Norway lobster (*Nephrops norvegicus*) in Division 6.a, Functional Unit 13 (West of Scotland, Firth of Clyde, and Sound of Jura)

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 2019–2021, catches in 2023 should be no more than 4596 tonnes (4122 tonnes for the Firth of Clyde and 474 tonnes for the Sound of Jura).

To ensure that the stock in Functional Unit (FU) 13 is exploited sustainably, management should be implemented at the FU level. In this particular FU, additional measures should be implemented to ensure that landings taken in each component (the Firth of Clyde and the Sound of Jura) are in line with the advice.

ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for Subarea 6. ICES considers this plan to be precautionary when implemented at the FU level.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and stock size is above MSY $B_{trigger}$.

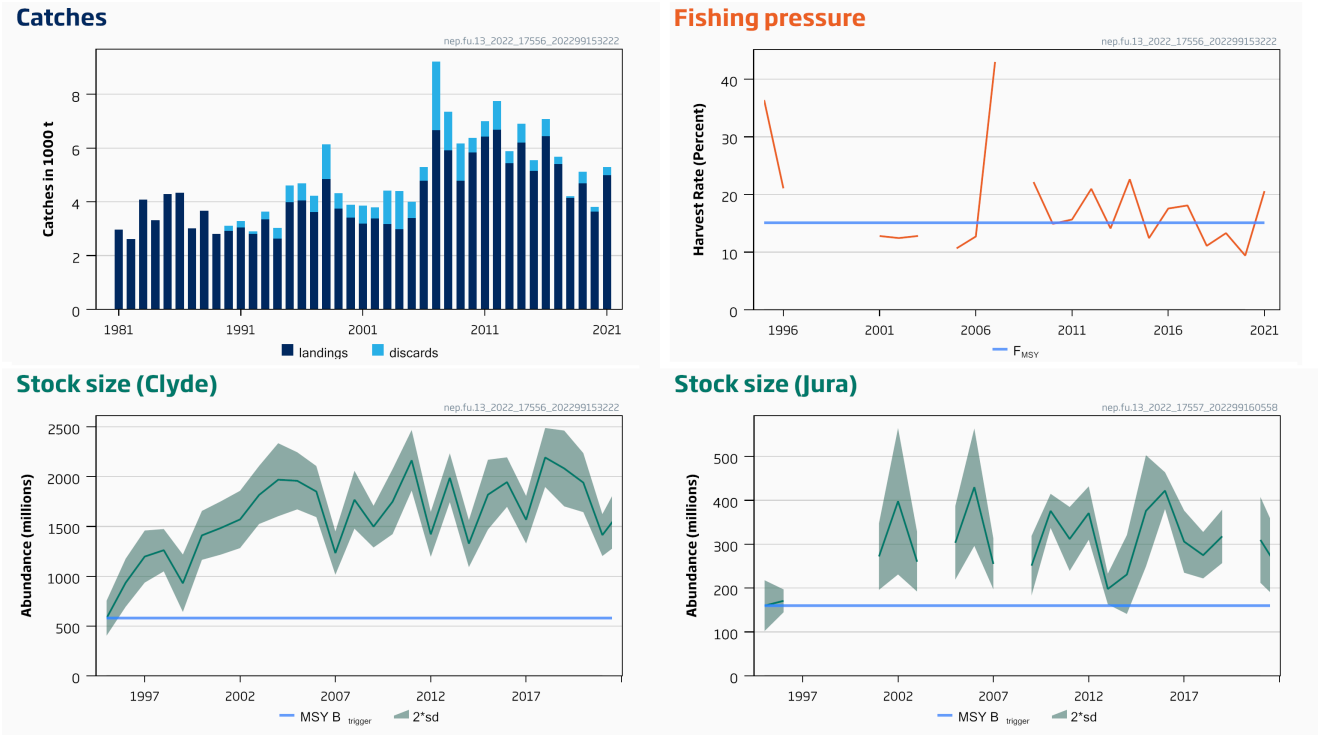

Figure 1 Norway lobster in Division 6.a, Functional Unit 13. Summary of the stock assessment. Catches (discard data only available from 1990), harvest rate (sum of landings and dead discards in numbers, divided by stock abundance), and stock abundance (underwater TV survey; Clyde and Jura). Harvest rates before 2006 may be underestimated because of the underreporting of landings. Harvest rates are calculated using the total catch divided by the stock abundance for the two components combined. For the Sound of Jura, an interpolated value for abundance in 2020 is used (average of 2019 and 2021).

