

The Quality of Recent Rebuilding Plans in Canada

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Introduction

The need to rebuild Canada's fisheries has never been greater. Dozens of fish stocks remain depleted decades after collapse, and Canada is in a vulnerable position because it depends on only a handful of species for most of its fisheries value (Archibald and Rangeley, 2021b; DFO, 2021d). There are concerns about shifts in species distributions and changes in ecosystem communities driven by climate change in all our oceans (Boyce et al., 2021; DFO, 2019, 2020a; Lam et al., 2016; Talloni-Álvarez et al., 2019; Wilson et al., 2020). These impacts, combined with human activities like fishing, coastal development, and resource exploitation, make the future health of our oceans highly uncertain and highlight the importance of developing and implementing strong rebuilding plans. Rebuilding fish stocks is integral to augmenting the resilience of coastal communities, preserving cultural and social traditions, and creating greater value over the long term (Archibald and Rangeley, 2019; Sumila and Teh, 2019).

In 2009, Fisheries and Oceans Canada (DFO) published clear policy commitments to implement rebuilding plans for depleted stocks in its first policy under the Sustainable Fisheries Framework (DFO, 2009). This policy requires that a rebuilding plan be in place for all stocks in the critical zone, ideally developed prior to the stock declining into the critical zone and that these plans should include additional restrictions on catch. Four years after the introduction of this policy, guidelines for the development of rebuilding plans were published (DFO, 2013). In 2017 Oceana Canada published its first annual Fishery Audit and found that few rebuilding plans existed for stocks in the critical zone, and of these plans, none met international best practices (Archibald et al., 2017b; Archibald and Rangeley, 2017a, 2018, 2019; Garcia et al., 2018; OECD, 2012).

In 2019, the importance of rebuilding was acknowledged by the federal government when it passed a modernized *Fisheries Act* that included a requirement to develop rebuilding plans for major fish stocks depleted to or below their limit reference points (LRPs) (Legislative Services Branch, 2019), the point below which serious harm is occurring to a stock (DFO 2009). This change is expected to increase the number of critically depleted stocks included in rebuilding plans, but the regulations outlining the requirements of rebuilding plans under the new act and a list of what stocks the new law will apply to are still in development (Public Works and Government Services Canada, 2021), meaning the revised act does not yet apply to any stocks.

As currently written, the draft rebuilding regulations fail to provide the clear direction that is necessary to allow stocks a chance to rebuild, as demonstrated from experience in other nations (Elmslie, 2021). The regulations should at a minimum reflect the existing guidance on timelines, which states that rebuilding should aim to be achieved within a reasonable timeline, usually within a period of 1.5–2 generations. The target for rebuilding should be in the healthy zone, with measurable objectives demonstrated to promote growth of the stock, set to at least above the LRP (the upper boundary of the critical zone), which is currently not the case in most rebuilding plans (Archibald and Rangeley, 2019).

Since the 2020 Fishery Audit, only two rebuilding plans were published (Atlantic cod in NAFO Divisions 2J3KL and Atlantic mackerel in NAFO subareas 3 and 4), discussed below. Disappointingly, they both fall short of Oceana Canada's expectations (Tables 1–4) and DFO's existing rebuilding plan policy guidelines (DFO 2013), and they fail to meet the legal requirements and intent of the draft *Fisheries Act* rebuilding regulations (Public Works and Government Services Canada, 2021).

Northern cod rebuilding plan

Northern cod (Atlantic cod in NAFO 2J3KL) was included in a long-awaited rebuilding plan in late December 2020 (DFO, 2021a), and Oceana Canada applauded the department for finally taking this important step towards rebuilding the stock. However, the rebuilding plan requires several improvements to ensure it effectively promotes rebuilding (Archibald and Rangeley, 2021a; Hutchings et al., 2021). The plan is lacking a rebuilding target in the healthy zone and the incorporation of other components of DFO's precautionary approach decision-making framework (hereafter "PA Framework"), such as removal references. It is missing timelines associated with rebuilding targets and missing a harvest decision rule that has been simulation tested and demonstrated to meet rebuilding objectives.

