THE PEW ENVIRONMENT GROUP

Out of THE ABYSS

Transforming EU rules to protect the deep sea

The Pew Environment Group

The Pew Environment Group is the conservation arm of The Pew Charitable Trusts, a non-governmental organisation that works globally to establish pragmatic, science-based policies that protect our oceans, preserve our wildlands and promote clean energy.

The Pew campaign to protect the deep sea

The Pew campaign to protect the deep sea works to promote sustainable and responsible fishing polices for the deep sea – the largest and least understood environment on the planet. The campaign employs the best available science and economic data to understand how we might better protect fragile deep-sea habitats and highly vulnerable fish populations from unsustainable and highly destructive fishing.

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Acknowledgments

This policy paper benefited tremendously from the initiative and analysis of Mark Gibson and expert knowledge of Matthew Gianni. A special thanks is owed to Professor Philip Weaver of the National Oceanography Centre, Southampton and Monica Verbeek and Carole White of Seas-At-Risk for their expertise and guidance.

For more information, visit www.pewenvironment.org/deepsea

January 2012

Cover

Main background photo: instrumentation panel showing tracks of previous trawls in the northeast Atlantic, Greenpeace/Kate Davison.
Round photos, left to right: orange roughy in the northeast Atlantic, JNCC/ Jaime Davies; coral sample of *Lophelia pertusa*, Inner Hebrides, North Atlantic, Greenpeace/Gavin Newman; electronic equipment onboard a trawler, PEG/ Corey Arnold.

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Acronyms

CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CPUE	catch per unit effort
EEZ	exclusive economic zone
FAO	Food and Agriculture Organization of the United Nations
ICES	International Council for the Exploration of the Sea
NEAFC	North East Atlantic Fisheries Commission
NPFC	North Pacific Fisheries Commission
RFMO	regional fisheries management organisation
SPRFMO	South Pacific Regional Fisheries Management Organisation
UNGA	United Nations General Assembly
VME	vulnerable marine ecosystem

EXECUTIVE SUMMARY

As currently practised, deep-sea fishing has serious and widespread environmental consequences for deep-sea fishing countries, the international community, and ocean ecosystems. Studies reveal that deep-sea fishing fleets around the world are causing significant harm to the ocean ecosystem by damaging vulnerable marine ecosystems (VMEs) both within their Exclusive Economic Zones (EEZs) and on the high seas. Such damage occurs through bottom contact with fragile habitats and the overfishing of highly vulnerable deep-sea species, including orange roughy (*Hoplostethus altanticus*), deep-sea sharks (e.g. *Centrophorus spp.*), and grenadiers (*Coryphaenoides spp.*). Many deep-sea species are now believed to be depleted regionally, if not globally.

The European Union's (EU) deep-sea fishing fleet is one of the largest in the world. In the northeast Atlantic – home to some of the most heavily exploited deep-sea fish stocks – the EU is responsible for 75 percent of the total regional catch of deep-sea species.[1] The EU is also a major player in high seas bottom fishing – an activity that frequently targets deep-sea species. The EU has an estimated 103 vessels conducting high seas bottom fishing, which is approximately one-third of the high seas bottom fishing fleet globally.[2] Given its size, the EU is uniquely poised to significantly improve the sustainability of deep-sea fishing and reduce negative impacts on VMEs.

Importantly, deep-sea fisheries are of little economic importance. Globally, deep-sea fisheries account for just 2 to 4 percent of world landings.[3] And in the EU, deep-sea fisheries account for just 1.2 percent of the EU's northeast Atlantic catch and 1.3 percent of the value of EU fishery product landings.[4]

Lyman Peak, Yakutat Seamount, Corner Rise Seamount Group, depth 1,426m. This shows an area of the seamount that was very heavily fished. Most of the old coral was ground into rubble, some of the living gorgonians and sponges are left but most are gone.

LES WATLING/NOAA-URI-IFE-DASS SCIENCE PARTY

Deep-sea catch winched aboard bottom trawler, in the Hatton Bank area of the North Atlantic, 410 miles north-west of Ireland.

GREENPEACE/KATE DAVISON

This policy paper summarises the current problems in the regulation of deep-sea fisheries in the northeast Atlantic by the EU, including weak catch and effort limits, lack of knowledge of the status of deep-sea fish stocks and the impact of fishing; incomplete deep-sea species coverage; deficient monitoring and control measures; significant data and reporting gaps; and a lack of sufficient measures to ensure sustainability and protect vulnerable deep-sea ecosystems such as cold-water coral reefs from the harmful impacts of bottom fisheries. Various assessments have found that the EU's deep-sea fisheries management regime for the northeast Atlantic is inadequate, poorly enforced, and inconsistent with EU and international principles, agreements and legal obligations for the sustainable management of fisheries. As a result, leading scientific authorities have concluded that the EU's fisheries for deep-sea species in the northeast Atlantic are 'outside safe biological limits' and that deep-sea fishing should be significantly reduced or ended entirely.[5]

KEY REFORMS

The Pew Environment Group recommends 10 key reforms for EU deep-sea fisheries management. These reforms are offered on the basis of European Commission reports and communications, EU regulations, scientific studies, fisheries management best practice, international commitments made by the EU, and various publicly available documents and analyses.

1. Incorporate a clear mandate for sustainable management.
2. Phase out the use of destructive fishing practices and gear.
3. Require that impact assessments are performed prior to deep-sea fishing.
4. Implement area closures where significant adverse impacts on VMEs are known or are likely to occur.
5. Regulate all deep-sea fishing operations, defined as fishing below 400m, and the catch of all deep-sea species.
6. Regulate deep-sea catches, not just deep-sea landings.
7. Reduce bycatch of deep-sea species and end discarding.
8. Require that more detailed fishing plans are to be submitted prior to deep-sea fishing.
9. Effectively manage fishing capacity and effort in deep-sea fisheries.
10. Improve reporting, monitoring, and compliance in deep-sea fisheries.

Globally, deep-sea fishing suffers from a lack of sustainable management practices. World landings are in a steady decline, and the high vulnerability of deep-sea fish stocks and deep-sea marine ecosystems is well documented. A **single pass** of a trawl net can **destroy coral reefs**, some of which may be as much as **8,500 years old**

INTRODUCTION

The European Union's deep-sea fishing fleet is one of the largest in the world. In the northeast Atlantic – home to some of the most heavily exploited deep-sea fish stocks – the EU is responsible for 75 percent of the total regional catch of deep-sea species.[6] The EU is also a major player in high seas bottom fishing – an activity that frequently targets deep-sea species. The EU has an estimated 103 vessels conducting high seas bottom fishing, which is approximately one-third of the high seas bottom fishing fleet globally.[7] Given its size, the EU is uniquely poised to significantly improve the sustainability of deep-sea fishing and reduce negative impacts on vulnerable marine ecosystems (VMEs).

Globally, deep-sea fishing suffers from a lack of sustainable management practices. World landings are in a steady decline, and the high vulnerability of deep-sea fish stocks and deep-sea marine ecosystems is well documented. A single pass of a trawl net can destroy coral reefs, some of which may be as much as 8,500 years old.[8] Many deep-sea species are now believed to be depleted regionally, if not globally. These include orange roughy (*Hoplostethus altanticus*), various species of deep-sea sharks (e.g. *Centrophorus spp.*), and several species of grenadiers (*Coryphaenoides spp.*). In many deep-sea areas where both deepwater corals and bottom trawl fishing have occurred, extensive damage to the corals has been documented.[9] The global environmental impact of deep-sea fishing is likely far greater than its economic importance – deep-sea fisheries account for just 2 to 4 percent of world landings.[10]

EU fisheries management has been unable to stop overfishing in most of its fisheries, including deep-sea fisheries. According to the European Commission, 63 percent of 'known' EU stocks are overfished.[11] This is far worse than the situation facing fisheries globally, where 32 percent of the world's fish stocks are overfished, depleted, or recovering from depletion.[12] Though exact estimates for EU deep-sea fisheries are unavailable, leading scientific authorities have ruled that all of these deep-sea fisheries are 'outside safe biological limits' and that fishing should be reduced or ended entirely.[13] That this recommendation has not been followed is particularly concerning as deep-sea species are relatively unimportant to the EU economy – deep-sea species represent just 1.3 percent of the total value of EU fishery product landings and 1.2 percent of the EU's entire northeast Atlantic catch (see Appendix II).

Given its key role in deep-sea fisheries, the EU has an opportunity to demonstrate to other countries that deep-sea fishing can be conducted responsibly and that it is following through on commitments made at the United Nations to manage deep-sea fisheries sustainably and protect deep-sea marine ecosystems. In this policy paper, the Pew Environment Group provides background information on deep-sea fishing, analyses the current problems with the EU's deep-sea fisheries management regulations, and provides a set of 10 key reforms to consider for the management of EU deep-sea fisheries. The analysis contained within this paper is a synthesis of European Commission reports and communications, EU regulations, scientific studies, fisheries management best practice, international commitments made by the EU, and various publicly available documents and analyses.

The next section provides a general overview of the history, extent, and problems of deep-sea fishing. Section 3 reviews available information on the state of deep-sea ecosystems and fishing operations in the northeast Atlantic and evaluates EU deep-sea fisheries management in the region. Section 4 concludes with 10 key reforms for EU deep-sea fisheries management.

THE DEEP SEA
AND THE PROBLEM OF DEEP-SEA FISHING

As currently practised, deep-sea fishing has serious and widespread environmental consequences for deep-sea fishing countries, the international community, and ocean ecosystems. Studies reveal that deep-sea fishing fleets around the world are causing significant harm to the ocean ecosystem by damaging VMEs both within their Exclusive Economic Zones (EEZs) and on the high seas. Such damage occurs through both the use of heavily weighted nets that drag across fragile bottom habitats and the overfishing of highly vulnerable deep-sea species.

This section provides brief descriptions of the deep sea and deep-sea fishing, explores the environmental consequences of destructive deep-sea fishing, reviews actions taken to limit the impacts, and discusses a variety of compounding factors.

