

6.3.27 Norway lobster (*Nephrops norvegicus*) in Division 4.a, Functional Unit 7 (northern North Sea, Fladen Ground) (update)

ICES stock advice

Please note: The present advice replaces the advice given for this stock in June 2016.

ICES advises that when the MSY approach is applied, and under the assumptions that discarding would occur only below the minimum conservation size (MCS) and that fishery selection patterns do not change from the average (2013–2015), catches in 2017 should not exceed 12 699 tonnes. This would imply wanted catch of no more than 12 656 tonnes.

In order to ensure the stock in this functional unit (FU) is exploited sustainably, management should be implemented at the FU level. In recent years, the catch in this FU 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 declined from the highest observed value in 2008 until the lowest abundance estimate in the time-series in 2015. In 2016 the stock size increased again and is now above MSY $B_{trigger}$. The harvest rate has declined in recent years and remains well below F_{MSY} .

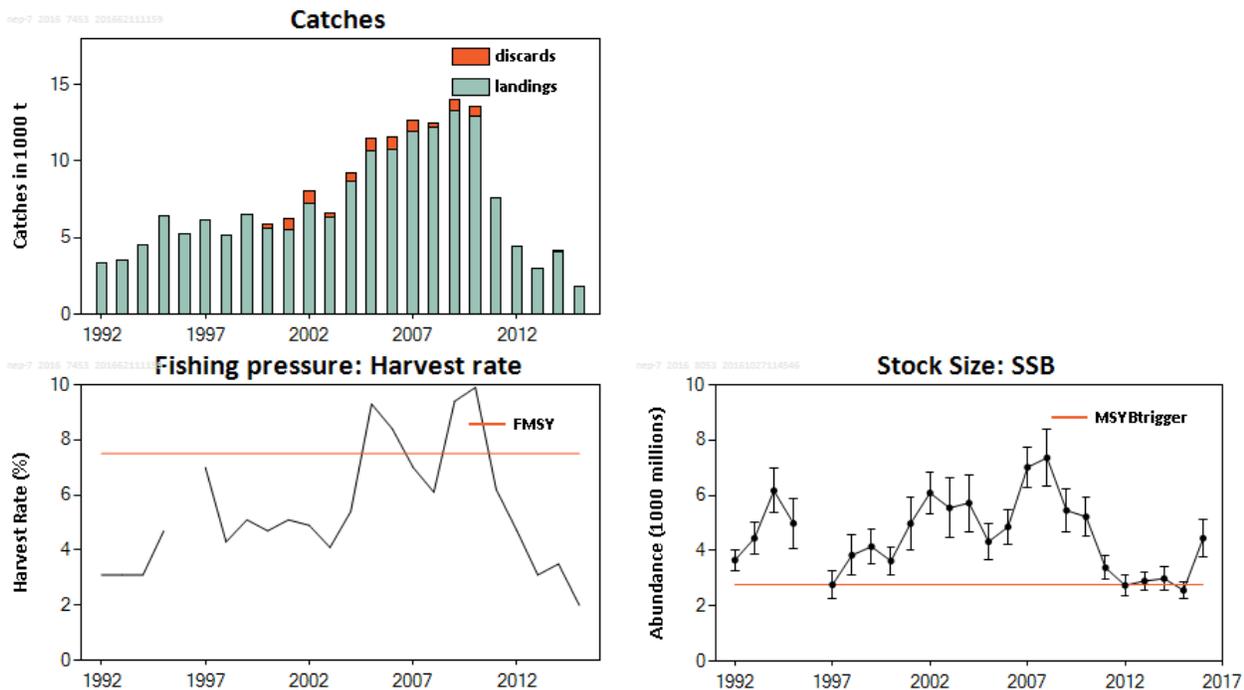


Figure 6.3.27.1 Norway lobster in Division 4.a, FU 7. Long-term trends in catches, harvest rate, and underwater TV survey (UWTV) abundance (used as F and SSB proxies). Orange lines show proxies for $MSY B_{trigger}$ and F_{MSY} . Harvest rates before 2006 may be unreliable owing to underreporting of landings.

