

## summary

- <1> 1. presentation
- <1> 2. the team
- <2> 3. the station
- <4> 4. impacts and pressures
- <6> 5. environmental diagnosis
- <7> 6. final evaluation
- <8> 7. progress plans
- <8> 8. calendar of action 2010

The **SILMAR Project** is gathering data at different research stations to explore the state of the coastal marine environment. With the participation of volunteers, who manage each station, key species are monitored and the data fed into the SILMAR website to build a picture of the conservation measures needed around the coast of Spain..



This is an initiative from **Fundació Mar** with the collaboration of **Fundación Biodiversidad**

## 1. presentation



Station:

**Cala Montgó**

Town:

**l'Escalada, Baix Empordà, Girona**

Code:

**GIM0109**

SILMAR Coordinator:

**Gaynor Rosier**

Team of volunteers:

**Jayson Muxlow, Suzi Wilson, Paul O'Connor, Bob Fenton, Steve Fenton, Jean Conklin, Cat Wilson, Mart Winchester**

Dates of activity:

**April-September 2009**

## 2. the team

**Gaynor Rosier**, of Welsh origin, came to Spain approximately 10 years ago. Now she lives in **l'Escalada** (Baix Empordà, Girona) where she operates the dive center **Kenna Ecodiving**, through which she collaborates with the **SILMAR** Network. **Gaynor** was the first volunteer to join the **SILMAR** Network at the first presentation of the project during the Barcelona Boat Show in 2008. From her center **Gaynor** offers divers and marine biology students the opportunity to take part in voluntary underwater research and conservation activities with the **SILMAR Project**. The participation of this center in the **SILMAR Project** has brought the **SILMAR** research methodology to more than 20 volunteers who joined this team during summer 2009, diving at the **GIM0109 research station**.

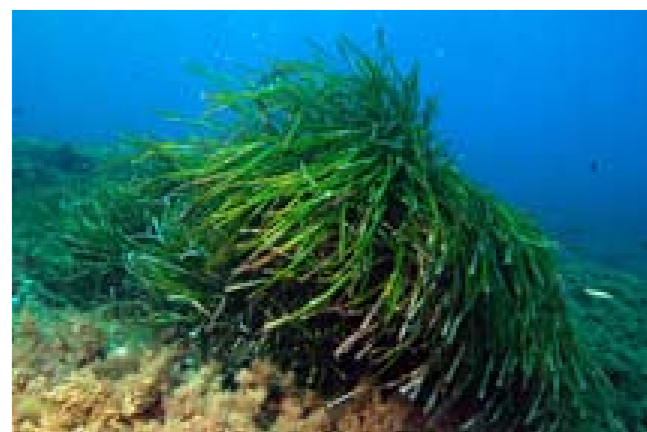
**Gaynor**, also actively took part in the first pilot dives to test the protocol at several research stations. We are grateful to **Gaynor** for her work within the **SILMAR project** and especially so for her collaboration in taking part at other stations and dedicating her time to promoting the Network to divers from other countries, achieving a team of volunteers with a high level of participation at the **GIM0109** research station.

### 2.1. Collaborating Dive Center

marinebiology.kennaecodiving.net  
www.kennaecodiving.net



### 3. the research station



#### 3.1. description

This Silmar Network research station is located in Cala Montgó a small bay to the south of the municipality that belongs to Torroella de Montgrí but that geographically is in the southern limit of the municipal town of l'Escala. It borders onto the north stretch of the coast of Montgrí, an area protected under the Spaces of Natural Interest of Catalunya Plan (PEIN) and an integral part of a wide marine terrestrial zone included in the Natura 2000 Network. In the future this zone will be integrated into the Park Montgrí-Medes-Baix Ter. The current nature reserve of the Medes Islands is 4 nautical miles to the south of this station.

The station GIM0109 has a submarine profile of shallow waters between 5 and 7 m. with an approximate surface of 500 m2 in a transect that passes from a rock found towards the south of the bay, approximately 350 m. from the beach and approximately 500 m. from buildings. In summer this area cannot be used for anchorage since it is protected by buoys that prevent the entry of boats. However, it is a zone frequented by kayakers and, occasionally scuba divers, snorkelers and sports fishermen. At an oceanographic level this bay is significantly affected by the easterly and of the southerly winds.

It is a station of scientific interest for the underwater ecosystem that is typical of Mediterranean coastal zones, such as well illuminated rock blocks in calm waters and also for the presence of an interesting Posidonia oceanica meadow that operates as an excellent bio-indicator of the quality of sea water in and around this area.

