

### 11.2.3 EU request to ICES on the assessment of the deep-sea status of certain fish species

#### ICES Response

ICES considers that *Reinhardtius hippoglossoides* (Greenland halibut), *Argentina silus* (greater silver smelt), *Polyprion americanus* ("wreckfish"), *Pagellus bogaraveo* (blackspot seabream), *Brosme brosme* (tusk), and *Phycis blennoides* (greater forkbeard) do qualify, on scientific grounds, as deep-sea species.

ICES considers that *Lepidopus caudatus* (silver scabbardfish), *Galeus melastomus* (blackmouth catshark), and *Molva molva* (ling) do not qualify, on scientific grounds, as deep-sea species.

#### Request

##### Background

Discussions on the Commission proposal concerning a revised deep-sea access regime are ongoing. The deep-sea status of the species listed below (and part of Annex I of the proposal) was questioned by some Member States (MS); the MS' justifications are given at the end of each bullet point.

- *Reinhardtius hippoglossoides* (Greenland halibut) – MS: "fished not in deep-sea but only in mid-water"<sup>1</sup>
- *Argentina silus* (greater silver smelt) – MS: "fished not in deep-sea but only in mid-water"
- *Lepidopus caudatus* (silver scabbard fish) – MS: "benthic-pelagic fish distributed between 100 and 300 m"
- *Polyprion americanus* ("grouper"<sup>2</sup>) – MS: "distributed between 40 and 450 m"
- *Pagellus bogaraveo* (sea bream) – MS: "not found below 700 m"
- *Galeus melastomus* (blackmouth dogfish) – MS: "higher fertility than other sharks"
- *Molva molva* (ling) – no justification available
- *Brosme brosme* (tusk) – no justification available
- *Phycis blennoides* (greater forkbeard) – MS: "distributed up to 300m"

##### Request

ICES is requested to comment as soon as possible (i) on whether the species listed above qualify, on scientific grounds, as deep-sea species and (ii) on the scientific validity of the justifications provided by the MS for each species.

To this end, ICES is requested to use the following definition for deep-sea fish species: "deep-sea fish species occur in deep-sea waters and are characterised by one or a combination of the following factors: slow growth, low natural mortality, high longevity, no annual continuous recruitment or spawning season".

<sup>1</sup> The Commission notes that this species can be fished in deep pelagic fisheries for redfish, for instance, but also on the benthos.

<sup>2</sup> The Commission interprets the vernacular name provided as corresponding to wreckfish.

#### Elaboration on the response

ICES has, as requested, based its response on the definition provided by the Commission. There is no agreed world-wide definition of deep water or of deep-water species. Setting a depth limit above and under which species would be considered demersal or deep-water dwellers would therefore be arbitrary. In Atlantic EU waters, the shelf break occurs around 200 m and for the purpose of this response ICES considers deep-sea waters as all waters below 200 m depth. This is in line with the limits used by the United Nations (UN) Food and Agriculture Organization (i.e. FAO, 2009; Bensch *et al.*, 2009) and ICES advice from 2005 (ICES, 2005).

***Reinhardtius hippoglossoides* (Greenland halibut)**

ICES considers that *Reinhardtius hippoglossoides* (Greenland halibut) does qualify, according to the definition above, as a deep-sea species.

Greenland halibut is a large fish predator that occurs over a wide range of depths (from 20 to 2200 m) and temperatures (from  $-1.5^{\circ}\text{C}$  to  $10^{\circ}\text{C}$ ) (Shuntov, 1965; Nizovtsev, 1989; Boje and Hareide, 1993; Hareide and Garnes, 2001; ICES, 2015a). The main geographical distributions of the species includes ICES Subareas XIV and V and the northern I and II (ICES, 2015b).

Fishing depth along the continental slopes ranges from 350–500 m around Iceland to about 1500 m at East Greenland, Norway, and the Faroe Islands. In 2014 the distribution of the fishery covered all areas but was discontinuous in its distribution (ICES, 2015a). Greenland halibut is fished by bottom trawl and bottom longline (ICES, 2013a).

Greenland halibut is believed to be a slow-growing species with strong sexual dimorphism in growth, a maximum age of 25+ years, and assessment models use a relatively low natural mortality for all ages ( $M = 0.1$ ; ICES, 2015a). Furthermore, an age validation study suggested that age estimated from otolith growth rings is significantly underestimated for Greenland halibut. The species also shows intermittent recruitment (ICES, 2015d).

