

Merluccius paradoxus Franca, 1960

Fig. 34

Merluccius capensis paradoxus Franca, 1960, *Mem. Junta Invest. Ultram.*, 2nd ser., 18: 57-101 (Southwest Afr., 27° 37'S-29° 51.7'S).

Synonyms: *Merluccius capensis* (non Castelnau, 1861): Franca, 1956: 49-68 (Southwest Afr.). *Merluccius merluccius paradoxus*: Franca, 1962: 7-48 (taxonomy). *Merluccius merluccius paradoxus*: Franca, 1971: 1-18 (Kunene). *Merluccius paradoxus*: Quéro, 1973: 117-123 (from Cape Frío to Port Elizabeth).

FAO Names: En – Deepwater Cape hake; Fr – Merlu du large du Cap; Sp – Merluza de altura del Cabo.

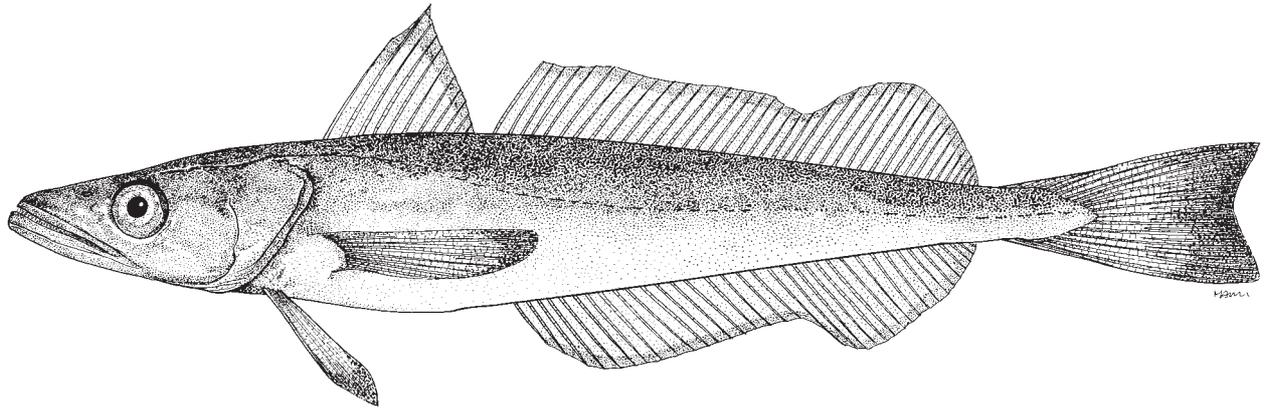


Fig. 34 *Merluccius paradoxus*

Diagnostic Features: Scales along the lateral line 121 to 143. Head 26.0 to 28.6% of standard length. Snout 30.6 to 35.3%, eye diameter 18.7 to 21.4%, and interorbital 22.5 to 28.0% of head length. Scales on nasal membrane, lacrimal, lower part of cheek, preopercular, and interopercular. Lower jaw slightly protruding with small teeth as on premaxillary. Gillrakers on first branchial arch 17 (19-20) 23, 4 to 7 on the upper arm and 13 to 18 on the lower. 1D 9 (11) 12 rays; 2D 37 (40) 42 rays; A 38 (39-41) 42 rays. Pectoral fins with 14 (15) 16 rays, length 19.1 to 23.6% of standard length; tips always reaching beyond the origin of anal fin. Posterior margin of caudal fin slightly convex. Vertebrae 54 (56) 58, 6 of which are cervical with 4 ribs. **Colour:** dark grey on dorsum, lighter on sides; light grey on belly. Black mark on submandibular, of varying size and form. Melanophores on gillrakers and their base. Mouth cavity and tongue greyish.

Additional Information: *Merluccius* species presenting the largest scaled areas on head. The dorsal and lateral parts of the head completely covered with scales, as well as the membrane of the front tip of the snout, under which slides the ascending process of the premaxillaries. Only a small part of the head situated between the posterior nasal orifice and orbit is without scales. Lacrimal, cheek, preopercular, subopercular, and interopercular completely covered by scales. Scales on *M. polli* are very similar to *M. paradoxus* except on the front tip of the snout, which lacks them. Despite sharing a large distribution area, it differs from *M. capensis* in having scales on the lacrimal, preopercular, and interopercular, and in having a submandibular mark.

Geographical Distribution: Eastern Atlantic, from Cape Frío (18°S) to the south of Agulhas Bank in the Indian Ocean, to East London; also recorded on the Madagascar Ridge (33°S-44°E). One of the specimens examined (MNHN 1988 1410), 41.5 cm total length and 36.6 cm standard length, was caught at 605 m depth southwest of Madagascar (22° 17'S-43° 03'E), a first recording in this locality (Fig. 35).

Habitat and Biology: Demersal species living in muddy depths on the continental shelf and slope at 200 to 850 m depths, although most commonly found below 400 m. Feeds mainly on fish, crustaceans (Mysidacea, Euphausiacea), and cephalopods (squids); juveniles feed mostly on Euphausiacea. Reproduction is not very well known, but probably takes place between September and November.

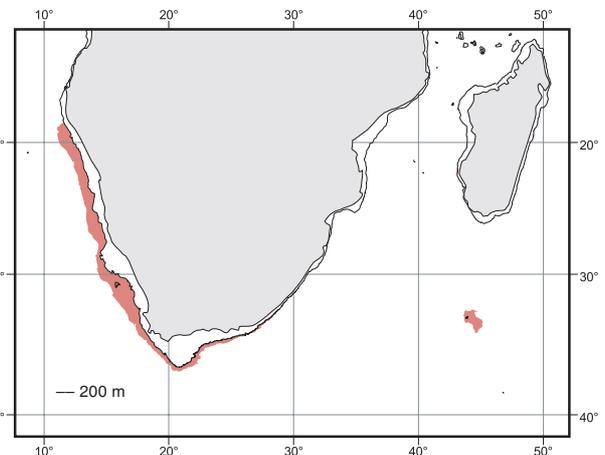


Fig. 35 *Merluccius paradoxus*
■ Known distribution

Size: Maximum recorded length, 82 cm (females) and 53 cm (males); commonly 40 to 60 cm.

