



ICES Advice for 2016

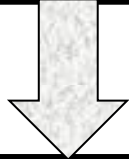
Carmen Fernández, ICES ACOM vice-chair

For NWWAC (Edinburgh, July 7, 2015)

Steps in Advisory Process

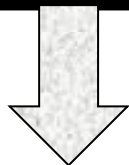
Expert Groups

Conduct assessments &
first draft of advice



Advice Drafting Groups

Finalise advice documents



ACOM

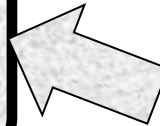
Approves and releases advice

Benchmark Workshops

In-depth revision of
assessment methods:
data, models...

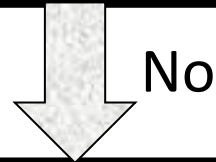
External Reviewers

Technical audits always
& extra reviewing
when needed



Basis for ICES Advice

Management Plan
Consistent with PA & agreed
as potential basis for advice by competent authorities



ICES MSY approach

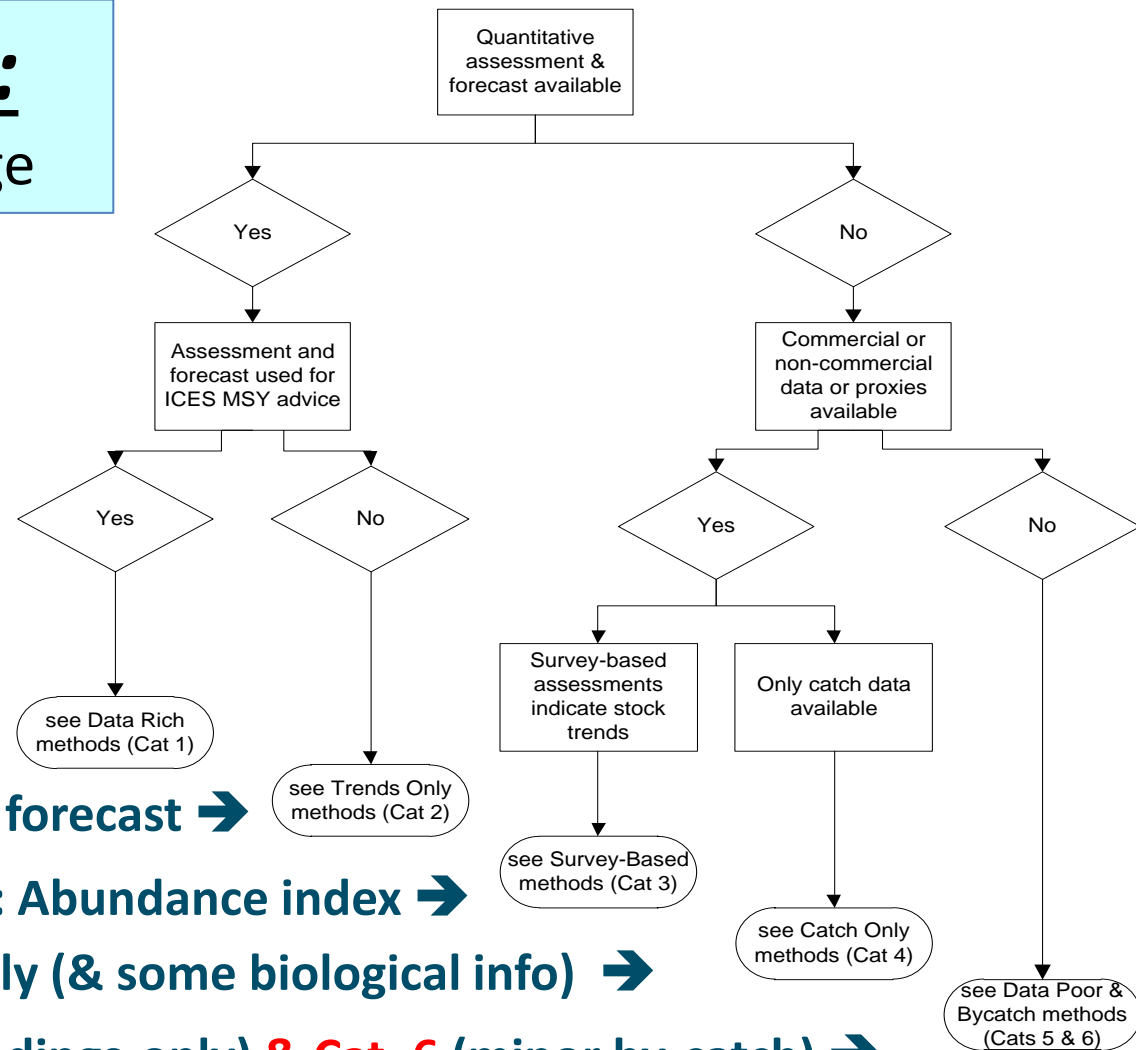


ICES PA approach

All options in Outlook Table

Stock Categories:

based on available knowledge



Cat. 1: Quantitative assessment & forecast →

Cat. 2: Qualitative assessment & forecast →

Cat. 3: Abundance index →

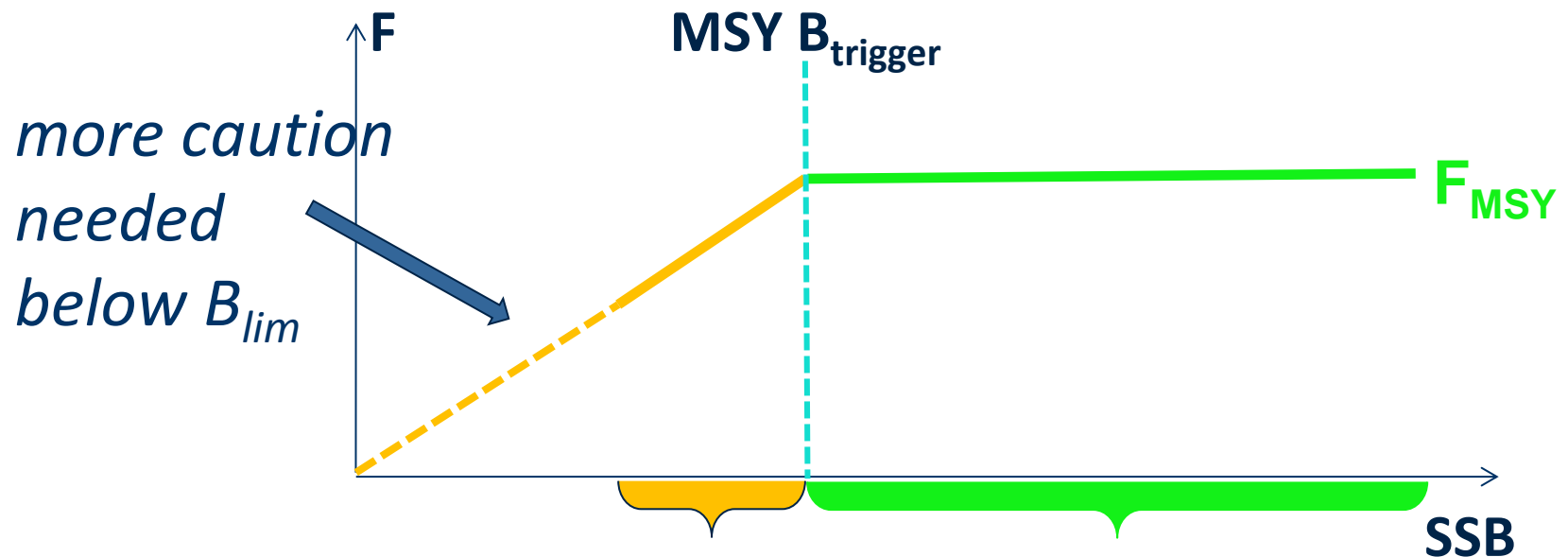
Cat. 4: Catch-only (& some biological info) →

Data poor: Cat. 5 (landings-only) & Cat. 6 (minor by-catch) →



ICES MSY approach (Category 1 stocks)

- ✓ Maximize long term average yield
- ✓ Safeguard against low SSB
- ✓ Stay within precautionary boundaries (WKMSYREF 2 & 3, 2014)



Stocks in Categories 2-6 -- Principles

- Available information should be used
- Advice should, to extent possible, follow same principles as for Category 1 stocks
- Precautionary approach: advice more cautious when knowledge about stock status decreases
- An MSY approach currently possible for Category 2 stocks; aim is to develop MSY also for Categories 3 and 4

Category 3 (stocks with abundance index)

Advice mostly based on previous advice [or recent catch or landings], modified according to index information (last 5-year index trend).

Advice: (previous advice) multiplied by index ratio:
(average index last 2 years)/(average index previous 3 years)

also incorporating:

1. **Uncertainty cap** (20% change limit, to dampen noise)
2. **Precautionary buffer** (20% reduction if status in relation to reference points unknown --- exceptions if significant increases in stock size or reductions in exploitation)

○ Advice does not change every year

Work in autumn 2015

WKLIFE 5 (October 5-9, Lisbon):

Identify and develop operational methods to provide plausible MSY reference point proxies for all ICES category 3 and 4 stocks (ToRs being finalised)

WKMSYPROXY (November 2-6??, Venue??):

technical work to respond to EC request on proxies for desirable / undesirable status for category 3 and 4 Western Waters stocks (ToRs being finalised)

WKMSYREF4 (October 13-16, Venue??):

F_{MSY} ranges (EC request) and precautionary reference points for category 1 and 2 Western Waters stocks (ToRs being finalised)

➔ To be followed by ADG (late November) and advice (December 18)

Catch advice

- **ICES advice:**
 - A. **if discards can be quantified** → ***catch advice***
implied landings if discard rates stay as in recent years
are also presented
 - B. **if discards unknown (possibly qualitative information)**
→ ***catch advice*** provided if information indicates
discard rate $< 5\%$ (discards negligible in the context of
precision of advice)

→ ***landings advice*** provided if information very
uncertain or discard rate considered to be $> 5\%$

Terminology: Wanted & Unwanted catch

For stocks under EU landing obligation in 2016:

To provide clear linkage to previous advice on catch and landings the advised catches are split into two components, termed wanted catch and the unwanted catch.

- **“Wanted catch”** is used to describe fish that would be landed in the absence of the EU landing obligation
- **“Unwanted catch”** refers to the component that was previously discarded.

This split, **based on the past performance of the fishery**, is expected to evolve and the relative magnitude of these components will change.

New structure of advice:

For each ecoregion:

- **Stock advice** (new format implemented this year)
- **Fisheries advice** (developed during 2015-2016)
- **Ecosystem advice** (to be developed 2016-2017)

5.3.14 Haddock (*Melanogrammus aeglefinus*) in Division VIb (Rockall)

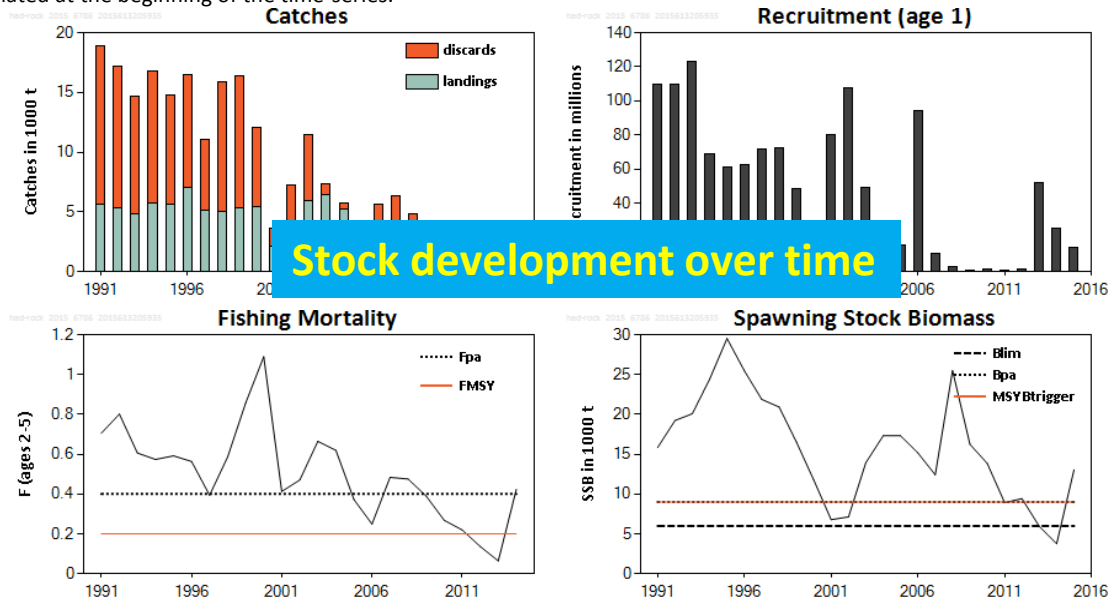
ICES stock advice

ICES advises that when the MSY approach is applied in 2016 should be no more than 3932 tonnes. If this stock is not under the EU landing obligation in 2016 and catches change from the average of the recent nine years (2006–2014), this implies landings of no more than 3225 tonnes.

Advice

Stock development over time

The spawning-stock biomass (SSB) has increased from the lowest observed in 2014 and is estimated to be above MSY $B_{trigger}$ in 2015. Fishing mortality (F) has declined over time but increased to above the F_{MSY} and F_{pa} in 2014. Recruitment during 2008–2012 is estimated to be extremely weak. Recruitment has improved since then but is still lower than the values estimated at the beginning of the time-series.



Stock development over time

Figure 5.3.14.1 Haddock in Division VIb. Summary of stock assessment (weights in thousand tonnes).

Stock and exploitation status

Table 5.3.14.1 Haddock in Division VIb. State of the stock and fishery, relative to reference points.

		Fishing pressure			Stock size			
		2012	2013	2014	2013	2014	2015	
Maximum Sustainable Yield	F_{MSY}	✓	✓	✗ Above	$B_{trigger}$	✗	✗	✓ Above trigger
Precautionary approach	F_{pa} F_{lim}	✓	✓	✗	✗	✗	✓	Full reproductive capacity
Management plan	F_{MGT}	-	-	Not applicable	-	-	-	Not applicable

Stock and exploitation status

Catch options

Table 5.3.14.2 Haddock in Division VIb. The basis for the catch options.

Variable	Value	Source	Notes
F ages 2–5 (2015)	0.21	ICES (2015a)	Total catch constraint
SSB (2016)	Catch options: assumptions intermediate year (2015)		
R _{age 1} (2015)			
R _{age 1} (2016)			
Catch (2015)			
Landings (2015)			
Discards (2015)	1064	ICES (2015a)	EU discards, based on mean discard rate-at-age for the period 2006–2014

Table 5.3.14.3 Haddock in Division VIb. The catch options. Weights in tonnes.

Rationale	Catch (2016)	Wanted catch* (2016)	Unwanted catch* (2016)	Basis	F total (2016)	F wanted catch* (2016)	F unwanted catch* (2016)	SSB (2017)	%SSB change**	%TAC change***
MSY approach	3932	3225	707	F _{MSY}	0.20	0.14	0.06	17871	+5%	+8%
Precautionary approach	7013	5740	1273	F _{pa} = 0.4	0.40	0.29	0.11	14294	-16%	+92%
Proposed management strategy	4007	Catch options for 2016				0.15	0.06	17779	+4%	+10%
Zero catch	0	0	0	F = 0	0.00	0.00	0.00	22496	+32%	-100%
Other options	3664	3006	658	-15% catch advice change^^	0.18	0.13	0.05	18181	+6%	+1%
	4310	3534	776	Stable catch advice^^	0.22	0.16	0.06	17426	+2%	+18%
	4312	3536	776	average F _{2010–2014}	0.22	0.16	0.06	17424	+2%	+18%
	4956	4063	893	+15% catch advice change^^	0.26	0.19	0.07	16673	-2%	+36%

* “Wanted catch” is used to describe fish that would be landed in the absence of the EU landing obligation. The “unwanted catch” refers to the component that was previously discarded (ICES, 2015b). The split into wanted and unwanted catch is based on the average ratio (at age) of discards to catches over the period 2006–2014.

** SSB 2017 relative to SSB 2016.

*** Wanted catch in 2016 relative to the EU TAC 2015 + Russian catches in 2015.

^ F_{HCR} derived from a two-step process: F = 0.2 followed by the TAC constraint, where the TAC₂₀₁₆ = TAC_{F=0.2} + 0.2 × (TAC₂₀₁₅ - TAC_{F=0.2}). To calculate the catch option of the proposed management strategy, ICES uses the advised catches for 2015 as the TAC₂₀₁₅; therefore, the formula for TAC₂₀₁₆ corresponds to catches of 3932 + 0.2 × (4310 - 3932) = 4007 t.

^^ Relative to the ICES catch advice for this stock given in 2014 for 2015.

Basis of the advice

Table 5.3.14.4 Haddock in Division VIb. The basis of the advice.

Advice basis	MSY approach
Management plan	There is no agreed management plan for haddock in this area. A management strategy is under consideration and is evaluated by ICES in 2013 (ICES, 2013). ICES concluded that a precautionary approach was required to ensure consistency with the precautionary approach under low recruitment conditions.

Quality of the assessment

The current assessment is consistent with last year's, but the final estimate of fishing mortality is very uncertain. The number of sampled discard trips in the last years has been very low. Haddock at age 3 years and older are rare in samples because the year classes were very weak. This also increases the uncertainty in F . Therefore, in the catch options five-year average values were used and a catch constraint applied in the intermediate year (2015). The catch constraint value is close to the ICES advice for 2015.

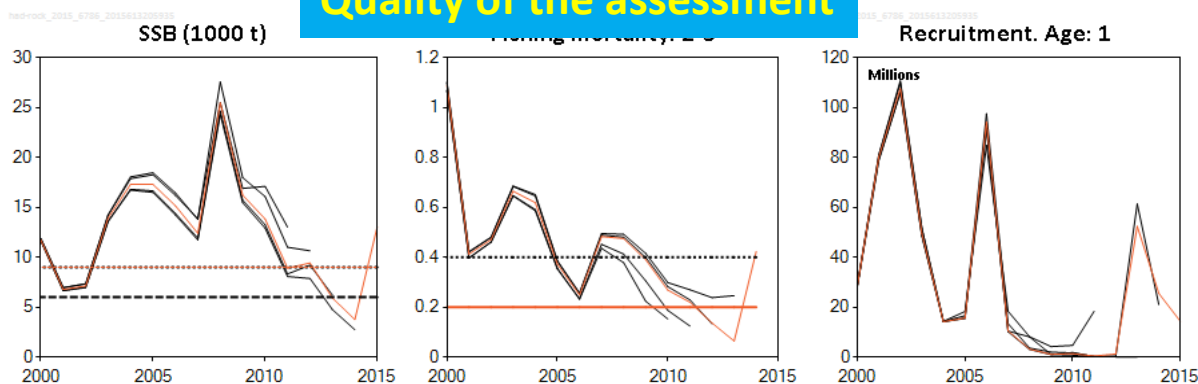


Figure 5.3.14.2 Haddock in Division VIb. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

A discards ban has been in place in

Issues relevant for the advice

Reference points

Table 5.3.14.5 Haddock in Division VIb. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	9000 t	B_{pa} .	ICES (2010)
	F_{MSY}	0.2	Based on stochastic simulations (ICES, 2013).	ICES (2014)
Precautionary approach	B_{lim}	60	$B_{lim} = B_{min}$ the lowest observed spawning stock estimated in	ICES (1998)
	B_{pa}	9000 t	to be the minimum SSB required to obtain a high probability of maintaining SSB above B_{lim} , taking into account the uncertainty of assessments.	ICES (1998)
	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.	ICES (1998)
Management plan	SSB_{MGT}	Not defined.		
	F_{MGT}	Not defined.		

Basis of the assessment

Table 5.3.14.6 Haddock in Division VIb. The basis of the assessment.

ICES stock data category	1 (ICES, 2015b).	
Assessment type	Analytical age-based assessment (XSA) that uses catches in the model and in the forecast.	
Input data	Com	uencies from catch and landing samplings);
Discards and bycatch	Disc	ge at age 3), fixed natural mortality (0.2).
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).	

Information from stakeholders

Since 2014, there has been a change in the sampling scheme in Subareas IV and VI. The sampling

History of advice, catch, and management

Table 5.3.14.7 Haddock in Division VIb. History of ICES advice, the agreed TAC, and ICES estimates of landings. Weights in thousand tonnes.

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	<i>Status quo</i> F; TAC	18.0			6.6	6.7	n/a
1990	Precautionary TAC	5.5			8.2	3.9	n/a
1991	Precautionary TAC				5.9	5.7	13.23
1992	Precautionary TAC				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*	11.02
1995	No long-term gain in increasing F	5.1**			5.5	5.6	9.17
1996	No long-term gains in increasing F	6.9**			6.8	7.1	9.36
1997	No advice given	4.9**			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***	5.3^	6.61
2001	Reduce F below F_{pa}	< 2.7	-		2.3***	2.0^	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 ^^			0.702^^^	6.3	6.4	0.88
2005	Lowest possible catch ^^			0.702^^^	5.2	5.2	0.51
2006	Lowest possible catch ^^			0.597^^^	2.8	2.8	0.39
2007	Reduce F below F_{pa} ^^	< 7.11	-	4.615^^^	3.3	3.3	2.24

All advice available online at:

<http://www.ices.dk>

Click on

Follow Advisory process → Latest advice

In addition to advice items, [principles and advice basis](#) in document “General context to ICES advice, 2014” (2015 version coming up soon)

For advice release dates, follow link:

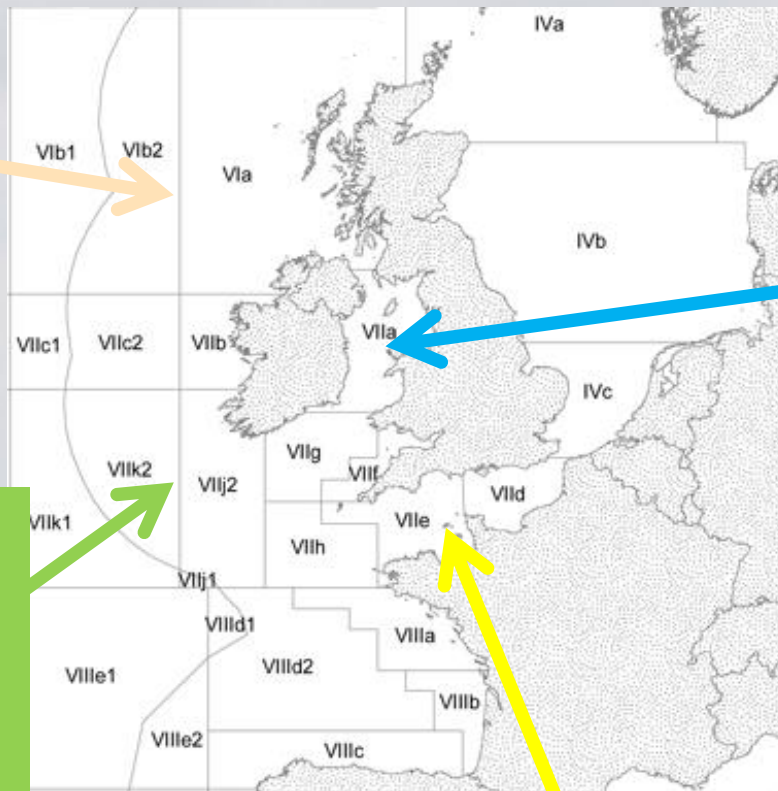
Follow Advisory process → Advice requests and advice release dates

Advice online

West of Scotland & Rockall (VIab)

- Cod (VIa; VIb)
- Haddock (VIa; VIb)
- Whiting (VIa; VIb)
- Anglerfish (IIIa,IV,VI)
- Megrim (IVa-VIa; VIb)
- *Nephrops* (FUs11-12-13)

ADVICE IN AUTUMN FOR: *Nephrops*, anglerfish IV and VI, megrim VIb, megrim VIIb-k and VIIIabd, VIIe plaice and sole



Irish Sea (VIIa)

- Cod
- Haddock
- Whiting
- Plaice
- Sole
- *Nephrops* (FUs 14-15-19)

