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Advice for 2015

ICES advises that, on the basis of the MSY approach and considering that no discard ban is in place in 2015, landings should be no more than 3409 tonnes. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 3797 tonnes.

In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level.



Figure 5.3.21.7.1 *Nephrops* in the Smalls (FU 22). Top left: Landings and discards in tonnes. Top right: UWTV survey abundance (proxy for SSB, 95% confidence intervals). Bottom right: harvest rate (green dashed line represents F_{MSY} harvest ratio proxy).

The UWTV abundance index has increased in recent years and is considered to be relatively stable. Harvest rates (removals/UWTV abundance) have decreased since 2007 and have been below the F_{MSY} proxy since 2011.

Management plans

No specific management objectives are known to ICES.

Biology

The "Smalls" can be characterized as an area of moderate (average of 0.4 individuals m⁻²) density of Nephrops.

The fisheries

Irish vessels have accounted for >90% of the landings in recent years. These vessels mainly use twin otter trawls. The fishery occurs throughout the year with a seasonal peak in activity in May.

Catch distribution	Total catch (2013) = 2.6 kt, where 2.3kt were estimated landings (100% otter trawl) and 0.4 kt
	discards.

Effects of the fisheries on the ecosystem

Nephrops fishery in the Celtic Sea has bycatches of whiting and cod, and to a lesser extent of haddock and hake.

Quality considerations

Sampling of this stock is adequate. A dedicated annual UWTV survey has taken place since 2006 which gives abundance estimates for the Smalls Grounds with high precision.

Scientific basis	
Stock data category	1 (<u>ICES, 2014a</u>).
Assessment type	Underwater TV survey combined with yield-per-recruit analysis from length data.
Input data	One survey index (UWTV-FU 22), commercial catches (international landings
	(Ireland, France, and UK), length frequencies from Irish catch and discard sampling);
	maturity data (from commercial catch sampling and during surveys), fixed natural
	mortality. Discard survival rate.
Discards and bycatch	Included in the assessment since 2003, with data series from the majority of the fleet
	covering ~95% of the landings.
Indicators	Commercial effort and lpue, length-frequency distributions of the catches by sex.
Other information	None.
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE).

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Reference points

	Туре	Value	Technical basis
	MSY B _{trigger}	Not defined.	
MSY approach	F _{MSY} (FU 22)	10.9%	F _{MSY} proxy equivalent to F _{35%SPR} for combined sexes
	harvest rate.		in 2011.
Precautionary	Not defined.		
approach			

(Last changed in: 2011)

Harvest ratio reference points (2011):								
Male Female Combined								
F _{max}	10.9%	17.7%	12.3 %					
F _{0.1}	6.5%	10.9%	7.5 %					
$F_{35\%SPR}$	8.4%	15.3%	10.9%					

For FU 22, the absolute density observed during the UWTV survey is medium (~ 0.4 individuals m⁻²), suggesting the stock has moderate productivity. The fishery in this area has been in existence since the 1960s and has been relatively stable for many years. Harvest ratios around the $F_{35\%SpR}$ are expected to deliver high long-term yield with a low probability of recruitment overfishing; $F_{35\%SpR}$ is therefore is chosen as the F_{MSY} proxy for FU 22.

Outlook for 2015

Basis: Absolute survey abundance index 2015 = 1622 million (2014 index); Mean individual weight in landings (2003–2013) = 22.20 g; Mean individual weight in discards (2003–2013) = 12.6 g; dead discards in numbers (13.1%, average 2011–2013).

Basis	Total catches*	Landings	Dead discards**	Surviving discards**	Harvest rate
	L+DD+SD	L	DD	SD	for L+DD
MSY approach = $F_{35\% SpR}$	3797	3409	291	97	10.9%
F ₂₀₁₁₋₁₃	2822	2533	217	72	8.1%
F _{0.1 Combined}	2613	2345	201	67	7.5%
F _{max}	4285	3846	329	110	12.3%

Weights in tonnes.

* Total catches are the landings plus dead and surviving discards.

** Total discard rate is assumed to be 17.9% of the catches (in numbers, last three years' average, 2011–2013); discard survival is assumed to be 25%.

MSY approach

Since MSY $B_{trigger}$ has not been identified for this stock, the ICES MSY approach has been applied without considering SSB in relation to MSY $B_{trigger}$. Following the ICES MSY approach implies a harvest rate at $F_{msy} = 10.9\%$. Considering that no discard ban is in place in 2015, this results in landings of no more than 3409 t. Assuming that discard rates do not change from the average of the last three years (2011–2013), this results in total catches of no more than 3797 t.

