



SPANISH MARINE RESERVES NETWORK

More than 35 years protecting our seas



GOBIERNO DE ESPAÑA

MINISTERIO DE AGRICULTURA, PESCA Y ALIMENTACIÓN



rir|m 
RED IBEROAMERICANA DE RESERVAS MARINAS


RESERVAS MARINAS DE ESPAÑA

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TECHNICAL REVIEW

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We would also like to show our gratitude to the people working in and for the Marine Reserves Network for making it possible, with a special mention to other administrations that manage marine reserves.

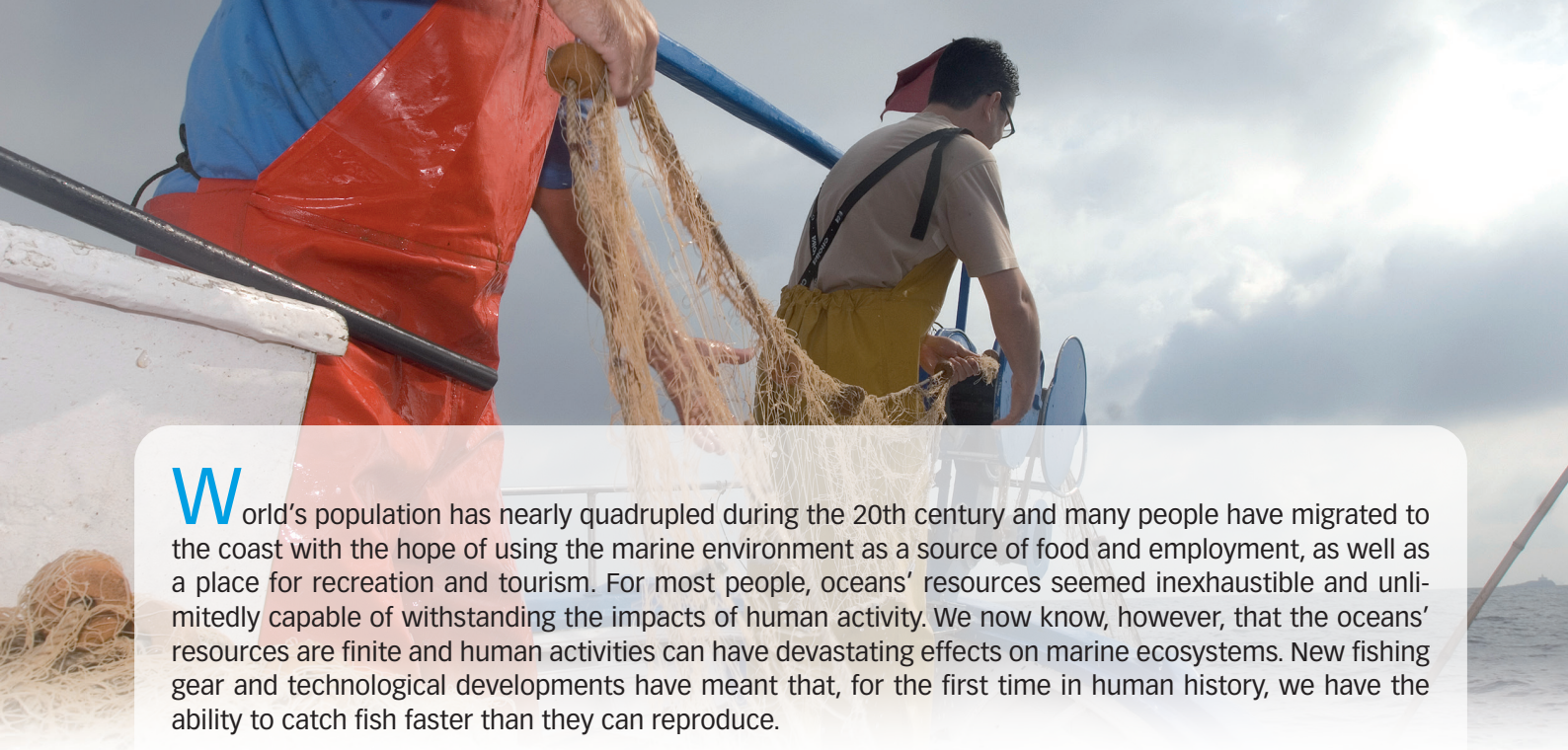
This reissue is dedicated to the memory of Enrique de Cárdenas, expert oceanographer in fishing and first Deputy Director of Protection of Fisheries Resources (currently General Sub-directorate for Scientific Research and Marine Reserves), an excellent friend and colleague to whom from the General Secretary for Fisheries we want to dedicate a special memory.

WEBPAGE

- Visit our website. Sign up for our Newsletter: www.reservasmarinas.net

- You may see our videos in the play list of Marine Reserves MAPA You tube channel: www.youtube.com/user/magramagob

- More information reservasmarinas@map.es



World's population has nearly quadrupled during the 20th century and many people have migrated to the coast with the hope of using the marine environment as a source of food and employment, as well as a place for recreation and tourism. For most people, oceans' resources seemed inexhaustible and unlimitedly capable of withstanding the impacts of human activity. We now know, however, that the oceans' resources are finite and human activities can have devastating effects on marine ecosystems. New fishing gear and technological developments have meant that, for the first time in human history, we have the ability to catch fish faster than they can reproduce.

Although fishing is an important and widely practiced activity, over-fishing can deplete populations and alter marine ecosystems. Fishing preferably targets bigger size specimens, so abundance of larger individuals is reduced and the reproductive capacity of these stocks decreases.

In addition, globally, the consumption of marine species has exceeded the sustainable limit and many species are currently being overexploited. Until recently, certain components of exploited populations were partially protected by natural shelters, being either too deep or too remote to be reached. But with improved navigation methods and increased fishing fleets, these sanctuaries are scarcer or have disappeared.

It is in this context that marine reserves, as protected areas, focused on maintaining artisanal fisheries, offer a unique opportunity to control and stop human impact, while at the same time, allowing the recovery of exploited species to benefit fishing outside reserve boundaries.

Marine reserves, as protected marine areas, are also the only available tool for the conservation of unique, sensitive or critical habitats for the benefit of species other than fishing ones, and so for the present and future generations.

Did you know that...?



More than 60% of the population lives in or near the coast and 80% of tourism is concentrated in coastal areas. Millions of people depend on marine and coastal resources for their food and livelihood.

The marine environment covers more than 70% of the planet's surface and is home to 80% of global biodiversity. Nevertheless, protected marine areas represent currently less than 10% of the ocean and less than 1% of the high seas.

The oceans store more than 90% of the world's carbon dioxide and capture 30% of carbon dioxide released into the atmosphere, thus playing a key role in the adaptation and mitigation of climate change.

1

What is a Marine Reserve?

“Facing an uncertain future, marine reserves are an investment in biodiversity and sustainable fisheries for the long term”. **Dr. Alfonso Ramos, University of Alicante.**

Marine reserves are protected by the fisheries legislation, (Law 5/2023 on sustainable fishing and scientific research), whose main goal is the enhancement of fishing resources and the maintenance of traditional artisanal fisheries in the area. Marine Reserves have been created on request of Fishermen’s associations, “cofradías”, representational bodies for the professional small scale fishing industry.

This essential support is the basis to protect these reserves from users outside the census of traditional artisanal fishermen.

Zoning

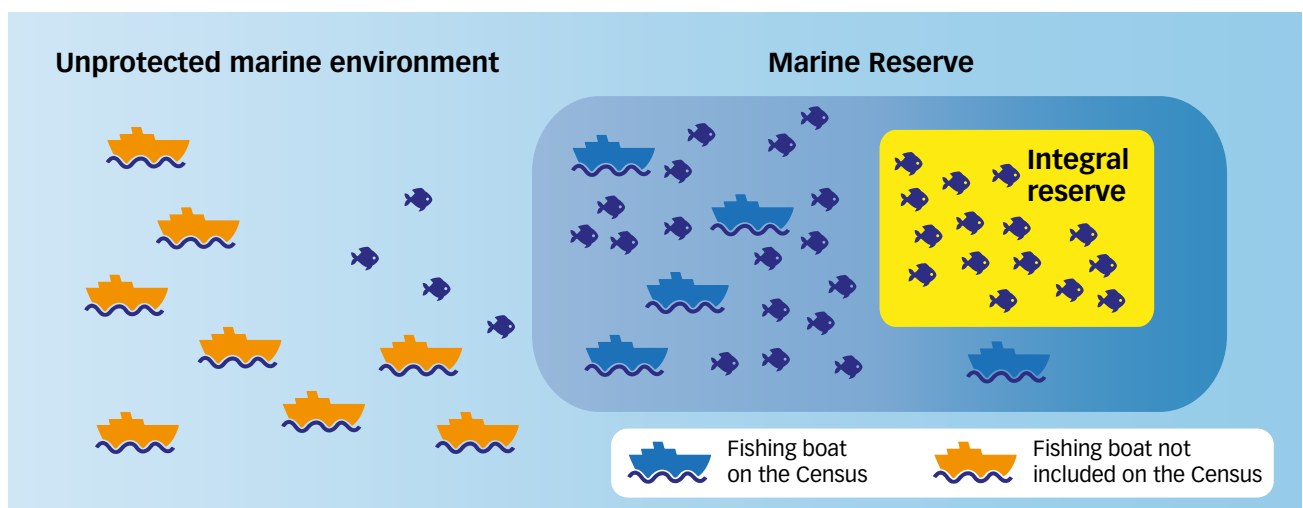
The surface of each marine reserve is divided into smaller sections in relation to their permitted uses. In each marine reserve there is at least one declared

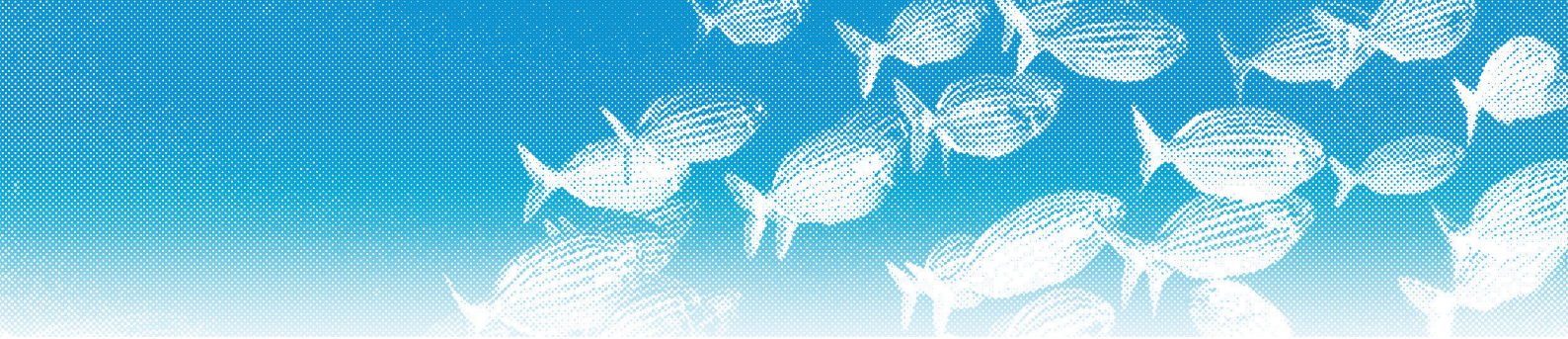
integral part where no use is authorized. These fully protected areas are essentially “no-take” zones. All other uses in the reserve are regulated: traditional artisanal fishing and scuba diving being its two main uses.

Within marine reserves the development of small scale fisheries carried out by local professionals is allowed and considered a core reserve activity.

With regards to recreational diving, a responsible and quality use of the reserve is expected, focused on environmental and, of course, human security. Fishermen’s fleet census and quotas for scuba divers are the tools used to control both activities.

Therefore in the marine reserves, traditional use by local artisanal fishermen is supported. These fisher-





men not only observe the local prohibition of fishing inside the integral reserve, but also self-regulate their activity with more strict criteria than in fishing-grounds adjacent to reserves.

For its part, recreational diving in protected marine areas, obviously attractive due to efficient preservation measures, is regulated aiming for a quality experience that must coordinate seascape preservation and necessary awareness in divers with the enjoyment of leisure.

Regulation in a marine reserve, outside the integral reserve, consists broadly in the following:

Professional fishing: On creation of the marine reserve, a census of authorized professional artisanal fishing vessels that can fish in its waters is established.

The professional fishermen who prove to have regularly fished in the zone for at least two years preceding the creation of the marine reserve are those who are listed on the census.



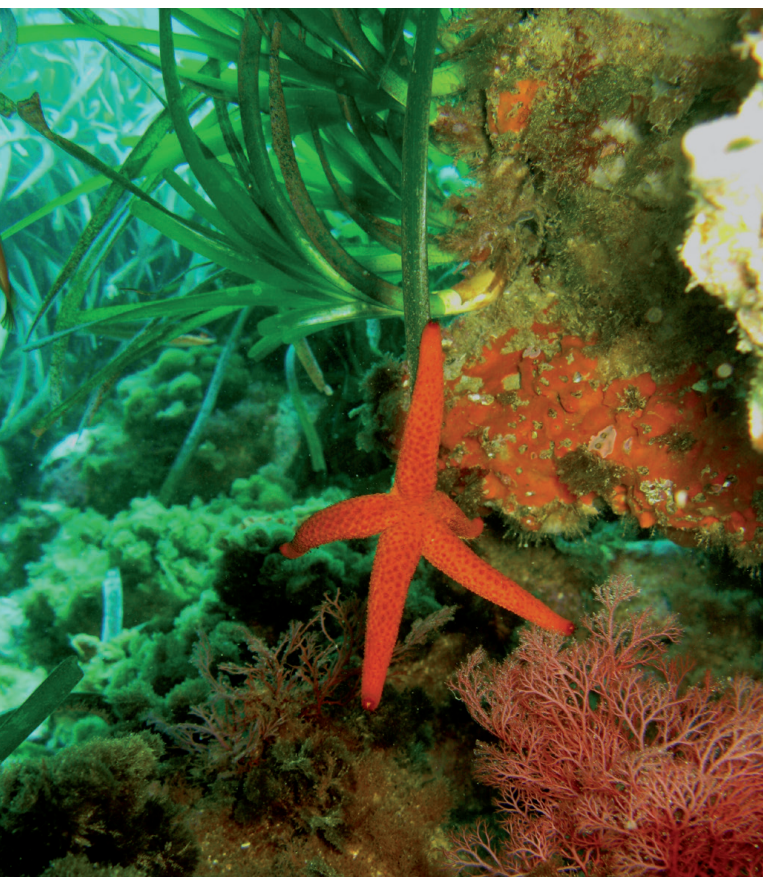
Only the development of artisanal fishing is allowed, leaving other gear such as **trawling completely prohibited in marine reserves.**

Diving: Diving is limited through setting up diving quotas, i.e., there is a maximum number of dives a year per diving point in each of the marine reserves. These quotas are based on historical data and requests from the industry, similarly to the authorized fishing vessels census.

To control these quotas and avoid damaging the marine reserves seabed, whenever possible, specific mooring buoys are set up for the vessels allowed in this activity, **therefore avoiding anchoring which is prohibited in the reserves.**

From shore or boat, **recreational fishing** is permitted in some of the marine reserves, but spear fishing and fishing contests are prohibited across the Marine Reserves Network.

Scientific research, subject to authorization, is permitted in marine reserves. Research is granted if the general interest of the study fits the aims of the marine reserve and marine environment preservation.



Photographs by: Felio Lozano and Jorge M. Cáceres.

