

*Coral Reef Conservation Program
2011-2016 Strategic Plan*

Office of Coastal and Aquatic Managed Areas
Florida Department of Environmental Protection
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1. Introduction

Florida's Coral Reefs

Spanning over 300 nautical miles (577 km) from the Dry Tortugas to Stuart, the Florida Reef Tract is the only tropical coral reef system, and one of the greatest natural resources, in Florida and the continental United States. These beautiful coral reefs, lying just off the beaches of the most urbanized coastal region in the state, are an extraordinary biological, geological and economic resource. Supporting a rich and diverse assemblage of more than 6,000 species, and protecting its shorelines from tropical storms and erosion, Florida's reefs are vital to our way of life. The Florida Reef Tract provides a source for recreation, fisheries, education, scientific research, and public inspiration. Roughly one third of Florida's 18 million residents live within the coastal region adjacent to the Florida Reef Tract (U.S. Census Bureau, 2011), and this region attracts over 30 million visitors a year (Profile Marketing Research, 2008; Pryor and Lewis, 2009; Synovate Travel and Leisure, 2009; Leeworthy et al., 2010). A study of natural and artificial reefs along southeast Florida and the Florida Keys showed that fishing, diving and boating-related expenditures generate \$6.3 billion in sales and income and sustain more than 71,000 jobs annually (Johns et al., 2001; 2004).

Off the mainland coast of southeast Florida, the northern extension of the Florida Reef Tract extends beyond the Florida Keys approximately 92 nautical miles (170 km) from Miami-Dade County into Martin County (Fig. 1). From Cape Florida (Miami-Dade County), north to central Palm Beach County, the reef system is described as a series of linear, Holocene *Acropora palmata* reef complexes (referred to as reefs, reef tracts or reef terraces) running parallel to shore and exhibiting abundant octocoral, macroalgae, stony coral and sponge assemblages (Lighty, 1977; Moyer et al., 2003; Banks et al., 2007; Walker et al., 2008). The outer reef is the most continuous reef complex, extending from Cape Florida to northern Palm Beach County. Inshore of these reef complexes, there are extensive nearshore ridges and colonized pavement areas. From Palm Beach County to Martin County, the reef system is comprised of limestone ridges and terraces, and worm reef (*Phragmatapoma* spp.), colonized by reef biota (Cooke and Mossom, 1992; Herren, 2004). Despite their high ecological and economic value, their unique position as the highest latitude reefs along the western Atlantic seaboard, and their close proximity to the most heavily developed and densely populated region in the state, these reefs have received limited scientific and resource management attention, until recently (Collier et al., 2008).

