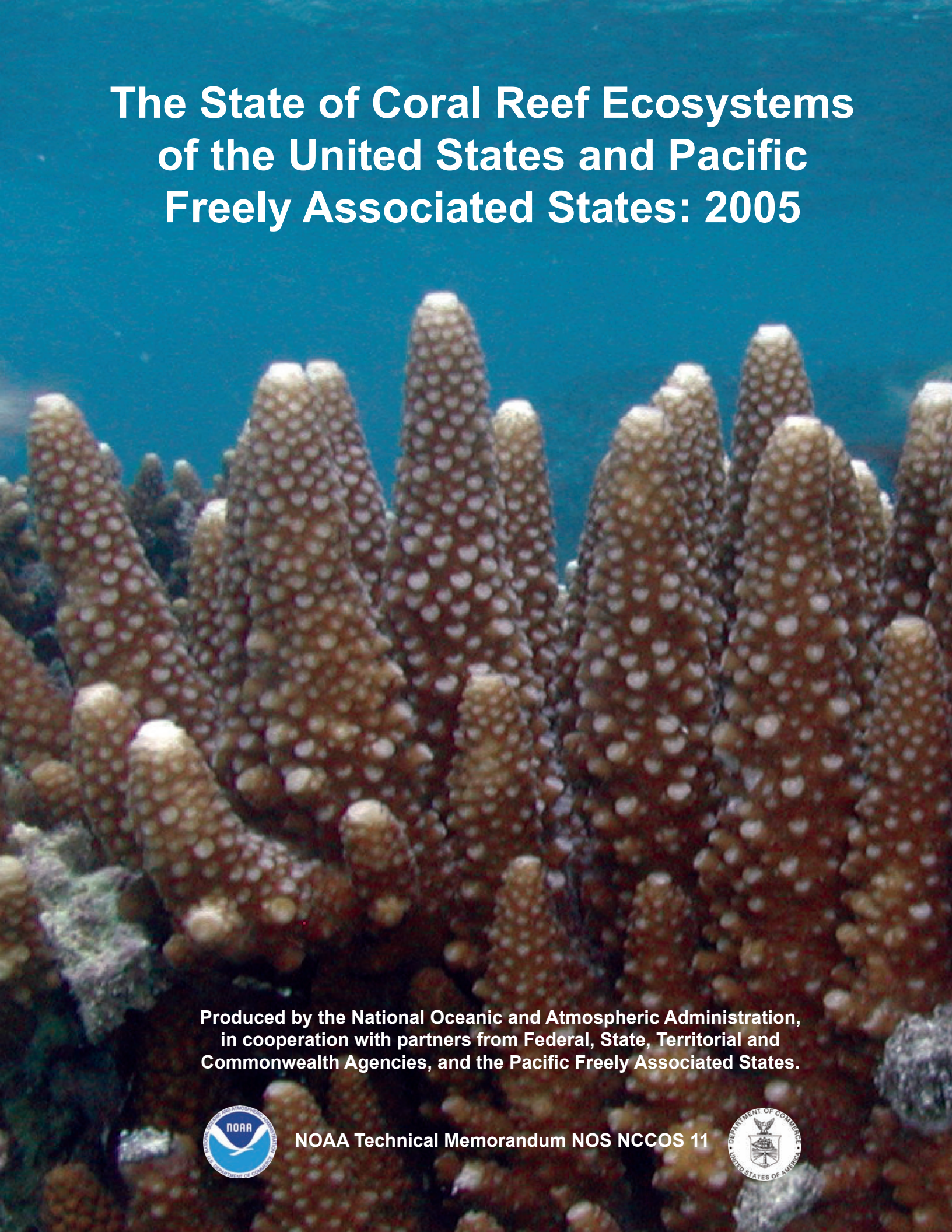
The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2005



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PREFACE

The purpose of this report is to provide an assessment of the current condition of coral reef ecosystems in U.S. jurisdictions, including the U.S. Virgin Islands, Puerto Rico, Navassa, Florida, Flower Garden Banks and other banks of the Gulf of Mexico, Hawaii, the Northwestern Hawaiian Islands, American Samoa, the Pacific Remote Island Areas, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI). The report also provides an examination of coral reefs in the Pacific Freely Associated States (FAS), including the Republic of the Marshall Islands, Federated States of Micronesia, and Republic of Palau. The report focuses primarily on shallow-water portions of these states and territories, from the shoreline to the maximum depth at which sunlight-dependent corals can survive. Coral communities occuring in deep and cold waters are the subject of a complementary report currently under development.

