MarPACE (Marine Propagation Along the Coasts of Europe)

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marbef

Pan-European gradients in spawning and settlement events

Marbef Network of Excellence

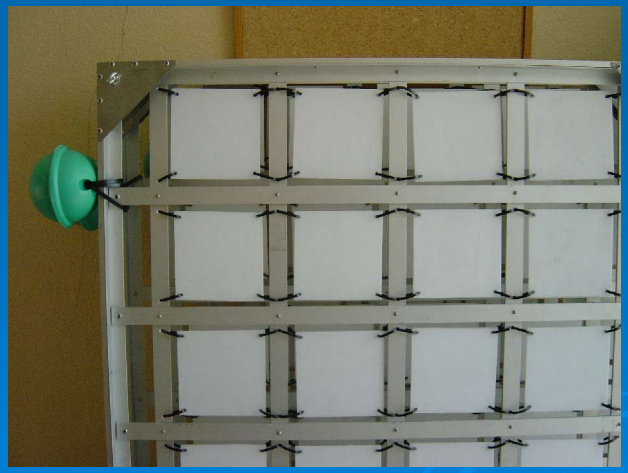
Objetives

- Identify phase-changes in recruitment along latitudinal gradients.
- By taking samples of both pelagic propagules, primary and secondary settled organisms, we intend to examine if there is a gradual gradient in recruitment or sudden shifts in recruitment patterns (possibly indicating bio-geographical boundaries).

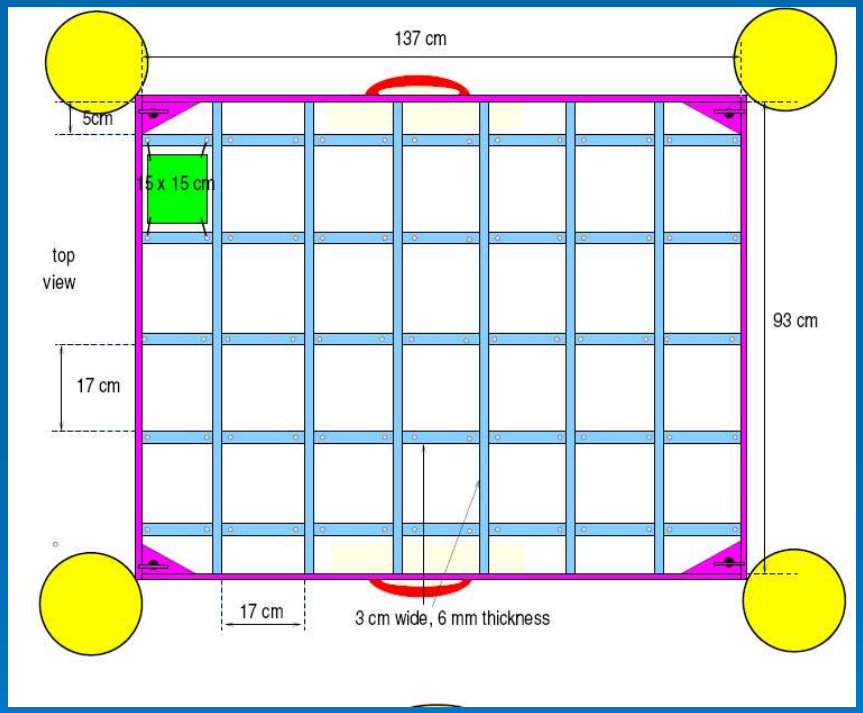
Steps in the study

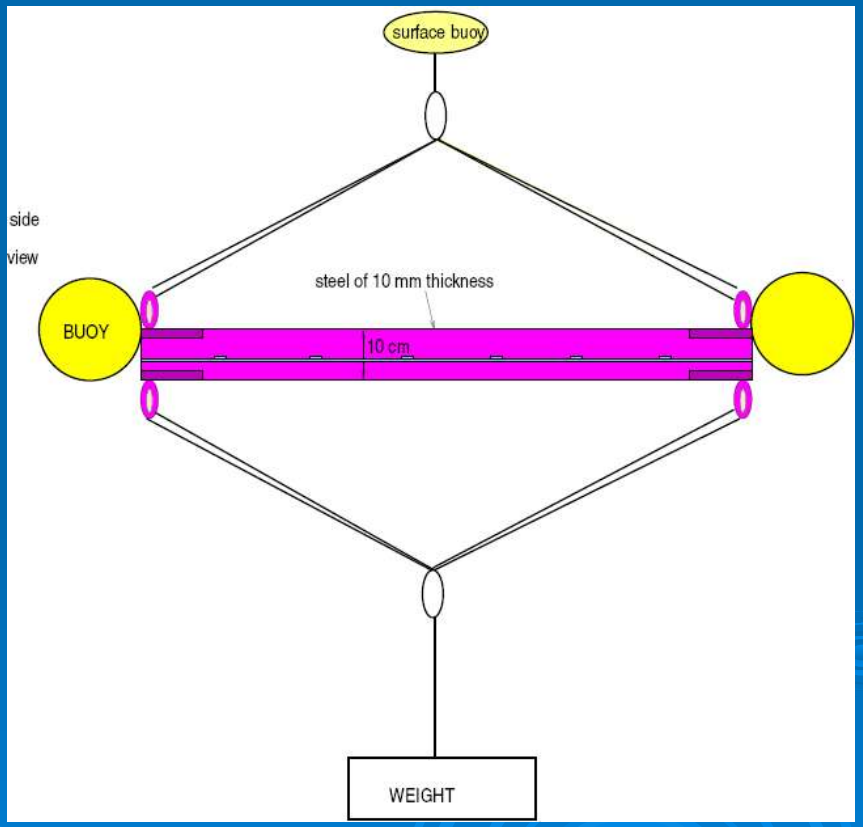
- Settlement and recruitment frames deployment
- Digital pictures
- Genetic determination

