

Contents

- 38 Whiting (*Merlangius merlangius*) in Division 7.a (Irish Sea)..... 1175
 - 38.1 General..... 1176
 - 38.2 Information from the industry..... 1178
 - 38.3 Data..... 1178
 - 38.4 Historical Stock Development..... 1179
 - 38.5 Short-term predictions 1181
 - 38.6 Medium-term predictions..... 1181
 - 38.7 MSY evaluations and Biological References Points..... 1181
 - 38.8 Management Plans 1181
 - 38.9 Uncertainties and bias in assessment and forecast..... 1181
 - 38.10 Recommendations for next benchmark assessment..... 1182
 - 38.11 Management Considerations..... 1183
 - 38.12 References 1183
 - 38.13 Tables and Figures 1184

38 Whiting (*Merlangius merlangius*) in Division 7.a (Irish Sea)

2023 Assessment and advice

WGCSE 2024 updated the assessment with 2023 data. The advice for this stock is biennial so does not change; however, a short-term forecast was run to update the data.

This is a category 1 stock where a full analytical assessment and forecast is carried out.

Type of assessment

SPALY update of ASAP assessment.

ICES advice applicable to 2024 (and 2025)

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catches in 2024 and 2025.

<https://doi.org/10.17895/ices.advice.21864330.v1>

Technical Service 2022

EU DGMARE has requested that ICES evaluate the following:

For by-catch and for target stocks (except data-limited deep sea stocks) where ICES is advising zero catch but the stock is caught in mixed fisheries with other species where non-zero catches are advised, and where sufficient data and understanding of processes exist, ICES will provide estimates of the likely catches of stocks for which there is zero catch advice, under the assumption that TACs for the target stocks are set in line with ICES advice, respectively in line with FMSY point and with FMSY lower, where available. In doing so, for the stocks for which there is zero catch advice, ICES will for the likely catches quantify corresponding changes in biomass and the probability of the biomass being above Blim at the end of the projection year.

For stocks where ICES is advising zero catches, ICES will identify stocks for which a sentinel fishery is required to monitor stock development. For such stocks, where possible, ICES will provide the minimum level of catches needed to provide sufficient data for ICES to continue providing scientific advice on the state of the stock. In doing so, ICES should in particular consider the following stocks for which there was advice for zero catches in 2022 and for which a sentinel fishery was conducted in 2023 or was being considered for 2023.

This technical service provides one additional scenario based on expected bycatch of status quo fishing effort. For whiting in Division 7.a:

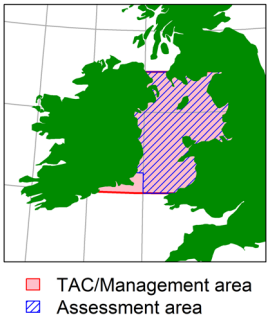
- 1318 tonnes are estimated to be caught as bycatch if fishing effort continues at status quo levels (average 2020–2022), which would result in a whiting spawning-stock biomass (SSB) of 982 tonnes in 2025.

<https://doi.org/10.17895/ices.advice.24720399.v1>

38.1 General

Stock description and management units

The stock and the management unit are both ICES Division 7.a (Irish Sea). Whiting landings taken or reported in ICES rectangles 33E2 and 33E3 have been reassigned to the 7.b,c,e–k whiting stock since 2003.



Management applicable to 2022

The minimum conservation reference size of whiting is 27 cm. This stock is subject to the landings obligation as part of the Commission Delegated Regulation (EU) 2018/2034.

In 2023 and 2024, the TAC was set at 721 t, with slightly differing country quotas between the two years.

Official landings as reported to ICES in 2023 were 63 t, a decrease from 78 t in 2022.

TAC 2023

Species:	Whiting <i>Merlangius merlangus</i>	Zone:	7a (WHG/07A.)
Belgium	2	(1)	Analytical TAC
France	21	(1)	Article 8 of this Regulation applies
Ireland	269	(1)	Article 3 of Regulation (EC) No 847/96 shall not apply
Netherlands	1	(1)	Article 4 of Regulation (EC) No 847/96 shall not apply
Union	293	(1)	
United Kingdom	428	(1)	
TAC	721	(1)	
(1) Exclusively for by-catches of whiting in fisheries for other species. No directed fisheries for whiting are permitted under this quota.			

TAC 2024

Species:	Whiting <i>Merlangius merlangus</i>	Zone:	7a (WHG/07A.)
Belgium	2 ⁽¹⁾	Analytical TAC	
France	21 ⁽¹⁾	Article 8 of this Regulation applies	
Ireland	262 ⁽¹⁾	Article 3(2) and (3) of Regulation (EC) No 847/96 shall not apply	
Netherlands	1 ⁽¹⁾	Article 4 of Regulation (EC) No 847/96 shall not apply	
Union	286 ⁽¹⁾		
United Kingdom	435 ⁽¹⁾		
TAC	721 ⁽¹⁾		
⁽¹⁾ Exclusively for by-catches of whiting in fisheries for other species. No directed fisheries for whiting are permitted under this quota.			

Fishery in 2023

The characteristics of the fishery are described in the [stock annex](#).

The fishery in 2023 was prosecuted by the same fleets and gears as in recent years.

The majority of catches are discards are from *Nephrops* directed fleets. The main fleets landing whiting are fin-fish directed fleets from Ireland and Northern Ireland. In recent years landings were submitted for the PTM_SPF metier. These are likely from trips targeting herring where whiting is a bycatch. Figure 38.2 shows the contribution of catch by fleet.

Table 38.1 gives the official nominal landings of 7.a whiting as reported by each country to ICES. Working Group estimates of the landings and discards for the main fleets are given in Table 38.2. In recent years the values provided to the WG are very similar to officially reported landings.

Belgium and UK(NI) submitted discard estimates for 2023. However, there were no OTB_CRU discard estimates from Ireland. This metier constitutes on average 17% of the overall OTB_CRU discards for the stock. In order to determine an estimate from this component of the catch for 2023, a linear model was applied to the total weight of whiting discards and effort from the Irish OTB_CRU fleet from 2010-2021 weighted by the number of trips. This resulted in an estimate of 219 t for the Irish OTB_CRU fleet for 2023. A similar approach was used for the Irish OTB_DEF fleet which resulted in an estimate of 4 t for this fleet.

Total discards were estimated to be 952 t in 2023.

No BMS landings or logbook registered discards were submitted to ICES for 2023.

The closure of the western Irish Sea to whitefish fishing from mid-February to the end of April, designed to protect cod, was continued in 2023 but is unlikely to have affected whiting catches which are mainly bycatch in the derogated *Nephrops* fishery. *Nephrops* vessels can obtain a derogation to fish in certain sections of the closed area, providing they fit separator panels to their nets to allow escape of cod and other fish. The TR2 fleet in 7.a are obliged to use one of four types of cod selective measures, namely a 'Swedish' grid; the inclined separator panel, SELTRA trawl or 300 square mesh panel.

A summary of the 2023 catches by main gear types is presented below.

Catch	Landings*			Discards		
982 tonnes	Finfish-directed otter trawls	<i>Nephrops</i> -directed otter trawls	Other gears	Finfish-directed otter trawls	<i>Nephrops</i> -directed otter trawls	Other gears
	80%	5%	15%	1%	81%	81%
	30 tonnes			952 tonnes		

*Landings from statistical rectangles 33E2 and 33E3 reallocated to whiting landings in divisions 27.7b-ce-k

38.2 Information from the industry

There was no information on the whiting stock from the industry.

38.3 Data

Data were provided by all countries according to the data call.

For WGCSE (2024) all data have been updated where possible. To allow an age based assessment, catch numbers at age, catch weights at age, stock weights at age have all be constructed since 2003 (WGCSE, 2017). These updates are documented in the Stock Annex.

Fishery landings

Working Group estimates of catch available since 1980 are illustrated in Figure 38.1 and indicate the declining trend since the start of the time-series. In 2023, there was a decrease in landings from 57 t to 30 t.

The introduction of UK and Irish legislation requiring registration of fish buyers and sellers may mean that the reported landings from 2006 onwards are more representative of actual landings.

Working group estimates of landings are corrected for misreporting in the past. There is information that officially reported landings of whiting, especially around the mid-1990s, have been inaccurate due to misreporting. Landings data have previously been partially corrected for by using sample-based estimates of landings at a number of Irish Sea ports. Due to the low level of landings recently, this has not been carried out since 2003. As for 7.a cod and haddock, the whiting landings taken or reported in ICES rectangles 33E2 and 33E3 have been reassigned to the 7.e-k whiting stock since 2003 (Table 38.3).

Fishery discards

Discard estimates are available from Northern Ireland, Irish and Belgian fleets. Raising methods used are described in the stock annex for 7.a whiting.

Landings-at-age data

Landings numbers at age are given in Table 38.4. For the 2003 data onwards, the catch and mean weight-at-age are estimated using combined UK (NI) and Irish quarterly length-weight relationships and age-length keys. This data is raised to the international catch data provided to ICES. Typically, quarterly landings are provided by the UK (Scotland), Belgium and France and annual landings are provided by UK (IOM). The quality of the landings-at-age data has been declining

in recent years due to reduced sample numbers commensurate with the decline in landings. In 2023, landings at-age were provided by Ireland and Northern Ireland.

Sampling and raising methods previously used are described in the stock annex for 7.a whiting. Methods for estimating quantities and composition of landings are described in the [stock annex](#).

Discards numbers-at-age data

In 2023, discard sampling numbers at age were only available from Northern Ireland.

Discard number at age are given in Table 38.5. Discarding of whiting is high within the Irish Sea. Discard Numbers at age were combined for ages 0 to 6+ and then raised to the international discards. There has been a high number of age 1 and 2 discarded at the start of the time series with almost all age 1, 2, 3 and 4 discarded later in time series (Figure 38.4).

The length frequency of discards of national sampled fleets in 2019 is given in Figure 38.3 This information has not been updated for 2023. More detailed information is available in the [stock annex](#).

Biological data

The derivation of these parameters and variables is described in the [stock annex](#). The Lorenzen method was used to estimate M. This was derived during WKIRISH, 2 and investigated during WKIRISH, 3. Maturity at age is knife edge at age 2. Stock weights were also revised at the benchmark meeting. Stock weights-at-age were derived from the catch weights and then smoothed using a three year moving average. Figure 38.5 shows the stock weights used. There are strong trends in mean weights at age over the time series with a minimum around 2000s for most ages. There was a small increase in the mid-2000s but overall mean weights are significantly lower than at the start of the series.

Survey data used in assessment

Table 38.6 describes the survey data made available to the Working Group.

Survey series for whiting provided to the Working Group are further described in the [stock annex](#) for 7.a whiting (Section B.3). Five survey series were available. The inclusion of the different available surveys was tested in a series of preliminary model runs at WKIRISH, 3

The three surveys used in the assessment are NIGFS-WIBTS-Q1 (G7144), NIGFS-WIBTS-Q4 (G7655), and NI MIK (19826). There was no new information available for the NI MIK (19826) survey in 2022. Previous sensitivity analysis has shown that missing data from this survey has little impact on the overall assessment.

Figure 38.6 shows the log standardized indices by cohort of the tuning fleets used in the assessment. There are very little cohort signals in any of the indices. The survey data shows a major change in the age structure of the stock around the mid-2000s. The two NI surveys show that older fish disappear around 2003 in the Q1 survey and around 2004 in the Q4 survey. This is mainly due to a decline whiting catches in the Eastern Irish Sea stratum which was explored in detail at WKIRISH. There is no indication of a year affect in 2023.

38.4 Historical Stock Development

Model used: ASAP

Software used: ASAP V3.0.17 NOAA Fisheries toolbox (<http://nft.nefsc.noaa.gov>)

FLR with R version 3.6.1 (64-bit) with packages FLEDA 2.5.2, FLCore 2.6.15, FLAssess 2.6.3, and Flash (<http://flr-project.org>)

Data screening

The general approach to data screening and analysis was followed in addition to the data exploration tools available in the FLR package FLEDA. The results of the data screening are fully documented using R markdown and are available in the folder 'Data\Whg 7.a \Assessment. on SharePoint. Table 38.7 shows the ASAP input data.

Final update assessment

The final assessment was run using the same settings as described in WKIRISH, 3. These final settings are described in the Stock Annex. The exception to this is the CV of 0.3 used for catch numbers at age for 2020.

Figure 38.7 shows the selectivity at age in the catch. Full selectivity is assumed for age 3 and the model is allowed to estimate ages 1 and 2. Table 38.8 shows the model estimates.

The observed and predicted index cpue values are shown in Figure 38.8. There is poor fit to the Northern Irish groundfish survey indices in the first half of the series but it improves in recent years.

The observed and predicted catches are shown in Figure 38.9. Fit to the overall catch is reasonably good. There is some deviation in the early to mid 1990's. This is most likely due to the introduction of the survey data into the assessment model.

Figure 38.10 shows the retrospective analysis. The predicted catch shows no obvious retrospective pattern. There is some deviation in the early part of the time series when the surveys were first introduced. However, recent estimates of SSB and F are consistent with no apparent bias. In some years, recruitment appears to be overestimated in the assessment.

A Mohn's rho analysis was conducted based on the ASAP stock assessment results, i.e. the last data year (2022) was used as the final year for comparison of SSB, F and recruitment and based on a five-year retrospective analysis. The results from the Mohn's rho analysis are shown in the following table:

	SSB	F (ages 1-3)	recruitment
Mohn's rho value	0.0976	-0.129	0.26

The Mohn's rho values for this assessment are below the threshold imposed by ICES of 20% for spawning stock biomass and 15% for fishing mortality.

