PRESPO

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Synthesis of the methodologies used to assess the selectivity and the discards rate in the artisanal fisheries

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Synthesis of the methodologies used to assess the selectivity and the discards rate in the artisanal fisheries

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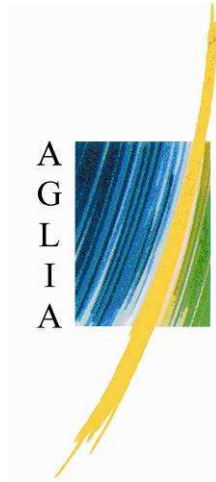
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Introduction

During the three years of the PRESPO projects, partners used different methodologies to achieve the workgroup 6's main objective: *To improve the artisanal fisheries management by the development of strategies leading to the selectivity gear's improvement and to the discards reduction*. The present work belongs to the action 1: *Review the methodologies which allow characterizing the discards and assessing the mortality linked to the gears. Moreover, some fisheries must be identified to work specifically on them.*

During the first year of PRESPO, partners identified the fisheries on which they could work to assess biological indicators, discards rate and/or improve the selectivity of the gears. From a country to another, the methodologies were very different and it appeared important for the partnership to collect them in a methodological guide to allow their transfer from a partner to another, but although to insure their transferability beyond the PRESPO project.

The methodologies are classified according to their objective:

- ▶ Assess biological aspects of species to allow the future development of a fishery targeting it;
- ▶ Assess the discards and/or bycatches rate of a fishery;
- ▶ Assess the selectivity of a gear and eventually improve it.

Remark:
Some methodologies were used for several objectives. Thus, they appeared in each relevant part.

For further information about one or another methodology, please visit the website of the PRESPO project and find the suitable contact: http://www.cripsul.ipimar.pt/PRESPO .

Methodology to evaluate biological aspects

Abundance and distribution patterns of demersal and epibenthic communities of the Portuguese North Coast, IPIMAR

General remarks	
Author (s)	IPIMAR, Field et al., 1982, Kristensen & Anderson, 1987, Quintino et al., 1989, Cardador & Borges, 1999, Kallianiotis et al., 2000, Serrano et al., 2008.
Creation	Methodology elaborated to study demersal and epibenthic communities targeted by the beam trawl fishing fleat.
Study area	Portugal, Norte
Objectives	To study abundance and distribution patterns of the demersal and epibenthic communities of the Portuguese northern coast and to understand the influence of depth, latitude and sediment characteristics.
Identification of issue/problem	The overall lack of scientific information of marine communities and assemblages in the Northern Portuguese shores, targeted by the beam trawl fishing fleat.
Metier	
Target species	Common prawn *(Palaemon serratus)* and pounting *(Trisopterus luscus).*
By-catch species	*Polybius henslowii, Callionymus lyra, Alloteuthis* spp., *Echiichthys vipera, Paguridae.*
Fishing gear studied	Beam trawl
Description of the fishing gear studied	For the present work a bottom trawl and a beam trawl were used. For the first survey it was used an otter trawl with 6 m horizontal opening and 30 mm mesh size. For the second survey a beam trawl with a 7 m length beam and 35 mm mesh size was used.
Material for the experimentation	
Type of boat	Research vessel Fishing vessel
Experimental material	Van Veen grab, sieves, portable multi-parameter field meter, balances, ictiometer, and digital calliper.
Method	
Type of study	Characterization of beam trawl total catches on the North of Portugal.
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	One yearly survey was acomplished during 2009 and 2010. For both surveys, nine latitudinal profiles were defined, approximately ten nautical miles apart from each other. At each profile six sampling stations were established, located at different depth strata (A:5-10m, B:10-15m, C:15-20m, D:20-30m, E:30-40m and F:40-50m). On all defined stations hauls were of 15 minutes during day-time and at a mean speed of 2,5 knots.
Which method is used?	Scientist(s) on board
_Why that choice of method?	This method was chosen to better control fishing hauls and also to acomplish "in situ" sampling.
Other data collected	Temperature, salinity, conductivity and sediment particle size were collected aiming to understand if these abiotic parameters influenced the abundance and distribution of the communities studied.
Period of experiment	2009 surveys were acomplished during September and 2010 surveys were acomplished during November and December.
_Why that choice of period of the study period?	The study period was chosen to gather a sufficient ammount of information that allowed to obtain valuable results and to compare the 2009 and the 2010 surveys.
Data analyses and outputs	

How are the data analyzed?	Frequency, abundance, total biomass and mean length for each species were determinated. Biodiversity indexes, Shannon-Weiver correlation index, univarite data analysis (ANOVA, t-tests) and multivariate data analysis were also applied.
Expected results	Characterization of the demersal and epibentic communities was expected, considering communities' biodiversity and relation with several parameters such as, latitude, depth and several abiotic features.
Deliverable	PRESPO report

Estimation of age and growth of bivalve species, IPIMAR

General remarks	
Author (s)	IPIMAR, e.g. Richardson (2001)
Creation	Methodology elaborated to study bivalve species in general
Study area	Portugal, Algarve
Objective	Estimate age and growth of *Dosinia exoleta*, *Arcopagia crassa* and *Venus verrucosa*
Identification of issue/problem	Lack of information on the age and growth of these species
Metier	
Target species	*Donax* spp., *Chamelea gallina*, *Spisula solida*, *Ensis siliqua*, *Pharus legumen*, *Callista chione*, *Dosinia exoleta* and *Glycymeris glycymeris.*
By-catch species	Mainly *Acanthocardia* spp., *Mactra* spp., *Laevicardium crassum* and *Spisula subtruncata*
Fishing gear studied	Dredge
Description of the fishing gear studied	Mechanical dredge made of a rigid iron structure with a toothed lower bar and a collecting system of metallic grid cage.
Material for the experimentation	
Type of boat	Research vessel
Experimental material	Mechanical dredge, digital calliper, polyester resin, rotating precision saw, automated grinder-polisher, ethyl acetate, acetate peels, optical microscope.
Method	
Type of study	Age and growth, by counting surface striae and micro-growth patterns in acetate peel replicas of sectioned shells.
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	60 individuals (20 specimens from three different fishing areas)
Which method is used?	Scientist(s) on board
_Why that choice of method?	These methods provide good estimates of age and growth
Period of experiment	Samples collected during June and July 2010
_Why that choice of period of the study period?	To coincide with periodic bivalve surveys performed by the IPIMAR's research vessel
Data analyses and outputs	
How are the data analyzed?	Von Bertalanffy growth functions (VBGF) and overall growth performance (OGP)
Expected results	Growth rates and parameters
Deliverable	PRESPO report Poster presentation and scientific paper

Estimation of age and growth of bivalve species, IPIMAR

General remarks	
Author (s)	IPIMAR e.g. Richardson (2001)
Creation	Methodology elaborated for the study of bivalve species in general
Study area	Portugal, Algarve
Objectives	Estimate age and growth of *Dosinia exoleta*, *Arcopagia crassa* and *Venus verrucosa*
Identification of issue/problem	Lack of information on the age and growth of these species
Metier	
Target species	*Donax* spp., *Chamelea gallina*, *Spisula solida*, *Ensis siliqua*, *Pharus legumen*, *Callista chione*, *Dosinia exoleta* and *Glycymeris glycymeris.*
By-catch species	Mainly *Acanthocardia* spp., *Mactra* spp., *Laevicardium crassum* and *Spisula subtruncata*
Fishing gear studied	Dredge
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Type of study	Age and growth Counting surface striae and micro-growth patterns in acetate peel replicas of sectioned shells.
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	60 individuals (20 specimens from three different fishing areas)
Which method is used?	Scientist(s) on board
_Why that choice of method?	These methods provide good estimates of age and growth
Period of experiment	Samples collected during June and July 2010
_Why that choice of period of the study period?	To coincide with periodic bivalve surveys performed by the IPIMAR's research vessel
Data analyses and outputs	
How are the data analyzed?	Von Bertalanffy growth functions (VBGF) and overall growth performance (OGP)
Expected results	Growth rates and parameters
Deliverable	PRESPO report Poster presentation and scientific paper

