



# From HCRs to management procedures: Advancing fisheries management at GFCM

---

## INTRODUCTION

DESPITE RECENT IMPROVEMENTS, half of the General Fisheries Commission for the Mediterranean's (GFCM's) assessed stocks remain in overexploitation. Management procedures can improve the situation by helping to end and prevent overfishing at GFCM.

A management procedure (MP) is a pre-agreed management framework that – when developed through management strategy evaluation (MSE) – helps secure stock health, increases long-term yields, and stabilizes catches. A key component of an MP is the harvest control rule (HCR), which links estimated stock status to a prescribed management action, such as a catch or effort limit.

GFCM has adopted HCRs for three stocks, and MSE work is underway for additional priority species. In 2026, GFCM has an important opportunity to build on this progress by adopting and implementing MSE-tested MPs for multiple stocks, while laying the groundwork for developing MSE-tested MPs for additional stocks.

This fact sheet provides an overview of GFCM's efforts to develop, adopt, and implement HCRs and MPs, along with [HarvestStrategies.org](https://www.harveststrategies.org) (HS.org) recommended next steps for advancing this approach to improve fisheries management in the region.

## AN OVERVIEW OF MSE, MPS AND HCRS

An HCR is a set of pre-agreed rules that sets fishing opportunities based on estimated stock status with the goal of maintaining a stock at the desired level. For example, an HCR may maintain fishing opportunities when biomass is within a specified target range or reduce fishing opportunities when biomass is below it (**Figure 1**).

To develop and select an HCR for a target stock, a computer simulation, called management strategy evaluation (MSE), tests the performance of candidate HCRs against multiple scenarios and uncertainties in the fishery. This MSE process is imperative, as it allows managers to determine which HCR would most likely achieve pre-agreed management objectives (i.e., formally adopted and measurable goals for the fishery) across a range of scenarios.

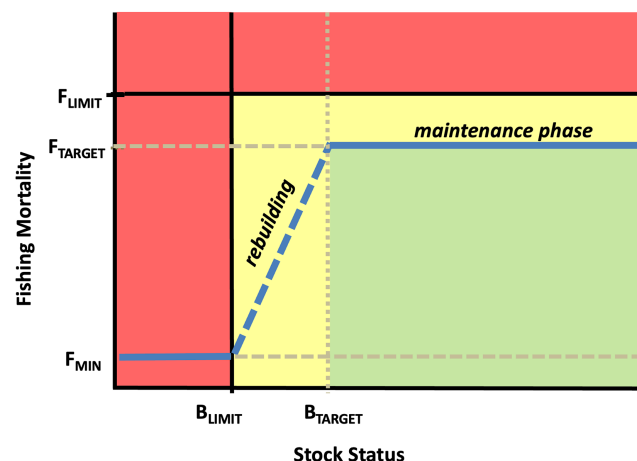


**Figure 1.** An example HCR curve (blue line) overlaid on a “Kobe plot,” which shows where the stock should be (green), the area to avoid (red), and the buffer zone (yellow) that helps avoid the red area. Below  $B_{\text{target}}$  (target reference point), precautionary measures are taken to reduce the probability that  $B_{\text{limit}}$  (limit reference point) will be breached.

However, an HCR is only one part of a fully specified MP. An HCR simply determines what management action should be taken based on estimated stock status, while a fully specified MP also defines how that stock status is estimated and what data are used. A fully specified MP therefore has three interconnected components:

- **Data collection program:** the monitoring, surveys, and sampling that provide information about the stock and fishery;
- **Estimation method:** the process of analyzing those data to estimate stock status indicators needed to run the HCR; and
- **HCR:** the pre-agreed decision rule that translates those estimated indicators into fishing opportunities, such as a catch or effort limit.

While an HCR can be implemented on its own, implementing a fully specified MP provides greater confidence that management will achieve the pre-agreed management objectives and leads to more predictable and consistent management since indicators that drive the HCR are clearly outlined and adhered to (**Figure 2**). The management of a fishery can begin with an HCR and subsequently develop the other components needed to create a fully specified MP, or it can begin with the full MP. MSE-testing fully specified MP candidates is particularly valuable because it evaluates the whole management system under the uncertainties and implementation challenges a fishery faces in practice.

