

**MEDAC LIST OF PAPERS AND RESEARCHERS OF RECREATIONAL FISHERIES**

During 2019, WG4 evaluated currently available literature on recreational fisheries in order to define which of the many studies are useful and significant for the purpose of further research on the sector in question, so as to be in a position to provide the Commission and the Member States with an up-to-date tool to be used as necessary in the pursuit of sustainable, conscious and non-discriminatory management of recreational fisheries in the Mediterranean basin.

| Paper/Publication   | Year | Author/s                | Modality     | Comments  |
|---|------|-------------------------|--------------|---|
| Cultural and socio-economic impacts of Mediterranean marine protected areas   | 2000 | Badalamenti et al.      | All          | Authors review management of different activities in Mediterranean MPAs, including recreational fisheries, to claim more focus on socio-economic impacts. |
| SFITUM, Sport fishing: an informative and economic alternative for Tuna fishing in the Mediterranean  | 2003 | Gordoa A.               | Angling      | Boat fishing  |
| Spearfishing in the Balearic Islands (West central Mediterranean): species affected and catch-evolution during the period 1975-2001         | 2004 | Coll et al.             | Spearfishing |   |
| Impacte de la pesca recreativa sobre les espècies comunes al litoral de Catalunya   | 2004 | ECOPROGES               | All          | Study for the Catalan fisheries Directorate, focused on the impact on species   |
| A conceptual framework to identify and understand conflicts in recreational fisheries systems, with implications for sustainable management | 2005 | Robert Arlinghaus       | All          |   |
| Global impact on recreational fisheries   | 2005 | Arlinghaus R., Cooke S. | All          | Letter responding the article <i>The impact of United States recreational fisheries on marine fish populations.</i>                                       |
| A fuzzy local expert system to estimate intrinsic extinction vulnerabilities of marine fishes to fishing                                    | 2005 | Cheung et al.           | All          | This article is useful for all fisheries (commercial and recreational), as it allows estimating vulnerability of targeted species to fishing              |
| The recreational fishery off Majorca Island (Western Mediterranean): some implications for coastal resource management                      | 2005 | Morales-nin et al.      | All          |   |
| Estudio del impacto socioeconómico de la pesca recreativa en el Mediterráneo español  | 2005 | TRAGSA                  | Boat         | Focused on Spanish Mediterranean boat fishing.  |
| Overcoming human obstacles to conservation of recreational fishery resources, with emphasis on central Europe                               | 2006 | Robert Arlinghaus       | Angling      | Paper based on freshwater ecosystems with private access, but some constraints and suggestions are applicable to marine RF                                |
| La pesca recreativa en Cataluña: aspectos biológicos, sociales y económicos   | 2006 | Maria A.                | All          | Focused just on Catalonia region  |
| Review of recreational fisheries survey methods   | 2006 | Sullivan et al.         | All          |   |

| Paper/Publication  | Year | Author/s                | Modality     | Comments   |
|--|------|-------------------------|--------------|--|
| Recreational fisheries in the Mediterranean countries: A review of existing legal frameworks   | 2007 | Gaudin C., De Young C.  | All          |  |
| Managing evolving fish stocks  | 2007 | Jorgensen et al.        | All          | The paper shows how fisheries-induced evolution may affect our experience on several marine activities, recreational fisheries being one of them   |
| EU Contract FISH/2004/011 on "Sport Fisheries" (or Marine Recreational Fisheries) in the EU  | 2007 | Pawson et al.           | All          |  |
| Influence of anatomical hooking depth, capture depth, and venting on mortality of painted comber ( <i>Serranus scriba</i> ) released by recreational anglers             | 2008 | Alòs J.                 | Angling      |  |
| Effects of hook size and barbless hooks on hooking injury, catch per unit effort, and fish size in a mixed-species recreational fishery in the western Mediterranean Sea | 2008 | Alòs et al.             | Angling      |  |
| The definition of marine recreational fishing in Europe  | 2008 | Pawson et al.           | All          |  |
| Spearfishing pressure on fish communities in rocky coastal habitats in a Mediterranean marine protected area   | 2008 | Lloret et al.           | Spearfishing | This paper is the result of an Interreg IIIc project (MEDPAN) full of methodological flaws (species identification, size estimations, survey methodology, etc). IFSUA identified them all and wrote a detailed report about it. The problem is that this paper has been cited and used many times after its publication by other authors, so the flaws are carried around. Even managers have used it to apply discriminatory regulations. |
| Recreational fisheries: Socioeconomic importance, conservation issues and management challenges  | 2009 | Arlinghaus R., Cooke S. | All          | Chapter 3 from book: Recreational hunting, conservation and rural livelihoods: science and practice, by Dickson et al.   |
| Adaptive management for a turbulent future   | 2010 | Allen et al.            | All          | This is a very general paper that mentions that this kind of management can help to mitigate anthropogenic impacts and, specifically, recreational harvest of animals and regulation of human participation in natural resource-based recreational activities.   |
| Scientists and recreational fishers: Communication manners and its efficiency  | 2010 | Cardona-Pons et al.     | Angling      | Although the study is only about angling, the conclusions could be applied to all modalities.  |
| Diversity and complexity of angler behaviour drive socially optimal input and output regulations in a bioeconomic recreational-fisheries model                           | 2010 | Johnston et al.         | All          | Study on freshwater species but interesting to understand the need to take fishers behaviour into consideration when managing RF.  |

