ECOREGION Celtic Sea and West of Scotland
STOCK Haddock in Division VIb (Rockall)

Advice for 2015

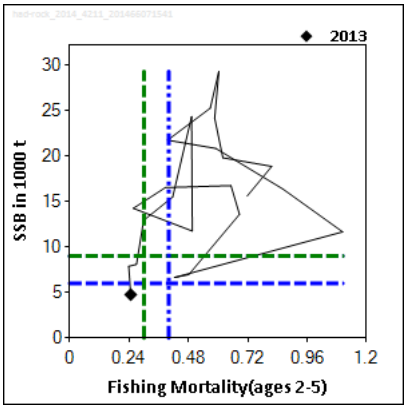
ICES advises on the basis of the MSY approach that catches should be no more than 4310 t in 2015. If discard rates (at age) do not change from the average of the last eight years (2006–2013), this implies landings of no more than 2930 t.

Further management measures should be introduced to reduce the discards, catches of small haddock, and to protect the incoming recruitment in 2013.

Stock status

Fishing pressure	2011	2012	2013
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓ Harvest sustainably

Stock size	2012	2013	2014
MSY ($B_{trigger}$)	✗	✗	✗ Below trigger
Precautionary approach (B_{pa},B_{lim})	o	✗	✗ Reduced reproductive capacity



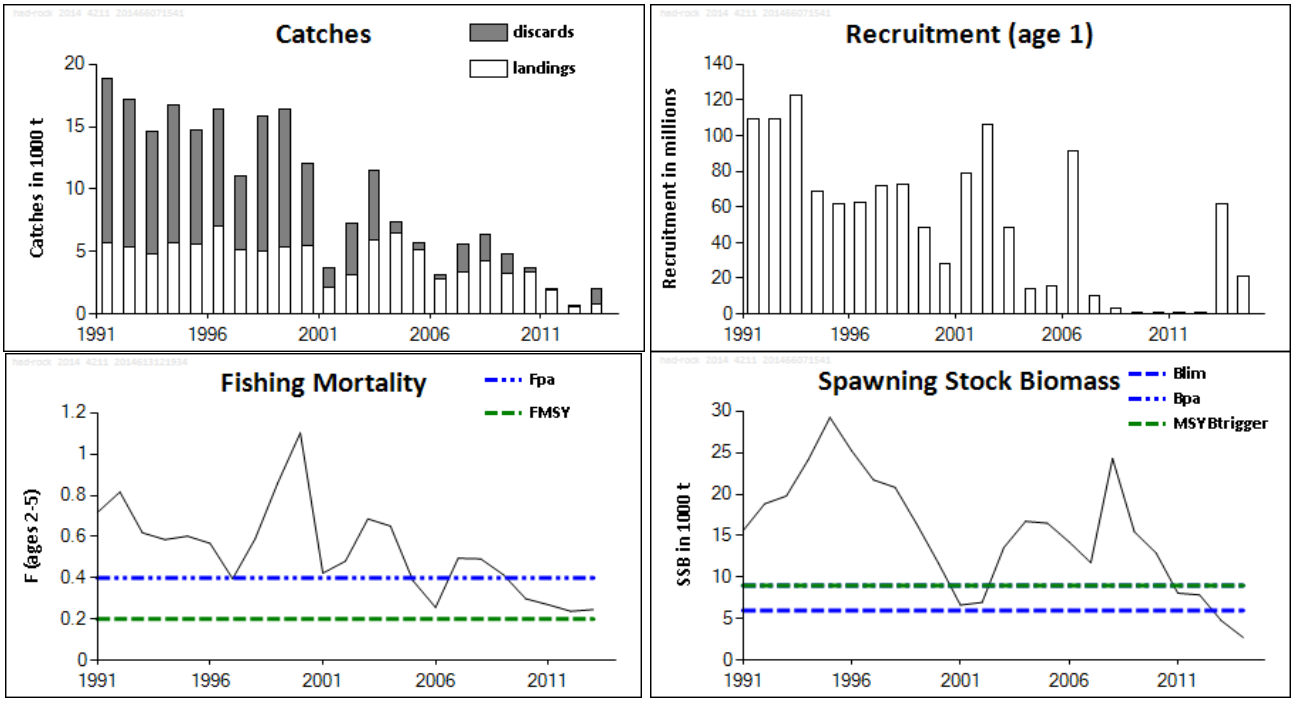


Figure 5.3.9.1 Haddock in Division VIb (Rockall). Summary of stock assessment (weights in thousand tonnes). Top right: SSB and F over the years.

