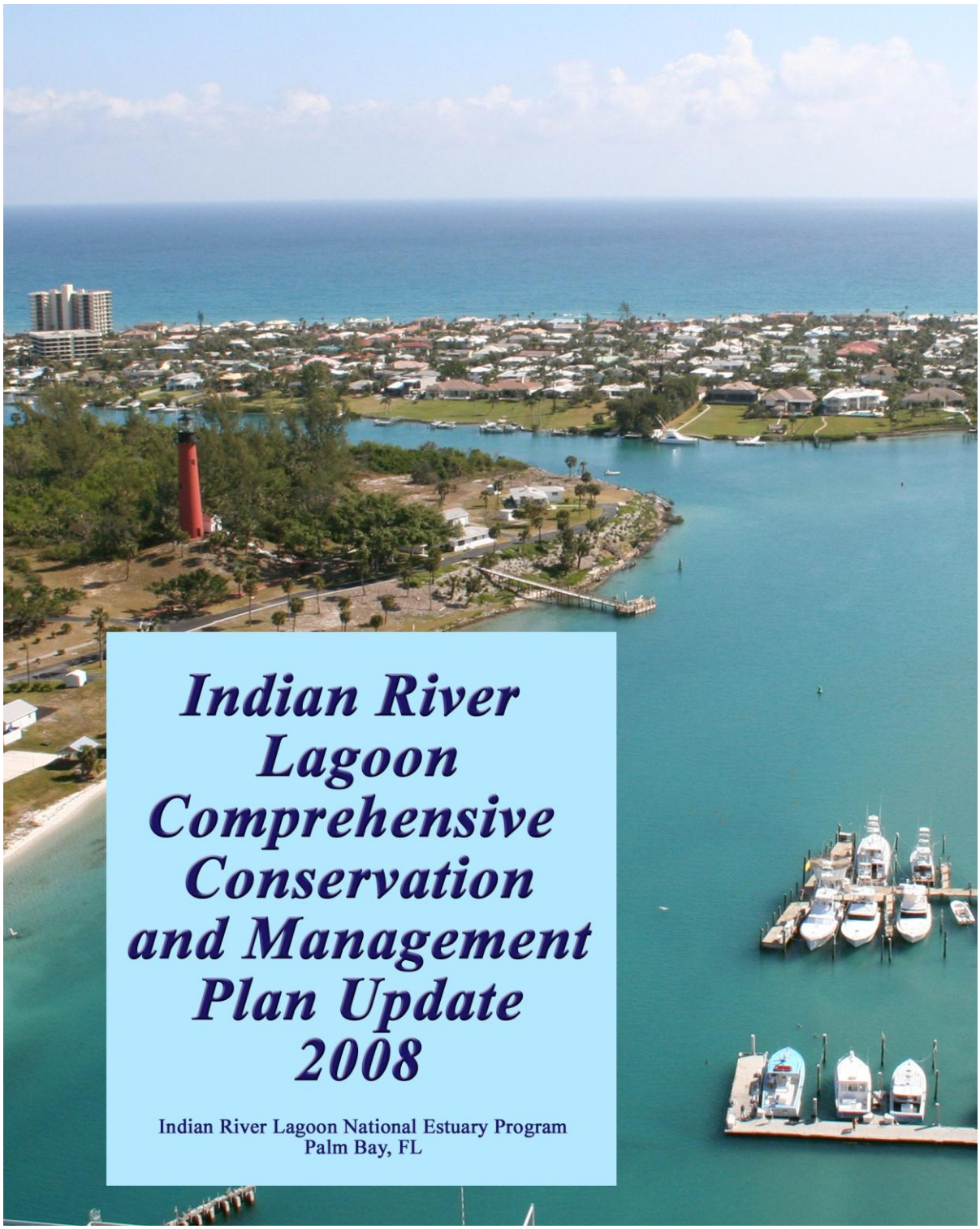


Indian River Lagoon Comprehensive Conservation and Management Plan Update 2008

Indian River Lagoon National Estuary Program
Palm Bay, FL

INTRODUCTION

The Need

In the Spring and Summer of 2007, the Indian River Lagoon National Estuary Program (IRL NEP) embarked on a process to review and update the core of the 1996 *Indian River Lagoon Comprehensive Conservation and Management Plan (CCMP),* the set of 68 recommended action items in 4 topic areas that guide the IRL NEP's work. This initiative to update the CCMP was discussed by the IRL NEP Advisory Board during their April 2007 meeting, with direction to staff to generate a draft for review and comment.

Eleven years of implementation activities under the original CCMP has resulted in a remarkable amount of progress toward restoration and protection of the lagoon. However, new issues and threats to the lagoon, such as climate change, toxic algae and exotic invasive fauna and flora have emerged since the original CCMP's development. In addition, new science, research, technologies, programs and organizations now exist. IRLNEP's activities and annual work plan projects have continually evolved within the existing CCMP framework over the previous eleven years trying to adapt to these new challenges and opportunities, however the action items in the CCMP have not been updated to reflect this evolution.

Background

The 1996 CCMP was developed using a local stakeholder process in accordance with the model used around the nation as the foundation for the U.S. Environmental Protection Agency (EPA) National Estuary Program. A detailed description of this planning process and its use at the 28 NEP sites can be found in the published EPA document titled "Community-Based Watershed Management: Lessons from the National Estuary Program" that can be downloaded at http://www.epa.gov/owow/estuaries/nepprimer/handbook.htm.

