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Norway lobster (*Nephrops norvegicus*) in Division 4.b, Functional Unit 34 (central North Sea, Devil's Hole)

ICES advice on fishing opportunities

Please note: The present advice replaces the advice given in June 2018 for catches in 2019 and 2020.

ICES advises that when the precautionary approach is applied, catches in each of the years 2019 and 2020 should not exceed 590 tonnes.

In order to ensure the stock in this functional unit (FU) is exploited sustainably, management should be implemented at the functional unit level.

Stock development over time

The state of the stock is unknown. The mean survey density indicates the stock declined from 2009 to 2017, but increased in 2018.

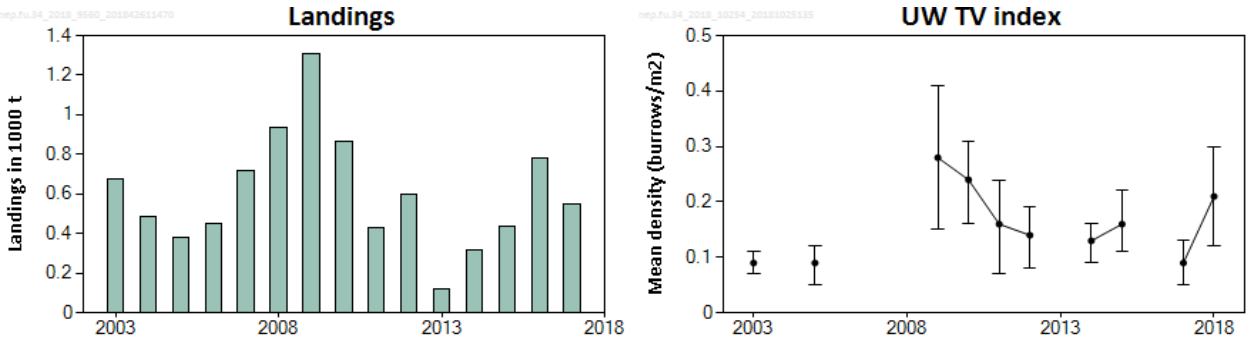

Figure 1 Norway lobster in Division 4.b, FU 34. Landings and stock density. Error bars represent 95% confidence intervals.

Stock and exploitation status

ICES cannot assess the stock and exploitation status relative to maximum sustainable yield (MSY) and precautionary approach (PA) reference points because the reference points are undefined.

Table 1 Norway lobster in Division 4.b, FU 34. State of the stock and fishery, relative to reference points.

		Fishing pressure				Stock size			
		2015	2016	2017		2016	2017	2018	
Maximum sustainable yield	F_{MSY}	?	?	?	Unknown	MSY $B_{trigger}$	?	?	? Undefined
Precautionary approach	F_{pa},F_{lim}	?	?	?	Unknown	B_{pa},B_{lim}	?	?	? Undefined
Management plan	F_{MGT}	–	–	–	Not applicable	B_{MGT}	–	–	– Not applicable
Qualitative evaluation	-	✓	?	✓	Above possible reference points	-	?	↘	↗ Increasing

Catch scenarios

The ICES framework for category 4 Norway lobster stocks (ICES, 2012) was applied for this stock. A catch based on the advice given in 2016 +20% (uncertainty cap) corresponds to a potential harvest rate of 5.4%, based on the 2018 density estimate of 0.21 *Nephrops* m^{-2}. This is below the range of MSY harvest rates in the North Sea (between 7.5% and 16%), which is considered conservative. Assuming that discard rates do not change from the rate of 12.9% (by number) and that the discard mortality rate is 100%, this implies catches of no more than 590 tonnes.

Table 2 Norway lobster in Division 4.a, FU 34. The basis for the catch scenarios.

Variable	Value	Notes
Stock density	0.21 *Nephrops* m^{-2}	UWTV 2018
Mean weight in wanted catches	32 g	Average 2007–2010 (benchmark estimate; ICES, 2013)
Mean weight in unwanted catches	14.9 g	Average 2000–2017 (from FU 7)
Unwanted catches rate (total)	12.9%	Average 2008–2011 (benchmark estimate; ICES, 2013; proportion by number)
Discard survival rate	0%	Discard survival is assumed to be zero.
Surface area estimate	1753 km^2	Benchmark estimate (ICES, 2013)

Table 3 Norway lobster in Division 4.a, FU 34. Annual catch scenarios for 2019 and 2020. Discarding is assumed to continue at recent average. All weights are in tonnes.

