Defra

Applying the Ecosystem Approach to Fisheries Management

A global stock take and best practice review: Summary report

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Joanne Pollett	Emma Wootton	Suzannah Walmsley
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Contributing Authors

Joanne Pollett, Suzannah Walmsley, Lucy Ward (ABPmer); Sarah Davie, Stephen Mangi Chai, Emily Vella, John Pearce, Catherine Whitley (MRAG)

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ABPmer
Quayside Suite, Medina Chambers, Town Quay, Southampton, Hampshire SO14 2AQ
T: +44 (0) 2380 711844 W: http://www.abpmer.co.uk/

Executive Summary

The UN Convention on Biological Diversity (CBD) is an international forum dedicated to the conservation and sustainable use of the world's biodiversity. In 2022, the Kunming-Montreal Global Biodiversity Framework (GBF) was agreed by 196 countries at the 15th Conference of the Parties to the Convention (COP15). The new framework sets a global mission to halt and reverse biodiversity loss by 2030, to be delivered through four long-term goals (by 2050) and 23 targets (by 2030). Targets 5, 9 and 10 of the GBF all commit the adopted Parties to using and managing their biodiversity sustainably, and Target 5, in particular, requires the use of the ecosystem approach to management.

This study examines how the Ecosystem Approach to Fisheries Management (EAFM) is being interpreted and applied globally. Traditional species-specific fisheries management is gradually shifting towards a more holistic approach that considers the wider impacts of fishing and interactions with other species, habitats and ecosystems. These aspects all fall within the ecosystem approach to fisheries management.

An in-depth report is available separately which provides a review of the current understanding of EAFM and the extent to which it is being implemented globally, in line with Target 5 of the GBF and demonstrates how the common principles of EAFM are being delivered using best practice methods. The approach taken for this study was a literature review and identification and consideration of a number of global case studies. This summary document provides a high-level overview of the findings and recommendations in the full report.

For this study we use the CBD definition of the Ecosystem Approach (EA), and the Food and Agriculture Organization (FAO) definition of Ecosystem Approach to Fisheries (EAF), in considering EAFM. The literature review established the following key components of EAFM:

- Target species sustainability
- Non target species interactions
- Habitat interactions
- Ecosystem structure and function
- Cross cutting components

Progress towards implementation of EAFM was reviewed against each of these areas. Aspects of EAFM have been incorporated into international agreements and treaties since 1982, but implementation of management measures has been slower. In 2022, the FAO questionnaire on the implementation of the Code of Conduct for Responsible Fisheries found that 82% of respondents had started implementing EAFM, although the extent of implementation varied.

Examples are given to demonstrate how aspects of EAFM are being addressed, and provide evidence that progress is moving in the right direction (details are provided in the full report). Where there are already fishery management measures in place, these may be adapted to address wider ecosystem impacts. For example, the contribution of fishery-related closed areas may also contribute to habitat conservation (and be recognised as other effective area-based conservation measures), and the use of bycatch reduction measures may also reduce discards or interactions with endangered, threatened and protected (ETP) species. There is less data available than needed to provide a comprehensive understanding of the level of implementation of EAFM globally, and the data that are available are skewed to more developed countries.

The literature review and case studies identified the common themes contributing the success of implementing EAFM. These themes have formed the basis for a number of recommendations for the design, implementation and evaluation of EAFM and how it can support the delivery of the GBF. The recommendations are summarised here:

Collaboration: There is a significant amount of information on approaches to implementing EAFM and sharing this knowledge will bring international benefits.

Establish baselines: Reviewing management measures that are already in place helps to understand how these could be modified for 'easy wins' and to enable managers and stakeholders to identify priority areas to focus the implementation of EAFM. The FAO's EAFM implementation toolkit provides guidance on this process.

Frameworks: Following a framework to achieve EAFM will help ensure that there are no gaps in the approach and that implementation follows timebound milestones. There are already training and capacity building materials available that could be more widely circulated to support fishery managers and other stakeholders to understand the requirements of EAFM.

Strategy and objectives: The use of an overarching national EAFM strategy, for example through a Fisheries Management Plan, would help coordinate implementation. The use of available toolkits can help prioritise social, economic and environmental objectives.

Adaptive management: Developing an approach to management that can be monitored to determine when changes are needed will support managers in decision making. This will be especially useful as fisheries begin to see the impacts of climate change.

Data collection protocols: Consistent, coordinated approaches to data collection should be established to enable countries to develop and improve their implementation of EAFM. Responses to the FAO CCRF survey should be encouraged, and if possible, expanded on, rather than new data collection processes established.

Regular review of progress and reporting: Regular review of management measures should take place to ensure management objectives are being met and no unintended consequences occur. A regular review will ensure best practice measures are continually being considered and incorporated into the management system.

1 Introduction

The UN Convention on Biological Diversity (CBD) is an international forum dedicated to the conservation and sustainable use of the world's biodiversity. In 2022, the Kunming-Montreal Global Biodiversity Framework (GBF) was agreed by 196 countries at the 15th Conference of the Parties to the Convention (COP15). The new framework sets a vison of living in harmony with nature by 2050 and aims to halt and reverse biodiversity loss by 2030, to be delivered through four long-term goals (by 2050) and 23 targets (by 2030). All Parties to the CBD must now take domestic action to fully and effectively implement the GBF, by updating their national biodiversity strategy and actions plans, ensuring they are aligned to the GBF and its goals and targets, ahead of COP16[1] (Decision 15/6 CBD 2022).

Since 1970, landings from marine fisheries have increased from approximately 60 million tonnes to 90 million tonnes. In 2021, the proportion of fish stocks within biologically sustainable levels was 62.3%, a decrease of 2.3 percentage points since 2019 (FAO 2024). In 2021, seven fishing countries accounted for approximately 50% of total global marine capture production, while the top 20 countries accounted for over 72% (FAO 2022). Clearly there is more work to be done to progress sustainable fisheries management and meet the targets of the GBF.

The GBF commits Parties to using and managing their biodiversity sustainably, and a commitment to the ecosystem approach now underpins many fisheries policies around the world. This report provides a review of the current understanding of EAFM and the extent to which it is being implemented globally, in line with Target 5 of the GBF.

Global Biodiversity Framework Target 5

Ensure Sustainable, Safe and Legal Harvesting and Trade of Wild Species: Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation, minimizing impacts on non-target species and ecosystems, and reducing the risk of pathogen spill-over, applying the ecosystem approach, while respecting and protecting customary sustainable use by indigenous peoples and local communities.

