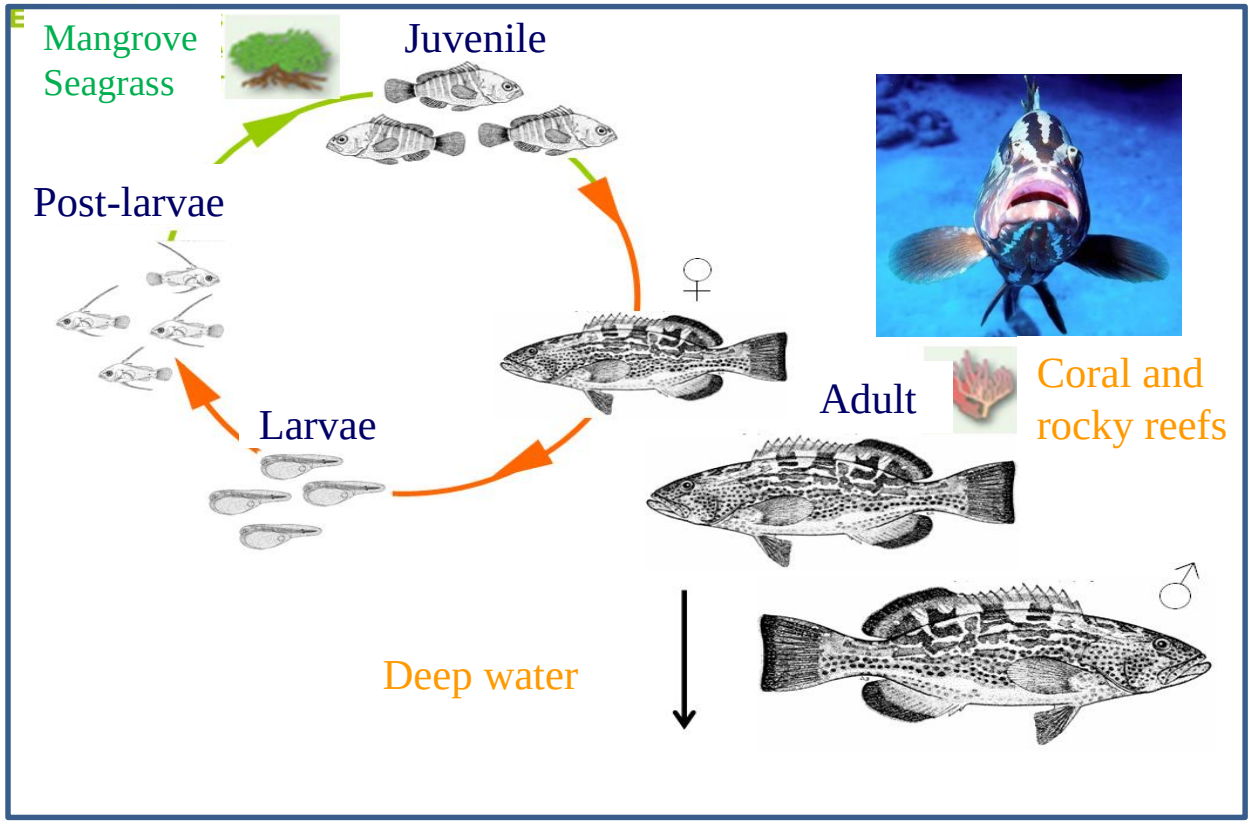
Demerstem

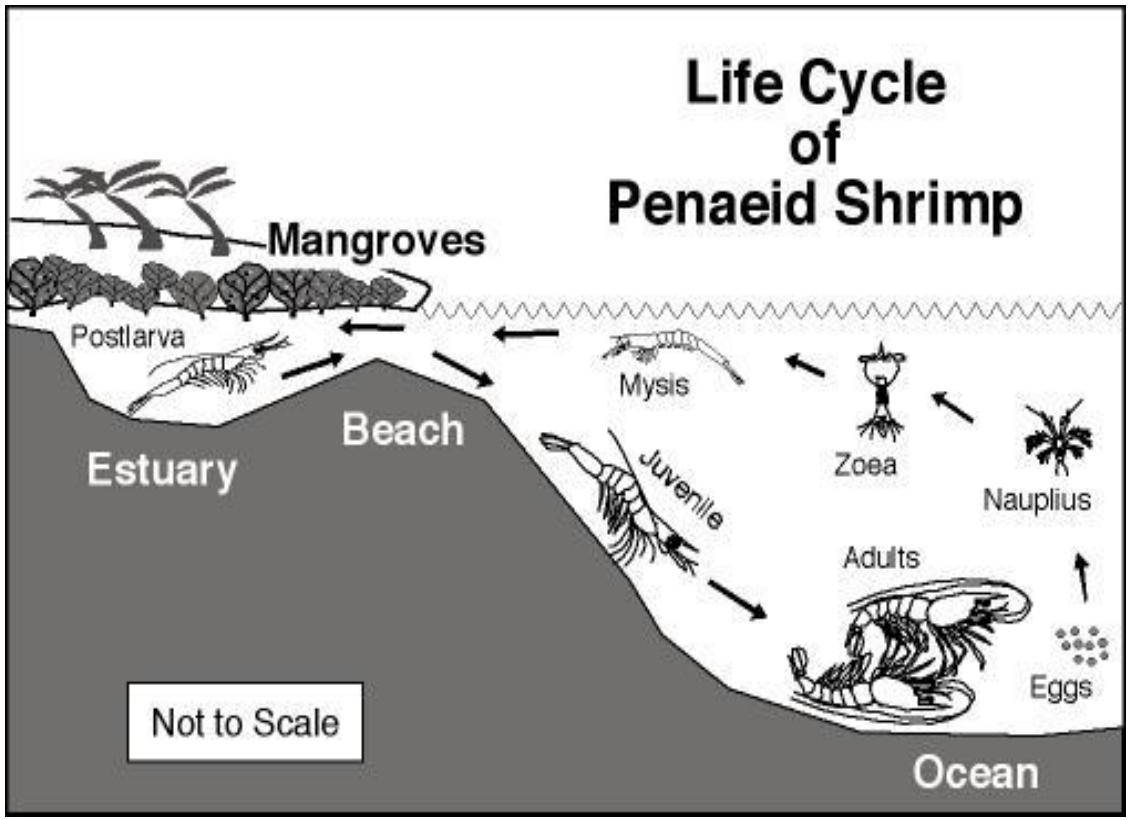
WP2 – Define coastal essential fish habitat for the demersal community

