

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 EU multiannual plan (MAP) for the North Sea is applied, catches in 2020 that correspond to the F ranges in the MAP are between 14 109 tonnes and 19 904 tonnes. The entire range is considered precautionary when applying the ICES advice rule.

Stock development over time

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

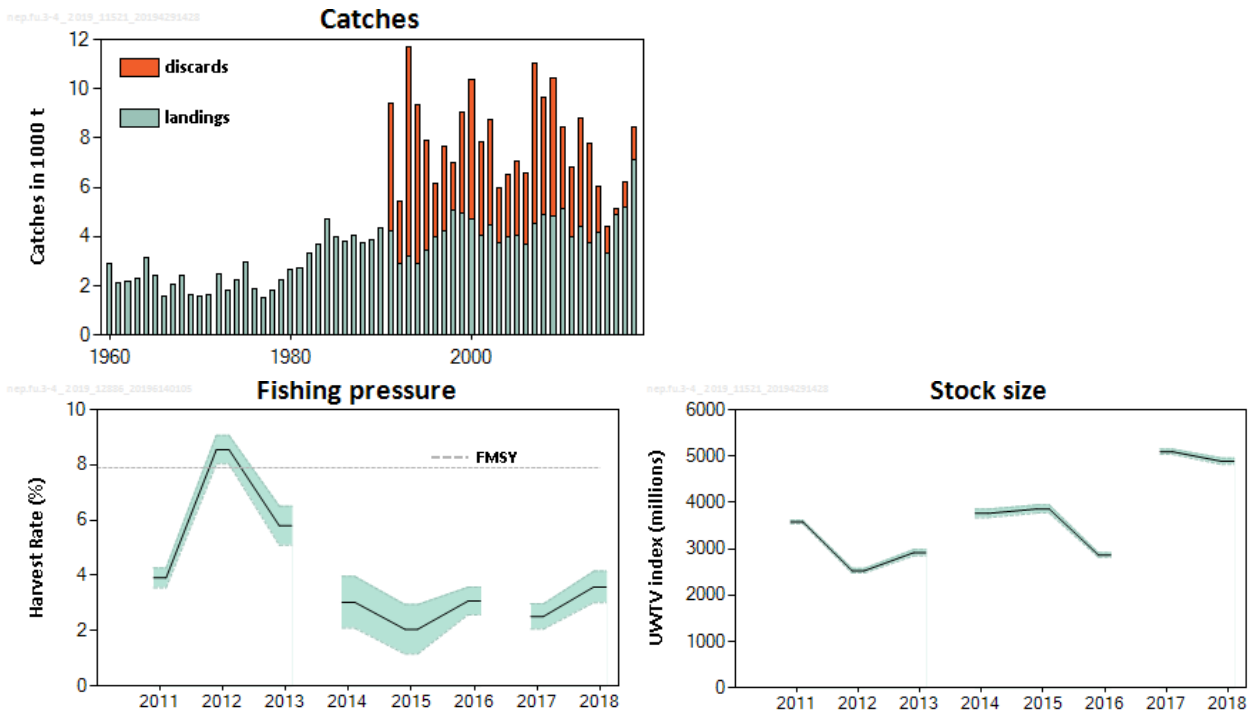


Figure 1 Norway lobster in Division 3.a, functional units 3 and 4. Summary of the stock assessment Long-term trends in landings (1960–2018) and catches (1991–2018), harvest rate, and underwater TV survey (UWTV) abundance (for animals greater than 17 mm carapace length). Orange line shows the proxy for F_{MSY} . Shaded areas are 95% confidence intervals. The area of the Norway lobster ground surveyed has changed over time, with spatial changes between 2013 and 2014, and an increase in the area of 27% between 2016 and 2017. This implies that the harvest rate was overestimated, and that 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				
		2016	2017	2018	2016	2017	2018		
Maximum sustainable yield	HR_{MSY}	✓	✓	✓ Below	MSY	?	?	?	Unknown
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓ Below possible reference points	B_{pa}, B_{lim}	?	?	?	Unknown
Management plan	F_{MGT}	✓	✓	✓ Below	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	4887 million individuals	UWTV 2018
Mean weight in wanted catch	57.0 g	Average 2016–2018
Mean weight in unwanted catch	22.6 g	Average 2016–2018
Unwanted catch proportion	25.3%	Average 2016–2018 (proportion by number)
Discard survival ratio	25%	Proportion by number
Dead unwanted catch ratio	20.3%	Average 2016–2018 (proportion by number)

