

2.3.14 Golden redfish (*Sebastes norvegicus*) in subareas 5, 6, 12, and 14 (Iceland and Faroes grounds, West of Scotland, North of Azores, East of Greenland)

ICES stock advice

ICES advises that when the Greenland and Iceland management plan for golden redfish is applied, catches in 2017 should be no more than 52 800 tonnes.

Stock development over time

Catches have been relatively stable since 1994. The 2000–2005 year classes (recruitment in 2005–2010) accounted for most of the catches in 2015. Recruitment is estimated to have been low since 2011. Spawning-stock biomass (SSB) has steadily increased for the past 20 years and is well above $MSY B_{trigger}$. Fishing mortality since 2010 has been estimated at around F_{MSY} .

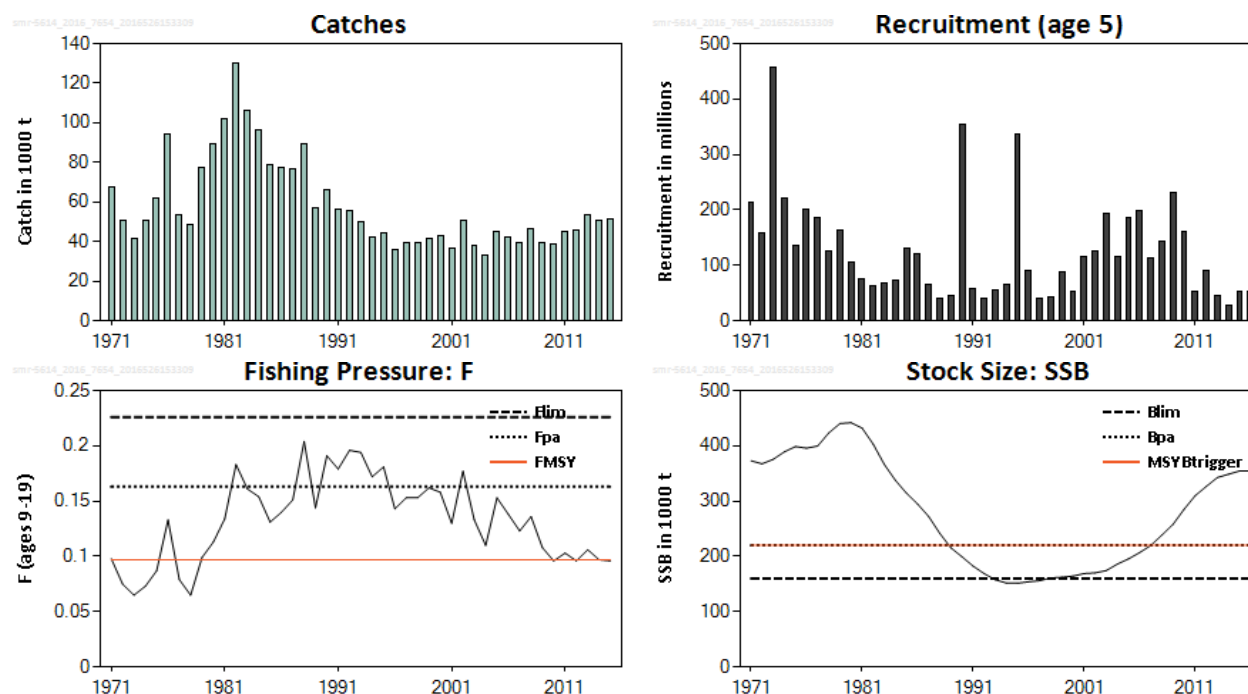


Figure 2.3.14.1 Golden redfish in subareas 5, 6, 12, and 14. Summary of the stock assessment. The unshaded bar (2016 value) in the recruitment plot is the average from 2011 to 2014. Note: $F_{MGT} = F_{MSY}$, and $SSB_{MGT} = MSY B_{trigger}$.

Stock and exploitation status

Table 2.3.14.1 Golden redfish in subareas 5, 6, 12, and 14. State of the stock and fishery relative to reference points. The expected range of realized F following the management plan (F_{MGT}) can be found in the management plan evaluation advice (ICES, 2014).

