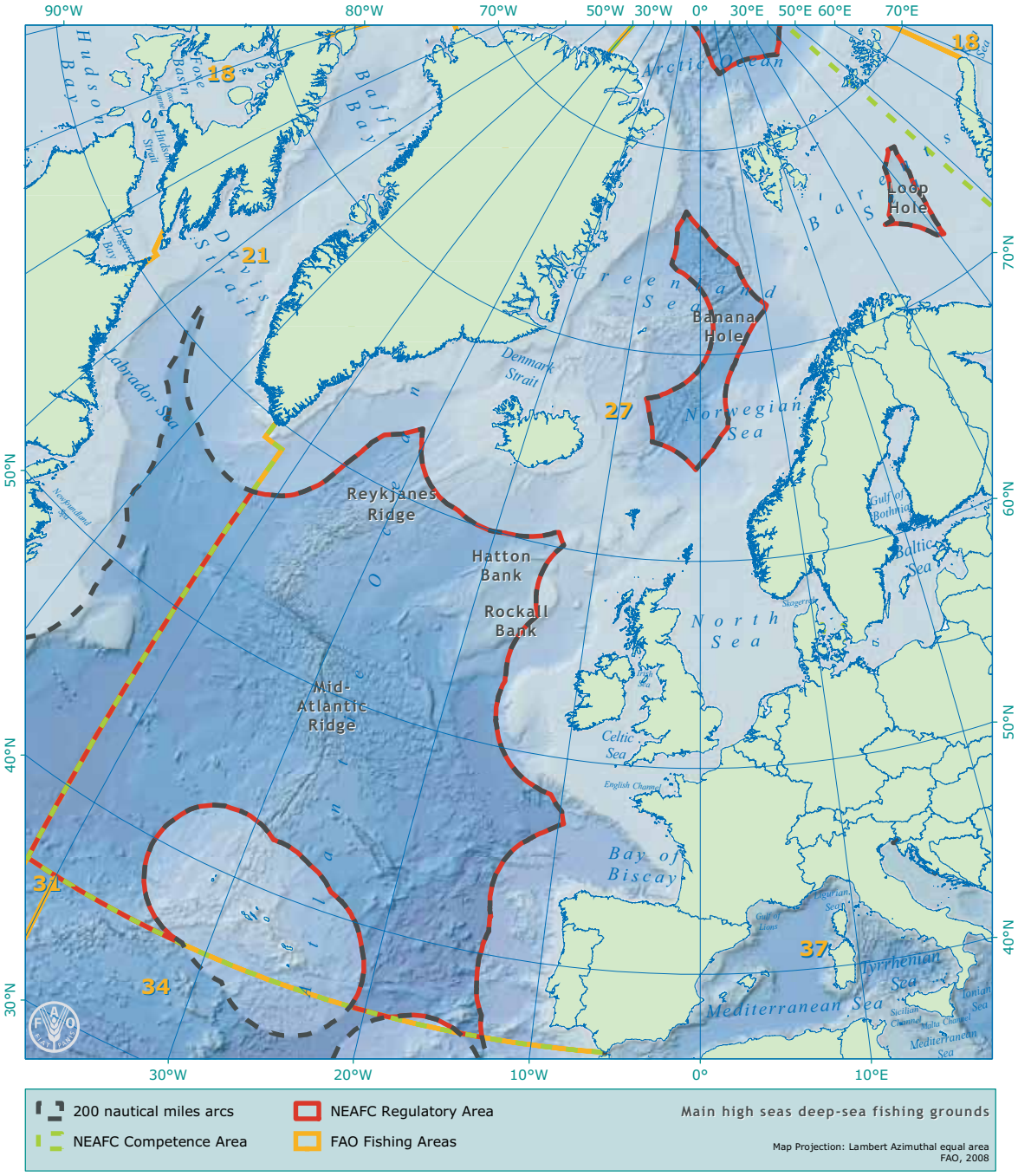
THE ATLANTIC OCEAN AND ADJACENT SEAS



MAP 1
High seas deep-sea fishing grounds in the North East Atlantic Ocean

North East Atlantic Ocean

FAO Statistical Area 27

GEOGRAPHIC DESCRIPTION OF THE REGION

The North East Atlantic region (FAO Statistical Area 27) 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. It covers all of the maritime area between the European continent and Greenland. Important geological 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, separating the North East Atlantic from the North West Atlantic (Map 1).

The North East Atlantic region is divided into fishing areas for statistical purposes. These areas have been established within the framework of the Food and Agriculture Organization of the United Nations (FAO) Coordinating Working Party on Fishery Statistics (CWP) in collaboration with interested parties in the region, including the International Council for the Exploration of the Sea (ICES) and the North East Atlantic Fisheries Commission (NEAFC). These areas are referenced in this review as ICES Areas (as seen in Maps 2 and 3).

MANAGEMENT REGIME APPLICABLE TO DEEP-SEA BOTTOM FISHERIES IN THE HIGH SEAS

Regional Fisheries Management Organization/Arrangement

NEAFC is the competent regional organization for fisheries management in the region. Its Area of Competence (see Map 1) covers FAO Statistical Area 27. The high seas area of the North East Atlantic is called the NEAFC "Regulatory Area". There are four sections of the NEAFC Regulatory Area, the largest being the main location for deep-sea high seas fisheries (see Map 1). A second section is in the Barents Sea, where a portion of international waters between the Norwegian and Russian exclusive economic zones (EEZs) is known as the "Loophole". The shared demersal fisheries in this area are managed by the Joint Norwegian-Russian Fisheries Commission established in 1976 to manage cod, haddock and capelin fisheries in the Barents Sea, although other pelagic and shrimp fisheries are managed by NEAFC. Another of the sections of high seas is known as the "Banana Hole" and lies beyond the Faroese, Icelandic, Greenland and Norwegian jurisdictions and the Svalbard Protection Zone. Finally, an area north of Greenland, Svalbard and Franz Josef Land towards the North Pole is also part of the NEAFC Regulatory Area.

The NEAFC contracting parties are the European Union (EU), Denmark in respect of Faroe Islands and Greenland, Iceland, Norway and the Russian Federation. Belize, Canada, the Cook Islands, Japan and New Zealand have the status of cooperating non-contracting parties.

The list of deep-sea species regulated by NEAFC includes 49 species. In 2002, NEAFC established a working group on deep-sea species which last met in June 2006. NEAFC receives scientific advice from ICES. The two main working groups of ICES dealing with deep-sea fisheries are the Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources (WGDEEP), and the ICES-Northwest Atlantic Fisheries Organization (NAFO) Joint Working Group on Deep Water Ecology (WGDEC). Other ICES working groups of relevance include the Arctic Fisheries Working Group (AFWG), the North-Western Working Group (NWWG), the Working Group on Elasmobranch

Fishes (WGEF), the Working Group on the Assessment of Northern Shelf Demersal Stocks (WGNSDS), the Study Group on Cold Water Corals (dissolved from 2005), and the Working Group on Ecosystem Effects of Fishing Activities (WGECO).

The NEAFC Permanent Committee on Management and Science (PECMAS) is responsible for the formulation of requests for scientific advice submitted to ICES, the reviewing of management measure proposals submitted by contracting parties, and for the provision of new developments or information on science, technology and management tools to the Secretariat.

DESCRIPTION OF DEEP-SEA BOTTOM FISHERIES IN THE HIGH SEAS

History of fisheries

There is a long history of exploitation of deep-sea species in the North East Atlantic beginning with the black scabbardfish (*Aphanopus carbo*) fishery around the Madeira Islands dating at least from the late nineteenth century (Martins and Ferreira, 1995). The more recent history of deep-sea fisheries in the international waters of the North East Atlantic was initiated by the former Union of Soviet Socialist Republics (USSR) in 1973, when aggregations of roundnose grenadier (*Coryphaenoides rupestris*) over the northern part of the MAR were discovered. Initial catches peaked at about 30 000 tonnes per annum and the fishery continued with varying intensity until the early 1990s. (Troyanovsky and Lisovsky, 1995) This fishery was mainly conducted using pelagic trawls, but also with bottom gear (Clark *et al.*, 2007).

A longline fishery also developed on the Reykjanes Ridge in the 1990s, targeting golden redfish (giant redfish) (*Sebastes marinus*) (Hareide *et al.*, 2001) and tusk (*Brosme brosme*). This fishery ceased in 1997 and was then resumed in 2005–2006. More to the south on the MAR, an alfonsino (*Beryx splendens* and *B. decadactylus*) commercial fishery in international waters was conducted at the end of the 1970s, but since then has been sporadic (ICES, 2007b).

