Extraction of species: Fisheries

1.1 Introduction

The EU Marine Strategy Framework Directive (2008/56/EC – hereinafter referred to as 'MSFD') calls for the assessment of pressures and impacts on the marine environment as listed in Table 2 of Annex III of the Directive. The selective extraction of species by commercial and recreational fishing constitutes one of the pressures to be assessed. Such assessment should be undertaken in relation to MSFD Descriptor of Good Environmental Status in terms of commercially exploited fish (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*).

This report endeavours in fulfilling the requirements of the Directive for the assessment of the Fisheries sector, to the extent possible, on the basis of existing data. For this purpose, this report provides a brief description of the Maltese fisheries, including the Maltese fishing fleet, with a view to provide a description of the level of this pressure in the marine environment, together with an assessment of the impacts of the fisheries sector on marine biodiversity and on the commercially exploited fish stocks.

1.2 Regulation and Management of Maltese Fisheries

This section provides a brief description of the most relevant national, regional and international legal instruments providing the basis for the regulation and management of fisheries in Malta.

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 marine organisms [Article 38(2) h].

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. They 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.

Malta is thus required to conduct an annual National Fisheries Data Collection Programme (NFDCP), in line with Council Regulation 199/2008 and Commission Decision 2008/949/EC. The fisheries independent surveys are carried out through the Mediterranean International Bottom Trawl Survey (MEDITS), an annual summer sampling survey carried out in the Geographical Sub-Area 15 (GSA15). Sampling using the MEDITS standard gear is performed at 45 selected stations at a depth ranging from 45 - 800 m. Through this survey, data is collected on abundance and biological aspects of MEDITS target species, including teleosts, elasmobranchs, crustacea and cephalopods.

*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 The Maltese 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. The social and cultural importance of the Maltese fishing industry far outweighs its negligible economic contribution to the national Gross Domestic Product (GDP).

1.3.1 The Maltese Fishing Fleet (2012)

As of 2012, the Maltese fishing fleet is composed of 3,015 fishing vessels. The registered vessels are classified in four categories[1] according to their type of operation:

- 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.

Out of the total number of registered fishing vessels, professional fishing vessels operating on a full-time basis (MFA category) account for 12.8% and professional fishing vessels operating on a part-time basis (MFB category) account for 21.8%. The largest percentage of registered fishing vessels, accruing to 64.2% of the fleet, are non-commercial fishing vessels (recreational) and amount to 1936 vessels. Auxiliary work boats engaged in fishing operations constitute only 1.2%, of the registered fishing fleet. Table 1 illustrates the distribution of vessels per category.

Table 1: Vessels per category[2]

Vessel Category	Number of Vessels	Active	Non-Active	%
MFA	386	378	8	12.8%
MFB	658	650	8	21.8%
MFC	1936	1900	36	64.2%
MFD	35	35	0	1.2%
TOTAL	**3015**	**2963**	**52**	**100.0%**

[1] These categories are stipulated in L.N. 407 of 2004, as amended by Legal Notice 426 of 2007

[2] Source: Vessel Register Database

The Maltese fishing fleet is composed of different types of vessels, which target a variety of species and operate within different ranges from the coast. These include a variety of traditional types of crafts, namely the *'luzzu', 'kajjik', 'firilla'* and the *'bimbu'*, which collectively account for 56% of the national fishing fleet. Trawlers and multi purpose vessels, account for 0.8% and 43.2% of the Maltese fishing fleet respectively. Table 2 indicates the distribution of the Maltese fleet by type and length. The length of the vessels ranges from 3 to 37.7m, with 93.6% of the vessels being less than 10m in length and the remaining 6.4% being 10m or longer.

Table 2: Distribution of the Maltese fleet by type and length (Source: Vessel Register Database)

Code	Vessel Type	<10	>=10	Total
3000	Trawlers/Trawler	0	23	23
88000	Multipurpose/MPV	1170	130	1300
98000	Other fishing vessels/Other	352	25	377
98001	Other fishing vessels/Luzzu	284	14	298
98002	Other fishing vessels/Kajjik	947	0	947
98003	Other fishing vessels/Firilla	21	0	21
98004	Other fishing vessels/Bimbu	41	0	41

1.3.2 Target species

The Maltese capture fisheries are described as multi-species and multi-gear fisheries, whereby fishers switch between fishing gears several times throughout the year. As such the Maltese fleet is known to land a variety of species, often exceeding 80 species in number. The total annual landings for 2011[3], reached 1,185 tons, accruing 6,175,103.

The majority of these landings (68% of the total landings) consisted of 7 species, namely shrimp, stone bass, dolphin fish, dogfish, swordfish, bluefin tuna and bogue. The second quarter of 2011 was also characterised by a peak in landings of mackerel (10.3% of total landings). The remainder 32% was composed of other miscellaneous species. Table 3 provides a breakdown of the fish landings for 2011.

[3] Official data on fish landings is provided by the National Statistics Office. [Online] Available at: http://www.nso.gov.mt/themes/theme_page.aspx?id=52#newsreleases

Table 3: Fish Landings for the year 2011[4]

Species	**2011** (tons)	%
Shrimp	41.8	3.5%
Stone Bass	9.4	0.8%
Dolphin fish	194.0	16.4%
Dogfish	27.0	2.3%
Swordfish	306.6	25.9%
Blue-fin Tuna	81.2	6.9%
Bogue	22.9	1.9%
Mackerel	121.9	10.3%
Others	377.9	32.0%
Total	1,182.7	100.0%

1.3.3 Fishing gears

This section provides a brief description of the main type of fishing gears employed by the Maltese Fisheries sector.