Interest of Fisheries: See *Merluccius capensis*.

Local Names: ANGOLA: Marmota, Pescada; DENMARK: Kulmule; FRANCE: Merlu du large du Cap, Merlu profond; GERMANY: Seehecht; NAMIBIA: Diepwater stokvis, Hake, Stokvis; POLAND: Morszczuk atlantycki; PORTUGAL: Marmota, Pescada, Pescada do sudoeste africano; SOUTH AFRICA: Deepwater hake, Diepwater stokvis; SPAIN: Merluza de altura del Cabo, Merluza de cantil; UNITED KINGDOM: Deep water hake, Deep-water Cape hake.

Literature: Pappe (1854); Franca (1962); Lozano Cabo (1965); Inada (1981b); Franca (1971); Lloris (1981 and 1982); Bianchi (1986); Lloris (1986); Inada *in* Cohen *et al.* (1990); Bianchi *et al.* (1999).

Merluccius patagonicus Lloris and Matallanas, 2003

Fig. 36

Synonyms: Very probably mixed up with *Merluccius hubbsi* Marini, 1933 and also perhaps with *M. australis* (Hutton, 1872).

FAO Names: En – Patagonian hake; Fr – Merlu de Patagonie; Sp – Merluza patagónica.

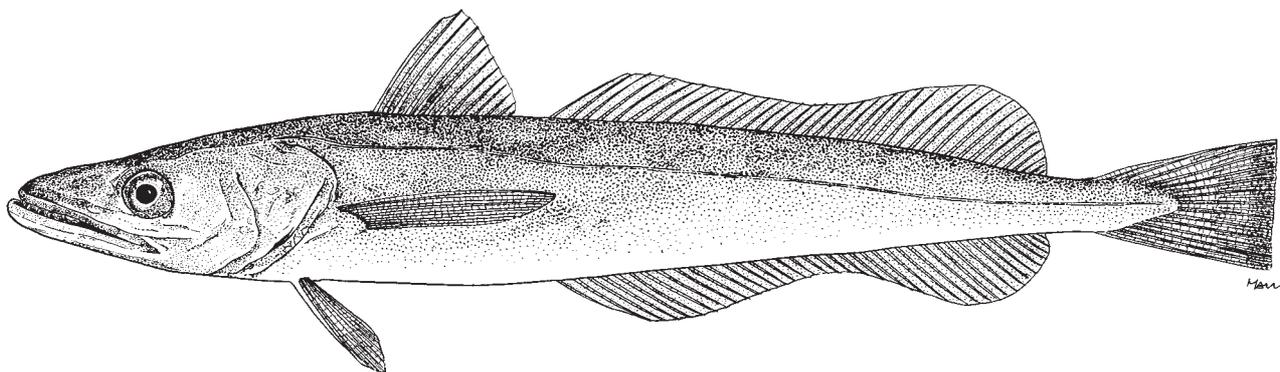


Fig. 36 *Merluccius patagonicus*

Diagnostic Features: Scales along the lateral line 123 to 126. Head 26.8 to 28.8% of standard length (28.8% on the holotype); snout 30.6 to 33.3% of head length (33.3% on the holotype). No scales on nasal membrane, lacrimal, and lower part of interopercular; scales on lower part of cheek and preopercular. Eye diameter 17.9% of head length on the holotype (14.1 to 20.2% on the paratypes) and interorbital 24.7% on the holotype (21.1 to 26.7% on the paratypes). Lower jaw protruding, with large visible teeth as on the premaxillaries. First branchial arch of the holotype with 14 gillrakers (14, 15 and 17 on paratypes): 3 or 4 on the upper part and 9 to 13 on the lower. 1D 11 rays on the holotype and 10 (11) 13 on the paratypes; 2D 38 rays on holotype (36 to 38 on paratypes); A 39 rays on holotype (37 to 38 on paratypes). Pectoral fins with 14 or 15 rays; length 15.6% of standard length on the holotype (15.2 to 16.8% on paratypes); in males and small specimens, fins reach origin of anal fin, but not on adult females. Ventral fins 11.7% of standard length on the holotype (10.7 to 13.0% on paratypes). Posterior margin of caudal fin truncate or slightly convex. **Colour:** brownish grey, darker on dorsum, light on sides, whitish on belly. Small melanophores on gillrakers and their base.

Additional Information: For this study, 160 specimens were captured between 45° and 49°S in the Argentinian Sea. The majority corresponded to the typical *Merluccius hubbsi* pattern. Five of them, caught at 95 m depth (45° 30'S – 65° 30'W), however, possessed clear differential characters. All of them with a free opercular edge separation diverging away from lateral line; otolith, hyomandibular, and urohyal differ from those of *M. hubbsi* and *M. australis* (Plates: VIII and IX, X, XI, XII – Fig. J), also differentiated by meristic character range (second dorsal and anal rays, and lateral line).

The specimen considered as a holotype (measuring 61 cm total length and 56.2 cm standard length) is kept at the Instituto de Ciencias del Mar (CMIMA-CSIC) in Barcelona, catalogue number IIPB 500/2001. IIPB 501, 502, and 504/2001 are considered paratypes; measurements, hyomandibular, and urohyal of the fifth specimen only have been retained.

Etymology: The name *Merluccius patagonicus* is derived from the marine geographical region from where the species comes (Patagonia Argentina)

Geographical Distribution: Latitude near Comodoro Rivadavia on the Argentinian Atlantic coast, 95 m deep.

Habitat and Biology: Unknown.

Size: Maximum length on specimen studied 77 cm (female) total length and 71 cm standard length; the smaller specimens 29.7 cm total length and 27 standard length.

Interest to Fisheries: Unknown up until now for having been mixed up with *M. hubbsi* and/or *M. australis*.

Local Names: None.

Literature: Lloris and Matallanas (2003).

Merluccius polli Cadenat, 1950

Fig. 37

Merluccius polli Cadenat, 1950, *Cong. Pêche pêcheur. Un. Franç. d'outre Mer.*, 129 (type locality: near Congo River mouth, 6°S).

