



How good is your marine protected area at curbing threats?

Mirta Zupan, Fabio Bulleri, Julian Evans, Simonetta Frascchetti, Paolo Guidetti, Antoni Garcia-Rubies, Marta Sostres, Valentina Asnaghi, Anthony Caro, Salud Deudero, et al.

► To cite this version:

Mirta Zupan, Fabio Bulleri, Julian Evans, Simonetta Frascchetti, Paolo Guidetti, et al.. How good is your marine protected area at curbing threats?. *Biological Conservation*, 2018, 221, pp.237–245. 10.1016/j.biocon.2018.03.013 . hal-01826691

HAL Id: hal-01826691

<https://hal.science/hal-01826691>

Submitted on 15 Apr 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

How good is your marine protected area at curbing threats?

Mirta Zupan^{a*}, Fabio Bulleri^b, Julian Evans^c, Simonetta Fraschetti^d, Paolo Guidetti^e, Antoni Garcia-Rubies^f, Marta Sostres^a, Valentina Asnaghi^g, Anthony Caro^a, Salud Deudero^h, Raquel Goñi^h, Giuseppe Guarnieri^d, Francois Guilhaumonⁱ, Diego Kersting^{j,k}, Athina Kokkali^l, Claudia Kruschel^m, Vesna Macicⁿ, Luisa Mangialajo^{o,p}, Sandra Mallo^h, Enrique Macpherson^f, Antonella Panucci^l, Mirko Radolovic^q, Mohamed Ramdani^s, Patrick J. Schembri^c, Antonio Terlizzi^{t,u}, Elisa Villa^v, Joachim Claudet^a

Affiliations

^a National Center for Scientific Research, PSL Research University, CRIOBE, USR 3278 CNRS-EPHE-UPVD, 66860 Perpignan, France

^b Dipartimento di Biologia, Università di Pisa, Via Derna 1, 56126, Pisa

^c Department of Biology, University of Malta, Msida MSD2080, Malta

^d Department of Biological and Environmental Sciences and Technologies, University of Salento, CoNISMa, 73100, Lecce, Italy

^e CoNISMa (Interuniversity National Consortium of Marine Sciences, 00196 Rome, Italy)

^f Centre d'Estudis Avançats de Blanes, CEAB-CSIC, C. acces Cala S. Francesc 14, 17300 Blanes, Spain

^g Department for the Earth, Environment and Life Sciences, University of Genoa, CoNISMa, 16132, Genoa, Italy

^h Instituto Español de Oceanografía - Centro Oceanográfico de Baleares. Muelle de Poniente s/n 07015 Palma de Mallorca, Spain.

ⁱ UMR 9190 MARBEC, IRD-CNRS-IFREMER-UM, Université de Montpellier, 34095 Montpellier, France

^j Section Paleontology, Institute of Geological Sciences, Freie Universität Berlin, 12249 Berlin, Germany

^k Departament de Biologia Evolutiva, Ecologia i Ciències Ambientals. Universitat de Barcelona, 08028 Barcelona, Spain

^l Hellenic Centre for Marine Research, 46.7 km. Athens Sounio, PO Box 712 19013 Anavyssos, Attiki, Greece

^m Department of Ecology, Agronomy and Aquaculture, University of Zadar, Trg kneza Višeslava 9, 23000 Zadar, Croatia

ⁿ Institute of marine biology, University of Montenegro, Dobrota b.b.; 85330 Kotor; Montenegro

^o Université Côte d'Azur, CNRS, ECOMERS, Parc Valrose 28, 06108 Nice Cedex, France

^p Sorbonne Universités, UPMC Univ Paris 06, CNRS, LOV, 06230 Villefranche-sur-mer, France

^q Administrative department for sustainable development, Region of Istria, Flanatička 29, 52100 Pula, Croatia

^s Institut scientifique de Rabat, Avenue Ibn Batouta, Rabat, Morocco

^t Department of Life Sciences, University of Trieste, CoNISMa, 34127 Trieste, Italy

^u Stazione Zoologica Anton Dohrn, 80121, Napoli, Italy

^v Microbia Environnement, Observatoire Océanologique, F-66651 Banyuls/mer, France

*is corresponding author

ABSTRACT

Marine protected areas (MPAs) are key tools to mitigate human impacts in coastal environments, promoting sustainable activities to conserve biodiversity. The designation of MPAs alone may not result in the lessening of some human threats, which is highly dependent on management goals and the related specific regulations that are adopted. Here, we develop and operationalize a local threat assessment framework. We develop indices to quantify the effectiveness of MPAs (or individual zones within MPAs in the case of multiple-use MPAs) in reducing anthropogenic extractive and non-extractive threats operating at local scale, focusing specifically on threats that can be managed through MPAs. We apply this framework in 15 Mediterranean MPAs to assess their threat reduction capacity. We show that fully protected areas effectively eliminate extractive activities, whereas the intensity of artisanal and recreational fishing within partially protected areas, paradoxically, is higher than that found outside MPAs, questioning their ability at reaching conservation targets. In addition, both fully and partially protected areas attract non-extractive activities that are potential threats. Overall, only three of the 15 MPAs had lower intensities for the entire set of eight threats considered, in respect to adjacent control unprotected areas. Understanding the intensity and occurrence of human threats operating at the local scale inside and around MPAs is important for assessing MPAs effectiveness in achieving the goals they have been designed for, informing management strategies, and prioritizing specific actions.

Keywords: fully protected area; partially protected area; management; extractive activities; non-extractive activities; marine use;

Highlights

- We present and operationalize a cost-effective framework to quantify local threats inside and outside MPAs.
- We assess how good MPAs are at curbing extractive and non-extractive threats.
- Fully protected areas effectively eliminate extractive threats.
- Fully protected areas attract non-extractive threats, when allowed.
- Small scale fishing intensity is larger in partially protected areas than outside.

1. Introduction

The effects of human coastal activities often combine into cumulative impacts on many marine ecosystems (Halpern et al., 2015; 2008). Marine protected areas (MPAs) represent the most common tool used in marine spatial planning to mitigate human impacts on marine ecosystems (Lubchenco and Grorud-Colvert, 2015; Lubchenco et al., 2003) and are being increasingly used worldwide both for conservation and fisheries management (Boonzaier and Pauly, 2015). Understanding how MPAs target threats they've been designed to address is essential to inform decision-making and optimize conservation outcomes (Guarderas et al., 2008; Hockings et al., 2004). Some MPAs are located in regions of high cumulative human impact, as shown both in the Mediterranean Sea (Coll et al., 2012; Rodríguez-Rodríguez et al., 2015) and in the Atlantic (Batista et al., 2014). This led to debate about their appropriateness at effectively reducing threats (Agardy et al., 2011; Jameson et al., 2002; Rodríguez-Rodríguez et al., 2015).

Most studies that aimed at evaluating MPAs effectiveness at reducing threat intensities were based on large scale assessments, with resolutions of 500 m (Batista et al., 2014) or 1 km² grid cells (Micheli et al., 2013; Portman and Nathan, 2015). Little emphasis has been given on mapping MPAs' specific threats acting at smaller spatial scales -- possibly with some heterogeneity across MPA zones in the case of multiple-use MPAs --, those at which MPAs and their respective management actions are primarily designed to operate in (MPAs being a local spatial management tool; Olsen et al., 2013). This can result in difficulties to translate research findings into management actions, compromising potential benefits of MPAs (Agardy et al., 2011; Freed and Granek, 2014; Kearney et al., 2012; Mills et al., 2010).

The effectiveness of MPAs in reducing threats should be assessed at a local scale, where protection schemes are implemented. To achieve this goal, it is crucial to understand the differences in occurrence and intensity of human activities between the protected and unprotected areas (Claudet and Guidetti, 2010; Portman and Nathan, 2015). This helps to determine whether an MPA is actually successful in mitigating threats or whether the trends observed are merely an indicator of what is occurring outside of the protected area, at larger scales (Hargreaves-Allen et al., 2011).

Two broad types of MPAs exist. First, fully protected areas (FPAs); where all extractive activities (e.g., fishing) are prohibited and where some non-extractive activities (e.g., diving) can be allowed. They are also known as no-take areas or marine reserves. Second, partially protected areas (PPAs); where some activities are prohibited (e.g., spearfishing), others regulated (e.g., fishing with trammel nets) and others allowed (e.g., boating). Those PPAs can be further classified down according to the impact allowed and regulated uses have on species and habitats (Horta e Costa et al., 2016). Different levels of partial protection, together with full protection, can be combined spatially within multiple-use MPAs. Accordingly, the capacity of MPAs to reduce threats will differ depending on their type, design, regulations and level of enforcement (Di Franco et al., 2016; Guidetti et al., 2008; Scianna et al., 2015). Therefore, information on the intensity of threats within each MPA zone and in the surrounding external areas is necessary to assess MPA effectiveness in reducing threats.

Obtaining detailed information on threats is resource demanding, both in terms of time and costs, as the sources of information are largely heterogeneous (Levin et al., 2014). There is a

need for a reliable, cost-effective method to assess the threat-reduction capacity of MPAs, robust to the heterogeneity of data sources and associated levels of confidence based on data quality. In addition, methods need to be standardized across MPAs as to allow both threat comparisons, among different zones within individual MPAs, and across MPAs.

Here, we developed a cost-effective framework to quantify threats at local scale and assess how MPAs are good (or not) at mitigating extractive and non-extractive local area-based threats (Fig. 1). We trialed the framework on 15 Mediterranean MPAs. MPAs in the Mediterranean Sea are a good model since this basin combines a high intensity of human uses (Claudet and Fraschetti, 2010; Portman and Nathan, 2015) together with a high conservation priority (Coll et al., 2010). This information is essential to inform local management as well as forthcoming regional marine spatial planning (European Commission, 2017).

2. Materials and methods

2.1. Data collection

We first identified human threats that affect marine ecosystems at a local scale and that can be managed by the MPA staff through regulations. This allowed the identification of 8 threats (Table 1). Threats were either assigned to extractive (i.e., professional and recreational fishing) or non-extractive uses (i.e., activities related to touristic frequentation).

We then developed indicators for each threat accounting for both availability of the data and the quality of the information given. The set of indicators selected was tailored to the data context of the study case, here the Mediterranean, where data availability can be poor in some regions. Data relevant for quantifying threat indicators were collected by means of questionnaires distributed to local managers and scientists. Local expert had to preferably obtain threat indicator values from scientific studies, technical reports or other official documents. When such sources were not available, expert opinion was considered. Three levels of confidence were applied for the estimated threat values (qualitative: high, medium, low). Threat indicator values were considered as high confidence when they were obtained directly from recent quantitative data (e.g., from monitoring data), as medium confidence when estimated from less recent quantitative data and as low confidence when no quantitative data were available and local experts of the particular MPA provided the estimation of the threat indicator value.

Threat indicators were quantified both within and outside 15 coastal MPAs in the Mediterranean Sea (MPAs listed in Appendix A). In case of multiple-use MPAs (n=13), data was obtained for each full (no-take/no-entry or no-take zones) or partial protection level. We used two approaches to delineate the outside area, depending on the characteristics of the threat: i) for commercial fishing with trawlers and purse seiners a 10 km radius surrounding the MPAs was applied, while ii) for all other threats originating closer to the shore the coastal section at a maximum distance from the shore equal to the MPAs most offshore limit was considered (Fig C.1.). This specific outside areas were chosen following consultations with at least one expert of each MPA. The two approaches aimed to reflect the nature and occurrence of that threat in order to avoid over- or underestimation of threat intensities, respectively, in the outside areas.

The total size of each zone within each MPA was obtained directly from managers and/or

from management plans, whilst the outside surface areas were calculated using QGIS 2.8/1 (QGIS Development Team, 2015).

All the raw data collected in this study can be found in Appendix B.

2.2. Threat indices

2.2.1. Threat intensity

Using the raw threat values (Table B.1), we calculated the intensity TI_{ijk} of each threat i within each protection level j (full protection, partial protection and no protection-outside) for each MPA k , as follows:

$$TI_{ijk} = T_{ijk} / A_{jk}$$

where T_{ijk} is the value of threat i in zone j of MPA k , and A_{jk} is the area (km²) of zone j in MPA k . We have then normalized threat intensity values (TI) by dividing each value with the maximum threat intensity value (TI) of each threat, which resulted in a standardized scale of [0;1]. These normalized values were then used to calculate the mean threat intensity of each threat in each protection level to explore the variability of threat intensity amongst protection levels. Detailed descriptive statistics of the normalized threat intensity index can be found in Appendix C.

2.2.2. Threat reduction capacity

The threat reduction capacity TR_{ijk} of each protection level j (excluding the outside area) of each MPA k was calculated as:

$$TR_{ijk} = - \left(1 - TI_{ijk} / TI_{o,ik} \right)$$

where TI_{ijk} is the intensity of threat i inside zone j of MPA k , and $TI_{o,ik}$ is the threat intensity of threat i outside of the MPA k . A negative value of TR indicates that the threat intensity is reduced inside the protected area relative to the outside; a positive value of TR indicates that the threat intensity is higher inside the MPA relative to the outside. The mean threat reduction capacity values (TR_{ijk}) were used to compare the reduction capacity of the fully and partially protected zones for every threat. Detailed descriptive statistics of the threat reduction capacity index can be found in Appendix C.

2.2.3. Zone threat reduction score

The zone threat reduction score (zT) was calculated as:

$$zT_{jk} = \frac{\sum_i TR_{ijk} * w_i}{\sum_i w_i} ,$$

where TR_{ijk} is the threat reduction capacity defined above and w_i is the weight associated to threat i (Table 1). The weights for each threat were derived from Horta e Costa et al. (2016) and were rescaled to values between 0 and 1, with 1 being the weight assigned to the threat with the greatest ecological impact (i.e. trawling). The weights were used to discriminate between different potential ecological impacts of each threat and were obtained with expert

knowledge, but based on previous studies (see detailed explanation in Appendix A of Horta e Costa et al., 2016).

2.2.4. MPA threat reduction score

The MPA threat reduction score $mpaT$ was calculated as:

$$mpaT_k = \frac{\sum_j zT_{jk} * A_{jk}}{\sum_j A_{jk}},$$

where zT_{jk} is the threat reduction score of zone j of MPA k , and A_{jk} is the surface area of zone j of MPA k . When the zone or MPA threat reduction score is negative, threats are being effectively reduced inside the zone and/or MPA compared to outside. When the threat reduction score is positive the MPA is actually enhancing threats rather than reducing them.

2.2.5. Local threat index

To account for the context in which MPAs are sited we calculated a local threat index lTI as follows:

$$lTI_{ik} = \frac{TI_{o,ik}}{\max TI_{o,i}},$$

where the $TI_{o,ik}$ is the intensity of threat i outside MPA k and $\max TI_{o,i}$ is the maximum intensity value of threat i recorded from all the outside areas of all considered MPAs. The local threat index ranges from 0 to 1, indicating a local low and high intensity, respectively, of a particular threat in the area outside an MPA compared to the broader context.

2.2.6. MPA local threat index

Local threat indices were aggregated at each MPA scale to calculate the MPA local threat index $mpa.lTI$ as follows:

$$mpa.lTI_k = \frac{\sum_i lTI_{ik} * w_i}{\sum_i w_i}$$

where lTI_{ik} is the local threat index of threat i of MPA k , as calculated above, and w_i is the weight of threat i . The values of the MPA local threat indices were normalized by dividing by the maximum local threat index value, resulting in a standard scale of 0-1, with low scores indicating a low local threat intensity, that is an overall low intensity of threats in the area outside the MPA, when compared to threat intensities in area outside the other MPAs in the region.

2.3. Data analyses

The relationship between the MPA threat reduction score ($mpaT$) and the MPA local threat index ($mpa.lTI$) were explored using a linear model. Additionally, the relationship between

the threat reduction score, *mpaT*, and the age and size of the MPA were also tested with a regression to investigate whether these design characteristics affect the threat reduction capacity of MPAs.

The data on the confidence level associated with each threat type and zone protection level was analysed using chi-square tests to assess whether there is an association between data quality and zone type or threat type, respectively.

All analyses were conducted using R (R Development Core Team, 2016). The R script is available in Appendix D.

3. Results

Mean threat intensities (*TI*) differed amongst protection levels threat type (Fig. 2). Fully protected zones had no extractive threats (by definition), however they had the highest intensity of all non-extractive threats. On average, the intensity of non-extractive threats was 2.6 and 16 times greater in fully protected zones compared to partially protected zones and the area outside of the MPAs, respectively.

All threats were present in partially protected zones, with the highest levels of both recreational and artisanal fishing (Fig. 2). In the area outside MPAs, the intensity of extractive threats was up to 18 times greater than the intensity of non-extractive threats.

The threat reduction capacity (*TR*) differed across protection level and threat type (Fig. 3). Fully protected areas removed all extractive threats, while on average, partially protected zones did not reduce extractive threats. The intensities of large commercial fisheries (trawling and purse-seine) were reduced in partially protected zones compared to the outside, yet the intensities of artisanal and recreational fishing were approximately 4.9 times greater than in the surrounding areas. All non-extractive threats were increased within fully and partially protected zones, compared to the outside surrounding areas.

The mean zone threat reduction score (*zT*) for non-extractive threats was, on average, 4.8 greater for fully protected zones compared to partially protected zones, yet this value was highly variable (Fig. 3).

The MPA threat reduction score (*mpaT*) ranged between -0.8 and 116 (Fig. 4). Overall, only three MPAs reduced all threats relative to the outside. Five MPAs reduced all extractive threats and two MPAs reduced all non-extractive threats relative to their outside area.

The intensity of threats in the areas outside of MPAs varied greatly among MPAs (Fig. C.2 in Appendix C). There were no significant relationship between the MPAs' threat reduction score (*mpaT*) and the MPA local threat index (*mpa.ITI*), indicating that the capacity of MPAs to reduce threats was independent on the intensity of threats in their surrounding areas ($p > 0.05$, see Fig. C.3 in Appendix C). Likewise, there were no significant relationships between the MPA threat reduction score and the age or size of the MPA ($p > 0.05$, see Fig. C.4 and C.5 in Appendix C).

The confidence levels associated with estimates of threat intensities differed among zones of MPAs and the outside areas (chi-squared test, $\chi^2 = 153.54$, $p < 0.001$). More than half of the values from the areas outside were given low confidence (Fig. 5). In contrast within the MPAs, the majority of threat values had high confidence, 65% and 50% in fully and partially

protected zones, respectively.

Confidence levels also differed amongst threats (chi-squared test, $\chi^2=233.63$, $p<0.001$). For all extractive threats, the greatest proportion of values had high confidence (Fig. 6). Scuba-diving and commercial boating were among the non-extractive threats with the highest proportion of high confidence, while the values attributed to private boating and bathing had low confidence.

4. Discussion

This study was designed to provide a framework of the effectiveness of MPAs at curbing threats at the scale they are designed, developing indices of the intensity of threats at the scale of single MPAs (Fig. 1). The information provided was scaled to support management actions designed to enhance the success of each MPA in achieving its goals (Hockings et al., 2004).

Our most compelling result is that threats can indeed increase in MPAs compared to outside areas. Even if absent for fully protected zones, many extractive threats were larger in partially protected zones compared to outside. Contrary to fully protected zones, partially protected zones do not necessarily have the objective to eliminate threats (e.g., via a fishing ban), but to regulate their intensity towards sustainable levels. Implementing management strategies that allow and maintain ecologically sustainable uses ensures long-term benefits from ecosystem services benefiting local economies and, hence, local communities (Roberts et al., 2005). In the Mediterranean Sea, the regulatory regimes of partially protected areas vary from MPA to another, however there are some common modalities (Portman et al., 2012).

Artisanal and recreational fishing are permitted in partially protected zones of many MPAs, although most of the time subjected to restrictions in the type of gear allowed. The intensity of artisanal and recreational fishing was up to 4.8 times higher inside partially protected zones compared to outside control areas. While the regulatory regime in partially protected zones may be stricter than in the surrounding outside areas, the former still attract more fishers and hence increase fishing pressure. Most of the partially protected zones considered in this study surround fully protected areas (Appendix A) and may attract fishermen. Full protection enhance fish abundance and size (Guidetti et al., 2014; Sala et al., 2012), often resulting in the spillover of larvae and adults to adjacent unprotected areas (Di Franco et al., 2015; 2012; Di Lorenzo et al., 2016; Garcia-Rubies et al., 2013; Goñi et al., 2010; Stobart et al., 2009), hence concentrating fishing effort (Kellner et al., 2007; Stelzenmüller et al., 2007).

The intensity of non-extractive threats was also higher within MPAs than in the areas outside, and at least 4 times higher in fully protected zones compared to partially protected zones. By definition, fully protected areas are places aiming to protect the full spectrum of biodiversity by limiting all kinds of extractive and destructive activity within them (Allison et al., 1998), yet this does not exclude all human activity. Indeed, most fully protected zones allow and, as we show here, *attract* visitation with the intent of non-extractive activities (Thurstan et al., 2012). Increasing non-extractive touristic activities are viewed as a positive socioeconomic output of MPAs in the Mediterranean Sea and worldwide (Leisher et al., 2007; Pascual et al., 2016), as they promote education, support employment and generate revenue (Hargreaves-Allen et al., 2011; Pascual et al., 2016; Spalding et al., 2017). Increasing tourism is, therefore, often listed as a looked-for objective of MPAs (Hargreaves-Allen et al., 2011). Thurstan et al.

(2012) suggest that unless all activities are adequately managed, regulation of extractive activities alone may not guarantee the levels of biodiversity protection expected from fully protected zones.

Only three MPAs were effective in reducing the intensity of threats in respect to adjacent unprotected areas. Examining the context in which MPAs are established is, nevertheless, central to understanding the capacity of MPAs in addressing threats and their conservation potential (Portman and Nathan, 2015). The majority of MPAs in this study are multiple-use MPAs that accommodate a variety of uses. This type of MPAs is common for densely populated systems (Agardy et al., 2003), such as the Mediterranean Sea, where reducing all threats is unlikely. Portman et al. (2015) showed that the variety of activities occurring within the Mediterranean MPAs is often greater than in the coastal unprotected areas of many Mediterranean countries. Yet, multiple use MPAs and particularly partially protected areas alone are now the most common type of MPAs being implemented worldwide (Claudet, 2017). They are being established to meet the international targets of protection (Agardy et al. 2016), with the stated objectives of biodiversity conservation. Our results point that the achievability of their goals should be questioned, as here, we show that not only the variety, but also intensity of threats is generally greater within MPAs than in the areas outside (see also Mora et al., 2006) that leads to the low threat reduction capacity of MPAs.

