

THE IRISH SEA SOLE-STOCK: A "Sole" Belgian Problem?

ACTION PLAN

2013

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1. INTRODUCTION

According to scientific advice, sole in the Irish Sea is a stock in very poor condition. Spawning stock biomass (SSB) and recruitment have continuously declined since 2001. In 2012 SSB reached the lowest level. The fishing mortality (F) shows a declining trend since the mid 1980's to a stable level in recent years but well above F_{msy}. The stock is considered to be at an increased risk of collapse. Recent recruitment levels have been lower than earlier in the time-series, with the 2011 recruitment being the lowest in the time series. This resulted in a steep decrease with 53 % of the TAC, from 300 tonnes last year to 140 tonnes for 2013. The biggest problem however is that this advice conflicts with the perception of fishermen, especially the Belgian fishermen, as landings per unit of effort are continuously increasing. These conflicting facts demand a thorough study of the scientific advice and the characteristics of this important fisheries for the Belgian fleet. The political aim is to develop a management plan that leads to a recovery of the sole stock in VIIa and a stable and sustainable fishery on sole.

2. BACKGROUND

2.1. The importance of the Irish Sea for the Belgian fleet

The Irish Sea is for many decades a traditional fishing ground for the Belgian fleet, especially for the Belgian beamtrawl fleet targeting sole. This is reflected in the relative stability dividing the Total Allowable Catches (TAC's) into national quota's.

Table 1. Belgian quota share for the most important quota species in VIIa and VII.

TAC	Sole VIIa	Plaice VIIa	Haddock VIIa	Cod VIIa	Rays VIa,b, VIIa-c, e-k	Anglerfish VII	Megrim VII
Belgian quota %	49,34	5,71	1,60	1,40	11,28	9,89	2,70

In 2011, **7,5 % of total landings** by the Belgian fleet were realized in the Irish Sea representing **7 % of the total value** of our fleet.

The most economically important fishing area's for the Belgian fleet in 2011 were, in descending order: North Sea (34 %), Eastern Channel (26 %), Bristol Channel and Celtic Sea (23 %), Bay of Biskay: 7 % and **Irish Sea: 7 %.**

The sole catch represents half of the value of the landings in all area's.

Although for some vessels the bycatches of rays, anglerfish and megrim in the area VIIa represent an important part of their income, **Belgian vessels cannot fish economically in the Irish Sea without catching sole.**

There are three main countries fishing for sole in the Irish Sea: Belgium taking the bulk of the landings (60 – 80 % in recent years). UK and Ireland are taking about 20 % and 10 % respectively of the sole landings. Northern Ireland, Scotland, Isle of Man and France take the remainder part. Sole catches from Ireland are mainly coming from bycatches in the Nephrops fishery (NW of Irish Sea).

2.2. Evolution of TAC and quota in the Irish Sea

Table 2. Evolution of TAC for the most important quota species in VIIa (in tonnes)

	SOLE	PLAICE	COD*	HADDOCK	WHITING	NEPHROPS (VII)**
2003	1.010	1.675	1.950	600	500	17.790
2004	800	1.340	2.150	1.500	514	17.450
2005	960	1.608	2.150	1.370	514	19.544
2006	960	1.608	1.828	1.275	437	21.498
2007	820	1.849	1.462	1.179	371	25.153
2008	669	1.849	1.199	1.238	278	25.153
2009	502	1.430	899	1.424	290	24.650
2010	402	1.630	674	1.424	157	22.432
2011	390	1.627	506	1.317	118	21.759
2012	300	1.627	380	1.215	89	21.759
2013	140	1.627	285	1.189	84	23.065

*Only cod is managed under a long-term (recovery) plan.

**VIIa contains two of the six functional units: FU14 (Irish Sea East) and FU15: Irish Sea West) – management until now on an annual basis for Area VII.

Over a period of 10 years' time the TAC's for **sole, cod and whiting** decreased with respectively 86 %, 85 % and 83 %. In the same period the TAC for plaice was stable while the TAC for haddock decreased slightly but constantly with a loss of 21% between 2004 and 2013. The economically most important TAC of Nephrops first increased with 41 % between 2003 and 2008 and thereafter decreased by 8% by 2013.

2.3. Evolution Belgian sole quatum and landings in the Irish Sea

Influence of the "Hague Preferences"

The principle of the Hague Preferences was fixed during the Conference of the Ministers for foreign affairs in 1976 in The Hague. The "relative stability" was decided several years later, in 1982, but The Hague Preferences continued to being invoked by UK and Ireland.

If the yearly fixed TAC for a "Hague – stock" decreases in such a way that the quota for UK and/or Ireland (calculated according to relative stability) are lower than the minimum level of "The Hague", than both countries can invoke their preferences. In that case, the "Hague" amount is deducted from the TAC and the remaining TAC is divided between the other countries according to the relative stability key. Consequently, the relative share of other countries is reduced. For instance: for 2013, the TAC for sole is decreasing with 53 % from 300 tonnes in 2012 to 140 tonnes for 2013. As the share for Ireland is lower than "The Hague" quantity, Ireland invokes the Hague preference and the quota share for Belgium decreases with 73 % to a remaining quota of 36 tonnes (131 tonnes in 2012).

Table 3. Evolution of the Belgian sole quorum and landings in the Irish Sea

Year	Initial quorum (tonnes)	Swap (tonnes)	Total quorum (tonnes)	Landings (tonnes)	Quota utilization (%)
2003	499	+189	688	695	101
2004	394	+130	524	519	99
2005	474	+247	721	670	93
2006	474	+203	677	368	54
2007	403	+196	599	287	48
2008	326	+167	493	205	42
2009	237	+144	381	241	63
2010	186	+126	312	189	61
2011	179	+119	298	230	77
2012	131	+115	246	222	90
2013	36	+ 37	73		

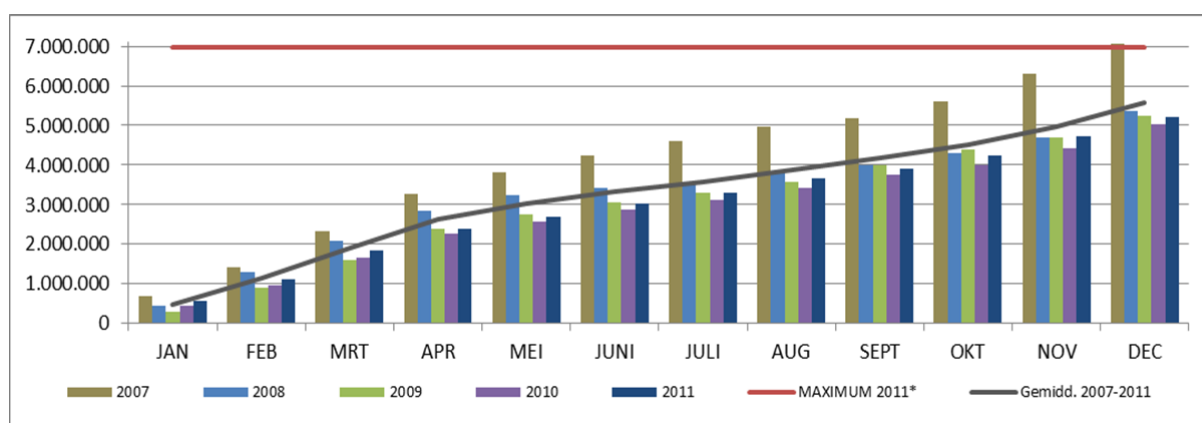
Traditionally, Belgium swapped a lot of sole but due to the dramatic decrease in TAC over the last 7 years, swap possibilities are scarce and very expensive.

For 2013 the initial quorum of 36 tonnes can be supplemented with 37 tonnes by swapping with the Netherlands, Ireland and UK. We foresee a minimum quorum of 73 tonnes, with a possible transfer of 24 tonnes from 2012 to 2013. The end result for 2013 will only be one third of that in 2012.

2.4. Fishing effort and Belgian activity in the Irish Sea

Besides the TAC management, EU introduced in 2003 a limitation in fishing effort for the Western Waters. In the ICES-areas VI + VI, VII en VIII maximum limits for fishing effort are fixed. For the Belgian fisheries there is a limit of 7.396.910 kW/seadays for area VII (all species except scallops) and an extra 354.066 kW/seadays for area VII for scallops only.

Figure 1. Cumulative Belgian fishing-effort in ICES-area VII (all species)



*maximum 2011: 7.396.910 – 415.000 (swapped)

According to the latest ICES-advice for 2013, total beam trawl effort in the Irish Sea has declined by about 75 % between 2003 and 2011. Fishing mortality has reduced over the same period, but to a lesser extent.