The state of the stock

Table 38.9 shows the estimated fishing mortality-at-age and Table 38.10 shows the stock numbers-at-age. The stock summary is given in Table 38.11 and Figure 38.11.

The present stock size is extremely low. SSB has declined since the start of the time series and has been well below B_{lim} since the mid 1990's. Recruitment has been low since the early 1990's with a slight increase in recent years. Large variations in fishing mortality estimates have been observed in recent years. F has been well above F_{lim} since the early 1990's.

38.5 Short-term predictions

Short-term projections were performed using FLR libraries. Recruitment for 2023–2024 was estimated at 118237 (GM 2000-2022:thousands). As the retrospective pattern has shown an overestimate of recruitment for some years, the terminal year was excluded from the GM for the WGCSE, 2024 assessment. Three year averages (2021-2023) were used for F (unscaled) and weights-at-age.

Input data for the short-term forecast are given in Table 38.12. The single-option output is given in Table 38.13, Table 38.14 and Table 38.15 gives the management options.

Estimates of the relative contribution of recent year classes to the 2024 landings and 2025 SSB are shown in Figure 38.12. The 2021-2022 year class estimates from ASAP accounts for 75% of the projected landings in 2025. The 2024 GM assumption contributes considerably to the estimated SSB in 2026 as does the 2023 ASAP assessment.

38.6 Medium-term predictions

There is no analytical assessment for this stock.

38.7 MSY evaluations and Biological References Points

ICES carried out an evaluation of MSY and PA reference points for this stock at WKIRISH, 3. The results are summarized below:

	Type	Value	Technical basis
MSY	MSY Btrigger	16300 t	Bpa
Approach	F _{MSY}	0.22	Median point estimates of EqSim with combined SR
	F _{MSY lower}	0.158	Median point estimates of EqSim with combined SR
	F _{MSY upper}	0.294	Median point estimates of EqSim with combined SR
	Blim	10000 t	Below 10,000 t recruitment is impaired
Precautionary	Bpa	16300 t	Blim combined with the assessment error
Approach	Flim	0.37	F with 50% probability of SSB less than Blim
	Fpa	0.22	F _{p.05} ; the F that leads to SSB ≥ Blim with 95% probability

In 2021, ICES updated the basis for Fpa as “the F that leads to SSB ≥ Blim with 95% probability”, ICES (2021). Prior to this, it was based on “Flim combined with the assessment error”, ICES (2017). The Fpa value of 0.22 remains unchanged.

38.8 Management Plans

No management plan has been agreed.

38.9 Uncertainties and bias in assessment and forecast

This stock was benchmarked in January 2017. The result of the benchmark was that the stock was elevated from a category 3 stock (trend-based assessment) to a category 1 stock (analytical assessment). The assessment includes information from the commercial fishery, including both

landings and discards, and takes into account selectivity changes that have occurred in 1995. Three survey series are used within the assessment. Natural mortality parameters were updated to reflect current stock dynamics. The highly fluctuating estimates of fishing mortality in recent years (2002 – present) are likely to be the result of variability in the sampling data and discard estimates. Despite this inherent uncertainty it is clear from the assessment and additional information from surveys that the stock remains extremely low.

38.10 Recommendations for next benchmark assessment

This stock was benchmarked in 2017 as part of the WKIRISH process. A number of recommendations for future work were made and these are listed below. This stock is due to be benchmarked again in 2025. The explorations of which are detailed below:

Assessment method

Currently a single fleet ASAP with fixed selection assumption is used. Exploring alternative modelling frameworks which allow for changes in selection should be investigated. There is very little data to inform the question whether survey catchability is flat-topped or dome-shaped. At the moment the highly truncated age structure means that this makes little difference in the model outputs. However, if the stock recovers and more older fish appear then this will need to be revisited.

Biological parameters

New natural mortality estimates from the Irish Sea EWE model should be included in the assessment. The stock shows very strong changes in weights-at-age over time (they can change by a factor of up to 2). This is likely to affect the natural mortality. Further information to support this would be very useful for future benchmarks.

Maturity estimate are available from Northern Ireland. This was explored at WGCSE 2023 where the NI maturity estimates were used in alternative assessment run. It had little impact on the overall stock status but it more likely better estimated as it is derived from real data.

Discards

Discards data remain highly uncertain for this stock. This probably contributes to the variable F patterns observed. Partitioning catch data into landings and discards or by fleet with different CVs may help smooth out some of this variability.

Life history parameters

Mean weights show trends which are currently smoothed. This should be explored further with a view to improving the approach and possibly using it in forecasts.

Other issues

Stock identity is assumed to be appropriate but there are East -West differences in population structure and in the past there has been speculation about emigration to 7g.

Dietary and Genetic Analysis

AFBI have recently undertaken a project looking at the genetic and dietary status of whiting in the Irish Sea, the results of which will help life history parameters of the whiting stock.

Ecosystem Models

There are several ecosystem models developed for the Irish sea, the most recent of which looks at food web interactions. Incorporating ecosystem models into the assessment and advice process will better inform on sustainable fisheries management and species conservation.

Sampling

Discard sampling should be improved for this stock since discards account for the vast majority of the catch in number. Despite various management initiatives discarding remains sporadic and high in the *Nephrops* fishery.

Tuning series

Currently calculated survey CVs are not used in ASAP. It might be worth exploring the impacts of using actual values instead of an assumed fixed CV in future assessment models.

The FSP survey potentially has useful information on the older fish (even though the survey is discontinued). Including the survey in the final assessment run resulted in many of the retrospective runs to fail to converge. It appears therefore that it causes the model to be unstable and was omitted from the final run. For future benchmarks it may be useful to investigate why this survey makes the model unstable.

38.11 Management Considerations

Discarding in the *Nephrops* fishery is the main management issue. Despite the implementation of several technical measures, which experimentally reduce whiting catches, as part of the cod long-term management plan and the full implementation of the landings obligation in 2019, the discards estimates still remain high, c.1,089 t. This stock is a major 'choke species' for the 7.a *Nephrops* fishery in the context of the landing obligation.

Effort limitations are in force within the Irish Sea as a result of the cod long-term management plan. These effort limitations have not significantly reduced mortality on whiting.

Whiting has a low market value, which is likely to contribute to discarding rates.

Technical measures applied to this stock include a minimum conservation reference size (≥ 27 cm), whiting now mature well below this MCRS.

38.12 References

- ICES, 2017 :Report of the Benchmark Workshop on the Irish Sea Ecosystem (WKIrish3), 30 January-3 February 2017, Galway, Ireland, ICES CM 2017/BSG:01
- ICES, 2017 : Report of the Second Workshop on the Impact of Ecosystem and Environmental Drivers on Irish Sea Fisheries Management (WKIrish2), 26-29 September 2016, Belfast, Northern Ireland, ICES CM 2016/BSG:02
- ICES. 2021a. Advice on fishing opportunities. In Report of the ICES Advisory Committee, 2021. ICES Advice 2021, section 1.1.1. <https://doi.org/10.17895/ices.advice.7720>.
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38.13 Tables and Figures

Table 38.1 Official landings (t) of Whiting in Division 7.a as reported to ICES

Year	Belgium	France	Ireland	Netherlands	UK(NI, Engl. & Wales)	Spain	UK (Isle of Man)	UK (Scotland)	UK	Total human consumption
1988	90	1,063	4,394		5,823		15	107		11,492
1989	92	533	3,871		6,652		26	154		11,328
1990	142	528	2,000		5,202		75	236		8,183
1991	53	611	2,200		4,250		74	223		7,411
1992	78	509	2,100		4,089		44	274		7,094
1993	50	255	1,440		3,859		55	318		5,977
1994	80	163	1,418		3,724		44	208		5,637
1995	92	169	1,840		3,125		41	198		5,465
1996	80	78	1,773	17	3,557		28	48		5,581
1997	47	86	1,119	14	3,152		24	30		4,472
1998	52	81	1,260	7	1,900		33	22		3,355
1999	46	150	509	6	1,229		5	44		1,989
2000	30	59	353	1	670		2	15		1,130
2001	27	25	482		506		1	25		1,066
2002	22	33	347		284		1	27		714
2003	13	29	265		130	85	1	31		554
2004	11	8	96		82		1	6		204
2005	10	13	94		47			<0.5		164
2006	4	4	55		22			<0.5		85
2007	3	3	187		3		1	<0.5		197
2008	2	2	68		11		1			84
2009	2		78		20					100
2010	5	3	97		16		<0.5			121
2011	4	3	95		16		<0.5			118
2012	5	1	58		10			1	11	86
2013	2	<0.5	44				<0.1	2	20	68
2014	2	<0.5	60		11		<0.1			73
2,015	1	<0.5	49		8					59
2,016	1	<0.5	44		5		<0.1			50
2,017	2	<0.5	32		17		<0.1			50
2018	1		44		19		<0.5			63
2019	4		129		63		<0.1			196
2020	5	<0.1	56		42		<0.1			102
2021	2	<0.1	109		38					149

Year	Belgium	France	Ireland	Netherlands	UK(NI, Engl. & Wales)	Spain	UK (Isle of Man)	UK (Scotland)	UK	Total human consumption
2022	4	0.1	34		40					78
2023*	4	0.1	34		25		<0.5			63

* Preliminary

Table 38.2 ICES estimates of discards, landings and catch of whiting in Division 7.a

Year	Discards by Country/Fleet					Discards	Landings	Catch
	<i>Nephrops</i> fish-ery ^b	IR-OTB fleet ^{c,e}	UK (NI) ^d	Bel-gium	UK (E&W) fleet			
1988	1.611					1.611	10.245	11.856
1989	2.103					2.103	11.305	13.408
1990	2.444					2.444	8.212	10.656
1991	2.598					2.598	7.348	9.946
1992	4.203					4.203	8.588	12.791
1993	2.707					2.707	6.523	9.230
1994	1.173					1.173	6.763	7.936
1995	2.151					2.151	4.893	7.044
1996	3.631					3.631	4.335	7.966
1997	1.928					1.928	2.277	4.205
1998	1.304					1.304	2.229	3.533
1999	1.092					1.092	1.670	2.762
2000	2.118					2.118	762	2.880
2001	1.012					1.012	733	1.745
2002	740					740	747	1.487
2003		480				480	517	996
2004		905				905	133	1.038
2005		272				272	125	397
2006		1.580	193			1.773	64	1.837
2007		725	787			1.512	35	1.547
2008		693	476			1.169	37	1.206
2009		688	633			1.321	39	1.360
2010		240	914			1.154	30	1.184
2011		330	616			946	31	977
2012		257	1.065	17	1	1.339	60	1.399
2013		95	833	17	3	948	33	981
2014		263	1.645	15	28	1.951	23	1.974
2015		438	1.074	9	1	1.521	28	1.549
2016		173	589		3	765	15	780
2017		122	544		1	667	36	703
2018		98	754		<0.5	853	46	899

Year	Discards by Country/Fleet					Discards	Landings	Catch
	<i>Nephrops</i> fish- ery ^b	IR-OTB fleet ^{c,e}	UK (NI) ^d	Bel- gium	UK (E&W) fleet			
2019		86	897	20	87	1,089	172	1,261
2020		102 ^f	906	22	Na	1,030	88	1,118
2021		431	1,118	22		1,571	81	1,662
2022		213 ^g	721	49	4	986	57	1,043
2023		224 ^h	553	173	3	952	30	982

^b Based on UK(N.Ireland) and Ireland data. ^f Average IR-OTB discards (2017-2019)

^c Based on data from Ireland

^g Of which 211 is based on LM (2010-2021)

^d Based on data from Northern Ireland

^{*} Preliminary (and rounded)

^e Raised using Days

^h Based on LM (2010-2021)

Table 38.3 Whiting landings taken or reported in ICES rectangles 33E2, 33E3 and 33E4 have been reassigned to the 7.e–k whiting stock since 2003.

