

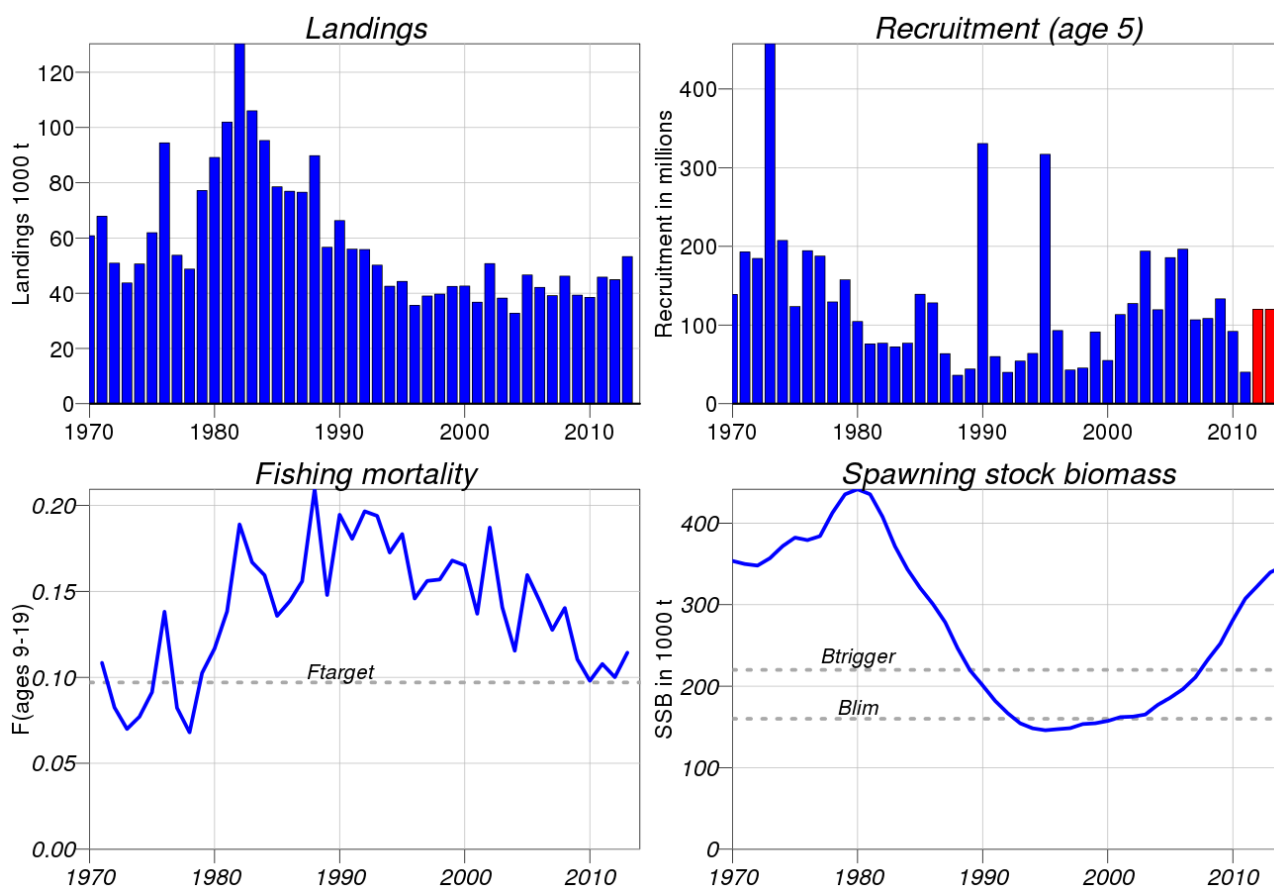
**ECOREGION** Iceland and East Greenland  
**STOCK** Golden redfish (*Sebastes norvegicus*) in Subareas V, VI, XII, and XIV

**Advice for 2015**

Based on the management and assessment plan evaluated by ICES in February 2014 (ICES, 2014a), ICES advises that catches in 2015 should be no more than 47 300 t. All catches are assumed to be landed.

