

Norway lobster (*Nephrops norvegicus*) in Division 4.b, Functional Unit 6 (central North Sea, Farn Deep)

ICES stock advice

Please note: The present advice replaces the advice given in June 2017 for catches in 2018.

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of 2014–2016, catches in 2018 should be no more than 1876 tonnes.

In order to ensure the stock in Functional Unit (FU) 6 is exploited sustainably, management should be implemented at the functional unit level. Any substantial transfer of the current surplus fishing opportunities from other FUs to FU 6 could rapidly lead to over-exploitation.

Stock development over time

The stock abundance index has increased since 2015, and currently it is just above MSY $B_{trigger}$. Harvest rates have been above the MSY level since 2008.

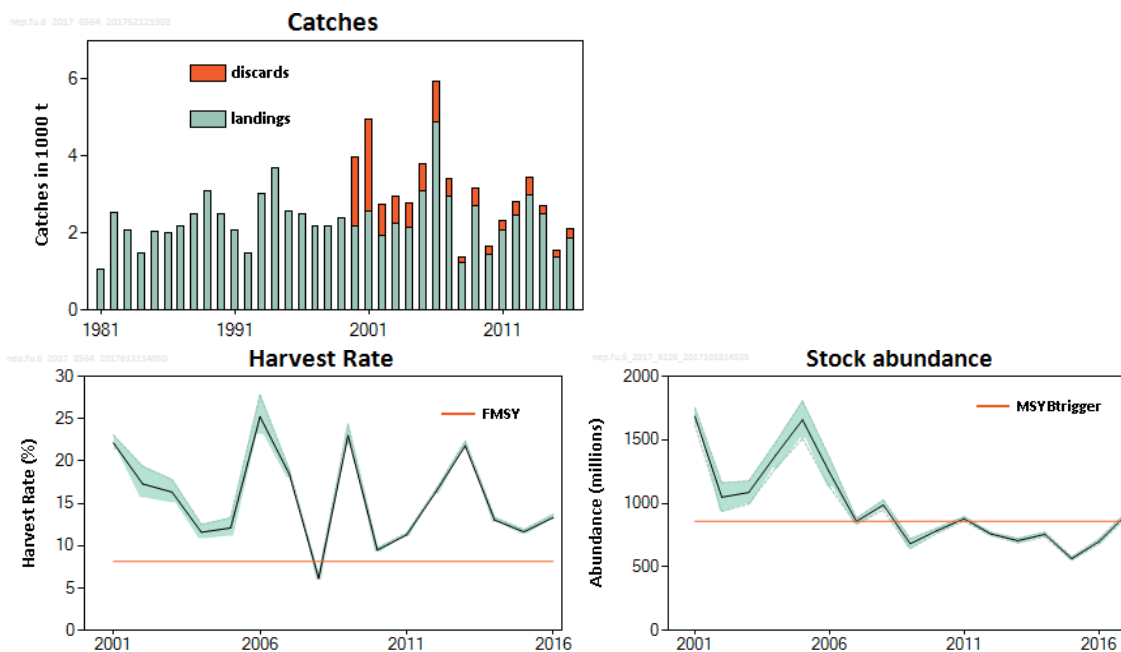


Figure 1 Norway lobster in Division 4.b, Functional Unit 6. Summary of the stock assessment. Long-term trends in catches, harvest rate, and underwater TV survey (UWTV) abundance for animals greater than 17 mm (used as F and SSB proxies). Discard data have only been included since 2000. Orange lines show proxies for MSY $B_{trigger}$ and F_{MSY} . UWTV abundance is calculated with a geostatistical method (2007–2017). Shaded areas for abundance are ± 1.96 standard deviations (95% confidence intervals). Confidence intervals for harvest rates are derived from the confidence intervals for abundance.