Recruitment frames and settlement panels



Structure


137 cm
5cm
15 x 15 cm
top
view
93 cm
17 cm
17 cm
3 cm wide, 6 mm thickness


surface buoy
side
view
steel of 10 mm thickness
BUOY
10 cm
WEIGHT

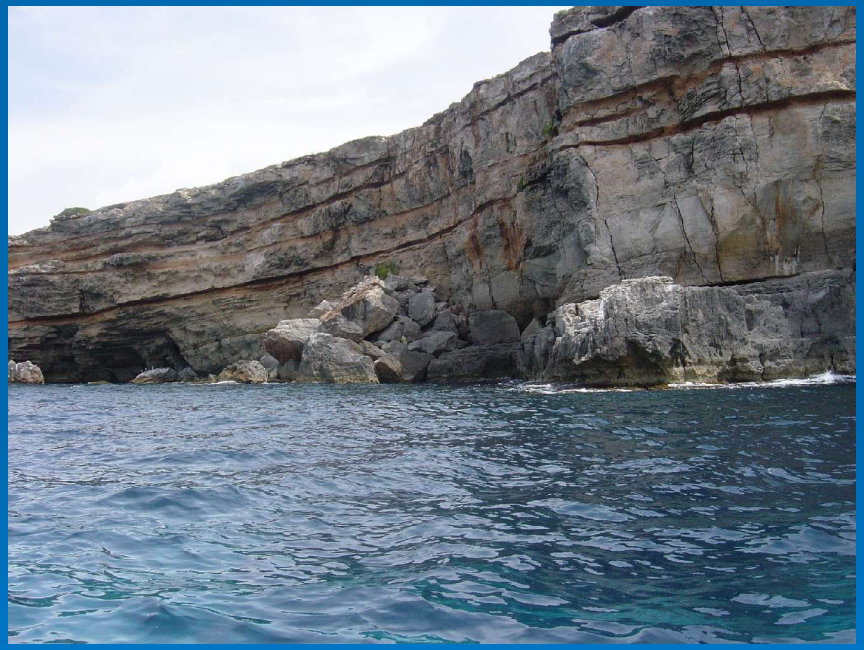
Sampling location Requirements

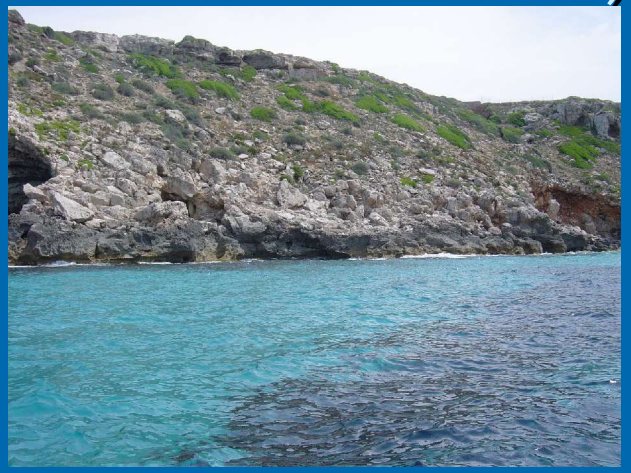
- Subtidal (100% submersion time)
- Local depth 3-5 m
- Low pollution levels
- Sheltered area (against wave action)
- Low river influence
- Salinity and environmental parameters as stable as possible
- Protected against human interference (anchoring, fishing, etc.)

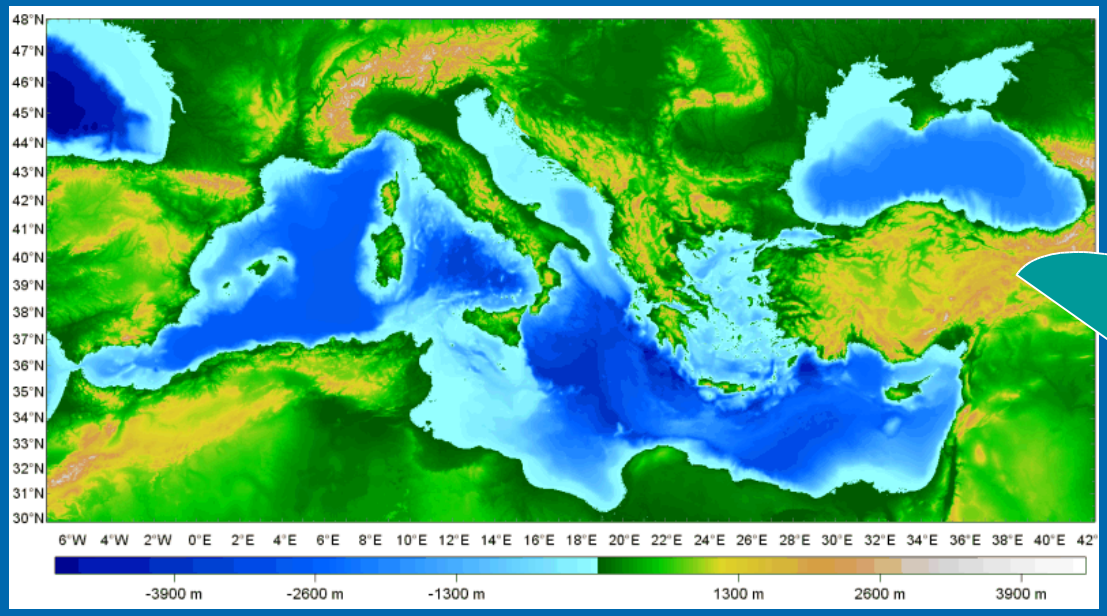
- Subtidal (100% submersion time)
- Local depth 6 m
- Low pollution levels
- Moderate sheltered area
- no river influence
- Salinity (aprox 38%), no river inputs
- Marine reserve, under control of guards

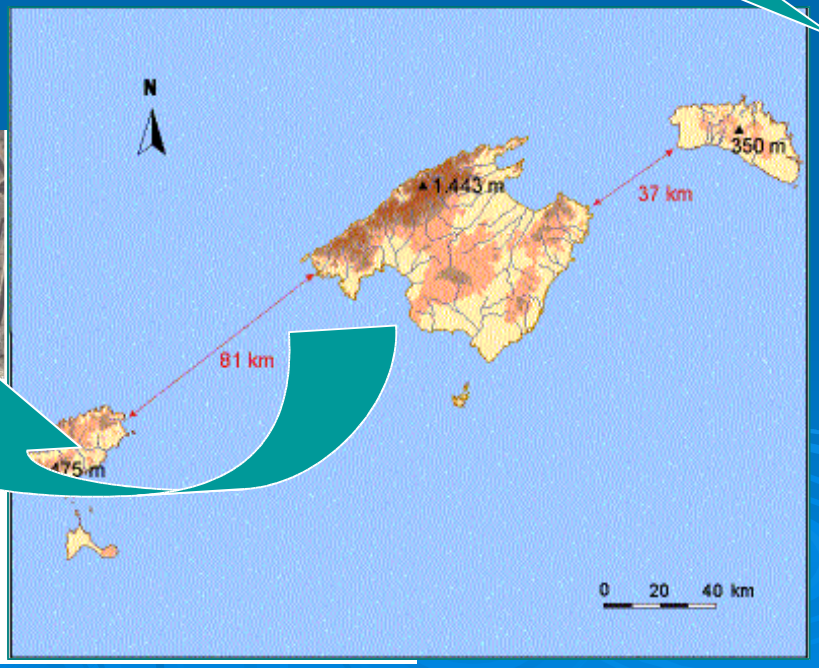
Location

Marine Reserve: Cap Regana i Cap Enderrocat, Majorca (Balearic Islands)