Synonyms: *Merluccius cadenati* Doutre, 1960, *Rev. Trav. Inst. scient. Tech. Pêche*, 24(4): 517 (from Cape Blanc to Cape Roxo). *Merluccius merluccius polli*: Franca, 1962, *Mem. Junta Invest. Ultram.*, 2(36): 25 (taxonomy). *Merluccius merluccius cadenati*: Franca, 1962, *Mem. Junta Invest. Ultram.*, 2(36): 25 (taxonomy). *Merluccius merluccius polli*: Lozano Cabo, 1965, *Publ. Téc. Junta Estud. Pesca*, 4: 20 (from Port Gentil to Benguela). *Merluccius merluccius cadenati*: Lozano Cabo, 1965, *Publ. Téc. Junta Estud. Pesca*, 4: 18 (from Cape Blanc to Cape Roxo).

FAO Names: En – Benguela hake; Fr – Merlu d'Afrique tropicale; Sp – Merluza de Benguela.

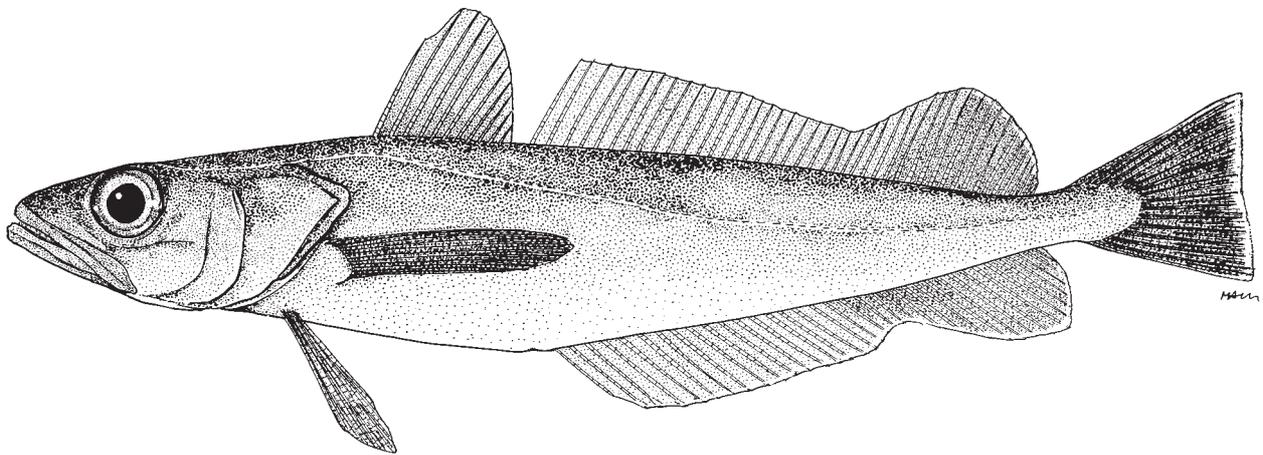


Fig. 37 *Merluccius polli*

Diagnostic Features: Scales along the lateral line 98 to 127. Head length 24.8 to 29.1% of standard length. Snout 30.2 to 35.9% of head length. Scales on nasal membrane, lacrimal, lower part of cheek, preopercular, and interopercular. Eye diameter 16.4 to 21.8%, interorbital 24.1 to 28.0% of head length. Head large, lower jaw very slightly or not prominent. Teeth small on lower jaw and premaxillaries. Gillrakers on first branchial arch 8 (10) 12: 1 to 3 on upper part and 7 to 9 on the lower. 1D 7 (11) 12; 2D 36 (38-39) 41; A 36 (38) 42. Pectoral fins with 14 (15) 17 rays, length 17.7 to 21.8% of standard length and reaching origin of anal fin. Ventral fins 13.0 to 16.7% of standard length. Posterior margin of caudal fin generally truncate, but sometimes concave. Vertebrae 52 (54-56) 57, 5 cervical with 3 ribs. **Colour:** generally blackish, darker on dorsum; caudal fin white-edged. Mouth cavity and tongue blackish. Black continuous mark on submandibular fold.

Additional Information: Seeing that differences were found between *Merluccius polli* Cadenat, 1950 and *M. cadenati* Doutre, 1960 in the otolith (*sagitta*), hyomandibular, urohyal, and certain meristic values, as well as a 500 km gap between the two geographic distributions (from Liberia, 05° 07'N, to Port Gentil, 0° 15'S), two subspecies have been proposed:

Merluccius polli polli Cadenat, 1950
(from Port Gentil, Angola to the north of Namibia)

1D. 10 (11) 12; **2D.** 36 (38) 41; **A.** 36 (38) 42; **P.** 14 (15) 17; **V.** 7; **Gr.** 8 (10) 11; **L.L.** 98-127;
TV. 53 (54) 57; **CV.** 5; **CC.** 3

Merluccius polli cadenati Doutre, 1960
(from Mauritania, Senegal, Gambia, Guinea-Bissau, Sierra Leone, and Liberia)

1D. 7 (11) 12; **2D.** 36 (39) 41; **A.** 36-40; **P.** 15-16; **V.** 7; **Gr.** 9 (10) 12; **L.L.** 110;
TV. 52 (56) 57; **CV.** 5; **CC.** 3.

Geographical Distribution: General distribution in the eastern Atlantic ranges from a point between Cape Barbas and Cape Blanc in Mauritania, through Senegal, Gambia, Guinea-Bissau, and Liberia (05° 07'), all the way to to Namibia. To the north it overlaps with *M. senegalensis*, and to the south with *M. capensis* and *M. paradoxus*. The subspecies proposed in this catalogue, *M. polli cadenati*, is distributed from Cape Barbas (aprox. 22°30'N) to Liberia (05° 07'N). After a 500 km break from Liberia to Port Gentil (0° 15' S), *M. polli polli* is found in Angola and to the north of Namibia (18° 30'S – 11° 26' E). Maurin (1963) reported catches of *M. polli cadenati* between Cape Juby and Cape Bojador at over 500 m depths, which is slightly more north of its usual distribution (Fig. 38).

