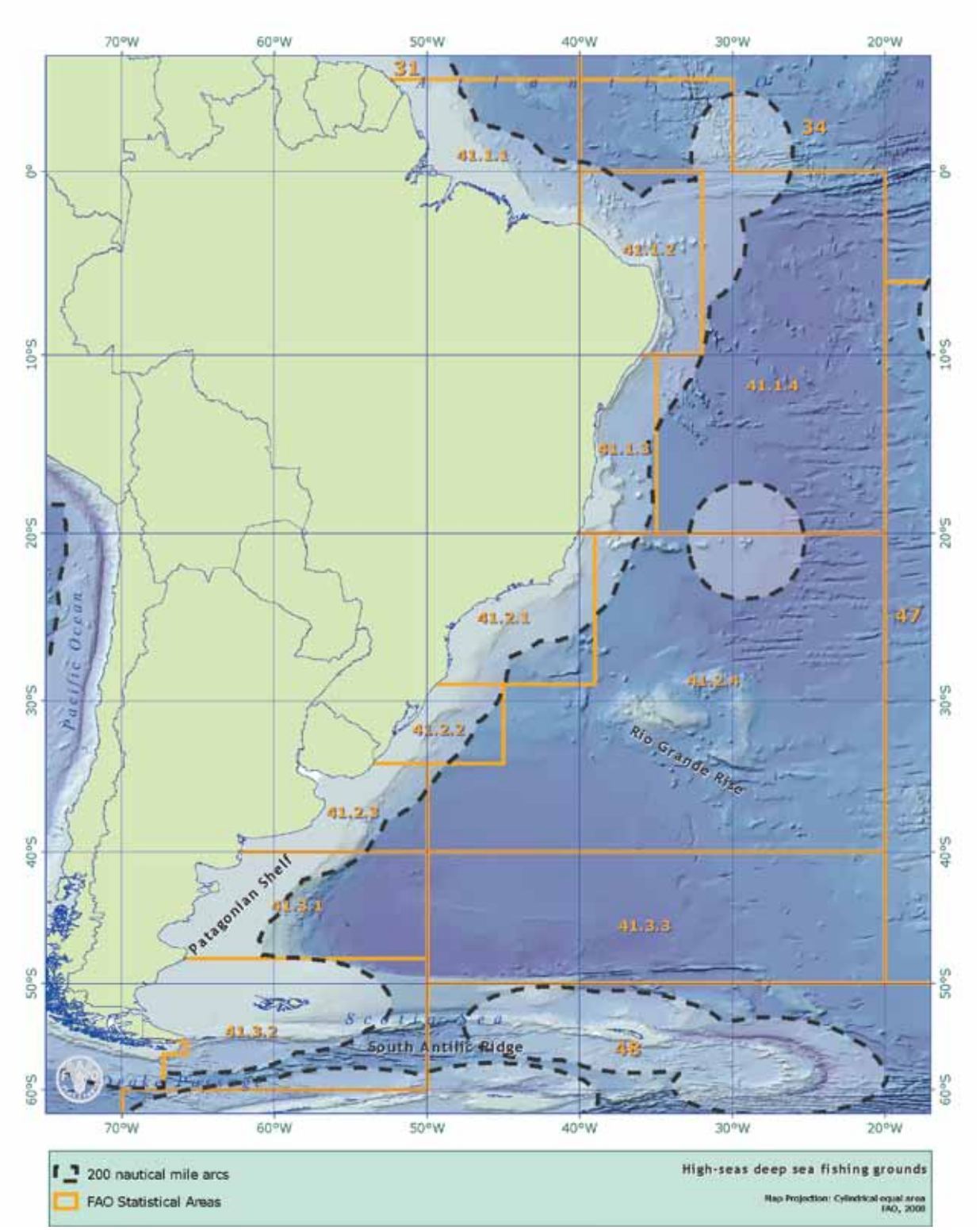


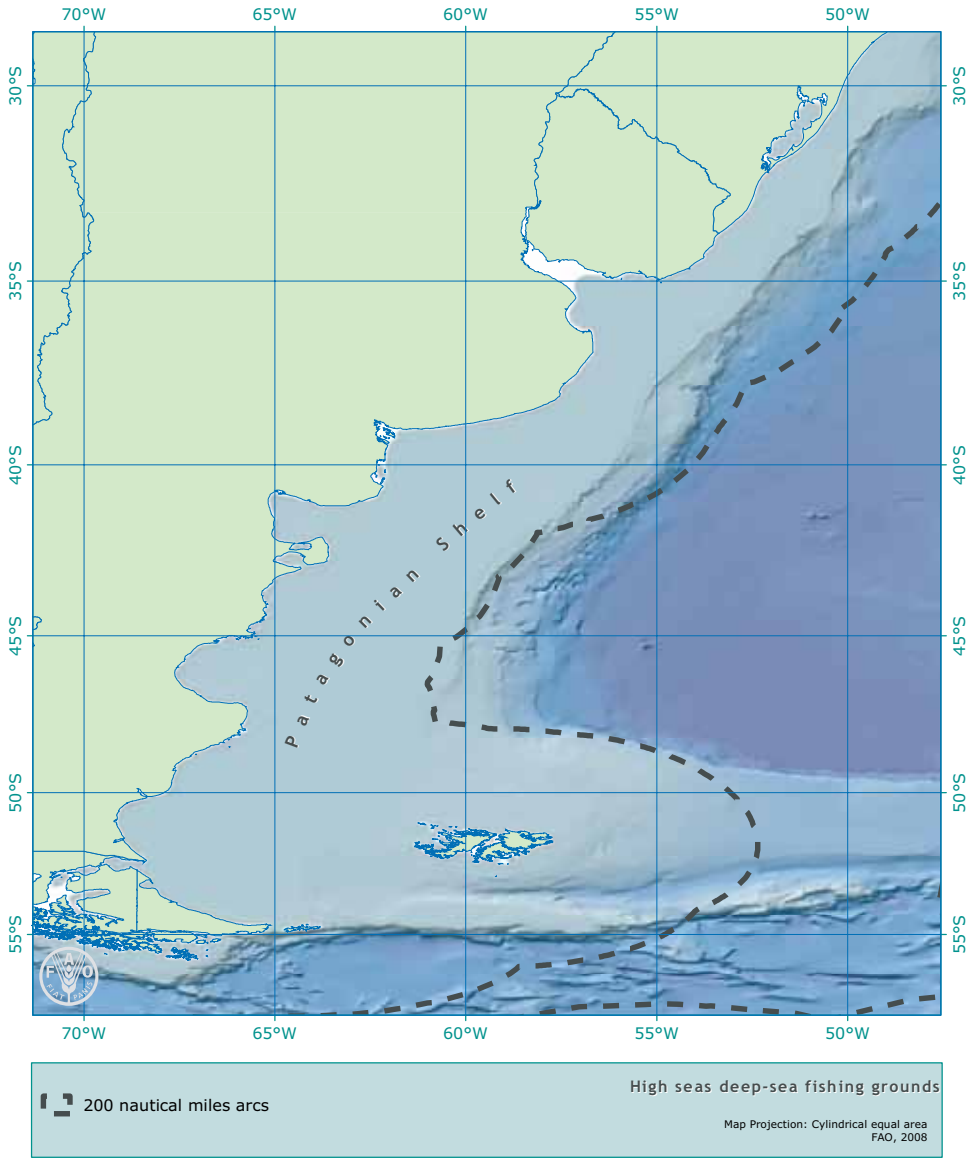
MAP 1
High seas deep-sea fishing grounds in the South West Atlantic Ocean

South West Atlantic Ocean

FAO Statistical Area 41

GEOGRAPHIC DESCRIPTION OF THE REGION

The South West Atlantic, corresponding to FAO Statistical Area 41, covers a total surface of 17.65 million square kilometres (km²) between 5°N latitude off the coast of Brazil south to 60°S latitude off the coast of Argentina (Map 1). The area includes a total continental shelf area of approximately 1.96 million km² of which a large portion off the coast of Argentina – the Patagonian Shelf – extends beyond 200 nautical miles from the baseline from which the breath of the territorial sea is measured (Map 2) (FAO, 2005). Individual seamounts and ridge systems are also present in the area and include the Rio-Grande Rise area.