Malta has submitted 'Fisheries Management Plans' for three types of fisheries (Lampuki FAD fishery, 'Lampara' fishery and bottom otter trawling) 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. Information on these fishing gears provided in this report is extracted from the management plans prepared by the Fisheries Control Directorate. More detailed information also in relation to fishing effort can be viewed at: **http://vafd.gov.mt/fish_con?l=1**

Lampuki FAD fishery

The fishery targeting dolphin fish (*Coryphaena hippurus*), which uses fish aggregating devices[5] (FADs) or *kannizzati* as these are locally known, opens in mid August and runs till the end of December or into January. This fishing gear consists of floating rectangular structures anchored to the bottom by means of limestone blocks. Attached to the floating structure are palm fronds which provide a shaded area and attracts fish. These FADs are distributed along transects around the Maltese Islands. Fishing authorisations for a maximum of 130 vessels with a set FAD trajectory per vessel are issued on an annual basis in accordance with Council Regulation 1967 of 2006.

[4] Source: National Statistics Office

[5] A free floating or anchored structure constructed out of palm fronds and/or polystyrene, which is deployed by fishermen to attract schools of fish (GFCM)

Lampara fishery

The 'Lampara' fishery is a type of pelagic fishing which targets species of mackerel and mackerel like fish (*Scomber japonicus*, *Trachurus* spp., *Sarda sarda*), sardinella (*Sardinella aurita*), anchovy (*Engraulis encrasicolus*), bogue (*Boops boops*) sardine (*Sardina pilchardus*) and barracuda (*Sphyraena sphyraena*). Lampara fishery uses strong lights to attract fish which are then caught by purse seining. This type of fishing takes place off the Northern coast of the archipelago but is mainly used in an area located 11.5km to the Southeast of the Maltese Islands (Hurd Bank). As at December 2012, 18 vessels were licensed to practise this type of fishing, with the majority of vessels being artisanal in nature (multi-purpose) and one with a length of 27m.

Trawling

Bottom trawling, which is the towing of a net along the bottom, is operational all year round in Malta. This fishery occurs over trawling grounds of different depths, fished at particular times of year and targeting specific species. Different types of trawling activities are undertaken as summarised below:

- Deep sea trawling during the day and night targeting red shrimps (*Aristaeomorpha foliacea* and to a lesser extent *Aristeus antennatus*). This trawling mainly takes place about 13km off Northwest Malta.
- Trawling in depths of around 200m during the day and close to the land targeting white shrimps (*Parapenaeus longirostris*), hake (*Merluccius merluccius*), red mullet (*Mullus barbatus*), octopus (*Octopus vulgaris*), squid (*Illex coindetti*), cuttlefish (*Sepia officinalis*) and marketed by-catches of dogfish, spotted dogfish, skate and rays (*Raja* spp.), bogue (*Boops boops*) and scad (*Trachurus trachurus*).
- Trawling in depths between 50-150m during the night targeting red mullet (*Mullus barbatus*), comber (*Serranus cabrilla*), Pandora (*Pagellus* spp.), squid (*Illex coindetti*), cuttlefish (*Sepia* spp.) and weaver (*Trachinus* spp.). This type of trawling is undertaken all along the Northern side of the island but the main zone is located 11.5km to the Southeast of the Maltese Islands (Hurd Bank)

23 trawlers are currently licensed to operate on a full-time basis, 12 of which can operate within the 25 nautical mile Fisheries Management Zone. These 12 boats have an overall tonnage of 1056GT and a total main engine power of 3700kW

Longlining

Other fisheries employing longlines[6], target blue-fin tuna (*Thunnus thynnus thynnus*), swordfish (*Xiphias gladius*) and some bottom dwelling species. The tuna season is considerably short in its duration and is closed once the quota assigned is reached.

[6] A number of connected lines either set at the bottom or drifting, each bearing a large number of baited hooks. A static or drifting fishing gear made up of a main line and secondary lines (branch lines) bearing each one a hook. These may be set or anchored to the bottom (bottom longline, anchored line) or close to the surface (drifting or anchored). (GFCM)

On the other hand the fishery targeting swordfish is carried throughout the year with the exception of October, November and March (closed season for swordfish fisheries). During the dolphin fish season, fishers targeting swordfish have access to a stretch of sea known as the "swordfish corridor", which is kept free from FADs.

During the winter months, bottom longlining targeting high quality fish such as the common seabream (*Pagrus pagrus*) and groupers (*Epinephelus* spp.) is the main activity.

Another category of fishing vessels known as Multi-Purpose Vessels (MPVs) carry out multi-gear fisheries and are active all year round by shifting from one gear to another.

1.4 Economic Valuation of the Fisheries Sector

The fisheries sector was assessed as part of the MSFD economic and social analysis together with the aquaculture sector (NACE code 3). The outcome of the economic assessment is provided in Table 3 which lists various economic indicators for this sector for the period between 2006 and 2012.

The average production value (2006-2012) of this sector (together with the aquaculture sector) is €94.6 million, with an employment in full time equivalents of 913 and average gross-value added of €19.6 million (approximately 0.3% of the Maltese Gross Domestic Product). Between 2006-2012, the Gross-Value added of the Fisheries sector declined by an average of 8.5% p.a. with an average annual increase in employment of 1.6%.

Table 4: Economic indicators for NACE code 3 (Fisheries and Aquaculture) for the period 2006-2012 as extracted from the MSFD Economic and Social Analysis[7]. FTE employment is measured in number of persons. Other variables are in €000s

	NACE Code: 3							
	2006	2007	2008	2009	2010	2011	2012	Average Growth
FTE Employment	845	885	899	959	944	928	928	1.6%
Output	94,924	140,489	99,298	90,267	71,690	60,996	104,599	1.6%
Intermediate Consumption	64,872	107,662	89,806	76,091	52,090	47,694	86,925	5.0%
Gross Value Added	30,052	32,827	9,492	14,176	19,600	13,302	17,674	-8.5%
Gross Operating Surplus	24,454	26,408	3,184	6,600	12,300	6,575	11,092	-12.3%
Compensation to Employees	5,395	6,152	5,954	7,188	6,892	6,415	6,987	4.4%
Proportion of Sector Activity Depending on Marine Environment	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	

