

# Saving a Reef for the Fish, and the People

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PLACENCIA, Belize - Twenty-six miles off the coast, just past the barrier reef and 70 feet below the surface, cubera snappers have formed a pillar of fish. The snappers are big. They run 20 to 40 pounds each - and they form a column 100 feet high that seems to grow out of a mass of several thousand fish schooling below.

The snappers swim up from the center of this mass and cascade down the outside of the column when they reach the top, creating a fountain of fish.

This synchronized swimming on a grand scale is a kind of foreplay. Because the fish spawn en masse, there is no individual mating ritual. It's a group event. The swimming patterns and the speed of the fish shift and change unpredictably until some behavioral trigger is pulled and the fish in the column release their sperm and eggs at the same time. It's an underwater whiteout.

To a land animal, whose gametes need protection from the harsh, dry world, this seems a stunning, almost careless act, an enormous jolt of reproductive energy spent all at once. To other fish, like the whale sharks that feed on the eggs, the huge cloud of gametes is a buffet.

And to the people of Placencia, the whale sharks are a new source of income. Scuba divers and snorkelers travel to see them, and during spawning, dive boats go past the reef, with all its color, and head out to the Gladden Spit Marine Reserve to see the sharks.

Whale sharks are enormous, up to 60 feet long, and peaceful. Like baleen whales, they feed on plankton, sucking water into a wide open mouth and forcing it out through their gills. They appear at Gladden Spit in April and May, when large aggregations of cubera snappers spawn. As fertilized eggs float to the surface in patches like small oil slicks, the whale sharks loll about with wide open mouths, inhaling their meals. Dr. Will Heyman, a marine biologist who has been working in Belize for the Nature Conservancy for 10 years, counted 25 whale sharks at one point in an area 150 feet in diameter. Given the number of fish spawning, more than enough fertilized eggs escape.

Dr. Heyman is leading a group of divers suspended in the water around the pillar of cubera snappers, watching, counting and videotaping. His research has supported efforts to protect spawning sites. Those efforts began with local fishermen who were seeing dwindling catches of some fish and realized that tourism, particularly scuba diving and fly-fishing, could be a new source of income.

By itself, Gladden Spit, which covers 40 square miles is tiny. But the creation of the Gladden Spit Marine Reserve and 10 others to protect places where reef fish gather to spawn are examples of conservation that focuses on small, valuable areas and that recognizes that humans are part of the environment. The effort also exhibits, in miniature, the essential problem of ecotourism - the tourists.

The protection effort did not start in New York or Geneva, but in small village like Placencia and Monkey River Village, with people like Eloy Cuevas. Mr. Cuevas was a commercial fisherman

and still is a lobsterman and fishing guide. He has worked with the Nature Conservancy and the Friends of Nature in studying the spawning aggregations and in talking to fishermen about the importance of conservation. Since he began working with Dr. Heyman, he has traveled to Mexico, Indonesia and the United States to talk to fishermen from a fisherman's point of view.

"It started here," Mr. Cuevas said of the conservation efforts. "But then the Nature Conservancy put in a lot over the last few years to make it really happen."

A number of organizations have collaborated and contributed money, including local groups like the Friends of Nature in Placencia and international organizations like the Wildlife Conservation Society, the World Wildlife Fund and the World Resources Institute.

Mr. Cuevas said the work focused strongly on developing economic alternatives for people who have depended on fishing.

"It's not just the environment or the ecosystem," he said. "It's the people that live around that area, as well."

It is important, he said, to give people who have depended on fishing or some other way of life to have a chance at something else like fly fishing or scuba. "Instead of going out there and just taking everything, you can use it in a different way and still make money from it."

Dr. Heyman was in Belize working on his doctorate when he met Mr. Cuevas, who took him to Gladden Spit in 1998 to see the huge spawning aggregations. Since then, 26 species have been identified as spawning at Gladden Spit, and Belize has protected 11 spawning-aggregations sites along the reef, what Dr. Heyman calls a "string of pearls."

