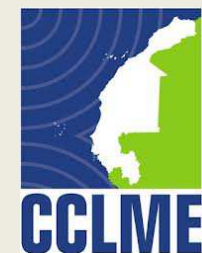




IEO STUDIES ON DISCARDS AND BY-CATCH OF THE SHRIMPER INDUSTRIAL FLEET IN WEST AFRICA



Eva García-Isarch and Zeneida Romero

CCLME Atelier « Sur la Collaboration avec les Armateurs sur l'utilisation des engins de pêches démersales et Formulation des Directives techniques régionales pour améliorer la sélectivité des chaluts de fond et réduire leurs impacts sur l'écosystème »

Nouadhibou (Mauritania), 17-19 June 2014

**A.- IEO STUDIES ON DISCARDS AND BY-CATCH
OF THE SHRIMPER INDUSTRIAL FLEET
IN WEST AFRICA**

1.INTRODUCTION

2.METHODS

3.RESULTS

4.CONCLUSIONS

**B.- PROPOSAL OF AN ACTIVITY PLAN TO SUPPORT
THE COUNTRIES**

**A.- IEO STUDIES ON DISCARDS AND BY-CATCH OF
THE SHRIMPER INDUSTRIAL FLEET IN WEST AFRICA**

INTRODUCTION



- 1) Definitions of by-catch and discard
- 2) Context of the IEO studies on discards and by-catch of the shrimper fleet in West Africa

1) Definitions of by-catch and discard

- **Target catch:** The catch of a species or species assemblage which is primarily sought in a fishery, such as shrimp, flounders, cods.
- **Incidental catch:** Retained catch of non-targeted species.
- **Discarded catch:** (usually shortened to *discards*): That portion of the catch returned to the sea as a result of economic, legal, or personal considerations.
- **Bycatch:** Discarded catch plus incidental catch.

Bycatch= Incidental catch + Discarded catch

Alvertson *et al.*, 1994

- **Discards**, or discarded catch, is that portion of the total organic material of animal origin in the catch, which is thrown away, or dumped at sea for whatever reason. It does not include plant materials and post harvest waste such as offal. The discards may be dead or alive.
- **Bycatch** is the part of a catch that is 'taken incidentally in addition to the target species towards which fishing effort is directed. Some or all of it may be returned to the sea as discards, usually dead or dying'.

FAO Fisheries Glossary <http://www.fao.org/fi/glossary/default.asp>

- **Discards**, or discarded catch, are that portion of the total organic material of animal origin in the catch, which is thrown away or dumped at sea, for whatever reason.
- **Discards are not a subset of bycatch** as the target species is often discarded.
- **Discard rate** is the percentage of the total catch that is discarded.
- **Bycatch** is the total catch of non-target animals.

Kelleher (2005)

Context of the IEO studies on discards and by-catch of the shrimper fleet in West Africa

In compliance with the multiannual EU programme pursuant to Council Regulation establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy (2008/949/EC), the IEO has initiated in 2010 a Programme of Observers on board Spanish shrimper vessels in NW African waters.

- 
- ✚ Concurrent samplings of the catches in EU vessels.
 - ✚ Analysis of discards produced by the EU fleets.
 - ✚ Biological studies of target species.

IEO Program of observers on board Spanish shrimper vessels in West Africa



IEO CÁDIZ

Spanish Shrimper fleet
NW African waters

2010 → MAURITANIA
2012

2011 → GUINEA-BISSAU
2013

OBJECTIVES OF THE IEO PROGRAM OF SCIENTIFIC OBSERVATIONS ONBOARD

- ✦ Identification of species of fish, crustaceans and cephalopods of the retained catch.
- ✦ Identification of main species of fish, crustaceans and cephalopods of the discards.
- ✦ Estimations of weight and number of the retained species.
- ✦ Estimations of weight and number of the discarded species.
- ✦ Length/Size frequency distributions of the species that compound the retained catch (concurrent sampling).
- ✦ Length/Size frequency distributions the species that compound the discards.
- ✦ Estimations of weight, number and length frequency (cephalothorax lengths) by sex, of the target species *Parapenaeus longirostris*, *Farfantepenaeus notialis* and *Aristeus varidens*.
- ✦ Estimations of biological parameters of the target species.
- ✦ Estimation of discards rates

A.- IEO STUDIES ON DISCARDS AND BY-CATCH OF THE SHRIMPER INDUSTRIAL FLEET IN WEST AFRICA

METHODS



Explained in detail in CCLME Atelier «Élaboration d'une méthodologie commune standard d'enregistrement des captures accessoires et des rejets à bord des navires de pêche commerciaux en Afrique de l'Ouest»

Dakar (Senegal), 20-21 March 2013

- 1) Organization of Annual Program of observations
- 2) Scientific Observations Onboard-General Scheme
- 3) Methods of estimating total discard by haul and of sampling discards
- 4) Database
- 5) Estimates of discards rates

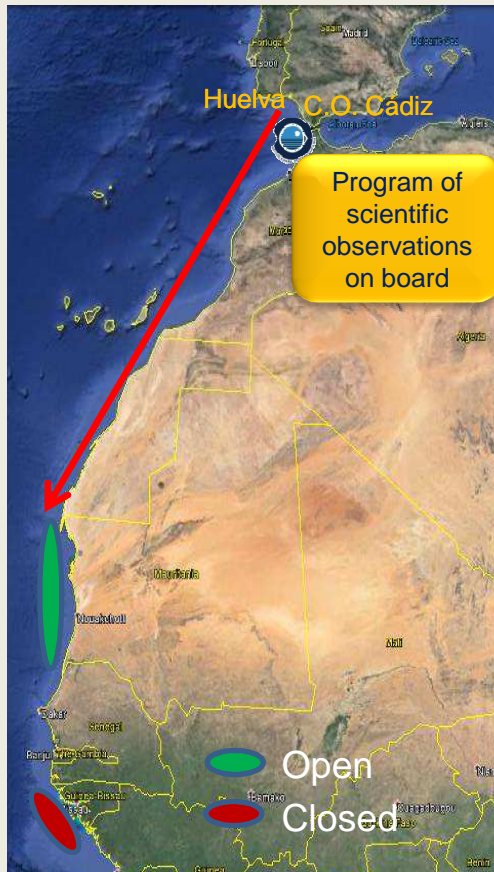
A.- IEO STUDIES ON DISCARDS AND BY-CATCH OF THE SHRIMPER INDUSTRIAL FLEET IN WEST AFRICA

RESULTS

- 1) Observations on board by year and area
- 2) Fishery general information
- 3) By-catch
- 4) Discard rates
- 5) Discards composition by haul type
- 6) Length frequency distributions of discarded species



2) Observations on board by year and area



YEAR	AREA (EEZ)	Fishing trips	Fishing days	REMARKS
2010	Mauritania	4	148	
2011	Guinea-Bissau	4	184	
2012	Mauritania	1	34	Fishery Closure
2013	-	0	0	Fishery Closure
2014	Mauritania	1	62	Currently operative

3) Fishery general information

MAURITANIA 2010

SCIENTIFIC OBSERVATION FISHING TRIP	DATES	FISHING DAYS
LANGAMAU-0110	22 January→9 March	47
LANGAMAU-0210	14 March→12 April	20
LANGAMAU-0310	3 July→4 September	63
LANGAMAU-0410	1 December→ 18 December	18
TOTAL-2010		148

GUINEA-BISSAU 2011

SCIENTIFIC OBSERVATION FISHING TRIP	DATES	FISHING DAYS
LANGABISS-0110	13 March→27 April	44
LANGABISS-0210	2 May→15 June	45
LANGABISS-0310	9 September→13 November	63
LANGABISS-0410	18 November→ 30 December	32
TOTAL-2011		184

MAURITANIA 2010

FISHING HAUL TYPE	TARGET SPECIES	DEPTH RANGE (m)	MEAN DURATION (hours: minutes)	HAUL (Number and %)
LAN	<i>Farfantepenaeus notialis</i>	13-70	2:43	669 (39%)
GAM	<i>Parapenaeus longirostris</i>	93-309	2:04	450 (59%)
ALI	<i>Aristeus varidens</i>	603-731	6:30	24 (2%)

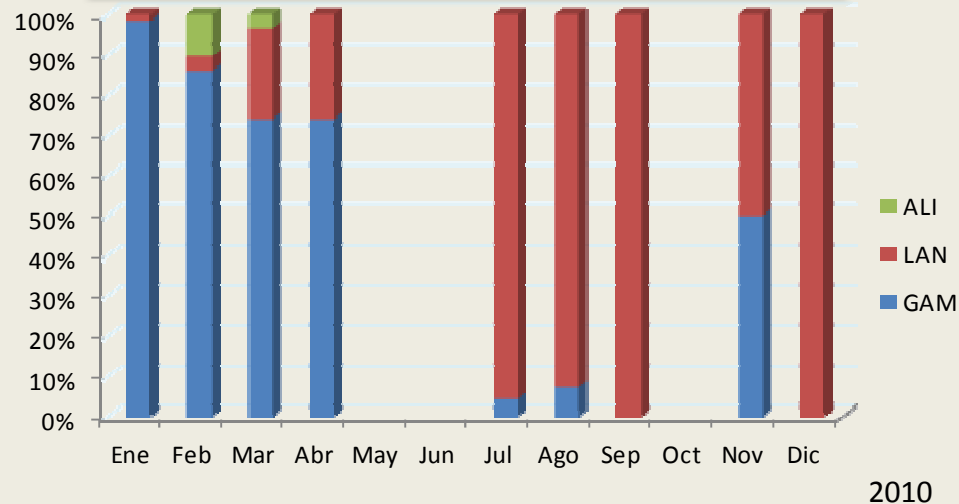
GUINEA-BISSAU 2011

FISHING HAUL TYPE	TARGET SPECIES	DEPTH RANGE	MEAN DURATION (hours: minutes)	HAUL (Number and %)
LAN	<i>F.notialis</i> & <i>P.monodon</i>	14-51	03:20	84 (8%)
GAM	<i>Parapenaeus longirostris</i>	167-430	03:03	615 (61%)
ALI	<i>Aristeus varidens</i>	374-823	04:23	312 (31%)