Stock and exploitation status

Table 6.3.27.1 Norway lobster in Division 4.a, FU 7. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size					
		2013	2014	2015	2014	2015	2016			
Maximum sustainable yield	F_{MSY}	✓	✓	✓	Appropriate	MSY	✓	✗	✓	Above trigger
Precautionary approach	F_{pa} , F_{lim}	?	?	?	Undefined	B_{pa} , B_{lim}	?	?	?	Undefined
Management plan	F_{MGT}	-	-	-	Not applicable	SSB_{MGT}	-	-	-	Not applicable

Catch options

Table 6.3.27.2 Norway lobster in Division 4.a, FU 7. The basis for the catch options.

Variable	Value	Source	Notes
Stock abundance	4449 million individuals	ICES (2016a) Annex 4	UWTV 2016
Mean weight in landings	38.24g	ICES (2016a)	Average 2013–2015
Mean weight in discards	15.30g	ICES (2016a)	Average 2013–2015
Mean weight in unwanted catch >MCS	16.13g	ICES (2016a)	Average 2013–2015
Mean weight in unwanted catch < MCS	7.58g	ICES (2016a)	Average 2013–2015
Discard rate (total)	0.83%	ICES (2016a)	Average 2013–2015 (proportion by number)
Discard rate (>MCS)	0.75%	ICES (2016a)	Average 2013–2015 (proportion by number)
Discard rate (< MCS)	0.08%	ICES (2016a)	Average 2013–2015 (proportion by number)
Discard survival rate	25%	ICES (2016a)	Proportion by number, only applies in scenarios when discarding is allowed.
Dead discard rate (total)	0.62%	ICES (2016a)	Average 2013–2015 (proportion by number), only applies in scenarios when discarding is allowed.
Dead discard rate (< MCS)	0.06%	ICES (2016a)	Average (proportion by number) 2013–2015, only applies in scenarios when discarding is allowed below MCS.

Table 6.3.27.3 Norway lobster in Division 4.a, FU 7. The catch options. All weights are in tonnes.

Catch options assuming zero discards

Rationale	Basis	Total catches	Wanted catches*	Unwanted catches*	Harvest rate**
MSY approach	MSY approach	12696	12654	42	7.5%
Other options	F_{2015}	3385	3374	11	2.0%
	$F_{2013-2015}$	4909	4893	16	2.9%
	$F_{35\%SPR}$	18959	18896	63	11.2%
	F_{max}	27763	27670	93	16.4%

* "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 discard rates estimates for average (2013–2015).

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

Discarding assumed below MCS only *

Rationale	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
MSY approach	MSY approach	12699	12698	12656	40	2	1	7.5%
Other options	F ₂₀₁₅	3386	3386	3375	11	0	0	2.0%
	F _{2013–2015}	4911	4911	4894	16	1	0	2.9%
	F _{35%SpR}	18963	18962	18900	60	2	1	11.2%
	F _{max}	27767	27766	27675	88	3	1	16.4%

* Assumed for all fleets.

** Unwanted landings are those animals >MCS, but historically 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 6.3.27.4 Norway lobster in Division 4.a, FU 7. The basis of the advice.

Advice basis	MSY approach.
Management plan	There is no management plan for Norway lobster in this area.

Quality of the assessment

The underwater TV (UWTV) survey in this area is conducted over an area of around 28 200 km² of suitable mud substrate. The Fladen Ground functional unit contains several patches of mud to the north of the grounds which are fished, bringing the overall area of substrate to 30 633 km². This northern area is not surveyed but would add to the abundance estimate. The abundance for the total ground is likely to be higher than currently estimated.

