

Long Term Dynamics of Chondrichthyan Fish Community in the Upper Tyrrhenian Sea

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Sharks in the world

- Sharks are declining worldwide because of fishing
- With short period of exploitation sharks show signs of strong depletion
- Particularly true in multispecies fishery



Med Fishery

- Old fishery
- Multispecies
- Artisanal
- Few available statistics

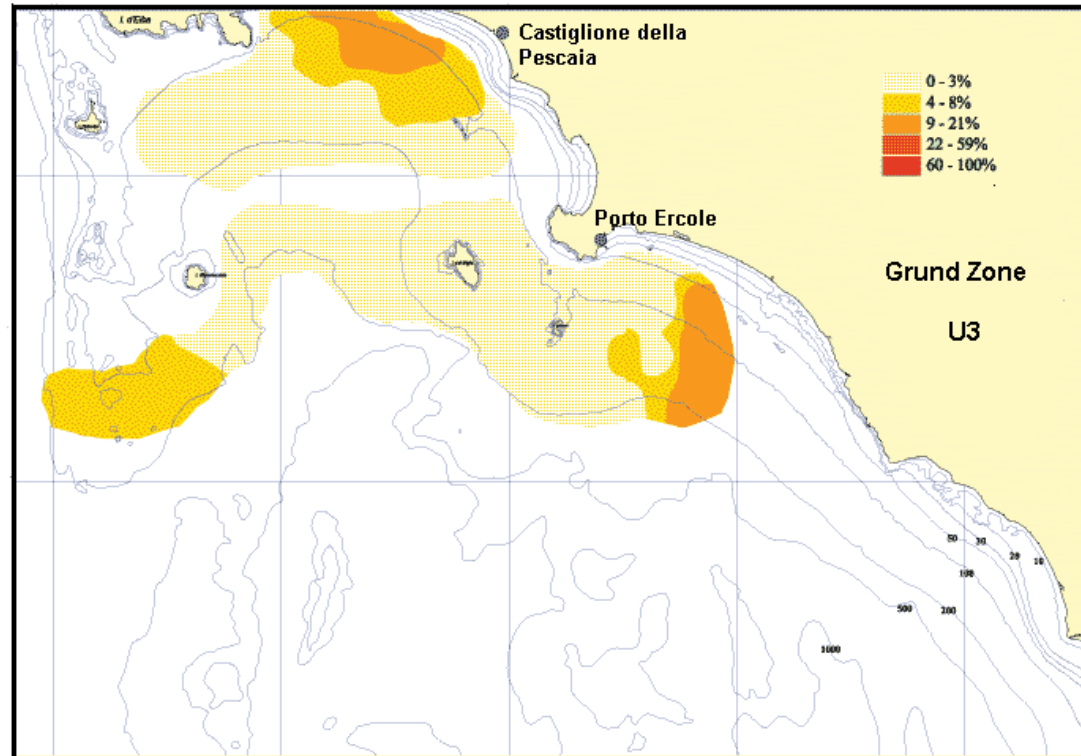
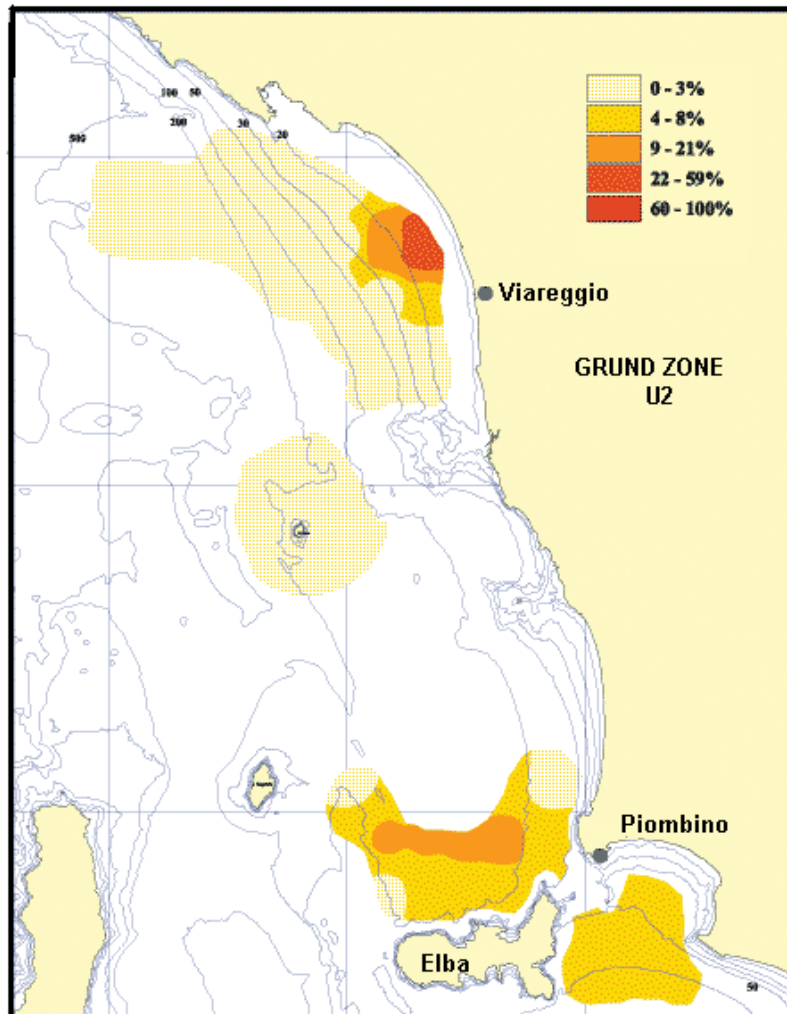


