

# REM technology to help fulfill the landing obligation in European fisheries towards more sustainable fishing



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## Fisheries observers, Remote Electronic Monitoring and landing obligation

The main control measures used in EU fisheries are the use of logbooks, monitoring of vessel geographic positions and the inspections of the vessels at sea (patrol vessel surveillance) and at the ports (inspection of the landings). Many studies indicate that this traditional control measures are not effective within the current Landing Obligation rules. The Remote Electronic Monitoring (REM) is currently considered as one of the best future alternatives for the control of fishing activity. In fact, many fleets have already incorporated this technology into their activity to respond to the requirements of regional fishing organizations and control authorities in many countries of the world.

The aim of this work was to test the implementation of innovative technologies based on artificial vision devices for catch composition determination and data management technologies installed on board. A study case including onboard observer trials and an automatic device was carried out to characterize discards and record unwanted species occurrence in commercial vessels. The 'iObserver system' was implemented to improve the quality and availability of data and consequently to deepen knowledge on the status of the fisheries resources. This technology is aimed to be able to identify and quantify the catch (targeted and discarded) without interfering with the activity of fishermen. Once the data (species and biomass estimation) is acquired by iObserver, information is pre-processed and transmitted to land (to management servers). This system will allow real-time decision making for the fishing activity in order to eventually perform a more selective fishing. Automatic estimates of discards by species allow to take real-time decisions, avoid areas/times with high discards rates and potentially to comply with landing obligation.

## North Iberian otter bottom trawl fisheries

The otter bottom trawl targeting demersal species in north Iberian waters is a mixed fishery operating in the Northern and Western coastal waters (ICES Divisions 8c and 9a). Two métiers operate on the continental shelf and upper slope:

- **Otter bottom trawl targeting demersal species (OTB\_DEF\_>=55)** in north Spanish Iberian waters ('Baca'). This métier targets demersal species, standing out hake (*Merluccius merluccius*), megrims (*Lepidorhombus boscii* and *L. whiffiagonis*) and anglerfish (*Lophius piscatorius* and *L. budegassa*).
- **Otter bottom trawl targeting pelagic and demersal species (OTB\_MPD\_>=55)** in Iberian waters ('Gran abertura') is a mixed bottom trawl fishery which takes place throughout the year. Horse mackerel (*Trachurus trachurus*) and mackerel (*Scomber scombrus*) are taken together with other species, mainly hake (*Merluccius merluccius*).



## Discard case study: Marin on board sampling program

### Data from a observer program in Marin fishing port trawler fleet at ICES 8c9a

Eight fishing vessels collaborate in the iobserver program and a total of 37 trips were carried out. We present results of discarding for the main commercial species in the trawl fishery and discard estimates for all the fleet in ICES 8c9a.

- ✓ Vessels in Spanish waters discard mainly hake, blue whiting and mackerel with discard rates from 66 to 86%.
- ✓ Métier OTB\_MPD presents lower discard rates.
- ✓ Vessels in Portugal waters discard pelagic species due to trip duration (3-7 days)
- ✓ Mean discards of the main eight quota species can reach 1442-7025 kg in a trip which must be landed at the Marin port.

