

Norway lobster (*Nephrops norvegicus*) in Division 6.a, Functional Unit 11 (West of Scotland, North Minch)

ICES stock advice

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 2819 tonnes.

To ensure that the stock in Functional Unit 11 is exploited sustainably, management should be implemented at the functional unit level.

Stock development over time

The historical harvest rate has fluctuated and is now just below F_{MSY} . The stock has been above MSY $B_{trigger}$ since 1998.

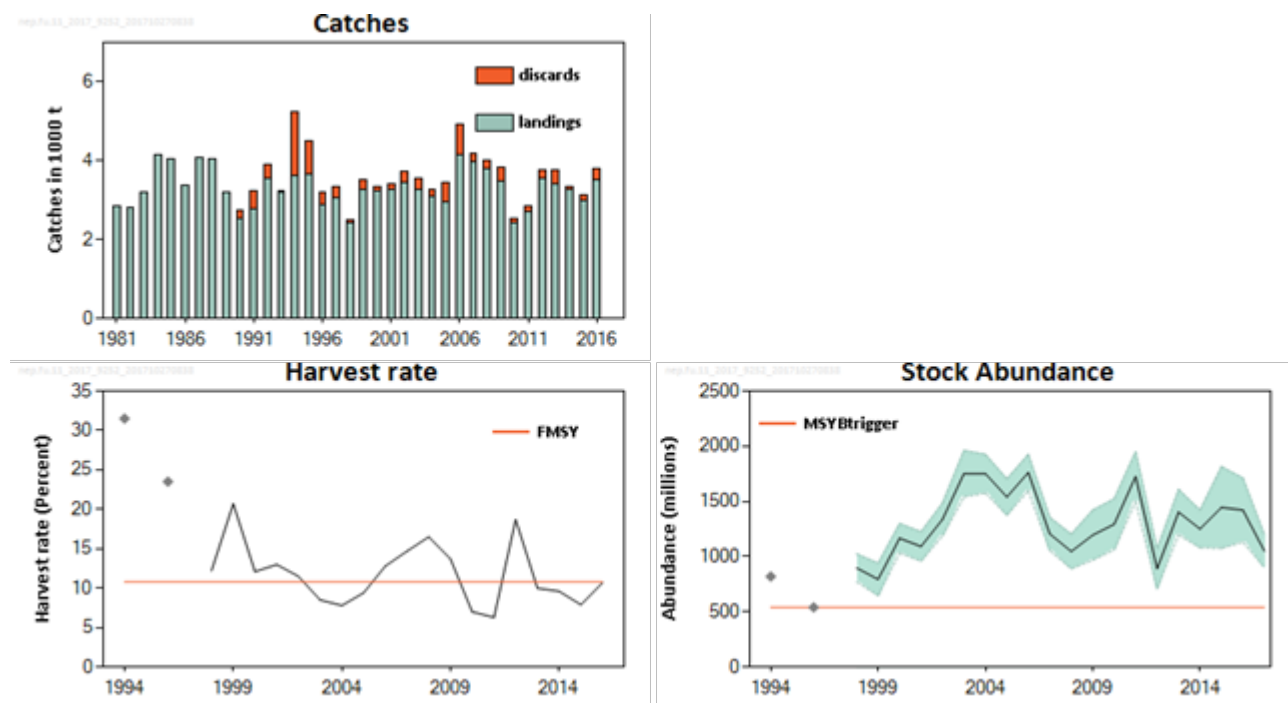


Figure 1 Norway lobster in Division 6.a, Functional Unit 11. Summary of the stock assessment. Catches (discards only available from 1990), harvest rate (sum of landings and dead discards in numbers, divided by total abundance), survey abundance (Underwater TV, millions; SSB proxy; 95% confidence intervals). Harvest rates before 2006 may be unreliable due to underreporting of landings. Orange lines represent $MSY B_{trigger}$ and the F_{MSY} harvest rate proxy.

