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

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FWC Restoration Ecology Staff

Florida Fish & Wildlife Conservation Commission
Fish & Wildlife Research Institute
South Florida Regional Laboratory

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

- FWC has received funding from the EPA 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
- Additional funding has been pledged by three NGOs
  - Establish additional sponge nurseries & undertake a large-scale sponge restoration project in Florida Bay

Florida Fish and Wildlife Conservation Commission

Old Dominion University

Sea Grant Florida

The Nature Conservancy

Bonefish & Tarpon Trust

Florida Keys Environmental Fund, Inc.

United States Environmental Protection Agency

Scaling-up Sponge Community Restoration

(1) Test whether sponge nurseries as donor sources are 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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Establishing & Evaluating Sponge Nurseries

- Four Nurseries Established
- Propagation Methods Being Evaluated
- Propagated > 6,000 Sponge Cuttings of Seven Species
- “Volunteer Week” May 1

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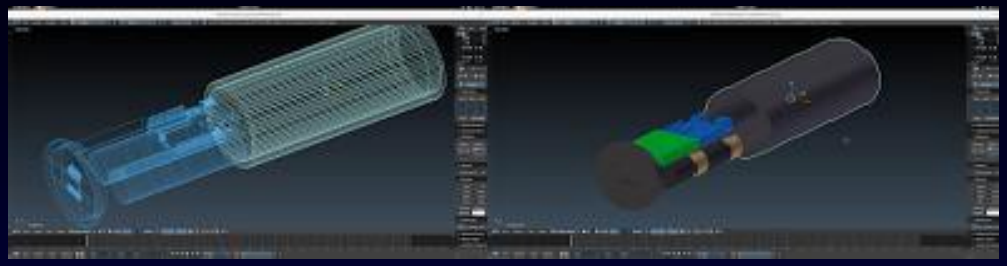
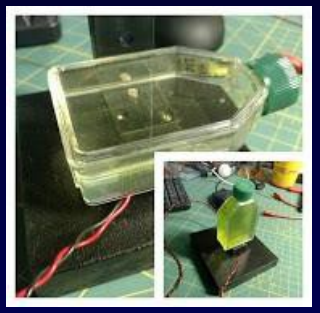
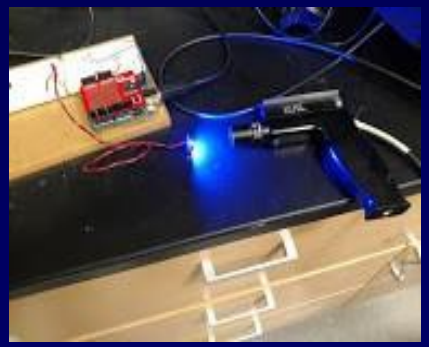
Sponge Filtration Study

- Use *in situ* fluorometers "upstream" and "downstream of small experimental sponge outplant sites
  - Measure phytoplankton pigments
- "Bench tests" conducted this winter/spring
- Field Testing began Summer 2016
- Refinements underway





Experimental pigment extract dilution series and pigment extract benchtop test apparatus.



Benchtop fluorometer prototype testing of LED emitter with light spectra output to computer

Sponge Recruitment Study

- How does restoration site proximity affect sponge fertilization success?
- Outplant sponges at three inter-site distances
- Sites established Summer/Fall 2016
- Preliminary faunal surveys completed

