RESTORING SEVEN ICONIC REEFS

A MISSION TO RECOVER THE CORAL REEFS OF THE FLORIDA KEYS
In the last 40 years, the Florida Reef Tract has lost 97% of the once dominant, reef-building coral species: elkhorn and staghorn.

**Coral Reefs**

* A Vital Ecosystem

- For **500 million years**, reef ecosystems have persisted in shallow seas, surviving ice ages and climate shifts.

- They are one of the **oldest and most biodiverse ecosystems** on Earth.
A NATIONAL TREASURE
THE FLORIDA REEF TRACT
FLORIDA KEYS
INTIMATELY CONNECTED TO CORAL REEFS

ECONOMICS & EMPLOYMENT

APPROXIMATELY
60% OF JOBS
in the Florida Keys are connected to the marine ecosystem.

$3,380,000,000
IN SALES AND INCOME, AS WELL AS $2.1 BILLION IN SPENDING.
HISTORY OF DECLINE
CARYSFORT REEF AS AN EXAMPLE

1975
1985
2004
2014
WHY BOTHER?

• Florida Keys long history of coral restoration efforts to learn from
  1. Concentrated efforts
  2. Abundance in numbers
  3. New species to be used
  4. Building resilience though diversity

• AND there are external efforts going on, designed to help the system as a whole.
  1. Mooring ball program
  2. Waste water treatment system
  3. FKNMS Restoration Blueprint
  4. Everglades Restoration efforts
BOLD ACTION IS REQUIRED

• We are facing a harsh reality that natural recovery is no longer an option.

• Active population enhancement is a necessity

• Recognizing the need for a comprehensive plan.

• The time was right…
MISSION: ICONIC REEFS

PROJECT DEVELOPED IN ASSOCIATION WITH

- NOAA's Restoration Center
- Florida Keys National Marine Sanctuary
- Coral Restoration Foundation
- State of Florida
- Mote Marine Lab
- Reef Renewal
- Florida Aquarium
- The Nature Conservancy
- Nova Southeastern University
- U.S. Geological Survey
- Plant a Million Corals Foundation
SEVEN ICONIC REEFS
SELECTED FOR COMPLETE RESTORATION

- Seven of the most iconic and important reef systems in the Florida Keys.
- A cross-organization and multi-agency team of experts and resource managers.
- An internationally unprecedented strategy for complete reef restoration.
MAKING OF AN ICON
BUILDING THE PLAN FOR RECOVERY AND RESTORATION

Mapping
Data Analysis
Cost Estimation
Site Zonation
Field Verification
SITE MAPPING
IDENTIFYING HABITAT ZONES FOR RESTORATION

Cheeca Rocks

Horseshoe Reef

Eastern Dry Rocks
SCOPE OF WORK
IDENTIFYING THE ACTIVITIES NEEDED

1. Site Preparation
2. Coral Propagation and Planting
3. Supplement with Grazers
4. Stewardship and Maintenance
5. Monitoring and Adaptive Mgt.
PHASE OF ICONS
PHASED APPROACH TO RESTORATION