The spawning-stock biomass increased up to 2008 as a result of the 2001 and 2005 year classes but has decreased constantly since then. SSB in 2013 and 2014 is below B_{lim}. Fishing mortality has declined over time but remains above the F_{MSY} proxy. Recruitment during 2007–2012 is estimated to be extremely weak. The 2013 survey data indicate that the 2012 year class (corresponding to the 2013 recruitment) is above the mean estimates of recruitment. The 2013 year class is below the average of the historical recruitment time-series.

Management plans

A management plan is under consideration and not yet adopted. It was evaluated by ICES in 2013 (ICES, 2013a). ICES concluded that a maximum F value of 0.2 in the HCR was required to ensure consistency with the precautionary approach under low recruitment conditions.

Biology

The haddock stock at Rockall is an entirely separate stock from that on the continental shelf of the British Isles. The Rockall haddock stock has lower growth rates and individuals achieve a smaller size than in other haddock populations in the Northeast Atlantic.

Environmental influence on the stock

Recruitment during 2007–2012 has been extremely low despite a moderate SSB. This may be related to rising seawater temperature on the Rockall bank. An increase in temperature leads to an acceleration of metabolic processes and an increase in the energy and food consumption. At the same time there was a significant reduction of ephausiids and *Calanus finmarchicus* which is the main food item for larval and juvenile haddock at Rockall. This situation of food scarcity could have resulted in increased predation and food competition by grey gurnard. All these factors may have led to a reduction in the recruitment of Rockall haddock.

The fisheries

Haddock in Division VIb are caught in a directed fishery and as a bycatch in demersal trawl and longline fisheries. Haddock are mostly taken in fisheries deploying otter trawls, but also by pair trawlers and longliners. In recent years, discards have been significantly reduced prior to 2013 as a result of the small number of young haddock in the population.

Catch distribution	Total catches (2013) = 1967 t, of which 826 t were landings (85% trawl and 15% longline) and 1143 t discards (58% by weight and 87% by numbers).

Effects of the fisheries on the ecosystem

In order to protect cold-water corals, four areas (northwest Rockall, Logachev Mounds, west Rockall Mounds, and Empress of British Banks) have been closed to demersal mobile and static gears since 2007.

Quality considerations

ICES noted last year that an F_{MSY} of 0.3 may not be consistent with the precautionary approach for this stock, and accordingly revised the F_{MSY} proxy for this stock in 2014 to a value of 0.2.

At the current low population abundance, the forecast of yield in 2015 and SSB in 2016 is highly dependent on the estimates of the 2012 year class (i.e. 2013 age 1 recruitment). The 2013 Rock-WIBTS-Q3 survey indicates that this year class is stronger than other recent year classes, in line with the results from the 2012 survey. Because of the extremely low recruitment during 2007–2012 most of the present haddock population in 2014 is at age 2 or age 1.

Recent assessments have consistently underestimated F and overestimated SSB and recruitment.

