

Long term data on the demersal faunal assemblages in the Central Mediterranean

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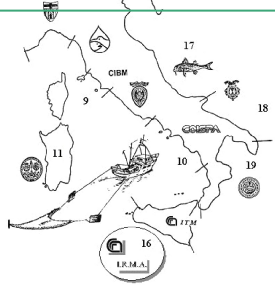
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²Laboratories of the Foundation of the Trend Holding Development



National and international projects on the assessment of the demersal resources of the Ionian Sea in the last 30 years

GRUPPO Nazionale Risorse Demersali GRU.N.D.



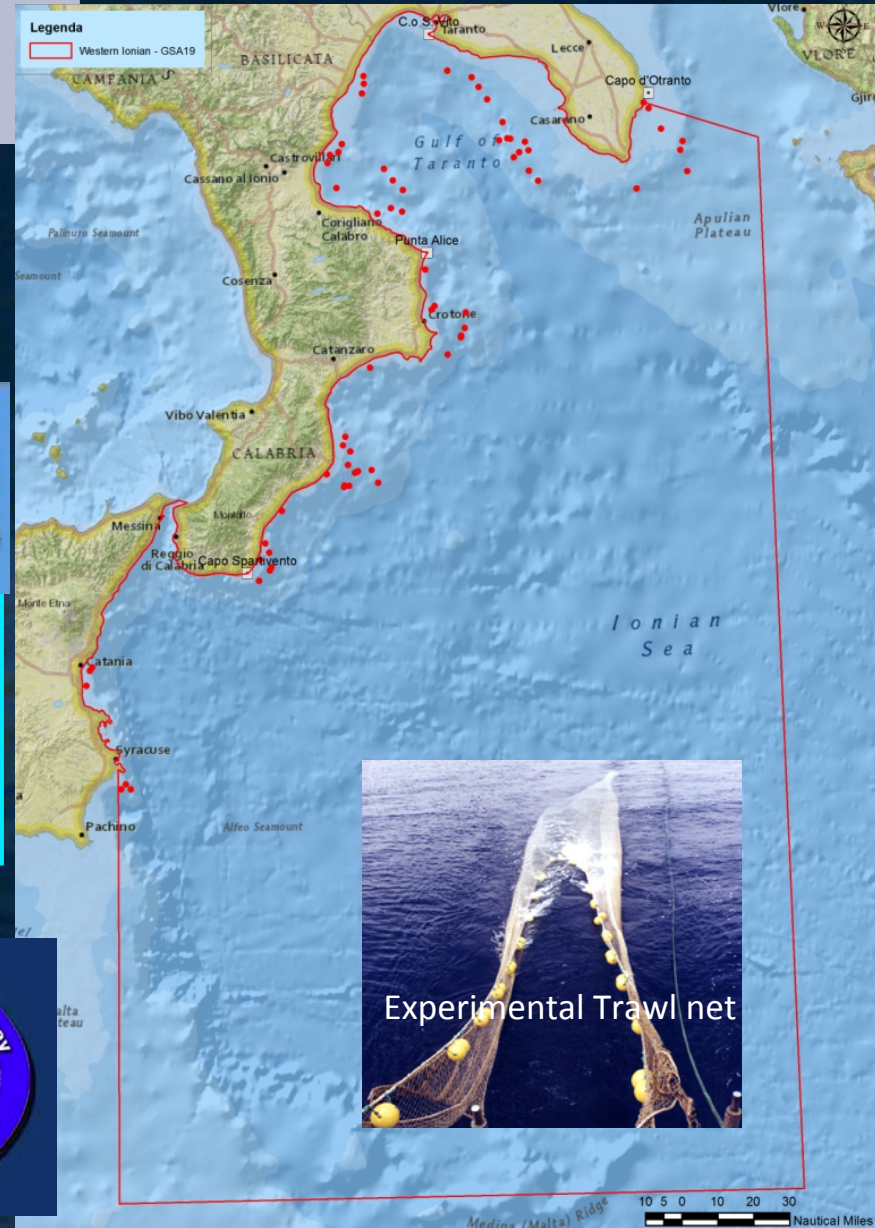
1985-2008
Assessment of Italian Demersal Resources

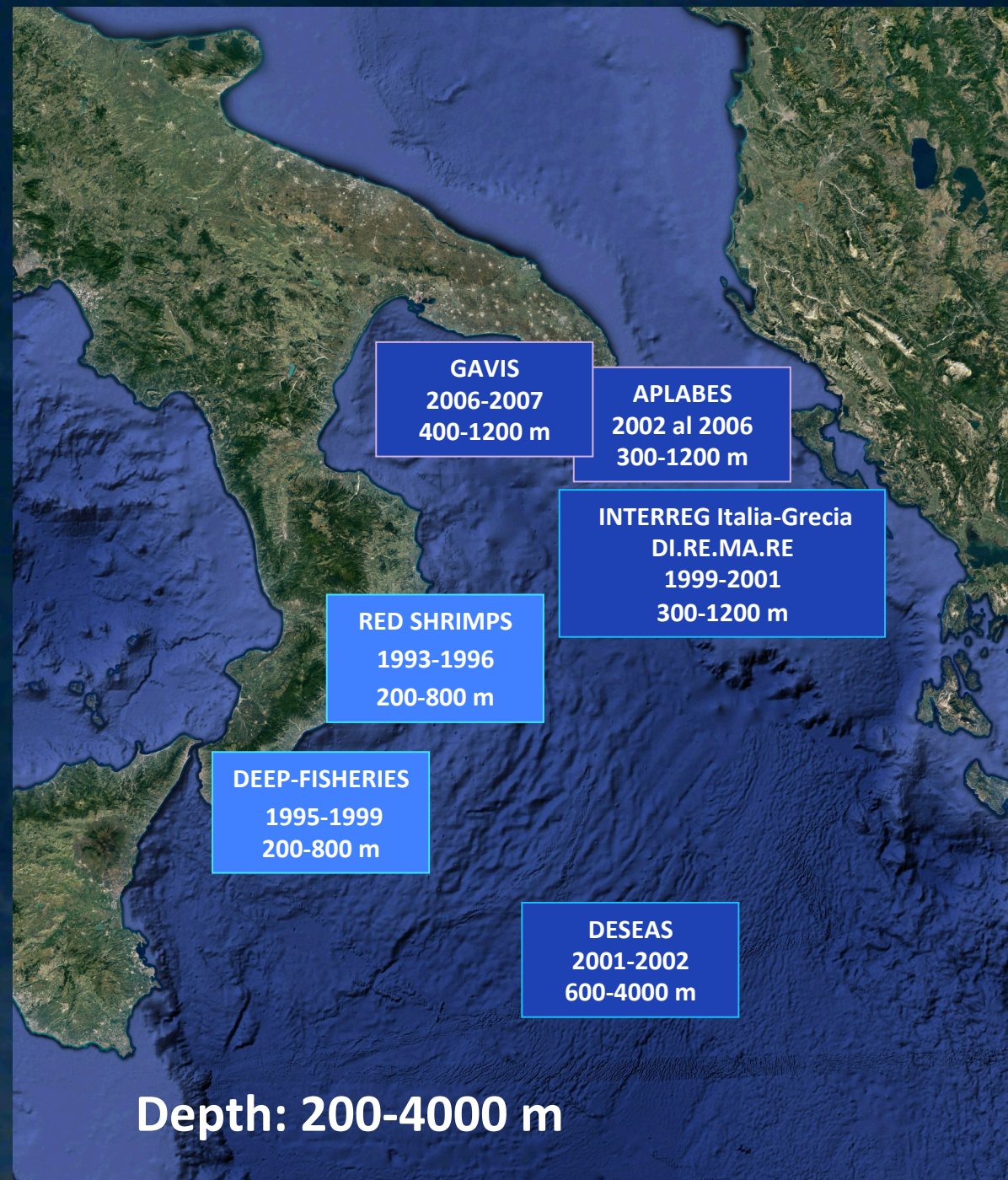


EU Data Collection Framework
Council Reg. (EC) 1543/2000 – Commission Reg. (EC) 1639/2001

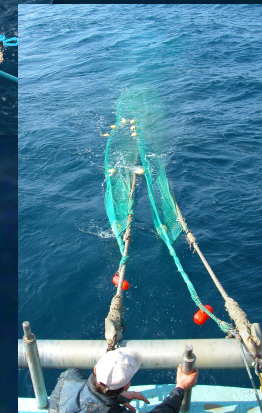
Time series 1985-2017 (depth: 10-800 m)