Table 3 Norway lobster in Division 3.a, functional units 3 and 4. Annual catch scenarios assuming discarding is allowed. All weights are in tonnes (t).

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							
EU MAP \wedge : F_{MSY}	19904	19313	17540	1773	591	7.9%	-8.0
F = MAP F_{MSY} lower	14109	13690	12433	1257	419	5.6%	-35
F = MAP F_{MSY} upper ***	19904	19313	17540	1773	591	7.9%	-8.0
Other scenarios							
F_{2018}	9019	8751	7948	803	268	3.6%	-58%

Catch options assuming zero discards

Basis	Total catch	Wanted catch	Unwanted catch	Harvest rate *	% advice change **
	WC+UC	WC	UC	for WC+UC	
EU MAP \wedge : F_{MSY}	18643	16429	2214	7.9	-13.8
F = MAP F_{MSY} lower	13215	11646	1569	5.6	-39
F = MAP F_{MSY} upper ***	18643	16429	2214	7.9	-13.8
Other scenarios					
F_{2018}	8448	7445	1003	3.6	-61%

\wedge EU multiannual plan (MAP) for the North Sea (EU, 2018)

* Calculated in numbers for dead removals.

** Total catch 2020 relative to F_{MSY} advice value 2019 (21 639 t).

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

The change in advice (-8.0% for the EU MAP F_{MSY} scenario) is mainly because the UWTV abundance is 4% lower in 2018 than in 2017. 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	EU multiannual plan (MAP) for the North Sea (EU, 2018).
Management plan	The EU multiannual plan (MAP) for stocks in the North Sea 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. ICES considers that the F_{MSY} range for this stock used in the MAP is precautionary.

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. The survey area has been modified since 2014 (including an extension into the western Skagerrak), and since 2017 the grounds in Division 3.a have been redefined following a benchmark meeting in 2016 (WKNEPH; ICES, 2016). The spatial area was therefore 27% larger in the 2017 and 2018 assessment, compared to assessments in earlier years. 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, existing methodology will continue to be used.

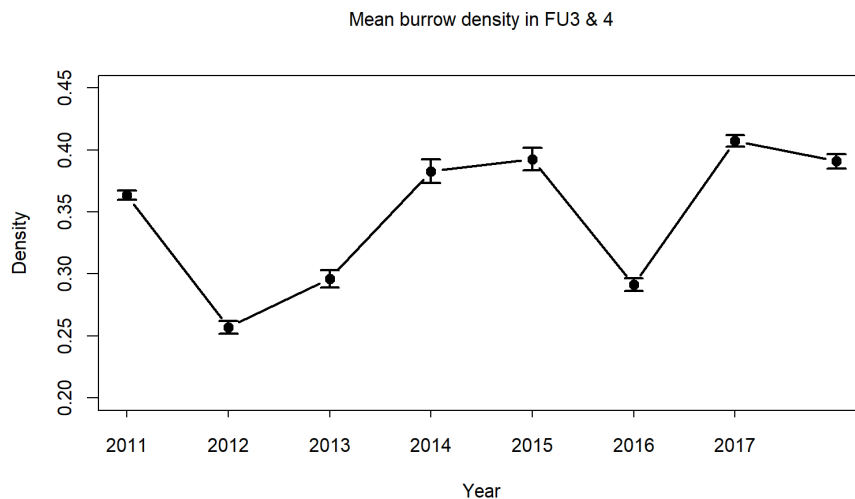


Figure 2 Norway lobster in Division 3.a, functional units 3 and 4. Mean burrow density from UWTV survey. Error bars indicate 95% confidence intervals.