Importantly, the rebuilding plan must be revised to include a rebuilding target reference point. The rebuilt target must be above the LRP and ideally above the yet-to-be-determined Upper Stock Reference (USR), the reference point that acts as the boundary between the cautious and healthy zones. By only including reference to the LRP, the plan does not meet international standards (that require limit *and* target reference points)¹ (FAO, 2020). Moreover, the plan also risks that the rebuilt target will be assumed to be just above "*the point below which serious harm is occurring to the stock*" (i.e., the LRP [DFO, 2009] plus one fish).

The rebuilding plan must be revised to include timelines associated with rebuilding targets, identifying how long rebuilding might take (Hutchings et al., 2021). This timeline should be based on long-term projections estimating how long rebuilding will take under all the different management scenarios that are included in the plan. These projections must include a scenario with zero fishing removals so that decision-making trade-offs involved in achieving a rebuilt state and the timeline to get there are informed and transparent (DFO, 2021c).

The rebuilding plan should also include all other components of DFO's PA Framework, such as removal references for each stock status zone. Science-based removal references would allow for increased confidence that removals are truly sustainable and will promote recovery. All components of DFO policy intended to ensure sustainable fisheries management should be included and applied in rebuilding plans.

While Oceana Canada commended DFO for including a Harvest Decision Rule (HDR) that attempts to outline expectations for harvest levels as the stock rebuilds, the HDR provided is deeply flawed (Archibald and Rangeley, 2021a; Hutchings et al., 2021). The HDR should be redesigned and simulation tested by DFO Science with independent peer review to ensure that it

¹ United Nations Fish Stocks Agreement (1995)

has an acceptable robustness to uncertainty, meets performance expectations, has a high probability of achieving management objectives, and conforms to DFO policy. Several aspects of the HDR suggest it is not consistent with international best practices or the intent of DFO's PA Framework (Archibald and Rangeley, 2021a; Hutchings et al., 2021). For example, it allows for increasing catches while the stock is in the critical zone (where DFO policy indicates removals should be kept to the lowest possible levels) and only covers the period during which the stock is between 25 per cent and 75 per cent of its LRP. At a minimum, the upper end should include the boundary of the critical/cautious zone, at which point it may be permissible for total removals to start to increase as the stock enters the cautious zone. An updated HDR should be included that has been independently peer reviewed and simulation tested.

Atlantic mackerel rebuilding plan

The Atlantic mackerel stock has been in the critical zone since 2011, and the rebuilding plan published in November 2020 lacks the rigour needed to rebuild this depleted stock with high confidence (DFO, 2021b). Specifically, this plan lacks rebuilding targets and associated timelines. Further, no HDRs appear to have been selected even though a Management Strategy Evaluation (MSE) process was held to develop one (DFO, 2020b), resulting in increased uncertainty in harvest level decisions moving forward. There are also few changes to fishery monitoring despite a clear need identified for improvements in *all* the bait fisheries and the recreational fishery.

The current Atlantic mackerel rebuilding plan does not state a specific biomass-based rebuilding target but instead presents a short-term goal of maintaining a positive biomass trajectory. Even when considering the long-term goal of growing the stock outside of the critical zone, these targets are not sufficient. The plan should be revised to include not only a specific biomass or abundance target but also a target that is above the USR and well within the healthy zone. Like the northern cod plan, by only including reference to the LRP, the plan does not meet international standards (that require limit *and* target reference points)² (FAO, 2020), and it also risks that the rebuilt target will be assumed to be just above "*the point below which serious harm is occurring to the stock*" (i.e., the LRP [DFO, 2009] plus one fish).

According to the rebuilding plan, results from the MSE process reveal that the timeframe within which this longer-term objective of rebuilding over the LRP can be achieved is beyond the duration of the rebuilding plan itself. While the goal remains to rebuild the stock above the LRP within 10 years (by 2030) with a high probability, the plan indicates there is too much uncertainty to establish a specific timeline for the long-term objective. However, rebuilding out of the critical zone is expected to take longer than 10 years even in the absence of commercial fishing, largely due to the impacts of unreported Canadian catches and the unknown amount of catch of Canadian mackerel (i.e., northern contingent) in the U.S.-based fisheries.

