

‘Reported’ versus ‘likely’ fisheries catches of four Mediterranean countries

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Summary: The fisheries catch statistics that member countries report annually to the Food and Agriculture Organization of the United Nations were compared, for the years 1950 to 2010, with ‘reconstructed’, and more likely catch data from the Mediterranean coasts of mainland Spain, France, Italy and Turkey. Reconstructed catches were 2.6 times higher than those submitted to the FAO by these countries in the 1950s, and 1.8 times higher since 2000. If discarded by-catch is ignored they were 2.3 and 1.6 times higher, respectively. The contributors to the reconstructed catch from 1950 to 2010 were large-scale industrial fisheries (46%), discards (29%), artisanal fisheries (10%), recreational fisheries (9%) and subsistence fisheries (6%). The non-reported catch was high in all fishing sectors, including industrial, artisanal and recreational fisheries. The non-inclusion of discards in national and FAO statistics undermines the transition to ecosystem-based fisheries management, but needs to be overcome, as discards must be tracked before discarding itself is eliminated. The systematic underestimation of small-scale fisheries is part of a global phenomenon that will have to be overcome if the potential of these fisheries for sustainable exploitation of coastal systems is to be realized, perhaps in the context of reducing overall fishing capacity, which is excessive in the Mediterranean Sea as elsewhere in the world.

Keywords: Mediterranean Sea; discards; unreported; industrial; artisanal; recreational; subsistence; fisheries; IUU fishing.

Contraste entre las capturas pesqueras “declaradas” y “probables” en cuatro países mediterráneos

Resumen: Se compararon las estadísticas de capturas pesqueras que los países miembros declaran anualmente a la Organización de las Naciones Unidas para la Agricultura y la Alimentación (FAO) para los años 1950 a 2010, con las capturas “reconstruidas” (y más probables) de las costas mediterráneas (excluyendo las islas) de España, Francia, Italia y Turquía. Las capturas reconstruidas fueron 2,6 veces superiores a los datos enviados a la FAO por estos países en la década de 1950, y 1,8 veces desde 2000, o 2,3 y 1,6 veces, respectivamente, sin tener en cuenta los descartes. Las capturas reconstruidas fueron obtenidas del sector industrial (es decir, pesca comercial de gran escala, con un 46 % de la captura total de 1950 a 2010), los descartes (29 %), la pesca artesanal (es decir, pesca comercial de pequeña escala, 10%), la pesca recreativa (9 %) y la de subsistencia (6 %). Por lo tanto, a pesar de que las capturas no declaradas fueron importantes en todos los sectores pesqueros, incluyendo la pesca industrial, artesanal y recreativa, la no inclusión de los descartes en las estadísticas nacionales y de la FAO va en detrimento de la transición hacia la aplicación de una gestión pesquera basada en el ecosistema. Esto debe corregirse ya que el descarte debe ser documentado antes de que la práctica de descartar pueda ser eliminada. En cuanto a la subestimación sistemática de la pesca de pequeña escala, es parte de un fenómeno global que debe ser corregido si se quiere materializar el potencial de estas pesquerías para la explotación sostenible de los sistemas costeros, tal vez en el contexto de una reducción global de la capacidad pesquera, que es excesiva, tanto en el mar Mediterráneo como en otras partes del mundo.

Palabras clave: mar Mediterráneo; descartes; capturas no declaradas; pesca industrial; pesca artesanal; pesca recreativa; pesca de subsistencia; IUU.

Citation/Como citar este artículo: Pauly D., Ulman A., Piroddi C., Bultel E., Coll M. 2014. ‘Reported’ versus ‘likely’ fisheries catches of four Mediterranean countries. In: Leonart J., Maynou F. (eds), *The Ecosystem Approach to Fisheries in the Mediterranean and Black Seas*. Sci. Mar. 78S1: 11-17. doi: <http://dx.doi.org/10.3989/scimar.04020.17A>

Editor: Jordi LLeonart and Francesc Maynou.

Received: November 4, 2013. **Accepted:** January 10, 2014. **Published:** March 28, 2014.

