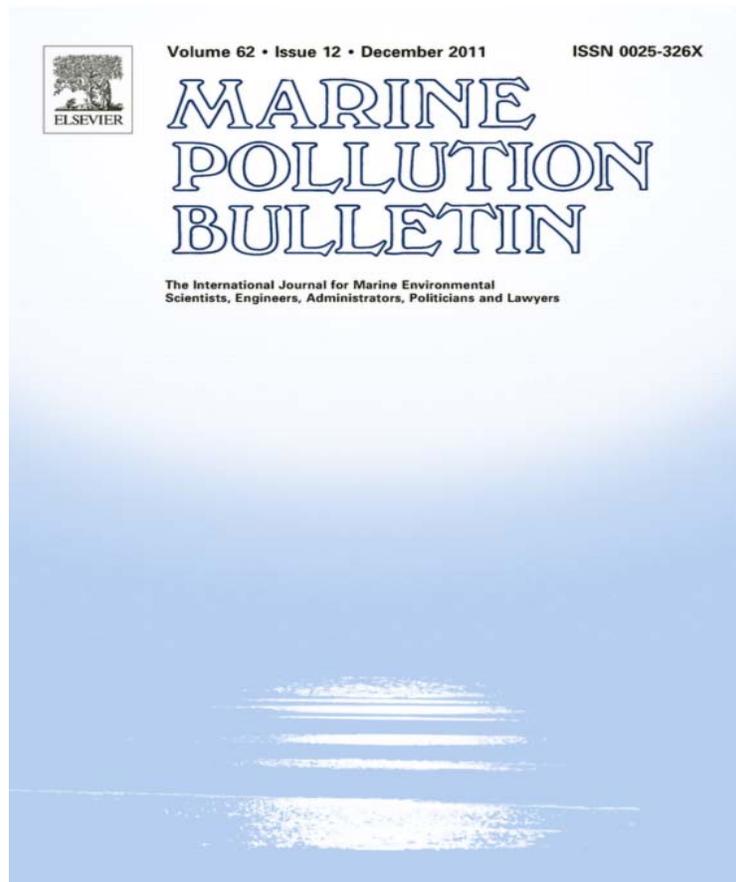


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# Marine Pollution Bulletin

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## Editorial

### Are we loving 'em to death?

What follows is a personal viewpoint regarding the state of coral reefs in the Florida Keys. My view is based on personal observations and geologic knowledge gained in recent years from high-resolution seismic profiles and many coral reef cores. Seismic profiles show that the majority of the outer-reef belt is <2 m, not as thick as would be expected and coring of the thicker backreef accumulations combined with C-14 dating indicate periods during the past 6000 years when coral reefs did not accrete. Such arrested growth, whether due to storms, freezes, or warming events, clearly occurred before there were significant numbers of humans in the Florida Keys. With this geologic background as a guide, I present a somewhat offbeat history of the Florida Keys. The story starts in 1950 when I first began diving there, and is based almost entirely on recollections. Much has been left out, and certainly many significant events have been missed.

I was born in Key West 2 years before the infamous Labor Day Storm of 1935 and began serious diving in the Keys in 1950. I had been fishing there with my father many years before learning to dive. In the early days, diving meant spear fishing. Early on, we made spears from Model A Ford brake rods that could be scrounged in junkyards. Because of age and location, I observed many historical and sociological changes leading up to the present. My history may seem cynical in part but nevertheless illuminates many ways that social history in the Keys affected coral reefs.

One must first realize that the Florida Keys have long been a magnet for people running away from something, starting with the first pirates and later British loyalists immigrating from the Bahamas. Key West for most of its history was like a foreign country (passport not needed) more closely allied to Cuba than to the US. In fact, in the 1800s the major markets for fish caught in Florida were Havana and Key West. People running from something (think alimony, etc.) are still arriving.

When I began driving from Miami to go diving in the early 1950s, the only gas station between Homestead and Key West that I can remember was in Marathon. The Last Chance Bar and Grill off US 1 in Homestead was almost the last chance. The Overseas Liquor store in Marathon was the other one. This was when bay bottom mud was being pumped up to create Duck Key and Key Colony Village, while other Keys were being enlarged and cut with canals. Seismic vessels did surveys just offshore using 50-lb charges of nitroamone. Evenly spaced 50- to 60-ft-diameter sand-filled holes in offshore turtle grass were clearly visible throughout the 1950s.

In 1959, I flew over an oil well being drilled a half mile off the Marquesas Keys. Drilling mud was streaming all the way to the outer-reef line. A 15,000-ft test well had already been drilled at Newfound Harbor on the edge of Coupon Bight. Three had already been drilled in North Key Largo and the last was drilled on the reef

line in 30 ft of water in 1960, not far from where Mel Fisher found the *Atocha* treasure ship.