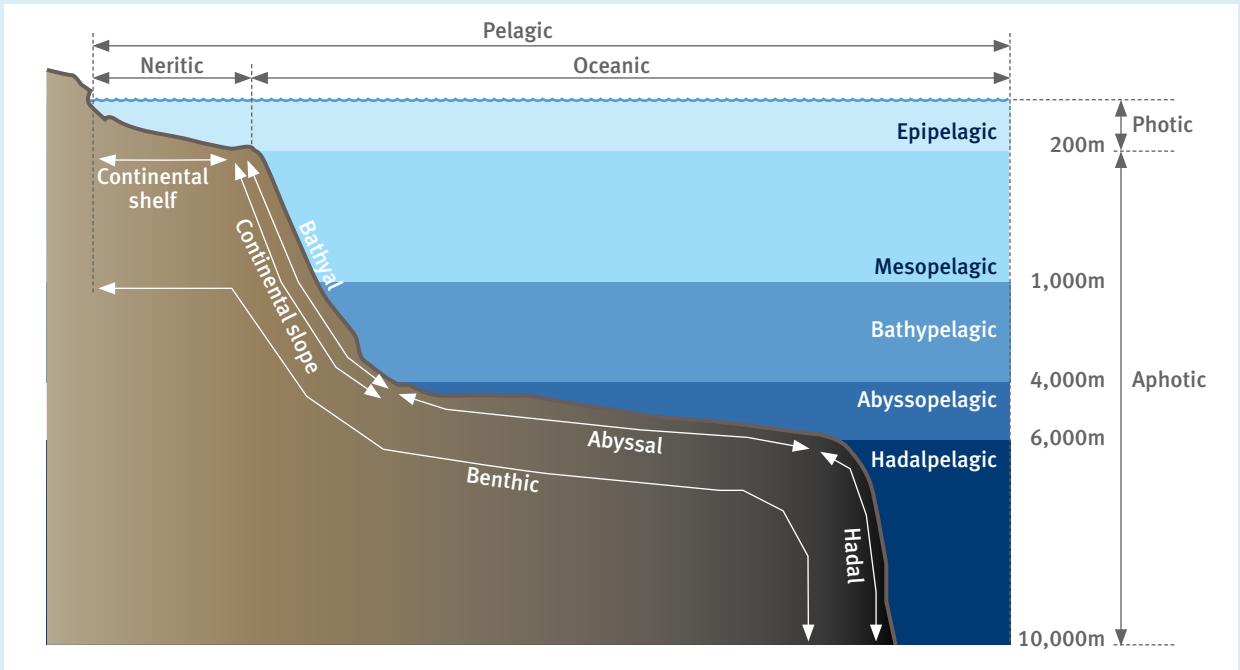
2.1 THE DEEP SEA

The deep sea is the largest habitat on the planet. This ocean region begins at 200m below the sea surface and can be broken into four depth zones: the mesopelagic zone ranging from 200 to 1,000m; the bathypelagic from 1,000 to 4,000m; the abyssopelagic from 4,000 to 6,000m; and the hadalpelagic zone, which is the habitat of deep ocean trenches. Seabed over 200m in depth covers about 50 percent of the planet's surface.[14]

Alternatively, the deep sea can be understood as beginning at the shelf break (typically around 200m) and extending below through the continental slope and continental rise to the abyssal plains and deep-ocean trenches.[15]

The deep sea has a near complete lack of light

Figure 1 | Depth zones of the ocean. *Source: FAO.*



and very low temperatures. Just 1 percent of light reaches depths of 150m, and this is insufficient for photosynthesis. No light penetrates beyond 1,000m.[16] The temperature falls steadily from a depth of 200 to 1,200m, roughly from an average of 12°C to 4°C; deeper than this the temperature falls to around 2°C.

The most common organisms in the deep sea are bony and cartilaginous fish, cephalopods, benthic invertebrates and planktonic invertebrates. Because there is no photosynthesis, these organisms largely survive on organic material from the surface layers of the ocean as it sinks into deeper waters. Though average deep-sea biomass density is relatively low, the ecosystem has very high biodiversity.[17] For instance, two-thirds of all coral species are found in the deep sea.[18] Marine organisms are even found in the ocean's deep trenches, such as species of snail fish found at a depth of 7,500m in New Zealand's Kermadec Trench.[19]

The extreme environment of the deep sea has resulted in unusual adaptations among deep-sea life. The slow growth of most deep-sea organisms means many species live unusually long lives, such as fish that live 150 years and coral reefs living up to 8,500 years. The ability to generate light – bioluminescence – is a common feature of deep-sea organisms. Hydrothermal vents and mud volcanoes on the seafloor have unique ecosystems at the base of which are species of bacteria that have the ability to subsist on chemical energy and are thus independent of photosynthesis.

Due to the costs and technical challenges of research, as well as the large geographic area, the deep sea is the least understood ecosystem on the planet. Approximately a little under 7 percent of the ocean's seabed has been surveyed.[20] It is estimated that there is a minimum of 750,000 marine species remaining to be discovered throughout the ocean,[21] many of which researchers believe will be found in the deep sea. For example, researchers on a cruise to the southeast Atlantic for the Census of Marine Life could only identify seven of 680 deepwater copepods sampled – 99 percent were new to science.[22]

The deep-sea ecosystem provides vast opportunities for scientific research and even advances in medicine. For example, deep-sea corals offer records of global and regional climate change and various deep-sea species,[23] such as corals and sponges, offer new medical compounds that may help treat cancer, arthritis, and other conditions.[24] One study has estimated that the ocean could produce between 250,000 and 600,000 novel chemicals that would produce cancer-fighting drugs worth up to 5.69 trillion USD.[25]

Gonatus. Many deep-sea species create their own light – bioluminescence.

SONKE JOHNSEN

2.2 DEEP-SEA FISHING

In common-usage 'deep-sea fish' refers to deepwater species that have evolved to grow more slowly, reach sexual maturity later and reproduce at lower rates than shallow-water species due to the characteristics of the deep-sea environment. However, there is no universally recognised definition of either 'deep-sea fish' or 'deep-sea fishery.'[26] FAO (Food and Agriculture Organization of the United Nations) technical papers have at times defined deep-sea fisheries as those which take place in ocean regions beyond the continental shelves and deeper than 200m.[27] The International Council for the Exploration of the Sea (ICES) uses a 400m reference point, while New Zealand uses a 500m reference point.[28] The current technological depth limit of deep-sea fisheries is about 2,000m.

Though deep-sea fishing has a long history, it did not become a significant fishing activity until the mid-twentieth century. Technological advancements in the 1950s and 1960s led to the creation of large deep-sea bottom trawling and longlining fleets.[29] Initially, the primary countries involved in developing deep-sea bottom trawl fisheries were those of Eastern Europe and the former Soviet Union.

As 200-mile EEZs were established and the Soviet Union collapsed, other countries developed bottom trawl fisheries within their own waters. Norwegian fleets pioneered industrial deep-sea longlining technology, which then spread to other countries including the Faroe Islands, Iceland, Russia, Spain and Ireland. The rapid development of deep-sea fisheries has greatly outpaced expansion in other fisheries. By one account, catches from deep-sea fisheries increased by 440 percent from 1975 to 2005, whereas global marine catches increased by only 47 percent.[30]

In the course of deep-sea fishing, many vessels target underwater mountains, otherwise known as seamounts. Seamounts interact with ocean currents to create upwellings that provide more nutrient-rich waters, thus making them areas of higher biological productivity. Scientists estimate that there are 100,000 or more seamounts around the global ocean, most of which have never been studied.[31]

Various estimates reveal that deep-sea species comprise between 2 and 4 percent of the global marine catch. An FAO report published in 2002 reviewed trends in reported catches of oceanic and deep-sea fish species from 1950–1999.[32] The report estimated that by 1999, approximately 2 million tonnes of fish were caught annually below 200m (in the mesopelagic and bathypelagic zones as opposed to the epipelagic zone), which represented 2.4 percent of the global marine catch. In addition, approximately 50 percent of the deep-sea catch since 1975 has consisted of a single species, blue whiting (*Micromesistius poutassou*), taken in a mid-water trawl fishery in the North Atlantic. In a FAO Technical Paper published in 2006, Sissenwine and Mace note that blue whiting does not fit the common definition of 'deep-sea species' as the species is relatively fast growing and early maturing – traits typical of shallow-water species.[33]

Though deep-sea fishing has a long history, it did not become a significant fishing activity until the mid-twentieth century

A separate analysis conducted for the 2003 World Conference on Deep-Sea Fishing found that about 4 percent of world catches are taken from deep-sea species, including blue whiting, scabbardfish, grenadiers, redfish, orange roughy, Greenland halibut, and argentines.[34] Again, blue whiting figured prominently.

Finally, a more recent estimate may be constructed for the 76 deep-sea species and species groups in the FAO Reported Landings Database, as identified in a 2005 FAO Technical Paper.[35] In 2009, these species and species groups accounted for 3.3 million tonnes, or 4.1 percent of the global catch.[36] However, it is important to note that blue whiting and largehead hairtail (*Trichiurus lepturus*) accounted for more than one-half of the estimate. Similar to blue whiting, Sissenwine & Mace note that largehead hairtail has characteristics more consistent with shallow-water species.[37] Removing these species, the remaining 74 deep-sea species and species groups would account for just 1.7 percent of the global catch of all fish species.

2.3 ENVIRONMENTAL CONSEQUENCES

As currently practised, deep-sea fishing has serious and widespread environmental consequences for ocean ecosystems. Deep-sea fishing has been found to damage VMEs through the overfishing of highly vulnerable deep-sea species, high rates of bycatch that lead to wasteful discarding, and contact of the fishing gear, particularly bottom trawl gear, with the seabed. These impacts have been well-documented in a number of scientific papers and reports over the past decade or more.

Overfishing

Deep-sea fishing is highly problematic as many deep-sea fish species cannot sustain high or even moderate levels of exploitation due to their characteristically slow growth rates and late maturity. A recent analysis of 41 commercially exploited deep-sea species found that, with few exceptions, deep-sea fisheries are unsustainable.[38]

Serious declines in deep-sea fisheries have been seen around the world. In the northeast Atlantic scientific authorities have declared 100 percent of the catch of deep-sea species to be 'outside safe biological limits.'[39] In New Zealand waters, the orange roughy fishery declined to about 20 percent of pre-fishing biomass in just 20 years; most associated bycatch species also declined in abundance with no indication of recovery.[40] Looking further back in history, stocks of pelagic armourhead (*Pseudopentaceros wheeleri*) in the international waters northwest of Hawaii collapsed after just one decade of intensive trawl fishing and have never recovered.[41] In the northeast Atlantic fishing operators have had to discover new, unexploited aggregations of blue ling (*Molva dipterygia*) and orange roughy stocks in order to sustain catches, as existing stocks were rapidly depleted.[42]

Bycatch

Bycatch rates for many deep-sea fishing gears are particularly alarming. Though precise figures for the deep-sea fishing sector are unavailable, small-scale studies suggest that deep-sea bycatch is typically much higher than that which is taken in shallow-water fisheries. For example, one study found an average of 48.5 percent of French deepwater fish catches were discarded from 1995 to 1997.[43] More recently, in 2010

Roller gear, used for bottom-trawling.

LES WATLING/NOAA-URI-IFE-DASS SCIENCE PARTY

ICES reported that bycatch of roundnose grenadier accounts for about 30 percent of catch in weight and 50 percent in number for French fleets targeting roundnose grenadier in the northeast Atlantic.[44] The FAO reports that about 70 different species are taken as bycatch in northeast Atlantic high seas bottom fisheries, while over 100 species are taken as bycatch in high seas bottom fisheries in the South Pacific.[45] It is unlikely that any of the bycatch fish that are discarded survive because of the severe changes in pressure from these great depths.[46] Further, deep-sea fish are adapted to conditions of low turbulence and their skin is not covered by mucous, so there is high mortality among fish that escape through trawl meshes.[47]

Bottom contact with fishing gear

Various deep-sea fishing gears come into contact with the seabed, but none are as destructive or widespread as deep-sea bottom trawling. This fishing gear consists of large weighted nets which are dragged across the seabed. Approximately 80 percent of the high seas catch of bottom species are taken by bottom trawlers.[48] Other types of deep-sea fishing include pots, longlines and gillnets.

Catch being landed on board a Spanish flagged bottom-trawler, in the Hatton Bank area of the North Atlantic.

GREENPEACE/KATE DAVISON

Bottom trawling has been shown to destroy deep-sea ecosystems like cold-water coral reefs and coral gardens with a single pass. Surveys of three previously trawled seamounts off Australia showed no signs of recovery of the ecosystems, even after they had been closed to trawling for 10 years. This suggests that recovery would take several decades, if not centuries.[49] Other studies have shown similarly slow rates of recovery.[50] Bottom trawling is also highly indiscriminate, with fishing gear catching whatever comes into the path of its nets and thereby 'stripping' an area of the organisms that live just above the sea floor.

An analysis of the impacts of various human activities on the deep-sea floor found the impacts of bottom trawling to be "very significant."[51] Further, a recent study of the orange roughy fishery on four seamounts off Chile found that bottom trawling had significant ecological effects over an eight-year period.[52] Among its findings were that the catch per unit of effort (CPUE) of both the target species and bycatch decreased exponentially as the area impacted by trawlers increased; bycatch diversity decreased significantly in fished areas; and community composition changed markedly between tows deployed at sites with different levels of bottom trawling activity.

