

Norway lobster (*Nephrops norvegicus*) in Division 4.b, Functional Unit 9 (central North Sea, Moray Firth)

ICES advice on fishing opportunities

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 982 tonnes and 1274 tonnes. The entire range is considered precautionary when applying the ICES advice rule.

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

Stock development over time

The stock has been above $MSY B_{trigger}$ for the entire time-series. The harvest rate has fluctuated around F_{MSY} and is now just below.

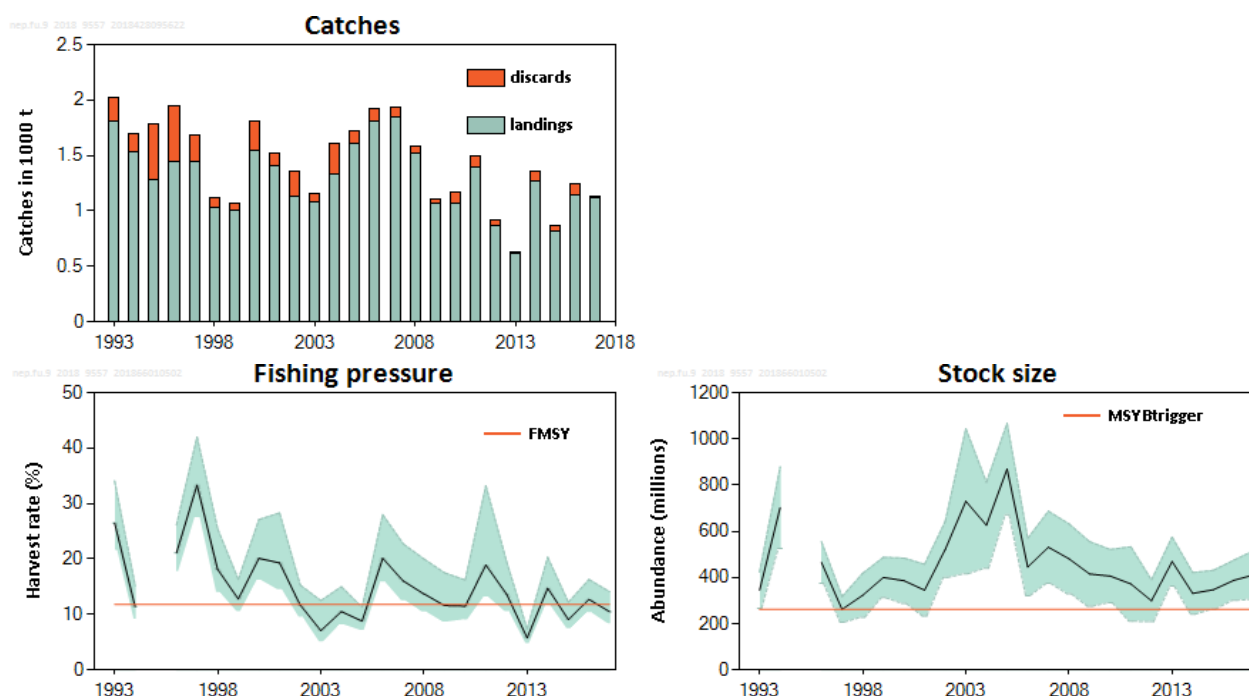


Figure 1 Norway lobster in Division 4.b, Functional Unit 9. Summary of the stock assessment. Long-term trends in catches, harvest rate (used as an F proxy), and underwater TV survey (UWTV) abundance (for animals greater than 17 mm). Orange lines show proxies for $MSY B_{trigger}$ and F_{MSY} . Shaded areas for harvest rate and abundance correspond to approximate 95% confidence intervals. 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 below F_{MSY} and stock size is above MSY $B_{trigger}$

Table 1 Norway lobster in Division 4.b, Functional Unit 9. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size		
		2015	2016	2017		2015	2016	2017
Maximum sustainable yield	F_{MSY}	✓	✗	✓ Below	MSY	✓	✓	✓ Above trigger
Precautionary approach	F_{pa}, F_{lim}	✓	?	✓ Below possible reference points	B_{pa}, B_{lim}	✓	✓	✓ Undefined
Management plan	F_{MGT}	✓	✗	✓ Within range	B_{MGT}	✓	✓	✓ Not applicable

Catch scenarios

Table 2 Norway lobster in Division 4.b, Functional Unit 9. The basis for the catch scenarios.