Habitat and Biology: Demersal species, generally found on the continental shelf and slope between a depth of 50 and 910 m. *M. polli cadenati* is found between 132 and 910 m, and can probably reach 1 000 m in Senegal and Gambia; *M. polli polli* is caught between a depth of 50 and 550 m. Feeds mainly on small fish, as well as squids, and natantia crustaceans.

Size: Maximum recorded length 80 cm; according to depth, commonly 16 to 42 cm.

Interest to Fisheries: Benguela hake (*Merluccius polli*) has been exploited in Angola and northern Namibia, although it is of little commercial interest. It is difficult to separate *Merluccius polli* and *M. senegalensis* catches. With regard to their exploitation and commercialization, Benguela hake is treated together with Senegalese hake (*M. senegalensis*) in the northern part of its distribution area and together with shallow water Cape hake (*M. capensis*) in the south. (See corresponding paragraphs for further information on respective fisheries.)

Local Names: ANGOLA: Marmota, Pescada, Pescada de Angola; CAPE VERDE: Pescada de Angola, Pescada africana, Pescada angolense; FRANCE: Merlu d'Afrique tropicale, Merluche; NAMIBIA: Benguela Seehecht, Hake, Stokvis; POLAND: Morszczuk angolanski; PORTUGAL: Marmota, Pescada de Angola; SENEGAL: Merlu; SPAIN: Merluza, Merluza de Angola, Merluza de Benguela, Merluza negra; UNITED KINGDOM: Benguela hake, Hake.

Literature: Hart (1948); Franca (1962); Maurin (1963); Lozano Cabo (1965); Pshenichnyy (1979); Inada (1981b); Bianchi (1986); Lloris (1986); Inada *in* Cohen *et al.* (1990), Bianchi *et al.* (1993); López Abellán and Ariz Tellería (1993).

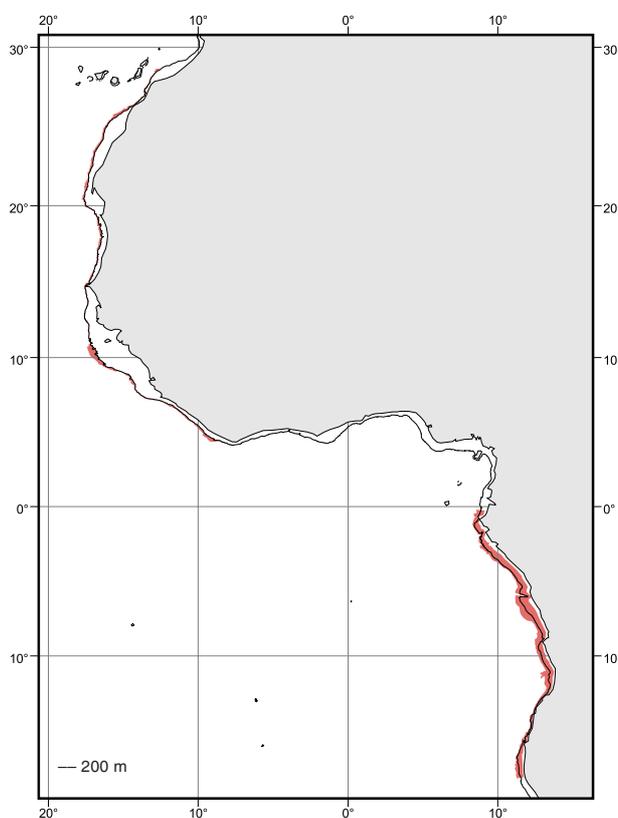


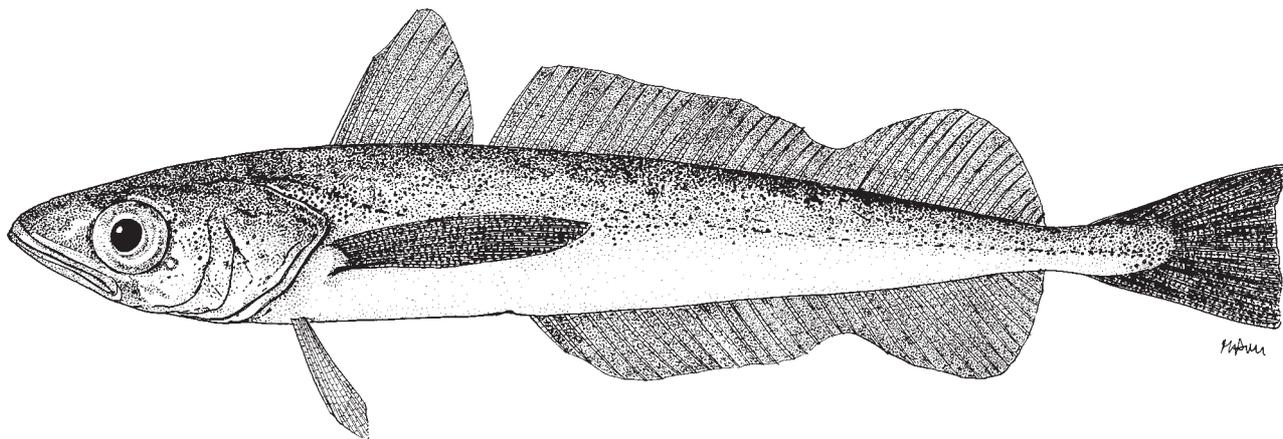
Fig. 38 *Merluccius polli*
Known distributions

Merluccius productus (Ayres, 1855)**Fig. 39**

Merlangus productus Ayres, 1855, *Proc. Cal. Acad. Sci.*, 1: 64 (type locality: San Francisco).

Synonyms: *Homalopomus trowbridgii* Girard, 1856, *Proc. Acad. Nat. Sci. Philad.*: 132 (Astoria, Oregon). *Gadus productus* Günther, 1862, *Cat. Fish. Brit. Mus.*, 4: 338 (coast of California). *Merluccius productus* Gill, 1863, *Proc. Acad. Nat. Sci. Philad.*: 247 (bibliography).

