

8 Roundnose grenadier (*Coryphaenoides rupestris*)

8.1 Stock description and management units

ICES WGDEEP has in the past proposed four assessment units of roundnose grenadier in the Northeast Atlantic:

- Skagerrak (Division 3.a);
- The Faroe-Hatton area, Celtic sea (Divisions 5.b and 12.b, Subareas 5, 7);
- the Mid-Atlantic Ridge 'MAR' (Divisions 5.b, 12.c, Subdivisions 5.a1, 12.a.1, 14.b.1);
- All other areas (Subareas 1, 2, 4, 8, 9, Division 14.a, Subdivisions 5.a.2, 14.b.2).

This current perception is based on what are believed to be natural restrictions to the dispersal of all life stages. The Wyville-Thomson Ridge may separate populations further south on the banks and slopes off the British Isles and Europe from those distributed to the north along Norway and in the Skagerrak. Considering the general water circulation in the North Atlantic, populations from the Icelandic slope may be separated from those distributed to the west of the British Isles. It has been postulated that a single population occurs in all the areas south of the Faroese slopes, including also the slopes around the Rockall Trough and the Rockall and Hatton Banks but the biological basis for this remains hypothetical.

In 2007, WGDEEP examined the available evidence of stock discrimination in this species but, on the available evidence, was not able to make further progress in discriminating stocks. On this basis WGDEEP concluded there was no basis on which to change current practice.

In the 2010s, genetic analyses have brought forward information regarding the stock discrimination in the roundnose grenadier. White *et al.* (2010), investigating a limited geographic area in the central and eastern North Atlantic, found evidence of population substructure and local adaptation to depth. Knutsen *et al.* (2012) covered a larger geographic range including East and West Atlantic as well as Arctic areas and found significant genetic structure. Parts of this structure, notably in peripheral (Canada) and bathymetrically isolated basins (Skagerrak and Trondheimsleia (off Norway)), was found to represent distinct biological populations with limited present connectivity with central Atlantic and West European slope. Off the British Isles (Irish slope, Rockall, and Rosemary Bank), the magnitude of genetic structure was found weak. This lack of definition could reflect that samples from this area represent a single, widespread population. On the other hand, a study of coastal Atlantic cod (Knutsen *et al.*, 2011) reported highly restricted connectivity (less than 0.5% adult fish exchanged per year) among two populations that were only weakly differentiated at microsatellite loci. This level is similar to that found between Greenland, Mid-Atlantic Ridge, Rockall, and Rosemary Bank for grenadier. These sites may therefore represent distinct demographical populations, where there is a sufficient gene flow to maintain genetic similarity in terms of allele frequency but the demography is driven by local/regional recruitment and growth with a minor contribution of large scale migrations of juveniles and adults or transport of larvae.

The current stock units are consistent with the study from Knutsen *et al.* (2012) except that the unit covering subareas 1, 2, 4, 8, and 9, Division 14.a, and subdivisions 14.b.2 and 5.a.2, should not be considered as a demographic stock or a genetic population because it includes Arctic and Atlantic areas in which roundnose grenadier was found to be genetically different. This unit might be only considered as an aggregations of areas where roundnose grenadier occurs at low to moderate density and is not subject to significant continuous exploitation.

8.2 Roundnose Grenadier (*Coryphaenoides rupestris*) in Division 5.b and 12.b, Subareas 6 and 7

8.2.1 The fishery

The majority of landings of roundnose grenadier from this area have historically been taken by bottom trawlers. To the west of the British Isles, in Divisions 5.b, 6.a, 5.b.2 and Subareas 7, French trawlers catch roundnose grenadier in a multispecies deep-water fishery. The Spanish trawling fleet operates further offshore along the western slope of the Hatton Bank in ICES Divisions 6.b.1 and 12.b.

8.2.2 Landings trends

Over the past two decades, landings from Division 5.b, reached more than 3800 t in 1991 and more than 2000 t in 2001. Between these two periods, the landings were low (less than 700 t in 1994). After 2001, landings decreased to about 1000 t in 2002 but increased further to about 1840 t in 2005 and then decreased to 74 t in 2011. Since then, landings have continued to gradually decreased. In the period 2011–2021, landings in 5.b were exclusively from French and Faroese trawlers (Table 8.2.0a), with 33 t in 2020, 22 t in 2021 and less than 8 t in 2022.

In Subarea 6, the highest landings were observed in 2001 (close to 15 000 t) and then decreased progressively to around 513 t in 2018, 202 t in 2019 and 318 t in 2020. Most of these landings were traditionally caught by French and Spanish trawlers (Table 8.2.0b), with small amounts from Scotland. Landings in 2021 were 116 t almost exclusively from French trawlers. In 2022, provisional total catches indicate similar level of catches, around 119 t, being the 87% captured by France, with small catches from Norway and Scotland.

In Subarea 7, landings close to 2000 t were recorded in 1993–1994, although recent annual landings are much lower (from 200–400 t/year in 2005–2007, to around 10 t in 2014–15). Only 2 t were reported in 2018 and less than 1 t in 2019, increasing slightly to 5 in 2020. Landings in 2021 were 2.5 t exclusively from France, and for 2022, provisional landings are below 1 t, also exclusively from French trawlers (Table 8.2.0c).

In ICES Division 12.b, the recent landings are exclusively from Spanish trawlers. After a peak to more than 12 700 t in 2004, reported landings have decreased to about 5300 t in 2009, 2900 t in 2011 and 992 t in 2014. In 2015 the landings went down to 363 t and then increased again slightly until the 632 t in 2016 and around 1000 in 2017 and 2018. In 2019, the landings decreased again to around 50% of the previous year (460t), and have been continue to decrease drastically since then, with 268t in 2020 and 0t in 2021 and 2022 (Table 8.2.0d).

In the mid-1990s Faroese landings were significant, but this fishery ended in the 2000s and now only few tonnes were landed. In 2004 French fisheries have landed up to 1700 t but since 2007 almost no landings were registered.

Official landings have been revised for 2021 and are preliminary for 2022.

8.2.3 ICES Advice

ICES advises that when the precautionary approach is applied, catches should be no more than 3177 tonnes in each of the years 2023 and 2024. All catches are assumed to be landed.

8.2.4 Management

TACs for EU vessels for deep-water species have been set since year 2003. These TACs are revised every second year. The EU TAC and national quotas from member countries apply to all vessels in EU EEZ and to EU vessels in international waters.

For Division 5.b and Subareas 6 and 7, a TAC was set at 639 t for 2021 and 639 t for 2022. The TAC since EC regulation 1367/2014 was a combined value for roundnose grenadier and roughhead grenadier (*Macrourus berglax*). Since 2019, this TAC set by EC regulation 2018/2025 is only for roundnose grenadier but with the following rule that "any bycatches for roughhead grenadier should be limited to 1% of each Member State's quota of roundnose grenadier and counted against that quota, in line with the scientific advice".

The rationale for this change is explained in the EC regulation: "According to the advice provided by ICES, limited on-board observations show that the percentage of roughhead grenadier has been less than 1% of the reported catches of roundnose grenadier. Based on those considerations, ICES advises that there should be no directed fisheries for roughhead grenadier and that bycatches should be counted against the TAC for roundnose grenadier in order to minimise the potential for species misreporting. ICES indicates that there are considerable differences, of more than an order of magnitude (more than ten times), between the relative proportions of roundnose and roughhead grenadier reported in the official landings and the observed catches and scientific surveys in the areas where the fishery for roughhead grenadier currently occurs. There are very limited data available for this species, and some of the reported landing data are considered by ICES to be species misreporting. As a consequence, it is not possible to establish an accurate historical record of catches of roughhead grenadier".

In Subareas 8, 9, 10, 12 and 14 the TAC for 2021 was set at 572 t and 572 t for 2022. This TAC covers areas with minor roundnose grenadier catches (8, 9 and 10), part of this assessment area (Division 12.b, the western slope of the Hatton bank) and the Mid-Atlantic Ridge (Divisions 12.a,c and Subarea 14). The main countries having quotas allocations under this TAC are Spain and Poland. Therefore these quota allocations are based upon historical landings in 12.b for Spain and in 12.a,c (Mid-Atlantic Ridge) for Poland.

The table below summarizes the TACs in the two management areas and landings in the assessment area.

| 5.b, 6, 7 | | | 7, 9, 10, 12, 14 | | Total international Landings 5.b, 6, 7, 12.b | ICES predicted |
|----------------|-----------|------------------|------------------|---------------------|--|-----------------------------|
| esti- mates | EU TAC | EU Land- ings | EU TAC | EU Landings 12.b | | catch corresp. to advice |
| 2005 | 5253 | 5777 | 7190 | 8782 | 14558 | - |
| 2006 | 5253 | 4535 | 7190 | 4361 | 8896 | - |
| 2007 | 4600 | 3880 | 6114 | 4258 | 8138 | < 6000 |
| 2008 | 4600 | 2980 | 6114 | 2432 | 5412 | < 6000 |
| 2009 | 3910 | 2566 | 5197 | 6377 | 8943 | < 6000 |
| 2010 | 3324 | 1421 | 5197 | 2910 | 4332 | < 6000 |
| 2011 | 2924 | 790 | 4573 | 2905 | 3695 | < 6000 |
| 2012 | 2546 | 546 | 3979 | 1343 | 1889 | < 6000 |

| 5.b, 6, 7 | | 7, 9, 10, 12, 14 | | Total international Landings 5.b, 6, 7, 12.b | | ICES predicted |
|----------------|-----------|------------------|-----------|--|------|-----------------------------|
| esti- mates | EU TAC | EU Land- ings | EU TAC | EU Landings 12.b | | catch corresp. to advice |
| 2013 | 4297 | 760 | 3581 | 991 | 1752 | < 6000 |
| 2014 | 4297 | 558 | 3223 | 988 | 1546 | < 6000 |
| 2015** | 4010 | 744 | 3644 | 363 | 707 | < 5433 |
| 2016** | 4078 | 732 | 3279 | 623 | 1005 | < 5511 |
| 2017** | 3052 | 633 | 2623 | 1001 | 1634 | ≤ 3897 |
| 2018** | 3120 | 521 | 2099 | 998 | 1519 | ≤ 3971 |
| 2019 | 2558 | 232 | 2281 | 457 | 689 | ≤ 3971 |
| 2020 | 2558 | 356 | 2281 | 268 | 624 | ≤ 3971 |
| 2021 | 639 | 140 | 572 | 0 | 140 | ≤ 3177 |
| 2022* | 639 | 127 | 572 | 0 | 127 | ≤ 3177 |

* provisional.

** combined TAC for roundnose grenadier and roughhead grenadier.

After the introduction of TACs in 2003 and 2005, the reported landings have decreased.

In addition to TACs, further management measures applicable to EU fleets are a licensing system, fishing effort limits, the obligation to land the fish in designated harbours and a regulation for on-board observations according to Council Regulation (EC) No 2347/2002 of 16 December 2002. In Faroese waters, the catch of roundnose grenadier is subject to a minimum size of 40 cm total length.

The fishery of this species was affected by the EU regulation 2016/2336 establishing specific conditions for fishing for deep-sea stocks, namely a ban for bottom trawling at depths > 800 m.

8.2.5 Data available

Landings and discards

Landings time-series data per ICES areas are presented in Tables 8.2.0a-e.

Landings data by ICES area were available for France, Norway and UK (England, Wales and Scotland) since 2005 and for Spain since 2010. Catch in Subarea 12 were allocated to Division 12.b (western Hatton bank) or 12.a,c (Mid-Atlantic Ridge) according to knowledge of the fisheries from WG members in years prior to 2010.

Catch and discards by haul were available from observer programmes from France and Spain.

French observer programme: Discards data are available routinely from France since 2004 through the Obsmer (observers at sea) program. The length distributions of discards from all these observations has been consistent and stable for the period 2004–2010 with about 30% of the weight and 50% of the number of roundnose grenadier caught being discarded, because of small size. This figure is higher than from previous sampling programme where the discarding rate in

the French fisheries was estimated slightly above 20% in 1997–1998 (Allain *et al.*, 2003). These differences may have come from a combination of changes in the depth distribution of the fishing effort and a decrease in the abundance of larger fish as visible in the landings. Since then, the discard rate has been reduced to 12% of the weight of the catch (29% in number of individuals) in 2011 and 6% in weight in 2012 (24% in numbers). In 2013, discards accounts for 15% of the catch in weight and 32% in number. Between 2014 and 2018, discards rates decreased, ranging between 3–6% of the catch in weight and 8–17% in number. In 2019 and 2020, reported discard rates were almost negligible, with around 0.7% and 0.6% in weight respectively, and in 2021 and 2022 the reported discard rate is close to 0 (around 0.5 in 2022).

The reduction of discards is related to:

1. a change of depth of the French fleet towards shallower waters
2. attempts to avoid areas where discards are high.

Spanish Observer programme (Hatton Bank): discard data are available from the Spanish Observer Programme. For the period 2004–2015, observers have covered on average $15 \pm 10\%$ (range 3–39%) of the fleet fishing days in Division 6.b, and $12 \pm 8\%$ (range 2–33%) in Division 12.b. Discards data for 2011 were not presented as they are considered to be inaccurate but provided again for 2012 and onwards. Although in the period 1996–2015 the discards occasionally reached 26% of the total observed weight catch, they were negligible in most sampled months. Annual average discards were around 7% (range 0–21%) in weight in both Divisions 6.b and 12.b (range 0–26%) for that period. These discards, however, correspond to undersized individuals.

In 2017, in area 6.b and 12.b, the discard rate is around 4.7% in weight (5.05% in 6.b and 4.6% in 12.b). In 2018, the discard rate is estimated to be around 2.5% (1.6% in 6.b and 3% in 12.b), and around 0.32% in 2019 (0.39% in 6.b.1 and 0.26% in 12.b). The sampling programs were suspended in most of 2020, due notably to administrative problems and to a lesser extend to covid-19, so there is no new discard information for 2020. In 2021 and 2022 there were no fishing effort in the area by the Spanish fleet.

Length composition of the landings and discards

Length composition of landings and discards were available for France and Spain covering different periods and areas (Figures 8.2.1–8.2.5).

8.2.5.1 Age composition

No new data.

8.2.5.2 Weight-at-age

No new data.

8.2.5.3 Maturity and natural mortality

No new data.

8.2.5.4 Research vessel survey and cpue

Research vessel survey

Data were available from the Marine Scotland deep-water survey since the years 1998 and from stats squares 41E0 through 45E0. This survey operates now on a biannual basis therefore no survey was carried out in 2020. Last survey occurred in 2021.

LPUE from the French trawl fishery to the west of the British Isles

In 2022 no new information was presented as the fishing effort has been greatly reduced. Historical standardized LPUE information based on haul by haul data from French skipper's personal tallybooks is included in the Stock annex.

LPUE from the Faroese commercial fleet

In 2022 no new information was presented as the fishing effort has been greatly reduced and more recent landings were at about 1t. Historical standardized LPUE information can be consulted in the stock annex.

CPUE from the Spanish commercial fleet.

CPUE series were calculated from commercial trawlers operating in 6.b.1 and 12.b areas, with effort being the total applied in each area in Kw-day, and the catches only those with any presence of roundnose grenadier in the total catch.

An updated revision of the available data for the period 2010-2020 was included for analysis. A general linear model (GLM) was used to standardize all the CPUE (kg/effort unit) series for the Spanish commercial fleet where the independent variables were the following: year, vessel and fishing area (6.b.1, 12.b). The dependent variable was the log-transformed kg per day measure for variable, which was back-transformed prior to use.

The standardized CPUE time series aims to serve as an approximation for the evolution of the stock in this period, but should be taken with caution, due to the limited number of years currently available and the fact that it only represents the area where the Spanish fleet has a higher presence, and not the whole stock area. In addition, the continuous reduction of the effort applied to this stock by all the commercial fleets, could pose an added difficulty to improving the quality of this series in coming years.

8.2.6 Data analyses

Trends from length distribution and individual weight

For France, the modal discarded length has remained constant (Figure 8.2.1) at around 11 cm while the average pre-anal length of the individuals in the landings has decreased from 20.8 cm in 1990 to around 15.5 cm since 2011. There is an increasing trend in the landings since then. The mean pre-anal length for landings was around 15 cm in 2018-2019, 16.3 cm in 2020 reaching 17.3 in 2021 (Figure 8.2.4).

Modal length for landings in 12.b and 6.b1 shows some differences, being in general those from 12.b smaller (Figures 8.2.2 and 8.2.3). Size-frequency data provided by Spain for the period 2001–2019 in 6.b.1 and 12.b shows the modal length (PAFL) of landings to be closely similar between divisions with female being larger than male by around 2 cm (Figure 8.2.5). The modal length of discards is around 9.5 cm. Over the period 2001–2019, there is no apparent trend in size of discards. However, for landed individuals, both the average size for male and female have decreased by 1 cm (from 15.5 cm to 14cm for females and 13.5 to 12.4 cm for males) until 2009. Over the period 2009–2020, in both 6.b.1 and 12.b, the mean length in landings has increased by two centimetres for both males and females in 2010–2014, with a tendency to decrease after 2015. The difference of modes of the length distributions of landed catch between the Spanish fleet in Divisions 6 and 12.b and the French fleet is possibly because of different sorting habits in relation to different markets.

It is therefore important that length distribution of the landings and discards are provided to the working group by all fleets exploiting the stock.

Time-series of mean individual weight from the Marine Scotland Deepwater Science survey shows no clear trends because of big confidence intervals. Average weight is around 0.75 kg in

2017, 0.5 kg in 2019 and 0.6 in 2021, but with very wide confidence intervals in most of the cases (Figure 8.2.6).

Trends in abundance indices

Marine Scotland Deep-water Science survey (MSDSS)

Data on Marine Scotland Deep-water Science survey was available for WGDEEP2022. There is an increasing trend of abundance over the period 2011–2013. Since 2015, there is however, a decrease and the index were close to the long term average of the series. (Figure 8.2.7).

Lpue from the Faroese commercial fleet

In 2021 no new information was presented and the CPUE series available for the Faroese commercial fleet ended in 2014. The historical CPUE time series can be found in the stock annex.

CPUE from the Spanish commercial fleet in 12.b

CPUE indices based on revised catches for the period 2010–2020 were estimated for the Spanish fleet in order to include the 12.b landings into the assessment. The CPUE has declined from 2010 to 2014 with a peak in 2017 followed by a decline in 2018. Preliminary data shows and a slight increase in 2019 (Figure 8.2.8). The general tendency of the total catches has been variable previous to 2010, with a general tendency to decrease since 2004, since there seems to be a change in the fishing habits, with a growing tendency for vessels to use this area as a stopover, either on the way out or on the way back, of other fishing grounds, mainly to the NAFO area.

LPUE from the French tallybooks

In 2021 no new information was presented. Stock annex includes the historical CPUE time series, which was available from 2010 to 2015.

Stock assessment

The advice on this stock is based on the framework for advice for ICES category 5 stocks for the entire stock since 2018.

In 2016, it was possible to provide advice on stock as category 1 advice for the part of the stock in subareas 6 and 7 and Division 5.b, but while the advice for the part of the stock occurring in Division 12.b was a catch-only assessment (category 5).

LPUE data from haul-by-haul data provided by French trawlers were used in previous assessments for subareas 6 and 7 and Division 5.b. The decrease in activity and number of boats now prevents the use of those indices in the assessment.

In 2020, an exploratory model using a new index available up to 2019 (Marine Scotland Deep-water Survey) was examined. However, this model formulation and the use of this survey as a biomass indicator was not benchmarked yet.

Discard data are available back to 1996. Discards have not been included in the assessment as it was considered that sorting patterns of discards and landings in earlier years may have been different.

The ICES framework for category 5 stocks was applied for the 2018–2022 advice. ICES considers that a precautionary reduction of catches should be implemented unless there is sufficient data to access the current level of exploitation of the stock.

The precautionary buffer (20% reduction in landings) was applied in 2016 and later in 2020 advice so it was not applied in 2022. Therefore, ICES advises that when the precautionary approach is applied, catches should be no more than 3177 tonnes in each of the years 2023 and 2024. All catches are assumed to be landed.

ICES cannot assess the stock and exploitation status relative to MSY and PA reference points because the reference points are undefined.

This stock is classified as Category 1 in the [NEAFC categorization of deep-sea species/stocks](#) which implies that NEAFC requires stock-specific management measures since the entire or a significant proportion of the catch is taken in the NEAFC regulatory area.

Previous stock assessment issues

This stock was benchmarked in 2010 and the assessment methodology based on the surplus production model has not been revised since then. At that time it was considered the assessment was considered to be of category 3. In 2012, this stock assessment was classified as category 1 due to development of short-term forecast.

Yet, some issues have not been resolved since the 2010 benchmark.

