

Norway lobster (*Nephrops norvegicus*) in Division 4.a, Functional Unit 7 (northern North Sea, Fladen Ground)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2018–2020, catches in 2022 should be no more than 14 803 tonnes.

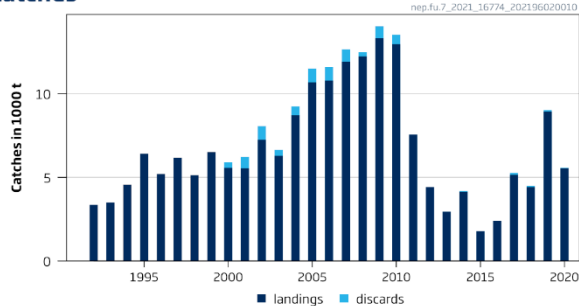
To ensure that the stock in Functional Unit (FU) 7 is exploited sustainably, management should be implemented at the functional unit level. The catch in FU 7 has been lower than advised in recent years, and if the difference is transferred to other FUs, this could result in non-precautionary exploitation of those FUs.

ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for Subarea 4. ICES considers this plan to be precautionary when implemented at the functional unit level.

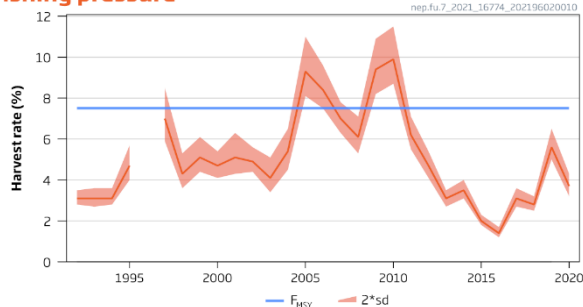
Stock development over time

Fishing pressure on the stock is below F_{MSY} and stock size is above MSY Btrigger.

Catches



Fishing pressure



Stock size

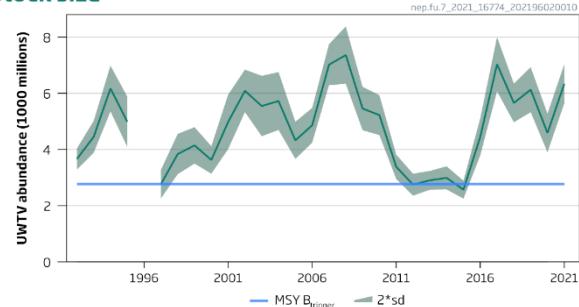


Figure 1 Norway lobster in Division 4.a, Functional Unit 7. Catches, harvest rate (sum of landings and dead discards in numbers, divided by stock abundance), and stock abundance (underwater TV survey). Harvest rates before 2006 may be underestimated because of underreporting of landings.

Catch scenarios

Table 1 Norway lobster in Division 4.a, Functional Unit 7. The basis for the catch scenarios.

Variable	Value	Notes
Stock abundance (2022)	6336	Underwater TV (UWTV) survey 2021; individuals in millions
Mean weight in projected landings	31.38	Average 2018–2020; grammes
Mean weight in projected discards	13.16	Average 2018–2020; grammes
Projected total discard rate	2.2	Average 2018–2020; percentage by number of the total catch
Discard survival rate	25	Percentage by number of the discards

Table 2 Norway lobster in Division 4.a, Functional Unit 7. Annual catch scenarios. All weights are in tonnes.

Catch scenarios assuming recent discard rates

Basis	Total catch	Dead removals	Projected landings	Projected dead discards	Projected surviving discards	% harvest rate*	% advice change**
	PL + PDD + PSD	PL + PDD	PL	PDD	PSD	For PL + PDD	
ICES advice basis							
MSY approach	14803	14768	14664	104	35	7.5	55
Other scenarios							
F ₂₀₂₀	7208	7191	7140	51	17	3.7	-25
F ₂₀₁₈₋₂₀₂₀	7894	7876	7821	55	18	4.0	-17.6
F _{MSY lower}	13026	12996	12905	91	30	6.6	36
F _{MSY upper} ***	14803	14768	14664	104	35	7.5	55
F _{35SpR}	22106	22054	21899	155	52	11.2	131
F _{max}	32369	32293	32066	227	76	16.4	240

* Calculated for dead removals.