MAP 2
High seas deep-sea fishing grounds off the Patagonian Shelf

The main geographic features that are high seas fishing grounds are: the Patagonian Shelf, the Rio-Grande Rise and other seamounts.

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

Regional Fisheries Management Organization/Arrangement

There is no multilateral regime currently in place for the high seas bottom fisheries in the South West Atlantic region. However, as states respond to calls for improved management and conservation, initiatives to create new RFMOs in unregulated high seas areas may emerge. The European Union (EU) has recently issued a communication stating that it intends to support and advance the creation of an RFMO and interim measures in the region (EC, 2007c). However, Argentina considers that conditions are not yet met for the creation of such an organization or the adoption of such measures. Most of the demersal stocks fished on the high seas are straddling stocks, including species that do not have typical deep-sea species characteristics such as Argentine hake (*Merluccius hubbsi*), Argentine short-fin squid (*Illex argentinus*) and southern blue whiting (*Micromesistius australis*) (Maguire *et al.*, 2006).

DESCRIPTION OF DEEP-SEA BOTTOM FISHERIES IN THE HIGH SEAS

History of fisheries

Fisheries for Argentine hake and Argentine shortfin squid, the principal target species in the current high seas bottom fisheries in the region, developed in the 1960s and 1970s by Argentine and distant water fleets, primarily from the former Union of Soviet Socialist Republics (USSR), Poland and Japan. In the 1980s, fleets from other distant water nations such as the Republic of Korea, Spain, Taiwan Province of China, Cuba and Germany, began targeting these species in the South West Atlantic. Throughout the 1990s, the Republic of Korea and Taiwan Province of China reported catches of shortfin squid of approximately 100 000–200 000 tonnes per year, with Japan reporting a catch of some 100 000 tonnes per year during the same period. The Argentine catch of shortfin squid fluctuated between 200 000 and 400 000 tonnes per year during the 1990s.

A fishery also took place on the Rio-Grande Rise area seamounts in the 1980s, targeting mainly alfonsino (*Beryx* spp.). This fishery, undertaken by the former USSR, was resumed in 2000 when a new seamount in the area was discovered, but no data are available on the catch. Other fisheries are reported to have taken place on individual seamounts in the area. (Clark *et al.*, 2007)

Spain and Japan and, to a lesser extent, Poland, Portugal and the Russian Federation report substantial fisheries for Argentine hake between the mid-1980s and the early 1990s, with only Spain continuing to report significant catches since the mid-1990s (between 15 000 and 27 000 tonnes per year from 1996 to 2001). The Argentine fishery for Argentine hake extends as far back as the 1950s with reported catches in the period 1977–2005 ranging between 250 000 and 600 000 tonnes per year. Unfortunately, it is not possible to determine from the available data the extent to which the catch of Argentine hake, Argentine short-fin squid or other species caught by distant water fleets reporting catches in the region has been taken on the high seas (or within national jurisdiction) (FAO, 2008).

Current fisheries

Table 1 and Figure 1 provide an overview of the main target species.

Bottom trawl fisheries for Argentine hake and Argentine shortfin squid

The main high seas bottom fisheries in the South West Atlantic region currently occur on the Patagonian Shelf and upper slope areas beyond 200 nautical miles from

the baseline from which the breath of the territorial sea is measured south of 40°S latitude and north of the Falkland Islands (Malvinas) (FAO Statistical Area 41.3).[1] Most of the fishing appears to be done by bottom trawling with the principal target species being Argentine shortfin squid and Argentine hake. However, a number of distant water fishing nations report substantial catches of other species in recent years, such as southern blue whiting, Patagonian grenadier (*Macruronus magellanicus*) and elasmobranches including rays, stingrays and mantas nei (FAO, 2008).