Variable	Value	Notes
Stock abundance	412 million individuals	UWTV 2017
Mean weight in wanted catch	27 g	Average 2015–2017
Mean weight in unwanted catch	10.8 g	Average 2015–2017
Unwanted catch rate (total)	11.9%	Average 2015–2017 (proportion by number)
Unwanted catch survival rate	25%	Proportion by number
Dead unwanted catch rate*	9.2%	Average 2015–2017 (proportion by number)

Table 3 Norway lobster in Division 4.b, Functional Unit 9. Annual catch scenarios. 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							
MAP^: F _{MSY}	1 274	1 258	1 210	48	16	11.8%	4.5%
F = MAP^ F _{MSY lower}	982	970	933	37	12	9.1%	−19.4%
F = MAP^ F _{MSY upper} ***	1 274	1 258	1 210	48	16	11.8%	4.5%
Other scenarios							
MSY approach	1 274	1 258	1 210	48	16	11.8%	4.5%
F _{0.1}	843	832	800	32	11	7.8%	−31%
F ₂₀₁₇	1 134	1 120	1 077	43	14	10.5%	−7.0%
F _{2015–2017}	1 167	1 152	1 108	44	15	10.8%	−4.3%
F _{max}	1 609	1 589	1 528	61	20	14.9%	32%

[^] Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016).

* Calculated for dead removals.

** Total catch 2019 relative to advice value 2018 (1 219 t).

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

The changes in advice from July 2017 are a result of the inclusion of the 2017 survey and updating mean weights and discard rates.

Basis of the advice

Table 4 Norway lobster in Division 4.b, Functional Unit 9. 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. The advice based on F_{MSY} range used in the EU MAP are considered precautionary.

Quality of the assessment

The length and sex composition of the catches is considered to be well sampled.

Issues relevant for the advice

The EU is finalizing a MAP for the North Sea, and ICES was requested to provide advice based on the proposed EU MAP.

The results of the 2018 underwater TV survey (UWTV) survey are expected to be available by October 2018, and the advice will be updated before the end of 2018 if there is significant deviation from the 2017 UWTV survey.

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 lobster were recorded as below MCRS (BMS category) in FU 9 despite catches 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 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 9 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.

[†] Version 2: mixed-fisheries text updated.

