

ECOREGION Iceland and East Greenland
STOCK Golden redfish (*Sebastes marinus*) in Subareas V, VI, XII, and XIV

Advice for 2014

Based on the ICES approach to data-limited stocks, ICES advises that catches should be no more than 51 980 t. All catches are assumed to be landed.

Stock status

F (Fishing Mortality)	
	2010–2012
MSY (F_{MSY})	Unknown
Precautionary approach (F_{pa}, F_{lim})	Unknown
Qualitative evaluation	Decreasing
SSB (Spawning-Stock Biomass)	
	2011–2013
MSY ($B_{trigger}$)	Unknown
Precautionary approach (U_{pa}, U_{lim})	Full reproductive capacity
Qualitative evaluation	Increasing in main area

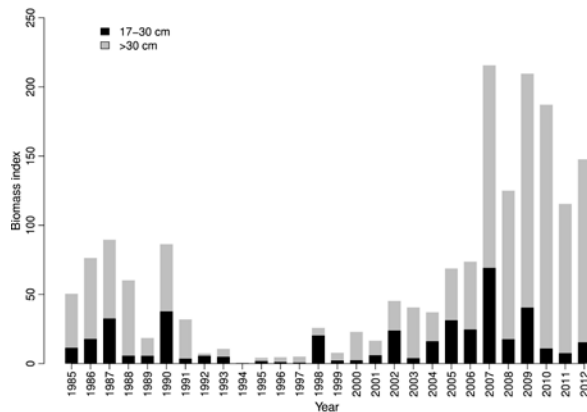
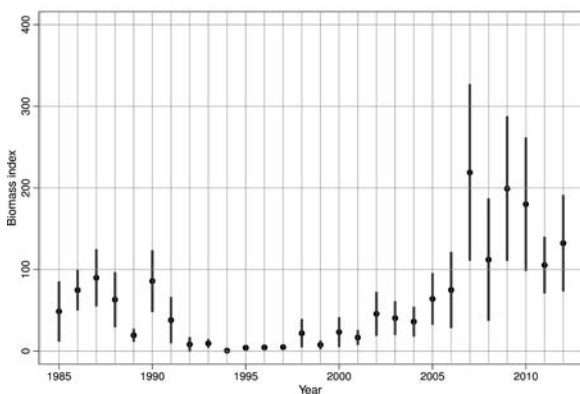
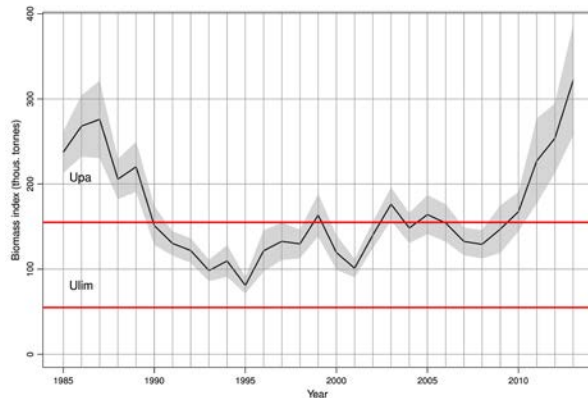
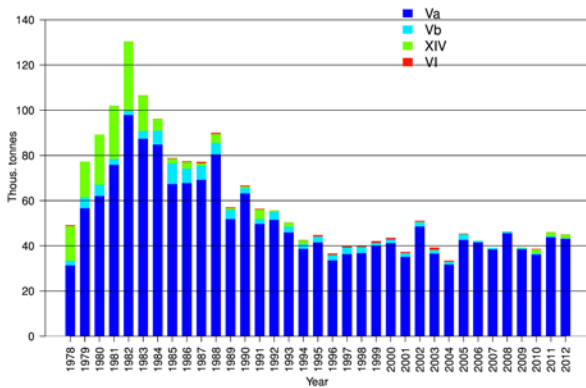


Figure 2.4.13.1 Golden redfish (*Sebastes marinus*) in Subareas V, VI, XII, and XIV. Top left: Landings by area. Top right: Survey biomass (± 1 standard error) for Icelandic waters (spring survey). Bottom: Survey biomass and abundance indices for East and West Greenland. Left: Total biomass index, including one standard error. Right: Total biomass index split into pre-fishery recruits (17–30 cm) and fishable redfish (>30 cm).