2

Spanish and Ibero-American Marine Reserves Network

■ RED DE RESERVAS MARINAS

Brief history of marine reserves network

In 1986, at the request of Alicante Council on a study led by Dr. Alfonso Ramos from the University of Alicante, the first marine reserve was created. It's located in Tabarca Island (Table 1). In the following years, 9 more reserves were declared and in 2007 the last marine reserve joined the network, the marine reserve of Levante de Mallorca - Cala Ratjada.

Currently there twelve ten fishing marine reserves managed by the General Secretary for Fisheries (MAPA): nine in the Mediterranean Sea and three in the Canary Islands waters (Atlantic).

Marine Reserves Network management special features

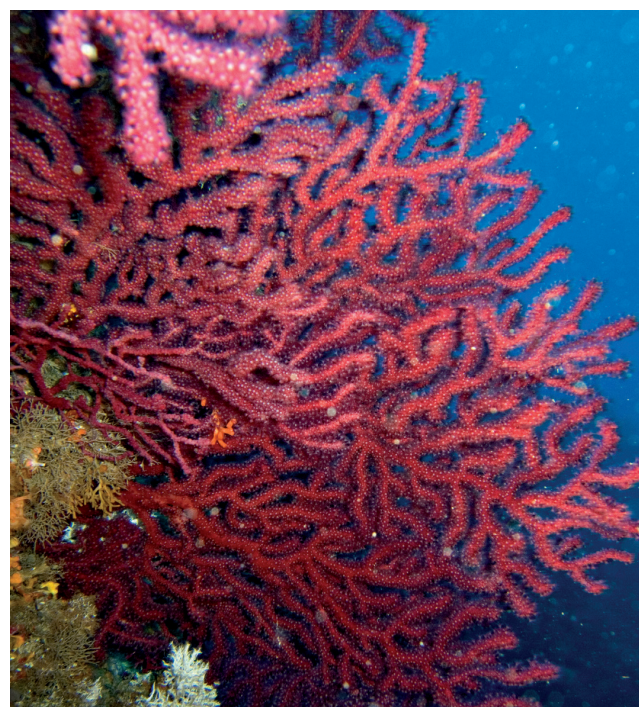
The General Secretary for Fisheries (GSF) manages these twelve marine reserves either exclusively or co-manages them with the regional government. Therefore, five of the marines are exclusively managed by the GSF and the other seven are jointly managed (Figure 1).

At present, the twelve marine reserves cover an area of 105,243 ha of which 10,162 ha are "no-take" zones (integral reserves) and the remaining surface, 95,081 ha, are buffer zones with regulated human activities (Table 2).

Marine Reserve	Date of Declaration
'1980 Isla de Tabarca	1986
Islas Columbretes	1990
Isla Graciosa e islotes del Norte de Lanzarote	1995
'1990 Cabo de Palos - Islas Hormigas	1995
Cabo de Gata-Níjar	
Punta de la Restinga - Mar de las Calmas	1996
Isla de Alborán	1997
Masía Blanca	1999
'2000 Isla de la Palma	2001
Levante de Mallorca - Cala Ratjada	2007
'2010 Cabo Tiñoso	2017
'2020 Isla de Dragonera	2020

Table 1. Historical declaration of marine reserves.

* Mixed-management marine reserves also have their own declaration standard for inland waters, promulgated by the respective autonomous communities.



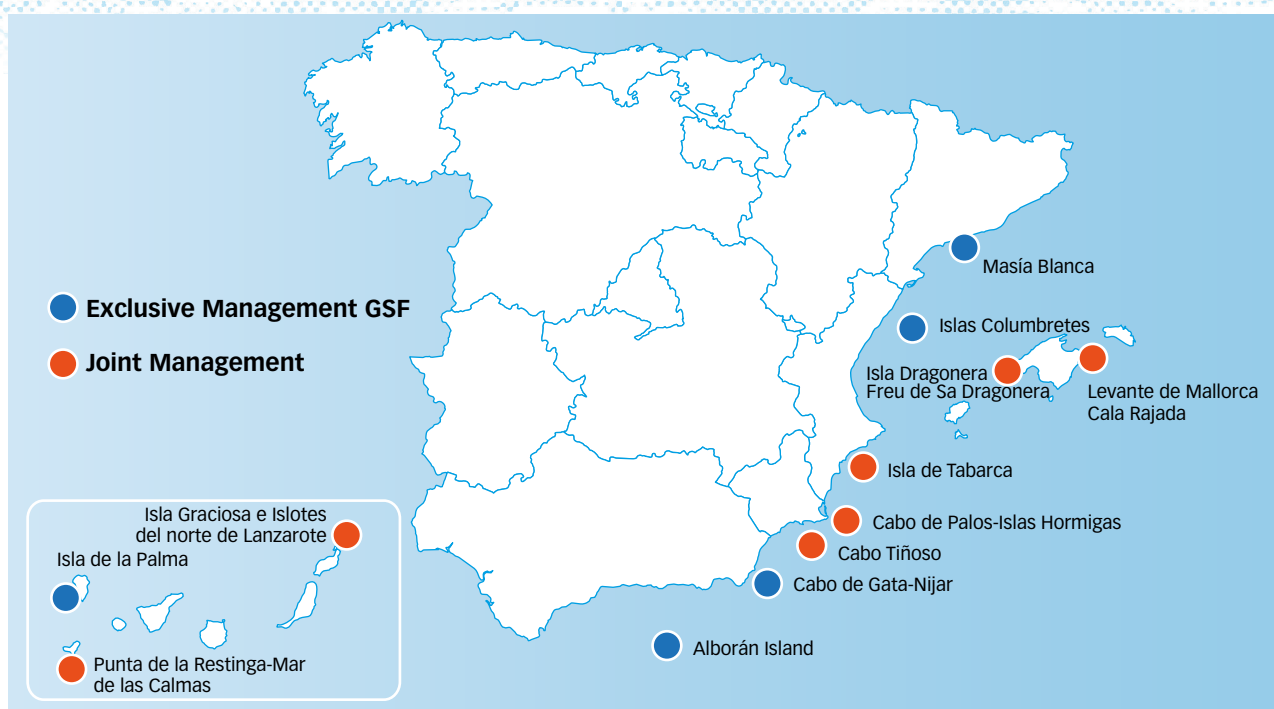


Figure 1. Location of the 12 marine reserves managed by the GSP, under exclusive or joint management.

Reserva marina	Superficies (ha)		
	Reserva integral	Resto de reserva	Superficie total
1. Masía Blanca*	43	406	449
2. Levante de Mallorca-Cala Rajada	1.968	9.219	11.187
3. Isla de Dragonera-Freu de Sa Dragonera	81	1.286	1.367
4. Islas Columbretes**	3.114	2.377	5.491
5. Isla de Tabarca	130	1.730	1.860
6. Cabo de Palos-Islas Hormigas	268	1.662	1.930
7. Cabo Tiñoso	85	1.088	1.173
8. Cabo de Gata-Níjar	1.692	3.219	4.911
9. Isla de Alborán	678	956	1.634
PENÍNSULA TOTAL	8.059	21.943	30.002
10. Isla Graciosa e islotes del norte de Lanzarote	1.071	69.693	70.764
11. Isla de La Palma	847	2.717	3.564
12. Punta de la Restinga-Mar de las Calmas	237	942	1.179
CANARY ISLANDS TOTAL	2.155	73.352	75.507
MARINE RESERVES TOTAL	10.214	95.295	105.509

Table 2. Zonification in marine reserves.

* Subject to consecutive closures, the entire surface is considered integral reserve.

** It works as an integral reserve as extractive activities are not taking place.



1

MASÍA BLANCA MARINE RESERVE (1999)

With an area of 449 ha, it is the smallest marine reserve of the network. It is located off the beaches of El Vendrell, Coma-Ruga, in the province of Tarragona.

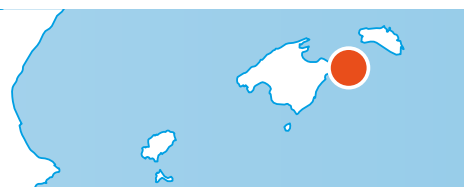
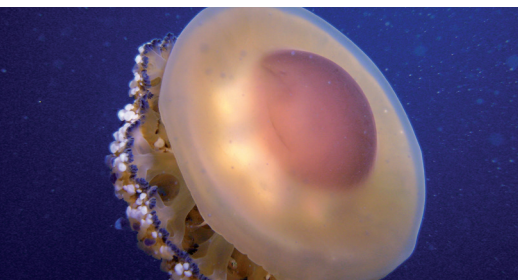


Its seabeds feature interesting examples of infralittorals communities, such as the seagrass *Posidonia oceanica* seagrass meadows endemic to the Mediterranean Sea like forests on land or *Cymodocea nodosa*, whose meadows are limper. The coral beds, formed by secondary bedrock colonized by infralittoral communities, are bars arranged perpendicularly to the coast. It also has sandy bottoms and *maërl* beds, known locally as "grapissar", consisting of free coralline red algae.

Species such as cuttlefish (*Sepia officinalis*), red mullet (*Mullus surmuletus*), gilt-head bream (*Sparus aurata*) and sea bass (*Dicentrarchus labrax*) abound in the reserve. The pen shell (*Pinna nobilis*) is another species found of no commercial interest.

The reserve is a breeding and spawning area. However, due to its small size, the response to protection is not obvious. Nevertheless local fishermen are satisfied.





2

LEVANTE DE MALLORCA - CALA RATJADA MARINE RESERVE (2007)

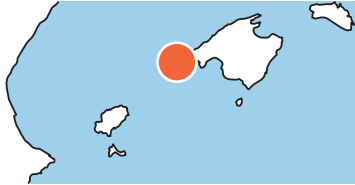
The Levante de Mallorca Marine Reserve has an area of 11,187 ha off the coast of the municipalities of Artà and Capdepera, on the island of Mallorca. The fisheries sector of this area is characterized by its high annual alternation or rotation of the various forms of traditional artisanal fishing.



While the main biological communities develop around the *Posidonia oceanica* meadows, rocky bottoms are nicely represented in the area. Grouper (*Epinephelus marginatus*), large-scaled scorpion fish (*Scorpaena scrofa*) and brown meagre (*Sciaena umbra*) species are prominent along with crustaceans such as the spiny lobster (*Palinurus elephas*), the slipper lobster (*Scyllarides latus*) and common lobster (*Homarus gammarus*). Free living calcareous rhodophyceous algae of the type *Phymatolithon* sp., *Lithothamnion* sp. and *Peyssonnelia* sp. are present and make up the *maërl* beds, where sea snail knobbed triton (*Charonia rubicunda*) takes refuge. There are exceptional dimly communities, the soft bottoms lodging the emblematic species such as noble pen shell or fan mussel (*Pinna nobilis*) and pearly razorfish (*Xyrichthys novacula*).

In the waters of the reserve, species of fishing interest can also be found such as dolphinfish (*Coryphaena hippurus*), or European squid (*Loligo vulgaris*).





3

DRAGONERA MARINE RESERVE (2020)

This reserve covers an area of 1,367 hectares around the Island of Dragonera, in the southwest of the Island of Mallorca. It is bathed by transparent waters and in the northern part, that of outer waters, it presents a small platform at the foot of a steep coast.

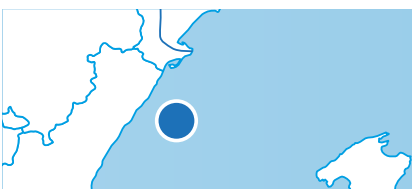
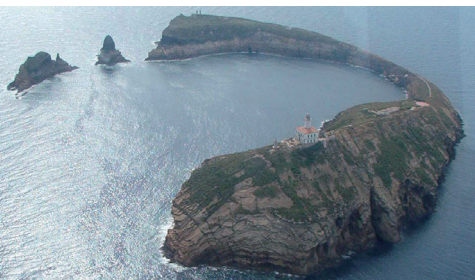


Submerged caves, overhangs, rocky ledges, detached blocks and mixed bottoms of fine and coarse sand with high hydrodynamism and good lighting constitute an ecosystem with high potential for the regeneration of fishing resources, which is the objective of all marine reserves in fishing interest.

In the area of outer waters, the following species linked to a greater or lesser extent to the seabed are found in abundance, with great potential for recovery: grouper, scorpion fish, moray eels, greater forkbeard, black croaker, bream (several species), sunfish, sea bream and common dentex as well as greater amberjack and European barracuda, these last two swimming species of the "nekton" whose habitat is the water column. The area is also a Special Protection Areas (SPAs) and habitat for protected seabirds such as the Cory's shearwater, Audouin's seagull and the endangered Balearic shearwater that nests on the island.

For these reasons, it is appropriate to establish the part of external waters as a marine reserve as stated in the mandatory report of the Spanish Institute of Oceanography, thus completing the protection and recovery of the area's fishing resources and also responding to the request of the Autonomous Community of the Balearic Islands.

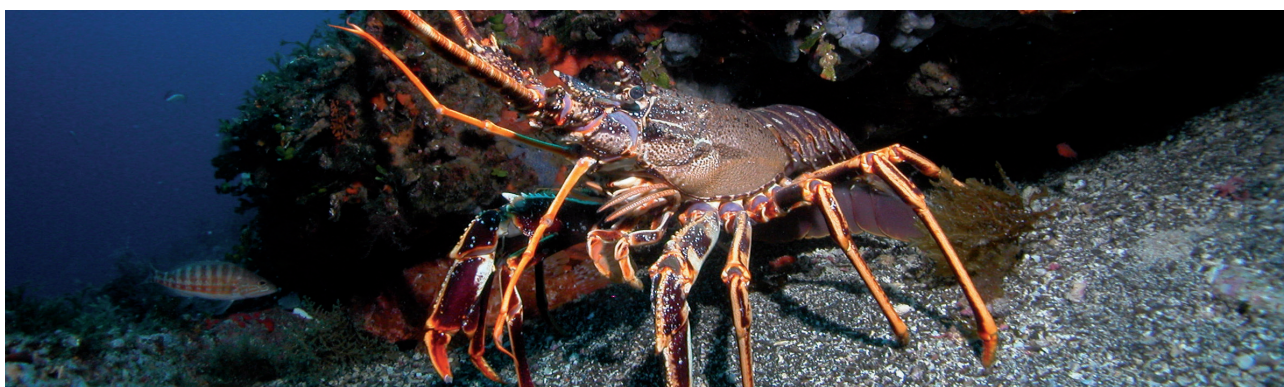




4

ISLAS COLUMBRETES MARINE RESERVE (1990)

Islas Columbretes Marine Reserve has a current area of 5,491 ha. It is located on the offshore platform about 30 miles off the coast of Castellón, halfway between the Balearic Islands and the Valencian coast. It is a flagship reserve and is located in the catchments area of the river Ebro contributions.



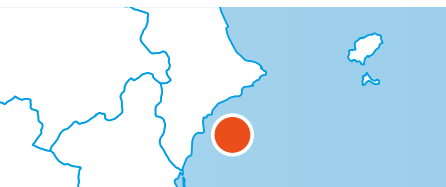
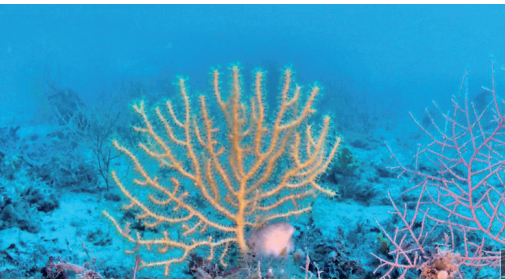
The seabeds of the reserve are home to many species, some already rare in other parts of the Mediterranean. In its different environments of walls and dimly light crevices, diverse communities of coralline gorgonians, detrital sand and gravel beds can be found, as well as disclosing beds of *maërl*, *Cymodocea nodosa* seagrass meadows and small coral reefs of *Cladocora caespitosa*. The macroalgae *Laminaria rodriguezii* associated to gaseous emissions of carbon dioxide form a unique enclave in the area of maximum protection.