Deep-sea species were also exploited by the former USSR in the early 1970s around the continental margins in areas such as Bill Bailey, Lousy, Hatton and Rockall Banks (Vinnichenko, 2000). These fisheries virtually ceased when coastal states, particularly Iceland, Faroe Islands and the United Kingdom, declared EEZs in the mid-1970s. In 1997, the United Kingdom reduced its exclusive fishery zone around Rockall Bank from 200 to 12 nautical miles, and thereafter bottom trawl and longline fisheries in the high seas were established by a number of countries, including Spain, Norway, Faroe Islands and the Russian Federation (Gordon, 2007). Most of these fisheries targeted deep-sea species such as roundnose grenadier, black scabbardfish, deep-sea sharks, blue ling (*Molva dypterygia*) and Greenland halibut (*Reinhardtius hippoglossoides*). On the shallower parts of the Rockall Bank, the Russian fleet resumed fishing for haddock (*Melanogrammus aeglefinus*). Apart from trawling, longline and gillnet fisheries also took place in this area.

A fishery for blue ling, on the MAR and west of the United Kingdom, was developed by German trawlers in the 1970s and French trawlers in the mid- to late 1970s. At that time, species such as roundnose grenadier, black scabbardfish and deep-sea sharks were discarded (Charuau *et al.*, 1995; Large *et al.*, 2003).

French and Faroese trawlers developed an orange roughy (*Hoplostethus atlanticus*) fishery in the early 1990s. The fishing grounds were mainly located in waters under national jurisdiction, on seamounts such as the Hebrides Seamounts and along the continental margin. Some fishing grounds were also located in international waters on the MAR (Thomsen, 1998) or on the Hatton and Rockall Banks. Maximum catches occurred in the mid-1990s but have declined since then (Clark *et al.*, 2007).

In the early 1990s, a fishery for Northeast Arctic cod (*Gadus morhua*) developed in the Barents Sea. Even if not a true deep-sea species, this fishery is an important

bottom fishery in the area. During the peak years around 1994, 7 percent of the catch of cod in the Barents Sea was considered to be caught in the Loophole (see Map 1), international waters spanning some 62 400 square kilometres (km²). By 1995, around 80 trawlers from Iceland, the main fishing nation in that area, were fishing in the Loophole. Vessels from the European Community, Greenland and Faroe Islands were also involved in the fishery. By 1998, high seas catches in these fisheries were down to little more than 2 000 tonnes as the cod stock shifted south. (Stokke, 2002)

TABLE 1
Main species of high seas deep-sea fisheries in the North East Atlantic

Common name	Scientific name	Vulnerability
Main target species – trawl fisheries		
Baird's slickhead (Baird's smoothhead)	*Alepocephalus bairdii*	
Black scabbardfish	*Aphanopus carbo*	4.0
Alfonsino	*Beryx splendens* and *B. decadactylus*	4.7
Blue ling	*Molva dypterygia*	4.0
Leafscale gulper shark	*Centrophorus squamosus*	1.5
Haddock	*Melanogrammus aeglefinus*	
Beaked redfish	*Sebastes mentella*	2.6
Orange roughy	*Hoplostethus atlanticus*	
Portuguese dogfish	*Centroscymnus coelolepis*	1.5
Roundnose grenadier	*Coryphaenoides rupestris*	2.4
Main target species – longline fisheries		
Greenland halibut	*Reinhardtius hippoglossoides*	3.2
Deep-sea sharks		
Ling	*Molva molva*	4.0
Tusk	*Brosme brosme*	3.8
Golden redfish (giant redfish)	*Sebastes marinus*	
Main target species – gillnet fisheries		
Hake	*Merluccius merluccius*	
Monkfish	*Lophius piscatorius* and *L. budegassa*	
Deep-sea sharks		
Deep-water red (or king) crab	*Geryon* spp.	
Other species		
Cardinal fishes	*Epigonus* spp.	
Greater forkbeard	*Phycis blennoides*	
Blackspot seabream	*Pagellus bogaraveo*	
Blackbelly rosefish (bluemouth)	*Helicolenus dactylopterus*	
Forkbeards nei	*Phycis* spp.	
Rabbit fish	Chimaeridae (mainly *Hydrolagus mirabilis* or *Chimaera monstrosa*)	
Roughhead grenadier	*Macrourus berglax*	
Roughsnout grenadier	*Trachyrincus scabrus*	

Current fisheries

The main commercial deep-sea species targeted in the high seas of the North East Atlantic are listed in Table 1 (see also Figure 1). Many of these species are long-lived, slow growing, have low fecundity and mature at a late age. On the basis of these and other characteristics, the ICES Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources (WGDEEP) graded the main target species on a scale of one to five in terms of vulnerability (five being least vulnerable) (ICES, 2001). These values are shown in Table 1 but should be treated as indicative.

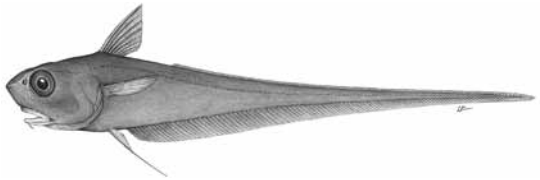
In recent years, the main high seas deep-sea fishing grounds in the North East Atlantic have been the Hatton and Rockall Banks, the Reykjanes Ridge and the MAR (see Map 2). In the northern part, there is also some deep-sea fishing in the two high seas "holes" known respectively as the Loophole in the Barents Sea and the Banana Hole in the Norwegian Sea, although there are no bottom fisheries in the latter. Sporadic fishing also occurs on some seamounts and other banks along the continental slopes and on both sides of the MAR.

Hatton and Rockall Banks

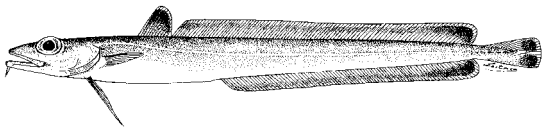
This fishing ground for deep-sea species is mainly located in the high seas (ICES Subareas XIIb and VIb1). It is surrounded from the north to the southeast by the EEZs

FIGURE 1
Examples of species targeted by bottom fisheries in the high seas of the North East Atlantic

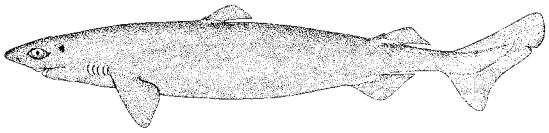
Roundnose grenadier (*Coryphaenoides rupestris*)



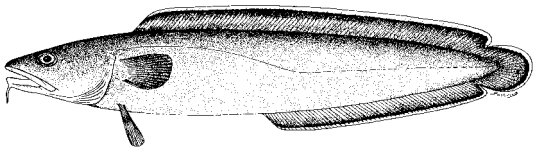
Blue ling (*Molva dypterygia*)



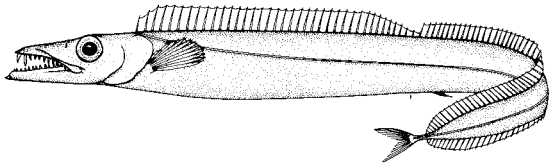
Portuguese dogfish (*Centroscymnus coelolepis*)



Tusk (*Brosme brosme*)



Black scabbardfish (*Aphanopus carbo*)



Source: FAO.

