FISHERY REGIMES IN ATLANTO-MEDITERRANEAN EUROPEAN MARINE PROTECTED AREAS

EMPAFISH PROJECT BOOKLET Nº 2

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EMPAFISH
European Marine Protected Areas as tools for Fisheries management and conservation

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Contents

Forewords

The management objective of local fisheries has been to maintain the viability of traditional fisheries and the existing fleets. In other words, to make fisheries sustainable and prevent overfishing.

The traditional measures for the management of coastal fisheries rested on the basis of singled-species models of population dynamics and the concept of maximum sustainable yield. They consists in controlling the catch and recommending a total allowable catch, and in to establish seasonal closures and gear specifications to guarantee a minimum size of fished individuals of target species and then, to ensure enough reproductive success and recruitment.

Most fisheries biological research has been oriented to provide information on the biological and ecological consequences of the reduction of the stock abundance, to predict recruitment and to estimate the parameters which define the population dynamics. Despite the huge amount of information and knowledge accumulated during the last decades, the traditional management tools have been insufficient to prevent overfishing of target and by-catch populations and their ecological consequences. More recently, fishery biologists have advocated a more ecological approach to fishery management by developing the concept of “Ecosystem approach to fisheries”, based on a series of principles whose general purpose is, as acknowledged by FAO, *to plan, develop and manage fisheries in a manner that addresses the multiple needs and desires of societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems.* This approach recognize explicitly that fisheries have the potential to alter the structure, biodiversity and productivity of marine ecosystems, and that natural resources should not be allowed to decrease below their level of maximum productivity. Nevertheless, translation of these aims, concepts and principles into actions is hard to achieve in practice.

In recent years, marine reserves have been strongly advocated as an ideal tool for the management of coastal fisheries, and a large number of marine protected areas (MPAs) have been established around the world, in an attempt to halt further deterioration of sensitive habitats, or serving as fisheries management tools. Marine fishery reserves are intended to protect critical spawning stock biomass, intraspecific genetic diversity, population age structure, recruitment supply and ecosystem balance, while maintaining fisheries.

In theory, those effects are important, not only for the preservation of the structure of populations where fishing is prohibited, but also for ensuring the gene flow between more or less distant populations and to export biomass to the surrounding areas so that fisheries take advantage of the protection. Potential spillover could be important in larval phases and for pelagic species, but also for non-pelagic fishes and some invertebrates such as lobsters or shrimps that may spend enough time inside the reserve to experience a significant reduction in fishing mortality while having the ability to move outside the protected area.

The effect of fishing restrictions on the density, size structure and biomass of fish populations inside the reserve has been thoroughly investigated and demonstrated and some evidences that marine reserves also preserve the gene pool and genetic diversity have been recently provided. However, the quantification of the benefits on fisheries and the mechanisms involved are still under speculation and numerous studies find difficulties in detecting the exportation of biomass from MPAs to surrounding areas.

Some modelling studies show that reserves have low effect in adjacent fisheries and produce minor improvements when compared with the best spatially uniform effort-control policies, although other approaches suggests that no-take marine reserves are always part of an optimal harvest designed to maximize yield.

From 1997 to 1999 the number of marine protected areas in the EU had doubled. As a consequence of this quick development, the heterogeneity in design, objectives, characteristics, management tools, monitoring plans and involved administrations is as large as the proper number of MPAs. In the last years, the European Commission has underlined the necessity to manage this situation and had promoted policy-oriented research to establish the potential of marine protected areas for marine environmental protection and fisheries enhancement.

In this context, EMPAFISH project (European Marine Protected Areas as tools for FISHeries management and conservation), supported by the European Commission, has as general objectives 1) to investigate the potential of different regimes of MPAs in Europe as measures to protect sensitive and endangered species, habitats and ecosystems from the effects of fishing; 2) to develop quantitative methods to assess the effects of marine protected areas and 3) to provide EU with a set of integrated measures and policy proposals for the implementation of MPAs as fisheries and ecosystem management tools.

The main objective of the project is to promote a basis for responsible and sustainable fisheries activity that contribute to healthy marine ecosystems, creating an economically viable and competitive fisheries industry, guaranteeing a fair standard of living for those who depend on fishing activities. The primary objective is to investigate the potential of different regimes of protected areas as measures to protect sensitive and endangered species, habitats and ecosystems from the effects of fishing, using 20 case studies where management regimes range from totally prohibited zones (“no take zones”) to protected areas where different levels of fishing are accepted either on a seasonal or activity basis and covering a broad geographic area from the Mediterranean to the Canary island, and Azores. A secondary objective is to develop quantitative methods to assess the effects of marine protected areas where these methods are lacking or not well suited to assess the relevant type of effects.

The work package 2 of EMPAFISH is devoted to evaluate and provide useful fishery related steady state variables as indicators of MPAs fishery effects, to analyse MPAs management regime on population parameters of the exploited resources and key non-commercial species, to analyse MPAs effects at varying temporal and spatial scales and to study the effects of MPAs on the geographic dispersion of fishing effort and fleet operational regimes.

Most of the difficulties in responding to the open queries on the effects of fishing protection and the real role of MPAs as fishery management tools are related with the above mentioned heterogeneity of designs, target species, gears, management regimes and monitoring plans. The present booklet reviews the characteristics of the case studies included in the project from the point of view of their fishing activities and fleets as a starting point to look for answers to such important questions.

Angel Pérez-Ruzafa
EMPAFISH coordinator

Introduction

Marine protected areas (MPAs) are areas of the sea where fishing is restricted or prohibited. They have been proposed throughout the world as an ideal way to protect marine ecosystems and associated fisheries (Plan Development Team 1990; Roberts & Polunin 1991; Dugan & Davis 1993; Agardy 1994; Gerber *et al*. 2002; Lubchenco *et al*. 2003) and are seen as key components in an ecosystem approach to fisheries management (Sutinen & Soboil 2001). Amongst their chief benefits is their role in conservation of valuable species and habitats, and the protection of economic resources (Salm *et al.* 2000). From a fisheries perspective, MPAs have been advocated as an insurance against uncertainties related to traditional management measures, which have in some cases failed to protect stocks against collapse (Pauly *et al.* 2002).

The effect of fishing protection on the density, size structure and biomass of fish populations has been thoroughly investigated (see reviews by García-Charton *et al.* 2000; McClanahan & Mangi 2000; Russ 2002; Halpern 2003). In general, fishing reduces population abundance, preferentially removing larger and older fish, thus changing the size and age structure of exploited populations (e.g. Jennings *et al*. 1995) and reducing potential fecundity. So, the cessation or reduction of fishing may promote an increase of the recruitment and of abundance as well as the mean size and age of the individuals of the protected populations.

Increases in the number and biomass of a number of species (Buxton & Smale 1989) or in the entire fish assemblage of the protected area (Cole *et al*. 1990; Polunin & Roberts 1993) have been observed in different studies. Most of these works show that the species more likely to respond to the cessation of fishing in marine reserves (reserve effect) are large, long-lived predators, organisms highly vulnerable to fishing and those whose populations are overexploited (Plan Development Team 1990; Roberts & Polunin 1993; Bohnsack 1996), meanwhile other species may not be influenced by protection or may show the opposite response (lower abundance or biomass in the reserve), presumably due to inter-specific interactions (Pinnegar *et al*. 2000).

Some studies show that the response time to protection is low and the positive effects on population density are reached within a period of time of 1 to 3 years (Halpern & Warner 2002).

Furthermore, marine reserves, like fishery reserves, are not closed systems and can determine a recovery in the productive potential of fishing resources, inside or in the immediate vicinity of the protected area. On this basis, it is widely accepted that MPAs offer, as potential advantages to fisheries, a net exportation of individuals or biomass to adjacent areas, commonly referred to as “spillover”. Three mechanisms can be responsible of this biomass exportation from a MPA: 1) random movements of fishes (home-range) (Rakitin & Kramer 1996; Kramer & Chapman 1999); 2) migration of individuals (trophic or reproductive) or home range relocation as a consequence of density dependent factors and 3) egg and larval dispersal (Gell & Roberts 2003). This process would result in a recovery of exploited populations outside the limits of MPAs, therefore enhancing the yield of neighbouring fisheries.

However, it must be taken into account that if home range of most individuals of a given species normally exceeds the protected area, fishes that surpass the MPA boundaries could be vulnerable to fishing mortality. Conversely, fishes whose home ranges are centred outside the MPA but include its boundaries could have reduced exposure to fishing. This is an important question to be considered in the design of marine reserves as it is clear that if the size of the protected area is not big enough in terms of home-range units, the protection on these species populations would actually be incomplete (DeMartini 1993). Thus, in this case consequences of spillover can benefit yields of local fisheries but they could be merely a result of a partial protection of several target fish populations.

Other expected effects of protection such as increasing reproductive potential of target species (e.g. Goñi *et al.* 2003), or protecting genetic diversity (e.g. González-Wangüemert *et al.* 2002, Pérez-Ruzafa *et al*. 2006), have received little attention by researchers, but there are some recent evidences of their functioning.

The best fishery evidence of fishing enhancement due to the effect of MPAs is that fishing effort is often very high in the limits of protected areas suggesting that catch rates are improved close to them (e.g. Shorthouse 1990; McClanahan & Kaunda-Arara 1996). The change in the attitudes and perceptions of fishers after the effects of protection in some cases, also suggests that commercial catches in nearby areas have improved (Shorthouse 1990; Badalamendi *et al*. 2000).

However, numerous studies find difficulties in detecting or quantifying the exportation of biomass from MPAs to surrounding areas (McClanahan & Mangi 2000; Sanchez-Lizaso *et al*. 2000; Gerber & Heppell 2004). And several confounding factors, including habitat heterogeneity (García-Charton & Pérez-Ruzafa 1998; 1999; 2001), inadequate sampling designs (García Charton *et al*. 2000) and localised research, weaken the ability to determine the effects of protection in many areas. In fact, after more than a decade of continuous and intense research, current knowledge is extremely unbalanced (Palumbi 2001) and the long term effects of MPAs are still a matter of controversy (Dawson *et al*. 2006; Steneck *et al*. 2006). Some of the main gaps in scientific knowledge that must be filled if MPAs are to be effectively used as fishery management tools relates with the dispersal capability of marine larvae, the movement patterns of juveniles and adults, the complex effects of fishing on ecological interactions at ecosystem level, the coastal hydrodynamic processes and well designed studies of no-take MPAs that can rigorously demonstrate process as recruitment subsidy and spillover to the surrounding region (Sale *et al*. 2005).

Most European MPAs have been developed in an attempt to unite and harmonise conservation and economic interests, improving fisheries through the sustainable exploitation of natural resources, and maximising additional socio-economic benefits such as diving and tourism. This booklet summarises the current status of fisheries in each of the case studies included in the EMPAFISH study. Each site has been characterised in terms of its management regime and fisheries activity, acceptable activities and target and by-catch species.

EMPAFISH
Area Map

1. Cabo de Palos - Islas Hormigas
2. Tabarca
3. San Antonio
4. Serra Gelada and Benidorm islets
5. Columbretes Islands
6. Anti-trawling zones (SE Spain)
7. Medes Islands
8. Cerbère-Banyuls
9. Côte Bleue
10. Sinis - Maldiventre
11. Bouches de Bonifacio
12. Ustica Island
13. Gulf of Castellammare / Trawl Ban Area
14. La Graciosa e Islotes del Norte de Lanzarote
15. La Restinga - Mar de las Calmas
16. Monte da Guia / Faial
17. Formigas islet / Dollabarat Bank
18. Tuscany Archipelago
19. Malta 25 NM Fisheries Management Zone (FMZ)
20. Rdum Majjiesa / Ras ir-Raheb

MPA: Cabo de Palos - Islas Hormigas

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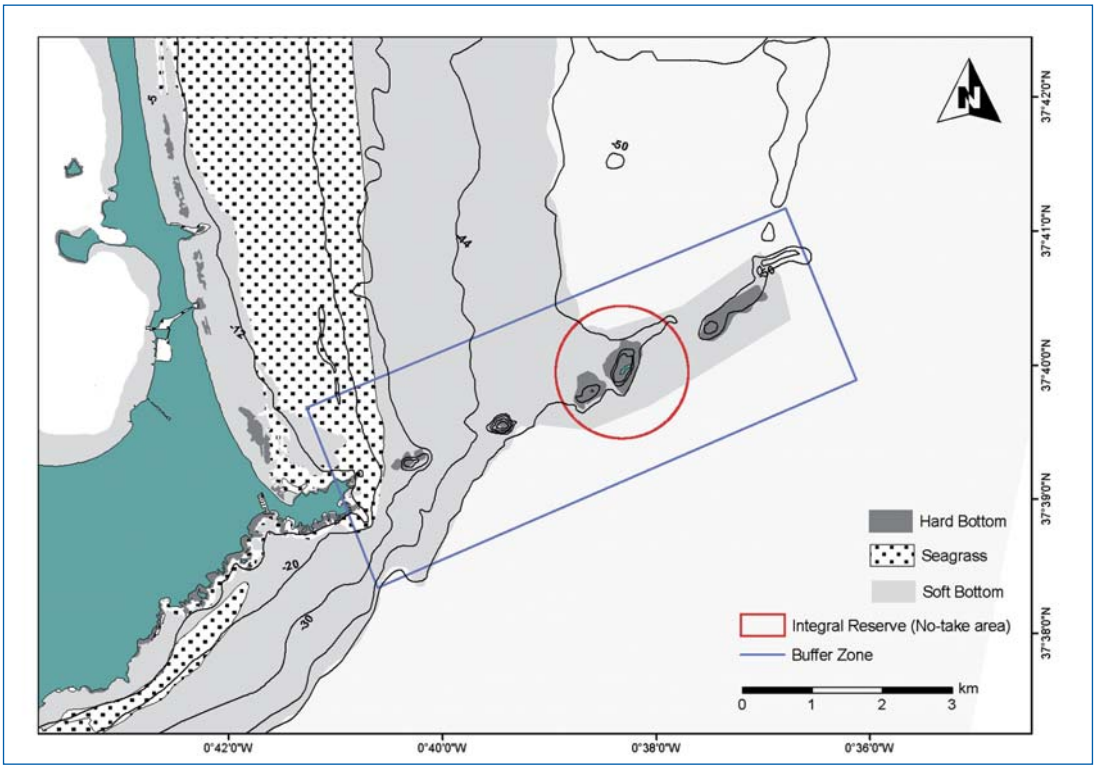
Location: 37°38'N 00°42'W
Country: Spain
Coastal/Island: Mixed inshore
Total size: 1,898 ha
Integral size: 270 ha
Year of establishment: 1995
Depth range: 0 – 100m
Protection objectives: Fisheries enhancement
Type of MPA: Partial
Habitats: *Posidonia oceanica* beds, rocky reefs (from supra- to circa littoral), caves, detritic bottoms, sandy bottoms
Socio-economic activities: Diving, tourism

Activities	Integral Reserve (IR)	Restricted Use Area (RU)
Forbidden	All activities except *	Spear fishing, trawling, seine, angling
Regulated	* Scientific survey	Scientific survey, artisanal fishing, angling, scuba diving
Allowed		Swimming, boating, anchoring

Description of the fisheries in and around the MPA

The marine reserve was created in 1995 under fishery legislation rules. Management of this area is shared between regional and national administration. The entire marine reserve is 1,898 ha in size, and it is formed by an integral reserve (270 ha) where all fishing activity is prohibited, and a restricted use area, which is acting as buffer zone, where some kind of artisanal fishery (clear trammel net and bottom long-line) is allowed under strict regulation. There are four fishing guilds in the region of Murcia two of which fish inside the marine reserve and a third one that fish in its vicinity. Boats coming from Santa Pola (Alicante), especially trawlers, fish around limits of the marine reserve.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR	-	-	-	-	-
	RU	Lobster trammel net	May-Sept	*Palinurus elephas*	*Phycis phycis*, *Scorpaena scrofa*, *Lophius piscatorius*	7
		Rockfish trammel net	May-Sept	*Dentex dentex*, *Scorpaena scrofa*	*Scorpaena porcus*, *Pagellus erythrinus*, *Sciaena umbra*	
		Dentex bottom long-line	Sept-Mar	*Dentex dentex*, *Epinephelus marginatus*	*Pagrus pagrus*	
Outside		Pelagic trap net	April-June	*Seriola dumerili*, *Sarda sarda*, *Auxis rochei*		39
		Sepia trap net	Nov-Mar	*Sepia officinalis*, *Loligo vulgaris*, *Seriola dumerili*	*Sphyraena sphyraena*, *Diplodus sargus*, *Lithognathus mormyrus*	
		Mullus trammel net	Mar-Aug	*Mullus surmuletus*	*Diplodus* spp., *Sepia officinalis*, *Serranus* spp.	
		Lobster trammel net	May-Sept	*Palinurus elephas*	*Phycis phycis*, *Scorpaena scrofa*, *Lophius piscatorius*	
		Rockfish trammel net	May-Sept	*Dentex dentex*, *Scorpaena scrofa*	*Scorpaena porcus*, *Pagellus erythrinus*, *Sciaena umbra*	
		Sparids gillnet	Oct-Jan	*Sparus aurata*, *Diplodus sargus*	*Pagellus erythrinus*	
		Dentex bottom long-line	Sept-April	*Dentex dentex*, *Epinephelus marginatus*	*Pagrus pagrus*	
		Grouper bottom long-line	Sept-Mar	*Epinephelus marginatus*	*Dentex* spp.	
		Surface-bottom long-line (*Palangre piedrabola*)	Sept-May	*Xiphias gladius*, *Epinephelus marginatus*, *Scorpaena scrofa*		
		Octopus pots	All seasons	*Octopus vulgaris*		
		Surface long-line	Jun-Sept	*Xiphias gladius*, *Thunnus thynnus*	Sharks	4
		Trawling	All seasons	*Mullus surmuletus*, *Merluccius merluccius*, *Octopus vulgaris*, *Aristeus antennatus*	*Sepia* spp. *Trachurus* spp.	8
		Purse seine	depending on the species	*Sardina pilchardus*, *Engraulis encrasicolus*, *Seriola dumerili*, Scombridae, *Aphia minuta*, *Atherina* spp.		8



Statistics

Landings of the most important species (by weight) from the region for 2004*

Total landings	Weight (tons)
Total landings (all species)	28.9
Seriola dumerili	3.8
Mullus spp.	2.9
Dentex dentex	2.4

* Landings data of the 7 boats which were allowed to fish within the marine protected area of Cabo de Palos – Islas Hormigas

Fishing regulations

Decreto nº 15/1995, de 31 de marzo, por el que se declara reserva marina de interés pesquero la zona de Cabo de Palos - Islas Hormigas. (B.O.R.M. núm. 92 de 21 de abril de 1995).

Orden de 22 de junio de 1995, por la que se establece una reserva marina en el entorno del Cabo de Palos - Islas Hormigas (B.O.E. núm 161 de 7 de julio de 1995).

Orden de 29 de abril de 1999 por la que se modifica la Orden de 22 de junio de 1995, por la que se establece una reserva marina en el entorno del Cabo de Palos - Islas Hormigas (B.O.E. núm 119 de 19 de mayo de 1999).

Resolución de 12 de mayo de 1999, de la Dirección General de Recursos Pesqueros, por la que se da publicidad al Convenio Marco de Colaboración entre el Ministerio de Agricultura, Pesca y Alimentación y la Consejería de Medio Ambiente, Agricultura y Agua de la Comunidad Autónoma de la Región de Murcia, relativo a la Gestión compartida de la Reserva Marina del entorno de Cabo de Palos - Islas Hormigas (B.O.E. núm. 141 de 14 de junio de 1999).

Orden de 7 de abril de 2000, de la Consejería de Agricultura, Agua y Medio Ambiente, por la que se regulan las modalidades de pesca autorizadas en aguas de la reserva marina de Cabo de Palos - Islas Hormigas (B.O.R.M. núm 92 de 19 de abril de 2000).

Orden de 6 de junio de 2001, por la que se modifica la Orden de 22 de junio de 1995, por la que se establece una reserva marina en el entorno del Cabo de Palos - Islas Hormigas (B.O.E. núm. 146 de 19 de junio 2001).

Orden de 19 de julio de 2001, de la Consejería de Agricultura, Agua y Medio Ambiente, por la que se regula el ejercicio de las actividades subacuáticas en aguas interiores de la reserva marina de Cabo de Palos - Islas Hormigas (B.O.R.M. núm. 174, de 28 de julio de 2001).

Resolución de 3 de septiembre de 2001, de la Secretaría General de Pesca Marítima, por la que se actualiza el censo de embarcaciones autorizadas a ejercer la pesca marítima profesional en la reserva marina del entorno de Cabo de Palos - Islas Hormigas (B.O.E. núm. 233 de 28 de septiembre de 2001).

Database reference

http://www.mapa.es/rmarinas/index_rm.htm
http://wwwcarm.es/econet/sicrem/p1/index.htm

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Publications

Pérez-Ruzafa A., García-Charton J.A., Marcos C., Gutiérrez J.M., Aliaga V., Barcala E., Fernández-Martínez A.I., González-Wangüemert M., Hegazi M.I., Romero P. & Salas F., 1995. *Seguimiento de arrecifes artificiales y establecimiento de la situación biológica inicial de la reserva Marina de Cabo de Palos-Islas Hormigas.* Universidad de Murcia y Consejería de Agricultura, Ganadería y Pesca de la Comunidad Autónoma de la Región de Murcia.

García B., 1996. Las pesquerías artesanales en los alrededores de la reserva marina de Cabo de Palos–Islas Hormigas (Murcia). En: *Congreso de Biología Pesquera (1995-1996).* Consejería de Agricultura, Agua y Medio Ambiente de la Región de Murcia.

Pérez-Ruzafa A., García-Charton J.A., Gutiérrez J.M., Vega T., Marcos C., Fernández-Martínez A.I., Salas F., Hegazi M.I., Aliaga V., Romero P., González-Wangüemert M., Sabah S., Ruíz-Fernández J.M. & Pérez-Ruzafa I.M., 1996. *Seguimiento de arrecifes artificiales y reservas marinas de la Región de Murcia*. Universidad de Murcia y Consejería de Medio Ambiente, Agricultura y Agua de la Comunidad Autónoma de la Región de Murcia.

Barcala E., Guillén J.E., Martínez M. & Mas J., 1998. *Asistencia técnica para la realización de un estudio sobre la sostenibilidad de las pesquerías de Cabo de Palos y Calblanque*. Institut d'Ecologia Litoral y Ministerio de Agricultura, Pesca y Alimentación, Subdirección General del Caladero Nacional, Acuicultura y Recursos Litorales.

García-Charton J.A. & Pérez-Ruzafa A., 1998. Correlation between habitat structure and a rocky reef fish assemblage in SW Mediterranean. *PSZN I: Marine Ecology* 19 (2): 11-128.

García-Charton J.A. & Pérez-Ruzafa A., 1999. Ecological heterogeneity and the evaluation of the effects of marine reserves. *Fisheries Research* 42: 1-20.

García-Charton J.A., Pérez-Ruzafa A. & Sánchez-Jerez P., 1999. A landscape perspective for the study of the relationship between reef fish assemblages and habitat structure in SW Mediterranean. *Il Naturalista Siciliano* 23 *(Supl.: International Workshop on Fish Visual Census in Marine Protected Areas*): 169-186.

García-Charton J.A., Williams I.D., Pérez-Ruzafa A., Milazzo M., Chemello R., Marcos C., Kitsos M.-S., Koukouras A. & Riggio S., 2000. Evaluating the ecological effects of Mediterranean marine protected areas: habitat, scale and the natural variability of ecosystems. *Environmental Conservation* 27: 159-178.

Pérez-Ruzafa A., Marcos C. & García-Charton J.A., 2000. Estrategias de conservación de la biodiversidad marina. In: Calvo J.F., Esteve M.A. & López F. (Coord.), *Biodiversidad. Contribución a su conocimiento y conservación en la Región de Murcia*. Instituto del Agua y del Medio Ambiente, Universidad de Murcia: 177-192.

García-Charton J.A., 2001. Bases para un plan regional de pesca en la Región de Murcia. In: Marcos C., García-Charton J.A. & Pérez-Ruzafa A. (Eds.), *Gestión y Ordenación del Medio Ambiente Natural*. Servicio de Publicaciones, Universidad de Murcia: 239-252.

García-Charton J.A. & Pérez-Ruzafa A., 2001. Spatial pattern and the habitat of a SW Mediterranean reef fish assemblage. *Marine Biology* 138: 917-934.

Pérez-Ruzafa A., García-Charton J.A., Marcos C., González-Wangüemert M. & Entrambasaguas L., 2001. *Estudios sobre las poblaciones de peces de la reserva marina de Cabo de Palos-Islas Hormigas: comparación espacial y seguimiento temporal.* Servicio Regional de Pesca y Acuicultura, Comunidad Autónoma de la Región de Murcia.

Pérez-Ruzafa A., Marcos C., García-Charton J.A., González-Wangüemert M., Polti S., Vera J. & Clemente C., 2002. *Seguimiento de la reserva marina de Cabo de Palos-Islas Hormigas. Valoración del impacto de los buceadores.* Servicio Regional de Pesca y Acuicultura, Comunidad Autónoma de la Región de Murcia.

Pérez-Ruzafa A., 2003. Los recursos pesqueros en la región de Murcia. In: Esteve M.A., Lloréns M. & Martínez Gallur C. (Eds.), *Los Recursos Naturales de la Región de Murcia. Un Análisis Interdisciplinar.* Servicio de Publicaciones de la Universidad de Murcia: 412-417.

Pérez-Ruzafa A., García-Charton J.A., Espejo C., Herrero A., Lawrence K., Marcos C., Polti S. & Cánovas F., 2003. *Estudios de seguimiento de la Reserva Marina de Cabo de Palos-Islas Hormigas*. Universidad de Murcia y Consejería de Agricultura, Agua y Medio Ambiente de la Comunidad Autónoma de la Región de Murcia.

García-Charton J.A., Pérez-Ruzafa A., Sánchez-Jerez P., Bayle J.T., Reñones O. & Moreno D., 2004. Multi-scale spatial heterogeneity, habitat structure and the effect of marine reserves on Western Mediterranean rocky reef fish assemblages. *Marine Biology* 144: 161-182.

Pérez-Ruzafa A., García-Charton J.A., Herrero A., Espejo C., González-Wangüemert M. & Marcos C., 2004. *Estudios de seguimiento de la Reserva Marina de Cabo de Palos-Islas Hormigas*. Universidad de Murcia y Consejería de Agricultura, Agua y Medio Ambiente de la Comunidad Autónoma de la Región de Murcia.

García-Charton J.A., Herrero A., Esparza-Alaminos O., Espejo C., Pérez-Ruzafa A. & Marcos C., 2005. *Estudio de seguimiento de la Reserva Marina de Cabo de Palos-Islas Hormigas*. Universidad de Murcia y Consejería de Agricultura y Agua de la Comunidad Autónoma de la Región de Murcia.

García-Charton J.A., Herrero-Pérez A., Esparza-Alaminos O., Pérez-Ruzafa A. & Marcos-Diego C., 2006. *Estudios de seguimiento de la reserva marina de Cabo de Palos - Islas Hormigas*. Universidad de Murcia y Consejería de Agricultura y Agua de la Comunidad Autónoma de la Región de Murcia.

González-Wangüemert M., Pérez-Ruzafa A., García-Charton J.A. & Marcos C., 2006. Genetic differentiation and gene flow of two Sparidae subspecies, *Diplodus sargus sargus* and *Diplodus sargus cadenati* in Atlantic and south-west Mediterranean populations. *Biological Journal of the Linnean Society* 89: 705-717.

Pérez-Ruzafa A., González-Wangüemert M., Lenfant P., Marcos C. & García-Charton J.A., 2006. Effects of fishing protection on the genetic structure of fish populations. *Biological Conservation* 129: 244-255.

García-Charton J.A., Esparza-Alaminos O., Rodríguez Hernández A., Saber-Rodríguez S., Treviño-Otón J., Herrero-Pérez A., Pérez Ruzafa A. & Marcos-Diego C., 2007. *Estudios de seguimiento de la reserva marina de Cabo de Palos - Islas Hormigas*. Universidad de Murcia y Consejería de Agricultura y Agua de la Comunidad Autónoma de la Región de Murcia.

González-Wangüemert M., Pérez-Ruzafa A., Cánovas F., García-Charton J.A. & Marcos C., 2007. Temporal genetic variation in populations of *Diplodus sargus* from the SW Mediterranean Sea. *Marine Ecology Progress Series* 334: 237-244.

Stobart B., García-Charton J.A., Espejo C., Rochel E., Goñi R., Reñones O., Herrero A., Crec'hriou R., Polti S., Marcos C., Planes S. & Pérez-Ruzafa A., 2007. A baited underwater video technique to assess shallow-water Mediterranean fish assemblages: Methodological evaluation. *Journal of Experimental Marine Biology and Ecology* 345: 158-174.

Pérez-Ruzafa A., Martín E., Zamarro J.M., Planes S., Harmelin-Vivien M., García-Charton J.A. & Marcos C., in press. The problem of detecting exportation of biomass in MPAs.

Esparza-Alaminos O., Pérez-Ruzafa A., Polti S., García-Charton J.A. & Marcos C., in press. Evolution of catches by artisanal fishing around Cabo de Palos-Islas Hormigas marine reserve in the context of fisheries of the Region of Murcia.

MPA: Tabarca

Contributors: Celia Ojeda-Martínez, Carlos Valle, Aitor Forcada-Almarcha, José Luis Sánchez-Lizaso, Francisca Giménez-Casalduero & Just Bayle.
Unidad de Biología Marina, Departamento de Ciencias del Mar y Biología Aplicada, Universidad de Alicante, Spain.