Deep-sea species

Celtic Sea &

West, Southwest Ireland

- Cod (VIIe-k)
- Haddock (VIIb-k)
- Whiting (VIIe-k)
- Plaice (CS; VIIh-k; VIIbc)
- Sole (CS; VIIh-k; VIIbc)
- Northern hake
- Anglerfish (VIIb-k, VIIIabd)
- Megrim (VIIb-k, VIIIabd)
- Pollack
- Sea bass
- *Nephrops* (FUs 16-17-20-22)

Channel

- Cod (IV, VIId, Skagerrak)
- Plaice (VIId)
- Plaice (VIIe)
- Sole (VIId)
- Sole (VIIe)

West of Scotland & Rockall (VIa & VIb)

- Cod (VIa; VIb)
- Haddock (Northern Shelf; VIb)
- Whiting (VIa; VIb)
- Megrin (IVa-VIa)

IN AUTUMN:

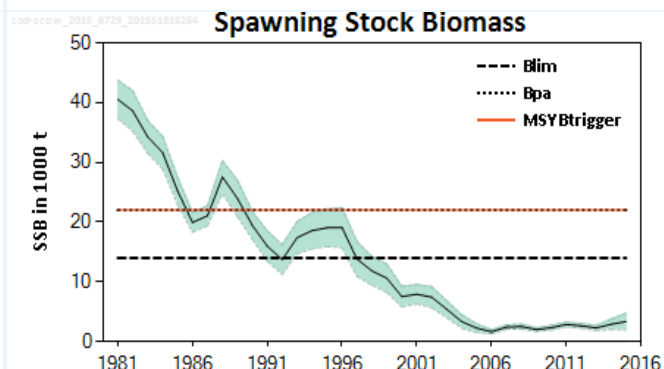
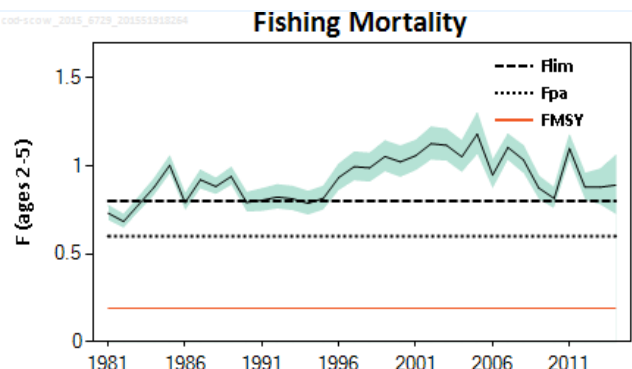
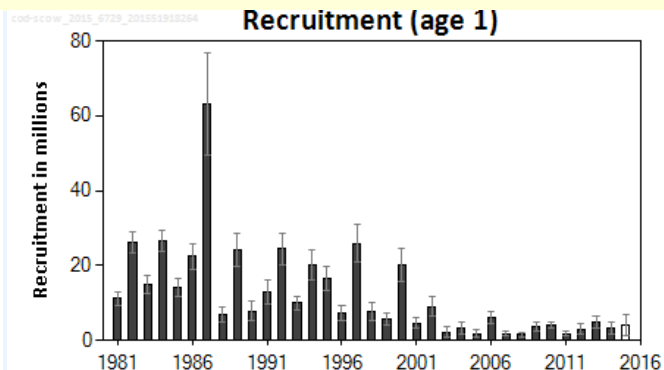
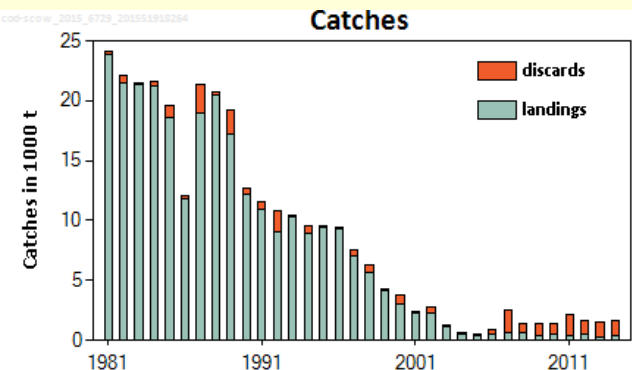
- Anglerfish (IIIa,IV,VI)
- Megrin (VIb)
- *Nephrops* (FUs11-12-13)



Cod in Division VIa (West of Scotland)

Advice for 2016 and 2017, MSY:

No directed fisheries and all catches should be minimised



* New Scottish IBTS Q1 survey series (since 2011) now in assessment

* F high, above F_{lim}

* Recruitment low since 2001, impaired

* SSB well below B_{lim}

* Very high discard rates in recent years

	Fishing pressure			Stock size				
	2012	2013	2014	2013	2014	2015		
Maximum Sustainable Yield	F_{MSY}	✗	✗	✗	Above			
Precautionary approach	F_{pa} , F_{lim}	✗	✗	✗	Harvest unsustainable			
Management Plan	F_{MGT}	✗	✗	✗	Above			
				MSY , $B_{trigger}$	✗	✗	✗	Below trigger
				B_{pa} , B_{lim}	✗	✗	✗	Reduced reproductive capacity
				SSB_{MGT}	✗	✗	✗	Below $SSB_{MP-lower}$

Cod in Division VIa (West of Scotland)

Catch 2014 ~ 1 670 t (discards ~ 80%)

$F(2015)=F(2012-2014)=0.88$; $SSB(2016)=3\ 500\ t < Blim\ (14\ 000\ t)$

$F_{MSY}=0.19$

Rationale	Catch 2016	Wanted catch 2016	Unwant catch2016	Basis	F Total 2016	F wanted catch2016	F unwanted catch2016	SSB 2017	%SSB change 2017 vs 2016
MSY approach	0	0	0	Zero catch	0	0	0	6.34	+82%
Manag. Plan*	1.79	0.43	1.36	$F_{2015} \times 0.75$	0.66	0.23	0.43	3.86	+11%
Other options	0.11	0.03	0.08	$F_{MSY} \times SSB_{2016} / MSY B_{trigger}$	0.03	0.01	0.02	6.19	+78%
	0.58	0.15	0.44	$F_{2015} \times 0.2$	0.18	0.06	0.11	5.53	+59%
	0.55	0.14	0.42	F_{MSY}	0.19	0.06	0.11	5.57	+60%
	1.08	0.26	0.81	$F_{2015} \times 0.4$	0.35	0.13	0.23	4.84	+39%
	1.51	0.36	1.14	$F_{2015} \times 0.6$	0.53	0.19	0.34	4.25	+22%
	1.88	0.44	1.43	$F_{2015} \times 0.8$	0.71	0.25	0.46	3.73	+7%
	2.20	0.51	1.69	$F_{2015} \times 1.0$	0.88	0.31	0.57	3.29	-6%

Weights in '000 tonnes *MP option calculated without 20% TAC constraint given 0 TAC in 2015

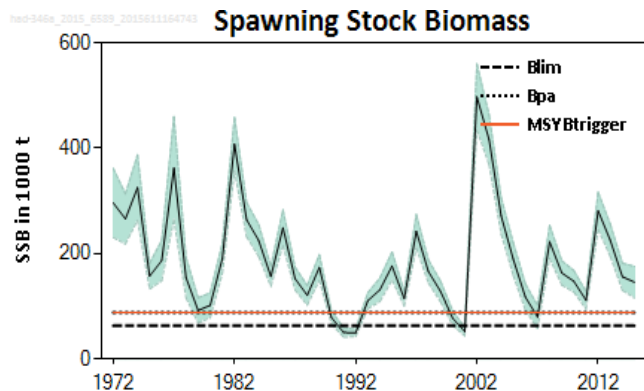
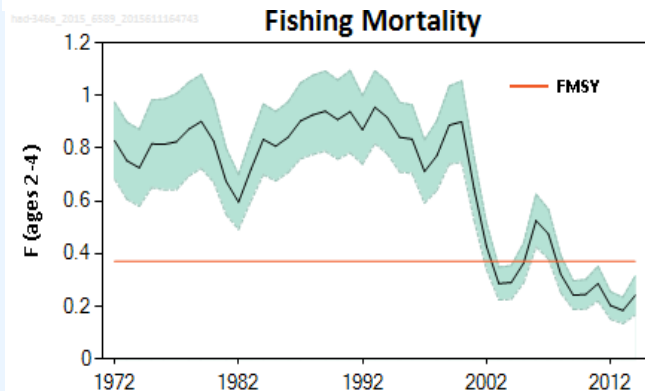
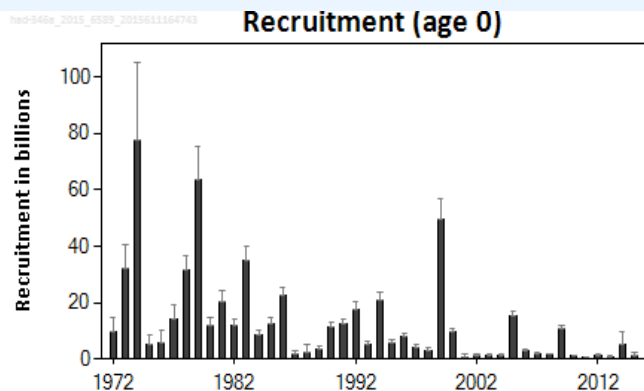
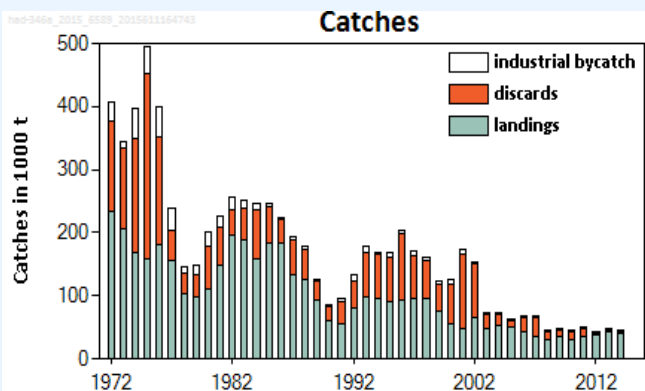
Management measures so far have not recovered the stock; measures do not constrain catches and mortality increasingly attributed to discarding.

Seal predation on cod may be significant.

Northern Shelf Haddock (Subarea IV & Divisions 3aW and VIa)

Advice for 2016, MSY: Catch $\leq 74\ 854$ t

If no LO: Landings $\leq 61\ 930$ t, assuming discard rates stay at last 3-year average



New $F_{MSY} = 0.37$

M also revised this year

F decreasing since 2000, and below F_{MSY} in recent years;

Recruitment: occasional large year classes (last one in 1999);

poor recruitment in recent years

SSB $>$ MSY Btrigger

	Fishing pressure			Stock size		
	2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	✓	✓	✓	Appropriate	
Precautionary approach	F_{par} , F_{lim}	✓	✓	✓	Below possible reference points	
Management Plan	F_{MGT}	-	-	-	Not applicable	
				MSY	✓	✓
				$B_{trigger}$	✓	✓
				B_{par} , B_{lim}	✓	✓
				SSB_{MGT}	-	-
					✓	Above trigger
					✓	Full reproductive capacity
					-	Not applicable

Northern Shelf Haddock (Subarea IV & Divisions 3aW and VIa)

Catch 2014 ~ 46 300 t (discards: 11%, IBC 0.1%)

F(2015) = model trend = 0.23; SSB (2016) = 122 kt > MSY $B_{trigger}$ (88 kt) ; $F_{MSY}=0.37$ Weights in '000 tonnes

Rationale	Total catch 2016	Wanted catch 2016	Unwanted catch 2016	IBC 2016	Basis	Total F 2016	F(wanted) 2016	F(unwanted) 2016	F(IBC) 2016	SSB 2017	% SSB change 17 vs 16	% TAC change*
MSY approach	74.854	61.930	12.924	0.000	F_{MSY}	0.370	0.308	0.062	0.000	195.868	61	30
Previous Manag.Str	61.233	50.691	10.543	0.000	F_{MGT} from previous MS	0.300	0.249	0.051	0.000	209.606	72	6
IBC only	0.000	0.000	0.000	0.000	No HC fishery	0.000	0.000	0.000	0.000	271.864	123	-100
Other options	36.862	30.580	6.282	0.000	$0.75 \times F(2015)$	0.175	0.145	0.029	0.000	234.189	92	-36
	49.784	41.331	8.453	0.000	F(2015)	0.233	0.194	0.039	0.000	220.888	81	-13
	59.531	49.286	10.245	0.000	$1.25 \times F(2015)$	0.291	0.242	0.049	0.000	211.324	73	3
	48.990	40.588	8.402	0.000	TAC – 15%	0.237	0.197	0.040	0.000	221.955	82	-15
	57.669	47.751	9.918	0.000	Rollover TAC	0.282	0.234	0.048	0.000	213.197	75	0
66.347	54.914	11.434	0.000	TAC + 15%	0.326	0.271	0.055	0.000	204.439	68	15	
Mixed-fisheries options – minor differences with calculation above can occur because of the different methodology used (ICES, 2015b).												
Maximum	102.907				A	0.55				164.911	35	
Minimum	23.760				B	0.11				243.610	100	
Cod	42.903				C	0.20				224.129	84	
SQ effort	51.330				D	0.24				215.637	77	
Value	60.086				E	0.29				206.868	70	
EffortMgt	40.751				F	0.19				226.307	86	

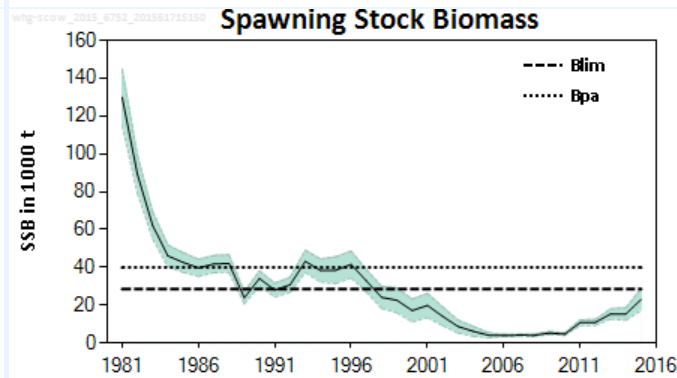
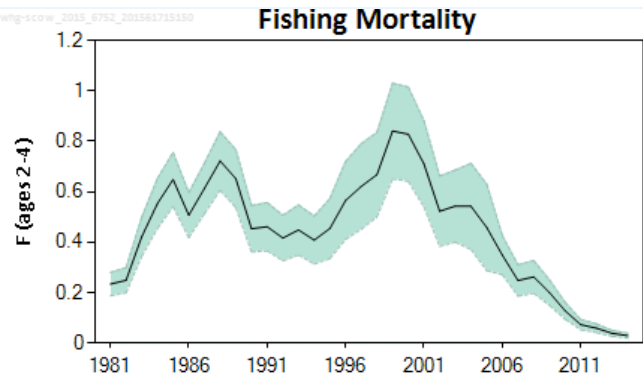
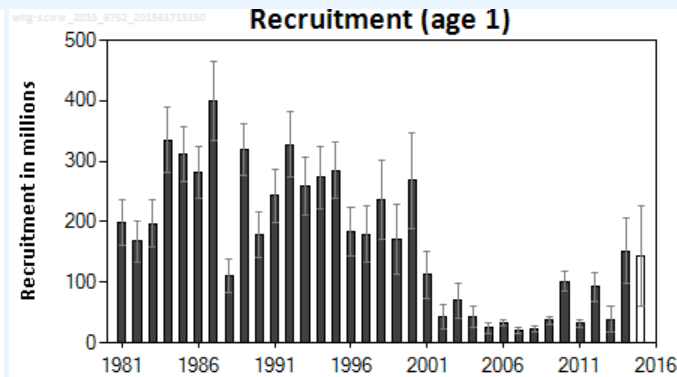
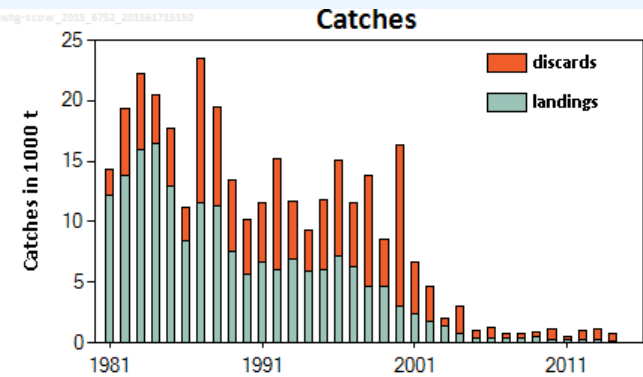
*Wanted catch (2016) relative to combined 2015 TAC for entire stock area (47 751 t)

Previous EU-Norway management strategy not appropriate for the combined stock

Whiting in Division VIa (West of Scotland)

Advice for 2016, Precautionary Approach:

No directed fisheries and all catches should be minimised



- * 2 new Scottish IBTS surveys series (Q1 & Q4, since 2011) now in assessment
- * new Blim and Bpa
- * Fishing mortality very low
- * Rec very low since 2002 but higher in recent years

* SSB increasing, remains $< B_{lim}$

Very high discarding

	Fishing pressure			Stock size			
	2012	2013	2014	2013	2014	2015	
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined	?	Undefined
Precautionary approach	F_{par} F_{lim}	?	?	?	Undefined	?	Reduced reproductive capacity
Management Plan	F_{MGT}	-	-	-	Not applicable	-	Not applicable
Qualitative evaluation	-	✓	✓	✓	Below possible reference points	-	-

Whiting in Division VIa (West of Scotland)

Catch (2014) ~ 1 100 t (~ 85% discarded)

$F(2015) = F(2012-2014) = 0.04$; $SSB(2016) = 28.9 \text{ kt} < B_{pa} (39.9 \text{ kt})$

Rationale	Catch 2016	Wanted catch 2016	Unwanted catch 2016	Basis	F Total (2016)	F wanted catch 2016	F unwanted catch 2016	SSB (2017)	% TAC change*	% SSB change 2017 vs 2016
Precautionary approach	0	0	0	zero catch	0.000	0.000	0.000	26192	-100%	-9%
Other options	191	95	97	$F_{2015} \times 0.2$	0.008	0.004	0.004	25968	-64%	-10%
	381	189	193	$F_{2015} \times 0.4$	0.017	0.008	0.009	25746	-28%	-11%
	569	282	289	$F_{2015} \times 0.6$	0.025	0.012	0.013	25525	7%	-11%
	756	374	384	$F_{2015} \times 0.8$	0.034	0.016	0.017	25308	42%	-12%
	941	466	478	$F_{2015} \times 1.0$	0.042	0.020	0.022	25092	77%	-13%
	1125	556	571	$F_{2015} \times 1.2$	0.051	0.024	0.026	24878	112%	-14%
	452	224	229	TAC - 15%	0.020	0.010	0.010	25663	-15%	-11%
	531	263	269	TAC	0.024	0.011	0.012	25570	0%	-11%
	611	302	310	TAC + 15%	0.027	0.013	0.014	25477	15%	-12%

Weights in tonnes.

*Wanted catch (2016) for the stock (VIa) relative to 2015 TAC for Subarea VI (263 t)

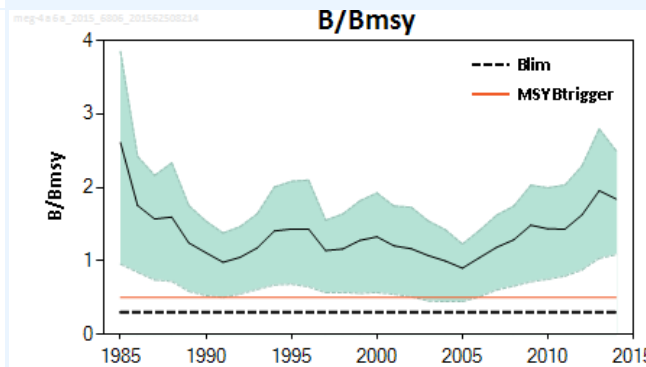
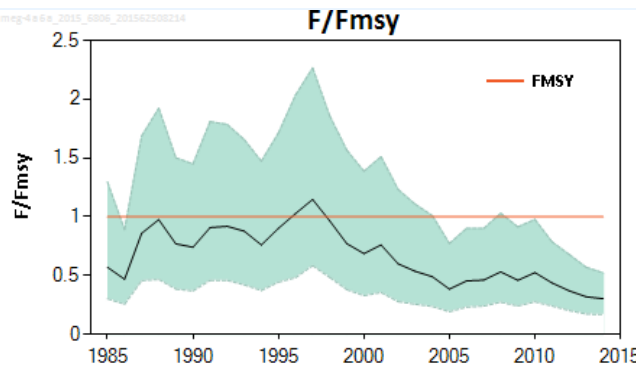
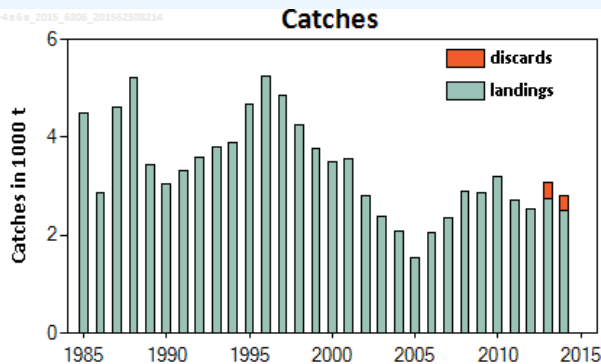
SSB expected to remain below B_{pa} in 2017, even with no catch in 2016

* The increase in mesh size (from 100 to 120 mm since 2010) and the large SMPs in *Nephrops* fishery have likely contributed to the observed reduction in F

Megrim (*Lepidorhombus spp.*) Divisions IVa and VIa

Advice for 2016 and 2017, MSY: Catch ≤ 8567 t in each year

➔ Landings $\leq 7\,539$ t, assuming discard rates stay at last 3-year average



- Assessment based on biomass dynamics model (no age or length data used)
- F below F_{MSY} ,
- Biomass above MSY $B_{trigger}$
- Discards $\sim 12\%$ of catch in recent years
- Bycatch in mixed demersal trawl in IVa and VIa

	Fishing pressure			Stock size		
	2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	✓	✓	✓	Below	
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓	Below possible reference points	
Management plan	F_{MGT}	-	-	-	Not applicable	
				MSY	✓	✓
				$B_{trigger}$	✓	✓
				B_{pa}	✓	✓
				B_{lim}	✓	✓
				SSB_{MGT}	-	-
					-	Not applicable

Megrim (*Lepidorhombus spp.*) Divisions IVa and VIa

Catch (2014) ~ 2 800 t (~ 11% discarded)

$$F(2015)/F_{MSY} = F(2012-2014)/F_{MSY} = 0.33; B(2016)/B_{MSY} = 1.8 > MSY B_{trigger}$$

Rationale	Catch 2016*	Landings 2016*	Discards 2016*	Basis	F_{2016}/F_{MSY}	B_{2017}/B_{MSY}	$P(B_{2017} < MSY B_{trigger})$	$P(B_{2017} < B_{lim})$
MSY approach	8567	7539	1028	F_{MSY}	1	1.41	0.6%	0.2%
Zero catch	0	0	0	$F = 0$	0	0	0%	0%
Other options	5666	4986	680	Long-term MSY	0.66	1.55	0.4%	0.2%
	7776	6843	933	TAC^ + 15%	0.90	1.46	0.6%	0.2%
	6761	5950	811	TAC^	0.78	1.50	0.5%	0.2%
	5747	5058	690	TAC^ -15%	0.66	1.54	0.4%	0.2%

Weights in tonnes.

* Split of catch into landings and discards assuming 12% discard rate (average 2012-2014).