Catch scenarios

Table 1 Norway lobster in Division 6.a, Functional Unit 13. The basis for the catch advice and scenarios.

Variable	Value	Notes
Firth of Clyde stock abundance (2023)	1665	UWTV Survey 2022; individuals in millions
Sound of Jura stock abundance (2023)	241	UWTV Survey 2022; individuals in millions
Mean weight in projected landings	17.16	Average 2019–2021 (combined for the Firth of Clyde and the Sound of Jura); in grammes
Mean weight in projected discards	7.33	Average 2019–2021 (combined for the Firth of Clyde and the Sound of Jura); in grammes
Projected discard rate	13.4	Average 2019–2021 (combined for the Firth of Clyde and the Sound of Jura); percentage by number of the total catch
Discards survival rate	25	Percentage by number of the discards

Table 2 Norway lobster in Division 6.a, Functional Unit 13. 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 discarding continues at the recent average rate.

Firth of Clyde

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	4122	4058	3866	192	64	15.1	14.3
Other scenarios							
$F_{MSY\ lower}$	2702	2660	2534	126	42	9.9	–25
$F_{MSY\ upper}$***	4122	4058	3866	192	64	15.1	14.3
F_{2021}	5622	5535	5274	261	87	21	56

Sound of Jura

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	474	467	445	22	7	12	–25
Other scenarios							
$F_{MSY\ lower}$	371	365	348	17	6	9.4	–41
$F_{MSY\ upper}$***	474	467	445	22	7	12	–25
F_{2021}	814	801	763	38	13	21	30

* By number.

** Advice values for 2023 are relative to the 2022 advice (F_{MSY} advice of 3607 tonnes for the Firth of Clyde, and 628 tonnes for the Sound of Jura).

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

The advice for 2023 is higher than for 2022 because of the higher combined estimated stock abundance.

Basis of the advice

Table 3 Norway lobster in Division 6.a, Functional Unit 13. 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, 2019) and considers it to be precautionary when implemented at the FU level. There is no agreement with the 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

Commercial catch sampling was impacted by the COVID-19 pandemic in 2020 and 2021. This affected quarterly sampling across both years, and to accommodate this, sample estimates were derived from available data (2017–2019). This is considered to have had minor impact on the quality of the assessment because discard rates have been consistently low in recent years (ICES, 2021 and 2022a).

It is not possible to reliably disaggregate the landings (and catch) data for the two components, so a combined harvest rate is presented over the whole FU (Figure 2).

Given the relative stock sizes and likely magnitude of the landings from the two components, the combined harvest rate shown in Figure 1 is expected to be more representative of the harvest rate in the Firth of Clyde than in the Sound of Jura.

Annual underwater television (UWTV) surveys are usually carried out for both components. The surveys have good coverage of the muddy sediment in each component and provide abundance estimates with acceptable precision.

Although the commercial catch-at-length samples are considered representative of the combined Norway lobster fishery in the Firth of Clyde and the Sound of Jura, sampling levels remain insufficient to provide estimates of mean weights and discard rates for each component separately. The discard rates and mean weights used in the catch scenarios are for the two components combined.

Issues relevant for the advice

During 2016–2021, the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 6 with exemptions for high survival. In 2022, this stock is still under a landing obligation and there are still exemptions in place. Most recent observations from the fishery indicate that some discarding above the minimum conservation reference size (MCRS) continues (Figure 3). Consequently, ICES is providing advice for 2023 assuming average discard rates as observed over the last three years. This is considered to be the most realistic assumption. 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 distinct components of Firth of Clyde and Sound of Jura in the FU are separated by a large area of sandy gravely sediment around the Mull of Kintyre. These are treated separately because of differences in burrow density and biological parameters, which imply different reference points.