		Fishing pressure			Stock size					
		2013	2014	2015	2014	2015	2016			
Maximum sustainable yield	F_{MSY}	✘	✔	✔	Appropriate	MSY	✔	✔	✔	Above trigger
Precautionary approach	F_{pa}, F_{lim}	✔	✔	✔	Harvested sustainably	B_{lim}, B_{pa}	✔	✔	✔	Full reproductive capacity
Management plan	F_{MGT}	-	✔	✔	Within expected range	SSB_{MGT}	✔	✔	✔	Above

Catch option

Table 2.3.14.2 Golden redfish in subareas 5, 6, 12, and 14. The basis for the catch options.

Variable	Value	Source	Notes
F ages 9–19 (2016)	0.097	ICES (2016a)	Based on calendar year catches following the TAC and the management plan
SSB (2017)	349 800 t	ICES (2016a)	
R _{ages} (2016)	54 million	ICES (2016a)	Average of 2011–2014
R _{ages} (2017)	54 million	ICES (2016a)	Average of 2011–2014
R _{ages} (2018)	54 million	ICES (2016a)	Average of 2011–2014
Total catch (2016)	53 000 t	ICES (2016a)	Based on calendar year catches following the TAC and the management plan

Table 2.3.14.3 Golden redfish in subareas 5, 6, 12, and 14. The catch option.

Rationale	Landings (2017)	Basis	F _{9–19} (2017)	SSB (2018)	% SSB change *	% TAC change **
Management plan	52 800	MP	0.097	341 200	-2.5%	-0.3%

Weights in tonnes.

* SSB 2018 relative to SSB 2017.

** TAC 2017 relative to assumed catches 2016.

Basis of the advice

Table 2.3.14.4 Golden redfish in subareas 5, 6, 12, and 14. The basis of the advice.

Advice basis	Greenland and Iceland management plan for golden redfish.
Management plan	<p>A management plan for golden redfish, aimed at providing maximum sustainable yield, has been evaluated by ICES (ICES, 2014) and is considered to be precautionary. ICES has been requested to give advice according to this plan.</p> <p>The management plan states:</p> <ul style="list-style-type: none"> - if $SSB_Y \geq SSB_{MGT}$: the catch for year Y+1 corresponds to the fishing mortality $F_{Y+1} = F_{MGT}$. - If $SSB_Y < SSB_{MGT}$: the catch for year Y+1 corresponds to $F_{Y+1} = F_{MGT} \times SSB_Y / SSB_{MGT}$. <p>Where: SSB_Y is the spawning stock biomass in year Y, $F_{MGT} = 0.097$ and $SSB_{MGT} = 220$ kt.</p>

Quality of the assessment

Because of the aggregating behavior of the species, survey indices are often largely dominated by a few large hauls. This causes high uncertainties in the survey indices and large interannual fluctuation in estimates of the biomass index. The assessment indicates different stock trends from various data sources, with the catch-at-age data showing a smaller increase in stock size than the survey biomass.



Figure 2.3.14.2 Golden redfish in subareas 5, 6, 12, and 14. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

Precautionary approach reference points (B_{pa} , F_{pa} , and F_{lim}) for stock and fishery status classification were calculated this year.

Reference points

Table 2.3.14.5 Golden redfish in subareas 5, 6, 12, and 14. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	220 kt	$B_{lim} \times \exp(0.2 \times 1.645)$	ICES (2014)
	F_{MSY}	0.097	Average of ages 9–19. F_{max} in the 2012 Gadget run, leading to < 1% probability of going below B_{lim} , based on recruitment patterns since 1975 and with large assessment uncertainty.	ICES (2014)
Precautionary approach	B_{lim}	160 kt	Lowest SSB in the 2012 Gadget run.	ICES (2014)
	B_{pa}	220 kt	$B_{pa} = B_{trigger} = B_{lim} \times \exp(0.2 \times 1.645)$	ICES (2016a)
	F_{lim}	0.226	F that leads to B_{lim} in the long term. From stochastic simulations.	ICES (2016a)
	F_{pa}	0.163	$F_{lim} / \exp(1.645 \times 0.2)$	ICES (2016a)
Management plan	SSB_{MGT}	220 kt	MSY $B_{trigger}$	ICES (2014)
	F_{MGT}	0.097	F_{MSY}	ICES (2014)

Basis of the assessment

Table 2.3.14.6 Golden redfish in subareas 5, 6, 12, and 14. The basis of the assessment.

