Food and Agriculture Organization of the United Nations

Adapting to a Changing Ocean: Management Procedures and Climate Resilience

How to prepare fisheries for climate change uncertainty

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global environment facility
INVESTING IN OUR PLANET

The Ocean Foundation

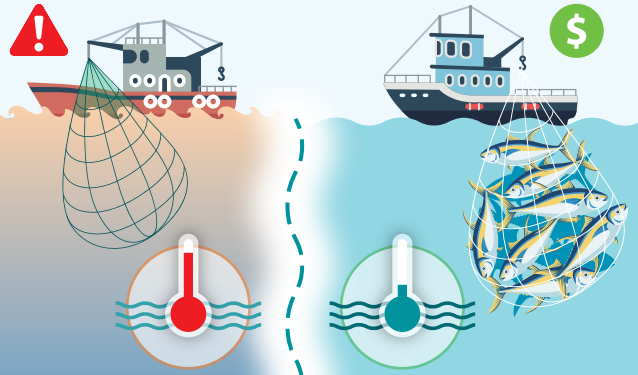
COMMON OCEANS PROGRAM
Tuna project

DESIGN AND INFOGRAPHICS: WWW.5WGRAPHICS.COM

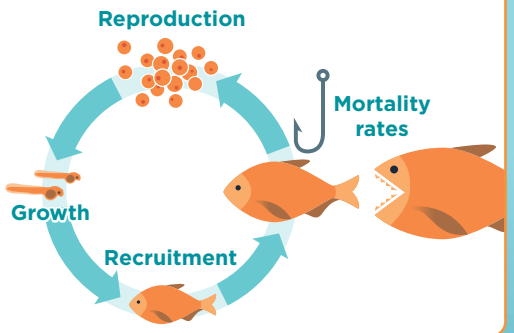
Climate Change Effects on Fisheries

OCEAN WARMING | OCEAN ACIDIFICATION | SHIFTING CURRENTS | SEA LEVEL RISE | EXTREME WEATHER | NEW / INCREASING DISEASE

PRODUCTIVITY CHANGES



ELEMENTS OF STOCK PRODUCTIVITY AFFECTED BY CLIMATE

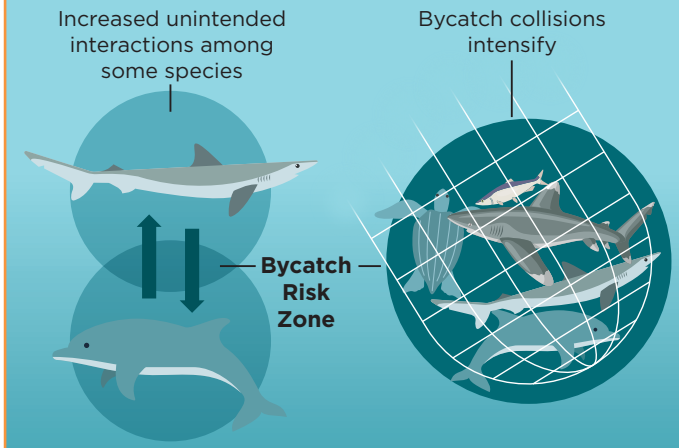


SHIFTING SPECIES RANGES AND MIGRATIONS

Fish cross managerial jurisdictions in search of more favorable environments

ECOSYSTEM AND BYCATCH IMPACTS

Increasingly unfavorable environmental conditions (e.g., low oxygen zones) are compressing available habitat



MIXED OUTCOMES ACROSS SPECIES AND REGIONS

While many stocks face declines or unpredictable shifts due to climate change, others are experiencing improved productivity and stock status

