Scaling-up Sponge Community Restoration in South Florida: its Efficacy and Ecosystem Implications

Progress Report #2

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Scaling up Sponge Community Restoration in South Florida: its Efficacy and Ecosystem Implications

- FWC has received funding from the Environmental Protection Agency for 2015-2018
- Collaboration with Old Dominion University & Florida Sea Grant
  - Project will provide the necessary underpinnings vital to a develop large-scale sponge restoration in the Florida Keys
    - Sponge restoration research/sponge nursery
    - Incorporate community participation/outreach & education component
    - Estimate the costs to conduct large-scale sponge restoration

Scaling up Sponge Community Restoration in South Florida: its Efficacy and Ecosystem Implications

- Additional funding has been pledged by three NGOs
- Establish additional *in situ* sponge nurseries
- Undertake a large-scale sponge restoration project in Florida Bay

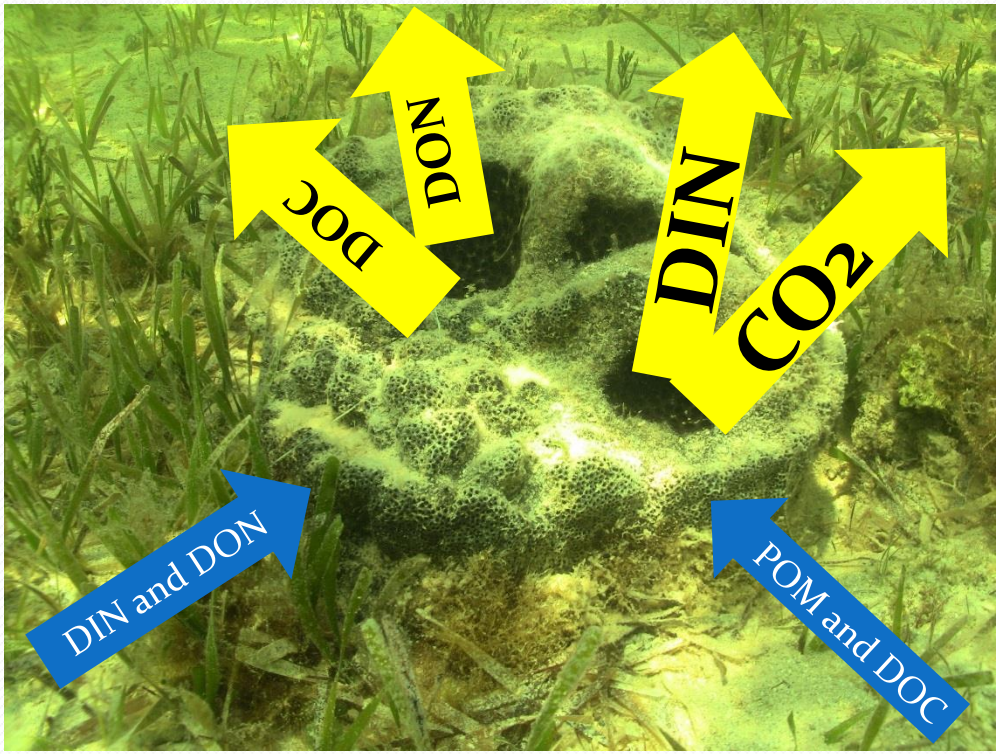
BONEFISH & TARPON TRUST

The Nature Conservancy

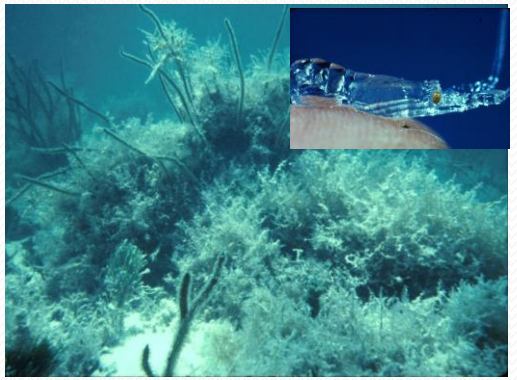
Florida Keys Environmental Fund, Inc.