Year	Official landings	ICES landings	ICES Discards	ICES catch	Landings taken or re- ported in rec- tangles 33E2 and 33E3
1988	11,492	10,245	1,611	11,856	
1989	11,328	11,305	2,103	13,408	
1990	8,183	8,212	2,444	10,656	
1991	7,411	7,348	2,598	9,946	
1992	7,094	8,588	4,203	12,791	
1993	5,977	6,523	2,707	9,230	
1994	5,637	6,763	1,173	7,936	
1995	5,465	4,893	2,151	7,044	
1996	5,581	4,335	3,631	7,966	
1997	4,472	2,277	1,928	4,205	
1998	3,355	2,229	1,304	3,533	
1999	1,989	1,670	1,092	2,762	
2000	1,130	762	2,118	2,880	
2001	1,066	733	1,012	1,745	
2002	714	747	740	1,487	
2003	554	517	480	996	159
2004	204	133	905	1,038	51
2005	164	125	272	397	33
2006	85	64	1,773	1,837	22
2007	197	35	1,512	1,547	161
2008	84	37	1,169	1,206	44
2009	100	39	1,321	1,360	63
2010	121	30	1,154	1,184	91
2011	118	31	946	977	75

Year	Official landings	ICES landings	ICES Discards	ICES catch	Landings taken or reported in rectangles 33E2 and 33E3
2012	86	60	1,339	1,399	43
2013	68	33	948	981	33
2014	73	23	1,951	1,974	50
2015	59	28	1,521	1,549	34
2016	50	15	765	780	40
2017	50	36	667	703	20
2018	63	46	853	899	18
2019	196	172	1,089	1,261	24
2020	102	88	1,030	1,118	14
2021	149	91	1,571	1,662	59
2022	78	57	986	1,043	21
2023	63	30	952	982	33

Table 38.4 Whiting7.a. Landings numbers-at-age

Year	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6
1980	0	14520	21811	6468	2548	350	0
1981	0	11203	29011	16004	2596	821	0
1982	41	5427	18098	19340	6108	813	0
1983	0	4886	9943	9100	4530	1165	321
1984	0	18254	12683	5257	2571	1045	402
1985	0	15540	35324	8687	996	0	675
1986	0	6306	16839	10809	1877	285	0
1987	0	10149	21563	6968	1943	242	0
1988	0	6983	25768	6989	1513	396	0
1989	0	11645	14029	13011	3645	490	0
1990	0	9502	17604	4734	1477	318	0
1991	102	7426	18406	5829	993	0	311
1992	0	8380	21907	7959	1374	462	0
1993	38	2742	21468	7327	932	0	135
1994	0	3245	6983	18509	1801	208	0
1995	0	1124	10095	3020	4444	233	0
1996	129	1652	6162	7432	1263	1082	135
1997	0	610	4239	2567	1795	87	79
1998	0	329	3287	4727	888	261	95
1999	1	341	2806	2607	741	160	119
2000	0	319	1364	1002	299	115	15
2001	0	111	1189	1006	171	53	20
2002	0	67	748	1480	376	48	41
2003	0	89	1051	606	199	0	0
2004	0	0	17	117	150	17	0
2005	0	0	101	216	95	21	3
2006	0	34	41	88	39	9	1
2007	0	24	41	32	10	3	0
2008	0	38	66	25	5	1	0
2009	0	65	44	22	4	1	0
2010	0	18	83	11	3	0	0
2011	0	1	17	59	15	3	0
2012	0	4	29	80	60	9	1
2013	8	81	36	20	5	1	1
2014	0	2	25	24	11	1	1
2015	0	2	25	24	11	1	1
2016	0	0	6	21	10	3	0
2017	0	0	9	50	43	5	1
2018	0	1	14	70	38	19	2
2019	0	0	146	181	72	45	23
2020	0	0	58	138	93	18	10
2021	0	0	32	119	62	42	6

2022	0	0	16	83	58	11	1
2023	0	6	15	26	8	17	0

Table 38.5 Whiting7.a. Discard numbers-at-age

Year	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6
1980	12786	32318	6888	65	26	0	0
1981	9865	24935	9162	162	26	0	0
1982	4047	8489	560	19	0	0	0
1983	23847	7328	2036	9	0	0	0
1984	26394	33900	1568	11	0	0	0
1985	12380	26461	1859	9	0	0	0
1986	28364	21111	1464	33	0	0	0
1987	16594	40598	1875	0	0	0	0
1988	6922	17958	1940	0	0	0	0
1989	17247	20701	2476	26	0	0	0
1990	4216	31810	3353	72	0	0	0
1991	20349	29334	3823	146	1	0	0
1992	1497	61451	10404	97	0	0	0
1993	12639	13979	17707	426	5	0	0
1994	3731	12063	1812	1702	29	0	0
1995	7118	17613	7015	492	234	0	0
1996	12732	39647	8168	1976	81	0	0
1997	8163	25497	5352	689	141	0	0
1998	6096	27131	2293	550	44	0	0
1999	20851	7677	2117	228	34	2	2
2000	7321	38922	4395	564	55	1	10
2001	16940	12631	3150	102	10	0	0
2002	8538	13412	1588	231	33	0	1
2003	12389	4595	201	0	0	0	0
2004	19699	14938	345	59	0	0	0
2005	643	5797	346	16	3	0	0
2006	15764	20590	613	21	0	0	0
2007	17436	24319	747	50	0	0	0
2008	10645	19994	676	16	0	0	0
2009	6622	27448	1176	0	0	0	0
2010	3946	15102	2810	64	1	0	0
2011	25982	8197	658	314	0	0	0
2012	6637	31020	790	37	1	3	0
2013	8493	11945	613	4	0	0	0
2014	13467	27553	2425	259	10	0	0
2015	3883	23595	2603	223	1	0	0
2016	4509	5780	4804	294	15	0	0
2017	3559	5870	4385	240	14	0	0
2018	6523	7386	2557	614	92	10	0
2019	6429	14041	3986	571	57	7	0
2020	11987	26870	978	50	3	0	0
2021	4272	18880	6496	396	18	4	0

2022	2837	18777	1468	270	67	12	1
2023	4088	7318	6193	1114	92	10	0

Table 38.5 Whiting in 7.a. Survey data available

NIGFS-WIBTS-Q1: Northern Ireland March Groundfish Survey

1993	2023					
1	1	0.21	0.25			
1	6					
1	665.6	710.3	81.2	11.7	4.3	0.8
1	1804.6	262.1	299.2	44.7	11.9	8.1
1	1688.9	635.7	174.2	88.4	22.0	6.3
1	1468.4	334.0	213.0	35.1	37.2	5.4
1	1406.1	1536.4	156.0	52.8	4.5	13.7
1	1485.0	754.4	415.4	29.7	7.4	1.8
1	1369.4	373.2	111.2	41.5	3.7	1.0
1	2302.4	410.9	181.8	26.6	3.7	0.0
1	1065.7	696.5	124.6	13.7	5.9	2.7
1	2307.7	686.7	175.3	52.9	11.2	1.4
1	1495.1	905.2	130.2	10.9	1.6	0.1
1	1609.8	231.7	61.4	2.7	1.3	0.2
1	689.3	124.0	28.5	12.3	2.8	0.1
1	959.8	235.6	30.3	6.0	0.1	0.1
1	905.0	158.6	14.9	2.7	0.2	0.0
1	756.7	347.0	45.0	2.8	0.3	0.4
1	1062.3	281.1	36.3	1.8	0.2	0.1
1	739.4	545.8	51.6	4.7	6.4	0.0
1	586.4	156.5	36.0	3.9	0.6	0.0
1	972.2	354.4	42.3	5.9	1.2	0.0
1	629.6	649.3	66.7	3.5	0.5	0.0
1	922.1	367.6	67.0	4.3	0.2	0.1
1	2797.3	469.3	18.8	2.3	0.0	0.0
1	1409.1	924.8	38.7	1.5	0.1	0.1
1	888.1	831.8	142.2	11.2	0.7	0.1
1	431.4	296.8	119.4	17.9	2.3	0.0
1	568.0	831.9	347.2	43.2	6.2	0.5
1	1573.5	583.4	127.3	9.2	0.3	0.6
1	569.4	951.5	86.2	9.9	2.9	0.6
1	1900.5	503.1	119.9	4.2	1.8	0.4
1	384.4	604.4	144.8	17.2	0.16	0.0

NIGFS-WIBTS-Q4: Northern Ireland October Groundfish Survey

1993	2023						
1	1	0.83	0.88				
0	6						
1	714.0	1040.5	475.9	67.5	8.2	3.1	0.3
1	1113.1	1320.0	208.6	150.7	33.9	2.3	0.5
1	3124.4	477.3	166.5	30.6	35.6	5.4	1.2
1	2306.2	591.2	134.4	52.4	10.5	7.0	1.3
1	2626.5	676.6	497.6	61.0	18.2	4.6	4.5
1	2863.5	466.8	153.8	72.8	6.2	2.2	0.1
1	2478.4	1079.7	192.0	51.7	43.3	3.7	1.8
1	2374.3	1084.7	126.0	20.0	16.9	6.0	2.7
1	6356.4	658.3	270.8	28.9	4.9	2.3	0.0
1	2692.4	1322.5	268.3	41.6	4.5	1.2	0.0
1	4431.0	1572.3	921.1	74.8	16.8	1.5	0.0
1	4457.1	699.6	268.3	113.8	4.4	1.9	0.0
1	2377.2	487.8	183.3	15.8	1.5	0.4	0.0
1	2849.2	144.8	46.8	7.9	1.8	0.0	0.0
1	2163.1	957.6	149.1	16.7	4.8	4.3	0.2
1	4884.6	1312.6	114.3	3.8	0.2	0.0	0.0
1	2246.5	510.8	71.7	7.5	1.6	0.0	0.2
1	2274.4	312.1	259.6	8.2	0.7	0.2	0.0
1	3534.1	348.4	139.7	26.3	3.5	0.9	0.0
1	1330.9	402.5	134.7	19.5	6.2	0.1	0.0
1	7135.8	354.7	155.9	31.1	1.5	0.5	0.9
1	4504.0	507.7	135.5	8.8	0.7	0.0	0.0
1	2802.4	891.0	115.2	6.3	0.7	0.0	0.0
1	2718.7	859.3	203.5	31.7	3.5	0.4	0
1	3011.1	714.1	368.4	78.4	4.2	0.0	0.1
1	4424.7	897.5	367.6	23.4	8.3	0.2	0.04
1	5613.5	643.2	148.5	27.4	3.2	0.3	0.00
1	2416.2	1157.8	98.4	16.0	0.2	0.5	0.00
1	5376.7	1018.7	143.1	25.6	4.9	0.0	0.1
1	1934.2	1178.4	174.9	33.7	1.6	0.9	0.00
1	3309.1	620.7	421.6	25.1	7.8	0.1	0.00

NIMIK : Northern Ireland MIK Net Survey

1994	2023		
1	1	0.46	0.5
0	0		
1	778	1994	
1	225	1995	
1	397	1996	
1	205	1997	
1	59	1998	
1	91	1999	
1	40	2000	
1	167	2001	
1	19	2002	
1	148	2003	
1	101	2004	
1	135	2005	
1	118	2006	
1	82	2007	
1	99	2008	
1	173	2009	
1	78	2010	
1	122.2	2011	
1	123.9	2012	
1	197.6	2013	
1	54.9	2014	
1	59.5	2015	
1	6.7	2016	
1	175.45	2017	
1	90.74	2018	
1	164.42	2019	
1	N/A	2020	
1	108.4	2021	
1	N/A	2022	
1	202	2023	

**UK (E&W)-BTS-Q3: *Corystes* Irish Sea Beam-Trawl Survey - Prime stations only –
Effort and numbers at age (per km towed)**

1988	2023		
1	1	0.75	0.79
0	1		
1	96	26	1988
1	93	21	1989
1	99	33	1990
1	216	25	1991
1	405	206	1992
1	253	95	1993
1	205	125	1994
1	1949	87	1995
1	169	194	1996
1	409	254	1997
1	893	199	1998
1	550	137	1999
1	320	122	2000
1	585	195	2001
1	280	96	2002
1	456	229	2003
1	917	330	2004
1	849	294	2005
1	1010	228	2006
1	339	89	2007
1	780	72	2008
1	389	371	2009
1	324	33	2010
1	1002	341	2011
1	442	426	2012
1	1535	228	2013
1	261	113	2014
1	211	112	2015
1	666	213	2016
1	489	230	2017
1	662	380	2018
1	307	186	2019
1	N/A	N/A	2020
1	340	132	2021
1	379	226	2022
1	274	80	2023

Eastern Irish Sea FSP: Isadale 2005 – 2013: Numbers of fish per hour towed

2005	2013					
1	1	0.16	0.20			
1	6					
1	0.22	11.06	21.12	5.28	0.98	0
	0.69					
1	8.69	46.65	15.22	1.85	0.53	0.013
	0					
1	4.24	10.77	5.55	1.01	0.28	0.02
	0					
1	3.7	10.29	8.58	1.99	0.38	0.29
	0					
1	27.3	84.91	48.67	3.61	0.33	0
	0					
1	4.54	57.92	43.5	4.95	0.16	0.05
	0.02					
1	2.22	8.42	31.85	5.13	0.96	0.02
	0					
1	5.15	80.9	29.75	22.08	1.24	0.13
	0					
1	4.21	47.35	26.43	3.13	1.72	0.01
	0					

[illegible]

[illegible]

Fecundity Option

0

Fraction of year that elapses prior to SSB calculation (0=Jan-1)

0

Maturity

[illegible]

0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1
0	0	1	1	1	1	1

Number of Weights at Age Matrices

2

Weight Matrix - 1

0.034	0.11	0.235	0.363	0.529	0.63	0.772
0.04	0.118	0.24	0.364	0.529	0.63	0.888
0.031	0.135	0.265	0.365	0.533	0.63	0.736
0.033	0.146	0.256	0.397	0.491	0.605	0.655
0.032	0.125	0.244	0.403	0.55	0.7	0.745
0.021	0.107	0.245	0.333	0.478	0.567	0.642
0.025	0.1	0.217	0.342	0.512	0.709	0.94
0.024	0.101	0.217	0.363	0.535	0.72	0.933
0.021	0.088	0.201	0.33	0.547	0.763	1.005
0.026	0.111	0.193	0.269	0.433	0.68	1.079
0.036	0.094	0.204	0.31	0.436	0.676	0.8
0.031	0.077	0.194	0.263	0.352	0.453	0.692
0.014	0.063	0.17	0.272	0.361	0.513	1.007
0.029	0.067	0.142	0.228	0.331	0.454	0.892
0.03	0.074	0.183	0.221	0.301	0.378	0.496
0.031	0.063	0.179	0.257	0.326	0.551	1.32
0.027	0.057	0.159	0.23	0.284	0.364	0.715
0.026	0.044	0.153	0.222	0.287	0.396	0.679
0.017	0.035	0.156	0.228	0.268	0.35	0.421
0.028	0.044	0.161	0.246	0.324	0.351	0.325
0.024	0.038	0.127	0.218	0.291	0.347	0.31
0.017	0.036	0.132	0.301	0.338	0.538	0.337
0.016	0.033	0.124	0.253	0.339	0.449	0.425
0.02	0.048	0.232	0.295	0.259	0	0
0.017	0.034	0.131	0.324	0.509	0.466	0
0.017	0.037	0.148	0.263	0.363	0.36	0.32
0.017	0.069	0.152	0.268	0.361	0.36	0.32
0.023	0.042	0.122	0.295	0.434	0.624	1.26
0.022	0.044	0.118	0.262	0.374	0.834	1.354
0.023	0.039	0.094	0.34	0.323	0.543	0
0.02	0.048	0.125	0.256	0.401	0.375	0
0.018	0.044	0.104	0.196	0.405	0.462	0.799
0.023	0.035	0.109	0.275	0.398	0.41	0.305
0.03	0.052	0.112	0.24	0.346	0.28	0.38
0.03	0.042	0.133	0.226	0.425	0.659	1.012
0.022	0.044	0.127	0.291	0.448	0.298	0.482