Additional considerations

General considerations for Nephrops in Division VII can be found at the beginning of Section 5.3.21.

Advice considerations

In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level (see Section 5.3.21).

Management considerations

Cod, whiting, and to a lesser extent haddock are landed together with *Nephrops*. The *Nephrops* trawl fleet operating in Divisions VIIgfh discards around 38% of its total catch by weight. Small *Nephrops* are the main species in the discards and the main fish species discarded are whiting, haddock, and dogfish (Anon., 2011).

The proportion of discarded *Nephrops* is substantial. On average over the last three years, around 17.9% in numbers (or 10.5% in weight) of the *Nephrops* caught are estimated to have been discarded.

Changes in fishing techniques and fishing patterns

In recent years several newer vessels specializing in *Nephrops* fishing have participated in this fishery. These vessels target *Nephrops* on several other grounds within the TAC area and move around to optimize catch rates. Since 2012 Irish vessels have increasingly been switching to quad-rig gears; these are expected to significantly increase catch rates by around 50%. Irish fishing effort has declined from a peak in 2007, while French effort has shown a declining trend since 1999. The lpue of the Irish *Nephrops*-directed fleet has been increasing since 2004 (see Figure 5.3.21.7.2).

Data and methods

The advice takes the 2014 UWTV survey results into account (Lordan et al., 2014).

The long-term average (2003–2013) for the mean weight in landings and discards (rather than a three-year average) was considered to be more appropriate as an input to calculate catch options, due to the interannual variation. The proportions retained by the fishery were averaged over the last three years (2011–2013) to reflect current retention practices.

Uncertainties in assessment and forecast

General comments of uncertainties in the assessment and forecast using the information from the UWTV surveys are discussed in the introduction of Section 5.3.21.

The main uncertainties in FU 22 relate to the mean weight in the landings, which is variable. Accordingly, a longer period for the calculation of mean weight has been used.

Comparison of the basis of previous assessment and advice

The basis for the assessment has not changed from last year.

The basis for the advice this year is the same as last year: the MSY approach.

Sources

Anon. 2011. Atlas of Demersal Discarding, Scientific Observations and Potential Solutions, Marine Institute, Bord Iascaigh Mhara, September 2011. ISBN 978-1-902895-50-5. 82 pp.

ICES. 2014a. Advice basis. *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.2. ICES. 2014b. Report of the Working Group for the Celtic Seas Ecoregion (WGCSE), 13–22 May 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:12.

Lordan, C., Doyle, J., Fitzgerald, R., O'Connor, S., Blaszkowski, M., and Simpson, S. 2014. The "Smalls" *Nephrops* Grounds (FU22) 2014 UWTV Survey Report and catch options for 2015. Marine Institute UWTV Survey report.



Figure 5.3.21.7.2 *Nephrops* in the Smalls (FU 22). Trends in effort (top) and lpue (bottom) for the Irish *Nephrops*-directed fleet.



Length frequencies for catch (dotted) and landed(solid): Nephrops in FU22

Figure 5.3.21.7.3 *Nephrops* in the Smalls (FU 22). Annual length distributions in the catches 2003–2013. Annual length composition of catch (dotted) and landed (solid). Males (right) and females (left) from 2003 (bottom) to 2013 (top). The vertical dashed line is mean length in the catches and the vertical solid line is mean length in the landings. The straight vertical lines correspond to 25 mm (MLS) and 33 mm carapace length.

Year	ICES advice ¹⁾	Predicted landings corresp. to advice (FU 22) ¹⁾	ICES landings FU 22	Total discards ²⁾ FU 22	ICES landings FUs 20–22
1987					3.4
1988					3.2
1989					4.0
1990					4.3
1991					3.3
1992		~3.8			4.2
1993		3.8			4.6
1994		3.8			5.1
1995		3.8			5.5
1996		3.8			4.8
1997		3.8			4.2
1998		3.8			3.9
1999			1.8		3.0
2000		3.8	2.9		4.7
2001		3.8	2.9		4.8
2002		3.8	2		4.7
2003		3.8	2.1	0.5	5.0
2004	Adjust TAC in line with landings of most recent 10 years	4.6	1.8	0.1	4.3
2005	Adjust TAC in line with landings of most recent 10 years	4.6	2.4	0.6	4.9
2006	Recent average landings 2000-2002	4.6	1.8	0.6	4.3
2007	No increase in effort	-	2.9	1.5	5.4
2008	No increase in effort	< 5.3	3.1	0.8	6.4
2009	No increase in effort	< 5.3	2.2	0.6	5.8
2010	No new advice, same as for 2009	< 5.3	2.8	0.4	4.8
2011	See scenarios; MSY reduce catch or $PA < 5.3$	-	1.6	0.1	2.9
2012	FU 22: MSY approach	2.33)	2.6	0.3	3.8
2013	FU 22: MSY approach (updated November 2012)	3.1 ³⁾	2.3	0.4	3.6
2014	FU 22: MSY approach	2.674 ³⁾			
2015	FU 22: MSY approach	3.409 ³⁾			