During the MSE, multiple models were used to test various HDRs. Under all modelling scenarios, few decision rules met all performance metric thresholds, including the scenario most similar to the 2019 Total Allowable Catch (TAC; 8000 t) (DFO, 2020b). The MSE did reveal trade-offs among HDRs tested (Van Beveren et al., 2020), but the details of these trade-offs were not

² United Nations Fish Stocks Agreement (1995)

clearly outlined in the rebuilding plan. The plan did indicate HDRs with high lower limits on future catches (6,000 t to 10,000 t) were progressively more likely to result in stock declines than increases in the next 3 to 10 years (DFO, 2020b). But no HDR was selected, resulting in increased uncertainty in harvest level decisions moving forward. The plan includes a section highlighting implemented management measures. These measures are separate from HDRs, and most were implemented in 2018, with no new measures implemented with the plan (with the exception of a decrease in TAC in 2019 from 10,000 back to 8,000 t, the level set in 2016). This should be rectified and an HDR selected that best promotes rebuilding.

The MSE reiterated that long-standing issues with fishery monitoring for the stock were impacting efforts at rebuilding (Van Beveren et al., 2020), and while the rebuilding plan did outline recent improvements in some areas, further improvements are required to account for unreported catches (e.g., monitoring of landings from bait fisheries in all administrative regions and the recreational fishery). The bait and recreational fishery landings have typically been identified as the key sources of uncertainty in total catches in past assessments (e.g., DFO, 2006), as these fisheries are not universally required to report their catches. Although mackerel is used as bait in various fisheries (e.g., tuna, snow crab, etc.), it is a particularly essential bait type in the economically important lobster fishery (Van Beveren et al., 2019). For instance, a single lobster fisherman might on average use around 5 t of mackerel (or other bait) per season to bait traps (Harnish and Martin Wilson, 2009). Despite the large volumes of fish landed in the recreational and bait fisheries, and despite the stock having been in the critical zone since 2011, the recreational fishery remains unregulated and little monitoring is required in the bait fishery. In addition to this, no additional monitoring has been proposed as a part of the rebuilding plan published in 2020.

Summary

Both recently published rebuilding plans lack target abundances in the healthy zone and scientifically informed timelines to rebuild the stock (DFO, 2021a, 2021b). Draft regulations include the requirement of targets and timelines but are ambiguous as to the desired target state and acceptable timelines to get there (Public Works and Government Services Canada, 2021). Stronger and more specific rebuilding plan requirements and guidelines are needed, as plans made with current draft regulations will be insufficient in the promotion of rebuilding and are likely to result in plans similar to those above. As currently written, they will maintain the status quo and fall far short of the existing laws and policies in other progressive fishing nations, which have demonstrated that with strong requirements and standards, stocks can be rebuilt to abundance (NOAA, 2019). Oceana Canada recommends DFO immediately begin updating both rebuilding plans to include target reference points in the healthy zone, timelines within which rebuilding to targets should occur, and science-based, simulation-tested harvest decision rules. For additional information on Oceana Canada's recommendations for rebuilding regulations, please see Elmslie (2021) and for rebuilding plan development, see Archibald and Rangeley (2019).

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Tables

Table 1. A comparison of Oceana Canada’s minimum requirements for rebuilding plans to DFO’s northern cod rebuilding plan.