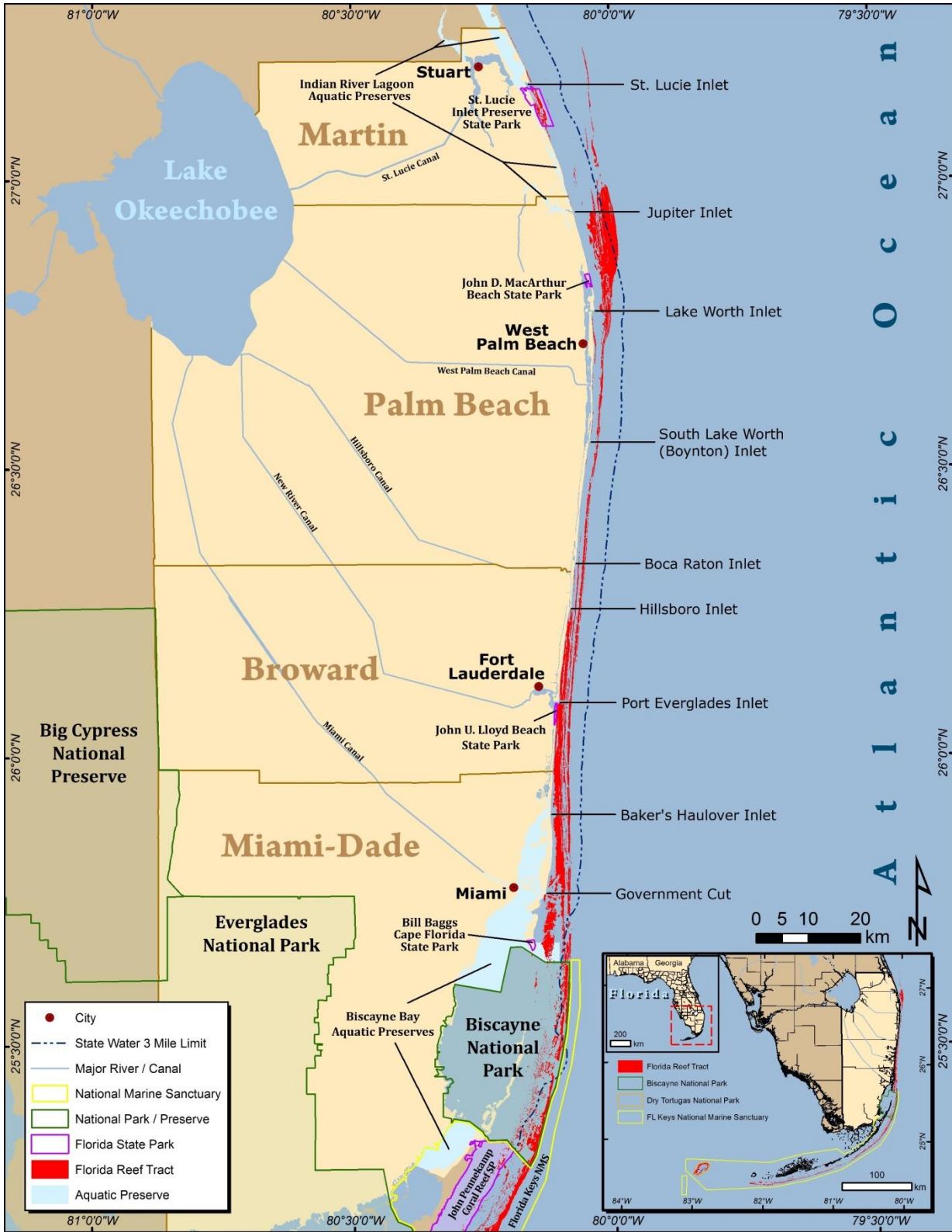


Figure 1. Comprising the northern third of the Florida Reef Tract, the reef system off southeast Florida runs parallel to the mainland coast from the northern border of Biscayne National Park in Miami-Dade County, to the St. Lucie Inlet in Martin County.

Coral Reef Resource Management

The State of Florida manages its coral reef resources cooperatively with local, state and federal agencies including the National Oceanic and Atmospheric Administration (NOAA), the National Park Service, the Florida Fish and Wildlife Conservation Commission, and the counties of Monroe, Miami-Dade, Broward, Palm Beach and Martin. Regulatory coordination with additional agencies including the U.S. Environmental Protection Agency, the U.S. Coast Guard, the U.S. Army Corps of Engineers and others supports the environmental conservation goals of the state.

The Florida Department of Environmental Protection (FDEP) is the lead government agency in the State of Florida for environmental management and stewardship. Comprised of three program areas – Regulatory Programs, Land and Recreation, Policy and Planning – the FDEP serves to protect the state’s air, water and land resources. Florida’s environmental priorities include restoring America’s Everglades, improving air quality, restoring and protecting water quality, conserving environmentally sensitive lands and providing recreation opportunities for citizens and visitors, today and in the future.

Within Land and Recreation, the FDEP’s Office of Coastal and Aquatic Managed Areas (CAMA) directs the management of Florida’s 41 aquatic preserves, three National Estuarine Research Reserves, the Florida Keys National Marine Sanctuary, and the Coral Reef Conservation Program (CRCP).

Since its establishment in 2004, the CRCP has coordinated research, monitoring and mapping, developed and implemented **local action strategies (LAS)**¹, and promoted partnerships and stakeholder/community outreach and education activities to raise public awareness of, and protect the coral reefs, hardbottom communities, and associated reef resources off mainland southeast Florida.

Through its role in supporting Florida’s membership on the U.S. Coral Reef Task Force, the CRCP was initially charged with leading the implementation of the Southeast Florida Coral Reef Initiative (SEFCRI) and contributing to the National Action Plan to conserve coral reefs. Through SEFCRI, local action strategies were implemented to address four key threats to the reefs of southeast Florida – lack of awareness and appreciation, land-based sources of pollution, maritime industry and

¹ See Appendix III, Glossary of Terms

coastal construction impacts, and fishing, diving and other uses. However, mounting local and global pressures on Florida's coral reef resources and demands from citizens and stakeholders for increased protection of Florida's reef resources led to a rapid expansion of the CRCP's role. For example, in addition to its long-term charge, through SEFCRI, to develop management options and implement a management plan for southeast Florida's reefs; in 2006, the CRCP was charged with coordinating, and ultimately leading, response to vessel groundings, anchor damage, and any other reef resource impact events in southeast Florida, including developing strategies to prevent coral reef injuries. As the CRCP approaches completion of the 2004 SEFCRI LAS, it must balance the development and implementation of new initiatives and projects with its mandate to sustain core regional coral reef management and conservation services.