48°N
47°N
46°N
45°N
44°N
43°N
42°N
41°N
40°N
39°N
38°N
37°N
36°N
35°N
34°N
33°N
32°N
31°N
30°N
6°W 4°W 2°W 0°E 2°E 4°E 6°E 8°E 10°E 12°E 14°E 16°E 18°E 20°E 22°E 24°E 26°E 28°E 30°E 32°E 34°E 36°E 38°E 40°E 42°
-3900 m
-2600 m
-1300 m
1300 m
2600 m
3900 m


N
1.443 m
350 m
37 km
81 km
475 m
0 20 40 km

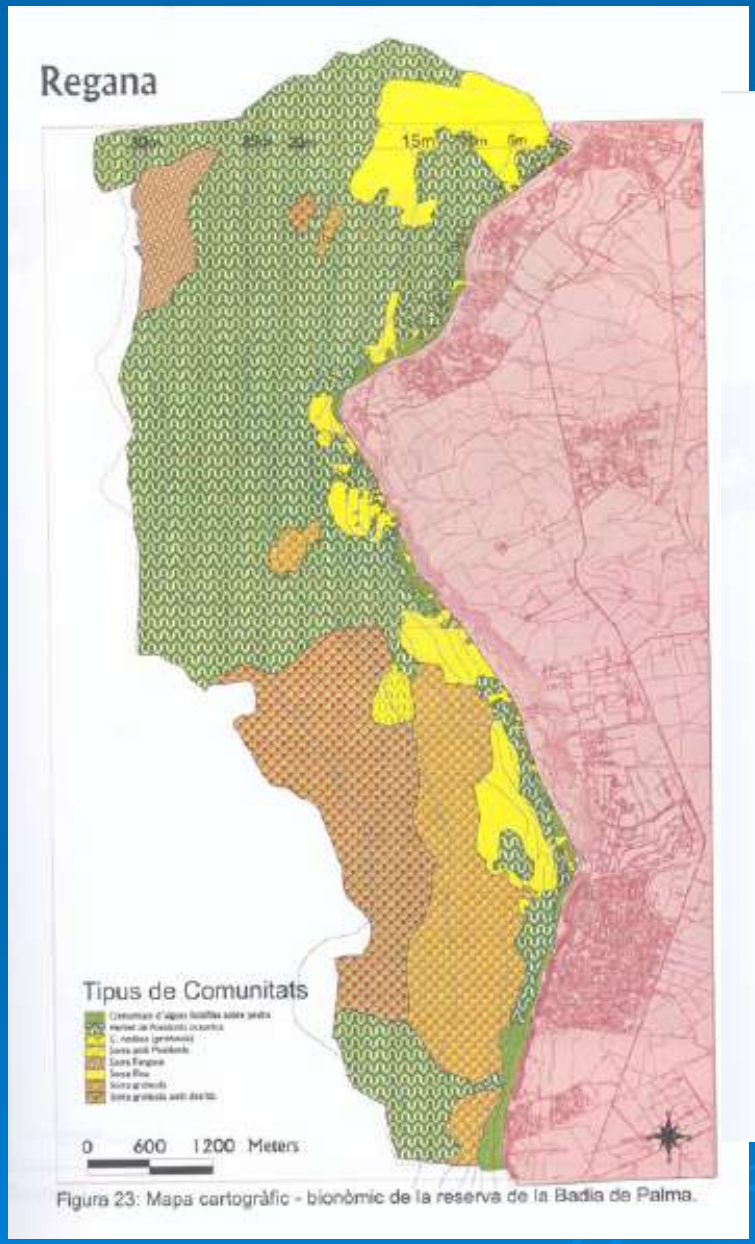
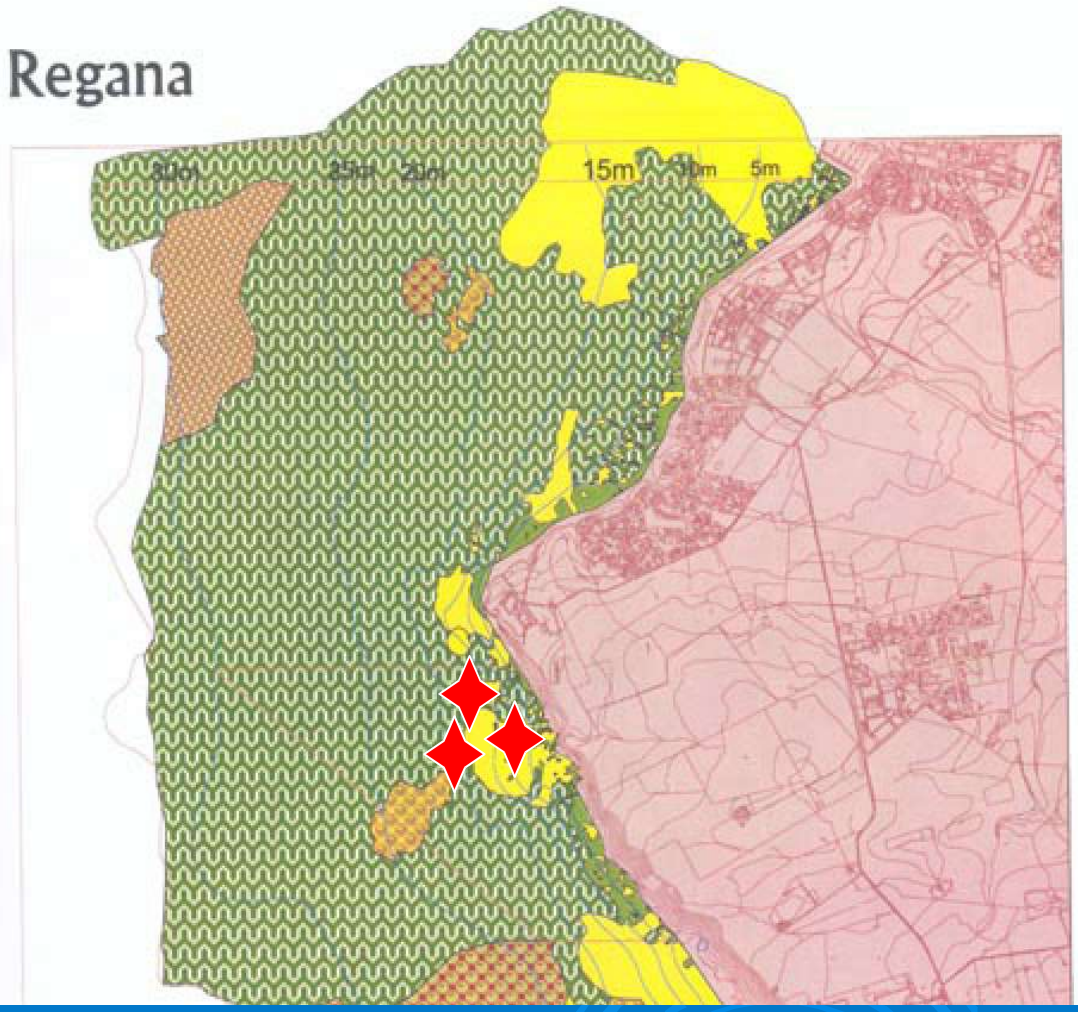
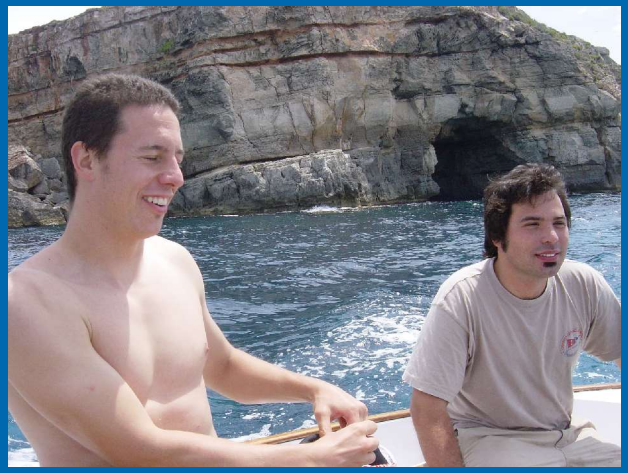