Stock and exploitation status

Table 1 Norway lobster in Division 6.a, Functional Unit 11. 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}	✓	✓	✓ Below		MSY $B_{Trigger}$	✓	✓ Above trigger
Precautionary Approach	F_{pa} F_{lim}	✓	✓	✓ Below possible reference points		B_{pa} , B_{lim}	✓	✓ Above possible reference points
Management plan	F_{MGT}	—	—	— Not applicable		B_{MGT}	—	— Not applicable

Catch options

Table 2 Norway lobster in Division 6.a, Functional Unit 11. The basis for the catch options.

Variable	Value	Source	Notes
Stock abundance (2018)	1050 million individuals	ICES (2017)	UWTV survey 2017 (used as abundance estimate for 2018)
Mean weight in landings	25.82 g	ICES (2017)	Average 1999–2016
Mean weight in discards	10.88 g	ICES (2017)	Average 1999–2016
Discard rate	11%	ICES (2017)	Average 2014–2016 (by number). Calculated as total discards divided by landings + total discards.
Discard survival rate	25%	ICES (2017)	Only applies in scenarios where discarding is assumed to continue.
Dead discard rate	8.5%	ICES (2017)	Average 2014–2016 (by number). Calculated as dead discards divided by dead removals (landings + dead discards). Only applies in scenarios where discarding is assumed to continue.

Table 3 Norway lobster in Division 6.a, Functional Unit 11. Annual catch options. All weights are in tonnes.

- a) Catch options for 2018 assuming zero discards.

Basis	Total catch	Wanted catches*	Unwanted catch*	Harvest rate**
ICES advice basis				
MSY approach; F_{MSY}	2742	2607	135	10.8%
Other options				
F_{2016}	2717	2583	134	10.7%

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

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

- b) Catch options for 2018 assuming discarding continues at the recent average rate.

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; F_{MSY}	2819	2784	2679	105	35	10.8%
Other options						
F_{2016}	2793	2758	2655	104	35	10.7%

* Calculated for dead removals and applied to total catch.

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 is assumed to survive (25%).

Basis of the advice

Table 4 Norway lobster in Division 6.a, Functional Unit 11. The basis of the advice.

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

Quality of the assessment

Since 1994 the underwater TV survey (UWTV) has provided abundance estimates by functional unit (FU) with adequate precision. Biological sampling for this stock is considered sufficient.

The UWTV survey for FU 11 does not cover *Nephrops* grounds in the inshore waters and sea lochs, waters that are typically fished by smaller vessels. The total area of these grounds is estimated to be less than 5% of the total stock areas and therefore the exclusion of these inshore areas from the survey is not considered to impact the quality of the assessment.

The long-term average (rather than a three-year average) was considered more appropriate as input for the mean weight in landings and discards in the calculation of catch options. This is due to interannual variation.

Issues relevant for the advice

From 2016, fisheries catching *Nephrops* in Division 6.a are covered by the EU landings obligation (EU, 2015). Creel fisheries are exempted from the landings obligation, with a *de minimis* exemption consisting of a 6% discard rate by weight for the trawl fishery in 2018 (reduced from 7% in 2016 and 2017). The average discard rate by weight in the trawl fishery for FU 11 over the last three years is 5.3%. The discard rate by number used in the calculation of the catch advice implies that the discard rate by weight will be 4.9 % in 2018 for the entire fishery.

For FU 11, the absolute density observed in the UWTV survey is intermediate compared to other *Nephrops* FUs, with an average density of around 0.6 individuals m^{-2} . This suggests the stock may have a medium productivity capability. Historical harvest ratios in this FU have been around $F_{35\%SPR}$ and landings have been relatively stable in the last thirty years. For these reasons, $F_{35\%SPR}$ (combined between sexes) is considered to deliver high long-term yield with a low probability of recruitment overfishing and is therefore chosen as a proxy for F_{MSY} .

A single TAC covers the entire ICES Subarea 6. 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.