Normally, Belgian vessels are very active in area VII from February until May and from end of August until Oktober. Exceptionally in 2011, there was a peak of activity in May and August.

Figure 2. Belgian total landings per month for 2009, 2010 and 2011 out of VIIa

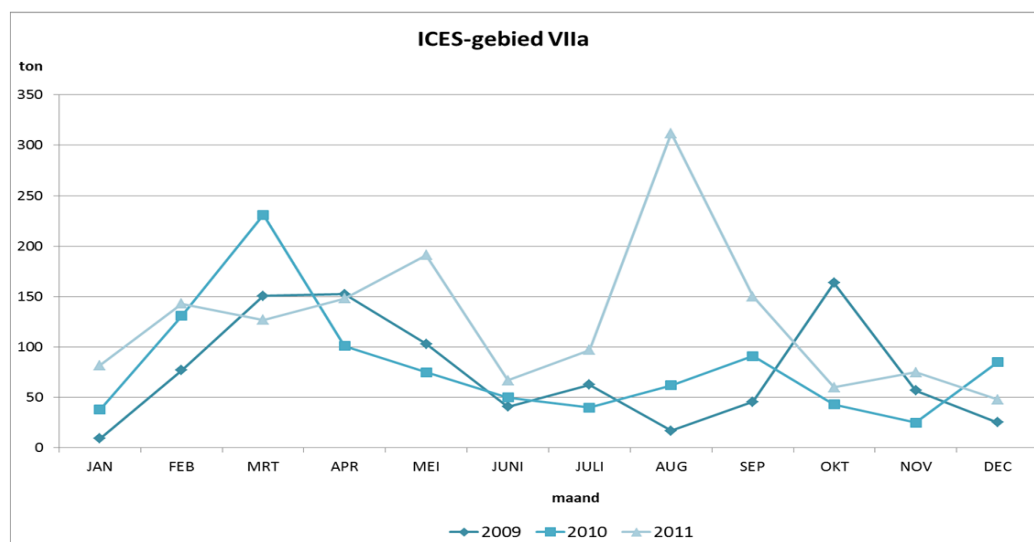


Table 4. Number of Belgian vessels active in VIIa.

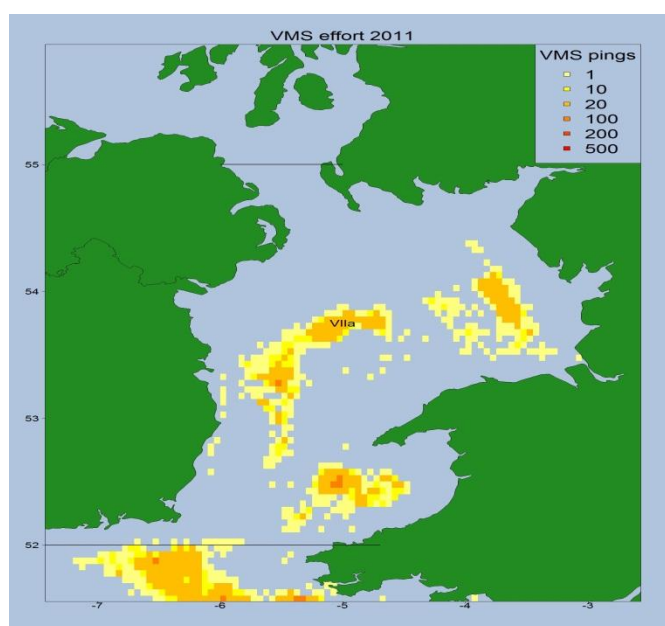
Year	n beamtrawls (TBB)	n ottertrawls (OTB)	Total n vessels	Total landings of sole (kg)
2011	19**	4***	23*	240.297
2012	19****	2	21	213.165

*of which 1 vessel fishing as well with TBB as OTB

**of which 2 vessels that didn't fish in 2012

*** of which 1 vessel that didn't fish in 2012

****of which 3 vessels that didn't fish in 2011



Map 1: Activity of Belgian vessels in VIIa in 2011 (from VMS-data)

2.5. Belgian quota management in the Irish Sea

Belgium has a collective quota management system for all stocks.

Irish Sea:

Sole: During the last two years the quantities of sole were assigned to vessels in kg/day at sea. Those vessels that were in the VIIa for more than 80 days a year in 2008 and 2009, could ask for a doubling of their sole quorum while their North Sea quorum was reduced by halve.

Plaice: no limits

Cod: a limitation in kg/day at sea

Haddock: a limitation in kg/day at sea. Otter trawlers get a double quorum share.

Quota management for sole in 2012

The initial quorum for sole in VIIa for 2013 reduced with 73 % to only 36 tonnes. There is a possible transfer of 24 tonnes from 2012 to 2013 and an extra 37 tonnes by swapping with the Netherlands, Ireland and UK. From February 2013 until end of August 2013, 81 tonnes have been allocated to 12 Belgian vessels.

Considering the 222 tonnes fished last year by 21 Belgian vessels of which 3 vessels fished more than 33 tonnes, the exercise to assign the very scarce quorum for 2013 was extremely difficult.

The Belgian authorities, on request by the sector, closed the Irish Sea during the month of January.

The historic rights of the 26 vessels that fished in the Irish Sea in 2011 and 2012 led to the following proposal for the period from February 1st until August 31^d.

- 3 vessels that were fishing more than 75 tonnes in VIIa receive 15 tonnes.
- 9 vessels that were present during at least 30 days at sea receive 4 tonnes.

There are no limitations per day at sea as was the case in the past.

Vessels receiving a sole quorum in VIIa may not fish for sole in VIIe and all vessels fishing in the Irish Sea are obliged to take scientific observers on board and participate in the scientific action plan for the Irish Sea.

2.6. Technical measures in the Irish Sea

The Belgian and UK (E&W) beam trawls use 80 mm mesh gear with, as legally obliged, 180 mm mesh sizes in the entire upper half of the anterior part of their net.

From June 1st of 2013 on, all Belgian beam trawls in all areas will be equipped with a square mesh panel of 300 mm mesh size in the back of the net.

According to ICES-advice of 2012 for 2013, the sole-fishery in the Irish Sea has very few discards, ranging from 0 % to 8 %.

3. SITUATION OF THE SOLE STOCK

3.1. UK Beam Trawl Survey Irish Sea (UK(E&W)-BTS-Q3)

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3.1.1. Technical aspects

Source :

ICES. 2013. Manual for the Offshore Beam Trawl Surveys, Revision 1.1, June 2011, Working Group on Beam Trawl Surveys. 24 pp.

History of the survey

An Autumn Irish Sea groundfish survey has been carried out annually by MAFF/DEFRA since 1979. A Granton otter trawl was used until 1987, in 1988 the commercial 4m beam trawl that is currently used was introduced. At the same time, a limited beam trawl survey was carried out in the Bristol Channel. From 1988 to 1992 the main survey effort was concentrated in the northeast Irish Sea and the Bristol Channel and since 1993 a standard survey covering the whole of ICES Divisions VIIa,f and g has been undertaken.

Current objectives

To provide independent (non-commercial) indices of abundance of all age groups of plaice, sole, cod and whiting in the Irish Sea, Bristol Channel and Western English Channel.

To provide an index of recruitment of juvenile plaice and sole prior to full recruitment to the fishery to the Working Group for the Celtic Seas Ecoregion (WGCSE).