2. Strategic Planning & Implementation Process

The purpose of this strategic plan is to set the vision, mission and goals of the CRCP, that will provide program direction, guide the development of annual work plans and facilitate ecosystem-based, adaptive management of southeast Florida's reefs through the 2015 state fiscal year. The process for development of this strategic plan began in 2009 with a review of current local, regional, state, and national coral reef conservation strategies, priorities and recommendations² to identify the most relevant coral reef conservation targets for inclusion in the *Florida Department of Environmental Protection Coral Reef Conservation Program 2011-2016 Strategic Plan*. Draft goals, objectives and strategies were developed for the plan by CRCP staff; and in 2010, CRCP sought review and comment on the draft content of the plan from stakeholders and SEFCRI Team members through an online public survey. A total of 315 individuals responded to the survey, rating the draft objectives and strategies as low, medium or high priority. CRCP also received 158 general comments on the draft plan. Seven criteria³, including the survey results, were developed and applied to rank each strategy from least to most likely to be successfully implemented through existing programmatic capacity. The results of this prioritization process were used to inform the selection and refinement of priority objectives and strategies included in the final five-year plan. Strategies that did not adequately meet prioritization criteria were deferred⁴ for consideration during the development of the next CRCP strategic plan. Additionally, it is recognized that implementation of the objectives and strategies within the five-year

² See Appendix II

³ See Appendix II

⁴ See Appendix II

scope of this plan is contingent on sustaining or acquiring adequate programmatic capacity and support of program partners, where appropriate.

The identification of specific projects and initiatives that meet the goals, objectives, and strategies of this plan, and will be continued or newly implemented, will be reviewed and determined annually by the CRCP, and with the SEFCRI Team for SEFCRI Projects, with consideration for 1) the current and projected status and trends of coral reef and associated resource health, derived from sound scientific research, monitoring and mapping data; 2) state, local and national natural resource management agency priorities; 3) stakeholder and community needs and input; and, 4) projects and initiatives which support CRCP's vision, mission and goals. Implementation of individual projects will also be contingent on the identification and acquisition of adequate resources (e.g. staff capacity, equipment, funding, technical support, statutory authority) necessary to accomplish individual project objectives. Funding and other support for projects and initiatives to be continued or implemented under this plan will be sought from Florida's Legislature, government agencies (state, local, federal), stakeholders and community members, academia, non-governmental organizations and private industry.

3. Vision and Mission

Vision

The CRCP's vision is that the health and management of Florida's coral reefs and associated reef resources are improving and global coral reef conservation goals are being met effectively to ensure sustainable marine resources and a high quality of life for the State of Florida, its citizens and visitors, today and in the future.

Mission

The mission of the CRCP is to protect southeast Florida's coral reef ecosystems by:

- promoting, coordinating and conducting research, monitoring, mapping; education and outreach; injury prevention and response; and,
- facilitating partnerships and stakeholder engagement in the development of management strategies and options that balance use and protection.

4. Goals, Objectives and Strategies

CRCP identified long-term goals, defined as actions that will require greater than five years, to accomplish CRCP's mission. Shorter-term (up to five years) objectives, and strategies to meet those objectives and fulfill CRCP's goals, were identified for the five-year state fiscal year period, 2011-2016. Goals, objectives and strategies are organized within three key program areas: CRCP Capacity, Education and Outreach, and Coral Reef Ecosystem Conservation. Terms highlighted in green are defined in Appendix III.

Goals

CRCP Capacity

- A. Acquire, sustain and enhance appropriate staffing levels, funding, technical resources, and operational and programmatic capacity within CRCP, including expanding facilities and staff to support resource management activities in Miami-Dade, Broward, Palm Beach and Martin counties.
- B. Contribute to the management of the Florida Reef Tract as a **holistic system**.
- C. Identify and implement management options for **southeast Florida's reefs** that include appropriate statutory authority to accomplish CRCP's mission. (Linked to Coral Reef Ecosystem Conservation Goal A.)
- D. Promote, coordinate, and conduct research, monitoring, and mapping to support coral reef conservation and management through enhanced understanding of ecosystem extent, characterizations and ecological processes.

Education and Outreach

- A. Encourage improved coral reef conservation through increased public awareness, appreciation and community support.
- B. Support strengthened **governance** to support effective coral reef management goals by informing elected officials and decision makers about the importance of, and threats to, coral reefs.
- C. Increase understanding of the connection between coral reefs, watersheds, human activities, and human welfare.
- D. Improve environmental stewardship and encourage **sustainable** development and non-consumptive resource use in southeast Florida.
- E. Support initiatives that improve understanding, and reduce the potential impacts, of **climate change**, with emphasis on efforts in Florida.

- F. Maintain established partnerships and cultivate new cooperative associations that complement or further the CRCP vision, mission and goals.

Coral Reef Ecosystem Conservation

- A. Develop and implement an **adaptive management plan** for the southeast Florida coral reef ecosystem to protect, and where possible, restore natural marine habitats, populations and ecological processes. (Linked to CRCP Capacity Goal C.)
- B. Reduce **chronic and acute stressors** to reef health from land-based sources of pollution and impacts from boating, fishing, diving, and other uses.
- C. Minimize and, where possible, eliminate localized human-induced habitat destruction from maritime industry and coastal construction activities.
- D. Support the development and implementation of a comprehensive network of management options, potentially including marine protected areas or zones, across the Florida Reef Tract to enable reef recovery within protected areas and support system-wide reef recovery and **resilience** to local and global stressors.
- E. Reduce **cumulative stressors** to coral reefs that weaken reef **resistance** and resilience to climate change.
- F. Recommend and support new or strengthened local, state, and federal regulations and enforcement capacity to protect coral reefs.
- G. Work with local, state and federal regulatory agencies to improve agency coordination and compliance with, and enforcement of, existing laws (e.g. Clean Water Act, fisheries regulations, Endangered Species Act listings and associated rules, Coral Reef Protection Act, etc.).

