

## Greater silver smelt (*Argentina silus*) in Subarea 14 and Division 5.a (East Greenland and Iceland grounds)

### ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in the fishing year 1 September 2021 to 31 August 2022 should be no more than 9244 tonnes.

### Stock development over time

Fishing pressure on the stock is below  $F_{MSY}$  and spawning-stock size is above MSY  $B_{trigger}$ ,  $B_{pa}$ , and  $B_{lim}$ .



**Figure 1** Greater silver smelt in Subarea 14 and Division 5.a. Summary of the stock assessment. Top left: total catches; Top right: recruitment (age 5); Bottom left: fishing mortality alongside F reference point ( $F_{MSY}$ ); Bottom right: spawning-stock biomass with biomass reference points ( $B_{lim}$  and  $B_{pa}$ ).

### Catch scenarios

A catch scenario is provided for the Icelandic fishing year from September 2021 to the end of August 2022.

**Table 1** Greater silver smelt in Subarea 14 and Division 5.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 6-14}$ (2021)	0.04	Based on catch of 5 232 in 2021
Spawning-stock biomass (2022)	52 175	Estimated by the model; in tonnes
Recruitment age 5 (2021)	81 717	Estimated by the model; in thousands
Recruitment age 5 (2022)	86 013	Estimated by the model; in thousands
Recruitment age 5 (2023)	46 651	Estimated by the model; in thousands
Catch (2021)	5 232	Assuming <i>status quo</i> catch (4 000 t, approximate average over the last three years) for the fishing year 2020/2021 and $F_{MSY}$ for the remainder of the calendar year; in tonnes

**Table 2** Greater silver smelt in Subarea 14 and Division 5.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2021/2022)	F (2022)	SSB (2023)	% SSB change *	% TAC change **	% Advice change ***
ICES MSY advice rule	9 244	0.07	45 684	-12%	5.8 %	NA

\* SSB in 2023 relative to SSB in 2022.

\*\* Advice value for 2021/2022 relative to the domestic TAC in 2020/2021.

\*\*\* No advice was requested for 2020/2021. Advice for 2020/2021 was issued by MFRI based on the same method agreed by ICES (8729 tonnes).

No ICES advice was requested for the fishing year 2020/2021. The catch advice for 2021/2022 is higher because the catch assumption in the interim year based on the uptake of recent years is lower than that assumed in the previous advice issued by MFRI for 2020/2021.

### Basis of the advice

**Table 3** Greater silver smelt in Subarea 14 and Division 5.a. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for greater silver smelt in this area

### Quality of the assessment

The stock was benchmarked in 2020 (ICES, 2021c) and is now assessed as a category 1 stock. The advice is based on the results of an age- and length-based assessment model (Gadget). The high variance in the input data likely makes the assessment uncertain, but the assessment is not considered to be biased (ICES, 2021c). The main source of variance is the survey index as it fluctuates greatly between years; this is partly caused by shoaling behaviour and vertical migrations. This uncertainty is reflected in the biological reference points.

The Icelandic autumn survey (IS–SMH) covers the depth range and geographical distribution of the stock and the fisheries in Division 5.a. For Subarea 14, where some catches have been reported in recent years, the Greenlandic deep-sea survey has shown the distribution of the species extends along the shelf edge down to 62° North with an unknown proportion of the stock.

A new source of catch data from Division 14.b (Greenlandic waters) has been used both to revise recent catch and in harvest rate estimation (Table 8).

### Issues relevant for the advice

The basis for advice has changed from category 3 to category 1 based on the benchmark carried out in 2020 (ICES, 2021c). ICES previously provided advice on this stock on a calendar year basis; the current advice is provided for the 2021/2022 fishing year.

The estimated recruitment at age five in 2021 is the highest in the time-series, however this high recruitment is forecasted to only contribute 6 % of the total advised catches in the 2021/2022 fishing year.

Catches in recent years have been below the TAC.

This stock is classified as Category 4 in the NEAFC categorization of deep-sea species/stocks. This 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).

## Reference points

**Table 4** Greater silver smelt in Subarea 14 and Division 5.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	25 440	$B_{pa}$ ; in tonnes	ICES (2021c)
	$F_{MSY}$	0.07	$F_{P05}$	ICES (2021c)
Precautionary approach	$B_{lim}$	18 308	$B_{loss}$ , lowest observed SSB (2003); in tonnes	ICES (2021c)
	$B_{pa}$	25 440	$B_{lim} * e^{1.645 * \sigma}$ where $\sigma = 0.2$	ICES (2021c)
	$F_{lim}$	0.24	The F that on average leads to $B_{lim}$	ICES (2021c)
	$F_{pa}$	0.07	$F_{P05}$ ; the F that leads to SSB $\geq B_{lim}$ with 95% probability	ICES (2021c)
Management plan	SSB <sub>mgt</sub>	Not defined		
	$F_{mgt}$	Not defined		

## Basis of the assessment

**Table 5** Greater silver smelt in Subarea 14 and Division 5.a. Basis of the assessment and advice.

ICES stock data category	1 ( <a href="#">ICES, 2021a</a> )
Assessment type	Length- and age-based analytical assessment (Gadget model)
Input data	Icelandic bottom trawl survey – Autumn (IS-SMH [G4493]) and landings in Division 5.a. and Subarea 14
Discards and bycatch	Discarding is considered negligible
Indicators	None
Other information	Last benchmarked in 2020 (ICES, 2021c)
Working group	Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources ( <a href="#">WGDEEP</a> )