Length–frequency of catches in the Fladen Ground area have clearly shifted towards larger animals since 2010 (Figure 6.3.27.5), suggesting a different selection pattern in the fishery. In addition, the discard rate has declined, potentially due to a shift to larger meshes (TR1) and use of highly selective gears (for cod avoidance). The larger size of Norway lobster in catches in recent years implies that the L₅₀ for both male and female selection is higher than previously estimated. The F_{MSY} reference point for FU 7 was updated in 2015 and takes new selection patterns and growth information into account.

Data from the latest UWTV survey (June 2016) have been used as the most up-to-date indicator of stock abundance.

Issues relevant for the advice

The results of the 2016 UWTV became available in August 2016 and showed a significant increase above the 2015 level. The advice for 2017 has therefore been updated to reflect the more recent data.

It should be noted that in recent years the catch in this FU has been lower than advised. The large abundance increase in 2016 may be related with a strong recruitment event. The size of *Nephrops* burrows is not quantified in the TV surveys, but burrow counters participating in the last survey reported a large number of small burrows in FU 7. If the increase is dominated by small *Nephrops*, it is unlikely they will appear in the fishery straight away given the selectivity observed for this FU.

Over 99% of the landings are taken by Scottish vessels. Approximately 45% landings are from vessels fishing for Norway lobster using a 80–99 mm mesh (TR2). There is increasing use of meshes larger than 100 mm (TR1). Since 2010, an increasing

number of TR2 vessels have been adapting gears to avoid cod bycatch when fishing for Norway lobster in ICES Division 4.a. Since 2011, discard rates in this FU have been close to zero and mean sizes of landed Norway lobster show a clear increase, suggesting a selectivity change. The reduction in the discard rate could be caused partly by lower retention of small individuals by the gear or by an increase in mesh size. Reduced recruitment could also contribute to lower discards.

There is a single total allowable catch (TAC) for the entire ICES Subarea 4, except Norwegian Deep. The advised catch for the Fladen Ground constitutes a large proportion of the total North Sea advised catch. Catches in the Fladen Ground have been declining since 2010 and are well below the advice for this area (Table 6.3.27.7). In order to ensure other FUs do not suffer from displacement from unused catch options from Fladen Ground, management should be implemented at the functional unit level.

Management should ensure that fishing opportunities are in line with the scale of the resource in each of the stocks.

For 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. The catch advice assumed discarding of all Norway lobster below the MCS for all fleets.

Results from a North Sea mixed-fisheries analysis are presented in ICES (2016c). For 2017, assuming a strictly implemented discard ban (corresponding to the “Minimum” scenario), haddock would be the most limiting stock (assuming that the full advised catch is taken), constraining 36 out of 41 fleet segments (corresponding to 91% of the 2015 kW days of effort). Cod and eastern Channel sole would be limiting for fleets, corresponding to 5% and 4% of the 2015 effort, respectively. Conversely, in the “Maximum” scenario with *Nephrops* managed by separate TACs for the individual functional units (FUs), *Nephrops* would be considered the least limiting stocks in many FUs. *Nephrops* in FU 33, FU 5, FU 32, FU 7, and FU Others would be the least limiting stocks for fleets in these FUs, representing 32%, 16%, 10%, 4%, and 17% of the 2015 effort, respectively. Eastern Channel plaice and saithe would be least limiting for other fleet segments, representing 12% and 9% of the 2015 effort, respectively.