The capacity to reduce (or not) threats was not dependent on the threat local context, the age or the size of the MPA. This suggests that the relationship between threat-intensity and reduction-capacity is mainly a function of management objectives and capacity (Gill et al., 2017), corresponding regulations (Horta e Costa et al. 2016) and enforcement (Guidetti et al., 2008) of each MPA rather than the magnitude of the outside threat intensities or design features. Hargreaves et al. (2017) examined the differences in threats inside and outside coral reef MPAs and they showed that MPAs with reduced threats had more staff and invested more funds into active management. Indeed, management has been identified as one of the most important factors affecting the effectiveness of MPAs (Gill et al., 2017). Understanding how different management regimes affect the threat reduction capacity of zones in multiple-use MPAs should be further investigated as it could shed light onto the highly variable responses we have observed among protection levels.

Our framework uses threats, and their respective indicators, that are most common and were easily obtained in the Mediterranean MPAs. While we were able to trial our framework using the information available, the assessment of the MPAs threat reduction capacity could be refined with more detailed and robust data. Besides, we do acknowledge that other types of threats may be present in other systems yet this issue can be easily overcome, as our framework can be adapted to suit a variety of systems, by incorporating new threats and their corresponding indicators.

We did not include poaching as one of the threats in our framework. Poaching levels can often be higher than assumed in MPAs (Bergseth et al., 2017) and represent an important threat to the effectiveness of MPAs. While we initially planned to collect data on poaching, we faced strong difficulties to quantitatively standardize this threat across MPAs. If standardized data can be obtained across a range of MPAs, this can easily be added in the framework as an additional threat.

Our results point out that we have greater confidence about what is happening inside MPAs than in their surrounding areas. The low confidence associated with threat values in the

unprotected, outside, areas might have affected the precision of our results. The areas outside MPAs are usually less monitored or completely unmonitored and estimating threat values for these areas was challenging. Good management should require regular monitoring, both for the ecological and environmental status of the MPA habitats (Fraschetti et al., 2013), but also should incorporate monitoring of the main activities that can lead to potential threats both inside and beyond the borders of the MPA (Claudet and Guidetti, 2010; Hargreaves-Allen et al., 2017; Parravicini et al., 2013).

Evaluating the success of MPAs is essential to maximize their conservation potential (Agardy et al., 2016; Pomeroy et al., 2005), especially within an adaptive management framework (Scianna et al., 2015). Contrary to previous assessments (Coll et al., 2012; Micheli et al., 2013) our approach uses data specific to each zone of the MPA, where strong heterogeneity among threats intensity can occur, and accounts for manageable threats at manageable scales relevant for MPA managers. We therefore believe this work has general and wide applications, especially for managers and planners who need to assess the success of MPAs at achieving marine spatial planning goals (Partelow et al., 2015).

Management implications

By providing the ability to easily compare threat intensities and the capacity of a given MPA to reduce threats, our proposed framework can help prioritize management actions. Management actions should first be directed towards reducing threats that would prevent achieving the MPA objectives. Besides, the threat assessment framework can help identify unexpected indirect effects of MPA creation, such as increased non-extractive threat due to increase attendance.

By providing the ability to easily compare threat reduction score among zones, in the case of multiple-use MPAs, our proposed framework can help guide local spatial planning. Assigning different uses in different zones can have trade-offs in terms of biodiversity conservation and ecosystem services delivery and threat assessment is a first step towards the identification of acceptable thresholds of uses. When scaled-up regionally, the threat assessment framework can help guide regional spatial planning.

The threat assessment framework could be incorporated into monitoring programs. First, monitoring threat evolution over time helps identify the management actions able to reduce threats. Second, this would necessarily imply to monitor and collect data, which is a condition of proper MPA effectiveness assessments.

Acknowledgments

This work was financially supported by the ERA-Net BiodivERsA (BUFFER project) and the EU-FP7 (COCONET project).

References

- Agardy, T., Bridgewater, P., Crosby, M.P., Day, J., Dayton, P.K., Kenchington, R., Laffoley, D., McConney, P., Murray, P.A., Parks, J.E., Peau, L., 2003. Dangerous targets? Unresolved issues and ideological clashes around marine protected areas. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 13, 353–367. doi:10.1002/aqc.583
- Agardy, T., Claudet, J., Day, J.C., 2016. “Dangerous Targets” revisited: Old dangers in new contexts plague marine protected areas. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 26, 7–23. doi:10.1002/aqc.2675
- Agardy, T., di Sciara, G.N., Christie, P., 2011. Mind the gap: Addressing the shortcomings of marine protected areas through large scale marine spatial planning. *Mar. Policy* 35, 226–232. doi:10.1016/j.marpol.2010.10.006
- Allison, G.W., Lubchenco, J., Carr, M.H., 1998. Marine Reserves are Necessary but not Sufficient for Marine Conservation. *Ecol. Appl.* 8, S79-92
- Batista, M.I., Henriques, S., Pais, M.P., Cabral, H.N., 2014. Assessment of cumulative human pressures on a coastal area: Integrating information for MPA planning and management. *Ocean Coast. Manag.* 102, 248–257. doi:10.1016/j.ocecoaman.2014.09.020
- Boonzaier, L., Pauly, D., 2015. Marine protection targets: an updated assessment of global progress. *Oryx* 50, 27–35. doi:10.1017/S0030605315000848
- Bergseth, B.J., 2017 Effective marine protected areas require sea change in compliance management. *ICES J. Mar. Sci.* doi:10.1093/icesjms/fsx105
- Claudet, J., Fraschetti, S., 2010. Human-driven impacts on marine habitats: A regional meta-analysis in the Mediterranean Sea. *Biol. Cons.* 143, 2195–2206. doi:10.1016/j.biocon.2010.06.004
- Claudet, J., Guidetti, P., 2010. Improving assessments of marine protected areas. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 20, 239–242. doi:10.1002/aqc.1087
- Claudet, J., 2017. Six conditions under which MPAs might not appear effective (when they are). *ICES J. Mar. Sci.* doi: 10.1093/icesjms/fsx074.
- Coll, M., Piroddi, C., Albouy, C., Ben Rais Lasram, F., Cheung, W.W.L., Christensen, V., Karpouzi, V.S., Guilhaumon, F., Mouillot, D., Paleczny, M., Palomares, M.L., Steenbeek, J., Trujillo, P., Watson, R., Pauly, D., 2012. The Mediterranean Sea under siege: spatial overlap between marine biodiversity, cumulative threats and marine reserves. *Glob. Ecol. and Biogeogr.* 21, 465–480. doi:10.1111/j.1466-8238.2011.00697.x
- Coll, M., Piroddi, C., Steenbeek, J., Kaschner, K., Ben Rais Lasram, F., Aguzzi, J., Ballesteros, E., Bianchi, C.N., Corbera, J., Dailianis, T., Danovaro, R., Estrada, M., Frogli, C., Galil, B.S., Gasol, J.M., Gertwagen, R., Gil, J., Guilhaumon, F., Kesner-Reyes, K., Kitsos, M.-S., Koukouras, A., Lampadariou, N., Laxamana, E., López-Fé de la Cuadra, C.M., Lotze, H.K., Martin, D., Mouillot, D., Oro, D., Raicevich, S., Rius-Barile, J., Saiz-Salinas, J.I., San Vicente, C., Somot, S., Templado, J., Turon, X., Vafidis, D., Villanueva, R., Voultsiadou, E., 2010. The Biodiversity of the Mediterranean Sea: Estimates, Patterns, and Threats. *PLOS ONE* 5, e11842–36. doi:10.1371/journal.pone.0011842
- Di Franco, A., Calò, A., Pennetta, A., De Benedetto, G., Planes, S., Guidetti, P., 2015. Dispersal of larval and juvenile seabream: Implications for Mediterranean marine protected areas. *Biol. Conserv.* 192, 361–368. doi:10.1016/j.biocon.2015.10.015

- Di Franco, A., Coppini, G., Pujolar, J.M., De Leo, G.A., Gatto, M., Lyubartsev, V., Melià, P., Zane, L., Guidetti, P., 2012. Assessing Dispersal Patterns of Fish Propagules from an Effective Mediterranean Marine Protected Area. *PLOS ONE* 7, e52108–14. doi:10.1371/journal.pone.0052108
- Di Franco, A., Thiriet, P., Di Carlo, G., Dimitriadis, C., Francour, P., Gutiérrez, N.L., de Grissac, A.J., Koutsoubas, D., Milazzo, M., del Mar Otero, M., Piante, C., Plass-Johnson, J., Sainz-Trapaga, S., Santarossa, L., Tudela, S., Guidetti, P., 2016. Five key attributes can increase marine protected areas performance for small-scale fisheries management. *Sci. Rep.* 6, 1–9. doi:10.1038/srep38135
- Di Lorenzo, M., Claudet, J., Guidetti, P., 2016. Spillover from marine protected areas to adjacent fisheries has an ecological and a fishery component. *J. Nat. Conserv.* 32, 62–66. doi:10.1016/j.jnc.2016.04.004
- European Commission, 2017. Maritime Affairs, Maritime spatial Planning. https://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning_en (accessed 10.07.2017)
- Fraschetti, S., Guarnieri, G., Bevilacqua, S., Terlizzi, A., Boero, F., 2013. Protection enhances community and habitat stability: evidence from a mediterranean marine protected area. *PLOS ONE* 8, e81838. doi:10.1371/journal.pone.0081838
- Freed, S., Granek, E.F., 2014. Effects of Human Activities on the World's Most Vulnerable Coral Reefs: Comoros Case Study. *Ocean Coast. Manage.* 42, 280–296. doi:10.1080/08920753.2014.904261
- Garcia-Rubies, A., Hereu, B., Zabala, M., 2013. Long-term recovery patterns and limited spillover of large predatory fish in a Mediterranean MPA. *PLOS ONE* 8, e73922. doi:10.1371/journal.pone.0073922
- Gill, D.A., Mascia, M.B., Ahmadi, G.N., Glew, L., Lester, S.E., Barnes, M., Craigie, I., Darling, E.S., Free, C.M., Geldmann, J., Holst, S., Jensen, O.P., White, A.T., Basurto, X., Coad, L., Gates, R.D., Guannel, G., Mumby, P.J., Thomas, H., Whitmee, S., Woodley, S., Fox, H.E., 2017. Capacity shortfalls hinder the performance of marine protected areas globally. *Nature*. 000, 1–16. doi:10.1038/nature21708
- Gonson, C., Pelletier, D., Gamp, E., Preuss, B., Jollit, I., Ferraris, J., 2016. Decadal increase in the number of recreational users is concentrated in no-take marine reserves. *Mar. Poll. Bull.* 107, 1–11. doi:10.1016/j.marpolbul.2016.04.007
- Goñi, R., Hilborn, R., Diaz, D., Mallol, S., Adlerstein, S., 2010. Net contribution of spillover from a marine reserve to fishery catches. *Mar. Ecol. Prog. Ser.* 400, 233–243. doi:10.3354/meps08419
- Guarderas, A.P., Hacker, S.D., Lubchenco, J., 2008. Current Status of Marine Protected Areas in Latin America and the Caribbean. *Conserv. Biol.* 22, 1630–1640. doi:10.1111/j.1523-1739.2008.01023.x
- Guerrero, A.M., McAllister, R.R.J., Corcoran, J., Wilson, K.A., 2013. Scale Mismatches, Conservation Planning, and the Value of Social-Network Analyses. *Conserv. Biol.* 27, 35–44. doi:10.1111/j.1523-1739.2012.01964.x
- Guidetti, P., Baiata, P., Ballesteros, E., Di Franco, A., Hereu, B., Macpherson, E., Micheli, F., Pais, A., Panzalis, P., Rosenberg, A.A., Zabala, M., Sala, E., 2014. Large-Scale Assessment of Mediterranean Marine Protected Areas Effects on Fish Assemblages. *PLOS ONE* 9, e91841–14. doi:10.1371/journal.pone.0091841
- Guidetti, P., Milazzo, M., Bussotti, S., Molinari, A., Murenu, M., Pais, A., Spanò, N., Balzano, R., Agardy, T., Boero, F., Carrada, G., Cattaneo-Vietti, R., Cau, A., Chemello, R., Greco, S., Manganaro, A., Notarbartolo di Sciara, G., Russo, G.F., Tunesi, L., 2008. Italian marine reserve effectiveness: Does enforcement matter? *Biol. Conserv.* 141, 699–709. doi:10.1016/j.biocon.2007.12.013

- Halpern, B.S., Frazier, M., Potapenko, J., Casey, K.S., Koenig, K., Longo, C., Lowndes, J.S., Rockwood, R.C., Selig, E.R., Selkoe, K.A., Walbridge, S., 2015. Spatial and temporal changes in cumulative human impacts on the world's ocean. *Nat. Commun.* 6, 7615. doi:10.1038/ncomms8615
- Halpern, B.S., Walbridge, S., Selkoe, K.A., Kappel, C.V., Micheli, F., D'Agrosa, C., Bruno, J.F., Casey, K.S., Ebert, C., Fox, H.E., Fujita, R., Heinemann, D., Lenihan, H.S., Madin, E.M.P., Perry, M.T., Selig, E.R., Spalding, M., Steneck, R., Watson, R., 2008. A Global Map of Human Impact on Marine Ecosystems. *Science* 319, 948–952. doi:10.1126/science.1149345
- Hargreaves-Allen, V., Mourato, S., Milner-Gulland, E.J., 2011. A Global Evaluation of Coral Reef Management Performance: Are MPAs Producing Conservation and Socio-Economic Improvements? *Environ. Manage.* 47, 684–700. doi:10.1007/s00267-011-9616-5
- Hargreaves-Allen, V.A., Mourato, S., Milner-Gulland, E.J., 2017. Drivers of coral reef marine protected area performance. *PLOS ONE* 12, e0179394–21. doi:10.1371/journal.pone.0179394
- Hockings, M., Stolton, S., Dudley, N., 2004. Management Effectiveness: Assessing Management of Protected Areas? *J. Environ. Policy Plan.* 6, 157–174. doi:10.1080/1523908042000320731
- Horta e Costa, B., Claudet, J., Franco, G., Erzini, K., Caro, A., Gonçalves, E.J., 2016. A regulation-based classification system for Marine Protected Areas (MPAs). *Mar. Policy* 72, 192–198. doi:10.1016/j.marpol.2016.06.021
- Jameson, S.C., Tupper, M.H., Ridley, J.M., 2002. The three screen doors: can marine “protected” areas be effective? *Mar. Poll. Bull.* 44, 1177–1183. doi:10.1016/S0025-326X(02)00258-8
- Kearney, R., Buxton, C.D., Farebrother, G., 2012. Australia's no-take marine protected areas: Appropriate conservation or inappropriate management of fishing? *Mar. Policy* 36, 1064–1071. doi:10.1016/j.marpol.2012.02.024
- Keller, B.D., Gleason, D.F., McLeod, E., Woodley, C.M., Airame, S., Causey, B.D., Friedlander, A.M., Grober-Dunsmore, R., Johnson, J.E., Miller, S.L., Steneck, R.S., 2009. Climate change, coral reef ecosystems, and management options for marine protected areas. *Environ. Manage.* 44, 1069–1088. doi:10.1007/s00267-009-9346-0
- Kellner, J.B., Tetreault, I., Gaines, S.D., Nisbet, R.M., 2007. Fishing the line near marine reserves in single and multispecies fisheries, *Ecol. Appl.* doi:10.1890/05-1845
- Leisher, C., Van Beukering, P., Scherl, L.M., 2007. *Nature's Investment Bank: How Marine Protected Areas Contribute to Poverty Reduction*. Arlington, USA: The Nature Conservancy
- Levin, N., Coll, M., Fraschetti, S., Gal, G., Giakoumi, S., Göke, C., Heymans, J.J., Katsanevakis, S., Mazor, T., Öztürk, B., Rilov, G., Gajewski, J., Steenbeek, J., Kark, S., 2014. Biodiversity data requirements for systematic conservation planning in the Mediterranean Sea. *Mar. Ecol. Prog. Ser.* 508, 261–281. doi:10.3354/meps10857
- Lubchenco, J., Grorud-Colvert, K., 2015. Making waves: The science and politics of ocean protection. *Science* 350, 382–383. doi:10.1126/science.aad5443
- Lubchenco, J., Palumbi, S.R., Gaines, S.D., Andelman, S., 2003. Plugging a hole in the ocean: the emerging science of marine reserves. *Ecol. Appl.* 13, 3–7. doi:10.1890/1051-0761(2003)013[0003:PAHITO]2.0.CO;2
- Micheli, F., Halpern, B.S., Walbridge, S., Ciriaco, S., Ferretti, F., Fraschetti, S., Lewison, R., Nykjaer, L., Rosenberg, A.A., 2013. Cumulative Human Impacts on Mediterranean and Black Sea Marine Ecosystems: Assessing Current Pressures and Opportunities. *PLOS ONE* 8, e79889. doi:10.1371/journal.pone.0079889

- Mills, M., Pressey, R.L., Weeks, R., Foale, S., Ban, N.C., 2010. A mismatch of scales: challenges in planning for implementation of marine protected areas in the Coral Triangle. *Conserv. Lett.* 3, 291–303. doi:10.1111/j.1755-263X.2010.00134.x
- Mora, C., Andréfouët, S., Costello, M.J., Kranenburg, C., Rollo, A., Veron, J., Gaston, K.J., Myers, R.A., 2006. Coral reefs and the global network of Marine Protected Areas. *Science* 312, 1750–1751. doi:10.1126/science.1125295
- Olsen, E.M., Fonseca, L., Goni, R., Johnson, D., Katsanevakis, S., Macpherson, E., Pelletier, D., Rabaut, M., Chantal-Ribeiro, M., Weaver, P., Zaharia, T., 2013. Achieving Ecologically Coherent MPA Networks in Europe: Science Needs and Priorities. European Marine Board Position Paper 18. Larkin, K.E. and McDonough, N. (Eds.). European Marine Board, Ostend, Belgium
- Parravicini, V., Micheli, F., Montefalcone, M., Morri, C., Villa, E., Castellano, M., Povero, P., Bianchi, C.N., 2013. Conserving biodiversity in a human-dominated world: degradation of marine sessile communities within a protected area with conflicting human uses. *PLOS ONE* 8, e75767. doi:10.1371/journal.pone.0075767
- Partelow, S., Wehrden, von, H., Horn, O., 2015. Pollution exposure on marine protected areas: A global assessment. *Mar. Poll. Bull.* 100, 352–358. doi:10.1016/j.marpolbul.2015.08.026
- Pascual, M., Rossetto, M., Ojea, E., Milchakova, N., Giakoumi, S., Kark, S., Korolesova, D., Melià, P., 2016. Socioeconomic impacts of marine protected areas in the Mediterranean and Black Seas. *Ocean Coast. Manage.* 133, 1–10. doi:10.1016/j.ocecoaman.2016.09.001
- Pomeroy, R.S., Watson, L.M., Parks, J.E., Cid, G.A., 2005. How is your MPA doing? A methodology for evaluating the management effectiveness of marine protected areas. *Ocean Coast. Manage.* 48, 485–502. doi:10.1016/j.ocecoaman.2005.05.004
- Portman, M.E., Nathan, D., 2015. Conservation “identity” and marine protected areas management: A Mediterranean case study. *J. Nat. Conserv.* 24, 109–116. doi:10.1016/j.jnc.2014.10.001
- Portman, M.E., Nathan, D., Levin, N., 2012. From the Levant to Gibraltar: A Regional Perspective for Marine Conservation in the Mediterranean Sea. *Ambio* 41, 670–681. doi:10.1007/s13280-012-0298-x
- QGIS Development Team, 2015. QGIS Geographic Information System. Open Source Geospatial Foundation. <https://qgis.osgeo.org>
- R Core Team, 2016. R: A language and environment for statistical computing. Foundation for Statistical Computing, Vienna, Austria
- Roberts, C.M., Hawkins, J.P., Gell, F.R., 2005. The role of marine reserves in achieving sustainable fisheries. *Philos. Trans. R. Soc. Lond., B, Biol. Sci.* 360, 123–132. doi:10.1098/rstb.2004.1578
- Rodríguez-Rodríguez, D., Sánchez-Espinosa, A., Schröder, C., Abdul Malak, D., Rodríguez, J., 2015. Cumulative pressures and low protection: a concerning blend for Mediterranean MPAs. *Mar. Poll. Bull.* 101, 288–295. doi:10.1016/j.marpolbul.2015.09.039
- Sala, E., Ballesteros, E., Dendrinos, P., Di Franco, A., Ferretti, F., Foley, D., Fraschetti, S., Friedlander, A., Garrabou, J., Güçlüsoy, H., Guidetti, P., Halpern, B.S., Hereu, B., Karamanlidis, A.A., Kizilkaya, Z., Macpherson, E., Mangialajo, L., Mariani, S., Micheli, F., Pais, A., Riser, K., Rosenberg, A.A., Sales, M., Selkoe, K.A., Starr, R., Tomas, F., Zabala, M., 2012. The Structure of Mediterranean Rocky Reef Ecosystems across Environmental and Human Gradients, and Conservation Implications. *PLOS ONE* 7, e32742–13. doi:10.1371/journal.pone.0032742
- Scianna, C., Niccolini, F., Gaines, S.D., Guidetti, P., 2015. Organization Science': A new prospective to assess marine protected areas effectiveness. *Ocean Coast. Manage.* 116, 443–448. doi:10.1016/j.ocecoaman.2015.09.005

- Spalding, M., Burke, L., Wood, S.A., Ashpole, J., Hutchison, J., zu Ermgassen, P., 2017. Mapping the global value and distribution of coral reef tourism. *Mar. Policy* 82, 104–113. doi:10.1016/j.marpol.2017.05.014
- Stelzenmüller, V., Maynou, F., Mart i n, P., 2007. Spatial assessment of benefits of a coastal Mediterranean Marine Protected Area. *Biol. Conserv.* 136, 571–583. doi:10.1016/j.biocon.2007.01.002
- Stobart, B., Warwick, R., González, C., Mallol, S., Díaz, D., Reñones, O., Goni, R., 2009. Long-term and spillover effects of a marine protected area on an exploited fish community. *Mar. Ecol. Prog. Ser.* 384, 47–60. doi:10.3354/meps08007
- Thurstan, R.H., Hawkins, J.P., Neves, L., Roberts, C.M., 2012. Are marine reserves and non-consumptive activities compatible? A global analysis of marine reserve regulations. *Mar. Policy* 36, 1096–1104. doi:10.1016/j.marpol.2012.03.006

Tables

Table 1. Local threats that can affect marine protected area (MPA) effectiveness and that can be managed by the MPA regulations. Indicators were chosen considering trade-offs between reliability and data availability. Weights reflect the potential impact of a given activity on both species and habitats and were rescaled after Horta e Costa et al. (2016)

Threat	Threat Indicator	Scaled weight
<i>Extractive threats</i>		
<i>Recreational fishing</i> : hook and line	Number of people (nb/year)	0.56
<i>Recreational fishing</i> : spearfishing	Number of people (nb/year)	0.33
<i>Artisanal fishing</i> : Professional fishing except trawlers/purse-seiners	Number of boats (nb/year)	0.82
<i>Commercial fishing</i> : Professional fishing trawlers/purse-seiners	Number of boats (nb/year)	1
<i>Non-extractive threats</i>		
<i>Tourism</i> : bathing/tramplng	Number of people (nb/year)	0.11
<i>Tourism</i> : scuba-diving	Number of dives (nb/year)	0.11
<i>Tourism</i> : private boating	Number of private boats (nb/year)	0.22
<i>Tourism</i> : commercial boating	Number of commercial touristic boats (nb/year)	0.22

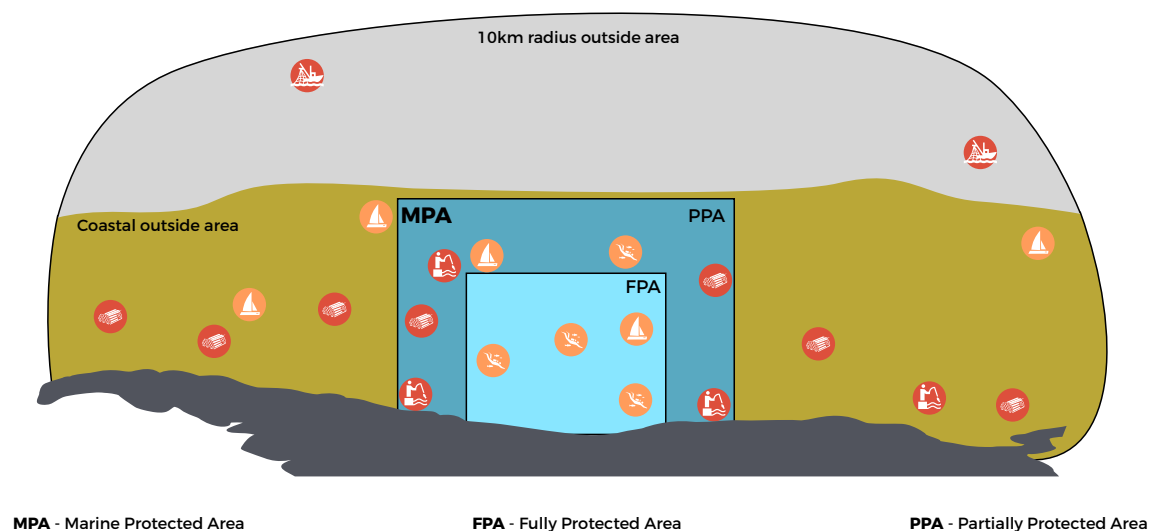
Figures

How good is your MPA at curbing threats?

