

ICES advice for 2013

cod-haddock-whiting-plaice-sole
hake-anglerfish-megrims-*Nephrops*

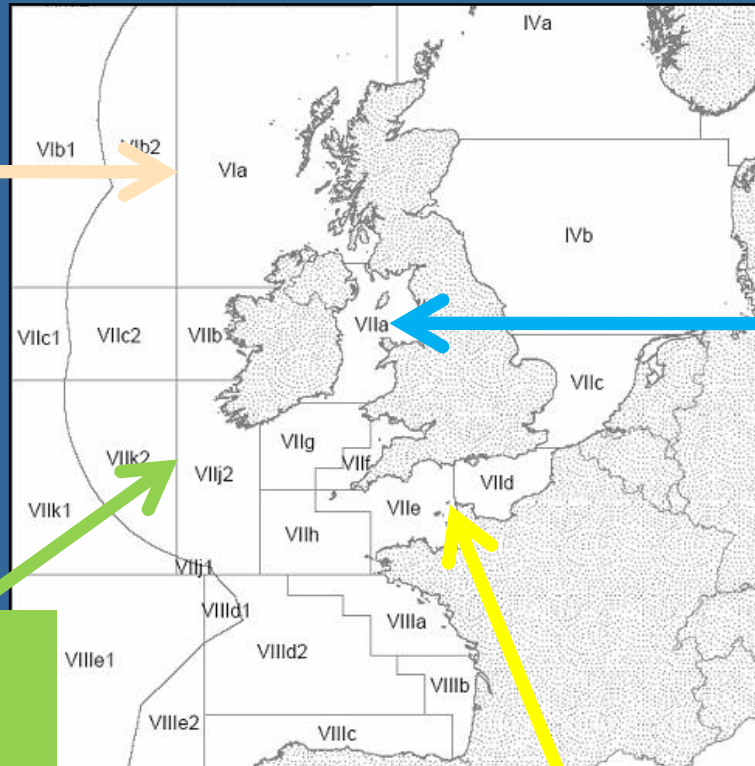
North Western Waters RAC

3 July 2012 – Dublin

Carmen Fernández
ACOM Vice-chair

West of Scotland & Rockall (VIab)

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



Irish Sea (VIIa)

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

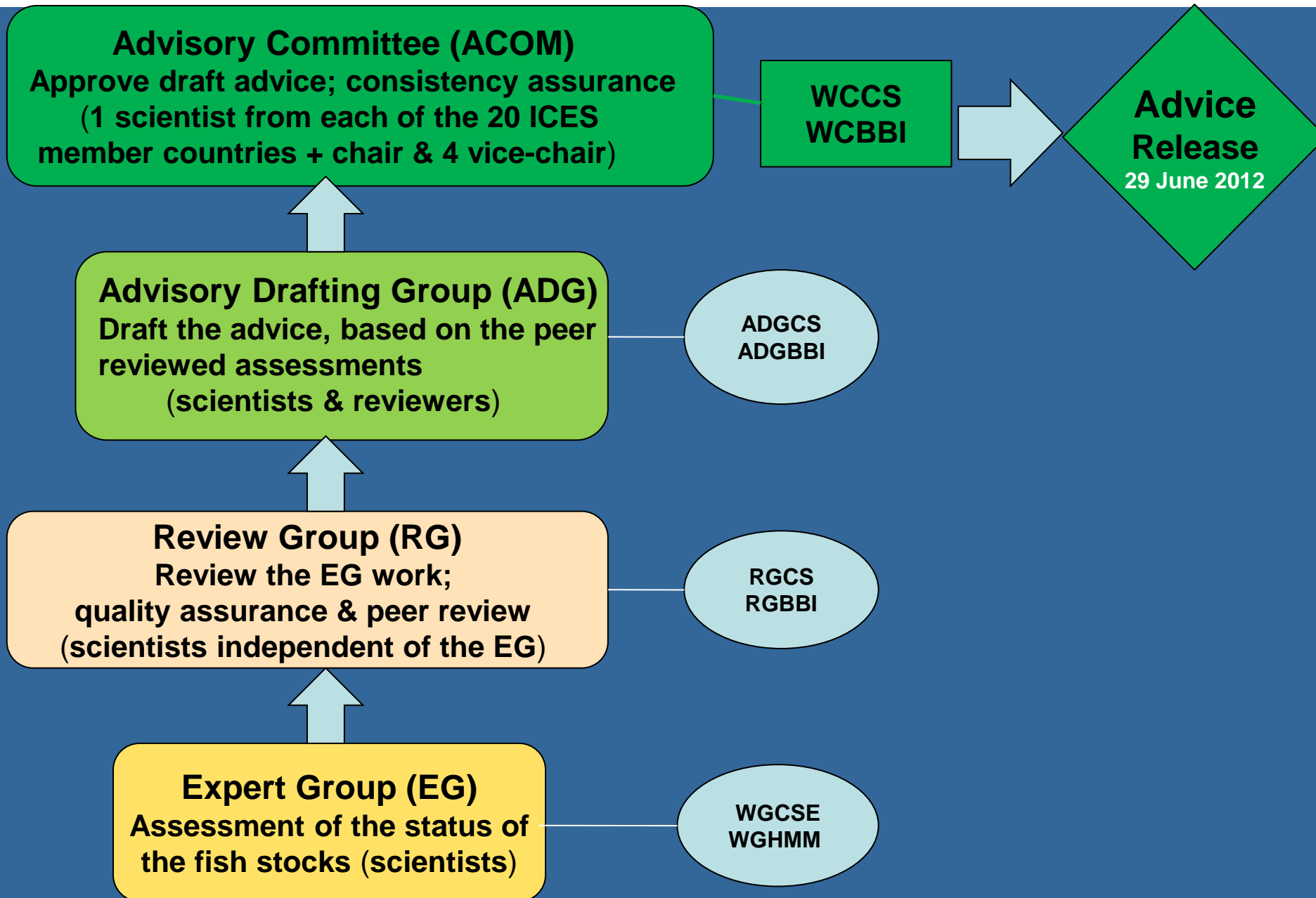
Celtic Sea & West, Southwest Ireland

- 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)
- Megrin (VIIb-k, VIIIabd)
- *Nephrops* (FUs 16-17-20-22)

English Channel

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

Advisory Process



All advice available online at:

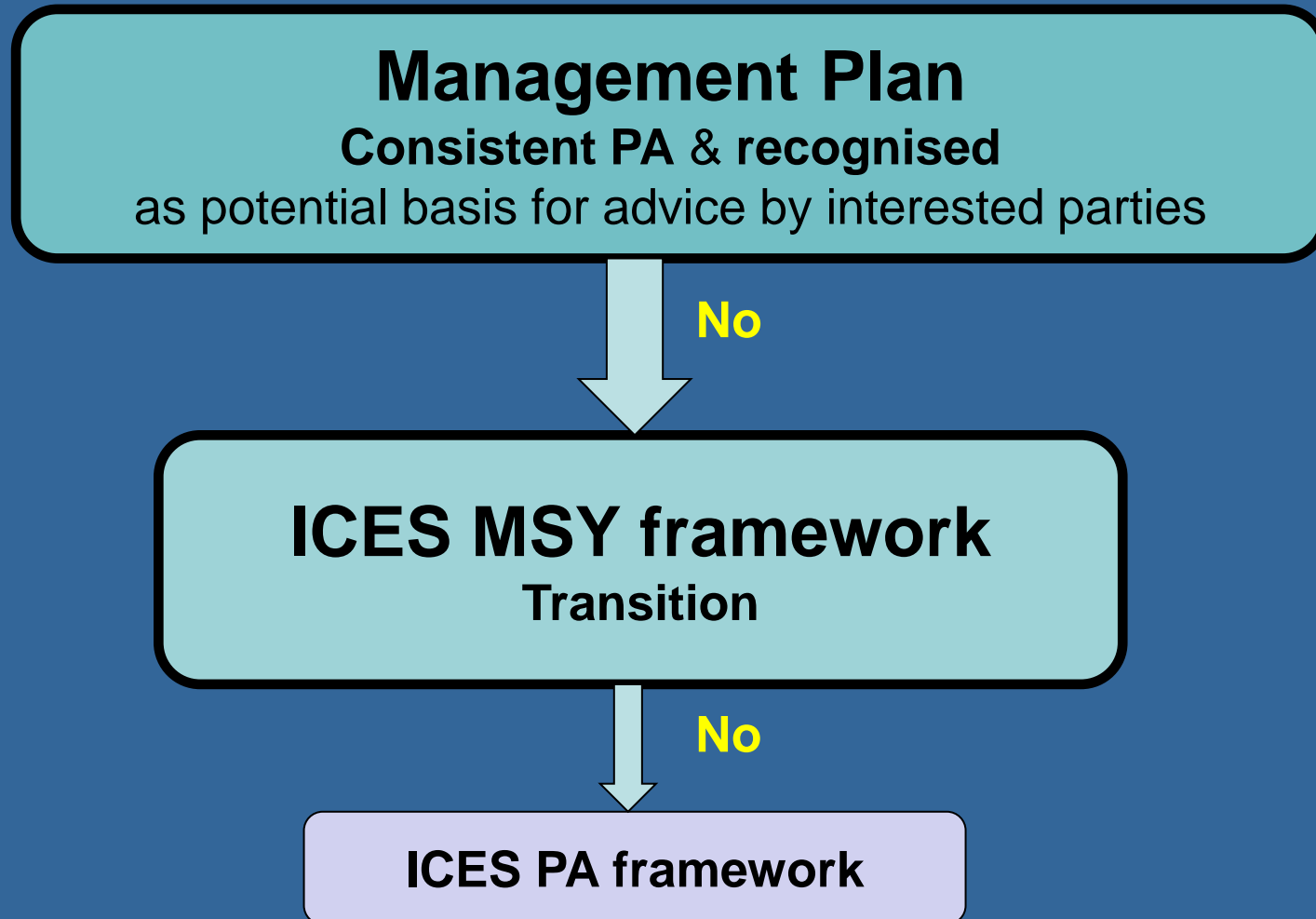
<http://www.ices.dk>

Follow link to

Advice → Latest advice

In addition to all advice items,

document “**General context to ICES advice**”
explains principles and basis for advice

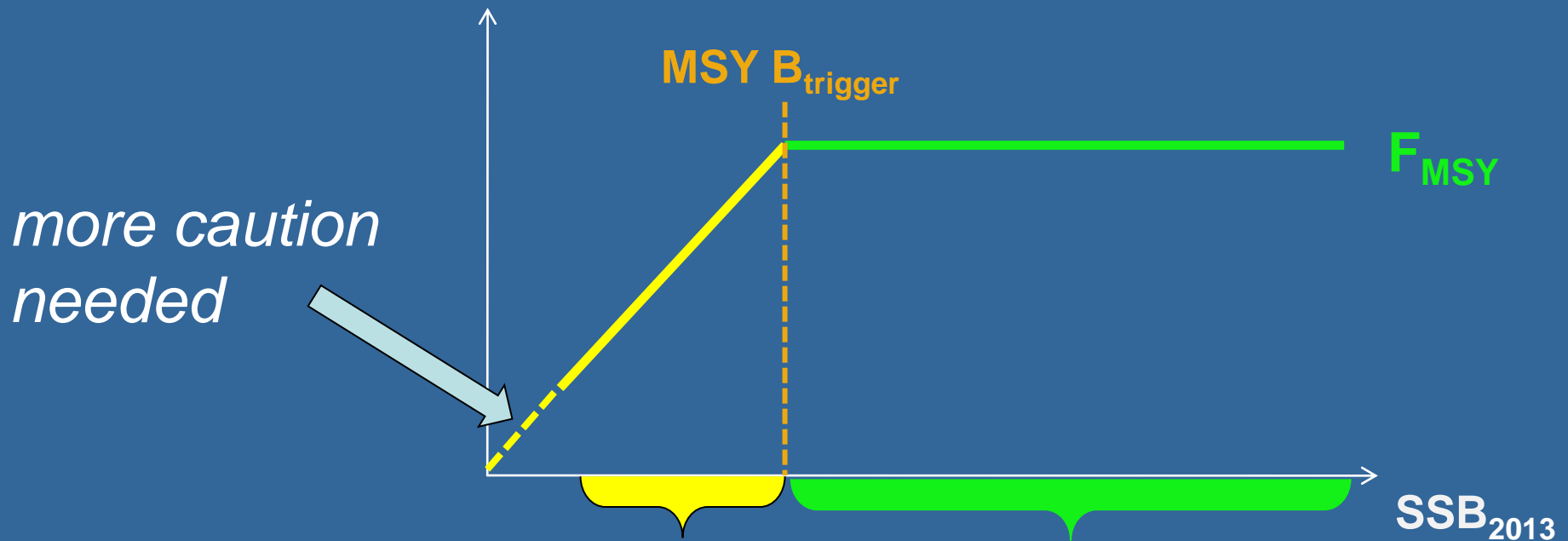


All options in Outlook Table for 2013

MSY Framework (as previous years):

- ✓ Maximize long term average yield
- ✓ Safeguard against low SSB

ICES MSY Harvest Control Rule:



Transition to MSY HCR by 2015

Moving from F_{2010} to $F_{\text{MSY-HCR}}$ in 2015 in 5 steps

$$F_{\text{MSY-HCR transition}} \text{ 2013} = 0.4 F(2010) + 0.6 F_{\text{MSY-HCR}}$$

$$F_{\text{MSY-HCR transition}} \text{ 2014} = 0.2 F(2010) + 0.8 F_{\text{MSY-HCR}}$$

$$F_{\text{MSY-HCR transition}} \text{ 2015} = 0.0 F(2010) + 1.0 F_{\text{MSY-HCR}} = F_{\text{MSY-HCR}}$$

(values of advised F capped at F_{pa} , for consistency with PA)

Data limited stocks (DLS): new approach this year

All stocks for which a “full assessment” and outlook table with catch options for 2013 can not be provided

- more than 120 of the approx 200 stocks for which ICES gives advice are DLS – *wide range of situations*
- In past: only qualitative advice provided (“Do not increase” or “Reduce” catch)

This year ICES is providing quantitative advice for the first time

Data limited stocks (DLS):

Work in 2012: -- enormous effort

WKFRAME 3 (Jan); WKLIFE (Feb); RGLIFE (May);

Further development by ICES Sec, scientists, ACOM

Principles:

- * Available information should be used
- * Advice for DLS should, to extent possible, follow same principles as for data-rich stocks (aiming towards exploitation consistent with MSY)
- * Precautionary approach: advice more cautious when knowledge about stock status is less

Data limited stocks (DLS):

- Categorisation of stocks (6 categories) from data rich towards situations of decreasing information
- Methods proposed for different categories – further developments, simulation testing,... expected before next year
- ***Common DLS situations:***
 - * stock abundance index and F in relation to $F_{\text{MSY-proxy}}$ available (plaice in 7d)
 - * stock abundance index available (anglerfish)
 - * F in relation to $F_{\text{MSY-proxy}}$ available (sole 7hjk)
 - * only a time series of landings available (sole 7bc)

Data limited stocks (DLS):

Advice starts from **recent catch** (for most stocks, average landings of last 3 years) and modifies it as follows:

- *If stock abundance index available:*
modify according to index trend in last 5 years
(Average last 2 years)/(Average 3 previous years)
- *If current F in relation to $F_{MSY-proxy}$ known:*
modify according to change required in current F to reach $F_{MSY-proxy}$ (could be in steps, until 2015)
- *If only time series of landings available:*
no modification (but precautionary margin always applied)

Data limited stocks (DLS):

After appropriate DLS method has been applied, 2 steps in sequence:

1. *Uncertainty window:*

limit result to 20% change (up or down)
(because results more noisy than with standard stock assessments)

2. *Precautionary margin:* 20% reduction if stock status relative to (candidate) reference points unknown, unless there is evidence that stock is strongly increasing or that exploitation (F or effort) has decreased substantially

Data limited stocks (DLS):

* Advice applicable to time-frame compatible with measurable response in metrics used as basis for advice

* Where least information available (only landings), and when precautionary margin applied:

no expected changes in advice for a number of years
(~3 years, to be further investigated)
unless important new knowledge emerges

Template (as last year)

Two-pager
 simple
 information for managers

Supporting information
 Background to two-pager

6.4.10

Advice June 2010

ECOREGION North Sea
STOCK Sole in Subarea IV (North Sea)

Advice Summary for 2011

SSB has fluctuated around the precautionary reference points for the last decade. Fishing mortality has shown a declining trend since 1995 and is estimated to be below F_{pa} in 2008 and 2009.

Stock status

	F (Fishing Mortality)			
	2007	2008	2009	
MSY (F_{MSY})	✗	✗	✗	Overfishing
Precautionary approach (F_{pa}/F_{low})	✗	✓	✓	Harvested sustainably
Management plan F_{MSY}	✗	✗	✗	$F > 0.2$

	SSB (Spawning Stock Biomass)			
	2008	2009	2010	
MSY (B_{MSY})	✓	✗	✗	Below trigger
Precautionary approach (B_{pa}/B_{low})	✓	○	○	Increased risk
Management plan SSB_{MSY}	✓	✗	✗	$SSB < 35\ 000\ t$

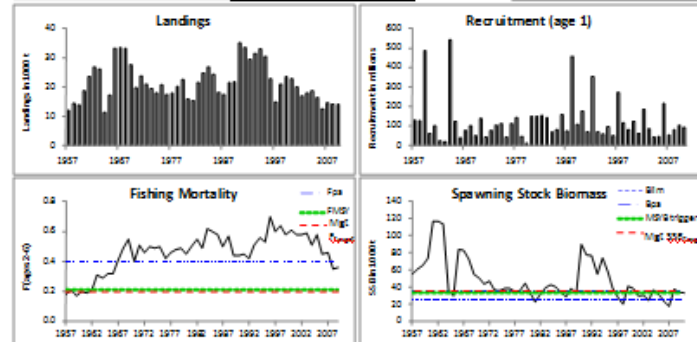
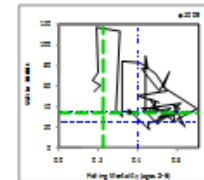



















Figure 6.4.10.1 Sole in Subarea IV (North Sea). Summary of stock assessment (October to 2009 season). Top right: SSB and F over the years.










SSB has fluctuated around the precautionary reference points for the last decade. Fishing mortality has shown a declining trend since 1995 and is estimated to be below F_{pa} in 2008 and 2009.

Management plan

A management plan for North Sea plaice and sole was agreed by the EC in 2007 (Council Regulation (EC) No. 876/2007), which results in a TAC of 13 800 and effort reduction of 10%. ICES has evaluated the long-term management plan and concluded that it leads on average to a low risk of $B < B_{pa}$ within the next 10 years. ICES concludes that for sole the management plan can be provisionally accepted as precautionary.

State of stock table (as last year)

F (Fishing Mortality)				
	2008	2009	2010	
MSY (F_{MSY})				Appropriate
Precautionary approach (F_{pa}, F_{lim})				Harvested sustainably
Management plan (F_{MGT})				Below target
SSB (Spawning Stock Biomass)				
	2009	2010	2011	
MSY ($B_{trigger}$)				Below trigger
Precautionary approach (B_{pa}, B_{lim})				Increased risk
Management plan (SSB_{MGT})				Above target

Status relative to repoints	Qualitative evaluation	
		Desirable situation e.g. F is below the relevant reference point or SSB is above the relevant reference point
		Status lies between the precautionary (pa) and limit (lim) reference points
		Undesirable situation e.g. F is above the relevant reference point or SSB is below the relevant reference point
		Status of the stock is either unknown because there is no quantitative assessment, or undefined when there is an analytical assessment but reference points are not undefined
		Absolute level unknown, but increasing
		Absolute level unknown, but unchanged
		Absolute level unknown, but decreasing

Overview of advice by species/stocks

Stock	F_{MSY}	MSY $B_{trigger}$	Advice last year	Advice this year
Cod West Scotland	0.19	22 000 t	lowest possible catch	no directed fisheries; minimise bycatch, discards
Cod Rockall	nd	nd	no increase in catch	70 t
Cod Celtic Sea	0.4	10 300 t	< 10 000 t	< 10 200 t
Cod Irish Sea	0.4	10 000 t	0 catch	no directed fisheries; minimise bycatch, discards

Stock	F_{MSY}	MSY $B_{trigger}$	Advice last year	Advice this year
Haddock W Scotland	0.3	30 000 t	< 10 200 t	< 9 300 t; technical measures in <i>Nephrops</i> TR2
Haddock Rockall	0.3	9 000 t	< 3 300 t	no directed fisheries; minimise bycatch, discards
Haddock VIIb-k	0.33	7 500 t	no increase in catch; technical measures	< 9 500 t ; technical measures
Haddock Irish Sea	nd	nd	reduce catch; technical measures	< 710 t; technical measures

Overview by species/stocks

Stock	F_{MSY}	MSY $B_{trigger}$	Advice last year	Advice this year
Whiting WScotland	nd	nd	reduce catch; improve selection pattern in Nephrops fleet	lowest possible catch; technical measures in <i>Nephrops</i> TR2 fleet
Whiting Rockall	nd	nd	no increase in catch	< 11 t
Whiting Celtic Sea	0.36	21 000 t	no increase in catch; technical measures to reduce discard rates	< 17 500 t; technical measures to reduce discard rates
Whiting Irish Sea	nd	nd	Reduce to lowest possible; technical measures to reduce discard rates	lowest possible catch; technical measures to reduce discard rates

Stock	F_{MSY}	MSY $B_{trigger}$	Advice last year	Advice this year
Plaice SW Ireland	0.24	nd	reduce catch	< 100 t; reduce bycatch and discards
Plaice W Ireland	nd	nd	no increase in catch	< 30 t
Plaice Celtic Sea	nd	nd	reduce catch; technical measures	< 360 t; technical measures to reduce discard rates
Plaice Irish Sea	nd	nd	no increase in catch; tech measures	< 490 t
Plaice W Channel	0.24	1 650 t	< 1440 t	< 2 100 t
Plaice E Channel	0.23	nd	no increase in catch	< 4 300 t; reduce discards

Stock	F_{MSY}	MSY $B_{trigger}$	Advice last year	Advice this year
Sole SW Ireland	0.31	nd	no increase in catch	< 200 t; take into account advice for plaice
Sole W Ireland	nd	nd	no increase in catch	< 30 t
Sole Celtic Sea	0.31	2 200 t	< 1 060 t	< 1 100 t
Sole Irish Sea	0.16	3 100 t	< 200 t	no directed fisheries; minimise bycatch, discards
Sole W Channel	0.27	2 800 t	< 740 t	< 960 t
Sole E Channel	0.29	8 000 t	< 5 600 t	< 5 900 t

Overview by species/stocks

Stock	F_{MSY}	MSY $B_{trigger}$	Advice last year	Advice this year
Hake – Northern	0.24	nd	< 51 900 t	< 45 400 t
Angler VIIb-k & VIIIabd	nd	nd	reduce catch	< 24 800 t
Angler IIIa, IV, VI	nd	nd	reduce catch	reduce by 20%
Megrim IVa, VIa	0.29	9 700 t	no increase in catch	< 4 700 t
Megrim Rockall	nd	nd	no increase in catch	< 160 t
Megrim VIIb-k & VIIIabd	nd	nd	reduce catch	< 12 000 t
Pollack VI, VII	nd	nd	no increase	< 4 200 t

Overview by species/stocks

FU	HR (F_{MSY})	MSY $B_{trigger}$	Advice last year	Advice this year
VI: 11 North Minch	12.5%	465 million	< 3 200 t	< 4 200 t
12 South Minch	12.3	1 016	< 5 500	< 5 800 t
13 Firth Clyde	16.4	579	< 4 200	< 5 600 t
13 Sound of Jura	14.5	nd	< 900	< 800 t
VII: 14 Irish Sea E	9.8	nd	< 960	< 880 t
15 Irish Sea W	17.1	3 billion	< 9 800	< 9 300 t
16 Porcupine	nd	nd	no increase in catch	< 1 100 t
17 Aran Grounds	10.5	nd	< 1 100	< 890 t
19 Ireland SE&SW	7.5	nd	reduce catch	< 820 t
22 Celtic Sea (Smalls)	10.9	nd	< 2 300	< 2 600 t
20-21 Celtic Sea (Labadie)	nd	nd	reduce catch	< 2 500 t

West of Scotland & Rockall (VIa & VIb)

- Cod
- Haddock
- Whiting
- Anglerfish
- Megrin
- Saithe
- Pollack
- Nephrops (FUs
11-12-13)

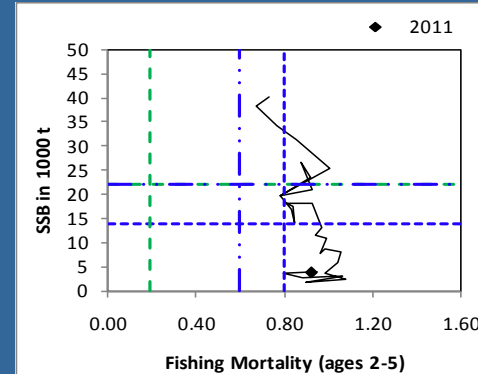
Advice for 2013 and 2014, MSY: No directed fisheries; minimise bycatch and discards

F (Fishing Mortality)

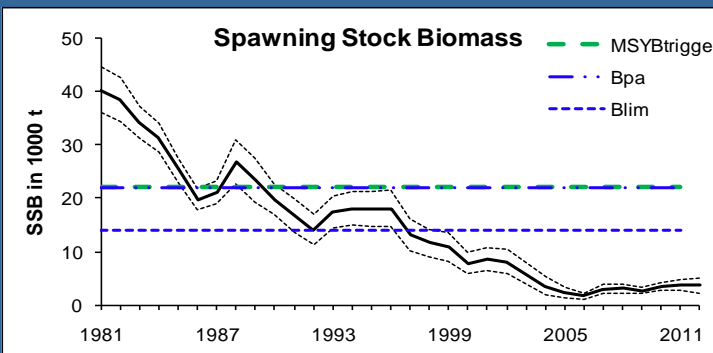
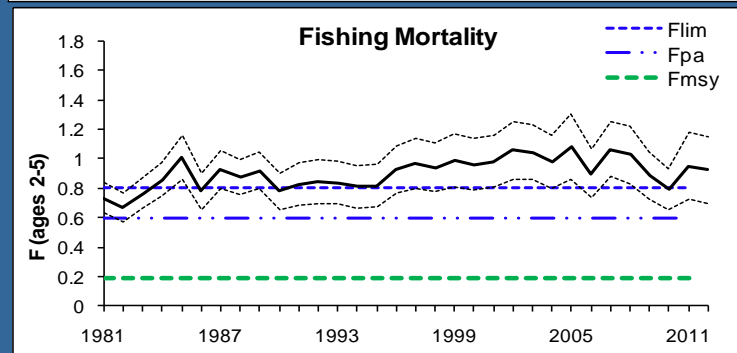
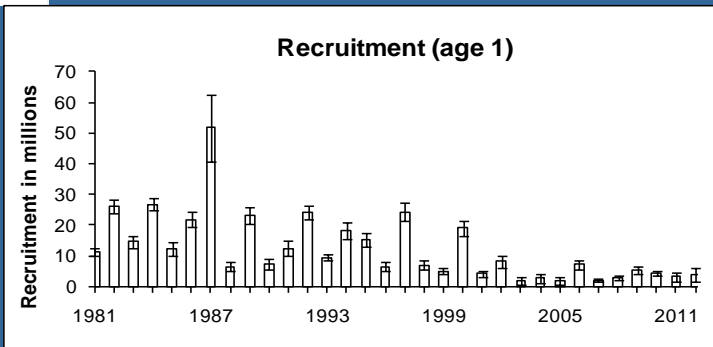
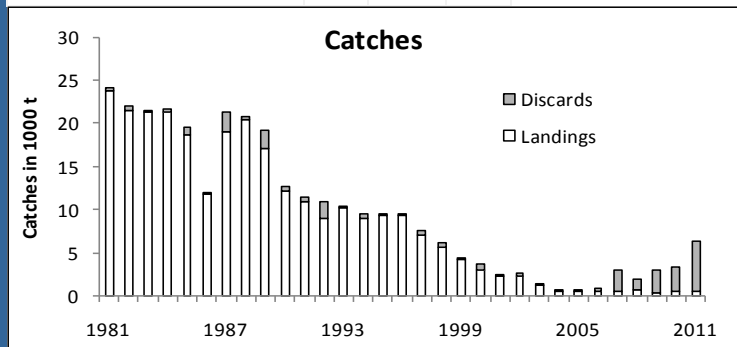
	2009	2010	2011	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa}, F_{lim})	✗	✗	✗	Harvest unsustainable

SSB (Spawning-Stock Biomass)

	2010	2011	2012	
MSY ($B_{trigger}$)	✗	✗	✗	Below trigger
Precautionary approach (B_{pa}, B_{lim})	✗	✗	✗	Reduced reproductive capacity



MSY $B_{trigger} = 22\ 000\ t$
 $F_{MSY} = 0.19$



* Mortality high, huge increase in discarding

* SSB increasing but $\ll B_{lim}$

* Rec low in last decade

Cod in Division VIa (West of Scotland)

Catch 2011 – 6 400 t (discards 92%)

Short-term forecast presented in terms of catch → split into landings, discards.