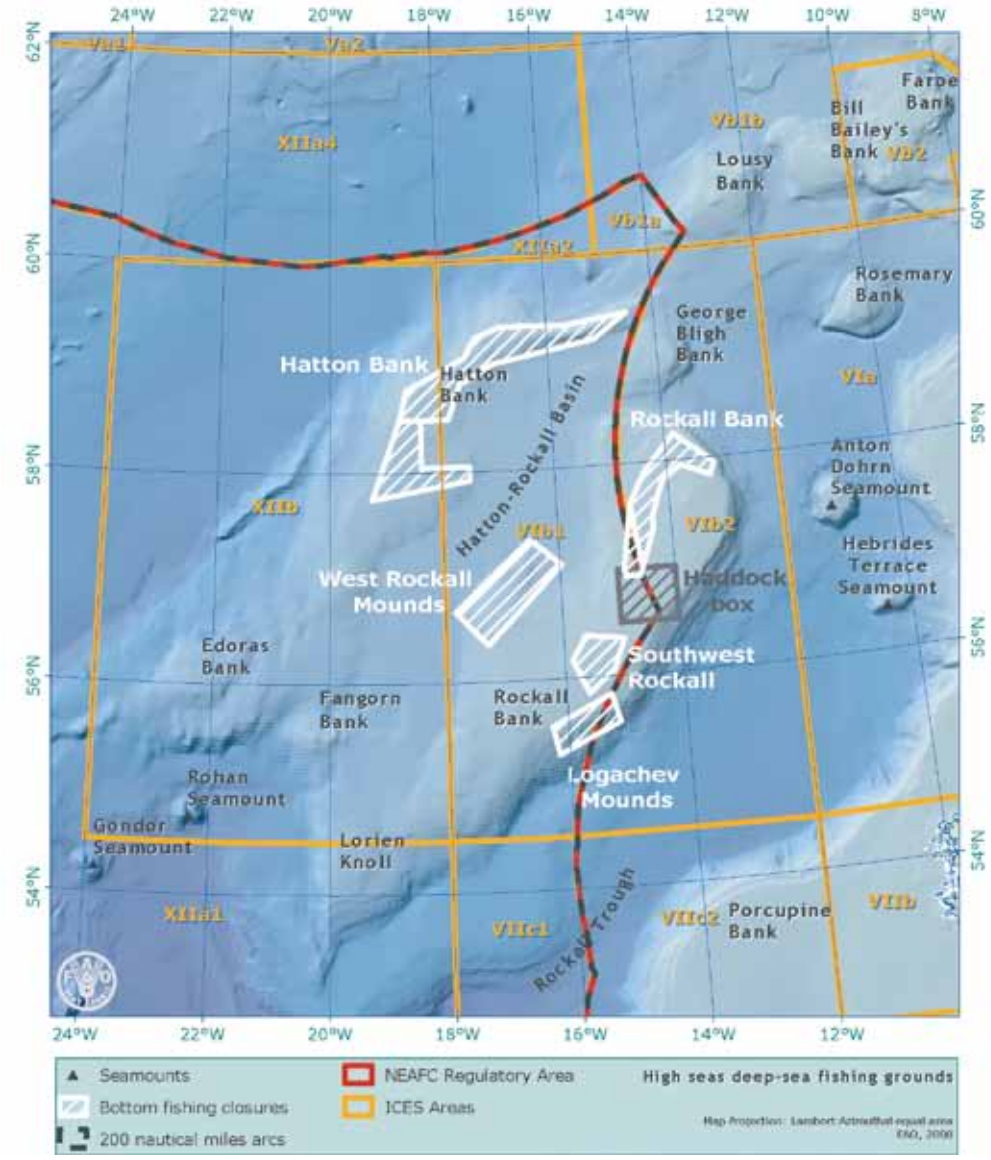
of four countries: Iceland, Faroe Islands, the United Kingdom and Ireland. Part of the Rockall Bank is in the United Kingdom and Ireland's EEZs (ICES Subarea VIb2). In the north, a chain of banks links the Rockall Bank to the Faroe Plateau: Georges Bligh, Lousy and Bill Bailey's Banks.

Part of the south slope of Lousy Bank is in international waters. On the eastern side, the Rockall Trough separates this international fishing ground from the slopes of the continental shelf. In the north, west of Bill Bailey's Bank, the Wyville-Thomson Ridge separates the Rockall Trough from the Faroe-Shetland Channel and is a barrier between the colder bottom waters of the Arctic and the warmer waters of the North Atlantic. To the south of the Rockall Bank, the Lorien Knoll is located in ICES Subarea XIIa1. Hatton Bank is deeper (minimum depth around 600 metres [m]) than Rockall Bank (rises up to the surface). The south of this fishing ground is limited by the abyssal plain.

Multispecies deep-sea bottom trawl fishery

A multispecies deep-sea bottom trawl fishery has been conducted for many years on the slopes of the Hatton and Rockall Banks. The target species are mainly roundnose grenadier, Baird's slickhead (*Alepocephalus bairdii*), black scabbardfish, leafscale gulper shark (*Centrophorus squamosus*) and Portuguese dogfish (*Centroscymnus coelolepis*). The latter two shark species are collectively referred to as siki sharks. Common bycatch consists of blue ling and greater forkbeard (*Phycis blennoides*). The fishing depth is between 800 and 1 600 m.

This fishery is dominated by the Spanish freezer trawl fleet, fishing mainly on the western part of the Hatton Bank, with increased effort on Baird's slickhead in recent years. The Spanish fleet consisted of 25 to 28 vessels fishing a total of approximately



MAP 2
Hatton and Rockall Banks deep-sea fishing grounds

1 500 days per year in the early part of the decade, but may have declined in recent years. Five vessels of the Spanish fleet work exclusively on this fishing ground, whereas the others also fish in the NAFO area and in the Irminger Sea. These latter vessels fish on Hatton Bank at the beginning or at the end of their fishing trip to their other fishing grounds in the North Atlantic (De Cardenas, 2007).

French deep-sea trawlers mainly operate within the European Community's EEZs, but some of them also fish in the high seas of the Hatton and Rockall Bank area, although there has been a decrease of activity in recent years. In 2005, 11 French trawlers (P. Lorance, personal communication, 2007) caught a total of 713 tonnes of roundnose grenadier (see Table 2) in this area, representing 16 percent of the total French catch of this species in the North East Atlantic. In 2006, the French catch of roundnose grenadier in the high seas of Hatton and Rockall Banks decreased to 184 tonnes, representing around 6 percent of the total French catch of this species in the North East Atlantic. Other species caught by French trawlers in the high seas include blue ling (1 percent of the total French catch of this species was caught in the high seas for 2005 and 6 percent in 2006), orange roughy (24 percent caught in the high seas for 2005 and 25 percent in 2006), and black scabbardfish (2 percent caught in the

TABLE 2
Indicative annual fishing effort and catches in the Hatton and Rockall Banks multispecies bottom trawl fishery for the period 2003–2006

Flag state	Number of vessels	Number of fishing days	Catch (tonnes)					
			Roundnose grenadier			Baird's slickhead		
France	11[7] (2005)	/	XIIb	Vb1a/ VIb1a	Year	/		
			85[4]	99[4]	2006			
			508[4]	205[4]	2005			
			1 707[4]	704[4]	2004			
Spain	29[4] (2006) 26[3] (2003, 2004)	1 500[3] (2003, 2004)	XIIb		Year	/		
			4 194		2005[4]			
			8 423		2004[4]			
United Kingdom (Scotland)	XII	VIb	Year	/		XII–VI int.		Year	0[2] (2003–2006)		
	0[2]	4[2]	2006			0[2]		2006			
	1[2]	7[2]	2005			9[2]		2005			
	2[2]	10[2]	2004			4.5[2]		2004			
	2[2]	19[2]	2003			1.85[2]		2003			
Russian Federation	XIIb	VIb	Year	XIIb	VIb	Year	XIIb	VIb	Year	XIIb	VIb	Year
	0[2, 6]	0[2, 6]	2006	0[6]	0[6]	2006	0[6]	0[6]	2006	0[6]	0[6]	2006
	1[2, 6]	1[2, 6]	2005	4[6]	11[6]	2005	9.6[6]	70.8[6]	2005	2.3[6]	12.6[6]	2005
	1[2, 6]	1[2, 6]	2004	2[6]	10[6]	2004	15[6]	77[6]	2004	3[6]	15[6]	2004
Poland	1 or 2[8] (2001–2004)	/	XII	VIb	Year	XII	VIb	Year			
			21[5]	13[5]	2004	0[5]	0[5]	2004			
			32[5]	452[5]	2003	6[5]	113[5]	2003			
Lithuania	1[1] (2006)	/	XII	VI	Year	XII	VI	Year			
			6	112	2006	11	317	2006			
			13[5]	92[5]	2005	69[5]	668[5]	2005			
			120[5]	961[5]	2004	21[5]	525[5]	2004			
			31[5]	939[5]	2003	13[5]	229[5]	2003			
Estonia	1[2] (2001–2006)	XII / VIb	Year	XII	VIb	Year	XII	VIb	Year			
		52[2]	2006	27[2]	34[2]	2006	75.7[2]	82.4[2]	2006			
		111[2]	2005	20[5]	80[5]	2005	/		2005			

/ = Unknown.
Sources:
[1] Response from EU DG FISH to FAO Questionnaire.
[2] Returned questionnaires to FAO by respective country.
[3] ICES, 2005a.
[4] ICES, 2007b.
[5] ICES, 2007a.
[6] Vinnichenko, Khlivnoy and Akhtarina, 2005; Vinnichenko and Bokhanov, 2006; Vinnichenko, 2007.
[7] P. Lorance. personal communication, 2007.
[8] NEAFC catch statistics.

high seas in 2005 and 5 percent in 2006). It has also been reported that French trawlers have been discarding species such as Baird's slickhead (N.-R. Hareide, personal communication, 2008).

The United Kingdom (Scotland) had four bottom trawlers in 2006 targeting mainly monkfish (*Lophius piscatorius* and *L. budegassa*) at shallower depths (as deep as 800 m) on Rockall Bank, with bycatch of deep-sea species including ling (*Molva molva*), blue ling and siki sharks. Some of these vessels may fish deeper, targeting deep-sea species such as roundnose grenadier, black scabbardfish and siki sharks (ICES, 2007b). In its answer to the 2007 FAO Questionnaire on High Seas Deep-sea Fisheries (hereinafter referred to as the FAO Questionnaire – see Appendix A), the United Kingdom indicated several vessels were engaged in deep-sea trawl fishing in the high seas of ICES Area XII (two vessels in 2003 and 2004, one in 2005), which is presumed, with some uncertainty, to have taken place on Hatton Bank (ICES Area XIIb), as part of the activity of the UK of the trawlers fishing on Rockall Bank.