In the 1950s, there were about 20 hardcore divers in Miami that spear fished in the Keys. Art Pinder was the most well known. I was part of a 3-person team that won the US National spear-fishing tournament twice. We divers knew each other because we often met at the same Miami fish markets and restaurants selling our fish.

One could launch a boat at places such as the long gone Gulf Stream Club on Garden Cove or other out-of-the-way places with little worry that your car and trailer might be stolen. If you carried your 6-hp outboard (mine was a Wizzard) in the trunk, you could rent a wooden skiff for 3 dollars a day. There were no dive shops or commercial dive boats. "Aqua lungs" were beginning to appear, but most young "skin divers" could not afford them. The greatest deterrent to Keys diving and fishing were the mosquitoes. Making the break from your car to boat and finally a safe distance offshore was punctuated by painful bites. A few roadside shops sold some conch shells and coral, but there were few tourists. Mosquitoes kept them in their automobiles.

The Coast Guard was still dynamiting fast-growing coral to open a channel for supply boats that supplied the manned lighthouses. About 5 people lived on the larger lighthouses, and the one at Carysfort Reef had telephone communications to shore. The remains of the cable can still be seen in the access channel.

Motels were few and far between, and water barely trickled from showerheads. It came from a 12-inch-diameter pipe (built for the Navy) that ran from Homestead to the Naval base in Key West. Keys well water was brackish much of the time, and hardy residents, known as "Conchs," relied on rainwater and cisterns. Lack of water and periodic hurricanes such as Donna in 1960 and Betsy in 1965 kept development and immigration from the mainland in check. The granddaddy of all hurricanes, of course, was the Labor Day Storm of 1935. It wiped out Flagler's railroad, killed more than 400 people, and was a nagging memory for many Keys residents.

In the late 1950s, Dr. Gill Voss (one of my professors at the University of Miami) became concerned that increasing numbers of shell and coral collectors were taking excessive amounts of coral. Few knew how fast corals grew back, although researchers at the Carnegie Institute Research Laboratory at Loggerhead Key, Dry Tortugas, had determined growth rates in the 1920s and 1930s. Voss teamed up with John Pennekamp, who lobbied, and published articles that paved the way for creation of what became John Pennekamp State Park. The park was dedicated in 1959 at Harry Harris Park. I attended and displayed black-and-white underwater photographs on a poster board. The new marine park was named after Pennekamp because, as Editor of the *Miami Herald* newspa-

per, he had played a major role in creating Everglades National Park (ENP) in 1947. National Park rules prevented National Parks from being named after people.

As originally proposed, ENP was to include Key Largo and the offshore coral reefs. That did not happen due to resistance from Key Largo landowners. Ironically, it was the outlawing of spear fishing that drove support for the State Park. Corals really were not yet considered as important as was stopping spear fishing. There had long been an ongoing war between charter-boat captains/lobstermen and young spear fishermen from Miami. These young divers, including me, brought little money to the Keys, competed for the local fish, and often brought in more fish than people who had paid considerable money for the sports fishing charter-boat experience. It made the charter-boat captains look bad. Also, the local "Conchs" were socially very different and tough minded. In fact, lobster fishermen murdered one diver many of us knew. He was shot when they caught him robbing traps. A young teenager with him in the boat was spared. No one was indicted and his death added fuel to the feud.

Interestingly, very few Keys charter-boat operators or lobster fishermen could swim very well or cared to learn. Fellow fishermen teased any one who accidentally fell in the water. They literally looked down on those who donned masks (we called them face plates) and flippers. Hardcore spear fishermen scorned snorkels. They were for sissy tourists. They usually had Ping-Pong balls or flaps on the top and those who used them we nicknamed "lids." So, when did the major changes in the Keys begin and why?

Major changes began in the mid-1970s. First came the 36-inch water pipe to Key West. Motels and other businesses at last had sufficient water. Next came aerial spraying of toxic pesticides to control mosquitoes, and coincidentally butterflies. Additionally, and what I think most important, no hurricanes struck the Keys in the 27-year-period between Betsy in 1965 and Andrew in 1992. Thankfully, Andrew missed the heart of the Keys.

Burger Kings, McDonalds, gas stations, and marinas popped up during the later part of the 1970s. However, the biggest social and monetary change occurred when an exotic grouper appeared: "square grouper," the local name for bales of marijuana. Pot, smuggling, and later cocaine, brought sudden wealth, and almost overnight previously poor lobster fishermen were driving Mercedes. Some purchased fleets of boats and thousands of traps. Motels and marinas grew larger and property values skyrocketed. Many boats moored in the newly built Port Largo canal system sported noticeably high water lines. Boats with waterlines below the surface were a dead giveaway to contraband loaded below decks. Scruffy young sail boaters could be seen purchasing burgers at the nearby Burger King with hundred dollar bills, and small planes landed night and day on the landing strip that paralleled the main channel to the Port Largo. Today, expensive homes dot what was then the runway. Homes, property, and boats were being bought with suitcases of hard cash, while beer trucks transported weed northward on US 1. Meanwhile illegal aliens literally floated in on rafts and makeshift boats, leading Immigration and Customs agents to set up roadblocks on US 1. They were usually right next to the Last Chance Bar and Grill. That was before US 1 was relocated to its present location east of the Last Chance.