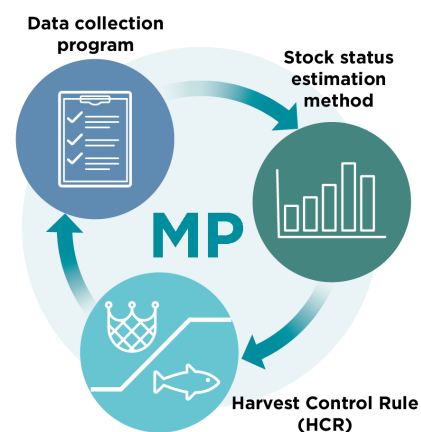


**Figure 2.** The elements of a fully specified MP, which includes an HCR.

## 5 reasons to adopt management procedures

Management Procedures:

- 1 Have had **proven success** in rebuilding and sustaining fisheries around the world.
- 2 Bring **greater predictability and stability** to seafood industries and the market.
- 3 Put the **fishery managers in the driver's seat** by taking a proactive, rather than reactive, approach to setting fishery management objectives.
- 4 Are a **future-proofing step**, ensuring the fishery can deliver on its long-term sustainability and economic objectives while adapting to changes in the environment.
- 5 Are able to **account for scientific uncertainty**, thereby providing greater clarity on how a strategy might perform given a range of plausible events.

## CONTEXT: FISHERIES MANAGEMENT AT GFCM

GFCM has made substantial progress in strengthening the scientific basis for fisheries management in the Mediterranean and Black Sea. The number of stock assessments have expanded over the past two decades, reaching 120 stocks in 2023.

At the same time, GFCM has increasingly adopted two-phased multiannual management plans for 11 fisheries. The first phase of the multiannual plans is a transitional period where interim measures are implemented in tandem with scientific advances. The second phase calls for the implementation of long-term, adaptive measures. In many of the multiannual plans, the first phase specifically calls for testing management measures using MSE to inform the second phase. Three stocks – blackspot seabream in the Alboran Sea, Adriatic Sea sardine and anchovy – have had HCRs adopted, with the Adriatic Sea HCRs already being implemented. Importantly, all three stocks had only HCRs adopted, rather than fully specified MPs.

In 2025, GFCM adopted a concept note on a stepwise MSE framework with increasing methodological complexity to account for differences in data availability, technical capacity, and fisheries' management needs, foreseeing three approaches:

- **Type 1 GFCM HCR:** A pre-defined, non-MSE-tested HCR that serves as a default for providing catch or effort advice, usually in conjunction with short-term forecasts (**Figure 3**). This approach is currently being utilized for deep-water rose shrimp (DPS) and giant red shrimp (ARS) in the Strait of Sicily, and common dolphinfish (DOL; **Table 1**).

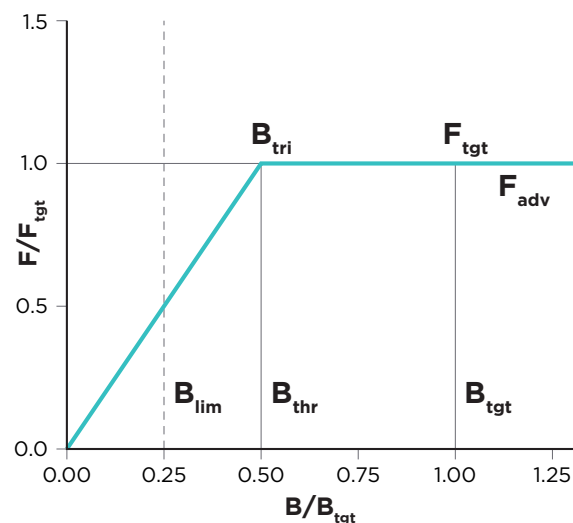


**Figure 3.** A conceptual illustration of candidate standard GFCM advice rule under a Type 1 HCR, as seen in the GFCM concept note. Fishing mortality ( $F$ ) advice corresponds to  $F_{tgt}$ , and the reference point  $B$  threshold ( $B_{thr}$ ) serves as trigger ( $B_{tri}$ ), below which fishing mortality is linearly reduced to minimize the risk of the stock's biomass ( $B$ ) dropping below  $B_{lim}$ .  $B_{lim}$  is defined as an undesirable stock status that has a high risk of impairing future reproduction and should be prevented with a high probability (e.g., 95 percent).  $F_{adv}$  is the default advice for fishing mortality, which corresponds to  $F_{tgt}$  if the stock's biomass is above  $B_{thr}$  and thus considered within safe biological limits.

