ADDITIONAL INFO GATHERED FROM SPAIN

Details are given for the requirements of more data or info marked in yellow:

Exemption	Shortfalls
Hake caught with trawls in directed fisheries in ICES subareas VIII and IX	a) It is stated that "There is no way to calculate the number of vessels practicing one métier at any time of the year. Thus, it is not possible to calculate a discard rate for the specific vessels practicing each métiers which are subject to the LO but a discard rate for the overall otter trawl fleet is available". **STECF is unable to evaluate, given the information provided, how the métier-specific discard rates were calculated.** b) More clarifications are needed for the 'non-Spanish data' in Table 1 (data for French, Belgian and Portuguese métiers). It is unclear to which year(s) they refer and how the respective calculations of discards have been made. **c) More clarifications are needed for two of Spanish métiers in the Bay of Biscay, namely "Bottom otter trawl (OTB_MCF>70) targeting mixed cephalopod and demersal species in Div. 8abd" and "Bottom otter trawl (OTB_MPD>70) targeting mixed pelagic and demersal species in Div. 8abd". These métiers are not included in Table 1 and it is stated in the text that "In 2018, trips deployed by these gears "are not currently under landing obligation".** d) The Regional Group should supply, if available, additional information on selectivity and socio -economics relevant to this exemption for countries other than Spain.

a) When stated: "There is no way to calculate the number of vessels practicing one métier at any time of the year. Thus, it is not possible to calculate a discard rate for the specific vessels practicing each métiers which are subject to the LO but a discard rate for the overall otter trawl fleet is

available", it is understood that **a priory**, the number of vessels expected to practice a métier cannot be estimated. Also, as vessels practice more than one metier per year, it could appear that there are more vessels all year around than actual number of vessels concerned by the LO.
For example: the Spanish fleet operating in 8abd is composed by 7 otter trawlers and 4 pair trawlers (2 fishing units) when checking the number of vessels by métier the result is:
Table 1. Trawl métiers deployed by Spanish trawl fleets in Subarea ICES 8. The most recent 3 years are included to show the variability in the métiers practiced by the vessels and the sampling level of each of them. This is, a variable number of vessels by métier with a fix number of vessels (fleet)

	2015					2016					2017				
	Number of vessels	Number of sampled vessels	Number of sampled trips	Total trips	% by metier	Number of vessels	Number of sampled vessels	Number of sampled trips	Total trips	% by metier	Number of vessels	Number of sampled vessles	Number of sampled trips	Total trips	% by metier
OTB_DEF_>=70_0_0	7	5	13	199	74.5%	7	6	13	217	82.8%	7	5	15	255	85.3%
OTB_MCF_>=70_0_0	7	0	0	68	25.5%	7	1	1	38	14.5%	7	0	0	13	4.3%
OTB_MPD_>=70_0_0	0	0	0	0	0.0%	2	0	0	2	0.8%	7	1	2	20	6.7%
OTB_SPF_>=70_0_0	0	0	0	0	0.0%	4	0	0	5	1.9%	6	1	2	11	3.7%
PTB_DEF_>=70_0_0	4	3	9	200	100.0%	4	2	10	155	100.0%	4	1	5	165	100.0%

In AZTI, sampling frame is aleatory, this is random. Sampling for discards is carried out on board vessels and later, at the end of the year, trips are classified in each of the metiers based on landing composition. Thus, there is a post-stratification of the metiers. If sampling is random, also in the post analysis, the allocation of sampling within metiers should result random.

Discards estimates are calculated within the same strata (metiers), quarter and area of fishing following standard procedures of discard raising commonly used in ICES (Charlottenlund, 2003)

b) "Bottom otter trawl (OTB_MCF≥70) targeting mixed cephalopod and demersal species in Div. 8abd" and "Bottom otter trawl (OTB_MPD≥70) targeting mixed pelagic and demersal species in Div. 8abd" are not under Landing Obligation as they are not fisheries targeting Hake. These metiers target a variety of other species and can be defined as multispecific fisheries. Also, referring to this multispecific metiers (OTB_MCF>70mm & OTB_MPD>70mm), the COMMISSION DELEGATED REGULATION (EU) 2018/44 of 20 October 2017 amending Delegated Regulation (EU) 2016/2374 establishing a discard plan for certain demersal fisheries in South-Western waters establishes in Annex of fisheries subject under landing obligation section 3. Hake (Merluccius merluccius) fisheries, that the fisheries under regulation are those with > 100 mm in Divisions 8abde and in Div. 8c with >70 mm mesh size or more than 5% of hake in landings or 5 metric tones. These are not the case of the above metiers.

The percentage of each of the metiers deployed by the trawl fleet in 8abd is stated in the above Table 1. OTB_MCF≥70 & OTB_MPD≥70, are metiers highly variable in its occurrence, as they are opportunistic depending on the success of the métier targeting Hake, OTB_DEF≥=70_0_0, along the year.