Management Plan: $F(2012) = 0.75 \cdot F(2011) = 0.71$; $SSB(2013) = 4.1 \ll B_{lim}(14 \text{ kt})$

Rationale	Human Consumption landings (2013)	Basis	F Total (2013)	F HC (2013)	F Disc (2013)	Catch Total (2013)	Discards (2013)	SSB (2014)	%SSB change ¹⁾
Management plan	0.46	$F = 0.75 \cdot F(2011) = 0.53$	0.53	0.13	0.40	1.91	1.45	4.87	+20%

Other forecasts: $F(2012) = F(2009-11) = 0.88$; $SSB(2013) = 3.6 \ll B_{lim}(14 \text{ kt})$

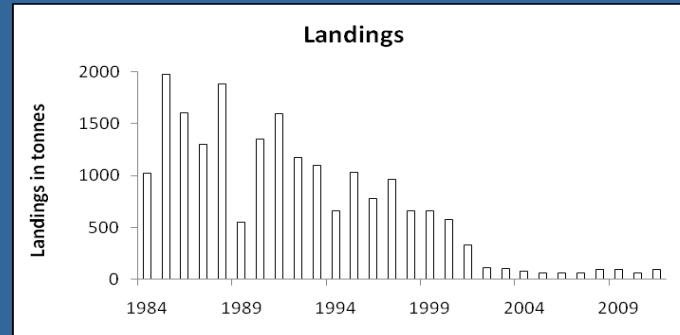
Rationale	Human Consumption landings (2013)	Basis	F Total (2013)	F HC (2013)	F Disc (2013)	Catch Total (2013)	Discards (2013)	SSB (2014)	%SSB change ¹⁾
MSY transition	0.27	$(F_{2010} \cdot 0.4) + (F_{HCR-MSY} \cdot 0.6)$	0.34	0.07	0.27	1.18	0.91	5.24	+45%
MSY framework	0.03	$F_{MSY} \cdot SSB_{2013} / MSY$ $B_{trigger}$	0.03	0.01	0.02	0.12	0.09	6.63	+83%
Precautionary approach	0	B_{pa}	0	0	0	0	0	6.79	+88%
Zero catch	0	$F = 0$	0	0	0	0	0	6.79	+88%
Other options	0.48	$(F_{2012} \cdot 0.8)$	0.7	0.14	0.56	2.13	1.65	4.02	+11%
	0.55	$(F_{2012} \cdot 1.0)$	0.88	0.18	0.7	2.49	1.94	3.56	-1.7%
	0.61	$(F_{2012} \cdot 1.2)$	1.05	0.21	0.84	2.81	2.19	3.15	-13%

Even with no catch in 2013, SSB will remain below B_{lim} in 2014

→ MSY (“more caution” part of HCR): no directed fisheries and minimise bycatch and discards

Advice for 2013 and 2014, DLS: Catch < 70 t

F (Fishing Mortality)	
	2009–2011
Qualitative evaluation	? Insufficient information
SSB (Spawning-Stock Biomass)	
	2009–2011
Qualitative evaluation	? Insufficient information



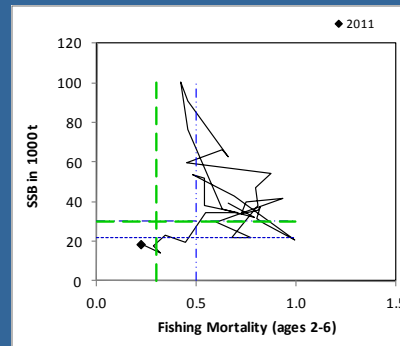
- Official landings: very low since 2002
- Doubts on accuracy of landings: vessels operate in VIa and VIb
- Irish LPUE shows same trend as landings
- In the absence of representative data for assessment: advice based on 20% precautionary reduction over recent (last 3 year average) landings

Haddock in Division VIa (West of Scotland)

Advice for 2013, MSY: Landings < 9 300 t.

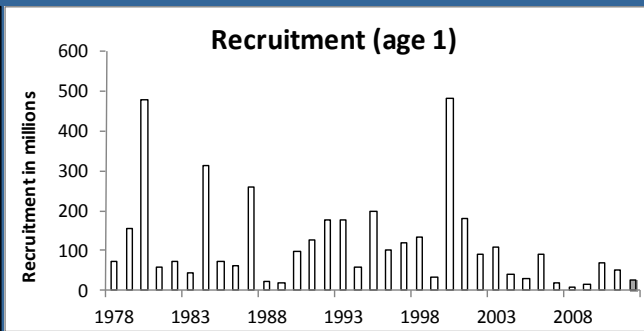
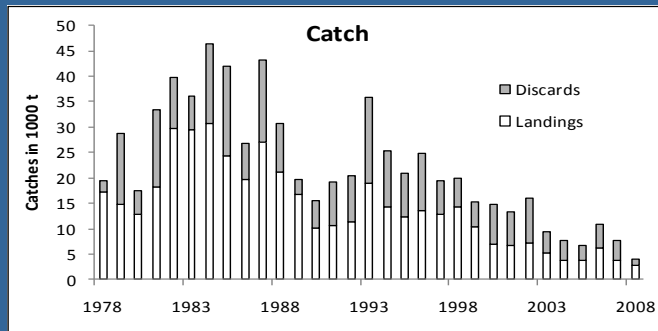
Technical measures to reduce discard rates in *Nephrops* (TR2) fleet

F (Fishing Mortality)				
	2009	2010	2011	
MSY (F_{MSY})	✓	✗	✓	Below target
Precautionary approach (F_{pa}, F_{lim})	✓	✓	✓	Harvested sustainably
SSB (Spawning-Stock Biomass)				
	2010	2011	2012	
MSY ($B_{trigger}$)	✗	✗	✗	Below trigger
Precautionary approach (B_{pa}, B_{lim})	✗	✗	⊙	Increased risk

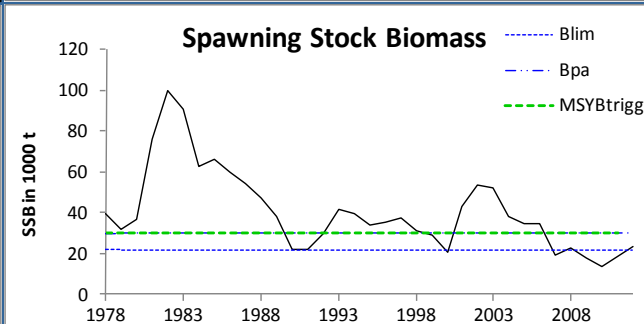
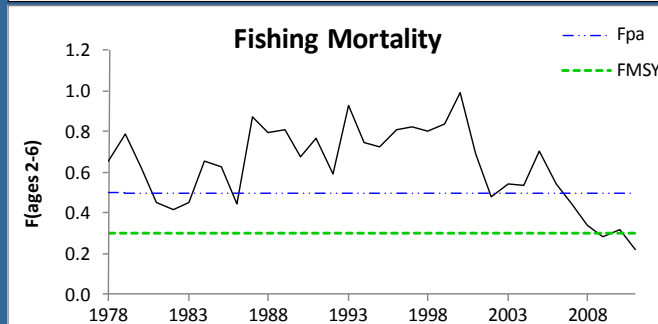


$$MSY B_{trigger} = 30\ 000\ t$$

$$F_{MSY} = 0.30$$



2009 YC strong relative terms



MP under development

Haddock in Division VIa (West of Scotland)

Catch 2011 – 3 200 t (discards 46%)

Nephrops vessels (TR2) responsible for ~80% of all discards while landing less than 5% of the total landings

Short-term forecast is for total removals → split into landings (56%), discards (36%), unallocated removals (8%)

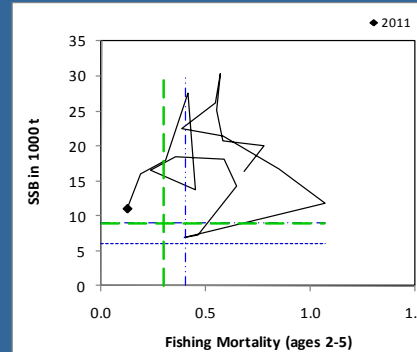
$$F(2012) = F_{sq} = F(2009-2011) = 0.27; SSB(2013) = 31.6 > MSY B_{trigger}$$

Rationale	Human Consumption landings (2013)	Basis	F Total (2013)	F HC (2013)	F Discard (2013)	F Unallocated (2013)	Catch Total (2013)	Discards (2013)	Unallocated removals (2013)	SSB (2014)	%SSB change ¹⁾	%TAC change ²⁾
Management plan proposal	7.519	+25%TAC ($F_{sq} * 0.86$)	0.24	0.13	0.08	0.02	13.4	4.8	1.1	35.5	+12%	+25%
MSY framework	9.3	$F_{MSY} (F_{sq} * 1.1)$	0.30	0.17	0.11	0.02	16.7	6.0	1.3	33.3	+5%	+55%
Precautionary approach	11.5	$SSB_{2014} > B_{pa}$	0.38	0.21	0.14	0.03	20.4	7.4	1.6	30.8	-3%	+90%
Zero catch	0	$F = 0$	0.00	0.00	0.00	0.00	0.0	0.0	0.0	44.5	+41%	-100%
Other options	6.0	$F_{sq} * 0.673$	0.18	0.10	0.07	0.01	10.7	3.9	0.9	37.3	+18%	0%
	4.5	$F_{sq} * 0.493$	0.14	0.08	0.05	0.01	8.1	2.9	0.6	39.1	+24%	-25%
	8.6	$F_{sq} * 1$	0.27	0.15	0.10	0.02	15.3	5.5	1.2	34.2	+8%	+43%

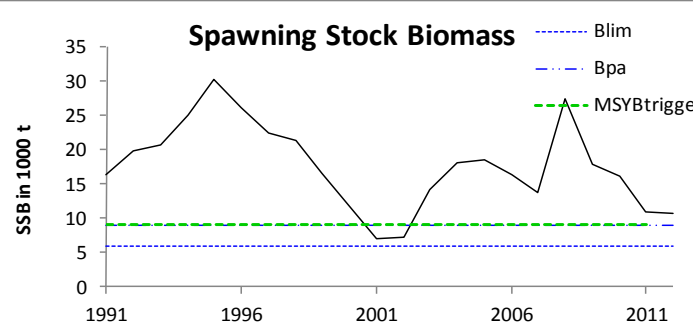
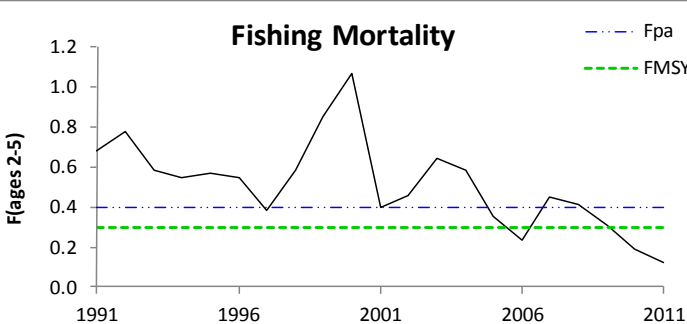
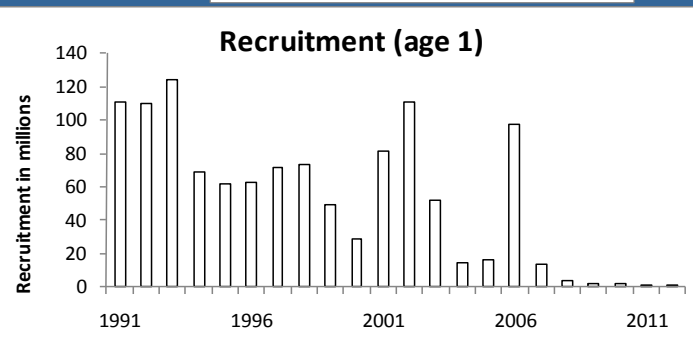
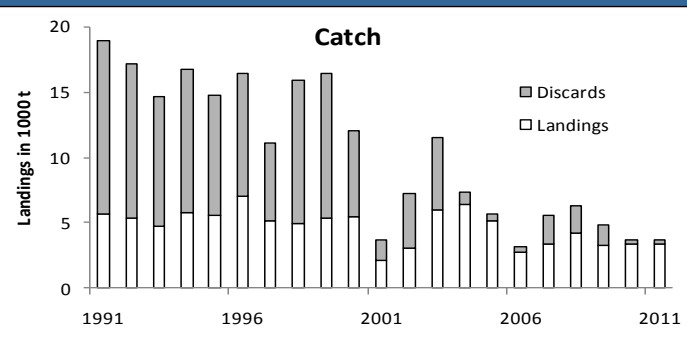
Weights in '000 tonnes.

Advice for 2013, MSY: No directed fisheries; minimise bycatch and discards. Due to extremely low Rec in recent years → SSB predicted to fall below B_{lim} in 2013 and 2014

F (Fishing Mortality)				
	2009	2010	2011	
MSY (F_{MSY})	✗	✓	✓	Below target
Precautionary approach (F_{pa}, F_{lim})	✓	✓	✓	Harvest sustainably
SSB (Spawning-Stock Biomass)				
	2010	2011	2012	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓	Full reproductive capacity



MSY $B_{trigger} = 9\ 000\ t$
 $F_{MSY} = 0.30$



MP under development

Haddock in Division VIb (Rockall)

Discards significantly reduced in recent years because few young haddock in population: discard ratio by weight ~ 60% (1991–2003) and 20% in recent period (2004–2011); in 2011 ~ 7%

Short-term forecast is for catch → split into landings, discards.

$F(2012)=F(2009-11)=0.21$; $SSB(2013)=5.8 < B_{lim}$

Rationale	Human consumption (2013)	Basis	F (2013)	Catch Total (2013)	SSB (2014)	SSB ₂₀₁₄ /M SY B _{trigger}	%SSB change ¹⁾	%TAC change ²⁾
MSY framework	1.7	$F_{MSY} * SSB_{2013} / MSY B_{trigger}$	0.19	1.9	3.4	0.38	-41.2	-48.5
Precautionary approach	SSB < B _{pa} for all scenarios	Maintain SSB > B _{pa}	-	-	-	-	-	-
Zero catch	0.0	F=0	0.0	0.0	5.0	0.55	-11.8	-100.0
Other options	1.6	$F_{2012} * 0.8$	0.16	1.7	3.5	0.39	-39.5	-51.5
	1.9	F_{2012}	0.21	2.0	3.2	0.36	-44.7	-42.4
	2.805	-15% TAC ($F_{2012} * 1.7$)	0.35	3.0	2.4	0.27	-58.5	-15.0
	3.3	0% TAC ($F_{2012} * 2.2$)	0.45	3.6	1.9	0.21	-67.2	0.0
	3.0	F_{pa} ($F_{2012} * 1.95$)	0.4	3.3	2.1	0.23	-63.7	-9.1
	3.795	+15% TAC ($F_{2012} * 2.9$)	0.6	4.2	1.4	0.16	-75.8	15.0

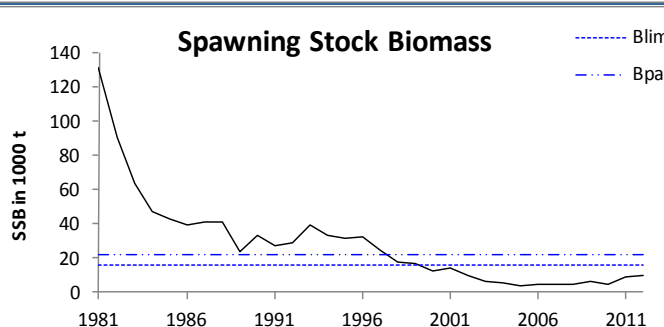
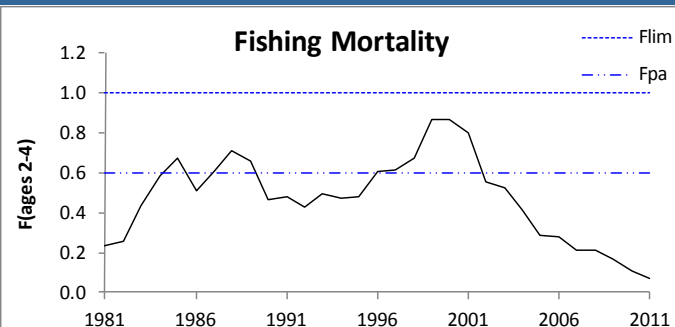
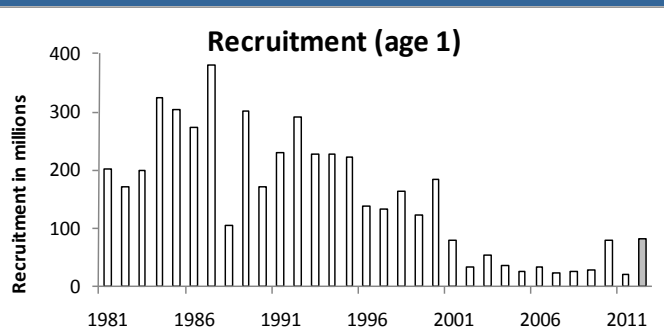
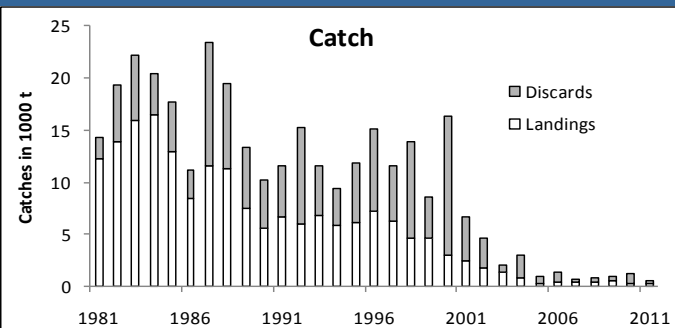
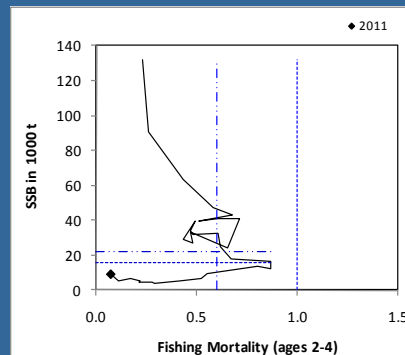
Weights in '000 tonnes.

SSB(2014) < B_{lim} even without catches in 2013

Advice for 2013, PA: Lowest possible catch.
 Technical measures to reduce discards in *Nephrops* (TR2) fleet.

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	?	?	? Unknown
Precautionary approach (F_{pa}, F_{lim})	✓	✓	✓ Harvested sustainably

SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	?	?	? Unknown
Precautionary approach (B_{pa}, B_{lim})	✗	✗	✗ Reduced reproductive capacity



* Fishing mortality very low

* SSB increasing but $< B_{lim}$

* Rec low in last decade; 2009 yc relatively strong

Whiting in Division VIa (West of Scotland)

Catch 2011 – 570 t (discards 60%)

Approx 80% of discards are from *Nephrops* (TR2) fleet → effective technical measures required to improve selection pattern and reduce discards

Short-term forecast is for catch → split into landings, discards.

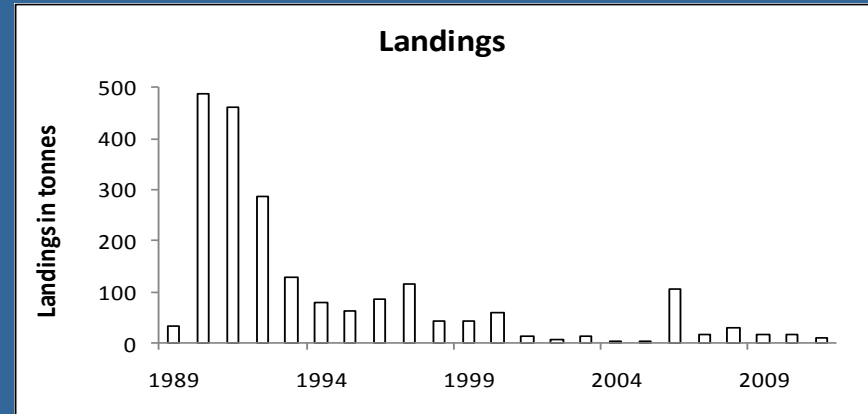
$F(2012) = F_{sq}$ (2009-2011 rescaled to 2011) = 0.07; Landings (2012) = 0.36; Discards (2012) = 0.32 ; $SSB(2013) = 14.1 < B_{lim}$ (16 kt)

Rationale	Human Consumption landings (2013)	Basis	F Total (2013)	F HC (2013)	F Disc (2013)	Catch Total (2013)	Discards (2013)	SSB (2014)	% SSB change ¹⁾	% TAC change ²⁾
Precautionary approach	0	B_{pa}	0	0	0	0	0	14.4	+2%	-100 %
Zero catch	0	$F = 0$	0	0	0	0	0	14.4	+2%	-100%
Other options	0.11	$(F_{2012} * 0.2)$	0.01	0.01	0.01	0.17	0.07	14.2	+1%	-65%
	0.21	$(F_{2012} * 0.4)$	0.03	0.02	0.01	0.34	0.13	14.0	-1%	-31%
	0.32	$(F_{2012} * 0.6)$	0.04	0.02	0.02	0.51	0.19	13.8	-2%	3%
	0.42	$(F_{2012} * 0.8)$	0.05	0.03	0.02	0.67	0.25	13.6	-4%	37%
	0.52	$(F_{2012} * 1.0)$	0.07	0.04	0.03	0.84	0.32	13.4	-5%	70%
	0.62	$(F_{2012} * 1.2)$	0.08	0.05	0.03	1.00	0.38	13.3	-6%	103%

Weights in '000 tonnes.