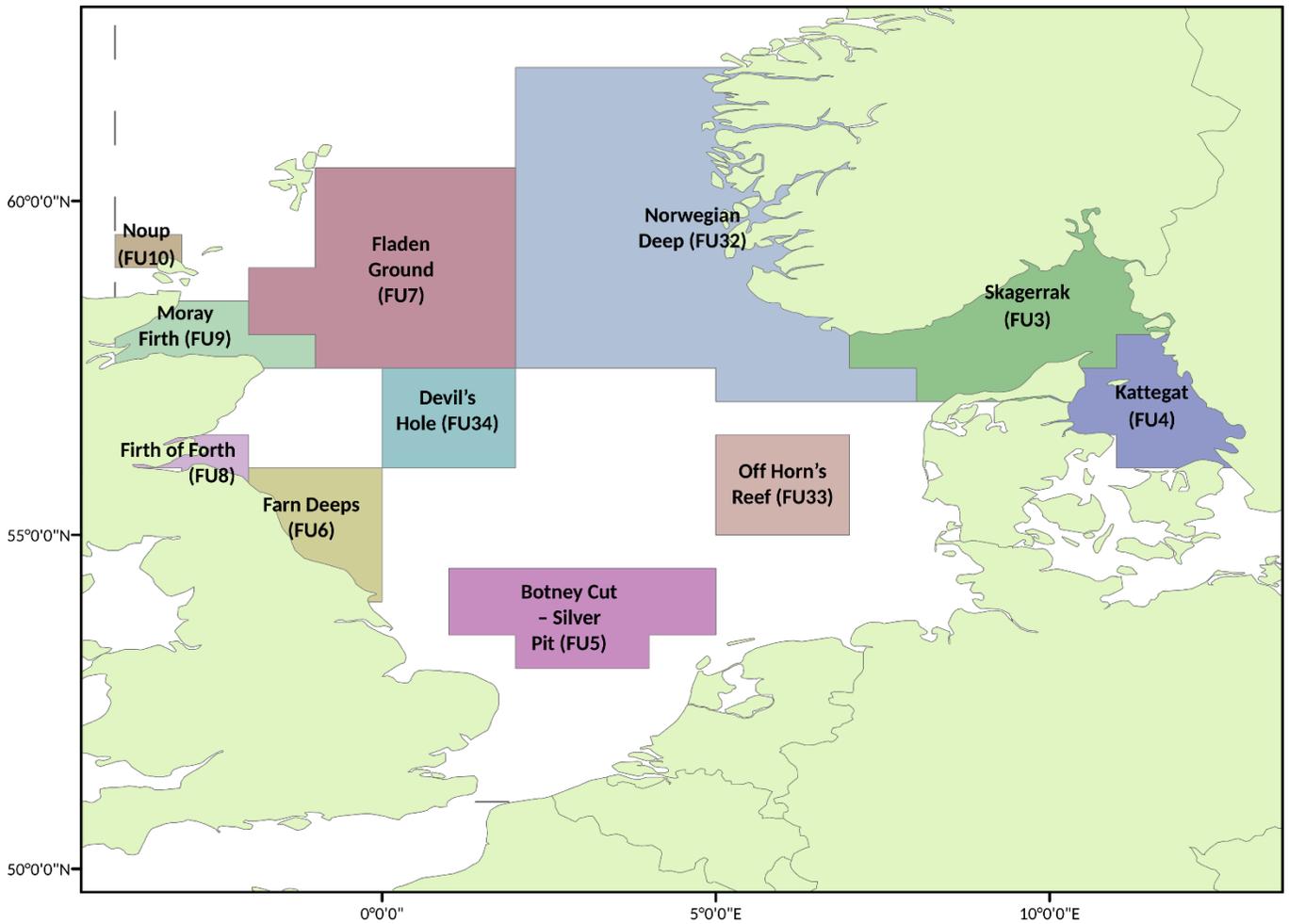


Figure 6.3.27.2 Norway lobster functional units in the North Sea and Skagerrak/Kattegat region.

Reference points

Table 6.3.27.5 Norway lobster in Division 4.a, FU 7. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2767 million individuals.	Lowest observed UWTV survey estimate of abundance (1992–2010).	ICES (2010)
	F_{MSY}	Harvest rate 7.5%.	Equivalent to the $F_{0.1}$ for combined sexes.	ICES (2015)
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 6.3.27.6 Norway lobster in Division 4.a, FU 7. The basis of the assessment.

