ADVICE ON FISHING OPPORTUNITIES FOR NORTHERN SHRIMP (*PANDALUS BOREALIS*) IN THE BARENTS SEA (ICES SUBAREAS 1 AND 2) IN 2026

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Advice on fishing opportunities for northern shrimp (*Pandalus borealis*) in the Barents Sea (ICES subareas 1 and 2) in 2026

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1 - Advice on fishing opportunities

The Institute of Marine Research (IMR) advises that when the MSY approach is applied, catches of northern shrimp in the Barents Sea in 2026 should not exceed 83 000 tonnes.

2 - Stock development over time

Exploitable stock biomass has remained above MSY $B_{trigger}$ and B_{lim} throughout the entire time series (Figure 1). Fishing pressure on the stock has been estimated below F_{MSY} and F_{lim}, with a low probability of exceeding F_{MSY} in 2025.

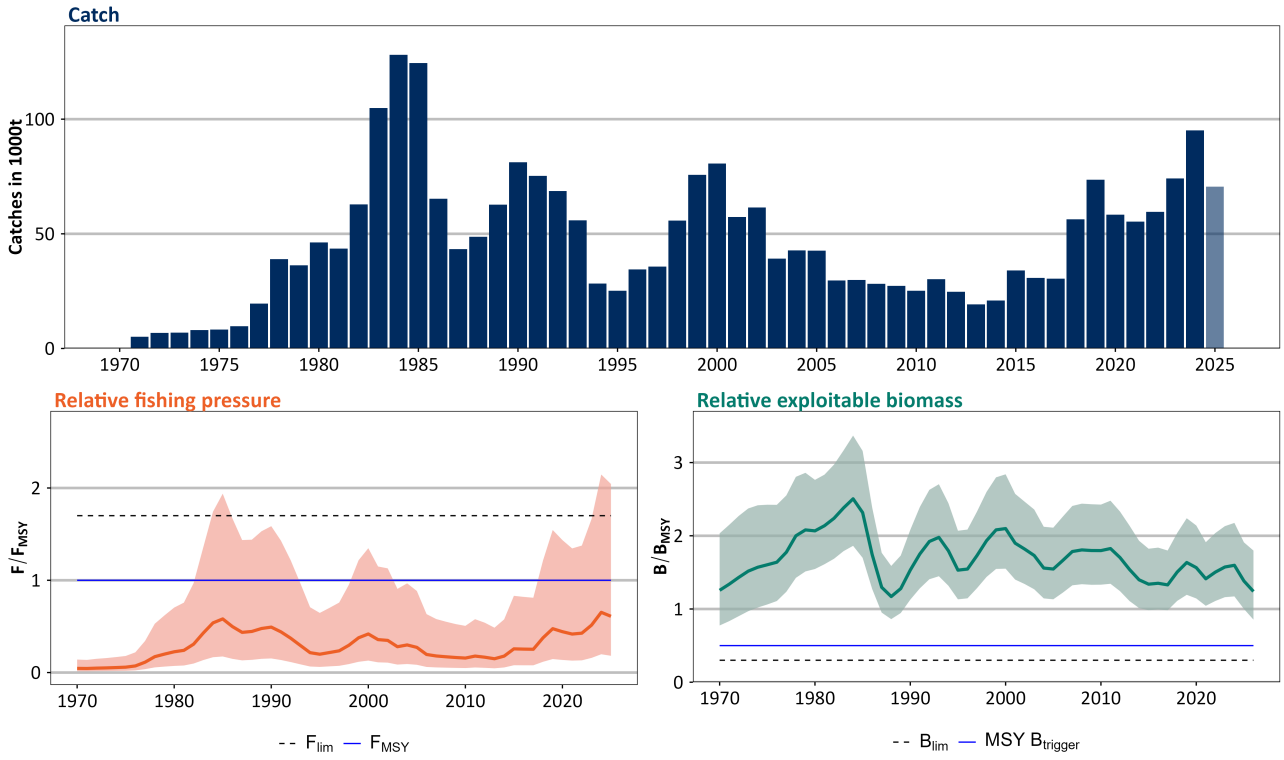

Figure 1: Stock assessment summary of northern shrimp in ICES subareas 1 and 2. Top: total catches (the final, lighter coloured bar depicts preliminary estimation of 2025 catches). Bottom: fishing mortality (orange) and exploited biomass (green) at the beginning of the year, relative to F_{MSY} and B_{MSY}, respectively, with orange and green lines showing estimated means and shaded areas 95% confidence intervals. Blue and dashed horizontal lines, respectively, indicate the MSY and precautionary approach reference points.

