

Norway lobster (*Nephrops norvegicus*) in Division 3.a, functional units 3 and 4 (Skagerrak and Kattegat)

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 15 339 tonnes and 21 639 tonnes. The entire range is considered precautionary.

Stock development over time

The stock size is considered to be stable. The estimated harvest rate for this stock is currently below F_{MSY} .

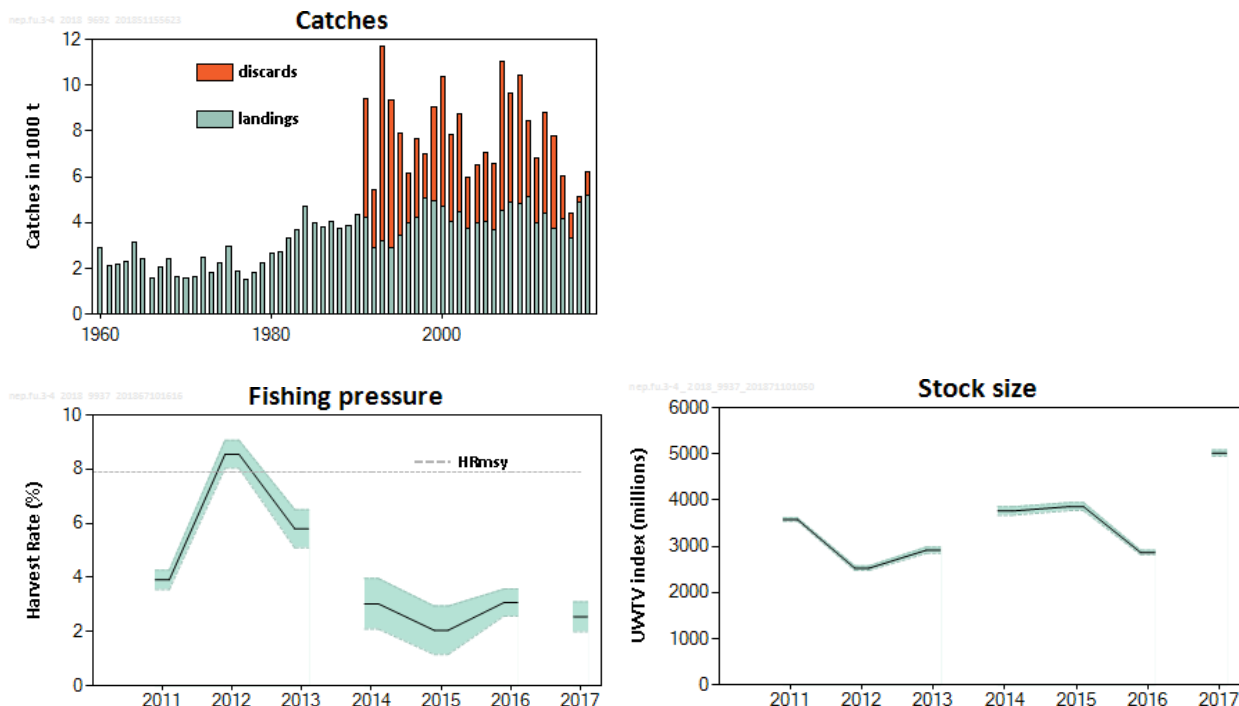


Figure 1 Norway lobster in Division 3.a, functional units 3 and 4. Summary of the stock assessment. Long-term trends in landings (1960–2017) and catches (1991–2017), harvest rate, and underwater TV survey (UWTV) abundance (for animals greater than 17 mm carapace length). Orange line shows the proxy for F_{MSY} . Shaded areas for abundance are ± 1.96 standard deviations (95% confidence intervals). Confidence intervals for harvest rates are derived from the confidence intervals for abundance. The area of the Norway lobster ground surveyed has increased over time, by 12% between 2013 and 2014 and by 27% between 2016 and 2017. This implies that the harvest rate was overestimated and abundance was underestimated before 2017.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is below F_{MSY} ; no reference points for stock size have been defined for this stock.

Table 1 Norway lobster in Division 3.a, functional units 3 and 4. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size					
		2015	2016	2017	2015	2016	2017			
Maximum sustainable yield	HR_{MSY}	✓	✓	✓	Below	MSY	?	?	?	Undefined
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 3.a, functional units 3 and 4. The basis for the catch scenarios.

