Historical Variation on Total Catch and Discard CPUEs and bottom trawl survey abundances in the Northern Spanish Shelf: are they related?

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SUMMARY:

Patterns of variation of total catch and discards of the Northern Atlantic Spanish shelf otter trawl fishery in the last two decades are analysed. These patterns are compared with the data series on species abundance indices obtained from scientific bottom otter trawl surveys.

INTRODUCTION & METHODS:

A discard sampling programme of Spanish trawlers has been carried out since 1994 to 2006, although with some gaps in the time series. Sampling on discards has been continuous from 2003 onwards under the European fisheries data collection regulation. Random sampling on board is assumed. Only data from last quarter each year have been used to allow comparisons with survey series since surveys are performed in October.

The data of species abundance come from a series of bottom trawl surveys carried out every autumn from 1994 to 2006, using standardized methodology (ICES, 2002). The survey design was based on a stratified random sampling scheme according to depth and geographical criteria. The number of hauls per stratum was proportional to the trawlable surface and the sampling unit used was 30-minute hauls at a speed of 3.0 knots, using the Baca 44/60 otter trawl gear.

CPUE (kg discarded/haul) per Species group as estimated by the observers have been compared with Abundance Indices (kg/hours) from Surveys. No relationship was found between discard weight and haul duration by species, therefore discard results in weight are presented in kilograms per haul (Pérez et al., 2002).

This study has been focused on those species with high discard rates, excluding less abundant species or abundant commercial species with low discard rate. Relationships between discard rates, total catch and survey abundance indices have been estimated using the Spearman Rank Order correlation. Cluster analyses using Bray-Curtis similarity index have been used to detect inter-year differences in both data series. Species responsible of those differences has been studied using SIMPER analysis.

Table 1. Sampling on board and Spanish Surveys. Number of trips, vessels and hauls sampled from 1994 to 2006. OTB: Bottom Trawl,

OTB in Divisions VIIIc and IXa

	1994	1997	1999	2000	2003	2004	2005	2006
Vessels	9	14	17	15	5	6	4	2
Trips	12	16	17	17	7	7	5	3
Hauls	126	89	100	69	35	26	26	13

Spanish Survey in Divisions VIIIc and IXa

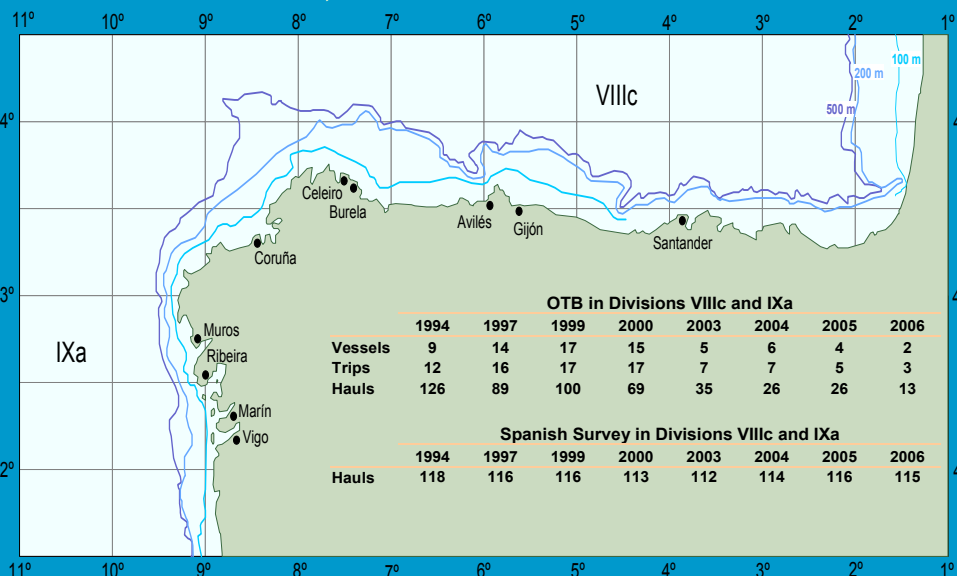|	1994	1997	1999	2000	2003	2004	2005	2006
Hauls	118	116	116	113	112	114	116	115

Figure 1. Spanish Commercial Total Catch from on board observers (kg/haul) vs. Spanish Surveys Abundance Indices (kg/haul 30'). rDS = Coefficient of Correlation of Discards/Surveys Indices. rTS = Coefficient of Correlation of Total Catch/Surveys Indices. Only values of Coefficients of Correlation represented in red are significant..