0.022	0.035	0.085	0.195	0.341	0.466	0.882
0.028	0.032	0.075	0.198	0.362	0.432	0.5
0.021	0.045	0.104	0.161	0.24	0.319	0.408
0.02	0.033	0.104	0.175	0.268	0.436	0.433
0.019	0.027	0.067	0.166	0.27	0.358	0.367
0.026	0.045	0.084	0.187	0.311	0.398	0.342
0.02	0.04	0.105	0.2	0.369	0.445	0.559
0.028	0.043	0.069	0.083	0.115	0.324	0.304
# Weight Matrix - 2						
0	0.0733	0.1733	0.2992	0.446	0.5795	0.7203
0	0.0785	0.1797	0.3003	0.4468	0.5795	0.7143
0	0.084	0.1873	0.311	0.4408	0.576	0.6948
0	0.085	0.194	0.321	0.45	0.5813	0.6668
0	0.079	0.1918	0.3163	0.4473	0.5743	0.6628
0	0.0697	0.1807	0.3038	0.4455	0.5825	0.6998
0	0.0643	0.1685	0.2907	0.4338	0.5893	0.7485
0	0.0598	0.1572	0.2857	0.4387	0.6195	0.8123
0	0.0617	0.15	0.2662	0.425	0.6262	0.8682
0	0.0607	0.1497	0.2533	0.3963	0.6057	0.8412
0	0.0608	0.1473	0.24	0.355	0.5375	0.7817
0	0.0545	0.1417	0.2393	0.3318	0.4772	0.718
0	0.048	0.1233	0.2218	0.3148	0.4282	0.7055
0	0.0463	0.117	0.2045	0.2927	0.3982	0.6358
0	0.0462	0.118	0.2002	0.2798	0.396	0.6755
0	0.0473	0.1208	0.202	0.2695	0.3752	0.6523
0	0.042	0.1142	0.205	0.2675	0.3703	0.6678
0	0.0367	0.1053	0.1952	0.258	0.3345	0.521
0	0.0322	0.101	0.194	0.2598	0.3227	0.4225
0	0.0313	0.0945	0.1937	0.2632	0.3212	0.3588
0	0.0312	0.0895	0.2015	0.2742	0.3532	0.3367
0	0.0293	0.0835	0.1987	0.2888	0.3812	0.3847
0	0.029	0.0992	0.2054	0.2847	0.4021	0.4114
0	0.0281	0.1007	0.2267	0.3261	0.3847	0.4357
0	0.0288	0.1045	0.2282	0.3338	0.3984	0.4062
0	0.0323	0.0918	0.2277	0.3525	0.3862	0.3827
0	0.0331	0.0939	0.2097	0.3355	0.4296	0.5145
0	0.0352	0.0901	0.2082	0.3326	0.4961	0.7133
0	0.0311	0.0815	0.2152	0.3261	0.5283	0.9183
0	0.0331	0.077	0.1989	0.3325	0.4804	0.9181
0	0.0326	0.0756	0.1883	0.3311	0.4127	0.784
0	0.0313	0.078	0.175	0.3326	0.3957	0.5933
0	0.032	0.0753	0.1748	0.3127	0.3924	0.455
0	0.0334	0.0808	0.1777	0.3134	0.4162	0.4746
0	0.0369	0.0836	0.1851	0.3267	0.4009	0.5369
0	0.0339	0.0805	0.1806	0.3283	0.4403	0.6021
0	0.0308	0.068	0.1713	0.3104	0.4016	0.555
0	0.0306	0.0625	0.1401	0.2712	0.3946	0.505
0	0.0301	0.0658	0.133	0.2375	0.3551	0.4336
0	0.029	0.0641	0.1307	0.2187	0.3307	0.3992
0	0.0275	0.06	0.1337	0.2251	0.3284	0.3758
0	0.0296	0.0603	0.1346	0.2462	0.3417	0.4099


```

2
2
2
2
# Selectivity Options for each block 1=by age, 2=logistic, 3=double logistic
2 2
# Selectivity Block #1 Data
0      1      0      0.25
0.5    1      0      0.25
0.9    1      0      0.25
1      -1     0      0.25
1      -1     0      0.25
1      -1     0      0.25
1      -1     0      0.25
3      1      0      1
0.5    1      0      1
0      0      0      0
0      0      0      0
0      0      0      0
0      0      0      0
# Selectivity Block #2 Data
0.2    1      0      0.5
1      -1     0      0
1      -1     0      0
1      -1     0      0
1      -1     0      0
1      -1     0      0
1      -1     0      0
1      -1     0      0
2      1      0      1
0.5    1      0      1
0      0      0      0
0      0      0      0
0      0      0      0
0      0      0      0
# Fleet Start Age
1
# Fleet End Age
7
# Age Range for Average F
2 4
# Average F report option (1=unweighted, 2=Nweighted, 3=Bweighted)
1
# Use Likelihood constants? (1=yes)
1
# Release Mortality by Fleet
1
# Catch Data
# Fleet-1 Catch Data
12786    46838    28699    6533    2574    350    621    16737
9865     36138    38173    16166    2622    821    339    21331
4088     13916    18658    19359    6108    813    400    17969

```

[illegible]

[illegible]

Release Proportion

Fleet-1 Release Data

[illegible]

```
# Survey Index Data
# Aggregate Index Units
2 2 2 2 2
# Age Proportion Index Units
2 2 2 2 2
# Weight at Age Matrix
1 1 1 1 1
# Index Month
3 10 5 9 5
# Index Selectivity Link to Fleet
-1 -1 -1 -1 -1
# Index Selectivity Options 1=by age, 2=logisitic, 3=double logistic
1 1 1 1 2
# Index Start Age
2 1 1 1 2
# Index End Age
7 7 1 2 7
# Estimate Proportion (Yes=1)
1 1 0 0 0
# Use Index (Yes=1)
```

Index-1 Selectivity Data

Index-2 Selectivity Data

Index-3 Selectivity Data

Index-4 Selectivity Data

[illegible]

0	0	0	0								
0	0	0	0								
0	0	0	0								
0	0	0	0								
0	0	0	0								
0	0	0	0								
# Index-5 Selectivity Data											
0	0	0	0								
0	0	0	0								
0	0	0	0								
0	0	0	0								
0	0	0	0								
0	0	0	0								
0	0	0	0								
0	0	0	0								
4	1	0	1								
0.5	1	0	1								
0	0	0	0								
0	0	0	0								
0	0	0	0								
0	0	0	0								
# Index-1 Data											
1980	0	0	0	0	0	0	0	0	0	0	
1981	0	0	0	0	0	0	0	0	0	0	
1982	0	0	0	0	0	0	0	0	0	0	
1983	0	0	0	0	0	0	0	0	0	0	
1984	0	0	0	0	0	0	0	0	0	0	
1985	0	0	0	0	0	0	0	0	0	0	
1986	0	0	0	0	0	0	0	0	0	0	
1987	0	0	0	0	0	0	0	0	0	0	
1988	0	0	0	0	0	0	0	0	0	0	
1989	0	0	0	0	0	0	0	0	0	0	
1990	0	0	0	0	0	0	0	0	0	0	
1991	0	0	0	0	0	0	0	0	0	0	
1992	0	0	0	0	0	0	0	0	0	0	
1993	1474	0.3	0	0.452	0.482	0.055	0.008	0.003	0.001	50	
1994	2431	0.3	0	0.742	0.108	0.123	0.018	0.005	0.003	50	
1995	2615	0.3	0	0.646	0.243	0.067	0.034	0.008	0.002	50	
1996	2093	0.3	0	0.702	0.16	0.102	0.017	0.018	0.003	50	
1997	3169	0.3	0	0.444	0.485	0.049	0.017	0.001	0.004	50	
1998	2694	0.3	0	0.551	0.28	0.154	0.011	0.003	0.001	50	
1999	1900	0.3	0	0.721	0.196	0.059	0.022	0.002	0.001	50	
2000	2925	0.3	0	0.787	0.14	0.062	0.009	0.001	0	50	
2001	1909	0.3	0	0.558	0.365	0.065	0.007	0.003	0.001	50	
2002	3235	0.3	0	0.713	0.212	0.054	0.016	0.003	0	50	
2003	2543	0.3	0	0.588	0.356	0.051	0.004	0.001	0	50	
2004	1907	0.3	0	0.844	0.121	0.032	0.001	0.001	0	50	
2005	857	0.3	0	0.804	0.145	0.033	0.014	0.003	0	50	
2006	1232	0.3	0	0.779	0.191	0.025	0.005	0	0	50	
2007	1081	0.3	0	0.837	0.147	0.014	0.002	0	0	50	
2008	1152	0.3	0	0.657	0.301	0.039	0.002	0	0	50	
2009	1382	0.3	0	0.769	0.203	0.026	0.001	0	0	50	

2010	1348	0.3	0	0.549	0.405	0.038	0.003	0.005	0	50
2011	783	0.3	0	0.749	0.2	0.046	0.005	0.001	0	50
2012	1376	0.3	0	0.707	0.258	0.031	0.004	0.001	0	50
2013	1350	0.3	0	0.466	0.481	0.049	0.003	0	0	50
2014	1361	0.3	0	0.677	0.27	0.049	0.003	0	0	50
2015	3288	0.3	0	0.851	0.143	0.006	0.001	0	0	50
2016	2374	0.3	0	0.594	0.39	1E-06	0.016	0.001	0	50
2017	1874	0.3	0	0.474	0.444	0.076	0.006	0.001	0	50
2018	868	0.3	0	0.497	0.342	0.138	0.021	0.003	0	50
2019	1797	0.3	0	0.316	0.463	0.193	0.024	0.003	0	50
2020	2294	0.3	0	0.686	0.254	0.055	0.004	0	0	50
2021	1620	0.3	0	0.351	0.587	0.053	0.006	0.002	0	50
2022	2530	0.3	0	0.751	0.199	0.047	0.002	0.001	0	50
2023	1151	0.3	0	0.334	0.525	0.126	0.015	0	0	50
# Index-2 Data										
1980	0	0	0	0	0	0	0	0	0	
1981	0	0	0	0	0	0	0	0	0	
1982	0	0	0	0	0	0	0	0	0	
1983	0	0	0	0	0	0	0	0	0	
1984	0	0	0	0	0	0	0	0	0	
1985	0	0	0	0	0	0	0	0	0	
1986	0	0	0	0	0	0	0	0	0	
1987	0	0	0	0	0	0	0	0	0	
1988	0	0	0	0	0	0	0	0	0	
1989	0	0	0	0	0	0	0	0	0	
1990	0	0	0	0	0	0	0	0	0	
1991	0	0	0	0	0	0	0	0	0	
1992	0	0	0	0	0	0	0	0	0	
1993	2309	0.3	0.309	0.451	0.206	0.029	0.004	0.001	0	50
1994	2829	0.3	0.393	0.467	0.074	0.053	0.012	0.001	0	50
1995	3841	0.3	0.813	0.124	0.043	0.008	0.009	0.001	0	50
1996	3103	0.3	0.743	0.191	0.043	0.017	0.003	0.002	0	50
1997	3889	0.3	0.675	0.174	0.128	0.016	0.005	0.001	0.001	50
1998	3566	0.3	0.803	0.131	0.043	0.02	0.002	0.001	0	50
1999	3851	0.3	0.644	0.28	0.05	0.013	0.011	0.001	0	50
2000	3631	0.3	0.654	0.299	0.035	0.006	0.005	0.002	0.001	50
2001	7322	0.3	0.868	0.09	0.037	0.004	0.001	0	0	50
2002	4331	0.3	0.622	0.305	0.062	0.01	0.001	0	0	50
2003	7017	0.3	0.631	0.224	0.131	0.011	0.002	0	0	50
2004	5545	0.3	0.804	0.126	0.048	0.021	0.001	0	0	50
2005	3066	0.3	0.775	0.159	0.06	0.005	0	0	0	50
2006	3050	0.3	0.934	0.047	0.015	0.003	0.001	0	0	50
2007	3296	0.3	0.656	0.291	0.045	0.005	0.001	0.001	0	50
2008	6315	0.3	0.773	0.208	0.018	0.001	0	0	0	50
2009	2838	0.3	0.791	0.18	0.025	0.003	0.001	0	0	50
2010	2855	0.3	0.797	0.109	0.091	0.003	0	0	0	50
2011	4053	0.3	0.872	0.086	0.034	0.006	0.001	0	0	50
2012	1894	0.3	0.703	0.213	0.071	0.01	0.003	0	0	50
2013	7680	0.3	0.929	0.046	0.02	0.004	0	0	0	50
2014	5157	0.3	0.873	0.098	0.026	0.002	0	0	0	50
2015	3816	0.3	0.734	0.234	0.03	0.002	0	0	0	50

