Overview of Corals and Hardbottom Resources in Southeast Florida

Contents (Unit 1, file 3 of 3):

- Introduction
- General Biology & Ecology of SE Florida Reefs
- Threats to SE Florida Reefs
- **Identification Resources for SE Florida Corals (cont.)**
- Nearshore Hardbottom Resources

Zoanthids: A Case of Mistaken Identity

Palythoa caribaeorum

"care-ebay-or-um" :

A fast growing colonial zoanthid that is often mistaken for coral – but it is not.

Mainly found in shallow reef habitats, *Palythoa* forms distinctive, monospecific mats that often dominate the available substrate. *Palythoa* is a fierce competitor for space (see bottom right image).

Octocorals

Approx. 37 species of sea fans, sea whips, gorgonians occur on SE FL reefs. Octocorals are more common than hard corals in SE FL.

No harvest of these species
FAC 68B-42.009 Marine Life Rule

Gorgonia ventalina *Gorgonia flabellum*

Millepora alcicornis/ branching fire coral

Reef Coral / Humann: pg #17
Abundant to common FL

Miami-Dade	*confirmed*	*very common*
Broward	confirmed	5%
Palm Beach	confirmed	very common
Martin	confirmed	?

Class Hydrozoa, not Anthozoa like the others

- Size = 1 - 18″
- The only fire coral in SE FL
- *M. complanata* (blade fire coral) is only in the FL Keys
- Common - *WARNING-STINGING DANGER*

No harvest of any *Millepora* species allowed

FAC 68B-42.009 Marine Life Rule

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Nearshore Hardbottom (NHB) Habitats

- **Shallow (0 - 4 m) structures from Miami-Dade to St Augustine.**
- **Many names (e.g., beachrock, coquina reef).**
- **Derived from shell fragments and sand that lithified 120,000 and 80,000 years ago during interglacial periods.**
- **Can reach heights of 2 m above the bottom with complex structure, especially in northern Palm Beach through Brevard counties.**

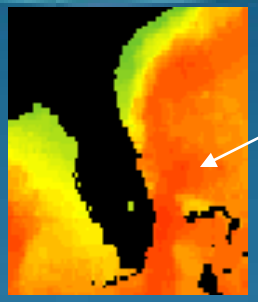
Nearshore Hardbottom Diversity

- Used by >1000 species (CSA, 2009)
  - ≈ 520 invert. species
  - ≈ 250 fish species
  - ≈ 300 algal types/species

- Essential Fish Habitat-Habitat Area of Particular Concern (EFH-HAPC following SAFMC, 1998).
- Component of *Acropora* Endangered Species Act critical habitat definition: **Natural consolidated hard substrate or dead coral skeleton that is free from fleshy and turf macroalgae cover and sediment cover** to maximize the potential for successful recruitment and population growth.

Nearshore Hardbottom across the SE FL Region

- NHB (0 - 4 m) habitat doesn't stop at 4m, it often intergrades into deeper water. The 3 - 8 m range can show transitional features of nearshore & mid-shelf hardbottom.
- NHB is most well-developed in Martin and northern Palm Beach counties, and is often highly colonized by worm rock.
- In Broward, NHB is often of relatively low relief, but examples of high biotic diversity are present, especially at 3-6 m depths.
- NHB is limited in Miami-Dade but can be present between 4-6 m depths (e.g., Bal Harbor to Lummus Park).



Many tropical species occur on nearshore hardbottom up to Cp. Canaveral.

Example of nearshore hard bottom present in Indian River County.

Fishes of East Florida NHB

Demersal Carnivores

- ≈30 families; 110 species
- Grunts, Drums, Wrasses

Cryptic Hardbottom Residents

- ≈ 8 families; 30 species
- Gobies, Blennies, Eels

Coastal Pelagics

- ≈ 10 families; 25 species
- Herring, Jacks
- Mackerel (huge nearshore winter schools in S. Martin Co.)

Herbivores

- ≈ 7 families; 20 species
- Damselfishes, Chubs
- Parrot fishes, Surgeon fishes

Source: CSA, 2009

NHB as Developmental Habitat for Fishes

- NHB fish species assemblage lists show high similarities with fishes of offshore reefs.
- One difference: despite substantial sampling in deeper waters, many species are rarely encountered as early stages in deeper habitats. Also, adults are often infrequent or absent from NHB.
- The NHB assemblage is juvenile-dominated with many species that don't settle in deep water. Besides NHB, there are no other natural structural habitats available in the 0 - 4 m depth range.

Newly settled lane snapper, 1.5 m.

NHB provides Developmental Habitat for Endangered Marine Turtles

- Juvenile sea turtles of three species commonly associate with shallow hardbottom of southeast Florida:
  - Green turtles (*Chelonia mydas)*
  - Loggerhead turtles (*Caretta caretta)*
  - Hawksbill turtles (*Eretmochelys imbricata)*

- Juvenile stages of the endangered green turtle can associate with shallow hardbottom for years, feeding on algae & using structure for shelter (CSA, 2009).
- Over 300 types of algae occur on NHB. The availability of specialized algal food items is is a primary driver of juv. habitat use by turtles in the SE FL region.

