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Reconstruction of Marine Fisheries Catches for the Republic of Malta (1950-2014)

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Abstract

The marine fisheries catches of Malta were reconstructed for the period 1950-2014, including for reported and previously unreported commercial large- and small-scale catches, unmonitored fisheries catches, i.e., subsistence and recreational fisheries, as well as major discards. The present study updates and improves a previous catch reconstruction for Malta for the 1950-2010 time period. Reconstructed marine fisheries catches for Malta are nearly 1.3 times the official landings reported by the FAO and national authorities on behalf of Malta, increasing from around 1,200 t·year in the 1950s to 3,700 t·year in the 2010s. The discrepancy between reported and reconstructed total catches is mostly due to the subsistence catches estimated, which here consist exclusively of on-board consumption and take-home catch of commercial fishers. While the Maltese fisheries statistical system includes procedures to estimate 'unmonitored' commercial landings, this contribution documents that it would be beneficial to also account for non-commercial catches.

Keywords: Unmonitored fisheries, Mediterranean, islands, recreational catches, subsistence catches, discards.

Introduction

The Republic of Malta (hereon Malta) is an archipelago located in the centre of the Mediterranean basin (Fig. 1). It consists of three main inhabited islands, i.e., Malta proper, with a land area of 246 km^2, Gozo with 67 km^2 and Comino with 3 km^2. Malta is situated off the south coast of Sicily, the east coast of Tunisia and the north coast of Libya. A 2015 census estimates the Maltese population at 431,333 (www.worldbank.org), of which more than 90% resides on Malta proper (Malta Statistics Office, 2015b).

Malta has a continental shelf area (to 200 m depth) of around 7,500 km^2 in a theoretical Exclusive Economic Zone (EEZ) of around 55,000 km^2 (www.seaaroundus.org). As with many Mediterranean countries, Malta has not formally declared an EEZ. Since 1971, the Maltese authorities have managed an Exclusive Fishing Zone (EFZ) which extends 25 nm from its baselines, covering a surface area of around 12,000 km^2. The EFZ was redefined in 2004 as a Fisheries Management Zone (FMZ) (Dimech *et al.*, 2009). For the purposes of the global *Sea Around Us* research initiative, we have assigned a theoretical EEZ to Malta based on the basic UNCLOS principles of 200 nm or mid-line between neighboring countries (Fig. 1). This EEZ assignment has no legal standing and is purely used to assist in the spatial assignment of catch data (Zeller *et al.*, 2016).

Maltese fisheries are typical Mediterranean, i.e., multi-species and multi-gear, where fishers deploy fishing gears depending on the fishing season (de Leiva *et al.*, 1998; Anonymous, 2013). The fishing industry contributes only 0.1% to Malta's Gross Domestic Product (GDP), and provides livelihoods for around 1% of the population (Dimech *et al.*, 2009; Anonymous, 2013). Historically, the sea around Malta was more important for trading than for fishing (Blouet, 1972; Goodwin, 2002), and thus, information on Malta's fisheries is relatively sparse, especially for early years. Chircop (2010) suggests, however, that the neglect of this sector by historians is what may have led to the erroneous assumption that the Maltese fishing sector was unimportant. Indeed, fishing seems to play an important role in the culture and traditions of the Maltese population (Randon, 1995; Chircop, 2010).

Most of the commercial marine fisheries catch is channelled through the central fish market in Valletta, where the catch data for the entire archipelago are assembled (de Leiva *et al.*, 1998). During the 1950s, and following a market survey, the Maltese Department of