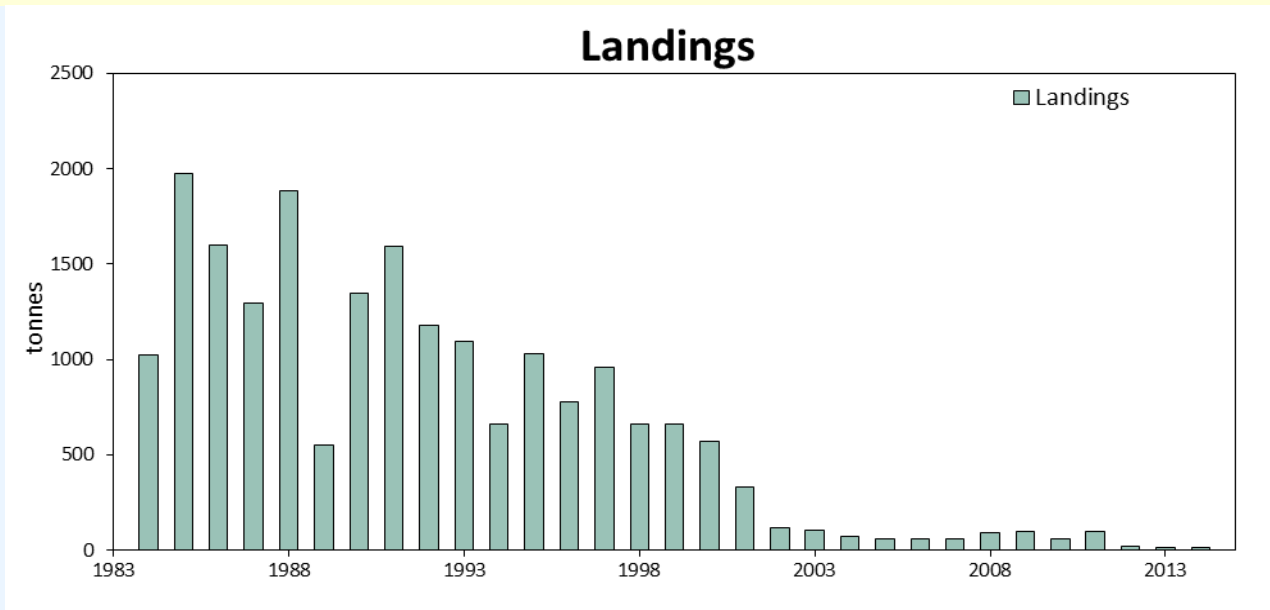
^Landings(2016) relative to 5950 t (2015 TACs for IV + VI – ICES advice 2015 for Rockall megrim)

* Inaccurate and missing age data prevents the development of an age-based assessment for this stock (depth- and sex-stratified age data would be needed)

* Discards included in assessment (observed since 2013, and modelled based on limited information before 2013)

Cod in Division VIb (Rockall)

Advice for 2016 and 2017, Precautionary Approach: Catch ≤ 17 t in each year

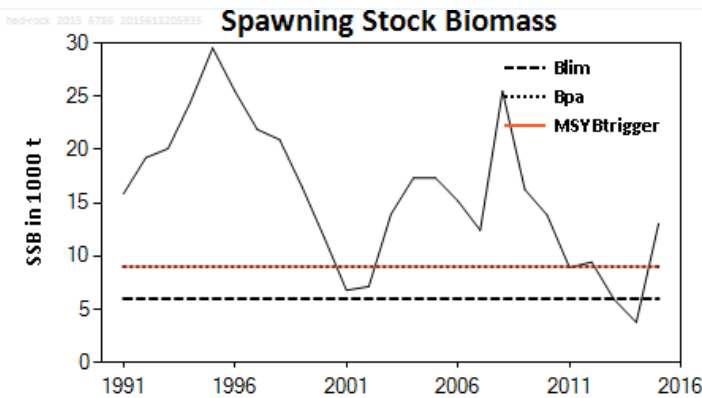
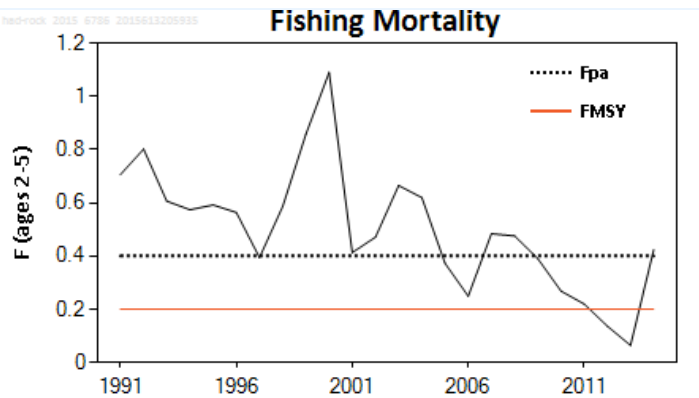
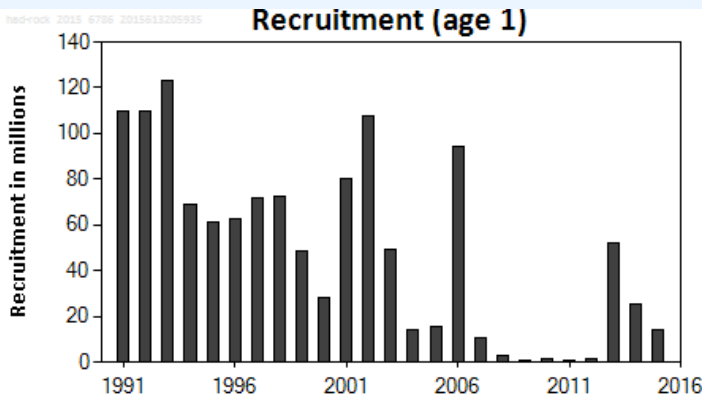
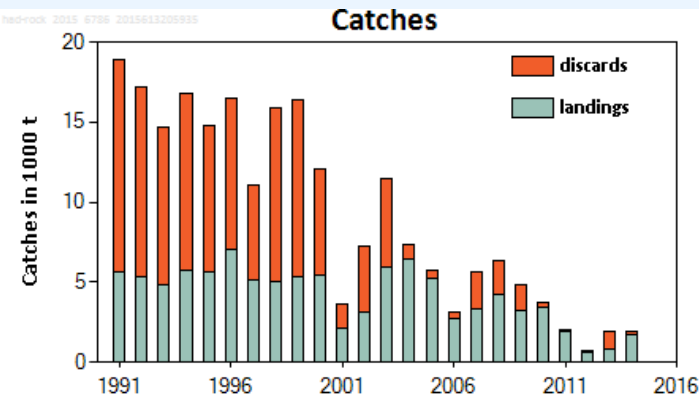


- Stock category: 6 ; Only data are official landings
- Available information insufficient to evaluate stock trends and exploitation status but suggests stock may be depleted (strong decline in landings in 2012-2014 and also declines in commercial lpue)
 - ➔ Previous advice is updated based on last 3-year average landings = 17 t
This corresponds to a 76% reduction relative to previous advice; therefore, no additional precautionary buffer (20% reduction) is necessary.
- Discards are considered negligible

Haddock in Division VIb (Rockall)

Advice for 2016, MSY: Catch \leq 3 932 t

If no LO: Landings \leq 3 225 t, assuming discard rates as in last 9-year average



* Fishing mortality has declined, although it increased in 2014 (but estimate uncertain)

* Rec: very low during 2007 – 2012; higher since 2013, but still lower than at the start of the series

	Fishing pressure			Stock size		
	2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	✓	✓	✗ Above	✗	✗
Precautionary approach	F_{pa} F_{lim}	✓	✓	⊙ Increased risk	✗	✗
Management plan	F_{MGT}	-	-	- Not applicable	-	-
				MSY $B_{trigger}$	✗	✗
				B_{pa} B_{lim}	✗	✗
				SSB_{MGT}	-	-
					✓ Above trigger	✓ Full reproductive capacity
					- Not applicable	- Not applicable

* SSB in 2015 above $MSY B_{trigger}$

Haddock in Division VIb (Rockall)

Catch 2014 ~ 1 950 t (discards: 16%)

$F(2015) = \text{Catch constraint} = 0.21$; $SSB(2016) = 17 \text{ kt} > MSY B_{\text{trigger}} (9 \text{ kt})$

$F_{MSY}=0.2$

Rationale	Catch 2016	Wanted catch 2016	Unwanted catch 2016	Basis	F total 2016	F wanted catch 2016	F unwanted catch 2016	SSB (2017)	%SSB change 17vs16	%TAC change **
MSY approach	3932	3225	707	F_{MSY}	0.20	0.14	0.06	17871	+5%	+8%
Precautionary approach	7013	5740	1273	$F_{pa} = 0.4$	0.40	0.29	0.11	14294	-16%	+92%
Proposed managem. strategy	4007	3287	720	F_{HCR}^{\wedge}	0.21	0.15	0.06	17779	+4%	+10%
Zero catch	0	0	0	$F = 0$	0.00	0.00	0.00	22496	+32%	-100%
Other options	3664	3006	658	-15% catch advice*	0.18	0.13	0.05	18181	+6%	+1%
	4310	3534	776	Stable catch advice*	0.22	0.16	0.06	17426	+2%	+18%
	4312	3536	776	average $F_{2010-2014}$	0.22	0.16	0.06	17424	+2%	+18%
	4956	4063	893	+15% catch advice*	0.26	0.19	0.07	16673	-2%	+36%

Weights in tonnes.

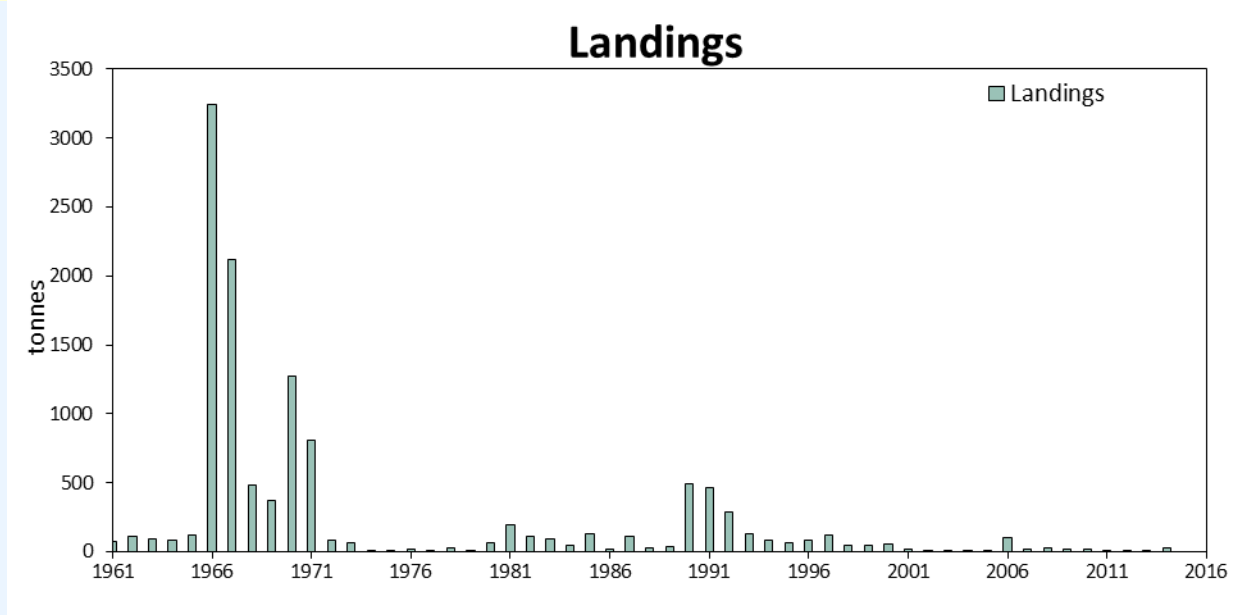
**Wanted catch (2016) relative to 2988 t (EU TAC 2015 + Russian catch)

$\wedge F = 0.2$ followed by TAC constraint: $TAC_{2016} = TAC_{F=0.2} + 0.2 \times (TAC_{2015} - TAC_{F=0.2}) = 3932 + 0.2 \times (4310 - 3932) = 4007$, using the ICES advised catches for 2015 (4310 t) as the TAC_{2015} .

* Relative to ICES advised catches for 2015 (4310, from ICES MSY approach)

Whiting in Division VIb (Rockall)

Advice for 2016 to 2018, Precautionary Approach: Catch ≤ 11 t in each year



- Stock category: 6
- Only data are official landings; landings are very low
- Unlikely that there is a self-sustaining whiting population at Rockall
- No change in perception, so the advice provided in the last 3 years remains valid for 2016-2018.
- Precautionary buffer (20% reduction) was applied in 2012; no need to apply it this year again

Celtic Sea & West, Southwest Ireland

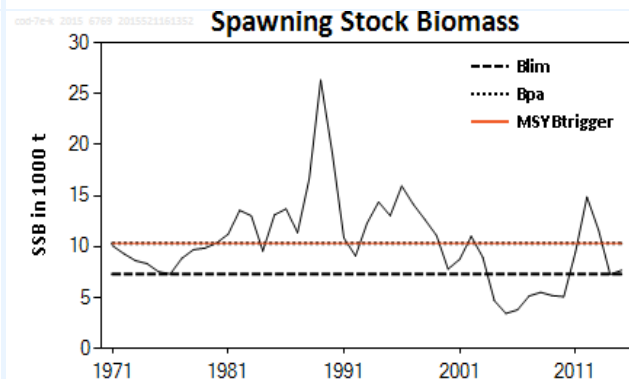
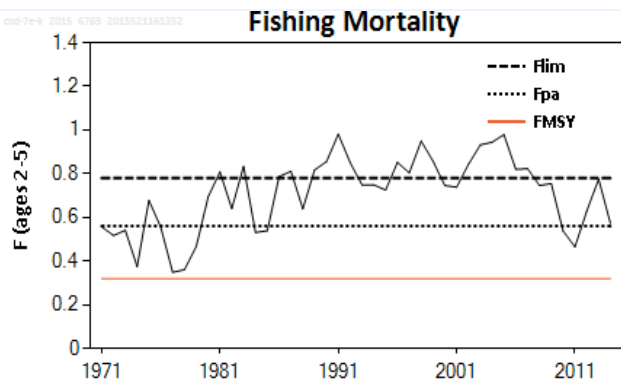
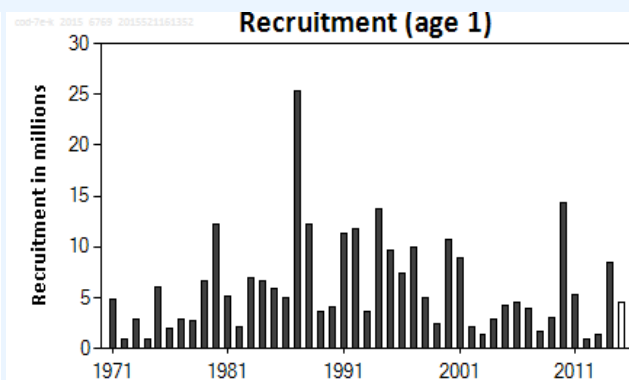
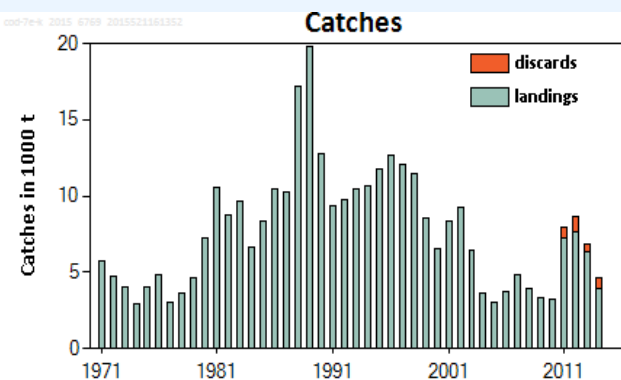
- Cod (VIIe-k)
 - Haddock (VIIb-k)
 - Whiting (VIIe-k)
 - Sole (CS; VIIh-k; VIIbc)
 - Plaice (CS; VIIh-k; VIIbc)
 - Anglerfish (VIIb-k, VIIIabd)
 - Pollack (VI, VII)
-
- Northern hake
 - Sea bass (IVbc, VIIa, VIId-h; VIa, VIIb, VIIj)
- IN AUTUMN:**
- Megrin (VIIb-k, VIIIabd)
 - *Nephrops* (FUs 16-17-20-22)



Cod in Divisions VIIe–k (Celtic Sea cod)

Advice for 2016, MSY: Wanted catch $\leq 3\,569$ t

- total catch can not be quantified (variable discard rates in recent past)



* New F_{MSY} value (0.32)

* F above F_{MSY} (whole time series) and currently above F_{pa}

* Rec highly variable: 2011 and 2012 yc very weak, 2013 yc above average

* SSB close to B_{lim} in last 2 years

Fishing pressure

Stock size

2012

2013

2014

2013

2014

2015

Maximum Sustainable Yield

F_{MSY}



Above

MSY

$B_{trigger}$



Below trigger

Precautionary approach

F_{pa} , F_{lim}



Increased risk

B_{pa} , B_{lim}



Increased risk

Management Plan

F_{MGT}

-

-

-

Not applicable

SSB_{MGT}

-

-

-

Not applicable

Cod in Divisions VIIe–k (Celtic Sea cod)

Catch (2014) ~ 4 620 t (~16% discards)

$F(2015) = F(2012-14) = 0.66$; $SSB(2016) = 9.9 \text{ kt} < MSY B_{trigger} (10.3 \text{ kt})$ $F_{MSY} = 0.32$

Rationale	Wanted catch (2016)	Basis	F (wanted catch) (2016)	SSB (2017)	%SSB change (2017 vs 2016)	% TAC change*
MSY approach	3569	$F_{MSY} \times SSB_{2016} / MSY B_{trigger}$	0.31	13682	+39%	-30%
Zero catch	0	$F = 0$	0	17985	+82%	-100%
Other options	3668	F_{MSY}	0.32	13565	+37%	-28%
	6593	F_{2015}	0.66	10141	+3%	+30%
	4304	TAC-15%	0.39	12811	+29%	-15%
	5080	Stable TAC (TAC 2015)	0.47	11899	+20%	0%
	5827	TAC+15%	0.56	11027	+11%	+15%
Mixed fisheries options (ICES, 2015b)						
Maximum	6362	A	0.58	11313	+14%	+25%
Minimum	3622	B	0.30	14538	+47%	-28%
Cod	3747	C	0.31	14389	+45%	-26%
Haddock	4644	D	0.39	13325	+35%	-8%
Whiting	6092	E	0.55	11627	+18%	+20%
Status quo effort	6253	F	0.57	11440	+16%	+23%

Weights in tonnes

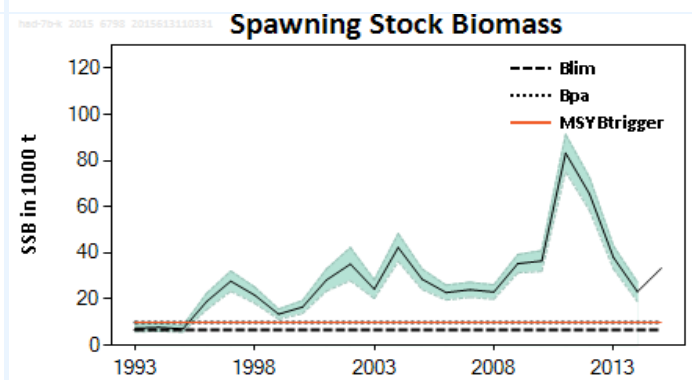
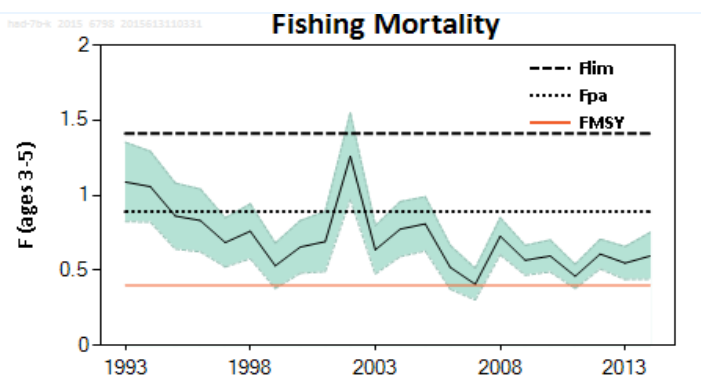
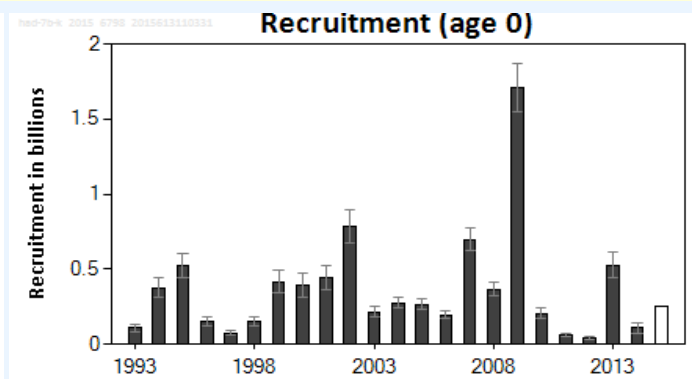
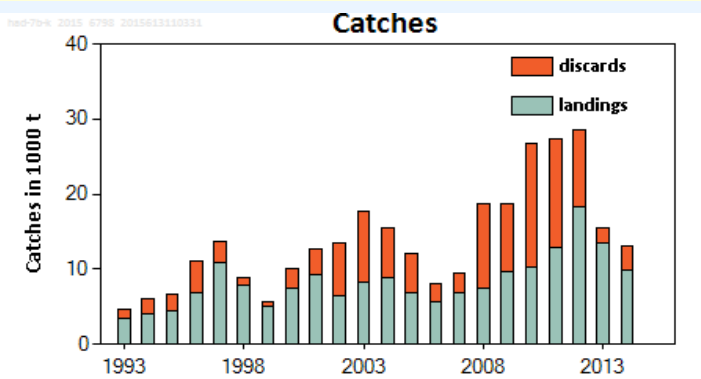
* Wanted catch 2016 relative to TAC 2015 (5072)

- Mixed fisheries analysis (cod/haddock/whiting): cod most restrictive stock for cod: many scenarios result in $F_{2016} > F_{MSY}$; “max” and “SQeffort” result in $F_{2016} > F_{pa}$
- Forecast sensitive to incoming recruitment assumptions
- Landings from southern part of Division VIIa (33E2-3) allocated to this stock

Haddock in Divisions VIIb-k

Advice for 2016, MSY: Catch \leq 8 590 t

➔ If no LO: Landings \leq 6 078 t, assuming discard rates as average of 1993-2014



- * New ref points
- * F above F_{MSY}
- * Rec: 2009 very strong, 2010-2012 low, 2013 above average
- * SSB peaked in 2011, then declined
- * increased discarding in recent years (when SSB was high and TAC very restrictive)

➔ catch options are based on discard rates of full time-series

		Fishing pressure			Stock size		
		2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	✗	✗	✗ Above	✓	✓	✓ Above trigger
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓ Harvested sustainably	✓	✓	✓ Full reproductive capacity
Management Plan	F_{MGT}	-	-	- Not applicable	-	-	- Not applicable
					MSY		
					B_{trigger}		
					B_{pa}, B_{lim}		
					SSB_{MGT}		

Haddock in Divisions VIIb–k

Catch (2014) ~ 13 000 t (~ 24% discards)

$F(2015) = F(2012-2014) = 0.58$; $SSB(2016) = 22.8 \text{ kt} > MSY B_{\text{trigger}} (10 \text{ kt})$

$F_{MSY}=0.40$

Rationale	Catch (2016)	Wanted catch (2016)	Unwanted catch (2016)	Basis	F catch 2016	F Wanted catch (2016)	F Unwant catch (2016)	SSB (2017)	%SSB change (2017 vs 2016)	%TAC change*
MSY approach	8590	6078	2513	F_{MSY}	0.40	0.36	0.04	25203	+11%	-27%
Zero catch	0	0	0	$F = 0$	0	0	0	33883	+49%	-100%
Other options	10052	7091	2961	-15% TAC	0.48	0.44	0.05	23748	+4%	-15%
	11872	8342	3530	Stable TAC	0.59	0.54	0.06	21946	-4%	0%
	13713	9593	4120	+15% TAC	0.72	0.65	0.07	20138	-12%	+15%
Mixed fisheries options (ICES, 2015b)										
Maximum	12196			A	0.62			21519	-6%	
Minimum	6964			B	0.32			26721	+17%	
Cod	7108			C	0.32			26577	+17%	
Haddock	8553			D	0.40			25131	+10%	
Whiting	11941			E	0.60			21769	-4%	
Status quo effort	11869			F	0.60			21841	-4%	

Weights in tonnes.

