

Advice from ICES on mackerel in the Northeast Atlantic for 2015



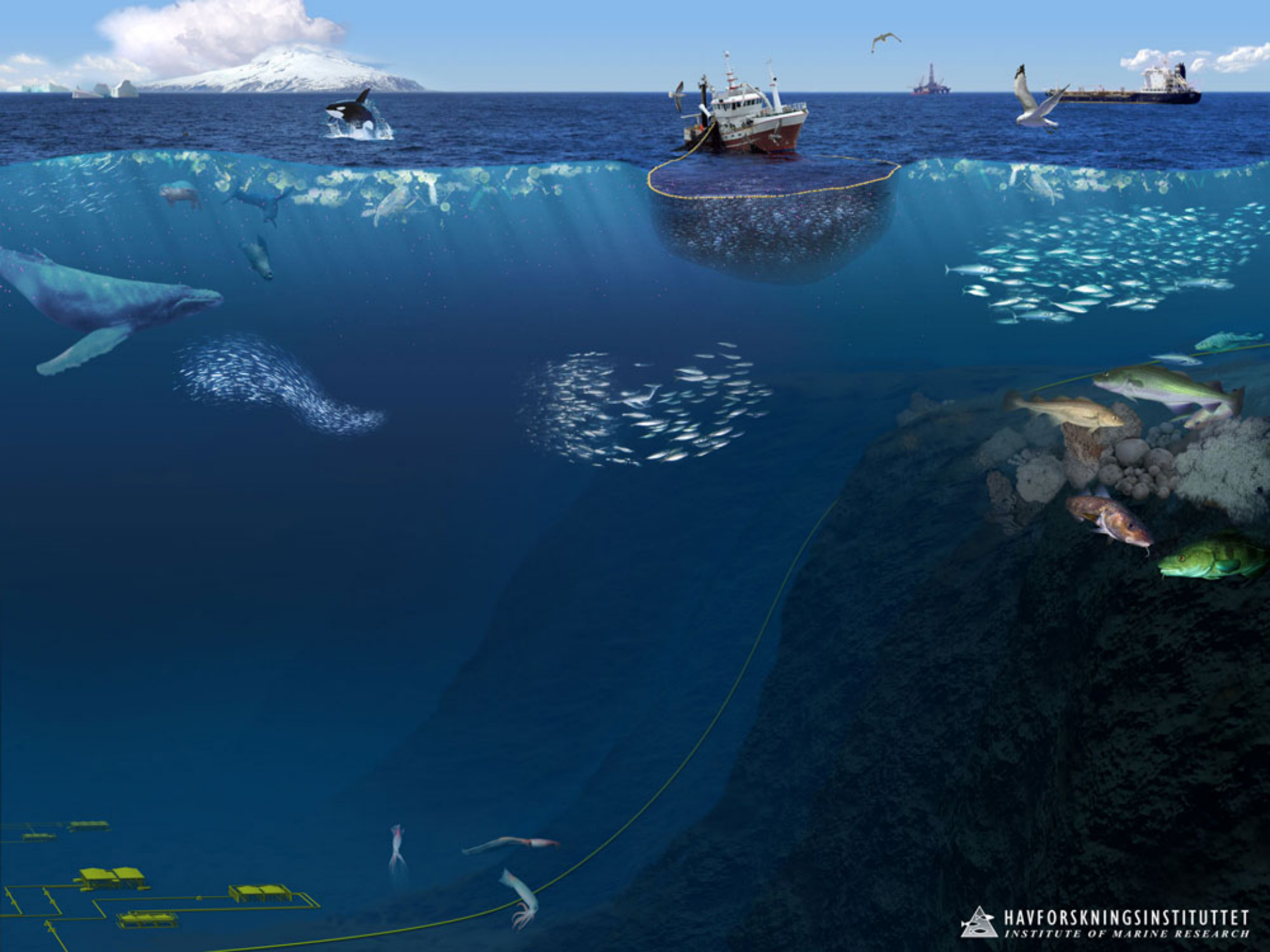
HAVFORSKNINGSINSTITUTTET
INSTITUTE OF MARINE RESEARCH



Presented by

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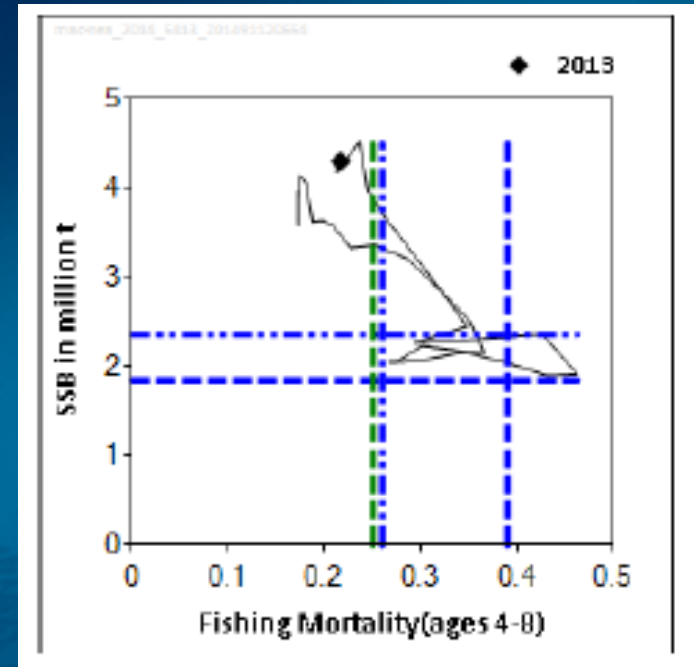
Advice for 2015

- ICES advises on the basis of the Norway, Faroe Islands, and EU management plan that catch in 2015 should be between 831 000 tonnes and 906 000 tonnes
- ICES advises that the existing measures to protect the North Sea spawning component should remain in place



Stock status

	Fishing pressure		
	2011	2012	2013
MSY (F_{MSY})	✓	✓	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	✓	✓	✓ Harvested sustainably
Management plan (F_{MGT})	✗	✓	✓ At target
Stock size			
	2012	2013	2014
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓ Full reproductive capacity
Management plan (SSB_{MGT})	✓	✓	✓ Above trigger