Discard time-series is available since 1996 and properly quantified since then. It is supposed from various exploratory runs that discard rates might have been higher at the beginning of the fishery. Because of this, discards have not been included in the past assessments and the impact of this is unknown. The reconstruction of a time-series of discard rates is required for the whole time-series. No new information has been available since then. Prior estimates of discards can only be addressed at the moment through assumptions to be tested.

Additionally, some issues regarding model requires more studies

- Estimates of r (intrinsic growth rates of the surplus production model) was possibly too high in regards of stock dynamics. This should be explored from modelling and data exploration. The lack of contrast between indices from observation and those predicted using estimates of r is a concern as trends from the model seem to increasingly differ over the years.
- A workaround to the problem above would be to use another model taking account additional information that are not currently taken account by the model such as length distributions and giving more value to recent information from survey indices.
- The French tallybooks, due to the decrease of effort and number of vessels in the deep-water French fisheries are no longer representative to derive abundance indices. The Marine Scotland Science Deep-water survey is available on a biannual basis in line with advisory years and a sufficient time-series has been integrated into the assessment over the last years. However, comparisons with the French tallybooks showed some strong differences of biomass, which leaves some doubt on biomass estimates. The reason for those differences have to be investigated.
- Spanish CPUE based on data from commercial fleet has been also calculated and tested as input for the assessment, combined with French and Scottish indices. The model shows discrepancies between the indices, with strong negative correlations between all of them.
- Multi Year Catch Curves are no longer available. Other indicator of stock status may be considered using for example, length or individual weight.

8.2.7 Management considerations

Previous simulations suggest that fishing mortality is below F_{MSY} .

8.2.8 Benchmark preparation

At this moment, there is no planned benchmark for this stock. In the current state, more work is needed to investigate what is the most appropriate approach to try to integrate the available information and develop a model that represents the dynamics of the stock.

Table 8.2.0a. Working Group estimates of landings (t) of roundnose grenadier from Division 5.b.

| Year | Faroes | France | Nor way | Germ any | Russia/ USSR | UK (E+W) | UK (Scot) | TOTAL |
|------|--------|--------|------------|-------------|-----------------|-------------|--------------|-------|
| 1988 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 1989 | 20 | 181 | 0 | 5 | 52 | 0 | 0 | 258 |
| 1990 | 75 | 1470 | 0 | 4 | 0 | 0 | 0 | 1549 |
| 1991 | 22 | 2281 | 7 | 1 | 0 | 0 | 0 | 2311 |
| 1992 | 551 | 3259 | 1 | 6 | 0 | 0 | 0 | 3817 |
| 1993 | 339 | 1328 | 0 | 14 | 0 | 0 | 0 | 1681 |
| 1994 | 286 | 381 | 0 | 1 | 0 | 0 | 0 | 668 |
| 1995 | 405 | 818 | 0 | 0 | 0 | 0 | 0 | 1223 |
| 1996 | 93 | 983 | 0 | 2 | 0 | 0 | 0 | 1078 |
| 1997 | 53 | 1059 | 0 | 0 | 0 | 0 | 0 | 1112 |
| 1998 | 50 | 1617 | 0 | 0 | 0 | 0 | 0 | 1667 |
| 1999 | 104 | 1861 | 2 | 0 | 0 | 29 | 0 | 1996 |
| 2000 | 48 | 1699 | 0 | 1 | 0 | 43 | 0 | 1791 |
| 2001 | 84 | 1932 | 0 | 0 | 0 | 0 | 0 | 2016 |
| 2002 | 176 | 774 | 0 | 0 | 0 | 81 | 0 | 1031 |
| 2003 | 490 | 1032 | 0 | 0 | 0 | 10 | 0 | 1532 |
| 2004 | 508 | 985 | 0 | 0 | 6 | 0 | 76 | 1575 |
| 2005 | 903 | 884 | 1 | 0 | 1 | 0 | 48 | 1837 |
| 2006 | 900 | 875 | 0 | 0 | 0 | 0 | 0 | 1775 |
| 2007 | 838 | 862 | 0 | 0 | 0 | 0 | 0 | 1700 |
| 2008 | 665 | 447 | 0 | 0 | 0 | 0 | 0 | 1112 |
| 2009 | 322 | 122 | 0 | 0 | 0 | 0 | 2 | 446 |
| 2010 | 229 | 381 | 0 | 0 | 0 | 0 | 1 | 611 |
| 2011 | 63 | 11 | 0 | 0 | 0 | 0 | 0 | 74 |

| Year | Faroës | France | Norway | Germany | Russia/USSR | UK (E+W) | UK (Scot) | TOTAL |
|-------|--------|--------|--------|---------|-------------|----------|-----------|-------|
| 2012 | 16 | 28 | 0 | 0 | 0 | 0 | 0 | 44 |
| 2013 | 24 | 36 | 0 | 0 | 0 | 0 | 0 | 60 |
| 2014 | 33 | 44 | 0 | 0 | 0 | 0 | 0 | 77 |
| 2015 | 24 | 28 | 0 | 0 | 0 | 0 | 0 | 52 |
| 2016 | 30 | 7 | 0 | 0 | 0 | 0 | 0 | 38 |
| 2017 | 9 | 21 | 0 | 0 | 0 | 0 | 0 | 30 |
| 2018 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 6 |
| 2019 | 19 | 11 | 0 | 0 | 0 | 0 | 0 | 30 |
| 2020 | 20 | 13 | 0 | 0 | 0 | 0 | 0 | 33 |
| 2021 | 12 | 10 | 0 | 0 | 0 | 0 | 0 | 22 |
| 2022* | 1 | 6 | <1 | 0 | 0 | 0 | <1 | 8 |

*Provisional.

Table 8.2.0b. Working Group estimates of landings (t) of roundnose grenadier from Subarea 6.

| Year | Estonia | Faroës | France | Germany | Ireland | Lithuania | Norway | Poland | Russia | Spain | UK (E+W) | UK (Scot) | TOTAL |
|------|---------|--------|--------|---------|---------|-----------|--------|--------|--------|-------|----------|-----------|-------|
| 1988 | 0 | 27 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 32 |
| 1989 | 0 | 2 | 2211 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2218 |
| 1990 | 0 | 29 | 5484 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5515 |
| 1991 | 0 | 0 | 7297 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7304 |
| 1992 | 0 | 99 | 6422 | 142 | 0 | 0 | 5 | 0 | 0 | 0 | 2 | 112 | 6782 |
| 1993 | 0 | 263 | 7940 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8205 |
| 1994 | 0 | 0 | 5898 | 15 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 5938 |
| 1995 | 0 | 0 | 6329 | 2 | 59 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 6472 |
| 1996 | 0 | 0 | 5888 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 156 | 6044 |
| 1997 | 0 | 15 | 5795 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 218 | 6032 |
| 1998 | 0 | 13 | 5170 | 0 | 0 | 0 | 21 | 0 | 0 | 3 | 0 | 0 | 5207 |
| 1999 | 0 | 0 | 5637 | 3 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5642 |
| 2000 | 0 | 0 | 7478 | 0 | 41 | 0 | 1 | 0 | 0 | 1002 | 1 | 433 | 8956 |
| 2001 | 680 | 11 | 5897 | 6 | 31 | 137 | 32 | 58 | 3 | 6942 | 21 | 955 | 14773 |

| Year | Estonia | Faeroes | France | Germany | Ireland | Lithuania | Norway | Poland | Russia | Spain | UK (E+W) | UK (Scotland) | TOTAL |
|-------|---------|---------|--------|---------|---------|-----------|--------|--------|--------|-------|----------|---------------|-------|
| 2002 | 821 | 0 | 7209 | | 12 | 1817 | | 932 | | | 6 | 741 | 11538 |
| 2003 | 52 | 32 | 4924 | | 11 | 939 | | 452 | 3 | | | 185 | 6598 |
| 2004 | 26 | 12 | 4574 | 0 | 8 | 961 | 0 | 13 | 72 | 1991 | 0 | 72 | 7729 |
| 2005 | 80 | 24 | 2897 | 0 | 17 | 92 | 1 | 0 | 71 | 468 | 0 | 44 | 3694 |
| 2006 | 34 | 25 | 1931 | 0 | 5 | 112 | 0 | 0 | 0 | 252 | 0 | 15 | 2374 |
| 2007 | 0 | 10 | 1552 | 0 | 2 | 31 | 0 | 0 | 0 | 354 | 0 | 4 | 1953 |
| 2008 | 0 | 6 | 1433 | 0 | 0 | 23 | 0 | 0 | 16 | 336 | 0 | 27 | 1841 |
| 2009 | 0 | 6 | 1090 | 0 | 0 | 0 | 0 | 0 | 0 | 279 | 0.3 | 15 | 1391 |
| 2010 | 0 | 13 | 1271 | 0 | 0 | 0 | 2 | 0 | 0 | 769 | 1.2 | 23 | 2079 |
| 2011 | 0 | 4 | 1112 | 0 | 0 | 0 | 0 | 0 | 0 | 682 | 0 | 8 | 1806 |
| 2012 | 0 | 0 | 1088 | 0 | 0 | 0 | 0 | 0 | 0 | 454 | 2 | 0 | 1544 |
| 2013 | 0 | 0 | 934 | 0 | 0 | 0 | 0 | 0 | 0 | 661 | 6 | 0 | 1601 |
| 2014 | 0 | 0 | 630 | 0 | 0 | 0 | 0 | 0 | 0 | 471 | 0 | 0 | 1101 |
| 2015 | 0 | 0 | 364 | 0 | 0 | 0 | 0 | 0 | 0 | 282 | 0 | 0 | 646 |
| 2016 | 0 | 0 | 422 | 0 | 0 | 0 | 0 | 0 | 0 | 330 | 0 | 5.5 | 757 |
| 2017 | 0 | 0 | 99 | 0 | 0.5 | 0 | 0 | 0 | 0 | 496 | 0 | 8 | 602 |
| 2018 | 0 | 0 | 184 | 0 | 0 | 0 | 0 | 0 | 0 | 323 | 0 | 6 | 513 |
| 2019 | 0 | 0 | 128 | 0 | 0 | 0 | 0 | 0 | 0 | 68 | 0 | 6 | 202 |
| 2020 | 0 | 0 | 204 | 0 | 0 | 0 | 0 | 0 | 0 | 108 | 0 | 5.5 | 318 |
| 2021 | 0 | 1 | 106 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 116 |
| 2022* | 0 | 0 | 104 | 0 | 0 | 0 | <1 | 0 | 0 | 0 | 0 | 15 | 119 |

* Provisional.

Table 8.2.0c. Working Group estimates of landings (t) of roundnose grenadier from Subarea 7.

| Year | Faroes | France | Ireland | Spain | UK (Scot) | TOTAL |
|------|--------|--------|---------|-------|-----------|-------|
| 1988 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1989 | 0 | 222 | 0 | 0 | 0 | 222 |
| 1990 | 0 | 215 | 0 | 0 | 0 | 215 |
| 1991 | 0 | 489 | 0 | 0 | 0 | 489 |

| Year | Faroes | France | Ireland | Spain | UK (Scot) | TOTAL |
|------|--------|--------|---------|-------|-----------|-------|
| 1992 | 0 | 1556 | 0 | 0 | 0 | 1556 |
| 1993 | 0 | 1916 | 0 | 0 | 0 | 1916 |
| 1994 | 0 | 1922 | 0 | 0 | 0 | 1922 |
| 1995 | 0 | 1295 | 0 | 0 | 0 | 1295 |
| 1996 | 0 | 1051 | 0 | 0 | 0 | 1051 |
| 1997 | 0 | 1033 | 0 | 5 | 0 | 1038 |
| 1998 | 0 | 1146 | 0 | 11 | 0 | 1157 |
| 1999 | 0 | 892 | 0 | 4 | 0 | 896 |
| 2000 | 0 | 859 | 0 | 0 | 0 | 859 |
| 2001 | 0 | 938 | 416 | 0 | 0 | 1354 |
| 2002 | 1 | 449 | 605 | 0 | 3 | 1058 |
| 2003 | 0 | 373 | 213 | 0 | 1 | 587 |
| 2004 | 0 | 248 | 320 | 0 | 0 | 568 |
| 2005 | 0 | 191 | 55 | 0 | 0 | 246 |
| 2006 | 0 | 248 | 138 | 0 | 0 | 386 |
| 2007 | 0 | 207 | 20 | 0 | 0 | 227 |
| 2008 | 0 | 27 | 0 | 0 | 0 | 27 |
| 2009 | 0 | 59 | 0 | 0 | 0 | 59 |
| 2010 | 0 | 41 | 0 | 0 | 0 | 41 |
| 2011 | 0 | 34 | 0 | 0 | 0 | 34 |
| 2012 | 0 | 48 | 0 | 0.2 | 0 | 48 |
| 2013 | 0 | 40 | 0 | 0 | 0 | 40 |
| 2014 | 0 | 11 | 0 | 0 | 0 | 11 |
| 2015 | 0 | 10 | 0 | 0 | 0 | 10 |
| 2016 | 0 | 4 | 0 | 0 | 0 | 4 |
| 2017 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 2 | 0 | 0 | 0 | 2 |
| 2019 | 0 | 0.8 | 0 | 0 | 0 | 0.8 |
| 2020 | 0 | 5 | 0 | 0 | 0 | 5 |

| Year | Faroes | France | Ireland | Spain | UK (Scot) | TOTAL |
|-------|--------|--------|---------|-------|-----------|-------|
| 2021 | 0 | 2.5 | 0 | 0 | 0 | 2.5 |
| 2022* | 0 | 0.5 | 0 | 0 | 0 | 0.5 |

* provisional.

Table 8.2.0d. Working Group estimates of landings (t) of roundnose grenadier from Subarea 12.b

| Year | Esto- nia | Fa- roes | France *** | Ger- man y | Ice- land | Ire- land | Lithua- nia | Spain | USSR/R ussia | UK (E+ W) | UK (Scotl .) | Nor- way | Total |
|------|--------------|-------------|---------------|------------------|--------------|--------------|----------------|-------|-----------------|-----------------|--------------------|-------------|-------|
| 1988 | | | | | | | | | | | | | 0 |
| 1989 | | | 0 | | | | | | 52 | | | | 52 |
| 1990 | | | 0 | | | | | | | | | | 0 |
| 1991 | | | 14 | | | | | | 158 | | | | 172 |
| 1992 | | | 13 | | | | | | | | | | 13 |
| 1993 | | 263 | 26 | 39 | | | | | | | | | 328 |
| 1994 | | 457 | 20 | 9 | | | | | | | | | 486 |
| 1995 | | 359 | 285 | | | | | | | | | | 644 |
| 1996 | | 136 | 179 | | 77 | | | 1136 | | | | | 1528 |
| 1997 | | 138 | 111 | | | | | 1800 | | | | | 2049 |
| 1998 | | 19 | 116 | | | | | 4262 | | | | | 4397 |
| 1999 | | 29 | 287 | | | | | 8251 | 6 | | | | 8573 |
| 2000 | | 6 | 374 | 9 | | | | 5791 | | 9 | 6 | | 6195 |
| 2001 | | 2 | 159 | | | 3 | | 5922 | | | 7 | 1 | 6094 |
| 2002 | | | 14 | | | | 18 | 10045 | | 1 | 2 | | 10080 |
| 2003 | | | 539 | | | 1 | 31 | 11663 | | | 1 | | 12235 |
| 2004 | | 8 | 1 693 | | | | 120 | 10880 | 91 | | 4 | | 12796 |
| 2005 | 20 | 5 | 508 | | | | 13 | 7804 | 81 | | 350 | | 8782 |
| 2006 | 27 | 1 | 85 | | | | 6 | 4242 | | | | | 4361 |
| 2007 | 140 | 2 | 0 | | | | 8 | 4108 | | | | | 4258 |
| 2008 | | 0 | 0 | | | | 3 | 2416 | 13 | | | | 2432 |
| 2009 | | | | | | | | 5335 | | | | | 5335 |
| 2010 | | | 1 | | | | | 2910 | | | | | 2911 |

| Year | Estonia | Fa-roes | France *** | Ger-man y | Ice-land | Ire-land | Lithua-nia | Spain | USSR/Russia | UK (E+W) | UK (Scotl.) | Nor-way | Total |
|-------|---------|---------|---------------|--------------|----------|----------|------------|--------|-------------|-------------|----------------|---------|-------|
| 2011 | | 3 | | | | | | 2905 | | | | | 2908 |
| 2012 | | 9 | | | | | | 1343 | | | | | 1352 |
| 2013 | | | | | | | | 991 | | | | | 991 |
| 2014 | | 3.6 | | | | | | 988 | | | | | 992 |
| 2015 | | | | | | | | 363 | | | | | 363 |
| 2016 | | | | | | | | 632 | | | | | 632 |
| 2017 | | | | | | | | 1001 | | | | | 1001 |
| 2018 | | | | | | | | 998.53 | | | | | 999 |
| 2019 | | 3 | | | | | | 454 | | | | | 457 |
| 2020 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 268 | 0 | 0 | 0 | 0 | 268 |
| 2021 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* Preliminary.

Table 8.2.0e. Working Group estimates of landings (t) of roundnose grenadier unallocated landings in 5.b, 6 and 12.

| Year | Unallocated |
|------|-------------|
| 1988 | 0 |
| 1989 | 0 |
| 1990 | 0 |
| 1991 | 0 |
| 1992 | 0 |
| 1993 | 0 |
| 1994 | 0 |
| 1995 | 0 |
| 1996 | 0 |
| 1997 | 0 |
| 1998 | 0 |
| 1999 | 0 |
| 2000 | 0 |

| Year | Unallocated |
|-------|-------------|
| 2001 | 208 |
| 2002 | 504 |
| 2003 | 952 |
| 2004 | 0 |
| 2005 | 0 |
| 2006 | 0 |
| 2007 | 0 |
| 2008 | 0 |
| 2009 | 0 |
| 2010 | 0 |
| 2011 | 0 |
| 2012 | 0 |
| 2013 | 0 |
| 2014 | 0 |
| 2015 | 0 |
| 2016 | 0 |
| 2017 | 0 |
| 2108 | 0 |
| 2019 | 0 |
| 2020 | 0 |
| 2021 | 0 |
| 2022* | 0 |

* Provisional.

