

This essay was written by Ben when he was the Science Coordinator at the Florida Keys National Marine Sanctuary. I think it is a wonderful piece that gives one a "feel" for the Florida Keys Coral Reef Ecosystem. I hope everyone enjoys reading it.

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Our local economy depends on it. We rely on it for food to feed our families and our guests. We use it for our recreation and entertainment. It helps cleanse the water. It provides shelter to thousands of species of organisms. We even built our houses, hospitals, and offices on its remnants. It is the coral reef ecosystem of the Florida Keys National Marine Sanctuary. Welcome. I'd like to take you on a tour of the Sanctuary and give you a sense of its diverse habitats and the life they support.

The principal purpose of the Florida Keys National Marine Sanctuary is to protect this ecosystem for its own sake, for our sake and for the enjoyment and use of future generations. However, the uses must be sustainable which means they can't diminish future generations' ability to enjoy or use the resources.

The Sanctuary is a special place- a place dominated by nature. Looking down from high above, one sees an incredibly beautiful archipelago swinging in a slow arc from the east, just south of Miami, to the west spanning a distance of 200 miles. The arc terminates in the Tortugas some 70 miles west of Key West. The waters surrounding the archipelago form the Sanctuary. Comprised of 9500 square kilometers of ocean, it is the second largest Sanctuary following Monterey Bay.

Whenever I leave the Florida Keys by plane my face is always plastered against the window so I can peer into the wilderness we call the "backcountry", where thousands of mangrove islands dot the seascape surrounded by brilliant turquoise waters and bone white sand. The juxtaposition of verdant mangroves against the turquoise waters set off by a big blue sky filled with billowy clouds is stunning. I search the waters hoping to see a large animal like a shark, ray, tarpon, or turtle.

If you were to take a snorkel trip from the backcountry, which is in the Gulf of Mexico north of the Keys, toward the south or the Atlantic Ocean you would pass over a diverse array of habitats from seagrass beds to hardbottom to the coral reef. These habitats and the organisms they support are all connected by the ebb and flow of the tide and form one big ecosystem.

One of the most noticeable things about the backcountry is how shallow the water is. Depths are generally less than four feet, making it an extremely difficult place to navigate. It takes a lot of experience and a keen eye to be able to successfully navigate through the backcountry. The backcountry provides one of the most exciting recreational fishing areas in the country, where flatsguides take anglers out to catch tarpon, permit, bonefish and a variety of other gamefish.

Seagrass beds are the most abundant habitat found in the Sanctuary, covering approximately 85% of the bottom. The seagrass beds in the Sanctuary, combined with the seagrasses to the north in Florida Bay, create the largest seagrass bed in the world.

Hidden among the seagrass blades are a plethora of juvenile fish and invertebrates taking cover from predators as they mature. The spiny lobster is one important invertebrate that begins its post larval life in the seagrass bed. As it matures and grows larger the lobster heads south with the prevailing flow of water and moves from the seagrasses to the hardbottom habitat. Here it finds refuge around large sponges or in crevices in the limestone bottom.

Hardbottom is prevalent in the channels between the Keys where the ripping currents have scoured the bottom exposing the underlying limestone. Growing on this exposed limestone or hardbottom are sponges, beautiful soft corals that sway in the currents, and a variety of mounding or encrusting-type hard corals. It's fun snorkeling the hardbottom habitat because a surprise always awaits you, like a resting green turtle wedged in a hole or a large boulder coral surrounded by juvenile fish.

We've now made it to the Atlantic Ocean-side of the Keys where seagrass beds are abundant and the hardbottom is punctuated by inshore coral patch reefs which extend the whole length of the Keys. Patch reefs are delightful places to visit because they are like oases in that the three-dimensionality of the coral heads attracts a huge diversity of fish life. One can easily swim around the perimeter of a patch reef absorbing all of the wondrous sites it has to offer.

Beyond the inshore patch reefs we get to the deeper waters (30-40 feet) of Hawk's Channel. This channel parallels the Keys and serves as the dividing line between nearshore waters and offshore waters. The channel is often turbid due to the muddy bottom easily stirred up by wind-driven currents. However, within this channel is one of the Sanctuary's hidden habitats- the mid-channel patch reef. Rising from the muddy seafloor some 20-30 feet high are coral patch reefs packed with mounding and boulder corals, and interspersed among these coral heads are giant soft corals the size of small trees. Huge sponges thrive in this turbid, high current environment as well. These coral patch reefs challenge the dogma that corals require low nutrient, clear waters to thrive.