Stock and exploitation status

Table 1 Norway lobster in Division 4.b, Functional Unit 6. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size			
		2014	2015	2016	2015	2016	2017	
Maximum Sustainable Yield	F_{MSY}	✘	✘	✘ Above	$B_{Trigger}$	✘	✘	✔ Above trigger
Precautionary Approach	F_{pa} F_{lim}	?	?	? Undefined	B_{pa} B_{lim}	?	?	✔ Above possible reference points
Management plan	F_{MGT}	—	—	— Not applicable	B_{MGT}	—	—	— Not applicable

Catch options

The latest estimate of stock abundance (902 million, value from the survey conducted in June 2017) is above the MSY $B_{trigger}$ value (858 million). The ICES MSY approach states that under such conditions the F_{MSY} harvest rate (8.12% for FU 6 Norway lobster) should apply for 2018.

Table 2 Norway lobster in Division 4.b, Functional Unit 6. The basis for the catch options.

Variable	Value	Source	Notes
Stock abundance	902 million individuals	ICES (2017a)	UWTV 2017
Mean weight in landings	29.09 g	ICES (2017a)	Average 2014–2016
Mean weight in discards	10.88 g	ICES (2017a)	Average 2014–2016
Mean weight in unwanted catch \geq MCS*	13.64 g	ICES (2017a)	Average 2014–2016
Mean weight in unwanted catch $<$ MCS	6.91 g	ICES (2017a)	Average 2014–2016
Discard rate (total)	24.18%	ICES (2017a)	Average 2014–2016 (proportion by number)
Discard rate (\geq MCS)	14.26%	ICES (2017a)	Average 2014–2016 (proportion by number)
Discard rate ($<$ MCS)	9.92%	ICES (2017a)	Average 2014–2016 (proportion by number)
Discard survival rate	15%	ICES (2017a)	Only applies in scenarios where discarding is allowed.
Dead discard rate (total)	21.33%	ICES (2017a)	Average 2014–2016 (proportion by number); only applies in scenarios where discarding is allowed.
Dead discard rate ($<$ MCS)	8.56%	ICES (2017a)	Average 2014–2016 (proportion by number); only applies in scenarios where discarding is allowed for <i>de minimis</i> exemptions.

* MCS = Minimum conservation size.

Table 3 Norway lobster in Division 4.b, Functional Unit 6. Annual catch options. All weights are in tonnes.

Catch options for 2018 assuming zero discards

Basis	Total catch	Wanted catch*	Unwanted catch*	Harvest rate**
ICES advice basis				
MSY approach	1808	1615	193	8.12%
Other options				
$F_{2014-2016}$	2819	2518	300	12.66%

* “Wanted” and “unwanted” catch are used to describe Norway lobster that would be landed and discarded in the absence of the EU landing obligation, based on average discard rate estimates for 2014–2016.

** Calculated for dead removals and applied to total catch.

Discarding assumed to continue at recent average

Basis	Total catch	Dead removals	Landings	Dead discards	Surviving discards	Harvest rate*
	L+DD+SD	L+DD	L	DD	SD	for L+DD
ICES advice basis						
MSY approach	1876	1846	1676	170	30	8.12%
Other options						
F ₂₀₁₄₋₂₀₁₆	2925	2878	2613	265	47	12.66%

* Calculated for dead removals and applied to total catch.

Discarding assumed below MCS only*

Basis	Total catch	Dead removals	Landings	Unwanted > MCS **	Dead discards < MCS	Surviving discards	Harvest rate ***
	L+U+DD+SD	L+U+DD	L	U	DD	SD	for L+U+DD
ICES advice basis							
MSY approach	1835	1828	1640	145	43	8	8.12%
Other options							
F ₂₀₁₄₋₂₀₁₆	2861	2849	2556	225	68	12	12.66%

* Assumed for all fleets.

** Unwanted landings (U) are animals > MCS that have historically been discarded.

*** Calculated for dead removals.

All harvest rates are calculated in numbers and refer to the dead removals. The difference in catch weights between catch options with the same harvest rates is related to the fact that, in the scenario allowing for discarding, a proportion of the discards are assumed to survive (15%).

Basis of the advice

Table 4 Norway lobster in Division 4.b, Functional Unit 6. The basis of the advice.

