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COMMON OCEANS PROGRAM

Tuna project

Management procedures & exceptional circumstances

Preparing fisheries for the unexpected

INTRODUCTION

MANAGEMENT PROCEDURES (MPs), ALSO KNOWN AS HARVEST STRATEGIES, provide pre-agreed frameworks for fisheries management decisions under uncertain conditions. MPs are developed and tested using management strategy evaluation (MSE), a simulation-based framework to assess candidate MPs across a wide range of plausible scenarios that capture uncertainty in stock dynamics, fishery behavior, and other factors such as environmental variability, data availability, and management measure implementation. By testing candidate MPs for performance under different scenarios, managers and scientists can select the MP that best achieves the agreed management objectives, even when the current state of the fishery or stock is uncertain and without knowing which conditions are most likely to occur in the future.

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Explicitly accounting for uncertainty is one of the main benefits of MPs for fisheries management. By establishing pre-agreed, adaptive frameworks MPs reduce reliance on short-term reactive decision-making, which is less robust to uncertainty, and instead provide long-term proactive, responsive management that can remain effective under changing conditions.

However, even well-designed MPs cannot anticipate every possible future scenario. Rare or unforeseen events – such as extreme or abrupt environmental changes, sequential recruitment failures, data gaps, new scientific knowledge, or substantial shifts in biology or the fishery operations – may fall outside the range of conditions tested during MP evaluations. These unexpected situations are referred to as “exceptional circumstances” (ECs).

Fully specified MPs should include a documented mechanism for identifying and addressing these ECs: an exceptional circumstances protocol (ECP). An ECP defines how to identify and respond to conditions beyond the scope (or range) of scenarios tested in the MSE. An ECP should outline how to review and, if required based on exceptional changes, adapt MPs, providing an additional mechanism to ensure MPs are effective tools for long-term fisheries management.

This factsheet explains what ECs are, how they’re managed, best practices for structuring and developing an ECP, and the importance of ECPs in dynamic fisheries management illustrated with real-world examples.

EXCEPTIONAL CIRCUMSTANCES

Exceptional circumstances are situations in which the observed stock, fishery, data, or implementation conditions indicate that the MP may no longer be operating within the range of assumptions tested in the MSE. ECs do not necessarily mean that the MP has failed. Rather, they indicate that additional scientific or management review may be needed before continuing to apply the MP as usual.