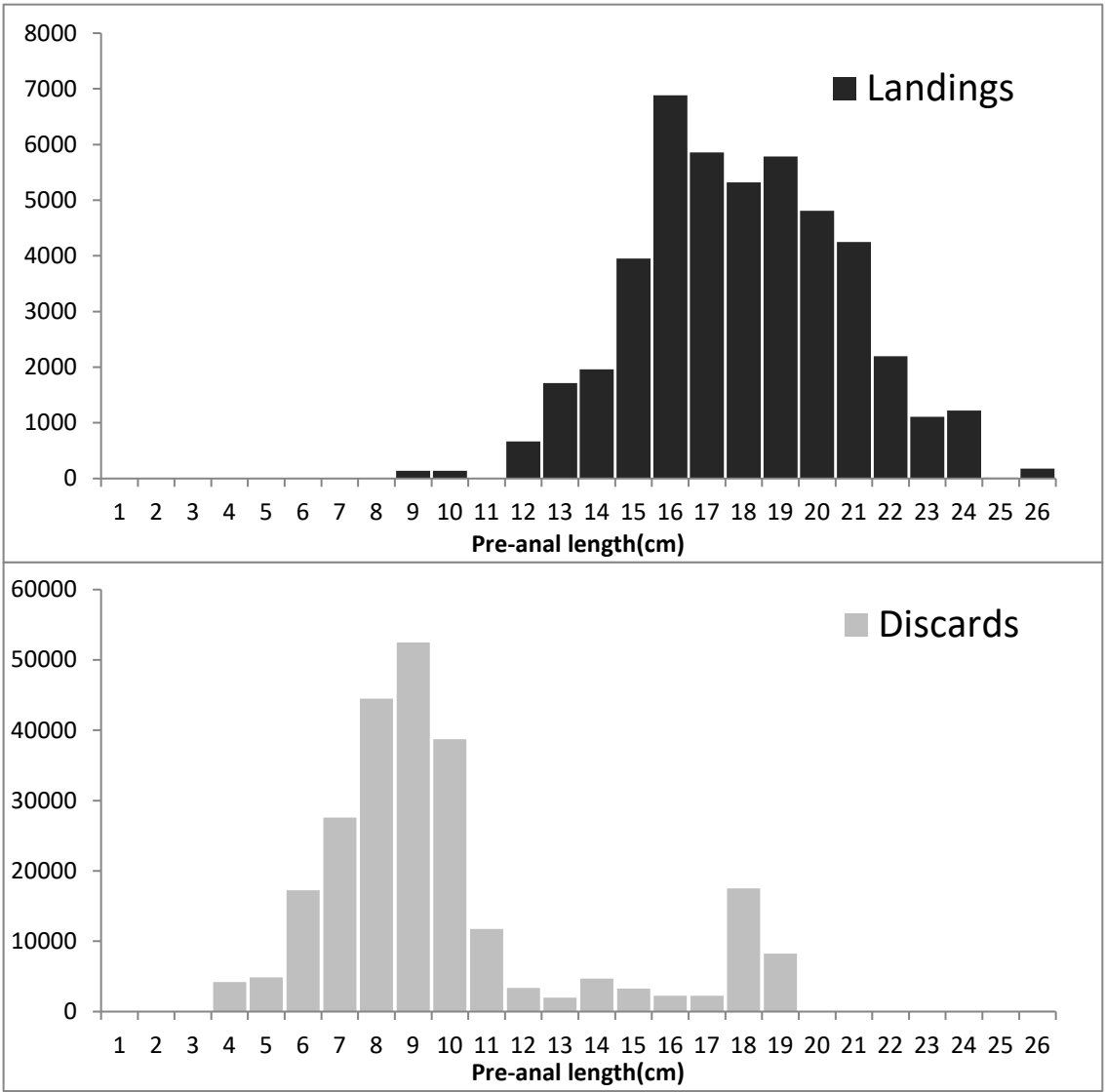
Table 8.2.0f. Working Group estimates of landings (t) of roundnose grenadier 5.b, 6, 7 and 12.b.

| Year | 5.b | 6 | 7 | 12.b | Unallocated | 5.b,6,7 | Overall total |
|------|------|------|-----|------|-------------|---------|---------------|
| 1988 | 1 | 32 | 0 | 0 | 0 | 33 | 33 |
| 1989 | 258 | 2218 | 222 | 52 | 0 | 2698 | 2750 |
| 1990 | 1549 | 5515 | 215 | 0 | 0 | 7279 | 7279 |
| 1991 | 2311 | 7304 | 489 | 172 | 0 | 10104 | 10276 |

| Year | 5.b | 6 | 7 | 12.b | Unallocated | 5.b,6,7 | Overall total |
|------|------|--------|------|--------|-------------|---------|---------------|
| 1992 | 3817 | 6782 | 1556 | 13 | 0 | 12155 | 12168 |
| 1993 | 1681 | 8205 | 1916 | 328 | 0 | 11802 | 12130 |
| 1994 | 668 | 5938 | 1922 | 486 | 0 | 8528 | 9014 |
| 1995 | 1223 | 6472 | 1295 | 644 | 0 | 8990 | 9634 |
| 1996 | 1078 | 6044 | 1051 | 1528 | 0 | 8173 | 9701 |
| 1997 | 1112 | 6032 | 1038 | 2049 | 0 | 8182 | 10231 |
| 1998 | 1667 | 5207 | 1157 | 4397 | 0 | 8031 | 12428 |
| 1999 | 1996 | 5642 | 896 | 8573 | 0 | 8534 | 17107 |
| 2000 | 1791 | 8956 | 859 | 6195 | 0 | 11606 | 17801 |
| 2001 | 2016 | 14773 | 1354 | 6094 | 208 | 18143 | 24445 |
| 2002 | 1031 | 11538 | 1058 | 10080 | 504 | 13627 | 24210 |
| 2003 | 1532 | 6598 | 587 | 12235 | 952 | 8717 | 21904 |
| 2004 | 1575 | 7729 | 568 | 12796 | 0 | 9872 | 22668 |
| 2005 | 1837 | 3694 | 246 | 8782 | 0 | 5777 | 14559 |
| 2006 | 1775 | 2374 | 386 | 4361 | 0 | 4535 | 8896 |
| 2007 | 1700 | 1953 | 227 | 4258 | 0 | 3880 | 8138 |
| 2008 | 1112 | 1841 | 27 | 2432 | 0 | 2980 | 5411 |
| 2009 | 446 | 1391 | 59 | 5335 | 0 | 4046 | 9381 |
| 2010 | 611 | 2079** | 41 | 2911** | 0 | 2731** | 5643** |
| 2011 | 74 | 1805** | 34 | 2907** | 0 | 1914** | 4822** |
| 2012 | 44 | 1542** | 48 | 1352** | 0** | 1634** | 2986** |
| 2013 | 60 | 1601** | 40 | 991** | 0** | 1701** | 2692** |
| 2014 | 77 | 1100** | 11 | 992** | 0** | 1188** | 2180** |
| 2015 | 52 | 646** | 10 | 363** | 0 | 708** | 1071** |
| 2016 | 38 | 777** | 4 | 632** | 0 | 819** | 1452** |
| 2017 | 30 | 603** | 0 | 1001 | 0 | 633** | 1634** |
| 2018 | 6 | 513 | 2 | 998 | 0 | 521 | 1519 |
| 2019 | 30 | 202 | 1 | 457 | 0 | 233 | 689 |
| 2020 | 33 | 318 | 5 | 268 | 0 | 356 | 624 |

| Year | 5.b | 6 | 7 | 12.b | Unallocated | 5.b,6,7 | Overall total |
|-------|-----|-----|-----|------|-------------|---------|---------------|
| 2021 | 22 | 116 | 2 | 0 | 0 | 140 | 140 |
| 2022* | 8 | 119 | 0.5 | 0 | 0 | 128 | 128 |

* Preliminary. ** Revised catches, updated in 2020.



Figures 8.2.1. Length distribution of the landings and discards of the French fleet in Division 5.b, 6, 7 based from on-board observations. Figures reflect data from 2022.

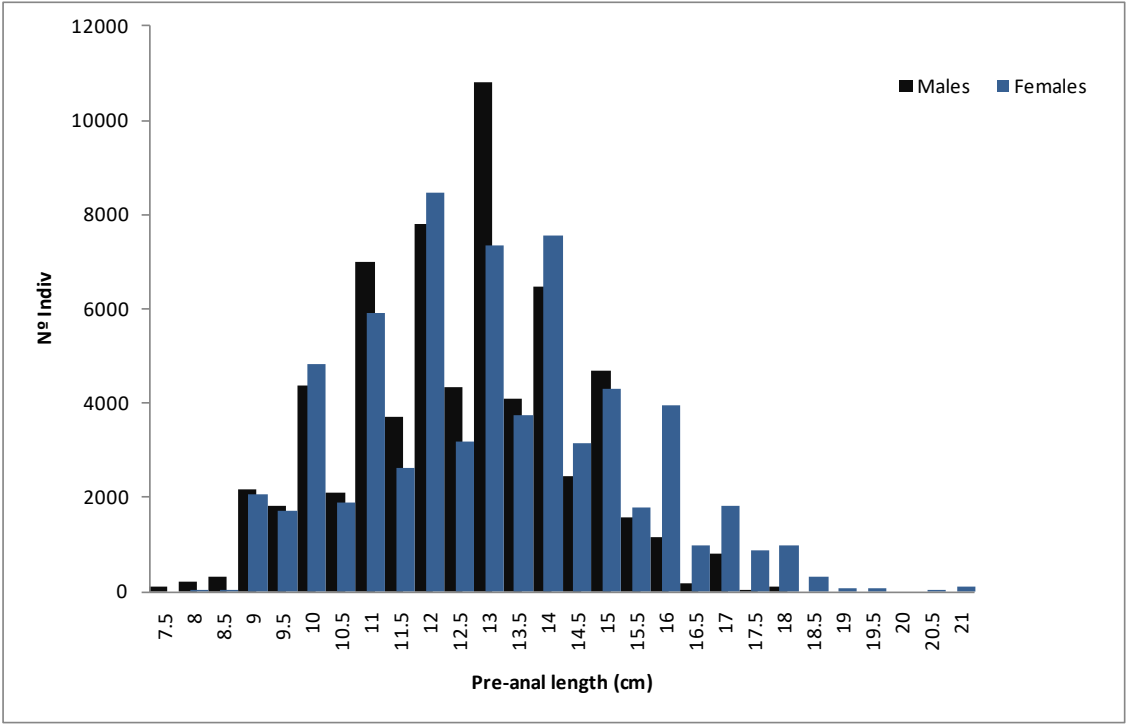


Figure 8.2.2. Length distribution of the landings of the Spanish fleet in Division 6.b.1 based from on-board observations in 2019. No new information was available in 2020-2022.

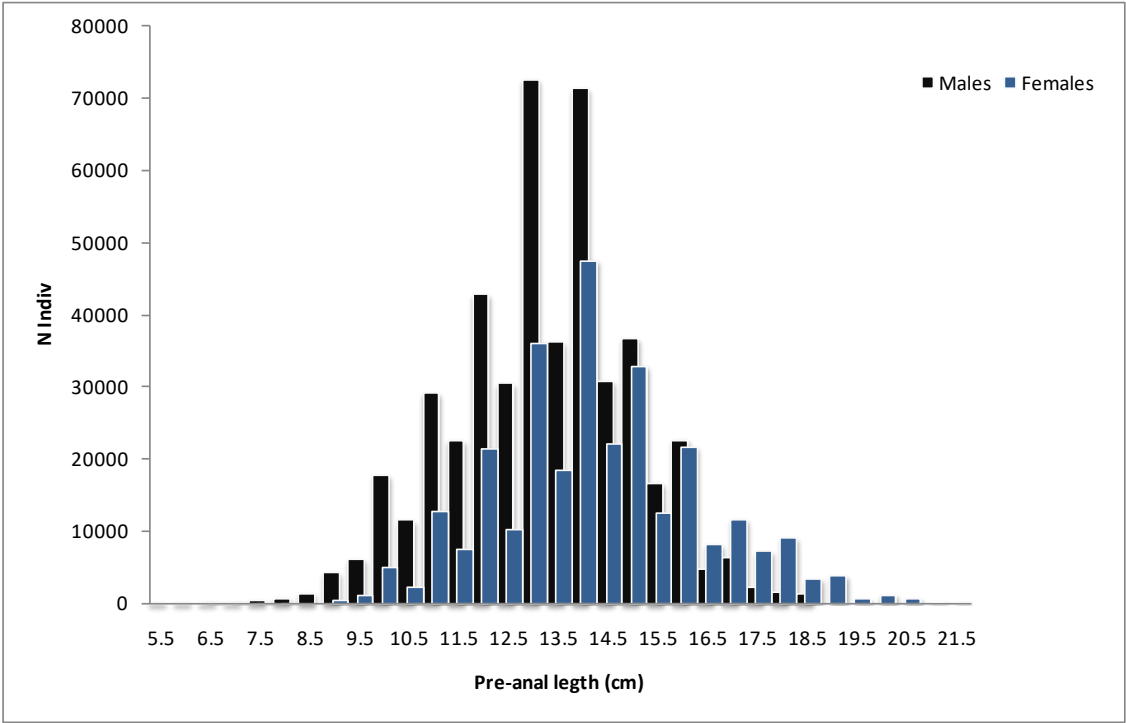


Figure 8.2.3. Length distribution of the landings of the Spanish fleet in Division 12.b based from on-board observations in 2019. No new information was available in 2020-2022.

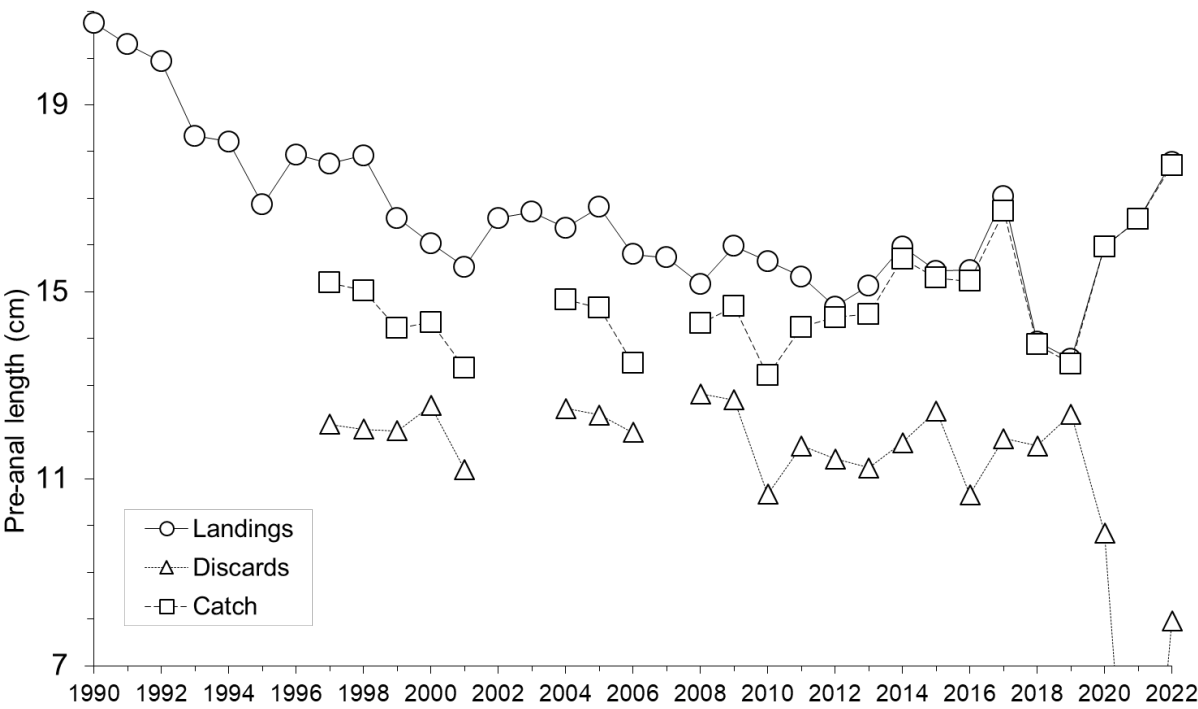


Figure 8.2.4. Evolution of the pre-anal length of roundnose grenadier in the French landings, catch and discards, 1990–2022. No information was available on discards for 2021.

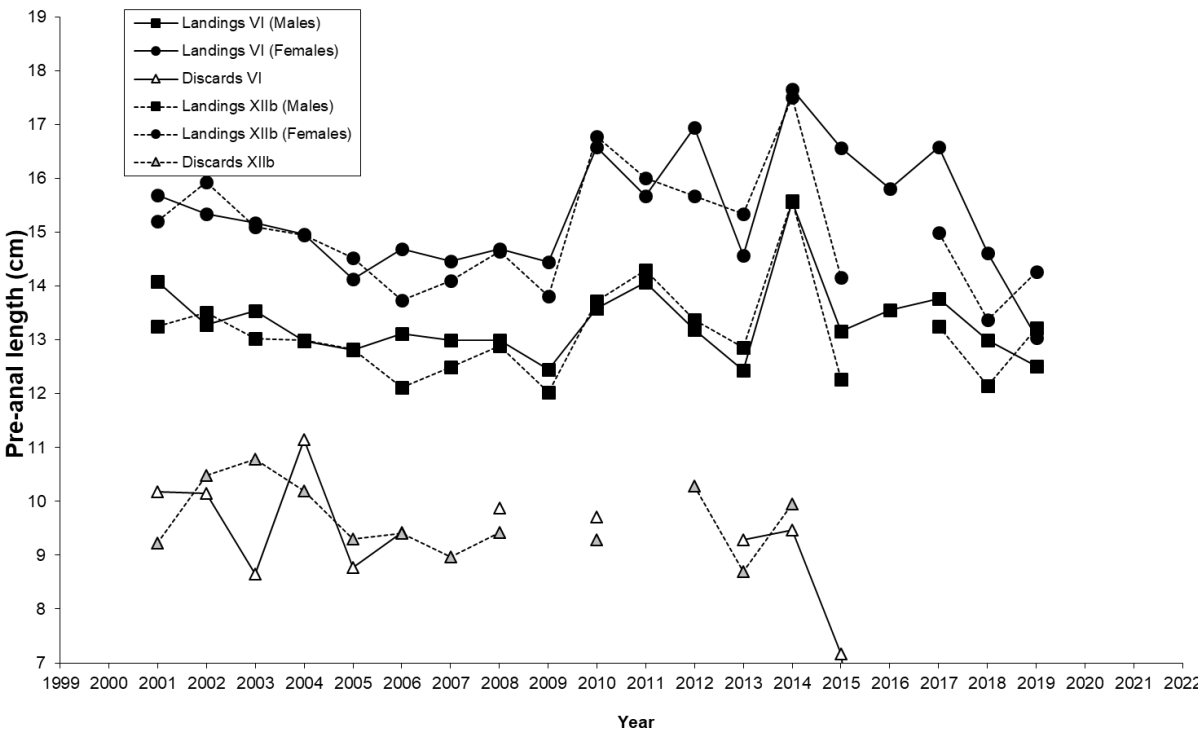


Figure 8.2.5. Evolution of the pre-anal length of roundnose grenadier in the Spanish landings and discards in Divisions 6.b and 12.b, 2001–2019. No new discard or landings length distribution information in 2020–22.

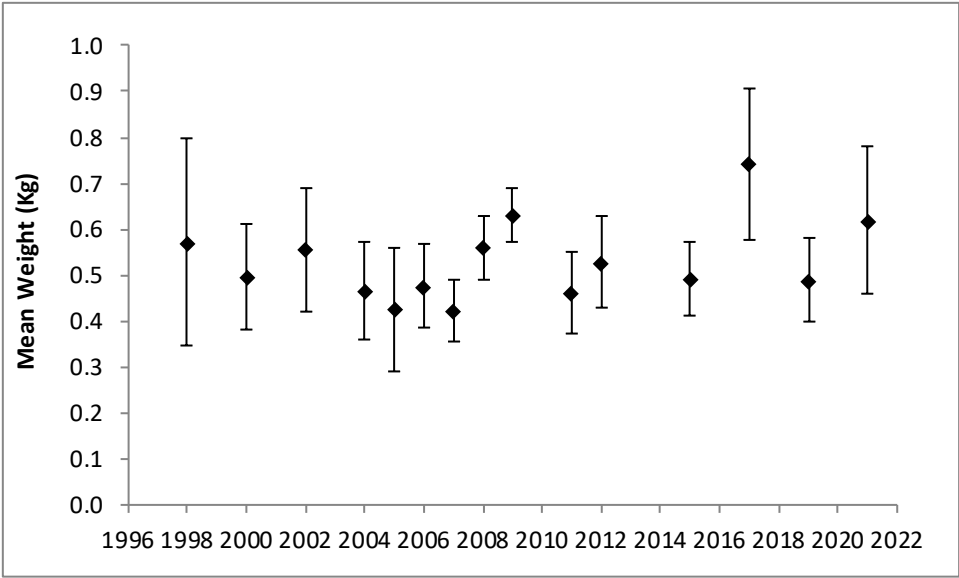


Figure 8.2.6. Mean individual weight of roundnose grenadier according to Marine Scotland deep-water science survey in 6.a.

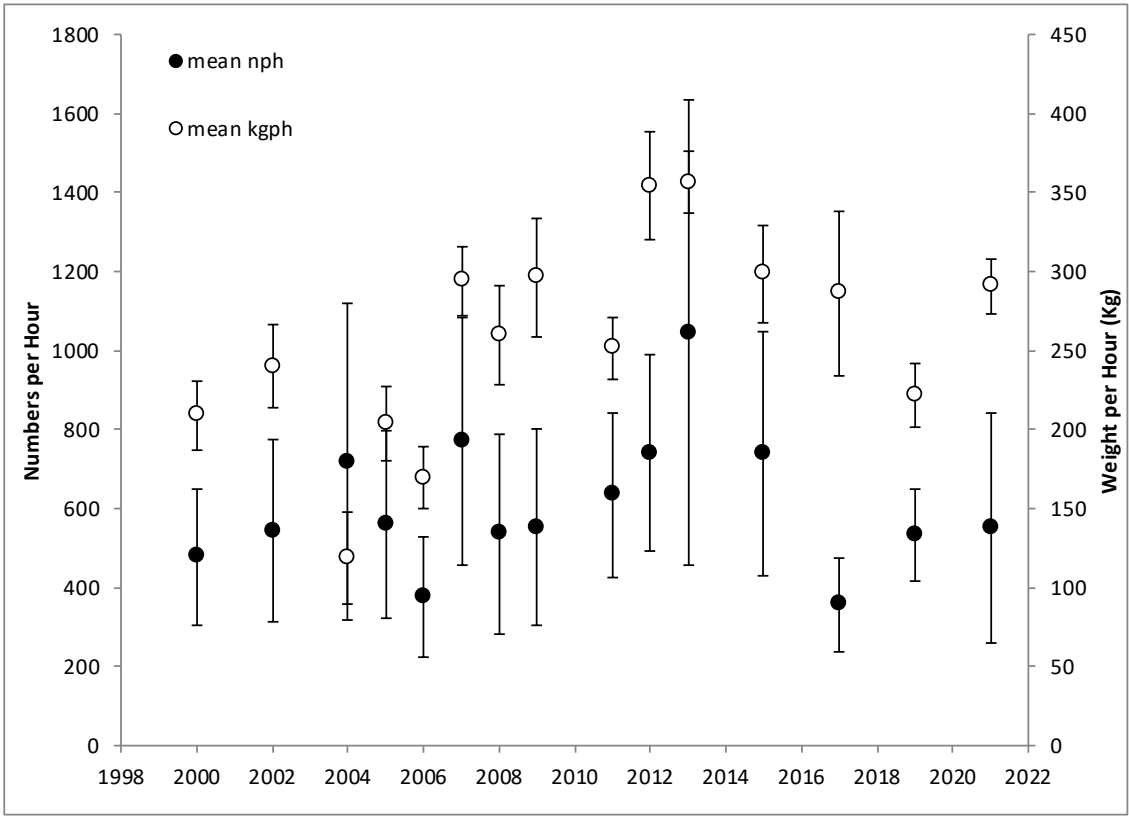


Figure 8.2.7. Abundance indices of roundnose grenadier according to Marine Scotland deep-water science survey in 6.a.