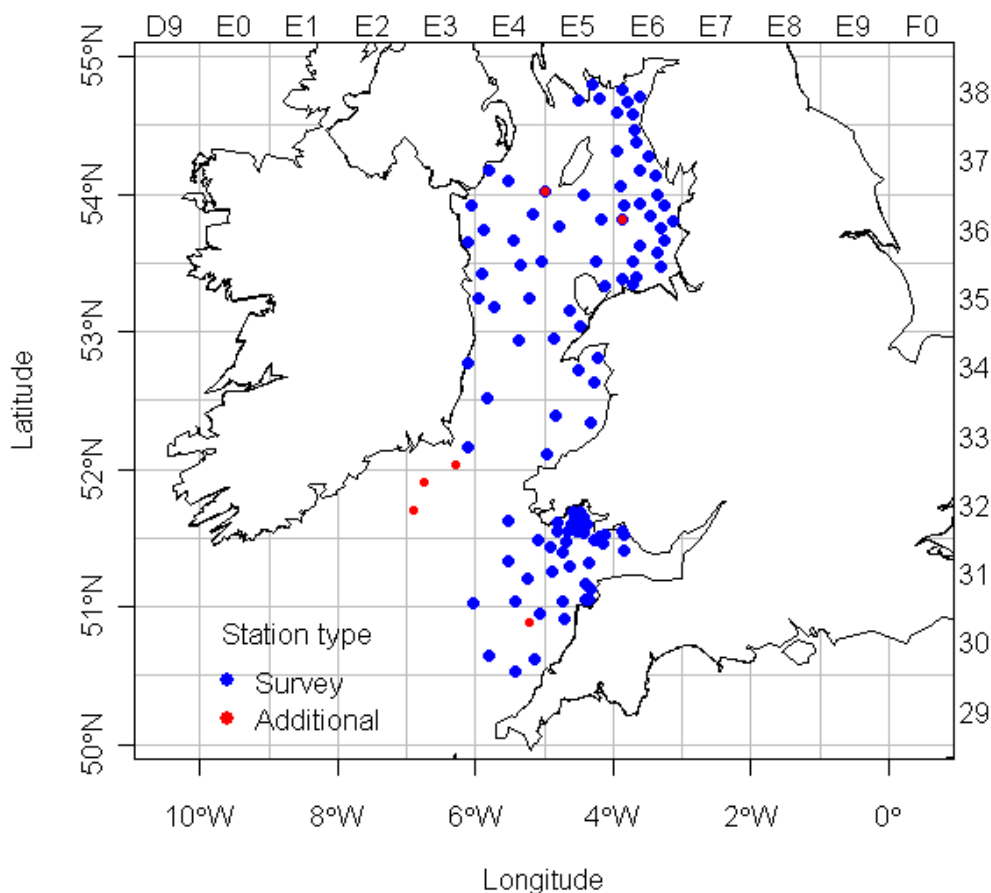
IMPORTANT : the discussed survey provides **relative** indices that give information on the evolution of the VIIa sole stock. Calculations of **stock sizes are not based on the survey**, but are derived mainly from commercial data.

Survey design

Fishing positions and stratification

The positions of stations are set historically, originally from areas deemed of high importance for plaice and sole catches by commercial fishermen. The cruise station number identifies the order of each gear deployment (including invalid tows) of any gear that goes over the side of the vessel during the cruise (i.e. the first deployment is station 1, and subsequent stations are incremental). Prime stations have unique numbers that do not change, irrespective of the cruise station number, and provide a fixed numbering system for sampling sites.

In the Irish Sea and Bristol Channel, the standard survey has in all 119 tows. Of the 119 primary stations, 68 are in ICES Division VIIa, 51 in ICES Divisions VIIf and g. All primary station positions are fixed and can be identified by a unique prime station number. The stations are stratified by sector and depth-band. The number of primary survey stations within each sector amount to: ISS (18 stations), ISN (16 stations), ISW (15 stations), SGC (16 stations), SEI (11 stations), BCI (32 stations), (BCO 11 stations). The 66 stations in sectors ISN, ISS and BCI are given top priority as they contribute to the VPA tuning and recruitment indices at the respective working groups. From 2008 the stations in the SEI sector have been removed from the survey grid. Three depth bands were used until 2000 - 0-20m, 20-40m and 40+m; in 2001 these were reduced to 2 depth bands - 0-20m and 20+m.



Map 2: Locations of sampling positions of the UK(E&W)-BTS-Q3 in the Irish and Celtic Seas (prime stations (blue) are fished every year).

Standard fishing method

Trawl speed should be 4 knots over the ground. Although commercial fishing vessels generally fish at higher speeds for a longer period, 4 knots is considered appropriate to shorter tows. Trawl duration should be 30 minutes. The start of the trawl should be given as the time that the gear has settled on the bottom, and the end of the trawl should be given as the time that hauling commenced. If for any reason a tow is less than 20 minutes or greater than 40 minutes, then the catch should still be fully processed, though the tow should be classified as an Additional tow, and a valid tow attempted where practicable. A warp length appropriate to the depth of water (a ratio of between 3.5 and 4 times the depth) is to be used. If for any reason this cannot be followed then you should document reasons why and flag the station as an additional tow and a valid tow attempted where practicable. Trawling should be conducted in daylight hours, defined as the time between 15 minutes before sunrise and 15 minutes past sunset. If a tow is conducted outside these hours it must be reported as an Additional tow and a valid tow attempted where practicable.

In the Irish Sea and Bristol Channel there are a number of primary stations that are only fished for 15 minutes primarily because of large numbers of small fish being caught, a high bycatch of benthic species, or the presence of endangered species in the survey history (e.g. angelshark *Squatina squatina*).

Beam trawl construction and rigging

History of the survey gear

Cefas has always used a commercially rigged 4m steel beam trawl, for the duration of this survey. The sampling gear consists of a commercially rigged (1989 style) 4m beam trawl (measured between inside edges of shoes) fitted with a chain mat, flip-up ropes, and a 40mm codend liner. The liner needs to be sufficiently long, that when attached to the forward end of the codend it extends to about 1 meter below the cod-line. The gear is towed at 4 knots (ground speed) for 30 minutes on a warp length appropriate to the depth of water (a ratio of between 3.5 and 4 times the depth). All the stations are identified by a unique number (Prime station no.), which never changes irrespective of the cruise station number. All tow positions are stored on board in the ships navigation system and backed up on Cefas's own systems in spreadsheets and on the FSS. There is no particular order in which the stations should be worked, although attention to the historical calendar period would be sensible. If static gear or other restrictions prevent the execution of a primary station there are often alternative tows in the same area. The SIC usually has positions of alternative tows that have been used before, when the primary station was not available.

Current gear and rigging

The sampling gear consists of a commercially rigged (1989 style) 4m beam trawl (measured between inside edges of shoes) fitted with a chain mat, flip-up ropes, and a 40mm codend liner. The liner needs to be sufficiently long, that when attached to the forward end of the codend it extends to about 1 metre below the cod-line. The dimensions are listed below:

- Headline: 4m x 22mm Combination wire rope.
- Groundrope: 10.8m x 22mm 6/19 construction wire rope.
- Flip-up: 10.4m x rubber on 22mm corlene rope.
- Mesh sizes: 125mm x braided nylon belly and wings+ 120mm polybraid in back + 75mm x codend with 40mm liner.
- Bridles: 2.9m x 5/8" Grade 40 drag alloy chain.
- Width: 4.5m (4m inside shoes).
- Weight: Approx 2.5 Tonnes.

Handling of catches

Catch sorting and collection of fish data

Catch sorting

It is recommended that the catch from all valid hauls be sorted fully were practicable. Wherever possible, the entire catch is sorted, with fish and shellfish species identified to the lowest taxonomic level possible. In the case of larger catches a selection of species/size categories of species may be identified as being sufficiently abundant that they can be subsampled, appropriately. If the entire catch cannot be sorted through then the data should be flagged accordingly when submitted to the DATRAS database.

Length composition

Length distributions are recorded for all fish species caught. Length is defined as total length (measured from tip of snout to tip of caudal fin). Length is measured to 0.1cm below for shellfish, to 0.5 cm below for herring and sprat, and to 1 cm below for all other species.

It is recommended that elasmobranch fish should be measured and weighed by sex.

After sorting the catch into species or species/sex, we need to obtain a length distribution for each catch category that accurately represents the length distribution. Where the numbers of individuals are too large for them all to be measured (as a result of time constraints etc) a representative subsample is selected of at least 75 fish, although sampling a very limited length range could be adequately achieved with less. In the event that a truly representative subsample cannot be selected, it will be necessary to further sort the species into two or more size grades or categories. The following two examples are used to describe incidences when grading or categorization may be required but are by no means exhaustive.

Example 1 - A catch element consists of 999 fish in the length range 18 - 26cm and one fish at 40cm. It is evident that a single subsample of 100 fish when raised up will give either 10 or zero fish at 40cm. The correct approach is to remove the one large fish and measure it separately, treating that sample as category 1, and take a subsample from the remaining 999 fish (category 2). When measured and raised this provides an accurate assessment of the numbers caught at each length for this element of the catch.

Example 2 - A catch element consists of 994 fish in the length range 18–26cm and 3 fish in the length range 10–12cm and 3 fish in the length range 38–40cm. It is evident that a single raised subsample of 100 fish could give anything between zero and 10 fish in the length ranges 10–12cm and 38–40cm. The correct approach is to remove the small and large fish and measure them as category 1, and then take a subsample from the remaining 994 fish (category 2). When measured and raised this provides an accurate assessment of the numbers caught in each length group for this element of the catch.

