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IEO scientific estimation of WGBIE stocks landings

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ABSTRACT

The methodology used to estimate Spanish landings had to be updated when processing the 2013 fisheries data due to changes in the quality and availability of fisheries statistics. WGBIE discussed and accepted this new methodology but requested a review of data from the previous two years (2011-2012) in order to facilitate comparison between both approaches. The 2013 data submitted last year were obtained with a preliminary version of the new methodology and therefore new landings estimations for the period 2011-2013 have been uploaded this year to InterCatch for northern and southern stocks of hake, anglerfishes and megrims. This working document describes both methodologies and provides an interpretation of their respective results.

INTRODUCTION

IEO has traditionally processed scientific fisheries data by combining both biological information and fisheries statistics. These data were obtained directly by IEO: biological data through sampling fishing trips and fisheries statistics from sales notes of the main landing ports. IEO has always strived to improve the quality of both data sources, however, its capacity for intervention in sales notes is negligible. A gradual loss of sales notes quality was noticed a few years ago, probably as a reaction to more restrictive management measures and the resulting economic penalties. The first approach to address these changes was to reinterpret sales notes by taking into account the harbour observers experience and the fishing trends of vessels observed in previous years.

In 2014, this approach was completely redesigned, to confer a new use to biological sampling, *i.e.*, raise the observed LPUE (Landings per Unit Effort) to the total effort. A similar method has been applied for the estimation of discards ever since the Data Collection Regulation (DCR) was implemented in 2002 (EC, 2001). However, the sampling coverage level at the landing port is observed to be much higher than on board the vessel. Therefore, the Spanish scientific fishery data submitted to the WGBIE last year were estimated using this new method (ICES, 2014).

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Regardless of the approach used to estimate landings and ever since 2011, the national institutional decisions required Spanish landings submitted to international bodies to be split into official and scientific values (where any difference would correspond to unallocated landings) (ICES, 2012; ICES, 2013; ICES, 2014). This context actually worsened the uncertainty of data from the last three years, and therefore the WGBIE requested that the 2011-2012 data be re-estimated using the new methodology, in order to facilitate comparison with the old approach. After the WGBIE meeting, the debugging of the new methodology showed that the 2013 estimates also needed to be checked.

The new 2011-2013 Spanish landing estimations were uploaded this year to InterCatch for northern and southern stocks of hake (*Merluccius merluccius*), anglerfishes (*Lophius piscatorius* and *L. budegassa*) and megrims (*Lepidorhombus boscii* and *L. whiffiagonis*). This working document provides data sets obtained by the old and new methods as well as additional information to facilitate interpretation of their respective results.

MATERIALS AND METHODS

Data

Data from landings sampling and official effort were compiled for the period 2011-2013. The landing sampling data were compiled in port as the biological sampling was being carried out. Likewise, the official effort data consisted of the total number of trips by *métier* recorded in logbooks.

The sampling plan addressed 21 sampling strata or national *métiers*. It split the current Spanish DCF *métiers* into the three main Atlantic fishing grounds: non-Iberian European waters (Irish, French and Scottish-English waters), North-western Spanish waters and South-western Spanish waters (Gulf of Cádiz). A total of 5711 trips were sampled during the period analyzed: 1571 in 2011, 1718 in 2012, and 2422 in 2013.

Estimation method

The current estimation method of Spanish fishing landings is based on raising the LPUE, obtained by sampling, to the total effort by *métier* (total number of trips). The calculation process is not only technical (*métier*) but also broken down by time (month) and space (landing port). The figure obtained is taken as the scientific landing estimate. When transmitting data, the difference between the estimated and official figures is submitted to ICES as “non-reported” landings. When both figures match, only the official value is reported, but it must be considered as the scientific estimate.

RESULTS

The Spanish landings estimated by the old and the new methods are provided in Table 1 and shown in Figures 1 and 2, for northern and southern stocks of hake, anglerfish and megrims. In the case of northern stocks, the new estimation method gives higher estimated landings for hake in 2011 (114%) and 2012 (115%). Anglerfishes show the highest differences in 2011, due to changes in the species allocation after revising some 2011 samplings. Megrim gives very similar estimations. Generally speaking, the trend in landings for all northern stocks is downward, except for black anglerfish.

