Conservation of Florida’s Coral Reefs through Controlled Propagation – Year 3

“Protect Our Reef” Grant - Progress Report

(April 1 to September 30, 2008)

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PROJECT GOALS
The focus of this project is to develop culture techniques and produce Florida hard corals for reef restoration research. Efforts for this year’s project are directed developing culture methods for four selected scleractinian corals for reef restoration research, expanding the number of captive broodstock colonies in the coral seed bank, producing large numbers of three key coral species for reef restoration research, evaluating the health of wild and cultured corals, and disseminating project results. The cultured coral fragments produced in this project will be used to scientifically evaluate coral re-establishment to increase success rates of restoration efforts.

PROJECT ACCOMPLISHMENTS

Objective 1: Develop optimal culture techniques to produce four key scleractinian coral species
Efforts to develop culture methods for four coral species (Acropora palmata, Acropora cervicornis, Montastrea cavernosa, Montastrea annularis) were conducted at TRL during this reporting period (Figures 1-4). The first experimental trial to evaluate growth and survival under different light conditions was completed in April 2008. This trial included three of the four target species (A. palmata was excluded). A new experimental trial was initiated in June 2008 to evaluate growth and survival under different light conditions in 3 replicated (100 gallon) tank systems; all four target species were included in the second growth trial (Figures 5-7). Initial growth measurements were taken for the new experimental trial in August 2008. The next set of growth measurements are scheduled for November 2008.

Figures 1-4. A. cervicornis, A. palmata, M. annularis, M. cavernosa

Figures 5-7. Experimental coral systems – Tanks 100A, 100B, 100C.
**Objective 2: Expand the number of captive broodstock colonies in the coral seed bank**

The Coral Aquaculture Laboratory at TRL has colonies from 19 species of scleractinian corals in the aquaculture tank systems in our environmentally controlled laboratory (Control Lab), which are being monitored for growth and survival. During this reporting period, we inventoried and redistributed the coral colonies in the Control Lab and in the outside raceways (Outside Raceways) in June (Figures 8-10). The coral seed bank is now being maintained in the 200-gallon tanks in the Control Lab and the 100-gallon tanks in the Control Lab are being used for experimental trials to evaluate the effects of light on growth and survival. The Outside Raceways are being used to growout large numbers of coral fragments and one raceway is being temporarily used to hold seedbank corals. Biannual growth measurements for corals in the seedbank were taken in April 2008. New colonies were not collected during this reporting period; however, colonies of some species were fragmented to increase the number of corals in the culture systems.

![Figures 8-10. Coral seed bank – Tanks 200A, 200B and 200C.](image)

**Objective 3: Produce large numbers of three key coral species for reef restoration research**

This objective was addressed in three ways: fragmenting coral colonies, placing newly fragmented corals in Control Lab and in Outside Raceway systems, and monitoring growth and survival of all coral fragments. Broodstock colonies for the three key coral species (*Acropora cervicorns*, *Montastrea cavernosa*, *Montastrea annularis*) are being maintained in the Control Lab broodstock facility at Mote’s Tropical Research Laboratory at Summerland Key. Corals were fragmented for the three key species and for two additional species during this reporting period (see Table 1).
Table 1. Expanded fragment inventory for coral species.

<table>
<thead>
<tr>
<th></th>
<th>November 2007</th>
<th>December 2007</th>
<th>June 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>A. cervicornis</em></td>
<td>0</td>
<td>47</td>
<td>85</td>
</tr>
<tr>
<td><em>A. palmata</em></td>
<td>0</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td><em>M. annularis</em></td>
<td>0</td>
<td>172</td>
<td>219</td>
</tr>
<tr>
<td><em>M. cavernosa</em></td>
<td>0</td>
<td>160</td>
<td>158</td>
</tr>
<tr>
<td><em>O. diffusa</em></td>
<td>0</td>
<td>0</td>
<td>97</td>
</tr>
<tr>
<td><strong>Total Number of Fragments</strong></td>
<td>0</td>
<td>379</td>
<td>559</td>
</tr>
</tbody>
</table>

**Objective 4: Evaluate the health of cultured and wild corals**
Microbial communities were documented on the *Montastraea annularis* colonies that are part of our light study. Results indicate that vibrio ratios vary under different light conditions although results were based on culture data using vibrio specific media, only. Current minimal impact swab techniques have proven ineffective for DNA extractions that would allow for a more comprehensive microbial DNA profiling. In upcoming studies, we will extract 3 polyps from each *Acropora cervicornis* sample in 3 different tank setting and at varying light levels. We chose this coral species because it is a fast grower and yet an important framework builder on the Florida Reef Tract. *A. cervicornis* has shown much promise in field cultivation studies and is an excellent candidate for restoration work. We have shown that we can successfully isolate enough DNA from as little as 3 polyps for use in DNA fingerprinting while inflicting minimal damage to fragments. We will use Terminal restriction fragment length (T-RFLP) Analysis for analyzing light level and tank effects on *A. cervicornis* fragments in culture.

**Objective 5: Disseminate project results**
No progress has been made on this objective during this reporting period.