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INTRODUCTION

The Mediterranean has been described as an ecosystem “under siege” (Coll et al. 2012). This applies particularly to the Mediterranean’s fisheries resources, which have been studied for a very long time, starting with Aristotle (Thompson 1947). This study has led to a rich literature, albeit one that is disparate, not least because it is written in a large number of languages ranging from Spanish, Italian, Arabic and French in the West and South to Greek and Turkish in the East.

Most importantly for the fisheries and their resource exploitation, however, is the fact that most Mediterranean countries do not fully monitor their fisheries in such a way that all withdrawals of biomass (i.e. landings plus discards) are accounted for over time, as is required for ecosystem-based management of fisheries (Pikitch et al. 2004). This is particularly true for small-scale fisheries, whose catches are suspected to be systematically underestimated throughout the world (Pauly 2006), the Mediterranean being no exception, and for recreational fisheries, which are rarely accounted for in official statistics. However, the scale of this underestimation is usually not known, and alternatives to the national/FAO datasets are rarely available.

Here, we document the concepts and methods used to ‘reconstruct’ the likely total withdrawals (catches) removed from the Mediterranean waters of Spain, France, Italy, and Turkey from 1950 to 2010. We present the estimated ‘real’ catches, and then discuss some of their implications for fisheries management.

MATERIALS AND METHODS

The Mediterranean catch from the small-scale (i.e. artisanal, recreational and subsistence) and industrial fisheries of Spain (excluding the Balearic Islands, but including the Gulf of Cadiz because this Atlantic region shares similar ecological and socio-economic

traits with its adjacent Mediterranean region), France (excluding Corsica), Italy (excluding Sardinia and Sicily), and Turkey (Fig. 1) were ‘reconstructed’ for 1950-2010 based on concepts in Pauly (1998) and the approach outlined in Zeller et al. (2007). Pauly asserts that:

- There is no fishery with ‘no data’, because fisheries, as social activities, will tend to impact on other sectors of an economy, such as employment and seafood supply, or through their fuel requirements. Thus, it is nearly always possible to estimate the ‘size’ of a fishery and its catches, even if approximately.

- When compiling statistics, it is easy to misinterpret the fields of questionnaires (or other forms) that are left empty because the catch of certain fisheries is not available. Thus, subsequent users of one’s statistics will interpret the empty fields as zeroes, and the notion of unknown but non-zero catches is lost.

Based on this, the approach of Zeller et al. (2007) for reconstructing catches consists of a six-step process, which may be summarized as:

- 1- Identification of existing reported catch time series:

- a- Landing reported by FAO, by taxon and year.
- b- National and regional data series by taxon and year.

- 2- Identification of sectors (e.g. recreational fishing), periods, taxa, gears, etc. not covered by (1), i.e. missing fisheries. This may involve extensive literature surveys and inputs by local experts.

- 3- Identifying alternative information sources for (2), via extensive survey of the peer-reviewed and grey literature and the input of local experts.

- 4- Development of data ‘anchor points’ in time for each missing item, and expansion of anchor point data to country-wide catch estimates.

- 5- Interpolation for time periods between data anchor points, often via per capita (or per-fisher) catch rates for non-commercial sectors.