WP2- 1. Scientific context

What is a fish habitat: the life cycle



➔ **Fish habitat at least one life stage**



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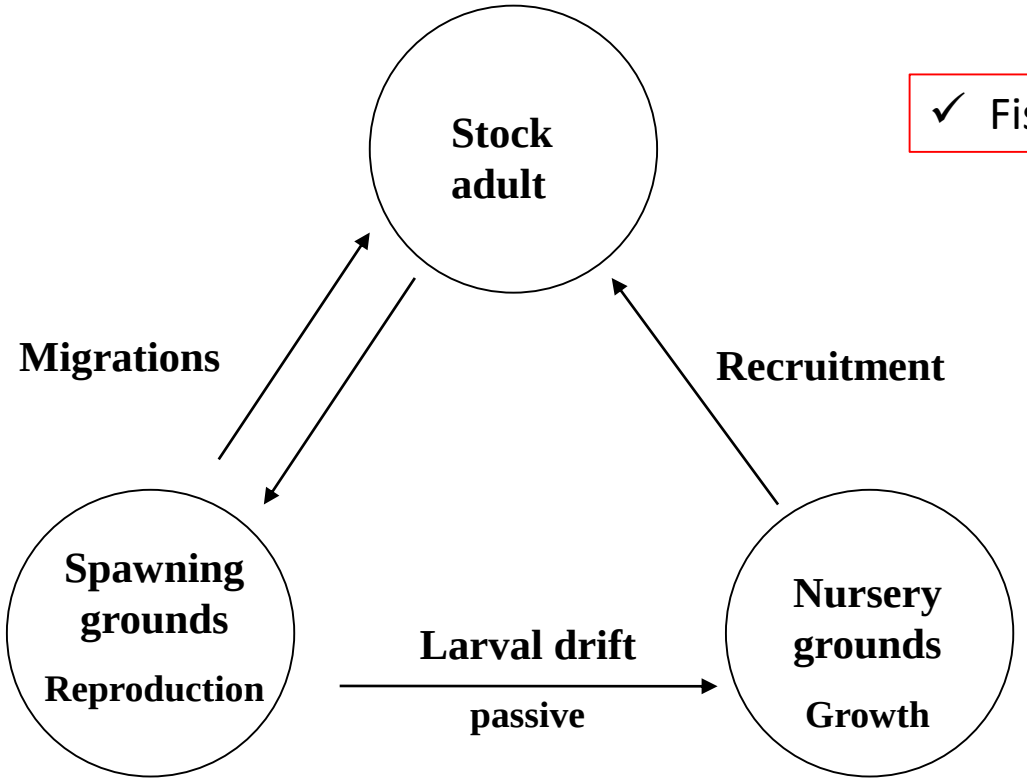


Harden-Jones (1968)

✓ Fish habitat

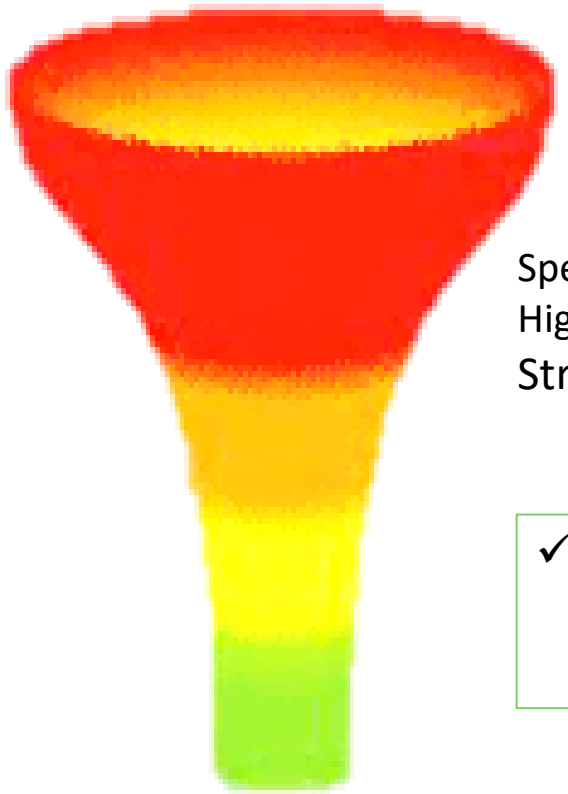
➔ **Fish habitat at least one life stage**

➔ Larval drift zones
➔ Nurseries
➔ Adult feeding zones
➔ Spawning areas
➔ Migration route

Specific population dynamics, low eggs to adult survival (≈ 1/100000)
High resilience to human catches / land or fresh water species
Strong habitat requirements, high dependency

WP2- 1. Scientific context

What is an essential fish habitat



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Strong habitat requirement → **Essential fish habitats**

✓ Level of importance
Concentration
Bottleneck

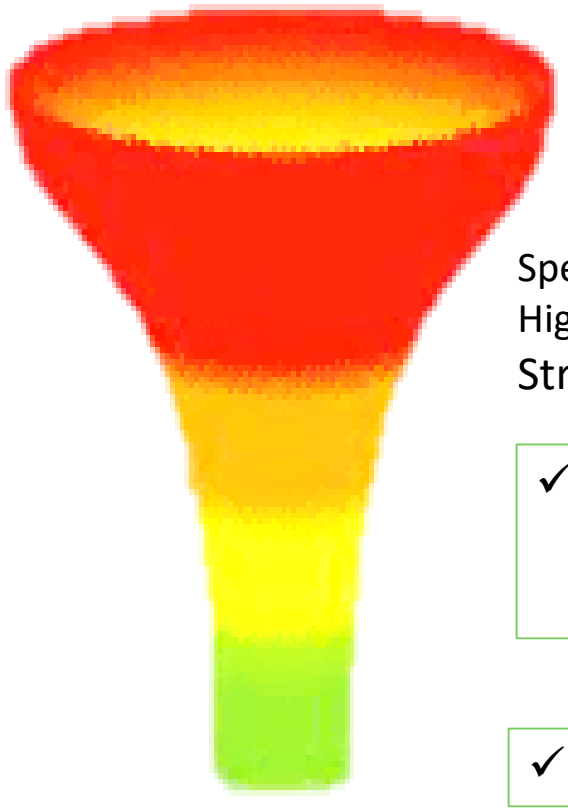
Contribution (overall & / unit area)
to population is high

- ➔ **Nurseries**
- ➔ **Spawning areas**

(*Beck et al., 2001; Dahlgren et al., 2006*)