Step 1. Identify threats



Step 2. Quantify threats inside and outside the MPA



Step 3. Calculate indices

Ti	Threat intensity	TRC	Threat Reduction Capacity	ZTR	Zone Threat Reduction	MTR	MPA Threat Reduction
	What is each threat intensity in each zone and inside the MPA overall?		Is the threat being reduced compared to the outside area?		Does the zone reduce threats compared to the outside area?		Does the MPA reduce threats compared to the outside area?

Step 4. Management implications

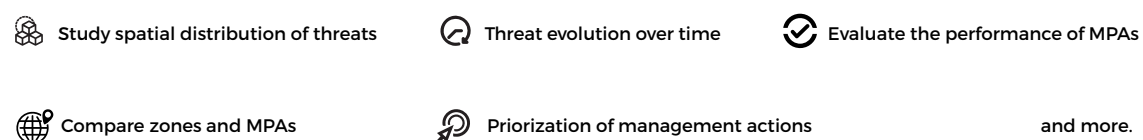


Fig. 1. The framework to assess how good are marine protected areas (MPAs) at curbing threats.

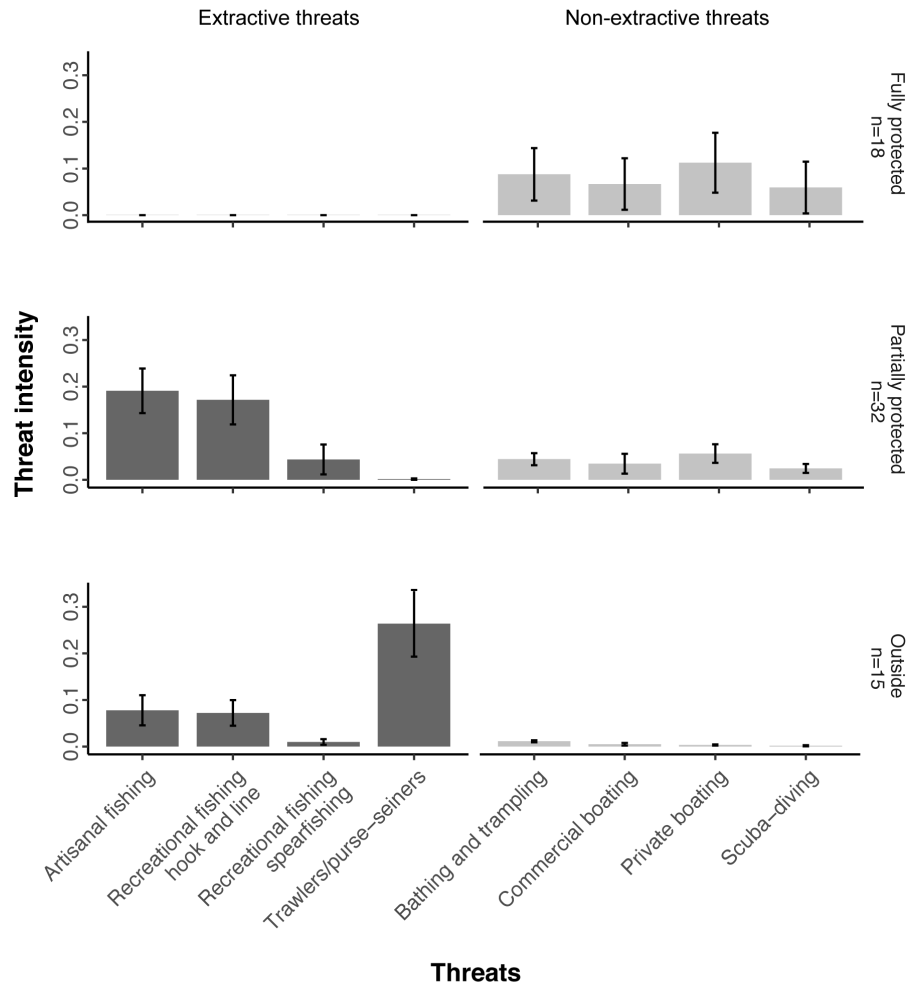


Fig. 2. Mean threat intensities (\pm SE) across fully protected, partially protected and outside zones of 15 marine protected areas.

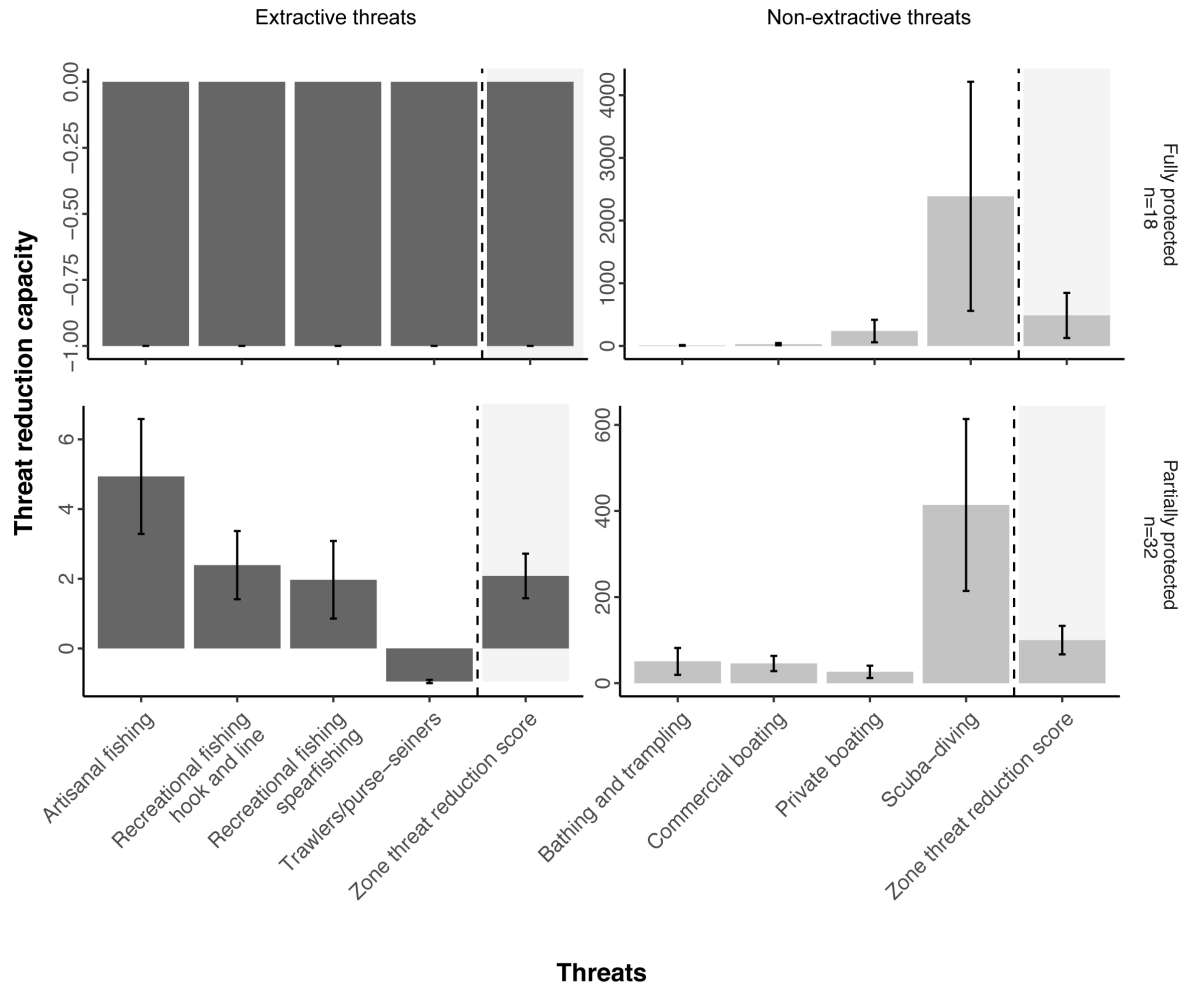


Fig. 3. Mean threat reduction capacity (\pm SE) for each threat across zones of different protection levels. The last bar of each panel represents the zone threat reduction score (zT). Negative values of the threat reduction capacity indicate that the threat is reduced in the marine protected area (MPA) relative to the outside, while positive values indicate that threats are higher inside the MPA relative to the outside.

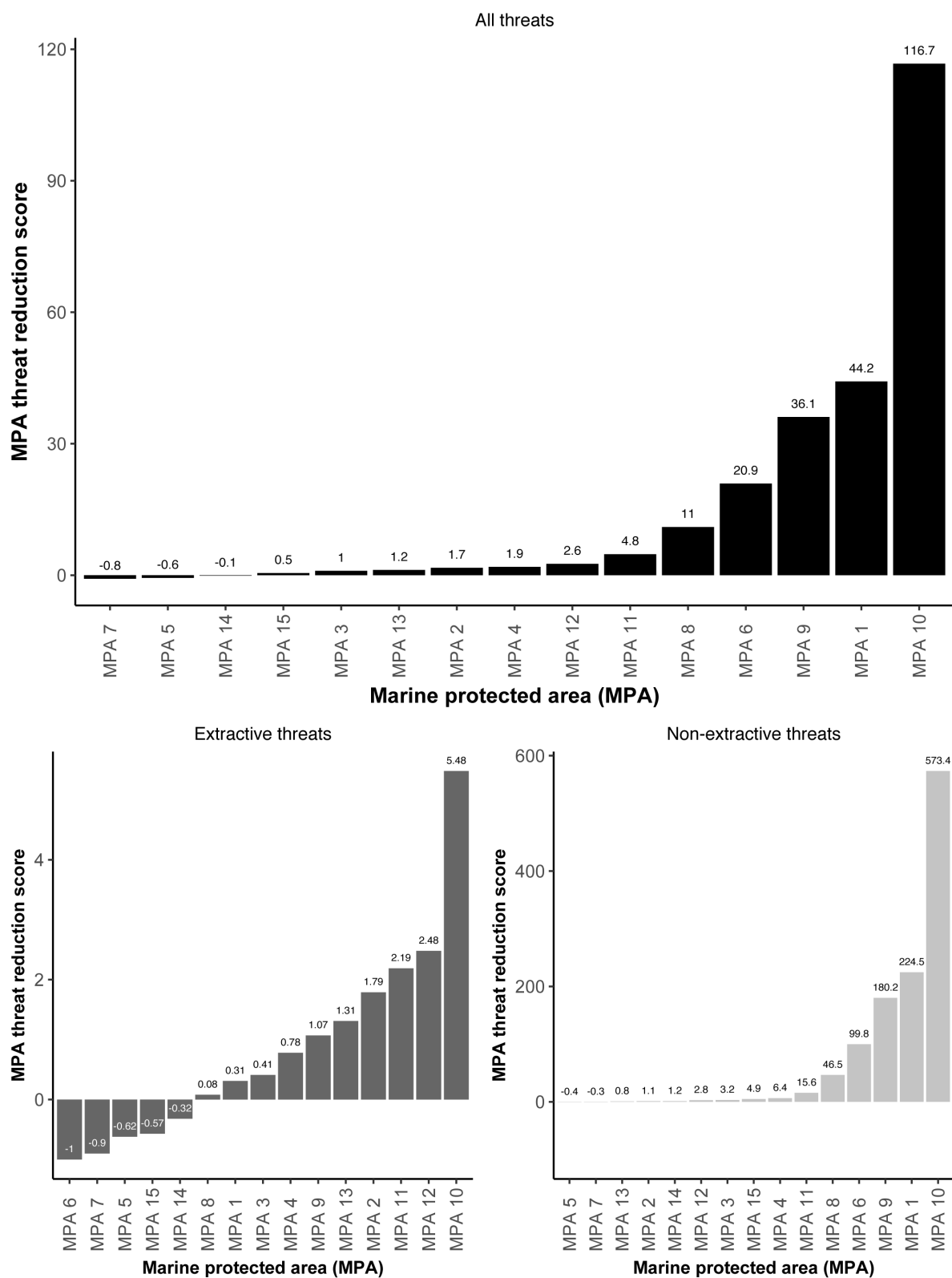


Fig. 4. Threat reduction score of marine protected areas (MPAs) for all threats combined (top panel), extractive (bottom left panel) and non-extractive threats (bottom right panel). Negative values of the threat reduction score indicate that threats are being effectively reduced within an MPA relative to the outside, while positive threat reduction score values indicate that the MPA is not effective at reducing threats compared to the outside.

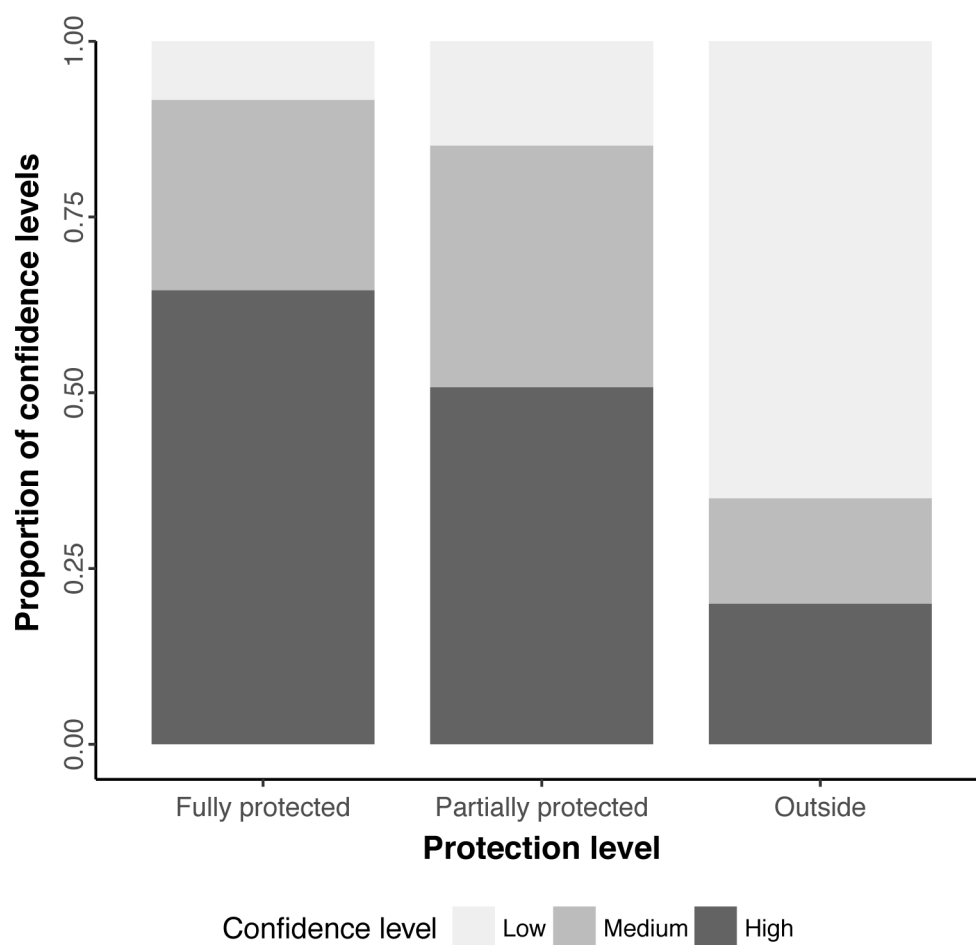


Fig. 5. Level of confidence (low, medium and high) associated to threat values corresponding to the fully protected zones, partially protected zones and the outside areas of the marine protected areas.

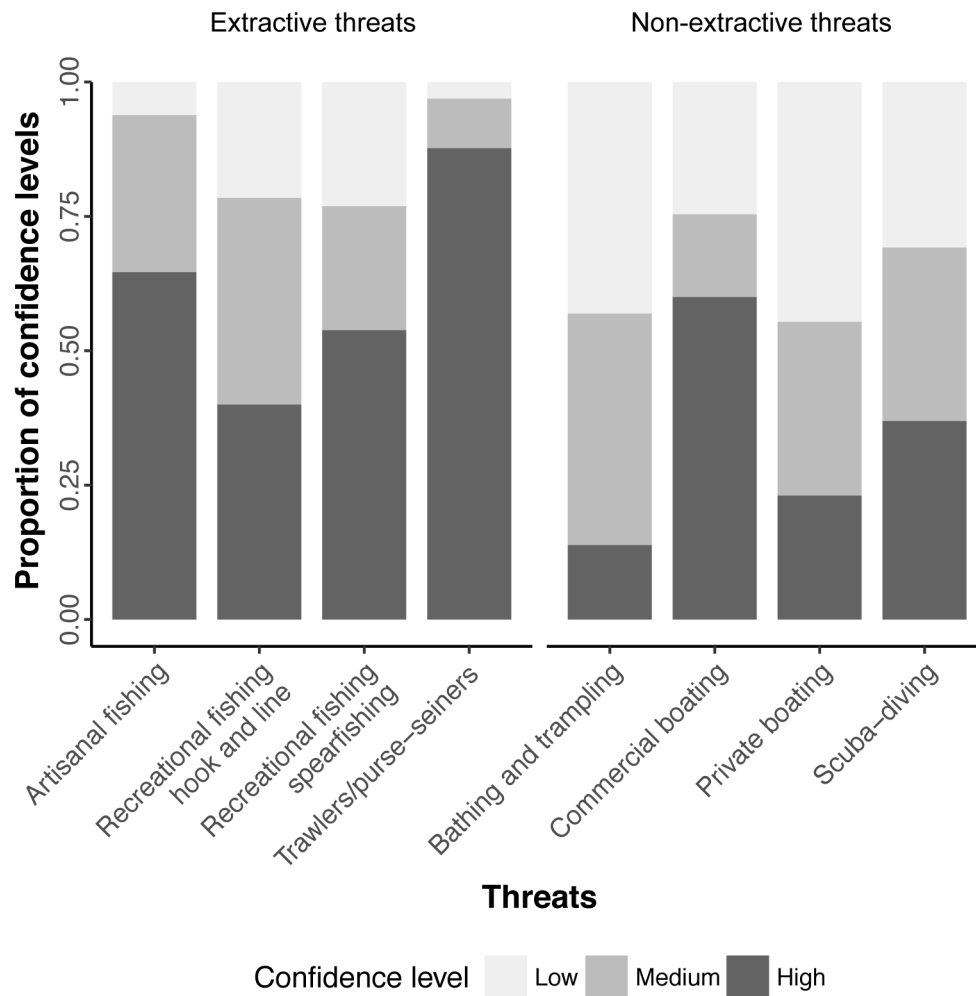


Fig. 6. Confidence levels (low, medium and high) associated to threat values for each threat. The red and blue outlines separate extractive and non-extractive threats.

Appendix A

Database of marine protected areas used in the present study

Table A.1: The characteristics of each of the marine protected areas (MPAs) included in this study. Zone name represents the official name on the basis of the establishment decree. Zones were classified according to the level of protection: fully protected zones (no-entry and no-take areas) and partially protected zones. The size of each zone within the MPA was obtained from managers and/or management plans, whilst the outside surface areas were calculated using QGIS 2.8/1 (QGIS Development Team, 2015). Commercial fisheries using trawlers and purse seiners were assessed in a 10km radius outside area whereas recreational and artisanal fishing and tourism were assessed in the coastal outside area.

