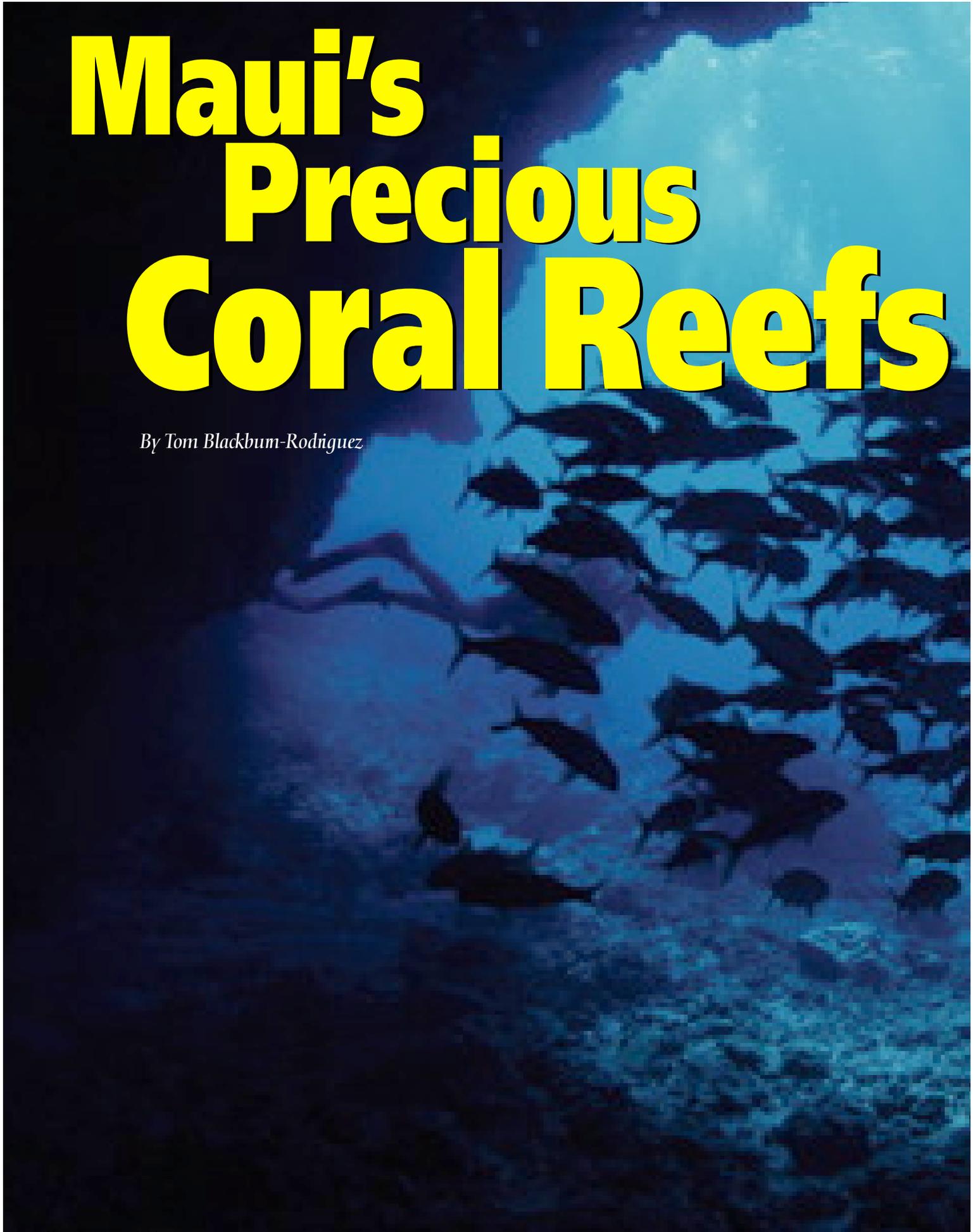


Maui's Precious Coral Reefs

By Tom Blackburn-Rodriguez



An underwater photograph of a coral reef. The water is clear and blue. In the foreground, there are large, dark, branching coral structures. In the background, several fish are visible, including a large, dark fish and a smaller, lighter fish. The overall scene is vibrant and colorful.