Other countries such as Poland (until 2004), Lithuania, Estonia and the Russian Federation also participate in this fishery, but with a limited number of vessels (Table 2).

Multispecies deep-sea longline fishery

This fishery operates over a wide bathymetric range, from 200 to 1 700 m, which has a significant influence on individual catch profiles. For example, at greater depths the species composition will, to a large extent, be dominated by deep-sea sharks and Greenland halibut. At shallower depths (200–600 m) on Rockall Bank, ling and tusk comprise the majority of the landings. Other species targeted include greater forkbeard, skates and blue ling.

Norwegian vessels are involved in this fishery, but the number of vessels declined from 17 in 2001 to three in 2006. The main targeted species are Greenland halibut in ICES Area XII and tusk and ling in ICES Area VI. One to four Russian longliners have participated on a seasonal basis in the fishery in recent years, targeting mainly sharks on the Hatton deep-sea slopes (700–1 700 m) and other species in shallower waters. The fishing effort of these longliners is around 17 000 hooks per fishing day (Vinnichenko *et al.,* 2005; Vinnichenko and Bokhanov, 2006; Vinnichenko, 2007). France also reports activity of one longliner targeting deep-sea species in the high seas of the North East Atlantic during 2003 and 2004. For a summary of the annual fishing effort in this fishery, see Table 3.

TABLE 3
Indicative annual fishing effort in the Hatton and Rockall Banks multispecies longline fishery for the period 2003–2006

Flag state	Number of vessels			Fishing days		
	Hatton	Rockall	Year	Hatton	Rockall	Year
Russian Federation	1[1, 3]	1[1, 3]	2006	48[1]	21[1]	2006
	1[3] or 2[1]	4[1, 3]	2005	33[1]	131[1]	2005
	1[1, 3]	1[1, 3]	2004	40[1]	49[1]	2004
France	1[3]		2003/ 2004	/		
Norway*	3[3]		2006	/		2006
	2		2005	37		2005
	4[2]		2004	172[2]		2004
	12[2]		2003	292[2]		2003

/ = Unknown.
* Part of this fishing activity is on the Mid-Atlantic Ridge.
Sources:
[1] Vinnichenko *et al.*, 2005; Vinnichenko and Bokhanov, 2006; Vinnichenko, 2007.
[2] ICES, 2005a.
[3] Returned questionnaires to FAO by respective country.

Bottom trawl fishery for haddock

Although haddock is not a deep-sea species, this fishery is important to note in this review as it is conducted with bottom gear and has bycatch of deep-sea species including rabbit fish (Chimaeridae), ling, blue ling, roundnose grenadier, tusk, beaked redfish (*Sebastes mentella*) and blackbelly rosefish (bluemouth) (*Helicolenus dactylopterus*). The fishing ground is located on the shallow plateau area of Rockall Bank (200-400 m). It is partially in the international waters, but overlaps the EEZs of Ireland and the United Kingdom. In order to protect haddock stocks NEAFC, in 2004, closed an area (the Haddock Box) to fishing by all gears except longlines. The boundaries of the area were later extended into the EEZs of the United Kingdom and Ireland by the European Community (see Map 2).

The ICES Working Group on the Assessment of Northern Shelf Demersal Stocks (WGNSDS) includes some information on this fishery. After part of the Bank was designated as international waters in 1999, the Russian Federation has been the main nation involved in the fishery. In recent years, Ireland and Scotland have also been participating in the fishery. Catch estimates of haddock on the high seas portions of the Rockall Bank for 2005 are 4 708 tonnes for the Russian Federation, 105 tonnes for Ireland and 375 tonnes for Scotland. For 2006, NEAFC reports the high seas catch of haddock by the Russian Federation was 2 154 tonnes, Norway 23 tonnes and the European Community reported a combined catch of 382 tonnes (NEAFC 2006).

Deepwater gillnet and tangle-net fishery

There have been several deep-sea gillnet fisheries in recent years that are characterized according to the target species, which in turn depends on the fishing depth and the gear

TABLE 4
Blue ling catch in ICES Areas Vb and VI, from 2004 to 2006

Year	Flag state	Catch (tonnes) by ICES Area			
		Vb1 (small part high seas)	Vb2 (EEZ)	VIa (EEZ)	VIb (EEZ and high seas)
2006	France	839	0	1 804	313
	Faroe Islands	1 230	632	13	15
	Others	38	50	513	35
	Total	2 107	682	2 330	363
2005	France	781	0	2 031	234
	Faroe Islands	1 028	609	17	1
	Others	16	20	635	98
	Total	1 825	629	2 683	333
2004	France	1 131	0	2 259	486
	Faroe Islands	751	710	10	4
	Others	33	74	532	117
	Total	1 915	784	2 801	607

Source: ICES, 2008.

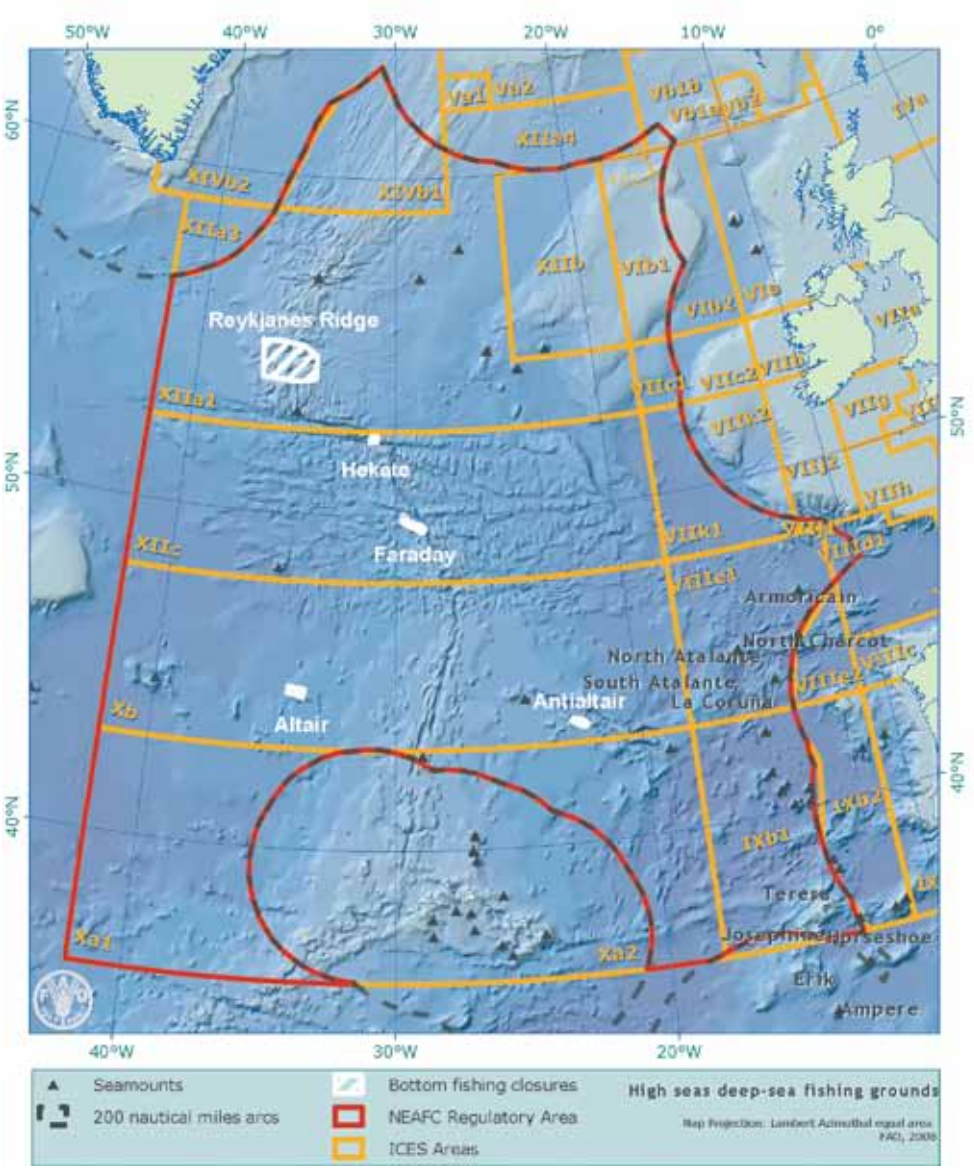
characteristics (e.g. mesh size). These are hake (*Merluccius merluccius*) (100–600 m), monkfish (100–800 m), deep-sea sharks (800–1 600 m) and deep-water red (or king) crabs (*Geryon* spp.) (600–1 200 m). These fisheries have taken place both within EEZ limits on the slopes of the European continental shelf and in the high seas on the slopes of Hatton and Rockall Banks. The main target species on the Hatton and Rockall Banks are monkfish, between 500 and 900 m, and the siki sharks deeper than 800 m. For the period 2003–2005, five to eight Spanish vessels registered in the United Kingdom were involved in bottom gillnet fishing on Hatton and Rockall Banks. In addition, a further two to three vessels were registered in Panama and Togo (Hareide *et al.*, 2005).