| Paper/Publication   | Year | Author/s                   | Modality     | Comments  |
|---|------|----------------------------|--------------|---|
| Socioeconomic implications of recreational shore angling for the management of coastal resources in a Mediterranean Marine Protected Area   | 2010 | Font T., Lloret J.         | Angling      | Shore-based   |
| Quantifying recreational fishing catch and effort: a pilot study of shore-based fishers in the Perth Metropolitan Area  | 2011 | Smallwood et al.           | Angling      | Focused on shore-based fishers  |
| The importance of trip context for determining primary angler motivations: are more specialized anglers more catch-oriented than previously believed?   | 2011 | Beardmore et al.           | Angling      | Although the study is on a freshwater species and angling, we believe it should be applicable to marine recreational fisheries modalities. It would be desirable more studies like this (mainly saltwater and spearfishing) to see if results are similar.  |
| Assessing the impact of artisanal and recreational fishing and protection on a white seabream ( <i>Diplodus sargus sargus</i> ) population in the north-western Mediterranean Sea, using a simulation model. Part 2: Sensitivity analysis and management measures | 2011 | Hussein et al.             | All          |   |
| Comunidades de peces de los arrecifes rocosos costeros de Galicia: ecología e impactos humanos  | 2011 | Pita P.                    | All          | In this PhD recreational fisheries CPUE is obtained from a survey answered by a ridiculous number of fishers (e.g. 54 spearfishers out of a population of more than 5000). This is against standard methodology in how recreational fisheries assessments should be carried out and thus, results in completely flawed data.                                      |
| Spearfishing regulation benefits artisanal fisheries: the ReGS indicator and its application to a multiple-use Mediterranean marine protected area  | 2011 | Rocklin et al.             | Spearfishing | It makes assemblages with species not targeted by spearfishers. The list used is completely different from MEDAC list. On the other hand, should an MPA have the role of benefiting commercial stakeholders and be detrimental to RF? Finally, although grouper being banned to spearfishing, they include it as fished by them. This is completely unacceptable. |
| Community involvement in recreational fisheries data collection: opportunities and challenges   | 2011 | Stenekes N., Sahlqvist P.  | All          | The paper shows the benefits of recreational fisheries monitoring programs in Australia.  |
| Influence of spear guns, dive gear and observers on estimating fish flight initiation distance on coral reefs   | 2012 | Januchowsky-Hartley et al. | Spearfishing |   |
| Technical Guidelines for Responsible Fisheries 13: Recreational Fisheries   | 2012 | Arlinghaus et al.          | All          | FAO Document. MEDAC developed advice based on this.   |
| Analyse économique et sociale de l'utilisation de nos eaux marines et du coût de la dégradation du milieu marin en Méditerranée occidentale, activités de loisirs utilisation des eaux marines, pêche récréative  | 2012 | Levret H.                  | All          |   |