The Indian River Lagoon National Estuary Program (also known as the Indian River Lagoon Program, IRLP), is one of 28 NEPs, and was established in 1990 through the EPA's designation of the Indian River Lagoon as an "estuary of national significance" in response to the nomination forwarded to the agency by Florida's Governor. In 1991, the planning process was developed to draft the CCMP and establish the IRL NEP Management Conference to guide development of the plan and its future implementation. The NEP model as a non-regulatory, stakeholder-driven, collaborative approach to coastal watershed restoration and protection is based on four cornerstones:

- A watershed focus that moves beyond political jurisdictions,
- Integration of good science with sound decision-making,
- Collaborative problem-solving, and
- Public involvement

The IRL NEP's CCMP's development was closely coordinated with the goals and objectives of the Indian River Lagoon Surface Water Improvement and Management (SWIM) Plan, a state mandated effort directing the state's five regional water management districts to design and implement plans for many natural surface water systems of the state that have been or are threatened with being degraded. The SWIM Act primarily concentrates on conducting scientific investigation and applying the findings of those investigations directly to restoration actions. The Indian River Lagoon SWIM Plan was updated by the St. Johns and South Florida water management districts in 2002. Due to similarities between the SWIM and NEP programs, and the strong foundation of support offered by the St. Johns River Water Management District (District, SJRWMD) to the IRL NEP, the District was selected as IRL NEP's local sponsoring agency and has provided excellent administrative, personnel and facility support to the IRL NEP since its inception in 1991. Since the 1996 approval of the IRL CCMP, efforts to conduct a unified SWIM and NEP program by the District as a closely coordinated federal and state program have been underway to maximize efficiencies in communication and program delivery.

As part of the effort to coordinate and compliment the IRL SWIM and IRL CCMP plans, the IRL NEP adopted the three IRL SWIM goals:

- Goal 1: To attain and maintain water and sediment of sufficient quality to support a healthy estuarine lagoon ecosystem;

- Goal 2: To attain and maintain a functioning, healthy ecosystem which supports endangered and threatened species, fisheries, commerce and recreation;

- Goal 3: To achieve heightened public awareness and coordinated interagency management of the Indian River Lagoon ecosystem.

The IRL NEP added one additional goal to the CCMP relating to the identification of long-term funding resources for implementation of the CCMP's recommendations:

- Goal 4: To identify and develop long-term funding sources for prioritized projects and programs to preserve, protect, restore and enhance the Indian River Lagoon system.

IRL NEP CCMP Structure

The 1996 CCMP begins with an Introduction *Physical Features of the IRL* section that includes a historical review of the region and the lagoon's impact on the region's development. This introduction describes an overview of the region's economic growth, the resources of the lagoon, a description of the historic alterations in the drainage features within the watershed made to create agricultural citrus and cattle grazing lands, alterations in the lagoon itself to aid navigation and establish permanent man-made inlets, and alterations to accommodate growth such as the building of causeways and bridges across the lagoon. The introduction also includes an overview of the lagoon's unique biodiversity created by the association of upland communities, freshwater communities, saltwater wetlands, man-made "spoil" islands and the biologically rich community of submerged aquatic vegetation located below the lagoon's surface.

Finally, the introduction includes a brief description of the current state of the lagoon, addressing the segmentation adopted by lagoon managers for characterizing the unique features of the estuary, the hydrodynamics of the system, a description of the pollutant loadings to the lagoon, the living resources, wildlife and primary habitats associated with the lagoon, as well as a description of governmental management programs and human uses of the estuary. In addition, a summary of how to use the CCMP as a management resource is described with reference to the associated series of technical Characterization Reports completed by the IRL NEP in 1994. Much of the information included within the introduction or *executive summary* of the CCMP, has been updated in the 2007 publication *Indian River Lagoon: An Introduction to a Natural Treasure*, that is available from the IRL NEP Project Office upon request and is widely distributed during outreach events and activities.

Following the introductory section, the CCMP includes Section B – Water and Sediment Quality Improvement addressing the four action plans for Point Sources Discharges, On-Site Sewage Disposal Systems, Management of Freshwater and Stormwater Discharges, Marina and Boat Impacts and Atmospheric Deposition. Each of these action plans includes recommendations for one or more actions to address these issues with an assigned priority, description of how the action may be accomplished, identification of who the primary and support responsible organizations are to implement the action, where the action is to be implemented, measures of progress for the action, and related actions if any.

Section C – Living Resources addresses seven additional action plans including Biodiversity, Seagrass, Wetlands, Impounded Marshes, Land Acquisition, Endangered and Threatened Species and Fisheries. Each of these seven action plans also includes a number of specific actions for implementation and identifies the action's priority, how, who, where, measure of progress and related actions.

Section D addresses Public and Governmental Support and Involvement including four action plans addressing Public Involvement and Education, Future Implementation, Data Information and Management, and Monitoring.

Section E addresses Financing of the IRLCCMP Implementation, and Section F includes a Glossary of Acronyms and Abbreviations, References and Appendices.

Guiding Principles and Scope of Work

In order to recognize the hard work of the many stakeholders who crafted the CCMP and too maintain the guiding vision from the original plan this update is offered as an addendum to the document approved in 1996. The guiding principles in the development of this update are to:

- Balance the need to address emerging challenges and opportunities with a notion of achievability and practicality; and,

- Honor the original CCMP vision and development process.

Following more than eleven years of implementation, the IRL NEP recognizes that some of the actions in the CCMP require ongoing, long-term work and may never be fully 'complete,' yet these actions are important to retain because they continue to provide direction and focus for our efforts. With these principles in mind, the 2008 CCMP Update process involves the following tasks:

Task 1: The first task for the CCMP update is to review each of the 68 action items to determine whether they should be 1) kept as is with the goal to continue implementation on an ongoing or as needed basis, 2) dropped from the CCMP because the action is determined to be complete or is no longer relevant, or 3) revise the action item to reflect current conditions, knowledge and needs. Actions are to be dropped from the CCMP if they meet one of the following criteria:

- Action is fully complete, implemented;
- Action has been institutionalized as an ongoing activity by a member of the IRL NEP Advisory Board or by another entity as a regular and routine activity that no longer requires special designation as a recommended or needed action within the CCMP;
- Action is combined with another action or has been incorporated into another action plan for enhanced achievability and practicality;
- Action is no longer relevant, effective, achievable or practical.