Fishing ground	Métier	Species	Species	Kg Retained/trip	Kg Discarded/trip	Discard rate
NW Spain	OTB_DEF_>=55_0_0	Lepidorhombus spp	Megrims	292	260	47
NW Spain	OTB_DEF_>=55_0_0	Lophius spp	Anglerfish	86	0	0
NW Spain	OTB_DEF_>=55_0_0	Merluccius merluccius	Hake	95	185	66
NW Spain	OTB_DEF_>=55_0_0	Micromesistius poutassou	Blue whiting	136	367	73
NW Spain	OTB_DEF_>=55_0_0	Scomber scombrus	Mackerel	90	566	86
NW Spain	OTB_DEF_>=55_0_0	Trachurus trachurus	Horse mackerel	207	64	24
TOTAL				904.49	1442.20	61.46
NW Spain	OTB_MPD_>=55_0_0	Merluccius merluccius	Megrims	75	74	50
NW Spain	OTB_MPD_>=55_0_0	Micromesistius poutassou	Blue whiting	17	70	80
NW Spain	OTB_MPD_>=55_0_0	Scomber scombrus	Mackerel	73	28	4
NW Spain	OTB_MPD_>=55_0_0	Trachurus trachurus	Horse mackerel	2568	10	0
TOTAL				3392.50	182.63	5.11
EU-Portugal	OTB_DEF_>=55_0_0	Lepidorhombus spp	Megrims	565	406	42
EU-Portugal	OTB_DEF_>=55_0_0	Lophius spp	Anglerfish	472	0	0
EU-Portugal	OTB_DEF_>=55_0_0	Merluccius merluccius	Hake	1156	411	26
EU-Portugal	OTB_DEF_>=55_0_0	Micromesistius poutassou	Blue whiting	30	793	96
EU-Portugal	OTB_DEF_>=55_0_0	Scomber scombrus	Mackerel	0	1395	100
EU-Portugal	OTB_DEF_>=55_0_0	Trachurus trachurus	Horse mackerel	44	4021	99
TOTAL				2265.27	7025.98	75.62

Table 1. Catch (landings and discards) of main commercial species by quarter (mean catch in kg by observed fishing trip). Data from iSEAS dedicated observer program (2014-2016) in Marin trawler fleet at ICES 8c9a

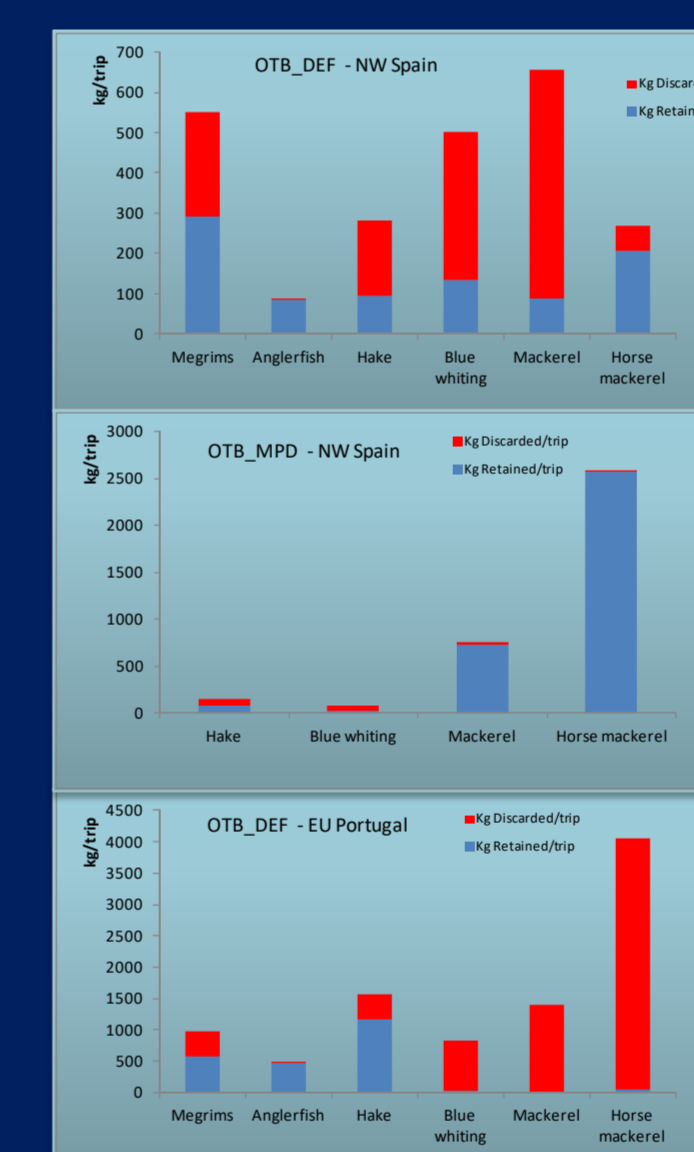


Figure 1. Catch (landings and discards) by métier (kg by observed fishing trip).