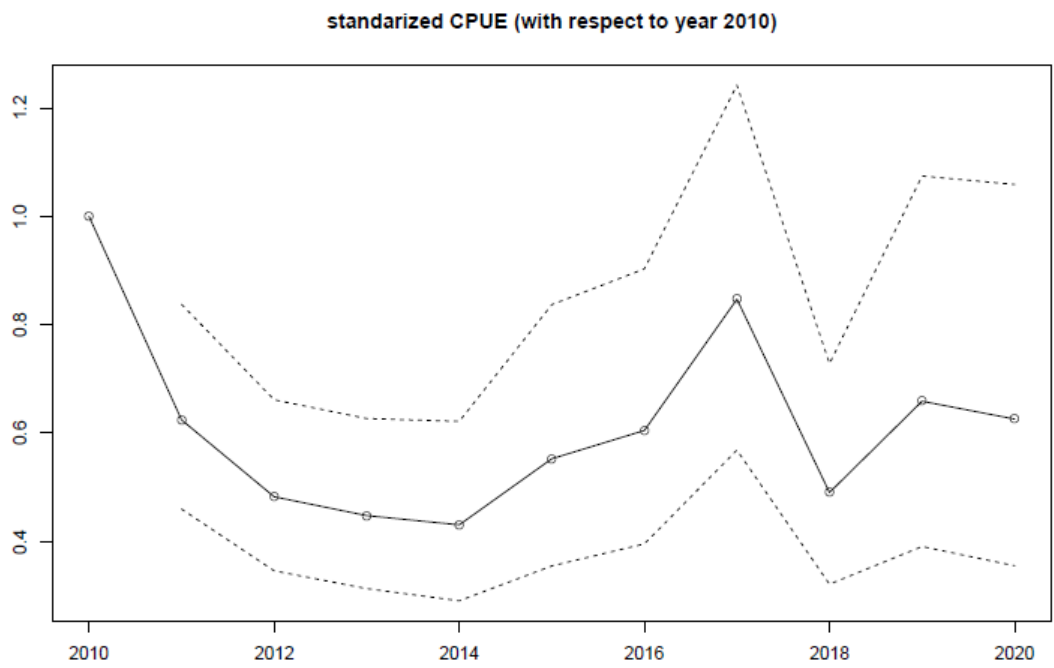


Figure 8.2.8. CPUE from the Spanish commercial fleet operating in 6.b.1 and 12.b. Dotted lines represent the confidence intervals.

8.3 Roundnose grenadier (*Coryphaenoides rupestris*) in Division 3.a

8.3.1 The fishery

From the late 1980s until 2006 a Danish directed fishery for roundnose grenadier was conducted in the deeper part of Division 3.a. Until 2003 landings increased gradually, from around 1000 t to 4000 t with fluctuations. In 2004 and 2005 exceptionally high catches were reported; reaching almost 12 000 tonnes in 2005. This directed fishery stopped in 2006 due to implementation of new agreed regulations between EU and Norway.

At present, there are no directed fisheries for roundnose grenadier in Division 3.a.

8.3.2 Landing trends

The total landings by all countries from 1988–2022 are shown in Table 8.3.0 and Figure 8.3.0.

The landings from the directed Danish fishery ceased in 2007 and the total landings have since been minor (<2 tonnes). The landings are now by-catches from other fisheries.

8.3.3 ICES Advice

The 2023 and 2024 advice for rng.3a is: “ICES advises that when the precautionary approach is applied, there should be zero catch in each of the years 2023 and 2024”.

8.3.4 Management

The directed fishery for roundnose grenadier was stopped in April 2006 based on agreements between Norway and the EU. The directed fishery has then been prohibited since 2006. Norway and the EU has introduced a mandatory use of sorting grids in shrimp fisheries in order to minimize the bycatch of fish.

In Council Regulation (EU) No 2023/194 of 30 January 2023, fixing for 2023 and 2024 the fishing opportunities for EU vessels for fish stocks of certain deep-sea fish species, a precautionary TAC was set to 2 tons for each year, for EU vessels in EU waters and international waters of Subarea 3. Since there is no area outside national jurisdiction (international waters) in 3.a, this regulation applies to EU waters unless other agreements are negotiated with Norway. There is no TAC for Norwegian vessels in Norwegian waters but the agreed regulation between EU and Norway apply for this area.

8.3.5 Data available

8.3.5.1 Landings and discards

Landings data from 1988–2022 are presented in Table 8.3.0. Discards have been reported from both the Swedish and Danish fishery since 2014 (Table 8.3.2).

8.3.5.2 Length compositions

Since the Danish directed fishery has stopped there is no new information on size compositions from commercial catches other than the data given for the period 1996–2006 (see stock annex for further details).

Updated information on size distribution from the Norwegian shrimp survey is provided in Figure 8.3.1. Length measurements are given in pre anal fin length (PAFL) in cm.

8.3.5.3 Age composition

Age data are available from a deep-sea species survey in 1987 and from the Norwegian shrimp survey in 2007-2023 (Table 8.3.3).

Age data were derived using age determination by transverse sections of sagittal otoliths and reading method with broken reading axis as developed by Bergstad (1990).

These age data are presented in Bergstad *et al.*, 2014.

8.3.5.4 Bycatch effort and cpue

Data from the Norwegian reference fleet have been analysed from 2013-2019 to estimate the catch of roundnose grenadier in the shrimp fishery (Table 8.3.5).

8.3.5.5 Survey indices

The Norwegian annual shrimp survey conducted since 1984 samples deeper parts of the Skagerrak and north-eastern North Sea (3.a and 4.a), including the depth range where the roundnose grenadier occurs (mainly 300–600 m) (Bergstad, 1990b). The minor area >600 m is an ammunition and warship dumping ground with warning against fishing. The survey is considered to adequately sample the main distribution area of roundnose grenadier, and the sample sizes by year (no. of tows at depths >300 m and >400 m) are presented in Table 8.3.1. The survey indices from the shrimp survey were updated with new information from 2023 (Table 8.3.4 and Figure 8.3.2). The indices are given as biomass (kg/h) and abundance (number/h).

8.3.6 Data analyses

An earlier study analysed the time-series of abundance of roundnose grenadier through the time-series (Bergstad *et al.*, 2014). Catch rates in terms of biomass (kg/h) and abundance (nos/h) were calculated for stations 300 m and deeper (Figure 8.3.2). Stations with zero catches were included, and the catches at non-zero stations were standardized by tow duration. The published analysis also includes a time-series of small grenadier, i.e. <5 cm pre anal fin length (PAFL), illustrating variation in recruitment.

8.3.6.1 Trends in landings, effort and estimated bycatches

Collated information on landings and estimates of bycatch from the Norwegian Reference fleet suggest that the removals of roundnose grenadier are now at low levels in Division 3.a. Discard has been reported since 2014. Although the discards from the fishery in this area from recent years was reported to be at the same level as the landings for some years, the level on reported total catch was still low and in the range of what it has been since 2007. However, Denmark reported 21 tons of discards from 2022.

There is no longer a directed fishery for grenadier in this area and data on effort and CPUE is therefore not available from the commercial catches. The earlier evaluation of the Danish CPUE data were presented in ICES (2007) but these CPUE data do not provide any clear indications of stock status nor stock development for the time of the directed fishery, which ceased in mid-2006.

Landings and discards have been insignificant and have been represented as bycatches from other fisheries. Data from the Norwegian reference fleet show that catches of roundnose grenadier in the Norwegian shrimp fishery is low (Table 8.3.5). However, discards from Denmark for 2022 was 21 tons and represents an increase compared with earlier years.

8.3.6.2 Size compositions

The recent length distributions from the Norwegian shrimp survey data contrasts with the 1991–2004 distributions by not having a distinct mode of small fish as seen in the early 1990s (Bergstad *et al.*, 2014). The pulse of juveniles appearing in the early 1990s appears to have represented the only major recruitment event through the time-series 1984–present. Recently some small juveniles appear every year in the survey, but there is no indication of a pronounced recruitment pulse as observed in the early 1990s.

The Danish and Norwegian length distributions, sampled from commercial landings and survey catches, respectively, agree well for those years covered by samples from both countries (1987 and 2004–2006) (See stock annex for information on the Danish length distributions from the directed fishery). Note that both in 1987 and 2004 there appear to be two clearly distinguishable components in the Danish length compositions. In the Norwegian data, several years show two modes and it is possible to follow the more abundant occurrence of juveniles <5 cm (PAFL) through several years.

8.3.6.3 Biomass and abundances indices from survey

The survey catch rate in terms of biomass (kg/h) and abundance (nos/h) varied strongly through the time-series, but elevated levels were observed from 1998 to 2005. The indices have declined since 2004 with both biomass and abundance being lowest on record in 2017. The index for 2023 show a small increase since the lowest record in 2017. Since the directed fishery is stopped and the bycatches from other fisheries are expected to be low, it is uncertain why the survey catches still are very low compared to the levels before 2000.

8.3.6.4 Age data

The age frequency distributions from recent years contrast with distributions from the 1980s (Bergstad, 1990b) in terms of proportions of old fish (e.g. >20 years) (Table 8.3.3). After the exploitation pulse in 2003–2005, the proportion of old fish has declined to very low levels (Bergstad *et al.*, 2014). In recent years, i.e. after 2006 the mean age in the catches has increased somewhat, but the proportion of fish >20 years remains low.

Analyses of size distributions and the time-series of survey abundance of small juveniles by Bergstad *et al.* (2014) suggested that only a single very abundant recruitment event occurred during the period 1984–2023, perhaps only a single major year class. This event rejuvenated the stock and enhanced abundance in subsequent years.

8.3.7 Comments on assessment

In 2022, the rb-rule was used for the assessment. This rule was chosen when lacking a SPiCT assessment and length measurements from the fisheries.

I_{trigger} is calculated as $I_{loss} \times 1.4$ and I_{loss} was defined as the lowest value in the Norwegian shrimp survey index in the period before the collapse (1990) ($I_{loss}=49.82$), giving $I_{trigger} = 69.73$ kg/h. The r would be the “2 over 3 rule” giving 1.25, the multiplier $m = 0.5$

In 2018, the stock was upgraded to a 3.2 category stock using the biomass index from the Norwegian shrimp survey, derived from the relevant depth range of the species in this area.

8.3.8 Management considerations

The decline in abundance after 2005–2006 suggested by the Norwegian shrimp survey catch rates probably reflect the combined effect of the enhanced targeted exploitation in 2003–2005 and low recruitment in the years following the single recruitment pulse in the early 1990s. The percentage of fish >15 cm is at a lower level as in the late 1980s and early 1990s, and there is no suggestion of a new recruitment pulse as seen in the 1990s. Recent age distributions almost lack the >20 years old component which was prominent in the 1980s.

Since the targeted fishery has stopped and the bycatch in the shrimp fishery seems to be overall low, the potential for recovery of the roundnose grenadier in Skagerrak may be good. Abundance levels has declined since 2004 and in 2017 it was the lowest recorded during the survey period 1984–2022. However, there has been a small increase in the index since 2017 but still at very low levels. Rejuvenation and growth of the population would at present seem unlikely due to low recruitment during the recent decade.

8.3.9 References

- Bergstad, O.A. 1990b. Distribution, population structure, growth and reproduction of the roundnose grenadier *Coryphaenoides rupestris* (Pisces:Macrouridae) in the deep waters of the Skagerrak. *Marine Biology* 107: 25–39.
- Bergstad, O.A., H.Ø. Hansen and T. Jørgensen. 2014. Intermittent recruitment and exploitation pulse underlying temporal variability in a demersal deep-water fish population. *ICES Journal of Marine Science*, 71: 2088–2100.

8.3.10 Tables and Figures

Table 8.3.0. Roundnose grenadier in Division 3.a. WG estimates of landings.

| Year | Denmark | Norway | Sweden | TOTAL |
|------|---------|--------|--------|--------|
| 1988 | 612 | | 5 | 617 |
| 1989 | 884 | | 1 | 885 |
| 1990 | 785 | 280 | 2 | 1067 |
| 1991 | 1214 | 304 | 10 | 1528 |
| 1992 | 1362 | 211 | 755 | 2328 |
| 1993 | 1455 | 55 | | 1510 |
| 1994 | 1591 | | 42 | 1633 |
| 1995 | 2080 | | 1 | 2081 |
| 1996 | 2213 | | | 2213 |
| 1997 | 1356 | 124 | 42 | 1522 |
| 1998 | 1490 | 329 | | 1819 |
| 1999 | 3113 | 13 | | 3126 |
| 2000 | 2400 | 4 | | 2404 |
| 2001 | 3067 | 35 | | 3102 |
| 2002 | 4196 | 24 | | 4220 |
| 2003 | 4302 | | | 4302 |
| 2004 | 9874 | 16 | | 9890 |
| 2005 | 11 922 | | | 11 922 |
| 2006 | 2261 | 4 | | 2265 |
| 2007 | + | 1 | | 1 |
| 2008 | + | + | | + |
| 2009 | 2 | + | + | 2 |
| 2010 | 1 | + | + | 1 |
| 2011 | | 0 | | 0 |
| 2012 | 1 | 0 | | 1 |
| 2013 | 1 | 0 | | 1 |
| 2014 | 0.6 | 0 | 0.4 | 1 |

| Year | Denmark | Norway | Sweden | TOTAL |
|------|---------|--------|--------|-------|
| 2015 | 0.6 | + | + | 0.6 |
| 2016 | 1.1 | 0.3 | 0.01 | 1.4 |
| 2017 | 0.7 | 0.03 | 0.03 | 0.76 |
| 2018 | 0.3 | 0.06 | | 0.36 |
| 2019 | 0.9 | 0.09 | + | 1 |
| 2020 | 0.4 | 0.8 | + | 1.2 |
| 2021 | 0.4 | 0.5 | + | 0.9 |
| 2022 | 0.9 | 0.7 | + | 1.6 |

* Preliminary data.

Table 8.3.1. Summary of data on bottom-trawl survey series from the Norwegian shrimp survey, 1984-2022. Rg-rock-hopper groundgear. 'Strapping' maximum width of trawl constrained by rope connecting warps in front of otter doors. MS-RV Michael Sars, HM-RV Håkon Mosby. Data from 2022 survey are included. All trawls were fitted with a 6mm mesh codend liner.

| YEAR | Survey month | Vessel | IMR Gear code | Additional gear info. | No. trawls >300m | No. trawls >400m | No. trawls survey |
|------|--------------|--------|---------------|---------------------------|------------------|------------------|-------------------|
| 1984 | OCT | MS | 3230 | Shrimp trawl | 10 | 1 | 67 |
| 1985 | OCT | MS | 3230 | " | 21 | 5 | 107 |
| 1986 | OCT/NOV | MS | 3230 | " | 24 | 9 | 74 |
| 1987 | OCT/NOV | MS | 3230 | " | 35 | 14 | 120 |
| 1988 | OCT/NOV | MS | 3230 | " | 31 | 11 | 122 |
| 1989 | OCT | MS | 3236 | Campelen 1800 35mm/40, Rg | 31 | 7 | 106 |
| 1990 | OCT | MS | 3236 | " | 26 | 5 | 89 |
| 1991 | OCT | MS | 3236 | " | 28 | 9 | 123 |
| 1992 | OCT | MS | 3236 | " | 27 | 10 | 101 |
| 1993 | OCT | MS | 3236 | " | 30 | 10 | 125 |
| 1994 | OCT/NOV | MS | 3236 | " | 27 | 10 | 109 |
| 1995 | OCT | MS | 3236 | " | 29 | 12 | 103 |
| 1996 | OCT | MS | 3236 | " | 27 | 11 | 105 |
| 1997 | OCT | MS | 3236 | " | 25 | 6 | 97 |
| 1998 | OCT | MS | 3270 | Campelen 1800 20mm/40, Rg | 23 | 6 | 97 |
| 1999 | OCT | MS | 3270 | " | 27 | 8 | 99 |

| YEAR | Survey month | Vessel | IMR Gear code | Additional gear info. | No. trawls >300m | No. trawls >400m | No. trawls survey |
|------|--------------|--------|---------------|--|------------------|------------------|-------------------|
| 2000 | OCT | MS | 3270 | " | 25 | 10 | 109 |
| 2001 | OCT | MS | 3270 | " | 18 | 4 | 87 |
| 2002 | OCT | MS | 3270 | " | 24 | 6 | 82 |
| 2003 | OCT/NOV | HM | 3230 | Shrimp trawl (as in 1984–1988) | 13 | 0 | 68 |
| 2004 | MAY | HM | 3270 | Campelen 1800 20mm/40, Rg | 17 | 6 | 65 |
| 2005 | MAY | HM | 3270 | " | 23 | 8 | 98 |
| 2006 | FEB | HM | 3270 | " | 10 | 0 | 45 |
| 2007 | FEB | HM | 3270 | " | 11 | 1 | 66 |
| 2008 | FEB | HM | 3271 | Campelen 1800 20mm/40, Rg and strapping* | 18 | 5 | 73 |
| 2009 | JAN/FEB | HM | 3271 | " | 25 | 7 | 91 |
| 2010 | JAN | HM | 3271 | " | 24 | 7 | 98 |
| 2011 | JAN | HM | 3271 | " | 22 | 7 | 93 |
| 2012 | JAN | HM | 3271 | " | 20 | 5 | 65 |
| 2013 | JAN | HM | 3271 | " | 28 | 8 | 101 |
| 2014 | JAN | HM | 3271 | " | 16 | 7 | 69 |
| 2015 | JAN | HM | 3271 | " | 28 | 9 | 92 |
| 2016 | JAN | HM | 3271 | " | 28 | 9 | 108 |
| 2017 | JAN | KB | 3271 | " | 30 | 9 | 128 |
| 2018 | JAN | KB | 3271 | Campelen 1800 20mm/40, Rg and strapping** | 27 | 8 | 111 |
| 2019 | JAN | KB | 3296 | Campelen 1800 20mm/40, Rg and strapping*** | 27 | 8 | 119 |
| 2020 | JAN | KB | 3296 | "" | 26 | 7 | 106 |
| 2021 | JAN | KB | 3296 | "" | 27 | 8 | 113 |
| 2022 | JAN | KB | 3296 | "" | 28 | 8 | 119 |
| 2023 | JAN | KB | 3296 | " | 29 | 8 | 116 |

* Path width of the tow constrained by a 10 m rope connecting the warps, 200 m in front of otter boards. ** Path width of the tow constrained to a 15 m rope connecting the warps, 100 m in front of the otter boards. *** Same trawl and strapping but from 2019 there are inserted several floaters on the trawl to lighten the trawl (Nordsjørigging).