Worm Rock – Individuals & Colonies

Colonies of the tube-building polychaete worm:
Phragmatapoma lapidosa (= *P. caudata*)

- Colonize NHB and as habitat engineers, support high diversity and important shallow food webs (one worm reef had >200 species of crustaceans alone; Nelson and Demetriades, 1992).
- Worm rock is EFH-HAPC (SAFMC, 1998).

Figure 4.4. Close up of the anterior tube of an individual *Phragmatopoma lapidosa* (*caudata*). Photo by D. McCarthy.

Figure 4.5. Honeycomb structure created by thousands of *Phragmatopoma lapidosa* (*caudata*). Photo by D. McCarthy.

Figure 4.3. Close up of the anterior end of the reef-building polychaete *Phragmatopoma lapidosa* (*caudata*). Photo by D. McCarthy.

Is NHB properly termed a reef?

- There is no universal definition for the term *reef*. Long standing use of the term by both technical and general audiences includes many non-coralline structures: *oyster reefs*, *artificial reefs*, *rocky reefs*, *worm reefs*, *coquina reefs*, etc. in addition to *coral reefs*.
- Functionally, reefs include marine structures built by the interaction of organisms and the environment that: have synoptic relief, can influence water and sediment movements, and whose composition differs from that found on and beneath the surrounding benthos.
- NHB is composed of a lithified matrix of biotic and abiotic units (mostly carbonate shell fragments and quartz). NHB structures influence water and sediment transport, maintain relief through time, and support diverse biotic assemblages. Worm rock can expand the structure but is less durable than underlying NHB.
- Significant outcrops of NHB possess far more of the attributes of non-coralline reef structures than not. It is as technically correct to term NHB a non-coralline reef as it is to refer to oyster reefs, artificial reefs, etc. In addition, hardbottom is the bedrock critical habitat for the recruitment of coral larvae and the reef structures they form.

Additional Information on Corals & Associated Fauna in Southeast Florida

Organism Identification

- Humann, P. *Reef Coral Identification.*
- Humann, P. *Reef Creature Identification.* (Non-Coral Invertebrates)
- Humann, P. *Reef Fish Identification.*
- Kosmynin, V. *Field ID of Scleractinian Corals* (powerpoint file: contact vladimer.kosmynin@dep.fl.state.us)
- Boykin, C. *Identification of Scleractinian Corals on SE FL Reefs.* (Incl. on the CD in the training materials)
- Kaplan, E. H. *Coral Reefs of the Caribbean and Florida (Peterson Field Guide).*

Additional Information on Corals & Associated Fauna in Southeast Florida

A large journal literature exists on these topics. Citations to book-length Southeast Florida resources are provided below. Pdfs of >100 research and policy articles on corals and nearshore hardbottom resources are available on the project CD.

- Riegl, B. & Dodge, R. E. (eds.). 2008. *Coral Reefs of the USA*. Springer. (Several important chapters specific to SE FL.)
- Continental Shelf Associates (CSA). 2009. *Ecological functions of nearshore hardbottom habitats in East Florida: a literature synthesis.* Prepared for FDEP, BBCS, 266 pp. http://www.dep.state.fl.us/beaches/publications/pdf/EFNHBE.pdf
- SAFMC. 2009. *Fishery Ecosystem Plan of the South Atlantic Region.* www.safmc.net/ecosystem/Home/EcosystemHome/tabid/435/Default.aspx
- Waddell, J.E. and Clarke, A.M. (eds.). 2008. *The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States.* NOAA Tech. Memorandum NOS NCCOS 73. 569 pp. http://ccma.nos.noaa.gov/ecosystems/coralreef/coral2008/welcome.html#products
- Many resources are also available via web sites on the next slide.

Corals - Associated Resources on the Web

- http://www.dep.state.fl.us/coastal/programs/coral - FDEP's Coral Reef Conservation Program
- http://www.southeastfloridareefs.net - SEFCRI
- http://coralreef.noaa.gov - NOAA's Coral Reef Conservation Program
- http://coris.noaa.gov - NOAA's Coral Reef Info. System
- http://www.allislandscorals.org – US All Islands Coral Reef Committee
- http://www.coralreef.gov - US Coral Reef Task Force
- http://www.reefbase.org - ReefBase
- http://www.eol.org - Encyclopedia of Life
- http://www.coralpedia.com - Coralpedia

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- V. Kosmynin
- C. Boykin
- D. Gilliam
- K. Banks
- K. Lindeman
- D. McCarthy
- http://www.coralcalcium.com/benefits-coral-calcium-full.htm
- Florent's Guide to The FL, Bahamas & Caribbean Reefs
- J. Greenberg
- D. Snyder
- T. Gibson
- D. Clark
- Vŏnē Research
- UN Environment Program
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Assessment of Training File Effectiveness

Coral training materials will be presented to agency offices by spring 2011. Agencies are encouraged to refine these slides to optimize effectiveness in agency-specific staff training. These assessment questions can assist that process:

- What aspects of this PowerPoint file were of greatest utility?
- What materials are necessary but lacking from this training file?
- What other edits or adds can be made to improve effectiveness?

Please return your input on these questions to your specific agency Point of Contact regarding coral awareness training materials.