

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

ICES advice on fishing opportunities

ICES advises that when the proposed EU multiannual plan (MAP) for the North Sea is applied, catches in 2019 that correspond to the F ranges in the MAP are between 1622 tonnes and 1882 tonnes. The entire range is considered precautionary when applying the ICES advice rule.

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 overexploitation.

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 mostly above F_{MSY} since the beginning of the time-series, except for 2008 and 2017.

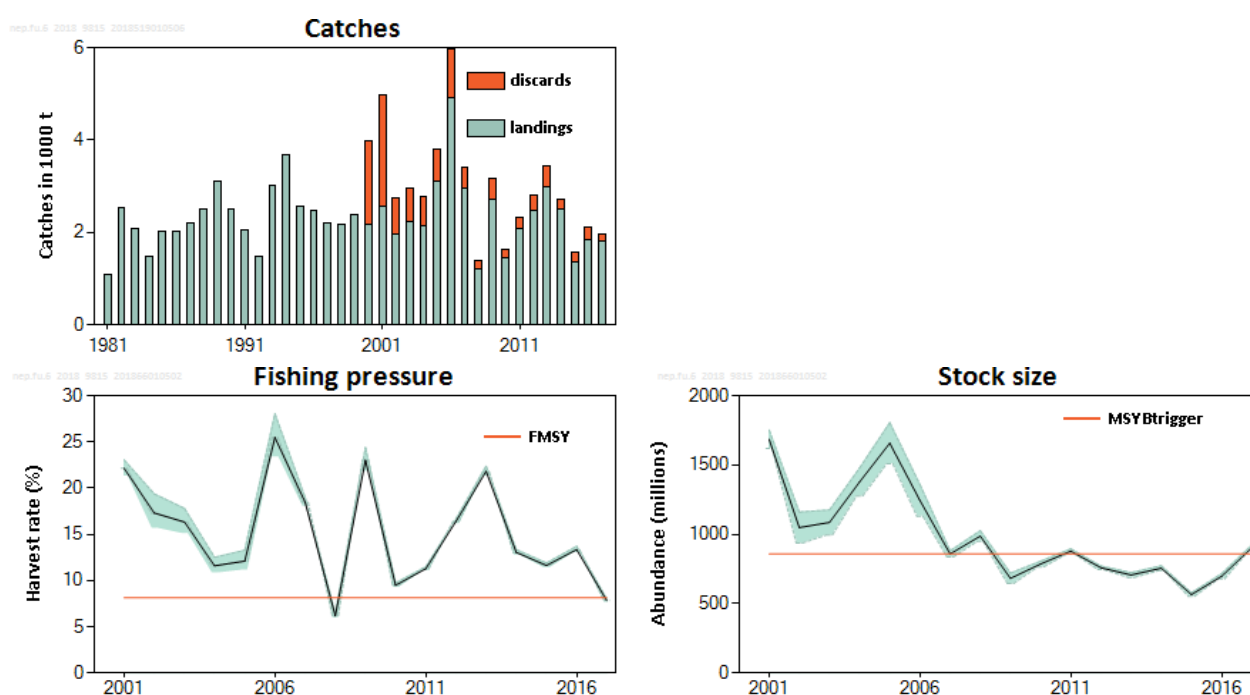


Figure 1 Norway lobster in Division 4.b, Functional Unit 6. Summary of the stock assessment. Long-term trends in catches, fishing pressure, and underwater TV survey (UWTV) abundance for animals greater than 17 mm carapace length (used as F and SSB proxies). Discard data have only been included since 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

ICES assesses that fishing pressure on the stock is below F_{MSY} and that stock size is above $MSY B_{trigger}$

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			
		2015	2016	2017	2015	2016	2017	
Maximum sustainable yield	F_{MSY}	✗	✗	✓ Below	$MSY B_{trigger}$	✗	✗	✓ Above trigger
Precautionary approach	F_{pa}, F_{lim}	?	?	? Undefined	B_{pa}, B_{lim}	?	?	? Undefined
Management plan	F_{MGT}	✗	✗	✓ Within range	B_{MGT}	✗	✗	✓ Above

Catch scenarios

The latest estimate of stock abundance (902 million individuals, 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 2019.