ICES stock data category	1 (ICES, 2016b)
Assessment type	Analytical assessment (Gadget model) that uses catches in the model and in the forecast.
Input data	Landings data and length distributions of catches from Iceland, Greenland, and the Faroes; survey data by length from IS-SMB and GER(GRL)-GFS-Q4, age data from Icelandic catches and IS-SMH.
Discards and bycatch	Considered negligible
Indicators	None
Other information	Benchmarked in 2014 (ICES, 2014).
Working group	North-Western Working Group (NWWG)

Information from stakeholders

There is no available information.

History of the advice, catch, and management

Table 2.3.14.7 Golden redfish in subareas 5, 6, 12, and 14. History of ICES advice, the TACs, and ICES estimates of landings (*S. norvegicus*).

Year	ICES advice	Predicted catch corresp. to advice	Iceland TAC*,##	Greenland TAC~	ICES landings
1987	No increase in F	83	95		77
1988	No increase in F	84	85		90
1989	TAC*	117*	77		57
1990	TAC*	116*	80		67
1991	Precautionary TAC	77 (117*)	55#		56
1992	Precautionary TAC	76 (116*)	90		56
1993	Precautionary TAC*	120*	104		50
1994	Precautionary TAC, if required	100*	90		43
1995	TAC	90*	77		45
1996	TAC for Division 5.a (28); precautionary TAC for Division 5.b and Subarea 15 (4)	32**	65		37
1997	Effort 75% of 1995 value	32**	65		40
1998	Effort reduced in steps of 25% from the 1995 level	37.2**	65		39
1999	Effort not increased compared to 1997	35**	65		42
2000	Catch not increased compared to 1998	35**	60		44
2001	Effort not increased compared to 1999	33**,^	57		37
2002	25% reduction in effort	29^^	65		51
2003	25% reduction in effort(2001)	31^^	60		39
2004	25% reduction in effort(2002)	37.4^^	57		33.4
2005	Maintain fishable biomass above U_{pa}	37^^	57		45.4
2006	Maintain fishable biomass above U_{pa}	37^^	57		42.2
2007	Maintain fishable biomass above U_{pa}	37^^	57	5~	39.1
2008	Maintain fishable biomass above U_{pa}	37^^	57	1~	46.3
2009	Maintain fishable biomass above U_{pa}	< 30	50		39.2
2010	Maintain fishable biomass above U_{pa}	< 30	50	6~	38.7
2011	Same advice as last year	< 30	37.5	8.5~	45.3
2012	Maintain catches	< 40	40	8.5~	45.6
2013	Maintain catches	< 40	45	8.5~	53.3
2014	20% increase in catches (rel. 2010–2012)	< 52	52	8.5~	50.7
2015	Management plan	< 47.3	45.6	8.5~	51.6
2016	Management plan	< 51	48.5	8.5~	
2017	Management plan	≤ 52.8			

Weights in thousand tonnes.

* Deep-sea *S. mentella* and *S. norvegicus* combined.

** *S. norvegicus* only.

^ In Division 5.a only.

^^ Both divisions 5.a and 5.b and Subarea 14.

Year ending 31 August.

From 1992 onwards: Quota year September–August.

~ Demersal redfish (*Sebastes norvegicus* and *S. mentella*).

History of catch and landings

Table 2.3.14.8 Golden redfish in subareas 5, 6, 12, and 14. Catch distribution by fleet in 2015 as estimated by ICES.

Total catch (2015)	Landings		Discards
51 645 t	92.4% bottom trawls	7.6% other gear	Negligible
	51 645t		

Table 2.3.14.9 Golden redfish in subareas 5, 6, 12, and 14. History of official commercial landings presented by area. Weights are in tonnes.