Variable	Value	Notes
Stock abundance	5093 million individuals	Abundance in TV assessment UWTV 2017
Mean weight in wanted catch	58.75 g	Average 2016–2017
Mean weight in unwanted catch	23.16 g	Average 2016–2017
Unwanted catch proportion	22.44%	Average (proportion by number) 2016–2017
Unwanted catch survival rate	25%	Proportion by number
Dead unwanted catch rate	17.83%	Average 2016–2017 (proportion by number)

Table 3 Norway lobster in Division 3.a, functional units 3 and 4. 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							
EU MAP [^] : F_{MSY}	21639	21085	19424	1661	554	7.9%	74%
$F = MAP F_{MSY lower}$	15339	14946	13769	1177	392	5.6%	23%
$F = MAP F_{MSY upper}^{***}$	21639	21085	19424	1661	554	7.9%	74%
Other scenarios							
F_{2017}	6993	6814	6277	537	179	2.6%	-44%

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

* Calculated in numbers for dead removals.

** Total catch 2019 relative to advice value 2018 (12 431 t).

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

The advice has increased by 74% mainly because the UWTV abundance is 78% higher in 2017 than 2016. The increase is caused by a combination of an increase of 27% in the area of the Division 3.a Norway lobster grounds after the redefinition of the grounds at the benchmark meeting in 2016 (WKNEPH; ICES, 2016a), and an increase in mean density (from 2016 to 2017) of 38% across the grounds. Changes are also a result of updating mean weights and discard rates.

Basis of the advice

Table 4 Norway lobster in Division 3.a, functional units 3 and 4. 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

Since 2011 UWTV surveys have been conducted in all six main fishing areas in Division 3.a. The spatial coverage has increased over time. Since 2014, the survey area has been extended into the western Skagerrak, and since 2017 the grounds in Division 3.a have been redefined following a benchmark meeting in 2016 (WKNEPH; ICES, 2016a). The spatial area was therefore 27% larger in the 2017 assessment compared to earlier years assessment. The abundance shown in Figure 1 has not been adjusted to take account of increasing spatial coverage and abundances prior to 2017 are underestimates. The density of Norway lobster increased by 38% from 2016 to 2017 (Figure 2). The estimated density is likely to be less biased than the total abundance, which is known to be biased due to the increased survey area.

Further work is required to update the methodology for estimating MSY reference points for this stock. Until this work has been completed (a workshop is planned in 2019), existing methodology will continue to be used.

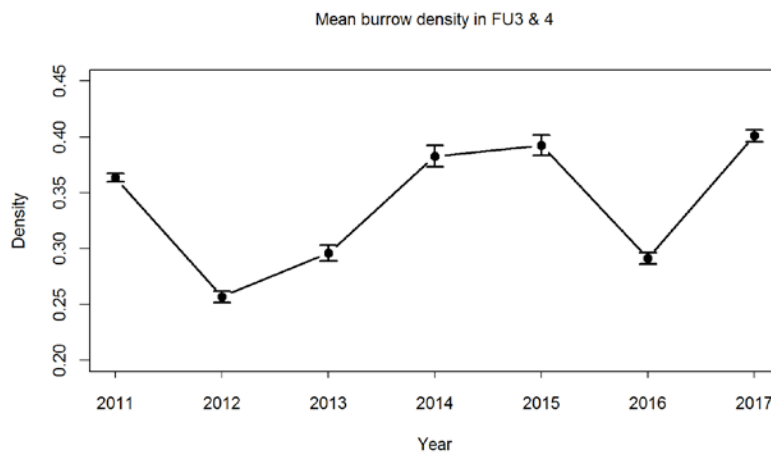


Figure 2 Norway lobster in Division 3.a, functional units 3 and 4. Mean burrow density from UWTV survey. Error bars indicate 95% confidence intervals.

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.

In this area, there was a mismatch between the minimum conservation reference size (MCRS, previously MLS) and mesh size in *Nephrops* trawl fisheries. Since 1 January 2016 the MCRS was lowered from 40 to 32 mm carapace length for EU countries fishing in this area (Figure 3). This reduced the proportion of the catch that was discarded. A discard ban implemented in the Norwegian zone of the Skagerrak on 1 January 2015 retains a minimum landing size of 40 mm carapace length.