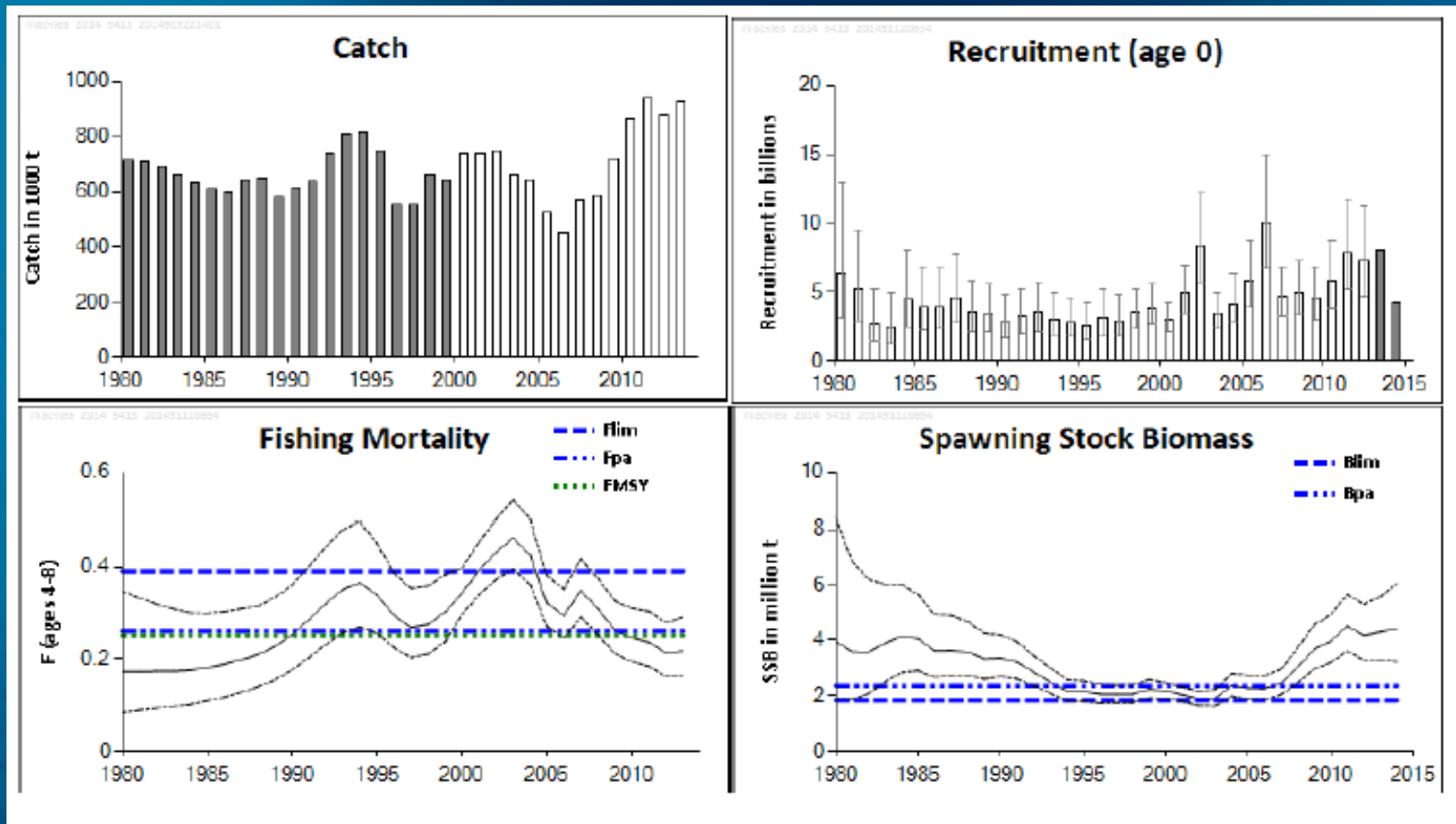


Fishing mortality in 2013 is estimated to be 0.22, below F_{MSY} and F_{PA} .
 Fishing mortality was above F_{lim} during the early 2000s

The mackerel stock is in a very good state!



Summary of stock assessment



The shaded catches prior to 2000 are the years that have been down-weighted in the assessment due to considerable underreporting that is suspected to have taken place. The shaded recruitment value for 2013 is from RCT3 and the shaded recruitment value for 2014 is the geometric mean of 1990-2012. Top right: SSB and F over the years. The black dotted lines represent the 95% confidence intervals.



Scientific basis

Stock data category	1 (ICES, 2014a).
Assessment type	1.0 age-based analytical model (SAM).
Input data	Catch data, tagging data (1980–2005 recapture year), and three survey indices: SSB index from triennial egg survey (1992_basis_ age-disaggregated abundance indices from IBTS survey (age 0, 1998–2013) and from the IESSNS survey (age 6+, 2007, 2010–2014). Landings prior to 2000 are considered to be underestimated.
Discards	Discards are known to take place, but are only quantified for part of the fisheries (0.5% in weight in 2013, the proportion of the landings covered cannot be calculated). Discards are considered negligible.
Indicators	None.
Other information	Spanish and French acoustic surveys and Radio Frequency Identification RFID tagging information. Benchmarked in 2014.