Description of the reproductive cycle of *Bolinus brandaris*, IPIMAR

General remarks	
Author (s)	IPIMAR e.g. Ramón & Amor (2002), Vasconcelos et al. (2008)
Creation	Methodology elaborated to study gastropod species in general
Study area	Portugal, Algarve
Objectives	Describe the reproductive cycle of *Bolinus brandaris*
Identification of issue/problem	Lack of information on the reproductive cycle of the species
Metier	
Target species	*Bolinus brandaris* and *Hexaplex trunculus*
By-catch species	Other gastropods (mainly *Bittium reticulatum*, *Gibbula umbilicaris*, *Jujubinus striatus* and *Nassarius* spp.) and echinoderms (mainly *Asterias gibbosa* and *Coscinasterias tenuispina*).
Fishing gear studied	Trap
Description of the fishing gear studied	"Wallet-line": the "wallet-line" is composed of a long mainline with many gangions, to which small square bags made of rigid plastic mesh are attached. These "wallets" are filled with live cockles (*Cerastoderma edule*). Several predator and scavenger species, including the target species, purple dye murex (*Bolinus brandaris*) and banded murex (*Hexaplex trunculus*), are attracted to the bait and become attached to the external surfaces of the "wallets" while handling, attacking or ingesting the cockles. Subsequently, fishermen periodically haul the gears, retrieve the target species and discard the by-catch species.
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	Fishing gear ("wallet-line"), digital calliper, top-loading balance, tissue processor, embedding station, automatic microtome, light microscope, scanner, digital image analysis software.
Method	
Type of study	Reproduction and size/age at maturity Histology of the gonads and reproductive condition indices (general condition index - K, gonadosomatic index - GSI, and penial index - PI)
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	12 monthly samples comprising around 50 individuals per month
Which method is used?	Scientist(s) on board
_Why that choice of method?	These methods are adequate and accurate for describing in detail the reproductive cycle of the species
Other data collected	Incidence and severity of imposex and female sterility, to ascertain their influence on the reproduction of the species.
Period of experiment	12 months (October 2008 - September 2009)
_Why that choice of period of the study period?	To gather one year of data and assess monthly variation in the reproductive cycle
Data analyses and outputs	
How are the data analyzed?	Monthly variation in gonadal maturation stages and reproductive condition indices (K, GSI and PI)
Expected results	Detailed description of the reproductive cycle, with emphasis on the establishment of the maturation period and main spawning season
Deliverable	PRESPO report Conference talk and scientific paper

Estimation of age and growth of *Bolinus brandaris*, IPIMAR

General remarks	
Title	Estimation of age and growth
Author (s)	IPIMAR e.g. Vasconcelos et al. (2006), Henry & Jarne (2007)
Creation	Methodology elaborated for the study of gastropod species in general
Study area	Portugal, Algarve
Objectives	Estimate age and growth of *Bolinus brandaris*
Identification of issue/problem	Lack of information on the age and growth of the species
Metier	
Target species	*Bolinus brandaris* and *Hexaplex trunculus*
By-catch species	Other gastropods (mainly *Bittium reticulatum*, *Gibbula umbilicaris*, *Jujubinus striatus* and *Nassarius* spp.) and echinoderms (mainly *Asterias gibbosa* and *Coscinasterias tenuispina*).
Fishing gear studied	Trap
Description of the fishing gear studied	"Wallet-line": the "wallet-line" is composed of a long mainline with many gangions, to which small square bags made of rigid plastic mesh are attached. These "wallets" are filled with live cockles (*Cerastoderma edule*). Several predator and scavenger species, including the target species, purple dye murex (*Bolinus brandaris*) and banded murex (*Hexaplex trunculus*), are attracted to the bait and become attached to the external surfaces of the "wallets" while handling, attacking or ingesting the cockles. Subsequently, fishermen periodically haul the gears, retrieve the target species and discard the by-catch species.
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	Fishing gear ("wallet-line"), snorkeling equipment, Dymo tape tags, cyanoacrilate glue, epoxy glue, digital calliper, top-loading balance.
Method	
Type of study	Age and growth: Mark-release-recapture
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	More than 1000 individuals marked and released in an earthen pond
Which method is used?	Scientist(s) on board
_Why that choice of method?	This method provides good estimates of age and growth
Period of experiment	24 months
_Why that choice of period of the study period?	To gather solid data for the analyses
Data analyses and outputs	
How are the data analyzed?	Monthly growth rates (individual and grouped into size-classes), Gulland-Holt graphical method
Expected results	Growth rates and parameters
Deliverable	PRESPO report Conference talk and scientific paper

Description of the reproductive cycle of *Bolinus brandaris*, IPIMAR

General remarks	
Author (s)	IPIMAR, e.g. Ramón & Amor (2002), Vasconcelos et al. (2008)
Creation	Methodology elaborated for the study of gastropod species in general
Study area	Portugal, Algarve
Objectives	Describe the reproductive cycle of *Bolinus brandaris*
Identification of issue/problem	Lack of information on the reproductive cycle of the species
Metier	
Target species	*Bolinus brandaris* and *Hexaplex trunculus*
By-catch species	Other gastropods (mainly *Bittium reticulatum*, *Gibbula umbilicaris*, *Jujubinus striatus* and *Nassarius* spp.) and echinoderms (mainly *Asterias gibbosa* and *Coscinasterias tenuispina*).
Fishing gear studied	Trap
Description of the fishing gear studied	"Wallet-line": the "wallet-line" is composed of a long mainline with many gangions, to which small square bags made of rigid plastic mesh are attached. These "wallets" are filled with live cockles (*Cerastoderma edule*). Several predator and scavenger species, including the target species, purple dye murex (*Bolinus brandaris*) and banded murex (*Hexaplex trunculus*), are attracted to the bait and become attached to the external surfaces of the "wallets" while handling, attacking or ingesting the cockles. Subsequently, fishermen periodically haul the gears, retrieve the target species and discard the by-catch species.
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	Fishing gear ("wallet-line"), digital calliper, top-loading balance, tissue processor, embedding station, automatic microtome, light microscope, scanner, digital image analysis software.
Method	
Type of study	Reproduction and size/age at maturity: Histology of the gonads and reproductive condition indices (general condition index - K, gonadosomatic index - GSI, and penial index - PI)
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	12 monthly samples comprising around 50 individuals per month
Which method is used?	Scientist(s) on board
_Why that choice of method?	These methods are adequate and accurate for describing in detail the reproductive cycle of the species
Other data collected	Incidence and severity of imposex and female sterility, to ascertain their influence on the reproduction of the species.
Period of experiment	12 months (October 2008 - September 2009)
_Why that choice of period of the study period?	To gather one year of data and assess monthly variation in the reproductive cycle
Data analyses and outputs	
How are the data analyzed?	Monthly variation in gonadal maturation stages and reproductive condition indices (K, GSI and PI)
Expected results	Detailed description of the reproductive cycle, with emphasis on the establishment of the maturation period and main spawning season
Deliverable	PRESPO report Conference talk and scientific paper

Methodological approach to the daily increment counting in *Octopus vulgaris* stylets for growth studies, IPIMAR