Spain reported that over the period 2003–2006, between 22 and 27 bottom trawl vessels operated in the South West Atlantic (Table 2). In 2006, 27 trawlers fished in the region with a high seas catch of 44 967 tonnes. Over 80 percent of the catch consisted of Argentine hake and Argentine shortfin squid. Other species reported retained in the catch were southern blue whiting, Patagonian grenadier, Longtail southern cod (*Patagonotothen ramsayi*), forkbeard (*Phycis phycis*), Patagonian squid (common squid) (*Loligo gahi*) and pink cusk eel (*Genypterus blacodes*).[2]

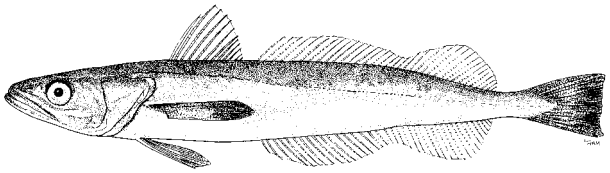
Estonia reported that a single vessel operated in the South West Atlantic in both 2005 and 2006 (Table 3). Fishing effort was reported as 81 days in 2005

TABLE 1
Main target species in the South West Atlantic

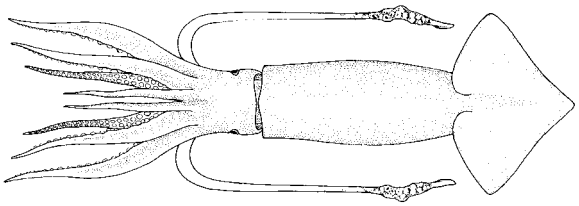
Common name	Scientific name	Spanish name
Main target species – trawl fisheries		
Argentine hake	*Merluccius hubbsi*	Merluza argentina
Argentine shortfin squid	*Illex argentinus*	Pota argentina
Main target species – bottom longline fishery		
Patagonian toothfish	*Dissostichus eleginoides*	Austromerluza negra
Other species		
Patagonian squid (common squid)	*Loligo gahi*	Calamar patagónico
Forkbeard	*Phycis phycis*	Brótola de roca
Patagonian grenadier	*Macruronus magellanicus*	Merluza de cola
Pink cusk eel	*Genypterus blacodes*	Congribadejo rosado
Longtail Southern cod	*Patagonotothen ramsayi*	Nototenia coluda
Antarctic rockcods noties nei	*Nototheniidae*	Tramas, doradillos nep
Southern blue whiting	*Micromesistius australis*	Polaca austral
Southern hake	*Merluccius australis* (*Merluccius polylepis*)	Merluza austral

FIGURE 1
Examples of species targeted by bottom fisheries in the high seas of the South West Atlantic

Argentine hake (*Merluccius hubbsi*)



Argentine short-fin squid (*Illex argentinus*)



Source: FAO.

TABLE 2
Spanish high seas bottom catch in the South West Atlantic, 2003–2006

Year	Argentine hake	Argentine shortfin squid	Rockcod	Patagonian grenadier	Pink cusk eel	Other	Total catch (tonnes)	Number of vessels (trawlers)
2006	22 283	14 481	2 865	1 858	1 049	2 431	44 967	27
2005	21 403	11 111	1 275	2 709	1 193	4 880	42 571	24
2004	17 255	2 788	317	526	566	1 462	22 914	23
2003	7 136	9 266	36	1 550	818	3 567	22 373	22

Source: response from Spain to FAO Questionnaire.

[1] Reference made to the Falkland Islands (Malvinas) is geographic in nature and does not prejudge the questions related to the territorial status of these islands.

[2] Response from Spain to the 2007 FAO Questionnaire on High Seas Deep-sea Fisheries (hereinafter referred to as the FAO Questionnaire: see Appendix A).