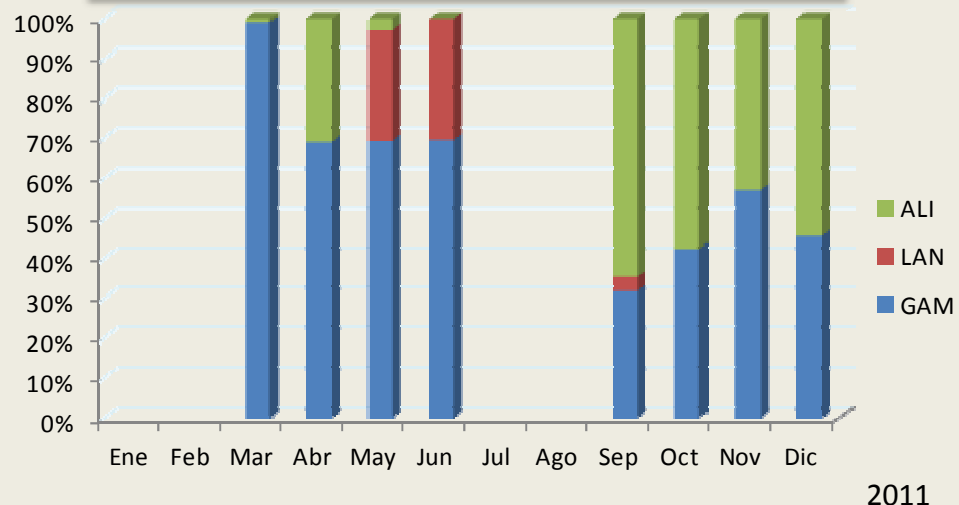
FISHING HAULS

N hauls/month	MAURITANIA 2010	G. BISSAU 2011
Jan	72	
Feb	174	
Mar	193	112
Apr	81	129
May	CLOSED SEASON	182
Jun	CLOSED SEASON	98
Jul	216	
Aug	236	
Sep	34	85
Oct	CLOSED SEASON	163
Nov		130
Dec	137	112
TOTAL	1143	1011

MAURITANIA 2010

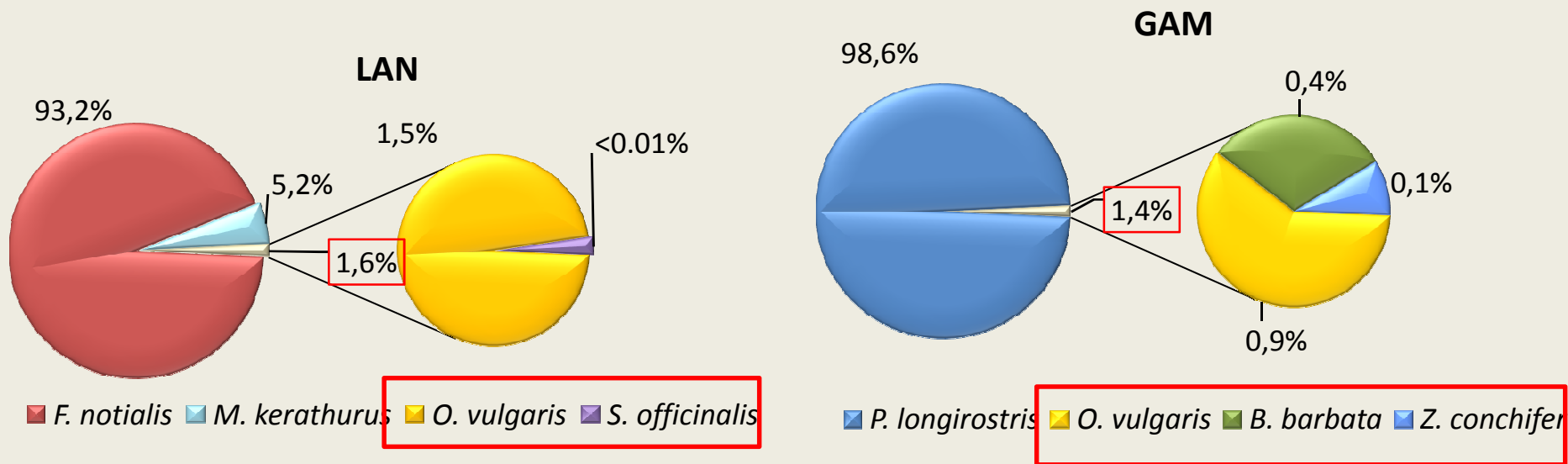


GUINEA-BISSAU 2011



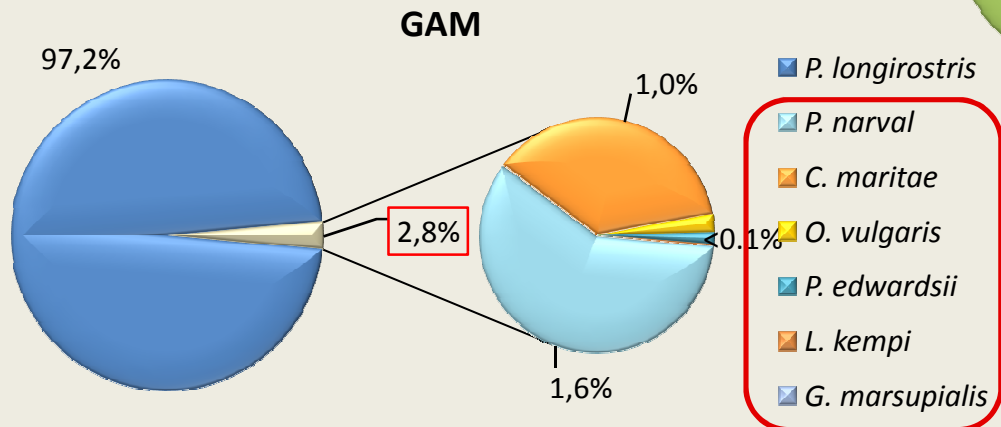
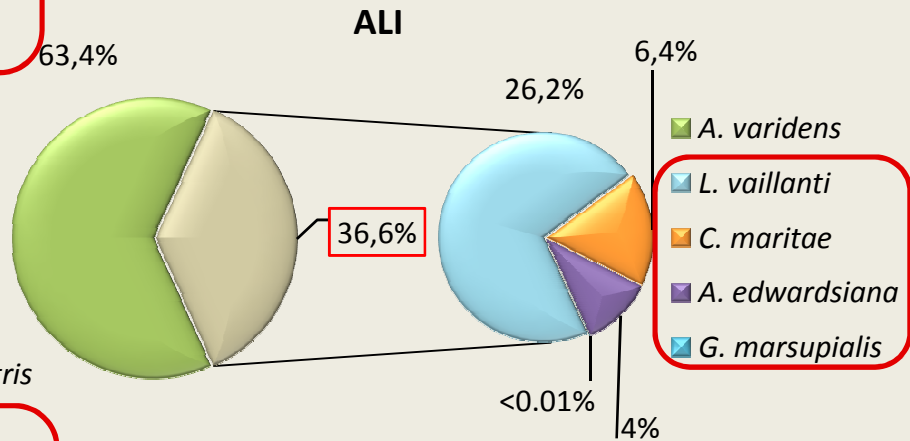
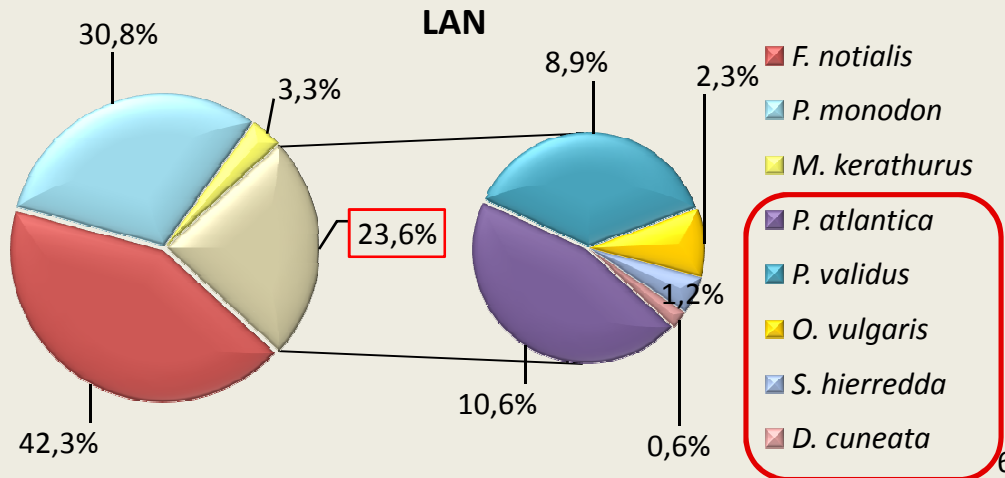
3) By-catch

MAURITANIA 2010



Target species	By-catch species	% By-catch
<i>Farfantepenaeus notialis</i>	<i>O.vulgaris, Sepia spp</i>	1.6%
<i>Parapenaeus longirostris</i>	<i>O.vulgaris, B. barbata, Z. conchifer</i>	1.4%

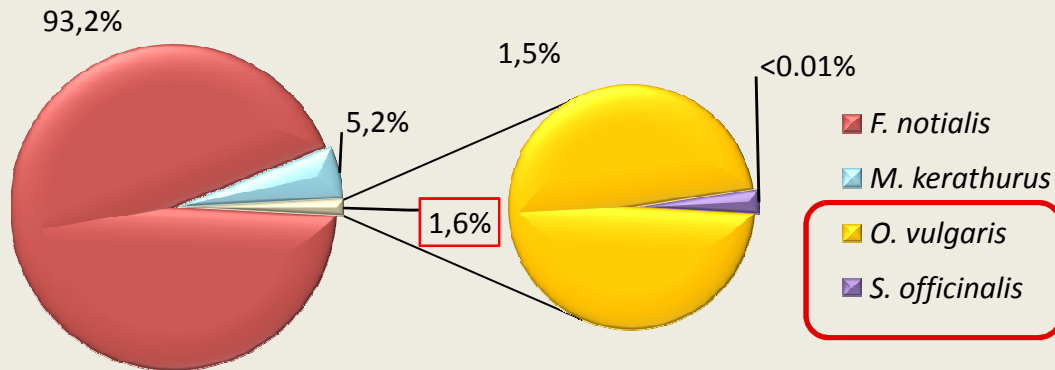
GUINEA-BISSAU 2011



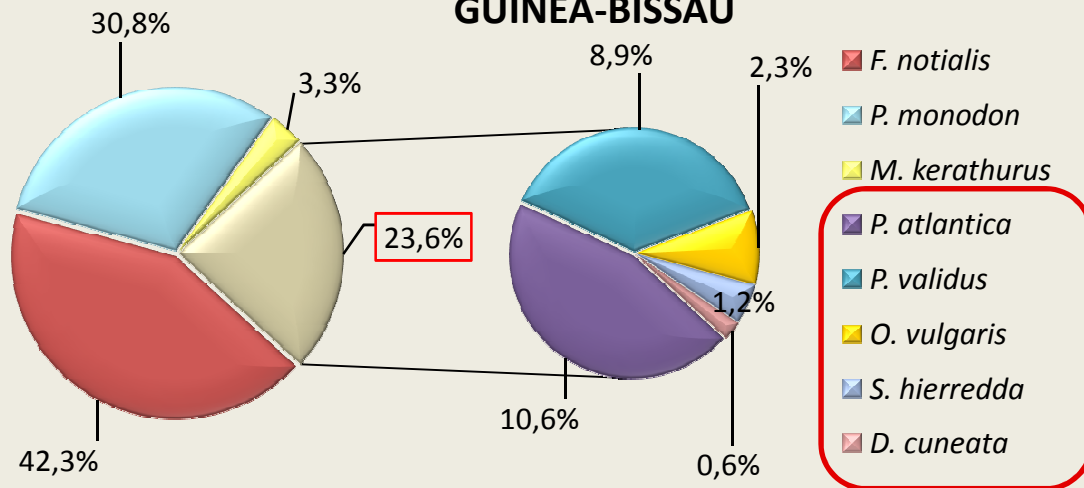
MAURITANIA vs GUINEA-BISSAU

"LAN"