[1] Convention on Biological Diversity. 2022. 15/6. Mechanisms for planning, monitoring, reporting and review (cbd.int)

2 Definitions and Principles

The ecosystem approach to fisheries management (EAFM) is not a new concept (FAO, 2003) and has been present in international conventions in some form since 1982. The GBF uses the definition of Ecosystem Approach outlined in the CBD:

> *'The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.'*

The CBD also provides details on implementation of the ecosystem approach:

> *'Application of the ecosystem approach helps to reach a balance of the three objectives of the Convention. It is based on the application of appropriate scientific methodologies focused on levels of biological organization that encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems. The ecosystem approach is the primary framework for action under the Convention on Biological Diversity.'*

While there is debate regarding definition of the ecosystem approach to fisheries, ultimately it is an acknowledgement that sustainable and productive fisheries and ecosystems require consideration of interactions between different species and other elements making up an ecosystem. The most important point is that any progress made from single species fisheries management towards managing fisheries sustainably in the context of their wider ecosystem is positive, regardless of the terminology used.

Key principles and components of EAFM have been identified from a review of papers and guidelines for EAFM together with responses to a survey implemented by ABPmer for this project. These provide a structure which was used to consider progress in the implementation of EAFM in the context of GBF Target 5 (Figure 1).

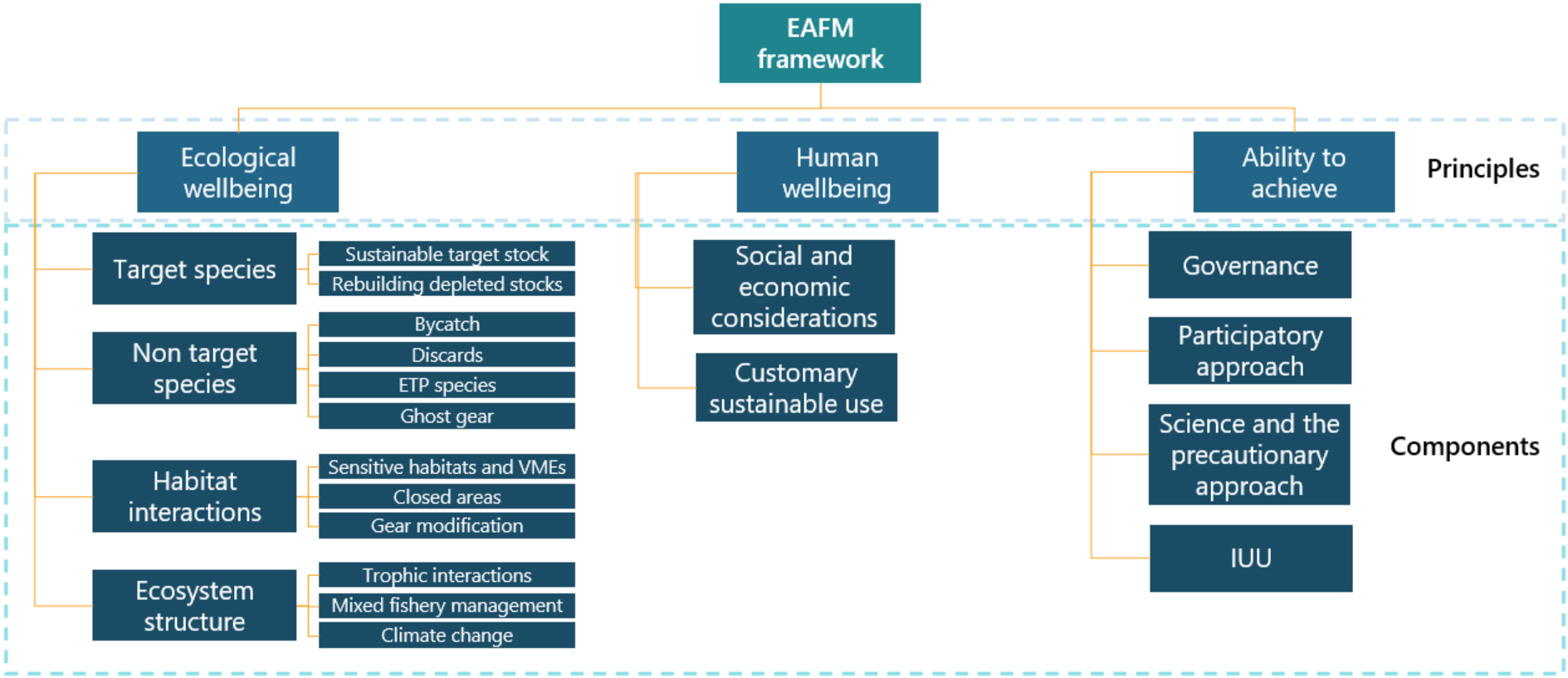


Figure 1. EAFM principles and underlying components based on findings from the literature review

3 Progress towards EAFM

The principles of EAFM have been incorporated into international agreements and treaties since the United Nations Convention on the Law of the Sea (UNCLOS) in 1982, which referenced the importance of managing 'associated species'. Since then, EAFM has been integrated into regional and national fishery policies of most developed countries and the work of Regional Fisheries Management Organisations (RFMOs), either explicitly or in its component parts (Fletcher 2020). References to EAFM and its components can also be seen to some extent in management policies of developing countries, although these tend to be less explicit and not part of an overarching strategy.

The Food and Agriculture Organisation (FAO) questionnaire on the implementation of the Code of Conduct for Responsible Fisheries (CCRF) (henceforth, the 'FAO CCRF questionnaire'), has been circulated to all nations every two to three years since 2000, and covers a significant number of the EAFM components, as well as explicitly asking members about their progress towards EAFM. In 2022, 82% of the respondents reported having started implementation of the ecosystem approach to fisheries, representing 61% of total global landings (based on 2021 FAO landings data). Figure 2 shows how the level of implementation of EAFM varies by region.