In case of large catches ($n > 1000$) of any species, the minimum sample size given above should be doubled.

Fish should be identified to the species level. Only if this proves impossible can some be grouped by genus or larger taxonomic group (e.g. *Pomatoschistus* species, Ammodytidae).

Sampling for Age, Sex and Maturity

Each CEFAS survey has its own sampling regime that matches its survey design.

Table 3.1.1 (see offshore survey manual) shows from which species biological data will be collected. For this report, a Y is noted when age material is collected. Additionally, weight, sex and maturity might be collected.

Quality assurance

Manuals

The UK manuals are updated regularly and are available from Cefas on request.

Gear

In the UK, standard gear descriptions are used to maintain the gear. A check is done before or after each survey. If the gear does not match the description, the gear technicians overhaul the gear. If the gear is damaged during the survey, a check will be performed immediately after the survey.

Data quality check

The UK uses the Electronic Data Capture (EDC) system to collect data that has inbuilt QC for min/max lengths. Other checks are carried out on the data, including checks carried out already on board of the survey vessel.

Before uploading in DATRAS (the trawl survey database hosted by ICES), files are screened. The legal ranges, mandatory fields and checks carried out have been approved by WGBEAM 2008 and are available at <http://www.ices.dk/datacentre/datsu/selrep.asp>.

3.1.2. Results for sole

Perception in 2012 – results up to 2011 (source: WGBEAM 2012)

Of all VII sole stocks, the abundance of year groups for the VIIa stock has been below mean time-series peaks since 2005. For 2011 there was an increase in the 1 group, compared to the proceeding year, which is still less than half of the time-series mean average. Again, as for the other stocks, the peaks in the abundance of 1 groups (1996, 1997 and 2004) can generally be tracked through to following years.

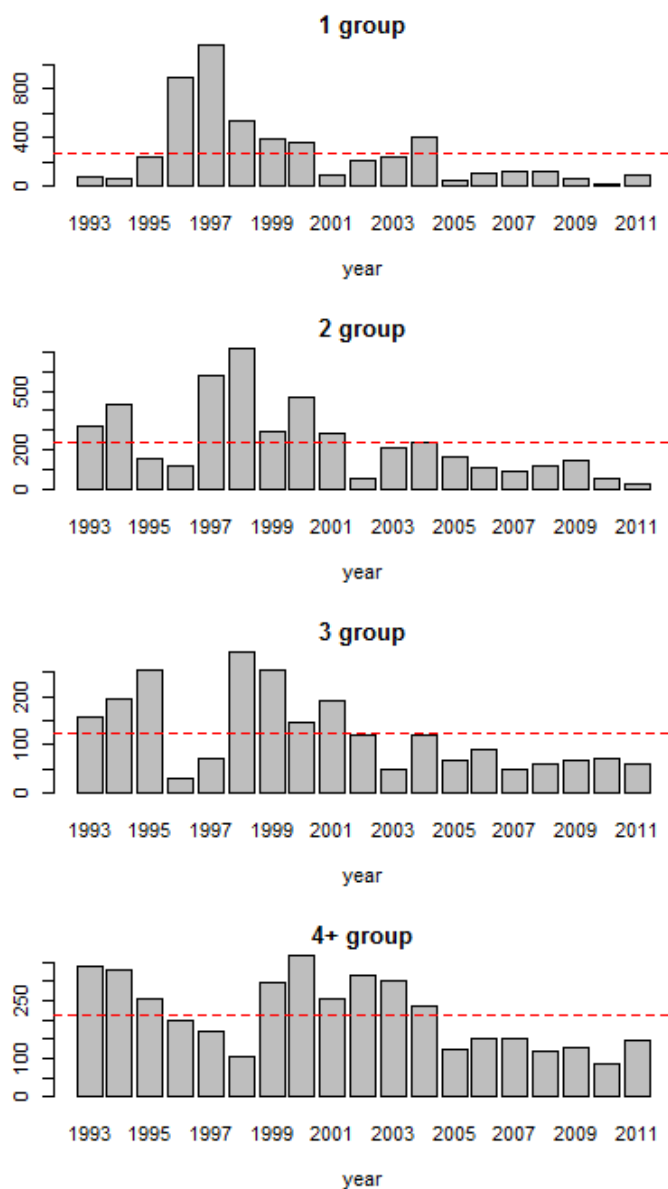


Figure 3: Mean numbers of sole per km towed for 4m beam trawl survey (UK(E&W)-BTS-Q3), Eastern Irish Sea (VIIa). Perception in 2012 (results up to 2011).

Perception in 2011 – results up to 2010 (source: WGBEAM 2011)

Of all sole stocks that are documented by beam trawl surveys, VIIa obviously harbours the stock in the poorest condition. The trend of poor recruitments in 2003–2009 for all ages was continued in 2010, with the smallest number of observed one year olds from the time-series in this year.

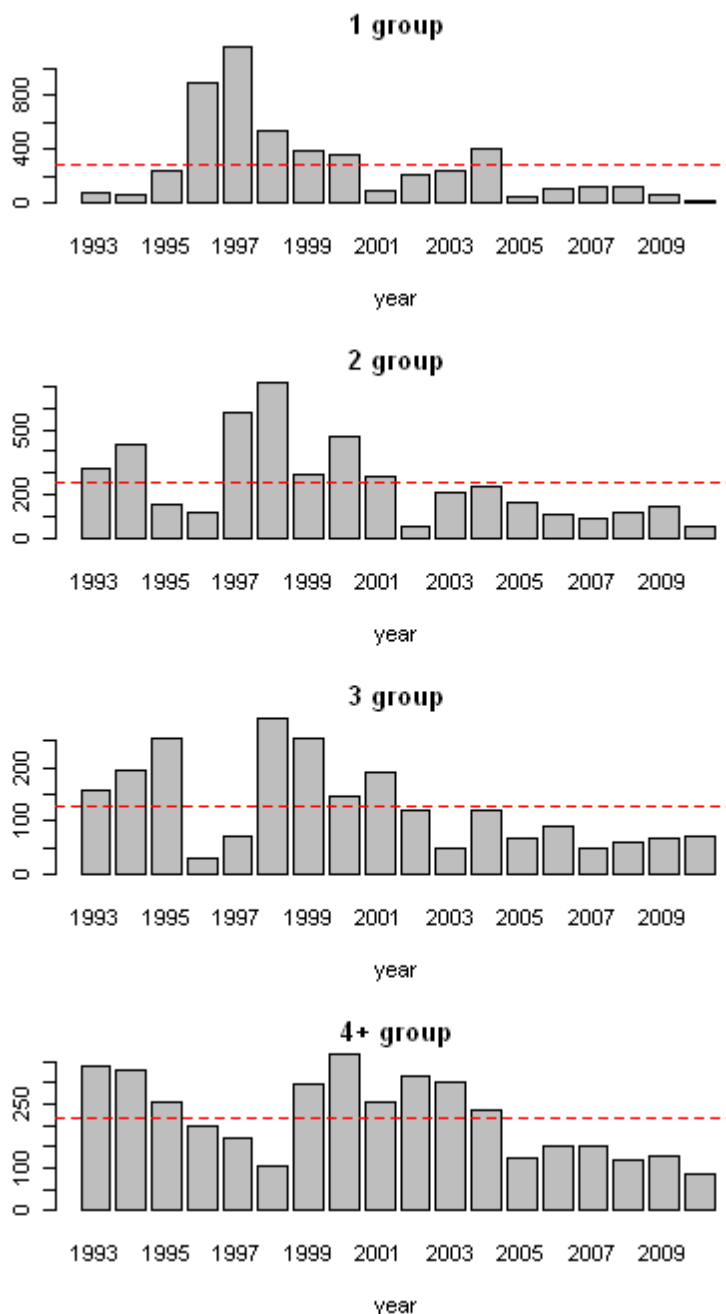


Figure 4: Mean numbers of sole per km towed for 4m beam trawl survey (UK(E&W)-BTS-Q3), Eastern Irish Sea (VIIa). Perception in 2011 (results up to 2010).

Details on the perception of the Irish Sea sole stock from two consecutive years (2011 & 2012) have been included in this working document to allow for comparison between these years. It is clear that the perception of the stock didn't change between years, and this is true for each individual age class depicted in the histograms (also not compared to the perceptions of the years prior to 2011, see older WGBEAM-reports). This is one of the

arguments on which we base the statement that the UK(E&W)-BTS-Q3 has a high internal consistency.