From 1994
MEDiterranean International Bottom Trawl Surveys





Trawl nets



Long-line

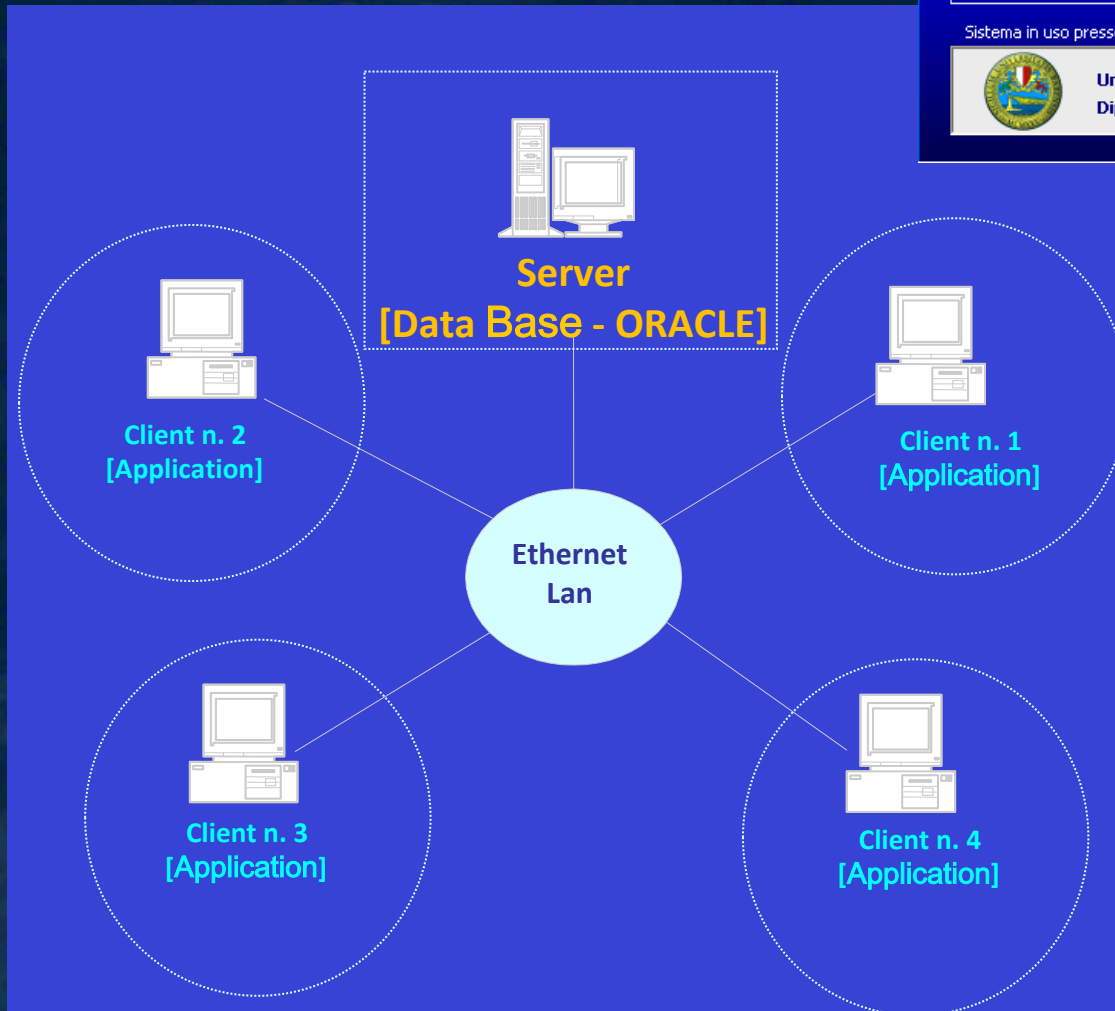


Traps



Data storage: structure

All data in a common data-base hosted
in the Biology Department of
University of Bari



Informazioni su FishWare©

FishWare© Sistema per il monitoraggio delle Risorse Alieutiche

Engineering:
Analisi: CRDL, DSNM, LTAG, PSSG
Sviluppo: DSNM, LTAG
Release: 4.22 (build 1)
del: 30/07/2015
Ambiente: Oracle 9i - Windows2000 Server


Albo Nazionale dei Centri di Ricerca MIUR
DD 97/04/Ric del Ministero dell'Istruzione,
dell'Università e della Ricerca


LABORATORI DELLA FONDAZIONE©
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Sistema in uso presso:


Università degli Studi di Bari
Dipartimento di Biologia

FISHWARE© System architecture
CLIENT – SERVER (INTRANET) Model

Data storage: Archives

- **Sampling stations** (position, environmental parameters)
- **Sampling gear** tipologies (trawl net, longline, traps)
- **Total Catch data**
(number and weight by species; number and weight of marine litter)
- **Individual data**
(weight, lengths, sex, maturity stages, age, stomach contents)



Historical database (December 2016)					
	Project Records	Surveys Records	Stations Records	Catch Records	Individuals Records
Total number	22	139	5068	121487	1805729

Homogeneous DB data structure

Gestione Stazioni - Aggiornamento record

Gestione Catture - Aggiornamento record

Progetto: **MEDIT** Campagna: **20** Stazione: **17** Attrezzo: **1**

☐ Elenca solo Specie Target Specie: **ARITANT** **Aristeus antennatus** Tipo Attrezzo: **RES**

Commerciale

Pescato		Campione Laboratorio		Rendimenti			
Quantità	Peso Kg	Quantità	Peso Kg	Kg / h	Kg / UM	N / h	N / UM
0	0	0	0	0	0	0	0

Discard

Pescato		Campione Laboratorio		Rendimenti			
Quantità	Peso Kg	Quantità	Peso Kg	Kg / h	Kg / UM	N / h	N / UM
0	0	0	0	0	0	0	0

Indistinto

Pescato		Campione Laboratorio		Rendimenti			
Quantità	Peso Kg	Quantità	Peso Kg	Kg / h	Kg / UM	N / h	N / UM
103	1,817	0	0	1,817	20,1029	103	1139,569

TOTALE

Gestione Individui - Aggiornamento record

Progetto: **MEDIT** Campagna: **20** Individuo: **89** Stazione: **65** Attrezzo: **1** Tipo Attrezzo: **RES**

Specie: **ARITANT** Cat. Faun.: **CRO**

Fattore di moltiplica: **2** Commerciale: **I** Peso: **18,8**

Note Individuo:

Lung. carapace: **36** Età, mesi:
 Sesso: **F** Età, giorni:
 Scala maturità: **KAVAFAA**
 Stadio maturità: **4**
 Lung. rostro:
 Presenza uova: **N**
 Stadio maturità uova:
 Presenza spermatofore: **5**
 Peso gonade:
 Tipo petasma:
 In muta:
 Lunghezza totale:
 Larg. carapace:
 Numero uova:
 Peso uova:
 Peso stomaco:
 Otoliti prelevati: **N**
 Età, anni:

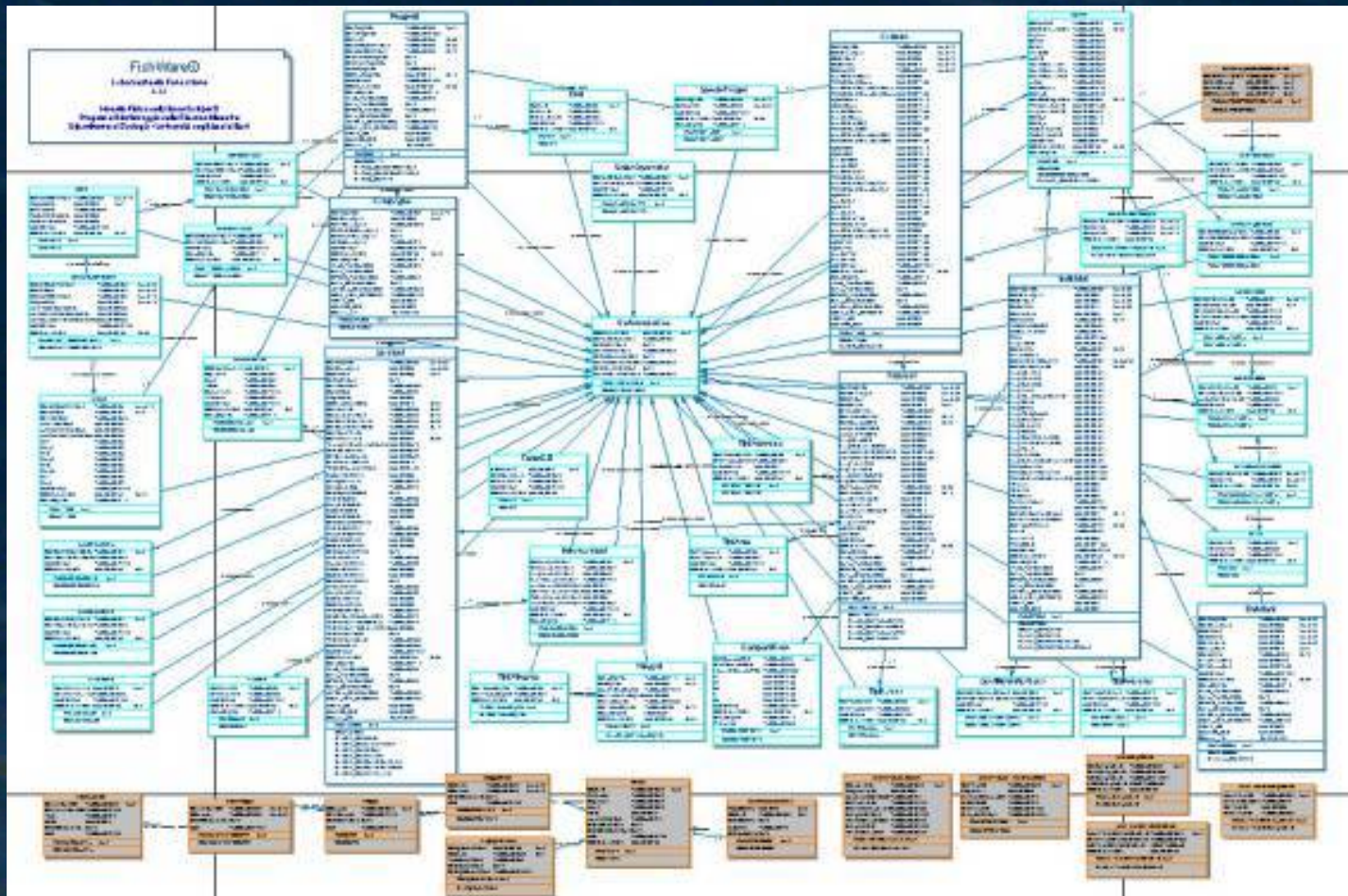
Elenco embrioni

Progetto	Campagna	Stazione	Attrezzo	Individuo	Embrione	Sesso	Lunghezza	Peso	Note

Aggiungi Modifica Cancella

Allegati Conferma Esci

RDBMS Oracle



Utilities

- Check in data-entry (validation procedures)
- Dynamic **QUERIES** (multifactorial tables also stored as metadata)
- Statistical analysis (also using R routine)
- Image upload
- Geo-referenced representations and maps (GIS)

Nome query CrossStrato-SessoDe26 **Descrizione** Analisi incrociata per specie tra strato di pesca e Sesso in De-26 **Tipo Query** CrossQuery

☐ Inserisci campo descrizione Query

Area di SELEZIONE PRIMARIA

Archivi

- ☐ Progetti
- ☐ Campagne
- ☐ Stazioni
- ☐ Altezze
- ☐ Catture
- ☐ Individui
- ☐ Embioni
- ☐ Specie
- ☐ Specie Target
- ☐ Scalematurita

Campi Disponibili

- Individui.CODPROGETTO
- Individui.CODCAMPAGNA
- Individui.IDSTAZIONE
- Individui.IDATTREZZO
- Individui.IDINDIVIDUO
- Individui.CODSPECIE
- Individui.FATTOREMULTIPLICA
- Individui.SECOMMERCIALE
- Individui.PESO
- Individui.LUNGTOTALE
- Individui.CODSESSO
- Individui.NUMEROUOVA

Campi Selezionati

Posizione	Campo	Step
Riga	Individui.CODSPECIE	
Riga	Stazioni.PROGRSTRATO	
Colonna	Individui.CODSESSO	

Espressione Individui.FATTOREMULTIPLICA **Valori** ☐ %Riga ☐ %Col **Funzione** Somma

Area di APPLICAZIONE FILTRI e CRITERI

☒ Individui.CODPROGETTO uguale a DE And ☐

☒ Individui.CODCAMPAGNA uguale a 26 ☐

Nome Query: CrossStrato-SessoDe26 Query PIVOT (Valori Assoluti) Data esec: 10 mar 2007 22:04:39 - Risultato Query - 2 tabelle - 9 campi - 233 records - 6,47

INDI_CODSPECIE	STAZ_PROGRSTRATO	EF	EM	F	I	M	N	Tutt
MERLIER	1	0	0	25	1	17	0	43
MERLIER	2	0	0	318	13	165	8	504
MERLIER	3	0	0	371	44	331	32	778
MERLIER	4	0	0	185	9	156	14	364
MERLIER	5	0	0	12	0	2	0	14
MICMPOU	3	0	0	27	2	32	6	67
MICMPOU	4	0	0	148	16	159	66	389
MICMPOU	5	0	0	6	0	0	0	6
MOLVIDP	5	0	0	0	0	0	1	1
MORAMOR	4	0	0	4	0	0	0	4
MORAMOR	5	0	0	0	0	0	0	0

Archivio

- ☒ Individui
- ☐ Catture
- ☐ Altro

Filtro

Progetto: GAVIS

Campagna: 1

Altezza: RES

Rete a Strascico

☒ Induci COVER

Specie

- ☐ Tutte
- ☒ Target: ARITANT CRO

Aristeus antennatus

Settori

- ☐ Tutti i settori
- ☐ Singolo Settore
- ☐ Macrosettore

Variabili

Variable indipendente (X): LUNGARAPACE Trasformata (X) ☐ Espon. X ☐

Variable dipendente (Y): PESO Trasformata (Y) ☐ Espon. Y ☐

Variable Frequenza: FATTOREMULTIPLICA N. Cifre dec.: 3

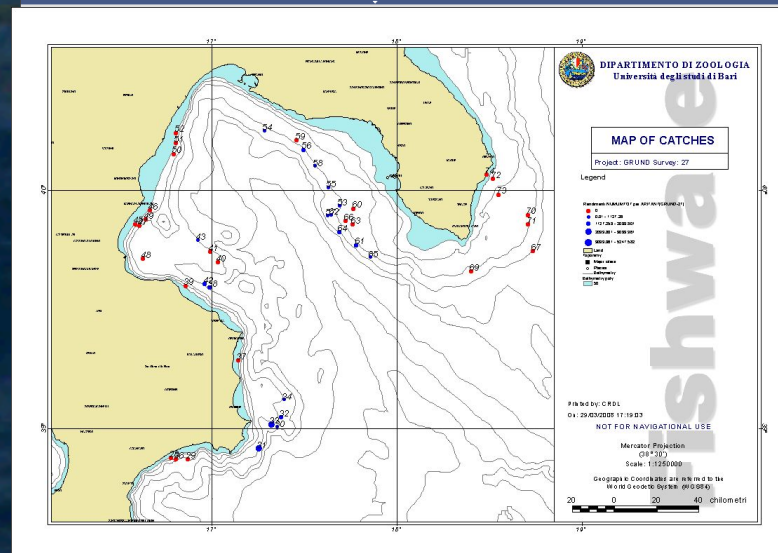
Modello di regressione

☒ Lineare ☐ Logarith ☐ Potenz ☐ Esponenz ☐ Polinom

☒ Visualizza Indice R Quadro ☒ Visualizza Formula

1 Preparo **2 Analizzo** **3 Crea Grafico** **N. Rec. 137** **N. Rec. Analizzati 133**

La funzionalità utilizza primitive dell'ambiente R.
R: A Computer Language for Statistical Data Analysis
Versione: 2.3.1

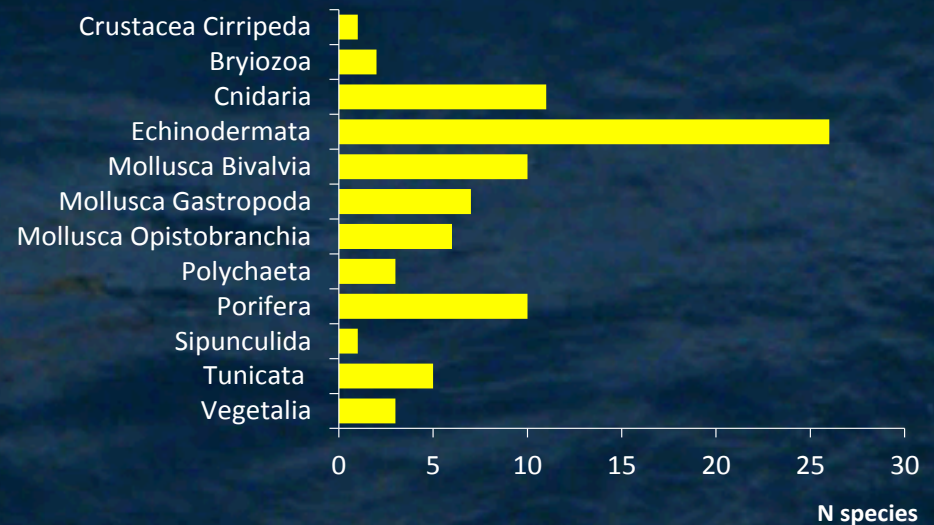
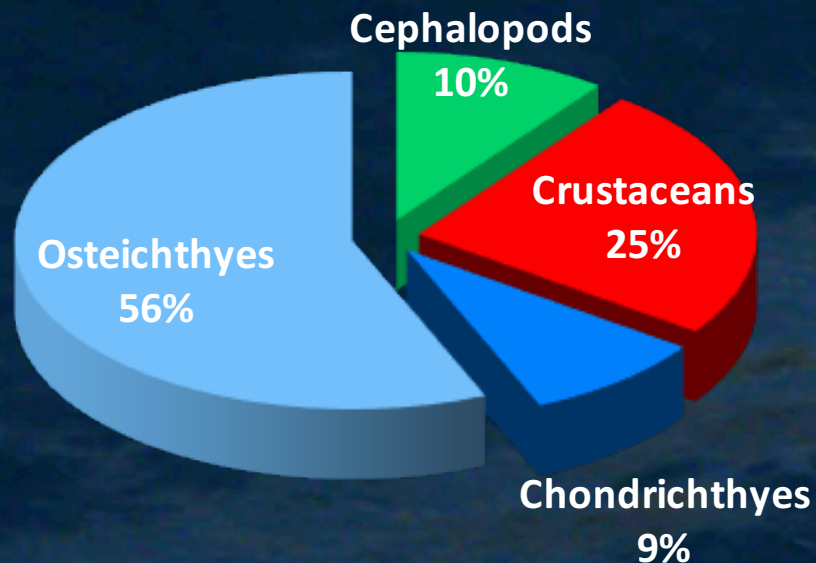