Working group	Working Group on Widely Distributed Stocks (WGWIDE).



Quality considerations

The assessment benchmarked in 2014 and the new assessment model was set up so that it takes into account the large uncertainty in historical catches prior to 2000. The assessment now uses an age-based state space assessment model (SAM), including new tuning series in addition to the egg survey index which provides an index of SSB.

Age disaggregated abundance indices are derived from the International Ecosystem Summer Survey in the Nordic Seas (IESSNS) (age 6+).

International Bottom Trawl Survey (IBTS) (age 0).

The model also incorporates tagging and recapture data for fish tagged at age 2. Tagging data are only used at present for the period 1980-2005.



ICES revisions on egg survey SSB time-series

SSB estimates derived from the mackerel egg surveys for the combined survey area. The green line represents the input data for the mackerel assessment until 2012. The red spot is the estimate given by WGMEGS for the updated advice. The blue line represents the agreed input data by WGWIDE 2014



Consequences of revised SSB fra egg survey

- Higher SSB estimates in 1992 and 1995, in the order of
- 1 million tonnes, because not all areas were included, and
- 600 000 tonnes lower SSB estimates in 2013 due to errors in calculations.
- Consequences:
 - Less variability in the SSB indices (flatter and less contrast),
 - Lower SSB in 2014 from the analytical assessment.