Advice for 2013 and 2014, DLS: Catch < 11 t

F (Fishing Mortality)	
	2009–2011
Qualitative evaluation	? Insufficient information
SSB (Spawning-Stock Biomass)	
	2009–2011
Qualitative evaluation	? Insufficient information



- * Official landings: currently negligible
- * Stock structure unclear: could be part of the stock in VIa
- * Doubts on accuracy of landings: vessels operate in VIa and VIb
- * In the absence of representative data for assessment: advice based on 20% precautionary reduction over recent (last 3 year average) landings

Anglerfish (*Lophius piscatorius* & *L. budegassa*) in Division IIIa and Subareas IV and VI

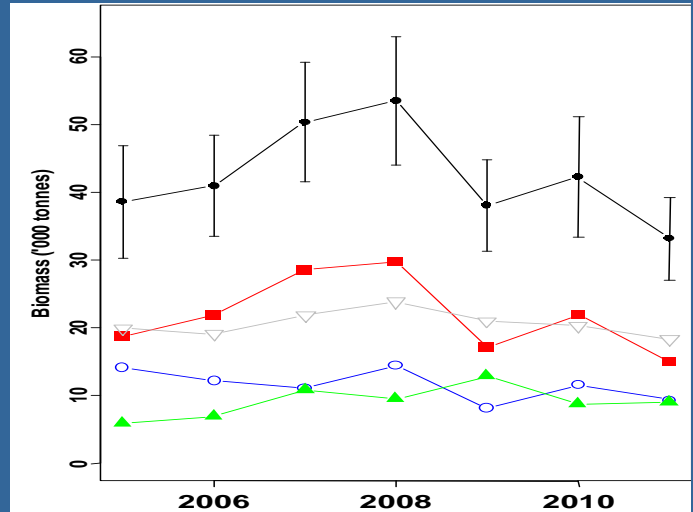
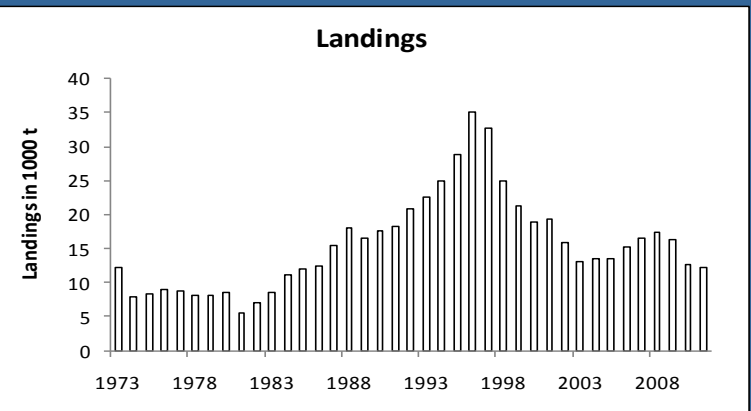
Advice 2013, DLS: Reduce catch by 20% in relation to last 3 years average. Due to uncertainty in landings data, ICES can not quantify resulting catch.

Dedicated anglerfish surveys in Division IVa and Subarea VI indicate decline since 2008:

(Average last 2 years) 20% lower than (average previous 3 years) → 20% catch decrease with respect to recent average (last 3 year average)

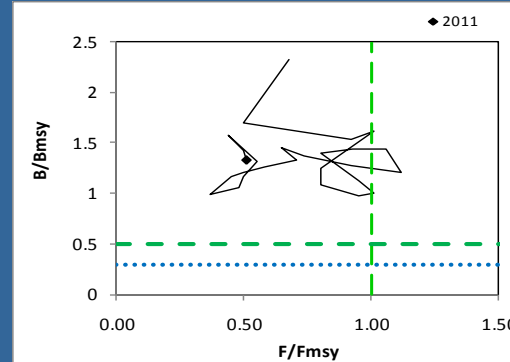
1. Uncertain window: 20% decrease
2. Precautionary margin: no, because significant effort decrease in main fisheries (Cod MP)

		F (Fishing Mortality)	
		2009–2011	
MSY (F_{MSY})	?	Unknown	
Precautionary approach (F_{pa}, F_{lim})	?	Unknown	
		SSB (Spawning-Stock Biomass)	
		2007–2011	
MSY ($B_{trigger}$)	?	Unknown	
Precautionary approach (B_{pa}, B_{lim})	?	Unknown	
Qualitative evaluation	↘	Decreasing	



Advice for 2013 and 2014, MSY: Landings < 4 700 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✓	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	✓	✓	✓ Harvested sustainably
Biomass			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓ Full reproductive capacity

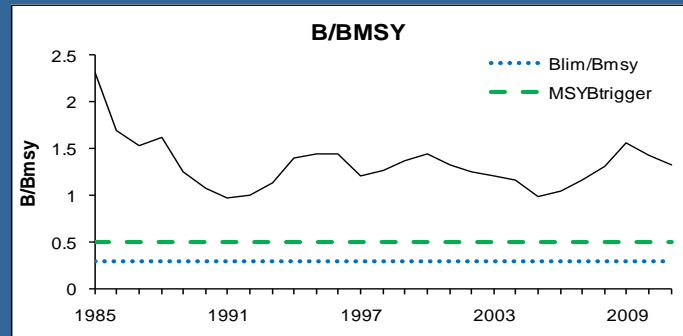
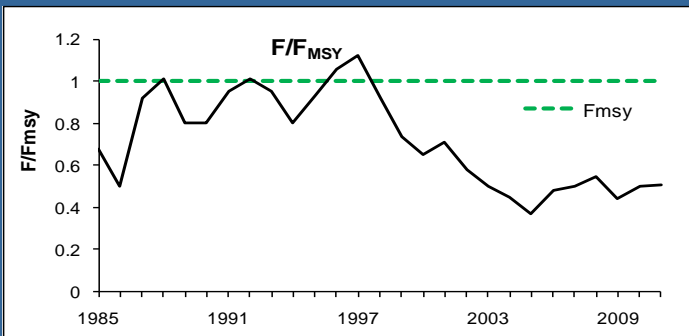
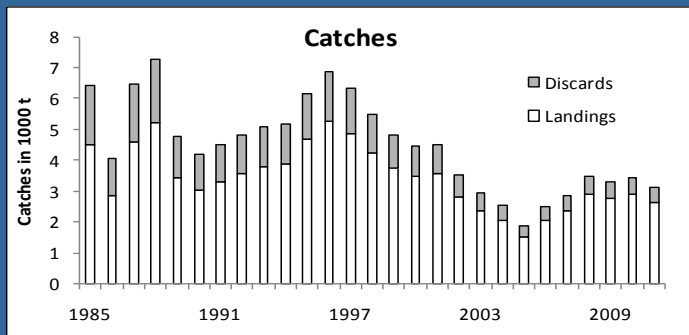


MSY $B_{trigger} = 9\ 700\ t$
 $F_{MSY} = 0.29$

Assessment based on biomass dynamics model (no age or length data used)

* F below F_{MSY}

* Biomass above MSY $B_{trigger}$



Megrim in Divisions IVa and VIa

Catch 2011 – 3 100 t (discards 15%)

Short-term forecast is for catch → split into landings, discards.

$$F(2012) = F_{sq}(2011) = 0.51 F_{MSY}$$

	Total catch option 2013 (tonnes)*			
Catch (2013)	4000	5000	5500	6000
Landings (2013) ¹⁾	3400	4250	4700	5100
Discards (2013) ¹⁾	600	750	800	900
Probability of Biomass ₂₀₁₄ falling below MSY B _{trigger}	1%	3%	4%	6%
Probability of Biomass ₂₀₁₄ falling below B _{lim}	0%	1%	1%	2%
Stock Size (B ₂₀₁₄ /B _{MSY})	1.41	1.25	1.21	1.16
Fishing Mortality (F ₂₀₁₃ /F _{MSY})	0.60	0.89	1.00	1.19

Megrim (*Lepidorhombus* spp) in Division VIb (Rockall)

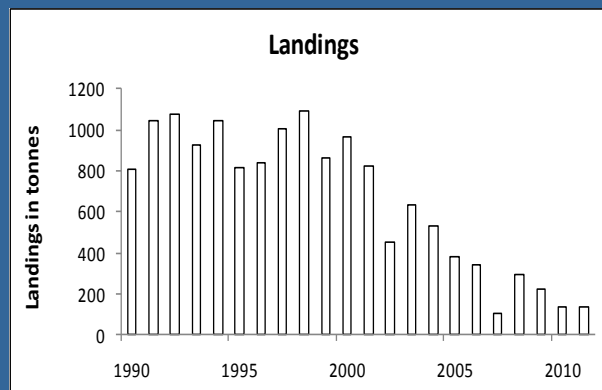
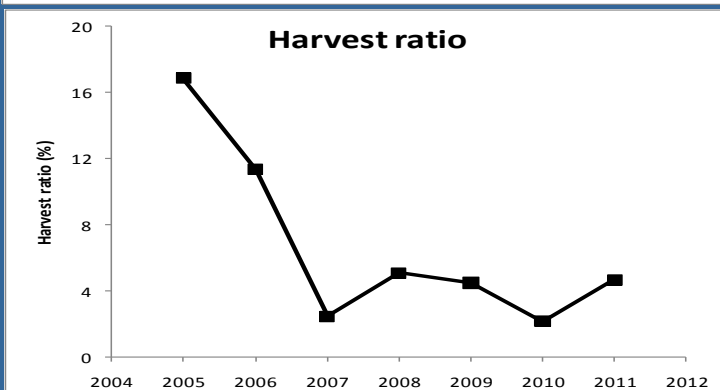
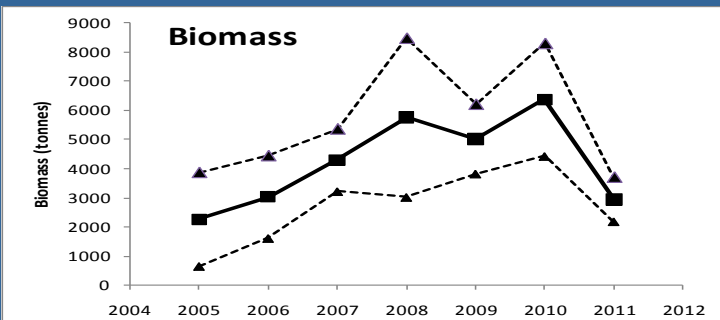
Advice for 2013, DLS: Catch < 160 t

F (Fishing Mortality)	
2009-2011	
MSY (F_{MSY})	Unknown
Precautionary approach (F_{pa}, F_{lim})	Unknown
Qualitative evaluation	Below poss. reference points
SSB (Spawning Stock Biomass)	
2007-2011	
MSY ($B_{trigger}$)	Unknown
Precautionary approach (B_{pa}, B_{lim})	Unknown
Qualitative evaluation	Decreasing

Survey biomass indicates increase during 2005-2010, with a decline in 2011:

(Average last 2 years) 7% lower than (average previous 3 years) → 7% catch decrease in relation to recent landings (last 3 year average)

1. Uncertainty window: 7% decrease
2. Precautionary margin: no, because harvest ratio very low (<5%)



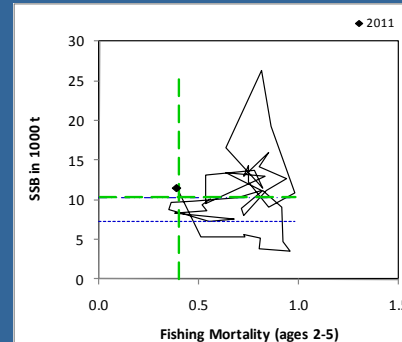
Celtic Sea, West & Southwest Ireland

- Cod (VIIe-k)
- Haddock (VIIb-k)
- Northern hake
- Anglerfish (VIIb-k, VIIIab)
- Megrin (VIIb-k, VIIIabd)
- Plaice (CS; VIIh-k; VIIbc)
- Sole (CS; VIIh-k; VIIbc)
- Whiting (VIIe-k)
- Nephrops FUs 16-17-20-22

Advice for 2013, MSY: Landings < 10 200 t

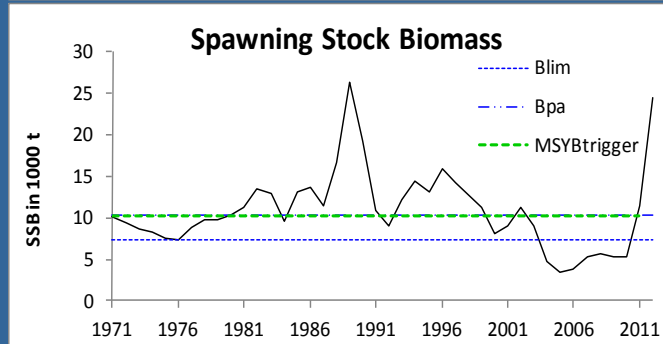
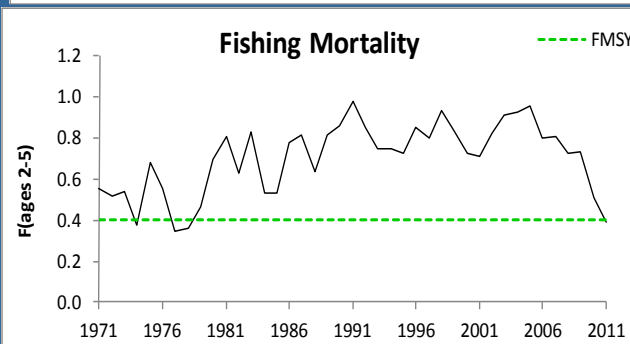
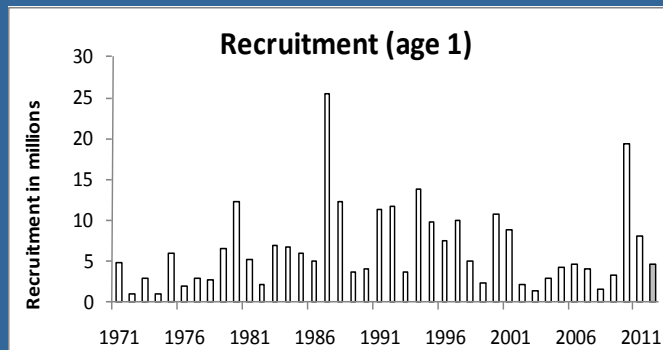
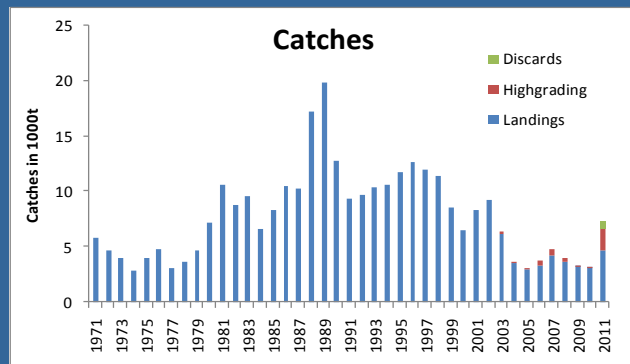
MP under development by the NWWRAC

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning-Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✗	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✗	✓	✓ Full reproductive capacity



$$MSY B_{trigger} = 10\,300\,t$$

$$F_{MSY} = 0.40$$



* Fishing declined and around F_{MSY} in 2011

* Very strong SSB increase

* 2009 yc very strong

* a lot of highgrading in 2011

Catch 2011 – 7 300 t (discards 35%; 70% of discards was highgrading)

Highgrading in first part of 2011 (mainly 2009 yc), before TAC was revised

Short-term forecast assumes all catch in 2012 and 2013 is landed

$F(2012) = 0.41$ (TAC constraint); $SSB(2013) = 25.6$ kt $>$ MSY $B_{trigger}$

Rationale	Landings (2013)	Basis	F (2013)	SSB (2014)	%SSB change ¹⁾	% TAC change ²⁾
MSY framework	10.2	$F_{MSY} (F_{2012} * 0.99)$	0.40	26.5	-6%	+2%
MSY transition	11.1	$0.4 * (F_{2010}) + 0.6 * F_{MSY}$	0.44	25.5	-9%	+11%
Zero catch	0	$F=0$	0.00	38.3	+36%	-100%
	9.9	$F_{2012} * 0.9$	0.38	26.9	-4%	-2%
Other options	10.8	F_{2012}	0.43	25.9	-8%	+7%
	11.7	$F_{2012} * 1.1$	0.47	24.9	-11%	+16%
	8.6	TAC-15% ($F_{2012} * 0.80$)	0.32	28.5	+1%	-15%
	10.1	TAC ($F_{2012} * 0.97$)	0.39	26.7	-5%	0%
	11.6	TAC+15% ($F_{2012} * 1.15$)	0.46	25.0	-11%	+15%

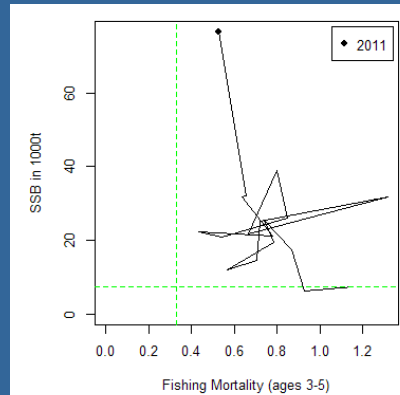
Weights in '000s t

MSY transition option not used because $F(2011)$ is already at F_{MSY}

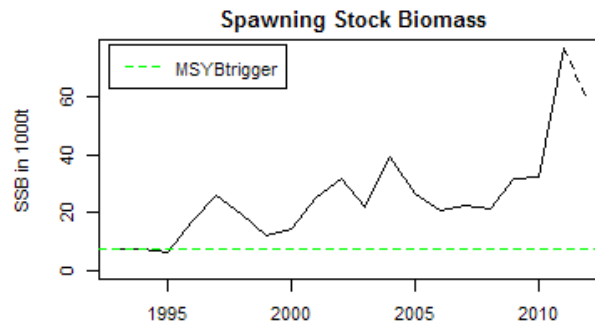
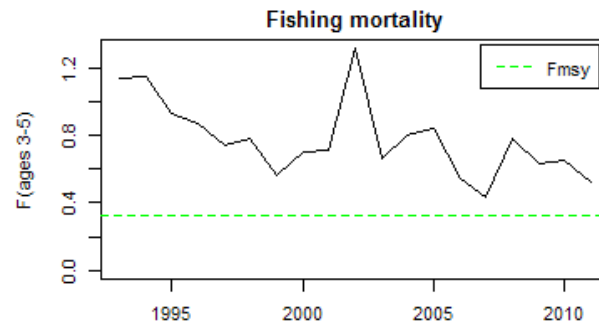
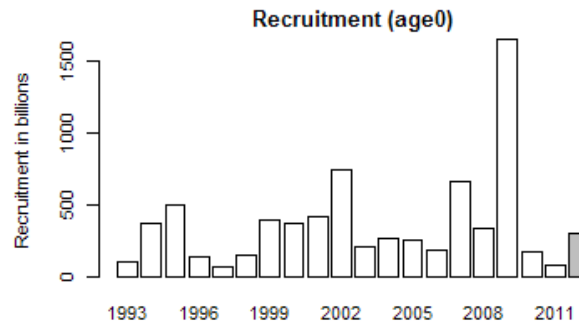
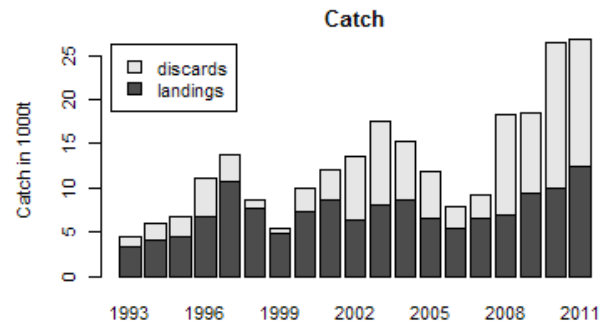
Haddock in Divisions VIIb-k

Advice for 2013, MSY transition: Landings < 9 500 t.
 Technical measures to reduce discard rates

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning-Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	? Undefined



MSY $B_{trigger} = 7\ 500\ t$
 $F_{MSY} = 0.33$



- * Fishing mortality above F_{MSY}
- * SSB increasing
- * 2009 yc exceptionally strong
- * increased discarding in 2010 (below MLS) and 2011 (over quota)

Catch 2011 – 26 800 t (discards 53%)

Discarding serious problem: in last 10 years, ~80% of catch in numbers discarded

Considerable uncertainty about estimated discards, but assessment results appear quite robust to this uncertainty

Short term forecast in terms of catch → split into landings, discards

$F(2012) = F(2009-2011) = 0.61$; Landings(2012)=19.7; Discards(2012)=4.7; $SSB(2013) > MSY B_{trigger}$

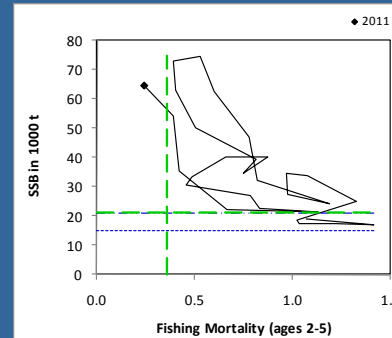
Rationale	2013 Land (HC)	Basis	2013 Disc	2013 catch	F Total 2013	F land 2013 ³⁾	F dis 2013 ³⁾	SSB 2014	%SSB change ¹⁾	%TAC change ²⁾
MSY framework	7.5	$F = F_{MSY} = 0.33$	2.1	9.6	0.33	0.28	0.05	36.9	+8%	-54%
MSY transition	9.5	$(F_{2010} * 0.4) + (F_{HCR-MSY} * 0.6)$	2.7	12.2	0.43	0.37	0.07	34.0	-1%	-42%
Zero catch	0		0	0	0	0	0	48.2	+41%	-100%
Other options	10.4	$F_{2012} * 0.8$	3	13.4	0.49	0.41	0.07	32.6	-5%	-37%
	11.4	$F_{2012} * 0.9$	3.3	14.7	0.55	0.46	0.08	31.1	-9%	-30%
	12.4	F_{2012}	3.6	16.0	0.61	0.52	0.09	29.6	-13%	-25%
	13.3	$F_{2012} * 1.1$	3.9	17.2	0.67	0.57	0.1	28.3	-17%	-19%
	14	-15% TAC	4.1	18.1	0.72	0.61	0.11	27.2	-20%	-15%
	16.4	TAC	5	21.4	0.91	0.77	0.14	23.5	-31%	+0%
	18.9	+15% TAC	5.9	24.8	1.14	0.97	0.17	19.8	-42%	+15%

Whiting in Divisions VIIe-k

Advice for 2013, MSY: Landings < 17 500 t.
Technical measures to reduce discard rates

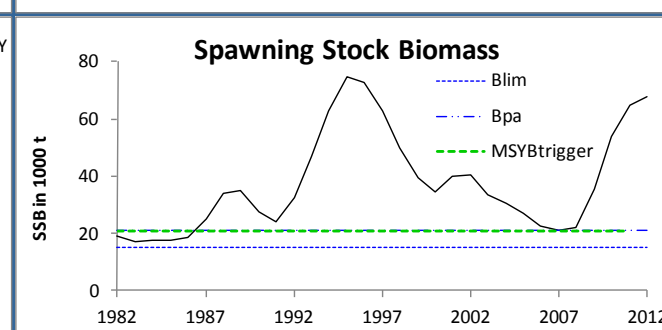
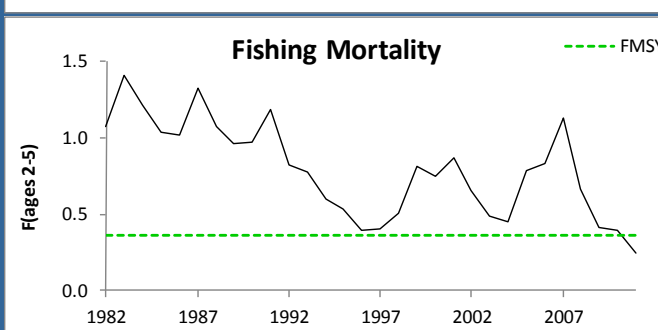
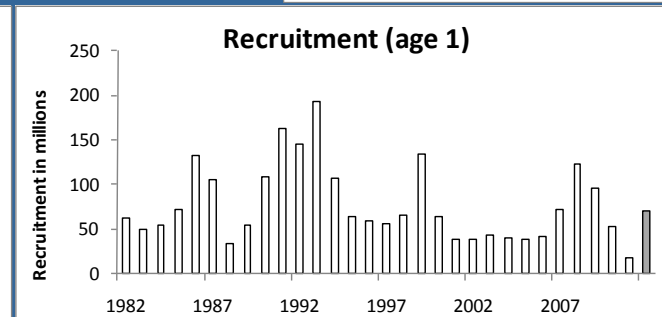
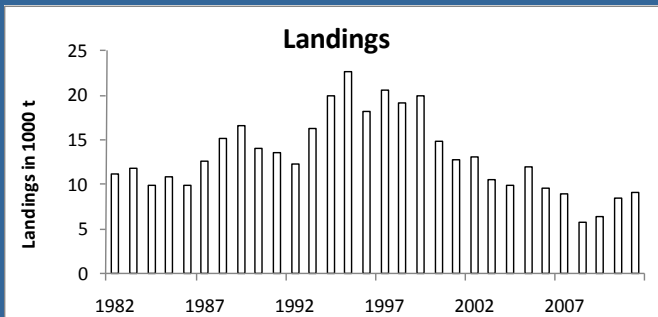
F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined

SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓ Full reproductive capacity



$$MSY B_{trigger} = 21\ 000\ t$$

$$F_{MSY} = 0.36$$



* Fishing mortality declining and below F_{MSY} in 2011

* SSB increasing

* 2007 and 2008 yc above average

* high discards, low market value

Catch 2011 – 14 300 t (discards 40%)

Discards not included in assessment (problematic, given high discards)