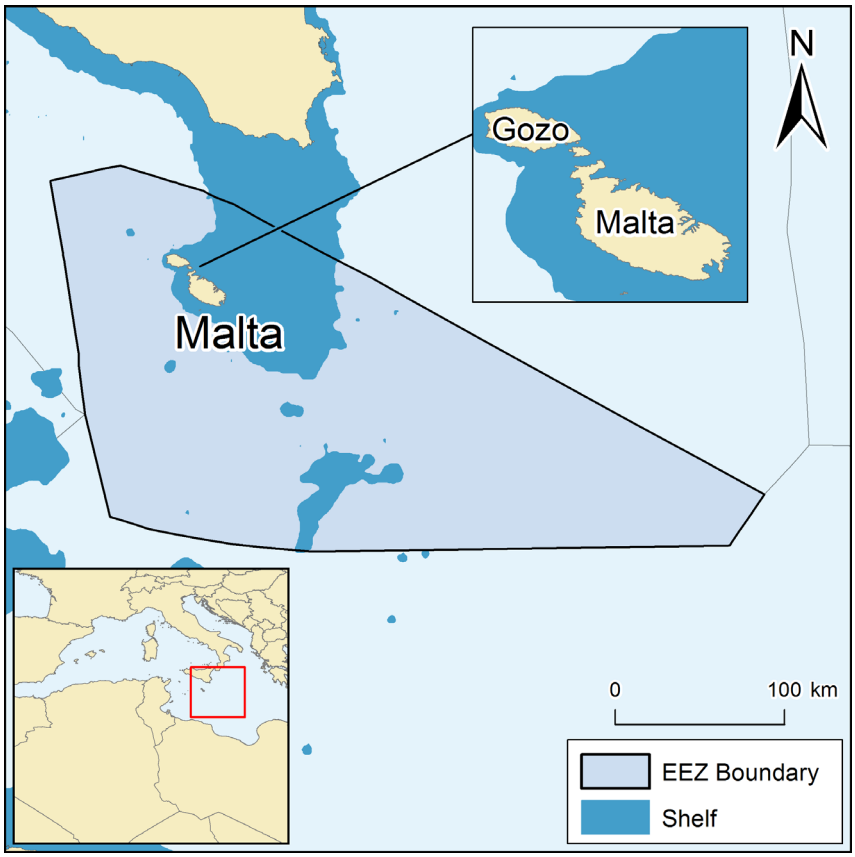

Fig. 1: The Republic of Malta, its continental shelf (to 200 m depth) and theoretical Exclusive Economic Zone-equivalent waters (EEZ), showing the major islands, Malta and Gozo, as well as the islet Comino in between.

Fisheries decided to add 25% to the monthly catch estimates derived from the market to account for any landings that bypassed the main fish market, e.g., direct sales to hotels, restaurants and consumers. To update this add-on, in 2005, a specific sampling program was initiated as part of the European Fisheries data collection program (European Commission, 2001) and concluded that the 25% were representative of the unreported component of commercial fisheries catches (Ministry for Sustainable Development, the Environment and Climate Change, pers. comm.). Thus, notionally otherwise 'unmonitored' commercial catches are included in official reported data through this 25% add-on. Recreational catches, however, cannot be marketed and are therefore not taken into account by the statistics (Anonymous, 2013). The same applies for catches used for subsistence (i.e., direct consumption) and major discards.

The catch reconstruction approach (Zeller *et al.,* 2007, 2016) provides a more realistic estimate of 'how much' and 'what kind of' fish is being extracted from world seas and oceans. This study was completed through the re-evaluation of all marine fisheries components, i.e., large-scale (industrial) and small-scale (artisanal, subsistence and recreational) sectors, as well as major discards (Zeller *et al.*, 2007; Zeller & Pauly, 2016). Such estimates may be less precise than that part of the catch that is officially reported, but they will be better than assigning a value of zero catch (i.e., the default value assigned for non-included data) to unmonitored fisheries (Zeller & Pauly, 2016).

Methods

Reported marine fisheries catch data were available by taxon and year from the Food and Agriculture Organization (FAO) Fishstat database and from the Maltese National Statistics Office (NSO). Both datasets match each other rather well, except for the year 1985 and for the time period 2007-2014. In 1985, the unexplained peak in the FAO data (compared to NSO data) is likely due to an error that increased the catches of all taxa. For the period 2007-2014, the data reported by FAO were consistently higher than the national Maltese data. Despite this discrepancy, both datasets followed the same trend between 2007 and 2010. However, from 2011 to 2014, catches as reported by FAO were increasing while those reported by the NSO were declining. The FAO reports the fisheries catch data received from the Maltese Ministry for Sustainable Development, the Environment and Climate Change, which is also responsible of fisheries. While

Table 1. Maltese fishing fleet between 1950 and 2014. *Italic*= backward carry; …= interpolation; ( )= assumption; [ ]= from data source, adjusted for inactive vessels; { }= from data source, adjusted for industrial vessels. Data source: Ministry for Sustainable Development, the Environment and Climate Change, pers. comm.; and National Statistics Office (2007, 2008, 2009a, 2009b, 2011, 2012a, 2012b, 2013, 2015a, 2016).