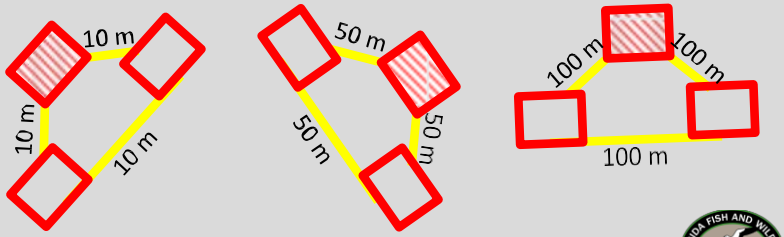
Legend

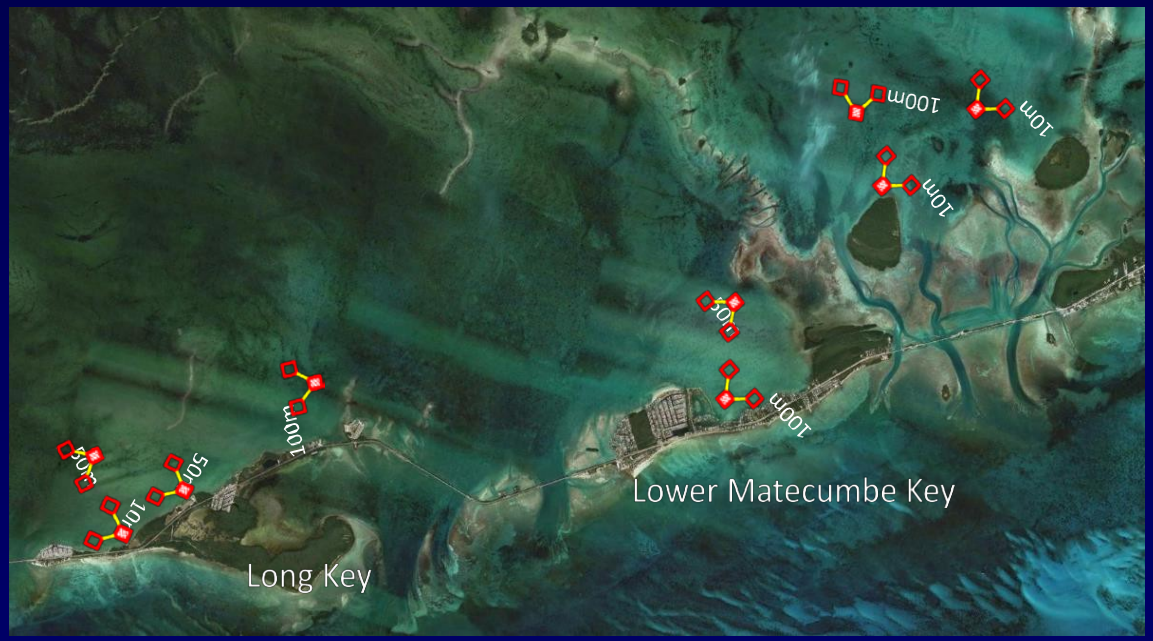
Established Sites (25 x 25 m)

Sites Established Jul/Aug 2016 (25 x 25 m)

