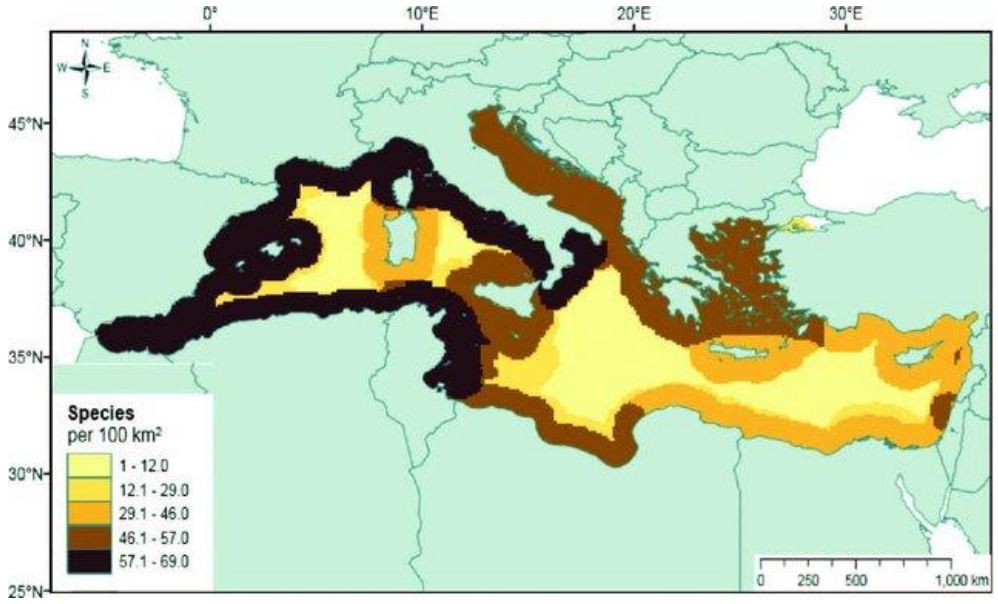
The LIFE PROMETHEUS project toward elasmobranchs' conservation

Emanuela Fanelli and the LIFE PROMETHEUS consortium

https://www.life-prometheus.eu/

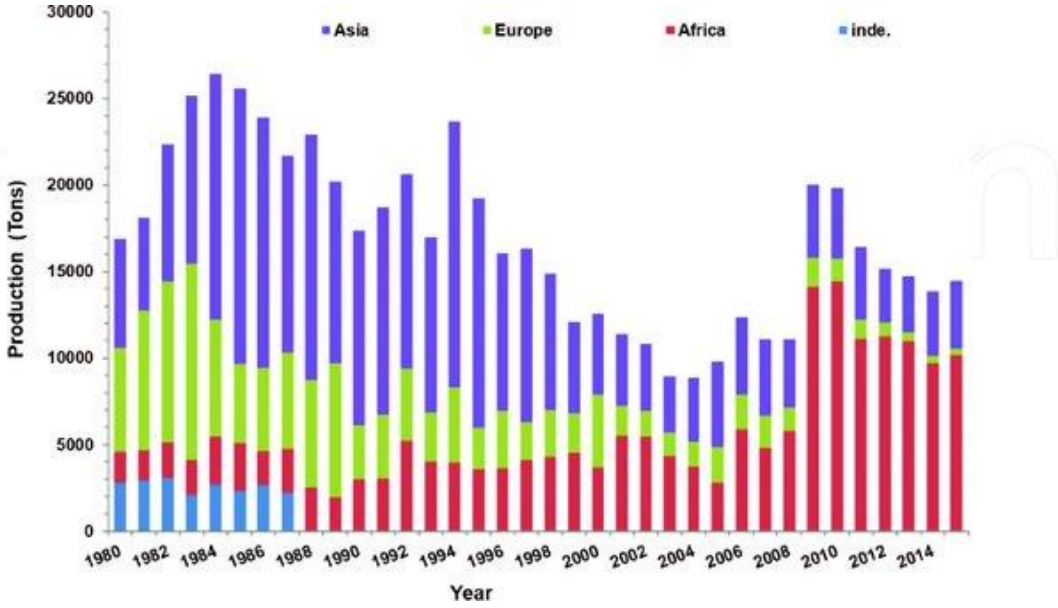
Why LIFE PROMETHEUS?

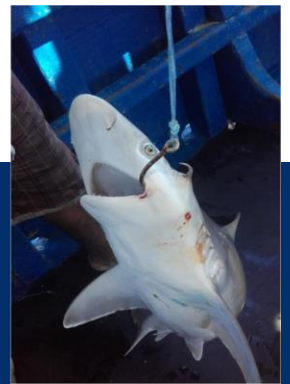
Because the Mediterranean Sea is a biodiversity hotspot for sharks and rays (86 species: 49 sharks and 37 batoids)



Bradai et al., 2018

...but it's also a hotspot of threats (overfishing, by-catch, habitat fragmentation and pollution)





Why LIFE PROMETHEUS?