Table 5.3.21.7.1	Nephrops in the Smalls (FU 22). ICI	ES advice, management, landings, and discards.

Weights in thousand tonnes. ¹⁾ Advice prior to 2014 applies to FUs **20–22**. ²⁾ 25% of discards are assumed to survive. ³⁾ Applies to FU 22 only.

Table 5.3.21.7.2

Nephrops in the Smalls (FU 22). ICES landings (t) by country as used by ICES.

FU 22 Landings (t)								
Year	France	Rep. of Ireland	UK	Belgium	Total			
1999	1 027	741	20		1 788			
2000	1 186	1 687	34		2 907			
2001	876	2 054	5		2 935			
2002	595	1 392	3		1 990			
2003	799	1 241	10		2 050			
2004	465	1 330	33		1 827			
2005	494	1 931	0		2 425			
2006	302	1 398	52		1 752			
2007	218	2 614	48		2 881			
2008	312	2 474	328		3 114			
2009	235	1 642	368		2 245			
2010	136	2 353	351		2 840			
2011	54	1 548	15		1 617			
2012	65	2 509	59		2 633			
2013*	83	2 079	86	7	2 255			

* Preliminary.

Table 5.3.21.7.3Nephrops in the Smalls (FU 22). Results from UWTV survey of the Smalls Nephrops grounds.

FU	Ground	Year	Number of stations	Mean density adjusted (burrow m ⁻²)	Domain area (km²)	Geostatistical abundance adjusted (millions of burrows)	CV on burrow estimate
		2006	100	0.49	2962	1503	2%
		2007	107	0.37	2955	1136	6%
		2008	76	0.36	2698	1114	6%
		2009	67	0.36	2824	1093	5%
22	Smalls	2010	90	0.37	2861	1141	4%
		2011	107	0.41	2881	1256	3%
		*2012	47	0.49	2934	1498	8%
		*2013	41	0.41	2975	1254	7%
		*2014	52	0.53	2970	1622	8%

*Reduced randomized isometric grid.

Year	Landings in numbers (millions)	Discards in numbers (millions)	Removals in numbers (millions) 25% discard survival	Propor. removals retained	Adjusted survey (millions)	95% Conf. intervals (millions)	Harvest ratio	FU 22 landings (t)	FU 22 discards (t)	Mean weight in landings (g)	Mean weight in discards (g)
2003	95.71	54.22	136.4	0.70	Na	Na	Na	2 050	535	21.4	9.9
2004	71.65	8.53	78.1	0.92	Na	Na	Na	1 828	76	25.5	8.9
2005	114.71	90.81	182.8	0.63	Na	Na	Na	2 425	647	21.1	7.1
2006	97.18	54.67	138.2	0.70	1503	59	9.2%	1 752	593	18.0	10.8
2007	164.78	149.88	277.2	0.59	1136	134	24.4%	2 880	1 513	17.5	10.1
2008	131.90	60.52	177.3	0.74	1114	131	15.9%	3 114	764	23.6	12.6
2009	92.75	31.08	116.1	0.80	1093	107	10.6%	2 245	589	24.2	19.0
2010	129.70	28.36	151.0	0.86	1141	89	13.2%	2 840	439	21.9	15.5
2011	61.55	6.65	66.5	0.93	1256	74	5.3%	1 617	144	26.3	21.7
2012	123.82	24.00	141.8	0.87	1498	235	9.5%	2 633	256	21.3	10.7
2013	96.63	30.68	119.6	0.81	1254	172	9.5%	2 255	362	23.3	11.8
2014					1622	254					
Average 2011–2013 0.87 Average 2003–2013 22.20									12.55		

Table 5.3.21.7.4 Nephrops in the Smalls (FU 22). Landings, discards, and removals in number, UWTV survey abundance estimates, harvest ratio, and total weight and mean weights of landings and discards.

Average 2011–2013 0.87 Average 2003–2013