The Role of Sponges in Water Quality

- Sponges have associations with many microorganisms that produce chemical transformations in the water as it is pumped through their tissues



- These microbes transform nitrogen to forms that are more available for primary producers
  - Seagrasses
  - Algae (*e.g.*, *Laurencia* spp.)
  - Phytoplankton

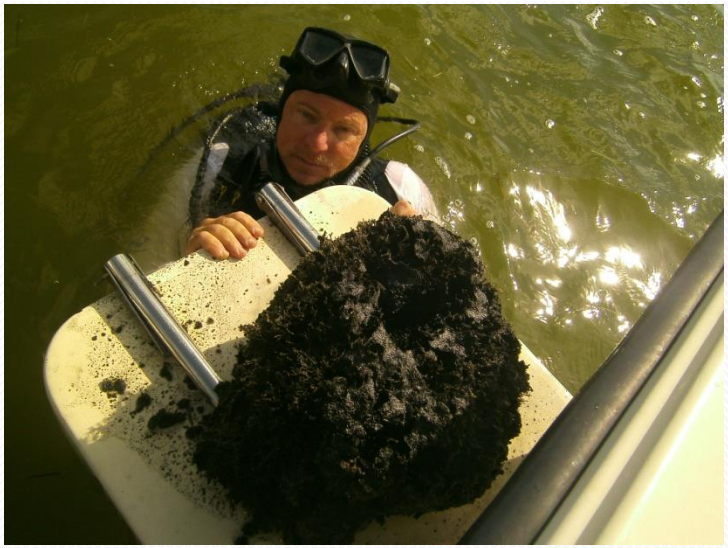


The Role of Sponges in Florida Bay

- Habitat for many commensal animals
  - Shrimps
  - Worms
  - Brittle stars
  - Fish
- Habitat for commercial species
  - Spiny lobsters
  - Stone crabs
- Primary forage for the endangered Hawksbill sea turtle

Florida Bay Algae Blooms and Sponge Die-Offs

Florida Bay Cyanobacterial bloom ‘Mystery Basin’ -- Fall 2013



- 98% Decline in Sponge Biomass

Florida Bay Sponge Restoration

Testing the Efficacy of Sponge Restoration in Florida Bay…Laying the Groundwork

The ODU Lab…

(1) Examined survival and growth of sponge transplants and the production of new recruits, thus potential for enhanced recovery

(2) Compared whole-sponge vs. sponge-cutting transplants

Results of Sponge Transplantations

Scaling-up Sponge Community Restoration

(1) *Test whether sponge nurseries as donor sources is an efficient, and environmentally sound method for large-scale sponge restoration Florida Bay*

(2) *Test in a field experiment whether sponge restoration can restore natural sponge filtration*

(3) *Test whether aggregation of restoration sites nearby one another improves sponge reproductive success and recruitment, as well as the effectiveness of restoration sites as essential fish habitat*

(4) *Develop and incorporate community participation and a coordinated public outreach and education component*

(5) *Undertake a large-scale sponge restoration effort*

(6) *Estimate the cost to conduct large-scale sponge restoration*

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Scaling-up Sponge Community Restoration

Sponge Nurseries

- Establish a series of sponge nurseries
- Specific questions about survival and growth rates of nursery-propagated sponges:
  - Can newly-propagated sponges be moved directly to restoration sites
  - How does attachment material & elevation above the substrate affect growth & survival of sponge cuttings

Permitted Sponge Nursery Locations

Established Sponge Nursery Locations

Nursery Species

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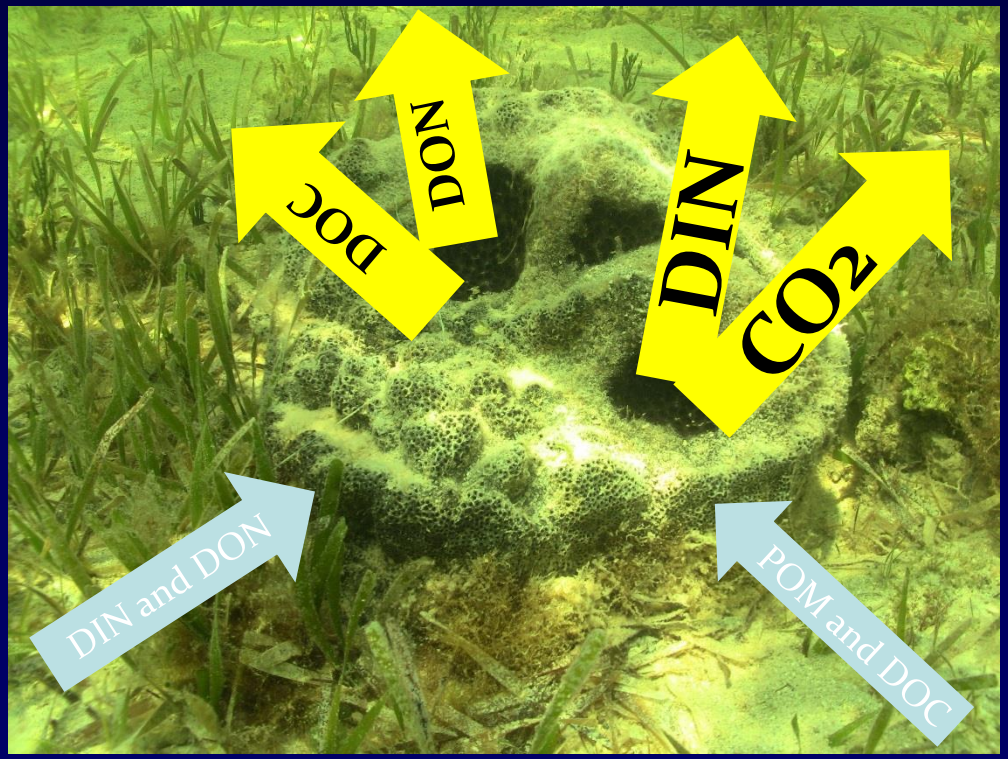
Mesocosm study of sponge biodiversity effects on filtration

