

Short communication

Teleostei, Scophthalmidae: four-spot megrim spotted in Norwegian waters

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The flatfish four-spot megrim (*Lepidorhombus boscii*) was registered in Norwegian waters, both in trawl catches and video observations. The records represent a considerable northward extension of the species. Specimens of up to 49 cm were measured, representing also a new maximum size for this species. The number of registrations has increased within the last years, indicating that the species got more common in this area.

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INTRODUCTION

Scophthalmidae (turbot, megrims, and brills) is a family of flatfishes with three genera and eight species (Chanet 2003, Fricke *et al.* 2018), seven of which are occurring in the eastern North Atlantic, five are previously known from Norwegian waters (Nielsen 1986, Pethon 2005). They are characterized by a clearly visible preoperculum with a free margin, the absence of a spine in the elongate and equally long pelvic fin bases, the presence of a lateral line on both sides, and the location of both eyes on the left side (Nielsen 1986). Genus *Lepidorhombus* has pelvic fins free from the anal fin, ctenoid scales on the eyed and cycloid scales on the blind side, as well as a toothed vomer (Nielsen 1986). There are two species in the genus, the megrim *Lepidorhombus whiffiagonis* (Walbaum, 1792) and the four-spot megrim *L. boscii* (Risso, 1810). They differ in morphology and coloration: in *L. boscii* the snout is shorter than the eye diameter (longer in *L. whiffiagonis*) and it has two very distinct black spots posterior on both the dorsal and the anal fin (Nielsen

1986, Pethon 2005, Robson *et al.* 2005). Although the median fins of *L. whiffiagonis* can be speckled, these spots are never so distinct and clearly marked as in *L. boscii*.

Four-spot megrim is a deepwater species found along the continental edge down to 800–1000 m depth on soft bottom, most common between 275 and 640 m, sometimes even pelagic (Nielsen 1986, Pethon 2005). It reaches a total length of about 44 cm but is rarely larger than 32 cm (Nielsen 1986, Pethon 2005, Munroe & Chanet 2016), sexual maturity occurs at 3–4 years of age, females can live up to at least 13 years, males to 11 years, females grow faster and larger than males (Robson *et al.* 2000, Landa *et al.* 2002, Landa & Fontenla 2016, Munroe & Chanet 2016), but growth rates vary also with area (Landa *et al.* 2002). Spawning is not well known but may occur along the outer continental shelf margin at considerable depths (Munroe & Chanet 2016), known nursery areas are in the Celtic Sea and on the Porcupine Bank (Dransfeld *et al.* 2004). Until now its distribution was indicated from Cape Bojador in the south, the Mediterranean, and northward to the British Isles (Nielsen 1986), west of the Faeroes (Pethon 2005), and southern Iceland

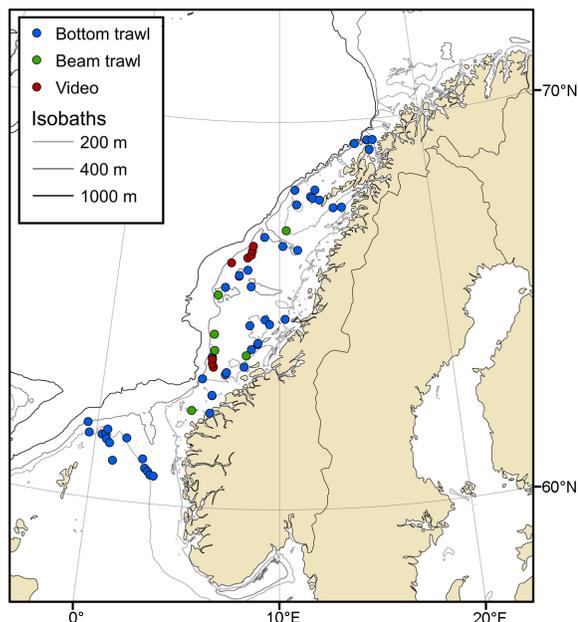


Figure 1. Map showing the registrations of *Lepidorhombus boscii* from 1995–2018, abundance per station not indicated.

(Jónsson and Pálsson 2013). However, although Velasco *et al.* (2015) report only two specimens from the northern North Sea, it was repeatedly found further north along the continental slope off Norway.

We report here these records and discuss the distribution of the species in northern waters.

MATERIAL AND METHODS

The fishes were obtained during different surveys conducted by the Institute of Marine Research (IMR), Norway. Fishery independent surveys for population monitoring in the North Sea and along the Norwegian coast use different types of bottom trawls (e.g. Campelen shrimp trawl, Alfredo cod trawl) with varying ground gear and mesh sizes. The specimens caught were identified and measured at sea, some of them frozen as vouchers. The MAREANO-project, which maps benthic organisms and bottom conditions off the Norwegian coast (www.mareano.no), used a beam trawl (horizontal opening 2 m, mesh width 4 mm, towed on the bottom for 5 min at a speed of 1.5 knots) to sample benthic organisms. All fishes from the beam trawl were frozen for later identification at land. Some specimens were subsequently transferred to the University Museum of Bergen where they are kept in 75 % ethanol for permanent storage. In addition to trawl catches, during the MAREANO surveys four-spot megrim was also recorded by video footage taken by IMR's video platform Campod, a tripod equipped with a high-definition video camera (SONY HDC-X300) and lights (Buhl-Mortensen *et al.* 2009). The camera has a manual zoom and focus and is mounted on a pan-and-tilt