Piscis

Other species

REFERENCES:

ICES, 2002. Manual for The International Bottom Trawl Surveys in the Western And Southern Areas. Revision II. Addendum to ICES CM 2002/D:03. Dublin, Ireland 8–11 April 2002.

ICES. 2007. Report of the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrim (WGHMM) ICES CM 2007/ACFM:21.

Pérez , N., L. Lema, and H. Araujo. 2002. Discards Variability during Long Trips of Spanish Trawler Fleets. Poster in VII Congreso Internacional de Oceanografía del Golfo de Vizcaya. Gijon (Spain) 2002.

Figure 2. All species Total Caught indices (kg/haul) and Spanish Surveys Abundance Indices (kg/haul 30').
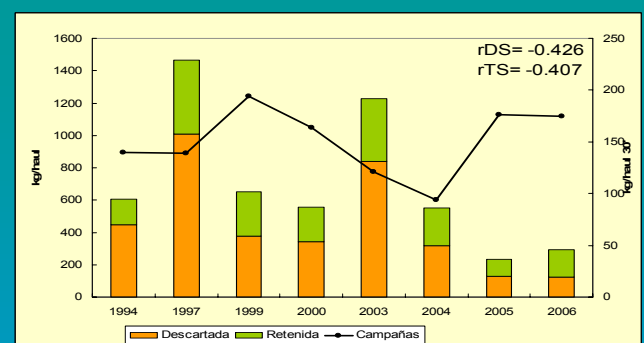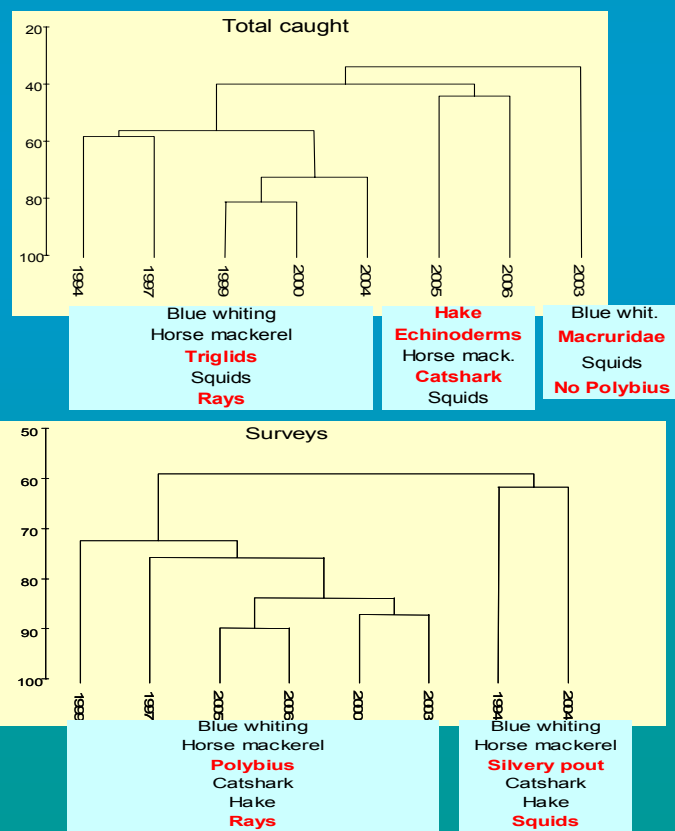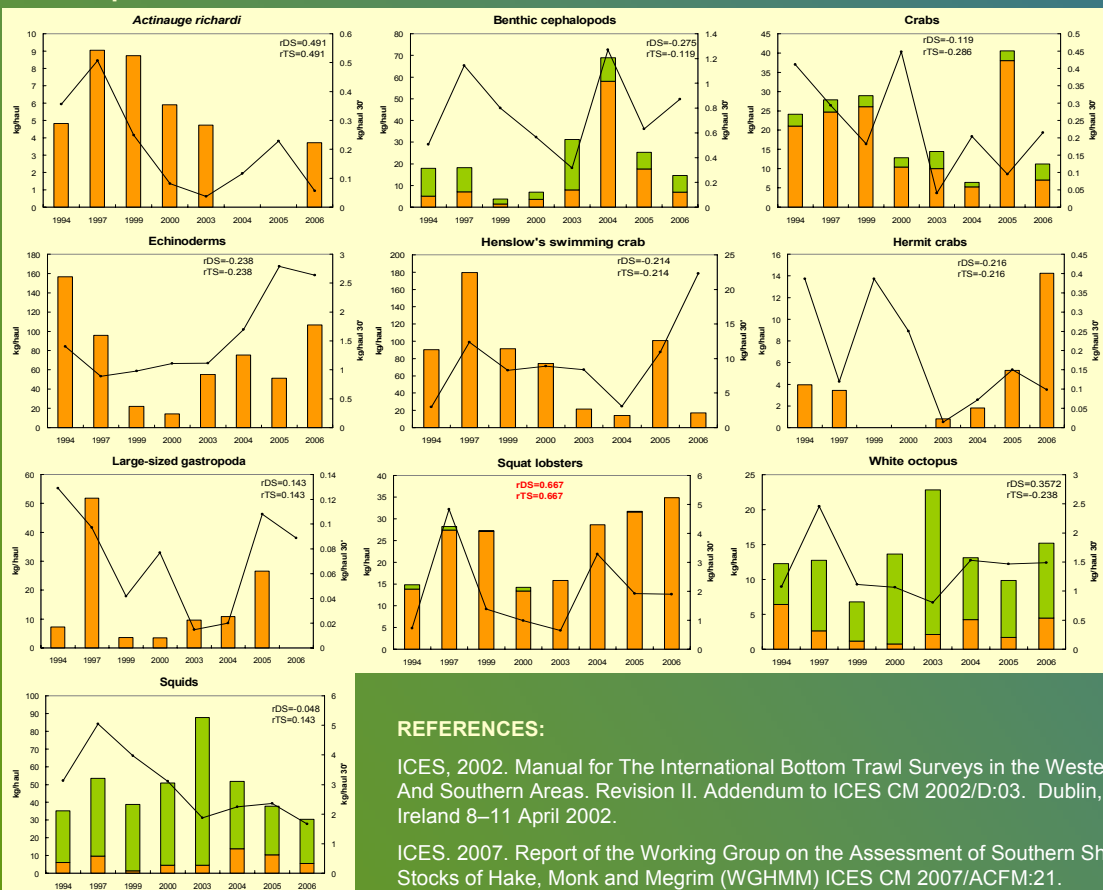