	Estimated Economic Activity Dependent on the Marine Environment							
	2006	2007	2008	2009	2010	2011	2012	Average Growth
FTE Employment	845	885	899	959	944	928	928	1.6%
Output	94,924	140,489	99,298	90,267	71,690	60,996	104,599	1.6%
Intermediate Consumption	64,872	107,662	89,806	76,091	52,090	47,694	86,925	5.0%
Gross Value Added	30,052	32,827	9,492	14,176	19,600	13,302	17,674	-8.5%
Gross Operating Surplus	24,454	26,408	3,184	6,600	12,300	6,575	11,092	-12.3%
Compensation to Employees	5,395	6,152	5,954	7,188	6,892	6,415	6,987	4.4%

1.5 Pressures and Impacts of the Fisheries Sector

The fisheries sector is a source of environmental pressures and impacts on the marine environment. Such impacts include the disruption of the seabed by some fishing activities such as trawling and associated benthic communities and the depletion of both target species population and other species which are incidentally caught by fisheries (by-catch).

1.5.1 Impacts on the Benthic Environment

As indicated by De Juan *et al.* (2011)[8], amongst others, the impact of demersal fishing, especially that caused by towed fishing gears, on the benthic habitats and ecosystems has been widely documented in numerous studies. Impacts associated with towed fishing gears include the scarring of the seabed, with the consequent degradation and destruction of benthic habitats, disruption of ecosystems and changes to the structure and composition of benthic communities.

[7] Adi Associates, E-Cubed Consultants & Ecoserv Ltd (AEE Consortium): A report on the economic and social analysis of the use of the marine waters and of the costs of degradation of the marine environment as defined by the MSFD, stating assumptions and sensitivity of analysis and integration of this report in the MSFD Initial Assessment. ERDF156 - Developing national environmental monitoring infrastructure and capacity.

[8] De Juan, S., Monsterrat, D. & Sanchez, P. 2011. Exploring the degree of trawling disturbance by the analysis of benthic communities ranging from a heavily exploited fishing ground to an undisturbed area in the NW Mediterranean. *Scientia Marina;* 75(3): 510-516

EC Regulation 1967 of 2006 prohibits the use of towed fishing gear on *Posidonia oceanica*, coralligenous habitats, mäerl beds and corals. The trawlable areas in Malta set by the same regulation are located on shelf and upper bathyal sublittoral sediments mainly characterised by coarse silt. Trawling in Malta therefore excludes areas characterised by *Posidonia oceanica* meadows and other sensitive habitats. Some of the trawling zones as per the said regulation coincide with bottoms where maerl beds have been documented. The Maltese Authorities have thus prohibited trawling activity in these areas. Further studies are underway to enhance knowledge about the distribution of maerl beds within the Malta Fisheries Mangement Zone. Malta's Fisheries Management Plans indicate that the Maltese authorities are currently studying the possibility of relocating part of the 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.

In terms of changes to benthic community structures, Dimech *et. al.* (2008)[9] describe differences in demersal communities within the Fisheries Management Zone (FMZ) where trawling activities are controlled, and outside this zone. On the basis of a total of 189 species (26 elasmobranchs, 111 teleosts, 26 decapods and 26 molluscs) characterising four distinct assemblages associated with four depth strata (outer shelf - 83-166m; shelf break - 140-230m; shallow slope - 270-440m; deep slope - 466-701m), significant differences in the biomass index were detected between the stations inside and outside the FMZ. Two outer shelf assemblages located within and outside the Fisheries Management Zone were also 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)[10] also indicate that fishing disturbance may cause shifts in benthic community structure, primarily affecting non-target species with consequent effects on the trophic groups within the communities.

[9] 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

[10] 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

1.5.2 Impacts on Commercial Species

The fisheries sector, targets a number of species, which are fished for direct human consumption or are destined for fishmeal[11]. Whilst noting that such target/commercial species have a normal or background mortality rate, these species face an additional mortality rate due to the fishing effort[12].

Fishing Mortality (MSFD criterion 3.1)

Fish stock assessments are conducted to determine if fish stocks are being sustainably exploited or otherwise. One indicator for fish stocks is 'Fishing mortality' which reflects the mortality of a target fish stock due to the fishing effort applied to it. The fish stocks exploited by Maltese fisheries show a wide spatial distribution and are shared with other countries. Within this context, and as also specified by STECF (2013)[13], stock assessments at a local scale would not have any weighting. In order for stock assessments of shared fish stock to be meaningful, these would need to be carried out at a regional scale.

Within this context, this report is referring to the stock assessments carried out by STECF[14] at a sub-regional scale on the basis of data provided by the Mediterranean countries. Such stock assessments are only available for a few stocks and are outlined in Table 5. The species assessed are all considered to be exploited unsustainably by STECF, however it should be noted that the Maltese contributions to the overall landings are generally low.

In addition to the species listed in Table 5, STECF also provide an assessment of the Thornback ray (*Raja clavata*) on the basis of GRUND and MEDITS trawl surveys carried out between 2002-2009 in GSA 15. This preliminary assessment indicates that the stock of *R. clavata* is overexploited.

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[11] Fishmeal is a commercial fisheries product made from fish, fish bones and offals from processed fish. It is a brown powder or cake obtained by drying the fish or fish trimmings, often after cooking, and then grinding it.

[12] The EU provides the following definition of fishing effort 'Fishing effort is calculated by multiplying the fishing capacity deployed by the period of time for which it is active. The EU uses two ways of measuring fishing capacity, one based on the size of the boat in gross tonnes, the other on the power of its engines in kilowatts. Effort limits are then set either as GT/days or KW/days.' [Online] Available at: http://ec.europa.eu/fisheries/cfp/fishing_rules/fishing_effort/index_en.htm

[13] Scientific, Technical and Economic Committee for Fisheries (STECF). 43rd Plenary Meeting Report (PLEN-13-02). 2013 Publications Office of the European Union, Luxembourg.