WP2- 1. Scientific context

What is an essential fish habitat



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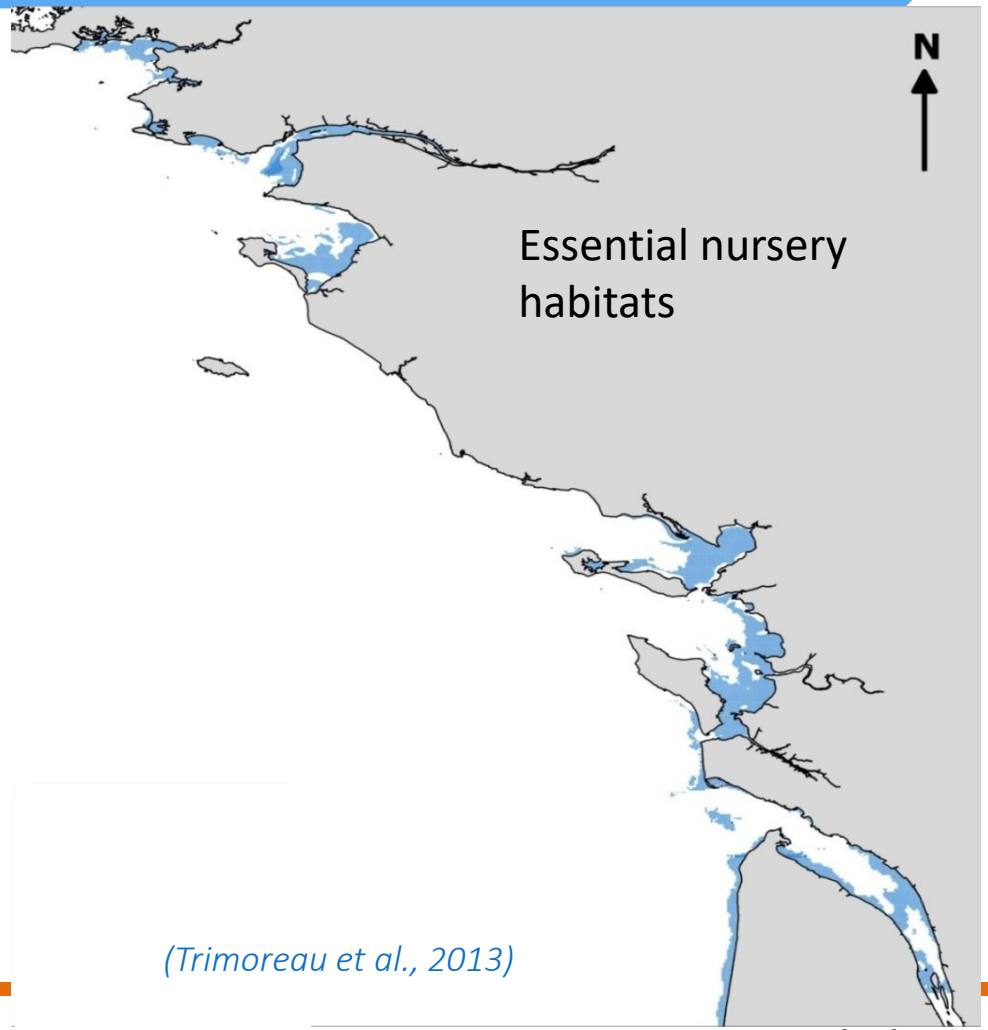
✓ Feasible job in Demerstem

➔ **Nurseries**

WP2- 1. Scientific context

What is an essential fish habitat

Flatfish nursery grounds
in the Bay of Biscay



(Trimoreau et al., 2013)

WP2- 1. Scientific context

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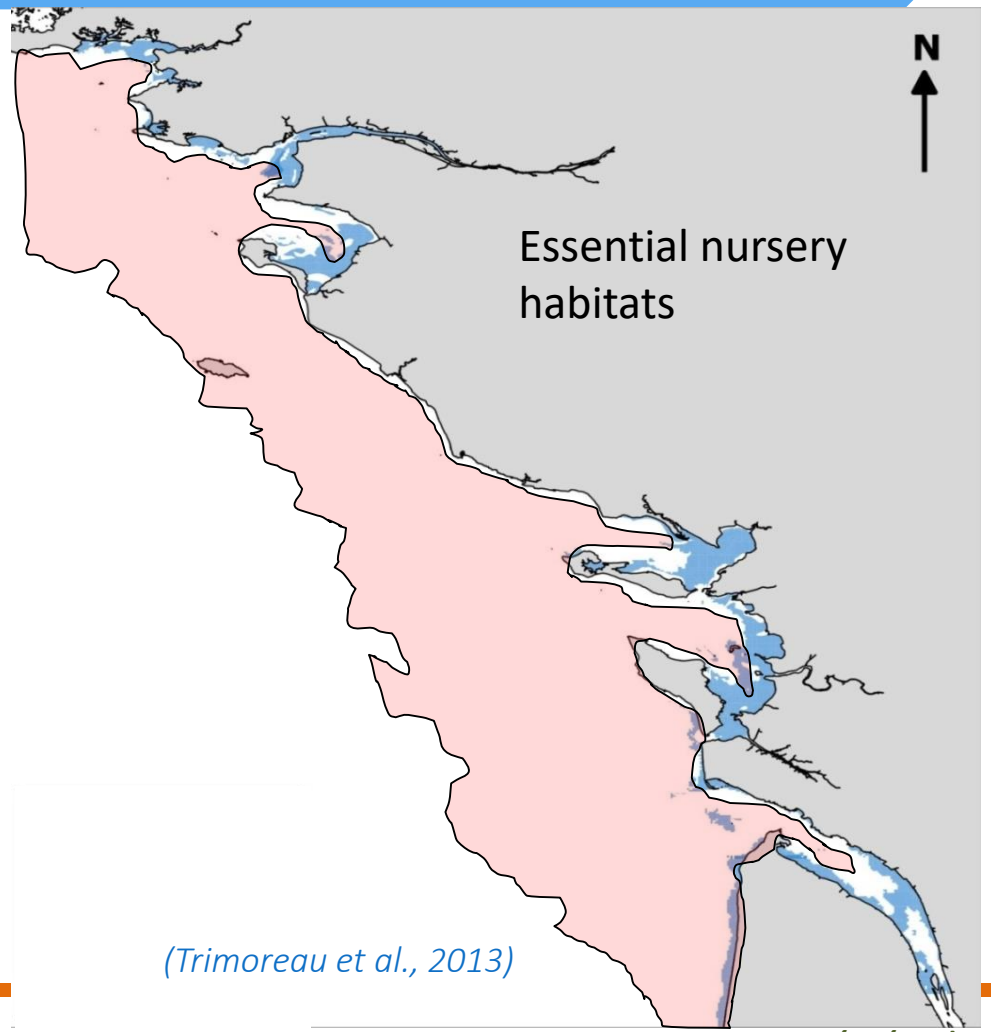

