ECOREGION **Widely distributed and migratory stocks**
SUBJECT **EU and NEAFC request for clarification regarding assessment of occurrence and catch levels of grenadier species in areas where roundnose grenadier is caught**

Advice summary

Given the uncertainty in the species composition of the reported grenadier catches it is currently not possible to provide advice on a fishery for roughhead grenadier. The fishery data since 2010 is insufficient to provide catch advice for this species. If managers wish to explore the possibility of managing this fishery there is a need for more comprehensive catch and effort data, ideally through an extended observer programme and confirmation of species landings in the future.

There are considerable differences, of more than an order of magnitude, 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. However, the observed catches and scientific surveys are spatially and temporally limited.

Request

A) Request from European Commission, DG MARE, Unit C2:

"Assessment of occurrence and catch levels of grenadier species in areas where roundnose grenadier is caught
Roundnose grenadier (Coryphaenoides rupestris) stocks are regulated by deep-sea TACs in four different areas: EU and international waters of I, II and IV; of III; of Vb, VI and VII; and of VIII, IX, X, XII and XIV.

In the scientific advice for roundnose grenadier, and in the working group reports, estimated catch data are mentioned also for roughhead grenadier. Yet at the same time the WGDEEP report in 2014 casts doubt on whether roughhead grenadier occurs in areas where roundnose is caught. (See e.g. p. 45: "quantities of roughhead grenadier up to 5000 t per year were reported while this species is not known to occur", p. 556: "Roughhead grenadier occurs on the MAR, but published catch rates in research trawls are very low", and p. 815: "Roughhead grenadier is mostly absent from observer data despite recorded annual catches above 1000 tonnes in 2005 and 2007. Similarly, roughsnout grenadier is absent from observer data although apparently between 1300 and 4800 tonnes where landed in the years 2005, 2007 and 2008. Gunther's grenadier was recorded by the observers but not in the logbooks.")

We would like ICES to give:

1.) *an overview and assessment of information on*
- *a.) the occurrence of these three species in the TAC areas listed above*
- *b.) and on the possibility of them being caught together, based on scientific surveys and other information where available.*

2.) *an overview of (official and/or estimated) catches of roundnose, roughhead and roughsnout grenadier in the TAC areas specified above, where available."*

B) **Request from the North East Atlantic Fisheries Commission:**

"At the PECMAS meeting, it was noted that the 2014 ICES WG DEEP report indicates that there may be a new and/or rapidly growing fishery for roughhead grenadier in the NEAFC Regulatory Area since 2010.In particular, it was noted by PECMAS that the level of reported roughhead grenadier fisheries compared to roundnose grenadier is surprising, as roughhead catches have traditionally been small in comparison.

ICES is asked to provide clarifications, to the extent possible, regarding these fisheries. This would include whether there are possible errors in the catch reporting or whether there is a new and/or rapidly growing fishery.

According to the WG DEEP report catch data is available from 1988. ICES is asked to clarify what trends can be seen in the fishery over time, including to get an overview of catches before 1988 if available.

If there is indeed a new and/or rapidly growing fishery for roughhead grenadier in the NEAFC Regulatory Area, ICES is asked to consider what advice it can provide on how to react to it, possibly on a provisional basis building on existing guidelines regarding new fisheries."

Basis of ICES advice

Information is available from official landings, observer trips, and scientific surveys.

Landings and catch

Working group estimates of landings of roundnose grenadier by country are provided in Tables 9.2.3.1.1–6. These are mostly official data, modified using WG data for some countries and years. Official landings of roughhead grenadier by ICES Subarea are provided in Table 9.2.3.1.7. The official catch data are facilitated by fishery authorities.

Roundnose grenadier is reported in official catches in all four European Commission TAC areas. Roughhead grenadier is reported in official catches in significant quantities, currently taken in the roundnose grenadier TAC area (Subareas VIII, IX, X, XII, and XIV; stock ID RNG/8X14-). In earlier years (2005–2009) significant catches were reported in Subareas VI and VII, which are part of the roundnose grenadier TAC area (Division Vb and Subareas VI and VII; stock ID RNG/5B67-).