Advice basis	ICES MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for Norway lobster in this area.

Quality of the assessment

Market sampling misses portions of the tailed category of landings which tend to be smaller individuals; the market sampling data may thus be biased towards larger sizes. For this reason the assessment only uses data from samples of the full unsorted catch when estimating the size composition of removals.

Data from the latest UWTV survey (June 2017) have been used as the most up-to-date indicator of stock abundance.

Issues relevant for the advice

The results of the 2017 UWTV survey became available in September 2017 and showed a significant increase in abundance compared to the 2016 level. The advice for 2018 has therefore been updated to reflect the more recent data.

From 2016 the EU landing obligation was applied to traps and trawl gears (80–99 mm mesh) fishing for Norway lobster in ICES Subarea 4. A *de minimis* exemption was made for individuals below the 25 mm minimum conservation size (MCS), up to a maximum of 6% of total landings. Other gears and mesh sizes are not under the landing obligation.

In November 2016, ICES advised on fishing opportunities assuming that discarding would only occur below the MCS. Observations from the 2016 fishery indicate that discarding above the MCS continues and has not changed markedly (Table 11 and Figure 3). Consequently, ICES is providing advice for 2018 assuming average discard rates observed over the last three years, which is considered to be a more realistic assumption.

It is expected that, under the EU landing obligation, below minimum size individuals that would formerly have been discarded would now be reported as below minimum size (BMS) landings in logbooks. However, BMS landings reported to ICES may be lower than expected for several reasons: minimum size individuals could either not have been landed and

not recorded in logbooks, or have been landed but not recorded as BMS. Furthermore, BMS landings recorded in logbooks may not have been reported to ICES.

In 2016, no Norway lobster were recorded as below MCS (BMS category) in FU 6 despite catches having been observed below the MCS (Figure 3).

Results from a North Sea mixed-fisheries analysis are presented in ICES (2017b); this analysis has not been updated. The analysis for or 2018, assuming a strictly implemented discard ban (corresponding to the “Minimum” scenario), indicated that whiting would be the most limiting stock, being estimated to constrain 24 out of 42 fleet segments. Haddock is the second most limiting stock, constraining eight fleet segments. Additionally, if Norway lobster was managed by separate TACs for the individual functional units (FUs), Norway lobster in FU 6 would be considered the most limiting stock for ten fleet segments. Conversely, in the “Maximum” scenario, saithe and eastern English Channel plaice would be the least limiting for 20 and 11 fleet segments, respectively. Finally, if Norway lobster was managed by separate TACs, Norway lobster in FUs 7, 5, 33, and outside the FUs in Subarea 4 would be the least limiting for nine, two, one, and two fleet segments, respectively. For those demersal fish stocks for which the F_{MSY} range is available, a “Range” scenario is presented that minimizes the potential for TAC mismatches in 2018 within the F_{MSY} range. This scenario returns a fishing mortality by stock which, if used for setting single-stock fishing opportunities for 2018, may reduce the gap between the most and the least restrictive TACs, thus reducing the potential for quota over- and undershoot. This “Range” scenario suggests that the potential for mixed-fisheries mismatch would be lowered with a 2018 TAC in the lower part of the F_{MSY} range for eastern English Channel plaice and saithe, and in the upper part of the range for cod and North Sea plaice. Norway lobster was not included in the “Range” scenario.

There is a single total allowable catch (TAC) for all of ICES Subarea 4, except for the Norway Deep. Management should be implemented at the functional unit level to ensure that fishing opportunities are in line with the scale of the resource for each of the stocks and the corresponding MSY approach.