- **Type 2 MSE-lite:** A “shortcut MSE process” that tests HCRs to evaluate trade-offs between short- and long-term conservation risks and fishing opportunities that does not refit the assessment model in each simulated year; instead, it emulates the assessment and advice process within the feedback loop. In other words, it greatly simplifies the estimation method step of the MP. This approach is currently being utilized for blackspot seabream in the Alboran Sea, giant red shrimp (ARS) in the Ionian Sea, and European hake (HKE) in the Strait of Sicily.

*“Management Strategy Evaluation is at the heart of the GFCM’s long-term vision for sustainable fisheries. Embedded in most GFCM multiannual management plans, MSE provides a pathway from transitional measures to adaptive, long-term management, ensuring that future decisions are robust, transparent and resilient in the face of uncertainty.”*

**Dr. Elisabetta Betulla Morello,**  
Senior Fisheries Officer, GFCM Fisheries  
Team Leader, FAO

- **Type 3 Full feedback loop MSE:** The most robust and complex approach, a complete feedback control loop to test HCRs that uses the estimation model and incorporates updated stock status estimates into management decisions over time. A Type 3 approach was utilized to develop, adopt, and implement HCRs for Adriatic Sea sardine and anchovy.

(Although not detailed in GFCM’s concept note, an alternative Type 3 approach is to utilize model-free or empirical rules, which use surveys or abundance indices as the stock status indicator that drives the HCR rather than a full stock assessment model.)

The three approaches provide a spectrum of fisheries management advice, representing increasing levels of methodological complexity. Type 1 is an approach, rather than an MSE-type, that applies the standard GFCM HCR in conjunction with short-term forecasts; Type 2 uses a simplified MSE framework to evaluate candidate HCRs/MPs; Type 3 evaluates HCRs/MPs within a full feedback-loop MSE, providing the most robust and comprehensive testing of the fisheries management process.

For stocks where analytical assessments are not available but suitable indicators may exist, GFCM is currently exploring and developing an alternative, data-limited MSE approach. To date, this approach is being utilized for blue and red shrimp (ARA) in the Strait of Sicily and in the Ionian Sea.

Several more stocks are in line for future development as laid out in the multiannual plans and other GFCM recommendations (**Table 1**).

*“Through its collaboration with partners from the Eastern Mediterranean on several projects, the FAO-GFCM supports countries in assessing marine resources and achieving robust fisheries management through Management Strategy Evaluation (MSE).”*

**Dr. Sharif Jemaa,**  
Associate Researcher, National Center for  
Marine Sciences, Lebanon

## PRIORITY ACTIONS AT THE 2026 COMMISSION MEETING AND BEYOND

To date, GFCM has made substantial progress in advancing MSE-tested HCRs for managing stocks across the Mediterranean (**Figure 4**). In 2026, the Scientific Advisory Committee on fisheries (SAC) developed advice for three stocks under Type 2 MSE approaches, and an additional two stocks under data-limited approaches. The SAC also developed advice for three stocks under a Type 1 approach, although this approach does not utilize MSE (**Table 1**).