## History of the advice, catch, and management

**Table 6** Greater silver smelt in Subarea 14 and Division 5.a. ICES advice, catches and Icelandic TAC. Prior to 2007 advice for this stock was included in the advice on greater silver smelt in other areas. The advice for 2007–2015 was for Division 5.a only. Prior to 2021, ICES advice was given on an annual basis, which was applied on a fishing year basis in Iceland. From 2021/2022 onwards, advice is for the Icelandic fishing year. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	ICES catches**	TAC Icelandic Division 5.a*	ICES catches Division 5.a*
2003	^		2686		
2004	^		3637		
2005	^		4481		
2006	^		4775		
2007	The fishery should not be allowed to expand unless it can be shown that it is sustainable		4226		
2008	Biennial		8778		
2009	Same advice as 2007		10829		
2010	Biennial		16428		
2011	Reduce exploitation rates to 2001–2007 levels		10515		
2012	No new advice, same as 2011		9290	8000	
2013	$F_{proxy}$ (2001–2007)	3700	7154	8000	
2014	No new advice, same as 2013	3700	7245	8000	7243
2015	$F_{proxy}$ (2002–2007), 20% lowering of target	4033	6068	8000	6849
2016	Precautionary approach: $F_{MSY proxy}$ (2002–2007), capped index increase	6477	5662	8000	6017
2017	Precautionary approach (same value as advised catches for 2016)	$\leq 7885$	4612	7885	3570

Year	ICES advice	Catch corresponding to advice	ICES catches**	TAC Icelandic Division 5.a*	ICES catches Division 5.a*
2018	Precautionary approach: $F_{MSY\ proxy}$ (2002–2007), capped index increase	≤ 9310	4460	9310	5158
2019	Precautionary approach	≤ 7603	3209	7603	2807
2020	Precautionary approach: $F_{MSY\ proxy}$ (2002–2007), capped index increase	≤ 9124	3797	9124	3775
2021	No ICES advice	-		8729***	
2021/2022	ICES MSY advice rule	≤ 9244			

\* Icelandic national fishing year from 1 September ending 31 August.

\*\* Calendar year (last year in the Icelandic national fishing year), including catches from Subarea 14 and Division 5.a.

\*\*\* Domestic advice and TAC (no ICES advice requested due to the COVID-19 disruption).

### History of the catch and landings

There are no reported catches in the NEAFC Regulatory Area.

**Table 7** Greater silver smelt in Subarea 14 and Division 5.a. Catch distribution by fleet in 2020 as estimated by ICES.

Catch (2020)	Landings	Discards
3797 tonnes	Trawl 100%	Negligible
	3797 tonnes	

**Table 8** Greater silver smelt in Subarea 14 and Division 5.a. History of commercial official total catches. All weights are in tonnes.

Year	Division 5.a	Division 14.b	Catches
1988	206	0	206
1989	8	0	8
1990	112	0	112
1991	247	0	247
1992	657	0	657
1993	1255	0	1255
1994	613	0	613
1995	492	0	492
1996	808	0	808
1997	3367	0	3367
1998	13387	0	13387
1999	6704	0	6704
2000	5657	0	5657
2001	3043	0	3043
2002	4960	0	4960
2003	2686	0	2686
2004	3637	0	3637
2005	4481	0	4481
2006	4775	0	4775
2007	4226	0	4226
2008	8778	0	8778
2009	10829	0	10829
2010	16428	0	16428
2011	10515	0	10515

Year	Division 5.a	Division 14.b	Catches
2012	9290	0	9290
2013	7154	0	7154
2014	7241	4	7245
2015	6056	12	6068
2016	5646	16	5662
2017	3946	666	4612
2018	4035	425	4460
2019	3208	0.5	3209
2020	3775	22	3797

### Summary of the assessment

**Table 9** Greater silver smelt in Subarea 14 and Division 5.a. Assessment summary by calendar year in Division 5.a and Subarea 14.

Year	Recruitment age 5	Spawning-stock biomass	Catches	Fishing mortality Ages 6–14
	thousands	tonnes		
2000	17381	19298	5657	0.158
2001	30286	18545	3043	0.081
2002	35008	17296	4961	0.109
2003	36024	18419	2680	0.052
2004	30808	23932	3645	0.062
2005	31879	32418	4482	0.070
2006	36073	37040	4769	0.067
2007	28700	41196	4227	0.052
2008	34691	45386	8778	0.109
2009	27922	44727	10828	0.135
2010	24570	42206	16428	0.23
2011	33980	34539	10516	0.163
2012	35260	31699	9289	0.145
2013	27562	33987	7155	0.106
2014	28077	34802	6348	0.093
2015	29940	36914	6070	0.085
2016	31848	40824	5662	0.075
2017	45464	43406	5011	0.062
2018	44989	46454	4460	0.047
2019	33674	56171	3209	0.031
2020	36192	59501	3797	0.034
2021	81717	56362		

### Sources and references

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[Download the stock assessment data and figures.](#)

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