MAURITANIA



GUINEA-BISSAU

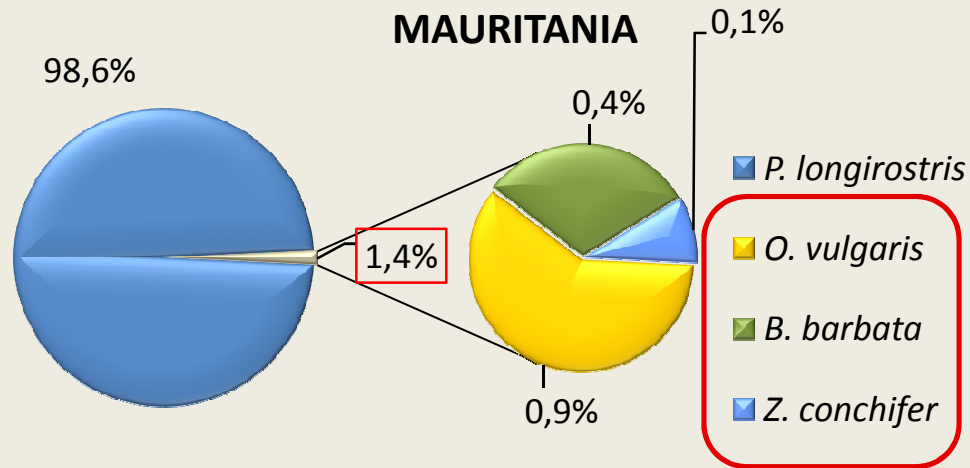


Farfantepenaeus notialis

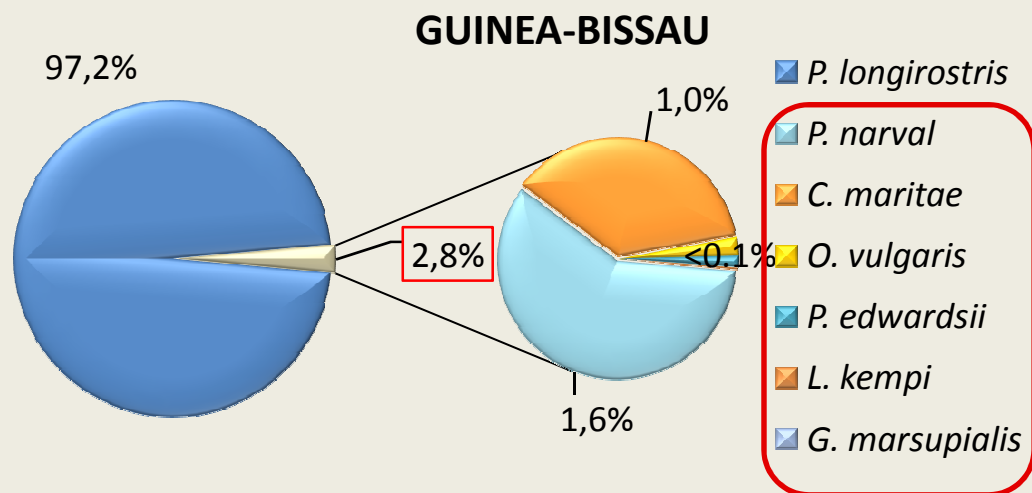
Area (EEZ)	Number of by-catch species	% By-catch
Mauritania	2	1.6%
Guinea-Bissau	5	23.6%

MAURITANIA vs GUINEA-BISSAU

"GAM"



Parapenaeus longirostris



Area (EEZ)	Number of by-catch species	% By-catch
Mauritania	3	1.4%
Guinea-Bissau	6	2.8%

4) Discard rates

TOTAL CATCH (tonnes)	MAURITANIA 2010	GUINEA-BISSAU 2011
LAN	1 580	220
GAM	2 039	797
ALI		243

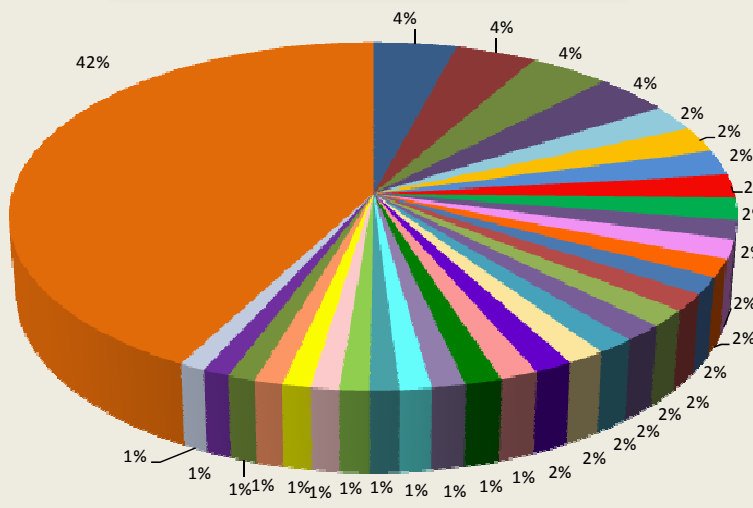
DISCARD RATE kgD:1 kg $C_{target\ sp}$	MAURITANIA 2010	GUINEA-BISSAU 2011
LAN	6.7:1	8.1:1
GAM	2.5:1	3.8:1
ALI	-	14.1:1

TOTAL DISCARD (tonnes)	MAURITANIA 2010	GUINEA-BISSAU 2011
LAN	10 592	1 780
GAM	5 098	3 028
ALI		3 420

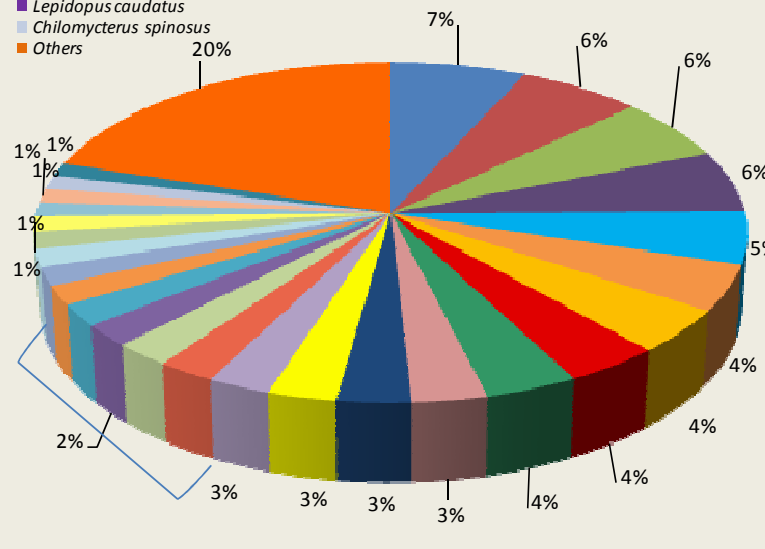
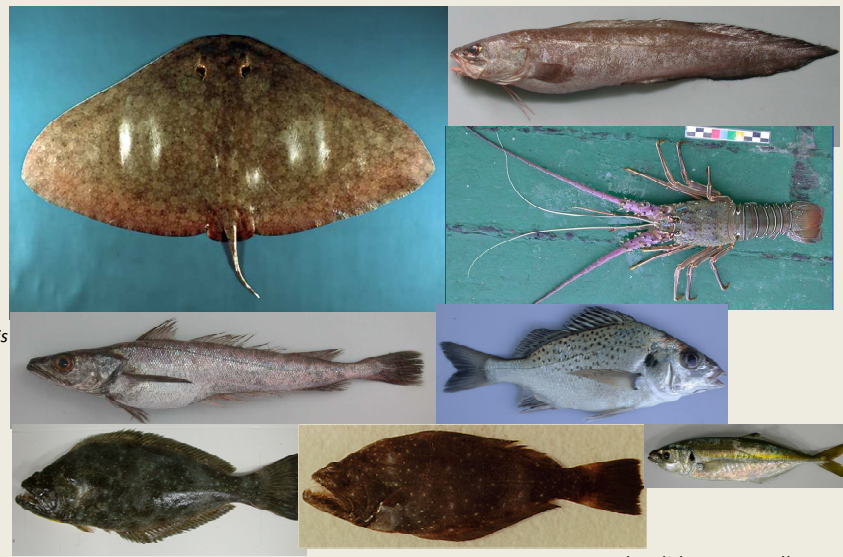
5) Discards composition and biodiversity by haul type

"LAN"

MAURITANIA 2010



- Gymnura altavela
- Brotula barbata
- Panulirus regius
- Aphanopus carbo
- Raja miraletus
- Merluccius polli
- Pomadasys perotaei
- Sphyma zygaena
- Psettodes belcheri
- Psettodes bennettii
- Caranx rhonchus
- Rhinobatos rhinobatos
- Ephippion guttifer
- Lithognathus mormyrus
- Drepane africana
- Chelidonichthys gabonensis
- Dasyatis pastinaca
- Chilomycterus reticulatus
- Diplodus bellottii
- Cymbium marmoratum
- Sepia elegans
- Uranoscopus albesca
- Torpedo torpedo
- Galeoides decadactylus
- Leptocharias smithii
- Scorpaena notata
- Trichiurus lepturus
- Pagrus auriga
- Branchiostegus semifasciatus
- Lepidopus caudatus
- Chilomycterus spinosus
- Others