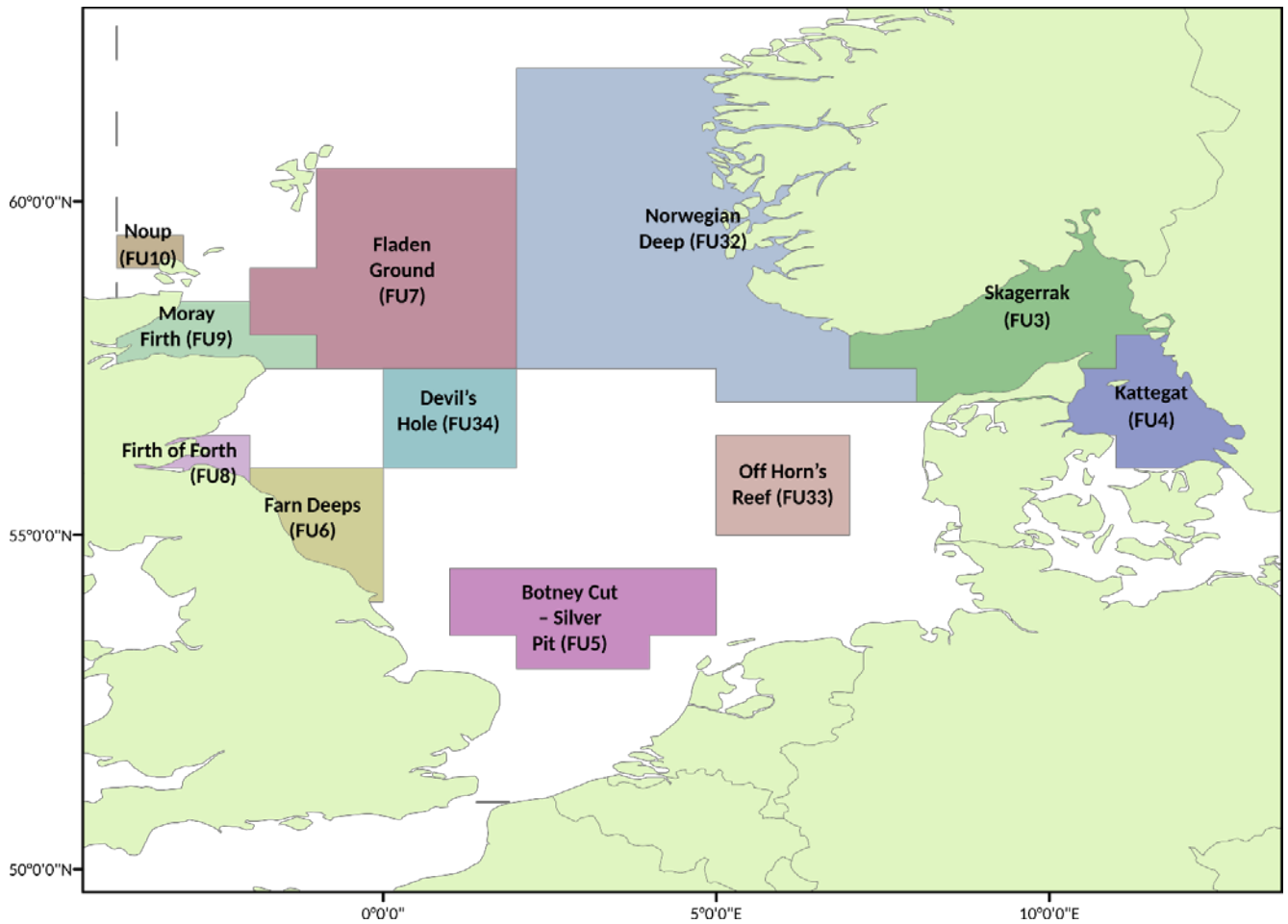


Figure 2 Norway lobster functional units in the North Sea and Skagerrak/Kattegat region.

Reference points

Table 5 Norway lobster in Division 4.b, Functional Unit 9. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	262 million individuals	Lowest observed UWTV survey estimate of abundance (1993–2010)	ICES (2010)
	F_{MSY}	Harvest rate 11.8%	Proxy, equivalent to $F_{35\%SPR}$ 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 MSY $B_{trigger}$	262 million	MSY $B_{trigger}$	
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	Harvest rate 11.8%	F_{MSY}	
	MAP range F_{lower}	Harvest rate 9.1 –11.8%	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 11.8 –11.8%	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).

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

Basis of the assessment

Table 6 Norway lobster in Division 4.b, Functional Unit 9. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018c).
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 9 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	Data series from the majority of the fleet/main fleets (covering 62% of the landings in 2017) were included in the assessment; 59% of the discards were obtained from sampling. BMS landings, where reported, are included as dead removals in the assessment since 2016.
Indicators	Sex ratio, length frequencies, mean size, LPUE.
Other information	Latest benchmark was performed in 2009 (ICES, 2009).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

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 9. ICES advice and ICES estimated landings and discards. All weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	ICES landings	ICES total discards *
1993				1809	214
1994				1537	153
1995				1279	502
1996	<i>Status quo</i> TAC			1451	492
1997	<i>Status quo</i> TAC			1447	230
1998				1032	89
1999				1009	55
2000				1539	269
2001				1401	125
2002	Catches to be maintained at the 2000 level			1132	220
2003	Catches to be maintained at the 2000 level			1080	70
2004	Catches to be maintained at the 2000 level			1333	272
2005	Catches to be maintained at the 2000 level			1605	122
2006	No increase in effort			1805	117
2007	No increase in effort, and harvest rate below 15%	2400		1843	95
2008	No new advice, same as for 2007	2400		1515	74
2009	No increase in effort and recent average landings	< 1800		1067	33
2010	Harvest rate no greater than that equivalent to fishing at F_{2008}	< 1400		1063	104
2011	MSY transition	< 1300		1391	102
2012	MSY approach	< 1100		866	54
2013	MSY approach	< 1000		623	10
2014	MSY approach	< 739		1253	87
2015	MSY approach	< 1185		816	56
2016	MSY approach	< 923	≤ 943**	1146	95^^

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	ICES landings	ICES total discards *
2017	MSY approach		≤ 1070***	1119	12^^^
2018	MSY approach		≤ 1219^		
2019	MAP^^ F ranges (Harvest rate = 9.1–11.8%)		982–1274^		

* Dead + surviving discards.

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

*** Assuming discarding 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).

History of the catch and landings

Table 8 Norway lobster in Division 4.b, Functional Unit 9. Catch distribution by fleet in 2017 as estimated by ICES.

Catch (2017)		Wanted catch		Unwanted catch	
99.7% dead	0.3% surviving	Directed <i>Nephrops</i> fishery 55% TR2	Mixed <i>Nephrops</i> /demersal fishery 45% TR1	75% dead	25% surviving
1131 tonnes		1119 tonnes		12 tonnes	

Table 9 Norway lobster in Division 4.b, Functional Unit 9. ICES estimates of landings by country (presented by gear for Scotland), discards and reported BMS landings. All weights are in tonnes.

