

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

### ICES advice on fishing opportunities

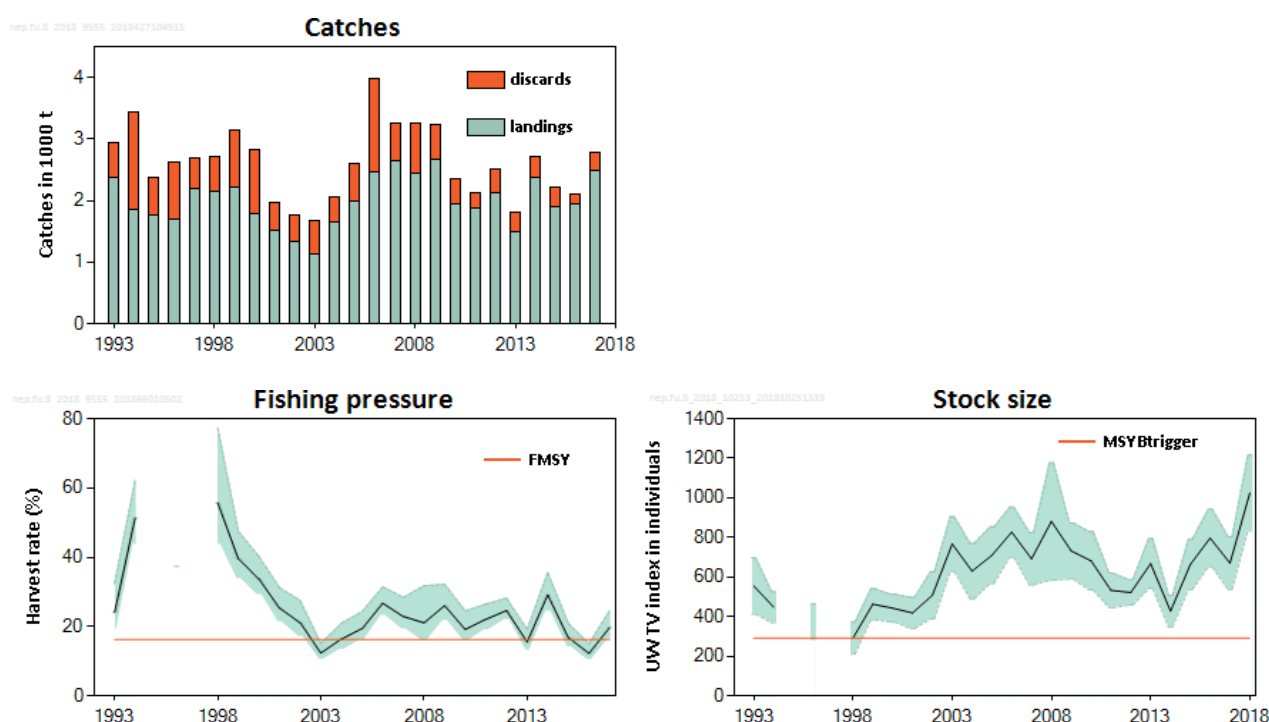
**Please note:** The present advice replaces the advice given in June 2018 for catches in 2019.

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 2321 tonnes and 3569 tonnes. The entire range is considered precautionary when applying the ICES advice rule.

In order to ensure the stock in Functional Unit (FU) 8 is exploited sustainably, management should be implemented at the FU level.

### 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 above  $F_{MSY}$ .



**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 carapace length) – 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

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

**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		
		2015	2016	2017		2016	2017	2018
Maximum sustainable yield	$F_{MSY}$	✗	✓	✗ Above		$MSY B_{trigger}$	✓	✓ Above trigger
Precautionary approach	$F_{pa}, F_{lim}$	?	✓	? Undefined		$B_{pa}, B_{lim}$	✓	✓ Above possible reference points
Management plan	$F_{MGT}$	✗	✓	✗ Above		$B_{MGT}$	✓	✓ Above

## Catch scenarios

**Table 2** Norway lobster in Division 4.b, Functional Unit 8. The basis for the catch scenarios.

Variable	Value	Notes
Stock abundance	1025 million individuals	UWTV 2018
Mean weight in wanted catch	23 g	Average 2015–2017
Mean weight in unwanted catch	10.2 g	Average 2015–2017
Unwanted catch rate (total)	20%	Average 2015–2017 (proportion by number)
Unwanted catch survival rate	25%	Proportion by number
Dead unwanted catch discard rate (total)	16.0%	Average 2015–2017 (proportion by number)