** Advice basis values for 2022 relative to the 2021 advice value (MAP F_{MSY} advice of 9579 tonnes).

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

The 55% increase in the catch advice is mainly a result of the increase in the abundance observed between the 2020 and 2021 UWTV surveys as well as updated mean weights and discard rates.

Basis of the advice

Table 3 Norway lobster in Division 4.a, Functional Unit 7. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the EU multiannual management plan (MAP) that has been agreed for this stock (EU, 2018) and considers it to be precautionary when implemented at the functional unit level. There is no agreement with Norway and UK regarding this plan, and it is not used as the basis of the advice for this stock. ICES provides catch scenarios consistent with the F _{MSY} ranges in the MAP.

Quality of the assessment

The Fladen Ground functional unit contains several patches of mud to the north of the grounds which are fished, bringing the overall area of substrate to 30 633 km². This northern area is not surveyed but would add to the abundance estimate. The abundance for the total ground is, therefore, likely to be higher than currently estimated.

Underwater TV (UWTV) surveys have been conducted for this stock since 1993, with a continuous annual series available since 1997.

Discard sampling was impacted by the COVID-19 situation; however, sampling in quarters 1 and 4 was considered sufficient (coverage 55% of the landings in 2020) to be used for the discard estimates.

Issues relevant for the advice

During 2016–2020, the EU landing obligation was applied to all catches of Norway lobster fisheries with exemptions for high survival. From 2021, the high survivability exemption has not been extended and was replaced by a *de minimis* exemption for vessels fishing with certain gears in UK waters of ICES Subarea 4 and Division 2.a. The new exemption applies to catches of Norway lobster below the minimum conservation reference size (MCRS), which shall not exceed 2% of the total annual catches of that species.

Observations from the fishery indicate that discarding above the MCRS continues (Figure 3). ICES is providing advice for 2022 assuming average discard rates as observed over the last three years. This is considered to be the most realistic assumption. In 2016–2020, no Norway lobster were officially recorded as below MCRS (BMS category) in FU 7, despite

catches having been observed below the MCRS (Figure 3). In a situation where all catch is landed, there would be no surviving discards, and the total catch advice and MSY harvest rate would be lower than those given in the catch scenario table (Table 2). However, reducing the catch of smaller Norway lobster would allow an increase in landings above those given in the catch scenario table.

The advised catch for the Fladen Ground constitutes a large proportion of the total advised North Sea catch. Catches in the Fladen Ground have declined since 2010 and are well below the level advised for this area (Table 7). To avoid other FUs suffering from displacement of unused catch from Fladen Ground, management should be implemented at the functional unit level. Management should ensure that fishing opportunities are in line with the scale of the resource in each of the stocks.

