

ATOLL RESEARCH BULLETIN

NO. 496

**STATUS OF CORAL REEFS IN THE WESTERN ATLANTIC:
RESULTS OF INITIAL SURVEYS,
ATLANTIC AND GULF RAPID REEF ASSESSMENT (AGRRA) PROGRAM**

**EDITED BY
JUDITH C. LANG**

**SUPPORT FOR THE PUBLICATION OF THIS VOLUME PROVIDED BY
THE BACARDI FAMILY FOUNDATION,
NATIONAL CENTER FOR CARIBBEAN CORAL REEF RESEARCH
AND
OCEAN RESEARCH AND EDUCATION**

**ISSUED BY
NATIONAL MUSEUM OF NATURAL HISTORY
SMITHSONIAN INSTITUTION
WASHINGTON, D.C., U.S.A.
JULY 2003**

ACKNOWLEDGMENT

The Atoll Research Bulletin is issued by the Smithsonian Institution to provide an outlet for information on the biota of tropical islands and reefs and on the environment that supports the biota. The Bulletin is supported by the National Museum of Natural History and is produced by the Smithsonian Press. This issue was financed by the Bacardi Family Foundation, the National Center for Caribbean Coral Reef Research (NCORE), and the Ocean Research and Education Foundation (ORE). Distribution was accomplished with funds from Atoll Research Bulletin readers and authors.

The Bulletin was founded in 1951 and the first 117 numbers were issued by the Pacific Science Board, National Academy of Sciences, with financial support from the Office of Naval Research. Its pages were devoted largely to reports resulting from the Pacific Science Board's Coral Atoll Program.

All statements made in papers published in the Atoll Research Bulletin are the sole responsibility of the authors and do not necessarily represent the views of the Smithsonian nor of the editors of the Bulletin.

Articles submitted for publication in the Atoll Research Bulletin should be original papers in a format similar to that found in recent issues of the Bulletin. First drafts of manuscripts should be typewritten double spaced and can be sent to any of the editors. After the manuscript has been reviewed and accepted, the author will be provided with a page format with which to prepare a single-spaced camera-ready copy of the manuscript.

COORDINATING EDITOR

Ian G. Macintyre

National Museum of Natural History
MRC-121

ASSISTANTS

Smithsonian Institution
PO Box 37012
Washington, DC 20013-7012

William T. Boykins, Jr.

Kay Clark-Bourne

Kassandra D. Brockington

E-mail: macintyre.ian@nmnh.si.edu

EDITORIAL BOARD

Stephen D. Cairns (MRC-163)

National Museum of Natural History

Brian F. Kensley (MRC-163)

(Insert appropriate MRC code)

Mark M. Littler (MRC-166)

Smithsonian Institution

Wayne N. Mathis (MRC-169)

Washington, D.C. 20560

Jeffrey T. Williams (MRC-159)

Joshua I. Tracey, Jr. (MRC-137)

Warren L. Wagner (MRC-166)

Roger B. Clapp

National Museum of Natural History
National Biological Survey, MRC-111
Smithsonian Institution
Washington, D.C. 20560

David R. Stoddart

Department of Geography
501 Earth Sciences Building
University of California
Berkeley, CA 94720

Bernard M. Salvat

Ecole Pratique des Hautes Etudes
Labo. Biologie Marine et Malacologie
Université de Perpignan
66025 Perpignan Cedex, France

PUBLICATIONS MANAGER

A. Alan Burchell

Smithsonian Institution Press

**STATUS OF CORAL REEFS IN THE WESTERN ATLANTIC:
RESULTS OF INITIAL SURVEYS,
ATLANTIC AND GULF RAPID REEF ASSESSMENT (AGRRA) PROGRAM**