Year	UK Scotland				UK England	Total landings	Total discards**	BMS reported to ICES
	<i>Nephrops</i> trawl	Other trawl	Creel	Sub-total				
1981	1299	117	0	1416	0	1416		
1982	1033	86	0	1119	0	1119		
1983	850	91	0	941	0	941		
1984	960	209	0	1169	0	1169		
1985	1908	173	0	2081	0	2081		
1986	1932	211	0	2143	0	2143		
1987	1724	268	0	1992	0	1992		
1988	1637	322	0	1959	0	1959		
1989	2102	474	0	2576	0	2576		
1990	1698	339	0	2037	0	2037		
1991	1285	235	0	1520	0	1520		
1992	1285	306	0	1591	0	1591		
1993	1505	304	0	1809	0	1809	214	
1994	1179	358	0	1537	0	1537	153	
1995	967	312	0	1279	0	1279	502	
1996	1084	364	1	1449	2	1451	492	
1997	1103	343	0	1446	1	1447	230	
1998	739	289	4	1032	0	1032	89	
1999	813	194	2	1009	0	1009	55	
2000	1341	196	2	1539	0	1539	269	
2001	1186	213	2	1401	0	1401	125	
2002	883	247	2	1132	0	1132	220	
2003	873	196	11	1080	0	1080	70	
2004	1222	103	8	1333	0	1333	272	
2005	1526	64	12	1602	3	1605	122	
2006	1751	42	11	1804	1	1805	117	
2007	1818	17	6	1841	2	1843	95	
2008	1444	68	3	1515	0	1515	74	
2009	1033	31	2	1066	1	1067	33	
2010	1026	28	9	1063	0	1063	104	

Year	UK Scotland				UK England	Total landings	Total discards**	BMS reported to ICES
	Nephrops trawl	Other trawl	Creel	Sub-total				
2011	1358	23	9	1390	1	1391	102	
2012	834	24	8	866	0	866	54	
2013	497	116	7	620	3	623	10	
2014	1183	56	2	1241	12	1253	87	
2015	774	40	0	814	2	816	56	
2016	1105	37	4	1146	<0.5	1146	95^	0
2017*	931	183	4	1118	1	1119	12^	0

* 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 9. Assessment summary.

Year	Adjusted abundance* (millions)	2 standard deviations	Harvest ratio (%)	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	345	78	26.5	77	19	91	1809	214	161	19.8	23.42	11.26	15.6
1994	702	176	11.4	69	15	80	1537	153	115	17.8	22.25	10.21	14
1995	NA	NA	NA	62	72	116	1279	502	376	53.8	20.59	6.93	46.6
1996	465	90	21.1	68	41	98	1451	492	369	37.5	21.4	12.11	31
1997	262	55	33.3	71	22	87	1447	230	172	23.8	20.43	10.42	18.9
1998	323	95	18.1	50	11	58	1032	89	67	17.6	20.47	8.29	13.8
1999	400	87	12.8	46	6	51	1009	55	41	12	21.79	8.63	9.3
2000	386	98	20.1	61	23	78	1539	269	201	27.5	25.44	11.73	22.1
2001	345	112	19.3	58	11	66	1401	125	94	16.3	24.18	11.04	12.8
2002	521	121	11.7	41	27	61	1132	220	165	39.7	27.68	8.18	33.1
2003	730	314	7.1	46	7	52	1080	70	52	13.7	23.32	9.51	10.6
2004	626	186	10.5	48	23	66	1333	272	204	32.6	27.57	11.62	26.6
2005	869	198	8.8	67	12	76	1605	122	92	15.0	23.84	10.31	11.7
2006	445	124	20.1	81	12	90	1805	117	87	12.8	22.34	9.86	9.9
2007	531	156	16	80	7	85	1843	95	72	7.9	23.04	13.95	6.0
2008	481	151	13.7	60	8	66	1515	74	55	11.4	25.29	9.60	8.8
2009	415	140	11.6	45	4	48	1067	33	25	7.6	23.46	8.72	5.8
2010	406	115	11.5	39	10	47	1063	104	78	19.8	26.94	10.63	15.7
2011	372	161	18.9	63	10	70	1391	102	77	13.9	21.63	10.12	10.8
2012	299	90	13.7	37	6	41	866	54	41	13.2	23.16	9.72	10.3
2013	469	106	5.8	26	1	27	623	10	8	3.3	24.95	11.21	2.5
2014	331	90	14.7	43	7	49	1253	87	65	14.6	28.94	11.79	11.3
2015	347	84	9.1	28	5	32	816	56	42	15.1	29.10	11.35	11.8
2016	388	87	12.7	42	9	49	1146	95	71	18.0	26.83	10.16	14.2
2017	412	106	10.5	42	1	43	1119	12	9	2.6	26.34	10.74	2

* For Norway lobster greater than 17 mm carapace.