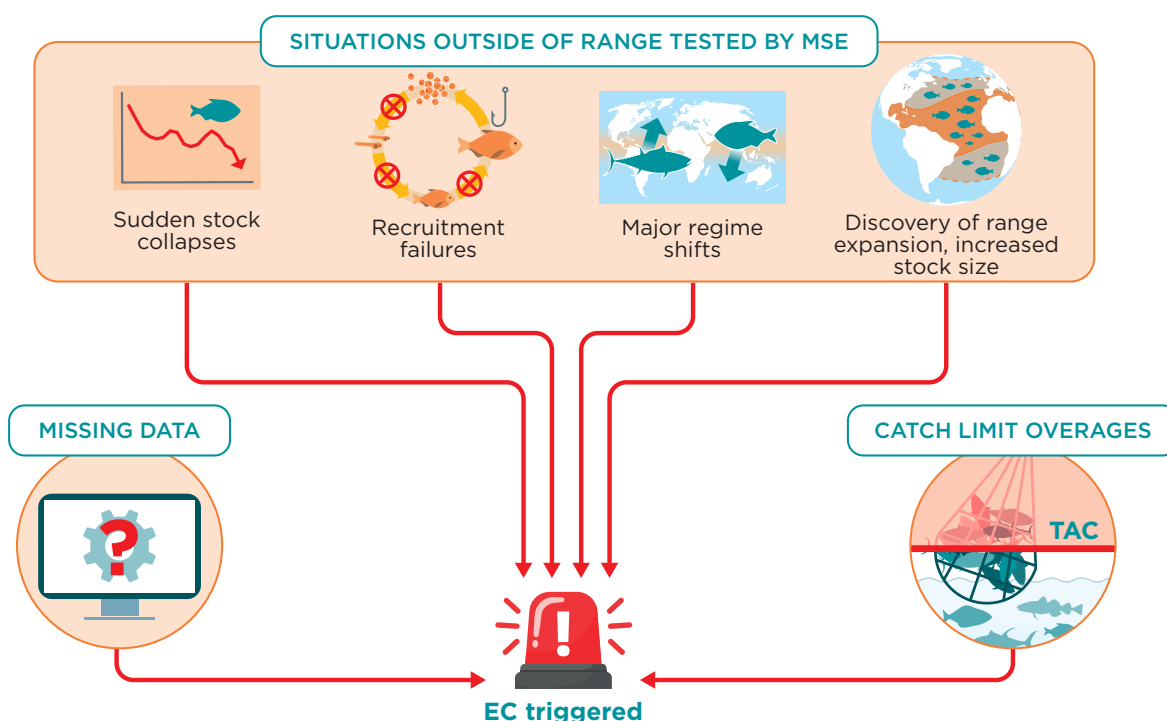


Figure 1. Schematic of common exceptional circumstances triggers.

ECs are typically triggered by one or more of the following (Figure 1):

- **Situations outside the range tested in and predicted by the MSE:** ECs can occur when stock or fishery conditions are outside of the range of dynamics analyzed within the MSE. These situations can occur when advances in biological knowledge, updated population estimates, or improved monitoring reveal that previous assumptions about stock productivity or fishery dynamics and impacts were incomplete or inaccurate. Examples include new, more informative abundance data or stock assessment models indicating the stock is larger or smaller than previously considered or shifts in productivity linked to climate change (see Box 1 on ECs and climate change). In other cases, observed indicators may show that the stock or fishery is developing differently from the trajectories considered plausible during MSE testing. For example, abundance indices, recruitment indicators, or other monitoring information may indicate that the stock is not rebuilding as expected or is increasing more rapidly than anticipated (Figure 2). Such patterns may suggest that stock productivity, recruitment, natural mortality, catchability, selectivity, environmental drivers, or fishery behavior differ from the assumptions represented in the MSE.
- **Operational or data limitations:** ECs may also be triggered when the MP's necessary input data are missing, delayed, or incomplete, such that there is insufficient information to apply the MP as intended. For example, the absence of data to estimate abundance indices could inhibit the estimation of the MP's stock status indicator, and, consequently, the confident implementation of the MP.
- **MP is not implemented as advised:** ECs can also be triggered when MP implementation is inconsistent with the MP advice. For example, if catches far exceed the total allowable catch (TAC) specified by the MP.

ECs are of most concern when the triggers could cause an unexpected deterioration of stock status; however, some MPs include EC triggers that indicate stock status is better than expected since foregone yield is also a risk in fisheries management.

