

## Norway lobster (*Nephrops norvegicus*) in Division 4.b, Functional Unit 8 (central North Sea, Firth of Forth)

### ICES stock advice

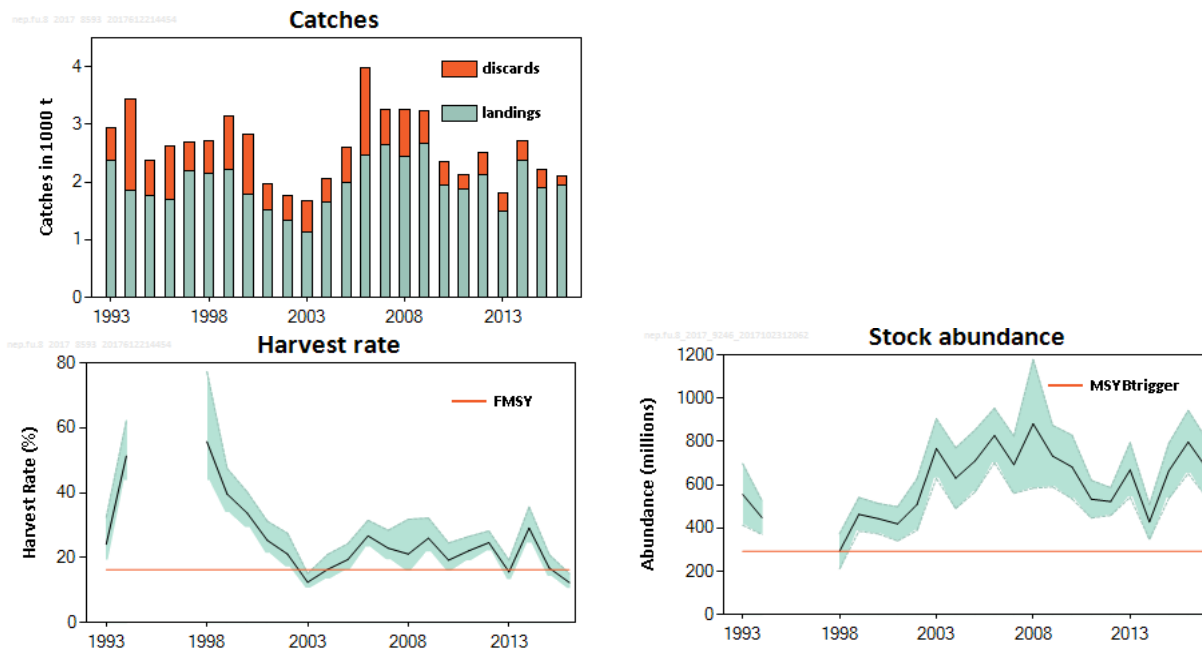
**Please note: The present advice replaces the advice given in June 2017 for catches in 2018.**

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 2376 tonnes.

In order to ensure the stock in Functional Unit (FU) 8 is exploited sustainably, management should be implemented at the FU level. In recent years, the catch in FU 8 has been lower than advised, and if the difference is transferred to other FUs, this could result in non-precautionary exploitation of those FUs.

### Stock development over time

The stock size has been above  $MSY B_{trigger}$  for most of the time-series. The harvest rate is varying and is now below  $F_{MSY}$ .



**Figure 1** Norway lobster in Division 4.b, Functional Unit 8. 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. Orange lines show proxies for  $MSY B_{trigger}$  and  $F_{MSY}$ . UWTV abundance is estimated by average densities per stratum area. Shaded areas for abundance are  $\pm 2$  standard deviations (approximately 95% confidence intervals). Confidence intervals for harvest rates are derived from the confidence intervals for abundance. Harvest rates prior to 2006 may be unreliable due to underreporting of landings.

## Stock and exploitation status

**Table 1** Norway lobster in Division 4.b, Functional Unit 8. 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	$B_{Trigger}$	✔	✔ 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 4.b, Functional Unit 8. The basis for the catch options.