FAO Names: **En** – North Pacific hake; **Fr** – Merlu du Pacifique nord; **Sp** – Merluza del Pacífico norte.

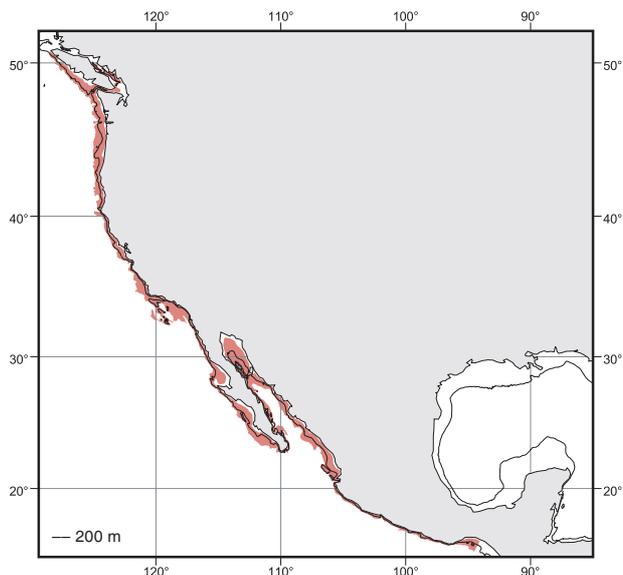
**Fig. 39** *Merluccius productus*

Diagnostic Features: Scales along the lateral line 144 to 166. Head 24.7 to 28.9% of standard length. Snout 31.1 to 35.4%, eye diameter 16.1 to 22.6%, and interorbital width 24.0 to 28.8% of head length. No scales on nasal membrane, lacrimal, lower part of cheek, preopercular, and interopercular. Gillrakers on first branchial arch 18 (22) 23, 3 to 6 on upper arm and 14 to 17 on lower. 1D 10 (11) 13 rays; 2D 37 (40-42) 44 rays; A 39 (41) 44 rays. Pectoral fins with 14 (16) 17 rays, length 17.4 to 21.9% of standard length and usually reaching beyond the origin of anal fin. Ventral fins 10.4 to 13.9% of standard length. Caudal-fin margin slightly concave. Vertebrae 50 to 55, 5 cervical with 3 ribs. **Colour:** silvery grey on back and whitish on belly.

Additional Information: Different populations have been described with meristic values and size variations, as noted below. North Pacific hake shares part of its distribution area with *M. angustimanus* (for differences see notes on the latter). Examples of differential characters are head length in comparison to standard length, number of gillrakers, scales along the lateral line, and hyomandibular and urohyal geometry.

Geographical Distribution: Eastern Pacific: Canada, United States and part of the Gulf of California, Mexico, up to 16°N (Gulf of Tehuantepec). To the south it shares its distribution area with Panama hake (*M. angustimanus*). Amongst the examined samples, one specimen (MNHN 0000-4954) coming from Mazatlan (Mexico) stands out, with a standard length of 424 mm, 22 (5+17) gillrakers, and head 27.9% of standard length (Fig. 40).

Habitat and Biology: North Pacific hake lives in association with the California Current, migrating to northern and shallower waters in autumn and winter. Feeds on crustaceans and fish: basic food for larvae and juveniles are copepods and euphausiacids, respectively. Adults feed on

**Fig. 40** *Merluccius productus*
Known distribution

euphausiacids, pandalids, and fish, especially herring; large specimens have cannibalistic habits. Growth is fast, attaining 26 cm by the second summer and 34 by the third; individuals can live up to 20 years, but commonly not more than 12. There is a dwarf population present mainly south of 28° 45'N, where most specimens reach sexual maturity at 2 years of age and over 22 cm. Another oceanic population, distributed north of 28° 44'N, reaches sexual maturity at 3 or 4 years and at 35 to 45 cm. Both populations live in the high seas, sometimes mixing at the limits of their respective distribution areas except during reproduction. The dwarf population reproduces between 25° and 28°N, 10 to 20 miles from the Baja Californian peninsular coast, between April and February; the population of larger-sized fish reproduces between 30° and 34°N, 100 to 200 miles from the Californian coast, with a peak in March. Little is known about reproductive aggregations; spawning seems to take place at 130 to 150 m depth, eggs float up to 40-60 m depth. The populations migrate north after reproduction, the larger the fish the farther north it reaches. Males, which are smaller than females, reach Canada later and begin their return to the spawning areas before them.

Size: Maximum recorded length 91 cm; common to 60 cm.

Interest to Fisheries: North Pacific hake (*Merluccius productus*) is the most abundant commercial species off the coast of California, Oregon, and Washington in the United States, and off British Columbia in Canada, where it is caught by pelagic trawlers. Fisheries evolved with the arrival of foreign fleets in 1966, with a rapid increase in fishing effort. Before the arrival of foreign fleets, the fisheries were local and coastal, and the small catches were used for fishmeal production. Soviet Union factory trawlers of around 85 m length were the first to arrive, and by 1970 other foreign fleets followed suit. In the 1980s, joint ventures with foreign countries were set up and sophisticated methods of detection were introduced, giving rise to an increase of local fleets of pelagic trawlers of around 25 m length. Development of this fishery faced difficulties as the product was subject to the alterations by myxozoa parasites, which induced muscular softening and proteolysis; this could only be avoided by rapid refrigeration or the use of enzyme inhibitors. At the end of the 1980s, only local fleets exploited the resources, as foreign fleets did not have access to fishing quotas. In the United States the catch was used for fishmeal and pet food, while the Soviet Union catch was gutted, filleted, and frozen, thus avoiding the softening of the flesh, which occurs 2 to 4 hours after being caught.

Annual catch evolution of this species has been irregular. Since the arrival of the Soviet Union fleet in 1966, catches increased from being insignificant to totalling over 150 000 tonnes and remaining relatively constant. In the 1980s local fleets, especially from the United States, gradually monopolized exploitation, and in 1987 the maximum catch totalled almost 300 000 tonnes. Foreign fleet activity gradually decreased until it ceased in 1990. A minimum of 35 000 tonnes was recorded in 1991, recovering in later years to around 200 000 tonnes, caught almost exclusively by the United States.