Location:	38°10'N 00°28'W
Country:	Spain
Coastal/Island:	Island
Total size:	1,400 ha
Integral size:	100 ha
Year of establishment:	1986
Depth range:	0 – 50m
Protection objectives:	Fisheries enhancement
Type of MPA:	Multiple uses
Habitats:	*Posidonia oceanica* beds and rocky reefs
Socio-economic activities:	Diving, tourism and fishing

Activities	Core I	Buffer IIa	Buffer IIb	Restricted IIIa	Restricted IIIb
Forbidden	Recreational fishing, professional fishing, swimming, anchoring, recreational diving	Recreational fishing, swimming, anchoring	Recreational fishing, swimming, anchoring	Recreational fishing, anchoring	Recreational fishing
Regulated	Scientific research*	Professional fishing (with traditional gears)	Professional fishing (with traditional gears)	Professional fishing (with traditional gears)	Professional fishing (with traditional gears)
Allowed	Boating	Scientific research, recreational diving*, boating	Scientific research, recreational diving*, boating	Scientific research, recreational diving*, swimming, boating	Scientific research, recreational diving*, swimming, anchoring, boating

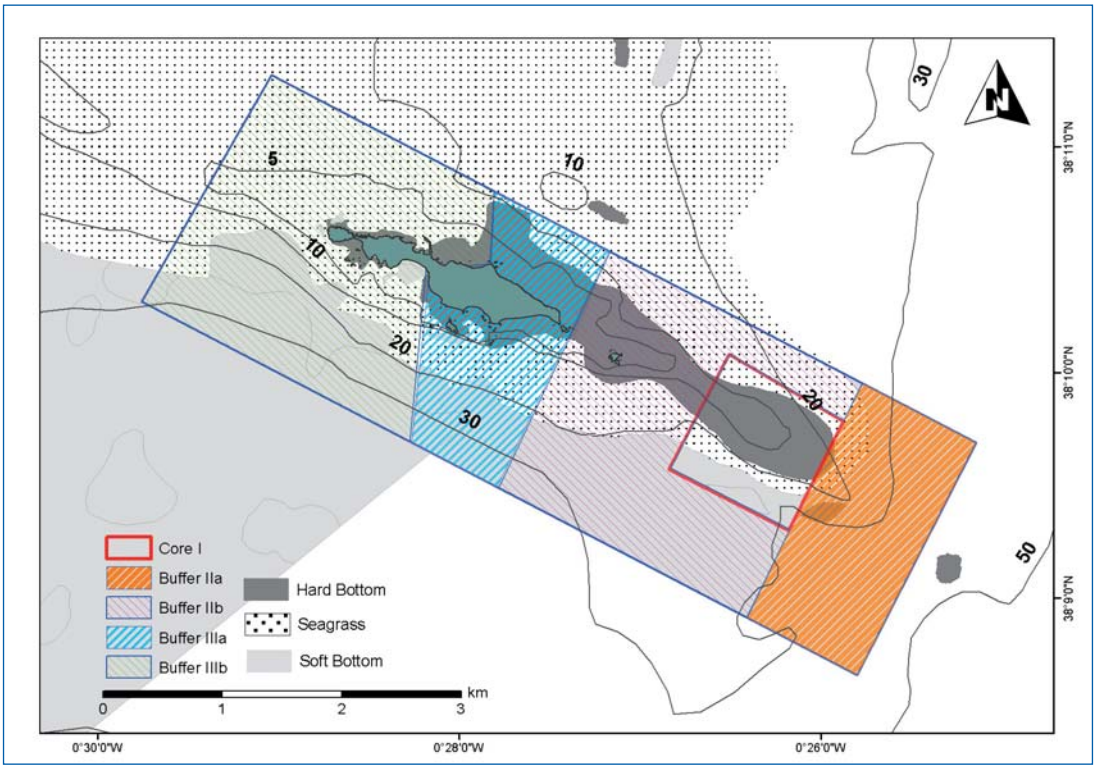
* Activities permitted under permission

Description of the fisheries in and around the MPA

The marine reserve was created to protect biodiversity and allow the regeneration of local fisheries around the protected area. Within the integral reserve all fishing activities are forbidden. The restricted use area is divided into internal and external waters, which are regulated by the regional government of Valencia and the Spanish State respectively.

The fleet is artisanal and the main fishing area is located at the eastern external part of the MPA. The different fishing gears differ according to the year period and the target species, being the more used trammel net for mullets and cuttlefish, demersal long-lines and traw-lines. In the buffer and regulated zones big and small trap nets are allowed. Moreover, an intense recreational fishery is developed around the boundaries of the MPA, including angling, trawl-line and spear fishing.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR	-	-	-	-	-
	RU	Trap nets (*Moruna gruesa*)	May-July	*Seriola dumerili, Dentex dentex,*	*Sphyraena sphyraena, Pomatomus saltatrix*	4
		Trap nets (*Moruna fina*)	Sept-Nov	*Atherina hepsetus*	*other juvenile fishes*	
		Troll line (*Curricán*)	All seasons	*Seriola dumerili, Epinephelus* spp.		
Outside		Trap net (*moruna gruesa*)	April-June	*Seriola dumerili, Sarda sarda, Auxis rochei*		20
		Trap net (*moruna fina*)	Nov-Mar	*Loligo vulgaris, Sepia officinalis, Seriola dumerili, Sphyraena sphyraena, Diplodus sargus, Lithognathus mormyrus*		
		Trammel net (*trasmallos finos*)	Mar-Aug	*Mullus surmuletus, Scorpaena scrofa, Scorpaena porcus, Dentex dentex, Sepia officinalis*		
		Trammel net (*trasmallos claros*)	May-Sept	*Palinurus elephas, Dentex dentex, Scorpaena scrofa, Phycis phycis, Pagellus erythrinus*		
		Gill net	Oct-Jan	*Sepia officinalis, Sparus aurata, Diplodus sargus*		
		Surface long-line	June-Sept	*Xiphias gladius, Thunnus thynnus,* sharks...		4
		Bottom long-line	Sept-April	*Pagrus pagrus, Diplodus sargus, Sciaena umbra, Dentex dentex*		
		Long line	Sept-Mar	*Epinephelus marginatus*		
		Trawling	All seasons	*Mullus surmuletus, Merluccius merluccius, Octopus vulgaris, Aristeus antennatus*		57
		Pure seine	depending on the species	*Sardina pilchardus, Engraulis encrasicolus, Seriola dumerili,* Scombridae, *Aphia minuta, Atherina* spp.		15



Statistics

Landings of the most important species (by weight) from the region for 2004*

	Weight (tons)
Total landings (all species)	2846.0
Species 1	Not available
Species 2	Not available
Species 3	Not available

* Landings data of fish market

Fishing Regulations

Foundation Text : Order 4th of April 1986, Regional Council of Agriculture and Fisheries. Founding of a MPA in Tabarca Island. (DOGV nº 397, 27th of June).

Order 4th April 1986 modified by Order 15th June 1988 and Order 24th July 2000 (Ministry of Agriculture, Fisheries and Food); Order 4th April 1986 modified by Order 19th October 2000 (Regional Council of Agriculture and Fisheries).

BOE nº 112, 10 may 1986; DOGV nº 397, 27 June 1986; BOE nº 163, 8 July 1988; BOE nº 184, 2 august 2000; DOGV nº 3868, 31 October 2000.

Law 3/2001, of the 26th of March, of Fishing activities of the Spanish State.

Law 9/1998, of the 15th of December, of Fishing activities of the Comunidad Valenciana (BOE nº 18, January 1999).

Database reference

http://www.agricultura.gva.es/estadisticos/

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Publications

Mediterraneo Servicios Marinos S.L., 1984. *Informe RM Tabarca 1984*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación. 70 pp.

Ramos-Esplá A.A., 1985. Contribución al conocimiento de la actividad pesquera (artesanal y deportiva) en los alrededores de la Isla Nueva de Tabarca (Alicante). *La reserva marina de la Isla Plana o Nueva Tabarca (Alicante).* Publ. Ayuntamiento de Alicante. Universidad de Alicante: 149-160.

Ramos Esplá A.A. & Bayle Sempere J.T., 1990. Management of the living resources in the Marine Reserve of Tabarca (Alicante, Spain). *Bull. Soc. Zool. France* 114 (4): 41-48.

Gomis C., 1991. *Informe RM Tabarca 3º avance*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Gomis C., 1991. *Informe RM Tabarca 4º avance*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1991. *Informe Tabarca 1991*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Ramos Esplá A.A., Bayle Sempere J.T. & Candela Espinosa C., 1992. Ordenación de la actividad pesquera en la Reserva Marina de Tabarca (Alicante, SE España). *Estudios sobre la Reserva Marina de Tabarca*. Publ. Minist. Agric., Pesca y Alimentación, Madrid: 155-164.

Gomis C., 1993. *Informe RM Tabarca 1993*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Gomis C., 1994. *Informe RM Tabarca informe final*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1994. *Informe Tabarca 1991 al 1994*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1995. *Informe Tabarca 1995*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1996. *Informe Tabarca 1996*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2005. *Tabarca monitorizacion de la pesca profesional 2005.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación. 70 pp.

Valle C., 2005. *Impactos antrópicos sobre la ictiofauna litoral*. PhD Thesis. Universidad de Alicante. 413 pp.

Forcada A., 2007. *Evaluación de las Áreas Marinas Protegidas y su efecto en las pesquerías artesanales del Mediterráneo occidental*. PhD Thesis. Universidad de Alicante. 457 pp.

MPA: San Antonio

Contributors: Celia Ojeda-Martínez, Carlos Valle, Aitor Forcada-Almarcha, José Luis Sánchez-Lizaso, Francisca Giménez-Casalduero & Just Bayle.
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Location:	38°48'N 00°11'E
Country:	Spain
Coastal/Island:	Coastal
Total size:	952.99 ha
Integral size:	115 ha
Year of establishment:	1993
Depth range:	0 – 22 m
Protection objectives:	Fisheries enhancement
Type of MPA:	Multiple uses
Habitats:	*Posidonia oceanica* beds and rocky reefs
Socio-economic activities:	Diving, tourism and fishing

Activities	Integral Reserve	Restricted Use Area
Forbidden	Angling, spear fishing, anchoring, professional fishing	Spear fishing, anchoring
Regulated	Recreational diving*, scientific research*	Scientific research*, angling
Allowed	Professional fishing (only traditional gears), swimming, boating	Professional fishing (only traditional gears), recreational diving, swimming, boating

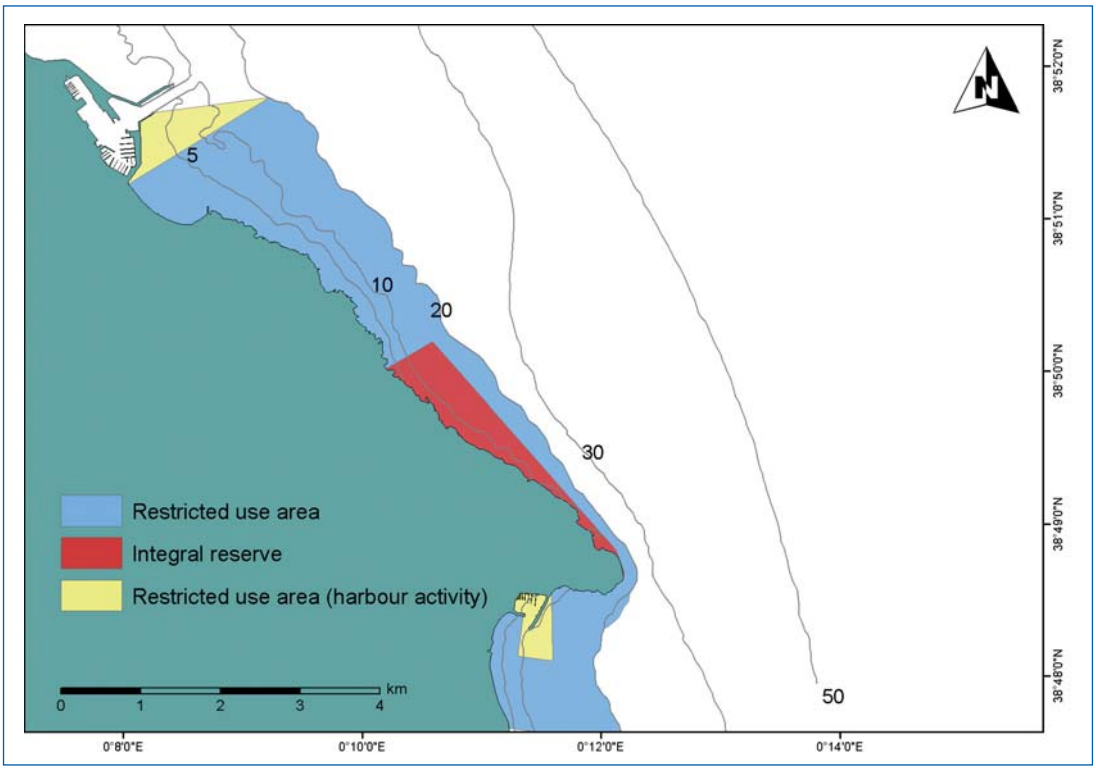
* Activities permitted under permission

Description of the fisheries in and around the MPA

The marine reserve was created around San Antonio cape to protect the natural resources and achieve a sustainable fishery, allowing local artisanal fishermen to preserve their way of life.

Within the reserve most fishing activities are forbidden, with the exception of small-scale fishing gears (trammel net and longline). A very productive fishery has developed close to the MPA. The abundance of the catches of species like *Mullus surmuletus, Pagrus pagrus, Dentex dentex*, etc. produce sustained incomes with time, compatible with the ecosystem protection. Artisanal fishing is mainly located around the southern area of San Antonio cape. The entire MPA is managed by the regional government of Valencia.

Area	Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside IR	-	-	-	-	-
Inside RU and Outside.	Trammel net (*trasmallos finos*)	Mar-Aug	*Mullus surmuletus, Scorpaena scrofa, Scorpaena porcus, Dentex dentex, Sepia officinalis*		15
	Trammel net (*trasmallos claros*)	May-Sept	*Palinurus elephas, Dentex dentex, Scorpaena scrofa, Phycis phycis, Pagellus erythrinus*		
	Gill net	Oct-Jan	*Sepia officinalis, Sparus aurata, Diplodus sargus*		
	Surface long-line	June-Sept	*Xiphias gladius, Thunnus thynnus,* sharks...		2
	Bottom long-line	Sept-April	*Pagrus pagrus, Diplodus sargus, Sciaena umbra, Dentex dentex*		
Outside	Trawling	All seasons	*Mullus surmuletus, Merluccius merluccius, Octopus vulgaris, Aristeus antennatus*		26
	Pure seine	depending on the species	*Sardina pilchardus, Engraulis encrasicolus, Seriola dumerili,* Scombridae, *Aphia minuta, Atherina* spp.		8



Statistics

Landings of the most important species (by weight) from the region for 2004*

	Weight (tons)
Total landings (all species)	7097.2
Species 1	Not available
Species 2	Not available
Species 3	Not available

* Landings data of fish market

Fishing regulations

Foundation Text : Order 9th of November 1993 by the Regional Council of the Generalitat Valenciana.
Order 9th of November 212/1993, Order 8th of November 180/2002, Order 10th of June 110/ 2005.
DOGV nº 2145, DOGV 4374, DOGV 5027.
Law 3/2001, of the 26th of March, of Fishing activities of the Spanish State.
Law 9/1998, of the 15th of December, of Fishing activities of the Generalitat Valenciana (BOE nº 18, January 1999).

Database reference

http://www.mapa.es/rmarinas/index_rirm.htm

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Publications

Cano F., 2001. *Informe San Antonio 2001*. Generalitat Valenciana, Conselleria de Territori i Habitatge.

Cano F., 2003. *Informe San Antonio periodo 2002-2003*. Generalitat Valenciana, Conselleria de Territori i Habitatge.

Cano F., 2005. *Informe San Antonio periodo 2003-2005*. Generalitat Valenciana, Conselleria de Territori i Habitatge.

MPA: Serra Gelada - Benidorm islets

Contributors: Celia Ojeda-Martínez, Carlos Valle, Aitor Forcada-Almarcha, José Luis Sánchez-Lizaso, Francisca Giménez-Casalduero & Just Bayle.
Unidad de Biología Marina, Departamento de Ciencias del Mar y Biología Aplicada, Universidad de Alicante, Spain.

Location:	38°48'N 00°11'E
Country:	Spain
Coastal/Island:	Coastal including inlets and small isles
Total size:	4,920 ha
Integral size:	-
Year of establishment:	2005
Depth range:	0 – 50 m
Protection objectives:	Protection of biodiversity
Type of MPA:	Multiple uses
Habitats:	*Posidonia oceanica* beds, rocky reefs and maërl
Socio-economic activities:	Diving, tourism and fishing

Activities	Area of special protection	Compatible activity zone	Area of special use
Forbidden	Recreational fishing	Recreational fishing (spear fishing)	
Regulated	Recreational diving, scientific research, professional fishing, anchoring	Professional fishing, anchoring	
Allowed	Swimming, boating	Recreational fishing (angling), recreational diving, swimming, boating, scientific research	Only fish farm activities

Description of the fisheries in and around the MPA

In Serra Gelada, trammel net, gill net and longlines are used widely around the MPA. Nowadays no regulation exists on these activities although some rules exist about in the management plan. Recreational fishing including angling, spear fishing and shellfish collecting is also uncontrolled. There is a Special Use Area where only fish farm activities are allowed. All the MPA is managed by the regional government of Valencia.

Area	Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside IR	-	-	-	-	-
Inside RU	Trammel net (*trasmallos finos*)	Mar-Aug	*Mullus surmuletus, Scorpaena scrofa, Scorpaena porcus, Dentex dentex, Sepia officinalis*		12
	Trammel net (*trasmallos claros*)	May-Sept	*Palinurus elephas, Dentex dentex, Scorpaena scrofa, Phycis phycis, Pagellus erythrinus*		
	Gill net	Oct-Jan	*Sepia officinalis, Sparus aurata, Diplodus sargus*		
	Surface long-line	June-Sept	*Xiphias gladius, Thunnus thynnus,* sharks...		2
	Bottom long-line	Sept-April	*Pagrus pagrus, Diplodus sargus, Sciaena umbra, Dentex dentex*		
Outside	Trawling	All seasons	*Mullus surmuletus, Merluccius merluccius, Octopus vulgaris, Aristeus antennatus*		26
	Pure seine	depending on the species	*Sardina pilchardus, Engraulis encrasicolus, Seriola dumerili,* Scombridae, *Aphia minuta, Atherina* spp.		8

Statistics

Landings of the most important species (by weight) from the region for 2004*

	Weight (tons)
Total landings (all species)	3451.4
Species 1	Not available
Species 2	Not available
Species 3	Not available

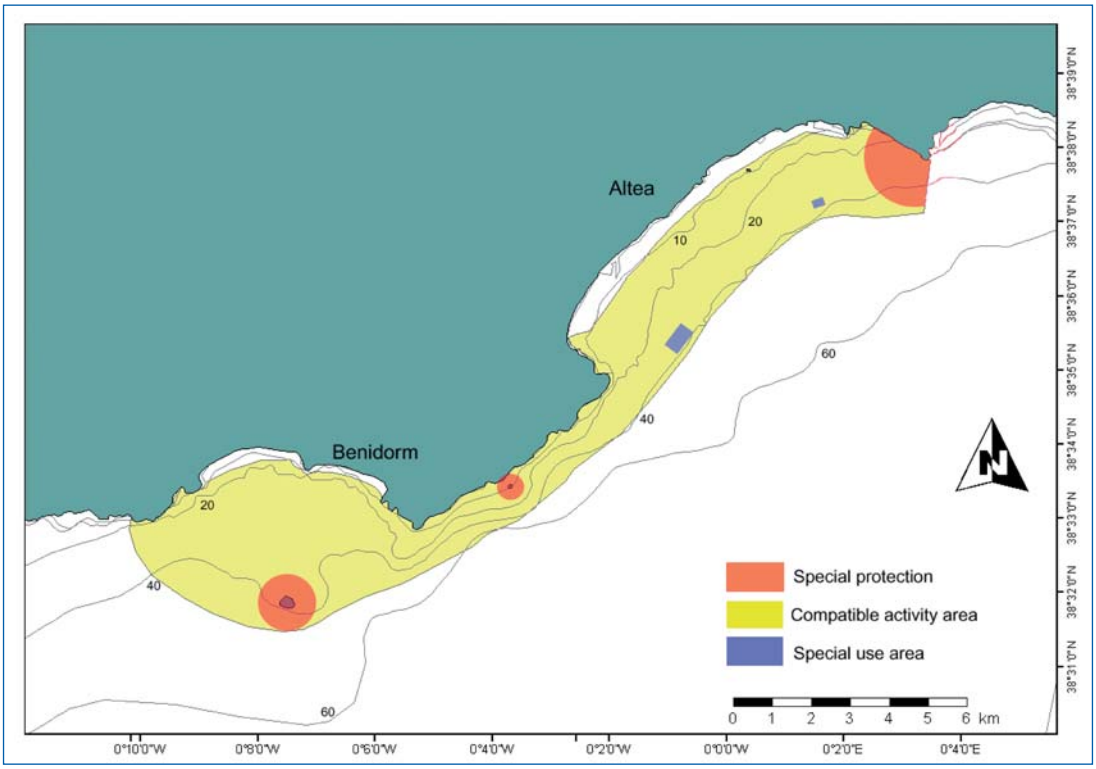
* Landings data of fish market

Fishing Regulations

Foundation Text: Order 29th of July 2005 by the Regional Government 129/2005. (DOGV 5062).
Law 3/2001, of the 26th of March, of Fishing activities of the Spanish State.
Law 9/1998, of the 15th of December, of Fishing activities of the Generalitat Valenciana (BOE nº 18, January 1999).

Database reference

Not available



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Mediterraneo Servicios Marinos S.L., 1997. *Estudios previos realizados al establecimiento del LIC de Benidorm*. Generalitat Valenciana, Conselleria de Territori i Habitatge.

Sánchez Jerez P., Bayle Sempere J.T., Arechavala P., Luna B., Ojeda-Martínez C., Vázquez Luis M., Valle Pérez C., Forcada A. & Fernández Jover D., 2007. *Evaluación de la biodiversidad de peces marinos e impacto de la pesca deportiva en el parc natural de Serra Gelada*. Informe Técnico Universidad Alicante – Conselleria de Medio Ambiente, Agua, Urbanismo y Vivienda (Generalitat Valenciana). 175 pp.

MPA: Columbretes Islands

Contributors: Raquel Goñi & Ben Stobart.
Instituto Español de Oceanografía (COB-IEO), Muelle de Poniente s/n, 07015 Palma de Mallorca, Spain.

Location:	39º 50'N 00º 37'E
Country:	Spain
Coastal/Island:	Mid continental shelf
Total size:	4,400 ha
No-take area (IR + RU):	1,883 ha
Year of establishment:	1990
Depth range:	0 - 80 m
Protection objectives:	Fisheries enhancement
Type of MPA:	No take
Habitats:	Rocky outcrops, coralligenous communities, maërl beds, *Cymodocea nodosa* beds
Socio-economic activities:	Diving, snorkelling, sailing, very limited professional and recreational fishing

Activities	Integral Reserve (IR)	Restricted use (RU)	Rest of Marine Reserve
Forbidden	Fishing, spear fishing, angling, anchoring, scuba diving, swimming	Fishing, spear fishing, angling, anchoring	Spear fishing, scuba diving, anchoring
Regulated		Scuba diving	Fishing, angling
Allowed	Scientific research, boating	Scientific research, boating, swimming	Scientific research, boating, swimming

Description of the fisheries in and around the MPA

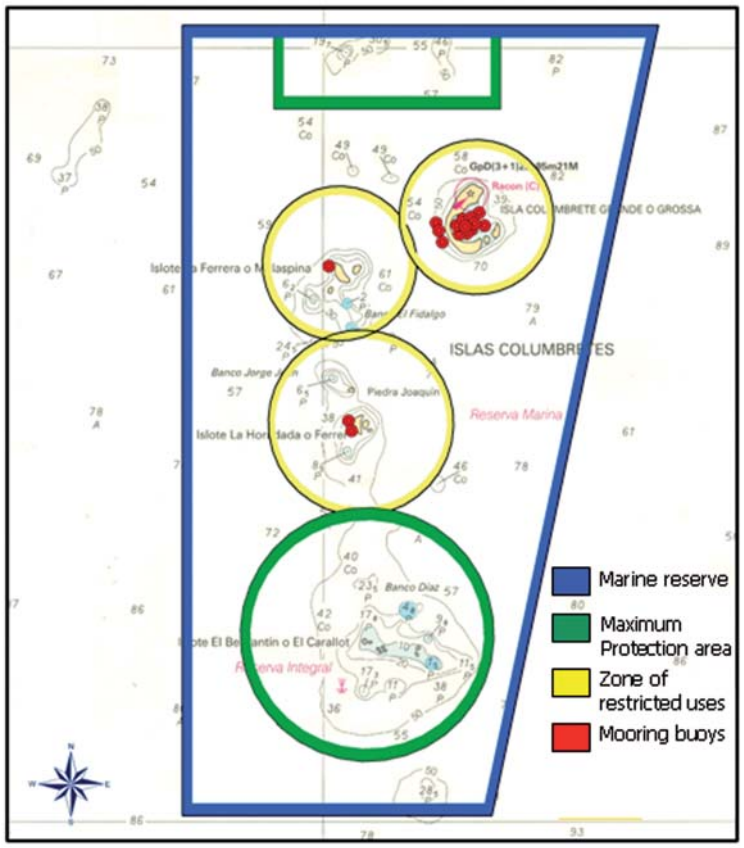
The Columbretes Island marine reserve was created for the enhancement of fisheries resources.

The no-take area of the reserve includes: a) integral reserve (IR) with two zones, around the Columbretes Grande and the Bergantin islands covering an area of 957.9 ha, and b) three areas of restricted use (RU) where, in addition to scientific research, restricted scuba diving is allowed. In the rest of the reserve, some professional and recreational fishing is allowed: listed boats can fish with purse-seine, troll-line, squid-jig or hand-line. In practice, almost no commercial fisheries take place in the reserve as it is far from the coast and the fisheries allowed are not of sufficient interest. The recreational fisheries have been greatly reduced after the recent prohibition of anchoring in shallow habitats (IR, RU).

Mainly two commercial fisheries operate on the grounds surrounding the reserve: a) Year-round bottom trawling targeting a mix of species like hake, squids, octopus, mullets and anglerfish and b) seasonal (March-August) trammel netting targeting the spiny lobster (*Palinurus elephas*). Both fisheries operate intensively along the boundary of the reserve.

The protection of this reserve is regulated by the General Secretariat for Maritime Fisheries, Ministry of Agriculture and Fisheries.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR, RU	none	-	-	-	-
	Rest of reserve	Purse seine		*Sardina pilchardus*	-	negligible
		Angling	Mainly summer	*Serranus* spp., *Scorpaena scrofa*	*Spondyliosoma cantharus*, *Phycis phycis*	
		Troll line	Mainly summer	*Serranus* spp., *Scorpaena scrofa*	*Spondyliosoma cantharus*, *Phycis phycis*	negligible
		Squid jig		Squid		negligible
		Hand line	Mainly summer			negligible
Outside (main fisheries only)		Trawling	All seasons	Mix species: *Merluccius merluccius*, *Octopus* spp., *Mullus* spp., *Lophius* spp.	Many	5-10
		Trammel net	Mar-Aug	*Palinurus elephas*	*Scorpaena scrofa*, *Lophius* spp., *Raja* spp., *Phycis phycis*	2-4



Statistics

Landings of the most important species (by weight) from the region for 2004
Not available

Fishing regulations

B.O.E. nº 97, 23rd April 1990
(http://www.mapa.es/rmarinas/lasreservas/columbretes/legislacion/orden_19_4/text.htm)

Database reference

http://www.mapa.es/rmarinas/index_rm.htm

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Publications

Reñones O., Quetglas A. & Goñi R., 2001. Effects of fishing restrictions on the abundance, size structure and mortality rate of a western Mediterranean population of *Scorpaena scrofa* (Linnaeus, 1758*). Rapp. Comm. Int. Mer Médit*. 36: 316.

Goñi R., Quetglas A. & Reñones O., 2003. Biologia, ecología, pesquerías y efecto reserva de la langosta roja, *Palinurus elephas*, Fabricius 1787, de Columbretes y Baleares (Mediterráneo Occidental). IEO-COB Report/LANGOSTA/03-1, 107pp.

Goñi R., Quetglas A. & Reñones O., 2003. Differential catchability of male and female European spiny lobster *Palinurus elephas* (Fabricius, 1787) in traps and trammel-nets. *Fisheries Research 65*: 295-307.

Quetglas A., Gaamour, Reñones O., Missaoui H., Zarrouk T., Elabed A. & Goñi R., 2004. Spiny lobster (*Palinurus elephas* Fabricius 1787) fishery in the western Mediterranean: A comparison of Spanish and Tunisian fisheries. *Boletín Sociedad Historia Natural Islas Baleares* 47: 63-80.

Goñi R., Quetglas A. & Reñones O., 2006. Spillover of lobster *Palinurus elephas* (Fabricius 1787) from a Western Mediterranean marine reserve. *Marine Ecology Progress Series* 308: 207-219.

Anti-trawling zones (SE Spain)

Contributors: Celia Ojeda-Martínez, Carlos Valle, Aitor Forcada-Almarcha, José Luis Sánchez-Lizaso, Francisca Giménez-Casalduero & Just Bayle.
Unidad de Biología Marina, Departamento de Ciencias del Mar y Biología Aplicada, Universidad de Alicante, Spain.

Location:	38°25'N 00°21'E
Country:	Spain
Coastal/Island:	Coastal
Total size:	20 – 800 ha
Integral size:	-
Year of establishment:	1989, 1996
Depth range:	0 – 28 m
Protection objectives:	Fisheries enhancement, protection of sea grasses
Type of MPA:	Artificial Reef
Habitats:	*Posidonia oceanica* beds and maërl
Socio-economic activities:	Diving, tourism and fishing

Activities	Anti-trawling zones
Forbidden	Trawling
Regulated	
Allowed	Professional fishing, recreational fishing, recreational diving, swimming, boating, scientific research

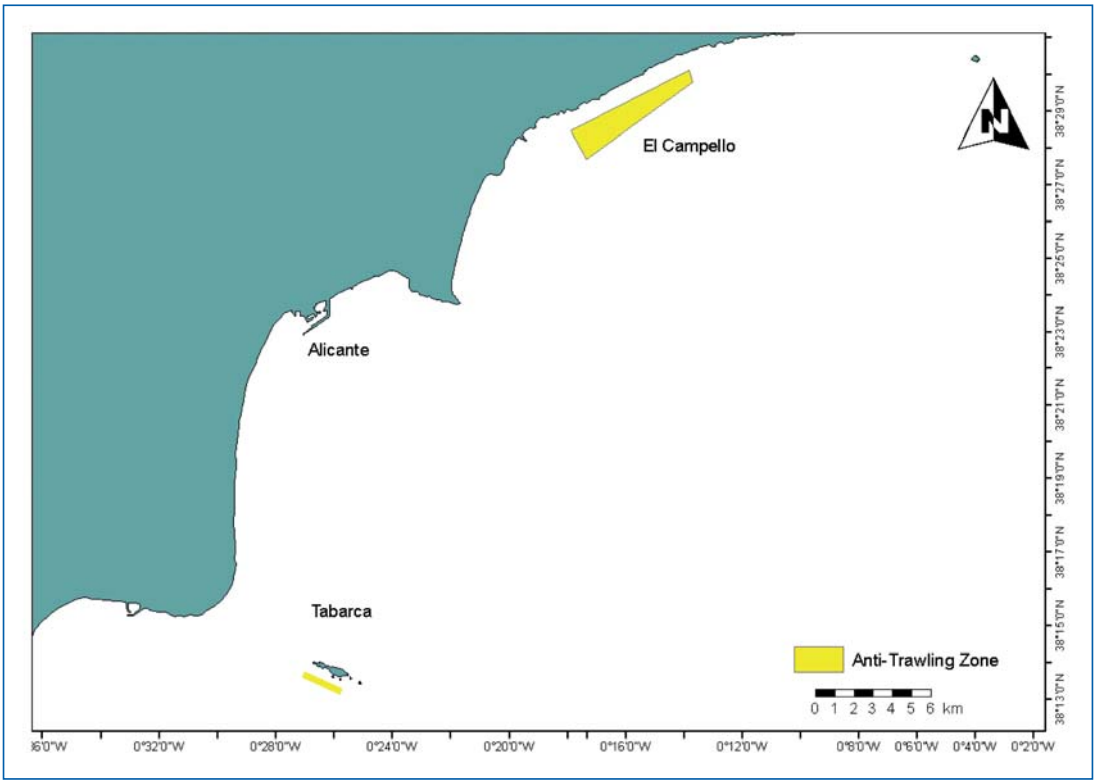
Description of the fisheries in and around the MPA

The anti-trawling reefs were established mainly to protect the *Posidonia oceanica* meadows.