Year	Artisanal	Recreational	Year	Artisanal	Recreational
1950	*566*	(50)	1976	[1,034]	…
1951-1952	…	…	1977	[1,060]	…
1953	[566]	…	1978	[1,069]	…
1954	[598]	…	1979	[1,072]	…
1955	[625]	…	1980	[1,069]	(150)
1956	[659]	…	1981	[1,080]	…
1957	[675]	…	1982	[1,111]	…
1958	[684]	…	1983	[1,145]	…
1959	[722]	…	1984	[1,209]	…
1960	[752]	…	1985	[1,293]	…
1961	[784]	…	1986	[1,356]	…
1962	[820]	…	1987	[1,385]	…
1963	[822]	…	1988-1989	…	…
1964	[831]	…	1990	…	(300)
1965	[876]	…	1991-2004	…	…
1966	[896]	…	2005	{1,314}	826
1967	[887]	…	2006	{1,307}	842
1968	[919]	…	2007	{1,212}	1,364
1969	[933]	…	2008	{1,038}	1,647
1970	[961]	…	2009	{1,024}	1,804
1971	[948]	…	2010	{1,011}	1,871
1972	[969]	…	2011	{972}	1,921
1973	[988]	…	2012	{960}	1,928
1974	[1,013]	…	2013	{943}	1,929
1975	[1,020]	…	2014	{937}	1,927

catch data reported by the ministry to the FAO include all landings by Maltese flagged vessels, the NSO reports only fisheries catches channeled through the central market. However, some Maltese flagged vessels, fishing for small pelagics, land their catches outside of Malta, e.g., in Sicily, when it is more convenient (i.e., closer to fishing grounds) or more profitable (higher ex-vessel prices) (Zeller *et al.,* 2016).

Overall, the data reported nationally have a better taxonomic breakdown than the data submitted to FAO. Therefore, the reported data baseline used here consists of national data for the 1950-2006 time period, and the FAO data for the 2007-2014 time period.

Information from government sources, independent studies and surveys, local experts and grey literature were used to complete this study, while following the general catch reconstruction approach outlined in Zeller *et al.* (2007) and Zeller *et al.* (2016).

Large-scale and small-scale fisheries

Until the mid-1990s, Malta did not explicitly differentiate between large- and small-scale commercial fisheries (here referred to as 'industrial' and 'artisanal', respectively). In 1995, the General Fisheries Council for the Mediterranean (GFCM), established a minimum length limit of 15 meters for industrial vessels (de Leiva *et al.*, 1998). This limit was decreased to 12 meters by the Department of Fisheries and Aquaculture (2013a), following the European data collection program (European Commission, 2001, 2010). Therefore, in this study, vessels under 12 m length are considered as the Maltese small-scale fleet (Table 1). They are mainly multi-gear, including trammel and drift nets, traps and *lampara* (surrounding nets) and are locally known as *luzzu* and *kajjik* (de Leiva *et al.*, 1998; Coppola, 1999). Longliners under 12-meter length, often family owned, are also considered part of the artisanal fishery (Ministry for Sustainable Development, the Environment and Climate Change, pers. comm.). Some longliners (around 10% of total longliners in 2006) and a few vessels exceeding 12 m in length, and all trawlers, irrespective of size, are included in the industrial fishing fleet, in line with Martín (2012). From a total of 1126 Maltese fishing vessels in 2008, only 8% are considered large-scale (i.e., industrial).

The Maltese fishing fleet is also classified into full-time and part-time vessels (Dimech *et al.*, 2009). Full-time vessels are mostly operated by full-time fishers, who usually own more than one boat, i.e., at least one large-scale and one small-scale vessel, and whose livelihood is based solely on fishing. Owning two types of vessels allows full-time fishers to fish off-shore during

the summer season, using the industrial boat, and inshore during the winter season, by deploying the smaller boat (de Leiva *et al.*, 1998; Gruppetta, 2002; Department of Fisheries and Aquaculture, 2013a).

The first introduction of trawlers in Malta dates back to the early 1930s. Despite this attempt being unsuccessful, steam trawlers were reintroduced in the mid-1950s. Since then, trawler numbers have been slowly expanding, reaching a maximum of 23 units in 2012 (Burdon, 1956; Ministry for Sustainable Development, the Environment and Climate Change, pers. comm.).

According to Burdon (1956), marine fisheries catches during the 1950s were at least 60% artisanal, while the remaining 40% were partly industrial, i.e., including a trawl fishery, and artisanal, i.e., pot and line fisheries. Trawlers were mostly active in winter and were much less successful in the warmer seasons. Furthermore, they were not used efficiently due to a lack of technical expertise among the crews at that time, who were also not used to spending long periods of time offshore (Anonymous, 1964). In 1964, most trawlers had no onboard refrigeration and used to operate outside of the presently assumed Maltese EEZ waters. Longliners began to gain popularity in the 1960s, which increased in the 1990s. During the 1960s, they were adopted by several Maltese fishers who preferred longliners to *lampara* during the winter season; they caught mainly swordfish (*Xiphias gladius*) and blue (*Prionace glauca*) and thresher (*Alopias vulpinus*) shark (Anonymous, 1964). During the 1990s, longliners started targeting Atlantic bluefin tuna (*Thunnus thynnus*, www.iccat.int).