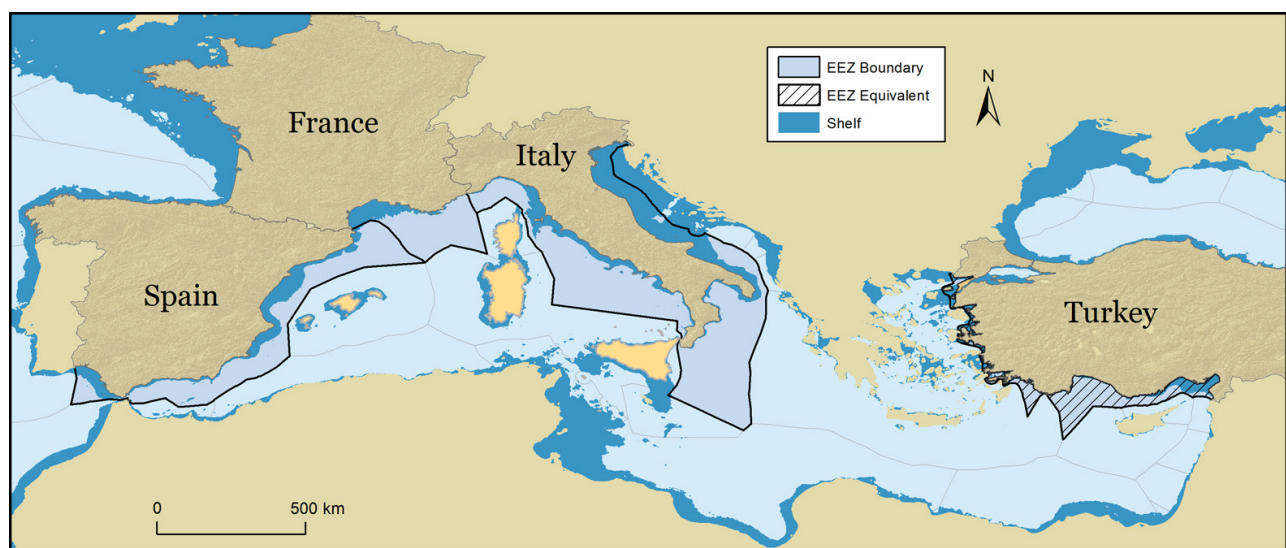


Fig. 1. – Location of the four exclusive economic zone (EEZ)-equivalent areas for which catches were reconstructed. Note that the Balearic Islands are not included with the Spanish Mediterranean coast (to which the Gulf of Cadiz area was appended, however), and nor are Corsica with France, Sardinia and Sicily with Italy, or the Dardanelles with Turkey. Based on non-official EEZ files distributed by the Flanders Marine Institute (VLIZ); see Suarez de Vivero (2010) for the current jurisdiction regarding EEZ claims in the Mediterranean.

Table 1. – Summary statistics of key features influencing fisheries along the Mediterranean coast of the four countries represented here, from west to east.

Results	Spain	France	Italy	Turkey
Exclusive economic zone (km ²) ^a	148006	64547	315972	72200
Shelf area (km ²)	36455	13510	76072	23035
Net primary production (mg C m ⁻² day ⁻¹)	593	602	464	399
Per capita seafood consumption (kg-year ⁻¹) ^b	27-30	34	25	8
Major river	Ebro	Rhône	Po	Seyhan

^a Based on non-official EEZ maps distributed by the Flanders Marine Institute (VLIZ); see Suarez de Vivero (2010) for the current jurisdiction regarding EEZ claims in the Mediterranean.

^b Average for 2005-2007; from www.st.nmfs.noaa.gov/st1/fus/fus10/08_perita2010.pdf, except for Spain, which is from Cerdeño (2012), and accounts for regional differences.

Table 2. – Summary of results from the reconstructed catches for Mediterranean Spain (from Coll et al. in press), France (from Bultel et al. in press), Italy (from Piroddi et al. in press) and Turkey (Ulman et al. 2013).

Results	Spain	France	Italy	Turkey
1) Mean total reconstructed catch 2006-2010 (in t-year ⁻¹)	244883	56819	314145	110500
2) Percent of (1) that is discarded	21.2	11.7	12.0	6.4
3) Percent of industrial catches in 2006-2000 landings	86.8	57.9	80.7	71.1
4) Percent of artisanal catches in 2006-2010 landings	2.5	25.8	11.5	23.2
5) Percent of recreational catches in 2006-2010 landings	7.4	15.3	6.8	4.9
6) Percent of subsistence catches in 2006-2010 landings	3.3	1.0	1.0	0.8
7) Catch/km ² of continental shelf (2006-2010; t-year ⁻¹)	6.7	4.2	4.1	4.8
8) Reconstructed catch/FAO or national data, early 1950s	1.7	2.9	1.5	2.2
9) Reconstructed catch/FAO or national data, 1950-2010	1.7	2.1	1.5	1.7
10) Reconstructed catch/FAO or national data, 2006-2010	1.7	2.2	1.5	1.7

6- Estimation of total catch time series, consisting of reported catches (1) and interpolated, country-wide expansion of previously missing data (5).