This report is the second in a series of national coral reef ecosystem status reports. The initial report, The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2002 (Turgeon et al., 2002), is similar to this report in that it incorporates the work of many scientists and managers from across the world. The first report provided a broad introduction to and a preliminary look at the status of coral reef ecosystems and was based primarily on qualitative information from the contributing authors. The initial report also included a considerable amount of background information that is not included in this report.

The lead entity coordinating the development of this report was the National Oceanic and Atmospheric Administration's (NOAA) Center for Coastal Monitoring and Assessment's Biogeography Team (CCMA-BT), which is part of the National Centers for Coastal Ocean Science. CCMA-BT scientists are responsible for three main tasks related to coral reef ecosystem conservation: 1) administration of a Federal grant program that supports selected monitoring efforts in U.S. jurisdictions and the FAS; 2) collection of standardized monitoring data in several U.S. jurisdictions through a well-established scientific field program; and 3) systematic production of benthic (sea floor) habitat maps depicting the spatial extent of the primary habitats comprising U.S. coral reef ecosystems. CCMA-BT was assisted in this reporting effort by NOAA Fisheries' Office of Habitat Conservation and NOAA's Coral Reef Conservation Program.

This report differs from the 2002 status report in several ways. The current report is based primarily on the analysis of monitoring data collected by scientists rather than qualitative assessments of ecosystem conditions. It utilizes the most recent monitoring data from all available sources, including but not limited to the activities supported by the grant program mentioned above. This report also includes a mapping component, which provides an analysis of the spatial extent of coral reef ecosystem habitats within each jurisdiction based on the estimated area in nearshore waters to 20 meters of water depth. It is critical to keep in mind that the term 'coral reef ecosystems' includes not only the coral reefs themselves, but also the associated habitats that are functional components of the ecosystem, such as mangroves, seagrass and macroalgae beds, and unconsolidated sediments.

Because the chapters reflect the hard work and dedication of writing teams from each jurisdiction, the teams should be cited as primary authors for the jurisdictional chapters of this report. Over 160 individuals from 14 jurisdictions contributed to this report, providing not only their time, attention, and hard work, but also in many cases, unpublished data that would otherwise not be available to the public at this time. The writing teams were assembled by each jurisdiction's report coordinators, who deserve praise for undertaking the daunting task of identifying and coordinating writing teams, arranging meetings, assigning tasks, assembling data sets, filling information gaps, and responding to requests from the report editor. The report would not be possible without their coordination efforts.

To assist in the challenging task of assimilating data and study results from 14 jurisdictions spanning 16 time zones, CCMA-BT scientists held two regional workshops in the spring of 2003–one in Saipan, CNMI and one in San Juan, Puerto Rico. Coordinators and authors from each of the jurisdictions attended the meetings and helped develop a report outline that would provide a common structure to guide chapter development. The coordinators, many of whom are the designated point of contact for all coral reef activities in their area, then assembled a writing team of coral reef ecosystem experts from academic, non-governmental, state, territorial, and Federal organizations. These teams were tasked with compiling an inventory of current monitoring efforts in their jurisdiction to determine which data sets should be used to assess ecosystem status within the established reporting structure. Subsequently, each team summarized the available data and provided a quantitative assess-

ment of the condition of the ecosystem based on three broad themes: water quality, benthic habitats, and associated biological communities. When considered altogether, these themes provide a basis for assessing overall condition and diagnosing potential contributing factors to threatened and impacted ecosystems.