The international community has been made aware of the significant environmental problems associated with deep-sea fishing. The report of a September 2007 UN FAO Expert Consultation on the

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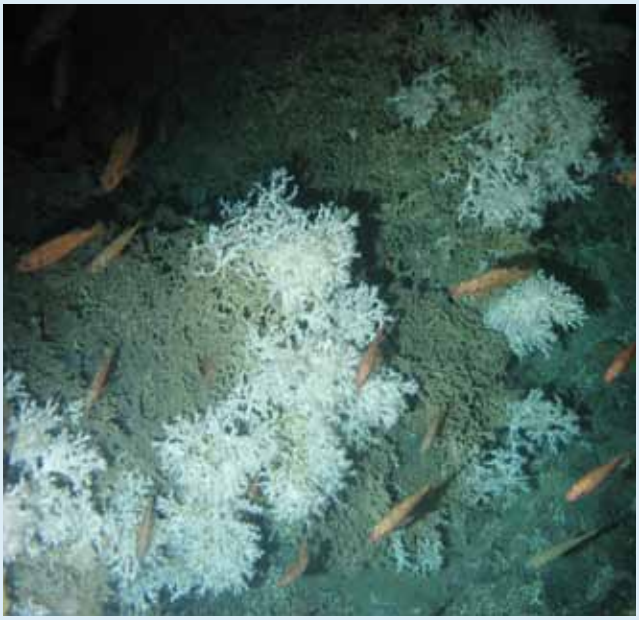


NOCS

Above: Rockall Bank, North Atlantic. Left: live coral with Sebastes. Right: broken coral and trawl marks.

management of deep-sea fisheries provides a good summary of scientific advice urging caution:

"Many of the problems associated with the conservation and management of DSF [deep-sea fisheries] are common to the management of coastal fisheries. In addition, many but not all marine living resources exploited by DSF have biological characteristics that make management problematic. These include: a) maturation at relatively old ages; b) slow growth; c) long life expectancies; d) low natural mortality rates; e) intermittent recruitment of successful year classes; f) adults may not spawn every year.[53]

"As a result, deep-sea marine living resources generally have low productivity and they are able to sustain only very low exploitation rates. Also, when these resources are depleted, recovery is expected to be long and not assured.[54]

"The problems… with regard to sustainable use of the marine living resources targeted by DSF also apply to the protection of VMEs and marine biodiversity, and are often even greater. Particular concerns include: a) the sensitivity and vulnerability of some species, communities and habitats to direct and indirect impacts of fishing (easily perturbed); b) the extreme longevity (100s to >1,000 years) of individuals of some types of organisms (e.g. octocorals) or the long times over which some habitats develop – up to >8,000 years for cold water coral reefs (slow recovery); c) the low resilience of species, communities and habitats as a result of low productivity, great longevity, unpredictable and usually low recruitment, and low growth rates (unpredictable recovery); d) a high proportion of species encountered within some deep-sea ecosystems are endemic, and are found nowhere else (high risk of loss of biodiversity, including extinctions); e) some vulnerable seafloor communities are distributed as spatially discrete units often within a small area relative to the overall area of the seabed (small perturbations may have significant consequences); f) the connectivity between populations within geographic regions may be critical to the long term sustainability of biodiversity (fragmentation and risk of loss of source populations); g) current knowledge of the ecosystem components and their relationships is generally poorly known and the gaps more difficult to fill (managing under greater uncertainty)."[55]

More recently, the 10-year Census of Marine Life found that deep-sea ecosystems are at high risks of human impacts and deep-sea fishing presently has the greatest impact on these environments.[56]

2.4 INTERNATIONAL CALL FOR ACTION TO PROTECT THE DEEP SEA

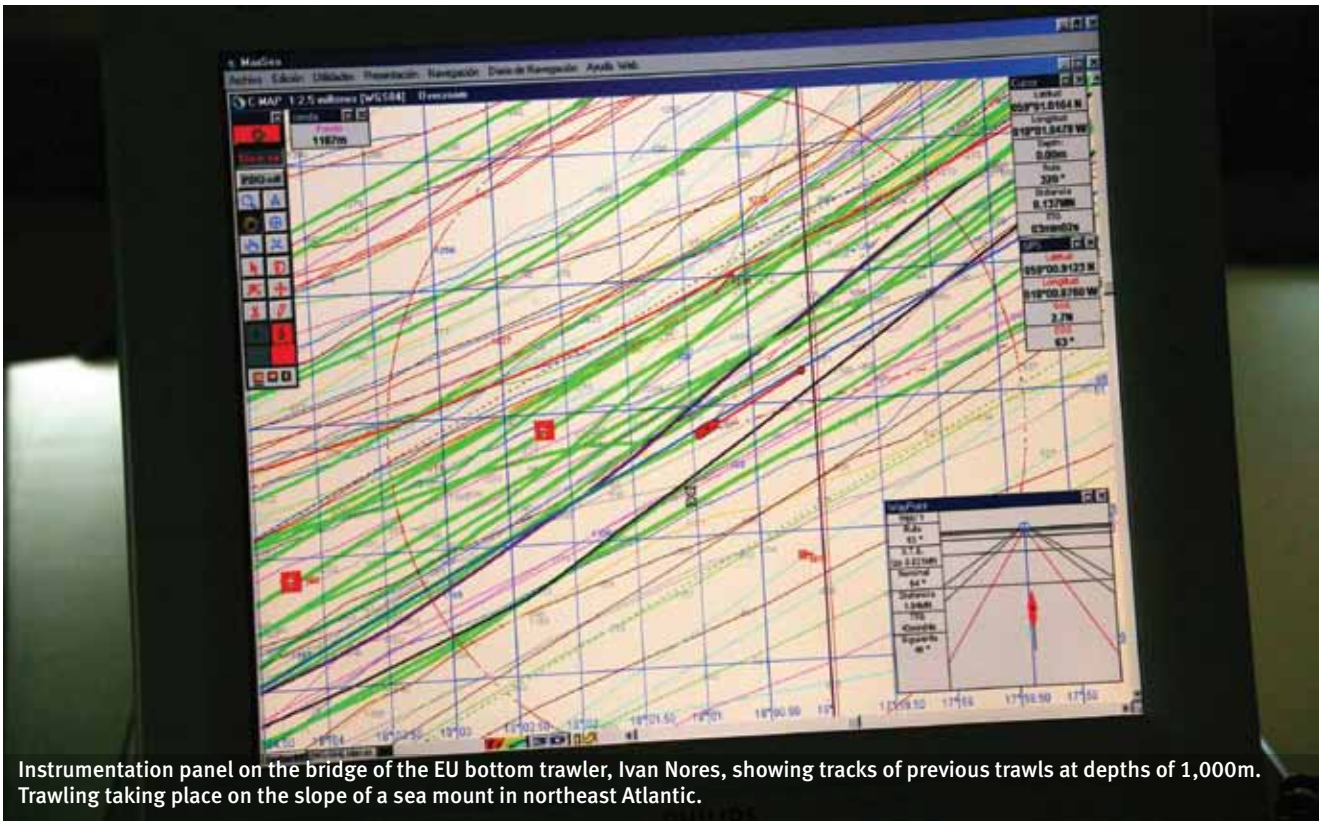
International concern over the impacts of deep-sea fishing in the high seas has been the subject of extensive debate by the United Nations General Assembly (UNGA) and other international bodies over the past 10 years. This debate has resulted in the adoption of a series of resolutions by the UNGA.

In 2004, it adopted resolution 59/25 which called on States to take urgent action to consider an interim prohibition of bottom trawling and other destructive fishing practices on the high seas until such time as appropriate conservation and management measures have been adopted in accordance with international law. A review in 2006 by the UN Secretary-General of the actions taken by States and regional fisheries management organisations (RFMOs) in response to the 2004 UNGA resolution found that: "Some States have undertaken, or are in the process of undertaking, extensive efforts to protect some fishery habitat areas within their national jurisdiction, in particular through the establishment of protected areas. However, this is not the case on the high seas, though deep-sea habitats in these areas are extremely vulnerable and require protection."[57]

As a result of the 2006 review, a number of States called for a moratorium on high seas bottom trawl fishing. The UNGA ultimately adopted a compromise resolution, offered by countries whose vessels engage in bottom fishing on the high seas, which contained a commitment to take a specific set of steps to manage deep-sea bottom fisheries on the high seas or else prohibit such fishing from taking place. Sustainable Fisheries Resolution 61/105, which was adopted by the UNGA in December 2006, calls on flag states and RFMOs to take the following actions.

1. Take action immediately, both individually and through RFMOs/Arrangements, on the basis of the precautionary approach and ecosystem approach, to manage fish stocks sustainably and protect VMEs – including seamounts, hydrothermal vents and cold-water corals – from destructive fishing practices.

2. Manage bottom fisheries on the high seas by assessing the impacts of individual bottom



Instrumentation panel on the bridge of the EU bottom trawler, Ivan Nores, showing tracks of previous trawls at depths of 1,000m. Trawling taking place on the slope of a sea mount in northeast Atlantic.

GREENPEACE/KATE DAVISON

fishing activities and adopting management measures to prevent significant adverse impacts on VMEs.

3. Close areas of the high seas to bottom fishing where VMEs are known or likely to occur unless fisheries in these areas can be managed to prevent significant adverse impacts on VMEs.

4. Ensure the long-term sustainability of deep-sea fish stocks.

5. Establish a move-on rule where vessels will be required to move out of an area where VMEs are encountered during the course of fishing operations.

Subsequent to the adoption of the 2006 resolution, States agreed to convene a Technical Consultation under the auspices of the FAO, to negotiate a set of guidelines on the implementation of the resolution. In 2008, the International Guidelines for the Management of Deep-sea Fisheries in the High Seas were adopted and subsequently endorsed by the FAO Committee on Fisheries and the UNGA.[58] These Guidelines establish the international standard for conducting impact assessments of deep-sea fisheries to determine whether significant adverse impacts would occur to vulnerable deep-sea ecosystems and species, including low-productivity fish species. Although primarily negotiated to aid States and RFMOs in the implementation of UNGA resolution 61/105 in the management of fisheries in the high seas, States recognised that the Guidelines are also applicable to the management of deep-sea fisheries within national waters or EEZs.[59]

Sample of coral dragged up from seabed during a bottom trawl from a fishing vessel.

GREENPEACE/STEVE MORGAN

In 2009, a follow-up UNGA resolution was also unanimously adopted after a UNGA review found that resolution 61/105 was not being properly implemented. Sustainable Fisheries Resolution 64/72 reaffirms resolution 61/105 and makes it clear that the measures called for in resolution 61/105 should be implemented by flag states and RFMOs consistent with the FAO Guidelines prior to allowing or authorising any bottom fishing on the high seas. Resolution 64/72 places particular emphasis on conducting impact assessments of bottom fisheries on the high seas and calls on flag states and RFMOs to "ensure that vessels do not engage in bottom fishing until such assessments have been carried out." Resolution 64/72 further calls for stock assessments and conservation measures to ensure the long-term sustainability of deep-sea fish stocks and non-target species and the rebuilding of depleted deep-sea fish stocks.

To date, the UNGA resolutions calling for deep-sea protections on the high seas have yet to be fully implemented.[60] In some areas of the high seas, fishing closures and other measures have been applied by the competent RFMOs, though none have fully implemented UNGA resolutions 61/105 and 64/72 in line with the FAO Guidelines. In some RFMOs, none of the Contracting Parties conducted impact assessments for their bottom fisheries (e.g. the North East Atlantic Fisheries Commission [NEAFC]), while in other areas, some or all Contracting Parties submitted impact assessments but the impact assessments were of variable quality, e.g. the Commission for the Conservation of Antarctic Marine Living Resources [CCAMLR], the North Pacific Fisheries Commission [NPFC], the South Pacific Regional Fisheries Management Organisation [SPRFMO]. Nonetheless the UNGA resolutions establish the international standard by which deep-sea fisheries should be managed, including by the EU within EU waters.

