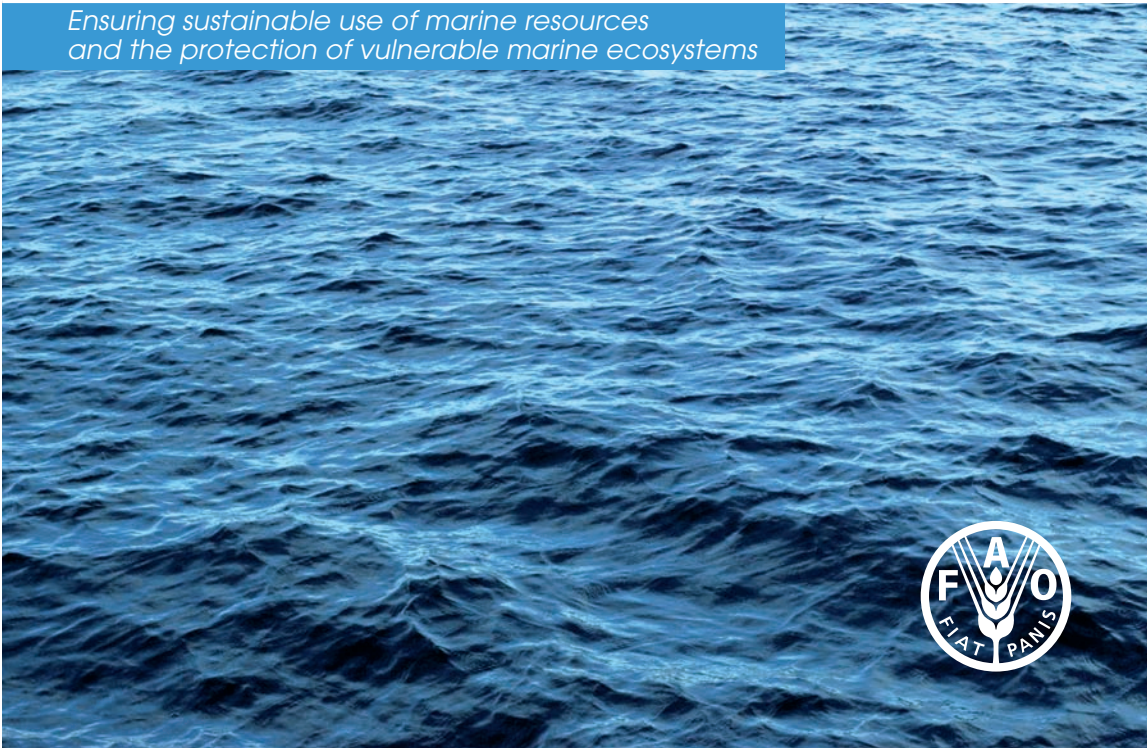
Deep-sea Fisheries in the High Seas

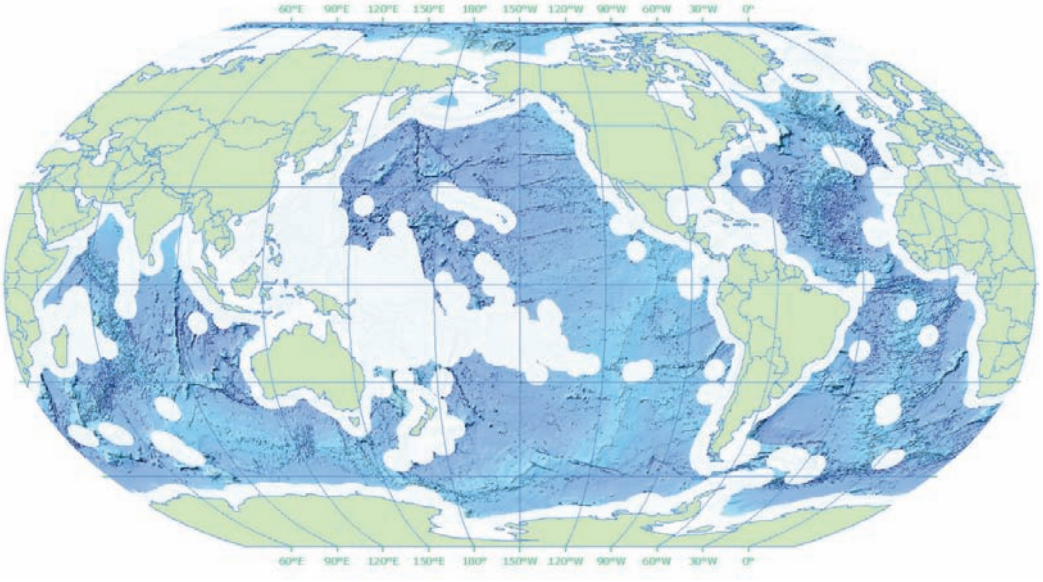
Ensuring sustainable use of marine resources and the protection of vulnerable marine ecosystems