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

Variable	Value	Notes
Stock abundance	902 million individuals	UWTV 2017
Mean weight in wanted catch	30 g	Average 2015–2017
Mean weight in unwanted catch	10.3 g	Average 2015–2017
Unwanted catch proportion	25%	Average (proportion by number) 2015–2017
Unwanted catch survival rate	15%	Proportion by number
Dead unwanted catch proportion	22%	Average 2015–2017 (proportion by number)

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

Basis	Total catch	Dead removals	Wanted catch	Dead unwanted catch	Surviving unwanted catch	Harvest rate*	% advice change **
	WC+DUC+SUC	WC+DUC	WC	DUC	SUC	for WC+DUC	
ICES advice basis							
EU MAP [^] : F_{MSY}	1 882	1 852	1 683	169	30	8.12	0.32
$F = MAP F_{MSY lower}$	1 622	1 597	1 451	146	26	7.0	-13.5
$F = MAP F_{MSY upper}^{***}$	1 882	1 852	1 683	169	30	8.12	0.32
Other options							
MSY approach	1 882	1 852	1 683	169	30	8.12	0.32
F_{2017}	1 813	1 784	1 621	163	29	7.8	-3.4

[^] Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016)

* Calculated for dead removals.

** Total catch 2019 relative to advice value 2018 (1 876 t).

*** $F_{MSY upper} = F_{MSY}$ for this stock

The minor changes in advice from November 2017 are a result of updating mean weights and discard rates.

Basis of the advice

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

Advice basis	Proposed EU multiannual plan (EU MAP) for the North Sea (EU, 2016)
Management plan	The EU MAP for the North Sea is currently being finalized and is not yet adopted. The advice based on F_{MSY} range used in the EU MAP are considered precautionary.

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 unsorted catch when estimating the size composition of removals.

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

Issues relevant for the advice

The EU is finalizing a MAP for the North Sea. ICES was requested by the EU to provide advice based on the proposed EU MAP.

The results of the 2018 UWTV survey are expected to be available by July 2018. If there is significant deviation from the 2017 UWTV survey the advice will be updated before the end of 2018.

In 2017 the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 4 with several exemptions. Observations from the 2016–2017 fishery indicate that discarding above the minimum conservation reference size (MCRS) continues and has not changed markedly (Figure 3). Consequently, ICES is providing advice for 2019 assuming average discard rates observed over the last three years, which is considered to be a more realistic assumption.

In 2016 and 2017, no Norway lobster were recorded as below MCRS (BMS category) in FU 6 despite landings having been observed below the MCRS (Figure 3).

Catches generally have been higher than the level advised by ICES, highlighting the issue that current management arrangements are not sufficient to contain the fishery within the sustainable limits determined by ICES. There is a single total allowable catch (TAC) for all of ICES Subarea 4, except for the Norwegian 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. From April 2016, the UK has imposed a range of measures on UK vessels fishing for Norway lobster in FU6 in order to try and reduce fishing mortality on the stock.

Mixed fisheries considerations

After years of positive development, North Sea cod is again estimated to be the most limiting stock in the Greater North Sea mixed-fisheries model. For 2019, assuming a strictly implemented discard ban (corresponding to the "Minimum" scenario), cod is estimated to constrain 18 out of 34 fleet segments. Whiting is the second most limiting stock, constraining twelve fleet segments. Conversely, in the "Maximum" scenario, saithe and both plaice stocks (North Sea and Eastern Channel) plaice would be the least limiting for 15, 6, and 3 fleet segments, respectively. Finally, if Norway lobster were managed by separate TACs, Norway lobster in FU 7 would be the least limiting for six fleet segments and Norway lobster in FU 6 would not be a limiting stock in mixed fisheries scenario (ICES, 2018a).

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 2019 within the F_{MSY} range. Currently, these range scenarios do not take into account Norway lobster stocks.