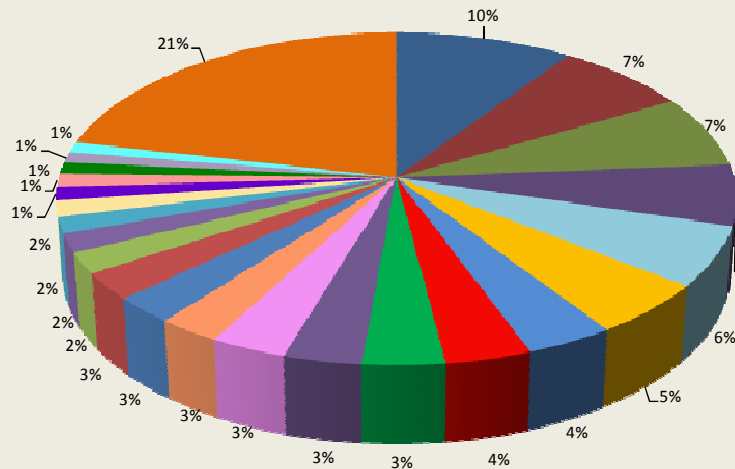


- Pseudotolithus senegallus
- Arius heudeloti
- Pseudupeneus prayensis
- Ilisha africana
- Cynoglossus canariensis
- Epinephelus aeneus
- Lagocephalus laeivigatus
- Trichiurus lepturus
- Eucinostomus melanopterus
- Pagellus bellottii
- Chilomycterus spinosus
- Asterioideo
- Raja miraletus
- Bothus podas
- Solitas gruveli
- Ophychtus ophis
- Psettodes benetti
- Brachydeuterus auritus
- Sepia orbignyana
- Cymbium sp.
- Syacium micrurum
- Cynoglossus senegalensis
- Pseudotolithus typus
- Citharichthys stampflii
- Cymbium olla
- Dicologlossa cuneata
- Otros

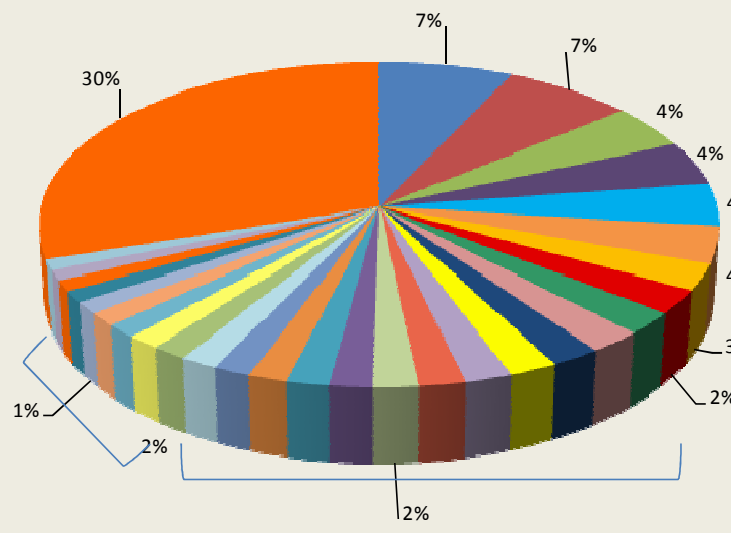
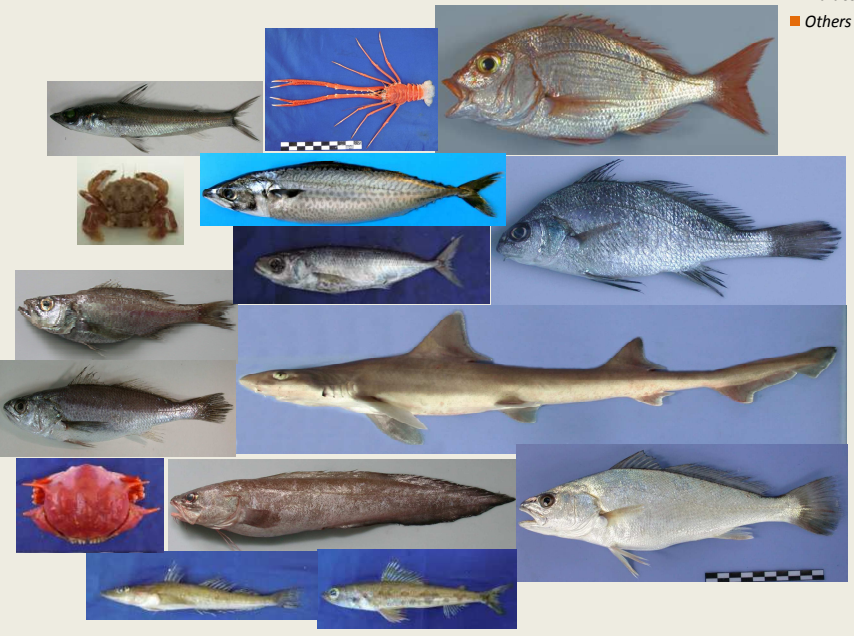
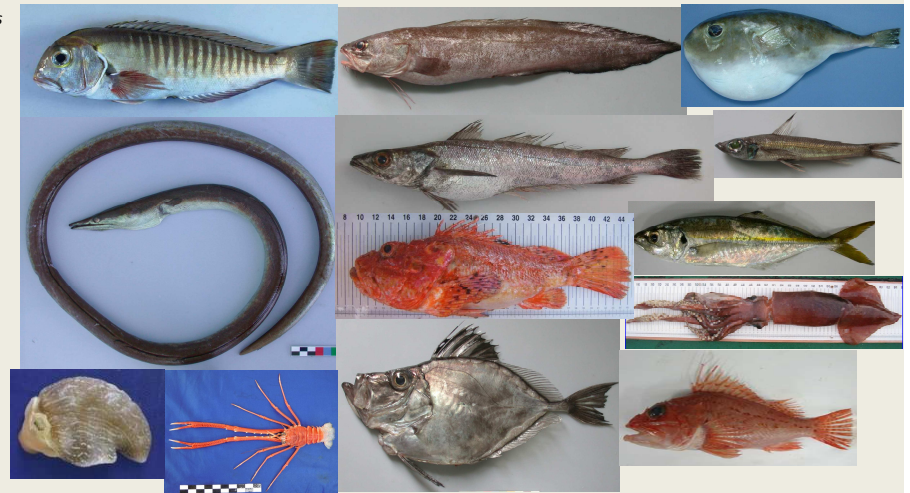
GUINEA-BISSAU 2011

"GAM"

MAURITANIA 2010



- *Branchiostegus semifasciatus*
- *Brotula barbata*
- *Chlorophthalmus agassizi*
- *Ophisurus serpens*
- *Merluccius polli*
- *Caranx rhonchus*
- *Scorpaena elongata*
- *Zenopsis conchifer*
- *Spherooides pachygaster*
- *Octopus vulgaris*
- *Todarodes sagittatus*
- *Munida inis*
- *Pontinus accraensis*
- *Zeus faber*
- *Pterothrissus bellocci*
- *Nudibranchia*
- *Helicolenus dactylopterus*
- *Trachurus trachurus*
- *Synagrops microlepis*
- *Dentex macrophthalmus*
- *Lepidotrigla carolae*
- *Bembrops heterurus*
- *Malacocephalus occidentalis*
- Others

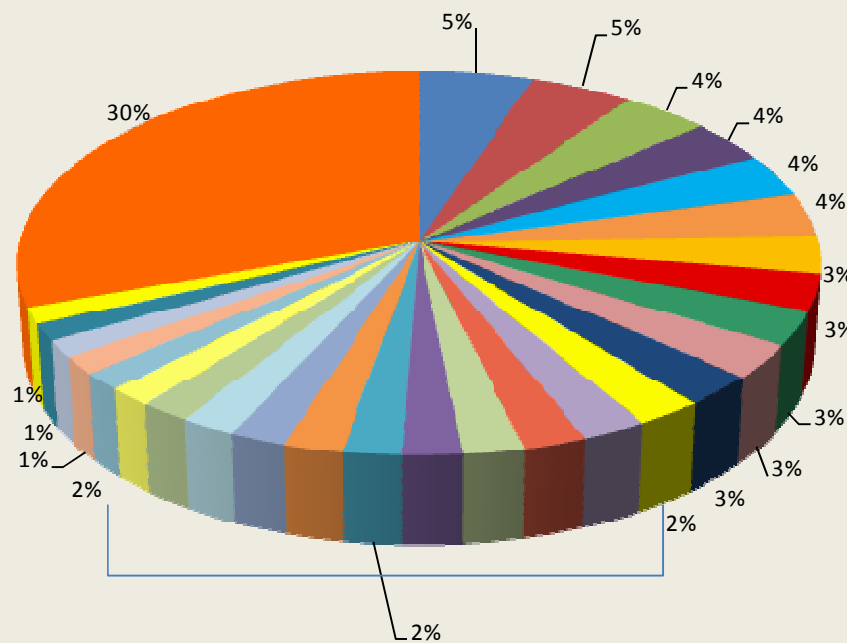


- *Chlorophthalmus atlanticus*
- *Dentex angolensis*
- *Munida rutllanti*
- *Scomber colias*
- *Umbrina canariensis*
- *Mustelus mustelus*
- *Synagrops microlepis*
- *Brotula barbata*
- *Argyrosomus regius*
- *Ariomma melanum*
- *Lophius vaillanti*
- *Octopus defilippi*
- *Liocarcinus corrugatus*
- *Trichurus lepturus*
- *Gephyroberyx darwinii*
- *Ophisurus serpens*
- *Trachurus trachurus*
- *Pentheroscion mbizi*
- *Trachurus trecae*
- *Synodus synodus*
- *Acanthocarpus brevispinis*
- *Raja miraletus*
- *Octopus vulgaris*
- *Bembrops heterurus*
- *Octopus macropus*
- *Illex coindetii*
- *Scorpaena normani*
- *Ijimaia loppei*
- *Lepidotrigla cadmani*
- Otros

GUINEA-BISSAU 2011

"ALI"

GUINEA-BISSAU 2011



- *Chlorophthalmus agassizi*
- *Merluccius polli*
- *Lithodes ferox*
- *Nematocarcinus africanus*
- *Chaunax pictus*
- *Talismania longifilis*
- *Lamprogrammus sp.*
- *Centrophorus squamosus*
- *Centrolophus niger*
- *Psychrolutes sp.*
- *Yarella blackfordi*
- *Chaceon maritae*
- *Laemonema laureysi*
- *Mitsukurina owstoni*
- *Gephyroberyx darwinii*
- *Stomias boa boa*
- *Ebinania costaecanariae*
- *Torpedo nobiliana*
- *Ijimaia loppei*
- *Anemona spp.*
- *Todaropsis eblanae*
- *Malacocephalus occidentalis*
- *Hypoclidonia bella*
- *Opisthoteuthis sp.*
- *Psenes cyanophris*
- *Bajacalifornia megalops*
- *Centrophorus granulosus*
- Otros



Biodiversity by haul type

MAURITANIA 2010

GROUP/HAUL TYPE	"LAN"	"GAM"
FISH	144	58
CRUSTACEANS	31	15
CEPHALOPODS	8	9
OTHER INVERTEBR.	25	7
TOTAL	208	89

"LAN" HAUL TYPE



"GAM" HAUL TYPE



GUINEA-BISSAU 2011

GROUP/HAUL TYPE	"LAN"	"GAM"	"ALI"
FISH	54	112	105
CRUSTACEANS	24	27	22
CEPHALOPODS	3	7	4
OTHER INVERTEBR.	9	17	9
TOTAL	90	163	140