They have been called “The Rainforests of the Sea.” They live in the ocean waters surrounding Maui struggling to survive under increasing pressure brought about by environmental changes and the weight of human impact. The recognition of their unique beauty and diverse ecology has brought about greater efforts to educate the public on the proper way to enjoy these unique treasures and to reduce the negative environmental impacts of marine debris, over-fishing, run-off pollution and reckless diving and snorkeling habits that can harm this undersea world so vital to the ecology of the ocean, our near shore resources and the health of our beaches.

Public efforts education and conservation efforts now on-going in Maui Nui and in Hawaii include the work of the Pacific Whale Foundation, The Snorkel Bob Foundation, the Hawai'i Community Foundation, the Pacific Islands Coastal Program, the State of Hawai'i Office of Planning, Coastal Zone Management, the Ocean Science Discovery Center and the National Fish and Wildlife Foundation, among others. Information for this article was drawn, in part, from their work, along with an excellent general information publication produced by the Pacific Whale Foundation entitled, *Exploring Hawaii's Coral Reefs*, and an entertaining educational Public Service Announcement Video called *Hawai'i Reef Etiquette*, created by For the Sea Productions.

What is a Coral Reef?

There are many sources of information where one can learn more about how reefs are created and why they are important to us. One of my favorites is actually geared toward children and presents clear and easily understandable facts. *EnchantedLearning.com* outlines in a brief readable format basic reef facts as part of a child friendly learning curriculum. At \$20 a year for a 12-month membership, I wish it had been around when my curious children began to ask “Why is the ocean blue?”, and other similar questions.

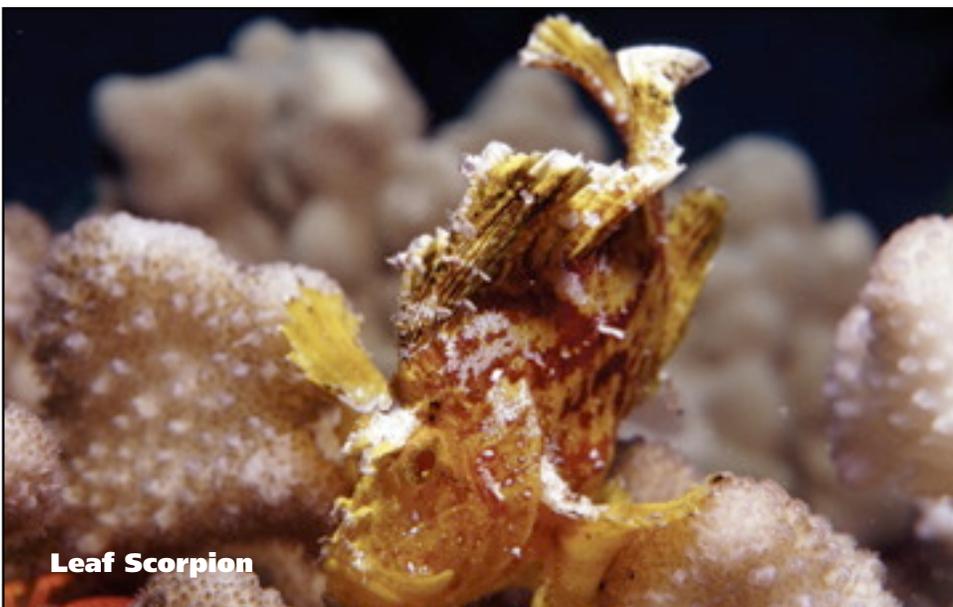
What is a reef? According to this educational site, “Coral reefs are warm, clear, shallow ocean habitats that are rich in life. The reef's massive structure is formed from coral polyps, tiny animals that live in colonies; when coral polyps die, they leave behind a hard, stony, branching structure made of limestone.”

“There are two types of coral, hard coral and soft coral. Hard corals (like brain coral and elkhorn coral) have hard, limestone skeletons which form the basis of coral reefs. Soft corals (like sea fingers and sea whips) do not build reefs.”