Site Sponge Community

44 Loggerheads
30 Vases
20 Brown Branching
22 Sheepswools
17 Yellows
19 Gloves
12 Stinkers

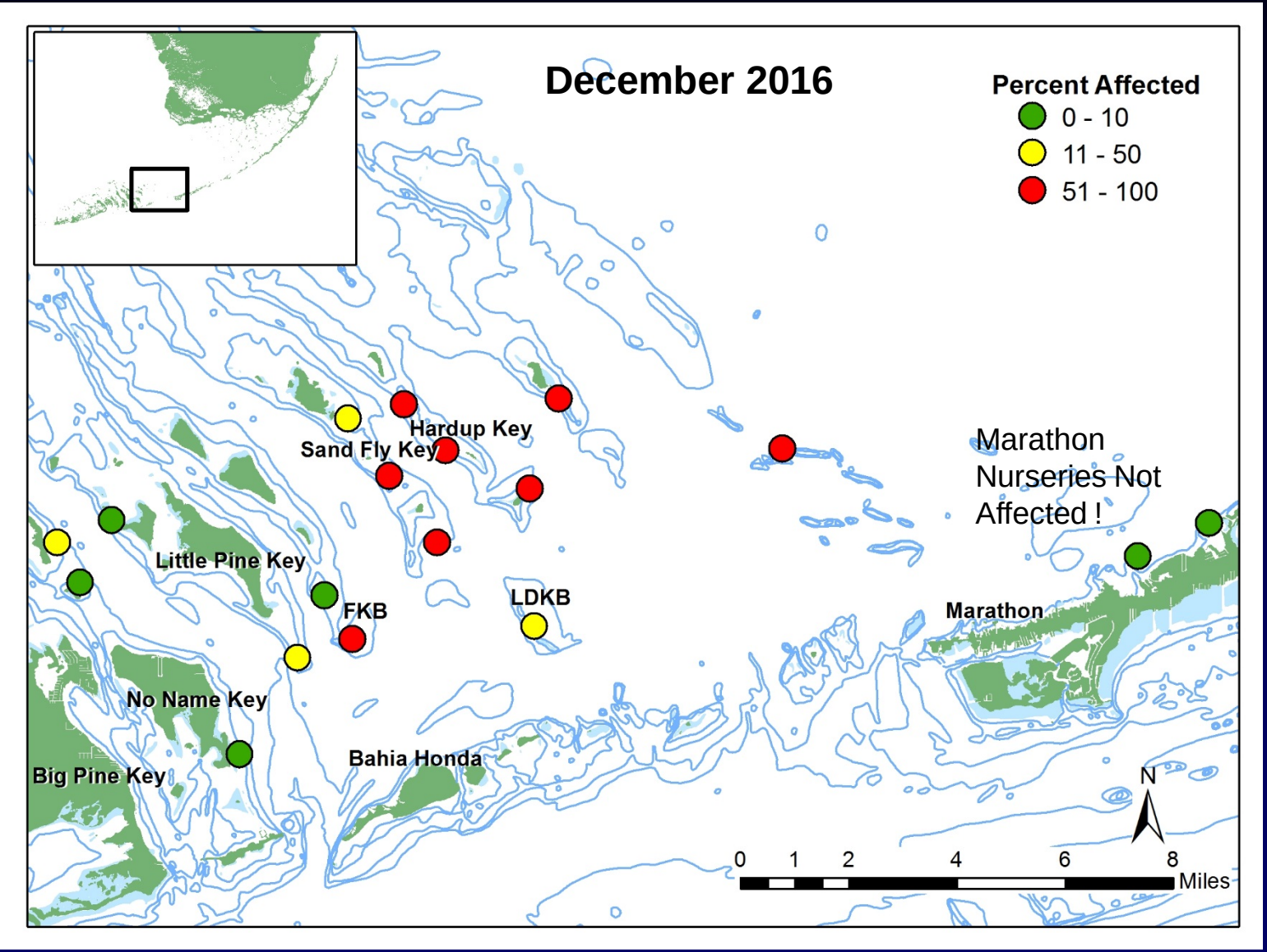




Sponge Die-Off Sandfly Key Nursery Region

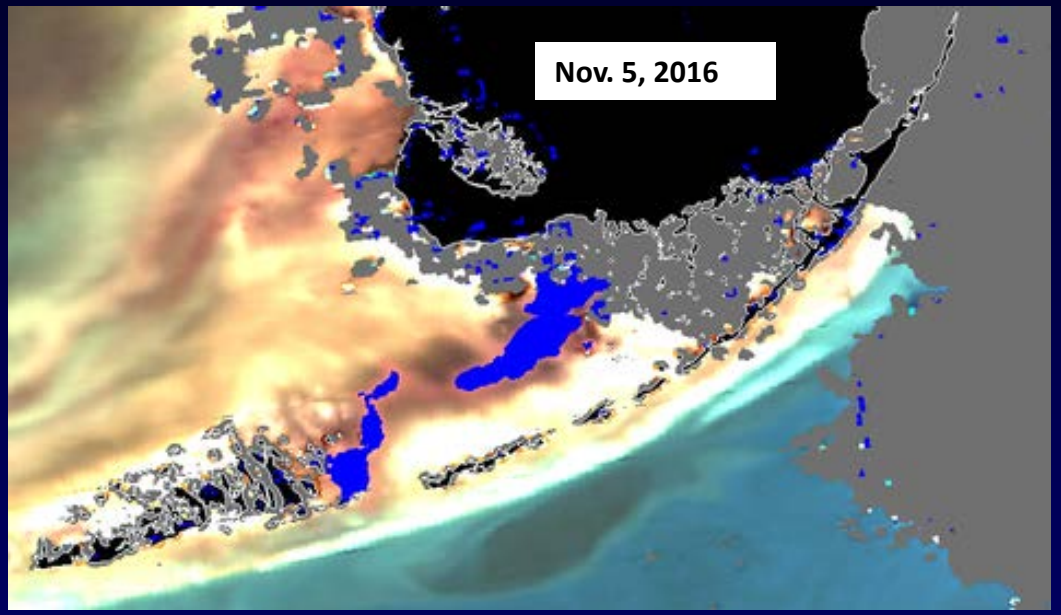
- Early December 2016 – Observed mortality of Vase, Brown Branching, Glove, Yellow, & Sheepswool sponges