4) Discard composition and biodiversity by haul type

RESULTS

GAM	
FISH	Kg/kg RC
<i>Chlorophthalmus agassizi</i>	34.2
<i>Merluccius polli</i>	26.7
<i>Brotula barbata</i>	25.2
<i>Pontinus accraensis</i>	7.7
<i>Synagrops microlepis</i>	6.3
<i>Helicolenus dactylopterus</i>	5.7
<i>Malacocephalus occidentalis</i>	4.54
<i>Caranx rhonchus</i>	4.37
<i>Zenopsis conchifer</i>	4.22
<i>Bembrops heterurus</i>	3.06
<i>Scorpaena elongata</i>	2.31
<i>Ophisurus serpens</i>	2.28
<i>Pterothrissus belloci</i>	2.23
<i>Branchiostegus semifasciatus</i>	2.21
<i>Trachurus trachurus</i>	1.31
<i>Synchiropus phaeton</i>	1.09
<i>Gephyroberyx darwinii</i>	0.98
<i>Monolene microstoma</i>	0.76
<i>Zeus faber</i>	0.61
<i>Lophius vaillanti</i>	0.57
Myctophidae	0.54
<i>Coelorinchus caelorhincus caelort</i>	0.42
<i>Lophiodes kempii</i>	0.37
<i>Sphoeroides pachygaster</i>	0.27
<i>Trigla lyra</i>	0.22
<i>Dentex macrophthalmus</i>	0.20
<i>Parasudis fraserbrunneri</i>	0.16
<i>Epigonus constanciae</i>	0.14
<i>Capros aper</i>	0.13
<i>Laemonema laureysi</i>	0.13
<i>Ophidion barbatum</i>	0.11
<i>Hoplostethus mediterraneus</i>	0.10

GAM	
FISH	Kg/kg RC
<i>Epigonus telescopus</i>	0.09
<i>Lepidotrigla carolae</i>	0.09
<i>Scyliorhinus stellaris</i>	0.08
<i>Thorogobius angolensis</i>	0.07
<i>Antigonia capros</i>	0.06
<i>Blennius normani</i>	0.06
<i>Peristedion cataphractum</i>	0.06
<i>Malacocephalus laevis</i>	0.06
<i>Trachurus trecae</i>	0.05
<i>Yarrella blackfordi</i>	0.05
<i>Symphurus normani</i>	0.04
<i>Hoplostethus cadenati</i>	0.03
<i>Lepidopus caudatus</i>	0.03
<i>Trachyrincus scabrus</i>	0.03
<i>Symphurus nigrescens</i>	0.03
<i>Nezumia aequalis</i>	0.03
<i>Gnathophis mystax</i>	0.03
<i>Chascanopsetta lugubris</i>	0.02
<i>Solitas gruveli</i>	0.02
<i>Microchirus wittei</i>	0.01
<i>Microchirus variegatus</i>	0.01
<i>Epigonus spp</i>	<0.1
<i>Raja straeleni</i>	<0.1
<i>Zenion hololepis</i>	<0.1
<i>Epigonus denticulatus</i>	<0.1
<i>Scyliorhinus canicula</i>	<0.1

GAM	
CRUSTACEANS	Kg/kg RC
<i>Munida iris</i>	13.1
<i>Plesionika heterocarpus</i>	1.43
<i>Solenocera africana</i>	1.08
<i>Acanthocarpus brevispinis</i>	0.69
<i>Liocarcinus corrugatus</i>	0.67
<i>Squilla mantis</i>	0.31
<i>Calappa pelii</i>	0.21
<i>Calappa granulata</i>	0.08
<i>Bathynectes maravigna</i>	0.05
<i>Dardanus arrosor</i>	0.05
<i>Scyllarus arctus</i>	0.02
<i>Pasiphaea multidentata</i>	0.01
<i>Parapandalus narval</i>	0.01
<i>Medorippe lanata</i>	<0,1
<i>Parthenope angulifrons</i>	<0,1
CEPHALOPODS	Kg/kg RC
<i>Octopus vulgaris</i>	1.53
<i>Sepia elegans</i>	0.70
<i>Todaropsis eblanae</i>	0.63
<i>Todarodes sagittatus</i>	0.25
<i>Ommastrephidae spp.</i>	0.11
<i>Sepia orbignyana</i>	0.04
<i>Sepia officinalis</i>	0.02
<i>Illex coindetii</i>	0.02
<i>Alloteuthis africana</i>	0.01
OTHER INVERTEBRATES	Kg/kg RC
Scyphozoa (jellyfish)	0.68
<i>Nudibranchia</i>	0.28
<i>Holothuria spp</i>	0.28
<i>Epizoanthidae</i>	0.19
<i>Suberites domuncula</i>	0.04
<i>Venus nux</i>	0.02

MAURITANIA 2010

"GAM" HAUL TYPE

GUINEA-BISSAU 2011

"LAN" HAUL TYPE

LAN		
FISH	kg/kg RC	kg/kg shrimp
<i>Pseudotolithus senegallus</i>	0.75	1.09
<i>Arius heudeloti</i>	0.69	0.97
<i>Pseudupeneus prayensis</i>	0.65	0.94
<i>Ilisha africana</i>	0.64	0.65
<i>Cynoglossus canariensis</i>	0.55	0.71
<i>Epinephelus aeneus</i>	0.48	1.08
<i>Lagocephalus laevigatus</i>	0.47	0.47
<i>Trichiurus lepturus</i>	0.43	0.44
<i>Eucinostomus melanopterus</i>	0.42	0.44
<i>Pagellus bellotii</i>	0.34	0.44
<i>Chilomycterus spinosus</i>	0.33	0.76
<i>Raja miraletus</i>	0.28	0.36
<i>Bothus podas</i>	0.26	0.59
<i>Solitas gruveli</i>	0.26	0.33
<i>Ophychtus ophis</i>	0.23	1.94
<i>Psettodes benetti</i>	0.23	0.52
<i>Brachydeuterus auritus</i>	0.20	0.21
<i>Syacium micrurum</i>	0.18	1.68
<i>Cynoglossus senegalensis</i>	0.15	0.22
<i>Pseudotolithus typus</i>	0.15	0.21
<i>Citharichthys stampflii</i>	0.15	0.16
<i>Dicologoglossa cuneata</i>	0.14	0.27
<i>Dactylopterus volitans</i>	0.10	0.24
<i>Pomadasys jubenili</i>	0.09	0.09
<i>Galeoides decadactylus</i>	0.08	0.09
<i>Fistularia petimba</i>	0.08	0.18
<i>Gadella sp.</i>	0.07	0.17
<i>Selene dorsalis</i>	0.07	0.08
<i>Acanthurus monroviae</i>	0.07	0.07
<i>Stephanolepis hispidus</i>	0.06	0.14
<i>Scorpaena angolensis</i>	0.06	0.07

LAN		
FISH	kg/kg RC	kg/kg shrimp
<i>Balistes carolinensis</i>	0.05	0.05
<i>Caranx rhonchus</i>	0.05	0.12
<i>Cynoglossus monodi</i>	0.05	0.06
<i>Pseudotolithus brachignat</i>	0.05	0.06
<i>Cloroscombrus chrysurus</i>	0.05	0.06
<i>Pteroscion peli</i>	0.05	0.05
<i>Chelidonichthys lucerna</i>	0.05	0.06
<i>Serranus accraensis</i>	0.03	0.04
<i>Nesiarchus nasutus</i>	0.03	0.07
<i>Citharus linguatula</i>	0.02	0.03
<i>Argyrosomus regius</i>	0.02	0.03
<i>Umbrina canariensis</i>	0.02	0.03
<i>Sardinella aurita</i>	0.02	0.02
<i>Mugil cephalus</i>	0.02	0.02
<i>Antennarius pardalis</i>	0.01	0.02
Gobiidae	0.01	0.01
<i>Brotula barbata</i>	0.01	0.01
<i>Cynoponticus ferox</i>	0.01	0.01
<i>Sphyaena guachancho</i>	0.01	0.01
<i>Rhinobatos rhinobatos</i>	0.01	0.01
<i>Dicologoglossa hexophtalr</i>	0.003	0.004
<i>Microchirus variegatus</i>	0.003	0.004
<i>Oblada melanura</i>	0.002	0.002
INVERTEBRATES		
CRUSTACEANS	kg/kg RC	kg/kg shrimp
Paguroidea	0.09	0.13
<i>Medorippe lanata</i>	0.06	0.06
<i>Cronius ruber</i>	0.06	0.07
<i>Farfantepenaeus notialis</i>	0.05	0.05
<i>Calappa pelli</i>	0.05	0.05
<i>Squilla mantis</i>	0.05	0.07

LAN		
CRUSTACEANS	kg/kg RC	kg/kg shrimp
<i>Squilla aculeata calmai</i>	0.05	0.05
<i>Callinectes amnicola</i>	0.05	0.05
<i>Portunus validus</i>	0.03	0.03
<i>Liocarcinus corrugatus</i>	0.03	0.04
Majidae	0.02	0.03
<i>Lisiosquilla hoeveni</i>	0.02	0.05
<i>Portunus hastatus</i>	0.02	0.04
<i>Scyllarides latus</i>	0.02	0.02
<i>Sternodromia spinirostr</i>	0.01	0.09
<i>Panulirus regius</i>	0.01	0.01
<i>Stenorhynchus seticorn</i>	0.01	0.01
<i>Scyllarus arctus</i>	0.004	0.005
Grapsidae	0.003	0.004
Porcellanidae	0.003	0.004
<i>Syconia sp.</i>	0.003	0.006
<i>Parapenaopsis atlantic</i>	0.001	0.001
<i>Macropodia sp.</i>	0.001	0.001
<i>Sicyonia galeata</i>	0.001	0.001
CEPHALOPODS	kg/kg RC	kg/kg shrimp
<i>Sepia orbignyana</i>	0.26	0.19
<i>Sepia officinalis/hierrec</i>	0.11	0.11
<i>Octopus vulgaris</i>	0.02	0.02
OTHER INVERTEBRATE	kg/kg RC	kg/kg shrimp
<i>Cymbium sp</i>	0.34	0.19
Asteroidea	0.34	0.31
<i>Cymbium olla</i>	0.15	0.14
Echinidae sp	0.04	0.03
Gasteropoda spp	0.04	0.03
Anemona spp	0.02	0.01
Nudibranchia spp	0.01	0.01
Poliqueta	0.004	0.004