3 - Catch scenarios

Table 1: Northern shrimp in ICES subareas 1 and 2. The basis for the catch advice and scenarios.

Variable	Value	Notes
F_{2025}/F_{MSY}	0.61	Corresponds to the predicted catch in 2025
B_{2026}/B_{MSY}	1.24	Short-term forecast (STF)
Catch 2025	71	Catch in thousand tonnes. Based on preliminary catch data (Norway) + average catches from other fleets in 2022-2024

Table 2: Northern shrimp in ICES subareas 1 and 2. Annual catch scenarios for 2026. Catches are in thousand tonnes, exploitable biomass and fishing mortality are relative values, and risks are in percentages.

Scenario	Catch (2026)	B_{2027}/B_{MSY}	F_{2026}/F_{MSY}	% risk of $B_{2027} < MSY\ B_{trigger}$	% risk of $F_{2026} > B_{MSY}$	% risk of $F_{2026} > F_{lim}$
MSY approach*	83	1.25	0.71	<0.1	30	9.2
$F_{2026} = F_{MSY}$	113	1.20	1.00	<0.1	50	21
$F_{2026} = F_{2025}$	68	1.28	0.58	<0.1	20	5
$F_{2026} = 0$	0	1.39	0.00	<0.1	<0.1	<0.1
*Using the fractile rule with 35th percentiles of F/F_{MSY} and B/B_{MSY} distributions and the catch distribution under $F=F_{MSY}$						

The substantial decrease in catch advice was caused by strong negative signals of both stock indices after a peak in catches in 2024. Following high catch advice in previous years that reflected the perceived large stock biomass, the current catch advice is more in line with long-term catches expected under a precautionary MSY approach.

4 - Basis of the advice

Table 3: Northern shrimp in ICES subareas 1 and 2. The basis of the advice.

Advice basis	MSY approach using 35th percentiles of fishing mortality, exploitable biomass and catch.
Management plan	No agreed precautionary management plan for northern shrimp in this area.

5 - Quality of assessment

In the 2024 assessment, the issue of negligible weight of the survey indices (ICES, 2022) on the stock estimates was addressed by incorporating the estimated uncertainty of the stock indices as observation error priors (Zimmermann *et al.*, 2024). This caused the stock trends to follow the survey indices more closely, resulting in shifted and slightly less pronounced fluctuations compared to previous assessments (Figure 2). However, compared to previous assessments the change did not affect the perception of the state of the stock or catch advice. The current assessment is in line with last year's revised assessment.

The strong dependency on the commercial CPUE index was considered a major remaining issue after the benchmark. The revision in 2024 was therefore considered an improvement that likely reflects the development of the stock better by linking it more closely to the ecosystem survey in the Barents Sea that covers the entire stock area. The standardization of the CPUE index remains a concern, specifically whether technological creep and spatial contractions of the fishery over more than 40 years are sufficiently accounted for. Preliminary

analysis with a revised standardization model that includes spatio-temporal correlation indicated significant sensitivity of the CPUE index and its effect on the assessment estimate to spatial model assumptions, calling for a method evaluation in 2026.

Sensitivity analysis showed that the priors have little impact on the perception of stock state and advice. However, the current configuration with informative priors results in some sensitivity to the underlying assumptions, especially on carrying capacity. The validity of these assumptions should be re-evaluated regularly. More contrast in the input time series might help to decrease the dependency on priors in the future.