In the case of southern stocks, the new estimation method gives higher estimated landings for both anglerfishes, but lower values for hake (60% and 74% in 2011 and 2012, respectively). However, the differences in both southern megrims are observed to be opposite between the species and years: 89% (2011) and 123% (2012) for four-spot megrim, and 203% (2011) and 80% (2012) for megrim. The new 2013 estimates are generally lower than the preliminary value provided last year, except for black anglerfish and megrim: 82% hake, 66% white anglerfish and 82% four-spot megrim. In 2013, the two values were obtained by the new method; however the old value reported to WGBIE last year was based on an inaccurate calculation of total effort, which resulted in an overestimation of landings of some stocks. Insofar as trends are concerned, the increasing trend of white anglerfish landings is seen in both estimation methods, while the decreasing trend of hake landings is only observed in the old estimates.

The method used for demersal fish has also been used to estimate landings of Norway lobster. However, estimates obtained have not exceeded the official landing figures in any *métier* for any year. Therefore, the Spanish Norway lobster official landing figures can be used for scientific purposes as scientific estimates. A recent issue concerning Norway lobster data is the geographical requirement of the 2014 ICES Data call, which establishes that landings must be given for the ICES statistical rectangles that specifically define the Functional Unit. This year, the Spanish Norway lobster landings in the FU rectangles have been uploaded to InterCatch for the very first time. Table 2 shows the percentage catches inside the FU rectangles in relation to the broader area traditionally covered to compile Norway lobster data, as observed in 2014.

DISCUSSION

As described above, both estimation methods give consistent patterns and provide similar results, except for southern hake. For the remaining stocks, the test conducted generally supports the old estimates, obtained through inference from previous year's fleet information, and also confirm the use of the new method based on sampled data. 2011 and 2012 act as a type of calibration intersection which permits the connection between the time series and the period beginning in 2013 (wherein only the new method can be used).

However, the estimates of southern hake landings obtained using the new method are not in line with the current knowledge of the fishery. The new estimation method is very dependent on the sampling level and sampling coverage. In fact, the difference between estimation methods becomes lower as sampling level increases. As against anglerfish and megrims which are mainly exploited by bottom otter trawl *métiers*, hake is present in all *métiers* (gillnet, long line, pelagic otter trawl and pair trawl). The last pan-European Data Collection Framework (DCF) establishes that sampling of *métier*-related variables must be performed in order to evaluate the quarterly length distribution of species in the catches, and the quarterly volume of discards (EC, 2008). Estimation of landing volumes was never the objective of biological sampling and therefore sampling coverage has been reinforced since 2014.

WGBIE mentioned review of the Spanish landings estimation in Section 1.5.2 of last year's report (ICES, 2014) and this was addressed in more detail in the respective section of each stock. Northern hake was assessed using scientific estimations. The unallocated landings were provided as a single aggregate, and they had to be divided by *métier* using alternative scientific information provided by the research institutes (Section 3; ICES, 2014). Unlike last year's submission, the non-reported landings uploaded to InterCatch this year were broken down by

métier. This change in data transmission facilitates the appropriate allocation of Length Frequency Distributions (LFD) for the unallocated landings.

The northern megrim section describes the 2013 Spanish data as official fishery statistics, while information from previous years was referred to as “*catches estimated by the WG based scientific estimations*” (Section 5; ICES, 2014). Just like in previous years, such data had not been reported by the Spanish Administration but rather by the Spanish Institutes responsible for scientific analysis, *i.e.* the IEO and the AZTI. The absence of unallocated landings for this stock in 2013 was due to logbooks recording real landings, and therefore the absence of higher values in the estimation process.

Unallocated landings were likewise available for the first time for the southern stocks of anglerfish in 2013. Therefore, they were considered to be inconsistent with the time series of landings and thus were rejected from the assessment (Section 10; ICES, 2014). As explained above, the 2013 estimated landings figures submitted last year were obtained from a preliminary version of the new methodology, which was based on misinterpretation of effort data. They were compiled from electronic logbooks for the first time but the computation processes that had been designed for traditional logbooks produced an overestimation of effort and consequently also of the estimated landings. The new values, calculated on corrected effort data, provide landings estimates that are in agreement with the historic perception of both stocks (Table 1 and Figure 2). In 2011 and 2012, the old method was unable to record unreported landings of anglerfish as their main source of data -sale notes- are not as accurate as fisheries sampling for some artisanal *métiers*.