4) Discard composition and biodiversity by haul type

RESULTS

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FISH	GAM	
	kg/kg RC	kg/kg shrimp
<i>Chlorophthalmus atlanti</i>	0.50	0.51
<i>Dentex angolensis</i>	0.49	0.49
<i>Scomber colias</i>	0.31	0.31
<i>Umbrina canariensis</i>	0.30	0.30
<i>Mustelus mustelus</i>	0.26	0.37
<i>Synagrops microlepis</i>	0.19	0.22
<i>Brotula barbata</i>	0.17	0.32
<i>Argyrosomus regius</i>	0.16	0.16
<i>Ariomma melanum</i>	0.16	0.16
<i>Lophius vaillanti</i>	0.15	0.15
<i>Trichiurus lepturus</i>	0.14	0.14
<i>Gephyroberyx darwinii</i>	0.14	0.17
<i>Ophisurus serpens</i>	0.13	0.13
<i>Trachurus trachurus</i>	0.13	0.13
<i>Pentheroscion mbizi</i>	0.12	0.46
<i>Trachurus trecae</i>	0.11	0.11
<i>Synodus synodus</i>	0.11	0.11
<i>Raja miraletus</i>	0.10	0.16
<i>Bembrops heterurus</i>	0.09	0.10
<i>Scorpaena normani</i>	0.08	0.08
<i>Ijimaia loppei</i>	0.07	0.08
<i>Lepidotrigla cadmani</i>	0.07	0.07
<i>Lophiodes kempii</i>	0.07	0.07
<i>Merluccius polli</i>	0.07	0.07
<i>Mystriophis rostellatus</i>	0.07	0.09
<i>Trigla lyra</i>	0.07	0.07
<i>Helicolenus dactylopterus</i>	0.06	0.06
<i>Capros aper</i>	0.06	0.06
<i>Pterothrissus belloci</i>	0.05	0.06
<i>Pontinus accraensis</i>	0.05	0.05
<i>Zenopsis conchifer</i>	0.05	0.07
<i>Scorpaena stephanica</i>	0.05	0.05
<i>Torpedo nobiliana</i>	0.05	0.05
<i>Sphoeroides pachygaster</i>	0.04	0.04
<i>Synagrops bellus</i>	0.04	0.05
<i>Chascanopsetta lugubris</i>	0.04	0.04
<i>Malacocephalus occiden</i>	0.04	0.05
<i>Parasudis fraserbrunneri</i>	0.04	0.04
<i>Raja straeleni</i>	0.04	0.05
<i>Echelus sp.</i>	0.03	0.03
<i>Squalus megalops</i>	0.034	0.355

FISH	GAM	
	kg/kg RC	kg/kg shrimp
<i>Centrophorus uyato</i>	0.03	0.03
<i>Phycis blennoides</i>	0.03	0.03
<i>Ruvettus pretiosus</i>	0.03	0.03
<i>Uranoscopus albesca</i>	0.03	0.03
<i>Citharus linguatula</i>	0.03	0.03
<i>Epigonus sp.</i>	0.03	0.03
<i>Zenion hololepis</i>	0.02	0.02
<i>Raja montagui</i>	0.02	0.03
<i>Antigonia capros</i>	0.02	0.02
<i>Aulopus cadenati</i>	0.02	0.21
<i>Scorpaena elongata</i>	0.02	0.02
<i>Oxynothus centrina</i>	0.02	0.03
<i>Echiophis creutzbergi</i>	0.02	0.02
<i>Echelus myrus</i>	0.02	0.02
<i>Peristedion cataphractum</i>	0.02	0.02
<i>Psenes cyanophris</i>	0.02	0.02
<i>Scyliorhinus stellaris</i>	0.02	0.05
<i>Dibranchus atlanticus</i>	0.01	0.01
<i>Zeus faber</i>	0.01	0.01
<i>Squantia oculata</i>	0.01	0.01
<i>Synchiropus phaeton</i>	0.01	0.01
<i>Caelorhynchus caelorhynchus</i>	0.01	0.01
<i>Hoplostethus mediterraneus</i>	0.01	0.04
Nettastomatidae	0.01	0.01
<i>Lepidotrigla carolae</i>	0.01	0.01
<i>Torpedo marmorata</i>	0.01	0.01
<i>Microchirus variegatus</i>	0.01	0.01
<i>Hypoclidonia bella</i>	0.01	0.01
<i>Sudis hialina</i>	0.01	0.01
<i>Monolene microstoma</i>	0.01	0.01
Nemichthyidae	0.01	0.01
<i>Epigonus telescopus</i>	0.01	0.01
<i>Laemonema laureysi</i>	0.01	0.01
<i>Moridae spp.</i>	0.01	0.01
<i>Diaphus sp.</i>	0.01	0.01
<i>Rhinconger sp.</i>	0.01	0.01
<i>Squalus blainvillei</i>	0.005	0.005
<i>Centroscyllium fabricii</i>	0.005	0.009
<i>Arnoglossus imperialis</i>	0.005	0.005
<i>Xenolepidichthys dalgleisi</i>	0.004	0.004
<i>Nettastoma melanurum</i>	0.004	0.004

"GAM" HAUL TYPE

FISH	GAM	
	kg/kg RC	kg/kg shrimp
<i>Ophidion barbatum</i>	0.003	0.003
Myctophidae	0.003	0.004
<i>Lophius sp.</i>	0.003	0.003
<i>Gadella maraldi</i>	0.003	0.003
<i>Chelidonichthys gabone</i>	0.003	0.003
<i>Yarella blackfordi</i>	0.003	0.003
<i>Priacanthus arenatus</i>	0.002	0.002
<i>Bathyconger sp.</i>	0.002	0.002
<i>Bathyraja sp</i>	0.002	0.002
<i>Malacocephalus laevis</i>	0.002	0.002
<i>Echelus pachyrhynchus</i>	0.002	0.002
<i>Gadella sp.</i>	0.002	0.002
<i>Bathysolea profundicola</i>	0.002	0.002
Gobiidae	0.001	0.001
<i>Hoplostethus cadenati</i>	0.001	0.001
Otros Stomiidae	0.001	0.001
<i>Symphurus nigrescens</i>	0.001	0.001
<i>Monolene sp.</i>	0.001	0.004
<i>Hymenocephalus italicus</i>	0.001	0.001
<i>Beryx splendens</i>	0.001	0.001
<i>Chaunax pictus</i>	0.001	0.001
<i>Stomias sp.</i>	0.001	0.001
<i>Dibranchus sp.</i>	0.001	0.001
<i>Polymetme corythaeola</i>	0.001	0.001
<i>Bathyrconger vicinus</i>	0.001	0.003
<i>Epigonus denticulatus</i>	0.001	0.001
<i>Galeus polli</i>	<0.001	<0.001
<i>Peristedion sp.</i>	<0.001	<0.001
<i>Chaunax sp.</i>	<0.001	<0.001
Paralepididae	<0.001	<0.001
INVERTEBRATES		
CRUSTACEANS	kg/kg RC	kg/kg shrimp
<i>Munida rutilanti</i>	0.63	0.66
<i>Liocarcinus corrugatus</i>	0.14	0.14
<i>Acanthocarpus brevispini</i>	0.11	0.11
<i>Callinectes amnicola</i>	0.05	0.05
<i>Plesionika edwardsii</i>	0.05	0.05
<i>Calappa pelli</i>	0.04	0.04
<i>Plesionika martia</i>	0.03	0.03
<i>Solenocera africana</i>	0.02	0.02
<i>Parapenaeus longirostri</i>	0.017	0.017

OTHER INVERTEBRATES	GAM	
	kg/kg RC	kg/kg shrimp
<i>Bathynectes mai</i>	0.01	0.02
<i>Paromola cuvieri</i>	0.01	0.01
<i>Plesionika heteroclitus</i>	0.01	0.01
<i>Parapandalus niger</i>	0.01	0.03
<i>Homola barbata</i>	0.01	0.01
Paguroidea	0.003	0.003
<i>Heterocarpus enigmatus</i>	0.002	0.002
<i>Diogenes pugilator</i>	0.002	0.002
<i>Dorippe lanata</i>	0.002	0.002
<i>Dardanus arroso</i>	0.002	0.002
Homolidae	0.001	0.001
Lithodidae	0.001	0.001
<i>Pasiphaea multipectinata</i>	0.001	0.001
<i>Pontocaris lacazei</i>	0.000	0.001
<i>Pasiphaea sivadati</i>	0.000	0.000
CEPHALOPODS	kg/kg RC	kg/kg shrimp
<i>Octopus defilippii</i>	0.146	0.146
<i>Octopus vulgaris</i>	0.096	0.121
<i>Octopus macropus</i>	0.086	0.094
<i>Illex coindetii</i>	0.079	0.080
<i>Todaropsis eblarina</i>	0.041	0.042
Otros Cephalopoda	0.010	0.010
<i>Sepia elegans</i>	0.007	0.009
OTHER INVERTEBRATES	kg/kg RC	kg/kg shrimp
Anemona spp.	0.055	0.056
Asterozoa	0.045	0.045
Holothurozoa	0.037	0.073
Gasteropoda	0.027	0.030
Porifera	0.012	0.012
Hydrozoa	0.011	0.011
Ophiurozoa	0.005	0.009
Ascidiacea	0.004	0.004
Actiniacea	0.004	0.005
Briozoa	0.004	0.004
Echinozoa	0.003	0.005
Arcidae	0.003	0.005
<i>Epizoanthus sp.</i>	0.001	0.001
<i>Modiolus sp.</i>	<0.001	<0.001
<i>Aphrodite spp.</i>	<0.001	<0.001
Poliqueta	<0.001	<0.001
Nassidae	<0.001	<0.001

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"ALI" HAUL TYPE

ALI		
FISH	kg/kg RC	kg/kg shrimp
<i>Chlorophthalmus agassizi</i>	0.43	0.43
<i>Merluccius polli</i>	0.38	0.74
<i>Chaunax pictus</i>	0.30	1.14
<i>Talismania longifilis</i>	0.30	0.30
<i>Lamprogrammus sp.</i>	0.26	0.83
<i>Centrophorus squamosus</i>	0.25	0.34
<i>Centrolophus niger</i>	0.25	0.39
<i>Psychrolutes sp</i>	0.24	0.51
<i>Yarella blackfordi</i>	0.22	0.47
<i>Laemonema laureysi</i>	0.20	0.51
<i>Mitsukurina owstoni</i>	0.19	0.23
<i>Gephyroberyx darwini</i>	0.19	0.25
<i>Stomias boa boa</i>	0.18	0.19
<i>Ebinania costaecanariae</i>	0.18	0.24
<i>Torpedo nobiliana</i>	0.18	0.19
<i>Ijimaia loppei</i>	0.17	0.27
<i>Malacocephalus occidentalis</i>	0.13	0.35
<i>Hypoclidonia bella</i>	0.13	0.21
<i>Psenes cyanophris</i>	0.12	0.41
<i>Bajacalifornia megalops</i>	0.12	0.12
<i>Centrophorus granulosus</i>	0.12	0.18
<i>Aphanopus carbo</i>	0.11	0.18
<i>Bathygadus sp.</i>	0.11	0.61
<i>Lophius vaillanti</i>	0.10	0.12
<i>Malacocephalus laevis</i>	0.10	0.19
<i>Lamprogrammus exutus</i>	0.07	0.11
<i>Ariomma melanum</i>	0.07	0.15
<i>Nemichthys scolopaceus</i>	0.07	0.07
<i>Photonectes parvimanus</i>	0.07	0.10
<i>Synagrops bellus</i>	0.06	0.22
<i>Raja batis</i>	0.06	0.09
<i>Dipturus batis</i>	0.06	0.14
<i>Diaphus sp.</i>	0.06	0.06
<i>Neoharriota pinnata</i>	0.06	0.15
<i>Bathyconger sp.</i>	0.06	0.10
<i>Gnathophis mystax</i>	0.06	0.26
<i>Centroscymus owstoni</i>	0.05	0.22

