Deep-Sea Fishing in European Waters: Ifremer Assessment and Research

"Deep-sea" fishing is often described as an ecological aberration, because of the damage that fishing gears cause to the seabed and to the populations fished. It is also represented as an uncontrolled activity, poorly understood by science.
As well as emphasizing the need to avoid generalizations (situations vary widely between regions of the world and types/methods of fishing), and the fact that fishing should be considered a harvesting activity, which consequently impacts the environment (no human activity can be considered entirely impact-free), Ifremer wishes here to report the results of its assessment and of its teams' research work on the definition of deep-sea fishing, the situation of exploited resources, the environmental impact, and management methods.

Defining of deep-sea fishing

There is still debate about whether deep-sea fishing should be defined as a fishing activity taking place beyond a certain depth, or as an activity that targets so-called deep-sea species. The World Food and Agriculture Organization (FAO) defines deep water as deeper than 200m, whereas the International Council for the Exploration of the Sea (ICES) uses a 400m limit. Any definition that relies on a purely bathymetric criterion encapsulates a wide variety of activities: as well as deep-sea species fishing, some fisheries target continental shelf species (such as monkfish, hake, and megrim) at depths of up to 600 or even 1000m.
Conversely, in European waters, the legal definition of deep-sea fishing is based on a list of species caught, including blue ling (which is fished at depths of 400 to 1300m), greater forkbeard, roundnose grenadier, and black scabbardfish (fished at depths of 750 to 1500m). Orange roughy and small sharks (sold as "siki" before they were banned) are also found at these depths. Fishing activities at depths of over 1500m are almost nonexistent in Europe today, because resources in these waters are scarcer.

Within the context of the European DEEPFISHMAN project, Ifremer has developed a new way of defining deep-sea fisheries, which involves combining the depth criterion and the proportion of the biomass of fish populations above and below this depth: species for which over 50% of the biomass is situated at depths of over 200m are considered to be deep-sea species. The species currently listed in Appendices I and II of the European regulation on deep-sea fisheries (EC 2347/2002) generally correspond to this definition. However, conger eels and Norway redfish are notable exceptions, as they do not meet this criterion. Under this definition, Greenland halibut, tusk, and beaked redfish are considered deep-sea species.

Species with very different biological characteristics

A few deep-sea species live to be very old (orange roughy can reach 120 years, and grenadier 70 years). They grow slowly and reproduce late, meaning that they can only support very moderate exploitation levels. Other species that are also considered to be deep-sea species have very different biological characteristics, with much shorter lifespans: 25 years for blue ling (making it comparable to cod) and 15 years for black scabbardfish.

Deep-sea fisheries and regulations

In France, deep-sea species are targeted by trawlers based in the ports of Boulogne-sur-mer, Concarneau, Le Guilvinec and Lorient. Some of these vessels devote most of their efforts to fishing these species, whereas others target them alternately with demersal species such as hake, saithe, monkfish, and megrim. Their main fishing zones are to the west of Scotland and around the Faeroe Islands. Nevertheless, since 2011, quotas are no longer given to EU vessels in this sector, following the failure to reach an agreement on the division of the TAC[1] for mackerel between the coastal States concerned.
The rapid and unchecked development of deep-sea fishing activities in the early 1990s led to a rapid and substantial decline of these resources. From 2003, management measures were put in place. These include quotas (and even a ban on fishing species like orange roughy and all deep-sea sharks from 2010), protection of blue ling aggregation areas, and bans on deep-sea fishing in certain zones in order to protect deep-sea corals,

[1] Total allowable catch.

large sponges and other benthic organisms. Regulations also include measures aiming to facilitate enforcement (for example, deep-sea fish can only be landed in a few ports), to provide information on resources and ecosystems (deep-sea fishing vessels must have on-board observers), and to limit fishing effort of flag States' fleets through a licensing system.