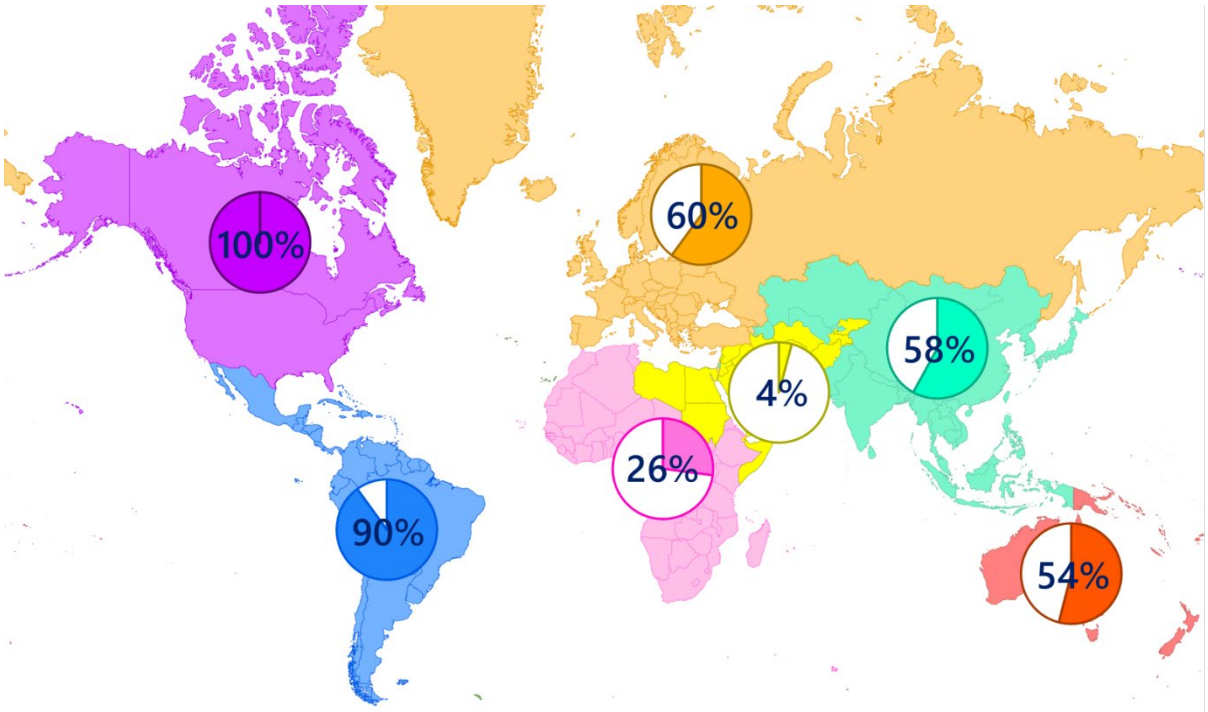


Figure 2. Percentage of regional landings under EAFM by region, based on the responses to the FAO CCRF questionnaire 2022 and the FAO global landings data (2021)

A study by Pitcher *et al*. (2009) reviewed progress towards EAFM made in 33 countries, and found that more progress had been made in developing policies for EAFM than in implementing management measure in practice, however several developing countries (e.g., Malaysia, Peru, Mexico, Ecuador and South Africa), scored better than developed countries, which was attributed to progressive fishery legislators and managers in these countries and the more community-based nature of local fisheries management (Pitcher *et al* 2009).

Of the respondents to the 2022 FAO CCRF questionnaire, 94% had developed Fishery Management Plans that provide detail of specific components of EAFM that are being addressed (Figure 3). In some regions, FMPs comprehensively address most EAFM components, although Asia and Near East have further progress to make. Addressing ghost gear, stock-specific target reference points, and additional measures for protecting habitats are areas that are less well addressed overall.

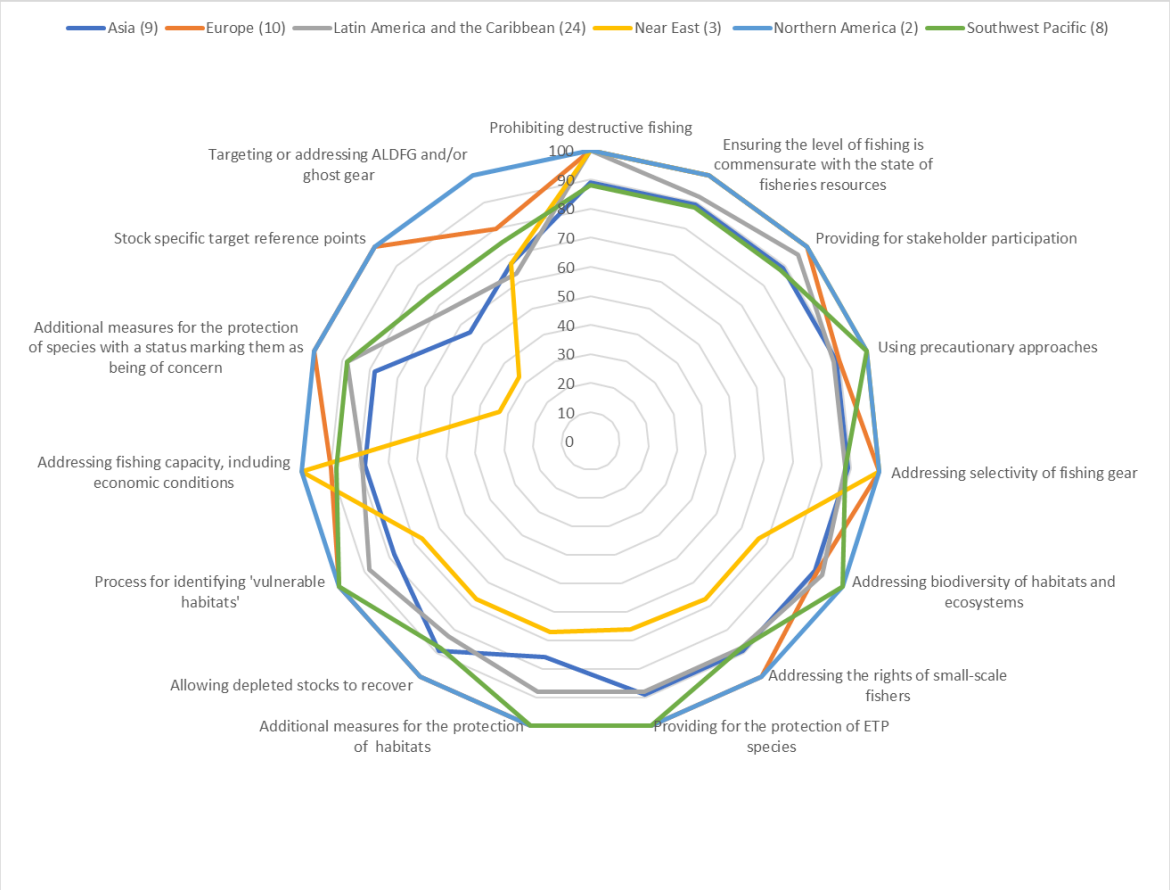


Figure 3. Percentage of respondents to the FAO CCRF questionnaire (2022) that reported EAFM-related measures implemented through FMPs.