Issues relevant for the advice

ICES was requested to provide advice based on the agreed EU MAP.

Since 1 January 2016 the MCRCs was lowered from 40 to 32 mm carapace length for EU countries fishing in this area (Figure 4). 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, 2016), because the survival rates estimated by Valentinsson and Nilsson (2015) have not been evaluated by ICES.

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

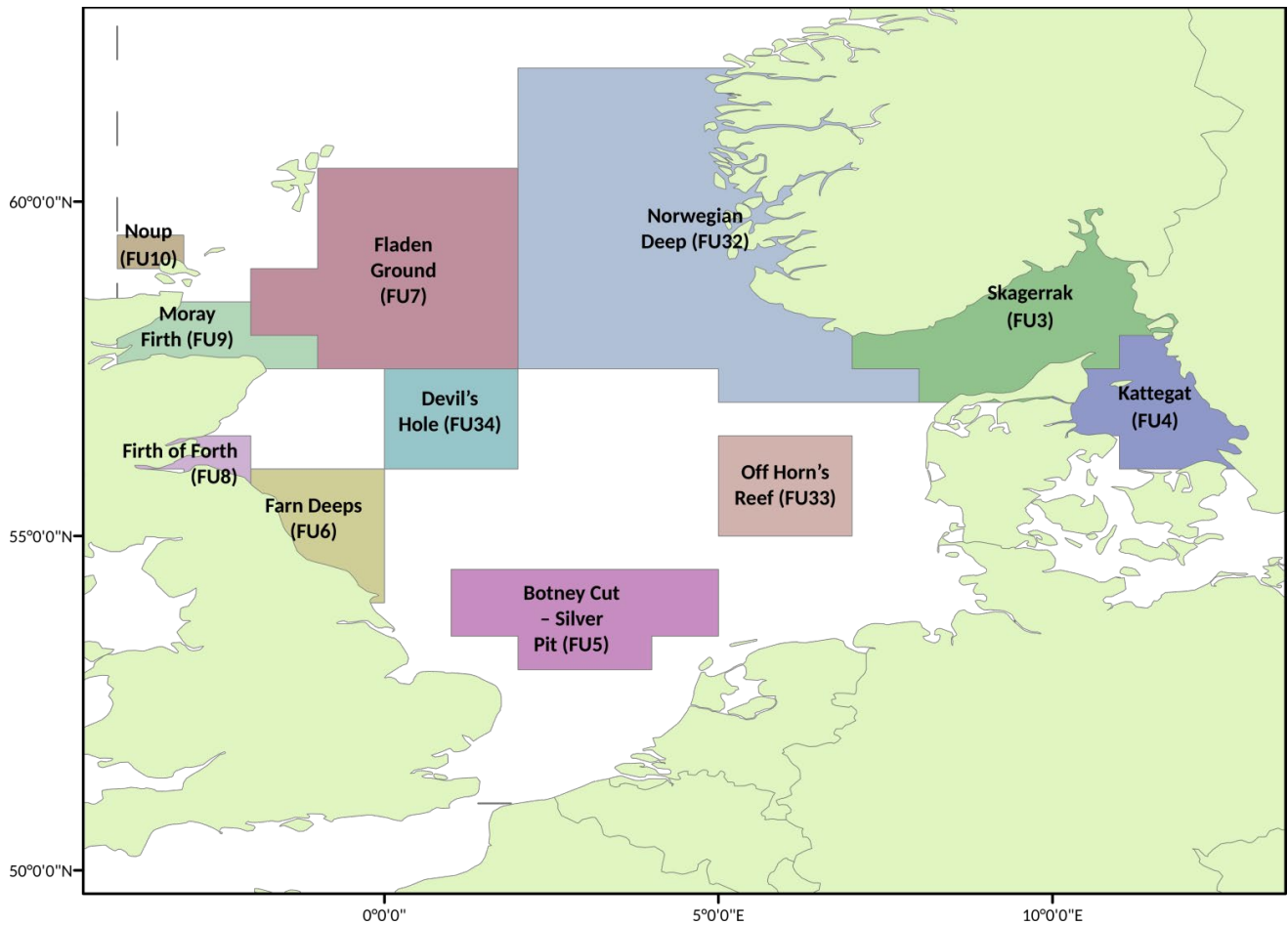


Figure 3 Norway lobster functional units in the North Sea and Skagerrak/Kattegat region.