These basic rules were adapted to our four countries, each of which had different conditions and datasets available for the reconstructions of total catches. Country-specific technical details on how these six points were implemented are presented in Coll et al. (in press) for Spain, Bultel et al. (in press) for France, Piroddi et al. (in press) for Italy, and Ulman et al. (2013) for Turkey, which collectively form the basis of this contribution (see also Table 1 for summary statistics for the separate countries, and Table 2 for a summary of results for each country).

RESULTS

Spain (excl. the Balears, but incl. the Gulf of Cadiz)

The total reconstructed cumulative catch from the Mediterranean coast of Spain including the Gulf of Cadiz from 1950-2010 was 22 million t, which was 1.7 times more than the 12.8 million t of reported landings (Table 2, Coll et al. in press). To highlight the unreported components, we list, in decreasing order of importance, the contribution of different segments of the fishery to the unreported total (in tonnage and then as a percentage): discards (4.3 million t; 47%), industrial catches (2.3 million t; 26%), recreational catches (1.3 million t; 15%), artisanal catches (659,000 t; 7%), and subsistence catches (488,000 t; 5%). By the late 2000s, recreational fishing was the most important sector for unreported landings (36%), followed by black market sales (32%), subsistence fishing (17%), unreported artisanal fishing (12%) and illegal catches (2%).

The major trends (Fig. 2A) of the total reconstructed catches revealed that they gradually increased from

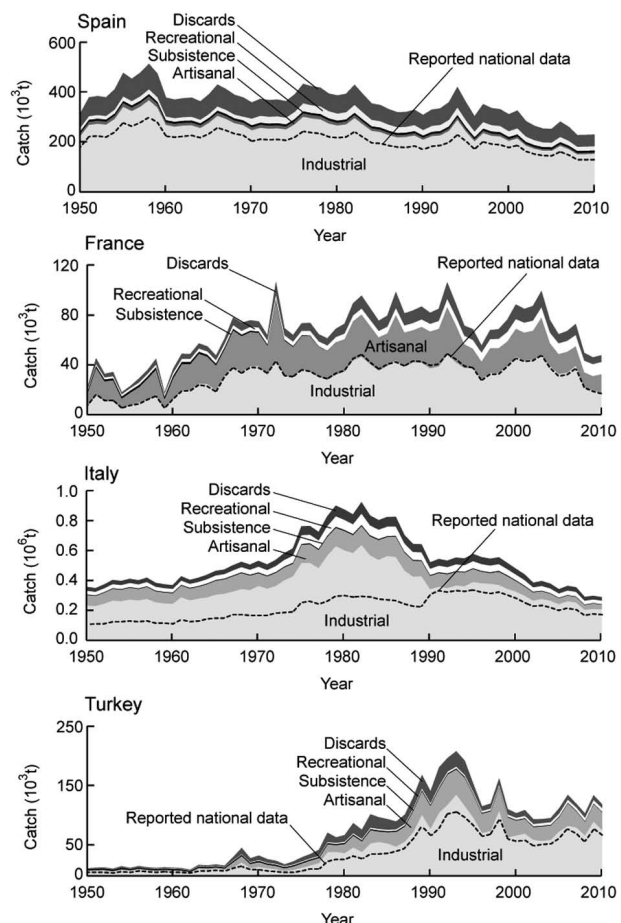


Fig. 2. – Total reconstructed catch by sector, compared with national reported data for the four countries in the Mediterranean Sea from 1950-2010.