1985-2016, depth range 10-4000 m
NW Ionian Sea, soft bottoms

Species collected during national and international study projects

420 benthopelagic species in the main categories

95 in other faunistic categories



**New species for the area, new depth records,
expected reduction or absence of some species**

e.g. D'Onghia *et al.*, 2004a, 2004b, *Sci. Mar.*; Maiorano *et al.*, 2010, *Chem. Ecol.*

Occurrence of sub-tropical species

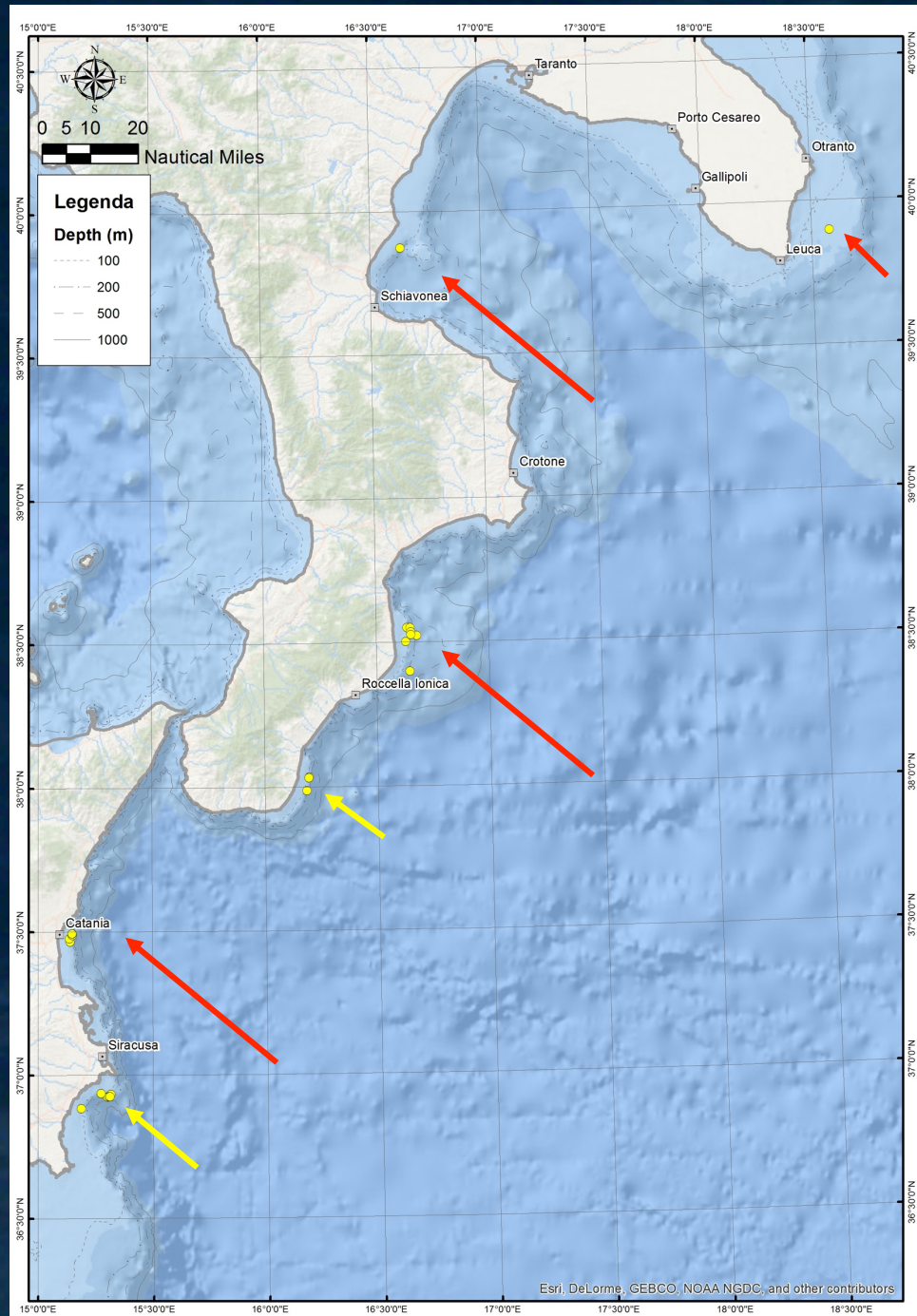
Sphoeroides pachygaster



1991 First record



Tursi *et al.*, 1992 Maiorano *et al.*, 2010