TABLE 3
Catch of the Estonian high seas bottom trawl vessel, 2006

Argentine hake	Argentine shortfin squid	Rockcod	Patagonian grenadier	Pink cusk eel	Other	Total catch (tonnes)	Number of vessels (trawlers)
700	499	127	73	22	48	1 469	1

Source: response from Estonia to FAO Questionnaire.

TABLE 4
Uruguayan high seas bottom catch in the South West Atlantic (2004–2006)

Year	Argentine hake	Argentine short-fin squid	Patagonian Toothfish	Total catch (tonnes)
2006	28 029.3	4 989.2	130.3	33 148.8
2005	41 180.8	4 894.2	669.4	46 744.4
2004	39 613.4	3 702.3	52.7	43 368.4

and 59 days in 2006. The high seas catch amounted to 878 tonnes in 2006. Over 95 percent of the catch consisted of Argentine hake and Argentine shortfin squid. The remainder of the retained catch consisted of Antarctic rockcods, pink cusk eel, sharks, and elasmobranches including rays, and skates nei.[3]

Uruguay reported catches of Argentine hake, Patagonian toothfish and Argentine short-fin squid (Table 4). The number of vessels involved and the fishing effort is unknown.[4]

The Republic of Korea reported that from 2003 through 2006, between 11 and 19 trawlers operated in the South West Atlantic each year. In 2006, 16 trawlers were fishing on the high seas in the region. In 2006, the total catch of the fleet of the Republic of Korea (including trawlers, longliners and trap setters) was 64 762 tonnes of fish and squid. The fishing effort of the trawl fleet is not known. The majority of the catch appears to consist of squid with Patagonian grenadier, hakes, rays and skates also taken in the fisheries.[5] Information on the catch and species composition per gear type was not made available.

Bottom longline fishery for Patagonian toothfish

The Republic of Korea reported that from 2003 through 2006, between five and nine longliners operated in the South West Atlantic per year. In 2006, seven longliners from the Republic of Korea were fishing for a total of 250 days on the high seas in the region.[6] Ukraine reported that two longliners in 2006, and one longliner in 2005, operated in the South West Atlantic targeting Patagonian toothfish (*Dissostichus eleginoides*); however, details on catch or effort were not reported.[7] FAO reports that 376 tonnes of Patagonian toothfish were reported by Ukraine in 2006 in the South West Atlantic (FAO, 2008).

Other bottom fisheries

A Working Document from the European Commission (EC) indicated that, in addition to the Spanish, Estonian and Korean fleets mentioned above, some 50 or more vessels registered in the Falkland Islands (Malvinas)[8], or flagged to China and Taiwan Province of China also participate in the bottom fisheries on the high seas of the South West

[3] Response from Estonia to FAO Questionnaire.
[4] Response from Uruguay.
[5] Response from the Republic of Korea to FAO Questionnaire.
[6] Response from the Republic of Korea to FAO Questionnaire.
[7] Response from Ukraine to FAO Questionnaire.
[8] See footnote 1.

Atlantic (EC, 2007a).In its response to the FAO Questionnaire, China reported no high seas bottom fishing in the region.[9]

The data available from the FAO FISHSTAT database (FAO, 2008) include reports of substantial catches of Argentine short-fin squid as well as Patagonian grenadier and several other groundfish species over the past several years by Japan, China, Taiwan Province of China, Portugal, the Russian Federation, Belize, Panama, the Falkland Islands (Malvinas)[10], Namibia and the United Kingdom among others (in addition to Spain, the Republic of Korea and Estonia). For example, the catch of Argentine short-fin squid by China is listed as 140 000 tonnes between the years 2003–2005; for Japan the catch is approximately 43 000 tonnes and the catch by Taiwan Province of China is listed at some 210 000 tonnes for the same period. However, the statistics in FAO (2008) do not differentiate between catches on the high seas and catches within EEZs, nor by gear type; thus it is impossible to determine how much, if any, of the catch by these countries is taken on the high seas and/or in bottom fisheries in the region (FAO, 2008).