A special case is found in southern megrims, where differences between the two landings estimates are also influenced by geographical reallocation of sampling trips. In the past, they were assigned to the ICES Division closest to the landing port but are now allocated using the georeferenced position provided by logbooks.

The Norway lobster section in last year’s WGBIE report describes the data as exclusive official landings (Sections 13 and 14; ICES, 2014). However, as explained above, the lack of unreported landings should be interpreted as scientific estimates. Another issue mentioned in the Norway lobster section refers to assessing the impact on the data, of the ICES requirement that requests specification of Norway lobster landings by statistical rectangle. The 2014 Spanish landings of Norway lobster have been uploaded to InterCatch broken down by ICES statistical rectangle, following the 2014 joined ICES Data call. The percentage landings inside the required ICES statistical rectangles are shown in Table 2, in order to facilitate comparison with the time series.

The scientific process of estimating landings should be differentiated from the unscientific submission of data, split into official data and unreported landings. The former would be equally relevant even though the scientific estimation of Spanish landings is presented as a single figure. The institutional requirement by the Spanish Administration, of clearly identifying official landings in the EG reports arose as a consequence of the EC penalising Spanish fleets basing on data submitted to the ICES, even though such data had been requested only for scientific purposes.

Evolution of effort

The new method for estimating landings using sampled LPUEs and total effort highlights the evolution of both stocks and fleets and permits preliminary identification of catch variations due to changes in fishing strategy. A look at the last four years illustrates the evolution of effort in Spanish and non-Spanish fishing grounds (Table 3).

The Spanish effort was reduced by 46% in non-Iberian European Atlantic waters where the highest reduction was observed on *métiers* targeting hake with bottom otter trawl in Subarea VII (reduction of 79%) and gillnets in Divisions VIIIabd (64%). Pair trawling for hake in Divisions VIIIabd decreased by 55%, while the remaining *métiers* decreased by about 25%: longlining of hake in VI-VII-VIIIabd, bottom otter trawling for megrim and anglerfish in Subarea VII and Divisions VIIIabd. This reduction is a consequence of adjustment of the Spanish fleet in non-Iberian European waters to the Spanish quotas. Some vessels from this fleet have been sold to other EU Member States.

Effort has evolved differently in Spanish Atlantic waters. Effort of monospecific gillnets increased for anglerfish ("*rasco*") but decreased for hake ("*volanta*"). Insofar as mixed bottom otter trawl *métiers* are concerned, the most significant change is observed in the Northern coastal bottom otter trawl fleet, where there is transference of effort from the pelagic *métier* ("*jurelera*") to the demersal *métier* ("*bacá*"). In this case, the fleet had to be adapted to the new Spanish fisheries management context, which recently began allocation of the national quota among fleet categories (BOE, 2010; BOE, 2011a; BOE, 2011b) and individual vessels (BOE, 2013).