Task 2: The second step is to explore the need for new actions within the existing action plans that are already included within one of the CCMP Sections: Water and Sediment Quality Improvement, Living Resources, Public and Governmental Support and Involvement, or Financing IRLCCMP Implementation. Additionally, the need to explore additional priority topic areas beyond these categories based on new threats and opportunities to the lagoon will be examined.

Task 3: The third task is to identify and describe goals, objectives and recommended actions for any additional priority action plans.

Task 4: The fourth task is to review the prioritization of the existing action plans based on current conditions, knowledge, practicality and achievability; re-rank these action plans as applicable and any new actions using the existing system of High, Medium and Low priority rankings for each action plan recommendation.

Task 5: The final step in the update will be to update Section E: Financing the IRL CCMP Implementation by providing a review of past, cumulative implementation costs using available data from previous annual leveraging reports and work plan projects, developing current cost estimates for ongoing implementation activities based upon data provided by partners, project costs for similar activities and best professional judgment, and including information from the updated IRL Economic Valuation Study update. A summary of the updated IRL economic assessment and natural resource valuation will be included in this updated section when available.

The items not addressed and deemed to be outside of the scope of the Update are:

- The goals and objectives outlined in each of the three primary action plan categories or Sections; and
- The overall organizational structure and operation of the Indian River Lagoon National Estuary Program.

The 2008 Update

To facilitate the coordination and drafting of the CCMP update, IRL NEP staff initiated the process by producing the first draft for review and comment and requested volunteers from the IRL Advisory, Technical and Citizen's committees to serve as a Steering Committee. The IRL CCMP Update Steering Committee met August 22, 2007. The Steering Committee reviewed all staff recommended changes and additions providing additional revisions and additional action plan recommendations. The second draft of the IRL CCMP Update was presented to a joint meeting of the IRL NEP Technical Advisory and Citizens Action committees on September 26, 2007. These meetings were open to the public and noticed under Florida Sunshine Law procedures.

The attached draft 2008 IRL NEP CCMP Update was presented to the IRL Advisory Board during their public meeting on October 24, 2007. Following the IRL Advisory Board's review, public comment was accepted through December 14, 2007. Public interest was solicited by distributing several press releases to regional media outlets in the watershed announcing the availability of the Update for review and comment including specification of the prescribed comment period with clear identification of procedures to provide comments electronically. Additionally, the quarterly IRL Newsletter featured several stories/columns highlighting the Update and detailing how the public may submit comments to the Program. All comments received during the public comment period were reviewed and discussed by the steering committee, and appropriate changes were incorporated.

The IRL Advisory Board will review the final draft of the Update during their regular winter meeting in 2008. Final comments and suggestions shall be solicited from the Board and members of the public during the meeting and a vote to adopt the CCMP Update shall occur. Upon adoption, the final CCMP Update will be transmitted to the U.S. EPA and the Office of the Governor for the State of Florida.

The Indian River Lagoon Comprehensive Conservation and Management Plan as an Evolving Plan

The 2008 CCMP Update process will reaffirm the IRL NEP's belief that the CCMP should continually evolve and be periodically revisited to address emerging threats and the changing needs of the lagoon's environment, and should actively incorporate new technologies and knowledge about the ecosystem as they are established.

Summary of Changes in the Draft 2008 CCMP Update

Overview

First Task – Review and assessment of all actions:

The 1996 CCMP includes 68 actions in three primary categories or topic areas. Of these original actions, through the draft 2008 Update:

- 13 actions are fully implemented as complete, institutionalized or combined with similar actions
- 14 actions are fully implemented, have been updated for clarity or currency and are on-going
- 30 actions have been substantially implemented, updated and are on-going
- 11 actions have been moderately implemented, updated and are on-going

The Summary Table on page 103 provides an at-a-glance overview of Update changes.

Themes in the Modifications to the Action Items

The modifications to the on-going actions fall into two general categories of changes:

- The next phase of work is needed, building on work to date; or
- Bringing the action up to date with current projects, partners, knowledge, laws, research, needs and opportunities.

Second Task – Need for new actions

Thirty new or replacement actions have been recommended for inclusion, four in Water and Sediment Quality Improvements, seventeen in Living Resources, eight in Public & Governmental Support and Involvement, and one new action in Financing IRL CCMP Implementation.

- 31 New action plans
- 3 Modify existing action plan titles to replace an on-going action

Third Task - Identify and describe goals, and objectives for any additional priority action plans and review the prioritization of the existing action plans

The prioritization scheme of actions in the 2008 CCMP Update is being maintained from the 1996 plan. The 68 actions in the original CCMP were assigned a ranking of High, Medium or Low across all actions by the membership of the IRL Management Conference. The criteria used to assign these rankings were 1) feasibility; 2) degree of need; 3) effectiveness in addressing the identified problem; and 4) relationship to other on-going or planned projects. The Management Conference recognized that while the prioritization of actions can provide some guidance to resource managers about the timing of actions, in reality, the opportunity and timing of implementing individual actions will rely primarily on the availability of funds, that is in turn driven by the "political climate."

Substantive Changes
The table on page 103 provides an overview of the changes in the 2008 CCMP Update. In addition a brief summary of the changes made to actions within the topic areas is provided below. The detailed description of each action begins on page 10.

Water and Sediment Quality Improvement
Three actions are identified as fully implemented – complete, institutionalized or combined with a similar action and will be removed from the final draft of the CCMP Update. Four actions are identified as fully implemented and are ongoing, and have been edited for clarity or updated for currency, or have recommended changes in ranking. Two of these actions have been changed in rank. Nineteen actions are substantially implemented, Four with no changes, fifteen edited for clarity or updated for currency with four having recommended changes in ranking. Five actions are identified as moderately implemented and have been updated for currency or edited for clarity with three of these actions including recommended changes in their ranking. Four new actions are submitted for addition under this section: one promoting connections of OSDS to central sewer in identified problem areas; and three new actions addressing implementation of TMDLs and BMAPs in the IRL.