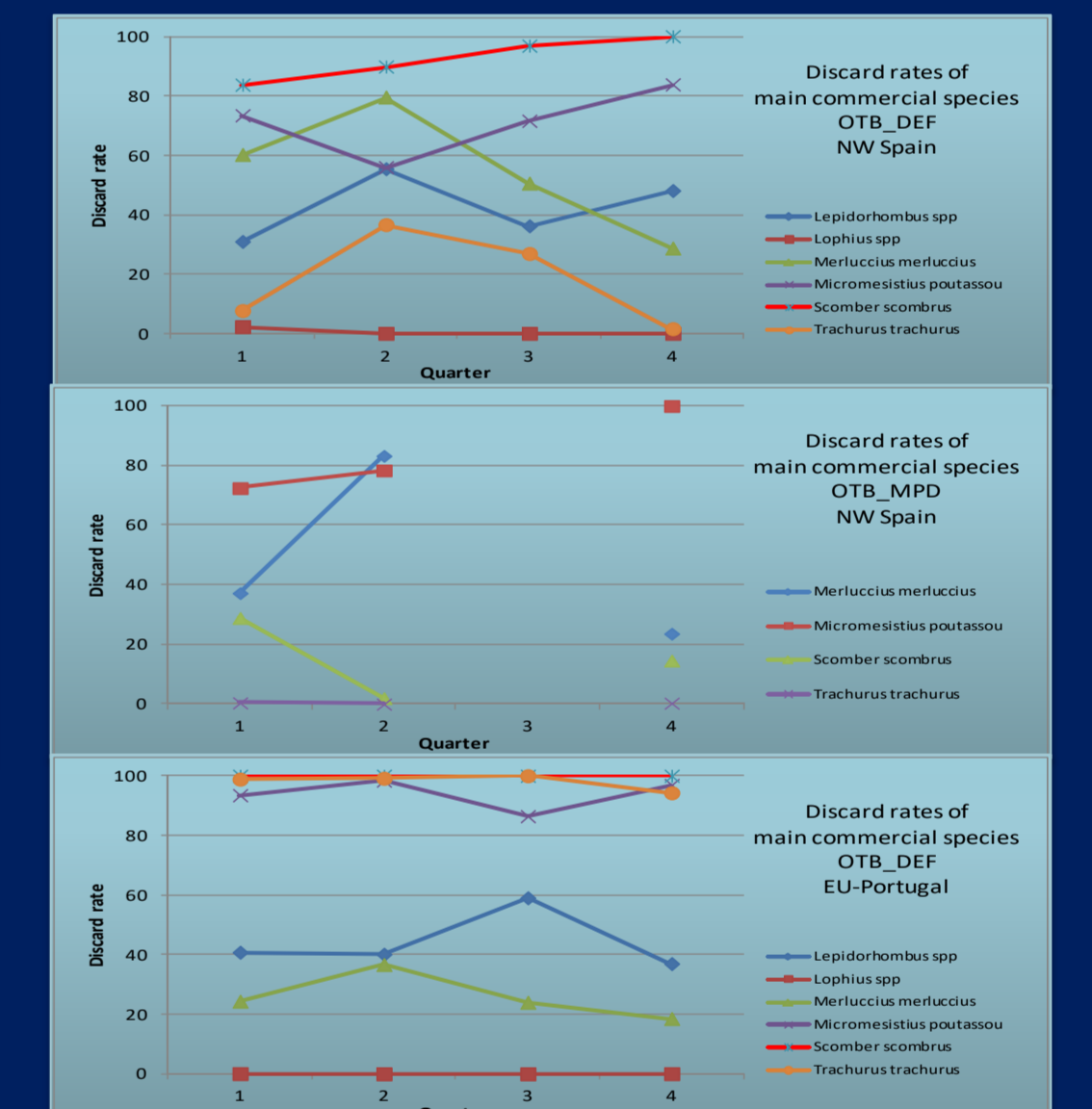


Figure 2. Catch (landings and discards) by quarter (kg by observed fishing trip).