For this stock, Swedish discard survival experiments indicate that the trawl discard survival may be around 50% (Valentinsson and Nilsson, 2015). As a result, an exemption from the landing obligation based on high survivability has been granted by the European Commission.

ICES continues to use the survival rate of 25% (ICES, 2016a) because the survival rates estimated by Valentinsson and Nilsson (2015) have not been evaluated by ICES. However, the impact of the lower survival assumption on the catch scenarios is expected to be relatively small due to the low discard rates.

The two functional units in Division 3.a, Skagerrak (FU 3) and Kattegat (FU 4), are considered to be a single stock.

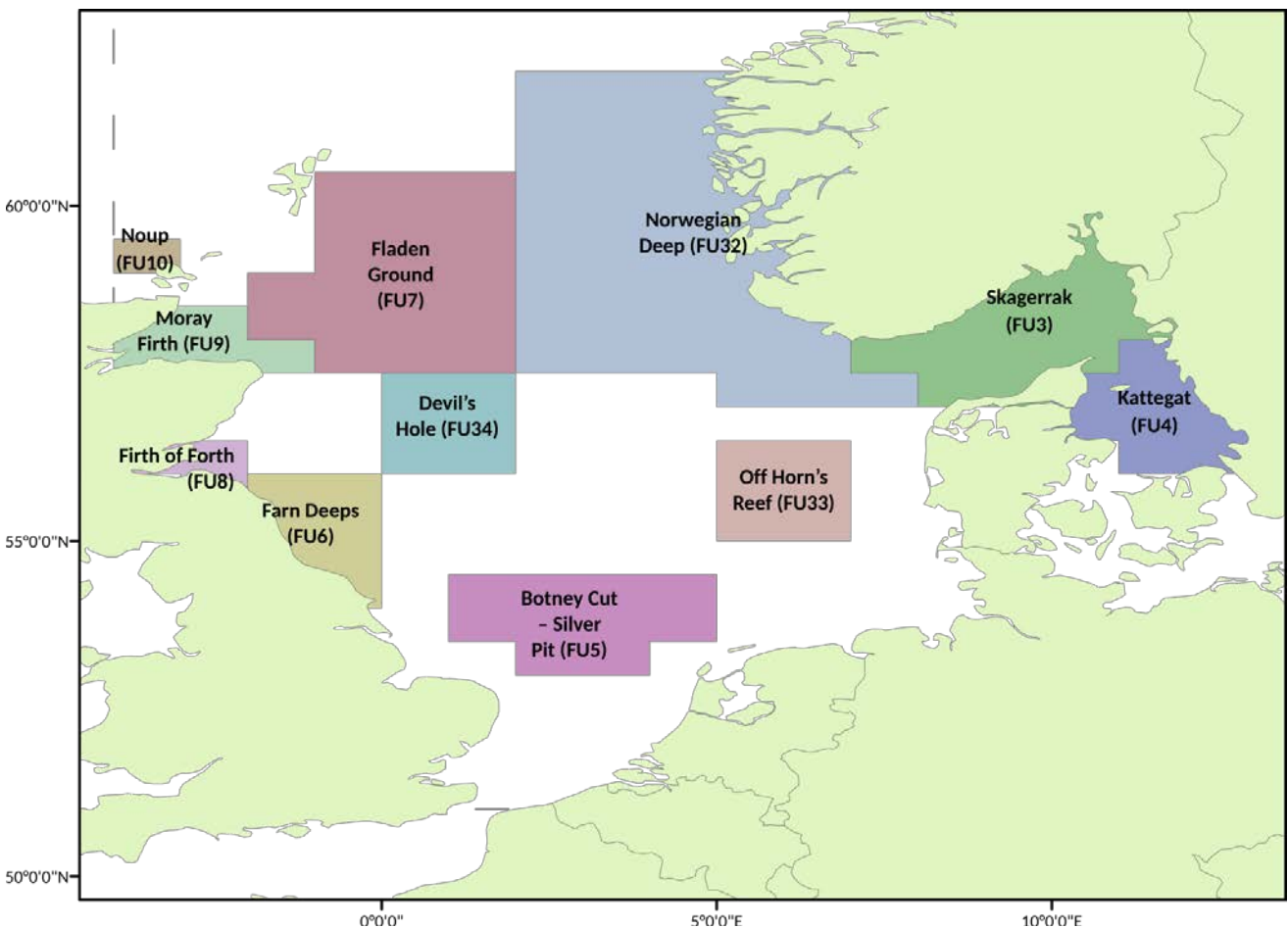


Figure 2 Norway lobster functional units in the North Sea and Skagerrak/Kattegat region.