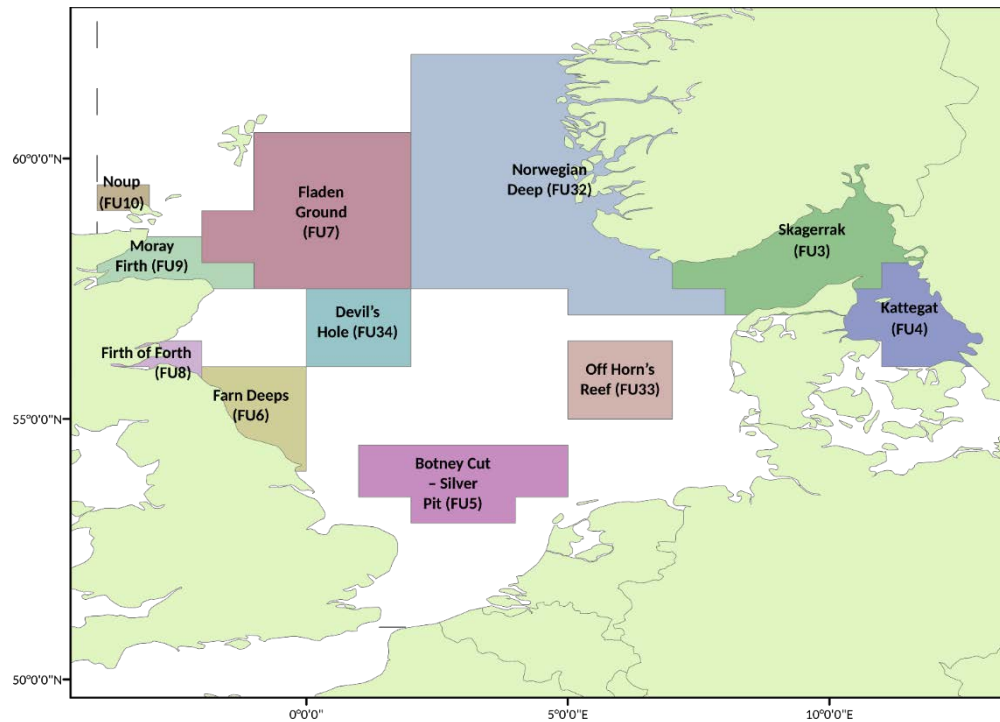


Figure 2 Norway lobster functional units (FU) in the North Sea and Skagerrak/Kattegat region.

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*	MAP MSY $B_{trigger}$	858 million	MSY $B_{trigger}$	
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	Harvest rate 8.12%	F_{MSY}	
	MAP range F_{lower}	Harvest rate 7.0–8.12%	Consistent with ranges provided by ICES (2015), resulting in no more than 5% reduction in long-term yield compared with MSY.	
	MAP range F_{upper}^{**}	Harvest rate 8.12–8.12%	Consistent with ranges provided by ICES (2015), resulting in no more than 5% reduction in long-term yield compared with MSY.	

* Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016)

** For this stock, $F_{MSY upper} = F_{MSY}$

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, 2018b)
Input data	One survey index (UWTV); Length–frequency data from the fishery. Commercial catches (international landings and length frequencies from English catch sampling, covering 78% 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 2017). BMS landings, where reported, are included as dead removals in the assessment since 2016.
Indicators	Sex ratio, length frequencies
Other information	The latest benchmark was performed in 2013 (ICES, 2013). The latest UWTV survey (June 2017) 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 catch estimates. All weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	ICES landings	ICES total discards*
2004				2 153	615
2005				3 094	715
2006	No increase in effort			4 903	1051
2007	No increase in effort, harvest rate < 15%	3 500		2 966	432
2008	No new advice, same as for 2007	3 500		1 220	166
2009	No increase in effort and landings (2007)	< 3 000		2 713	461
2010	Harvest rate no greater than that equivalent to fishing at F_{2008}	< 1 200		1 443	201
2011	MSY transition	< 1 900		2 070	246
2012	MSY transition	< 1 400		2 460	345
2013	MSY transition	< 1 400		2 982	450
2014	MSY transition	< 1 026		2 503	198
2015	(update November) MSY approach	< 1 127		1 371	190
2016	MSY approach	< 680	≤ 738 **	1 854	272 ^^^
2017	MSY approach		≤ 1 143 ***	1 812	140 ^^^
2018	MSY approach		≤ 1 876 ^		
2019	MAP^^ F ranges (Harvest rate = 7.0–8.12%)		1622–1882 ^		

* 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.

