ADDITIONAL INFORMATION FOR THE *DE MINIMIS* EXEMPTION CONSOLIDATION REQUEST FOR HAKE (*MERLUCCIUS MERLUCCIUS)* OF 6% , FOR 2017 AND 2018 AND 5% THEREAFTER PROPOSED) FROM SPAIN FOR TRAWLERS CATCHING HAKE IN THE BAY OF BISCAY (ICES VIIIABD).

0. Contenido

KEY ISSUES

- Otter and Pair trawls targeting hake and other species like monkfish, megrim and crustaceans and operating in Bay of Biscay (VIIIabd) waters are reported to have largely variable hake discards.

- In all hake trawling fisheries, main reason for discarding hake is the undersized individuals (< 27 cm).

- Selectivity trials for hake catches were experimented on board pair trawls and otter trawlers targeting hake in VIIIabcd. Operation of the gear was closed monitored. Results presented promising results in relation to different configurations of Square Mesh Panel (SMP). More trials will be deployed for further development on the technical solution (i.e. distances to cod-end, enhance contact probability of fishes with SMP) to improve its escapement efficiency for hake.

- Slight improvement of selectivity, caveats to significant changes in selectivity patterns; the *de minimis* appear to be a solution to soften the expected high impact of the landing obligation on trawl fisheries. Pair trawls are subject to improve in selectivity while otter trawls show an added difficulty: the mixture of species that highly limits the capacity of selectivity improvement.

- The implementation of the Landing Obligation for hake, for the analysed otter trawler fleet, would increase the risks associated to handling heavy weights and to concentration and iterative work, creating added unsafe working levels for the crew.

- Workable solutions, as employing more people on board, increase costs. Other solutions such as incorporate devices for sorting catches on deck, appear not to be physically feasible for actual "baka" vessels. Also, it is not clear that would help significantly in the sorting time considering the multispecies nature of the otter trawlers catch.

- In general, for the otter trawls metiers, there are clear difficulties in the short- and medium-term to implement technological solutions to improve the sorting, handling and storing all catches.

1. Introduction

In the 22nd June 2017, the European Commission sent a request to some member states requiring additional information on hake exemption in order to be widely assessed before the 10th of July at STECF plenary.

For the hake exemption request, the added information required was:

> *The Commission need more information of the economic impact of increasing selectivity and of sorting and handling catch. Information about the fleets and fisheries concerned by the exemption are requested.*

This report compiles the above information.

Thus, in this report a detailed description of the economic quantitative results of simulated changes in selectivity deployed during 2016 are presented. Assessments on board in relation to the increase of work due to implementation of LO for hake by trawlers are detailed. Also, a detailed description of the métiers for which *de minimis* exemption is required is included.

2. Disproportional cost for the part of the fleet responsible for highest discard rates

By means of simulation models (FLBEIA (Garcia et al. 2013)), in 2016, the potential economic and social effect of the Landing Obligation. Theoretical results on Pair trawls show how selectivity improvements will reduce the potential choke effect created by the catch of individuals under MCRS (Minimum Conservation Reference Size) but at the expense of a higher effort that will create higher operating costs. Furthermore these selectivity improvements are not able to compensate the potential losses of marketable hake that could appear related to sorting of catches, safety and working hours on board. A summary of Prellezo et al. (2017) is included here.

Report on the economic effects on Changes in selectivity in Bay of Biscay pair trawlers. AZTI (25/04/2016)

3. Introduction

In this report a likely change in the selectivity of the pair trawlers is simulated in order to understand the likely economic implications and the incentives in place.

1. Material and methods

2.1 The fleet

Pair bottom trawl, uses a very high vertical opening bottom net. For this fleet hake is around the 90% of the landings and approximately the same value in term of income for this pair bottom trawl fleet. It implies that it can be considered as a singles species fleet. The constraint coming from hake comes from the characteristic of this fleet that approximately 5% of the catches of hake (in weight) are individuals under the MCRS. These individuals under the MCRS were normally discarded. Furthermore, according to the 99% of the discards of hake are of individuals under the MCRS. Under the provisions of the current CFP they have to be landed and count against the quota.