**Table 3** Norway lobster in Division 4.b, Functional Unit 8. Annual catch scenarios. Discarding is assumed to continue at the recent average. 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 <sub>MSY</sub>	3 569	3 478	3 204	274	91	16.3%	50%
F= MAP F <sub>MSY lower</sub>	2 321	2 262	2 084	178	59	10.6%	−2.3%
F = MAP F <sub>MSY upper</sub> ***	3 569	3 478	3 204	274	91	16.3%	50%
Other scenarios							
MSY approach	3 569	3 478	3204	274	91	16.3%	50%
F <sub>0.1</sub>	2 059	2 006	1848	158	53	9.4%	−13.3%
F <sub>35SpR</sub>	2 780	2 709	2496	213	71	12.7%	17.0%
F <sub>2015–2017</sub>	3 569	3 478	3204	274	91	16.3%	50%
F <sub>2017</sub>	4 313	4 203	3872	331	110	19.7%	82%

<sup>^</sup> Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016).

\* Calculated for dead removals.

\*\* Total catch 2019 relative to advice value 2018 (2376 tonnes).

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

The change in advice (+50% for the EU MAP  $F_{MSY}$  scenario) from November 2017 is a result of updating mean weights and discard rates, and incorporating the results of the 2018 UWTV survey.

## Basis of the advice

**Table 4** Norway lobster in Division 4.b, Functional Unit 8. The basis of the advice.

Advice basis	Proposed EU multiannual plan (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.

## Quality of the assessment

The length and sex composition of the landings is considered to be well sampled. Catch 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 (June 2018) 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, and ICES was requested by the EC to provide advice based on the proposed EU MAP.

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

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 lobsters were recorded as being below MCRS (BMS category) in FU 8 despite landings having been observed below the MCRS (Figure 3).

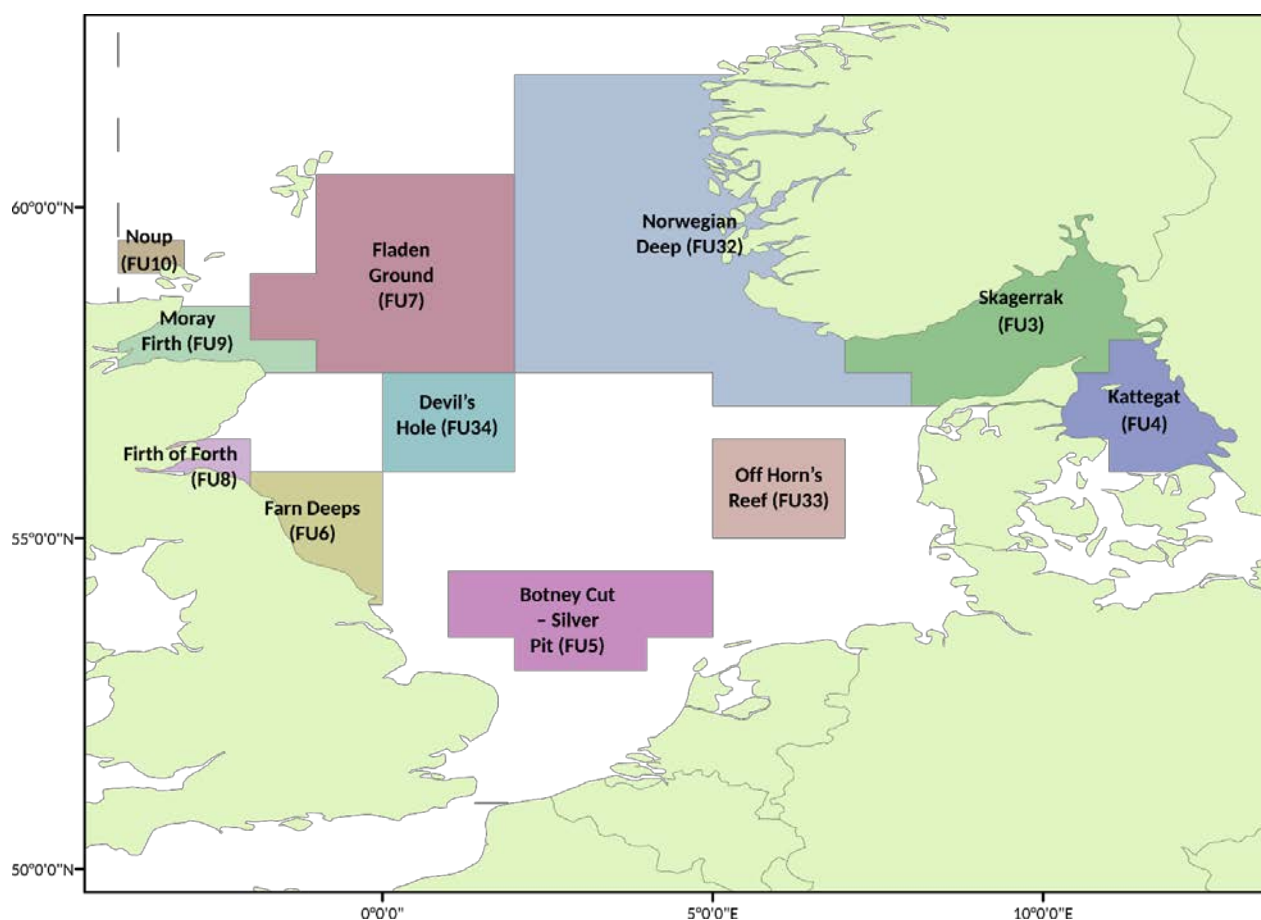
A single total allowable catch (TAC) covers all of ICES Subarea 4, except the Norwegian Deep. Management should ensure that fishing opportunities are in line with the scale of the resources in each of the stocks.