Landings have been stable at around 41 thousand tonnes since 1995. A major part of the catches consists of the 1998–2003 year classes; the 1985 and 1990 year classes are diminishing proportionally. SSB in 2013 is estimated at around 60% of its maximum, which is two times higher than it was in 1995 when it was at its lowest. Fishing mortality has decreased from the 1990s by around 40% in 2012 (Figure 2.4.13.2).

Management plans

The regulation is based on TAC in Iceland and in Greenland, but through an effort system in the Faroe Islands. The separation of golden redfish and Icelandic slope *S. mentella* in the quota was implemented in the 2010/2011 fishing season. The TAC in Greenland is set for redfish, with no distinction being made between *S. marinus* and *S. mentella*.

Biology

Sebastes marinus is a species with late maturation (matures between 10 and 14 years old) and slow growth (can get older than 50 years) and is hence considered to be vulnerable to overexploitation. It can therefore only sustain low exploitation and management should be based on that consideration.

The fisheries

The majority of the golden redfish catch is taken in ICES Division Va, which has contributed 95–98% of the total landings since 1990. Since 2009 an increased redfish fishery has taken place in Subarea XIV. In Division Vb golden redfish is only bycatch in the saithe fishery and has decreased in recent years. *S. marinus* is to a certain extent caught together with “Icelandic slope *S. mentella*” in all areas.

Catch distribution	Total catch (2012) = 45.3 kt, where 92% was taken by bottom trawls and 8% by other gear-types. Discarding is considered minimal.
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Quality considerations

Due to the aggregating behavior of the species, survey indices are often largely composed of a few large hauls. This causes high CVs in the indices and large interannual fluctuation in estimates of biomass.

The methods applied to derive quantitative advice for data-limited stocks are expected to evolve as they are further developed and validated. The harvest control rules are expected to stabilize stock size, but they may not be suitable if the stock size is low and/or overfished.

Scientific basis

Assessment type	Gadget model and ICES approach to data-limited stocks (DLS).
Stock data category	Category 2.1.1.
Input data	Two survey indices (Icelandic spring survey since 1985 and autumn survey since 1996); landings from Iceland, Greenland, and the Faroe Islands, catch-at-age from Iceland, and length frequencies from catch sampling of Faroe Island and Iceland; survey indices (IS-SMB, IS-SMH, GER(GRL)-GFS-Q4, FO-GFS-Q1, and FO-GFS-Q3).
Discards and bycatch	Discards are not included and are assumed negligible.
Indicators	Gadget model used as trend indicator.
Other information	Faroeese groundfish surveys since 1994 and 1996, German groundfish survey on the Greenland shelf since 1982. Benchmarked in February 2012, further review of the model settings in 2013.
Working group report	NWWG (ICES, 2013).

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Reference points

	Type	Value	Technical basis
MSY Approach	MSY B_{trigger}		
	F_{MSY}		
Precautionary approach	U_{lim}	55	20% of the highest observed survey index*.
	U_{pa}	155	60% of the highest observed survey index*.
	F_{lim}	Undefined.	
	F_{pa}	Undefined.	

(unchanged since 1998)

* Technical basis for the survey index:

The basis for the calculation of the U_{pa} is the Icelandic spring groundfish survey index series starting in 1985. Since 1990 the average U has been around half of U_{max} – the highest observed index in the time-series (276 in 1987). This has not resulted in any strong year classes compared to higher U 's. A precautionary U_{pa} is therefore proposed at $U_{\text{max}} \times 0.6$, corresponding to the U 's associated with the most recent strong year class. U is regarded as a proxy for SSB but represents the fishable biomass.

ICES approach to data-limited stocks

The Gadget model has been adopted as indicative of the trend. ICES DLS approach, Category 2.1.1 is therefore used as basis for catch advice for this stock. Based on the prognosis of the GADGET model, the estimated landings for 2014 are 54 400 t, which is an increase of 26% compared to average landings in 2010–2012. This implies an increase of catches of at most 20% (uncertainty cap used) in relation to the average catch of the last three years, corresponding to catches of no more than 51 980 t. Considering that the current exploitation is not detrimental to the stock, the effort in the main fisheries has decreased significantly and biomass has increased, no additional precautionary reduction is needed.