“Coral reefs develop in shallow, warm water, usually near land, and mostly in the tropics; coral prefer temperatures between 70 and 85 ° F. There are coral reefs off the eastern coast of Africa, off the southern coast of India, in the Red Sea, and off the coasts of northeast and northwest Australia and on to Polynesia. There are also coral reefs off the coast of Florida, USA, to the Caribbean, and down to Brazil.”



Frog Fish



Leaf Scorpion

The different types of reefs include Fringing reefs which are reefs that form along a coastline. They grow on the continental shelf in shallow water. Barrier reefs grow parallel to shorelines, but farther out, usually separated from the land by a deep lagoon. They are called barrier reefs because they form a barrier between the lagoon and the seas, impeding navigation. Coral Atolls are rings of coral that grow on top of old, sunken volcanoes in the ocean. They begin as fringe reefs surrounding a volcanic island; then, as the volcano sinks, the reef continues to grow, and eventually only the reef remains.

After reading the site you will also know the name and location of the largest coral reef in the world. It is the Great Barrier Reef (off the coast of North East Australia) and it is over 1,257 miles long!

Unique Aspects of the Reefs of Hawai'i

The Pacific Whale Foundation's *Exploring Hawaii's Coral Reefs* does an excellent job of describing the evolution of Hawaii's reefs, why they are important and the unique characteristics of the inhabitants of our reefs.

According to the pamphlet, compared with other reef communities in the Pacific Ocean, fewer marine species inhabit Hawai'i's coral reefs, however, about 24 percent of Hawai'i's fish species are found nowhere else in the world, along with 20 percent of Hawai'i's reef building corals, 21 percent of marine snails and 25 percent of sponges.

Hawai'i is the most isolated island chain in the world, separated by more than 2,000 miles from any continent or major island group. It is also one of the few places in the world where the majority of stages of reef evolution can be seen. Volcanic activity on the Big Island will become home to new reefs. Fringing reefs are visible throughout Hawai'i, barrier reefs exist off of O'ahu and Kaua'i and coral atolls can be seen in the Northwestern Hawaiian Islands.

One amazing fact noted in the publication is that 80 percent of all reefs found in U.S. Waters exist in Hawai'i. Yet, the reefs are fragile and vulnerable

due to our water temperatures being on the cool side of the survival range for reefs, as a result Hawai'i's reefs may grow less than 2 inches a year.

It has been estimated by some experts that global warming can be a threat to the health of our reefs as well. If the water were to rise by just 2 degrees it could lead to the phenomenon known as coral bleaching, in which the coral die and turn white. This has been observed off the coast of Florida. Another aspect of global warming is the rise in sea levels near the shore, leading to more powerful wave action and stronger currents that can bring damaging pollutants normally contained near the shore farther out to the coral bed, where they previously had been less affected. A recently reported preliminary study by scientists from the U.S. Geological Survey has initially indicated this possibility along the south shore of Moloka'i.

If you love Maui's white sand beaches, you can thank the reef ecosystem, which sends granulated coral remains to help make up those calming shores that we love to walk on at sunset. In addition, the reefs protect the shoreline from waves and storms and help create some of Hawai'i's enjoyable surfbreaks.

Challenges to Maintaining Healthy Reefs

According to Zoe Norcross-Nu'u, Coastal Processes Extension Agent for the University of Hawaii Sea Grant College Program, one of the threats to the health of Maui's coral reefs is building along the coast.

She has noted that, "Building along the coast can have negative effects on reefs by increasing the runoff of sediment and pollutants. Along with development usually comes an increase in impervious surfaces, such as buildings, driveways and roads. The water running off these structures is directed into storm drains, or sometimes flows overland in the form of sheet flow, and carries pollutants (such as motor oil) and sediment (mud and silt) to the ocean.

The sediment blocks sunlight to the corals and as such inhibits photosynthesis, and also smothers the corals; the

other pollutants may harm the corals directly. This can be exacerbated by developments—near the coast as well as further inland—that leave the earth exposed following the initial excavation. Even when best management practices are used to control erosion and sedimentation, these methods often fail, particularly under heavy rainfall or winds," she said.