Living Resources
Six actions are identified as fully implemented – complete, institutionalized or combined with a similar action and will be removed from the final draft of the CCMP Update. Ten actions are substantially implemented and are on-going and have been edited for clarity or updated for currency, one of these actions recommends a change in ranking. Six actions are moderately implemented, one with no changes and the other five updated for currency or edited for clarity and two actions with a recommended change in priority. Eighteen new actions are proposed under this section.

Public and Governmental Support and Involvement
Four actions are fully implemented as complete, institutionalized or combined with a similar action and will be removed from the final draft CCMP Update. Ten actions are fully implemented and are on-going, two have no changes, and eight have been updated for currency or edited for clarity. Eight new actions are recommended for inclusion. Three new actions address scientific research, four address responses to environmental incidents and

rapid assessment of environment incidents, and one addresses behavior-oriented programs to reduce personal pollution.

Financing IRLCCMP Implementation

One new action is recommended for addition to this section to undertake an analysis of the lagoon's economic value on a recurring basis.

Point Source Discharges Action Plan

Objective:
To ensure compliance with the Indian River Lagoon Act and to reduce or eliminate, where possible, industrial and domestic wastewater discharges to the Indian River Lagoon.

Problem:
Over the years, several methods have been used to treat and dispose of sewage or wastewater in the Indian River Lagoon region. Initially, these methods included outhouses, septic tanks and, on occasion, direct discharges to the lagoon. As more people moved to the region, concerns for public health prompted the construction of wastewater treatment plants (WWTPs) in many urban areas to collect and treat wastewater. The effluent from WWTPs was often discharged to the lagoon or one of its tributaries.

The effects of these wastewater discharges on the lagoon's water quality became a concern, especially following the passage of the Clean Water Act by Congress in 1970. Millions of dollars were spent to construct new WWTPs or to upgrade existing facilities to meet new, more stringent, water quality standards. Even with these improvements, studies found the lagoon system was unable to assimilate the pollutant loads from both wastewater and stormwater discharges. As a result, the Florida Legislature enacted Chapter 90-262, also known as the Indian River Lagoon Act.

This act, with some limited exceptions, required all domestic WWTPs to cease discharging effluent to the Indian River Lagoon by April 1, 1996. Presently (2008), all WWTPs in the Indian River Lagoon region are in compliance with the Lagoon Act.

Industrial discharges are not addressed by the Indian River Lagoon Act. Currently (2008), there are more than 50 permitted industrial waste discharges to the lagoon, ranging from cooling water from power plants to brine discharges from reverse osmosis potable water treatment plants to concrete batch plants.

Actions:

PS-1 Ensure compliance with the Indian River Lagoon Act.

Revised Language:
None

Rationale for Revision:
N/A

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of domestic wastewater plants discharging effluent to the Indian River Lagoon, progress in providing central sewer service to areas identified in SWIM report as "problem" or "potential problem" for on-site sewage treatment and disposal systems (OSTDS, primarily septic tanks).

Related Actions:
None

Comments/Background:
All WWTPs the Indian River Lagoon region are presently in compliance with the Indian River Lagoon Act. Five WWTPs (Edgewater, Cape Canaveral, Cocoa Beach, Cocoa, Vero Beach) continue to have periodic wet weather discharges to the Indian River Lagoon but are working on projects that will ultimately eliminate these discharges. Pollutant load reductions required to meet TMDLs may result in the elimination of these periodic discharges. FDEP continues to monitor compliance with the Indian River Lagoon Act through review of permit applications from WWTPs.

Another section of the Indian River Lagoon Act directed local governments to develop and initiate implementation of programs to provide central sewer service to areas identified in the SWIM reports as "problem" or "potential problem" areas for OSTDS. While central sewer has been provided to several of these areas, many are still served by OSTDS.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: FDEP, local governments
Support: WMDs, interest groups

PS-2 Ensure that any proposed changes or exemptions from the Indian River Lagoon Act are consistent with the original intent and purpose of the Act and will not reduce the effectiveness of the Act.

Revised Language:
Original language "Prevent changes to the Indian River Lagoon Act which would reduce its effectiveness" revised as shown above.

Rationale for Revision:
Revised for clarity, priority change

1996 Priority Ranking: High
2008 Recommended Priority: Medium

Measure of progress:
Number of deleterious changes to or exemptions from the Indian River Lagoon Act

Related Actions:
PIE-1, PIE-2

Comments/Background:
No changes to or exemptions from the Indian River Lagoon Act have been sought or granted.

Implementation:
Full, ongoing action

Responsible Parties:
Primary: FDEP, IRLNEP
Support: WMDs, interest groups

PS-3 Reduce or eliminate industrial discharges to the Indian River Lagoon.

Revised Language:
Added the word, "industrial" to measure of progress

Rationale for Revision:
Revised for clarity

1996 Priority Ranking: Medium
2008 Recommended Priority: Medium

Measure of progress:
Reduction of industrial wastewater discharges to the Indian River Lagoon

Related Actions:
None

Comments/Background:
FDEP continues review of permit applications for industrial wastewater sources. NEP sponsored review of impacts of discharges from reverse osmosis potable water treatment plants.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: FDEP

Support: WMDs, local governments, interest groups

PS-4 Investigate and recommend funding alternatives for the upgrading of WWTPs.

Revised Language:
None..

Rationale for Revision:
Priority change

1996 Priority Ranking: Medium
2008 Recommended Priority: High

Measure of progress:
Number of alternatives for financing wastewater treatment facility upgrades located or developed

Related Actions:
None

Comments/Background:
NEP funds grant writer to assist local governments is locating and applying for grants.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: FDEP
Support: USEPA, WMDs, local governments

PS-5 Investigate and promote alternatives to deep well disposal of domestic and industrial effluents.

Revised Language:
Original language "Investigate alternatives to deep well disposal of domestic wastewater and industrial effluents" revised as shown above.

Rationale for Revision:
Revised for clarity

1996 Priority Ranking: Medium
2008 Recommended Priority: Medium

Measure of progress:
Development and implementation of acceptable and feasible alternatives for disposal of WWTP effluent.