General remarks	
Author (s)	IPIMAR, Lourenço, S.; Moreno, A.; Pereira, J.
Creation	Methodology elaborated considering the need to evaluate accurately the age of common octopus
Study area	Portugal, Lisboa e Vale do Tejo and Algarve
Objectives	Develop a routine to assess common octopus age on the daily increment analysis
Identification of issue/problem	Statoliths are routinelly used to estimate the age of squid and cuttlefish, although in octopus these structures don't present the regular pattern of deposition connected to growth. The alternative is to use the stylets (internal shell remants) that also present the incremental deposition pattern related to growth. This structure has some problems related to dehydration of the fibrous constitution.
Metier	
Target species	common octopus (*Octopus vulgaris*)
By-catch species	*not determined*
Fishing gear studied	Trap Pot
Description of the fishing gear studied	commercial-type plastic mesh traps and plastic and clay pots
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	general laboratorial material for biological sampling
Method	
Type of study	Age and growth
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	In each monthly sample, stylets from a female and a male are collected by 200 gr weight class.
Which method is used?	Self-sampling by fishermen
_Why that choice of method?	This sampling strategy allow to have a representative sample of all the individuals of the population
Period of experiment	January 2009 to June 2010
Preliminary necessary work	Was necessary to test which is the most suitable preservation medium to avoid extreme dehidration of the stylets. Stylets preserved in ethanol 70%, formol 4%, solution of glycerine and etahnol 70% (3:1) and fresh stylets were sectioned, mounted in glace slices with Crystalbond ©, polish with different grain sandpaper and observed under 400x magnification to test the visibility of the increments. The best preservation medium is the formol 4%.
Data analyses and outputs	
How are the data analyzed?	Daily increments counts and distinct growth areas measurements should be compared with mantle length and weight by General Linear Modeling using as comparative factor the study area.
Expected results	Aproximate age structure and preliminary growth estimates in two different oceanographic reagions.
Deliverable	PRESPO report

Spawning, settlement and recruitment areas of *Octopus vulgaris*, IPIMAR

General remarks	
Author (s)	IPIMAR Moreno, A.; Pereira, J.; Lourenço, S.; Santos, A.M. et al
Creation	Methodology elaborated to study the demersal species in general
Study area	Portugal
Objectives	To identify wich are the sapwning, settlement and recruiment areas of *Octopus vulgaris* along the portuguese coast.
Identification of issue/problem	The need to determine settlement/recruitment grounds as a basis for the possible implementation of closed areas for the fisheries
Metier	
Target species	Demersal species
By-catch species	e.g. common octopus (*Octopus vulgaris*)
Fishing gear studied	Bottom trawl
Description of the fishing gear studied	shrimp and horse mackerel bottom trawling gear (CAM and CAR)
Material for the experimentation	
Type of boat	Research vessel
Experimental material	bottom trawl nets, cruise and laboratory equipment for biological sampling
Method	
Type of study	distribution and abundance study
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	16 survey cruises between 1996 and 2008, 1120 fishing hauls, between 20 and 750 m depth, 2469 octopus measured, number, weigth, sex and maturity of *O. vulgaris*, number of recruits by haul during bottom trawl surveys
Which method is used?	Scientist(s) on board
_Why that choice of method?	appropriate for distribution studies
Other data collected	Environmental data: SST, runoff index, UI, sediment type. Aiming to assess the effect physical and environmental conditions on octopus distribution, recuitment and spawning areas
Period of experiment	1996-2008 (winter, summer and autumn surveys)
_Why that choice of period of the study period?	to have a long time series of abundance and biomass distribution along the portuguese coast and assess interannual variation.
Preliminary necessary work	collection of environmental data from national and international databases
Data analyses and outputs	
How are the data analyzed?	krigging, ANOVA, GAM's
Expected results	Maps of recruitments and spawning areas along the continental shelf
Deliverable	PRESPO report scientific paper

Seasonal trends on reproductive cycle of *Octopus vulgaris* in the Portuguese coast, IPIMAR

General remarks	
Author (s)	IPIMAR, Lourenço, S.; Moreno, A.; Narciso, L.; González, A.; Pereira, J.
Creation	The methodology applied makes use of biologica indices as the proportion of mature individuals by month and two distinct gonad-somatic index in order to identify the season where the reproductive activity of the species is more intense
Study area	Portugal, Lisboa e Vale do Tejo and Algarve
Objectives	To identify different reproductive strategies adopted by different populations, considering the distinct oceanographic features of the northwest coast within the Western Iberian Upwelling System and the South coast within the Golf of Cádiz System.
Identification of issue/problem	*Octopus* populations are geographically separated and subjected to different environmental characteristics. It adapts its life cycle to take advantage of the best biological and oceanographic conditions, as temperature and salinity, "producing" different spawning and recruitemnt seasons depending of the environmental conditions, and these seasonality factors must be considered in the possibility of imposing management regulation.
Metier	
Target species	common octopus (*Octopus vulgaris*)
Fishing gear studied	Trap and Pot
Description of the fishing gear studied	commercial-type plastic mesh traps and plastic and clay pots
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	general laboratorial material for biological sampling
Method	
Type of study	Reproduction and size/age at maturity
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	the entire capture of a single trip of a boat by month in the Algarve; stratified size samples from the catch in the Center, 79 samples
Which method is used?	Self-sampling by fishermen
_Why that choice of method?	This sampling strategie allows having a representative sample of all the individuals of the population
Period of experiment	2007-2010 (48 months)
_Why that choice of period of the study period?	During this period we have monthly assess samples in two different points on the portuguese coast
Data analyses and outputs	
How are the data analyzed?	To have monthly results regarding sex ratio, proportion of mature individuals, monthly mean GSI and monthly mean Hayashi Index. Also proportion of mature individuals by 200 gr weight classes were analysed in order to calculate the maturity ogive and weight of maturity both in the nortwest coast and south coast.
Expected results	To identify a single and extended reproductive season in the northwest coast, between earlier spring and summer with two spawning peaks; and a short and intense spawning season in August/September in the south coast.
Deliverable	PRESPO report Scientific paper and Conference talk: Lourenço, S, Moreno, A., Pereira, J. Seasonal trends of reproductive cycle of *Octopus vulgaris* in two environmental distinct coastal areas. 8th International Symposium Cephalopods - Present and Past, August 30 to September 3, 2010.

Growth and reproduction of *Palaemon serratus*, IPIMAR

General remarks	
Author (s)	IPIMAR, Figueiredo, 1972; Arrobas, 1974; Sardã, 1978; Arrobas, 1983; Campillo, 1984; Huerta, 1984; Gonçalves e Ribeiro, 1996, Guerao & Ribera, 2000.
Creation	Methodology elaborated to study *Palaemon serratus* reproductive biology.
Study area	Portugal, Norte
Objectives	Determine the *Palaemon serratus* reproduction season and minimum landing size.
Identification of issue/problem	Although there is a closed season for the *P. serratus* fishery, the fishing is thought to occur during the reproduction season.
Metier	
Target species	*Palaemon serratus*
By-catch species	*Polybius henslowii, Paguridae, Asterias rubens, Marthasterias glacialis, Callyonimus lyra, Crangon crangon*
Fishing gear studied	Sombreira
Description of the fishing gear studied	Sombreira is a rectangular liftnet, made of polyamide with a 18mm mesh size. It has a headrope with floaters and a footrope with sinkers.
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	GPS; depth, salinity, conductivity and salinity probe; scale; caliper; microscope.
Method	
Type of study	Reproduction and size/age at maturity
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	13 monthly samples of *P. serratus* catches were collected from artisanal vessels. The samples were sorted by sex and the total length, postorbital cephalothorax length, weight and maturity stage were recorded.
Which method is used?	Scientist(s) on board
_Why that choice of method?	For taking sampling decisions and "in situ" data sampling
Other data collected	Water temperature, salinity, conductivity, depth and geographical coordinates
Period of experiment	May 2009 to May 2010 (all months)
_Why that choice of period of the study period?	To study the reproductive cycle of *P. serratus*
Data analyses and outputs	
How are the data analyzed?	Sex ratio, mean size and weight, weight-length relationship, growth curve, length frequency histograms , percentage of females carrying eggs, evolution of sexual maturation stages throughout the year, gonadosomatic and hepatosomatic indexes, size at sexual maturity.
Expected results	Assess the length composition and sex-ratio of P. serratus, estimate its growth parameters, determine the reproduction season and estimate the size at sexual maturity, improve the management of the fishery.
Deliverable	Scientific paper

