

# Monitoring needs for MSFD

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# Current Black Sea monitoring MSFD

Mandatory					Optional
Water – Eutrophication	Biota contamination	Biota	Water- pollution	Sediments pollution	
BOD <sub>5</sub>	Heavy metals (Cd, Cu, Hg, Pb)	Phytoplankton (total density, total biomass)	total petroleum hydrocarbons	Particle size	Radioactivity
N (NH <sub>4</sub> , NO <sub>2</sub> , NO <sub>3</sub> & N total)	Persistent pesticides (organochlorine pesticides)	Chlorophyll “a”	Heavy metals (Cd, Cu, Hg, Pb)	Description of sediments	Heavy metals (Co, Cr, Fe, Zn, Ni)
O <sub>2</sub> (dissolved and saturation)	PCBs	Mesozooplankton		Heavy metals (Cd, Cu, Hg, Pb)	Persistent pesticides (organochlorine pesticides)
P (PO <sub>4</sub> & P total)		Biomass of Noctiluca		Pesticides (DDT, DDD, DDE, Lindane)	Detergents
SiO <sub>4</sub>		Macrophytobenthos		PCBs	Alkalinity
pH		Macrozoobenthos		Total hydrocarbons	Hexachloro-cyclohexane
Salinity		Fish landing (annually)			Total Organic Carbon (TOC)
Secchi depth					Phenols volatile
Temperature					Conductivity
Total suspended solids					Polycyclic aromatic hydrocarbons

# Potential methodologies

Plot sampling	Distance sampling	Mark-recapture	Repetitive surveys for occupancy estimation	Removal methods	Other
<b>Fish</b>					
<u>Trawls, dredges; strip transects (divers, ROVs, drop cameras)</u>	Line transects by divers or submersibles	Tagging	By divers; based on fisheries data (potential)	<u>A variety of methods based on fisheries data</u>	Acoustic methods; fixed-time swims, rapid visual techniques
<b>Invertebrates</b>					
Endobenthos <u>Grabs, corers; dredges; burrow counting</u>	na	Tagging of megafauna (mollusks, crustaceans)	Based on repetitive endobenthic samples (potential)	Simple removal or CPUE (for megafauna)	

Katsanevakis S, Weber A, Pipitone C, Leopold M, Cronin M, Scheidat M, Doyle TK, Buhl-Mortensen L, Buhl-Mortensen P, D'Anna G, de Boois I, Dalpadado P, Damalas D, Fiorentino F, Garofalo G, Giacalone VM, Hawley KL, Issaris Y, Jansen J, Knight CM, Knittweis L, Kröncke I, Mirto S, Muxika I, Reiss H, Skjoldal HR, Vöge S. 2012.

## Monitoring marine populations and communities: methods dealing with imperfect detectability

Aquatic Biology 16: 31–52

		<u>or dorsal fins</u>			
Pinnipeds Quadrat sampling of colonies	na	Photo identification from natural markings in pelage	In marine caves, beaches, etc. (potential)	CPUE (bycatches), simple removal	<u>Colony counts</u>
<b>Seabirds</b>					
<u>Shipboard or aerial strip transects</u>	Shipboard line transects	<u>Ringling</u>	Shipboard or aerial (potential)	CPUE (bycatches), simple removal	Seawatching
<b>Marine turtles</b>					
<u>Shipboard or aerial strip transects</u>	Aerial or boat surveys (line transects)	PIT tagging, satellite tagging	Shipboard, aerial, or diver-based (potential)	CPUE (bycatches), simple removal	<u>Nest counts</u>

## How to decide what to monitor?

“In the Black Sea biological and physicochemical elements are monitored despite the indicators are not developed for all elements”

(from: **Technical guidance on MSFD monitoring**, November 2013)

## How to decide what to monitor?

What to  
manage?

Management  
tools  
(indicators)

What to measure?  
(monitoring)

# D1-biodiversity

## 1. Species distribution

- 1.1.1. Distribution range
- 1.1.2. Distribution pattern with the latter, **where appropriate**

## 2. Population size

- 1.2.1. Population abundance **and/or** biomass, **as appropriate**

## 6. Habitat condition

- 1.6.1. Condition of the **typical** species and **communities**
- 1.6.2. Relative abundance **and/or** biomass, **as appropriate**
- 1.6.3. Physical, hydrological and chemical condition

## D1-biodiversity; knowledge gaps

What we do not know/understand well enough:

- basic understanding of ‘responsiveness’ of the biological indicators
- nano- and microbiology
- processes and functional relationships in the marine environment, taking into account differences in temporal and spatial scales
- causes of long-term changes identified with monitoring

(from: **Technical guidance on MSFD monitoring**, November 2013)

# D3-commercial fish and shellfish

## 1. Pressures:

- Indicator 3.1.1: Fishing mortality (F) on the level of whole Black Sea
  - Indicator 3.1.2 Ratio between catch and biomass index

## 2. State and impact:

- Indicator 3.2.1: Spawning Stock Biomass (SSB) – on the level of the whole Black Sea
  - Indicator 3.2.2 Biomass indices

## 3. Population age and size distribution

- Indicator 3.3.1: Proportion of fish larger than the mean size of first sexual maturation
- Indicator 3.3.2: Mean maximum length across all species found in research vessel surveys
- Indicator 3.3.3: 95% percentile of the fish length distribution observed in research vessel surveys
  - Indicator 3.3.4 Size at first sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation



# The MSFD triangle-dilemma in (fish) surveys