THREATS ASSOCIATED WITH THESE CHANGES

Heightened Risk of Overexploitation and Conflict

Reduced Effectiveness of Current Management Frameworks and Bodies

Increased Risk of Noncompliance

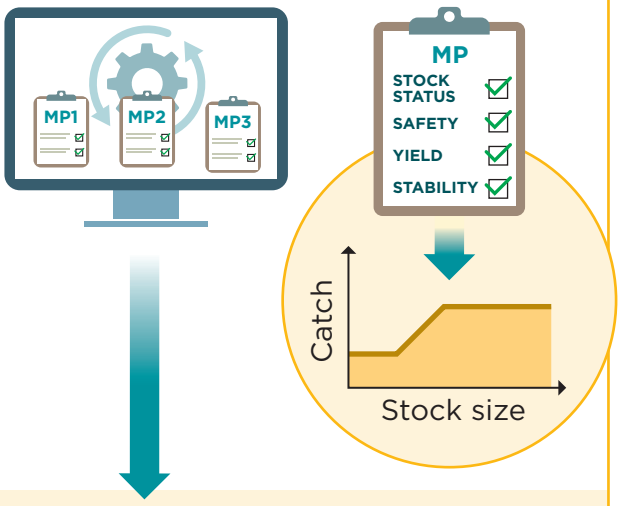
Socioeconomic Strain on Vulnerable Nations and Communities

Developing Climate-Ready Management Procedures

PLANNING FOR CLIMATE CHANGE WITH MANAGEMENT STRATEGY EVALUATION (MSE)

MSE is a simulation-based process used to test **management procedures (MPs)** under real-world and future conditions

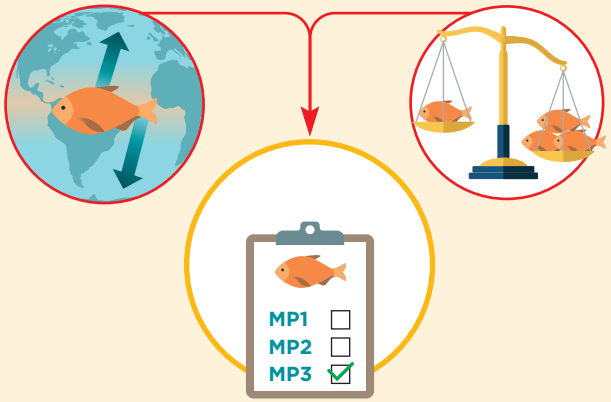
MPs are pre-agreed rules that automatically set fishing limits based on **indicators**



MSE helps managers prepare for climate change by stress-testing **MPs** across a range of climate scenarios, such as:

Shifting stock distributions

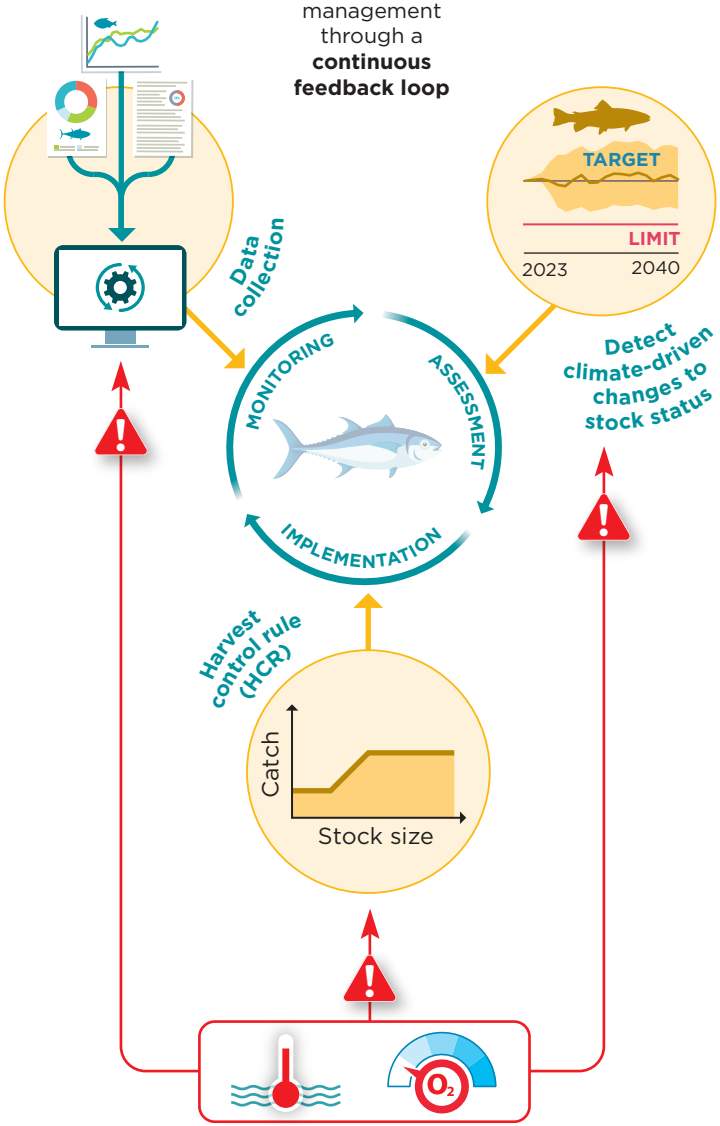
Changes in productivity



To identify the most **robust MP** that will keep the fishery sustainable despite uncertainties and environmental change

RESPONDING TO CLIMATE CHANGE WITH MANAGEMENT PROCEDURES (MPs)

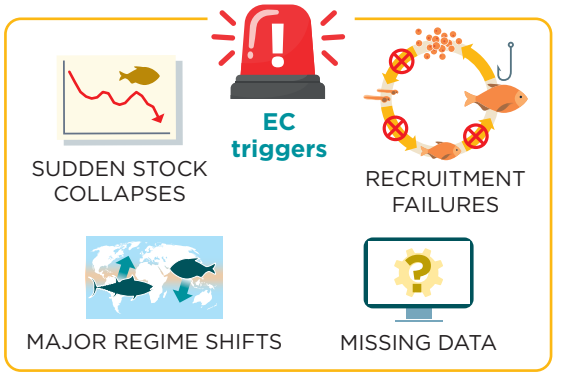
MPs enable adaptive management through a **continuous feedback loop**



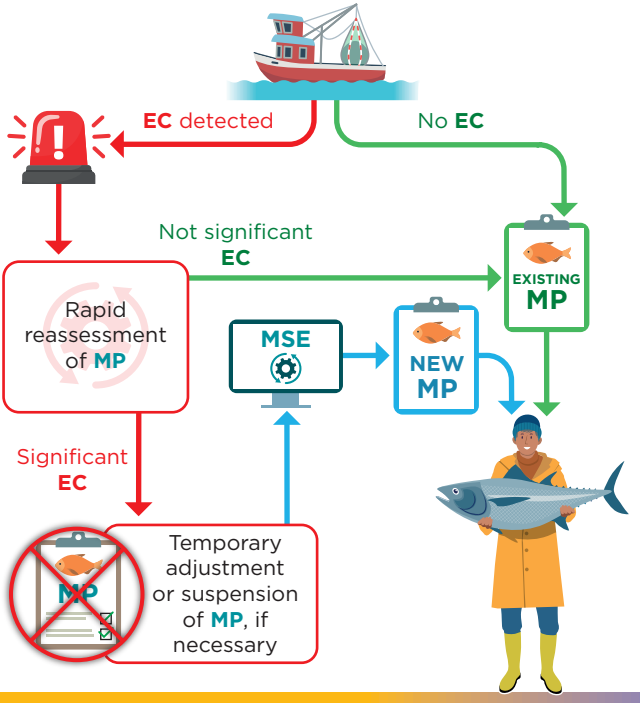
Climate change can impact every part of the system, from the availability of data to the effectiveness of management responses, which is why it's critical to test MPs for climate resilience using **MSE** and to prepare for unexpected shifts through **exceptional circumstances protocols**