Currently the minimum mesh size (MMS) for which this fleet can operate is of 100mm if the target species is hake.

2.2 The simulation model

The model used has been the FLBEIA . It has been developed in R using FLR libraries . The model projects several fleets and the likely consequence on the stocks dynamics under different management scenarios.

2.3 Fleet operating models

All fleets that exert a fishing mortality to hake and megrim have been included in the model although only the Spanish pair trawler fleet operating in the Bay of Biscay has been economically conditioned. In particular it has been using AZTI data sources obtained through the Data Collection Framework of the EU . This data source combines the information from log sheets, discards sampling, landing declarations and sales notes and the time series used goes from the year 2009 to the year 2013. Costs of fishing have been obtained from the Annual Economic Report of the EU fishing fleet . To adapt these values to the specific conditioning of the case study, the economic figures have been weighted by the proportion of vessels that each segment has, and then, converted into weighted averages of the fleets (Table 1). Three types of costs are defined, those that change with the effort (variable and fuel costs), those that change with the value of landings (crew costs) and those that change with the number of vessels (fixed, capital and depreciation costs).

2.4 Stocks operating models

Hake has been simulated using age structured dynamic and the data necessary to condition the model has been taken from ICES assessment working group reports . The stock recruitment relationship (SRS) used is a Bayesian segmented regression to be consistent with methodology used by ICES on estimating the reference points of this stock . The population has been projected combined this SSR with an exponential survival equation . The reference point (FMSY) used for hake is 0.27 and has been calculated by ICES . The TAC advice is generated using the harvest control Rule (HCR) provided by ICES in the framework of the MSY . This HCR is based on three reference points: FMSY as explained before, the Btrigger (the biomass that triggers a specific stock recovery action) set at 46000 tones and Blim (the level of spawning stock biomass –SSB- below which recruitment may be impaired) set at 33000 tones. The HCR advises FMSY unless the SSB falls below Btrigger but above Blim. If SSB falls below Btrigger the F advised is reduced in such a way that the biomass recovers this Btrigger. Finally, if the biomass falls below Blim the TAC advised will be zero.

There is an "others" stock that account for the catches of other species different from hake. The catches of these "others" stocks are proportional to the effort deployed by the fleet assuming an arbitrary "big" added biomass.

Hake prices have been extracted from the sale sheets of the fleet using averages from the year 2009 to the year 2013 (Table 2). The different commercial categories have been converted into ages using expert knowledge. Remarkably, the "U" shape of the price-age structure. It implies that "small" individual (under age 3 or 67cm) and "big" individuals (over age 4 or 75cm) have higher prices than "medium" sized hake individuals. This result was also contrasted in the interviews with the skippers. For the "others" stock an average price has also been calculated.

Stochasticity has been introduced in the stock recruitment relationship of hake. A lognormal multiplicative error around the stock-recruitment curve (with a variation coefficient equal to the one observed in the historical period) has been used. 250 iterations have been run.

2.5 Interaction between fleet and stocks: Catch model

The interaction between hake population and catch is done in biomass and the relationship between catch and effort is based on a Cobb Douglas production model , at age level. The Cobb Douglass function has been used given because it assumes a bi-non-linear relationship between the two inputs (fishing effort and total stock biomass) and the produced catch. In particular, two exponents (alpha and beta) are used as scaling factors for fishing effort and total stock biomass. This is in contrast to the common assumption that fishing mortality is directly proportional to effort and that yield is proportional to stock size .

It has been considered that the catchability can be discomposed as a product of the selectivity of the gear used and a parameter that incorporates the vulnerability, accessibility and availability of the fish to the fleet such as in .

Selectivity at length of pair trawlers with 100mm MMS has been estimated in . In the same work the selectivity of 80mm MMS is provided. However, there are no works that provide selectivity at length for hake of pair trawlers with 120 mm MMS. Furthermore, there are multiple factors affecting size selection of the towed fishing gears for a determined mesh size, such as spatial and seasonal variations , gear design, netting materials and twine diameters or factors at vessel-level afffecting codend selectivity . All these factors explain the huge variability in the size selection experiments of towed fishing gears.

