

Norway lobster (*Nephrops norvegicus*) in divisions 7.a, 7.g, and 7.j, Functional Unit 19 (Irish Sea, Celtic Sea, eastern part of southwest of Ireland)

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for Western waters and adjacent waters is applied, catches in 2020 that correspond to the F ranges in the MAP are between 749 tonnes and 839 tonnes. The entire range is considered precautionary when applying the ICES advice rule.

To ensure that the stock in Functional Unit (FU) 19 is exploited sustainably, management should be implemented at the functional unit level.

Stock development over time

The harvest rates have been below F_{MSY} since 2014. Stock abundance has shown a declining trend, and has been below $MSY B_{trigger}$ since 2018.

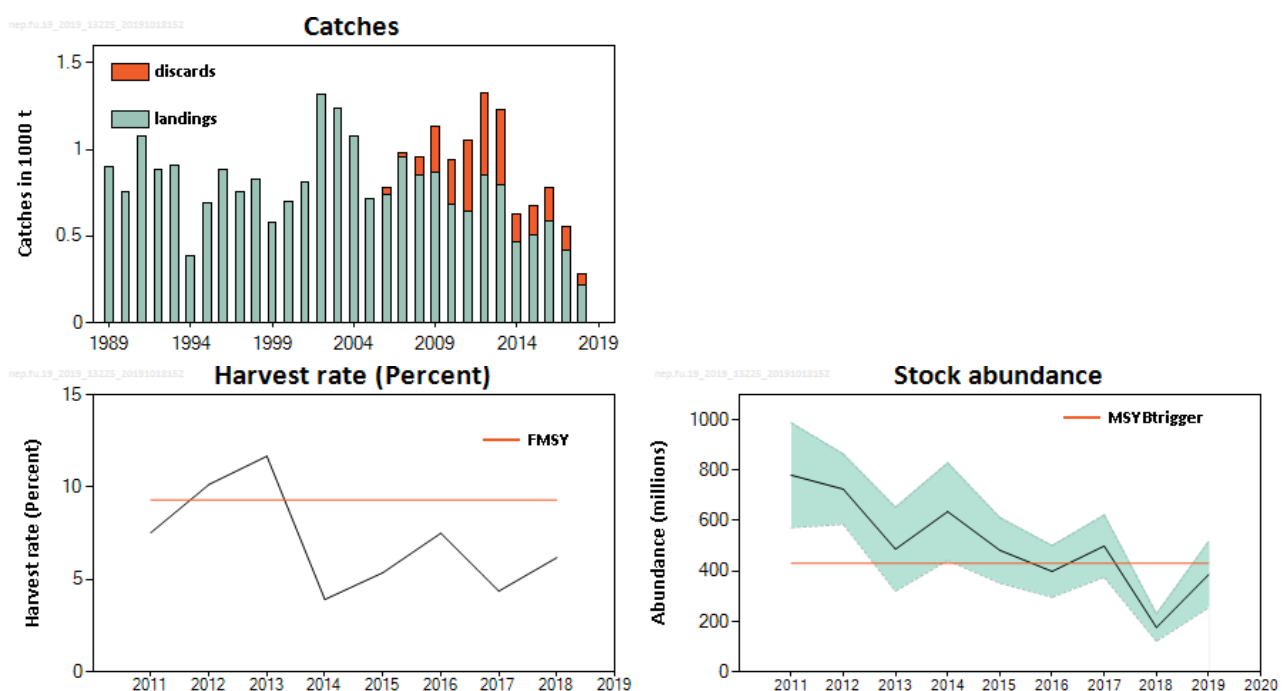


Figure 1 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Summary of the stock assessment. Catches (discards are only available from 2006 onwards), harvest rate (sum of landings and dead discards in numbers divided by total abundance), and stock abundance (underwater TV survey; 95% confidence intervals). Orange lines represent the F_{MSY} harvest rate and $MSY B_{trigger}$.