Methodology to assess catch (discards and/or bycathes) rate

Discard data collection with observer sampling and selfsampling for bottom gillnet, AZTI

General remarks	
Author (s)	Luis Arregi, Nekane Alzorriz, AZTI
Creation	Methodology elaborated especially for the PRESPO project with the fishermen
Study area	Spain, Basque Country
Objective	To characterize the discard in the main gillnet artisanal métiers.
Identification of issue/problem	No relevant information on discards characterization available for these metiers
Metier	
Target species	Hake, Red mullet
By-catch species	Horse mackerel, mackerel, bib, bogue......
Fishing gear studied	Bottom gillnet
Description of the fishing gear studied	Gillnets mesh sizes from 50 mm to 90 mm
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	Freezer for sample conservation and laboratory material for biological analysis.
Method	
Type of study	Dicard characterization study
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	Number of samples not previously fixed, trying to get a minimum number of samples by month.
Which method is used?	Self-sampling by fishermen
_Why that choice of method?	Reduction on experiment cost and maximization of samples number
Other data collected	Characterization of the hauls
Period of experiment	from March 2010 to July 2011
_Why that choice of period of the study period?	Trying to cover all the seasons of the selected gillnet metiers
Preliminary necessary work	Recopilation of all the available information on discards in Basque Country artsisanal fisheries and discussion with fishermen
Data analyses and outputs	
How are the data analyzed?	Charlottelund analysis for data raisin
Expected results	Characterization of discard in artisanal fisheries
Deliverable	PRESPO report

Discard data collection with observer sampling and selfsampling for bottom trammel net, AZTI

General remarks	
Author (s)	Luis Arregi, Nekane Alzorriz, AZTI
Creation	Methodology elaborated especially for the PRESPO project with the fishermen
Study area	Spain, Basque Country
Objective	To characterize the discard in the main trammel net artisanal métiers.
Identification of issue/problem	No relevant information on discards characterization for these métiers.
Metier	
Target species	Sole, Monkfish and Scorpion fish
By-catch species	Horse mackerel, mackerel, Cat shark, bib,......
Fishing gear studied	Bottom trammel net
Description of the fishing gear studied	Trammel nets inner pannel mesh sizes from 90 mm to 120 mm and outer mesh sizes from 500 mm to 600 mm
Material for the exeprimentation	
Type of boat	Fishing vessel
Experimental material	Freezer for sample conservation and laboratory material for biological analysis.
Method	
Type of study	Dicard characterization study
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	Number of samples not previously fixed, trying to get a minimum number of samples by month.
Which method is used?	Self-sampling by fishermen
_Why that choice of method?	Reduction on experiment cost and maximization of samples number
Other data collected	Characterization of the hauls
Period of experiment	from March 2010 to July 2011
_Why that choice of period of the study period?	Trying to cover all the season of the selected trammel net metiers
Preliminary necessary work	Recopilation of all the available information on discards in Basque Country artsisanal fisheries and discussion with fishermen
Data analyses and outputs	
How are the data analyzed?	Charlottelund analysis for data raisin
Expected results	Characterization of discard in artisanal fisheries
Deliverable	PRESPO report

Comparison of three different shrimp fishing gears, IPIMAR

General remarks	
Author (s)	IPIMAR, Batista et al., 2009; Matsuoka, 2008; Emanuelsson, 2008; Fahy, 2006; Ceia, 2002; Kelly et al., 2008; Vázquez-Rowe et al., 2010;
Creation	Methodology created for the PRESPO projetc to compare three fishing gears
Study area	Portugal, Norte
Objectives	Determine and compare the catch and by-catch of three different shrimp gears (sombreira liftnet, bombos traps and beam trawl).
Identification of issue/problem	Which one of the three gears has less by-catch and which yields the higher catch of *P. serratus*.
Metier	
Target species	*Palaemon serratus*
By-catch species	*Polybius henslowii, Paguridae, Asterias rubens, Marthasterias glacialis, Callyonimus lyra, Crangon crangon*
Fishing gear studied	Sombreira, trap and beam trawl
Description of the fishing gear studied	Sombreira is a rectangular liftnet, made of polyamide with a 18mm mesh size. It has a headrope with floaters and a footrope with sinkers. Bombos traps are round, made up of 2 metalic loops and 25 mm mesh size net. The trap is kept open by pieces of wood. The beam trawl consists of a cone-shaped body thet ends in a codend. The horizontal opening is provided by a 7 m metal beam.
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	GPS; depth, conductivity and salinity probe; scale; caliper; ictiometer.
Method	
Type of study	Catch comparison between 3 gears
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	A total of 61 surveys at sea were conducted: 17 with bombos traps, 25 with sombreira liftnet and 19 with the beam trawl. At each survey samples of the catch and by-catch species were identified, counted, weighed and, whenever possible, measured. Information regarding the fishing effort was also recorded.
Which method is used?	Scientist(s) on board
_Why that choice of method?	For taking sampling decisions and "in situ" data sampling
Other data collected	Water temperature, salinity, conductivity, depth and geographical coordinates
Period of experiment	March 2009 to March 2010, Every month
_Why that choice of period of the study period?	To study the possible seasonal catch and by-catch changes in the fishery
Data analyses and outputs	
How are the data analyzed?	Determine the fishing effort and total catch per unit effort (CPUE) for each fishing gear. Determine the frequency, abundance, total biomass, mean weight and mean length for each species. Size-frequency histograms for the target species and for the most frequent bycatch species. Determine the catch species composition of each gear used.
Expected results	Describe the fishing gears and their mode of operation; characterize and compare the catches from the three fishing gears and determine the bycatch ratio; determine catch per unit effort (CPUE) of the target and bycatch species throughout the year; relate the environmental parameters with the catch per unit effort (CPUE); propose management measures for P. serratus fishery.
Deliverable	Scientific paper