Red lobster (*Palinurus elephas*) is the flagship species of this marine reserve, whose population, having increased in abundance and average size, has benefited from the protection afforded by the marine reserve. It is easy to see groupers (*Epinephelus marginatus*) in shallow waters.

Thanks to the transparency of its waters, Islas Columbretes seabeds have a dense vegetation cover with an interesting development of deep algal communities such as the mentioned *Laminaria rodriguezii* or algae of the *Cystoseira* genus. Other species of interest are the pen shell (*Pinna*

nobilis) or the striking red gorgonian (*Paramuricea clavata*).





5

ISLA DE TABARCA MARINE RESERVE (1986)

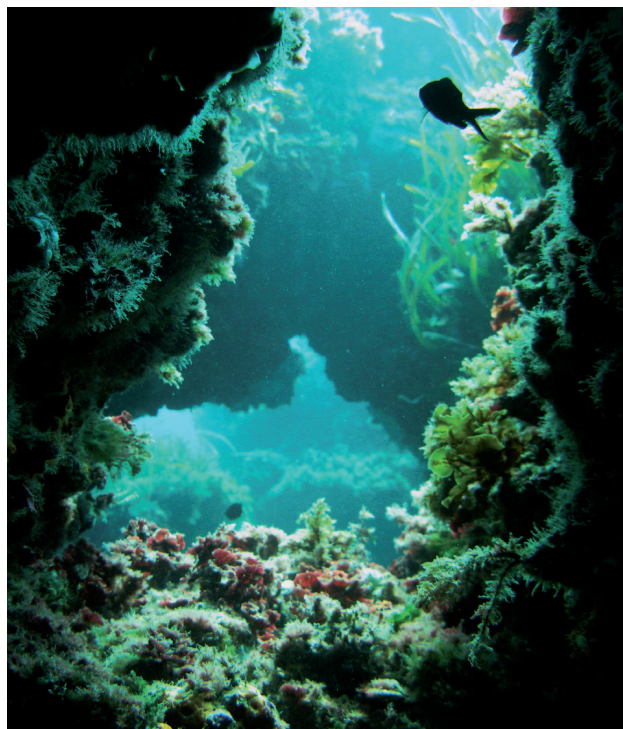
Isla de Tabarca Marine Reserve is the oldest of all the network marine reserves. It covers an area of 1,860 ha around the island, which is located off the coast of Santa Pola, Alicante.



The seabed of Tabarca Island is covered with *Posidonia oceanica* seagrass meadows in excellent condition. The oxygen produced by this plant purifies and enriches the water, while the vegetation cover is a breeding area and shelter for larvae and fish fry. The wrack of dead leaves form characteristic beds on the coast, as a proof of the good conditions of the surrounding sea beds and contribute to the formation and preservation of beaches by retaining fine sediment and diminishing the erosive effect of waves and currents. Exceptional flowerings of this plant have created a 'tide of acorns' caused by its fruit, which has dyed the inlets of the island green.

Sponges, sea fans, starfish, sea urchins, pen shells, cephalopods and crustaceans and other varieties of fish take shelter among the rocks or vegetation: moray (*Muraena* sp.), conger (*Conger conger*), grouper (*Epinephelus* sp.), comber (*Serranus* spp.), stripy red mullet (*Mullus surmuletus*), while other species of sea bream (*Sarpa salpa*), sand smelt (*Atherina presbyter*), dentex (*Dentex dentex*), red porgy (*Pagrus pagrus*), gilt-head bream (*Sparus*

aurata) and amberjack (*Seriola dumerilii*), among many others, sail in its waters.





6

CABO DE PALOS – ISLAS HORMIGAS MARINE RESERVE (1995)

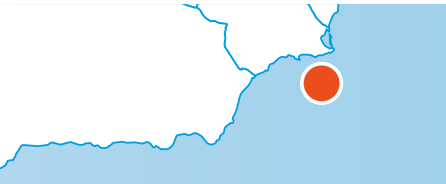
This marine reserve protects a 1,930 ha area off the coast of Cabo de Palos, in the southern part of Murcia's Mar Menor in Hormigas Islands surroundings. Here Mediterranean currents join Atlantic currents entering through the strait of Gibraltar.



Shallow marine communities are presented here, with meadows of *Posidonia oceanica* seagrass in the shallowest water and a costal relief made up of several underwater mountains, which rise from deeper areas with coralline communities, almost reaching the surface, in a strong currents environment.

Dusky grouper (*Epinephelus guaza*), seabass (*Dicentrarchus labrax*), dentex (*Dentex dentex*), gilt-head bream (*Sparus aurata*), pelagic species such as amberjack (*Seriola dumerilii*), scombrids like Atlantic bonito (*Sarda sarda*) and bullet tuna (*Auxis rochei*) abound in this waters.





7

CABO TIÑOSO MARINE RESERVE (2017)

Cabo Tiñoso Marine Reserve has a total area of 1,173 hectares, located between Isla Plana and Cala Mojarra, along the coast of the Isla de Las Palomas in Murcia. It is characterized, among other things, by its high ecological value, which includes the presence of marine phanerogams and submerged caves.



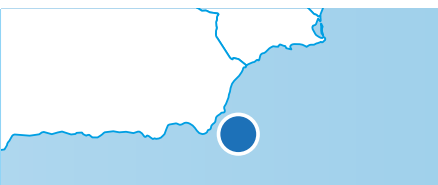
Cabo Tiñoso area features natural landscapes of great beauty, dominated by a rugged coastal topography, beaches, small coves, and cliffs, all linked to a low degree of human intervention. The presence of *Posidonia oceanica* serves as a support for numerous species linked to the coast (such as mullet, white seabream, and picarel), which find a favorable environment for reproduction and development, as well as attracting other pelagic species such as greater amberjack and barracudas.

The *maërl* beds are also characteristic, with a high diversity and abundance of associated organisms. It is considered an important breeding area for mollusk and crustacean species, as well as for juveniles of pelagic and demersal species.

The singular presence of populations of seabirds such as the European storm petrel and the Cory's shearwater is noteworthy. It is considered a key natural space for the conservation of the loggerhead sea turtle (*Caretta caretta*), the common dolphin (*Tursiops truncatus*), as well as other cetaceans such as the long-finned pilot whale (*Globicephala melas*), striped dolphin (*Stenella coeruleoalba*) for the seasonal passage of fin whales

(*Balaenoptera physalus*) and sperm whales (*Physeter macrocephalus*).





8

CABO DE GATA – NÍJAR MARINE RESERVE (1995)

The Marine Reserve of Cabo de Gata-Níjar has an area of 4,911 ha. The warm stream of the Mediterranean current and the less saline and colder stream from the Atlantic converge here, in front of Cabo de Gata, forming an area of high biological productivity and wealth.

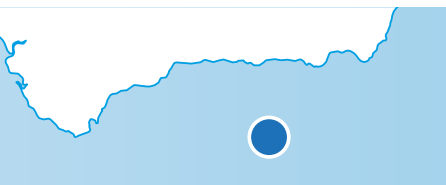
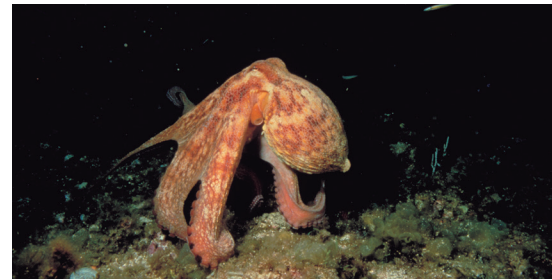
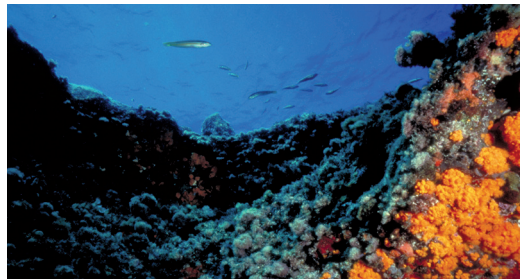


It has alternate overhanging seabeds of sand and rock. *Posidonia oceanica* meadows can be found in the shallow areas, submerging flush and highly productive communities. Communities of photophilic algae are found and brown algae of the genus *Cystoseira*, an indicator of clean well-oxygenated water, are abundant.

In the marine reserve the waters are thriving with fish species like merou (*Epinephelus marginatus*), seabass (*Dicentrarchus labrax*), dentex (*Dentex dentex*), red mullet (*Mullus* spp.) and other pelagic species such as seasonally tuna milk (*Seriola* spp.). As for molluscs, we should mention the clam (*Chamelea gallina*) and among cephalopods, octopus (*Octopus vulgaris*), cuttlefish (*Sepia officinalis*) and squid (*Loligo vulgaris*).

Species of conservational interest include the stony cup coral (*Dendropoma petraeum*), the pen shell (*Pinna nobilis*) or the orange coral gastropod *Astroides calycularis* which form a rigid structure dominated by reefs of vermetids, similar to those of tropical coral reefs, with *Neogoniolithon brassica-florida* calcareous algae.





9

ISLA DE ALBORÁN MARINE RESERVE (1997)

This marine reserve can be found in the waters of the Alborán Sea, around the Alborán Island. This area is the most western portion of the Mediterranean Sea and a connecting point of the waters of the Mediterranean and the Atlantic. The reserve stretches 1,634 ha around the Island.



The confluence of the cold, rich waters of the Atlantic entering through the straits of Gibraltar and the warmer and more saline waters of the Mediterranean Sea circulating deeper in opposite directions, create exceptional conditions, thus making this a unique place in the world, where Mediterranean and Atlantic species coexist.

Maërl communities formed by unanchored coralline red algae with populations of red coral *Corallium rubrum*, a protected species in the reserve, stand out in its deeper parts. In the shallower waters we come across unique species of brown algae of the genus *Cystoseira*, *Phyllariopsis purpurascens* Kelp forests and *Laminaria ochroleuca*, large brown algae that can reach up to 5 meters.

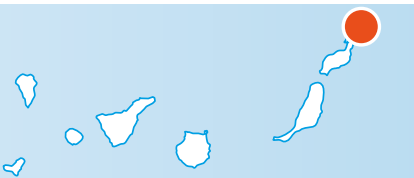
And as fish species in rocky substrates, we encounter specimens such as merou (*Epinephelus marginatus*), seabream (*Pagrus pagrus*), forkbeard (*Phycis phycis*), blackbelly rosefish (*Helicolenus dactylopterus*) and spiny lobster (*Palinurus elephas*).

Stony cup coral (*Astroides calycularis*) and long-spined urchin (*Centrostephanus longispinus*) are

also found, as is the endangered species Ferruginous limpet (*Patella ferruginea*). Gastropod *Dendropoma petraeum* and calcareous algae *Neogoniolithon brassica-florida* form vermetid reefs in this reserve.

The importance of the Alborán Sea should be noted both on a global and European level for its populations of cetaceans and turtles. It is the only passageway between the Atlantic and the Mediterranean of these highly migratory groups of species but resident cetacean populations are present in this area as well.





10

ISLA GRACIOSA E ISLOTES DEL NORTE DE LANZAROTE MARINE RESERVE (1995)

With a total area of 70,764 ha, this marine reserve is the largest in the network. It is found in the waters where the Chinijo Archipelago of the Canary Islands and volcanic islets bathe, and is located north of the Island of Lanzarote.



The bodies of water are influenced by the upwelling of cold, rich waters from the African coast. Predominately having steep rocky seabeds with caves, crevices and tunnels, it is an area with a large marine platform unique to the Canary Islands. Algal cover is formed by the sea grass *Cymodocea nodosa*, known as "sebadales" in Canary Islands and by species of algae such as *Caulerpa* sp., *Halimeda* sp., or *Cystoseira* sp.

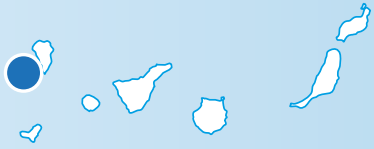
Locally known as "blanquizales" (barren grounds), the outcome of intense algal grazing by the urchin *Diadema africanum*, are found in some areas.

Fish living here include species such as the gilt-head bream (*Sparus aurata*), seabass (*Dicentrarchus labrax*), dentex (*Dentex dentex*) and parrotfish (*Sparisoma cretense*) while in deeper waters, hake (*Merluccius merluccius*) is abundant and of great interest to artisanal fisheries.

Giving colour to the seabeds and tunnels are the sponges, bryozoans and red and yellow gorgonians. The black coral (*Gerardia savaglia*) spot is an underwater landscape of exceptional beauty.

The invertebrates include sea snails (*Patella* spp.), oyster (*Spondylus senegalensis*), the slipper lobster (*Scyllarides latus*) and the spiny fan-mussel *Pinna rudis*.





11

ISLA DE LA PALMA MARINE RESERVE (2001)

Isla de la Palma Marine Reserve in the Canary Islands covers an area of 3,564 ha off the west coast of the island.



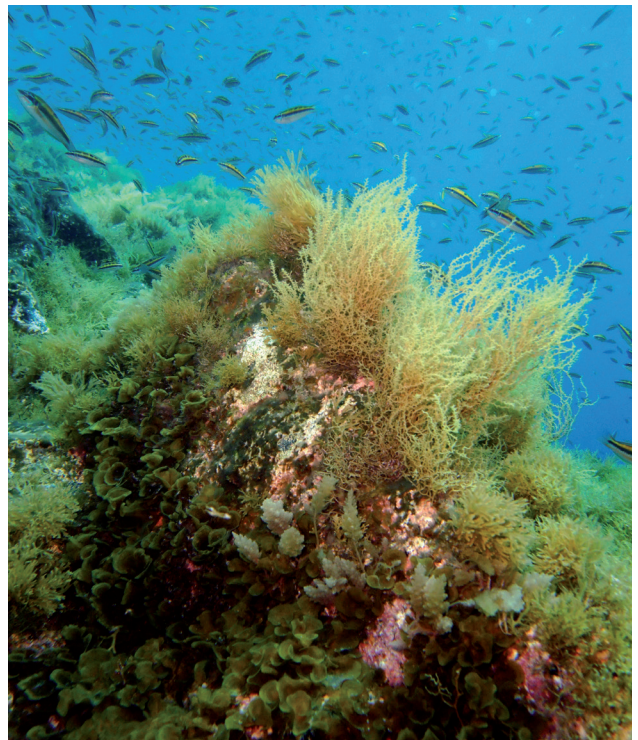
It is characterized by a scarce continental shelf and steep bottoms of both scenic and biological value where numerous cracks, caves and tunnels house communities of interest. Waters of great depths can be reached close to the coast, making it a place of great interest for pelagic species.