[14] Scientific, Technical and Economic Committee for Fisheries (STECF). Review of Scientific Advice for 2013. Consolidated Advice on Fish Stocks of Interest to the European Union (STECF-12-22)

Table 5: Fishing Mortality ($F_{current}$) as calculated at sub-regional level by STECF[15]

Species	$F_{current}$	$F_{MSY} = F_{0.1}$ (reference point as proposed by STECF)	Area	Year of stock assessment	Maltese contribution to total landings
Merluccius merluccius	1.12	0.15	GSA 15 & 16	2010	0.7% (2009)
Aristaeomorpha foliacea	1.09[16]	0.4[17]	GSA 15 & 16	2011	2% (2010)
Parapenaeus longirostris	1.21	0.95	GSA 12-16	2010	0.2% (2010)
Pagellus erythrinus	0.72	0.3	GSA 15 & 16	2012	3% (2006-2011)
Mullus barbatus	1.3	0.45	GSA 15 & 16	2012	1% (2005-2011)
Lophius budegassa	0.3[18]	0.16	GSA 15 & 16	2012	1.6% (2006-2011)

Stock assessments of large pelagics exploited by Maltese fishers, namely the Atlantic bluefin tuna (*Thunnus thynnus thynnus*) and the swordfish (*Xiphias gladius*) are carried out at a regional scale by the International Commission for the Conservation of Atlantic Tunas (ICCAT). The 2011 Fishing mortality ($F_{2011}/F_{0.1}$) of the Atlantic bluefin tuna for the East Atlantic and Mediterranean was calculated as 0.7 and 0.36 on the basis of the reported catch and an inflated catch scenario respectively, both values being below the reference target $F_{0.1}$ (0.1 per year on the basis of reported catch; 0.083 on the basis of the inflated catch). 2012 ICCAT assessments imply that stock status has improved in comparison to previous assessments, with a decline in fishing mortality for both younger and older fish and an increase in Spawning Stock Biomass[19]. Assessment of Mediterranean swordfish indicates that the stock is below the level which can support Maximum Sustainable Yield and that current fishing mortality slightly exceeds F_{MSY}[20].

Health status of stocks (MSFD criterion 3.3 of Commission Decision 2010/477/EU)

Stock assessments of other commercial species are not available at a regional scale. Given such data limitations, this report attempts the application of MSFD indicators 3.3.1-3.3.2 for criterion 3.3 (Population Age and Size Distribution) with a view to, to the extent possible, provide a holistic assessment of the Fisheries' status in line with the requirements of the MSFD. The application of these indicators would provide an indication of the health status of commercially exploited species, which status would be negatively affected through unsustainable fisheries.

This analysis is based on the data generated by the MEDITS surveys for a selection of MEDITS target species standardised to the level of Geographical Sub-Area 15. The selection of species for the application of MSFD indicators 3.3.1-3.3.3 follows from the selection of

[15] Scientific, Technical and Economic Committee for Fisheries (STECF). Review of Scientific Advice for 2013. Consolidated Advice on Fish Stocks of Interest to the European Union (STECF-12-22)

[16] This applies to the female part of the stock only

[17] This applies to the female part of the stock only

[18] This is an approximate value based on a VIT analysis

[19] http://www.iccat.int/Documents/SCRS/ExecSum/BFT_EN.pdf

[20] http://www.iccat.int/Documents/SCRS/ExecSum/SWO-MED_EN.pdf

species which are representative of the 'Demersal Fish' and 'Demersal Elasmobranchs' carried out for assessing the 'Fish' functional group for the purposes of Descriptor 1 of the MSFD.

The top ten teleosts and top ten elasmobranchs ranked in terms of abundance and biomass for two depth strata (50-200m and 200-800m) 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 demersal assemblages for the two depth strata. The final selection of species included MEDITS target species for which biological data is collected, hence, for which application of MSFD indicators 3.3.1-3.3.3 was possible. These indicators were also applied to three crustacean species of commercial importance in Malta. The list of MEDITS target species used in this analysis is included in Table 6.

Table 6: List of MEDITS target species deemed representative of the Maltese demersal assemblages for which MSFD Indicators 3.3.1-3.3.3 were applied.

Species	Code
Teleosts	
Helicolenus dactylopterus	HELIDAC
Lophius budegassa	LOPHBUD
Merluccius merluccius	MERLMER
Mullus barbatus	MULLBAR
Mullus surmuletus	MULLSUR
Phycis blennoides	PHYIBLE
Spicara flexuosa	SPICFLE
Trachurus trachurus	TRACTRA
Zeus faber	ZEUSFAB
Elasmobranchs	
Etmopterus spinax	ETMOSPI
Galeus melastomus	GALUMEL
Heptranchias perlo	HEPTPER
Mustelus asterias	MUSTAST
Mustelus mustelus	MUSTMUS
Raja circularis	RAJACIR
Raja clavata	RAJACLA
Raja melitensis	RAJAMEL
Raja miraletus	RAJAMIR
Raja oxyrhincus	RAJAOXY
Scyliorhinus canicula	SCYOCAN
Squalus blainvillei	SQUABLA
Torpedo marmorata	TORPMAR
Crustacea	
Aristaeomorpha foliacea	ARISTFOL
Nephrops norvegicus	NEPRNOR
Parapenaeus longirostris	PAPELON

The results of this analysis are provided in Annexes IV – VI to this report and discussed in the section on 'assessment of status'. However it is important to highlight the limitations of the data analysis as follows:

(i) *Indicator 3.3.1 – Proportion of fish larger than the mean size of first sexual maturation*

In healthy populations, this indicator is expected to reflect a high proportion of 'old' individuals which proportion is stable throughout the years.

This indicator was applied to those target species for which the 'Length at first maturity (L_m)' was available on www.fishbase.org. Such data was only available for ten of the selected species and the quoted L_m does not distinguish between females and males. This is considered to be a significant limitation since the analysis was carried out for males and females combined in the knowledge of the fact that L_m would differ between sexes. Such analysis should be carried out using length at first maturity by sex.