| Paper/Publication  | Year | Author/s                | Modality     | Comments   |
|--|------|-------------------------|--------------|--|
| Towards resilient recreational fisheries on a global scale through improved understanding of fish and fisher behaviour                                 | 2013 | Arlinghaus et al.       | All          | Understanding fish and fisher behaviour is paramount for resilient fisheries   |
| Communication between scientists, fishery managers and recreational fishers: Lessons learned from a comparative analysis of international case studies | 2013 | Dedual et al.           | All          |  |
| Unexpectedly high catch-and-release rates in European marine recreational fisheries: implications for science and management                           | 2013 | Ferter et al.           | Angling      |  |
| La pêche récréative en mer en France Métropolitaine (Atlantique, Manche, Mer du Nord, Méditerranée)  | 2013 | Levrel et al.           | All          | Results of the survey taken by IFREMER   |
| A comparative analysis between recreational and artisanal fisheries in a Mediterranean coastal area  | 2013 | Lloret et al.           | All          | All assumptions on spearfishing are, at least, dubious due to being based on the paper by the same authors on 2008 that is considered completely flawed. |
| overcoming human obstacles to conservation of recreational fishery resources, with emphasis on central Europe  | 2013 | Cooke et al.            | Angling      | Authors present different scenarios in which tagging by unexperienced fishers is questioned.   |
| Análisis de la flota recreativa y de su impacto socioeconómico y pesquero en Euskadi   | 2013 | Zarauz et al.           | Angling      | Socio-economics of boat fishing in Basc Country  |
| Estimation of the recreative fishery catches along the Venetian coast  | 2014 | Anelli Monti et al.     | All          |  |
| Explaining participation rates in recreational fishing across industrialised countries   | 2014 | Arlinghaus et al.       | All          | Results mix freshwater and marine RF   |
| Socio-ecological approach of the recreational squid fishery  | 2014 | Cabanellas-Reboredo M.  | Angling      | Boat fishing   |
| Angling for endangered fish: Conservation problem or conservation action?  | 2014 | Cooke et al.            | Angling      |  |
| Does recreational catch impact the TAC for commercial fisheries?   | 2014 | Eero et al.             | All          | Based on an Atlantic species but perfectly applicable to other basins  |
| Biological and ecological impacts derived from recreational fishing in Mediterranean coastal areas   | 2014 | Lloret et al.           | All          | All assumptions on spearfishing are, at least, dubious due to being based on the paper by the same authors on 2008 that is considered completely flawed. |
| A review of biology, fisheries and population structure of <i>Dentex dentex</i>  | 2014 | Marengo M., Marchand B. | All          | Authors make a review on this species, including its fisheries. A point is dedicated to recreational.  |
| How relevant are recreational fisheries? Motivation and activity of resident and tourist anglers in Majorca  | 2014 | Morales-nin et al.      | All          |  |
| Spear fishing ban in MPAs: the rational choice?  | 2014 | Pita et al.             | Spearfishing | The study identifies several flaws in some of the main studies focused on spearfishing   |