To rebuild, a plan must <i>at a minimum</i> :		Does the northern cod rebuilding plan meet minimum requirements?	Score
Be legally binding: All fisheries interacting with the target stock must comply with the rules in place to rebuild the stock.		No – It is clearly stated that the plan is not legally binding.	0/1
Be developed and implemented in consultation with rights-holders and stakeholders: All parties directly affected by the rebuilding plan should be consulted.		Yes – The plan specifies that the 2+3KLMNO Groundfish Advisory Committee exists as an opportunity for stakeholders and Indigenous groups involved in 2J3KL cod management to voice concerns or issues. Meetings dedicated to northern cod occur every year in the spring. A rebuilding working group made up of a subset of advisory committee members was formed and tasked with supporting rebuilding plan development. Several meetings were held with this group, but the last meeting appears to have been held in 2018. At that time DFO indicates in its annual Sustainable Fisheries Framework fiscal year work plans that divergent stakeholder views were limiting progress in defining a Harvest Control Rule. Media reports after the plan was released in late 2020 indicate industry did not meet as a working group after 2018 and expressed frustrations regarding consultation on the plan.	1/1
Set objectives for rebuilding, including:	a target abundance that is in the healthy zone – i.e., at or near the biomass that supports maximum sustainable yield (MSY) – and allows the stock to support a high-yield, sustainable fishery.	Partially – The long-term goal of the plan is to grow the stock out of the Critical zone however, no target abundance is explicitly stated. The LRP (or B_{lim}), the point below which the stock is considered in the critical zone, is defined as “the average spawning stock biomass (SSB) during the 1980s” and could theoretically be calculated. The plan could be improved by explicitly quantifying biomass targets to the healthy zone	0.5/1
	a timeframe based on a scientific estimate of how long rebuilding will take.	No – The plan states that a timeline could not be defined for how long rebuilding the biomass above B_{lim} will take, due to high levels of natural mortality.	0/1

To rebuild, a plan must <i>at a minimum</i> :		Does the northern cod rebuilding plan meet minimum requirements?	Score
	a probability estimate of at least 75 per cent that the target abundance will be met within the timeframe.	No – The rebuilding plan states that there is a probability of 63–73 per cent that the spawning stock biomass will be above the 2019 value in 2020 and a less than 10 per cent probability that the SSB will be above B_{lim} in 2022.	0/1
	associated milestones: specific and measurable interim targets that represent the steps towards rebuilding.	Partially – The plan includes a short-term objective of growing the stock above 75 per cent of B_{lim} , which can be measured. No interim targets exist for when the stock is growing towards this value; however, this 75 per cent of B_{lim} is referred to as an interim target later in the plan.	0.5/1
Set management measures that will have a high probability of success of meeting the objectives. Management measures will require, at a minimum, harvest decision or control rules and will often also require immediate and substantial reductions in fishing mortality.		Partially – The plan contains a section dedicated to management measures and states the harvest decision rule for the stock. This rule specifies that a low level of fishing mortality will be maintained until the spawning stock biomass reaches 75 per cent of B_{lim} . The plan states that fishing mortality will have a cap based on stock magnitude but that due to the uncertainty of natural mortality estimates, the probability of success cannot be determined.	0.5/1
Establish a plan for monitoring, review, evaluation, and revision to track progress towards rebuilding objectives and make changes as needed.		Partially – The plan includes a section dedicated to evaluation and performance review that indicates the plan will be periodically monitored with a full review performed within five years unless an exception occurs. Possible exceptions are outlined and include the SSB nearing either 25 per cent or 75 per cent of B_{lim} , a sustained significant directional change in natural mortality, or a change in scientific understanding such as a new model or reference point.	0.5/1
Be publicly available to increase transparency of decision-making and ensure everyone has access to the information required to evaluate the plan.		Yes – The rebuilding plan is available when searched for through the Integrated Fisheries Management Plan page.	1/1
REBUILDING PLAN MINIMUM REQUIREMENTS TOTAL SCORE			4.0/9

Table 2. A comparison of Oceana Canada's further comprehensive rebuilding plan criteria to DFO's northern cod rebuilding plan.