Furthermore, interpretation of the results should take into consideration the temporal and spatial distribution patterns of the species, which were not factored in throughout this analysis and interpretation of data.

(ii) *Indicator 3.3.2 – Mean maximum length across all species found in research vessel surveys*

In healthy populations, this indicator is expected to reflect the predominance of large individuals which is stable throughout the years.

The application of this indicator was based on the raw data collected by the MEDITS surveys from 2005-2012. Limitations are related to the fact that some of the selected species were not consistently abundant/present in the MEDITS hauls throughout the years. In some cases, the abundance was too low to ensure that the calculated mean maximum length is representative of the population of the species. Furthermore, as with indicator 3.3.1, interpretation of the results should take into consideration the temporal and spatial distribution patterns of the species, which were not factored in throughout this analysis

(iii) *Indicator 3.3.3 – 95% percentile of the fish length distribution observed in research vessel surveys*

In healthy populations, this indicator is expected to reflect the predominance of large individuals which is stable throughout the years.

For the purpose of this indicator, the cumulative percentage of the abundance of the selected target species across length classes was plotted for the years 2005-

2012 with a view to compare the 95th percentile of fish length distribution across years. Once again, the interpretation of such data for species which were not consistently abundant in MEDITS hauls might provide an incorrect indication of status based on this indicator.

This analysis should be considered as a preliminary analysis the results of which should be reaffirmed through longer-term data.

1.5.3 Impacts on non-commercial species

Impacts of fisheries on non-commercial species are mainly associated with incidental capture of non-target species or by-catch. The most common by-catches in the Mediterranean involve non-commercial benthic species, but may also involve marine turtles and seabirds. Protected species such as marine turtles may be landed for rehabilitation purposes, however by-catch which does not constitute protected species and which has no economic value is generally discarded.

Discards generated by the Maltese fishing fleet are not significant mainly as a result of quotas being used up. Data on discards is currently collected for bottom otter trawlers targeting demersal species and for drifting longlines targeting large pelagic fish. The amount of discards generated by set longline fishery is negligible, so no discard information is collected for this fishery.

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 crustacea *Aristaeomorpha foliacea*, *Parapenaeus longirostris* and *Nephrops norvegicus*, and the fish *Merluccius merluccius*. Percentage of discards of these species from the total catches in 2009 ranged between 3.1-9.6%. 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 discards of commercial species being negligible. The majority of the non-target by-catch of tuna longline fishery constitutes loggerhead turtles (*Caretta caretta*), which in most cases are released in accordance with current legislation and are only landed for rehabilitation purposes. Incidental capture of marine turtles is in fact considered to be a major threat to this functional group in Malta (reference is hereby made to the MSFD Initial Assessment report on 'Marine Turtles' for further details). The actual extent of the impact of incidental capture on marine turtles needs to be further studied. Data will be available once the new electronic logbook for vessels >12m is in place.

Incidental capture of seabirds from long-lining is also documented by Dimech *et al.* (2008)[21] and Darmanin *et al.* (2010) [22] (reference is hereby made to the MSFD Initial Assessment report on 'Seabirds' for further details).

Data on turtle, seabird and shark by-catch per unit effort of surface and bottom long-lining as reported by fishermen is shown in Figure 1 and Figure 2 respectively for 2008-2011.

[21] Dimech M., Darmanin M., Caruana C., Raine H (2008) Preliminary data on seabird by-catch from the Maltese long-line fishery. ICCAT SCRS/2008/027.

[22] Darmanin, M., Caruana, R. & Dimech, M. 2010. Report on Studies to Investigate Seabird By-Catch by Maltese Fishers. Report by the Capture Fisheries Branch for the EU LIFE Yelkouan Shearwater Project LIFE06 NAT/MT/000097

Figure 1: Birds, turtle and shark by-catch per unit effort (mean per month) of surface long-lining as reported by fishermen. Species were not specified by the dataset. Data provided by the Fisheries Department.