| Paper/Publication   | Year | Author/s                          | Modality     | Comments   |
|---|------|-----------------------------------|--------------|--|
| The use of spearfishing competition data in fisheries management: evidence for a hidden near collapse of a coastal fish community in Galicia (NE Atlantic Ocean)      | 2014 | Pita et al.                       | Spearfishing | Spear fishing data is used to show the decline of coastal fish communities (independently of the cause).   |
| The economic gains from reallocating specific saltwater fisheries   | 2015 | American sportfishing association | All          |  |
| Improving knowledge exchange among scientists and decision-makers to facilitate the adaptive management of marine resources: A review of knowledge and research needs | 2015 | Cvitanovic et al.                 | All          | Review paper useful for all kind of fisheries, including recreational and commercial   |
| The structure and function of angler mental models about fish population ecology: The influence of specialization and target species                                  | 2015 | Gray et al.                       | Angling      | Although the study is on a freshwater species and angling, it is perfectly applicable to marine recreational fisheries modalities.   |
| Effectively managing angler satisfaction in recreational fisheries requires understanding the fish species and the anglers  | 2015 | Beardmore et al.                  | Angling      | Although the study is on a freshwater species and angling, we believe it should be applicable to marine recreational fisheries modalities. It would be desirable more studies like this (mainly saltwater and spearfishing) to see if results are similar. |
| Comparing industry sector values, with a case study of commercial fishing and recreational sea angling  | 2015 | Tinch et al.                      | All          |  |
| Comparing different survey methods to estimate European sea bass recreational catches in the Basque country   | 2015 | Zarauz et al.                     | All          | Although the study is focused in the Atlantic is perfectly applicable to the Mediterranean.  |
| Collaborative approaches to accessing and utilising historical citizen science data: a case-study with spearfishers from eastern Australia                            | 2015 | Gledhill et al.                   | Spearfishing | How to take advantage of recreational fisheries knowledge and sources of information to establish baselines to understand change in marine ecosystems. Applicable to other RF modalities, also.  |
| Smartphones reveal angler behavior: a case study of a popular mobile fishing application in Alberta, Canada.  | 2015 | Papenfuss et al.                  | All          | Paper based on freshwater ecosystems, but applicable to marine RF  |
| Fast and behavior-selective exploitation of marine fish targeted by anglers   | 2016 | Alós et al.                       | Angling      | Study on <i>Xyrichtys novacula</i> . Vulnerability to angling. The idea of vulnerability could probably be extrapolated to other gears.  |
| Recommendations for the future of recreational fisheries to prepare the socio-ecological system to cope with change   | 2016 | Arlinghaus et al.                 | All          | Conclusions and recommendations emerged from 2014 WRFC   |
| Response of fish populations to novel and traditional harvesting regulations  | 2016 | Bond et al.                       | All          | Conference paper based on laboratory experiment suggests harvesting slots managing outperform traditional min length management. It would be desirable to test it in the sea.  |

| Paper/Publication   | Year | Author/s                   | Modality     | Comments   |
|---|------|----------------------------|--------------|--|
| Estimating harvest and its uncertainty in heterogeneous recreational fisheries  | 2016 | Cabanellas-Reboredo et al. | Angling      | Focused on <i>Loligo vulgaris</i> fishery (boat) in Mallorca but applicable to many modalities   |
| Comparative analysis between artisanal and recreational fisheries of <i>Dentex dentex</i> in a Marine Protected Area                                      | 2016 | Marengo et al.             | All          | Biased toward artisanal fisheries. Although they catch more Dentex, they claim measures to RF. On the other hand, it's against Malak A. et al. (2011) conclusion that spear fishing is the main threat of <i>Dentex dentex</i> in the Mediterranean and here its impact is considered low. |
| Assessing the impact of spear fishing by using competitions records and underwater visual censuses  | 2016 | Pita et al.                | Spearfishing |  |
| Consumptive tourism causes timidity, rather than boldness, syndromes: a response to Geffroy et al.  | 2016 | Arlinghaus et al.          | All          | The authors of the response state that consumptive tourism does not cause boldness but timidity syndrome based on recreational fishing examples.   |
| Does unreported catch lead to overfishing?  | 2016 | Rudd M.B., Branch T.A.     | All          | Useful for any kind of fishery, recreational and commercial  |
| The Barcelona agreement: a manifesto towards the spearfishing of the future   | 2016 | Sbragaglia et al.          | Spearfishing | The authors explain the main challenges for this activity in over-exploited coastal ecosystems   |
| Bait worms: a valuable and important fishery with implications for fisheries and conservation management  | 2016 | Watson et al.              | Angling      | Assessment and ecological implications of bait collecting  |
| Why do fishers fish? A cross-cultural examination of the motivations for fishing  | 2016 | Young et al.               | All          | An study of fishers motivations, comparing recreational and artisanal and finding out that they have a lot in common (recreational mindset).   |
| Spearfishing data reveals the littoral fish communities' association to coastal configuration   | 2017 | Boada et al.               | Spearfishing |  |
| Expanding aquatic observations through recreation   | 2017 | Brewin et al.              | All          |  |
| The nexus of fun and nutrition: Recreational fishing is also about food   | 2017 | Cooke et al.               | All          |  |
| Evaluation of observer-and industry-based catch data in a recreational charter fishery  | 2017 | Gray C.A., Kennelly S.J.   | Angling      |  |
| Recreational sea fishing in Europe in a global context - Participation rates, fishing effort, expenditure, and implications for monitoring and assessment | 2017 | Hyder et al.               | All          |  |
| Toward a mechanistic understanding of vulnerability to hook-and-line fishing: Boldness as the basic target of angling-induced selection                   | 2017 | Klefoth et al.             | Angling      | Although the experiment was made with freshwater fish, it is probably applicable to marine species   |
| What makes fish vulnerable to capture by hooks? A conceptual framework and a review of key determinants   | 2017 | Lennox et al.              | Angling      | Applicable to recreational and commercial fisheries that target fish with hooks  |
| Conciliating artisanal and recreational fisheries in Aneгада Bay, Argentina   | 2017 | Llompарт et al.            | All          |  |