4 Case Studies

Ten case studies were developed to highlight where ecosystem approaches have been implemented within fisheries management, the degree to which they have been effective and how they have delivered outcomes specified in Target 5. The case studies were selected to provide a range of gear types, species and regions, with the intention of identifying common best practice approaches, implementation challenges and learnings to be considered in the future (Figure 4).

Although these case studies present different scenarios for location, scale, gear type and fish species, there are overlaps in their approach to fisheries management and how this contributes to the implementation of EAFM. Table 1 sets out the high-level management approaches used in each case study, and additional information is provided in the full report.

Figure 4. Map of case study locations

Table 1. Management approaches implemented in each of the case studies

Case study	Policy instruments	Limited access	Input or output controls	Gear modifications	Spatial and temporal closures	Co management	Market incentives	Enforcement and deterrents
Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)	✓	✓	✓	✓	✓		✓	✓
Philippines small scale fishery	✓	✓			✓	✓	✓	✓
South African hake trawl fishery	✓	✓	✓	✓	✓	✓	✓	✓
New Zealand deep trawl fishery	✓	✓	✓	✓	✓	✓	✓	✓
Canadian halibut longline fishery	✓	✓	✓	✓	✓	✓	✓	✓
Belize territorial user rights for fisheries (TURF)	✓	✓			✓	✓		✓
Iceland mixed trawl fishery	✓	✓	✓	✓	✓	✓	✓	✓
UK Lyme Bay	✓	✓	✓	✓	✓	✓		✓
WCPFC tuna fishery	✓	✓	✓	✓	✓		✓	✓
Gulf of California pelagic fishery	✓	✓	✓	✓	✓	✓	✓	✓

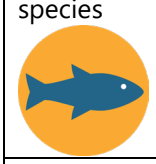
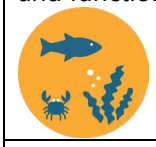
The purpose of these measures can be applied to address multiple components of EAFM. For example, managing a mixed fishery using a quota-based system can also be used to reduce or prevent bycatch and discard issues through quota trading prior to landing.

The literature review indicated that EAFM is expected to be implemented in a stepwise approach, however these case studies reflect that in reality the approach to EAFM is tailored to each fishery's priority objectives. For example, where there is more selective fishing gear, there is less need to address bycatch or discard issues so management has been prioritised elsewhere.

5 Global Biodiversity Framework

The overarching objective of GBF Target 5 is to 'Ensure Sustainable, Safe and Legal Harvesting and Trade of Wild Species'. The ecosystem approach is the primary framework for action under the CBD and is an explicit element of Target 5. Table 2 shows the linkages between GBF Target 5 and the components of EAFM.

Table 2. Components of EAFM and the requirements of GBF Target 5.

EAFM component		GBF Target 5					
		Sustainable	Legal	Preventing over exploitation	Minimising impacts on non-target species and ecosystems	Applying the ecosystem approach	Customary sustainable use
Target species 	Target species management	✓	✓	✓		✓	
	Rebuilding depleted stocks	✓		✓		✓	
Non-target species 	Bycatch	✓		✓	✓	✓	
	Discards	✓	✓	✓	✓	✓	
	Ghost gear	✓			✓	✓	
	ETP species	✓	✓	✓	✓	✓	
	IUU	✓	✓	✓		✓	
Habitat interactions 	Closed areas	✓		✓	✓	✓	
	Gear modification	✓		✓	✓	✓	
Ecosystem structure and function 	Trophic level impacts	✓		✓	✓	✓	
	Mixed fishery management	✓		✓	✓	✓	
	Climate change	✓			✓	✓	✓
Cross cutting 	Social and economic considerations	✓	✓			✓	✓
	Customary sustainable use	✓	✓			✓	✓
	Participatory approach		✓			✓	✓
	Science and the precautionary approach	✓		✓	✓	✓	
	Governance and policy	✓	✓	✓	✓	✓	✓

This report demonstrates where EAFM implementation has contributed to the outcomes specified in the GBF, as relates to fisheries. The full report contains in-depth information on the examples and case studies mentioned in this summary document.

5.1 GBF outcome: Ensuring that the use, harvesting and trade of wild species is sustainable, safe and legal

Sustainable

The headline indicator for GBF Target 5 is the proportion of fish stocks within biologically sustainable limits. The first step towards ecological wellbeing through the implementation of EAFM is to ensure that target species are managed sustainably. FAO (2024) estimates that 62.3% of global fish stocks are considered to be fished at a biologically sustainable level, although this varies at a regional level (Figure 5).

