RELOCALISATION
DU
CENTRE D'OCEANOLOGIE DE MARSEILLE

ANNEXE 2
Les sites européens de suivi de la biodiversité sous la responsabilité de la Station Marine d'Endoume

In
Warwick et al. 2003: **BIOMARE European Marine Biodiversity Research Sites**. NIOO-CEME, Yerseke, NL. ISBN 90-74638-15-5. 118 pages

Le but principal de BIOMARE était d'établir l'infrastructure et les conditions exigées pour la recherche sur la biodiversité marine à long terme et à une échelle européenne. L'action avait 3 objectifs principaux : (1) sélectionner des sites de référence reconnus et établir un réseau comme base pour la recherche sur la biodiversité marine en Europe, (2) faire l'inventaire et choisir des mesures internationalement reconnues et normalisées ainsi qu'évaluer la pertinence d'indicateurs et d'indices de la biodiversité et en proposer un certain nombre, agréés au plan européen, et (3) acquérir des moyens de diffusion et d'accessibilité des résultats et de gestion de réseax de la recherche en biodiversité marine.

Le rapport de l'objectif 1, d'où sont extraits les fiches suivantes, décrit 100 sites de recherche sur toutes les côtes européennes qui constituent l'armature logistique et scientifique du réseau. Seulement 12 d'entre eux sont des sites de références, choisis comme étant le moins impactés possible par l'activité humaine et représentatifs des habitats côtiers européens. Ces sites de références avec un certain nombre de sites focaux seront plus particulièrement le siège de recherches soutenues. La plupart de ces sites sont proches des Stations Marines qui peuvent fournir l'infrastructure pour les opérations de suivis, l'exploration et le travail expérimental. Le COM, à travers la SME, est responsable de 5 sites de suivis en Méditerranée

PORT-CROS ISLANDS	France	Conservation status ☆ ☆ ★ ★ ★	

Co-ordinates: 43°00'N, 6°23'E

Coralligenous ground at La Gabinière, with gorgonians, *Anthias* and Red Scorpionfish. Photo J G Harmelin

Description of site:

The National Park of Port-Cros comprises one inhabited island (48 permanent people and several thousand visitors, mostly in summer) and three smaller uninhabited islands, which are part of Hyères Archipelago 8 km off Bénat Cape. The islands are exposed to the main east-west current of the north-west Mediterranean coming from the Gulf of Genova in Italy. The total area is 700 ha of land and 1300 ha of sea. There is no permanent freshwater runoff. Sea-water is very clear and visibility generally exceeds 20m. This area has had the status of National Park since 1963. The marine zone, 600 m off the coast around the islands, includes all the major habitat types of the NW Mediterranean, except pure muddy sediments, and is near bathyal assemblages from deep-sea cliffs. Littoral rocky habitats are well represented, including mid-littoral algal rims of *Lithophyllum byssoides*. There are three small sand beaches. Sublittoral rocky habitats are well represented, with vertical cliffs, boulders, and small caves, coralligenous constructions and various algal assemblages, including diverse *Cystoseira* algae. Sublittoral sandy habitats include typical assemblages associated to "detritic coast sand" that have disappeared from polluted areas, e.g. maerl, large arborescent bryozoans and deep stands of laminarian and other large seaweeds. Seagrass beds are well represented, mostly *Posidonia* beds, and a few *Cymodocea* beds. This is one of the rare Mediterranean marine protected areas receiving active management. Researches on biodiversity and inventories made since 1963 demonstrate its unique richness in habitats, benthic fauna and flora and attest to the recovery of populations of flagship**,** vulnerable**,** species. It constitutes a prominent reference site in this part of the Mediterranean Sea for both the good shape of communities and its biogeographic status, intermediate between northern and southern influences. The Park accommodates a large number of visitors and divers, who are informed and made aware of the problems of biodiversity by the Park authorities and many documents for the layman are available.