ICES stock data category	1 (ICES, 2016b).
Assessment type	Underwater TV survey linked to yield-per-recruit analysis from length data (ICES, 2016a).
Input data	Commercial catches (international landings, length frequencies from Scottish catch sampling), one survey index (FU 7 UWTV). Maturity data from commercial catch sampling. Natural mortalities from Morizur (1982).
Discards and bycatch	Included in the assessment, data series from the majority of the fleets/main fleets, covering 80% of the landings in 2015. No discards were observed in 2015.
Indicators	Sex ratio, length frequencies, mean size, LPUE.
Other information	The latest benchmark (based on the UWTV survey) was performed in 2009 (ICES, 2009).
Working groups	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

Results for Norway lobster exist in the fishers’ survey for Area 1, which is larger than FU 7. These results indicate similar trends to the assessment (Napier, 2014). No new information has been provided for 2015.

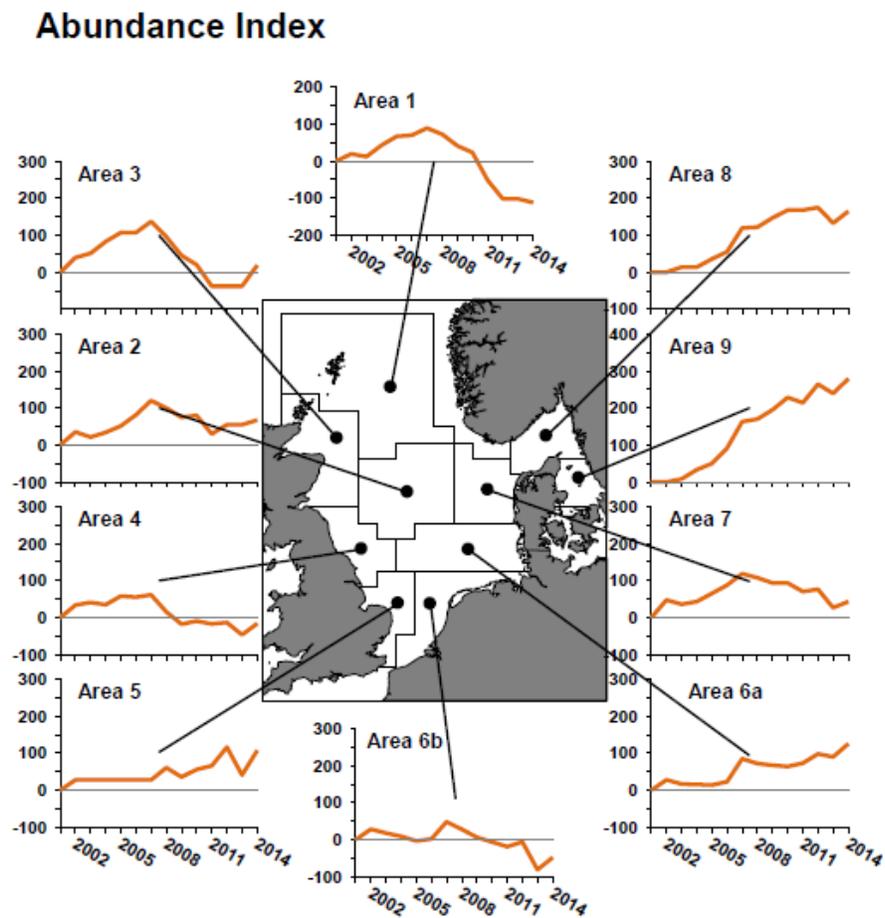


Figure 6.3.27.3 Cumulative time-series of index of perceptions of abundance of Norway lobster by roundfish sampling area from the Fishers' North Sea Stock Survey (see page 14 of Napier [2014] for an explanation of the index).

History of the advice, catch, and management

Table 6.3.27.7 Norway lobster in Division 4.a, FU 7. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in thousand tonnes.