## 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 eastern English Channel) plaice would be the least limiting for 17, 9, 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 seven fleet segments (ICES, 2018b). Norway lobster in FU 8 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 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*	MAP	292 million	MSY $B_{trigger}$	
	MSY $B_{trigger}$			
	MAP $B_{lim}$	Not defined		
	MAP $F_{MSY}$	Harvest rate 16.3%	$F_{MSY}$	
	MAP range $F_{lower}$	Harvest rate 10.6–16.3%	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 16.3–16.3%	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). The values for the reference points will be based on ICES advice.

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

## 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, 2018c</a> ).
Assessment type	Underwater TV survey linked to yield-per-recruit analysis from length data (ICES, 2018d).
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 84% of the landings in 2017). 85% of the discards were obtained from sampling (15% raised discards). BMS landings, where reported, are included as dead removals in the assessment since 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

No additional information is available.

## History of the advice, catch, and management

**Table 7** Norway lobster in Division 4.b, Functional Unit 8. ICES advice and ICES catches. All weights are in tonnes.

Year	ICES advice	Landings advice	Catch advice	ICES landings	ICES total discards *
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
2015	MSY approach	< 1769		1897	311
2016	MSY approach	< 1866	$\leq 2040$ **	1935	165 ^^^
2017	MSY approach		$\leq 2548$ ***	2493	280 ^^^
2018	MSY approach		$\leq 2376$ ^		
2019	MAP^^ F ranges (Harvest rate=10.6–16.3%)		2321–3569 ^		

\* Dead + surviving discards.

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

\*\*\* Assuming discarding includes Norway lobster below MCRS only.

^ Assuming discard rate average for 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 8. Catch distribution by fleet in 2017 as estimated by ICES.

Catch (2017)		Wanted catches			Unwanted catches	
97% dead	3% surviving	Directed <i>Nephrops</i> fishery 85% TR2	Mixed <i>Nephrops</i> /demersal fishery 15% TR1	< 0.5% creel	75% dead	25% surviving
2773 tonnes		2493 tonnes			280 tonnes	

**Table 9** Norway lobster in Division 4.b, Functional Unit 8. ICES estimates of landings by gear for UK Scotland, total landings for UK (E, W & NI), total discards, and reported BMS. 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	
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
2017 **	2406	16	10	2432	61	2493	280 ^^^	0

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

\*\* Provisional.

\*\*\* Dead + surviving discards.