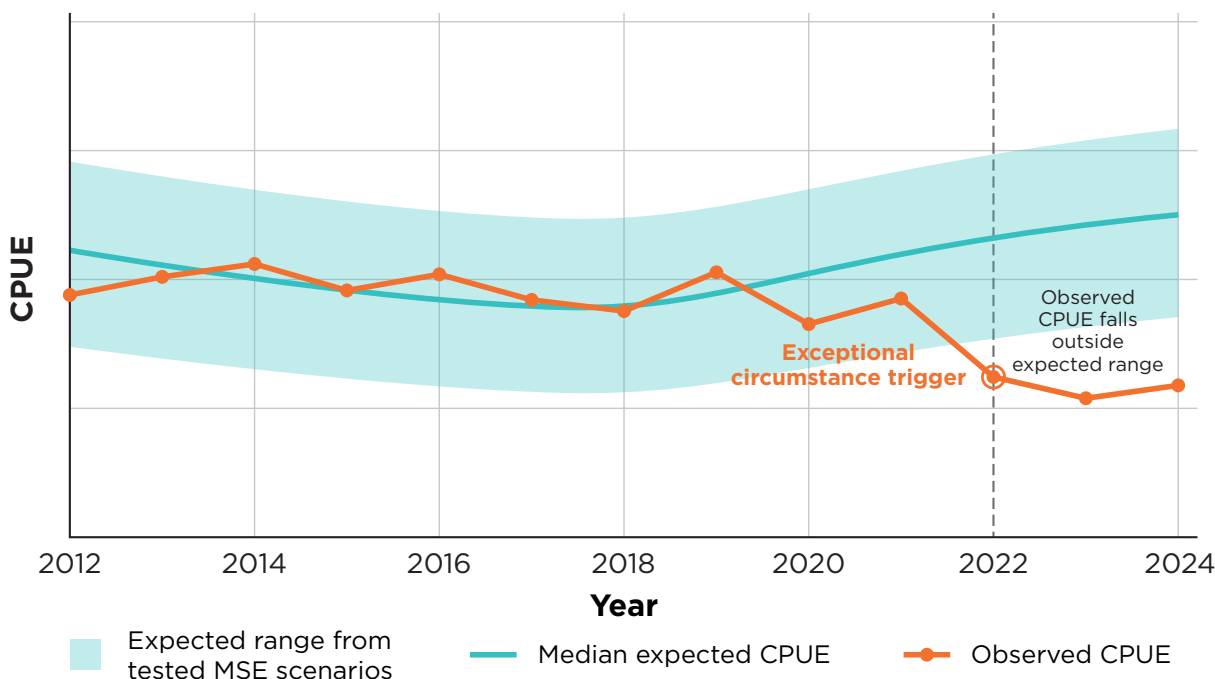


Figure 2. Illustration of an example exceptional circumstance triggered by a situation outside the range of scenarios evaluated in the MSE, in this case when catch per unit effort (CPUE) values fell outside the range predicted by the MSE.

STRUCTURE & DEVELOPMENT OF EXCEPTIONAL CIRCUMSTANCES PROTOCOLS

ECs are addressed through pre-agreed frameworks known as exceptional circumstances protocols (ECPs), which both define what constitutes an EC and how managers and scientists should respond when an EC is identified. Having an ECP in place ensures that management decisions and processes remain structured when conditions fall outside of those considered during MSE testing, making an ECP a critical part of a fully specified MP. ECPs should ideally combine quantitative EC triggers with a transparent process for expert review.

Quantitative EC triggers can be based on percentages above or below what was tested in the MSE, or analyses can be conducted to discern how far outside the tested range an estimate would have to be before the adopted MP is no longer considered reliable. This specificity is necessary to maintain the pre-agreed, prescriptive, and predictable nature of MPs. Clear ECP directives help to make MP implementation replicable and successful at achieving the desired management objectives.

If an ECP is not fully specified, it has the potential to be used to undermine an MP. A vague ECP, which uses broad or qualitative language to define ECs, can be exploited as a loophole to argue against MP-prescribed changes in fishing effort or catch by subjectively claiming that an EC has occurred.

Conversely, an ECP should allow some flexibility since not all ECs can be defined or have quantitative trigger levels. Including more general provisions can allow expert judgement by scientists to declare ECs and determine if an MP needs to be revised. Further, ECPs might allow for periodic consideration of additional potential qualitative ECs. This generalized approach has pros and cons:

Table 1. The pros and cons of having more flexible, generalized provisions in ECPs.

Pros	Cons
● Expert judgment: A specific ECP triggers an EC when a pre-defined data stream surpasses a set threshold; however, additional changes not explicitly listed in the ECP could still be cause for concern. A general ECP allows the scientific body to make an informed judgement call and trigger an EC based on unforeseen concerns, such as a sudden increase in gear efficiency, catch per unit effort (CPUE) or stock biomass. ● Cumulative impact detection: A specific ECP would fail to trigger an EC if an indicator(s) falls just below the trigger threshold, even if a pattern across indicators might signal a concern. A general ECP allows experts to synthesize multiple data streams together and look at cumulative impacts to identify concerning situations that a specific ECP might overlook.	● Management loopholes: “Significant change” or other generalized language used to define EC triggers allows for subjective interpretation, which could consequently allow stakeholders to argue against necessary, MP-prescribed catch adjustments. This could effectively undermine an MP, returning management to <i>ad hoc</i> decision-making inadvertently. ● Loss of prescriptive and predictable nature of MP: The goal of an MP is to provide prescriptive and predictable fisheries management; general ECPs could open the door to more frequent debate and disagreement, undermining the long-term stability of an MP and generally eroding confidence in an MP’s longer-term reliability. ● Consensus barrier: Without specific data or quantitative triggers, the scientific body may struggle to reach consensus about whether a situation qualifies as an EC, leading to stalled management decisions or incomplete MP implementation.