The stock is at full reproductive capacity, and it is above U_{pa} . There is evidence that stock size is increasing; the assessment that is indicative of trends shows that stock size has been increasing since 1995, and exploitation rate has reduced significantly (by at least a third). Hence the precautionary buffer has not been applied.

Additional considerations

Management considerations

Sebastes marinus is a species with late maturation and slow growth and is thus considered to be vulnerable to overexploitation. It can therefore only sustain low exploitation and management should be based on that consideration.

The strong 1990 year class has been in the Icelandic fishery for a decade and will also sustain the stock in the short term. The 1998–2003 year classes are above average and have been recruiting to the fishery since 2006.

Subarea XIV is an important nursery area for *S. mentella* and *S. marinus*. The survey index of the fishable stock of *S. marinus* in Subarea XIV has increased in recent years, but with a large measurement uncertainty (Figure 2.4.13.2). Measures to protect juvenile redfish in Subarea XIV should be continued (sorting grids in the shrimp fishery).

In Subarea XIV redfish and cod are found in the same areas and depths and historically these species have been taken in the same fisheries. For 2014, ICES advises that no fishery should take place on cod in Greenland waters. Management measures should be put in place that will minimize catches of cod in a directed fishery for *S. marinus*.

No formal agreement on the management of *S. marinus* exists among the three coastal states, Greenland, Iceland, and the Faroe Islands. In Greenland and Iceland, the fishery is regulated by a TAC and in the Faroe Islands by effort limitation.

Regulations and their effects

A quick closure system was implemented in 1977 in Iceland to protect juvenile redfish. If more than 20% of a catch observed on board is less than 33 cm a small area can be closed for at least two weeks. For this reason there is no minimum landing size for golden redfish. The effect of the quick closure has not been evaluated and since 2001 there have been relatively few quick closures on small golden redfish, or on average three every year. The reason for the few quick closures on small golden redfish is because large areas southwest and west of Iceland are closed permanently or temporarily for trawling to protect juvenile golden redfish. These areas were closed partly because of frequent quick closures on redfish fisheries in 1991–1995. The effects of these closed areas have not been evaluated, but the increase in the spring survey index since 2003 is partly related to increased aggregation of golden redfish in these areas.

Since the late 1980s in Division Va and since 2002 in Subarea XIV it has been mandatory in the shrimp fishery to use sorting grids in order to reduce bycatches of juvenile redfish in the shrimp fishery.

Uncertainty in the assessment

A single abundance index that covers the whole distributional range of the stock is not available. The assessment is based on a survey index from Division Va only and landings from all three areas. This approach may create a bias in the assessment that cannot be quantified.

Comparison with previous assessment and advice

The assessment method is the same as last year. This year's advice is based on the DLS approach, Category 2.1.1.

Sources

ICES 2012a. Report of the Benchmark Workshop on Redfish Stocks, 1–8 February 2012. ICES CM 2012/ACOM:48.
ICES. 2012b. Report of the North-Western Working Group, 26 April–3 May 2012. ICES CM 2012/ACOM:07.
ICES. 2013. Report of the North-Western Working Group, 25 April–2 May 2013. ICES CM 2013/ACOM:07.