What are deep-sea fisheries in the high seas?

Deep-sea fisheries are those that take place at great depths (up to 1 600 metres). Many deep-sea fisheries take place in waters beyond national jurisdiction (such as the exclusive economic zone [EEZ]), that is in the high seas. For some, the deep seas have become the iconic last frontier for the expansion of marine fisheries. The great depths and distances from the coast at which marine living resources are caught by deep-sea fisheries in the high seas pose scientific and technical challenges, particularly in providing scientific support for management.

A number of governmental and non-governmental organizations with mandates relating to conservation of the environment, biodiversity and management of fisheries have expressed concerns about the likely, known or feared consequences of deep-sea fishing in terms of its effects and impacts on target stocks, associated species and habitats. These concerns are reflected in resolutions adopted by the United Nations General Assembly and led to the adoption of specific recommendations by the FAO Committee on Fisheries at its twenty-seventh session, in March 2007, which prompted the subsequent development and adoption (in August 2008) of the *FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas*.



This map shows the high seas (indicated in dark blue), which cover a substantial part of the world's oceans.

The fisheries

The types of fishing gear and vessels used in deep-sea fisheries vary greatly, depending on the species targeted and their behaviour. In general, these fisheries are conducted at depths considerably below 200 m, on continental slopes or isolated oceanic topographic structures such as seamounts, ridge systems and banks.

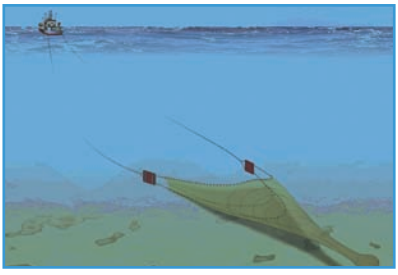
In 2008, FAO carried out a worldwide review of bottom fisheries in the high seas of nine major oceanic regions, compiling the best available information. The review found that, in 2006, approximately 285 vessels were involved in high seas bottom fisheries. The total global catch of these bottom fisheries, based on the catch of approximately 60 species, was estimated to be around 250 000 tonnes for 2006.

At least 27 flag states were involved in these fisheries that year according to the review, with Spain, the Republic of Korea, New Zealand, the Russian Federation and Australia having the largest number of deep-sea high seas vessels. Some vessels involved in deep-sea fisheries in the high seas may fish exclusively in the high seas, but others also operate within EEZs during the course of the year, either in deep seas or in shallower waters. Most vessels target several species throughout the year and some regularly change fishing gear. These fisheries are competitive and require a high-level of investment.

History

Small-scale deep-sea fisheries using hooks and lines developed in the early 1800s while trawl fisheries for deep-sea species using factory freezer trawlers started in the mid-1950s. With the extension of EEZs, starting in the 1970s, several fleets no longer had access to coastal or near-shore fishing grounds; some simply ceased operations while others began developing deep-sea fisheries in the high seas. Since the mid-1990s, the reduction of fish stocks inside EEZs, quota limits and technological advances have increasingly led vessel operators to seek alternative fishing opportunities outside EEZs.

Fishing gear



Longlines, bottom trawls, mid-water trawls, gillnets and traps/pots are used in deep-sea fisheries in the high seas. Trawling is the predominant bottom fishing method, representing nearly 70 percent of vessels in the high seas. Some fisheries, such as those for orange roughy (*Hoplostethus atlanticus*), generally use technologically advanced fish detection and net monitoring equipment: in these aimed-trawling fisheries, the trawl gear may hardly touch the bottom, while other deep-sea trawl fisheries require the trawl to make bottom contact for several hours.