NO. 496

	PAGES
FOREWORD	
<i>Robert N. Ginsburg and Judith C. Lang</i>	vii
CAVEATS FOR THE AGRRA "INITIAL RESULTS" VOLUME	
<i>Judith C. Lang</i>	xv
SYNTHESIS OF CORAL REEF HEALTH INDICATORS FOR THE WESTERN ATLANTIC: RESULTS OF THE AGRRA PROGRAM (1997-2000)	
<i>Philip A. Kramer (On behalf of the AGRRA contributors to this volume)</i>	i
SURVEYS	
BAHAMAS	
A rapid assessment of coral reefs near Hopetown, Abaco Islands, Bahamas (stony corals and algae) <i>Joshua S. Feingold, Susan L. Thornton, Kenneth W. Banks, Nancy J. Gasman, David Gilliam, Pamela Fletcher, and Christian Avila</i>	58
Assessment of the Andros Island Reef System, Bahamas (Part 1: stony corals and algae) <i>Philip A. Kramer, Patricia Richards Kramer, and Robert N. Ginsburg</i>	76
Assessment of the Andros Island Reef System, Bahamas (Part 2: fishes) <i>Philip A. Kramer, Kenneth W. Marks, and Timothy L. Turnbull</i>	100
Assessment of coral reefs off San Salvador Island, Bahamas (stony corals, algae and fish populations) <i>Paulette M. Peckol, H. Allen Curran, Benjamin J. Greenstein, Emily Y. Floyd, and Martha L. Robbart</i>	124
BELIZE	
Assessment of selected reef sites in northern and south-central Belize, including recovery from bleaching and hurricane disturbances (stony corals, algae and fish) <i>Paulette M. Peckol, H. Allen Curran, Emily Y. Floyd, Martha L. Robbart, Benjamin J. Greenstein, and Kate L. Buckman</i>	146
BRAZIL	
Rapid assessment of the Abrolhos Reefs, eastern Brazil (Part 1: stony corals and algae) <i>Ruy K.P. Kikuchi, Zelinda M.A.N. Leão, Viviane Testa, Leo X. C. Dutra, and Saulo Spanó</i>	172
Rapid assessment of the Abrolhos reefs, eastern Brazil (Part 2: fish communities) <i>Ruy K.P. Kikuchi, Zelinda M.A.N. Leão, Cláudio L.S. Sampaio, and Marcelo D. Telles</i>	188

CAYMAN ISLANDS

- Status of coral reefs of Little Cayman, Grand Cayman and Cayman Brac, British West Indies, in 1999 and 2000 (Part 1: stony corals and algae)
Carrie Manfrino, Bernhard Riegl, Jerome L. Hall, and Robert. Graifman 204

- Status of coral reefs of Little Cayman and Grand Cayman, British West Indies, in 1999 (Part 2: fishes)
Christy V. Pattengill-Semmens and Brice X. Semmens 226

COSTA RICA

- A rapid assessment at Cahuita National Park, Costa Rica, 1999 (Part 1: stony corals and algae)
Ana C. Fonseca E. 248

- A rapid assessment at Cahuita National Park, Costa Rica, 1999 (Part 2: reef fishes)
Ana C. Fonseca E. and Carlos Gamboa 258

CUBA

- Rapid assessment of coral communities of María La Gorda, southeast Ensenada de Corrientes, Cuba (Part 1: stony corals and algae)
Pedro M. Alcolado, Beatriz Martínez-Duranas, Grisel Menendez-Macia, Rosa del Valle, Miguel Hernández, and Tamara García 268

- Rapid assessment of coral communities of María La Gorda, southeast Ensenada de Corrientes, Cuba (Part 2: reef fishes)
Rodolfo Claro and Karel Cantelar Ramos 278

MEXICO

- Rapid assessment of Mexico's Yucatan Reef in 1997 and 1999: pre- and post-1998 mass bleaching and Hurricane Mitch (stony corals, algae and fishes)
Robert S. Steneck and Judith C. Lang 294

- Condition of coral reef ecosystems in central-southern Quintana Roo, Mexico (Part 1: stony corals and algae)
Miguel A. Ruiz-Zárte, Roberto C. Hernández-Landa, Carlos González-Salas, Enrique Núñez-Lara, and J. Ernesto Arias-González 318

- Condition of coral reef ecosystems in central-southern Quintana Roo, Mexico (Part 2: reef fish communities)
Enrique Núñez-Lara, Carlos González-Salas, Miguel A. Ruiz-Zárte, Roberto Hernández-Landa, and J. Ernesto Arias-González 338

- Condition of selected reef sites in the Veracruz Reef System (stony corals and algae)
Guillermo Horta-Puga 360

NETHERLANDS ANTILLES

- Condition of coral reefs off less developed coastlines of Curaçao (Part 1: stony corals and algae)
Andrew W. Bruckner and Robin J. Bruckner 370

- Condition of coral reefs off less developed coastlines of Curaçao (Part 2: reef fishes)
Andrew W. Bruckner and Robin J. Bruckner 394

- A post-hurricane, rapid assessment of reefs in the Windward Netherlands Antilles (stony corals, algae and fishes)
Kristi D. Klomp and David J. Kooistra 404

ST. VINCENT

A rapid assessment of the Horseshoe Reef, Tobago Cays Marine Park, St. Vincent, West Indies (stony corals, algae and fishes)