Status of Sharks in the Med

- We believe a gross underestimation of the status of sharks in the basin
- Previous researches: shark diversity declined by 50% in 50 years
- IUCN: 70% of 84 species require better monitoring
- Unknown Status before 1948

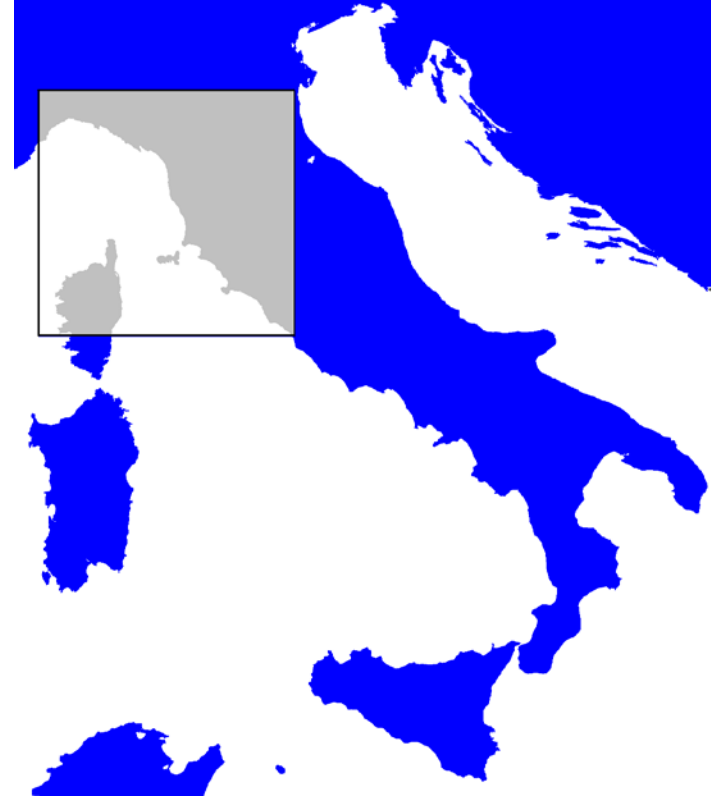
Trawl Fishery

- Since early 1900s
- Primarily 0 to 400 meters
- most important fishing technique in the area