TABLE 4
Summary of available catch and effort data for 2006

Country	No. of vessels	Catch (tonnes)	Effort (days per year)
Trawl (mid- and bottom trawl) fishery			
Estonia	1	878	59
Republic of Korea	16	64 762*	–
Spain	27	44 967	–
Bottom longline fishery			
Republic of Korea	7	–	250
Ukraine	2	376**	–
Trap fishery			
Republic of Korea	2	–	270

* This figure is the reported catch combined for all Republic of Korea vessels engaged in bottom fisheries on the high seas of the South Pacific, including those employing trawl, longline and other gears.
** Information derived from FAO FishStat (FAO, 2008).
Sources: responses by countries to FAO Questionnaire; FAO, 2008.

Other current bottom fisheries in the region include fisheries on individual seamounts, such as on the Rio-Grande Rise; however, no data are available on these fisheries (Clark *et al.*, 2007).

In addition, two trap setters from the Republic of Korea were fishing for a total of 270 days on the high seas in the region in 2006.[11]

Catch and effort summary

Table 4 provides a summary of catch and effort by gear type and country in 2006.

Illegal, Unreported and Unregulated (IUU) fishing

Little information is available on IUU bottom fishing activities in this area. These fisheries are currently unregulated by a multi-lateral mechanism.

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

Status of target stocks

According to an FAO review of straddling and highly migratory stocks worldwide in 2006 (Maguire *et al.*, 2006), Argentine short-fin squid was considered fully exploited; Argentine hake was considered overexploited or depleted, with signs of recovery in recent years; southern blue whiting was considered fully to overexploited; and the pink cusk eel and Patagonian grenadier were considered moderately exploited. The status of rockcods, sharks and rays is unknown.

Status of bycatch stocks

The bycatch of non-commercial species is largely unknown.

[9] Response from China to FAO Questionnaire.
[10] See footnote 1.
[11] Response from the Republic of Korea to FAO Questionnaire.

Impacts on Vulnerable Marine Ecosystems (VMEs)

A recent assessment of the likely distribution of stony or hard cold-water corals in relation to seamounts worldwide concluded that they are likely to be found in association with seamounts at fishable depths throughout the South Atlantic Ocean between 20° and 60°S latitude (Clark *et al.*, 2006). Biogeographic assessments of the likely distribution of other species potentially vulnerable to deep-sea bottom fisheries have yet to be conducted with respect to seamounts, other underwater features and the continental slope areas of the Patagonian Shelf.

A study conducted for the EC reports three main harvesting areas for EC vessels bottom fishing in the South West Atlantic, two of which are located in international waters bordering the Argentine EEZ. According to the EC, in these two areas, the sea bed falls rather abruptly from 200 to 1 000 m corresponding to locations where deep-water corals and sponges are likely to occur on the steep continental slope. Although hakes and squid are harvested mainly on sandy bottoms on the shelf flats, trawls extending beyond the shelf break may be deployed deep and thus threaten to damage any coral reefs they encounter (EC, 2007a).

CONSERVATION AND MANAGEMENT MEASURES

At least some of the vessels operating in the region are subject to reporting requirements and other measures by the flag states concerned. The EC reports that vessels flagged to EU countries are subject to monitoring, including some level of onboard observer coverage, and licensing arrangements. Argentina reports that use of vessel monitoring systems (VMS) is required for the commercial Argentinean fleet operating in the area.

Recently, Spain announced that it will conduct a research survey specifically aimed at the identification of VMEs in the region. The EC meanwhile has issued draft regulations for the management of the high seas bottom fisheries conducted in the region by vessels flying the flag of EU member states. These regulations are designed to implement the UN General Assembly Resolution 61/105 and would essentially require flag states of the EU to regulate fishing activities in a manner consistent with the UN Resolution (EC, 2007b). Argentina reported on the adoption of conservation and management regulations in relation to the sedentary species of the Argentinean shelf, including the establishment of management areas beyond 200 miles from the baseline. This would imply that the EC draft regulations would not apply to these species in this area.