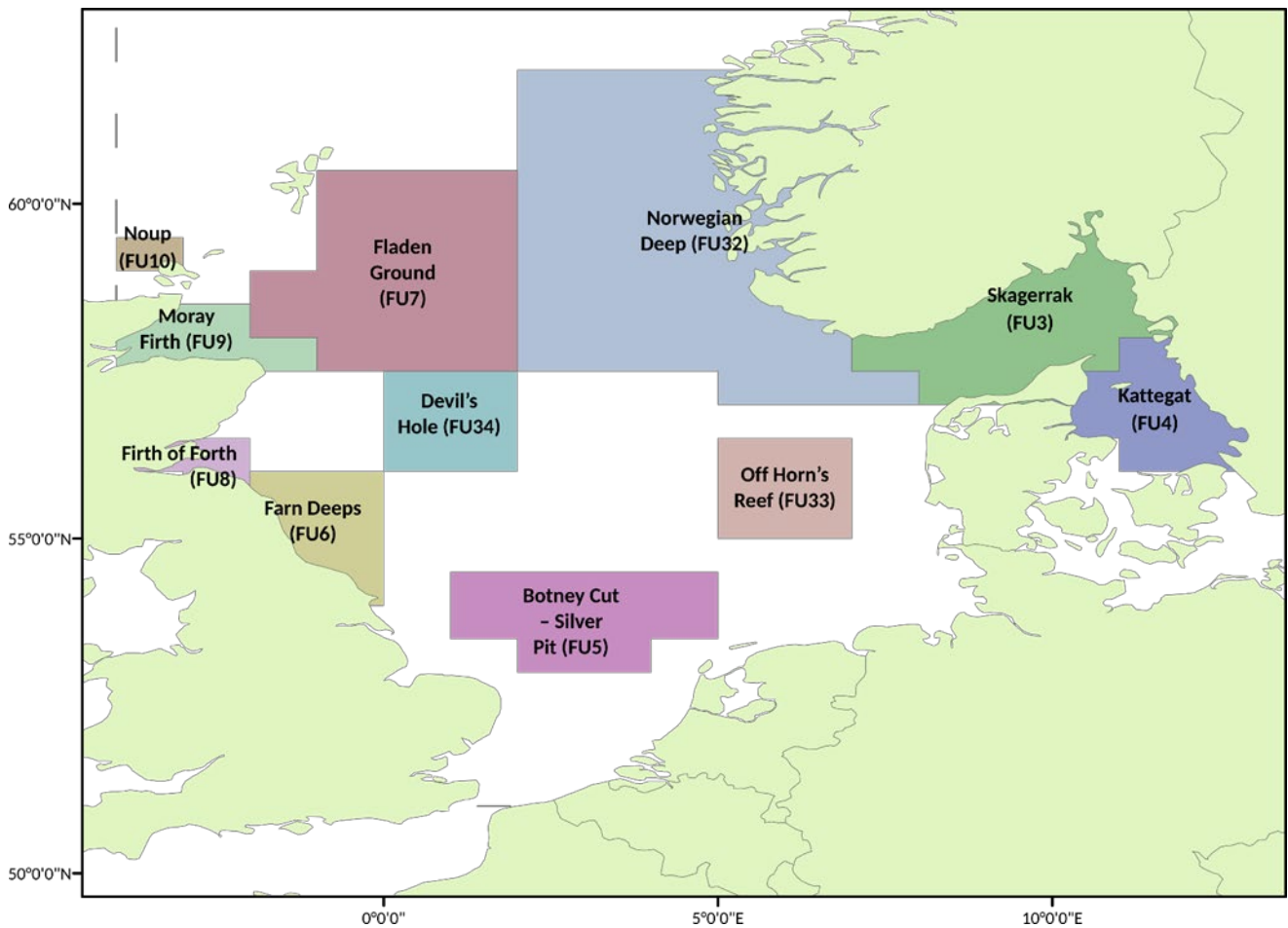


Figure 2 Norway lobster functional units in the North Sea and Skagerrak/Kattegat region.

Reference points

Table 4 Norway lobster in Division 4.a, Functional Unit 7. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2767	Lowest observed UWTV survey estimate of abundance (1992–2010); millions of individuals.	ICES (2010)
	F_{MSY}	7.5	Proxy, harvest rate equivalent to the $F_{0.1}$ for combined sexes; percentage by number.	ICES (2015a)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU Management plan (MAP) (EU, 2018)	MAP			
	MSY $B_{trigger}$	2767	MSY $B_{trigger}$; millions of individuals.	ICES (2010)
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	7.5	Harvest rate equivalent to F_{MSY} ; percentage by number	ICES (2015a)
	MAP range F_{lower}	6.6–7.5	Harvest rate consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY; percentage by number	ICES (2015b)
	MAP range F_{upper}^*	7.5–7.5	Harvest rate, $F_{MSY upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of $SSB < B_{lim}$ as no B_{lim} is defined; percentage by number	ICES (2015b)

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

Basis of the assessment

Table 5 Norway lobster in Division 4.a, Functional Unit 7. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021a)
Assessment type	Underwater TV survey linked to yield-per-recruit analysis from length data (ICES, 2021b)
Input data	Commercial catches (international landings, length frequencies from Scottish catch sampling), one survey index (FU 7 [UWTV; U6028]). 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 from the majority of the main fleets (in 2020, only covering 55% of the landings). Fifty-five percent of the discards were obtained from sampling (45% 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) took place in 2009 (ICES, 2009)
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

History of the advice, catch, and management

Table 6 Norway lobster in Division 4.a, Functional Unit 7. ICES advice and ICES estimates of landings and discards. All weights are in tonnes.