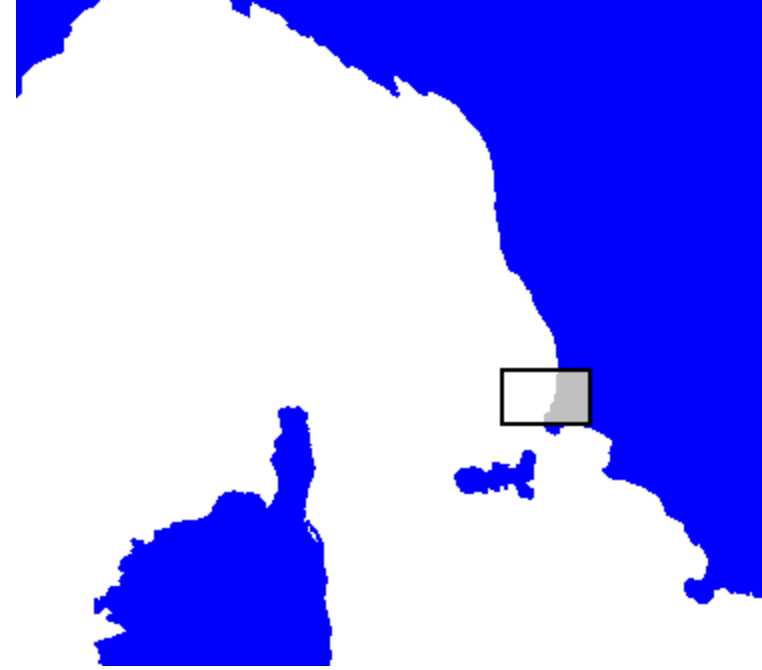
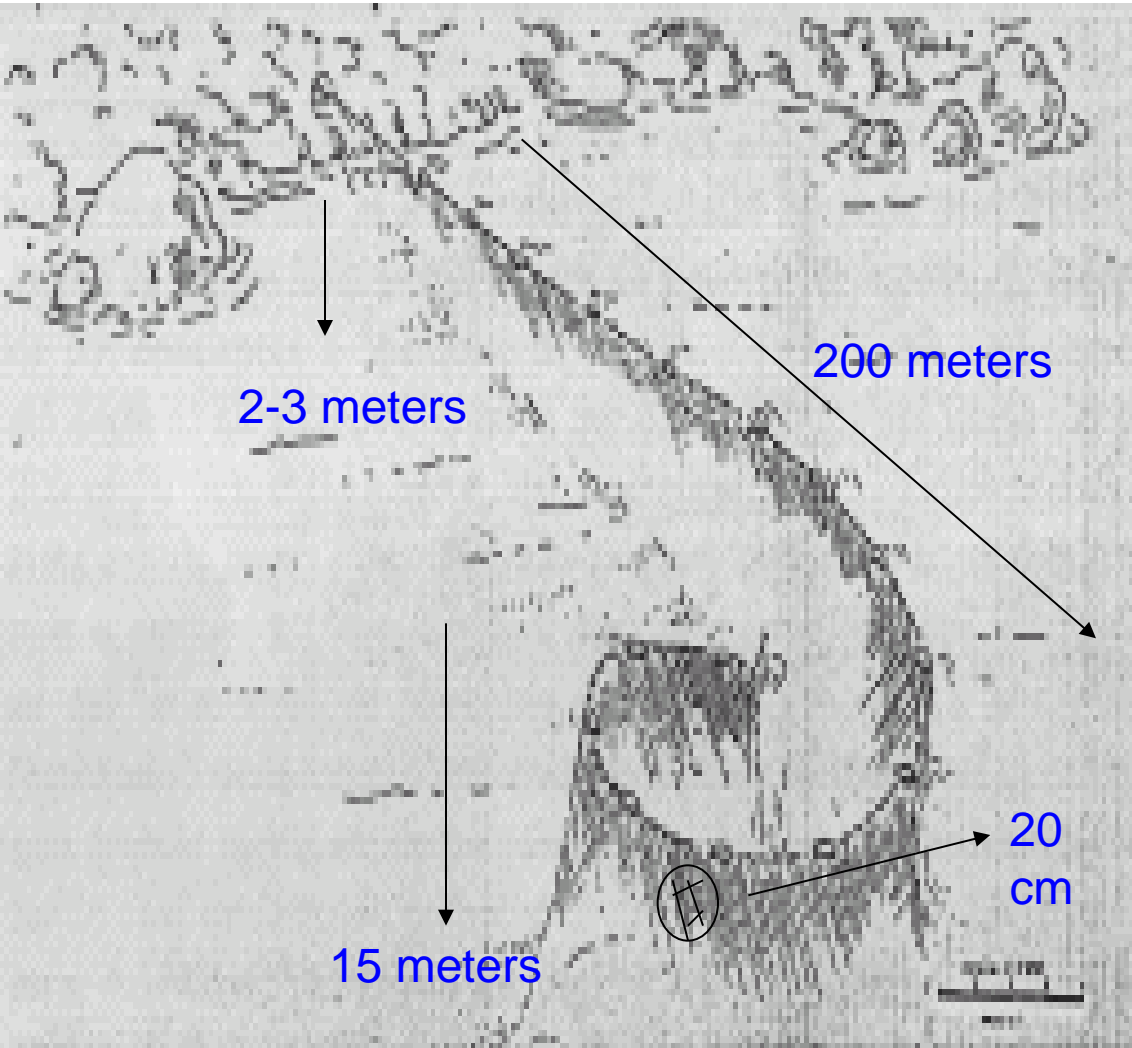