1950 until 1960 and peaked in 1958 at 516000 t, after which they began to decline for the rest of the study period. There were substantial fluctuations until 1982,

after which catches declined to a minimum value of 227000 t·year⁻¹ in 2008, which resembles the official landings data (Fig. 2A; Table 2). In the early 1950s, total reconstructed catches averaged 375000 t·year⁻¹ and in the late 2000s total reconstructed catches averaged 245000 t·year⁻¹, representing a 65% decline in catches.

Our study highlights the importance of recreational and artisanal fisheries in the area. In fact, the diversity and economic importance of artisanal gears in small-scale fisheries are essential features of Mediterranean fishing (Tudela 2004). Other components of total fisheries removals may still be underestimated. For example, recreational fisheries also produce discards, which were not accounted for here (Franquesa et al. 2004, SFITUM 2006). Recreational catches are an important part of total fisheries removals and their importance has grown over time, especially since game fishing is a growing leisure activity in many Mediterranean countries.

Sardine (*Sardina pilchardus*), hake (*Merluccius merluccius*) and anchovy (*Engraulis encrasicolus*) contributed the bulk of removals since they are highly targeted species. Juvenile hake are substantially unreported, as they represent a substantial part of illegal catch. Trawling for hake, which has been the most important demersal target species in the Mediterranean in the past, has resulted in catches that consist almost entirely of immature fish (Hidalgo et al. 2009). Sardine and anchovy are subjected to substantial market price fluctuations and have been heavily discarded throughout the time period analysed. Additionally, the growing demand for feed for cage tuna may place some pressure on the unreported catch of small pelagic fish. Specific studies about unreported and discarded events of these highly caught species could improve our estimate of total catch removal of fisheries.

Obvious declines are observed for many important commercial species such as the three most-caught taxa, likely suggesting overfishing in line with existing assessments (Palomera et al. 2007, Abdul Malak et al. 2011). On the other hand, catches have increased in recent years for some species, such as round sardinella (*Sardinella aurita*), which is expanding its distribution range northward (Sabatés et al. 2006). In general, the catches are very taxonomically diverse and this diversity of the catch has also increased with time due to diversification of targeted species and the expansion of fishing to further and deeper fishing grounds.

France (excl. Corsica)

The total reconstructed catch for the French Mediterranean or Gulf of Lions from 1950-2010 was 4 million t, which was 2.1 times more than the 1.9 million t of reported landings (Table 2, Bultel et al. in press). In decreasing order of importance, the contribution of the different segments of the fishery to the unreported total was as follows: artisanal catches, 900000 t (42%); industrial catches, 500000 t (23%); discards, 415000 t (20%); recreational catches, 270000 t (13%); and subsistence catches, 36000 t (2%).

The major trends (Fig. 2B) of the total reconstructed catches was that they grew rapidly from 1950 to the early 1970s, peaking at over 100000 t·year⁻¹ in 1972, after which they appeared semi-stable from 1973 until about 1993 (averaging 75000 t·year⁻¹). Total catches then dropped precipitously from 2004 until 2010, averaging just 38000 t·year⁻¹ from 2008 to 2010. The sharp decline was mostly attributable to reported catches from the industrial sector, which dropped from 36000 t·year⁻¹ in the early 2000s to under 15000 t·year⁻¹ from 2008 to 2010. In the 1950s, total reconstructed catches averaged 28000 t·year⁻¹, compared with 62000 t·year⁻¹ from 2000 on, the increase mainly stemming from the increased influence of the recreational sector (Herfaut et al. 2013), which grew from an average of 1800 t·year⁻¹ in the 1950s to 8600 t·year⁻¹ in the 2000s. The French Mediterranean fisheries have been declining at a very alarming rate in recent years. Our total reconstructed industrial catches declined by a factor of 2.25 from 2000-2002 to 2008-2010, while the total reconstructed artisanal catches declined by a factor of 1.8 during the same period.

There is usually a large disparity between the quality of the data collected from the industrial fisheries and those collected from the artisanal fisheries, mainly because it is thought that the latter are negligible. France does monitor its artisanal sector, but only to a limited extent. Here, we show that better monitoring and reporting would be warranted, given that the artisanal sector generates catches nearly as high as the industrial sector.