Within the anti-trawling reefs, fishing activities are not regulated. The fleet works in the fishing-grounds close to the artificial reefs, using trammel nets for mullets (mesh size <40 mm) and cuttlefish (mesh size 40 - 60 mm). There is evidence that their captures have increased around some artificial reefs (e.g.: El Campello) due to an increase of stocks favoured by the ban of trawling.

Many of the anti-trawling reefs are managed by the regional government.

Area	Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside/outside	Trammel net (*trasmallos finos)*	Mar-Aug	*Mullus surmuletus, Scorpaena scrofa, Scorpaena porcus, Dentex dentex, Sepia officinalis*		25
	Trammel net (*trasmallos claros*)	May-Sept	*Palinurus elephas, Dentex dentex, Scorpaena scrofa, Phycis phycis, Pagellus erythrinus*		
	Gill net	Oct-Jan	*Sepia officinalis, Sparus aurata, Diplodus sargus*		
	Bottom long-line	Sept-April	*Pagrus pagrus, Diplodus sargus, Sciaena umbra, Dentex dentex*		
Outside	Trawling	All seasons	*Mullus surmuletus, Merluccius merluccius, Octopus vulgaris, Aristeus antennatus*		60
	Pure seine	depending on the species	*Sardina pilchardus, Engraulis encrasicolus, Seriola dumerili,* Scombridae, *Aphia minuta, Atherina* spp.		10



Statistics

Landings of the most important species (by weight) from the region for 2004
Not available

Fishing regulations

Law 3/2001, of the 26th of March, of Fishing activities of the Spanish state.
Law 9/1998, of the 15th of December, of Fishing activities of the Generalitat Valenciana (BOE nº 18, January 1999).

Database reference

Not available

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Publications

Mediterraneo Servicios Marinos S.L., 1991. *Informe Arrecife Artificial Tabarca Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1992. *Informe Arrecife Artificial Calpe Fase I*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1992. *Informe Arrecife Artificial Benidorm Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1992. *Informe Arrecife Artificial Calpe Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1992. *Informe Arrecife Artificial Tabarca Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1992. *Informe Arrecife Artificial Santa Pola*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1993. *Informe Arrecife Artificial Tabarca Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1993. *Informe Arrecife Artificial Calpe Fase II*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1993. *Informe Arrecife Artificial Benidorm Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1993. *Informe Arrecife Artificial Calpe Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1993. *Informe Arrecife Artificial Torrevieja Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1994. *Informe Arrecife Artificial Calpe Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1994. *Informe final (1991 a 1994) Arrecife Artificial Benidorm Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1994. *Informe Arrecife Artificial Tabarca Fase II*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1994. *Informe Arrecife Artificial Torrevieja.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1994. *Informe Arrecife Artificial Torrevieja Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1994. *Informe Arrecife Artificial Torrevieja Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Sánchez-Jerez P., 1994. *Degradación de las praderas de* Posidonia oceanica *(L.) Delile por la pesca de arrastre en El Campello (SE ibérico): influencia sobre la estructura de la comunidad animal asociada*. Tesis de Licenciatura. Universidad de Alicante. 123 pp.

Mediterraneo Servicios Marinos S.L., 1995. *Informe final (1992 – 1995) Arrecife Artificial Torrevieja Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1995. *Informe Arrecife Artificial Torrevieja Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1995. *Informe final (1992 a 1994). Arrecife Artificial Calpe Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1995. *Informe final (1992 a 1995). Arrecife Artificial Calpe Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1995. *Informe Arrecife Artificial Tabarca Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Martínez Hernández J.M., 1996. *La pesca artesanal de El Campello (Alicante, SE ibérico): Caracterización y Elementos para una ordenación*. Tesis doctoral. Facultad de Ciencias. Departamento de Ecología. Universidad de Alicante. 243 pp.

Mediterraneo Servicios Marinos S.L., 1996. *Informe final Arrecife Artificial Tabarca Fase II*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1996. *Informe final (1993 – 1996) Arrecife Artificial Torrevieja Fase II*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 1998. *Informe Arrecife Artificial Benidorm Fases II y III.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2000. *Informe Arrecife Artificial Torrevieja Fase III.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2000. *Informe Arrecife Artificial Benidorm Fases II y III*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2000. *Informe Arrecife Artificial Villajoyosa Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2001. *Informe Arrecife Artificial Villajoyosa Fase I.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2001. *Informe Arrecife Artificial Villajoyosa Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2001. *Informe Arrecife Artificial Torrevieja Fase III*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2001. *Informe final (1991–2001) Arrecife Artificial Altea*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2001. *Informe Arrecife Artificial Altea Fase II.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2001. *Informe Arrecife Artificial Guardamar.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2002. *Informe Arrecife Artificial Guardamar*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2002. *Informe final Arrecife Artificial Villajoyosa Fase II*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2002. *Informe Arrecife Artificial Torrevieja Fase III*. Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

Mediterraneo Servicios Marinos S.L., 2004. *Informe Arrecife Artificial Torrevieja Fase III.* Generalitat Valenciana. Servicio de Pesca de la Conselleria de Agricultura, Pesca y Alimentación.

MPA: Medes Islands

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Location:	42º02'55"N 03º13'30"E (center of Meda Gran Island)
Country:	Spain
Coastal/Island:	Island (inshore)
Total size:	511 ha
Integral size:	93 ha
Year of establishment:	1983
Depth range:	20 – 60 m
Protection objectives:	Conservation
Type of MPA:	No take/ partial
Habitats:	Rocky reefs, *Posidonia oceanica* beds, caves
Socio-economic activities:	Tourism, diving

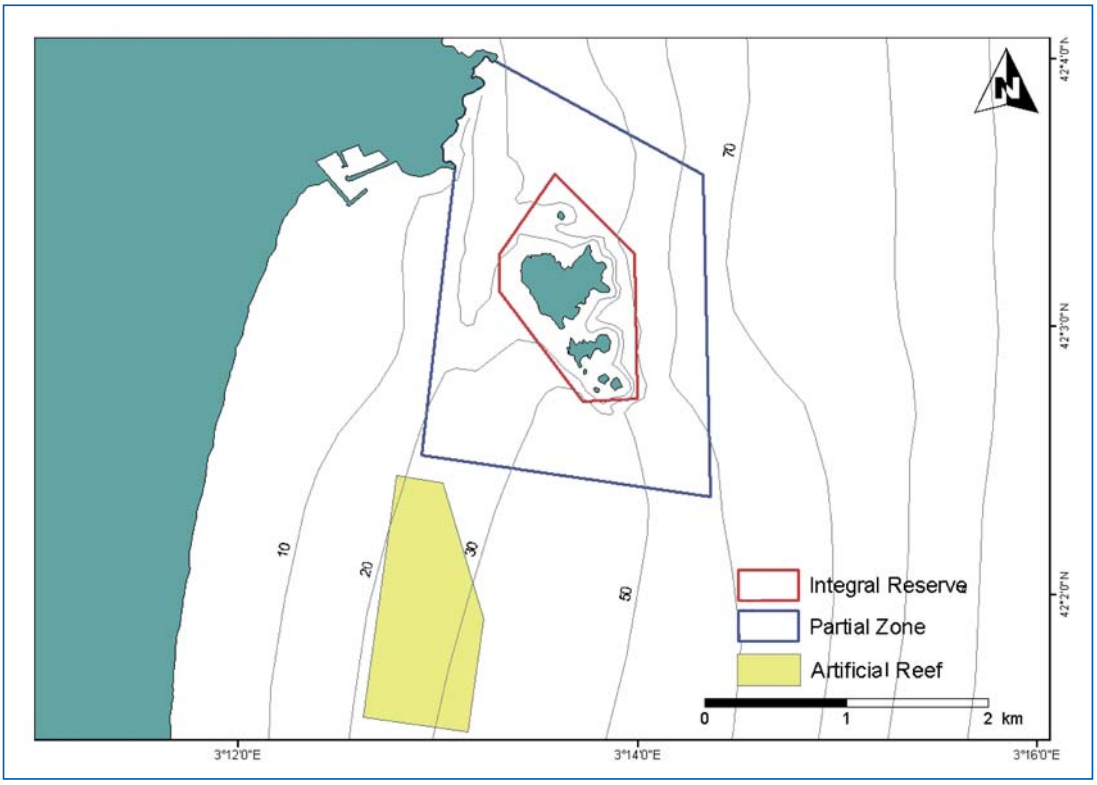
Activities	Integral Reserve (IR)	Restricted Use Area (RU)
Forbidden	All extractive activities (commercial fishing, angling, spear fishing)	Spear fishing, trawling
Regulated	Scuba diving, swimming, anchoring, scientific research	Artisanal fishing
Allowed	Boating (navigation)	Scuba diving, recreational fishing, boating, anchoring

Description of the fisheries in and around the MPA

The primary purpose of Medes Marine Reserve is conservation, scientific research and ecotourism. At present the MPA is managed by the Environment Department of the Autonomous Government of Catalonia.

Within the integral reserve all fishing activities are forbidden. Professional artisanal fishing is allowed for licensed boats inside the Restricted Use area. Only the fishing boats with base in L'Estartit, a small village very close to the MPA, can go fishing into the nearby area of Medes Islands. Although the artisanal fleet of this port consists of 30 vessels, only a small number, 4 to 6, go fishing regularly all year round. The boats are small and operate close to the base port of L'Estartit. Most fishing activity concentrates in an area of around 4 km from the MPA border, mainly within 2 km from the MPA border. Fishing is allowed 5 days a week. Fishing activity is low by the end of autumn and winter because of weather conditions.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR					
	RU	gillnet	All seasons, main season: winter	*Pagellus erythrinus*		4
		trammel net	May-Oct	*Palinurus elephas*		4
		trammel net	June-Aug	*Mullus surmuletus*		4
		Traps		*Octopus vulgaris*		1
Outside		gillnet	All seasons, main season: winter	*Pagellus erythrinus*		4
		trammel net	May-Oct	*Palinurus elephas*		4
		trammel net	June-Aug	*Mullus surmuletus*		4
		traps		*Octopus vulgaris*		1
		gillnet	All seasons, main season: April to Oct	*Merluccius merluccius*		3-4
		trammel net	Jan-April	*Sepia officinalis*		3-4
		trammel net	Dec-Feb	*Solea vulgaris, Psetta maxima*		3-4
		trammel net	All seasons	*Dicentrarchus labrax*		3-4
		longline	All seasons, main season: Mar-Sept	*Sparus aurata*		1
		hand line	July-Mar	*Loligo vulgaris*		1



Statistics

Landings of the most important species (by weight) from the region for 2004*

	Weight (tons)
Total landings (all species)	9.76
Merluccius merluccius	2.32
Sparus aurata	1.85
Mullus surmuletus	0.92

* no official landings records available; data below are an estimate from the sampling on board conducted during 2004

Fishing regulations

1983: DOGC 391, 21.12.1983, Departament d'Agricultura, Ramaderia i Pesca de la Generalitat de Catalunya. First protection measure implemented: prohibition of fishing and of the extraction of living marine resources around Medes Islands.

1990: DOGC 1381, 17.12 1990, Llei 19/1990 del Parlament de Catalunya de conservació de la flora i la fauna del fons marí de les Illes Medes. Act 19/1990 of the Parliament of Catalonia for the conservation of the underwater marine flora and fauna of the Medes Islands reads: "*The aim of this Act is to establish specific laws and regulations on the conservation of the flora and fauna of the marine environment of the Medes Islands and their surroundings so as to avoid the destruction, deterioration or alteration of the natural habitat*" (Art.1).

Decret 215/1999, 27.07.1999, pel qual s'aproven les normes generals del Pla per a la conservació de les àrees protegides de les Illes Medes per al període 1999-2002. Departament de Medi Ambient de la Generalitat de Catalunya (definition of regulations, uses and conservation measures).

Decret 59/2003, 20.02.2003, prorrogava la vigència de les normes generals del Pla per a la conservació de les àrees protegides de les Illes Medes a l'any 2003 (extension to 2003 of the regulations in force).

Decret 234/2004, 16.03.2004, pel qual es prorroga la vigència de les normes generals del Pla per a la conservació de les àrees protegides de les Illes Medes. Departament de Medi Ambient i Habitatge de la Generalitat de Catalunya (update and extension of the regulations in force previously defined).

Database reference

http://mediambient.gencat.net/eng//el_medi/parcs_de_catalunya/medes/inici.jsp

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Publications

Lleonart J., 1990. La Pesquería de Cataluña y Valencia: descripción global y planteamiento de bases para su seguimiento. EC DG XIV Contract Reference 1989/3, 1634 pp. (Available at the library of the CSIC-Institut de Ciències del Mar, Barcelona).

García-Rubies A. & Zabala M., 1990. Effects of total fishing prohibition on the rocky fish assemblages of Medes Islands marine reserve (NW Mediterranean). *Scientia Marina* 54: 317- 328.

García-Rubies A., Zabala M. & Hereu B., 2003. Seguiment de la població de meros (*Epinephelus marginatus*) i d'altres espècies vulnerables de Les Illes Medes i la costa veïna parcialment protegida (1991-2003). In: *Seguiment Temporal de l'Àrea Marina Protegida de Les Illes Medes. Informe Anual, any 2003*. Edited by Generalitat de Catalunya, Departament de Medi Ambient: 3-55.

Stenzenmüller V., Maynou F. & Martín P., 2007. Spatial assessment of benefits of a coastal Mediterranean Marine Protected Area. *Biological Conservation* 136: 571-583.

MPA: Cerbère-Banyuls

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Location:	42º 29'N 03º 09'E
Country:	France
Coastal/Island:	Coastal
Total size:	650 ha
Integral size:	65 ha
Year of establishment:	1974
Depth range:	0 – 60 m
Protection objectives:	Conservation
Type of MPA:	Partial
Habitats:	Rocky reef, coralligenous
Socio-economic activities:	Recreational fishing, tourism, scuba diving

Activities	Integral Reserve (IR)	Buffer Zone
Forbidden	Professional fishing, scuba diving, angling, spear fishing, anchoring	Spear fishing
Regulated	Cruising	Fishing, angling, anchoring, cruising
Allowed	Swimming	Swimming, scuba diving

Description of the fisheries in and around the MPA

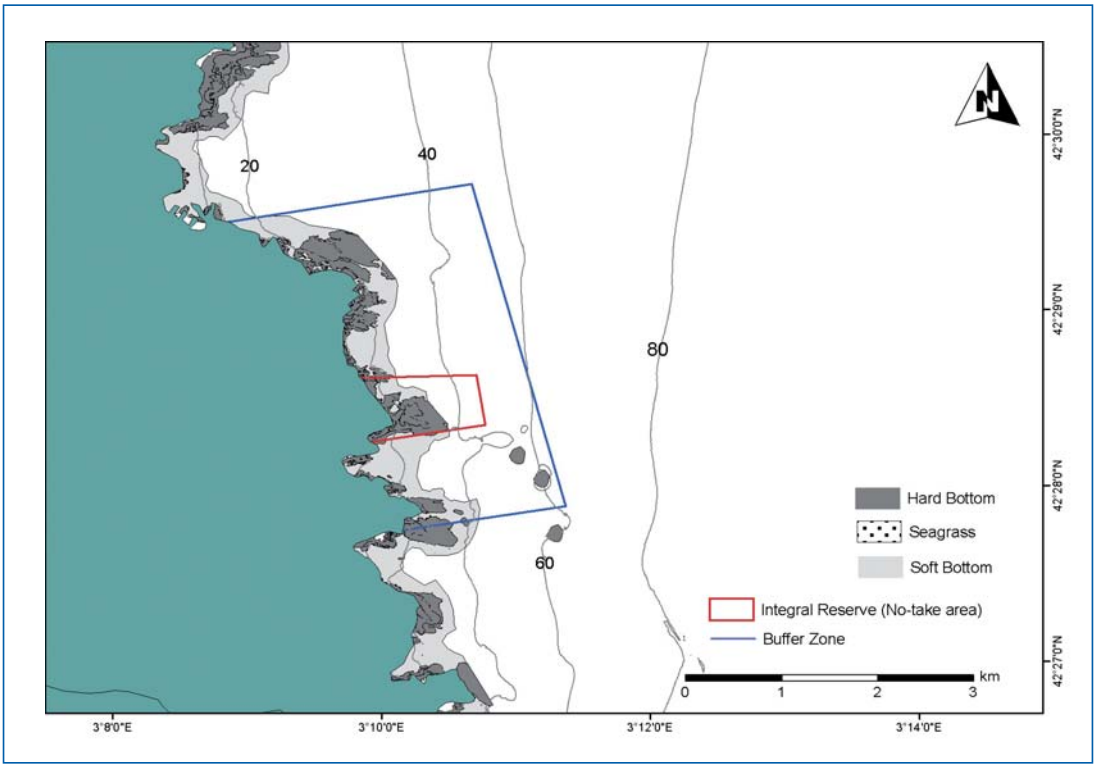
The marine reserve was created in 1974 in order to slow down the unreasoned exploitation of the sea, involved in a significant degradation of fauna and marine flora. At this period, the two principal causes were the trawlers working near the coasts and destroying the spawning grounds as well as the animal and fixed flora species, and tourism which, while constituting a considerable share of the local incomes, had led to an anarchistic development of fishing and pleasure sailing, underwater fishing and scuba diving.

With these disturbances, it is advisable to add pollution: domestic pollution in an area which was deprived of any means of purification of the used water directly rejected at sea; chemical pollution related to the development of the agricultural treatments; use of toxic paintings anti-stains on the boats hulls ; rejection at sea of hydrocarbons by the pleasure boats or professionals.

To achieve a sustainable fishery allowing local artisanal fishermen and to restore environment, the MPA was divided, in 1977, in two parts: integral reserve, in which all fishing activities are forbidden; and partial reserve, in which artisanal fishery is regulated.

Artisanal fleet, 6 fishermen on 4 vessels, is completely traditional and original. This fishery gathers all the units not practising professionally trawling or fishing with the seine of the pelagic resources. These boats, using a whole range of fixed or mobile gear, have varied characteristics: from a few meters without motorization, to largest boats. These small "metiers" can be schematically identified according to the zone of activity: littoral fisheries, gathering modest units operating at sea, inside the 3 miles area. This fishery is seasonally marked with fluctuations between the winter and the summer.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR	None	-	-	-	-
	RU	Gillnet	All seasons	*Merluccius merluccius*	*Merluccius merluccius*, *Pagellus acarne*, *Mullus barbatus*, *Triglidae*	4
		Gillnet	Spring-Summer	*Sparus aurata*, *Pagellus erythrinus*, *Diplodus* sp., *Dicentrarchus labrax*	*Sparus aurata*, *Pagellus erythrinus*	3
		Combined gillnet-trammel net	Spring-Summer	*Sarda sarda*, *Lichia amia*, *Seriola dumerili*	*Sarda sarda*, *Auxis rochei*	2
		Trammel net	Spring-Summer	*Palinurus elephas*, *Homarus gammarus*	*Palinurus elephas*, *Scorpaena scrofa*, *Uranoscopus scaber*, *Lophius piscatorius*	4
		Trammel net	Spring-Summer	*Mullus* sp.	*Mullus* sp., *Scorpaena* sp., *Sepia officinalis*	3
		Long-lines	Spring-Summer	*Conger conger*	*Conger conger*, *Dicentrarchus labrax*, *Diplodus* sp.	1
Outside		Gillnet	All seasons	*Merluccius merluccius*	*Merluccius merluccius*, *Pagellus acarne*, *Mullus barbatus*, *Triglidae*	4
		Gillnet	Spring-Summer	*Sparus aurata*, *Pagellus erythrinus*, *Diplodus* sp., *Dicentrarchus labrax*	*Sparus aurata*, *Pagellus erythrinus*	3
		Combined gillnet-trammel net	Spring-Summer	*Sarda sarda*, *Lichia amia*, *Seriola dumerili*	*Sarda sarda*, *Auxis rochei*	2
		Trammel net	Spring-Summer	*Palinurus elephas*, *Homarus gammarus*	*Palinurus elephas*, *Scorpaena scrofa*, *Uranoscopus scaber*, *Lophius piscatorius*	4
		Trammel net	Spring-Summer	*Mullus* sp.	*Mullus* sp., *Scorpaena* sp., *Sepia officinalis*	3
		Long-lines	Spring-Summer	*Conger conger*	*Conger conger*, *Dicentrarchus labrax*, *Diplodus* sp.	1



Statistics

Landings of the most important species (by weight) from the region for 2003*

	Weight (tons)
Total landings	7,564
Sardina pilchardus	2,849
Engraulis encrasicolus	1,696
Merluccius merluccius	510

* Landings data from Port-Vendres

Fisheries Regulations

Arrêté interministériel du 26 février 1974 portant création de la réserve de Cerbère - Banyuls.

Décret n° 90-790 du 6 septembre 1990. Portant création de la réserve naturelle marine de Cerbère- Banyuls (Pyrénées-Orientales).

Arrêté préfectorale n°674 du 14 Octobre 1994 régulant les activités de pêche commerciales sur la zone de la réserve naturelle marine de Cerbère- Banyuls (Pyrénées-Orientales).

Arrêté préfectorale n°673 du 14 Octobre 1994 régulant les activités de pêche récréatives sur la zone de la réserve naturelle marine de Cerbère- Banyuls (Pyrénées-Orientales).

Database reference

Not available

Web site for list of data relevant for Banyuls mpa:
http://biomex.univ-perp.fr/
http://www.cg66.fr/environnement/reserve_marine/index.html
http://www.airesmarines.org/reseau/membres.asp?id=8

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http://www.cg66.fr/environnement/reserve_marine/index.html

Publications

Galaup A. & Segurel M., 1996. *Pression qualitative et quantitative de la pêche plaisancière dans la réserve*. Rapport de stage.

Jouvenel J.Y., 1997. *Ichthyofaune de la côte rocheuse des Albères*. Thèse de doctorat. EPHE. 280 pp.

Benard I., 2000. *Etude des situations économique et écologique de la côte vermeille en vue de la creation d'un parc national*. Mémoire de stage.

EPHE, 2000. *Etude de « l'effet réserve » dans la réserve naturelle de Banyuls-Cerbère. Décembre 2000*. XIème CONTRAT de PLAN Etat-Région. Rapport EPHE.

Planes S., Galzin R., García Rubies A., Goñi R., Harmelin J.-G., Le Diréach L., Lenfant P. & Quetglas A., 2000. Effects of marine protected areas on recruitment processes with special reference to Mediterranean littoral ecosystems. *Environmental Conservation* 27: 126-143.

Planes S., Lenfant P., Romans P., Lecchini D., Jacquet S., Crec'hriou R., Sasal P., Duchêne J.C. & Licari M.L., 2000. *Etude de l'effet réserve dans la réserve naturelle de Banyuls Cerbère*. Rapport EPHE- Plan Etat - Région, 163 pp.

Criquet G., 2001. *La pêche professionnelle dans la région de Banyuls sur mer. Effort et productions*. Mémoire de DESS, Université de Corse. 43 pp.

EPHE, 2002. *Etude de l'impact de la réserve naturelle marine de Banyuls-Cerbère comme source d'exportation de poissons littoraux adultes vers des zones avoisinantes. Juin 2002*. Rapport EPHE.

Garcia-Charton J. & Planes S., 2002. *Etude de l'impact de la Réserve Naturelle Marine de Cerbère-Banyuls comme source d'exportation de poissons littoraux adultes vers les zones avoisinantes*. Rapport EPHE – Conseil Général des Pyrénées-Orientales, 43p.

Guillou A., Lespagnol P. & Ruchon F., 2002. *La pêche aux petits métiers en Languedoc-Roussillon en 2000-2001.* Rapport final de convention Région Languedoc-Roussillon-IFREMER n°00/1210041/YF, 108p + 6 annexes.

Planes S., Ody D. & Schrimm M., 2005. Project Progress Summary. BIOMEX. Year 2 progress report.

Planes S. Ody D. & Schrimm M., 2005. Project Progress Summary. BIOMEX. Year 2 progress report. Annexe book.

MPA: Côte Bleue (Carry-le-Rouet & Cap Couronne)

Contributors: Laurence Le Diréach.
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Location:	43º 19'N 05º 10'E
Country:	France
Coastal/Island:	Coastal inshore and offshore
Total size:	85 / 210 ha
Integral size:	85 / 210 ha
Year of establishment:	1983 / 1996
Depth range:	0 – 34 m / 13 – 50 m
Protection objectives:	Protection and restoration of naturals habitats and fisheries enhancement
Type of MPA:	No take
Habitats:	*Posidonia oceanica* beds, rocky reefs, sandy substrates
Socio-economic activities:	Tourism; around MPA: fishing, scuba diving and boating

Activities	Integral reserve
Forbidden	All types of fishing, professional fishing and recreational fishing including spear fishing, scuba diving, anchoring
Allowed	Swimming, snorkeling, cruising, boating

Description of the fisheries in and around the MPA

The Côte Bleue Marine Park was created with the following objectives: management, protection and restoration of natural habitats; maintaining professional fishing activities; information and public awareness; scientific studies and experimentation.

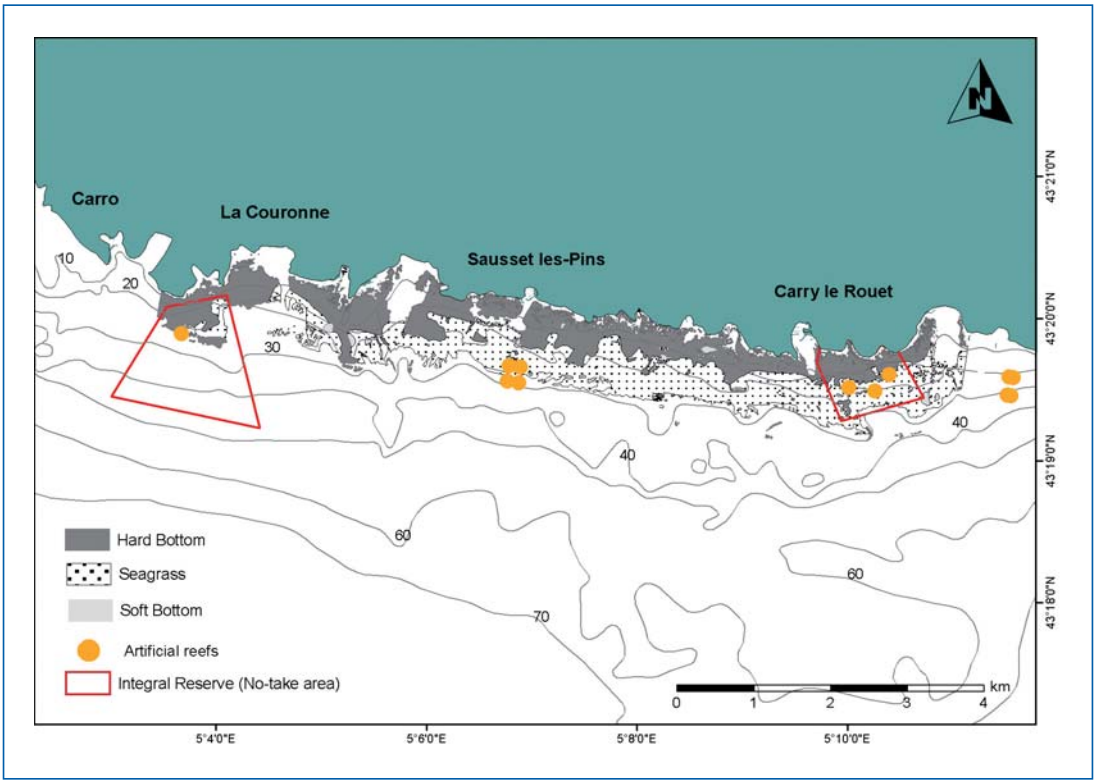
Within the reserve all fishing activities are forbidden and artificial production reefs have been installed to enhance the fisheries resources.

Outside the reserve, trawling is forbidden within the 3 nautical mile limit from the coast (general regulation). To fight against illegal trawling, protection reefs have been deployed in the Côte Bleue Marine Park. Forty to fifty boats, from 6 harbours, operate in the area of influence of the reserves. The fishing methods used are mainly traditional.

Area		Gear	Seasonality (months)	Target Species	Bycatch Species	No. of Vessels
Inside	IR	None	-	-	-	-
Outside		Trammel nets (different metiers use these nets)	All seasons	*Sparidae*, *Scorpaena scrofa*, *Labrus* spp., *Symphodus* spp., *Scorpaena* spp., *Coris julis*, *Seranus* spp., *Mullus* spp., *Solea* sp., *Sepia officinalis*, *Palinurus elephas*	*Octopus vulgaris*, *Sarpa salpa*, *Spicara maena*, *Boops boops*, *Sardinella aurita*, *Phycis phycis*, *Lophius piscatorius*, *Pagellus* spp.	30 All, except vessels using bottom long line and tuna netters
		Gill nets (different metiers use these nets)	Spring, summer and automn	*Merluccius* sp., *Mullus* spp., *Labrus* spp., *Symphodus* spp., *Scorpaena* spp., *Coris julis*, *Seranus* spp., *Sparidae*, *Dicentrarchus labrax*, *Scomber* sp., *Pagellus* spp., Triglidae	*Sarpa salpa*	30 All, except vessels using bottom long line and tuna netters
		Combined gillnet-trammel net	March to July and September to December (winter for *Dicentrarchus labrax*)	*Sparus aurata*, *Lithognathus mormyrus*, *Diplodus* spp., *Sarda sarda*, *Auxis* spp., *Dicentrarchus labrax*, *Pagellus* sp.	*Sarpa salpa*, *Sardinella aurita*	30 All, except vessels using bottom long line and tuna netters
		Bottom long line	All seasons	*Sparus aurata*, *Diplodus* sp., *Pagellus* sp., *Dicentrarchus labrax*, *Conger conger*	*Phycis phycis*, *Muraena helena*	Few number of vessels (one sure, probably a maximum of five)
		Tuna nets	Summer	*Thunnus thynnus*, *Xiphias gladius*, *Brama brama*	*Mola mola*	Few number of vessels (probably less than ten)

Statistics

Landings of the most important species (by weight) from the region for 2004
Not available



Fisheries Regulations

Arrêté Préfectoral n°6/83 portant création d'une zone interdite sur le littoral de la commune de Carry le Rouet et Arrêté n°08 du 17/01/83 portant interdiction de pêche, plongée et chasse sous-marine dans une zone située sur le littoral de la commune de Carry le Rouet-quartier des Affaires Maritimes de Marseille.