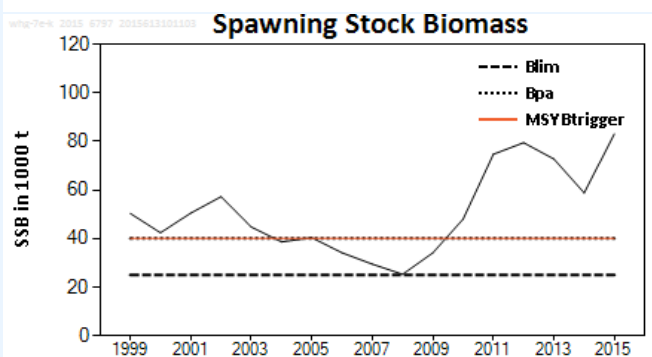
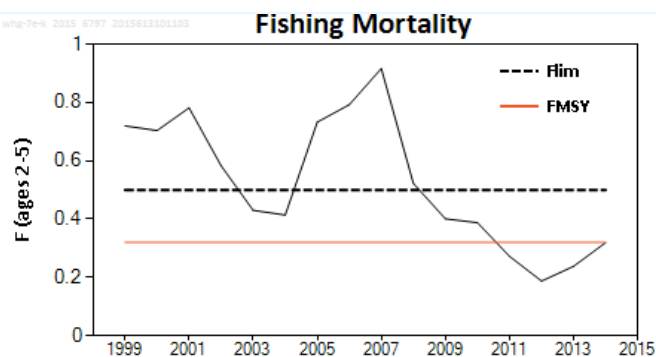
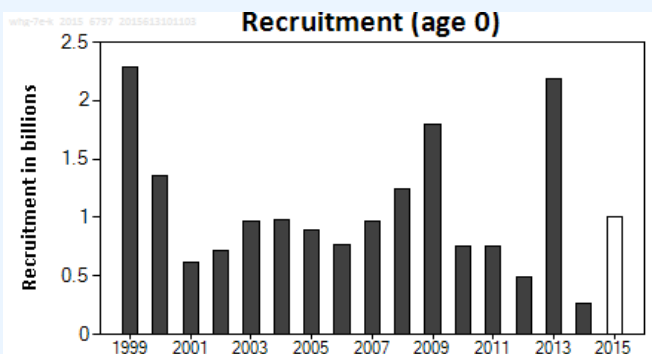
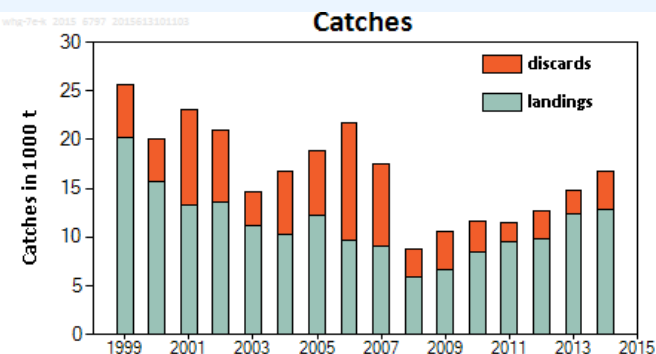
*Wanted catch 2016 relative to TAC 2015 (8342 t)

- Discards expected to be high in 2015 (2013 yc), but the SMPs and increased mesh sizes may reduce this
- Mixed fisheries (cod/haddock/whiting): Scenarios “whiting”, “SQeffort” and “max” result in $F_{2016} > F_{MSY}$ for haddock
- Landings in south of Division VIIa (33E2-3) allocated to this stock

Whiting in Divisions VII bc,e-k

Advice for 2016, MSY: Catch $\leq 19\,076$ t

If no LO: Landings $\leq 15\,395$ t, assuming discard rates stay at last 3-year average



* F decreased since 2007 and is at F_{MSY} in 2014

* Rec very high in 2013 but weak before and after

* SSB increasing trend since 2008

* Mixed fisheries (cod, haddock, whiting); high discards

	Fishing pressure			Stock size				
	2012	2013	2014	2013	2014	2015		
Maximum Sustainable Yield	F_{MSY}	✓	✓	✓	Appropriate			
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓	Below possible reference points			
Management Plan	F_{MGT}	-	-	-	Not applicable			
				MSY	✓	✓	✓	Above trigger
				$B_{trigger}$	✓	✓	✓	Full reproductive capacity
				B_{pa}, B_{lim}	✓	✓	✓	Not applicable
				SSB_{MGT}	-	-	-	Not applicable

Whiting in Divisions VII bc,e-k

Catch (2014) ~ 16 700 t (~ 23% discards)

$F(2015) = F(2012-2014) = 0.25$; $SSB(2016) = 68 \text{ kt} > MSY B_{\text{trigger}} (40 \text{ kt})$

$F_{MSY} = 0.32$

Rationale	Catch 2016	Wanted catch 2016	Unwanted catch 2016	Basis	F catch 2016	F Wanted catch 2016	F Unwant catch 2016	SSB (2017)	%SSB change 2017 vs 2016
MSY approach	19076	15395	3682	F_{MSY}	0.32	0.24	0.08	66187	-2%
Zero catch	0	0	0	$F = 0$	0	0	0	83110	+23%
Other options	12478	10106	2371	$F_{2015} \times 0.80$	0.2	0.15	0.05	71999	+7%
	13885	11238	2647	$F_{2015} \times 0.90$	0.22	0.17	0.05	70755	+5%
	15262	12343	2919	$F_{2015} \times 1.00$	0.25	0.19	0.06	69540	+3%
	16609	13422	3187	$F_{2015} \times 1.10$	0.27	0.21	0.07	68354	+1%
	17926	14476	3450	$F_{2015} \times 1.20$	0.3	0.23	0.07	67196	-1%
Mixed fisheries options (ICES, 2015b)									
Maximum	18463			A	0.33			63716	-6%
Minimum	10236			B	0.17			70978	+5%
Cod	10398			C	0.17			70835	+5%
Haddock	12693			D	0.21			68802	+2%
Whiting	18070			E	0.32			64061	-5%
SQ effort	18038			F	0.32			64089	-5%

Weights in tonnes

- SMP since 2012 but no evidence yet of selectivity improvements
- Mixed fisheries (cod/haddock/whiting): whiting is least limiting for whiting, only “max” scenario results in $F_{2016} > F_{MSY}$
- Landings in south of Division VIIa (33E2-3) allocated to this stock (minor)

Mixed fisheries – Celtic Sea gadoids (cod, haddock, whiting)

Analysis assumes:

- “fleets’ stocks shares” in line with single-species advice for 2016 and historical proportion of stock landings taken by each fleet
- same fleet behaviour (fishing pattern, species catchability) in 2015 and 2016 as in 2014
- fishing opportunities calculated for catches and all fish caught count against TAC

Six example mixed fisheries scenarios:

min: each fleet stops fishing when its first stock share exhausted

max: each fleet stops fishing when its last stock share exhausted

cod: each fleet stops fishing when its cod stock share exhausted

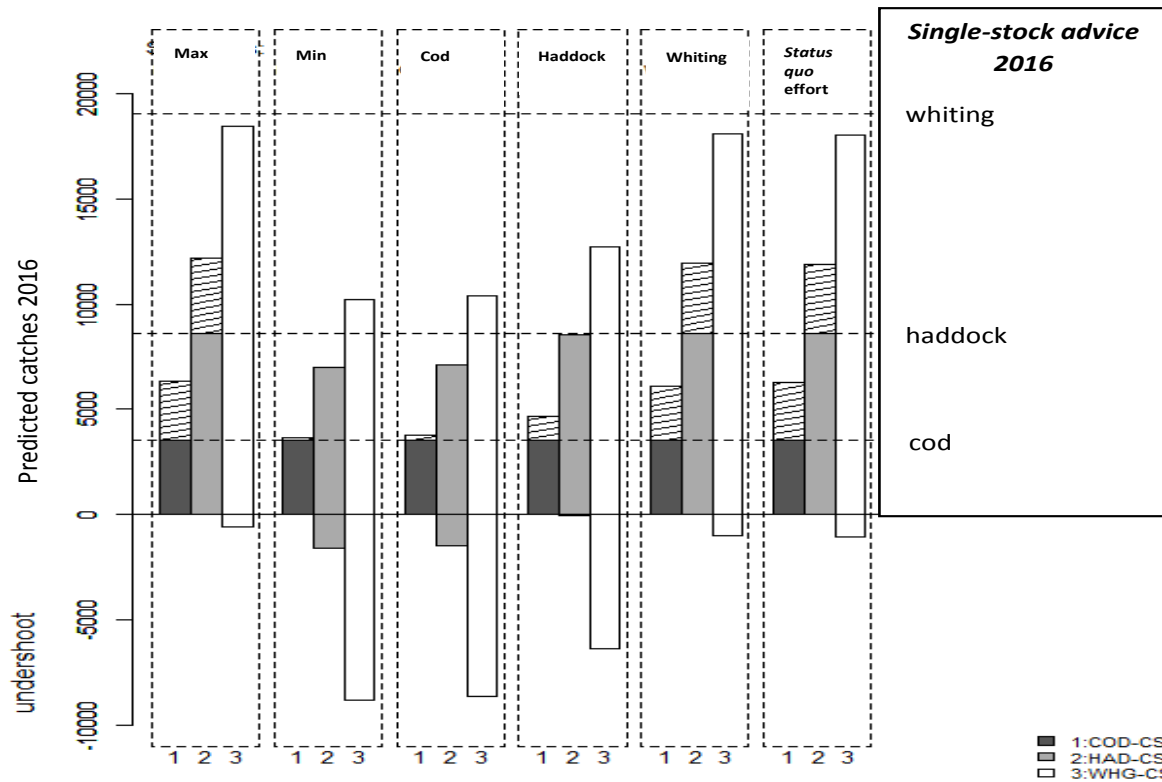
haddock: each fleet stops fishing when its haddock stock share exhausted

whiting: each fleet stops fishing when its whiting stock share exhausted

Status quo effort: effort equal to 2014

Predicted catch for 2016, per stock and scenario

overshoot (hatched) and undershoot (below zero)



* Individual stock objectives can not all be achieved simultaneously (with current fishing patterns)

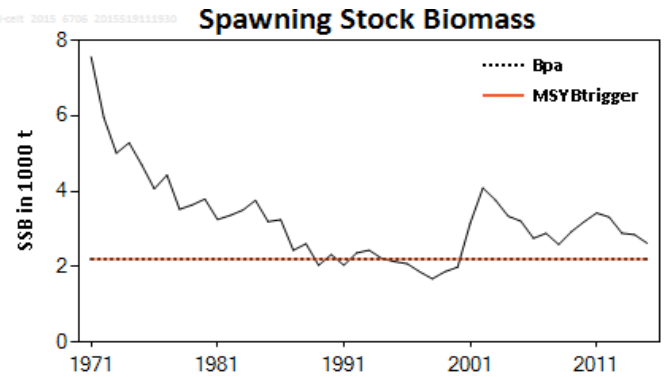
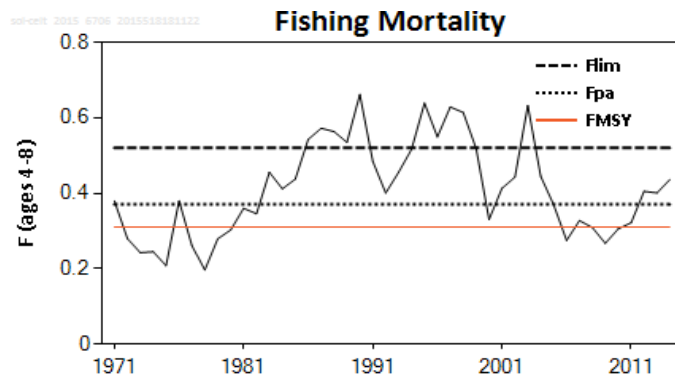
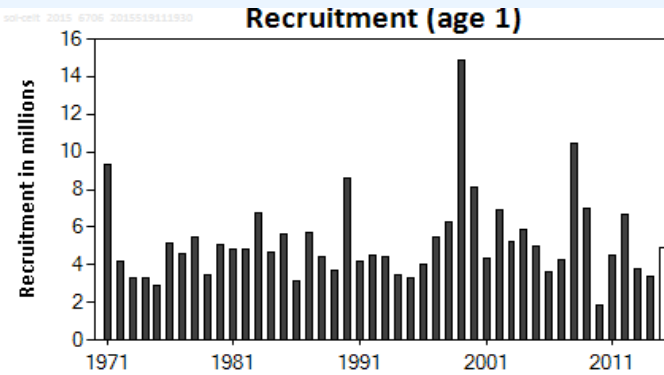
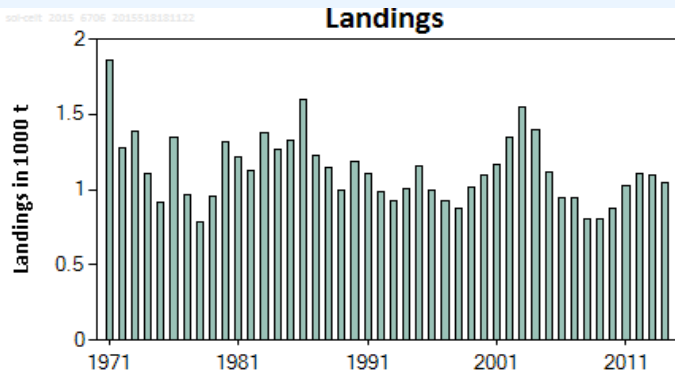
* Single-species advice: cod is most limiting and whiting less limiting

- **For cod:** $F(2016) \leq F_{MSY}$ only for “min” and “cod”;
 $F(2016) > F_{pa}$ for “SQ_effort” and “max”
- **For haddock:** $F(2016) \leq F_{MSY}$ for “min”, “cod” and “had”
- **For whiting:** $F(2016) \leq F_{MSY}$ for all except “max”

Sole in Celtic Sea (VII f,g)

Advice for 2016, MSY: Catch \leq 760 t.

If no LO: Landings \leq 745 t, assuming discard rates stay at last 3-year average



* F increasing since 2009, above F_{pa}

* Rec fluctuates around average

* SSB above MSY $B_{trigger}$

	Fishing pressure			Stock size						
	2012	2013	2014	2013	2014	2015				
Maximum Sustainable Yield	F_{MSY}	✘	✘	✘	Above	MSY	✔	✔	✔	Above trigger
Precautionary approach	F_{pa} , F_{lim}	○	○	○	Increased risk	B_{pa} , B_{lim}	✔	✔	✔	Full reproductive capacity
Management Plan	F_{MGT}	-	-	-	Not applicable	SSB_{MGT}	-	-	-	Not applicable

Sole in Celtic Sea (VII f,g)

Catch (2014) ~ 1 060 t (~ 2% discards)

Discards very low not included in assessment, but used to provide advice

$F(2015) = 0.34$ (TAC constraint); $SSB(2016) = 2\,540\text{ t} > MSY B_{trigger}$ (2 200 t) $F_{MSY} = 0.31$

Rationale	Total catch* 2016	Wanted catch 2016	Basis	F Wanted catch 2016	SSB 2017	%SSB change 2017 vs 2016	% TAC change**
MSY approach	760	745	F_{MSY}	0.31	2593	+2%	-12%
Precautionary approach	884	867	F_{pa}	0.37	2476	-3%	+2%
Zero catch	0	0	$F = 0$	0.00	3307	+30%	-100%
Other options	737	723	TAC – 15%	0.30	2613	+3%	-15%
	823	807	F_{2015}	0.34	2534	0%	-5%
	868	851	Stable TAC	0.36	2491	-2%	0%
	999	979	TAC + 15%	0.43	2370	-7%	+15%

Weights in tonnes

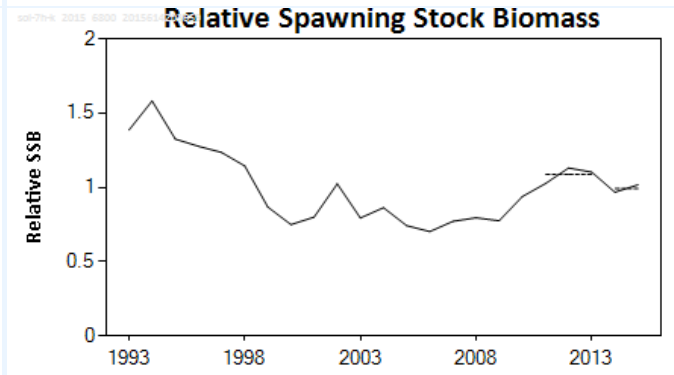
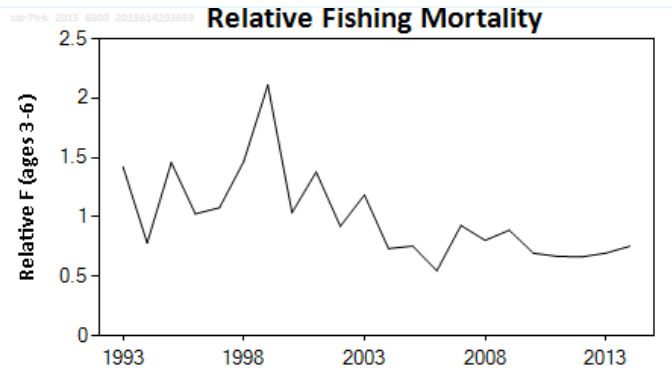
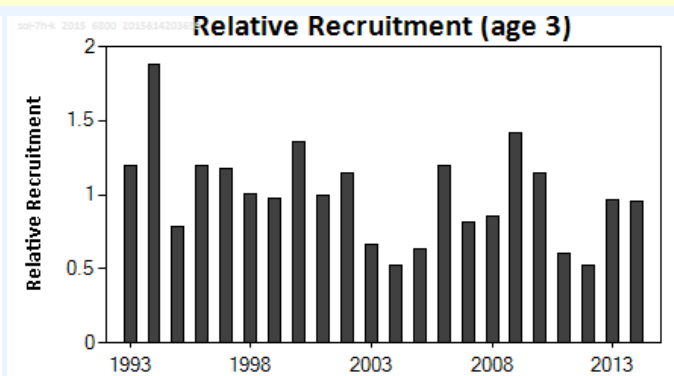
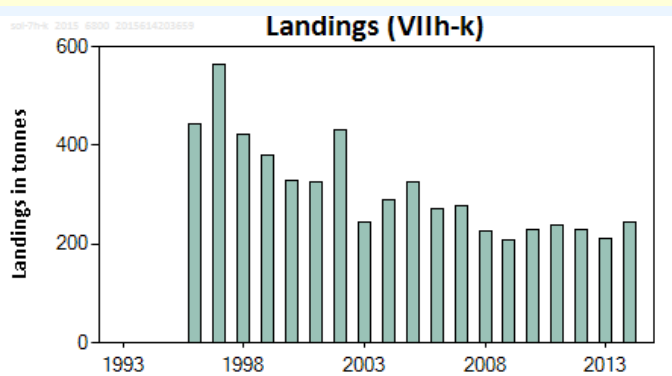
* Total catch calculated is from wanted catch based on average 2012-2014 discard rate (2%)

** Wanted catch 2016 relative to TAC 2015 (851 t)

$F(2015)$ calculated from 2015 TAC → advice could be overoptimistic if TAC overshoot

Sole in Divisions VIIh-k (Celtic Sea South; Southwest of Ireland)

Advice for 2016, Precautionary Approach: Catch \leq 205 t.



* Assessment (gives trends) based on commercial data from Div VII jk:

SSB: slight increase since 2005; F stable in recent years, lower than during 1990s

* Div VII h: only landings data → no assessment of trends

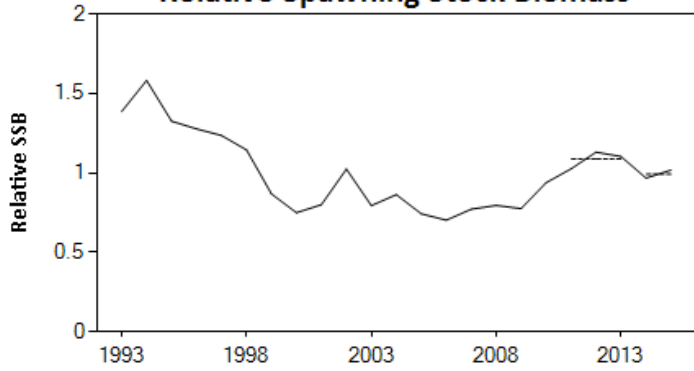
	Fishing pressure			Stock size			
		2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined	?	Undefined
Precautionary approach	F_{pa} F_{lim}	?	?	?	Undefined	?	Undefined
Management Plan	F_{MGT}	-	-	-	Not applicable	-	Not applicable
Qualitative evaluation	-	✓	✓	✓	Below possible reference points	↘	↘
						↗	Stable

* **Category 3** stock based on SSB assessment trend

Result applied to the catch from Div VII h-k

Sole in Divisions VIIh-k (Celtic Sea South; Southwest of Ireland)

Relative Spawning Stock Biomass



Index A (2 last years: 2014-15)	0.99 (relative SSB)	
Index B (3 preceding years : 2011-13)	1.08 (relative SSB)	
Index ratio (A/B)	0.91	
Uncertainty cap	Not applied	-
Recent advised catch (for Div VIIh-k)	225 tonnes	
Discard rate	Negligible	
Precautionary buffer	Not Applied	-
Catch advice (for Div VIIh-k)*	205 tonnes	

*Recent advised catch x index ratio

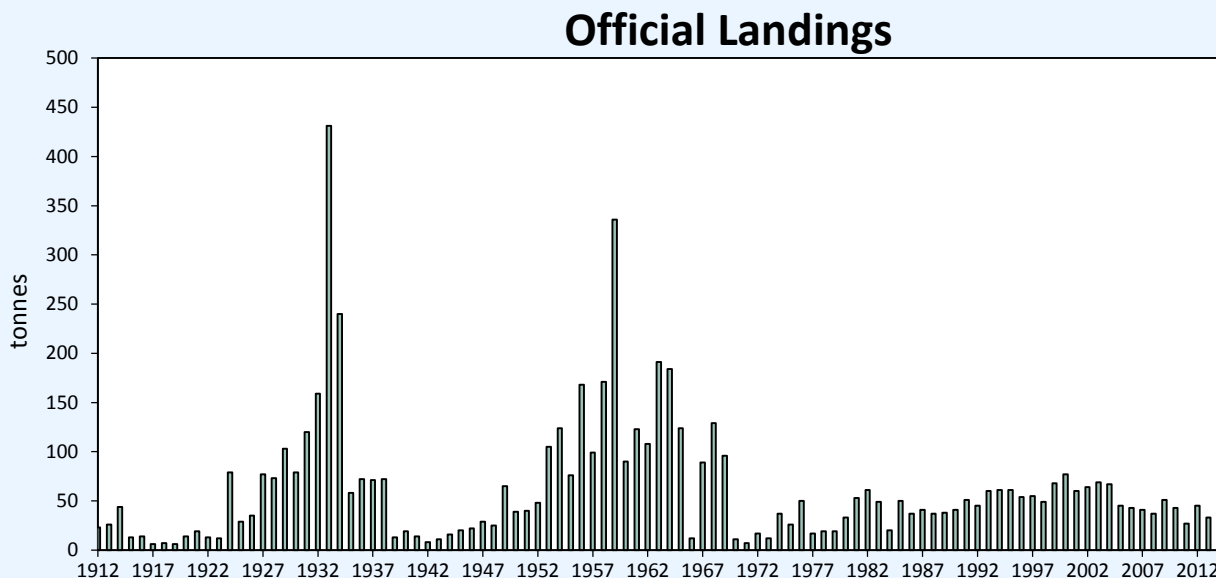
Precautionary buffer not applied because broad age structure in catch indicates low mortality

Discards are considered to be negligible.