To overdue this limitation the percentage change in l50 from moving from 80mm to 100 mm has been calculated. It has been used as a proxy of the l50, while the shape of the results obtained are that l50 with a MMS of 80 mm is of 22.6 cm the one of 100 mm is of 34.6 cm and hence it has been assumed that the l50 for a MMS of 120 mm is of 40.8 cm, which is under the range of L l50 predicted by (from 22 to 43 cm).

These selectivity at length curves are transformed into age using the Von Bertalanffy growth model used in the ICES assessment working group for hake . This is a necessary step to fit the results into the age structured dynamic of the simulation model. As a reference the length of 27 cm is obtained by hake in between the month 6 (average length of 25.5cm) and the month 9 (average length of 30cm) of their first year.

3. Scenarios tested

Two scenarios have been tested: 100mm MMS and 120mm MMS. Perfect implementation of the management system has been assumed in the management procedure. LO starts in the year 2016 and no exemptions to this LO have been introduced.

4. Results

Results of the likely change on the selectivity from 100mm to 120mm MMS are presented in relative terms in the following three figures:

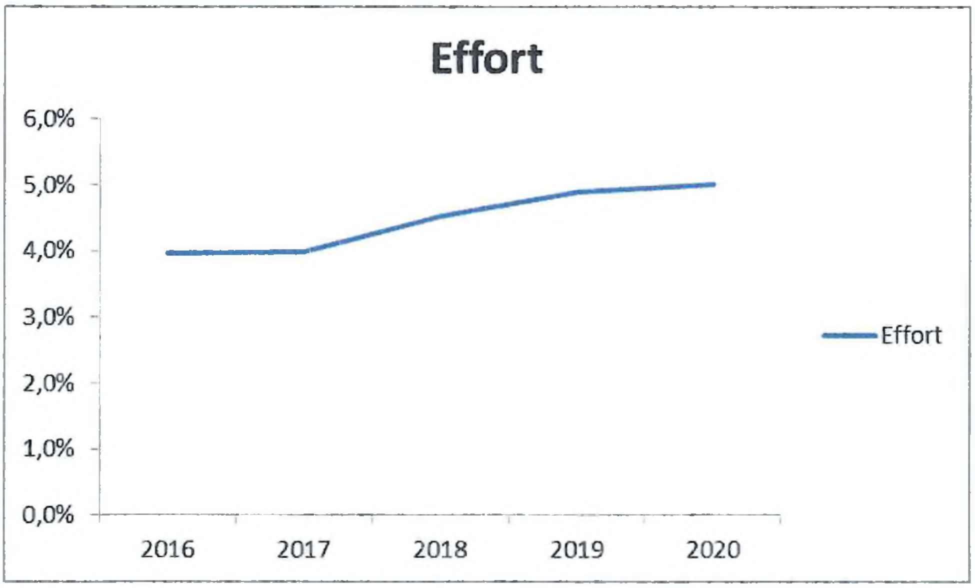

Figure 1. Effort change in percentage due to a shift from a 100mm to a 120mm MMS. Positive values imply that effort is higher when a 120mm MMS is used than when a 100mm MMS is used.

The first result is that given that the retention rate of hake is lower, more effort is required to catch the quota that each vessel has (Figure 1)). This extra effort can be interpreted as more fishing days of each vessel, but also in terms of the extra work that the crew has to do in order to catch this higher amount of fish. The value of this extra effort moves from a 4% in 2016 to a 5% in the year 2020.

The positive side is that less catch is made of hake individuals under the MCRS (27cm). Or in other words that given the quota a mayor part of the catch can be sold directed to human consumptions. Overall it produces higher revenue of around 2% (Figure 2) simply because the landing that can be sold are higher.