Figure 3. Cluster analysis of discards data (above) and survey data (below). Species typifying intra-groups are listed below each group. Species typifying inter-groups are marked in red.

RESULS AND DISCUSSIONS:

Only a few groups (Figure 1) present significant correlations between discards and survey indices: namely: Hake, Longspine snipefish (due to very high values of 94 and 97) and Squat lobsters. No relation has been found between all species Total Discard, Retained Catch or Total Catch indices (kg/haul) and Spanish Surveys Abundance Indices (kg/haul 30') Figure 2.

These poor correlations probably could be due to:

- Discards estimates come from a larger sampling period (three months) than surveys (a month).

- Species targeted on commercial vessels in this area are different in each haul, and as result there is a high variability of catches between them.

- A number of different boats (with different characteristic) are used on discard sampling .

- The number of commercial hauls each year is more variable than in the case of surveys.

Therefore the variability source is smaller in surveys and this produces different results, mainly for benthic species with patchy distribution. The denser discard sampling catch better those species distributed in groups than surveys. Nevertheless, the samples from commercial catch do not represent a random sampling and are influenced by different factor as commercial target species, market values, quota etc.

The hake correlation result, however, shown that the inclusion of discard data in the assessment would represent an opportunity to improve the understanding of the fleets' behaviour and get more information about the population for assessment as performed by the WGHMM (ICES, 2007).

Cluster analysis show again remarkable differences between discard and survey data. In discard data years 2003, 2005 and 2006 are the more different, whereas 1994 and 2004 are the first years split in survey data. Differences between groups are due to less abundant groups as macrurids (probaby reflecting a higher percentage of deep-water samples), squids, triglids or rays.