



U.S. Global Change Research Program

National Climate Assessment

2012 Technical Inputs Report



Coastal Impacts, Vulnerabilities, and Adaptation

TABLE OF CONTENTS

Chapter 1: Introduction and Context	6
Lead Author: Mary Culver, NOAA	
1.1 Scope and Purpose	6
▪ Virginia Burkett, USGS	
▪ Margaret Davidson, NOAA	
1.2 Linkages with Overlapping Topics of the NCA	7
▪ Ralph Cantrel, NOAA	
▪ Margaret Davidson, NOAA	
1.3 Reliance on the Coastal Zone	10
▪ Mary Culver, NOAA	
▪ Hilary Stockdon, USGS	
▪ Britta Bierwagen, EPA	
Chapter 2: Physical Climate Forces	22
Lead Author: S. Jeffress Williams, USGS	
2.1 Overview of Climate and Sea Level Rise Trends That Effect the Coastal Zone	22
▪ S. Jeffress Williams, USGS	
▪ James G. Titus, EPA	
▪ Jay Ratcliff, USACE	
2.2 Sea Level Rise Scenarios from the NCA Scenarios Working Group	36
▪ Adam Parris, NOAA	
▪ Obey, Jayantha, South Florida Water Management District	
2.3 Extreme Events and Future Scenarios from the NCA Technical Team on Extremes ..	46
▪ James P. Kossin, NOAA	
▪ Timothy M. Hall, NASA	
▪ Thomas R. Knutson, NOAA	
▪ Ty V. Wamsley, USACE	
2.4 Changes in Precipitation Patterns that Affect Coastal Systems	70
▪ Thomas G. Huntington, USGS	
▪ Aaron R. Byrd, USACE	

2.5 Changes in Temperature That Effect Coastal Systems	91
▪ David Atkinson, University of Victoria	
▪ Thomas Ravens, University of Alaska	
▪ Hajo Eicken, University of Alaska	
▪ Michael Lilly, GW Scientific	
2.6 Wave Regimes	102
▪ Peter Ruggiero, Oregon State University	
▪ Don Resio, University of North Florida	
Chapter 3: Vulnerability and Impacts on Natural Resources	113
Lead Author: Carlton H. Hershner, Jr., Virginia Insitute of Marine Science	
3.1 Potential Impacts on Biota, Habitats, and Coastal Landforms	113
▪ Robert R. Twilley, Louisiana State University	
▪ Grant Ballard, Point Reyes Bird Observatory	
▪ Donald R. Cahoon, USGS	
▪ Hilary Stockdon, USGS	
▪ Charles "Pete" H. Peterson, University of North Carolina	
▪ Julie D. Rosati, USACE	
3.2 Relative Vulnerabilty of U.S. Coastal Regions	133
▪ E. Robert Thieler, USGS	
▪ John Marra, NOAA	
3.3 Water Resources in the Coastal Zone	143
▪ Neil Ganju, USGS	
▪ Hans Paerl, University of North Carolina	
▪ Robert Diaz, Virginia Institute of Marine Science	
▪ Robert Howarth, Cornell University	
3.4 Nonlinear Change, Interactions/Feedbacks and Tipping Points	149
▪ Jordan West, EPA	
▪ Glenn Guntenspergen, USGS	
▪ Tom Doyle, USGS	

Chapter 4: Vulnerability and Impacts on Human Development

Lead Author: Tony MacDonald, Monmouth University

4.1 Brief Characterization of Potential Impacts on Coastal Settlements and Infrastructure	155
▪ Jeffrey A. Melby, USACE	
▪ Paul H. Kirshen, University of New Hampshire	
▪ Jeff Lillycrop, USACE	
▪ Austin Becker, Stanford University	
4.2 Economic Impacts	169
▪ Philip G. King, San Francisco State University	
▪ Aaron McGregor, California Ocean Science Trust	
4.2.1 Economic Impacts on the Insurance Industry	169
▪ Lindene Patton, Zurich Financial Services	
4.2.2 Economic Impacts on the Recreation & Tourism Industry	
▪ Janet Cikir, National Park Service	
4.2.3 Economic Impacts on the Real Estate & Tax Assessments	182
▪ Jim London, Clemson University	
4.2.4 Economic Impacts on Emergency Response and Recovery	187
▪ Maria G. Honeycutt, NOAA	
▪ Doug Bellomo, FEMA	
▪ Gavin Smith, University of North Carolina	
4.2.5 Economic Impacts on Coastal and Nearshore Oil & Gas	192
▪ Virginia Burkett, USGS	
4.3 Human Health Impacts	
▪ Juli M. Trtanj, NOAA	
4.4 Potential Impacts on Military Readiness	204
▪ Edmond J. Russo, USACE	
▪ John A. Hall, DOD	
4.5 Integrated Risk Assessment in the Coastal Zone	215
▪ Susan Cutter, University of South Carolina	
▪ Cindy Thatcher, USGS	
▪ Kirsten Dow, University of South Carolina	

Chapter 5: Adaptation and Mitigation

Lead Author: Lara Hansen, ECOadapt

- 5.1 Status of Adaptation Planning in the Coastal Zone 218
 - Kristen Fletcher, Coastal States Organization
 - Michael Craghan, EPA
 - Benjamin L. Preston, Oak Ridge National Laboratory
 - Diana Bowen, Coastal States Organization
 - Jessica Grannis, Georgetown University
- 5.2 Public Adaptation Activities 232
 - Lara Hansen, ECOadapt
 - Ellie Cohen, Point Reyes Bird Observatory
 - Rachel Gregg, ECOadapt
- 5.3 Consideration of Climate Change in Coastal Resource Management and Restoration 247
 - Zoe Johnson, Maryland Department of Natural Resources
 - Rebecca Beavers, National Park Service
 - Jeff Benoit, Restore America’s Estuaries
 - James Paul, Coastal Protection and Restoration Authority of Louisiana
 - Richard Raynie, Coastal Protection and Restoration Authority of Louisiana
- 5.4 Advances in the Development of Tools, Training, and Assessment to Support Adaptation 260
 - Jennie Hoffman, ECOadapt
 - Stephen Gill, NOAA
 - Lynne Hale, The Nature Conservancy
 - John Rozum, NOAA
 - Brian Holland, ICLEI – Local Governments for Sustainability
 - Doug Marcy, NOAA
- 5.5 Mitigation Opportunities in the Coastal Zone 272
 - Jeff Benoit, Restore America’s Estuary