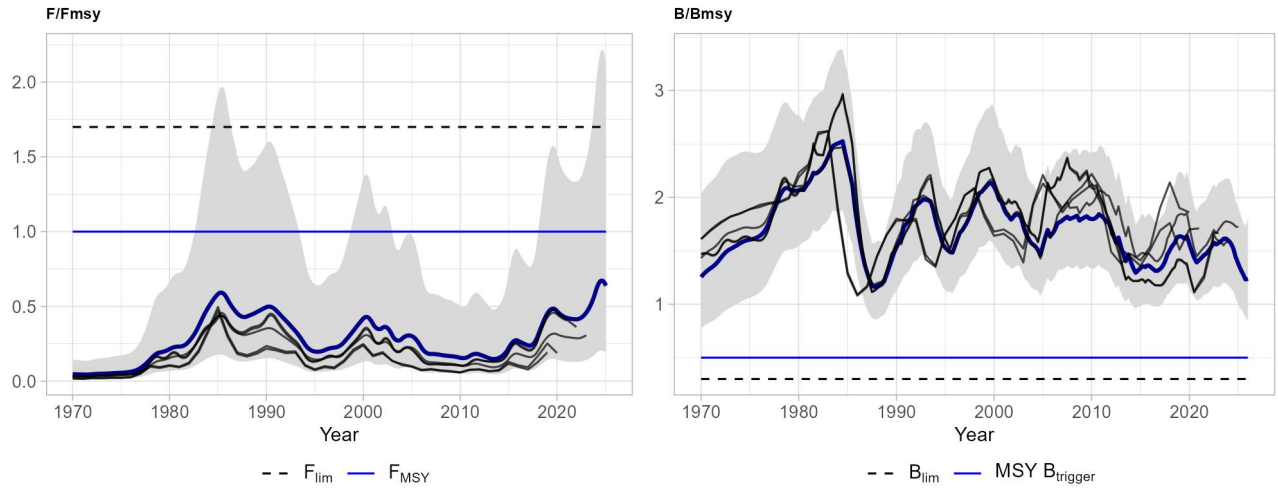

Figure 2: Historical assessment results for northern shrimp in ICES subareas 1 and 2. Trends of F/F_{MSY} and B/B_{MSY} as estimated in the past stock assessments in 2020 to 2024 (black lines show estimated mean) are compared with the current assessment (blue lines and shaded areas show estimated mean and 95% confidence intervals, respectively).

6 - Issues relevant for the advice

There is currently no total allowable catch for the stock and catches are therefore largely unrestricted. Changes in catches over time are assumed to follow mostly economic drivers (Lancker *et al.*, 2023), including decreases in other major fisheries such as Atlantic cod in the Barents Sea. A harvest control rule for a common management strategy was presented in 2024 (Trochta *et al.*, 2024) but so far not implemented.

Surplus production models assess only the exploitable biomass and therefore lack information on recruitment and other drivers of stock fluctuations. Information on size composition and recruitment should be considered as auxiliary indicators of the stock development.

7 - Reference points

Table 4: Northern shrimp in ICES subareas 1 and 2. Reference points, values, and their technical basis.

Framework	Reference points	Value*	Technical basis
MSY approach	MSY $B_{trigger}$	B/B_{MSY} = 0.5	Relative value from the SPiCT model. Reference points are estimated directly from the SPiCT assessment model and change when the assessment is updated.
	F_{MSY}	F/F_{MSY} = 1	
Precautionary approach	B_{lim}	B/B_{MSY} = 0.3	
	F_{lim}	F/F_{MSY} = 1.7	
*No reference points are defined for this stock in terms of absolute values. The SPiCT-estimated values of the ratios F/F_{MSY} and B/B_{MSY} are used to estimate stock status relative to the MSY reference points.			

8 - Basis of the assessment

Assessment type	Surplus production in continuous time (SPiCT)
Input data	Fishery catches (1970—2025); two survey indices: the combined Norwegian and Russian shrimp surveys (1984—2002) and the Norwegian/Russian ecosystem survey (2004—2025); one fishery-based index (standardized CPUE from Norwegian logbooks) (1980—2025).
Discards and bycatch	Discarding is considered to be negligible.
Indicators	Standardized CPUE index from the Russian fleet; recruitment and length indices from the Norwegian/Russian ecosystem survey (2004—2025).
Other information	None

9 - History of the advice, catch, and management

Table 5: Northern shrimp in ICES subareas 1 and 2. ICES advice and official landings. All weights are in tonnes. Assessment and advice were carried out by the NAFO-ICES Pandalus Assessmen Group (NIPAG) until 2021, by the Joint Russian-Norwegian shrimp working group in 2022 and 2023, by Joint Russian-Norwegian working group on Arctic Fisheries (JNR-AFWG) in 2024, and by the Institue of Marine Research (IMR) in 2025.