Norway lobster in the Firth of Clyde occur at a high density (with an average of around 0.8 individuals m^{-2}) compared to other FUs, suggesting a relatively high productivity. The fishery in the Clyde area has been in existence since the 1960s, with the population and biological parameters having been studied numerous times. Historical harvest rates in this FU have been generally high, at or above F_{max}. F_{max} is considered an appropriate F_{MSY} proxy, expected to deliver high long-term yield with a low probability of recruitment overfishing in the Firth of Clyde. For the Sound of Jura the density is also relatively high. However, the fishery here has been sporadic and sampling is at a relatively low level; therefore, a more cautious $F_{35\%SPR}$ (the fishing mortality that gives 35% spawning potential ratio) is considered an appropriate F_{MSY} proxy.

A single TAC covers the entire ICES Subarea 6. Management should be implemented at the FU level (Figure 2) to avoid local over-exploitation and to ensure that fishing opportunities are in line with the scale of the resource for each of the stocks and consistent with an MSY approach.

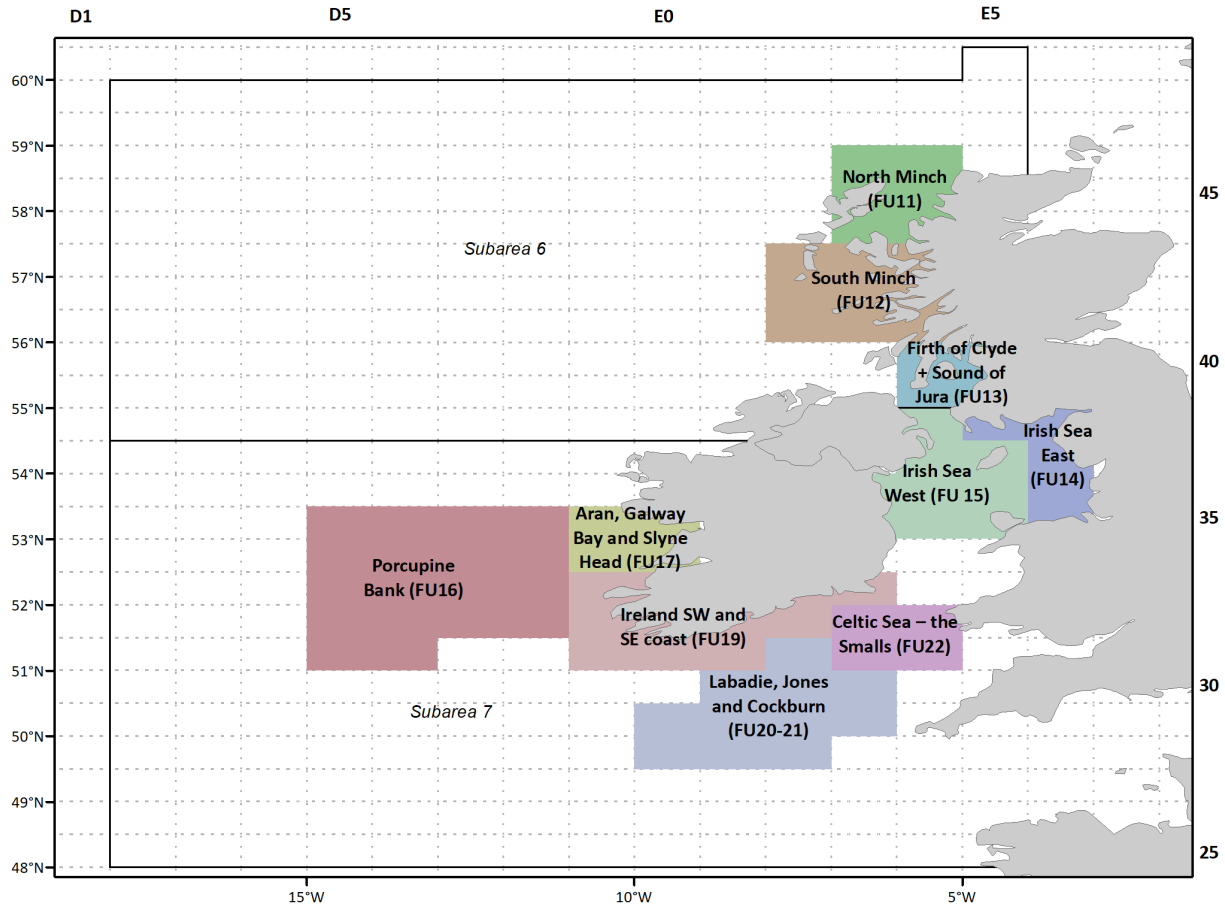

Figure 2 Norway lobster functional units in subareas 6 and 7.