Observer programme

Scientific observer data are supplied on a cooperative basis by a limited number of countries; they are patchy and restricted in their spatial and temporal coverage of the fishing season. Their quality is often affected by the variable willingness of vessel operators to cooperate. The three species (roundnose, roughhead, and roughsnout grenadier) can be readily identified, as demonstrated by the French and Spanish observer programmes described below.

French observer programme

Catch and discards data have been collected routinely by France since 2008 through their national programme of on-board sampling of French fishing fleets. Data for the years 2004–2006 were collected under an independent programme. The French fishery for deep-water species operates in ICES Divisions Vb, VIa,b, and VIIc–j. The bulk of the landings and fishing effort are from the EU waters of Divisions Vb and VIa (Cornou *et al.*, 2013). Owing to the obligations from the EU regulation 2347/2002 this fishery has an observer coverage of 16.5% (percentage number of observed fishing trips/total number of fishing trips) in 2012 – one of the highest in the whole French fleet.

The length distributions of discards from all these observations have 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 due to their small size. This figure is higher than in the previous sampling programme, which estimated the discarding rate in the French fisheries 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 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 number). In 2013, discards accounted for 15% of the catch in weight and 32% in number. The reduction of discards is related to:

1) a change in depth of the French fleet, moving towards shallower waters; and
2) attempts to avoid areas where discards would be high.

In the French fishery, as in other fisheries in the northeast Atlantic basin, catches of roughhead grenadier are small compared to the catches of roundnose grenadier. In the 2012 on-board observations roundnose and roughhead grenadiers made up 10% and 0.03% of the total catch, respectively.

Spanish observer programme

Catch and discard data are available from the Spanish Observer Programme. For the period 2004–2013, observers on Hatton Bank covered on average 15% (ranging from 3% to 39% in 2004–2013) of the fishing days for the fleet in Division VIb, and 12% (ranging from 2% to 33% in 2004–2013) in Division XIIb. Although the discards occasionally reached 26% of the total observed catch (by weight) in the period 1996–2013, they are negligible in most sampled months. Annual average discards are 7% in weight for both Divisions VIb and XIIb. In Division VIb the range is 0%–21% and in Division XIIb 0%–26%. These discards correspond to undersized individuals. Discards data for 2011 were excluded as they are considered to be inaccurate, but the data for 2012 and 2013 were used.

Observers have been working in Reykjanes (Divisions XIVb and XIIa) since 1995, collecting information on the redfish fishery; the sampling of grenadiers as target species was only started in 2011. It is estimated that the proportion of the fishery with observers on board during 2012 and 2013 was roughly 37% and 45%, respectively.

Landings data used by the Working Group

Landings data used by ICES WGDEEP consist of official catch data adjusted by scientific observer data.

Because observer data only cover one fishing trip of a single vessel, catch estimates for each species from observer data are based on catch per day in a given ICES area. A monthly average of this catch-per-unit-effort (cpue) is multiplied by the total number of fishing days for all ships in that month and area. For months with no observer coverage, a weighted average of the cpue during the observed months is used. This is an approximate method that does not take into account possible seasonal changes in catchability of the target species. The scale of the fishery (four to six vessels of approximately the same size, fishing simultaneously) does not justify the use of more complicated methods. On Hatton Bank (ICES Divisions VIb and XIIb) observer data are usually available from both areas, but from Reykjanes (ICES Subdivision $XIVb_1$ and Division XIIa) observer data since 2011 have only been available from Division XIVb. It seems that as the fleet started to target grenadier, they stopped fishing redfish in Division XIIa.

The areas where scientific observer data were used to derive working group estimates of landings of roundnose grenadier are Subdivision $XIVb_1$ and Divisions VIb and XIIb (Tables 9.2.3.1.1–6).

Survey data

There is a Scottish deep-water survey in Subarea VI. This survey does not cover the areas where roughhead grenadier is reported as landed.

A number of surveys have been carried out on the Mid-Atlantic Ridge over the past years, with different goals and equipment (Bergstad *et al.*, 2012; Fossen *et al.*, 2008; Hareide and Garnes, 2001). Although all of the surveys recorded the presence of roughhead grenadier, only one of the study sites in one of the surveys overlapped with the current grenadier fishing grounds (Hareide and Garnes, 2001). In this survey, roughhead grenadier catches were recorded at 60º–61ºN, and mostly at depths greater than 1200 m, but catches were nonetheless rather scarce (31–52 kg per 1000 hooks). Roundnose grenadier were not reported in the grenadier fishing grounds of this study site.