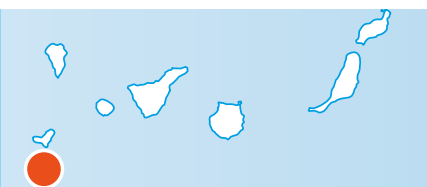
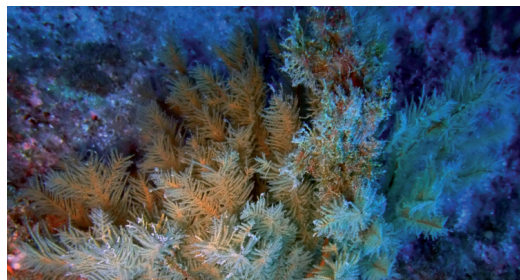
The species of fish that are found in the marine reserve include the parrotfish (*Sparisoma cretense*), bream (*Sarpa salpa*), amberjack (*Seriola* spp.) and grouper (*Mycteroperca fusca*), some of which are difficult to find in the other western islands of the Canary archipelago.

Brown algae communities dominate the marine flora, with a presence of the protected species *Cystoseira abies-marina*. Seabeds of tropical anemones are a unique haven for these species. Between the caves and crevices, a high biodiversity of marine invertebrates are found including the presence of the Canarian lobster (*Scyllarides latus*).

Finally, mammals and sea turtles are frequently seen in the waters of the reserve, as well as and worthy of noting, the presence of bottlenose dol-

phin (*Tursiops truncatus*) and loggerhead turtle (*Caretta caretta*).





12

PUNTA DE LA RESTINGA - MAR DE LAS CALMAS MARINE RESERVE (1996)

La Punta de La Restinga–Mar de las Calmas Marine Reserve is located southwest of the island of El Hierro in front of the town of La Restinga. Sheltered from the prevailing trade winds of the Canary Archipelago, it has an area of 1,179 ha and is the most southern marine reserve in Europe.



The waters here are the warmest of the entire archipelago, with tropical affinity communities that are either rare or not found in other parts of the Islands. The seabeds are rocky and steep with veriles, caves and tunnels such as El Bajón and La Punta de Los Saltos. Vegetative cover is dense, dominated by calcareous and brown algae.

The marine reserve is located in an area rich in species of commercial interest. The fishing wealth and isolation of the town of La Restinga has allowed the rise of local artisanal fisheries with its own characteristics. Species of commercial importance include parrotfish (*Sparisoma cretense*), merou (*Serranus* spp.), triggerfish (*Canthidermis sufflamen*), grouper (*Epinephelus* spp.), island grouper (*Mycteroperca* spp.) and various eel species (*Muraena* spp.). Various tunas like tuna (*Sarda sarda*), skipjack (*Katsuwonus pelamis*), wahoo (*Acanthocybium solandri*), yellowfin tuna (*Thunnus albacares*) and albacore (*Thunnus alalunga*) make this fishery one of the most important of the area in spring and summer.

The waters of the reserve are visited by deep-sea species such as the whale shark (*Rhincodon typus*),

smalltooth sand tiger (*Odontaspis ferox*) or manta ray (*Manta birostris*). Additionally, sea turtles and dolphins can often be seen. Within the group of cetaceans, an interesting resident population of beaked whales is found, although their elusive habits make their study complex. The reserve is also home to the protected species spotfin burrfish (*Chilomycterus reticulatus*) and brown spiny lobster (*Panulirus echinatus*). The abundant fauna is divided between the seabeds and hollows, housing lobsters (*Panulirus* spp.), black and gold corals, shrimp, anemones and sponges, among others.



■ THE IBERO-AMERICAN MARINE RESERVES NETWORK

The Ibero-American Marine Reserves Network

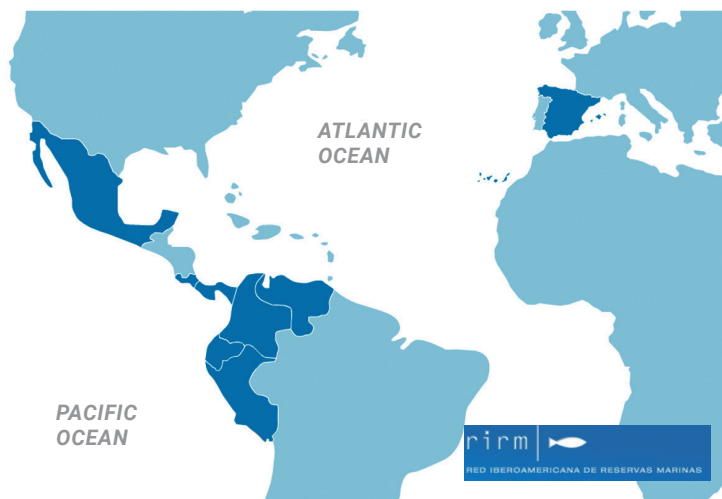
The Ibero-American Marine Reserves Network is an association of people who aim to share experienced management for both the Spanish and Ibero-American marine protected areas, thus profiting from existing information and bringing together those involved in the management of these places.

Joining the network is completely free, the only requirement being participation and cooperation in exchange of information. In order to become part of the network, only signing the accession protocol is needed.

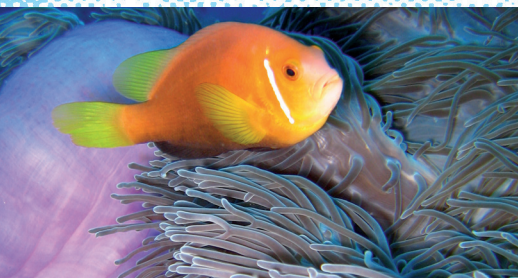
The beginnings of the network were made possible thanks to the ARAUCARIA Programme from the Spanish Agency of International Co-operation (AECI) by funding some of the first actions within the Ibero-American network in the protected marine area of the Galapagos Islands.

Currently, this network consists of protected marine spaces along the Spanish Coast and in both Central and South America: México, Colombia, Costa Rica, Ecuador, Panamá, Perú and Venezuela, making up 12 marine reserves in Spain, 16 other Spanish protected areas in the marine environment and 25 marine protected areas of Ibero-America.

Table 1 shows Spanish marine protected areas that, in addition to the 12 marine reserves, belong to the Ibero-American Network. Table 2 indicates the Ibero-American network marine areas and the countries they belong to.



1	RIRM Spanish Marine Protected Areas	Province
1	Badia de Palma (S'Arenal- Cap Regana Marine Reserve) (Mallorca)	Balearic Islands
2	Illes Medes	Gerona
3	Cap de Sant Antoni Marine Reserve	Alicante
4	Ses Negres Integral Marine Reserve	Gerona
5	Cap de Creus Integral Nature Reserve	Gerona
6	Nord de Menorca Marine Reserve	Balearic Islands
7	Cabo de Gata- Níjar Natural Park	Almería
8	Eivissa and Formentera Freus Marine Reserve (Eivissa and Formentera)	Balearic Islands
9	Gatzelugatxe Protected Biotope	Vizcaya
10	Illas atlánticas National Park	Pontevedra
11	Migjorn de Mallorca (Mallorca)	Balearic Islands
12	Illa del Toro e Illes Malgrats (Mallorca Island)	Balearic Islands
13	Guadalquivir Estuary Fishing Reserve	Sevilla/Huelva/Cádiz



1 RIRM Spanish Marine Protected Areas		Province
14	Os Miñarzos	La Coruña
15	Ría de Cedeira	La Coruña
16	Dragonera Marine Reserve	Balearic Islands

Tabla 1. Other spanish Marine Protected Areas belonging to the Ibero-American Marine Reserves Network.

2 Country	
COLOMBIA	Corales del Rosario Gorgona
	Old Providence McBean Lagoon
	Isla Salamanca
	Santuario Malpelo
	Tayrona
	Uramba
	Utra
COSTA RICA	Cahuita
	Cabo Blanco
	Corcovado
	Gandoca-Manzanillo
	Isla del Coco
	Las Baulas
	Manuel Antonio
	Marino Ballena
	Santa Rosa
	Tortuguero
ECUADOR	Galápagos
MÉXICO	Bahía de Loreto
	El Vizcaíno
	Isla del Golfo de California
PANAMÁ	Isla de Coíba
PERÚ	Puntas Guaneras
	Paracas
VENEZUELA	Los Roques

Tabla 2. Ibero-American Protected Areas Network.

Photographs by: *Animal's House*.



3

Artisanal Fisheries

Artisanal fishing is turning around the whole philosophy of marine reserves: the purpose of these reserves is to support traditional artisanal fishermen who, on a regular basis, perform fishing activities in those established marine reserves.

Artisanal fishing in marine reserves can only be exercised by the fishing boats that are included in the census.

These are lists of the vessels that had habitually fished in its waters before the reserve was created.

The census of the authorized fishing boats are “under quota,” which means that the total number of fishing boats cannot be exceeded thus, limiting the impact of fishing. At this point, artisanal fishing is already reducing its impact by its adaption to the reserves and the compliance with avoiding fishing inside the no-take areas within marine reserves.

Their kind of fishing in the reserves is known as “small-scale fisheries”, and gathers various forms of traditional fishing. These fisheries are one day long, focusing mainly on bottom species.

Small fisheries assort a variety of fishing gear and appliances which suit local needs. Therefore, including selective gillnets used with sepia or lobster, bait rigs, long lines, “palangrillos” (small long lines) and traps and pots for invertebrates and fish. In some Mediterranean marine reserves small trap net gears such as “almadrabilla”, “solta” or “moruna” are authorized.

One can easily differentiate between the Mediterranean gears and the craft used in the Canary Islands reserves. Canary Island fisheries basically use



Photographs by: Tamia Brito.

hooks, with hand lines and rods, trolling rods with bait for tuna and traps, pots and shrimp and eel drum, while net gear predominates in the Mediterranean reserves.

Prospects of Traditional Fishing

The fishing sector is now at a cross-road: traditional fishing was seen as an activity anchored in the past. However, it is currently re-emerging as a sustainable activity.

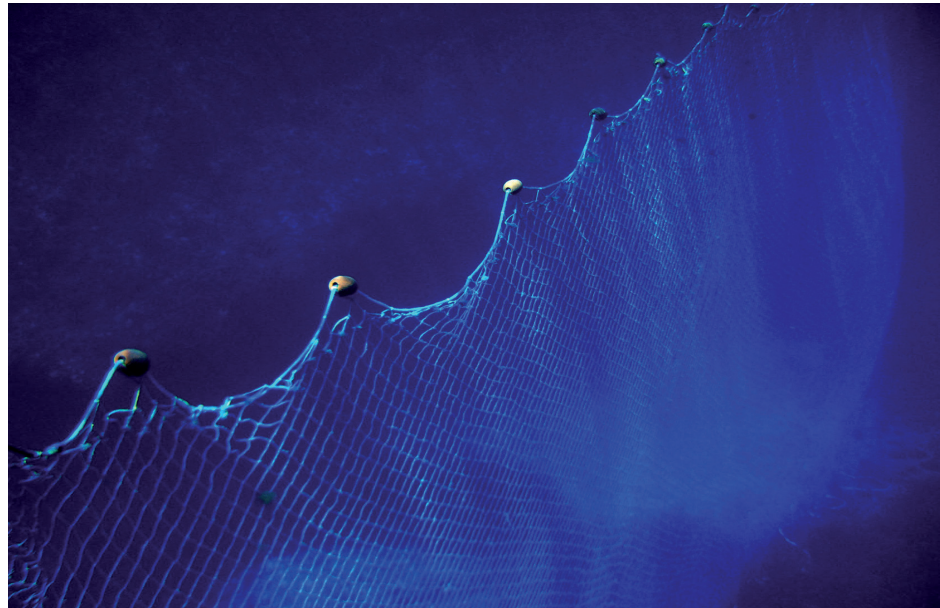
This term, although used widely, defines traditional fishermen activities very well. They have an understanding about the places and species they fish and respect the natural cycles within the marine habitats and their natural rotation.

These fishermen know how to adapt to seabed changes, seasons and bycatch, all within an order to ensure fishing year after year on the same grounds.

Natural generational replacement of fishermen in marine reserves occurs, however, with difficulty, which could be due to factors such as the harshness of the job or the little social relevance.

There are also specific problems such as some cases of overfishing, including competition between commercial fishing and some forms of recreational fishing or more global problems like tropicalisation, causing imbalances between species or facilitating the progress of alien invasive species.

Finally, the close relationship between the maintenance of artisanal fishing and the conservation of the marine environment is an increasingly obvious fact and not only in Spain. Marine reserves understand that the practice of traditional fishing benefits both the fishermen and in turn, improve and preserve fisheries and marine habitats.





4

Marine Reserves Equipment

Every declared protected area must have funds available to ensure its goals compliance. Thus a budget to finance human means and material to guarantee effective monitoring and protection is put in place. In the case of Marine Reserves this budget is, on average, about 400,000€ a year for each marine reserve. The General Secretary for Fisheries allocates each of those budgets to the surveillance and monitoring of both onshore and off shore reserves.

Material resources

All marine reserves have at least one vessel or ship in use for the surveillance and monitoring. The marine reserve network has a fleet of 21 ships spread over the ten reserves. These vessels are between 6 and 20 meters long and have specific characteristics depending on the needs and conditions of the reserves that use them and the weather, thus ensuring that surveillance is conducted in the most effective manner.

Ships can have different facilities. Basic equipment consists of GPS, radio and mobile communication, binoculars, a PA system and searchlights.

Larger units are equipped with all of the above and more. They also have radar, an electronic chart display, plotter and sounder. They also have new types of technology for surveillance and monitoring: radars, georeferenced cameras, ROVs (Remotely Operated Vehicle) dynamic mapping, remote surveillance systems (Unmanned vehicles, telephoto lens, telescopes and night vision binoculars).

In addition to the means of surveillance at sea, the reserves have various means on land, in their offi-

ces, visitor centres and through the use of their vehicles such as SUV. So both on land or near the coast, facilities of all kinds to enable and develop surveillance and monitoring tasks exist.



Photographs by: Main: Javier Llorente. Bottom right: Felio Lozano.



Human Teams

The human teams are groups of versatile people working in marine reserves who develop surveillance work both on land and at sea.

They are characterised by:

- The Legal capacity to act
- Institutional and Legal support of their actions.
- Permanent presence

The operational teams at sea consist of at least, a skipper, a sailor and a mechanic, as well as a biologist or similar.

Their functions are focused around the surveillance and control of activities within the reserve, therefore, not only overseeing the appropriate use of the marine reserve but also working against and reporting misuses.