Table 8.3.2. Discards (tons) reported for roundnose grenadier in 3a from 2014-2021.

| Year | Denmark | Sweden | Norway | TOTAL |
|------|---------|--------|--------|-------|
| 2014 | | 0.4 | | 0.4 |
| 2015 | 1 | | | 1 |
| 2016 | 0.1 | 0.9 | | 1 |
| 2017 | | 1.6 | | 1.6 |
| 2018 | 2.9 | 0.01 | | 2.9 |
| 2019 | 0.5 | 0.08 | | 0.6 |
| 2020 | 0 | 0 | | 0 |
| 2021 | 0 | 0 | | 0 |
| 2022 | 21.7 | 2.2 | | 23.9 |

Table 8.3.3. Cumulative percentages (%) for selected ages from the deep-sea species survey in 1987 and from the Norwegian shrimp survey in 2007-2023

| Year | Age | | | | |
|------|-----|----|----|----|-----|
| | 5 | 10 | 20 | 30 | 50 |
| 1987 | 9 | 21 | 45 | 75 | 96 |
| 2007 | 10 | 23 | 83 | 94 | 96 |
| 2008 | 22 | 40 | 92 | 99 | 100 |
| 2009 | 14 | 30 | 88 | 93 | 100 |
| 2010 | 12 | 29 | 71 | 96 | 99 |
| 2011 | 6 | 23 | 65 | 94 | 99 |
| 2012 | 10 | 28 | 48 | 96 | 100 |
| 2013 | 14 | 28 | 56 | 92 | 99 |
| 2014 | | | | | |
| 2015 | 7 | 17 | 48 | 95 | 100 |
| 2016 | | | | | |
| 2017 | 14 | 52 | 81 | 94 | 99 |
| 2018 | 23 | 50 | 77 | 99 | 100 |
| 2019 | 8 | 37 | 64 | 92 | 100 |
| 2020 | 40 | 64 | 83 | 97 | 100 |

| Year | Age | | | | |
|------|-----|----|----|----|-----|
| | 5 | 10 | 20 | 30 | 50 |
| 2021 | 20 | 55 | 83 | 97 | 100 |
| 2022 | 33 | 53 | 81 | 95 | 99 |
| 2023 | 22 | 50 | 79 | 92 | 100 |

Table 8.3.4. Mean biomass index and mean abundance index from the Norwegian shrimp survey 1984-2023. Missing data are from surveys that are not representable according to roundnose grenadier catches (less stations > 300 m). Data from 2016 are considered unreliable according to gear inconsistencies.

| Number stations>300m (n) Mean biomass (kg/h), Mean abundance (n/h), Number (n) and Standard error (SE) | | | | | |
|--|----|--------|----------|---------|---------|
| Year | n | (kg/h) | SE(kg/h) | (n/h) | SE(n/h) |
| 1984 | 10 | | | | |
| 1985 | 21 | 108.12 | 38.32 | 149.95 | 49.43 |
| 1986 | 24 | 83.75 | 32.16 | 117.83 | 46.99 |
| 1987 | 35 | 76.15 | 13.56 | 125.80 | 24.60 |
| 1988 | 31 | 72.14 | 13.92 | 105.19 | 21.22 |
| 1989 | 31 | 122.69 | 43.48 | 195.94 | 73.07 |
| 1990 | 26 | 49.81 | 18.20 | 72.66 | 27.55 |
| 1991 | 28 | 107.14 | 22.27 | 176.86 | 38.75 |
| 1992 | 27 | 188.54 | 67.53 | 698.52 | 337.67 |
| 1993 | 30 | 58.59 | 19.42 | 190.33 | 74.15 |
| 1994 | 27 | 87.19 | 21.21 | 372.96 | 143.56 |
| 1995 | 29 | 118.30 | 32.36 | 440.62 | 144.41 |
| 1996 | 27 | 99.63 | 31.68 | 268.01 | 116.92 |
| 1997 | 25 | 113.86 | 66.47 | 362.72 | 222.08 |
| 1998 | 23 | 255.54 | 87.80 | 812.82 | 336.85 |
| 1999 | 27 | 149.30 | 42.85 | 388.83 | 122.54 |
| 2000 | 25 | 129.27 | 30.39 | 389.06 | 107.71 |
| 2001 | 18 | 105.33 | 51.84 | 272.99 | 151.99 |
| 2002 | 24 | 174.77 | 66.27 | 371.70 | 129.97 |
| 2003 | 13 | | | | |
| 2004 | 17 | 324.38 | 125.48 | 1143.35 | 487.33 |

| Number stations>300m (n) Mean biomass (kg/h), Mean abundance (n/h), Number (n) and Standard error (SE) | | | | | |
|--|----|--------|----------|--------|---------|
| Year | n | (kg/h) | SE(kg/h) | (n/h) | SE(n/h) |
| 2005 | 23 | 193.65 | 93.81 | 550.42 | 260.94 |
| 2006 | 10 | | | | |
| 2007 | 11 | | | | |
| 2008 | 18 | 95.58 | 65.81 | 259.10 | 208.53 |
| 2009 | 25 | 72.72 | 39.81 | 207.41 | 121.84 |
| 2010 | 24 | 33.24 | 21.47 | 77.21 | 54.81 |
| 2011 | 22 | 26.84 | 12.61 | 54.76 | 27.05 |
| 2012 | 20 | 16.69 | 11.97 | 34.40 | 23.83 |
| 2013 | 28 | 11.48 | 4.92 | 35.06 | 16.90 |
| 2014 | 16 | 25.62 | 15.76 | 49.56 | 28.69 |
| 2015 | 28 | 7.28 | 4.59 | 21.19 | 12.14 |
| 2016 | 28 | | | | |
| 2017 | 30 | 6.64 | 2.41 | 15.74 | 6.73 |
| 2018 | 27 | 12.88 | 6.60 | 41.91 | 26.13 |
| 2019 | 27 | 14.59 | 5.77 | 40.09 | 18.05 |
| 2020 | 26 | 18.72 | 11.48 | 63.02 | 38.07 |
| 2021 | 27 | 9.59 | 5.03 | 26.14 | 14.19 |
| 2022 | 28 | 23.87 | 10.94 | 75.20 | 35.61 |
| 2023 | 29 | 19.24 | 8.89 | 38.81 | 19.10 |

Table 8.3.5. Proportion of tows with shrimp trawl that caught roundnose grenadier. Data from Norwegian Reference fleet

| Year | Total number of shrimp trawl | Number of trawl hauls that caught roundnose grenadier | Catch of roundnose grenadier (kg) | % of the total catch |
|------|------------------------------|---|-----------------------------------|----------------------|
| 2013 | 243 | 0 | | 0 |
| 2014 | 288 | 2 | | 0.69 |
| 2015 | 1489 | 14 | | 0.94 |
| 2016 | 4811 | 23 | | 0.48 |
| 2017 | 3798 | 20 | 29 | 0.53 |
| 2018 | 2849 | 19 | | 0.67 |

| | | | | |
|------|------|---|----|------|
| 2019 | 1233 | 4 | 80 | 0.32 |
|------|------|---|----|------|

Table 8.3.6. Mean average catch (kg/km²) from the Swedish bottom trawl survey 2018-2021.

| Year | nHauls>=300 m | nHauls with catch | mean | var | sd | se |
|------|------------------|----------------------|-------|----------|-------|-------|
| 2018 | 15 | 11 | 114.6 | 24921.9 | 157.9 | 40.8 |
| 2019 | 10 | 4 | 128.2 | 157271.1 | 396.6 | 125.4 |
| 2020 | 14 | 11 | 381.3 | 223687.7 | 473.0 | 126.4 |
| 2021 | 7 | 2 | 272.6 | 114841.2 | 338.9 | 128.1 |

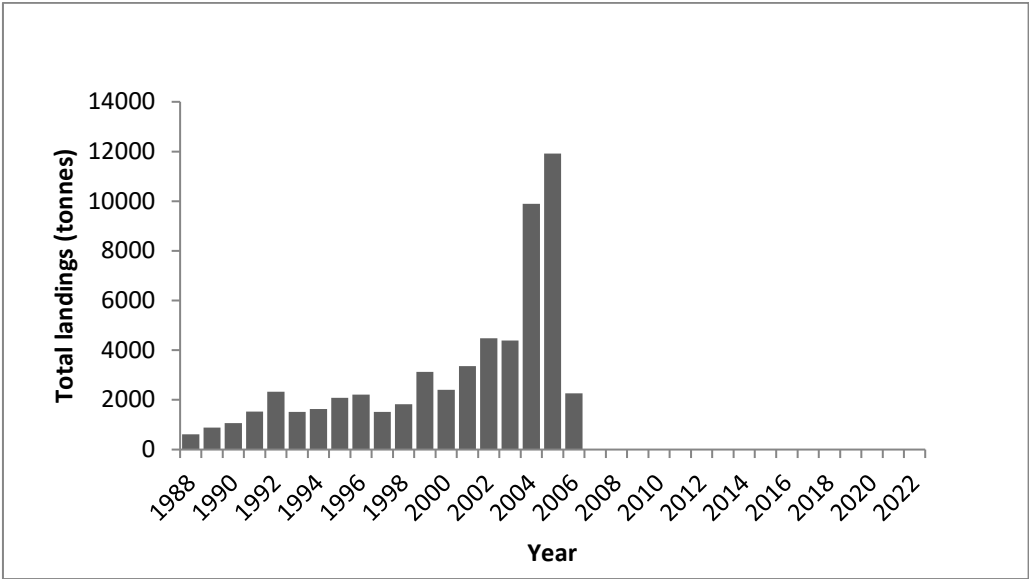


Figure 8.3.0. Landings of roundnose grenadier from Division 3.a. Landings from 2007–2022 are insignificant.

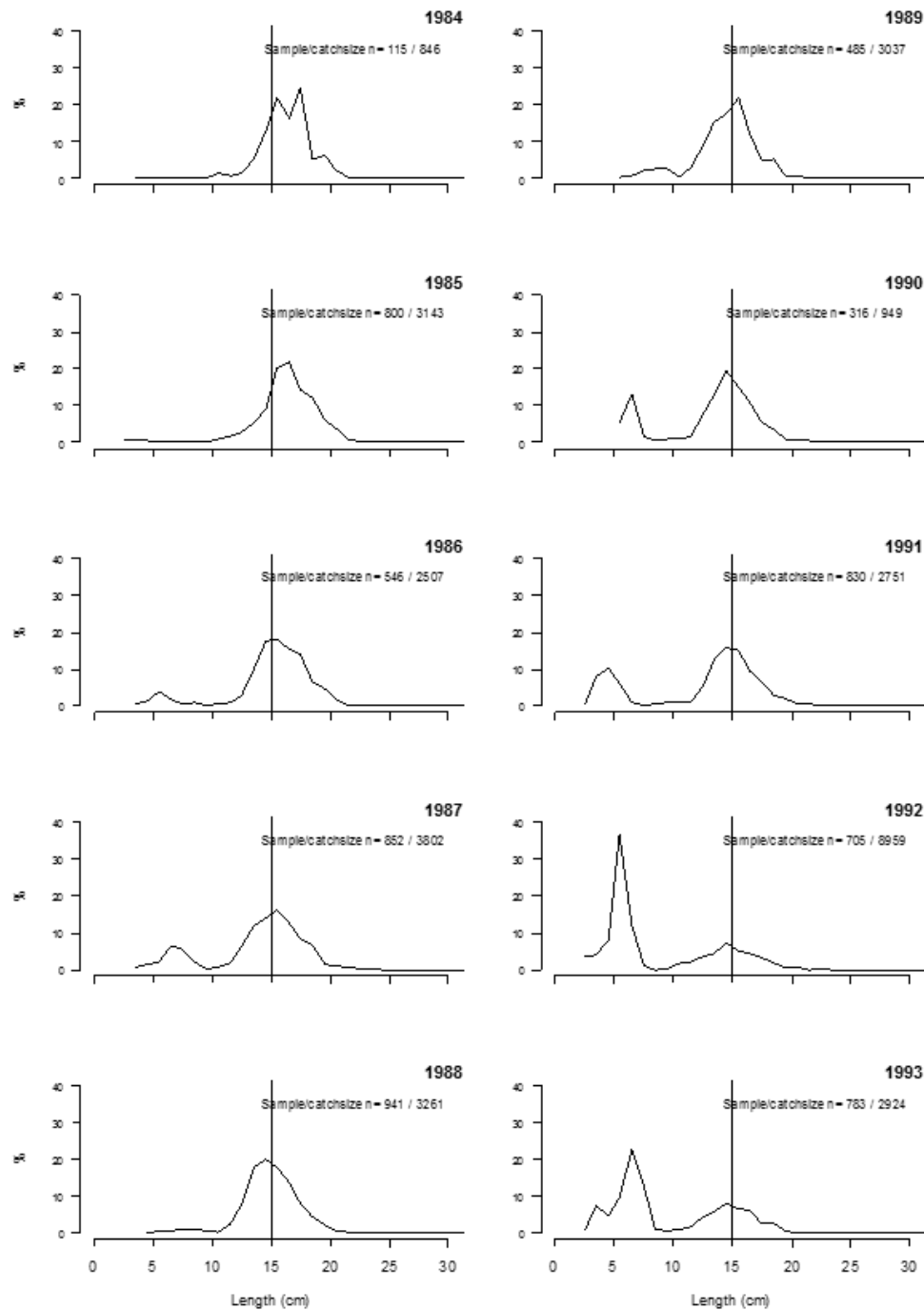


Figure 8.3.1. Length–frequency distributions for roundnose grenadier, 1984–2023. Data from Norwegian shrimp survey, all catches deeper than 300 m. Length is measured as pre-anal fin length in cm (PAFL). The distributions are calculated as percent number of fish in each cm length interval standardized to total catch number and trawling distance for each station each year.

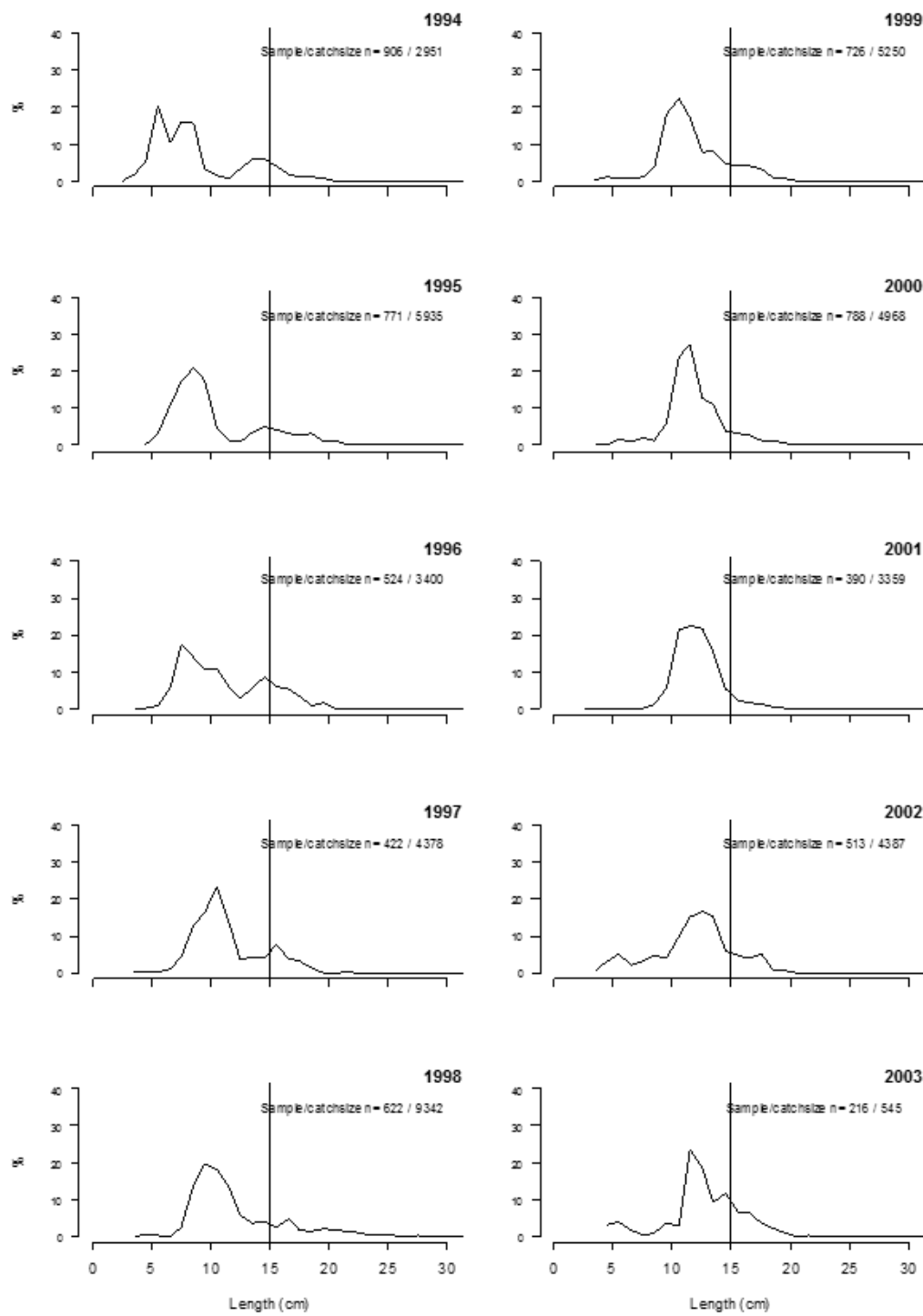


Figure 8.3.1. (Con't).

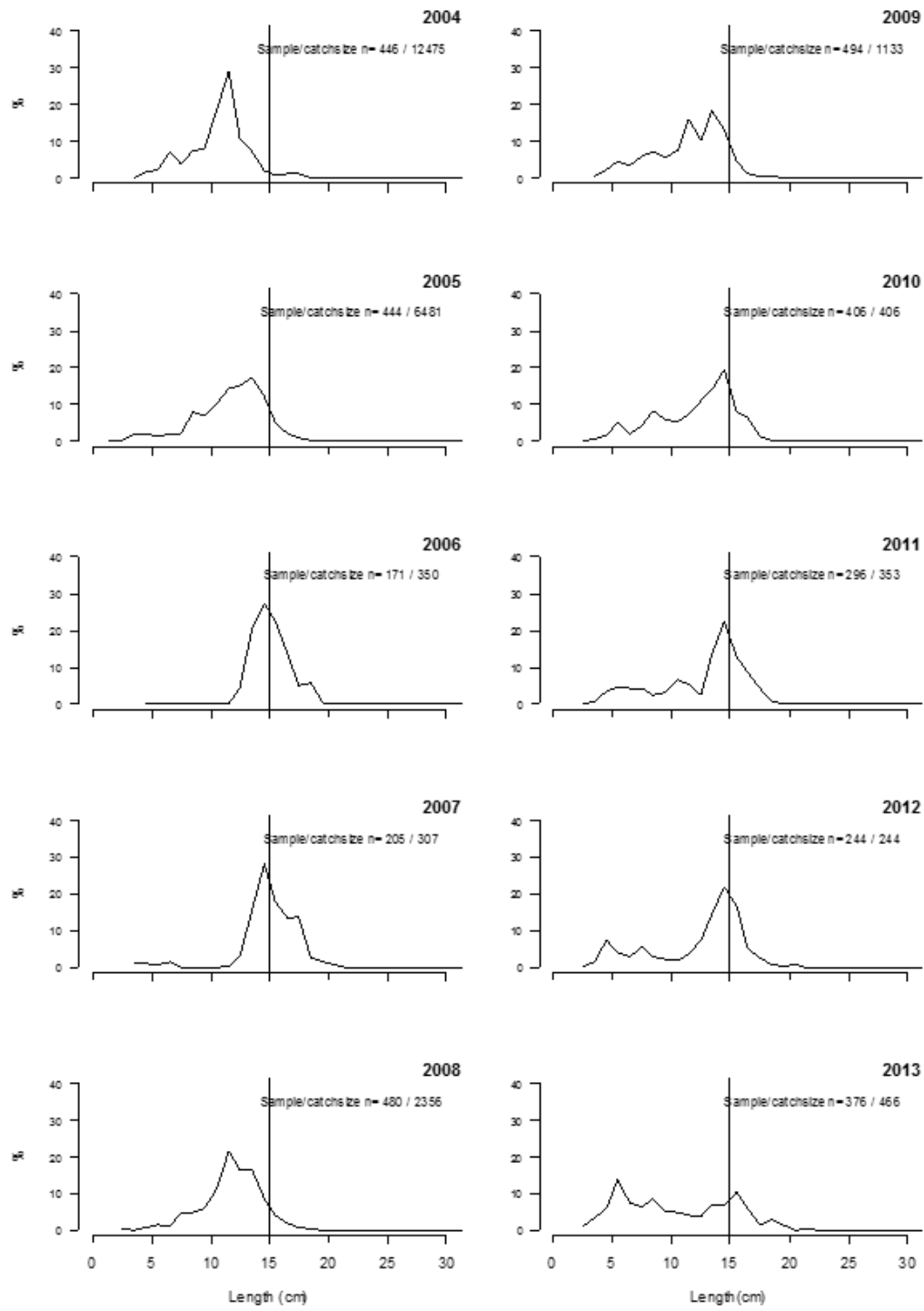


Figure 8.3.1. (Con't).