Rationale	Basis	Total catches	Wanted catches *	Unwanted catches *	Harvest rate **	% Advice change ***
Precautionary approach	2016 advice for 2017 & 2018 + 20%	590	552	38	5.4%	20%
Other scenarios	2016 advice for 2017 & 2018 −20%	394	368	26	3.6%	−20%
	2016 advice for 2017 & 2018	492	460	32	4.5%	0%
	Recent average landings (2015–2017)	631	590	41	5.8%	28%
	Average landings (2008–2017)	679	635	44	6.2%	38%
	MSY harvest rate	817	764	53	7.5%	66%
	Maximum	1396	1305	91	12.8%	184%

* Wanted" and "unwanted" catch are used to described Norway lobster that would be landed and discarded, based on average discard rate estimates (12.9%).
** Calculated for dead removals and applied to total catch.
*** Total catch 2019 and 2020 relative to advice value for 2017 and 2018 (492 t).

Basis of the advice

Table 4 Norway lobster in Division 4.b, FU 34. The basis of the advice.

Advice basis	ICES precautionary approach
Management plan	The EU MAP for the North Sea is currently being finalized and is not yet adopted.

Quality of the assessment

The time-series of underwater TV (UWTV) survey data is incomplete. Surveys were conducted in 2003 and 2005 and during the periods 2009–2012, 2014–2015, and 2017–2018.

The catch options are based on a calculation of potential landing options and harvest rates, given the known surface area of Norway lobster habitat and observed densities of the functional unit. The surface area is based on an estimate of area derived from Scottish vessel monitoring system (VMS) data from Scottish Norway lobster vessels from 2006 to 2009. The area of ground shown in geological charts is significantly larger than this and landings have been made from these areas. Therefore, the area should be regarded as a minimum estimate and the harvest rate could well be lower than implied by the analysis.

In recent years, only limited sampling data of catches have been available for this stock. Therefore, mean weights in discards are borrowed from the adjacent FU 7 and are used in addition to historical data.

Issues relevant for the advice

MSY harvest rates estimated for other FUs vary between 7.5% and 16%. Because this is a data-limited stock, ICES uses the lower boundary of that range as an upper limit for advice.

The results of the 2018 UWTV survey became available in June 2018 and showed a significant increase from the 2017 level. The advice for 2019 and 2020 has therefore been updated to reflect the more recent data.

Catches increased substantially to levels well above ICES advice in 2016 and 2017, highlighting the issue that current management arrangements are not sufficient to contain the fishery within the sustainable limits determined by ICES.

Mixed-fisheries considerations

Results from a North Sea mixed-fisheries analysis are presented in the ICES mixed-fisheries advice (ICES, 2018a). The analysis has been updated, taking into account the latest changes made to the assessments and forecasts for stocks with reopened advice.

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 24 out of 40 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 the eastern English Channel) plaice would be the least limiting for 17, 9, and three fleet segments, respectively. Finally, if Norway lobster were managed by separate TACs, Norway lobster in FU 7 would be the least limiting for seven fleet segments (ICES, 2018b). Norway lobster in FU 34 is not limiting in mixed-fisheries scenarios (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.