2011-2016 Objectives and Strategies

CRCP Capacity

Objective 1: Sustain and improve CRCP core services (general operations, programs and projects).

Strategies:

- 1.1 Maintain CRCP general operations (as they exist at the start of state fiscal year 2011) to ensure program stability.
 - Existing Staff: 1 manager, 1 assistant manager, 1 office manager, 3 project coordinators, 1 Reef Injury Prevention & Response Program coordinator, 1 associate project coordinator, 1 program assistant, 1 facilities maintenance specialist, 1 NOAA CRCP fellow, 1 NOAA fisheries liaison

- Existing Facilities: FDEP Biscayne Bay Environmental Center, including office space, dock facilities, maintenance facilities and equipment, furnishings, office equipment, supplies and information technology network for 12 staff plus interns
- Existing Equipment: 2 vehicles (1 mid-size hybrid SUV, 1 pickup truck), 1 26' vessel, scuba diving and safety equipment for Miami dive unit staff, restoration and monitoring field supplies
- Existing Administration: CRCP grant proposal development and award administration, contract development and administration, budget planning and management, procurement, human resource administration

1.2 Maintain existing CRCP services, programs, and partnerships.

- Coral reef report development
- Coral Reef Resource Awareness Training Program
- Education & Outreach Program
- Florida Reef Resilience Program (FRRP)
- LAS development, implementation and project management (including sustaining long-term implementation of successful strategies implemented under the 2004 SEFCRI LAS)
- Management options and management plan development and implementation
- Marine Debris Reporting and Removal Program
- Marine Regulation Awareness Program
- Reef Injury Prevention and Response (RIPR) Program
- Southeast Florida Marine Event Response Program (SEMERP)
- SEFCRI Team Coordination
- Southeast Florida Coral Reef Evaluation and Monitoring Project (SECREMP)
- Southeast Florida Coral Reef Water Quality Monitoring Project (SECRWQMP)
- Southeast Florida regulatory program support
- Threatened and endangered reef species recovery planning and implementation
- U.S. All Islands Coral Reef Committee (USAIC)
- U.S. Coral Reef Task Force (USCRTF)

Objective 2: Identify gaps in CRCP capacity and resources needed to fulfill the CRCP Strategic Plan, and where possible, fill identified gaps.

Strategies:

- 2.1 Seek and acquire sustainable state funding to support CRCP core services and strategic plan goals.
- 2.2 Continue to engage in resource management activities which support conservation and management of the Florida Reef Tract as a holistic system.
- 2.3 Foster development of expanded legislative authorities to protect coral reefs.
- 2.4 Complete Martin County **bathymetric** and **benthic** habitat mapping.
- 2.5 Initiate and sustain **fisheries-independent monitoring** in southeast Florida.
- 2.6 Sustain and expand long-term water quality monitoring in southeast Florida.
- 2.7 Expand the number of SECREMP sites and review survey design for potential expansion or modification of sampling parameters (e.g. recruitment).
- 2.8 Track locations and information for threatened, endangered, and unique coral colonies and masses off southeast Florida.
- 2.9 Expand recovery rate information for **functional groups** on southeast Florida reefs.

Education and Outreach

Objective 1: Build upon the existing CRCP Education and Outreach Program to expand coral reef awareness and protection with emphasis on, but not limited to:

- Expanding upon existing land-based sources of pollution education and outreach efforts.
- Incorporating the latest science about climate change and **ocean acidification** into education and outreach activities.
- Increasing awareness of applicable local, state and federal regulations.
- Integrating monitoring data results into education and outreach strategies to inform stakeholders about impacts on resources and recommended abatement measures.

Strategies:

- 1.1 Maintain and update CRCP and SEFCRI websites.

- 1.2 Maintain a presence at community events with supporting education and outreach materials.
- 1.3 Sustain the ongoing multimedia public service announcement campaign.
- 1.4 Develop and implement an outreach campaign to minimize, and where possible eliminate, the impacts of recreational and marine event anchoring on Florida's reefs.
- 1.5 Continue to conduct coral reef teacher trainings.
- 1.6 Continue to produce and distribute the *Southeast Florida Reef News*.
- 1.7 Expand education programs that inform stakeholders about regulations and best practices when boating, fishing and diving (e.g. Marine Regulation Awareness Program).
- 1.8 Disseminate coral reef awareness and protection materials to boaters, anglers and divers through targeted organizations and publications (e.g. National Association of State Boating Law Administrators, Fishing Lines, local dive instructors).
- 1.9 Compile and disseminate coral reef awareness and protection information, specifically targeting new southeast Florida residents.

