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

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

- FWC has been notified by the EPA that the agency will receive an award, but we have not received grant documents
- Collaboration with Old Dominion University & Florida Sea Grant
  - Project will provide the necessary underpinnings vital to 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 – presently working on an MOU
- Establish additional *in situ* sponge nurseries
- Undertake a large-scale sponge restoration project in Florida Bay

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
Comparison of Pre- and Post-Bloom Sponge Volume

Pre-Bloom Volume
3,995,890 Liters

Post-Bloom Volume
61,087 Liters

A 98 % Decline
Consequences of Sponge Die-off?

- Loss of water column filtration
- Change in N-cycling
- Loss of habitat fishes, turtles, & invertebrates
- Damage to sponge & lobster fisheries
- Other?

*Revised Marine Nitrogen Cycle*
Florida Bay Sponge Restoration
Testing the Efficacy of Sponge Restoration in Florida Bay…Laying the Groundwork

- New Vase sponge cuttings
- Vase sponge cuttings 4 yrs later
- Sponge Filtration

Fish and Macroinvertebrate Biodiversity

- Bar chart showing fish and macroinvertebrate biodiversity comparison between control sites and restoration sites.
Scaling-up Sponge Community Restoration

(1) Establish a network of sponge nurseries in Florida Bay
   • Provide sponges for restoration activities
   • Research to refine the husbandry process

(2) Test effect of sponge biodiversity on ecosystem services:
   • planktonic communities
   • water quality

(3) Test effect of sponge biodiversity on restoration success:
   • recruitment of new sponges
   • abundance of fish and macroinvertebrates

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

(5) Undertake a large-scale sponge restoration effort
   • ~ 30,000 nursery-propagated sponges

(6) Estimate the costs to conduct large-scale sponge restoration
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Scaling-up Sponge Community Restoration

Sponge Nurseries

- Test whether the establishment of sponge nurseries as donor sources is an efficient, effective, and environmentally sound method for use in the large-scale restoration of sponge communities in Florida Bay

- Permit Request to FKNMS
Nursery Species

- Glove Sponge
- Fire Sponge
- Yellow Sponge
- Loggerhead Sponge
- Vase Sponge
- Brown Branching Sponge

- Sheepswool Sponge
- Blue Rope Sponge
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Scaling-up Sponge Restoration

Test effect of sponge biodiversity on ecosystem services

• Test in a field experiment whether sponge restoration can restore natural sponge filtration effects on planktonic communities and key water quality parameters

• Intend to take first steps during October 2015 if the award has been received
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Scaling-up Sponge Community Restoration

• Test whether aggregation of restoration sites nearby one another improves sponge reproductive success and recruitment
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Scaling-up Sponge Community Restoration

• Develop and incorporate community participation
  – Coordinated by Shelly Krueger, Florida Sea Grant agent at the Monroe County Extension Service (University of Florida Institute of Food and Agricultural Sciences)

• Will develop a multimedia campaign
  – four newspaper articles
  – six radio spots
  – one fact sheet

• Will coordinate with the P.I.s to provide volunteers to assist with sponge propagation and nursery development activities
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  • planktonic communities
  • water quality

(3) Test effect of sponge biodiversity on restoration success:
  • recruitment of new sponges
  • underwater soundscapes & fish/invertebrate recruits
  • abundance of fish and macroinvertebrates

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

(5) Undertake a large-scale sponge restoration effort
  • minimum 15,000 nursery-propagated sponges

(6) Estimate the costs to conduct large-scale sponge restoration
Scaling-up Sponge Community Restoration

- FWC will outplant a minimum of 15,000 nursery-propagated sponges in the region of Florida Bay that was most highly impacted by the recent cyanobacterial blooms
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Scaling-up Sponge Community Restoration

- We will evaluate the project’s manpower costs
  - Staff and volunteer time involved in sponge propagation, nursery development and maintenance, sponge out-planting, and associated administrative functions
  - Associated materials, vessel use, fuel costs, etc.
  - We will use these estimates to provide the estimated costs of future sponge restoration efforts
Scaling-up Sponge Community Restoration
Stay Tuned…

Questions?

Florida Keys Environmental Fund, Inc.

The Nature Conservancy

NOAA

Old Dominion University

Sea Grant Florida