Methods

- DATA
 - Trawl data (1972-2004)
 - Fish traps (1898-1922)
 - Historic literature
- ANALYSES
 - GLM : negative binomial distribution, log link
 - Predictor variables
 - **Year**
 - **Season**
 - **Depth**
 - **Statistical zone (GRUND divisions)**
 - **Swept area treated as an offset parameter**

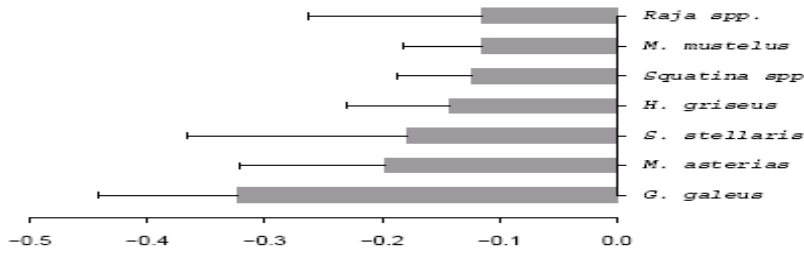


Fish Trap of Baratti

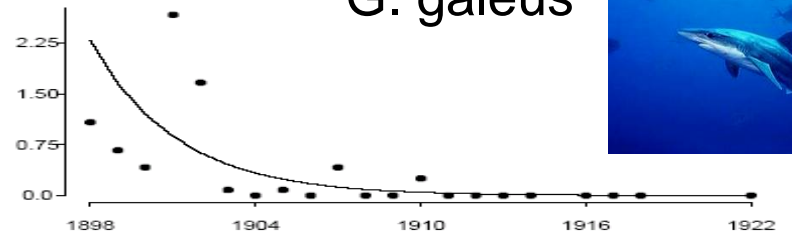


Instantaneous rate of change per year

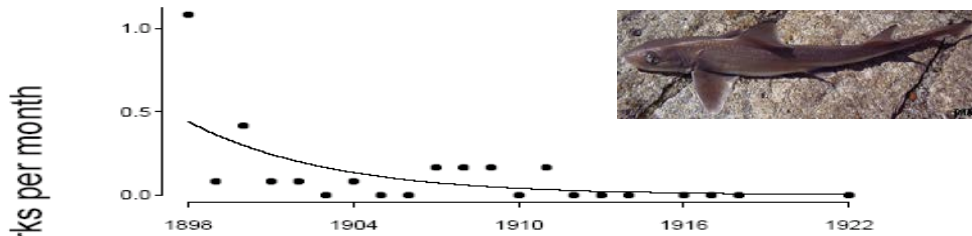
Fish trap species