Sponge Die-Off Sandfly Key Nursery Region



Satellite detection of cyanobacteria blooms in Florida Bay

MODIS-Aqua Enhanced Red-Green-Blue (ERGB) composite image from normalized water-leaving radiance at 547 nm (R), 488 nm (G), and 443 nm (B).



Blue-shaded areas indicate a cyanobacteria bloom according to a modified-CI_{MODIS} technique (Wynne et al., 2010) [pers. comm. Jennifer Cannizzaro, University of South Florida].

Sponge Die-Off Sandfly Key Nursery Region

- Die-off had abated by January 2017
- Approx. 20% of sponges in Sandfly Key nursery lost
- Marathon nurseries not impacted
- Propagation at all nurseries has resumed
- Affected propagation experiments re-established

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Scaling-up Sponge Community Restoration

- Updated Fact Sheet on Sponge Restoration Research
- Poster Presentation – December 2016 at Restore America's Estuaries Conference in New Orleans
- Sponge Forum Held March 2017
- Volunteer Sponge Week at Nurseries


Florida Sea Grant
Science Serving Florida's Coast
Sea Grant Florida

Florida Bay Sponge Restoration

After widespread sponge die-offs, researchers are working to restore sponge habitats

Where have all the sponges gone? Healthy sponge populations are an important part of the Florida Keys ecosystem. But a series of harmful algal blooms has essentially eliminated once-thriving sponge communities over large areas of Florida Bay. Researchers from Old Dominion University and the Florida Fish and Wildlife Conservation Commission are now testing methods to restore sponge communities.

Who?

Researchers from the University of Florida and Old Dominion University (ODU) have been studying various aspects of sponge biology and ecology in the Florida Keys for many years. Several years ago, these researchers started studying sponge community restoration. Now, joined by researchers from the Florida Fish & Wildlife Conservation Commission (FWC), they are scaling-up their sponge restoration research efforts. This large-scale project also presents opportunities for community participation, inviting volunteers to work side by side with scientists to restore sponges in the Florida Keys.

What?

Sponges are animals that are among the most visible residents of the hard-bottom habitats typical of the Florida Keys and

Florida Bay. Sponges are essential to the healthy ecosystem functioning of the Florida Keys, because they continuously filter large volumes of water, removing particulate matter. Sponges also alter water chemistry by cycling nutrients and provide essential nursery habitat for important fisheries species such as spiny lobster, stone crab and bonefish.

The loss of such an important component of nearshore habitats has prompted calls for sponge restoration. Scientists are currently evaluating if sponge nurseries are an efficient means of producing a biologically diverse assemblage of sponges in order to restore Florida Bay sponge communities. By transplanting sponges onto experimental sites, researchers will evaluate how to ensure sponge transplants become self-sustaining and help restore the health of the Florida Bay ecosystem.

Why?

Phytoplankton blooms in the early 1990s, 2007, and 2013 caused mass sponge die-offs over wide areas of the Middle and Upper Florida Keys. Once such an extensive die-off occurs, the recovery of the sponge community can be lengthy due their slow growth and limited larval dispersal. Consequently, restoring sponge communities by transplanting cuttings of healthy sponges

A healthy sponge community in Florida Bay

A loggerhead sponge after a die-off

Propagating new sponges using cuttings from a healthy sponge

Florida Sea Grant College Program – University of Florida
P.O. Box 110400, Gainesville, FL 32611-0400
352.392.2801
www.flseagrant.org

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Questions?