Short term forecast in terms of landings

$F(2012) = F(2009-2011) = 0.35$; Landings(2012) = 19.1

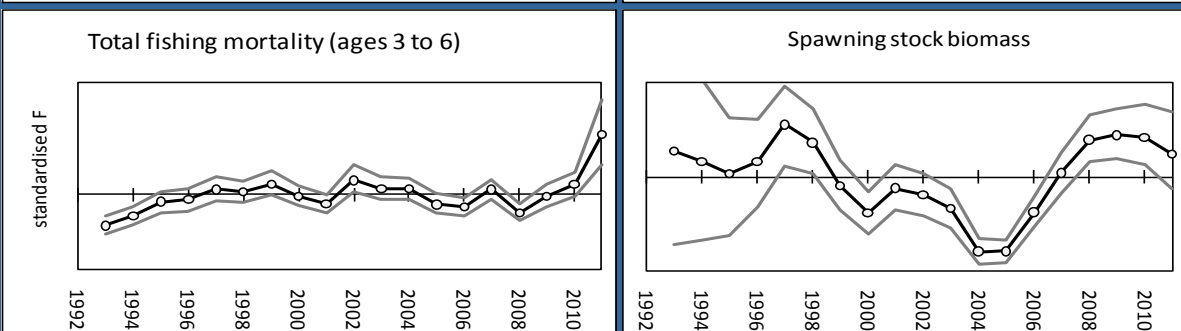
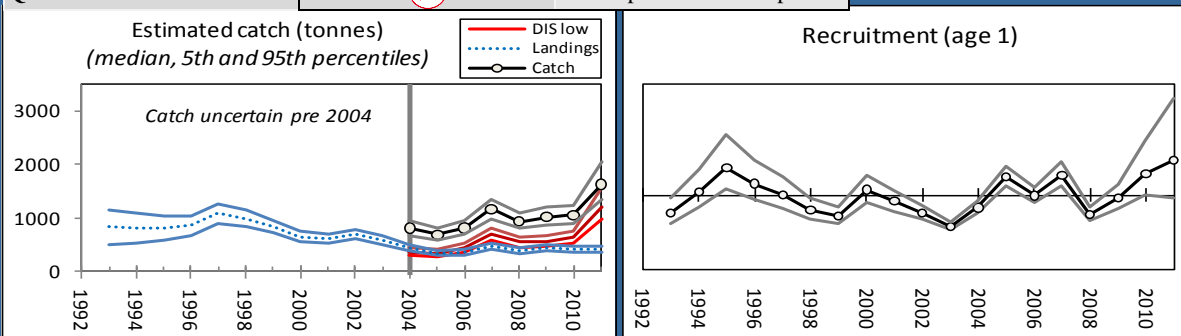
Rationale	Human Consumption landings (2013)	Basis	F Total (2013)	SSB (2014)	%SSB change ¹⁾
MSY framework	17.5	F_{MSY}	0.36	53.7	-9%
Zero catch	0	$F=0$	0	73.1	24%
Other options	12.8	$F_{sq} * 0.7$	0.25	58.9	0%
	14.3	$F_{sq} * 0.8$	0.28	57.2	-3%
	15.8	$F_{sq} * 0.9$	0.32	55.6	-6%
	17.2	$F_{sq} * 1$	0.35	54.1	-8%
	18.5	$F_{sq} * 1.1$	0.39	52.6	-11%
	19.8	$F_{sq} * 1.2$	0.42	51.2	-13%
	23.3	$F_{sq} * 1.5$	0.53	47.4	-20%

Weights in '000 tonnes

Advice for 2013, DLS: Landings < 360 t. Technical measures to reduce discard rates

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	?	?	? Unknown
Precautionary approach (F_{pa}, F_{lim})	?	?	? Unknown
Qualitative evaluation	↗	↗	✘ Above poss. reference points

SSB (Spawning Stock Biomass)		
2007-2011		
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	✘	Below poss. reference points



* Very high discards (e.g. 72% of catch in weight in 2011 discarded – mostly below MLS)

* Assessment includes discards, but uncertain: only indicative of trends

* SSB well below historic levels (from LPUE data)

Catch 2011 – 1 500 t (discards 72%)

Use SSB trends from assessment as stock indicator:

(Average last 2 years) is 1.5% higher than (average of 3 previous years)

→ 1.5% increase over recent landings (last 3 year average)

1. Uncertainty window: 1.5 % increase
2. Precautionary margin: yes, because stock considered overexploited → 20% reduction

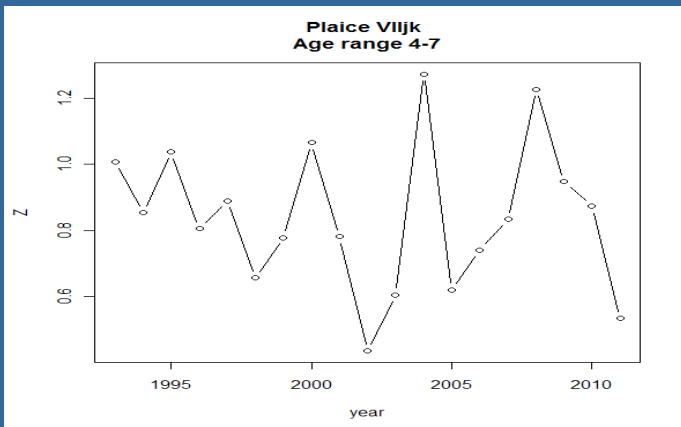
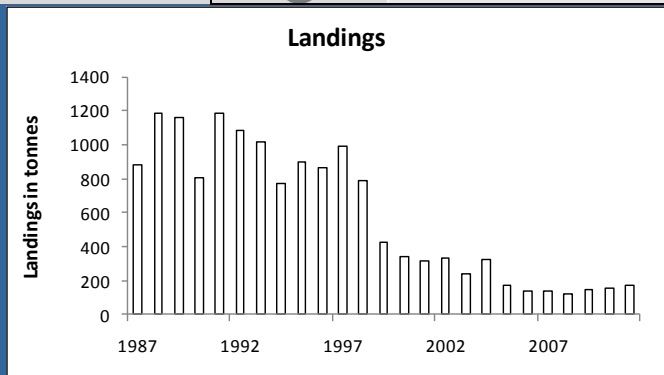
→ 1.5% increase followed by 20% reduction (applied to last 3 year average landings)

Result: 360 t

Plaice in Divisions VIIh-k (Southwest of Ireland)

Advice for 2013 and 2014, DLS: Catch < 100 t. Reduce bycatch and discards

F (Fishing Mortality)		
		2009-2011
MSY (F_{MSY})	?	Unknown
recautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	⊗	Above poss. reference points
SSB (Spawning Stock Biomass)		
		2009-2011
Qualitative evaluation	?	Unknown



* Very high discards (>60% by weight)

* Exploratory catch curve analysis shows that a 60% reduction from current F is required to reach the F_{MSY} proxy → 60% reduction from recent landings (last 3 year average)

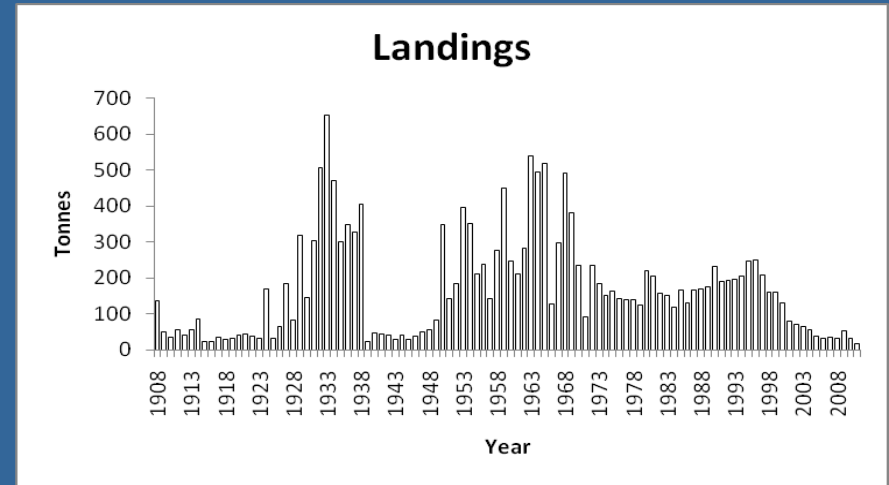
1. Uncertainty window: only 20% reduction
2. Precautionary margin: applied because SSB level unknown → 20% reduction

→ 20% reduction, followed by 20% reduction (applied to last 3 year average landings):

Result: 100 t

Advice for 2013 and 2014, DLS: Catch < 30 t

F (Fishing Mortality)	
	2009–2011
Qualitative evaluation	? Insufficient information
SSB (Spawning-Stock Biomass)	
	2009–2011
Qualitative evaluation	? Insufficient information



* Official landings

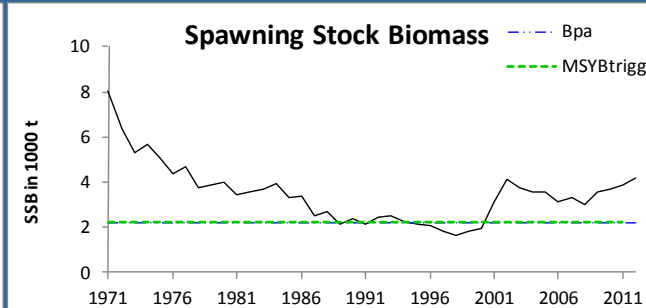
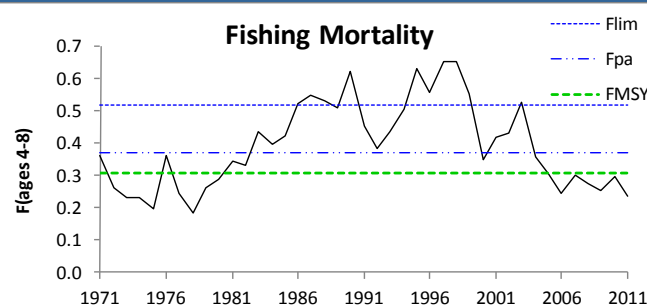
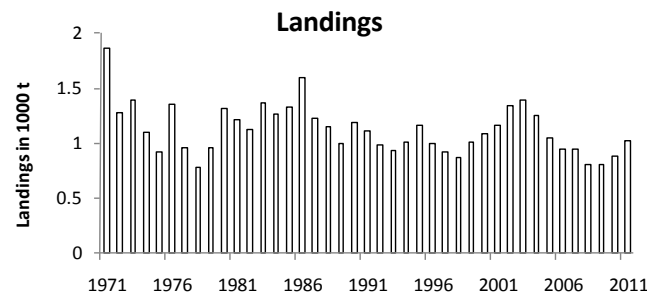
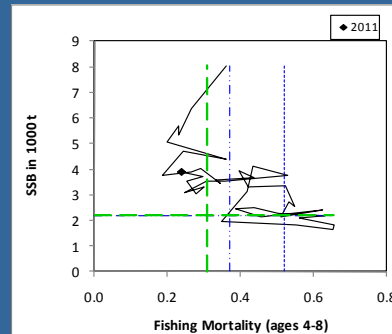
* In the absence of representative data for assessment: advice based on 20% precautionary reduction over recent (last 3 year average) landings

Sole in Celtic Sea (VIIf,g)

Advice for 2013, MSY: Landings < 1 100 t

MSY $B_{trigger} = 2\ 200\ t$
 $F_{MSY} = 0.31$

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✓	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	✓	✓	✓ Harvested sustainably
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓ Full reproductive capacity



* 2007 yc above average

* 2009 yc lowest in time series

Sole in Celtic Sea (VIIf,g)

Landings 2011 – 1 000 t (discards ~2-5%)

Discards not included in assessment (not a problem, very low)

Short term forecast in terms of landings

$F(2012) = F(2009-2011) = 0.26$; Landings(2012) = 19.1; $SSB(2013) > MSY B_{trigger}$

Rationale	Landings (2013)	Basis	F (2013)	SSB (2014)	%SSB change ¹⁾	% TAC change ²⁾
MSY framework	1.1	F_{MSY}	0.31	4.0	-1%	+6%
Precautionary Approach	1.3	F_{pa}	0.37	3.8	-5%	+24%
Zero catch	0	$F=0$	0	5.1	+27%	-100%
Other options	0.9	TAC – 15% ($F_{2012} * 0.92$)	0.24	4.2	+5%	-15%
	1.0	F_{2012}	0.26	4.2	+3%	-8%
	1.1	Stable TAC ($F_{2012} * 1.10$)	0.29	4.1	+1%	0%
	1.2	TAC + 15% ($F_{2012} * 1.29$)	0.34	3.9	-3%	+15%

Weights in '000s tonnes

Sole in Divisions VIIh-k (Southwest of Ireland)

Advice for 2013 and 2014, DLS: Landings < 200 t. Management should take into account advice to reduce bycatch and discards of plaice in this area.

F (Fishing Mortality)		
		2009–2011
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✓	close to current proxy for F_{MSY}
SSB (Spawning Stock Biomass)		
		2009–2011
Qualitative evaluation	?	Unknown

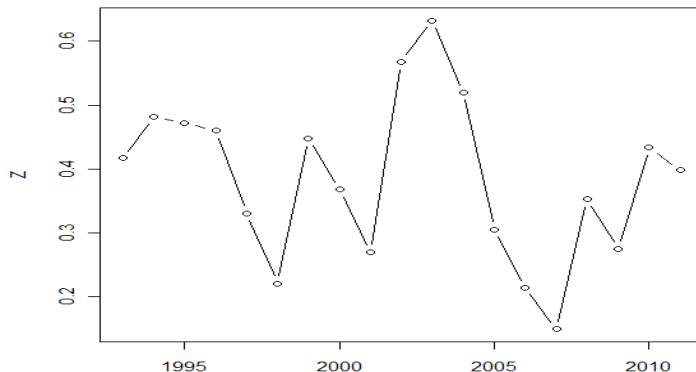
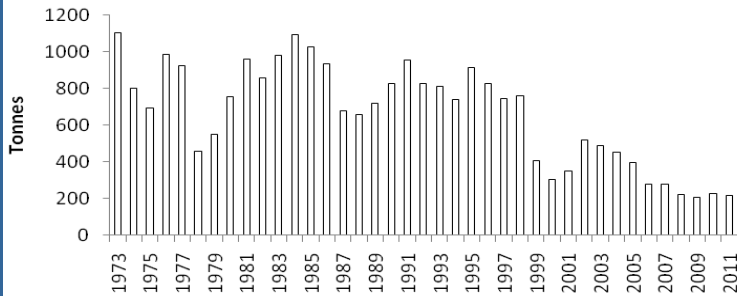
* Exploratory catch curve analysis shows that the F_{MSY} proxy is 15% above current F → 15% increase from recent landings

1. Uncertainty window: 15% increase
2. Precautionary margin: applied because SSB level unknown → 20% reduction

→ 15% increase, followed by 20% reduction (applied to last 3 year average landings):

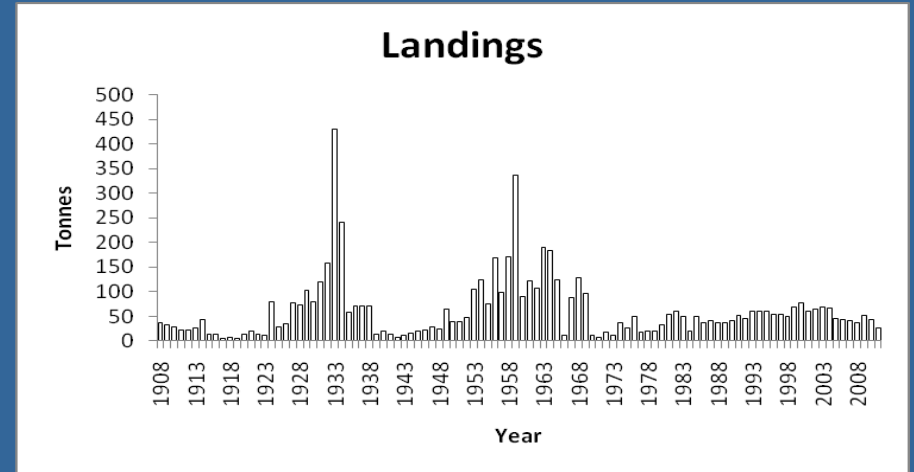
Result: 200 t

Landings



Advice for 2013 and 2014, DLS: Catch < 30 t

F (Fishing Mortality)	
	2009–2011
Qualitative evaluation	? Insufficient information
SSB (Spawning-Stock Biomass)	
	2009–2011
Qualitative evaluation	? Insufficient information



* Official landings; landings have been low for several decades

* In the absence of representative data for assessment: advice based on 20% precautionary reduction over recent (last 3 year average) landings

Anglerfish (*Lophius piscatorius* and *L. budegassa*)

Divisions VIIb–k and VIIIa,b,d

Advice for 2013, DLS: Catch < 24 800 t

Lophius piscatorius

	F (Fishing Mortality)	
	2009–2010	2011
MSY (F_{MSY})	?	?
Precautionary approach (F_{pa}, F_{lim})	?	?

	Total Stock Biomass	
	2007–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

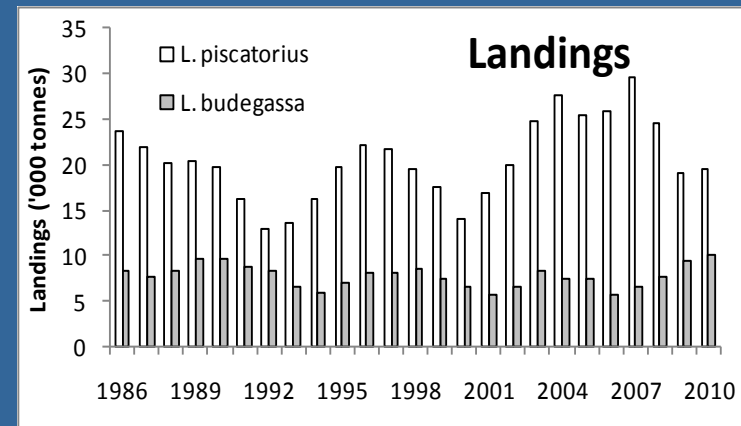
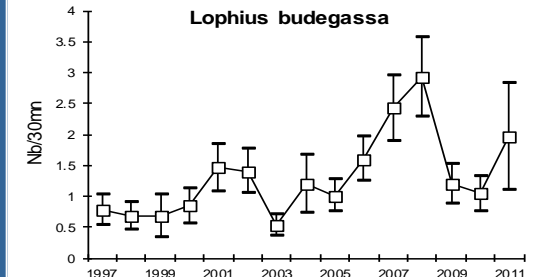
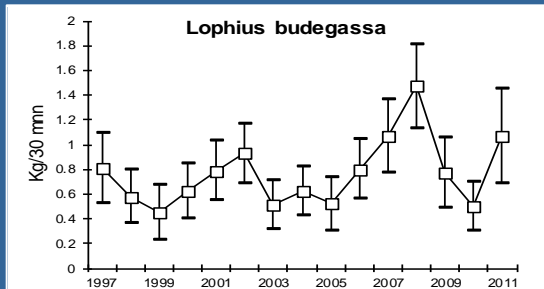
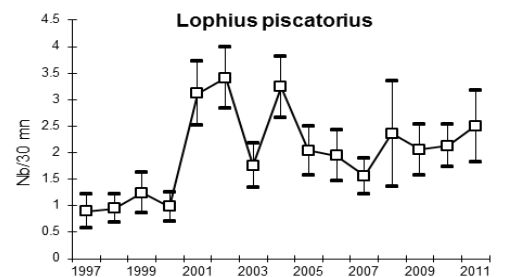
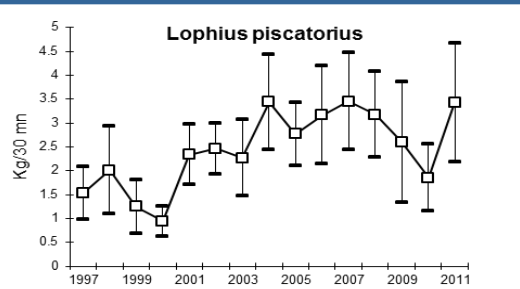
Lophius budegassa

	F (Fishing Mortality)	
	2009–2010	2011
MSY (F_{MSY})	?	?
Precautionary approach (F_{pa}, F_{lim})	?	?

	Total Stock Biomass	
	2007–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

* Overall stock trend stable, increasing during 2000s, decreasing in recent years

* Indications that discarding of small fish increased in recent years, but no reliable estimates



Landings 2010 – 29 700 t (discards unknown)

Spanish landings not available in 2011

Use biomass index from survey as stock indicator:

* *L. piscatorius*:

(Average last 2 years) is 14% lower than (average of 3 previous years)

→ 14% decrease over recent landings (2008-10 average): 19 700 t

* *L. budegassa*:

(Average last 2 years) is 20% lower than (average of 3 previous years)

→ 20% decrease over recent landings (2008-10 average): 6 900 t

1. Uncertainty window: 14% decrease for *L.pisc* and 20% decrease for *L.bude*

2. Precautionary margin: not applied, because steady effort decline in main fisheries

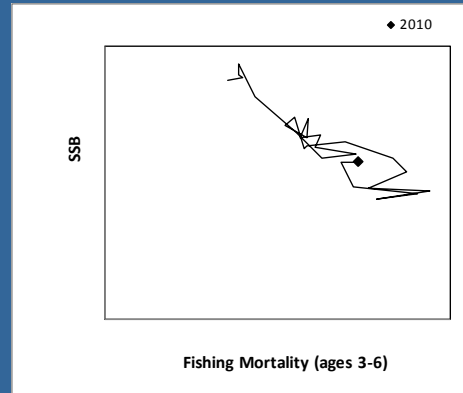
Result: 24 800 t

Megrim (*Lepidorhombus whiffiagonis*)

Divisions VIIb–k and VIIIa,b,d

Advice for 2013, DLS: Landings < 12 000 t

F (Fishing Mortality)		
2002 -2010		2011
MSY (F_{MSY})	?	?
Precautionary approach (F_{pa}, F_{lim})	?	?
Qualitative evaluation	→	?
SSB (Spawning Stock Biomass)		
2006 - 2010		2011
MSY ($B_{trigger}$)	?	?
Precautionary approach (B_{pa}, B_{lim})	?	?
Qualitative evaluation	↗	↗

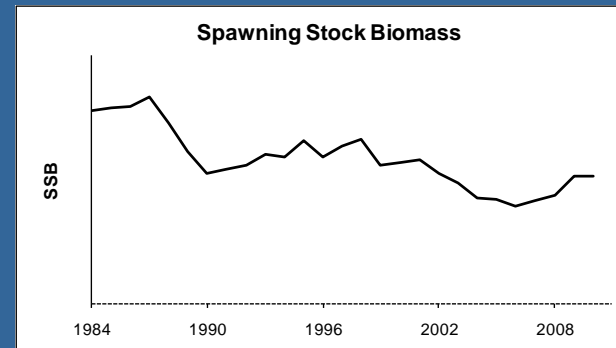
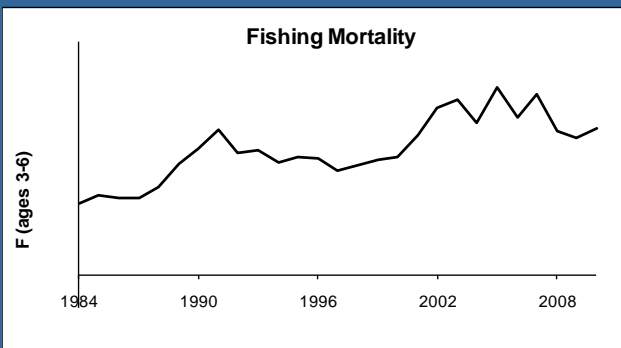
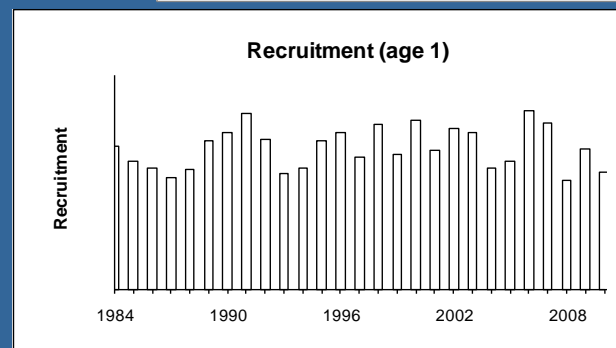
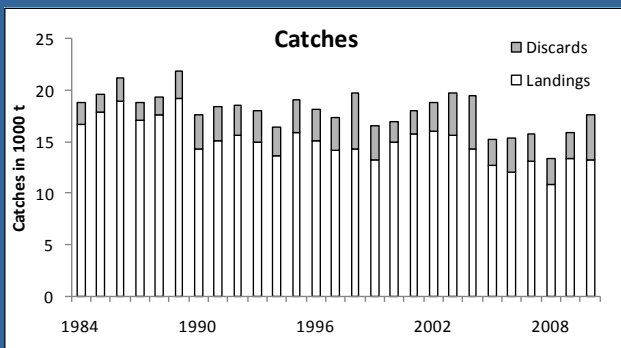


* Only indicative of trends

* Assessment uses data only until 2010 (no Spanish data in 2011)

* Discards substantial (~25% in weight), many gaps (no discards provided by France in last decade). Assessment model estimates missing discards but uncertain

Last 5 year increase: 25%



1. Window: 20% increase
2. Exploitation unknown with no indication of decreasing or low F → 20% reduction (precautionary margin)

Megrim (*L. whiffiagonis*) in Divisions VIIb–k and VIIIa,b,d

Use SSB from assessment as stock indicator:

(Average last 2 years) is 25% higher than (average of 3 previous years)