The major taxa caught in the Gulf of Lions for the entire 1950-2010 period were Gadiformes (hake, blue whiting and poor cod), Mullidae, Clupeidae, Scombridae and Sparidae. Since about 1970, Clupeidae have shown a declining trend, which accelerated in 2008; since about 2000, the Scombridae have also been on a declining trend, which also accelerated in 2008; Sparidae catches appear to have remained steady since the early 1970s.

Italy (excl. Sicily and Sardinia)

The total reconstructed catch for the Italian Peninsula from 1950-2010 was approximately 45.6 million t, which was 2.5 times more than the 17.7 m t of reported data (Table 2, Piroddi et al. in press). In decreasing order of importance, the contribution of the different segments of the fishery to the unreported total was as follows: industrial catches, 6.7 million t (63%); discards, 2.4 million t (23.5%); artisanal catches, 970000 t (9.5%); subsistence catches, 282000 t (3%); and recreational catches, 137000 t (1%).

The major trend (Fig. 2C) of the total reconstructed catches is that total catches grew gradually from 1950 until 1972 and more rapidly from 1973, until peaking at 866000 t in 1983, after which they began to decline, averaging slightly over 320000 t year⁻¹ from 2006 to 2010. Recreational catches were the only sector whose catches grew throughout the 1950-2010 study period. Overall, there was a marked difference between the reconstructed catch and national reported data, the latter

of which showed a slight increase in catches until the late 1980s and a decline beginning in the mid-1990s. After World War II, increasing global demand for fish and fish products in combination with a technological revolution prompted fishing effort and capacity to increase exponentially (Cataudella and Spagnolo 2011), allowing for a rapid increase in catches until 1980. Afterwards, catches rapidly declined, primarily as a result of a decrease in the biomass of small pelagics, particularly European anchovy (*Engraulis encrasicolus*) and European pilchard (*Sardina pilchardus*), as well as many other important demersal and pelagic fish stocks (Arneri 1996, Iborra 2008). Only the catches of marine invertebrates have increased.

Unreported catches, a serious issue in Italian fisheries, have never truly been assessed, and their contribution to total landings will continue to be better understood as more studies on the topic are completed. Our study indicates that the unreported component of the landings accounts for at least one third of total fisheries removals. Of all unreported catch types, the impact of driftnets was estimated from the early 1990s, and that of recreational, artisanal and other industrial fisheries from the 1950s.

Turkey (excl. the Dardanelles)

The total reconstructed catch for Turkey's Mediterranean marine fisheries catches from the Aegean and Levant Seas as estimated for the years 1950-2010 was just under 4 million t (Table 2, Ulman et al. 2013), or 85% more than the 2.15 million t of reported data (Figure 2D). In decreasing order of importance, the contribution of the different segments of the fishery to the unreported total was as follows: industrial catches, 2.1 million t (54%); artisanal catches, 1 million t (27%); discards, 550000 t (14%); recreational catches, 133000 t (3%); and subsistence catches, 110000 t (2%).

Total reconstructed catches exhibited three distinct periods (Fig. 2D): 1950-1977 was characterized by slow growth; 1978-1993 was characterized by rapid growth, peaking at over 180000 t in 1993; and 2006-2010 was a period of declining catches, averaging less than 115000 t-year⁻¹. The period of slow growth may be attributable to the fact that the main industrial fishing area, in Iskenderun Bay, was already showing the effects of overfishing as early as the 1950s; the period of rapid growth was due to heavy state investment into the development of fisheries, which radically increased overall capacity (Knudsen 2004); declining catches were the inevitable result. The industrial fishing fleet has continued to grow uncontrollably (most notably after the 1980s), which has been detrimental to the declining stocks of target species (Gücü 2001).