Since 2006, there has been a temporary ban on deep-sea gillnetting in the NEAFC Regulatory Area and in European Union waters at depths >200 m in ICES Areas VI, VIIb, VIIc, VIIj, VIIk and XII east of 27°W. This ban was amended later that year by the European Commission to allow for the hake fishery to continue at depths <600 m inside EU waters. The ban is still in force in the NEAFC Regulatory Area. In its answer to the FAO Questionnaire, the United Kingdom mentioned the activity of one gillnetter in the high seas areas of Hatton and Rockall Banks in 2006, which caught leafscale gulper shark (34 tonnes), greater forkbeard (33 tonnes), blue ling (19 tonnes), rabbit fish (13 tonnes) and other shark species (16 tonnes).

Bottom trawl fishery for blue ling

Finally, there is an important bottom trawl fishery harvesting blue ling undertaken by Faroese and French trawlers. Faroese otterboard trawlers target this species mainly during the spawning season and primarily in their EEZ, and the French trawlers catch blue ling as a bycatch of the fishery for roundnose grenadier, black scabbardfish and deep-sea sharks. The major catches of blue ling by the Faroese and French fleets take place within national jurisdictions, in ICES Areas Vb and VIa, respectively, but some fishing also occurs in international waters (ICES Areas VIb1 or Vb1a in the north of Rockall Bank on the southern slope of the Lousy Bank). Blue ling catches of these two flag states in ICES Areas V and VI are presented in Table 4. Statistics available do not differentiate high seas catch but, according to IFREMER[1] (P. Lorance, personal communication, 2007) logbook data, 1 percent of the blue ling caught by French trawlers was captured in the high seas in 2005, and 6 percent in 2006.

[1] French Research Institute for Exploitation of the Sea.



MAP 3
The Mid-Atlantic Ridge deep-sea fishing grounds (including ICES Areas)

The Mid-Atlantic Ridge

The Mid-Atlantic Ridge (see Map 3), which extends from the Icelandic EEZ to the Portuguese EEZ surrounding the Azores, is the other main high seas fishing area for deep-sea resources in the North East Atlantic. The northern portion of the MAR is called the Reykjanes Ridge. Bottom fishing grounds are essentially composed of seamounts and peaks along the ridge system.

Bottom trawlers targeting orange roughy and black scabbardfish

This fishery is conducted on the seamounts of the MAR. In recent years, the fishery has been sporadic. One Faroese bottom trawler was active in the fishery in 2004 and 2006, where the catch included roundnose grenadier and some deep-sea sharks. The fishing effort of the vessel for 2004 was 82 fishing days (ICES, 2005a). Two Irish trawlers also participated in the fishery in 2003 (65 days at sea), and one in 2004 (38 days at sea). One Irish trawler also fished in ICES Subarea X in 2004 (38 days at sea, with a total catch of 34 tonnes). For an overview of the catches, see Table 5.

TABLE 5
Irish and Faroese catches of deep-sea species on the Mid-Atlantic Ridge, from 2003 to 2006

Country	Species	Catch (tonnes)							
		2003		2004		2005		2006	
	ICES Subarea	XII	X	XII	X	XII	X	XII	X
Faroe Islands	Orange roughy	0	0	146	320	159	129	81	8
Faroe Islands	Black scabbardfish	0	0	95	112	127	56	8	11
Faroe Islands	Roundnose grenadier	0	0	8	1	5	0	1	0
Faroe Islands	Alfonsino nei	0	0	0	0	0	0	0	0
Ireland	Orange roughy	136	0	0	19	0	0	0	0
Ireland	Black scabbardfish	1	0	0	0	0	0	0	0
Ireland	Cardinal fishes nei	0	0	0	15	0	0	0	0
Ireland	Grenadiers nei	1	0	0	0	0	0	0	0
Ireland	Portuguese dogfish	5	0	0	0	0	0	0	0

Source: ICES, 2007a.

TABLE 6
Summary of the fishing effort and catch of roundnose grenadier by Russian vessels, from 2003 to 2006

Year	Number of vessels	ICES Area	Number of fishing days	Catch of roundnose grenadier (tonnes)
2006	No activity reported			
2005	1	XIIa1/XIIc	42	600
		Xb	37	799
2004	1	XIVb1	1	19
		XIIa1/XIIc	23	371
2003	2	XII	50	585

Sources: Vinnichenko *et al.*, 2005; Vinnichenko and Bokhanov, 2006; Vinnichenko, 2007.

Trawlers targeting roundnose grenadier on the Mid-Atlantic Ridge (ICES Areas XIVb1, XIIc and Xb)
The history of this fishery is briefly described in the section on the History of fisheries. Trawlers fish on the bottom during the day and off-bottom at night, following the diurnal movements of the fish. Effort in this fishery has been much lower in recent years with the activity of only one vessel reported from 2004 to 2006 by the Russian Federation to ICES WGDEEP (see Table 6). The fishing area overlaps ICES Areas XIV and XII, and continued down to ICES Area Xb in 2005. In 2004, it should be noted that the gear mentioned in the Russian report is a pelagic trawl (Vinnichenko *et al.*, 2005), but is probably operated quite close to the seafloor.

Trawl fishery targeting spawning aggregations of blue ling on the Reykjanes Ridge
One of the blue ling spawning aggregations fished in the North East Atlantic is located along the southern border of the Icelandic EEZ (ICES, 2004). In recent years, there has been sporadic activity of Spanish trawlers in this fishery, with reported catch of blue ling in ICES Area XIV. Bycatch is mainly composed of roundnose grenadier.

Mid-water trawl fishery targeting beaked redfish in the Irminger Sea
The fishing ground of the fishery for beaked redfish overlaps the south of the Icelandic EEZ, the south of the Greenland EEZ, the NEAFC Regulatory Area on the Reykjanes Ridge (ICES Areas XIVb1 and XIIa1), and Divisions 1F, 2H and 2J of the NAFO Regulatory Area (see review of the North West Atlantic). Bycatch in the fishery includes roundnose grenadier, roughhead grenadier and tusk, which indicates that, at least in some cases, the fishing gear is likely to be operating close to the bottom. The

main countries participating in the fishery are the Russian Federation, Norway (six vessels in 2006 fishing with pelagic trawl)[2], Faroe Islands, Germany, Poland, Spain (seven vessels), Portugal and Iceland. Recently, Latvia and Lithuania have also reported catches of beaked redfish in ICES Areas XIVb and XII. An unpublished report of the Spanish Department of Fisheries (De Cardenas, 2007) describes this fishery – fishing starts in the spring in ICES Areas XII and XIV and finishes in October in NAFO Divisions 1F, 2H and 2J, following the concentrations of beaked redfish.

Longline fisheries on Reykjanes and Mid-Atlantic Ridges targeting golden redfish, tusk and sharks

An experimental vertical longline fishery was undertaken by Norway in 1996 and 1997 (Hareide *et al.,* 2001). This fishery resumed in 2005–2006 with one Russian longliner. In 2005, total catch was 15 tonnes, with a fishing effort of 12 days and 47 000 hooks. In 2006, total catch was 407 tonnes, with a fishing effort of 80 days and 709 000 hooks (Vinnichenko and Bokhanov, 2006; Vinnichenko, 2007).

In 2004, a Spanish bottom longliner also conducted an exploratory fishing trip on the MAR for 54 days, with a total catch of 80 tonnes. The activity of some Norwegian longliners on the MAR is also mentioned in the 2005 WGDEEP report: two longliners in 2003 and one in 2004 (ICES, 2005a).

A few Irish longliners targeting deep-sea sharks are also mentioned in the 2005 WGDEEP report, both in ICES Subareas XII and X (one longliner, 13 days at sea in 2003).

Other deep-sea fisheries in EEZs surrounding the Mid-Atlantic Ridge or with pelagic gear

Azores deep-sea fisheries

The main deep-sea fishery in the Azores is the traditional multispecies fishery using longlines and handlines operating on seamounts. The main target species is the blackspot seabream. In 2005 and 2006 respectively, 1 451 and 957 tonnes were caught by Portugal in ICES Area X (ICES, 2007a). Other deep-sea species included in the catch are species such as alfonsino, forkbeard and black scabbardfish. While most of this fishery takes place within the EEZ surrounding the Azores islands, the fishing grounds of the largest vessels extend, to some extent, into international waters, both in the north (NEAFC Regulatory Area) and in the south (Central Eastern Atlantic).