Reference points

Table 4 Norway lobster in Division 6.a, Functional Unit 13. Reference points, values, and their technical basis.

Firth of Clyde

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	580	Lowest observed abundance estimate (Firth of Clyde); individuals in millions	ICES (2016)
	F_{MSY}	15.1	Proxy, harvest rate equivalent to F_{max} for combined sexes, derived from a length-based per recruit analysis; percentage by number	ICES (2016)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU management plan (EU 2019)	MAP MSY $B_{trigger}$	580	MSY $B_{trigger}$; individuals in millions	ICES (2016)
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	15.1	Harvest rate equivalent to F_{MSY}; percentage by number	ICES (2016)
	Lower range of F_{MSY}	9.9–15.1	Harvest rate, consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY; percentage in numbers	ICES (2016)
	Upper range of F_{MSY}	15.1–15.1	Harvest rate, $F_{MSY\ upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of SSB < B_{lim}; percentage by number	ICES (2016)

Sound of Jura

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	160	Lowest observed abundance estimate (Sound of Jura); individuals in millions	ICES (2016)
	F_{MSY}	12.0	Proxy harvest rate equivalent to F_{max} for combined sexes, derived from a length-based per recruit analysis; percentage by number	ICES (2016)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU Management plan (EU 2019)	MAP MSY $B_{trigger}$	160	MSY $B_{trigger}$; individuals in millions	ICES (2016)
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	12.0	Harvest rate equivalent to F_{MSY}; percentage by number	ICES (2016)
	MAP Lower range of F_{MSY}	9.4–12.0	Harvest rate, consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY; percentage in numbers	ICES (2016)
	MAP Upper range of F_{MSY}	12.0–12.0	Harvest rate, $F_{MSY\ upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of SSB < B_{lim}; percentage by number	ICES (2016)

Basis of the assessment

Table 5 Norway lobster in Division 6.a, Functional Unit 13. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Underwater TV survey (ICES, 2022b)
Input data	One survey index (UWTV-FU13 [U6028]); commercial catches (international landings, length frequencies from Scottish and Northern Ireland catch sampling); fixed maturity parameters (from survey data); fixed natural mortalities. Discard survival rate.
Discards and bycatch	Included in the assessment since 1990; dataseries from the majority of the main fleets cover almost all landings
Indicators	Size structure, mean size, and sex ratio of catches
Other information	The latest benchmark (based on the UWTV survey) was performed in 2009 (ICES, 2009)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Norway lobster in Division 6.a, Functional Unit 13. ICES advice, landings, and discards. All weights are in tonnes.

Year	ICES advice	Landings advice for the Firth of Clyde (FU 13)	Landings advice for the Sound of Jura (FU 13)	Catch advice for the Firth of Clyde (FU 13)*	Catch advice for the Sound of Jura (FU 13)*	ICES landings	Total discards**
1989						2812	
1990						2909	193
1991						3038	247
1992	Maintain current effort					2803	100
1993	Maintain current effort					3343	295
1994	Maintain current effort					2630	397
1995	Maintain current effort					3987	619
1996	Maintain current effort					4057	635
1997	As for 1996					3621	598
1998	Maintain current effort					4841	1292
1999	As for 1998					3752	566
2000	Maintain current effort					3417	470
2001	As for 2000					3182	677
2002	Maintain current effort					3384	406
2003	As for 2002					3173	1247
2004	Maintain current effort					2973	1435
2005	As for 2004					3395	611
2006	No increase in effort					4780	515
2007	No increase in effort and harvest rate of 15%	3765				6660	2566
2008	As for 2007	3765				5923	1433
2009	No increase in effort and recent average catch	< 5700				4779	1390
2010	Harvest rate no greater than that equivalent to fishing at $F_{0.1}$	< 3900				5843	536
2011	MSY transition scheme	< 4100	< 500			6432	568
2012	MSY approach	< 4200	< 900			6687	1066
2013	MSY approach	< 5600	< 800			5435	454
2014	MSY approach	< 5744	< 521			6207	696
2015	MSY approach	< 3766	< 614			5147	401
2016	MSY approach			≤ 5554***	≤ 1014***	6447	636
2017	MSY approach			≤ 5755	≤ 992	5403	275
2018	MSY approach			≤ 4484	≤ 695	4143	68
2019	MSY approach			≤ 5990	≤ 598	4683	435
2020	Management plan			5227 (range 3428–5227)	634 (range 496–634)	3636	174
2021	Management plan			4791 (range 3142–4791)	634 (range 496–634)	4995	292
2022	MSY approach			≤ 3607	≤ 628		
2023	MSY approach			≤ 4122	≤ 474		

* Assuming recent discard rates from 2017 onwards.
** Dead + surviving discards.
*** Assuming all catches are landed.