Typically, ECPs are developed in the year following the MP adoption so they can be specified to the MP; however, if the ECP is more general or the MP being adopted builds on previous examples, it can be adopted at the same time as the MP. Some regional fishery management organizations (RFMOs), such as the Indian Ocean Tuna Commission (IOTC), choose to have a general ECP that applies to all of their stocks that are managed by an MP.

BOX 1: Exceptional circumstances and climate change

Climate change may affect stocks and fisheries in ways that are difficult to anticipate during MSE testing. For example, changes in ocean temperature, oxygen levels, or ecosystem dynamics could alter stock productivity and/or spatial distribution in previously unconsidered ways. The robustness testing within MSEs, which represents less likely, yet still possible rare event scenarios, often attempts to account for such impacts. However, unforeseen, or out of forecast range, climate impacts may occur that were not included in MSE robustness testing, and thus the adopted MP's effectiveness will be uncertain under these conditions.

Pre-agreed ECPs provide a structured mechanism for detecting and responding to unexpected impacts of climate change, reducing the risk of overexploitation and ensuring management remains effective under changing environmental conditions.

EVALUATING AND RESPONDING TO EXCEPTIONAL CIRCUMSTANCES

The scientific committee or advisory process of the relevant Regional Fishery Body (RFB), including RFMOs, typically checks annually if ECs are occurring as part of an MP's monitoring strategy. However, EC evaluations can be less frequent (e.g., once every 3 years at the time of running the MP and setting fishing opportunities for the next management cycle). On the pre-agreed EC evaluation schedule, the scientific committee considers the most up-to-date information available for the stock and fishery against the indicators for ECs specified within the ECP to determine whether an EC has likely occurred. Declaring an EC does not necessarily mean the MP will be stopped or abandoned; the ECP instead specifies a process for responding to an EC trigger based on the nature and severity of the EC and the best scientific knowledge of the implications for the ongoing reliability of the MP.

In practice, the implementation process of an ECP is:

- The scientific body evaluates whether there are any exceptional circumstances based on the EC triggers specified in the ECP, and any other specified process for EC considerations.
- If an EC is found to exist, the scientific body then assesses the severity and risk to the stock and fishery if the current MP continues to be applied, sometimes by conducting additional simulation tests.
- If the scientific body determines that the EC undermines the effectiveness and reliability of the MP, or makes implementing the MP inadvisable, the scientific body provides advice to managers on how to proceed, given the severity of, and risk associated with, the EC.

This advice can include alternative management actions, such as adjusting the TAC by X% or utilizing a different method to set an interim TAC. Advice should also be given as to whether the existing MP can be modified to continue effectively (or in a more risk-averse manner) managing the stock, or if a new MP is needed. The scientific body can also provide interim management advice while revising the existing MP or developing new candidate MPs.

If there is no immediate risk to the stock, the suggested response might also be to pursue new research or data collection while continuing to apply the MP in the interim.

- Based on the advice of the scientific body, fishery managers decide how to respond to the EC. ECPs may also include a pre-agreed, default response to an EC trigger in cases where consensus cannot be reached on how to respond to the EC.