Local Names: DENMARK: Kulmule; FINLAND: Kaliforninkummeliturska; FRANCE: Merlu du Pacifique nord; GERMANY: Nordpazifischer seehecht, Pazifikhecht, Seehecht; GREECE: Bakaliaro; ITALY: Nasello dei Pacifico; NORWAY: Kalifornisk, Lysing; PORTUGAL: Pescada do Pacifico, Pescada do Pacifico norte; SPAIN: Merluza, Merluza del Pacifico norte, Merluza norteña, Merluza pacifica norteamericana; SWEDEN: Kalifornisk kummel; TURKEY: Pasifik berlami; UNITED STATES: North Pacific hake, Pacific hake, Whiting.

Literature: Ayres (1855); Girard (1856); Günther (1862); Gill (1863); Kner (1865); Schmeltz (1869); Marini (1933); Roedel (1948); Ginsburg (1954); Lozano Cabo (1965); Hart (1973); Vrooman and Paloma (1977); Inada (1981b); Ermakov (1983); Inada *in* Cohen *et al.* (1990); Inada, (1995); Methot and Dorn (1995).

Merluccius senegalensis Cadenat, 1950

Fig. 41

Merluccius senegalensis Cadenat, 1950, *Congr. Pêches Pêcher. Un. Franç. d'outre-mer*. 127-130 (type locality: "near the Cape Verde Island").

Synonyms: *Merluccius merluccius* (*non* Linnaeus, 1758): Belloc, 1937: 341-346 (Cape Verde, Senegal). *Merluccius merluccius senegalensis*: Franca, 1962: 25, 42 (taxonomy). *Merluccius merluccius senegalensis*: Lozano Cabo, 1965: 18 (from Cape Cantín to Cape Roxo). *Merluccius senegalensis*: Maurin, 1968: 34-36 (from north Morocco to Mauritania).

FAO Names: En – Senegalese hake; Fr – Merlu du Sénégal; Sp – Merluza del Senegal.

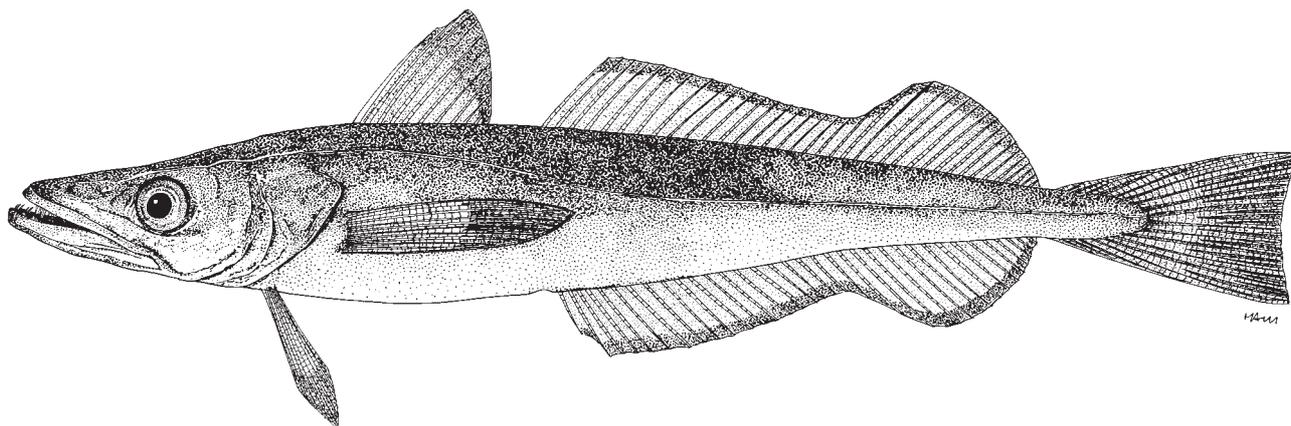


Fig. 41 *Merluccius senegalensis*

Diagnostic Features: Scales along the lateral line 124 to 155. Head 24.9 to 27.7% of standard length. Snout 30.2 to 34.1%, eye diameter 17.1 to 20.8%, and interopercular 27.0 to 31.0% in head length. Scales on nasal membrane, lower part of cheek, preopercular, and interopercular; no scales on lacrimal. Lower jaw very prominent, with a clear prognathism; mouth rather oblique. Gillrakers on first branchial arch 12 (15) 21, 3 or 4 on the upper arm and 10 to 17 on the lower. 1D 7 (11) 12 rays; 2D 37 (40) 43 rays; A 36 (38-39) 40 rays. Pectoral fins with 12 (15) 17 rays, length 16.5 to 21.3% of standard length, reaching origin of anal fin. Ventral fins 13.1 to 16.9% of standard length. Posterior margin of caudal fin usually truncate, slightly concave in specimens over 40 cm. Vertebrae 51 (54) 56, 6 cervical with 4 ribs. **Colour:** dark grey, blackish on dorsum and lighter on belly. Mouth cavity and tongue blackish. A split black mark on the submandibular fold.

Additional Information: Dendrograms of similarity and the analysis of allozymes show certain affinities between *Merluccius senegalensis*, *M. merluccius*, and *M. capensis*, as already noted in the respective sections of each species. *M. senegalensis*, as well as the rest of the species in the genus, shares its distribution area with other *Merluccius* species, in this case with *M. polli cadenati*. The two are easily distinguished, as among other characters, *M. senegalensis* has more gillrakers (12 to 21, as opposed to 9 to 12 for *M. polli cadenati*), the lower jaw prognathous, and lacks scales on the lacrimal.