Stock and exploitation status

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

Table 1 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size		
		2016	2017	2018		2017	2018	2019
Maximum sustainable yield	F_{MSY}	✓	✓	✓ Below		$MSY B_{trigger}$	✓ ✗	✗ Below trigger
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓ Below possible reference points		B_{pa}, B_{lim}	✓ ?	? Undefined
Management plan	F_{MGT}	✓	✓	✓ Below range		B_{MGT}	✓ ✗	✗ Below trigger

Catch scenarios

The latest estimate of stock abundance is below $MSY B_{trigger}$ (430 million). The ICES maximum sustainable yield (MSY) approach states that under such conditions, the F_{MSY} harvest rate (9.3%) for FU 19 should be reduced by multiplying it by the ratio of current abundance to $MSY B_{trigger}$. This corresponds to a harvest rate of $9.3 \times (386/430) = 8.4\%$ for the advice in 2020.

Table 2 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. The basis for the catch advice and scenarios.

Variable	Value	Notes
Stock abundance (2020)	386 million	UWTV survey 2019 (number of individuals).
Mean weight in wanted catch	29.0 grammes	Average 2016–2018.
Mean weight in unwanted catch	14.8 grammes	Average 2016–2018.
Unwanted catch	38.5%	Average 2016–2018 (proportion by number).
Discards survival	25%	Proportion by number
Dead unwanted catch	31.9%	Average 2016–2018.

Table 3 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Annual catch scenarios. All weights are in tonnes. The figures in the table are rounded. Calculations were done with unrounded inputs and computed values may not match exactly when calculated using the rounded figures in the table.

Catch scenarios assuming recent discard rates

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							
MSY approach; F = EU MAP^: F _{MSY} × Stock Abundance 2019 / MSY B _{trigger}	839	788	636	152	51	8.4	385
MAP F _{MSY lower} × Stock Abundance 2019 / MSY B _{trigger}	749	703	568	136	45	7.5	333
MAP F _{MSY upper} × Stock Abundance 2019 / MSY B _{trigger}	839	788	636	152	51	8.4	385
Other options							
F = MAP F _{MSY}	934	878	708	170	57	9.3	440
F = MAP F _{MSY lower}	834	783	632	151	50	8.3	382
F = MAP F _{MSY upper} ***	934	878	708	170	57	9.3	440
F ₂₀₁₈	621	583	471	113	38	6.2	259

Catch scenarios assuming zero discards

Basis	Total catch	Wanted catch	Unwanted catch	Harvest rate * %	% advice change **
	WC + UC	WC	UC	for WC + UC	
ICES advice basis					
MSY approach; $F = \text{EU MAP}^\wedge: F_{\text{MSY}} \times \text{Stock Abundance 2019} / \text{MSY } B_{\text{trigger}}$	763	578	184	8.4	341
MAP $F_{\text{MSY lower}} \times \text{Stock Abundance 2019} / \text{MSY } B_{\text{trigger}}$	681	516	165	7.5	294
MAP $F_{\text{MSY upper}} \times \text{Stock Abundance 2019} / \text{MSY } B_{\text{trigger}}$	763	578	184	8.4	341
Other options					
$F = \text{MAP } F_{\text{MSY}}$	845	640	204	9.3	388
$F = \text{MAP } F_{\text{MSY lower}}$	754	572	182	8.3	336
$F = \text{MAP } F_{\text{MSY upper}}^{***}$	845	640	204	9.3	388
F_{2018}	563	427	136	6.2	225

[^] EU multiannual plan (MAP) for Western waters (EU, 2019).

* By number.

** Advice value for 2020 relative to the advice value for 2019 (173 tonnes).

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

The large increase in total catch advice is the result of the increase in observed stock abundance in 2019, as well as the higher harvest rate used in the advice.

Basis of the advice

Table 4 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. The basis of the advice.

Advice basis	The EU multiannual plan (MAP) for stocks in the Western waters and adjacent waters (EU, 2019)
Management plan	<p>The EU multiannual plan (MAP) for stocks in the Western waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and making use of the F_{MSY} range for the stock.</p> <p>In accordance with the MAP, catches higher than those corresponding to F_{MSY} can only be taken providing SSB is greater than $\text{MSY}_{B_{\text{trigger}}}$, and one of the following conditions is met:</p> <ul style="list-style-type: none"> a) if it is necessary for the achievement of objectives of mixed fisheries; b) if it is necessary to avoid serious harm to a stock caused by intra- or inter-species stock dynamics; c) in order to limit variations in fishing opportunities between consecutive years to not more than 20%. <p>ICES considers that the F_{MSY} range for this stock used in the MAP is precautionary.</p> <p>Full details of the plan are described in EU (2019).</p>

Quality of the assessment

An annual underwater television (UWTV) survey has been carried out since 2011 in FU 19 (Figure 2), with full coverage of all the discrete patches since 2013. The survey gives estimates of burrow densities for the main patches of *Nephrops* habitat in FU 19, and an abundance estimate for the entire stock with acceptable precision.