Alice Deschamps, André Desrochers, and Kristi D. Klomp 438

TURKS AND CAICOS ISLANDS

Assessment of the coral reefs of the Turks and Caicos Islands (Part 1: stony corals and algae)

Bernhard Riegl, Carrie Manfrino, Casey Hermoyian, Marilyn Brandt, and Kaho Hoshino 460

Assessment of the coral reefs of the Turks and Caicos Islands (Part 2: fish communities)

Kaho Hoshino, Marilyn Brandt, Carrie Manfrino, Bernhard Riegl, and Sasha C.C. Steiner 480

UNITED STATES

A rapid assessment of the Flower Garden Banks National Marine Sanctuary (stony corals, algae and fishes)

Christy V. Pattengill-Semmens and Stephen R. Gittings 500

VENEZUELA

Rapid assessment of coral reefs in the Archipiélago de Los Roques National Park, Venezuela (Part 1: stony corals and algae)

Estrella Villamizar, Juan M. Posada, and Santiago Gómez 512

Rapid assessment of coral reefs in the Archipiélago de Los Roques National Park, Venezuela (Part 2: fishes)

Juan M. Posada, Estrella Villamizar, and Daniela Alvarado 530

VIRGIN ISLANDS

A rapid assessment of coral reefs in the Virgin Islands (Part 1: stony corals and algae)

Richard S. Nemeth, Adam Quandt, Laurie Requa, J. Paige Rothenberger, and Marcia Taylor 544

A rapid assessment of coral reefs in the Virgin Islands (Part 2: fishes)

Richard S. Nemeth, Leslie D. Whaylen, and Christy V. Pattengill-Semmens 566

ADDITIONAL AGRRA DATA

Assessment tables for Abaco, Bahamas (fishes), Lighthouse, Belize (corals, algae, fishes) and Bonaire, Netherlands Antilles (corals, algae, fishes)

Philip A. Kramer and Baerbel G. Bischof 590

SUPPLEMENTAL INFORMATION

Condition of coral reef ecosystems in central-southern Quintana Roo, Mexico (Part 3: juvenile reef fishes)

Carlos González-Salas, Enrique Núñez-Lara, Miguel A. Ruiz-Zárate, Roberto C. Hernández-Landa, and J. Ernesto Arias-González 598

APPENDIX ONE

The Atlantic and Gulf Rapid Reef Assessment Protocols: Former Version 2.2

Patricia Richards Kramer and Judith C. Lang 611

APPENDIX TWO

Fish biomass conversion equations

Kenneth W. Marks and Kristi D. Klomp 625

LIST OF PLATES

Prepared by

Patricia Richards Kramer, Robert N. Ginsburg, and Judith C. Lang

Plate 1.	Location of AGRRA sites assessed as of mid 2003.	xiv
Plate 2.	Caribbean reef crests: then and now.	56
Plate 3.	Caribbean coral reefs: past and present baselines.	57
Plate 4.	Reef coral condition.	123
Plate 5.	Stony corals: partial mortality.	145
Plate 6.	Stony corals: recent mortality.	247
Plate 7.	Stony corals: old mortality.	267
Plate 8.	Stony corals: disease.	359
Plate 9.	Stony corals: bleaching.	393
Plate 10.	Stony corals: predation.	403
Plate 11.	Reef algae.	459
Plate 12.	<i>Diadema antillarum</i> .	511
Plate 13.	Reef fishes.	629
Plate 14.	AGRRA methods.	630

Status of Coral Reefs in the Western Atlantic: Results of Initial Surveys, Atlantic and Gulf Rapid Reef Assessment (AGRRA) Program. Atoll Res. Bull p. Macfield, M.D. & P.R. Kramer The Healthy Mesoamerican Reef Ecosystem Initiative: a conceptual framework for evaluating reef ecosystem health. Proc. 10 th Int. Coral Reef Symp. Okinawa: Marks, K.W. & J.C. Lang AGRRA Summary Products, version (10/2006). Includes surveys of the coral reefs in; Bahamas, Belize, Brazil, Caymen Islands, Costa Rica, Cuba, Mexico, Netherlands Antilles, St. Vincent, Turks and Caicos Islands, United States, Venezuela and Virgin Islands. Condition. Vg. You may also like The World of Lakes: Lakes of the World. Morris, P.; Burgis, M. Price £25.00. Ponds, Pools and Puddles (New Naturalist). Biggs, J. Price £50.00. Ponds, Pools and Puddles (New Naturalist). Biggs, J. Price £50.00. The Response of Lake Ecosystems to Changes in Biotic and Abiotic Conditions. Alimov, A.F.; Bul'on, V.V. Price £20.00.