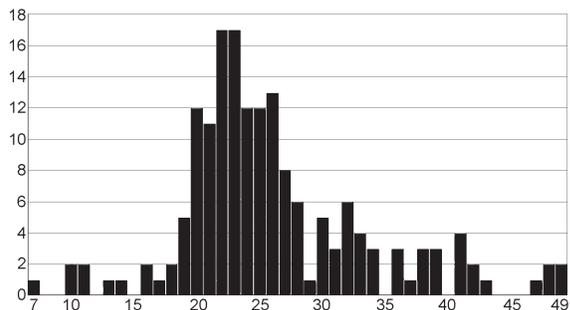


Figure 2. Length distribution of the 169 specimens of *Lepidorhombus boscii*, x-axis: total length in cm, y-axis: number of specimens.

device. For the present observations the Campod was towed 1.5 meters above the seabed at a speed of 0.7 knots (Buhl-Mortensen *et al.* 2009).

Locality and length-data on all *Lepidorhombus boscii* were extracted from the IMR database. CTD data were available for 26 stations.

RESULTS

In the years 1995–2018, 195 specimens of *L. boscii* were caught, registered and verified or considered valid. The specimens were caught at 51 bottom trawl and six beam trawl stations (Figure 1). Depths varied from 90 to 497 m, most specimens (35 %) were caught in 200–250 m depth. Temperatures varied from 6.3 to 10.9 °C, and salinity from 34.05 to 35.38 ‰. The northernmost record was taken in October 2016 at 69°27.1'N 16°10'E (ZMUB 23814). The highest abundance at one station was registered in March 2018 at 68°01.4'N 12°13.9'E with 24 specimens after 15 min trawling. Total length was recorded for 169 specimens, ranging from 7–49 cm (Figure 2). Five specimens were larger than 44 cm (Figure 2 and 3, ZMUB 23815), the previously accepted maximum size of this species. Specimens of the congener *L. whiffiagonis* were registered at 20 of the 51 bottom trawl stations.

During two surveys in June 2014 and August/September 2015, 13 specimens were recorded on video (Figure 1 and 4). Bottom depth was between 245–362 m, temperature between 7.5–8.0 °C, and salinity between 35.20–35.23 ‰. The bottom substrate registered during the video transects was muddy sand, gravelly muddy sand, and sandy mud (www.mareano.no).

DISCUSSION

The present records are the northernmost occurrences ever reported for this species, including the first records from the Norwegian shelf and from north of the Arctic circle. They represent a significant range extension for the species of about



Figure 3. *Lepidorhombus boscii* obtained at trawl station 55114, 6 November 2018, 63°30.62'N 6°57.97'E, 287 m depth, 48.5 and 21 cm TL, ZMUB 23815. Picture taken from frozen specimens, typical damages of fins and fin membranes due to trawling and handling. Photo: Rupert Wienerroither.

1,400 km to the northeast (Pethon 2005). Between 1995 and 2010 only 15 specimens have been registered (ranging from 13–49 cm), and in the years 2011–2017 the average annual catch was around 15 specimens (beam trawl and video observations not included). In 2018 the registrations increased considerably, and 67 specimens (ranging from 7–48 cm) were caught. Despite this increase in number of specimens registered, there is no consecutive northward range extension recognizable. Already the first 15 specimens (found at 8 stations in the years 1995–2008) were distributed from 62 to 68°N. Neither can there be seen a clear trend in the length distribution. Trawling effort and method as well as area of coverage haven't changed significantly in these years, so the expanded area of distribution as well as the rise in abundance are likely to reflect the real situation. However, in the last 10–20 years the focus on species identification at IMR vessels has increased, and former misidentifications with megrim *L. whiffiagonis* cannot be completely excluded. Megrim is found in the same area, but also further north and south in the shallower Barents Sea and North Sea, respectively. It is also much more common, with more than 70,000 specimens having been registered in the IMR-database since 1972 at more than 5,000 stations in the same area, plus the Barents and North Sea.

The range extension northward in Norwegian waters is in accordance with the situation in Iceland. Four-spot megrim was registered there for the first time in 2008. It is now found south and southwest of the island in 140–180 m depth (Jónsson and Pálsson 2013).



Figure 4. *Lepidorhombus boscii* recorded during MAREANO video transect R1566VL1615, 1 September 2015, 66°39.95'N 8°17.28'E, 282 m depth. Red laser points are 10 cm apart.

During the two MAREANO surveys lasting for 11 and 21 days, the video observations of the species were spatially (Figure 1) and temporally (two and three days, respectively) close together. This, and the trawl haul from March 2018 described above, indicate that the species might be quite abundant locally.

There are no north-south or seasonal trends in depth or length distribution discernable. Most specimens were caught in 200–250 m depth, but this might rather reflect IMRs prevailing trawling depth than species preferences. In the Celtic Sea it is most abundant between 250 and 400 m (Velasco *et al.* 2015). Size varied significantly within the stations, the largest ones being caught together with the more common sizes (Figures 2 and 3). The species is of no commercial interest in Norwegian waters, hence neither sexing, staging or aging was done during the surveys. Therefore, it is difficult to say why the species grows larger in Norwegian waters.

The fishes reported by us were found during all seasons and, apart from the smallest ones, in all sizes, even raising the maximum length of the species. This might indicate that the species has built a resident population in Norwegian waters. Sánchez *et al.* (1998) found that on the northern Spanish shelf juveniles of both *Lepidorhombus*-species occupy deeper water and a narrower depth range than adults. This might explain why no juveniles or larvae have been found yet, as the mesh size of the trawling gear used in these depths is too large.

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