According to the DEEPFISHMAN project, most of the adult biomass of Greenland halibut is found at depths  $>200$  m (DEEPFISHMAN, 2012).

***Argentina silus* (greater silver smelt)**

ICES considers that *Argentina silus* (greater silver smelt) does qualify, according to the definition above, as a deep-sea species.

Greater silver smelt is not a midwater, but a benthic-pelagic species that seldom moves more than 50 m above the bottom. It is caught in bottom trawl in Iceland and to a large extent also in the Faroes and Norway. In Iceland greater silver smelt is fished at depths between 500 and 800 m along the southern, southwestern, and western coasts.

There is a clear linear relationship between mean length of greater silver smelt and depth, with larger fish being in deeper water. Exploratory assessment models use a relatively low natural mortality for all ages ( $M = 0.1$ ; ICES, 2015d).

***Lepidopus caudatus* (silver scabbardfish)**

ICES considers that *Lepidopus caudatus* (silver scabbardfish) does not qualify, according to the definition above, as a deep-sea species.

The species is distributed throughout the Mediterranean Sea and in the southern part of the northeast Atlantic, with low abundance in the southern part of the Bay of Biscay and only occasionally occurring north of  $48^{\circ}\text{N}$ . In the Mediterranean Sea it occurs mostly in shallow waters, with large adults being caught even in coastal waters. In the Ionian Sea, it was almost exclusively caught between 0 and 400 m in a survey covering depths down to 800 m, with larger abundance found on the continental shelf (D'Onghia *et al.*, 2000). The species does not seem to be long-lived; older individuals are 5 to 7 years old. In the Atlantic, Figueiredo *et al.* (2015) found the maximum age in the Azores (ICES Division X) to be similar, with only 1% of the examined individuals being older than 7 years. In a longline survey around Lanzarote and Fuerteventura, Canaries, in the eastern-central Atlantic, 75% of occurring individuals were found between 200 and 400 meters, and 25% in shallower and deeper waters (Lorance *et al.*, 2002). Therefore, the silver scabbardfish does not meet the longevity criteria to be categorized as a deep-sea species. Depending on the area it may be considered primarily a shelf species (in the Ionian Sea), or an upper slope species (mainly occurring at depths of 200 to 400 m in the Azores and the Canaries).

***Polyprion americanus* (“wreckfish”)**

ICES considers that *Polyprion americanus* (“grouper”, better known in FAO as “wreckfish”) does qualify, according to the definition above, as a deep-sea species.

The bass grouper *Polyprion americanus* is a large demersal teleost (>1.5 m) that inhabits deep continental and oceanic island slopes (at depths of 50 to 1000 m) with a global distribution, including the northeast Atlantic waters from Norway to Cape Verde (Wakefield *et al.*, 2013).

This species is rarely encountered and knowledge of its biology and catch history is limited. It can potentially reach 2 m in length and a weight of 100 kg (Roberts, 1989). A maximum age of 78 years for females and 55 years for males was determined from thin transverse sections of otoliths, with an extended juvenile pelagic stage that reaches maturity at 14.4 and 11.2 years, respectively (Wakefield *et al.*, 2013).

The spawning period is from autumn to early winter (March to June). The combined natural mortality in the western North Atlantic waters is estimated as  $M = 0.14$  (Vaughan *et al.*, 2001).

The exceptional longevity and associated life attributes together with the depth range distribution, qualifies this species as a deep-water species according to the definition provided.

***Pagellus bogaraveo* (red blackspot seabream)**

ICES considers that *Pagellus bogaraveo* (better known as (red) blackspot seabream in FAO) does qualify, according to the definition above, as a deep-sea species.

The red blackspot seabream is found in the northeast Atlantic, from south of Norway to Cape Blanc, in the Mediterranean Sea, and in the Azores, Madeira, and Canary Archipelagos (Desbrosses, 1938; Pinho and Menezes, 2005). Red blackspot seabream is a benthopelagic species that inhabits various types of bottom (rock, sand, and mud) down to a depth of 900 m. The vertical distribution of this species varies according to individual size and the season of the year. Red blackspot seabream undertakes a vertical spawning migration, with the adults moving from deeper to shallower waters during the spawning season and forming aggregations. Red blackspot seabream is also found on the shelf and down to 700 m on seamounts in ICES Subarea IX (Morato *et al.*, 2001). In the Strait of Gibraltar fishing takes advantage of the fluctuation of the tide at depths from 350 to 700 m (ICES, 2015d). Lorange (2011) hypothesized a relatively low natural mortality ( $M = 0.2$ ) based on the observed maximum age.