Based on this information, and to remain conservative, we assumed that industrial catches represent only 1% of the annual catch in the early 1950s, and reached 30% in 1990. By 2009, industrial catches accounted for around 74% of the total annual fish catches.

Recreational fishery

Recreational fishing is well developed in Malta. The majority of the recreational boats are registered as non-commercial fishing vessels, known as MFC, in the national Fishing Vessel Register (FVR) of the Department of Fisheries (Table 1). These vessels require a fishing licence and use mainly trolling lines, but seasonally use traps and other minor fishing gears (www.agriculture.gov.mt; Malta Centre for Fisheries Sciences, 2008). Some recreational vessels are only registered with the National Maritime Register and practice angling, which does not require a fishing licence (Malta Centre for Fisheries Sciences, 2008; Anonymous, 2013). Different recreational fishing organisations and associations exist in Malta and are usually part of the largest Maltese amateur fishing club known as "*Federazzjoni ta l-Ghaqdiet tas-Sajjieda Dilettanti Malta*" (Malta Centre for Fisheries Sciences, 2008; Anonymous, 2013). Shore anglers exist, but do not need any registration or license, and their number is unknown.

In 2007, the number of registered 'MFC' recreational vessels exceeded the number of registered commercial vessels (National Statistics Office, 2009a). In 2014, recreational vessels (Table 1) represented around 65% of the total Maltese fishing fleet (National Statistics Office, 2016).

Recreational fishery catches were reconstructed based on a pilot study launched by the Malta Centre for Fisheries Sciences in 2005, following a national fisheries data collection program (Malta Centre for Fisheries Sciences, 2006). According to this study, the 74 surveyed recreational Maltese fishers, whose vessels were registered as MFC, landed a combined 1,291 kg·year^{-1} of fish in 2005. However, it is not clear from this study whether the surveyed recreational fishers were representative of the number of recreational boats, i.e., 74 fishers for 74 boats. To remain conservative, we assumed that this was the case, meaning that in 2005 catches of MFC-registered vessel were 17.4 kg·boat^{-1}·year^{-1}.

To reconstruct the marine recreational fishery catches for the time period 1950-2014, we assumed that in 1950, the recreational catch rate per boat per year was approximately double the estimate for 2005 (i.e., 35 kg·boat^{-1}·year^{-1}) to account for more abundant fish stocks allowing higher catch rates. An interpolation was performed between 1950 and 2005 for the recreational catch rate. To account for the subsequent 10 years, we extrapolated.

The recreational catch rate was applied to the number of MFC-registered recreational boats. However, the number of these vessels is available only for the years 2000-2014 (Table 1). Given the absence of data for earlier years, we conservatively assumed that there were 50 recreational boats in 1950, increasing to 150 in 1980 and doubling in number in 1990 (Table1). The boom in number of recreational boats in 1990 was due to the considerable economic development in Malta by the 1990s, i.e., people earning more money which allowed them to buy boats, tourists were more frequent, etc. (Ebejer, 2006). To account for the missing years, interpolations were performed.

Note that there is no significant catch and release in Malta; only rarely are small fishes and juveniles released, which were here neglected. Large pelagics are rarely caught by the recreational fishery.

A taxonomic disaggregation of the recreational catches by the MFC-registered recreational boats is available in the 2005 study and was used to disaggregate the reconstructed recreational fisheries catches.

Due to the lack of any data or information on non-MFC recreational vessel catches (i.e., boat-based angling) and shore-based angling, these components of recreational fishing were not estimated. The national authorities may wish to consider deriving some estimates for these activities. Given the exclusion of these two

components, we consider our estimates of recreational catches to be very conservative and thus represent minimal estimates.

Subsistence fishery

In the case of Malta, subsistence catches represent the fish retained by commercial fishers for their own and crew or family consumption. Thus, no dedicated, exclusive subsistence fishery (in the sense of Zeller *et al.,* 2015) is claimed to exist in Malta.

According to Khalfallah (2013), the subsistence catch component for the Tunisian artisanal fishery was around 4 $kg \cdot day^{-1} \cdot boat^{-1}$. Maltese small-scale vessels usually spend around 150 to 200 days per year fishing. The number of artisanal boats was obtained from the Maltese Agriculture and Fisheries reports for the years 2005-2014 (Table 1). Subsistence catches for the Maltese small-scale sector are obtained by applying the Tunisian subsistence catch rate to the number of Maltese fishing days and the number of small-scale boats in Malta.

For the large-scale fishery, the subsistence catch amount (i.e., on-board consumption) was set as equivalent to about 1% of the reconstructed industrial landings and was thus derived from the reconstructed industrial landings data for the time period 1950-2014.

The composition of reported commercial catches was used to disaggregate the subsistence catches to family level.