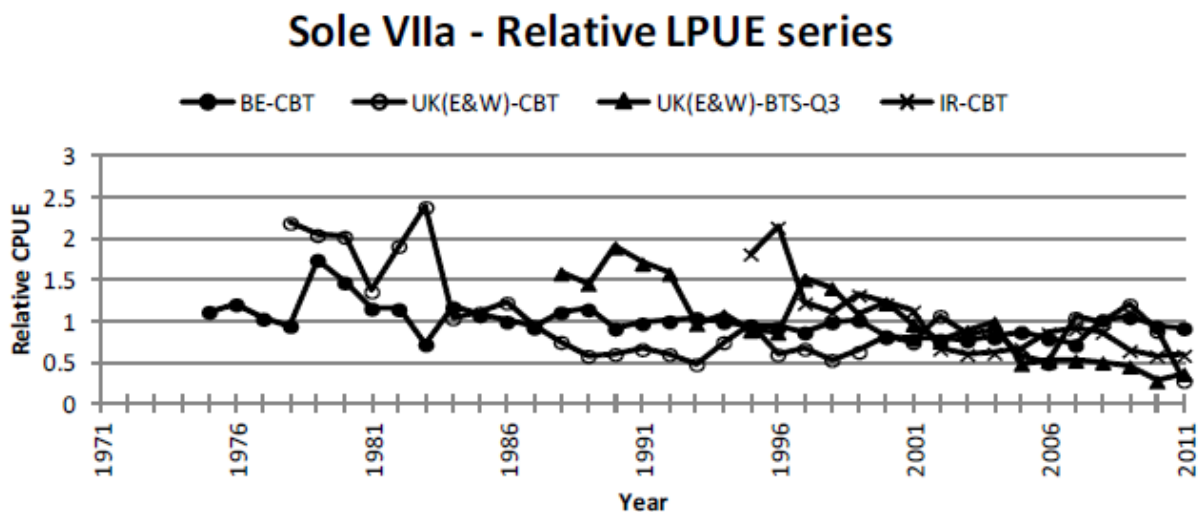
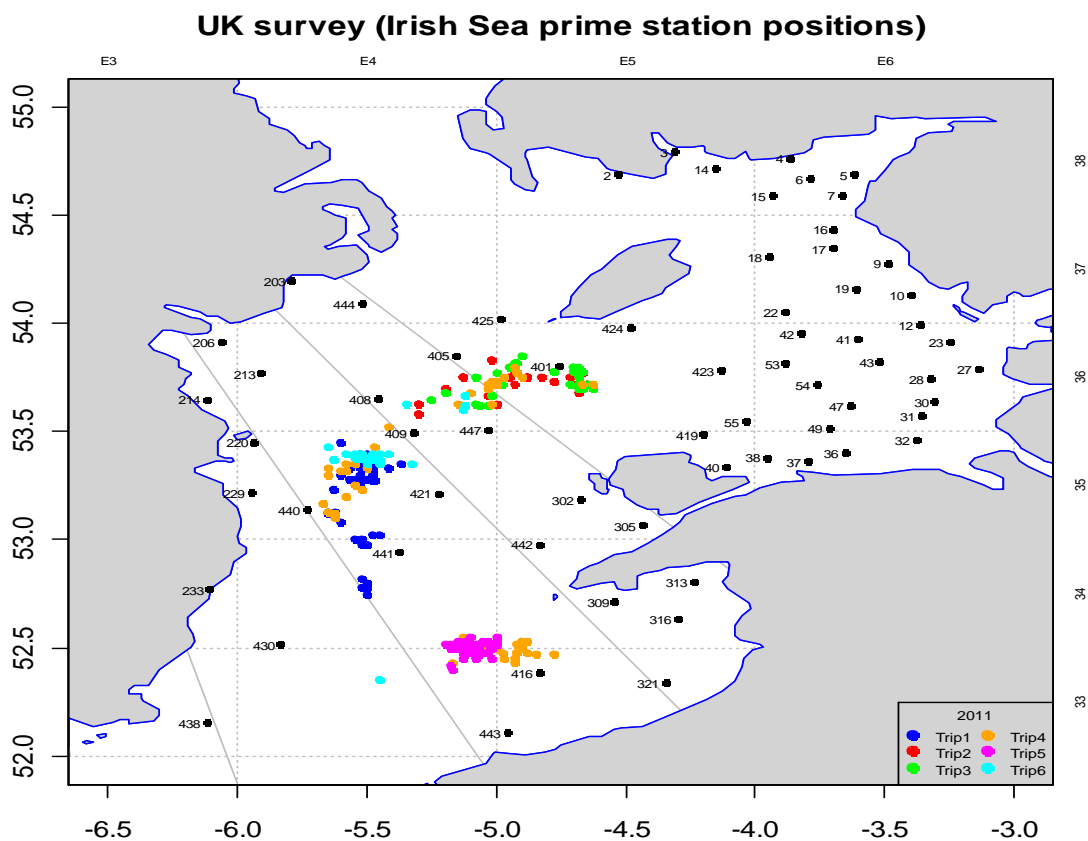


Figure 5: Relative LPUE for the UK(E&W)-BTS-Q3 and three commercial fleets (source: WGCSE 2012).

Figure 5 illustrates that the survey abundance index (UK(E&W)-BTS-Q3) is lower than all three commercial indices since 2005. The English commercial beam trawl index (UK(E&W)-CBT) dropped to the level of the survey in 2011, but was higher in the years prior to that. The Belgian commercial beam trawl index is the highest of them all.

Especially this last fact gave rise to the Belgian fisherman's perception that something must be wrong with the UK survey, but that cannot be concluded from a comparison of commercial data with survey data, as the survey fishes fixed positions over the entire Irish Sea area (including stations where there is no or few sole) whereas fishermen obviously avoid areas with consistent lower catches and keep fishing the hotspots that their experience allowed them to identify. Therefore it is not more than logical that a commercial index is higher in a setting where fish are not present in the same densities all over the total area. Maps 1 and 3 indeed illustrate that Belgian beam trawlers don't spread their fishing effort uniformly over the entire Irish Sea.

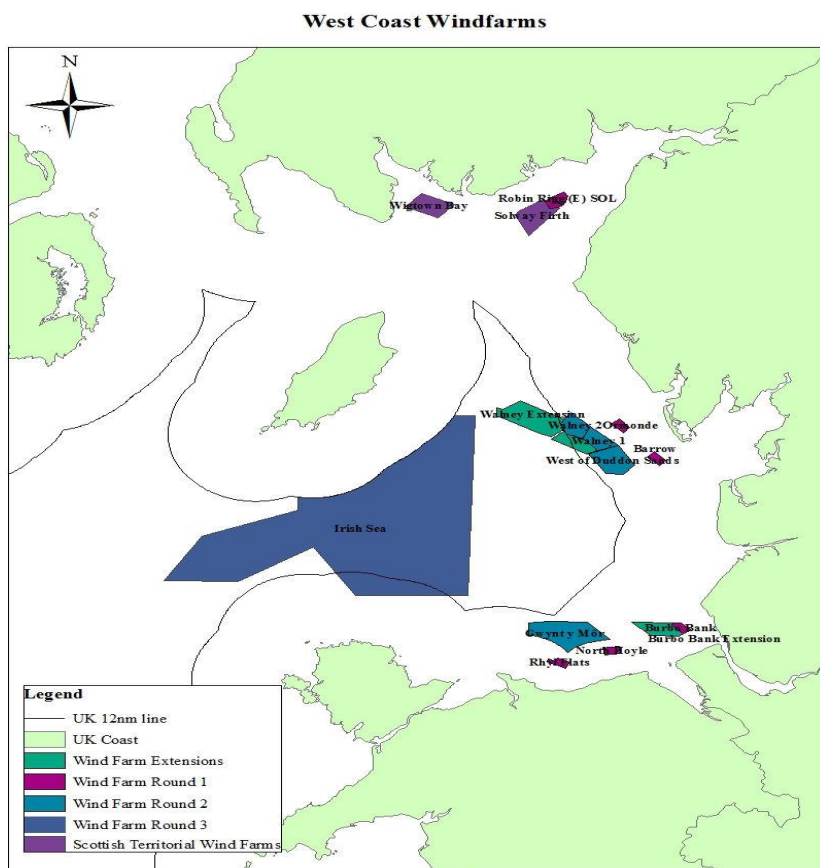


Map 3: Fixed sampling stations of the UK(E&W)-BTS-Q3 and locations of six ILVO-observer trips on board of Belgian commercial beam trawlers in the Irish Sea in 2011. The geographical area where these beam trawlers fished (coloured dots) is representative for the main Belgian beam trawl effort, although there is also some effort in the northeastern part of the Irish Sea (Liverpool Bay).