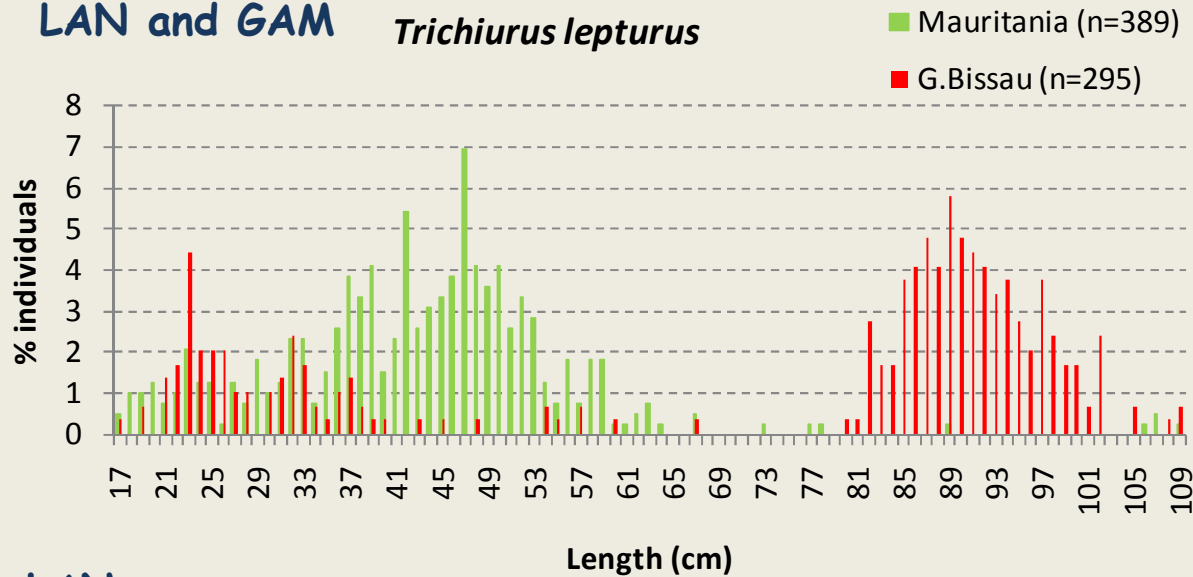
ALI		
FISH	kg/kg RC	kg/kg shrimp
<i>Diretmoides pauciradiatus</i>	0.05	0.09
<i>Xenodermichtys copei</i>	0.04	0.04
Nettastomatidae	0.04	0.10
<i>Caelorhinchus caelorhincus</i>	0.04	0.08
<i>Centrophorus uyato</i>	0.04	0.05
<i>Halosaurus guentheri</i>	0.03	0.06
<i>Mentodus rostratus</i>	0.03	0.07
<i>Pterothrissus bellocci</i>	0.03	0.05
<i>Raja montagui</i>	0.03	0.03
<i>Raja alba</i>	0.03	0.04
<i>Rajella sp.</i>	0.03	0.03
<i>Nezumia aequalis</i>	0.03	0.03
<i>Bathysolea profundicola</i>	0.02	0.04
<i>Gadella maraldi</i>	0.02	0.03
<i>Lophiodes kempii</i>	0.02	0.03
<i>Coloconger cadenati</i>	0.02	0.03
<i>Setarches guentheri</i>	0.02	0.12
<i>Nezumia sp.</i>	0.02	0.09
<i>Scyliorhinus stellaris</i>	0.02	0.03
<i>Galeus melastomus</i>	0.02	0.03
<i>Bathyraxa sp</i>	0.02	0.02
<i>Hoplostethus cadenati</i>	0.02	0.05
<i>Hymenocephalus italicus</i>	0.02	0.13
<i>Epigonus sp.</i>	0.02	0.04
<i>Oxynothus centrina</i>	0.02	0.03
<i>Melanonus zugmayeri</i>	0.02	0.02
<i>Bathygadus melanobranchus</i>	0.02	0.02
Mixinidae	0.02	0.03
<i>Raja straeleni</i>	0.02	0.02
<i>Gadella sp.</i>	0.01	0.03
<i>Deania profundorum</i>	0.01	0.02
<i>Galeus atlanticus</i>	0.01	0.02
<i>Trichiurus lepturus</i>	0.01	0.02
<i>Chlorophthalmus atlanticus</i>	0.01	0.01
<i>Galeus polli</i>	0.01	0.02
<i>Chauliodus sp.</i>	0.01	0.01
<i>Nesiarchus nasutus</i>	0.01	0.02

ALI		
FISH	kg/kg RC	kg/kg shrimp
<i>Talismania sp.</i>	0.01	0.01
<i>Rhinoconger sp.</i>	0.01	0.01
<i>Diretmus argenteus</i>	0.01	0.01
<i>Bathyconger vicinus</i>	0.01	0.01
<i>Symphurus sp.</i>	0.01	0.03
<i>Dicrolene sp.</i>	0.01	0.01
<i>Polymetme corythaeola</i>	0.01	0.01
<i>Lepidopus caudatus</i>	0.006	0.010
<i>Chascanopsetta lugubris</i>	0.006	0.024
<i>Trachyrhynchus trachyrhynchus</i>	0.006	0.008
<i>Astronesthes gemmifer</i>	0.006	0.010
<i>Ruvettus pretiosus</i>	0.005	0.006
<i>Synagrops microlepis</i>	0.005	0.005
<i>Halosaurus ovenii</i>	0.004	0.006
Nemichthyidae	0.003	0.004
<i>Promethychtis prometeus</i>	0.003	0.005
<i>Echelus sp.</i>	0.003	0.003
<i>Argyropelecus gigas</i>	0.003	0.005
<i>Etmopterus pusillus</i>	0.003	0.004
<i>Cynoglossus sp.</i>	0.002	0.003
<i>Lophius sp.</i>	0.002	0.002
<i>Centroscymnus coelolepis</i>	0.002	0.002
<i>Stomias sp.</i>	0.002	0.002
<i>Hydrolagus mirabilis</i>	0.002	0.002
<i>Parasudis fraserbrunneri</i>	0.002	0.003
<i>Phycis blennoides</i>	0.001	0.003
Moridae spp.	0.001	0.002
<i>Dibranchius atlanticus</i>	<0.001	0.001
Myctophidae	<0.001	<0.001
<i>Ophisurus serpens</i>	<0.001	<0.001

ALI		
INVERTEBRATES		
CRUSTACEANS	kg/kg RC	kg/kg shrimp
<i>Lithodes ferox</i>	0.33	0.86
<i>Nematocarcinus afric</i>	0.30	0.86
<i>Chaceon maritae</i>	0.20	0.47
<i>Gnatophausia sp</i>	0.05	0.05
<i>Paromola cuvieri</i>	0.04	0.05
<i>Stereomastis sculpta</i>	0.03	0.04
<i>Acantephyra spp</i>	0.02	0.02
<i>Polycheles sp.</i>	0.02	0.03
<i>Bathynectes maravig</i>	0.01	0.03
<i>Plesionika sp.</i>	0.005	0.006
<i>Aristeus varidens</i>	0.004	0.005
<i>Sergestes sp.</i>	0.004	0.005
<i>Acanthephyra pelagii</i>	0.003	0.004
<i>Munida sp</i>	0.002	0.005
<i>Glyphus marsupialis</i>	0.002	0.003
<i>Heterocarpus ensifer</i>	0.002	0.002
<i>Aristaeopsis edwards</i>	0.001	0.002
<i>Plesionika heterocar.</i>	0.001	0.001
<i>Parapenaeus longiro.</i>	0.001	0.001
<i>Munida rutilanti</i>	0.001	0.001
<i>Paguridae sp.</i>	0.001	0.001
<i>Plesionika martia</i>	<0.001	0.001
CEPHALOPODS	kg/kg RC	kg/kg shrimp
<i>Todaropsis eblanae</i>	0.15	0.19
<i>Opisthoteuthis sp</i>	0.12	0.19
<i>Illex coindetii</i>	0.09	0.28
<i>Octopus macropus</i>	0.09	0.09
OTHER INVERTEBRAT	kg/kg RC	kg/kg shrimp
<i>Anemona spp.</i>	0.170	0.246
<i>Echinoidea</i>	0.053	0.113
<i>Holoturioidea</i>	0.020	0.026
<i>Asteroidea</i>	0.009	0.020
<i>Poliqueta</i>	0.007	0.017
<i>Gasteropoda</i>	0.005	0.010
<i>Epizoanthus sp.</i>	0.006	0.008
<i>Muricidae</i>	0.001	0.001