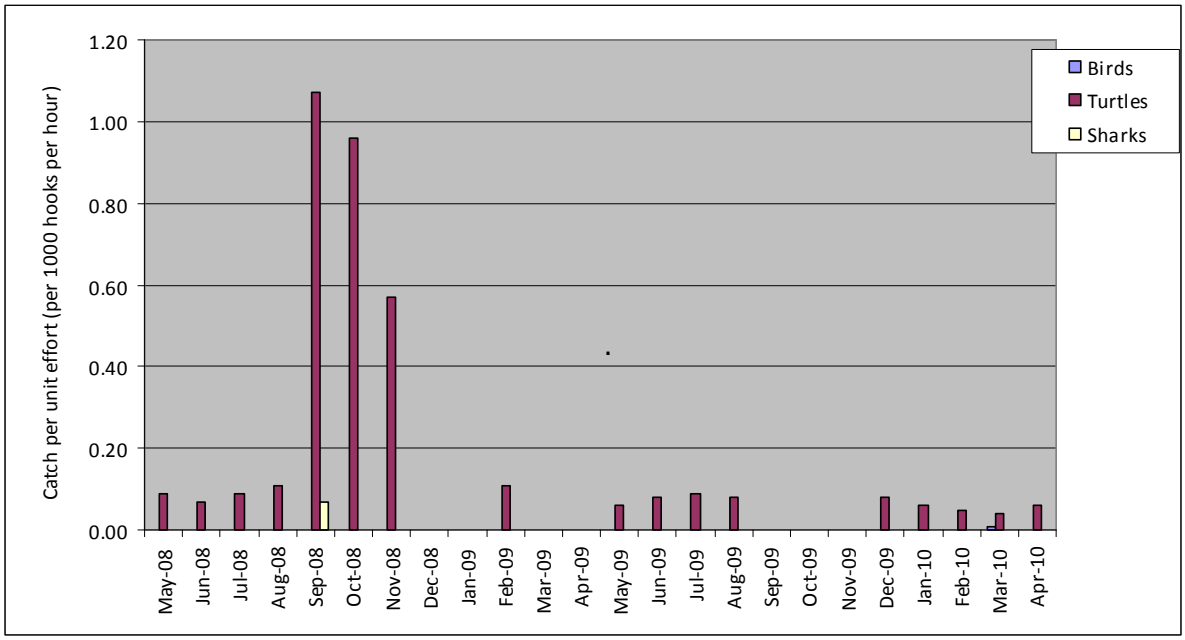
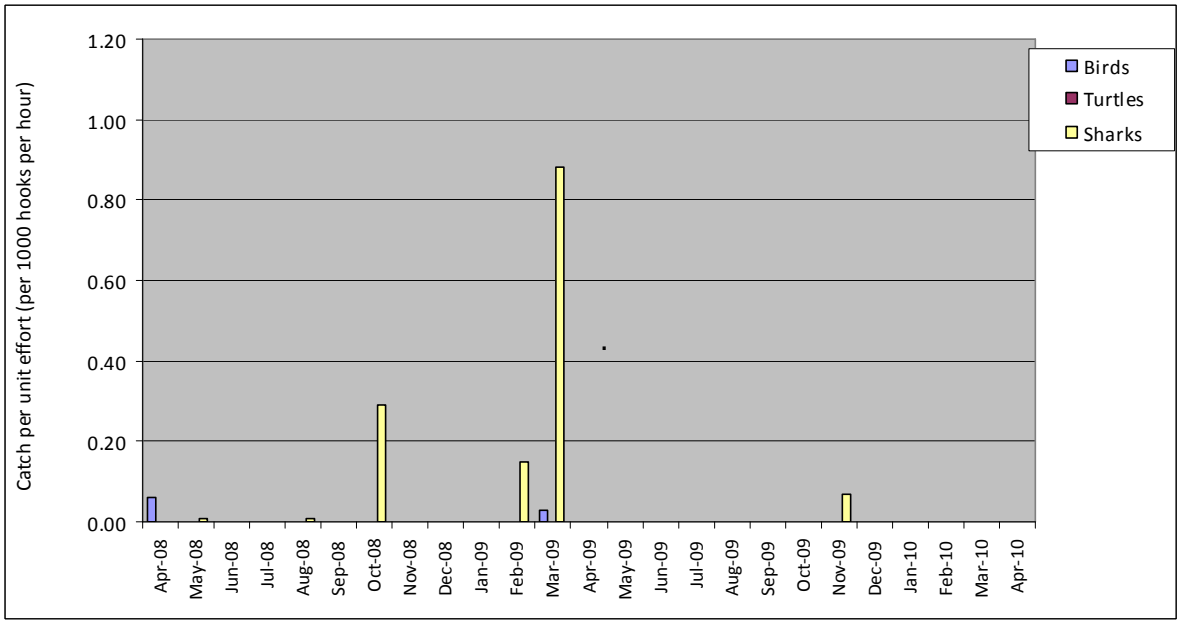


Figure 2: Birds, turtle and shark by-catch per unit effort (mean per month) of bottom long-lining as reported by fishermen. Species were not specified by the dataset. Data provided by the Fisheries Department.



In order to bring Malta in line with the provisions of the Mediterranean Regulation EC 1967/2006, the bottom otter trawl fleet has recently increased mesh sizes to 40 mm square / 50 mm diamond. In addition a significant number of Maltese swordfish fishermen are adopting a mitigation measure to reduce the catch of unwanted species, in particular of juvenile undersized swordfish, by setting their long lines deeper than in previous years. Maltese longline fishers have also been using other mitigation measures such as side setting, weight on snood and use of pre-thawed bait.

1.6 Assessment of Status

1.6.1 MSFD criteria and indicators for Descriptor 3

The MSFD calls for assessment of the fisheries sector in terms of the criteria and indicators set by Commission Decision 2010/477/EU for MSFD 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*. The criteria and indicators are listed below for ease of reference:

Criterion 3.1: Level of pressure of the fishing activity

- Fishing mortality (3.1.1), or
- Ratio between catch and biomass index (3.1.2)

Criterion 3.2: Reproductive Capacity of Stock

- Spawning Stock Biomass (3.2.1), or
- Biomass Indices (3.2.2)

Criterion 3.3: Population age and size distribution

- 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) or
- Size at first sexual maturation which may reflect the extent of undesirable genetic effects of exploitation (3.3.4)

As previously discussed, in view of the fact that Maltese fisheries target stocks which are shared across the region, Indicator 3.1.1 should only be applied at a regional scale to ensure a meaningful interpretation of the level of the pressure of fishing activity on stocks. Fishing mortality is thus not the most suitable indicator to measure the level of pressure of the fishing activity exerted by the Maltese fleet. Furthermore, the fishing mortality exerted by the Maltese fleet is usually insignificant since the percentage contribution of the Maltese landings is relatively very low (refer to Table 5). With reference to Malta's management plans for bottom otter trawl fisheries, the European Commission's Scientific, Technical and Economic Committee for Fisheries (STECF)[23] states that '*the Maltese share of these species*

[23] Scientific, Technical and Economic Committee for Fisheries (STECF). 43rd Plenary Meeting Report (PLEN-13-02). 2013 Publications Office of the European Union, Luxembourg.

landings is very low and therefore, any action taken by Maltese authorities to address the overexploitation will have little, if any, effect on the status of the stock'.

Therefore Fishing mortality (F) assessed in this report is that quoted for specific commercial species by STECF at a sub-regional or regional scale. The same would apply to the assessment of the stock in terms of reproductive capacity (Indicator 3.2.1). However information in terms of this indicator is limited also at regional or subregional level and will not be resorted to.

The application of indicators for criterion 3.3 however was attempted for a selection of MEDITS target species for which the relevant information was available.

1.6.2 Assessment Area

Fishing mortality quoted in this report is that provided by STECF at the level of Geographical subareas within the Mediterranean region, mostly at the level of Geographical subareas 15 and 16 and for one species (*Parapenaeus longirostris*) at the level of GSA 12-16.