Arrêtés de concession de cultures marines n°164 du 23/12/94, n°17/CM-28 du 28/02/89 et n°292 du 31/12/85 pour la réserve de Carry le Rouet.

Arrêté Préfecture Maritime n°43/95 du 04/10/95 et n°7/98 du 03/0398 pour la réserve de Carry le Rouet.

Arrêté de concession de cultures marines n°17 du 14/05/96 portant autorisation d'exploitation de cultures marines pour la concession de la zone marine protégée et de récifs artificiels devant le Cap Couronne « dans un but expérimental de protection, de conservation et de régénération des fonds », « toute forme de pêche, le mouillage et le dragage sont interdits, la plongée y est également interdite ».

Arrêté ministériel de réserve-cantonnement de pêche du 12/02/98 (JO du 21/02/98) renouvelant les arrêtés du 27/04/95 et du 08/09/87 portant renouvellement et extension d'une réserve de pêche sur le littoral du département des Bouches du Rhône (communes de Carry le Rouet et de Martigues).

Arrêté préfectoral de concession du 15/12/03 (Concession d'Endigage et d'Utilisation des Dépendances du DPM de 10 000 ha) « …accordée au profit du Syndicat Mixte Parc Marin de la Côte Bleue pour l'implantation et la conservation de récifs artificiels… », « le Syndicat mixte du Parc Marin est autorisé à gérer 2 secteurs réglementés du domaine public maritime: un de 85 ha à Carry le Rouet, un de 210 ha au droit du Cap Couronne.

Arrêté du Ministère de l'agriculture, de l'alimentation, de la pêche et de la ruralité du 16/12/04 - portant renouvellement des réserves de pêche dans le département des Bouches-du-Rhône devant les communes de Carry-le-Rouet et de Martigues et y "interdisant la Pêche sous toutes ses formes".

Arrêté du Préfet Maritime n°048/2005 du 25/07/05 faisant suite aux arrêtés préfectoraux 7/98 du 03/03/98 pour la commune de Carry le Rouet et 3/97 du 21/02/97 pour la commune de Martigues– réglementant la plongée sous-marine, le mouillage des navires et embarcations à l'intérieur de deux zones protégées sur le littoral de la commune de Carry-le-Rouet et la communes de Martigues.

Database reference

Not available

Contact

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Publications

Jouvenel J.-Y. & Bachet F., 2002. *Programme de suivi des peuplements ichthyologiques de la réserve marine Richard Fouque du Cap Couronne. Rapport final bilan 1995 à 2001*. Aquafish Technology/Parc Marin de la Côte Bleue edit.

Bachet F., Daniel B. & Renaud A., 2003. Suivi de l'évolution du peuplement d'oursins comestibles (*Paracentrotus lividus*) dans le quartier de Martigues. 19ème note. Avril 1994-Août 2003. *C.R. Trav. scient. Parc Marin Côte Bleue 2003,* 3: 36-46.

MPA: Sinis - Maldiventre

Contributors: Ivan Guala[1], Giorgio Massaro[2], G. Andrea de Lucia[3], Giovanni De Falco[3] & Paolo Domenici[3].
[1]Fondazione IMC – International Marine Centre – Onlus, Localitá Sa Mardini, 09072 Torregrande (OR), Italy.
[2]Area Marina Protetta "Penisola del Sinis – Isola di Mal di Ventre", P.zza Eleonora, 09072 Cabras (OR), Italy.
[3]IAMC-CNR Istituto Ambiente Marino Costiero Sezione di Oristano, Loc. Sa Mardini, 09072 Torregrande (OR), Italy.

Location:	39°55'N 008°20'E
Country:	Italy
Coastal/Island:	Mixed
Total size:	25,673 ha
Integral size:	529 ha
Year of establishment:	1997
Depth range:	0 – 50 m
Protection objectives:	Environmental protection
Type of MPA:	No take/partial
Habitats:	*Posidonia oceanica* beds, rocky reefs, sandy/detritic bottoms
Socio-economic activities:	Tourism, diving, fishery

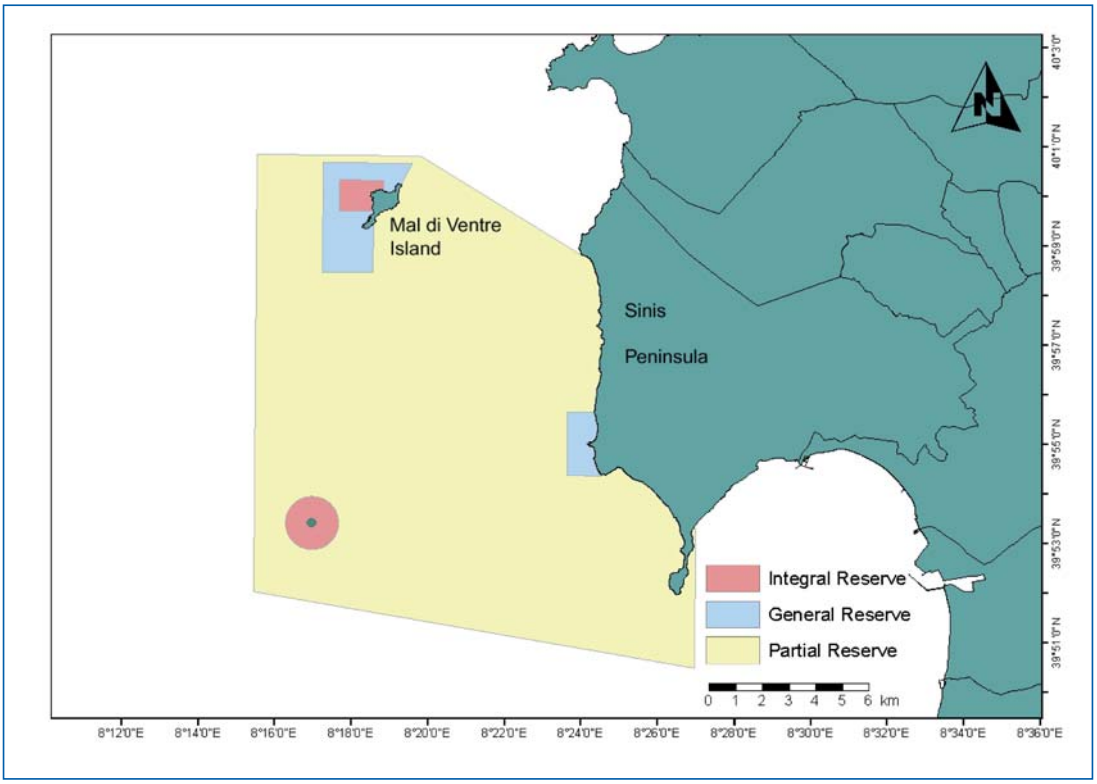
Activities	Integral Reserve (zone A)	General Reserve (zone B)	Partial Reserve (zone C)
Forbidden	Fishing, scuba diving, boating, swimming, angling	Spear fishing	Spear fishing
Regulated	Scientific survey	Scientific survey, boat anchoring, fishing, scuba diving, angling, boating	Scientific survey, fishing, scuba diving, angling
Allowed		Swimming	Swimming, boating, anchoring

Description of the fisheries in and around the MPA

The main aims of "Penisola del Sinis – Isola di Maldiventre" marine reserve are environmental protection, fisheries enhancement, environmental education, research and sustainable development.

All fishing activities are forbidden within the Integral Reserve (zone A); the General Reserve (zone B) and the Partial Reserve (zone C) have the same regime of restriction: trammel nets, pots and long-lines are allowed under the regulation of the MPA Management Board, trawling is forbidden and sea urchin (*Paracentrotus lividus)* fishery is restricted to skin diving. The fleet operating in the region is currently composed of 430 boats mainly partitioned in three marinas (Oristano, Marceddì and Su Pallosu); among the vessels potentially able to fish inside the MPA, more than 50% are small boats normally working in more sheltered areas outside the reserve (Gulf of Oristano and neighbouring lagoons).

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	A	-	-	-	-	-
	B	Gill and trammel nets	All seasons	*Mullus surmuletus, Scorpaena scrofa, Sepia officinalis*		225
		Pot	All seasons	*Octopus vulgaris*		
		Long lines	All seasons	Sparidae		
	C	Gill and trammel nets	All seasons	*Mullus surmuletus, Scorpaena scrofa, Sepia officinalis*		
		Pot	All seasons	*Octopus vulgaris*		
		Long lines	All seasons	Sparidae		
		Skin diving	Nov-April	*Paracentrotus lividus*		225
Outside		Gill and trammel nets	All seasons	*Mullus surmuletus, Scorpaena scrofa, Sepia officinalis*		430 (including those operating in adjacent lagoons)
		Pot	All seasons	*Octopus vulgaris*		
		Long lines	All seasons	Sparidae		
		Bottom trawl	All seasons	*Mullus surmuletus, Merluccius merluccius, Aristeus antennatus*		12



Statistics

Landings of the most important species (by weight) from the region for 2004

	Weight (tons)
Total landings (all species)	482.8
Octopus vulgaris	102.7
Mullidae *(Mullus surmuletus, Mullus barbatus)*	34.8
Scorpaenidae *(Scorpaena porcus, Scorpaena scrofa)*	34.6

It is important to emphasize the landings of about 2,500,000 individuals of *Paracentrotus lividus* for each of the fishing seasons (2004-2005, 2005-2006, 2006-2007, November to April).

Fishing regulations

Foundation Text of Marine Protected Area “Sinis – Maldiventre”: Decree 12.12.1997, integrally substituted by Decree 06.09.1999, modified by Decree 17.07.2003. Legal references GURI n°45 (24.02.1998), GURI n°255 (29.10.1999) and GURI n°262 (11.11.2003).

Decree for the regulation of maritime fishery: n° 963 (14.07.65) and n° 1639 (02.10.1968).

Regional Decrees for the regulation of sea urchin fishery: RAS n° 276 (03.03.94), RAS n° 2984 (20.10.99), RAS n° 31680 (08.11.99).

Council of Cabras Decree for the regulation of sea urchin fishery within the Marine Protected Area “Sinis – Maldiventre”: n° 94 (12.11.2003).

Council of Cabras Decree for the regulation of sea urchin fishery within the Marine Protected Area “Sinis – Maldiventre”: n° 130 (02.11.2004).

Database reference

Data on fishery (fleet and yield composition) come from Oristano Coast Guard database;
Data on sea urchin fishery come from MPA "Sinis-Maldiventre" database and IMC scientific programmes.

Contact

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Publications

Murenu M., Pais A., Addis P., Farci S., Ferrari A., Olita A., Ortu A., Poma S., Mura F., Greco S. & Cau A., 2004. Preliminary data on fish assemblages structure in three Sardinian marine protected areas. *Biol. Mar. Medit.* 11 (2): 76-81.

Baroli M., De Falco G., Antonini C., Coppa S. & Facheris C., 2006. Distribution and population structure of sea urchin *Paracentrotus lividus* in the Penisola del Sinis - Isola di Maldiventre marine protected area (Western Sardinia) finalised to fishery management. *Biol. Mar. Medit*. 13 (1): 326-333.

MPA: Bouches de Bonifacio

Contributors: Jean Michel Culioli & Maddy Cancemi.
Office de l'Environnement de la Corse, Service "Parc Marin International", BP 507, 20169 Bonifacio, France.

Location:	41º 25'N 09º 15'E
Country:	France
Coastal/Island:	Mixed
Total size:	80,000 ha
Integral size:	1,200 ha
Year of establishment:	1998
Depth range:	0 - 80 m
Protection objectives:	Environmental protection
Type of MPA:	Partial
Habitats:	*Posidonia oceanica* beds, rocky reefs, caves, sandbanks slightly covered by water
Socio-economic activities:	Tourism, fishing, scuba diving, environmental education

Activities	Integral Reserve	Buffer zone	Partial Reserve
Forbidden	Fishing, scuba diving	Spear fishing, small net mesh size (<62mm), recreational coast angling, recreational longline	Small net mesh size (<62mm)
Regulated	Scientific survey	Scientific survey, fishing, scuba diving	Spear fishing, scientific survey, fishing, scuba diving, angling
Allowed	Boating, anchoring, swimming	Swimming, boating, anchoring, artisanal fishery	Swimming, boating, anchoring, artisanal fishery

Description of the fisheries in and around the MPA

The main objectives of the Bouches de Bonifacio MPA are conservation, environmental protection and fisheries enhancement. The Ministry of Ecology and Sustainable Development is responsible for the reserve and it is managed by the Corsican Environment Office.

The MPA is divided into 3 zones, Integral Reserve (IR, 1,200 ha), Restricted Use area (RU, 12,000 ha) and Partial Reserve (PR, 66,800 ha). Within the integral reserve all fishing activities are forbidden. Artisanal fisheries are allowed in the RU and PR. Professional fishing is only allowed outside the reserve.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR	N/A	N/A	N/A	N/A	N/A
	RU	Trammel net, long line	All seasons	*Mullus surmuletus, Palinurus elephas, Pagellus erythrinus, Phycis phycis, Scorpaena scrofa*	*Torpedo marmorata, Synodus saurus*	36-38
Outside		Trammel net, long line	All seasons	*Mullus surmuletus, Palinurus elephas, Pagellus erythrinus, Phycis phycis, Scorpaena scrofa*	*Torpedo marmorata, Synodus saurus*	36-38

Statistics

Landings of the most important species (by weight) from the region for 2002

	Weight (tons)
Total landings	39 (April-July 2002)
Dentex dentex	13.2 (April-July 2002)
Scorpaena scrofa	8 (April-July 2002)
Palinurus elephas	6.5 (April-July 2002)

Fishing regulations

Decree of the fisheries activities regulation 9 january 1852.

Arrêté n°393 of the no take area of Bonifacio and Porto Vecchio, 17 november 1983.

Natural reserve decree of the Bonifacio straits, 23 september 1999.

Decision n°46/2004/DRAM for the apnea experimental fishery of sea urchins into the perimeter of the protected reinforced area of Lavezzi islands (natural reserve of Bonifacio Straits), 20 January 2004.

Arrêté n°196/2004/DRAM for the reglamentation of the spearfishing activities into the natural reserve of Bonifacio, 23 july 2004.

Database reference

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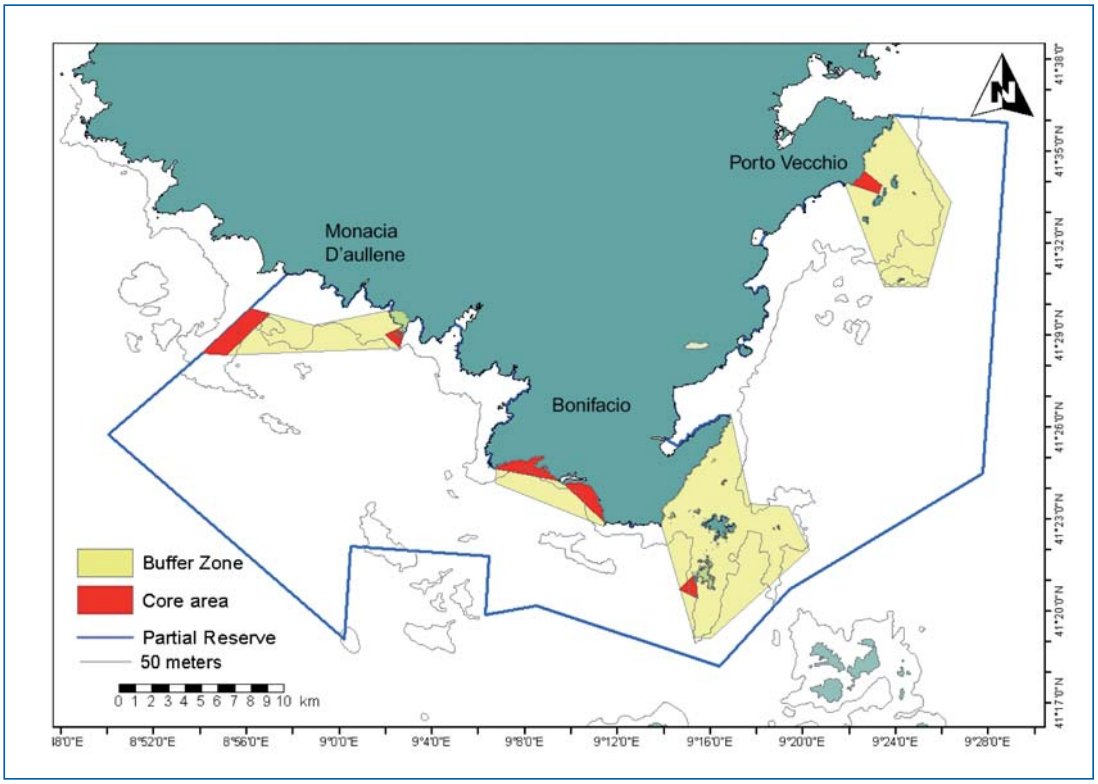


Publications

Culioli J.M., 1994. La pêche professionnelle dans la Réserve Naturelle des Iles Lavezzi (Corse). Effort et productions. *Trav. Sci. Parc. nat. rég. Rés. nat. Corse* , *Fr.* 52: 1-106.

Orsoni V., 2000. *Mise en évidence de la relation entre les variables environnementales et les espèces prélevées par la pêche artisanale sur le périmètre de la Réserve Naturelle des Bouches de Bonifacio*. Mémoire DESS «Ecosytèmes Méditerranéens Littoraux». Laboratoire Parasites et Ecologie Méditerranéenne - Réserve Naturelle des Bouches de Bonifacio. Université de Corse. 55 pp, 5 annexes.

Rigo D., 2000. *La pêche professionnelle dans la Réserve Naturelle des Bouches de Bonifacio (Corse)- Effort et productions.* Mémoire DESS «Ecosytèmes Méditerranéens Littoraux». Laboratoire Parasites et Ecologie Méditerranéenne - Réserve Naturelle des Bouches de Bonifacio. Université de Corse. 53 pp, 6 annexes.

Ehlinger L., 2001. *Rendements des filets trémails dans la réserve Naturelle des Bouches de Bonifacio (Corse): évolution et optimisation.* Rapport D.E.S.S. Univ. de Corse. 50 pp.

Mouillot D., 2001a. *Etude de l'effort et des productions halieutiques dans le périmètre de la Réserve Naturelle des Bouches de Bonifacio entre Avril et Septembre 2001.* Office de l'Environnement de la Corse. Association du cercle des Etudiants en Ecologie Méditerranéenne. 80 pp.

Mouillot D., 2001b. *Etude de l'effort de pêche et des productions halieutiques dans le périmètre de la Réserve Naturelle des Bouches de Bonifacio entre Mai et Septembre 2000.* Office de l'Environnement de la Corse. Association du cercle des Etudiants en Ecologie Méditerranéenne. 101 pp.

Santoni M.-C., 2001. *Effort et productions de la pêche artisanale sur le site de le Réserve Naturelle des Bouches de Bonifacio (Corse du Sud).* Mémoire de Maîtrise, Univ. de Corse. 40 pp.

Culioli J.M., 2002. La pêche professionnelle artisanale dans la Réserve Naturelle des Bouches de Bonifacio: un exemple de gestion soutenable des ressources halieutiques côtières. Actes du Colloque «Les Aires marines protégées en Méditerranée», Novembre 2001 –Porticcio (France-Corsica). Ministère de l'Aménagement du Territoire et de l'Environnement. Office de l'Environnement de la Corse. Centre d'Activités Régionales pour les Aires Spécialement Protégées: 101-108.

Mouillot D., Culioli J.M. & Do Chi T., 2002. Indicator Species analysis: an alternative to classical tests to identify non-random distribution of species with the context of marine protected areas (MPAs). *Environmental Conservation* 29: 385-390.

Santoni M.-C., 2002. *Evolution de l'effort et des productions de la pêche artisanale sur le site de la Réserve Naturelle des Bouches de Bonifacio (Corse du Sud).* Mémoire de D.E.S.S., Univ.de Corse. 64 pp.

Tomasini J.-A, Mouillot D., Elhinger L. & Santoni M.-C., 2003. *Etude de la faune marine de la réserve naturelle des Bouches de Bonifacio (Parc Marin International). Résultats de la campagne de pêches expérimentales juin-juillet 2003*. Rapport Office de l'Environnement de la Corse – Mari Nustrali: 33 pp.

Office de l'Environnement de la Corse (Culioli J.M.), 2005. Estimation de la perte de production selon deux méthodes de pêche : filets calés 12h ou 24h en cas d'attaque de grands dauphins *Tursiops truncatus*. *Rapport final de l'action C1 du Life Linda*: 36 pp + annexes.

MPA: Ustica Island

Contributors: Renato Chemello & Marco Milazzo.
Dipartimento di Ecologia, Laboratorio di Ecologia Marina e Conservazione della Natura, Università di Palermo, Via Archirafi 18, 90123 Palermo, Italy.

Location: 38º42'N,13º43'E
Country: Italy
Coastal/Island: Island
Total size: 15,951 ha
Integral size: 60 ha
Year of establishment: 1986 (effective establishment: 1991)
Depth range: 0 – ~1,000 m
Protection objectives: Environmental protection
Type of MPA: No take/partial
Habitats: *Posidonia oceanica* beds, rocky reefs, sandy bottoms, marine caves
Socio-economic activities: Tourism, diving, small scale fishery

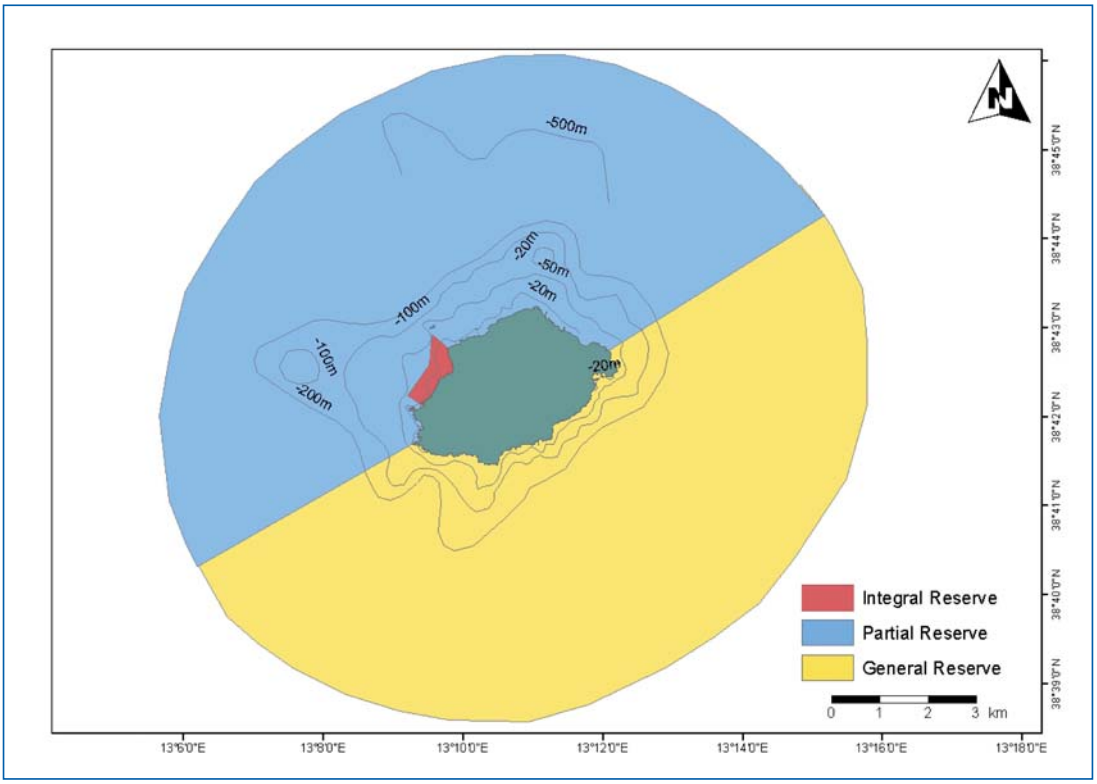
Activities	Integral Reserve	Partial reserve	General reserve
Forbidden	All activities (including access)	Trawling, spear fishing, sea urchin harvesting	Trawling, spear fishing
Regulated		Professional fishing (small scale fishery) is limited to local boats	Professional fishing (small scale fishery) is limited to local boats
Allowed	Scientific research, swimming permitted in two small beaches	Scuba diving, swimming, sport fishing, mooring	Scuba diving, swimming, sport fishing (including sea urchin harvesting), mooring

Description of the fisheries in and around the MPA

The main aims of the "Ustica Island" MPA are environmental protection, fisheries enhancement, environmental education and research activity.

Fishing is a small scale activity mainly carried out using traps, gill nets and long-lines. All fishing activities are forbidden within the Integral Reserve (zone A). Gill nets, traps and long-lines are allowed under the regulation of the MPA Management Authority, but are restricted to 7 local vessels within the Partial Reserve (zone B) and the General Reserve (zone C). Spearfishing and trawling are banned within the MPA boundaries (three miles from the island coasts). Sea urchin harvesting is permitted only in zone C by skin divers and angling is not regulated in either zone B or zone C.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	Zone A	-	-	-	-	-
	Zone B	Gill net	Mar-Jul	*Spicara* spp., *Boops boops*		7 local vessels
		Gill net	whole year	*Mullus surmuletus*, *Palinurus elephas*, *Scorpaena* spp., *Phycis phycis*, *Merluccius merluccius*, *Muraena helena*		
		Trap	whole year	*Plesionika narval*		
		Long line	whole year	*Epinephelus marginatus*, *Diplodus* spp., *Muraena helena*		
	Zone C	Gill net	Mar-Jul	*Spicara* spp., *Boops boops*		7 local vessels
		Gill net	whole year	*Mullus surmuletus*, *Palinurus elephas*, *Scorpaena* spp., *Phycis phycis*, *Merluccius merluccius*, *Muraena helena*		
		Trap	whole year	*Plesionika narval*		
		Long line	whole year	*Epinephelus marginatus*, *Diplodus* spp., *Muraena helena*		
		Skin diving	Nov-May	*Paracentrotus lividus*		



Statistics

Landings of the most important species (by weight) from the region for 2004
Not available

Fishing regulations

Decree, November 12th , 1986 - GURI n° 71 (26/03 /1987)
Decree, August 8th, 1990 GURI n° 219 (19/09/1990)

Database reference

Not available

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Publications

Arculeo M., Mazzola A., Parrinello N. & Gristina M., 1996. Dati sulla pesca costiera nell'isola di Ustica (Tirreno meridionale). *Naturalista Siciliano* S4, XX (1-2): 109-119.

Arculeo M., Mazzola A., Parrinello N. & Gristina M., 1999. Dati sulla pesca costiera nell'isola di Ustica (Tirreno meridionale). *Biologia Marina Mediterranea* 6 (1): 228-229.

MPA: Gulf of Castellammare / Trawl Ban Area

Contributors: Carlo Pipitone, Giovanni D'Anna, Fabio Badalamenti & Tomás Vega Fernández.
CNR-IAMC Laboratorio di Ecologia Marina, Via G. Da Verrazzano 17, 91014 Castellammare del Golfo (Tp), Italy.

Location:	38°05'N 12°55'E (approx. centre point)
Country:	Italy
Coastal/Island:	Mixed inshore/offshore
Total size:	20,000 ha
Integral size:	N/A
Year of establishment:	1990
Depth range:	0 – 500 m
Protection objectives:	Fisheries enhancement
Type of MPA:	Fishery reserve (trawl ban area)
Habitats:	Mud flats, sand, *Posidonia oceanica* beds, rocky reefs, detritic
Socio-economic activities:	All uses (including recreational and professional fishing) are permitted, except trawling

Activities	Trawl Ban Area
Forbidden	Trawl fishing
Regulated	None
Allowed	All other activities

Description of the fisheries in and around the MPA

The Gulf of Castellammare fishery reserve was created through a Regional Act to regenerate and enhance the demersal marine resources, to achieve a sustainable fishery allowing local artisanal fishermen to preserve their activity.

Twelve trawlers are based in the Gulf: 2 in Castellammare (inside the MPA) and 10 in Terrasini (located outside the eastern side of the MPA). Trawlers from Castellammare fish deep-sea species inside the Gulf off the MPA border. Trawlers from Terrasini target either the same deep-sea resource or other shelf and slope resources located east of the MPA. Some 70 small vessels, using artisanal gear, are registered at harbours located inside the MPA, with a further 30 registered at Terrasini. It must be noted that some of the Terrasini trawlers may well fish illegally inside the eastern sector of the MPA.

In addition to year-round fishing activities there are two seasonal fisheries: (i) a FAD fishery (September to November) targeting dolphin fish and pilot fish with small purse seines; (ii) a fish-fry fishery (late winter to early spring) targeting highly valuable juvenile sardine and anchovy with small boat seines. Occasionally other types of gear are used (drifting gill nets, jigs, and cane pots).