INFORMATION AND REPORTING GAPS

There is a need for more accurate information on catch, bycatch and the locations of areas fished in relation to potential impacts on VMEs, particularly along the slope areas of the Patagonian Shelf. Assessments of the known or likely distribution of VMEs in the region are needed. In addition, stock assessments of the bottom fisheries on the high seas need to be conducted, insofar as these are not covered by, or incorporated into, assessments by coastal states of the straddling fish stocks in the region. Furthermore, there have been no systematic assessments of the impact of the fishery on non-target, associated and dependent demersal species or vulnerable benthic ecosystems.

SOURCES OF INFORMATION

In their responses to the FAO Questionnaire sent to states known as having a high seas deep-sea fishing fleet, four countries (Estonia, the Republic of Korea, Spain and Ukraine) officially replied with some information regarding deep-sea fishing in the high seas of the South West Atlantic Ocean. China also responded but did not report fisheries in this area. In addition, FAO reports, communications from the European Commission, the Census of Marine Life and other sources as footnoted were used.

SUMMARY TABLE FOR 2006

Main flag states involved in fisheries	Spain, Estonia, the Republic of Korea and Ukraine
Estimated total number of vessels	55
Total reported catch (tonnes)	110 983

Main fisheries			
Gear	**Target species**	**Fishing grounds**	**FAO Statistical Area**
Bottom trawl fisheries	Argentine hake and Argentine shortfin squid	Patagonian Shelf and upper slope areas	FAO Statistical Area 41.3
Bottom longline fishery	Patagonian toothfish	Unknown	FAO Statistical Area 41
Trap	Unknown	Unknown	FAO Statistical Area 41
Bottom gear	Unknown	Seamounts, e.g. on the Rio-Grande Rise	FAO Statistical Area 41

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BIBLIOGRAPHY

Clark, M.R., Tittensor, D., Rogers, A.D., Brewin, P., Schlacher, T., Rowden, A., Stocks, K. & Consalvey, M. 2006. *Seamounts, deep-sea corals and fisheries: vulnerability of deep-sea corals to fishing on seamounts beyond areas of national jurisdiction*. Cambridge, United Kingdom, United Nations Environment Programme (UNEP)-World Conservation Monitoring Centre (WCMC).

Clark, M.R., Vinnichenko, V.I., Gordon, J.D.M., Beck-Bulat, G.Z., Kukharev, N.N. & Kakora, A.F. 2007 Large-scale distant-water trawl fisheries on seamounts. *In* Pitcher, T.J., Morato, T., Hart, P.J.B., Clark, M.R., Haggan, N. & Santos, R.S. (eds.) *Seamounts: Ecology, Fisheries and Conservation.* Fish and Aquatic Resources Series, pp. 361–399. Oxford, United Kingdom, Blackwell.

EC. 2007a. Commission Staff Working Document. Accompanying document to the Communication from the Commission to the Council and the European Parliament: destructive fishing practices in the high seas and the protection of vulnerable deep sea ecosystems. Commission of the European Communities. Brussels, 17 October. SEC 1314.

EC. 2007b. Proposal for a Council Regulation on the protection of vulnerable marine ecosystems in the high seas from the adverse impacts of bottom fishing gears. COM/2007/605 final. 17 October. (Available at http://ec.europa.eu/fisheries/legislation/proposals/conservation_en.htm).

EC. 2007c. Communication from the Commission. Destructive fishing practices in the high seas and the protection of vulnerable deep sea ecosystems. COM/2007/604 final. 17 October.

FAO. 2005. *Review of the state of world marine fishery resources*. FAO Fisheries Technical Paper 457. Rome. 235 pp.

FAO. 2008. FAO Fisheries and Aquaculture Information and Statistics Service. Capture Production 1950–2006. FishStat Plus – Universal software for fishery statistical time series (online or CD-ROM). Food and Agriculture Organization of the United Nations. (Available at: http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp).

Maguire, J.J., Sissenwine, M., Csirke, J., Grainger, R. & Garcia, S. 2006. *The state of world highly migratory, straddling and other high seas fishery resources and associated species*. FAO Fisheries Technical Paper 495. Rome, FAO. 84 pp.