Other seamounts in the high seas of the North East Atlantic

There are several seamounts located off the South European Atlantic Shelf (ICES Subareas VIIIe1 and IXb1). In its answer to the FAO Questionnaire, the United Kingdom mentioned the activity of one gillnetter in ICES Area VIIIe1. Fishing in this area is likely to be taking place on the seamounts present in that area (North Atalante, South Atalante, North Charcot, La Coruña and Armorican Seamounts – see Map 3) and may target species such as deep-sea sharks or deep-water red crabs.

Other seamounts are located further south in ICES Area IXb1, northeast of the Madeira EEZ, including Josephine, Horseshoe, Ampère, Erik and Teresa. No information about recent commercial fisheries in this area has been found for this review, but at least some exploratory fishing has been conducted in the past by Soviet and Portuguese vessels (Clark *et al*., 2007). This fishing ground overlaps the Eastern Central Atlantic (FAO Statistical Area 34), which is under the management of the Fishery Committee for the Eastern Central Atlantic (CECAF).

Elsewhere on both the east and west sections of the MAR, peaks are located at fishable depths, including Altair and Antialtair, which have been closed to bottom

[2] Response from Norway to FAO Questionnaire.

fisheries since 2005. Again, no information concerning fishing on these or other seamounts in recent years has been found.

The Banana Hole in the Norwegian Sea

The high seas area of the Norwegian Sea (ICES Subareas IIa1 and IIb1, known as the "Banana Hole") is not subject to bottom gear fisheries. The main pelagic species caught in this area are herring, blue whiting and mackerel. A pelagic beaked redfish fishery in the international waters of ICES Subarea IIa has developed in recent years, with catches ranging from 9 tonnes in 2002 to 27 000 tonnes in 2006 (ICES, 2007d). Canada mentioned the activity of one trawler targeting beaked redfish in 2006 (433.2 tonnes). In its response to the FAO Questionnaire, Norway reported the activity of two trawlers and one longliner in this area in 2006.

The slopes of the Vooring Plateau overlap the high seas, with depths greater than 1 300 m. It is unlikely that there is a bottom fishery in this area because of the low temperature at these depths. Maps based on NEAFC vessel monitoring system (VMS) data for the period 2003–2005 show some activity of trawlers in the area, but it can be presumed that they are pelagic trawlers.

The Loophole in the Barents Sea

A high seas area in the Barents Sea (ICES Subdivision Ia) is known as the "Loophole", a section of international waters surrounded by the Norwegian and Russian EEZs. For much of the year, the Loophole has significant quantities of ice and thus the season for possible fishing there is fairly short. Fisheries in the area are managed by a trilateral agreement between Norway, the Russian Federation and Iceland (Churchill, 1999).

Bottom trawl for Northeast Arctic cod

The main fishery in these relatively shallow waters (between 150 and 350 m in depth) is composed of bottom trawlers targeting Northeast Arctic cod. According to the Eurostat/ICES database, the main fishing nations participating in this fishery are Norway and the Russian Federation (ICES, 2007a). In its response to the FAO Questionnaire, Norway reported for 2006 the activity of two trawlers in the area, but insufficient information was available to estimate catch and effort in this specific high seas area.

In its answer to the FAO Questionnaire, the Russian Federation reported, for the 2003–2006 period, the activity of 12 to 19 trawlers and one to four longliners, depending on the year (see Table 7). These vessels fish both within the Russian EEZ and in international waters. Species such as blue ling, tusk, greater forkbeard and skate are reported as bycatch of fisheries in this region (Vinnichenko et al., 2005; Vinnichenko and Bokhanov, 2006; Vinnichenko, 2007).

TABLE 7
Russian Federation fleet fishing in the Barents Sea with bottom fishing gears

Year	Trawlers	Longliners
2006	14	3
2005	19	3
2004	12	1
2003	14	4

Catch and effort summary

Table 8 contains information on reported high seas catches of species taken in bottom fisheries in the Northeast Atlantic in 2006. The majority of the catch consists of deep-water species. NEAFC has compiled catch data for deep-sea fisheries (other than redfish and blue whiting which were included earlier statistics as well) in the Regulatory Area since 2004, the first year that high seas fisheries for most deep-sea species in the Northeast Atlantic were subject to regulation by NEAFC. The catch of all regulated deep-sea species combined was reported to be 26 503 tonnes in 2004, 73 447 tonnes in 2005 and 54 623 tonnes in 2006. Approximately 95 percent of the catch of deep-sea species in 2005 and 2006 was taken by European Community fleets. In

addition, NEAFC reports catches of 'non-regulated' (Non-RR) species on the high seas, several of which are caught using bottom gears. These consist primarily of shallower-water species such as Northeast Arctic cod (although this category does include small quantities of deeper water species such as spotted wolffish (*Anarhichas minor*). Finally, as indicated previously, the fishery for haddock in the NEAFC Regulatory Area is a bottom fishery and the catch has been included in Tables 8 and 9 even though haddock is not considered a deep-sea species. Conversely, while redfish (*Sebastes spp*) is generally considered a deep-sea species, the main fishery for redfish (beaked redfish) in the NEAFC Regulatory Area is consistently described as a pelagic mid-water fishery; thus the high seas catch figures for redfish have not been included in Tables 8 and 9.

TABLE 8
High seas bottom catch in the North East Atlantic, 2006

Species	EC	Faroe Islands	Greenland	Norway	Russian Federation	Total
Deep-sea RR (> 200 tonnes)*						
Baird's Smoothhead	299					299
Argentines	1 072			1		1 073
Blue Ling	2 109	143		376	21	2 649
Backbelly Rosefish	1 166			7		1 173
Black Scabbardfish	5 014	18				5 032
European Conger	9 461					9 461
Portuguese Dogfish	999					999
Longnose Velvet Dogfish	335					335
Greater Forkbeard	1 417			10		1 427
Greenland Halibut	6 432		1 913			8 345
Gulper Shark	238					238
Leafscalegulper Shark	1 223					1 223
Deep-Water Red Crab	461					461
Ling	9 361			271		9 632
Orange Roughy	587	89				676
Common Mora	208					208
Roundnose Grenadier	6 327					6 327
Red (Blackspot) Seabream	1 470					1 470
Silver Scabbard	516					516
Tusk	824			231	119	1 174
Wreckfish	935					935
Other Sharks**	308					308
OTHER DEEP-SEA RR (< 200 TONNES)***	584	3		67	8	662
Total Deep-Sea RR Species	**51 346**	**253**	**1 913**	**963**	**148**	**54 623**
Non-RR Species > 200 tonnes						
Atlantic Cod	1 651					1 652
Skates	1 016			13		1 029
OTHER NON-RR SPECIES (< 200 TONNES)****	89	26		1		116
Other						
Haddock	382			23	2 154	2 559
Total	54 484	279	1 913	1 000	2 302	59 978

* RR - Regulated species; non RR - Unregulated species
** Black Dogfish, Birdbeak Dogfish, Greenland Shark, Blondnose Six-Gilled Shark, Kitefin Shark, Blackmouth Dogfish, Knifetooth Dogfish
*** Alfonsinos, Rabbitfish (Rattail), Cardinal Fish, Forkbeard (Forkhead), Roughhead Grenadier, Round Skate, Small Redfish (Norw. Hadd.), Spiny (Deep-Sea) Scorpionfish
**** Wolfish, Atlantic Halibut, American Plaice, Northern Prawn
Source: NEAFC, 2006

TABLE 9
Summary of high seas bottom catch, 2004–2006

Country	2004	2005	2006
Deep Sea RR			
EC	25 157	69 883	51 346
Faroes	642	756	253
Greenland	0	0	1 913
Norway	648	620	963
Russia	56	2 188	148
Subtotal	**26 503**	**73 447**	**54 623**
Non RR			
EC		1 854	2 756
Faroes		215	26
Norway		28	14
Russian Federation		112	0
Subtotal		**2 209**	**2 796**
Haddock			
EC*	356	222	382
Faroes		3	
Norway	8	28	23
Russian Federation	5 844	4 708	2 154
Subtotal	**6 208**	**4 961**	**2 559**
Total	**32 711**	**80 617**	**59 978**

* Includes 164 tonnes caught by Poland in 2004
Sources: NEAFC 2004a; NEAFC 2005b; NEAFC 2006)

It is interesting to note that there are significant discrepancies in the reported catches in the North East Atlantic. An example is the reported catch of roundnose grenadier in recent years as shown in Table 10. This highlights the difficulty associated with data collection in high seas deep-sea fisheries.