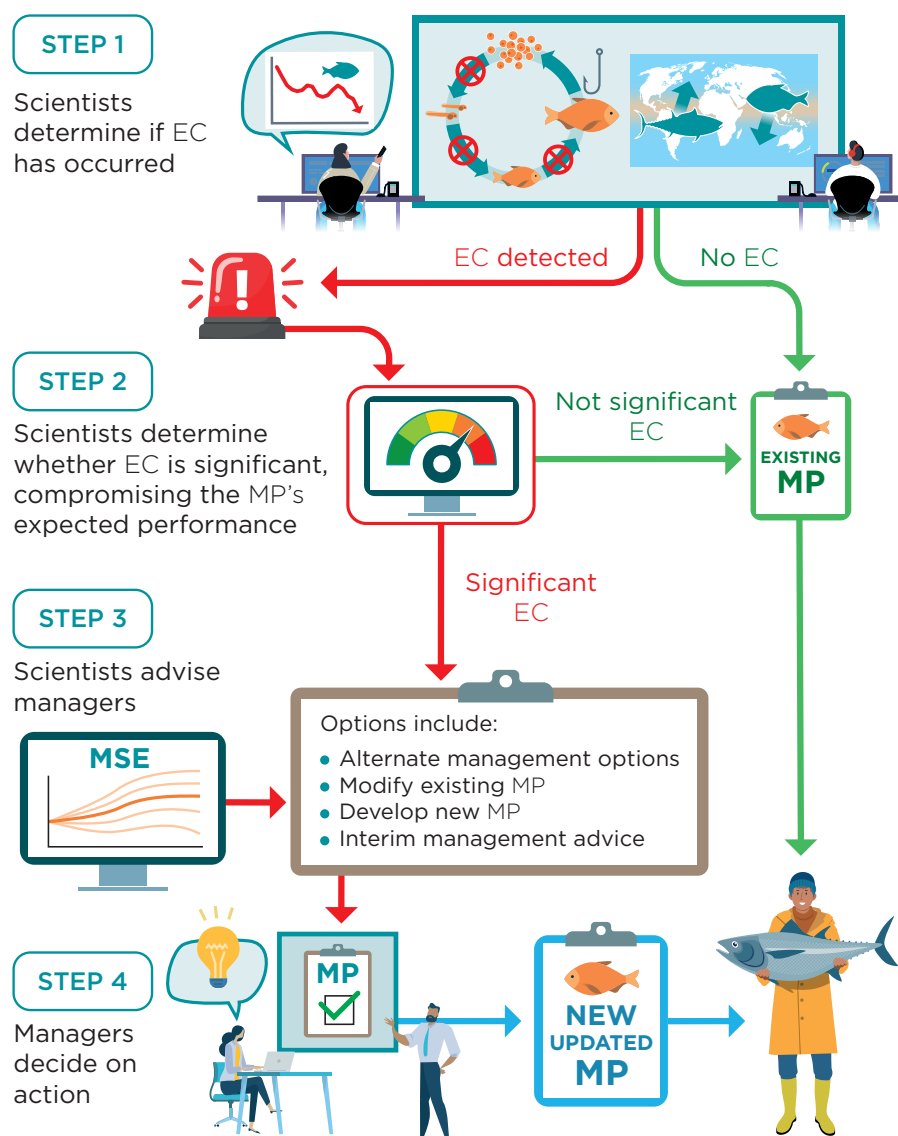


Figure 3. Process for evaluating and responding to exceptional circumstances.

EXCEPTIONAL CIRCUMSTANCES VS MANAGEMENT PROCEDURE REVIEWS

In addition to the systematic EC evaluations described above, the MP itself should periodically undergo a formal review, typically every two to three management cycles/six to ten years. This formal MP review is a much more thorough process than an EC review, and the two processes should not be confused.

A formal MP review ensures the MP is performing as expected and is sufficiently meeting the agreed management objectives. This timing and process for this review should be specified in the adopted MP and typically includes:

- A thorough analysis of MP implementation:** Is the process of running the MP every management cycle smooth? Are the necessary data being collected according to the agreed monitoring strategy? Are managers and stakeholders satisfied with the approach? Are all management objectives being met?

- **A stock assessment check:** A “health check” to ensure the stock is at, above, or tracking towards the MP target objective should be completed. This stock status assessment should use the most up-to-date and the best scientific methods practical for the data and resources available. Alternatively, it might use the same methodology that was used prior to the adoption of the MP (i.e., a ‘continuity’ assessment), adding new data to assess the current population status and compare it to previous efforts. If the stock is declining or increasing unexpectedly, reconsidering the MP could be warranted. This stock status assessment may be run once per management cycle as part of the MP monitoring process, or less often, but the periodicity should be agreed as part of the MP’s implementation plan.
- **A review of the ECP:** A review of both the EC triggers and process for responding to them is conducted to confirm the ECP is efficiently functioning as intended.

If the MP review suggests the MP is meeting the management objectives and running smoothly as expected, the MP can and should continue to be implemented as initially agreed since MPs are intended to be long-term, ‘fixed’ management approaches.

However, if the review suggests the MP is not meeting the management objectives or operating satisfactorily, there are several options:

- Update (or, “recondition”) the MSE with the new data, which could lead to slight modifications to the MP;
- Retune the existing MP to the new data and/or new tuning objectives, which could lead to slight modifications to the MP;
- Revisit the alternative MP options that were already tested within the existing MSE framework, and consider adopting one of them;
- Test new MP options that incorporate new data/indices within the existing MSE framework, and adopt a new MP; or
- Develop a new MSE framework to test alternate MPs and adopt a new MP.

If one of the above options is selected, a workplan should be outlined for developing the new approach. A precautionary transition plan is also necessary to guide the fishery’s management for the year or two it takes to develop and adopt the revised or alternate MP.

REAL-WORLD EXCEPTIONAL CIRCUMSTANCES EXAMPLES

ECPs are applied at multiple RFMOs as a critical component of their adopted MPs and implementation processes. The examples provided below demonstrate how ECPs function in practice and their role in ensuring adaptive, precautionary management under unexpected conditions.

Southern Bluefin Tuna

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) adopted an MP for Southern bluefin tuna in 2011. They also established an ECP, which CCSBT refers to as “metarules.” The ECP for the Southern bluefin tuna MP requires the Extended Scientific Committee to annually review the stock and fishery indicators and consider: whether the MP inputs are impacted, if population dynamics fall outside of the tested range, if the fishery has changed substantially, or if catches are greater than the TAC. The ECP provides example indicators for these ECs, but notes the document is “illustrative and not meant as [a] complete or exhaustive list” allowing for expert advice as needed.

An EC was triggered in 2015 due to an absence of data: one of the two primary data inputs for the empirical MP was an aerial survey used as an index of abundance, but it was not conducted in 2015 due to a lack of funding. However, as the survey was conducted again in 2016 and 2017, the scientists determined the TACs for those years did not need to be adjusted. The aerial survey was fully discontinued in 2018 due to funding, creating a data gap that qualified as an EC starting in 2019. However, upon examining the EC's potential impact, it was determined that "recruitment indicators [were] primarily positive" and the MP-recommended TAC for 2020 could proceed.

At the same time, scientific advances in genetic analyses enabled the development of a new abundance index. This new abundance index was incorporated into a new MP in 2019, filling the gap left by the aerial survey, and improving upon other information on changes in population dynamics and stock productivity. Further, the novel MP provided the opportunity to increase the target reference point from 20% B_0 to 30% B_0 to reflect the desired stock size, given how well the original MP had helped to recover the population. Thus, the EC prompted a response to the lack of data and also led to additional improvements and updates to the MP and its objectives.

Indian Ocean Bigeye Tuna

IOTC adopted an MP for bigeye tuna in 2022. It does not include a specific ECP since IOTC uses a generic ECP for all stocks, which it agreed to in 2021. The generic IOTC ECP notes that ECs can include:

- "New knowledge about the stock, population dynamics or biology
- Changes in fisheries or fishing operations
- Changes to input data to the MP, or missing data, or
- Inconsistent implementation of the MP advice (e.g. total catch is greater than the TAC)"

The IOTC Scientific Committee (SC) annually reviews the MP for evidence of these ECs. If evidence exists, they will then review the impact and severity of the EC as relevant to MP implementation and provide advice, such as a change in TAC, dependent on the EC's impact on the MP.

Under this generic ECP, an EC was detected for bigeye tuna in 2024. A new TAC for the period 2026 to 2028 was due to be set by the MP in late 2024, but the standardized CPUE index used in the MP was not yet available. This missing information represented "changes to input data to the MP" and therefore triggered an EC. The SC then developed a plan of action: the updated CPUE index was produced in early 2025, the new TAC for 2026 to 2028 was calculated by running the MP using the new CPUE index in February 2025 in time for IOTC Commission discussions in May. The updated CPUE index was able to be used in the MP without issues for performance, and the bigeye MP continues to be implemented.

Greenland Halibut

The Northwest Atlantic Fisheries Organization (NAFO) originally adopted an MP for Greenland halibut in 2010. The primary indicators for ECs under that MP were set in 2011 based on catch and survey data; in particular, if observed values were outside the 5th to 95th percentiles of what was tested in the MP simulations, ECs were occurring. The Scientific Council determined that at least one survey data value was outside of the 95th percentile in each of the years that followed, and that ECs were therefore occurring but that this did not affect the applicability of the MP. In 2016, NAFO adopted a new catch estimation protocol that allowed it to develop robust catch estimates for the first time. The Scientific Council's evaluation of these estimates

showed that catch had been above the 95th percentile in every year from 2010 to 2015, which might have necessitated a more active response to the ECs if known.