EXCEPTIONAL CIRCUMSTANCES PROTOCOLS (ECPs) AS A SAFETY NET

ECPs are pre-agreed frameworks for detecting and responding to **rare or extreme conditions beyond the tested limits of the MP**



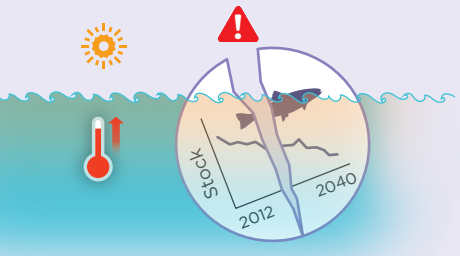
By embedding **ECPs** into the management system, fisheries build resilience not just to gradual climate-driven changes but also to sudden events—ensuring the system remains flexible and capable of rapid recovery



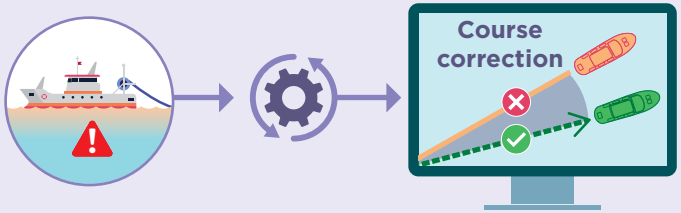
Benefits of Climate-Ready Management Procedures

WHY IT MATTERS

Static, traditional management approaches may struggle to keep up due to climate impacts



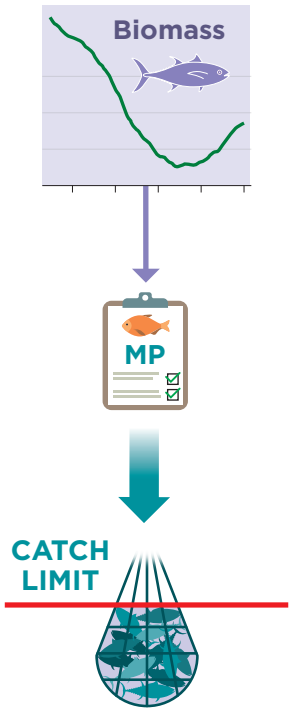
Climate-ready fisheries managed with **MPs** are designed to be dynamic, forward-looking, and adaptive...



...helping both ecosystems and fishing communities thrive in uncertain conditions.

SUSTAINABILITY

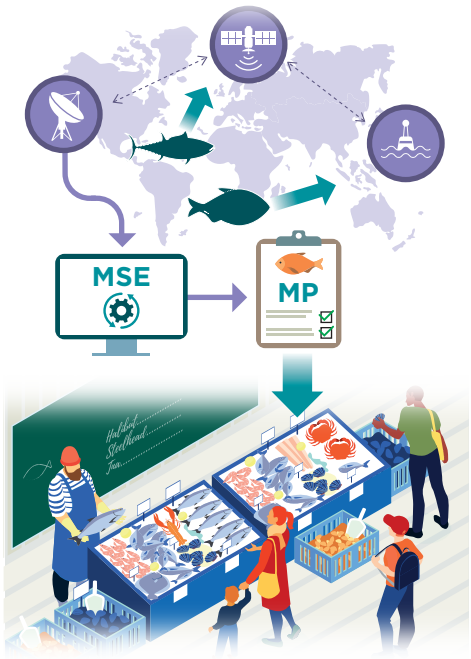
Aligns fishing pressure with recent data on stock health...



...reducing the risk of overfishing.