Discards

According to Malta Centre for Fisheries Sciences (2008), discards within the small-scale fishery are negligible and those of industrial boats are estimated to be around 5% of the industrial catch, on average. However, according to Tsagarakis *et al.* (2014), the discard ratio for small-scale gears in the Mediterranean basin in 2006 varies from around 3.7% of total catches for traps to approximately 19% for seiners. Tsagarakis *et al.* (2014) also estimated industrial bottom trawler discards in the Mediterranean to be around 33% in 2006. According to the global study of Kelleher (2005), discards of trawl fisheries in the Mediterranean is the equivalent of 45% of total catch. Based on both sources mentioned above and in order to remain conservative, discard rates of 3% and 30% were applied to artisanal and industrial reconstructed fisheries catches, respectively. Here, we assume that, of the industrial gear, only trawlers generate discards.

We considered three major types of discards:

(i) Juvenile porgies (Family Sparidae, e.g., *Diplodus* spp.), wrasses (Labridae) and gobies (Gobiidae), but also small groupers (*Epinephelus* spp*., Serranus scriba*), moray eel (*Murena helena*) and damselfish (*Chromis chromis*) (Ministry for Sustainable Development, the Environment and Climate Change, pers. comm.);

(ii) Species that are not consumed by people, such as pelagic stingray (*Pteroplatytrygon violacea*), ocean sunfish (*Mola mola*), stingrays (*Dasyatis* spp.), devil fish (*Mobula mobular*), rabbitfish (*Chimaera monstrosa*), longspine snipefish (*Macrorhamphosus scolopax*), boarfish (*Capros aper*) and small species of the Gobiidae family (Ministry for Sustainable Development, the Environment and Climate Change, pers. comm.); and

(iii) Species whose size is under the minimum legal landing size, such as the small-spotted catshark (*Scyliorhinus canicula*), greater forkbeard (*Phycis blennoides*), shrimps (*Pandalus* spp.), Norway lobster (*Nephrops norvegicu*s), hake (*Merluccius merluccius*), blackbelly rosefish (*Helicolenus dactylopterus*), thornback ray (*Raja clavata*) and longnosed skate (*Dipturus oxyrinchus*) (Department of Fisheries and Aquaculture, 2013a).

While the first group represents species discarded by the artisanal fishery, the second represents species that may occur in both artisanal and industrial discards. The third group concerns discards by the industrial (trawl) fishery. The Malta Centre for Fisheries Sciences (2008) provides a species disaggregation of discards by trawlers for the year 2007. The estimation of the proportion of each taxonomic group within the industrial and artisanal discards was based on the sources mentioned above.

Results

The marine fisheries catches for the Republic of Malta were reconstructed for the time period 1950-2014, including small- and large-scale commercial, recreational, and subsistence catches, as well as major discards. Total reconstructed catches were 1.3 times the reported baseline data for the study period. Catches increased from around 1,200 $t \cdot year^{-1}$ in the 1950s (around 1,000 $t \cdot year^{-1}$ reported) to around 1,700 $t \cdot year^{-1}$ in the 1960s (around 1,400 $t \cdot year^{-1}$ reported), and 1,800 $t \cdot year^{-1}$ in the 1970s (around 1,500 $t \cdot year^{-1}$ reported), before steadily declining to the all-time low of around 800 t in 1992 (around 500 t reported). Between 2007 and 2014 catches had been increasing to an all-time peak catch of 3,300 t in 2014 (2,400 t reported) (Fig. 2a, Appendix Table A1). The unreported catches grew during the late 1980s and the early 1990s, and were more or less equivalent to half the landings reported by the national Maltese authorities in the last few decades. Unreported catches were driven almost exclusively by discards and subsistence catches (Fig. 2a, Appendix Table A1). Discards are playing an increasing role in the unreported catches in the last few years, mainly due to the rapid growth in the trawl fishery.