Exemption	**Shortfalls**
By catches pelagic species: horse mackerel (Trachurus spp.), mackerel (Scomber scombrus), anchovy (Engraulis encrasicolus) and boarfish (Caproidae). Combined de minimis for the species up to a maximum of 7% in 2019 and 2020, and up to a 6% in 2021 of the total annual catches of these species made by trawlers (gear codes : OTT, OTB, PTB, OT, PT, TBN, TBS, TX, SSC, SPR, TB,TBB, SDN, SX, SV) in fisheries in ICES divisions VIII and IX.	**a) No information on economics or selectivity studies were reported to support the case.**
	b) No information on number of vessels involved and no information on Spanish and Portuguese fleets.
	c) No information on observer trip numbers compared to total fishing trips.
	d) Lack of information on discard rates except for France.

a) Information on selectivity studies were included in a summarized way and also in an extended way, in the requirement for the consolidation of the Hake de minimis (see report). Pelagic species are by-catches of some directed hake fisheries. Thus, selectivity results from Hake experiences are used also here to build the knowledge base for the pelagic species de minimis requirement.

A) Text from De minimis exemption consolidation request of 5% for Hake (Merluciius merluccius) for 2019 and thereafter proposed from Spain trawlers catching Hake in the Bay of Biscay(ICES 8abd & 8c&9a, ANNEXES (Annex 2 & Annex 3)) HAKE DE MINIMIS REPORT:

1. Studies on selectivity measures

In order to study the impact of the landing obligation on Spanish fleets, a program was developed on a regional basis by main scientific institution AZTI. From 2015 to 2018, studies are being conducted in the Bay of Biscay (8abd) With the objectives to assess for feasible improvement of selectivity to obtain significant escapement of hake (and other possible choke species) of the bottom trawls and pair trawls targeting hake and the mixed species composition. Results confirming observation are described in previous reports (De minimis exemption consolidation request of 5% for Hake (Merluciius merluccius) for 2019 and thereafter proposed from Spain trawlers catching Hake in the Bay of Biscay(ICES 8abd & 8c&9a, ANNEXES (Annex 2))

Among the choke species mentioned above: previous reports (horse mackerel, mackerel, blue whiting, hake and boarfish deserve special attention. These five species, all subject to TACs or total allowable catch, are the most discarded by trawling fleets in ICES 8abcd and IXa (Rochet et al., 2014). The reason for discarding tends to be lack of quota, the reaching the limit of the quota, or the size of the fish, particularly when the fish are smaller than the Minimum Conservation Reference Size (MCRS). By virtue of the new CFP, these captures should be carried to port, landed and counted against the quota according to a preset schedule. If there is quota for them, the management, storage and preservation of the catch on board represent a problem as well as a logistical complication, with consequences for the profitability of the fleet. Meanwhile, if there is no quota, this may additionally involve some other type of consequence for the fleet, the worst case being the paralyzing of the vessel due to lack of quota.

The selectivity studies conducted during previous years (Report on extended outline for hake de minimis request in the Discard Plan, June 2017), pointed out towards improving the contact of the devices in relation with the hake. This is, to improve the proportion of fish that is subject to a size-dependent probability of escape through the gear/device. AZTI has focus on the Square Mesh panel (SMP) as the first option to improve selectivity since this device is the best accepted by the industry. Is cheap, easy to handle and to set, it does not affect the performance of the trawl, no interaction with fish that can cause collapse of the trawl.

In this context, work has been focused on improving the contact of the SMP in relation with the hake. With that aim, strategy has been different in relation with the different métiers, “Baka” otter trawl and pair trawl.

In this section just results of selectivity studies in species other than hake are presented. This results can be found in the report (De minimis exemption consolidation request of 5% for Hake (Merluciius merluccius) for 2019 and thereafter proposed from Spain trawlers catching Hake in the Bay of Biscay(ICES 8abd & 8c&9a, ANNEXES (Annex 3))

Results show that selectivity could be improved in fleets such as pair trawlers but for otter trawlers with a highly multispecies catch, selectivity devices appear to be limited in their capacity to improve escapement, furthermore, it is proven that, in any trial at sea for otter trawls and different configuration of the cod-end, no improvement of the selectivity is obtained for hake.

1.1 Experimental trials on board commercial Pair Trawlers F/V Kaxu-Kaxarra (March to April 2016) and F/V Kaxu-Kaxarra (November 2016) (corresponding métier: Pair bottom trawl (PTB_DEF>70) targeting hake in Div. 8abd (Bay of Biscay))

The experimental fishing cruises were carried out on board the trawler pair "Kaxu-Kaxarra". These vessels use the pair trawling method to fish, using High Vertical Opening trawl nets to target hake, for which they employ a $\geq$ 100 mm mesh size in the codend. The characteristics of these vessels can be found in Table 2.

Table 2: Main features of the vessels used in the study.

Vessel name	Call signal	Total length (m)	Engine power (HP)	GT
Kaxu	ECJT	37	500	372
Kaxarra	ECKC	37	500	372

The cruises used Very High Vertical Opening (VHVO) bottom trawling gear. The characteristics of this gear include a vertical opening of around 30 metres in the floatline and a horizontal opening between spreaders or dan leno sticks of 200 m. The total length of the gear from the spreaders to the codend is around 200 m and the codend is 20 m long. This net is towed at a speed of 2 knots. The codends employed in the course of the 2015 and 2016 cruises were similar (Table 3).

Table 3: Characteristics of the codends used during the selectivity cruises.