MPA code	MPA name	Zone name	Protection level	Zone size (km ²)	MPA size (km ²)	Year of establishment	Outside area - coastal (km ²)	Outside area- 10 km radius (km ²)
MPA 01	AMP Portofino	Zona A	Fully protected (no entry)	0.18	3.94	1998	15.13	190.98
		Zona B	Partially protected	1.95				
		Zona C	Partially protected	1.81				
MPA 02	Al Hoceima	Zona A	Fully protected (no take)	17.8	24.2	2004	183.7	631.53
		Zona C	Partially protected	6.4				
MPA 03	Cerbere-Banyuls Natural Marine Reserve	Zone de protection renforcée	Fully protected	0.65	6.5	1974	55.33	194.02
		Zone de protection partielle	Partially protected	5.85				
MPA 04	Dwejra MPA	<i>one zone only</i>	Partially protected	2.29	2.27	2007	24.75	347.66
	Levante de mallorca-cala Rajada	Amortiguación	Partially protected	93.86	112.86	2007	156.25	684.03

MPA 05		Integral	Fully protected (no take)	19				
MPA 06	Masia Blanca	Buffer	Fully protected (no take)	2.07	2.50	1999	36.43	196.48
		Integral	Fully protected (no take)	0.43				
MPA 07	NP Brijuni	Zone A	Fully protected (no take)	31.24	34.01	1983	68.1	398.78
		Zone B	Partially protected	2.77				
MPA 08	National rine Park of Zakynthos	Peripheral zone	Partially protected	31.94	83.31	1999	171.12	1050.33
		Zone A	Partially protected	8.01				
		Zone B	Partially protected	35.95				
		Zone C	Partially protected	7.40				
MPA 09	Parc Natural de Cap de Creus	Parc Natural Cadaques	Partially protected	9.6	30.5	1998	76.52	557.97
		Parc Natural Cap de Creus	Partially protected	2.3				
		Parc Natural Cap Gros	Partially protected	7.1				
		Parc Natural Cap Norfeu	Partially protected	3.3				
		Reserva Natural Integral des Encalladora	Fully protected (no entry)	0.02				
		Reserva Natural Parcial del Cap de Creus	Partially protected	2.9				

		Reserva Natural Parcial del Cap Norfeu	Partially protected	2.7				
		Reserva Natural Parcial dels Farallons	Partially protected	2.6				
MPA 10	Parc Natural del Montgrí, el baix Ter i les Medes	Reserva Natural Parcial de les Illes Medes	Partially protected	9.4	15.19	2010	94.35	348.87
		Reserva Natural Parcial de les Illes Medes	Fully protected (no take)	1				
		Parc Natural Marí	Partially protected	4.79				
MPA 11	Parque Nacional marítimo terrestre del Archipiélago de Cabrera	Reserva marina	Fully protected (no entry)	2.12	87.05	1991	64.91	800.32
		Uso especial	Fully protected (no take)	0.71				
		Uso moderado	Partially protected	77.98				
		Uso restringido	Fully protected (no take)	0.68				
		Uso restringido pesquero	Partially protected	5.62				
MPA 12	Porto Cesareo	Zone A	Fully protected (no take)	1.99	164.87	1997	307.91	407.17
		Zone B	Fully protected (no take)	30.21				
		Zone C	Partially protected	132.66				
MPA 13	Rdum Majjiesa to Ras ir-Raheb	<i>one zone only</i>	Partially protected	8.49	8.49	2007	115.8	308.29

MPA 14	Torre Guaceto	Zona A	Fully protected (no take)	1.85	22.33	1991	76.87	282.03
		Zona B	Fully protected (no entry)	18.85				
		Zona C	Partially protected	22.33				
MPA 15	Kornati	Anchoring subzone (3a)	Partially protected	1.41	216.78	1994	462.13	1269.35
		Recreation subzone (2b)	Partially protected	2.36				
		Settlement subzone (3b)	Partially protected	0.64				
		Strict protection subzone (1b)	Fully protected (no take)	111.52				
		Tradition and culture subzone (2a)	Partially protected	82.22				
		Very strict protection subzone (1a)	Fully protected (no entry)	18.64				

Appendix B

Raw threat data collected of marine protected areas used in the present study

Table B.1. Raw data collected for all threat indicators for each zone of all marine protected areas (MPAs) used in this study. The source of data and confidence level associated to each threat value are also presented. Zone name represents the official name on the basis of the establishment decree. Zones were classified according to the level of protection: fully protected zones (no-entry and no-take areas), partially protected zones and the unprotected-outside areas. The size of each zone within the MPA was obtained from managers and/or management plans, whilst the outside surface areas were calculated using QGIS 2.8/1 (QGIS Development Team, 2015). Commercial fisheries using trawlers and purse seiners were assessed in a 10km radius outside area whereas recreational and artisanal fishing and tourism were assessed in the coastal outside area.

MPA Code	Zone name	Protection level	Zone size (km ²)	Threats	Indicators	Value	Data source	Confidence	Details
MPA 01	Zona A	No-entry	0.175	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 01	Zona A	No-entry	0.175	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 01	Zona A	No-entry	0.175	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 01	Zona A	No-entry	0.175	Tourism: bathing/trampl ing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 01	Zona A	No-entry	0.175	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	MPA regulations
MPA 01	Zona A	No-entry	0.175	Tourism: private boating	Number of private boats (nb/year)	0	data	high	MPA regulations
MPA 01	Zona A	No-entry	0.175	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 01	Zona A	No-entry	0.175	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 01	Zona B	Partially protected	1.95	Artisanal fishing	Number of boats (nb/year)	39	data	high	Portofino MPA data of granted licences
MPA 01	Zona B	Partially protected	1.95	Recreational fishing: hook and line	Number of people (nb/year)	400	data	medium	Estimated data (on the basis of resident population)
MPA 01	Zona B	Partially protected	1.95	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 01	Zona B	Partially protected	1.95	Tourism: bathing/trampl ing	Number of people (nb/year)	150000	data	low	Cappanera et al. (2010)
MPA 01	Zona B	Partially protected	1.95	Tourism: commercial boating	Number of commercial	0	data	high	MPA regulations

					touristic boats (nb/year)				
MPA 01	Zona B	Partially protected	1.95	Tourism: private boating	Number of private boats (nb/year)	1924	data	medium	Cappanera et al. (2014): estimated data referred to 2013 season
MPA 01	Zona B	Partially protected	1.95	Tourism: scuba-diving	Number of dives (nb/year)	32306	data	medium	Cappanera et al. (2014): estimated data referred to 2013 season
MPA 01	Zona B	Partially protected	1.95	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 01	Zona C	Partially protected	1.811	Artisanal fishing	Number of boats (nb/year)	39	data	high	Portofino MPA data of granted licences
MPA 01	Zona C	Partially protected	1.811	Recreational fishing: hook and line	Number of people (nb/year)	349	data	medium	Estimated data (on the basis of resident population)
MPA 01	Zona C	Partially protected	1.811	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 01	Zona C	Partially protected	1.811	Tourism: bathing/trampl ing	Number of people (nb/year)	150000	data	low	Cappanera et al. (2010): estimated data referred to the period from June to September
MPA 01	Zona C	Partially protected	1.811	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	MPA regulations
MPA 01	Zona C	Partially protected	1.811	Tourism: private boating	Number of private boats (nb/year)	8767	data	medium	Cappanera et al. (2014): estimated data referred to 2013 season
MPA 01	Zona C	Partially protected	1.811	Tourism: scuba-diving	Number of dives (nb/year)	2000	expert opinion	low	Cappanera et al. (2014): estimated data referred to 2013 season
MPA 01	Zona C	Partially protected	1.811	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 01	Outside	Outside	15.13	Artisanal fishing	Number of boats (nb/year)	159	data	high	Ligurian Region data, MARTE+ (Cattaneo-Vietti R. 2013)

MPA 01	Outside	Outside	15.13	Recreational fishing: hook and line	Number of people (nb/year)	800	expert opinion	low	Estimated
MPA 01	Outside	Outside	15.13	Recreational fishing: spearfishing	Number of people (nb/year)	100	expert opinion	low	Estimated
MPA 01	Outside	Outside	15.13	Tourism: bathing/trampl ing	Number of people (nb/year)	100000	expert opinion	low	Estimated data (on the basis of the number of resident people, ISTAT 2012)
MPA 01	Outside	Outside	15.13	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	140	data	high	Cappanera et al. (2014): estimated data referred to 2013 season
MPA 01	Outside	Outside	15.13	Tourism: private boating	Number of private boats (nb/year)	3600	expert opinion	low	Estimated
MPA 01	Outside	Outside	15.13	Tourism: scuba-diving	Number of dives (nb/year)	100	expert opinion	low	Estimated
MPA 01	Outside	Outside	190.98	Trawlers/purse-seiners	Number of boats (nb/year)	53	data	high	Fleet register EC - December2013
MPA 02	Zona A	No-take	17.8	Artisanal fishing	Number of boats (nb/year)	0	data	medium	Franzosini C. & Limam A. (2006); AGIR (2013)
MPA 02	Zona A	No-take	17.8	Recreational fishing: hook and line	Number of people (nb/year)	0	data	medium	Nibani H. (2010); AGIR (2013)
MPA 02	Zona A	No-take	17.8	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	Nibani H. (2010), AGIR (2013)
MPA 02	Zona A	No-take	17.8	Tourism: bathing/trampl ing	Number of people (nb/year)	0	expert opinion	medium	expert opinion
MPA 02	Zona A	No-take	17.8	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	low	Nibani H. (2010), AGIR (2013)
MPA 02	Zona A	No-take	17.8	Tourism: private boating	Number of private boats (nb/year)	0	expert opinion	low	expert opinion

MPA 02	Zona A	No-take	17.8	Tourism: scuba-diving	Number of dives (nb/year)	100	data	medium	Nibani H. (2010), AGIR (2013)
MPA 02	Zona A	No-take	17.8	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	medium	Franzosini C. & Limam A. (2006), AGIR (2013)
MPA 02	Zona C	Partially protected	6.4	Artisanal fishing	Number of boats (nb/year)	130	data	high	Franzosini C. & Limam A. (2006), AGIR (2013)
MPA 02	Zona C	Partially protected	6.4	Recreational fishing: hook and line	Number of people (nb/year)	1800	data	medium	Franzosini C. & Limam A. (2006), AGIR (2013)
MPA 02	Zona C	Partially protected	6.4	Recreational fishing: spearfishing	Number of people (nb/year)	800	data	medium	Franzosini C. & Limam A. (2006), AGIR (2013)
MPA 02	Zona C	Partially protected	6.4	Tourism: bathing/trampl ing	Number of people (nb/year)	1200	expert opinion	low	Nibani H. (2010); AGIR (2013)
MPA 02	Zona C	Partially protected	6.4	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	Nibani H. (2010), AGIR (2013)
MPA 02	Zona C	Partially protected	6.4	Tourism: private boating	Number of private boats (nb/year)	50	expert opinion	low	Nibani H. (2010), AGIR (2013)
MPA 02	Zona C	Partially protected	6.4	Tourism: scuba-diving	Number of dives (nb/year)	850	data	medium	Nibani H. (2010), AGIR (2013)
MPA 02	Zona C	Partially protected	6.4	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	Franzosini C. & Limam A. (2006)
MPA 02	Outside	Outside	183.7	Artisanal fishing	Number of boats (nb/year)	416	data	medium	Franzosini C. & Limam A. (2006)
MPA 02	Outside	Outside	183.7	Recreational fishing: hook and line	Number of people (nb/year)	2250	expert opinion	low	expert opinion
MPA 02	Outside	Outside	183.7	Recreational fishing: spearfishing	Number of people (nb/year)	900	expert opinion	low	expert opinion
MPA 02	Outside	Outside	183.7	Tourism: bathing/trampl ing	Number of people (nb/year)	4500	expert opinion	low	expert opinion

MPA 02	Outside	Outside	183.7	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	Nibani H. (2010); AGIR (2013)
MPA 02	Outside	Outside	183.7	Tourism: private boating	Number of private boats (nb/year)	500	expert opinion	low	expert opinion
MPA 02	Outside	Outside	183.7	Tourism: scuba-diving	Number of dives (nb/year)	1500	expert opinion	low	expert opinion
MPA 02	Outside	Outside	631.53	Trawlers/purse -seiners	Number of boats (nb/year)	22	data	medium	Franzosini C. & Limam A. (2006), AGIR (2013)
MPA 03	Zone de protection renforcée	No-take	0.65	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 03	Zone de protection renforcée	No-take	0.65	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 03	Zone de protection renforcée	No-take	0.65	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 03	Zone de protection renforcée	No-take	0.65	Tourism: bathing/trampl ing	Number of people (nb/year)	2000	expert opinion	low	Estimated: 5% of the total number of snorkelers in the Reserve
MPA 03	Zone de protection renforcée	No-take	0.65	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	MPA regulations
MPA 03	Zone de protection renforcée	No-take	0.65	Tourism: private boating	Number of private boats (nb/year)	500	expert opinion	low	Estimated
MPA 03	Zone de protection renforcée	No-take	0.65	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 03	Zone de protection renforcée	No-take	0.65	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA regulations

MPA 03	Zone de protection partielle	Partially protected	5.85	Artisanal fishing	Number of boats (nb/year)	15	data	medium	number of fishing licenses
MPA 03	Zone de protection partielle	Partially protected	5.85	Recreational fishing: hook and line	Number of people (nb/year)	1549	data	high	number of licenses
MPA 03	Zone de protection partielle	Partially protected	5.85	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 03	Zone de protection partielle	Partially protected	5.85	Tourism: bathing/trampl ing	Number of people (nb/year)	35857	data	medium	Extrapolate value based on the underwater trail of Peyrefite (25 100 snorkelers per year) representing 70% of the total number of snorkelers
MPA 03	Zone de protection partielle	Partially protected	5.85	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	Estimation based on regular sailing survey (30 boats on the reserve per day)
MPA 03	Zone de protection partielle	Partially protected	5.85	Tourism: private boating	Number of private boats (nb/year)	1830	expert opinion	medium	Estimated
MPA 03	Zone de protection partielle	Partially protected	5.85	Tourism: scuba-diving	Number of dives (nb/year)	21862	data	medium	Only 10 scuba-diving center (on 18) returned their log-book in 2013
MPA 03	Zone de protection partielle	Partially protected	5.85	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 03	Outside	Outside	55.33	Artisanal fishing	Number of boats (nb/year)	40	expert opinion	medium	Number of surrounding harbors Licenses but no data on Spanish fleet (probably more: between 28 and 50)
MPA 03	Outside	Outside	55.33	Recreational fishing: hook and line	Number of people (nb/year)	6200	expert opinion	low	Estimation based on 100 fishing trip per day in summer but no real data on spanish situation
MPA 03	Outside	Outside	55.33	Recreational fishing: spearfishing	Number of people (nb/year)	620	expert opinion	low	Estimation based on 10% of the recreational activity is represented by spearfishes

MPA 03	Outside	Outside	55.33	Tourism: bathing/trampl ing	Number of people (nb/year)	500000	expert opinion	low	Estimation data based on sand beach areas: Racou, Portails, Collioure, Port Vendres, Paulille, Les Elmes, Banyuls, Aloes, Cerbère, PortBou, Lanca
MPA 03	Outside	Outside	55.33	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	26	data	medium	in 2008, 13 cruise boats, 3 tankers (117 trips) and 10 bottom glass boats
MPA 03	Outside	Outside	55.33	Tourism: private boating	Number of private boats (nb/year)	1830	data	high	Data from Google Earth : 1830 = number of mooring places in different harbors located inside the "outside zone" (Collioure, Port Vendres, Banyuls, Cerbère, PortBou, Colera, Llança)
MPA 03	Outside	Outside	55.33	Tourism: scuba-diving	Number of dives (nb/year)	64000	data	high	Data from the Golf of Lion natural marine park; more expand than the outside zone but most of diving spots are located in the rocky coast
MPA 03	Outside	Outside	194.02	Trawlers/purse -seiners	Number of boats (nb/year)	10	expert opinion	medium	Number of Licences in Port Vendre but no data on Spanish fleet (probably more : between 5 and 15)
MPA 04	Inside	Partially protected	2.286	Artisanal fishing	Number of boats (nb/year)	8	data	medium	Registry of fishing vessels held by Ministry
MPA 04	Inside	Partially protected	2.286	Recreational fishing: hook and line	Number of people (nb/year)	30	expert opinion	low	Estimated
MPA 04	Inside	Partially protected	2.286	Recreational fishing: spearfishing	Number of people (nb/year)	2873	data	low	Registry of spear gun licenses held by Malta Police Force
MPA 04	Inside	Partially protected	2.286	Tourism: bathing/trampl ing	Number of people (nb/year)	5000	data	low	Estimated based on logs kept by Malta Tourism Authority beach supervisors

MPA 04	Inside	Partially protected	2.286	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	17	data	high	List of licensed commercial vessels held by Transport Malta
MPA 04	Inside	Partially protected	2.286	Tourism: private boating	Number of private boats (nb/year)	NA		low	NA
MPA 04	Inside	Partially protected	2.286	Tourism: scuba-diving	Number of dives (nb/year)	10000	expert opinion	low	Estimated
MPA 04	Inside	Partially protected	2.286	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	Registry of fishing vessels held by Ministry
MPA 04	Outside	Outside	24.75	Artisanal fishing	Number of boats (nb/year)	89	data	medium	Registry of fishing vessels held by Ministry
MPA 04	Outside	Outside	24.75	Recreational fishing: hook and line	Number of people (nb/year)	400	expert opinion	low	Estimated
MPA 04	Outside	Outside	24.75	Recreational fishing: spearfishing	Number of people (nb/year)	2873	data	low	Registry of spear gun licenses held by Malta Police Force
MPA 04	Outside	Outside	24.75	Tourism: bathing/trampl ing	Number of people (nb/year)	60000	data	low	Estimated based on logs kept by Malta Tourism Authority beach supervisors
MPA 04	Outside	Outside	24.75	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	30	expert opinion	low	Estimated
MPA 04	Outside	Outside	24.75	Tourism: private boating	Number of private boats (nb/year)	NA		low	NA
MPA 04	Outside	Outside	24.75	Tourism: scuba-diving	Number of dives (nb/year)	3500	expert opinion	low	Estimated
MPA 04	Outside	Outside	347.66	Trawlers/purse-seiners	Number of boats (nb/year)	39	data	high	Registry of fishing vessels held by Ministry
MPA 05	Integral	No-take	19	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 05	Integral	No-take	19	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations

MPA 05	Integral	No-take	19	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 05	Integral	No-take	19	Tourism: bathing/trampl ing	Number of people (nb/year)	1000	data	medium	Internal MPA reporting
MPA 05	Integral	No-take	19	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	5	data	high	Harbour Authorities
MPA 05	Integral	No-take	19	Tourism: private boating	Number of private boats (nb/year)	150	data	high	Internal MPA reporting
MPA 05	Integral	No-take	19	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 05	Integral	No-take	19	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 05	Amortigua ción	Partially protected	93.86	Artisanal fishing	Number of boats (nb/year)	50	data	high	MPA regulations
MPA 05	Amortigua ción	Partially protected	93.86	Recreational fishing: hook and line	Number of people (nb/year)	685	data	high	Internal MPA reporting
MPA 05	Amortigua ción	Partially protected	93.86	Recreational fishing: spearfishing	Number of people (nb/year)	64	data	high	Regional number of Licenses
MPA 05	Amortigua ción	Partially protected	93.86	Tourism: bathing/trampl ing	Number of people (nb/year)	180000	data	medium	Internal MPA reporting
MPA 05	Amortigua ción	Partially protected	93.86	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	10	data	high	Internal MPA reporting
MPA 05	Amortigua ción	Partially protected	93.86	Tourism: private boating	Number of private boats (nb/year)	2800	data	medium	Internal MPA reporting
MPA 05	Amortigua ción	Partially protected	93.86	Tourism: scuba-diving	Number of dives (nb/year)	4222	data	high	Anual Report Regional Tourism Department

MPA 05	Amortiguación	Partially protected	93.86	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 05	Exterior	Outside	156.25	Artisanal fishing	Number of boats (nb/year)	64	data	high	Regional Boat Census
MPA 05	Exterior	Outside	156.25	Recreational fishing: hook and line	Number of people (nb/year)	7560	data	medium	Regional number of Licenses
MPA 05	Exterior	Outside	156.25	Recreational fishing: spearfishing	Number of people (nb/year)	380	data	medium	Regional number of Licenses
MPA 05	Exterior	Outside	156.25	Tourism: bathing/trampl ing	Number of people (nb/year)	340000	expert opinion	low	Estimated
MPA 05	Exterior	Outside	156.25	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	50	data	low	Annual Report Regional Tourism Department
MPA 05	Exterior	Outside	156.25	Tourism: private boating	Number of private boats (nb/year)	7000	data	low	Annual Report Regional Tourism Department
MPA 05	Exterior	Outside	156.25	Tourism: scuba-diving	Number of dives (nb/year)	10000	expert opinion	low	Estimated
MPA 05	Exterior	Outside	684.03	Trawlers/purse-seiners	Number of boats (nb/year)	6	data	high	Regional Boat Census
MPA 06	Integral	No-take	0.431	Artisanal fishing	Number of boats (nb/year)	0	data	medium	MPA regulations
MPA 06	Integral	No-take	0.431	Recreational fishing: hook and line	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 06	Integral	No-take	0.431	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 06	Integral	No-take	0.431	Tourism: bathing/trampl ing	Number of people (nb/year)	150000	data	medium	Allowed. Permit not required.Data from MPA wardens for 2013.
MPA 06	Integral	No-take	0.431	Tourism: commercial boating	Number of commercial	11	data	medium	Allowed. Data from MPA wardens for 2013.

					touristic boats (nb/year)				
MPA 06	Integral	No-take	0.431	Tourism: private boating	Number of private boats (nb/year)	1193	data	medium	Allowed. Data from MPA wardens for 2013.
MPA 06	Integral	No-take	0.431	Tourism: scuba-diving	Number of dives (nb/year)	0	data	medium	MPA regulations
MPA 06	Integral	No-take	0.431	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	medium	MPA regulations
MPA 06	Buffer	No-take	2.0718	Artisanal fishing	Number of boats (nb/year)	0	data	medium	MPA regulations
MPA 06	Buffer	No-take	2.0718	Recreational fishing: hook and line	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 06	Buffer	No-take	2.0718	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 06	Buffer	No-take	2.0718	Tourism: bathing/trampl ing	Number of people (nb/year)	150000	data	medium	Allowed. Permit not required. Data from MPA wardens for 2013.
MPA 06	Buffer	No-take	2.0718	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	36	data	medium	Allowed. Permit not required. Data from MPA wardens for 2013.
MPA 06	Buffer	No-take	2.0718	Tourism: private boating	Number of private boats (nb/year)	1232	data	medium	Allowed. Data from MPA wardens for 2013.
MPA 06	Buffer	No-take	2.0718	Tourism: scuba-diving	Number of dives (nb/year)	0	data	low	Allowed. Data from MPA wardens for 2013.
MPA 06	Buffer	No-take	2.0718	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	medium	MPA regulations
MPA 06	Exterior	Outside	36.43	Artisanal fishing	Number of boats (nb/year)	6	data	high	Allowed. Data from MPA wardens for 2013.
MPA 06	Exterior	Outside	36.43	Recreational fishing: hook and line	Number of people (nb/year)	15	data	medium	Allowed. Data from MPA wardens for 2013.