Reference points

Table 5 Norway lobster in Division 3.a, functional units 3 and 4. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B_{trigger}	Not defined	It is not possible to determine an appropriate MSY B_{trigger} at this time because of the short survey series	ICES (2016a)
	F_{MSY}	Harvest rate 7.9%	Proxy, equivalent to F_{MAX} combined sex	ICES (2011)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan*	MAP MSY B_{trigger}	Not defined		
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	Harvest rate 7.9%	F_{MSY}	ICES (2015)
	MAP range F_{lower}	Harvest rate 5.6–7.9%	Consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2015)
	MAP range F_{upper} **	Harvest rate 7.9–7.9%	Consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2015)

* Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016)

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

Basis of the assessment

Table 6 Norway lobster in Division 3.a, functional units 3 and 4. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2016b)
Assessment type	Underwater TV survey (ICES, 2018)
Input data	Commercial catches. One survey index (UWTV), length–frequency data, and discard samples. Annual maturity data from commercial catch samples. Natural mortalities from literature: 0.3 for males and immature females, and 0.2 for mature females (Morizur, 1982) for all years.
Discards and bycatch	Included in the assessment, data series from the majority of the fleet/ main fleets (covering 98% of the landings in 2017)
Indicators	Landings per unit effort, mean size
Other information	This stock was benchmarked in 2016 (WKNEPH; ICES, 2016a) for spatial area definition only
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 for this stock.

History of the advice, catch, and management

Table 7 Norway lobster in Division 3.a, functional units 3 and 4. ICES advice, TACs and ICES catches. All weights are in tonnes. Values of landings and catches corresponding to advice and TAC prior to 2013 are presented to the nearest thousand tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	TAC	ICES landings	ICES discards
1991					4228	5183
1992		~4000		3500	2905	2523
1993		~4300		3500	3212	8493
1994		2900		3500	2874	6450
1995		2900		4800	3427	4464
1996	Status quo TAC	2900		4800	3980	2148
1997	Status quo TAC	2900		4800	4206	3469
1998		4000		4800	5056	1944
1999		4000		4800	4949	4108
2000		3800		5000	4710	5664
2001		3800		4500	4056	3767
2002	Catches to be maintained at the 2000 level	4700		4500	4448	4311
2003	Catches to be maintained at the 2000 level	4700		4500	3767	2208
2004	Catches to be maintained at the 2000 level	4700		4700	3965	2532
2005	Catches to be maintained at the 2000 level	4700		5200	4034	3014
2006	No increase in effort	-		5200	3672	2926
2007	No increase in effort	-		5200	4512	6524
2008	No increase in effort	-		5200	4860	4746
2009	Current effort appears to be sustainable	< 5200		5200	4846	5599
2010	Current effort appears to be sustainable	< 5200		5200	5123	3332
2011	Recent average landings (2007–2009)	< 4700		5200	3986	2835
2012	MSY approach	< 6000		6000	4429	4361
2013	MSY approach	< 5200		5200	3760	4010
2014	MSY approach	< 5019		5019	4150	1854
2015	MSY approach	< 5318	< 10 290	5318	3350	1038
2016	MSY approach	< 7827	< 11 793	11 001**	4889	256^
2017	MSY approach		< 13 099	12 715**	5211	1024^
2018	MSY approach		≤ 12 431	11 738**		
2019	MAP*** F ranges (Harvest rate=5.6–7.9%)		15339–21639*			

* Assuming the high survival exemption continues in 2019, this implies landings of 13 769–19 424 tonnes.

** Catch quota.

*** Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016)

^ Since 2016, discards refer to unwanted catches.

History of the catch and landings

Table 8 Norway lobster in Division 3.a, functional units 3 and 4. Catch distribution by fleet in 2017 as estimated by ICES.