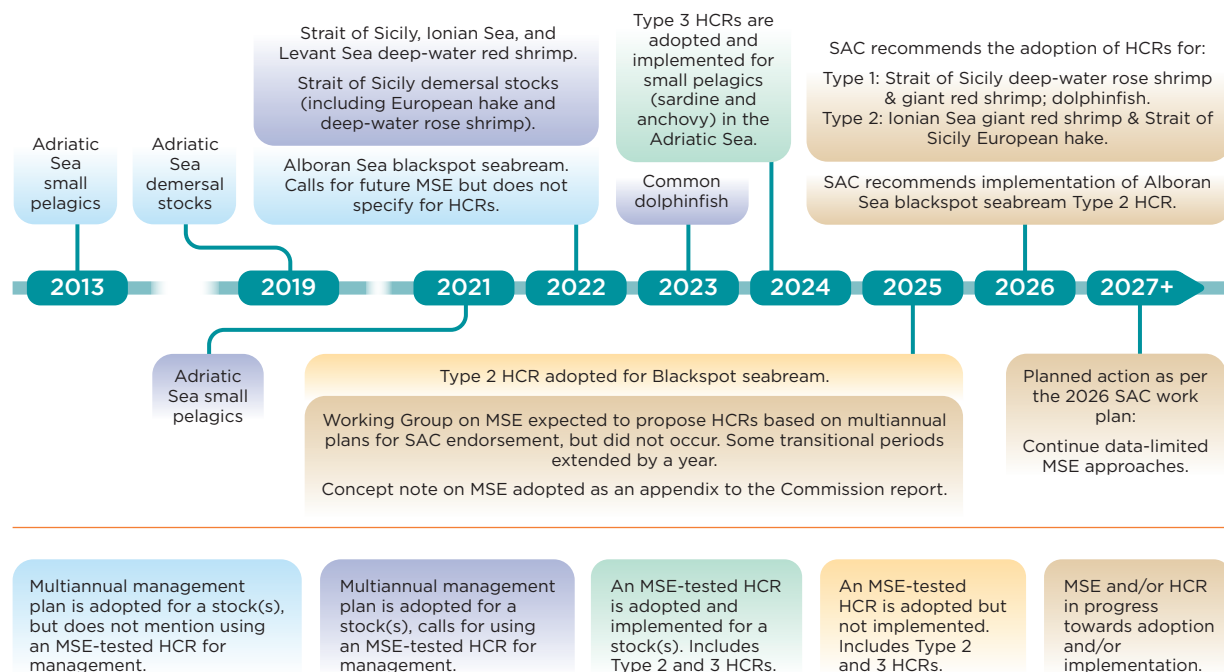


**Figure 4.** A timeline of recent and upcoming MSE and HCR work at GFCM.

**At the 2026 Commission meeting,** HS.org suggests that the Commission should take the opportunity to continue building on existing positive momentum:

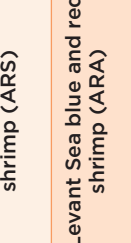
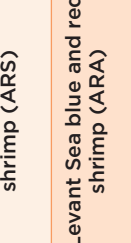
- **Implement the blackspot seabream HCR starting 1 January 2027.**
- **Move from standalone HCRs to adopting and implementing fully specified MPs** for European hake in the Strait of Sicily and giant red shrimp in the Ionian Sea. A data collection program and estimation method were assumed during testing of the HCRs and could easily be added to the HCR proposals for adoption this year. Doing so would ensure application consistent with the testing, thus providing greater confidence that the applied management approach will meet management objectives.
- **Adopt and implement the HCRs** for Strait of Sicily deep-water rose shrimp, giant red shrimp, blue and red shrimp; Ionian Sea blue and red shrimp; and common dolphinfish, and make a plan to MSE-test these HCRs in the near future.

**In 2027 and beyond,** HS.org suggests the Commission builds upon its strong foundation:

- **Transition any adopted HCRs to fully specified MPs,** by specifying the data collection and estimation method components.
- **Move towards a Type 3 MSE approach** for testing HCRs and fully specified MPs in order to test the full feedback loop between data, assessment, management advice, and implementation, both for species that have not yet had an initial MSE completed, as well as during the MP review process to update existing HCRs and MPs.
- **Extend these MSE approaches to additional priority stocks,** and test the robustness of each MP to stresses associated with climate change.

**Table 1.** Summary of stock status, MSE/HCR efforts to date, recommendations from the 2026 SAC, and HS.org's recommendations for action at the 2026 Commission meeting and beyond.