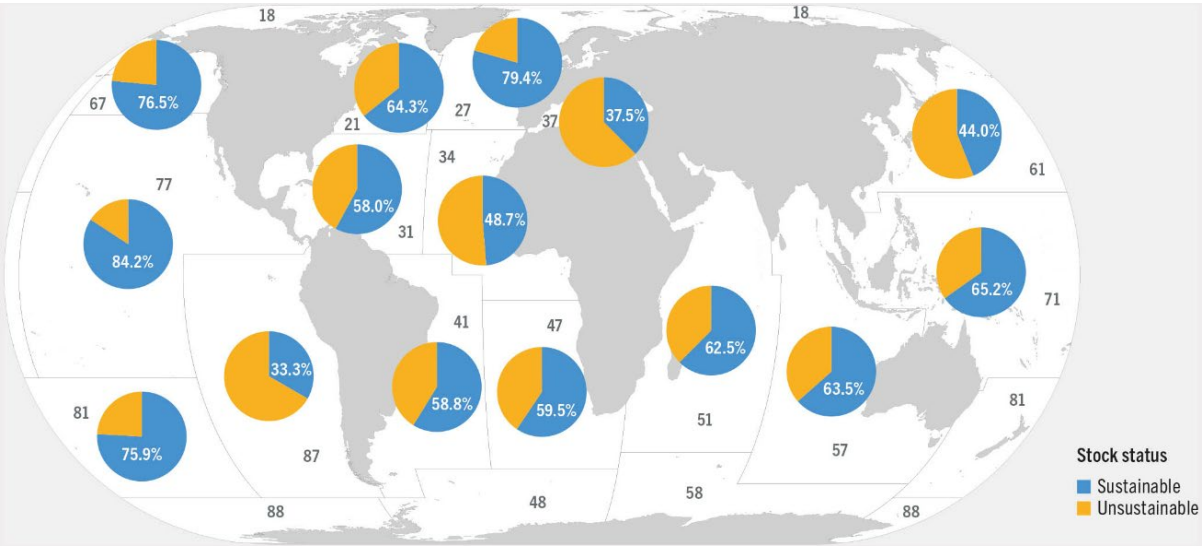


Figure 5. FAO percentages of biologically sustainable and unsustainable fishery stocks by major fishing area, 2021 (FAO 2024)

Countries have committed to international fisheries and biodiversity related agreements that specify the implementation of EAFM and its underlying components. These components have been incorporated into national and regional legislation either individually or as an overarching EAFM strategy. Depleted stocks have been identified and the necessary rebuilding plans and recovery measures implemented to improve stock status to a level where it can be considered sustainable. After the decline of the Namibian hake fishery, surveys were implemented to inform management decisions and a precautionary TAC set annually to allow the stock to increase. In many cases, fisheries have gone on to be successfully MSC certified, demonstrating their performance at a sustainable level.

One of the first steps seen in countries committing to implementation of EAFM is the development of a plan to improve data collection and undertake assessments of stock status. The Philippines case study highlights the prioritisation and development of a national stock assessment programme to support the sustainable management of fisheries resources. It is understood that approximately 50% of global stocks have some form of stock assessment that enables an understanding of whether the fishery has a sustainable biomass, which still leaves a significant knowledge gap for species that have not been scientifically assessed.

Safe

EAFM does not address the 'safe' aspect of this target, which relates to the spread of disease and pathogen spillover. However, the increased ecosystem resilience resulting from implementing EAFM may contribute to a robust fishery and ecosystem that are able to withstand stressors more readily than fisheries that are not managed using this more holistic approach.

Legal

Illegal, unreported and unregulated (IUU) fishing activities are responsible for the loss of 11–26 million tonnes of fish each year (FAO 2022, Figure 6), which is estimated to have an economic value of US$10–23 billion.

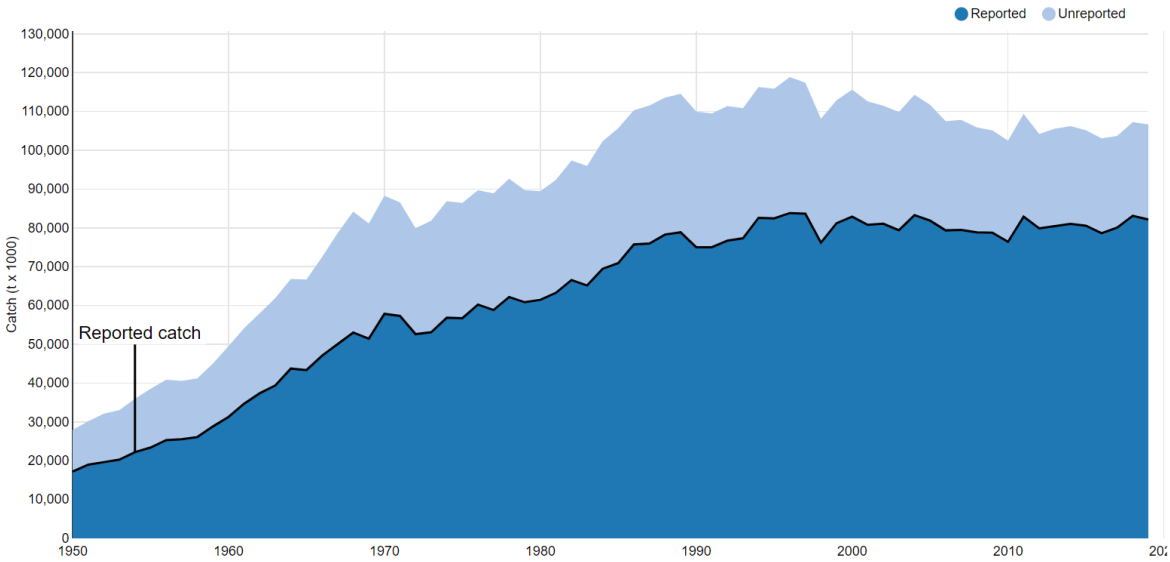


Figure 6. Estimated unreported catch as a fraction of global landings from the Sea Around Us project using FAO data (2020)

As IUU is a global concern in fisheries of all types and sizes, solutions need to be considered at an appropriate scale. The implementation and enforcement of EAFM will help address IUU fishing through sustainable management measures that take account of all removals from a fish stock and the wider social and economic impacts of illegal activity. For example, in the Philippines, where a significant proportion of the population is reliant on fishing for food security, the national fisheries agency collaborated with USAID to identify IUU activity and how it should be addressed, including collaboration with other countries for enforcement activity. FAO (2022) highlighted that there are clear linkages between IUU fishing and social issues, so implementation of EAFM that takes account of social and economic issues when designing management could reduce IUU activity.

Establishing fisheries governance frameworks based on EAFM, enforcing the associated management measures and introducing data collection frameworks that support the use of science and the precautionary approach to management are all components of EAFM and will contribute to reducing the opportunities for IUU activity to take place. Nationally, countries increasingly require vessel registrations, logbook submissions, Vessel Monitoring Systems (VMS) and other monitoring systems to minimise the likelihood of IUU activity. Additionally financial penalties and other restrictions encourage compliance with fishing regulations. For example, New Zealand enforces sanctions dealing with IUU, including prison, fines up to 500,000 NZD, and quota, vessel and/or property forfeiture. Restrictions on trade and legislation to protect endangered, threatened and protected (ETP) species, such as in Belize, will contribute to ensuring there is no market for landing these species. Improved levels of collaboration

across boarders will also contribute to ensuring IUU is being addressed at an international level, as well as national.