Year	ICES advice	Landings corresponding to the advice	Catch corresponding to the advice	ICES landings	ICES total discards *
1992		~ 2700		3363	
1993		2700		3492	
1994		5000		4568	
1995		5000		6419	
1996		5000		5210	
1997		5000		6170	
1998		7000		5136	
1999		7000		6518	
2000		9000		5570	340
2001		9000		5542	687
2002		9000		7245	820
2003		9000		6294	349

Year	ICES advice	Landings corresponding to the advice	Catch corresponding to the advice	ICES landings	ICES total discards *
2004		12800		8730	506
2005		< 12800		10684	823
2006	No increase of effort	-		10791	798
2007	No increase in effort and harvest rate below 7.5%	< 10900		11911	747
2008	No new advice, same as for 2007	< 10900		12239	257
2009	No increase in effort and recent average landings	< 11300		13327	707
2010	Harvest rate no greater than that equivalent to fishing at $F_{0.1}$	< 16400		12968	560
2011	MSY approach	< 13300		7559	0
2012	MSY approach	< 14100		4415	0
2013	MSY approach	< 10000		2951	0
2014	MSY approach	< 8959		4147	37
2015	MSY approach	< 10759		1784	0
2016	MSY approach	< 6847	< 6856**	2399	0
2017	MSY approach		≤ 12699 ***	5155	115
2018	MSY approach		$\leq 16577^{\wedge}$	4420	68
2019	MAP^^^ F_{ranges} (harvest rate = 6.6–7.5%)		11596–13178 [^]	8931	100
2020	Management plan		12552–14263 [^]	5543	28
2021	Management plan		8430–9579 ^{^^}		
2022	MSY approach		$\leq 14803^{\wedge\wedge}$		

* Dead + surviving discards.

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

*** Assuming discarding below the minimum conservation reference size (MCRS) only.

[^] Assuming average discard rates from the year 2000 onwards.

^{^^} Assuming average discard rates for the last three years.

^{^^^} EU multiannual plan (MAP) for the North Sea (EU, 2018).

History of the catch and landings

Table 7 Norway lobster in Division 4.a, Functional Unit 7. Catch distribution by fleet in 2020 as estimated by ICES.

Catch		Landings		Discards	
99.9% dead	0.1% surviving	Directed <i>Nephrops</i> fishery TR2 9%	Mixed <i>Nephrops</i> /demersal fishery TR1 91%	75% dead	25% surviving
5571 tonnes		5543 tonnes		28 tonnes	

Table 8 Norway lobster in Division 4.a, Functional Unit 7. ICES estimates of landings by gear for UK (Scotland), total landings for Denmark, and total discards. All weights are in tonnes.

Year	UK (Scotland)				Denmark	Other countries *	Total landings	Total discards ***
	<i>Nephrops</i> trawl	Other trawl	Creel	Subtotal				
1981	304	68	0	372	0	0	372	
1982	381	40	0	421	0	0	421	
1983	588	105	0	693	0	0	693	
1984	552	94	0	646	0	0	646	
1985	1020	120	0	1140	7	0	1147	
1986	1401	92	0	1493	50	0	1543	
1987	1023	349	0	1372	323	0	1695	
1988	1309	185	0	1494	81	0	1575	
1989	1724	410	0	2134	165	0	2299	
1990	1703	598	0	2301	236	3	2540	
1991	3021	772	0	3793	424	6	4223	
1992	1809	1164	0	2973	359	31	3363	
1993	2031	1234	0	3265	224	3	3492	

Year	UK (Scotland)				Denmark	Other countries *	Total landings	Total discards ***
	Nephrops trawl	Other trawl	Creel	Subtotal				
1994	1816	2356	0	4172	390	6	4568	
1995	3568	2389	19	5976	439	4	6419	
1996	2338	2578	7	4923	286	1	5210	
1997	2712	3221	0	5933	235	2	6170	
1998	2290	2673	0	4963	173	0	5136	
1999	2860	3546	0	6406	96	16	6518	
2000	2916	2546	0	5462	103	5	5570	340
2001	3540	1936	0	5476	64	2	5542	687
2002	4511	2546	0	7057	173	15	7245	820
2003	4175	2033	0	6208	82	4	6294	349
2004	7274	1319	1	8594	136	0	8730	506
2005	8849	1508	5	10362	321	1	10684	823
2006	9470	1026	1	10497	283	11	10791	798
2007	11055	734	0	11789	119	3	11911	747
2008	11432	666	0	12098	133	8	12239	257
2009	12688	499	0	13187	130	10	13327	707
2010	12544	288	0	12832	124	12	12968	560
2011	7367	128	0	7495	64	< 1	7559	0
2012	4257	81	0	4338	75	2	4415	0
2013	2275	663	0	2938	5	8	2951	0
2014	3928	206	0	4134	10	3	4147	37
2015	1465	307	0	1772	8	4	1784	0
2016	2021	374	0	2395	2	2	2399	0
2017	2862	2290	0	5152	1	2	5155	115
2018	2282	2133	0	4415	1	4	4420	68
2019	6702	2203	0	8905	7	19	8931	100
2020 **	3532	1991	0	5523	18	2	5543	28