Habitats present:

	Mud	Sand	Rock
Littoral		X	X
Sublittoral	X	X	X
Seagrass beds		X	

Description of fauna and flora:

Posidonia beds are well developed and, thanks to the lack of turbidity, reach much deeper limits (33-37m) than along urbanised coasts of the mainland. One of the last "*Posidonia* barrier reefs" of the Western Mediterranean occurs at the bottom of Port-Cros Bay. Comprehensive inventories of many components of the biota have been published or are available from the Marine Park Authority, including Rhodophycota, Phaeophycota, Chlorophycota, Chrysophyceae, Magnoliophyta, Foraminifera, Porifera, Cnidaria, Sipuncula, Annelida, Chelicerata, Crustacea, Mollusca, Brachiopoda, Bryozoa, Echinodermata, Tunicata, Pisces and

Mammalia. The restriction of fishing activity, particularly the ban of trawling and spearfishing, has led to a spectacular increase in fish populations, especially flagship species such as the dusky grouper (*Epinephelus marginatus*), brown meagre (*Sciaena umbra*), large sparids (*Dentex dentex, Sparus aurata, Pagrus pagrus, Diplodus* spp.) and barracuda (*Sphyraena viridiana*). Several large, vulnerable, invertebrate species are well represented, such as the bivalve mollusc *Pinna nobilis*, the decapod crustacean *Scyllarides latus* and the echinid *Centrostephanus longispinus*. The recent population increase of some southern species, particularly fishes, is monitored. The outstanding quality of fish aggregations and general landscape of some sublittoral areas, such as the La Gabinière islet, is very popular among sport divers and frequently covered by media. Approximately 340 scientific publications have been devoted to the marine flora and fauna of Port-Cros.

Dusky grouper (*Epinephelus marginatus*) at La Gabinière, Port Cros. Photo J G Harmelin

Human impact:

There is no industrial pollution or mining, and agriculture is negligible. The permanent population is 48, and most of the visitors in summer (220,000 visitors per year on the island, 16,000 pleasure boats and 20,000 divers) remain only during daytime. Professional fishing is restricted to small trammel net fisheries (one local fisherman and ca. 5 to 6 fishermen from the mainland), with annual catches of 14 tons. Amateur fishing is limited to the north and west coasts beyond 50 m from the shoreline. A charter of good use has been established with regional diving companies for limiting the impact of divers. An underwater path for snorkellers education is organised every summer at La Palud beach by the Park staff. Several studies showing a low level of contamination by pollutants have been published.

On-going research:

Biodiversity studies, additions to the inventories and monitoring of faunistic changes are ongoing on several groups of biota and diverse assemblages, involving approximately 12 professional scientists. Time-series data are available for *Posidonia* beds, dusky grouper (*Epinephelus marginatus*), Brown meagre (*Sciaena umbra*), *Pinna nobilis*, *Paramuricea clavata*, and echinoids.

Facilities:

The main island is accessible by public transport (passenger ferry, 1-hour crossing from Hyères and Lavandou). The Park offers facilities for accommodation and field work, including small boats and an air compressor for diving. Several restaurants are available during the tourist season and some are open throughout the year.

Database available:

Inventories of the fauna and flora are available as Word or Exel files from the Park Authorities.

Website:

General data on the Port-Cros National Park, including land and marine area are available on http://www.portcrosparcnational.fr/site.asp and http://www.provenceweb.fr/e/var/portcros/portcros.htm

Commitment:

The National Park authority supports research on the marine zone, mainly done by scientists from the Centre d'Océanologie de Marseille, the Museum National d'Histoire Naturelle, the Universities of Nice and Barcelona. The area is a ZNIEFF zone and Natura 2000 site.

CALANQUES COAST, MARSEILLE	France	Conservation status ☆ ★ ★ ★ ★	

Co-ordinates: 43°12'N, 5°25'E

Trémies Cave, dark zone, with highly diverse fauna of encrusting invertebrates. Photo J.G. Harmelin.

Description of site:

The uninhabited and uneven limestone shoreline 15 km long, indented by deep "calanques" (fjords), includes numerous fully submerged submarine caves.

Description of fauna and flora:

The site contains a representative array of the Mediterranean habitat types, including rocky substrata, caves and *Posidonia* meadows. It is rich in flagship species, such as the red coral *Corallium rubrum*, gorgonians and numerous endemic Mediterranean species.

Habitats present:

	Mud	Sand	Rock
Littoral		X	X
Sublittoral	X	X	X
Seagrass beds		X	

Human impact:

A limited part (west side) is under the influence of the sewage outlet of Marseille, which is treated by physico-chemical methods (biological treatment is planned). The eastern area is relatively free from pollution. The site is popular among divers and pleasure boats. It has a limited legal protection, with a planned National Park. Natura 2000 habitat.

Facilities:

Facilities are available at the Centre d'Océanologie de Marseille (COM), with easy access from Marseille and Cassis harbors.