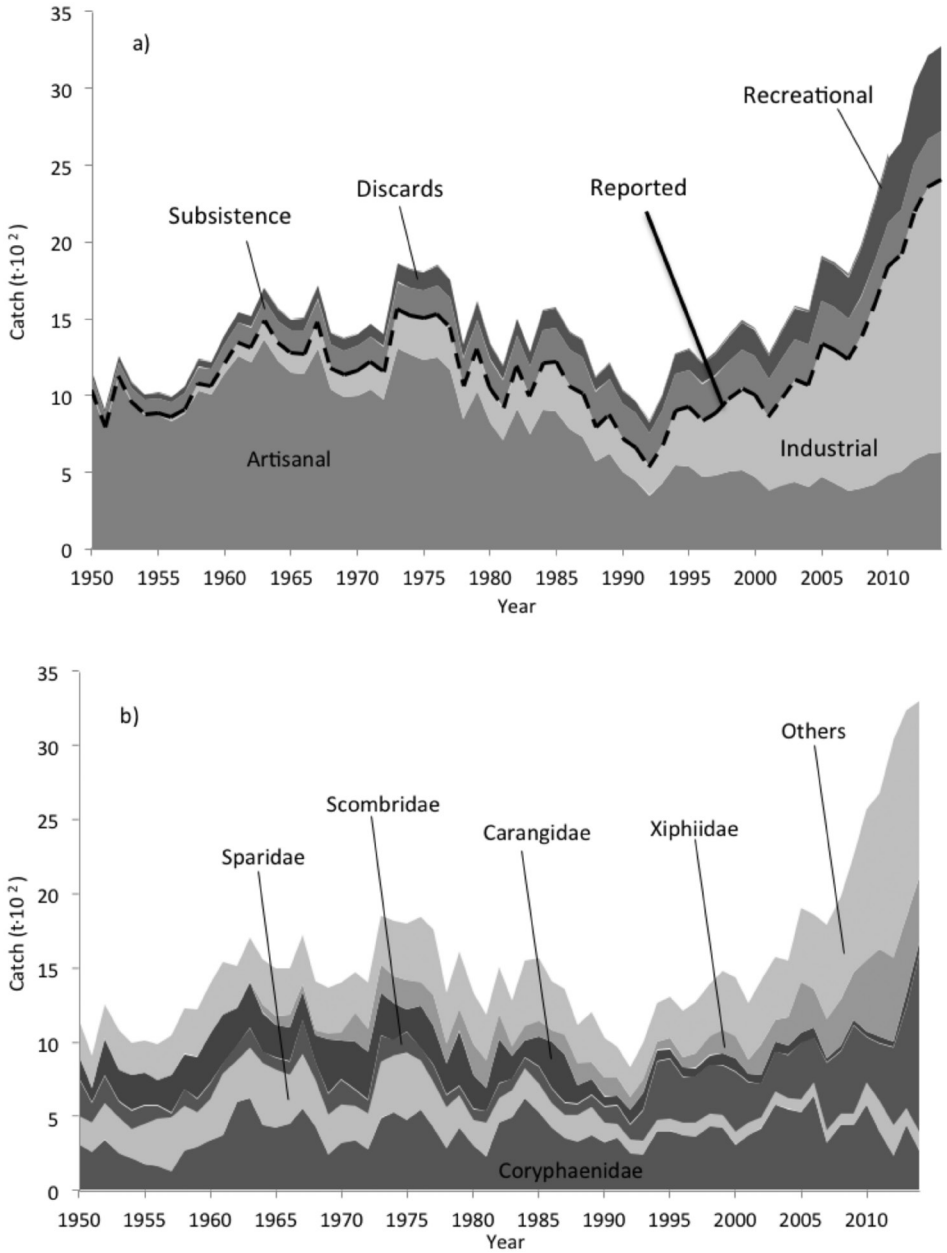

Fig. 2: Reconstructed total catches for Malta by a) fisheries sector, plus discards, for 1950-2014. Reported baseline catch data are overlaid as dashed line; and b) by main taxonomic groups; note that the 'others' category includes 90 additional taxonomic groups (see Appendix Table 2).

The catch composition suggested that dolphinfish (*Coryphaena hippurus*) of the family Coryphaenidae is the most sought after species, followed by the family Sparidae and particularly bogue (*Boops boops*) (Fig. 2b, Appendix Table A2). The family Scombridae, mainly the Atlantic bluefin tuna (*Thunnus thynnus*) and chub mackerel (*Scomber japonicus*), and the family Carangidae, mainly the pilot fish (*Naucrates doctor*) and the Mediterranean horse mackerel (*Trachurus mediterraneus*), represent the third and fourth most important taxa by the Maltese fishing industry, respectively (Fig. 2b, Appendix Table A2).

Discussion

Our reconstruction of Malta's total catches from 1950 to 2014 combines reported landings (industrial and artisanal) along with our best estimates of unreported recreational and subsistence catches, as well as estimates of artisanal and industrial discards. It should be noted that some of these estimates may be imprecise due to the scarcity of available information. However, they represent a more accurate picture of the total catch volume than assigning zero catches for these components (which is the result of not reporting on existing, but unmonitored com-

ponents (Pauly & Zeller 2016). It should also be noted that parts of these reconstructed catches may be taken in EEZ or EEZ-equivalent waters of neighbouring countries in the Mediterranean.