* "Other countries" includes Belgium, Norway, and UK (England).

** Provisional.

*** Dead + surviving discards.

Summary of the assessment

Table 9 Norway lobster in Division 4.a, Functional Unit 7. Assessment summary.

Year	UWTV abundance *	Two standard deviations	Harvest rate	Landings numbers	Discard numbers	Removals numbers	Landings	Discards	Dead discards	Discard rate	Mean weight in landings	Mean weight in discards	Dead discard rate
	millions		% by number	millions			tonnes			% by number	grammes		% by number
1992	3661	376	3.1	114	NA	NA	3363	NA	0	NA	29.61	NA	NA
1993	4450	569	3.1	138	NA	NA	3492	NA	0	NA	25.38	NA	NA
1994	6170	814	3.1	193	NA	NA	4568	NA	0	NA	23.72	NA	NA
1995	4987	896	4.7	233	NA	NA	6419	NA	0	NA	27.51	NA	NA
1996	NA	NA	NA	175	NA	NA	5210	NA	0	NA	29.82	NA	NA
1997	2767	510	7.0	192	NA	NA	6170	NA	0	NA	32.08	NA	NA
1998	3838	717	4.3	164	NA	NA	5136	NA	0	NA	31.37	NA	NA
1999	4146	649	5.1	213	NA	NA	6518	NA	0	NA	30.55	NA	NA
2000	3628	491	4.7	153	21	169	5570	340	255	12.0	36.35	16.24	9.3
2001	4981	970	5.1	221	43	253	5542	687	515	16.3	25.1	15.94	12.8
2002	6087	757	4.9	259	55	301	7245	820	615	17.4	27.93	14.97	13.7
2003	5547	1076	4.1	209	24	226	6294	349	262	10.1	30.15	14.83	7.8
2004	5725	1030	5.4	282	34	307	8730	506	379	10.6	30.98	15.06	8.2
2005	4325	662	9.3	368	46	403	10684	823	617	11.2	29.05	17.74	8.6
2006	4862	619	8.4	369	54	409	10791	798	599	12.7	29.25	14.87	9.8
2007	7017	730	7.0	447	55	488	11911	747	560	10.9	26.63	13.67	8.4
2008	7360	1019	6.1	434	18	448	12239	257	192	3.9	28.18	14.54	3
2009	5457	772	9.4	473	51	511	13327	707	530	9.7	28.2	13.85	7.5
2010	5224	711	9.9	492	34	517	12968	560	420	6.5	26.38	16.44	4.9
2011	3382	435	6.2	209	0	209	7559	0	0	0	36.17	NA	0
2012	2748	392	4.7	128	0	128	4415	0	0	0	36.91	NA	0
2013	2902	335	3.1	89	0	89	2951	0	0	0.024	34.9	NA	0.0181
2014	2990	412	3.5	102	3	104	4147	37	28	2.5	43.11	13.9	1.92
2015	2569	320	1.97	51	0	51	1784	0	0	0	36.7	NA	0
2016	4449	662	1.43	63	0	63	2399	0	0	0.022	39.43	NA	0.0167
2017	7036	968	3.1	212	10	219	5155	115	86	4.4	25.37	11.66	3.4
2018	5656	689	2.8	155	5	159	4420	68	51	2.9	30.58	14.42	2.2
2019	6129	802	5.6	338	8	344	8931	100	75	2.2	28.31	13.32	1.64
2020	4589	688	3.7	166	2	168	5543	28	21	1.41	35.26	11.74	1.06
2021	6336	697											

* For animals greater than 17 mm carapace length.