Red blackspot seabream is a protandric hermaphrodite species changing from male to female at ages often assumed to be between 4 and 6, but which could possibly be as high as 8 years (Lorange, 2011). Red blackspot seabream has a low productivity and is considered a slow-growing species with a reported maximum age of 20+ years (Gueguen, 1969). An annual reproductive cycle has been described for the species in this area (Gil, 2006) in the Strait of Gibraltar. Lorange (2011) hypothesized a relatively low natural mortality ( $M = 0.2$ ) based on the observed maximum age.

***Galeus melastomus* (blackmouth catshark)**

ICES considers that *Galeus melastomus* (blackmouth dogfish, also known as blackmouth catshark by FAO) does not qualify, according to the definition above, as a deep-sea species.

Concerning blackmouth catshark (*Galeus melastomus*), ICES reiterates the answer to the request from the Commission in 2013 regarding ‘Opinion on modification to the list of deep-sea sharks’ (ICES, 2013b), that “*G. melastomus* should be removed from the list of deep-water sharks.”

***Molva molva* (ling)**

ICES considers that *Molva molva* (ling) does not qualify, according to the definition above, as a deep-sea species.

Ling has a wide distribution in all northeast Atlantic waters. In Icelandic waters it is found on the continental shelf and on slopes southeast, south, and west of Iceland at depths of 0–1000 m, but it is mainly caught in the fisheries at depths around 200–500 m by longliners and trawlers.

Spawning occurs in April to June at depths of 60 m to about 500 m, and young ling about 2–4 years old (< 40 cm) are taken on hooks near land (i.e. in Faroese waters; ICES, 2015d). The age range is 2 to 20 years and assessment models use a relatively low natural mortality for all ages ( $M = 0.15$ ; ICES, 2015d).

The rather continuous life history traits of this species according to depth hardly allows for a clear distinction between typical demersal and deep-sea species. However, the DEEPFISHMAN project (DEEPFISHMAN, 2012) considered deep waters as depths greater than 200 m and deep-water fish as those with more than 50% of the adult biomass distributed below 200 m (based on survey data in the Bay of Biscay and Celtic Sea, 43.5°N to 52°N). The estimated proportion of biomass below 200 m for this species was 8%.

ICES Working Group on the Biology and Assessment of Deep-sea Fisheries Resources (WGDEEP) does not consider that this species generally fulfils the requirements to be considered a deep-sea species according to the definition provided above.

***Brosme brosme* (tusk)**

ICES considers that *Brosme brosme* (tusk) does qualify, according to the definition above, as a deep-sea species.

Tusk is a benthic species, and though it is widely distributed in the North Atlantic waters at depth ranges of 18–1000 m, it spawns in shallower waters between 40–400 m (Cohen *et al.*, 1990). According to Pethon (2005) tusk is most common at depths between 200 and 500 m, but it can be found at depths between 50 and 1000 m. The average depth of catch by the Norwegian longliner fleet in ICES Division Vb is 480 m; the mean catching depth is at a higher level (less than 300 m) in the more northern ICES Subareas I and II, and in Icelandic waters tusk is caught together with ling and cod above and below depths of 200 m. The highest estimated age in the catch is 15–17 years in both Subareas I and II and Division Vb. Age data is not available from other areas.

The assessment models for this species use a relatively low natural mortality for all ages ( $M = 0.15$ ; ICES, 2012).

The DEEPFISHMAN project (DEEPFISHMAN, 2012) considers this species as a deep-water one in EU waters, where the platform breaks at 200 m, with more than 50% of the biomass assumed to occur at depths below 200 m. Tusk is also known to occur on hard bottom and has been observed associated with cold-water corals.

***Phycis blennoides* (greater forkbeard)**

ICES considers that *Phycis blennoides* (greater forkbeard) does qualify, according to the definition above, as a deep-sea species.

The greater forkbeard is a gadoid fish which is widely distributed in the Northeastern Atlantic, from Norway and Iceland to Cape Blanc in West Africa and the Mediterranean (Svetovidov, 1986; Cohen *et al.*, 1990).