**Stock status**

Fishing pressure			
	2011	2012	2013
Management plan ( $F_{MGT}$ )	✗	✗	✗ Above
Stock size			
	2012	2013	2014
Management plan ( $B_{trigger}$ )	✓	✓	✓ Above
Precautionary approach ( $U_{pa}$ )	✓	✓	✓ Above



**Figure 2.3.13.1** Golden redfish (*Sebastes norvegicus*) in Subareas V, VI, XII, and XIV. Top left: Total landings. Top right: Estimated recruitment at age 5. Bottom left: Fishing mortality at ages 9–19. Bottom right: Spawning-stock biomass based on fixed maturity ogive.

Landings were stable from 1994 to 2011, averaging 41 000 tonnes (37 000–46 000 tonnes). In 2013 the landings increased and are estimated at 53 000 tonnes, the highest since 1990. The 1998–2003 year classes accounted for most of the catches in 2013, but the share of the 1985 and 1990 year classes has decreased to 7%. SSB in 2014 is estimated at around 60% above  $B_{trigger}$  and more than twice that in 1995, when it was at its lowest. Fishing mortality has decreased

considerably since the 1990s. Fishing mortality in 2010–2013 is estimated at 0.105, which is slightly higher than the target of 0.097 according to the management plan.

## Management plans

The regulation is based on TAC in Iceland and in Greenland, and 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. norvegicus* and *S. mentella*.

A harvest control rule (HCR) was evaluated by ICES in early 2014 (ICES, 2014a) to be in accordance with the MSY and precautionary approach. According to the HCR the advice is based on  $F_{9-19} = 0.097$  when the spawning stock is above a  $B_{\text{trigger}}$  of 220 000 tonnes, but on

$$F_{9-19} = 0.097 \frac{SSB}{220}$$

when  $SSB < 220\,000$  tonnes.

No formal agreement on the management of *S. norvegicus* presently exists among the three coastal states, Greenland, Iceland, and the Faroe Islands.

## Biology

### *New scientific name*

This species has up to now been named *Sebastes marinus*. It was decided to adopt the species list by WoRMS (<http://www.marinespecies.org/>). The name used for this species will hence hereafter be *Sebastes norvegicus*.

*Sebastes norvegicus* is a species with late maturation (matures between 10 and 14 years old) and slow growth (can get older than 50 years) 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 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. norvegicus* is to a certain extent caught together with demersal *S. mentella* in all areas.

<b>Catch distribution</b>	Total catch (2013) = 53 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 dominated by a few large hauls. This causes high CVs in the indices and large interannual fluctuation in estimates of biomass. The assessment indicates conflicting stock trends from different data sources, the catch-at-age data showing less increase in stock size than the survey data.

## Scientific basis

<b>Stock data category</b>	1 ( <a href="#">ICES, 2014b</a> ).
<b>Assessment type</b>	Analytical assessment (Gadget model).
<b>Input data</b>	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.
<b>Discards and bycatch</b>	Not included, considered negligible.
<b>Indicators</b>	None.
<b>Other information</b>	Recruitment data for small redfish (< 19 cm) from IS-SMB, IS-SMH, GER(GRL)-GFS-Q4, and GRL-GFS. Benchmarked in 2012 (ICES, 2012a).
<b>Working group</b>	North-Western Working Group ( <a href="#">NWWG</a> ).

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**Reference points**

	Type	Value	Technical basis
Management plan	F <sub>target</sub>	0.097	F <sub>MSY</sub> (ICES, 2014b).
	B <sub>trigger</sub>	220 kt	Safe distance above B <sub>lim</sub> (ICES, 2014b).
MSY approach	F <sub>MSY</sub>	0.097	Average of ages 9–19. F <sub>max</sub> in the 2012 Gadget run, leading to < 1% probability of going below B <sub>lim</sub> , under recruitment patterns seen since 1975 and with large assessment uncertainty (ICES, 2014b).
Precautionary approach	B <sub>lim</sub>	160 kt	Lowest SSB in the 2012 Gadget run (ICES, 2014b).

(Last changed in: 2014)

**Outlook for 2015**

Basis: Landings (2014) = 48.5; F<sub>2014</sub> = 0.101; SSB<sub>2014</sub> = 342; B<sub>5+</sub> (2014) = 507; SSB<sub>2015</sub> = 352; B<sub>5+</sub> (2015) = 516; R<sub>5</sub> (2015) = 120 (average).

