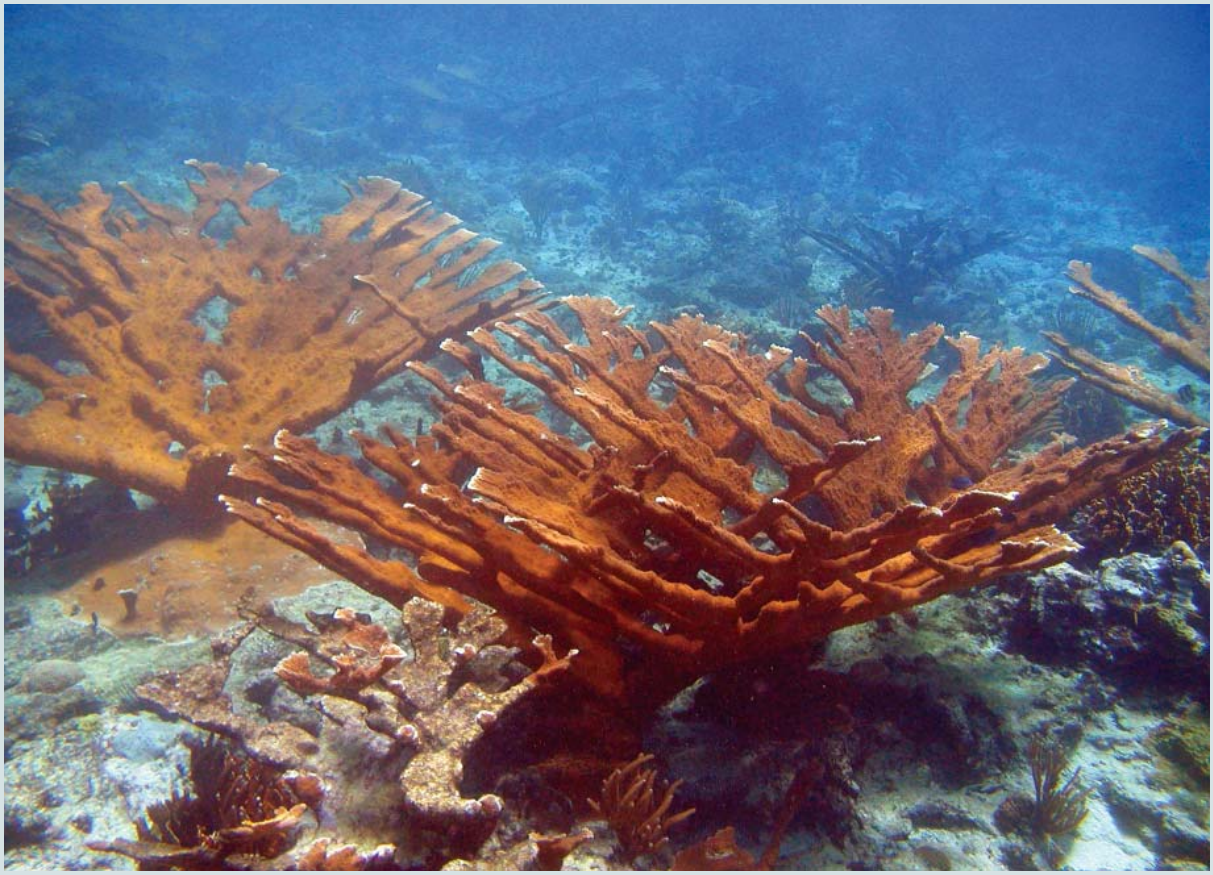
BY IAN LUNDGREN

Basic ecology of elkhorn coral and threats to its

CORALS (SCLERACTINIA) are small colonial invertebrate marine animals. Like jellyfish, they use tentacles to disable their prey; however, they are also sessile (attached to substrate) and excrete a hard calcium carbonate skeleton. When a coral dies, its skeleton forms the structure of coral reefs. Coral polyps, the individual organisms, are symbiotic with unicellular algae called zooxanthellae. Corals derive most of their energy from these algae and in return the algae receive shelter.



PHILIPPE MAYOR

Elkhorn coral is a shallow-water, highly branched species that can grow very large and resemble trees. Though it has been a major reef builder in the Caribbean Sea, this species has undergone drastic declines over the past 30 years as a result of various natural and human causes: disease, hurricanes, predation, and most recently bleaching. In 2006, elkhorn coral and a related species, staghorn coral (*Acropora cervicornis*), were the first coral species to be protected under the Endangered Species Act.

Bleaching

In corals, bleaching is a generalized response to stress, and multiple stresses can increase the severity of bleaching. Corals derive their often brilliant color from symbiotic algae. Under stress, algae are expelled from coral tissue, leaving coral polyps clear, making the underlying white coral skeleton conspicuous, and giving the colony the appearance of having been "bleached." Although almost any type of stress can induce bleaching, the rise in water temperature from global climate change has induced bleaching on a massive scale. Because tropical corals live very close to their upper temperature limit, global climate change has the potential to cause more severe and more frequent mass coral bleaching

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survival

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NPS

Photos (clockwise from top left, facing page):

Healthy elkhorn coral, storm-damaged coral, fireworms, coral predatory snails, and coral with white pox disease.

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events like the one observed in the Caribbean in 2005. Acidification of oceans from increased carbon dioxide dissolved in ocean water is an additional threat to corals related to climate change.

Disease

Various, poorly understood diseases affect elkhorn coral. First observed in the 1970s, white-band disease appears as a narrow band of infected tissue (bleached) that migrates from the base of the colony toward the branch tips; the cause remains unknown. This disease kills coral tissue and can quickly eliminate entire colonies (2 inches [5 cm] per day). Linked to poor water quality, specifically a bacterium present in human feces (*Serratia marcescens*), white pox disease appears as expanding patches of dead tissue on the coral colony.

Hurricanes

The forces generated by hurricanes in the marine environment can break shallow branching corals such as elkhorn, especially if disease or organisms (e.g., burrowing worms that erode the coral tissue) weaken the corals' skeletons. Hurricanes can very quickly snap coral branches and turn coral thickets into rubble, which cannot reattach themselves to the substrate and thus continue to grow. Although tropical cyclones are naturally occurring, scientists believe that global climate change is increasing the frequency and severity of these storms, which can directly impact coral communities in the Caribbean.

Predation

Snails (*Coralliophila* spp.) and fireworms (*Hermodice* spp.) are the most significant invertebrate predators of corals. Snails are gregarious and individually consume up to 2.5 inches (65 mm) of coral tissue per day. Fireworms prefer coral tips, where growth occurs, and their feeding on individual coral colonies can be extensive. Overfishing of hogfish and lobsters, which eat snails and fireworms, allows these coral predators to multiply, which in turn increases predation on elkhorn corals beyond natural levels.