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

## Summary of the assessment

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

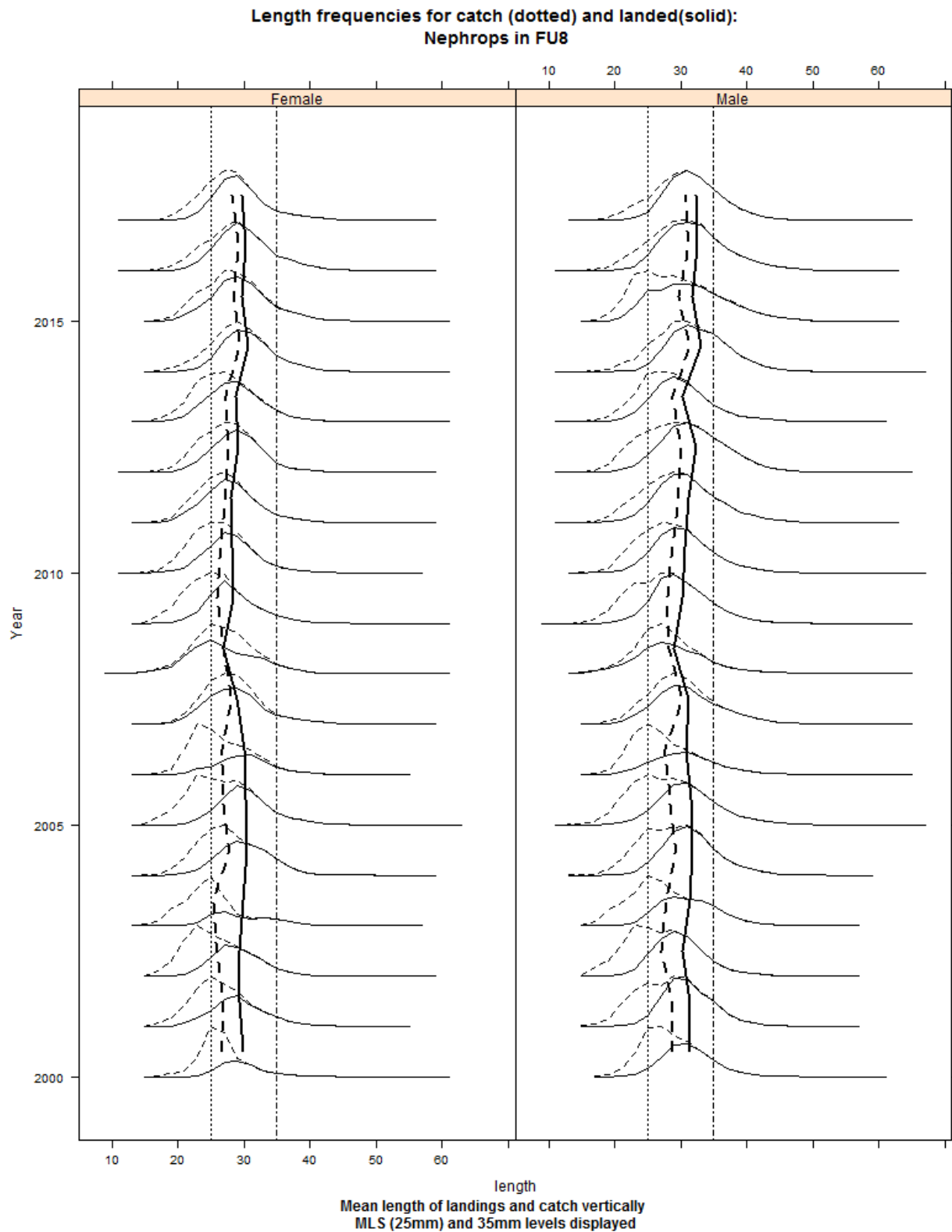
Year	Adjusted abundance * (millions)	2 standard deviations	Harvest rate (%)	Landings numbers (millions)	Discards numbers (millions)	Removals numbers (millions)	Landings (tonnes)	Discards (tonnes)	Dead discards (tonnes)	Discard rate (%)	Mean weight in landings (grammes)	Mean weight in discards (grammes)	Dead discard rate (%)
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	19.7	111	28	132	2493	280	210	20	23.07	10.07	15.8
2018	1025	190											

\* For Norway lobster 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.

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