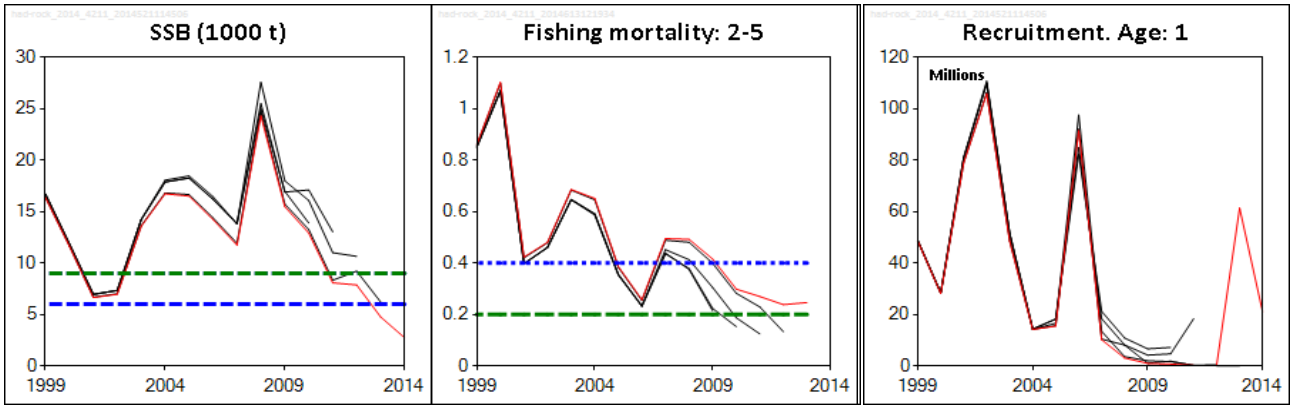


Figure 5.3.9.2 Haddock in Division VIb (Rockall). Historical assessment results (final-year recruitment estimates included).

Scientific basis

Stock data category	1 (ICES, 2014a).
Assessment type	Analytical age-based assessment (XSA).
Input data	Commercial catches (international landings, ages and length frequencies from catch and landing samplings); one survey index (Rock-WIBTS-Q3); fixed maturity ogive (knife-edge at age 3), fixed natural mortality (0.2).
Discards and bycatch	Discards were included in the assessment for the entire time-series, based on the main fleets.
Indicators	Russian trawl-acoustic survey and the trawl survey-based assessment, statistical catch-at-age analysis (StatCam analytical model).
Other information	None.
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE).

ECOREGION Celtic Sea and West of Scotland
STOCK Haddock in Division VIb (Rockall)

Reference points

	Type	*Value*	*Technical basis*
MSY approach	MSY $B_{trigger}$	9000 t	B_{pa}.
	F_{MSY}	0.2	Based on stochastic simulations (ICES, 2013a).
Precautionary approach	B_{lim}	6000 t	$B_{lim} = B_{loss,}$ the lowest observed spawning stock estimated in previous assessments.
	B_{pa}	9000 t	$B_{pa} = B_{lim} * 1.5$. This is considered to be the minimum SSB required to obtain a high probability of maintaining SSB above B_{lim}, taking into account the uncertainty of assessments.
	F_{lim}	Not defined.	Not defined due to uninformative stock recruitment data.
	F_{pa}	0.4	This F is adopted by analogy with other haddock stocks as the F that provides a small probability that SSB will fall below B_{pa} in the long term.

(Last changed in: 2014).

Outlook for 2015

Basis: F_{2014} = TAC constraint = 0.18; R (2014) [RCT3] = 21 030 thousands; R (2015) [25th percentile of the historical R time-series] = 10 169 thousands; SSB (2015) = 15.02; Catch (2014) = 2.79; Landings (2014) = TAC constraint for landings (2014) = 1.21; Discards (2014) = 1.58.

Rationale	Catch (2015)	Landings (2015)	Discards (2015)	Basis	F total (2015)	F landings (2015)	F discards (2015)	SSB (2016)	%SSB change[1)]	%TAC change[2)]
MSY approach	4.31	2.93	1.38	F_{MSY}	0.20	0.13	0.07	19.2	+28%	+142%
Precautionary approach	7.73	5.24	2.49	$F_{pa} = 0.4$	0.40	0.26	0.14	15.1	+1%	+332%
Proposed management plan	3.80	2.58	1.22	$F_{HCR} = 0.2$ and $TAC_{2015} = TAC_{F=0.2} + 0.2 \times (TAC_{2014} - TAC_{F=0.2})$	0.18	0.11	0.06	19.8	+32%	+114%
Zero catch	0	0	0	F = 0	0.00	0.00	0.00	24.4	+63%	−100%
Other options	5.24	3.56	1.68	average $F_{2011–2013}$	0.25	0.16	0.09	18.1	+21%	+193%
	1.49	1.02	0.48	−15% TAC	0.07	0.05	0.02	22.6	+51%	−15%
	1.78	1.21	0.57	0% TAC	0.08	0.05	0.03	22.3	+48%	+0%
	2.04	1.39	0.65	+15% TAC	0.10	0.06	0.04	21.9	+46%	+15%

Weights in thousand tonnes.
[1)] SSB 2016 relative to SSB 2015.
[2)] Landings 2015 relative to TAC 2014.
Total catches have been divided into landings and discards using the average ratio (at age) of discards to catches over the period 2006–2013.