Species

A large portion of deep-sea high seas catch is taken in the North Atlantic. In the North East Atlantic, for example, vessels will typically target a range of species, such as ling (*Molva dypterygia*), Greenland halibut (*Reinhardtius hippoglossoides*), roundnose grenadier (*Coryphaenoides rupestris*), black scabbardfish (*Aphanopus carbo*), a few species of sharks and more recently exploited species such as Baird's slickhead (*Alepocephalus bairdii*) and deep-sea red crab (*Chaceon affinis*). The majority of deep-sea fisheries in this area involve bottom trawlers which may operate mid-water trawls as well, but longliners are also present in smaller numbers.

In other regions, the vessels target a much more limited number of species, for example in the Southern Ocean where the fisheries (using longlines) are mainly targeting toothfish (*Dissostichus eleginoides* and *D. mawsoni*).

In the South Pacific and the Indian Ocean many of the bottom fisheries take place over rough geological features (e.g. seamounts and ridges).

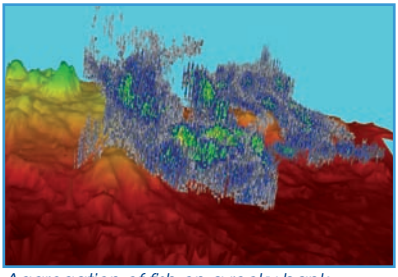
Bottom trawling for orange roughy is generally done as aimed-trawling. Mid-water trawlers, which may operate nets close to the seabed, mainly target alfonsino (*Beryx splendens*). Longliners in the South Pacific typically target species such as hapuka (*Polyprion* spp.), bluenose warehou (*Hyperoglyphe antarctica*) and morwongs (*Nemadactylus* spp.).

What makes these species so particular?

Although deep-sea fisheries in the high seas affect species with diverse life histories and productivity rates, those that have given rise to most concern are fisheries that affect more vulnerable species (e.g. those with low productivity). Some deep-sea species are highly productive and support larger fisheries, e.g. blue whiting (*Micromesistius poutassou*), but as the depth of the fishery increases, the number of low productivity species encountered increases. These more vulnerable species often mature at a relatively old age, are long-lived, slow growing, have low natural mortality, potentially have intermittent recruitment of successful year classes and may not spawn every year. Species with one or more of these characteristics can generally sustain only low, if not very low, exploitation rates. High exploitation rates for these species lead to rapid resource depletion: stock recovery is long and is not even assured.

Orange roughy for instance is a typical deep-sea species with slow growth, a long life span and low natural mortality that aggregates in dense concentrations. Technological innovation in the late 1970s and early 1980s made it possible to exploit this species profitably, using trawls. Dense fish aggregations made high catch rates possible, resulting initially in large increases in total catches of the species. However, in many cases, catch rates and total catches decreased quickly as the low productivity of the species did not allow for sustainable harvests at such high levels.

What makes these habitats so particular?



Aggregation of fish on a rocky bank.

Human activities, such as fishing, can have a negative impact not only on living marine resources but also on related ecosystems. Species groups, communities or habitats that are easily damaged and take a long time to recover are considered vulnerable. The vulnerability of an ecosystem is related to the vulnerability of its constituent populations, communities or habitats. Features of an ecosystem may be *physically vulnerable* (i.e. structural elements of the ecosystem may be damaged through direct contact by fishing gear) or *functionally vulnerable* (i.e. selective removal of a species may change the manner in which the ecosystem functions). The most vulnerable ecosystems are those that are both easily disturbed and slow to recover.

Examples of species groups and communities that are considered sensitive and potentially vulnerable include certain coldwater corals and hydroids, some types of sponge-dominated communities and seep or vent communities comprised of unique invertebrate and microbial species.

These species and communities may be associated with submerged edges and slopes of the continental shelf, summits and flanks of seamounts, guyots, banks, knolls, and hills, canyons and trenches, hydrothermal vents and cold seeps.