Examples discussed in full report: Indonesia IUU enforcement; US Seafood Import Monitoring Scheme; Rights-based fisheries management; MSC chain of custody; EU trade measures.

Management approaches that can address IUU include: Limited access, Total Allowable Catch (TACs), harvest control rules, reference points, observer coverage, inspections, fines and penalties, international collaborations, VMS, remote electronic monitoring (REM).

5.2 GBF outcome: Preventing overexploitation (including overfishing)

The core purpose of EAFM is to manage fisheries sustainably, by taking a holistic approach to measures introduced based on the use of best available science and the precautionary approach. The 2022 FAO CCRF questionnaire found that 92% of respondents had measures in place to ensure the use of the precautionary approach to provide conservative safety margins in fisheries-related decision making.

Management measures have been introduced in fisheries globally as a reaction to stock depletion. This includes legislation for rebuilding plans and reduced fishing pressure in, for example, the United States, Canada, Europe, Japan, Chile and New Zealand. Studies show that after decades of overfishing, many global fish stocks have recovered through the implementation of effective management including regulating catch and fishing mortality, regulating effort and regulating spatial access (Anderson *et al* 2018).

Common measures used to maintain fish stocks at a sustainable level include input controls (effort limitations), output controls (TAC) and technical measures (gear restrictions), which can be seen in practice in the case studies discussed in the full report. The use of a pre-agreed management approach (harvest strategy and harvest control rules that provide a process for managing pressure on the stocks) has been shown to support adaptive, flexible management decisions that can respond to fluctuations in the stock with predetermined measures to reduce the level of fishing pressure (Gutteridge *et al* 2024). The presence of a robust fisheries management system has been shown to correlate with healthier stock biomass (Costello *et al* 2012). By widening the scope of these management measures to address all components of EAFM relevant to the fishery, the whole ecosystem is likely to be more resilient, and less susceptible to overexploitation. The Lyme Bay case study demonstrates how a well-managed area can be more resilient to extreme storms and recover quicker than in other areas.

Understanding stock status and ensuring there are adaptive flexible management approaches in place that can react quickly to changes in stock biomass are important. To be able to do this, data must be collected, reference points developed and ideally management scenarios modelled. Regular review of harvest rates and stock biomass against pre-agreed harvest control rules enable adaptive management to limit the chance of the stock becoming overfished. This approach will be particularly important in the face of climate change.

Examples of successful stock rebuilding plans discussed in full report: Namibian hake; Georges Bank scallop fishery; CCAMLR, IPHC (Canada).
Management approaches that can address overexploitation include: Limited access, TACs, harvest control rules, reference points, management strategy evaluation, data collection, precautionary approach.

5.3 GBF outcome: Minimising impacts on non-target species and ecosystems (including bycatch)

Historically, fisheries management measures were used to regulate the pressure on the target stock, but understanding and mitigating the wider impacts of fishing activity has become an integral part of fisheries management with regards to sustaining healthy ecosystems (Bellido *et al.*, 2011). One of the core principles of EAFM is ecological wellbeing, covering the impacts of fishing activity on target species, non-target species, habitats and ecosystems. The full report outlines the current status of each of these components and the types of management that can be used to mitigate the potential impacts from fishing.

Management measures initially designed to prevent overfishing of target stocks can be modified to address wider ecosystem impacts identified through EAFM. In the Iceland and Canada case studies, managing non-target species is done through a tradeable quota system that ensures vessels can trade between themselves to land all their catch. In the Mexican and South African case studies a specific bycatch quota is taken from the overall quota allocation and accounted for in stock assessments. The use of TACs to regulate the amount of fish removed from a population can take into account the needs of other species e.g. food for birds and other predators. The CCAMLR case study, in particular, demonstrates how low trophic level species such as krill can be managed in a precautionary way to ensure sufficient biomass remains for other species that consider krill a food source.

Measures that reduce discards often align with measures to reduce bycatch or limit fishing effort on target species. Other methods that have been employed by fisheries managers and the fishing industry to reduce and avoid bycatch and discards, including the use of incentives, real-time closures, reporting apps, and gear modifications. In many countries, crew are trained to identify species interacting with the fishery and help to develop best practice guides specific to the gear and vessels they use.

Managing the wider impacts of fishing through gear modifications and spatial management supports vessels to avoid catching non-target species and juveniles or from interacting with benthic habitats. The types of innovation seen in fisheries addressing gear impacts on catch are often most successful when measures have been developed with stakeholder participation and engagement. Crucial to the success of these policies is the use of monitoring through either REM or observers to ensure regulations are followed. The Canadian case study highlights the use of REM and observers for 100% at sea monitoring of fishing activity under the IPHC. In New Zealand and Iceland, strong penalties (financial, loss of permits, prison time) can act as significant deterrents to non-compliance.

The potential impact of fishing gear on the seabed and on vulnerable habitats has been high on the global ocean agenda since the 1990s (FAO 2022) and the implementation of EAFM requires that the wider ecosystem, including the impact of fishing on habitats is addressed through management measures. The most common approach to managing sensitive habitats is through spatial management, which is reflected in all the case studies featured in the full report. Spatial management can be permanent or seasonal, and designed to protect key life stages (e.g. juveniles and spawning grounds), as well as to mitigate the impacts of gear on sensitive habitats or to protect habitats important for the functioning of the wider ecosystem (e.g. Vulnerable Marine Ecosystems; VMEs). Spatial management areas designed to regulate sustainable fishing activity often generate additional benefits for species, ecosystems and fishing communities, as well as support social and economic development (FAO 2022). There are other tools already in use, such as gear modifications, that can also contribute to a reduction of the impacts of fishing when spatial management is not socially or economically viable. In some fisheries, the approach has been taken to implement gear modifications that reduce the interaction of fishing gear with the seabed while still allowing commercial fishing to take place (McConnaughey *et al*, 2019).

The wider impacts of a fishery on the ecosystem it operates in and how this can be managed is one of the more advanced stages of EAFM. Often this is limited due to the difficulty in fully understanding the impacts of the fishery or being able to attribute ecosystem changes to fishing activity. Ecosystem based analytical models have been used for many years to support fishery managers in understanding the potential repercussions of management scenarios, occasionally resulting in innovative approaches to managing a fishery and its impacts on the ecosystem.