| Stock                                                                                                                                                                                      | Stock status & management importance                                                                                                                                                                                                                                                                                                                                                                                     | Current MSE/HCR status                                                                                                                                                               | HS.org-Recommended Action at the 2026 Commission Meeting                                                          | HS.org-Recommended Action in 2027 & Beyond                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Alboran Sea blackspot seabream</b><br><br><i>Isabelle Cheret, CC BY 4.0 (modified image)</i>         | <p>Depleted and in overexploitation; despite additional remedial measures adopted in 2024 that revised catch limits and added a longer fishery closure.</p> <p>High value as a commercial species.</p> <p>The multiannual plan called for long-term management measures to be established for 2026 to 2030.</p>                                                                                                          | 2026 SAC recommended implementation of the Type 2 HCR adopted in 2025.                                                                                                               | Agree to implement the HCR starting 1/1/2027.                                                                     |                                                                                      |
| <b>Ionian Sea giant red shrimp (ARS)</b><br><br><i>Isabelle Cheret, CC BY 4.0 (modified image)</i>      | <p>GSAs 18-20: Biomass around <math>B_{\text{tgt}}</math> in sustainable exploitation.</p> <p>As a deep-water red shrimp, giant red shrimp is one of the most valuable resources in the Mediterranean Sea.</p> <p>Action this year is necessary to align with the multiannual plan, which originally called for HCR-based catch limits to be endorsed by the SAC in 2025 for long-term management from 2026 to 2030.</p> | 2026 SAC recommended adoption of a Type 2 HCR.<br>(GFCM HCR with target fishing mortality of 0.2 and max interannual variation rate of 10 percent, resulting in 378t catch in 2027.) | Adopt and implement fully specified MPs, including a data collection program and estimation method with each HCR. | When the HCR/MP is reviewed in the future, consider utilizing a Type 3 MSE approach. |
| <b>Strait of Sicily European hake (HKE)</b><br><br><i>Isabelle Cheret, CC BY 4.0 (modified image)</i> | <p>GSAs 12-16: Biomass around <math>B_{\text{tgt}}</math> in sustainable exploitation.</p> <p>High commercial value.</p> <p>Action this year is necessary to align with the multiannual plan, which originally called for HCR-based catch limits to be endorsed by the SAC in 2025 for long-term management from 2026 to 2030.</p>                                                                                       | 2026 SAC recommended adoption of a Type 2 HCR.<br>(GFCM standard HCR with target fishing mortality of 0.25.)                                                                         |                                                                                                                   |                                                                                      |

| Stock                                                                                                                                                                                             | Stock status & management importance                                                                                                         | Current MSE/HCR status                                                                                                                                                                                                                                             | HS.org-Recommended Action at the 2026 Commission Meeting           | HS.org-Recommended Action in 2027 & Beyond                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strait of Sicily deep-water rose shrimp (DPS)</b><br><br><i>Isabelle Cheret, CC BY 4.0 (modified image)</i> | GSAs 12-16: Rebuilding, in sustainable exploitation.<br>Action this year is necessary to align with the multiannual plan.                    | 2026 SAC recommended adoption of a Type 1 HCR.<br><i>(<math>F_{adv}</math> scenario derived from the HCR, coinciding with <math>F_{target}</math> and a catch of 5,302t in 2027.)</i>                                                                              | Adopt and implement the HCRs.                                      | Consider expanding the HCRs to fully specified MPs.<br>When the HCR/MP is reviewed in the future, consider utilizing a Type 2 or 3 MSE approach.                                                     |
| <b>Strait of Sicily giant red shrimp (ARS)</b><br><br><i>NCAA Official, CC BY-NC-SA 2.0 (modified image)</i>   | GSAs 12-16: Increased risk of being overexploited, in overexploitation.<br>Action this year is necessary to align with the multiannual plan. | 2026 SAC recommended adoption of a Type 1 HCR.<br><i>(Scenario assuming constant <math>F</math> in the intermediate year corresponding to <math>F</math> level in 2024 to be consistent with multiannual plan implementation.)</i>                                 | Adopt and implement the HCRs.                                      | Consider expanding the HCRs to fully specified MPs.<br>When the HCR/MP is reviewed in the future, consider utilizing a Type 2 or 3 MSE approach.                                                     |
| <b>Common dolphinfish (DOL)</b><br><br><i>NCAA Official, CC BY-NC-SA 2.0 (modified image)</i>                  | New benchmark assessment finalized in 2026; sustainably exploited.<br>Action this year is necessary to align with the multiannual plan.      | 2026 SAC recommended adoption of a Type 1 HCR.<br><i>(To guide discussions on catch limits for 2027-2031, with scope for a gradual increase in <math>F</math> towards <math>F_{MSY}</math> (approx. 3,714 t), while recognizing the associated uncertainties).</i> | Adopt and implement the HCRs.                                      | Consider expanding the HCRs to fully specified MPs.<br>When the HCR/MP is reviewed in the future, consider utilizing a Type 2 or 3 MSE approach.                                                     |
| <b>Strait of Sicily blue and red shrimp (ARA)</b><br><br><i>CC BY 4.0 (modified image)</i>                    | GSAs 12-16: No assessment available (2025).<br>Action this year is necessary to align with the multiannual plan.                             | 2026 SAC advised the use of a data-limited MSE to set fishing opportunities.<br><i>(Possible increase of fishing opportunities by approximately 20 percent compared to 2024 levels, with a catch advice of 166t.)</i>                                              | Adopt and implement the output from the data-limited MSE approach. | Support the development of the data-limited MSE approach. In the future, transition to a Type 2 or 3 MSE approach – utilizing the highest-tiered approach possible – as data availability increases. |
| <b>Ionian Sea blue and red shrimp (ARA)</b><br><br><i>CC BY 4.0 (modified image)</i>                          | GSAs 18-20: Possibly overexploited (qualitative advice).<br>Action this year is necessary to align with the multiannual plan.                | 2026 SAC advised the use of a data-limited MSE to set fishing opportunities.<br><i>(Application of precautionary catch advice for 2027 between 200 and 250t.)</i>                                                                                                  | Adopt and implement the output from the data-limited MSE approach. | Support the development of the data-limited MSE approach. In the future, transition to a Type 2 or 3 MSE approach – utilizing the highest-tiered approach possible – as data availability increases. |
| <b>Levant Sea giant red shrimp (ARS)</b><br>                                                                 | GSA 24: Possibly sustainably exploited (qualitative advice).<br>GSA 26: Possibly overexploited (qualitative advice).                         | Listed in 2025 concept note on MSE, with 2027 as the foreseen year for the implementation of long-term measures.                                                                                                                                                   | N/A                                                                | Support the development of HCRs and fully specified MPs, utilizing the highest-tiered approach possible (Type 3), given data availability.                                                           |
| <b>Levant Sea blue and red shrimp (ARA)</b><br>                                                              | GSA 24: Possibly sustainably exploited (qualitative advice).<br>GSA 26: Possibly overexploited (qualitative advice).                         | Listed in 2025 concept note on MSE, with 2027 as the foreseen year for the implementation of long-term measures.                                                                                                                                                   | N/A                                                                | Support the development of HCRs and fully specified MPs, utilizing the highest-tiered approach possible (Type 3), given data availability.                                                           |