2016	3817	0.3	0.712	0.225	0.053	0.008	0	0	0	50
2017	4176	0.3	0.721	0.171	0.088	0.019	0	0	0	50
2018	5722	0.3	0.774	0.157	0	0.064	0	0	0	50
2019	6436	0.3	0.872	0.1	0.023	0.004	0	0	0	50
2020	3689	0.3	0.655	0.314	0.027	0.004	0	0	0	50
2021	6569	0.3	0.818	0.155	0.022	0.004	0.001	0	0	50
2022	3324	0.3	0.582	0.355	0.053	0.01	0	0	0	50
2023	4384	0.3	0.755	0.142	0.096	0.006	0.002	0	0	50

Index-3 Data

1980	0	0	0	0	0	0	0	0	0	
1981	0	0	0	0	0	0	0	0	0	
1982	0	0	0	0	0	0	0	0	0	
1983	0	0	0	0	0	0	0	0	0	
1984	0	0	0	0	0	0	0	0	0	
1985	0	0	0	0	0	0	0	0	0	
1986	0	0	0	0	0	0	0	0	0	
1987	0	0	0	0	0	0	0	0	0	
1988	0	0	0	0	0	0	0	0	0	
1989	0	0	0	0	0	0	0	0	0	
1990	0	0	0	0	0	0	0	0	0	
1991	0	0	0	0	0	0	0	0	0	
1992	0	0	0	0	0	0	0	0	0	
1993	0	0	0	0	0	0	0	0	0	
1994	778	0.5	0	0	0	0	0	0	0	0
1995	225	0.5	0	0	0	0	0	0	0	0
1996	397	0.5	0	0	0	0	0	0	0	0
1997	205	0.5	0	0	0	0	0	0	0	0
1998	59	0.5	0	0	0	0	0	0	0	0
1999	91	0.5	0	0	0	0	0	0	0	0
2000	40	0.5	0	0	0	0	0	0	0	0
2001	167	0.5	0	0	0	0	0	0	0	0
2002	19	0.5	0	0	0	0	0	0	0	0
2003	148	0.5	0	0	0	0	0	0	0	0
2004	101	0.5	0	0	0	0	0	0	0	0
2005	135	0.5	0	0	0	0	0	0	0	0
2006	118	0.5	0	0	0	0	0	0	0	0
2007	82	0.5	0	0	0	0	0	0	0	0
2008	99	0.5	0	0	0	0	0	0	0	0
2009	173	0.5	0	0	0	0	0	0	0	0
2010	78	0.5	0	0	0	0	0	0	0	0
2011	122.2	0.5	0	0	0	0	0	0	0	0
2012	123.9	0.5	0	0	0	0	0	0	0	0
2013	197.6	0.5	0	0	0	0	0	0	0	0
2014	54.9	0.5	0	0	0	0	0	0	0	0
2015	59.5	0.5	0	0	0	0	0	0	0	0
2016	6.7	0.5	0	0	0	0	0	0	0	0
2017	175.4	0.5	0	0	0	0	0	0	0	0
2018	90.74	0.5	0	0	0	0	0	0	0	0
2019	164.4284624	0.5	0	0	0	0	0	0	0	0
2020	0	0.5	0	0	0	0	0	0	0	0
2021	108.4	0.5	0	0	0	0	0	0	0	0

1983	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0
2005	38.66	0.5	0	0	0	0	0	0	0
2006	72.953	0.5	0	0	0	0	0	0	0
2007	21.87	0.5	0	0	0	0	0	0	0
2008	25.23	0.5	0	0	0	0	0	0	0
2009	164.82	0.5	0	0	0	0	0	0	0
2010	111.12	0.5	0	0	0	0	0	0	0
2011	48.6	0.5	0	0	0	0	0	0	0
2012	139.25	0.5	0	0	0	0	0	0	0
2013	82.85	0.5	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0	0
# Phase Control									
# Phase for F mult in 1st Year									
1									
# Phase for F mult Deviations									
1									
# Phase for Recruitment Deviations									
3									
# Phase for N in 1st Year									
1									
# Phase for Catchability in 1st Year									

[illegible]

[illegible]

Discard Effective Sample Size by Year and Fleet

0
0
0
0
0
0
0
0
0
0

0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
Lambda for F Mult in First year by Fleet
0
CV for F Mult in First year by Fleet
0.9
Lambda for F Mult Deviations by Fleet
0
CV for F Mult Deviations by Fleet
0.9
Lambda for N in 1st Year Deviations
0
CV for N in 1st Year Deviations
.9
Lambda for Recruitment Deviations
.1
Lambda for Catchability in First year by Index
0 0 0 0 0
CV for Catchability in First year by Index

```

0.9 0.9 0.9 0.9 .9
# Lambda for Catchability Deviations by Index
0 0 0 0 0
# CV for Catchability Deviations by Index
.9 .9 .9 .9 .9
# Lambda for Deviation from Initial Steepness
0
# CV for Deviation from Initial Steepness
.9
# Lambda for Deviation from Unexploited Stock Size
0
# CV for Deviation from Unexploited Stock Size
.9
# NAA Deviations Flag
1
# Initial Numbers at Age in 1st Year
1000000 500000 250000 125000 60000 30000 10000
# Initial F Mult in 1st Year by Fleet
1
# Initial Catchability by Index
.001 .001 .001 .001 0.001
# Stock Recruitment Flag
0
# Initial Unexploited Stock
1000
# Initial Steepness
1
# Maximum F
2.5
# Ignore Guesses (Yes=1)
0
# Projection Control
# Do Projections (Yes=1)
0
# Fleet Directed Flag
1
# Final Year in Projection
2024
# Projection Data by Year
2024 -1 3 -99 1
# Do MCMC (Yes=1)
0
# MCMC Year Option
1
# MCMC Iterations
0
# MCMC Thinning Factor
0
# MCMC Random Seed
0
# Agepro R Option

```

```
-1
# Agepro R Option Start Year
0
# Agepro R Option End Year
0
# Export R Flag
1
# Test Value
-23456
#####
##### FINIS #####
# Fleet Names
#$All
# Survey Names
#$NI-Q1
#$NI_Q2
#$NI-MIK
#$UK-BTS
#$UK-FSP
#
```

Table 38.7 Whiting 7.a. Selectivity of the catches and indices.

Age	Catch	NI-Q1	NI-Q4	NI-MIK
0	0.108	0	0.667	1.00
1	0.817	0.471	0.756	0.00
2	0.994	1.00	1.00	0.00
3	1.000	1.00	1.00	0.00
4	1.000	1.00	1.00	0.00
5	1.000	1.00	1.00	0.00
6	1.000	1.00	1.00	0.00

Table 38.8 Whiting 7.a Fishing mortality- (F) -at age.

	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6
1980	0.026	0.175	0.422	0.493	0.502	0.503	0.503
1981	0.031	0.211	0.508	0.594	0.604	0.605	0.606
1982	0.035	0.234	0.563	0.658	0.67	0.671	0.671
1983	0.035	0.237	0.572	0.668	0.68	0.681	0.681
1984	0.043	0.288	0.694	0.811	0.825	0.826	0.827
1985	0.052	0.352	0.847	0.99	1.007	1.009	1.009
1986	0.041	0.274	0.661	0.772	0.785	0.787	0.787
1987	0.043	0.29	0.699	0.817	0.831	0.833	0.833
1988	0.037	0.248	0.597	0.697	0.709	0.711	0.711
1989	0.052	0.348	0.838	0.979	0.997	0.998	0.999
1990	0.044	0.297	0.716	0.837	0.851	0.853	0.853

	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6
1991	0.045	0.303	0.73	0.853	0.868	0.869	0.869
1992	0.075	0.503	1.211	1.415	1.44	1.443	1.443
1993	0.06	0.401	0.966	1.129	1.149	1.151	1.151
1994	0.062	0.415	1	1.169	1.189	1.191	1.191
1995	0.099	0.749	0.911	0.916	0.916	0.916	0.916
1996	0.108	0.818	0.995	1.001	1.001	1.001	1.001
1997	0.093	0.707	0.861	0.866	0.866	0.866	0.866
1998	0.131	0.997	1.213	1.22	1.22	1.22	1.22
1999	0.104	0.791	0.962	0.968	0.968	0.968	0.968
2000	0.135	1.029	1.252	1.259	1.26	1.26	1.26
2001	0.11	0.834	1.015	1.021	1.021	1.021	1.021
2002	0.151	1.146	1.394	1.402	1.402	1.402	1.402
2003	0.075	0.57	0.694	0.698	0.698	0.698	0.698
2004	0.211	1.606	1.954	1.965	1.965	1.965	1.965
2005	0.058	0.438	0.532	0.535	0.536	0.536	0.536
2006	0.186	1.413	1.718	1.729	1.729	1.729	1.729
2007	0.147	1.115	1.356	1.364	1.364	1.364	1.364
2008	0.119	0.906	1.102	1.109	1.109	1.109	1.109
2009	0.135	1.024	1.246	1.253	1.253	1.253	1.253
2010	0.14	1.065	1.296	1.303	1.303	1.303	1.303
2011	0.106	0.804	0.978	0.984	0.984	0.984	0.984
2012	0.139	1.058	1.287	1.294	1.294	1.294	1.294
2013	0.081	0.613	0.746	0.751	0.751	0.751	0.751
2014	0.184	1.4	1.703	1.713	1.713	1.713	1.713
2015	0.121	0.916	1.114	1.121	1.121	1.121	1.121
2016	0.069	0.521	0.634	0.638	0.638	0.638	0.638
2017	0.055	0.417	0.508	0.511	0.511	0.511	0.511
2018	0.055	0.418	0.509	0.512	0.512	0.512	0.512
2019	0.093	0.707	0.861	0.866	0.866	0.866	0.866
2020	0.099	0.752	0.915	0.921	0.921	0.921	0.921
2021	0.112	0.849	1.033	1.039	1.04	1.04	1.04
2022	0.062	0.472	0.575	0.578	0.578	0.578	0.578
2023	0.072	0.547	0.665	0.669	0.669	0.669	0.669

Table 38.9 Whiting 7.a Stock Numbers-at-age (start of year) ('1000)

	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6
1980	637486	390074	124892	21042	7460	1024	1827
1981	322139	211327	146638	39932	6995	2595	1027
1982	284158	106222	76652	43017	12004	2196	1178
1983	882907	93380	37658	21283	12126	3531	1027

1984	633181	289990	32991	10369	5942	3532	1374
1985	514434	206401	97383	8039	2510	1496	1279
1986	872689	166111	65041	20360	1627	527	603
1987	473888	285062	56560	16386	5123	426	306
1988	485228	154424	95515	13708	3941	1282	190
1989	594097	159126	53994	25650	3717	1114	431
1990	513350	191939	50328	11388	5244	788	339
1991	659842	167110	63865	11995	2686	1286	286
1992	230657	214616	55290	15015	2784	648	393
1993	212467	72820	58137	8031	1986	379	147
1994	182634	68101	21837	10787	1414	362	99
1995	335907	58417	20138	3918	1825	247	83
1996	200522	103575	12376	3950	853	420	79
1997	169374	61273	20485	2233	791	180	109
1998	165785	52511	13531	4225	511	191	73
1999	206439	49478	8682	1963	679	87	46
2000	108697	63301	10048	1617	406	148	30
2001	190471	32302	10131	1401	250	66	30
2002	78863	58074	6283	1791	275	52	21
2003	120098	23080	8274	760	240	39	11
2004	93243	37913	5847	2017	206	69	15
2005	105583	25685	3409	404	154	17	7
2006	153232	33917	7429	976	129	52	8
2007	103271	43297	3700	650	94	13	6
2008	148028	30346	6362	465	90	14	3
2009	91929	44709	5494	1031	84	17	3
2010	91809	27338	7193	771	160	14	3
2011	150168	27155	4222	960	114	25	3
2012	78430	45969	5445	774	196	24	6
2013	160354	23220	7152	733	116	31	5
2014	194948	50334	5633	1654	189	31	10
2015	122009	55178	5563	501	162	20	4
2016	80653	36803	9893	891	89	30	5
2017	101800	25624	9788	2559	256	27	11
2018	106002	32789	7563	2874	836	88	14
2019	210159	34139	9670	2218	938	288	36
2020	111559	65155	7538	1994	508	227	81
2021	179062	34383	13755	1472	432	116	73
2022	75242	54487	6588	2387	283	88	40
2023	154568	24060	15221	1809	729	91	43
2024	118237	48944	6239	3817	504	215	41

Table 38.10 Whiting 7.a Stock Summary: weights in tonnes: CatchPred is predicted catch from ASAP. Recruitment at age zero ('1000), Fbar ages (1-3)