Objective 2: Work with local municipalities to establish higher environmental standards (e.g. greening programs, water reuse, sewage treatment, etc.).

Strategies:

- 2.1 Support development and implementation of storm drain labeling programs by southeast Florida counties and municipalities.

Objective 3: Support continued development and implementation of the USCRTF National Action Plan, resolutions, working group recommendations and other initiatives, as appropriate for Florida.

Strategies:

- 3.1 Continue Southeast Region Administrator's service as Florida's point of contact to the USCRTF.
- 3.2 Attend and participate in the USCRTF and its Steering Committee meetings, as required through Florida's membership in the USCRTF.

- 3.3 Provide or recommend Florida representatives to participate in USCRTF working groups, development and implementation of resolutions and other USCRTF actions, as appropriate.

Objective 4: Support external efforts and partnerships that foster coral reef conservation.

Strategies:

- 4.1 Engage in partnerships and working groups that support Florida's coral reef conservation goals and priorities (e.g. FRRP, USAIC).

Coral Reef Ecosystem Conservation

Objective 1: Define and recommend management options for the mainland southeast Florida reef system based on management goals, best available science, monitoring results and stakeholder input.

Strategies:

- 1.1 Complete implementation of initial SEFCRI Fishing, Diving and Other Uses Focus Area LAS projects required for this objective.
- 1.2 Fill gaps identified in CRCP Capacity Objective 2, Strategies 1-6.
- 1.3 Identify, recommend and where feasible, work to establish protection zones (e.g. no take, no anchor, no entry) in sensitive resource areas, and areas potentially resilient to climate change (which may or may not contain high coral coverage or abundance), to be integrated into the comprehensive network of management options.
- 1.4 Engage in state and nationwide marine spatial planning activities to inform local planning processes.
- 1.5 Support updating and expanding socio-economic studies of southeast Florida's reefs at appropriate intervals (e.g. studies done by Johns et al., 2001; 2004).
- 1.6 Update southeast Florida's benthic habitat maps at appropriate temporal intervals and spatial scales, expanding previous mapping efforts to answer specific management questions (e.g. high density coral coverage areas, healthy biological areas).

Objective 2: Work collaboratively with partners to develop, implement and support action plans including monitoring, research, stakeholder communication and response strategies to support management of the Florida Reef Tract as a holistic system.

Strategies:

- 2.1 Support the development and implementation of a comprehensive marine zoning strategy, in cooperation with partners, for the entire Florida Reef Tract.
- 2.2 Work with regional partners to develop consistent messaging (e.g. terminology, signage, and maps) to the public about coral reef management actions.
- 2.3 Continue to actively participate in the FRRP.
- 2.4 Work with FRRP partners to implement the *Climate Change Action Plan for the Florida Reef System 2010-2015*.

Objective 3: Reduce the impacts of land-based sources of pollution on the Florida Reef Tract.

Strategies:

- 3.1 Sustain and expand (e.g. sites, frequency, parameters) the long-term SECRWQMP, and link the results to benthic habitat monitoring data, to aid in determining linkages between environmental factors and changes in the coral reef community.
- 3.2 Identify cause and effect relationships between land-based sources of pollution and adverse effects on reef resources (e.g. biomarker studies).
- 3.3 Support implementation and refinement of numeric nutrient criteria for the Florida Reef Tract.
- 3.4 Continue to characterize and quantify amount and **flux** of pollution sources to southeast Florida's reefs.
- 3.5 Engage in Comprehensive Everglades Restoration Plan and related activities and meetings.

Objective 4: Reduce impacts from **extractive** and **non-extractive** recreational and commercial uses.

Strategies:

- 4.1 Initiate fisheries-independent monitoring on southeast Florida's reefs.
- 4.2 Support fishery management agency actions to increase size and abundance of reef fish species.
- 4.3 Continue and expand upon the Marine Debris Reporting and Removal Program.
- 4.4 Support mooring buoy programs, if appropriate, in high-use areas.

Objective 5: Support efforts to reduce coastal development impacts on coral reefs and associated reef resources (e.g. vegetated sand dunes, wetlands, mangroves, etc.) and improve **mitigation** efficacy.

Strategies:

- 5.1 Support the evaluation of existing innovative and emerging technologies and best management practices for coastal construction adjacent to coral reef resources.
- 5.2 Support ways to continually improve shoreline maintenance and restoration practices.
- 5.3 Expand delivery of the Coral Reef Resource Awareness Training Program to local, state, and federal regulatory program and coastal construction industry staff to support improved protection of coral reef resources in coastal construction project design and permit conditions.
- 5.4 Work with regulatory program staff to implement the SEFCRI **cumulative impacts** analysis tool, historical permit-tracking database, and associated guidance documents.

Objective 6: Increase capacity to prevent and respond to coral reef injuries associated with vessel impacts and non-regulated activities.

Strategies:

- 6.1 Identify and implement new management actions to prevent and respond to reef injuries.
- 6.2 Conduct research and training to improve understanding and capacity to assess, restore and resolve reef injuries.