There are probably as many conservation groups and government agencies involved in reef conservation as there are species that spawn at Gladden Spit. The humans form their own multispecies aggregation of nongovernmental organizations and engender new ones, as well.

At first glance, this political environment can seem terribly tangled. But Laretta Burke, a senior associate in the information program at the World Resources Institute, said, "it's a good thing to have lots of groups involved in coastal management."

The protection of spawning sites, Ms. Burke said, is "a very important effort."

Janet Gibson of the Wildlife Conservation Society's marine program in Belize said that spawning sites were "obviously a critical area of conservation."

"It's the reproduction of the species," Ms. Gibson added.

The group actually charged by the government with protecting Gladden Spit is the Friends of Nature in Placencia, which hires and pays rangers and proposes regulations, said Lindsay Garbutt, executive director. For instance, some traditional fishing is allowed in protected areas. And neither snorkelers nor divers are supposed to try to grab a whale shark, a rule sometimes honored in the breach, at substantial risk to the human being simply from the movement of a frightened shark.

Although to tourists the waters may not seem depleted, Mr. Garbutt said that 25 years ago he could anchor in one spot and take 1,500 conch. Now he said: "In a month, you can't do that. It is vital for us to conserve what little we have left."

If spawning is protected, then other fish will not have to follow in the wake of the endangered like the Nassau grouper. Just north of Gladden Spit at Caye Glory, Dr. Heyman said, the groupers have all but disappeared.

"In 1968," he said, "they used to have 300 boats out there and two tons of gravid Nassau groupers every day coming off of there. We went to the same place a couple of years ago to survey it, and there were only about 21 groupers there. That has been the kind of story we've seen all over the Caribbean time and time again, multiple places, multiple times."

Dr. Heyman has come to the conclusion that there are particular characteristics of spawning sites that draw many species. He has come up with a model for predicting where such sites will be found - "reef promontories that jut windward into deep waters." He has not yet published the findings in a scientific journal, however, and said although he had a lot of evidence to support this conclusion, it is not yet widely accepted, and he is still gathering information.

The goal of protecting the spawning site was not just to protect the spawning fish, but also to preserve the lucrative visits of the whale sharks. Belize is known for a variety of fishing and diving. But in April and May in Placencia, there is only one place where the dive boats are going and one thing the divers and snorkelers want to see - Gladden Spit and the whale sharks.

That desire sometimes gets out of hand. On a trip out to the shark zone in Gladden Spit where the snappers spawn and the sharks cruise, divers on a boat from the Sea Horse dive shop complained about snorkelers who moved too close, including one who tried to grab a shark.

The Sea Horse is run by Brian Young, a founder of a group that gave rise to the Friends of Nature. He had to time his arrival at the spawning site, because just five boats are allowed at a time. Even so, that can mean close to 50 divers and snorkelers. And some divers and snorkelers were complaining this season that fewer whale sharks had been seen, that the reserve was already being ruined and that the \$15 fee for entering the reserve should be greatly increased. They also made unkind comments about the snorkelers, most of them involving very heavyweight belts and no flotation devices.

Mr. Young and Mr. Garbutt said the diving regulations might be reconsidered before next season.

Early in the evening, when the tourist boats must leave, the researchers dive. One evening, at least one shark was in the water, a youngster, 20 feet long. A few divers caught a glimpse of it. But those who had come up fairly early and were waiting in the skiff for the others saw the same shark, very close. Mr. Cuevas drove the boat near it, gently, and it lazed along next to the hull mouth wide open.

Under the surface, the dog snappers were spawning in small groups that would whirl off from the main column, and the cuberas were following their architectonic mating ritual, releasing their gametes into the saline and relative safety of the sea.

At the surface, as if to keep things in perspective, the shark was vacuuming up the results of this miracle of nature, and the humans staring in amazement at its gaping mouth.



Douglas David Seifert

Cubera snappers in a spawning ritual off Gladden Spit in Belize. Their eggs sustain not only them but also a critical population of whale sharks.



Douglas David Seifert

A whale shark is attracted to the spawning ritual of Cubera snappers spawn off Gladden Spit in Belize.