

Monitoring Factsheet: Fish & Commercial Species

October 2015

1. Subject: Fish & Commercial Species

This monitoring factsheet covers two different but related elements:

- (i) 'fish' as functional groups within marine ecosystems to be assessed from a biodiversity point of view;
- (ii) 'commercial species' as those species targeted by Fisheries including fish, crustaceans and molluscs.

Data collection processes outlined in this document cater for both elements.

1.1. Fish

The MSFD Commission Staff Working Paper¹ identifies nine functional groups belonging to the fish species group:

- Diadromous fish
- Coastal Fish
- Pelagic fish
- Pelagic elasmobranchs
- Demersal Fish
- Demersal Elasmobranchs
- Deep-Sea fish
- Deep-Sea Elasmobranchs
- Ice-associated fish

'Diadromous' and 'Ice-associated' fish are not present and are thus not relevant fish assemblages in Malta. The 'coastal fish' functional group is deemed to be represented by fish assemblages present at depths up to 50m, the latter coinciding with the depth limit adopted for 'shallow sublittoral sediments' and 'shallow sublittoral rock' by the MSFD Initial Assessment on benthic habitats.

¹ European Commission 2011. Commission Staff Working Paper: Relationship between the initial assessment of marine waters and the criteria for good environmental status. SEC(2011)1255 final.

1.2. Commercial Species: Fisheries

Fisheries in Malta are typical of the Mediterranean artisanal fisheries, predominantly non-industrial and mostly distributed along the coast. Maltese fisheries are also considered as multi-species and multi-gear fisheries, whereby fishers alter between fishing gears throughout the year, depending on the species targeted.

2. Monitoring Requirements

2.1. EU Common Fisheries Policy (EU Regulation 1380/2013)

The EU Common Fisheries Policy is geared towards ensuring exploitation of living aquatic resources that provides sustainable economic, environmental and social conditions, through inter alia conservation and management of living aquatic resources, limitation of environmental impact of fishing and management of the fleet capacity. A new Common Fisheries Policy (CFP) has been agreed by Council and Parliament and is effective from 1 January 2014.

Member States shall, in accordance with the rules adopted in the area of data collection, collect biological, environmental, technical, and socio-economic data necessary for fisheries management, manage those data and make them available to end-users, including bodies designated by the Commission. This data should enable the assessment of:

- the state of exploited marine biological resources;
- the level of fishing and the impact that fishing activities have on the marine biological resources and on the marine ecosystems; and
- the socio-economic performance of the fisheries, aquaculture and processing sectors within and outside Union waters.

Council regulation 199/2008 concerning the establishment of a '*Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy*' includes provisions on the collection and management of data relating to fishing vessels, their activities and monitoring. For this purpose the European Commission adopted Commission Decision 2010/93/EU adopting a multiannual Community programme for the collection, management and use of data in the fisheries sector for the period 2011-2013. Within this context, Member States are required to collect economic and stock-related variables. Collection of stock-related variables needs to consider the following categories of species as outlined in Appendix VII of Commission Decision 2010/93/EU:

- Group 1: Species that drive the international management process including species under EU management plans or EU recovery plans or EU long term multi-annual plans or EU action plans for conservation and management based on Council Regulation (EC) No 2371/2002;
- Group 2: Other internationally regulated species and major non-internationally regulated by-catch species;

- Group 3: All other by-catch (fish and shellfish) species. The list of Group 3 species shall be established at the regional level by the relevant regional co-ordination meeting and agreed by STECF;

Member States are also required to carry out research surveys at sea to evaluate the abundance and distribution of stocks independently of the data provided by commercial fisheries, and to assess the impact of the fishing activity on the environment. Mediterranean International Trawl Surveys (MEDITS) are carried out following the MEDITS protocol in Geographical Sub-area 15. The MEDITS list species list is divided into two groups: Group 1 and Group 2.

2.2. Marine Strategy Framework Directive – MSFD (2008/56/EC)

2.2.1. Annex III characteristics/pressures/impacts

The MSFD calls for an assessment of the environmental status based on a list of characteristics listed in Table 1 of Annex III to the Directive, and pressures and impacts listed in Table 2 of the same Annex.

Implementation of this monitoring factsheet will be addressing the following:

- information on the structure of fish populations, including the abundance, distribution and age/size structure of the populations, as per Table 1 of Annex III;
- *Physical damage*: selective extraction (e.g. exploration and exploitation of living and non-living resources on seabed and subsoil), as per Table 2 of Annex III.
- *Biological disturbance*: selective extraction of species, including incidental non-target catches (e.g. by commercial and recreational fishing), as per Table 2 of Annex III.

2.2.2. Annex I Good Environmental Status Descriptors

MSFD Annex I descriptors of Good Environmental Status and the associated criteria and indicators established by MSFD Commission Decision 2010/477/EU for assessment of progress towards the achievement of GES in terms of fish and commercial species, and which will be addressed through implementation of this monitoring factsheet, are listed hereunder:

2.2.2.1. Fish

Descriptor 1: *Biological Diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions*

- 1.1 Species Distribution
 - Distributional Range (1.1.1)
- 1.2 Population Size
 - Population Abundance and/or biomass as appropriate (1.2.1)

- 1.3 Population Condition
 - Population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity rates, survival/mortality rates) (1.3.1)

2.2.2.2. Commercial species

Descriptor 3: *Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.*

- 3.2. Reproductive capacity of the stock
 - Biomass indices (3.2.2).
- 3.3. Population age and size distribution

Primary indicators:

 - Proportion of fish larger than the mean size of first sexual maturation (3.3.1)
 - Mean maximum length across all species found in research vessel surveys (3.3.2)
 - 95 % percentile of the fish length distribution observed in research vessel surveys (3.3.3)

2.3. Habitats Directive (92/43/EEC)

The EU Habitats Directive is the main Community legislation which aims to conserve and protect species of community interest listed in its Annexes. The only fish species found in the Maltese Islands and listed in Annex II (whose conservation requires the designation of Special Areas of Conservation) and Annex V (Animal and Plant species of Community interest whose taking in the wild and exploitation may be subject to management measures) are *Alosa* spp. and the Mediterranean killifish *Aphanius fasciatus*. The latter species is not covered by this monitoring factsheet since it will be covered by the inland waters monitoring regime.

2.4. Water Framework Directive (2000/60/EC)

The Water Framework Directive establishes requirements for good surface water quality. The Directive requires the assessment of chemical and physico-chemical elements supporting the Biological Quality Elements (BQE/s) which need to be assessed for the classification of ecological status.

The WFD includes 'fish fauna' as a biological quality element to be monitored in transitional waters. This is relevant with regards to populations of the Mediterranean killifish (*Aphanius fasciatus*). This species is not covered by this monitoring factsheet since it will be covered by the inland waters monitoring regime.

2.5. Barcelona Convention

The principal aim of the Barcelona Convention and its protocols is to reduce pollution in the Mediterranean Sea and to protect and improve the marine environment in the area, thereby contributing to its sustainable development.

The Protocol for Specially Protected Areas and Biodiversity in the Mediterranean issued under the framework of the Barcelona Convention lists 'endangered or threatened species' in Annex II and 'species whose exploitation is regulated' in Annex III (Table 1). This protocol calls for scientific and technical research and monitoring programmes necessary for the identification and monitoring of the protected species.

2.6. The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)

The Council of Europe's Bern Convention aims at the conservation of European wild flora and fauna and their natural habitats, with a particular focus on the protection of endangered natural habitats and species, including migratory species, while promoting European co-operation in this field. The European Community is also a Contracting Party to the Bern Convention. Appendix II lists 'Strictly Protected fauna species' and Appendix III lists 'Protected fauna species' (Table 1).

Specific recommendations issued under the auspices of the Bern Convention call for monitoring of species. Recommendation No. 59 (1997) on the Drafting and Implementation of Action Plans of Wild Fauna Species calls for the identification of species requiring Species Action Plans which plans should take into consideration biological data, including distribution, habitat, population size estimates, trend, and other demographic data, migratory and dispersal patterns (if applicable), genetics, taxonomy, and ecological and ethological studies.

2.7. Convention on Conservation of Migratory Species of Wild Animals (Bonn Convention)

This Convention aims at the conservation of migratory species and their habitats. It calls on Parties to acknowledge the need to take action to avoid any migratory species becoming endangered through promoting, cooperating in and supporting research related to migratory species.

Species listed in Appendix I of this Convention are migratory species deemed to be in danger of extinction throughout all or a significant proportion of their range. Appendix II of the Convention lists migratory species that have an unfavourable conservation status or would benefit significantly from international co-operation (Table 1). The Convention encourages the contracting parties to conclude global or regional agreements for the conservation and management of individual species or,

more often, of a group of species listed on Appendix II. Agreements should provide for, *inter alia*, periodic review of the conservation status of the migratory species concerned and the identification of the factors which may be harmful to that status, and research on the ecology and population dynamics of the migratory species concerned, with special regard to migration.

Table 1: Species of fish listed in Regional Conventions

Species	Barcelona Convention: SPABD Protocol	Bern Convention	Bonn Convention
<i>Alopias vulpinus</i>	Annex III		
<i>Alosa alosa</i>	Annex III		
<i>Alosa fallax</i>	Annex III		
<i>Aphanius fasciatus</i>	Annex II	Appendix II	
<i>Carcharhinus plumbeus</i>	Annex III		
<i>Carcharias taurus</i>	Annex II		
<i>Carcharodon carcharias</i>	Annex II	Appendix II	Appendix I & II
<i>Centrophorus granulosus</i>	Annex III		
<i>Cetorhinus maximus</i>	Annex II	Appendix II	Appendix I & II
<i>Dipturus batis</i>	Annex II		
<i>Epinephelus marginatus</i>	Annex III	Appendix III	
<i>Galeorhinus galeus</i>	Annex II		
<i>Gymnura altavela</i>	Annex II		
<i>Heptranchias perlo</i>	Annex III		
<i>Hippocampus guttulatus</i>	Annex II	Appendix II	
<i>Hippocampus hippocampus</i>	Annex II	Appendix II	
<i>Isurus oxyrinchus</i>	Annex II		Appendix II
<i>Isurus paucus</i>			Appendix II
<i>Lamna nasus</i>	Annex II		Appendix II
<i>Leucoraja circularis</i>	Annex II		
<i>Leucoraja melitensis</i>	Annex II		
<i>Manta birostris</i>			Appendix I
<i>Mobula mobular</i>	Annex II	Appendix II	
<i>Mustelus asterias</i>	Annex III		
<i>Mustelus mustelus</i>	Annex III		
<i>Mustelus punctulatus</i>	Annex III		
<i>Odontaspis ferox</i>	Annex II		
<i>Oxynotus centrina</i>	Annex II		
<i>Petromyzon marinus</i>	Annex III		
<i>Pomatoschistus microps</i>		Appendix III	
<i>Pomatoschistus minutus</i>		Appendix III	
<i>Pomatoschistus tortonesei</i>	Annex II	Appendix II	
<i>Prionace glauca</i>	Annex III		
<i>Pristis pectinata</i>	Annex II		
<i>Pristis pristis</i>	Annex II		
<i>Proterorhinus marmoratus</i>		Appendix III	
<i>Rhinobatos cemiculus</i>	Annex II		
<i>Rhinobatos rhinobatos</i>	Annex II		
<i>Rostroraja alba</i>	Annex II	Appendix III	
<i>Sciaena umbra</i>	Annex III	Appendix III	
<i>Sphyrna lewini</i>	Annex II		
<i>Sphyrna mokarran</i>	Annex II		
<i>Sphyrna zygaena</i>	Annex II		
<i>Squalus acanthias</i>	Annex III		Appendix II

<i>Squatina aculeata</i>	Annex II		
<i>Squatina oculata</i>	Annex II		
<i>Squatina squatina</i>	Annex II	Appendix III	
<i>Thunnus thynnus</i>	Annex III		
<i>Umbrina cirrosa</i>	Annex III	Appendix III	
<i>Xiphias gladius</i>	Annex III		

2.8. International Commission for the Conservation of Atlantic Tunas (ICCAT)

The International Commission for the Conservation of Atlantic Tunas (ICCAT) is an intergovernmental organisation responsible for the management and conservation of tuna and tuna-like species in the Atlantic Ocean and adjacent seas. ICCAT compiles fishery statistics from its members and entities fishing for these species in the Atlantic Ocean, coordinates research, including stock assessment, on behalf of its members and develops scientific-based management advice.

2.9. General Fisheries Commission for the Mediterranean (GFCM)

The GFCM's objectives are to promote the development, conservation, rational management and best utilization of living marine resources, as well as the sustainable development of aquaculture in the Mediterranean, Black Sea and connecting waters. The GFCM is instrumental in coordinating efforts by governments to effectively manage fisheries at regional level following the Code of Conduct for Responsible Fisheries. Malta is a member of the GFCM as from 29th April 1965 and follows recommendations issued by this Commission.

The GFCM Data Collection Reference Framework is being developed at the time of compiling this document. This framework will be implemented by the GFCM for countries in the Mediterranean and Black Sea. It reflects the Data Collection Framework under the EU Common Fisheries Policy.

2.10. Other Initiatives

*Action Plan for the Conservation of Dusky Groupers *Epinephelus marginatus* (Lowe, 1834) in Malta* (<http://www.mepa.org.mt/species-grouperap>)

This action plan proposes conservation and population assessment measures with the aim to (i) contribute to national and regional measures for the conservation of groupers; (ii) assess the impacts and threats; (iii) enhance knowledge about groupers; (iv) to enhance the population of groupers and (v) protect the habitats and ecological niches of groupers.

3. Targets

This section includes targets in relation to ‘fish’ and ‘commercial species’ as established for the purpose of Article 10 of the MSFD. Implementation of this monitoring factsheet will assess progress contribute to the achievement of the MSFD targets.

In addition to the targets listed in this section, it should be noted that ‘Fisheries Management Plans’ were prepared by Malta for three types of fisheries (Lampuki FAD fishery, ‘Lampara’ fishery and bottom otter trawling)² as part of the requirements of EC regulation 1967 of 2006 and Council Regulation 2371 of 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy. Assessment of the targets stipulated by these Management Plans is not being addressed by this monitoring factsheet.

Policy	Status to be achieved	Targets
Marine Strategy Framework Directive	<p><i>Fish:</i> The population abundance of key marine species is stable and their population dynamics are indicative of long-term viability.</p>	<p>Species composition and/or abundance of demersal fish and demersal elasmobranchs associated with shelf and upper bathyal sublittoral sediments is stable over [applies to Demersal Fish and Demersal Elasmobranchs associated with shelf sublittoral sediment or upper bathyal sediments]</p>
	<p><i>Fisheries:</i> Sustainable exploitation of fish stocks as indicated by the population age and size distribution of selected commercial species is achieved through effective management and monitoring of fishing effort.</p>	<p>To ensure better use of fishery independent data in analysis of fish populations.</p>
		<p>Management and monitoring of fishing activities result in a sustainable fishing effort over time, in line with the measures put forward in Malta’s Fisheries Management Plans, with a view to ensure sustainability of the stocks targeted by Maltese fisheries.</p>

² http://vafd.gov.mt/fish_con?l=1

4. Competent Authorities

Policy	Competent Authority
CFP	Fisheries
WFD	Malta Environment and Planning Authority
MSFD	Office of the Prime Minister (delegation of technical implementation to the Malta Environment and Planning Authority)
Barcelona Convention: SPABD Protocol	Malta Environment and Planning Authority

5. Spatial Extent of monitoring requirements

Policy	Extent of marine waters
CFP: Fisheries Independent Surveys	GFCM Geographical sub-area 15
WFD	Transitional Waters only
MSFD	Extent of waters to be monitored depends on relevance and established GES and targets.
Barcelona Convention: SPABD Protocol	Regional

6. Monitoring Approach

This monitoring factsheet includes five monitoring subprogrammes listed hereunder:

Monitoring sub-programme	Title	Monitoring Purpose
Fish		
1	Mobile species – fish - abundance	State
2	Mobile species – fish - population characteristics	State
Commercial Species		
3	Commercial species – population characteristics	State
4	Mobile species – mortality from Fisheries	Impact
5	Activities extracting living resources – distribution/extent in space and time	Activity

This monitoring programme reflects the National Data Collection Programme (2011-2013) for Malta which programme is pursuant to the Common Fisheries Policy. This monitoring factsheet adapts the National Data Collection Programme to enable assessment of status of selected fish species in terms of MSFD criteria and indicators, as well as assessment of status for commercial species.

6.1.1. Fish

With reference to fish species (monitoring sub-programmes 1 & 2), this monitoring programme applies to the 'demersal fish' and 'demersal elasmobranch' functional groups. Species selected as representative of these two functional groups, including shark species listed in regional conventions (Table 2), will be subject to monitoring processes and data analysis in accordance with this monitoring factsheet with a view to assess their status in terms of population size and population characteristics. Such species are sampled as part of the Fisheries independent surveys. Within this context, the parameters to be monitored for 'Demersal Fish' and 'Demersal Elasmobranchs' reflect those required by the Mediterranean International Trawl Surveys (MEDITS) as follows:

MEDITS G1 species:

- Total number of individuals
- Total Weight
- Individual length

- Sex
- Maturity
- Individual weight
- Age only for Group 1 teleosts

MEDITS G2 species:

- Total number of individuals
- Total Weight
- Individual length

6.1.2. Commercial Species

With respect to commercial species (monitoring sub-programmes 3, 4 and 5) the monitoring programme is based on the monitoring requirements pursuant to Commission Decision 2010/93/EU. Selection of métiers and stocks for monitoring purposes is also based on the provisions of the Commission Decision and reflect those included in National Data Collection Programme (2011-2013) for Malta.

The monitoring parameters reflect MEDITS data from fisheries independent surveys, métier-related variables and stock-related variables from fisheries dependent surveys as follows:

- MEDITS data:
 - Individual length (G1&G2 species)
 - Sex (G1 species)
 - Maturity (G1 species)
- Métier-related variables:
 - Quarterly length distribution of species in catches per métier
 - Landings: weight of catch per species
 - Weight of catch
 - total number of individuals landed recorded through on-board observations only
 - Discards: quarterly volume of discards
- Stock-related variables:
 - Individual information on length;
 - Individual information on weight;
 - Individual information on sex;
 - Individual information on maturity (excluding the selected elasmobranchs).

Monitoring sub-programme 3 focuses on population characteristics of selected stocks, including demographic structure of the catches. Monitoring sub-programme 4 focuses on assessing the impacts from extraction of species through the use of landings and discard data. Monitoring sub-programme 5 focuses on distribution and intensity of the fishing activities.

This monitoring programme does not cover 'Fishing Mortality' and 'Spawning Stock Biomass' for commercial species for the purpose of MSFD Descriptor 3. It is however understood that Fisheries Dependent data collected as per Malta's National Data Collection Programme (2013) will contribute to determination of these two indicators at a regional scale. The stocks targeted by Maltese fishers are composed of stocks which are shared with other countries. For almost all of these stocks, due to the small size of the Maltese fleet, the contribution to mortality by Maltese fishers is negligible. Were Malta to calculate these indicators independently, the information gained would not be very meaningful. Thus, for Malta, it would be best to contribute to the calculation of such indicators on a regional level.

7. Assessment of status

7.1. Fish

Assessment of status is based on assessment of trend data in relation to the following parameters:

- Species distribution
- List of typical species
- Population size (biomass)
- Size class structure

Assessment of status on the basis of the criterion 'Population Condition' will be qualitative and based on expert judgement in the first monitoring years.

7.2. Commercial Species

At a local scale, assessment of status for commercial species will be mainly qualitative and based on expert judgement. Nevertheless, data collected on commercial species should continue to be assessed together with data from neighbouring jurisdictions in order to assess population status at a regional level.

8. Monitoring sub-programme 1:
Mobile species – fish - abundance

8.1. Monitoring Parameters

8.1.1. Species

Table 2: Species representative of the ‘demersal fish’ and ‘demersal elasmobranch’ functional groups

Species	Fisheries Dependent Surveys	Fisheries Independent Surveys (MEDITS)	Conventions
DEMERSAL FISH			
<i>Argentina sphyraena</i>			
<i>Chlorophthalmus agassizi</i>			
<i>Coelorhynchus coelorhynchus</i>			
<i>Gadiculus argenteus</i>			
<i>Helicolenus dactylopterus</i>	G3	MEDITS G2	
<i>Hoplostethus mediterraneus</i>			
<i>Lepidotrigla cavillone</i>			
<i>Lophius budegassa</i>	G2	MEDITS G2	
<i>Macrorhamphosus scolopax</i>			
<i>Merluccius merluccius</i>	G1	MEDITS G1	
<i>Mullus barbatus</i>	G1	MEDITS G1	
<i>Mullus surmuletus</i>	G1	MEDITS G1	
<i>Nezumia aequalis</i>			
<i>Peristedion cataphractum</i>			
<i>Phycis blennoides</i>	G3	MEDITS G2	
<i>Serranus cabrilla</i>			
<i>Spicara flexuosa</i>	G3	MEDITS G2	
<i>Trachurus trachurus</i>	G2	MEDITS G2	
<i>Zeus faber</i>	G3	MEDITS G2	
DEMERSAL ELASMOBRANCHS			
<i>Chimaera monstrosa</i>			
<i>Dasyatis pastinaca</i>			
<i>Dipturus oxyrinchus</i>	G1	MEDITS G1	
<i>Etmopterus spinax</i>	G1	MEDITS G1	
<i>Galeus melastomus</i>	G1	MEDITS G1	
<i>Heptanchias perlo</i>	G1	MEDITS G1	✓

<i>Leucoraja circularis</i>	G1	MEDITS G1	✓
<i>Leucoraja melitensis</i>	G1	MEDITS G1	✓
<i>Mustelus asterias</i>	G1	MEDITS G1	✓
<i>Mustelus mustelus</i>	G1	MEDITS G1	✓
<i>Oxynotus centrina</i>	G1	MEDITS G1	✓
<i>Raja clavata</i>	G1	MEDITS G1	
<i>Raja miraletus</i>	G1	MEDITS G1	
<i>Scyliorhinus canicula</i>	G1	MEDITS G1	
<i>Squalus blainvillei</i>	G1	MEDITS G1	
<i>Torpedo marmorata</i>	G1	MEDITS G1	

8.1.2. Criteria and Indicators

Table 3: Criteria and indicators to be applied for ‘Demersal fish’ and ‘Demersal Elasmobranchs’ species

Species	Parameter	Criteria	Indicator
Species representative of the ‘demersal fish’ and ‘demersal elasmobranch’ functional groups	Presence in hauls	Species Distribution in MEDITS hauls	Distributional range on the basis of MEDITS hauls
		Condition of the typical species and communities	List of typical species
	Total weight per species	Population Size	Standardised Biomass (kg/km ²)

8.2. Monitoring methodologies

Trawl surveys are carried out following the MEDITS protocol in GSA 15 where 45 stations are sampled using the IFREMER GOC 73 bottom trawl net: width 22m; height of vertical opening: 2m; length: 40m; stretched mesh size at cod-end: 20mm.

8.3. Monitoring area

While MEDITS is carried out within GSA 15, the data generated by MEDITS for stations within the 25 nautical mile Fisheries Management Zone will be used for assessment purpose.

8.4. Monitoring frequency

Yearly

9. Monitoring sub-programme 2:
Mobile species – fish - population characteristics

9.1. Monitoring Parameters

9.1.1. Species

Table 4: MEDITS G1 and G2 species representative of the ‘demersal fish’ and ‘demersal elasmobranch’ functional groups

Species	Fisheries Dependent Surveys	Fisheries Independent Surveys (MEDITS)	Conventions
DEMERSAL FISH			
<i>Helicolenus dactylopterus</i>	G3	MEDITS G2	
<i>Lophius budegassa</i>	G2	MEDITS G2	
<i>Merluccius merluccius</i>	G1	MEDITS G1	
<i>Mullus barbatus</i>	G1	MEDITS G1	
<i>Mullus surmuletus</i>	G1	MEDITS G1	
<i>Phycis blennoides</i>	G3	MEDITS G2	
<i>Spicara flexuosa</i>	G3	MEDITS G2	
<i>Trachurus trachurus</i>	G2	MEDITS G2	
<i>Zeus faber</i>	G3	MEDITS G2	
DEMERSAL ELASMOBRANCHS			
<i>Dipturus oxyrinchus</i>	G1	MEDITS G1	
<i>Etmopterus spinax</i>	G1	MEDITS G1	
<i>Galeus melastomus</i>	G1	MEDITS G1	
<i>Heptranchias perlo</i>	G1	MEDITS G1	✓
<i>Leucoraja circularis</i>	G1	MEDITS G1	✓
<i>Leucoraja melitensis</i>	G1	MEDITS G1	✓
<i>Mustelus asterias</i>	G1	MEDITS G1	✓
<i>Mustelus mustelus</i>	G1	MEDITS G1	✓
<i>Oxynotus centrina</i>	G1	MEDITS G1	✓
<i>Raja clavata</i>	G1	MEDITS G1	
<i>Raja miraletus</i>	G1	MEDITS G1	
<i>Scyliorhinus canicula</i>	G1	MEDITS G1	
<i>Squalus blainvillei</i>	G1	MEDITS G1	
<i>Torpedo marmorata</i>	G1	MEDITS G1	

9.1.2. Criteria and Indicators

Table 5: Criteria and indicators to be applied in terms of population characteristics

Species	Parameter	Criteria	Indicator
MEDITS G1 and G2 species	Individual length (length frequency distributions)	Population Demographic Characteristics	Body size class structures (number/km ² per length class)

9.2. Monitoring methodologies

Trawl surveys are carried out following the MEDITS protocol in GSA 15 where 45 stations are sampled using the IFREMER GOC 73 bottom trawl net: width 22m; height of vertical opening: 2m; length: 40m; stretched mesh size at cod-end: 20mm.

9.3. Monitoring area

While MEDITS is carried out within GSA 15, the data generated by MEDITS for stations within the 25 nautical mile Fisheries Management Zone will be used for assessment purpose.

9.4. Monitoring frequency

Yearly

10. Monitoring sub-programme 3:
Commercial species – population characteristics

10.1. Monitoring Parameters

10.1.1. Species

Table 6: Commercial species subject to monitoring

Species	MSFD functional group	Fisheries Dependent Surveys ³	Fisheries Independent Surveys (MEDITS)	Conventions
PELAGIC FISH				
<i>Coryphaena hippurus</i>	Pelagic fish	G2		
<i>Thunnus thynnus</i>	Pelagic fish	G1		✓
<i>Xiphias gladius</i>	Pelagic fish	G1		✓
COASTAL FISH				
<i>Epinephelus marginatus</i>	Coastal ⁴			✓
<i>Merluccius merluccius</i>	Demersal fish	G1	MEDITS G1	
<i>Mullus barbatus</i>	Demersal fish	G1	MEDITS G1	
<i>Mullus surmuletus</i>	Demersal fish	G1	MEDITS G1	
<i>Heptatranchias perlo</i>	Demersal elasmobranch	G1	MEDITS G1	✓
<i>Mustelus mustelus</i>	Demersal elasmobranch	G1	MEDITS G1	✓
<i>Raja clavata</i>	Demersal elasmobranch	G1	MEDITS G1	
<i>Raja miraletus</i>	Demersal elasmobranch	G1	MEDITS G1	
<i>Squalus blainvillei</i>	Demersal elasmobranch	G1	MEDITS G1	
CRUSTACEA				
<i>Aristaeomorpha foliacea</i>	N/A	G1	MEDITS G1	
<i>Nephrops norvegicus</i>	N/A	G1	MEDITS G1	
<i>Parapenaeus longirostris</i>	N/A	G1	MEDITS G1	
MOLLUSCA				
<i>Illex coindetti</i>	N/A	G2	MEDITS G2	

³ In accordance with Appendix VIII of 2010/93/EU

⁴ Although the species is being listed as a 'coastal' species, it occurs up to depths of 540m, however its frequency decreases beyond 50m depth.

10.1.2. Criteria and Indicators

The criteria and indicators for assessment of fish populations in terms of population characteristics are listed below. These criteria and indicators reflect those stipulated by EU Commission Decision 2010/477/EU for MSFD Descriptor 3 (commercial species). The criteria/indicators are subject to revisions on the basis of any potential revisions to the MSFD Commission Decision.

Table 7: Criteria and indicators to be applied for commercial species

Species	Data Collection Process or Parameters	Criteria	Indicators
COASTAL FISH			
<i>Epinephelus marginatus</i> ⁵	Market sampling/onboard observations	Demographic characteristics of catches	Length frequency distribution in catches ⁶
DEMERSAL FISH/ELASMOBRANCHS			
MEDITS G1 species: <i>Merluccius merluccius</i> , <i>Mullus barbatus</i> , <i>Mullus surmuletus</i> , <i>Heptatranchias perlo</i> , <i>Mustelus mustelus</i> , <i>Raja clavata</i> , <i>Raja miraletus</i> , <i>Squalus blainvillei</i>	MEDITS (Individual length)	Population age and size distribution	Mean Maximum length across all species found in research vessels 95% percentile of the fish length distribution observed in research vessel surveys
	MEDITS (weight of individuals, maturity)	Reproductive capacity of stock	Biomass index for the fraction of the population which is mature ⁷
	Metier-related variables (quarterly length) & stock-related variables (individual information on length)	Demographic characteristics of catches	Length distribution of species in catches (per species, per metier) ⁸
	Metier-related variables (weight of catch)	Reproductive capacity of stock	Weight of catch per species (total biomass as a proxy of the stock)

⁵ The indicators included in this monitoring factsheet reflect two of the actions listed by the Action Plan in relation to 'Collection of data to assess the dynamics of the groupers' populations and the fishery status': (i) Collection of biological and biometrical data from dead and fished specimens and fill the groupers identification sheets; and (ii) gather official information on fish landings

⁶ This indicator should be applied to catches in recognition of the fact that in catches there is a general bias towards larger individuals.

⁷ This can only be applied if maturity is known or can be measured. Otherwise, total biomass can be used as a proxy of the stock reproductive capacity (ICES MSFD D3 Report 2012).

⁸ This indicator should be applied to catches in recognition of the fact that in catches there is a general bias towards larger individuals.

			reproductive capacity)
MEDITS G1 species for which Length at first maturation (L_m) ⁹ is available	MEDITS (Individual length; sex)	Population age and size distribution	Proportion of fish larger than the mean size of first sexual maturation
CRUSTACEA			
<i>Aristaeomorpha foliacea</i> ; <i>Nephrops norvegicus</i> ; <i>Parapenaeus longirostris</i>	MEDITS data	Population age and size distribution	Mean Maximum length across all species found in research vessels
			Proportion larger than the mean size of first sexual maturation
			95% percentile of length distribution observed in research vessel surveys
	MEDITS (weight of individuals, maturity)	Reproductive capacity of stock	Biomass index for the fraction of the population which is mature ¹⁰
	Metier-related variables (quarterly length) & stock-related variables (individual information on length)	Demographic characteristics of catches	Length distribution of species in catches (per species, per metier) ¹¹
Metier-related variables (weight of catch)	Reproductive capacity of stock	Weight of catch per species (total biomass as a proxy of the stock reproductive capacity)	
MOLLUSCA			
<i>Illex coindetti</i>	MEDITS data	Population age and size distribution	Mean Maximum length across all species found in research vessels
			Proportion larger than the mean size of first sexual maturation
			95% percentile of length distribution observed in research vessel surveys
	MEDITS (total weight)	Reproductive capacity of stock	Biomass index as a proxy of the stock reproductive capacity.
	Metier-related variables	Demographic characteristics of	Length distribution of species in catches (per

⁹ In cases where L_m is not specified for males/females application of the indicator needs to be based on assumptions.

¹⁰ This can only be applied if maturity is known or can be measured. Otherwise, total biomass can be used as a proxy of the stock reproductive capacity (ICES MSFD D3 Report 2012).

¹¹ This indicator should be applied to catches in recognition of the fact that in catches there is a general bias towards larger individuals.

	(quarterly length) & stock-related variables (individual information on length)	catches	species, per metier) ¹²
	Metier-related variables (weight of catch)	Reproductive capacity of stock	Weight of catch per species (total biomass as a proxy of the stock reproductive capacity)
PELAGIC FISH			
<i>Coryphaena hippurus</i> ; <i>Thunnus thynnus</i> ; <i>Xiphias gladius</i>	Raw data to be collected and analysed at a regional scale – no indicators to be measured at a National scale for the pelagic species through this monitoring programme.		

10.2. Monitoring methodologies

Monitoring methodologies for commercial species reflect those stipulated by Malta's National Data Collection Programme in line with Council Regulation (EC) 199/2008, Commission Regulation (EC) 665/2008 and Commission Decision (EC) 93/2010: 2011-2013 National Programme Proposal.

- Metier-related and Stock-related variables are measured for commercial species listed in Table 6 through on-board observations, on-board purchasing, market sampling. (Table 8). Additional parameters are monitored through MEDITS described in Section 8.2.
- Stock-related variables of samples obtained onboard commercial vessels are raised to the total landings of the relevant fleets. For species where only lengths are recorded in the monthly on-board sampling campaigns, sample weights are calculated using available length-weight relationships from GSA 15.

¹² This indicator should be applied to catches in recognition of the fact that in catches there is a general bias towards larger individuals.

Table 8: Monitoring of métier-related and stock-related variables for species listed in Table 6

Species	Parameters	Methodology
<i>Heptanchias perlo</i> ; <i>Mustelus mustelus</i> ; <i>Raja clavata</i> ; <i>Raja miraletus</i> ; <i>Squalus blainvillei</i>	Length	On-board observations
	Length, weight, sex, maturity	MEDITS
<i>Epinephelus marginatus</i>	Length	Market sampling/onboard observations
<i>Merluccius merluccius</i>	Length	On-board observations
	Length, weight, sex and maturity	MEDITS
<i>Mullus surmuletus</i> , <i>Mullus barbatus</i>	Length	On-board observations/onshore sampling
	Length, weight, sex, maturity	Market sampling
		MEDITS
<i>Thunnus thynnus</i>	Length, sex	On-board observations
	Length	At landings
<i>Xiphias gladius</i>	Length	On-board observations
		At landings
	Length& weight, (sex and maturity when possible)	Market Sampling
<i>Coryphaena hippurus</i>	Length	On-board observations
	Length, weight, sex, maturity	Market Sampling
<i>Aristaeomorpha foliacea</i> ; <i>Nephrops norvegicus</i> ; <i>Parapenaeus longirostris</i>	Length, weight, sex, maturity	On-board purchasing
		MEDITS
<i>Illex coindetti</i>	Length, weight, sex, maturity	Market purchasing
		MEDITS

10.3. Monitoring area

Not applicable

10.4. Monitoring frequency

Yearly (three year sampling plan)

11. Monitoring sub-programme 4:
Mobile species – mortality from Fisheries

11.1. Monitoring Parameters

11.1.1. Landings data

Landings data is as a measure of the level of pressure of the fishing activity on commercial species. The parameters to be monitored are listed hereunder. These parameters are subject to revision following the initial monitoring year.

Table 9: Landings data

Species	Data collection process	Criteria	Indicator
<i>Epinephelus marginatus</i> ¹³	Metier-related variables: Landings data	Level of pressure of the fishing activity	Weight of <i>Epinephelus marginatus</i> landed
<i>Merluccius merluccius,</i> <i>Mullus barbatus,</i> <i>Mullus surmuletus,</i> <i>Heptatranchias perlo,</i> <i>Mustelus mustelus,</i> <i>Raja clavata, Raja miraletus, Squalus blainvillei;</i> <i>Aristaeomorpha foliacea; Nephrops norvegicus;</i> <i>Parapenaeus longirostris; Illex coindetti; Coryphaena hippurus; Thunnus thynnus; Xiphias gladius</i>			Total weight of catch per metier per species
			Total number of individuals landed recorded through on-board observations only

¹³ The indicators included in this monitoring factsheet reflect two of the actions listed by the Action Plan in relation to 'Collection of data to assess the dynamics of the groupers' populations and the fishery status': (i) Collection of biological and biometrical data from dead and fished specimens and fill the groupers identification sheets; and (ii) gather official information on fish landings

11.1.2. Discards

This monitoring sub-programme reflects the requirements of Commission Decision 2010/93/EU for the collection of métier-related variables, specifically the quarterly volume of discards by métier. The métiers selected for sampling of discards the same métiers selected for sampling of métier-related variables as per Malta's National Data Collection Programme 2011-2013. Data on discards is collected for group 1, 2 and 3 species, as listed in Appendix VII of Commission Decision 2010/93/EU.

11.2. Monitoring methodologies

11.2.1. Landings Data

- Data on landings (weight) for commercial species listed in Table 6 is collected for the métiers as listed in Table 10.
- The data is collected by using information from (i) logbooks of the fleet of vessels over 10m; (ii) Sales Notes for vessels over and under 10m for the vessels that land in the Valletta fishmarket only; and (iii) questionnaire sampling survey for vessels under 10m registered in the Maltese fishing fleet register.

Table 10: List of métiers subject to assessment of landings and associated commercial species

Metier	Commercial Species
Drifting longlines	<i>Thunnus thynnus</i> <i>Xiphias gladius</i>
Lampara nets	<i>Coryphaena hippurus</i>
Purse seines	<i>Thunnus thynnus</i>
Bottom otter trawls	<i>Mullus surmuletus</i> <i>Aristaeomorpha foliacea</i> <i>Parapenaeus longirostris</i> <i>Nephrops norvegicus</i> <i>Illex coindetti</i>
Set longlines	<i>Epinephelus marginatus</i> <i>Heptranchias perlo</i> <i>Mustelus mustelus</i> <i>Squalus blainvillei</i> <i>Raja clavata</i> <i>Raja miraletus</i>
Trammel nets	<i>Mullus surmuletus</i>
Pots and traps	<i>Epinephelus marginatus</i> <i>Illex coindetti</i>
Trolling lines	<i>Coryphaena hippurus</i>

11.2.2. Discards

Discards in Malta are monitored for métiers specified in Table 11. This table is subject to revisions on the basis of revisions to Malta's National Programme for Data Collection.

Table 11: Monitoring of discards

Metier	Target species	Fishing Season	Methodology	Discards
Drifting longlines	<i>Thunnus thynnus</i> and <i>Xiphias gladius</i>	All year	At sea monitoring	Discards sampled as outlined in Table 3.3.4 of the RCM Med&BS 2009 report ¹⁴ .
Lampara nets	<i>Coryphaena hippurus</i> with by-catches of <i>Seriola dumerili</i> & <i>Naucrates ductor</i>	August-December	At sea monitoring	Catch composition can be approximated to the landings, however some species may be caught as by-catch but are not landed.
Bottom otter trawl	<i>Aristaeomorpha foliacea</i> & <i>Mullus barbatus</i>	All year	At-sea monitoring	Discards sampled as outlined in Table 3.3.4 of the RCM Med&BS 2009 report ¹⁵ .
Trammel nets	<i>Mullus surmuletus</i> & <i>Sepia officinalis</i> .	All year	At-sea monitoring/ onshore sampling	Need for monitoring of discards still to be determined
Purse Seines	Small pelagic fish such as mackerel, namely <i>Trachurus</i> spp., <i>Scomber</i> spp. and other small pelagic fish		At-sea monitoring	Need for monitoring of discards still to be determined
Set gillnets	Small and large pelagic fish		At-sea monitoring	Need for monitoring of discards still to be determined

¹⁴ Report of the 6th Regional Coordination Meeting for the Mediterranean and Black Seas (RCM Med and BS 2009).

¹⁵ Report of the 6th Regional Coordination Meeting for the Mediterranean and Black Seas (RCM Med and BS 2009).

12. Monitoring sub-programme 5:
Activities extracting living resources – distribution/extent in space and time

Data on fisheries will be collected through the National Data Collection Programme 2011-2013 as follows:

- ***Maltese fishing fleet:*** the Maltese fishing vessel register includes the number of active and non-active vessels forming part of the fleet register as at 30 January of the reference year. Number of active/non-active vessels in the following categories are recorded:
 - Category A (MFA): Professional Fishing Vessels - Full-time
 - Category B (MFB): Professional Fishing Vessels - Part-time
 - Category C (MFC): Non-Commercial Fishing Vessels (recreational)
 - Category D (MFD): Auxiliary Vessels (work boats) used in fishing operations.

- ***Distribution of fishing activities:*** Location of fishing activities is mapped using Vessel Monitoring System data.

- ***Fishing Intensity:*** Fishing intensity is calculated on the basis of the capacity of the fishing fleet (data included in the Fishing Vessels Register) and data on fishing effort collected through logbooks and questionnaire sampling surveys as per Table 12.

Table 12: Fishing Intensity

Variable	Vessels >10m LOA	Vessels <10m LOA
Days at sea	Logbook data	Sales vouchers and small scale fishery questionnaire sampling survey
Hours fished	Logbook data	Sales vouchers and small scale fishery questionnaire sampling survey
kW*Fishing days	Logbook data + fleet register	Sales vouchers and small scale fishery questionnaire sampling survey and fleet register
GT * Fishing days	Logbook data + Fleet register	Sales vouchers and small scale fishery questionnaire sampling survey and fleet register
Number of trips	Logbook data	Sales vouchers and small scale fishery questionnaire sampling survey
Number of fishing operations	Logbook data, questionnaire	Sales vouchers and small scale fishery questionnaire sampling survey
Number of nets, Length	Questionnaire	Small scale fishery questionnaire sampling survey
Number of hooks, number of lines	Questionnaire	Small scale fishery questionnaire sampling survey
Number of pots, traps	Questionnaire	Small scale fishery questionnaire sampling survey
Soaking Time	Questionnaire	Small scale fishery questionnaire sampling survey

13. Links to monitoring processes

Monitoring in terms of this factsheet is linked with monitoring or related processes as follows:

- Monitoring of 'Demersal fish' and 'Demersal Elasmobranchs' contributes to monitoring of shelf and upper bathyal sediment in terms of habitat condition through monitoring of species composition (refer to 'seabed habitats' monitoring factsheet);
- Monitoring of biological parameters for fish and commercial species would provide supporting parameters for the monitoring of contaminants in biota (refer to 'contaminants' monitoring factsheet).
- Monitoring of turtle/seabird by-catch as per 'marine reptiles' and 'seabirds' monitoring factsheet will contribute to monitoring sub-programme 4.

14. Quality Assurance & Quality Control

Sampling methodologies and analysis of samples shall be carried out in line with standards and guidance documents listed in this section:

- MEDITS-Handbook. Version n. 7, 2013, MEDITS Working Group : 120 pp.

15. Data collection, storage and dissemination

All data should be collected and stored in accordance with the INSPIRE Technical Specifications listed in this section and/or any other relevant INSPIRE standard as identified through the Marine Pilot Project¹⁶. Processed data to be uploaded in a geoportal.

- 'D2.8.III.19 Data Specification on Species Distribution – Technical Guidelines'¹⁷.

16. Responsible organisations

Monitoring sub-programme	Responsible authorities
Mobile species – fish - abundance	Fisheries, MEPA
Mobile species – fish - population characteristics	Fisheries, MEPA
Commercial species – population characteristics	Fisheries, MEPA
Mobile species – mortality from Fisheries	Fisheries
Activities extracting living resources – distribution/extent in space and time	Fisheries

¹⁶ <https://circabc.europa.eu/w/browse/bc33dff1-0f8c-467a-8382-7724c5f79d45>

¹⁷ <http://inspire.ec.europa.eu/index.cfm/pageid/2>;

17. Gaps and Research Needs

Gaps	Plans to address gaps
Coastal and pelagic species of fish are not adequately covered by this monitoring factsheet.	Fish visual census techniques may be explored to test applicability of this methodology for monitoring coastal fish. Consideration to be given to link such monitoring with monitoring of non-indigenous species along specified transects (reference made to monitoring factsheet for 'non-indigenous species').

18. Main Sources

- AAE Consortium (ADI Associates Ltd, Ecoserv Ltd and E Cubed Consultants). 2014. Long Term Monitoring Strategy for the Marine Environment of the Maltese Islands under the Marine Strategy Framework Directive. Service Contract for the development of a long-term monitoring strategy for the marine environment, a social and economic analysis of the use of marine waters and costs of degradation, and baseline sediment survey in inland waters (MEPA tender ref: CT3048/2012). ERDF156 - Developing national environmental monitoring infrastructure and capacity. Malta, unpublished report, 252 pp.
- AAE Consortium (ADI Associates Ltd, Ecoserv Ltd and E Cubed Consultants). 2014. Long Term Monitoring Programme for the Marine Environment of the Maltese Islands under the Marine Strategy Framework Directive. Service Contract for the development of a long-term monitoring strategy for the marine environment, a social and economic analysis of the use of marine waters and costs of degradation, and baseline sediment survey in inland waters (MEPA tender ref: CT3048/2012). ERDF156 - Developing national environmental monitoring infrastructure and capacity. Malta, unpublished report, 346 pp.
- Ministry for Sustainable Development, the Environment and Climate Change. 2013. National Data Collection Programme. In line with Council Regulation (EC) 199/2008, Commission Regulation (EC) 665/2008 and Commission Decision (EC) 93/2010. Malta. 2011-2013 National Programme Proposal.