→ 25% decrease over recent landings (2008-10 average): 14 954 t

1. Uncertainty window: cap increase at 20%

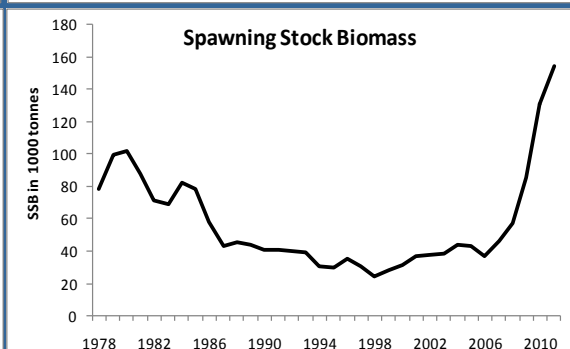
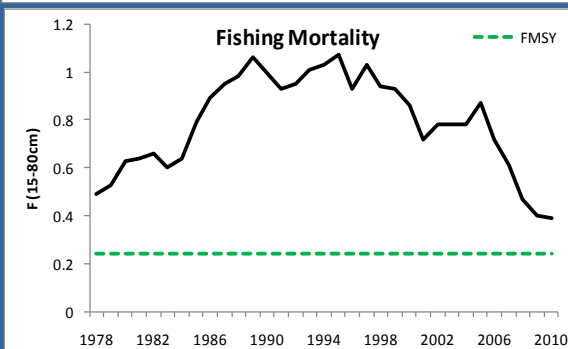
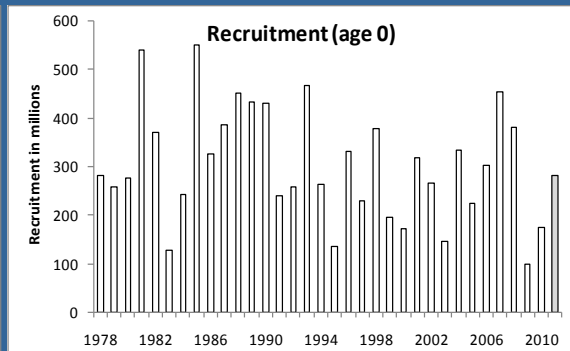
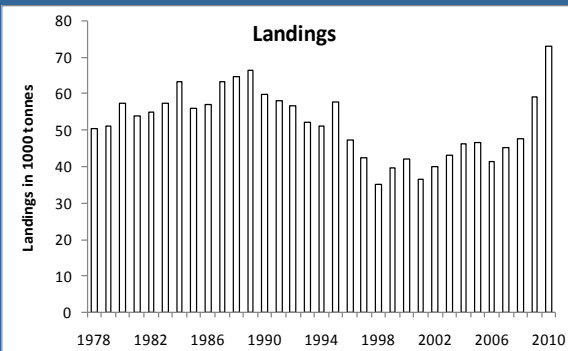
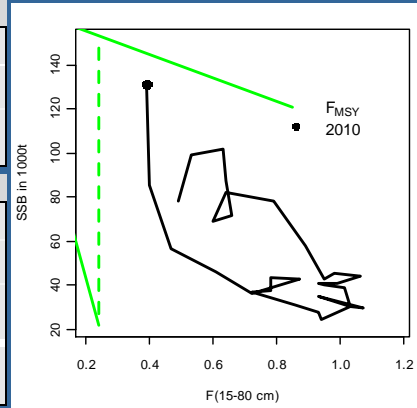
2. Precautionary margin: 20% reduction applied, because exploitation unknown and there is no indication of low or decreasing F

→ 20% increase, followed by 20% reduction applied to recent landings (2008-10 average)

Result: 12 000 t

Advice for 2013, MSY transition: Landings < 45 400 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✘	✘	? Not available
Precautionary approach (F_{pa}, F_{lim})	?	?	? Not available
SSB (Spawning-Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	?	?	? Not available
Precautionary approach (B_{pa}, B_{lim})	?	?	? Not available
Qualitative evaluation	↗	↗	✓ Above poss. reference points



* No assessment in 2012, last year's assessment

* Strong yc in 2007 and 2008, but weak in 2009 and 2010

* Very strong increase in SSB and decrease in F

* Rapid growth and fast dynamics

Hake – Northern stock

Landings 2010 – 73 000 t (discards ~6 700 t, but underestimated)

No stock landings or discards in 2011 (Spanish data not available)

Discards included in assessment, but incomplete, high uncertainty

Short term forecast in terms of catch → split into landings, discards

$F(2011) = F(2012) = F(2008-10) = 0.42$; landings (2011) = 77, landings (2012) = 63;
SSB (2013) = 110 kt

Rationale	Human consump. landings (2013)	Basis	F Total (2013)	F HC (2013)	F Disc (2013)	Disc. (2013)	Catch Total (2013)	SSB (2014)	%SSB change ₁₎	%TAC change ₂₎
MSY framework	37.2	F_{MSY} ($F_{sq} * 0.57$)	0.24	0.20	0.04	1.7	39.0	141.9	+24%	-32%
MSY transition	45.4	$0.4 * F_{2010} + 0.6 * F_{MSY}$ ($F_{sq} * 0.71$)	0.30	0.26	0.04	2.1	47.6	133.4	+17%	-18%
Recovery Plan	46.8	-15% TAC ($F_{sq} * 0.75$)	0.31	0.27	0.05	2.2	49.0	132.0	+16%	-15%
Other options	55.1	Equal TAC ($F_{sq} * 0.91$)	0.38	0.32	0.06	2.7	57.8	123.3	+8%	0%
	59.9	$F_{sq} * 1$	0.42	0.36	0.06	2.9	62.8	118.4	+4%	+9%
	63.3	+15% TAC ($F_{sq} * 1.08$)	0.454	0.39	0.07	3.1	66.4	114.7	0%	+15%
	68.9	$F_{sq} * 1.2$	0.51	0.43	0.07	3.4	72.3	108.9	-5%	+25%

35% of projected landings in 2013 comes from assumed recruitment (2011-13)

Pollack in Subareas VI and VII

Advice for 2013 and 2014, DLS: Catch < 4 200 t

F (Fishing Mortality)	
	2009–2011
Qualitative evaluation	? Insufficient information
SSB (Spawning-Stock Biomass)	
	2009–2011
Qualitative evaluation	? Insufficient information

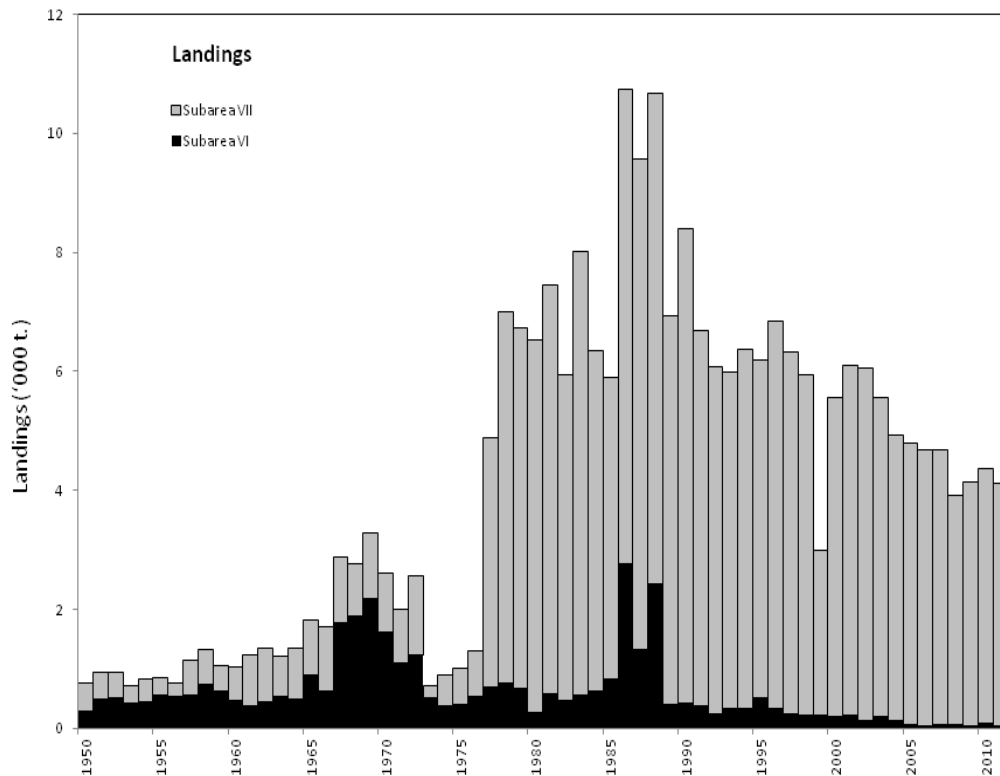
* Almost all landings from Subarea VII

* Caught mostly by trawls and gillnets; catches by recreational fisheries unknown

* DCAC (method that estimates a sustainable catch) applied to Subareas VI and VII separately

* Subarea VI: recent landings below DCAC → 10% increase

* Subarea VII: recent landings very close to DCAC

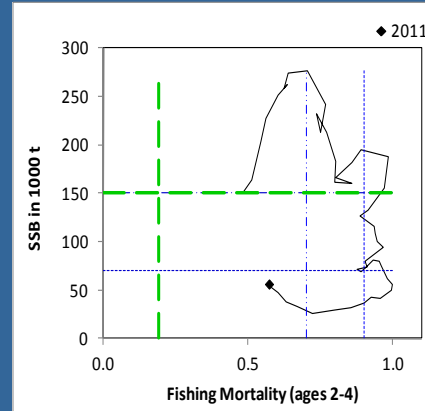


English Channel (VIId & VIle)

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

Advice for 2013, EU/Norway MP: Landings < 25 441 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	✓	✓	✓ Harvested sustainably
Management plan (F_{MP})	✗	✗	✗ Above target
SSB (Spawning-Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✗	✗	✗ Below trigger
Precautionary approach (B_{pa}, B_{lim})	✗	✗	✗ Reduced reproductive capacity
Management plan (SSB_{MP})	✗	✗	✗ Below trigger



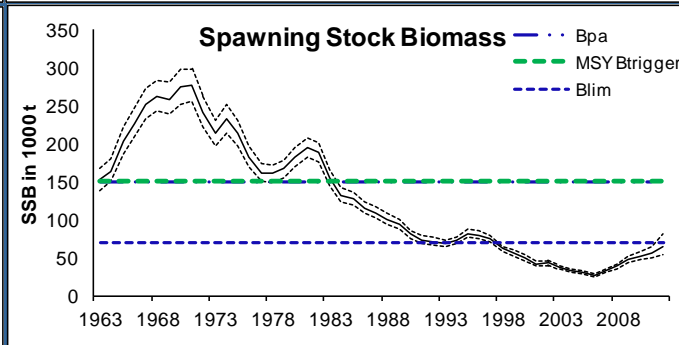
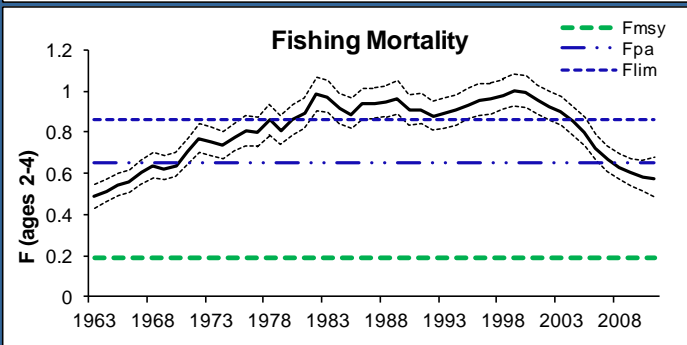
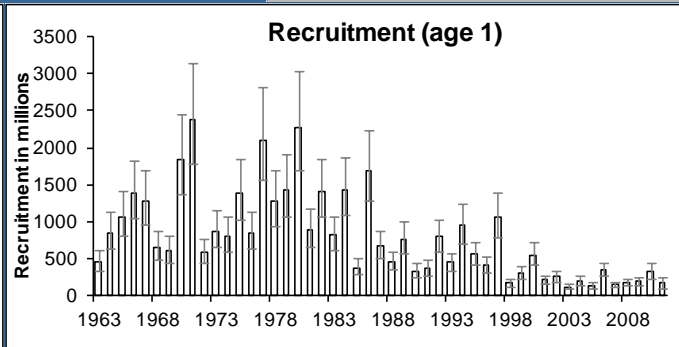
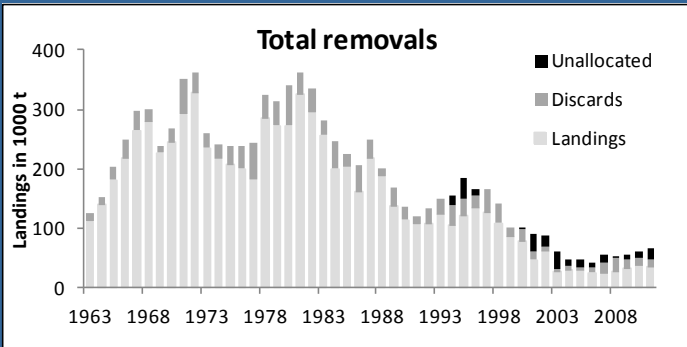
* Gradual improvement in last years, but still poor stock status

* F well above F_{MSY}

* SSB just below B_{lim}

* All yc since 1997 very low

* Proportion discarded in recent years higher than in past



Total removals 2011 – 67 kt: landings (35kt), discards (12kt), unallocated (20kt)
 Catch = landings + discards = 47 kt

Main sources of uncertainty: unallocated removals and assumptions for $F(2012)$

Short term forecast in terms of catch → split into landings, discards, unallocated

$F(2012)$ reduction according to MP; $SSB(2013) = 78 \text{ kt} (> B_{lim})$

Rationale	Landings ¹⁾	Basis	F_{total}	F_{land}	F_{disc}	F_{unal} ²⁾	Disc	Unal ²⁾	SSB	%SSB ³⁾	%TAC ⁴⁾
	(2013)		(2013)	(2013)	(2013)	(2013)	(2013)	(2013)	(2014)	Change	Change
Management Plan	25.441	TAC constraint	0.26	0.15	0.06	0.05	6.5	8.6	107	+37%	-20%

F (2012) reduction according to observed trend in F during 2006-10; SSB(2013) = 76 kt ($> B_{lim}$)

Rationale	Landings ¹⁾	Basis	F _{total}	F _{land}	F _{disc}	F _{unal} ²⁾	Disc	Unal ²⁾	SSB	%SSB ³⁾	%TAC ⁴⁾
	(2013)		(2013)	(2013)	(2013)	(2013)	(2013)	(2013)	(2014)	Change	Change
Management Plan	25.441	TAC constraint	0.27	0.16	0.06	0.06	6.6	8.6	103	+36%	-20%
MSY framework	10	F_{MSY}^* $SSB_{2013}/B_{trigger}$	0.10	0.06	0.02	0.02	2.5	3.4	123	+63%	-69%
MSY transition	28	Transition rule	0.29	0.17	0.06	0.06	7.2	9.4	101	+33%	-13%
Zero catch	0	F=0	0.00	0.00	0.00	0.00	0.0	0.0	136	+80%	-100%
Other options	19	F_{MSY}	0.19	0.11	0.04	0.04	4.9	6.4	112	+47%	-41%
	25.441	TAC ₂₀₁₂ -20%	0.27	0.16	0.06	0.06	6.6	8.6	103	+36%	-20%
	38.161	TAC ₂₀₁₂ +20%	0.43	0.25	0.09	0.09	10.2	13.0	87	+15%	+20%
	43	F_{2012}	0.50	0.29	0.10	0.11	11.7	14.8	81	+7%	+36%
	43	Landings 2012	0.49	0.28	0.10	0.10	11.5	14.6	82	+8%	+34%
Mixed fisheries options – minor differences with calculation above can occur due to different methodology used (ICES, 2012b)											
Maximum	49	A	0.77	NA	NA	NA	NA	NA	50	-34 %	+55 %
Minimum	25	B	0.25	NA	NA	NA	NA	NA	114	51 %	-20 %
Cod MP	25	C	0.29	NA	NA	NA	NA	NA	95	+25 %	-20 %
SQ effort	42	D	0.55	NA	NA	NA	NA	NA	68	-10%	+33 %
Effort_Mgt	30	E	0.32	NA	NA	NA	NA	NA	96	+26 %	-6 %

Mixed fisheries options presented in advice for first time: TAC for cod is the limiting one in North Sea

Plaice in Division VII d (Eastern Channel)

Advice for 2013, DLS: Catch < 4 300 t; reduce discards

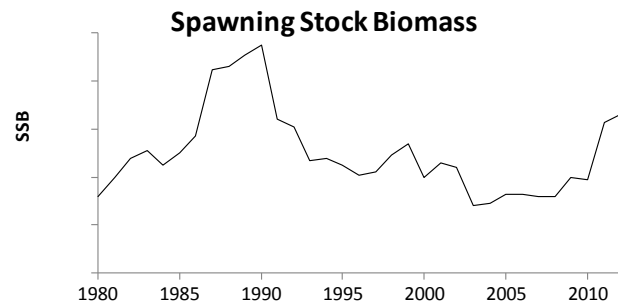
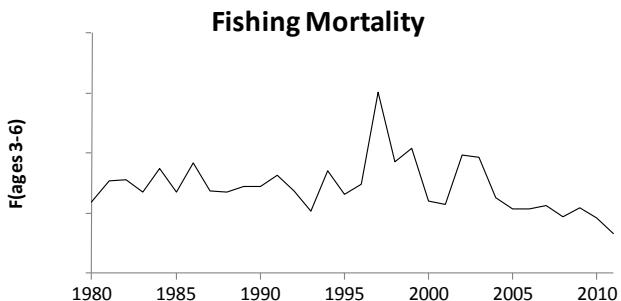
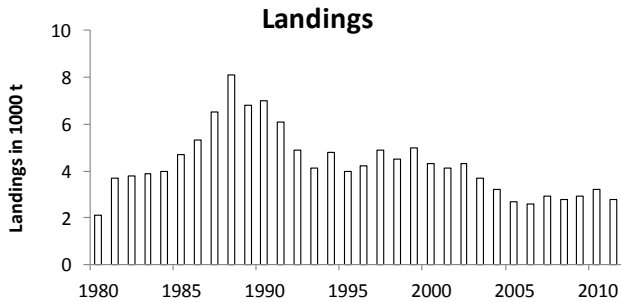
F (Fishing Mortality)		
2009-2011		
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	↘	Lowest in time series
SSB (Spawning-Stock Biomass)		
2008-2012		
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	increasing



- * F decreasing
- * SSB increasing
- * 2009 yc good

* Discards substantial and not included in assessment → assessment only indicative of trends

* Average $F(2009-11)$ ~ twice F_{MSY}



Landings 2011 – 3 500 t (discards unknown, usually ~50% by number)

- Main mesh size (80 mm) does not match MLS of plaice (27 cm)

Use assessment results: SSB as stock indicator and value of current F in relation to F_{MSY}

- (Average SSB last 2 years) is 74% higher than (average of previous 3 years)
- To reach F_{MSY} in 2015, a 29% reduction in F needed in 2013
- → Multiply recent landings (last 3 year average) by $1.74 \cdot 0.71 = 1.24$, i.e. 24% increase

1. Uncertainty window: 24% increase → 20% increase

2. Precautionary margin: not applied because method designed to reach F_{MSY} in 2015

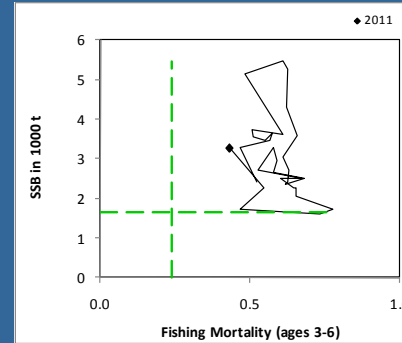
Result: 4 300 t

Plaice in Division VIIe (Western Channel)

Advice for 2013, MSY transition: Landings < 2 100 t

MSY $B_{trigger} = 1\ 650\ t$
 $F_{MSY} = 0.24$
 revised this year

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	? Undefined

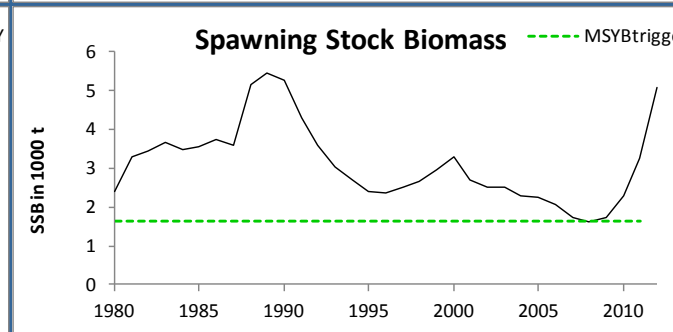
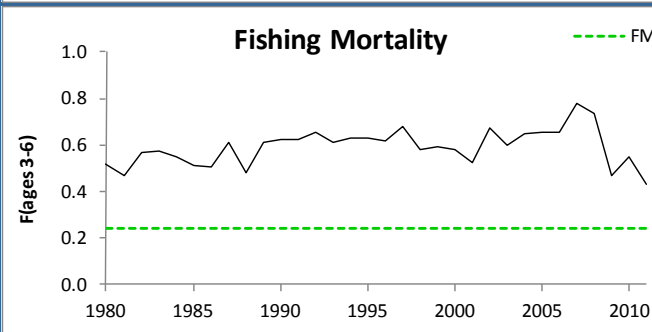
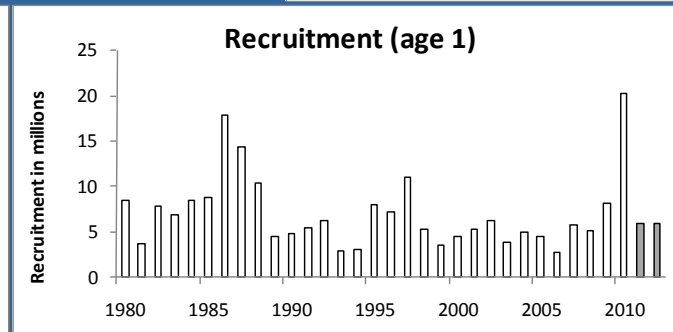
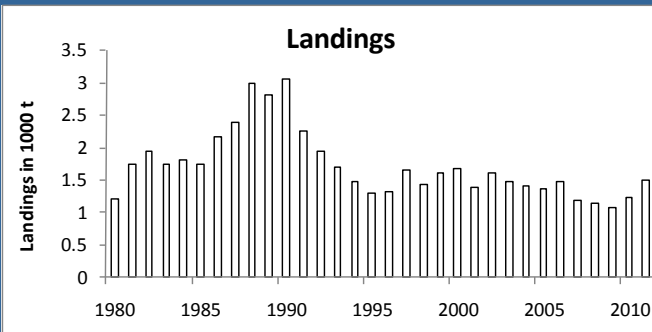


* F decreasing, above F_{MSY}

* SSB increasing

* 2009 yc very good

* Discards not in assessment, but lower than for other plaice stocks



Landings 2011 – 1 300 t (discards unknown)

* Plaice stock identity uncertainties (migration at spawning time between VIIe and VIId): accounted for in assessments and forecasts of both divisions

Short term forecast in terms of landings

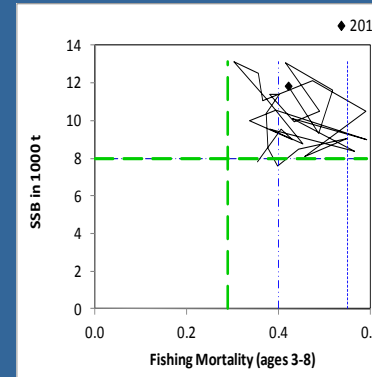
$F(2012)=F(2009-11)=0.48$; $SSB(2013)=5.8$ kt > $MSY B_{trigger}$

Rationale	Landings (2013) ¹⁾	Basis	F (2013)	SSB (2014)	%SSB change ²⁾
MSY framework	1.4	$F_{MSY} (F_{2012} * 0.50)$	0.24	6.7	+15%
MSY transition	2.1	$(0.4 * F_{2010} + 0.6 * F_{MSY}) = F_{2012} * 0.75$	0.36	6.0	+3%
Zero catch	0	$F=0$	0.00	8.3	+43%
Other options	1.4	$F_{2012} * 0.5$	0.24	6.7	+15%
	1.7	$F_{2012} * 0.6$	0.29	6.4	+10%
	2.0	$F_{2012} * 0.7$	0.34	6.1	+5%
	2.2	$F_{2012} * 0.8$	0.39	5.9	+1%
	2.5	$F_{2012} * 0.9$	0.43	5.6	-3%
	2.7	$F_{2012} * 1.0$	0.48	5.4	-7%
	3.0	$F_{2102} * 1.1$	0.53	5.2	-11%