Rationale	Landings (2015)	Basis	F <sub>9–19</sub> (2015)	SSB (2016)	B <sub>5+</sub> (2016)	% SSB change <sup>1)</sup>	% TAC change <sup>2)</sup>
Management plan F <sub>9–19</sub> = 0.097	47.3	HCR	0.097	362	525	2.8%	–2.5%

Weights in thousand tonnes.

<sup>1)</sup> SSB 2016 relative to SSB 2015.

<sup>2)</sup> TAC 2015 relative to landings 2014.

**Additional considerations**

*Management considerations*

*Sebastes norvegicus* 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. norvegicus*. The survey index of the fishable stock of *S. norvegicus* in Subarea XIV has increased in recent years, but with a large measurement uncertainty. 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. norvegicus*.

No formal agreement on the management of *S. norvegicus* 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 fish smaller 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 to use sorting grids in the shrimp fishery in order to reduce bycatches of juvenile redfish.

#### *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 and Subarea XIV and on landings from all three areas. There are still large uncovered areas in Subarea XIV and recruitment indices usable for tuning have not been compiled. Recruitment in coming years is therefore uncertain, but the surveys in Division Va and Subarea XIV indicate that most recent year classes are small.

#### *Comparison with previous assessment and advice*

The basis for advice has changed since last year when it was based on DLS approach. This year the advice is based on the management plan (ICES, 2014a).

#### **Sources**

- ICES. 2012a. Report of the Benchmark Workshop on Redfish (WKRED 2012), 1–8 February 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:48. 291 pp.
- ICES. 2012b. Report of the North-Western Working Group (NWWG), 26 April–3 May 2012, ICES Headquarters, Copenhagen. ICES CM 2012/ACOM:07. 1425 pp.
- ICES. 2013. Report of the North-Western Working Group (NWWG), 25 April–02 May 2013, ICES Headquarters, Copenhagen. ICES CM 2013/ACOM:07. 1538 pp.
- ICES. 2014a. 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.
- ICES. 2014b. Advice basis. In Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.2.
- ICES. 2014c. Report of the North-Western Working Group (NWWG), 24 April–1 May 2014, ICES Headquarters, Copenhagen, Denmark. ICES CM 2014/ACOM:07. 902 pp.

**Table 2.3.13.1** Golden redfish (*Sebastes norvegicus*) in Subareas V, VI, XII, and XIV. ICES advice, management, and landings.

Year	ICES Advice	Predicted catch corresp. to advice	Iceland TAC <sup>a,f</sup>	Greenland TAC <sup>g</sup>	<i>S. norvegicus</i> ICES landings
1987	No increase in F	83	95		77
1988	No increase in F	84	85		90
1989	TAC <sup>a</sup>	117 <sup>a</sup>	77		57
1990	TAC <sup>a</sup>	116 <sup>a</sup>	80		67
1991	Precautionary TAC	77 (117 <sup>a</sup> )	55 <sup>e</sup>		56
1992	Precautionary TAC	76 (116 <sup>a</sup> )	90		56
1993	Precautionary TAC <sup>a</sup>	120 <sup>a</sup>	104		50
1994	Precautionary TAC, if required	100 <sup>a</sup>	90		43
1995	TAC	90 <sup>a</sup>	77		45
1996	TAC for Division Va (28); precautionary TAC for Division Vb and Subarea XIV (4)	32 <sup>b</sup>	65		37
1997	Effort 75% of 1995 value	32 <sup>b</sup>	65		40
1998	Effort reduced in steps of 25% from the 1995 level	37.2 <sup>b</sup>	65		39
1999	Effort not increased compared to 1997	35 <sup>b</sup>	65		42
2000	Catch not increased compared to 1998	35 <sup>b</sup>	60		44
2001	Effort not increased compared to 1999	33 <sup>b,c</sup>	57		37
2002	25% reduction in effort	29 <sup>d</sup>	65		51
2003	25% reduction in effort(2001)	31 <sup>d</sup>	60		39
2004	25% reduction in effort(2002)	37.4 <sup>d</sup>	57		33.4
2005	Maintain fishable biomass above U <sub>pa</sub>	37 <sup>d</sup>	57		45.4
2006	Maintain fishable biomass above U <sub>pa</sub>	37 <sup>d</sup>	57		42.2
2007	Maintain fishable biomass above U <sub>pa</sub>	37 <sup>d</sup>	57	5 <sup>g</sup>	39.1
2008	Maintain fishable biomass above U <sub>pa</sub>	37 <sup>d</sup>	57	1 <sup>g</sup>	46.3
2009	Maintain fishable biomass above U <sub>pa</sub>	< 30	50		39.2
2010	Maintain fishable biomass above U <sub>pa</sub>	< 30	50	6 <sup>g</sup>	38.7
2011	Same advice as last year	< 30	37.5	8 <sup>g</sup>	46.0
2012	Maintain catches	< 40	40	8 <sup>g</sup>	45.3
2013	Maintain catches	< 40	45	8 <sup>g</sup>	53.3
2014	20% increase in catches (rel. 2010–2012)	< 52	52	8 <sup>g</sup>	
2015	Management plan	< 47.3			