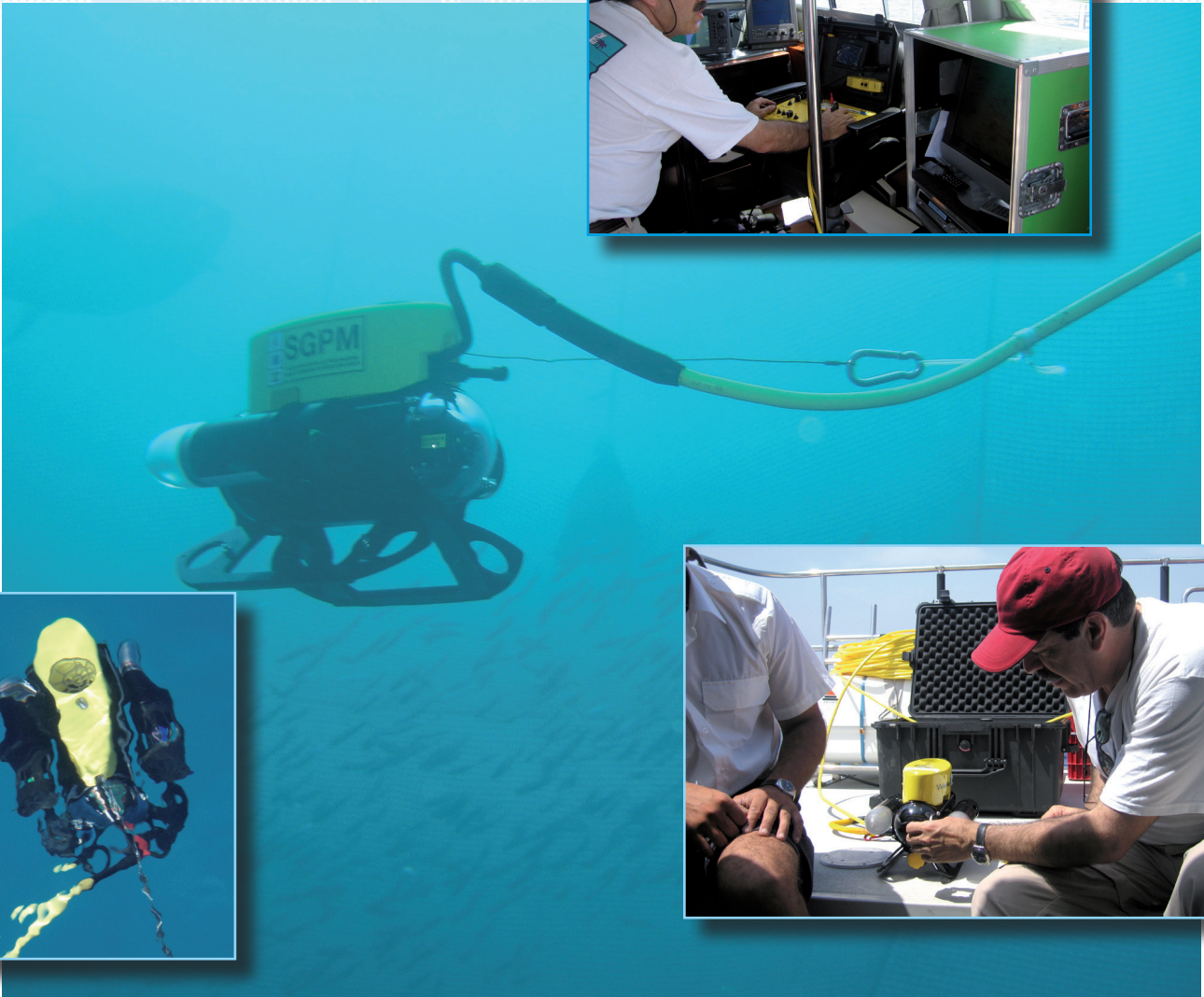
These teams also develop functions, such as collecting information on the reserve, following-up on their conservation status, and serve as a point of Information for other users of the marine reserve.

Signalling and beaconing

Some marine reserves have marked perimeters, however is not mandatory to beacon at sea as a marine reserve is not a hazard to navigation. Some of these marine reserves have marks on land or beacons that provide insight into zoning through leading lines.

Cartography

Updated cartographic data bases on morphology and nature of the seabed; distribution of habitats and marine communities; location of use and man-



agement measures are essential tools in the management of marine reserves. Furthermore, these tools are installed in vessels and support the work of scientific teams conducting research from different institutions in collaboration with the staff and resources of the reserves. Georeferencing of information is essential to the ongoing progress of all work in the Marine Reserve Network.

Inter-governmental cooperation

To reinforce the effectiveness of both monitoring and control within the marine reserves, collaboration with agencies of marine competence has been established. These agencies are the Navy, Police and Civil Guard, with whom cooperation is achieved through partnerships, agreements and joint action plans.



Photographs by: Small lower left: Javier Llorente. Other photos: Felio Lozano.



RESERVAS MARINAS DE ESPAÑA



RM Isla de Tabarca, autor Felio Lozano



RM Islas Columbretes, autor Diego K. Kersting



RM Isla Graciosa, autor Luis Toledo



RM Cabo de Gata- Níjar, autor Raúl Alonso



RM Cabo de Palos-Islas Hormigas, autor José Antonio Cano



RM Punta de La Restinga-Mar de Las Calmas, autora Tamia Brito



RM Isla de Alborán, autor Servicio de la reserva marina



RM Masía Blanca, autor Juan Carlos Jorquera



RM Isla de La Palma, autora Tamia Brito



RM Levante de Mallorca-Cala Rajada, autor Javier Llorente



RM Cabo Tiñoso, autor José Oliva



RM Isla de Sa Dragonera, autor Jordi Company



5

Benefits of Marine Reserves

Through the protection of marine reserves we can expect the following benefits:

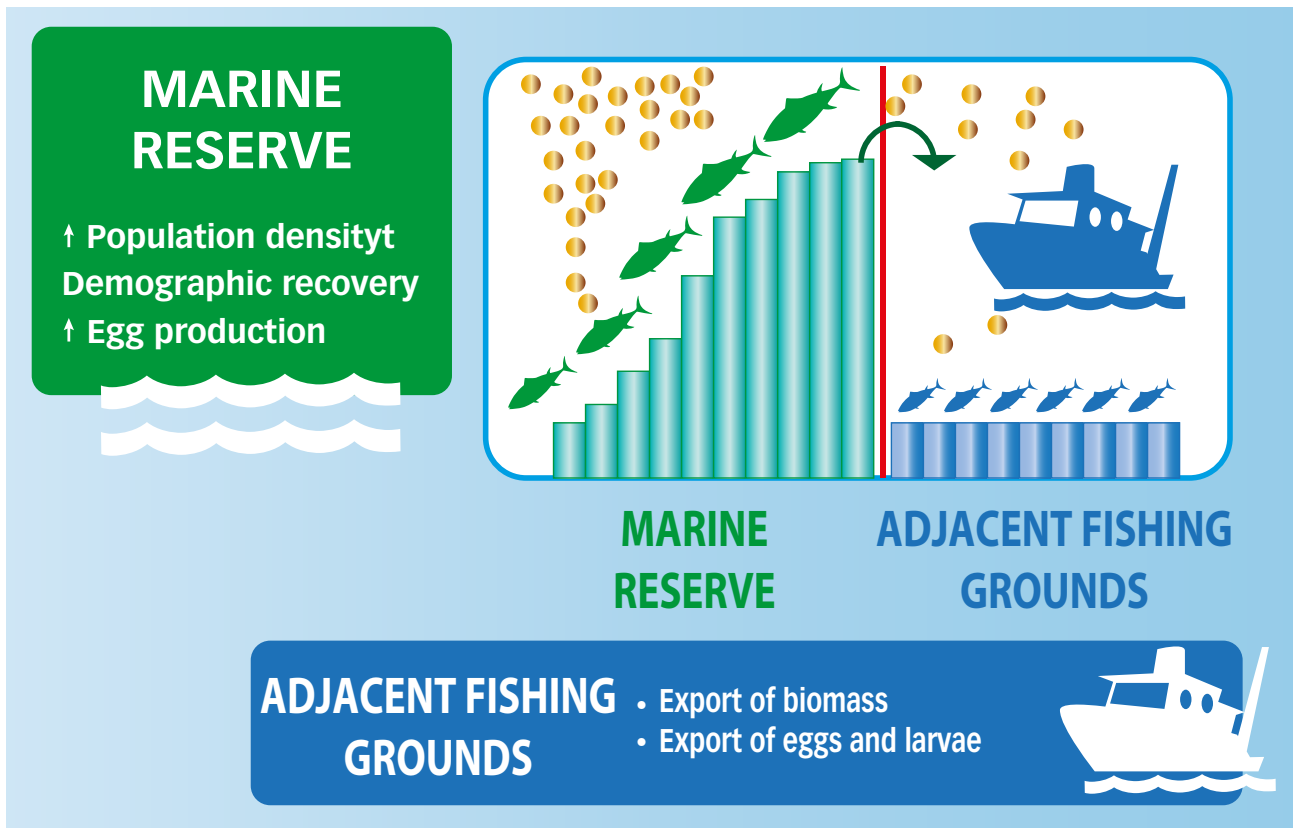
looking for enhancement of target species, should be big enough to shelter their essential habitats.

Benefits for Endangered Species

Many studies from the marine reserves have proved that the abundance, medium size, spawning biomass increases rapidly when fishing stops. These demographic changes are the expected outcome in the absence of fishing, not forgetting that marine reserves,

Direct Benefits for fishermen

It is well known that in marine reserves, when the maximum capacity of a 'fishing interest' species is reached, migration outwards takes place, hence, making them available to the fishing community outside the marine reserve. This is the effect of spillover, which has been documented in Spanish marine reserves.





Ecological benefits of marine reserves

Marine reserves protect habitats and sea communities from human activities that can lead to a loss of biodiversity. Many reserves have unique habitats or ones with potential to maintain or restore biodiversity, which can translate to benefits either of monetary value: more catches; or existence value: The more endangered species and ecosystems are threatened, the higher value we grant to the existence of the areas where they are protected.

Other benefits of marine reserves

Besides helping fishing or protection within these ecosystems, marine reserves are a reference as areas of good environmental state, difficult to reach in exploited areas, particularly in touristic areas. Marine reserves are also used to spread knowledge and understanding of the natural systems at sea.

Finally, they play an important role in researching and understanding the impacts of human activities on nature. They act as benchmarks to determine if the observed changes are due to natural factors such as climate or oceanographic conditions or to human actions like fishing and others.





6

Awareness in Marine Reserves

Surveillance is crucial to marine reserves so that they don't become "paper parks". A marine reserve without scientific monitoring is a project going in an unknown direction. A marine reserve without awareness actions has no future.

Disclosure allows us to reach citizens protection values, show resources hidden underwater and their biodiversity on our shores. This information is not, but should be, obvious to everyone since it is an important resource for all of us.

If you do not know the richness of your sea and the beauty that it holds, why would you want to protect it? Is it possible to want to protect what you do not know? We need people that are mindful and want to protect the sea, not only the marine reserves but the whole sea.

Therefore, the work of outreach and awareness made through marine reserves aims to increase awareness of the value of a well-preserved sea. In particular, strengthen the fishing heritage of traditional fishing and highlight the importance to users of behaving responsibly in the marine environment. These guidelines refer to everyone at sea, professionals and visitors.

There are different ways to get the message across different audiences. For example, conducting talks aimed at specific sectors, such as recreational fishermen, divers, marinas and, of course, schools.

Not to forget the outreach monitoring services of marine reserves achieve with direct reporting tasks through daily contact with users.



With all these actions we make visible to the user what the reserve is, its value, (which goes far beyond fishing resources enhancement) the need for the means employed for management, and also for a responsible behaviour by users, as well as the results of management and the results of everybody's efforts, too.

Activities aimed at children try, through games, to help them see the importance of protecting the marine environment and the variety of life that exists there.



In the case of Levante de Mallorca - Cala Ratjada Marine Reserve, marine biologist Javier Llorente, develops games like 'Eco-system Game', which gives each child a role as a particular species to interact with the others. The 'Fishing Game' is also available for both children and adults, where 5 or 6 participants play with fish coloured stones with spoons and tongs.

In the same marine reserve, when weather permits, excursions are made out to sea, thanks to the collaboration of tourist boats and professional fishermen. They also take some fishing samples into the



Education of the Canary Islands Government has led to a boost in educational content on the sea, marine reserves and fishing in schools.

Neighbouring schools to the marine reserves Punta de La Restinga - Mar de Las Calmas (Hiero Island), La Palma, Isla Graciosa e islotes del Norte de Lanzarote are visited by experts from the marine reserves who give talks and team up with teachers.

They show publications from those marine reserves such as "Fishing in El Hierro" or "Do you know your sea friends?", which is now a teaching resource, that has also been shown by professional fishermen in local schools around the islands of Gran Canaria. They also explain to students what their job entails making it an unforgettable day for all. From 2021, the marine reserves of the Mediterranean also have a teaching resource (top photo).

schools to present a short introduction of marine biology. This is, for sure, a fine formula to awaken the curiosity of children.

In the Canary Islands, school outreach programme from the marine reserves has a long history.

This collaborative agreement signed by the General Secretary for Fisheries and the Regional Ministry of

Illustration by: Bruno Lanzarote. Child's drawing: Anahí Machin.





7

Three Lighthouses

Marine reserves adjacent to coastal areas have served to restore, maintain and provide functions to heritage buildings of great value and to the buildings around the headlight lanterns, which fell into disuse.

This way, marine reserves have secured a triple objective: keep these buildings, use them for different purposes related to marine reserves and avoid new coastal construction. Such is the case of three lighthouses; Columbretes Islands, Alborán and La Palma Island, each one has been adapted to the most efficient use.

Columbretes lighthouse

It is located on Isla Grossa, also called Big Columbrete, the main island within the group. Construction was completed in 1860 and in 1975 became automated and its keepers and their families left.

In winter 1992 the General Secretary for Fisheries assumed the surveillance of the marine reserve. Afterwards, scientific interest aroused and a demand for housing researchers rose. Soon after, the General Secretary for Fisheries decided to restore the lighthouse, while preserving a heritage building and providing researchers with accommodation and a laboratory for scientific work.

The General Secretary for Fisheries restored the lighthouse in 2008 and Generalitat Valenciana updated the surroundings. Nowadays it is used as a scientific base and laboratory.

Alborán lighthouse

Alborán lighthouse was built in 1860 and inhabited by the families of lighthouse keepers until 1966,

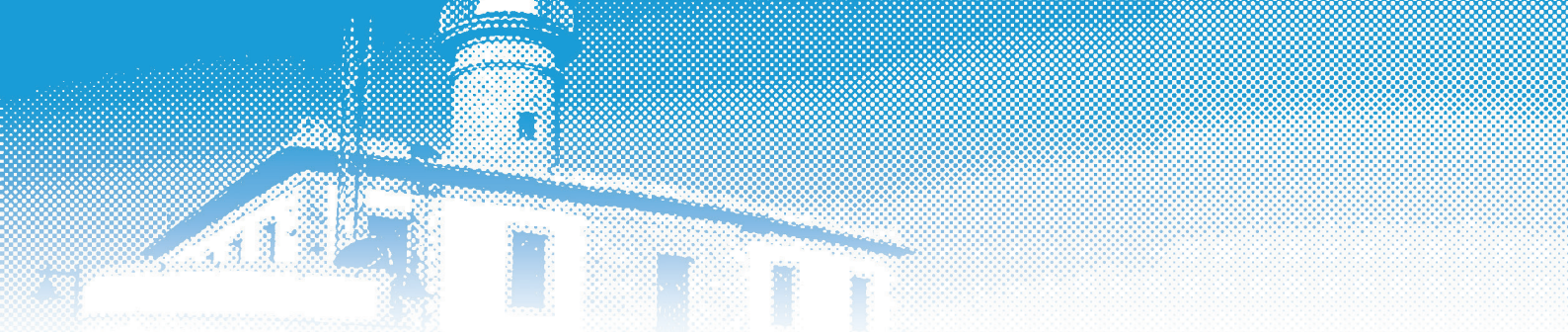


when it became automated.. Currently, it has many uses: permanent housing for the navy, science laboratory and library and accommodation facilities for the marine reserve guards and scientific teams.

Given the importance of the Alborán Sea for cetacean populations, the lighthouse is often visited by scientific teams experts in cetacean species. The building is used as a watching point for sightings and listing populations.

Fuencaliente Lighthouse – La Palma Island

Fuencaliente Lighthouse is located at the very far end of the southern part of La Palma Island, next to salt fields. The west wing of the lighthouse was re-



stored in 2006 and converted into an interpretation centre for the Marine Reserve on the Island.

The centre, which now receives more than 34,000 visits per year, aims to enhance awareness and understanding of the problems of the sea through a three dimensional design by Miguel Mansanet: The visitor enters a life-size diorama that reproduces the marine reserve, its bottom and rocky species. The glazed floor draws attention to a global problem: marine litter. The bronze sculpture of a dolphin caught in fishing net shows the effect humans may have on sea life.