Historical assessment results

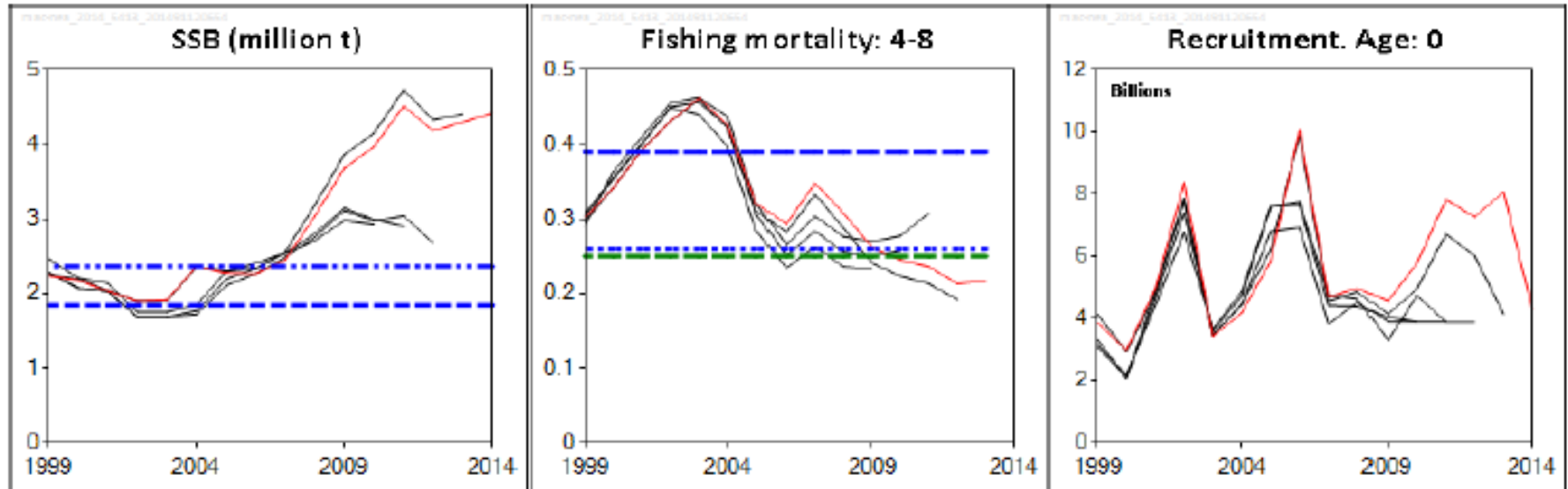


Figure 9.3.17b.2

Mackerel in the Northeast Atlantic. Historical assessment results. Terminal year recruitments are geometric mean recruitment. Horizontal lines represent reference points.

The 2013 assessment is from the SAM model during WKPELA. There was no assessment in 2013, so results and historical perceptions on SSB, F and recruitment have changed significantly. Horizontal lines represent reference points (Blim, Bpa) and (Fmsy, Fpa, Flim)



Reference points last changed in 2014

Reference points

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
Management plan	SSB_{trigger}	2.20 million t	Medium-term simulations conducted in 2008*.
	F_{target}	0.20–0.22	Medium-term simulations conducted in 2008*.
MSY approach	$MSY B_{\text{trigger}}$	2.36 million t	Proxy based on B_{pa} *.
	F_{MSY}	0.25	Stochastic simulation conducted at benchmark assessment in 2014.
Precautionary approach	B_{lim}	1.84 million t	B_{loss} in 2002 from 2014 benchmark assessment.
	B_{pa}	2.36 million t	$\exp(1.654 \times \sigma) \times B_{\text{lim}}$, $\sigma = 0.15$.
	F_{lim}	0.39	F_{loss} , the F that on average leads to B_{lim} .
	F_{pa}	0.26	F that on average leads to B_{pa} .

(Last changed in: 2014)

* Evaluation ongoing following the draft request submitted for evaluation by ICES.



Outlook for 2015

Basis: $F(2014) = 0.32$ (catch constraint); $SSB(2014)^1 = 4\,605$ kt ; $R(2013) = RCT3 = 8\,064\,141$ thousands; Catch (2014) = 1 396 kt (See *Additional considerations*). $R(2014-2016) = GM(1990-2012) = 4\,272\,254$ thousands.

Rationale	Catch (2015)	F (2015 & 2016)	Basis	SSB (2015) Spawning time	SSB (2016) Spawning time	SSB change ²	TAC change ^{3,4}
Management plan	906	0.22	F(management plan upper boundary) 0.22	4 372	4 304	-2%	-35%
	869	0.21	F(management plan mid-point) 0.21	4 379	4 339	-1%	-38%
	831	0.20	F(management plan lower boundary) 0.20	4 386	4 375	0%	-40%
MSY framework	1 017	0.25	F_{MSY}	4 351	4 197	-4%	-27%
Precautionary approach	1 054	0.26	F_{pa}	4 344	4 163	-4%	-25%
Zero catch	0	0	$F = 0$	4 528	5 193	15%	-100%
Other options	1 396	0.36	catch 2015 = catch 2014	4 276	3 840	-10%	0%

Weights in thousand tonnes.