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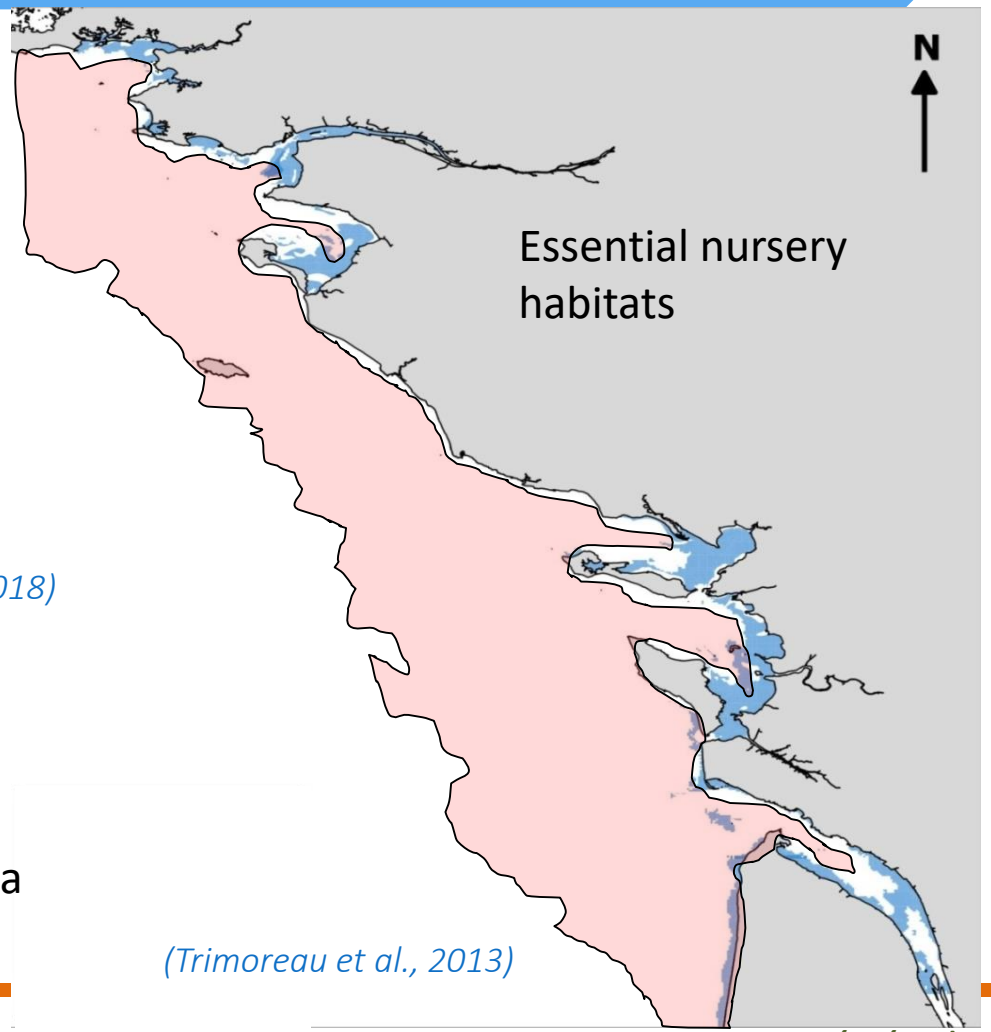


(Trimoreau et al., 2013)

Dependence to estuarine & coastal nurseries

30% of species & **66% of landings**

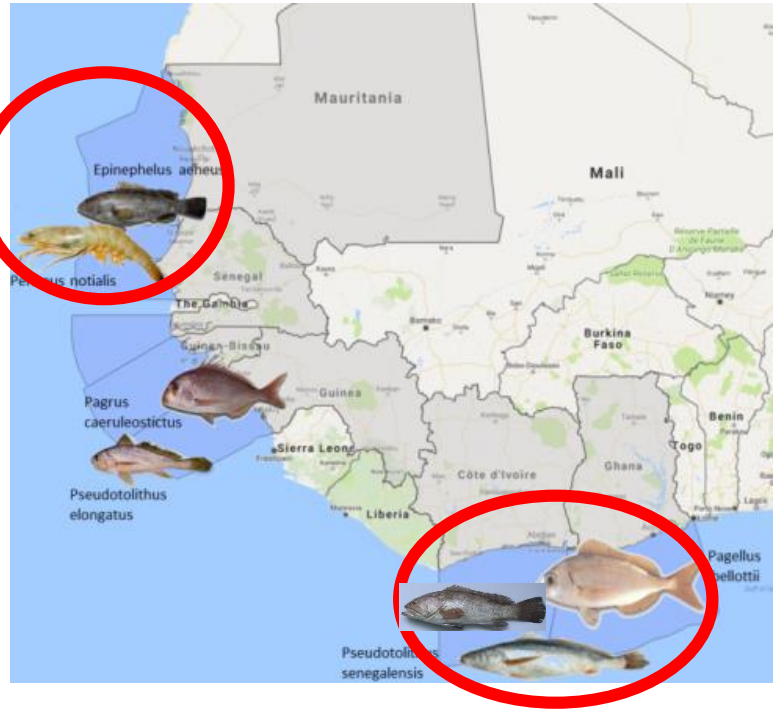
(ICES evaluated species ; Brown et al., 2018)

A need for the same knowledge in West Africa
Demerstem, WP2

WP2- 1. Scientific context

What is an essential fish habitat

A need for the same knowledge in West Africa
Demerstem, WP2



2 cases studies with ≠ species

Mauritania - Senegal
- Epinephelus aeneus
- Penaeus notialis

Côte D'Ivoire– Ghana
- Epinephelus aeneus
- Pseudotolithus senegalensis
- Pagellus bellottii