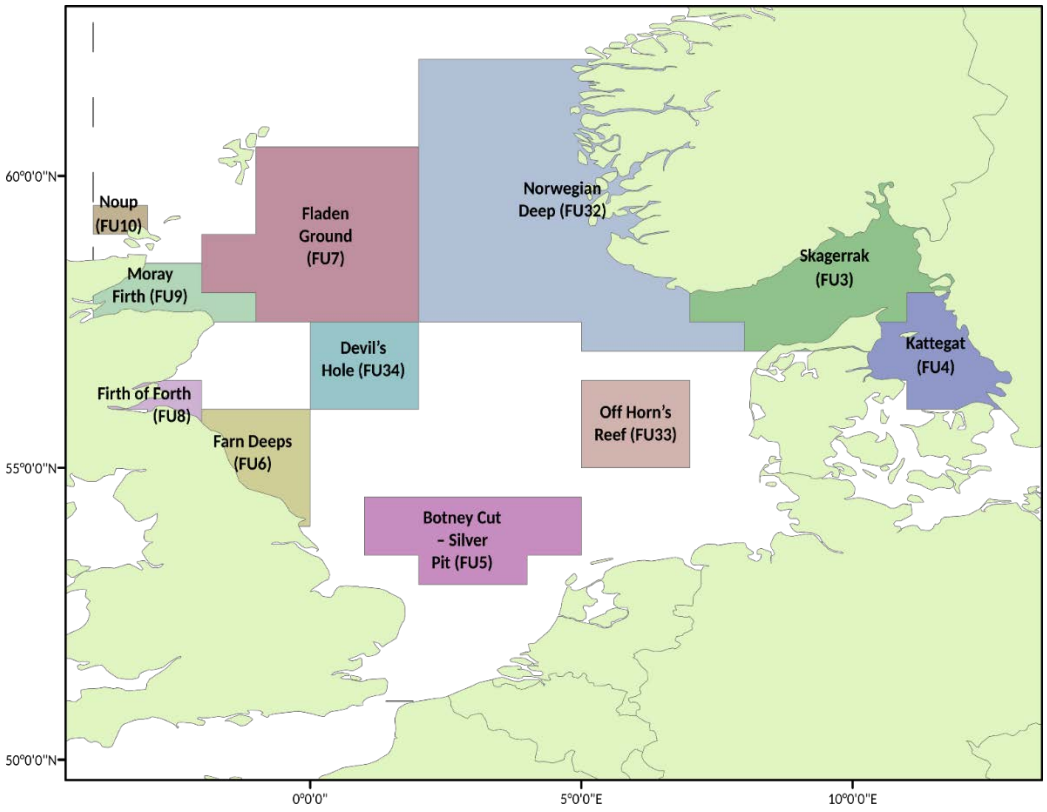

Figure 3 Norway lobster functional units in the North Sea and Skagerrak/Kattegat region.

Basis of the assessment

Table 5 Norway lobster in Division 9.a, Functional Unit 30. Basis of the assessment and advice.

ICES stock data category	4.1.4 (ICES, 2018c).
Assessment type	Data-limited method for *Nephrops* (ICES, 2018b).
Input data	Commercial catches (international landings, length frequencies from Scottish catch sampling 2006–2011), habitat extent, mean size, one survey index.
Discards and bycatch	Used to provide advice but not included in the assessment. Discard rates estimated for 2008–2011 were used to calculate discards used in the advice.
Indicators	None.
Other information	Latest benchmark was performed in 2013 (ICES, 2013).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), Working Group on Mixed Fisheries Advice (WGMIXFISH-ADVICE).

Information from stakeholders

No additional information is available.

History of the advice, catch, and management

Table 6 Norway lobster in Division 4.b, FU 34. History of ICES advice and ICES estimates of landings. All weights in tonnes.

Year	ICES advice	Landings corresponding to advice	Catches corresponding to advice	ICES landings
2009	No separate advice			1305
2010	No separate advice			865
2011	No separate advice			432
2012	No separate advice	-		597
2013	Average landings (last 10 years)	< 600		120
2014	No new advice, same as 2013	< 600		320
2015	Recent average landings (last 3	< 383	< 410	440
2016	No new advice, same as for 2015	< 383	< 410	780
2017	Precautionary approach	≤ 459	≤ 492	550
2018	Precautionary approach	≤ 459	≤ 492	
2019	Precautionary approach		≤ 590	
2020	Precautionary approach		≤ 590	

History of the catch and landings

Table 7 Norway lobster in Division 4.a, FU 34. Catch distribution by fleet in 2017 as estimated by ICES.