This station is ideal for the Silmar Network team of volunteers for study and experimentation as it is one of the most outstanding landscapes of the north Catalan coast and yet allows for easy observation with a simple team of snorkelers or divers.

The dominant vegetation present in the first stretch of rocky benthos is algae, a habitat in which numerous invertebrates develop throughout their life cycles. Above the algae covered rocky bottom we find abundant fish species, including several from the wrasse family as well as scorpionfish, combers and espáridos

After this less than pristine rocky bottom community we find the Posidonia oceanic meadow in a good state of conservation.



#### b) fauna

➔ 67 species 40 invertebrates and 27 vertebrates



nº	name of species
 2	Verongia aerophoba; Ircinia fasciculata.
 7	Anemonia sulcata; Actinia equina; Cereus pedunculatus; Rhizostoma pulmo; Cotylorhiza tuberculata; Pelagia noctiluca, Eunicella singularis.
 13	Haliotis lamellosa, Hypselodoris elegans; Thais haemastoma; Ostrea edulis; Octopus vulgaris; Sepia officinalis; Aplysia fasciata; Chiton olivaceus; Trunculariopsis trunculus; Peltodoris atromaculata; Mytilus Galloprovincialis; <b>Pinna nobilis</b> <sup>14</sup> , <b>Lurida lurida</b> <sup>124</sup> .
 2	Spirographis spallanzanii; Sabella pavonina.
 5	Palaemon elegans, Dardanus calidus, Pagurus anachoretus, Inachus dorsettensis, Maja crispata.
 4	Calpensia nobilis; Myriapora truncata; Savyniella lafontii, Pentapora fascialis.
 3	Echinaster sepositus, <b>Paracentrotus lividus</b> <sup>25</sup> , Arbacia lixula.
 4	Clavellina lepadiformes, Aplidium concicum, Microcosmus sabatieri, Halocynthia papillosa.
 27	Chromis chromis, Diplodus sargas, Diplodus vulgaris, Diplodus puntazzo, Diplodus anularis, Sarpa salpa, Thalassoma pavo, Coris julis, Gobius luteus, Parablennius rouxi, Parablennius gattorugine, Parablennius pilicornis, Parablennius tentaculares, Symphodus rostratus, Symphodus tinca, Symphodus cinereus, Labrus merula, Serranus cabrilla, Serranus scriba, Scorpaena notata, Scorpaena porcus, Scorpaena scrofa, Spicara maena, Lepadogaster candollei, Trypterygion delaisi, Bothus podas, Torpedo marmorata.

#### 3.2. biodiversity indicators

The primary groups of key species found in both ecosystems are:

##### a) flora

➔ 12 species of algae and 1 seagrass

	name of species
 12	Cystoseira mediterranea <sup>124</sup> , Halopteris scoparia; Padina pavonica; Asparagopsis armata; Codium bursa; Codium vermilara; Halimeda tuna; Corallina elongata; Acetabularia acetabulum; Dasycladus vermicularis; Dictyota dichotom, Sphaerococcus coronopifolius
 1	Posidonia oceanica <sup>1234</sup>

##### marine species included in:

1. Spanish Catalogue of Threatened Species (CEE) / 2. Berne Convention: appendix I and II (2002) / 3. EC Habitats Directive (1992) / 4. Barcelona Convention - Appendix II, threatened or endangered species (1999) / 5. Barcelona Convention - Appendix III, species whose exploitation is regulated (1999)

# 4. impacts and pressures

The next section describes the socio-environmental context and ecology of the municipality, and analyzes the factors influencing the quality of the sea and coast in this area.

## 4.1. antecedents

The town of l'Escala is situated on the south of the Bay of Roses, between the mouth of the ancient river Fluvià and the hill of Montgó. At the south it borders on the municipality of Torroella de Montgrí (Baix Empordà). The old town stands between the Mediterranean Sea and a group of hills, the northernmost front of the Montgrí massif.

At a geological level the area is principally calcareous with layers of slimes and more superficial clays. The town of l'Escala was born in the XVIIth century as a fishermen's quarter of the people of Sant Martí d'Empúries. In the XVIIIth century it was restored as municipality.

It is mainly coastal people who have suffered the "boom" of construction from the tourist decade of the 70s. Of the original emblematic people, those remaining are relegated to a small nucleus surrounded by new constructions of houses, buildings and urban developments.