The conservation status of elasmobranchs in the Mediterranean is alarming

IUCN Red List Category	Number of Species
Extinct (EX)	0
Regionally Extinct (RE)	0
Critically Endangered (CR)	20
Endangered (EN)	11
Vulnerable (VU)	8
Near Threatened (NT)	9
Least Concern (LC)	12
Data Deficient (DD)	13
Total number of species assessed	73

IUCN 2016

39 species (out of 73 assessed) are threatened (VU-EN-CR), and 13 are DD. From 1980 to 2015 the number of threatened species increased of 18%

Bradai et al., 2018

In a nutshell

PROMETHEUS=PROMoting Elasmobranchs conservation THrough by-catch reduction, Ecotourism and alternative sUStainable fisheries

Total budget €7,170,996 (60% co-funded), 5 EU countries (France, Spain, Italy, Greece and Cyprus), 18 beneficiaries and 3 associated partners (research institutes, universities, NGOs, SMEs, fishers' cooperatives and MPAs), 12 intervention areas, 15 target species, coordinated by UNIVPM (Emanuela Fanelli)

Coordinator beneficiary

Associated partners

Life PROMETHEUS

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What LIFE PROMETHEUS will do to improve the conservation of elasmobranchs?

Of the three main foreseen actions, TWO actively involve fishers (Actions 1 and 2)

Action 1: By-catch reduction

Fishers' involvement

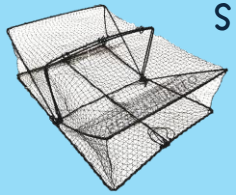
Use of deterrents

Support for fundraising

Inverse fishing time, bite experiment

Action 2: Fish alien species not sharks

Training Workshops Demos



Sustainable fishery of IAS

Restaurants and supply chains' involvement

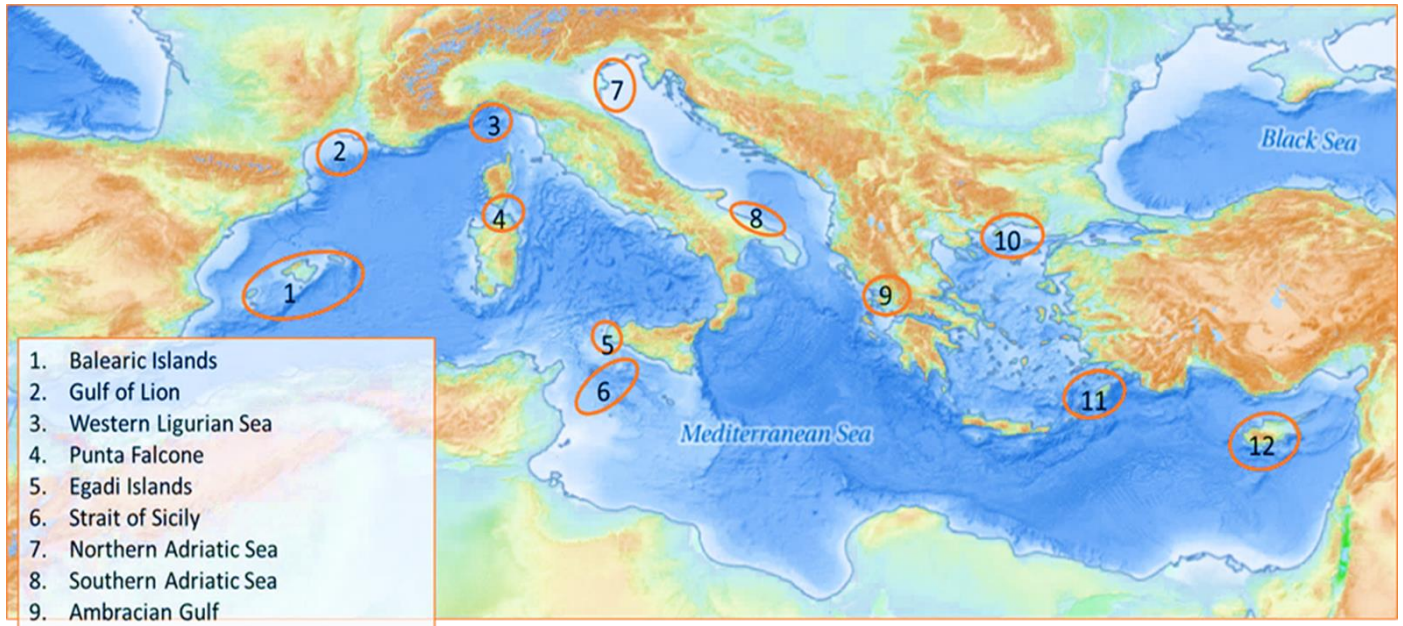
Promotion of IAS consumption

Action 3: Eco-sustainable diving

20 m

In aggregations areas (Pelagie and Egadi archipelagos)

WHERE?