It is found on the continental shelf from depths of 60 m and is caught in deep-water fisheries, down to at least 1000 m in both the Atlantic and Mediterranean Sea (Massutí *et al.*, 1996; Casas and Piñeiro, 2000). The greater forkbeard is a quite fast-growing species with a strong sexual dimorphism; females reach lengths of more than 80 cm, corresponding to an age of 14 years, and males have an asymptotic length of about 60 cm with the highest estimated age not exceeding 6 years (Casas and

Piñeiro, 2000). The spawning areas and seasonality are also not well identified (ICES, 2015d). Juveniles occur on the shelf, with one-year-old fish caught at depths of about 100 m in demersal trawl surveys, such as the French EVHOE survey in the Celtic Sea.

In the Mediterranean Sea, the highest abundance and biomass are found at depths between 200 and 400 m (Massutí *et al.*, 1996). Data from the Spanish survey on the Porcupine Bank show that the highest catch rates of greater forkbeard are obtained at depths between 300 m and 450 m. In commercial fisheries, greater forkbeard is caught by bottom trawls, longlines, and nets, mostly as a bycatch.

## Sources and references

Bensch, A., Gianni, M., Gréboval, D., Sanders, J. S., and Hjort, A. 2009. Worldwide review of bottom fisheries in the high seas. FAO Fisheries and Aquaculture Technical Paper No. 522, Rev. 1. Rome, FAO. 145 pp.

Boje, J., and Hareide, N-R. 1993. Trial deepwater longline fishery in Davis Strait, May–June 1992. NAFO SCR Doc. 93/53, Serial No. N2236. 6 pp.

Casas, J. M., and Pineiro, C. 2000. Growth and age estimation of greater fork-beard (*Phycis blennoides* Brunnich, 1768) in the north and northwest of the Iberian Peninsula (ICES Division VIIIc and IXa). Fisheries Research, 47:19–25.

Cohen, D. M., Inada, T., Iwamoto, T., and Scialabba, N. 1990. FAO species catalogue. Vol. 10. Gadiform fishes of the world (Order Gadiformes). An annotated and illustrated catalogue of cods, hakes, grenadiers and other gadiform fishes known to date. FAO Fish. Synop. 125(10). Rome: FAO. 442 pp.

D'Onghia, G., Mastrototaro, F., and Maiorano, P. 2000. Biology of silver scabbardfish, *Lepidopus caudatus* (Trichiuridae), from the Ionian Sea (Eastern-Central Mediterranean). Cybium, 24(3): 249–262.

DEEPFISHMAN. 2012. Guidelines towards a prototype management and monitoring framework for deep-water fisheries/stocks in the NE Atlantic. DEEPFISHMAN – Management and Monitoring of Deep-sea Fisheries and Stocks, Project number: 227390. Small or medium scale focused research action. Topic: FP7-KBBE-2008-1-4-02 (Deep-sea fisheries management). Deliverable D7.4.

Desbrosses, P. 1938. La dorade commune (*Pagellus centrodontus*) et sa pêche. Revue du Travail de l'Office des Pêches maritime, 5(2): 167–222.

FAO. 2009. International Guidelines for the Management of Deep-sea Fisheries in the High Seas. Rome. 73 pp.

Figueiredo, C., Diogo, H., Pereira, J. G., and Higgins, R. M. 2015. Using information-based methods to model age and growth of the silver scabbardfish, *Lepidopus caudatus*, from the mid-Atlantic Ocean. Marine Biology Research, 11: 86–96.

Gil, J. 2006. Biología y pesca del voraz [*Pagellus bogaraveo* (Brünnich, 1768)] en el Estrecho de Gibraltar. Tesis Doctoral, Universidad de Cádiz (UCA, Spain).

Gueguen, J. 1969. Croissance de la dorade, *Pagellus centrodontus* Delaroche. Revue du Travail de l' Institut des Pêches Maritimes, 33(3): 251–254.

Hareide, N-R., and Garnes, G. 2001. The distribution and abundance of deep water fish along the Mid-Atlantic Ridge from 43°N to 61°N. Fisheries Research, 51: 297–310.

ICES. 2005. Deep-water fisheries resources south of 63°N. In Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment, and Advisory Committee on Ecosystems, 2005. ICES Advice. Volume 10.