Year	ICES advice	Landings advice	Catch advice	ICES landings	ICES total discards*
1992		~2.7		3.4	
1993		2.7		3.5	
1994		5.0		4.6	
1995		5.0		6.4	
1996		5.0		5.2	
1997		5.0		6.2	
1998		7.0		5.1	
1999		7.0		6.5	
2000		9.0		5.6	0.3
2001		9.0		5.5	0.7
2002		9.0		7.2	0.8
2003		9.0		6.3	0.3
2004		12.8		8.7	0.5
2005		< 12.8		10.7	0.8
2006	No increase of effort	-		10.8	0.8
2007	No increase in effort and harvest rate below 7.5%	< 10.9		11.9	0.7
2008	No new advice, same as for 2007	< 10.9		12.24	0.3
2009	No increase in effort and recent average landings	< 11.3		13.33	0.7
2010	Harvest rate no greater than that equivalent to fishing at $F_{0.1}$	< 16.4		12.82	0.6
2011	MSY approach	< 13.3		7.6	0
2012	MSY approach	< 14.1		4.4	0
2013	MSY approach	< 10		3.0	0
2014	MSY approach	< 8.959		4.1	0.04
2015	MSY approach	< 10.759		1.8	0
2016	MSY approach	< 6.847	≤ 6.856**		
2017	MSY approach		≤ 12.699***		

* Dead + surviving discards.

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

*** Assuming discarding below MCS only.

History of catch and landings

Table 6.3.27.8 Norway lobster in Division 4.a, FU 7. Catch distribution by fleet in 2015 as estimated by ICES.

Catch (2015)		Landings		Discards
100% dead	0% surviving	directed <i>Nephrops</i> fishery 45% TR2	mixed <i>Nephrops</i> /demersal fishery 55% TR1	0 t
1786 t		1786 t		

Table 6.3.27.9 Norway lobster in Division 4.a, FU 7. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	UK Scotland				Denmark	Other countries*	Total	Total discards***
	<i>Nephrops</i> trawl	Other trawl	Creel	Sub-total				
1981	304	68	0	372	0	0	372	
1982	381	40	0	421	0	0	421	
1983	588	105	0	693	0	0	693	
1984	552	94	0	646	0	0	646	
1985	1020	120	0	1140	7	0	1147	
1986	1401	92	0	1493	50	0	1543	
1987	1023	349	0	1372	323	0	1695	
1988	1309	185	0	1494	81	0	1575	
1989	1724	410	0	2134	165	0	2299	
1990	1703	598	0	2301	236	3	2540	
1991	3021	772	0	3793	424	6	4223	
1992	1809	1164	0	2973	359	31	3363	
1993	2031	1234	0	3265	224	3	3492	
1994	1816	2356	0	4172	390	6	4568	
1995	3568	2389	19	5976	439	4	6419	
1996	2338	2578	7	4923	286	1	5210	
1997	2712	3221	0	5933	235	2	6170	
1998	2290	2673	0	4963	173	0	5136	
1999	2860	3546	0	6406	96	16	6518	
2000	2916	2546	0	5462	103	5	5570	340
2001	3540	1936	0	5476	64	2	5542	687
2002	4511	2546	0	7057	173	15	7245	820
2003	4175	2033	0	6208	82	4	6294	349
2004	7274	1319	1	8594	136	0	8730	506
2005	8849	1508	5	10362	321	1	10684	823
2006	9470	1026	1	10497	283	11	10791	798
2007	11055	734	0	11789	119	3	11911	747
2008	11432	666	0	12098	133	8	12239	257
2009	12688	499	0	13187	130	10	13327	707
2010	12544	288	0	12832	124	12	12968	560
2011	7367	128	0	7495	64	< 0.5	7559	0
2012	4257	81	0	4338	75	2	4415	0
2013	2275	663	0	2938	5	8	2951	0
2014	2164	1970	0	4134	10	3	4147	37
2015**	806	968	0	1774	8	4	1786	0

*Other countries includes Belgium, Norway, and UK (England).

**Provisional.

*** Dead + surviving discards.

Summary of the assessment

Table 6.3.27.10 Norway lobster in Division 4.a, FU 7. Assessment summary.