History of catch and landings

Table 7 Norway lobster in Division 6.a, Functional Unit 13. Catch distribution by fleet in 2021 as estimated by ICES.

Catch		Landings		Total discards	
99% dead	1% surviving	*Nephrops* trawl fishery	*Nephrops* creel fishery	75% dead	25% surviving
5287 tonnes		94%	6%	292 tonnes	
		4995 tonnes			

Table 8 Norway lobster in Division 6.a, Functional Unit 13. History of ICES estimates of landings (for Scotland by gear) and total discards. All weights are in tonnes.

Year	UK Scotland				Other UK	Total landings	Discards*
	Nephrops trawl	Other trawl	Creel	Subtotal			
1981	2498	404	66	2968	0	2968	
1982	2372	169	79	2620	0	2620	
1983	3889	121	52	4062	14	4076	
1984	3070	153	77	3300	10	3310	
1985	3921	293	65	4279	7	4286	
1986	4073	176	79	4328	13	4341	
1987	2860	82	64	3006	3	3009	
1988	3507	107	43	3657	7	3664	
1989	2577	184	35	2796	16	2812	
1990	2731	121	23	2875	34	2909	193
1991	2844	145	26	3015	23	3038	247
1992	2530	247	9	2786	17	2803	100
1993	3200	110	5	3315	28	3343	295
1994	2503	50	28	2581	49	2630	397
1995	3766	131	26	3923	64	3987	619
1996	3880	108	27	4015	42	4057	635
1997	3486	46	26	3558	63	3621	598
1998	4540	79	39	4658	183	4841	1292
1999	3476	29	37	3542	210	3752	566
2000	3142	63	75	3280	137	3417	470
2001	2890	65	95	3050	132	3182	677
2002	3075	53	105	3233	151	3384	406
2003	2954	20	119	3093	80	3173	1247
2004	2619	8	88	2715	258	2973	1435
2005	3148	5	94	3247	148	3395	611
2006	4356	1	179	4536	244	4780	515
2007	6069	4	221	6294	366	6660	2566
2008	5320	3	184	5507	416	5923	1433
2009	4304	1	191	4496	283	4779	1390
2010	5162	5	211	5378	465	5843	536
2011	5664	9	219	5892	540	6432	568
2012	5617	4	203	5824	863	6687	1066
2013	4708	4	212	4924	511	5435	454
2014	4770	1	258	5029	1178	6207	696
2015	4035	8	206	4249	898	5147	401
2016	4922	6	267	5195	1248	6447	636
2017	4195	3	263	4461	942	5403	275
2018	3574	13	253	3840	303	4143	68
2019	3834	3	265	4102	581	4683	435
2020	2869	10	225	3104	532	3636	174
2021	3805	50	233	4088	907	4995	292

*Dead + surviving discards.

Summary of the assessment

Table 9 Norway lobster in Division 6.a, Functional Unit 13. Assessment summary.