Year	Advice	Catch corresponding to advice	Agreed TAC	Total catch
2005	No increase compared to 2004	43 600	-	42618
2006	No increase in catch above recent level	40 000	-	29627
2007	Catch that will prevent exceeding F_{lim} in the long term	50 000	-	29931
2008	Catch that will prevent exceeding F_{lim} in the long term	50 000	-	28188
2009	Catch that will prevent exceeding F_{lim} in the long term	50 000	-	27272
2010	Catch that will prevent exceeding F_{lim} in the long term	50 000	-	25198
2011	Catch that will prevent exceeding F_{MSY} in the long term	60 000	-	30226
2012	Catch that will prevent exceeding F_{MSY} in the long term	60 000	-	24756
2013	Catch that will maintain stock at current high biomass	60 000	-	19249
2014	No new advice, same as for 2013	60 000	-	20964
2015	Move exploitation towards F_{MSY}	< 70 000	-	34022
2016	Move exploitation towards F_{MSY}	< 70 000	-	30749
2017	Move exploitation towards F_{MSY}	≤ 70 000	-	30442
2018	Move exploitation towards F_{MSY}	≤ 70 000	-	56341
2019	Move exploitation towards F_{MSY}	≤ 70 000	-	73582
2020	MSY approach: mode of the F_{MSY} distribution as basis of advice	≤ 150 000	-	58380
2021	MSY approach: mode of the F_{MSY} distribution as basis of advice	≤ 140 000	-	55355
2022	MSY approach: mode of the F_{MSY} distribution as basis of advice	≤ 140 000	-	59580
2023	MSY approach: mode of the F_{MSY} distribution as basis of advice	≤ 156 000	-	74185
2024	MSY approach: mode of the F_{MSY} distribution as basis of advice	≤ 143 000	-	95164
2025	MSY approach: 35th fractiles of B/B_{MSY}, F/F_{MSY} and catch distributions as basis of advice	≤ 150 000	-	
2026	MSY approach: 35th fractiles of B/B_{MSY}, F/F_{MSY} and catch distributions as basis of advice	≤ 83 000	-	

10 - History of the catch and landings

Table 6: Total catches of northern shrimp in subareas 1 and 2 by country. Country-specific information only available from 2000 (except for Norway and Russia). All values are in tonnes.

Year	Norway	Russia	EU	Greenland	Faroes	Iceland	United Kingdom	Others/unknown
1970	5508							0
1971	5116							26
1972	6772							0
1973	6921							0
1974	8008							0
1975	8197							2
1976	9752							0
1977	14700							4854
1978	20484	18270						189
1979	25435	10474						390
1980	35061	11219						0
1981	32713	9886						1011
1982	43451	15552						3835
1983	70798	29105						4903
1984	76636	43180						8246
1985	82123	32104						10262
1986	48569	10216						6538
1987	31353	6690						5324
1988	32021	12320						4348
1989	47064	12252						3432
1990	54182	20295						6687
1991	39663	29434						6156
1992	39657	20944						8021
1993	32663	22397						806
1994	20162	7108						1063
1995	19337	3564						2319
1996	25445	5747						3320
1997	29079	1493						5163
1998	44792	4895						6103
1999	52612	10765						12293
2000	55333	19596						5768
2001	43031	5846						8408
2002	48799	3790						8899
2003	34172	2776						2277
2004	35918	2410						4406
2005	37253	435						4930
2006	27352	4	1365	0	906	0	0	
2007	25558	192	1729	0	2451	0	0	

Year	Norway	Russia	EU	Greenland	Faroes	Iceland	United Kingdom	Others/unknown
2008	20662	417	2207	0	4902	0	0	
2009	19784	0	4903	0	2586	0	0	
2010	16776	0	6309	0	2110	0	0	
2011	19928	0	5292	0	4432	574	0	
2012	14159	5	5073	0	4205	41	1280	
2013	8846	1067	5416	95	3660	164	0	
2014	10234	741	5667	149	4171	2	0	
2015	16618	1151	8665	2774	4665	148	0	
2016	10898	2491	9275	2821	4920	344	0	
2017	7010	3849	11406	3487	4689	0	0	
2018	23126	12561	13394	803	5173	0	1283	
2019	23925	28081	15342	1566	4325	0	344	
2020	19116	21265	14489	633	2750	0	128	
2021	29890	12379	10638	0	2311	0	136	
2022	35290	3809	17662	0	2819	0	0	
2023	34782	12288	22019	0	2482	2613	0	
2024	49799	16570	18052	2926	7816	0	0	

11 - Summary of the assessment

Table 7: Northern shrimp in the ICES subareas 1 and 2. Estimated exploitable biomass, catch and fishing mortality over time. Exploitable biomass and fishing mortality are relative to B_{MSY} and F_{MSY}, with 95% confidence intervals (low and high values). Predicted catches are mean estimates of catches in the stock assessment model. Catches for the final year are based on preliminary information.