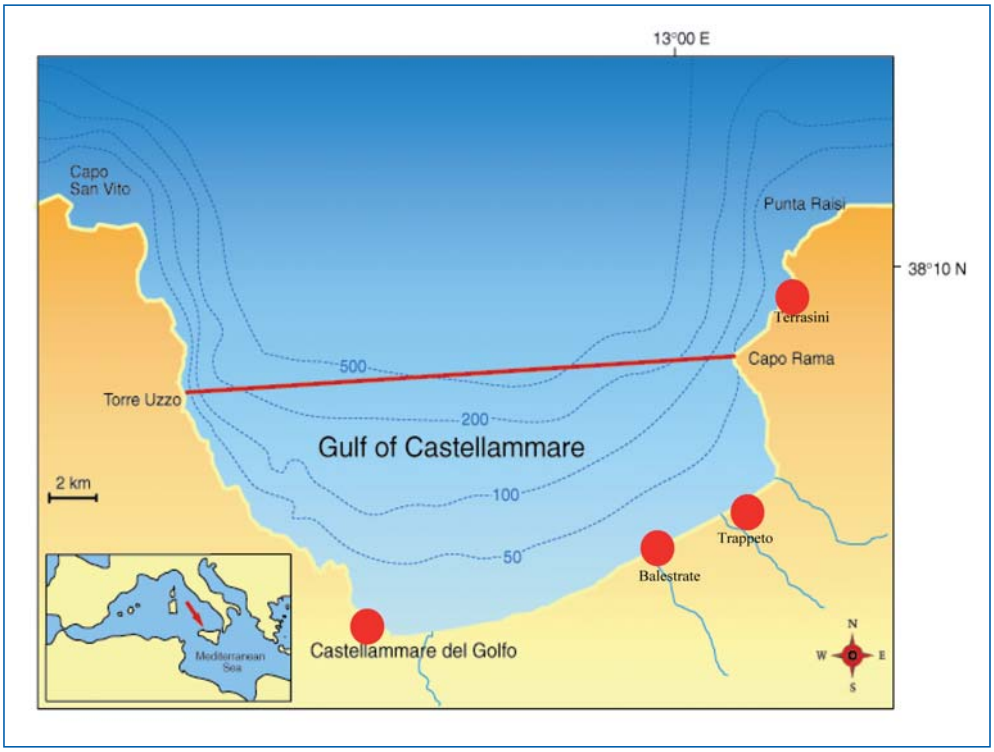
Area	Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	Combined gillnet-trammel net	All seasons	*Mullus barbatus, Sepia officinalis, Boops boops, Trachurus trachurus, Merluccius merluccius, Pagrus pagrus, Pagellus erythrinus*	*Diplodus sargus, Diplodus vulgaris, Epinephelus marginatus, Mullus surmuletus, Octopus vulgaris, Lithognathus mormyrus, ...*	70+
	Gill net	summer-autumn	*Seriola dumerili,* Scombridae, *Merluccius merluccius, Pagrus pagrus*		
	Boat seine	winter	fish fry (juvenile clupeoids)		?
	FAD seine	summer-autumn	*Seriola dumerili* juv., *Coryphaena hippurus*	*Naucrates ductor*	?
	Bottom longline	summer	*Merluccius merluccius, Lepidopus caudatus, Dicentrarchus labrax, Trigla lucerna, Diplodus sargus, Lithognathus mormyrus*		?
	Jig	summer	*Todarodes sagittatus*		?
Outside (in Gulf)	Trawling	All seasons	*Aristeus antennatus, Parapenaeus longirostris*	*Merluccius merluccius, Lophius piscatorius, Plesionika narval, ...*	2
Outside (off Gulf)	Trawling	All seasons	*Aristeus antennatus, Parapenaeus longirostris, Merluccius merluccius, Mullus barbatus, Eledone moschata*	*Spicara flexuosa, Octopus vulgaris, Eledone cirrhosa, Loligo vulgaris, Pagellus erythrinus, Lepidopus caudatus, Pagellus acarne, Lophius piscatorius, ...*	10

Statistics

Landings of the most important species (by weight) from the region for 1998-99*

	Weight (tons)		
	Castellammare	Balestrate	Trappeto
Total landings (all species)	1,945	1,291	691
Merluccius merluccius	196	58	71
Mullus barbatus	72	56	82
Species 3	N.A.	N.A.	N.A.

* Landings data collected during one year on a forth nightly basis in the three ports inside the MPA. Data extrapolated to the estimated annual number of days fished (n=229 in Castellammare, n=213 in Balestrate, n=179 in Trappeto).



Fishing regulations

Fishing regulations in the reserve:
Regional act of Sicily nº 25/1990

Fishing regulations around the reserve: regional as well as national legislation on fishing and fisheries applies in this case, e.g.:
National act nº 963/1965
National act nº 41/1982
Regional act of Sicily nº 32/2000

Database reference

None

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Publications

D'Anna G., Badalamenti F., Gristina M. & Pipitone C., 1994. Influence of artificial reefs on coastal nekton assemblages of the Gulf of Castellammare (northwest Sicily). *Bull. Mar. Sci*. 55 (2-3): 418-433.

Pipitone C., Badalamenti F., D'Anna G. & Patti B., 1996. Divieto di pesca a strascico nel Golfo di Castellammare (Sicilia nord-occidentale): alcune considerazioni. *Biol. Mar. Medit*. 3 (1): 200-204.

Pipitone C., Badalamenti F. & D'Anna G., 1997 a. Catture diurne e notturne di alcune specie ittiche di platea nel Golfo di Castellammare (Sicilia nord-occidentale). *Biol. Mar. Medit*. 4 (1): 538-540.

Pipitone C., Badalamenti F. & D'Anna G., 1997 b. Contributo alla conoscenza dell'ittiofauna di platea del Golfo di Castellammare (Sicilia nord-occidentale). *Biol. Mar. Medit*. 4 (1): 541-547.

Pipitone C., Badalamenti F., D'Anna G. & Patti B., 2000. Fish biomass increase after a four-year trawl ban in the Gulf of Castellammare (NW Sicily, Mediterranean Sea). *Fish. Res*. 48 (1): 23-30.

D'Anna G., Badalamenti F. & Pipitone C., 2001. Rendimenti di pesca sperimentale con tramaglio nel Golfo di Castellammare dopo otto anni di divieto di pesca a strascico. *Biol. Mar. Medit*. 8 (1): 704-707.

Pipitone C., Badalamenti F., D'Anna G., James C., Pickering H. & Whitmarsh D., 2001. Le risorse ittiche demersali nel Golfo di Castellammare (Sicilia NO) dopo otto anni di divieto di strascico. *Biol. Mar. Medit*. 8 (1): 757-760.

Badalamenti F., D'Anna G., Pinnegar J.K. & Polunin N.V.C., 2002. Size-related trophodynamic changes in three target fish species recovering from intensive trawling. *Mar Biol.* 141: 561-570.

Pipitone C., 2002. Gulf of Castellammare trawl ban, Sicily. In: Gell, F.R. & Roberts, C.M. (Eds.), *The fishery effects of marine reserves and fishery closures*. WWF-US, Washington, DC: 80-81.

Whitmarsh D., James C., Pickering H., Pipitone C., Badalamenti F. & D'Anna G., 2002. Economic effects of fishery exclusion zones: a Sicilian case study. *Mar. Res. Econ*. 17: 239-250.

Himes A.H., 2003. Small-scale Sicilian fisheries: opinions of artisanal fishers and sociocultural effects in two MPA case studies. *Coast Manag*. 31: 389-408.

Whitmarsh D., Pipitone C., Badalamenti F. & D'Anna G., 2003. The economic sustainability of artisanal fisheries: the case of the trawl ban in the Gulf of Castellammare, NW Sicily. *Mar. Pol*. 27: 489-497.

Mardle S., James C., Pipitone C. & Kienzle M., 2004. Bioeconomic interactions in an established fishing exclusion zone: the Gulf of Castellammare, NW Sicily. *Nat. Res. Model*. 17 (3): 287-316.

Pipitone C., Badalamenti F., D'Anna G., James C., Pickering H., Scotti G. & Whitmarsh D., 2004. Ricerca e gestione delle risorse marine costiere nella "riserva di pesca" del Golfo di Castellammare (Sicilia N/O). *Biol. Mar. Medit*. 11 (2): 1-11.

Badalamenti F., Sweeting C.J., Polunin N.V.C., Pinnegar J., D'Anna G. & Pipitone, C., in press. Limited trophodynamics effects of trawling on three Mediterranean fishes. *Mar Biol.*

MPA: La Graciosa e Islotes del Norte de Lanzarote

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Location: 29º 20'N 13º 25'W
Country: Canary Islands, Spain
Coastal/Island: Island (inshore and offshore)
Total size: 70,700 ha
Integral size: 1,225 ha
Year of establishment: 1995
Depth range: 0 – 1000 m
Protection objectives: Fisheries enhancement, conservation
Type of MPA: Partial
Habitats: Rocky reefs, caves, mäerl, *Cymodocea nodosa* beds, sandy substrates
Socio-economic activities: Fishing, tourism, diving

Activities	Core area (Integral zone)	Buffer Zone	Rest of the reserve
Forbidden	All activities except scientific research	Recreational fishing, scuba diving, swimming, snorkelling, anchoring	Spear fishing
Regulated	Scientific research	Scientific research	Recreational trolling, angling from the shore, scientific research, scuba diving, anchoring
Allowed		Professional fishing with hook and line and with certain traditional nets for the capture of *Sarpa salpa* and migratory species, boating	Professional fishing with hook and line and with certain traditional nets for the capture of *Sarpa salpa* and migratory species, boating, swimming, snorkelling

Description of the fisheries in and around the MPA

Since its establishment, only artisanal boats fish within the reserve. Within the integral reserve all fishing activities are forbidden.

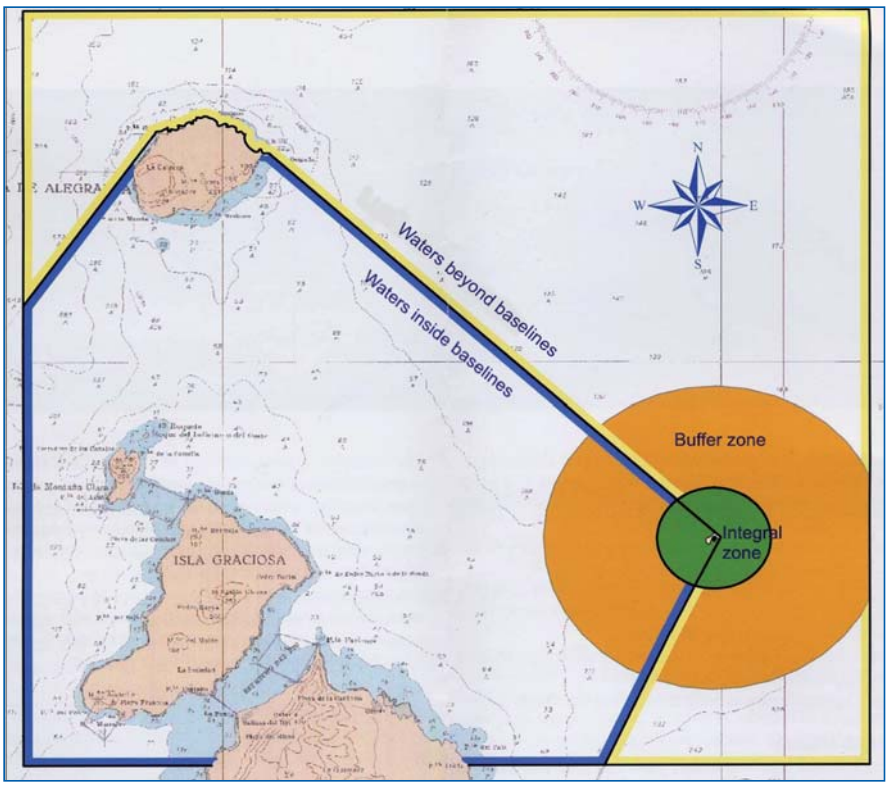
The reserve is divided into internal and external waters, which are regulated by the Regional Government of the Canary Islands and the Spanish State respectively. The artisanal fleet operating in the reserve belongs to a list, closed for local and traditional reasons, with vessels from Caleta del Sebo (La Graciosa), Órzola (NE of Lanzarote), La Santa (NW of Lanzarote) and Arrecife (E of Lanzarote). In 2003, date of the last official list, there were 73 vessels within this operative fleet. Since the abundance of target species of the 1980's commercial fleet decreased severely during the 1990's, no large commercial vessels operates in the zone of influence of the reserve. Only the artisanal fleet operates in this zone.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR	-	-	-	-	-
	RU	Hand line	Depending on the species	*Sparisoma cretense, Pagrus pagrus, Spondyliosoma cantharus, Serranus atricauda, Pagellus erythrinus, Epinephelus marginatus*	*Diplodus vulgaris, Phycis phycis, Scorpaena* spp., *Mycteroperca fusca, Balistes capriscus, Diplodus sargus, Bodianus scrofa, Pseudocaranx dentex, Pontinus kuhlii, Pagrus auriga, Diplodus cervinus, Parapristipoma octolineatum*	21
		Pole and line	April-Oct.	*Sparisoma cretense*	-	15
		Pole and line with live bait	April-Nov.	*Seriola* spp., *Mycteroperca fusca, Sphyraena viridensis, Dentex dentex*		7
		Jig	May-Oct.	*Loligo vulgaris*	*Sepia officinalis*	9
		Purse seine	All seasons	*Sarpa salpa, Boops boops, Sardina pilchardus, Engraulis encrasicolus*	*Oblada melanura, Trachinotus ovatus, Sardinella* spp., *Belone belone*	1
		Beach seine	All seasons	*Atherina presbyter*	*Sardina pilchardus, Sardinella* spp., *Belone belone, Boops boops*	2
		Shellfish seeking	Mar-Nov.	*Patella* spp.	*Osilinus* spp.	3
		Octopus long-handled tool	All seasons	*Octopus vulgaris*	-	2
Outside		Trap	March-Nov.	*Scorpaena* spp., *Dentex* spp., *Phycis phycis, Pagrus pagrus*	*Muraena helena, Gymnothorax* spp., *Conger conger*	2
		Electric reel hook and line	All seasons	*Merluccius merluccius, Polyprion americanus*	*Pagellus bogaraveo, Schedophilus ovalis, Mustelus mustelus*	7

Statistics

Landings of the most important species (by weight) from the region for 2005

	Weight (tons)
Total landings (all species)	120.76
Sparisoma cretense	25.57
Merluccius merluccius	12.26
Sarpa salpa	11.81



Fishing regulations

National laws:

Orden de 19 de mayo de 1995, por la que se establece una reserva marina en el entorno de la isla Graciosa y de los islotes del Norte de Lanzarote. (B.O.E. núm. 131 de 2 de junio de 1995).

Orden de 20 de enero de 1999 por la que se modifica la Orden de 19 de mayo de 1995, por la que se establece una reserva marina en el entorno de la isla Graciosa y de los islotes del norte de Lanzarote. (B.O.E. núm. 31 de 5 de febrero de 1999).

Ley 3/2001, de 26 de marzo, de Pesca Marítima del Estado. (B.O.E. 28 de marzo de 2001).

Orden de 3 de octubre de 2001 que modifica la orden de 19 de mayo de 1995 por la que se establece una reserva marina en el entorno de la isla Graciosa y de los islotes del Norte de Lanzarote (B.O.E núm. 250 de 18 de octubre de 2001).

Resolución de 5 de marzo de 2003, por la que se actualiza el censo de embarcaciones autorizadas a ejercer la pesca marítima profesional en la reserva marina del entorno de la Isla de La Graciosa e islotes del Norte de Lanzarote (B.O.E. núm. 89 de 14 de abril de 2003).

Orden APA/677/2004, de 5 de marzo, por la que se regula la pesca con artes de cerco en el Caladero Nacional de Canarias. (B.O.E núm. 65 de 16 de marzo de 2004).

Regional laws:

Decreto 62/1995, de 24 de marzo, por el que se establece una reserva marina de interés pesquero en el entorno de la isla de La Graciosa y de los islotes del Norte de Lanzarote. (B.O.C. núm. 51 de 26 de abril de 1995).

Decreto 162/2000, de 24 de julio, por el que se modifica el Decreto 62/1995, de 24 de marzo, por el que se establece una reserva marina de interés pesquero en el entorno de la isla de La Graciosa y de los islotes del Norte de Lanzarote. (B.O.C. núm. 100 de 7 de agosto de 2000).

Orden de 12 de diciembre de 2000, por la que se determina la documentación que es preciso aportar para la obtención de la autorización que posibilite la realización de actividades de pesca recreativa en las aguas interiores de la reserva marina del entorno de la isla de La Graciosa y de los islotes del Norte de Lanzarote. (B.O.C. núm 3 de 5 de enero de 2001).

Anuncio de la Viceconsejería de Pesca por el que se hace pública la Resolución de 10 de enero de 2003, que da publicidad a la modificación del Convenio Marco de colaboración entre el Ministerio de Agricultura, Pesca y Alimentación y la Consejería de Agricultura, Ganadería, Pesca y Alimentación de la Comunidad Autónoma de Canarias, relativo a la gestión compartida de la reserva marina del entorno de la isla de la Graciosa e Islotes del Norte de Lanzarote. (B.O.C. núm. 39 de 26 febrero de 2003).

Ley 17/2003, de 10 de abril, de Pesca de Canarias. (B.O.C. núm. 162 de 8 julio 2003).

Resolución de 22 de mayo de 2003, de la Viceconsejeria de Pesca, por la que se actualiza el censo de las embarcaciones autorizadas a ejercer la pesca marítima profesional en la reserva marina de interés pesquero del entorno de la isla de La Graciosa e islotes del Norte de Lanzarote (B.O.C. núm. 117 de 20 de junio de 2003).

Decreto 182/2004, de 21 de diciembre, por el que se aprueba el Reglamento de la Ley de Pesca de Canarias (B.O.C. núm. 4 de 7 de enero de 2005).

Database reference

http://www.gobiernodecanarias.org/agricultura/pesca/pesca_canarias/default.htm

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Publications

Santana J.I., González J.A., Lozano I.J., Caldentey M.A., Lozano F., Gómez J.A. & Castillo R., 1985. *Informe preliminar sobre las pescas con nasas y palangres realizadas a bordo del buque Taliarte durante los meses de Junio y Julio de 1985*. Consejería de Agricultura y Pesca. Gobierno Autónomo de Canarias. 208 pp.

González J.A., Lozano I.J., Caldentey M.A., Santana J.I., Gómez J.A. & Castillo R., 1988. Resultados de la campaña de prospección pesquera "CANARIAS 85". *Inf. Técn. Inst. Esp. Oceanogr.*, nº 57: 93 p.

González J.A., Brito A., Falcón J.M., Santana J.I. & Lozano I.J., 1995. *Recursos pesqueros y marisqueros de los islotes y acantilados de Famara (Norte de Lanzarote).* Informe para la Dirección General de Medio Ambiente, Gobierno de Canarias. Instituto Canario de Ciencias Marinas y Departamento de Biología Animal (Ciencias Marinas) de la Universidad de La Laguna. 53 p.

Brito A., Barquín J., Braun J.G., Lozano I., Ocaña O., Reyes J., Falcón J.M., González G., Pascual P.J., Báez A., Martín-Sosa P., Cabrera M., Sancho A., Alcántara E. & García M.N., 1997. *Evaluación de las poblaciones de peces y macroinvertebrados de interés pesquero, análisis de la explotación de los recursos y obtención de parámetros para la gestión de la futura reserva marina de La Graciosa e islotes al norte de Lanzarote.* Tomos I y II. Consejería de Agricultura, Pesca y Alimentación, Gobierno de Canarias. Departamentos de Biología Animal (Ciencias Marinas y Zoología) y Biología Vegetal (Botánica), Universidad de La Laguna. 395 pp. + anexos.

Brito A., Barquín J., Braun J.G., Reyes J., Falcón J.M., González G., Pascual P.J., Báez A., Cabrera M., Sancho A., Martín-Sosa P., Dorta C. & Tosco J.O., 1998. *Estudio de los parámetros biológicos, ecológicos y pesqueros en relación con el funcionamiento de las reservas marinas canarias.* Tomos I y II. Consejería de Agricultura, Pesca y Alimentación, Gobierno de Canarias. Departamentos de Biología Animal (Ciencias Marinas y Zoología) y Biología Vegetal (Botánica), Universidad de La Laguna. 515 pp. + anexos.

Macías J., Pascual J., Lozano I.J., González J.A., Santana J.I., Díaz A. & Portillo A., 1999. *Plan de Desarrollo Pesquero de Canarias 1999-2004. Situación y Perspectivas*. Viceconsejería de Pesca del Gobierno de Canarias y Canaest Consultores, S.A: 514 p + anexos.

Brito A., Barquín J., González G. & Sancho, A., 2000. *Estudio sobre la valoración del estado de las poblaciones de Lapa Blanca y Lapa Negra en la Reserva Marina de La Graciosa*. Consejería de Agricultura, Pesca y Alimentación, Gobierno de Canarias. Departamento de Biología Animal (Ciencias Marinas), Universidad de La Laguna. 7 pp + Anexo.

Brito A., Falcón J.M., Martín-Sosa P., Dorta C. & García N., 2000. *Proyecto de creación de un archivo fotográfico de las especies de interés pesquero de la Reserva Marina de La Graciosa e Islotes al Norte de Lanzarote.* Consejería de Agricultura, Pesca y Alimentación, Gobierno de Canarias. Departamento de Biología Animal (Ciencias Marinas), Universidad de La Laguna. 126 pp.

Brito A., Pascual P.J. & García, N, 2000. *Estudio sobre la captura experimental del Calamar del Alto en las aguas de la Reserva Marina del entorno de la isla de La Graciosa e islotes al norte de Lanzarote.* Consejería de Agricultura, Pesca y Alimentación, Gobierno de Canarias. Departamento de Biología Animal (Ciencias Marinas), Universidad de La Laguna. 11 pp + Anexo.

Brito A., Barquín J., González G., Sancho A., Falcón J.M., Hernández J.C.P. & García N., 2001. *Estudio sobre la valoración del estado de las poblaciones de las principales especies marisqueras (lapas y burgado) en la Reserva Marina de La Graciosa.* Consejería de Agricultura, Pesca y Alimentación, Gobierno de Canarias. Departamento de Biología Animal (Ciencias Marinas), Universidad de La Laguna. 13 pp + Anexo.

Martín-Sosa P., Brito A., Lozano I.J. & Sancho A., 2001. Establecimiento de un sistema de recogida de datos pesqueros para el análisis del “efecto reserva” en las poblaciones de interés pesquero en la Reserva Marina de “La Graciosa” (norte de Lanzarote, Islas Canarias). Primeros resultados. *Actas de las I Jornadas Internacionales sobre Reservas Marinas*. Ed. MAPA. Madrid: 89-104.

Santana J.I., González J.A., Quiles J.A., Marrero M.F., Lozano I.J. & Jiménez S., 2001. *Prospección con nasas camaroneras tradicionales en la zona exterior de la Reserva Marina de la Graciosa (Lanzarote)*. Memoria científico-técnica final. Instituto Canario de Ciencias Marinas, Telde (Gran Canaria). 75 pp.

Martín-Sosa P., Cansado S., Fernández M.A.R. & Girard D., 2005. *Seguimiento científico del efecto de la Reserva Marina de La Graciosa (Islas Canarias). Resultados de la Campaña de Prospección Pesquera “PEXLAGRACIOSA 2005”.* Instituto Español de Oceanografía, Centro Oceanográfico de Canarias. Informe Preliminar: 25 pp. + Anexos.

Tuset V.M., García-Díaz M.M., González J.A., Lorente M.J. & Lozano I.J., 2005. Reproduction and growth of the painted comber *Serranus scriba* (Serranidae) off the Marine Reserve of Lanzarote Islands (Central-eastern Atlantic). *Estuarine Coastal and Shelf Science* Vol. 64: 335-346.

MPA: La Restinga - Mar de las Calmas

Contributors: Pablo Martín-Sosa[1], Jesús M. Falcón[2], Carmelo Dorta[2], Ignacio J. Lozano[2], Alberto Brito[2] & Sergio Cansado[1].
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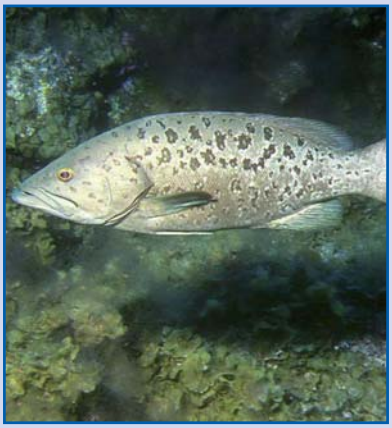


Location:	27º 38'N 18º 00'W
Country:	Canary Islands, Spain
Coastal/Island:	Island (mixed inshore – offshore)
Total size:	750 ha
Integral size:	180 ha
Year of establishment:	1996
Depth range:	0 – 400 m
Protection objectives:	Fisheries enhancement, conservation
Type of MPA:	Partial
Habitats:	Rocky reefs, caves, mäerl, sandy substrates
Socio-economic activities:	Fishing, tourism, diving

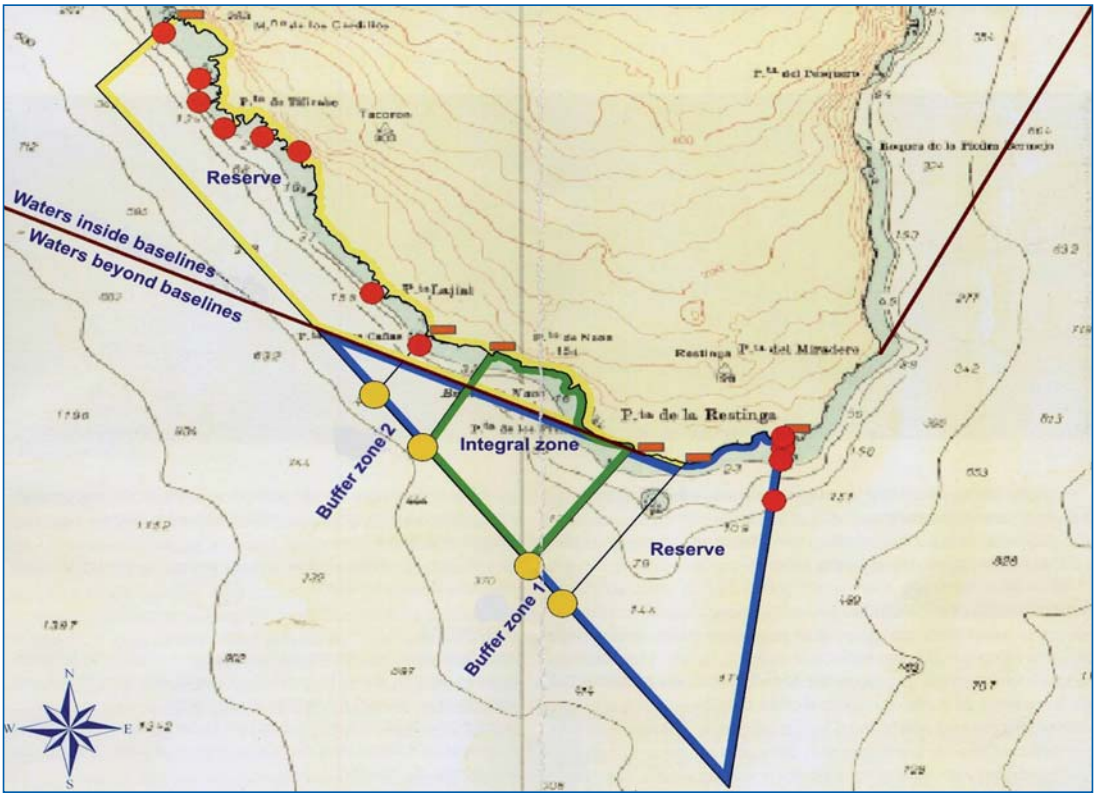
Activities	Core area (Integral zone)	Buffer Zone	Rest of the reserve
Forbidden	All activities except scientific research, professional tuna fisheries and boating	Recreational fishing from boat, spear fishing, angling form the shore	Recreational fishing from boat, spear fishing, angling from the shore
Regulated	Scientific research	Scuba diving, scientific research, anchoring	Scuba diving, scientific research, anchoring
Allowed	Professional tuna fisheries, boating	Professional fishing with hook and line, professional tuna fisheries, boating, swimming	Professional fishing with traditional fishing gears, angling from the shore, swimming, boating, snorkelling

Description of the fisheries in and around the MPA

The marine reserve was created in 1996, and requested by fishermen themselves.

Within the integral reserve all fishing activities are forbidden except professional tuna fisheries. The reserve is divided into internal and external waters, which are regulated by the Regional Government of the Canary Islands and the Spanish State respectively. The artisanal fleet operating in the reserve consists of approximately 40 vessels from El Hierro. Only the artisanal fleet operates in this zone and in the rest of the island of El Hierro. The fishing gears and target species are diverse and the most of vessels fish different species depending on the availability of the resource and the season, and also fish inside or outside the reserve depending on the weather conditions.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR	-	-	-	-	-
	RU	Pole-and-line (hand operated)	May-Aug	*Katsuwonus pelamis*	*Thunnus albacares*	15
		Hand-line, Pole-and-line (hand operated)	May-Oct	*Thunnus albacares, Seriola fasciata, Seriola rivoliana*	*Katsuwonus pelamis, Sphyraena viridensis, Mycteroperca fusca, Seriola dumerili*	8
		Snorkeling hand line	All seasons	*Sparisoma cretense*	*Bodianus scrofa, Serranus atricauda*	10
		Moray trap	Mar-Oct	*Muraena augusti, Gymnothorax unicolor*	*Enchelycore anatina, Gymnothorax miliaris*	4
		Purse seine	Sep-Jun	*Oblada melanura, Sarpa salpa*	*Kyphosus sectator, Sphyraena viridensis, Diplodus vulgaris, Diplodus cervinus cervinus, Diplodus sargus cadenati, Diplodus puntazzo, Lithognathus mormyrus, Trachinotus ovatus, Boops boops*	1
		Hand line	May-Dec	*Balistes capriscus, Canthidermis sufflamen*	*Boops boops*	6
		Harpoon, Troll line, Hand line	Sep-Jun	*Acanthocybium solandri*		16
		Hand-line	Abr-Oct	*Epinephelus marginatus*	*Seriola fasciata, Seriola rivoliana Seriola dumerili, Sphyraena viridensis, Muraena augusti*	2
Outside		Pole-and-line (hand operated)	May-Aug	*Katsuwonus pelamis*	*Thunnus albacares, Thunnus alalunga, Thunnus obesus, Makaira nigricans*	15
		Hand-line, Pole line (hand operated)	May-Oct	*Thunnus albacares, Seriola fasciata, Seriola rivoliana*	*Katsuwonus pelamis, Mycteroperca fusca, Sphyraena viridensis, Seriola dumerili*	8
		Snorkeling hand line	All seasons	*Sparisoma cretense*	*Bodianus scrofa, Serranus atricauda*	10
		Moray trap	Mar-Oct	*Muraena augusti, Gymnothorax unicolor*	*Enchelycore anatina, Gymnothorax miliaris, Epinephelus marginatus*	4
		Moray trap	All seasons	*Muraena helena, Gymnothorax polygonius*	*Gymnothorax maderensis*	3
		Electric reel hook and line	Oct- May	*Serranus atricauda*	*Bodianus scrofa, Pagrus pagrus, Phycis phycis, Scorpaena scrofa*	7
		Electric reel hook and line	All seasons	*Beryx splendens*	*Beryx decadactylus, Polymixia nobilis, Promethichthys prometheus, Pontinus kuhlii, Helicolenus dactylopterus dactylopterus, Polyprion americanus, Ruvettus pretiosus, Epigonus telescopus, Schedophilus ovalis, Xiphias gladius*	8
		Purse seine	Sep-Jun	*Oblada melanura, Sarpa salpa*	*Kyphosus sectator, Sphyraena viridensis, Diplodus vulgaris, Diplodus cervinus cervinus, Diplodus sargus cadenati, Diplodus puntazzo, Lithognathus mormyrus, Trachinotus ovatus, Boops boops*	1
		Hand line	May-Dec	*Balistes capriscus, Canthidermis sufflamen*	*Boops boops*	6
		Harpoon, Troll line, Hand line	Sep-Jun	*Acanthocybium solandri*		16
		Hand line	Apr-Oct	*Epinephelus marginatus*	*Seriola fasciata, Seriola rivoliana, Seriola dumerili, Sphyraena viridensis, Muraena augusti*	2
		Shellfish seeking (from shore or snorkeling)	Jan-Aug	*Patella candei crenata, Patella ulyssiponensis aspera*		5



Statistics

Landings of the most important species (by weight) from the region for 2004

	Weight (tons)
Total landings (all species)	177.5
Acanthocybium solandri	45.6
Katsuwonus pelamis	33.9
Sparisoma cretense	23.1

Fishing regulations

National laws:

Orden de 24 de enero de 1996, por la que se establece una reserva marina en el entorno de la Punta de La Restinga - Mar de las Calmas (isla de El Hierro) (B.O.E. núm. 30 de 3 de febrero de 1996).