Year	Area				Total
	Division 5.a	Division 5.b	Subarea 6	Subarea 14	
1978	31300	2039	313	15477	49129
1979	56616	4805	6	15787	77214
1980	62052	4920	2	22203	89177
1981	75828	2538	3	23608	101977
1982	97899	1810	28	30692	130429
1983	87412	3394	60	15636	106502
1984	84766	6228	86	5040	96120
1985	67312	9194	245	2117	78868
1986	67772	6300	288	2988	77348
1987	69212	6143	576	1196	77127
1988	80472	5020	533	3964	89989
1989	51852	4140	373	685	57050
1990	63156	2407	382	687	66632
1991	49677	2140	292	4255	56364
1992	51464	3460	40	746	55710
1993	45890	2621	101	1738	50350
1994	38669	2274	129	1443	42515
1995	41516	2581	606	62	44765
1996	33558	2316	664	59	36597
1997	36342	2839	542	37	39761
1998	36771	2565	379	109	39825
1999	39824	1436	773	7	42040
2000	41187	1498	776	89	43550
2001	35067	1631	535	93	37326
2002	48570	1941	392	189	51092
2003	36577	1459	968	215	39220
2004	31686	1139	519	107	33451
2005	42593	2484	137	115	45329
2006	41521	656	0	34	42211
2007	38364	689	0	83	39134
2008	45538	569	64	80	46251
2009	38442	462	50	224	39177
2010	36155	620	220	1653	38648
2011	43773	493	83	1005	45354
2012	43103	491	41	2017	45635
2013	51330	372	92	1499	53263
2014	47769	201	60	2706	50736
2015*	48769	270	44	2562	51645

* Provisional.

Summary of the assessment

Table 2.3.14.10 Golden redfish in subareas 5, 6, 12, and 14. Assessment summary.

Year	Recruitment (age 5)	SSB	Catches	Mean F Ages 9–19
	millions	tonnes	tonnes	
1971	214	373000	67860	0.098
1972	159	367500	50870	0.075
1973	458	375600	41699	0.065
1974	222	389100	50578	0.073
1975	135	398700	61900	0.087
1976	202	395900	94400	0.133
1977	185	399600	53733	0.079
1978	126	423300	48816	0.065
1979	164	440300	77208	0.099
1980	105	441900	89175	0.113
1981	75	432100	101974	0.134
1982	64	403100	130401	0.183
1983	68	366600	106442	0.161
1984	73	337600	96034	0.154
1985	132	314300	78623	0.131
1986	122	294600	77060	0.140
1987	65	272300	76551	0.151
1988	41	241700	89456	0.204
1989	45	215400	56677	0.144
1990	353	199500	66250	0.191
1991	59	182500	56072	0.179
1992	40	168900	55670	0.196
1993	55	157800	50249	0.194
1994	65	151900	42386	0.172
1995	338	151600	44159	0.181
1996	90	154100	35933	0.143
1997	42	156200	39219	0.153
1998	42	161200	39446	0.153
1999	87	162500	41267	0.162
2000	53	164500	42774	0.158
2001	116	169000	36791	0.130
2002	127	170200	50700	0.177
2003	195	174500	38252	0.133
2004	115	186200	32932	0.110
2005	187	195600	45192	0.153
2006	198	207000	42211	0.138
2007	114	219900	39136	0.123
2008	142	238700	46187	0.136
2009	232	257800	39128	0.108
2010	161	285300	38428	0.096
2011	52	309900	45271	0.103
2012	92	326600	45555	0.096
2013	45	342700	53201	0.106
2014	28	348700	50677	0.097
2015	54*	354600	51601	0.096
2016	54*	354800		

* Average from 2011 to 2014.

Sources and references

ICES. 2014. Iceland, Faroe Islands, and Greenland request to ICES on evaluation of a proposed long-term management plan and harvest control rule for golden redfish (*Sebastes marinus*). *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 2, Section 2.2.3.1.

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