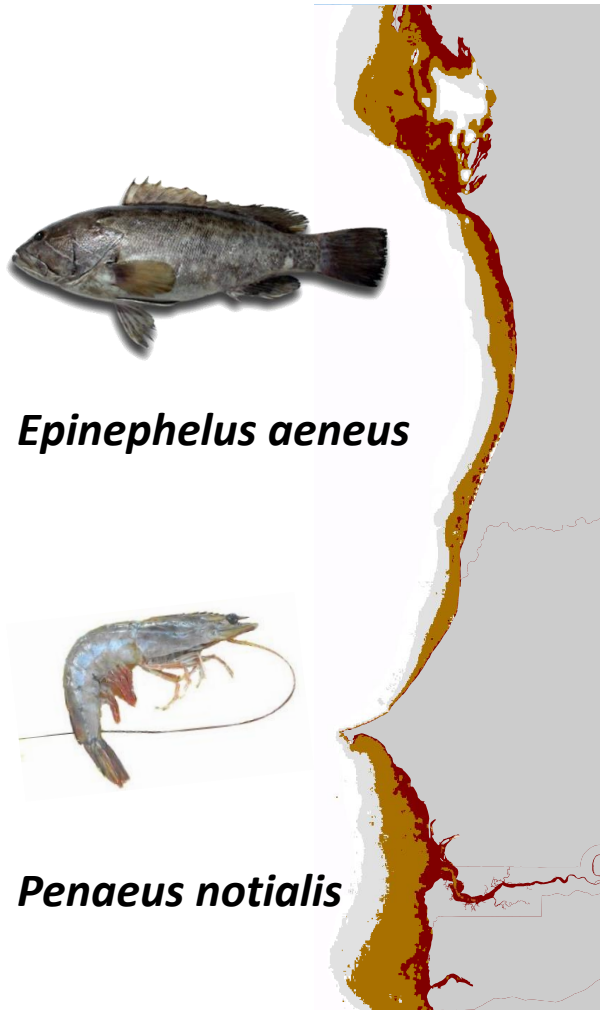
2 PhD fellows

OULD EL VALLY, Yeslem

QUENUM, Crespin Luc

Demerstem, WP 2 Case Study 1

Mauritania-Senegal



Epinephelus aeneus

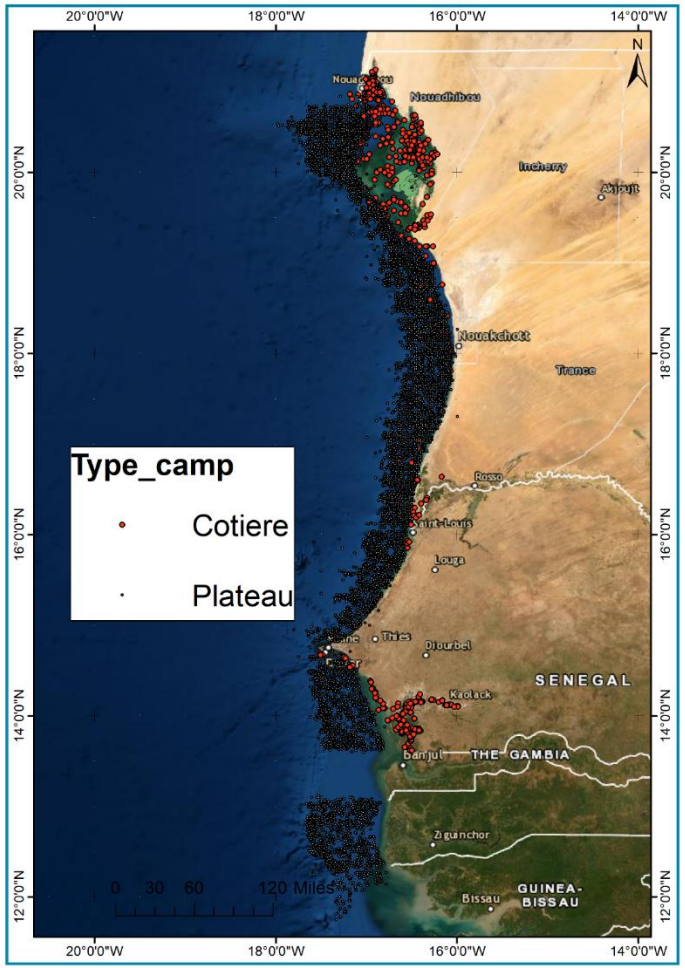
Penaeus notialis

Demerstem, WP 2 Case Study 1

Coastal data (bays and lagoons, estuaries, mangroves)

Country	Couverture	Nb. Surveys	Start	End
Senegal	Sine Saloum	63	20/04/1990	26/10/2007
	Bolon Bamboung	30	11/03/2003	16/10/2012
	Petite-Côte	7	27/04/2012	15/05/2012
	Joal et Saint-louis	10	10/04/2015	06/10/2016
Mauritania	Banc d'Arguin	9	08/02/2000	18/04/2004
	Banc d'Arguin et Jpwelling	4	07/01/2019	24/10/2019
	Golfe d'Arguin	15	14/10/2000	23/06/2020

134 surveys/projects, 2707 stations

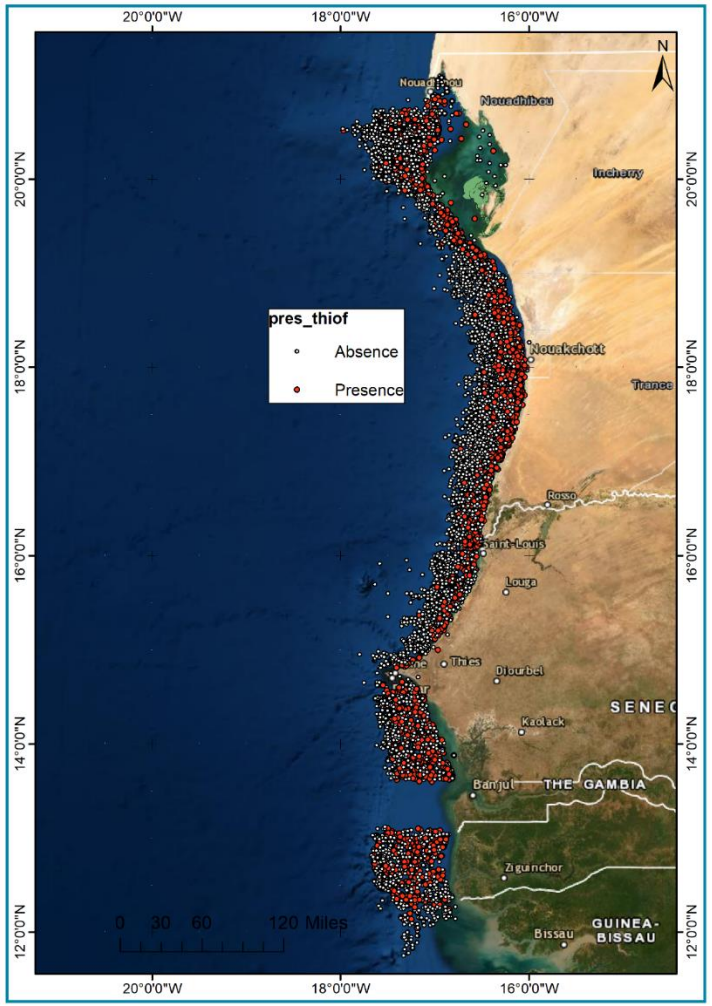


Demerstem, WP 2 Case Study 1

Survey data on the continental shelf

Country	Ship	Surveys	Years
Mauritania	NDIAGO	71	1982-1996
	AL-AWAM	150	1997-2019
	ALMORAVIDE	10	1982-1986
	LUBLINO	1	1990
	LAURENT AMARO	16	1968-1985
Senegal	LOUIS SAUGER	16	1986-1999
	ITAF_DEME	21	Depuis 2000
	GLC	2	2012 et 2015

287 surveys, 14192 trawl stations



Demerstem, WP 2 Case Study 1

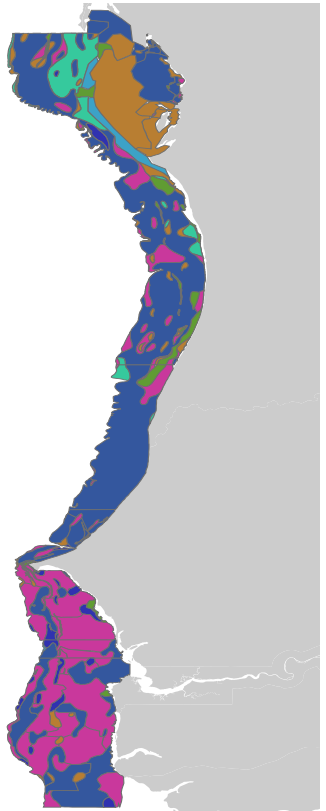
Habitat maps

- **Sediment: D**omain + SSPAC +PPEAO + Maigret (1976) + Piessens (1979)