Objective 7: Support and, where possible, strengthen agency capacity and authorities to conserve coral reefs.

Strategies:

7.1 Support development or strengthening of specific rules, regulations, and enforcement provisions to protect coral reef resources (e.g. Coral Reef Protection Act).

7.2 Provide local field support for agency regulatory, compliance and enforcement activities.

Objective 8: Promote the development and implementation of new SEFCRI LAS projects by SEFCRI Team members, which include tangible outcomes and performance measures.

Strategies:

8.1 New LAS will directly support, or be compatible with, one or more of the following coral reef management and strategic plans⁵:

- FDEP CRCP's 2011-2016 Strategic Plan
- Florida's Coral Reef Management Priorities 2010-2015
- Climate Change Action Plan for the Florida Reef System 2010-2015
- Reef Resilience Conference 2008: Resilience Strategies
- 2010-2015 NOAA Coral Reef Conservation Program National Goals and Objectives
- U.S. Coral Reef Task Force National Action Plan
- NOAA National Marine Fisheries Service *Acropora* Recovery Plan

8.2 New LAS will address existing or emerging local threats to coral reef conservation in southeast Florida, or the top three global threats to coral reef conservation (fishing impacts, land-based sources of pollution, climate change) identified through the 2010-2015 NOAA Coral Reef Conservation Program National Goals and Objectives⁶.

⁵ See Appendix I

⁶ See Appendix I

5. Appendices

Appendix I: Coral Reef Management and Conservation Documents

A. Florida's Coral Reef Management Priorities 2010-2015

http://coralreef.noaa.gov/aboutcrctp/strategy/reprioritization/managementpriorities/resources/florida_mngmnt_clr.pdf

B. Climate Change Action Plan for the Florida Reef System 2010-2015

http://www.dep.state.fl.us/coastal/programs/coral/climate_change.htm

C. Reef Resilience Conference 2008: Resilience Strategies

<http://frrp.org/RRC2008%20Results/Final%20FRRP%20strategies%20votes.pdf>

D. 2010-2015 NOAA Coral Reef Conservation Program National Goals and Objectives

<http://coralreef.noaa.gov/aboutcrctp/strategy/currentgoals/>

E. NOAA Coral Reef Ecosystem Integrated Observing System (CREIOS) Workshops Report

http://coralreef.noaa.gov/aboutcrctp/strategy/reprioritization/creios/resources/creios_report.pdf

F. U.S. Coral Reef Task Force National Action Plan

<http://www.coralreef.gov/about/CRTFAxnPlan9.pdf>

G. NOAA National Marine Fisheries Service *Acropora* Recovery Plan

<http://sero.nmfs.noaa.gov/pr/esa/acropora.htm>

H. U.S. All Islands Committee Strategic Plan

<http://www.allislandscorals.org>

Appendix II: Strategy Prioritization Criteria & Deferred Strategies

Strategy Prioritization Criteria

- Benefit to resource (direct and indirect)
- Funding available or obtainable for implementation
- Ease of strategy implementation
- Ease of strategy outcome implementation
- Benefit to local/state economy
- Perceived benefit by resource users
- Support from stakeholders and SEFCRI Team in survey results

Deferred Strategies

The following strategies (listed below) were identified as important components necessary for attaining CRCP's vision and long-term goals. However, because they did not adequately meet prioritization criteria at the time of the final strategic plan draft, they have been deferred for consideration during the development of the next CRCP strategic plan. However, if an opportunity arises during the implementation of this plan, these strategies may be acted upon concurrently.

CRCP Capacity

- 1.1a Convert contracted and other personnel services (OPS) staff to full-time employee (FTE) staff to improve program stability.
- 2.10 Maintain CRCP's southeast Florida permit comment database.
- 2.11 Explore the potential for a satellite office in the Palm Beach or Martin county area.

Education and Outreach

- 1.10 Continue to support regional reef and coastal cleanup events that complement the FDEP Marine Debris Program.

Appendix III: Glossary of Terms

Adaptive management plan: A flexible plan which incorporates the use of science and monitoring to guide and improve natural resource management. Adaptive management allows decision makers to adjust the direction of a project in response to new knowledge or monitoring results.

Bathymetric: Pertaining to measurement of the depths of oceans, lakes or other large bodies of water.

Benthic: Pertaining to or occurring on the bottom of an ocean, lake or other body of water; bottom dwelling organisms, living on, or in, the floor of a sea or lake.

Chronic and acute stressors: Stressors are physical, biological and chemical factors or processes that harm ecosystems or their components, causing lethal or sub-lethal effects. Chronic stressors are those that limit long-term survivorship, growth and reproduction of coral reef organisms over a long-term period. Acute stressors are those that directly lead to the death of coral reef organisms over a short-term period.

Climate change: Any change in the ocean-atmospheric climate system over time, whether due to natural variability or human activity.