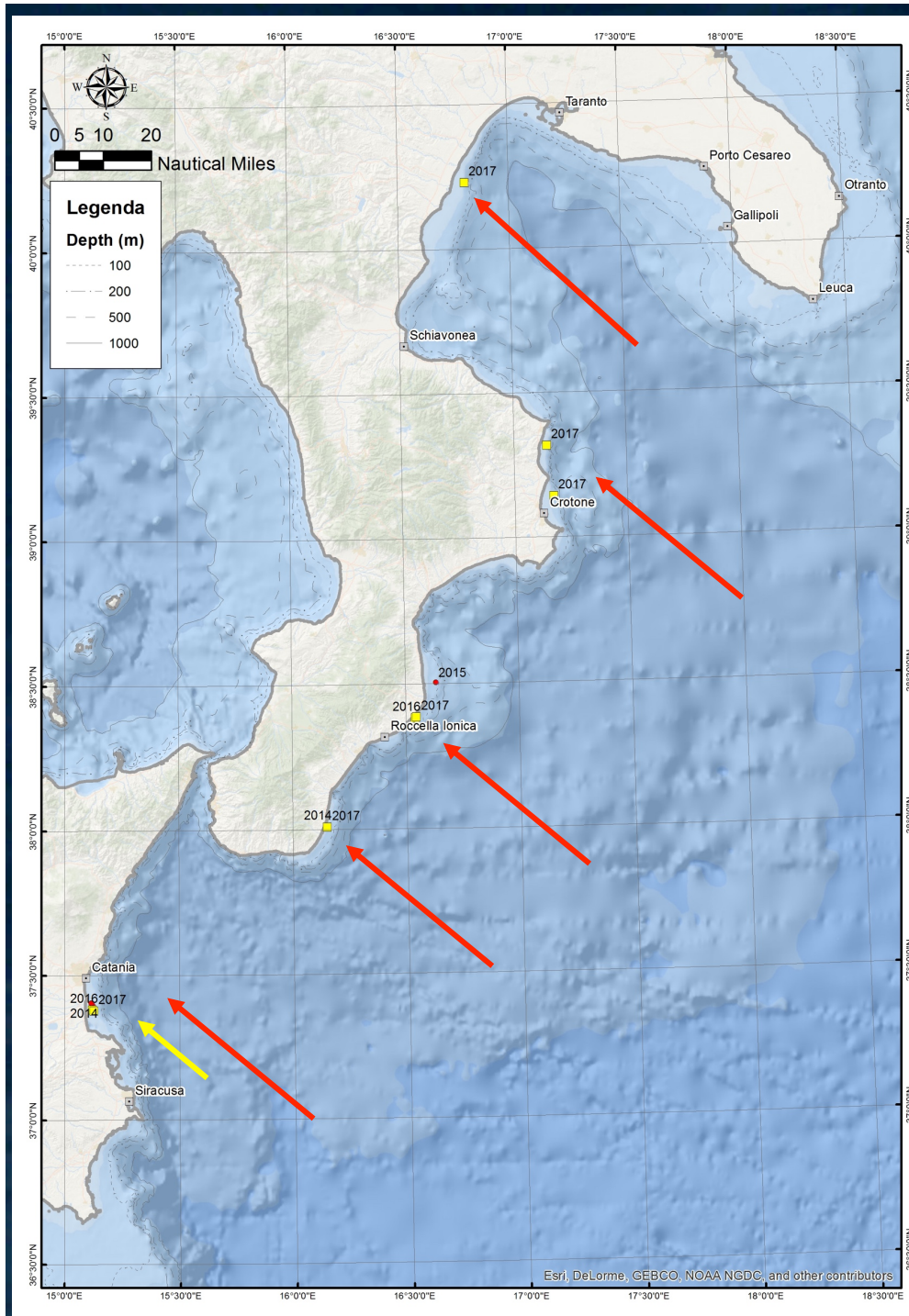


Occurrence of sub-tropical species

Balistes capriscus

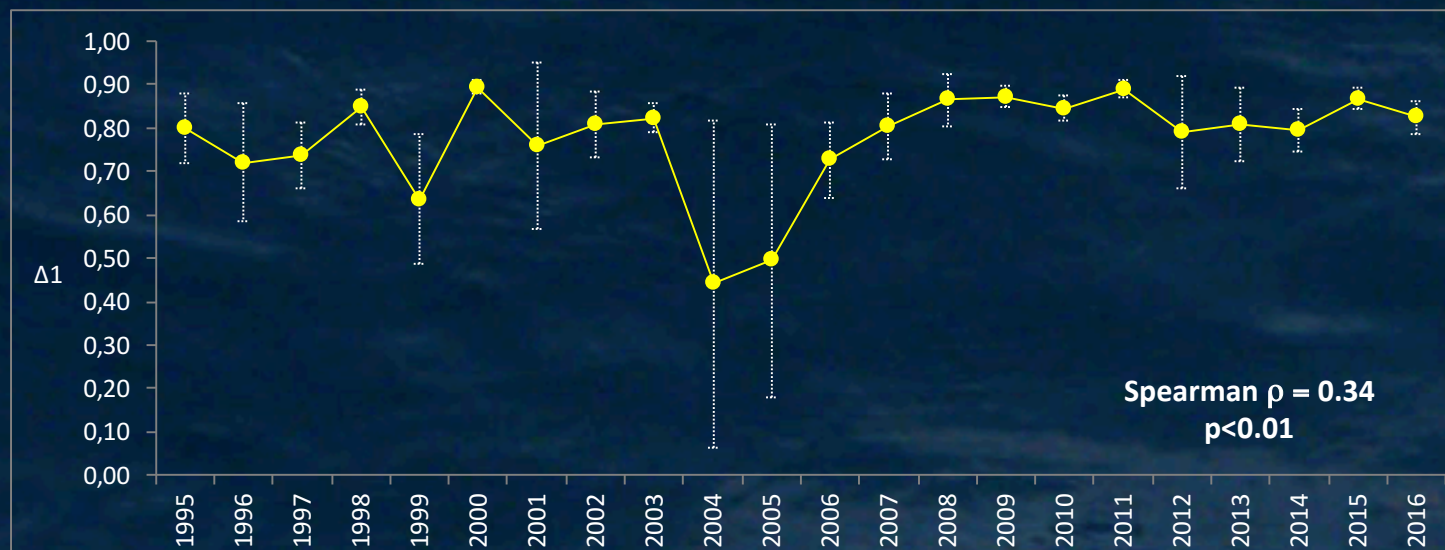


2006 1st record



Community Indicators - Historical trends (1995-2016)

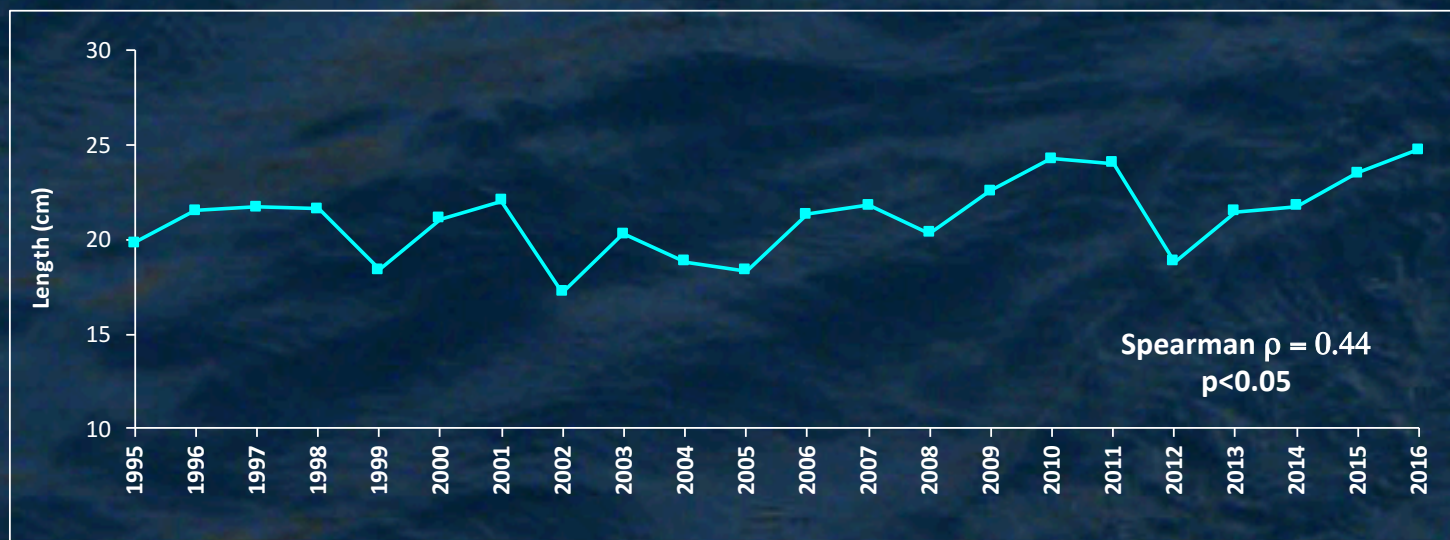
Diversity index Δ_1 (Hurlbert, 1971) - Medits 1995-2016



R-SUFI routine
Rochet *et al.*, 2004

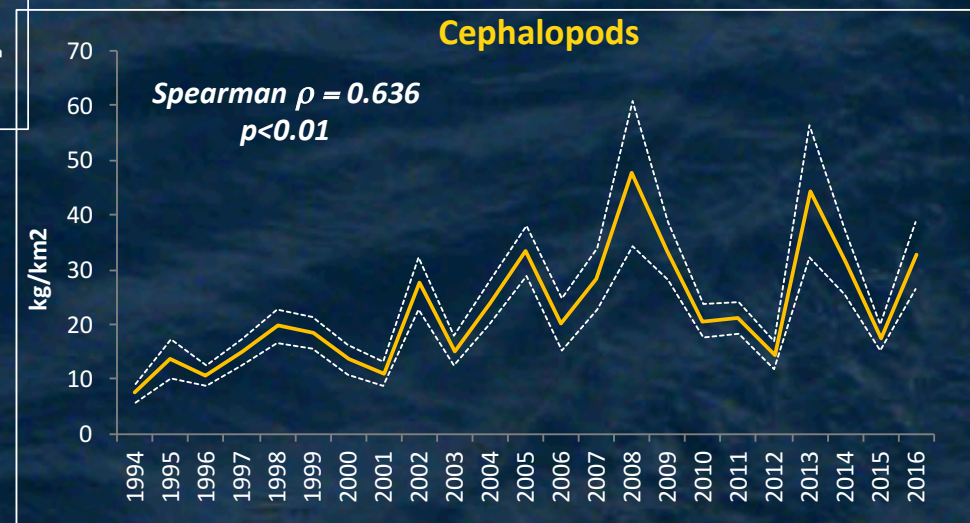
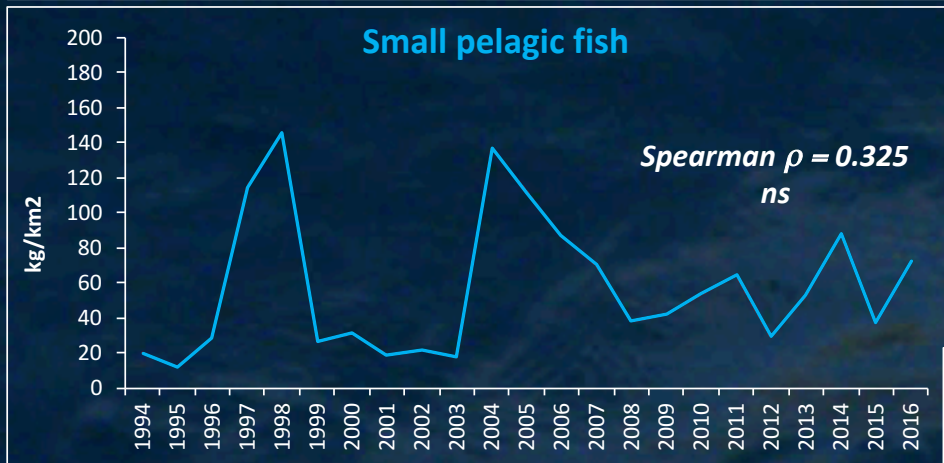
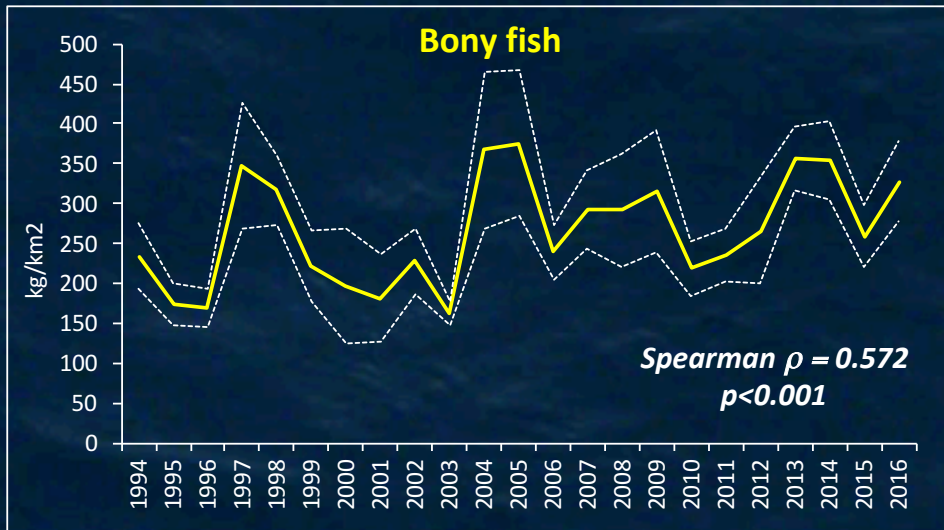
Mean maximum length of fishes ($L_{0.95}$) - Medits 1995-2016