Figura 23: Mapa cartogràfic - bionòmic de la reserva de la Badia de Palma.

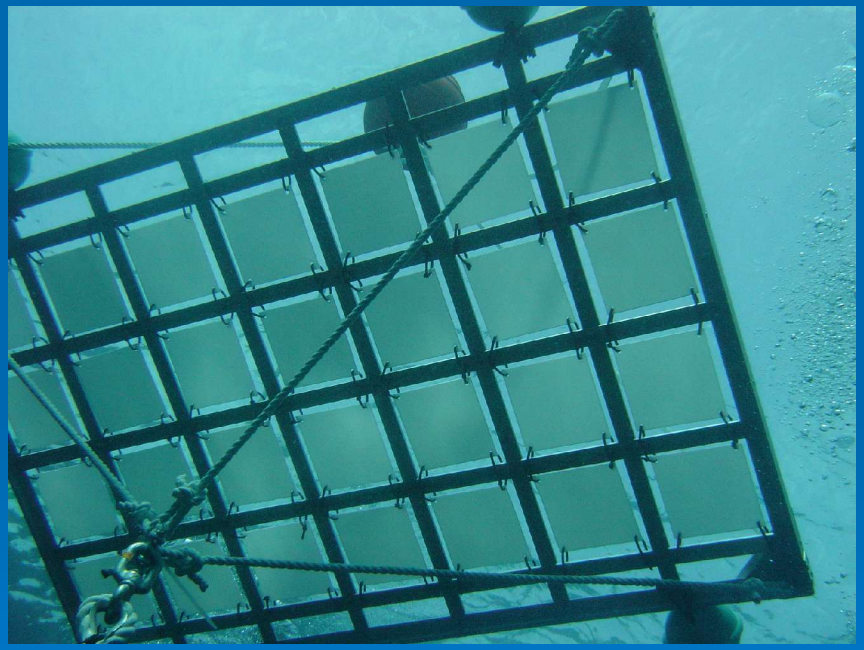


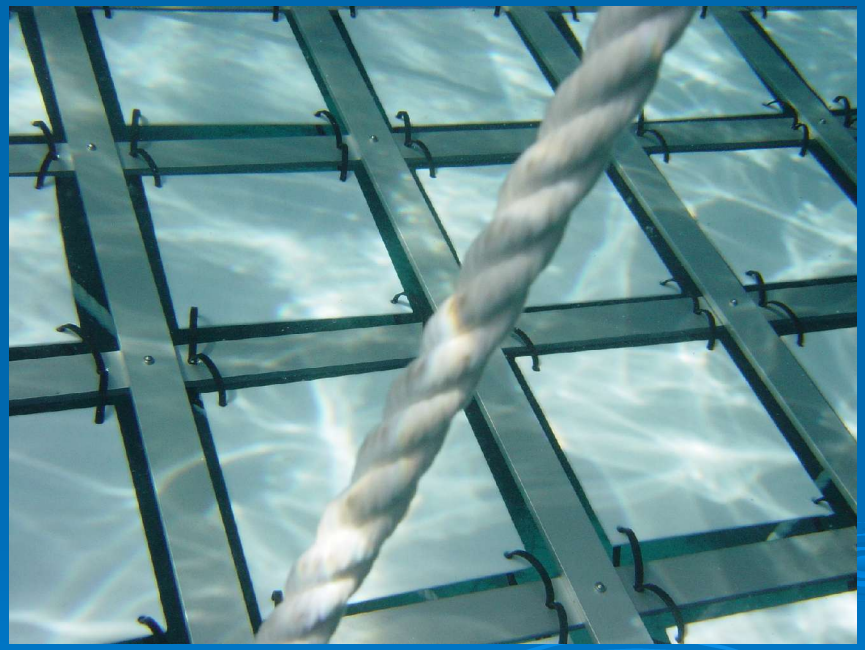
Mooring the frames

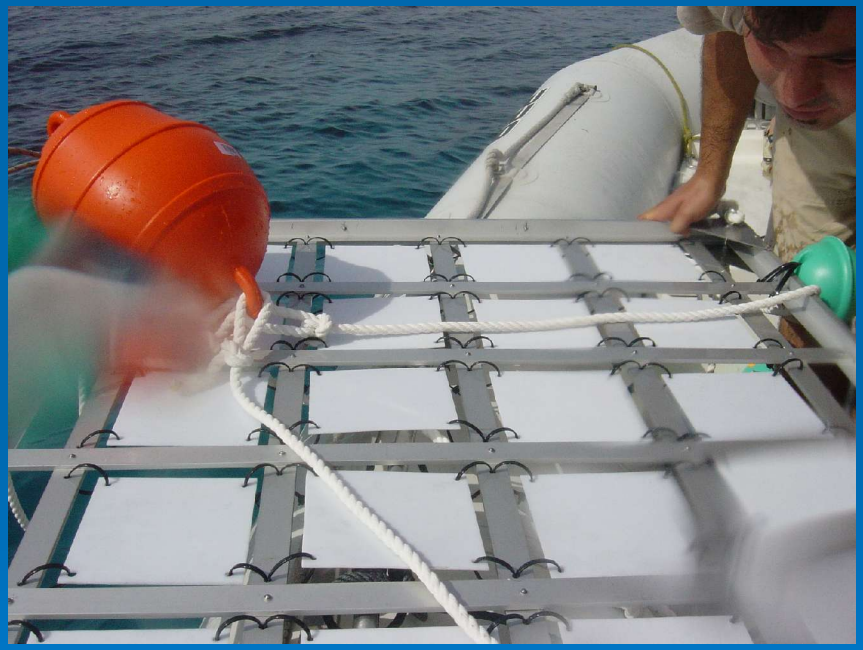


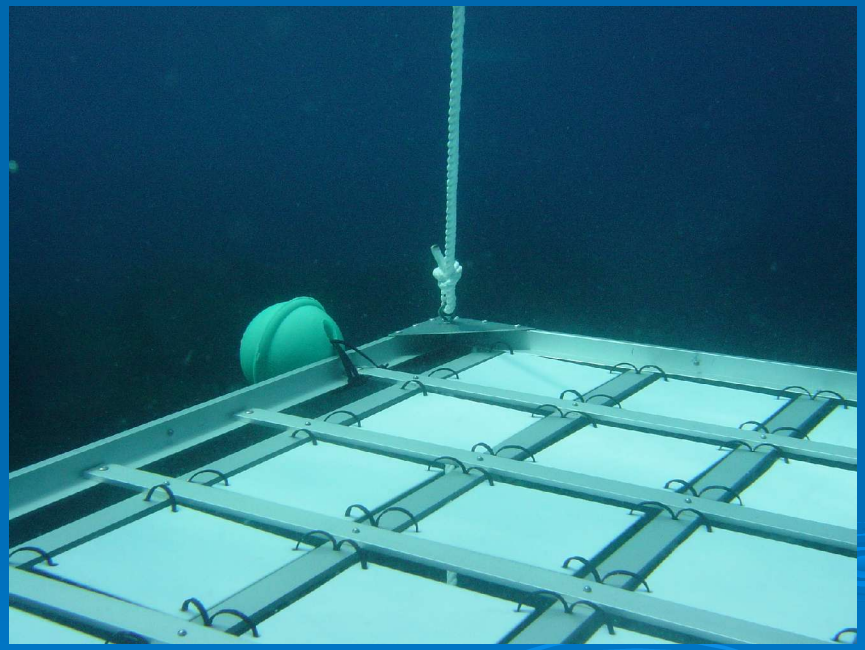
13th may 2006

The frames

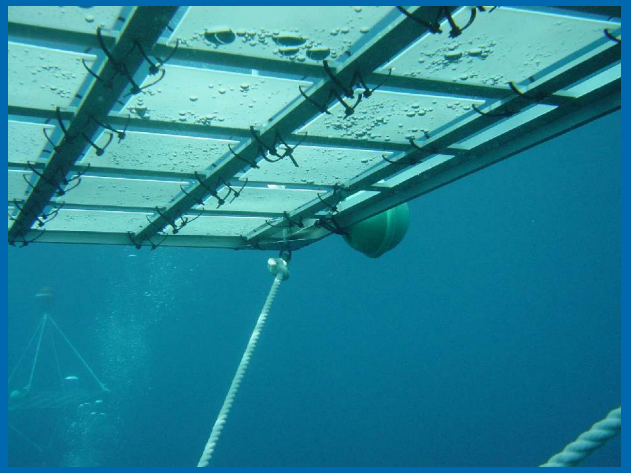


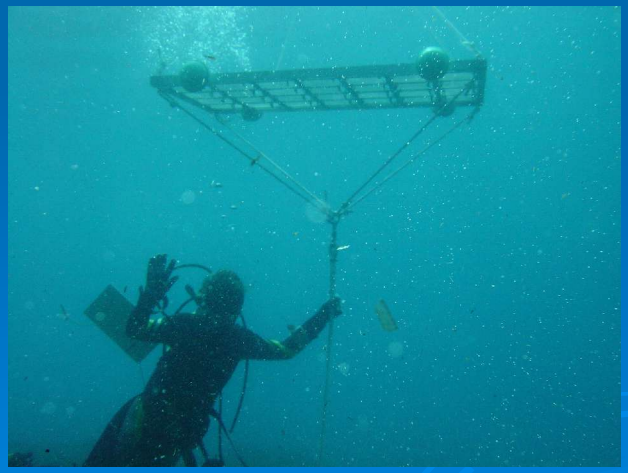


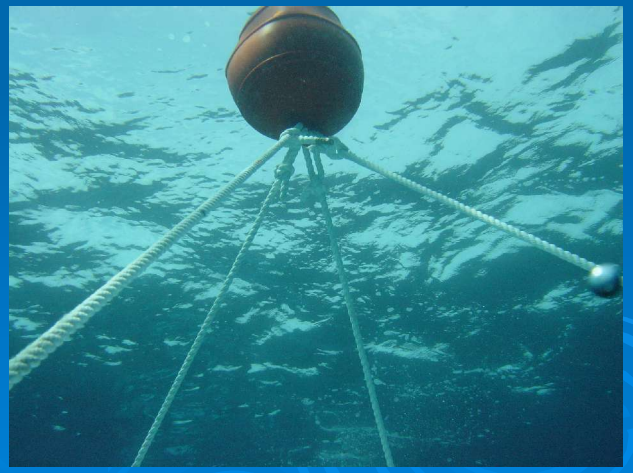




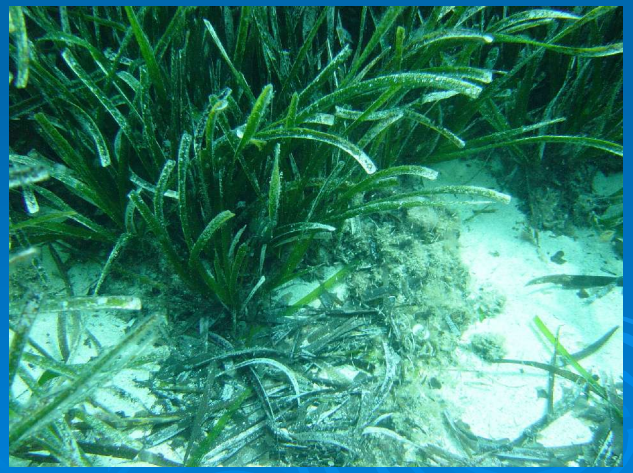
Underwater…







Seabottom Tipology



Posidonia oceanica seagras beds

T = 0 weeks (begin of experimental period)

0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

← clean panels (age = 0)

BEFORE SAMPLING

AFTER SAMPLING

Recruitment frame **Sampled panels**
(no. indicates "age" of panels)

T = 2 weeks

2	2	2	2	2	2	2
2	2	2	2	2	2	2
2	2	2	2	2	2	2
2	2	2	2	2	2	2

+

0
0

=

0	0	2	2	2	2	2
2	2	2	2	2	2	2
2	2	2	2	2	2	2
2	2	2	2	2	2	2

+

2
2

T = 4 weeks

2	2	4	4	4	4	4
4	4	4	4	4	4	4
4	4	4	4	4	4	4
4	4	4	4	4	4	4

+

0
0

=

0	2	0	4	4	4	4
4	4	4	4	4	4	4
4	4	4	4	4	4	4
4	4	4	4	4	4	4

+

2
4

T = 6 weeks

2	4	2	6	6	6	6
6	6	6	6	6	6	6
6	6	6	6	6	6	6
6	6	6	6	6	6	6

+

0
0

=

0	4	2	0	6	6	6
6	6	6	6	6	6	6
6	6	6	6	6	6	6
6	6	6	6	6	6	6

+

2
6

Etc.

T = 54 weeks

2	52	50	48	46	44	42
40	38	36	34	32	30	28
26	24	22	20	18	16	14
12	10	8	6	4	2	54

+

0
0

=

0	52	50	48	46	44	42
40	38	36	34	32	30	28
26	24	22	20	18	16	14
12	10	8	6	4	2	0

+

2
54

T = 56 weeks (end of experimental period)

Pelagic propagules

Field

- Water samples at the surface
- Sampling frequency is biweekly,
- Sampling period is 1 year + 1 month seasonal overlap (i.e. Covering 28 sampling periods)