Related Actions:
None

Comments/Background:
No new deep wells have been proposed or constructed as of 2008. Reuse of effluent encouraged by water management districts through the provision of funding for alternative water supply development.

Implementation:
Moderate**,** ongoing action

Responsible Parties:

Primary: FDEP
Support: USEPA, WMDs, NRCS, academia

On-Site Sewage Treatment and Disposal Systems Action Plan

Objective:
Determine the impacts on on-site sewage treatment and disposal systems (OSTDS) on the resources of the Indian River Lagoon and to develop and implement strategies to address these impacts.

Problem:
Within the Indian River Lagoon basin, on-site sewage treatment and disposal systems (OSTDSs) are used to treat and dispose of wastewater from homes and businesses that are not connected to central sewer systems. Surveys found that more than 120,000 OSTDS are located within the Indian River Lagoon basin. While the OSTDS count includes a few small (<5,000 gallons/day) wastewater treatment plants, most OSTDS consist of a septic tank and drainfield.

The use of OSTDS in the Indian River Lagoon area can affect water quality in the estuary. Many of the soils of the lagoon region are not well suited for proper drainfield operation. This may result in poorly treated wastes or other pollutants reaching the lagoon. Other factors, such as depth to the water table and density of OSTDS can also affect system performance. Anticipated sea level rise and a resulting increase in the elevation of the Indian River Lagoon may affect the treatment capabilities of OSTDS by elevating the water table. Studies conducted for the Indian River Lagoon SWIM program found more than 70 percent of OSTDS in the Indian River Lagoon basin are located in areas identified as "problem" or "potential problem" areas for septic tanks.

Actions:

OSDS-1 Complete or continue the projects related to OSDS in the 1994 Swim Plan update and the Indian River Lagoon Act.

Revised Language:
None

Rationale for Revision:
Removed - Projects completed. Move to success list.

1996 Priority Ranking: High
2008 Recommended Priority: N/A

Measure of progress:
Number or percent of OSDS-related projects completed

Related Actions:
None

Comments/Background:
SWIM Plan and Indian River Lagoon Act projects completed. Several of the identified OSDS "problem" areas connected to central sewer by local government.

Implementation:
Full, completed

Responsible Parties:
Primary: N/A
Support: N/A

OSDS-2 Develop and implement an OSTDS inspection program within the six lagoon counties.

Revised Language:
Original language "Develop and implement a program to inspect OSDS" revised as shown above.

Rationale for Revision:
Revised for clarification and priority change

1996 Priority Ranking: High
2008 Recommended Priority: Medium

Measure of progress:
Development and implementation of OSDS inspection programs in the Indian River Lagoon region

Related Actions:
None

Comments/Background:
Florida Department of Health has implemented permitting and annual inspection of aerobic OSTDS. Information on OSTDS inspection programs implemented in other areas has been provided to local governments.

Implementation:
Moderate**,** ongoing action

Responsible Parties:
Primary: *FDOH*, CPHUs
Support: NRCS, FDEP, WMDs, local governments

OSDS-3 Undertake further studies of OSTDSs in the region to quantify the impacts of OSDSs on the Indian River Lagoon and to further quantify the extent of "problem" and "potential problem" areas.

Revised Language:
None

Rationale for Revision:
Priority change

1996 Priority Ranking: Medium
2008 Recommended Priority: High

Measure of progress:
Completion of OSDS study that quantifies pollutant loadings from OSDS

Related Actions:
None

Comments/Background:
Several studies of OSTDS have been done in the Indian River Lagoon (including an EPA-funded study managed by NEP staff) but the role of OSTDS in pollutant loadings to the Indian River Lagoon remains unclear.

Implementation:
Full, ongoing action

Responsible Parties:
Primary: *FDOH*, CPHUs
Support: NRCS, FDEP, WMDs, local governments

OSDS-4 Promote the connection of areas served by OSTDS to central sewer service or, where connection to central sewer is not feasible, promote the development and use of alternative or advanced OSTDS technologies offering improved treatment in areas identified in the IRL SWIM studies as "problem" or "potential problem" for OSTDS. Identify and publicize potential funding sources that could be used to connect areas served by OSTDS to central sewer or support the development and use of alternative or advanced OSTDS technologies.

Revised Language:
None – New action

Rationale for Revision:
Suggested by IRL CCMP steering committee

1996 Priority Ranking: None
2008 Recommended Priority: High

Measure of progress:
Number of OSDS installed in "problem" or "potential problem" areas using alternate or advanced technologies. Number of funding sources identified and publicized.

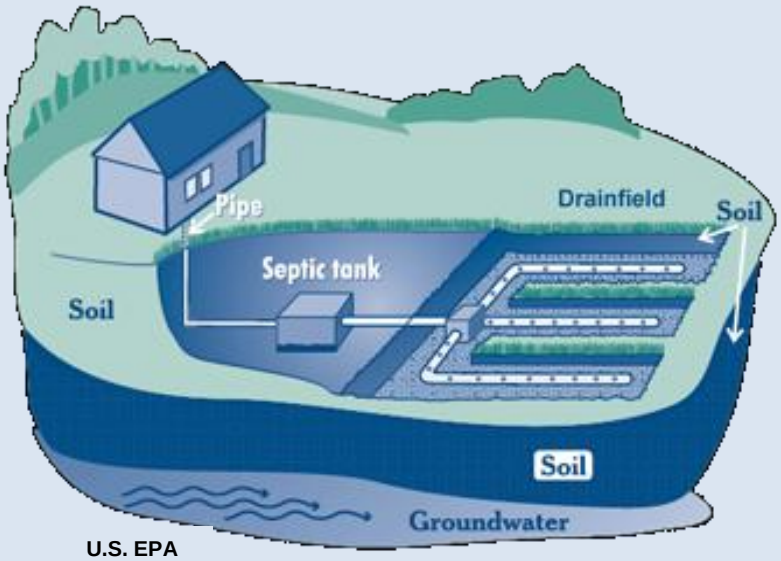
Related Actions:
OSDS-2, OSDS-3

Comments/Background:
Added by IRLCCMP Steering Committee with additional editing provided at the TAC/CAC review.