Inspecting car trunks for illegal aliens revealed the true extent of drug smuggling, so periodic roadblocks persisted. These roadblocks of course impacted tourism—and smuggling, leading to establishment of the so-called Conch Republic on April 23, 1982. Creating the Republic and threatening to secede from the Union was a publicity stunt, but the term Conch Republic stuck and proudly remains today. To avoid being caught at the roadblock, smugglers could telephone the Last Chance Bar (they posted their phone number on a chalk board) and learn if one was in place. Too many Keys politicians and public employees found easy money

irresistible. Some roads to nowhere were constructed. The one on Sugarloaf Key now has a gate to prevent access. It was always covered with skid marks where small planes landed to unload. The Keys were a very different place worthy of many Jimmy Buffett songs. "A pirate turns 40" was popular.

The exact dates escape me but a Supreme Court decision limited the State's offshore jurisdiction to 3 miles on the Atlantic side of the Keys. Pennekamp State Park could no longer protect the best reef areas farther offshore. This change in State jurisdiction provided an opportunity for NOAA's new Marine Sanctuary Program to collaborate with the State. Through a mutual agreement, they took over jurisdiction of the unprotected offshore Federal waters and the Key Largo National Marine Sanctuary was born. State rangers were deputized to patrol and protect the Federal waters off shore from Pennekamp Park. I was on the boat taking photos of the ceremony when John Pennekamp cosigned the official documents. At that time, corals were still relatively pristine.

After the new water pipe, acceleration of mosquito spraying, lack of hurricanes, and the creation of the Sanctuary, the upper Keys suddenly became a magnet for out-of-state divers. They came in droves and they brought money! Dive shops sprang up, as did dive charter boats. The war with line-fishing charter boats was over. Scuba diving became king!

Meanwhile business leaders in the lower Keys took note and looked longingly at the activity and money lavished on the upper Keys. After some preliminary studies, NOAA proposed establishment of the Looe Key National Marine Sanctuary. Several long and heated public hearings ensued. Most tough-minded Conch Republic residents resisted anything associated with the Federal government. Signs everywhere said, "Just Say No To NOAA." Some faded signs still exist. NOAA representatives left, fearful for their safety, later to return but not to the Keys. This time they held the public hearings in Miami to avoid the riotous atmosphere of the lower Keys. I attended one conducted at the UM Rosenstiel School. Interestingly, the majority of those present again testified against establishment of the Looe Key Sanctuary, but outside pressure from environmental foundations, especially the Tropical Audubon Society, turned the tide. The last executive order President Jimmy Carter signed on the night he left office created the Looe Key National Marine Sanctuary. Soon after establishment, the first manager was fired for spear fishing in Looe Key Sanctuary.

Keys "saltwater Conchs" know the rest of the story. Anti-government sentiment began to change as outsiders from the mainland, known as "freshwater conchs," moved to the Republic. Population exploded, business flourished, and adult bookstores appeared on every major Key. Sometimes I wonder what the Keys' attraction really is?

On November 16, 1990, a new bill was signed that converted the entire Florida Keys south of Biscayne National Park into a National Marine Sanctuary. The final management plan was completed May 1993. I think it important to note that the Sanctuary is under the Department of Commerce, making it philosophically and politically distinct from nearby Everglades Park and Biscayne National Park, which are both under the Department of Interior. Pennekamp State Park still exists, and there are several other State-owned island areas. In addition, there are Fish and Wildlife-protected areas, including the Marquesas Keys, nestled within the Marine Sanctuary. Fish and Wildlife is responsible for protecting the Key deer in the lower Keys. Key deer protection has long been controversial, and millions have been spent on protection from speeding automobiles. Fish and Wildlife is also under the Department of Interior.

The Florida Keys National Marine Sanctuary surrounds Dry Tortugas National Park, with its historic Fort Jefferson. Ironically, the State of Florida owns the land under the Dry Tortugas Park, adding another layer of government control! In summary, the Florida Keys

have two Federal agencies and one State agency busy at work saving natural resources!

Knowing which agency to contact to obtain a research permit can be confusing for scientists outside the Keys, so after a few weeks of phone calls, I once prepared a popular pamphlet for researchers titled, "How to obtain a research permit in the Florida Keys." It was not popular with some agencies because it exposed the jigsaw nature of jurisdictions.

