Innovative solutions for coastal fish nursery restoration

Fabien Dubas & Gilles Lecaillon – ECOCEAN
Phillipe Lenfant & Reda Neveu – CNRS University of Perpignan
GENERAL CONTEXT

The Natural Life Cycle of Coastal Fish

- Spatial and temporal habitat partitioning
- Coastal nursery habitat definition
Coastal development causes habitat loss, reduced biodiversity, and damaged ecosystem functions.

- The need to reconnect
A POTENTIAL SOLUTION

The Biohut, an artificial fish nursery

- It enhances ecosystem functions and services
- It mitigates human impacts by preserving biodiversity
HOW DOES BIOHUT WORK?

A double cage system fixed along **docks** and under **pontoons** providing refuge and food for PL and YOY.

- **Dock Biohut in Le Brusc**
- **Inner cage filled with oyster shells provides food**
- **Outer empty cage provides shelter**
- **Pontoon Biohut in Monaco**
NAPPEX Project: Evaluate the Biohut benefit in six marinas

- CNRS CEFREM
  University of Perpignan
- Assessment by Visual Census
- Biohut zone VS control zone
- Every two weeks during 20min
Species diversity 2013-2014

Dock Biohut and Control 2013

Pontoon Biohut and Control 2013

Dock Biohut and Control 2014

Pontoon Biohut and Control 2014
Out of the 30 species observed in the six marinas

Species per type of habitat

<table>
<thead>
<tr>
<th>Habitat Category</th>
<th>Number of species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dock Biohut</td>
<td>7</td>
</tr>
<tr>
<td>Pontoon Biohut</td>
<td>4</td>
</tr>
<tr>
<td>Dock Control</td>
<td>1</td>
</tr>
<tr>
<td>Pontoon Control</td>
<td>1</td>
</tr>
</tbody>
</table>

Specific richness: Biohut > Control areas
Ecological succession of *Diplodus spp.* - **2013**

- **Mean abundances in the Biohuts**
- **Campaigns**: 1 to 10, spanning April to August
- **Species Colors**:
  - Blue: *D. vulgaris*
  - Red: *D. puntazzo*
  - Green: *D. sargus*
  - Purple: *D. annularis*

**Observations**:
- Ecological succession in Biohut habitat
- Limit interspecific competition

---

Ecological succession of *Diplodus spp.* - **2014**

- **Mean abundances in the Biohuts**
- **Campaigns**: 11 to 18, spanning April to August

**Observations**:
- Ecological succession in Biohut habitat
- Limit interspecific competition
Habitat in the life cycle of juvenile *Diplodus puntazzo* (99 observations)

**Dock Biohut**
- Quai
- Seawall

**Pontoon Biohut**
- 30-35
- 40-45
- 50-55
- 60-65

**Habitat & size dependence:**
- Small: floating dock
- Medium: fixed dock
- High: rocky

**Interest of various structures to close the cycle for Young of the Year**
BIOHUT DISSECTION

1) Remove from the water
   - T0=20kg  T4=35kg

2) Collect into baskets
   - 7800 subjects collected into 69 Biohut => more than 100 subjects / Biohut

3) Count, measure and identification
   - 70 species – benthic fish, crustaceans, mollusks, worms, echinoderms...
A TOOL FOR PUBLIC EDUCATION

- Visible from the docks,
- with educational signs,
- make people realize about coastal ecosystems richness
- and the necessity to preserve it
Unexpected inhabitants

Blue Crab, Baltimore

Epinephelus marginatus, Brusc

Syngnathidae, Marseillan

Hyppocampus Guttullatus, Mèze
Wrasse sleeping in a natural habitat
Wrasse sleeping in Biohut habitat
Thanks for your attention

« People protect what they love »
Jean Yves Cousteau