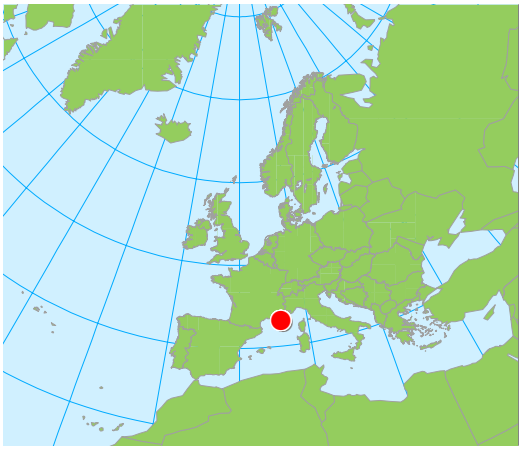
Available database and website:

The species inventory for several invertebrate groups (sponges, serpulid polychaetes, bryozoans, crustaceans) and algae is available in the COM.

Commitment and ongoing research:

The site has been intensively studied by the COM for more than 40 years, both in the zone under the influence of the Marseille sewage and in the unaffected zone. The studies include monitoring and inventories of the sublittoral rocky shore, coralligenous and cave fauna, monitoring of the evolution of the soft bottom fauna and bioaccumulation research in invertebrates.

CARRY-LE-ROUET	France	Conservation status ☆ ☆ ★ ★ ★	



Co-ordinates: 43°19.1'N, 5°9.8'E

Carry reserve: sparids (*Diplodus sargus*, *Sarpa salpa*) in a *Posidonia* meadow mixed with rocks. Photo J G Harmelin

Description of site:

Carry-le-Rouet fisheries reserve (85 ha) is part of the "Côte Bleue" Marine Park, Gulf of Marseilles, France, a managed zone along a rocky, moderately urbanised, coast. The protected area, adjacent to the shore, includes rocky and sandy bottoms gently slopping from 0 to 30-40 m depth.

Habitats present:

	Mud	Sand	Rock
Littoral			
Sublittoral		X	X
Seagrass beds	X		

Description of fauna and flora:

The area houses large seagrass beds (*Posidonia oceanica*) mixed with low, heterogeneous, rocks and, to a lesser extent, shallow and deeper sandy communities. There is a rich fish fauna including vulnerable species such as the dusky grouper (*Epinephelus marginatus*) and the brown meagre (*Sciaena umbra*), and a typical rocky sessile fauna, including gorgonians and precious red coral (*Corallium rubrum*).

Human impact:

The no-take area has been strictly protected since 1987 and is physically protected by anti-trawling artificial reefs deployed at its periphery. Diving is forbidden. The area can be subjected to low levels of pollution from nearby Marseilles city (population 850,000) and sporadic runoff of the Rhône river. Natura 2000 habitat.

Facilities:

Diving for marine biodiversity research is possible with the Park staff. Snorkelling is possible freely from the shore. Larger research vessels, fully equipped laboratory and library are available at the Centre d'Océanologie de Marseille.

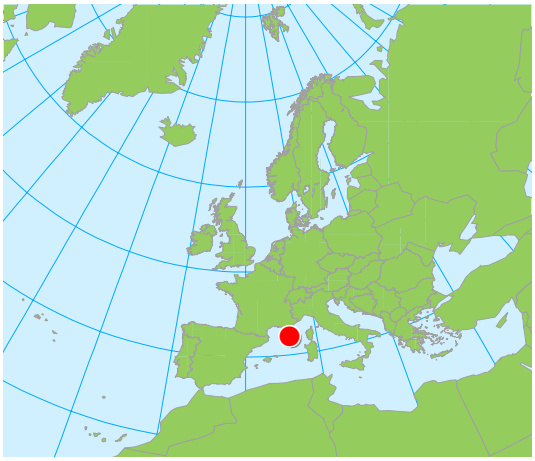
Available database and website:

A fish inventory is available at the Park. Website: http://perso.wanadoo.fr/parcmarin/pages/protect.htm

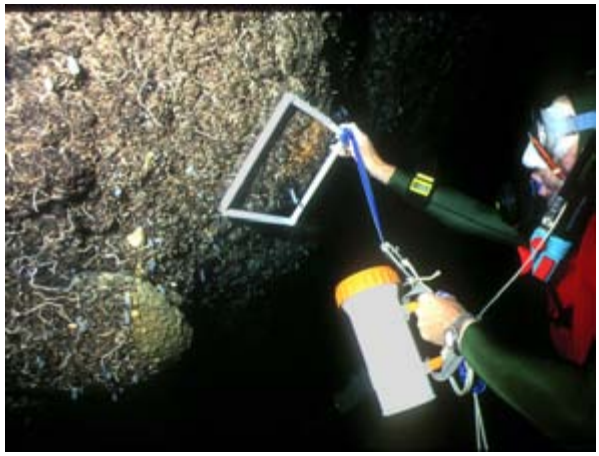
Commitment and ongoing research:

The Centre d'Océanologie de Marseille and the GIS Posidonie undertake biodiversity-related research in the area.