Cumulative stressors/impacts: Stressors are physical, biological and chemical factors or processes that harm ecosystems or their components, causing lethal or sub-lethal effects. Cumulative stressors/impacts are those which increase through successive additions, leading to impaired coral reef ecosystem function.

Extractive uses: Human activities that are intended to or require removing natural resources from the environment. All extractive uses are inherently consumptive and can have direct and/or indirect impacts on ecosystems. Extractive activities include the various forms of fishing, catching lobsters or tropical fish, shell collecting, sand mining, some types of monitoring, manipulative science research, etc. Fishing, for example, directly impacts ecosystems by removing targeted species, and perhaps, by altering habitat. Fishing can indirectly impact fish stocks by causing bycatch and release mortality. Catch-and-release fishing is classified as extractive because it requires removing organisms from the habitat, disrupts natural behavior, causes injury, and often results in mortality. Sand mining, for use in beach nourishment, is extractive and can indirectly impact ecosystems by altering habitat and destroying sand dwelling organisms. (See also, **non-extractive uses**.)

Fisheries-independent monitoring: A fish monitoring program using standardized sampling methods to examine the population of fishes as a whole; in contrast, a fishery-dependent monitoring program uses data from and provides information on, only the exploited segment of a population.

Flux: The rate and quantity of transfer of fluids, particles or energy across a given area (amount of flow per unit of time); a flow or discharge; the quantity of a fluid that crosses a unit area of a given area in a unit of time.

Functional group: A collection of organisms of specific morphological, physiological, behavioral, biochemical properties; examples: stony corals, octocorals, macroalgae, zoanthids and substrate (e.g., rock, rubble and sediments).

Governance: The legal authorities, administrative policies, structure and decisions which direct or affect natural resource management capacity.

Holistic system: A whole ecosystem in which the species and habitats within the community are dependent upon each other to maintain the function and stability of the system; an integrated or whole system rather than the individual parts, places, habitats or species within a whole system.

Local action strategy (LAS): A short-term (implementable in 1-3 years) action or project that addresses key issues identified at the state or territorial level and remedies specific problems regarding the health of coral reef ecosystems.

Mitigation: A comprehensive stepwise process of evaluating and implementing least damaging project options which include: 1) avoidance of impacts, 2) minimization of non-avoidable impacts, and 3) compensatory replacement of lost ecosystem services for non-avoidable impacts.

Non-extractive uses: Human activities that do not require removal of natural resources are non-extractive. Examples potentially include recreational diving, nature study, environmental education, photography, sightseeing, tourism, water skiing, pleasure boating, and non-extractive resource monitoring (e.g. visual census). Non-extractive activities can be classified as either **consumptive** or **non-consumptive** (see below). (See also, **extractive uses**.)

Consumptive uses: Human activities that result in damage or loss of natural resources. By definition, all extractive activities are consumptive. Examples include all forms of fishing and collecting. Examples of consumptive, non-extractive activities include anchoring; accidental diver contact and damage to corals, sponges, or other benthos; and disposing of trash, chemical waste, or sewage overboard. Even activities with low individual impacts such as diver contact with reefs may have significant cumulative, consumptive impacts over time by damaging habitat in high intensity use areas.

Non-consumptive uses: Human activities that do not directly or indirectly damage natural resources. Examples include no-touch recreational diving, drift diving (i.e. no anchoring), glass bottom boat tours, snorkeling, visual fish surveys, educational viewing and teaching, and use of mooring buoys.

In summary: Fishing is extractive and consumptive. Recreational diving is non-extractive but may be consumptive or non-consumptive depending on how it is practiced. Likewise, boating is non-extractive, but may be consumptive or non-consumptive depending on how it is practiced.

Ocean acidification: The decrease in the pH of the Earth's oceans, caused by their uptake of carbon dioxide from the atmosphere; the process whereby atmospheric carbon dioxide dissolves in seawater producing carbonic acid, which subsequently lowers pH of surrounding seawater.

Resilience: Following injury or partial mortality from natural or human-induced disturbances, the capacity of a coral reef community to maintain or restore ecological function equivalent to that present before the disturbance.

Resistance: The ability of a coral reef to tolerate (i.e. not be injured by) and survive disturbances, such as extreme temperatures, pollutants, diseases, or storm events.

Southeast Florida's reefs: The northern extension of the Florida Reef Tract, spanning 170 km from the northern border of Biscayne National Park in Miami-Dade County to the St. Lucie Inlet in Martin County. Southeast Florida's reefs are comprised of a complex of colonized limestone ridges that support a rich and diverse assemblage of stony corals, octocorals, macroalgae, sponges, and fishes. Nearshore habitats include hardbottom, patch reefs and worm reefs; offshore coral reef communities occur on Holocene *Acropora palmata* mid-shelf and shelf-margin reefs. Colonized Anastasia Formation limestone ridges and terraces occur in Martin County and northern Palm Beach County.

Sustainable: The capacity to endure; an ecosystem condition in which biodiversity, renewability, and resource productivity are maintained over time.