ECONOMIC STABILITY

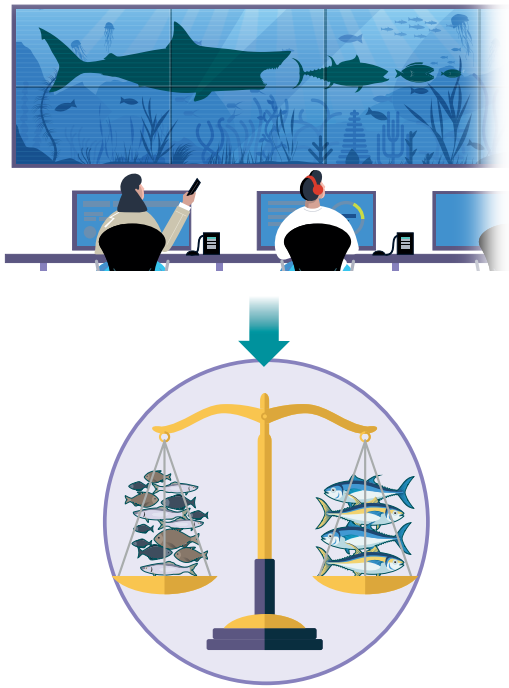
Enables quicker, science-based management adjustments to unexpected stock shifts...



...minimizing disruptions and losses and maintaining a more predictable, stable market supply.

ECOSYSTEM HEALTH

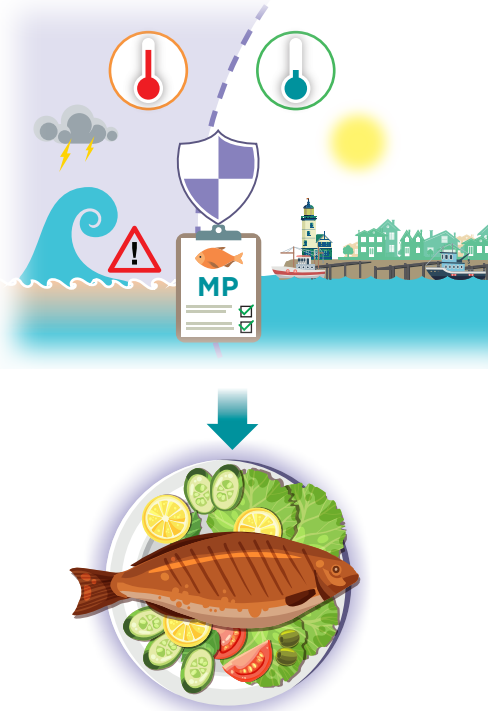
Can account for broader changes in food webs, habitats, and predator-prey dynamics...



...helping to support balanced ecosystems.

COMMUNITY RESILIENCE

Helps vulnerable coastal nations and communities better prepare for and respond to climate impacts...

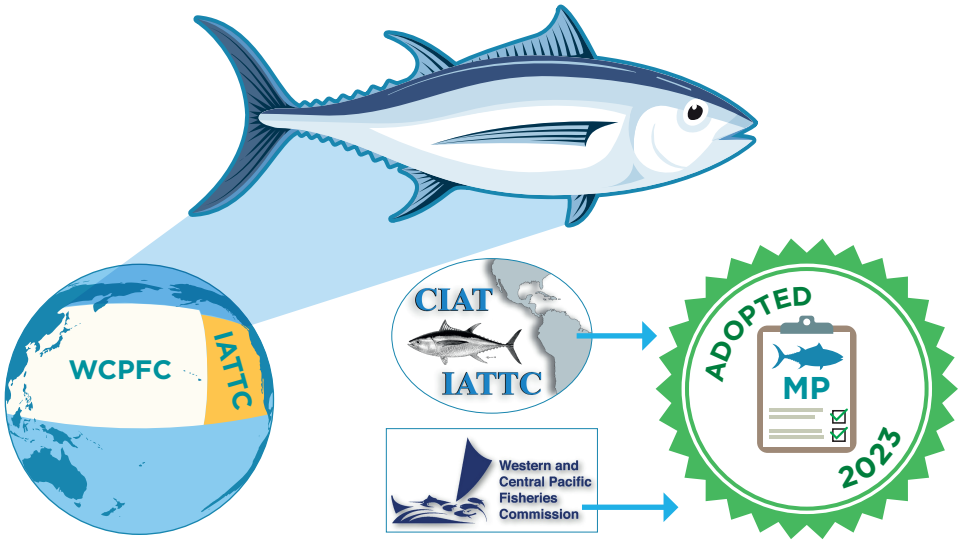


...protecting livelihoods and food security.