The 'assessment area' for 'extraction of species' in terms of Criterion 3.3 however 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 for the application of indicators 3.3.1-3.3.3 is equivalent to Geographical sub-area 15.

1.6.3 Status

Indicator 3.1.1: Fishing mortality (regional scale)

This indicator is available at a sub-regional scale for six commercial shared stocks: the teleosts *Merluccius merluccius*, *Pagellus erythrinus*, *Mullus barbatus* and *Lophius budegassa*; and the crustacean *Aristaeomorpha foliacea* and *Parapenaeus longirostris*. In accordance with the information provided by STECF (2013)[24], $F_{current}$ for all these species is greater than the reference point $F_{0.1}$ (which is a proxy to $F_{maximum\ sustainable\ yield}$). This implies that all these species are fished unsustainably within the Mediterranean region. However it should be noted that landings of such species by Maltese fishers are very low (refer to Table 5). Hence the level of pressure exerted by Maltese fishers on these shared stocks is unlikely to be significant.

Given the limited stock assessments at a regional scale and, noting that as indicated by STECF (2011)[25], such assessment should be carried out at a regional scale for shared stocks, classification of status for all commercial species targeted by Maltese fishers in terms of MSFD indicator 3.1.1 is not possible at this stage.

[24] Scientific, Technical and Economic Committee for Fisheries (STECF). Review of Scientific Advice for 2013. Consolidated Advice on Fish Stocks of Interest to the European Union (STECF-12-22)

[25] Scientific, Technical and Economic Committee for Fisheries (STECF). Review of Scientific Advice for 2013. Consolidated Advice on Fish Stocks of Interest to the European Union (STECF-12-22)

Indicator 3.3.1: Proportion of fish larger than the mean size of first sexual maturation

This indicator was applied to selected MEDITS target species for which the 'Length at first maturity' (L_m) was available from Fishbase (www.fishbase.org). These species include the teleosts *Helicolenus dactylopterus*, *Merluccius merluccius*, *Mullus barbatus*, *Mullus surmuletus*, *Spicara flexuosa*, *Trachurus trachurus* and *Zeus faber*; and elasmobranchs *Mustelus asterias*, *Raja clavata* and *Scyliorhinus canicula*. The results of this analysis for each species are presented in Annex IV to this report. The size-class analysis presented in Annex III to this report was also used to support the interpretation of the analysis in terms of Indicator 3.3.1. The size-class analysis was also based on MEDITS data grouped for two time periods with a span of four years (2005-2008 and 2009-2012). Length frequency distribution based on one sampling period would provide a snapshot of the population size distribution at one particular time during the year. Averaging length-class distributions over the specified year periods would also average changes in size distributions as a result of species' life cycles. Comparison of the size frequency distributions between the two periods would reflect trends in this parameter which are not due to the natural life history of the species.

The proportion of individuals $>L_m$ for *Mullus barbatus*, *Mullus surmuletus* and *Spicara flexuosa* is generally above 80% (with the exception of 2005-2007 period for *Mullus surmuletus*), implying that the populations of such species are healthy. This is also confirmed by the size-class structures which show a normal distribution across length classes, slightly skewed towards the higher length classes, and stable across the two time periods under consideration (2005-2008 and 2009-2012). For *S. flexuosa* such distribution however was only evident in the period 2009-2012.

The proportion $>L_m$ for *Zeus faber* and *Mustelus asterias* ranges between 20-80% but seems to be on the increase. The size class structure for the former species also indicates that the abundance of larger individuals has increased in the more recent years when compared with the period 2005-2008. For *Mustelus asterias* the size class structure does not show any evident patterns, however this could be attributed to the relatively low abundance of this species in MEDITS hauls, hence the samples attained may not be representative of the actual population.

Helicolenus dactylopterus, Merluccius merluccius, *Trachurus trachurus*, *Raja clavata* and *Scyliorhinus canicula* show a very low proportion of individuals with length $>L_m$ throughout all the sampling years.

The size-class structures for the latter two species *R. clavata* and *S. canicula* show a relatively normal distribution skewed towards larger individuals in the period 2009-2012. Therefore the results of indicator 3.3.1 for these two species do not necessarily reflect an unhealthy status, but would need to be assessed in the light of the species' temporal and spatial distribution and life cycles.

For *H. dactylopterus*, *M. merluccius* and *T. trachurus* this population structure is also confirmed by the size-class analysis, which for all three species shows a normal distribution with a predominance of smaller individuals for both time periods under consideration. Trends in biomass across years however (refer to Annex I to this report) do not show any evident decline in biomass for these three species. Therefore the predominance of smaller individuals for the population of these species does not necessarily reflect an unhealthy status, but may be due to the natural spatial variation of the species within GSA 15 or beyond.

Based on the above discussion, status in terms of indicator 3.3.1 is deemed to be 'good' for some species, three out of ten, and uncertain for others. Comparison of trends in biomass and size-class structures for those species with low proportions of individuals $>L_m$ imply that such low proportion does not necessarily reflect an unhealthy status and the results should be interpreted with further knowledge on the biology of the species in question. Furthermore, this indicator was carried out for females and males combined, in the knowledge of the fact that L_m may vary between the two sexes. Therefore, the outcome of the analysis as carried out in this report (as a result of data limitations) may not reflect the actual proportion of individuals greater than the length at first maturity and, in the future, this indicator should be applied for females and males separately.

Due to the above-mentioned uncertainties, it is not possible to classify status of fish in terms of MSFD Indicator 3.3.1.

Indicator 3.3.2: Mean Maximum Length across all species found in research vessel surveys

Trends in mean maximum lengths for selected MEDITS target species for the period 2005-2012 are included in Annex V to this report. Most of the species assessed show a generally stable 'mean maximum length', with some oscillations throughout the whole sampling period. It was difficult to interpret the results for some species, especially elasmobranchs of which abundance in MEDITS haul was relatively low or of which presence was not constant throughout the sampling period. Such species include *Raja* spp*., Mustelus* spp., *Heptranchias perlo*, *Torpedo marmorata* and *Squalus blainvillei*.