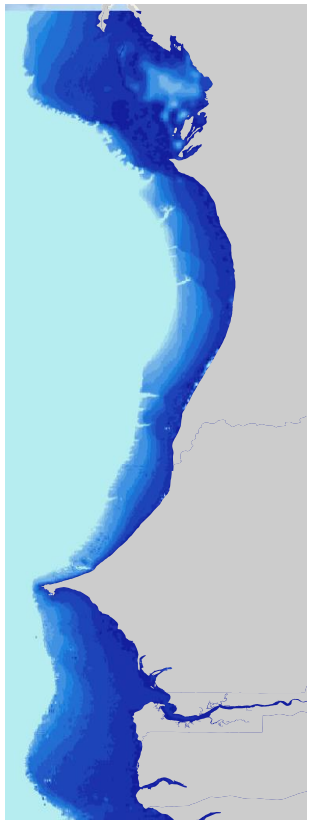
- **Bathymetry:** GEBCO 2020 (General Bathymetric Chart of the Oceans, www.gebco.net)
- Spatial scale : 15 sec.; ≈ 450m

- Seagrasses & Mangroves : PNBA

Sediment

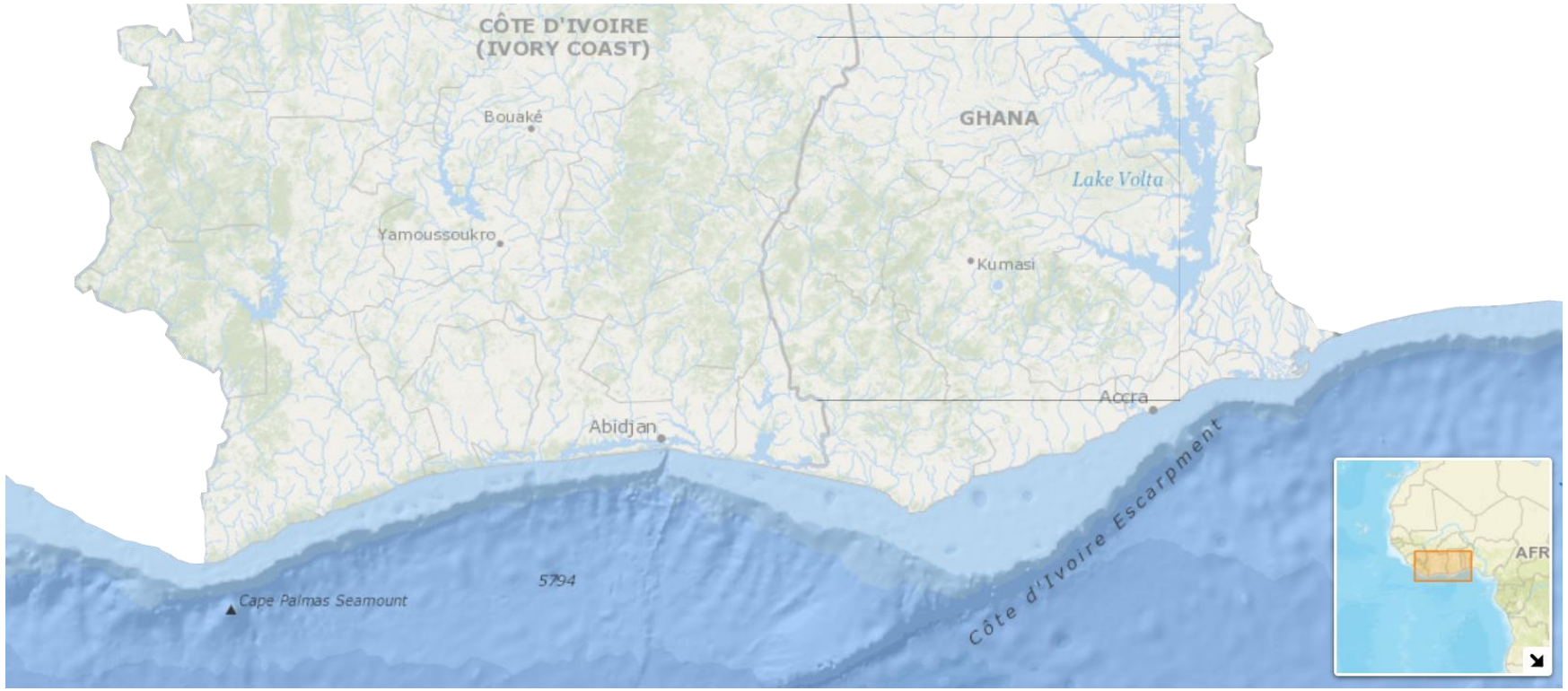


Bathymetry



Demerstem, WP 2 Case Study 2

Côte d'Ivoire-Ghana



Pseudotolithus senegalensis

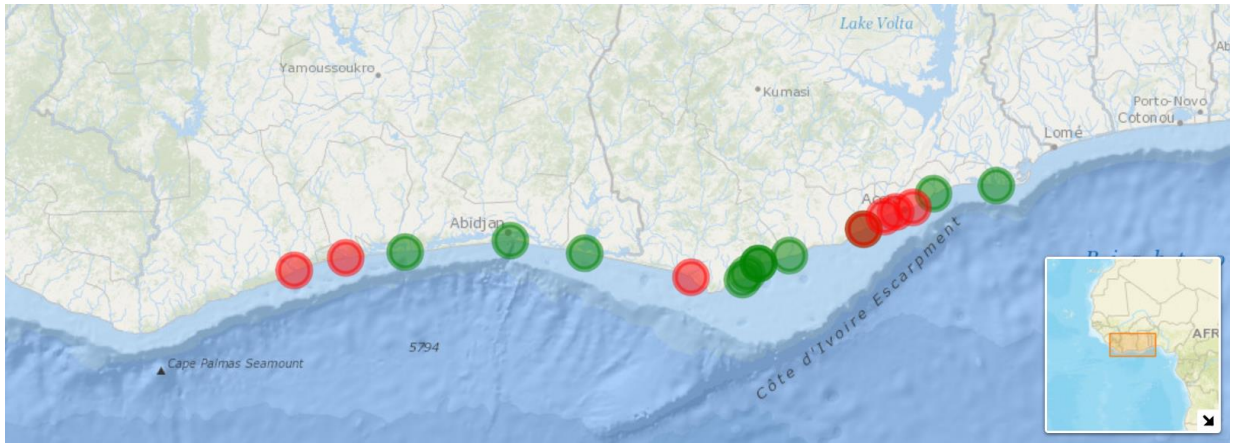
Epinephelus aeneus

Pagellus bellottii

Demerstem, WP 2 Case Study 2

Coastal data (bays and lagoons, estuaries, mangroves)

Ecosystem	Gear	Mesh
Lagune Grand-Lahou	Filet maillant ; épervier ; harpon; nasse; palangre	20-70 mm
Lagune Ebrié	Chalut ; senne tournante	
Lagune Aby	Senne de plage, tournante, syndicat ; filet maillant	
Estuaire de Whin	Senne	5 mm
Lagune Essei	Senne	5 mm
Estuaire de la rivière Pra	Epervier	20 mm
Anlo beach	Senne	20-50 mm
Estuaire de Kakum	Senne	5 mm
Estuaire de Kakum	Senne	5 mm
Lagune Oyibi	Epervier	25 mm
Lagune Laloi	Epervier	25 mm
Estuaire de la Volta	Senne	80 mm