1. Balearic Islands
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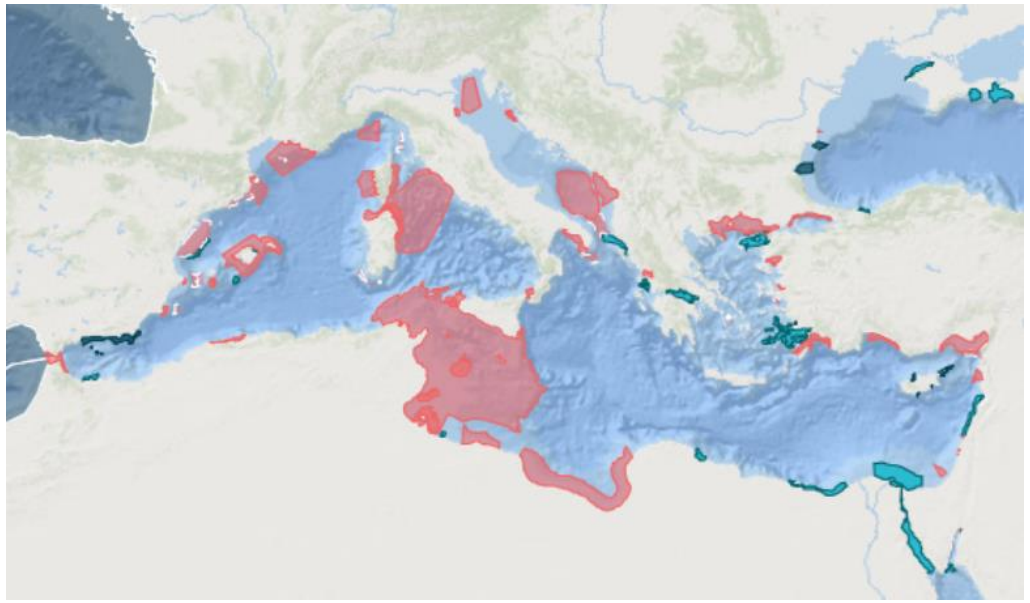
3. Western Ligurian Sea
4. Punta Falcone
5. Egadi Islands
6. Strait of Sicily
7. Northern Adriatic Sea
8. Southern Adriatic Sea
9. Ambracian Gulf
10. Nestos delta
11. Rhodes Island
12. Cyprus

12 Project Areas (PAs), spanning across the Med and including MPAs and SCIs

https://sharkrayareas.org/e-atlas/



Most of the PAs have been recognised as ISRAs by the IUCN in 2023

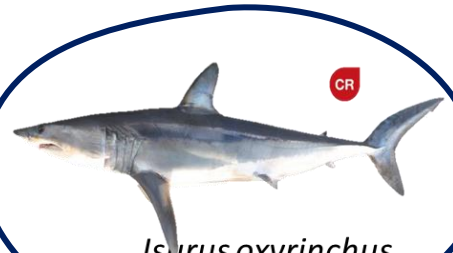
WHICH SPECIES? 6 critically endangered, 4 endangered, 5 vulnerable

CR EN VU

8 target species

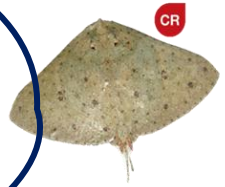
Rostroraja alba (PA1)

Raja radula (PA 1/4)



Isurus oxyrinchus (PA 2/3/4/5)

Prionace glauca (PA 5/6/8/10/11)



Gymnura altavela (PA 8/10)

Aetomylaeus bovinus (PA 8)

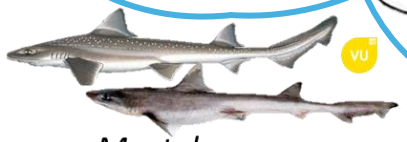
Carcharhinus plumbeus (PA 2/3/5/6/7)

Glaucostegus cemiculus (PA 11)

7 secondary species

Lamna nasus

Mobula mobular



Mustelus spp.

Dasyatis spp.

Myliobatis aquila

Mustelus spp. include *M. mustelus* and *M. punctulatus* (*M. asterias* rare)

Dasyatis spp. include *D. pastinaca* and *D. tortonesei*

Action 1: reduction of by-catch

Case study	Project area (PA)	Target species	Secondary species	Total n° of surveys	Seasons	Gear	Days/survey	Number commercial boats involved	Number of fishermen involved in task 4.2	Methodology
Ibiza and Formentera Islands / GSA 5	PA1	*Rostroraja alba* and *Raja radula*	*Dasyatis* spp., *Myliobatis aquila*, *Aetomylaeus bovinus*	6	Autumn - Spring	Trammel net	10	1-3	around 25	WP4: Parallel net setting (control and experimental gears equipped with magnetic or electric deterrents)
Gulf of Lion	PA2	*Prionace glauca*	*Pteroplatytrygon violacea*	2	summer-autumn	Pelagic Longline	10	1-3	80	WP4: Parallel longline setting (control and experimental gears equipped with magnetic or electric deterrents)
Strait of Sicily and Egadi Islands/ GSA 16	PA5	*Raja radula*	*Mustelus* spp. and *Myliobatis aquila*	2	Autumn-Summer	Trammel net	12	1-3	around 12	WP4: Parallel net setting (control and experimental gears equipped with magnetic or electric deterrents)
Strait of Sicily/ GSA 16	PA6	*Isurus oxyrinchus* and *Prionace glauca*	*Myliobatis aquila*, *Mustelus* spp.	2	Spring-Summer	Longline	12	1-3	around 12	WP 4: Parallel longline setting (control and experimental gears equipped with magnetic [illegible] deterrents)
MPA Punta Falcone / GSA 11	PA4	*Isurus oxyrinchus*	*Prionace glauca*, *Lamna nasus*, *Mobula mobular*	4	Spring-Summer	Longline				
Northern Adriatic / GSA 17	PA7	*Carcharhinus plumbeus* and *Prionace glauca*	*Mustelus* spp.	4	Summer	Gillnet				
Northern Adriatic / GSA 17	PA7	*Prionace glauca*	*Alopias vulpinus* and *Carcharhinus plumbeus*	4	Spring-Summer-Autumn	Recreational fishing (drifting)	20			