ICES. 2012. Report of the Working Group on the Biology and Assessment of Deep-sea Fisheries Resources (WGDEEP), 28 March–5 April, Copenhagen, Denmark. ICES CM 2012/ACOM:17. 929 pp.

ICES. 2013a. Stock Annex: Greenland halibut (*Reinhardtius hippoglossoides*) in Subareas V, VI, XII, and XIV (Iceland and Faroes grounds, West of Scotland, North of Azores, East of Greenland). International Council for the Exploration of the Sea. 16 pp.

- ICES. 2013b. Opinion on modification to the list of deep-sea sharks. *In* Report of the ICES Advisory Committee, 2013. ICES Advice 2013, Book 11, Section 11.2.1.1.
- ICES. 2015a. Report of the North-Western Working Group (NWWG), 28 April–5 May, ICES HQ, Copenhagen Denmark. ICES CM 2015/ACOM:07. 717 pp.
- ICES. 2015b. Report of the Arctic Fisheries Working Group (AFWG), 23–29 April, ICES HQ, Hamburg, Germany. ICES CM 2015/ACOM:05.
- ICES. 2015c. Greenland halibut (*Reinhardtius hippoglossoides*) in Subareas I and II (Northeast Arctic). *In* Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 3, Section 3.3.7.
- ICES. 2015d. Report of the Working Group on the Biology and Assessment of Deep-sea Fisheries Resources (WGDEEP), 20–27 March 2015, Copenhagen, Denmark. ICES CM 2015/ACOM:17. 738 pp.
- Lorance, P. 2011. History and dynamics of the overexploitation of the blackspot sea bream (*Pagellus bogaraveo*) in the Bay of Biscay. *ICES Journal of Marine Science*, 68: 290–301.
- Lorance, P., Souissi, S., and Uiblein, F. 2002. Point, alpha and beta diversity of carnivorous fish along a depth gradient. *Aquatic Living Resources*, 15: 263–271.
- Massutí, E., Morales Nin, B., and Lloris, D. 1996. Bathymetric distribution and recruitment patterns of *Phycis blennoides* (Pisces: Gadidae) from the slope of the northwestern Mediterranean. *Scientia Marina*, 60(4): 481–488.
- Morato, T., Sola, E., Gros, M. P., and Menezes, G. 2001. Feeding habits of two congener species of seabreams, *Pagellus bogaraveo* and *Pagellus acarne*, off the Azores (northeastern Atlantic) during spring of 1996 and 1997. *Bulletin of Marine Science*, 69: 1073–1087.
- Nizovtsev, G. P. 1989. Recommendations on rational exploitation of Greenland halibut stocks in the Barents and Norwegian seas. USSR Ministry of Fisheries, PINRO, Murmansk, 93 pp. (In Russian.)
- Pethon, P. 2005. Aschehougs store fiskebok. H. Aschehoug & Co., Oslo. 448 pp. (In Norwegian.)
- Pinho, M. R., and Menezes, G. 2005. Azorean Deepwater Fishery: Ecosystem, Species, Fisheries and Management Approach Aspects. Deep Sea 2003: Conference on the Governance and Management of Deep-sea Fisheries, Conference Poster and Dunedin Workshop Papers. *FAO Fish. Proc.* 3/2.
- Roberts, C. D. 1986. Systemics of the percomorph fish genus *Polyprion* Oken, 1817. PhD Thesis, Victorian University of Wellington.
- Shuntov, V. P. 1965. Distribution of Greenland halibut and arrowtooth flounder in the northern Pacific. *Trudy VNIRO*, 58: 155–164. (In Russian.)
- Svetovidov, A. N. 1986. Gadidae. *In* *Fishes of the Northeastern Atlantic and the Mediterranean*. Vol II by P. J. P. Whitehead, M-L. Bauchot, J-C. Hureau, J. Nielsen, and E. Tortonese. (Eds). Unesco, Paris, 1986. 490 pp.
- Vaughan, D. S., Manooch, C. S., and Potts, J. C. 2001. Assessment of the wreckfish fishery on the Blake Plateau. *American Fisheries Society Symposium*, 25: 105–120.
- Wakefield, C. B., Newman, S. J., and Boddington, D. K. 2013. Exceptional longevity, slow growth and late maturation infer high inherent vulnerability to exploitation for bass groper *Polyprion americanus* (Teleostei: Polyprionidae). *Aquatic Biology*, 18: 161–174. doi: 10.3354/ab00501.