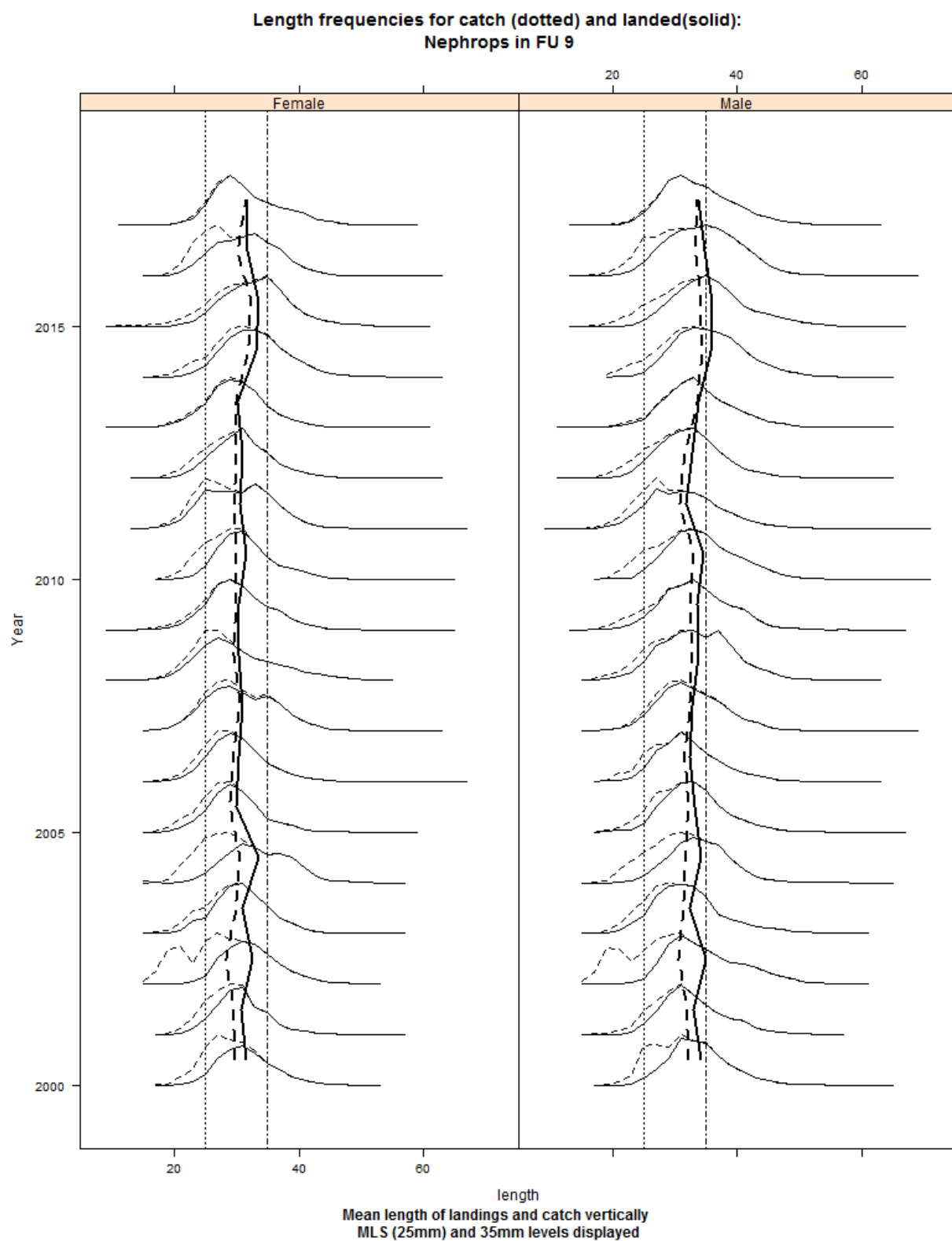


Figure 3 Norway lobster in Moray Firth (FU 9). Catch length–frequency distribution and mean size in catches and landings. Vertical lines are minimum landing size (25 mm) and 35 mm.

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