Year	Adjusted abundance (millions)	95% CI	Harvest ratio (%)	Landings numbers (millions)	Discards numbers (millions)	Removals numbers (millions)	Landings (tonnes)	Discards (tonnes)	Dead discards (tonnes)	Discard rate (%)	Mean weight in landings (g)	Mean weight in discards (g)	Dead discard rate (%)
1992	3661	376	3.1	114	0	114	3363	0	0	0	29.61	NA	0
1993	4450	569	3.1	138	0	138	3492	0	0	0	25.38	NA	0
1994	6170	814	3.1	193	0	193	4568	0	0	0	23.72	NA	0
1995	4987	896	4.7	233	0	233	6419	0	0	0	27.51	NA	0
1996	NA	NA	NA	175	0	175	5210	0	0	0	29.82	NA	0
1997	2767	510	7	192	0	192	6170	0	0	0	32.08	NA	0
1998	3838	717	4.3	164	0	164	5136	0	0	0	31.37	NA	0
1999	4146	649	5.1	213	0	213	6518	0	0	0	30.55	NA	0
2000	3628	491	4.7	153	21	169	5570	340	255	12	36.35	16.24	9.3
2001	4981	970	5.1	221	43	253	5542	687	515	16.3	25.1	15.94	12.8
2002	6087	757	4.9	259	55	301	7245	820	615	17.4	27.93	14.97	13.7
2003	5547	1076	4.1	209	24	226	6294	349	262	10.1	30.15	14.83	7.8
2004	5725	1030	5.4	282	34	307	8730	506	379	10.6	30.98	15.06	8.2
2005	4325	662	9.3	368	46	403	10684	823	617	11.2	29.05	17.74	8.6
2006	4862	619	8.4	369	54	409	10791	798	599	12.7	29.25	14.87	9.8
2007	7017	730	7	447	55	488	11911	747	560	10.9	26.63	13.67	8.4
2008	7360	1019	6.1	434	18	448	12239	257	192	3.9	28.18	14.54	3.0
2009	5457	772	9.4	473	51	511	13327	707	530	9.7	28.20	13.85	7.5
2010	5224	711	9.9	492	34	517	12968	560	420	6.5	26.38	16.44	4.9
2011	3382	435	6.2	209	0	209	7559	0	0	0	36.17	NA	0
2012	2748	392	4.7	128	0	128	4415	0	0	0	36.91	NA	0
2013	2902	335	3.1	89	0	89	2951	0	0	0	34.90	NA	0
2014	2990	412	3.5	102	3	104	4147	37	28	2.5	43.11	13.9	1.9
2015	2569	320	2.0	51	0	51	1786	0	0	0	36.7	NA	0
2016	4449	662											

NA = not available.