- Sample size 2 – 10 l, depending on local densities of propagules

Lab (sample treatment)

- Water is filtered over a 31.5 µm pore size Teflon screen (Monodur) with a diameter of 47 mm, using only slight underpressure
- Filter is folded with two forceps and wrapped in aluminum foil
- Number of sample is noted on aluminum foil
- Store in plastic bag or box with relevant information about the experiment, i.e. sampling station, sampling date, type of material, etc.
- Sample is stored at –80 °C until shipping
- Transport filters on dry ice to DNA Extraction Lab of one of the partners

Primary settlers

Field

- Recruitment panels (3 frames in total)
- Sampling frequency is biweekly
- Sampling period is 1 year + 1 month seasonal overlap (i.e. Covering 28 sampling periods)
- One “slot” per frame is reserved for primary settler panel
- Replace fouled panel by clean one
- Store fouled panel in numbered sample case

Lab (sample treatment)

- Take sampled panel out of special case
- Take digital photo of both sides of sampled panel
- Note down number of photos and number of sampled panel
- Make a description of community present on both sides of sampled panel
- Scrape material from both sides of sampled panel
- Collect scraped material in container with artificial sterilized seawater
- Water containing scraped material is filtered over a 31.5 µm pore size Teflon screen (Monodur) with a diameter of 47 mm, using only slight underpressure
- Filter is folded with two forceps and wrapped in aluminum foil
- Number of sample is noted on aluminum foil
