OCEANOGRAPHY:

Survey Confirms Coral Reefs Are in Peril

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A new census of key coral reef inhabitants shows that they are in terrible shape. Spiny lobsters and bumphead parrotfish have disappeared from most of the surveyed reefs they were known to inhabit, as have Nassau groupers, a favorite food fish in the Caribbean. Even moray eels seem to be suffering.

The tallies come from Reef Check, a 5-year survey of the world's coral reefs by scientists and some 5000 volunteer scuba divers and local fishers. The resulting report, "The Global Coral Reef Crisis: Trends and Solutions," released last week, describes the decline of both fish and invertebrates essential to the well-being of reef communities. The final word: Reefs "are in dire straits," says Steve Gittings, a marine biologist at the National Oceanic and Atmospheric Administration (NOAA) in Silver Spring, Maryland.

The conclusion comes as no surprise. For more than a decade, marine biologists have been complaining about the state of the world's reefs, citing ever more frequent observations of dead or dying coral. Some of the first warning bells sounded in 1990, when it appeared that global warming was killing the microscopic algae that feed corals. Over the ensuing years, researchers also traced the blame to coastal development, overfishing, and pollution.

Drying up. A count of coral reef organisms such as the Nassau grouper (*top*) and a cowry snail called the flamingo tongue (*bottom*) revealed human-inflicted losses.

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These conclusions were somewhat shaky, however, because so few reefs had been evaluated; even fewer had been monitored long term (*Science*, 25 July 1997, p. 491). Stepping forward, Gregor Hodgson, a marine ecologist at the University of California, Los Angeles (UCLA), and his colleagues established Reef Check (*Science*, 6 June 1997, p. 1494). About 200 people helped with the first survey, in Kauai, Hawaii. By the year's end, the organizers had data on about 300 reefs in 31 countries. That success prompted the establishment of yearly Reef Checks.

Some researchers have questioned the value of data gathered by volunteers. But according to UCLA's Jennifer Liebeler, a co-author of the report, straightforward protocols and data review by scientists make the results sound. At each site, volunteers and their scientist-supervisors estimate the ratio of live coral to dead coral. Some species they count, such as parrotfish, are indicative of reef quality. Others, such as spiny lobsters, help reveal the extent of overfishing. And a few, such as the giant clam, show how curio and aquarium-trade collectors are affecting reefs. As far as Gittings is concerned, with just a few species to keep an eye on, "the volunteer counts are not going to be that far off."

Clive Wilkinson of the Australian Institute of Marine Science in Townsville, Queensland, says that the surveys have given him new information, even though he is a longtime veteran of coral biology. For example, the extent of overfishing was news to him. Sea cucumbers are missing from half the reefs, and in Guam their numbers dropped from 17 per 100 square meters in 1997 to about three in 2001. The Nassau grouper has virtually disappeared: Among 162 reefs, 142 reefs had none, 12 more had just one. But the good news is that marine sanctuaries, where fishing is limited, appear to be working. The surveys found higher numbers of certain key species there compared to other areas, which "is valuable to note," says Wilkinson.

Those arguing for new measures to protect reefs may soon get more ammunition. A NOAA report coming out next month highlighting reefs in the United States and U.S. Territories will include data from volunteer surveys, long-term research projects, and remote sensing. And by November, Wilkinson expects to finish a catalog of damage done to reefs, including an assessment of reefs' prospects. Both reports are expected to show widespread damage to reef communities. Gittings hopes the efforts will "continue the momentum" and draw attention to the plight of this marine resource.