Year	Lan	Dis	Cat	CatPred	Tsb	Ssb	SsbCv	Recr	RecrCv	Fbar	FbarCv
1980	13422	3314	16737	16691.79	61768.39	33175.95	0.330179	637485.5	0.327	0.364	0.322
1981	18267	3064	21331	21136.3	60294.28	43705.13	0.24766	322138.7	0.425	0.438	0.295
1982	17167	801	17969	17941.1	44032.68	35110.06	0.270045	284157.8	0.446	0.485	0.332
1983	10577	1829	12405	12357.87	30269.13	22331.86	0.348404	882907	0.254	0.492	0.389
1984	11619	3380	14999	14735.62	38113.6	15204.35	0.415453	633181.2	0.314	0.598	0.355
1985	15525	2644	18169	17958.34	37310.16	22923.99	0.296506	514434.1	0.345	0.730	0.326
1986	10063	2066	12129	12074	29026.23	18345.3	0.324574	872689.3	0.263	0.569	0.351
1987	10411	3859	14270	14063.02	33379.84	16333.12	0.339715	473887.5	0.347	0.602	0.324
1988	10245	1611	11856	11792.61	30146.68	20618.71	0.280498	485228.4	0.323	0.514	0.327
1989	11305	2103	13408	13391.26	26749.02	17090.05	0.307817	594096.8	0.267	0.722	0.322
1990	8212	2444	10656	10631.62	24366.94	12697.06	0.328525	513349.8	0.251	0.617	0.305
1991	7348	2598	9946	9909.51	22738.07	13630.58	0.261816	659842.2	0.168	0.628	0.253
1992	8588	4203	12791	12551.13	21880.35	11578.77	0.209772	230657.4	0.152	1.043	0.183
1993	6523	2707	9230	6729.115	12641.22	9269.658	0.150534	212467.4	0.130	0.832	0.166
1994	6763	1173	7936	4969.317	8488.129	5341.868	0.157316	182633.8	0.136	0.861	0.172
1995	4893	2151	7044	4502.295	6626.329	3863.215	0.159541	335907	0.117	0.859	0.167
1996	4335	3631	7966	4349.858	7009.449	2659.291	0.182842	200521.9	0.128	0.938	0.146
1997	2277	1928	4205	2979.086	5162.7	2913.997	0.148295	169373.8	0.138	0.811	0.163
1998	2229	1304	3533	2871.645	4102.392	2411.538	0.156979	165785.3	0.129	1.143	0.163
1999	1670	1092	2762	2233.155	2972.687	1424.019	0.194092	206439.1	0.127	0.907	0.174
2000	762	2118	2880	2343.066	3373.971	1398.992	0.187142	108697	0.138	1.180	0.150
2001	733	1012	1745	1609.898	2179.792	1233.352	0.170227	190471.3	0.130	0.957	0.180
2002	747	740	1487	1878.563	2782.741	1098.606	0.192435	78863.01	0.135	1.314	0.154
2003	517	480	996	1275.683	1751.916	1103.374	0.168284	120098.2	0.148	0.654	0.234
2004	133	905	1038	2051.076	2265.227	1173.334	0.194795	93242.83	0.124	1.841	0.160
2005	125	272	397	508.1619	1297.931	468.3194	0.253417	105582.8	0.138	0.502	0.274
2006	64	1773	1837	2552.025	2094.634	971.9815	0.213584	153232.2	0.125	1.620	0.177
2007	35	1512	1547	1509.598	2035.136	511.097	0.269342	103270.7	0.130	1.278	0.165
2008	37	1169	1206	1278.324	1601.86	658.1004	0.204619	148028.1	0.124	1.039	0.188
2009	39	1321	1360	1487.126	2146.968	667.09	0.211501	91929.13	0.133	1.174	0.170
2010	30	1154	1184	1438.508	1641.66	750.4518	0.189552	91809.04	0.127	1.221	0.183
2011	31	946	977	975.0654	1396.786	546.8325	0.227126	150168.3	0.125	0.922	0.193
2012	60	1339	1399	1423.411	2089.969	618.9473	0.21005	78429.97	0.134	1.213	0.166
2013	33	948	981	1033.199	1535.16	759.6008	0.194576	160353.5	0.139	0.703	0.218
2014	23	1951	1974	2611.059	2713.985	856.6748	0.209566	194948.4	0.117	1.605	0.171
2015	28	1521	1549	1732.558	2473.345	602.8174	0.249661	122009.2	0.115	1.050	0.173
2016	15	765	780	818.6892	2001.198	867.6521	0.176926	80653.22	0.126	0.598	0.198
2017	36	668	704	696.3796	1840.009	1055.904	0.159598	101799.9	0.122	0.478	0.210
2018	46	853	899	876.3238	2102.592	1115.636	0.164319	106001.8	0.138	0.479	0.207
2019	172	1089	1261	1435.107	2214.659	1224.63	0.162514	210158.7	0.136	0.811	0.222
2020	88	1030	1118	1298.827	2730.134	938.3667	0.219424	111559	0.140	0.863	0.231
2021	91	1571	1662	1758.299	2221.475	1203.75	0.181715	179062.3	0.121	0.974	0.189
2022	57	986	1043	1079.861	2566.834	806.8964	0.209506	75241.73	0.181	0.542	0.232
2023	30	952	982	979.6904	2187.185	1410.042	0.192335	154568.1	0.235605	0.627	0.282761
2024*	NA	NA	NA	NA	NA	1072.522	NA	118237	NA	0.7142	NA

Table 38.11 Whiting 7.a . Input values for short-term forecast. Note that Sel and CWt refer to the landings and DSel and DCWt refer to the discards. Numbers in thousands; Weights in kg.

2024										
Age	N	M	Mat	PF	PM	SWt	Sel	CWt	DSel	DCWt
0	118237	1.078	0	0	0	0	0	0	0.082	0.025
1	48944	0.803	0	0	0	0.031	0.062	0.241	0.561	0.043
2	6239	0.718	1	0	0	0.062	0.302	0.289	0.455	0.085
3	3817	0.608	1	0	0	0.125	0.534	0.34	0.229	0.125
4	504	0.554	1	0	0	0.23	0.679	0.399	0.083	0.189
5	215	0.518	1	0	0	0.352	0.739	0.484	0.023	0.179
6	41	0.518	1	0	0	0.412	0.754	0.403	0.008	0

2025										
Age	N	M	Mat	PF	PM	SWt	Sel	CWt	DSel	DCWt
0	118237	1.078	0	0	0	0	0	0	0.082	0.025
1	37067	0.803	0	0	0	0.031	0.062	0.241	0.561	0.043
2	11762	0.718	1	0	0	0.062	0.302	0.289	0.455	0.085
3	1426	0.608	1	0	0	0.125	0.534	0.34	0.229	0.125
4	970	0.554	1	0	0	0.23	0.679	0.399	0.083	0.189
5	135	0.518	1	0	0	0.352	0.739	0.484	0.023	0.179
6	71	0.518	1	0	0	0.412	0.754	0.403	0.008	0

2026										
Age	N	M	Mat	PF	PM	SWt	Sel	CWt	DSel	DCWt
0	118237	1.078	0	0	0	0	0	0	0.082	0.025
1	37067	0.803	0	0	0	0.031	0.062	0.241	0.561	0.043
2	8908	0.718	1	0	0	0.062	0.302	0.289	0.455	0.085
3	2689	0.608	1	0	0	0.125	0.534	0.34	0.229	0.125
4	362	0.554	1	0	0	0.23	0.679	0.399	0.083	0.189
5	260	0.518	1	0	0	0.352	0.739	0.484	0.023	0.179
6	57	0.518	1	0	0	0.412	0.754	0.403	0.008	0

Table 38.12 Whiting 7.a .Single-option output of the short-term forecast (F = mean F 2021–2023). Numbers in thousands, weights in tonnes.

2024

Age	F (lan)	CatchNos	Yield	DF	DCatchNos	DYield	StockNos	Biomass	SSNos	SSB
0	0	0	0	0.082	5735	141	118237	0	0	0
1	0.062	4	1	0.561	16237	693	48944	1537	0	0
2	0.302	15	4	0.455	2456	210	6239	389	6239	389
3	0.534	297	101	0.229	1286	161	3817	476	3817	476
4	0.679	122	49	0.083	92	17	504	116	504	116
5	0.739	76	37	0.023	17	3	215	76	215	76
6	0.754	18	7	0.008	0	0	41	17	41	17
Total	0.299	532	199	0.415	25823	1225	177997	2611	10816	1074

2025

Age	F (lan)	CatchNos	Yield	DF	DCatchNos	DYield	StockNos	Biomass	SSNos	SSB
0	0	0	0	0.082	5735	141	118237	0	0	0
1	0.062	3	1	0.561	12297	525	37067	1164	0	0
2	0.302	28	8	0.455	4630	395	11762	733	11762	733
3	0.534	111	38	0.229	481	60	1426	178	1426	178
4	0.679	234	94	0.083	177	33	970	223	970	223
5	0.739	48	23	0.023	10	2	135	48	135	48
6	0.754	31	12	0.008	0	0	71	29	71	29
Total	0.299	455	176	0.415	23330	1156	169668	2375	14364	1211

2026

Age	F (lan)	CatchNos	Yield	DF	DCatchNos	DYield	StockNos	Biomass	SSNos	SSB
0	0	0	0	0.082	5735	141	118237	0	0	0
1	0.062	3	1	0.561	12297	525	37067	1164	0	0
2	0.302	21	6	0.455	3507	299	8908	555	8908	555
3	0.534	209	71	0.229	906	113	2689	335	2689	335
4	0.679	88	35	0.083	66	12	362	83	362	83
5	0.739	92	44	0.023	20	4	260	92	260	92
6	0.754	25	10	0.008	0	0	57	24	57	24
Total	0.299	438	167	0.415	22531	1094	167580	2253	12276	1089

Table 38.13 Whiting 7.a. Management options table. Weights in tonnes.

Fmult	Catch25	Land25	Dis25	FCatch25	FLand25	FDis25	SSB26	dSSB	dTac
0	0	0	0	0	0	0	2175	79.75%	-100%
0.1	169	23	145	0.071	0.0049	0.066	2029	67.69%	-76.98%
0.2	328	45	283	0.143	0.0099	0.133	1893	56.45%	-55.20%
0.3	479	66	413	0.21	0.0148	0.199	1766	45.95%	-34.67%
0.4	622	85	537	0.29	0.0197	0.27	1648	36.20%	-15.26%
0.5	756	103	654	0.36	0.025	0.33	1538	27.11%	3.19%
0.6	884	119	765	0.43	0.03	0.4	1435	18.60%	20.53%
0.7	1005	135	871	0.5	0.034	0.47	1339	10.66%	37.03%
0.8	1120	149	971	0.57	0.039	0.53	1250	3.31%	52.71%
0.9	1229	163	1066	0.64	0.044	0.6	1166	-3.64%	67.55%
1	1332	176	1157	0.71	0.049	0.66	1088	-10.08%	81.69%
1.1	1430	188	1243	0.79	0.054	0.73	1016	-16.03%	95.15%
1.2	1524	199	1325	0.86	0.059	0.8	948	-21.65%	107.91%
1.3	1612	209	1403	0.93	0.064	0.86	885	-26.86%	119.97%
1.4	1697	219	1478	1	0.069	0.93	826	-31.74%	131.48%
1.5	1777	228	1549	1.07	0.074	1	771	-36.28%	142.44%
1.6	1854	237	1617	1.14	0.079	1.06	720	-40.50%	152.98%
1.7	1927	245	1682	1.21	0.084	1.13	672	-44.46%	162.97%
1.8	1996	252	1744	1.29	0.089	1.2	628	-48.10%	172.54%
1.9	2063	260	1803	1.36	0.094	1.26	586	-51.57%	181.55%
2	2126	266	1860	1.43	0.099	1.33	547	-54.79%	190.29%
2.1	2187	272	1915	1.5	0.103	1.4	511	-57.77%	198.61%
2.2	2245	278	1967	1.57	0.108	1.46	477	-60.58%	206.52%
2.3	2301	284	2017	1.64	0.113	1.53	446	-63.14%	214.15%
2.4	2354	289	2065	1.71	0.118	1.6	416	-65.62%	221.50%
2.5	2406	294	2111	1.79	0.123	1.66	389	-67.85%	228.57%

Table 38.14 Whiting 7.a. Management options Advice table. Weights in tonnes.

Basis	Total catch (2025)	Projected landings (2025)	Projected discards (2025)	F total (2025)	F _{projected} landings (2025)	F _{projected} discards (2025)	SSB (2026)	% SSB change*	% advice change^^
MSY approach: F = 0	0	0	0	0	0	0	2175	80	-
Other scenarios									
F _{MSY} = F _{pa}	489	67	422	0.22	0.0151	0.2	1758	45	-
F = 0	0	0	0	0	0	0	2175	80	-
F _{MSY} lower	361	50	311	0.158	0.0109	0.147	1865	54	-
F _{MSY} upper	489	67	422	0.22	0.0151	0.2	1758	45	-
F _{MSY} × SSB ₂₀₂₅ /MSY B _{trigger}	39	5	34	0.0163	0.00112	0.0151	2140	77	-
F _{MSY} lower × SSB ₂₀₂₅ /MSY B _{trigger}	28	4	24	0.0117	0.00081	0.0109	2150	78	-
F _{MSY} upper × SSB ₂₀₂₅ /MSY B _{trigger}	39	5	34	0.0163	0.00112	0.0151	2140	77	-
F _{lim}	780	106	674	0.37	0.026	0.34	1518	25	-
SSB ₂₀₂₆ = B _{lim} [^]									
SSB ₂₀₂₆ = B _{pa} = MSY B _{trigger} [^]									
SSB ₂₀₂₆ = SSB ₂₀₂₅	1172	156	1016	0.6	0.042	0.56	1210	0	-
SSB ₂₀₂₆ = SSB ₂₀₂₅ × 1.2	863	116	746	0.42	0.029	0.39	1452	20	-
F = F ₂₀₂₄	1332	176	1157	0.71	0.049	0.66	1088	-10.1	-

* SSB 2026 relative to SSB 2025.

[^] The B_{lim}, B_{pa}, and MSY B_{trigger} options were left blank because B_{lim}, B_{pa}, and MSY B_{trigger} cannot be achieved in 2026, even with zero catch.

^{^^} This is not provided as catch advice for 2024 and 2025 was 0.