Analyse catches from the cuttlefish trap fishery, IPIMAR

General remarks	
Author (s)	IPIMAR
Creation	Methodology elaborated for the PRESPO project and with fishermen
Study area	Portugal, Algarve
Objectives	Analyse catches from the cuttlefish trap fishery that occurs on the Algarve coast (southern Portugal) in terms of catch composition, fishing yield, bycatch and discards; characterisation of the cuttlefish catch
Metier	
Target species	*Sepia officinalis*
By-catch species	*Balistes carolinensis, Conger conger, Dicentrarchus labrax, Diplodus annularis, D. puntazzo, D. vulgaris, Halobatrachus didactylus, Mullus surmuletus, Phycis phycis, Spondyliosoma cantharus, Symphodus bailloni, Maja squinado, Octopus vulgaris, Hippocampus hippocampus, Syngnathus acus*
Fishing gear studied	Trap
Description of the fishing gear studied	The cuttlefish trap has a rectangular shape and comprises a steel frame covered with a 35mm plastic quadrat mesh. The funnel entrance is placed in one of the small sides of the trap. On the top of the trap exists a small "door" to remove the catch. The traps are set in a string or singly with a line to the surface where it is supported by a buoy and is anchored with flat stones to sink them and reduce their movement on the ocean floor. Bushes that will act as spawning substrate are attached to the opposite side of the funnel entrance.
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	GPS; ichtyometer or a digital caliper; top loading electronic balance; multi-parameter sounder
Method	
Type of study	By-catch
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	A total of 20 to 28 fishing trials were carried out per year. The traps were set individually on sandy bottoms at depths ranging from 3 to 6m depth which is the typical fishing depth for the cuttlefish trap fishery. For each fishing trip it was registered the coordinates, the duration of each fishing operation, the number of traps hauled and the number of individuals caugth per trap and per species. In 2011 environemental parameters are also collected at the begginning and end of ecah fishing trial. Since the number of traps varied during the sampling period, between 48 and 90 traps, data was standardized to 50 traps. For each trap, the catch was sorted into target (cuttlefish) and non-target (bycatch) species. To each bycatch individual caugth it was attributed a condition status score (dead, moribund, healthy) to have an idea of the fate of discards.
Which method is used?	Scientist(s) on board
_Why that choice of method?	For taking sampling decisions and "in situ" data sampling
Other data collected	Environmental parameters. To understand if there exists a relationship between the cuttlefish catches and environmental parameters.
Period of experiment	2009 -2011, May - October
_Why that choice of period of the study period?	Is the spawning season of cuttlefish
Data analyses and outputs	

How are the data analyzed?	For each trap hauled it was recorded the number of cuttlefish and bycatch caught. On land, all individuals caught were measured to nearest mm (using an ichtyometer or a digital caliper), weighted to nearest g (using a top loading electronic balance) and sexed in the case of cuttlefish. Dorsal mantle length (ML), total length (TL) and carapace length (CL) was measured for cuttlefish, fishes and crabs, respectively. Sex-ratios were tested against a 1:1 ratio with χ^2 statistics; The relationship between specimen size (ML) and total weight (TW) for males and females was investigated through regression analysis (least squares method), by fitting the power function (Y=aXb) to raw data and the slopes of linear regressions for males and females were compared using a t-test (Ho: $\beta M = \beta F$; HA: $\beta M \neq \beta F$) (Zar, 1996), with statistical significance at $P < 0.05$. To evaluate differences between L-F against sex, the Kolmogorov-Smirnov goodness of fit test (K-S) for two samples [Ho: FA (x) = FB (x)] was applied, with a significance level of ±95%; ANAVA to compare catches between years.
Expected results	Assess catch composition, sex ratio, weight-length relationship and length-frequency distributions
Deliverable	PRESPO report Conference talk and scientific paper

Characterization of the skate fishery in the central coast of Portugal, IPIMAR

General remarks	
Author (s)	IPIMAR, Serra-Pereira and Figueiredo
Creation	Methodology elaborated with the fishermen under the PhD project on skates fishery, biodiversity and conservation
Study area	Portugal, Centro
Objectives	Identify the different fishing segments catching skates in the centre of Portugal. Identify possible seasonal target fisheries.
Identification of issue/problem	(1) Characterization of the fishing fleet landing skates: number of vessels and their main technical features; (2) Characterization of the fishing trips: identification and characterization of the main fishing gears used and species landed; (3) Fishery seasonality; (4) Identification of the main fishing grounds; and (5) Estimation of the fishing effort.
Metier	
Target species	Skates (Rajidae)
By-catch species	*Solea solea, Dicentracus labrax, Lophius spp., Zeus faber, Diplodus vulgaris*
Fishing gear studied	Trammel net
Description of the fishing gear studied	Fishing net with three layers of netting, where the external nets have a mesh size larger than 200 mm.
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	NA (landing port sampling based on interviews to the fisherman)
Method	
Type of study	Fishery description
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	Sampling two to four times a month at Peniche landing port. Random selection of fishing trips with landings of skates.
Which method is used?	Self-sampling by fishermen
_Why that choice of method?	To maximize the number of samples taken by month.
Other data collected	Fishing effort (soaking time and number of nets), fishing ground of each operated fishing gears, daily landings data, vessels specifications,
Period of experiment	Jan-Jul, Sep-Nov 2010
_Why that choice of period of the study period?	To cover the seasonality of the fishery
Data analyses and outputs	
How are the data analyzed?	Fishing seasonality, target species population dynamic, by-catch species diversity, multivariate data analysis (e.g. tree-based analysis, flexible discriminant analysis)
Expected results	1. Characterize the fishing fleet landing skates. 2. Characterize the skate fishery seasonality. 3. Identify the main fishing grounds where skates are caught and characterize them in terms of skate species composition. 4. Identify fishing patterns of the fleet catching skates, in terms of fishing gears used, target species or top species caught and main skate species landed by fishing regime. 5. Estimate fishing effort and CPUE.
Deliverable	PRESPO report

Tangle net selectivity and assessment of discards on the Culatra Wedge sole fishery, IPIMAR

General remarks	
Author (s)	IPIMAR, Miguel Neves dos Santos
Creation	Methodology elaborated for the PRESPO project and with the fishermen
Study area	Portugal, Algarve
Objectives	To estimate the tangle net selectivity and assess the discards on the Culatra wedge sole fishery
Identification of issue/problem	Illegal fishery as mesh size of the net is below the legal size (60 mm)

Metier	
Target species	Dicologoglossa cuneata
By-catch species	*Microchirus azevia, Mullus surmuletus, Pagellus acarne* and *Merluccius merluccius*
Fishing gear studied	Tangle net
Description of the fishing gear studied	Tangle net with a mesh size of 45 and 50 mm. The float rope does not have buoys.

Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	Tangle nets constructed by the fishermen

Method	
Type of study	Catch comparison between 2 gears (a gear-indicator and the gear tested)
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	All the catches are sampled by mesh size: counted, weighted and measured. The target species was sexed and the maturity stage registered.
Which method is used?	Scientist(s) on board
_Why that choice of method?	Onboard observers were used as fishermen are used to practices (routine) which makes the collection of all specimens impossible (traditionally species are immediately discarded)
Other data collected	Geographical coordinates of fishing sites and depth
Period of experiment	2009-2011 (year round)
_Why that choice of period of the study period?	Fishermen target the wedge sole year round
Preliminary necessary work	No testing was necessary. Meetings were helded with fishermen

Data analyses and outputs	
How are the data analyzed?	In terms of selectivity usingGILLNET package and with standard methodologies from what concerns bycatch and discards
Expected results	Provide technical guidance for fisheries managers on the possibility to make the fishery legal (or not)
Deliverable	PRESPO report

Selectivity and discards of the artisanal gillnet for red mullet (*Mullus surmuletus*) off the coast of Asturias (NW Spain) and implications for fishery management, CEP

General remarks	
Author (s)	Fernández Rueda, M.P., García Flórez, L., Alcázar ,J., Herrador, R. and A. Muñoz, CEP
Creation	Methodology elaborated especially for the PRESPO project
Study area	Spain, Principado de Asturias
Objectives	To study the selectivity and discards using different gillnet height and mesh size combinations for red mullet
Identification of issue/problem	Fishermen asked for the increase in height for the red mullet gillnet

Metier	
Target species	*Mullus surmuletus*
By-catch species	Main species: *Merluccius merluccius*, *Boops boops*, *Trachurus trachurus*.
Fishing gear studied	Bottom gillnet
Description of the fishing gear studied	The red mullet gillnet is a bottom gillnet composed of several net sheets each of 50 m long. The mesh size is over 50 mm and the maximum gear heigh is 3. It is used by artisanal vessels generally in depths under 80 m adn during the late spring and summer seasson.

Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	Two experimental gears (3m and 5 m high), each one of 1000 m long were arranged combining different mesh sizes. Each gear was composed of 20 sheets of 50 m long and 4 different stretched mesh lengths (53, 60, 75 and 87 mm). Sheets of the fous different meshes where placed alternately in each gear ir order to give them the same catch probability. The distance between sheets was 3m.

Method	
Type of study	Catch comparison between 2 gears (a gear-indicator and the gear tested)
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	The study involved 18 experimental fishing days, 3 each month, between may and october 2010. The surveys were carried out in waters close to the port of Lastres, in the eastern coast of Asturias, at depths between 12 and 70 m. Each fishig day the two experimental gears were used under proffesional conditions, with the setting of the gear before sunrise and hauling 3/5 hours later.
Which method is used?	Scientist(s) on board
_Why that choice of method?	To ensure the collection of all the catches (commercial species and discards) and to ensure the classification of the catches coming on board from each type of sheet
Other data collected	Depth, meteorological conditions, the setting and hauling time, setting and hauling coordinates
Period of experiment	From May to October 2010
_Why that choice of period of the study period?	Because it involved the period of traditional red mullet gillnet fishing
Preliminary necessary work	Preliminar study of artisanal net gears in Asturias: selectivity and discards (Prespo report, April 2010); Revision of scientific literature concerning gillnet selectivity and discards

Data analyses and outputs	
How are the data analyzed?	Selectivity indexes, selectivity curves (SELECT method), length frequency distributions. By-catch species diversity, statistical analysis of discard rates
Expected results	Gears selectivity, by-catch composition, discard rates
Deliverable	PRESPO report Scientific paper

Comparison of the catches between clam and hydraulic dredge, IFAPA

General remarks	
Author (s)	IFAPA, Leonori & Fiorentini, 1999
Creation	Methodology elaborated for the study of demersal resources in general
Study area	Spain, Gulf of Cádiz
Objectives	Evaluate the catched and non catched resources in active gears
Identification of issue/problem	The presence of undersized target species and associated by-catch (benthic macroinvertebrate) together with the commercial-size target species in dredges for shellfish fishery

Metier	
Target species	Striped venus (*Chamelea gallina*) and wedge shell (*Donax trunculus*)
By-catch species	*Echinocardium cordatum, Mactra corallina, Liocarcinus vernalis, Ophiura texturata, Spisula subtruncata, Diogenes pugilator*
Fishing gear studied	Dredge
Description of the fishing gear studied	Clam and hydraulic dredge. The first one is made of a rigid iron structure with a toothed lower bar and a collecting system of metallic grid cage and the second one consists of an array of backward facing jets, for fluidising the sediment, mounted ahead of a rectangular collecting box of 2,5 m width open at the front end.

Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	Van Veen dredge, sieves, termometer, Secchi disk, water sampling bottle. In laboratory, balance, gauge, binocular microscopy

Method	
Type of study	Catch comparison between 2 gears (a gear-indicator and the gear tested)
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	Six bimonthly surveys in two different areas consisting in three samples for each species and gear. Samples were collected between 1 and 3 m depth for *D. trunculus* and 5 to 8 m for *C. gallina* by 5 minutes fishing trawling.
Which method is used?	Scientist(s) on board
_Why that choice of method?	For taking sampling decisions and "in situ" data sampling
Other data collected	Environmental water parameters (Temperature, turbidity, total suspended solids, chlorophyll and dissolved nutrients) and sediment granulometry and organic matter content
Period of experiment	January-March-May-July October-December 2010
_Why that choice of period of the study period?	To study the possible seasonal changes and by-catch in catches along the year

Data analyses and outputs	
How are the data analyzed?	Selectivity curves, target species population dynamic, by-catch species diversity, multivariate data analysis
Expected results	Gears selectivity, by-catch composition, seasonal variation of benthic community
Deliverable	PRESPO report

Test of fish pots on board of commercial vessels, IFREMER

General remarks	
Author (s)	Sonia Méhault and Fabien Morandeau, IFREMER
Creation	Methodology especially elaborated for the PRESPO project with the fishermen
Study area	France, Bay of Biscay
Objectives	Assess the potential of capture of fish pots in the artisanal fisheries of the bay of Biscay
Identification of issue/problem	Artisanal fishermen show a growing interest to diversify their fishing activity in a responsible and sustainable way. The fish pots show an interesting catch potential in Northern European countries, but no information on this technique is available along the French coastline. It is necessary to better understand how this technique could target and catch local commercial species.
Metier	
Target species	Any commercial fish species
Fishing gear studied	Pot
Description of the fishing gear studied	Fish pots available on the Euroepan market, as well as pots specifically designed in a previous French project (ITIS) have been lent and used by fishermen. Various concepts of color, mesh size, weight, entrance shape and position have been tested.
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	No experimental material. All tests were done by fishermen who filled fishing forms after having used the pots lent (voluntary basis).
Method	
Type of study	Description of catches made with the pots lent
What is analyzed?	All the commercial species caught
Describe the analyse (sample or all the catches)	Fish pots were lent to fishermen in order to use them under commercial conditions. They had to explore themselves how to use the gears in an optimum way.
Which method is used?	Self-sampling by fishermen
_Why that choice of method?	Fishermen have good knowledge of sectors with fish abundance, and a good knowledge of fish behaviour. Test of fish pots on board of commercial vessels are complementary to the experiments carried out on board of research vessels.
Other data collected	Type of sea bed, weather, depth, type of bait, duration of pot immersion
Period of experiment	2009 and 2010, all along the year
Preliminary necessary work	Observation of fish pots in flume tank to observe their behaviour in the water current.
Data analyses and outputs	
How are the data analyzed?	The catch capacity of each pot model and bait used are compared
Expected results	Identify the best performing gears and their optimum implementation (type of bait, duration of immersion, etc.).
Deliverable	Internal Ifremer report + PRESPO report.

Assessement of discarded *Nephrops* survival rate, IFREMER

General remarks	
Author (s)	Sonia Méhault and Fabien Morandeau, IFREMER
Creation	Methodology elaborated especially for the PRESPO project with the fishermen
Study area	France, Bay of Biscay
Objectives	Up-date the survival rate of discraded nephrops after trawling in the bay of Biscay
Identification of issue/problem	The last discarded nephrops survival rate evaluation in the bay of Biscay was conducted in 1975. The values obtained are still used in the ICES stock assessment procedure though the gears used by fishermen changed considerably between the seventies and today. Therefore there is a need to update and improve the Nephrops survival rate.
Metier	
Target species	*Nephrops norvegicus*
By-catch species	Hake and fish species, but not very relevant in that experiment
Fishing gear studied	Bottom trawl
Description of the fishing gear studied	Twin trawl, 70 or 80mm mesh codend, top square mesh panel for fish escapement
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	The study was conducted in two steps: (1) the vitality state of nephrops just before being discarded is assessed directly on board. (2) The survival rate of nephrops discarded alive was assessed using perforated plastique tubes and oysters bags for re-immersion on the sea bed
Method	
Type of study	Assessement of survival rate of discarded nephrops from trawlers
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	The vitality state of nephrops just before being discarded was assessed directly on board, 8 sea trials have been conducted to sample 33 hauls. To assess the survival rate of nephrops discarded alive, 3 sea trials were conducted, and for each of them 5 hauls were sampled. All hauls were conducted under commercial conditions.
Which method is used?	Scientist(s) on board
_Why that choice of method?	Because the catch had to be treated under commercial conditions to get representative duration of emersion of nephrops to be discarded, the crew was not available to contribute to the experiment.
Other data collected	Biological data: length, sex, number of pincers and vitality state of discarded *Nephrops*. External data: Air temperature, duration of emersion, total catch volume, tow duration
Period of experiment	2009 and 2010 - Step (1): Assessement of the vitality state of *Nephrops* just before being discarded: 8 trials all along the year. Step (2) : Assessement of the survival rate of *Nephrops* discarded alive: July and october
_Why that choice of period of the study period?	Step (1): cover the whole fishing period. Step (2): compromise between boat availaibity to do the specific sea trials and the highest intensity of nephrops fishing.
Data analyses and outputs	
How are the data analyzed?	The variability in survival rate is analysed statistically with respect to biological and external parameters.
Expected results	Range of percentage of survival rate.
Deliverable	Working document presented to the ICES Nephrops working Group + PRESPO report.