- Store in plastic bag or box with relevant information about the experiment, i.e. sampling station, sampling date, type of material, etc.
- Sample is stored at –80 °c until shipping
- Transport filters on dry ice to DNA Extraction Lab of one of the partners

Secondary settlers

Field

- Recruitment panels (3 frames in total)
- Sampling frequency is bi-weekly
- Sampling period is 1 year + 1 month seasonal overlap (i.e. Covering 28 sampling periods)
- Per frame, total number of samples are reserved for secondary settler panels (see Fig. 2)
- Replace one fouled secondary settler panel by a clean one
- Store fouled panel in numbered sample case

Lab (sample treatment)

- Take sampled panel out of special case
- Take digital photo of both sides of sampled panel
- Note down number of photos and number of sampled panel
- Make a description of community present on both sides of sampled panel (see Fig. 3)
- Scrape material from both sides of sampled panel
- Collect scraped material in container with artificial sterilized seawater
- Water containing scraped material is filtered over a 31.5 µm pore size Teflon screen (Monodur) with a diameter of 47 mm, using only slight underpressure
- Filter is folded with two forceps and wrapped in aluminum foil
- Number of sample is noted on aluminum foil
- Store in plastic bag or box with relevant information about the experiment, i.e. sampling station, sampling date, type of material, etc.
- Sample is stored at –80 °C until shipping
- Transport filters on dry ice to DNA Extraction Lab of one of the partners