Vulnerability

Some features, particularly those that are physically fragile or inherently rare, may be vulnerable to most forms of disturbance, but the vulnerability of many populations, communities and habitats may vary greatly depending on the type of fishing gear used or the kind of disturbance experienced. Vulnerability is not an absolute concept: disturbances could be considered acceptable at a given time and/or location but considered to cause unacceptable damage at other times and/or locations.

According to the FAO International Guidelines, deep-sea ecosystems would be considered vulnerable when they are:

- unique or rare because of the species, communities or habitats they contain;
- functionally significant, e.g. contain discrete areas or habitats that are necessary for the survival, function, spawning/reproduction or recovery of fish stocks, particular life-history stages (e.g. nursery grounds or rearing areas), or of rare, threatened or endangered marine species;
- fragile, i.e. are highly susceptible to degradation by human activities, including through depletion of species;

- important because of the life-history traits of component species that make recovery difficult, i.e. ecosystems that are characterized by species that are slow growing, long-lived, mature late and have unpredictable recruitment; and
- structurally complex, i.e. have ecological processes that are dependent on these structured systems.

How are these fisheries being managed?

Deep-sea fisheries in the high seas are not only unique because of the nature of the resources fishers exploit and the potential vulnerability of some of the ecosystems in which they occur. There are governance challenges specific to managing fisheries in areas beyond national jurisdiction. These challenges stem from the nature and scope of the existing international legal and institutional framework relevant to the management of deep-sea fisheries, which has its roots in various instruments, including the 1982 United Nations Convention on the Law of the Sea. Such instruments were developed at a time when the extent of the scientific and technological development that would allow access to these resources and increase the importance of protecting marine biodiversity could hardly be anticipated. Management is also often complicated by deficient or unavailable data and inadequate systems of administration.

Governance problems are of even greater concern in areas where no regional fisheries management organizations or arrangements (RFMO/As) currently exist with a mandate to manage deep-sea fisheries.

International Guidelines for the Management of Deep-sea Fisheries in the High Seas

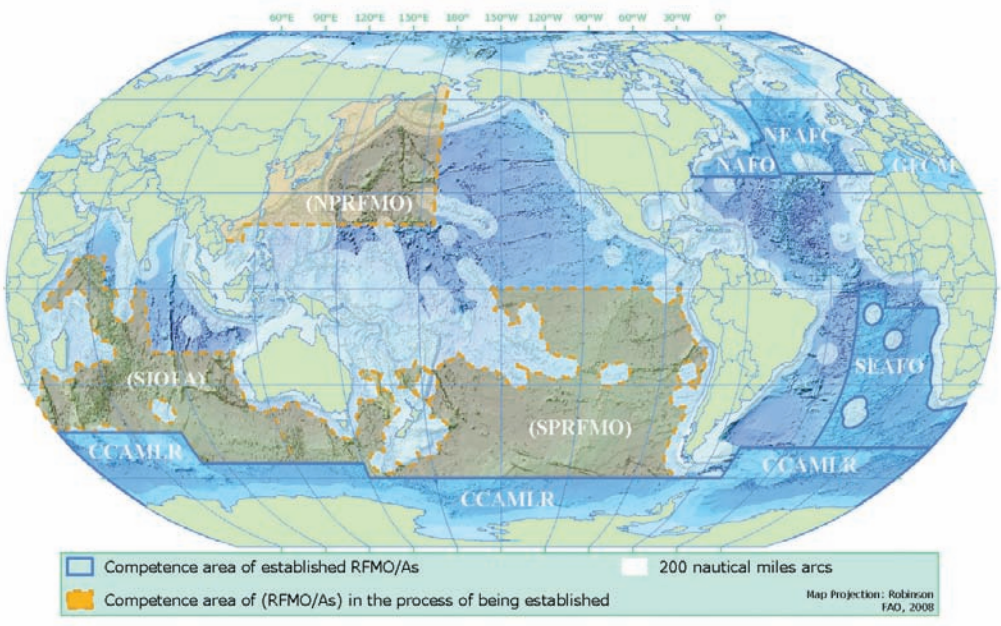
FAO developed the *International Guidelines for the Management of Deep-sea Fisheries in the High Seas* through a participatory process involving fisheries experts, fishery managers from governments, the fishing industry, academia and non-governmental and intergovernmental organizations. A range of studies and meetings were completed over the period 2006–2008 with a view to informing people about the process and discuss issues such as the definition of vulnerable marine ecosystems (VMEs) and data needs for these fisheries. A list of documents resulting from this work is provided at the end of this brochure. This process led to the holding of a Technical Consultation where representatives of Member States negotiated and adopted the text of the International Guidelines in August 2008.