Implementation:
N/A

Responsible Parties:

Primary: *FDOH*, CPHUs, local government
Support: FDEP, WMDs, NRCS, academia, interest groups



U.S. EPA

Fresh and Storm Water Discharges Action Plan

Objective:

To develop and implement strategies to address the impacts of freshwater and stormwater discharges on the resources of the Indian River Lagoon.

Problem:

Historically, stormwater runoff flowed to the Indian River Lagoon from a long, narrow drainage basin generally located east of present-day US Highway 1. This basin included approximately 1,000 square miles. Much of the rain that fell was absorbed into soil and slowly released

For more than a century, drainage projects ranging in size from a few acres to hundreds of square miles were constructed to facilitate development of land for agricultural or urban uses. Many of the lands where the larger development and drainage projects were located historically drained to either the St. Johns River or Lake Okeechobee basins. To control floodwaters or lower the water table, drainage systems were constructed that directed "excess" waters to the Indian River Lagoon. As a result, the drainage basin of the Indian River Lagoon doubled in size to more than 2,000 square miles.

Smaller projects, which are numerous and found throughout the lagoon region, include stormwater systems serving individual residential, commercial, agricultural and industrial development projects as well as roadways and other public works. Historically, the primary purpose of these projects was drainage, moving stormwater to the nearest surface water body as quickly as possible with little retention, detention or other treatment

Discharges from this improved and expanded drainage system have resulted in widely variable salinities in the Indian River Lagoon. During the wet season, discharges are large, resulting in reduced salinity. In the dry season, waters are retained for agricultural or urban irrigation, which results in reduced flows with subsequently higher salinity in the lagoon. These broad fluctuations in salinity can adversely affect many important estuarine species that are dependent on narrow salinity ranges.

Additionally, discharges often contain large amounts of suspended materials, high nutrient concentrations and other pollutants. Increased pollutant loadings have adversely affected water quality and the resources of the Indian River Lagoon. Discharges of suspended solids have created turbid waters and muck deposits in many of the lagoon's tributaries. These deposits smother seagrasses and other valued resources and may result in algal blooms and subsequent fish kills due to loading of excess nutrients.

In recent years, the impact of fresh and stormwater discharges on the Indian River Lagoon has been recognized and actions to address these impacts have been initiated. At the federal level, a National Pollutant Discharge Elimination System (NPDES) stormwater permit requirement has been implemented throughout the Indian River Lagoon basin. Several projects are underway, pending or planned to address the impacts of larger drainage systems,

some regional in scope, on the Indian River Lagoon. Many additional projects have been completed, are pending or are planned to address smaller drainage systems as well. New construction is now required to provide stormwater treatment for proposed development projects. Most local governments have developed and implemented stormwater utilities to provide funding for operation, maintenance and upgrading of their stormwater systems.

Actions:

FSD-1 Complete or continue the diagnostic, management or pilot projects related to stormwater or freshwater discharges being planned or undertaken by federal, state, regional and local governments.

Revised Language:
Original language "Complete or continue the diagnostic, management or feasibility projects related to freshwater or stormwater discharges found in the 1994 SWIM Plan update" revised as shown above.

Rationale for Revision:
Updated to reflect current status. Edits suggested at TAC/CAC review.

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of stormwater retrofit, treatment or freshwater re-diversion projects completed; progress toward meeting PLRGs or TMDLs; reductions in pollutant loadings or volume of freshwater discharged.

Related Actions:
None

Comments/Background:
Various retrofit, assessment, and PLRG/TMDL development projects have been completed, continuing, pending or planned. NEP has provided funding, review/comment, staff support, contract administration and numerous other services for these projects or programs.

Implementation:
Full**,** ongoing action

Responsible Parties:
Primary: Local governments
Support: WMDs, FDEP

FSD-2 Continue implementation of the NPDES nonpoint source (stormwater) permitting program throughout the Indian River Lagoon region.

Revised Language:
Original language "Implement the NPDES nonpoint source (stormwater) permitting program throughout the Indian River Lagoon region" revised as shown above.

Rationale for Revision:
Updated to reflect current status, priority change

1996 Priority Ranking: Medium
2008 Recommended Priority: High

Measure of progress:
Number of counties and cities within the Indian River Lagoon basin participating in the NPDES stormwater permitting program

Related Actions:
None

Comments/Background:
All local governments within the Indian River Lagoon are required to participate in the NPDES stormwater program. NEP has sponsored or participated in workshops and regular meetings with local government stormwater staff to educate and assist them with NPDES permit requirements.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: FDEP, USEPA
Support: WMDs, local governments

FSD-3 Develop, implement and update pollutant load reduction goals (PLRGs) for all areas of the Indian River Lagoon.

Revised Language:
Original language "Develop, and implement pollutant load reduction goals *(PLRGs)* for all areas of the Indian River Lagoon" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of Indian River Lagoon segments with fully developed PLRGs, the implementation status of PLRGs , number of PLRGs updated.

Related Actions:
SG-1, TMDL-1, TMDL-2, TMDL-3

Comments/Background:
PLRGs based on the ecological requirements of the seagrass community have been developed by the water management districts for the Indian River Lagoon. The PLRGs were developed using predictive models developed and validated for the Indian River Lagoon and using lagoon water quality data, hydrologic and hydrographic data and a variety of other lagoon-specific data and information. These PLRGs and the data and information used to develop them also serve as the basis for Total Maximum Daily Loads (TMDLs) for the lagoon developed by EPA and FDEP.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: WMDs
Support: FDEP, local governments

FSD-4 Develop and implement best management practices (BMPs) for the management of stormwater, agricultural and fresh water discharges.