| Paper/Publication  | Year | Author/s                    | Modality     | Comments   |
|--|------|-----------------------------|--------------|--|
| A matter of scales. The management of recreational fisheries in the EU   | 2017 | Pita et al.                 | All          |  |
| The role of recreational fisheries in the sustainable management of marine resources   | 2017 | Ogana A.                    | All          |  |
| Making waves: Marine citizen science for impact  | 2017 | Schläppy et al.             | All          | Although not directly focused on recreational fisheries, it could be very useful for RF stakeholders   |
| Angler apps as a source of recreational fisheries data: opportunities, challenges and proposed standards   | 2017 | Venturelli et al.           | All          | Opportunities and challenges of apps as a source of data for RF assessments  |
| Recreational fisheries in Portofino Marine Protected Area, Italy: Some implications for the management   | 2017 | Venturini et al.            | Angling      |  |
| Participatory adaptive management leads to environmental learning outcomes extending beyond the sphere of science  | 2017 | Fujitani et al.             | Angling      | Although the study is on a freshwater species and angling, we believe it is applicable to all marine recreational fisheries modalities.                                |
| An assessment of catches of shore sport fishing competitions along the coast of the Maltese Islands: Implications for conservation and management            | 2018 | Agius Darmanin S., Vella A. | Angling      | Just focused on shore based competitions   |
| Welfare of aquatic animals: where things are, where they are going, and what it means for research, aquaculture, recreational angling and commercial fishing | 2018 | Browman et al.              | All          | Applicable to recreational and commercial fisheries.   |
| Identifying recreational fisheries in the Mediterranean Sea through social media   | 2018 | Iovos et al.                | All          | Taking data from social media is very dangerous, as a very limited part of the RF population uses them. Indeed, there is a new trend among fishers to avoid them.      |
| Recreational fishing in Spain: First national estimates of fisher population size, fishing activity and fisher social profile                                | 2018 | Gordoa et al.               | All          | First assessment made of the whole Spanish population of recreational fishers using an app.  |
| Estimating recreational fishing fleet using satellite data in the Aegean and Ionian Seas (Mediterranean Sea)   | 2018 | Keramidas et al.            | Angling      | Limited to boat fishing  |
| Estimating post-release mortality of European sea bass based on experimental angling   | 2018 | Lewin et al.                | Angling      |  |
| The impact of marine recreational fishing on key fish stocks in European waters  | 2018 | Radford et al.              | All          | Although the article is full of extrapolations due to scarce data, the authors stress the need to include RF catches in stock assessments                              |
| Spearfishing modulates flight initiation distance of fishes: the effects of protection, individual size, and bearing a speargun                              | 2018 | Sbragaglia et al.           | Spearfishing | Results differ in some aspects with those of Januchowsky-Hartley et al. More studies on this subject should be made in order to understand which is the general trend. |
| Opinion: Governing the recreational dimension of global fisheries  | 2019 | Arlinghaus et al.           | All          |  |
| The future of recreational fisheries: advances in science, monitoring, management and practice   | 2019 | Brownscombe et al.          | All          | Review on different aspects of recreational fisheries, including research. Some data offered seems dubious, like that catch and release in European RF is around 60%.  |

| Paper/Publication   | Year | Author/s          | Modality | Comments   |
|---|------|-------------------|----------|--|
| The first estimates of species compositions of Spanish marine recreational fishing reveal the activity's inner and geographical variability | 2019 | Dedeu et al.      | All      |  |
| Recreational and small-scale fisheries may pose a threat to vulnerable species in coastal and offshore waters of the western Mediterranean  | 2019 | Lloret et al.     | All      | Lloret keeps using his 2008 flawed data and the biased results keep spreading to other papers. |
| Data mining on YouTube reveals fisher group-specific harvesting patterns and social engagement in recreational anglers and spearfishers     | 2019 | Sbragaglia et al. | All      |  |