Geographical Distribution: Eastern Atlantic, from Cape Cantin, Morocco (32° 32'N) to Cape Roxo, Senegal (12° 25'N). To the north, up to Cape Blanc, its distribution area overlaps with that of the European hake (*M. merluccius*), and from Cape Barbas (aprox. 22° 30'N) to Cape Roxo (12° 25'N), with that of the Benguela hake (*Merluccius polli*). Already mentioned here with the proposed subspecies *M. polli cadenati*. Its distributional limit varies throughout the year, moving further south from October to April and back again in August. Its relative abundance allows it to be situated in the optimum zone of distribution between Cape Barbas and Cape Timiris (Fig. 42).

Habitat and Biology: A demersal and bathypelagic species, lives preferentially over mud or sandy-mud bottoms in 18 to 800 m depths, although it is most abundant on the upper and lower part of the continental slope between 100 and 600 m. Feeds on fish (*Synagrops microlepis*, *Chlorophthalmus agassizi*, *Trachurus trecae*, Scombridae, Macrouridae, Myctophidae, and other Merlucciidae), crustaceans (*Munida iris*, *Parapenaeus longirostris*, *Plesionika edwardsi*, and *Plesionika heterocarpus*), and cephalopods. Growth characteristics are not very well known; males seem to reach first sexual maturity between 22 and 28 cm. Spawning occurs in northern areas from January to March, according to Doutré (1960), and from October to March, according to López Abellán and Ariz Tellería (1993), coinciding with the southern migration; females are more abundant than males. The fecundity of a female of 57.5 cm (TL), a weight of 1 kg, and with ovaries of 87 g was found with around 78 600 oocytes.

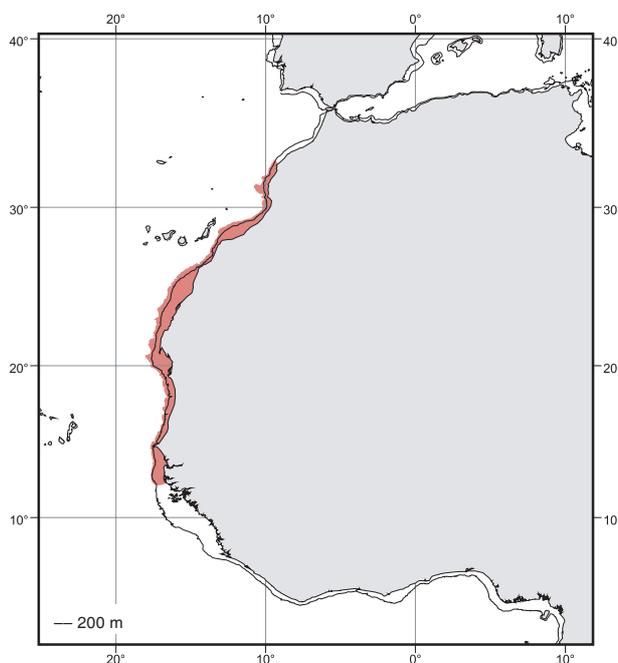


Fig. 42 *Merluccius senegalensis*
 Known distribution

Size: Maximum recorded length 87 cm (females) and 78 cm (males); common up to 65 cm.

Interest to Fisheries: Senegalese hake under 40 m in length are caught by trawlers targeting this species, as well as by smaller longliners and gillnetters. It is also captured as a bycatch of fisheries targeting cephalopods and shrimp. It shares its distribution area in the north with European hake (southern Morocco) and in the south with Benguela hake (Mauritania and Senegal). This leads to catches quite often being mixed up, especially with Benguela hake. The eastern central Atlantic fishery began at the beginning of the twentieth century, with sailing trawlers from southern Spanish coast exploiting north African fishing grounds. This fleet gradually became motorized, vessels became larger, and their fishing range extended further south (Mauritania and Senegal). By the end of the 1960s, Portuguese, Polish, and USSR fleets, amongst others, were exploiting the resource, and they continued to do so, using large trawlers of up to 2 000 GRT, until the 1970s. After the EEZ declaration, and in 1986 with the fishing agreement between Morocco and the European Union, European fleets were gradually reduced in the Moroccan EEZ. By 2000 only local fleets exploited the area. This species is marketed fresh or frozen.

Eastern central Atlantic catches also include Benguela hake (*M. polli*), owing to overlapping of fisheries and identification problems. Catches reported to FAO show a peak period between 1973 and 1977 with around 100 000 tonnes annually resulting from USSR-fleet activity, and to a lesser extent, Spanish fleets. From 1977 a drastic drop is recorded owing to an abrupt decrease in the USSR fleet; a certain stability is regained at the end of the 1980s, with annual catches of around 20 000 tonnes taken out by Spanish fleets.

Local Names: DENMARK: Kulmule; FRANCE: Merlu du Sénégal, Merlu noir; GERMANY: Seehecht; MOROCCO: Colin; POLAND: Morszczuk senegalski; PORTUGAL: Pescada negra; SPAIN: Merluza del Senegal; UNITED KINGDOM: Black hake, Senegalese hake.

Literature: Doutre (1960); Franca (1962); Maurin (1963); Lozano Cabo (1965); Inada (1981b and c); Inada *in* Cohen *et al.* (1990); López Abellán and J. Aríz Tellería (1993); Lloris and Rucabado (1998).