MSY approach

Following the ICES MSY approach implies a fishing mortality at F_{MSY} = 0.20, resulting in catches of no more than 4310 t in 2015. If discard rates (at age) do not change from the average of the period 2006–2013, this implies landings of no more than 2930 t. This is expected to lead to an SSB of 19 200 t in 2016.

Further management measures should be introduced to reduce the discards, catches of small haddock, and to protect the incoming recruitment in 2013.

Precautionary approach

Fishing mortality in 2015 should be no more than F_{pa} = 0.4, which implies catches in 2015 of no more than 7730 t. If discard rates (at age) do not change from the average of the period 2006–2013, this implies landings of no more than 5240 t. This is expected to bring SSB in 2016 above B_{pa}

Further management measures should be introduced to reduce the discards, catches of small haddock, and to protect the incoming recruitment in 2013.

Management plan

ICES evaluated a new HCR proposal for the Rockall haddock stock in 2013 (ICES, 2013a) and found that under the low recruitment conditions, a maximum F of 0.2 was required in the HCR to ensure consistency with the precautionary approach. If F = 0.2 in 2015, then SSB is forecast to be above B_{pa} at the end of 2015. Under these circumstances, the proposed HCR initially calculates catches according to a fishing mortality of 0.2 in 2015, followed by the application of a TAC constraint adjustment. This results in F = 0.18 in 2015, corresponding to catches of no more than 3800 t in 2015. If discard rates (at age) do not change from the average of the period 2006–2013, this implies landings of no more than 2580 t.

Additional considerations

Advice considerations

Discards significantly increased in 2013 and are expected to remain high in 2014 as a consequence of the strong 2012 year class.

Further technical measures to reduce bycatch discarding of the recruiting year classes should be considered. These might include increasing the mesh size in the square mesh panels and/or increasing the mesh size in gadoid fisheries catching haddock, as well as considerations on minimum landing size.

Management considerations

The TAC presently only applies to catches in the EU zone. The TAC should apply to all areas and countries having fisheries for this stock. Since 1999 part of Division VIb has been in international waters where non-EU vessels are not subject to TAC. This allows for an unregulated fishery in the Rockall area. In later years, effort and catch of non-EU fleets have significantly declined and there was no non-EU fishery in 2011, whereas it was very low in 2012.

Haddock is taken in a mixed fishery together with monk and megrim. Some of the fisheries include substantial catches of blue whiting and non-assessed species such as grey gurnard.

The effects of regulations

Following the NEAFC agreement in March 2001, an area of the NEAFC zone around Rockall was closed to fishing. In spring 2002, part of the shallow water in the EU component was also closed to trawling. The main goal of the ban was to protect young haddock distributed in shallow water. At the request of NEAFC, ICES provided advice on the Rockall closure area and additional measures for the protection of juveniles (ICES, 2013b). ICES concluded that the overall impact of the current closure area is difficult to assess, and advised that a number of technical and operational measures could be examined to improve the selection pattern of the entire fishery.

Data and methods

The assessment is based on catch numbers-at-age and one survey index (Rock-WIBTS-Q3). After an interruption in 2010, the survey was resumed in 2011 with a new gear, but an analysis showed that there was no detectable difference between the older and new survey on haddock indices (ICES, 2012). The survey area coverage was also reviewed and extended into deeper waters, starting in 2011. In most cases the survey areas that include areas with depths less than 200 m are regarded as the standard survey areas. The indices obtained from the standard survey areas were used for the assessment. New survey indices will be used for the assessment once the time-series for the whole area of haddock distribution is of sufficient length.

Discarding occurs in part of the fishery and has been estimated and used in the assessment.

Uncertainties in assessment and forecast

Stochastic simulations conducted in 2014 indicate values of F_{MSY} in the range of 0.18–0.21 and F_{MAX} = 0.21 (ICES, 2014b). ICES is providing advice this year that follows the MSY approach with a revised value of F_{MSY} = 0.2.