Year	UWTV abundance estimate (Clyde)	2 x Standard deviations	UWTV abundance estimate (Jura)	2 x Standard deviations	Landings in number	Total discards in number *	Removals in number	Harvest rate (by number)**	Landings	Total discards *	Discard proportion (by number)	Dead discard proportion (by number)	Mean weight in landings	Mean weight in discards
	millions							%	tonnes		%		grammes	
1995	579	176	160	58	207	82	269	36.4	3987	619	28	23	19.24	7.54
1996	935	242	171	26	187	61	233	21.1	4057	635	25	20	21.68	10.35
1997	1198	262	-	-	150	70	202	-	3621	598	32	26	24.21	8.50
1998	1262	213	-	-	269	187	409	-	4841	1292	41	34	17.98	6.92
1999	930	289	-	-	216	93	286	-	3752	566	30	25	17.39	6.05
2000	1411	246	-	-	171	48	207	-	3417	470	22	17.4	19.96	9.75
2001	1486	268	272	76	164	82	225	12.8	3182	677	34	27	19.46	8.23
2002	1571	288	398	167	207	50	245	12.4	3384	406	20	15.4	16.35	8.12
2003	1817	292	260	68	166	134	266	12.8	3173	1247	45	38	19.13	9.31
2004	1970	367	-	-	158	168	284	-	2973	1435	52	44	18.80	8.54
2005	1959	287	303	84	189	69	241	10.7	3395	611	27	22	17.96	8.81
2006	1851	257	430	134	248	55	290	12.7	4780	515	18.2	14.3	19.27	9.31
2007	1233	218	255	58	350	387	640	43.0	6660	2566	53	45	19.05	6.64
2008	1769	291	-	-	357	207	512	-	5923	1433	37	30	16.59	6.94
2009	1499	210	251	68	261	169	388	22.2	4779	1390	39	33	18.31	8.23
2010	1750	327	376	39	276	55	317	14.9	5843	536	16.7	13.1	21.21	9.68
2011	2165	305	312	73	333	74	388	15.7	6432	568	18.2	14.3	19.34	7.65
2012	1421	227	371	61	306	93	376	21.0	6687	1066	23	18.6	21.83	11.42
2013	1990	246	198	35	262	62	309	14.1	5435	454	19.0	15.0	20.72	7.37
2014	1328	237	231	90	295	78	353	22.6	6207	696	21	16.6	20.79	8.92
2015	1820	351	376	127	232	54	273	12.4	5147	401	18.9	14.8	22.21	7.43
2016	1946	249	422	42	364	69	416	17.6	6447	636	15.9	12.4	17.70	9.21
2017	1568	239	306	71	316	32	340	18.1	5403	275	9.5	7.1	17.02	8.55
2018	2193	297	275	53	268	7	273	11.1	4143	68	2.5	1.9	16.14	9.79
2019	2083	381	318	61	271	64	319	13.3	4683	435	19.1	15.0	17.26	6.82
2020	1941	297	-	-	195	23	212	9.4 ***	3636	174	10.5	8.1	18.96	7.59
2021	1414	211	310	98	328	38	356	20.6	4995	292	10.5	8.1	15.27	7.59
2022	1665	316	241	71	-	-	-	-	-	-	-	-	-	-

* Dead + surviving discards.

** Values prior to 2006 may be underestimates because of underreporting of landings.

*** The harvest rate is estimated based on a linear interpolation of abundance for Sound of Jura in 2020, as no survey was carried out in that year.