Variable	Value	Source	Notes
Stock abundance	670 million individuals	ICES (2017a)	UWTV 2017
Mean weight in landings	23.25 g	ICES (2017a)	Average 2014–2016
Mean weight in discards	10.75 g	ICES (2017a)	Average 2014–2016
Mean weight in unwanted catch > MCS	13.98 g	ICES (2017a)	Average 2014–2016
Mean weight in unwanted catch < MCS	7.22 g	ICES (2017a)	Average 2014–2016
Discard rate (total)	21.2%	ICES (2017a)	Average 2014–2016 (proportion by number)
Discard rate (> MCS)	11.1%	ICES (2017a)	Average 2014–2016 (proportion by number)
Discard rate (< MCS)	10.1%	ICES (2017a)	Average 2014–2016 (proportion by number)
Discard survival rate	25%	ICES (2017a)	Proportion by number; only applies in scenarios where discarding is allowed.
Dead discard rate (total)	16.8%	ICES (2017a)	Average 2014–2016 (proportion by number); only applies in scenarios where discarding is allowed.
Dead discard rate (< MCS)	7.8%	ICES (2017a)	Average 2014–2016 (proportion by number); only applies in scenarios where discarding is allowed below the minimum conservation size (MCS).

**Table 3** Norway lobster in Division 4.b, Functional Unit 8. Annual catch options. All weights are in tonnes.

### Catch options assuming zero discards

Basis	Total catches	Wanted catches *	Unwanted catches *	Harvest rate **
ICES advice basis				
MSY approach	2250	2001	249	16.3%
Other options				
$F_{0.1}$	1298	1154	144	9.4%
$F_{2016}$	1698	1510	188	12.3%
$F_{35SpR}$	1753	1559	194	12.7%
$F_{2014-2016}$	2677	2381	296	19.4%

\* “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 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	2376	2310	2113	197	66	16.3%
Other options						
F <sub>0.1</sub>	1370	1332	1218	114	38	9.4%
F <sub>2016</sub>	1793	1743	1594	149	50	12.3%
F <sub>35SpR</sub>	1851	1800	1646	154	51	12.7%
F <sub>2014–2016</sub>	2827	2749	2514	235	78	19.4%

\* Calculated for dead removals.

**Discarding assumed below MCS only\***

Basis	Total catch	Dead removals	Landings (wanted catch)	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	2309	2288	2052	174	62	21	16.3%
Other options							
F <sub>0.1</sub>	1330	1318	1183	100	35	12	9.4%
F <sub>2016</sub>	1740	1725	1548	131	46	15	12.3%
F <sub>35SpR</sub>	1798	1782	1599	135	48	16	12.7%
F <sub>2014–2016</sub>	2746	2722	2442	207	73	24	19.4%

\* 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 is assumed to survive (25%).

**Basis of the advice**

**Table 4** Norway lobster in Division 4.b, Functional Unit 8. 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**

The length and sex composition of the landings are considered to be well sampled. Discard sampling has been conducted on a quarterly basis for Scottish Norway lobster trawlers in this fishery since 1990 and is considered to represent the fishery adequately. The underwater TV (UWTV) surveys have been conducted for this stock since 1993, with a continuous annual series available since 1998.

Data from the latest UWTV survey (August 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 became available in August 2017 and showed a significant decrease in abundance to below the 2016 level. The advice for 2018 has therefore been updated to reflect the more recent data.

From 2016 the EU landing obligation is 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 animals 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 the previous stock advice from November (ICES, 2016a), 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 (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, only a very small percentage of Norway lobster were recorded as below MCS (BMS category) in FU 8 (less than 0.1%), despite this FU historically having shown relatively high discard rates.

Results from a North Sea mixed-fisheries analysis are presented in ICES (2017b); this analysis has not been updated. The analysis for 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 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.

A single total allowable catch (TAC) covers all of ICES Subarea 4, except the Norwegian Deep. Management should ensure that fishing opportunities are in line with the scale of the resources in each of the stocks.