She goes on to say that, "Some important ways to improve water quality thereby helping improve living conditions for coral, are to reduce impervious (non water absorb-

ing) surfaces. A recent workshop in Kahului hosted by Hawaii Sea Grant College discussed the benefits of using porous asphalt that allows water to percolate through rather than running off and carrying pollutants to the ocean. Other techniques for parking lots and driveways such as permeable pavers also help to reduce runoff, as do vegetated swales and storm drains. Minimizing exposed dirt surfaces is critical, as well as carefully adhering to best management practices during



Photo: Darren Jew, LivingImage.com

construction and ensuring proper disposal of chemicals and motor oil."

Robert Wintner, also known as "Snorkel Bob" to Maui's tourists, has another take on what can be done to protect Maui's fragile reefs. Among his concerns are snorkel operators that feed the fish or sell fish food to visitors to use when they are snorkeling, the dumping of waste from tour boats and people who are not educated on the proper way to approach the reef, damaging the reefs by walking on them and engaging in other harmful practices.

What's wrong with feeding the fish? According to Wintner, "When you have fish food you no longer have an ecosystem, from the microorganisms on up. Fish food kills microorganisms and it kills about the bottom third of the food chain. So you get the mid-range species, you get fewer species and they're bigger than they should naturally occur in nature."

In an industry that brings hundreds of millions of dollars annually into Hawai'i and on an island that may have as many as 50,000 tourists on a given day, what can be done to



Dale Bonar (left) and Snorkel Bob are working together to protect Maui's reefs. Here, they complete a dive to check on challenges to reef health.

protect the reefs? Wintner thinks that we need additional Marine Protection areas (MPA's) where no fishing or snorkeling is allowed until the fish recover from the tourist pressure. According to Wintner, "there are places that can stand the pressure and that's where we should be sending people."

Dale Bonar, Executive Director of the Maui Coastal Land Trust and Chair of the State of Hawaii Natural Area Reserves Commission (NARS) points to two other threats to the sustainability of our reefs. The first is the use of so called Gill Nets. Referred to by their opponents as "Curtains of Death," these nets can stretch for miles and catch everything except the very smallest fish. In addition to their excessive fish kills, Bonar also points out that the nets can become snagged on reefs and do incredible damage to the coral as they are dragged along the reef.

Another concern of Bonar's, one shared by Wintner, is the significant taking of fish destined for the aquarium industry. With modern technology, using vacuum equipment, Wintner estimates that one million fish are taken from reefs in Hawaii and sold across the nation. Operating under minimal regulation, the fish are generally caught at night, which is also when the coral open up and feed. This reduction in the number of the small fish can be harmful to coral because the small fish feed on algae and other nutrients that can smother the coral if not removed.

How You Can Help

Here are a few steps that you can take to help protect Maui's coral reefs that were taken in part from suggestions made by the Pacific Whale Foundation and the video *Hawaii's Reef Etiquette*, which is now being viewed by cruise line passengers that come to Hawaii and also on Aloha Airlines to visitors

who fly here as well.

1. Take only photos and leave only bubbles.
2. Don't walk or stand on coral. Living coral polyps are very fragile. They are the reef builders. That means getting rid of those rubber slip-ons that protect your feet when snorkeling.
3. Don't feed the fish. Their diet is in the natural environment, not in a stale bagel.
4. Don't touch or break off pieces of coral for a souvenir. Remember, too, taking live coral or rock with marine life attached is illegal in Hawai'i.
5. Ask where your fish came from when buying fish for your home aquarium. If they came from the wild, it could be from irresponsible collecting that is a threat to Hawai'i's reefs.
6. Think about pollution. Use fewer household chemicals. Reduce the use of chemicals on your lawn or garden. Help prevent wastewater pollution.
7. Support efforts to create an Ocean Management Plan for Hawai'i in order to better manage our reefs and ocean resources.
8. Reduce suntan lotion use. The oil left in the water harms the coral. Instead, consider wearing UV protection beach clothing that allows you to swim without getting a sunburn.
9. Don't litter or throw cigarette butts on the beach. What's on the beach will eventually go into the ocean and may be eaten by the fish causing them harm.

Editor's Note—to learn more about Hawai'i's reefs, to help support distribution of the "Hawaii Reef Etiquette" video, or to gain information regarding coastal zone management in Hawaii, contact www.hawaiiireef.org, www.pacificwhale.org or www.czmhawaii.com. **REMS**