This model of development demands large quantities of energy, generates enormous quantities of waste in the summer season, and creates great pressure on the coastal territory that over time loses its unique quality and attractiveness.

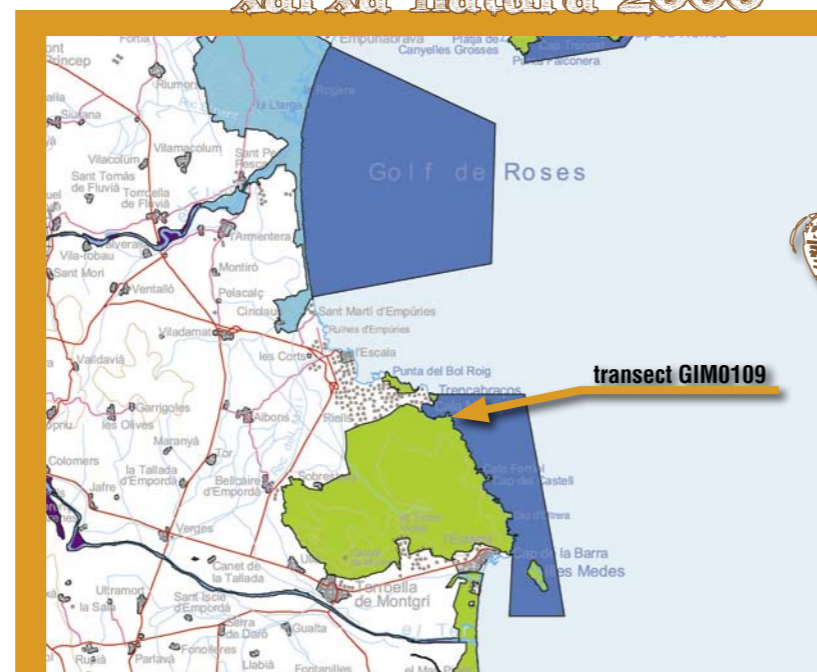


▲ fishing

### ▼ impacts of Easterly winds



## xarxa natura 2000



Proposed integration of Cala Montgó (Silmar station GIM0109) within the Park Montgrí-Medes

## 4.2. socio-environmental factors



### population

Permanent population\*: 9.829 inhabitants  
 Area in km<sup>2</sup>: 16, 3 km<sup>2</sup>  
 Population density: 602,6 hab./km<sup>2</sup>  
 District: Alt Empordà  
 Agricultural land: 499 ha  
 Forestry: 15 ha



### tourism

Summer population in 2008:  
 15.238 inhabitants  
 Hotel accomodation:  
 784 in 17 establishments



### infrastructure

- Sewerage treatment
- EDAR shared with other towns
- Volume: 21.000 m<sup>3</sup>/day
- Total volume\*: 547.614 m<sup>3</sup>
- Population Equivalent: 70.000 inhabitants
- Destination of the effluent: the sea
- Underwater pipes: 4
  - 1 in front of the town
  - 1 at the marina (no data)
  - 1 in Cala Montgó (no data)
  - 1 at Port del Rei (no data)
- Quality of sea water
  - Very good in 68 % of Costa Brava beaches
- Quality of beaches
  - Good in 79 % of those in the Alt Empordà district

Font: CCB\*\*

Font: ACA\*\*\*

Font: ACA



### activities

►►Fishing activity:  
 Commercial fishing: 37 boats  
 Total volume of fishing in 2008: 1.652 tons

►►Nautical activity:  
 Fishing port  
 Meters of quay: 2.371  
 Marine berths: 1.259  
 Mooring buoys: 1 with 40 at Riells Playa



### Natural reserves and other refuges

- Rivers and streams: Irrigations ditches of Rec de la Branca and Rec del Molí.
- Waterways: The deltas of the Muga and Fluvià rivers are protected areas totally under the jurisdiction of the town of l'Escala
- L'Escala's protected spaces:
  - 159,89 ha. within PEIN, 106, 22 ha. within Aiguamolls de l'Empordà and 53,27ha. in the area of Montgrí, the two final areas included in the Natura 2000 network.
  - Some 53 ha of the sea falls within the Natura 2000 network with a further 1,793,14 ha of coastal area included.
  - Adjoining the PEIN area of Montgrí south of the town, with a total of 4.763,00 ha. and a sea surface of 994,90 ha.
  - The Medes Islands Marine Reserve lies some 4,5 miles to the south with 21,5 ha of land within PEIN and 511 ha. of the sea protected.