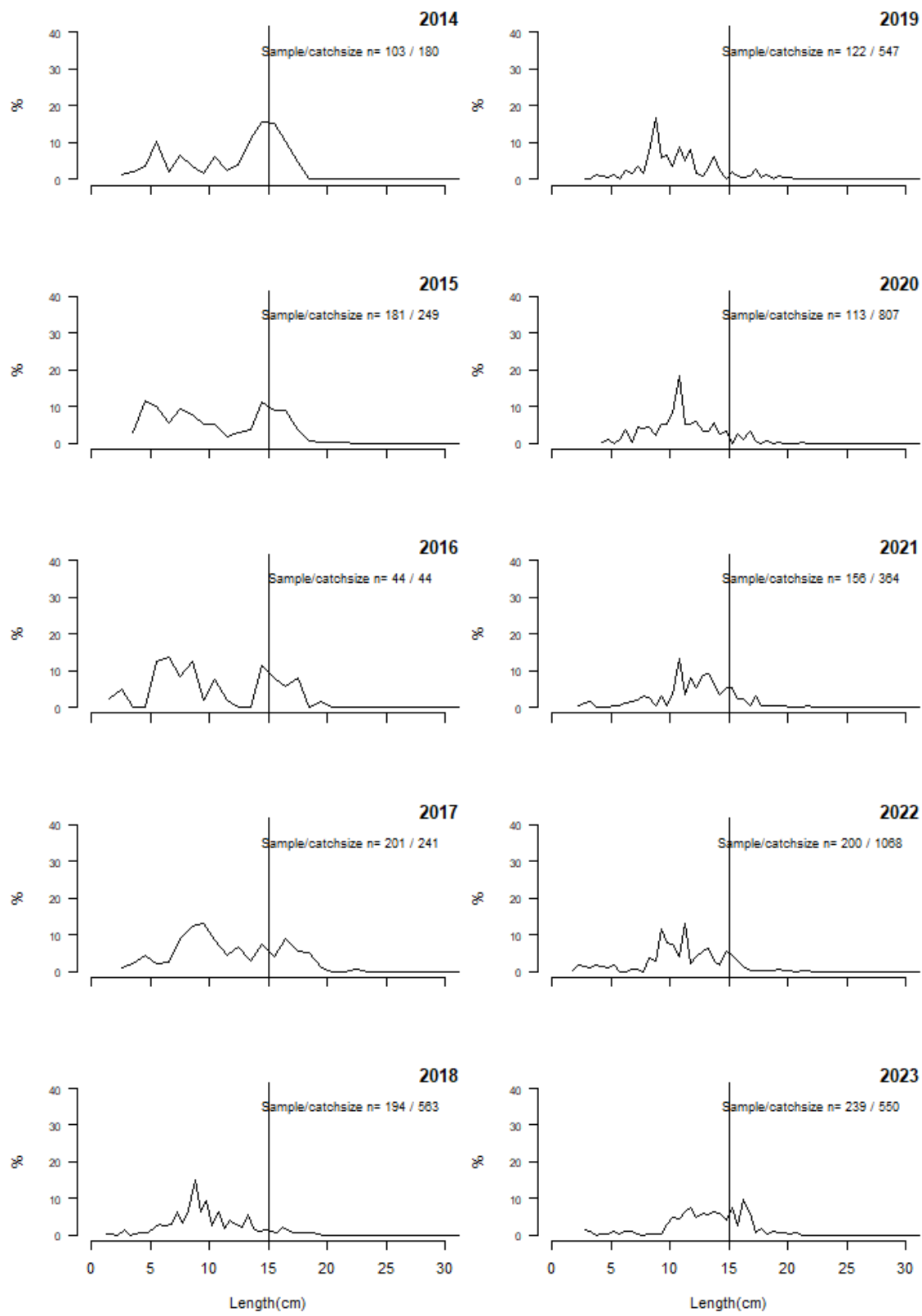


Figure 8.3.1. (Con't).

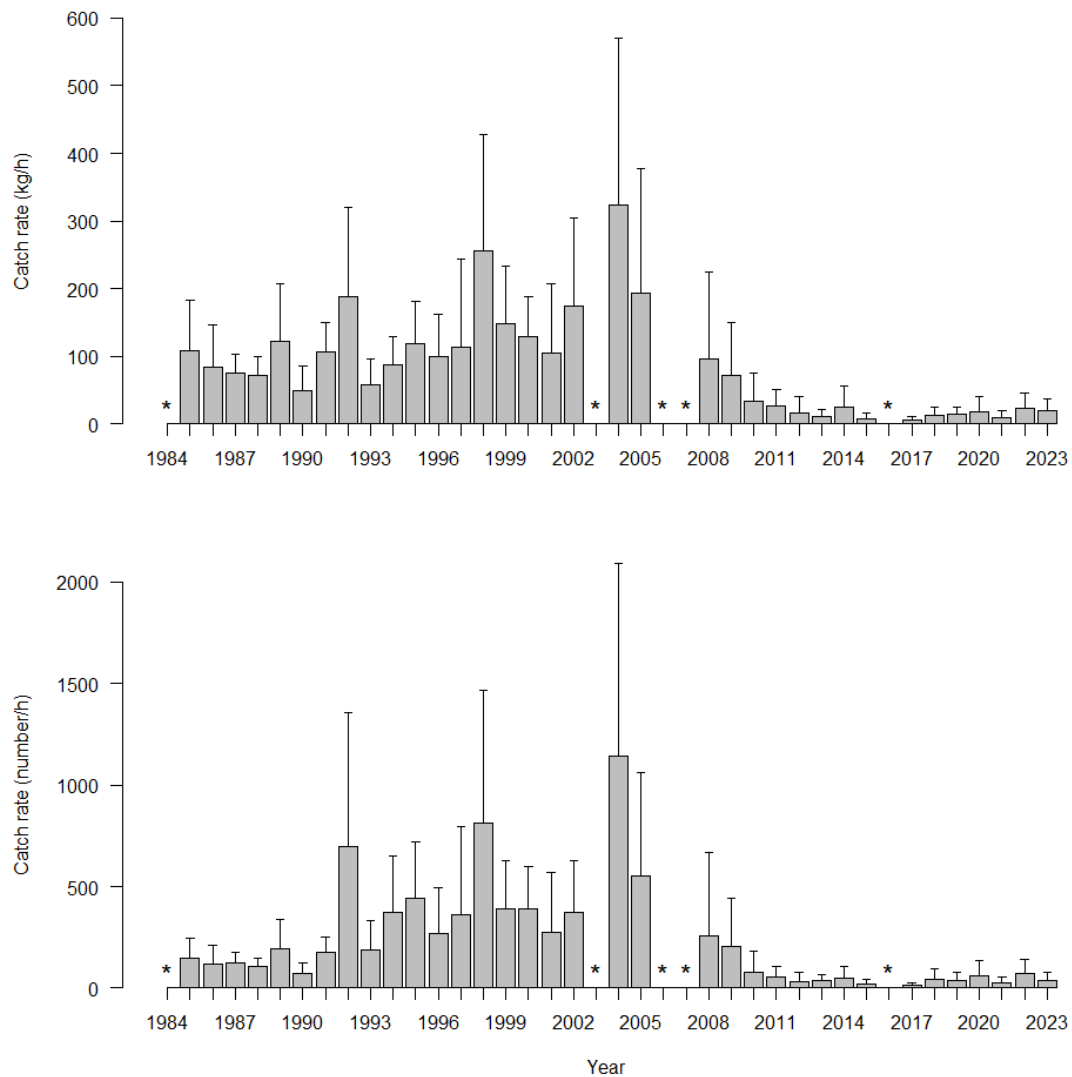


Figure 8.3.2. Survey catch rates in biomass (kg/h) and abundance (nos/h) of grenadier 1984–2023 in the Norwegian shrimp survey. Note: in 1984, 2003, 2006, and 2007 only a single or no trawls were made deeper than 400 m, thus the primary grenadier habitat was not sampled for those years. For 2016 data from the shrimp survey is regarded as unreliable due to inconsistencies with trawling gear and data from that year should be excluded. For the other years the survey is thought to cover the distribution area of roundnose grenadier Lines indicate estimates of 2SE (Updated from Bergstad *et al.*, 2014).

8.4 Roundnose Grenadier (*Coryphaenoides rupestris*) in Divisions 10.b, 12.c and Subdivisions 5.a.1, 12.a.1, 14.b.1 (Oceanic Northeast Atlantic and northern Reykjanes Ridge)

8.4.1 The fishery

The fishery on the Northern Mid-Atlantic Ridge (MAR) started in 1973, when dense concentrations of roundnose grenadier were discovered by USSR exploratory trawlers. Roundnose grenadier aggregations may have occurred on 70 seamount peaks between 46–62°N, but only 30 of them were commercially important and subsequently exploited. Since the early 1990s, fisheries on MAR have been sporadic and much smaller in scale. USSR/Russian fleet has the maximum length of the history of fishery and took the greatest volume of landings. Since 2010, Russian fleets abandoned the fishery, which is almost exclusively exploited by Spain in recent years.

8.4.1.1 Landings trends

The highest annual catch (almost 30 000 t) was taken by the Soviet Union in 1975 (Figure 9.4.1, see Stock Annex for detailed information) and in subsequent years the Soviet catch varied from 2800 to 22 800 tonnes. The fishery for grenadier declined after the dissolution of the Soviet Union in 1992. In the last 15 years, there has been a sporadic fishery by vessels from Russia (annual catch estimated at 200–3200 t), Poland (500–6700 t), Latvia (700–4300 t) and Lithuania (data on catch are not available). Grenadier has also been taken as bycatch in the Faroese orange roughy fishery and Spanish demersal multispecies fishery.

There is no information about target fishery of roundnose grenadier on the MAR in 2006 and 2007. In 2008 and 2009 Russian trawlers made attempts at fishing with pelagic and bottom trawls in the southern part of the Division 12.c. Total catches were 30 t and 12 t respectively including 13 t and 5 t of roundnose grenadier. In 2010, Russian trawler caught 73 t roundnose grenadier during a short-term fishery (two days) in the southern part of the Division 10.b.

In 2008, the Spanish fleet targeting redfish on the MAR reported landings of roundnose grenadier in 14.b.1 totalling 1722 tonnes. Since 2010, roundnose grenadier became a target species. In 2011 official landings in 14.b.1 increased to 2239 tonnes. In subsequent years total estimated landings amounted to of 1860, 1790 and 2065 t in 2012, 2013 and 2014 respectively (Table 9.4.2). To these figures an unallocated catch in 14.b.1 of 1098 and 1015 t must be added in 2012 and 2014, respectively. The total estimated preliminary catch in 2014 consists of 3466 t including Spanish catch in 14.b.1, negligible Faroese and French bycatches in 10.a, 12.a and 14.b.1 and discards. Catches have been reported only by Spain since 2015. In 2015 total Spanish catch was declared as 862 t (533 and 329 tonnes in 14.b.1 and 12.a.1 respectively; Table 9.4.3). In 2016 the landings were estimated as 660 tonnes. In 2017 and 2018, preliminary official landings were considerably low, not exceeding 84 tonnes. In 2019 the landings increased to 215 tonnes and in 2020 decreased to 131 tonnes, all in Division 12.a.1. (Table 9.4.1 and 9.4.3). In 2021, zero tonnes were reported.

There has been uncertainty in the number of Spanish landings in 2015–2016, and previous report include different figures. Additionally, most landings of roundnose grenadier from the NEAFC Regulatory Area are caught in Division 12.b and 6.b.1, which are part of another stock (rng.27.5b6712b). The current report only includes data for 2021 based on preliminary official landings from InterCatch.

8.4.1.2 ICES Advice

ICES advice applicable to 2020–2023

“ICES advises that when the precautionary approach is applied, landings should be no more than 574 tonnes in each of the years 2020 and 2023. ICES cannot quantify the corresponding catches.”

8.4.1.3 Management

There is a TAC for the roundnose grenadier in Subareas 8, 9, 10, 12 and 14. It applies to European Union (EU) waters and EU vessels in international waters (See Section 9.1.2). The EU TAC combined ICES advices on catch for 2 stocks: the roundnose grenadier in divisions 10.b and 12.c, and in subdivisions 12.a.1, 14.b.1, and 5.a.1 and the roundnose grenadier in subareas 6 and 7, and divisions 5.b and 12.b. This allows for the realization of the full amount of TAC in any of these areas. For 2021, NEAFC recommendation (Rec. 5:2021) on the conservation and management of roundnose grenadier (*Coryphaenoides rupestris*) and other grenadiers in the NEAFC Regulatory Area (Divisions 10.b and 12.c, and Subdivisions 12.a.1 and 14.b.1) specifies:

1. A total allowable catch limitation of 574 tonnes of roundnose grenadier is established.
2. No direct fisheries for roughhead grenadier and roughsnout grenadier should be authorised, and bycatches of these grenadiers as well as other grenadiers (Macrouridae) should be counted against the total allowable catch of roundnose grenadier specified in Point 1.
3. Contracting Parties shall submit all data on the relevant fishery to ICES, including catches, bycatches, discards and activity information. Catches should be reported by species. Unidentified grenadiers should be recorded as Macrouridae.

8.4.2 Data available

8.4.2.1 Landings and discards

From earlier years data are WGDEEP estimates based on national submissions to ICES which are not fully included in InterCatch. Landings are given in Tables 9.4.1–9.4.3. The information on landings have been variable and at a considerably lower level down to insignificant in 2017 and 2018 but have increased to about 215 tonnes in 2019 and reached 131 tonnes in 2020. In 2021, zero tonnes were reported. Landings from the 1970s to the 1990s were reported to be mostly from pelagic trawling. In the 2000s there has been pelagic trawling in Division 14 and bottom trawling in Division 12. There were no discards of roundnose grenadier on Russian trawlers where smallest fish and waste were used for fishmeal processing. The information on discards is very limited. An assessment of discards was conducted in 2014, when the discards on Spanish target fishery estimated by scientific observers was at level of 386 tonnes (Tables 9.4.2). No discards have been reported from 2015–2021. Discards of roundnose grenadier in other fisheries have declined and this can be attributed to the decline of the deep-water fishery overall.

8.4.2.2 Length compositions

No new data on length compositions were presented.

8.4.2.3 Age compositions

No new data on age compositions were presented.

8.4.2.4 Weight-at-age

No new weight-at-age data are available.

8.4.2.5 Maturity and natural mortality

No new data on natural mortality are available.

8.4.2.6 Catch, effort and research vessel data

Catch and CPUE data are given in the Stock Annex. There are gaps in the CPUE time-series due to lack of catch statistics for 1973 and 1982 and absence of target fishery in 1994–1995 and 2006–2009 (data for some years cannot be used owing to short fishing periods). Effort data for each subareas and divisions are available for Russian fleet in 2003–2009. Effort data for Spanish fleet is available for 2010–2020, but information remains very uncertain.

8.4.3 Data analyses

Substantial landings were recorded in the 1970s and 1980s. Since then, landings have been variable and have decreased considerably to around 27 tonnes in 2018. In 2019, landings reached 215 tonnes, all in Subdivision 27.12.a.1. Provisional landings are 131 tonnes in 2020 and zero tonnes in 2021. ICES cannot quantify the corresponding catches.

Since 2010 the official Spanish CPUE and effort data are available (see Stock Annex). The current effort is low compared to the effort developed by USSR vessels in the 1970s and the CPUE seems also low. Long-term comparison is debilitated by the lack of standardisation of fleet and vessel type. The Spanish CPUE in Subdivisions 14.b.1 were on maximum historical levels in 2011. In 2012–2013 the CPUE declined and was stable in 2014–2015. The time-series of the CPUE for Subdivisions 12.a.1 is very limited.

8.4.4 Stock assessment

The ICES framework for category 5 stocks was applied for the 2020–2023 advice (ICES, 2019). ICES considers that a precautionary reduction of catches should be implemented unless there is sufficient data to access the current level of exploitation of the stock.

The precautionary buffer (20% reduction in landings) was applied in the 2015 advice and the available new data (catch statistics) do not change the assessment of the stock. There is no data on abundance trends but in the absence of fishing, the stock is expected to rebuild from the past depletion state caused by exploitation before the 2000s. Therefore, ICES advises that when the precautionary approach is applied, landings should be no more than 717 tonnes in each of the years 2020 to 2023. ICES cannot assess the stock and exploitation status relative to MSY and PA reference points because the reference points are undefined.

This stock is classified as Category 4 in the NEAFC categorization of deep-sea species/stocks which implies that fisheries are primarily restricted to Coastal State exclusive economic zones (EEZs) and therefore management measures are not taken by NEAFC unless complementary to coastal state conservation and management measures.

8.4.5 Biological reference points

No attempt was made to propose reference points for this stock.

8.4.6 Comments on the assessment

No analytical assessments were carried out.

8.4.7 Management considerations

Active roundnose grenadier fishery was resumed in 2010, but the current status is unknown due to insufficient data. The landings series is very limited and the CPUE data are very uncertain. The CPUE can be use as indicator of the state of stock in future.

8.4.8 References

- ICES. 2019. Advice basis. In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, section 1.2. <https://doi.org/10.17895/ices.advice.5757>
- Vinnichenko V., Khlivnoy V. 2008. New data on distribution of young roundnose grenadier (*Coryphaenoides rupestris*) in the North Atlantic Grenadiers of the world oceans: Biology, stock assessment and fisheries. American Fisheries Society, 2008. 119–124 pp.

8.4.9 Tables and Figures

Table 9.4.1. Working group estimates of catch for roundnose grenadier from Subareas 12.a.1 and 12.c, between 2012 and 2021 (data from 1973-2011 is shown in the Stock Annex)

| Year | USSR/Russia | Poland | Latvia | Faroes | Spain | Lithuanian | Total |
|-------------------|-------------|--------|--------|--------|-------|------------|-------|
| 2012 | | | | | 864 | 4 | 868 |
| 2013 | | | | | 118 | | 118 |
| 2014 | | | | 4 | | | 4 |
| 2015 | | | | | 329 | | 329 |
| 2016 | | | | | 289 | | 289 |
| 2017 | | | | | 16* | | 16 |
| 2018 | | | | | 27* | | 27 |
| 2019 | | | | | 215* | | 215 |
| 2020 ¹ | | | | | 131* | | 131 |
| 2021 ¹ | | | | | 0 | | 0 |

¹—preliminary statistics. * Subareas 12.a.1 only

Table 9.4.2. Working group estimates of catch for roundnose grenadier from Subdivision 14.b.1.

| Year | USSR/Russia | Spain | Unallocated | Discards | Total |
|------|-------------|-------|-------------|----------|-------|
| 1976 | 11 | | | | 11 |
| --- | | | | | |
| 1982 | 153 | | | | 153 |
| --- | | | | | |
| 1997 | 3361 | | | | 3361 |
| 1998 | | | | | |
| 1999 | | | | | |
| 2000 | 5 | | | | 5 |
| 2001 | 69 | | | | 69 |
| 2002 | 4 | 235 | | | 239 |
| 2003 | | 272 | | | 272 |
| 2004 | 201 | | | | 201 |
| 2005 | | | | | |

| Year | USSR/Russia | Spain | Unallocated | Discards | Total |
|-------------------|-------------|-------|-------------|----------|-------|
| 2006 | | | | | |
| 2007 | | 57 | | | 57 |
| 2008 | | 1722 | | | 1722 |
| 2009 | | | | | |
| 2010 | | 753 | | | 753 |
| 2011 | | 2239 | | | 2239 |
| 2012 | | 1860 | 1098 | | 2958 |
| 2013 | | 1790 | | | 1790 |
| 2014 | | 2065 | 1015 | 386 | 3466 |
| 2015 | | 533 | | | 533 |
| 2016 | | 371 | | | 371 |
| 2017 | | 68 | | | 68 |
| 2018 | 0 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 | 0 |
| 2020 ¹ | 0 | 0 | 0 | 0 | 0 |
| 2021 ¹ | 0 | 0 | 0 | 0 | 0 |

¹—preliminary statistics.