MPA 06	Exterior	Outside	36.43	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	Allowed. Data from MPA wardens for 2013.
MPA 06	Exterior	Outside	36.43	Tourism: bathing/trampl ing	Number of people (nb/year)	150000	expert opinion	low	Estimated (Permit not needed. Unknown.)
MPA 06	Exterior	Outside	36.43	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	215	data	medium	Allowed. Data from MPA wardens for 2013.
MPA 06	Exterior	Outside	36.43	Tourism: private boating	Number of private boats (nb/year)	124	data	medium	Allowed. Data from MPA wardens for 2013.
MPA 06	Exterior	Outside	36.43	Tourism: scuba-diving	Number of dives (nb/year)	1232	expert opinion	low	Permit not needed. Unknown but high.
MPA 06	Exterior	Outside	196.48	Trawlers/purse-seiners	Number of boats (nb/year)	24	data	high	Allowed. Data from MPA wardens for 2013.
MPA 07	Zone A	No-take	31.24	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 07	Zone A	No-take	31.24	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 07	Zone A	No-take	31.24	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 07	Zone A	No-take	31.24	Tourism: bathing/trampl ing	Number of people (nb/year)	131516	data	high	Total no. of visitors for 2013 on two main islands (only around 1/3 are bathing)
MPA 07	Zone A	No-take	31.24	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	3	data	high	Only the boat from NP, and two other boats have the permission to take tourists to the island (the boat from NP Brijuni makes from 4 (winter) to 14 (summer) trips per day, and other two boats 1 trip per day during the summer)

MPA 07	Zone A	No-take	31.24	Tourism: private boating	Number of private boats (nb/year)	2500	data	low	Total no. of boats moored in the port of the main island for 2013 is 1830.
MPA 07	Zone A	No-take	31.24	Tourism: scuba-diving	Number of dives (nb/year)	1000	expert opinion	medium	Estimated
MPA 07	Zone A	No-take	31.24	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 07	Zone B	Partially protected	2.77	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 07	Zone B	Partially protected	2.77	Recreational fishing: hook and line	Number of people (nb/year)	250	expert opinion	medium	There are two types of permits: monthly and yearly. No. of issued monthly permits for 2013. is 1077 and of yearly permis 8. Only 2 kg of fish is allowed per one person per day for local citizens of three surrounding municipalities. Only traditional (recreational) fishing is allowed for dawn to dusk. Value in the table is calculated presuming that same persons are buying monthly permits 5 months during the year and based on the counted small boats in surrounding ports.
MPA 07	Zone B	Partially protected	2.77	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 07	Zone B	Partially protected	2.77	Tourism: bathing/trampl ing	Number of people (nb/year)	35000	expert opinion	medium	On one of the two islands (Jerolim) is obligated ticket buying (17370 visitors for 2013), but on the second island visiting is free of charge. It is presumed that around same number of visitor visit the second island (Kozada).

MPA 07	Zone B	Partially protected	2.77	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	20	expert opinion	medium	Around 20 commercial boats take visitors to those 2 islands.
MPA 07	Zone B	Partially protected	2.77	Tourism: private boating	Number of private boats (nb/year)	1000	expert opinion	low	Around 1000 boats are counted on the map in surrounding ports.
MPA 07	Zone B	Partially protected	2.77	Tourism: scuba-diving	Number of dives (nb/year)	100	expert opinion	medium	1 spots in this zone 2 where diving is allowed (with permit). Total number of dives in zone 1 and 2 for 2013 is 497 and for 2012 is 350. So the average number of dives per year is around 450 - 400 for zone 1 and 50 for zone 2.
MPA 07	Zone B	Partially protected	2.77	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 07	Outside	Outside	68.1	Artisanal fishing	Number of boats (nb/year)	50	expert opinion	low	Very rough estimation
MPA 07	Outside	Outside	68.1	Recreational fishing: hook and line	Number of people (nb/year)	1000	expert opinion	low	In this zone there is around 20 fishing organizations
MPA 07	Outside	Outside	68.1	Recreational fishing: spearfishing	Number of people (nb/year)	100	expert opinion	low	The assumption is that 10% of persons are practicing spearfishing
MPA 07	Outside	Outside	68.1	Tourism: bathing/trampl ing	Number of people (nb/year)	400000	expert opinion	low	In this zone lives around 70.000 local citizens and in 2013 in this zone has arrived 430.000 tourists
MPA 07	Outside	Outside	68.1	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	2000	expert opinion	low	Most of commercial touristic boats are sailing boats for rent (other commercial boats around 100)
MPA 07	Outside	Outside	68.1	Tourism: private boating	Number of private boats (nb/year)	5000	expert opinion	low	In this zone around 4500 boats were counted in big and small ports on Google map

MPA 07	Outside	Outside	68.1	Tourism: scuba-diving	Number of dives (nb/year)	5000	expert opinion	low	In this zone there is around 20 diving centers with many diving sites
MPA 07	Outside	Outside	398.78	Trawlers/purse -seiners	Number of boats (nb/year)	20	expert opinion	low	Very rough estimation
MPA 08	Peripheral zone	Partially protected	31.944	Artisanal fishing	Number of boats (nb/year)	5	data	medium	Internal MPA reporting
MPA 08	Peripheral zone	Partially protected	31.944	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 08	Peripheral zone	Partially protected	31.944	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 08	Peripheral zone	Partially protected	31.944	Tourism: bathing/trampl ing	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 08	Peripheral zone	Partially protected	31.944	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	200	expert opinion	medium	Internal MPA reporting
MPA 08	Peripheral zone	Partially protected	31.944	Tourism: private boating	Number of private boats (nb/year)	500	expert opinion	medium	Internal MPA reporting
MPA 08	Peripheral zone	Partially protected	31.944	Tourism: scuba-diving	Number of dives (nb/year)	7000	data	medium	Internal MPA reporting
MPA 08	Peripheral zone	Partially protected	31.944	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	Internal MPA reporting
MPA 08	Zone A	Partially protected	8.014	Artisanal fishing	Number of boats (nb/year)	9.93	data	high	Internal MPA reporting
MPA 08	Zone A	Partially protected	8.014	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 08	Zone A	Partially protected	8.014	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 08	Zone A	Partially protected	8.014	Tourism: bathing/trampl ing	Number of people (nb/year)	180000	data	medium	MPA regulations

MPA 08	Zone A	Partially protected	8.014	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0		low	Internal MPA reporting
MPA 08	Zone A	Partially protected	8.014	Tourism: private boating	Number of private boats (nb/year)	0		low	Internal MPA reporting
MPA 08	Zone A	Partially protected	8.014	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	Internal MPA reporting
MPA 08	Zone A	Partially protected	8.014	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	Internal MPA reporting
MPA 08	Zone B	Partially protected	35.945	Artisanal fishing	Number of boats (nb/year)	31.5	data	high	Internal MPA reporting
MPA 08	Zone B	Partially protected	35.945	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 08	Zone B	Partially protected	35.945	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 08	Zone B	Partially protected	35.945	Tourism: bathing/trampl ing	Number of people (nb/year)	310000	data	medium	MPA regulations
MPA 08	Zone B	Partially protected	35.945	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	200	expert opinion	medium	Internal MPA reporting
MPA 08	Zone B	Partially protected	35.945	Tourism: private boating	Number of private boats (nb/year)	500	expert opinion	medium	Internal MPA reporting
MPA 08	Zone B	Partially protected	35.945	Tourism: scuba-diving	Number of dives (nb/year)	3000	data	medium	Internal MPA reporting
MPA 08	Zone B	Partially protected	35.945	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	Internal MPA reporting
MPA 08	Zone C	Partially protected	7.404	Artisanal fishing	Number of boats (nb/year)	8.7	data	high	Internal MPA reporting
MPA 08	Zone C	Partially protected	7.404	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations

MPA 08	Zone C	Partially protected	7.404	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 08	Zone C	Partially protected	7.404	Tourism: bathing/trampl ing	Number of people (nb/year)	200000	expert opinion	medium	MPA regulations
MPA 08	Zone C	Partially protected	7.404	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	200	expert opinion	medium	Internal MPA reporting
MPA 08	Zone C	Partially protected	7.404	Tourism: private boating	Number of private boats (nb/year)	500	expert opinion	medium	Internal MPA reporting
MPA 08	Zone C	Partially protected	7.404	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	Internal MPA reporting
MPA 08	Zone C	Partially protected	7.404	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	Internal MPA reporting
MPA 08	Outside	Outside	171.12	Artisanal fishing	Number of boats (nb/year)	40	data	medium	Internal MPA reporting
MPA 08	Outside	Outside	171.12	Recreational fishing: hook and line	Number of people (nb/year)	0	expert opinion	high	Estimated
MPA 08	Outside	Outside	171.12	Recreational fishing: spearfishing	Number of people (nb/year)	500	expert opinion	low	Estimated
MPA 08	Outside	Outside	171.12	Tourism: bathing/trampl ing	Number of people (nb/year)	500000	expert opinion	low	Estimated
MPA 08	Outside	Outside	171.12	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	10	expert opinion	low	Estimated
MPA 08	Outside	Outside	171.12	Tourism: private boating	Number of private boats (nb/year)	400	expert opinion	low	Estimated
MPA 08	Outside	Outside	171.12	Tourism: scuba-diving	Number of dives (nb/year)	1000	expert opinion	low	Estimated

MPA 08	Outside	Outside	1050.33	Trawlers/purse-seiners	Number of boats (nb/year)	10	expert opinion	high	Estimated
MPA 09	Reserva Natural Integral des Encalladora	No-entry	0.02	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Integral des Encalladora	No-entry	0.02	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Integral des Encalladora	No-entry	0.02	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Integral des Encalladora	No-entry	0.02	Tourism: bathing/trampl ing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Integral des Encalladora	No-entry	0.02	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Integral des Encalladora	No-entry	0.02	Tourism: private boating	Number of private boats (nb/year)	0	data	high	MPA regulations

MPA 09	Reserva Natural Integral des Encalladora	No-entry	0.02	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Integral des Encalladora	No-entry	0.02	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Parcial dels Farallons	Partially protected	2.6	Artisanal fishing	Number of boats (nb/year)	12	data	high	Nº of boats actually fishing here (Nº of boats in the nearby ports); http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/centre_de_documentacio/pnat_cc_fons_documental/biblioteca_digital/medi_mari/
MPA 09	Reserva Natural Parcial dels Farallons	Partially protected	2.6	Recreational fishing: hook and line	Number of people (nb/year)	24	data	medium	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/centre_de_documentacio/pnat_cc_fons_documental/biblioteca_digital/medi_mari/
MPA 09	Reserva Natural Parcial dels Farallons	Partially protected	2.6	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Parcial dels Farallons	Partially protected	2.6	Tourism: bathing/trampl ing	Number of people (nb/year)	2972	data	medium	http://catalegclassicbeg.cultura.gencat.cat/search~S50*cat
MPA 09	Reserva Natural Parcial dels Farallons	Partially protected	2.6	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	14	data	high	http://catalegclassicbeg.cultura.gencat.cat/search~S50*cat

MPA 09	Reserva Natural Parcial dels Farallons	Partially protected	2.6	Tourism: private boating	Number of private boats (nb/year)	2362	data	medium	http://catalegclassicbeg.cultura.gencat.cat/search~S50*cat
MPA 09	Reserva Natural Parcial dels Farallons	Partially protected	2.6	Tourism: scuba-diving	Number of dives (nb/year)	30100	data	medium	http://catalegclassicbeg.cultura.gencat.cat/search~S50*cat
MPA 09	Reserva Natural Parcial dels Farallons	Partially protected	2.6	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Parcial del Cap de Creus	Partially protected	2.9	Artisanal fishing	Number of boats (nb/year)	12	data	high	Nº of boats actually fishing here (Nº of boats in the nearby ports); http://catalegclassicbeg.cultura.gencat.cat/search~S50*cat
MPA 09	Reserva Natural Parcial del Cap de Creus	Partially protected	2.9	Recreational fishing: hook and line	Number of people (nb/year)	121	data	medium	http://catalegclassicbeg.cultura.gencat.cat/search~S50*cat
MPA 09	Reserva Natural Parcial del Cap de Creus	Partially protected	2.9	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Parcial del Cap de Creus	Partially protected	2.9	Tourism: bathing/trampl ing	Number of people (nb/year)	6092	data	medium	https://www.idescat.cat/
MPA 09	Reserva Natural Parcial del Cap de Creus	Partially protected	2.9	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	14	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos

MPA 09	Reserva Natural Parcial del Cap de Creus	Partially protected	2.9	Tourism: private boating	Number of private boats (nb/year)	4841	data	medium	http://ports.gencat.cat/es/
MPA 09	Reserva Natural Parcial del Cap de Creus	Partially protected	2.9	Tourism: scuba-diving	Number of dives (nb/year)	4900	data	medium	http://nautica.gencat.cat/ca/busseig-esbarjo/centres_immersio/
MPA 09	Reserva Natural Parcial del Cap de Creus	Partially protected	2.9	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Parcial del Cap Norfeu	Partially protected	2.7	Artisanal fishing	Number of boats (nb/year)	12	data	high	Nº of boats actually fishing here (Nº of boats in the nearby ports); http://agricultura.gencat.cat/ca/ambits/pesca/dar_flota_pesquera/dar_estadistiques/dar_detall_flota_pesquera_per_ports/
MPA 09	Reserva Natural Parcial del Cap Norfeu	Partially protected	2.7	Recreational fishing: hook and line	Number of people (nb/year)	34	data	medium	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/normativa_especifica/
MPA 09	Reserva Natural Parcial del Cap Norfeu	Partially protected	2.7	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 09	Reserva Natural Parcial del Cap Norfeu	Partially protected	2.7	Tourism: bathing/trampl ing	Number of people (nb/year)	2229	data	medium	https://www.idescat.cat/

MPA 09	Reserva Natural Parcial del Cap Norfeu	Partially protected	2.7	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	14	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos
MPA 09	Reserva Natural Parcial del Cap Norfeu	Partially protected	2.7	Tourism: private boating	Number of private boats (nb/year)	1771.2 76596	data	medium	http://ports.gencat.cat/es/
MPA 09	Reserva Natural Parcial del Cap Norfeu	Partially protected	2.7	Tourism: scuba-diving	Number of dives (nb/year)	4200	data	medium	http://nautica.gencat.cat/ca/bus-seig-esbarjo/centres_immersio/
MPA 09	Reserva Natural Parcial del Cap Norfeu	Partially protected	2.7	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 09	Parc Natural Cap Gros	Partially protected	7.1	Artisanal fishing	Number of boats (nb/year)	12	data	high	Nº of boats actually fishing here (Nº of boats in the nearby ports); http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/normativa_especifica/
MPA 09	Parc Natural Cap Gros	Partially protected	7.1	Recreational fishing: hook and line	Number of people (nb/year)	89	data	medium	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/normativa_especifica/
MPA 09	Parc Natural Cap Gros	Partially protected	7.1	Recreational fishing: spearfishing	Number of people (nb/year)	17	data	high	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/normativa_especifica/
MPA 09	Parc Natural Cap Gros	Partially protected	7.1	Tourism: bathing/trampl ing	Number of people (nb/year)	7429	data	medium	https://www.idescat.cat/
MPA 09	Parc Natural Cap Gros	Partially protected	7.1	Tourism: commercial boating	Number of commercial	14	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos

					touristic boats (nb/year)				
MPA 09	Parc Natural Cap Gros	Partially protected	7.1	Tourism: private boating	Number of private boats (nb/year)	5904.2 55319	data	medium	http://ports.gencat.cat/es/
MPA 09	Parc Natural Cap Gros	Partially protected	7.1	Tourism: scuba-diving	Number of dives (nb/year)	7000	data	medium	http://nautica.gencat.cat/ca/busseig-esbarjo/centres_immersio/
MPA 09	Parc Natural Cap Gros	Partially protected	7.1	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 09	Parc Natural Cap de Creus	Partially protected	2.3	Artisanal fishing	Number of boats (nb/year)	12	data	high	Nº of boats actually fishing here (Nº of boats in the nearby ports); http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/normativa_especifica/
MPA 09	Parc Natural Cap de Creus	Partially protected	2.3	Recreational fishing: hook and line	Number of people (nb/year)	26	data	medium	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/normativa_especifica/
MPA 09	Parc Natural Cap de Creus	Partially protected	2.3	Recreational fishing: spearfishing	Number of people (nb/year)	13	data	high	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/normativa_especifica/
MPA 09	Parc Natural Cap de Creus	Partially protected	2.3	Tourism: bathing/trampl ing	Number of people (nb/year)	3269	data	medium	https://www.idescat.cat/
MPA 09	Parc Natural Cap de Creus	Partially protected	2.3	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	14	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos
MPA 09	Parc Natural Cap de Creus	Partially protected	2.3	Tourism: private boating	Number of private boats (nb/year)	2597.8 7234	data	medium	http://ports.gencat.cat/es/

MPA 09	Parc Natural Cap de Creus	Partially protected	2.3	Tourism: scuba-diving	Number of dives (nb/year)	0	data	medium	http://nautica.gencat.cat/ca/busseig-esbarjo/centres_immersio/
MPA 09	Parc Natural Cap de Creus	Partially protected	2.3	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 09	arc Natural Cadaques	Partially protected	9.6	Artisanal fishing	Number of boats (nb/year)	12	data	high	Nº of boats actually fishing here (Nº of boats in the nearby ports); http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/normativa_especifica/
MPA 09	arc Natural Cadaques	Partially protected	9.6	Recreational fishing: hook and line	Number of people (nb/year)	149	data	medium	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/centre_de_documentacio/pnat_cc_fons_documental/biblioteca_digital/medi_mari/
MPA 09	arc Natural Cadaques	Partially protected	9.6	Recreational fishing: spearfishing	Number of people (nb/year)	23	data	high	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/centre_de_documentacio/pnat_cc_fons_documental/biblioteca_digital/medi_mari/
MPA 09	arc Natural Cadaques	Partially protected	9.6	Tourism: bathing/trampl ing	Number of people (nb/year)	15750	data	medium	https://www.idescat.cat/
MPA 09	arc Natural Cadaques	Partially protected	9.6	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	14	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos
MPA 09	arc Natural Cadaques	Partially protected	9.6	Tourism: private boating	Number of private boats (nb/year)	12517.02128	data	medium	http://ports.gencat.cat/es/
MPA 09	arc Natural Cadaques	Partially protected	9.6	Tourism: scuba-diving	Number of dives (nb/year)	7000	data	medium	http://nautica.gencat.cat/ca/busseig-esbarjo/centres_immersio/
MPA 09	arc Natural Cadaques	Partially protected	9.6	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations

MPA 09	Parc Natural Cap Norfeu	Partially protected	3.3	Artisanal fishing	Number of boats (nb/year)	12	data	high	N° of boats actually fishing here (N° of boats in the nearby ports); http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/normativa_especifica/
MPA 09	Parc Natural Cap Norfeu	Partially protected	3.3	Recreational fishing: hook and line	Number of people (nb/year)	180	data	medium	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/centre_de_documentacio/pnat_cc_fons_documental/biblioteca_digital/medi_mari/
MPA 09	Parc Natural Cap Norfeu	Partially protected	3.3	Recreational fishing: spearfishing	Number of people (nb/year)	29	data	high	http://parcsnaturals.gencat.cat/ca/cap-creus/coneix-nos/centre_de_documentacio/pnat_cc_fons_documental/biblioteca_digital/medi_mari/
MPA 09	Parc Natural Cap Norfeu	Partially protected	3.3	Tourism: bathing/trampl ing	Number of people (nb/year)	18127	data	medium	https://www.idescat.cat/
MPA 09	Parc Natural Cap Norfeu	Partially protected	3.3	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	14	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos
MPA 09	Parc Natural Cap Norfeu	Partially protected	3.3	Tourism: private boating	Number of private boats (nb/year)	14406.38298	data	medium	http://ports.gencat.cat/es/
MPA 09	Parc Natural Cap Norfeu	Partially protected	3.3	Tourism: scuba-diving	Number of dives (nb/year)	8400	data	medium	http://nautica.gencat.cat/ca/bus-seig-esbarjo/centres_immersio/
MPA 09	Parc Natural Cap Norfeu	Partially protected	3.3	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 09	Outside	Outside	76.52	Artisanal fishing	Number of boats (nb/year)	57	data	high	N° of boats in the nearby ports (Roses, Port de la Selva &

									Llançà); http://agricultura.gencat.cat/ca/ambits/pesca/dar_flota_pesquera/dar_estadistiques/dar_detall_flota_pesquera_per_ports/
MPA 09	Outside	Outside	76.52	Recreational fishing: hook and line	Number of people (nb/year)	600	expert opinion	low	Estimated
MPA 09	Outside	Outside	76.52	Recreational fishing: spearfishing	Number of people (nb/year)	60	expert opinion	low	Estimated (only rocy coasts have been taken into account)
MPA 09	Outside	Outside	76.52	Tourism: bathing/trampl ing	Number of people (nb/year)	650000	expert opinion	low	Including sandy beaches; https://www.idescat.cat/
MPA 09	Outside	Outside	76.52	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	14	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos
MPA 09	Outside	Outside	76.52	Tourism: private boating	Number of private boats (nb/year)	10000	expert opinion	low	http://ports.gencat.cat/es/
MPA 09	Outside	Outside	76.52	Tourism: scuba-diving	Number of dives (nb/year)	150	expert opinion	low	http://nautica.gencat.cat/ca/bus-seig-esbarjo/centres_immersio/
MPA 09	Outside	Outside	557.97	Trawlers/purse-seiners	Number of boats (nb/year)	44	data	high	Nº of boats in the nearby ports (Roses, Port de la Selva & Llançà); http://agricultura.gencat.cat/ca/ambits/pesca/dar_flota_pesquera/dar_estadistiques/dar_detall_flota_pesquera_per_ports/
MPA 10	Reserva Natural Parcial de les Illes Medes	No-take	1.003	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 10	Reserva Natural Parcial de	No-take	1.003	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations

	les Illes Medes								
MPA 10	Reserva Natural Parcial de les Illes Medes	No-take	1.003	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 10	Reserva Natural Parcial de les Illes Medes	No-take	1.003	Tourism: bathing/trampl ing	Number of people (nb/year)	25000	data	medium	Estimated from https://www.idescat.cat/
MPA 10	Reserva Natural Parcial de les Illes Medes	No-take	1.003	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	17	data	high	Official data (2011); http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos
MPA 10	Reserva Natural Parcial de les Illes Medes	No-take	1.003	Tourism: private boating	Number of private boats (nb/year)	17000	expert opinion	low	Estimated from http://ports.gencat.cat/es/
MPA 10	Reserva Natural Parcial de les Illes Medes	No-take	1.003	Tourism: scuba-diving	Number of dives (nb/year)	67000	data	medium	Official data (2011); http://parcsnaturals.gencat.cat/ca/illes-medes/coneixeu-nos/normativa_especifica/
MPA 10	Reserva Natural Parcial de les Illes Medes	No-take	1.003	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 10	Zona Perifrica de la RNP marina	Partially protected	4.79	Artisanal fishing	Number of boats (nb/year)	15	data	high	Official data http://parcsnaturals.gencat.cat/ca/illes-medes/coneixeu-nos/normativa_especifica/