## relevant data

### ► 5 Protected marine species

See page 3 for the species list

### ► Fixing CO<sub>2</sub>

Seagrass could store carbon for a value of 83 g of C / m<sup>2</sup> and year, in a scale in-between 45 and 190 g of C / m<sup>2</sup> and year.

That means a minimum of 850 kg of C / ha and year.

(\*) Data from 2008  
 (\*\*) Consorci de la Costa Brava  
 (\*\*\*) Agència Catalana de l'Aigua

## 5. environmental diagnosis and significant disturbance

The station GIM0109 set in Cala Montgó and whose management is shared between the villages of l'Escala (terrestrial zone) and Torroella de Montgrí (marine zone) is a very touristic zone mainly between April and October. Its uses and impacts can be seen in the chart below:

Activity	Level of disturbance	Justification	Consequences for water quality and biodiversity
<b>Moorings</b>	Seasonal, intense	<ul style="list-style-type: none"> <li>▶ Mooring buoys have not been fitted using ecological methods and materials</li> <li>▶ There are abandoned, non-ecological mooring buoys that have not been retrieved and replaced with ecological buoys.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Erosion of the Posidonia oceanica meadow.</li> <li>▶ Erosion of the rocky bottom and benthic communities.</li> <li>▶ Noise and chemical pollution of the sea, such as discharge of bilge water and fuel.</li> </ul>
<b>Navigation</b>	Seasonal, intense	<ul style="list-style-type: none"> <li>▶ The area is visited by many boats in summer because of the beautiful landscape and clear waters.</li> <li>▶ When there is a northerly wind many boats seek the shelter of this bay and the opportunity for free mooring.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Erosion of the Posidonia oceanica meadow.</li> <li>▶ Erosion of the rocky bottom and benthic communities.</li> <li>▶ Noise and chemical pollution of the sea, such as discharge of bilge water and fuel.</li> </ul>
<b>Commercial fishing</b>	Medium	<ul style="list-style-type: none"> <li>▶ Commercial fishermen rarely visit this area, however, lost fishing line and net can occasionally be found at the outer edge of the bay.</li> <li>▶ High pressure from years of sea urchin harvesting.</li> </ul>	<ul style="list-style-type: none"> <li>▶ High impact on the communities of fish of low commercial interest but of high ecological interest.</li> <li>▶ Gorgonian and other fragile benthic communities affected by dragging of lost fishing nets.</li> <li>▶ Reduction in the population of sea urchins.</li> </ul>
<b>Sport fishing</b>	Seasonal, intense	<ul style="list-style-type: none"> <li>▶ This calm water area is ideal for spear fishing.</li> <li>▶ The northern shore is intensely fished with rod and line.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Affects on the populations of fish of high ecological interest: serranidea (Groupers, seabass) and bream (Gilthead and other seabream). A fall in the fast breeders and changes in the sizes and structures of populations.</li> <li>▶ Physical affects upon benthic sedentary species like gorgonians and sponges by being broken by nylon fishing line.</li> </ul>
<b>Water contamination</b>	High in summertime	<ul style="list-style-type: none"> <li>▶ The town has 5 underwater effluent pipes, some of which function below standard.</li> <li>▶ The northern currents transport seawater carrying varying levels of pollution, thus affecting local water quality via changes in natural conditions. In Cala Montgo, where we have the GIM0109 station, there is a pipe that in summer discharges waste water with high load of organic matter, oils and detergents.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Contamination of seawater via discharge of freshwater carrying faecal and organic nutrients disrupts the chemical balance of the sea and induces changes in the ecosystem, with the effect that the most sensitive species are disappearing.</li> </ul>
<b>Visitors</b>	Very intense, seasonal	<ul style="list-style-type: none"> <li>▶ The northern shore of Cala Montgo is totally built up and this type of dense urbanization leads to an elevated number of persons using these waters.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Increased number of bathers in summer carrying contaminants into the water (sun creams, urine, etc).</li> <li>▶ Elevated pressure on natural resources by the direct removal of marine species.</li> <li>▶ Noise pollution.</li> <li>▶ Pollution with garbage, plastic bags, cigarette butts, etc.</li> </ul>
<b>Natural impacts</b>	Intense, specific	<ul style="list-style-type: none"> <li>▶ Easterly winds</li> </ul>	<ul style="list-style-type: none"> <li>▶ Seasonally, coinciding with changes in the equinox, this coast is battered by strong easterly winds. On 26 December 2008 the easterly wind affected 25% of Posidonia meadow, transforming the physical structure of the benthos and destroying a great number of species and communities, and causing a temporary loss of biodiversity within the ecosystem.</li> </ul>