Table 9.4.3. Working group estimates of catch of roundnose grenadier in Divisions 10.b, 12.c and Subdivisions 5.a.1, 12.a.1, 14.b.1, by area.

| Year | 5.a.1 | 10.b | 12.a.1 and 12.c | 14.b.1 | Total |
|------|-------|------|-----------------|--------|-------|
| 1973 | 820 | 0 | 226 | 0 | 1046 |
| 1974 | 12561 | 0 | 5874 | 0 | 18435 |
| 1975 | 0 | 0 | 29894 | 0 | 29894 |
| 1976 | 0 | 170 | 4545 | 11 | 4726 |
| 1977 | 0 | 0 | 9347 | 0 | 9347 |
| 1978 | 0 | 0 | 12310 | 0 | 12310 |
| 1979 | 0 | 0 | 6145 | 0 | 6145 |
| 1980 | 0 | 0 | 17419 | 0 | 17419 |
| 1981 | 0 | 0 | 2954 | 0 | 2954 |

| Year | 5.a.1 | 10.b | 12.a.1 and 12.c | 14.b.1 | Total |
|------|-------|------|-----------------|--------|-------|
| 1982 | 0 | 0 | 12472 | 153 | 12625 |
| 1983 | 0 | 0 | 10300 | 0 | 10300 |
| 1984 | 0 | 0 | 6637 | 0 | 6637 |
| 1985 | 0 | 0 | 5793 | 0 | 5793 |
| 1986 | 0 | 0 | 22842 | 0 | 22842 |
| 1987 | 0 | 0 | 10893 | 0 | 10893 |
| 1988 | 0 | 0 | 10606 | 0 | 10606 |
| 1989 | 0 | 0 | 9495 | 0 | 9495 |
| 1990 | 0 | 0 | 2838 | 0 | 2838 |
| 1991 | 0 | 0 | 7510 | 0 | 7510 |
| 1992 | 0 | 0 | 1979 | 0 | 1979 |
| 1993 | 0 | 249 | 2912 | 0 | 3161 |
| 1994 | 0 | 0 | 1132 | 0 | 1132 |
| 1995 | 0 | 0 | 359 | 0 | 359 |
| 1996 | 0 | 3 | 344 | 0 | 347 |
| 1997 | 0 | 1 | 6710 | 3361 | 10072 |
| 1998 | 0 | 1 | 7600 | 0 | 7601 |
| 1999 | 0 | 3 | 1151 | 0 | 1154 |
| 2000 | 0 | 0 | 2325 | 5 | 2330 |
| 2001 | 0 | 0 | 1716 | 69 | 1785 |
| 2002 | 0 | 0 | 737 | 239 | 976 |
| 2003 | 0 | 0 | 510 | 272 | 782 |
| 2004 | 0 | 1 | 444 | 201 | 646 |
| 2005 | 0 | 799 | 600 | 0 | 1399 |
| 2006 | 0 | 0 | 1 | 0 | 1 |
| 2007 | 0 | 0 | 2 | 57 | 59 |
| 2008 | 0 | 0 | 13 | 1722 | 1735 |
| 2009 | 0 | 0 | 5 | 0 | 5 |
| 2010 | 0 | 73 | 0 | 753 | 826 |

| Year | 5.a.1 | 10.b | 12.a.1 and 12.c | 14.b.1 | Total |
|-------------------|-------|------|-----------------|--------|-------|
| 2011 | 0 | 0 | 0 | 2239 | 2239 |
| 2012 | 0 | 0 | 868 | 2958 | 3826 |
| 2013 | 0 | 0 | 118 | 1790 | 1908 |
| 2014 | 0 | 0 | 4 | 3466 | 3470 |
| 2015 | 0 | 0 | 329 | 533 | 862 |
| 2016 | 0 | 0 | 289 | 371 | 660 |
| 2017 | 0 | 0 | 16* | 68 | 84 |
| 2018 | 0 | 0 | 27* | 0 | 27 |
| 2019 | 0 | 0 | 215* | 0 | 215 |
| 2020 ¹ | 0 | 0 | 131* | 0 | 131 |
| 2021 ¹ | 0 | 0 | 0 | 0 | 0 |

¹—preliminary statistics. * Subareas 12.a.1 only.

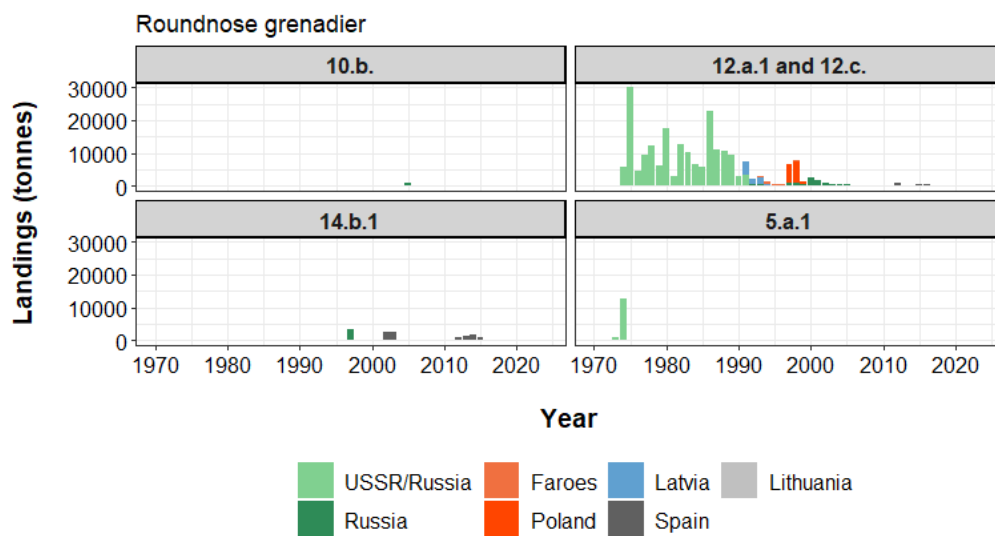


Figure 9.4.1. Landings of roundnose grenadier in ICES Divisions 10.b, 12.c and Subdivisions 5.a.1, 12.a.1, 14.b.1 in 1973–2021.

8.5 Roundnose grenadier (*Coryphaenoides rupestris*) in subareas 1, 2, 4, 8, and 9, Division 14.a, and in subdivisions 5.a.2 and 14.b.2 (Northeast Atlantic and Arctic Ocean)

8.5.1 The fishery

Areas of the main fisheries for roundnose grenadier are covered in the other sections of this chapter. Landings of roundnose grenadier in subareas 1, 2, 4, 8, and 9, Division 14.a, and in subdivisions 14.b.2 and 5.a.2 are mostly bycatch of trawl and longline fisheries for other species.

Most landings between 2000–2015 were from divisions 5.a.2 and 14.b.2. Since 2015, most landings are from subareas 1 and 2 and Subdivision 14.b.2. Landings from other areas have been minor in recent years. Trends in landings may reflect changes in fishing activity in other fisheries rather than in stock abundance.

8.5.1.1 Landings trends

Landing statistics by countries in the period 1990–2022 are presented in Tables 9.5.1–9.5.5.

In the subareas 1 and 2 the catch of roundnose grenadier in 2022 was 37 t. In recent years, the species was partly taken as bycatch in the trawl and longline fisheries targeting other deep-water species. Since 1990, landings ranged from 0 t to 101 t in 1997, showing a significant decline since 1998 (Table 9.5.1). In subareas 1 and 2, the major contribution to the total catch was made by Norway. This is assumed to be from the bottom longline fishery targeting Greenland halibut in Division 2.a.. Earlier French landings, that reached 41 t, were assigned to this species however a recent revision of the data indicates that previous landings are more likely to correspond to roughhead grenadier. Therefore, it is assumed that there are no French landings for roundnose grenadier from subareas 1 and 2 or account for minor bycatch from other fisheries that are considered to be negligible.

In Subarea 4, the minor catches of roundnose grenadier were reported in 2022 from ICES Division 4.a, amounting for less than 0.5 t. Negligible catches were also reported by Norway in gillnet and seine fisheries. Between 1990–2022 total landings in this area ranged between 0 and 372 t (Table 9.5.2). Unusually high landings were reported by the Danish fleet in 2004. Similar to French landings in Subareas 1 and 2, earlier landings of roundnose grenadier in Subarea 4 likely correspond to roughhead grenadier but since 2014 landings are correctly assigned.

For the period 1990–2022, landings of roundnose grenadier within Icelandic waters (Division 5.a) varied 3 to 398 t, mostly by Iceland (Table 9.5.3). Maximum landings were recorded in 1992–1999 when 120–398 t were caught annually as bycatch in mixed deep-water fisheries. However, it should be noted that catches may include other grenadier species until 1990. In recent years (2010–2022), landings of roundnose grenadier ranged between 3 to 84 t were taken in Icelandic waters as bycatch in trawl fisheries for Greenland halibut and redfish. Reported landings have increased from 5 tonnes on average between 2016–2020 to 27 tonnes (2021–2022). Between 1990 and 2022, landings of roundnose grenadier from subareas 8 and 9 ranged between 0 to 28 t annually. Since 2009, reported landings from this area are negligible (Table 9.5.4).

Landings from Division 14.a and Subdivision 14.b.2 (Greenland and Icelandic waters) in 1990–2022 varied from 15 to 262 t (Table 9.5.5). There is no directed fishery for roundnose grenadier in these areas. Most of the landings is taken as bycatch of the Greenland halibut bottom-trawl fisheries by Greenland and Germany. In 2022 landings were 136 t, corresponding to 113 t from

Subdivision 14.b.2 and 23 t from Division 14.a, mostly by Norway and Greenland. In 2020, by-catch of roundnose grenadier reported by Greenland reached the lowest levels in more than 10 years, 11 t. No catches by Icelandic vessels from Subdivision 14.b.2 are reported since the year 1993.

Between 2001 and 2003 unallocated landings were assigned to subareas 1, 2, 4, 8, 9 and Division 5.a.2 and 14.b.2 (Table 9.5.6).

8.5.1.2 ICES advice

ICES advice applicable to 2015

“The 2012 advice for this stock is biennial and valid for 2013 and 2014 (ICES, 2012). New data available do not change the perception of the stock. Therefore, the advice for this fishery in 2015 is the same as the advice for 2013: Based on the ICES approach for data-limited stocks, ICES advises that fisheries should not be allowed to expand from 120 t until there is evidence that this is sustainable.”

ICES advice applicable to 2016 and 2017

“ICES advises that when the precautionary approach is applied, landings should be no more than 65 tonnes in each of the years 2016–2017. ICES cannot quantify the corresponding catches.”

ICES advice applicable to 2018 and 2019

“ICES advises that when the precautionary approach is applied, landings should be no more than 65 tonnes in each of the years 2018 and 2019. ICES cannot quantify the corresponding catches.”

ICES advice applicable to 2020 and 2023

“ICES advises that when the precautionary approach is applied, landings should be no more than 131 tonnes in each of the years from 2020 to 2023. ICES cannot quantify the corresponding catches.”

8.5.1.3 Management

This stock is classified as Category 4 in the NEAFC categorization of deep-sea species/stocks which implies that fisheries are primarily restricted to Coastal State exclusive economic zones (EEZs) and therefore management measures are not taken by NEAFC unless complementary to coastal state conservation and management measures (NEAFC, 2016).

Management measures adopted by NEAFC established a total allowable catch limitation of 574 tonnes of roundnose grenadier in 2021 and no direct fisheries for roughhead grenadier and roughsnout grenadier should be authorised in NEAFC Regulatory Area. Since then, NEAFC did not renew specific measures for grenadiers. ICES WGDEEP understands that measures are now just covered by the Recommendation 7: 2018 on Deep-Sea Fisheries within the NEAFC Regulatory Area.

In eastern Greenland, main fishing operations are in Subdivision 14.b.2 and here, a combined annual TAC for roundnose and roughhead grenadiers has been 1000 tonnes since 2010.

There are also a range of other management measures covering this roundnose grenadier stock, including a TAC in Subareas 8, 9, 10, 12, and 14 (RNG/8X14-) for EU and UK vessels in EU and UK waters and for EU and UK vessels in international waters, and a TAC for grenadiers for EU and Norway in Greenland waters of 5 and 14 (GRV/514GRN)¹.

There are other management measures that afford protection to deep-water fishery resources in the North-east Atlantic including depth limits on bottom trawling and netting (Regulation (EU) 2016/2336²), spatial management (e.g., MPAs) and specific requirements for the protection of Vulnerable Marine Ecosystems (Regulation (EU) 2016/2336 and Regulation (EU) 2022/1614³). In terms of current depth limits in EU and UK waters, and for EU and UK vessels in international waters, bottom set gillnets may be deployed to depths less than 600 m, whilst bottom trawling is prohibited at depths greater than 800 m (Regulation (EU) 2019/1241⁴).

The TAC for roundnose grenadier in the European Union and international waters of 1, 2 and 4 (RNG/124-) was last fixed in 2018.

There may be other management measures that WGDEEP experts may not be aware of.

8.5.2 Data available

8.5.2.1 Landings and discards

From earlier years data are WG estimates based on national submissions to ICES, which are not fully included in InterCatch.

Landings are given in Table 9.5.1–9.5.5. Estimated discards owing to bycatch in Spanish fisheries for demersal fish in 8 and 9 did not exceed 2 t in 2012, and 1 t in subsequent years. In 2020, Spain reported discards data from divisions 8.c (3 t) and 9.a (1 t); zero discards from Spanish vessels were reported in 2021. No discards were reported from the Portuguese bottom otter trawl fisheries in Division 27.9.a since 2020. Discard data from subareas 8 and 9 for the year 2022 was not available to WGDEEP at the time of the writing of this report.

National catch statistics of Greenland are available for 14.b.2 from 1999 to 2022. These may include both landings from Greenland and other countries vessels, wherefore it was unclear whether this implies double count with landings reported by other countries. A potential misreporting is suspected for roundnose grenadier, as fisheries-independent data have revealed that roughhead grenadier is much more common than roundnose grenadier in ICES Subarea 14.b.2.

¹ Regulation (EU) 2023/194 fixing for 2023 the fishing opportunities for certain fish stocks, applicable in Union waters and, for Union fishing vessels, in certain non-Union waters, as well as fixing for 2023 and 2024 such fishing opportunities for certain deep-sea fish stocks.

² Regulation (EU) 2016/2336 of the European Parliament and of the Council of 14 December 2016 establishing specific conditions for fishing for deep-sea stocks in the north-east Atlantic and provisions for fishing in international waters of the north-east Atlantic and repealing Council Regulation (EC) No 2347/2002. <http://data.europa.eu/eli/reg/2016/2336/oj/eng>

³ EU. 2022. Commission implementing regulation (EU) 2022/1614 of 15 September 2022 determining the existing deep-sea fishing areas and establishing a list of areas where vulnerable marine ecosystems are known to occur or are likely to occur. http://data.europa.eu/eli/reg_impl/2022/1614/oj

⁴ Regulation (EU) 2019/1241 of the European Parliament and of the Council of 20 June 2019 on the conservation of fisheries resources and the protection of marine ecosystems through technical measures, amending Council Regulations (EC) No 1967/2006, (EC) No 1224/2009 and Regulations (EU) No 1380/2013, (EU) 2016/1139, (EU) 2018/973, (EU) 2019/472 and (EU) 2019/1022 of the European Parliament and of the Council, and repealing Council Regulations (EC) No 894/97, (EC) No 850/98, (EC) No 2549/2000, (EC) No 254/2002, (EC) No 812/2004 and (EC) No 2187/2005

– while roundnose grenadier is more abundant in reported catches from the same area (WGDEEP 2023: WD06).

Bycatches from Norway are assumed to be from the bottom longline fleet. The proportion of roundnose grenadier catch from the longline fishery is questionable, since this species is unlikely to be caught by hooks (Hareide, 1995). These records are likely to be roughhead grenadier, but WGDEEP is not able to validate this assumption.

There remains some uncertainty on historical landings and discards, which have not been always accurate or provided by all countries. Additionally, there is a discrepancy between reported catches in Greenland waters, the origin of which had not been resolved at the time of writing this report. Therefore, available data needs to be reviewed to provide robust estimations.

Landings of roundnose grenadier inside and outside the NEAFC Regulatory Area are provided in table 9.5.7.

8.5.2.2 Length compositions

No new data.

8.5.2.3 Age compositions

No new data.

8.5.2.4 Weight-at-age

No new data.

8.5.2.5 Maturity and natural mortality

No new data.

8.5.2.6 Catch, effort and research vessel data

Greenland's annual bottom trawl survey is the main source for fishery-independent data for roundnose grenadier in Subarea 14 (Greenland waters).

Greenland carried out a bottom buffered bottom trawl fishery-independent survey from 1998 to 2017 (no survey in 2001) on board R/V Paamiut using an Alfredo III bottom trawl. The survey was resumed in 2022, starting a new index survey series, after interruption since 2017, covering areas within the Greenland waters of subarea 14.b.2 (Greenland waters). The survey in 2022 has a new fix station allocation design. The survey is depth stratified and covers the slope and shelf (400-1500 m) between the 3 nm line (baseline) and the 200 nm (Exclusive Economic Zone) or middle line to Iceland. A new research vessel, RV Tarajoq and a new trawl gear, Bacalao 476, with a mesh size of 136 mm and a 30-mm mesh-liner in the cod-end were used. Towing speed is between 2.5-3.0 knots and is estimated from the start and end positions of the haul, with a 30-min bottom time (tows of at least 15 min are accepted). Detailed information is provided in the Working Document available to WGDEEP (Nogueira and Christiansen, 2023; WD6).

8.5.3 Data analyses

Fisheries-independent data

During the 2022 bottom trawl survey in East Greenland, roundnose grenadier was caught in 18 of the 73 hauls. Catches were generally low and were only found in Q2 at 1001-1500 and Q5 between depth of 601 to 1500 m. The total biomass estimates for roundnose grenadier in 2022 was 84 t (S.E. = 17), lower than previous estimates (Figure 9.5.1). The majority of the fish were

found in 800–1000 m depth strata (Nogueira and Christiansen, 2023; WD6). In 2022, there was a mode in the length distribution around 3 cm (Figure 9.5.2), but changes in survey design and effects of gear selectivity in observed changes in length distributions cannot be excluded.

Fisheries-dependent data

Yearly and monthly logbook information, and CPUE distribution from 1999 to 2022 for roundnose grenadier were presented to WGDEEP (Nogueira and Christiansen, 2023; WD7). Data presented are a mix of targeted catches and bycatch of the Greenland halibut fishery in East Greenland.

Catches of roundnose grenadier have fluctuated throughout the evaluated time period (1999 to 2022) ranging from 129.3 tons (1999) to 29.2 tons (2008). Catches in 2022 within the Greenland waters of Subdivision 14.b.2 were 113 t, most caught during the months of June and July (68.3 % of the total reported catch).

Data from deep waters surveys conducted in East Greenland (1998-2016 and 2022) is suggestive that roughhead grenadier is more abundant than roundnose grenadier. Therefore, it is likely that there is misidentification of grenadier species confounding the logbook data of roundnose grenadier and roughhead grenadier.

Biological reference points

There are no reference points for this stock.

WKLIFE has not yet suggested methods to estimate biological reference points for stocks, which have only landings data or are bycatch species in other fisheries.

8.5.4 Comments on the assessment

No assessment was carried out for this stock.

8.5.5 Management considerations

This is a bycatch fishery and advice for other stocks and fisheries should take into account advice on this stock. Trends in landings may reflect changes in activity in other fisheries rather than in stock abundance. Most landings since 2000 are from subdivisions 5.a.2 and 14.b.2, and have been relatively stable. Since 2016, it is noticeable a decrease in landings from Subdivision 5.a.2 and increase from subareas 1 and 2. Landings from other areas were negligible since 2016. There are no reported catches inside the NEAFC Regulatory Area.

The current stock units are consistent with the study from Knutsen et al. (2012) except that the unit covering subareas 1, 2, 4, 8, and 9, Division 14.a, and subdivisions 14.b.2 and 5.a.2, should not be considered as a demographic stock or a genetic population because it includes areas of the Arctic and Atlantic oceans in which roundnose grenadier was found to be genetically distinct. This unit might be only considered as an aggregation of areas where roundnose grenadier occurs at low to moderate density and is not subject to significant continuous exploitation.

Given the bathymetric distribution of roundnose grenadier in the Northeast Atlantic, the fishery for this species may be affected by the recent EU regulation for the protection of Vulnerable Marine Ecosystems (Regulation (EU) 2022/1614). In terms of depth limits in EU and UK waters, and for EU and UK vessels in international waters, bottom set gillnets may be deployed to depths less than 600 m, whilst bottom trawling is prohibited at depths greater than 800 m (Regulation (EU) 2016/2336 and Regulation (EU) 2019/1241).

WGDEEP is aware of Norwegian regulations for fisheries in Norwegian EEZ, and in Jan Mayer and Svalbard (ICES Subarea 2), that define seabed deeper than 1000 m as vulnerable and ban the deployment of bottom-contact gears.