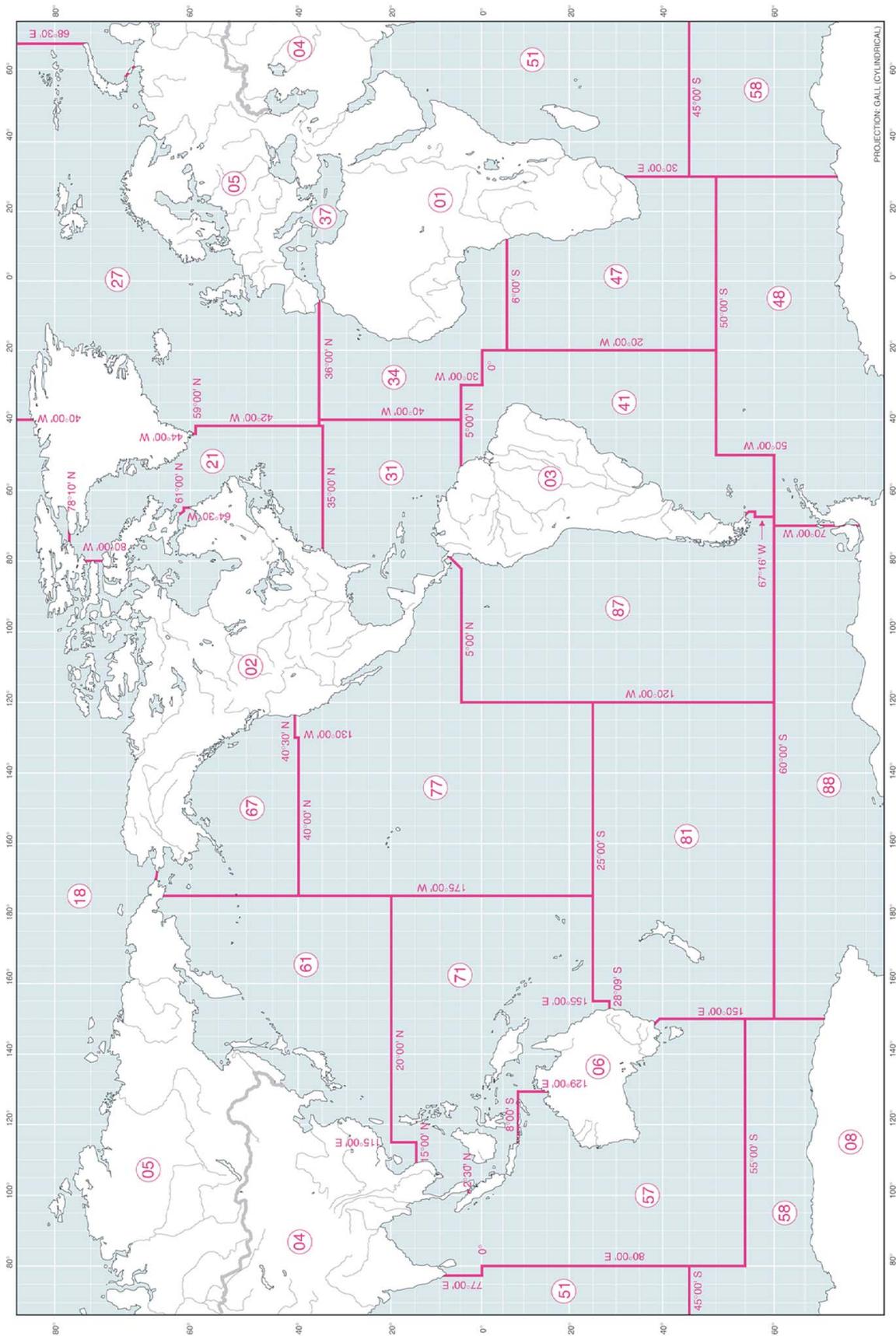
3. LIST OF SPECIES BY MAJOR FISHING AREAS

Listed in the below Table are species present in this catalogue and different FAO statistical areas, showing the distribution area of each species in thousand nautical square miles.

| SPECIES | Page | GEOGRAPHICAL DISTRIBUTION | | | | | | | | | | | | | | | | | |
|----------------------------------|------|---|-----|-----|-----|----|-----|-----|----|----|----|----|----|----|----|-----|----|----|------|
| | | MAJOR FISHING AREA FOR STATISTICAL PURPOSES | | | | | | | | | | | | | | | | | |
| | | 18 | 21 | 27 | 31 | 34 | 37 | 41 | 47 | 48 | 51 | 57 | 58 | 61 | 67 | 77 | 81 | 87 | 88 |
| <i>Lyconodes argenteus</i> | 9 | | | | | | | • | | | | | | | | | | | |
| <i>Lyconus brachycolus</i> | 10 | • | • | • | • | • | • | • | | | | | | | | | | | |
| <i>Lyconus pinnatus</i> | 11 | | | | | • | | • | ◦ | • | • | ◦ | | | | • | | ◦ | |
| <i>Macruronus capensis</i> | 12 | | | | | | | • | | | | | | | | | | | |
| <i>Macruronus novaezelandiae</i> | 13 | | | | | | | 51 | | | 35 | | | | | 65 | 92 | | 243 |
| <i>Merluccius albidus</i> | 20 | | 10 | | 404 | | | | | | | | | | | | | | 414 |
| <i>Merluccius angustimanus</i> | 21 | | | | | | | | | | | | | | 81 | | 4 | | 86 |
| <i>Merluccius australis</i> | 23 | | | | | | | 386 | | | | | • | | | 204 | 44 | | 634 |
| <i>Merluccius bilinearis</i> | 27 | | 392 | | 95 | | | | | | | | | | | | | | 487 |
| <i>Merluccius capensis</i> | 29 | | | | | | | 147 | | 4 | | | | | | | | | 151 |
| <i>Merluccius gayi</i> | 31 | | | | | | | | | | | | | | | | 97 | | 97 |
| <i>Merluccius hubbsi</i> | 34 | | | | | | | 509 | | | | | | | | | | | 509 |
| <i>Merluccius merluccius</i> | 36 | | | 593 | | 63 | 344 | | | | | | | | | | | | 1000 |
| <i>Merluccius paradoxus</i> | 40 | | | | | | | | 85 | 6 | | | | | | | | | 91 |
| <i>Merluccius patagonicus</i> | 42 | | | | | | | • | | | | | | | | | | | |
| <i>Merluccius polli</i> | 43 | | | | | 34 | | | 27 | | | | | | | | | | 61 |
| <i>Merluccius productus</i> | 45 | | | | | | | | | | | | | | 27 | 91 | | | 118 |
| <i>Merluccius senegalensis</i> | 47 | | | | | 76 | | | | | | | | | | | | | 76 |

• Known distribution ◦ Probable distribution

MAJOR FISHING AREAS FOR STATISTICAL PURPOSES



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LIMITE ENTRE LAS ZONAS DE PESCA EN AGUAS CONTINENTALES EUROPEAS Y ASIÁTICAS

LIMITES DE LAS ÁREAS PRINCIPALES DE PESCA