Offshore from Hawk's Channel about 2-3 miles from land the bottom rises up again to about 18 feet, and here we come across another band of patch reefs surrounded by seagrass beds. These offshore patch reefs serve as another important refuge for migrating fish and lobster on their way to the coral reef tract. Some of the richest coral cover in the Sanctuary is found on these patch reefs. Some of these patch reefs have 35-40% coral cover compared to an average of about 14% for the reef tract.

Finally we arrive at the reef tract which parallels the Keys approximately 4-5 miles offshore. It's not a true barrier reef so we call it a reef tract. The reef tract is a discontinuous line of coral reefs that started growing some 7,000 years ago on an outcropping of limestone. The better developed reefs are found in the Upper and Lower Keys where water from Florida Bay does not impede coral growth nearly as much as in the Middle Keys. Along the reef tract the coral grows in a spur and groove formation. The spurs are fingers of coral perpendicular to shore and the

prevailing wave direction, and the grooves are channels between the spurs that help export excess sand off the coral reef into deeper water. At the top of the spur in about four feet of water is the reef crest, and it is here in this wave-dominated environment that branching elkhorn coral thrives. Behind the reef crest in even shallower water is the reef flat where few corals survive due to the high wave energy. As the spur gradually descends into deeper water (15-30 feet) the reef crest becomes the fore reef. A more delicate branching coral called staghorn coral grows in these deeper, calmer waters as do many of the boulder and mounding corals. The Sanctuary has over 90 species of corals. In the 30-50 foot depth range the fore reef sequesters into the intermediate reef where the spur and groove formation becomes less pronounced. At the foot of the spurs, in what's called the buttress zone, you can find huge mounds or heads of coral rising 10-15 feet from the seafloor. Beyond the buttress zone is the deep reef extending from 50 to about 80 feet. Coral in the intermediate and deep reef zones are abundant, but low in profile, and have taken on more of a plate-like or encrusting morphology due to the lower light conditions.

The reefs down to about 100 feet, or safe SCUBA depth, have been fairly well-studied, but beyond that we know very little about the health and abundance of corals. Corals don't grow much below 160 feet in the Keys because there isn't enough light to sustain them. One of the primary objectives of the Sustainable Seas Expeditions is to extend our ability to assess coral health and monitor it over time. The corals in shallow water have been severely affected by diseases in the past several years. We are wondering whether disease is as prevalent in deeper waters as it is in shallow water. We are still discovering new coral reefs in the westernmost portions of the Sanctuary around the Tortugas. The Sustainable Seas Expeditions will help us explore and document these areas.

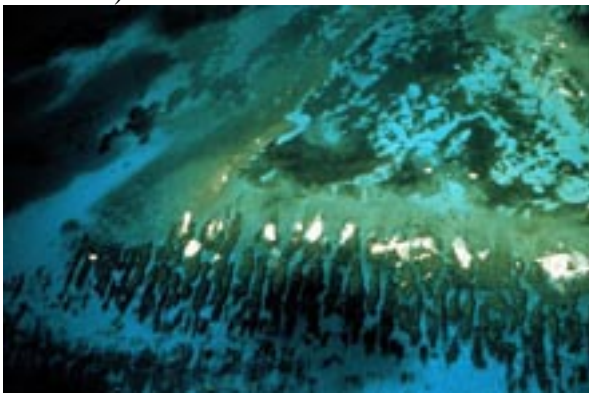
I hope this tour of the ecosystem has given you a sense for the variety of habitats in the Sanctuary and the diversity of life they support. It is the only coral reef tract we have in this country so it's up to us to treat it with respect and to use it sustainably.



Stunning scenes of mangrove islands, turquoise waters and billowy clouds are common in the Florida Keys backcountry. (photo credit: FKNMS)



Seagrass offers a place of refuge for small creatures hiding from hungry predators. (photo credit: FKNMS)



Looe Key typifies the spur-and-groove pattern of the reef tract. (photo credit: FKNMS)



Constant wave action helps branching corals to thrive in the shallow water of the reef crest. (photo credit: FKNMS)