TAC is for VIId,e

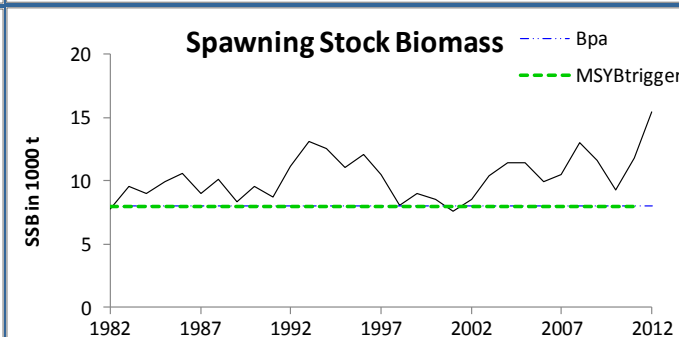
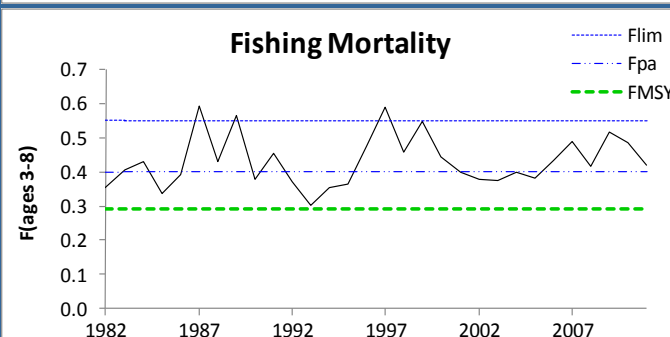
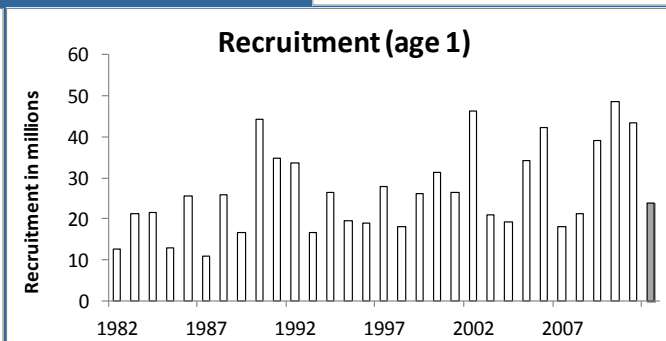
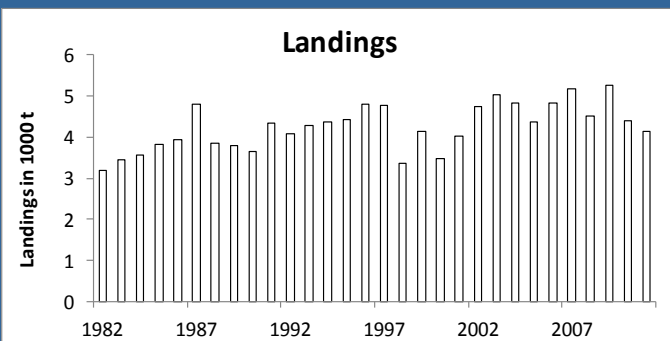
Advice for 2013, MSY transition: Landings < 5 900 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	○	○	○ Increased risk
SSB (Spawning-Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓ Full reproductive capacity



$$MSY B_{trigger} = 8\ 000\ t$$

$$F_{MSY} = 0.29$$



* Above average yc in 2008-10

* SSB increasing in 2011 and 2012

* F above F_{pa} and F_{MSY}

Landings 2011 – 4 100 t (discards unknown, but minor)

* High discards of plaice below MLS

Short term forecast in terms of landings

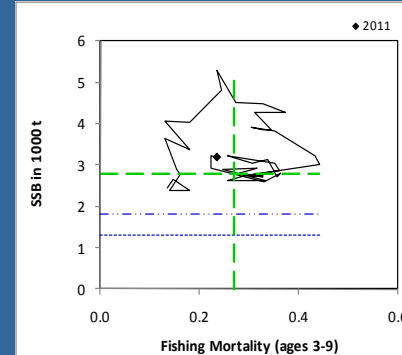
$F(2012)=TAC \text{ constraint}=0.38$; Landings(2012)=5 580 t; $SSB(2013)=23\ 300 \text{ t} > MSY B_{\text{trigger}}$

Rationale	Landings (2013)	Basis	F(2013)	SSB(2014)	%SSB change ¹⁾	%TAC Change ²⁾
MSY framework	4800	F_{MSY}	0.29	17 200	-1%	-14%
MSY transition	5900	$(F_{2010} * 0.4) + (F_{MSY} * 0.6)$	0.37	16 000	-8%	+5%
Precautionary approach	6300	F_{pa}	0.40	15 600	-10%	+13%
Zero catch	0	$F=0$	0	22 200	+28%	-100%
Other options	4743	TAC -15% $(F_{2012} * 0.75)$	0.29	17 200	-1%	-15%
	5580	Stable TAC $(F_{2012} * 0.99)$	0.35	16 400	-6%	0%
	6100	F_{2012}	0.38	15 900	-9%	+9%
	6417	TAC +15% $(F_{2012} * 1.1)$	0.41	15 500	-11%	+15%

Sole Vile – Western Channel

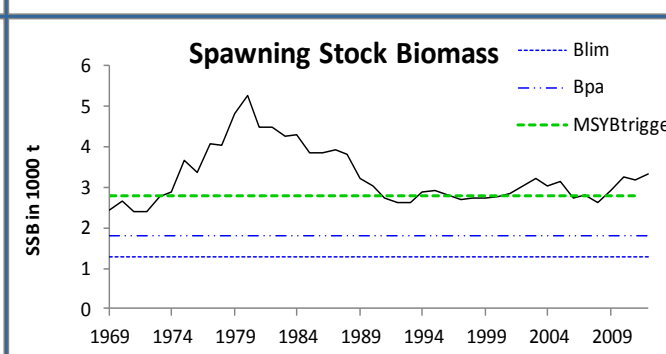
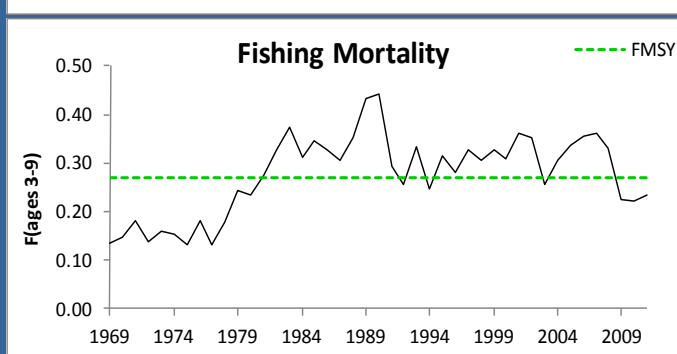
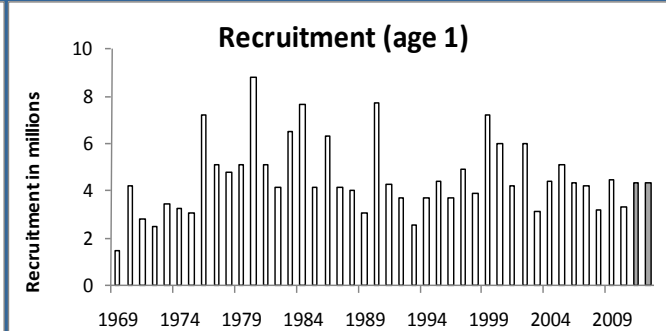
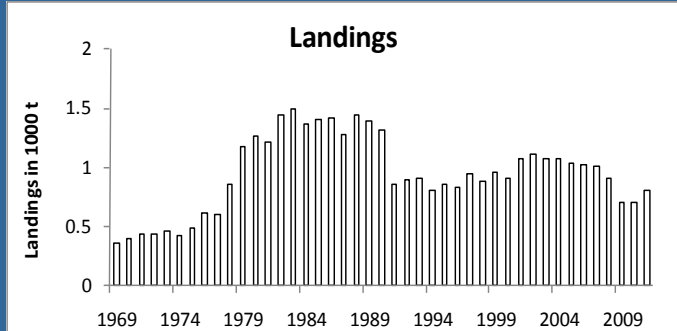
Advice for 2013, MSY: Landings < 960 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✓	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓ Full reproductive capacity



$$MSY B_{trigger} = 2\,800\,t$$

$$F_{MSY} = 0.27$$



- * No trends in recruitment
- * SSB stable for about 2 decades

* F below F_{MSY} since 2009

Landings 2011 – 800 t (discards 1%)

Short term forecast in terms of landings

$F(2012)=F(2009-11)=0.23$; Landings(2012)=790 t; $SSB(2013)=3\ 500\ t > MSY\ B_{trigger}$

Rationale	Landings (2013)	Basis	F (2013)	SSB (2014)	%SSB change ¹⁾	% TAC change ²⁾
MSY framework	960	$F_{MSY} (= F_{2012} * 1.19)$	0.27	3500	0	+23
Management plan	894	$F_{MP} (= F_{MSY} * 0.93)$ TAC constraint	0.25	3530	+2	+15
Zero catch	0	0	0	4400	+28	-100
Other options	430	$F_{2012} * 0.5$	0.11	4000	+15	-44
	510	$F_{2012} * 0.6$	0.14	3900	+13	-34
	590	$F_{2012} * 0.7$	0.16	3800	+11	-24
	670	$F_{2012} * 0.8$	0.18	3800	+9	-14
	663	- 15% TAC ($F_{2012} * 0.83$)	0.18	3760	+9	-15
	750	$F_{2012} * 0.9$	0.20	3700	+6	-4
	777	0%TAC ($F_{2012} * 0.94$)	0.21	3650	+6	0
	820	F_{2012}	0.23	3600	+4	+6
	894	+ 15% TAC ($F_{2012} * 1.1$)	0.25	3530	+2	+15

ICES has not evaluated management plan

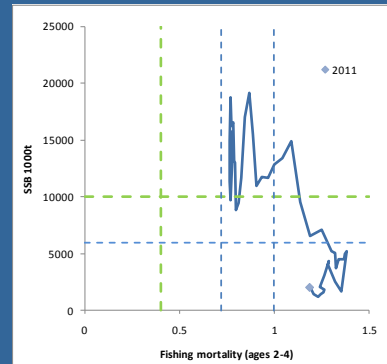
Irish Sea (VIIa)

- Cod
- Haddock
- Whiting
- Plaice
- Sole
- *Nephrops*

Cod in Division VIIa (Irish Sea)

Advice for 2013 and 2014, MSY: No directed fisheries; bycatch and discards minimised

F (Fishing Mortality)			
	2009 2010		2011
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	✗	✗	✗ Harvested unsustainably
SSB (Spawning-Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✗	✗	✗ Below trigger
Precautionary approach (B_{pa}, B_{lim})	✗	✗	✗ Reduce reproductive capacity



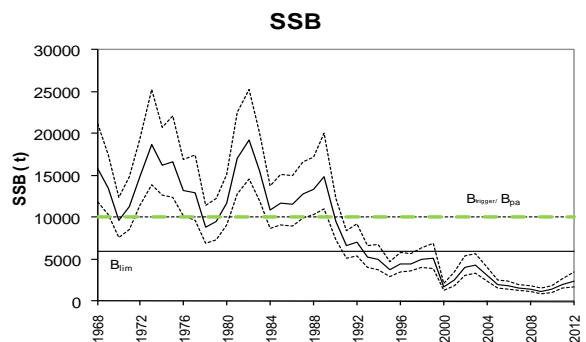
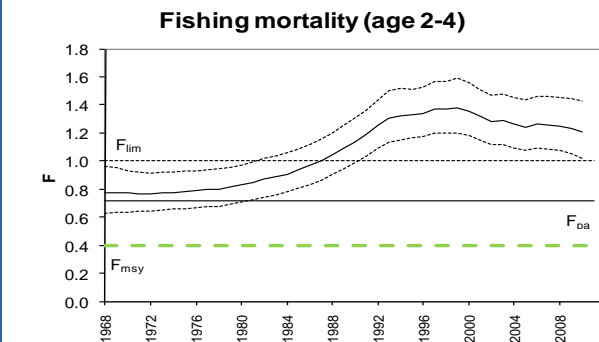
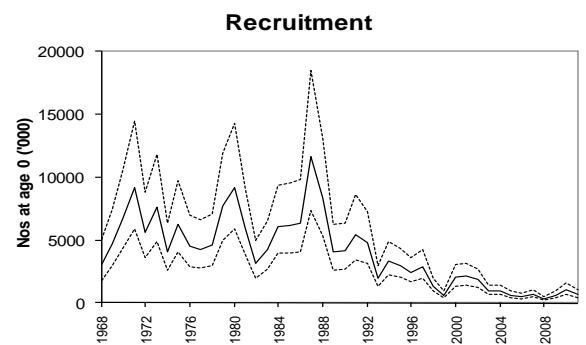
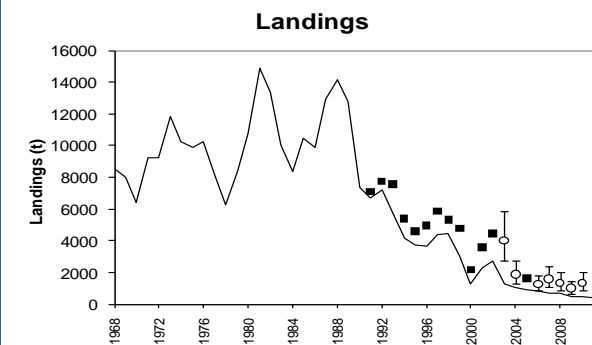
$$MSY B_{trigger} = 10\,000\ t$$

$$F_{MSY} = 0.4$$

* F in recent years is uncertain (due to unaccounted mortality) but total mortality remains very high

* SSB 10-fold decline since late 1980s: well below B_{lim}

* Recruitment very low in last decade



Haddock in Division VIIa (Irish Sea)

Advice for 2013, DLS: Catch < 710 t;
technical measures to reduce discards

* Assessment only
 indicative of trends

* SSB from assessment as
 stock indicator:

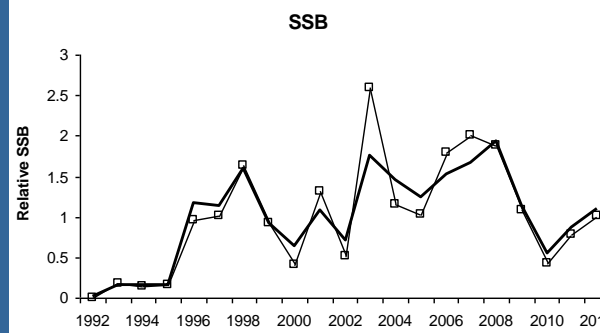
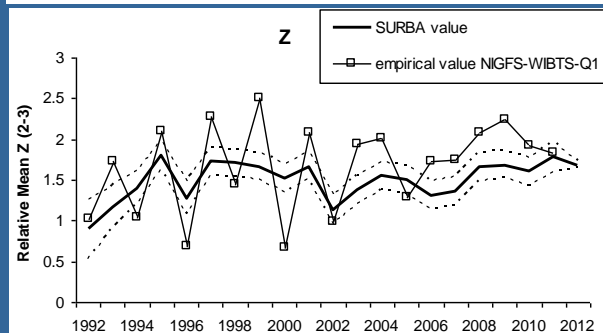
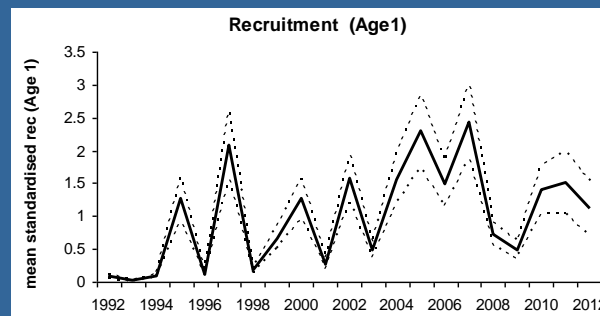
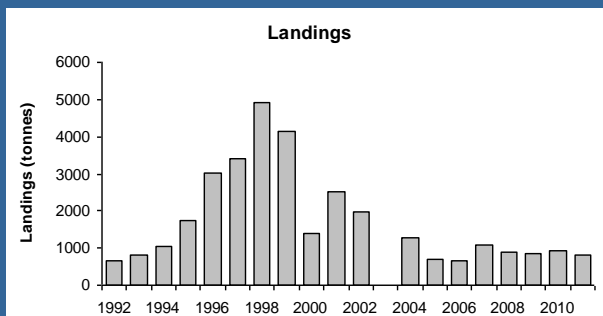
(Average of last 2 years) is
 18% below (average of
 previous 3 years)

➔ 18% reduction

1. Uncertainty window:
 18% reduction

2. Additional precautionary
 margin: No, because very
 big increase in SSB since
 early 1990s and strong
 effort reductions in main
 fisheries (Cod MP)

F (Fishing Mortality)		
		2009–2011
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
SSB (Spawning-Stock Biomass)		
		2008–2012
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing



Whiting in Division VIIa (Irish Sea)

Advice for 2013 and 2014, precautionary considerations: lowest possible catch; technical measures to reduce discards

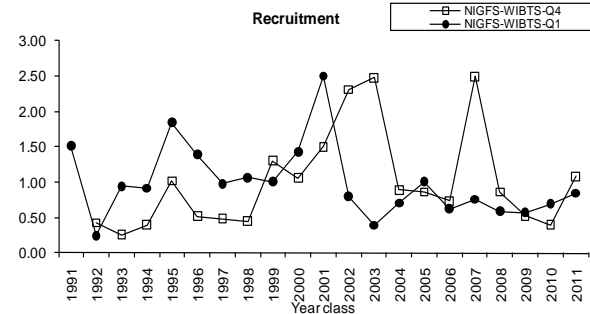
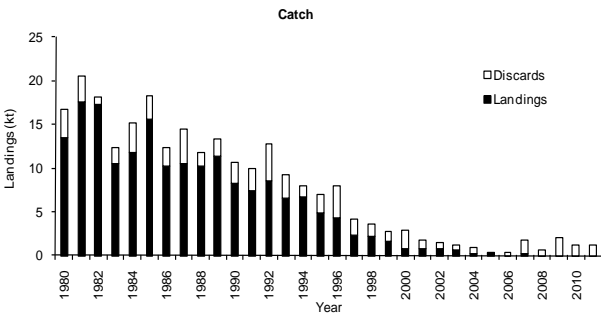
F (Fishing Mortality)

	2009–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✗	Above poss. reference points

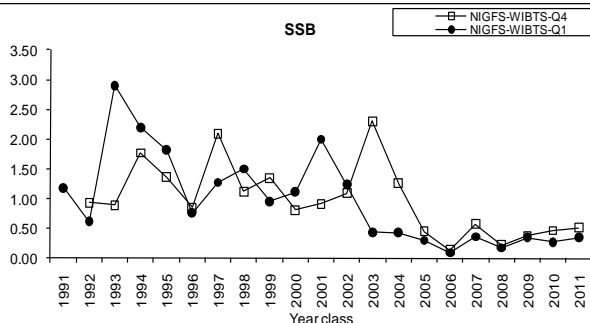
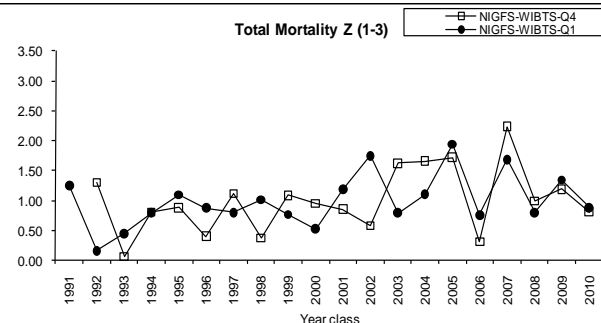
SSB (Spawning Stock Biomass)

	2009–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	✗	Below poss. reference points

* Surveys, long-term info on yield and catch composition indicate that current SSB extremely low



* Current F likely above possible F_{MSY} values



* No remaining targeted whiting fishery in Irish Sea: bycatch and discarded (low market value)

Plaice in Division VIIa (Irish Sea)

Advice for 2013, DLS:
Landings < 490 t

* Assessment only indicative of trends

* SSB from assessment as stock indicator:

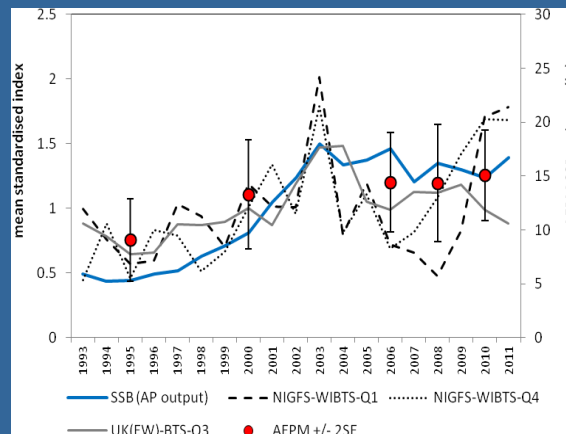
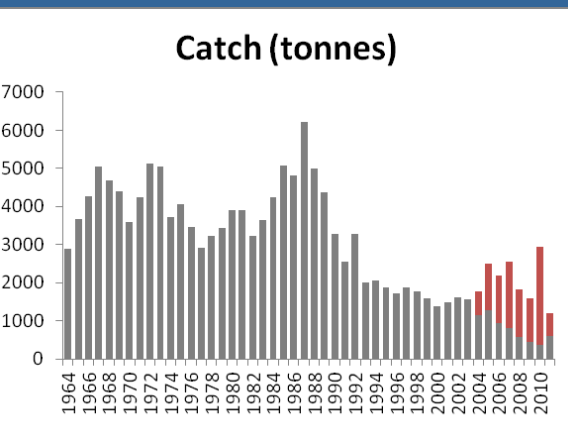
(Average of last 2 years) is 2% above (average of previous 3 years)
➔ 2% increase

F (Fishing Mortality)	
2009-2011	
MSY (F_{MSY})	Unknown
Precautionary approach (F_{pa}, F_{lim})	Unknown
Qualitative evaluation	Below poss. reference points
SSB (Spawning Stock Biomass)	
2008-2012	
MSY ($B_{trigger}$)	Unknown
Precautionary approach (B_{pa}, B_{lim})	Unknown
Qualitative evaluation	Above poss. reference points



1. Uncertainty window: 2% increase

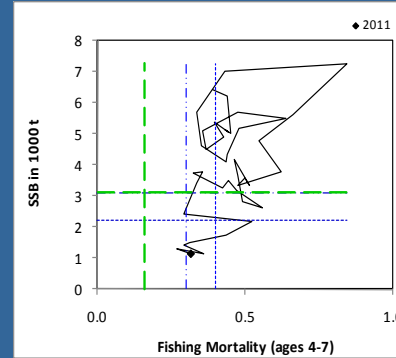
2. Additional precautionary margin: No, because recent F likely very low (catch/biomass ~ 15% in recent years)



Sole in Division VIIa (Irish Sea)

Advice for 2013 and 2014, MSY: No directed fisheries; bycatch and discards should be minimised

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	⊙	⊙	⊙ Increased risk
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✗	✗	✗ Below trigger
Precautionary approach (B_{pa}, B_{lim})	✗	✗	✗ Reduced reproductive capacity

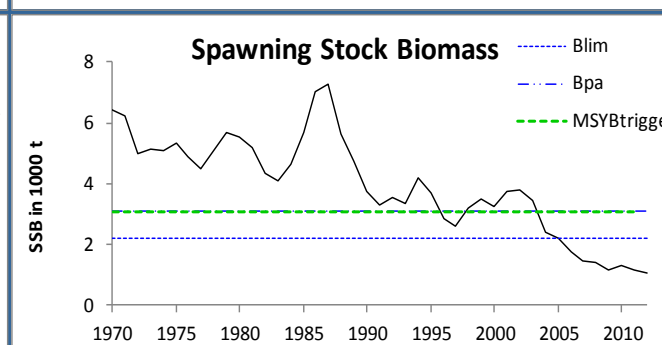
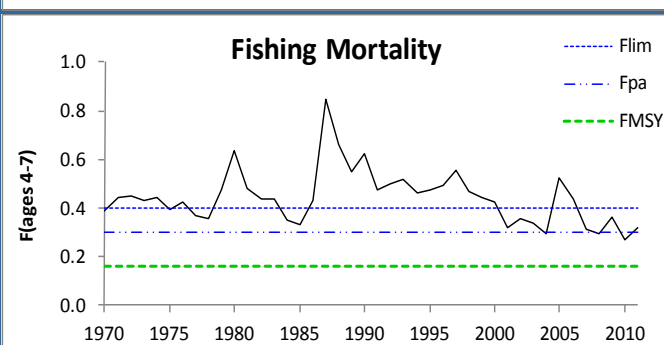
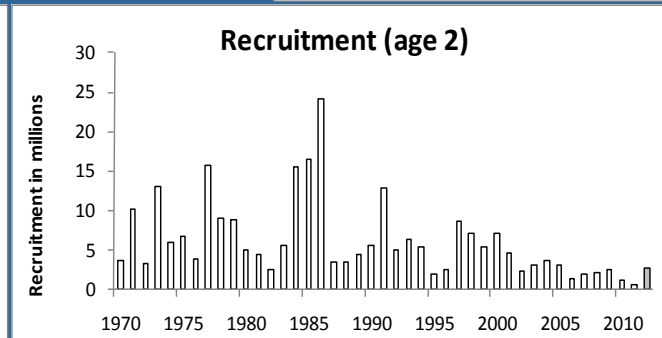
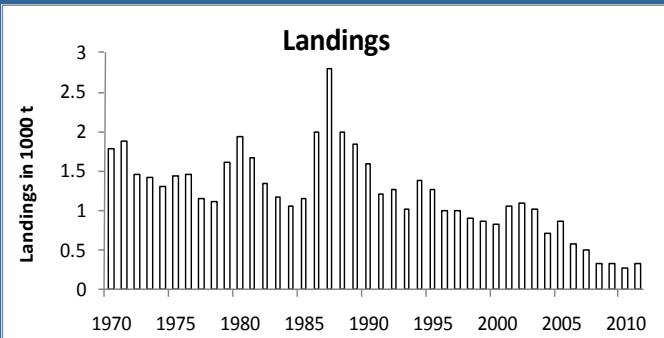


$$MSY B_{trigger} = 3\ 100\ t$$

$$F_{MSY} = 0.16$$

In last decade:

- * SSB declined continuously and is now at historic minimum
- * F stable around F_{pa}
- * Recruitment lower than previously; Rec in 2010 and 2011 lowest in time series