Orange roughy and grenadier found in UK waters on the Anton Dohrn seamount.

JNCC, JNCC.GOV.UK, 2010/JAIME DAVIES

THE MISMANAGEMENT OF EU DEEP-SEA FISHERIES

The EU's deep-sea fishing fleet is one of the largest in the world. The EU is a major player in high seas bottom fishing, which frequently targets deep-sea species. The EU high seas bottom fishing fleet consisted of an estimated 103 vessels in 2006, which represented approximately 36 percent of the high seas bottom fishing fleet globally.[61] In the northeast Atlantic – home to some of the most heavily exploited deep-sea fish stocks – the EU is responsible for 75 percent of the reported regional catch of deep-sea species.[62]

Given its size, the EU can play an important, constructive role by ensuring that deep-sea fishing is both sustainable and does not cause significant adverse impacts on VMEs. Such leadership is needed now more than ever. There is already widespread evidence of significant damage to deep-sea ecosystems such as cold-water corals and serious declines in deep-sea fish species, target as well as non-target species, in the northeast Atlantic. Catch and market data suggest the EU can act to protect the deep sea with relatively little economic impact. The EU's deep-sea landings in 2010 were worth an estimated 101 million Euro – just 1.3 percent of the value of all EU fishery product landings in 2008 (see Appendix II). The EU's reported deep-sea catch in 2010 was 45,554 tonnes, just 1.2 percent of the EU's entire catch in the northeast Atlantic.

This section examines deep-sea fishing and its impacts in the northeast Atlantic, provides a summary of the EU deep-sea access regime and supporting measures, and explores how EU deep-sea management has proven inadequate and ineffective.

3.1 DEEP-SEA FISHING IN THE NORTHEAST ATLANTIC

The northeast Atlantic is limited to the north by the Arctic Ocean and to the south by the 36°N parallel, which corresponds to the southern point of the Iberian Peninsula. Important features in the high seas of this region include the Mid-Atlantic Ridge (MAR), the Reykjanes Ridge, Hatton Bank and Rockall Bank. The western limit south of Greenland is the 42°W meridian. This area corresponds with FAO Statistical Area 27 (ICES sub-areas I to XIV).

Fishing in the international waters of the northeast Atlantic is managed by NEAFC. The primary source of scientific advice for fisheries management in the region is provided by ICES, a network of more than 1,600 scientists from 200 institutions linked by an intergovernmental agreement.[63]

According to ICES data, 16 countries or self-governing territories reported catches of deep-sea species in the northeast Atlantic in 2008 (see Appendix II). Eleven were EU Member States, though 96 percent was taken by just four EU countries: Spain, France, Portugal and the Netherlands. The non-EU countries or territories were the Channel Islands, Faroe Islands, Iceland, Norway and the Russian Federation. On the high seas of the northeast Atlantic, the main fishing states or territories are Spain, France, the Baltic states, Norway, the Russian Federation, and the Faroe Islands.


Black scabbardfish, Madeira fish market. EMILY DOLAN


Anemone, Darwin Mounds, Rockall Trough. NOCS

The reported catch of deep-sea species to NEAFC for 2009, the latest year for which catch information is available, was approximately 146,000 tonnes. However, it is clear that NEAFC Contracting Parties are reporting some combination of the catch of deep-sea species from fisheries both on the high seas and within EEZs, presumably on straddling stocks, without differentiating between the two areas. Furthermore, the reporting of the catch of deep-sea species has varied widely since 2004, the year that NEAFC first established a regulation to require reporting of catch of deep-sea species. In 2009 both Iceland and Norway began reporting large catches of deep-sea species to NEAFC, raising the overall reported catch to close to 150,000 tonnes. The actual catch of deep-sea species in the high seas is likely to be considerably less than this figure – possibly only a few thousand tonnes. Aside from the fact that NEAFC Contracting Parties do not report high seas catches of deep-sea species separately from the catch within EEZs, there are considerable problems with the data and reporting of deep-sea catches.[64]

3.2 IMPACTS ON SPECIES AND ECOSYSTEMS

The northeast Atlantic is home to some of the oldest and largest deep-sea fisheries in the world, and there is increasing evidence of significant declines in the region's deep-sea fish species and biomass. There are numerous problems with the management of deep-sea fisheries, including the sustainability of deep-sea fish stocks (both target and bycatch species) and the ecosystem impacts of deep-sea fisheries in the northeast Atlantic.

In spite of the lack of scientific information, ICES estimates that 100 percent of the catch of all deep-sea fish stocks is outside safe biological limits, compared to an estimated 10 percent of the catch of all stocks managed by the EU combined.[65] Significant population declines have been found for various species of deep-sea sharks in the northeast Atlantic. IUCN classifies the gulper shark (*Centrophorus granulosus*) as Critically Endangered and the leafscale gulper shark (*Centrophorus squamosus*) and Portuguese dogfish (*Centroscymnus coelolepis*) as Endangered. The birdbeak dogfish (*Deania calcius*), kitefin shark (*Dalatias licha*), lowfin gulper shark (*Centrophorus lusitanicus*) and angular rough shark (*Oxynotus centrina*) are categorised as Vulnerable.[66] These sharks were previously targeted by EU deep-sea fisheries and continue to be taken as bycatch.

Bottom trawling – the predominant gear used – is highly destructive

Bottom trawling is the dominant method of bottom fishing in the deep-sea in the northeast Atlantic as well as other ocean regions (the exception is the Southern Ocean around Antarctica, where the regional treaty organisation established to manage the fisheries in the region – CCAMLR – has banned bottom trawling on the high seas). ICES stated in 2007 that: "the impact of bottom trawl is far more detrimental to the seabed than static gear,"[67] and in 2008 reiterated this conclusion in a report to NEAFC, stating:

"The primary methods of fishing within the NEAFC area include bottom trawling by otter trawl, pelagic trawling, pelagic fishing by seine net, longlining, gillnetting, tangle netting, and the use of traps… Any gear that has bottom contact has the potential to damage vulnerable deep-water habitats. The degree of impact depends on the type of gear, the degree of contact with the seabed and the frequency of contact. Thus, even bottom gear with a low potential for damage per deployment can potentially cause significant impact if used intensively. Of the types of fishing listed above, the greatest instantaneous physical impact on sensitive habitats is likely to be caused by towed otter trawls…" – that is, bottom trawl fishing.[68]

Close up of a sample of *Lophelia pertusa* taken from Mingulay coral reef complex, Inner Hebrides, North Atlantic

GREENPEACE/GAVIN NEWMAN

"The greatest instantaneous physical impact on sensitive habitats is likely to be caused by bottom trawl fishing…" *ICES*

Numerous reports and studies over the past decade point to bottom trawling in the deep sea as a fishing practice of particular concern and the single greatest direct threat to vulnerable marine benthic ecosystems.[96] In 2002, ICES reported that: "Photographic and acoustic surveys have recently located trawl marks at 200–1,400m depth all along the northeast Atlantic shelf break area from Ireland, Scotland and Norway" and expressed concern specifically about the impact of deep-sea bottom trawling on *Lophelia pertusa*, a reef-forming species of cold-water coral common to the northeast Atlantic.[70]

In a study published in 2010, Benn et al. estimated that the cumulative area of deep seabed (defined

as areas of the seabed greater than 200m deep) impacted by bottom trawling on the Hatton and Rockall Banks in the northeast Atlantic in 2005 was between 741km² and 37,160km², a figure that in order of magnitude, is higher than the impact on the deep seabed of all other human activities combined in the entire northeast Atlantic (the area the authors defined by the boundaries of the OSPAR Convention).

A global review of cold-water corals published by the United Nations Environment Programme (UNEP) in 2004 noted that the detrimental effects of bottom trawling to coral ecosystems has been well documented in the northeast Atlantic in Scandinavian waters, off western Ireland, and in the northern Rockall Trough. The report notes that detrimental impacts of bottom trawling on cold-water corals have been documented in other ocean areas as well, including the Oculina reefs off eastern Florida; the Solenosmilia reefs on the summits of some south Tasmanian seamounts; the oceanic banks in New Zealand waters; the octocoral gardens in Alaskan waters; and coral grounds off Nova Scotia. The report also cited an estimate from the Norwegian Institute of Marine Research that between 30 and 50 percent of the cold-water coral reefs known or expected to be found in Norwegian waters had been partially or totally damaged by bottom-trawling activities.[71] More recently Hogg et al. reviewed the distribution, biology and ecology of deepwater sponges, another important deepwater habitat-forming species found throughout the northeast Atlantic and other parts of the world. The report states that: "Mobile fishing gear that contacts the seabed, particularly trawling, is the fishing apparatus that poses the greatest threat to deepwater sponge grounds."[72]

Discarded bycatch (Scabbardfish) on the deck of a Spanish flagged bottom-trawler, in the Hatton Bank area of the North Atlantic.

GREENPEACE/KATE DAVISON

Bycatch rates are high in the mixed species deep-sea trawl fisheries causing broad adverse impacts on whole communities of deep-sea species. ICES sums up the concerns in this regard as follows:

"At depths between about 400 and 1,500m there may be between 40 and 50 demersal species present in [the catch] depending on gear type. Maximum species diversity occurs between 1,000–1,500m before declining markedly with depth. Deep-water species are typically slow growing, long lived, late maturing and have low fecundity. Fishing has a greater effect on species with such life history traits, making them particularly vulnerable to overexploitation. This applies to both the target and non-target species. A large proportion of deep-water trawl catches (upwards of 50 percent) can consist of unpalatable species and numerous small species, including juveniles of the target species, which are usually discarded. The main species in the discards of the trawl fishery is by far the Baird's smoothhead (*Alepocephalus bairdii*), however, a large number of other non-marketable benthopelagic species are discarded. The survival of these discards is unknown, but believed to be virtually zero due to fragility of these species and the effects of pressure changes during retrieval. Therefore such fisheries tend to deplete the whole fish community biomass."[73]

This was reinforced by a study published in 2009 which concluded that deep-sea fisheries in the northeast Atlantic off the coast of Ireland have substantially depleted whole communities of deep-sea fish stocks and populations, including species of no commercial value, as deep as 2,500m, which is well below the lowest depths of approximately 1,600m at which bottom fishing actually occurs.[74]

To illustrate the species and ecosystem impacts of deep-sea fishing, several case studies based on ICES advice may be considered. The cases are typical of the scientific information available and the concerns expressed by ICES for all deep-sea species for which ICES provides advice. The status of the stocks of all such deep-sea species is unknown, a situation recognised by ICES for some years.[75]

Case 1 | Black scabbardfish (*Aphanopus carbo*)[76]

State of the stock: UNKNOWN

SCIENTIFIC ADVICE AREA: ICES areas Vb, VI, VII, XIIb (Northern areas)

SCIENTIFIC ADVICE
- It is not known if this catch level [over the last 10 years] is sustainable in the long term.
- The current abundance of the stock is around 20 percent of the initial levels (start of the fishery).
- Black scabbardfish is mainly taken in mixed trawl fisheries along with roundnose grenadier and sharks.
- Due to the mixed nature of the trawl fisheries any measure taken to manage this species in these areas should take into account the advice given for other species taken in the same mixed fishery.
- Deepwater trawls impact the ocean floor; this includes potential damage to deepwater coral communities.
- No reliable assessment can be presented for this assessment unit and fishing possibilities cannot be projected.