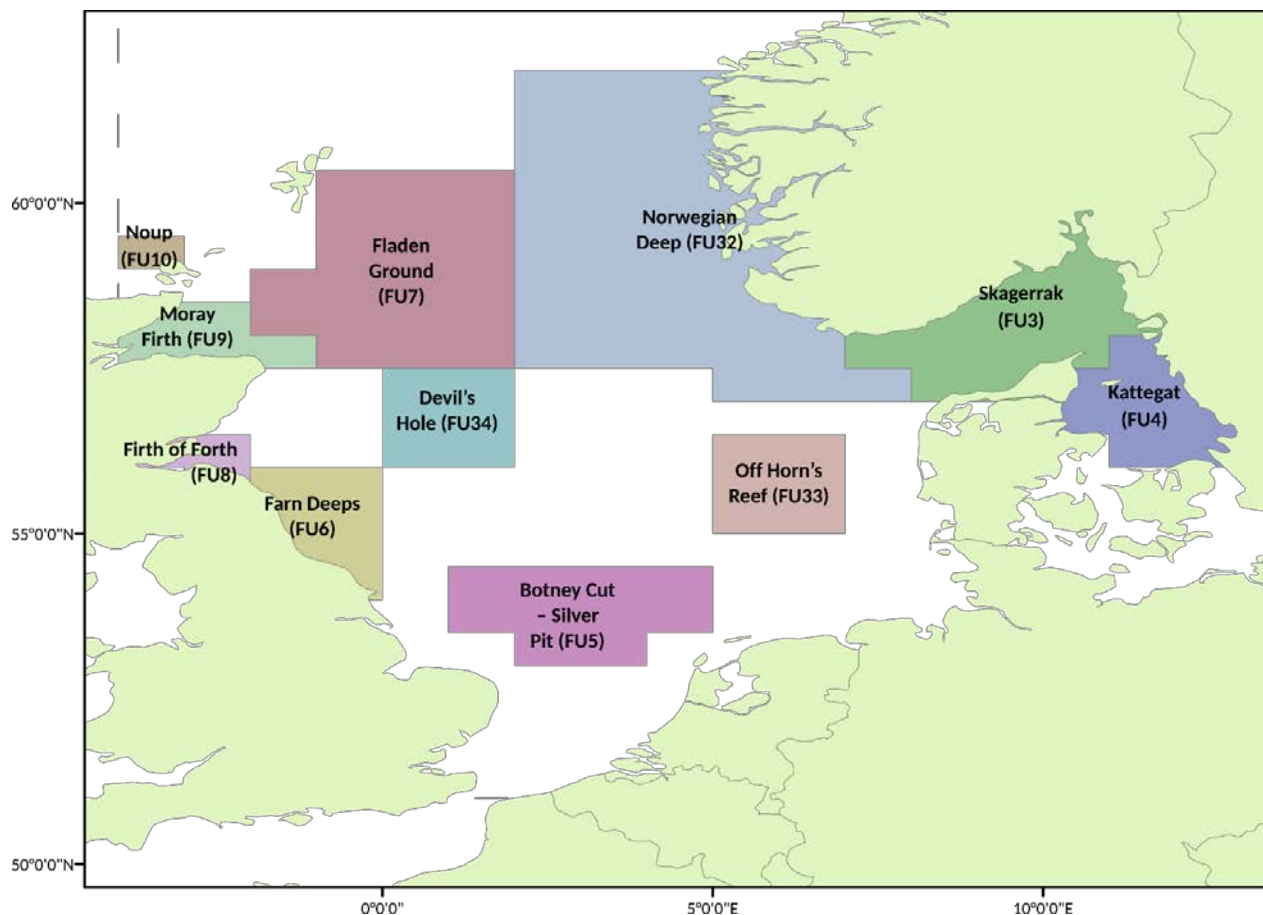


Figure 2 Norway lobster functional units in the North Sea and Skagerrak/Kattegat region.

### Reference points

Table 5 Norway lobster in Division 4.b, Functional Unit 8. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	292 million individuals	Lowest observed UWTV survey estimate of abundance (1993–2010)	ICES (2010)
	$F_{MSY}$	Harvest rate 16.3%	Proxy, equivalent to $F_{max}$ for combined sexes	ICES (2012)
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		

## Basis of the assessment

**Table 6** Norway lobster in Division 4.b, Functional Unit 8. Basis of the assessment and advice.

ICES stock data category	1 ( <a href="#">ICES, 2016b</a> )
Assessment type	Underwater TV survey linked to yield-per-recruit analysis from length data (ICES, 2017a)
Input data	Commercial catches (international landings, length frequencies from Scottish catch sampling), one survey index (FU 8 UWTV). Maturity data from commercial catch sampling. Natural mortalities from Morizur (1982): 0.3 for males and immature females, 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 89% of the landings). 95% of the discards were obtained from sampling (5% raised discards). BMS landings, where reported, are included as dead removals in the assessment from 2016.
Indicators	Sex ratio, length frequencies, mean size, LPUE
Other information	The latest benchmark (on the use of UWTV surveys) was performed in 2009 (ICES, 2009).
Working groups	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak ( <a href="#">WGNSSK</a> )

## 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 8. Official landings and ICES estimated discards. All weights are in tonnes.