In 6 areas we will try PROMETHEUS solutions for reducing by-catch in longline fishery

Ligurian sea/ GSA 9	PA3	*Prionace glauca*	*Isurus oxyrinchus* and *Mobula mobular*	4	Pending	Longline	14 fish trips	9	22	WP4: Normal J-off hook and EPM equipped J-off hooks
South Adriatic / GSA 18	PA8	*Prionace glauca*	*Pteroplatytrygon violacea*	4	summer-autumn	Pelagic Longline	6 fishing trips	3-4	24	WP4: Comparing the catch rate in a longline where the hooks are alternately baited with plastic squid and mackerel
South Adriatic / GSA 18	PA8	*Prionace glauca*	*Pteroplatytrygon violacea*	6	summer-autumn	Pelagic Longline	12 fishing trips	3-4	24	WP4: Comparing the catch rate in fishing trips (consecutive) one with a traditional fishing strategy (gear fishes at night) and other with the reverse fishing strategy (gear fishes during the day)
Ambracian Gulf / GSA20	PA9	*Gymnura altavela*, *Aetomylaeus bovinus*	*Mustelus* spp. *Carcharhinus plumbeus*, *Myliobatis aquila*	4	Autumn-Winter-Spring-Summer	Gillnet, trammel net	15	3	10	WP4: Parallel net setting (control and experimental gears equipped with magnetic or electric deterrents)
Rhodes Island / GSA20	PA11	*Carcharhinus plumbeus*	*Gymnura altavela*, *Myliobatis aquila*, *Mustelus* spp.	4	Autumn-Winter	Longline	10	2	5	WP4: Parallel longline setting (control and experimental)/ Circle hooks and deterrents
Cyprus / GSA 25	PA12	*Glaucostegus cemiculus*	*All the target and accessory elasmobranch species*	8	Winter/Spring/Summer/Autumn	Demersal small-scale fisheries	8	2	3	WP4: Comparing the catch rate in fishing trips (consecutive) one with a traditional fishing strategy (gear fishes at night) and other with the reverse fishing strategy (gear fishes during the day)
GSA 25	PA12	*Glaucostegus cemiculus*	*Carcharhinus plumbeus*	6	Spring/Summer/Autumn	Surf casting recreational fishing	20	0	30 anglers	WP4: Normal circle-off hook and EPM equipped circle-off hooks and Ocean guardian device

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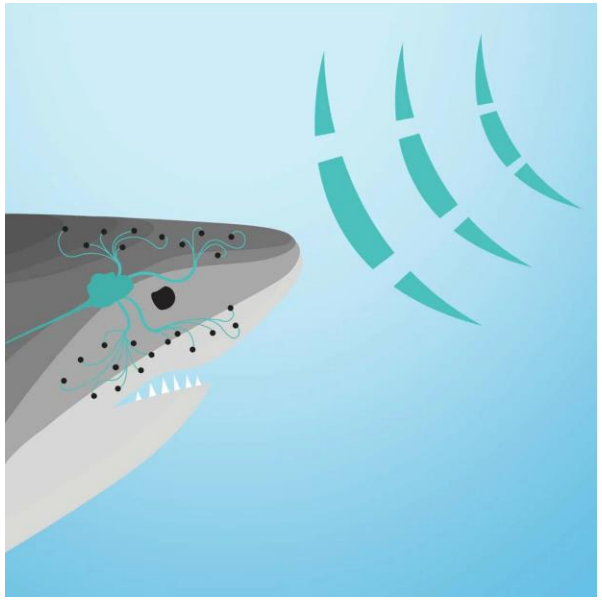
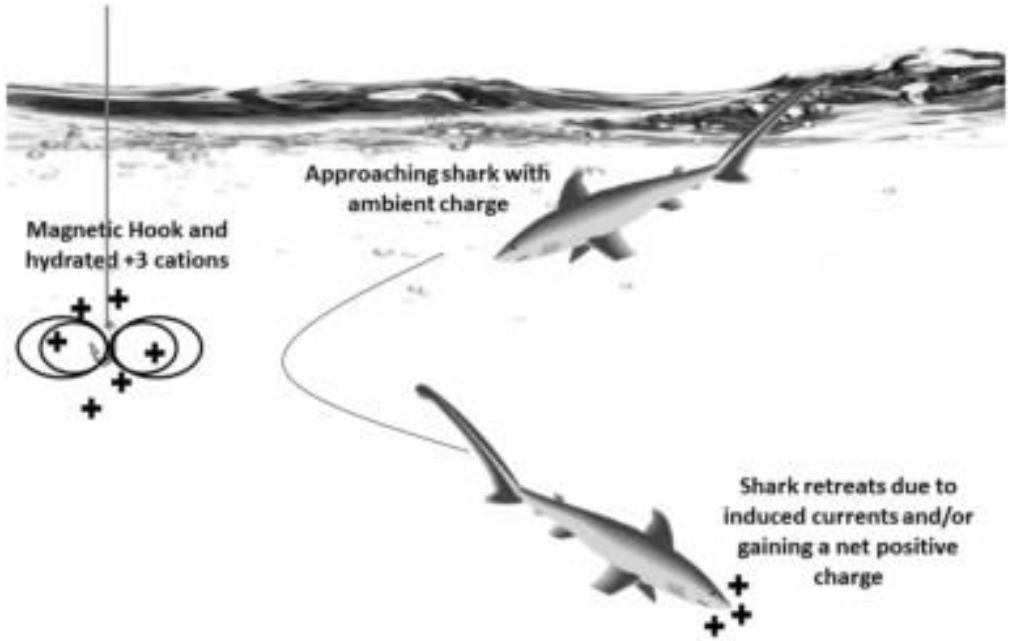
Action 1: by-catch reduction