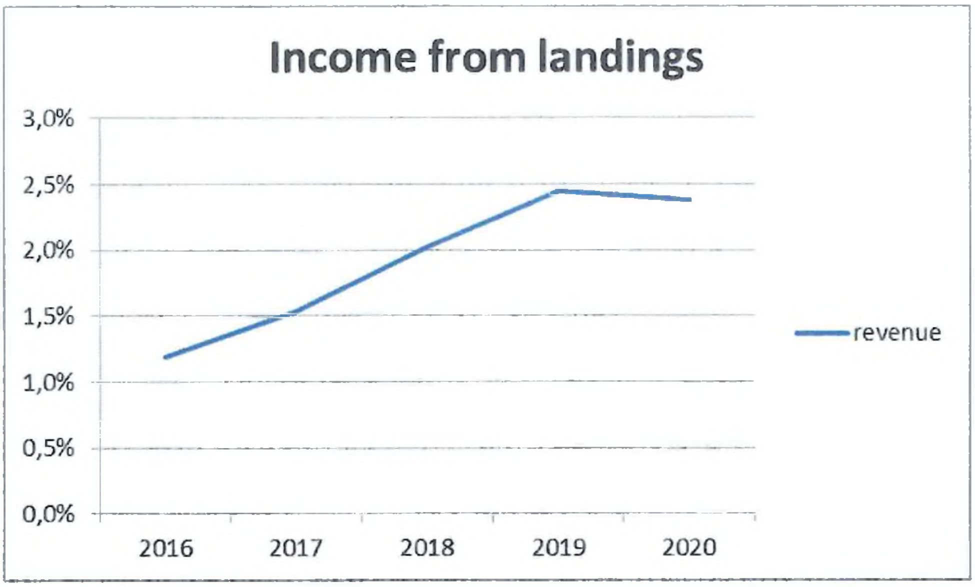

Figure 2. Income from landings change in percentage due to a shift from a 100mm to a 120mm MMS. Positive values imply that eff-ffort is higher when a 120mm MMS is used than when a 100mm MMS is used.

Overall there is a higher effort but also higher revenues. This implies that more catch is sold but using more effort. If the overall result in measured in terms of profits (Figure 3) it is obtained that at the beginning of the selectivity change profits decrease a1.5% and only after biomass is recovered these will be shifted back to the their statu quo situation.

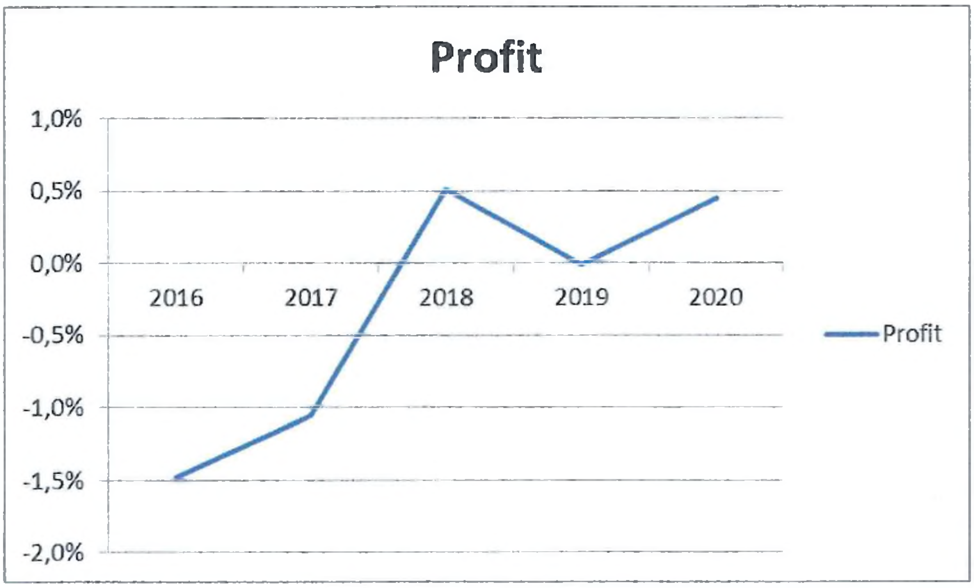

Figure 3. Profit changes in percentage due to a shift from a 100mm to a 120mm MMS. Positive values imply that effort is higher when a 120mm MMS is used than when a 100mm MMS is used.

Overall this implies that from the capital owner perspective it is not worth to invest in a selectivity change given that the return of the necessary investment will be negative. Furthermore from the crew point of view it is neither worth to have this selectivity change given that even if the wages (based on a share system) are increased at the same level as the income from landings (2%) the eff-ffort required for obtaining these remuneration will increase in average by a 4.5%.

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