^^ Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016)

^^^ Since 2016, discards refer to unwanted catches (including BMS landings).

History of the catch and landings

Table 8 Norway lobster in Division 4.b, Functional Unit 6. Catch distribution by fleet in 2017 as estimated by ICES.

Catch (2017)		Wanted catch			Unwanted catch	
99% dead	1% surviving	Mixed <i>Nephrops</i> /demersal fishery 22% TR1	Directed <i>Nephrops</i> fishery 76% TR2	2% other	85% dead	15% surviving
1 952 t		1 812 t			140 t	

Table 9 Norway lobster in Division 4.b, Functional Unit 6. ICES estimates of landings by country, total landings, discards and reported BMS. All weights are in tonnes.

Year	UK England & N. Ireland	UK Scotland	Other countries**	Total landings	Discards	BMS reported to ICES
1981	1 006	67	0	1 073		
1982	2 443	81	0	2 524		
1983	2 073	5	0	2 078		
1984	1 471	8	0	1 479		
1985	2 009	18	0	2 027		
1986	1 987	28	0	2 015		
1987	2 158	33	0	2 191		
1988	2 390	105	0	2 495		
1989	2 930	168	0	3 098		
1990	2 306	192	0	2 498		
1991	1 884	179	0	2 063		
1992	1 403	60	10	1 473		
1993	2 941	89	0	3 030		
1994	3 530	153	0	3 683		
1995	2 478	90	1	2 569		
1996	2 386	96	1	2 483		
1997	2 109	80	0	2 189		
1998	2 029	147	1	2 177		
1999	2 197	194	0	2 391		
2000	1 947	231	0	2 178	1 805	
2001	2 319	255	0	2 574	2 393	
2002	1 739	215	0	1 954	795	
2003	2 031	214	0	2 245	716	
2004	1 952	201	0	2 153	615	
2005	2 936	158	0	3 094	715	
2006	4 430	434	39	4 903	1 051	
2007	2 525	437	4	2 966	432	
2008	976	244	0	1 220	166	
2009	2 299	414	0	2 713	461	
2010	1 258	185	0	1 443	201	
2011	1 806	250	14	2 070	246	
2012	2 177	256	27	2 460	345	
2013	2 666	305	11	2 982	450	
2014	2 104	345	54	2 503	198	
2015	1 186	174	11	1 371	190	
2016	1 726	125	3	1 854	272 ^^^	0
2017*	1 534	260	18	1 812	140 ^^^	0

* Provisional.

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

^^^ Since 2016, discards refer to unwanted catches (including BMS).

Summary of the assessment

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

Year	UWTV abundance index* (millions)	2 standard deviations	Landings (tonnes)	Discard rate (by number)	Mean weight landings (grammes)	Mean Weight Discards (grammes)	Number removed (millions)	Observed harvest rate (by number)
2001	1 685	67	2 574	67%	20.67	9.62	373	22%
2002	1 048	112	1 954	46%	20.00	9.50	181	17.3%
2003	1 085	90	2 245	42%	21.89	9.56	177	16.3%
2004	1 377	101	2 153	42%	23.14	9.22	160	11.6%
2005	1 657	148	3 094	35%	23.58	10.32	200	12.1%
2006	1 244	114	4 903	31%	22.53	10.58	317	26%
2007	858	23	2 966	25%	24.95	10.89	159	18.5%
2008	987	39	1 220	25%	26.63	10.97	61	6.2%
2009	682	38	2 713	29%	24.45	10.54	157	23%
2010	785	21	1 443	23%	25.18	11.74	74	9.5%
2011	878	17	2 070	23%	27.05	11.02	99	11.3%
2012	758	13	2 460	27%	27.30	10.16	124	16.4%
2013	706	18	2 982	30%	27.60	9.80	154	22%
2014	755	18	2 503	14.9%	29.90	13.50	98	13.0%
2015	565	18	1 371	29%	29.39	9.99	66	11.6%
2016	697	19	1 854	29%	27.97	10.23	93	13.3%
2017	902	21	1 812	18.6%	31.53	10.75	71	7.8%

*For Norway lobster greater than 17 mm carapace length.