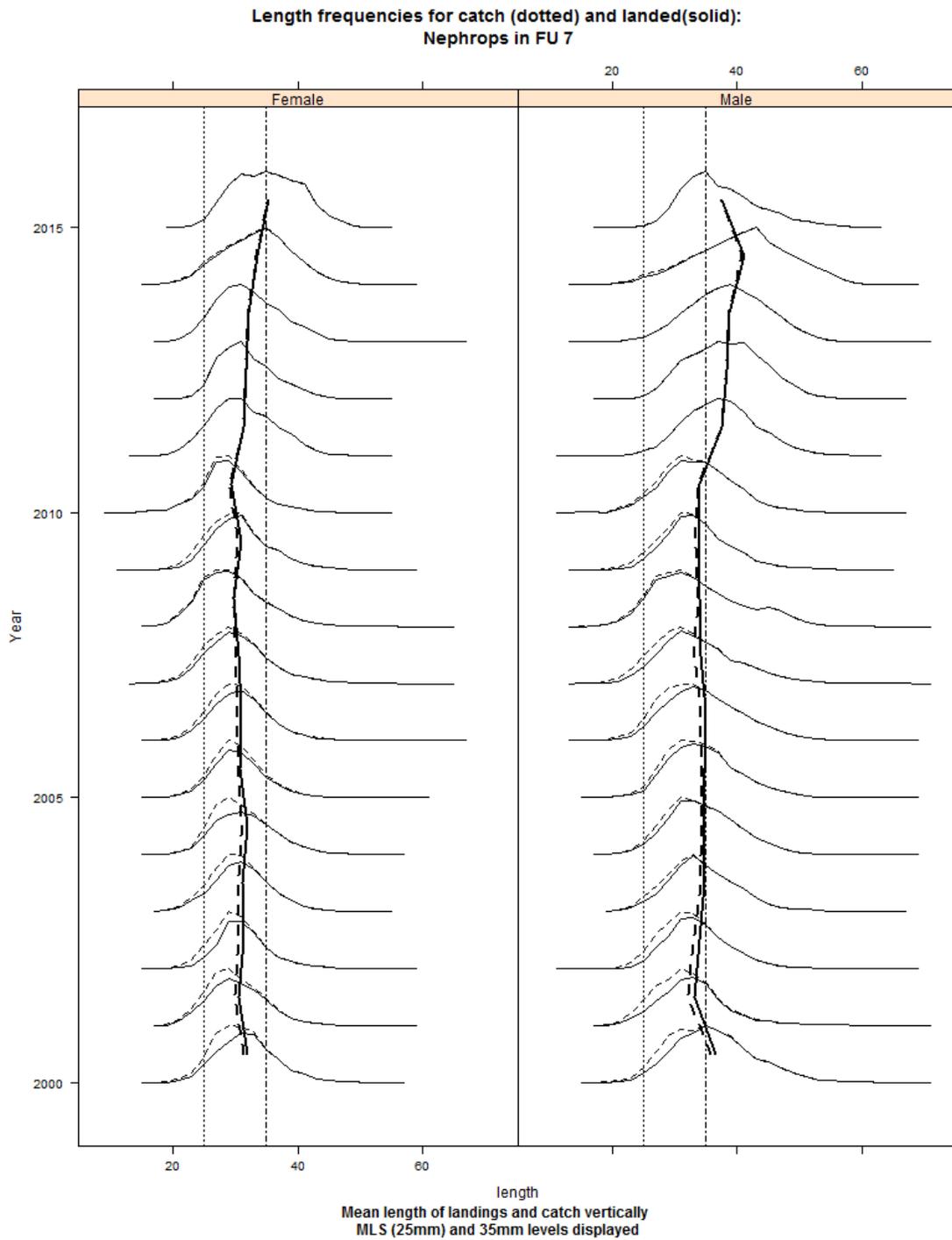


Figure 6.3.27.4 Norway lobster in Fladen Ground (FU 7). Catch length–frequency distribution and mean size in catches and landings. Vertical lines are minimum landing size (25 mm) and 35 mm.

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. ICES CM 2010/ACOM:13. 1058 pp.
- ICES. 2015. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 28 April–7 May 2015, ICES HQ, Copenhagen, Denmark. ICES CM 2015/ACOM:13. 1229 pp.
- ICES. 2016a. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 26 April–5 May 2016, Hamburg, Germany. ICES CM 2016/ACOM:14. 1023 pp.
- ICES. 2016b. Advice basis. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2. [http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2016/2016/Introduction to advice 2016.pdf](http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2016/2016/Introduction%20to%20advice%202016.pdf)
- ICES. 2016c. Report of the Working Group on Mixed-Fisheries Advice (WGMIXFISH-ADVICE), 23–27 May 2016, ICES Headquarters, Copenhagen, Denmark. ICES CM 2016/ACOM:22. 118 pp.
- Morizur, Y. 1982. Estimation de la mortalité pour quelque stocks de langoustine, *Nephrops norvegicus*. ICES CM 1982/K:10.
- Napier, I. R. 2014. Fishers' North Sea stock survey 2014. NAFC Marine Centre, Shetland, Scotland. <http://nsss.eu/>.