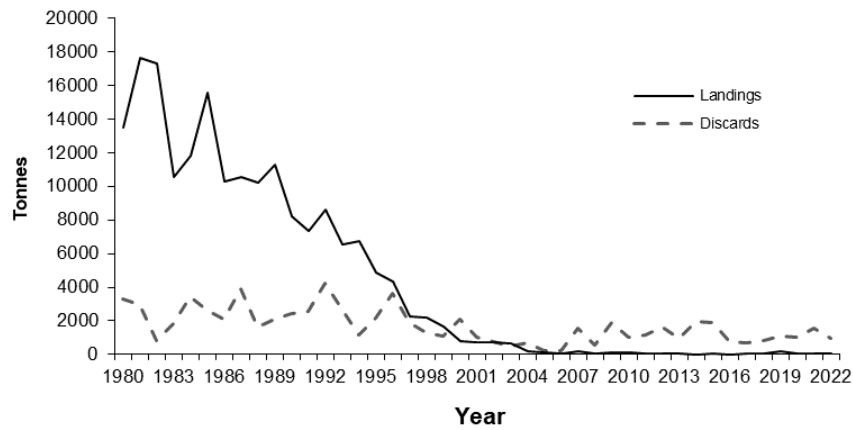


Figure 38.1 Whiting 7.a Working group estimates of International landings and discards

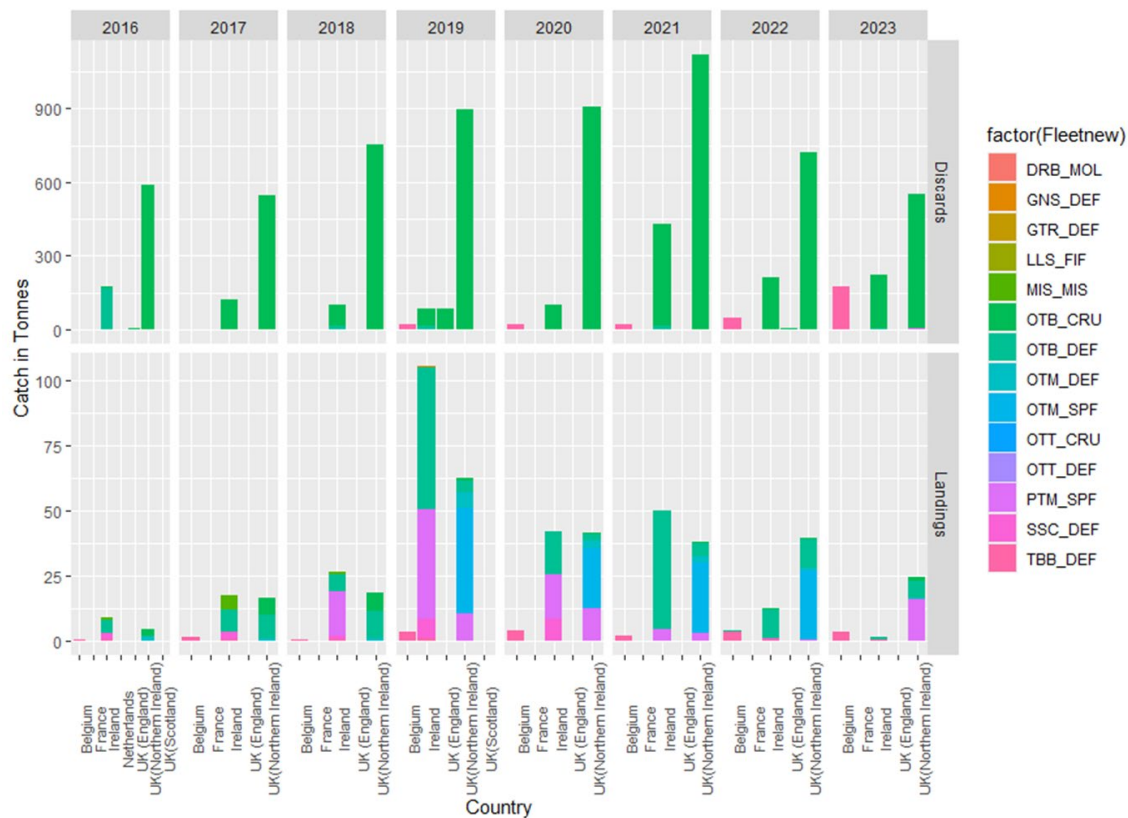


Figure 38.2 Whiting 7.a Landings and discards by fleet

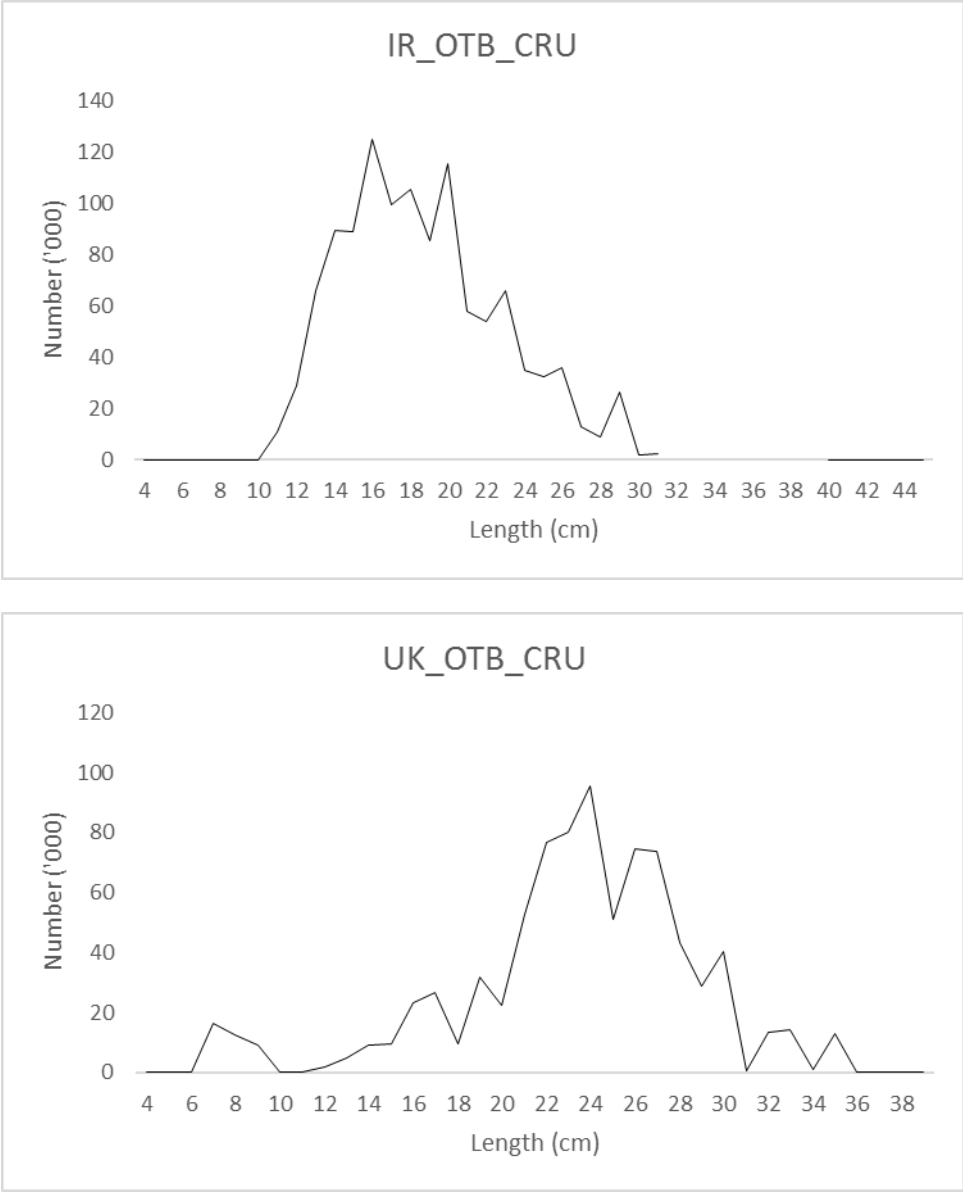


Figure 38.3 Whiting 7.a discard length–frequency by national fleets for the OTB_CRU metier. Note due to low levels of retained catch, and hence low sampling, these data are not presented. Not updated at WGCSE, 2024

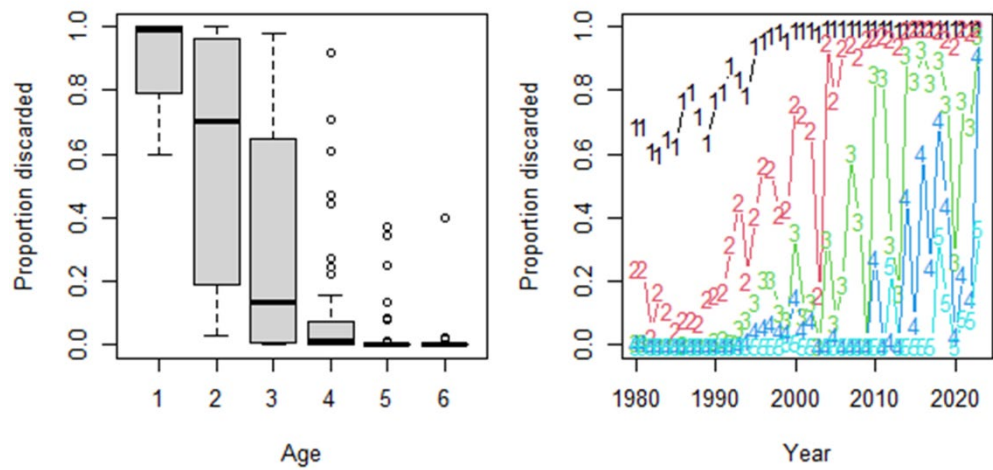


Figure 38.4 Whiting 7.a Proportion of discards by age (left) and year (right)

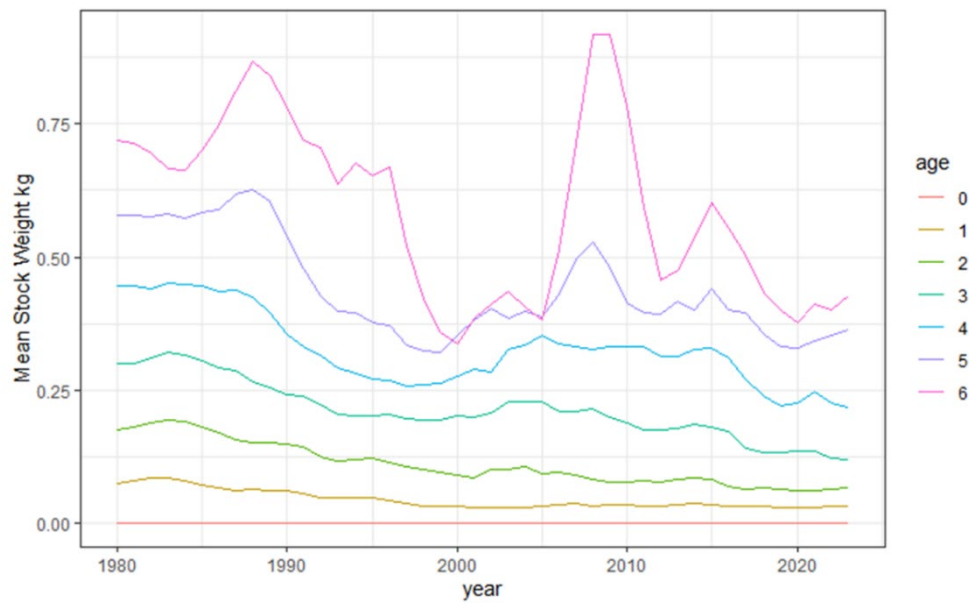


Figure 38.5 Whiting 7.a Smoothed Stock Weights (Three year running average)

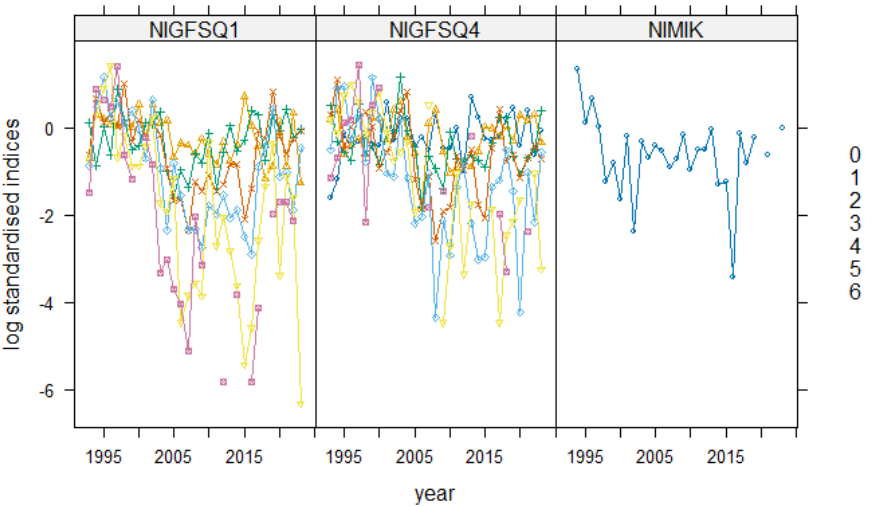


Figure 38.3 Whiting 7.a. Log Standardized indices of tuning fleets by cohort.