## CONCLUSION

At the 2026 annual meeting and beyond, HS.org urges GFCM to build upon its commendable advances in HCR and MSE development and continue establishing a strong foundation for long-term, precautionary, and adaptive sustainable fisheries management. Transitioning to Type 3 MSEs and fully specified MPs from Type 1 and Type 2 HCRs is a critical step in that evolution.

The immediate opportunity at the 2026 annual meeting lies in adopting and implementing the Type 2 HCRs – ideally as components of fully specified MPs – for giant red shrimp in the Ionian Sea and European hake in the Strait of Sicily, as well as implementing the Type 2 HCR for blackspot seabream in the Alboran Sea. Further, adopting and implementing the Type 1 HCRs and data-limited approaches for the five other SAC-recommended stocks is also important this year.

In the future, this work should continue moving towards fully specified MPs tested with full feedback loop MSEs for all multiannual plan-managed stocks, as this will maximize the likelihood of successfully achieving GFCM's management objectives for abundant and profitable fisheries.

Continued investment in these approaches in the near term can pay off over the long term by providing a stronger foundation for sustainable fisheries, more predictable management responses, and resilient fishing opportunities across the region.

*“Well-designed harvest strategies can support healthy fish stocks and sustainable, profitable fisheries. Developed collaboratively by scientists, managers, and stakeholders, these strategies use management objectives, risk tolerances, timelines, and tested harvest control rules to guide decisions. Although management strategy evaluation requires an initial investment, experience shows that effective strategies, supported by strong compliance, can deliver lasting benefits.”*

**Dr. Mohammed Malouli Idrissi,**  
Morocco, GFCM SAC Chair

## References

FAO. 2025. The State of Mediterranean and Black Sea Fisheries 2025. General Fisheries Commission for the Mediterranean. Rome. <https://doi.org/10.4060/cd7701en>

FAO. 2026. *General Fisheries Commission for the Mediterranean: Report of the forty-eighth session – Malaga, Spain, 4–9 November 2025: Appendix 16/A*. General Fisheries Commission for the Mediterranean (GFCM) - Session Reports, No. 48. Rome.



**WWW.HARVESTSTRATEGIES.ORG**

**CONTACT: [info@harveststrategies.org](mailto:info@harveststrategies.org)**



**@hrvststrategies**



**[harveststrategies.org](https://www.harveststrategies.org)**

 **THE OCEAN  
FOUNDATION**

DESIGN: 5W INFOGRAPHICS