Status Quo Phase 1a Phase 1b Phase 2

2019 2020 2025 2025 2028 2035

Status Quo  Phase 1a  Phase 1b  Phase 2

2%* 10% 15%

Increases in coral cover ➔ ➔ ➔ ➔ ➔
### 20 YEARS OF RECOVERY

**Mature Corals Planted:** ~497,000

<table>
<thead>
<tr>
<th>Region</th>
<th>Reef</th>
<th>Restorable Area (sq m)</th>
<th># of Corals Planted</th>
<th># of Grazers Added</th>
<th># of Corals Planted</th>
<th># of Grazers Added</th>
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<tbody>
<tr>
<td>Upper Keys</td>
<td>Carysfort Reef</td>
<td>125,890</td>
<td>112,228</td>
<td>94,982</td>
<td>93,026</td>
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<td></td>
<td>Horseshoe Reef</td>
<td>12,223</td>
<td>16,139</td>
<td>5,696</td>
<td>19,556</td>
<td>5,696</td>
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<td>Middle Keys</td>
<td>Cheeca Rocks</td>
<td>12,414</td>
<td>12,209</td>
<td>15,517</td>
<td>21,783</td>
<td>15,517</td>
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<tr>
<td></td>
<td>Sombrero Reef</td>
<td>13,461</td>
<td>11,842</td>
<td>10,096</td>
<td>13,267</td>
<td>10,096</td>
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<tr>
<td></td>
<td>Looe Key Reef</td>
<td>57,438</td>
<td>47,794</td>
<td>43,078</td>
<td>68,864</td>
<td>43,078</td>
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<tr>
<td>Lower Keys</td>
<td>Newfound Harbor</td>
<td>8,447</td>
<td>4,599</td>
<td>11,066</td>
<td>9,429</td>
<td>11,066</td>
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<tr>
<td></td>
<td>Eastern Dry Rocks</td>
<td>36,337</td>
<td>30,667</td>
<td>21,633</td>
<td>35,917</td>
<td>21,633</td>
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<td><strong>Subtotal</strong></td>
<td></td>
<td><strong>266,209</strong></td>
<td><strong>235,479</strong></td>
<td><strong>202,068</strong></td>
<td><strong>261,842</strong></td>
<td><strong>202,068</strong></td>
</tr>
</tbody>
</table>

**Phase 1 A/B**

- **ACTION:** Add rapid-growing corals
- **DURATION:** 5-7 Years of Work
- **10-YR GOAL:** ~15% cover

**Phase 2**

- **ACTION:** Add slower-growing corals
- **DURATION:** 10-12 Years of Work
- **20-YR GOAL:** ~25% cover
CARYSFORT REEF
RESTORING AN ICON

Legend
- Backreef
- Carysfort Reef
- Deep Reef
- Dense Palmata Framework
- Forereef Terrace
- Patch reefs
- Reef Crest
- Shallow Reef Crest
- Spur and Groove - sides
- Spur and Groove - top

Google Earth
Image © 2020 Maxar Technologies
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
CARYSFORT REEF COMPLEX

• Total Area Mapped
  • North: 259,601m²
  • South: 257,778m²

• Restorable Area
  • North: 54,088m²
  • South: 71,802m²

 PHASE 1 RESTORATION TARGETS

<table>
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<tr>
<th></th>
<th>NORTH CF</th>
<th>SOUTH CF</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>Elkhorn</td>
<td>22,049</td>
<td>40,576</td>
<td>62,625</td>
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<tr>
<td>Staghorn</td>
<td>12,740</td>
<td>18,562</td>
<td>31,302</td>
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<td>Star coral</td>
<td>5,877</td>
<td>5,269</td>
<td>11,146</td>
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<tr>
<td>Brain coral</td>
<td>3,278</td>
<td>3,076</td>
<td>6,354</td>
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<tr>
<td>Pillar coral</td>
<td>485</td>
<td>317</td>
<td>802</td>
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TOTAL  44,429  67,800  112,229
WHAT'S THE COST?

RESTORING AMERICA'S ONLY BARRIER REEF

Coral Propagation and Planting
- $61 Million
- $7.4 Million Grazer Additions
- $8.2 Million Research and Monitoring
- $8.9 Million Adaptive Management
- $11.8 Million Site Preparation and Maintenance

PHASE 1
$97 Million
RESTORE AMERICA’S ONLY BARRIER REEF, OR...

- Host the Macy’s Day Parade for 10 yrs
- Host the Grammys for 10 yrs
- Buy a Van Gogh
- Buy 20 sets of Super Bowl Rings

Produce 1/4th of an Avengers Movie
COLLABORATION
MISSION ICONIC IS A MULTI-AGENCY INITIATIVE

RESOURCE MANAGEMENT, STEWARDSHIP & GOVERNANCE

RESTORATION SCIENCE PARTNERS

LAND-BASED RESTORATION PRACTITIONERS

OCEAN-BASED RESTORATION PRACTITIONERS
STEWARDSHIP

• Mission Iconic Reefs will enlist on the ground support from the Florida Keys community.

• Creation of site prep and site maintenance teams.
  • Two working groups formed

• Volunteering with collaborators.
THANK YOU

Resources available at: www.fisheries.noaa.gov

Search for: “Mission Iconic Reefs”