Case 2 | Roundnose grenadier (*Coryphaenoides rupestris*)[77]

State of the stock: UNKNOWN

SCIENTIFIC ADVICE AREA: ICES areas Vb, VI, VII, XIIb

SCIENTIFIC ADVICE
- The roundnose grenadier shows low productivity, which can only sustain low rates of exploitation.
- Roundnose grenadier are caught in a mixed fishery, which also catches deepwater sharks, black scabbardfish and blue ling.
- Discards account for about 30 percent of catch in weight and 50 percent of catch in number for the French fleets.
- As this fishery is part of a mixed fishery, any fishing effort on roundnose grenadier also impacts other commercial and non-commercial deepwater species.
- Deepwater trawls have an impact on the ocean floor; this includes potential damage to deepwater coral communities.
- No reliable assessment can be presented for this assessment unit and fishing possibilities cannot be projected.

Case 3 | Blue ling (*Molva dypterygia*)[78]

State of the stock: UNKNOWN

SCIENTIFIC ADVICE AREA: ICES areas I, II, IIIa, IV, X, Va, XIV

SCIENTIFIC ADVICE
- Measures should be implemented to minimise the bycatch.
- Closed areas that protect spawning aggregations should be maintained, and expanded where appropriate.
- Blue ling form a bycatch component of fisheries targeting other species, and the effect of these fisheries on the ecosystem should be seen in the context of the other fisheries in these areas.
- As this fishery is part of a mixed fishery, any fishing effort on blue ling also impacts other commercial and non-commercial deepwater species.
- Deepwater trawls have an impact on the ocean floor; this includes potential damage to deepwater coral communities.
- Blue ling is particularly vulnerable to exploitation because fisheries can target spawning aggregations.
- No reliable assessment can be presented for this assessment unit and fishing possibilities cannot be projected.

3.3 OVERVIEW OF EU DEEP-SEA MANAGEMENT

In 2002, the EU began a new phase of regulating deep-sea fisheries with the passage of Council Regulation 2347/2002. This regulation is commonly referred to as the 'deep-sea access regime.' Prior to this time, there were two EU regulations in place for the management of deep-sea species.[79] According to the Commission, however, these regulations had only limited effect on deep-sea fisheries. Specifically, they "only applied to fisheries along the Western slope, did not clearly define the regulated activity and contained effort ceilings which were not restricting."[80]

The deep-sea access regime came into effect on January 1 2003. It applies to all EU fishing vessels operating in the northeast Atlantic, as well as adjoining areas of FAO regulatory area 34 (CECAF sub-areas 1 and 2).[81] After the deep-sea access regime was approved, the EU began to set total allowable catches (TACs), as permitted under the Common Fisheries Policy (CFP).

The deep-sea access regime was intended to limit and reduce the fishing of vulnerable marine species. As the Commission notes, the passage of the deep-sea access regime "occurred at a time of increasing exploitation of some deep-sea species which was not accompanied by acceptable levels of scientific knowledge about the relevant stocks, nor by precautionary management measures."[82] ICES has repeatedly indicated that many deep-sea stocks were too heavily exploited and in a state that was actually or potentially 'outside safe biological limits' – findings that were endorsed by the European Commission's Scientific, Technical and Economic Committee for Fisheries (STECF).[83]

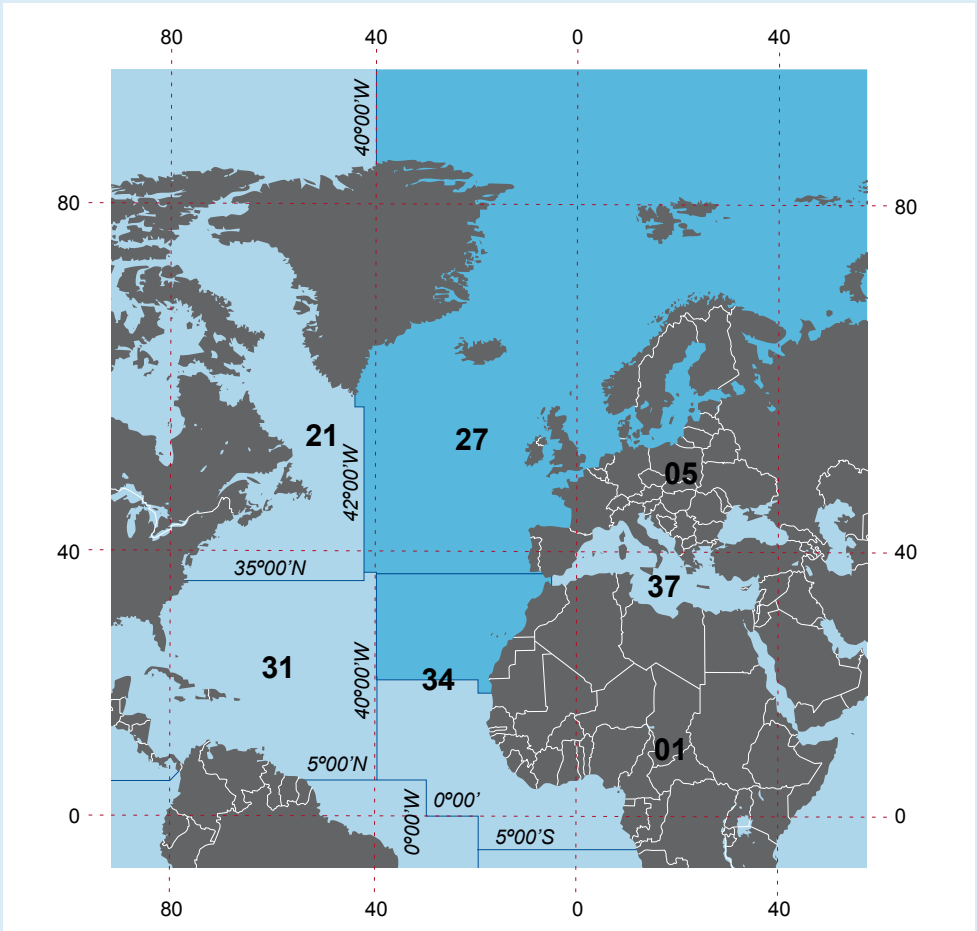


Figure 2 | Coverage Area of the EU Deep-Sea Access Regime, Council Regulation No. 2347/2002
NB. This map is a representation of the area – for accurate co-ordinates, see links page 39.

The deep-sea access regime can be understood as consisting of six core management measures.

1. Fishing permits

EU vessels catching more than 10 tonnes annually of Annex I species are required to hold special deep-sea fishing permits.[84] These permits must be issued by Member States in accordance with Council Regulation 1627/1994.[85] Each member country should forward a list of permitted deep-sea fishing vessels to the Commission.[86]

2. Effort restriction

Member State vessels holding deep-sea fishing permits are subject to an effort restriction, to no higher than the aggregate power or volume of Member State deep-sea fishing vessels in 1998, 1999 or 2000.[87] 'Power' means the total installed engine power of vessels in kilowatts, and 'volume' means gross engine tonnage.[88]

3. Port surveillance

Member States must designate specific ports for the landing of any quantity of Annex I deep-sea species in excess of 100kg, determine inspection and surveillance procedures, and share a list of these ports with the Commission.[89]

4. Observers and reporting requirements

Each Member State is required to assign scientific observers to permitted vessels.[90] Further, each State is required to prepare a "sampling plan for the deployment of observers and sampling at port for the collection of representative data that are adequate for the assessment and management of the deep-sea fish stocks." The observer shall independently record information on the vessel's gear, as specified in Annex III of the regulation, in addition to the information specified in the sampling plan.

5. Designated species

'Deep-sea species' are defined as those 24 species listed in Annex I of the regulation (see Appendix I).[91] As such, the regulation's provisions on fishing permits, effort restrictions and designated ports are limited to only these species. Catch information must also be provided for these species, as well as another 22 species listed on Annex II (see Appendix I).[92]

6. Information sharing

Member States shall communicate to the Commission information about catches of deep-sea species and fishing effort deployed, expressed as kilowatt-fishing days for each six-month period of the calendar year.[93] This information should be broken down by year-quarter, type of gear used, species, and geographic subdivision (ICES or CECAF). Member States should also provide information for catches of Annex II species (see Appendix I). Additionally, each Member State is to send a list of designated ports and observer reports to the Commission within 30 days after receipt of a written request.[94] These provisions are in addition to those established by Council Regulation 2847/93, which establish a control system applicable to the CFP.

Other measures

The deep-sea access regime provides the bulk of available conservation and management measures for European deep-sea fisheries management. However, deep-sea management is also strongly supported by other EU and RFMO measures that generally apply to EU deep-sea fisheries in the northeast Atlantic. The three most important supporting measures are as follows.

1. Total allowable catch (TACs)

Under the 1992 CFP, the Council may set quantitative limits on catches, in addition to a variety of measures.[95] The same day the Council passed the deep-sea access regime, it also passed regulation 2340/2002, which fixed catch limitations for a number of deep-sea fish stocks for each of the Member States that exploit these fisheries.[96] The Council has since continued fixing catch limits every two years for certain deep-sea species.[97]

2. Vessel Monitoring Systems (VMS)

Since 2005, all EU vessels exceeding 15m in length are required to have installed onboard a functioning system that allows detection and identification of that vessel by remote monitoring systems.[98] Member States are required to make biannual reports to the Commission on the basis of this data.[99]

3. VME impact assessments and area closures on the high seas

Consistent with UNGA resolutions 64/72 and 61/105, bottom fishing countries are to implement measures preventing bottom gears from causing significant impacts on VMEs on the high seas.[100] States fishing in the northeast Atlantic, including EU Member States, have sought to implement the UN resolutions through various measures in NEAFC. In order to comply with NEAFC resolutions, the EU has to subsequently pass implementing regulations.

3.4 EVALUATION OF THE EU DEEP-SEA ACCESS REGIME

Various assessments have found the EU deep-sea access regime to be inadequate, poorly implemented, and inconsistent with EU and international management principles. Each core element is reviewed below.

Fishing permits

It is unclear how successful the fishing permit scheme has been due to significant reporting problems. A review by the Commission in 2007 found that only Spain and Portugal had provided lists of vessels holding deep-sea permits.[101] This is in spite of the fact that all Member States with deep-sea fishing vessels are required by law to do so.[102] As discussed below, fishing permits are only required for a narrow range of deep-sea species that are actually caught and landed, and it is unclear how closely deep-sea fishing vessels are monitored for compliance with the requirements of such fishing permits.

The Anton Dohrn Seamount is comprised predominantly of corals, including large gorgonian species, small bamboo coral, soft coral *Anthomastus* sp. and the antipatharian *Leiopathes* sp.

JNCC, JNCC.GOV.UK, 2010/JAIME DAVIES

Effort restriction

According to the Commission, the maximum limit on effort "has probably had no effect."[103] The methodology used for calculating maximum effort resulted in effort ceilings that "are unrealistically high and do not restrict the number of vessels targeting deep-sea species."[104] Another reason is that fishing capacity has increased due to technical efficiency improvements. An analysis of EU fishing capacity has found that total fishing capacity in the deep-sea sector expanded by 34–44 percent between 1990 and 2006, even as the total number of vessels declined.[105]

The Commission admits that it does not yet know what level of effort would result in sustainable catches of deep-sea species, and that full application of the precautionary approach would have required a much greater effort restriction, if not fishery closures:

"The lack of basic knowledge on the biology of deep-sea species and of the deep-sea ecosystem means that the TAC (total allowable catch) and effort limitations that were fixed were somewhat arbitrary. Full compliance with the precautionary approach would have required the setting of much lower TACs and effort limits, or even the closure of the fisheries."[106]

Port surveillance

It is recognised that regulation 2347/2002 is deficient in its provisions for port surveillance as no guidelines were given for surveillance and inspection procedures.[107] The Commission found that landings of deep-sea species are "sometimes considered to be of lower priority,"[108] yet deep-sea species are among the most vulnerable of marine species targeted by fishing activities.