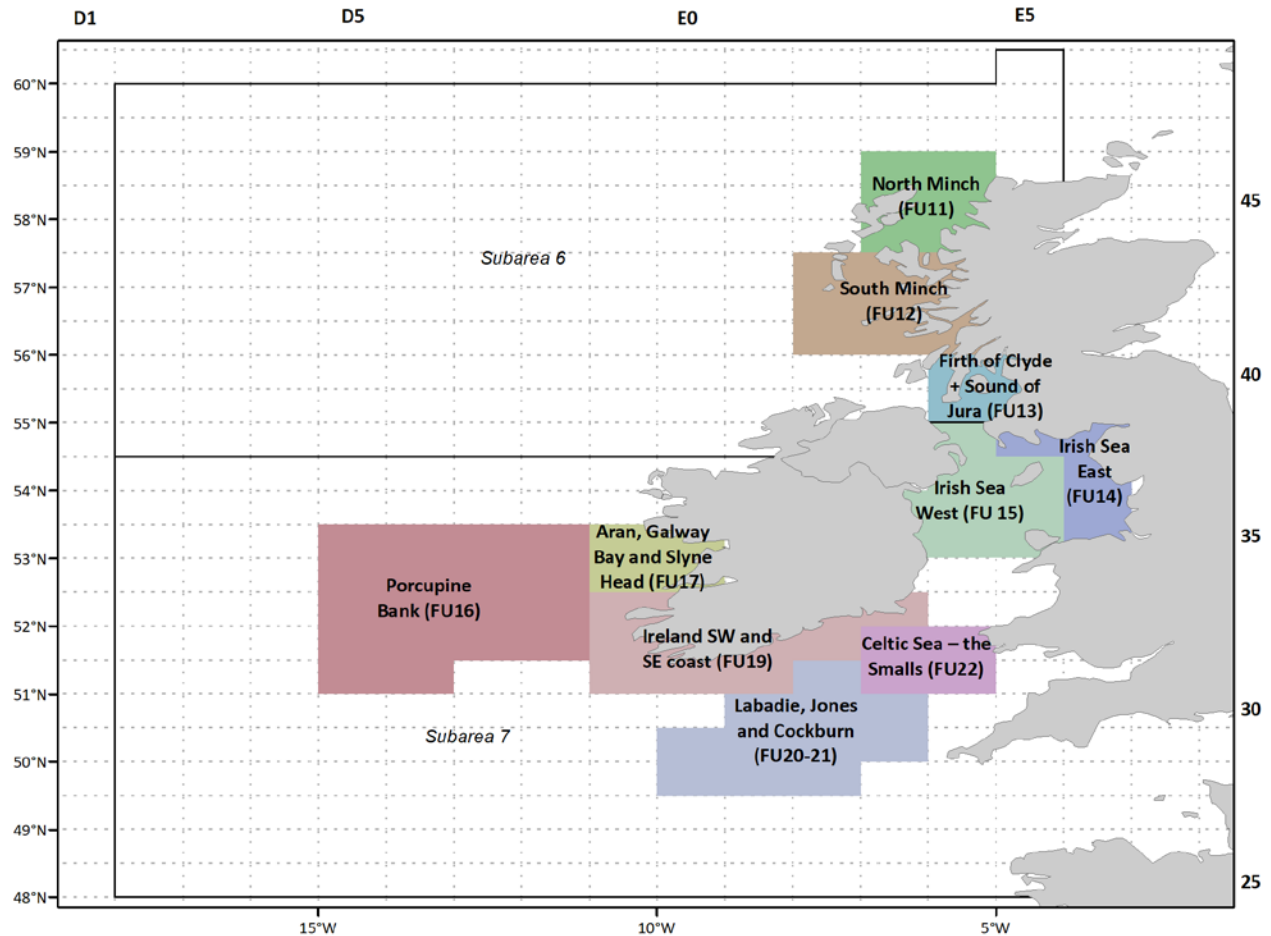


Figure 2 Norway lobster functional units in subareas 6 and 7.