Examples discussed in full report: Scottish real-time reporting; Norwegian bycatch programme; Swedish grid; LED lights; Consumer campaigns; At-sea observer programmes and REM; 100% Fish Project; Safe release protocols; Ropeless pots; Limiting the weight and durability of gear; Reducing physical contact and penetration depth of gear within the seabed; Operational changes; Canadian groundfish forum; ICES mixed fishery advice; 'Pretty good yield' ranges; Management Strategy Evaluation; F_{ECO}.

Management approaches that can mitigate the impacts of fishing on non-target species include: Mesh sizes, bycatch quota, temporary closures, observers, biodegradable gear, reporting protocols, risk assessments, move on rules, VMS, REM.

5.4 GBF outcome: Respecting and protecting customary sustainable use by indigenous peoples and local communities

The importance of the 'human element' in fisheries management has been highlighted as one of the key components of EAFM, and in practice this often relates to customary sustainable use.

The 2022 FAO CCRF questionnaire does not cover customary sustainable use and it is difficult to determine the extent that it is currently being considered in fisheries management. The concept has been incorporated into national policies in many countries, including Canada and Australia, as well as in cross jurisdictional agreements such as the Circumpolar Inuit Declaration on Sovereignty in the Arctic (2009). In practice, most consideration of customary sustainable use focuses on the incorporation of indigenous, artisanal and community knowledge in fisheries management.

Setting aside an allocation for each fleet segment (small-scale, by gear type, indigenous populations) contributes to the fair use of the resource. This should not be tradeable across sectors (or only to a certain limit) to ensure that consolidation of the quota does not occur. The use of community quota, quota pools or terrestrial user rights for fisheries (TURFs) are also options for ensuring equitable access to the resource within the bounds of a sustainable overall harvest. Legislation that sets out these rights, along with a process for incorporating indigenous knowledge into fishery management decisions will contribute to the successful long-term, sustainable and holistic approach to fishing activities.

Examples discussed in full report: Canada, Belize, New Zealand, Japan, Australia.

Management approaches to address customary sustainable use: Legislation, priority access, quota allocation, co-management processes

5.5 GBF outcome: Providing social, economic and environmental benefits for people

Implementing EAFM requires consideration of ecological, social and economic needs, and demonstrates the importance of stakeholder collaboration in successfully setting and achieving the agreed objectives. The importance of including social and economic considerations when developing and implementing fisheries management has been a key component that sets EAFM apart from traditional fisheries management. There are numerous societal objectives that can be met by sustainably managing fisheries resources to improve human well-being and equity between various stakeholders while ensuring that the systems that sustain these services are not irretrievably compromised (FAO 2022). In cases where objectives have a social focus, the management implemented can have additional economic and environmental benefits. The use of TURFs in Belize to incentivise stewardship of the resource can also contribute to the health of the seabed habitats by limiting access from larger vessels using bottom-towed gear.

The 2022 FAO CCRF questionnaire asked members about the implementation of aspects of EAFM, and found that 92% of respondents have activities in place to consider the social and economic aspects of fishing. Initiatives already in place were most prominently related to implementing capacity development of fisheries organisations and other stakeholders (90%), supporting Small Scale Fisheries (SSF) actors to take an active part in sustainable resource management (95%), and enhancing SSF value chains, post-harvest operations and trade (90%).

The use of social and economic risk assessments can help identify and prioritise management measures that contribute to ensuring social, economic and environmental benefits for people. Providing an underlying framework for participation in management decisions and setting fisheries objectives that account for social impacts can improve management outputs. Where social aspects have not been considered early on in the management process, policies have needed to be altered to account for unintended consequences, by which time damage to communities may already have occurred. Ensuring early involvement in the management process and accountability for its success has also been shown to secure stakeholder buy-in and improve compliance with management measures. The Iceland case study demonstrates how fisheries management implemented without the consideration of social impacts may need to be refined in the future.

Evidence has shown that the use of the MSC Standard in South Africa provides both economic benefits through increased prices and secure markets, as well as the social benefits of increased job security both in fisheries and supply chains (Lallemand *et al*, 2016). Effective management systems can achieve social and economic benefits while maintaining the sustainable production of fishery resources and the function and structure of the ecosystem they depend on (European Commission 2022). In many of the gear and management innovations discussed in this report, there is potential for a win-win-win scenario that allows fishers to generate maximum income while fishing less. This situation means that there is a reduced impact on habitats and ecosystems, and often reduces fuel usage (Sciberras *et al* 2022).

Examples discussed in full report: South Africa, Canada, Philippines, Canada, Belize, Lyme Bay.

Management approaches to address social, economic and environmental benefits: Social and economic risk assessments, MSC certification, subsistence quota allocation, consultation processes, co-management.

5.6 GBF outcome: Contributing to the resilience and long-term efficiency and productivity of fisheries and to food security

In addition to the management set out above, the resilience of fisheries and their contribution to food security is addressed through the development of specific social objectives that prioritise food security and subsistence needs in the approaches to fisheries management. Well-managed stocks of Alaskan pollock, mackerel and tinned tuna contribute to global food security. This is becoming increasingly important in the face of climate change, where the use of adaptive management and regular reviews will support fisheries managers to be proactive in identifying and addressing emerging impacts.

The identification and protection of juveniles and spawning areas will support the continued growth of fish populations, and the use of ecosystem models to consider the needs of prey species and other trophic interactions will contribute to maintaining the overall resilience of the ecosystem. Some of the adaptable fishery management approaches discussed throughout this report, such as real time reporting and ecosystem modelling will contribute to the management of fisheries in the face of climate change.

The case studies and examples in the report have demonstrated that for countries heavily reliant on fish as a source of nutrition, EAFM can help to identify, address and monitor management measures with the intention of ensuring a resilient and robust ecosystem that will support the health of their fisheries (Heenan *et al*, 2015). This is reflected in government policies that prioritise social and economic impacts and food security in fisheries management decisions (Tolentino-Zondervan and Zondervan, 2022), and through the prioritisation of small-scale fisheries in the Philippines case study and First Nations fishing for food, social or ceremonial purposes in the Canadian case study.

Examples discussed in full report: Southern Ocean krill fishery; Welsh cockle bird food model; South Africa anchovy and sardine; Philippines; Canada.

Management approaches to address resilience and food security: Closed areas, science and the precautionary approach to setting quotas and determining reference points, ecosystem modelling, adaptive management, regular reviews.