- Evaluated sponge biomass and diversity on water column properties
  - Nitrogen availability
  - Bacterio-plantkton conc.

Scaling-up Sponge Restoration

- Will use mature sponge cuttings from earlier work
- Experimental set-up scheduled for summer 2016



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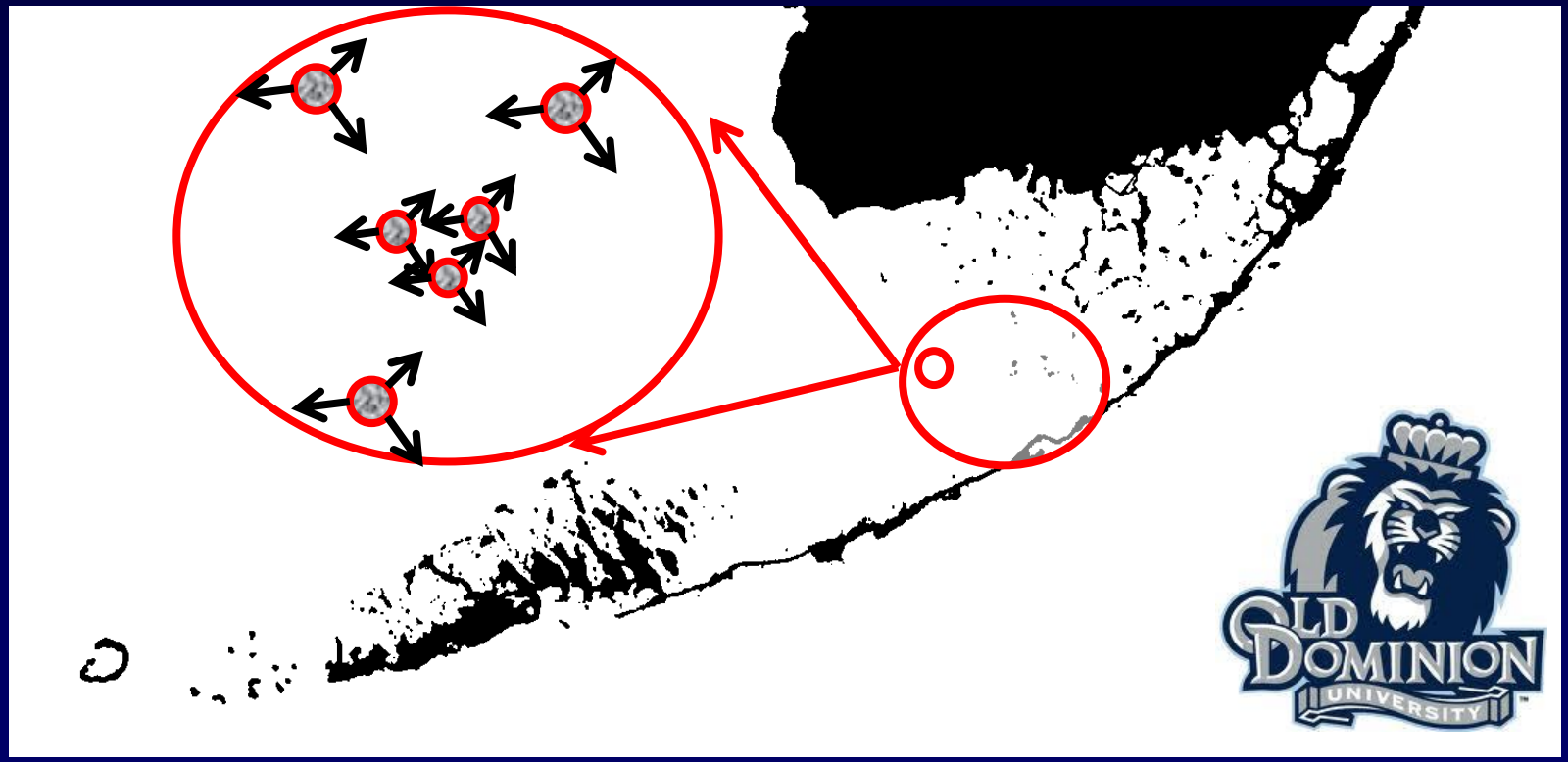
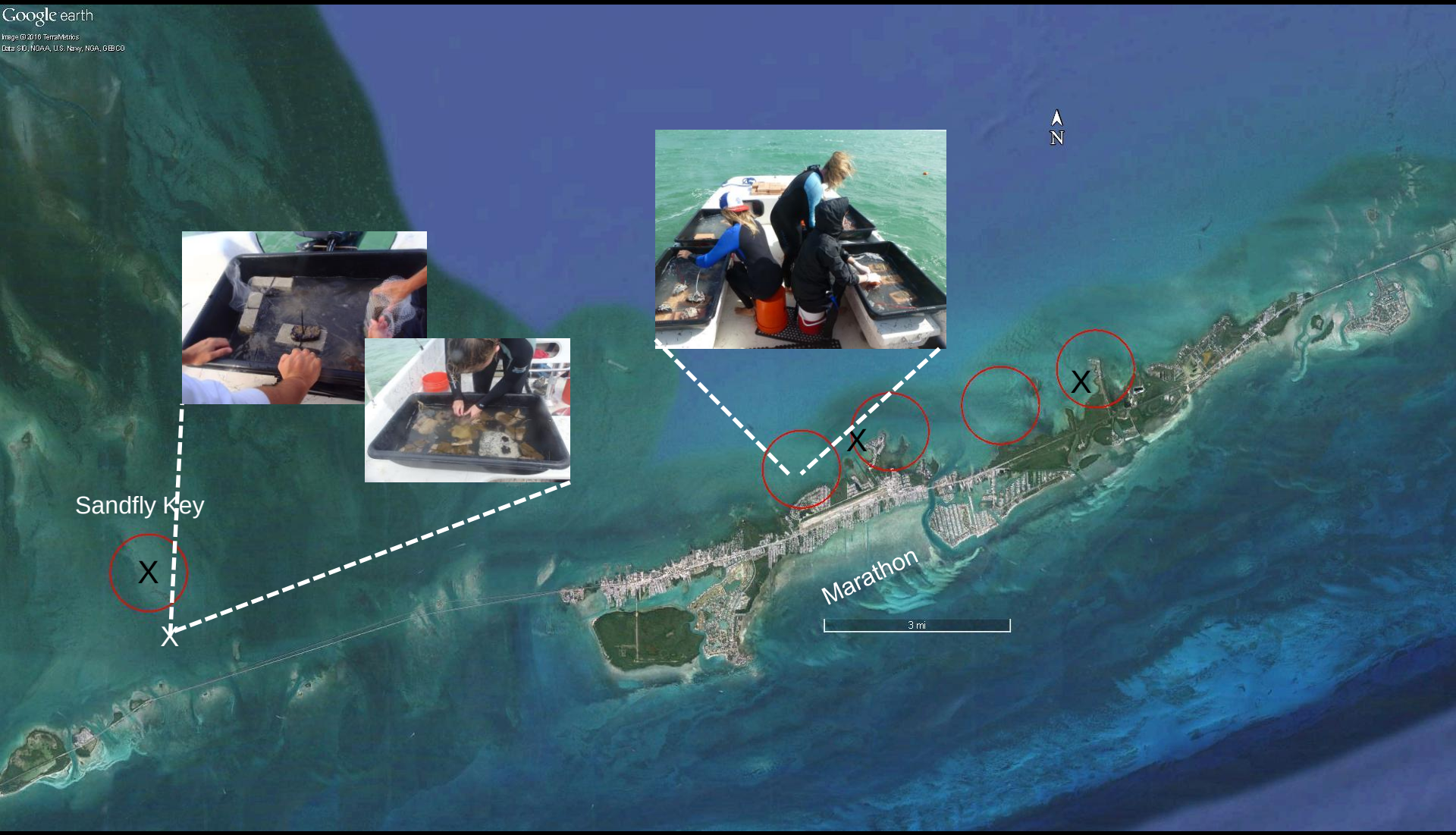
Scaling-up Sponge Community Restoration

- **Does situating sites closer to one another enhance sponge fertilization success?**
- **Outplant sponges at three inter-site distances**
  - Recruitment of new sponges, fishes & invertebrates
  - Habitat use by fish and macroinvertebrates



Additional Sponge Propagation



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Scaling-up Sponge Community Restoration
Stay Tuned…

Questions?