	Codend 2015	Codend 2016
Netting material	PE	PE
Twine thickness (mm)	4 in Double twine	4 in Double twine
Mesh opening (mm)	99.6	102.5
Codend length (m)	20	20
Number meshes around	100	100
Mesh opening upper chafer (mm)	231.7	232.7
Mesh opening lower chafer (mm)	78.2	76.4

The main difference in terms of the sampling of catch using the SMP bag lies in the fact that while during 2015 the focus was on hake, in 2016 this was extended to the other "choke species" such as horse mackerel, mackerel, blue whiting and boarfish. The measurements for all species were rounded down to the nearest cm.

The qualitative analysis of underwater images recorded on the different test hauls, provides valuable information on the behaviour of different species in different places inside the trawl,

as well as their interaction with the SMP. Notably, hake displays less active behaviour compared to more pelagic species such as horse mackerel, mackerel and blue whiting, which swim more vigorously. On the other hand, hake tend to go closer to the bottom of the net (see Figure 1.), although some vertical movements of this species were observed. Horse mackerel has the most active behaviour of all the species analysed and is the fish that escapes most through the SMP. This is because it is a very active swimmer and occupies the upper zone of the net where the SMP is located.

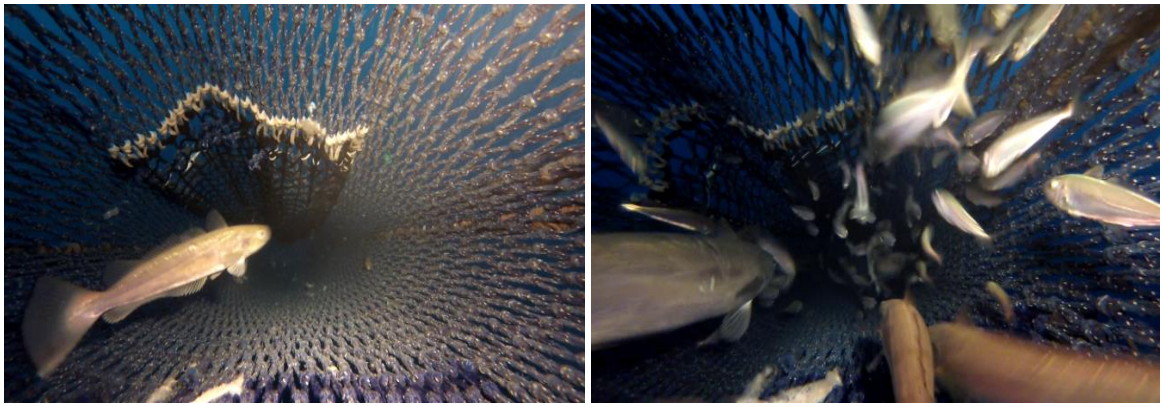

Figure 1**:** Hake swimming near the bottom of the net and horse mackerel swimming near the top.

The escape of hake through the SMP is relatively small, possibly related to the reduced activity of this species' swimming behaviour inside the net, as revealed by the underwater video images recorded inside the trawl. Even so, there is potential for improving the performance to favour escape and reduce the unwanted catch of hake less than 27 cm in size, especially considering that images have been recorded of important escapes of unwanted species in this fishery, such as horse mackerel and blue whiting, which could be species that paralyses the fishery if their quotas become exhausted. These species have shown much more active escape behaviour through the SMP than hake. For this reason, the SMP could be a valuable alternative technique for minimising unwanted catch under the Landing Obligation regulation. To increase escape rates of hake <27 cm it is necessary to improve/increase the level of contact the fish have with the SMP using various means:

- physical devices within the net that lead the fish to the SMP; separator panels, guiding ropes and so on;
- increasing the area of the SMP and/or increasing the number of devices (side and/or low panels) ,
- using a full "tube" of SMP at the front of the codend of the net;
- using visual stimuli (contrast/colour of the netting in the panel, light-emitting elements, etc.), which have been shown to favour contact with the SMP to trigger escape behaviour in certain species

1.2 Commercial cruise report on board Baka Trawlers F/V Gure Gaskuña (20-26 March 2017) and F/V Intxorta Mendi (27th March-Abril 2nd 2017): (corresponding métier: Bottom otter trawl (OTB_DEF>70) targeting demersal species in Div. VIIIabd (Bay of Biscay))

In relation with the “baka” trawl, where towing speed is about 4 knots, the strategy was to try to improve the contact probability of the fishes with the SMP by setting physical devices within the net trying to lead the fish to the SMP. The selected devices from several meeting discussions with industry were guiding ropes. In OTB_DEF≥70, the lower panel of the trawl in the extension piece is in contact with the bottom. This means that the important level of turbidity inside the trawl could be a key factor affecting the fish contact with the SMP. Taking that fact into account, the escapement of the fish could be easier by the upper part of the trawl.