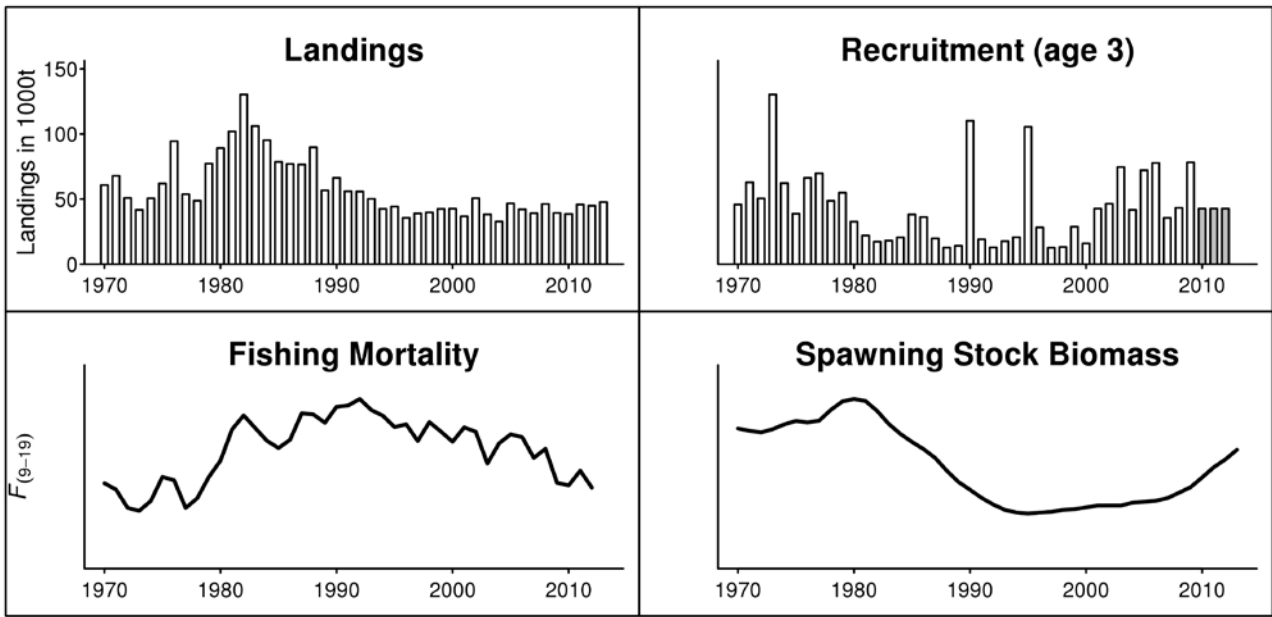


Figure 2.4.13.2 Golden redfish in Subareas V, VI, XII, and XIV. Summary of stock assessment (weights in thousand tonnes.).

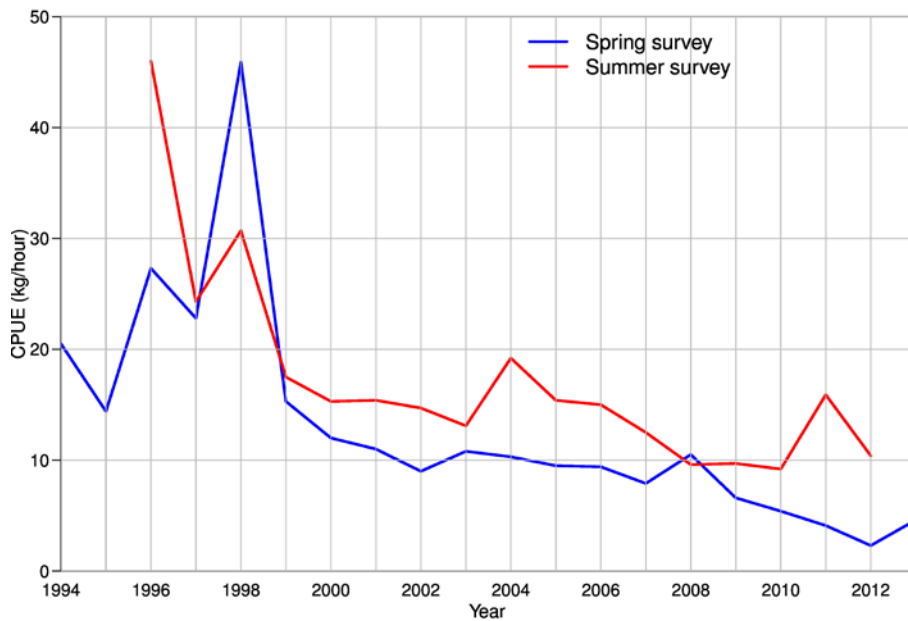


Figure 2.4.13.3 Golden redfish (*Sebastes marinus*) in Subareas V, VI, XII, and XIV. CpuE in the Faroese spring groundfish survey and the summer groundfish survey in ICES Division Vb.

Table 2.4.13.1 Golden redfish (*Sebastes marinus*) in Subareas V, VI, XII, and XIV. ICES advice, management, and landings.