Catch (2017)		Wanted catches		Unwanted catches	
96% dead	4% surviving	Trawling 94%	Creeling 6%	75% dead	25% surviving
6234 tonnes		5211 tonnes		1024 tonnes	

Table 9 Norway lobster in Division 3.a, functional units 3 and 4. History of commercial catch and landings; official landings and ICES estimated discards are presented by country. All weights are in tonnes.

Year	Denmark	Norway	Sweden	Germany	Total landings	Total discards*	Total catch
1991	2824	185	1219		4228	5183	9411
1992	2052	104	749		2905	2523	5428
1993	2250	103	859		3212	8493	11 705
1994	2049	62	763		2874	6450	9324
1995	2419	90	918		3427	4464	7891
1996	2844	102	1034		3980	2148	6128
1997	2959	117	1130		4206	3469	7675
1998	3541	184	1319	12	5056	1944	7000
1999	3486	214	1243	6	4949	4108	9057
2000	3325	181	1197	7	4710	5664	10 374
2001	2880	138	1037	1	4056	3767	7823
2002	3293	116	1032	7	4448	4311	8760
2003	2757	99	898	13	3767	2208	5975
2004	2955	95	903	12	3965	2532	6497
2005	2901	83	1048	2	4034	3014	7048
2006	2432	91	1143	6	3672	2926	6598
2007	2887	145	1467	13	4512	6524	11 036
2008	3174	158	1509	19	4860	4746	9606
2009	3372	128	1331	15	4846	6129	10 975
2010	3721	124	1249	29	5123	3548	8671
2011	2937	87	945	17	3986	2847	6833
2012	2970	104	1355	0	4429	4771	9200
2013	2550	73	1134	3	3760	4010	7770
2014	2785	88	1269	7	4150	1854	6004
2015	2121	91	1138	0	3350	1038	4389
2016	3440	87	1363	0	4890	256**	5145
2017	3700	81	1430	1	5211	1024**	6234

* Dead + surviving discards.

** Since 2016, discards refer to unwanted catches.

Summary of the assessment

Table 10 Norway lobster in Division 3.a, functional units 3 and 4. Assessment summary. Weights are in tonnes.

Year	UW Tv index (millions)	High	Low	Landings	Discards	Harvest rate	High	Low	Mean weight landings (grammes)	Mean weight discards (grammes)	Discard rate (by number)
1960				2871							
1961				2118							
1962				2188							
1963				2275							
1964				3112							
1965				2424							
1966				1595							
1967				2036							
1968				2408							
1969				1657							
1970				1584							

Year	UW Tv index (millions)	High	Low	Landings	Discards	Harvest rate	High	Low	Mean weight landings (grammes)	Mean weight discards (grammes)	Discard rate (by number)
1971				1606							
1972				2478							
1973				1829							
1974				2215							
1975				2950							
1976				1863							
1977				1518							
1978				1830							
1979				2240							
1980				2648							
1981				2720							
1982				3298							
1983				3676							
1984				4711							
1985				3989							
1986				3825							
1987				4046							
1988				3727							
1989				3877							
1990				4341							
1991				4228	5183						
1992				2912	2523						
1993				3209	8493						
1994				2874	6450						
1995				3427	4464						
1996				3979	2148						
1997				4206	3469						
1998				5056	1944						
1999				4949	4108						
2000				4710	5664						
2001				4056	3767						
2002				4448	4311						
2003				3767	2208						
2004				3965	2532						
2005				4034	3014						
2006				3672	2926						
2007				4512	6524						
2008				4876	4746						
2009				4829	5599						
2010				5123	3332						
2011	3577	3612	3542	3985	2835	3.91	4.265	3.555	59.57	25.55	0.626
2012	2526	2577	2475	4430	4361	8.55	9.065	8.035	56.67	26.48	0.698
2013	2914	2984	2844	3760	4010	5.8	6.507	5.093	59.70	28.23	0.693
2014	3762	3853	3670	4150	1854	3.03	3.963	2.097	68.40	31.84	0.487
2015	3857	3945	3770	3350	1038	2.05	2.943	1.157	69.70	31.44	0.405
2016	2863	2912	2814	4890	256*	3.074	3.573	2.575	61.13	22.97	0.127
2017	5093	5150	5036	5211	1024*	2.553	3.105	2.000	56.37	23.35	0.322

*Since 2016, discards refer to unwanted catches.