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 (2016)
	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		
EU Management plan (MAP) *	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)

* EU multiannual plan (MAP) for the North Sea (EU, 2018)

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

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, 2018)
Assessment type	Underwater TV survey (ICES, 2019).
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 from the majority of the main fleets (covering 99% of the landings in 2018).
Indicators	Landings per unit effort, mean size
Other information	This stock was benchmarked in 2016 (WKNEPH; ICES, 2016) 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	6129
2010	Current effort appears to be sustainable	< 5200		5200	5123	3548
2011	Recent average landings (2007–2009)	< 4700		5200	3986	2847
2012	MSY approach	< 6000		6000	4429	4771
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^

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	TAC	ICES landings	ICES discards
2017	MSY approach		< 13 099	12 715 **	5211	1024 ^
2018	MSY approach		≤ 12 431	11 738 **	7100	1336 ^
2019	MAP *** F ranges (Harvest rate = 5.6–7.9%)		15 339–21 639	13 733 **		
2020	Management Plan		14 109–19 904*			

* Assuming the high survival exemption continues in 2020, this implies landings of 12 433–17 540 tonnes.

*** EU multiannual plan (MAP) for the North Sea (EU, 2018)

^ 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 2018 as estimated by ICES.

Catch (2018)		Wanted catches		Unwanted catches	
96% dead	4% surviving	Trawling 95%	Creeling 5%	75% dead	25% surviving
8435 tonnes		7100 tonnes		1336 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	4889	256 **	5145
2017	3700	81	1430	1	5211	1024 **	6234
2018	5133	97	1870	0	7100	1336 **	8435

* 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	UWTV abundance (millions)	High	Low	Landings	Discards	Harvest rate (% by numbers)	High	Low	Mean weight landings (grammes)	Mean weight discards (grammes)	Discard ratio (% by number)
1960				2871							
1961				2118							
1962				2188							
1963				2275							
1964				3112							
1965				2424							
1966				1595							
1967				2036							
1968				2408							
1969				1657							
1970				1584							
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				4860	4746						
2009				4846	6129						
2010				5123	3548						
2011	3577	3612	3542	3986	2847	3.91	4.265	3.555	60.7	25.9	62.6

Year	UWTV abundance (millions)	High	Low	Landings	Discards	Harvest rate (% by numbers)	High	Low	Mean weight landings (grammes)	Mean weight discards (grammes)	Discard ratio (% by number)
2012	2526	2577	2475	4429	4771	8.55	9.065	8.035	55.9	26.1	69.8
2013	2914	2984	2844	3760	4010	5.8	6.507	5.093	59.8	28.2	69.3
2014	3762	3853	3670	4150	1854	3.03	3.963	2.097	62.5	29.4	48.7
2015	3857	3945	3770	3350	1038	2.05	2.943	1.157	63.9	29.2	40.5
2016	2863	2912	2814	4889	256 *	3.074	3.573	2.575	61.3	22.7	12.7
2017	5093	5150	5036	5211	1024 *	2.553	3.105	2.000	55.4	22.9	32.2
2018	4887	4957	4816	7100	1336 *	3.581	4.148	3.014	54.4	22.3	25.3

*Since 2016, discards refer to unwanted catches.