Indicator for the life
history composition of
the fish community

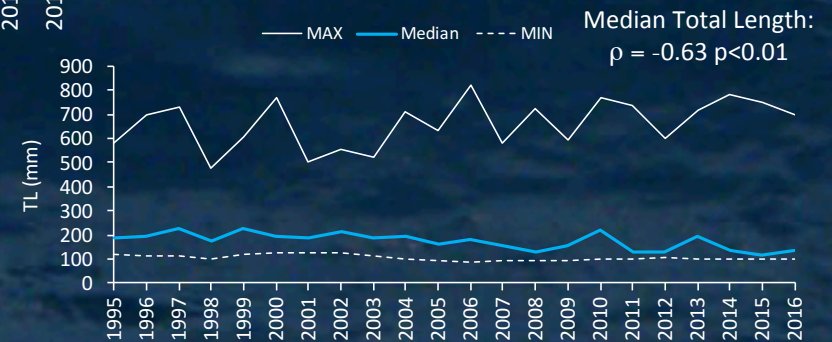
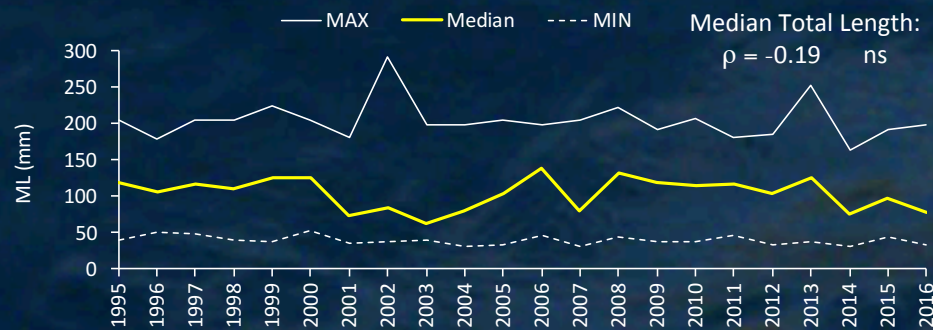
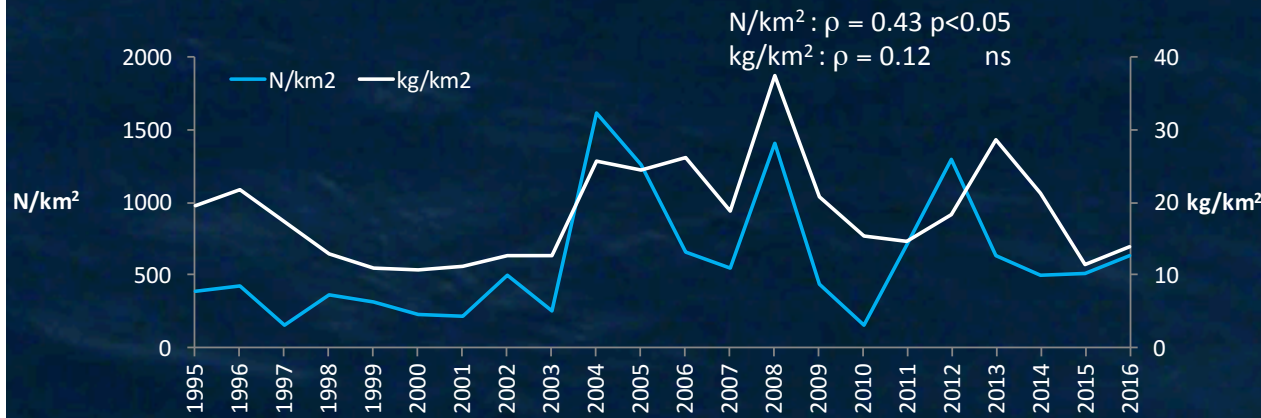


Community Indicators – Historical trends (1994-2016)

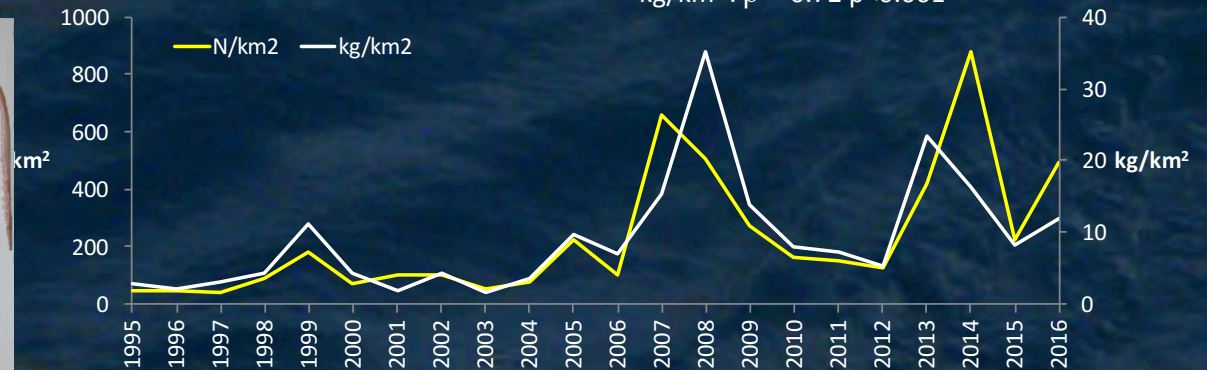
Faunal assemblages



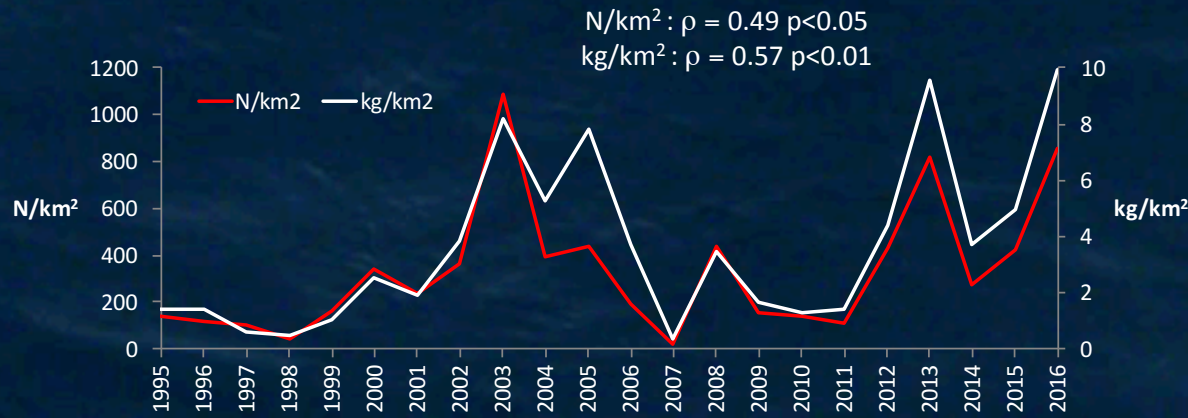
Population - Historical trends (1994-2016)