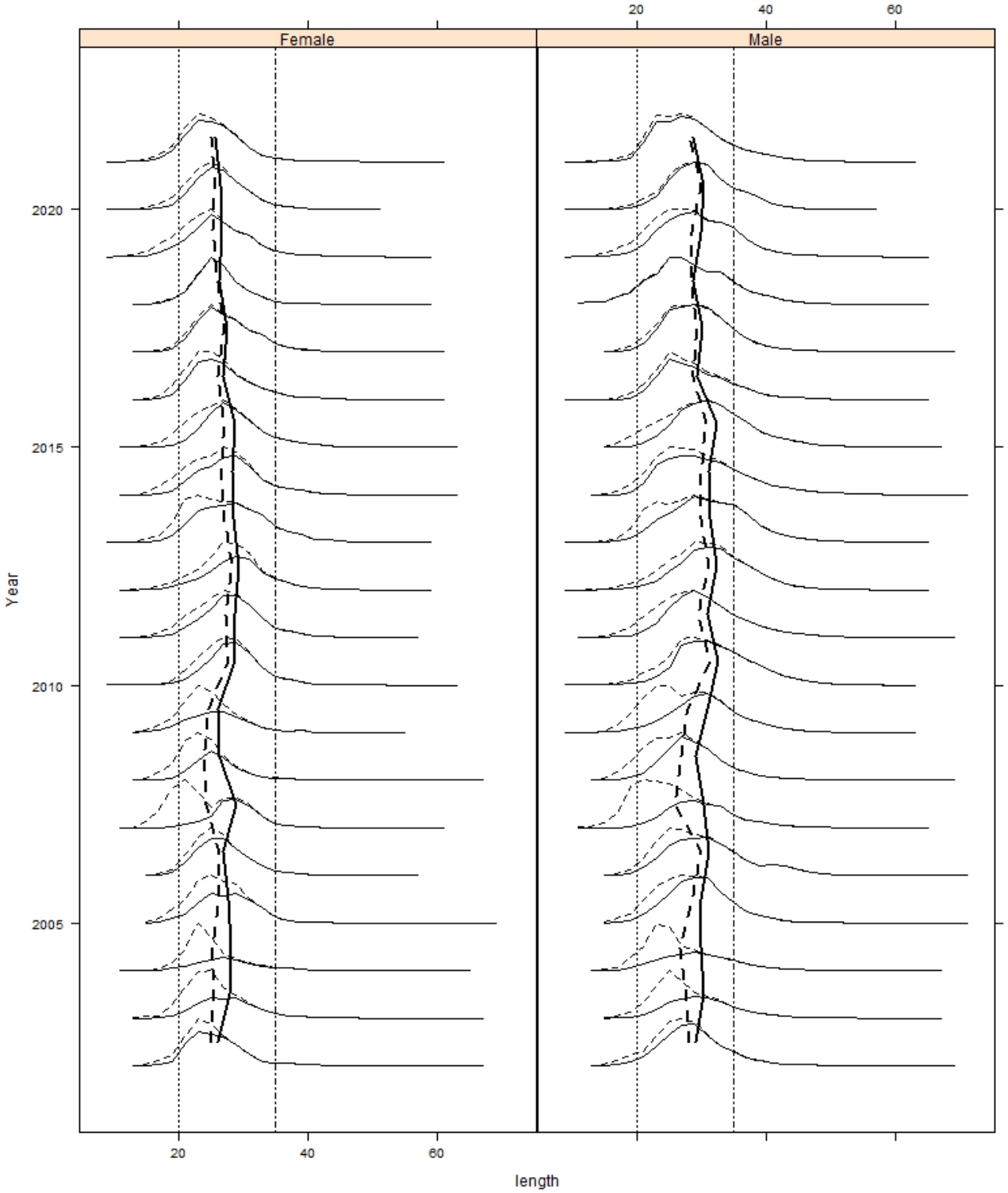

Figure 3 Norway lobster in Division 6.a, Functional Unit 13. The dashed lines represent catches while the solid lines represent landings. Annual length–frequency distributions are shown on the horizontal, the vertical bold lines represent mean lengths. Minimum conservation reference size (20 mm) and 35 mm visual reference levels indicated. All lengths are shown in carapace length (mm).

Sources and references

EU. 2019. Regulation (EU) 2019/472 of the European Parliament and of the Council of 19 March 2019 establishing a multiannual plan for stocks fished in the Western Waters and adjacent waters, and for fisheries exploiting those stocks, amending Regulations (EU) 2016/1139 and (EU) 2018/973, and repealing Council Regulations (EC) No 811/2004, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007 and (EC) No 1300/2008. Official Journal of the European Union, L 83: 1–17. http://data.europa.eu/eli/reg/2019/472/oj

ICES. 2009. Report of the Benchmark Workshop on Nephrops (WKNEPH), 2–6 March 2009, Aberdeen, UK. ICES CM 2009/ACOM:33. 156 pp. https://doi.org/10.17895/ices.pub.5337

ICES. 2016. EU request to ICES to provide F_{MSY} ranges for selected stocks in ICES subareas 5 to 10. In Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 5, Section 5.4.1. 13 pp. https://doi.org/10.17895/ices.advice.5612

ICES. 2021. Working Group for the Celtic Seas Ecoregion (WGCSE). ICES Scientific Reports, 2:40. 1461 pp. http://doi.org/10.17895/ices.pub.5978

ICES. 2022a. Advice on fishing opportunities. *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, section 1.1.1. https://doi.org/10.17895/ices.advice.19928060

ICES. 2022b. Working Group for the Celtic Seas Ecoregion (WGCSE). ICES Scientific Reports. 4:45. http://doi.org/10.17895/ices.pub.19863796

Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Norway lobster (*Nephrops norvegicus*) in Division 6.a, Functional Unit 13 (West of Scotland, the Firth of Clyde and Sound of Jura). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, nep.fu.13, https://doi.org/10.17895/ices.advice.19772401