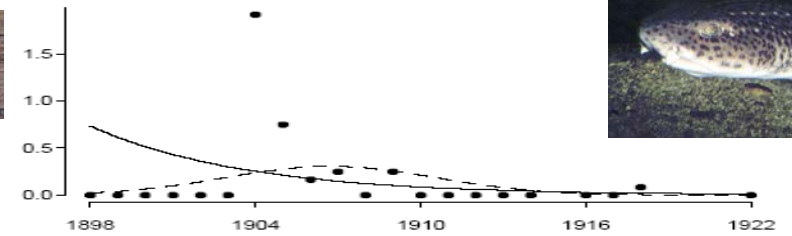
G. galeus



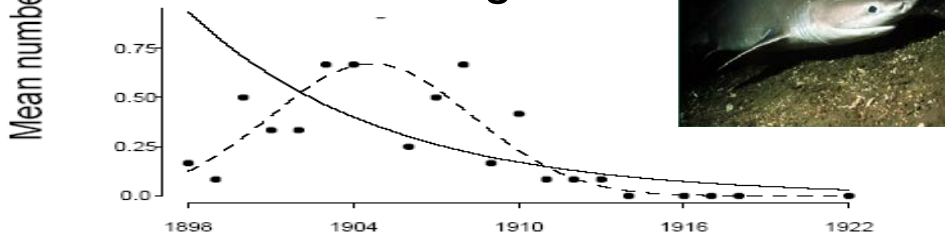
M. asterias



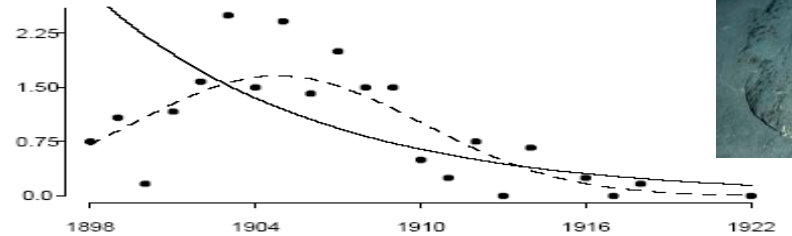
S. stellaris



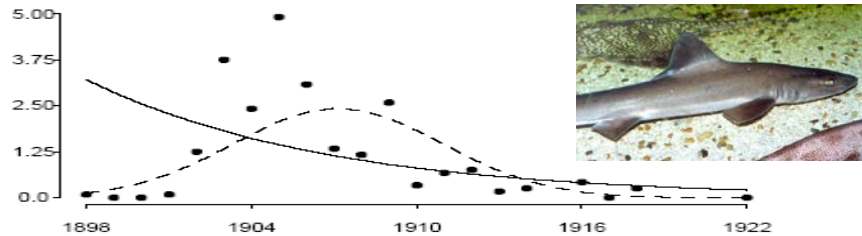
H. griseus



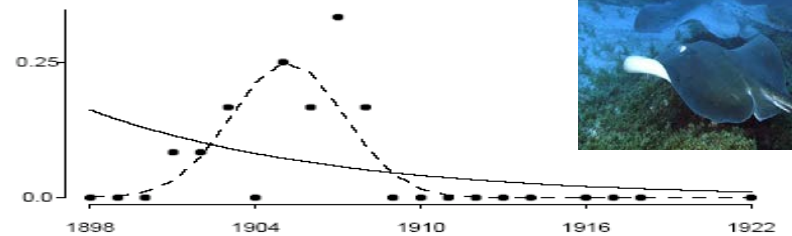
Squatina spp.



M. mustelus



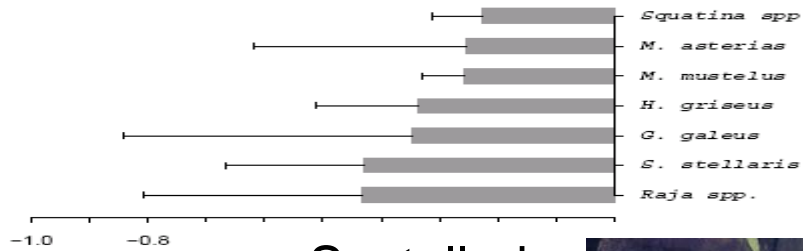
Raja spp.



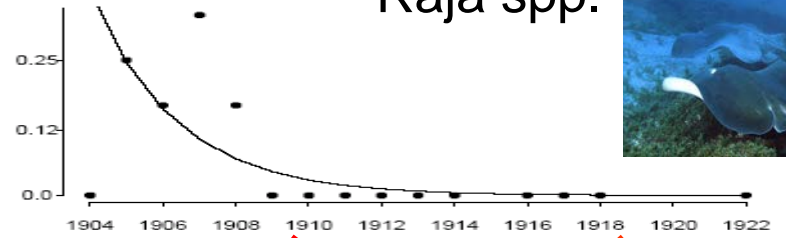
Year

Instantaneous rate of change per year

Fish trap species



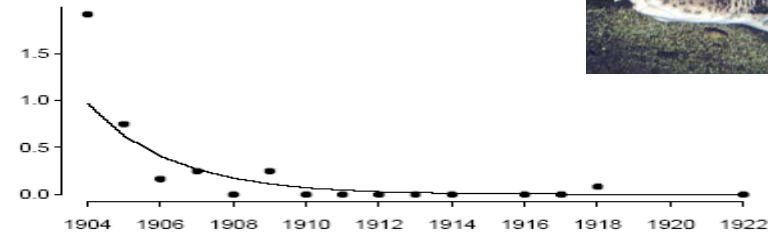
Raja spp.