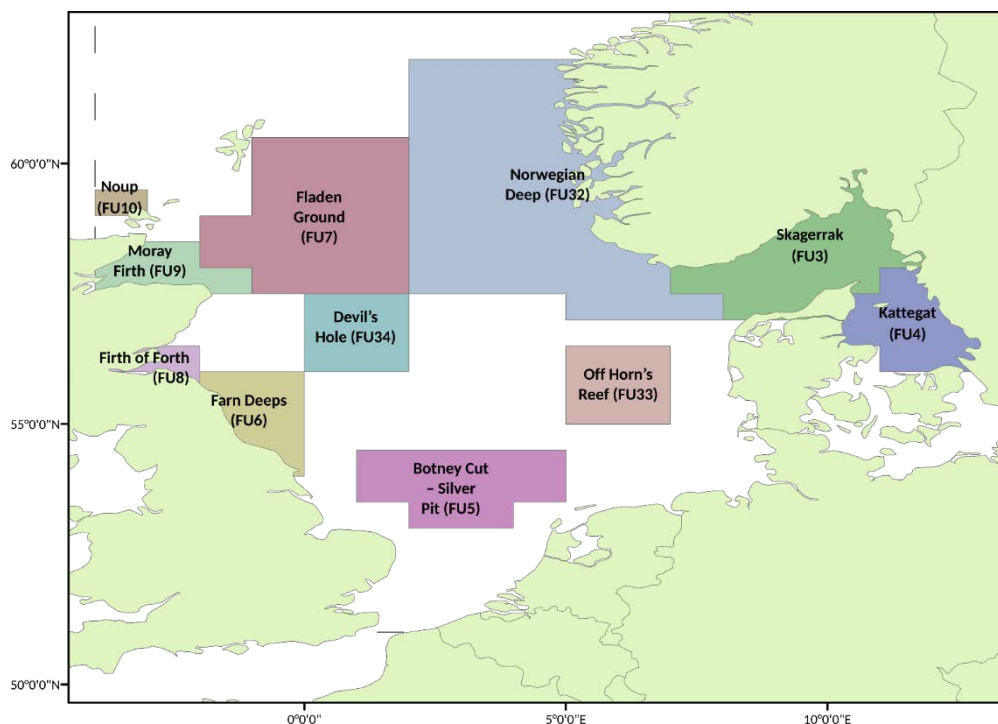


Figure 2 Norway lobster functional units in the North Sea and Skagerrak/Kattegat region.

Reference points

Table 5 Norway lobster in Division 4.b, Functional Unit 6. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	858 million	UWTV survey index at start of current decline (2007)	ICES (2010)
	F_{MSY}	Harvest rate 8.12% *	Proxy, equivalent to $F_{35\%SPR}$ males	ICES (2010)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

* Previously reported as the rounded value, 8.1%.

Basis of the assessment

Table 6 Norway lobster in Division 4.b, Functional Unit 6. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016)
Assessment type	Underwater TV survey linked to yield-per-recruit analysis from length data (ICES, 2017a).
Input data	One survey index (UWTV); Length–frequency data from the fishery. Commercial catches (international landings and length frequencies from English catch sampling, covering 90% of the landings); maturity data from commercial catch sampling. Natural mortalities from Morizur (1982): 0.3 for males and immature females, and 0.2 for mature females for all years.
Discards, BMS landings, and bycatch	Included in the assessment, data series from the majority of the fleet/main fleets (covering 90% of the landings in 2016). BMS landings, where reported, are included as dead removals in the assessment from 2016.
Indicators	Sex ratio, length frequencies
Other information	The latest benchmark was performed in 2013 (ICES, 2013). The latest UWTV survey (June 2016) information was used to provide advice.
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7 Norway lobster in Division 4.b, Functional Unit 6. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Landings advice	Catch advice	ICES landings	ICES total discards*	BMS reported to ICES
2004				2153	615	
2005				3094	715	
2006	No increase in effort			4903	1051	
2007	No increase in effort, harvest rate < 15%	3500		2966	432	
2008	No new advice, same as for 2007	3500		1220	166	
2009	No increase in effort and landings (2007)	< 3000		2713	461	
2010	Harvest rate no greater than that equivalent to fishing at F_{2008}	< 1200		1443	201	
2011	MSY transition	< 1900		2070	246	
2012	MSY transition	< 1400		2460	345	
2013	MSY transition	< 1400		2982	450	

Year	ICES advice	Landings advice	Catch advice	ICES landings	ICES total discards*	BMS reported to ICES
2014	MSY transition	< 1026		2503	198	
2015	(update November) MSY approach	< 1127		1371	190	
2016	MSY approach	< 680	≤ 738**	1854	272	0
2017	MSY approach		≤ 1143***			
2018	MSY approach		≤ 1876^			

* Dead + surviving discards.