MPA 10	Zona Perifirica de la RNP marina	Partially protected	4.79	Recreational fishing: hook and line	Number of people (nb/year)	950	data	medium	Font T., Lloret J., Pianté C. 2012. Recreational fishing within Marine Protected Areas in the Mediterranean. MedPAN North Project. WWFFrance.
MPA 10	Zona Perifirica de la RNP marina	Partially protected	4.79	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	Font T., Lloret J., Pianté C. 2012. Recreational fishing within Marine Protected Areas in the Mediterranean. MedPAN North Project. WWFFrance.
MPA 10	Zona Perifirica de la RNP marina	Partially protected	4.79	Tourism: bathing/trampl ing	Number of people (nb/year)	1000	expert opinion	low	Estimated from https://www.idescat.cat/
MPA 10	Zona Perifirica de la RNP marina	Partially protected	4.79	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	17	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos
MPA 10	Zona Perifirica de la RNP marina	Partially protected	4.79	Tourism: private boating	Number of private boats (nb/year)	500	expert opinion	medium	Estimated from http://ports.gencat.cat/es/
MPA 10	Zona Perifirica de la RNP marina	Partially protected	4.79	Tourism: scuba-diving	Number of dives (nb/year)	75	expert opinion	low	Estimated from http://nautica.gencat.cat/ca/bus-seig-esbarjo/centres_immersio/
MPA 10	Zona Perifirica de la RNP marina	Partially protected	4.79	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	http://agricultura.gencat.cat/ca/ambits/pesca/dar_flota_pesquera/dar_estadistiques/dar_detall_flota_pesquera_per_ports/
MPA 10	Parc Natural Mari	Partially protected	9.4	Artisanal fishing	Number of boats (nb/year)	35	data	high	estimated from Secanell (2011)
MPA 10	Parc Natural Mari	Partially protected	9.4	Recreational fishing: hook and line	Number of people (nb/year)	950	data	medium	Font et al. (2012)

MPA 10	Parc Natural Mari	Partially protected	9.4	Recreational fishing: spearfishing	Number of people (nb/year)	95	data	medium	Font et al. (2012)
MPA 10	Parc Natural Mari	Partially protected	9.4	Tourism: bathing/trampl ing	Number of people (nb/year)	40000	expert opinion	low	https://www.idescat.cat/
MPA 10	Parc Natural Mari	Partially protected	9.4	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	17	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos
MPA 10	Parc Natural Mari	Partially protected	9.4	Tourism: private boating	Number of private boats (nb/year)	20000	expert opinion	low	http://ports.gencat.cat/es/
MPA 10	Parc Natural Mari	Partially protected	9.4	Tourism: scuba-diving	Number of dives (nb/year)	12700	data	high	http://nautica.gencat.cat/ca/bus-seig-esbarjo/centres_immersio/
MPA 10	Parc Natural Mari	Partially protected	9.4	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	http://agricultura.gencat.cat/ca/ambits/pesca/dar_flota_pesquera/dar_estadistiques/dar_detall_flota_pesquera_per_ports/
MPA 10	Outside	Outside	94.35	Artisanal fishing	Number of boats (nb/year)	36	data	high	http://agricultura.gencat.cat/ca/ambits/pesca/dar_flota_pesquera/dar_estadistiques/dar_detall_flota_pesquera_per_ports/
MPA 10	Outside	Outside	94.35	Recreational fishing: hook and line	Number of people (nb/year)	1000	expert opinion	low	Font et al. (2012)
MPA 10	Outside	Outside	94.35	Recreational fishing: spearfishing	Number of people (nb/year)	50	expert opinion	low	Font et al. (2012)
MPA 10	Outside	Outside	94.35	Tourism: bathing/trampl ing	Number of people (nb/year)	600000	expert opinion	low	http://ports.gencat.cat/es/
MPA 10	Outside	Outside	94.35	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	17	data	high	http://es.costabrava.org/a-donde-ir/transportes/cruceros-maritimos

MPA 10	Outside	Outside	94.35	Tourism: private boating	Number of private boats (nb/year)	500	expert opinion	low	http://ports.gencat.cat/es/
MPA 10	Outside	Outside	94.35	Tourism: scuba-diving	Number of dives (nb/year)	200	expert opinion	low	http://nautica.gencat.cat/ca/busseig-esbarjo/centres_immersio/
MPA 10	Outside	Outside	348.87	Trawlers/purse -seiners	Number of boats (nb/year)	44	data	high	http://agricultura.gencat.cat/ca/ambits/pesca/dar_flota_pesquera/dar_estadistiques/dar_detall_flota_pesquera_per_ports/
MPA 11	Reserva marina	No-entry	2.12	Artisanal fishing	Number of boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Reserva marina	No-entry	2.12	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Reserva marina	No-entry	2.12	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Reserva marina	No-entry	2.12	Tourism: bathing/trampl ing	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Reserva marina	No-entry	2.12	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Reserva marina	No-entry	2.12	Tourism: private boating	Number of private boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Reserva marina	No-entry	2.12	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Reserva marina	No-entry	2.12	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso especial	No-take	0.71	Artisanal fishing	Number of boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso especial	No-take	0.71	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403

MPA 11	Uso especial	No-take	0.71	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso especial	No-take	0.71	Tourism: bathing/trampl ing	Number of people (nb/year)	59319	data	high	Sum of: 21272 bathing/trampl ing from commercial boats; and 38047 bathing/trampl ing from private boats
MPA 11	Uso especial	No-take	0.71	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	497	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso especial	No-take	0.71	Tourism: private boating	Number of private boats (nb/year)	8095	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso especial	No-take	0.71	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso especial	No-take	0.71	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso moderado	Partially protected	77.98	Artisanal fishing	Number of boats (nb/year)	47	data	high	License for 47 boats, data on how many days have been working are available from the managers of the MPA, but are not processed
MPA 11	Uso moderado	Partially protected	77.98	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso moderado	Partially protected	77.98	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso moderado	Partially protected	77.98	Tourism: bathing/trampl ing	Number of people (nb/year)	14830	expert opinion	low	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso moderado	Partially protected	77.98	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	248	expert opinion	low	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403

MPA 11	Uso moderado	Partially protected	77.98	Tourism: private boating	Number of private boats (nb/year)	4000	expert opinion	low	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso moderado	Partially protected	77.98	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso moderado	Partially protected	77.98	Trawlers/purse-seiners	Number of boats (nb/year)	1	data	high	License for 1 boat with a maximum of 20 working days per year
MPA 11	Uso restringido	No-take	0.68	Artisanal fishing	Number of boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido	No-take	0.68	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido	No-take	0.68	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido	No-take	0.68	Tourism: bathing/trampl ing	Number of people (nb/year)	4794	expert opinion	low	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido	No-take	0.68	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	50	expert opinion	low	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido	No-take	0.68	Tourism: private boating	Number of private boats (nb/year)	1020	expert opinion	low	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido	No-take	0.68	Tourism: scuba-diving	Number of dives (nb/year)	3000	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido	No-take	0.68	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido pesquero	Partially protected	5.62	Artisanal fishing	Number of boats (nb/year)	25	expert opinion	low	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido pesquero	Partially protected	5.62	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403

MPA 11	Uso restringido pesquero	Partially protected	5.62	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido pesquero	Partially protected	5.62	Tourism: bathing/trampl ing	Number of people (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido pesquero	Partially protected	5.62	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido pesquero	Partially protected	5.62	Tourism: private boating	Number of private boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido pesquero	Partially protected	5.62	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Uso restringido pesquero	Partially protected	5.62	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Fuera	Outside	64.91	Artisanal fishing	Number of boats (nb/year)	6	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Fuera	Outside	64.91	Recreational fishing: hook and line	Number of people (nb/year)	555	expert opinion	low	Estimation from data of a study on recreational fishing (Morales-Nin et al. 2005)
MPA 11	Fuera	Outside	64.91	Recreational fishing: spearfishing	Number of people (nb/year)	277	expert opinion	low	Estimation from data of a study on recreational fishing (Morales-Nin et al. 2005)
MPA 11	Fuera	Outside	64.91	Tourism: bathing/trampl ing	Number of people (nb/year)	96122	expert opinion	low	Data from VMS, a total of 7 boats
MPA 11	Fuera	Outside	64.91	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	150	expert opinion	low	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 11	Fuera	Outside	64.91	Tourism: private boating	Number of private boats (nb/year)	12050	expert opinion	low	Data from VMS, a total of 7 boats

MPA 11	Fuera	Outside	64.91	Tourism: scuba-diving	Number of dives (nb/year)	25	expert opinion	low	Data from VMS, a total of 6 boats
MPA 11	Fuera	Outside	800.32	Trawlers/purse -seiners	Number of boats (nb/year)	7	data	high	http://www.caib.es/sites/espaisnaturalsprotegits/f/127403
MPA 12	Zona A	No-take	0.782	Artisanal fishing	Number of boats (nb/year)	0	expert opinion	medium	MPA Consortium
MPA 12	Zona A	No-take	0.782	Recreational fishing: hook and line	Number of people (nb/year)	0	expert opinion	medium	MPA Consortium
MPA 12	Zona A	No-take	0.782	Recreational fishing: spearfishing	Number of people (nb/year)	0	expert opinion	medium	MPA Consortium
MPA 12	Zona A	No-take	0.782	Tourism: bathing/trampl ing	Number of people (nb/year)	0	data	medium	MPA Consortium
MPA 12	Zona A	No-take	0.782	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	expert opinion	high	MPA Consortium
MPA 12	Zona A	No-take	0.782	Tourism: private boating	Number of private boats (nb/year)	50	expert opinion	medium	MPA Consortium
MPA 12	Zona A	No-take	0.782	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona A	No-take	0.782	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona A	No-take	1.213	Artisanal fishing	Number of boats (nb/year)	0	expert opinion	medium	MPA Consortium
MPA 12	Zona A	No-take	1.213	Recreational fishing: hook and line	Number of people (nb/year)	0	expert opinion	medium	MPA Consortium
MPA 12	Zona A	No-take	1.213	Recreational fishing: spearfishing	Number of people (nb/year)	0	expert opinion	medium	MPA Consortium
MPA 12	Zona A	No-take	1.213	Tourism: bathing/trampl ing	Number of people (nb/year)	5500	expert opinion	medium	Estimated on the basis of beach extension and the total number of tourists within the C zone

MPA 12	Zona A	No-take	1.213	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona A	No-take	1.213	Tourism: private boating	Number of private boats (nb/year)	50	expert opinion	medium	MPA Consortium
MPA 12	Zona A	No-take	1.213	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona A	No-take	1.213	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona B	Partially protected	12.302	Artisanal fishing	Number of boats (nb/year)	107	data	high	MPA Consortium
MPA 12	Zona B	Partially protected	12.302	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona B	Partially protected	12.302	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona B	Partially protected	12.302	Tourism: bathing/trampl ing	Number of people (nb/year)	0	expert opinion	medium	MPA Consortium
MPA 12	Zona B	Partially protected	12.302	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	10	data	medium	MPA Consortium
MPA 12	Zona B	Partially protected	12.302	Tourism: private boating	Number of private boats (nb/year)	3000	expert opinion	low	MPA Consortium
MPA 12	Zona B	Partially protected	12.302	Tourism: scuba-diving	Number of dives (nb/year)	0	data	medium	MPA Consortium
MPA 12	Zona B	Partially protected	12.302	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona B	Partially protected	17.904	Artisanal fishing	Number of boats (nb/year)	107	data	high	MPA Consortium
MPA 12	Zona B	Partially protected	17.904	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA Consortium

MPA 12	Zona B	Partially protected	17.904	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona B	Partially protected	17.904	Tourism: bathing/trampl ing	Number of people (nb/year)	0	expert opinion	medium	MPA Consortium
MPA 12	Zona B	Partially protected	17.904	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	10	data	medium	MPA Consortium
MPA 12	Zona B	Partially protected	17.904	Tourism: private boating	Number of private boats (nb/year)	0	expert opinion	low	MPA Consortium
MPA 12	Zona B	Partially protected	17.904	Tourism: scuba-diving	Number of dives (nb/year)	0	data	medium	MPA Consortium
MPA 12	Zona B	Partially protected	17.904	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA Consortium
MPA 12	Zona C	Partially protected	132.666	Artisanal fishing	Number of boats (nb/year)	107	data	high	MPA Consortium
MPA 12	Zona C	Partially protected	132.666	Recreational fishing: hook and line	Number of people (nb/year)	1150	data	high	MPA Consortium
MPA 12	Zona C	Partially protected	132.666	Recreational fishing: spearfishing	Number of people (nb/year)	500	data	high	MPA Consortium
MPA 12	Zona C	Partially protected	132.666	Tourism: bathing/trampl ing	Number of people (nb/year)	150000 0	expert opinion	medium	Estimated on the basis of nb of presence recorded by Touristic agency of Apulia
MPA 12	Zona C	Partially protected	132.666	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	10	data	low	MPA Consortium
MPA 12	Zona C	Partially protected	132.666	Tourism: private boating	Number of private boats (nb/year)	3000	expert opinion	low	MPA Consortium
MPA 12	Zona C	Partially protected	132.666	Tourism: scuba-diving	Number of dives (nb/year)	2000	data	low	MPA Consortium

MPA 12	Zona C	Partially protected	132.666	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA Consortium
MPA 12	Outside	Outside	307.91	Artisanal fishing	Number of boats (nb/year)	107	expert opinion	low	Assumed the same of C zone
MPA 12	Outside	Outside	307.91	Recreational fishing: hook and line	Number of people (nb/year)	1150	expert opinion	low	Assumed the same of C zone
MPA 12	Outside	Outside	307.91	Recreational fishing: spearfishing	Number of people (nb/year)	1000	expert opinion	low	Assumed the same of C zone
MPA 12	Outside	Outside	307.91	Tourism: bathing/trampl ing	Number of people (nb/year)	150000 0	expert opinion	medium	Assumed the same of C zone
MPA 12	Outside	Outside	307.91	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	10	expert opinion	low	Assumed the same of C zone
MPA 12	Outside	Outside	307.91	Tourism: private boating	Number of private boats (nb/year)	3000	expert opinion	low	Assumed the same of C zone
MPA 12	Outside	Outside	307.91	Tourism: scuba-diving	Number of dives (nb/year)	2000	expert opinion	low	Assumed the same of C zone
MPA 12	Outside	Outside	407.17	Trawlers/purse-seiners	Number of boats (nb/year)	0	expert opinion	low	Assumed the same of C zone
MPA 13	Inside	Partially protected	8.487	Artisanal fishing	Number of boats (nb/year)	48	data	medium	Registry of fishing vessels held by Ministry
MPA 13	Inside	Partially protected	8.487	Recreational fishing: hook and line	Number of people (nb/year)	50	expert opinion	low	Estimated
MPA 13	Inside	Partially protected	8.487	Recreational fishing: spearfishing	Number of people (nb/year)	2873	data	low	Registry of speargun licences held by Malta Police Force
MPA 13	Inside	Partially protected	8.487	Tourism: bathing/trampl ing	Number of people (nb/year)	30000	data	low	Estimated based on logs kept by Malta Tourism Authority beach supervisors
MPA 13	Inside	Partially protected	8.487	Tourism: commercial boating	Number of commercial	25	expert opinion	low	Estimated

					touristic boats (nb/year)				
MPA 13	Inside	Partially protected	8.487	Tourism: private boating	Number of private boats (nb/year)	100	data	low	Estimated based on satellite imagry obtained from Google Earth
MPA 13	Inside	Partially protected	8.487	Tourism: scuba-diving	Number of dives (nb/year)	100	expert opinion	low	Estimated
MPA 13	Inside	Partially protected	8.487	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	Registry of fishing vessels held by Ministry
MPA 13	Outside	Outside	115.8	Artisanal fishing	Number of boats (nb/year)	388	data	medium	Registry of fishing vessels held by Ministry
MPA 13	Outside	Outside	115.8	Recreational fishing: hook and line	Number of people (nb/year)	1000	expert opinion	low	Estimated
MPA 13	Outside	Outside	115.8	Recreational fishing: spearfishing	Number of people (nb/year)	2873	data	low	Registry of speargun licences held by Malta Police Force
MPA 13	Outside	Outside	115.8	Tourism: bathing/trampl ing	Number of people (nb/year)	125000	data	low	Estimated based on logs kept by Malta Tourism Authority beach supervisors
MPA 13	Outside	Outside	115.8	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	150	expert opinion	low	Estimated
MPA 13	Outside	Outside	115.8	Tourism: private boating	Number of private boats (nb/year)	1000	data	low	Estimated based on satellite imagry obtained from Google Earth
MPA 13	Outside	Outside	115.8	Tourism: scuba-diving	Number of dives (nb/year)	20000	expert opinion	low	Estimated
MPA 13	Outside	Outside	308.29	Trawlers/purse -seiners	Number of boats (nb/year)	49	data	high	Registry of fishing vessels held by Ministry
MPA 14	Zona A	No-take	1.386	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-take	1.386	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations

MPA 14	Zona A	No-take	1.386	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-take	1.386	Tourism: bathing/trampl ing	Number of people (nb/year)	473.5	data	high	Curtesy of Torre Guaceto Management Consortium - Just snorkeling linked to environmental education activities (nb of visitors)
MPA 14	Zona A	No-take	1.386	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-take	1.386	Tourism: private boating	Number of private boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-take	1.386	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-take	1.386	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-entry	0.46	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-entry	0.46	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-entry	0.46	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-entry	0.46	Tourism: bathing/trampl ing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-entry	0.46	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-entry	0.46	Tourism: private boating	Number of private boats (nb/year)	0	data	high	MPA regulations

MPA 14	Zona A	No-entry	0.46	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 14	Zona A	No-entry	0.46	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona B	Partially protected	1.63	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona B	Partially protected	1.63	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 14	Zona B	Partially protected	1.63	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 14	Zona B	Partially protected	1.63	Tourism: bathing/trampl ing	Number of people (nb/year)	120000	data	high	Just snorkeling linked to environmental education activities (nb of visitors)
MPA 14	Zona B	Partially protected	1.63	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona B	Partially protected	1.63	Tourism: private boating	Number of private boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona B	Partially protected	1.63	Tourism: scuba-diving	Number of dives (nb/year)	80	data	high	Curtesy of Torre Guaceto Management Consortium - Just snorkeling linked to environmental education activities (nb of visitors)
MPA 14	Zona B	Partially protected	1.63	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 14	Zona C	Partially protected	18.85	Artisanal fishing	Number of boats (nb/year)	5	data	high	Curtesy of Torre Guaceto Management Consortium - Just snorkeling linked to environmental education activities (nb of visitors)
MPA 14	Zona C	Partially protected	18.85	Recreational fishing: hook and line	Number of people (nb/year)	323	data	high	Curtesy of Torre Guaceto Management Consortium - Just snorkeling linked to

									environmental education activities (nb of visitors)
MPA 14	Zona C	Partially protected	18.85	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 14	Zona C	Partially protected	18.85	Tourism: bathing/trampl ing	Number of people (nb/year)	180000	expert opinion	medium	Estimated on the basis of beach surface and number of visitors in the B zone. In this case people doesn't have to pay!!!!
MPA 14	Zona C	Partially protected	18.85	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	Based on Historical images of google earth
MPA 14	Zona C	Partially protected	18.85	Tourism: private boating	Number of private boats (nb/year)	0	data	medium	Based on Historical images of google earth
MPA 14	Zona C	Partially protected	18.85	Tourism: scuba-diving	Number of dives (nb/year)	80	expert opinion	medium	Assumed on the basis of nb of divers in B zone. Also for C zone divers need autorization of MPA.
MPA 14	Zona C	Partially protected	18.85	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 14	Outside	Outside	76.87	Artisanal fishing	Number of boats (nb/year)	95	data	high	Curtesy of Torre Guaceto Management Consortium
MPA 14	Outside	Outside	76.87	Recreational fishing: hook and line	Number of people (nb/year)	365	expert opinion	low	Estimated
MPA 14	Outside	Outside	76.87	Recreational fishing: spearfishing	Number of people (nb/year)	365	expert opinion	low	Estimated
MPA 14	Outside	Outside	76.87	Tourism: bathing/trampl ing	Number of people (nb/year)	300000	expert opinion	low	Estimated
MPA 14	Outside	Outside	76.87	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	expert opinion	low	Based on Historical images of google earth

MPA 14	Outside	Outside	76.87	Tourism: private boating	Number of private boats (nb/year)	8	expert opinion	low	Based on Historical images of google earth
MPA 14	Outside	Outside	76.87	Tourism: scuba-diving	Number of dives (nb/year)	100	expert opinion	low	Estimated
MPA 14	Outside	Outside	282.03	Trawlers/purse -seiners	Number of boats (nb/year)	1	data	high	Curtesy of Torre Guaceto Management Consortium
MPA 15	Very strict protection subzone (1a)	No-entry	18.64	Artisanal fishing	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 15	Very strict protection subzone (1a)	No-entry	18.64	Recreational fishing: hook and line	Number of people (nb/year)	0	data	high	MPA regulations
MPA 15	Very strict protection subzone (1a)	No-entry	18.64	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 15	Very strict protection subzone (1a)	No-entry	18.64	Tourism: bathing/trampl ing	Number of people (nb/year)	0	expert opinion	medium	MPA regulations
MPA 15	Very strict protection subzone (1a)	No-entry	18.64	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	low	MPA regulations
MPA 15	Very strict protection subzone (1a)	No-entry	18.64	Tourism: private boating	Number of private boats (nb/year)	0	data	low	MPA regulations
MPA 15	Very strict protection subzone (1a)	No-entry	18.64	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 15	Very strict protection	No-entry	18.64	Trawlers/purse -seiners	Number of boats (nb/year)	0	data	high	MPA regulations

	subzone (1a)								
MPA 15	Strict protection subzone (1b)	No-take	111.52	Artisanal fishing	Number of boats (nb/year)	0	data	medium	MPA regulations
MPA 15	Strict protection subzone (1b)	No-take	111.52	Recreational fishing: hook and line	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 15	Strict protection subzone (1b)	No-take	111.52	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	high	MPA regulations
MPA 15	Strict protection subzone (1b)	No-take	111.52	Tourism: bathing/trampl ing	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 15	Strict protection subzone (1b)	No-take	111.52	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	591	data	high	Number of ticket sold to commercial touristic boats
MPA 15	Strict protection subzone (1b)	No-take	111.52	Tourism: private boating	Number of private boats (nb/year)	12803	data	high	Number of ticket sold to small boats
MPA 15	Strict protection subzone (1b)	No-take	111.52	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 15	Strict protection subzone (1b)	No-take	111.52	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 15	Tradition and culture subzone (2a)	Partially protected	82.22	Artisanal fishing	Number of boats (nb/year)	107	expert opinion	low	There is 107 licences for artizanal fisheries for people who have properties in NP Kornati. Licences include

									trammel nets, long lines and hook and line fishing gear but they are not allowed to sell fish.
MPA 15	Tradition and culture subzone (2a)	Partially protected	82.22	Recreational fishing: hook and line	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 15	Tradition and culture subzone (2a)	Partially protected	82.22	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 15	Tradition and culture subzone (2a)	Partially protected	82.22	Tourism: bathing/trampl ing	Number of people (nb/year)	50000	expert opinion	low	There is estimation that half of the guests go swimming and walking around the park
MPA 15	Tradition and culture subzone (2a)	Partially protected	82.22	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	591	data	high	Number of ticket sold to commercial touristic boats
MPA 15	Tradition and culture subzone (2a)	Partially protected	82.22	Tourism: private boating	Number of private boats (nb/year)	12803	data	high	Number of ticket sold to small boats
MPA 15	Tradition and culture subzone (2a)	Partially protected	82.22	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 15	Tradition and culture subzone (2a)	Partially protected	82.22	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 15	Recreation subzone (2b)	Partially protected	2.36	Artisanal fishing	Number of boats (nb/year)	0	data	medium	MPA regulations
MPA 15	Recreation subzone (2b)	Partially protected	2.36	Recreational fishing: hook and line	Number of people (nb/year)	0	data	medium	MPA regulations