Reference points

Table 5 Norway lobster in Division 6.a, Functional Unit 11. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	540 million individuals	Lowest observed abundance estimate from UWTV survey time-series.	ICES (2016a)
	F_{MSY}	10.8% harvest rate	F_{MSY} proxy equivalent to $F_{35\%SPR}$ combined sexes derived from length-based per recruit analysis.	ICES (2016a)
Precautionary approach	B_{lim}			
	B_{pa}			
	F_{lim}			
	F_{pa}			
Management plan	SSB_{mgt}			
	F_{mgt}			

Basis of the assessment

Table 6 Norway lobster in Division 6.a, Functional Unit 11. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016b).
Assessment type	Underwater TV survey.
Input data	One survey index (UWTV-FU11); commercial catches (international landings, length frequencies from Scottish catch sampling); fixed maturity parameters from survey data; fixed natural mortalities. Discard survival rate.
Discards and bycatch	Included in the assessment since 1990, data series from the majority of the main fleets covering all landings.
Indicators	Size structure, mean size, and sex ratio of catches.
Other information	The latest benchmark (based on the UWTV survey) was performed in 2013 (ICES, 2013).
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7 Norway lobster in Division 6.a, Functional Unit 11. ICES advice, landings and discards. All weights are in tonnes.

Year	ICES advice	Landings advice	Catch advice	ICES landings	Total discards*
1989				3205	
1990				2546	199
1991				2793	441
1992	Maintain current effort			3559	353
1993	Maintain current effort			3193	29
1994	Maintain current effort			3614	1637
1995	Maintain current effort			3655	856
1996	Maintain current effort			2872	323
1997	As for 1996			3046	286
1998	Maintain current effort			2441	67
1999	As for 1998			3257	273
2000	Maintain current effort			3247	100
2001	As for 2000			3259	160
2002	Maintain current effort			3440	277
2003	As for 2002			3269	299
2004	Maintain current effort			3082	202
2005	As for 2004			2949	507
2006	No increase in effort			4166	757
2007	No increase in effort and harvest rate of 15%	3200		3978	214
2008	As for 2007	3200		3799	194
2009	No increase in effort and recent average catch	< 4100		3496	327
2010	Harvest rate no greater than that equivalent to fishing at $F_{0.1}$	< 1000		2413	128
2011	MSY transition scheme	< 3100		2697	154
2012	MSY approach	< 3200		3542	213
2013	MSY approach	< 4200		3413	364
2014	MSY approach	< 3485		3257	77
2015	MSY approach	< 3092		3002	143
2016	MSY approach		≤ 3770**	3529	266
2017	MSY approach		≤ 3814***		
2018	MSY approach		≤ 2819***		

* Dead + surviving discards.

** Assuming all catches are landed.

*** Assuming recent discarding rates.

History of the catch and landings

Table 8 Norway lobster in Division 6.a, Functional Unit 11. Catch distribution by fleet in 2016 as estimated by ICES.

Catch		Landings			Total discards	
98.8% dead	1.2% surviving	Directed <i>Nephrops</i> fishery		Mixed <i>Nephrops</i> /demersal fishery	75% dead	25% surviving
		86% trawl	13.6% creels	0.4% trawl		
3795 t		3529 t			266 t	

Table 9 Norway lobster in Division 6.a, Functional Unit 11. History of landings and discards; ICES estimates of landings (for Scotland by gear) and total discards. All weights are in tonnes.