8.5.6 **References**

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8.5.7 **Tables and Figures**

Table 9.5.1. Working group estimates of landings of roundnose grenadier from Subareas 1 and 2.

| Year | Faroes | Denmark | Germany | Norway | Russia/USSR | UK (E+W) | France | TOTAL |
|------|--------|---------|---------|--------|-------------|----------|--------|-------|
| 1990 | | | 5 | | 12 | | | 17 |
| 1991 | | | 3 | 28 | | | | 31 |
| 1992 | | 1 | | 29 | | | | 30 |
| 1993 | | | | 2 | | | | 2 |
| 1994 | | | 12 | | | | | 12 |
| 1995 | | | | | | | | 0 |
| 1996 | | | | | | | | 0 |
| 1997 | 1 | | | 100 | | | | 101 |
| 1998 | | | | 87 | 13 | | | 100 |
| 1999 | | | | 44 | 2 | | | 46 |

| Year | Faroes | Denmark | Germany | Norway | Russia/USSR | UK (E+W) | France | TOTAL |
|-------|--------|---------|---------|--------|-------------|----------|--------|-------|
| 2000 | | | | | | | | 0 |
| 2001 | | | | | | 2 | | 2 |
| 2002 | | | | 11 | 1 | | | 12 |
| 2003 | | | | 4 | | | | 4 |
| 2004 | | | | 27 | | | | 27 |
| 2005 | | | | 12 | | | | 12 |
| 2006 | | | | 6 | 2 | | | 8 |
| 2007 | | | | 11 | 1 | | | 12 |
| 2008 | | | | 10 | | | | 10 |
| 2009 | | | | 8 | | | | 8 |
| 2010 | | | | 17 | 6 | | | 23 |
| 2011 | | | | 16 | | | | 16 |
| 2012 | | | | 5 | | | | 5 |
| 2013 | | | | 17 | | | | 17 |
| 2014 | | | | 4 | | | | 4 |
| 2015 | | | | 11 | | | | 11 |
| 2016 | | | | 2 | | | 0 | 2 |
| 2017 | | | | 4 | | | < 1 | 4 |
| 2018 | | | | 21 | | | < 1 | 21 |
| 2019 | 0 | 0 | 0 | 35 | 0 | 0 | < 0.1 | 35 |
| 2020 | 0 | < 0.01 | 0.1 | 25 | 0 | 0 | 0 | 25 |
| 2021 | 0 | 0 | 0 | 44 | | | < 0.1 | 45 |
| 2022* | 0 | 0 | 0 | 37 | 0 | < 0.1 | 0 | 37 |

* Preliminary data.

Table 9.5.2. Working group estimates of landings of roundnose grenadier from Subarea 4.

| Year | Germany | Norway | UK (Scot) | Denmark | France | TOTAL |
|------|---------|--------|-----------|---------|--------|-------|
| 1990 | 2 | | | | | 2 |
| 1991 | 4 | | | | | 4 |
| 1992 | | | 4 | 1 | | 5 |

| Year | Germany | Norway | UK (Scot) | Denmark | France | TOTAL |
|------|---------|--------|-----------|---------|--------|-------|
| 1993 | 4 | | | | | 4 |
| 1994 | 2 | | | 25 | | 27 |
| 1995 | 1 | | 15 | | | 16 |
| 1996 | | | 5 | 7 | | 12 |
| 1997 | | | 10 | | | 10 |
| 1998 | | | | | | 0 |
| 1999 | | 5 | | | | 5 |
| 2000 | | | | | | 0 |
| 2001 | | | | 17 | | 17 |
| 2002 | | 1 | 26 | | | 27 |
| 2003 | | 1 | 11 | | | 12 |
| 2004 | | | 1 | 371 | | 372 |
| 2005 | | 2 | | | | 2 |
| 2006 | | 4 | | | | 4 |
| 2007 | | 1 | | | | 1 |
| 2008 | | | | | | 0 |
| 2009 | | | | | | 0 |
| 2010 | | 2 | 0 | | | 2 |
| 2011 | | 0 | 0 | | | 0 |
| 2012 | | 1 | | | | 1 |
| 2013 | | | | | | 0 |
| 2014 | | | | | 3 | 3 |
| 2015 | | 1 | < 1 | | 1 | 2 |
| 2016 | | 0 | 0 | | 1 | 1 |
| 2017 | | < 1 | | | < 1 | < 1 |
| 2018 | | < 0.5 | | | < 1 | < 1 |
| 2019 | 0 | < 0.5 | 0 | 0 | 0 | 1 |
| 2020 | 0.1 | < 0.1 | 0 | 0 | 2 | 2 |
| 2021 | 0 | < 0.5 | 0 | 0 | < 0.5 | 1 |

| Year | Germany | Norway | UK (Scot) | Denmark | France | TOTAL |
|-------|---------|--------|-----------|---------|--------|-------|
| 2022* | 0 | < 0.5 | < 0.1 | 0 | < 0.5 | < 0.5 |

*Preliminary data.

Table 9.5.3. Working group estimates of landings of roundnose grenadier from Division 5.a.2.

| Year | Faroes | Iceland** | Norway | UK (E+W) | Denmark | Greenland | Germany | TOTAL |
|------|--------|-----------|--------|----------|---------|-----------|---------|-------|
| 1990 | | 7 | | | | | | 7 |
| 1991 | | 48 | | | | | | 48 |
| 1992 | | 210 | | | | | | 210 |
| 1993 | | 276 | | | | | | 276 |
| 1994 | | 210 | | | | | | 210 |
| 1995 | | 398 | | | | | | 398 |
| 1996 | 1 | 139 | | | | | | 140 |
| 1997 | | 198 | | | | | | 198 |
| 1998 | | 120 | | | | | | 120 |
| 1999 | | 129 | | | | | | 129 |
| 2000 | | 54 | | | | | | 54 |
| 2001 | | 40 | | | | | | 40 |
| 2002 | | 60 | | | | | | 60 |
| 2003 | | 57 | | | | | | 57 |
| 2004 | | 181 | | | | | | 181 |
| 2005 | | 76 | | | | | | 76 |
| 2006 | | 62 | | | | | | 62 |
| 2007 | 1 | 13 | 2 | | | | | 16 |
| 2008 | | 29 | | | | | | 29 |
| 2009 | | 46 | | | | | | 46 |
| 2010 | | 59 | | | | | | 59 |
| 2011 | | 62 | | | | | | 62 |
| 2012 | 0 | 80 | | | | | | 80 |
| 2013 | | 84 | | | | | | 84 |
| 2014 | | 36 | | | | | | 36 |

| Year | Faroes | Iceland** | Norway | UK (E+W) | Denmark | Greenland | Germany | TOTAL |
|-------|--------|-----------|--------|----------|---------|-----------|---------|-------|
| 2015 | | 22 | | | 2 | | | 24 |
| 2016 | | 51 | | | | | | 51 |
| 2017 | | 18 | | | | 0 | | 18 |
| 2018 | | 13 | 0 | | | | | 13 |
| 2019 | | 2 | | | | | 1 | 3 |
| 2020 | | 6 | | | | 3 | | 9 |
| 2021 | | 6 | 26 | | | | | 32 |
| 2022* | | 20*** | | | | < 0.5 | < 0.5 | 21 |

* Preliminary data. ** includes other grenadiers from 1990 to 1996. *** Catch from Iceland is reported for Subarea 5.a and it is assumed to be within Division 5.a.2.

Table 9.5.4. Working group estimates of landings of roundnose grenadier from Subareas 8 and 9.

| Year | France | Spain | Portugal | TOTAL |
|------|--------|-------|----------|-------|
| 1990 | 5 | | | 5 |
| 1991 | 1 | | | 1 |
| 1992 | 12 | | | 12 |
| 1993 | 18 | | | 18 |
| 1994 | 5 | | | 5 |
| 1995 | | | | 0 |
| 1996 | 1 | | | 1 |
| 1997 | | | | 0 |
| 1998 | 1 | 19 | | 20 |
| 1999 | 9 | 7 | | 16 |
| 2000 | 4 | | | 4 |
| 2001 | 7 | | | 7 |
| 2002 | 3 | | | 3 |
| 2003 | 2 | | | 2 |
| 2004 | 2 | | | 2 |
| 2005 | 8 | | | 8 |
| 2006 | 27 | 1 | | 28 |
| 2007 | 10 | | | 10 |

| Year | France | Spain | Portugal | TOTAL |
|-------|--------|-------|----------|-------|
| 2008 | 8 | | | 8 |
| 2009 | 1 | | | 1 |
| 2010 | 1 | | | 1 |
| 2011 | 1 | | | 1 |
| 2012 | 0 | | | 0 |
| 2013 | 0 | | | 0 |
| 2014 | 0 | | | 0 |
| 2015 | 1 | | | 1 |
| 2016 | 0 | 0 | | 0 |
| 2017 | 0 | 0 | | 0 |
| 2018 | 0 | 0 | | 0 |
| 2019 | < 0.5 | 0 | 0 | < 0.5 |
| 2020 | 0.1 | 0 | 0 | 0.1 |
| 2021 | < 0.1 | 0 | 0 | < 0.1 |
| 2022* | 0 | 0 | 0 | 0 |

* Preliminary data.

Table 9.5.5. Working group estimates of landings of roundnose grenadier from Division 14.a and Subdivision 14.b.2.

| Year | Faroes | Germany | Greenland | Iceland | Norway | UK (E+ W) | UK (Scot) | Russia | Estonia | TOTAL |
|------|--------|---------|-----------|---------|--------|-----------|-----------|--------|---------|-------|
| 1990 | | 45 | 1 | | | 1 | | | | 47 |
| 1991 | | 23 | 4 | | | 2 | | | | 29 |
| 1992 | | 19 | 1 | 4 | 6 | | 1 | | | 31 |
| 1993 | | 4 | 18 | 4 | | | | | | 26 |
| 1994 | | 10 | 5 | | | | | | | 15 |
| 1995 | | 13 | 14 | | | | | | | 27 |
| 1996 | | 6 | 19 | | | | | | | 25 |
| 1997 | 6 | 34 | 12 | | 7 | | | | | 59 |
| 1998 | 1 | 116 | 3 | | 6 | | | | | 126 |
| 1999 | | 105 | 138 | | 19 | | | | | 262 |
| 2000 | | 41 | 96 | | 5 | | | | | 153 |

| Year | Faroes | Germany | Greenland | Iceland | Norway | UK (E+ W) | UK (Scot) | Russia | Estonia | TOTAL |
|-------|--------|---------|-----------|---------|--------|-----------|-----------|--------|---------|-------|
| 2001 | | 11 | 75 | | 7 | 2 | 72 | | | 172 |
| 2002 | | 25 | 56 | | 15 | 1 | 1 | | | 103 |
| 2003 | | | 55 | | 5 | 1 | | | | 76 |
| 2004 | | 27 | 107 | | | | | | | 137 |
| 2005 | | | 62 | | 6 | 1 | | | | 76 |
| 2006 | | 35 | 79 | | 17 | | | | | 131 |
| 2007 | 1 | | 43 | | 1 | | | | | 45 |
| 2008 | | | 31 | | | | | 12 | | 43 |
| 2009 | | | 45 | | 2 | | | | | 47 |
| 2010 | | 33 | 61 | | 7 | | | | | 101 |
| 2011 | | 32 | 138 | | 4 | | | | | 174 |
| 2012 | | | 126 | | 1 | | | | | 127 |
| 2013 | | | 129 | | 2 | | | | | 131 |
| 2014 | 0 | | 100 | | 7 | | | | 4* | 111 |
| 2015 | | | 141 | | | | | | | 179 |
| 2016 | | | 64 | | | | | | | 79 |
| 2017 | | | 93 | | | | | | | 119 |
| 2018 | | 59 | 127 | | 1 | | | | | 217 |
| 2019 | 0 | 35 | 27 | 0 | 92 | 0 | 0 | 3 | 0 | 157 |
| 2020 | 0 | 28 | 12 | 0 | 2 | 0 | 0 | 3 | 0 | 44 |
| 2021 | 1 | 31 | 34 | 0 | 78 | 0 | 0 | | 0 | 143 |
| 2022* | 0 | 14 | 13 | 0 | 103 | 0 | 0 | 5 | 0 | 136 |

* Preliminary data. ** Estonian landings in 2014 not reflected in ICES catch statistics.

Table 9.5.6. Working group estimates of landings of roundnose grenadier from 1, 2, 4, 5.a.2, 8, 9, 14.a and 14.b.2.

| Year | 1+2 | 4 | 5.a.2 | 8+9 | 14.b.2 | 14.a | Unallocated | Total |
|------|-----|---|-------|-----|--------|------|-------------|-------|
| 1990 | 17 | 2 | 7 | 5 | 47 | | | 78 |
| 1991 | 31 | 4 | 48 | 1 | 29 | | | 113 |
| 1992 | 30 | 5 | 210 | 12 | 31 | | | 288 |

| Year | 1+2 | 4 | 5.a.2 | 8+9 | 14.b.2 | 14.a | Unallocated | Total |
|------|-----|-----|-------|-------|--------|------|-------------|-------|
| 1993 | 2 | 4 | 276 | 18 | 26 | | | 326 |
| 1994 | 12 | 27 | 210 | 5 | 15 | | | 269 |
| 1995 | 0 | 16 | 398 | 0 | 27 | | | 441 |
| 1996 | 0 | 12 | 140 | 1 | 25 | | | 178 |
| 1997 | 101 | 10 | 198 | 0 | 59 | | | 368 |
| 1998 | 100 | 0 | 120 | 20 | 126 | | | 366 |
| 1999 | 46 | 5 | 129 | 16 | 262 | | | 458 |
| 2000 | 0 | 0 | 54 | 4 | 142 | | | 200 |
| 2001 | 2 | 17 | 40 | 7 | 167 | | 208 | 441 |
| 2002 | 12 | 27 | 60 | 3 | 98 | | 504 | 704 |
| 2003 | 4 | 12 | 57 | 2 | 61 | | 952 | 1088 |
| 2004 | 27 | 372 | 181 | 2 | 134 | | | 716 |
| 2005 | 12 | 2 | 76 | 8 | 69 | | | 167 |
| 2006 | 8 | 4 | 62 | 28 | 131 | | | 233 |
| 2007 | 12 | 1 | 16 | 10 | 45 | | | 84 |
| 2008 | 10 | 0 | 29 | 8 | 43 | | | 90 |
| 2009 | 8 | 0 | 46 | 1 | 47 | | | 102 |
| 2010 | 23 | 2 | 59 | 1 | 101 | | | 186 |
| 2011 | 16 | 0 | 62 | 1 | 174 | | | 253 |
| 2012 | 5 | 1 | 80 | 0 | 127 | | | 213 |
| 2013 | 17 | 0 | 84 | 0 | 131 | | | 232 |
| 2014 | 4 | 3 | 36 | 0 | 111 | | | 154 |
| 2015 | 11 | 2 | 24 | 1 | 141 | | | 179 |
| 2016 | 2 | 1 | 51 | 0 | 62 | 2 | | 118 |
| 2017 | 4 | < 1 | 18 | 0 | 93 | | | 115 |
| 2018 | 21 | < 1 | 13 | 0 | 185 | 2 | | 221 |
| 2019 | 35 | 1 | 3 | < 0.5 | 157 | 0 | | 196 |
| 2020 | 25 | 2 | 9 | 0.1 | 45 | 0 | | 81 |
| 2021 | 45 | 1 | 32 | < 0.1 | 143 | 1 | | 222 |

| Year | 1+2 | 4 | 5.a.2 | 8+9 | 14.b.2 | 14.a | Unallocated | Total |
|-------|-----|-------|-------|-----|--------|------|-------------|-------|
| 2022* | 37 | < 0.5 | 21 | 0 | 112 | 23 | | 193 |

* Preliminary data.

Table 9.5.7. Roundnose grenadier in the Northeast Atlantic. Landings inside and outside the NEAFC Regulatory Area (RA) as estimated by ICES. Landings in tonnes.

| Year | Inside the NEAFC RA | Outside the NEAFC RA | Total landings | Proportion inside the NEAFC RA (%) |
|-------|---------------------|----------------------|----------------|------------------------------------|
| 2017 | 0 | 115 | 115 | 0 |
| 2018 | 0 | 221 | 221 | 0 |
| 2019 | 0 | 196 | 196 | 0 |
| 2020 | 0 | 81 | 81 | 0 |
| 2021 | 0 | 222 | 222 | 0 |
| 2022* | 0 | 193 | 193 | 0 |

* Preliminary data.

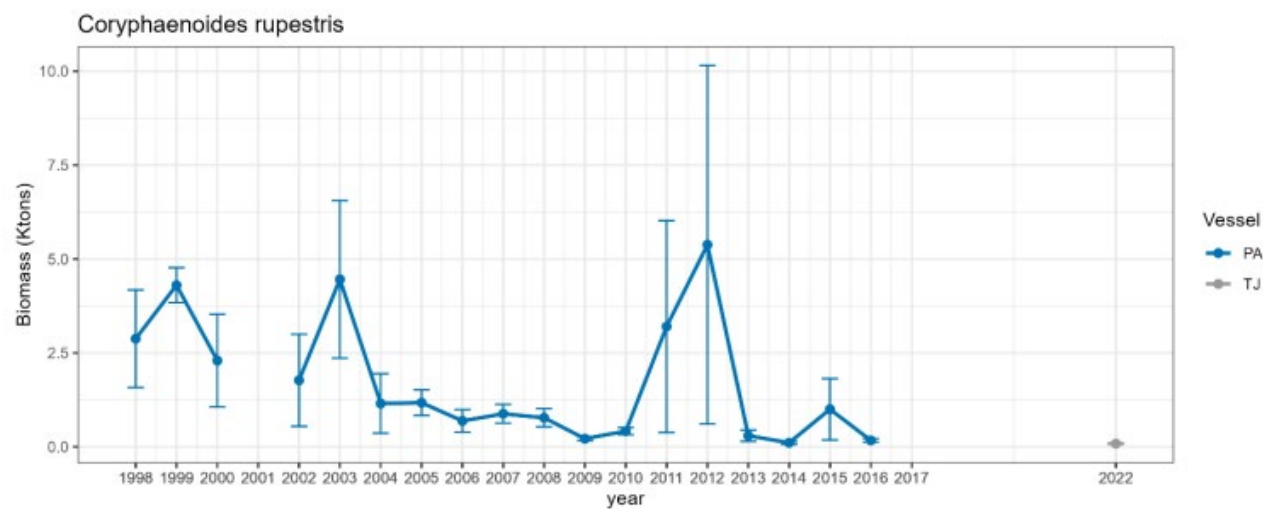


Figure 9.5.1. Roundnose grenadier (RNG) biomass (tonnes) calculated by swept area method in tonnes and +/- S.E. by year for the period 1998-2019 on board R/V Paamiut (PA) and on board R/V Tarajoq (TJ) in 2022 (Nogueira and Christensen, 2023; WD6).

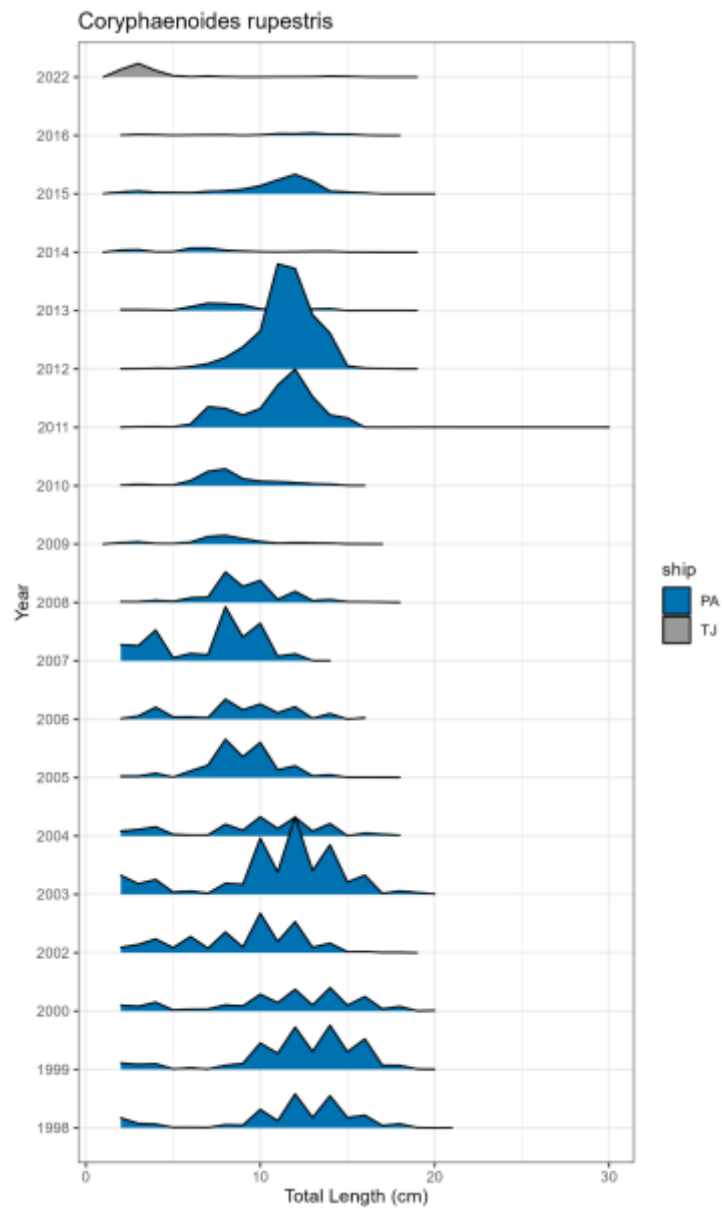


Figure 9.5.2. Length frequency distribution of roundnose grenadier sampled in ICES subarea 14.b.2, onboard the R/V Paamiut (PA) between 1998-2016, and onboard R/V Tarajoq (TJ) in 2022.. No survey was carried out in 2001, and between 2017-2021 (Nogueira and Christiansen, 2023; WD6).