A list of researchers who work in European and/or national research institutes and organisations is also provided together with this information; these are experts who have acquired in-depth knowledge and experience on the specific issues affecting the recreational fisheries sector. This list reflects to some degree the confidence that the stakeholders have in those fisheries scientists who demonstrate that they know how to approach the matters that are unique to the recreational fisheries sector in a fair and unbiased way, thus providing high-level scientific support in the endeavour to define future management choices for a recreational fisheries sector that is sustainable, easy-to-integrate and which does not suffer undue discrimination.

| Scientist Name, Surname      | Interest area (maritime, freshwaters, both) | Job Country | Institute/University/EU (ICES - STECF)  |
|------------------------------|---|-------------|---|
| Alòs, Pep                    | maritime                                    | Spain       | IMEDEA                                  |
| Arlinghaus, Robert           | Both  | Germany     | Leibniz-Institute of Freshwater Ecology |
| Azzurro, Ernesto             | maritime                                    | Italy       | ISPRA                                   |
| Baudrier, Jérôme             | maritime                                    | France      | IFREMER                                 |
| Boada, Jordi                 | maritime                                    | Spain       | UB                                      |
| Brown, Adam                  | maritime                                    | UK          | CEFAS                                   |
| Cavaleiro Diogo, Hugo Miguel | maritime                                    | Portugal    | University of Azores                    |
| Colella, Sabrina             | maritime                                    | Italy       | ISMAR                                   |
| Dedeu Luntón, Arnau Luk      | maritime                                    | Spain       | ICM-CSIC                                |
| Ferter, Keno                 | maritime                                    | Norway      | IMR                                     |
| Gordoa, Ana                  | maritime                                    | Spain       | CEAB-CSIC                               |
| Grati, Fabio                 | maritime                                    | Italy       | CNR-IRBIM and FAO GFCM                  |
| Hyder, Kieran                | maritime                                    | UK          | CEFAS                                   |
| Keramidas, Ioannis           | maritime                                    | Greece      | AUT                                     |
| Lafon, Jérôme                | maritime                                    | France      | FranceAgriMer                           |
| Lozano, Matías               | maritime                                    | Spain       | IEO                                     |



| Scientist Name, Surname  | Interest area<br>(maritime,<br>freshwaters, both) | Job Country | Institute/University/EU (ICES -<br>STECF) |
|--------------------------|---|-------------|---|
| Michailidis, Nikolas     | maritime  | Cyprus      | DFMR                                      |
| Mohamed, Esha            | maritime  | Sweden      | SLU                                       |
| Morales-Nin, Beatriz     | maritime  | Spain       | IMEDEA                                    |
| Mugerza, Estanis         | maritime  | Spain       | AZTI                                      |
| Olesen, Hans Jakob       | maritime  | Denmark     | DTU                                       |
| Papadopoulos, Anastasios | maritime  | Greece      | FRI                                       |
| Pita, Pablo              | maritime  | Spain       | USC                                       |
| Rangel, Mafalda          | maritime  | Portugal    | CCMAR                                     |
| Sbragaglia, Valerio      | maritime  | Italy       | ISPRA                                     |
| Sköv, Christian          | maritime  | Denmark     | DTU                                       |
| Strehlow, Harry Vincent  | maritime  | Germany     | Thünen-Institute                          |
| Veiga, Pedro             | maritime  | Portugal    | Sustainable Fisheries<br>Partnership      |
| Verleye, Thomas          | maritime  | Belgium     | VLIZ                                      |
| Villasante, Sebastián    | maritime  | Spain       | USC                                       |
| Volstad, John Helge      | maritime  | Norway      | IMR                                       |
| Weltersbach, Simon       | maritime  | Germany     | Thünen-Institute                          |
| Zarauz, Lucia            | maritime  | Spain       | AZTI                                      |