A main uncertainty in the assessment concerns the estimates of discards in the EU fleets. In some years these are directly estimated from sampling on-board Scottish and Irish vessels, whereas in other years they are inferred using survey length frequencies, average fishery selectivity and discarding ogives, and length frequencies from port sampling. In 2010 there was no discard sampling or survey, and average discard rates were applied. Additionally, there are doubts on the degree of age-reading agreement by international experts. The determination of the fishing mortality for the latest strong year class (2005) is uncertain because that year class is now included in the plus group.

The 2012 year classes are predicted to dominate the stock biomass in 2015 and 2016, and therefore the estimates of these year classes have a strong impact on the short-term forecast.

The international fishery at Rockall is difficult to predict, with the potential for total landings to exceed the TAC. In recent years this has not been the case and the forecast therefore assumes that total landings will be limited by the TAC in 2014, implying a low fishing mortality in that year (30 % lower than the average F over 2011–2013). An assumption of F *status quo* (F = average 2011–2013) in 2014 would result in lower forecast landings and SSB in 2015.

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

ICES, 2012. Report of the International Bottom Trawl Survey Working Group (IBTSWG), 27–30 March, Lorient, France. ICES CM 2012/SSGESST:03.

ICES. 2013a. Request from NEAFC to evaluate the proposals for the harvest control components of the management plan for Rockall haddock fisheries. *In* Report of the ICES Advisory Committee, 2013. ICES Advice 2013, Book 5, Section 5.3.3.2.

ICES. 2013b. Request from NEAFC on the closure area and additional measures for the protection of juvenile haddock on Rockall Bank. *In* Report of the ICES Advisory Committee, 2013. ICES Advice 2013, Book 5, Section 5.3.3.3.

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.

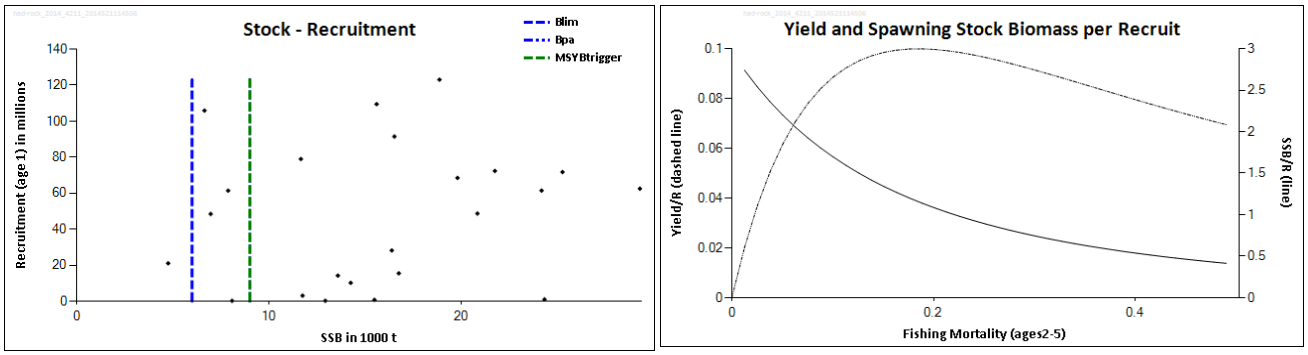


Figure 5.3.9.3 Haddock in Division VIb (Rockall). Yield-per-recruit analysis (right panel) and stock–recruitment relationship (left panel).

Table 5.3.9.1 Haddock in Division VIb (Rockall). ICES advice, management, landings, and discards.