So what has all this "tough love" activity created? By 1994, there were 30,000 septic tanks, about 10,000 cesspits (septic tanks without bottoms), and dozens of small sewage-treatment plants discharging treated sewage into 1000 shallow (55- to 65-ft deep) injection wells. A depth of 95 ft was later mandated by the State. Most of the septic tanks and their drain fields are connected to homes on canals. Flush fluoroscene dye down the toilet (as I have done at various locations), and it soon appears in the adjacent canal.

The city of Key West closed its sewage outfall pipe and now injects into cavernous Eocene limestone at a depth of approximately 3000 ft. Every day the city of Miami injects approximately 200,000 gallons of treated sewage into the same formation at Black Point near Homestead, yet the Miami outfall off Virginia Key is still in operation. Thanks to research and support of the Environmental Protection Agency, a regionalized sewage system is presently under construction on the larger Florida Keys. They will also use deep injection wells. Meanwhile green lawns flourish thanks to chemical fertilizers and weed killers.

Mosquito spraying remains routine, and I am told butterflies are making a comeback in certain areas. There are certain areas that are off limits for spray planes and trucks. To my knowledge, there have been no significant peer-reviewed studies to determine the effect of mosquito spraying on coral and the marine ecosystem in general. I conclude that even hardcore environmentalists draw the line between which organisms live or die.

All the above changes came rapidly, and one might wonder, did the Marine Sanctuaries and National Parks created to save the reefs have any reverse effect by publicizing and attracting more and more divers, businesses, residents, hotels, motels, etc., to the Florida Keys?

On the other hand, did people come simply because of the unprecedented 27-year-absence of hurricanes? Or could it have been the sudden abundance of freshwater and mosquito control? Did the resultant increase in human sewage and chemicals brought on by the influx of people contribute to reef demise? Or was demise caused by runoff of chemicals from agriculture, so-called "Big Sugar," to the north? Clearly, overfishing brought on by population explosion explains the dwindling fish population, but whether dwindling fish affected coral growth remains controversial.

Most Keys citizens have selected a favorite villain, and some would like to see a barricade at the entrance to the Keys, or at least a tollgate. I personally maintain that a major factor has been the absence of devastating hurricanes since 1965. Periodic hurricanes, such as those that occurred repeatedly before 1965, clearly would have greatly changed Keys history.

Nowadays, many argue coral demise is due to global warming, or the newest villain, alkalinity shift (a.k.a. ocean acidification), but

they forget that major coral mortality began back when leading scientists were predicting global cooling.

As every coral scientist in the Florida Keys knows, the demise of the coral reefs began in the late 1970s and peaked in the El Niño years of 1983 and 1984. Significant coral bleaching came to the Keys later in 1986–1987. Ironically, coral demise was also occurring throughout the Caribbean in the early 1980s, even around islands with few people as well as along the north coast of Jamaica, and at the same time the black-spined sea urchin *Diadema antillarum* suffered at least 90 percent mortality everywhere in the Caribbean. The urchins literally died off in a period of 1 year during 1983, about the same year that a Caribbean-wide seafan disease caused by the soil fungus *Aspergillus sydowii* appeared.

The most spectacular rapid die-off of elkhorn and staghorn corals occurred within a few months during 1983, adjacent to the Finger Lakes Marine Laboratory on remote San Salvador, Bahamas. The rapid die-off was well documented by the scientists at the field station. In addition, their quick demise virtually eliminated a nearby dive resort that catered to underwater photographers. There was little left to photograph.

In retrospect, 1983 and 1984 were also the banner years for African dust transport to the Caribbean and Florida. Nothing as rapid and mysterious as this had happened since the Caribbean-wide demise of commercial sponges in 1938. More recent sponge blights have occurred in the Gulf of Mexico, most likely caused by so-called red tides. The great sponge blight of the Caribbean has long been forgotten, and its cause was never determined. So what really caused reef demise and the earlier sponge deaths? Could it be a combination of numerous factors, as some think? Many scientists and agencies have selected their favorite candidates or combinations of factors that seem to shift with time. Physical damage such as boat groundings that can be somewhat controlled through fines are often the preferred villain. Natural biological cycles or the African dust hypothesis are not acceptable villains—they cannot be controlled through fines and no one profits. Maybe we are killing reefs by simply loving them to death? Or is the cause simply too many people?

Much remains to be learned, but unfortunately, little research is directly aimed at experimentally determining causes, and it is unlikely that significant funding is available for conducting definitive experiments. That is especially true for mosquito pesticides. Would not it be ironic if all this time it was pesticides in the Keys that were killing the corals? No one is going to do that research. For the most part, we just pick around the edges of problems, so knee-jerk finger pointing will likely continue until the coral bounces back and everyone can claim victory. I admit this is a personal, rather cynical history not to be found in Chamber of Commerce publications or publications from various agencies. You certainly won't see a connection made between square groupers and coral demise anywhere!

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