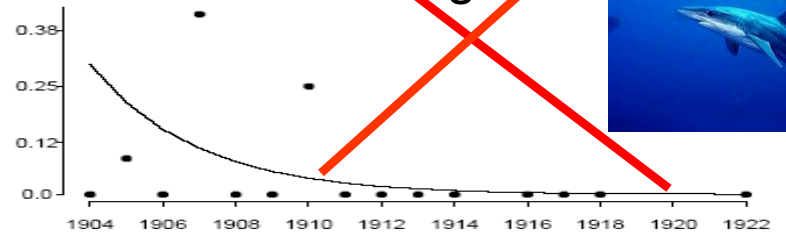
S. stellaris



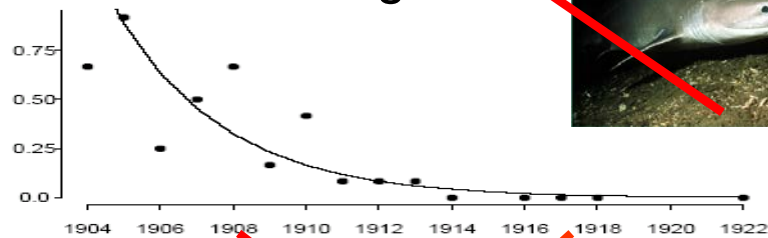
Mean number of sharks per month



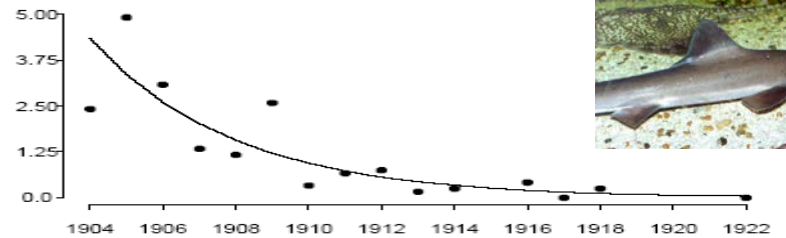
~~*G. galeus*~~



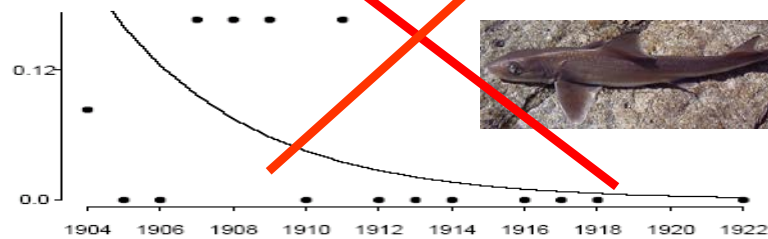
~~*H. griseus*~~