Table 11 gives estimates of the number of vessels by fishery, based on the information presented in the previous section. These numbers should be used cautiously, since the same vessel may be involved in more than one fishery. Information on fishing time or days will be required to provide a better estimate of overall fishing effort.

Illegal, Unreported and Unregulated (IUU) fishing

Fisheries in the international waters of the North East Atlantic have been subject to IUU fishing. More than 100 000 tonnes of Northeast Arctic cod and 30 000–40 000 tonnes of haddock were estimated to be illegally fished in the Barents Sea in 2005 (Norwegian Directorate of Fisheries, 2006).

Other examples of IUU fishing include the beaked redfish fishery in the Irminger Sea. Studies carried out by the European Union Joint Research Centre in collaboration with NEAFC concluded that the fishing effort in this pelagic fishery could have been 25 percent higher during the observation days in June 2002 and 2003 than that reported to NEAFC (NEAFC, 2004b).

NEAFC now maintains a public list of vessels observed in the Regulatory Area engaging in IUU (NEAFC IUU B list). In 2007, port state control was introduced in the NEAFC Scheme of Control and Enforcement (NEAFC, 2007a). NEAFC reported (November 2007) that IUU fishing by non-contracting parties has been drastically reduced by the control of transshipment activities through the IUU A (observation) and B (confirmed IUU) lists, as well as the newly implemented port state controls (NEAFC, 2007d).

TABLE 10
Comparison of the reported catch of roundnose grenadier in the North East Atlantic

		Catch (tonnes) of roundnose grenadier: EU		
		2004	2005	2006
1	NEAFC –high seas catch only	18 038	25 024	6 327
2	ICES WGDEEP 2008 – estimated high seas catch		10 890	8 995
	High seas and some EEZ catch			
3	ICES: reported catch in Areas Vb; VIb; VIIc,j,k; VIIId,e; XIIa; IXb; X; XII; and XIVb (high seas and some EEZ combined)*	6 127	9 359	6 946
4	FAO Fishstat Area 27 – Reported catch by Estonia, France, Germany, Ireland, Lithuania, Poland, Spain (high seas and EEZ combined)**	9 058	10 230	8 741

* *Source:* ICES catch by species, area and year (1973-2007) Eurostat/ICES database on catch statistics - ICES 2007 Copenhagen. This includes all ICES Areas with a some portion in the high seas.
** Not including Denmark and Sweden – catch reported by both countries exclusively from the area (within EC waters) between the Baltic Sea and North Sea. No other EU country reported catches of roundnose grenadiers in the NE Atlantic. (FAO, 2008)

TABLE 11
Estimated number of vessels in recent years by fishery or fishing area

Fishery	Year	Estimated number of vessels
Hatton and Rockall Banks and surrounding fishing grounds		
Multispecies trawl fishery	2004–2006	45–57
Multispecies longline fishery	2004–2006	8–10
Bottom trawl fishery for haddock	/	/
Deep-sea gillnet and tangle-net fishery	2006	1 (banned since 2006)
Bottom trawl fishery for blue ling	/	/[1]
Mid-Atlantic Ridge		
Trawl fishery targeting roundnose grenadier	2004-2006	1
Trawl fishery targeting spawning aggregations of blue ling on the Reykjanes Ridge	/	1 (potential vessel)[2]
Loophole in the Barents Sea		
Bottom trawl for Northeast Arctic cod	2006	163
Bottom longline fishery	2006	3

/ = Unknown.
[1] There is no information concerning the number of Faroese vessels. French vessels involved in this fishery are probably at least some of the vessels already counted in the multispecies fishery.
[2] The Spanish trawler mentioned here is probably one of the trawlers fishing on Hatton Bank and may also be involved in the beaked redfish fishery in the NEAFC and NAFO Regulatory Areas.
[3] Two Norwegian and 14 Russian vessels.

STATUS OF THE STOCKS, BYCATCH AND IMPACTS ON VULNERABLE MARINE ECOSYSTEMS

Status of target stocks

In the North East Atlantic, the geographic distribution of several deep-sea stocks overlaps the high seas and parts of the Icelandic, Faroese and European Union EEZs. The stocks are assessed by ICES, and the most recent fishery advice is summarized below.

In 2005, most exploited deep-sea species in the North East Atlantic were considered to be harvested unsustainably; however, it was not possible to provide advice for specific deep-sea species. Consistent with a precautionary approach, ICES recommended immediate reductions in established deep-sea fisheries unless they could be shown to be sustainable. New deep-sea fisheries or expansion of existing fisheries into new fishing areas should not be permitted unless the expansion is very cautious, and is accompanied by programmes to collect data that allow evaluation of stock status as the basis for determining sustainable exploitation (ICES, 2005b).

Stock assessments carried out in 2006 remained exploratory for most species. Advice based on the best available evidence was to reduce the 2007–2008 EU total allowable catch (TAC) compared with those in previous years or to stop fishing for most deep-sea species. In a few cases (e.g. black scabbardfish in ICES Subareas VIII and IX), the status quo was advised for stocks entirely or partly distributed in the high seas. TAC reductions were advised for roundnose grenadier (in ICES Divisions Vb, VI, VII and XIIb) and black scabbardfish (ICES Divisions V, VI, VII and XII).

Blue ling stocks in the North East Atlantic are considered to be depleted and ICES advises that catches should be reduced to the lowest possible level, primarily by stopping the directed fishery (ICES, 2006a).

Stocks of orange roughy in the North East Atlantic are considered to be small and ICES advice from 2006 states: "Orange roughy can only sustain very low rates of exploitation. Currently, it is not possible to manage a sustainable fishery for this species. Hence, ICES recommends no fishery for this species. Bycatch in mixed fisheries should be limited as far as possible" (ICES, 2006a). Limited orange roughy fisheries are currently allowed in areas other than ICES Subareas V, VI and VII but with a total catch of 150 tonnes for each contracting party and only in areas where

a "footprint" has already been established by a contracting party previous to 2005 (NEAFC, 2007c).

Deep-sea sharks, and particularly the two main commercial species in the North East Atlantic, Portuguese dogfish and leafscale gulper shark, are considered very sensitive to exploitation. The 2006 ICES advice is that no directed fisheries should be permitted unless there are reliable estimates of current exploitation rates and stock productivity. TACs should be set at zero for the entire distribution area of the stocks and additional measures taken to prevent bycatch of the Portuguese dogfish and leafscale gulper shark in fisheries targeting other species.

The status of alfonsino stocks (*Beryx* spp.) is unknown. In the high seas there are concerns about misreporting from the MAR areas (ICES, 2006b). For these species, a TAC of 316 tonnes is allowed for the whole North East Atlantic.

Finally, the status of the Rockall haddock (*Melanogrammus aeglefinus*) stock is uncertain, but stock size is considered to be low.

The lack of reporting on fishing activity increases the uncertainties in stock and exploitation status assessments, which are currently limited to the trend analysis of catch per unit effort (CPUE) and international landings declarations. The NEAFC management measures for 2007 concerning deep-sea fishing include the obligation for contracting parties to develop sampling plans for deep-sea species (including discards where necessary), and to communicate them via NEAFC to ICES, with a reviewing process. Recent estimates of the discard of juvenile roundnose grenadier are 30 percent by weight and 50 percent by number of the catch in the trawl fishery for roundnose grenadier (ICES 2008). Further uncertainty is created in the gillnet fisheries where the impact of lost and abandoned nets on species is unknown, but likely to have an impact on the status of affected stocks (Hareide *et al.*, 2006).

Status of bycatch stocks

Most deep-sea fisheries are multispecies. For example, about 70 deep-sea species have been recorded in catches of trawlers targeting roundnose grenadier. Very little is known about the status of bycatch stocks. Discard rates in these fisheries are recognized as high, but largely unreported. Many deep-sea species are considered to be vulnerable to injury, and survival rates of discards in these fisheries are very low and include a high mortality of immature fish.

In 2007, NEAFC requested ICES WGDEEP to coordinate the planning of dedicated deep-sea research surveys. The plan proposed by the Working Group (ICES, 2007b) covers an annual international survey along the European continental slope, from west of the United Kingdom to Portugal and a triennial international survey on the MAR.

Impacts on Vulnerable Marine Ecosystems (VMEs)

The ICES Working Group on Deep Water Ecology (WGDEC) provides scientific information in relation to the protection of VMEs in the North East Atlantic. Some national and international research programmes, including scientific surveys, have been conducted (Irish BIM surveys, MAR-ECO[3], HERMES[4], etc.). The ICES WGDEC has developed a database to inventory and georeference all these surveys (ICES, 2007c). Survey data and observations of commercial fishing operations are used to map the occurrence of cold-water coral reefs. These data have been used to define bottom fishing closures on Rockall and Hatton Banks (see Map 2). A set of seamounts has also been temporarily closed to bottom fishing in the international waters of the Reykjanes Ridge and on the Mid-Atlantic Ridge (see Map 3).