References

- BOE. 2010. Orden ARM/3361/2010, de 23 de diciembre, por la que se establecen medidas para la gestión de la pesquería de merluza en las divisiones CIEM VIIIc y IXa. Núm. 316, Sec. III, Pág. 108392-108397.
- BOE. 2011a. Orden ARM/3157/2011, de 10 de noviembre, por la que se establece el reparto porcentual de posibilidades de pesca del jurel y el rape entre las diferentes modalidades de pesca en las divisiones CIEM VIIIc y IXa. Núm. 280, Sec. I, Pág. 121871-121875.
- BOE. 2011b. Orden ARM/3156/2011, de 10 de noviembre, por la que se establece el reparto porcentual de posibilidades de pesca de la bacaladilla, el gallo y la cigala entre las diferentes modalidades de pesca en las divisiones CIEM VIIIc y IXa. Núm. 280, Sec. I, Pág. 121866-121870.
- BOE. 2013. Orden AAA/1307/2013, de 1 de julio, por la que se establece un Plan de gestión para los buques de los censos del Caladero Nacional del Cantábrico y Noroeste. Núm. 165, Sec. III, Pág. 51652-51673.
- EC. 2001. COMMISSION REGULATION (EC) No 1639/2001 of 25 July 2001 establishing the minimum and extended Community programmes for the collection of data in the fisheries sector and laying down detailed rules for the application of Council Regulation (EC) No 1543/2000. 17.8.2001. L 222/53-115.
- EC. 2008. COMMISSION DECISION of 6 November 2008 adopting a multiannual Community programme pursuant to Council Regulation (EC) No 199/2008 establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy. 23.12.2008. L 346/37-88.
- ICES. 2012. Report of the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrim (WGHMM), 10-16 May 2012, ICES Headquarters, Copenhagen. ICES CM 2012/ACOM:11, 599 pp.
- ICES. 2013. Report of the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrim (WGHMM), 10 - 16 May 2013, ICES Headquarters, Copenhagen. ICES CM 2013/ACOM:11A, 719 pp.
- ICES. 2014. Report of the Working Group for the Bay of Biscay and the Iberian waters Ecoregion (WGBIE), 7–13 May 2014, Lisbon, Portugal. ICES CM 2014/ACOM:11, 714 pp.

Table 1. Estimation of Spanish landings for the hake, anglerfish and megrims stocks assessed by the WGBIE. WGBIE data: data provided to WGBIE during the last three years (ICES, 2012; ICES, 2013; ICES, 2014). New approach data: scientific landings estimation obtained by raising sampled LPUEs to the total effort by *métier*.

Stock	WGBIE data			New approach data		
	2011	2012	2013*	2011	2012	2013
hke-nrtn	45801	37409	33409	52177	42932	34485
anp-78ab	3356	3287	3642	4317	3581	3598
anb-78ab	3486	3093	3322	2686	3037	3163
mgw-78	5625	5200	5010	5679	5081	5000
hke-soth	14860	11970	10490	8925	8722	8609
anp-8c9a	850	1088	2274	1014	1212	1347
anb-8c9a	640	498	601	750	613	709
mgb-8c9a	1079	708	1040	947	853	851
mgw-8c9a	126	270	211	268	268	220

* 2013 WGBIE data was estimated using a preliminary version of the new approach, so 2013 values were also revised.

Table 2. Percentage of Norway lobster landings inside the FU statistical rectangles in relation to the landings of the entire Iberian Subdivision, as they were traditionally reported.

FU	Description	ICES area	Statistical rectangles	% of 2014 landings inside rectangles
25	North Galicia	VIIIc	15E0-E1; 16E1	83.7
26	West Galicia	IXa	13–14 E0–E1	96.3
27	North Portugal	IXa	6–12 E0; 9–12 E1	100
29	South Portugal	IXa	2 E0–E2	100
30	Gulf of Cadiz	IXa	2–3 E2–E3	83.8
31	Cantabrian Sea	VIIIc	16E4-E7	77.4

Table 3. Evolution of the Spanish *métiers* effort: relation between the 2014 effort and the 2011 effort.

Fishing Ground	<i>Métier</i> acronym	<i>Métier</i> description	Ratio of effort
Non-Iberian Atlantic European waters (ICES Subareas VI and VII and Divisions VIIIabd)	GNS_DEF_>=100_0_0	Set gillnet targeting hake in VIIIabd	0.36
	GNS_DEF_120-219_0_0	Set gillnet targeting hake in VII	0.55
	LLS_DEF_0_0_0	Set longline targeting hake in VI, VII and VIIIabd	0.73
	OTB_DEF_>=70_0_0	Bottom otter trawl in VIIIabd	0.76
	OTB_DEF_100-119_0_0	Bottom otter trawl targeting hake in VI and VII	0.21
	OTB_DEF_70-99_0_0	Bottom otter trawl targeting megrims in VII	0.73
	PTB_DEF_>=70_0_0	Bottom pair trawl targeting hake in VIIIabd	0.45
Atlantic Iberian waters (ICES Divisions VIIIc and IXa)	GNS_DEF_>=100_0_0	Set gillnet (" <i>rasco</i> ") for anglerfish	1.24
	GNS_DEF_60-79_0_0	Set gillnet (" <i>beta</i> ") targeting demersal fish	0.87
	GNS_DEF_80-99_0_0	Set gillnet (" <i>volanta</i> ") for hake	0.88
	GTR_DEF_60-79_0_0	Trammel net targeting demersal fish	0.83
	LLS_DEF_0_0_0	Set longline targeting demersal fish	0.91
	OTB_DEF_>=55_0_0	Bottom otter trawl (" <i>baca</i> ") targeting demersal fish	1.42
	OTB_MCD_>=55_0_0	Bottom otter trawl targeting crustaceans and demersal fish in Southern IXa	1.01
	OTB_MPD_>=55_0_0	Bottom otter trawl (" <i>jurelera</i> ") targeting pelagic and demersal fish	0.76
PTB_MPD_>=55_0_0	Bottom pair trawl targeting pelagic and demersal fish	0.95	