Use of electro-magnetic deterrents

The literature is somewhat controversial in this sense, especially regarding magnetic deterrents, with the effect (+/-) and its magnitude depending on different variables (species/type of material/environmental conditions...)





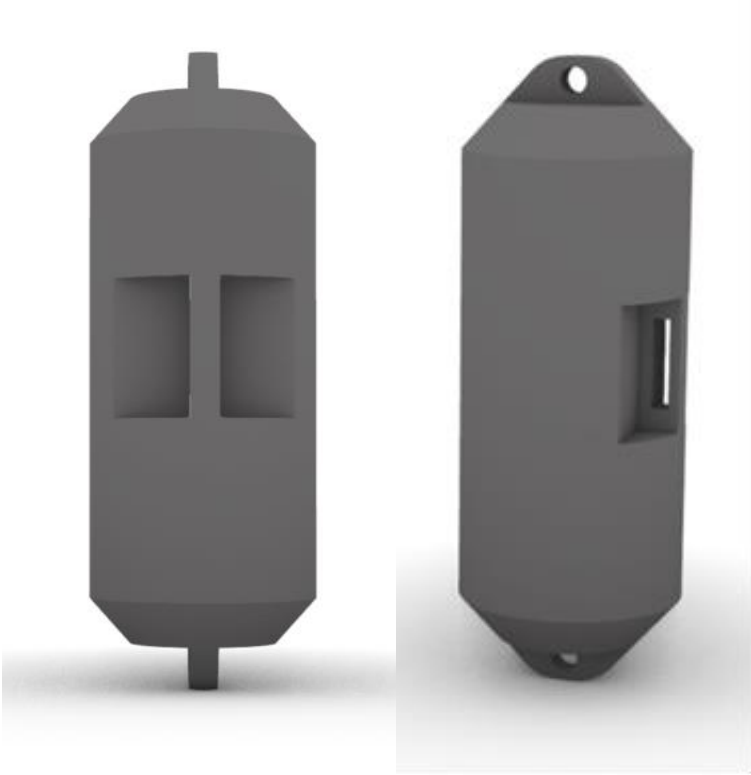
Action 1: reduction of by-catch

Testing of magnetic deterrents

Two different **TEST** experiments:

Balearic Islands (IEO-CSIC, test of deterrents on batoids, *Raja radula*, *Raja miraletus*, *Dasyatis* spp.)

Ambracian Gulf (ISea, test of deterrents on batoids and small sharks, *Gymnura altavela*, *Mustelus* spp.)