Resolución de 17 de mayo de 1999, de la Dirección General de Recursos Pesqueros, por la que se da publicidad al Convenio Marco de colaboración entre el Ministerio de Agricultura, Pesca y Alimentación y la Consejería de Agricultura, Pesca y Alimentación de la Comunidad Autónoma de Canarias relativo a la Gestión compartida de la Reserva Marina en el entorno de la punta de la Restinga-Mar de las Calmas, en la Isla de El Hierro (B.O.E. núm. 142 de 15 de junio de 1999).

Ley 3/2001, de 26 de marzo, de Pesca Marítima del Estado (B.O.E. 28 de marzo de 2001).

Resolución de 19 de noviembre de 2001 de la Secretaría General de Pesca Marítima por la que se actualiza el censo de embarcaciones autorizadas a ejercer la pesca marítima profesional en la reserva marina del entorno de la Punta de la Restinga - Mar de las Calmas (Isla de El Hierro) (B.O.E. núm. 297 de 12 de diciembre de 2001).

Orden APA/677/2004, de 5 de marzo, por la que se regula la pesca con artes de cerco en el Caladero Nacional de Canarias (B.O.E núm. 65 de 16 de marzo de 2004).

Regional laws:

Orden de 27 de mayo de 1994, de la Consejería de Pesca y Transportes, por la que se prohíbe el uso de las nasas para peces y se regula la pesca al puyón en las aguas interiores de la isla de El Hierro (B.O.C. núm 72, de 13 de junio de 1994).

Decreto núm. 30/1996, de 16 de febrero, por el que se establece una reserva marina de interés pesquero en la isla de El Hierro, en el entorno de la Punta de La Restinga, Mar de las Calmas (B.O.C.núm. 31, de 11 de marzo de 1996).

Ley 17/2003, de 10 de abril, de Pesca de Canarias (B.O.C. núm. 162 de 8 julio 2003).

Decreto 182/2004, de 21 de diciembre, por el que se aprueba el Reglamento de la Ley de Pesca de Canarias (B.O.C. núm. 4 de 7 de enero de 2005).

Database reference

http://www.gobiernodecanarias.org/agricultura/pesca/pesca_canarias/default.htm

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Publications

Santana J.I., González J.A., Lozano I.J., Caldentey M.A., Lozano F., Gómez J.A. & Castillo R., 1985. *Informe preliminar sobre las pescas con nasas y palangres realizadas a bordo del buque Taliarte durante los meses de Junio y Julio de 1985*. Consejería de Agricultura y Pesca. Gobierno Autónomo de Canarias: 208 p.

González J.A., Lozano I.J., Caldentey M.A., Santana J.I., Gómez J.A. & Castillo R., 1988. Resultados de la campaña de prospección pesquera "CANARIAS 85". *Inf. Técn. Inst. Esp. Oceanogr.*, nº 57: 93 p.

Mena J., Brito A., González J.A., Rodríguez F.M. & Falcón J.M., 1993. La pesca artesanal del Peto (*Acanthocybium solandri* (Cuvier, 1832)) en las Islas Canarias. *Boletín del Instituto Español de Oceanografía* 9 (2): 305-312.

Brito A., Barquín J., Falcón J.M., González-Lorenzo G., Pascual-Alayón P. & Dorta C. 1995. *Informe sobre la propuesta de creación de una reserva marina en el Mar de las Calmas (El Hierro, Islas Canarias)*. Informe realizado a petición del Ministerio de Agricultura, Pesca y Alimentación. Departamento de Biología Animal (Ciencias Marinas y Zoología), Universidad de La Laguna. 40 p.

Jiménez S., 1997. *Taxonomía, Biología y Pesca de las especies de la Familia Muraenidae (Osteichthyes, Anguilliformes) en las Islas Canarias.* Tesis Doctoral (no publicada). Universidad de La Laguna.

Brito A. & Dorta C., 1998. *Estudio global de la pesca en El Hierro.* Departamento de Biología Animal (Ciencias Marinas), Universidad de La Laguna. Consejería de Agricultura, Pesca y Alimentación del Gobierno de Canarias. 37 pp. + anexos.

Brito A. & Dorta C., 1998. *Programa de Gestión de las Pesquerías Artesanales de La Restinga, PGPAdRE*. Departamento de Biología Animal (Ciencias Marinas), Universidad de La Laguna. Consejería de Agricultura, Pesca y Alimentación del Gobierno de Canarias. 71 pp. + anexos.

Brito A., Barquín J., Braun J.G., Reyes J., Falcón J.M., González G., Pascual P.J., Báez A., Cabrera M., Sancho A., Martín-Sosa P., Dorta C. & Tosco J.O., 1998. *Estudio de los parámetros biológicos, ecológicos y pesqueros en relación con el funcionamiento de las reservas marinas canarias. Tomos I y II*. Consejería de Agricultura, Pesca y Alimentación, Gobierno de Canarias. Departamentos de Biología Animal (Ciencias Marinas y Zoología) y Biología Vegetal (Botánica), Universidad de La Laguna. 515 pp. + anexos.

Menezes G., Da Silva H.M., Krug H., Balguerias E., Delgado J., González J.A., Lozano I.J., Lorenzo J.M., Carvalho D. & Santana J.I., 1998. Design optimisation and implementation of demersal cruise surveys in the Macaronesian archipelagos. *Arquivos do DOP, Sér. Estudos.* Universidade dos Açores, Horta (Azores, Portugal) (ISSN 0873-285X). Vol: 3/98: 1-162 + appendices.

Macías J., Pascual J., Lozano I.J., González J.A., Santana J.I., Díaz A. & Portillo A., 1999. *Plan de Desarrollo Pesquero de Canarias 1999-2004. Situación y Perspectivas*. Viceconsejería de Pesca del Gobierno de Canarias y Canaest Consultores, S.A: 514 p + anexos.

Brito A., Falcón J.M., Dorta C., García N. & Martín-Sosa P., 2000. *Proyecto de creación de un archivo fotográfico de las especies de interés pesquero de la Reserva Marina de La Restinga - Mar de Las Calmas (El Hierro).* Consejería de Agricultura, Pesca y Alimentación, Gobierno de Canarias. Departamento de Biología Animal (Ciencias Marinas), Universidad de La Laguna. 101 pp.

MPA: Monte da Guia / Faial

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Location:	38° 31'N 28° 37'W
Country:	Portugal, Azores
Coastal/Island:	Island (mixed inshore – offshore)
Total size:	443 ha
Integral size:	10 ha
Year of establishment:	Integral part and buffer zone since 1980, the SCI (Site of Community Importance) is part of Natura 2000 (2002)
Depth range:	0 - 125 m
Protection objectives:	Conservation, scientific research, tourism
Type of MPA:	Partial
Habitats:	Rocky reefs, caves, sandy substrates, shallow inlets and bays
Socio-economic activities:	Fishing, diving, tourism

Activities	Integral Reserve (IR)	Buffer Zone	SCI
Forbidden	Fishing, boating, swimming, scuba diving, spear fishing, angling, anchoring	Fishing, spear fishing, angling	
Regulated	Scientific survey	Scientific survey	Fishing, scientific survey, spear fishing
Allowed		Boating, swimming, scuba diving, anchoring	Scuba diving, swimming, angling, boating, anchoring

Description of the fisheries in and around the MPA

The main objective of the Monte da Guia marine reserve is to manage the marine environment in a way that safeguards its nature conservation importance at the same time as benefiting the local community.

Within the integral reserve and the buffer zone all fishing activities are forbidden. In the rest of the area, general regulations for the entire archipelago apply: no boats longer than 12 m are allowed to operate within 6 NM of the coast and netting is banned except for use in fisheries to catch live bait (when hand nets or small purse seines are used) or under a special permit for gill netting. Traditionally, the area between the islands of Faial and Pico (the 'channel'), where the Monte da Guia is located, is a fishing ground for the artisanal open-deck fleet that operate from both islands. This fleet comprises a multi-specific fishery targeting different species: hand line for bottom fishes, shore gill-netting for bottom and pelagic fishes, purse-seining for juvenile pelagics and pole-and-line fishing for larger pelagic predators. Spear fishing and mollusc collection (limpet, barnacle, crab and octopus) are also common.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR	-	-	-	-	-
	GR	-	-	-	-	-
Outside		Hand line	Year-round	*Epinephelus marginatus, Serranus atricauda, Pagellus bogaraveo, Polyprion americanus, Conger conger, Phycis phycis, Helicolenus dactylopterus*	*Raja* spp., *Galeorhinus galeus, Pagellus acarne, Balistes capriscus*	97
		Gillnet	Year-round	*Sparisoma cretense, Sphyraena viridensis, Sarda sarda*	*Diplodus vulgaris,* Mugilidae, *Sarpa salpa*	
		Purse seine	Year-round	*Trachurus trachurus*	*Pagellus bogaraveo, Sardina pilchardus*	
		Pole and line	Year-round	*Seriola* spp., *Pseudocaranx dentex*	*Balistes capriscus*	

Statistics

Landings of the most important species (by weight) from the region for 2004*

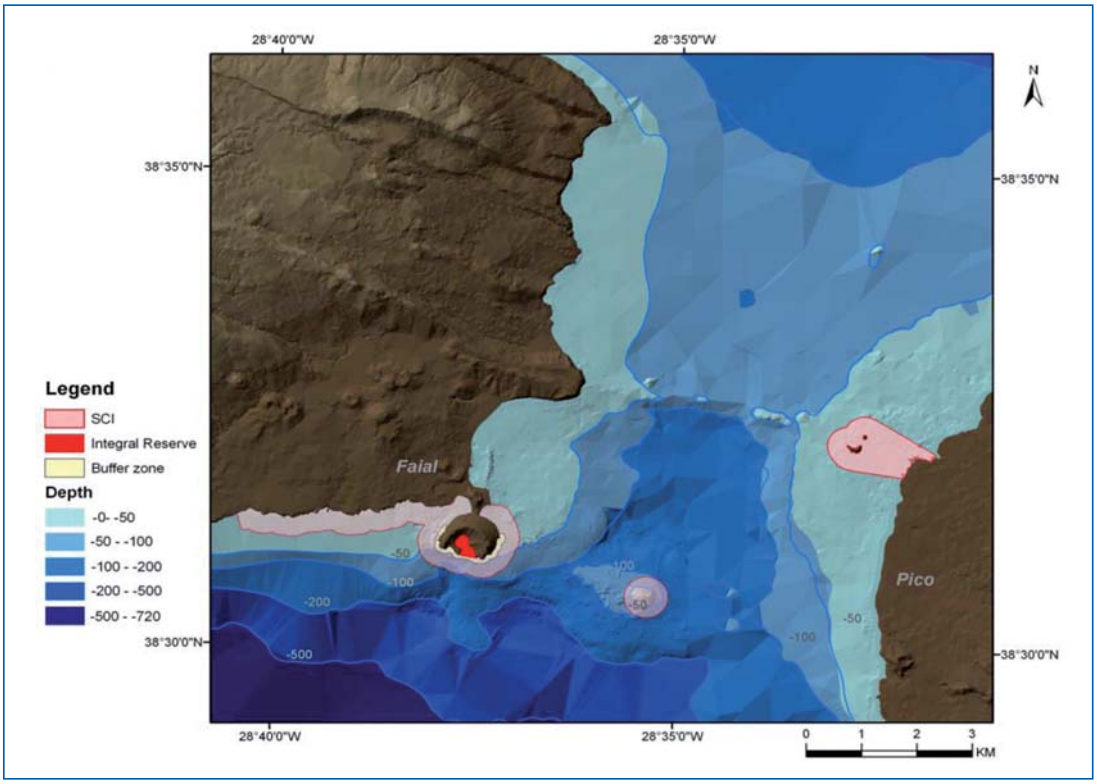
	Weight (tons)
Total landings (all species)	1,235.078
Katsuwonus pelamis	810.391
Pagellus bogaraveo	160.791
Thunnus obesus	89.686

*Landings from Horta harbour

Fishing regulations

National legislation:
Law Decree nº. 7/2000, May 30th
Ordinance 1102-C/2000, November 22nd
Law Decree nº. 278/98, July 7th
Law Decree nº. 383/98, November 27th

Regional legislation:
Decree nº. 27/98, July 9th
Decree nº. 101/2002, October 24th
Regional Decree nº 1/1980/A, January 31st
Regional Regulatory Decree nº 13/84/A, March 31st



Database reference

http://www.lotacor.pt/
http://www.horta.uac.pt/projectos/macmar/ogamp/index.html

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Publications

Nash R.D.M., Santos R.S., Geffen A.J., Hughes G. & Ellis T.R., 1994. Diel variability in catch rate of juvenile flatfish on two small nursery grounds (Port Erin Bay, Isle of Man and Porto Pim Bay, Faial, Azores). *Journal of Fish Biology* 44 (1):35-45.

Porteiro F.M. & Martins H.R., 1994. Biology of *Loligo forbesi* Steenstrup, 1856 (Mollusca: Cephalopoda) in the Azores: sample composition and maturation of squid caught by jigging. *Fisheries Research* 21 (1-2) (Special Issue): 103-114.

Santos R.S., Hawkins S., Monteiro L.R, Alves M. & Isidro E.J., 1995. Marine research, resources, and conservation in the Azores. *Aquatic Conservation – Marine and Freshwater Ecosystems* 5 (4): 311-354.

Nash R.D.M. & Santos, R.S., 1998. Seasonality in diel catch rate of small fishes in a shallow-water fish assemblage at Porto Pim bay, Faial, Azores. *Estuarine, Coastal and Shelf Science* 41 (5): 579-591.

Sousa F., Isidro E., & Erzini K., 1999. Semi-pelagic long line selectivity for two demersal species from the Azores: the black spot sea bream (*Pagellus bogaraveo*) and the bluemouth rockfish (*Helicolenus dactylopterus dactylopterus*). *Fisheries Research* 41: 25-35.

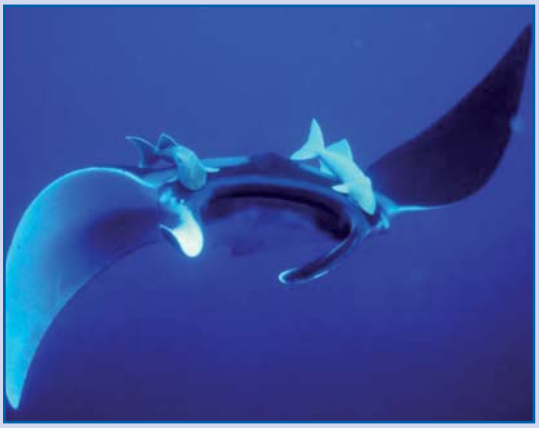
Morato T., Guenette S. & Pitcher T.J., 2001. Fisheries impacts on North Atlantic ecosystems: catch, effort and national/regional data sets. *Fisheries Centre Research Reports* 9 (3): 214-220.

Carreira G.P., Gonçalves J.M. & Nash R.D.M., 2002. Exploitation of octopus in the Azores (NE Atlantic): current status and experimental fishery. *Bulletin of Marine Science* 71 (2): 1116.

Morato T., Solà E., Grós M.P. & Menezes G., 2003. Diets of thornback ray (*Raja clavata*) and tope shark (*Galeorhinus galeus*) in the bottom longline fishery of the Azores, north-eastern Atlantic. *Fishery Bulletin* 101 (3): 509-602.

MPA: Formigas islet / Dollabarat Bank

Contributors: Frederic Vandeperre, Pedro Afonso, Frederico Cardigos, Ruth Higgins, Fernando Tempera & Ricardo Serrão Santos. Departamento de Oceanografia e Pescas, IMAR - Universidade dos Açores, PT-9901-862 Horta, Portugal.



Location:	37º 14'N 24º43W - 37º 17'N 24º 47'W
Country:	Portugal, Azores
Coastal/Island:	Island (offshore)
Total size:	52,527 ha
Integral size:	52,527 ha
Year of establishment:	1988 (modified in 2003)
Depth range:	0 - > 1700 m
Protection objectives:	Conservation, scientific research, tourism
Type of MPA:	Integral
Habitats:	Rocky reefs, *Laminaria* beds, *Cystoseira* beds, deep coral
Socio-economic activities:	Fishing, diving, tourism

Activities	General reserve
Forbidden	Spear fishing, catch and collection of organisms except *
Regulated	* Tuna fishing, scientific research, archaeological extraction, geological extraction
Allowed	Boating, diving, anchoring

Description of the fisheries in and around the MPA

The Formigas Islets and Dollabarat Bank MPA was created to protect and to manage the natural environment and its resources, to enhance scientific knowledge and to organise tourist, recreational and fishery activities in a sustainable manner.

The Formigas Islets comprise an area of deep sea and sub- and supra-aquatic seamounts. The Dollabarat Bank, on the other hand, is a shallow marine plain.

All fishing activities are forbidden within the reserve, with the exception of tuna fisheries, under certain conditions. These fisheries may only be conducted by pole-and-line and only by vessels that are equipped with the MONICAP (MONItorização Contínua das Actividades da Pesca) monitoring system, a system that can track the location of any given vessel. Traditionally, the area as been a fishing ground for the artisanal open-deck and semi-artisanal fleet targeting bottom fish, both in the shallow and in the deeper part of the seamount, that operate from the neighboring islands of Santa Maria and São Miguel. This fishing occurs also in the islets and seamount slopes located nearest to the islands. Limpet collection and spear fishing is known to have occurred from the neighboring islands.

The reserve is regulated by the Regional Government of the Azores.

Area	Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	Pole-and-line	Spring/Summer	tuna	-	19
Outside	Pole-and-line	Spring/Summer	tuna	-	19
Outside	Bottom longline	Year-round	*Pagellus bogaraveo*, *Polyprion americanus*, *Conger conger*, *Phycis phycis*, *Helicolenus dactylopterus*, *Beryx* sp., *Molva dipterygia*	*Raja* spp., *Galeorhinus galeus*, *Lepidopus caudatus*, *Mora moro*	N/A
Outside	Surface longline	Year-round	*Xiphias gladius*	*Prionace glauca*, *Caretta caretta*	N/A

Statistics

Landings of the most important species (by weight) from the region for 2004
Not available

Fishing regulations

National legislation:
Law Decree nº. 7/2000, May 30th
Ordinance 1102-C/2000, November 22nd
Law Decree nº. 278/98, July 7th
Law Decree nº. 383/98, November 27th

Regional legislation:
Regional Law Decree nº. 26/2003/A, May 27th
Decree nº. 27/98, July 9th
Decree nº. 101/2002, October 24th

Database reference

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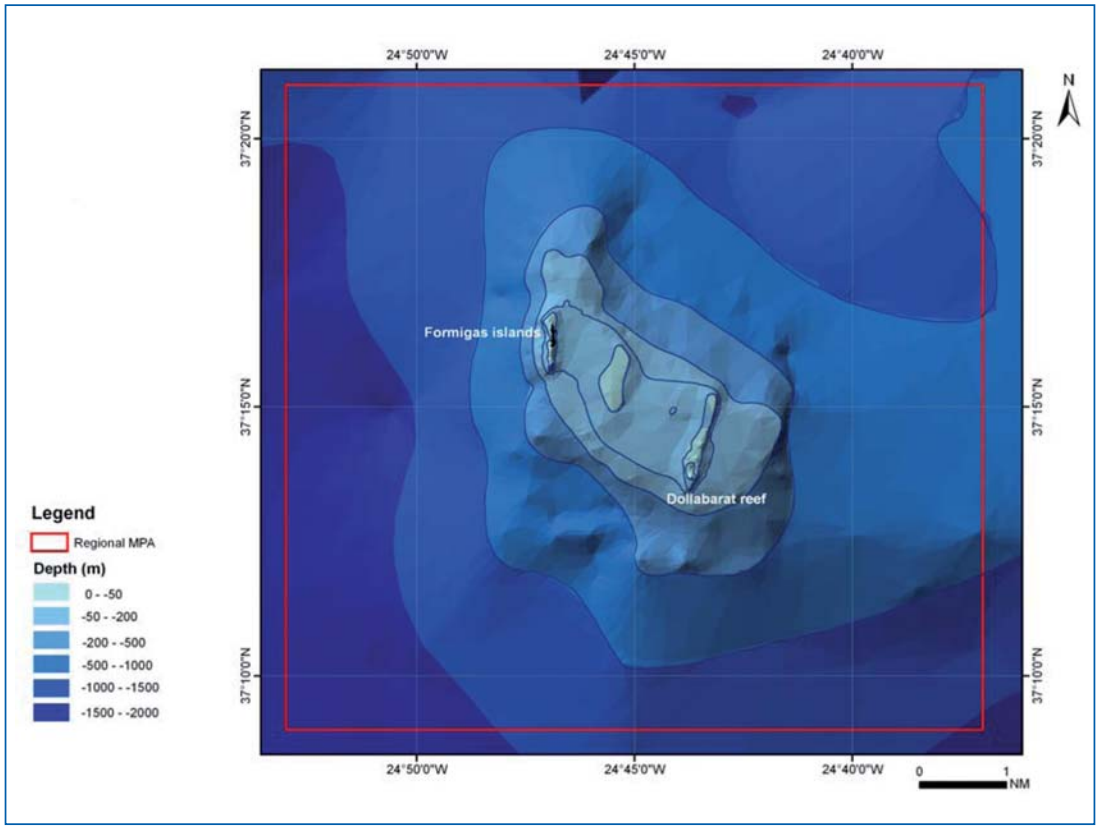

Publications

Porteiro F.M. & Martins H.R., 1994. Biology of *Loligo forbesi Steenstrup*, 1856 (Mollusca: Cephalopoda) in the Azores: sample composition and maturation of squid caught by jigging. *Fisheries Research* 21(1-2) (Special Issue): 103-114.

Santos R.S., Hawkins S., Monteiro L.R, Alves M. & Isidro E.J., 1995. Marine research, resources, and conservation in the Azores. *Aquatic Conservation – Marine and Freshwater Ecosystems* 5 (4): 311-354.

Sousa F., Isidro E. & Erzini K., 1999. Semi-pelagic longline selectivity for two demersal species from the Azores: the black spot sea bream (*Pagellus bogaraveo*) and the bluemouth rockfish (*Helicolenus dactylopterus dactylopterus*). *Fisheries Research* 41: 25-35.

Avila S.P., Fontes J., Tempera F. & Cardigos F., 2000. Additions to the marine molluscs of the Formigas Islets, Azores. *Acoreana* 9 (2): 175-178.

Morato T., Guenette S. & Pitcher T.J., 2001. Fisheries of the Azores (Portugal), 1982-1999. Fisheries impacts on North Atlantic ecosystems: catch, effort and national/regional data sets. *Fisheries Centre Research Reports* 9 (3): 214-220.

Pinho M.R., Gonçalves J.M. & Martins H.R., 2001. Biology and abundance of *Cancer bellianus* (Decapoda, Brachyura) around the Azores. *ICES Journal of Marine Science* 58 (4): 896-903.

Carreira G.P., Gonçalves J.M. & Nash R.D.M., 2002. Exploitation of octopus in the Azores (NE Atlantic): current status and experimental fishery. *Bulletin of Marine Science*,71 (2): 1116.

Morato T., Solà E., Grós M.P. & Menezes G., 2003. Diets of thornback ray (*Raja clavata*) and tope shark (*Galeorhinus galeus*) in the bottom longline fishery of the Azores, north-eastern Atlantic. *Fishery Bulletin* 101 (3): 509-602.

MPA: Tuscany Archipelago

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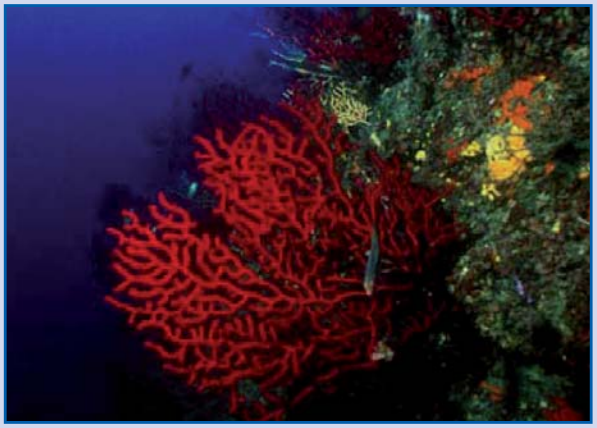


Location: 42°45'N 10°15'E
Country: Italy
Coastal/Island: 100% island
Total size: 56,766 ha
Integral size: 6,147.4 ha
Year of establishment: 1996
Depth range: 0 – 100 m
Protection objectives: Conservation of natural habitats, promotion of eco-tourism
Type of MPA: Partial
Habitats: *Posidonia oceanica* beds, rocky reefs, sandy bottom
Socio-economic activities: Diving, tourism

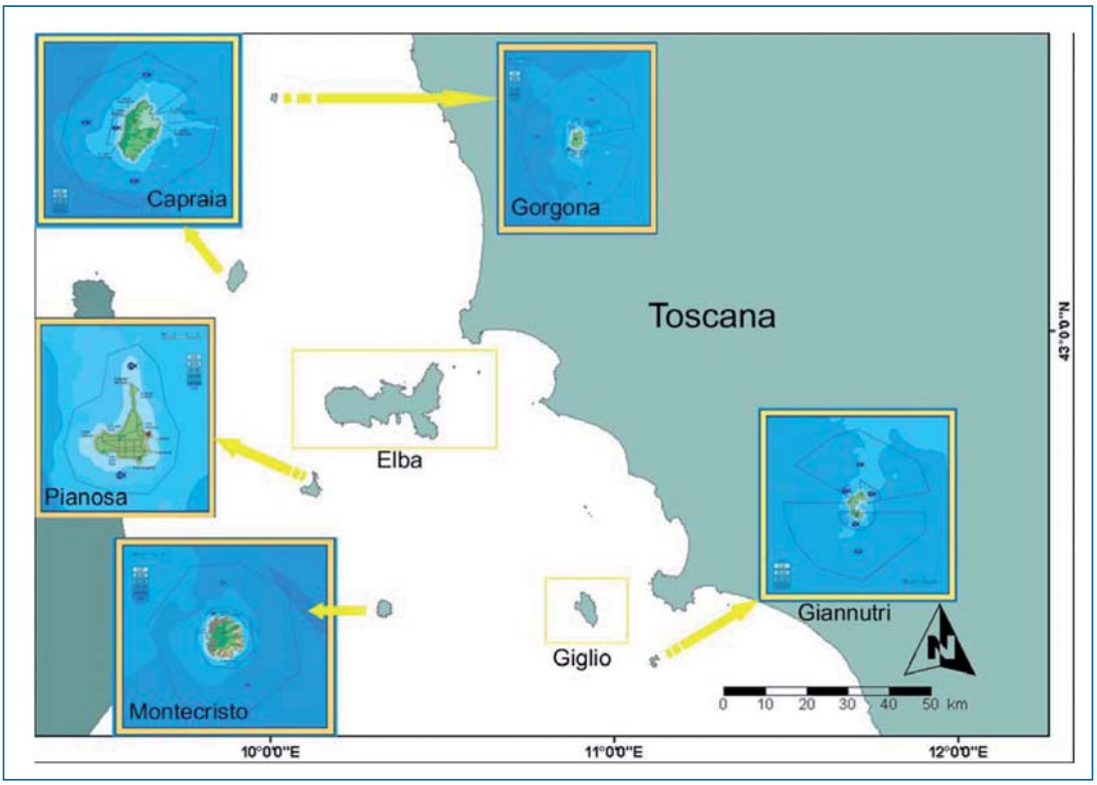
Activities	Integral Reserve (IR)	Restricted Use area (RU)	Free access
Forbidden	Fishing, spearfishing, angling, scuba diving, swimming, boating, anchoring	Spearfishing	
Regulated	Scientific research	Fishing, angling	
Allowed		Swimming, scuba diving, scientific research, boating, anchoring	All activities

Description of the fisheries in and around the MPA

The Tuscany Archipelago National Park was created with the primary aims of preserving natural habitats and promoting eco-tourism. MPAs are established on the islands of Capraia, Gorgona, Giannutri, Pianosa and Montecristo.

Within the integral reserve all fishing activities are forbidden. The MPA is divided into integral reserve, restricted use and free access areas, which are regulated by the Ente Parco Nazionale Arcipelago Toscano and by general Italian maritime laws. Resident artisanal fishing guilds are found on the islands of Elba, Capraia and Giglio. Boats coming from the mainland, mostly from Porto Santo Stefano (Grosseto), especially trawlers, fish around limits of the marine reserve.

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	IR	-	-	-	-	-
	RU	n/a	n/a	n/a	n/a	n/a
Outside		n/a	n/a	n/a	n/a	n/a



Statistics

Landings of the most important species (by weight) from the region for 2005

	Weight (tons)
Total landings	6,412.08
Sardina pilchardus	1567.37
Engraulis encrasicolus	791.11
Trachurus spp.	190.73

Fishing regulations

L. 394/91.
D.P.R. 22/07/1996.
D.M. Ambiente 19/12/1997.

Database reference

Information about the Parco Nazionale Arcipelago Toscano can be found visiting the website: www.islepark.it

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Publications

Auteri R., Abella A., Baino R., Righini P., Serena F., Voliani A. & Silvestre R., 1994. Considerazioni sullo stato di sfruttamento delle risorse demersali (Foce del Magra-Isola d'Elba). *Biol. Mar. Medit*. 1 (2): 23-25.

De Ranieri S., Belcari P., Bertolini D., Biagi F., Mori M., Reale B., Sartor P., Sbrana M. & Viva C., 1994. Considerazioni sullo stato di sfruttamento delle risorse demersali (Isola d'Elba-Isola di Giannutri). *Biol. Mar. Medit*. 1 (2): 27-41.

Sartor P. & De Ranieri S., 1994. Pesca con reti a strascico tradizionali e ad ampia apertura verticale: analisi comparativa dello sbarcato. *Biol. Mar. Medit*. 1 (1): 311-312.

Sbrana M. & Reale B., 1994. Selettività di una rete a strascico di tipo "Italiano" sulla cattura di nasello (*Merluccius merluccius* L.) nell'Arcipelago Toscano. *Biol. Mar. Medit*. 1 (1): 313-314.

Viva C. & De Ranieri S., 1994. Analisi dello sbarcato di *Merluccius merluccius* L. con reti da traino a Porto Santo Stefano (GR, Italia). *Biol. Mar. Medit*. 1 (1): 321-322.

Abella A. & Serena F., 1995. Definition of the groundfish assemblages caught off the Tuscanian coast for fisheries management purposes. *Rapp. Comm. int. Mer Médit*. 34: 235.

