisheries and Oceans Canada (2020) Rebuilding plan for Atlantic mackerel – NAFO Subareas 3 and 4. Available: <https://www.dfo-mpo.gc.ca/fisheries-peches/ifmp-gmp/mackerel-atl-maquereau/mac-atl-maq-2020-eng.html>. Accessed Mar 16, 2021.
17. Van Beveren E, Marentette JR, Smith A, Castonguay M and Duplisea DE (2020) Evaluation of Rebuilding Strategies for northwestern Atlantic Mackerel (NAFO Subareas 3 and 4). DFO Can. Sci. Advis. Sec. Res. Doc. 2020/021. v + 56 p.
18. Fisheries and Oceans Statistical Services (2019) Survey of Recreational Fishing in Canada, 2015. Available: <https://www.dfo-mpo.gc.ca/stats/rec/can/2015/index-eng.html>. Accessed Mar 16, 2021.
19. DFO (2019) Redfish (*Sebastes mentella* and *S. fasciatus*) Stocks Assessment in Units 1 and 2 in 2019. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/019.: 24.
20. DFO (2017) Assessment of Redfish Stocks (*Sebastes mentella* and *S. fasciatus*) in Units 1 and 2 in 2017. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2018/032.: 22.
21. DFO (2018) Units 1+2 Redfish Management Strategy Evaluation. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2018/033.: 22.
22. COSEWIC (2013) COSEWIC assessment and status report on the bocaccio (*Sebastes paucispinis*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 49 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).
23. DFO (2019) Bocaccio (*Sebastes paucispinis*) stock assessment for British Columbia in 2019, including guidance for rebuilding plans. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/025.: 17.
24. DFO (2021) Pacific Region Integrated Fisheries Management Plan, groundfish, effective February 21, 2021, Version 1.0.
25. Stanley RD, Karim T, Koolman J and McElderry H (2015) Design and implementation of electronic monitoring in the British Columbia groundfish hook and line fishery: a retrospective view of the ingredients of success. *ICES Journal of Marine Science* 72: 1230–1236. doi: 10.1093/icesjms/fsu212
26. Koolman J, Mose B, Stanley RD, *et al.* (2007) Developing an integrated commercial groundfish strategy for British Columbia: Insights gained in participatory management. *Biology, assessment, and management of North Pacific rockfishes* Alaska Sea Grant, University of Alaska Fairbanks.: 353–366.
27. Thomson J (2020) 'You're out there alone': whistleblowers say workplace abuse hides true impacts of B.C.'s trawl fishery. *The Narwhal*. Available: <https://thenarwhal.ca/youre-out-there-alone-whistleblowers-say-workplace-abuse-hides-true-impacts-of-b-c-s-trawl-fishery/>. Accessed Mar 18, 2021.
28. Thomson J (2021) 'Trapped': Women Working as Fishery Observers Allege Sex Harassment, Assault at Sea. *VICE - World News*. Available: <https://www.vice.com/en/article/jgqnag/trapped-women-working-as-fishery-observers-allege-sex-harassment-assault-at-sea>. Accessed Mar 18, 2021.
29. Commissioner of the Environment and Sustainable Development (2016) Report 2—Sustaining Canada's Major Fish Stocks—Fisheries and Oceans Canada. Available: https://www.oag-bvg.gc.ca/internet/English/parl_cesd_201610_02_e_41672.html. Accessed Sep 30, 2020.

30. Thomson J (2020) Fisheries and Oceans Canada pulls at-sea observers from fishing boats due to coronavirus pandemic. *The Narwhal*. Available: <https://thenarwhal.ca/fisheries-oceans-canada-pulls-at-sea-observers-fishing-boats-coronavirus-covid-19/>. Accessed Mar 18, 2021.