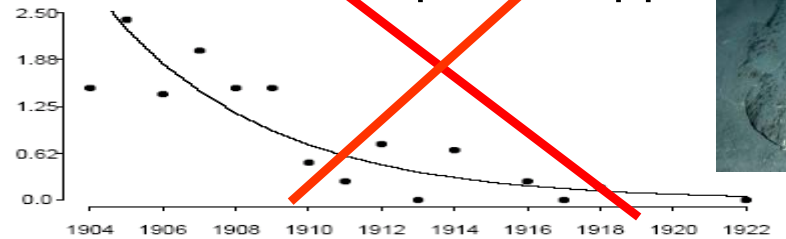
M. mustelus



~~*M. asterias*~~

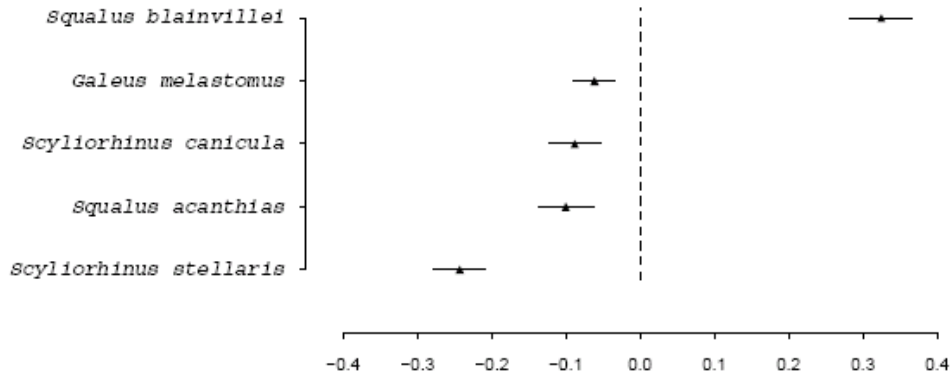


~~*Squatina* spp.~~

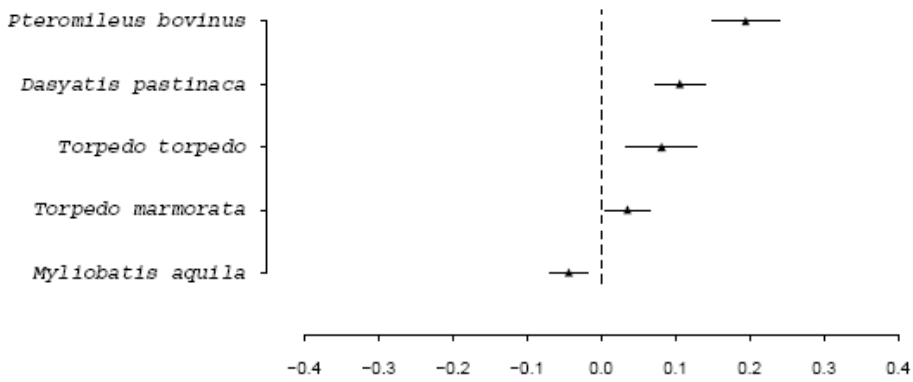


Year

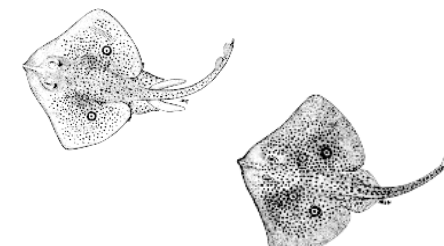
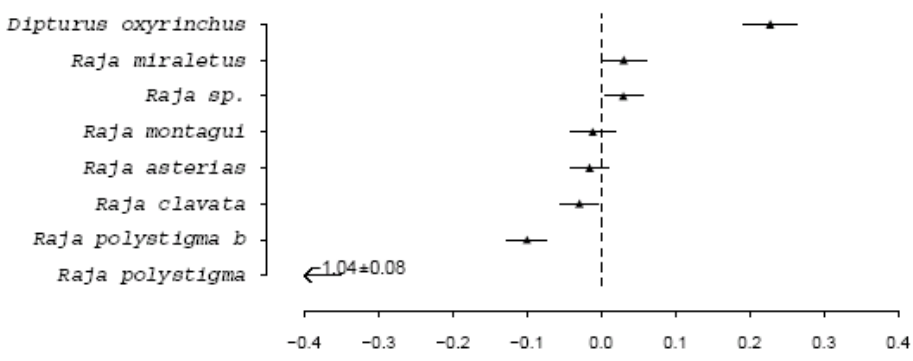
Sharks