De Ranieri S., 1995. Le risorse demersali nell'Arcipelago Toscano Meridionale. *Atti Soc. Tosc. Sci. Nat. Pisa*, Mem. Ser. A, Vol. 102, Suppl.: 185-195.

Reale B., Sbrana M. & De Ranieri S., 1995. Population dynamics of *Merluccius merluccius* exploited by two different trawl-nets in the Northern Tyrrhenian Sea. *Rapp. Comm. int. Mer Médit*. 34: 254.

Sartor P., Sbrana M. & Reale B., 1996. Sfruttamento del nasello, *Merluccius merluccius*, (L. 1758) nell'Arcipelago Toscano Meridionale. *Biol. Mar. Medit*. 3 (1): 576-578.

Biagi F., Gambaccini S. & Zazzetta M., 1997. Popolamento ittico di un'area protetta all'Isola d'Elba. *Biol. Mar. Medit.* 4 (1): 466-468.

Demestre M., Sbrana M., Alvárez F. & Sánchez, P., 1997. Analysis of the interaction of fishing gears in Mullus barbatus fisheries of the Western Mediterranean. *J. Appl. Ichtyiol*. 13: 49-56.

De Ranieri S., Belcari P., Bertolini D., Biagi F., Chiericoni V., Cognetti A.G., Mori M., Nannini N., Reale B., Rocca V., Sartor P. & Sbrana M., 1997. Reclutamento di alcune specie ittiche demersali nel Mar Tirreno Settentrionale. *Biol. Mar. Medit*. 4 (1): 237-243.

Abella A. & Serena F., 1998. Stato di sfruttamento del nasello nei compartimenti di pesca di Livorno e Viareggio. *Biol. Mar. Medit*. 5 (2): 136-150.

Abella A. & Serena F., 1998. Selettività e vulnerabilità del nasello nella pesca a strascico. *Biol. Mar. Medit*. 5 (2): 496-504.

Auteri R., Abella A., Baino R., Righini P., Serena F., Silvestre R., Voliani A. & Zucchi A., 1998. Valutazione delle risorse demersali dalla foce del Magra all'Isola d'Elba: sintesi delle ricerche sulla pesca a strascico negli anni 1985-97. *Biol. Mar. Medit*. 5 (3): 30-39.

Baino R., Righini P. & Silvestri R., 1998. Target species and CPUE of trammel, gillnet and combined net in sandy and rocky bottoms. *Rapp. Comm. int. Mer Médit*. 35: 516-517.

Belcari P., Sartor P. & De Ranieri S., 1998. I cefalopodi nello sbarcato commerciale con reti a strascico del Mar Tirreno Settentrionale. *Biol. Mar. Medit*. 5 (2): 318-325.

Biagi F., De Ranieri S., Belcari P., Bertolini D., Chiericoni V., Farnocchia I., Mori M., Nannini N., Reale B., Sartor P., Sbrana M. & Viva C., 1998. Valutazione delle risorse demersali nell'Arcipelago Toscano dall'Isola d'Elba all'Isola di Giannutri. *Biol. Mar. Medit*. 5 (3): 40-52.

Biagi F., Gambaccini S. & Zazzetta M., 1998. Fish community structure and the complexity of substratum: the case of "Le Ghiaie" protected marine area (Island of Elba). *Atti 12° Congresso A.I.O.L.*, Isola di Vulcano 1996, Vol. II: 273-284.

Sartor P., Belcari P., Carbonell A., González M., Quetglas A. & Sánchez P., 1998. The importance of cephalopods to trawl fisheries in the western Mediterranean. *S. Afr. J. mar. Sci*. 20: 67-72.

Sartor P., Reale B., Sbrana M. & Biagi F., 1998. Analisi dello sbarcato commerciale con reti a strascico presso un porto del Mar Tirreno Settentrionale. *Biol. Mar. Medit*. 5 (2): 81-91.

Sbrana M., Biagi F., Sartor P. & De Ranieri S., 1998. Osservazioni sulla selettività di una rete a strascico commerciale utilizzata nell'Arcipelago Toscano (Tirreno Settentrionale). *Biol. Mar. Medit*. 5 (2): 449-456.

Voliani A. & Abella A., 1998. Stime di selettività su *Mullus barbatus* con differenti metodologie e alcune considerazioni sulla loro validità. *Biol. Mar. Medit*. 5 (2): 457-464.

Voliani A., Abella A. & Serena F., 1998. Problematiche inerenti la valutazione dello stato di sfruttamento di *Mullus barbatus*. *Biol. Mar. Medit*. 5 (2): 169-183.

Martin P., Sartor P. & García-Rodríguez M., 1999. Exploitation patterns of the European hake *Merluccius merluccius*, red mullet *Mullus barbatus* and striped red mullet *Mullus surmuletus* in the western Mediterranean. *J. Appl. Ichtyol*. 15: 24-28.

Sartor P., Biagi F., Mori M. & Sbrana M., 1999. Analisi dello scarto di importanti specie ittiche nella pesca a strascico del Mar Tirreno settentrionale. *Biol. Mar. Medit*. 6 (1): 605-608.

Sbrana M., Sartor P., Reale B. & Biagi F., 1999. Inter-specific selectivity of experimental set nets along Tuscany coast. *Biol. Mar. Medit*. 6 (1): 609-613.

Abella A., Serena F. & Fortunati L., 2000. Dinamica della flotta peschereccia a strascico di Viareggio descritta mediante l'uso di un sistema geografico (GIS). *Biol. Mar. Medit*. 7 (1): 565-570.

Belcari P., De Ranieri S., Reale B., Sartor P., Sbrana M. & Viva C., 2001. Spatial distribution and seasonal concentration of European hake's juveniles, *Merluccius merluccius* (L., 1758), in the north Tyrrhenian sea. *Rapp. Comm. Int. Mer. Médit*. 36: 238.

Sartor P., Recasens L., Viva C. & Lleonart J., 2001. Analysis of the impact of the fishery on the adult population of European hake in the northwestern Mediterranean. *Rapp. Comm. Int. Mer. Médit*. vol. 36: 321-322.

Sartor P., Sartini M., Reale B. & Sbrana M., 2001. Analysis of the discard practices in the *Merluccius merluccius* (L. 1758) bottom trawl fishery of the Northern Tyrrhenian Sea. *Biol. Mar. Medit*. 8(1): 771-774.

Sbrana M., Belcari P., Francesconi B. & Rossetti I., 2001. Gill net fishery targeting *Solea vulgaris* Quensel, 1806 in the Eastern Ligurian Sea. *Rapp. Comm. int. Mer. Médit*. 36: 323.

Sbrana M., Francesconi B. & Viva C., 2001. Catch efficiency and demographic structure of the catches of two types of trammel nets for the cuttlefish*, Sepia officinalis* Linnaeus, 1758, along the coastal area of Livorno. *Biol. Mar. Medit.* 8 (1): 779-782.

Sbrana M., Reale B. & Viva C., 2001. Catch efficiency of fixed experimental set nets along a coastal area of the Eastern Ligurian Sea. *Biol. Mar. Medit*. 8 (1): 775-778.

Biagi F., Sartor P., Ardizzone G.D., Belcari P., Belluscio A. & Serena F., 2002. Analysis of demersal assemblages off the Tuscany and Latium coasts (North-Western Mediterranean). *Scientia Marina* 66 (suppl. 2): 233-242.

Rossetti I., Francesconi B., Gambaccini S. & Vannucci A., 2002. Il distretto di pesca della Toscana. *I quaderni scientifici della Lega Pesca* 3: 3-57.

Sartor P., Sbrana M., Ungaro N., Marano C.A., Piccinetti C. & Manfrin G., 2002. Distribution and abundance of *Citharus linguatula*, *Lepidorhombus boscii* and *Solea vulgaris*, (Osteichthyes: Pleuronectiformes) in the Mediterranean sea. *Scientia Marina* 66 (suppl. 2): 83-102.

Sbrana M., Reale B., Rossetti I. & Sartor P., 2002. Fishing grounds of the Livorno artisanal fleet, Eastern Ligurian Sea. *Biol. Mar. Medit*. 9 (1): 804-807.

Voliani A., Abella A. & Auteri R., 2002. Un approccio semplice per confrontare il ricavo potenziale dei fondali sfruttati dalla pesca a strascico. *Biol. Mar. Medit*. 9 (1): 826-830.

De Ranieri S., Serena F., Sartor P., De Biasi A.M., Tudini L. & Rabiti R., 2003. Realizzazione d'indagine per la conoscenza e la valorizzazione delle attività di pesca e maricoltura in Toscana. ARSIA, Agenzia Regionale per lo Sviluppo e l'Innovazione nel settore Agricolo-forestale, Firenze, Regione Toscana, G. C. Antonelli (a cura di), pp. 1-45, cd allegato.

Sartor P., Sbrana M., Reale B. & Belcari P., 2003. Impact of the deep sea trawl fishery on demersal communities of the Northern Tyrrhenian Sea (Western Mediterranean). *J. Northw. Atl. Fish. Sci.* vol. 31: 275-284.

Sbrana M., Sartor P. & Belcari P., 2003. Analysis of the factors affecting crustacean trawl fishery catch rates in the northern Tyrrhenian Sea (western Mediterranean). *Fisheries Research* 65: 271-284.

Sbrana M., Sartor P. & Reale B., 2003. Fishing capacity and fishing activity of the trammel net targeting red mullets in the artisanal fleet of Livorno (Eastern Ligurian Sea). *Biol. Mar. Medit*. 10 (2): 909-912.

Micheli F., Benedetti-Cecchi L., Gambaccini S., Bertocci I., Borsini C., Osio G.-C. & Romano F., 2005. Cascading human impacts, marine protected areas, and the structure of Mediterranean reef assemblages. *Ecological Monographs* 75: 81-102.

MPA: 25NM Fisheries Management Zone (FMZ). Around Malta

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Location:	35º 56'N 14º 20º E
Country:	Malta (Central Mediterranean)
Coastal/Island:	Island (mixed inshore/offshore)
Total size:	1,198,000 ha
Integral size:	-
Year of establishment:	As Exclusive Fishing Zone (EFZ) (1971), and as Fisheries Management Zone (FMZ) following EU accession (2004)
Depth range:	0 - 1,200 m
Protection objectives:	Fisheries conservation; conservation of benthic ecosystems supporting fisheries
Type of MPA:	Partial
Habitats:	Sandbanks, reefs, *Posidonia oceanica* beds, large shallow inlets and bays, offshore habitats including open water, and various types of sedimentary bottoms.
Socio-economic activities:	Fishing, maritime activities, all types of inshore aquatic activities

Activities	3 Nautical mile limit	12 Nautical mile limit	25 Nautical mile limit
Forbidden	Trawling		
Regulated	Fishing, angling	Fishing, angling, trawling	Fishing, angling, trawling
Allowed	Swimming, diving, boating, anchoring, spear fishing	Swimming, diving, boating, anchoring, spear fishing	Swimming, diving, boating, anchoring, spear fishing

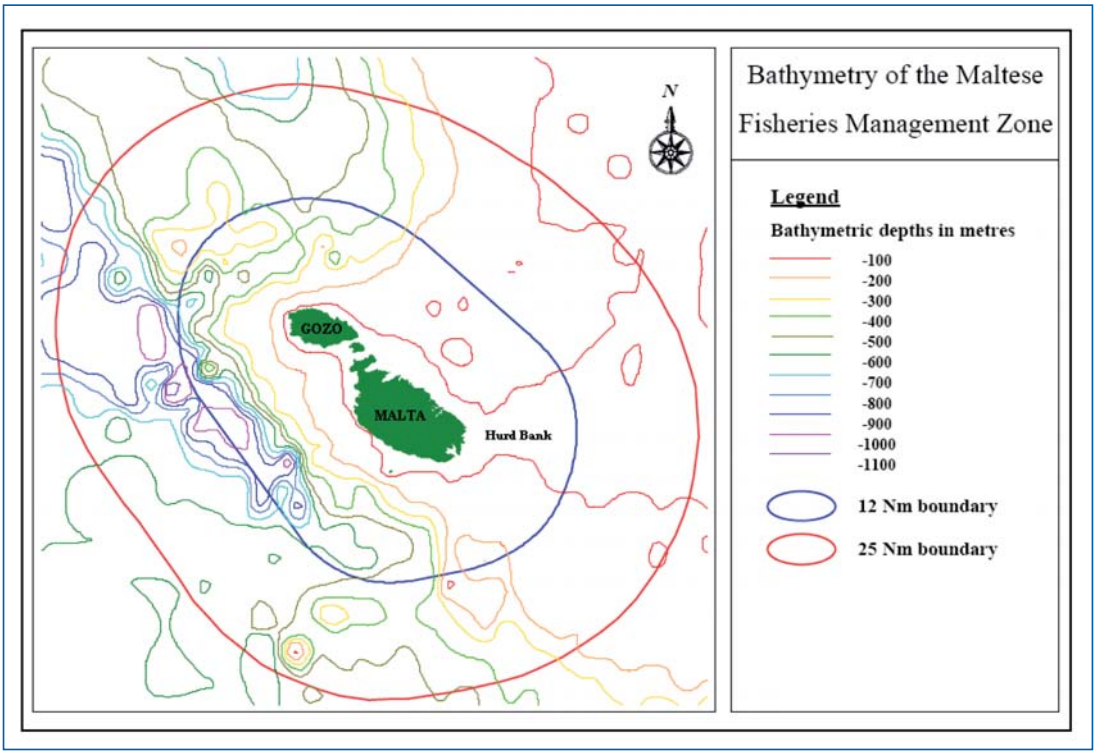
Description of the fisheries in and around the MPA

The key aim of the Malta Fisheries Management Zone (FMZ) is to protect the fisheries resources of Malta's sea area and the ecosystems on which they depend. During the accession negotiations with the EU, Malta presented to the EU a number of studies which showed the negative effects that purse-seining and industrial long-lining (two very intensive fishing methods), as practised by EU fishers, would have in the Maltese EFZ area if this was opened up to these fishery types. The EU recognized the conflict that exists between these intensive fishing methods and the less intensive passive fishing operations practised to date by the Maltese fishing fleet. For this reason, the EU agreed that when Malta would become a member state, sustainable fishing in the previous EFZ would be safeguarded through the setting up of a Fisheries Management Zone and the implementation of a variety of management actions. Thus, the Malta FMZ in effect functions as a 'marine protected area' albeit being a new type for the Mediterranean.

The measures adopted for the management of resources within the FMZ are designed to limit fishing effort and capacity by restricting size and engine power of fishing vessels. In particular, only vessels smaller than 12 m are allowed to fish within the zone since these are considered as boats that practice small scale coastal fishing and which are therefore least harmful to the ecological regime within the zone.

By way of exception to the above arrangement, four types of fishing activities are nevertheless allowed, but sometimes restricted, within the Malta 25 NM FMZ by vessels that may be larger than 12 m. These are trawling, fishing for Lampuki (Dolphin fish), lampara (small-scale pelagic purse seining with the aid of lamps) and fishing for tuna, swordfish and other highly migratory species.

Area	Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside	bottom longlines	Jan-Mar	*Pagellus* spp., *Dentex dentex*, *Polyprion americanus*, *Epinephelus* spp. *Pagrus pagrus*	*Raja* spp., *Scorpaena* spp., *Squalus blainvillei*, *Squatina squatina*	1,492
	trammel-nets and gill-nets	All seasons	*Mullus barbatus*, *Mullus surmuletus*, Scorpaenidae (*Scorpaena* spp.), *Boops boops*, *Trachurus* spp.	Sparidae spp. (e.g. *Oblada melanura* *Pagrus pagrus*), Scorpaenidae (e.g. *Scorpaena* spp.)	550
	drift-nets	Mar-July	*Oblada melanura*, *Scomber japonicus*, *Scomber scombrus*	Sparidae spp.	12
	'Lampara' purse-seining	Jan-Aug	*Scomber japonicus*, *Scomber scombrus*, *Engraulis encrasicolus*, *Sardina pilchardus*	*Trachurus trachurus*, *Trachurus mediterraneus*, *Boops boops*, *Alosa alosa*	18
	Surface long-lines	May-July	*Thunnus thynnus*	*Xiphias gladius*	321
	ring net/*kannizzati*	Aug-Jan	*Coryphaena hippurus*,	*Naucrates ductor*, *Seriola dumerili*	185
	traps	All seasons	*Octopus vulgaris*, *Spicara* spp., *Boops boops*	*Muraena helena*, *Palinurus elephas*, Scorpaenidae spp.	543
	Trawling (50 – 150m)	All seasons	*Mullus barbatus*, *Serranus* spp., *Pagellus* spp., *Trachinus* spp.	*Octopus vulgaris*, *Todarodes sagittatus*, *Sepia officinalis*	17
	Trawling (150-300m)	All seasons	*Merluccius merluccius*, *Parapenaeus longirostris*, *Mullus barbatus*	*Raja* spp., *Boops boops*, *Trachurus* spp. *Mullus surmuletus*	
	Deep sea Trawling (400 – 800m)	All seasons	*Aristaeomorpha foliacea*, *Nephrops norvegicus*, *Parapenaeus longirostris*	*Citharus linguatula* *Phycis blennoides*, *Merluccius merluccius*, *Aristeus antennatus*	
Outside	Surface long-lines	May-July	*Thunnus thynnus*	*Xiphias gladius*	321
	bottom longlines	Jan-Mar	*Pagellus spp.*, *Dentex dentex*, *Polyprion americanus*, *Epinephelus costae*, *Pagrus pagrus*	*Raja* spp., *Scorpaena* spp., *Squalus acanthias*, *Squatina squatina*	1,492
	Trawling (50 – 150m)	All seasons	*Mullus barbatus*, *Serranus* spp., *Pagellus* spp., *Trachinus* spp.	*Octopus vulgaris*, *Todarodes sagittatus*, *Sepia officinalis*	< 50
	Trawling (150-300m)	All seasons	*Merluccius merluccius*, *Parapenaeus longirostris*, *Mullus barbatus*	*Raja* spp., *Boops boops*, *Trachurus* spp. *Mullus surmuletus*	
	Deep sea Trawling (400 – 800m)	All seasons	*Aristaeomorpha foliacea*, *Nephrops norvegicus*, *Parapenaeus longirostris*	*Citharus linguatula*, *Phycis blennoides*, *Merluccius merluccius*, *Aristeus antennatus*	



Statistics

Landings of the most important species (by weight) from the region for 2004

	Weight (tons)
Total landings (2004)	1,068
Coryphaena hippurus	473 (44%)
Thunnus thynnus	228 (21%)
Xiphias gladius	174 (16%)

Fishing regulations

Legislation directly related to fisheries and aquaculture

Chapter 425 Fisheries Conservation & Management Act
Chapter 146 Agriculture and Fishing Industries (Financial Assistance) Act
Chapter 129 Tunny Fishery (Shares) Act
Subsidiary Legislation LN 407 (2004) Fishing Vessels Regulations
Subsidiary Legislation 10.12 Fishery Regulations
Subsidiary Legislation 138.01 Fish Marketing Regulations
Subsidiary Legislation 138.03 Slipway (Use) Regulations
Subsidiary Legislation 10.30 Berthing Regulations
Subsidiary Legislation 138.04 Registration of Fishing Boats Regulations
Subsidiary Legislation 138.06 Marine Vegetation Licence Regulations
Subsidiary Legislation 138.02 Tunny Fish (Importation) Restriction Order
Subsidiary Legislation 36.34 Aquaculture Regulations
Subsidiary Legislation 231.12 Sale of Fish Regulations
Subsidiary Legislation 231.43 Fish Packing and Processing Establishment Regulations
Subsidiary Legislation 36.26 Prohibition of Sale of Sea-Food Regulations
Subsidiary Legislation 35.01 Fees Leviable by Government Departments Regulations (Sections 5b & Ministry for Agriculture & Fisheries - Fisheries section)

Subsidiary Legislation 35.10 Fees for Abattoir and Veterinary Services Regulations (Section II)
Subsidiary Legislation 117.12 Price Control of Fish Regulations
Subsidiary Legislation 35.13 Fees Levied at Agricultural Produce Marketing Centres Regulations
Subsidiary Legislation 138.05 Fisheries Officers (Remuneration) Regulations
Council of the European Union (2004) Council Regulation (EC) No 813/2004. Corrigendum to Council Regulation (EC) No 813/2004 of 26 April 2004 amending Regulation (EC) No 1626/94 as regards certain conservation measures relating to waters around Malta (OJ L 150, 30.4.2004). *Official Journal*/ L185 (24/5/200).

Database reference

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Publications

Agriculture and Fisheries Statistics, 1998-2004. Malta. Valletta. National Statistics Office, xvi + 148 pp.

Leiva I., Busuttil C., Darmanin M. & Camillleri M., 1998. *Project FAO COPEMED Artisanal fisheries in the western Mediterrranean: Malta fisheries.* The Department of Fisheries and Aquaculture. Malta. Unpublished report, 21 pp.

Anonymous, 2000. *Technical and biological Report for the Region M3 (Italian coasts - South Tyrrhenian Sea, Strait of Sicily - and Maltese waters)*. Unpublished report, Mazara del Vallo, Italy. 37pp.

Camilleri M., Coppola R. & De Leiva J.L., 2000. *Operational Units - A Preliminary Study* General Fisheries Commission for the Mediterranean Scientific Advisory Committee Sub-Committee on Statistics and Information. Project FAO – Copemed Report 36 pp.

Farrugia A. & Rodriguez-Cabello C., 2000. *Preliminary study on the age estimation of bluefin tuna (*Thunnus thynnus, L.*) around the Maltese Islands*. SCRS/108/00. Project FAO – Copemed Report 4 pp.

Morales–Nin B., Camilleri M., Darmanin M., Camilleri C., Besbes A. & El Abed Amor, 2000. Fishery, biology and management of dolphin fish (*Coryphaena hippurus*) in Malta and Tunisia. Report of the activities for the year 2000. Cory-Malta & Tunisia. 28 pp.

Anonymous, 2001a. *A study to establish that the shelf of the Maltese Islands is a distinct management unit*. Unpublished report, Department of Fisheries and Aquaculture, Malta. 15 pp.

Anonymous, 2001b. *Technical and biological Report for the Region M3 (Italian coasts - South Tyrrhenian Sea, Strait of Sicily - and Maltese waters)*. Unpublished report. Mazara del Vallo, Italy. 32pp.

Camilleri M. & Darmanin M., 2001. *Catch and effort data of the Maltese dolphin fish fishery*. Project FAO – Copemed Report 6 pp.

Farrugia A., 2001. Revision of historical catches of bluefin tuna made by Maltese longliners. SCRS/01/164. Col.Vol.Sci.Pap. ICCAT, 54(5): 1768-1770. (2002)

Fiorentino F., Camilleri M., Bono G., Gancitano S., Giusto G.B., Ragonese S., Rizzo P. & Rosso B., 2001. On a spawning aggregation of the Brown Meagre, *Sciaena umbra* L., 1758 (Sciaenidae, Osteichthyes) in Maltese waters (Sicilian Channel – Central Mediterranean). *Rapp. Comm. int. Mer Médit.*, vol. 36, p. 266.

Anonymous, 2002. La campagna *Medits 2002 nello Stretto di Sicilia (Mar Mediterraneo): rapporto finale*. Unpublished report, IRMA-CNR, Mazara (TP), Italia. 19 pp.

Camilleri M., Cordina G. & Franquesa R., 2002. *An analysis of the impact of purse seining and industrial longlining in Malta's 25 mile Conservation Zone*, Department of Fisheries and Aquaculture, Malta. Unpublished report. 23 pp.

Farrugia A., De la Serna Ernst J.M. & De Urbina Gutiérrez O., 2002. Sex-ratio by length-class of bluefin tuna (*Thunnus thynnus* L.) caught by Maltese longliners. SCRS/02/094 (2002) - Project FAO – Copemed Report 3 pp.

Ragonese S., Camilleri M., Gancitano S., Rizzo P., Bono G. & Fiorentino F., 2002. Evaluating age at sexual maturity in *Sciaena umbra* Linnaeus, 1758 (Osteichthyes, Sciaenidae) on the basis of otolith microstructure. *Biol. Mar. Medit*. 9 (1): 789-791.

Anonymous, 2003. La campagna *Medits 2003 nello Stretto di Sicilia (Mar Mediterraneo): rapporto finale*. Unpublished report, IRMA-CNR, Mazara (TP), Italia. 21 pp.

Camilleri M., 2003. Background to the establishment of the 25 mile Fisheries Conservation Zone around the Maltese islands. In: *Proceeding of the APS Seminar*, Malta, pp. 99-106.

Drago A., 2003. Addressing the need of marine observations for fisheries. In: *Proceeding of the APS Seminar*, Malta. pp. 33-73.

Farrugia Fenech A., 2003. Description of the Maltese longline fishery targeting bluefin tuna (*Thynnus thunnus* L.) in the Mediterranean sea. Col. Vol. Sci. Pap. ICCAT, 55 (3): 1148-1156.

Fiorentino F., Garofalo G., Gristina M. & Levi D., 2003. The ratio between "bottom dwelling" and overall fish biomass (BOI) as an indicator of trawling impact on demersal assemblages. *Biol. Mar. Medit*. 10 (2): 819-823.

Gristina M., Bono G., Fiorentino F. & Garofalo G., 2003. L'impatto della pesca a strascico sulla diversità delle comunità demersali dello Stretto di Sicilia. *Biol. Mar. Medit*. 10 (2): 838-842.

Morales-Nin B., 2003. Final report Mediterrranean dolphin fishery. FAO/COPEMED CORY03 Project FAO – Copemed Report 13 pp.

Viñas J., Pla Zanuy C., El Tawil M., Hattour A., Farrugia A. & De la Serna Ernst J.M., 2003. Mitochondrial genetic characterization of bluefin tuna (*Thunnus thynnus*) from three Mediterranean (Libya, Malta, Tunisia); and one Atlantic locations (Gulf of Cadiz). SCRS/02/172. Project FAO – Copemed Report 36 pp.

Anonymous, 2004. La campagna *Medits 2004 nello Stretto di Sicilia (Mar Mediterraneo): rapporto finale*. Unpublished report, IRMA-CNR, Mazara (TP), Italia. 20 pp.

Fiorentino F., Garofalo G., Gristina M., Gancitano S. & Norrito G., 2004. Some relevant information on the spatial distribution of demersal resources, benthic biocoenoses and fishing pressure in the Strait of Sicily pg 50 – 66 In: *MedSudMed. 2004. Report of the Expert Consultation on the Spatial Distribution o Demersal Resources in the Straits of Sicily and the Influence of Environmental Factors and Fishery Characteristics*. GCP/RER/010/ITA/MSM-TD-02. *MedSudMed Technical Documents,* 2: 102 pp.

Gristina M., Garofalo G., Bianchini M., Camilleri M. & Fiorentino F., 2004. Evaluation of the performance of an index of trawling impact in the strait of Sicily. *Biol. Mar. Medit*. 11 (2): 230-241.

Ragonese S., Gancitano S., Camilleri M. & D. Levi, 2004. An integrate analysis of size at age data of *Sciaena umbra* Linnaeus, 1758 (Osteichthyes, Sciaenidae) of the Central Mediterranean Sea. *Biol. Mar. Medit*. 11 (2): 612-616.

Ramos-Esplá A., Valle-Pérez C., Bayle-Sempere J.T & Sánchez-Lizaso J.L., 2004. Areas Marinas Protegidas como herramientas de Gestión Pesquera en el Mediterráneo (Area COPEMED). *Serie Informes y Estudios COPEMED* nº 11.

De la Serna Ernst J.M., Farrugia A., Hattour A., El Tawil M., Srour A. & Rioja Garay M.P., 2005. *Informe 2003 del programa: Biología y Pesca del atun Rojo (Thunnus thynnus L.) y pez espada (Xiphias gladius L.) en el Mediterráneo*. Project FAO – Copemed Report 36 pp.

Dimech M., Camilleri M., Gristina M., Kaiser M.J. & Schembri P.J., 2005a. Relationship between commercial & non-commercial species and abiotic characteristics in trawled muddy habitats on the Maltese continental shelf. *Fish Habitat Ecology and Conservation*. FSBI, Bangor Wales, July 2005. Poster presentation.

Dimech M., Camilleri M., Gristina M., Kaiser M.J. & Schembri P.J., 2005b. Commercial, non-target species and sediment characteristics of deep-water trawled muddy habitats on the Maltese continental shelf. *Xjenza* 10: 18-25.

MedSudMed, 2005. Report of the Third Meeting of the Coordination Committee. FAOMiPAF Assessment and Monitoring of the Fishery Resources and Ecosystems in the Straits of Sicily. GCP/RER/010/ITA/MSM-TD-10. *MedSudMed Technical Documents,* 10: 44 pp.

Mosteiro A. & Camilleri M., 2005. *Pilot Study on Dolphin fish 2004-Malta*. Project FAO – Copemed Report. 21 pp.