Neodymium 35N, 42N and 52N covered by a plastic shell

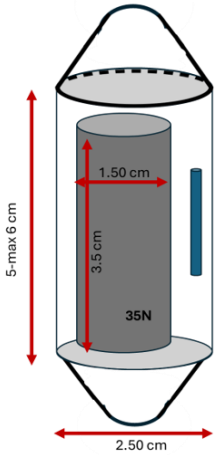
ACTIVITIES CARRIED OUT UNTIL NOW

Development of magnetic deterrent prototypes

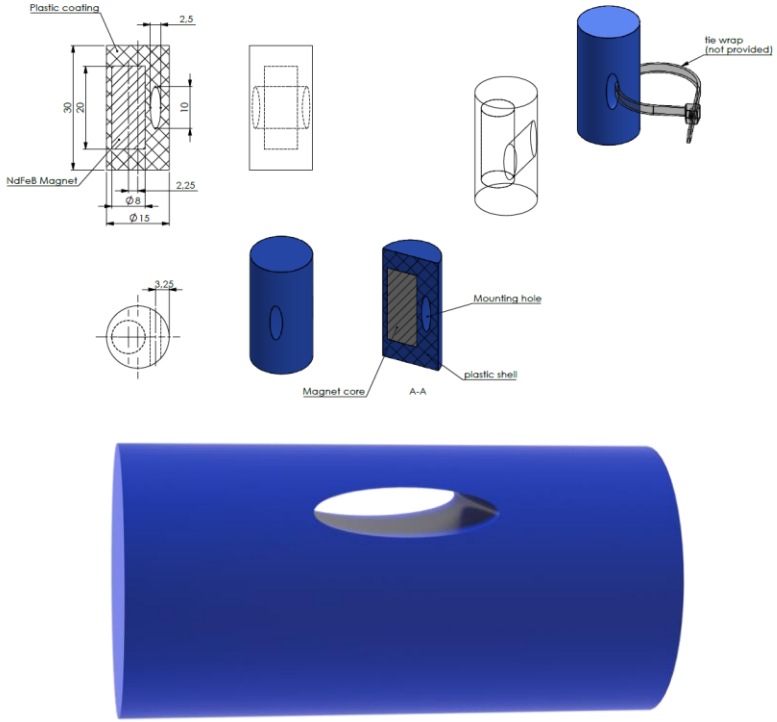
Customized designs:

- Different shapes and ways to attach it to the gears
- All neodynium magnets (35N or 52N)

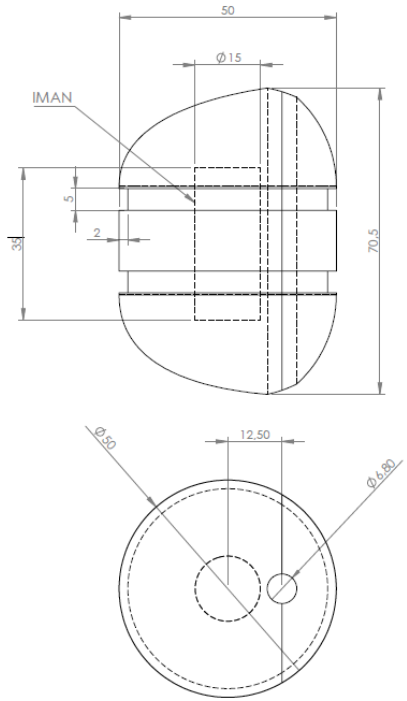
Italy: 35N; trammel and gill nets, **longline**

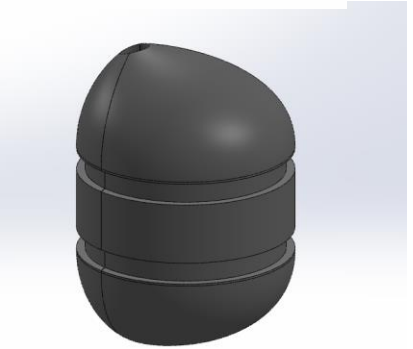


Greece and Cyprus: 35N; trammel and gill nets and **longline** (Greece), surfcasting (Cyprus)



Spain: 52N magnets; trammel and gill nets



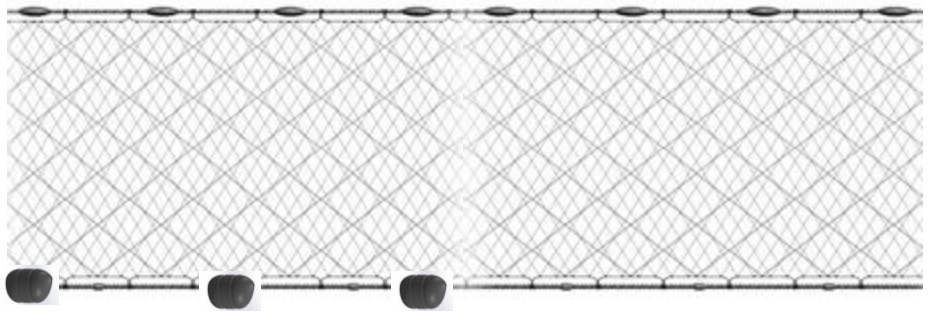


ACTIVITIES CARRIED OUT UNTIL NOW

Experimental design

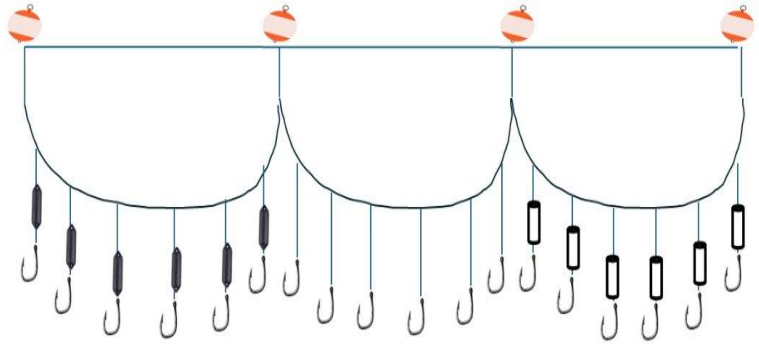
Nets

- Parallel net setting or alternated net sections
- Catch rates comparison
- Baited Remote Underwater Video (BRUV; Strait of Sicily)
- Treatments: deterrent, negative control (same deterrent device with no magnetic properties), blank control (no device – conventional nets)