Figure 1. Comparison of the WGBIE northern stocks landings estimated by the old (WGBIE 2014) and the new (New approach) methods: hake (hke-nrtn), white anglerfish (anp-78ab), black anglerfish (anb-78ab), and megrim (mgw-78).

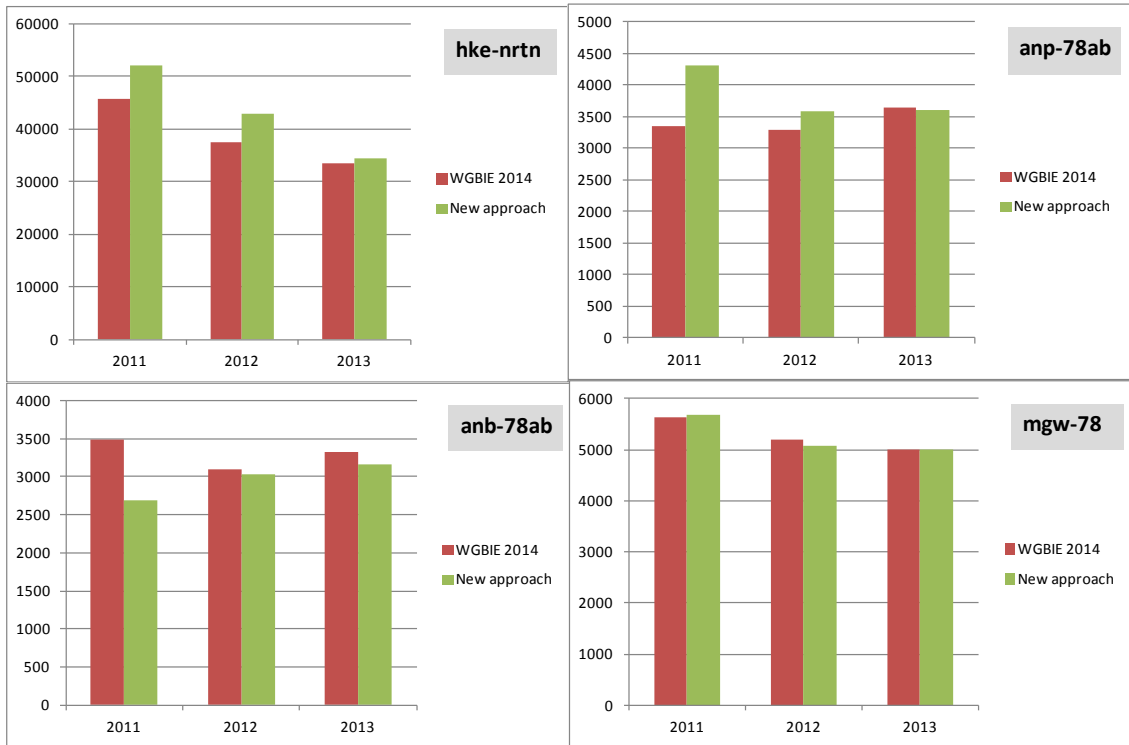


Figure 2. Comparison of the WGBIE southern stocks landings estimated by the old (WGBIE 2014) and the new (New approach) methods: hake (hke-soth), white anglerfish (anp-8c9a), black anglerfish (anb-8c9a), four-spot megrim (mgb-8c9a), and megrim (mgw-8c9a).