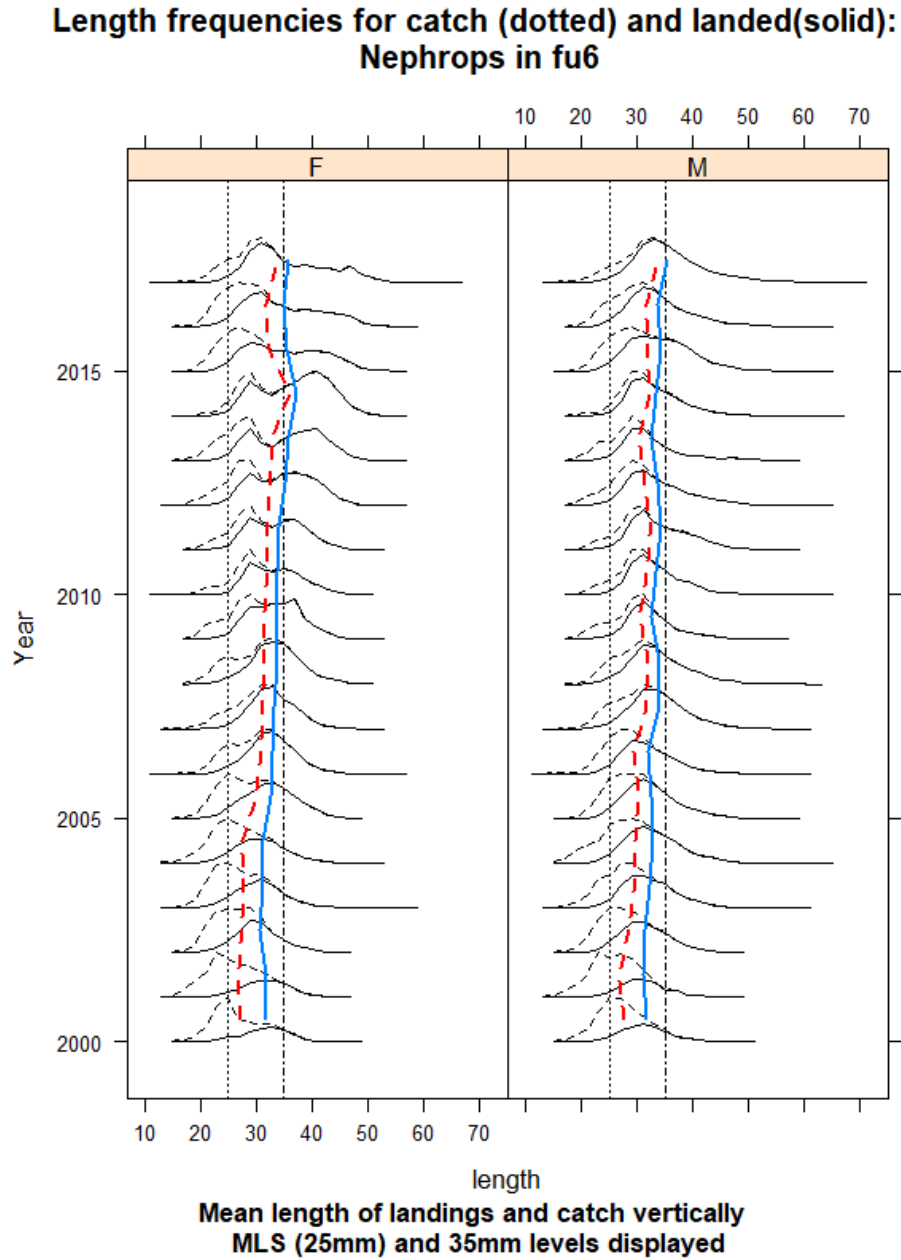


Figure 3 Norway lobster in Farn Deep (FU 6). Catch length–frequency distribution and mean size in catches (red and dashed line) and landings (blue line). Vertical lines are minimum landing size (25 mm) and 35 mm.

Sources and references

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