Year	ICES advice	Landings advice	Catch advice	ICES landings	ICES total discards *	BMS reported to ICES
1993				2368	567	
1994				1850	1584	
1995				1762	620	
1996				1687	930	
1997				2193	494	
1998				2144	578	
1999				2207	938	
2000				1785	1032	
2001				1527	436	
2002				1340	421	
2003				1127	546	
2004				1657	406	
2005				1989	602	
2006	No increase in effort			2458	1510	
2007	No increase in effort, harvest rate < 15%	1500		2651	614	
2008	No new advice, same as for 2007	1500		2450	796	
2009	No increase in effort and recent average landings	< 2500		2663	573	
2010	Harvest rate no greater than that equivalent to fishing at $F_{max}$	< 1600		1950	407	
2011	MSY transition	< 2000		1889	231	
2012	MSY transition	< 1700		2129	379	
2013	MSY transition	< 1400		1503	301	
2014	MSY transition	< 1417		2384	353	

Year	ICES advice	Landings advice	Catch advice	ICES landings	ICES total discards *	BMS reported to ICES
2015	MSY approach	< 1769		1897	311	
2016	MSY approach	< 1866	≤ 2040**	1935	165	2
2017	MSY approach		≤ 2548***			
2018	MSY approach		≤ 2376^			

\* Dead + surviving discards.

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

\*\*\* Assuming discarding includes animals below MCS only.

^ Assuming recent total discard rate (21.2% by number).

## History of the catch and landings

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

Catch (2016)		Landings			BMS	Discards	
98% dead	2% surviving	directed <i>Nephrops</i> fishery 86% TR2	mixed <i>Nephrops</i> /demersal fishery 8% TR1	6% creel	< 0.1%	75% dead	25% surviving
2102 tonnes		1935 tonnes			2 tonnes	165 tonnes	

**Table 9** Norway lobster in Division 4.b, Functional Unit 8. History of commercial catch and landings. Official landings and ICES estimated discards are presented by country. All weights are in tonnes.

Year	UK Scotland				UK (E, W & NI)	Total*	Total discards ***	BMS reported to ICES
	<i>Nephrops</i> trawl	Other trawl	Creel	Subtotal				
1981	947	60	0	1007	0	1007		
1982	1138	57	0	1195	0	1195		
1983	1681	43	0	1724	0	1724		
1984	2078	56	0	2134	0	2134		
1985	1907	61	0	1968	0	1968		
1986	2204	59	0	2263	0	2263		
1987	1583	90	2	1675	0	1675		
1988	2455	74	0	2529	0	2529		
1989	1834	53	0	1887	1	1888		
1990	1900	30	0	1930	1	1931		
1991	1362	43	0	1405	0	1405		
1992	1715	41	0	1756	0	1756		
1993	2349	17	0	2366	2	2368	567	
1994	1827	17	0	1844	6	1850	1584	
1995	1707	53	0	1760	2	1762	620	
1996	1621	66	0	1687	0	1687	930	
1997	2136	55	0	2191	2	2193	494	
1998	2105	37	0	2142	2	2144	578	
1999	2193	10	1	2204	3	2207	938	
2000	1775	9	0	1784	1	1785	1032	
2001	1484	34	0	1518	9	1527	436	
2002	1302	31	1	1334	6	1340	421	
2003	1116	8	0	1124	3	1127	546	
2004	1650	4	0	1654	3	1657	406	
2005	1974	0	4	1978	11	1989	602	
2006	2438	3	12	2453	5	2458	1510	
2007	2627	10	7	2644	7	2651	614	
2008	2435	2	8	2445	5	2450	796	
2009	2620	8	26	2654	9	2663	573	

Year	UK Scotland				UK (E, W & NI)	Total*	Total discards ***	BMS reported to ICES
	<i>Nephrops</i> trawl	Other trawl	Creel	Subtotal				
2010	1923	5	13	1941	9	1950	407	
2011	1789	6	89	1884	5	1889	231	
2012	1944	17	126	2087	42	2129	379	
2013	1409	24	58	1491	12	1503	301	
2014	2344	4	14	2362	22	2384	353	
2015	1784	2	43	1829	68	1897	311	
2016**	1786	1	116	1903	32	1935	165	2

\* There are no landings by other countries from this FU.