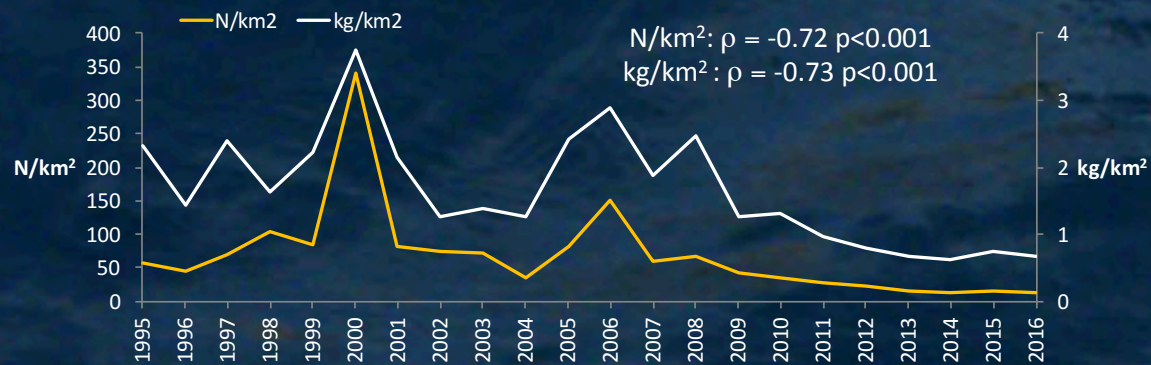
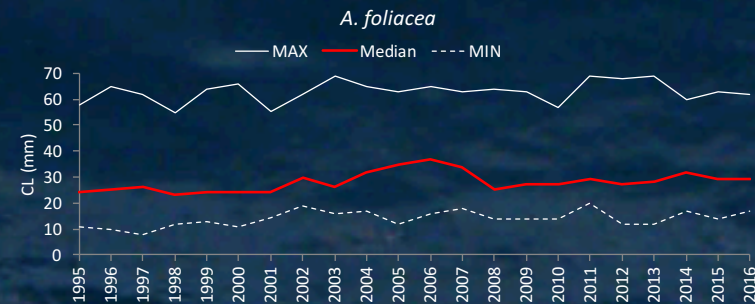
Illex coindetii



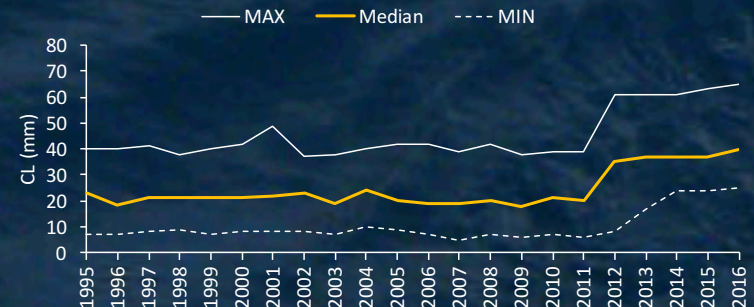
Population Historical trends (1994-2016)



Median Carapace Length
 $\rho = 0.63$ $p < 0.01$



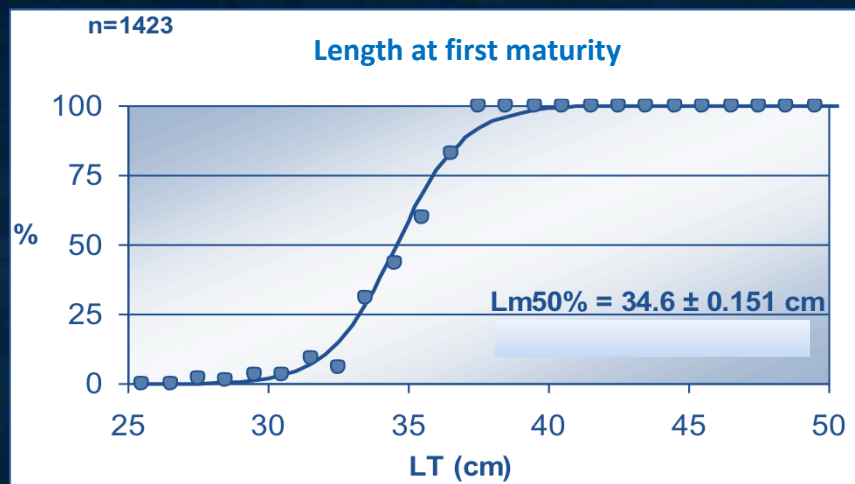
Median Carapace Length
 $\rho = 0.37$ ns



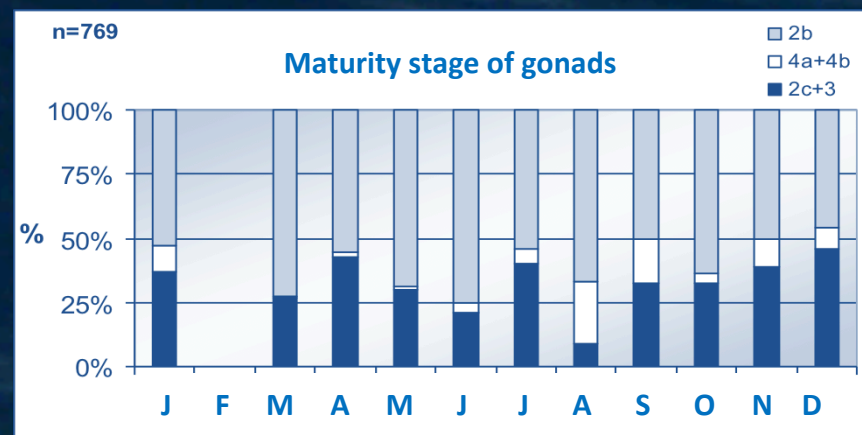
Life history traits: gonads maturity



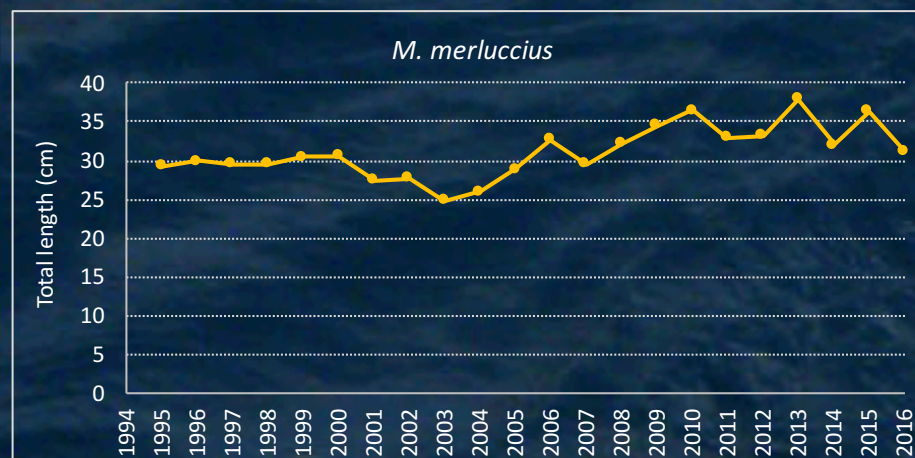
life stages were used to identify length at first maturity



Spearman $\rho = 0.68$
 $P < 0.01$



Trend of length at first maturity



Localization of nursery and spawning grounds of the target species

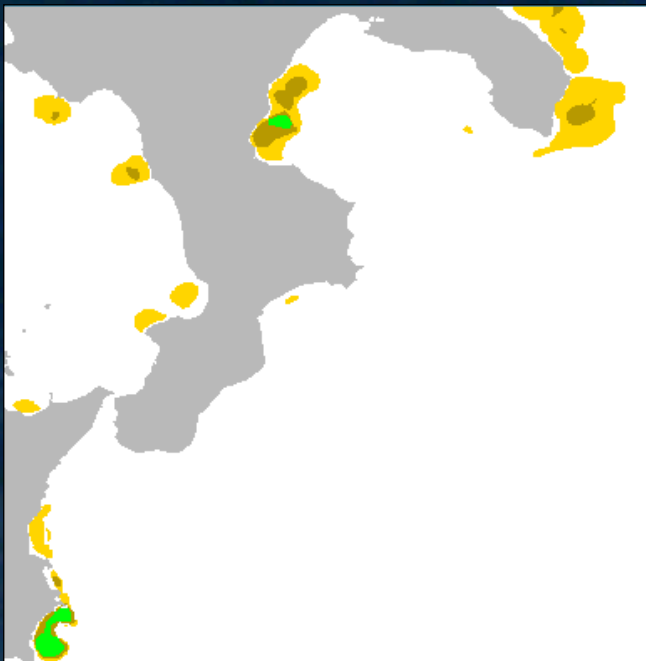


European project *MEDISEH* (*MEDiterranean Sensitive Habitats*)
from *MAREA Framework*



- length at first maturity
- N/km² per recruits/spawners.