Sole in Division VIIa (Irish Sea)

Landings 2011 – 330 t (discards < 8%)

Short term forecast in terms of landings

$F(2012)=F(2009-11)=0.32$; Landings(2012)=280 t ; $SSB(2013) = 1\ 100\ t < B_{lim} (2\ 200\ t)$

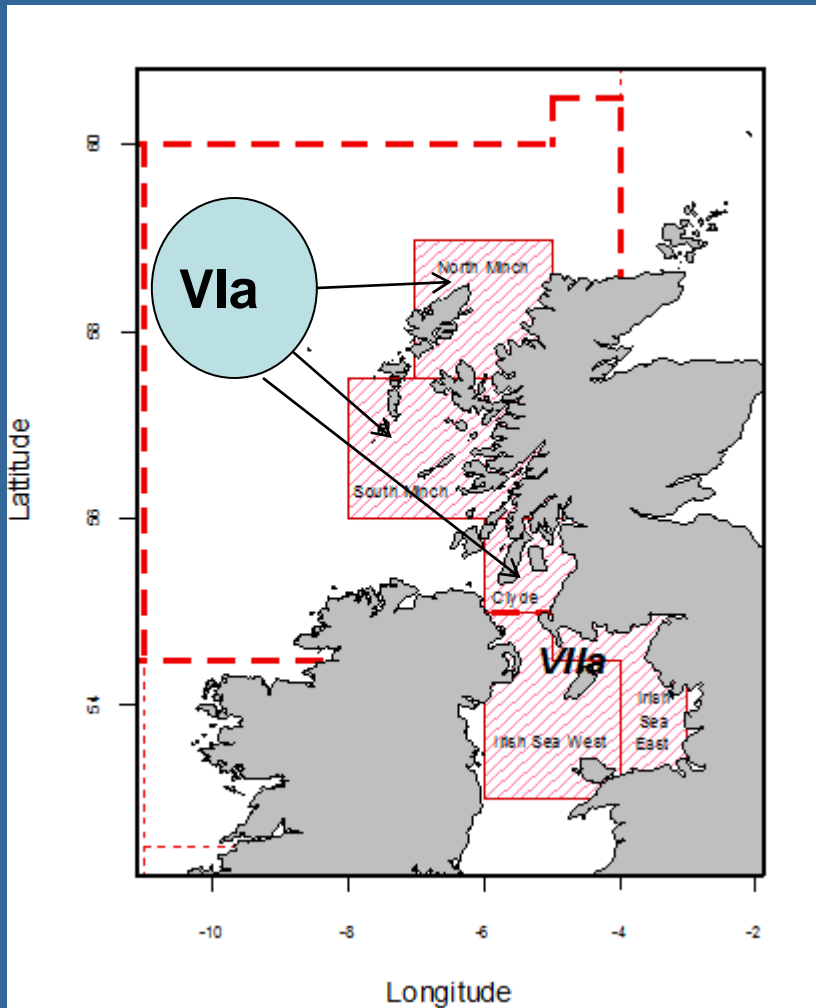
Rationale	Landings (2013)	Basis	F(2013)	SSB(2014)	%SSB change ¹⁾	%TAC Change ²⁾
MSY framework	60	$F_{HCR-MSY} = F_{MSY} * SSB_{(2013)} / MSY B_{trigger}$	0.06	1500	+30%	-80%
MSY transition	140	$0.4 * F_{(2010)} + 0.6 * F_{HCR-MSY}$	0.14	1400	+23%	-52%
Precautionary approach	0	$SSB_{2014} > B_{pa}$	0	1500	+35 %	
Zero catch	0	$F=0$	0	1500	+35%	-100%
Other options	230	TAC – 25% ($F_{2012} * 0.73$)	0.23	1300	+16%	-25%
	255	TAC – 15% ($F_{2012} * 0.84$)	0.26	1300	+14%	-15%
	300	Stable TAC (F_{2012})	0.32	1200	+10%	0%
	345	TAC + 15% ($F_{2012} * 1.18$)	0.37	1200	+6%	+15%

Weights in tonnes

Even with no catch in 2013, the stock will remain below B_{lim} in 2014

Nephrops ...

Nephrops in Division VIa



FU 11 – North Minch

FU 12 – South Minch

FU 13 – Firth of Clyde
&
Sound of Jura

- * Management should be implemented at Functional Unit level
- * Bycatch of other species in *Nephrops* TR2 fleet (haddock, whiting advice): Selectivity of this fleet needs to be improved
- * Reliability of landings data significantly improved since 2006
- * These FUs have annual UWTV surveys that provide abundance estimates
- * Advice based on applying an MSY proxy harvest ratio to most recent (2011) abundance estimate from UWTV survey
(taking into account discard rates and mean weight in landings)

FU 11 – North Minch 2013: < 4 200 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✓	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?
SSB (Spawning-Stock Biomass)			
	2009	2010	2011
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?

FU 13 – Firth of Clyde 2013: < 5 600 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	?
SSB (Spawning-Stock Biomass)			
	2009	2010	2011
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?

FU 12 – South Minch 2013: < 5 800 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✓	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?
SSB (Spawning-Stock Biomass)			
	2009	2010	2011
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?

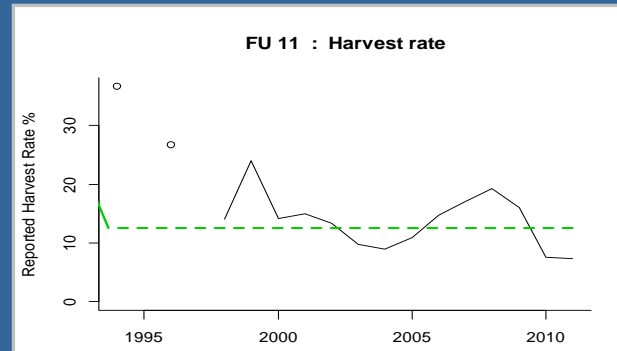
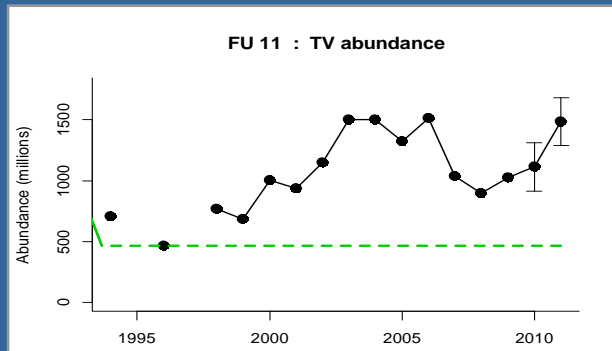
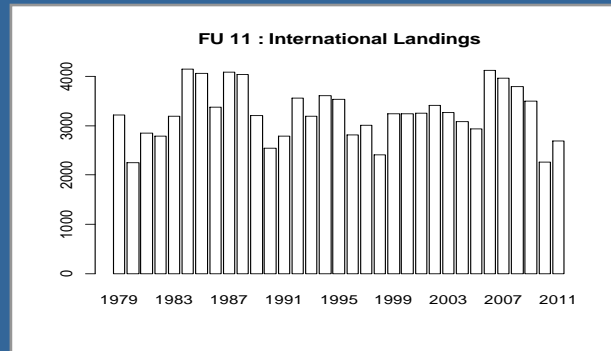
FU 13 – Sound of Jura 2013: < 800 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✓	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?
SSB (Spawning-Stock Biomass)			
	2009	2010	2011
MSY ($B_{trigger}$)	?	?	?
Precautionary approach (B_{pa}, B_{lim})	?	?	?

FU 11 (North Minch)

Advice for 2013, MSY: Landings < 4 200 t

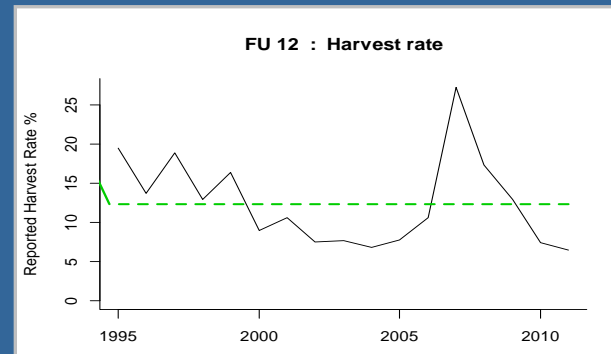
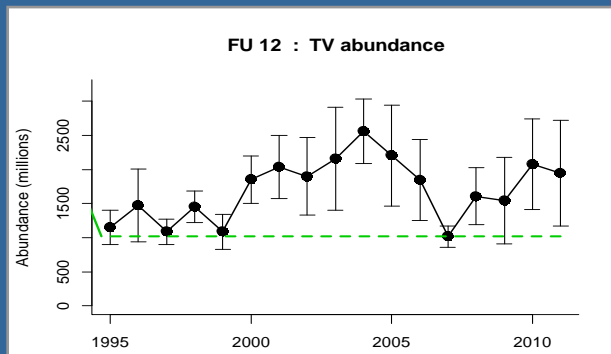
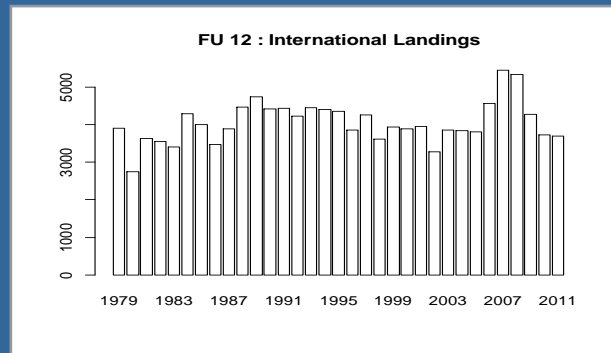
F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✘	✔	✔ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?
SSB (Spawning-Stock Biomass)			
	2009	2010	2011
MSY ($B_{trigger}$)	✔	✔	✔ Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?



FU 12 (South Minch)

Advice for 2013, MSY: Landings < 5 800 t

F (Fishing Mortality)				
	2009	2010	2011	
MSY (F_{MSY})	✘	✔	✔	Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Not defined
SSB (Spawning-Stock Biomass)				
	2009	2010	2011	
MSY ($B_{trigger}$)	✔	✔	✔	Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?	Not defined



Advice for 2013, MSY: Landings < 6 400 t (5 600 + 800)

Firth of Clyde

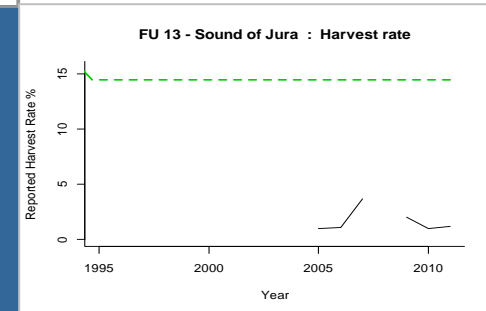
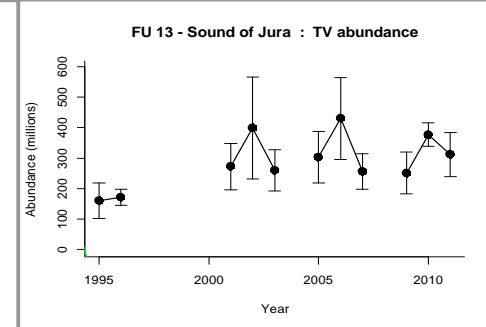
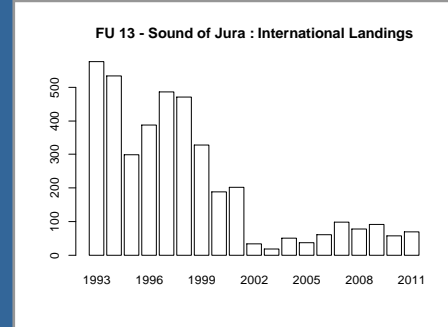
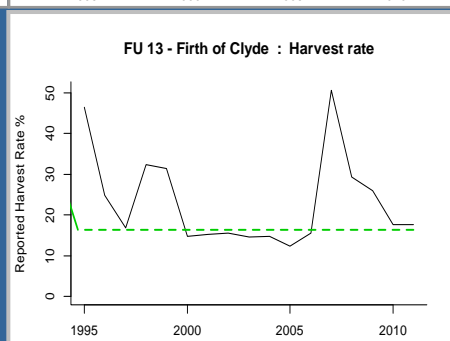
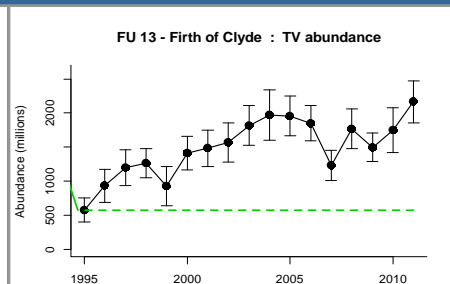
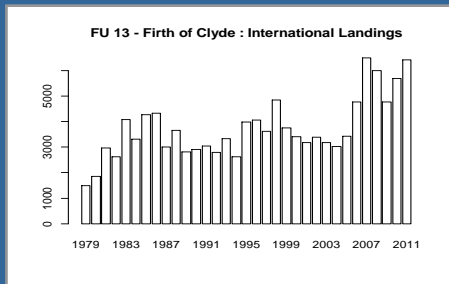
F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	?

SSB (Spawning-Stock Biomass)			
	2009	2010	2011
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?

Sound of Jura

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✓	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?

SSB (Spawning-Stock Biomass)			
	2009	2010	2011
MSY ($B_{trigger}$)	?	?	?
Precautionary approach (B_{pa}, B_{lim})	?	?	?



Bycatch of cod generally low, but higher than in FUs 11, 12: cod spawning area

Nephrops in Subarea VII

FU 14 – Irish Sea East

FU 15 – Irish Sea West

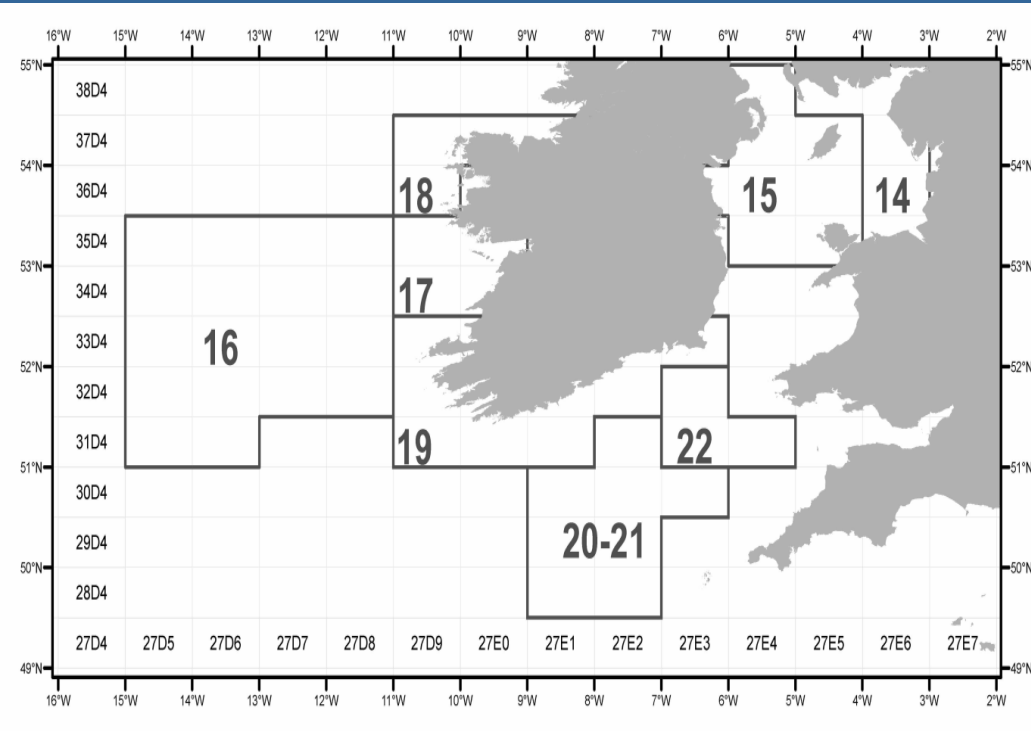
FU 16 – Porcupine Bank

FU 17 – Aran Grounds

FU 19 – Ireland SW and SE coast

FU 20-21 – Celtic Sea, Labadie

FU 22 – Celtic Sea, Smalls



- * Management should be implemented at Functional Unit level
- * Bycatch and discards of other species in *Nephrops* trawl fleet (cod, haddock, whiting, hake, monkfish, megrim)
- * Reliability of landings data significantly improved since 2007
- * Most FUs have UWTV surveys that provide abundance estimates:

Advice based on applying an MSY proxy harvest ratio to most recent (2011) abundance estimate from UWTV survey

- * Different approach for FU 16 and FU 20-21 (no UWTV survey)

FU 14 – Irish Sea East

2013: < 880 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✓	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	?	?	? Undefined
Precautionary approach (B_{pa}, B_{lim})	?	?	? Undefined

FU 15 – Irish Sea West

2013: < 9 300 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✓	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	? Undefined

FU 16 – Porcupine Bank

2013: 1 100 t

F (Fishing Mortality)		
	2011	
MSY (F_{MSY})	?	Undefined
Precautionary approach (F_{pa}, F_{lim})	?	Undefined
Qualitative evaluation	↘	Absolute level unknown, but decreasing
SSB (Spawning Stock Biomass)		
	2011	
MSY ($B_{trigger}$)	?	Undefined
Precautionary approach (B_{pa}, B_{lim})	?	Undefined
Qualitative evaluation	↗	Increasing, from critically low abundance

FU 17 – Aran Grounds

2013: < 890 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✓	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	?	?	? Undefined
Precautionary approach (B_{pa}, B_{lim})	?	?	? Undefined

FU 19 – Ireland SW and SE

2013: 820 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	?	?	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning Stock Biomass)			
	2009-2011		
Qualitative evaluation	→ Without trend		

FU 20-21 – Celtic Sea

2013: 2 500 t

F (Fishing Mortality)	
Qualitative evaluation	2009-2011
	↘ Decreasing
SSB (Spawning Stock Biomass)	
Qualitative evaluation	2009-2011
	? Unknown

FU 22 – Celtic Sea

2013: < 2 600 t

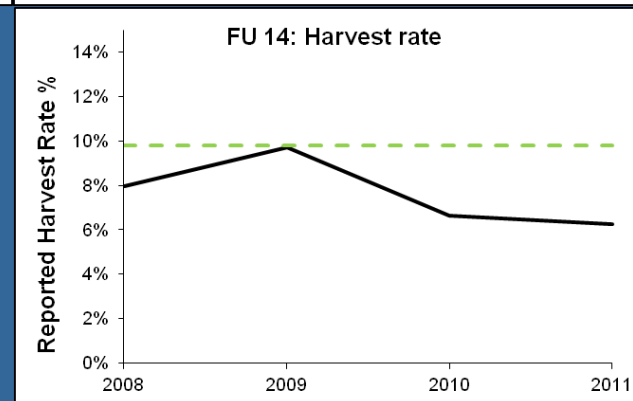
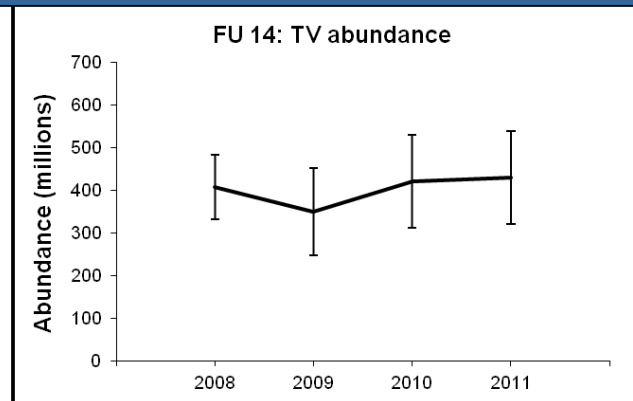
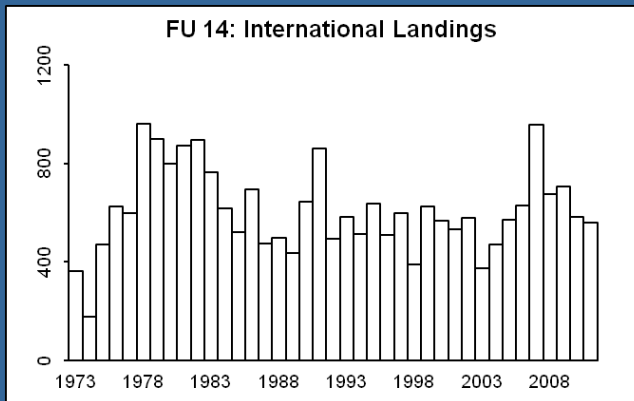
F (Fishing Mortality)			
	2008	2009	2010
MSY (F_{MSY})	✗	✓	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	?	?	? Unknown
SSB (Spawning Stock Biomass)			
	2008	2009	2010
MSY (B_{MSY})	?	?	? Unknown
Precautionary approach (B_{pa}, B_{lim})	?	?	? Unknown
Qualitative information	→	→	→ Stable

FU 14 (Irish Sea, East)

Advice for 2013, MSY: Landings < 880 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✓	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	?	?	? Undefined
Precautionary approach (B_{pa}, B_{lim})	?	?	? Undefined

Selectivity should be improved to reduce bycatch of cod, whiting and undersized plaice



FU 15 (Irish Sea, West)

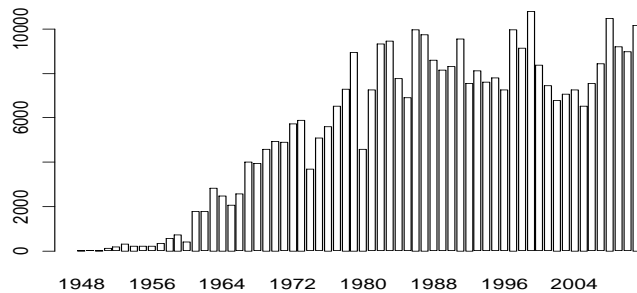
Advice for 2013, MSY: Landings < 9 300 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✓	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	? Undefined

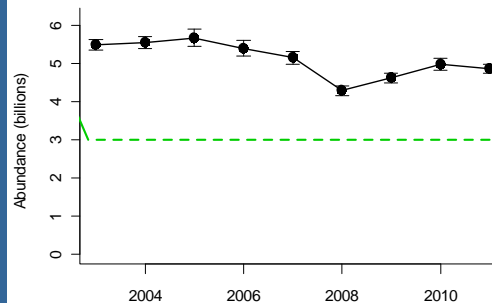
Selectivity should be improved to reduce bycatch of juvenile whiting, haddock, cod

Nephrops are major food species for cod in Irish Sea

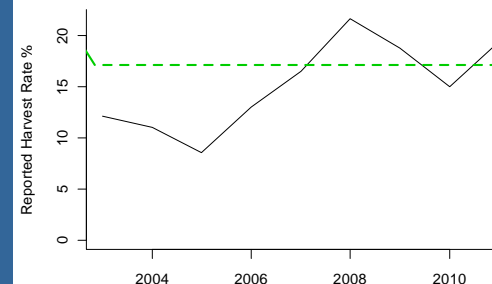
FU 15 : International Landings



FU 15 : TV abundance



FU 15 : Harvest rate

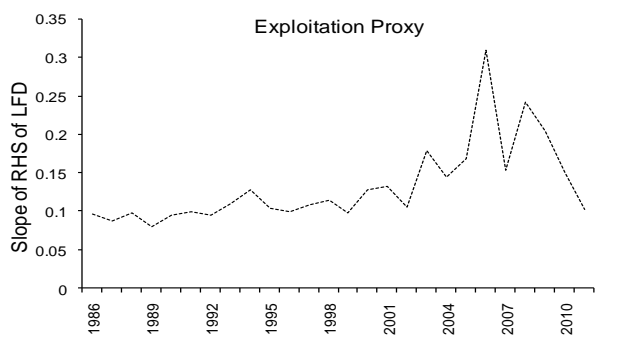
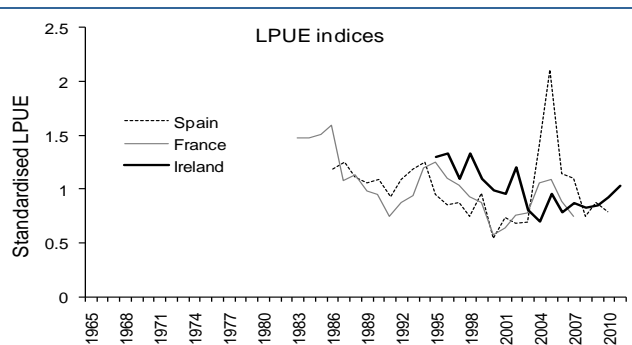
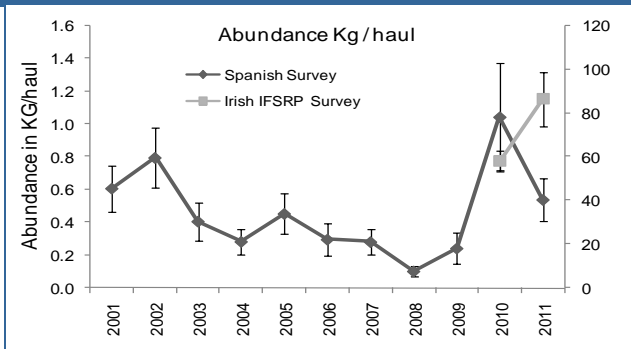
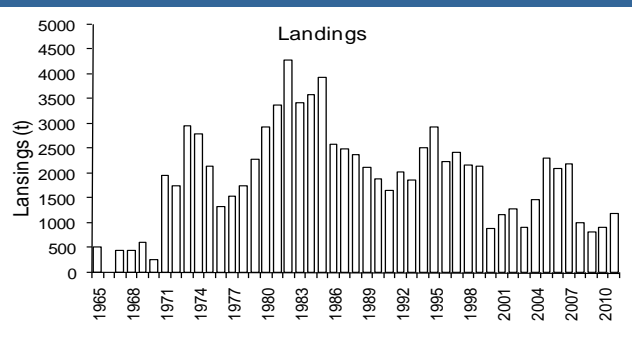