Although over the whole period, artisanal landings represent over 50% of total landings, by 2014, the industrial sector represents 53% of the total catches compared to 19% for the artisanal sector. This illustrates the substantial growth of the industrial sector in the last few decades, and may also have resulted in a substantial spatial expansion of fishing by Maltese vessels (Swartz *et al.*, 2010). There has also been considerable increase of catches of small pelagics by the industrial fishery in the past decade, while catches of large pelagics slightly decreased. This may be due to 'fishing down' occurring in Maltese waters (Pauly *et al.,* 1998).

The predominance of dolphinfish in catches is due to its cultural importance. Locally known as '*lampuki'*, the dolphinfish is considered an emblematic fish, particularly targeted by the Maltese fishers during a season devoted to this species. This season represents a cultural and festive celebration not only for fishers, but also for the Maltese population (Goodwin, 2002; Department of Fisheries and Aquaculture, 2013b).

There are some commercial catches that could be deemed 'unmonitored' in the officially reported data, i.e., fishes sold directly to hotels, restaurants and consumers and not channelled through the monitored central fish market in Valletta, from where the fisheries statistics are collected. However, the monitoring agency (Department of Fisheries) accounts for these catches through a percentage add-on to the monthly production (Ministry for Sustainable Development, the Environment and Climate Change, pers. comm.). Thus, the final reported data of Malta does include a best estimate of 'unmonitored' commercial landings. Malta is to be commended for having taken such a proactive approach for many decades to estimating what otherwise would have remained unreported commercial catches.

As in neighbouring Mediterranean countries, e.g., Greece, Italy and Tunisia, the Maltese fishing industry consists of multispecies operations using a large number of multi-gear small-scale boats, but also increasingly larger industrial vessels. However, Malta has relatively small fisheries catches overall, due to the relatively small area of productive continental shelf waters around the Maltese islands (Fig. 1). Malta, however, clearly outperforms many surrounding countries in terms of catch data accountability, as the differences between reconstructed and reported data of 1.3 times is relatively small compared to, e.g., Italy (2.6 times, Piroddi *et al.*, 2015). This 'quality' of Maltese data monitoring and reporting is largely due to the 'unmonitored' commercial adjustment factor having been applied by Maltese authorities to their monitored commercial data for many decades. A truly commendable step, unfortunately missing (but urgently needed; Pauly & Zeller, 2016) from data systems in most other countries around the world. What now remains to be achieved by Malta is to derive and include similar adjustment factors (or estimates) for the non-commercial aspects of Maltese fisheries, namely the recreational catches (see e.g., The Bahamas, Smith & Zeller, 2016) and the 'subsistence' catches (take-home and on-board consumption on commercial fishing vessels), as well as for discards (even if not requested by FAO for international reporting). This would make Malta a world leader in comprehensive marine catch data reporting.

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Appendix Table A1. Reported landings vs. total reconstructed catch (in tonnes), and catch by sector, with discards shown separately, for Malta, 1950-2014.

Year	Reported landings	Reconstructed total catch	Artisanal	Industrial	Recreational	Subsistence	Discards
1950	1,038	1,160	1,028	10	1.75	86	34
1951	796	910	788	8	1.85	86	26
1952	1,131	1,256	1,120	11	1.95	86	37
1953	964	1,083	954	10	2.04	86	32
1954	883	1,004	874	9	2.14	91	29
1955	889	1,018	873	16	2.23	95	31
1956	859	994	836	22	2.32	101	32
1957	913	1,056	882	31	2.40	104	36
1958	1,080	1,235	1,035	46	2.49	107	45
1959	1,059	1,221	1,006	53	2.57	114	46
1960	1,217	1,395	1,146	71	2.65	120	56
1961	1,348	1,542	1,259	90	2.73	127	65
1962	1,315	1,516	1,217	98	2.80	133	66
1963	1,491	1,707	1,368	123	2.88	136	78
1964	1,348	1,561	1,226	122	2.95	137	73
1965	1,279	1,498	1,153	126	3.02	144	72
1966	1,276	1,502	1,140	136	3.09	148	75
1967	1,481	1,725	1,311	170	3.15	150	90
1968	1,184	1,414	1,038	145	3.22	152	75
1969	1,138	1,371	989	149	3.28	155	74
1970	1,163	1,406	1,002	162	3.34	160	79
1971	1,225	1,474	1,045	180	3.39	160	85
1972	1,157	1,407	978	179	3.45	163	83
1973	1,566	1,860	1,311	255	3.50	174	116
1974	1,525	1,823	1,264	261	3.55	178	116
1975	1,506	1,808	1,236	270	3.60	180	118
1976	1,535	1,846	1,247	287	3.65	184	124
1977	1,448	1,759	1,165	283	3.69	187	120
1978	1,064	1,340	848	216	3.73	182	90
1979	1,306	1,611	1,030	276	3.77	188	114
1980	1,054	1,336	823	231	3.81	183	94
1981	921	1,192	711	210	4.14	183	84
1982	1,197	1,508	915	282	4.46	195	112
1983	993	1,289	751	242	4.77	196	95
1984	1,216	1,552	910	306	5.07	212	119
1985	1,219	1,572	903	317	5.36	226	122
1986	1,067	1,413	781	286	5.64	232	109
1987	1,015	1,363	735	280	5.91	236	106
1988	798	1,119	571	227	6.17	230	85
1989	876	1,210	620	256	6.42	232	95
1990	724	1,038	507	217	6.66	228	80
1991	662	974	448	214	7.33	227	78
1992	536	833	351	185	7.98	223	66
1993	679	1,005	429	250	8.61	229	88
1994	902	1,272	549	353	9.21	239	122
1995	925	1,308	542	384	9.79	241	131
1996	840	1,214	472	368	10.35	239	124
1997	886	1,276	478	408	10.89	243	137
1998	979	1,396	505	473	11.40	249	157
1999	1,050	1,487	518	532	11.89	253	172
2000	1,004	1,440	473	532	12.36	252	171
2001	860	1,269	385	475	12.81	246	151
2002	986	1,426	419	567	13.23	253	174
2003	1,103	1,584	443	660	13.64	262	205
2004	1,067	1,556	404	663	14.02	264	211
2005	1,336	1,906	476	861	14.37	283	272
2006	1,296	1,865	431	864	14.38	283	272
2007	1,236	1,794	383	853	22.86	267	267
2008	1,392	1,984	400	993	27.08	255	310
2009	1,596	2,262	422	1,175	29.08	271	365
2010	1,839	2,576	486	1,353	29.56	287	421
2011	1,923	2,680	508	1,415	29.74	287	440
2012	2,204	3,043	582	1,622	29.23	306	504
2013	2,359	3,242	623	1,736	28.63	315	539
2014	2,406	3,301	636	1,770	27.98	318	550