Ongoing agency efforts to assess and monitor elements of coral reef ecosystems form the basis for this report. However, it is important to realize that monitoring data are rarely collected in the same way or with the same frequency. Indeed, methods differ considerably among jurisdictions. These differences preclude the comparison of data or important metrics across jurisdictions in the National Summary section of this report. Instead, conclusions drawn across jurisdictions are limited to whether a particular attribute is being measured and whether these measurements result in data that are sufficiently robust to illuminate trends or patterns. Therefore, the condition of coral reef ecosystems within each jurisdiction is evaluated independently and is not comparable to other jurisdictions. Unless all of the jurisdictions implement a standard protocol, it is unlikely that interjurisdictional comparisons can ever be made with any scientific rigor. A few agencies have already initiated a standard complement of monitoring activities across multiple jurisdictions in an attempt to address this problem. If met with success, these integrated programs may aid coral resource managers throughout the U.S. and FAS in the development of a common set of diagnostic tools to help affect positive change in coral reef ecosystems.

This report is structured to provide information according to the primary threats, topics, and goals outlined in the *National Coral Reef Action Strategy* (NCRAS; NOAA, 2002) and other guidance documents developed by the U.S. Coral Reef Task Force (USCRTF) and its member organizations. Following the Executive Summary, which distills general conclusions from the entire document, an introductory chapter provides background information about the distribution of coral reef ecosystems in the U.S. and FAS, the different types of reefs that occur in these areas, and an estimate of the potential extent of coral reef ecosystems (including reefs, seagrass and macroalgae beds, sand patches, etc.) for each jurisdiction. The third chapter summarizes the current understanding of the 13 key natural and anthropogenic threats to coral reef ecosystems that were identified in the NCRAS. An additional 'other' threat category was included to allow writing teams to characterize threats that may be important or unique to a specific jurisdiction, but do not appear on the NCRAS list of key threats.

Chapters 4 through 17 comprise the heart of this report. In these chapters, the local writing teams characterized the current understanding of the condition of the coral reef ecosystems in their jurisdictions. Writing teams were asked to: 1) describe the geographical distribution of reefs and provide salient background information; 2) discuss how each of the key threats has manifested in their area; 3) describe existing monitoring programs and identify specific data sets upon which their assessments are based; 4) present methods, results, and discussion for each monitoring data set, organized around the three primary themes of water quality, benthic habitats, and associated biological communities; 5) introduce the conservation and management actions currently being undertaken to respond to issues of concern; and 6) provide an overall summary of the status of each jurisdiction's coral reef ecosystems and priority recommendations for future research and management alternatives.

Finally, the National Summary chapter synthesizes and integrates the results and conclusions from each of the preceding chapters to present broad-scale conclusions from a national perspective. The structure of the National Summary chapter reframes the results of the jurisdiction chapters in the context of the goals identified in the NCRAS. Grouping the information in this way clearly demonstrates how the report conclusions can help measure progress towards overarching NCRAS goals and provide a means to evaluate the effectiveness of management actions.

This report represents an evolving effort to determine the condition of coral reef ecosystems at both local and national scales. To do this, scientists must ask the right questions, and then design effective studies to gather data with sufficient frequency to confidently answer those questions. This report serves as a vehicle for the dissemination of information about data collection activities in the U.S. and FAS. As more monitoring data are collected and analyzed, scientists will be better equipped to present time series information and provide condition reports that address all aspects of these complex and dynamic ecosystems.

Another objective of this report is to increase the participation of scientists and managers at all levels in synthesizing all available information to provide the most robust, integrated assessments possible. Data collection and integrated reporting of information are crucial to management efforts that strive to protect and conserve coral reefs, their associated habitats, and the organisms that depend on them. It is hoped that, through this and future

reporting efforts, gaps in the current state of knowledge about U.S. coral reef ecosystems will be identified and filled, and that the availability of up-to-date, accurate, comprehensive scientific information will enable managers to slow or even halt the general decline in coral reef ecosystem health that has become evident in the last several decades.