Year	ICES Advice	Predicted catch corresp. to advice	Iceland TAC ^{1,6}	Greenland TAC ⁷	<i>S. marinus</i> ICES landings
1987	No increase in F	83	95		77
1988	No increase in F	84	85		90
1989	TAC ¹	117 ¹	77		57
1990	TAC ¹	116 ¹	80		67
1991	Precautionary TAC	77 (117 ¹)	55 ⁵		56
1992	Precautionary TAC	76 (116 ¹)	90		56
1993	Precautionary TAC ¹	120 ¹	104		50
1994	Precautionary TAC, if required	100 ¹	90		43
1995	TAC	90 ¹	77		45
1996	TAC for Division Va (28); precautionary TAC for Division Vb and Subarea XIV (4)	32 ²	65		37
1997	Effort 75% of 1995 value	32 ²	65		40
1998	Effort reduced in steps of 25% from the 1995 level	37.2 ²	65		39
1999	Effort not increased compared to 1997	35 ²	65		42
2000	Catch not increased compared to 1998	35 ²	60		44
2001	Effort not increased compared to 1999	33 ^{2,3}	57		37
2002	25% reduction in effort	29 ⁴	65		51
2003	25% reduction in effort(2001)	31 ⁴	60		39
2004	25% reduction in effort(2002)	37.4 ⁴	57		33.4
2005	Maintain fishable biomass above U _{pa}	37 ⁴	57		45.4
2006	Maintain fishable biomass above U _{pa}	37 ⁴	57		42.2
2007	Maintain fishable biomass above U _{pa}	37 ⁴	57	5	39.1
2008	Maintain fishable biomass above U _{pa}	37 ⁴	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	46.0
2012	Maintain catches	< 40	40	8	45.3
2013	Maintain catches	< 40	45	8	
2014	20% increase in catches (rel. 2010–2012)	<52			

Weights in thousand tonnes.

¹ Deep-sea *S. mentella* and *S. marinus* combined.

² *S. marinus* only.

³ In Division Va only.

⁴ Both Divisions Va and Vb and Subarea XIV.

⁵ Year ending 31 August.

⁶ From 1992 onwards: Quota year September–August.

⁷ Demersal redfish (*Sebastes marinus* and *S. mentella*).

Table 2.4.13.2 Golden redfish (*Sebastes marinus*) in Subareas V, VI, XII, and XIV. Official landings (in tonnes) by area.

Year	Area				Total
	Va	Vb	VI	XIV	
1978	31,300	2,039	313	15,477	49,129
1979	56,616	4,805	6	15,787	77,214
1980	62,052	4,920	2	22,203	89,177
1981	75,828	2,538	3	23,608	101,977
1982	97,899	1,810	28	30,692	130,429
1983	87,412	3,394	60	15,636	106,502
1984	84,766	6,228	86	5,040	96,120
1985	67,312	9,194	245	2,117	78,868
1986	67,772	6,300	288	2,988	77,348
1987	69,212	6,143	576	1,196	77,127
1988	80,472	5,020	533	3,964	89,989
1989	51,852	4,140	373	685	57,050
1990	63,156	2,407	382	687	66,632
1991	49,677	2,140	292	4,255	56,364
1992	51,464	3,460	40	746	55,710
1993	45,890	2,621	101	1,738	50,350
1994	38,669	2,274	129	1,443	42,515
1995	41,516	2,581	606	62	44,765
1996	33,558	2,316	664	59	36,597
1997	36,342	2,839	542	37	39,761
1998	36,771	2,565	379	109	39,825
1999	39,824	1,436	773	7	42,040
2000	41,187	1,498	776	89	43,550
2001	35,067	1,631	535	93	37,326
2002	48,570	1,941	392	189	51,092
2003	36,577	1,459	968	215	39,220
2004	31,686	1,139	519	107	33,451
2005	42,593	2,484	137	115	45,329
2006	41,521	656	0	34	42,211
2007	38,364	689	0	83	39,134
2008	45,538	569	64	80	46,251
2009	38,442	462	50	224	39,177
2010	36,155	620	220	1,653	38,648
2011	43,773	493	83	1,676	46,025
2012 ¹⁾	43,103	491	41	1,643	45,278

¹⁾ Provisional.