The entry of the simulation room displays panels on some problems at sea such as discharge and waste. This lighthouse wants to remain a beacon in alerting the threats of man in the sea, but also to serve as an opportunity to educate in the values of protecting both sea and fishermen.



Photographs by: Carlos Fierro and Tamia Brito.

8

Marine Reserves: Indicators of global change

Global climate change

Global climate change is causing major disruptions on our planet on unprecedented time scale and geographical rate. Under its name, a series of processes that can be directly related to human activity converge. They have direct or indirect effects on the global environment. The most widely known is that of global warming or climate change. This is produced by the dramatic increase in greenhouse gases in the atmosphere, mainly generated by the CO₂ (carbon dioxide) resulting from burning fossil fuels.

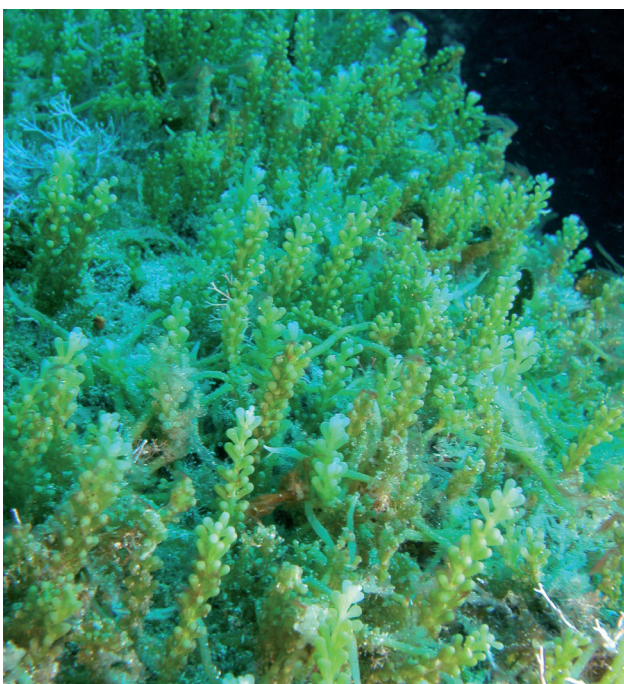
However, climate change also includes a number of processes like alien species spread. This is the

introduction of species into a completely new area where they end up being dominant due to the lack of competitors and predators.

Global change affects both terrestrial and marine ecosystems, however, given the added difficulties of scientific research at sea, more work is still needed to describe and understand the effects and the response of the marine ecosystems as a whole.

In order to do this, it is necessary to have a robust historical series of data collected to assess trends over sufficient and extensive periods of time.

Although collection of data in the marine environment is increasing, the existence of long series of data is still scarce.

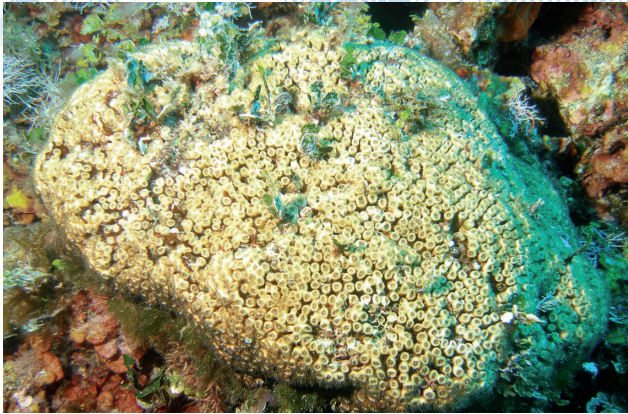


Marine reserves and new threats

Marine reserves are one of the tools used for the effective conservation of biodiversity and fishing management at both local and regional level. However the areas protected by these reserves cannot escape the impacts of global change, characterized by its intensity on a widespread geographical scale.

Due to this level of rapid change, marine reserves have become privileged laboratories for those who study and follow a long-term response of various species and biological communities to these new threats.

The protection offered by the reserves can rule out other anthropogenic impacts that could distort the information obtained. The marine reserves provide an infrastructure that greatly facilitates the arduous task of carrying out studies at sea.



Thanks to the marine reserves and the scientific monitoring programs they develop, significant progress is being made to understand and explain the effects of global change on marine communities and analyze their chances of recovery for the future.

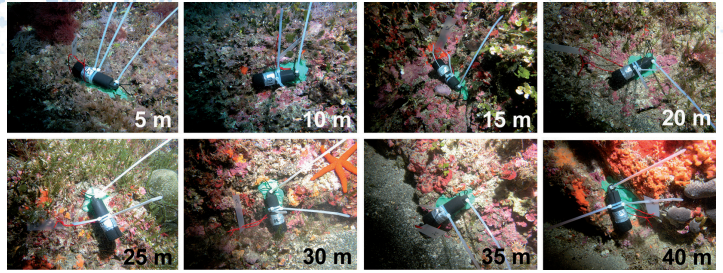
Islas Columbretes Marine Reserve – A global change indicator

Columbretes Islands house one of the most important types of Mediterranean coral under threat, *Cladocora caespitosa*.

This species is extremely sensitive to increasing seawater temperatures and the research and mon-



Photographs by: Diego K. Kersting.



itoring done at Columbretes have shown its value as a bio indicator of the effects of global warming.

Regular monitoring of coral mortality associated with the water temperature has been performed since the detection of the first mass mortality affecting this species in Columbretes after the hot summer of 2003.

The data is obtained by installing a system of thermometers along the reserve. The results obtained through the establishment of these protocols have allowed the investigation, for the first time, of the relationship between overheating of the water and the high mortality rates in the reef.

Moreover, the alien algae *Caulerpa Cyllindracea* and *Lophocladia lallemandii*, are both invasive algae which were first detected along the Grossa Island bay in 2006. They have now become part of the underwater scenery.

The study of the evolution of this algae spread was performed by regular monitoring throughout the marine reserve. Annual tests would record the abundance of both species of algae and their interaction with native species.

This information is of great importance not only for understanding the effects of these invasive species on native communities, but also in establishing measures in order to prevent from further invasions of others and these species in other areas.

The information obtained through monitoring these factors associated with global change is enormously valuable given the shortage of long-term data along the Mediterranean.

This research conducted in Columbretes stands as a manifesto to the importance of data collection over a long period of time. It also serves as a recognition for these reserves as sentinels of global change. Marine reserve management philosophy is committed to long-term studies.

9

Recent volcanic activity - Canary Islands

Two of the three marine reserves in the Canary Islands are influenced by recent volcanic phenomena: the marine reserve of the island of La Palma and the Punta de La Restinga-Mar de Las Calmas Marine Reserve.

These volcanic phenomena have influenced the two marine reserves in different ways: forming underwater landscapes of high interest in the Marine Reserve of La Palma Island, and being the cause of massive mortality of flora and fauna in the Punta de la Restinga-Mar de Las Calmas Marine Reserve, but turning it into a laboratory for the study of ecological succession in real time.

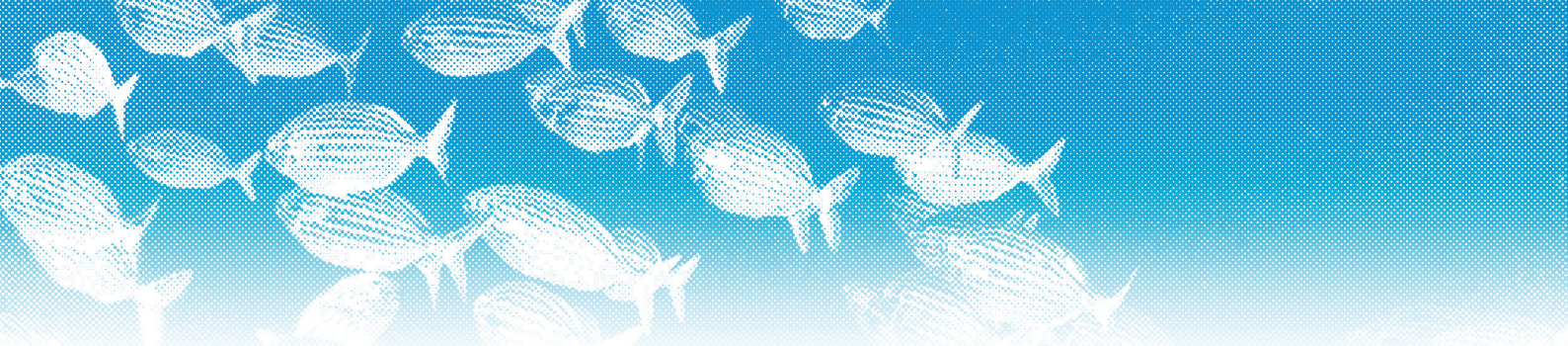
Volcanism in the Marine Reserve of La Palma

Between October 26 and November 18, 1971, the eruption of the Teneguía volcano took place on La Palma, and its lava flows reached the sea on the southwest coast of the island. The volcanic flows, upon reaching the sea and cooling, gave rise to particular underwater landscapes and structures, in the form of extremely steep bottoms with numerous cracks, tunnels, caves, and volcanic buildings, which currently form one of the most recent underwater environments in Spain from a geological point of view.

On September 19, 2021, the eruption of Cumbre Vieja began, forming a nearly 200-meter-high mountain, the Tajogaite volcano, with two submarine lava deltas formed by the intrusion of submarine lava

flows into the disappeared Los Guirres beach, over a mile north of the La Palma Island marine reserve. This eruption has been closely monitored by experts within the PEVOLCA Scientific Committee, of which the Directorate General of Sustainable Fisheries is a part, and constitutes an excellent example of collaboration between scientific networks and authorities from different administrations involved in volcanism, meteorology, and all scientific and human alert and safety aspects at all levels of the Administration: Cabildo, Municipalities, Autonomous Community, and different ministerial departments. These lava deltas buried some sampling stations in the vicinity of the marine reserve, and their evolution is being studied by the Directorate General of Sustainable Fisheries with the human and material resources of the reserve: biologist and crews of the Ignacio Aldecoa, the reserve's ship.



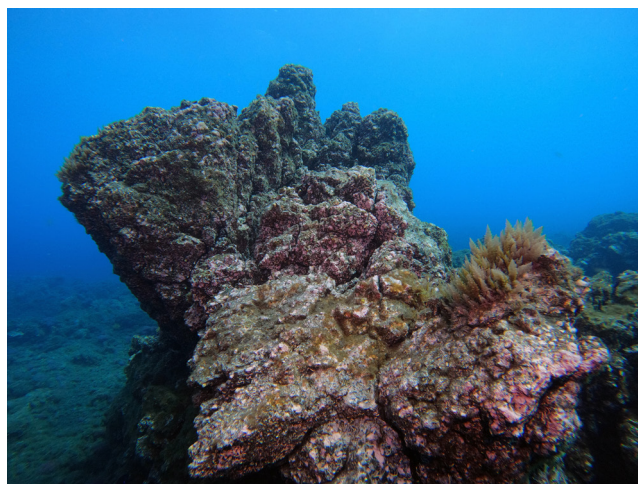
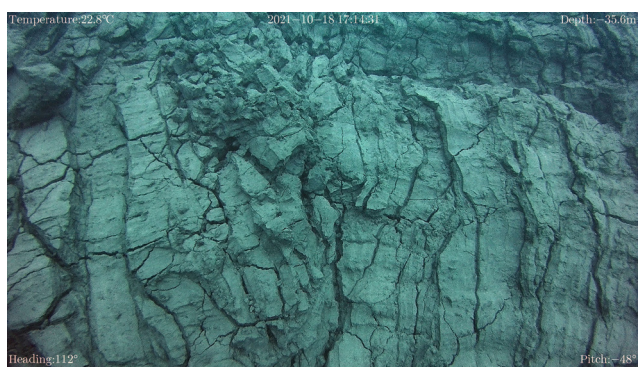


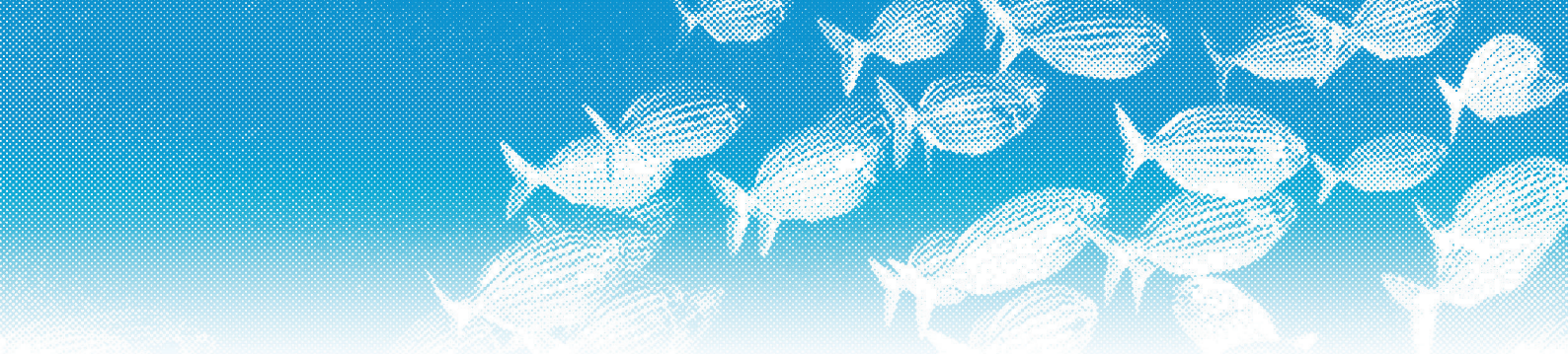
The images taken by the biologist of the reserve service and expert, Tamia Brito, in immersion and through the reserve's latest generation ROV (4K) show clear images of these new bottoms and their rapid colonization, all of high scientific value and interest in the framework of the monitoring of the marine reserve, which, like the southwestern area of the coast of La Palma, received a rain of ash for weeks. The exposed nature of that coast has favored the dispersal of ash and continuous recovery, as observed from the La Palma Island marine reserve, and this aspect is a benefit to take into account, as happened with the Tagoro submarine volcano in El Hierro.

Volcanism in the Punta de la Restinga-Mar de las Calmas Marine Reserve

On the island of El Hierro, on October 11, 2011, the submarine eruption of the Tagoro volcano took place, one mile from the outer limit of the Punta de la Restinga-Mar de las Calmas marine reserve, which affected the marine reserve during the first few years due to the acidity of the waters, anoxia, spilled substances, and increased temperature. The General Secretary of Fisheries has noted the relatively rapid recovery of the communities and hydrological conditions prior to the eruption in a short period of time, due to the good condition of the reserve in which fishing and recreational diving, as well as photo sub championships in different modalities, have returned to normal and are a world reference.

This eruption, despite being a very important milestone from a geological and scientific point of view, brought disastrous consequences for the marine





Erupción del Tagoro



reserve, at least during the first few years after its beginning. As the eruption began and with the emission of the first gases and volcanic products, the Mar de las Calmas became a green stain full of dead fish and other animals.