## 6. final evaluation

### State of the quality of the environment and biodiversity

The final evaluation of station GIM0109, and the changing tendencies, analyzed by integrating the information obtained from biological and ecological investigation with socio-environmental factors:

- ▶ In general the station has an acceptable level of environmental quality bearing in mind the intensive and seasonal use of the zone by tourists for more than 40 years. The situation of the station, protected from northerly winds, favours the development of a well structured and mature ecological community. The warning species of quality such as *Cystoseira mediterranea* is low in the coastal zone due to the moderate level of contamination of the marine water. In deeper zones (4 – 6m) the benthos has a reduced presence of the gorgonia species *Eunicella Singulares* compared to other adjacent areas of similar characteristics with less pressure. This stems from the physical impact of anchoring, professional fishing and rod fishing. The diversity of fish is high compared to other zones, but a strong fishing pressure, especially from sports fishing, is detected by the absence of reproductive individuals of average and large size: the secondary males of the rainbow wrasse *Coris Julis* and the adult males combers *Serranus cabrilla* are almost nonexistent.
- ▶ In the rest of the station **GIM0109** the predominant community is the *Posidonia oceanica* meadow, which apart from the impacts derived from the storms and from indiscriminate anchoring that have affected its physical structure in a chronic way, still supports a level of environmental quality and of acceptable biodiversity. The majority of species detected in the transect are found on the *Posidonia* beds.

- As result of this first 2009 evaluation of the **SILMAR Project Network**, the weighting that we give to the station **GIM0109** based on 5 principal factors that are

estimated to determine the environmental quality, the level of biodiversity and the capacity of recovery of the area is the following:

Factors	Level of Impact <sup>(1)</sup>	Partial score <sup>(2)</sup>
Artificialization of the area	M	5
Tourism	H	4
Contamination	M	6
Direct impacts upon the ecosystem	M	4
Level of removal of marine resources	H	4
<b>Score</b>		<b>4.6</b>

<b>Station GIM0109 score</b>	
Environmental quality	6
Biodiversity	6
Ability to recover	Possible
<b>Final score</b>	<b>6</b>



(1) The level of impact is given a value on the scale Low, Moderate, and High

(2) The Partial score is given a value on the scale from 0 to10 based on the impact upon the environment and the ecosystem: the more impact, the lower the score.

The ability to recover is on a scale of None, Possible, Optimal

## 7. progress plan

One of the targets of the Silmar Project is to enhance the quality of the natural environment through marine safekeeping, with the support of the local public bodies and the most influential coastal agencies of the region. Knowing that this marine zone is included in the proposed area of the Natura 2000 Network and that in the future it will be integrated within the new Park Montgrí - Medes, provides an optimistic outlook for the progress of conservation.

The proposals that Fundació Mar and the team of volunteers have established to improve the state of the GIM0109 station and for extrapolation of the coastal data to the environment in general are:

1. To promote a project for the installation of ecological moorings for Cala Montgó.
2. Ecological arrangement of the zones of use and enlargement of the zones for bathing.
3. To evaluate the ecological impact of the underwater pipe and to ask for corrective measures to be taken.
4. To promote protection measures by mapping the free moorings in the bay and developing a guide of good practice with regard to mooring.
5. Put energy into awareness-raising amongst the residents and users of the area, getting the message across to the responsible agencies, camp sites, neighbourhood groups, town hall, etc.
6. To promote a campaign of land and underwater cleanliness of the GIM0109 zone.
7. To support the actions of study and conservation in the SILMAR Project network

## 8. calendar of actions for 2010

Calendar	Action
02-03/2010	Presentation of the results and information to the 2 relevant Town Halls.
02-03/2010	Presentation of Silmar results to the media
03-04/2010	Design and preparation of 2010 activity within the SILMAR Project framework
03-06/2010	Awareness-raising campaign to sensitise users and cleaning of the sea bed at station GIM0109
06-09/2010	Continue SILMAR monitoring at station GIM0109
31/07/2010	Day of the Sea
01-11/2010	Presentation of the results of SILMAR 2010 – GIM0109



**fundaciómar**  
www.fundacionmar.org

Fundació Mar. Begur, december of 2009