Sole in Divisions VIIbc (West of Ireland)

Advice for 2016 and 2017, Precautionary Approach:

Catch ≤ 30 t in each of the years



- Stock category: 6
- Only data are official landings; Stock status unknown.
- Catches too low to support collection of necessary information for stock assessment
- Precautionary buffer (20% reduction) applied in the advice issued in 2012 and no change in stock perception → same advice applicable for 2016 and 2017
- Discards considered negligible

Plaice Celtic Sea (VII f,g)

Catch (2014) ~ 1 560 t (~ 74% discards)

* **Category 3**

[using survey trends, inconsistencies encountered with previous age-based assessment]

- no change in stock perception from last year
- no PA buffer (applied in 2012, not considered necessary this year again)

➔ Advice as last year: Catch < 1500 t

If no LO and discard rates stay at last 3-year average: Landings < 420 t

* High discards of plaice in mixed sole and plaice fishery: mismatch between selectivity and minimum landing size & relatively low market value of plaice

Plaice in Divisions VIIh-k (Celtic Sea South; Southwest of Ireland)

Landings (2014) ~ 17 t

Discard rate in otter trawl in VIIjk ~ 30%; discard rates in VIIh unknown.

* Category 3

[SSB trend from assessment]

- no change in stock perception from last year
- no PA buffer (applied in 2013, not needed this year again)

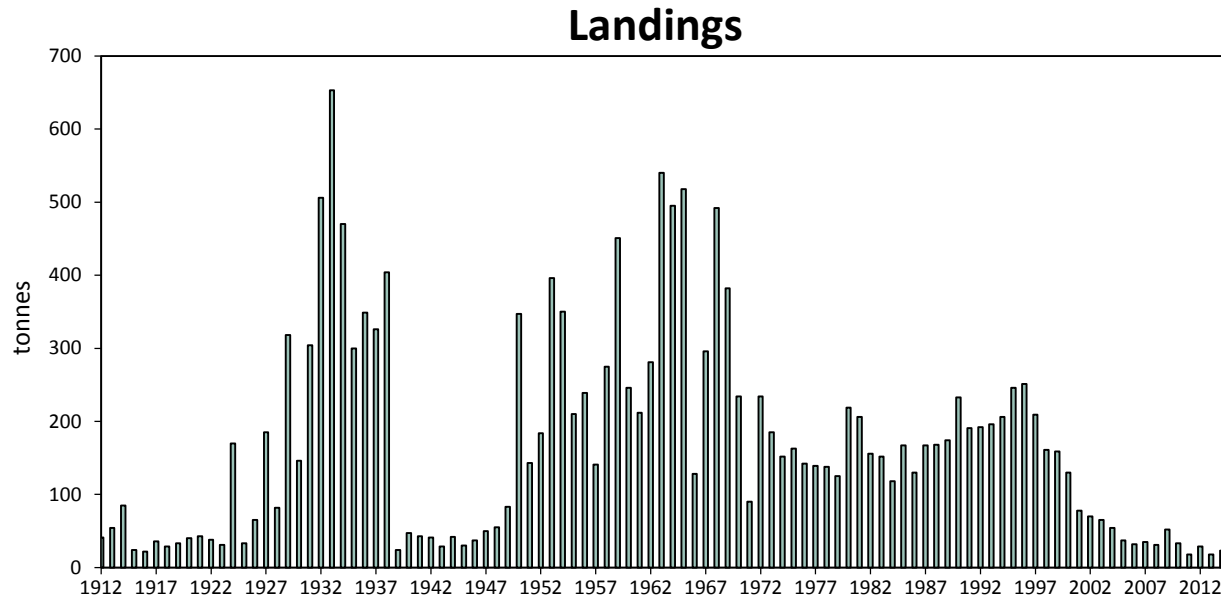
➔ Advice as last year: Wanted catch < 135 t
Total catch can not be quantified

- Management should take into account that plaice is caught in a mixed fishery.
- Plaice caught in spatially distinct areas: restricting effort in those areas may be more effective than limiting landings
- Management should focus on small plaice catches. An increase in mesh size could improve selection, but also affect catches of marketable fish

Plaice in Divisions VIIbc (West of Ireland)

Advice for 2016 and 2017, Precautionary Approach:

Wanted catch ≤ 30 t in each of the years; total catch can not be quantified



- Stock category: 6
- Only data are official landings; recent discard estimates variable and uncertain
- Stock status unknown.
- Catches too low to support collection of necessary information for stock assessment
- Precautionary buffer (20% reduction) applied in the advice issued in 2012 and no change in stock perception → same advice applicable for 2016 and 2017

Anglerfish (*Lophius piscatorius*) Div VIIb–k and VIIIa,b,d

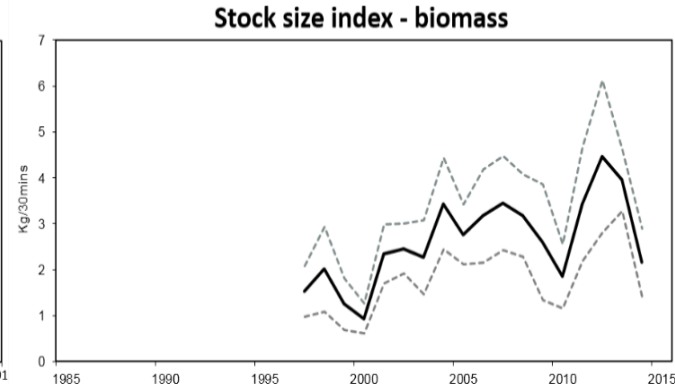
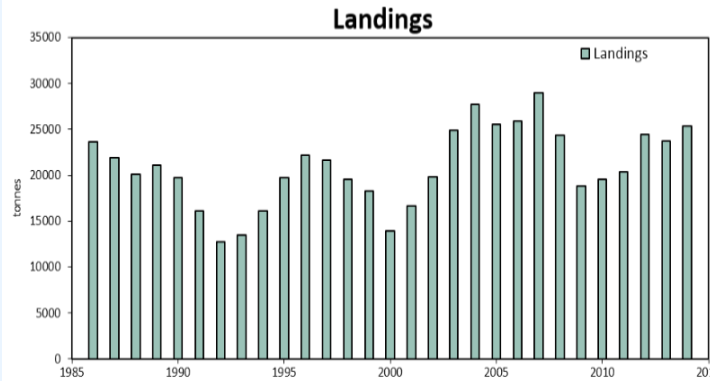
Advice for 2016, PA: Landings $\leq 26\ 691$ t ; total catch can not be quantified

Management of 2 anglerfish species under a combined TAC prevents effective control of single-species exploitation rates and could lead to overexploitation of either species.

* Biomass and recruitment indices from survey

* **Category 3**

* No change in stock perspective from last year (also based on other information)



	Fishing pressure			Stock size				
	2012	2013	2014	2012	2013	2014		
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined			
Precautionary approach	F_{pa}, F_{lim}	?	?	?	Undefined			
Management Plan	F_{MGT}	-	-	-	Not applicable			
Qualitative evaluation	-	?	?	?	Unknown			
				MSY	?	?	?	Undefined
				$B_{trigger}$?	?	?	Undefined
				B_{pa}, B_{lim}	?	?	?	Undefined
				SSB_{MGT}	-	-	-	Not applicable
				-	↗	↘	↘	Stable

Anglerfish (*Lophius piscatorius*) Div VIIb–k and VIIIa,b,d

Landings (2014) ~ 25.3 kt

Discards known to take place but can not be quantified

* Category 3

[survey trends (EVHOE), also information from commercial Ipue and Porcupine survey]

- no change in stock perception from last year
- no PA buffer (never applied because of steady effort decrease since early 1990s and overall increasing trend in indices)

→ Advice as last year: Landings \leq 26 691 t

Total catch can not be quantified (discarding non-negligible but uncertain quality of available discards estimates)

- Only trends-based assessment at this time due to uncertain growth parameters and uncertain discard estimates

Anglerfish (*Lophius budegassa*) Div VIIb–k and VIIIa,b,d

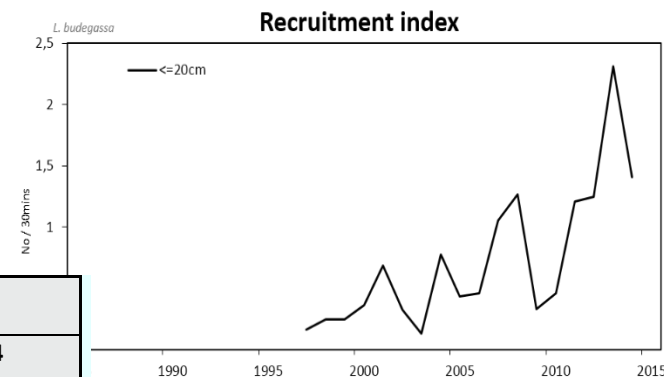
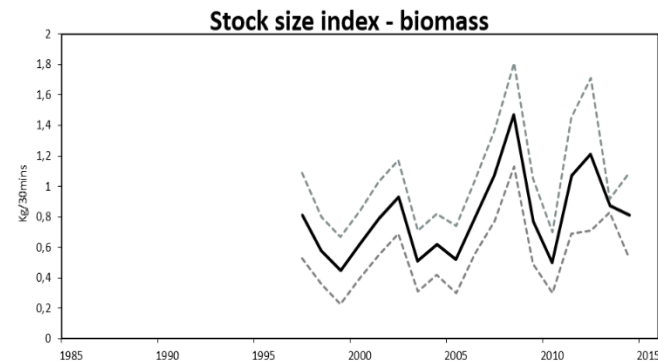
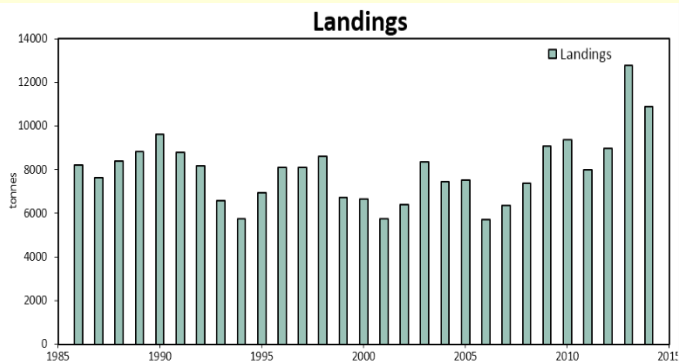
Advice for 2016, PA: Landings $\leq 10\,757$ t ; total catch can not be quantified

Management of 2 anglerfish species under a combined TAC prevents effective control of single-species exploitation rates and could lead to overexploitation of either species.

* Biomass and recruitment indices from survey

* Category 3

* No change in stock perspective from last year (also based on other information)



	Fishing pressure			Stock size				
	2012	2013	2014	2012	2013	2014		
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined			
Precautionary approach	F_{par}, F_{lim}	?	?	?	Undefined			
Management Plan	F_{MGT}	-	-	-	Not applicable			
Qualitative evaluation	-	?	?	?	Unknown			
				MSY	?	?	?	Undefined
				$B_{trigger}$?	?	?	Undefined
				B_{par}, B_{lim}	?	?	?	Undefined
				SSB_{MGT}	-	-	-	Not applicable
				-	↗	↘	↘	Stable

Anglerfish (*Lophius budegassa*) Div VIIb–k and VIIa,b,d

Landings (2014) ~ 10.9 kt

Discards known to take place but can not be quantified

* **Category 3**

[survey trends (EVHOE), also information from commercial Ipue]

- no change in stock perception from last year
- no PA buffer (never applied because of steady effort decrease since early 1990s and overall increasing trend in indices)

➔ Advice as last year: Landings \leq 10 757 t

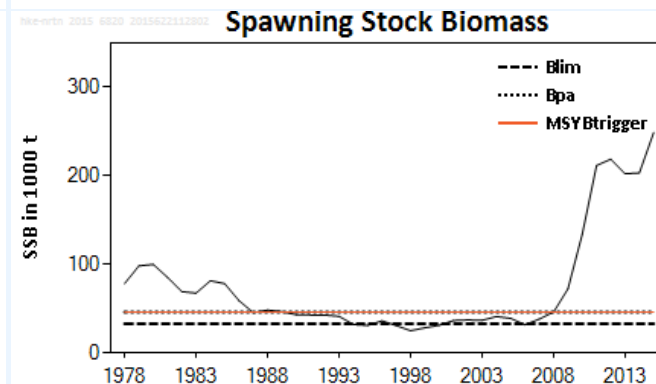
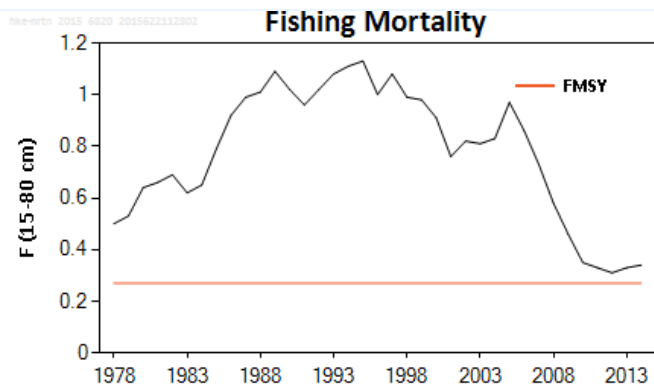
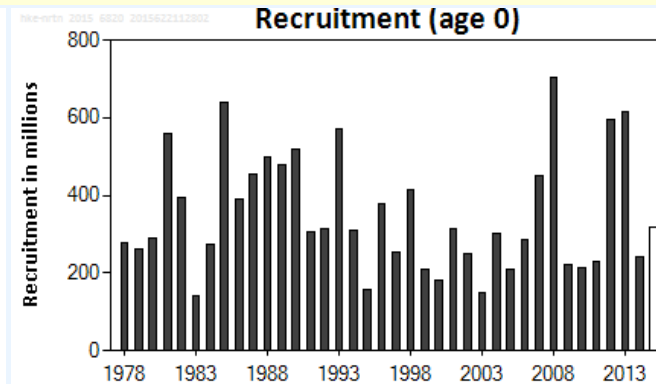
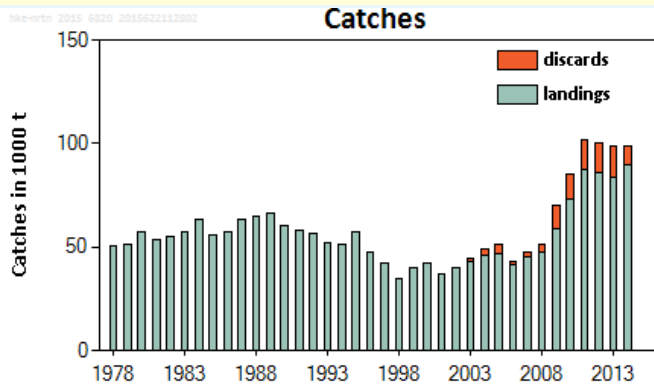
Total catch can not be quantified (discarding non-negligible but uncertain quality of available discards estimates)

- Only trends-based assessment at this time due to uncertain growth parameters and uncertain discard estimates

Hake – Northern stock (IIIa, IV, VI, VII, VIIIabd)

Advice for 2016, MSY: Catch \leq 109 592 t

If no LO: Landings \leq 96 651 t, assuming discard rates stay at last 3-year average



* F decreased significantly in last decade; remains above F_{MSY}

* Rec very high in 2012 and 2013; lower in 2014

* SSB at highest value since start of assessment

	Fishing pressure			Stock size						
	2012	2013	2014	2013	2014	2015				
Maximum Sustainable Yield	F_{MSY}	✘	✘	✘	Above	MSY $B_{trigger}$	✔	✔	✔	Above trigger
Precautionary approach	F_{par}	?	?	?	Undefined	B_{par}	✔	✔	✔	Full reproductive capacity
Management Plan	F_{MGT}	-	-	-	Not applicable	B_{lim}	-	-	-	Not applicable

Hake – Northern stock

Catch (2014) ~ 98.9 kt (~ 9% discards)

Discards of large fish increased strongly in recent years (more large fish and quota restrictions for some fleets)

Discards of juvenile hake also substantial in some areas and fleets

$F(2015) = F(2012-14) = 0.33$; $SSB(2016) = 287$ kt > MSY Btrigger (46.2 kt)

$F_{MSY} = 0.27$

Rationale	Total Catch 2016	Additional unwanted catch 2016	FROM FORECAST								
			Wanted catch 2016	Unwanted catch 2016	Basis	F total 2016	F wanted catch 2016	F unwanted catch 2016	SSB (2017)	%TAC change*	%SSB change 2017 vs 2016
MSY approach	109592	2513	96651	10428	F_{MSY}	0.27	0.21	0.06	291799	+6%	+2%
Recovery plan	102455	2350	90385	9720	$F_{recovery-plan}$	0.25	0.19	0.06	298739	-1%	+4%
Zero catch	0	0	0	0	$F = 0$	0	0	0	398305	-100%	+39%
Other options	70997	1631	62713	6653	$F_{sq} \times 0.5$	0.17	0.13	0.04	329322	-31%	+15%
	87480	2008	77222	8250	-15% TAC	0.21	0.16	0.05	313299	-15%	+9%
	95686	2195	84438	9053	$F_{sq} \times 0.7$	0.23	0.18	0.05	305320	-7%	+6%
	102983	2362	90849	9772	Equal TAC	0.25	0.19	0.06	298225	0%	+4%
	118511	2716	104476	11319	+15% TAC	0.30	0.23	0.07	283133	+15%	-1%
	118503	2716	104468	11319	$F_{sq} \times 0.9$	0.30	0.23	0.07	283133	+15%	-1%
	129252	2961	113888	12403	$F_{sq} \times 1$	0.33	0.25	0.08	272675	+25%	-5%
149522	3422	131619	14481	$F_{sq} \times 1.2$	0.40	0.30	0.09	252950	+45%	-12%	

Weights in tonnes

* Wanted catch (2016) relative to TAC 2015 (90 849 t)

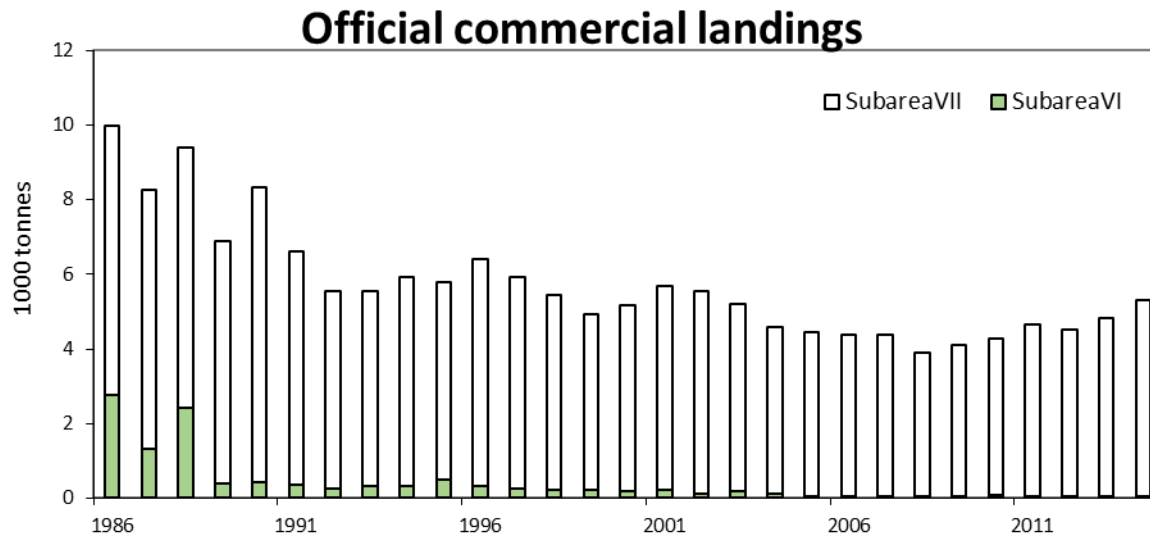
“Additional unwanted catch” calculated as $0.026 \times$ forecasted wanted catch

Pollack in Subareas VI and VII

Advice for 2016 and 2017, Precautionary Approach:

Commercial catch $\leq 4\ 200$ t ; ICES can not quantify recreational catches

Stock
category 4

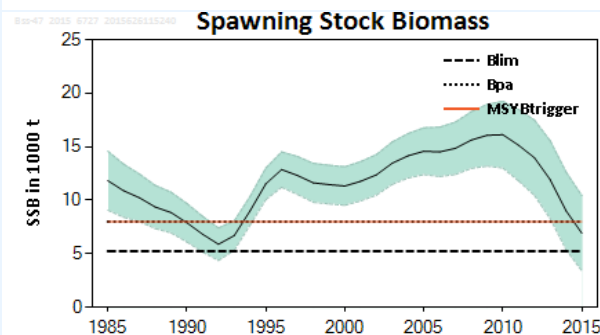
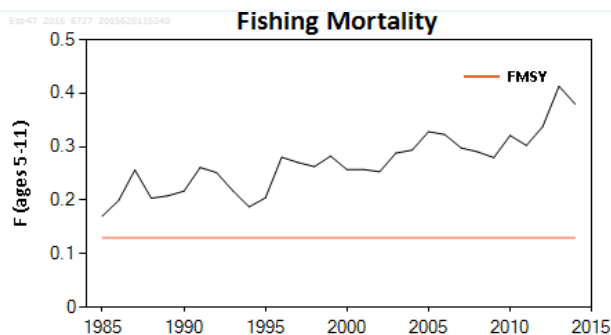
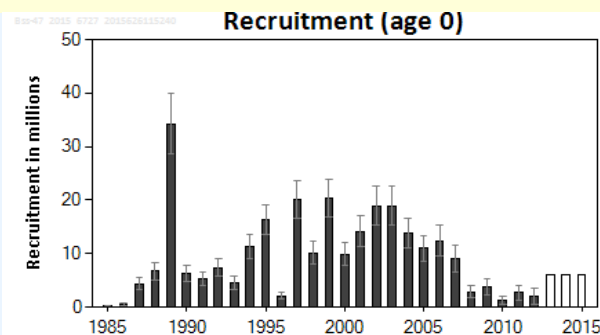
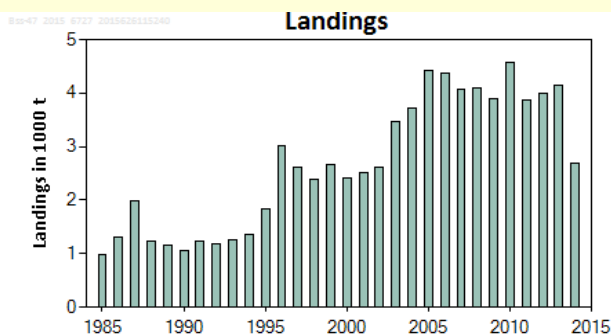


- * Advice based on official commercial landings (almost all landings from Subarea VII)
- * Stock status unknown
- * DCAC (method to estimate a sustainable catch, interpreted as an approximation to MSY) applied in 2012 to Subareas VI and VII separately.
No change in perception → same advice applicable to 2016 and 2017
- * Main uncertainty is the unknown recreational catch, considered to be significant
- * Further information on stock identity and biological information needed

Sea bass in IVbc, VIIa and VIId-h

Advice for 2016, MSY: Total landings (commercial + recreational) ≤ 541 t
total catch can not be quantified

A management plan urgently needed, to develop and implement measures to substantially reduce fishing mortality throughout the range of the stock



- * Landings in graph only commercial fishery
- * F is for commercial + recreational fishery (based on the available information: ~ 1500 t recreational landings in 2012)
- * F increasing and $> F_{MSY}$ proxy
- * recruitment very poor since 2008
- * decreasing SSB
- * new: MSY Btrigger (8000 t)

2012 2013 2014

2013 2014 2015

Maximum Sustainable Yield	F_{MSY}	✘	✘	✘	Above
Precautionary approach	F_{pa}, F_{lim}	?	?	?	Undefined
Management plan	F_{MGT}	-	-	-	Not applicab

MSY	✔	✔	✘	Below trigger
$B_{trigger}$	✔	✔	○	Increased risk
B_{pa}, B_{lim}	✔	✔	-	Not applicable
SSB_{MGT}	-	-	-	Not applicable

Sea bass in IVbc, VIIa and VIId-h

Commercial landings 2014 ~ 2 700 t (discards not quantified ~ 5% in weight).
 Recreational catch substantial, not fully quantified (surveys indicate annual landings ~ 1 500 t in 2012)

Stock structure poorly understood, tagging studies ongoing

Although there are uncertainties in the assessment, results (recruitment, SSB) confirmed by all available data.