In 2019 the survey camera system and reviewing method changed. A comparison showed no significant difference in density estimates between the new and the old method. Previous assumptions relating to correction factors are still applied.

The main quality concern relates to mean weight estimates and discard rates, that are quite variable over the time-series. This partially reflects the difference in mean sizes of patches with different underlying densities. Adequate catch sampling remains difficult for such a heterogeneous area.

Issues relevant for the advice

From 2016 the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 7, with several exemptions. Observations from the 2016–2018 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 2020 assuming average discard rates as observed over the last three years, which is considered to be the most realistic assumption.

ICES notes that catches in Subarea 7 have been less than the TAC in recent years, as there has been a general decline in trawling fishing effort for Norway lobster (ICES, 2019).

Irish discard survival experiments indicate that the trawl discard survival may be around 64% (BIM, 2017). As a result, an exemption from the landings obligation based on high survivability has been granted by the European Commission. ICES continues to use the survival rate of 25% (ICES, 2016) as the survival rates estimated by BIM (2017) have not been evaluated by ICES.

In this FU vessels tend to be small with limited space and crew, and on-board tailing (keeping only the tail) of the catch is not as prevalent as in other FUs around Ireland. As a result, the proportion of discarded *Nephrops* in FU 19 is high relative to other areas.

The density of *Nephrops* in FU 19 is considered medium (average density 0.3 individuals m⁻²). The knowledge of biological parameters is poor, and the exploitation rate on males is usually higher than on females. For these reasons, a harvest rate consistent with a combined sex $F_{0.1}$ is considered an appropriate proxy for F_{MSY} .

A single TAC covers the entire ICES Subarea 7. 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 as well as the corresponding MSY approach.