A comprehensive rebuilding plan <i>should</i> also contain:	Does the northern cod rebuilding plan meet additional criteria?	Score
Other stock-specific objectives , such as target size or age structure, restoring historical distribution, maintaining social or cultural value, or restoring economic benefits.	No – The plan includes a section detailing that rebuilding the stock would result in the maintenance of its ecosystem role, additional commercial value, and maintenance of value to Indigenous peoples, but these were not explicitly stated as objectives. Specific objectives only refer to spawning stock biomass. No other biological objectives for the stock are included (e.g., target size or age structure, spatial distribution).	0/1
An overview of all fisheries interacting with the stock , including all directed commercial fisheries and all other fisheries (including bycatch, recreational, bait, and food-social-ceremonial), with a summary of socio-economic and cultural importance; history of management and assessment; and an overview of all contributions to fishing mortality.	Partially – The plan includes a section that highlights the socio-economic and cultural significance of rebuilding this stock. Important changes in management and fisheries interacting with the stock are highlighted in the “Overview of the Fishery” section. This includes the inshore fishery (including gear types), recreational fishery (including gear types), and Indigenous food, social, and ceremonial (FSC) fishery. Details on stock assessments completed by COSEWIC are included in the plan, but the history of Canadian Science Advisory Secretariat stock assessments are not discussed. Bycatch of 2J3KL cod in other groundfish fisheries is outlined, but the rebuilding plan could be improved upon by more specific mention of whether all sources of fishing mortality are accounted for in assessments and management.	0.5/1
A review of impediments to successfully rebuilding the stock , including considerations of the biology of the species, any recent evolutionary changes, impacts of environmental conditions, multispecies interactions, other fisheries impacts, and the levels of uncertainty and risk.	Partially – There is no section dedicated to a review of impediments to the successful rebuilding of the stock. Some factors are briefly noted in various sections of the rebuilding plan and include abundance of prey species (capelin) and high levels of natural mortality. Reasons for uncertain levels of natural mortality are highlighted in the “Management Issues” section. Environmental conditions are also considered, as the plan states cooler-than-average water temperatures can result in decreased productivity and lower abundance of prey species. The potential for harp seals to hinder rebuilding was considered, but there is little evidence supporting this possibility. Fishing mortality is also highlighted as a threat to rebuilding. Recent evolutionary changes are not discussed, but an overview of cod biology is included in the plan.	0.5/1
An evaluation or consideration of alternative management measures to increase transparency of decision-making.	No – The plan does not outline any management measures evaluated or considered other than those previously put in place or anticipated to be in place in relation to harvest caps under the harvest decision rule.	0/1

A comprehensive rebuilding plan <i>should</i> also contain:	Does the northern cod rebuilding plan meet additional criteria?	Score
An overview of economic, social, and ecological impacts of the rebuilding plan to reduce surprises and allow for mitigation planning.	No – The plan does not include an overview of economic, social, or ecological impacts of the rebuilding plan.	0/1
An outline of the steps to follow when objectives are met to prepare for changes to management once the stock is rebuilt and fishing efforts may be increased.	Yes – The plan indicates that once the primary objective of exceeding the limit reference point is met, the standard Integrated Fisheries Management Plan (IFMP) process will be used to support the longer-term objective of stock growth into the healthy zone.	1/1
REBUILDING PLAN ADDITIONAL CRITERIA TOTAL SCORE		2.0/6

Table 3. A comparison of Oceana Canada’s minimum requirements for rebuilding plans to DFO’s Atlantic mackerel rebuilding plan.

To rebuild, a plan must <i>at a minimum</i> :	Does the Atlantic mackerel rebuilding plan meet minimum requirements?	Score
Be legally binding: All fisheries interacting with the target stock must comply with the rules in place to rebuild the stock.	No – It is clearly stated that the plan is not legally binding.	0/1
Be developed and implemented in consultation with rights-holders and stakeholders: All parties directly affected by the rebuilding plan should be consulted.	Yes – The plan states that DFO convenes every second year (at a minimum) to discuss issues pertaining to Atlantic mackerel. This is done through the Atlantic Mackerel Advisory Committee (AMAC), which allows for the involvement of industry representatives, Indigenous and First Nations organizations, provincial government officials, and environmental non-governmental organizations to provide input on mackerel management measures. The Atlantic Mackerel Rebuilding Plan Working Group is also mentioned as subset of AMAC, where industry stakeholders, provincial governments, DFO representatives, and Indigenous representatives with a common interest in the fishery can discuss management.	1/1