** Assuming all catches are landed and selection patterns do not change.

*** Assuming discarding below MCS only.

^ Assuming discard rates average of the last three years.

History of the catch and landings

Table 8 Norway lobster in Division 4.b, Functional Unit 6. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)		Landings	Unwanted catch	
98% dead	2% surviving	Almost entirely taken in demersal trawl fisheries	85% dead	15% surviving
2126 t		1854 t	272 t	

Table 9 Norway lobster in Division 4.b, Functional Unit 6. History of commercial catch and landings; ICES estimated values are presented by country. All weights are in tonnes.

Year	UK England & N. Ireland	UK Scotland	Other countries**	Total landings	Discards	BMS reported to ICES
1981	1006	67	0	1073		
1982	2443	81	0	2524		
1983	2073	5	0	2078		
1984	1471	8	0	1479		
1985	2009	18	0	2027		
1986	1987	28	0	2015		
1987	2158	33	0	2191		
1988	2390	105	0	2495		
1989	2930	168	0	3098		
1990	2306	192	0	2498		
1991	1884	179	0	2063		
1992	1403	60	10	1473		
1993	2941	89	0	3030		
1994	3530	153	0	3683		
1995	2478	90	1	2569		
1996	2386	96	1	2483		
1997	2109	80	0	2189		
1998	2029	147	1	2177		
1999	2197	194	0	2391		
2000	1947	231	0	2178	1805	
2001	2319	255	0	2574	2393	
2002	1739	215	0	1954	795	
2003	2031	214	0	2245	716	
2004	1952	201	0	2153	615	
2005	2936	158	0	3094	715	
2006	4430	434	39	4903	1051	
2007	2525	437	4	2966	432	
2008	976	244	0	1220	166	
2009	2299	414	0	2713	461	
2010	1258	185	0	1443	201	
2011	1806	250	14	2070	246	

Year	UK England & N. Ireland	UK Scotland	Other countries**	Total landings	Discards	BMS reported to ICES
2012	2177	256	27	2460	345	
2013	2666	305	11	2982	450	
2014	2104	345	54	2503	198	
2015	1186	174	11	1371	190	
2016*	1726	125	3	1854	272	0

* Provisional.

** "Other countries" includes the Netherlands, Belgium, and Denmark.

Summary of the assessment

Table 10 Norway lobster in Division 4.b, Functional Unit 6. Assessment summary. Weights are in tonnes.

Year	UWTV abundance index* (millions)	2 standard deviations	Landings	Discard rate (by numbers)	Mean weight landings (g)	Mean weight Discards (g)	Number removed (millions)	Harvest rate
2001	1685	67	2574	66.60%	20.67	9.62	373	22.1%
2002	1048	112	1953	46.10%	20.00	9.50	181	17.3%
2003	1085	90	2245	42.10%	21.89	9.56	177	16.3%
2004	1377	101	2152	41.70%	23.14	9.22	160	11.6%
2005	1657	148	3094	34.50%	23.58	10.32	200	12.1%
2006	1244	114	4858	31.30%	22.53	10.58	314	25.2%
2007	858	23	2966	25.00%	24.95	10.89	159	18.5%
2008	987	39	1213	24.90%	26.63	10.97	61	6.1%
2009	682	38	2711	29.30%	24.45	10.54	157	23.0%
2010	785	21	1443	23.00%	25.18	11.74	74	9.5%
2011	878	17	2072	22.60%	27.05	11.02	99	11.3%
2012	758	13	2457	27.42%	27.30	10.16	124	16.4%
2013	706	18	2982	29.80%	27.60	9.80	154	21.8%
2014	755	18	2503	14.90%	29.90	13.50	98	13.0%
2015	565	13	1371	28.97%	29.39	9.99	66	11.6%
2016	697	19	1854	28.65%	27.97	10.23	93	13.3%
2017	902	21						

* For animals greater than 17 mm.