5.7 GBF outcome: Conserving and restoring biodiversity

Although the main purpose of EAFM is about managing the fishery, there are many examples of how this can lead to the conservation of other aspects of the ecosystem, for example management of spawning grounds can also protect habitats. Reducing the impact of the fishery on bycatch, ETP species and habitats also contributes to the conservation of these species.

Examples discussed in full report: South Africa, New Zealand, Belize, CCAMLR.

Management approaches to conserve and restore biodiversity in line with EAFM: Reporting protocols, rebuilding plans, trade restrictions, closed areas, biodegradable gear, footprint restrictions, effort limitations

6 Conclusions

This report examines how the Ecosystem Approach to Fisheries Management is being interpreted and applied globally. There is significant reference to the use of the ecosystem approach in international fisheries agreements, and in many cases this has been transferred into regional and national legislation. While there may not yet be a cohesive EAFM strategy in all countries, there is still evidence that many of the aspects of EAFM are being addressed through policy, although less so in practice.

As seven countries account for almost 50% of global landings, understanding the progress of these countries in implementing EAFM provides insights into progress globally. Of these seven countries, five have committed to eradicating IUU activity through the Port State Measures Agreement; six have ratified the CBD, and associated GBF targets; and five have made moves towards introducing protected areas in their waters. A significant proportion of their landings are from bottom trawl gear which must be well managed to ensure mitigation of any impacts on benthic habitats, bycatch and discard rates. However, given that SSF are estimated to account for 40% of global landings (Bitoun *et al* 2024) but are often data poor and less regulated, there is a significant gap in knowledge in determining the true performance of global fisheries.

The case studies reviewed represent a range of fishing scenarios and yet many of the management approaches implemented through EAFM display common theme contributing to the success of the fishery. These common themes include external drivers to implement EAFM, such as stock collapse or food security concerns; policies underpinned by the cross-cutting components identified in the literature review; and the use of management measures that addresses more than one EAFM objective. These common themes formed the basis of the recommendations in the report, shown below:

Collaboration: There is a significant amount of information on approaches to implementation and sharing this knowledge will bring international benefits. An EAFM working group could be responsible for coordinating workshops to share ideas and experiences and building networks. A knowledge hub or data sharing platform could support this collaboration by recording approaches to EAFM and lessons learnt that could be shared in other fisheries locally, nationally and internationally. This is especially important as many fish stocks straddle multiple management jurisdictions and collaboration could help reduce resource requirements for data collection and stock assessments and improve enforcement to address IUU.

Establish baselines: Reviewing management measures that are already in place helps to understand how these could be modified for 'easy wins' and to enable managers and stakeholders to identify priority areas to focus the implementation of EAFM. The FAO's EAFM implementation toolkit provides guidance on this process.

Frameworks: Following a framework to achieve EAFM will help ensure that there are no gaps in the approach and that implementation follows timebound milestones. Fishery Improvement Projects enable fisheries to use the MSC Standard as a framework to address stock status, environmental impacts and develop robust management over a timebound period with stakeholder participation. On successful completion of this process the fishery could be considered for a full MSC assessment, which may improve market access and provide a price premium as an incentive for performing at a level consistent with best practice. Other frameworks include the FAO's EAFM implementation toolkit.

Strategy and objectives: The use of an overarching national EAFM strategy, for example through a Fisheries Management Plan, would help coordinate implementation. It can draw on existing legislation to set out how EAFM is being implemented and set out clear and transparent objectives to help prioritise resources. Early consideration of social, economic and environmental pillars through stakeholder engagement will contribute developing objectives that ensure that potential consequences are identified. Having a concerted drive for EAFM, and clear strategy to achieve it, would speed up implementation and ensure issues are more comprehensively addressed at a national level but also with international support and guidance.

Adaptive management: Developing an approach to management that can be monitored to determine when changes are needed will support managers in decision making. This should include the use of harvest control rules that set out pre-agreed actions in response to declines in stock biomass so that fishery managers can react quickly to potential stock fluctuations and stakeholders are already aware of the process. This will be especially useful as fisheries begin to see the impacts of climate change.

Data collection protocols: Consistent, coordinated approaches to data collection should be established to enable countries to develop and improve stock assessments. Fisheries dependent data is a valuable source of information that crew can be trained to collect; this process has been shown to improve fishers' buy-in to the management process. Independent observer coverage further validates information gathered, using either in-person observers or REM. Establishing recording protocols to document interactions with bycatch, ETP species and habitats is a first step to understanding the types of interactions that occur and provides data to inform management decisions. Monitoring data collected over time will help detect environmental changes and pre-empt ecosystem changes, and account for uncertainties and data gaps to implement a precautionary approach to fishery management. Responses to the FAO CCRF survey should be encouraged, and if possible, expanded on, rather than establishing new data collection processes.

Regular review of progress and reporting: Regular review of management measures should take place to ensure management objectives are being met and no unintended consequences occur. A regular review will ensure best practice measures are continually being considered and incorporated into the management system. Reporting mechanisms already exist and should be used where possible, but currently much reporting is on a national level, and does not allow for RFMOs and other shared stocks to demonstrate progress towards EAFM.

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8 Abbreviations/Acronyms

ALDFG	Abandoned, Lost and otherwise Discarded Fishing Gear
CBD	Convention on Biological Diversity
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCRF	Code of Conduct for Responsible Fisheries
EA	Ecosystem Approach
EAF	Ecosystem Approach to Fisheries
EAFM	Ecosystem Approach to Fisheries Management
ETP	Endangered Threatened and Protected
FAO	Food and Agriculture Organization
GBF	Global Biodiversity Framework
IPHC	International Pacific Halibut Commission
IUU	Illegal, Unreported and Unregulated
MSC	Marine Stewardship Council
NZD	New Zealand Dollar
REM	Remote Electronic Monitoring
SSF	Small Scale Fisheries
TAC	Total Allowable Catch
TURF	Territorial User Right Fisheries
UK	United Kingdom
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
US	United States (America)
USAID	United States Agency for International Development
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
WCPFC	Western and Central Pacific Fisheries Commission

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SI units are used unless otherwise stated.

Contact Us

ABPmer

Quayside Suite,
Medina Chambers
Town Quay, Southampton
SO14 2AQ

T +44 (0) 23 8071 1840
F +44 (0) 23 8071 1841
E enquiries@abpmer.co.uk

www.abpmer.co.uk