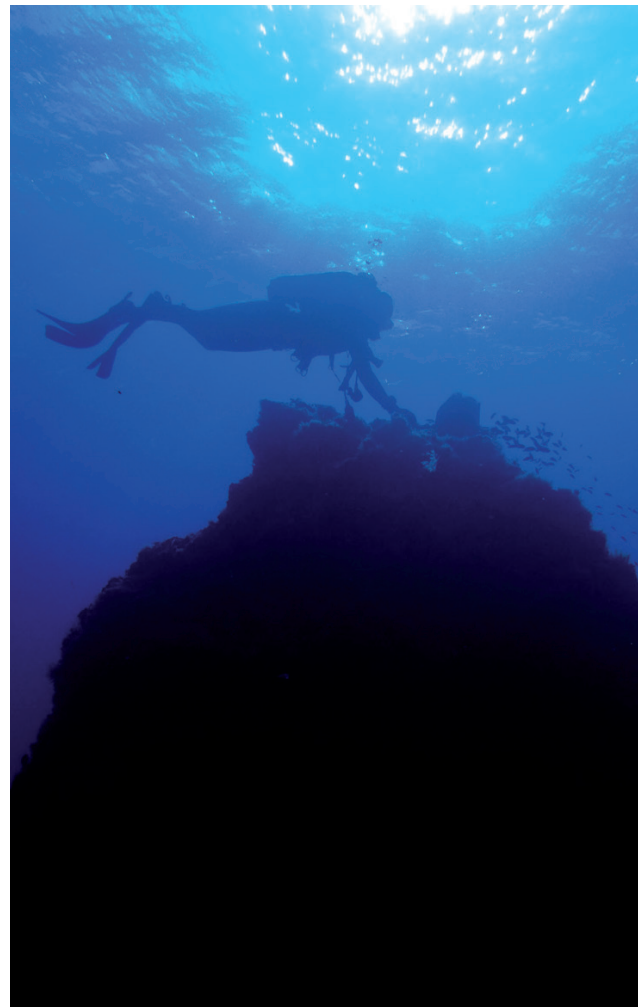
However, this event, which posed a threat to the conservation status of species and habitats in the marine reserve, is also being used as an opportunity: thanks to this phenomenon, the Punta de La Restinga-Mar de Las Calmas Marine Reserve has become an excellent laboratory for studying the evolution of underwater ecosystems after an eruptive episode of these characteristics.

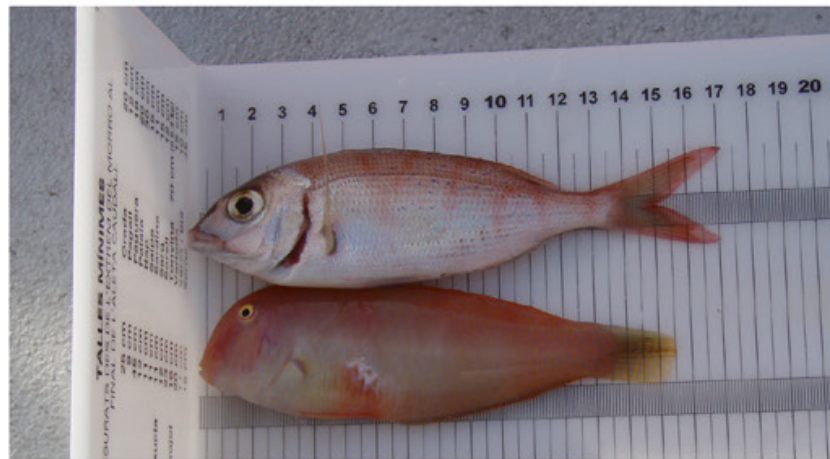
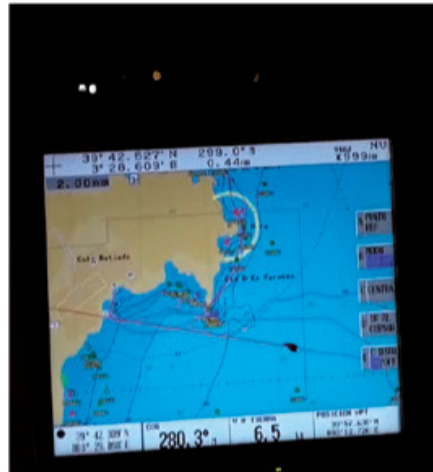
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For the study of these indicators, a chemical analysis laboratory is available, and various instruments are used, such as portable measurement probes, autonomous diving equipment, photography and video cameras, as well as a ROV (Remotely Operated Vehicle) for obtaining underwater images.

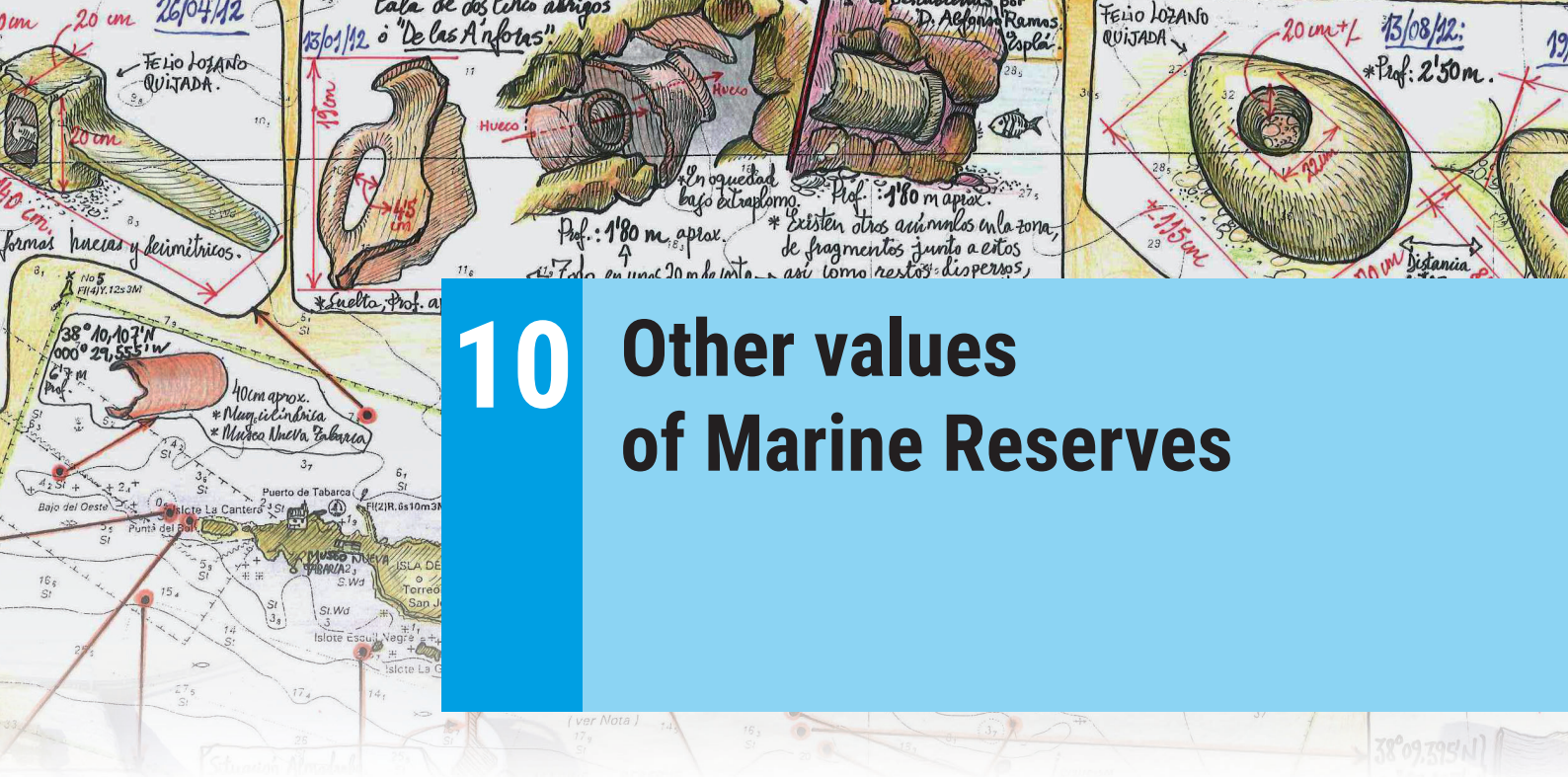
At present, the marine reserve has already recovered considerably, and although there are still

some aspects to be improved, its prospects are promising.





Autores fotografías: Animal's house, Pauline Gauffier, BIRM - SGP/MAPA, Javier Bermúdez, Tamia Brito, Javier Llorente



10

Other values of Marine Reserves

More than 35 year-old Network of Marine Reserves, provides examples, some curious, which highlight its value. It is not only limited to the improvement of fishing resources,

i.e. traditional fishing and biodiversity; it goes much further than that, providing additional benefits and services in progress as the reserves mature.

Marine reserves also serve as a tool for awareness and study of global problems at a local level. This includes factors such as climate change or marine littering, of which unfortunately these protected fishing areas are not immune to, despite being areas of good environmental status. They are also the perfect place to carry-out research using types of technology safe from any damage.

Marine reserves are paradigmatic places which make society aware to address certain problems: Collecting rubbish is one example. In these cases, campaigns are carried out with the support of managing administrations and local authorities and with the collaboration of divers and civil society, and even schoolchildren, who through activities such as drawing, can illustrate the problem.

Moreover, marine reserves are the subject to numerous requests to perform sampling, research and works that require hi-tech materials for underwater work. Marine reserves are fully equipped to handle these types of requests. So in the case of Cabo de Palos Islas Hormigas Marine Reserve, a sonobuoy to conduct underwater acoustic cetacean research has been put in place.

Furthermore, marine reserves have an aesthetic appeal that does not go unnoticed and have



inspired many artists. Such is the case with University of Murcia Professor Aurora Alcaide and Isla de Tabarca Marine Reserve. They got together to generate a collection of work reflecting the relationship between man and sea. They also address the ecological footprint or global problems such as marine litter or the presence of invasive species.

Additionally, this reserve is home to a rare artistic expression made from the rubbish collected at Tabarca port that invites reflection: "Trash fish" by Felio Lozano, the marine reserve biologist. He is the same author of "Isla Plana de Nueva Tabarca Island and marine reserve map", a nod to Mediterranean mythology. It gathers and summarises knowledge

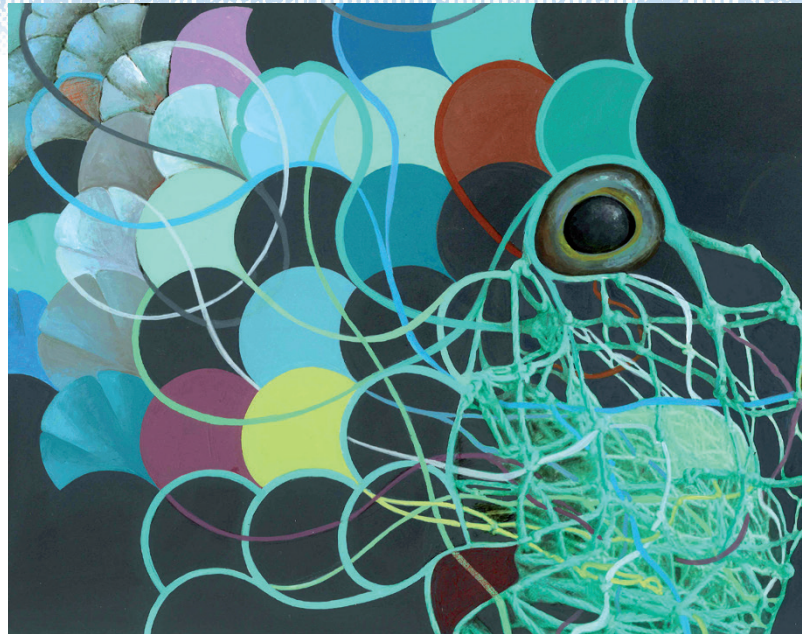


collected on the natural heritage and the many years of work carried out by the Isla de Tabarca marine reserve team.

Further evidence of the seascape appeal is the 18 editions of El Hierro Island 'Open Photosub', documenting the 19 years of Punta de La Restinga-Mar de Las Calmas Marine Reserve and cancelled once due to the underwater volcano. This is a classic open competition for underwater photography, world-renowned, which also serves to verify the recovery of the seabed after the eruption. This recovery is being helped by the marine reserve management and care.

Harboring archaeological heritage goods adds value to marine reserves, too. Experts in their diving routines have found archaeological remains making their job ever so worthwhile.

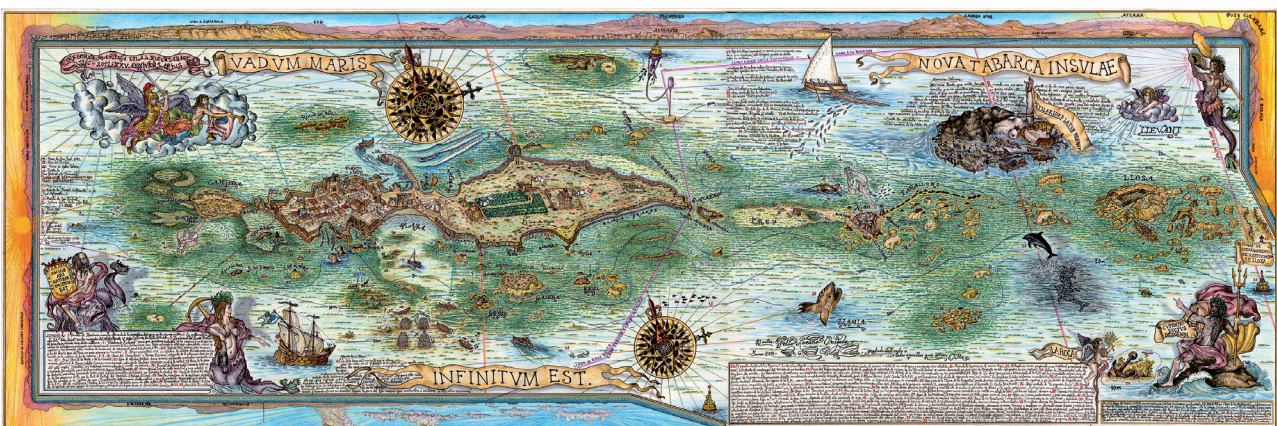
Archaeological Authorities are notified of the discoveries, which are extracted under strict protocols



and delivered for restoration and exhibition. Metal anchors, amphora remains and shipwreck timber from different ages were found in Isla de Tabarca Marine Reserve

The most important findings have been two anchors found in shallow waters, a roman anchor stock and various trace metals of unknown origin. Some of these findings have been displayed at Nueva Tabarca Museum, located on the Island itself. Marine reserve biologist work has made possible the completion of Alicante's Underwater Archaeological Map.

While maturing, the marine reserves network shows us new uses and unexpected benefits which add to its value and should be known and appreciated by society.



Photographs by: Top: Joan Costa. Painting by: Aurora Alcaide. Lower illustration (Tabarca map) by: Felio Lozano. Drawing on the top by: Felio Lozano.

11

Prospects

The current context

We all depend on the health of the oceans; they offer multiple environmental goods and services. However, they run the risk of irreversible damaging the biodiversity, habitats and ecological functions that they currently maintain. If current trends are not reversed, the ability of the oceans to provide food for future generations will be seriously compromised and residents of areas dependent on fisheries will suffer the most.

Technology allows us to fish practically anywhere in depths greater than a kilometre or consider mining



resources where was unthinkable a few years ago. In this new millennium, the only refuges that can guarantee the survival of marine life will be those protected by law. This is what marine reserves are: maximum protection zones with fishing quotas for traditional fishing.

Our attitudes and practices have to change and quickly. A new solution is needed to protect marine ecosystems, based on respect for the sea, globally, involving and inspiring our society.

This new model should encourage concrete actions aimed at restoring healthier and resilient oceans, and the sustainable use of marine resources.