A trawl survey was carried out in 2005 by IEO within the frame of the ECOVUL/ARPA project on Hatton Bank to investigate the distribution patterns of deep-sea fish and invertebrates and the impact of deep-sea trawling. Several grenadier species were recorded during the survey. Roundnose grenadier made up 64% in weight of the total survey catch. Roughnose grenadier (*Trachyrinchus murrayi*) was also present (2.4%), as well as roughhead grenadier (less than 1%). There is no mention in this study of roughsnout grenadier (Durán Muñoz *et al.*, 2012).

Unlike in the Atlantic basin where the current fisheries occur, the abundant grenadier species in the Faroe–Shetland Channel (Northern North Sea) and the eastern Norwegian Sea is the roughhead grenadier, with the roundnose grenadier being much less abundant or even absent (Bullough *et al.*, 1998; Bergstad *et al.*, 1999). Further south a population of roundnose grenadier occurs in the Skagerrak and in some Norwegian fjords (Bergstad, 1990; Bergstad *et al.*, 2014). The two grenadier species occur in different hydrological environments, the roughhead grenadier being associated with colder, more boreal waters.

Discussion/conclusions

The available survey and observer data both provide inconclusive information, with limited spatial and temporal coverage. These data show that all three species (roundnose, roughhead, and roughsnout grenadier) are present in Divisions VIb and XIIb, whereas only roundnose and roughsnout grenadier are recorded in observer data from Division XIVb. On average, observed commercial catches of roundnose grenadier in Subareas VI and XII are two orders of magnitude larger than those of roughsnout grenadier, and three orders of magnitude larger than those of roughhead grenadier.

Response to specific questions

A) European Commission

1.) *an overview and assessment of information on the occurrence of these three species in the TAC areas listed above and on the possibility of them being caught together*

No overall survey or catch-per-unit-effort data are available to give a complete picture of the distribution of the three species.

Roundnose grenadier is reported in official catches in all four European Commission TAC areas. Roughhead grenadier is reported in official catches in significant quantities, currently taken in the roundnose grenadier TAC area (Subareas VIII, IX, X, XII, and XIV; stock ID RNG/8X14-). In earlier years (2005–2009) significant catches were reported in Subareas VI and VII, which are part of the TAC regulation area (Division Vb and Subareas VI and VII; stock ID RNG/5B67-). Survey and observer data show that roundnose, roughhead, and roughsnout grenadier species are present in Divisions VIb and XIIb, whereas only roundnose and roughsnout grenadier are recorded in observer data from Division XIVb. On average, observed catches of roundnose grenadier in Subareas VI and XII are two orders of magnitude larger than those of roughsnout grenadier, and three orders of magnitude larger than those of roughhead grenadier.

2.) *an overview of (official and/or estimated) catches of roundnose, roughhead and roughsnout grenadier in the TAC areas specified above, where available."*

Available information on official and estimated catches of roundnose and roughhead grenadier are provided in ICES 2014 Advice (ICES, 2014, Section 9.3.23). No additional information is available.

B) NEAFC

Clarification on the species composition of NEAFC regulatory area fisheries since 2010

No overall survey or catch-per-unit-effort data are available to give a complete picture of the distribution of the three species.

Roundnose grenadier is reported in official catches in all four European Commission TAC areas. Roughhead grenadier is reported in official catches in significant quantities, currently taken in the roundnose grenadier TAC area (Subareas VIII, IX, X, XII, and XIV; stock ID RNG/8X14-). Survey and observer data show that roundnose, roughhead, and roughsnout grenadier species are present in Divisions VIb and XIIb, whereas only roundnose and roughsnout grenadier are recorded in observer data from Division XIVb. On average, observed catches of roundnose grenadier in Subareas VI and XII are two orders of magnitude larger than those of roughsnout grenadier, and three orders of magnitude larger than those of roughhead grenadier.