- 1) SSB at spawning time (early April).
- 2) SSB 2016 relative to SSB 2015.
- 3) TAC in 2015 relative to estimated catches in 2014.
- 4) There is no internationally agreed TAC for 2014.



Estimation of 2014 catch

Estimation of 2014 catch	Tonnes	Reference
EU quota	611 205	Coastal state agreement, 12 March 2014
Spanish payback	-9 747	European Council Regulation 2011/165
EU quota deductions	-6 568	EC press release, 11 August 2014
Norwegian quota	279 115	Coastal state agreement, 12 March 2014
Russian quota	116 700	Estimate from Russian WGWIDE members
Discards	4 664	Previous years' estimate
Icelandic quota	147 721	Ministry of Industries and Innovation: Press release, 16 April 2014. No. 376/2014
Interannual quota transfer 2013 \Rightarrow 2014 (IS)	6 908	Fisheries Directory webpage
Faroese quota	156 240	Coastal state agreement, 12 March 2014
Greenland quota	90 000	Estimate from Greenland Institute of Natural Resources
Total expected catch (incl. discards)	1 396 238	



Management plan

Management plan

A management plan was agreed by Norway, Faroe Islands, and the EU in October 2008. ICES has evaluated the plan and concluded that it was precautionary (ICES, 2008, 2014d). The plan is currently not being implemented and the quotas being set do not correspond to the advised TAC. Advising according to the new assessment using the management plan is still considered precautionary, provided the year-on-year TAC constraint is not implemented in the first year of the readoption of the plan. Therefore, ICES has not included the percentage constraints stated in clause 4 of the management plan in calculating the TAC for 2015. The plan implies a catch between 831 000 and 906 000 tonnes in 2015. This corresponds to a catch decrease between 35% and 40% compared to the estimated catch in 2014.

Such a TAC would lead to an estimated SSB in 2016 between 4.3 and 4.4 million tonnes.

EU, Norway, and the Faroes have approached ICES with a draft request on a revised long-term management plan evaluation. ICES is currently carrying out analyses to answer this request draft.