Revised Language:
Original language "Develop and implement new or improved best management practices (BMPs) for the management of freshwater discharges or stormwater management" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC review meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of projects to develop or improve BMPs; number of projects implementing new or improved BMPs

Related Actions:
TMDL-1, TMDL-2, TMDL-3

Comments/Background:
Local governments and agricultural interests have implemented several projects demonstrating new and innovative technologies and management strategies. An agricultural BMP manual has been developed for the citrus industry. NEP has funded projects, assisted in design and implementation, provided review and comment and assisted in intergovernmental coordination of assessments of both agricultural and urban BMPs.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: WMDs, NRCS, FDEP, local governments
Support: Academia, consultants/private industry

FSD-5 Update and enhance comprehensive drainage maps of the Indian River Lagoon basin.

Revised Language:
Original language "Develop a comprehensive drainage map of the Indian River Lagoon basin" revised as shown above.

Rationale for Revision:
Updated to reflect current status. Edits suggested at TAC/CAC meeting

1996 Priority Ranking: Medium
2008 Recommended Priority: Medium

Measure of progress:
State of completion of updated drainage maps

Related Actions:
None

Comments/Background:
A general basin-wide and sub-basin drainage map has been completed; additional information on sub-basins is being added as local governments develop and complete stormwater management plans. NEP has funded and developed projects such as stormwater management plans that develop additional, localized information for inclusion in regional maps.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: WMDs, WCDs, local governments
Support: NRCS

FSD-6 Reduce the impacts of muck on the Indian River Lagoon.

Revised Language:
Original language "Reduce the impacts of muck (ooze) on the Indian River Lagoon" revised as shown above.

Rationale for Revision:
Edited for clarity

1996 Priority Ranking: Medium
2008 Recommended Priority: Medium

Measure of progress:
Cubic yards of muck removed, upstream sources of muck identified and reduced

Related Actions:
SG-1

Comments/Background:
WMDs, FDEP, FIND, COE, local governments undertaking cooperative muck removal projects. NEP providing support for design, permitting, monitoring, administration, funding, public information and intergovernmental coordination of these projects.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: WMDs
Support: U.S. Army Corps of Engineers, FIND, FDEP, local governments

FSD-7 Amend local government comprehensive growth management plans and land development regulations to incorporate the goals, objectives and actions found in the IRLCCMP.

Revised Language:
Original language "Amend local comprehensive growth management plans or land development regulations to reduce the impact of development on the various resources of the Indian River Lagoon" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting, priority change

1996 Priority Ranking: Medium
2008 Recommended Priority: High

Measure of progress:
Number of local government comprehensive growth management plans incorporating Indian River Lagoon CCMP objectives; number of local governments implementing updated, resource-based, land development regulations

Related Actions:
W-1, W-2, W-3

Comments/Background:
Several local governments have incorporated IRLCCMP goals and objectives into their comprehensive growth management plans and land development regulations.

Implementation:
Moderate, ongoing action

Responsible Parties:
Primary: Local governments
Support: IRLNEP, WMDs, FDEP, interest groups

FSD-8 Enact legislation allowing the use of state revolving trust-fund monies for nonpoint source control projects such as freshwater and stormwater discharge management

Revised Language:
None

Rationale for Revision:
Removed – Action accomplished by legislative action in 1997. Move to success list.

1996 Priority Ranking: Medium
2008 Recommended Priority: N/A

Measure of progress:
Availability of state revolving funds for non-point source pollution control projects

Related Actions:
None

Comments/Background:
Legislation passed in 1997 allows use of 10% of SRF funds for non-point source projects.

Implementation:
Full, completed

Responsible Parties:
Primary: N/A
Support: N/A

FSD-9 Strengthen existing stormwater or freshwater discharge management programs.

Revised Language:
Original language "Investigate the potential of strengthening existing stormwater or freshwater discharge management programs" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: Medium
2008 Recommended Priority: Medium

Measure of progress:
Number of agencies implementing regular regulation review; number of regulations reviewed and updated

Related Actions:
None

Comments/Background:
Ongoing and periodic program and standards review undertaken by EPA, FDEP, WMDs and other agencies; local governments reviewing and updating comprehensive growth management plans and land development regulations.

Implementation:
Substantial; Ongoing action

Responsible Parties:
Primary: FDEP, WMDs, WCDs, local governments

Support: Academia, interest groups

FSD-10 Encourage the proper use of fertilizers, herbicides, pesticides and reuse water.

Revised Language:
Original language "Encourage the proper use of fertilizers, herbicides, and pesticides revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of programs implemented, to inform the public about the impacts of freshwater and stormwater discharges on the Indian River Lagoon and how the public can reduce its impact on the lagoon.

Related Actions:
PIE-4

Comments/Background:
Florida Yards and Neighborhoods program implemented statewide by IFAS. Ongoing action, however continued funding to implement this program is a challenge. The Florida Department of Agriculture is proposing new labeling requirements on all bags of fertilizer sold through retail establishments throughout the state to better educate the consumer and reduce nutrient runoff from residential applications.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: University of Florida/Institute of Food and Agricultural Sciences
Support: USEPA, FDEP, USDA, DACS, WMDs, local governments, interest groups

FSD-11 Educate residents and property owners about the impacts of freshwater and stormwater discharges on the Indian River Lagoon and what they can do to reduce these impacts.

Revised Language:
None

Rationale for Revision:
N/A

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Programs implemented to inform the public about the impacts of freshwater and stormwater discharges on the Indian River Lagoon and how the public can reduce its impact on the Indian River Lagoon

Related Actions:
PIE-1, PIE-3, PIE-4

Comments/Background:
NPDES stormwater permits require permittees to develop stormwater education programs. See Public Involvement and Education (PIE) Actions. The Florida department of Agriculture and Consumer Services is proposing new formulation, labeling and application requirements on all fertilizers sold through retail establishments throughout the state to better educate the consumer and reduce nutrient runoff from residential application.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: IRLNEP, WMDs
Support: FDEP, NRCS, local governments, interest groups

FSD-12 Continue reviews of plans of reclamation for water control districts and the standard operating procedures and project works of each large drainage system and agricultural drainage system. Develop and implement strategies to reduce discharges and pollutant loadings to the Indian River Lagoon from these sources.