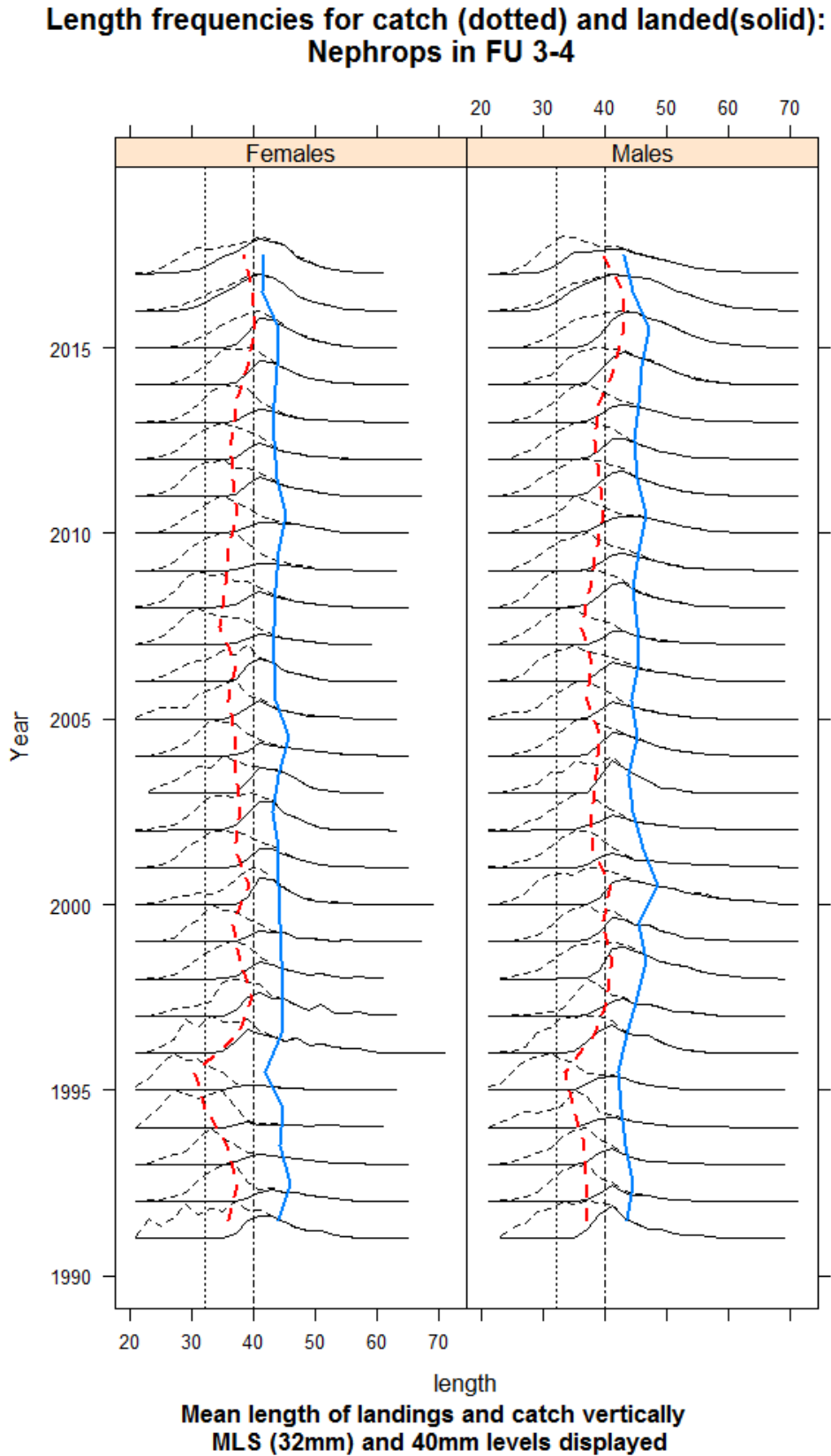


Figure 3 Norway lobster in Skagerrak and Kattegat (FU 3 and FU 4). Catch length–frequency distribution and mean size in catches (red broken line) and landings (blue line). Vertical lines are current minimum landing size (32 mm) and the old MLS at 40 mm.

Sources and references

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