Longline

- Parallel longline setting or alternate longline sections
- Catch rates comparison (all PAs)
- Line mounted cameras (Strait of Sicily) and
- Treatments: deterrent, negative control, blank control

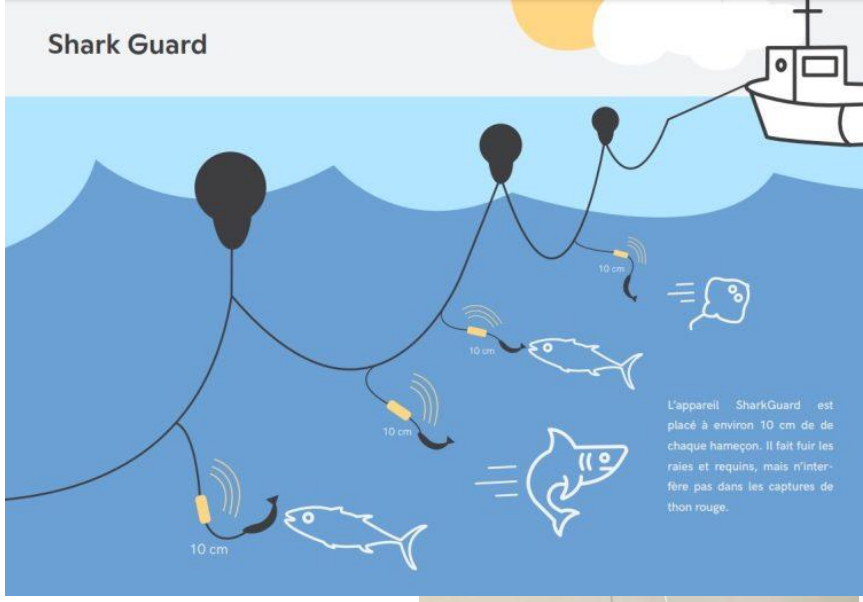


Recreational fishery

- Alternated fishing
- Catch rates comparison
- Treatments: deterrent, negative control, blank control

Action 1: reduction of by-catch

Application of electric deterrents



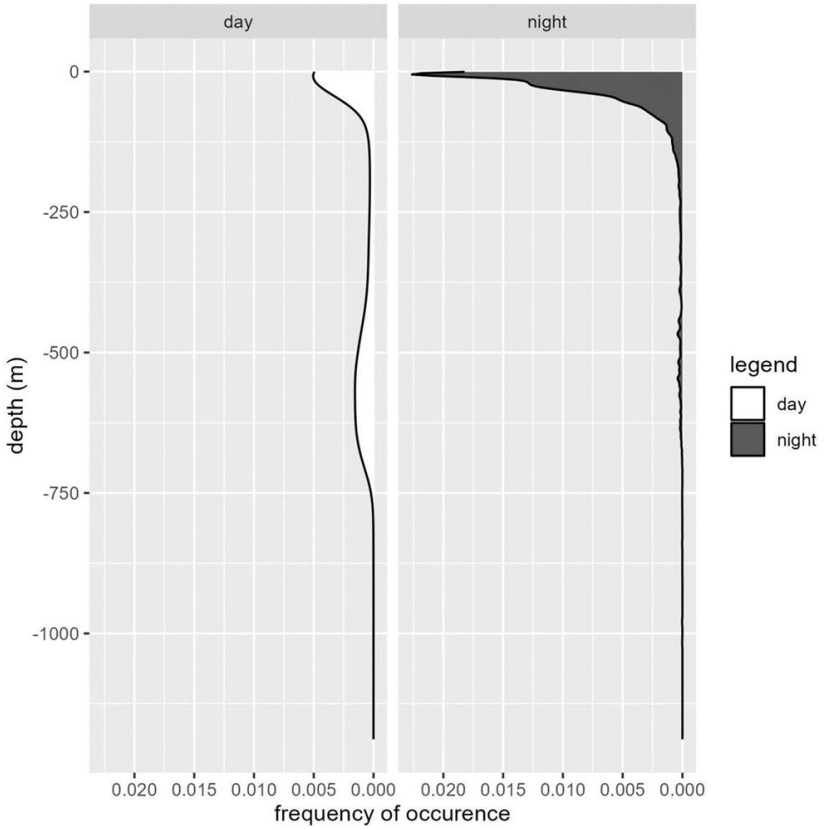
SHARKGUARD (Fishtek) deterrents have been already tested by SATHOAN (FR), with positive results (significant decrease of blusharks and pelagic sting rays by-catch).