NA = not available.

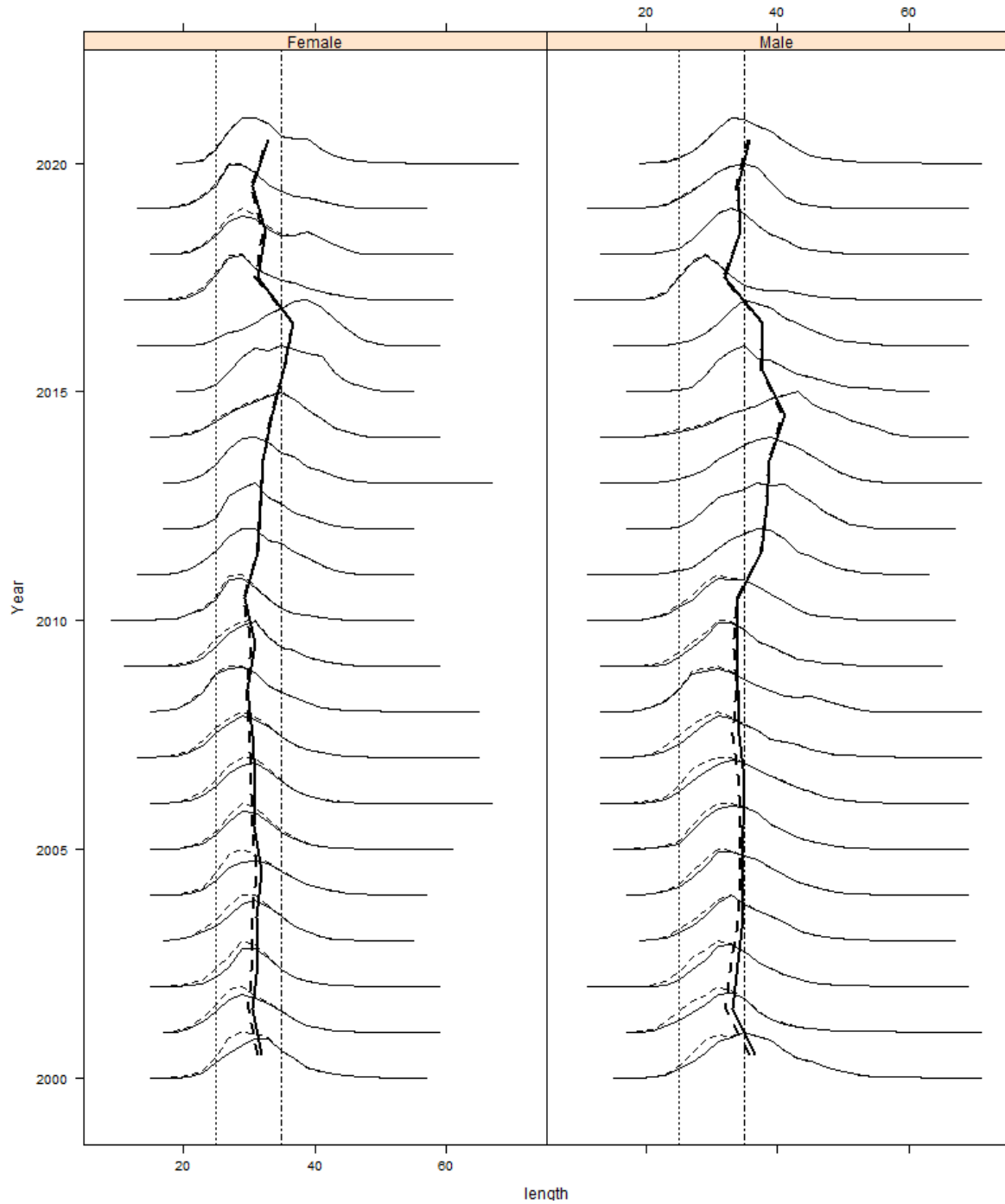


Figure 3 Norway lobster in Division 4.a, Functional Unit 7. The dashed lines represent catches while the solid lines represent landings. Annual length–frequency distributions are shown on the horizontal; the vertical bold lines represent mean lengths. Minimum conservation reference size (25 mm) and 35 mm visual reference levels indicated. All lengths are shown in carapace length (mm).

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