Under-reported catches were the largest component, due to inefficient monitoring, control and surveillance (MCS) systems in Turkey. Furthermore, fishers may under-report their catches due to distrust of the present taxation system. The combined landings of all demersal species from the Levantine region declined drastically from 10000 t-year⁻¹ in 1992 to 2000 t-year⁻¹ from 2001 to 2010. The last figure is reflected in the

low discard rate for Turkey presented for 2006-2010 (Table 2), which was estimated by gear type and target species. The contributions of the recreational and subsistence sectors to total catches are small compared with the commercial sectors.

The size and power of the Turkish fishing fleet is far in excess of that needed to generate current catches; this problem, if not addressed, will cause catch per effort, fish sizes and stock sizes to continue to decline (Ulman et al. 2013).

DISCUSSION

Besides the obvious results, i.e. the wide divergence between our reconstructions and officially reported data, we should discuss a few commonly-held views that we encountered during the reconstruction work leading to the four reports that form the basis of this contribution. The views concern the availability of alternative data, the definition of small-scale/artisanal fisheries and the relationship between subsistence and recreational fisheries. We also discuss, as an aside, the willingness of colleagues to participate in this reconstruction.

It was not really difficult to identify data or to formulate reasonable assumptions with which to fill in the gaps in official data. The reason here is that the official data are not incomplete because "there are no data", but because the national agencies reporting officially in the four countries we report on here (and in the other 150+ maritime countries for which reconstructions are available) do not see it as their mandate to report on any more than industrial fisheries catches and the formal part of the artisanal sector, leaving the informal part of the sector, as well as the subsistence and recreational fisheries, undocumented. It is quite straightforward, using the scientific literature (peer-reviewed and grey), to infer on the catch and catch composition of these neglected small-scale, but often very substantial fisheries. There is thus no legitimate reason for the national agencies reporting to FAO to add to the confusion generated by illegal, unreported and unregulated (IUU) fishing.

The same applies to discarded by-catch, which practically none of the national fishery agencies in the world appear to include in catch statistics, although they are definitely part (and sometimes an important part) of fisheries catches. Only one Regional Fisheries Management Organization (RFMO), the Commission for the Management of Antarctic Marine Living Resources (CCAMLR) includes discards in its catch statistics, while the other RFMOs, as well as the FAO, publish studies on discarding but do not include them in their statistics (see e.g. Kelleher 2005; Zeller and Pauly 2005). We mention this here as the issue of by-catch retention, and hence the abolition of discarding, or at least its reduction, is a major issue for the reform of the European Common Fisheries Policy, which will have large implications for fisheries in European seas, including the Mediterranean fisheries (Sarda et al. in press).

Another issue (or rather non-issue) is the definition of artisanal fisheries, here understood to be a small-

scale activity generating products that are sold, unlike subsistence fishing, conducted primarily for one's own (or family) consumption, and recreational fishing, conducted primarily for enjoyment (see Griffiths et al. 2007). There is obviously a lot of overlap between these categories, but between countries, especially in the Mediterranean, there is far more coherence than one would think upon reading, for example, the literature on maritime anthropology (Pauly 2006). For the purposes of our reconstruction, we accepted each country's definition of small-scale-artisanal fisheries, which generally amounted to using fixed or passive gear, and/or craft of 10-15 m, but excluding any active or dragged gear, which cannot be considered artisanal (Martín 2012).

There are also definitional problems concerning recreational (Cisneros-Montemayor and Sumaila 2010) and subsistence fisheries (Schumann and Macinko 2007), both of which are also neglected in official reporting systems, but which generate appreciable catches. In our case, their joint contributions ranged from 5% to 16% of total catches, with recreational fisheries, however defined, preponderant over subsistence fisheries (Table 2). In the course of completing the four historic catch reconstructions highlighted here, and others around the Mediterranean and elsewhere, in several cases we noted a distinct reticence by colleagues in government agencies to participate in work that might be seen as challenging their government, while this was less noticeable with university-based colleagues. We will not give details, but regret this situation, a rational response in the face of some governments' actions (for the serious case of Canada, see Turner 2013). Other difficulties encountered during the catch reconstructions in the Mediterranean Sea include the facts that (1) much relevant documentation is not digitized and is only available in local languages, (2) access to digitized data in possession of regional and national administrations is not always publically available and requests to access these data are frequently ignored, and (3) the compilation of information from local stakeholders requires time to build trust and robust communication mechanisms. Therefore, the participation of local experts during the catch reconstruction is essential.