MPA 15	Recreation subzone (2b)	Partially protected	2.36	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 15	Recreation subzone (2b)	Partially protected	2.36	Tourism: bathing/trampl ing	Number of people (nb/year)	50000	expert opinion	low	There is estimation that half of the guests go swimming and walking around the park
MPA 15	Recreation subzone (2b)	Partially protected	2.36	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	591	data	high	Number of ticket sold to commercial touristic boats
MPA 15	Recreation subzone (2b)	Partially protected	2.36	Tourism: private boating	Number of private boats (nb/year)	591	data	high	Number of ticket sold to small boats
MPA 15	Recreation subzone (2b)	Partially protected	2.36	Tourism: scuba-diving	Number of dives (nb/year)	12803	expert opinion	low	Estimated
MPA 15	Recreation subzone (2b)	Partially protected	2.36	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 15	Anchoring subzone (3a)	Partially protected	1.41	Artisanal fishing	Number of boats (nb/year)	0	data	medium	MPA regulations
MPA 15	Anchoring subzone (3a)	Partially protected	1.41	Recreational fishing: hook and line	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 15	Anchoring subzone (3a)	Partially protected	1.41	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 15	Anchoring subzone (3a)	Partially protected	1.41	Tourism: bathing/trampl ing	Number of people (nb/year)	50000	expert opinion	low	There is estimation that half of the guests go swimming and walking around the park
MPA 15	Anchoring subzone (3a)	Partially protected	1.41	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	591	data	high	Number of ticket sold to commercial touristic boats
MPA 15	Anchoring subzone (3a)	Partially protected	1.41	Tourism: private boating	Number of private boats (nb/year)	12803	data	high	Number of ticket sold to small boats

MPA 15	Anchoring subzone (3a)	Partially protected	1.41	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 15	Anchoring subzone (3a)	Partially protected	1.41	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 15	Settlement subzone (3b)	Partially protected	0.64	Artisanal fishing	Number of boats (nb/year)	0	data	medium	MPA regulations
MPA 15	Settlement subzone (3b)	Partially protected	0.64	Recreational fishing: hook and line	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 15	Settlement subzone (3b)	Partially protected	0.64	Recreational fishing: spearfishing	Number of people (nb/year)	0	data	medium	MPA regulations
MPA 15	Settlement subzone (3b)	Partially protected	0.64	Tourism: bathing/trampl ing	Number of people (nb/year)	50000	expert opinion	low	There is estimation that half of the guests go swimming and walking around the park
MPA 15	Settlement subzone (3b)	Partially protected	0.64	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	0	data	high	MPA regulations
MPA 15	Settlement subzone (3b)	Partially protected	0.64	Tourism: private boating	Number of private boats (nb/year)	0	data	high	MPA regulations
MPA 15	Settlement subzone (3b)	Partially protected	0.64	Tourism: scuba-diving	Number of dives (nb/year)	0	data	high	MPA regulations
MPA 15	Settlement subzone (3b)	Partially protected	0.64	Trawlers/purse-seiners	Number of boats (nb/year)	0	data	high	MPA regulations
MPA 15	Outside	Outside	462.13	Artisanal fishing	Number of boats (nb/year)	160	data	medium	MPA regulations
MPA 15	Outside	Outside	462.13	Recreational fishing: hook and line	Number of people (nb/year)	1500	expert opinion	low	Estimated

MPA 15	Outside	Outside	462.13	Recreational fishing: spearfishing	Number of people (nb/year)	500	expert opinion	low	Estimated
MPA 15	Outside	Outside	462.13	Tourism: bathing/trampl ing	Number of people (nb/year)	40000	expert opinion	low	Estimated
MPA 15	Outside	Outside	462.13	Tourism: commercial boating	Number of commercial touristic boats (nb/year)	700	expert opinion	low	Estimated
MPA 15	Outside	Outside	462.13	Tourism: private boating	Number of private boats (nb/year)	17000	expert opinion	low	Estimated
MPA 15	Outside	Outside	462.13	Tourism: scuba-diving	Number of dives (nb/year)	33270	expert opinion	medium	Estimated
MPA 15	Outside	Outside	1269.35	Trawlers/purse-seiners	Number of boats (nb/year)	70	expert opinion	medium	Estimated

References

Association AGIR. 2013. Appui et accompagnement à la création/post création d'activités génératrices de revenus et de coopérative les pêcheurs néo-alphabétisés au sein du littoral du Rif centrale et orientale Marocain. Rapport global final. 120p.

http://panorama.solutions/sites/default/files/rapport-final-projet-agir_-app.pdf

Cappanera, V., Venturini, S., & Campodonico, P., Blini, V., Ortenzi, 2010. Valutazione dell'impatto antropico legato alle attività svolte nell'Area Marina protetta Portofino (AMP). Le attività di fruizione 2010-2011. Rapporto tecnico: 194 pp.

Cappanera, V., Venturini, S., & Campodonico, P. 2014. Valutazione dell'impatto antropico e socio-economico nell'Area Marina Protetta del Promontorio di Portofino. Portofino MPA, Annual Report, 1–51 pp.

Cattaneo-Vietti, R. (ed.). 2013. La pesca ricreativa nel Mar Ligure. In Modelli di governante e monitoraggio e valorizzazione delle risorse ittiche (pp. 1–84). Regione Liguria: Progetto strategico MARTE+.

Franzosini, C., Limam, A. 2006. Plan de gestion de la composante marine du Parc National d'Al Hoceima. Rapport du Projet Régional pour le Développement d'Aires Protégées Marines et Côtières dans la Région Méditerranéenne (Projet MedMPA). 92 p.

Font, T., Lloret, J., Piante, C. 2012. Recreational fishing within Marine Protected Areas in the Mediterranean. MedPAN North Project. WWFFrance: 168 pp

Nibani, H. 2010. Rapport des ateliers de communication sur la gestion du Parc Nationale d'Al Hoceima. Rapport final, 31p.
<http://www.mapama.gob.es/es/parques-nacionales-oapn>.

Sacanell, M. 2010. Avaluació de les captures de la pesca artesanal en la zona d'influència de l'Àrea Protegida de les Illes Medes.

Appendix C

Supplementary Figure and Descriptive Statistics

Supplementary Figures

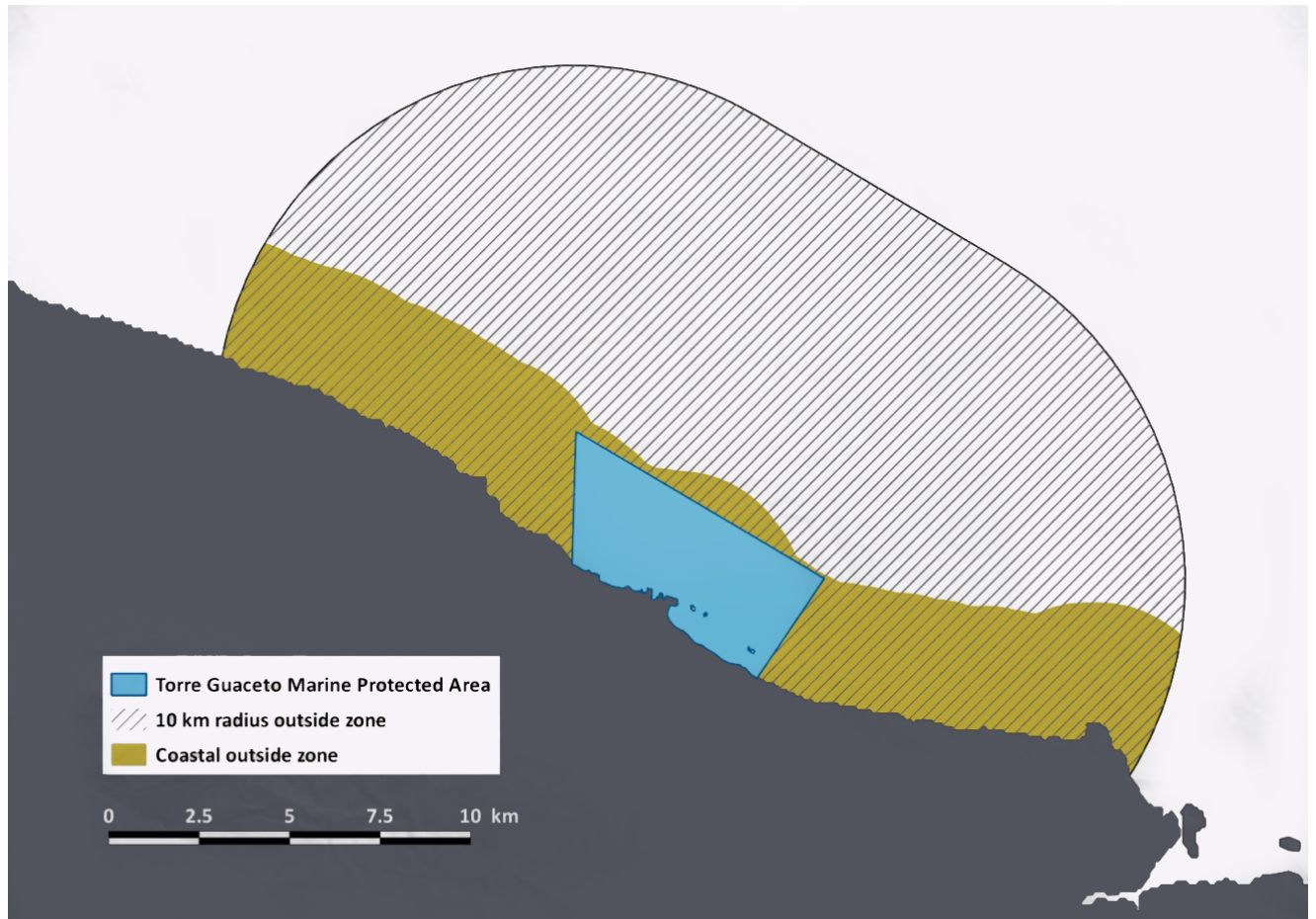


Fig. C.1. Example of outside areas of a marine protected area, as used for the study. We used two approaches to delineate the outside area, depending on the characteristics of the threat: 1) for commercial fishing with trawlers and purse seiners a 10 km radius surrounding the MPAs was applied (dashed area), while 2) for all other threats originating closer to the shore we considered the coastal section up to a maximum distance from the shore equal to the MPAs most offshore limit (brown area).

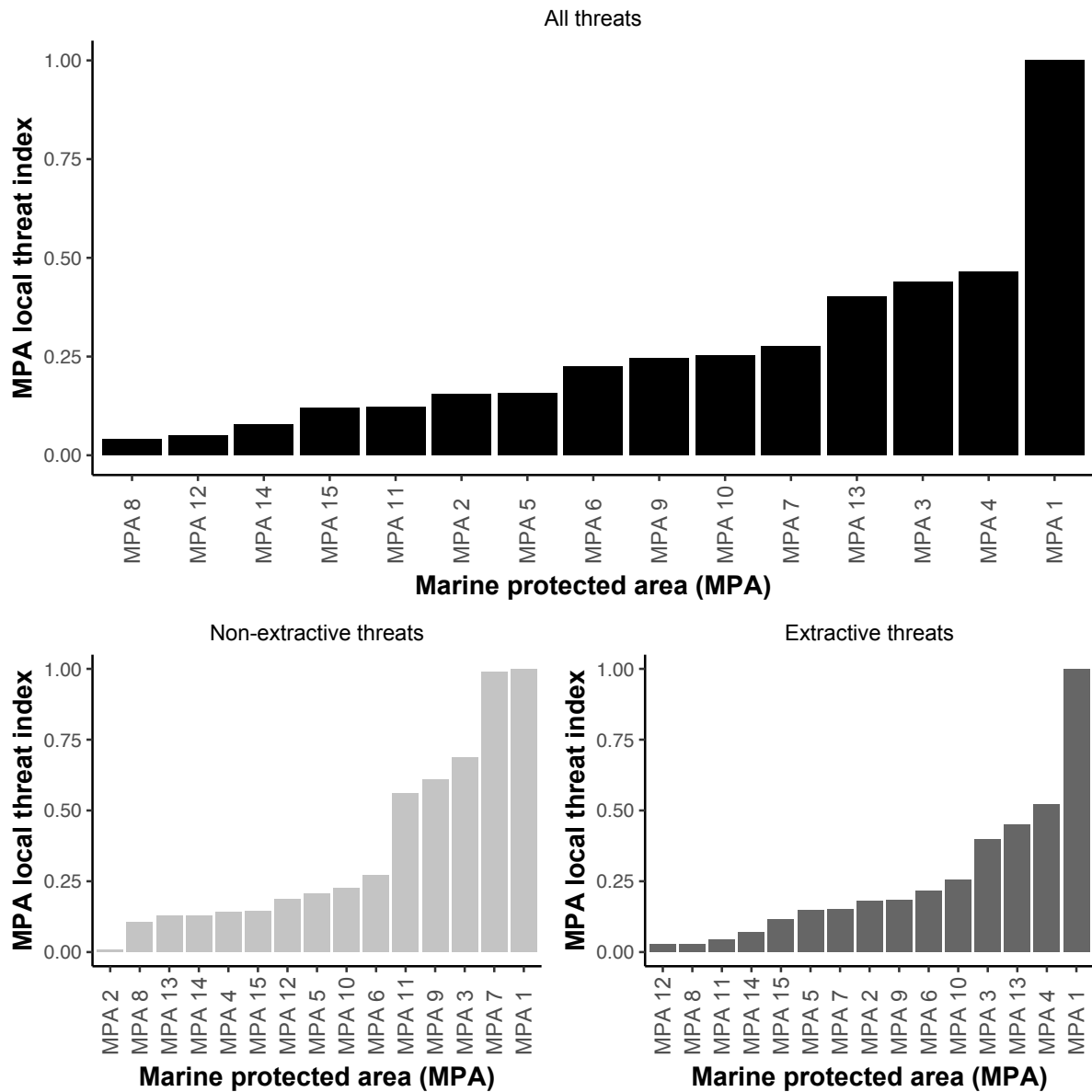


Fig. C.2. Local threat index of marine protected areas (MPAs) for all threats combined (top panel), extractive (bottom left panel) and non-extractive threats (bottom right panel). A low/high index mean that the MPA have a low/high threat intensities in its outside area, when compared to the threat intensities found in the outside areas of the other MPAs included in this study.

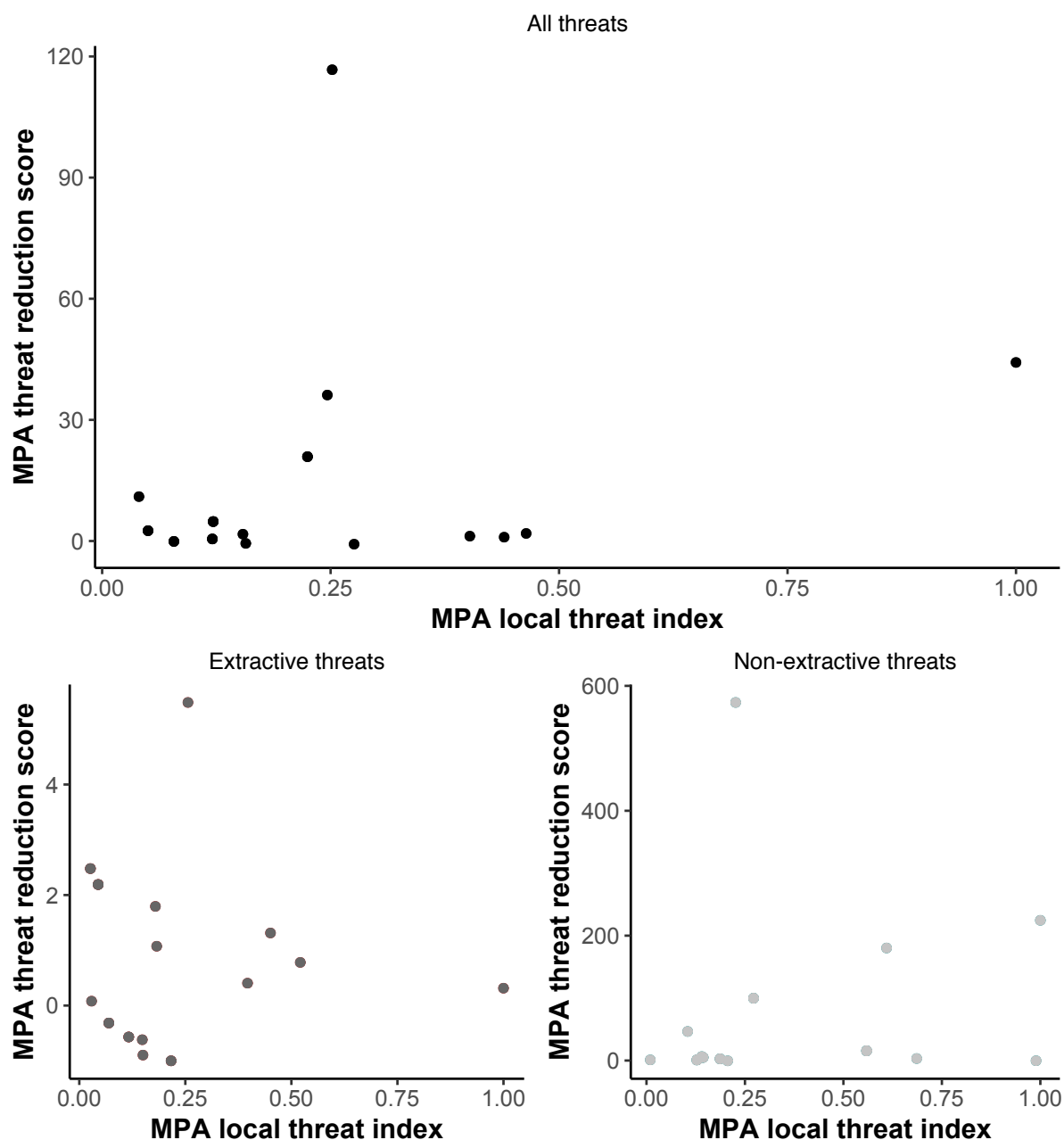


Fig. C.3. Relationships between the marine protected area (MPA) threat reduction score and the MPA local threat index for all threats combined (top panel), extractive (bottom left panel) and non-extractive threats (bottom right panel). No significant linear relationships were found ($p>0.05$).

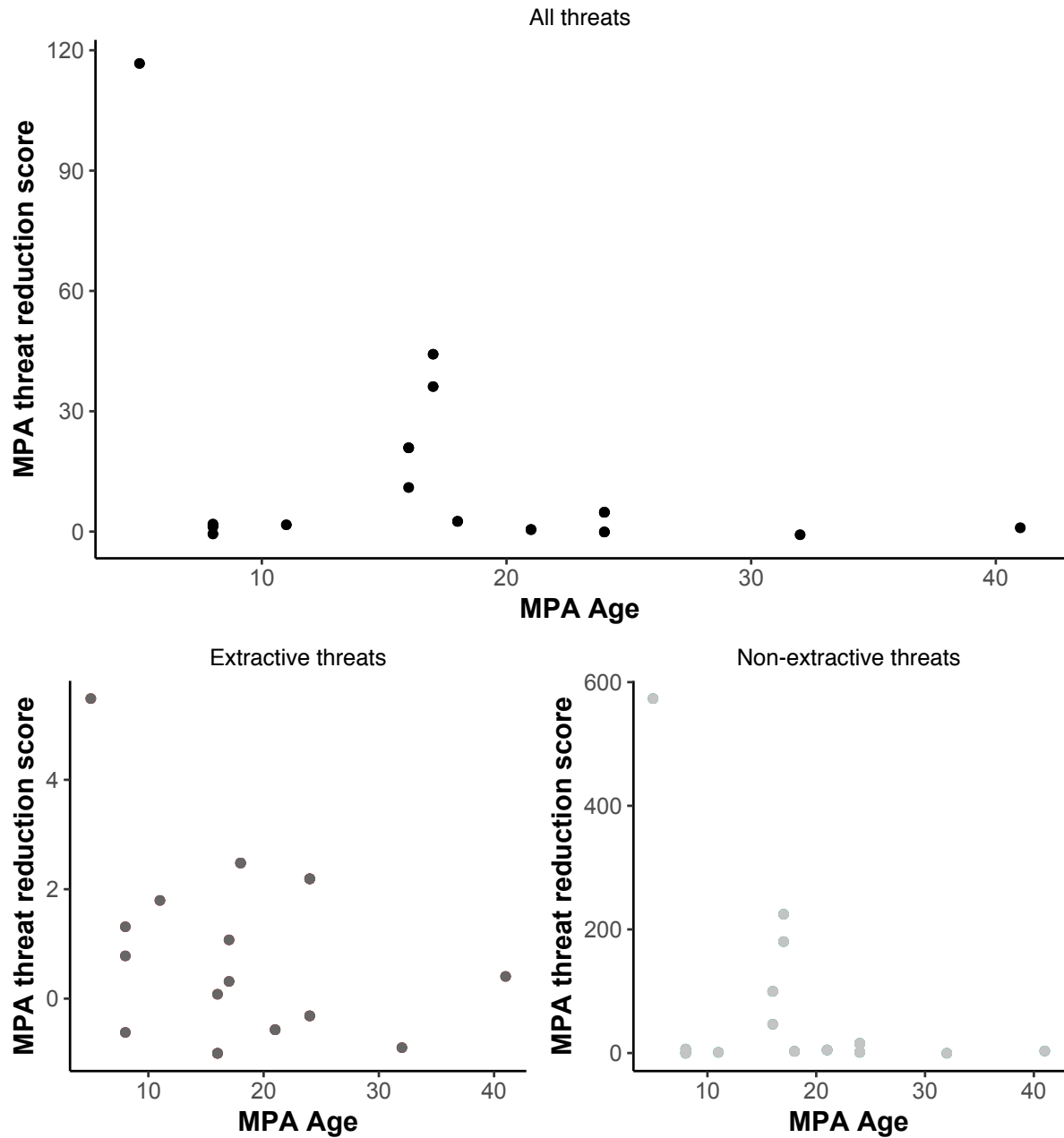


Fig. C.4. Relationships between the threat reduction score and the age of the marine protected areas (MPAs) for all threats combined (top panel), extractive (bottom left panel) and non-extractive threats (bottom right panel). No significant linear relationships were found ($p > 0.05$).