Observers and reporting requirements

Reporting and scientific observer coverage is quite poor. Member States share effort and landings data, but not catch data, with the Commission and scientific authorities.[109] This is highly problematic as discarding is known to be high in many deepwater fisheries.[110] The FAO notes that there are "significant discrepancies" in the reporting of landings, in addition to a widespread lack of reporting on fishing effort and discards.[111] ICES notes that this lack of accurate information is a major impediment to managing these fisheries sustainably.[112] Without accurate catch data, ICES is unable to provide reliable stock assessments and advice.

There is also evidence of rampant misreporting. A 2008 analysis of fishing catches in the NEAFC regulatory area, where EU deep-sea vessels operate, revealed that only 27 percent of vessels that transmitted VMS data had ever reported a catch.[113] And 70 percent of those vessels reporting catches of demersal (e.g. deep-sea) species in the NEAFC area reported only one species in a given reporting period. ICES noted that it is very unlikely that these demersal, deepwater species are caught in single species fisheries, and that the catch reports are likely to be incomplete, with vessels reporting only their target or most abundant species. ICES also noted that the species composition of the data showed very high interannual variation that could be due to unexplained variation in exploitation patterns, but may also indicate significant amounts of missing data and/or high levels of misreporting.[114] Separately, ICES noted that the actual fishing effort in the beaked redfish (*Sebastes mentella*) fishery in the Irminger Sea may have been 25 percent higher than that which was reported during observation days in June 2002 and 2003.[115]

Finally, even in the event of full implementation and sufficient oversight, it is not clear that catch data would be of sufficient quality. This is because the deep-sea access regime does not provide guidelines for catch sampling plans, a problem noted by the Commission in its 2007 review.[116]

Designated species

The list of species for which EU vessels are subject to effort restrictions (Annex I) and monitoring (Annex I and II) are insufficient to protect all deep-sea species from overexploitation by European fleets. The two lists comprise 46 species that are either targeted or caught as bycatch, yet many more species are actually caught in deep-sea fishing operations in the region. For example, almost 70 species are reportedly caught in deep-sea trawl fisheries targeting roundnose grenadier in the northeast Atlantic.[117] Moreover, of the 46 species listed in the Annexes, only 25 deep-sea species or species groups are subject to catch restrictions.

> "The **lack of basic knowledge** on the biology of deep-sea species and of the **deep-sea ecosystem** means that the TAC (total allowable catch) and effort limitations that were fixed were somewhat arbitrary"
> *European Commission*

To effectively manage deep-sea fisheries, the list of species requiring fishing permits and reporting needs to be expanded. In 2009, STECF was asked to review the list of species included in the deep-sea access regime. STECF subsequently recommended that two more species be included in Annex I: beaked redfish and Greenland halibut (*Reinhardtius hippoglossoides*).[118] For Annex II, STECF recommended that several additional species should be included: grenadiers (*Macrourid spp.*) other than roundnose grenadier and roughhead grenadier (*Macrourus berglax*); hairlip brotula (*Cataetyx laticeps*); other skates than those listed in the annex; snub-nosed spiny eel (*Notocanthus chemnitzi*); black gemfish (*Nesiarchus nasutus*); and elongate frostfish (*Benthodesmus elongates*). It is possible that other species should be recommended for inclusion, but the catch data upon which these recommendations were made are quite poor.

STECF also found that several species should be removed from Annex II as they are mostly found at depths shallower than 400m: Conger eel (*Conger conger*); Norway redfish (*Sebastes viviparous*); greater eelpout (*Lycodes esmarkii*); and silver scabbardfish (*Lepidopus caudatus*).[119]

Samples of discarded bycatch from an EU bottom-trawler, in the Hatton Bank area of the North Atlantic.

Information sharing

Though required by regulation 2347/2002, the sharing of information on deep-sea fishing is very poor and inconsistent. As mentioned above, a review by the Commission found that only Spain and Portugal had provided lists of vessels with deep-sea permits, though all Member States with deep-sea fishing vessels are required by law to do so.[120] Landings data, rather than the required catch data, were only provided to the Commission by Member States. STECF highlighted this problem in a 2009 report, noting that catch data were unavailable:

"To gain a true perception of removals from these fisheries, catch data are required. In principle observer data should be available since the regulation requires Member States to sample these species on board commercial vessels and STECF notes that such data was not provided."[121]

Further, STECF notes that "late and inconsistent data reports received from some Member States" has been a "repeated experience" and that shortfalls were most evident in the data from Spain and France.[122] In 2008, Spain and France accounted for 43 percent of the reported landings of deep-sea species by EU vessels.[123]

3.5 EVALUATION OF OTHER EU FISHERIES MANAGEMENT MEASURES

Available reviews also reveal that other supporting management measures have not been effectively implemented in the management of deep-sea fisheries.

TACs

The Commission's review of deep-sea catch limits found that they "have probably had some effect in curbing fishing mortality on some of the main targeted species."[124] However, the effect has been far from sufficient. In 2010, ICES estimated that 100 percent of all deep-sea fisheries are 'outside safe biological limits.'[125]

On one hand, the EU has taken important steps to expand TACs to other deep-sea species, as well as setting zero TACs for species that appear to already be depleted. TACs were first established in 2002, and these applied to seven species in limited areas over the following two years.[126] In 2004, the coverage of TACs increased to 19 species or species groups, 11 of which were deep-sea sharks.[127] In 2008, TACs were applied to two additional shark species,[128] and in 2010 TACs were applied to another four shark species, meaning TACs will be applied to a total of 25 deep-sea species or species groups in the 2011 period.[129] In 2010 'zero' TACs were applied to orange roughy and various deep-sea sharks, meaning no targeted fishing will be allowed. And no bycatch of deep-sea sharks will be allowed to be landed beginning 2012.[130]

On the other hand, the progress made on TAC coverage and zero TACs has been far from sufficient. This is due to several reasons.

First, according the Commission, many TACs are set far above real landings, meaning they do not constrain fishing in a physical sense.[131] In 2008, only seven of 25 TACs were utilised at rates above 80 percent, and nine were utilised at rates less than 50 percent.[132] This consistent under-utilisation of TACs has occurred since TACs were first instituted in 2003.

Second, TAC coverage remains limited. TACs have only been set for 25 of the 46 species designated by the deep-sea access regime, while about 70 species are caught in deep-sea fishing activities in the northeast Atlantic.[133] With the exception of red seabream, TACs have only been applied to Annex I species, which are commercially targeted species, but not Annex II, which consist mostly of bycatch species. Yet many of the Annex II species are caught in large quantities in mixed-species deep-sea fisheries.[134] Further, TACs are not typically created to regulate a species in the entirety of its range, meaning the fishing of many species may


GREENPEACE/KATE DAVISON

be regulated in one sub-area but not another. The Commission provides a telling example:

"The danger of inadvertently excluding an area from the TAC regime was illustrated by the development of a targeted roundnose grenadier fishery in the Norwegian waters of ICES Area III. Regulation 2270/2004 fixed a TAC of 1590 tonnes for ICES III, but specified that this applied to Community and International waters. The TAC did not therefore cover Norwegian waters… This loophole was exploited by a number of Danish vessels that were legally fishing under historical rights recognised by Norway…"

Third, due to reporting problems, the 'total allowable catch' does not truly apply to catches, but rather what fishing operators choose to land. Available information, though limited, reveals that discards are very high. For example, discards account for about 30 percent of catch in weight and 50 percent in number for French fleets targeting roundnose grenadier.[135]

The poor design of present TACs and the currently ineffective effort restrictions mean that deep-sea fisheries today are still largely unregulated. The Commission supports this conclusion with its 2009 review, noting that landings of most deep-sea species have increased in recent years, and this includes species that have had TACs applied to them.[136]

VMS

The VMS in deep-sea fisheries is also highly problematic. The Commission notes that VMS data for deep-sea vessels are poorly monitored and that local inspectors are not informed of any suspicious activities:

"Alarms at the Fisheries Monitoring Centres (FMC) are generally not set to give an automatic warning when a fishing vessel is fishing or is in transit in regulated areas. This means that although technically possible, the FMCs do not keep the local inspectors informed of any suspicious activities by specific vessels on the fishing ground. If this was done, it would allow such vessels to be targeted by inspectors when they arrived in port."[137]

VME impact assessments and area closures on the high seas

In 2008 NEAFC required that Member States submit assessments of the impacts their high seas bottom fishing have on VMEs.[138] No impact assessments have been submitted to the NEAFC Secretariat or Permanent Committee on Management and Science (PECMAS).[139] It appears the term "where possible" in Article 2[i] of the regulation has allowed NEAFC Contracting Parties to treat this regulation as voluntary, though assessments are of course required by the UNGA resolutions. In 2010, NEAFC added another provision to the bottom fisheries regulation on impact assessments for fishing in new areas. Based on the language, it appears that such impact assessments are also voluntary until specified otherwise.

Since 2006, NEAFC has closed a number of areas to bottom fishing on the Rockall Bank, Hatton Bank and the Mid-Atlantic Ridge. However, a review of the implementation of UNGA resolutions 61/105 and 64/72 found that not all have been closed where VMEs are known or likely to occur.[140] Altogether, NEAFC estimates that approximately 54.2 percent of the seabed at fishable depths, defined as areas where the seabed is less than 2,000m deep, is now closed to bottom fishing in the largest of the three high seas areas that comprise the NEAFC Regulatory Area 1 – the high seas area south of Iceland.[141]

Finally, vessels are required to 'move-on' from an area in the event that various threshold levels for the catch of corals or sponge species are exceeded. However, in 2010, the joint NAFO/ICES Working Group on Deepwater Ecology (WGDEC) found that NEAFC move-on protocols and threshold values, as presently established, are of limited benefit in preventing significant adverse impacts.[142]

REFORMING
THE EU DEEP-SEA ACCESS REGIME

Given the many problems in the EU's northeast Atlantic deep-sea fisheries, the EU deep-sea access regime is in need of reform. The Commission has previously proposed three options for reforming the deep-sea access regime: 1) minimal change for the sake of regulatory consistency across CFP regulations; 2) slightly more change to honour international obligations with minimum administrative costs; or 3) improve the access regime in all its parts.[143] The Pew Environment Group believes the first two options are inadequate given the serious problems examined in the previous section. In addition, the widespread declines in deep-sea fisheries and ecosystems suggest that the regulation should not only be reformed, but also expanded. Indeed, as far back as 2005, ICES called for a "complete overhaul of deep-sea fisheries" and the European Commission recognised that many deep-sea fish stocks in the northeast Atlantic have such low productivity that "sustainable levels of exploitation are probably too low to support an economically viable fishery."[144]

The Pew Environment Group recommends 10 key reforms for EU deep-sea fisheries management. These reforms are offered on the basis of European Commission reports and communications, EU regulations, scientific studies, fisheries management best practice, international commitments made by the EU, and various publicly available documents and analyses. The 10 recommendations are as follows.

1. A clear mandate for sustainable management

Use clear language to require conservation, stock and fleet management measures to ensure the long-term conservation of target and non-target deep-sea fish stocks and species, as well as the recovery of depleted populations of fish, that is consistent with the best scientific information available and the precautionary principle/approach. This language should be incorporated into a new article that outlines the objectives of the regulation.

The EU is required by various regulations and international obligations to manage all fisheries for the purposes of conservation and in line with the precautionary principle/approach. However, deep-sea stocks continue to be overexploited, scientific advice is ignored, and the precautionary approach has not been applied.

2. Phase-out of bottom trawling gear

Establish a timetable to gradually phase out bottom trawling in favour of less destructive deep-sea fishing methods.