The main point of the contribution is, however, the disparity between the reconstructed catches and the official data. Overall, i.e., for our four countries and the entire 61-year period covered here, the reconstructed catches are 1.76 times the official data, but this global ratio hides more than it reveals. The ratio drops to 1.56 if discards are not considered; more interestingly, this ratio (with discards included) was 2.08 in the 1950s but dropped to only 1.78 in the 2000s (see above and Table 2 for details on a per-country basis), which is encouraging.

Currently, we do not present confidence interval or other measure of uncertainty with our reconstruction, although an approach combining the pedigree of (and hence confidence in) the data upon which they are based (Funtowicz and Ravetz 1990) with a Monte-Carlo approach (Ainsworth and Pitcher 2005;

Tesfamichael and Pitcher 2007) may be used toward this purpose in the future. It is important to realize, however, that conventional confidence intervals, expressing how close one would be on average to a given result if one were to repeat its estimation a large number of times (i.e. dealing with its precision) are perfectly inadequate here, because we are dealing with the bias (lack of accuracy) caused by deliberate omission of a catch component.

Finally, we should briefly reflect on what, if any, are the management implication of a catch that is about twice as high as is conventionally assumed. One obvious implication is that the Mediterranean may be twice as productive, with respect to fisheries, than has been assumed so far, which may modify certain development plans, especially as they are now supposed to be ecosystem-based. However, real fishing effort has increased exponentially in the region and is substantially higher than nominal effort, thus painting a very different picture that indicates a process towards depletion of resources over time. Also, this result suggests that the institutional neglect that small-scale (artisanal, recreational and subsistence) fisheries suffer from may be actually based on the misunderstanding that small-scale fisheries must generate small catches. Our results demonstrate that from 2006 to 2010, from 13% (in Spain) to over 42% (in France) of total catches in the Mediterranean (discards excluded) are contributed by small-scale, mainly artisanal and recreational fisheries (see Table 2). The systematic underestimation of the small-scale fisheries of the Mediterranean is part of a global phenomenon (Pauly 2006) that will have to be overcome if the potential of these fisheries for sustainable exploitation of coastal systems is to be realized.

Increased tourism, seafood consumption and recreational fishing in the Mediterranean region will continue to exacerbate stresses on the coastal ecosystem and its resources. With many key commercial taxa showing a declining trend (Abdul Malak et al. 2011), it is necessary for fisheries managers to fully apprehend how much fish have been and are being removed and by whom, so that appropriate decisions regarding the future of these resources can be made.

CONCLUSIONS

The rationale of, and methods for, historic fisheries catch reconstruction are presented, along with some results for four Mediterranean countries: Spain, France, Italy and Turkey. Jointly, these reconstructions illustrate the fact that the government agencies of countries bordering the Mediterranean neglect small-scale (artisanal, recreational and subsistence) fisheries, and hence their contribution to local seafood supplies. Data availability for this reconstruction was generally good, and their obstacles are mainly perceived ones. Examples of such assumed, but easily overcome, obstacles were alleged scarcity of data, the assumed disparity of definitions of small-scale fisheries between different countries, and the absent quantification of uncertainty for reconstructed catch estimates.

ACKNOWLEDGEMENTS

Daniel Pauly, Aylin Ulman, and Elise Bulte acknowledge support from the *Sea Around Us* Project, a scientific collaboration between the University of British Columbia and the Pew Charitable Trusts. Chiara Piroddi would like to thank Dr. Labbranchi for providing useful interpretations of national data and Alessio Morelli, Lt Commander, Head of the Fisheries National Control Unit, for his valuable knowledge and interpretation of the Italian IUU sector. Marta Coll was supported by the Marie Curie CIG grant to BIOWEB and the Spanish Ramon y Cajal Research Programme.

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