Two selectivity cruises were conducted on board “baka” commercial trawlers, (20-26 March) and (27th March-Abril 2nd). The report of these cruises is collected in Annex 2. The objective was to test the ability of guiding ropes to increasesing the contact of by approaching the fish withto the SMP. The cruises were conditioned since the necessary permissions from French authorities for the use of the small mesh covers did not arrived in time and was not available for the cruisewas not available in time. So, the collection of information was based on underwater images, instead of on analysis of the distribution of the catch in different compartments as it was planned (covers in codend and SMP for data collection and characterization of the escapement comparatively with and without the guiding ropes). The video recordings from 19 hauls with different configurations of the guiding ropes, with and without them, are available (about 80 hours of underwater recordings). From the analysis of the footages, one of the main findings is that the hake is observed being defeated by the speed of the trawl (close , next to 4 knots). This species makes no swimming effort to remain in the trawl without being driven through the codend by the water flow inside the trawl.

Unlike the hake, there are other species such as horse mackerel and especially mackerel, showing a very active behavior (Fig. 2), trying to keep the speed of the trawl and succeeding by observed periods of time up to 30 minutes. However, very few mackerel attempting to escape through the SMP have been observed, despite staying close to the panel for long time periods. In addition, some mackerels have been observed trying to escape through the SMP and getting stuck in the mesh due to the speed of the trawl what makes it difficult the exit movement.

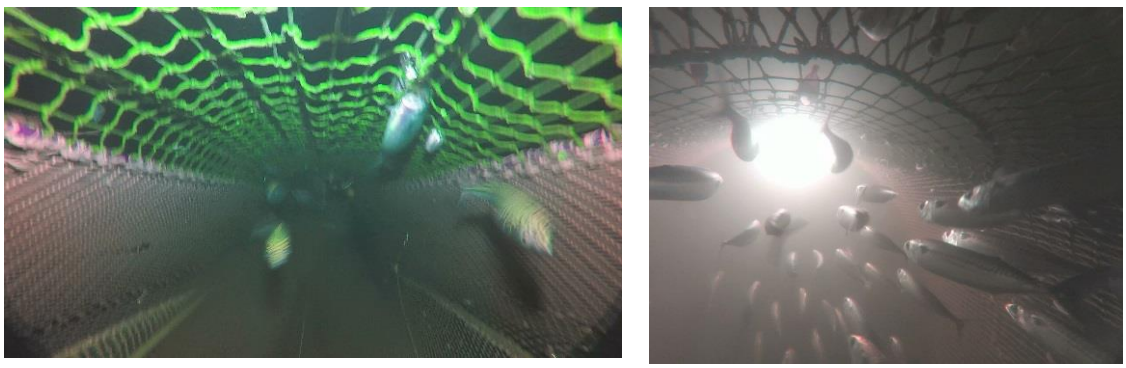

Figure 2: Picture of the mackerels swimming with the trawl, in the left a mackerel can be seen stuck in the mesh

In conclusion, considering the behavior observed for different pelagic species in the baka trawl, the combination of guiding ropes and the SMP placed in the upper plan of the trawl, does not seem to lead to an increase in the escapement rates for this species.

1.3 Research cruise on R/V Emma Bardam (June 2017)

This cruise was carried out on a research vessel and the objective of the cruise was to asses on the effect on selectivity of several devices set next to a square mesh panel. The idea was to increase the escapement through the panel by leading the fish towards it and forcing the contact. A research vessel was selected for this study in order to have the opportunity of make as much settings as necessary for the correct performance of the panel with the devices. The cruise took place in the ICES Division 8b, in the same fishing grounds where the commercial bottom trawlers targeting demersal species operate regularly. During 12 days at sea, 32 valid hauls were made.

The fishing gear used during the surveys was a is GOC73, paired with the Morgere doors usually used in this research vessels.

To check for selectivity improvement, an experimental net module was built consisting in a tube section and a coded. The tube section was around 5 meters long and a SMP was placed in the middle of it (Figure 1.). The escapement of the SMP was collected in a small mesh size cover net (called WINDOW). Behind the tube, there was the codend 7 meters long with another small mesh cover (called COVER-UP CODEND) to collect the fish escapement through the codend. The system from the tube to the end of the cover-up codend was 14 meters long. All this module is joined to the end part f the net GOC73.

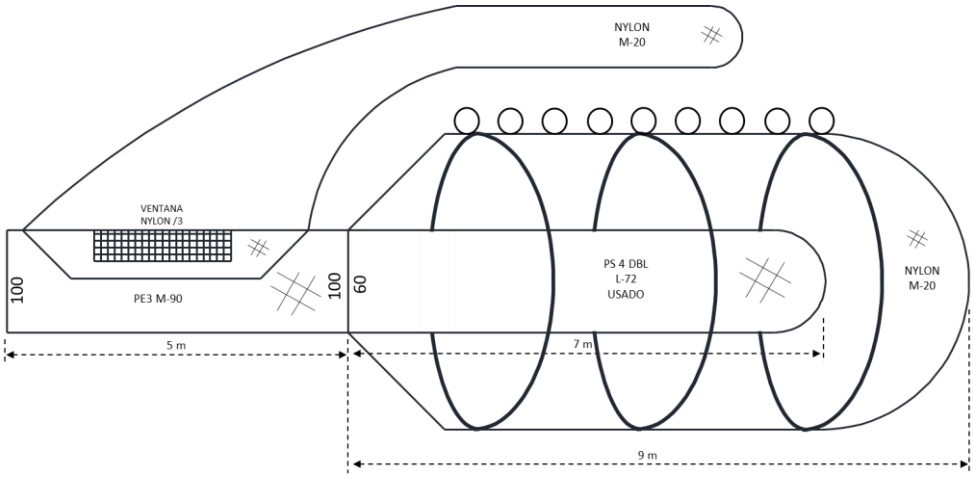

Figure 1. Scheme of the module built with the SMP tube and the codend and the different net covers to collect the escapement.

