Rigs-to-Reefs Structures and Coral Community Development in the N. Gulf of Mexico: A First View

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N. Gulf of Mexico
Artificial Reef and Rigs-to-Reefs Zones

Options for Rigs to Reefs Program

- Cut, topple, and tow to R2R site
- Cut and topple in place
- Sever at ≥ 85 ft depth, remove top, and place on bottom
Questions

- Are toppled R2R structures facilitating coral community development in the N. Gulf of Mexico?

- Are there differences between coral communities on the Rigs-to-Reefs (R2R) structures vs. the standing oil/gas platforms?

- What are the genetic affinities of these populations? (in progress)
Phases I & II

SCUBA and Video Surveys

Re-drawn from - California Dept. Conservation

http://www.consrv.ca.gov/dog/picture_a_well/offshore_platform.htm
Phase III

Control:
SCUBA Video Surveys,
R2R Structures and Platforms

ROV Video Surveys
(same)

Re-drawn from - California Dept. Conservation
http://www.consrv.ca.gov/dog/picture_a_well/offshore_platform.htm
SeaBotix LBV-300 ROV

- MMS
- ARACAR

http://www.wfl.fhwa.dot.gov/td/images/seabot.jpg
Structures sampled and assessed for –

- Species distribution and abundance
- Depth distribution
- Coral tissue – DNA samples
  - For population genetic differentiation/affinities
  - Technique - AFLPs
  - Collected by hand and ROV
  - In progress
Coral Tissue Sample Collection by ROV
Delivering Coral Samples to Collection Basket
Madracis decactis
Oculina diffusa

http://www.reeftalk.com/reviews/showproduct.php/product/1027/sort/7/cat/49/page/1
Phyllangia americana
Coral density in no./10m²

Total Coral Density
Standing Platforms vs. Rigs-to-Reefs

- Standing Platforms
- Rigs-to-Reefs Structures

n.s., p > 0.05, Mann-Whitney U-test
**Tubastrea coccinea Density**

**Standing Platforms vs. Rigs-to-Reefs**

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<thead>
<tr>
<th></th>
<th>Standing Platforms</th>
<th>Rigs-to-Reefs Structures</th>
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<tr>
<td>Coral density in no./10m²</td>
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* p < 0.05, Mann-Whitney U-test
**Madracis decactis**

Total Coral Density

![Graph showing coral density in no./10 m²](attachment:graph.png)

- **Standing Platforms**
- **Rigs-to-Reefs Structures**

Coral density in no./10 m² $(Y+0.5)$

*** $p < 0.001$, Mann-Whitney U-test
. Total coral density – same on Rigs-to-Reefs structures vs. platforms

. *Tubastrea coccinea* (ahermatypic) – density higher on R2R

. *Madracis decactis* (hermatypic; reef-building coral) – density higher on R2R
Phyllangia americana Density
Standing Platforms vs. Rigs-to-Reefs

*** p < 0.001
Mann-Whitney U-Test
Oculina diffusa Density
Standing Platforms vs. Rigs-to-Reefs

Non-significant (n.s.), \( p > 0.05 \)
Kruskal-Wallis Test
- *Phyllangia americana* – higher on standing platforms

- *Oculina diffusa* – equivalent densities on both types of structures

- Species-specific responses caused lack of density differences when considering all corals; averaged out
Depth Distribution of Corals
Depth Distribution
All Corals

Relative Abundance (Proportion)

Rigs-to-Reefs Structures

Standing Platforms

Depth (m)

Depth Distribution Chart

All Corals

Relative Abundance

Depth (m)

0.1 0.2 0.3 0.4 0.5

0.1 0.2 0.3 0.4 0.5
Depth Distribution

*Madracis decactis*

Relative Abundance (Proportion)

Rigs-to-Reefs Structures

Standing Platforms

Depth (m)
**Depth Distribution**

*Oculina diffusa*

- **Rigs-to-Reefs Structures**
  - Relative Abundance (Proportion)
  - Depth (m)
  - 20, 30, 40, 50, 60, 70, 80, 90, 100

- **Standing Platforms**
  - Depth (m)
Conclusions

. Total coral density – same on Rigs-to-Reefs and standing platforms
   - Due to opposing species-specific abundance patterns

. *Tubastrea coccinea* – higher on R2R structures

. *Madracis decactis* – hermatype – also thriving on R2R structures
Conclusions (cont.)

- *Phyllangia americana* – opposing pattern – higher on standing platforms

- *Oculina diffusa* – same on R2R and standing platforms

- Depth distributions
  - All corals shallower on R2R
  - Madracis decactis limited to shallows on R2R and standing platforms
  - Oculina diffusa – deep distribution on standing platforms
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