

Stock Annex: Blue ling (*Molva dypterygia*) in subareas 1, 2, 8, 9, and 12, and in divisions 3.a and 4.a

Stock specific documentation of standard assessment procedures used by ICES.

Stock:	Blue ling (<i>Molva dypterygia</i>) in subareas 1, 2, 8, 9, and 12, and in divisions 3.a and 4.a (bli.27.nea)
Working Group:	Working Group on Biology and Assessment of Deep-sea Fisheries (WGDEEP)
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A. General

A.1. Stock definition

In the Northeast Atlantic, blue ling (*Molva dypterygia*) is distributed from the Barents Sea along the coast of Norway to the west of the British Isles, around the Faroe Islands and Iceland and off the east coast of Greenland. ICES works with three different stocks for this area:

- 1) Bli.27.nea (Subarea 1, 2, 8, 9, 12 and Divisions 3a, 4a)
- 2) Bli.27.5a, 14
- 3) Bli.27.5b, 6-7

Biological investigations in the early 1980s suggested that at least two adult stock components were found within the area, a northern stock in Subarea 14 and Division 5.a with a small component in 5.b, and a southern stock in Subarea 6 and adjacent waters in Division 5.b. However, the observations of spawning aggregations in each of these areas and elsewhere suggest further stock separations. This is supported by differences in length and age structures between areas as well as in growth and maturity. Egg and larval data from early studies also suggest the existence of many spawning grounds. However, in most areas small blue ling below 60 cm do not occur and fish appear in survey and commercial catch at 60–80 cm suggesting large scale spatial migrations and therefore limited population structuring. The conclusion is that stock structure of blue ling in the ICES area is uncertain. Until new data suggest another population structure, ICES will assess (i) one stock in Division 5.b and Subareas 6 and 7, (ii) one in Division 5.a and 14 and one for all other areas where the species occurs.

This stock annex is for these other areas". These include subareas 1 and 2 and divisions 4.a and 3.a where historical landings have been significant and subareas, 8 and 9, where the species does not occur. Landings reported in 8 and 9 are ascribed to the related Spanish ling (*Molva macrophthalmus*) and are not considered for assessment of blue ling. The situation in Subarea 12 is different as this subarea includes part of the Mid-Atlantic Ridge (in divisions 12.a1, 12.a2, 12.a4 and 12.c) and the western slope of the Hatton Bank (in Division 12.b). None of these have represented major landings in the 2000s. However, based upon the continuity of bathymetric features and lesser abundance, blue ling from the western Hatton Bank (12.b) is likely to be connected to the same species from the northern Hatton Bank (6.b). Therefore, including ICES Division 12.b in the assessment unit for 5.b, 6 and 7 could be considered. Because of the much lesser abundance of blue ling on the Hatton Bank, this would not impact significantly on the assessed stock biomass and dynamics.

A.2. Fishery

Blue ling has been under high fishing pressure on spawning aggregations in all the stock units. This fishery was regarded as not sustainable and restrictions on directed fisheries on spawning aggregations were implemented. Historically, there was a such Norwegian directed gillnet fishery on spawning aggregations on Storegga in Subarea 2, this fishery landed around 6000 tons per year in the 1970's and 80's. Since 2009 new regulations have banned this directed fishery, and blue ling in Subarea 2 is now only allowed as bycatch. Blue ling has been an important bycatch in trawl fisheries for mixed deep-water species on Hatton Bank (Division 12.b). In the rest of the assessment unit area (Subarea 1 and divisions 3.a, 4.a, 12.a and 12.c) blue ling has only been caught in small quantities.

Blue ling is landed for both human consumption.

A.3. Ecosystem aspects

Blue ling has a wide distribution in the Northeast Atlantic. Spawning areas have been observed from Scotland to Iceland (Lousy Bank, Bill Baily Bank, Faroe Bank, Reykjanes Ridge, Westman Islands), off the Norwegian coast (Storegga), and at East Greenland (Large *et al.*, 2010). Spawning depth varies with area and range most commonly from 600-1000 m. Spawning time February-March in Icelandic waters, March-April in the Scotland-Faroes region and May-June on Storegga (Magnusson *et al.*, 1997). Eggs and larvae occur over a large part of the distribution area and juveniles are pelagic before the demersal settlement. There are some occurrences of young fish in the Icelandic bottom trawl survey but in general there are uncertainties of where individuals grow up.

Blue ling will be found mostly around 400-650 m depth but can occasionally be found at depths down to 1000 m. It is mainly a piscivorous predator although crustaceans and cephalopods are also fed upon.

Blue ling can be about 30 years old. Age determination is difficult, and the method involves embedding and cutting thin otoliths slices for counting growth rings under binocular. Age at maturity is thought to be between 6-12 years; length at maturity is about 75-85 cm, with maximum length 155 cm. The growth is rapid in the first years but slows

down after onset of sexual maturation. Females become larger than males, but during first years of life there is little difference in growth between sexes.

B. Data

B.1. Commercial catch

Full landings data are available from 1988 to present but it is thought that fisheries in some of these areas pre-date the time series. Incomplete landings data are available from Norwegian longline fisheries from 1896 onwards. Additional landings data from other areas may be available from 1950 onwards.

It is thought that discarding of blue ling is insignificant since the fishery is catching mostly adult individuals. Discards reported to ICES are very small.

B.2. Biological

Considerable general information is available on the life history characteristics of this species; in ex. maximum length=155 cm, length at maturity=86 cm, maximum age=30 years

B.3. Surveys

There are no dedicated surveys on this species in the stock area. Other Norwegian surveys in the area are using demersal trawls and they are not properly sampling blue ling.

B.4. Commercial CPUE

There is a Norwegian CPUE from the fisheries in subareas 1 and 2 and divisions 3a and 4a. The series started in 2000 and is calculated as (kg/number hooks)*1000 on Norwegian logbook data. Because of the small quantities caught by the fishery, this CPUE cannot be use for assessing the biomass trend in these subareas.

B.5. Other relevant data

C. Assessment: data and method

The stock is defined as a category 5 stock, and assessment is based on catch trends from fisheries in the area. The fisheries vary between areas in gear types but all catches of blue ling are now bycatches from other fisheries.

D. Short-Term Projection**E. Medium-Term Projections****F. Long-Term Projections****G. Biological Reference Points**

No biological reference points are set for this stock unit.

H. Other Issues**H.1. H.1. Historical overview of previous assessment methods****I. References**

Large P.A., G.Diez, J.Drewery, M.Laurans, G.Pilling, D.G.Reid, J.Reinert, A.B.South and V.I.Vinnichenko. 2010. Spatial and temporal distribution of spawning aggregations of blue ling (*Molva dypterygia*) west and northwest of the British Isles. *ICES Journal of Marine Science*, 67(3):494-501.

Magnusson, J.V., O.A.Bergstad, N.R.Hareide, J.Magnusson and J.Reinert. 1997. Ling, blue ling and tusk of the Northeast Atlantic. *TemaNord* 1997:535. Nordic Council of Ministers, Copenhagen 1997.