Year	ICES Advice Single-stock exploitation boundaries from 2004 onwards	Predicted catch corresp. to advice	Predicted landings corresp. to advice	Agreed TAC	Official landings	ICES landings	Discards
1987	Precautionary TAC	10.0			8.0	8.4	n/a
1988	Precautionary TAC	10.0			7.6	7.9	n/a
1989	*Status quo* F; TAC	18.0			6.6	6.7	n/a
1990	Precautionary TAC	5.5			8.2	3.9	n/a
1991	Precautionary TAC	5.5			5.9	5.7	13.23
1992	Precautionary TAC	3.8			4.5	5.3	11.87
1993	80% of F(91)	3.0			4.1	4.8	9.85
1994	If required, precautionary TAC	-			3.7	5.7[a]	11.02
1995	No long-term gain in increasing F	5.1[b]			5.5	5.6	9.17
1996	No long-term gains in increasing F	6.9[b]			6.8	7.1	9.36
1997	No advice given	4.9[b]			5.2	5.2	5.89
1998	No increase in F	4.9			5.1	4.5	10.86
1999	Reduce F below F_{pa}	3.8	-		6.0	5.1	11.06
2000	Reduce F below F_{pa}	< 3.5	-		5.7[c]	5.3[d]	6.61
2001	Reduce F below F_{pa}	< 2.7	-		2.3[c]	2.0[d]	1.54
2002	Reduce F below 0.2	< 1.3	-		3.0	3.3	4.15
2003	Lowest possible F	-	-		6.1	6.2	5.52
2004	Lowest possible catch [e]		-	0.702[f]	6.3	6.4	0.88
2005	Lowest possible catch [e]		-	0.702[f]	5.2	5.2	0.51
2006	Lowest possible catch [e]		-	0.597[f]	2.8	2.8	0.39
2007	Reduce F below F_{pa} [e]	< 7.11	-	4.615[f]	3.3	3.3	2.24
2008	Keep F below F_{pa} [e]	< 10.6	-	6.916[f]	4.2	4.2	2.10
2009	No long-term gains in increasing F [e]	-	< 4.3	5.879[f]	3.8	3.8	1.56
2010	No long-term gains in increasing F [e]	-	< 3.3	4.997[f]	3.4	3.4	0.31
2011	See scenarios	-		3.748[f]	1.9	1.9	0.15
2012	MSY approach	-	< 3.3	3.300[f]	0.7	0.7	0.02
2013	No directed fisheries, minimize bycatch and discards	0	0	0.99[f]	0.8	0.8	1.1
2014	MSY approach	< 1.62	<0.98	1.21[f]			
2015	MSY approach	< 4.31	< 2.93				

Weights in thousand tonnes.
[a] Including misreporting.
[b] Landings at *status quo* F.
[c] Incomplete data.
[d] Discards are not taken into account for the assessment, and data of the Russian fleet which lands the whole catch were adjusted to exclude fish below MLS of 30 cm.
[e] Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.
[f] Agreed EU TAC for Division VIb and Subareas XII and XIV.
n/a = Not available.

Table 5.3.9.2 Haddock in Division VIb (Rockall). Landings (tonnes) in 1995–2012, as officially reported to ICES, and ICES estimates.

COUNTRY	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013[a]
Faroe Islands	-	-	-	-	n/a	n/a	-	-	-	-	2	2	16	16	42	2	53	-
France	-[b]	-	-	-	5	2	-	1	-	-	-	-	-	-	-	<1	-	-
Iceland	-	+	-	167	-	-	-	-	-	-	-	-	-	-	-	-	-	--
Ireland	747	895	704	1021	824	357	206	169	19	105	41	338	721	352	169	123	31	105
Norway	24	24	40	61	152	70	49	60	32	33	123	84	36	71	65	40	48	121
Portugal	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	-	-	-	458	2154	630	1630	4237	5844	4708	2154	1282	1669	55	198	-	1	4
Spain	1	22	21	25	47	51	7	19	-	-	5	-	-	-	-	-	-	-
UK (E,W&NI)	293	165	561	288	36	-	-	56	-	-	-	-	-	-	-	-	-	--
UK (Scot.)	5753	4114	3768	3970	2470	1205	1145[3]	1607	411[c]	332[c]	440[c]	1643[c]	1779[c]	2951[c]	2931[c]	1738[c]	577[c]	596
Total	6818	5220	5098	5990	5688	2315	3037	6148	6306	5178	2765	3349	4221	3445	3405	1903	710	826
Unallocated catch	−543	−591	−599	−851	−357	−279	299	94[e]	139[e]	1	0	0	0	0	0	0	0	0
WG estimate	6275	4629	4499	5139	5331[d]	2036[d]	3336[d]	6242[d]	6445	5179	2765	3349	4221	3445	3405	1903	710	826

[a] Preliminary.
[b] Included in Division VIa.
[c] Includes UK England, Wales, and N. Ireland landings.
[d] Includes the total Russian catch.
[e] Non-official.
n/a = not available.