Rays and Torpedos

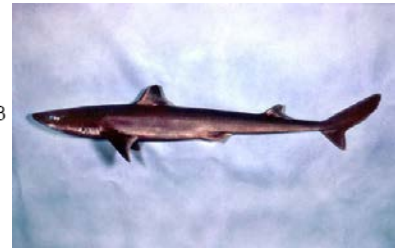
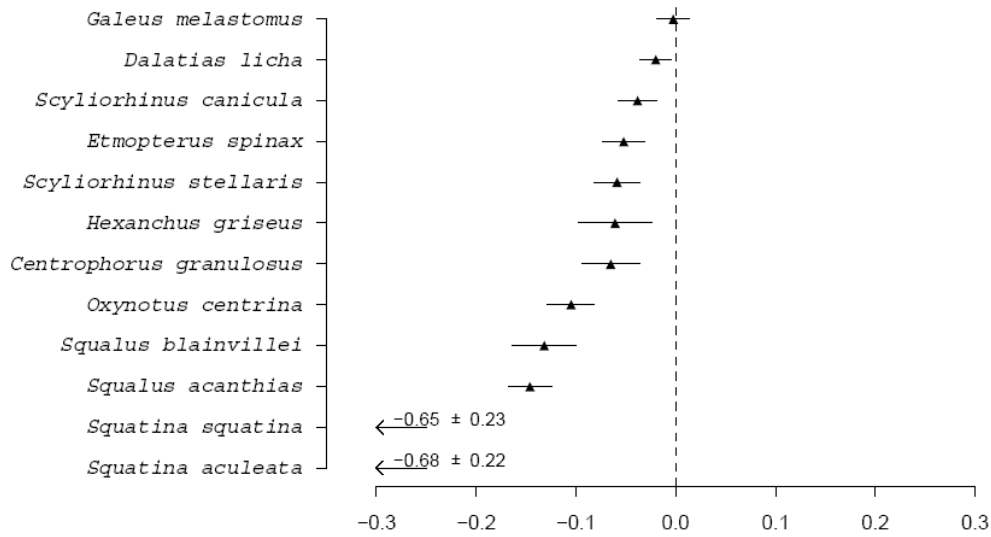


Skates

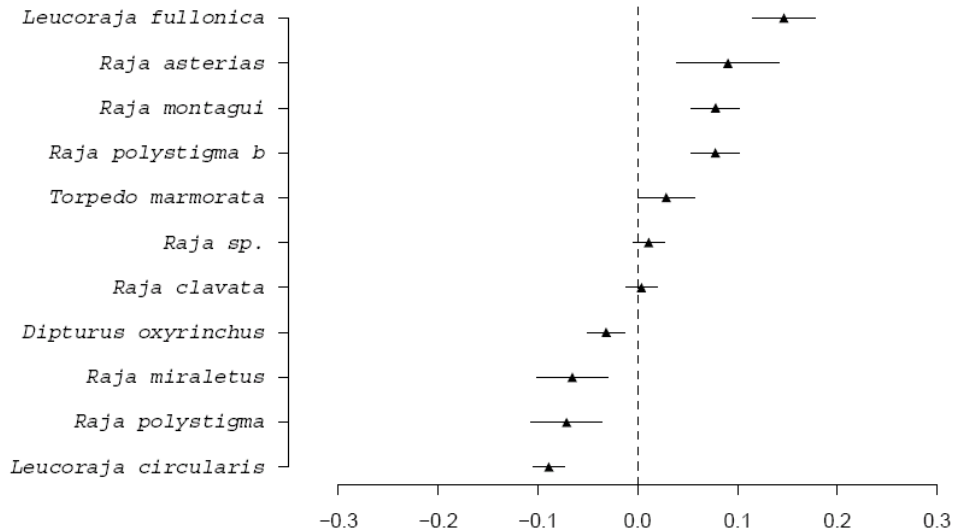


Instantaneous rate of change in abundance

Sharks



Skates and Torpedos



Instantaneous rate of change in abundance

Coastal waters

- 31 species existed in the early part of the century
- 15 have been lost / declined under detectable levels
- Others are still fished in deeper waters but show negative trends in abundance
- Modification of elasmobranch community assets

Deep waters

- More buffered from the effect of fishing exploitation
- Although evident decline of shark populations
- Even abundant and non commercial species undergone strong decline in the last 30 years

Lost species (Sharks)



Galeorhinus galeus

Mustelus asterias

Mustelus mustelus

Mustelus punctulatus

Squatina aculeata

Squatina oculata

Squatina squatina

Hepranchias perlo

Lost species (Rays and Torpedoes)



Torpedo nobiliana



Dasyatis centroura



Dasyatis violacea

Lost species (Skates)



Dipturus batis



Rostroraja alba



Raja brachiura



Raja undulata

Fishing effects

- strong modification of the marine ecosystem
- Direct
 - reduction in abundance of many species
- Indirect
 - **Predator release effect**
 - **Elimination of competitors**

Future steps

- Analyses at basin scale by using all the GRUND and MEDITS surveys and all the scattered historical information disseminated in its sectors
- Test several ecological questions
- **Identify general predictors of shark vulnerability to fishing pressure**

Acknowledgments