



# EFFECTS OF MARINE LITTER ON MEDITERRANEAN MARINE LIFE: A MONITORING PROTOCOL BASED ON BIOINDICATOR ORGANISMS

## SELECTION CRITERIA FOR THE CHOICE OF SENTINEL SPECIES FOR MARINE LITTER

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## Selection criteria of sentinel species

### General categories

### Attributes

#### 1) background information

- Clear taxonomic identification
- Scientific knowledge on ecology and biology characteristics

#### 2) habitat information

- Habitat
- Home range

#### 3) trophic information and feeding behaviour

- Feeding behaviour (e.g. feed on schooling, opportunism, feed on pleuston, bentivorous feeders)
- Feeding mechanism (e.g. filter feeding)
- Trophic level (e.g. large pelagic predators, bioaccumulation)
- Keystone species

#### 4) spatial distribution

- Spatial coverage

#### 5) commercial importance and conservation status

- Commercial importance (human health)
- Easy availability
- Protected, threatened or managed species

#### 6) Documented ingestion of ML

- **Data availability on ML ingestion during time**



# DEMERSAL FISH

live in strong connection with sea bottoms and depends on benthic prey for feeding. Microplastics ingestion has been reported in these species.

*Mullus barbatus*



*Solea spp*



*Merluccius merluccius*



*Galeus melastomus*



**THESE SPECIES CAN BE USED AS SMALL-SCALE INDICATORS IN MEDITERRANEAN SEAFLOOR.**



# PELAGIC FISH

## THESE SPECIES CAN BE CONSIDERED GOOD SENTINEL SPECIES AT SMALL-SCALE IN COSTAL WATERS

*Boops boops*



- Do not carry out large movements
- Represents fishing resources exploited by artisanal fisheries
- They are opportunistic predators
- They occupies an intermediate position in the marine pelagic trophic web
- The consumption of plastic debris by these species may also be in part determined by the predation on gregarious prey.

*Trachinotus ovatus*



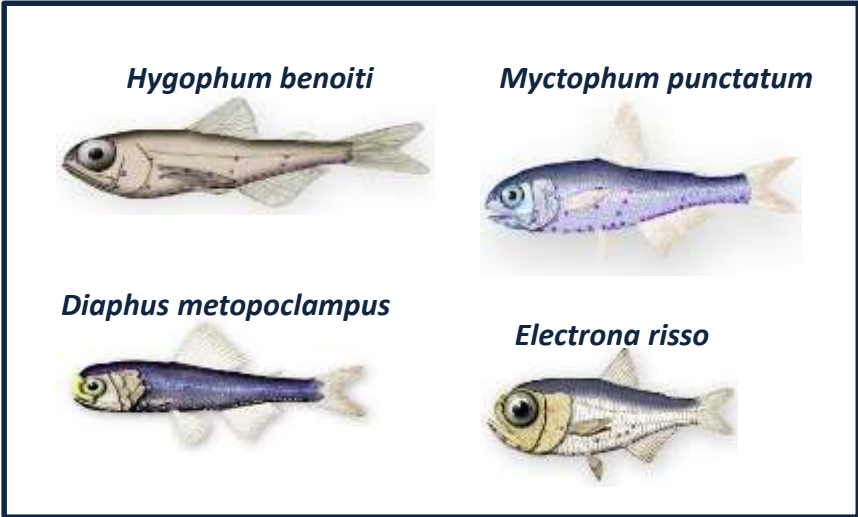
Microplastics ingestion has been reported in these species.



# MESOPELAGIC FISH

they usually carry out diel vertical migration and play an important role in the energy transfer from surface to deeper waters and from low trophic levels of food web to top predators

## MESOPELAGIC FISH CAN REPRESENT INDICATORS OF THE PRESENCE AND IMPACT OF MICROPLASTICS OF MEDITERRANEAN PELAGIC ENVIRONMENT AT SMALL-SCALE LEVEL



*Maurolicus muelleri*



# SMALL PELAGIC FISH

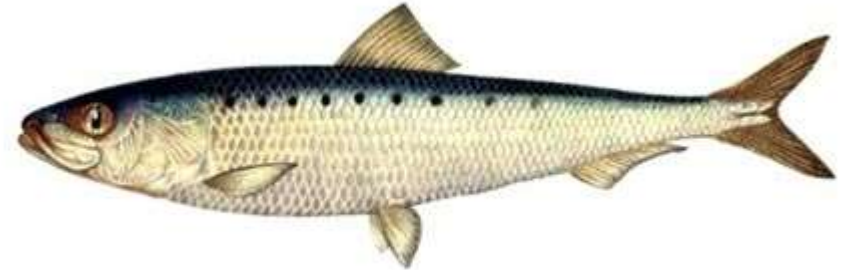
## THESE SPECIES ARE PROPOSED AS SENTINEL SPECIES AT SMALL-SCALE IN OPEN WATERS

- They are filter feeders
- They are among the most important commercial fishing resources of Mediterranean Sea
- They represent main prey of several pelagic predators
- Microplastics ingestion has been reported in these species

*Engraulis encrasicolus*



*Sardina pilchardus*





# LARGE PELAGIC FISH

They are migratory fish widely distributed in the Mediterranean and top predators having an important role in the pelagic trophic web. Their high commercial value and importance for food consumption is an additional reason for the choice of these species in the monitoring strategy

## MEDIUM-SCALE SENTINEL SPECIES IN OPEN WATERS

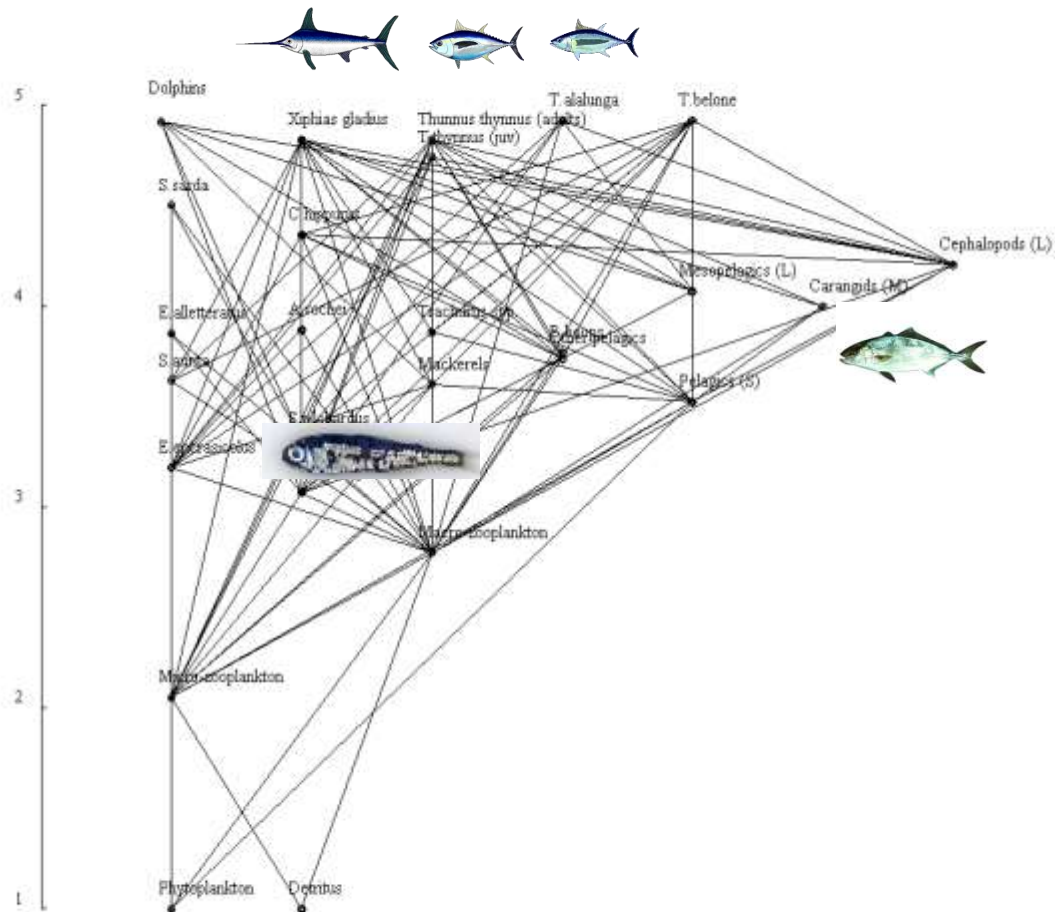


## WIDE-SCALE SENTINEL SPECIES IN OPEN WATERS



# RECONSTRUCTION OF TROPHIC WEB OF TYRRHENIAN SEA

Trophic level



**PLASTIC BUSTERS**