Bottom trawl gears are highly unselective and destructive, resulting in unsustainable fishery yields and significant ecosystem impacts. In addition, EU bottom trawling fleets generate low profits and are highly dependent on EU subsidies.[145]

3. Prior impact assessments required for all EU-flagged vessels using bottom gears

Require that impact assessments be conducted prior to the authorisation of individual deep-sea fishing activities to determine the effects of deep-sea fishing on VMEs and the long-term conservation of deep-sea fish stocks, including both target and bycatch species. The impact assessments should be conducted consistent with the internationally agreed standard for impact assessments of deep-sea fisheries contained in the 2008 International Guidelines for the Management of Deep-sea Fisheries in the High Seas, which were endorsed by the UNGA.

The EU, as a supporter of UNGA resolutions 64/72 and 61/105, has committed to conducting impact assessments prior to authorising bottom fishing on the high seas in order to determine whether significant adverse impacts would occur on VMEs as a result of bottom fishing by EU vessels. Subsequent

to the adoption of UNGA resolution 61/105, the European Commission announced the following:

"The requirement of an environmental impact assessment as a condition for the authorisation of individual fishing activities is the first and indeed the lynchpin of the set of recommendations issued by the General Assembly. This represents a radically innovative principle in fisheries management. In contrast with other resource exploitation activities carried out in the oceans and seas, where it is established practice to require prior impact assessments (e.g. installing offshore oil or gas platforms), the effects of fishing on marine habitats are generally assessed only after the fact, if at all."[146]

The EU has, to-date, relied on RFMOs to implement the UNGA resolutions where they exist. In the northeast Atlantic, however, a review of the measures adopted by NEAFC (as of July 2011) reveals that NEAFC has failed to fully implement a requirement that impact assessments be conducted for high seas bottom fisheries in the northeast Atlantic.[147] Because of this, and the failings by other RFMOs to which the EU is a Contracting Party, the Commission has suggested unilateral implementation of the provisions of the UNGA resolutions on deep-sea fisheries for its vessels within RFMO convention areas.[148] The Pew Environment Group agrees.

The EU has already taken such unilateral action in unmanaged high seas areas with Council Regulation 734/2008.[149] This regulation incorporates all of the key elements of the international blueprint for managing deep-sea fisheries as reflected in UNGA resolution 61/105. Among its provisions, the regulation requires impact assessments of bottom fisheries, a demonstration that harm is not likely to occur as a result of bottom fishing as a condition for permitting such fishing to occur, and that bottom fishing be restricted to pre-agreed or pre-authorised fishing areas. Consistent with the position of the EU during the UN negotiations, the regulation places particular emphasis on requiring impact assessments. These and the other provisions of EC 734/2008 are already a part of EU law and should be applied to the regulation of deep-sea fisheries in the northeast Atlantic.

The EU should also require impact assessment for EU vessels using bottom gears within its own waters. As a party to the UN Fish Stocks Agreement, the EU has committed to ensuring the compatibility of conservation and management measures on the high seas and within its waters.[150]

Example of habitat present on Rockall Bank seamount, including *Lophelia pertusa*, glass sponges, seastars and anemones.

JNCC, JNCC.GOV.UK, 2010/JAIME DAVIES


Deep-water coral diversity near the Menez Gwen hydrothermal field, Azores.

SEAMA

4. Area closures

Establish provisions that require the closure of areas to fishing where VMEs are known or likely to occur unless measures are in place to prevent significant adverse impacts.

Area closures are an internationally recognised management tool for the purposes of protecting VMEs. In implementing UNGA resolutions 64/27 and 61/105, a number of RFMOs have adopted such spatial conservation measures to protect VMEs, including NEAFC and the North Atlantic Fisheries Organization (NAFO) – both in the North Atlantic – as well as the General Fisheries Commission for the Mediterranean (GFCM), the South East Atlantic Fisheries Organisation (SEAFO), and CCAMLR.[151] Meanwhile, the EU has already closed some areas to bottom fishing within its waters. Most notable was a regulation adopted by the European Council in 2005 to close the waters around the Azores, Madeira and Canary Islands to bottom trawl fishing to protect seamounts. However, many deep-sea areas within EU waters where VMEs are known or likely to occur remain open to bottom contact fishing.[152]

5. Full regulation of deep-sea fishing

Define the scope of the new deep-sea access regime to include a) all deep-sea fishing operations occurring at depths greater than 400m, and b) all deep-sea species caught by deep-sea fishing activities, including target, bycatch and VME indicator species.

Annex I of regulation 2347/2002 lists 24 species that are defined as deep-sea species and managed by the access regime, and Annex II lists 22 species, ostensibly bycatch species, that are subject to data reporting requirements. As discussed above, they include some species that are not truly deep-sea species. These two lists also fail to encompass the entirety of species affected by EU deep-sea fishing activities in the northeast Atlantic, which would include 70 or more species.[153] These two annexes should be expanded to include all and only deep-sea species that are affected or potentially affected by the EU's fishing activities. Annex II should be explicitly defined as a list of bycatch species, and VME indicator species (e.g. sponges, corals) should be added to Annex II.

6. Regulate catch, not just landings

Redefine total allowable catch to mean all catch, including bycatch and discarded catch, and not just landings, to ensure that fishing mortality is effectively regulated for all species impacted by fishing. Conservation and management measures for mixed-species fisheries should be established on the basis of the catch or bycatch of the most vulnerable species.

At present, TACs have been applied to the landings of deep-sea species, not their catch, and this significantly undermines the integrity of the management tool. This is because most deep-sea

fisheries are mixed fisheries and result in significant amounts of bycatch and discards. If management measures are to ensure sustainable catches, real mortality must be regulated. No species should be overfished for the exploitation of another species. To date, only 25 of 46 species listed in Annex I and II have received TACs and yet all are believed to be 'outside safe biological limits.'[154]

7. Reduce bycatch and end discards

Phase in a requirement that all catch be landed unless there is an adequate justification (e.g. high survival potential), and reduce bycatch through area closures and the phase out of highly unselective and destructive gears. Conservation and management measures for mixed species fisheries should be established on the basis of the catch or bycatch of the most vulnerable species.

8. Detailed fishing plans

Require that the applicant for a deep-sea fishing permit should provide a detailed fishing plan with their application, and that it be adhered to throughout the duration of the permit.

Detailed fishing plans allow for the improved monitoring of deep-sea fishing activities. They would include the following information: (a) the intended location of the activities; (b) the targeted species; (c) the type of gears and the depth at which they will be deployed; and (d) the configuration of the bathymetric profile of the seabed in the intended fishing grounds, where this information is not already available.

Deviations from such plans provide indication of possible non-compliance with the deep-sea access regime and other supporting regulations. Detailed fishing plans are already required for EU vessels fishing with bottom gear in unmanaged high seas areas.[155]

9. Effectively manage fishing capacity and effort

Require that fishing effort and capacity is to be regularly assessed and limited to prevent overfishing, and ensure that levels of fishing effort do not exceed those commensurate with the long-term conservation of deep-sea fishery resources.

Scientific advice indicates that management of fishing effort is a key method of managing deep-sea stocks for long-term stability.[156] As discussed above, effort restrictions placed on deep-sea fishing were set at unrealistically high levels, while, at the same time, fishing capacity has increased due to technical efficiency gains.

10. Improve reporting, monitoring, and compliance

Establish standardised sampling and reporting procedures applicable to all fishing vessels authorised by Member States to fish for deep-sea species, standardise inspection and surveillance procedures for reporting of landings in designated ports, create standards for the monitoring of EU deep-sea vessel VMS data, and increase observer coverage to 100 percent. Non-compliance with the deep-sea access regime, including data submission requirements, should result in the temporary suspension and possible revocation of a deep-sea fishing permit.

EU deep-sea fisheries are plagued by a lack of data on catches and landings and there is evidence of widespread non-compliance with EU regulations. A common scientific sampling plan for catches based on best practice will ensure that scientific data are sufficient and comparable across countries. Such scientific data will be further supported by an increase in observer coverage. Guidelines for port inspection and surveillance procedures will ensure that landings data are credible and that deep-sea fishing vessels are not catching or landing more than they are allowed. Standards for the monitoring of VMS data will improve monitoring and surveillance by allowing for the notification of suspicious activity to port authorities.

Years of fisheries management in the EU and elsewhere suggest that the present regulations will have little impact if there are no penalties for non-compliance. Fishing vessels that do not comply with the deep-sea access regime should have their fishing permits suspended pending corrective measures. Continued non-compliance should result in a permanent revocation of a deep-sea fishing permit.

APPENDIX I

SPECIES LISTED IN ANNEXES I AND II OF EU REGULATION 2347/2002

A total of 46 species or species groups are listed in Annex I and Annex II of EU regulation 2347/2002. They appear listed below along with additional information on their common names and adjustments made to include all species in this report's data analysis, as further detailed in the following appendix.

Annex I		
Scientific name	**Common name(s)**	**Data notes**
Aphanopus carbo	Black scabbardfish	
Apristuris spp.	Iceland catshark	a
Argentina silus	Greater silver smelt, greater argentine	
Beryx spp	Alfonsinos	
Centrophorus granulosus	Gulper shark	
Centrophorus squamosus	Leafscale gulper shark	
Centroscyllium fabricii	Black dogfish	
Centroscymnus coelolepis	Portuguese dogfish	
Centroscymnus crepidater	Longnose velvet dogfish	
Chlamydoselachus anguineus	Frilled shark	b
Coryphaenoides rupestris	Roundnose grenadier	
Dalatias licha	Kitefin shark	
Deania calceus	Birdbeak dogfish	
Etmopterus princeps	Great lanternshark	
Etmopterus spinax	Velvet belly	
Galeus melastomus	Blackmouth catshark	
Galeus murinus	Mouse catshark	
Hexanchus griseus	Six-gilled shark, bluntnose sixgill shark	
Hoplostethus atlanticus	Orange roughy	
Molva dypterygia	Blue ling	
Oxynotus paradoxus	Sailfin roughshark	
Phycis blennoides	Greater forkbeard	
Scymnodon ringens	Knifetooth dogfish	
Somniosus microcephalus	Greenland shark	

a Approximate category of catsharks, etc., nei (Scyliorhinidae) was used.
b No catch data reported.

Annex II		
Scientific name	**Common name(s)**	**Data notes**
Alepocephalus bairdii	Baird's smoothhead, Baird's slickhead	
Alepocephalus rostratus	Risso's smoothhead	c
Antimora rostrata	Blue antimora, blue hake	
Chaceon (Geryon) affinis	Deepwater red crab, deep-sea red crab	
Chimaera monstrosa	Rabbit fish, rattail	
Conger conger	Conger eel, European conger	
Epigonus telescopus	Black cardinal fish, deepwater cardinal fish	
Helicolenus dactylopterus	Bluemouth, blue mouth redfish, blackbelly rosefish	
Hoplostethus mediterraneus	Mediterranean Slimehead, Silver roughy	
Hydrolagus mirabilis	Large-eyed rabbit fish, ratfish	d
Lepidopus caudatus	Silver scabbardfish, cutlass fish	
Lycodes esmarkii	Eelpout	e
Macrourus berglax	Roughhead grenadier, rough rattail	
Mora moro	Common mora	
Pagellus bogaraveo	Red seabream, blackspot seabream	
Polyprion americanus	Wreckfish	
Raja fyllae	Round skate, round ray	
Raja hyperborea	Arctic skate	
Raja nidarosiensis	Norwegian skate	
Rhinochimaera atlantica	Straightnose rabbitfish	
Sebastes viviparus	Norway redfish, Small redfish, Norway haddock	
Trachyscorpia cristulata	Spiny scorpionfish, deep-sea scorpionfish	f

c Approximate category of slickheads nei (Alepocephalus spp.) was used.
d No catch data reported.
e Approximate category of eelpouts (Lycodes spp.) was used.
f Listed under alternative scientific name of Trachyscorpia echinata.