To rebuild, a plan must <i>at a minimum</i> :		Does the Atlantic mackerel rebuilding plan meet minimum requirements?	Score
Set objectives for rebuilding, including:	a target abundance that is in the healthy zone – i.e., at or near the biomass that supports maximum sustainable yield (MSY) – and allows the stock to support a high-yield, sustainable fishery.	Partially – The plan includes the short-term objective of maintaining a positive trajectory in terms of biomass growth and minimizing the probability that current Atlantic mackerel SSB is less than the previous year's SSB. The long-term goal is for the stock SSB to rebuild above the LRP.	0.5/1
	a timeframe based on a scientific estimate of how long rebuilding will take.	No – The SSB growth and trajectory will be evaluated over five years, after the 2021, 2023, and 2025 stock assessments. The aim of the plan is to rebuild the stock biomass above the LRP within 10 years; however, it is expected that it will take longer than this even in an absence of commercial fishing. The plan could be improved by at least outlining how long rebuilding is expected to take even in the absence of fishing.	0/1
	a probability estimate of at least a 75 per cent that the target abundance will be met within the timeframe.	No – The rebuilding plan indicates that it is not likely that the stock will achieve the goal of rebuilding above the LRP within 10 years (probability is less than 75 per cent) under fishing mortality similar to current levels. If commercial removals are 0 t, the probability of rebuilding above the LRP by 2021 is 68 per cent. If the removals were increased to 10,000 t, this probability would change to 48 per cent.	0/1
	associated milestones: specific and measurable interim targets that represent the steps towards rebuilding.	Partially – The only milestone mentioned in the rebuilding plan was to maintain a positive trajectory of SSB growth over five years, but this is also mentioned as the short-term goal of the plan.	0.5/1
Set management measures that will have a high probability of success of meeting the objectives. Management measures will require, at a minimum, harvest decision or control rules and will often also require immediate and substantial reductions in fishing mortality.		Partially – New management measures include a reduction in TAC (20 per cent) the year before the plan was published (after an increase two years prior to plan publication), additional protection measures for spawning mackerel, attempts to ameliorate reporting and catch monitoring, and scientific funding. The plan states that these measures will promote rebuilding through various sectors while allowing “limited participation in the fishery.” In 2017 a TAC of 10,000 t was chosen, but this was decreased to 8,000 t in 2019. Harvest strategies were explored that include the possibility of increasing the TAC to 10,000 t once again, despite mentioning the chosen reduction to 8,000 t. None of the harvest control rules tested in the	0.5/1

To rebuild, a plan must <i>at a minimum</i> :	Does the Atlantic mackerel rebuilding plan meet minimum requirements?	Score
	model simulations met the performance thresholds and resulted in a high probability of meeting the objective.	
Establish a plan for monitoring, review, evaluation, and revision to track progress towards rebuilding objectives and make changes as needed.	Yes - The rebuilding plan includes a section dedicated to evaluation and performance review, which will occur through the Atlantic Mackerel Rebuilding Plan Working Group and the Atlantic Mackerel Advisory Committee. Reviews will be conducted every two years at a minimum and can result in the addition of new management measures if objectives are not being achieved.	1/1
Be publicly available to increase transparency of decision making and ensure everyone has access to the information required to evaluate the plan.	Yes - The rebuilding plan is available when searched for through the Integrated Fisheries Management Plan page.	1/1
REBUILDING PLAN MINIMUM REQUIREMENTS TOTAL SCORE		4.5/9

Table 4. A comparison of Oceana Canada's further comprehensive rebuilding plan criteria to DFO's Atlantic mackerel rebuilding plan.