[3] The MAR-ECO Patterns and processes of the ecosystems of the northern mid-Atlantic project is part of the Census of Marine Life.

[4] Hotspot Ecosystem Research on the Margins of European Seas.

CONSERVATION AND MANAGEMENT MEASURES

The main measures in place for the management of deep-sea fisheries in the NEAFC Regulatory Area include the following.

- Limitations of fishing effort by fishing fleets targeting deep-sea resources have been recommended since 2004. These limitations are calculated as a percentage of the previous year's effort, and are revised each year.
- Interim area closures to bottom trawling and other static gears. Four seamounts of the Mid-Atlantic Ridge and a section of the Reykjanes Ridge are currently closed to protect vulnerable deep-sea habitats (Map 3). On Hatton and Rockall Banks, four areas were closed in 2007. For 2008, the boundaries of two of these areas were adjusted (Rockall and Hatton closures) and one additional area has been closed to bottom fishing (southwest Rockall closure) by NEAFC Recommendation IX: 2008 (Map 3).
- Prohibition of the use of gillnets, entangling nets and trammel nets at any position where the charted depth is greater than 200 m.
- Prohibition on directed orange roughy fisheries in ICES Subareas V, VI and VII.
- Prohibition of shark finning.

The NEAFC Scheme of Control and Enforcement (NEAFC, 2007a) describes all contracting parties' obligations regarding fishing vessels, catch and effort reporting, VMS, inspection at sea, port state controls, infringement procedures and measures to promote compliance by non-contracting party fishing vessels.

Contracting parties are requested to ensure that their fishing vessels communicate catch, effort and transshipment reports. Reporting is requested when entering the Regulatory Area, on a weekly basis during fishing trips inside the Regulatory Area, and when exiting the Regulatory Area. Contracting parties are also requested to report catch and effort data to ICES by semester. The European Union, a contracting party of NEAFC, has established a specific regulation (2347/2002) for deep-sea fisheries. This regulation establishes the requirement of a special fishing permit as well as reporting obligations (by semester). Deep-sea fisheries are identified by means of a list of target species. However, not all the deep-sea species listed in the NEAFC Scheme of Control and Enforcement are part of this list.

In addition, the primary management tool in the EU is a TAC. This management tool for deep-sea species was first introduced in 2003, and TACs have been revised every second year since then. Following ICES advice, TACs for 2005–2006 were set lower than for 2003–2004 and further reduced for 2007–2008. EU TACs apply to EU fleets operating in the EU and international waters and to non-EU vessels operating in EU waters.

Further management measures were discussed at an Extraordinary Meeting of the Commission of NEAFC (July 2008). The Commission adopted measures to monitor and regulate the impact of fisheries in its Regulatory Area. The new measures will require:

- all bottom fishing activity from the last 20 years to be mapped;
- fisheries to be regulated by exploratory protocols in areas where previous bottom fisheries activities did not take place;
- mapping of VMEs; and
- NEAFC contracting parties to have their vessels cease fishing when a VME is encountered in the course of fishing (NEAFC, 2008a).

NEAFC and the OSPAR Commission (for the protection of the marine environment of the North East Atlantic) have initiated the first efforts towards multisectoral management in the high seas. Joint management efforts between fisheries and conservation will be undertaken under a new memorandum of understanding which was adopted by the two organizations in 2008 (NEAFC, 2008b).

INFORMATION AND REPORTING GAPS

The low catch and effort data reporting for deep-sea fisheries in the high seas of the North East Atlantic is a major concern that has been recently outlined by the NEAFC performance review (NEAFC, 2007b).

ICES reporting areas were modified in 2005 in order to split data between the high seas and waters under national jurisdiction, and to avoid the aggregation of data related to different deep-sea fishing grounds (e.g. Hatton Bank and Reykjanes Ridge). A limited number of countries started to report to ICES WGDEEP using these new spatial reporting units in 2007. This issue is a real shortcoming in the analysis of high seas deep-sea fisheries in the region, particularly since no detailed catch and effort data are publicly available. Catch reporting by new ICES Areas might still be insufficient for the monitoring of deep-sea fisheries. For example, ICES Area VIb overlaps Hatton and Rockall Banks. Scientists have therefore recommended reporting by ICES statistical squares (1° latitude by ½° longitude).

Almost no fishing effort data are published. Measurement and reporting of fishing effort seem to be a major concern in the region. There is no requirement to record effort in EU logbooks. Although NEAFC has introduced effort reduction, every participating party measures effort in a different way. In 2007, to address this issue, NEAFC recommended that fishing effort be calculated as aggregate power, aggregate tonnage, fishing days at sea or number of participating vessels (NEAFC, 2008c).

Within the framework of the Coordinating Working Party on Fishery Statistics (CWP), under the STATLANT programme, ICES is collaborating with FAO and with RFMOs to compile annual catch statistics by flag of fishing country, species and ICES reporting area. FAO FishStat software is used for the management and dissemination of these catch statistics. The last reporting year of the current data set is 2006.

Tentative utilization of the VMS data managed by NEAFC for the spatial analysis of fishing effort and linkage to catch data has been performed by ICES Scientific Working Groups (WGDEEP in particular) in recent years. Initial results show that data quality of VMS has to be improved to be suitable for such analysis: lack of standardization in the data format, missing information (gear not always recorded) and low recording frequency (every two hours) make the separation of fishing and cruising time difficult.

SOURCES OF INFORMATION AND BIBLIOGRAPHY

In their reply to the FAO Questionnaire sent to states known as having a high seas deep-sea fishing fleet, seven countries (Canada, Estonia, Germany, France, the United Kingdom, Norway and Ukraine) officially replied with some information regarding deep-sea fishing in the high seas of the North East Atlantic. Iceland reported no activity in the high seas deep-sea fisheries in this area in recent years. The Spanish Department of Fisheries confirmed the information presented in this regional review.

The Directorate-General for Maritime Affairs and Fisheries of the European Commission (EC DG MARE) also provided some information on EU countries' deep-sea fishing fleets, but with no distinction between fishing activity in areas inside EEZ limits and on the high seas. Other sources of information have therefore also been considered: ICES Working Groups reports and working documents (e.g. Russian Federation reports to WGDEEP); the Eurostat/ICES database on catch statistics (1973–2006) (ICES, 2007a); and NEAFC public statistics (NEAFC catch statistics), which include some effort data for 2004, and catch by species and contracting party for the 2000–2006 period. Other useful information has been found in the reports of European Community working groups and projects. Some published syntheses of deep-sea fisheries in the North East Atlantic have also been considered. References to the main sources are listed at the end of this chapter.

SUMMARY TABLE FOR 2006

Main flag states involved in fisheries	Spain, United Kingdom (Scotland), France, Russian Federation, Norway, Faroe Islands (Denmark) and Ireland
Estimated total number of vessels	66–70
Total reported catch (tonnes)	59 978

Main fisheries			
Gear	**Target species**	**Fishing ground**	**Regional Area**
Bottom trawl	Roundnose grenadier, Baird's slickhead, black scabbardfish, leafscale gulper shark and Portugese dogfish	Slopes of the Hatton and Rockall Banks	ICES XIIb and VIb1
Longline	Deep-sea sharks, Greenland halibut, ling and tusk	Rockall Bank (200–600 m) and deeper waters	ICES XII and VI
Bottom trawl	Haddock	Rockall Bank (200–400 m)	ICES VIb1 (HS) and VIb2 (United Kingdom EEZ)
Bottom trawl	Blue ling	Rockall Bank and part of Lousy Bank	ICES VIb1 and Via (HS) ICES Vb and Via (EEZ)
Gillnet	Hake, monkfish, deep-sea sharks and deep-water red (or king) crabs	Within EEZ limits on the slopes of the European continental shelf and in the high seas on the slopes of Hatton and Rockall Banks	ICES XII and X
Bottom trawl	Orange roughy and black scabbardfish	Seamounts	ICES XII and X
Bottom trawl	Roundnose grenadier	Seamounts of the Mid-Atlantic Ridge	ICES XIVb1, XIIc and Xb
Bottom trawl	Blue ling spawning aggregations	Reykjanes Ridge	ICES XIV, etc.
Related fisheries			
Pot	Blue ling, black scabbardfish and roundnose grenadier	Inside Faroe Islands EEZ but also in international waters on the south slope of the Lousy Bank	ICES Vb
Mid-water trawl	Beaked redfish	Irminger Sea	ICES XIVb1 and XIIa1
Longline and handline	Multispecies: blackspot seabream	Seamounts	ICES X
Longline	Golden redfish, tusk and deep-sea sharks	Reykjanes Ridge and MAR	ICES XII and ICES VI

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