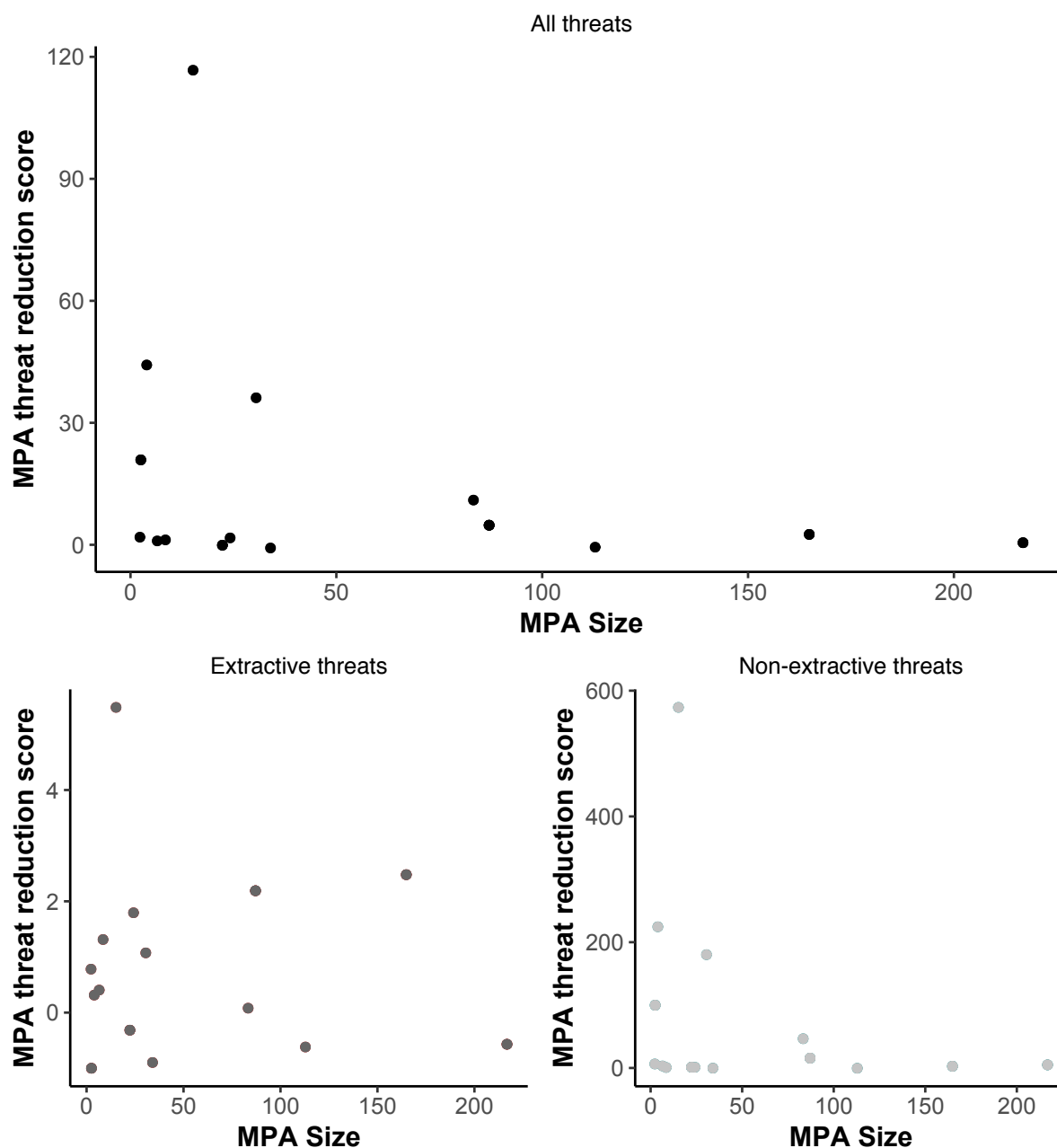


Fig. C.5. Relationships between the threat reduction score and the size of the marine protected areas (MPAs) for all threats combined (top panel), extractive (bottom left panel) and non-extractive threats (bottom right panel). No significant linear relationships were found ($p>0.05$).

Descriptive statistics for the threat intensity index and threat reduction capacity index

Table C.1. Descriptive statistics for the standardized threat intensity index. The standardized threat intensity values were obtained by dividing with the maximum threat intensity of each threat. This resulted in a standardized scale of 0-1. These normalized values were then used to calculate the mean threat intensity of each threat in each protection level to explore the variability of threat intensity amongst protection levels (Fig. 1).

Protection level	Threats	Type	Mean	Standard deviation	Sample Size	Standard error	Median	Min	Max	25%	50%	75%
Fully Protected	Artisanal fishing	extractive	0	0	18	-	0	0	0	0	0	0
Fully Protected	Recreational fishing: hook and line	extractive	0	0	18	-	0	0	0	0	0	0
Fully Protected	Recreational fishing: spearfishing	extractive	0	0	18	-	0	0	0	0	0	0
Fully Protected	Trawlers/purse-seiners	extractive	0	0	18	-	0	0	0	0	0	0
Fully Protected	Tourism: bathing/tramplng	non-extractive	0.08750	0.23875	18	0.05627	0.00057	0	1	0	0.00057	0.01845
Fully Protected	Tourism: commercial boating	non-extractive	0.06659	0.23437	18	0.05524	0	0	1	0	0	0.02005
Fully Protected	Tourism: private boating	non-extractive	0.11240	0.27257	18	0.06425	0.00310	0	1	0	0.00310	0.04281
Fully Protected	Tourism: scuba-diving	non-extractive	0.05926	0.23529	18	0.05546	0.00000	0	1	0	0.00000	0.00000
Partially protected	Artisanal fishing	extractive	0.19081	0.27044	32	0.04781	0.09877	0	1	0.02718	0.09877	0.20850
Partially protected	Recreational fishing: hook and line	extractive	0.17145	0.29805	32	0.05269	0.03182	0	1	0	0.03182	0.15975
Partially protected	Recreational fishing: spearfishing	extractive	0.04362	0.18155	32	0.03209	0	0	1	0	0	0.00191
Partially protected	Trawlers/purse-seiners	extractive	0.00144	0.00817	32	0.00144	0	0	0.04621	0	0	0
Partially protected	Tourism: bathing/tramplng	non-extractive	0.04423	0.07340	32	0.01298	0.00822	0	0.23799	0.00222	0.00822	0.04245
Partially protected	Tourism: commercial boating	non-extractive	0.03448	0.12059	32	0.02132	0.00351	0	0.59878	0	0.00351	0.00814

Partially protected	Tourism: private boating	non-extractive	0.056 24	0.11317	32	0.02001	0.009 19	0	0.535 73	0.000 76	0.009 19	0.055 91
Partially protected	Tourism: scuba-diving	non-extractive	0.024 45	0.05391	32	0.00953	0.000 70	0	0.248 01	0	0.000 70	0.020 99
Outside	Artisanal fishing	extractive	0.077 81	0.12497	15	0.03227	0.033 57	0.004 29	0.487 99	0.016 11	0.033 57	0.081 27
Outside	Recreational fishing: hook and line	extractive	0.072 10	0.10633	15	0.02745	0.030 70	0	0.398 42	0.015 08	0.030 70	0.054 84
Outside	Recreational fishing: spearfishing	extractive	0.009 82	0.02336	15	0.00603	0.002 58	0	0.092 36	0.001 01	0.002 58	0.004 58
Outside	Trawlers/purse-seiners	extractive	0.263 77	0.27445	15	0.07086	0.185 72	0	1.000 00	0.032 96	0.185 72	0.422 19
Outside	Tourism: bathing/tramplng	non-extractive	0.011 39	0.00824	15	0.00213	0.011 21	0.000 07	0.025 97	0.005 25	0.011 21	0.017 57
Outside	Tourism: commercial boating	non-extractive	0.004 96	0.01089	15	0.00281	0.000 67	0	0.041 96	0.000 17	0.000 67	0.002 73
Outside	Tourism: private boating	non-extractive	0.003 26	0.00449	15	0.00116	0.001 26	0.000 01	0.014 04	0.000 23	0.001 26	0.003 91
Outside	Tourism: scuba-diving	non-extractive	0.001 74	0.00438	15	0.00113	0.000 12	0.000 01	0.017 32	0.000 06	0.000 12	0.001 09

Table C.2. Descriptive statistics for the threat reduction capacity index. A negative value of index indicates that the threat intensity is reduced inside the protected area relative to the outside; a positive value of index indicates that the threat intensity is higher inside the MPA relative to the outside. The mean threat reduction capacity values were used to compare the reduction capacity of the fully and partially protected zones for every threat (Fig. 2).

Protection level	Threats	Type	Mean	Standard deviation	Sample Size	Standard error	Median	Min	Max	25%	50%	75%
Fully Protected	Artisanal fishing	extractive	-1	0	18	0	-1	-1	-1	-1	-1	-1
Fully Protected	Recreational fishing: hook and line	extractive	-1	0	18	0	-1	-1	-1	-1	-1	-1
Fully Protected	Recreational fishing: spearfishing	extractive	-1	0	18	0	-1	-1	-1	-1	-1	-1

Fully Protected	Trawlers/purse-seiners	extractive	-1	0	18	0	-1	-1	-1	-1	-1	-1
Fully Protected	Tourism: bathing/tramplng	non-extractive	8.41	23.12	18	5.45	-0.94	-1	83.52	-1	-0.94	2.17
Fully Protected	Tourism: commercial boating	non-extractive	28.36	79.61	18	18.76	-1	-1	301.91	-1	-1	2.91
Fully Protected	Tourism: private boating	non-extractive	237.56	763.16	18	179.88	1.11	-1	3197.31	-1	1.11	18.46
Fully Protected	Tourism: scuba-diving	non-extractive	2386.14	7752.38	18	1827.25	-1	-1	31511.71	-1	-1	-1
Partially protected	Artisanal fishing	extractive	4.93	9.33	32	1.65	2.65	-1	47.12	0.22	2.65	5.28
Partially protected	Recreational fishing: hook and line	extractive	2.39	5.54	32	0.98	0.52	-1	21.96	-1	0.52	2.70
Partially protected	Recreational fishing: spearfishing	extractive	1.97	6.31	32	1.12	-1	-1	24.51	-1	-1	0.63
Partially protected	Trawlers/purse-seiners	extractive	-0.95	0.27	32	0.05	-1	-1	0.47	-1	-1	-1
Partially protected	Tourism: bathing/tramplng	non-extractive	50.55	175.82	32	31.08	-0.11	-1	901.60	-0.87	-0.11	6.66
Partially protected	Tourism: commercial boating	non-extractive	45.74	100.08	32	17.69	9.04	-1	461.24	-0.67	9.04	27.34
Partially protected	Tourism: private boating	non-extractive	26.35	80.78	32	14.28	4.49	-1	400.49	-0.43	4.49	9.68
Partially protected	Tourism: scuba-diving	non-extractive	413.85	1129.49	32	199.67	4.32	-1	5904.77	-1	4.32	217.31

APPENDIX D

Title: How good is your marine protected area at curbing threats?

Authors: Zupan, M., Bulleri, F., Evans, J., Frascchetti, S., Guidetti, P., Garcia-Rubies, A., Sostres, M., Asnaghi, V., Caro, A., Deudero, S., Goñi, R., Guarnieri, G., Guilhaumon, F., Kersting, D., Kokkali, A., Kruschel, C., Macic, V., Mangialajo, L., Mallol, S., Macpherson, E., Panucci, A., Radolovic, M., Ramdani, M., Schembri, P.J., Terlizzi, A., Villa, E., Claudet, J.

Journal: Biological Conservation

```
# This R script can be used to calculate the following indices

# 1. Threat intensity index
# 2. Threat reduction capacity index
# 3. Zone threat reduction score
# 4. MPA threat reduction score
# 5. Local threat index
# 6. MPA Local threat index

# Open and load table with raw data on MPA threats assessment

MPAthreats

#Load
library(plyr)

#####

#####

#                                Prep the table

#####

#####

# Add threat weights; Import threat weight value of each threat (Table 1;
https://www.dropbox.com/s/1301uzj0s907gbp/MPAthreats.xlsx?dl=0)

Threats<-MPAthreats[, "Threats"]; Threats<-as.character(Threats); sort(unique(Threats))

Threats[Threats=="Trawlers/purse-seiners"]= 1
Threats[Threats=="Artisanal fishing"]= 0.82
Threats[Threats=="Recreational fishing: hook and line"]= 0.56
Threats[Threats=="Recreational fishing: spearfishing"]= 0.33
Threats[Threats=="Tourism: commercial boating"]= 0.22
Threats[Threats=="Tourism: private boating"]= 0.22
Threats[Threats=="Tourism: scuba-diving"]= 0.11
Threats[Threats=="Tourism: bathing/tramplng"]= 0.11
T
hreats<-as.numeric(Threats)
MPAthreats$Weight<-Threats

# Assign threat type (extractive or non-extractive)

MPAthreats$Type[MPAthreats$Threats == "Trawlers/purse-seiners"] <- "extractive"
MPAthreats$Type[MPAthreats$Threats == "Recreational fishing: spearfishing"] <- "extractive"
MPAthreats$Type[MPAthreats$Threats == "Recreational fishing: hook and line"] <- "extractive"
MPAthreats$Type[MPAthreats$Threats == "Artisanal fishing"] <- "extractive"
MPAthreats$Type[MPAthreats$Threats == "Tourism: scuba-diving" ] <- "non-extractive"
MPAthreats$Type[MPAthreats$Threats == "Tourism: private boating" ] <- "non-extractive"
MPAthreats$Type[MPAthreats$Threats == "Tourism: commercial boating" ] <- "non-extractive"
```

```
MPAthreats$Type[MPAthreats$Threats == "Tourism: bathing/trampling" ] <- "non-extractive"
```

```
#####
```

```
# 1. Threat Intensity
```

```
#####
```

```
# Threat intensity (TI) was calculated as  $TI_{ijk} = T_{ijk} / A_{jk}$ ;  
# where  $T_{ijk}$  is the value of threat  $i$  in zone  $j$  of MPA  $k$ , and  $A_{jk}$  is the area (km2) of zone  
#  $j$  in MPA  $k$ .
```

```
MPAthreats$TI= MPAthreats$Value/MPAthreats$Zone.size
```

```
# To compare threat intensity amongst protection levels, we have then normalized threat  
# intensity values (TI) by dividing each value with the maximum threat intensity value (TI)  
# of each threat, which resulted in a standardized scale of [0;1].
```

```
# First, we extract the maximum threat intensity of each threat  
Threat_Max<-aggregate(MPAthreats$TI,by=list(Threats=MPAthreats$Threats),FUN=function(x)  
c(max(x,na.rm=TRUE)))
```

```
# We merge this information with our database  
MPAthreats<-merge(MPAthreats,Threat_Max,c("Threats"),all.x=TRUE)  
names(MPAthreats)[14]<-"TI.Max" # name the new column
```

```
#divide each threat intensity with the maximum intensity of that threat  
MPAthreats$norm.TI = MPAthreats$TI/MPAthreats$TI.Max
```

```
# what we have now is normalized threat intensity values ranging from 0-1.  
# we have used this to generate descriptive statistics in Appendix C and Figure 1
```

```
#####
```

```
# 2. Threat reduction capacity
```

```
#####
```

```
# Threat reduction capacity (TR) was calculated as:  
#  $TR_{ijk} = 1 - (TI_{jk} / TI_{o,ik})$   
# where  $TI_{ijk}$  is the intensity of threat  $i$  inside zone  $j$  of MPA  $k$ ,  
# and  $TI_{o,ik}$  is the threat intensity of threat  $i$  outside of the MPA  $k$ .
```

```
threat.red = MPAthreats # create another table with same data
```

```
# We are comparing threats from inside and outside the MPA, so we need to split our data set  
between inside and outside of the MPA
```

```
Threat_Out<-threat.red[threat.red$Protection.level=="Outside",] # separate the Outside Values  
Threat_Out<-Threat_Out[,c("MPA.name", "Threats", "Value", "TI")] # retain the important columns
```

```
threat.red<- threat.red[threat.red$Protection.level!="Outside",] # keep only Inside values
```

```
reduction<-merge(threat.red,Threat_Out,c("MPA.name", "Threats"),all.x=TRUE) # combine the  
Outside and Inside values
```

```
# Renaming columns  
names(reduction)[13]<-"TI.In" # threat intensity inside  
names(reduction)[17]<-"TI.Out" # threat intensity outside
```

```
## Threat reduction capacity
```

```

reduction$TR = -(1-(reduction$TI.In)/(reduction$TI.Out))

# this data was used to generate Figure 2.
# The descriptive statistics can be found in Appendix C

#####

# 3. Zone threat reduction score

#####
# The zone threat reduction score (zT) was calculated as:
#  $zT_{jk} = \sum (TR_{ijk} * w_i) / \sum (w_i)$ 
# where TRijk is the threat reduction capacity defined above and wi is the weight associated
# to threat i (Table 1).

# First, we calculate the zone threat reduction score for each threat type separately
(extractive, non-extractive)

zone = reduction # create new table to work with

# Calculate numerator
zone$wTR = (zone$TR) * (zone$Weight)

numerator = ddply (zone,c("MPA.name", "Protection.level",
                          'Zone.size', "MPA.size", 'Type', 'Zone.name'), summarise,
                  num = sum(wTR, na.rm = T))

# Calculate denominator

# Now we need to divide the wTR with the sum of the weights in each zone
# in some cases, the threats are not present, so we should not account for them
# to do this we assign a 0 value to the weight when no threat is present

zone$Weight.zone= ifelse (is.nan(zone$TR), 0, zone$Weight)

## now we sum the Weight.zone variable in each zone

denominator = ddply (zone,c("MPA.name", "Protection.level",
                             'Zone.size', "MPA.size", 'Type', 'Zone.name'), summarise,
                    den = sum(Weight.zone, na.rm = T))

# Now we merge the tables with the numerator and denominator

Zone.score=merge(numerator, denominator)

Zone.score$zT=Zone.score$num/Zone.score$den

# Now we calculate the zone threat reduction score for the all threats combined
# same as above

# sum wTr in each zone
numerator.all = ddply (zone,c("MPA.name", "Protection.level",
                              'Zone.size', "MPA.size", 'Zone.name'), summarise,
                      num = sum(wTR, na.rm = T))

## now we sum the Wight.all variable in each zone

denominator.all = ddply (zone,c("MPA.name", "Protection.level",
                                'Zone.size', "MPA.size", 'Zone.name'), summarise,
                        den = sum(Weight.zone, na.rm = T))

# Now we merge the tables with the numerator and denominator

```

```

Zone.score.all=merge(numerator.all, denominator.all)

Zone.score.all$zT=Zone.score.all$num/Zone.score.all$den

#####

#                               4. MPA threat reduction score

#####

# The MPA threat reduction score is calculated (mpaT)
#  $mpaT_k = \sum (zT * A_{jk}) / \sum (A_{jk})$ 
# where is the threat reduction score of zone j of MPA k, and Ajk is the surface area of
# zone j of MPA k.

# First, we calculate the MPA threat reduction score for extractive and non-extractive
# threats, separately

MPA.type = Zone.score # create a new table to work on

# calculate numerator
MPA.type$zT.Area = MPA.type$zT * MPA.type$Zone.size

MPA.type.score = ddply ( MPA.type, c("MPA.name", 'Type'), summarise,
                        num = sum(zT.Area),
                        den = unique (MPA.size))

MPA.type.score$mpa.T.type = MPA.type.score$num / MPA.type.score$den

# Now we calculate the MPA threat reduction score for the threats combined

MPA.all = Zone.score.all # create a new table to work on

# calculate numerator
MPA.all$zT.Area = MPA.all$zT * MPA.all$Zone.size

MPA.all.score = ddply ( MPA.all, c("MPA.name"), summarise,
                        num = sum(zT.Area),
                        den = unique (MPA.size))

# Calculate the MPA threat reduction score for extractive and non-extractive threats
# separately
MPA.all.score$mpa.T = MPA.all.score$num / MPA.all.score$den

#####

#                               5. Local threat index

#####

# The local threat index was calculated as:
#  $lTI_{ik} = TI_{o,ik} / \max TI_{o,i}$ 
# where the  $TI_{o,ik}$  is the intensity of threat i outside MPA k and is the maximum intensity
# value of threat i recorded from all the outside areas of all considered MPAs

# We have already calculated the intensity of each threat, so we will now just extract it

local = MPAtreats[MPAtreats$Protection.level=='Outside',]
# The numerator is the variable TI
# The denominator: we need to extract the maximum threat intensity of every threat from the
# outside area

```

```

Threat_OutMax<-aggregate(local$TI,by=list(Threats=local$Threats),FUN=function(x)
c(max(x,na.rm=TRUE)))
#merge tables
local<-merge(local,Threat_OutMax,c("Threats"),all.x=TRUE)

names(local)[16]<-"Outside_Max"

# Now we can look at the regional context of each threat

local$LocMax = local$TI/local$Outside_Max # this would be used to plot with the threat figure

#####

#
                                6. MPA local threat index
#####

# Calculated as:
# mpa.lTI k = sum (local threat index * weight) / sum (weight)
# where lTIik is the local threat index of threat i of MPA k, as calculated above, and wi is
the weight of threat i.

# MPA local threat index for extractive and non-extractive threats, separately

local$w.LocMax= local$LocMax * local$Weight

Type.local = ddply (local,c("MPA.name", 'Type'), summarise,
                    sumLocMax = sum(w.LocMax, na.rm = T))

# denominator for the two threat types
Type.local.weight = ddply (local,c("MPA.name", 'Type'), summarise,
                           W = sum(Weight, na.rm = T))

Type.local=merge(Type.local, Type.local.weight, all=TRUE)

# MPA local threat index for extractive and non-extractive threats separately

Type.local$mpa.local.type = Type.local$sumLocMax / Type.local$W

# MPA local threat index for all threats combined

All.local = ddply (local,c("MPA.name"), summarise,
                  sumLocMax = sum(w.LocMax, na.rm = T))

# denominator
All.local.weight = ddply (local,c("MPA.name"), summarise,
                          W = sum(Weight, na.rm = T))

All.local=merge(All.local, All.local.weight, all=TRUE)

# MPA local threat index for all threats combined

All.local$mpa.local = All.local$sumLocMax / All.local$W

```