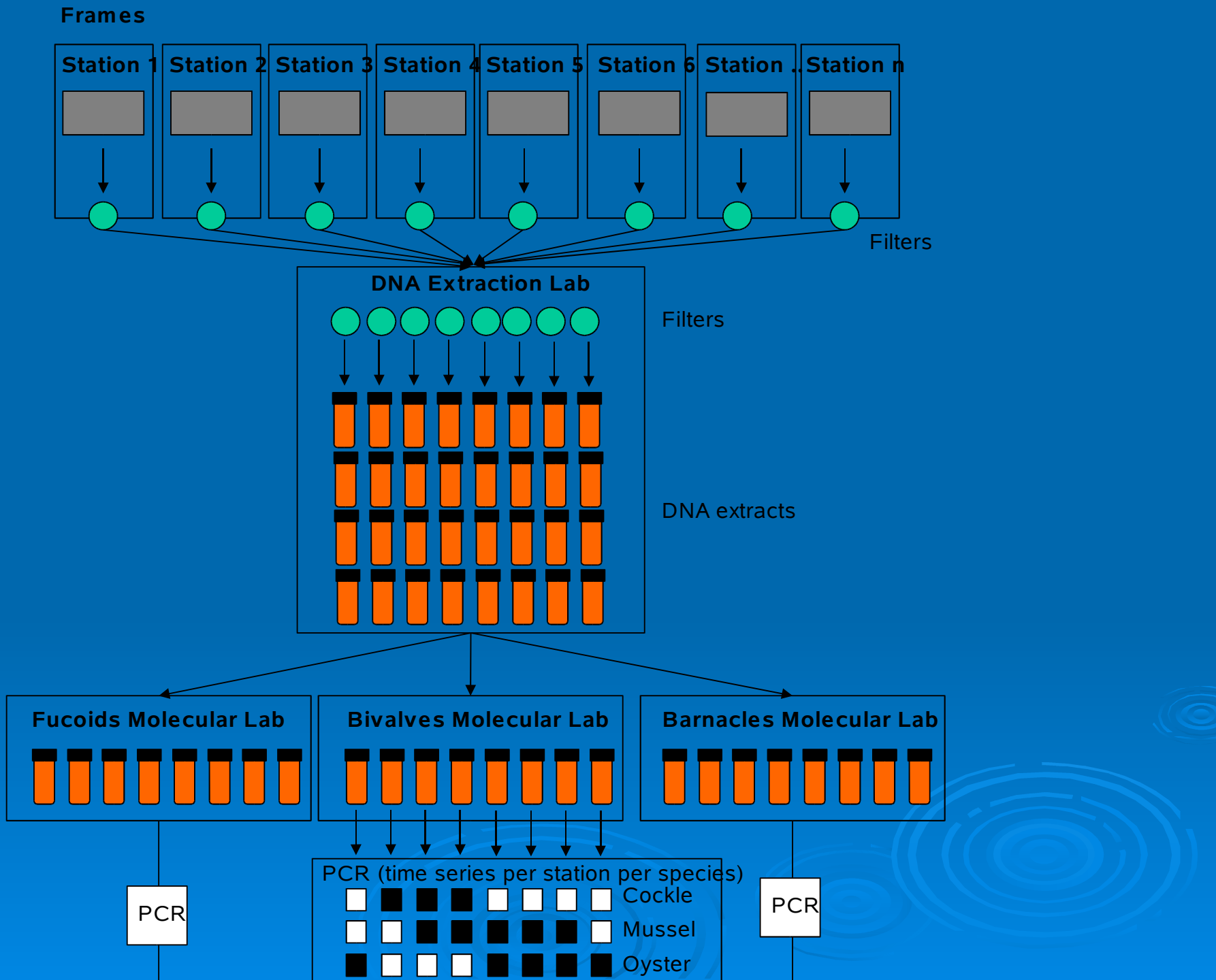
Sample Analysis

Description of settlement panels

- Digitize the description forms
- Forward the digital photographs and digitized description forms to the manager of the central database.

DNA samples

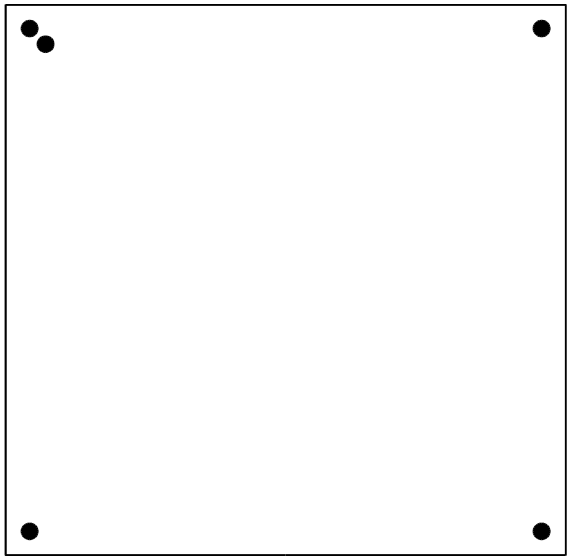
- Ship the frozen samples to the DNA extraction laboratory (one laboratory within our community, still to be chosen)
- Colleagues at this laboratory will extract the DNA from the samples according to a standardized protocol, including a test of the quality of the DNA product
- The DNA extract will be divided into a number of portions, and subdivided (mailed) to a number of other institutes that are specialized in species identification of a particular taxonomic group of species
- Colleagues of the specialized labs determine the species presence/absence in the range of samples (3 time series per species per station)
- Results of species identification are forwarded to the central database of the project, which can only be accessed by active project members


Frames
Station 1
Station 2
Station 3
Station 4
Station 5
Station 6
Station ..
Station n
Filters
DNA Extraction Lab
Filters
DNA extracts
Fucoids Molecular Lab
Bivalves Molecular Lab
Barnacles Molecular Lab
PCR
PCR (time series per station per species)
Cockle
Mussel
Oyster
PCR

DESCRIPTION RECRUITMENT PANEL

Sampling station: .....
Nr. of recruitment frame: 1 / 2 / 3
Nr. of recruitment panel: .....
Starting date panel: .....
Sampling date panel: .....
Description performed by: .....
Description date: .....

TOP: nr digital photo: .....



- ☐ Microalgae: .....
- ☐ Macroalgae: .....
- ☐ Sponges: .....
- ☐ Hydroids, etc.: .....
- ☐ Flatworms, etc.: .....
- ☐ Annelids: .....
- ☐ Echiurans, etc.: .....
- ☐ Crustaceans: .....
- ☐ Insects, etc.: .....
- ☐ Molluscs: .....
- ☐ Bryozoans: .....
- ☐ Sea urchins, etc.: .....
- ☐ Acorn worms, etc.: .....
- ☐ Fish: .....
- ☐ Other: .....