Appendix Table A2. Reconstructed total catch (in tonnes) by major taxonomic categories for Malta, 1950-2014. 'Others' contain 90 additional taxonomic groups. See www.seaaroundus.org for accessing and downloading complete datasets.

Year	Coryphaenidae	Sparidae	Scombridae	Carangidae	Xiphiidae	Others
1950	312	199	255	145	6	243
1951	266	198	131	100	6	208
1952	345	249	185	247	6	224
1953	257	244	106	212	6	258
1954	218	208	121	231	6	219
1955	180	279	123	214	7	214
1956	171	327	80	171	7	237
1957	132	367	34	247	7	269
1958	269	313	108	233	8	304
1959	294	243	89	281	8	307
1960	341	282	108	325	8	331
1961	378	416	68	326	9	346
1962	599	288	97	247	9	276
1963	629	343	127	308	10	291
1964	444	423	73	261	57	303
1965	424	401	76	217	61	320
1966	456	335	85	227	86	313
1967	558	365	234	188	49	330
1968	436	318	117	175	40	327
1969	243	273	143	364	39	309
1970	323	267	164	257	61	333
1971	342	243	98	321	196	274
1972	278	248	93	321	153	314
1973	491	387	172	285	191	333
1974	530	388	100	246	183	375
1975	476	455	140	150	203	383
1976	548	334	85	279	163	437
1977	426	310	111	259	211	442
1978	289	282	83	206	134	347
1979	425	220	68	366	149	383
1980	304	183	70	222	211	347
1981	232	240	71	153	185	311
1982	460	174	95	291	172	316
1983	500	182	78	149	67	314
1984	629	206	69	112	98	438
1985	532	198	114	195	112	422
1986	430	168	97	308	82	328
1987	356	165	81	318	134	309
1988	332	191	67	119	157	253
1989	376	192	86	98	117	342
1990	328	141	104	66	125	276
1991	359	101	121	62	121	210
1992	255	104	96	94	86	199
1993	243	97	206	113	92	253
1994	405	80	392	72	59	264
1995	406	88	401	63	75	275
1996	378	93	301	58	75	309
1997	368	96	312	53	100	348
1998	438	93	322	61	133	348
1999	425	92	334	74	165	398
2000	310	96	399	84	158	392
2001	377	94	263	55	96	385
2002	423	82	219	57	207	438
2003	586	88	265	64	152	429
2004	552	83	286	56	193	387
2005	532	94	375	65	343	497
2006	644	96	296	66	259	504
2007	327	90	449	25	267	635
2008	448	81	417	32	312	693
2009	447	83	590	32	321	789
2010	585	150	308	34	481	1,018
2011	404	208	382	44	590	1,052
2012	240	210	521	37	565	1,471
2013	445	115	679	83	524	1,396
2014	269	140	1,184	80	440	1,189