3.1.3. Questions/Action Points

- The captions under Figures 3 and 4 explicitly mention 'Eastern Irish Sea'? If the survey index is only based on data from the eastern part of the Irish Sea, and the Belgian commercial index uses mainly data from the western part, then we are comparing apples with pears and may have a problem.
 - o Action 1 : Find out whether this is really what was meant. Is it true that only the survey results of the eastern part of the Irish Sea were used for the abundance calculations, and if so why this area is considered to be representative for the entire Irish Sea.
 - o Action 2 : To gain more insight in the possibility of different trends in different parts of VIIa, an idea could be to calculate separate indices (by age class and combined) for the eastern and the western Irish Sea, or even by ICES statistical rectangle.
- Fishing possibilities – for commercial vessels AND surveys – in the eastern part of the Irish Sea have been heavily influenced by anthropogenic developments (e.g. windmill farms) over the last decade. Survey stations that can no longer be fished due to this,

are usually replaced by stations in the neighborhood (same depth, same substrate type). However, it is not unthinkable that changing stations had an impact on the abundance index that don't reflect real changes in stock size and composition.



Map 4: UK West Coast windmillfarms (Irish Sea)

- Action 3 : Find out more about changes in stations over the years, and potential impact of this on survey abundance indices.

Kelle Moreau will take up these action points with Brian Harley (survey coordinator) and Ian Holmes (scientist in charge on the survey). Depending on the results of this discussion, it will be decided what further action should be undertaken. Contacts have been made in the month of February 2013.

3.2. Sole Irish Sea (VIIa) - Assessment notes.

Authors: Willy Vanhee, Sofie Nimmegeers

Sole in the Irish Sea can be classified as a stock in poor condition. SSB and recruitment have shown continued decline since 2001 and SSB is currently estimated to be below Blim and substantially below MSYBtrigger. The reproductive capacity of the stock has been much reduced in recent years and the stock is considered to be at an increased risk

of collapse. Therefore ICES decided to benchmark the sole in Irish Sea in 2011. WKFLAT 2011 met from 1st to 8th February 2011 at ICES headquarters in Copenhagen. The meeting was chaired by Rob Scott (JRC) and the ICES co-ordinator was Jean-Claude Mahé (France). Chris Legault (USA) and Chris Francis (New Zealand) participated in the meeting as invited external experts. A total of 16 participants from seven countries were in attendance. Stakeholder representatives were in attendance for part of the meeting.

The total international landings have gradually decreased over the time series from around 2000 tonnes in the late eighties to a record low of 330 tonnes in 2011, of which 76% (250 t) was landed by Belgium, 15% (48 t) by Ireland, 7% (23 t) by the UK (England & Wales) and the remainder by Northern Ireland and France. These proportions are reflected in the age composition of the catch-at-age matrix, which forms the basis of the assessment, together with the tuning file.

Due to the sparse biological sampling in some years by some countries, the raising procedure based on three separate national age-length keys (Belgium, Ireland and UK) was replaced by a combined age-length key. This combined ALK was then applied to the separate length distributions of the national catches to obtain catch numbers-at-age for each individual country. The sum of these numbers at age results in the catch-at-age matrix.

Discards are not a substantial part of the catch for this high valued species. Therefore, discards are currently not included in the assessment and their inclusion would unlikely change the perception of the stock.

Previously, the Irish Sea sole assessment was based on XSA with two survey tuning indices (UK(E&W)-BTS-Q3 and UK(E&W)-BTS-Q1). The UK March survey (UK(E&W)-BTS-Q1) indices, which only provides information for years 1993 up to 1999, was omitted from the assessment as it no longer contributes to the final survivor estimates. The UK September survey (UK(E&W)-BTS-Q3) provides information on year class strength from 1988 up to present day for ages 1 to 9. The consistency between the catch-at-age matrix and the survey indices is shown in the figure of the log catchability residuals ([Figure 6](#)). The small residuals indicate a good correlation between the catch (commercial landings) and the tuning file. This pattern was continued in the update assessment of 2012. The UK(E&W)-BTS-Q3 shows very good consistency in tracking year class strengths throughout its time series e.g. the strong and poor year classes are estimated consistently by all ages of the survey indices ([Figure 7](#)). A similar picture resulted from the update assessment of 2012. WKFLAT 2011 found no reason to recommend alterations or modifications to the survey design.

Up to 2004 the Belgian commercial beam trawl fleet (BEL-CBT) was one of the commercial tuning fleets in the assessment, giving information on the older ages. In 2005, the BEL-CBT was omitted from the assessment as XSA results showed unexplainable shifts in fishing mortality and SSB by adding one additional annual dataset. WKFLAT 2011 considered the possibility of reintroducing the Belgian commercial tuning series in the assessment of Irish Sea sole. The XSA assumes a constant catchability over all years in the tuning fleets whereas commercial fleets may be subject to changing catchabilities over time (e.g. management restrictions and changes in fleet behaviour). Furthermore the fact that the inclusion of the Belgian commercial tuning series did not improve the assessment results, WKFLAT2011 decided not to reincorporate the Belgian commercial tuning fleet data.

WKFLAT2011 also stipulated that the ability of the UK(E&W)-BTS-Q3 tuning series to provide a fishery independent index with which to tune the assessment, does not provide any meaning of concern.

The accuracy of an assessment methodology is determined by its ability to consistently predict the 'truth'. Bias is the degree to which the method consistently under -or overestimates the 'truth'. The analysis procedure involves the creation of retrospective time series plots for assessment predictions (fishing mortality, spawning stock biomass and recruitment). It is apparent that for sole in the Irish Sea there is very little retrospective bias for these parameters (Figure 8), indicating an accurate assessment. This pattern was continued in the update assessment of 2012.

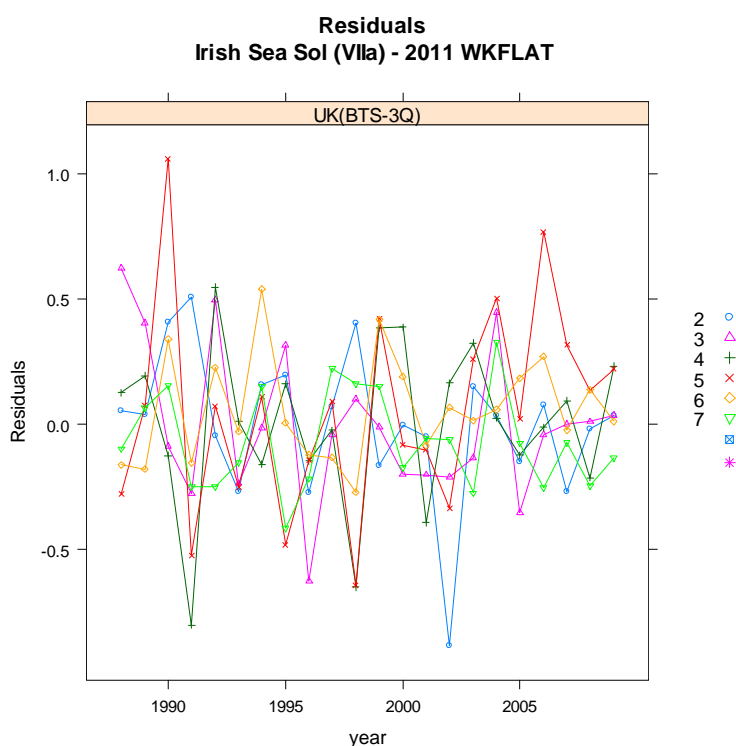


Figure 6. Residual plots of UK(BTS-3Q) from final XSA run

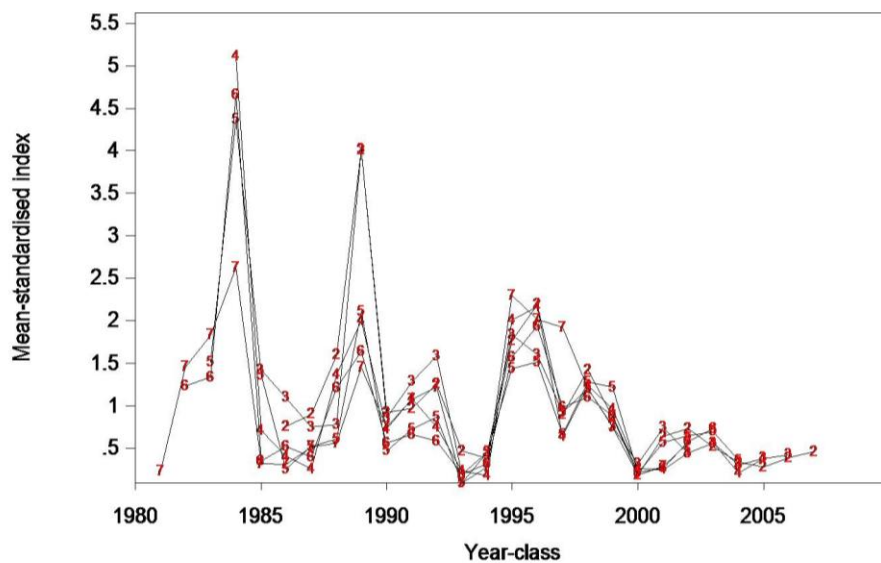


Figure 7. Mean standardised indices of year class strenght from the UK(BTS-3Q).