Based on previous research (Arregi et al., 2016), 80-90 mm mesh size was identified to be the most suitable in the SMP for hake experiments in relation to the TMRC and a fall-through experiment. In fact, it implies that other choke species (mackerel, horse mackerel and blue whiting) have a larger size range with escapement possibility.

In addition to the square mesh panel (SMP), different configurations, including some devices (ropes, floats and lights) were tried to increase the contact of fish with the surface of the SMP for escaping. The configurations applied to the SMP were:

1) SMP (Control): SMP without any add-on.

2) SMP + guiding ropes (SMP+CG): consist on 6 elastic ropes placed under de SMP with the purpose of being detected by fish and to obstruct their way to the codend leading fish towards the SMP.

3) SMPS + guiding ropes + floats (SMP+CG+FL): this configuration adds oval plastic floats to the guiding ropes aiming to be more detectable by fish. The floats provide vibration or fluttering to the guiding ropes when towing.

4) SMP + blue LED lights (SMP+LED): Ten blue LED lights were placed around the SMP and were supposed to attract the fish, so they increase contact probability and escapement.

In Table X we can see the retention rate by compartment and species for the pooled results of the 24 hauls.

Table X: Retention rate by compartment for the main species.

Retention rate by compartment of the main species	Hake	Horse mackerel	Mackerel	Blue whiting
WINDOW	0.7%	1.8%	20.1%	14.5%
CODEND	58,1 %	70.9%	65.3%	86.4%
COVER-UP CODEND	41,2%	27.3%	14.5%	5.5%

Each one of the different configurations planned was tested in 8 hauls with the following results (Table X).

Table X: Mean retention rates per compartment for each configuration tested and species studied.

	Nº of hauls	SMP (%)	Codend Cover (%)	Codend (%)
HAKE				
SMP (Control)	8	0,7	48,3	51,0
SMP+CG	8	0,6	38,1	61,3
SMP+CG+FL	8	1,0	40,6	58,3
SMP+LED	8	0,6	40,4	59,0
HORSE MACKEREL				
SMP (Control)	8	3,2	42,1	54,7
SMP+CG	8	1,1	71,0	28,0
SMP+CG+FL	8	1,0	56,7	42,3
SMP+LED	8	3,7	49,0	47,3
BLUE WHITING				
SMP (Control)	8	26,2	39,9	33,9
SMP+CG	8	19,6	48,3	32,1
SMP+CG+FL	8	22,5	72,1	5,4
SMP+LED	8	13,4	59,3	27,3

- For the 4-main species analyzed, just blue whiting showed significant rates of escapement through the SMP (13,4-26,2%, depending on the configuration of physical elements examined).
- Horse mackerel and Blue whitting show lower escapement rates: less than 4% and 1% respectively for mackerel (1-3,7%) and hake (0,6-1%).
- The effect of the other elements (ropes, lights and floats) to increase the escapement was very low.

A summary of socio-economic effects on the fisheries are here included. These ones refers to the studies included in De minimis exemption consolidation request of 5% for Hake (Merluccius merluccius) for 2019 and thereafter proposed from Spain trawlers catching Hake in the Bay of Biscay(ICES 8abd & 8c&9a, ANNEXES (Annex 3))

1.4 Sorting and handling of the catches: disproportionate costs

Several scientific projects (OBLIDE, SELECT) are currently ongoing for mixed fisheries, to assess, apart from selectivity, the economic impacts of the landing obligation at vessel and fleet levels.

Disproportionate costs are not just related to the cost of handling all the ex- discards biomass on board, but cost should be understood as all added expenses derived from the Landing Obligation regulation (e.g. inclusion of new selectivity devices…). Thus, cost would be associated to the excess of biomass by the direct implementation of the LO, to the increase in crew and time needed for handling biomass on board and to the new generated costs to manage the biomass once are brought to port. Also, related to the limited hold capacity, the full application of the landing obligation would result in fill up the vessel hold more quickly and with a significant part of undersized fish as it occurs in the fishery catching hake. A plausible Consequences of the LO implementation isare the return of the fishing vessel at port before the usual trip time to land catches of lower no value. A fishing trip would therefore be shorter and less economically profitable with a negative impact in the salary of the crew.

All these events are to be summed up and considered under the light of added cost and they are to be added to annual regular fishing exploitation cost derived from the normal fishing activity (as underlined by the Commission staff working paper, 2011[1]),. For calculations of most of the added cost, documentation supplied in the report on extended outline for hake *de minimis* request in Spain Discard Plan, 2016 is included in Annex 3. These costs will be most certainly disproportionate compared to the valorisation which could be made of the unwanted catches to be landed.

The increased crew work was also assessed for establishing disproportionate cost due to full implementation of the Landing Obligation see Annex 3.

1.5 Disproportionate 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 (see Annex 3)

1.6 1.6 Disproportionate cost related to handling of large of multispecific biomass on board impacting on safety.