These actions should include all members of society: all levels of government, fishermen, other sea users and civilians working together with common goals to maintain and protect the marine environment, which clearly, should be strongly supported by institutional and economic agencies.

In this respect, even though they currently cover a small fraction of the sea, marine reserves are a very powerful tool.



Status of marine reserves in the international context

The role in the promotion and protection of marine and oceanic ecosystems has been recognized at higher political levels. The World Summit on Sustainable Development and the Convention on Biological Diversity (CBD), IUCN and the G8 have appealed to the International community to establish a global network system of marine protected areas.

The most universal conventions such as the CBD, United Nations Law of the Sea or UN instruments such as the Code of Conduct for Responsible Fisheries point to the sustainable and equitable use of marine resources and food security in the context of eradication of poverty.

In the framework of the EU, marine reserves of Spain belong in full to the Natura 2000 Network and are areas of "good environmental status". Some are also SPAMIs areas (Barcelona Convention), some

World Biosphere Reserves of the MAB Programme UNESCO and the seven in the Mediterranean sea are part of MEDPAN. Therefore, their goals match European or International level while their effects are still felt positively on a local basis.

Society, concerned with the loss of biodiversity within the marine reserves, perceives that tangible results can be obtained through maintenance of environmental and heritage values.

Outlook for Marine Reserves Network

Marine reserves are now entering their fourth decade; the results of this marine network have been effective. Thanks to the financing from the General Secretary for Fisheries , EU structural funds (IFOP,



Future Verbs



- Protect more** ▶ Reach the goal of a 30% conservation of coastal and marine areas in the entire world by 2030.
- More involvement** ▶ Involve a wider variety of stakeholders, forging new alliances and move from awareness to action. Bringing people together to marine protected areas by establishing a global network of protected areas for future generations.
- Investing more** ▶ Account for the wealth of the oceans by recognising the true value of marine resources. Spend more money, more time and add more partners to the marine reserves.

EMFF, PRTR), which offer new means of financial support to EU fishermen and that grant a predominant role to fishermen in the protection.

These funds are financing some of the actions included in the Marine Reserve Network strategy, such as the use of new technologies (ICT) to reduce surveillance costs and improve the cost/efficiency ratio of monitoring, reinforcing and increasing awareness actions, the adoption of catch traceability monitoring systems, the development of fishing-seafaring tourism or the diversification of funding sources.

Indeed, marine reserves are part of the Community Fisheries Policy and, therefore, can benefit from a return on spending made by the Government by being co-financed by the European Union (EU). In turn, the reserves fit into Aichi Goals 6 and 11, created within the framework of the Strategic Plan for Biodiversity. In particular, the results and lessons that marine reserves show to us are a relevant practical case study of reliably protected areas through the corresponding management plans, in continuous adaptation and with permanent, structural financing that allows them to be endowed with human and material resources.



The Marine Reserves Network constitutes a case study of the protection of marine areas, and although its scale is local, the experience acquired can and should have a broader reading. Lastly, it should be noted that during this long management journey there has been a change in society, increasing awareness and the perception that a healthy sea improves our quality of life and that it is necessary to protect it. However, only with the awareness and collaboration of all, will it be possible to achieve the ambitious goals of protection of marine spaces marked by international agreements and commitments signed by Spain within the framework of the EU.

Thus, the marine reserves, without covering large extensions, are good examples of protected marine spaces for various reasons. Requested by the traditional professional fishing sector, which is a predominant activity on our coastline and which needs a healthy coastline. They act as drivers of change towards a new governance focused on environmental well-being. Through reserves, not only the ancient and traditional craft of artisanal fishing is regulated, due to its socio-economic and heritage values, but also a recent and increasing use such as recreational diving, with the agreement of all users. This coexistence is not easy, but the need to share a well-preserved space and maintain its quality implies a commitment between such different sectors, but forced to understand and comprehend that they share the same objective: carrying out their respective activities in an informed and responsible way, harmonizing the use of space, and considering that caring for the sea is a fundamental reason that unites much more than what can separate specific interests. Thus, reserves are laboratories of governance and examples, on a small scale, of marine spatial planning.



In the horizon 2030

The 17 Sustainable Development Goals (SDGs) approved on September 25, 2015 by the 193 member states of the United Nations (UN) within the framework of the 2030 Agenda, with the aim of shifting towards a resilient and sustainable world, constitute broad and comprehensive goals that address the root causes of problems such as hunger or environmental degradation.

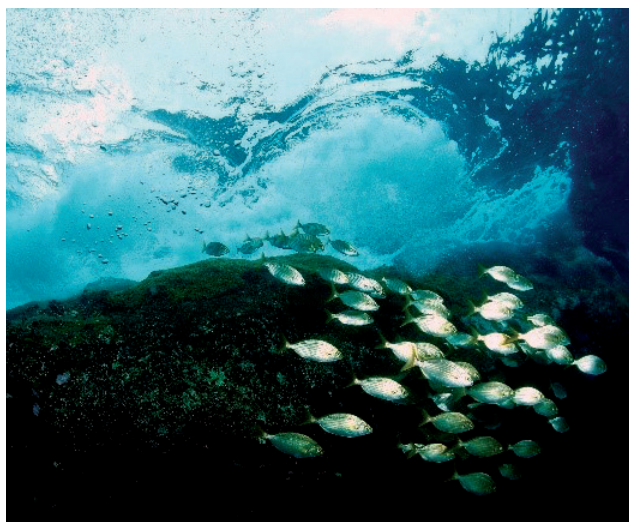
The SDGs call on all of us to take action. Goal 14, "Conserve and sustainably use the oceans, seas, and marine resources for sustainable development," includes, among other things, Marine Protected Areas as a necessary and effective tool. In this sense, the Network of Marine Reserves fully aligns with SDG 14 "Life Below Water," but is also related to other SDGs such as SDG 3 "Good Health and Well-being," which clearly relates to healthy fishing grounds for artisanal fishing or the environmental well-being sought by recreational divers in underwater itineraries.

Likewise, SDG 4 "Quality Education" has a direct application in reserves through a pedagogical approach that introduces teachers and students not only to the concept of reserves, but also to field trips that are well received. In this sense, the General Secretary of Fisheries was invited to participate in the "Protected Area Managers" working group of the PAEAS (Plan of Action for Environmental Education for Sustainability) in 2020, contributing the lessons learned in the reserves through educational and outreach activities. In the Aula del Mar in Almería, we were able to see the pride of a student, the son of a fisherman, in his father's trade, wise in the sea and fishing, and a protagonist in this essential activity for society. Along the same lines, the poetry collection by Inocencia Páez, reissued by the Ministry of Agriculture, Fisheries and Food, describes the daily life of La Graciosa: fishing and distant fishing trips in the Salvajes Islands, chores, celebrations, and festivals, gathered episodes that constitute an emotional and endearing testimony.

In addition, SDG 6 "Clean water", in the case of the marine environment, fits with the integral management of the reserves where environmental good status is pursued, with clean water being an essential factor for the fishing grounds of marine reserves.

Therefore, the General Secretary for Fisheries, through the services of marine reserves, ensures to prevent impacts such as extraction of sands, spills, collection of floating garbage on the seabed, or by divers who must follow the "criteria for responsible diving in marine reserves" published in the BOE. Likewise, the dissemination pillar of the Network of Marine Reserves of Fishing Interest includes awareness of marine litter, extraction of lost gear, the importance of recycling, reusing and reducing, bringing these concepts closer through educational actions and collaborations in volunteer actions such as cleaning beaches and seabeds, always following the corresponding protocols and with the necessary safety measures for volunteers and encouraging the use of applications that turn the results of awareness-raising actions into statistical samples.

Marine reserves are sentinels of global change and provide relevant information for SDG 13 "Climate Action": continuous monitoring provides data on the appearance of species of tropical affinity, which, in the case of macroalgae, partially change the underwater landscapes, as does *Lophocladia lallemandii*, which colors some of the Mediterranean reserve floors pink. The Columbretes Islands Marine Reserve has been providing data on sea surface temperature since its creation in 1990, and since 2003, continuously, from the range between 5 and 40 meters deep. This has made it possible to detect the hard coral *Cladocora caespitosa* as an indicator species of water warming, whose polyps die due to rising temperatures, causing the bleaching of parts of these colonies.





Finally, SDG 17 “Partnerships for the Goals” represents the day-to-day of adaptive management in marine reserves, where managers, scientists, and economic sectors with activity in the reserves, such as artisanal fishing and recreational diving, share objective information on which to base management. We can affirm that marine reserves fully align with the orientation of the 2021-2030 Decade, declared by the UN as the “Decade of Ocean Science for Sustainable Development”.

Recognizing the need to advance and increase protection of the sea through Marine Protected Areas, marine reserves are providing information that allows us to be optimistic: even in areas where fishing is allowed, except for integral reserves and those of the Columbretes Islands and Masía Blanca, fishing results and those related to environmental conditions are encouraging. With the exception of the two most recent reserves, Cabo Tiñoso (2017) and Dragonera (2020), the rest of the reserves have been established for more than 10 years, with the oldest ones approaching 30 years, which allows us to verify their good evolution.

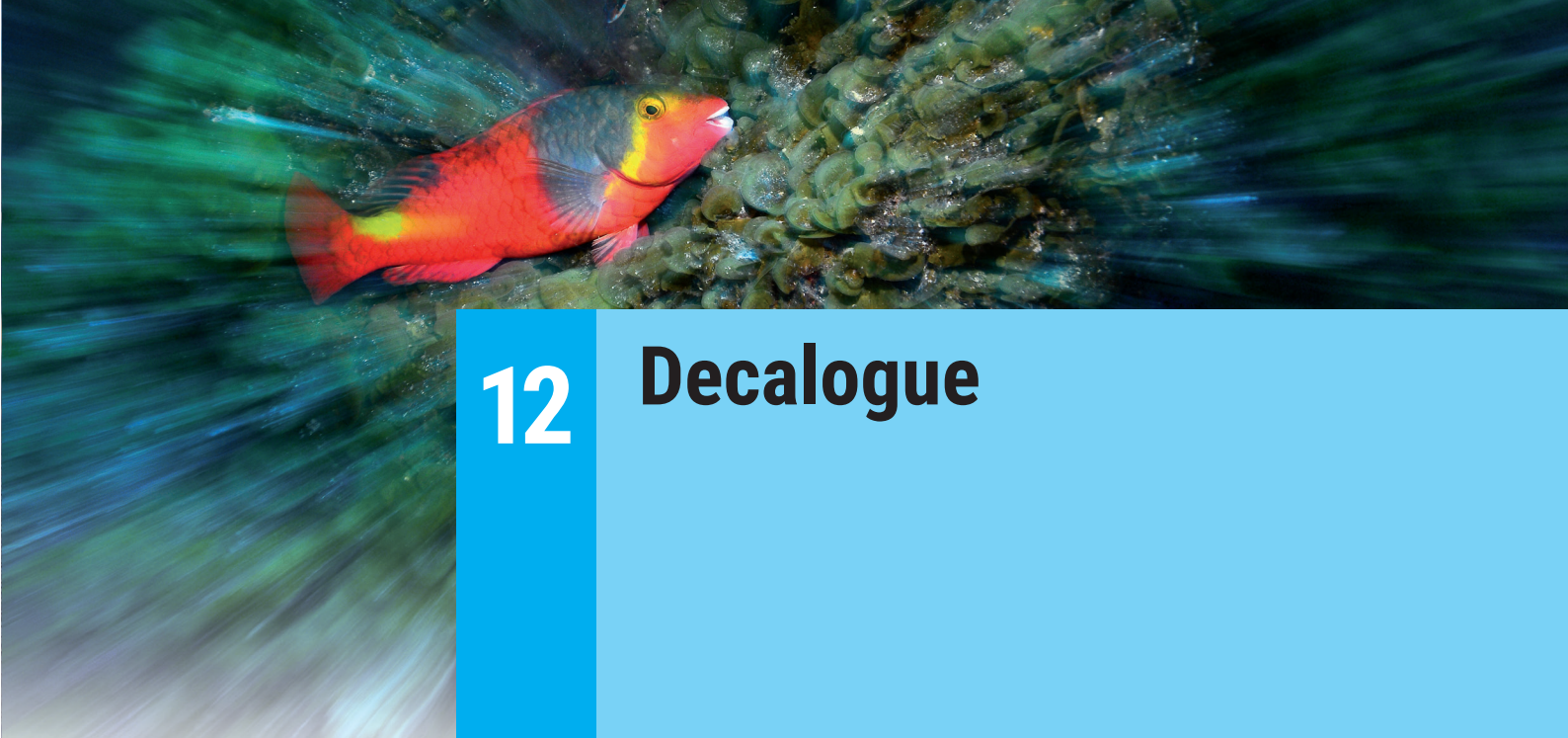
In addition, as described at the beginning, marine reserves show, at the local level, the gradient between the zone of maximum protection, the integral reserve, and the rest of the reserve zone with fishing uses, which, at the request of the fishing sector itself, is usually more restrictive in the regulation of fishing than the adjacent non-protected fishing zone. This zoning between no-take zones and protected fishing zones constitutes a fertile field for the research of the effects of spatial protection, of great interest to advance in the development of Marine Protected Areas.

In addition, the good fishing and scenic results that we, as managers and users of marine reserves, observe indicate that we are on the right track. In this sense, we can talk about the role of reserves as sentinels in the face of impacts, but also as beacons: the path followed to support traditional artisanal fishing with its knowledge base extends its effects beyond artisanal fishing and its yields beyond the fisheries policy that inspires it, as seen in previous chapters.

Taking into account the vital importance of oceans for the health of the planet and for humans, the benefits of marine reserves, still to be further and better investigated, are a “green ray” of hope that must become a new paradigm: managing the marine public domain and fisheries resources, which are public goods within the framework of sectorial fisheries policy, with a demanding agenda in the coming years, in the already close horizon of 2030, and in which governments, managers, teams of the Reserve Network, users, and the rest of civil society must increasingly get involved, while we better understand the threats to the sea, but also the benefits that protection provides.

This palpable reality is stimulating and the best incentive to observe, advance and continue telling it through marine reserves, with the reference of 2022, the Year of Artisanal Fishing, and within the framework of the Decade of Ocean Science for Sustainable Development 2021-2030, and in the horizon, hopefully near, the UN Ocean Treaty.

**Marine reserves,
a guarantee of the future
for the benefit of all of us!**



12

Decalogue

- 1 A marine reserve is a protected area created for the enhancement of the fishing resources which benefits everybody.
- 2 Marine reserves are places where traditional fishing is developed, compatible with the enhancement of the fishing resources.
- 3 Marine reserves protect habitats and promote regeneration of the species and not just those targeted by fisheries.
- 4 Marine reserves are always home to, at least, one area of “integral reserve”, only for scientific activity.
- 5 Exported biomass from marine reserves is contributing to marine life beyond their borders, thanks to a phenomenon called “Reserve Effect”.
- 6 People who work for marine reserves devote all their efforts to understand and protect the marine environment, promoting its respect and care through collaboration.
- 7 Help us preserve marine reserves. Whenever you visit one, help us keeping them in good condition and improving them.
- 8 Marine reserves are areas where conservation and tradition coexist: Find out more about them, read, ask, and help to promote these protected areas.
- 9 Expand your respect for the marine environment to other places outside marine reserves, and choose quality fish products.
- 10 Marine reserves conservation and protection is a task for all, for our enjoyment and for future generations... for the benefit of all of us.

Marine reserves... a guarantee for the future.

For the benefit of all of us!

Photograph by: Rui Guerra

Back page photographs by: Enrique Granja, Rafael Fernández and Animal's House

