

CORAL REEF BIOLOGICAL CRITERIA

Patricia Bradley¹, William S. Fisher² and Debbie Santavy²

U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory,

¹ Atlantic Ecology Division, Narragansett, RI

² Gulf Ecology Division, Gulf Breeze, FL 32561

Coral reefs worldwide are experiencing decline from a variety of stressors. Some important stressors are land-based sources of pollution and human activities in the coastal zone. However, few tools are available to offset the impact of these stressors. The Clean Water Act (CWA) provides a framework for developing water quality standards to protect the physical, chemical and biological integrity of the Nation's waters. Physical and chemical standards already provide some measure of protection for coral reefs, but more specific protection can come from biological standards. Biological thresholds, like physical and chemical thresholds, can be used to determine attainment or impairment of a State's designated uses. This means that coral reef condition can be used to determine whether standards are being met. If coral condition does not meet established criteria, the waterbody is listed as impaired and corrective action by the State is required. Biocriteria are not currently in use for coral reefs or for any marine resource, but many States have implemented biocriteria to protect freshwater resources. Biocriteria for coral reefs will require robust assessment approaches, indicators that are sensitive to human disturbance and scientifically-defensible, long-term monitoring strategies. Several recent advances in these areas make biocriteria a feasible goal for reef protection and conservation. A rapid bioassessment protocol was introduced and validated in the Florida Keys and U.S. Virgin Islands¹ and several stony coral indicators have been validated for sensitivity (responsiveness) to human disturbance^{2,3}. Additional reef resources are being examined as candidate metrics, including gorgonian octocorals, sponges and reef invertebrates⁴. Finally, an approach for generating and implementing coral reef biocriteria has been summarized in a recent EPA Report⁵. A workshop of coral reef experts will be meeting in Puerto Rico to begin developing the conceptual framework and thresholds that can be coupled with management objectives and used to evaluate alternative decision options. The results from this workshop will be used as a basis for coral reef biocriteria for the Caribbean.

¹ Fisher WS. 2007. Stony Coral Rapid Bioassessment Protocol. U.S. Environmental Protection Agency, Office of Research and Development, EPA/600/R-06/167, Washington, D.C. 60 Pp.

² Fisher, W.S., L.S. Fore, A. Hutchins, R.L. Quarles, J.G. Campbell, C. LoBue and W.S. Davis 2008. Evaluation of stony coral indicators for coral reef management. *Mar Poll Bull.* 56:1737-1745.

³ Oliver, L.M., J.C. Lehrter, and W.S. Fisher 2011. Relating coral reef condition to human activity in the watersheds of St. Croix, U.S. Virgin Islands. *Marine Ecology Progress Series* 427:293-302.

⁴ Santavy DL, Fisher WS, Campbell JG and Quarles RL. 2012. Field Manual for Coral Reef Assessments. U.S. Environmental Protection Agency, Office of Research and Development, Gulf Ecology Division, Gulf Breeze, FL. EPA/600/R-12/029. April 2012.

⁵ Bradley, P., L. S. Fore, W. S. Fisher and W. S. Davis 2010. Coral Reef Biological Criteria: Using the Clean Water Act to Protect a National Treasure. EPA/600/R-10/054, July 2010, 141 pp.