The study**, Work and effort evaluation for baka trawler (OTB) crew** from Division 8abd after application of Hake Landing Obligation measures, **has reached the conclusions described below**, summarized from more detailed information on Annex 4. Some characteristics of "Baka" single trawlers are important to understand the difficult nature of the workable

[1] http://ec.europa.eu/fisheries/reform/sec_2011_891_en.pdf

solutions for reducing bycatch and not increase cost in a disproportionate way:

1. For all métiers being deployed by “Baka” single trawls, 60 out of the, around, 65 species landed, are species not subject to any TAC or MCRS. This is for OTB_DEF≥70: hake, anglerfish and megrim are the main landed species, within more than other 60 landed species (pouts, dogfish, triglids…) which are not subject to any TAC (Total Allowable Catch) or MCRS (Minimum Conservation Reference Size). In the OTB_MCF≥70 Squids, cuttlefish and red mullet are the main target, but there are more than 60 other landed species (pouts, hake, monkfish…), most of them not subject to any TAC or MCRS. For the OTB_MPD≥70, horse mackerel and mackerel are the target species, but there are more than 60 other landed species (hake, pouts, red mullets), most of them not subject to any TAC or MCRS.

2. Commercial sizes of species without TAC and MCRS (red mullet, pouts, squids) coincide with small sizes of species with TAC and MRCS (i.e. hake), the degree of mixture of species in the codend and on deck make the separation of species and sizes a time-consuming task , as well as and a highly concentration demanding onetask as regards crew concentration and work load.

Plate 1. Typical catch from a Baka trawl in the Bay of Biscay

The results of the study show that after the implementation of hake landing obligation

measures in the bottom trawlers (OTB) operating in Division 8abd (locally known as “baka”), there are two main consequences that affect the work of the crew onboard:

First consequence: There is an increase in the number of hours per working day at sea, of such magnitude that they surpass requirements of ILO’s Agreement 180 and Directive 1999/63/CE which states that “the maximum number of working hours will not exceed 14 hours for each 24-hour period”.

With the application of the Landing Obligation in 2016, which entails the onboard retention of previously discarded hake, in 38.3% of the working days at sea per year the established maximum number of hours per working day is surpassed (e.g. > 14 hours per day).

Second consequence: There is an increase of the levels of metabolic expenditure linked to fish manipulation work. According to the methodology of the standard ISO 8996:2004[2] for measuring metabolic-rate associated with working activity, it is considered that for a professional activity, the physical work load maintained over years should not exceed 2000-2500 Kcal/day (Sherred, 1967; Grandjean, 1983). Over this threshold, the working activity falls under the category of “hard work” (working activity not sustainable over long periods of time).

With the application of Landing Obligation in 2016 (retention of hake previously discarded), in 41.3% of the days of the year the recommended levels of effort for a working day are exceeded (hard work > 2000-2500 kcal/day). It must be taken into account that the estimations of this study do not consider the evaluation of metabolic expenditure for other activities conducted by the crew, like the additional physical effort required to compensate for the vessel’s pitch and roll of the vessel. As a result, the estimates of metabolic expenditure of the crew may be slightly underestimated.

Considering the previous findings, it is necessary to find alternatives and solutions that enable application of the landing measures without surpassing acceptable effort levels for crew on board “baka” single trawlers. Among these alternatives, it is worth mentioning:

i) Reduce bycatch capture using selective fishing methods, which are efficient enough to enable substantial decreases in the main TAC species non-wanted catches.
ii) Maintain a percentage of discards (de minimi exemption) to reduce the amount of fish to be handle on board.
iii) Find technological solutions that enable a reduction in the work load associated with manipulation of fish species on board, as a possible increase in the number of crew is limited in these trawlers.
iv) Operational solutions could need structural modifications of the fishing vessel or installation of new equipment and machinery to help in the fish manipulation that could be or not be technically viable given the present configuration of the fishing vessels.

Solutions to avoid extra work and unsafe conditions, for instance incorporating more crew on board, would increase the cost of the activity in a disproportionate manner and, in most of the cases, would not even be feasible to implement due to accommodation limitation on board.

[2] ISO 8996:2004: Ergonomic of the thermal environment-Determination of metabolic rate.

In the same way, in some of the vessels visited for the study, technological solutions to help handling extra biomasses of fish on board seem not to have easilyhave not an easy implementation, as vessels are limited in their spatial capacity. Moreover, of incorporating any machinery or device for any kind of fish transportation/classification seems not possible without deploying very large costs. See complementary information on safety on board in Annex 3.

a) Number of Spanish vessels involved and information about fleets (see Table 1). Year reference 2016. Division 8abd. Total number of vessels 11. Seven otter trawlers and 4 pair trawlers (2 fishing units).

b) Sampling level. Year reference 2016. Division 8abd.