Assessment of the state of deep-sea resources

Ifremer, within ICES,[2] helps to assess the main exploited resources in the Northeast Atlantic, including deep-sea species. For these species in particular, there has been large-scale data collection over the last few years, thanks to the presence of observers on the vessels concerned, and to access to very detailed data from numerous fishing skippers. Analysis of this information requires specific models, which today make it possible to make relatively reliable diagnoses of the states of the main exploited stocks.

The 2012 assessments and advice from the international scientific community (ICES) recognized that **the exploitation of deep-sea species stocks had been brought to a sustainable level (following overexploitation at the beginning of the 2000s). This improvement shows that the positive effects of appropriate management can become apparent quite quickly**, even for deep-sea species. In fact, the improvement in the state of deep-sea fish stocks is a result of the international fishing effort on these species being reduced by a factor of four (according to STECF data) since 2003.

Today, the sustainability of the exploitation of these stocks (grenadier, black scabbardfish, and blue ling) is now established. These three species account for almost three quarters (73% in 2011) of catch made by "deep-sea" trawlers. Although the number of other species caught as bycatch for the whole fishery can be high (around 100), most are only caught occasionally and in very small quantities. Thus, the catch of over 70 species taken together does not exceed 1% of the total annual catch weight, and the number of species caught per haul is much lower (15 on average). Onboard observers (under the Obsmer programme) estimated discard catch at 20% of total catch in 2011. The observations showed that discards are mainly made up of two species: Baird's slickhead and greater argentine. It is also sometimes necessary to include chimaera, for which scientists express no concerns.

Impact of fishing activities on ecosystems

The impact of fishing activities (and not only "deep-sea" fishing) on vulnerable marine ecosystems (coldwater corals, sponges, etc) is well-documented. Thus, the 2009 BobGeo campaign led by Ifremer in the Bay of Biscay, as part of the European CORALFISH project, clearly showed trawl tracks in coral fields, despite the fact that "deep-sea" fishing no longer takes place in the Bay of Biscay. Previous research (for example Ifremer's CARACOLE campaign in 2004) showed that other fishing gears (nets and longlines) can also damage vulnerable ecosystems. However, the damage observed in the past, particularly when the deep-sea fishery first began, has been reduced today by the establishment of closed areas and the large reduction in the international fishing effort. These measures have led de facto to a freeze of the footprint (the surface affected by fishing), particularly because the allocated quotas are easily caught in regularly frequented fishing zones. This situation confines trawl fishing to sedimentary zones, which are less sensitive to its effects.

Aside from carrying out surveys on vulnerable marine ecosystems, Ifremer works to **improve fishing gears, in order to decrease their impact** (examples include lighter or raised footropes, or doors that gently skim the seabed). Thus, Ifremer is a partner in a research project ("Reduction of gear impact and discards in deep-sea fisheries") supported by the Directorate-General for Fisheries and Maritime Affairs within the European Commission. This project aims to reduce contact between trawls and the seabed.

Improving knowledge and management

Our understanding of deep-sea fish and ecosystems is rapidly improving. Today, knowledge about the distribution areas, lifespans and growth patterns of exploited deep-sea fish is good. The models used for assessments are getting better and now allow a more precise understanding of the state of resources. Deep-sea ecosystems have been studied and mapped. This allows us to identify and protect the most vulnerable zones. The European DEEPFISHMAN project led to more accurate assessments of stocks and deep-sea fisheries, and to proposals for management methods. Thus, the freezing of the ecological footprint,[3] highlighted by this project, should make it possible to fully exploit targeted stocks, whilst keeping fishing within currently exploited zones.

[2] The International Council for the Exploration of the Sea.

[3] The ecological footprint is a measure of how much pressure man exerts on nature.

Current fisheries management has already put an end to most overfishing of deep-sea fish, and continued research on these deep-sea populations and ecosystems should further improve management, ensure the sustainable renewal of these stocks, and allow to maintain fishing activities. Consequently, the straightforward ban of deep-sea fishing, whose sustainability is at least partly achieved, seems unnecessary. However, like any management decision, those concerning deep-sea fisheries are a matter of politics.