$F(2015) = F(2014) = 0.38$ (0.28 comm + 0.10 recreat); $SSB(2016) = 5\,280\text{ t} < MSY\ B_{trigger}$ (8 000 t)

Weights in tonnes

$F_{MSY} = 0.13$

Rationale	Total landings 2016 commerc + recreat	Basis	F total	SSB (2017)	%SSB change 2017 vs 2016
MSY approach	541	$F_{MSY} \times SSB_{2016} / MSY\ B_{trigger}$	0.09	5581	+6%
Zero catch	0	$F = 0$	0	6058	+15%
Other options	804	$F_{MSY} = 0.13$	0.13	5351	+1%
	2093	F_{2014}	0.38	4232	-20%
	1733	$0.8 \times F_{2015}$	0.30	4543	-14%
	1346	$0.6 \times F_{2015}$	0.23	4879	-8%
	929	$0.4 \times F_{2015}$	0.15	5242	-1%
	482	$0.2 \times F_{2015}$	0.08	5634	+7%

Management plan needed.

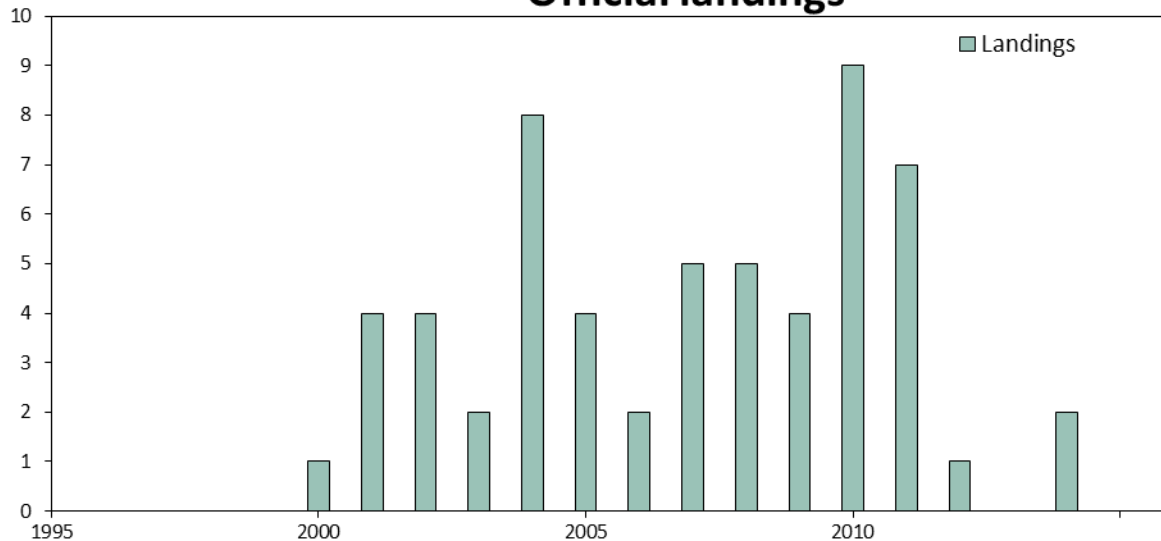
F should be reduced; stock likely to decline further in short-term due to recent low recruitment.

Sea bass in VIa, VIIb and VIIj (West of Scotland and Ireland)

Advice for 2016 and 2017, Precautionary Approach:

Commercial landings ≤ 5 t in each of the years; total catch can not be quantified

Official landings



* Only official commercial landings available (very low)

* discards not quantified

* recreational catch unknown

- Stock category: 6
- Stock identity poorly understood, tagging studies ongoing.
- Moratorium for Irish commercial fisheries since 1990 (Irish industry reports high sporadic catches which are discarded); negligible sea bass discards in observer trips
- Precautionary buffer (20% reduction) applied in the advice issued in 2013 and no change in stock perception → same advice applicable for 2016 and 2017

Irish Sea (VIIa)



- Cod
- Haddock
- Whiting
- Plaice
- Sole

IN AUTUMN:

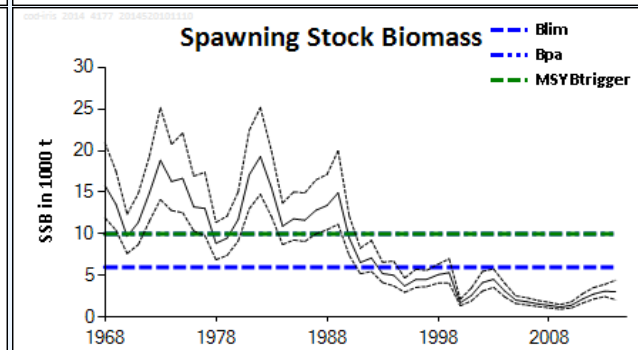
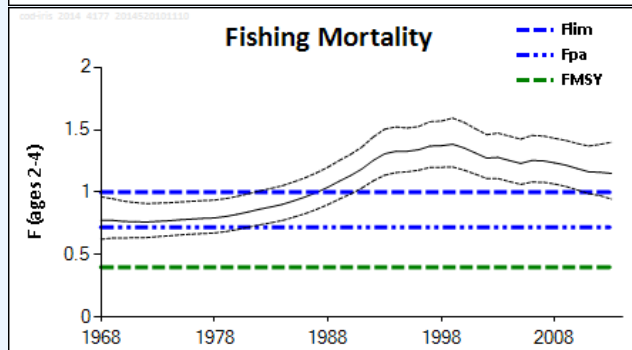
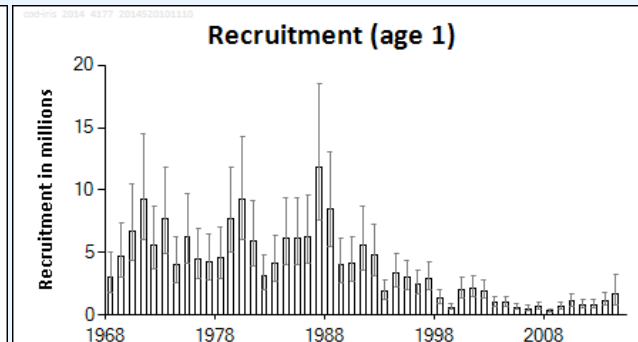
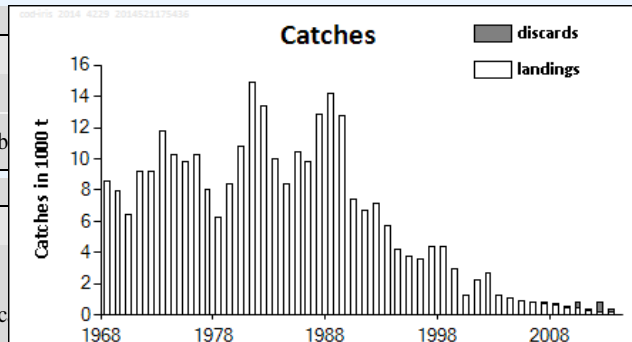
- *Nephrops*
(FUs 14-15-19)

Cod in Division VIIa (Irish Sea)

Advice for 2015 and 2016, MSY & PA:

- Advice issued in 2012 was biennial (for 2013 and 2014)
 - New data do not change stock perception → same advice for 2015 and 2016
- No directed fisheries; bycatch and discards should be minimised

		Fishing pressure		
		2011	2012	2013
MSY (F_{MSY})		✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})		✗	✗	✗ Harvested unsustainably
		Stock size		
		2012	2013	2014
MSY ($B_{trigger}$)		✗	✗	✗ Below trigger
Precautionary approach (B_{pa}, B_{lim})		✗	✗	✗ Reduce reproductive capacity



F declining, above F_{lim}

SSB increased recently, but well below B_{lim}

Recruitment continues low

Cod in Division VIIa (Irish Sea)

- At present, cod mainly bycatch in *Nephrops* fishery; selectivity devices introduced in recent years to reduce cod bycatch
- Discard estimates not integrated in assessment due to the short time-series
- Model estimates removals much larger than reported landings, despite more accurate catch reporting

Causes for discrepancy unclear

- Alternative assessment based on available discard data and without estimating total removals shows a substantial reduction in F , but still very low SSB and Recruitment

Haddock in Division VIIa (Irish Sea)

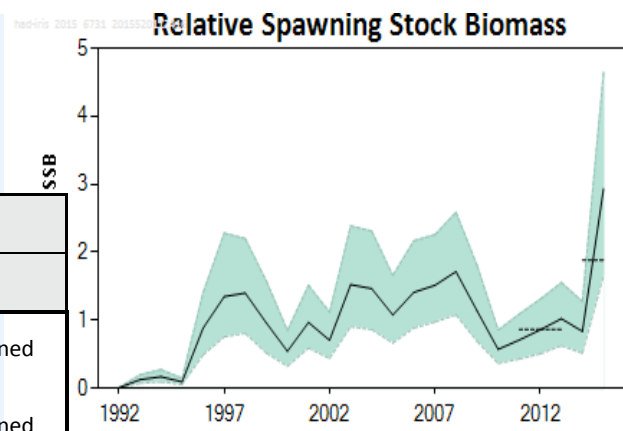
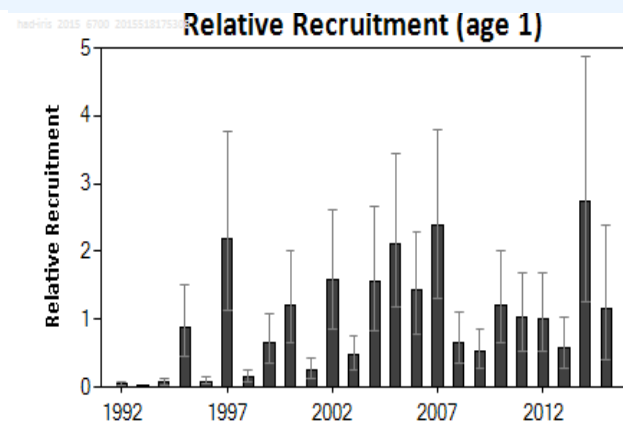
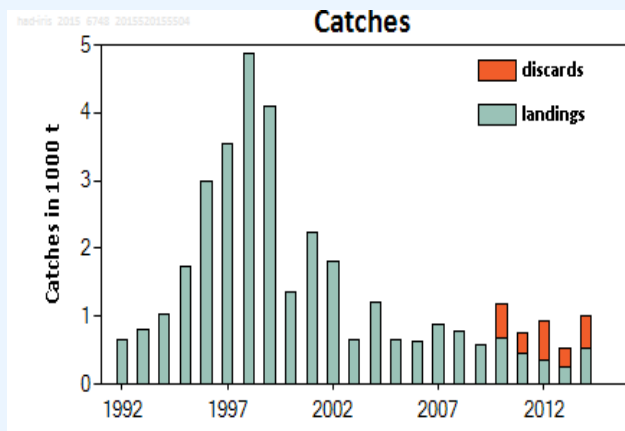
Advice for 2016, Precautionary Approach: Catch $\leq 1\,072\text{ t}^*$

If no LO: Landings $\leq 481\text{ t}$, assuming discard rates stay at last 3-year average

*Advice is for stock and does not include catches taken or reported in rectangles 33E2-3

Assessment:
survey-based,
indicative of trends
(Category 3)

Strong 2013 year class
led to SSB increase in
2015

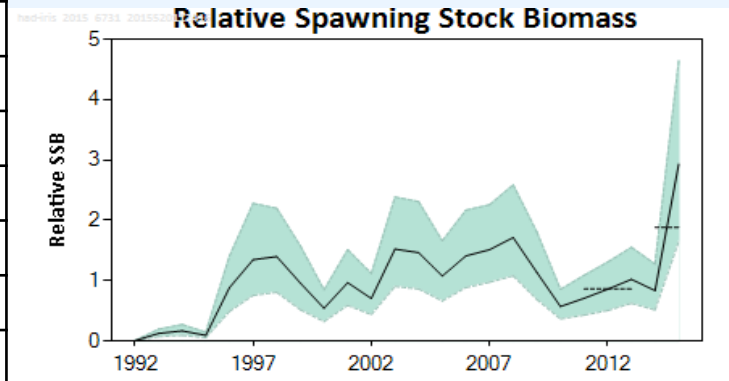


	Fishing pressure			Stock size						
	2012	2013	2014	2013	2014	2015				
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined	MSY	?	?	?	Undefined
Precautionary approach	F_{par}, F_{lim}	?	?	?	Undefined	B_{par}, B_{lim}	?	?	?	Undefined
Management Plan	F_{MGT}	-	-	-	Not applicable	SSB_{MGT}	-	-	-	Not applicable
Qualitative evaluation	-	?	?	?	Unknown	-	↗	↘	↗	Increasing

Haddock in Division VIIa (Irish Sea)

Catch (2014) ~ 1 000 t (~ 49% discards)

Index A (2014–2015)	0.98	
Index B (2011–2013)	0.45	
Index ratio (A/B)	2.18	
Uncertainty cap	Applied	1.2
Recent advised catch (for 2015)	893 tonnes	
Discard rate (average 2012-2014)	55%	
Precautionary buffer	Not applied*	-
Catch advice (Recent advised catch x cap)	1072 tonnes	
Wanted catch corresponding to the catch advice	481 tonnes	



*Precautionary buffer not needed given the large increase in index

Landings from south of Division VIIa (rectangles 33E2-3) are not considered part of this stock (included in haddock VIIb-k stock) → This needs to be considered when setting catch options for VIIa and VIIb-k

ICES framework with 20% uncertainty cap not sufficiently responsive to dynamic nature of this stock (high variability in recruitment)

Whiting in Division VIIa (Irish Sea)

Advice for 2016, Precautionary Approach:

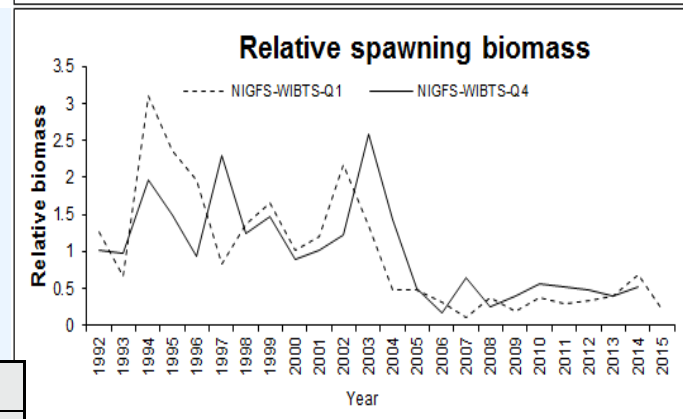
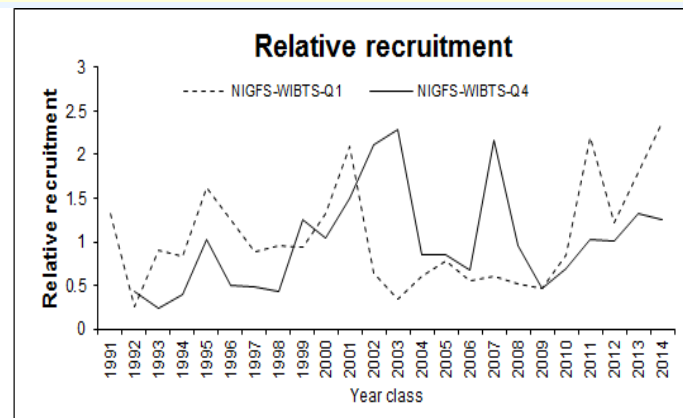
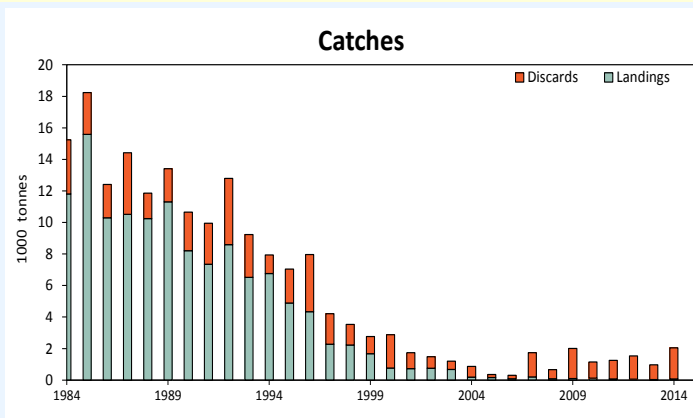
No directed fisheries and all catches should be minimised

Assessment:
survey-based,
indicative of trends
(Category 3)

Stock size very low

Catch(2014) ~ 2 000 t (~ 99% discards)

Majority of whiting caught are discards in *Nephrops* fishery, below MLS → could become major choke

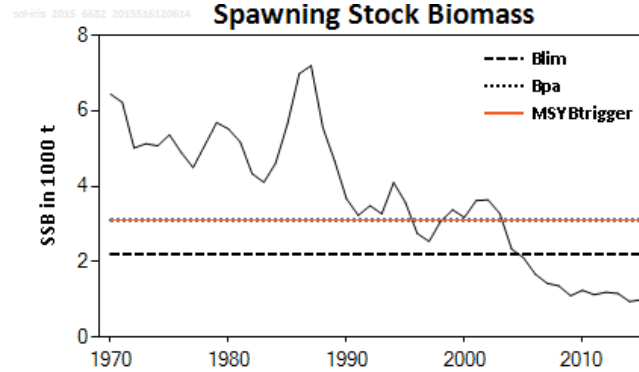
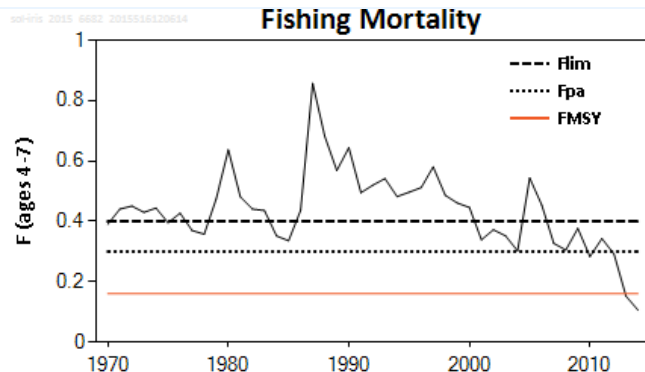
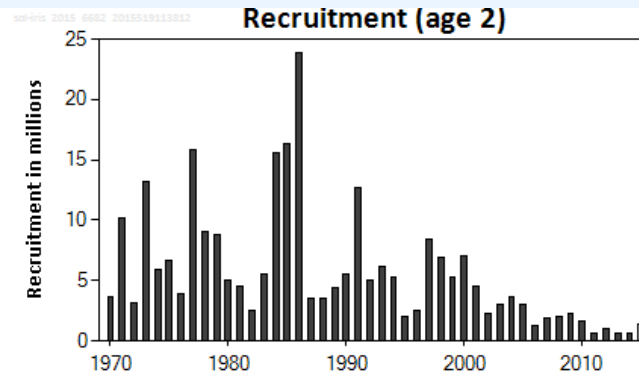
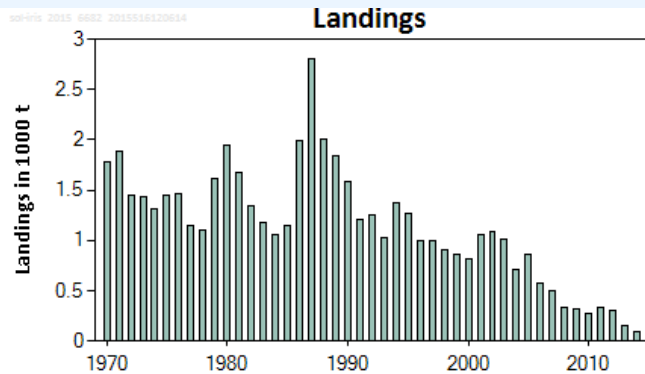


	Fishing pressure			Stock size			
	2012	2013	2014	2013	2014	2015	
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined	?	Undefined
Precautionary approach	F_{par} F_{lim}	?	?	?	Undefined	?	Undefined
Management Plan	F_{MGT}	-	-	-	Not applicable	-	Not applicable
Qualitative evaluation	-	?	?	?	Unknown	-	Below possible reference points

Sole in Division VIIa (Irish Sea)

Advice for 2016, MSY:

No directed fisheries and all catches should be minimised



* F :
 overall declining trend
 since late 1980s,
 below F_{MSY} since 2013

* Recent recruitment
 at lowest in time
 series

* SSB declined
 continuously and
 below B_{lim} in last
 decade

	Fishing pressure			Stock size		
	2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	✗	✓	✓	Below	
Precautionary approach	F_{pa} F_{lim}	✓	✓	✓	Harvested sustainably	
Management Plan	F_{MGT}	-	-	-	Not applicable	
	MSY	✗	✗	✗	Below trigger	
	$B_{trigger}$	✗	✗	✗	Reduced	
	B_{pa}	✗	✗	✗	reproductive capacity	
	B_{lim}	✗	✗	✗	reproductive capacity	
	SSB_{MGT}	-	-	-	Not applicable	

Sole in Division VIIa (Irish Sea)

Catch (2014) ~ 106 t (~ 7% discards)

Discards not included in assessment, but not expected to change stock perception

$F(2015)=0.10$ (TAC constraint); $SSB(2016) = 1\,105\text{ t} < B_{lim}$ (2 200 t)

$F_{MSY} = 0.16$

Rationale	Total catch (2016) *	Wanted catch (2016)	Basis	F Wanted catch (2016)	SSB (2017)	%SSB change 2017 vs 2016	%TAC Change^
MSY approach	0	0	F = 0	0	1351	+22%	-100%
Other options	62	58	$F_{MSY} \times SSB_{2016} / MSY B_{trigger}$	0.057	1293	+17%	-35%
	73	68	TAC – 25%	0.066	1285	+16%	-25%
	83	77	TAC – 15%	0.075	1276	+15%	-15%
	97	90	Stable TAC	0.089	1263	+14%	0%
	112	104	TAC + 15%	0.103	1249	+13%	+15%
	109	101	F_{2015}	0.101	1251	+13%	+12%

* Total catch from Wanted catch forecast, based on 7% discard rate (2012-2014 average)

^ Wanted catch (2016) relative to TAC 2015 (90 t)