MSY approach

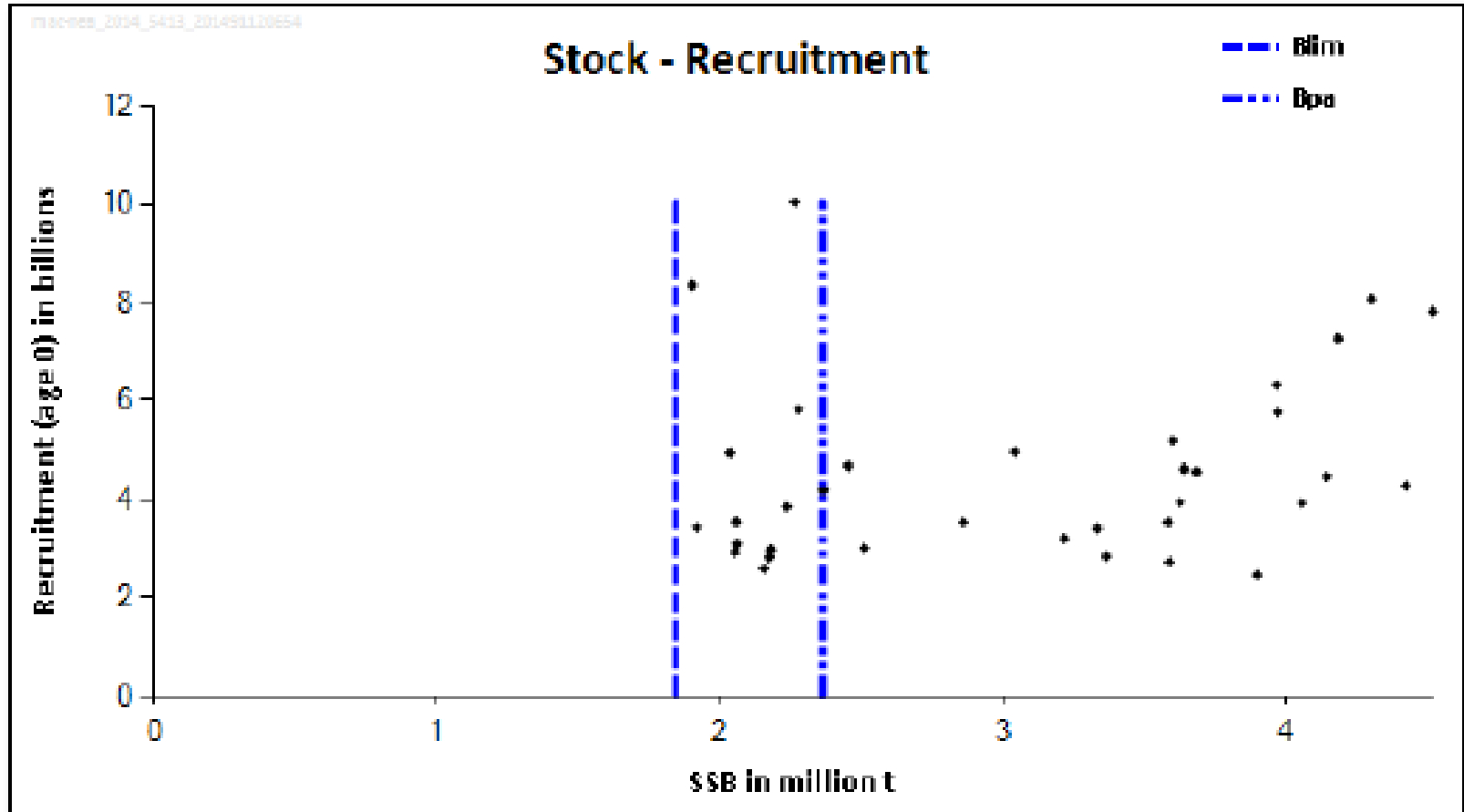
Following the ICES MSY framework implies that fishing mortality can be increased to 0.25 (F_{MSY}), resulting in a total catch of 1 017 000 tonnes in 2015. This would lead to an estimated SSB in 2016 of 4.2 million tonnes.

Precautionary approach

Following the precautionary approach (PA) implies that fishing mortality in 2015 should be no higher than F_{pa} ($F = 0.26$), corresponding to a total catch of 1 054 000 tonnes in 2015. SSB in 2015 would remain above B_{pa} .



Stock-recruitment relationship



Draft request on a revised long-term management plan evaluation

A management plan was agreed by Norway, Faroe Islands and the EU in October 2008. ICES has evaluated the plan and concluded that it was precautionary (ICES 2008, 2014b). However, since 2009, there has been no international agreement on TAC. Advicing according to the new assessment using the management plan is still considered precautionary, even though the plan may no longer result in a long-term maximization of the yield.

EU, Norway and the Faroes have approached ICES with a draft request on a revised long-term management plan evaluation. ICES is currently carrying out analyses to answer this request draft. This work should provide the appropriate combination of $B_{trigger}$ and fishing mortality range consistent with the precautionary approach and MSY objectives.



Management plan harvest control rules from 2008

9.3.17.1 Annex Management plan harvest control rule

ICES evaluated the following harvest control rule contained in the Norway, Faroe Islands, and EU management plan for mackerel in the Northeast Atlantic, agreed in October 2008:

1. *For the purpose of this long-term management plan, "SSB" means the estimate according to ICES of the spawning stock biomass at spawning time in the year in which the TAC applies, taking account of the expected catch.*
2. *When the SSB is above 2,200,000 tonnes, the TAC shall be fixed according to the expected landings, as advised by ICES, on fishing the stock consistent with a fishing mortality rate in the range of 0.20 to 0.22 for appropriate age groups as defined by ICES.*
3. *When the SSB is lower than 2,200,000 tonnes, the TAC shall be fixed according to the expected landings as advised by ICES, on fishing the stock at a fishing mortality rate determined by the following:*

*Fishing mortality $F = 0.22 * SSB / 2,200,000$*

4. *Notwithstanding paragraph 2, the TAC shall not be changed by more than 20% from one year to the next, including from 2009 to 2010.*
5. *In the event that the ICES estimate of SSB is less than 1,670,000 tonnes, the Parties shall decide on a TAC which is less than that arising from the application of paragraphs 2 to 4.*
6. *The Parties may decide on a TAC that is lower than that determined by paragraphs 2 to 4.*
7. *The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES.*