\*\* Provisional.

\*\*\* Dead + surviving discards.



**Summary of the assessment**

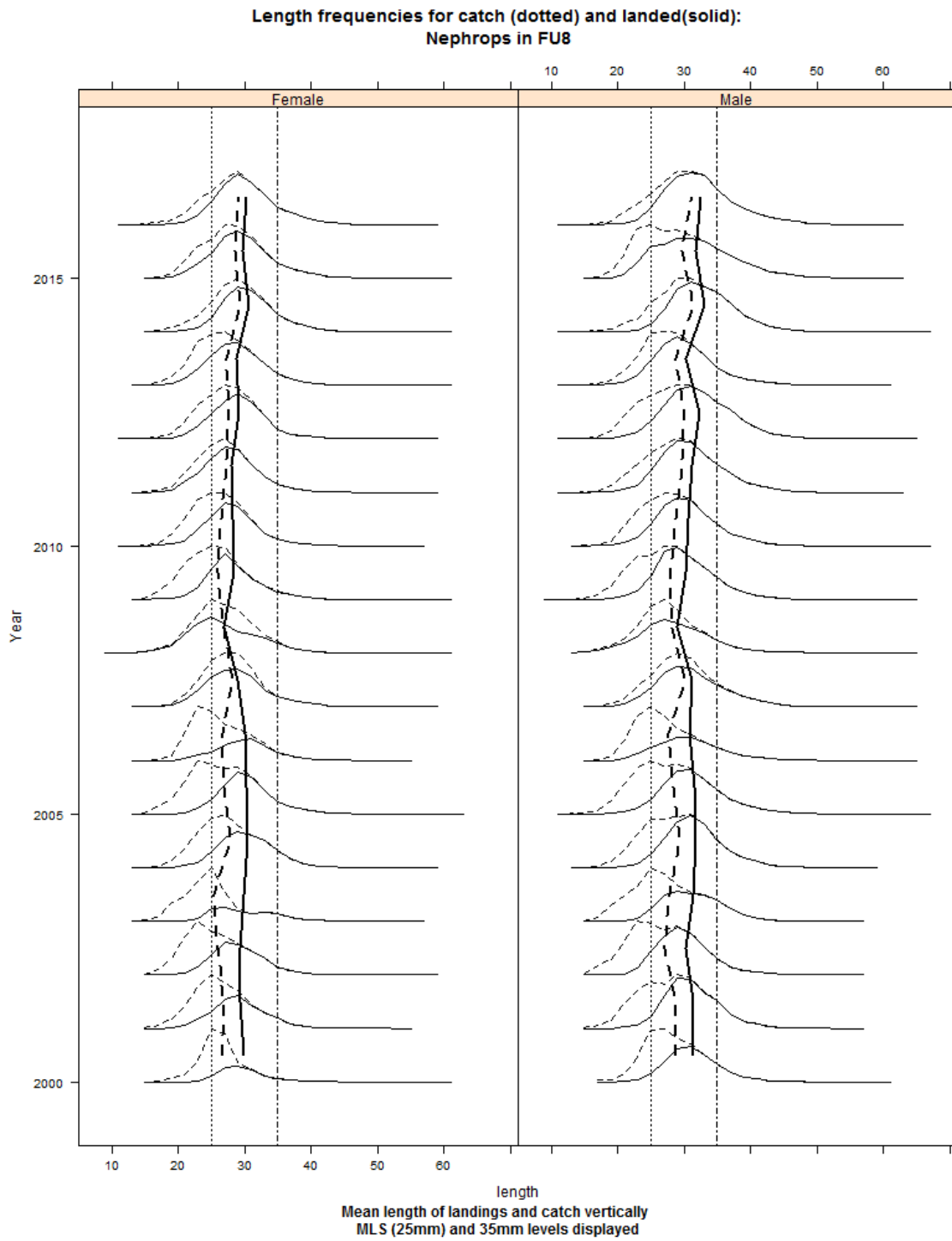
**Table 10** Norway lobster in Division 4.b, Functional Unit 8. Assessment summary.