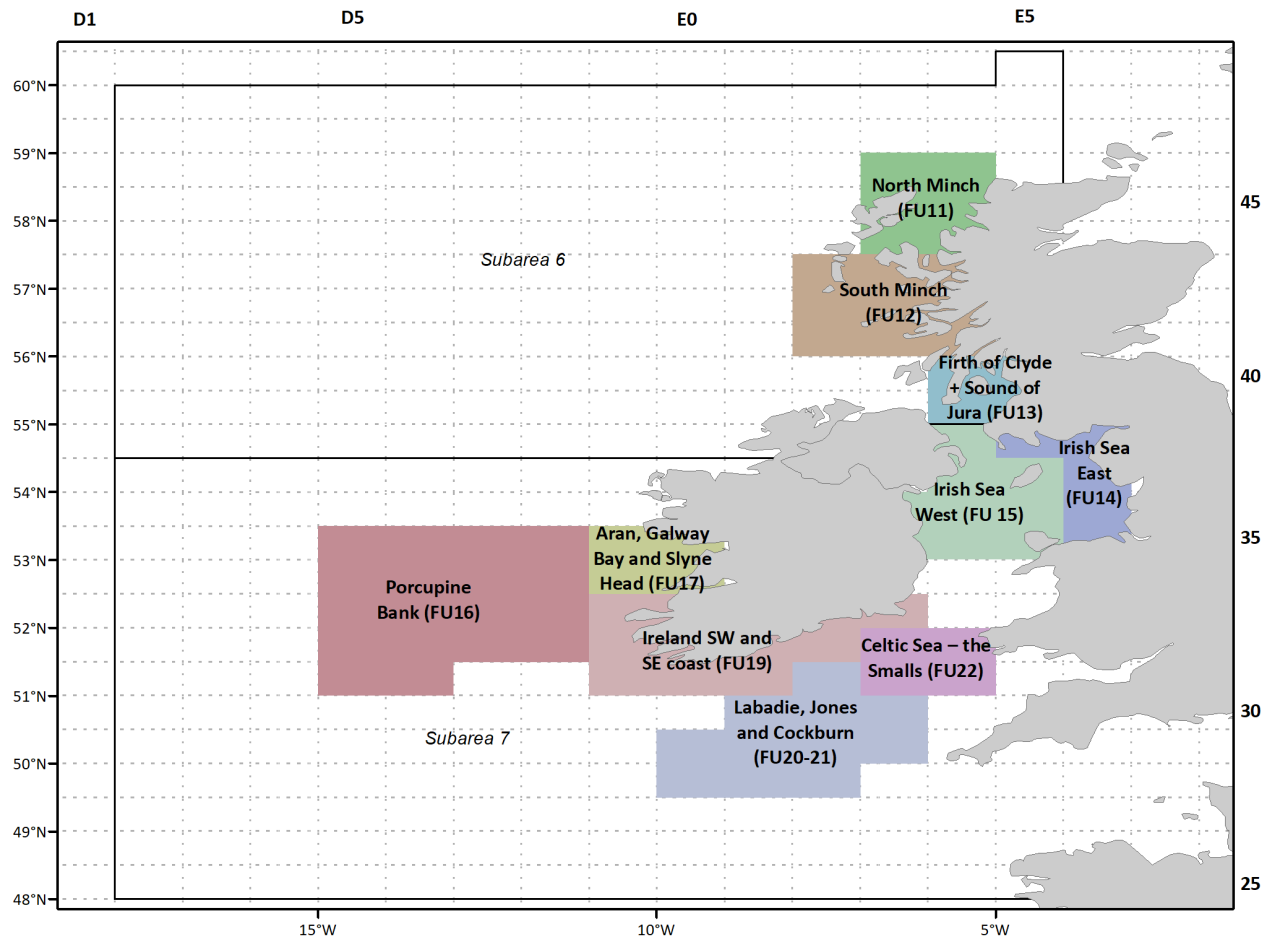


Figure 2 Norway lobster functional units in subareas 6 and 7.

Reference points

Table 5 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	430 million individuals	5% interval on the probability distribution of abundance for the time-series 2011–2015, assuming a normal distribution.	ICES (2016)
	F_{MSY}	9.3% harvest rate	F_{MSY} proxy equivalent to $F_{0.1}$ for combined sexes, derived from a length-based per recruit analysis.	ICES (2016)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	MAP target MSY $B_{trigger}$	430 million individuals	MSY $B_{trigger}$	EU (2019); ICES (2016)
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	9.3% harvest rate	F_{MSY}	EU (2019); ICES (2016)
	MAP range F_{lower}	8.3–9.3% harvest rate	Consistent with ranges provided by ICES (2016), resulting in no more than 5% reduction in long-term yield compared with MSY.	EU (2019); ICES (2016)
	MAP range F_{upper}	9.3–9.3% harvest rate	F_{MSY} upper value capped at F_{MSY} because it has not been possible to evaluate the probability of $SSB < B_{lim}$ (ICES, 2016).	EU (2019); ICES (2016)

Basis of the assessment

Table 6 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Underwater TV survey (ICES, 2019).
Input data	Commercial catches (international landings from Ireland, France, and UK); length frequencies from catch and discard sampling (Ireland); one UWTV survey index (UWTV-FU 19); maturity data from commercial catch and survey sampling; fixed natural mortality. Discard survival rate.
Discards and bycatch	Included in the assessment since 2006.
Indicators	Commercial length frequencies by sex. Two bottom trawl surveys (IGFS-WIBTS-Q4 and EVHOE-WIBTS-Q4).
Other information	This stock was benchmarked in 2014 (WKCELT ; ICES, 2014).
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

Information from stakeholders

No additional information is available for this stock.

History of the advice, catch, and management

Table 7 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. ICES advice and estimated landings. All weights are in tonnes.