They will be tested by recreational fishers in Northern Adriatic and on **longlines in the Strait of Sicily**

Action 1: reduction of by-catch

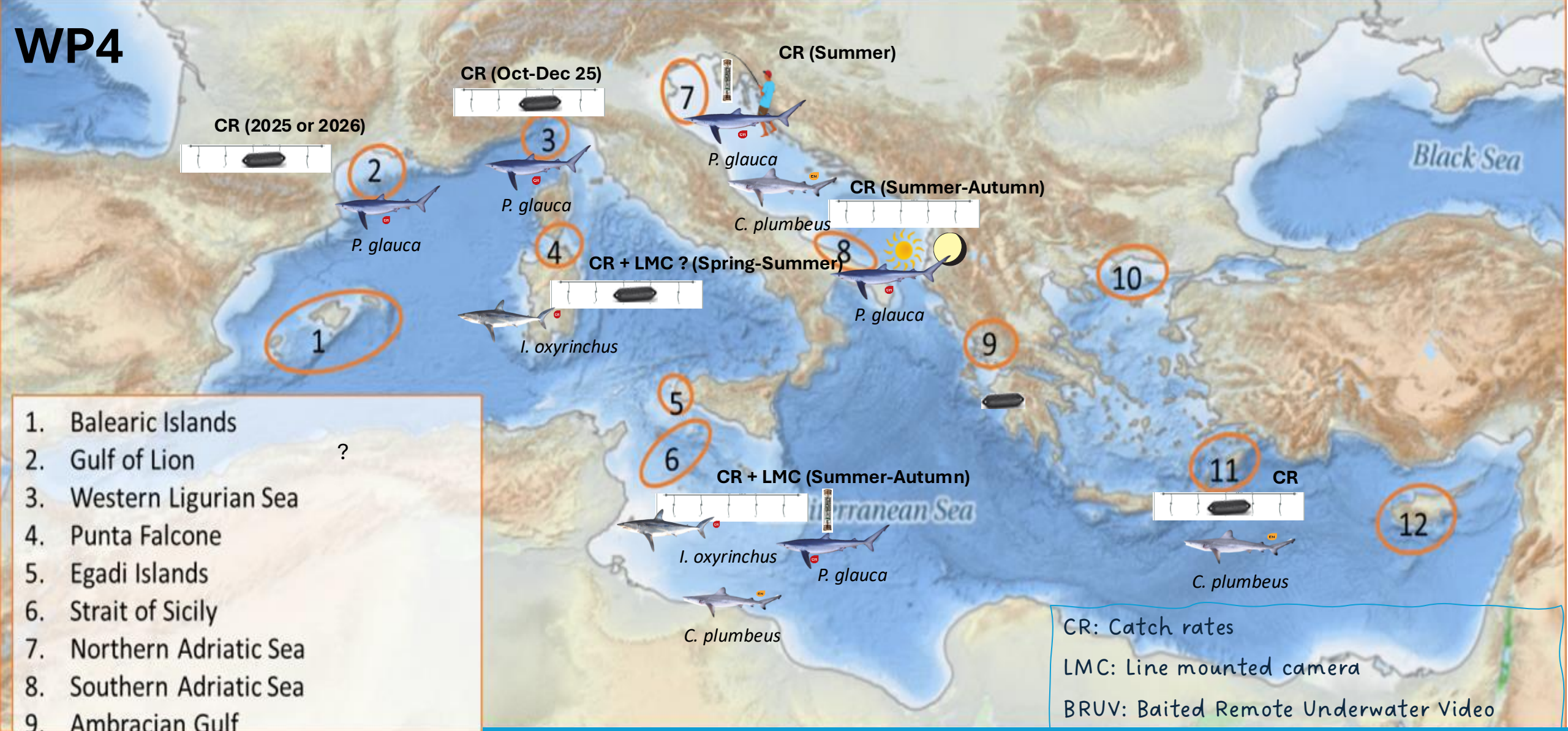
Reverse fishing time and bait selection in the Southern Adriatic Sea (COISPA, Resp. Dr. Carbonara)

Use of reverse fishing strategy (gear fishing during day): blue sharks are known to swim close to the surface during the night and in deep waters during the day.
Use of plastic squid and mackerels: this reduces considerably (ca. 30%) the by-catch (Gilman et al., 2020).



Carbonara et al., 2024

WP4



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?

CR: Catch rates

LMC: Line mounted camera

BRUV: Baited Remote Underwater Video

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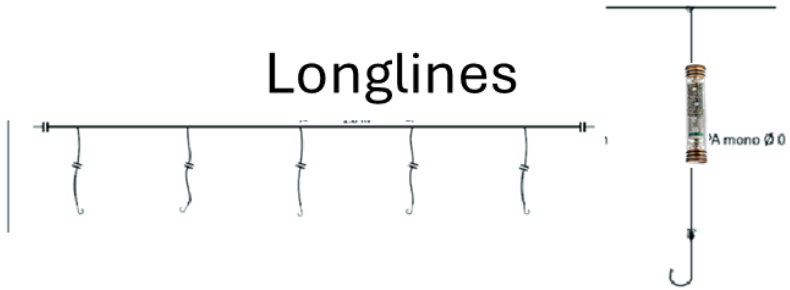
How we will monitor the efficacy of these measures?



comparison of commercial *vs.* bycatch captures from fishers adopting or not the mitigation measures (**on-board observers, self sampling, landings**)

In some PAs, other monitoring techniques will be applied to **verify the presence of the target species** in the areas where bycatch mitigation measures will be applied and **evaluate spatial and temporal trends** of their abundance:

Baited remote underwater video (BRUV)

Longline mounted cameras (LMC)

eDNA

https://www.life-prometheus.eu/

Thank you

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