Additional remarks: .....

BOTTOM: nr digital photo: .....

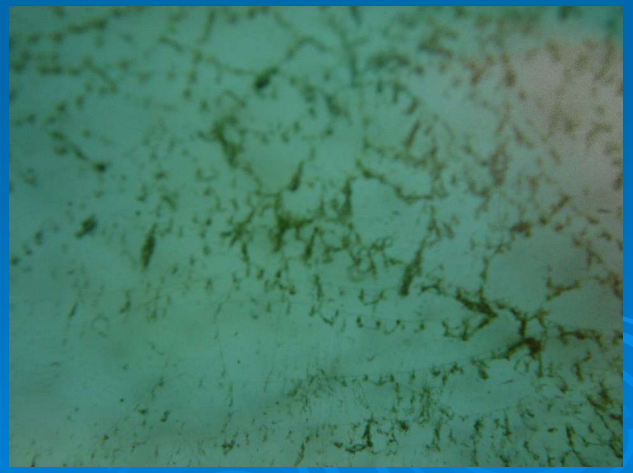
- ☐ Microalgae: .....
- ☐ Macroalgae: .....
- ☐ Sponges: .....
- ☐ Hydroids, etc.: .....
- ☐ Flatworms, etc.: .....
- ☐ Annelids: .....
- ☐ Echiurans, etc.: .....

Extraction of 1st panel

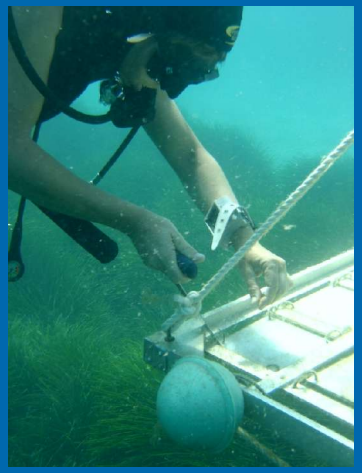
- Deployment of the frames: 13th may 2006
- Replacement of 1st panels: 6th june

Are there any settlers already……?

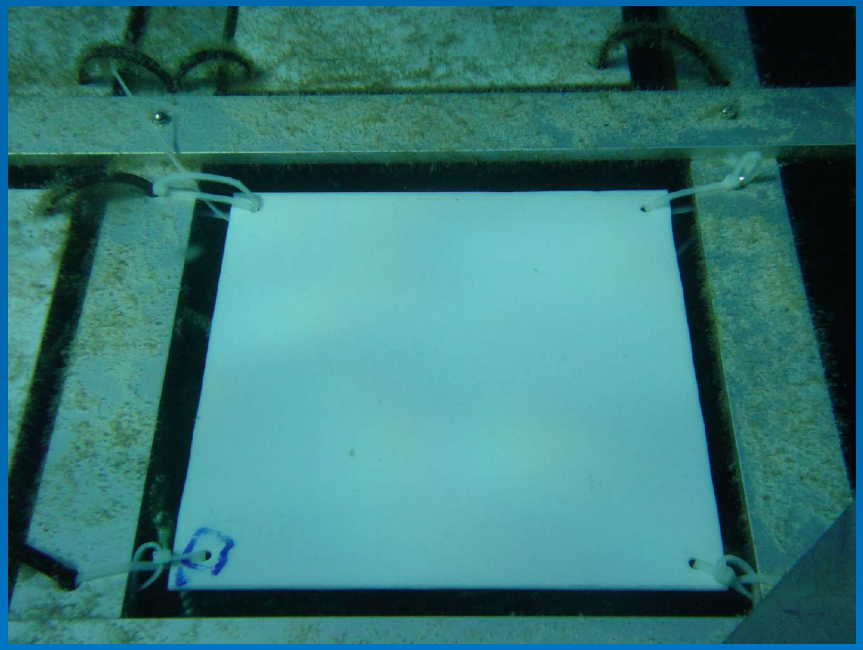
Yes, already colonisation of algae (clorificeans, faeoficeans)

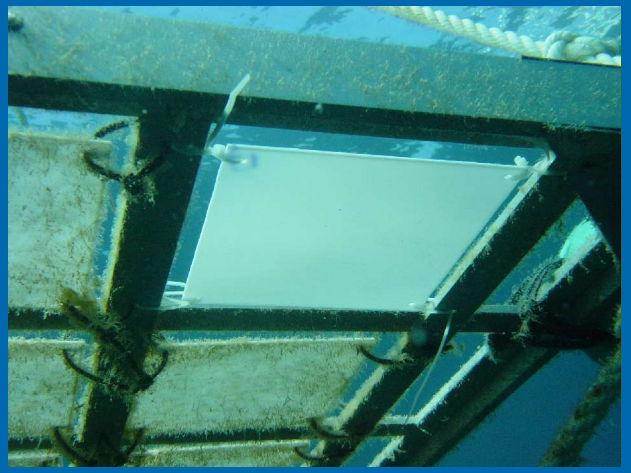


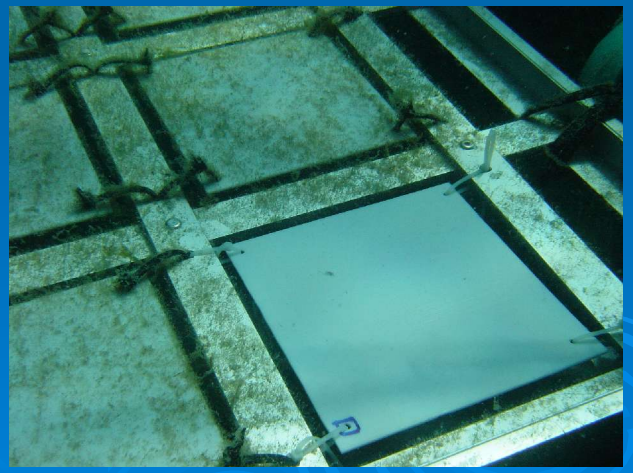
Replacement 1st panel: 6th june 2006



The new panel







Acknowledgements

- Irene, Pedro, vigilantes reserva Marina de Cap Enderrocat i Cap Regana
- DG Pesca, Govern Balear
- Bazar ‘Las Palmeras’, sponsor llaut