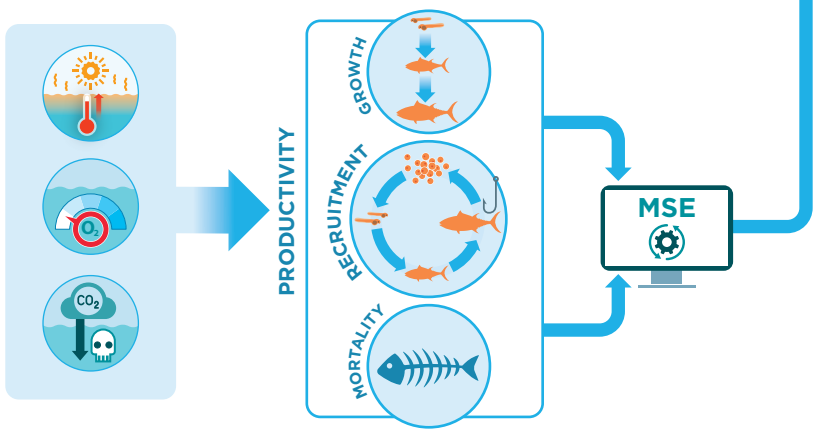
Climate-Ready Management Procedures in Action

There are already **MPs** in place that have been designed to account for potential changes in productivity resulting from a warming ocean. Here are two examples:

NORTH PACIFIC ALBACORE

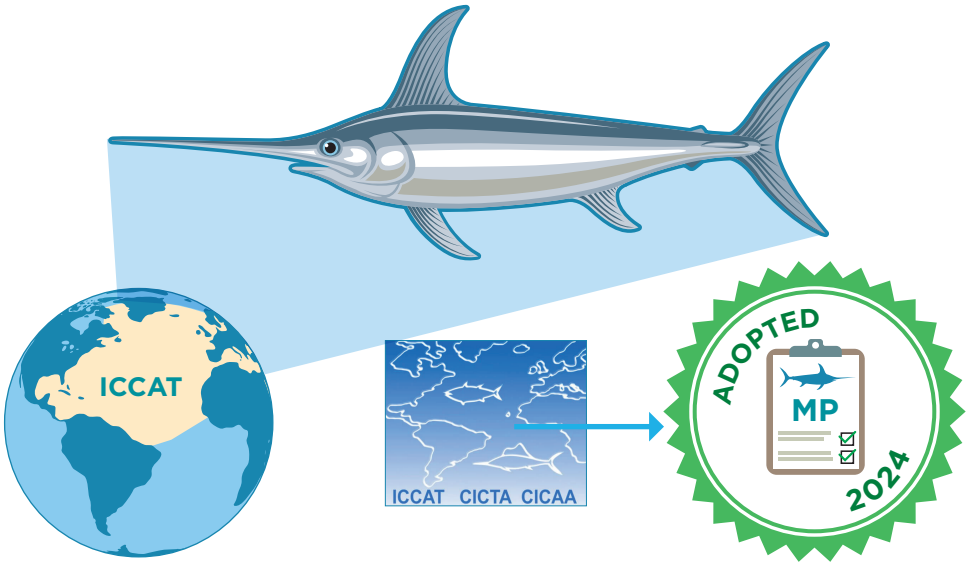


IATTC (Inter-American Tropical Tuna Commission) and **WCPFC** (Western and Central Pacific Fisheries Commission) adopted an **MSE-tested MP** for North Pacific albacore in 2023.