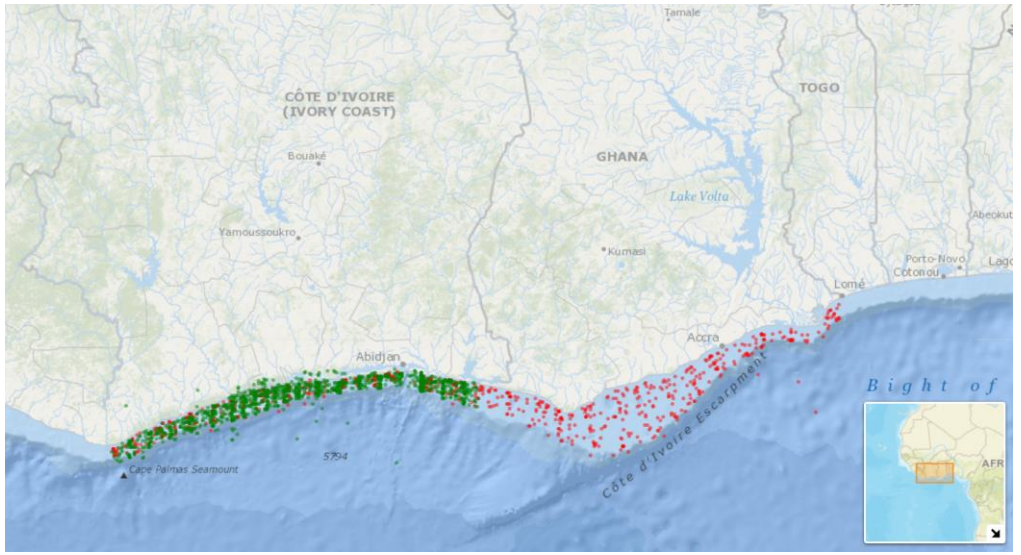


11 studied sites

Demerstem, WP 2 Case Study 2

Survey data on the continental shelf

Projets	Navires	Années	Engins	Nombre total d'échantillons
CHALCI	N/O André Nizery	1978 ; 1979 ; 1980 ; 1983 ; 1984 ; 1985 ; 1986	Chalut grée par l'arrière de type PICARD, de 24,6m de corde de dos et dont l'ouverture de maille du cul était de 39 mm ou 48 mm	19 115
NANSEN	N/R Dr Fridtjof Nansen	1999 ; 2000 ; 2004 ; 2005 ; 2006 ; 2007 ; 2019	Chalut de fond Super Gisund ; tête de 31 m ; maille du cul = 20 mm avec un filet intérieur de 10 mm de maille	14 173
UEMOA-SUD	N/O Général Lansana Conté	2012 ; 2015	Chalut de fond à panneaux ; longueur de corde de dos = 33,1 m ; largeur d'ouverture = 15,85 m ; hauteur d'ouverture = 4 m ; maille du cul = 25 mm	62 964

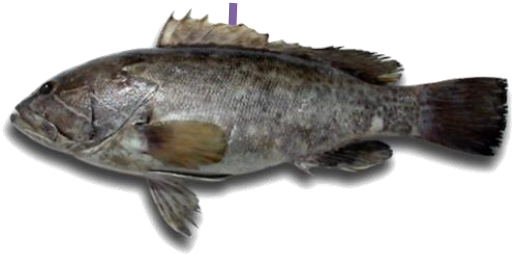


16 surveys, 1640 trawl stations

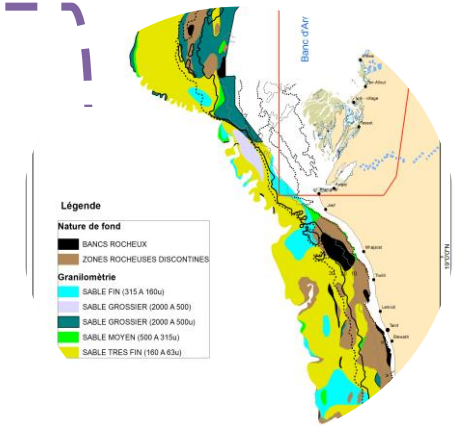
WP2 – 3. Nursery description

Combine 2 categories of data

Fish



Habitat



Centralised database

- Surveys
- Projects
- Sediment
- Bathymetry
- Mangroves, estuaries…

WP2 – 3.1 Coastal nursery description

Develop a qualitative description of habitat suitability : Evaluate the nursery niche

Presence(juveniles) = f(environmental factors)

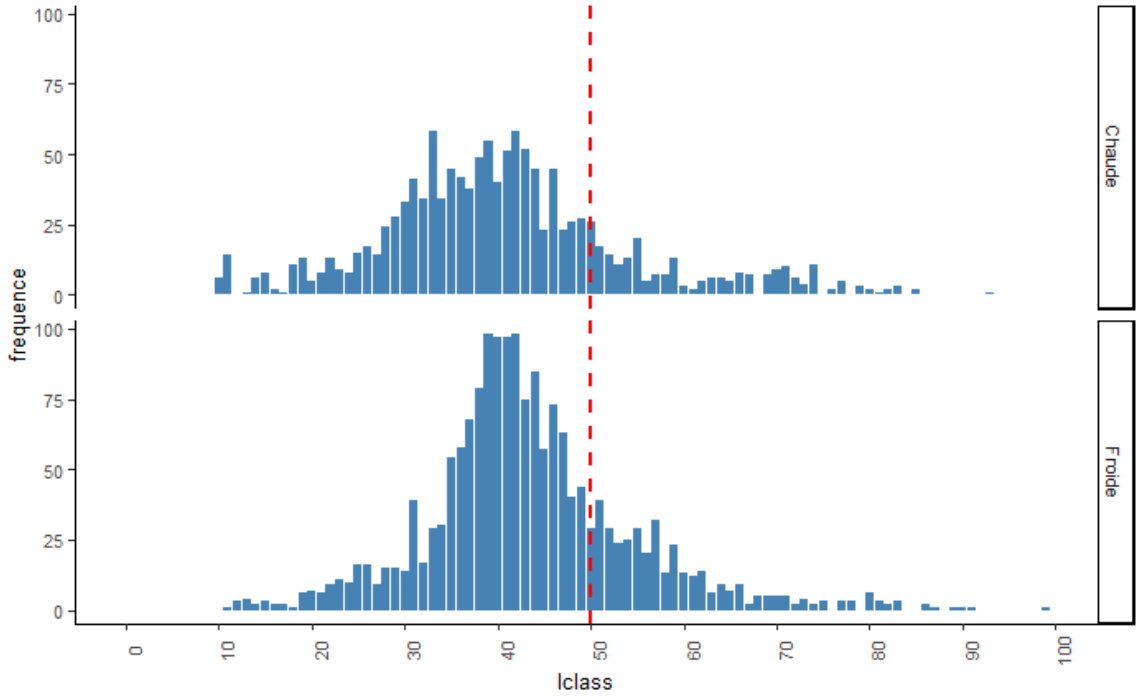
example of case study 2

Système (Ouest vers Est)	*Pseudotolithus senegalensis*	*Epinephelus aeneus*	*Pagellu bellottiis*
Lagune Grand-Lahou	+	+	-
Lagune Ebrié	+	+	-
Lagune Aby	+	+	-
Estuaire de Whin	-	-	-
Lagune Essei	-	-	-
Estuaire de la rivière Pra	+	+	-
Plage d'Anlo	+	-	-
Estuaire de Kakum	-	-	-
Estuaire de Kakum	-	-	-
Lagune Oyibi	-	-	-
Lagune Laloi	-	+	-
Estuaire de la Volta	+	+	-