MPA: Rdum Majjiesa - Ras ir-Raheb

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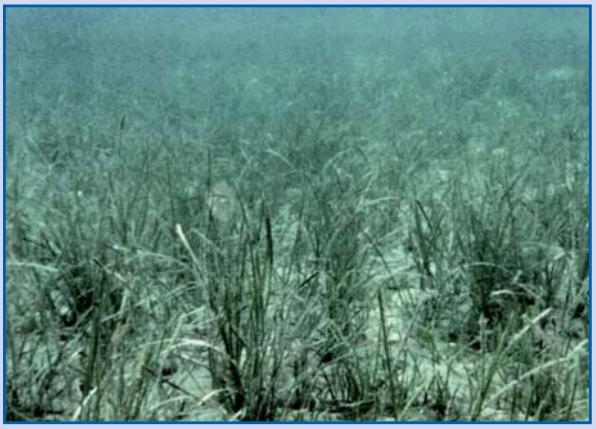


Location:	35º 56N 14º 20º E
Country:	Malta (Central Mediterranean)
Coastal/Island:	Island (inshore)
Total size:	885 ha
Integral size:	88.38 ha
Year of establishment:	Special Area of Conservation - Candidate site of international importance GN. 112 of 2007
Depth range:	0-50 m
Protection objectives:	Biodiversity conservation; research; education
Type of MPA:	Partial
Habitats:	Sandbanks, reefs, *Posidonia oceanica* beds, large shallow inlets and bays, coastal lagoons, caves
Socio-economic activities:	Fishing, all types of inshore aquatic activities

Activities	Zone A (No entry-no take)	Zone B, C, D (Entry-no-take with guided access)	Zone E (Entry-no-take with free access)	Zone P (General protection)
Forbidden	Spear Fishing, scuba diving, fishing, angling, anchoring, boating, swimming,	Spear fishing, angling, anchoring, boating, trawling	Spear fishing, angling, anchoring, trawling	Spear Fishing
Regulated	Scientific research	Scuba diving	Boating	Anchoring, trawling, angling
Allowed		Swimming, scientific research	Swimming, scuba diving, scientific research	Swimming, boating, scuba diving, scientific research

Description of the fisheries in and around the MPA

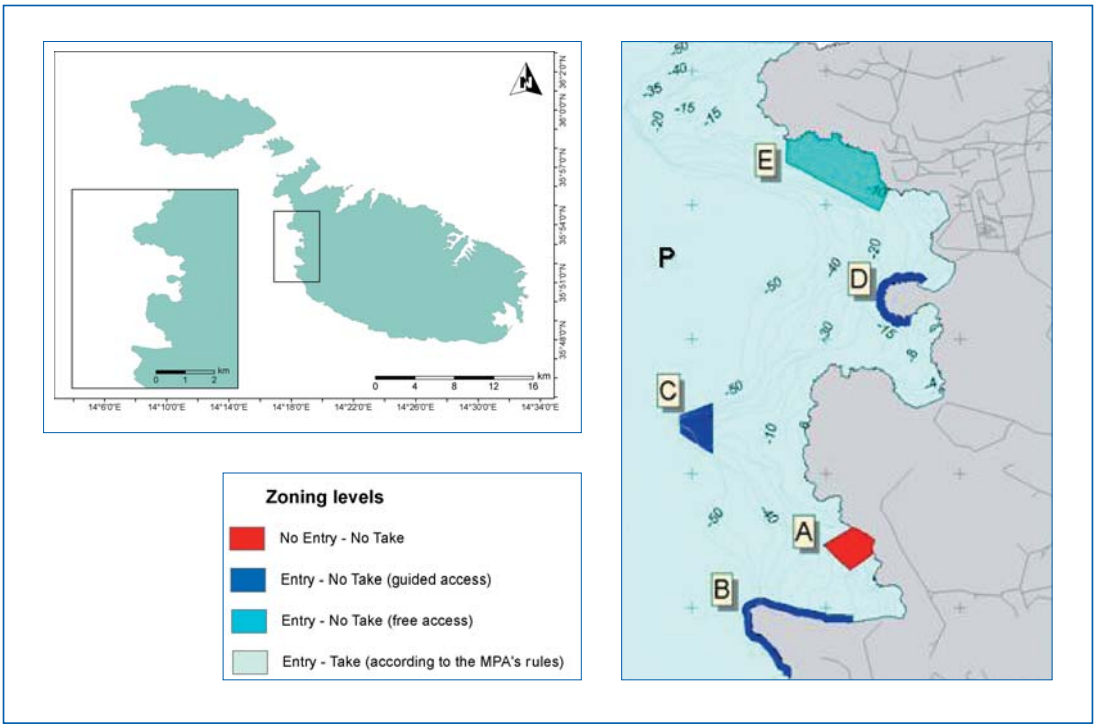
Fishing in the area is of the artisanal type and there is no large scale commercial fishing. The only mooring area for fishing boats within the MPA is Gnejna Bay, where there are some 102 boats belonging to part-time fishermen (those whose living does not depend on fishing alone).

Traditional fishermen use lamps (‘*lampara*’ fishing) to catch pelagic species (*Alosa alosa*, *Boops boops, Sardina pilchardus, Scomber japonicus*, *Scomber scomber, Trachurus trachurus*, *Trachurus mediterraneus*), small long-lines, trammel nets or ‘*parit’* for catching demersal

fish and cephalopods, **'***parit xkitt'* (combined gillnets-trammel nets)**,** for catching bogue and *Trachurus* spp. and *'nasses'* (cane or metal basket traps) for moray eels, octopus, spiny lobster, sardines and picarel. Traditional fishing takes place mainly near sand banks and escarpments. Bogue fishing is practised by fleet-owners (Rdum Majjiesa). Hand-line fishing takes place all along the coast, except along beaches, in places where access to the sea is possible. Basket traps are also used near Fomm ir-Rih.

During spring, small boats fish for cuttlefish (*Sepia officinalis*) in sandy bays. A female specimen is used to attract and catch males. Gear is often lost, particularly nets and traps abandoned on the seabed, which have an adverse impact on fauna, and may be hazardous for divers. The area is also popular for spear fishing for species such as the dusky grouper (*Epinephelus marginatus*) and common octopus (*Octopus vulgaris*).

Area		Gear	Seasonality	Target Species	Bycatch Species	No. of Vessels
Inside (Zone)	A	/	/	/	/	/
	B,C,D	/	/	/	/	/
	E	/	/	/	/	/
	P	Trammel nets	All year round	*Alosa alosa*, *Boops boops*, *Sardina pilchardus*, *Scomber japonicus*, *Scomber scombrus*, *Trachurus trachurus*, *Trachurus mediterraneus*	Sparidae spp. (e.g. *Oblada melanura*, *Pagrus pagrus*)	N/A
		Traps	All year round	*Octopus vulgaris*, *Spicara* spp.	*Muraena helena*, *Palinurus elephas*, *Boops boops*, Scorpaenidae spp.	N/A
		Bottom long lines	All year round	*Pagellus* spp., *Dentex dentex*, *Epinephelus costae*, *Pagrus pagrus*	*Raja* spp., *Scorpaena* spp.,	N/A
		Trolling lines combined with hand spears	Spring	*Sepia officinalis*		N/A
		Trolling lines	All year round	*Seriola dumerili*	*Auxis rochei*	N/A
Outside		Trammel nets	All year round	*Alosa alosa*, *Boops boops*, *Sardina pilchardus*, *Scomber japonicus*, *Scomber scombrus*, *Trachurus trachurus*, *Trachurus mediterraneus*	Sparidae spp. (e.g. *Oblada melanura*, *Pagrus pagrus*)	N/A
		Traps	All year round	*Octopus vulgaris*, *Spicara* spp.	*Muraena helena*, *Palinurus elephas*, *Boops boops*, Scorpaenidae spp.	N/A
		Bottom long lines	All year round	*Pagellus* spp., *Dentex dentex*, *Epinephelus costae*, *Pagrus pagrus*	*Raja* spp., *Scorpaena* spp.,	N/A
		Trolling lines combined with hand spears	Spring	*Sepia officinalis*		N/A
		Trolling lines	All year round	*Seriola dumerili*	*Auxis rochei*	N/A



Statistics

Landings of the most important species (by weight) from the region for 2004
Not available

Fishing regulations

There are no fisheries regulations

Database reference

http://www.mepa.org.mt/Environment/index.htm?Marine_Protected_Area/mainframe_ mpa.htm&1

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Publications

Pirotta K. & Schembri P.J., 2000. *Report on surveys of the bathymetry, submarine geophysical features, seascapes and benthic biotic assemblages of the area from Rdum Majjiesa to Raheb Cave on the northwestern coast of the island of Malta, designated as a candidate Marine Conservation Area.* Unpublished report prepared as part of Project Activity 3.6: Marine Conservation Areas, Coastal Area Management Programme For Malta (CAMP Malta) [United Nations Environment Programme, Mediterranean Action Plan and Government of Malta]; 64 pp + Plates 1-114 + Figs 1-11.

Grech P., 2002. *A pilot study for the evaluation, designation and management of a Marine Protected Area: Rdum Majjiesa to Ras ir-Raheb Cave* (*NW coast of Malta*). Final report. Unpublished report prepared as part of Project Activity 3.6: Marine Conservation Areas, Coastal Area Management Programme For Malta (CAMP Malta) [United Nations Environment Programme, Mediterranean Action Plan and Government of Malta]; 70 pp. + Annexes I-IV.

Agnesi S., Di Nora, S., Tunesi L., Grech P., Manca Zeichen M., Mo G., Molinari A., Piccione M.E., Pirotta K., Salvati E. & Schembri P.J., 2003. *Zoning proposal for the Marine Protected Area from Rdum Majjiesa to Ras ir-Raheb Cave*. ICRAM, RAC/SPA, UNEP-MAP, 65 pp.

Schembri P.J., Grech P. & Pirotta K., 2004. Recommendations for a scientific monitoring programme for the proposed Rdum Majjiesa to Raheb Cave marine protected area. Technical report developed within the Regional Project for the Development of Coastal Protected Areas in the Mediterranean Region (MedMPA). 22 pp.

Anonymous, 2005. Rdum Majjiesa to Ras ir-Raheb, A Marine Protected Area – A Draft Management Framework for the Marine Environment Phase I, Public consultation document. Malta Environment and Planning Authority, Environment Protection Department, Nature Protection Unit. Malta. 40 pp.

Description of the fishing gears

	Standard abbreviation: $	ISSCFG $
Handline The fish are attracted by a natural or artificial bait (lures) placed on a hook fixed to the end of a line or snood, on which they get caught.*	LHP	09.1.0
Longline A fishing gear in which short lines carrying hooks are attached to a longer main line at regular intervals. Longlines are laid on the bottom or suspended horizontally at a predetermined depth with the help of surface floats. The main lines can be as long as 150 km and have several thousand hooks (e.g. in tuna fisheries).*	LLS LLD	09.3.0 09.4.0
Trawling Towed net consisting of a cone-shaped body, closed by a bag or cod end and extended at the opening by wings. It can be towed by one or two boats and, according to the type, are used on the bottom or in midwater (pelagic). In certain cases, as in trawling for shrimp or flatfish, the trawler can be specially rigged with outriggers to tow up to four trawls at the same time (double rigging).*	OTB PTB TBS OTM PTM TMS	03.1.2 03.1.3 03.1.5 03.2.1 03.2.2 03.2.3
Pole-and-line A fishing technique in which surface schooling fish are attracted to the vessel and driven into very active feeding behavior by throwing live or dead bait into the water and spraying water onto the sea surface to simulate the escape behavior of small preys. The fish lured with a line and a hook attached to a pole and pulled off the water by manual or powered devices. This fishing method is used worldwide to capture surface-swimming tuna such as yellowfin tuna and skipjack.*	LHP LHM LX	09.1.0 09.2.0 09.9.0
Gill net Single vertical nylon netting walls that catches fish by gilling. As fish attempt to swin through the mesh of the net, they become snagged by their opercles, fins or scales.#	GNS	07.1.0
Trammel net Bottom-set net made with three walls of netting, the two outer walls being of a larger mesh size than the loosely hung inner netting panel. The fish get entangled in the inner small meshed wall after passing through the outer wall.*	GRT	07.5.0
Purse seine Nets characterized by the use of a purse line at the bottom of the net. The purse line enables the net to be closed like a purse and thus retain all the fish caught. The purse seines, which may be very large, are operated by one or two boats. The most usual case is a purse seine operated by a single boat, with or without an auxiliary skiff.*	PS1 PS2	01.1.1 01.0.2
Pots Traps, designed to catch fish or crustaceans, are in the form of cages or baskets various materials (wood, wicker, metal rods, wire netting, etc.) and have one or more openings or entrances. Usually set on the bottom, with or without bait, singly or in rows, connected by ropes (buoy-lines) to buoys on the surface showing their position.*	FPO	08.2.0
Jig A method of fishing using lures (weight surrounded by a crown of small hooks) on a vertical line moved up and down (jigged) by hand or mechanically. Extremely efficient for fishing oceanic squids at night.*	LHP LHM LX	09.1.0 09.2.0 09.9.0
FAD Seine These FADs (Fish Aggregating Devices) take the form of small rafts made of floating material, which are then anchored to the bottom. Their use was introduced after it was noticed by local fishers that Dolphin Fish along with other species such as Pilot Fish (*Naucrates ductor*) and the Amberjack (*Seriola dumerili*) tend to aggregate within the shadow cast by floats. To further augment the number of fish, palm fronds are attached underneath each float to extend the shaded area. Once the Dolphin Fish aggregate, they are caught by surrounding nets similar to a purse-seine. When the boat is near an FAD various trolls made out of feathers or artificial bait are set and when one fish is caught, a decoy Dolphin Fish is thrown into the sea to attract any others that may be present under the FAD. When the number of fish present makes it worthwhile the surrounding operation is then undertaken.	PS LTL	01.1.0 09.6.0
Troll line Simple line, provided with natural or artificial bait and trailed near the surface or at a certain depth by a vessel. Several lines are usually towed at the same time, by using outriggers.*	LTL	09.6.0

	Standard abbreviation: $	ISSCFG $
Tuna nets Drifting gillnets to catch tuna.	GND	07.2.0
Beach seine A beach seine is a seine net operated from the shore. The gear is composed of a bunt (bag or lose netting) and long wings often lengthened with long ropes for towing the seine to the beach. The headrope with floats is on the surface, the footrope is in permanent contact with the bottom and the seine is therefore a barrier which prevent the fish from escaping from the area enclosed by the net.*	SB	02.1.0
***Octopus* long-handled tool** Picking of specimens (with knife). Very specific. It also can be made by underwater seeking (snorkel).	MIS	20.0.0
Trap Fishing by means of devices able to trap fish in confined environment (traps, pots) often designed and baited to catch a particular species: Crab pot, lobster pot, tuna trap, fyke nets.*	FPO FYK	08.2.0 08.3.0
Electric reel hook and line Line used by an electric reel, with several (10-20) medium-size hooks (4/0, 5/0), placed very near to the bottom. Monofilament wire, then mother line of 1.6 mm thick with the hooks at the end of pieces of nylon of 1.2 mm thick that come out of the mother line each 1.5 m. Quite specific used in the right place and time of the year. Medium-size boats.	LHM LL	09.2.0 09.5.0
Harpoon Or harpoon gear means fishing gear consisting of a pointed dart or iron attached to the end of a line several hundred feet in length, the other end of which is attached to a floatation device. Harpoon gear is attached to a pole or stick that is propelled by hand or mechanical means into the body of the aquatic animal.*	HAR	10.1.0
Skin diving Picking off specimens with knife by underwater seeking (snorkel).	MIS	20.0.0
Drift nets Kept near the surface, or a certain distance below it, by numerous floats, the net drifts freely with the current, separately or, more often with the boat to which they are attached. A driftnet may be used close to the bottom (e.g. shrimp driftnet) or at the surface (e.g. herring driftnet) usually across the path of migrating fish schools. Aquatic animals strike the net and become entangled in its meshes. Large Scale Pelagic Driftnets are surface or sub-surface driftnets of large dimensions (exceeding 2.5 km and up to 50 km) the use of which is banned by a UN resolution. Also referred to as driftnets.*	GND	07.2.0
Trap net A spiral-shaped simple net designed to intercept and retain fish in a confined space.	FIX	08.9.0
Combined gillnet-trammel net Consist in two parts: an upper one being a standard gillnet where semi demersal or pelagic fish may be gilled and lower part being a trammel net where bottom fish may entangle.	GTN	07.6.0
Boat seine The type most representative of this category is the Danish seine. The design of these nets, consisting of two wings, a body and a bag, is similar in many ways to that of trawls. Operated from a boat, they are generally used on the bottom, where they are hauled by two ropes, usually very long, set in the water so as to ensure that as many fish as possible are driven or herded towards the opening of the net.*	SV SDN	02.2.0 02.2.1
Angling Art of fishing with hook and line using a rod.	LHP	09.1.0

* Source: FAO Fisheries Global Information System (FIGIS), (http://www.fao.org/figis/servlet/static?dom=root&xml=index.xml)

Source: Jennings S., Kaiser M.J. & Reynolds J.D., 2001. *Marine Fisheries Ecology*. Blackwell Science Ltd., Oxford. (http://www.blackwell-science.com)

$ Source: Nedelec, C. & Prado J., 1990. Definition and classification of fishing gear categories. *FAO Fisheries Technical Paper* nº 222, rev. 1 (reprinted, 1999), Rome, FAO: 92 pp.

List of species caught in the fisheries

Species	Common Name (English)
Acanthocybium solandri	wahoo
Alosa alosa	Alice shad
Aphia minuta	transparent goby
Aristaeomorpha foliacea	deep-sea shrimp
Aristeus antennatus	rose shrimp
Atherina hepsetus	Mediterranean sand smelt
Atherina presbyter	sand smelt
Atherina spp.	genus of Atherinidae (silversides)
Auxis rochei	bullet tuna
Auxis spp.	genus of Scombridae (mackerels, tunas and bonitos)
Balistes capriscus	trigger fish
Belone belone	garpike
Beryx decadactylus	alfonsino
Beryx splendens	splendid alfonsino
Beryx spp.	genus of Berycidae (alfonsinos)
Bodianus scrofa	barred hogfish
Boops boops	bogue/boga
Brama brama	Atlantic pomfret
Canthidermis sufflamen	ocean triggerfish
Caretta caretta	loggerhead sea turtle
Citharus linguatula	spotted flounder
Conger conger	conger eel
Coris julis	Mediterranean rainbow wrasse
Coryphaena hippurus	common dolphinfish
Dentex dentex	common dentex
Dentex spp.	genus of Sparidae (porgies)
Dicentrarchus labrax	European seabass
Diplodus cervinus	zebra seabream
Diplodus cervinus cervinus	zebra seabream
Diplodus puntazzo	sharpsnout seabream
Diplodus sargus	white bream
Diplodus sargus cadenati	Moroccan white seabream
Diplodus vulgaris	common two-banded seabream
Diplodus ssp.	genus of Sparidae (sea breams)
Eledone cirrosa	lesser octopus
Eledone moschata	musky octopus
Enchelycore anatina	fangtooth moray
Engraulis encrasicolus	European anchovy
Epigonus telescopus	bulls-eye
Epinephelus costae	striped grouper
Epinephelus marginatus	dusky grouper
Epinephelus spp.	genus of Serranidae (sea basses: groupers and fairy basslets)
Galeorhinus galeus	tope shark
Gymnothorax maderensis	moray eel
Gymnothorax miliaris	goldentail moray
Gymnothorax polygonius	polygon moray
Gymnothorax unicolor	brown moray
Gymnothorax spp.	genus of Muraenidae (moray eels)
Helicolenus dactylopterus	blue-mouthed redfish
Helicolenus dactylopterus dactylopterus	bluemouth rockfish
Homarus gammarus	European lobster
Katsuwonus pelamis	skipjack tuna
Kyphosus sectator	Bermuda sea chubb

Labrus spp.	wrasses
Lepidopus caudatus	silver scabbardfish
Lichia amia	leerfish
Lithognathus mormyrus	striped seabream
Loligo vulgaris	common squid
Lophius piscatorius	anglerfish
Lophius spp.	monkfish
Makaira nigricans	Atlantic blue marlin
Merluccius merluccius	European hake
Merluccius spp.	genus of Merlucciidae (merluccid hakes)
Mola mola	ocean sunfish
Molva dipterygia	blue ling
Mora moro	common mora
Mugilidae	mullets
Mullus barbatus	plain surmullet
Mullus surmuletus	striped red mullet
Mullus spp.	genus of Mullidae (goatfishes)
Muraena augusti	black moray
Muraena helena	Mediterranean moray
Mustelus mustelus	smooth-hound
Mycteroperca fusca	island grouper
Naucrates ductor	pilotfish
Nephrops norvegicus	Norway lobster
Oblada melanura	saddled seabream
Octopus vulgaris	common octopus
Octopus spp.	genus of octopodidae (octopus)
Osilinus spp.	genus of Trochidae (top shells)
Pagellus acarne	axillary seabream
Pagellus bogaraveo	blackspot seabream
Pagellus erythrinus	common pandora
Pagellus spp.	genus of Sparidae (porgies)
Pagrus auriga	redbanded seabream
Pagrus pagrus	common seabream
Palinurus elephas	European spiny lobster
Paracentrotus lividus	purple sea urchin
Parapenaeus longirostris	pink shrimp
Parapristipoma octolineatum	african striped grunt
Patella candei crenata	limpet species
Patella ulyssiponensis aspera	limpet species
Patella spp.	limpet
Phycis blennoides	greater forkbeard
Phycis phycis	forkbeard
Plesionika narval	narwal shrimp
Polymixia nobilis	Atlantic beardfish
Polyprion americanus	wreckfish
Pomatomus saltatrix	bluefish
Pontinus kuhlii	offshore rockfish
Prionace glauca	blue shark
Promethichthys prometheus	Bermuda catfish
Psetta maxima	turbot
Pseudocaranx dentex	white trevally
Raja spp.	genus of Rajidae (skates)
Ruvettus pretiosus	oilfish
Sarda sarda	Atlantic bonito
Sardina pilchardus	European pilchard

Sardinella aurita	round sardinella
Sardinella spp.	genus of Clupeidae (Herrings, shads, sardines, menhadens)
Sarpa salpa	goldline/salema
Schedophilus ovalis	imperial blackfish
Sciaena umbra	brown meagre
Scomber japonicus	chub mackerel
Scomber scombrus	atlantic mackerel
Scomber spp.	genus of Scombridae (Mackerels, tunas, bonitos)
Scombridae	mackerels, tunas, bonitos
Scorpaena porcus	black scorpionfish
Scorpaena scrofa	large-scaled scorpionfish
Scorpaena spp.	genus of Scorpaenidae (scorpionfishes or rockfishes)
Scorpaenidae	genus of Scorpaenidae (scorpionfishes or rockfishes)
Sepia officinalis	common cuttlefish
Seriola dumerili	Mediterranean greater amberjack
Seriola fasciata	lesser amberjack
Seriola rivoliana	almaco jack
Seriola spp.	genus of the Carangidae (jacks and pompanos)
Serranus atricauda	blacktail comber
Serranus spp.	genus of Serranidae (sea basses: groupers and fairy basslets)
Solea vulgaris	common sole
Solea spp.	genus of Soleidae (soles)
Sparidae	porgies
Sparisoma cretense	parrotfish
Sparus aurata	gilthead seabream
Sphyraena sphyraena	European barracuda
Sphyraena viridensis	yellowmouth baracuda
Spicara flexuosa	blotched picarel
Spicara maena	blotched picarel
Spicara spp.	genus of Centracanthidae (picarels)
Spondyliosoma cantharus	black seabream
Squalus acanthias	spiny dogfish
Squatina squatina	angelshark
Symphodus spp.	genus of Labridae (wrasses)
Synodus saurus	Atlantic lizardfish
Thunnus alalunga	albacore
Thunnus albacares	yellowfin tuna
Thunnus obesus	bigeye tuna
Thunnus thynnus	bluefin tuna
Todarodes sagittatus	European flying squid
Torpedo marmorata	spotted torpedo
Trachinotus ovatus	derbio
Trachinus spp.	genus of Trachinidae (weeverfishes)
Trachurus mediterraneus	Mediterranean horse mackerel
Trachurus trachurus	Atlantic horse mackerel
Trachurus spp.	genus of Carangidae (Jacks and pompanos)
Trigla lucerna	tub gurnard
Triglidae	gurnards
Uranoscopus scaber	Atlantic stargazer
Xiphias gladius	swordfish

References

Agardy T., 1994. Advances in marine conservation: the role of marine protected areas. *Trends in Ecology and Evolution* 9 (7): 267-270.

Badalamenti F., Ramos A.A., Voutsiadou E., Sanchez-Lizaso J.L., D'Anna G., Pipitone C., Mas J., Ruiz Fernández J.A., Withmarsh D. & Riggio S., 2000. The need to consider cultural and socio-economic factors in establishing Mediterranean marine reserves. *Environmental Conservation* 27: 110-125.

Bohnsack J.A., 1996. Maintenance and recovery of reef fishery productivity. In: Polunin, N.V.C. & Roberts C.M. (Eds.), *Reef Fisheries*. Chapman & Hall London: 283-313.

Buxton C.D. & Smale M.G., 1989. Abundance and distribution patterns of three temperate marine reef fish (Teleostei: Sparidae). in exploited and unexploited areas off the southern cape coast. *Journal of Applied Ecology* 26: 441 - 451.

Cole R.G., Ayling T.M. & Creese R.G., 1990. Effects of marine reserve protection at Goat Island, northern New Zealand. *Journal of Marine and Freshwater Research* 24: 197-210.

Dawson M.N., Grosberg R.K. & Botsford L.W., 2006. Connectivity in Marine Protected Areas. *Science* 313: 43-44.

DeMartini E.E., 1993. Modeling the potential of fishery reserves for managing Pacific coral reef fishes. *Fish. Bull.* 91: 414-427.

Dugan J.E. & Davis G.E., 1993. Applications of marine refugia to coastal fisheries management. *Canadian Journal of Fisheries and Aquatic Sciences* 50: 2029-2042.

García-Charton J.A. & Pérez-Ruzafa A., 1998. Correlation between habitat structure and a rocky reef fish assemblage in the southwest Mediterranean. *Marine Ecology-Pubblicazioni della Stazione Zoologica di Napoli* 19 (2): 111-128.

García-Charton J.A. & Pérez-Ruzafa A., 1999. Ecological heterogeneity and the evaluation of the effects of marine reserves. *Fish. Res.* 42: 1-20.

García-Charton J.A. & Pérez-Ruzafa A., 2001. Spatial pattern and the habitat structure of a Mediterranean rocky reef fish local assemblage. *Marine Biology* 138: 917-934

García-Charton J.A., Pérez-Ruzafa A., Sánchez-Jerez P., Bayle-Sempere J.T., Reñones O. & Moreno D., 2004. Multi-scale spatial heterogeneity, habitat structure, and the effect of marine reserves on Western Mediterranean rocky reef fish assemblages. *Marine Biology* 144 (1): 161-182.

García-Charton J.A., Williams I., Pérez-Ruzafa A., Milazzo M., Chemello R., Marcos C., Kitsos M.-S., Koukouras A. & Riggio S., 2000. Evaluating the ecological effects of Mediterranean marine reserves: habitat, scale and the natural variability of ecosystems. *Environmental Conservation* 27: 159-178.

Gell F.R. & Roberts C.M., 2003. Benefits Beyond Boundaries: the Fishery Effects of Marine Reserves. *Trends in Ecology & Evolution* 18 (9): 448-455.

Gerber L.R. & Heppell S.S., 2004. The use of demographic sensitivity analysis in marine species conservation planning. *Biological Conservation* 120: 121-128

Gerber L.R., Kareiva P.M. & Bascompte J., 2002. The influence of life history attributes and fishing pressure on the efficacy of marine reserves. *Biological Conservation* 106: 11-18.

González-Wangüemert M., Marcos C., García-Charton J.A. & Pérez-Ruzafa A., 2002. Importancia de la genética de poblaciones en la gestión de áreas marinas protegidas. *Proc. Mediterranean Symposium on marine and coastal protected areas*: 339-348.

Goñi R., Quetglas A. & Reñones O., 2003. Size at maturity, fecundity and reproductive potential of a protected population of the spiny lobster *Palinurus elephas* (Fabricius, 1787) from the western Mediterranean. *Marine Biology* 143: 583–592.

Halpern B.S., 2003. The impact of marine reserves: do reserves work and does reserve size matter? *Ecological Applications* 13 (1) Supplement**:** S117-S137.

Halpern B.S. & Warner R.R., 2002. Marine reserves have rapid and lasting effects. *Ecol. Lett*. 5: 361-366.

Jennings S., Grandcourt E.M & Polunin N.V.C., 1995. The effects of fishing on the diversity, biomass and trophic structure of Seychelles reef fish communities. *Coral Reefs* 14: 225-235.

Kramer D.L. & Chapman M.R., 1999. Implications of fish home range size and relocation for marine reserve function. *Environmental Biology of Fishes* 55: 65-79.

Lubchenco J., Palumbi S.R., Gaines S.D. & Andelman S., 2003. Plugging a hole in the ocean: the emerging science of marine reserves. *Ecological Application,* 13 (1): S3-S7.

McClanahan T.R. & Kaunda-Arara B., 1996. Fishery recovery in a coral-reef marine park and its effects on the adjacent fishery. *Conservation Biology* 10(4): 1187-1199.

McClanahan T.R. & Mangi S., 2000. Spillover of exploitable fishes from a marine park and its effect on the adjacent fishery. *Ecological Applications* 10(6): 1792-1805.

Palumbi S.R., 2001. The ecology of marine protected areas. In: Bertness M.D., Gaines S.D. & Hay M.E. (Eds.), *Marine community ecology*. Sinauer Associates. Sunderland: 509-530.

Pauly D., Christensen V., Guénette S., Pitcher T.J., Sumaila U.R., Walters C.J., Watson R. & Zeller D., 2002. Towards sustainability in world fisheries. *Nature* 418: 689-695.

Pérez-Ruzafa A., González-Wangüemert M., Lenfant P., Marcos C. & García-Charton J.A., 2006. Effects of fishing protection on the genetic structure of fish populations. *Biological Conservation* 129: 244-255.

Pinnegar J.K., Polunin N.V.C., Francour P., Badalamenti F., Chemello R., Harmelin-Vivien M., Hereu B., Milazzo M., Zabala M., D'Anna G. & Pipitone C., 2000. Trophic cascades in benthic marine ecosystems: lessons for fisheries and protected-area management. *Environmental Conservation* 27: 179-200.

Plan Development Team, 1990. The potential of marine fishery reserves for reef fish management in the U.S Southern Atlantic. *NOAA Technical Memorandum, NMFS-SEFC-261,* Southeast Fisheries Center, Miami, Florida.

Polunin N.V.C. & Roberts C.M., 1993. Greater biomass and value of target coral-reef fishes in two small Caribbean marine reserves. *Marine Ecology Progress Series* 100 (1-2): 167-176.

Rakitin A. & Kramer D.L., 1996. Effect of a marine reserve on the distribution of coral reef fishes in Barbados. *Marine Ecology Progress Series* 131: 97-113

Roberts C.M. & Polunin N.V.C., 1991. Are marine reserves effective in management of reef fisheries? *Reviews in Fish Biology and Fisheries* 1: 65-91.

Roberts C.M. & Polunin N.V.C., 1993. Effects of marine reserve protection on Northern Red Sea fish populations. *Proceedings 7th International. Coral Reef Symposium*: 979-987.

Russ G.R., 2002. Yet another review of marine reserves as reef fisheries management tools. In: Sale, P.F. (Ed), *Coral reef fishes: dynamics and diversity in a complex ecosystem*. Academic Press, San Diego: 421-443.

Sale P.F., Cowen R.K., Danilowicz B.S., Jones G.P., Kritzer J.P., Lindeman K.C., Planes S., Polunin N.V.C., Russ G.R., Sadovy Y.J. & Steneck R.S., 2005. Critical science gaps impede use of no-take fishery reserves. *Trends in Ecology & Evolution* 20 (2): 74-80.

Salm R.V., Clark J.R. & Siirila E., 2000. *Marine and coastal protected areas: a guide for planners and managers*. IUCN. Washington DC.

Sánchez-Lizaso J.L., Goñi R., Reñones O., García-Charton, J.A., Galzin R., Bayle J.T., Sánchez-Jerez P., Pérez-Ruzafa A. & Ramos A.A., 2000. Density dependence in marine protected populations: A review. *Environmental Conservation* 27: 144-158.

Shorthouse B., 1990. The Great Barrier Reef Marine Park: How does it work for fishermen? *Australian Fisheries* 49: 16-17.

Steneck R.S., Cowen R.K., Paris C.B. & Srinivasan A., 2006. Connectivity in marine protected areas – Response. *Science* 313 (5783): 44-45.

Sutinen J.G. & Soboil M., 2001. The performance of fisheries management systems and the ecosystem challenge. *Conference on Responsible Fisheries in the Marine Ecosystem*. Reykjavik, Iceland, October 2001.

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