LA CIOTAT 3 PP CAVE	France	Conservation status ☆ ☆ ★ ★ ★	



Co-ordinates: 43°09'N, 5°36'E



3 PP cave, counting deep-sea hexactinellid sponge *Oopsacas minuta*. Photo J Vacelet

Description of site:

The 3PP cave, near La Ciotat, is a 120 m long tunnel in a conglomerate layer, with a deep mud layer on the floor. Due to its descending profile, with the entrance 15 m deep and the end 24 m deep, the cave traps by density a cold water mass and has a thermal regime of cold homothermy similar to that of the deep Mediterranean.

Description of fauna and flora:

There are typical faunal assemblages from shadowed and dark caves. Most remarkable are bathyal organisms, such as hexactinellid and carnivorous sponges, that have colonized the cave from a nearby deep canyon.

Habitats present:

	Mud	Sand	Rock
Littoral			
Sublittoral	X	X	X
Seagrass beds			

Human impact:

There is no notable pollution. The cave is rarely visited by local divers.

Facilities:

Facilities are available from the Centre d'Océanologie de Marseille (COM) 25 km distant. There is easy boat access from La Ciotat harbour (1 km).

Available database and website:

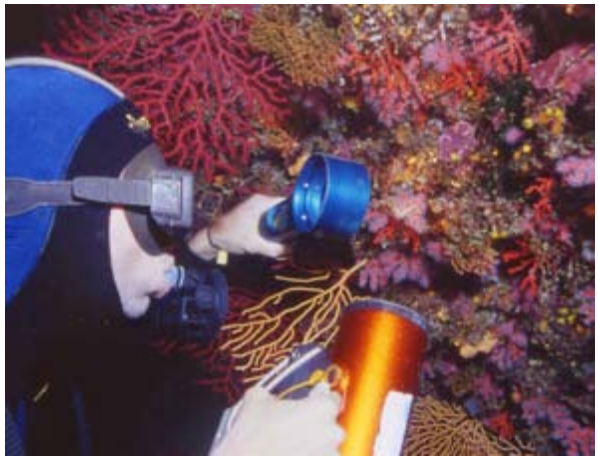
A species inventory for several invertebrate groups (sponges, serpulid polychaetes, bryozoans, crustaceans) is available in the COM.

Commitment and ongoing research:

The cave has been intensively studied by the COM for 11 years: continuous temperature recordings, species inventories, biodiversity researches, studies on the physiology, taxonomy and phylogeny of deep-sea species found in this "bathyal island in a littoral environment".

RIOU ARCHIPELAGO, MARSEILLE	France	Conservation status ☆ ☆ ★ ★ ★	

Co-ordinates: 43°11'N, 5°23'E



Gorgonians and red coral on a slightly overhanging cliff. Photo J G Harmelin

Description of site:

The Riou Archipelago, near Marseille, is a group of uninhabited limestone islands with varied topography. The archipelago contains the whole set of sandy and rocky habitats typical of the NW Mediterranean, including vertical cliffs down to more than 70 m and submarine caves.

Habitats present:

	Mud	Sand	Rock
Littoral		X	X
Sublittoral	X	X	X
Seagrass beds	X		

Description of fauna and flora:

The Archipelago contains a rich and diverse coralligenous fauna and flora, and is rich in Mediterranean endemic species and flagship species such as the red coral and several gorgonians.

Human impact:

The north coasts of the archipelago may be exposed to the effect of treated sewage from Marseille. The south coasts are under the influence of the general east-west current of the North-Western Mediterranean, and are free from obvious pollution. The site is very popular among divers and marine tourists. It is a Natura 2000 habitat.

Facilities:

Facilities are available at the Centre d'Océanologie de Marseille (COM).

Available database and website:

A species inventory for several algal groups and invertebrates (sponges, serpulid polychaetes, bryozoans, crustaceans) is available in the COM. Web site (mostly terrestrial): http://www.conservatoire-du-littoral.fr/front/process/Content.asp?rub=8&rubec=152

Commitment and ongoing research:

The site has been routinely studied by the COM for 50 years. Ongoing studies include monitoring of the coralligenous and cave assemblages, continuous temperature recordings, permanent quadrats, inventories of the cave and cliff fauna, and changes in flora and fauna after a recent temperature-related mortality event.