Appendix IV: List of Acronyms

CAMA	Office of Coastal and Aquatic Managed Areas
CRCP	Coral Reef Conservation Program
CREIOS	Coral Reef Ecosystem Integrated Observing System
FDEP	Florida Department of Environmental Protection
FRRP	Florida Reef Resilience Program
LAS	Local action strategy
NOAA	National Oceanic and Atmospheric Administration
RIPR	Reef Injury Prevention and Response
SECREMP	Southeast Florida Coral Reef Evaluation and Monitoring Project
SECRWQMP	Southeast Florida Coral Reef Water Quality Monitoring Project
SEFCRI	Southeast Florida Coral Reef Initiative
SEMERP	Southeast Florida Marine Event Response Program
USAIC	United States All Islands Coral Reef Committee
USCRTF	United States Coral Reef Task Force

6. Literature Cited

Banks K., Riegl B., Piller W., Dodge, R.E. and Shinn, E.A. 2007. *Geomorphology of the southeast Florida continental reef tract (Dade, Broward and Palm Beach Counties, USA)*. Coral Reefs 26: 617-640.

Collier C., Ruzicka R., Banks K., Barbieri L., Beal J., Bingham D., Bohnsack J., Brooke S., Craig N., Dodge R., Fisher L., Gadbois N., Gilliam D., Gregg L., Kellison T., Kosmynin V., Lapointe B., McDevitt E., Phipps J., Poulos N., Proni J., Quinn P., Riegl B., Spieler R., Walczak J., Walker B. and Warrick D. 2008. *The State of Coral Reef Ecosystems of Southeast Florida*. pp. 131-159. In: J.E. Waddell and A.M. Clarke (eds.), *The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2008*. NOAA Technical Memorandum NOS NCCOS 73. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team. Silver Spring, MD. 569 pp.
<http://ccma.nos.noaa.gov/stateofthereefs>

Cooke C.W and Mossom S. 1992. *Geology of Florida*. pp 29-227. In: *Florida Geological Survey 20th Annual Report*. 294 pp.

Herren L. 2004. *St. Lucie Inlet Preserve State Park Reef Monitoring Program Progress Report #2*. Florida Department of Environmental Protection. 22 pp.

Johns G.M., Leeworthy V.R., Bell F.W. and Bonn M.A. 2001. *Socioeconomic Study of Reefs in Southeast Florida, Final*. Hazen and Sawyer Environmental Engineers & Scientists. 348 pp.
http://www.dep.state.fl.us/coastal/programs/coral/pub/Reef_Valuation_DadeBrowardPBMonroe2001.pdf

Johns G.M., Milon J.W. and Sayers D. 2004. *Socioeconomic Study of Reefs in Martin County, FL. Final Report*. Hazen and Sawyer Environmental Engineers & Scientists. 120 pp.
http://www.dep.state.fl.us/coastal/programs/coral/pub/Reef_Valuation_MartinCounty2004.pdf

Leeworthy V.R., Loomis D.K. and Paterson S.K. 2010. *Linking the Economy and the Environment of Florida, Visitor Profiles: Florida Keys/Key West 2007-08*. Office of National Marine Sanctuaries, National Ocean Service, National Oceanic and Atmospheric Administration, and U.S. Department of Commerce. 299 pp.
<http://www.monroecounty-fl.gov/DocumentView.aspx?DID=756>

Lighty R.G. 1977. *Relict shelf-edge Holocene coral reef: southeast coast of Florida*. pp. 215-221. In: D.L. Taylor (ed.). *Proceedings from the 3rd International Coral Reef Symposium, Vol. 2*. Miami, FL. 628 pp.

Moyer R.P., Riegl B., Banks K. and Dodge R.E. 2003. *Spatial patterns and ecology of benthic communities on a high-latitude South Florida (Broward County, USA) reef system*. *Coral Reefs* 22: 447-464.

Profile Marketing Research. 2008. *Report on Palm Beach County Tourism Fiscal Year 2007/2008*. Tourist Development Council of Palm Beach County. 62 pp.
<http://www.pbcgov.com/touristdevelopment/pdf/FY07-08AnnualTourismRep.pdf>

Pryor J.T. and Lewis D.L. 2009. *Broward County 2008 Comprehensive Annual Financial Report*. Broward County, Florida. 138 pp.
http://www.broward.org/Accounting/Documents/2008_cafr.pdf

Synovate Travel and Leisure. 2009. *Greater Miami and the beaches 2010 visitor industry overview*. Greater Miami Convention and Visitors Bureau. 48 pp.
<http://www.miamiandbeaches.com/Pictures/WebRpt/Annual%20Report%202010.pdf>

U.S. Census Bureau. 2011. *Population Finder*. <http://www.census.gov>

Walker B.K., Riegl B. and Dodge R.E. 2008. *Mapping coral reefs in suboptimal water clarity: southeast Florida, USA*. *Journal of Coastal Research* 24: 1138-1150.