Year	ICES advice	Landings advice*	Catch advice	ICES landings	Total discards **
1992		3800		888	
1993		~4000		905	
1994		~4000		390	
1995		~4000		695	
1996		4000		888	
1997		4000		756	
1998		4000		827	
1999		4000		579	
2000		4000		696	
2001		4000		815	
2002		4440		1318	
2003		4440		1239	
2004	Restrict landings to 2000–2002 levels	3300		1074	
2005	Restrict landings to 2000–2002 levels	3300		711	
2006	Restrict landings to 2000–2002 levels	3300		741	37
2007	Constrain effort at recent levels	--		957	26
2008	Constrain effort at recent levels	--		866	107
2009	No increase in effort and landings (2007)	< 800	--	833	258
2010	No new advice, same as for 2009	< 800	--	722	269
2011	See scenarios	-		608	387

Year	ICES advice	Landings advice*	Catch advice	ICES landings	Total discards **
2012	Reduce catches	-		770	420
2013	MSY approach	< 820		781	404
2014	MSY approach	< 521		468	161
2015	MSY approach	< 715		507	177
2016	MSY approach		≤ 793***	591	194
2017	MSY approach		≤ 838^	420	138
2018	MSY approach		≤ 1192^	219	65
2019	MSY approach		≤ 173^		
2020	Management plan		839 (range 749–839) ^		

* Prior to 2007 ICES gave combined advice for FUs 16, 17, 18, and 19, and other rectangles in this area.

** Dead + surviving discards.

*** Assuming all catches are landed.

^ Assuming recent discard rates.

History of the catch and landings

Table 8 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Catch distribution by fleet in 2019 as estimated by ICES. All weights are in tonnes.

Catch		Landings	Discards	
94.3% dead	5.7% surviving	Almost 100% otter trawl	75% dead	25% surviving
284 t		219 t	65 t	

Table 9 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. History of ICES estimates of landings by country and discards. All weights are in tonnes.

Year	France	Rep. of Ireland	UK	Total landings	Discards*
1989	245	652	2	899	
1990	181	569	4	754	
1991	212	860	5	1077	
1992	233	640	15	888	
1993	229	672	4	905	
1994	216	153	21	390	
1995	175	507	12	695	
1996	145	736	7	888	
1997	93	656	7	756	
1998	92	733	2	827	
1999	77	499	3	579	
2000	144	541	11	696	
2001	111	702	2	815	
2002	188	1130	0	1318	
2003	165	1075	0	1239	
2004	76	997	1	1074	
2005	62	648	2	711	
2006	65	675	1	741	37
2007	63	894	0	957	26
2008	46	805	15	866	107
2009	55	764	15	834	258
2010	14	694	13	721	269
2011	23	585	1	608	387
2012	11	758	1	770	420
2013	4	771	6	781	404
2014	6	459	3	468	161
2015	5	502	0	507	177
2016	4	583	3	590	194
2017	4	412	4	420	138
2018	4	210	5	219	65

* Dead + surviving discards.

Summary of the assessment

Table 10 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Assessment summary.

Year	UWTV abundance estimate	95% Confidence Interval	Landings in number	Total discards in number*	Removals in number	Harvest rate (by number)	Landings	Total discards*	Discard rate (by number)	Dead discard rate (by number)	Mean weight in landings	Mean weight in discards
	millions					%	tonnes		%		grammes	
1989							899					
1990							754					
1991							1077					
1992							888					
1993							905					
1994							390					
1995							694					
1996							888					
1997							756					
1998							827					
1999							579					
2000							696					
2001							815					
2002							1318					
2003							1240					
2004							1074					
2005							712					
2006							741	37				
2007							957	26				
2008			25	5	29		851	105	17.7	13.9	33.7	19.4
2009			28	19	42		868	269	39.5	32.8	30.5	14.5
2010			23	19	37		687	257	45.1	38.1	29.6	13.5
2011	665	171	26	32	50	7.5	643	409	55.7	48.5	24.9	12.6
2012	594	111	32	37	60	10.1	849	473	53.6	46.4	26.3	12.7
2013	487	161	29	36	57	11.7	794	436	55.3	48.1	26.9	11.9
2014	636	188	16	11	25	3.9	468	161	41.1	34.4	28.6	14.1
2015	482	126	17	12	26	5.4	507	167	41.1	34.3	29.8	14.1
2016	399	100	20	14	30	7.5	590	193	40.8	34.1	29.9	14.2
2017	499	120	15	10	22	4.4	420	139	39.7	33.1	28.8	14.5
2018	176	53	8	4	11	6.2	219	65	34.8	28.6	28.2	15.7
2019	386	127										

*Dead + surviving discards.