	2016				
	Number of vessels	Number of sampled vessles	Number of sampled trips	Total trips	% by metier
OTB_DEF_>=70_0_0	7	6	13	217	82.8%
OTB_MCF_>=70_0_0	7	1	1	38	14.5%
OTB_MPD_>=70_0_0	2	0	0	2	0.8%
OTB_SPF_>=70_0_0	4	0	0	5	1.9%
PTB_DEF_>=70_0_0	4	2	10	155	100.0%

c) Information on discards included in Annex 1 of De minimis exemption consolidation request of 5% for Hake (Merluciius merluccius) for 2019 and thereafter proposed from Spain trawlers catching Hake in the Bay of Biscay(ICES 8abd & 8c&9a, ANNEXES (Annex 1))

DISCARDS 2016

Metier	Sea Area	Year	Species	Mean Discards (Kg) by trip	Total Discards(Kg) raised to total trips	Sampled trips	Total trips
OTB_DEF_>=70_0_0	27.8.abd	2016	Horse mackerel	5,680	1,232,603	13	217
OTB_DEF_>=70_0_0	27.8.abd	2016	Mackerel	2,653	575,780	13	217
OTB_MCF_>=70_0_0	27.8.abd	2016	Horse mackerel	6,850	260,285	1	38
OTB_MCF_>=70_0_0	27.8.abd	2016	Mackerel	2,733	103,848	1	38
PTB_DEF_>=70_0_0	27.8.abd	2016	Horse mackerel	306	94,993	10	310
PTB_DEF_>=70_0_0	27.8.abd	2016	Mackerel	585	181,221	10	310
PTB_DEF_>=70_0_0	27.8.abd	2016	Boarfish	-	860	10	310

Country	Exemption applied for (species, area, gear type)	Species as bycatch or target	Number of vessels subject to LO (8abd)	Estimated landings (in tonnes) 2016	Estimated discards (in tonnes)	Estimated catch (in tonnes)	Discard rate	Estimated de minimis maximum volume (in tonnes) (7%)
ESP	OTT, OTB, PTB, OT, PT, TBN, TBS, TX, SSC, SPR, TB, SDN, SX, SV	TARGET/BY-CATCH	217	16806				1176
ESP	OTT, OTB, PTB, OT, PT, TBN, TBS, TX, SSC, SPR, TB, SDN, SX, SV 8ABD	TARGET/BY-CATCH	11	38.043 (JAX) 139.549 (MAC) 0 (BOC) 0 (ANE) TOTAL: 177.592	12.836 (JAX) 5.971 (MAC) 46.86 (BOC) 35 (ANE) TOTAL: 18.889	94.795 (JAX) 145.520 (MAC) 46.86 (BOC) 35 (ANE)	14% (JAX) 4% (MAC) 100% (BOC) 100% (ANE) TOTAL:240.396	6.636 (JAX) 10.186 (MAC) 3.28 (BOC) 2.45 (ANE) TOTAL:16.828

Exemption	Shortfalls
by-catches of the species megrim (Lepidorhombus spp.), anglerfish (Lophiidae), plaice (Pleuronectes platessa), whiting (Merlangius merlangus) and pollack (Pollachius pollachius), a combined de minimis up to a maximum of 5% of the total annual catches of these species made by trawlers (gear codes: OTT, OTB, PTB, OT, PT, TBN, TBS, TX, SSC, SPR, TB,TBB, SDN, SX, SV) in divisions VIII and IX.	**a) No information on numbers of vessels involved**

Country	Exemption applied for (species, area, gear type)	Species as bycatch or target	Number of vessels subject to LO	Estimated landings (in tonnes) 2016	Estimated discards (in tonnes)	Estimated catch (in tonnes)	Discard rate	Estimated de minimis maximum volume (in tonnes)
ESP	OTT, OTB, PTB, OT, PT, TBN, TBS, TX, SSC, SPR, TB,TBB, SDN, SX, SV	TARGET/BY-CATCH	217	3255				162

- In 8abd, this fishery is deployed by a goup of vessels along a short period of the year, corresponding with movement of the trawl fleet towards targeting an assemblage of species in shallower waters than the rest of the year. The métier deploying this fishery is, mainly, OTB_MCD≥70. Thus from the above Table 1., number of vessels in 2016, deploying this métier were 7. In 2017, same number of vessels deployed this métiers but no on-board sampling was carried out. Quantities here presented correspond to all trawl métiers as the low number of sampling by this métier could mask actual estimates of discards. Megrim and Anglerfish discard estimates correspond to 2016 while whiting estimates correspond to 2017.

Country	Exemption applied for (species, area, gear type)	Species as bycatch or target	Number of vessels subject to LO	Estimated landings (in tonnes) 2016	Estimated discards (in tonnes)	Estimated catch (in tonnes)	Discard rate	Estimated de minimis maximum volume (in tonnes) 5%
ESP	OTT, OTB, PTB, OT, PT, TBN, TBS, TX, SSC, SPR, TB,TBB, SDN, SX, SV 8abd	TARGET/BY-CATCH	7	(MEG) 222 (ANF) 137 (WHG) 12 TOTAL 371	(MEG) 7 (ANF) 0 (WHG) 4 TOTAL 11	(MEG) 229 (ANF) 137 (WHG) 16 TOTAL 382	(MEG) 3 (ANF) 0 (WHG) 25	(MEG) 11.45 (ANF) 6.85 (WHG) 0.8 TOTAL 19.1

by-catches of the species megrim (Lepidorhombus spp.), anglerfish (Lophiidae), plaice (Pleuronectes platessa), whiting (Merlangius merlangus) and pollack (Pollachius pollachius), a combined de minimis up to a maximum of 4% of the total annual catches of these species made by gillnetters (gear codes: GNS, GND, GNC, GTR, GTN) in divisions VIII and IX.	a) According to the request, the fleet is particularly vulnerable to the risk of commercial catch losses an improvement in selectivity would cause. However, no references on economic/selective studies were reported.
	b)The request based on disproportionate costs is from the risk of presence of choke species that may generate hold overloading and increase the sorting time on board for the crew management but no supporting information is provided. Regional group should be asked to supply this information if available.
	c)Number of vessels involved is not provided.

b) No identification of this fishery is made in the area 8abd. Thus no data can be supplied. This is a typical French Fishery.