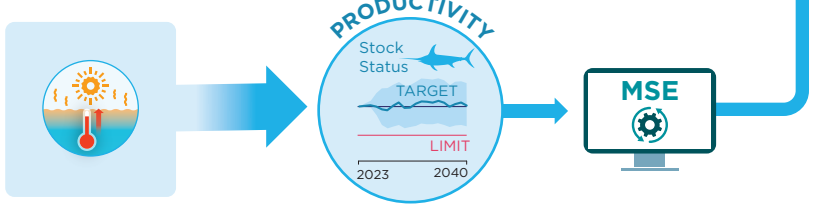


Climate change scenarios were considered in the **MSE** that included changes in recruitment and productivity that could be linked to climate impacts.

NORTH ATLANTIC SWORDFISH



ICCAT (International Commission for the Conservation of Atlantic Tunas) adopted an **MSE-tested MP** for North Atlantic swordfish in 2024.



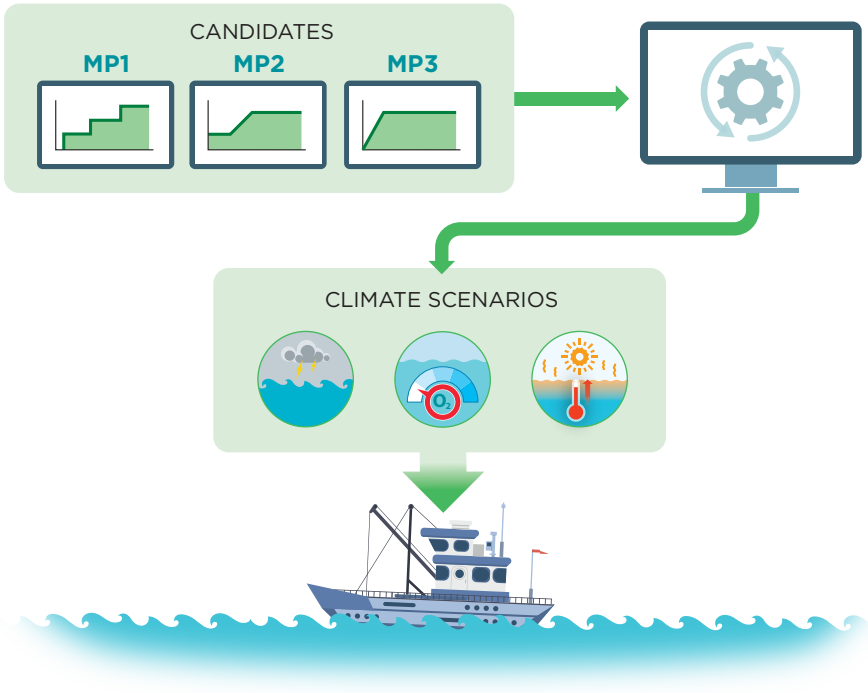
As part of the **MSE** process, a basic test of robustness to climate change impacts was performed—assessing how the selected **MP** would perform under shifts in stock productivity related to temperature changes.

However, the climate tests were preliminary and did not cover an adequate range of possible futures, so more sophisticated testing is now underway.

The Path Forward: Building Climate-Ready Fisheries

USE MSE TO STRESS-TEST MPs WITH CLIMATE-DRIVEN SCENARIOS

Use **MSE** to rigorously test candidate **MPs** under a range of climate-driven scenarios



ADOPT CLIMATE-READY MPs TO INSTITUTE ADAPTIVE, TIMELY MANAGEMENT

MPs can detect and respond to changes in fish stock conditions, without adopting new management measures

INVEST IN DATA AND INNOVATION

Help to better understand and detect environmental shifts and their impacts on fisheries resources to design more robust, forward-looking **MPs**

STRENGTHEN REGIONAL AND INTERNATIONAL COOPERATION

Collaborate on climate-resilient science and policy

Climate change is reshaping the future of fisheries, but MSE-tested, climate-smart MPs provide a proactive and responsive path forward to maintain sustainability.
By planning for uncertainty, responding quickly, and working across borders, we can build resilient systems supporting both ocean ecosystems and fishing communities.