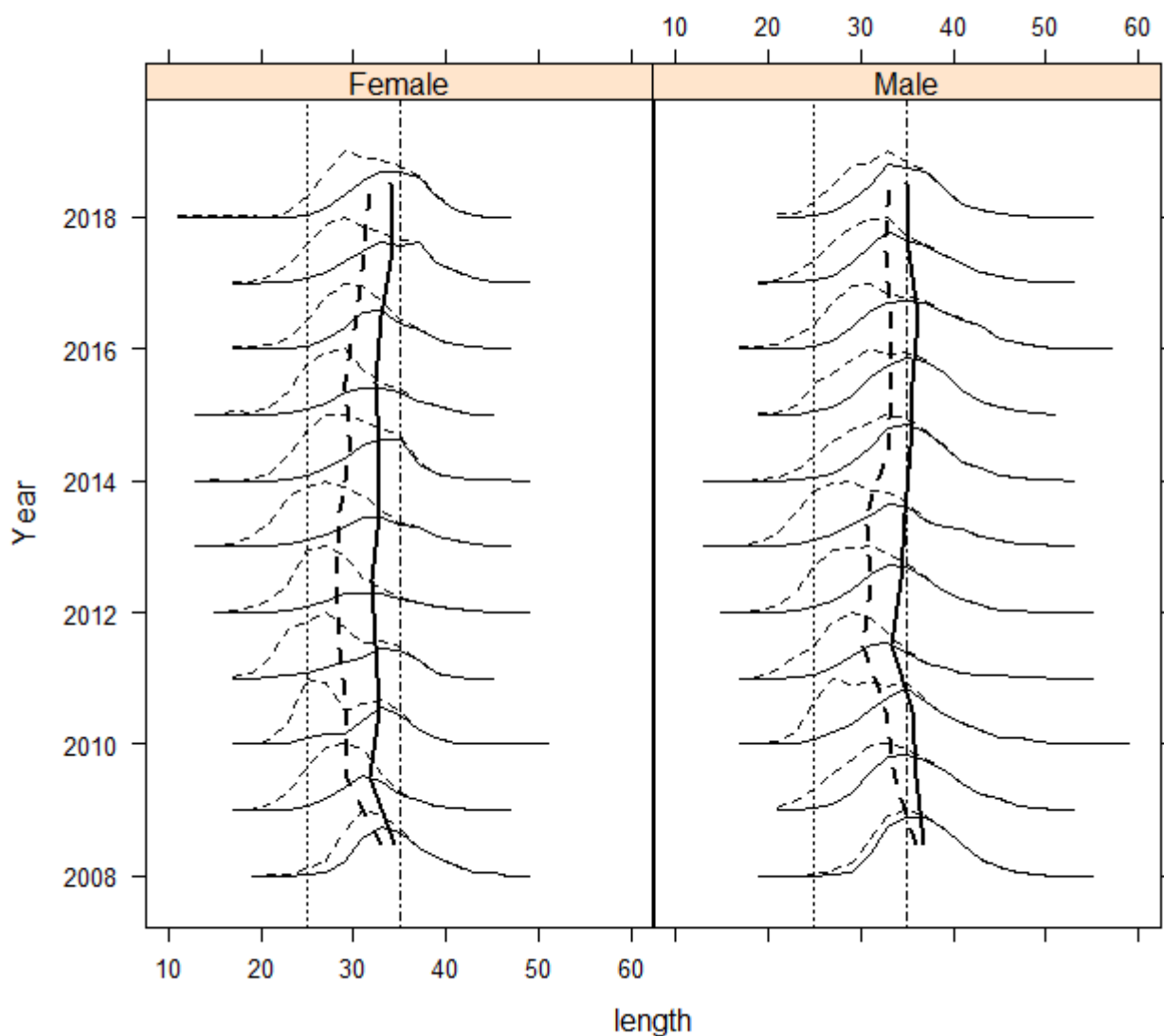


Figure 3 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Catch length–frequency distribution and mean size in catches (dotted lines) and landings (solid lines). The vertical lines indicate the minimum conservation reference size (25 mm) and the 35 mm visual reference level.

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