Even with no catch in 2016, the stock will remain below B_{lim} in 2017

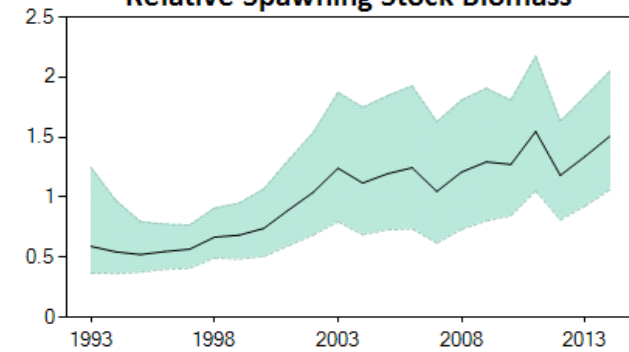
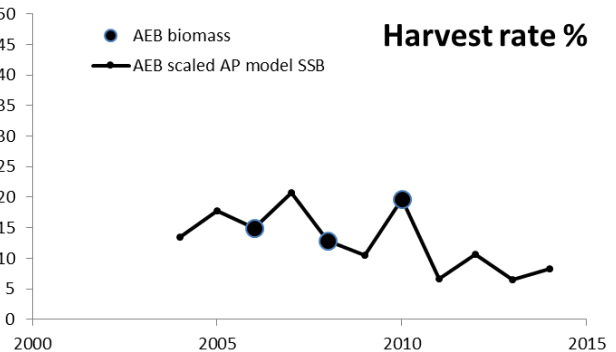
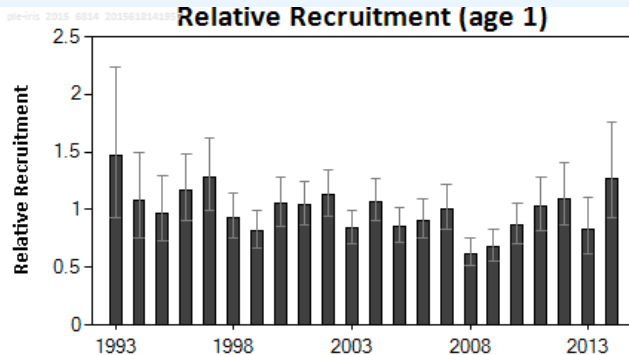
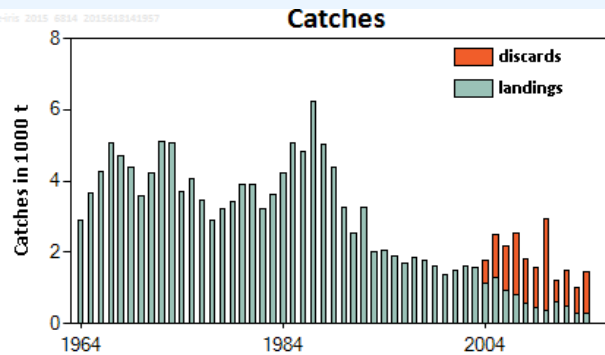
Given low SSB and Rec in last decade → catch advice = 0 (MSY approach)

Total effort in mixed demersal and beam trawl fisheries has declined substantially over last decade to lowest recorded levels

Plaice in Division VIIa (Irish Sea)

Advice for 2016, Precautionary Approach: Catch $\leq 1\,244$ t

If no LO: Landings ≤ 343 t, assuming discard rates stay at last 3-year average



* Assessment indicative of trends (Category 3)

* SSB stable since 2003,

* high uncertainty in annual SSB estimates

* Harvest rate low, hence F considered below possible reference points

* Majority of catch is discarded; recent gear selectivity measures little effect on plaice

	Fishing pressure			Stock size				
	2012	2013	2014	2012	2013	2014		
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined			
Precautionary approach	F_{par} F_{lim}	?	?	?	Undefined			
Management Plan	F_{MGT}	-	-	-	Not applicable			
Qualitative evaluation	-	✓	✓	✓	Below possible reference points			
				MSY	?	?	?	Undefined
				$B_{trigger}$?	?	?	Undefined
				B_{par}	?	?	?	Undefined
				B_{lim}	-	-	-	Not applicable
				SSB_{MGT}	-	-	-	Not applicable
				-	↘	↗	↗	Stable

Plaice in Division VIIa (Irish Sea)

Catch (2014) ~ 1 480 t (~ 81% discards)

* **Category 3**

[SSB trends from assessment model and Harvest Rate]

- no change in stock perception from last year
- no PA buffer (never applied because F considered to be below possible reference points)

➔ Advice as last year: Catch \leq 1 244 t

If no LO and discard rates stay at average of 2012-2014 (72%),
this corresponds to landings of \leq 343 t

- Total effort in mixed demersal and beam trawl fisheries has declined substantially over last decade to lowest recorded levels

Irish Sea regional benchmark

- Management of Irish Sea fisheries challenged by lack of recovery in some fish populations (cod, whiting, sole) despite large reductions in fishing effort.
- Total mortality remains very high for gadoid stocks.
- There have also been significant changes in growth rates, productivity and maturity for various species.
- WKIrish: ~ 18 month process, driven by the objective of disentangling which potential drivers (ecosystem and/or environmental) are important to consider for stock assessments and management plans for Irish Sea fisheries.

Irish Sea regional benchmark

4 main workshops + intersessional work. The plan at present is:

- **WKIrish1** (September 2015): Impact of ecosystem and environmental drivers on Irish Sea fisheries management
- **WKIrish2** (late 2015): Data compilation
- **WKIrish3** (early 2016): Stock assessment benchmark
- **WKIrish4** (late 2016 or 2017): Towards development of an integrated ecosystem assessment and advice

WKIrish1 (Dublin, September 14-15):

Impact of ecosystem and environmental drivers on Irish Sea fisheries management

- a) With stakeholders, scope current challenges for advice provision for Irish Sea fisheries;
derive a list of management objectives that should be considered when exploring ecosystem based management of fisheries

WKIrish1 (Dublin, September 14-15):

Impact of ecosystem and environmental drivers on Irish Sea fisheries management

- b) Identify potential tools, data and knowledge to investigate the challenges to fisheries management in the Irish Sea (including analysis of productivity changes, carrying capacity, multispecies models, and mixed fisheries approaches). These can be empirical, simulation or qualitative in nature.

[The tools identified should be available for use throughout the following 12 months to explore the potential interactions of growth, selectivity and mortality on the dynamics of fish populations.]

WKIrish1 (Dublin, September 14-15):

Impact of ecosystem and environmental drivers on Irish Sea fisheries management

- c) Using the two ToRs above, develop a roadmap to generate the required scientific knowledge to support an ecosystem based fisheries management approach for the Irish Sea;
- d) Identify inter-sessional work needed, including an action list of responsible people for each task to lead the inter-sessional work.

Channel (Divisions VII d and e)



- Cod (IV, VIIId, Skagerrak)
- Sole (VIIId)
- Plaice (VIIId)

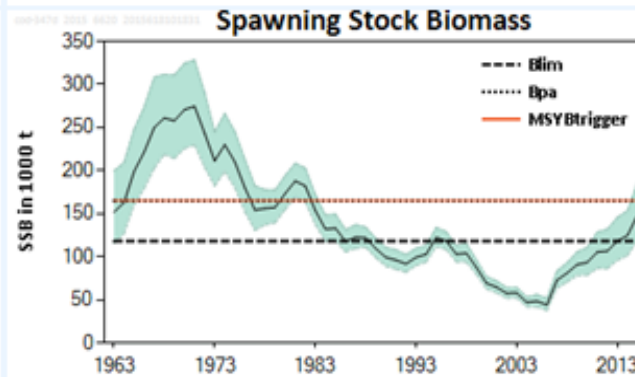
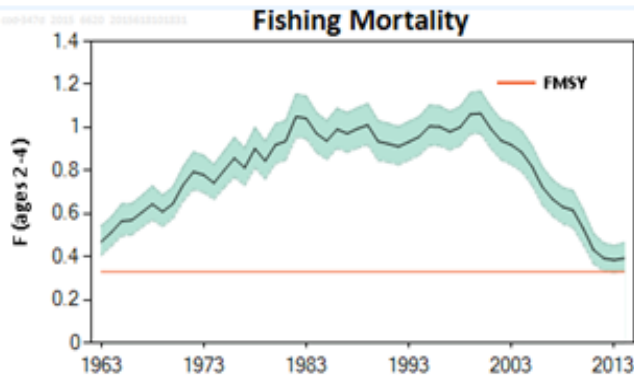
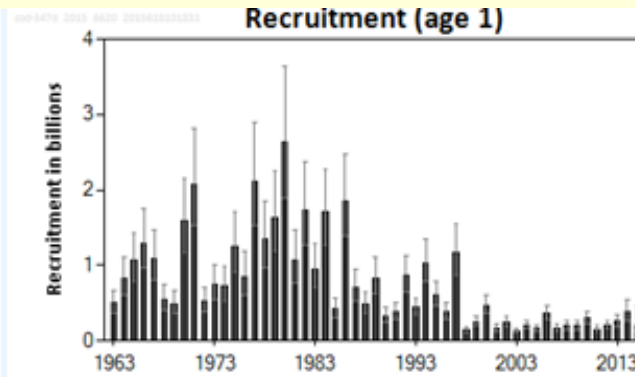
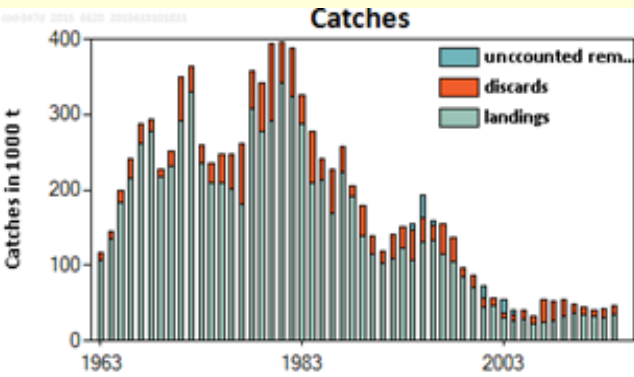
IN AUTUMN:

- Sole (VIIe)
- Plaice (VIIe)

Cod in Subarea IV and Divisions VIId and IIIa West

Advice for 2016, MSY: Catch $\leq 49\,259$ t

If no LO: Landings $\leq 40\,419$ t, assuming discard rates as in 2014



Benchmark in 2015

- * Revisions to catch data, survey indices, M, maturity, model settings

- * Annually varying maturity ogive (maturation at younger ages increased over time) → changes in SSB

- * Changes in exploitation pattern at older ages

- * New ref points: F_{MSY} , B_{lim} , B_{pa} , $MSY B_{trigger}$

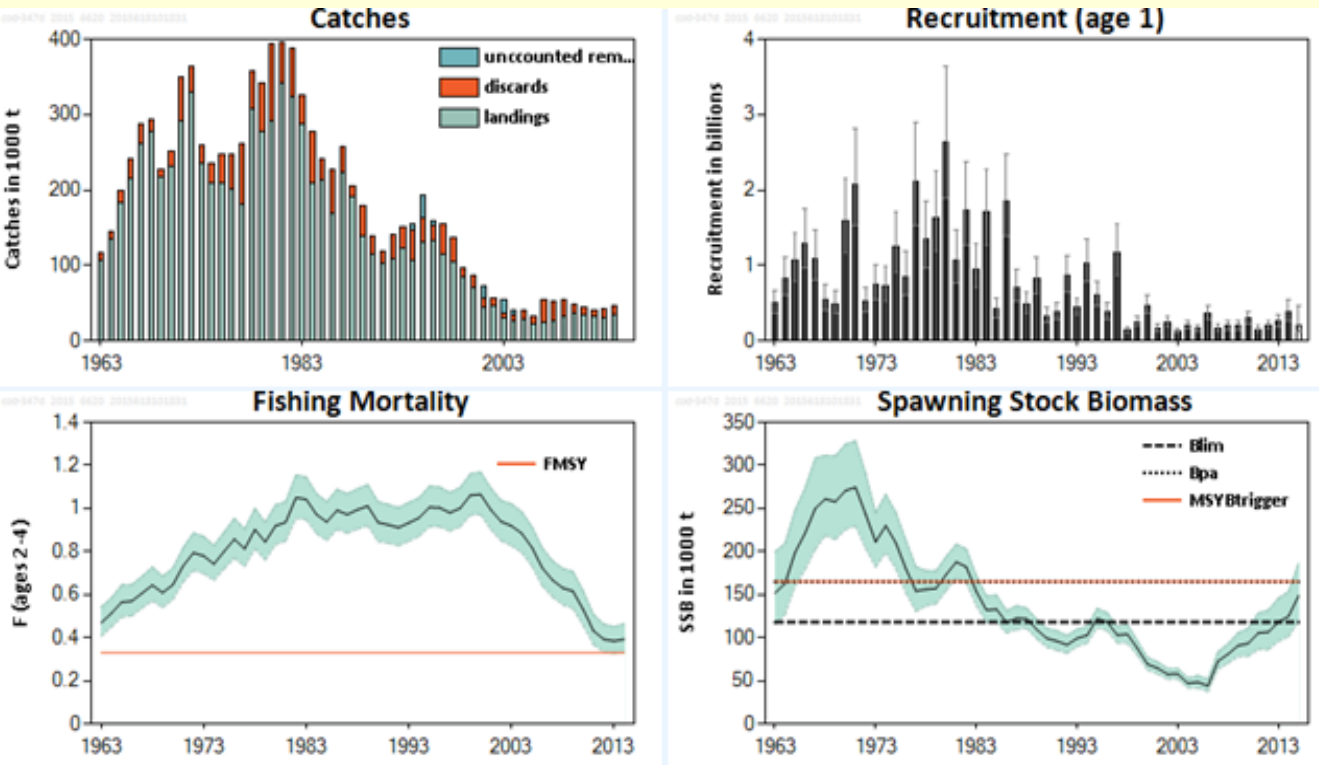
- * Until MP evaluated as precautionary, advice follows MSY approach

	Fishing pressure			Stock size			
		2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	✗	✗	✗	✗	✗	Above Below trigger
Precautionary approach	F_{pa} , F_{lim}	?	?	?	○	○	Undefined Increased risk
Management plan	F_{MGT}	✓	✓	✓	✗	✗	At F_{MS} -upper Below SSB_{MS} -upper

Cod in Subarea IV and Divisions VIId and IIIa West

Advice for 2016, MSY: Catch $\leq 49\ 259$ t

If no LO: Landings $\leq 40\ 419$ t, assuming discard rates as in 2014



* F declined since 2000, remains above F_{MSY}

* Rec: poor since 1998

* SSB: increasing since 2006, now between B_{lim} and B_{pa}

* Catch (2014) ~ 45.4 kt ($\sim 24\%$ discarded)

	Fishing pressure			Stock size			
		2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	✘	✘	✘ Above	✘	✘	✘ Below trigger
Precautionary approach	F_{pa} F_{lim}	?	?	?	○	○	○ Increased risk
Management plan	F_{MGT}	✔	✔	✔ At $F_{MS-upper}$	✘	✘	✘ Below $SSB_{MS-upper}$

Cod in Subarea IV and Divisions VIIId and IIIa West

F (2015)=F(2014)=0.40; SSB(2016) = 164 kt < MSY B_{trigger} (165 kt)

F_{MSY}=0.33

Rationale	Total catch 2016	Wanted catch 2016	Unwanted catch 2016	Basis	F _{total} 2016	F _{wanted} 2016	F _{unwanted} 2016	SSB (2017)	%SSB Change 2017 vs 2016	% TAC Change*
MSY approach	49259	40419	8840	$F_{MSY} \times SSB_{2016} / B_{trigger}$	0.33	0.23	0.10	187263	14	15
EU–Norway MS previous ref pts	51165	42073	9092	Long-term phase	0.34	0.24	0.10	184261	13	20
EU–Norway MS new ref pts	49778	40848	8930	Long-term phase	0.33	0.23	0.10	186640	14	17
Zero catch	0	0	0	F = 0	0.00	0.00	0.00	244123	49	-100
Other options	49648	40741	8907	F _{MSY}	0.33	0.23	0.10	186796	14	16
	34093	28049	6044	TAC ₂₀₁₅ - 20%	0.22	0.15	0.07	203741	25	-20
	36226	29802	6424	TAC ₂₀₁₅ - 15%	0.23	0.16	0.07	201332	23	-15
	38358	31555	6803	TAC ₂₀₁₅ - 10%	0.25	0.18	0.07	198785	22	-10
	40492	33308	7184	TAC ₂₀₁₅ - 5%	0.26	0.19	0.07	196308	20	-5
	42625	35061	7564	Constant TAC	0.28	0.20	0.08	193984	19	0
	44761	36814	7947	TAC ₂₀₁₅ + 5%	0.29	0.21	0.08	191717	17	5
	46896	38567	8329	TAC ₂₀₁₅ + 10%	0.31	0.22	0.09	189192	16	10
	49030	40320	8710	TAC ₂₀₁₅ + 15%	0.33	0.23	0.10	186562	14	15
	51165	42073	9092	TAC ₂₀₁₅ + 20%	0.34	0.24	0.10	184261	13	20
	58006	47608	10398	F ₂₀₁₅	0.40	0.28	0.12	177257	8	36
Mixed-fisheries options – minor differences in the calculation above can occur because of the different methodology used (ICES, 2015b).										
Maximum	101154			A	0.87			114022	-30	
Minimum	29047			B	0.19			192961	18	
Cod	47128			C	0.33			172550	5	
SQ effort	54726			D	0.39			164079	0	
Value	63388			E	0.47			154506	-6	
Effort_Mgt	46069			F	0.32			173736	6	

Weights in tonnes

* Wanted catch (2016) relative to 2015 TAC (35 061 t)

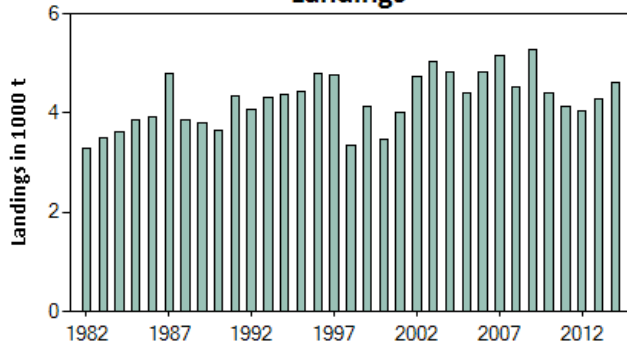
Mixed fisheries: Whiting and Nephrops FU6 (if own TAC) main limiting species in 2016.

Sole VIId – Eastern Channel

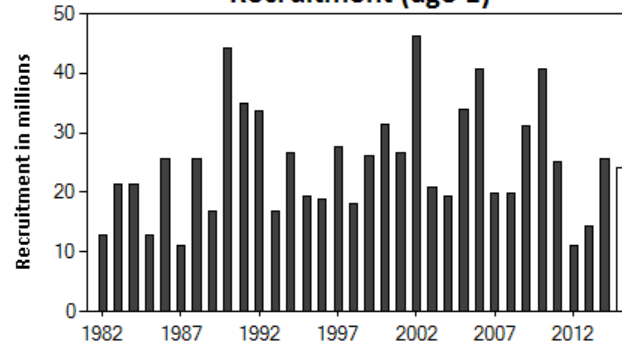
Advice for 2016, MSY: Catch $\leq 2\ 685$ t

If no LO: Landings $\leq 2\ 376$ t, assuming discard rates as in 2014

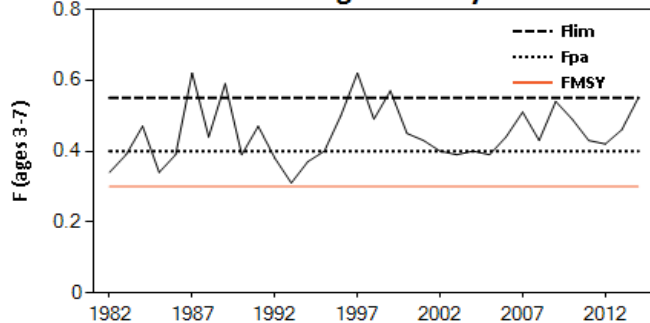
Landings



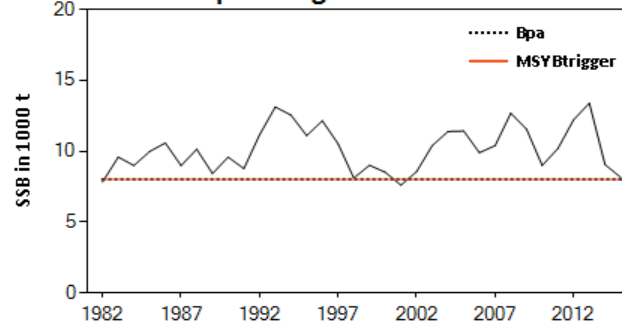
Recruitment (age 1)



Fishing Mortality



Spawning Stock Biomass



* F_{MSY} slightly revised, now 0.30

* F above F_{MSY} and at F_{lim} in 2014

* Recruitment in 2012 and 2013 among lowest in time series (most recent recruitment estimates uncertain for this stock and can change significantly between assessments)

* SSB fluctuating above $MSY B_{trigger}$

Fishing pressure

2012 2013 2014

Maximum Sustainable Yield

F_{MSY}



Above

Precautionary approach

F_{par}
 F_{lim}



Harvested unsustainably

Management Plan

F_{MGT}

-

-

-

Not applicable

Stock size

2013 2014 2015

MSY
 $B_{trigger}$



At trigger

B_{par} B_{lim}



Full reproductive capacity

SSB_{MGT}

-

-

-

Not applicable

Sole in Division VIId (Eastern Channel)

Catch (2014) ~ 5 200 t (discards ~ 11.5%)

High discards of plaice below MLS in 80 mm mixed flatfish beam-trawl fishery

$F(2015) = F(\text{TAC constraint}) = 0.50$; $SSB(2016) = 8\,440\text{ t} > MSY B_{\text{trigger}} (8\,000\text{ t})$

$F_{MSY} = 0.30$

Weights in tonnes

Rationale	Total Catch 2016*	Wanted catch 2016	Basis	F Wanted catch 2016	SSB(2017)	%SSB change 2017 vs 2016	%TAC Change**
MSY approach	2685	2376	F_{MSY}	0.3	10036	19	-32
Precautionary approach	3424	3030	F_{pa}	0.4	9340	11	-13
Zero catch	0	0	$F=0$	0	12569	49	-100
Other options	4111	3638	F_{2015}	0.5	8694	3	4
	3346	2961	TAC -15%	0.39	9414	12	-15
	3936	3483	Stable TAC	0.48	8859	5	0
	4525	4005	TAC +15%	0.57	8305	-2	15
<i>Mixed fisheries options – minor differences with calculation above can occur due to different methodology used (ICES, 2015b)</i>							
Maximum	6888		A	1.37	4969	-41	
Minimum	2086		B	0.27	10046	19	
Cod	3413		C	0.48	8634	2	
SQ effort	3792		D	0.55	8231	-2	
Value	3821		E	0.56	8200	-3	
Effort_Mgt	3696		F	0.53	8333	-1	

*Total catch calculated from forecasted wanted catch, based on discard rate of 2014 (11.5%)

** Wanted catch (2016) relative to 2015 TAC (3483 t)

Mixed fisheries: Big F reduction needed for stock to reach F_{MSY} in 2016

➔ sole in VIId is a main limiting stock in 2016

Plaice in Division VIIId (Eastern Channel)

Advice for 2016, MSY:

Division VIIId stock: Catch \leq 17 250 t

If no LO: Landings \leq 11 096 t, assuming discards stay at last 3-year average

Plaice caught in Div VIIId (assuming the proportion of plaice taken in Div VIIId that is from Division VIIe and Subarea IV plaice stocks is as during 2003-2014):

Catch of plaice in Div VIIId \leq 19 883 t

If no LO: Landings \leq 12 789 t, assuming discard rates stay at last 3-year average

Plaice mix during spawning period:

- part of the catches of plaice in Division VIIId are from the Western Channel and North Sea stocks
- ***assessment and advice assume that 87% of the annual plaice catch in VIIId is from the VIIId plaice stock, and 13% from adjacent stocks***
- assessment (for the stock) and advice (for the stock and for the area) account for this mixing
- new data are needed to determine if currently assumed mixing rates are still valid given the general increase of plaice stocks

Plaice in Division VIIId (Eastern Channel)