Observer data are very patchy and limited in the spatial and temporal coverage and cannot provide unequivocal verification of catches. However, they suggest that abundance of roundnose, roughhead, and roughsnout grenadiers is very dissimilar. The disagreement found in the data available to ICES indicates that closer monitoring of these fisheries is needed to answer the question whether a growing fishery for roughhead grenadier exists or not.

ICES catch data and trends in the fishery

Available information on official and estimated catches of roundnose and roughhead grenadier are provided in ICES 2014 Advice (ICES, 2014, Section 9.3.23). ICES has some data prior to 1988 (see Table 9.2.3.1.5) for Divisions XIIa and XIIc.

Advice regarding reported roughhead grenadier fishery

Given the uncertainty in the species composition of the reported grenadier catches it is currently not possible to provide advice on a fishery for roughhead grenadier. It is expected that fisheries for roughhead grenadier would be local fisheries on populations on individual seamounts or in the Greenland waters, Subdivision $XIVb_2$. The fishery data since 2010 is insufficient to provide catch advice for this species. If NEAFC wishes to explore the possibility of managing this fishery there is a need for more comprehensive catch and effort data, ideally through an extended observer programme and confirmation of species landings in the future.

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Table 9.2.3.1.1 Working Group estimates of landings of roundnose grenadier from Subarea VI.

Year	Estonia	Faroes	France	Germany	Ireland	Lithuania	Norway	Poland	Russia	Spain	UK (E+W)	UK (Scot)	TOTAL
1988		27		4							1		32
1989		2	2211	3								2	2218
1990		29	5484	2									5515
1991			7297	7									7304
1992		99	6422	142			5				2	112	6782
1993		263	7940	1								1	8205
1994			5898	15	14							11	5938
1995			6329	2	59							82	6472
1996			5888									156	6044
1997		15	5795		4							218	6032
1998		13	5170				21			3			5207
1999			5637	3	1					1			5642
2000			7478		41		1			1002	1	433	8956
2001	680	11	5897	6	31	137	32	58	3	6942	21	955	14 773
2002	821		7209		12	1817		932			6	741	11 538
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	467	0	44	3694
2006	34	25	1931	0	5	112	0	0	0	393	0	15	2515
2007	0	10	1552	0	2	31	0	0	0	252	0	4	1851
2008	0	6	1433	0	0	23	0	0	16	458	0	27	1963
2009	0	6	1090	0	0	0	0	0	0	1900	0.3	15	3012
2010	0	13	1271	0	0	0	2	0	0	1498	1.2	23	2809
2011	0	4	1112	0	0	0	0	0	0	345	0	8	1469
2012	0	0	1088	0	0	0	0	0	0	258	2	0	1348
2013*	0	0	925	0	0	0	0	0	0	482	6	0	1414

* Provisional.

Table 9.2.3.1.2 Working Group estimates of landings of roundnose grenadier from Division XIIb.

Year	Estonia	Faroes	France**	Germany	Iceland	Ireland	Lithuania	Spain	USSR/Russia	UK (E+W)	UK (Scotl.)	Norway	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	10 045		1	2		10 080
2003			539			1	31	11 663			1		12 235
2004		8	1693				120	10 880	91		4		12 796
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					2758					2759
2011		3						1575					1578
2012		9						657					666
2013*								796					796

*** Provisional.**

** French landings reported in former ICES Subarea XII allocated to XIIb.

Table 9.2.3.1.3 Working Group estimates of unallocated landings of roundnose grenadier in Division Vb and Subareas VI and VII.

Year	Unallocated
1988	
1989	
1990	
1991	
1992	
1993	
1994	
1995	
1996	
1997	
1998	
1999	
2000	
2001	208
2002	504
2003	952
2004	0
2005	0
2006	0
2007	0
2008	0
2009	
2010	
2011	
2012	4515
2013*	929

* Provisional.

Table 9.2.3.1.4 Working Group estimates of landings of roundnose grenadier from Divisions and Subareas Vb, VI, VII, and XIIb.