	Relative exploitable biomass			Relative fishing mortality				
Year	B/B_{MSY} (low)	B/B_{MSY}	B/B_{MSY} (high)	Catch	Predicted catch	F/F_{MSY} (low)	F/F_{MSY}	F/F_{MSY} (high)
1970	0.87	1.42	2.29	6	5	0.01	0.04	0.12
1971	0.93	1.48	2.34	5	6	0.01	0.04	0.12
1972	1.00	1.55	2.42	7	6	0.01	0.04	0.13
1973	1.06	1.62	2.48	7	7	0.02	0.05	0.14
1974	1.10	1.66	2.50	8	8	0.02	0.05	0.15
1975	1.13	1.67	2.48	8	9	0.02	0.06	0.17
1976	1.16	1.69	2.47	10	11	0.02	0.07	0.21
1977	1.28	1.82	2.58	20	19	0.04	0.11	0.33
1978	1.46	2.03	2.83	39	33	0.06	0.17	0.51
1979	1.54	2.10	2.87	36	38	0.06	0.20	0.60
1980	1.56	2.08	2.77	46	43	0.07	0.22	0.69
1981	1.63	2.15	2.84	44	49	0.08	0.24	0.74
1982	1.70	2.25	2.97	63	65	0.10	0.30	0.95
1983	1.80	2.39	3.16	105	97	0.13	0.42	1.33
1984	1.87	2.51	3.36	128	122	0.17	0.53	1.71
1985	1.71	2.32	3.15	124	111	0.17	0.57	1.90
1986	1.28	1.75	2.38	65	69	0.15	0.49	1.64
1987	0.96	1.30	1.77	43	48	0.13	0.43	1.41
1988	0.87	1.17	1.59	49	49	0.14	0.44	1.41
1989	0.95	1.28	1.73	63	61	0.15	0.47	1.50
1990	1.14	1.54	2.08	81	74	0.15	0.49	1.56
1991	1.29	1.76	2.39	75	74	0.14	0.44	1.40
1992	1.42	1.93	2.62	69	67	0.11	0.37	1.19
1993	1.46	1.98	2.70	56	52	0.09	0.29	0.95
1994	1.33	1.80	2.44	28	33	0.06	0.21	0.69
1995	1.14	1.54	2.07	25	27	0.06	0.20	0.63
1996	1.15	1.55	2.08	35	33	0.07	0.21	0.69
1997	1.29	1.74	2.33	36	39	0.07	0.23	0.74
1998	1.45	1.94	2.60	56	55	0.09	0.29	0.93
1999	1.56	2.09	2.79	76	73	0.12	0.37	1.19
2000	1.56	2.10	2.84	81	77	0.13	0.41	1.32
2001	1.41	1.90	2.57	57	60	0.11	0.35	1.13
2002	1.35	1.82	2.46	61	58	0.11	0.34	1.11
2003	1.28	1.74	2.36	39	42	0.09	0.28	0.89

	Relative exploitable biomass			Relative fishing mortality				
Year	B/B (low)	B/B	B/B (high)	Catch	Predicted catch	F/F (low)	F/F	F/F (high)
2004	1.15	1.56	2.12	43	42	0.09	0.30	0.95
2005	1.14	1.55	2.11	43	41	0.08	0.27	0.87
2006	1.23	1.67	2.26	30	31	0.06	0.19	0.62
2007	1.33	1.79	2.40	30	30	0.06	0.18	0.57
2008	1.35	1.81	2.44	28	28	0.05	0.17	0.54
2009	1.34	1.80	2.43	27	27	0.05	0.16	0.51
2010	1.34	1.80	2.42	25	26	0.05	0.15	0.50
2011	1.35	1.83	2.48	30	29	0.05	0.18	0.57
2012	1.25	1.71	2.33	25	25	0.05	0.16	0.53
2013	1.12	1.55	2.14	19	20	0.05	0.15	0.48
2014	1.02	1.40	1.93	21	22	0.05	0.18	0.56
2015	0.99	1.34	1.82	34	32	0.08	0.25	0.82
2016	1.00	1.36	1.84	31	31	0.08	0.25	0.80
2017	0.99	1.33	1.80	30	32	0.08	0.25	0.79
2018	1.12	1.51	2.04	56	55	0.12	0.37	1.19
2019	1.20	1.64	2.24	74	71	0.15	0.47	1.52
2020	1.15	1.57	2.14	58	59	0.14	0.44	1.41
2021	1.05	1.42	1.91	55	56	0.13	0.41	1.32
2022	1.12	1.51	2.04	60	61	0.13	0.42	1.35
2023	1.17	1.58	2.13	74	75	0.16	0.51	1.63
2024	1.18	1.60	2.17	95	90	0.20	0.64	2.10
2025	1.01	1.39	1.91	71	72	0.18	0.60	2.00
2026	0.86	1.24	1.80					

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