Year	UK Scotland					Other UK & Ireland	Total	Total discards*
	<i>Nephrops</i> trawl	Other trawl	Creel	Below minimum size (BMS)	Subtotal			
1981	2320	171	370	0	2861	0	2861	
1982	2323	105	371	0	2799	0	2799	
1983	2784	96	317	0	3197	0	3197	
1984	3449	160	534	0	4143	0	4143	
1985	3235	117	708	0	4060	0	4060	
1986	2641	203	537	0	3381	0	3381	
1987	3459	143	482	0	4084	0	4084	
1988	3450	148	437	0	4035	0	4035	
1989	2603	112	490	0	3205	0	3205	
1990	1941	134	471	0	2546	0	2546	199
1991	2229	126	438	0	2793	0	2793	441
1992	2978	149	432	0	3559	0	3559	353
1993	2699	86	408	0	3193	0	3193	29
1994	2916	246	453	0	3614	0	3614	1637
1995	2940	183	532	0	3655	0	3655	856
1996	2354	148	370	0	2872	0	2872	323
1997	2553	102	391	0	3046	0	3046	286
1998	2023	68	350	0	2441	0	2441	67
1999	2792	56	409	0	3257	0	3257	273
2000	2695	28	524	0	3247	0	3247	100
2001	2649	42	568	0	3259	0	3259	160
2002	2775	79	586	0	3440	0	3440	277
2003	2606	45	618	0	3269	0	3269	299
2004	2391	30	661	0	3082	0	3082	202
2005	2270	23	656	0	2949	0	2949	507
2006	3446	23	697	0	4166	0	4166	757
2007	3361	26	591	0	3978	0	3978	214
2008	3229	13	557	0	3799	0	3799	194
2009	2849	34	613	0	3496	0	3496	327
2010	1783	9	621	0	2413	0	2413	128
2011	2109	17	571	0	2697	0	2697	154
2012	2963	12	565	0	3540	2	3542	213
2013	2356	480	575	0	3411	2	3413	364
2014	2752	13	490	0	3255	2	3257	77
2015	2561	23	418	0	3002	0	3002	143
2016**	3039	15	475	0.4***	3529	0	3529	266

* Dead + surviving discards.

** Preliminary.

*** Below minimum size landings are not rounded, showing the reported values.

Summary of the assessment

Table 10 Norway lobster in Division 6.a, Functional Unit 11. Assessment summary.

Year	UWTV abundance estimate	95% CI	Harvest ratio*	Landings numbers	Total discards in numbers**	Removals numbers	Landings	Total discards*	Discard rate	Mean weight in landings	Mean weight in discards	Dead discard rate
	millions		%	millions			tonnes		%	grammes		%
1994	820	121	31.5	154	139	258	3614	1637	47.4	23.45	11.8	40.3
1995	No survey			164	80	225	3655	856	32.8	22.24	10.65	26.8
1996	541	77	23.5	108	26	127	2872	323	19.4	26.68	12.49	15.3
1997	No survey			140	26	159	3046	286	15.4	21.71	11.18	12
1998	898	126	12.2	103	8	110	2441	67	7.5	23.65	8.04	5.7
1999	794	147	20.7	144	28	165	3257	273	16.4	22.7	9.69	12.8
2000	1166	134	12.1	134	10	142	3247	100	6.9	24.19	10.08	5.2
2001	1092	133	13	129	17	141	3259	160	11.7	25.33	9.32	9.1
2002	1337	149	11.5	133	28	154	3440	277	17.6	25.93	9.78	13.8
2003	1751	211	8.5	126	30	148	3269	299	19.2	26.03	10	15.2
2004	1751	175	7.8	122	18	136	3082	202	13	25.16	11.02	10.1
2005	1540	164	9.4	107	50	144	2949	507	32	27.65	10.09	26.1
2006	1762	165	12.8	170	74	225	4166	757	30.3	24.52	10.27	24.6
2007	1206	150	14.7	168	12	177	3978	214	6.5	23.61	18.1	5
2008	1047	157	16.5	159	19	173	3799	194	10.5	23.9	10.36	8.1
2009	1195	227	13.7	138	35	164	3496	327	20.3	25.42	9.34	16
2010	1293	231	7	82	12	91	2413	128	12.4	29.39	10.98	9.6
2011	1726	226	6.3	96	16	108	2697	154	14.2	27.56	9.66	11
2012	891	181	18.7	151	21	167	3542	213	12.6	23.43	10.33	9.3
2013	1403	206	10	122	24	140	3413	364	16.4	27.52	15.18	12.8
2014	1251	171	9.6	115	8	121	3257	77	6.3	27.96	9.99	4.8
2015	1445	370	7.9	103	15	114	3002	143	12.6	28.74	9.66	9.8
2016	1422	290	10.7	136	22	152	3529	266	14	25.76	12.05	10.9
2017	1050	149										

* Harvest ratios prior to 2006 may be underestimates because of underreporting of landings.

** Dead + surviving discards.

Sources and references

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