WP2 – 3.2. Nursery mapping on the shelf

First data threatment: estimation of juveniles CPUE (example of E. aeneus in case study 1)

% juvenile thiof on shelf data



Rate of measurment for the thiof
Data on the Mauritania-Senegal shelf

	Sized	No size	Total
NB stations	405	2413	2818
%	14%	86%	100%

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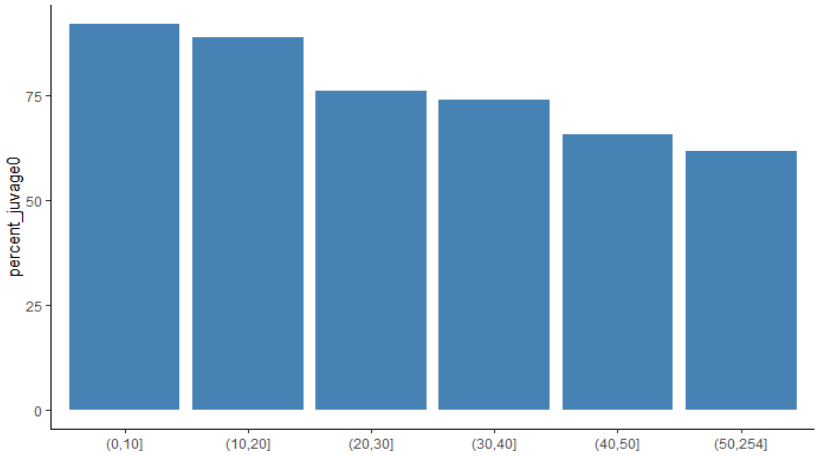
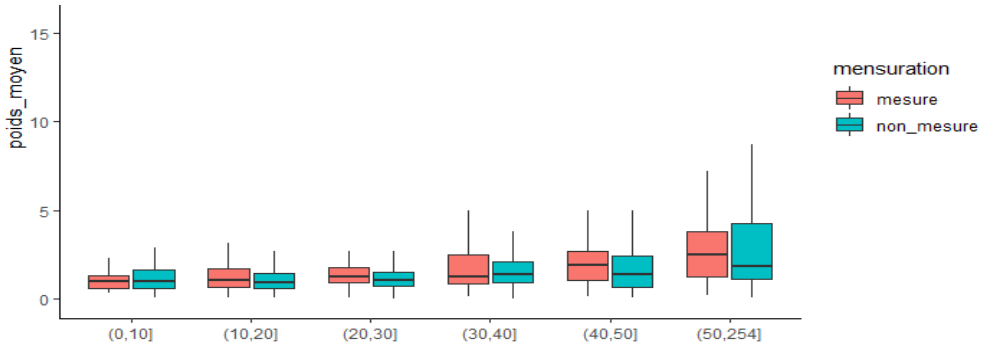


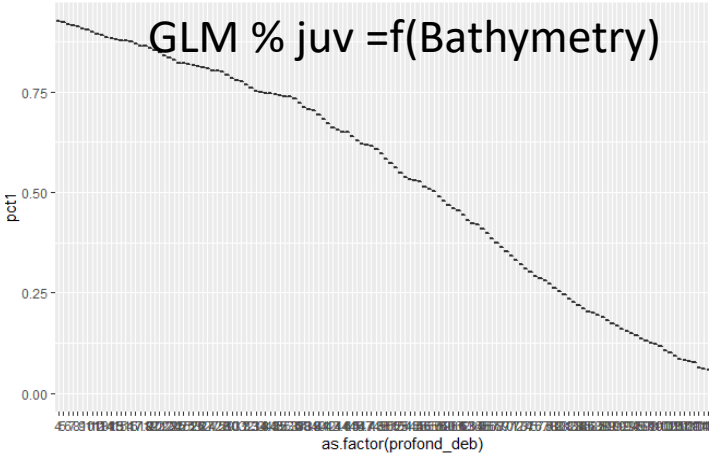
% juveniles (<50cm) /bathy



Average weight measured / non measured for ≠ bathy

Sized

15%



No size

85%

Extrapolation to non sized samples

Juveniles CPUE on the whole dataset

WP2 – 3.2. Nursery mapping on the shelf

3.2.1. Develop an habitat suitability model (HSI)

- Merge fish data and environmental factors

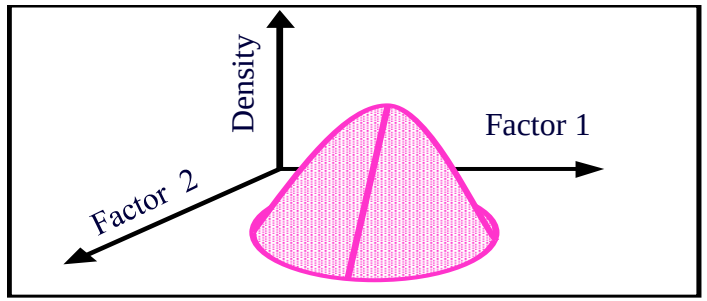
n1 potential environmental descriptors ↔ n2 survey data

Map of 1 environmental descriptor (static or temporal)

1 survey data (position, date)
1 associated value for this descriptor

- Choose, fit then evaluate and validate an HSI

Density(juveniles) = f(environmental factors)



3.2.2. Create predicted maps

Maps of environmental descriptors

Prediction with HSI model

Habitat suitability map

WP2 – 4. Deliverables

For the 2 case studies

4.1. Database of coastal surveys
(in association to the shelf surveys database in WP1)

4.2. Maps of descriptors of coastal habitats
(in association to large scale environmental maps and layers in WP4)

Achieved

4.3. Both qualitative (coastal) & quantitative knowledge (shelf) on nursery habitats

4.4. Essential fish habitat maps

4.5. Needs of further coastal fish survey data and survey protocol

To do

WP2 – 5. Toward management

Integrating essential fish habitats into fisheries management (with WP1)

For each case study (ecosystem)

Estimate the contribution of different essential fish habitats to fish populations & fisheries

Consider the impact of fisheries and other pressures on these essential fish habitats

Then

Discuss with the MAVA project to integrate considerations on essential fish habitats for both demersal and small pelagic species

WP2 – 6. Schedule

	2019				2020												2021												2022												2023		
	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Collecte du matériel-données																																											
Pré-traitement des données																																											
Analyse des données																																											
Bibliographie																																											
Rédaction(thèse et articles scientifiques)																																											
Séjours à Rennes																																											

Demerstem

WP2 – Define coastal essential fish habitat for the demersal community

Thanks for your attention
any question?