However the mean maximum length of some species shows a slight (but in some cases steady) decline throughout the years. These species include *Helicolenus dactylopterus*, *Merluccius merluccius* and to a lower extent *Lophius budegassa* and *Galeus melastomus*. The size-class structure for the latter species however implies that larger individuals of *G. melastomus* were more abundant in the period 2009-2012 (normal distribution shifted towards the larger individuals in the period 2009-2012). Therefore while maximum lengths may be lower in recent years, the overall trend is for a greater occurrence of larger individuals in the period 2009-2012 when compared to 2005-2008.

L. budegassa was not very abundant in the MEDITS hauls. Therefore the results of this indicator and the size-class analysis should be interpreted with caution, since the dataset may not be representative of the species' population. In fact the size-class structure does not show any particular pattern and individuals are almost equally spread across length-

classes, with some peaks in length classes ranging between 260-290mm. On the other hand, this spread can be noted for both time periods 2005-2008 and 2009-2012, implying that the available dataset might not be representative of this species' population.

With respect to *H. dactylopterus* and *M. merluccius*, the declining trend in mean maximum length throughout the sampling period seems to corroborate with the results of indicator 3.3.1 (proportion of fish larger than the mean size at first sexual maturation). The size-class analysis for these two species also confirms the predominance of small individuals, with a slightly higher abundance of *M. merluccius* individuals noticed in the period 2009-2012 when compared to the period 2005-2008. However, as previously stated, the length frequency distributions should be interpreted in the light of knowledge on the spatial and temporal distribution of the species. The predominance of small individuals across both time periods may imply that the sampling procedure might be excluding areas characterised by the adult individuals. Therefore the populations of these two species within the region or subregion might not be adequately represented by the current datasets. While further long-term data is necessary to confirm (or otherwise) any declining trends in mean maximum length for these two species, it must be stressed that the interpretation of this indicator should also factor in information on the biology of the species and their spatial and temporal distribution.

This indicator was also applied for the commercial crustacean species *Aristaeomorpha foliacea*, *Nephrops norvegicus* and *Parapenaeus longirostris*. The mean maximum length throughout the sampling period for the former species is stable, while that for the latter two shows a slight decline. The size-class structure for these two species however shows a (more or less) normal distribution which is stable across the two time periods (2005-2008 and 2009-2012). Therefore the results of indicator 3.3.2 for *N. norvegicus* and *P. longirostris* do not necessarily reflect an unhealthy status.

Given that the mean maximum length is stable (or in some cases on the increase) for most of the species assessed, the overall status on the basis of this indicator is deemed to be 'good'. Status for those species of which mean maximum length shows a declining trend is however uncertain and should be confirmed through longer-term data.

Indicator 3.3.3: 95% percentile of the fish length distribution observed in research vessel surveys

For the purposes of this indicator, the 95th percentile of the cumulative abundance of the species against length was compared across sampling years. The plots of cumulative abundance against length classes for each year are presented in Annex VI to this report.

The interpretation of the results was difficult mainly in view of the lack of trends in values of the 95th percentile across years. For most species, the length at which the 95th percentile of cumulative abundance occurs fluctuates throughout the sampling period without showing any consistent decline or increase. Furthermore, it was not possible to interpret the results for species with relatively low abundances in MEDITS hauls for which exponential curves were not attained.

However, some species such as *Etmopterus spinax* showed an increasing trend in the length class at which the 95th percentile of cumulative abundance occurs (2007-2009-2010-2011). For other species, while no trends could be observed throughout the whole sampling period, the length class at the 95th percentile in cumulative abundance has declined in the period 2009-2012. Such species include *Helicolenus dactylopterus*, *Merluccius merluccius*, *Mullus barbatus*, *Mullus surmuletus*, *Raja melitensis*, *Raja miraletus*, *Squalus blainvillei*, *Aristaeomorpha foliacea*, *Nephrops norvegicus* and *Parapenaeus longirostris*. While such decline in recent years would not necessarily reflect an unhealthy status for most of the species mainly because other indicators are indicating otherwise and longer-term data would be necessary, the results of this indicator for *H. dactylopterus* and *M. merluccius* might be corroborating the results of indicators 3.3.1 and 3.3.2 for these two species. This implies the need for further studies on these two species.

In view of the above-mentioned difficulties in data interpretation, status cannot be defined in terms of indicator 3.3.3.

Overall status

Given the above-mentioned uncertainties in the outcome of the application of MSFD Indicators 3.3.1 – 3.3.3, coupled to the current data limitations in terms of stock assessments, it is not deemed possible to define an overall status in terms of MSFD Descriptor 3 for this first reporting cycle.

1.7 Data Gaps

Since its accession to the EU, Malta has enhanced its fisheries data collection efforts in order to fulfil its legal obligations. However there are still data limitations which hampered the assessment of status in line with the MSFD requirements. Fisheries data limitations have also been highlighted by Malta's annual report on the National Data Collection Programme under Council Regulation (EC) 199/2008, Commission Regulation (EC) 665/2008 and Commission Decisions 2008/949/EC, 2010/93/EU (2011)[26]. In particular, the stock assessment data for a number of species is inadequate for the definition of status and the identification of trends in stock. Furthermore, stock assessments at a regional scale are limited to a low number of species.

[26] Agriculture and Fisheries Regulation Department, Ministry for Resources and Rural Affairs, 2011. National Data Collection Programme Under Council Regulation (EC) 199/2008, Commission Regulation (EC) 665/2008 and Commission Decisions 2008/949/EC, 2010/93/EU Malta - 2010 – Annual Report. [Online] Available at: http://energyefficiency-fisheries.jrc.ec.europa.eu/documents/10213/471692/Malta_Technical_Report_2010_Text_21-November-2011.doc