Weights in thousand tonnes.

<sup>a</sup> Deep-sea *S. mentella* and *S. norvegicus* combined.

<sup>b</sup> *S. norvegicus* only.

<sup>c</sup> In Division Va only.

<sup>d</sup> Both Divisions Va and Vb and Subarea XIV.

<sup>e</sup> Year ending 31 August.

<sup>f</sup> From 1992 onwards: Quota year September–August.

<sup>g</sup> Demersal redfish (*Sebastes norvegicus* and *S. mentella*).

Table 2.3.13.2

Golden redfish (*Sebastes norvegicus*) 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	43,103	491	41	1,643	45,278
2013 <sup>1)</sup>	51,330	372	92	1,663	53,457

<sup>1)</sup> Provisional.

**Table 2.3.13.3** Golden redfish (*Sebastes norvegicus*) in Subareas V, VI, XII, and XIV. Summary from assessment.

Year	Total biomass 1000 t	SSB 1000 t	Recruitment Age 5	Catch 1000 t	F <sub>9-19</sub>
1971	574.5	349.9	192.9	67.9	0.108
1972	578.4	347.9	184.6	50.9	0.082
1973	624.8	357.0	457.5	43.7	0.07.0
1974	659.0	371.7	207.5	50.6	0.077
1975	678.2	382.3	123.7	61.9	0.091
1976	683.0	379.2	194.5	94.4	0.138
1977	692.4	384.1	187.7	53.8	0.082
1978	720.0	412.9	129.4	48.7	0.068
1979	737.7	435.4	157.6	77.2	0.102
1980	728.3	441.6	104.5	89.1	0.117
1981	699.8	435.5	75.9	102.0	0.138
1982	645.1	407.7	77.0	130.3	0.189
1983	581.7	371.4	72.2	106.0	0.167
1984	531.4	343.1	77.1	95.3	0.159
1985	497.4	320.6	139.1	78.5	0.136
1986	470.4	301.2	128.1	76.9	0.144
1987	436.5	278.5	63.5	76.6	0.156
1988	390.4	246.4	36.1	89.8	0.209
1989	351.3	219.2	44.1	56.6	0.148
1990	351.6	201.0	330.7	66.3	0.195
1991	330.5	182.0	59.9	56.0	0.181
1992	311.4	166.9	39.8	55.8	0.197
1993	294.6	154.5	54.2	50.2	0.194
1994	283.9	148.3	63.9	42.5	0.173
1995	301.7	146.0	317.0	44.3	0.183
1996	306.6	147.3	93.0	35.6	0.146
1997	305.1	148.5	42.8	39.0	0.156
1998	306.3	153.5	45.4	39.7	0.157
1999	304.1	154.5	91.2	42.5	0.168
2000	299.4	157.4	55.0	42.6	0.165
2001	306.6	162.0	113.3	36.7	0.137
2002	311.2	162.7	127.4	50.7	0.187
2003	329.0	165.2	194.0	38.2	0.141
2004	348.8	177.1	119.5	32.8	0.115
2005	372.6	185.9	185.7	46.6	0.16.0
2006	402.2	196.3	196.4	42.1	0.144
2007	420.1	210.7	106.6	39.2	0.128
2008	442.8	232.5	108.3	46.2	0.14.0
2009	463.2	252.3	133.3	39.3	0.111
2010	486.2	281.1	91.9	38.5	0.098
2011	496.0	307.4	40.1	45.8	0.108
2012	505.0	323.4	120.0	44.9	0.100
2013	516.5	339.6	120.0	53.3	0.114
2014	520.4	347.2	120.0		