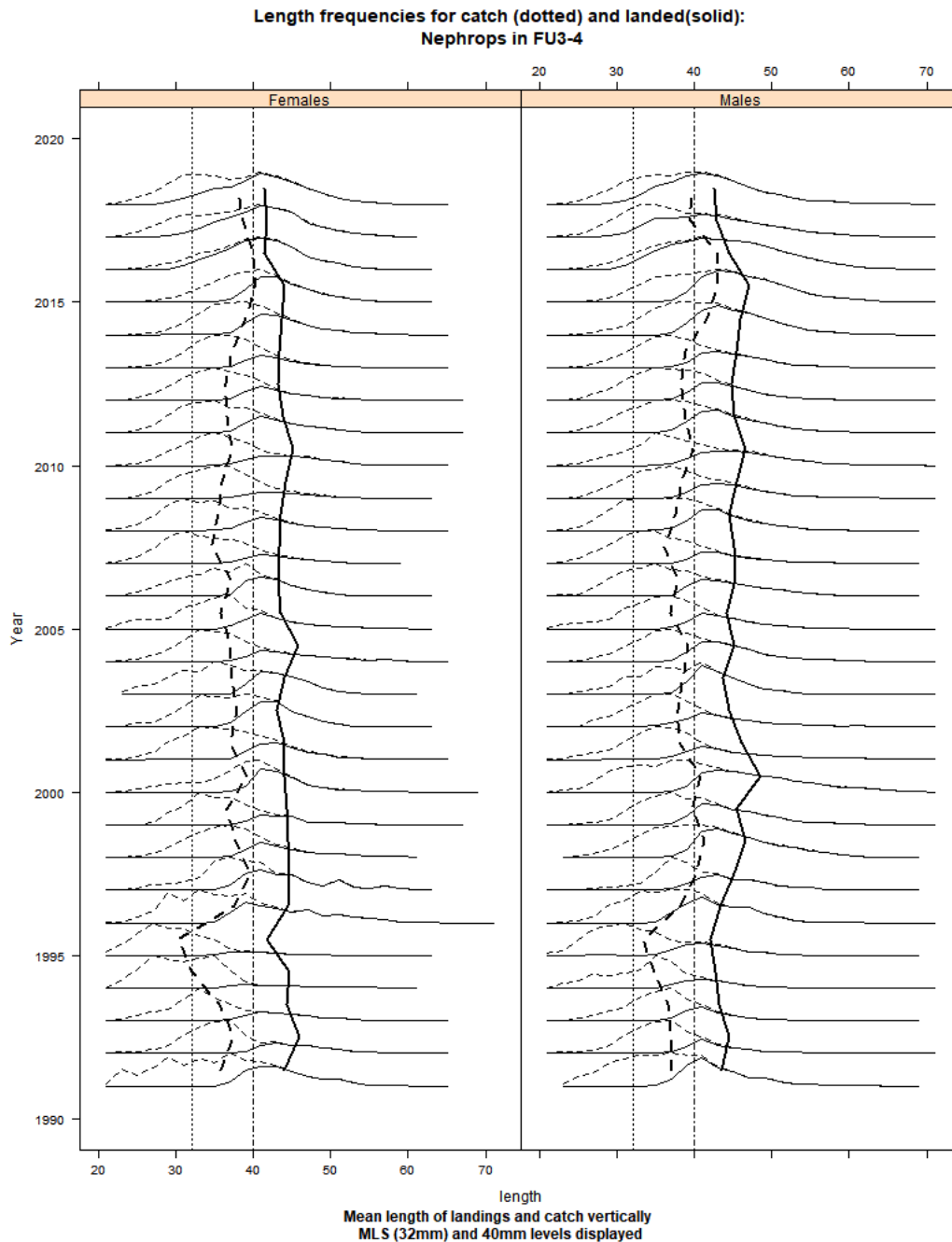


Figure 4 Norway lobster in Skagerrak and Kattegat (FU 3 and FU 4). Catch length–frequency distribution and mean size in catches (broken line) and landings (solid line). Vertical lines are current minimum landing size (32 mm) and the old MLS at 40 mm.

Sources and references

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