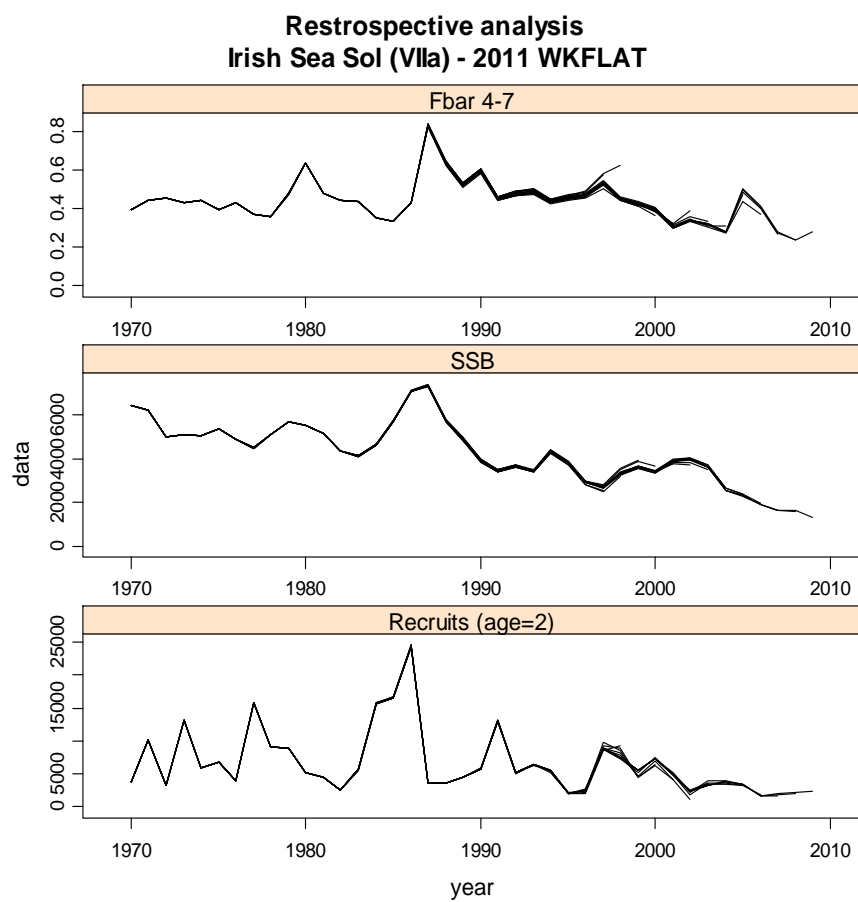


Figure 8. Retrospective plots from the final XSA run.

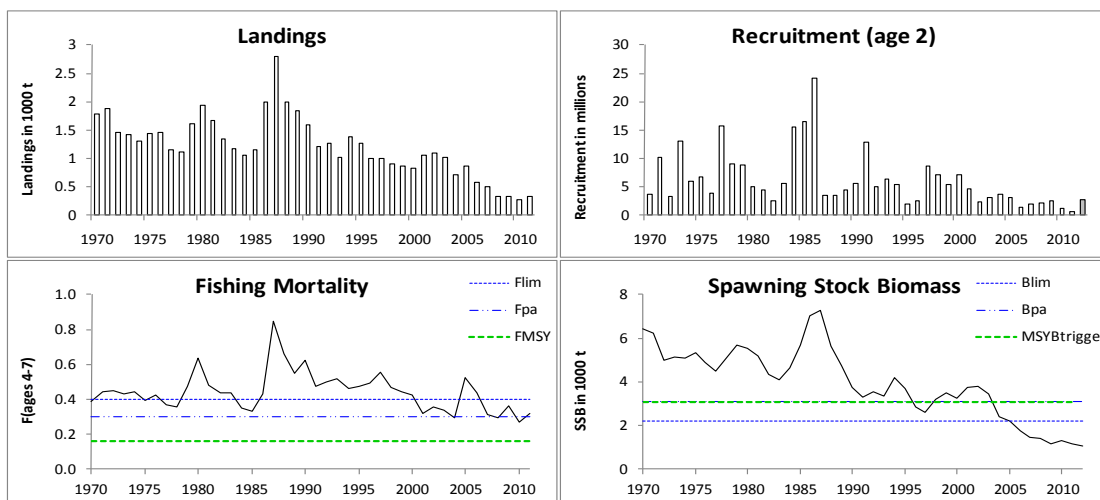


Figure 9. Sole in Division VIIa. Summary of stock assessment.

Conclusions:

Adding the 2011 data to the time-series, together with the minor revisions for 2010 did not cause any additional anomalies compared to the WKFLAT2011 assessment.

The assessment results show very strong consistency in estimates of SSB, recruitment and fishing mortality, with almost no retrospective pattern apparent.

Conclusions on the status of the stock (Figure 9) can be summarised as follows: SSB has continuously declined since 2001 and is below B_{lim} since 2006. In 2012 SSB reached the lowest level. The fishing mortality shows a declining trend since the mid 1980s to a stable level in recent years, well above F_{MSY}. Recent recruitment levels have been lower than earlier in the time-series, with the 2011 recruitment being the lowest in the time series.

4. REGIONAL APPROACH AND THE ROLE OF THE NWWRAC

The Irish Sea (ICES division VIIa) is part of the area under the jurisdiction of the North Western Waters Regional Advisory Council (NWWRAC), since 2005 working on a proactive and regional-based strategic approach in organizing work to ensure evidence based advice to the Commission.

The Final Activity Report on Year 7 of the working of the NWWRAC, mentions six priorities on which the NWWRAC has focused during the period from 01/10/2011 until 30/09/2012. The items of interest in relation to the Irish Sea sole problem are highlighted below.

1. CFP-Reform

2. Management measures in the Celtic Sea

2.1. **Long-term management plan for mixed demersal fisheries in the Celtic Sea (VIIIfg) – Research Needs**

The NWWRAC works towards the development of a stakeholder-lead multi-annual management plan for mixed demersal fisheries within a defined area of the Celtic Sea using an ecosystem-based approach. A steering group was established in November 2011 and a letter was subsequently submitted to the EC outlining a structure for a study and asking the Commission to consider the provision of financial support.

This was recently included in the open call for tenders No MARE/2012/22 under Lot 1: Scientific support for the development of a management plan in the Celtic Sea.

The main purpose of this service contract is to elaborate a decision-support tool (a scientific model) that will enable the assessment of management options in the context of the Celtic Sea's mixed fisheries. **The tool should be modular, flexible and versatile enough to apply to areas beyond the Celtic Sea, as is or with limited adaptation.**

In view of the problems in the Irish Sea and the fact that we want to study a similar approach for this area, Belgium signed in for the joint tender for this project.

2.2. Selectivity measures for the Celtic Sea

3. Review of the Cod Management Plan (EC Regulation 1342/2008)

3.1. Long term review

From the outset of the review process carried out by ICES and STECF, the NWWRAC has been involved in the call to evaluate the management plan for cod stocks. The NWWRAC position paper, dealing with general aspects as well as providing specific recommendations on a fishery-by-fishery basis for the cod stocks in VIa, VIId and VIIa, was presented at the STECF EWG 11-07 in June 2011. The outcomes of this meeting were reported at a Focus Group in July 2011 and subsequently, NWWRAC representatives were present at a STECF meeting in November 2011. In 2012 the NWWRAC agreed to hold two additional Focus Group meetings to continue the work on this topic (resp. in March and in July 2012).

The work in the first Focus Group led to the preparation and adoption of a position paper titled: "*Rebooting fisheries management in the West of Scotland and Irish Sea Demersal Fisheries: Breaking the Cycle of Decline*".