Perforated plastic tubes for re-immersion of individual discarded *Nephrops*

Osters bag for immersion of tubes

Methodology to assess and/or improve selectivity

Methodology for selectivity study in gillnets, AZTI

General remarks	
Author (s)	Luis Arregi, Nekane Alzorriz, AZTI
Creation	Methodology elaborated with the fishermen and usually used for selectivity experiments on gillnets
Study area	Spain, Basque Country
Objectives	To describe the seelctivity of the small meshed gillnets used for red mullet
Identification of issue/problem	A request from fishermen to increase the mesh size in the red mullet fishery
Metier	
Target species	Red mullet
By-catch species	Horse mackerel, bogue
Fishing gear studied	Gillnet
Description of the fishing gear studied	Gillnets with small mesh sizes
Material for the exeprimentation	
Type of boat	Fishing vessel
Experimental material	Experimental gillnets with 47- 50 and 53 mm mesh sizes.
Method	
Type of study	Selectivity comparison between differente mesh sizes (47 mm, 50 mm, 53)
What is analyzed?	A sample of the catches (all the red mullets are masured)
Describe the analyse (sample or all the catches)	The number of set depends on the quantity of fish catched to determine the selectivity.
Which method is used?	Scientist(s) on board
_Why that choice of method?	Because for selectivity experiments scientist on board is needed
Other data collected	No
Period of experiment	August 2010 and July 2011
_Why that choice of period of the study period?	Fishing season for small meshed gillnets targeting red mullet
Preliminary necessary work	Recopilation of information on the fishery, boats involved, areas and gears used and agreement with fishermen
Data analyses and outputs	
How are the data analyzed?	With Constat Software
Expected results	Selectivity parameters for tested meshes
Deliverable	PRESPO report

Study of bycatch reduction devices (BRD) in clam dredges, IPIMAR

General remarks	
Author (s)	IPIMAR
Creation	Methodology elaborated especially for the PRESPO project
Study area	Portugal, Algarve
Objectives	Evaluate a possible introduction of bycatch reduction devices (BRD) in clam dredges
Identification of issue/problem	In certain areas the porportion of bycatch can reach 50% of total catch
Metier	
Target species	*Spisula solida, Chamelea gallina, Donax trunculus*
By-catch species	Cnidaria, Nemertina, Polychaeta, Gastropoda, Bivalvia, Cephalopoda, Echinodermata, Decapoda and Vertebrata
Fishing gear studied	Dredge
Description of the fishing gear studied	Clam dredges are comprised of a metallic frame, a toothed lower bar and a rectangular metallic grid box to retain the catch. The length of the teeth used in dredges varies according to the target species and takes into account the maximum burrowing depth of the species being harvested. Usually, the length of the teeth used to catch clams does not exceed 20 cm, whilst in the case of the razor clam fishery, the tooth length may reach 60 cm.
Material for the experimentation	
Type of boat	Research vessel
Experimental material	top loading electronic balance; digital calliper or an ichtyometer
Method	
Type of study	Selectivity (gear with a cover to retain all the catches; panels of different mesh sizes; BRD)
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	Six types of BRDs were tested and consist of a rigid grid, made of stainless steel mounted at a 45-50º degree angle in the middle of the retention system of the dredge aiming to guide part of bycatch individuals and debris to an opening on the top of the dredge. Three of the BRDs had a square mesh grid (mesh size of 31, 41 and 51mm) whereas the other 3 were constitute by a grid with 31, 41 or 51mm bar spacing. To compare the catch from dredges equipped with BRDs with standard dredges, two identical dredges were towed simultaneously side-by-side. For each BRD, 5 to 11 tows were performed. Every tow was conducted for 5 min at 2 knots, the speed currently used by commercial dredgers. The duration of dredge hauls was measured from the time the winch stopped paying out the towing cable to the time when the winch was restarted. For the two sampling periods a total of 96 tows were performed. The catches were sorted onboard and the debris fraction was weighed. For each tow, damaged specimens were immediately recorded, weighed and whenever possible measured.
Which method is used?	Scientist(s) on board
_Why that choice of method?	For taking sampling decisions and "in situ" data sampling
Period of experiment	2009 and 2010, May or June
_Why that choice of period of the study period?	Weather conditions
Data analyses and outputs	
How are the data analyzed?	BRD reduction rates, catch and bycatch composition, fishing yields, damaged and debris weight, length-frequency distributions, analyses of variance ANOVA or Kruskal–Wallis ANOVA for comparison of overall proportions, Student–Newman-Keuls test for multiple comparisons, two sample t-test or Mann–Whitney test ; Kolmogorov–Smirnov test.

Expected results	To understand if the use of BRDs is effective in reducing bycatch, debris and damage but at the same without decreasing significantly fishing yields; To determine if BRDs can be used in the bivalve dredge fishery.
Deliverable	PRESPO report Conference talk and scientific paper

Tangle net selectivity and assessment of discards on the Culatra Wedge sole fishery, IPIMAR

General remarks	
Author (s)	IPIMAR, Miguel Neves dos Santos
Creation	Methodology elaborated for the PRESPO project and with the fishermen
Study area	Portugal, Algarve
Objectives	To estimate the tangle net selectivity and assess the discards on the Culatra wedge sole fishery
Identification of issue/problem	Illegal fishery as mesh size of the net is below the legal size (60 mm)

Metier	
Target species	*Dicologoglossa cuneata*
By-catch species	*Microchirus azevia, Mullus surmuletus, Pagellus acarne* and *Merluccius merluccius*
Fishing gear studied	Tangle net
Description of the fishing gear studied	Tangle net with a mesh size of 45 and 50 mm. The float rope does not have buoys.

Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	Tangle nets constructed by the fishermen

Method	
Type of study	Catch comparison between 2 gears (a gear-indicator and the gear tested)
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	All the catches are sampled by mesh size: counted, weighted and measured. The target species was sexed and the maturity stage registered.
Which method is used?	Scientist(s) on board
_Why that choice of method?	Onboard observers were used as fishermen are used to practices (routine) which makes the collection of all specimens impossible (traditionally species are immediately discarded)
Other data collected	Geographical coordinates of fishing sites and depth
Period of experiment	2009-2011 (year round)
_Why that choice of period of the study period?	Fishermen target the wedge sole year round
Preliminary necessary work	No testing was necessary. Meetings were helded with fishermen

Data analyses and outputs	
How are the data analyzed?	In terms of selectivity using GILLNET package and with standard methodologies from what concerns bycatch and discards
Expected results	Provide technical guidance for fisheries managers on the possibility to make the fishery legal (or not)
Deliverable	PRESPO report

Selectivity and discards of the artisanal gillnet for red mullet (*Mullus surmuletus*) off the coast of Asturias (NW Spain) and implications for fishery management, CEP

General remarks	
Author (s)	Fernández Rueda, M.P., García Flórez, L., Alcázar, J., Herrador, R. and A. Muñoz, CEP
Creation	Methodology elaborated especially for the PRESPO project
Study area	Spain, Principado de Asturias
Objectives	To study the selectivity and discards using different gillnet height and mesh size combinations for red mullet
Identification of issue/problem	Fishermen asked for the increase in height for the red mullet gillnet

Metier	
Target species	*Mullus surmuletus*
By-catch species	Main species: *Merluccius merluccius, Boops boops, Trachurus trachurus*.
Fishing gear studied	Bottom gillnet
Description of the fishing gear studied	The red mullet gillnet is a bottom gillnet composed of several net sheets each of 50 m long. The mesh size is over 50 mm and the maximum gear heigh is 3. It is used by artisanal vessels generally in depths under 80 m adn during the late spring and summer seasson.

Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	Two experimental gears (3m and 5 m high), each one of 1000 m long were arranged combining different mesh sizes. Each gear was composed of 20 sheets of 50 m long and 4 different stretched mesh lengths (53, 60, 75 and 87 mm). Sheets of the fous different meshes where placed alternately in each gear ir order to give them the same catch probability. The distance between sheets was 3m.

Method	
Type of study	Catch comparison between 2 gears (a gear-indicator and the gear tested)
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	The study involved 18 experimental fishing days, 3 each month, between may and october 2010. The surveys were carried out in waters close to the port of Lastres, in the eastern coast of Asturias, at depths between 12 and 70 m. Each fishig day the two experimental gears were used under proffesional conditions, with the setting of the gear before sunrise and hauling 3/5 hours later.
Which method is used?	Scientist(s) on board
_Why that choice of method?	To ensure the collection of all the catches (commercial species and discards) and to ensure the classification of the catches coming on board from each type of sheet
Other data collected	Depth, meteorological conditions, the setting and hauling time, setting and hauling coordinates
Period of experiment	From May to October 2010
_Why that choice of period of the study period?	Because it involved the period of traditional red mullet gillnet fishing
Preliminary necessary work	Preliminar study of artisanal net gears in Asturias: selectivity and discards (Prespo report, April 2010); Revision of scientific literature concerning gillnet selectivity and discards

Data analyses and outputs	
How are the data analyzed?	Selectivity indexes, selectivity curves (SELECT method), length frequency distributions. By-catch species diversity, statistical analysis of discard rates
Expected results	Gears selectivity, by-catch composition, discard rates
Deliverable	PRESPO report Scientific paper

Selectivity of T90 codend, IFREMER

General remarks	
Title	Selectivity of T90 codend
Author (s)	Sonia Méhault and Marc Meillat, IFREMER
Creation	Methodology especially elaborated for the PRESPO project
Study area	France, Bay of Biscay
Objectives	Assess the escapement from trawl codend of hake and *Nephrops* below commercial size
Identification of issue/problem	The nephrops trawl fishery generates high rate of discards in the mixed *Nephrops*/fish fishery of the bay of Biscay. There is a need to improve significantly the selectivity of the trawl gears used in this fishery.
Metier	
Target species	*Nephrops norvegicus,* Hake *(Merluccius merluccius)*
By-catch species	other fish species (horse maquerel, blue whiting)
Fishing gear studied	Bottom trawl
Description of the fishing gear studied	Twin trawl, 70mm mesh codend set as T90 (turn at 90° to open the mesh)
Material for the experimentation	
Type of boat	Research vessel
Experimental material	The test gear (with T90 codend) is compared to a standard trawl gear
Method	
Type of study	Catch comparison between 2 gears (a gear-indicator and the gear tested)
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	The catches of the test and standard gears are analysed separately. The species are separated, identified, weighed and the individuals are measured. If a high quantity of one species is caught, a sub-sample is done.
Which method is used?	Scientist(s) on board
Other data collected	Position and duration of hauls, geometry of the gear.
Period of experiment	Spring - May 2009
_Why that choice of period of the study period?	Suitable period to catch *Nephrops* with trawl
Preliminary necessary work	Small scale T90 gear tested in flume tank of Ifremer Lorient
Data analyses and outputs	
How are the data analyzed?	Modelisation of catch comparison data based on Holst and Revill method (Holst, R., Revill, A., 2009. A simple statistical method for catch comparison studies. Fisheries research, 95, 254-259)
Expected results	Percentage of escapament reached with a T90 codend better than the one reach with a simple top square mesh panel.
Deliverable	Internal Ifremer report and PRESPO report

Bottom trawl and selectivity devices, Aglia

General remarks	
Author (s)	Aglia: Thierry Guigue, Benoit Figarède
Creation	Methodology especially elaborated for the PRESPO project with fishermen
Study area	France, Bay of Biscay
Objectives	The methodology has two main objectives: allow a strong implication of fishermen, compare catches from twin bottom trawl.
Identification of issue/problem	Underzise catches for various species, especially hake and *Nephrops*
Metier	
Target species	*Nephrops*
By-catch species	hake, *Nephrops*, whiting…
Fishing gear studied	Bottom trawl
Description of the fishing gear studied	Twin bottom trawl used to catch *Nephrops*
Material for the experimentation	
Type of boat	Fishing vessel
Experimental material	square mesh panel, flexible grid
Method	
Type of study	Catch comparison between 2 gears (a gear-indicator and the gear tested)
What is analyzed?	A sample of the catches
Describe the analyse (sample or all the catches)	about 15 survey of 5 days each year
Which method is used?	Scientist(s) on board
_Why that choice of method?	Because fishermen don't have time to collect those data
Other data collected	General data on the vessel, materiel, weather, fishing strategy. All those data are usefull to analyse the effect of the selectivity devices
Period of experiment	april to september in 2009, 2010 and 2011
_Why that choice of period of the study period?	Because it is the period during which nephrops are targeted by most of the bottom trawlers
Preliminary necessary work	test in scientifics tank and on a scientific vessel
Data analyses and outputs	
How are the data analyzed?	Fishing area, commerciales catches (total weight and individual size) for nephrops, hake, red mullet and sole. Discard quantity (weight or estimatation), *Nephrops* and hake discard (total weight and individual size)
Expected results	a better selectivity pattern for *Nephrops* and hake
Deliverable	PRESPO report

Nephrops pot and fish trap, Aglia

General remarks	
Author (s)	Aglia: Benoit Figarède
Creation	Methodology especially elaborated for the PRESPO project with fishermen
Study area	France, Bay of Biscay
Objectives	The methodology has two main objectives : allow a strong implication of fishermen, analyse catches and tecnical aspects of alternative/complementary fishing gears
Identification of issue/problem	Underzise catches for various species, especially hake and *Nephrops*
Metier	
Target species	*Nephrops*, fish in general
By-catch species	none
Fishing gear studied	Pot
Description of the fishing gear studied	Scottish or Danish *Nephrops* trap and 3 models of fish trap
Material for the experimentation	
Type of boat	Fishing vessel
Method	
Type of study	study focus on a fishing gear efficiency
What is analyzed?	All the catches
Describe the analyse (sample or all the catches)	7 vessels during one year for *Nephrops* pot, 8 vessel during one year for fish trap
Which method is used?	Self-sampling by fishermen
_Why that choice of method?	low cost, an important number of data, real professionnal fishing condition
Other data collected	weather
Period of experiment	april to october in 2010 and 2011
_Why that choice of period of the study period?	because it is the period during which target species are available
Preliminary necessary work	test in scientifcs tank and on a scientific vessel
Data analyses and outputs	
How are the data analyzed?	catch global analyse (species, weight). All the data are in an access database the analyse is done with excel
Expected results	a better knowledge of the gear
Deliverable	PRESPO report