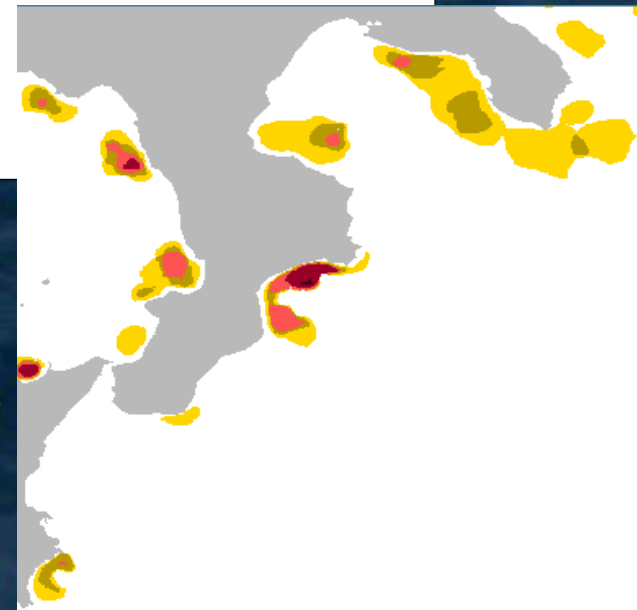
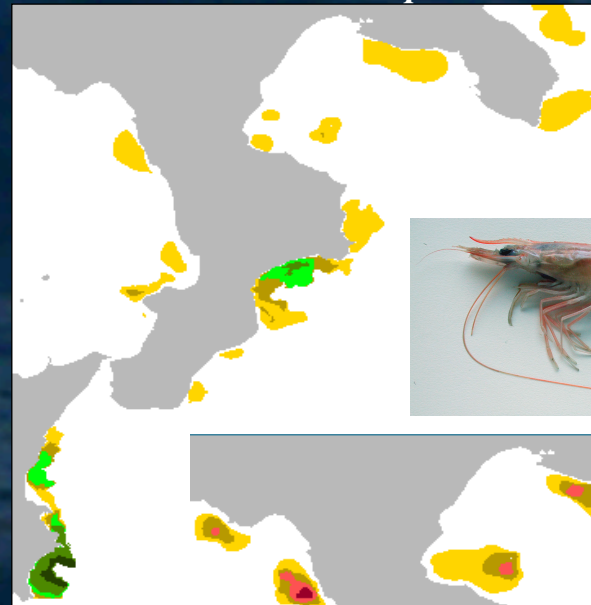
Merluccius merluccius



The more persistent nursery areas

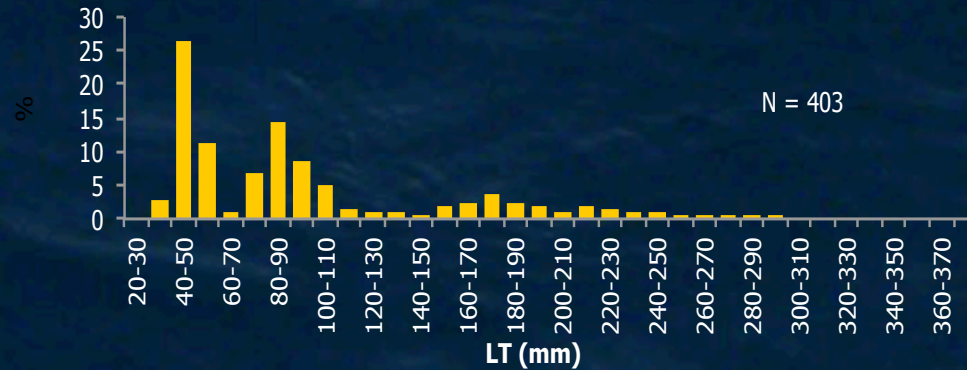
The more persistent
nursery areas

Parapenaeus longirostris

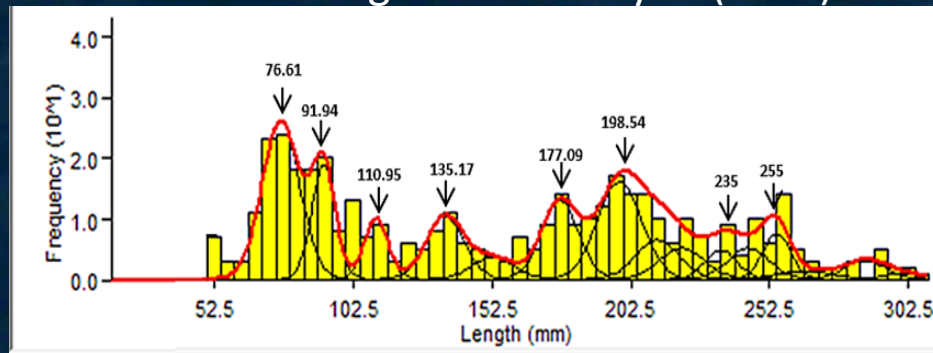


The highest levels of
persistency of the
spawning areas

Life history traits: age and growth



Modal Progression Analysis (MPA)

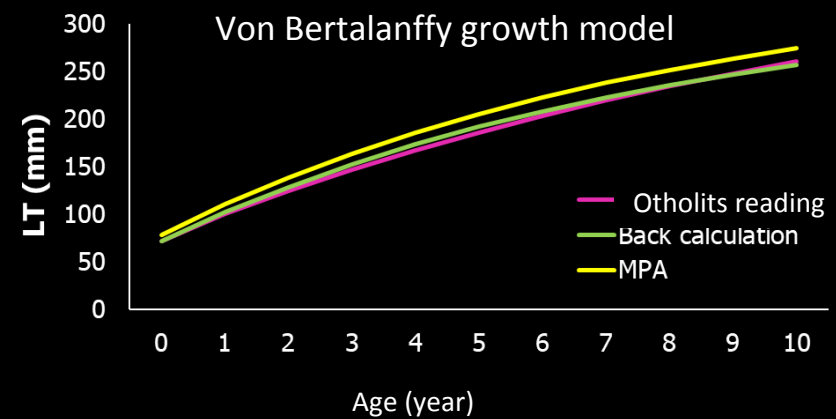


Growth parameters

L_{∞}

k (anno⁻¹)

t_0 (anno)

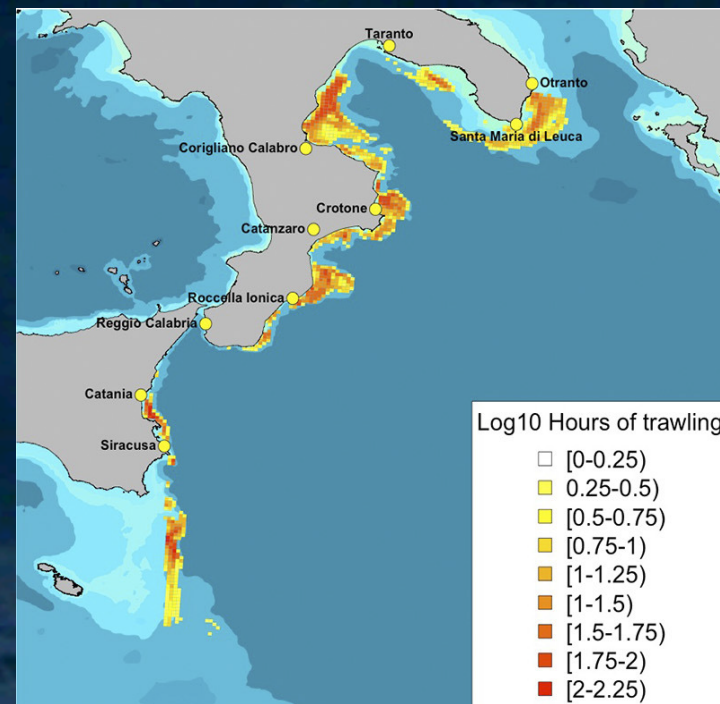




Assessment: The fisheries management set at the scale of Geographical Sub-Areas

Merluccius merluccius

Growth parameters (von Bertalanffy)
$L_{\infty} = 104$ (cm, TL)
$k = 0.20$
$t_0 = -0.01$
$L \cdot W$
$a = 0.0036$
$b = 3.2$
Natural mortality
M vector Age0=1.16 , Age1=0.53, Age2=0.40, Age3=0.35, Age4=0.32
Length at maturity (L50)
$L_{50} = 312$ mm TL
Proportion of matures
Age0=0.00, Age1=0.19, Age2=0.86, Age3=1.00, Age4=1.00



Yearly trawling effort (mean for 2008–2015) for vessel monitoring system (VMS)-equipped vessels (Russo et al., 2017)

Given the results of the present analysis, the stock is in overfishing, being exploited at level of F_{curr} .

Based on	Indicator	Analytic al reference point (name and value)	Current value from the analysis (name and value)	Empirical reference value (name and value)	Trend (time period)	Stock Status
Fishing mortality	Fishing mortality	$F_{0.1} = 0.18$	$F_c = 0.95$ (mean of the last three years)			
	Fishing effort					
	Catch					
Stock abundance	Biomass	$B_{curr} < B_{66th}$		O_1		
	SSB					
Recruitment						
Final Diagnosis		The current fishing mortality averaged on the last three years is higher than the agreed Reference Point ($F_{0.1}$).				

Remarks

- ✓ The storage in a **common database of checked and standardised data** coming from different research projects conducted over a **long-time period** allows the analysis of a large amount of information on the Ionian area.
- ✓ The availability of such historical data represents a powerful opportunity
 - to detect **potential changes** over time **in the Ionian faunal assemblages**
 - to analyse over a long-time period **the life-history traits** at populations level.
- ✓ This knowledge may be also useful to assess **the response of the demersal communities to natural and anthropogenic pressures** also acting in the recent years at both local Ionian and Mediterranean scale.

A photograph taken from inside a ship, looking out through a rectangular window. The window frame is white. Outside, the ocean is a deep blue with small, white-capped waves. The horizon is a straight line in the distance under a clear, light blue sky. The text "Thank you" is written in white, sans-serif font across the lower middle of the window view.

Thank you