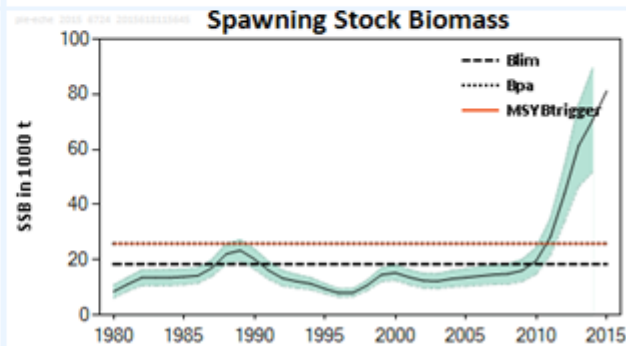
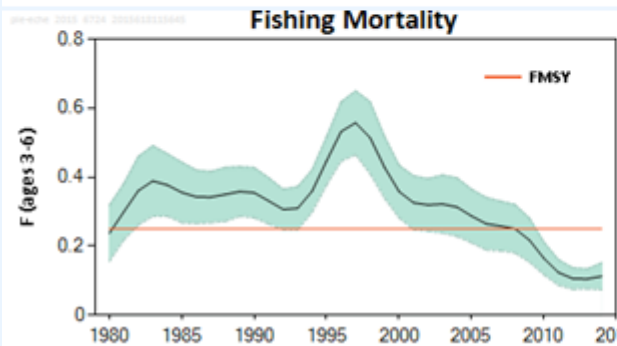
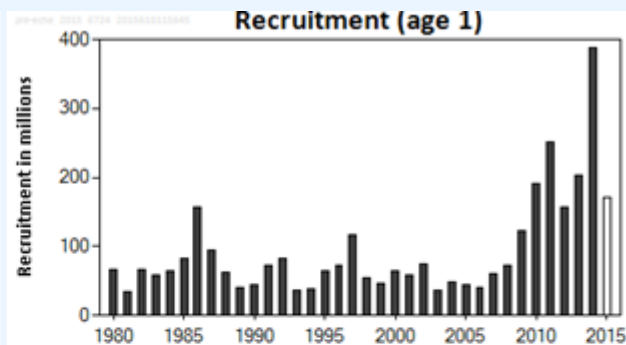
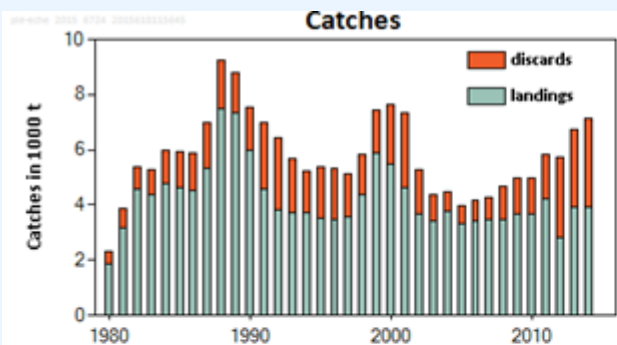
Benchmark in 2015

From Category 2 to 1

Discards included in assessment (data since 2006, earlier years estimated in assessment)

M revised (rescaled assessment)

All reference points new



* F declined since mid-1990s, presently below F_{MSY}

* Rec and SSB have increased strongly since 2010

	Fishing pressure			Stock size						
	2012	2013	2014	2013	2014	2015				
Maximum Sustainable Yield	F_{MSY}	✓	✓	✓	Appropriate	MSY	✓	✓	✓	Above trigger
Precautionary approach	F_{pa} F_{lim}	✓	✓	✓	Below possible reference points	B_{pa} , B_{lim}	✓	✓	✓	Full reproductive capacity
Management plan	F_{MGT}	-	-	-	Not applicable	SSB_{MGT}	-	-	-	Not applicable

Plaice in Division VIId (Eastern Channel)

Catch of plaice in VIId (2014) ~ 8 200 t (discards 47%)

* Large number of undersized plaice discarded with 80 mm mesh

F(2015)= F(2015 TAC & VIId prop) =0.07; SSB(2016) = 92.9 kt > MSY Btrigger (25.8 kt)

$F_{MSY} = 0.25$

Division VIId plaice stock											Plaice in Division VIId			
Rationale	Total catch 2016	Wanted catch 2016	Unwanted catch 2016	Basis	F total catch 2016	F wanted catch 2016	F unwanted catch 2016	SSB (2017)	% SSB change	% change want. catch vs 2014	Total catch (2016)	Wanted catch 2016	Unwanted catch (2016)	% change wanted catch vs 2014
MSY Approach	17250	11096	6156	F_{MSY}	0.25	0.14	0.1	89282	-4	202	19883	12789	7095	196
Other options	8087	5182	2906	F_{2014}	0.11	0.06	0.05	100694	8	41	9322	5973	3350	38
	5742	3675	2067	Landings 2014	0.08	0.04	0.03	103659	12	0	6618	4236	2383	-2
	6887	4410	2477	Land. 2014 +20%	0.09	0.05	0.04	102210	10	20	7938	5084	2856	18
	4595	2940	1656	Land. 2014 - 20%	0.06	0.03	0.03	105114	13	-20	5297	3389	1909	-22
<i>Mixed-fisheries options – minor differences with calculation above can occur because of the different methodology used (ICES, 2015b)</i>														
Maximum	17067			A	0.25			88039	-5					
Minimum	3958			B	0.05			104574	13					
Cod	5853			C	0.08			102150	10					
SQ effort	8170			D	0.11			99200	7					
Value	6971			E	0.10			100724	8					
EffortMgt	7501			F	0.10			100050	8					

Mixed fisheries: one of the less limiting stocks

The large catch advice for the VIId stock could lead to overexploitation of VIId stock under single TAC for VIId

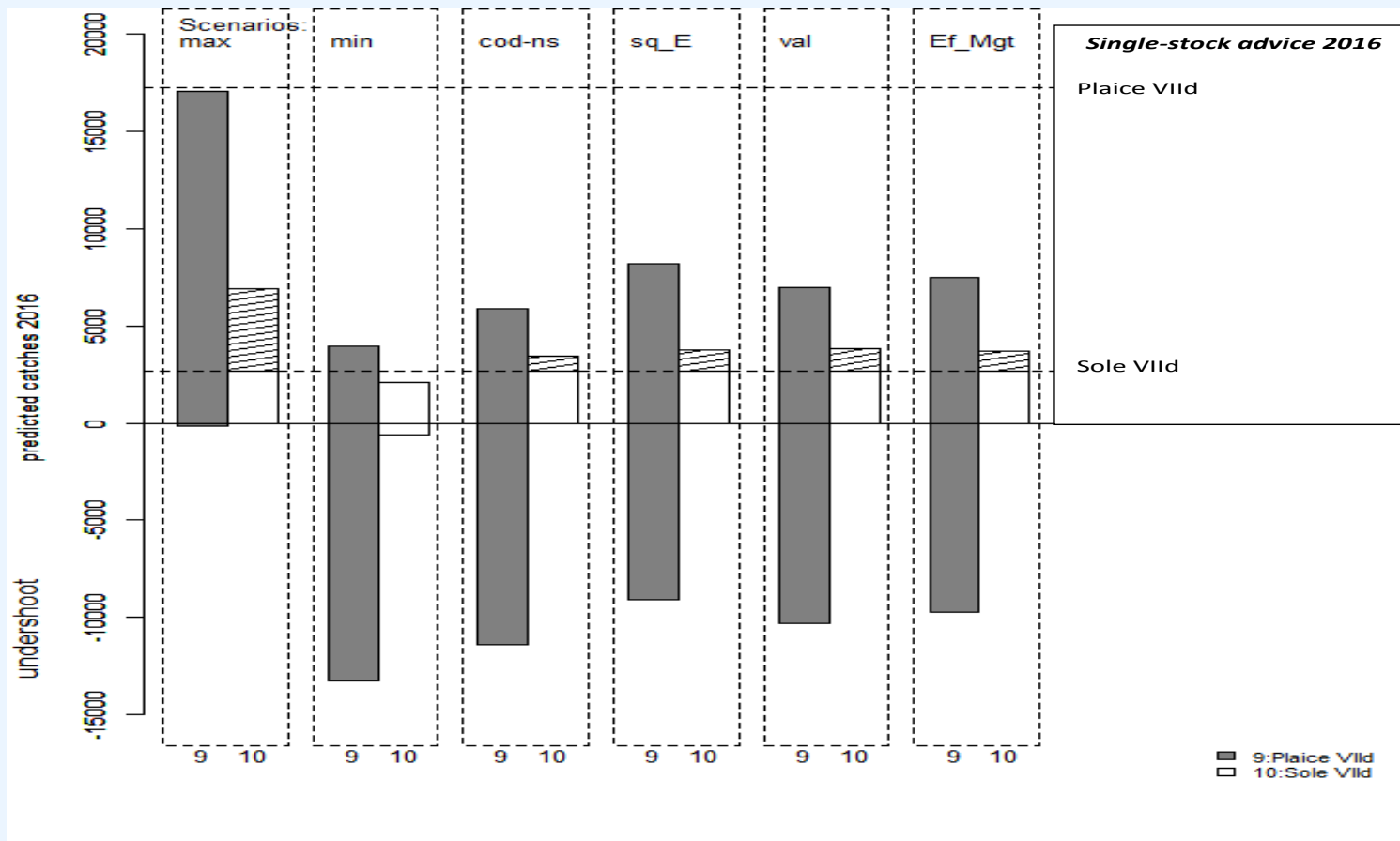
Mixed fisheries analysis for North Sea

Results for 2016

Detailed results for Eastern Channel plaice and sole:

Predicted catch for 2016, for the smaller stocks (flatfish stocks in Division VIId).
Detail from Figure 6.2.2.2.1

overshoot (hatched) and undershoot (below zero)



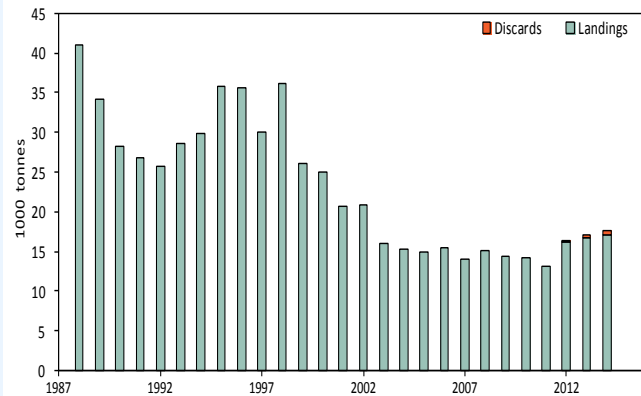
Deep-sea stocks

Ling in Div IIIa, IVa, and Subareas VI, VII, VIII, IX, XII, XIV

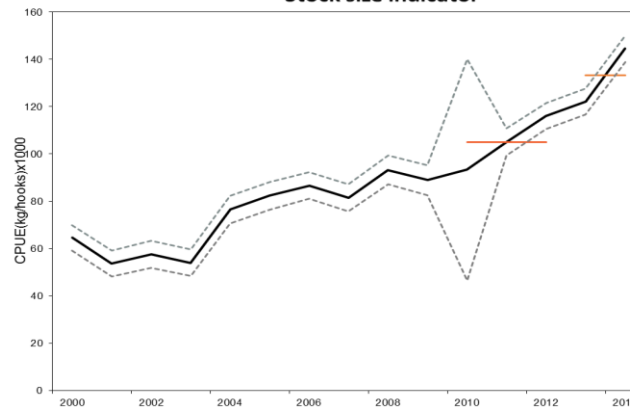
Advice for 2016 and 2017, Precautionary Approach:

Catch \leq 14 746 t in each year; discarding considered negligible

Catches



Stock size indicator



Stock category 3

Advice based on standardized commercial cpue from Norwegian LL

cpue series for IVa, VIa and VIb show similar trends

Index A (2013–2014)	133.3	
Index B (2010–2012)	104.9	
Index ratio (A/B)	1.27	
Uncertainty cap	Applied	1.2
Revised previous advice (2012–2015)**	12 288 t	
Discard rate	Negligible	
Precautionary buffer	Not applied	-
Catch advice*	14 746 t	

* (Revised previous advice) x cap

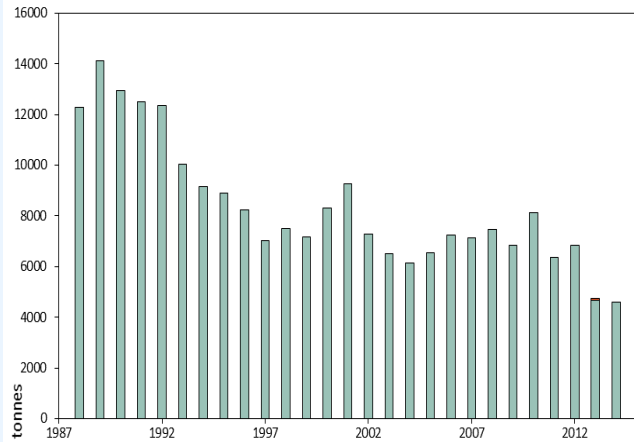
** Advice issued in 2012, recalculated using the index now available, resulting in (average 2009-11 catch) x (index ratio at that time=1.13) x (PA buffer)

Tusk in Div IIIa, Vb, VIa, XIIb, and Subareas IV, VII, VIII, IX

Advice for 2016 and 2017, Precautionary Approach:

Catch \leq 8 415 t in each year; discards considered negligible

Catches



Stock size indicator



Category 3.

Trends from standardized cpue from Norwegian fishery, which covers main areas of species

cpue shows similar trends in all main areas (IVa, Vb, VIa)

Index A (2013–2014)		138.1
Index B (2010–2012)		139.9
Index ratio (A/B)		0.99
Uncertainty cap	Not applied	
Previous advice (2013-2015)		8 500 t
Discard rate		Negligible
Precautionary buffer	Not applied	
Catch advice *		8 415 t

PA buffer never applied due to the rapid stock increase

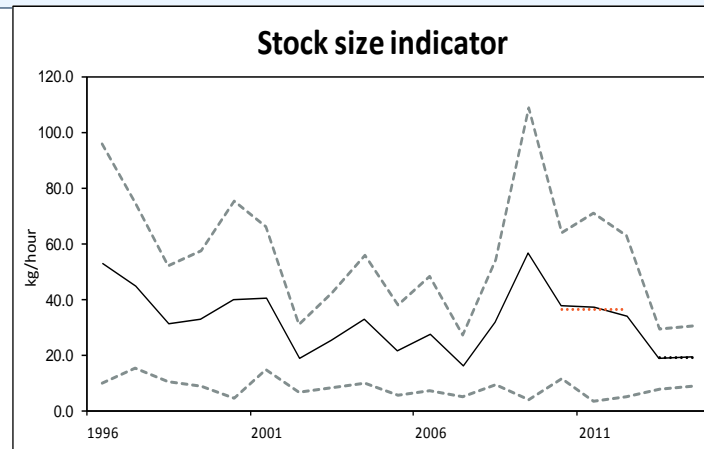
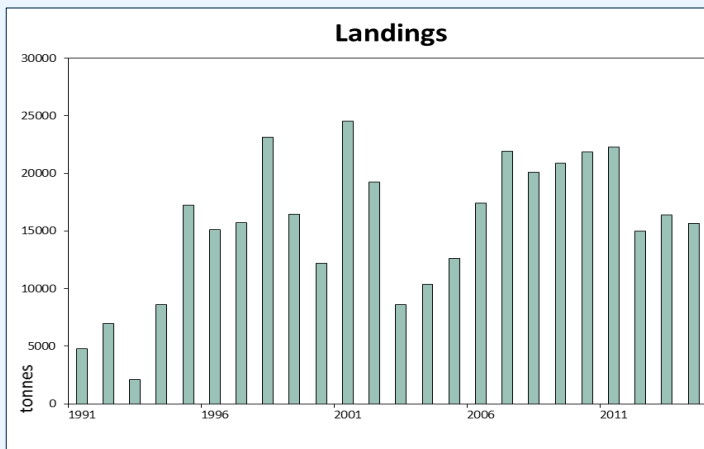
* (previous advice) x (index ratio)

Greater silver smelt in Vb and VIa

Advice for 2016 and 2017, Precautionary Approach: Landings $\leq 10\ 030$ t each year
Discarding known to take place, but ICES can not quantify corresponding catches

ICES has revised greater silver smelt advice units (before, a much larger area).
Stock structure unknown, but species not thought to be highly migratory and
fishery is in specific areas.

To reduce the risk of local depletion, 4 advisory units are now considered.



Category 3

biomass index
from Faroese
summer survey

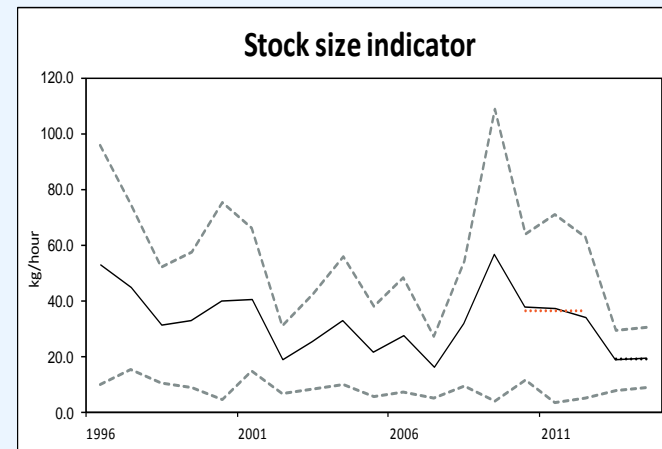
does not cover
whole stock area
(deeper stations
needed)

Most catches from Faroe Islands, where discarding is
not likely to be significant

Discarding may be substantial in EU waters; information from 2014 suggests discards
are about 5% of total stock catches but not all fisheries are included

Greater silver smelt in Vb and VIa

Index A (2013–2014)	19.1	
Index B (2010–2012)	36.3	
Index ratio (A/B)	0.53	
Uncertainty cap	Applied	0.8
Average landings (2012, 2013, 2014)	15 672 t	
Discard rate	Unknown	
Precautionary buffer	Applied	0.8
Landings advice*	10 030 t	



* Average landings (2012-2014) x cap x PA buffer

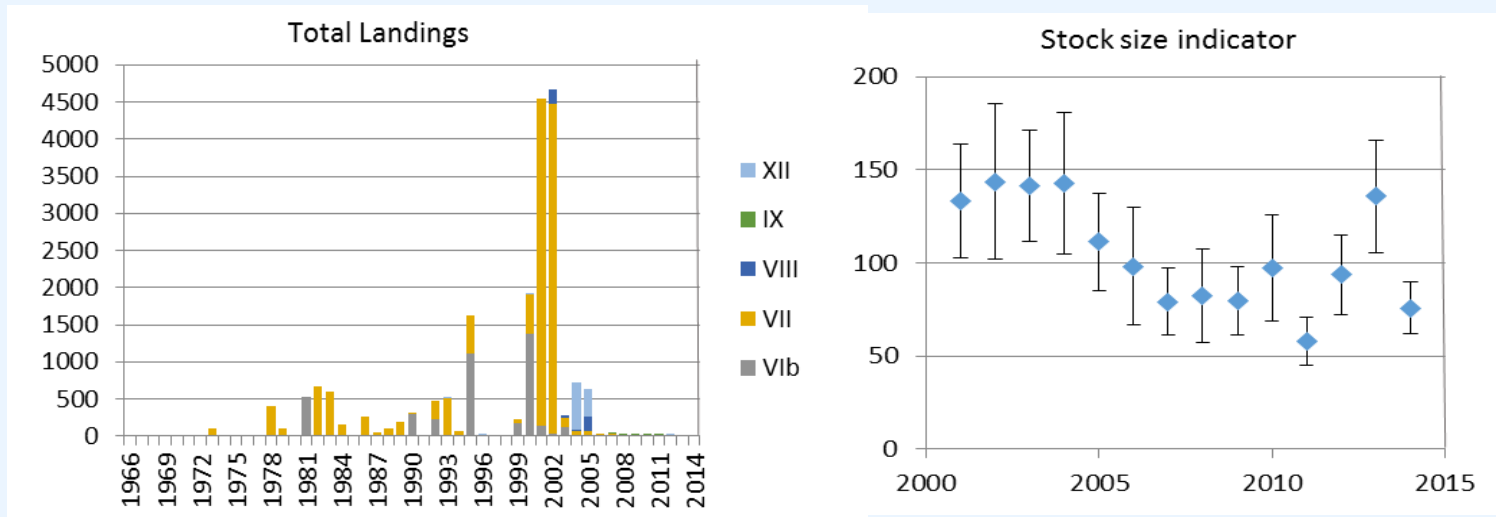
PA buffer applied because exploitation status unknown

Greater silver smelt in Subareas VII-X, XII, and Division VIb

Advice for 2016 and 2017, Precautionary Approach: Landings ≤ 15 t each year
Discarding known to take place, but ICES can not quantify corresponding catches

ICES has revised greater silver smelt advice units (before, a much larger area).
Stock structure unknown, but species not thought to be highly migratory and
fishery is in specific areas.

To reduce the risk of local depletion, 4 advisory units are now considered.

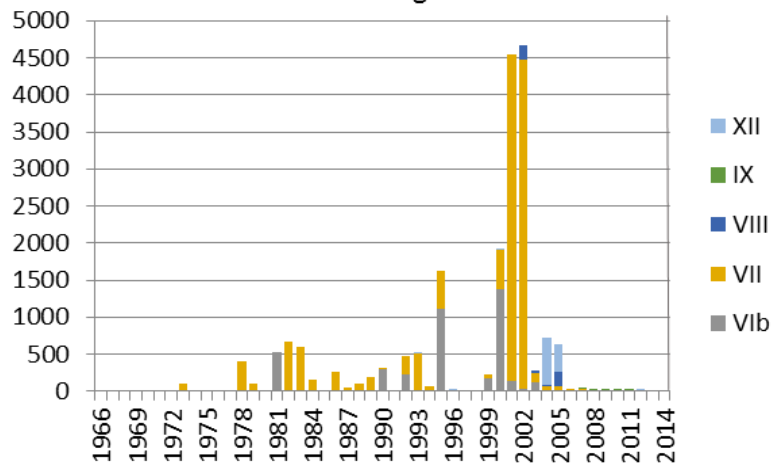


Category 3:

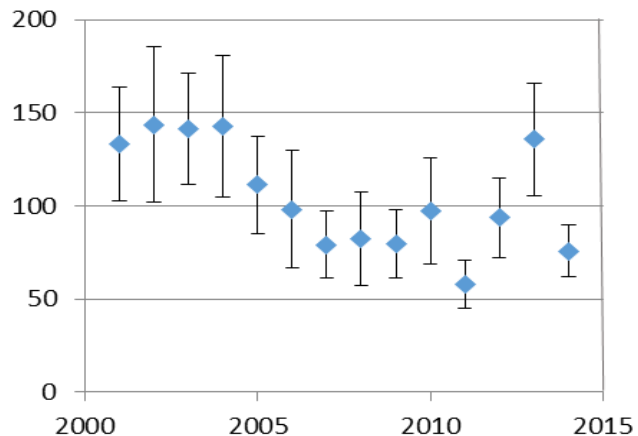
- biomass index Porcupine survey
- survey does not cover whole stock area, but represents area with bulk of catches

Greater silver smelt in Subareas VII-X, XII, and Division VIb

Total Landings



Stock size indicator



Index A (2013–2014)	91 t	
Index B (2010–2012)	74 t	
Index ratio (A/B)	1.22	
Uncertainty cap	Applied	1.20
Average landings (2012, 2013, 2014)	13 t	
Discard rate	Unknown	
Precautionary buffer	Not applied	
Landings advice *	15 t	

Landings variations over time more likely to reflect market variations than fish abundance.

Advice based on recent landings, may not reflect potential fishing opportunities

* (Average landings 2012-2014) x cap

PA buffer not needed because the low landings in recent years suggest low exploitation

Considerable discarding known to occur in some demersal and deep-water fisheries

Roughhead grenadier in Northeast Atlantic

Advice for 2016 to 2020: No directed fisheries ; bycatch should be counted against the TAC for roundnose grenadier to minimise potential for species misreporting

- Roughhead grenadier reported as bycatch, with records back to 1990.
- Reported landings mostly very low, with occasional large landings (> 1000 t) reported in VI, XII and XIV since 2002

ICES advice 2014 (Special request, November 2014):

- * Given uncertainty in species composition of the reported grenadier catches, it is currently not possible to provide advice on a fishery for roughhead grenadier.
- * If managers wish to explore the possibility of managing this fishery there is a need for more comprehensive catch and effort data, ideally through an extended observer programme and confirmation of species landings in the future.

ICES considers that historical roughhead grenadier catches have been low (< 100 t in recent years, based on limited on-board observations). These considerations drive the ICES advice.

Roughsnout grenadier in Northeast Atlantic

Advice for 2016 to 2020: No directed fisheries ; bycatch should be counted against the TAC for roundnose grenadier to minimise potential for species misreporting

- Landings for this species only reported in 2012 (57 t)
- This species should not be subject to individual TAC regulation or a separate advice sheet. There is no basis for future advice without reliable data.

Thank you!

Comments/Questions ?