The Focus Group in July 2012 agreed to build on the foundations of the paper and agreed to hold a second Focus Group meeting to develop a scoping paper to make a management plan operational for mixed fisheries in VIa and in VIIa.

A letter was sent to the EC - DGMARE on October 18th with an advice from the North Western Waters RAC on an audit of Irish Sea Cod Assessments and Management measures and on a Fully Documented Fishery for the West of Scotland Demersal Fisheries, on which DGMARE responded in December 2012.

During the meeting of working group 4 (Irish Sea) in Paris on January 30th 2013, the problem of the Irish Sea Sole was presented by Belgium.

The working group agreed to undertake the following action: **Ask the Executive Committee to include an audit of the sole stock in the development of a mixed fisheries management plan for the Irish Sea. Integrate the principal areas of concern, Cod, Nephrops and Sole using science/industry partnerships in the development of the management plan through an integrated ecosystem approach between the three main economic stocks: IS sole (Belgian data), Nephrops (Irish data) and Cod (UK data).**

The initiative was generally welcomed as very timely and the action proposed was accepted.

The initiative was highlighted as a good example of how industry and science could collaborate to improve data and knowledge of stocks.

The Executive Committee decided to send a letter to the Commission asap.

In this respect it is worth while noticing that on the **5th of July 2012**, a first meeting was held in Dublin of the **Focus Group – Mixed Fisheries Management Plan for the Irish Sea (ICES area VIIa)**.

Alan Mc Culla, chairman of the group, introduced the document from Poseidon Management prepared for the Anglo North Irish Fish Producers Organisation (ANIFPO):

"An Ecosystem Approach to Fisheries Management in the Irish Sea", a possible basis to kick-start a Mixed-Fishery Management Plan for the Irish Sea.

It was stated at this meeting that, in general, the stocks in the Irish Sea are in a relatively poor state. More data is NOT needed, what is needed now is to refine the assessments we already have. There is good co-operation between the science and the various fleets, more observer coverage and more than enough independent surveys available.

The next step is to move to a Mixed Fishery model.

Norman Graham (IE Marine Institute) outlined the pathway to success we should follow:

- Carry out the single stock assessments first
- Look at all the technical interactions and map the area
- Identify the priority actions and fix the objectives
- Take account of economic and social aspects

According to Norman Graham, a bio-economic model might be the best tool to analyse all these variables so to solve the problem in a stepwise approach.

The Commission representative welcomed the initiative and hoped to see progress made by the NWWRAC in the following months.

3.2. Short term actions: interim measures to improve implementation of the management plan

4. Skates, Rays and Sharks

In the second half of Year 7, the NWWRAC has worked on developing a proposal for management measures for skates and rays in ICES areas VI and VII. A Focus Group meeting took place on the 26th of September where two successive versions of the management plan were discussed, but no agreement could be reached.

The members however agreed to consider a proposal from the fishing industry to introduce a voluntary, pilot closure in April – June 2013 of the spawning grounds for rays identified and mapped in the Irish Sea. A proposal for closure was sent to the EC in December 2012.

5. Collaborative work with scientists and Member States to improve data quality for stock assessments

The NWWRAC has now achieved a mature and continuous dialogue with both ICES (MIRAC, Benchmark workshops, Data Compilation meetings etc...) and the main, national, scientific institutes from Ireland, France, UK and Spain in order to improve data quality for stock assessments. Regional task forces for NWW were established at sub-regional level of the Working Groups of the NWWRAC held in April 2011, and data coordinators for each priority stock were subsequently appointed to liaise with scientific correspondents and identify data gaps.

The NWWRAC submitted an annual progress report of its work to ICES (Junly 2011 – July 2012) summarizing what has been achieved and outlined future actions in relation to each specific data limited stock identified as a priority in NWW.

In this paper a request was included tot ICES to arrange a third workshop (WKDDRAC3) in order to determine the progress achieved and develop further proposals for a framework of collaboration between ICES and the relevant RACs involved in this initiative (i.e. the NWWRAC, NSRAC and SWWRAC). The NWWRAC proposed the following items for consideration: ecosystem considerations in ICES advice, the mixed fisheries/multispecies approach for regional areas and the role of fishing industry representatives in collating and gathering relevant data and information in advance of ICES benchmark meeting.

ICES replied favourably to this request and asked the NWWRAC Secretariat to act as a coordinator of this initiative from the RACs and liaise with its counterparts in de NS and SWW to develop and submit a paper with items and recommendations.

In view of the action plan and project on sole in the Irish Sea the Flemish scientific institute ILVO wants to liaise with the NWWRAC to collaborate to improve data quality for stock assessments.

6. Control and compliance of CFP-rules for stocks in North Western Waters.

Conclusion:

From the highlighted items above, it seems clear that there is a lot going on in the region around the Irish Sea. The NWWRAC has done a lot of preparatory work and opened the door for inclusion of the issue of the sole stock in VIIa. For us it is therefore clear that the Belgian problems in the Irish Sea can only be addressed in a regional way and in the context of mixed fisheries management and ecosystem approach.

[This would lead to a "regional approach" for a "Belgian problem".](#)

5. ACTION PLAN AND PROPOSAL FOR A PROJECT

5.1. Objectives

The general objective of this action plan is to restore the stock of sole in the Irish Sea (ICES area VIIa) to MSY-levels within a reasonable time and to secure a sustainable demersal fisheries by the Belgian fleet in the Irish Sea.

Therefore, a letter will be submitted to the European Commission with a first study of the problem and with a request for financial support for a project carried out by ILVO, to find a solution to the problem of the Irish Sea sole and this framed within the stakeholder-lead regional search for a mixed fisheries management plan within an ecosystem approach.

5.2. Phase 1: Terms of Reference of the action plan

Timing: 2013

- Learn about regional approach and role of scientists in view of regionalization under the CFP
- Integrate the sole project in a regional approach
- Screen the survey and assessment of the sole stock in VIIa.
- Look at all the technical interactions and map the area
- Improve collaboration and co-management with fisheries scientists, managers and industry
- Link to ecosystem approach and mixed fisheries management in the Irish Sea
- Collaborate and learn from stakeholder-lead multi-annual management plan for mixed fisheries demersal fisheries within a defined area of the Celtic Sea using an ecosystem-based approach (Lot 1 project under Call for tenders No MARE/2012/22)
- Develop a project for the Irish Sea sole stock

5.3. Project proposal (Phases 2 and 3)

Timing: +/- 2013/2014-2015

PHASE 2

- Where possible full observer coverage for Belgian vessels in 2013 and 2014
- Follow NWWRAC and appropriate working groups and focus groups. Amongst others: collaboration with, advice from and feedback to working group 4 on Irish Sea of NWWRAC
- Collaborate between scientists for data screening and examining survey and assessment for sole in the Irish Sea:
 - Action 1 : Find out whether it is true that only the survey results of the eastern part of the Irish Sea were used for the abundance calculations, and if so why this area is considered to be representative for the entire Irish Sea.

- Action 2 : To gain more insight in the possibility of different trends in different parts of VIIa, an idea could be to calculate separate indices (by age class and combined) for the eastern and the western Irish Sea, or even by ICES statistical rectangle.
- Action 3 : Find out more about changes in stations over the years, and potential impact of this on survey abundance indices.
- Explore possibilities for a Belgian observer and/or fisherman and/or scientist to join UK(E&W)-BTS-Q3 Survey (2013)
- Submit request for research project to European Commission for Belgian fishing vessel to fish next to research vessel during survey (in 2014?)
- Exchange of ideas and results with NWWRAC – WG 4 (Irish Sea) and Producer organizations on project on mixed fisheries management and ecosystem approach

PHASE 3

- Processing the data from the observer coverage
- Collaborate between scientists to adapt and finalize the survey and assessment if necessary
- Give adequate advice to industry and management authorities about (Belgian) fisheries in VIIa
- Collaboration between scientists and NWWRAC to develop a management plan (for sole) for the Irish Sea, if possible on mixed fisheries basis within ecosystem approach
- Rapportage to authorities, RAC's and industry

5.4. Expected results

- Reinstall credibility in scientific advice for fisherman and authorities
- Develop a strong fisheries-science-partnership supporting scientific advice
- Develop scenario's for implementing regional management from a bottom-up approach
- Reach and retain MSY-level for sole in VIIa, as well as for cod and associated species as haddock, whiting e.a.
- Ensure a stable and sustainable activity of part of the Belgian fleet in the Irish Sea within the context of regional management