Country	Exemption applied for (species, area, gear type)	Species as bycatch or target	Number of vessels subject to LO	Estimated landings (in tonnes) 2016	Estimated discards (in tonnes)	Estimated catch (in tonnes)	Discard rate	Estimated de minimis maximum volume (in tonnes)
ESP	GNS, GND, GNC, GTR, GTN	TARGET/BY-CATCH	68	697				28

by-catches of the following pelagic species: horse mackerel (Trachurus spp.), mackerel (Scomber scombrus), anchovy (Engraulis encrasicolus) and boarfish (Caproidae), a combined de minimis for the species up to a maximum of 3% in 2019 ,2020 and 2021, of the total annual catches of these species made **by gillnetters** (gear codes: GNS, GND, GNC, GTR, GTN) in fisheries in ICES divisions VIII and IX, X and CECAF areas 34.1.1, 34.1.2, 34.2.0.	a)According to the request, the fleet is particularly vulnerable to the risk of commercial catch losses an improvement in selectivity would cause. However, no information on economic/selective studies were reported.
	b)Request based on disproportionate costs is from the risk of presence of choke species that may generate hold overloading and increase the sorting time on board for the crew management. No references were reported.
	c)No information on number of vessels
	d)Catch and discard profile only provided for Spain – Regional Group should be asked to supply the material for other MSs
	e)No information regarding number of observer trips compared to total number of fishing trips.

d) Data here included correspond to the artisanal fleet deploying net métiers. Sampling correspond to year 2010 and 2011 in Division 8c, no sampling has been deployed on this fleet on the recent years. Industrial and artisanal netters have not been of concern of discards in the routinely National Sampling Plan deployed since 2003 in Spain. Thus, data here presented has to be considered as a pilot exercise, it could be used as a discard reference level, but not as absolute estimates of the dimension of discards in all Spanish netter fleets. 6.

Country	Exemption applied for (species, area, gear type)	Species as bycatch or target	Number of vessels subject to LO	Estimated landings (in tonnes) 2016	Estimated discards (in tonnes)	Estimated catch (in tonnes)	Discard rate	Estimated de minimis maximum volume (in tonnes) 3%
ESP	GNS, GND, GNC, GTR, GTN	BY-CATCH					(MAC) 13% (JAX) 12%	

By-catches of all species regulated with TAC and cuota, a combined de minimis up to a maximum of 1% in 2019, 2020 and 2021 of the total annual catches made by the artisanal fleet in ICES divisions VIII, IX, X and CECAF areas 34.1.1, 34.1.2, 34.2.0.

b) Annex I, cited in the text is not provided. Annex I was not completed at the end, therefore not included, we should have deleted this reference. Find here additional information from Spain based in 2016 data.

Country	Exemption applied for (species, area, gear type)	Species as bycatch or target	Number of vessels subject to LO	Estimated landings (in tonnes) 2016 from TAC and quota species	Estimated discards (in tonnes)	Estimated catch (in tonnes)	Discard rate	Estimated de minimis maximum volume (in tonnes) 1%
ESP	Small scale census	TARGET/BY-CATCH	4455	10329	516,45	10845	5%	103,29

for by-catches of the following pelagic species: horse mackerel (Trachurus spp.), mackerel (Scomber scombrus), anchovy (Engraulis encrasicolus) and boarfish (Caproidae), a combined de minimis for the species up to a maximum of 1% in 2019 ,2020 and 2021, of the total annual catches of these species made by for longliners (codes: LHP, LHM, LLS, LLD) in fisheries in ICES divisions VIII and IX, X and CECAF areas 34.1.1, 34.1.2, 34.2.0.	a)Request based on disproportionate costs from the risk of presence of choke species that may generate hold overloading and increase the sorting time on board for the crew management. No references were reported.
	b) Are anchovy and boarfish required here? France wanted to include them for us is OK to have it just for mackerel and horse mackerel
	c) Number of vessels involved is not provided.
	d)catch and discard profile not supplied. Regional group should supply the above information.

D) No data on discards on board lonline metiers are available. Longline have not been object of study for the National Sampling Plan on discards in ICES area.

REFERENCES

Annex. 2018. De minimis exemption consolidation request of 5% for Hake (Merluciius merluccius) for 2019 and thereafter proposed from Spain trawlers catching Hake in the Bay of Biscay(ICES 8abd & 8c&9a, ANNEXES (Annex 2))

ICES, 2003. Workshop on Discard Sampling Methodology and Raising Procedures Danish Institute for Fisheries Research, Charlottenlund, Denmark.2 – 4 September, 2003. Final Report. The ICES Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBS).