Fish

1.1 Introduction

This report aims at fulfilling the requirements of the EU Marine Strategy Framework Directive (MSFD) in terms of Article 8 (1) and associated Annex III, in providing information on the structure of fish populations, including the abundance, distribution and age/structure of the populations.

Data on fish populations is generated through the implementation of Malta's National Fisheries Data Collection Programme (NFDCP) initiated in January 2005. This programme is in line with EU's Council Regulation 199/2008, establishing a *Community framework for the collection, management and use of data for the purpose of forming a solid basis for scientific analyses of fisheries and of providing for the formulation of sound scientific advice for the implementation of the common fisheries policy* (hereinafter referred to as the 'Data Collection Framework') and Commission Decision EC949/2008 adopting a multiannual Community programme pursuant to EC199/2008.

The most relevant data for assessing fish populations is generated through the scientific surveys carried out as part of the Data Collection Framework namely the Mediterranean International bottom trawl survey (MEDITS) and the Pan-Mediterranean pelagic survey (MEDIAS). MEDITS surveys target benthic and demersal assemblages while MEDIAS targets small pelagics.

While the scope of such surveys is focused on fishery resources, data generated through such surveys allowed the part fulfillment of the MSFD requirements in terms of assessment of the fish functional groups defined by the MSFD Commission Staff Working Paper[1]. Assessment of fish functional groups which are not covered by these surveys could not be assessed at this stage in view of data limitations.

1.2 Relevant Legislation and/or Management Activities

Malta has been committed to the safeguarding and regulation of fish and fisheries for a number of decades. This section outlines the main legislative tools or policies which include provisions aiming at regulating and/or conserving fish species, and are thus of relevance to the implementation of the MSFD.

[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.

1.2.1 Fisheries Conservation and Management Act, 2011

The main legal instrument enacting the regulation and management of the fisheries sector in Malta is the Fisheries Conservation and Management Act, 2011 (Act II of 2001, Chapter 425). This act makes provision for the regulation, conservation and management of the fisheries of Malta and matters incidental thereto. This Act has a wider scope and is not just limited to the safeguard of fish that are captured for direct consumption, since certain provisions of the Act also provide a legal basis for the protection of turtles, dolphins and other aquatic organisms [Article 38(2) h]. This Act builds on the past efforts in regulating national fisheries, which date back to the early 1930's Fishery Regulations (Government Notices 206/1934 and 148/1935).

Malta has recently enacted the Enforcement of Sea Fishing Conventions Order, 2011 (Legal Notice 209/11 and Legal Notice 282/11) which provide for the enforcement of restrictions and obligations emanating from Fisheries Conventions to which Malta is a Party.

Legal Notice 354 of 2013 issued under the Fisheries Conservation and Management Act (Cap. 425) and entitled '*Implementation and Enforcement of Certain Fisheries Management Plans Order*', adopts the management plans for the Lampuki fishery, Lampara fishery and Bottom Trawling which were recently approved by the European Union. The scope of this Order is the implementation and, where applicable, the enforcement of these management plans in conformity with the obligations of Malta under Article 19 of the Council Regulation (EC) No 1967/2006 of 21 December 2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea.

*1.2.2 **The EU Common Fisheries Policy, Council Regulation EC 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 and **Commission Decision 2008/949/EC** outlining a multiannual Community programme pursuant to Council Regulation 199/2008*

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.

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 2008/949/EC outlining a

multiannual Community programme pursuant to Council Regulation 199/2008. Within this context, Member States are required to collect economic and stock-related variables. 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. Such surveys are referred to as 'Fishery Independent Surveys'.

Fishery Independent Surveys

The Fishery Independent surveys carried out in Malta include the MEDITS Trawl Surveys. MEDITS is a bottom trawl survey carried out on a regional basis[2] which aims to collect data on benthic and demersal species, targeting species which have an existing or potential commercial value.

Sampling using the MEDITS standard gear is performed at 45 selected stations within Geographical sub-area 15. The hauls are positioned following a depth stratified sampling scheme as per Table 1. For each fish, crustacean and cephalopod species collected in the hauls, the total weight and number of individuals is recorded. Other parameters are measured for MEDITS target species including individual length, sex, maturity, individual weight and age.

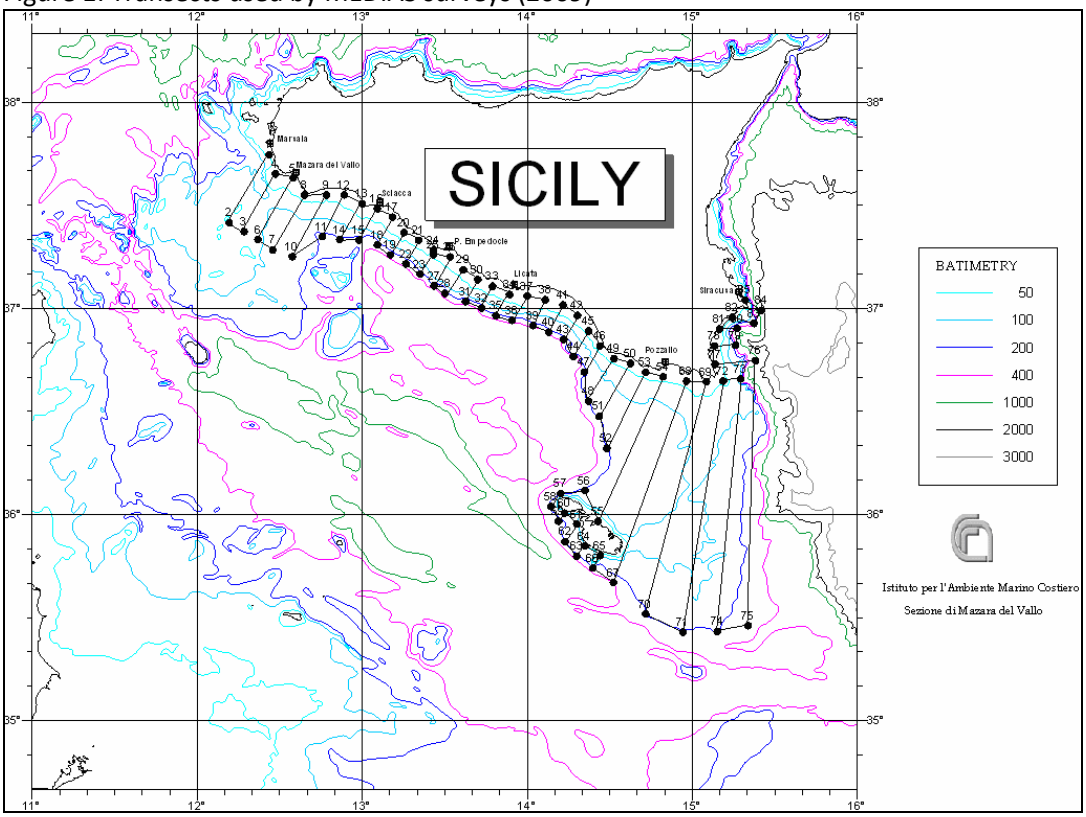
Table 1: Depth zones covered by the MEDITS trawl surveys

Layer	Depth (m)	Surface (km²)
A	10-50	152
B	50-100	1473
C	100-200	3076
D	200-500	3353
E	500-800	2526
	Total	**10580**

The Mediterranean acoustic survey (MEDIAS) is another Fisheries Independent Survey targeting the assessment of the spatial distribution and abundance of small pelagic fish. The biological parameters measured during the acoustic survey include the Length frequency distribution and age-length keys for target fish species, namely *Engraulis encrasicolus* and *Sardina pilchardus*. The survey is carried out in collaboration with the Centre for National research in Italy along transects indicated in Figure 1.

[2] All the participants use the same gear, the same sampling protocol and the same methodology

Figure 1: Transects used by MEDIAS surveys (2009)



1.2.3 Council Regulation (EC) No 1967/2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea, relates to the conservation, management and exploitation of living aquatic resources in the Mediterranean.

This regulation applies to the conservation, management and exploitation of living aquatic resources and constitutes a number of provisions related to the conservation of marine resources including the regulation or prohibition of specific fishing activities on protected or sensitive habitats, in particular *Posidonia oceanica*, coralligenous habitats, mäerl beds and corals. Provisions in this regulation are also related to regulation of mesh sizes, hook sizes, and specification of minimum sizes of marine organisms that are caught.

The regulation also calls for the establishment of Fishing Protected Areas in which fishing activities may be banned or restricted in order to conserve and manage living aquatic resources or to maintain or improve the conservation status of marine ecosystems. Member States should also adopt management plans for specific Mediterranean fisheries (Article 19).

The regulation adopts the 25-mile Fisheries Management Zone around the Maltese Islands, stipulates provisions regulating fishing within this zone and prohibits fishing for dolphinfish within the 25Nm Fisheries Management Zone by FAD from 1 January to 5 August each year. It further stipulates that the number of vessels for dolphinfish fishery shall not exceed 130.

The regulation also sets the authorized trawlable areas within the 25 nautical mile Fisheries Management Zone (Annex V). Malta's Fisheries Management Plans however indicate that the Maltese authorities are currently studying the possibility of relocating part of these authorized trawlable areas due to a rationalization exercise that has led to the closure of parts of the areas due to protected habitats present in the zones. Specifically, the management plans point out that the authorized trawling zones as per Annex V of regulation 1967 of 2006 include areas which are found within the 3 nautical mile zone, which areas should be reconsidered to protect coastal resources from trawling activities and to give priority to artisanal fisheries.

1.2.4 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.

Malta is a member of ICCAT since 7th August 2003 and thus observes ICCAT Recommendations, including the ones on the Bluefin tuna catch limits and has regulated fishery through the Fishery Regulations (G.N. 206/1934, G.N. 148/1935) which lay down detailed licensing and operational regulations. Through the implementation of other relevant legal provisions, Malta has established the number of fishing vessels allowed to target Bluefin Tuna using purse seine nets and surface long line fishing operating in the ICCAT Convention area. The open season for the taking of Bluefin Tuna by Maltese registered fishing vessels, commences on the 15th April and extends to the 31st December. However the season comes to an end, once the allocated catch quota for Malta is reached.

1.2.5 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.

1.3 Description of Fish assemblages

The MSFD Commission Staff Working Paper[3] identifies nine functional groups belonging to the fish species group to be assessed as part of the MSFD Initial Assessment:

- 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. This depth zone is not covered by the Fishery Independent Surveys, hence data on this functional group is limited.

The MEDIAS surveys which can generate data on the 'Pelagic fish' functional group, target only two species of small pelagics: *Engraulis encrasicolus* and *Sardina pilchardus*. These species would not be representative of the whole functional group. Current data on large pelagics is restricted to stock assessments of the main commercial species (*Thunnus thynnus* and *Xiphias gladius*) carried out at the regional scale in the framework of the International Commission for the Conservation of Atlantic Tunas (ICCAT). The scope of such stock assessments is mainly related to the assessment of fishing pressure and is not specifically relevant to the assessment of fish populations. For this reason, while the results of the MEDIAS surveys carried out in the period 2009-2011 are included in Annexes I - II to this report, no assessment of status could be undertaken for 'Pelagic Fish'.

Data on 'Pelagic Elasmobranchs', 'Deep-sea fish' and 'Deep-sea elasmobranchs' is not available, thus precluding the possibility to describe these functional groups and assess their status.

[3] 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.

Within this context, the current data scenario, which essentially reflects the data generated pursuant to the Data Collection Framework through the Fisheries independent surveys MEDITS and MEDIAS, limits assessment to the 'Demersal Fish' and 'Demersal Elsamobranchs' functional groups.

1.4 Selection of Representative Species

For the purposes of assessing status at the functional group level for 'Demersal Fish' and 'Demersal Elasmobranchs', species representative of these two functional groups were selected.

The selection of species was based on the data generated by the MEDITS survey at depths between 50-800m for the years 2007 – 2011. As indicated by Dimech *et al*. (2007)[4] species assemblages vary with depth with fishery resources deemed to be stratified into four main depth ranges. Two depth strata were used in selecting representative species of the 'Demersal Fish' and 'Demersal Elasmobranchs' functional groups: 50m-200m and 200m – 800m. These depth zones group some of the strata identified by Dimech *et al.* (2007)[5], with the 50m-200m representing the shelf strata and the 200m-800m representing the slope strata in Dimech *et al*. (2007). These two depth zones would however still reflect differences in species composition of the fish assemblages with depth.

The top ten teleosts and top ten elasmobranchs ranked in terms of abundance and biomass for two depth strata were selected. This selection was subject to expert judgement on the basis of knowledge of demersal assemblages (Dr. Leyla Knittweis, personal communication) in order to ensure that the selected species are truly representative of the Maltese fish functional groups. The selection of species for both teleosts and elasmobranchs for the two depth strata are indicated in Table 2. This selection includes MEDITS target species and other non-target species.

[4] Dimech, M.; Camilleri, M.; Kaiser, M.J. & Schembri, P.J. 2007. Demersal Assemblages on deep water trawling grounds off the Maltese Islands: Management Implications; *Comm. int. Mer Médit*., **38**

[5] Dimech *et al*. (2007) indicate that the fishery resources of the Maltese trawling grounds are stratified in four main depth ranges: 80-160m (outer continental shelf); 160-270m (shelf break); 270-440m (upper slope) and 440-800m (deep slope).

Table 2: Selection of species representing teleosts and elasmobranchs for two depth strata, based on ranking in terms of abundance and biomass, as well as expert judgement. MEDITS target species are in bold, while species represented in both depth zones are highlighted.

Demersal Teleosts	
Depth Zone: 50m-200m	**Depth Zone: 200m-800m**
***Trachurus trachurus* (TRACTRA)**	*Chlorophthalmus agassizi* (CLORAGA)
Macrorhamphosus scolopax (MACOSCO)	*Nezumia aequalis* (NEZUSCL)
***Mullus barbatus* (MULLBAR)**	*Hoplostethus mediterraneus* (HOPLMED)
***Merluccius merluccius* (MERLMER)**	***Phycis blennoides* (PHYIBLE)**
***Zeus faber* (ZEUSFAB)**	***Merluccius merluccius* (MERLMER)**
Argentina sphyraena (ARGESPY)	***Helicolenus dactylopterus* (HELIDAC)**
***Mullus surmuletus* (MULLSUR)**	*Gadiculus argenteus* (GADIARG)
***Spicara flexuosa* (SPICFLE)**	*Coelorhynchus coelorhynchus* (COELCOE)
Lepidotrigla cavillone (LEPTCAV)	*Peristedion cataphractum* (PERICAT)
Serranus cabrilla (SERACAB)	***Lophius budegassa* (LOPHBUD)**
Depth Zone: 50m-200m	**Depth Zone: 200m-800m**
***Scyliorhinus canicula* (SCYOCAN)**	***Galeus melastomus* (GALUMEL)**
***Raja miraletus* (RAJAMIR)**	***Etmopterus spinax* (ETMOSPI)**
***Raja clavata* (RAJACLA)**	*Chimaera monstrosa* (CHIMMON)
***Mustelus mustelus* (MUSTMUS)**	***Raja oxyrhincus* (RAJAOXY)**
***Mustelus asterias* (MUSTAST)**	***Scyliorhinus canicula* (SCYOCAN)**
Oxynotus centrina (OXYCEN)	***Raja clavata* (RAJACLA)**
Dasyatis pastinaca (DASIPAS)	***Squalus blainvilei* (SQUABLA)**
***Torpedo marmorata* (TORPMAR)**	***Heptranchias perlo* (HEPTPER)**
***Squalus blainvilei* (SQUABLA)**	***Raja circularis* (RAJACIR)**
***Raja oxyrhincus* (RAJAOXY)**	***Raja melitensis* (RAJAMEL)**

1.5 Pressures

Pressures on fish populations include:

- the selective extraction of species, including incidental non-target species;
- contamination by hazardous substances;
- interferences with hydrological processes, potentially affecting the spawning, breeding and feeding areas and migration routes of fish; and
- underwater noise.

The effects of such pressures on fish populations are poorly documented, however some publications attribute differences in demersal assemblages, including fish, to trawling activities. Dimech *et. al.* (2008)[6] describe differences in demersal communities within the Fisheries Management Zone (FMZ) where trawling activities are controlled, and outside this zone. Two shelf assemblages located within and outside the Fisheries Management Zone were differentiated on the basis of species composition. The authors attribute this differentiation to differences in fishing pressure with species groups sensitive to trawling, such as elasmobranchs (for example *Scyliorhinus canicula* and *Raja clavata*) being very common inside the Fisheries Management Zone and practically absent outside. The analysis of the size-spectra of the Outer Shelf also indicated that elasmobranchs were larger in size inside the Fisheries Management Zone.

Dimech et al. (2005)[7] indicate that fishing disturbance may cause shifts in benthic community structure, primarily affecting non-target species. According to these authors, different non-target assemblages in two studied areas may be related to different levels of trawling intensity.

In terms of incidental capture or by-catch, it should be noted that discards in Maltese fishery are generally not significant. Discards generated by the bottom otter trawl fishery mainly constitute commercial species which were either below marketable size or too damaged to be sold. Such species include the fish *Merluccius merluccius*. Other species discarded by bottom otter trawls in 2009 include in order of decreasing importance *Galeus melastomus*, *Etmopterus spinax*, *Scyliorhinus canicula*, *Raja clavata*, *Dipturus oxyrinchus*, *Leucoraja melitensis*, *Dalathias licha*, *Raja montagui*, *Torpedo marmorata*, *Chimaera monstrosa*, *Leucoraja circularis* and *Torpedo nobiliana*. Discards generated by longlines are mainly non-commercial species with the majority of discards being loggerhead turtles. Fish species in discards generated by longlines include the pelagic stingray *Pteroplatytrygon violacea*, the oilfish *Ruvettus pretiosus*, the ocean sunfish *Mola mola* and the devil fish *Mobula mobular*. The significance of the effects of such by-catch is not known at this stage.

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[6] Dimech, M., Camilleri, M., Hiddink, J.G., Kaiser, M.J., Ragonese, S. & Schembri, P.J. Differences in demersal community structure and biomass size spectra within and outside the Maltese Fishery Management Zone (FMZ) *Scientia Marina* 72(4): 669-682

[7] Dimech, M.; Camilleri, M., Gristina, M., Kaiser, M.J., & Schembri, P.J. 2005. Commercial and non-target species of deep-water trawled muddy habitats on the Maltese continental shelf. Xjenza 10: 18-23

1.6 Assessment of Status

Assessment of the status of fish populations in Malta is limited to two functional groups identified by MSFD Commission Staff Working Paper[8], namely the 'Demersal Fish' and 'Demersal Elasmobranchs'.

This assessment is based on the data generated by the MEDITS trawl surveys for the period 2005-2012, namely biomass data and length frequency distributions standardised to the level of Geographical Subarea 15.

1.6.1 MSFD criteria and indicators

The MSFD criteria and indicators stipulated by the MSFD Commission Decision 2010/477/EU for Descriptors 1 and 3 are deemed relevant for the assessment of status of fish populations. However, given that status is being defined at the level of the functional group, this assessment is mainly based on Indicators 1.6.1 (Condition of the typical species and communities) and 1.6.2 (Relative abundance and/or biomass as appropriate). On the other hand, the definition of status in terms of these two indicators builds on the outcome of the application of indicators at the species level for the selected representative species, particularly indicator 1.2 (Population abundance and/or biomass, as appropriate). The application of the MSFD indicators at species and functional group level is outlined in Table 3.

The application of MSFD Indicators 1.3.1 (Population demographic characteristics – body size structure) and indicators 3.3.1-3.3.3 related to fish population age and size distribution was dictated by the type of biological parameters collected as part of the MEDITS survey. These indicators could thus be only applied to MEDITS target species for which length data is collected.

Indicators 3.3.1-3.3.3 were applied to MEDITS target species for the purposes of MSFD Descriptor 3 (*Population 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*) and were mainly used to assess status of the pressure 'extraction of species' as listed in Annex III of the Directive. The outcome of this analysis is included in Annexes IV-VI to this report and would provide further information with respect to the health status of representative MEDITS target species. The assessment of status of the fish populations should thus be read in conjunction with the MSFD Initial Assessment report on 'extraction of species' and analysis therein.

[8] 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.

The interpretation of the results of the application of the MSFD indicators, should acknowledge the limitations of the analysis. Such limitations are mainly related to the fact that the application of the MSFD indicators did not factor in the biology of the selected species and their spatial and temporal distribution. The MEDITS surveys are restricted to 45 stations within Geographical Sub-area 15. Therefore the data collected through such surveys may not be representative of the whole population of species of which distribution may extend beyond the sampled area. Furthermore, the stations sampled may not be covering all the areas occupied by the different life stages of the species in question. Given that the MEDITS surveys take place during the summer season, the available dataset may not be reflecting seasonal fluctuations in species' populations.

1.6.2 Assessment Area

The 'assessment area' for fish populations reflects the extent of the MEDITS survey, since such assessment is based on the data generated by this survey. In this regard, the assessment area is equivalent to Geographical sub-area 15.

Table 3: Application of the MSFD Criteria and Indicators for Descriptors 1 for assessment of 'Demersal fish' and 'Demersal teleosts'

Descriptor	Criterion	Indicator	Application of MSFD Indicators	Results
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 climate conditions.*	1.2 Population Size	1.2.1 Population abundance and/or biomass, as appropriate	This indicator was applied to: ▪ 10 individual species deemed representative of 'demersal fish' within the 50m-200m depth zone ▪ 10 individual species deemed representative of 'demersal fish' within the 200m-800m depth zone ▪ 10 individual species deemed representative of 'demersal elasmobranchs' within the 200m-800m depth zone ▪ 10 individual species deemed representative of 'demersal elasmobranchs' within the 200m-800m depth zone	Annex I to this report (trends in biomass)
	1.3 Population Condition	1.3.1 Population demographic characteristics – body size structure	This indicator was applied to 9 MEDITS target teleost species and 13 MEDITS target elasmobranch species deemed representative of the demersal assemblages. The results include Length frequency distributions for each species based on MEDITS abundance data for the 50-800m depth zone standardised at the level of Geographical subarea 15. Means of four year periods, 2005-2008 and 2009-2012 were used with a view to avoid fluctuations due to the life cycles of the species.	Annex II to this report (size-class structure per species)
	1.6 Habitat Condition	1.6.1 Condition of the typical species and communities	This indicator follows from indicator 1.2.1 and is based on the interpretation of trends in biomass of representative species for 'demersal fish' and 'demersal elasmobranchs' which would reflect trends in species composition (and biomass) throughout the sampling period 2005-2012 and hence status at the functional group level.	Annex I to this report (trends in biomass)
		1.6.2 Relative abundance and/or biomass as appropriate.	Indicator follows from indicator 1.2.1, based on which relative biomass was worked out for 'demersal fish' and 'demersal elasmobranchs' at the two depth zones under consideration for same species. This indicator would reflect status at the functional group level.	Annex III to this report.

1.6.3 Status – Demersal Fish (or teleosts)

Biomass of the majority of selected demersal fish within the two depth zones (Annex I to this report) fluctuates throughout the sampling period 2005-2012 without any evident trends. The only species which seems to show a relatively steady decline in biomass during the period 2006-2012 is *Gadiculus argenteus* in depth zone 200m-800m. However such declining trend would need to be confirmed through longer-term data.

A preliminary analysis of trend-lines superimposed on the biomass bar-charts however indicates some trends, which although in most cases are not pronounced, imply slight declines or increases for the biomass of specific species as indicated in Table 4. The significance of such trends is questionable, especially due to the generally pronounced fluctuations in biomass across the sampling period. Further long-term data is thus required to confirm such trends.

Since length data is collected for the MEDITS target species, size-class analysis in terms of MSFD Indicator 1.3.1 (Population Demographic characteristics) can shed light with respect to the population condition of target species showing a decline in biomass throughout the sampling period. The size-class analysis (Annex II to this report) was carried out for two periods represented by a span of four years (2005-2008 and 2009-2012) across both depth zones.

For *Helicolenus dactylopterus* and *Trachurus trachurus* the decline in biomass can be observed in terms of lower abundances across length classes for the 2009-2012 period. *Merluccius merluccius* (which shows a decline in biomass only within the deeper zone as opposed to an increase in the shallower zone) shows the opposite trend, with an observable increase in abundance across length classes for the 2009-2012 period. For all three species the size class distribution shows a predominance of smaller individuals for both time periods under consideration. While healthy populations are expected to be characterized by a high proportion of large individuals (as per MSFD Commission Decision 2010/477/EU), there is no evidence of deterioration in the health status of these species' populations, since the predominance of smaller individuals is observed for both time periods. It is interesting to note however that the outcome of Indicators 3.3.1 – 3.3.3 (Annexes IV-VI to this report) also reflected a potentially unhealthy status for *Merluccius merluccius* and *Helicolenus dactylopterus*. These results might be due to a sampling artefact, whereby the MEDITS surveys might not be collecting samples which are representative of the whole population of these species (for example excluding areas characterized by adult individuals). Interpretation of these results should ideally take into consideration the natural spatial and temporal distribution of the species.

The size class distribution of *Spicara flexuosa* on the other hand seems to confirm the decline in biomass, reflected as a lower abundance for length frequency distribution in the 2009-2012 period. However the abundance is more normally distributed along the length

classes for the latter period, as opposed to the curve being skewed towards smaller individuals in the 2005-2008 period. These results should therefore be interpreted with caution and further long-term data would be required to confirm any trends.

All selected teleost species are constantly present in the MEDITS hauls throughout the sampling period under consideration. Therefore it can be safely stated that species composition is stable and that the status at the functional group level in terms of Indicator 1.6.1 - Condition of the typical species and communities can be considered to be 'good'. Such status however cannot be confirmed in terms of trends in biomass of the representative species and would need to be re-affirmed through longer-term data.

With respect to relative biomass (Indicator 1.6.2), there are no evident patterns in this parameter for demersal teleosts within the 50m-200m depth zone. However demersal teleost assemblages in the deeper zone are clearly dominated by *Chlorophthalmus agassizi* followed by a fluctuating predominance of *Peristedion cataphractum*, *Coelorhynchus coelorhynchus*, *Gadiculus argenteus*, *Merluccius merluccius* in the period 2005-2008 and of *Coelorhynchus coelorhynchus*, *Peristedion cataphractum* and *Phycis blennoides* during the 2010-2012 period. The rest of the species have a relatively low biomass when compared to these species.

However such pattern is not constant throughout the sampling period and no conclusions can be drawn from these results. As a consequence, status in terms of relative biomass is uncertain and further information is required to understand the dynamics of demersal teleosts also in terms of the ecosystems functions.

Table 4: Trends in biomass for demersal teleosts within the two depth zones under consideration. Species are ranked in terms of representativity (based on abundance, biomass and expert judgement) of the demersal fish assemblages associated with the two depth zones. MEDITS target species are in bold, while species represented in both depth zones are highlighted.

Species (code)	Overall trends in biomass
Depth Zone: 50m-200m	
***Trachurus trachurus* (TRACTRA)**	Decline
Macrorhamphosus scolopax (MACOSCO)	Decline
***Mullus barbatus* (MULLBAR)**	Stable
***Merluccius merluccius* (MERLMER)**	Increase
***Zeus faber* (ZEUSFAB)**	Increase
Argentina sphyraena (ARGESPY)	Decline
***Mullus surmuletus* (MULLSUR)**	Increase
***Spicara flexuosa* (SPICFLE)**	Decline
Lepidotrigla cavillone (LEPTCAV)	Decline
Serranus cabrilla (SERACAB)	Stable
Depth Zone: 200m-800m	
Chlorophthalmus agassizi (CLORAGA)	Stable
Nezumia aequalis (NEZUSCL)	Stable
Hoplostethus mediterraneus (HOPLMED)	Stable
***Phycis blennoides* (PHYIBLE)**	Increase
***Merluccius merluccius* (MERLMER)**	Decline
***Helicolenus dactylopterus* (HELIDAC)**	Decline
Gadiculus argenteus (GADIARG)	Decline
Coelorhynchus coelorhynchus (COELCOE)	Decline
Peristedion cataphractum (PERICAT)	Increase
***Lophius budegassa* (LOPHBUD)**	Stable

1.6.4 Status – Demersal Elasmobranchs

As for demersal teleosts, the biomass of the demersal elasmobranchs fluctuates throughout the sampling period without any evident trends. Peaks in biomass are evident for *Etmopterus spinax*, *Chimaera monstrosa*, *Raja oxyrhincus*, *Heptranchias perlo* and *Raja circularis* in 2009 for the 200m-800m depth zone. However, given the significant difference in biomass when compared to the rest of the sampling period, these peaks were attributed to a sampling artefact and were not included in below analysis.

Trend-lines superimposed on the biomass bar-charts indicate that most of the species show a stable or an increasing trend in biomass throughout the years (Table 5). While, the significance of such trends is highly questionable and should be confirmed through longer-term trend data, they imply stability of demersal elasmobranchs through time.

As per above data analysis for teleosts, the size-class structures of MEDITS target species which seem to show a decline in biomass throughout the sampling period can shed light with respect to the population condition in terms of MSFD Indicator 1.3.1 (Population Demographic characteristics). Size class structure for *Heptranchias perlo* shows additional (rather than a shift towards) smaller individuals in the period 2009-2012, while the mean maximum length of this species (indicator 3.3.2) also shows a slight decline throughout the years. However this data cannot be interpreted with certainty in view of the very low abundance of this species in MEDITS hauls.

The size-class structure of *Etmopterus spinax* shows a shift towards larger individuals in the period 2009-2012 period. The same species showed an increasing trend in the length class at which the 95^{th} percentile of cumulative abundance occurs (2007-2009-2010-2011). Once again, these results should be interpreted with caution in view of the relatively low abundance of this species in MEDITS hauls.

In terms of species composition, not all species were present throughout the whole sampling period. However once again this could be due to a sampling artefact and species composition appears to be more stable during the more recent years (2007-2012).

Based on the above data interpretation, the status of demersal elasmobranchs in terms of Indicator 1.6.1 - Condition of the typical species and communities is deemed to be ‘good’ in view of the stability in both species composition and trends in biomass throughout the sampling period.

Table 5: Trends in biomass for demersal elasmobranchs within the two depth zones under consideration. Species are ranked in terms of representativity (based on abundance, biomass and expert judgement) of the demersal fish assemblages associated with the two depth zones. MEDITS target species are in bold, while species represented in both depth zones are highlighted.

Species (code)	Overall trends in biomass
Depth Zone: 50m-200m	
***Scyliorhinus canicula* (SCYOCAN)**	Increase
***Raja miraletus* (RAJAMIR)**	Stable
***Raja clavata* (RAJACLA)**	Increase
***Mustelus mustelus* (MUSTMUS)**	Increase
***Mustelus asterias* (MUSTAST)**	Increase
Oxynotus centrina (OXYCEN)	Increase
Dasyatis pastinaca (DASIPAS)	Decline
***Torpedo marmorata* (TORPMAR)**	Stable
***Squalus blainvilei* (SQUABLA)**	Increase
***Raja oxyrhincus* (RAJAOXY)**	Increase
Depth Zone: 200m-800m	
***Galeus melastomus* (GALUMEL)**	Increase
***Etmopterus spinax* (ETMOSPI)**	Decline (excl. 2009 peak)
Chimaera monstrosa (CHIMMON)	Stable (excl. 2009 peak)
***Raja oxyrhincus* (RAJAOXY)**	Increase (excl. 2009 peak)
***Scyliorhinus canicula* (SCYOCAN)**	Stable
***Raja clavata* (RAJACLA)**	Stable
***Squalus blainvilei* (SQUABLA)**	Increase
***Heptranchias perlo* (HEPTPER)**	Decline (excl. 2009 peak)
***Raja circularis* (RAJACIR)**	Increase (excl. 2009 peak)
***Raja melitensis* (RAJAMEL)**	Increase

In terms of relative biomass (indicator 1.6.2) demersal elasmobranchs in the 50-200m depth zone are dominated by *Raja clavata* and *Scyliorhinus canicula* in the period 2008-2012. *Dasyatis pastinaca* on the other hand constituted the dominant species in 2005-2006 for the same depth zone. For the deeper zone (200m-800m), *Raja clavata* and *Raja oxyrhincos* predominated throughout most of the sampling period, although *Galeus melastomus*, *Squalus blainvillei* and *Scyliorhinus canicula* are also deemed to be important in terms of relative biomass. Given the strong fluctuations in relative biomass of the different species throughout the sampling period, no concrete conclusions can be drawn from the current datasets and status in terms of relative biomass is uncertain. Such data should be analysed in relation to ecosystem functions, data on which is currently limited, thus limiting the extent to which the outcome of such analysis can be interpreted.

1.7 Data Gaps

Data gaps are mainly in relation to the fish functional groups as defined by the MSFD Commission Staff Working Paper, other than the 'Demersal fish' and 'Demersal Elasmobranchs', on which data with respect to species representative of such groups is either very limited or completely lacking.

With respect to 'Demersal fish' and 'Demersal Elasmobranchs', data limitations are mainly due the fact that the main source of data for these two functional groups, the MEDITS surveys, are focused on target species which have an existing or potential commercial value. Other non-target species for which biological parameters are not measured as per the MEDITS protocol may also be representative of the functional groups in question.

Furthermore, an analysis carried out on the basis of the data collected by MEDITS should ideally be carried out in the knowledge of ecosystem functions and the spatial and temporal distribution of the selected species. Such knowledge is currently limited, thus also limiting the interpretation of the results of this analysis.