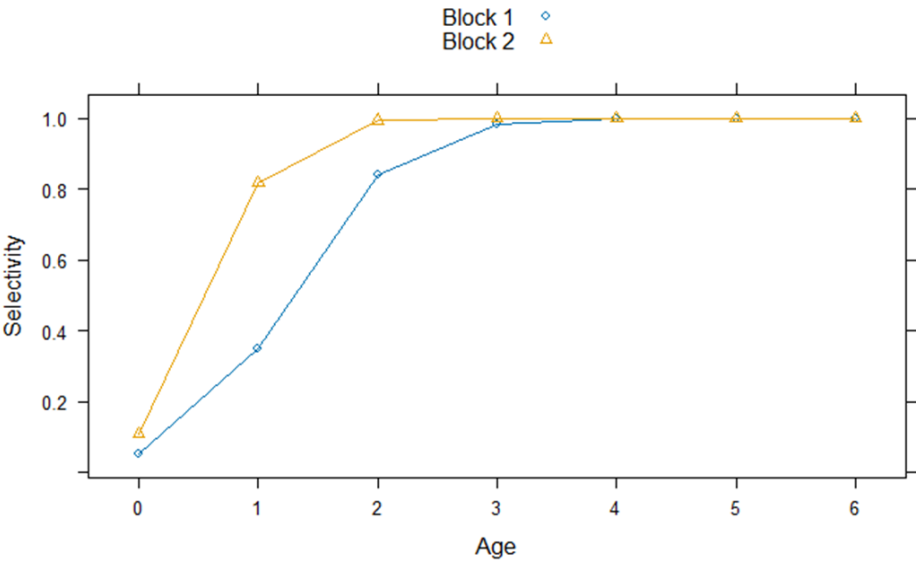


Figure 38.7 Whiting 7.a. Selectivity at age in the Catch.

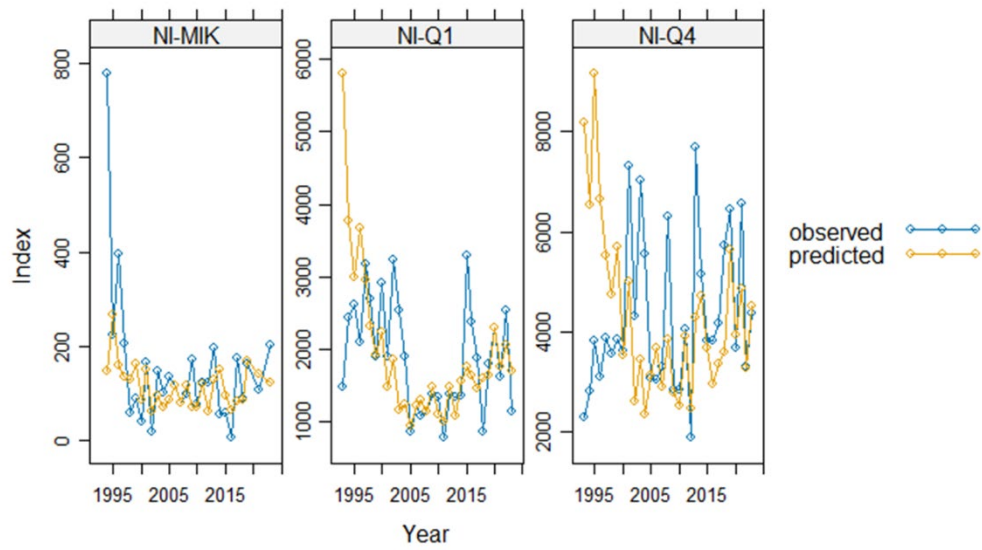


Figure 38.8 Whiting 7.a. Observed and Predicted index cpue

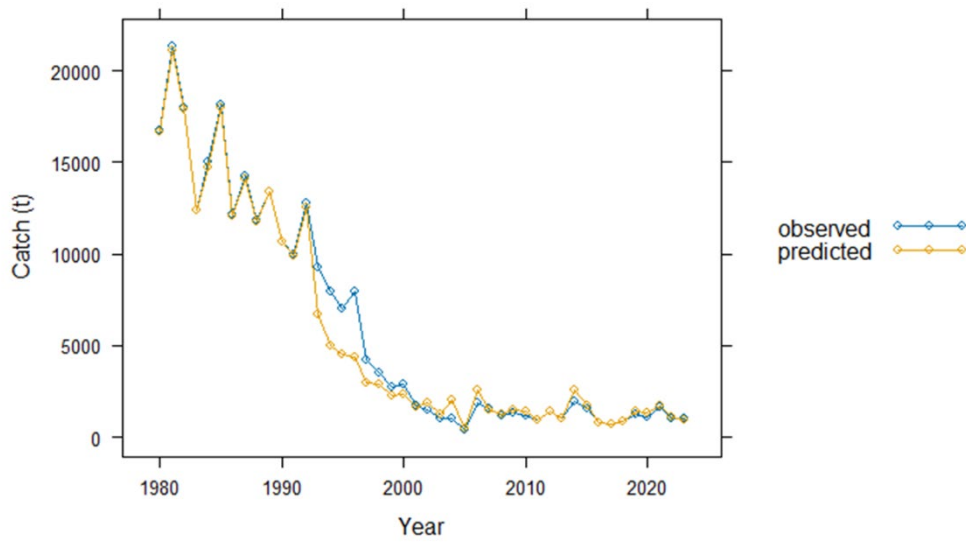


Figure 38.9 Whiting 7.a. Observed and Predicted catch

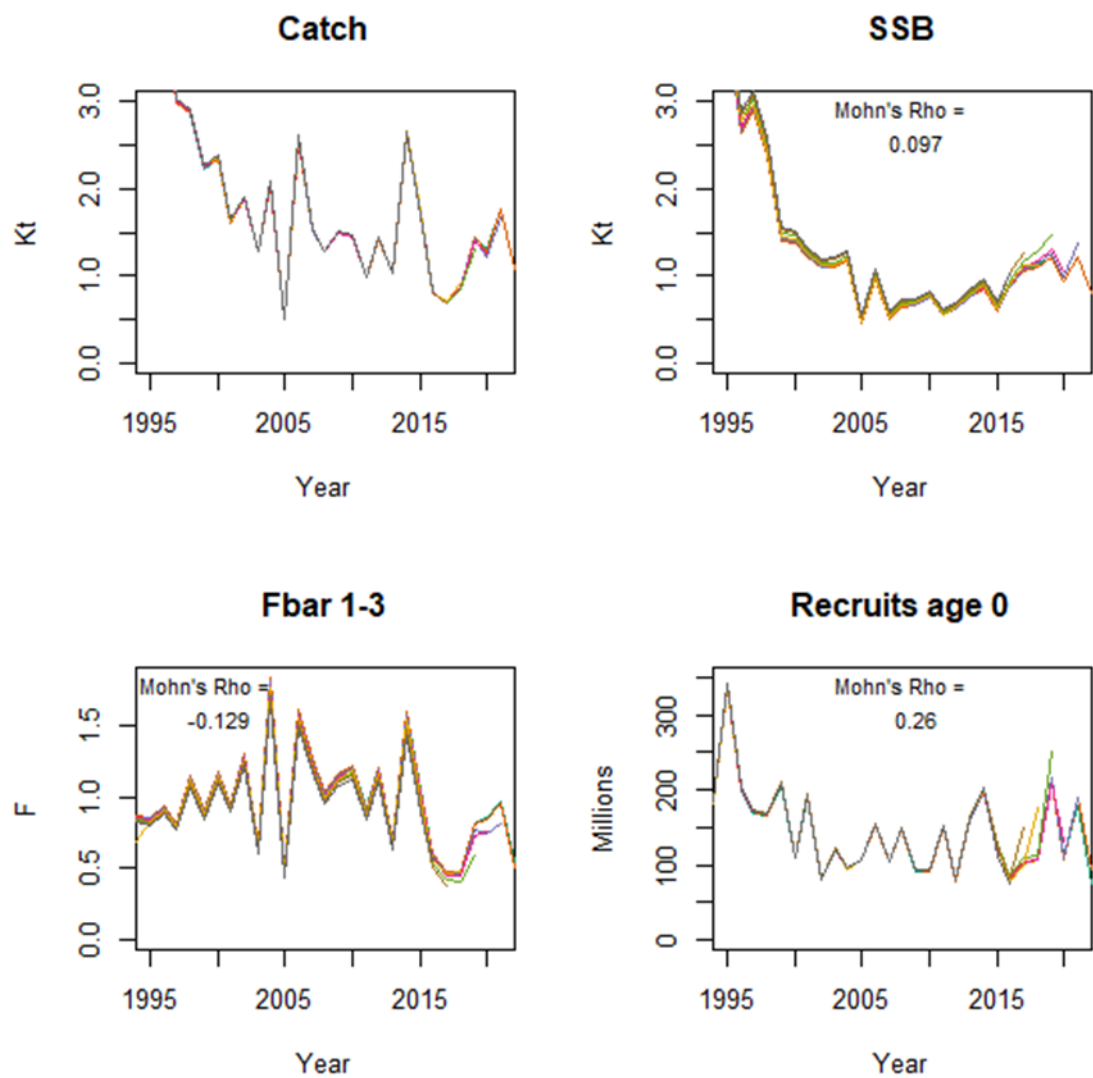


Figure 38.4 Whiting 7.a. Retrospective analysis of the final ASAP run with Mohn's Rho calculation. Image shows >5 peels but calculation is based on 5 peels only.

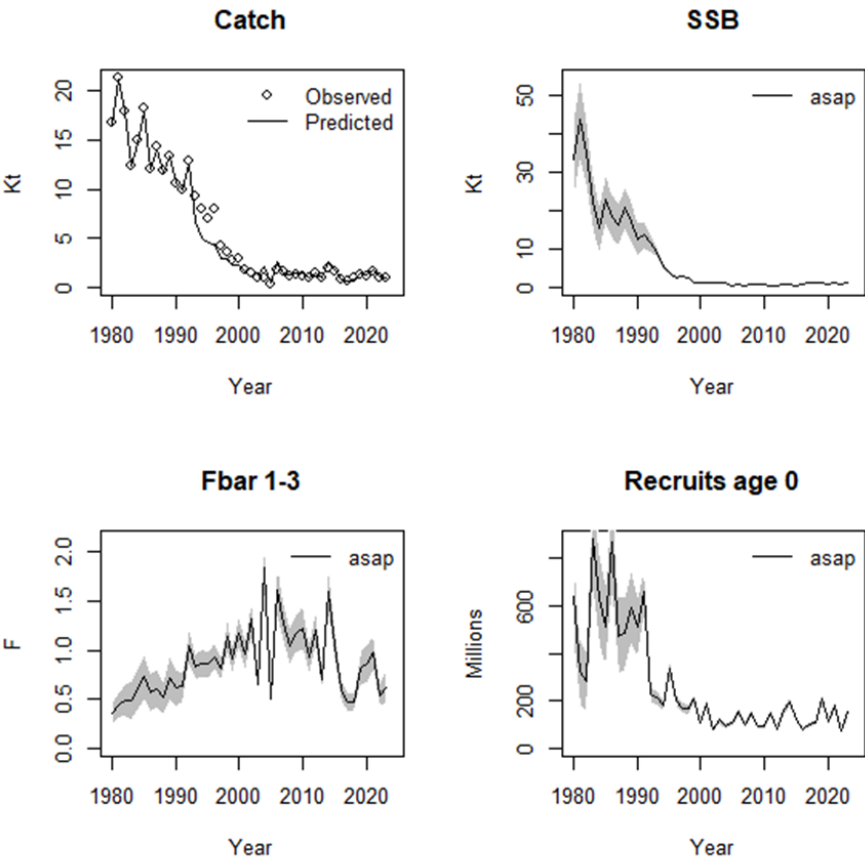


Figure 38.11 Whiting 7.a. Stock Summary Plot. The thick black line represents the ASAP assessment. Standard deviations from ASAP are shaded grey. The thick black line in the catch plot represents the predicted catch from ASAP.

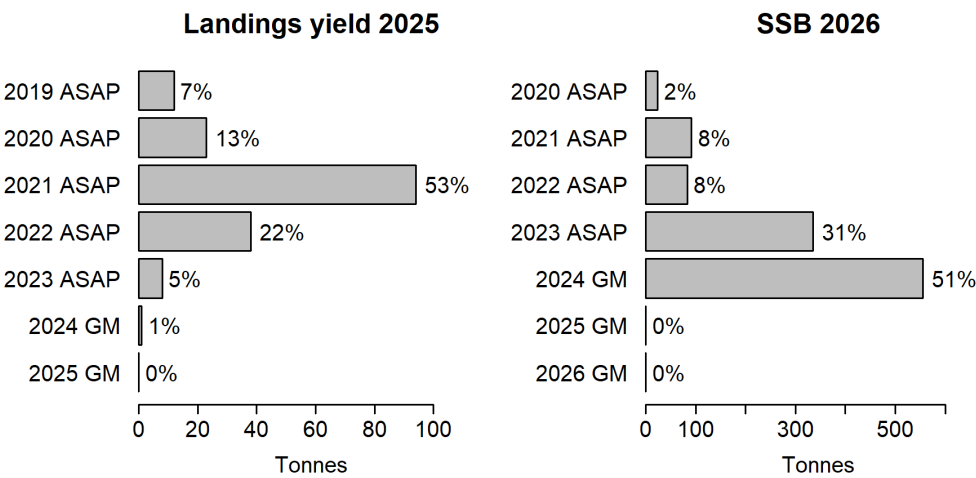


Figure 38.12 Whiting 7.a. Stock numbers of recruits and their source for recent year classes used in predictions, and the relative (%) contributions to landings and SSB (by weight) of these year classes.