FU 16 (Porcupine Bank)

Advice for 2013, DLS: Catch < 1 100 t

F (Fishing Mortality)		
2011		
MSY (F_{MSY})	?	Undefined
Precautionary approach (F_{pa}, F_{lim})	?	Undefined
Qualitative evaluation	↘	Absolute level unknown, but decreasing
SSB (Spawning Stock Biomass)		
2011		
MSY ($B_{trigger}$)	?	Undefined
Precautionary approach (B_{pa}, B_{lim})	?	Undefined
Qualitative evaluation	↗	Increasing, from critically low abundance

- * LFD indicate exploitation rate has declined
- * Stock biomass increasing from very low level (sex ratio in catches now back to normal; males predominate)
- * Deep-water stock: lower productivity



* **DCAC:** estimates sustainable catch based on past history

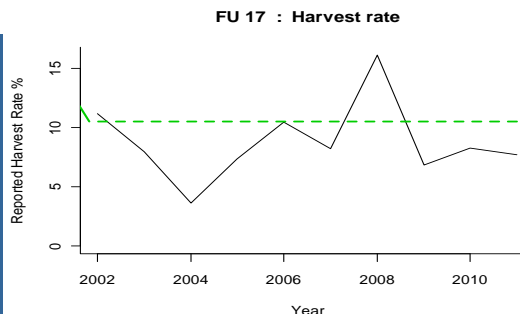
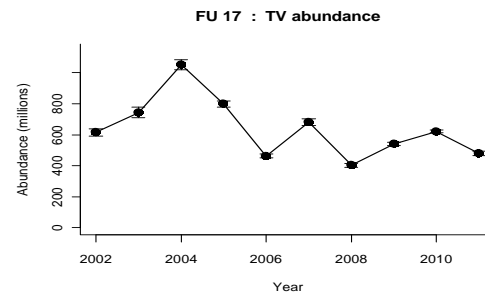
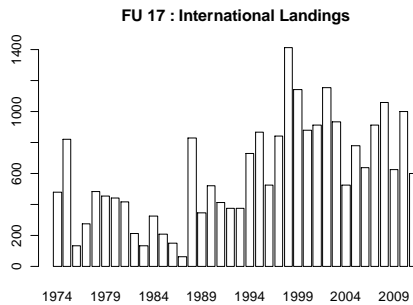
* Recent catch below DCAC:

increase recent catch (last 3 year average) by no more than 10%

FU 17 (Aran Grounds)

Advice for 2013, MSY: Landings < 890 t

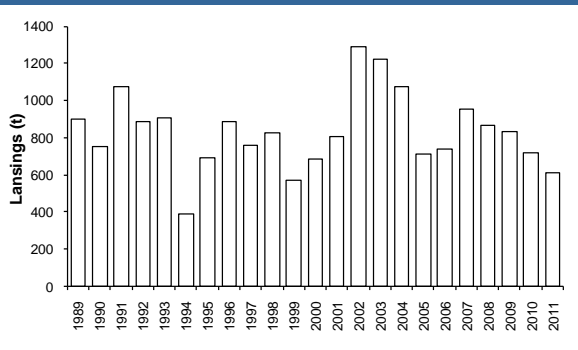
F (Fishing Mortality)				
	2009	2010	2011	
MSY (F_{MSY})	✓	✓	✓	Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Undefined
SSB (Spawning Stock Biomass)				
	2010	2011	2012	
MSY ($B_{trigger}$)	?	?	?	Undefined
Precautionary approach (B_{pa}, B_{lim})	?	?	?	Undefined



FU 19 (SW and SE coasts of Ireland)

Advice for 2013, MSY: Landings < 820 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	?	?	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
SSB (Spawning Stock Biomass)			
2009-2011			
Qualitative evaluation	➔ Without trend		

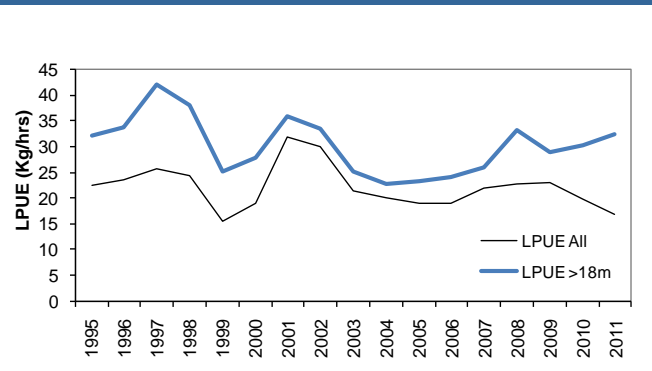


* Numerous small mud patches: heterogeneity across area, difficult to sample adequately

* Relatively extensive UWTV survey conducted for first time in 2011:

used to provide advice this year,

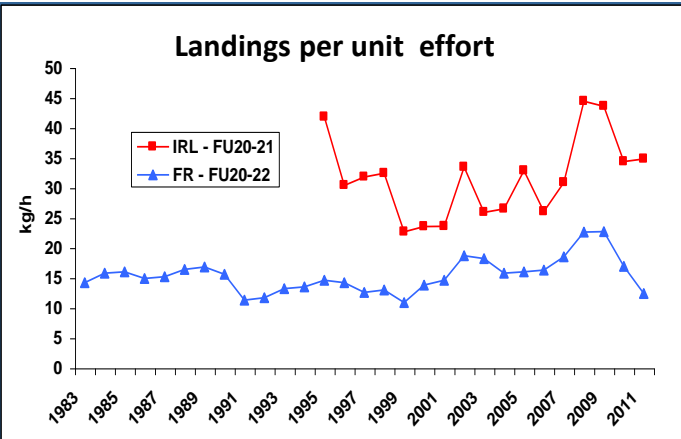
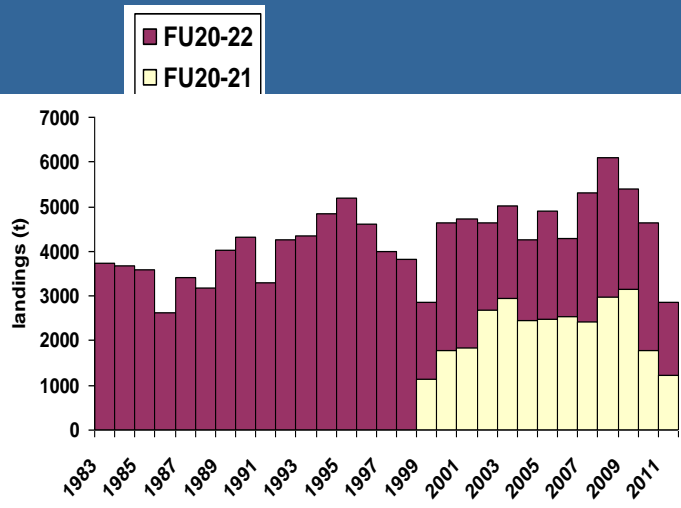
making conservative assumptions on abundance and MSY harvest rate proxy



FU 20-21 (Celtic Sea -- Labadie)

Advice for 2013 and 2014, DLS: Landings < 2 500 t

F (Fishing Mortality)	
Qualitative evaluation	2009–2011 Decreasing
SSB (Spawning Stock Biomass)	
Qualitative evaluation	2009–2011 Unknown



* Strong recruitment in recent years led to increased commercial LPUE (2008-09)

Decrease in last 2 years from peak levels

Decrease targeting of *Nephrops* by French fleet

* Advice based on last 10 year average landings:

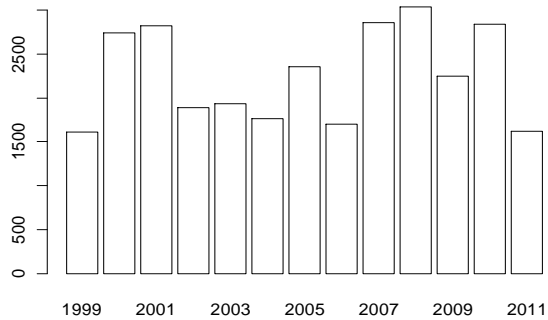
explores the harvest ratios that would result from these landings under a range of potential *Nephrops* densities in the FU and considered precautionary

FU 22 (Celtic Sea -- Smalls)

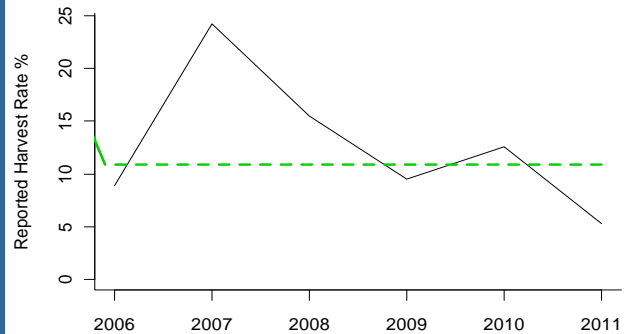
Advice for 2013, MSY: Landings < 2 600 t

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✗	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	?	?	? Unknown
SSB (Spawning Stock Biomass)			
	2009–2011		
Qualitative evaluation	→ Stable		

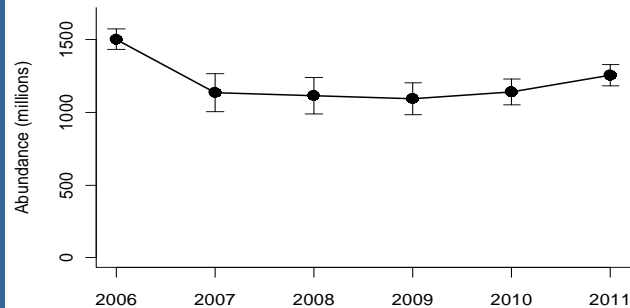
FU 22 : International Landings



FU 22 : Harvest rate



FU 22 : TV abundance



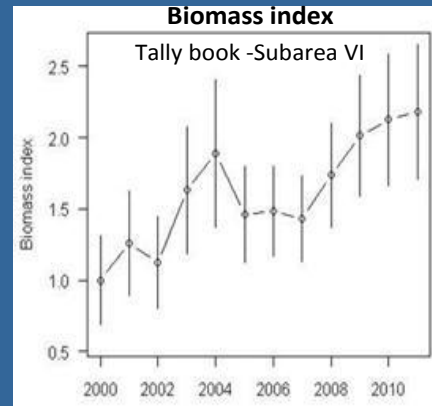
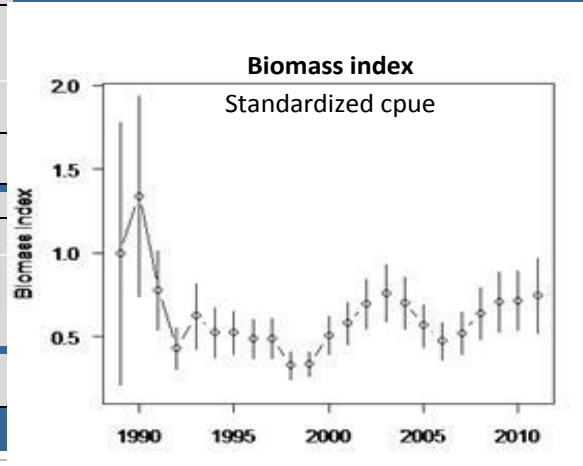
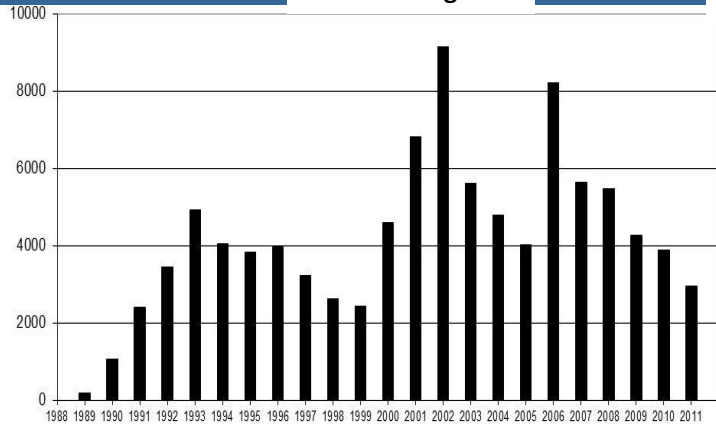
Deep-sea species ...

Black scabbardfish in Subareas VI, VII and Divisions Vb and XIIb

Advice for 2013 and 2014, DLS: Catch < 4 700 t

F (Fishing Mortality)		
		2009–2011
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✓	Above poss ref points
SSB (Spawning-Stock Biomass)		
		2009–2011
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	✓	Above poss ref points

Total landings



* Landings and CPUE data from start of fishery

* CPUE from tally book in VI, considered the most reliable biomass index

* Growth faster than for other deep-water species

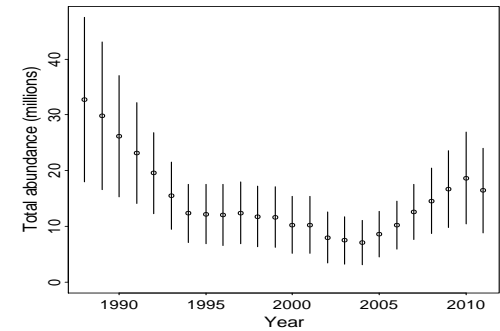
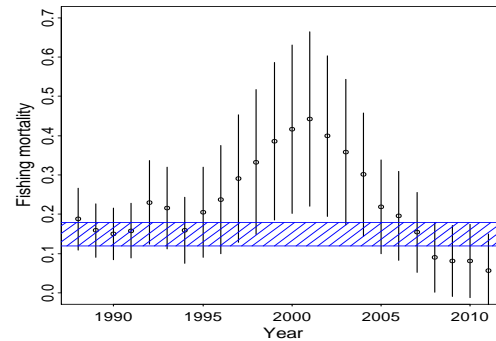
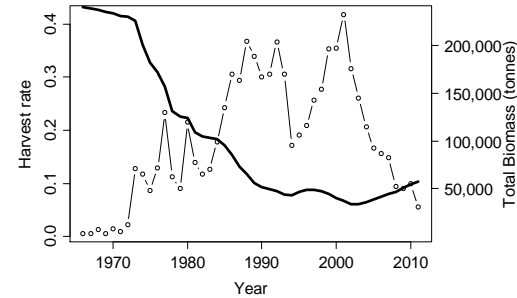
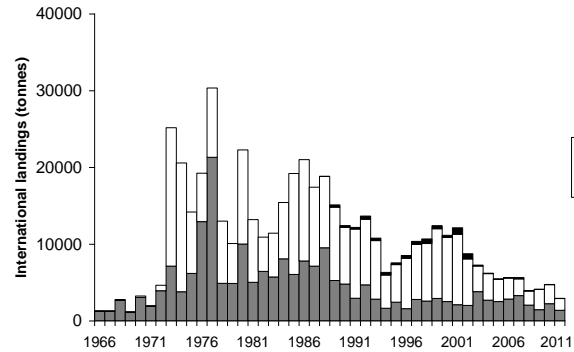
* Mixed trawl fisheries with roundnose grenadier and blue ling

* Trend in last 5 years: 20% increase

* Precautionary margin: no, because exploitation not detrimental to stock

Advice for 2013 and 2014, DLS: Catch < 3 900 t. Existing management measures should be continued. Spatial management to prevent target fishing on spawning aggregations should be expanded to Division Vb.

F (Fishing Mortality)		
MSY (F_{MSY})	✓	2009–2011 Below target
Precautionary approach (F_{pa}, F_{lim})	?	Undefined
SSB (Spawning-Stock Biomass)		
MSY ($B_{trigger}$)	?	Unknown, $B_{trigger}$ undefined
Precautionary approach (B_{pa}, B_{lim})	?	Undefined
Qualitative evaluation	↗	Increasing



Top (SRA): Large biomass decrease during 1970-1990

Bottom (MYCC): F and 9+ abundance

Since early 2000s: decreasing F (now below F_{MSY} proxies) and increasing abundance

- * Gadoid: grows much faster than most deep-water species
- * Vulnerable to exploitation because fisheries can target spawning aggregations
- * Main fisheries: trawlers in Vb and VI

Catch advice based on:

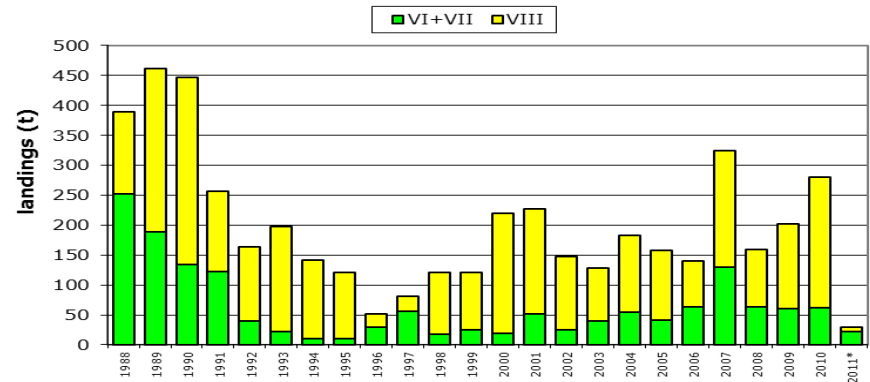
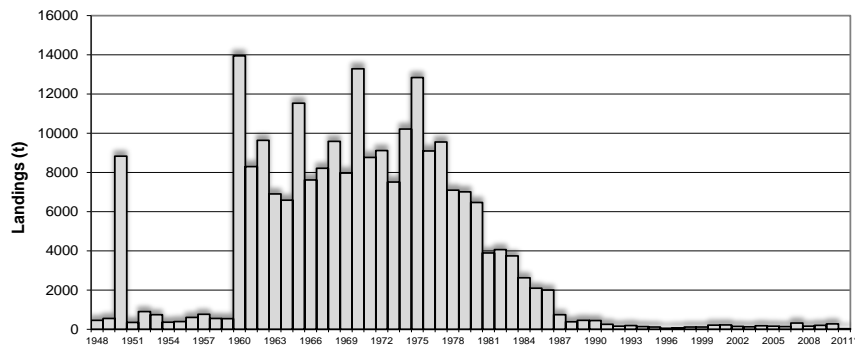
- current F below F_{MSY} proxies
- stock biomass increasing but at unknown level in relation to reference points

→ Do not increase catch from recent (2008-2011) average: 3 900 t

Red seabream in Subareas VI, VII and VII

Advice for 2013 and 2014: No directed fisheries; reduce bycatch.

F (Fishing Mortality)		
		2009–2011
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown
SSB (Spawning-Stock Biomass)		
		2009–2011
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	✗	likely to be below $B_{trigger}$ and B_{lim}



Catches well below historic levels, indicating depletion. No indication of recovery

* Red seabream: low productivity

* Bycatch in longline, GN and trawl fisheries; no catch data on recreational fisheries

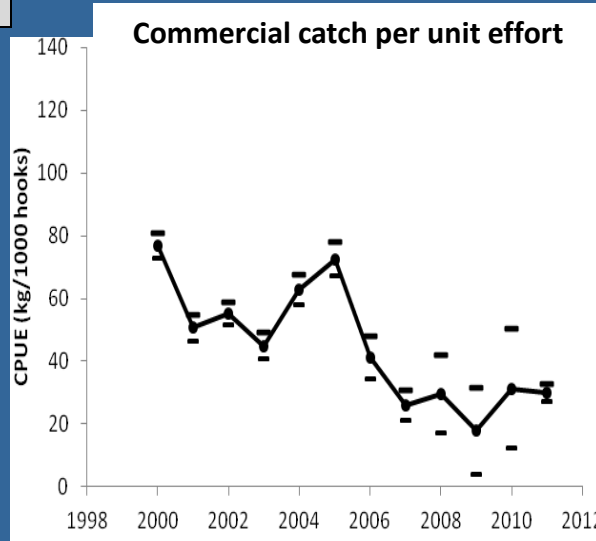
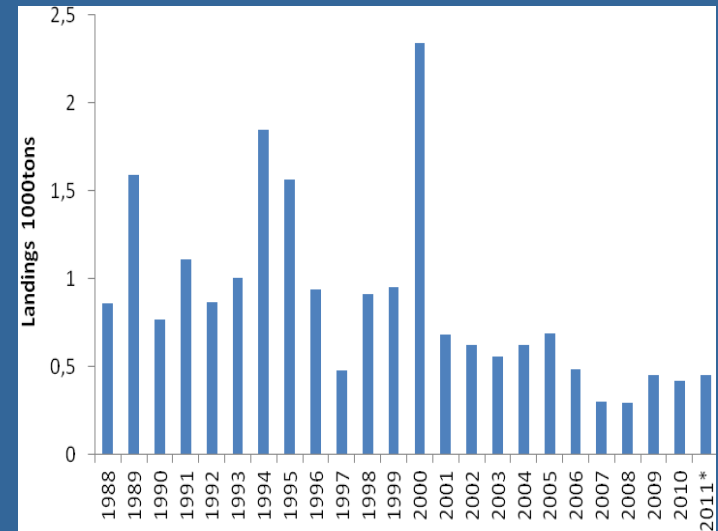
Advice for 2013 and 2014, DLS: Catch < 350 t

F (Fishing Mortality)

		2009–2011
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown

SSB (Spawning-Stock Biomass)

		2009–2011
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	→	Stable



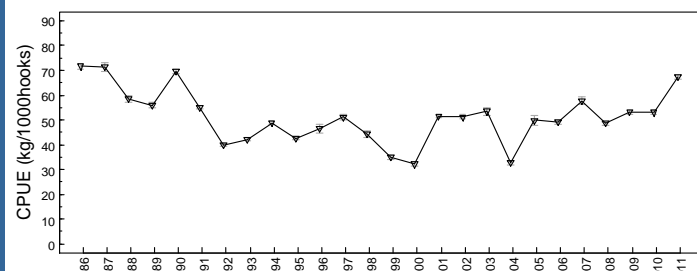
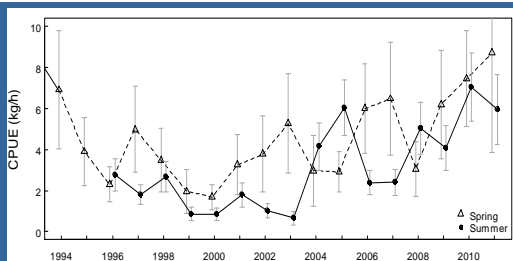
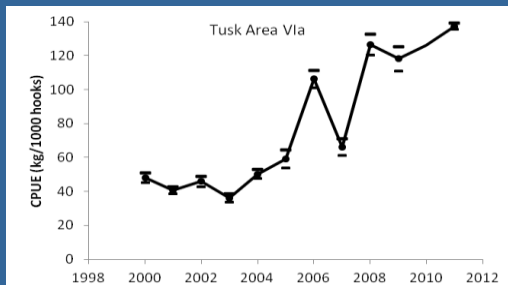
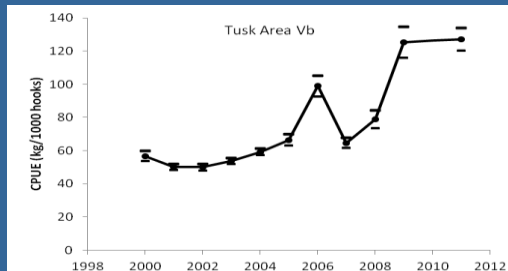
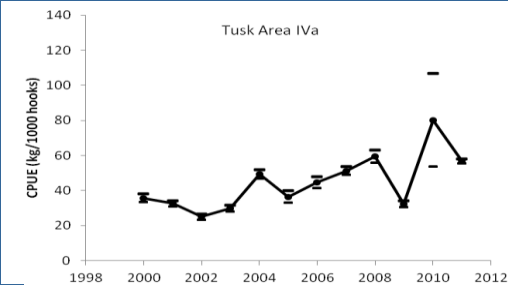
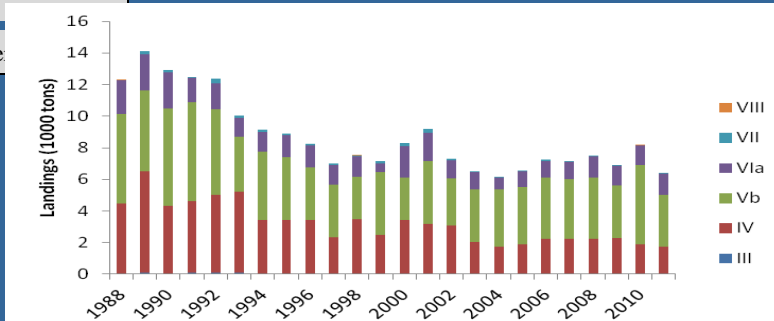
CPUE index may not accurately represent stock abundance (not standardised)

- * Bycatch in trawl, GN and longline fisheries
- * Reduce catch by 20% with respect to last 3 year average

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

Advice for 2013 and 2014, DLS: Catch < 8 500 t

F (Fishing Mortality)		
2009–2011		
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
SSB (Spawning-Stock Biomass)		
2009–2011		
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	✓	Above possible reference



Index has increased by more than 20% in last 5 years

Exploitation not detrimental to stock

→ do not increase catch by more than 20%

**Thank you for your attention!
Comments and questions?**