5) Length frequency distributions of discarded species

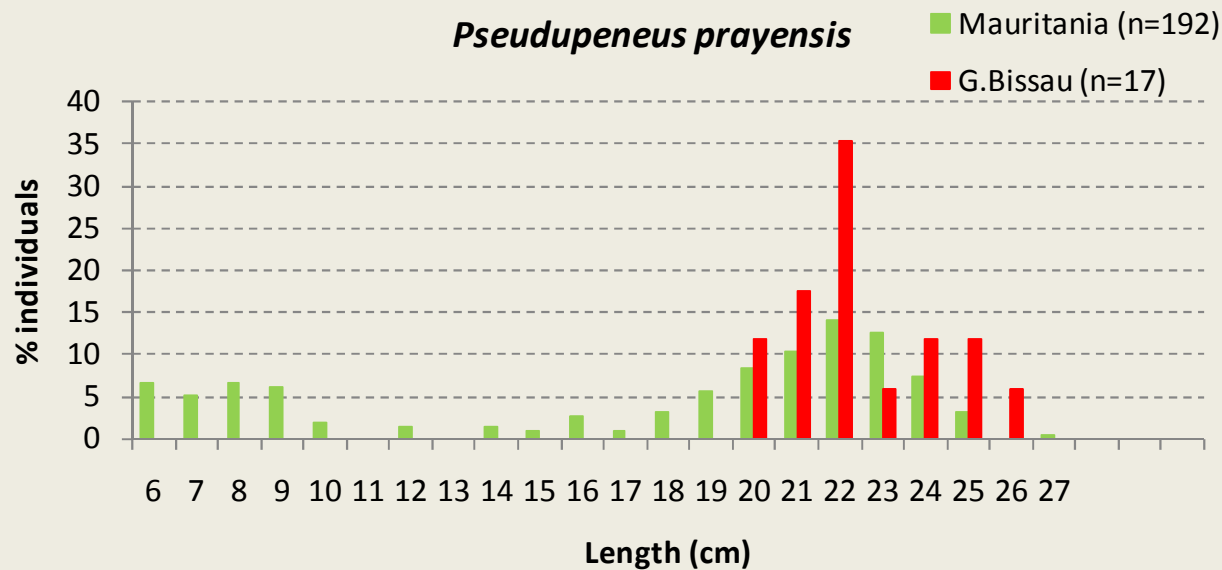
LAN and GAM *Trichiurus lepturus*



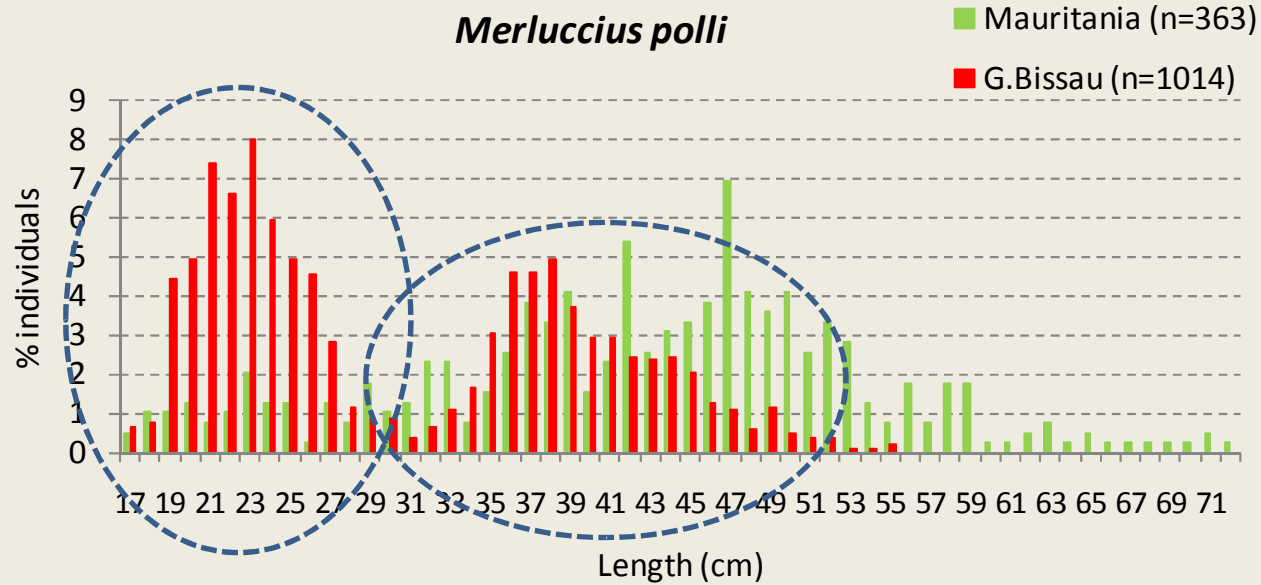
Trichiurus lepturus

LAN

Pseudupeneus prayensis



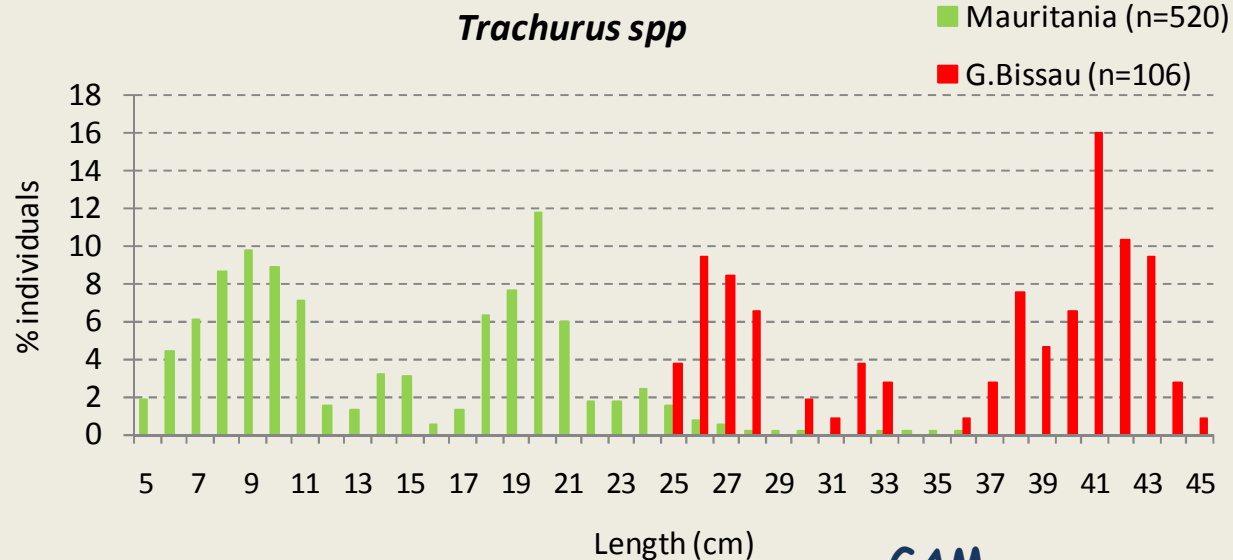
Pseudupeneus prayensis



Merluccius polli

GAM

ALI

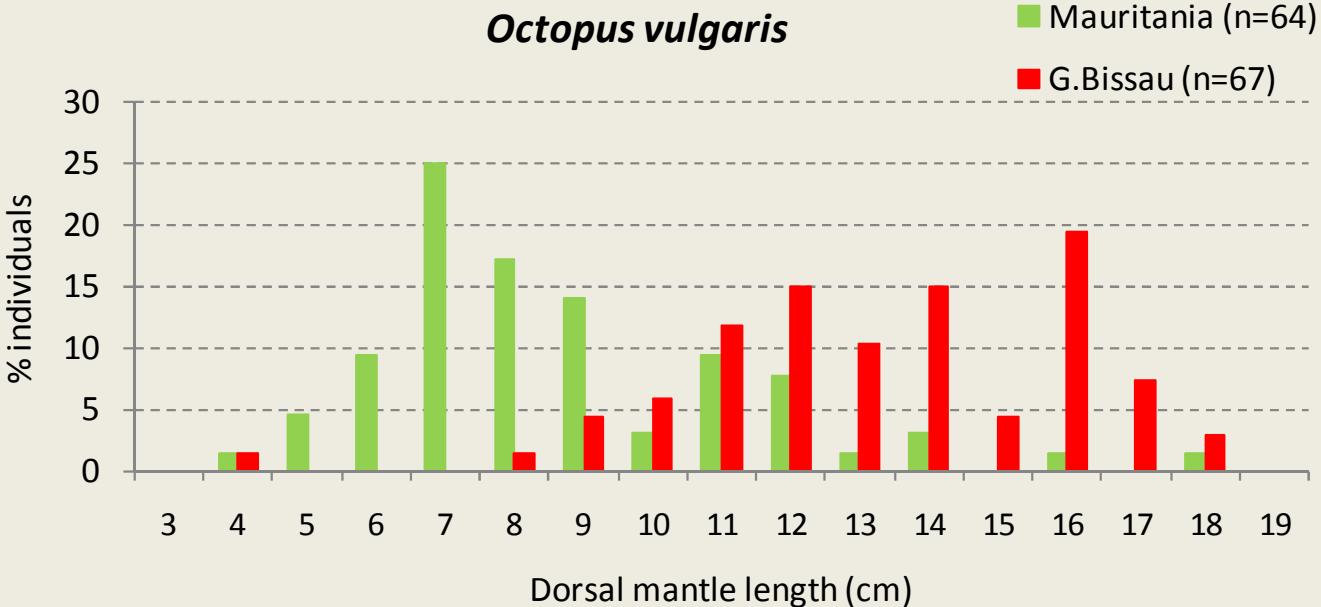


Trachurus trecae



Trachurus trachurus

GAM




**A. - IEO STUDIES ON DISCARDS AND BY-CATCH OF
THE SHRIMPER INDUSTRIAL FLEET IN WEST AFRICA**

CONCLUSIONS



CONCLUSIONS

1. Well developed and continued program on studies of discards and by-catch of the shrimper industrial fleet carried out by the IEO in West Africa.
2. Clear differences found among both areas. 
 - Higher yields of target species in Mauritania → lower levels of by-catch and discards.
 - Differences in by-catch and discards species composition.
 - Higher discards diversity in Guinea-Bissau.
3. Shallower trawls (LAN) produce high level of discards.
4. Need to continue programs of observations onboard.

↓
Studies on discards, by-catch and others

↓
Fishery Management

Mesh size:

🇲🇷 Mauritania: 50 mm

🇬🇧 Guinea-Bissau: 40 mm

	MAURITANIA		GUINEA BISSAU	
Yields of target spp	HIGHER P. longirostris: 68 kg/h F. notialis: 43 kg/h		LOWER P. longirostris: 54 kg/h F. notialis: 5 kg/h	
Bycatch	LOWER		HIGHER	
Bycatch percentages and species	LAN (2 spp) (1.6%) Octopus vulgaris Sepia officinalis	GAM (1.4%) Octopus vulgaris Brotula barbata Z. conchifer	LAN (3 spp) (23.6%) Portunus validus Octopus vulgaris Sepia hierredda D. cuneata	GAM (2.8 %) Plesionika narval Chaceon maritae Octopus vulgaris P. edwardsii Lophiodes kempii G. marsupialis
Discard	LOWER		HIGHER	
Discard rate (kg D/kg target spp)	LAN 6.7:1	GAM 2.5:1	LAN 8.1:1	GAM 3.8:1
Discards biodiversity (number of species)	LAN 208	GAM 89	LAN 90	GAM 163

Differences in discards composition.



B.- PROPOSAL OF AN ACTIVITY PLAN TO SUPPORT THE COUNTRIES

- + Need of coordination between the countries for developing programs of observers onboard.
- + Standardization of methods used.
- + Collaboration in training observers onboard, if needed.
- + Collaboration in training on discards and by-catch data analysis, if needed.
- + IEO data base for scientific observations onboard available for all the countries.

Thanks for your attention!!!!



Merci de votre attention !!!!