The MP was revised in 2017, with an updated ECP that established indicators keyed to the availability of data from five different seasonal surveys. Disruptions to three of the five surveys from 2020 to 2022 resulted in a finding of ECs in 2022 and 2023; however, in both cases NAFO had sufficient data from other surveys to derive a TAC for the following years, and MP revision was not required.

In 2024, the MP and associated ECP were updated to provide management advice from 2025 to 2034. This update occurred as a result of the scheduled review of the 2017 MP, not because of an EC. Newly available data and methodology called for a reconditioning of the MSE and facilitated a more robust evaluation of candidate MPs, and the MP was updated accordingly. The ECP was also tweaked slightly to simplify the survey data indicators. Missing data from one of the surveys used in the MP continued to trigger ECs in 2024 and 2025, but in each case the Scientific Council's sensitivity analysis showed that excluding the survey with missing data resulted in minimal effect on the MP outputs. The TACs for 2025 and 2026 were therefore calculated using data from only four of the five surveys.

Atlantic Bluefin Tuna

The International Commission for the Conservation of Atlantic Tunas (ICCAT) adopted an MP for Atlantic bluefin tuna in 2022, and an ECP was adopted the following year. Specific language and indicators were included for three EC principles: the stock and/or fishery is in a state not considered plausible in the MSE; the data are not available, sufficient, or appropriate; and total catch is above the TAC.

The first management cycle of the MP ended in 2025, at which point ICCAT scientists ran the MP to set the western and eastern TACs for the 2026 to 2028 management cycle and performed their annual check for ECs. New scientific methods had produced the first genetics-based estimate of the western stock size, which represented a significant scientific advance on a key uncertainty in the MSE. However, the new population estimate was within the range considered in the MSE. ICCAT scientists disagreed as to whether this new information constituted an EC based on the ECP language but still ran new MSE simulations and updated the MP. According to the ECP, however, scientists first need to determine whether an EC exists before deciding whether a change in advice is necessary and what that advice should be.

ICCAT scientists then provided both the original MP and the revised MP and their associated TACs for each stock to the Commission, leading to extensive negotiations on how to proceed. Ultimately, the Commission decided to operate under the original MP, albeit with incomplete implementation. In the East, the MP-based TAC was prescribed; however, in the West, the TAC was set 20% higher than prescribed by the MP. Further, a 100-ton transfer from the East to the West was approved. In all, the western TAC was set 24% higher than the advice provided by the MP.

As a result of frustrations with this process, ICCAT adopted a less specific ECP for North Atlantic swordfish in 2025 in an effort to reduce potential conflict over triggering an EC and instead allow for expert opinion. The ECP reads, "It is not possible to define all scenarios in which ECs may occur in this protocol... The protocol should not be viewed as a definitive set of criteria/responses."

A stock assessment "health check" and MP review are now underway in 2026-28 and will consider the new genetics result for the western stock, addressing the source of the 2025 EC debate.

CONCLUSION

Consideration of ECs is a critical component of fully specified MPs, providing a framework for fisheries management to respond effectively under unexpected conditions. By detailing a structured, pre-agreed process for identifying and responding to unanticipated scenarios, ECPs ensure MPs remain adaptive and effective under a wide range of conditions.

However, the design and implementation of ECPs require careful consideration. EC triggers should be specified and clearly described to avoid ambiguity. If they are too vague, they have the potential to become loopholes that enable *ad hoc*, politicized decision-making, undermining the long-term predictability and stability of the MP. Additionally, the EC review process should be well-defined and efficient, and should avoid becoming unnecessarily time- or resource-intensive. Importantly, the initial MSE should test a broad range of plausible uncertainties, broader than what may be considered in a typical stock assessment, to reduce the likelihood of ever triggering an EC.

Ultimately, the development and implementation of ECPs strengthens the MP framework, ensuring that the impacts of rare or unforeseen events are considered through a transparent, science-based approach. Having a well-designed ECP in place reduces the risk that unexpected conditions – such as climate change impacts – will lead to ineffective or stalled management practices, thus ensuring fisheries are sustainably managed in the long term.

Citations

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