## iObserver testing

The IEO is being in charge of a standardized scientific observer program (random allocation) to analyze and raise the data to obtain discard estimates for stock assessment and comply with European data compilation schemes (DCF). In the LIFE iSEAS, SICAPTOR and SICAPTOR2 projects, a dedicated trial program (non-random allocation) on board the fleet of the port of Marin (OPROMAR) has been carried out, simulating the application of this new rule to set up a case study of the application of the landing obligation in the mixed trawling fleet of Marin fishing port. A interdisciplinary team is carrying out the development of protocols for implementation and use of innovative technologies based on a test program with artificial vision devices for catch composition determination and data management technologies installed on board. Observer trials and an automatic iOBSERVER are used to characterize discards and record unwanted species occurrence and test the potential use of camera discard recording to comply with landing obligation.

## What are the reasons?

- Two main causes of discarding are:
- ✓ Fish discarded below the legal minimum landing size
- ✓ Attributed to fishers' responses to quota restrictions

Factors of discards amounts: technical, biological, environmental, legislative, economic, cultural, social. To develop successful discard mitigation measures, it is necessary to better identify the reasons for discarding.

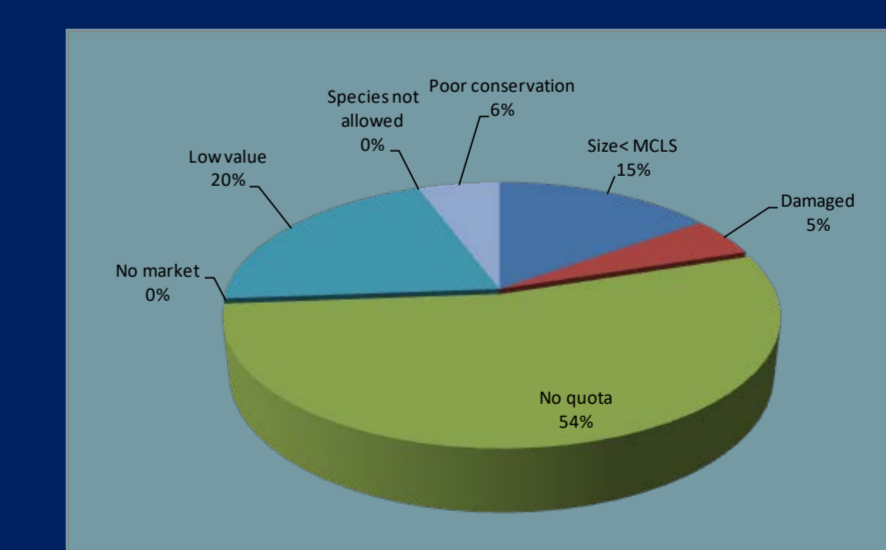


Figure 3. Reason of discarding for all métiers

Code	Discard reason
MLS	Size-MCLS
DAM	Damaged
NM	No market
QUO	No quota
VAL	Low value
NAL	Species not allowed
QAL	Poor conservation

Table 3. Reasons of discarding by métier.

OTB_DEF_NW Spain	MLS	DAM	QUO	MAR	VAL	NAL	QAL
Lepidorhombus spp	96	4				100	
Lophius spp							
Merluccius merluccius	74	26					
Micromesistius poutassou	1	22		62	16		
Scomber scombrus	3	0.5		97			
Trachurus trachurus	2	0.2		98			
Total	27	2	0.3	0	58	0	4
OTB_MPD_NW Spain	MLS	DAM	QUO	MAR	VAL	NAL	QAL
Lepidorhombus spp	100						
Lophius spp							
Merluccius merluccius	66	35					
Micromesistius poutassou				74	27		
Scomber scombrus				13	87		
Trachurus trachurus				35	65		
Total	27	38	0	0	45	0	30
OTB_DEF Portugal	MLS	DAM	QUO	MAR	VAL	NAL	QAL
Lepidorhombus spp	91	9					
Lophius spp							
Merluccius merluccius	36	0			64		
Micromesistius poutassou				78	22		
Scomber scombrus				0.4		44	56
Trachurus trachurus				1	99		
Total	10	2	76	5	0	6	



Read the QR and watch the movie!