Year	Adjusted abundance*	2 standard deviations	Harvest rate	Landings numbers	Discards numbers	Removals numbers	Landings	Discards	Dead discards	Discard rate	Mean weight in landings	Mean weight in discards	Dead discard rate
	millions		%								millions	tonnes	%
1993	555	142	24.1	97	49	134	2368	567	426	33.3	24.3	11.64	27.3
1994	448	78	51.3	95	180	230	1850	1584	1188	65.5	19.51	8.79	58.8
1995	NA	NA	NA	90	59	134	1762	620	465	39.5	19.55	10.54	32.9
1996	375	88	37.3	81	78	140	1687	930	697	49.2	20.81	11.85	42.1
1997	NA	0	NA	116	56	158	2193	494	371	32.6	18.87	8.79	26.6
1998	292	81	55.7	118	60	163	2144	578	434	33.9	18.23	9.6	27.8
1999	463	78	39.6	110	97	183	2207	938	704	47	20.05	9.63	39.9
2000	443	70	33.7	82	90	150	1785	1032	774	52.5	21.83	11.42	45.3
2001	419	79	25.3	72	45	106	1527	436	327	38.7	21.22	9.59	32.1
2002	508	119	21.1	68	52	107	1340	421	316	43.1	19.62	8.16	36.2
2003	767	138	12.4	51	59	95	1127	546	410	53.9	22.31	9.25	46.7
2004	630	140	16.4	74	40	103	1657	406	304	34.9	22.45	10.25	28.7
2005	710	143	19.4	89	65	138	1989	602	452	42.1	22.33	9.28	35.3
2006	827	126	26.7	115	142	221	2458	1510	1133	55.2	21.43	10.67	48.1
2007	692	132	22.9	126	43	159	2651	614	461	25.3	20.97	14.34	20.3
2008	881	297	21.1	142	58	186	2450	796	597	29.1	17.23	13.65	23.5
2009	732	142	26	137	71	190	2663	573	430	34.1	19.41	8.09	27.9
2010	682	147	19.2	99	43	131	1950	407	305	30.2	19.76	9.55	24.5
2011	533	87	22.1	100	24	118	1889	231	173	19.5	19.75	9.56	15.3
2012	522	64	24.6	100	38	129	2129	379	284	27.2	21.66	10.10	21.9
2013	668	126	15.6	81	31	104	1503	301	226	27.4	19.30	9.82	22.0
2014	428	80	29.1	102	30	124	2384	353	265	22.9	24.30	11.66	18.3
2015	664	127	16.8	90	29	112	1897	311	234	24.4	21.84	10.74	19.5
2016	797	146	12.3	85	17	98	1937**	165	123	16.4	23.62	9.86	12.8
2017	670	133											

\* For animals greater than 17 mm.

\*\* Includes BMS landings.

NA = not available.



**Figure 3** Norway lobster in Firth of Forth (FU 8). 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

- ICES. 2009. Report of the Benchmark Workshop on *Nephrops* (WKNEPH), 2–6 March 2009, Aberdeen, UK. ICES CM 2009/ACOM:33. 156 pp.
- ICES. 2010. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 5–11 May 2010, ICES Headquarters, Copenhagen, Denmark. ICES CM 2010/ACOM:13. 1058 pp.
- ICES. 2012. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 4–10 May 2011, ICES Headquarters, Copenhagen. ICES CM 2011/ACOM:13. 1197 pp.
- ICES. 2016a. Norway lobster (*Nephrops norvegicus*) in Division 4.b, Functional Unit 8 (central North Sea, Firth of Forth). *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 6, Section 6.3.28. 9 pp.
- ICES. 2016b. Advice basis. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2.
- ICES. 2017a. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 26 April–5 May 2017, ICES Headquarters, Copenhagen, Denmark. ICES CM 2017/ACOM:21. 1077 pp.
- ICES. 2017b. Report of the Working Group on Mixed-Fisheries Advice for the North Sea (WGMIXFISH-ADVICE), 22–26 May 2017, ICES Headquarters, Copenhagen, Denmark. ICES CM 2017/ACOM:18. In preparation.
- ICES. 2017c. Norway lobster (*Nephrops norvegicus*) in Division 4.b, Functional Unit 8 (central North Sea, Firth of Forth). June advice. *In* Report of the ICES Advisory Committee, 2017. ICES Advice 2017, nep.fu.8. DOI: 10.17895/ices.pub.3194.
- Morizur, Y. 1982. Estimation de la mortalité pour quelque stocks de langoustine, *Nephrops norvegicus*. ICES CM 1982/K:10. 19 pp.