Putting the Heat on Coral

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Something is harming the world's coral reefs, and now researchers think they may have identified at least part of the problem: A devastating disease appears to attack the healthiest coral whenever sea temperatures rise. If that conclusion holds, it could force a rethinking of policies intended to protect the reefs.

For millions of years, coral reefs have served as underwater rain forests, hosting some of the richest and most diverse concentrations of species on the planet. Within the past decade, however, scientists have discovered that corals are dying at an alarming rate--up to 20 times faster than normal--particularly in the world's warmest waters. One possible culprit is "white syndrome," a stress-related disease of coral that seems to be spreading in Australia's Great Barrier Reef, the largest assembly of coral on the planet. The disease causes the coral, usually dark green or orange, to turn white and die.

An international team studied 48 sites along the reef over 6 years to examine a possible link between ocean temperature and white syndrome. Divers with the Australian Institute of Marine Science Long-term Monitoring Program counted the infected colonies on a wide range of reef types. They also documented changes in the colonies via periodic videos. As it reports today in PLoS Biology, the team added satellite data compiled by the U.S. National Oceanic and Atmospheric Administration to the mix to calculate weekly sea surface temperature anomalies. These are instances in which local water temperatures rise 1° Celsius or more above mean records for each location. The researchers combined the satellite data with the onsite inspections to evaluate the extent of white syndrome.

After merging the temperature data and the fieldwork, the team found a "strong statistical correlation" among three factors, says marine biologist and lead

author John Bruno of the University of North Carolina in Chapel Hill. The greater the temperature anomalies and the denser the colonies, he says, the greater the frequency of white syndrome. "It would be nice to have a lot more data, but [the study] is a relatively massive sample," Bruno says, adding that the findings show efforts to keep coral dense and healthy seem to be making it more vulnerable to the disease.

The team's research is important because it applies an epidemiological approach to an infectious disease affecting the reef, says marine scientist Richard Aronson of the Dauphin Island Sea Lab in Alabama. That method has produced the key finding: "Temperature-mediated disease outbreaks will preferentially affect denser, healthier coral populations," he says. Consequently, mirroring efforts to establish Marine Protected Areas, which are intended to increase fish populations, might not be the best strategy for protecting coral, Aronson says, unless it is coupled with an attempt to mitigate the effects of climate change, because encouraging denser populations in warming seas could render them more vulnerable to diseases.