These guidelines are designed to provide guidance on management factors ranging from an appropriate regulatory framework to the components of a good data collection programme, and include the identification of key management considerations and measures necessary to ensure the conservation of target and non-target species, as well as affected habitats. The guidelines also offer guidance on interim measures that may be taken in areas where no competent RFMO/As exist or where an RFMO/As is in the process of developing the range of policies and measures required for effective management of deep-sea fisheries.

In addition, the guidelines set out measures to be adopted for the prevention of significant adverse impacts (SAIs) on VMEs and the protection of the marine biodiversity that these ecosystems contain. Once a VME is identified, appropriate management measures must be taken to ensure that SAIs on the VME do not occur. SAIs, as described in the guidelines, are those that compromise ecosystem integrity (i.e. ecosystem structure or function) in a manner that:

- impairs the ability of affected populations to replace themselves;
- degrades the long-term natural productivity of habitats; or
- causes, on more than a temporary basis, significant loss of species richness, habitat or community types.

These guidelines are voluntary and constitute an instrument of reference to help states and RFMO/As in formulating and implementing appropriate measures for the management of deep-sea fisheries in the high seas. Their adoption represents a major step forward in addressing both fisheries management and marine biodiversity conservation in an integrated manner and contributes to the development and strengthening of the applicable legal and institutional framework.



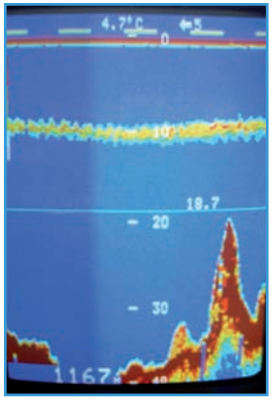
This map shows regional fisheries management organizations or arrangements that manage deep-sea fisheries – both established ones and those in the process of being established.*

** CCAMLR – Commission for the Conservation of Antarctic Marine Living Resources;*
GFCM – General Fisheries Commission for the Mediterranean;
NAFO – Northwest Atlantic Fisheries Organization;
NEAFC – North East Atlantic Fisheries Commission;
SEAFO – South East Atlantic Fisheries Organisation;
NPRFMO – North Pacific Ocean Fisheries Organization;
SIOFA – South Indian Ocean Fisheries Agreement;
SPRFMO – South Pacific Regional Fisheries Management Organization.

Future directions

A great deal of work has been accomplished in the last few years, but much remains to be done, particularly in relation to the creation of more appropriate institutions. RFMO/As will need to be established where they do not exist or are not duly mandated to address deep-sea high seas fisheries. States and RFMO/As will also need to pursue efforts initiated in implementing international guidance and developing the appropriate set of policies and measures required for the effective management of fisheries and conservation of marine biodiversity.

Managing deep-sea fisheries in the high seas according to the approach used for shelf fisheries with traditional monitoring, control and surveillance and reliance on government-executed scientific surveys and stock assessments could be prohibitively expensive. A cooperative approach, involving the fishing industry, fishery scientists, fishery managers and non-governmental organizations, may offer an affordable and potentially considerably more effective alternative. This approach has already been used in a few countries, however, overall attitudes and traditional practices may need to change substantially for it to be applied on a larger scale. Trust between stakeholders is needed to implement innovative and effective management approaches that increase the sustainability of deep-sea fisheries and protect the deep-sea ecosystems in which they occur.



Net monitor image.

The FAO International Guidelines provide a framework and starting point to develop such a collaborative approach. FAO has begun a special programme to support the effective implementation of the guidelines through, *inter alia*, institutional building, policy development, improvement of methodologies and management for the identification of VMEs and the development of appropriate fisheries management approaches. In order to be implemented, this programme will require adequate support through multidonor financing.

Acknowledgements

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