Table 5.3.9.3 Haddock in Division VIb (Rockall). Summary of stock assessment.

Year	Recruitment Age 1 thousands	SSB (tonnes)	Landings (tonnes)	Discards (tonnes)	Mean F Ages 2–5
1991	109762	15586	5656	13228	0.717
1992	109475	18851	5321	11871	0.817
1993	123051	19788	4781	9853	0.619
1994	68478	24155	5732	11023	0.586
1995	61442	29266	5587	9168	0.603
1996	62498	25244	7072	9356	0.568
1997	71743	21733	5167	5894	0.396
1998	72349	20822	4986	10862	0.59
1999	48679	16372	5356	11062	0.861
2000	28174	11655	5444	6609	1.103
2001	78987	6644	2123	1535	0.423
2002	105902	6967	3117	4152	0.481
2003	48451	13578	5969	5521	0.686
2004	14180	16738	6437	883	0.652
2005	15474	16514	5189	505	0.386
2006	91473	14243	2756	386	0.257
2007	10169	11742	3348	2242	0.495
2008	3056	24312	4221	2100	0.492
2009	970	15476	3237	1557	0.416
2010	722	12920	3404	306	0.299
2011	206	8079	1905	152	0.27
2012	169	7871	710	16	0.238
2013	61393	4759	825	1143	0.246
2014	21030*	2743			
Average	**50326**	**15252**	**4276**	**5192**	**0.53**

* RCT3 estimate.

Appendix 5.3.9 ICES suggestion for the Harvest Control Rule for Rockall haddock fishery

ICES suggested in the harvest control rule advice provided in August 2013 (ICES, 2013a) that the HCR that was found to be consistent with the precautionary approach should be rewritten as follows, to avoid ambiguities in its application.

In the following, the TACs refer to total catches, not just landings. Measures shall be put in place to ensure that total catch does not exceed the established TAC, including measures to record and minimise discards. After the introduction of these measures, the method of setting a human consumption TAC currently used by ICES shall not be applied.

"*1. Every effort shall be made to maintain a level of spawning-stock biomass (SSB) greater than* B_{pa} *and a minimum level of SSB greater than* B_{lim}*.*

In paragraphs 2–5, $SSB_{0.2}$ *denotes the SSB at the end of the year in which the TAC is applied, assuming F = 0.2 during that year. No iterative process is involved anywhere in the calculations in paragraphs 2–5.*

2. For [20XX] and subsequent years the Parties agreed to set a TAC to be consistent with a fishing mortality rate of no more than 0.2 for appropriate age groups, when $SSB_{0.2}$ *is estimated to be above* B_{pa}*.*

3. The Parties agreed that the TAC that results from the application of the fishing mortality referred to in paragraph 2 will be adjusted according to the following formula:

$$TAC_y = TAC_f + 0.2 \times (TAC_{y-1} - TAC_f)$$

where TAC_y *is the TAC that is to be set by the management plan,* TAC_{y-1} *is the TAC that was fixed the previous year, and* TAC_f *is the TAC resulting from the provisions in paragraphs 1 and 2.*

4. Where $SSB_{0.2}$ *is estimated to be below* B_{pa} *but above* B_{lim}*, the TAC shall not exceed a level, which will result in a fishing mortality rate equal to*

$$0.2 - [0.2 \times (B_{pa} - SSB_{0.2}) / (B_{pa} - B_{lim})].$$

This consideration overrides paragraph 3.

5. Where $SSB_{0.2}$ *is estimated to be below* B_{lim}*, there should be no directed fishery for haddock (F = 0.0) and bycatch and discards of haddock should be minimized. This consideration overrides paragraph 3.*

6. No later than the end of the fifth year after the implementation of the Plan the Parties shall review the Plan, taking into account inter alia *advice from ICES concerning the performance of the Plan.*"