Year	Vb	VI	VII	XIIb	Unallocated	Vb,VI,VII	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	10 276
1992	3817	6782	1556	13	0	12 155	12 168
1993	1681	8205	1916	328	0	11 802	12 130
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	10 231
1998	1667	5207	1157	4397	0	8031	12 428
1999	1996	5642	896	8573	0	8534	17 107
2000	1791	8956	859	6195	0	11 606	17 801
2001	2016	14 773	1354	6094	208	18 143	24 445
2002	1031	11 538	1058	10 080	504	13 627	24 210
2003	1532	6598	587	12 235	952	8717	21 904
2004	1575	7729	568	12 796	0	9872	22 668
2005	1837	3694	246	8782	0	5777	14 558
2006	1775	2515	386	4361	0	4676	9037
2007	1700	1851	227	4258	0	3778	8036
2008	1112	1963	27	2432	0	3102	5534
2009	446	3012	59	5335	0	4046	9381
2010	611	2809	41	2759	0	3461	6220
2011	74	1469	34	1578	0	1577	3155
2012	44	1348	48	657	6997	1440	9094
2013*	45	1414	39	796	1522	1498	3815

* Provisional.

Table 9.2.3.1.5 Working group estimates of roundnose genadier catch from Subdivision XIIa$_1$ and Division XIIc.

Year	USSR/ Russia	Poland [2)]	Latvia [2)]	Faroes [2)]	Spain	Total
1973	226					226
1974	5874					5874
1975	29894					29 894
1976	4545					4545
1977	9347					9347
1978	12 310					12 310
1979	6145					6145
1980	17 419					17 419
1981	2954					2954
1982	12 472					12 472
1983	10 300					10 300
1984	6637					6637
1985	5793					5793
1986	22 842					22 842
1987	10 893					10 893
1988	10 606					10 606
1989	9495					9495
1990	2838					2838
1991	3214 [1)]		4296			7510[1]
1992	295		1684			1979
1993	473		2176	263		2912
1994			675	457		1132
1995				359		359
1996	208			136		344
1997	705	5867		138		6710
1998	812	6769		19		7600
1999	576	546		29		1151
2000	2325					2325
2001	1714			2		1716
2002	737					737
2003	510					510
2004	436			8		444
2005	600					600
2006				1		1
2007				2		2
2008	13					13
2009	5					5
2010						
2011						
2012 [1)]					864	
2013 [3)]					118	

[1)] Revised catch data. [2)] Official ICES data. [3)] Provisional data.

Table 9.2.3.1.6 Working group estimates of catch of roundnose genadier from Subdivision XIVb1.

Year	USSR/ Russia	Spain	Unallocated	Total
1976	11			11
1982	153			153
1997	3361			3361
1998				
1999				
2000	5			5
2001	69			69
2002	4	235[2]		239
2003		272[2]		272
2004	201			201
2005				
2006				
2007				
2008				
2009				
2010		242 [1)]		242 [2)]
2011		2440 [1)]		2440 [1)]
2012		1860	1098	2958
2013 [3)]		1789		1789

[1)] Revised catch data. [2)] Official ICES data. [3)] Provisional data.

Table 9.2.3.1.7 Official data of landings of roughhead grenadier (t). Data from 2012 are provisional.

Year	I and II	III and IV	Va	Vb	VI and VII	VIII	XII	XIV	TOTAL
1988									
1989									
1990	589								589
1991	829								829
1992	424	7							431
1993	136				18			52	206
1994	0				5			5	10
1995	1				4			2	7
1996	3	4	15		13				35
1997	21	5	4	6	12				48
1998	55	1	1	9	10			6	82
1999	0			99	38			14	151
2000	48	4	2	1	11		7		73
2001	94	10	1	4	45		10	26	190
2002	29	3	4	3	12	1	1143	53	1248
2003	77	2	33	12	11		225	33	393
2004	79	1	3	10	33		752	55	933
2005	77	39	5	6	1488		2205	40	3860
2006	78		7	10	2003	3	976	4	3081
2007	49		2	5	1180		420	15	1671
2008	55			3	128		73	3	262
2009	53		5		210		7	4	279
2010	45		22	1	11		1	422	502
2011	29	2	21		4		2	264	322
2012	54	1	16	3	195		526	2740	3535
2013	36	1	16	2	181		210	835	1281