Gulper shark – one of over 40 deep-sea sharks caught and killed by EU bottom trawler Playa de Menduina, fishing in the Hatton Bank, northeast Atlantic.

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APPENDIX II

ESTIMATING THE VOLUME AND VALUE OF THE EU REGIONAL DEEP-SEA LANDINGS

The ICES/Eurostat database for 1950–2010 was used to obtain reported catches for all countries fishing for deep-sea species in the northeast Atlantic. Deep-sea species were defined as those listed on Annex I and Annex II of EU regulation 2347/2002 (detailed in Appendix I).

It is important to note that the EU's relative regional impact on deep-sea species is likely higher than is reflected in the data. Iceland and Norway account for 18.7 percent of the non-EU catch, and these countries have policies prohibiting the discarding of fish at sea. In the EU, meanwhile, it is prohibited to keep onboard catches in contravention to regulations; unreported discards are believed to be high.

To estimate the value of the EU's 2010 deep-sea landings, two separate data sources were used: the EU's Eurostat database and a 2009 European Commission review of regulation 2347/2002.[157] Eurostat data was used when it provided more recent price data. These sources allowed 93.4 percent of the 2010 catch to be valued. Price data were unavailable only for three species – greater argentine, Mediterranean slimehead and mouse catshark – but greater argentine alone accounted for more than 99 percent of the unvalued catch. The unvalued catch was valued using a weighted average of the available pricing data. According to fishbase.org, greater argentine is typically priced "very high," suggesting that it was valued conservatively.

Eurostat was used to find the total value of all marine fishery products landed in the EU, as well as the total reported northeast Atlantic catch for the EU. In the case of fishery products, the latest available figure from 2007 was used.

Results: see tables and graphs on pages 31-32.

Deep-sea fish caught by the EU bottom trawler, Ivan Nores, fishing in the North Atlantic Ocean.

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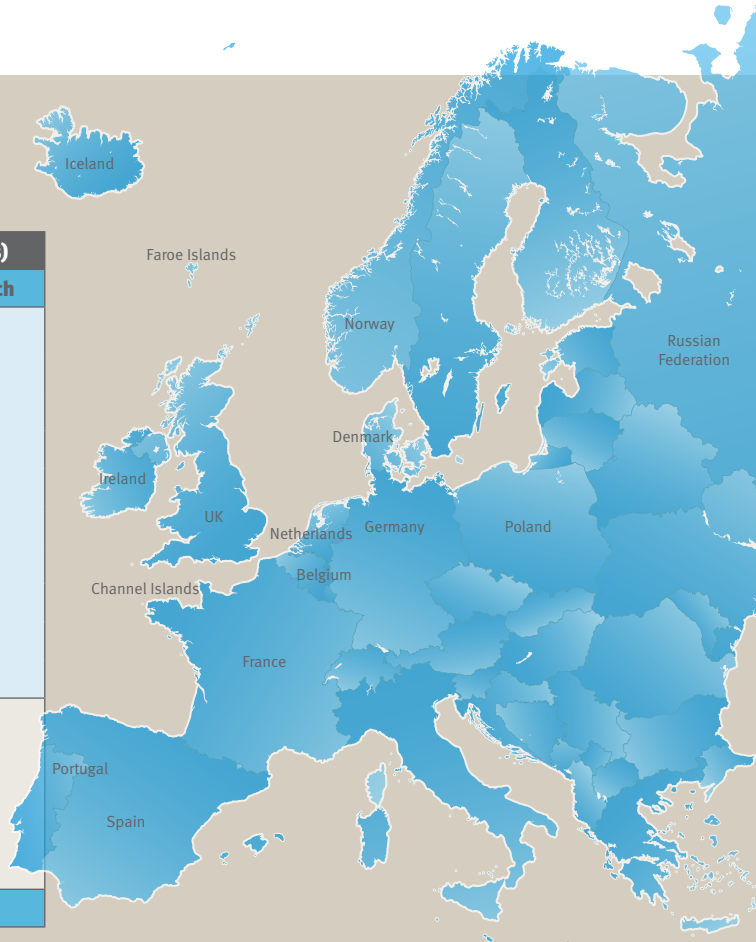
RESULTS

Reported catch of deep-sea species in the northeast Atlantic, 2010 (tonnes)			
EU or non EU	**Country**	**Catch in tonnes**	**% of catch**
EU	Belgium	26	75.2%
	Denmark	3	
	France	13,757	
	Germany	480	
	Ireland	78	
	Netherlands	2,904	
	Poland	4	
	Portugal	6,840	
	Spain	20,133	
	United Kingdom	1,329	
Non-EU	Channel Islands	15	24.8%
	Faroe Islands	3,535	
	Iceland	9,230	
	Norway	2,078	
	Russian Federation	154	
TOTAL		**60,566**	**100.0%**



EU northeast Atlantic deep-sea fisheries data	
EU deep-sea catch, 2010	45,554 tonnes
EU northeast Atlantic catch, all species, 2010	3,698,869 tonnes
Deep-sea fisheries as % of EU northeast Atlantic	1.2%
Estimated value of reported EU deep-sea catch, 2010	€100,881,957
Landings of fishery products in EU, 2007	€7,505,043,304.00
Value as % of 2008 EU fishery product landings	1.3%

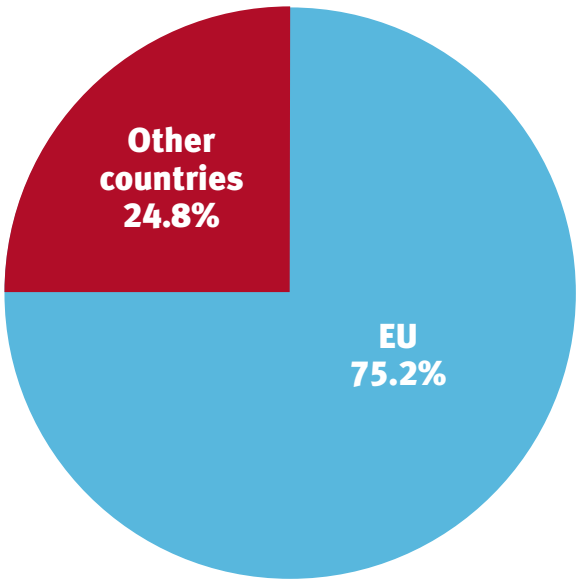
It is important to note that the EU's relative regional impact on deep-sea species is likely higher than is reflected in the data

Volume of EU deep-sea catch, 2010 (tonnes)		
Spain	20,133	44.2%
France	13,757	30.2%
Portugal	6,840	15.0%
Netherlands	2,904	6.4%
United Kingdom	1,329	2.9%
Germany	480	1.1%
Ireland	78	0.2%
Belgium	26	0.1%
Poland	4	0.0%
Denmark	3	0.0%
Total	**45,554**	**100.0%**
Values have been rounded.		

Value of EU deep-sea catch, 2010 (euros)		
Spain	€47,005,813	46.6%
Portugal	€23,741,261	23.5%
France	€20,747,917	20.6%
Netherlands	€6,429,776	6.4%
United Kingdom	€2,692,894	2.7%
Ireland	€124,146	0.1%
Germany	€108,819	0.1%
Belgium	€27,638	0.0%
Denmark	€3,254	0.0%
Poland	€440	0.0%
Total	**€100,881,957**	**100.0%**
Values have been rounded.		

RESULTS (contd)

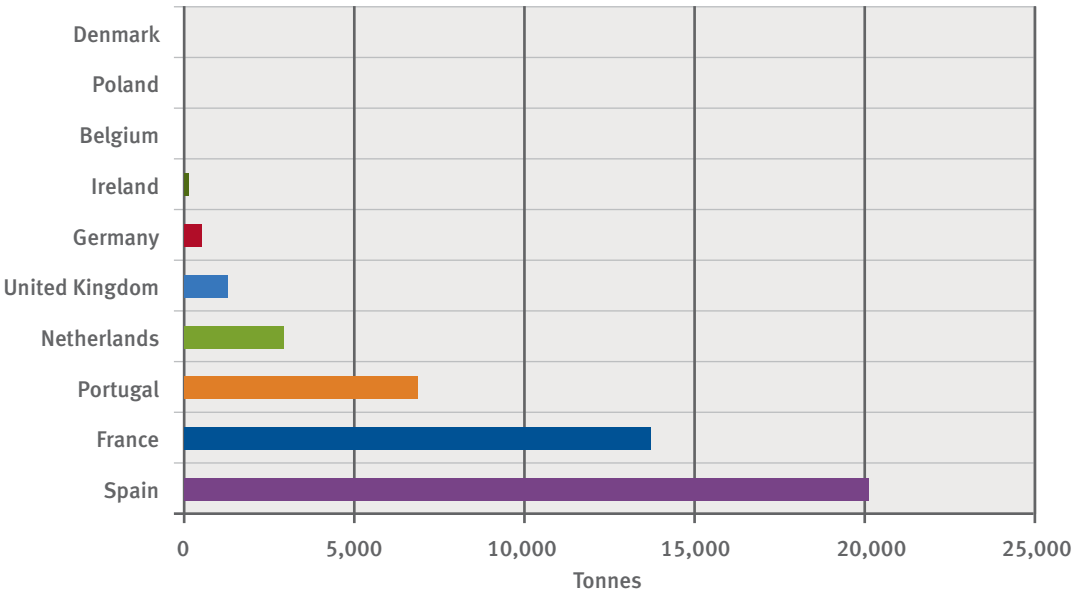
Deep-sea catch in the northeast Atlantic, 2010



See page 31 for tables.

See pages 28-29 for species groups.

EU deep-sea catch in the northeast Atlantic, 2010



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127 TACs were also applied to tusk, see supra note 126 for discussion. Also, Council Regulation No. 2270/2004 of 22 December 2004 fixing for 2005 and 2006 the fishing opportunities for Community fishing vessels for certain deep-sea fish stocks. TACs were also established for greater silver smelt, as in Regulation 2340/2002, only they were applied under a separate regulation as negotiations with Norway are required.

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156 "Scientific bodies advise consistently that the best management tool in deep-sea fisheries would be limitations of fishing effort." European Commission, supra note 129.

157 See European Commission, supra note 80.

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For further information and precise co-ordinates see links:
www.fao.org/fi/figis/area/data/assets/images/Area34.gif
www.fao.org/fishery/area/Area27/en

Photographic acknowledgments

Corey Arnold
Greenpeace
Kate Davison
Gavin Newman
Steve Morgan
National Oceanography Centre, Southampton (NOCS)
Professor Philip Weaver, NOCS
Veerle Huvenne, NOCS
Telmo Morato and Ricardo Serrão Santos, University of the Azores
Les Watling, University of Hawaii
Sonke Johnsen
Emily Nolan
Jaime Davies, IFREMER
Joint Nature Conservation Committee (JNCC), jncc.gov.uk

"...deep-sea fisheries in the northeast Atlantic off the coast of Ireland have substantially **depleted whole communities of deep-sea fish stocks and populations**, including species of no commercial value, as deep as 2,500m, which is well below the lowest depths of approximately 1,600m at which bottom fishing actually occurs" *ICES*

Reef building corals, sponges, and seastars are just some of the spectacular fauna found at Anton Dohrn Seamount.

JNCC, JNCC.GOV.UK, 2010/JAIME DAVIES

Pew is a member of the Deep Sea Conservation Coalition (DSCC). The DSCC is a coalition of over 70 organisations worldwide promoting the protection of deep sea ecosystems from the harmful impacts of fishing and other activities.
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