Table 11 Norway lobster in Division 4.b, Functional Unit 6. Discard rate as a proportion of total catch (in numbers), and also given below and above MCS.

Year	Proportion of total catch (%)		
	< MCS	≥ MCS	total
2000	32.94	30.21	63.15
2001	38.29	28.27	66.55
2002	26.89	19.22	46.11
2003	24.24	17.95	42.19
2004	24.83	16.94	41.76
2005	17.13	17.42	34.56
2006	14.49	16.84	31.33
2007	11.32	13.70	25.03
2008	11.41	13.47	24.87
2009	13.76	14.53	28.29
2010	7.89	15.08	22.97
2011	8.37	14.23	22.60
2012	11.55	15.88	27.43
2013	14.68	15.20	29.88
2014	2.90	12.02	14.92
2015	13.78	15.19	28.97
2016	13.09	15.56	28.65
average 2014–2016	9.92	14.26	24.18

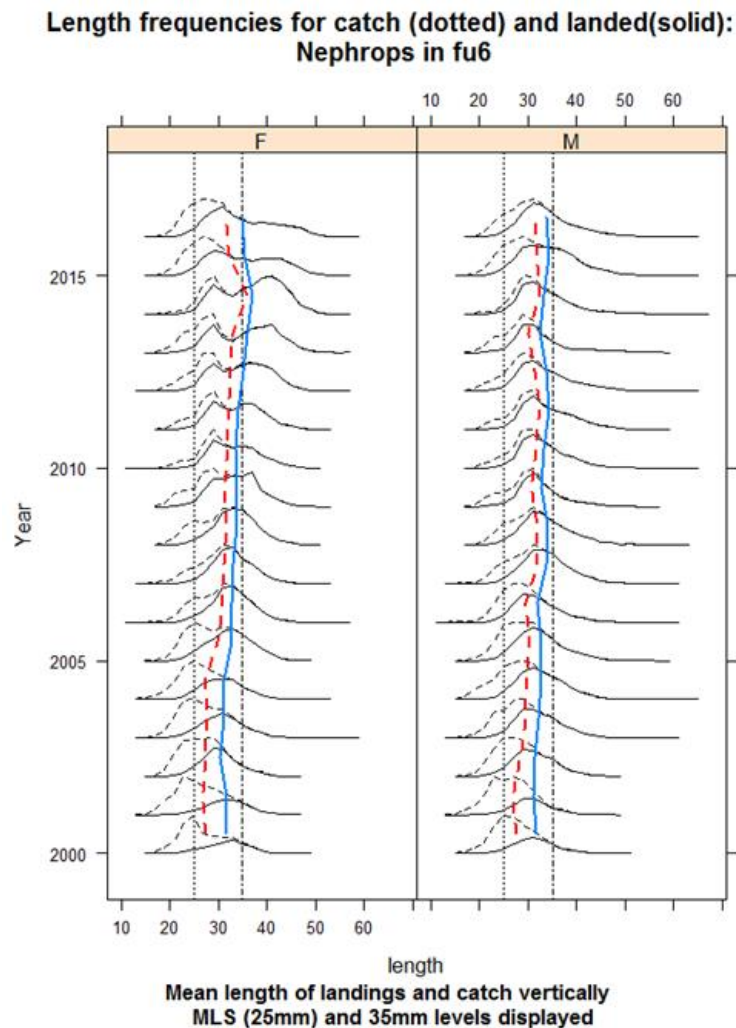


Figure 3 Norway lobster in Farn Deep (FU 6). Catch length–frequency distribution and mean size in catches and landings. Vertical lines are minimum landing size (25 mm) and 35 mm.

Sources and references

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