A comprehensive rebuilding plan <i>should</i> also contain:	Does the Atlantic mackerel plan meet additional criteria?	Score
Other stock-specific objectives , such as target size or age structure, restoring historical distribution, maintaining social or cultural value, or restoring economic benefits.	No - The short- and long-term goals are both presented in terms of biomass, and no other objectives related to target size or age structure, historical distribution, maintenance of cultural value, or restoration of economic benefits are included in the rebuilding plan.	0/1
An overview of all fisheries interacting with the stock , including all directed commercial fisheries and all other fisheries (including bycatch, recreational, bait, and food-social-ceremonial), with a summary of socio-economic and cultural importance; history of management and assessment; and an	Partially - There is a brief overview of the current commercial inshore fishery (and gear types), recreational fishery, bait fishery, and Indigenous food, social, and ceremonial (FSC) fishery. Bycatch of Atlantic mackerel in other fisheries is only briefly mentioned in a statement concerning low landings mostly composed of bycatch within NAFO Subdivisions 3 and 4. The plan could be improved upon by describing if all sources of fishing mortality are accounted for and considered in stock assessment and management. The rebuilding plan includes a list of policies and regulations that apply to the Atlantic mackerel fishery and the two advisory committees that meet every second year to discuss stock management (the Atlantic Mackerel	0.5/1

A comprehensive rebuilding plan <i>should</i> also contain:	Does the Atlantic mackerel plan meet additional criteria?	Score
overview of all contributions to fishing mortality.	Advisory Committee and a subset of that group, the Atlantic Mackerel Rebuilding Plan Working Group). The plan briefly highlights stock trends from the 2019 stock assessment. A section dedicated to socio-economic and cultural importance is included in the plan. This section highlights the importance of the commercial fishery, Indigenous fishery, and recreational fishery and includes a trade profile. Figure 2 of the rebuilding plan also includes landings (in thousands of tonnes) with corresponding value (in millions of dollars) for Atlantic mackerel from 2008–2017.	
A review of impediments to successfully rebuilding the stock , including considerations of the biology of the species, any recent evolutionary changes, impacts of environmental conditions, multispecies interactions, other fisheries impacts, and the levels of uncertainty and risk.	Partially – Within the biological synopsis of the species section of the plan, high levels of fishing mortality (including unaccounted-for mortality), poor recruitment, and low spawning stock biomass are stated as the main impediments to rebuilding. Fishing occurring during spawning seasons and fishing occurring in the United States that catches Canadian spawning mackerel are also described as hindering rebuilding. The plan mentioned increased monitoring of all fishing mortality sources, aiding in reducing uncertainty and in establishing appropriate management measures. Mackerel has been shown to be heavily affected by environmental variables including availability and quality of food. Multispecies interactions are discussed in the biological synopsis, as mackerel play an important ecosystem role in the transfer of energy from low trophic levels (zooplankton) to higher trophic levels (larger fish, marine mammals, and seabirds). Recent evolutionary changes and impacts on other fisheries are not discussed.	0.5/1
An evaluation or consideration of alternative management measures to increase transparency of decision-making.	Partially – The plan outlines the current management measures in place and some proposed measures, such as an amendment to the <i>Atlantic Fishery Regulations, 1985</i> to prevent illegal fishing. Alternative measures are not specifically stated. A Management Strategy Evaluation (MSE) was conducted to evaluate several HCRs; however, little detail is provided in how they would work, and none appear to have been selected. Despite the MSE that was conducted in order to look for trade-offs among management strategies, the details of these trade-offs were not included in the rebuilding plan.	0.5/1
An overview of economic, social, and ecological impacts of the rebuilding plan to reduce surprises and allow for mitigation planning.	No – The plan does not address economic, social, or ecological impacts of the rebuilding plan.	0/1
An outline of the steps to follow when objectives are met to prepare for changes to	Partially – The plan does not directly address the steps to follow when objectives are met. However, it is stated that once the primary objective of exceeding the limit reference point is	0.5/1

A comprehensive rebuilding plan <i>should</i> also contain:	Does the Atlantic mackerel plan meet additional criteria?	Score
management once the stock is rebuilt and fishing efforts may be increased.	met, the standard Integrated Fisheries Management Plan (IFMP) process will be used to support the longer-term objective of stock growth into the healthy zone.	
REBUILDING PLAN ADDITIONAL CRITERIA TOTAL SCORE		2.0/6