Catch (2017)	Wanted catch		Unwanted catch
Unknown	directed *Nephrops* fishery 13% TR2	mixed *Nephrops*/demersal fishery 87% TR1	Unknown
	550 t		

Table 8 Norway lobster in Division 4.b, FU 34. History of commercial landings; ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	UK Scotland				UK (E, W & NI)	Denmark	Netherlands	Total Landings
	Nephrops trawl	Other trawl	Creel	Subtotal				
1991	64	21	0	85				85
1992	78	28	0	106				106
1993	23	21	0	44				44
1994	79	50	0	129				129
1995	37	95	0	132				132
1996	40	89	0	129				129
1997	30	70	0	100				100
1998	15	73	0	88				88
1999	80	122	0	202				202

Year	UK Scotland				UK (E, W & NI)	Denmark	Netherlands	Total Landings
	Nephrops trawl	Other trawl	Creel	Subtotal				
2000	89	95	0	184				184
2001	159	112	0	271				271
2002	240	103	0	343				343
2003	518	157	0	675				675
2004	398	90	0	488				488
2005	253	125	0	378				378
2006	359	89	0	448				448
2007	649	68	0	717				717
2008	844	93	0	937				937
2009	1297	8	0	1305				1305
2010*	816	22	0	838	25	1	1	865
2011	406	16	0	422	6	4		432
2012	546	4	0	550	37	10		597
2013	65	41	0	106	11	3		120
2014	293	14	0	307	13			320
2015	383	18	0	401	39	<0.5		440
2016	738	6	0	744	36	0	0	780
2017**	400	122	0	522	28	0	0	550

* Landings for countries other than Scotland before 2010 are currently unavailable.
** Provisional.

Summary of the assessment

Table 9 Norway lobster in Division 4.b, FU 34. Sensitivity analysis of harvest rates for a range of potential densities, assuming the fishery selection pattern does not change. Shaded cells indicate harvest ratios above the F_{MSY} proxy for this stock of 7.5%.

Basis	Total catch	Wanted catch	Unwanted catch	Density (*Nephrops* m^{-2})								% advice change
				0.05	0.09	0.15	0.21*	0.3	0.4	0.6	0.8	
2016 Advice −36%	315	294	20	12.1	6.8	4	2.9	2	1.52%	1.01%	0.76%	−36%
2016 Advice −29%	350	328	23	13.5	7.5	4.5	3.2	2.2	1.69%	1.13%	0.84%	−29%
2016 Advice −25%	369	345	24	14.2	7.9	4.7	3.4	2.4	1.78%	1.19%	0.89%	−25%
2016 Advice −20%	394	368	26	15.2	8.4	5.1	3.6	2.5	1.90%	1.26%	0.95%	−20%
2016 Advice	492	460	32	19	10.5	6.3	4.5	3.2	2.4	1.58%	1.19%	0%
2016 Advice + 20%	590	552	38	23	12.6	7.6	5.4	3.8	2.8	1.90%	1.42%	20%
Average (2015–2017)	631	590	41	24	13.5	8.1	5.8	4.1	3	2	1.52%	28%
Average (2008–2017)	679	635	44	26	14.5	8.7	6.2	4.4	3.3	2.2	1.64%	38%
2016 Advice + 66% (MSY)	817	764	53	32	17.5	10.5	7.5	5.2	3.9	2.6	1.97%	66%
Maximum	1396	1305	91	54	30	17.9	12.8	9	6.7	4.5	3.4	184%

* Density estimate from the UWTV survey in 2018.

Sources and references

ICES. 2012. ICES Implementation of Advice for Data-limited Stocks in 2012 in its 2012 Advice. ICES CM 2012/ACOM:68. 42 pp.

ICES. 2013. Report of the Benchmark Workshop on *Nephrops* Stocks (WKNEPH), 25 February–1 March 2013, Lysekil, Sweden. ICES CM 2013/ACOM:45. 230 pp.

ICES. 2018a. Mixed-fisheries advice for Subarea 4, Division 7.d, and Subdivision 3.a.20 (North Sea, eastern English Channel, Skagerrak). *In* Report of the ICES Advisory Committee, 2018. ICES Advice 2018, mix-ns. 16 pp. https://doi.org/10.17895/ices.pub.4612.

ICES. 2018b. Report of the Working Group on Mixed-Fisheries Advice (WGMIXFISH-ADVICE), 21–26 May 2018, ICES Headquarters, Copenhagen, Denmark. ICES CM 2018/ACOM:19. In preparation.

ICES. 2018c. Advice basis. *In* Report of the ICES Advisory Committee, 2018. ICES Advice 2018, Book 1, Section 1.2. https://doi.org/10.17895/ices.pub.4503.

ICES. 2018d. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 24 April–3 May 2018, Ostend, Belgium. ICES CM 2018/ACOM:22. *In preparation*.