Revised Language:
Original language "Undertake a review of the plans of reclamation, standard operating procedures and project works of each large drainage system. Develop strategies to reduce discharges to the Indian River Lagoon" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: Medium

2008 Recommended Priority: Medium

Measure of progress:
Number of plans of reclamation reviewed and updated; status of implementation of revised plans of reclamation

Related Actions:
FSD-3, FSD-4, SG-1, TMDL-1, TMDL-2, TMDL-3

Comments/Background:
Plans of reclamation and operating procedures for most large drainage systems and agricultural drainage systems have been reviewed as part of the Comprehensive Everglades Restoration Plan (CERP), SWIM Plan or local stormwater utility projects. Strategies to update these systems and their operation are in various stages of completion.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: WCDs, WMDs, ACOE, NRCS
Support: FDEP, local governments, interest groups

FSD-13 Upgrade existing urban and agricultural stormwater systems to reduce pollutant loadings to the Indian River Lagoon.

Revised Language:
Original language "Upgrade existing stormwater systems" revised as shown above.

Rationale for Revision:
Edited for clarity; edits suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of stormwater upgrade projects implemented

Related Actions:
FSD-3, FSD-4, FSD-12, TMDL-1, TMDL-2, TMDL-3

Comments/Background:
Numerous stormwater projects have been implemented by local governments and funded by a variety of sources. Master stormwater management plans have been developed and are being implemented by many local governments. NEP has funded

or assisted in obtaining funding for numerous projects, provided technical assistance and review, coordinated projects between various jurisdictions and encouraged WMDs to increase funding of local government assistance grants. A grants writer has been funded by NEP to assist local governments in locating and applying for grants.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: Local governments, FDOT
Support: WMDs, FDEP

FSD-14 Develop and implement appropriate mechanisms to fund and undertake the operation, maintenance and improvement of urban and agricultural stormwater management systems to reduce pollutant loadings.

Revised Language:
Original language "Develop appropriate mechanisms to fund and undertake the operation, maintenance and improvement of stormwater management systems" revised as shown above.

Rationale for Revision:
Suggested by IRL CCMP Steering Committee and at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of stormwater utilities or similar funding mechanisms implemented by cities and counties within the Indian River Lagoon region

Related Actions:
FSD-8

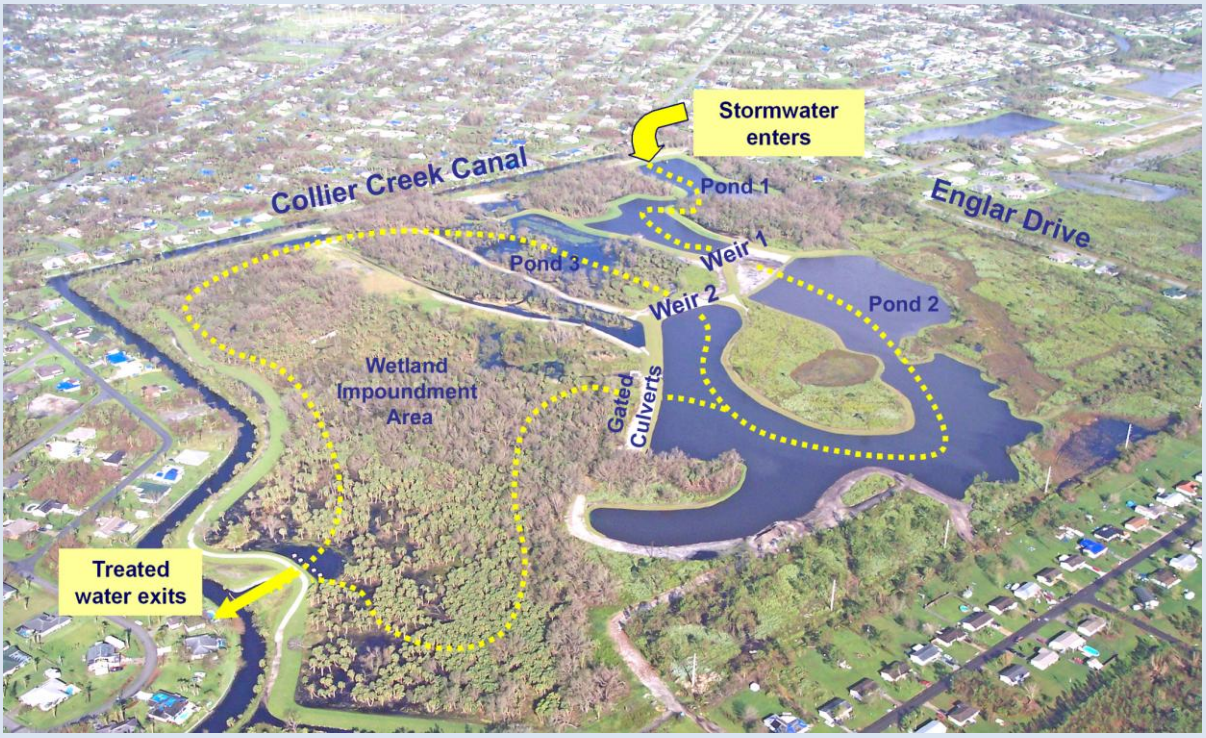
Related Actions:
None

Comments/Background:
Most local governments have developed and implemented stormwater utilities however some have passed enabling legislation but not implemented the full program. NEP has promoted the implementation of stormwater utilities, has provided public education about stormwater and utilities, and has funded development of several stormwater management plans as a precursor to a utility.
Implementation:

Substantial, ongoing action

Responsible Parties:

Primary: Local governments
Support: WMDs, FDEP



Marina and Boat Impacts Action Plan

Objective:
To reduce impacts to the Indian River Lagoon from boating activities and to engage the boating public and marine industries as active participants in the protection and restoration of Indian River Lagoon resources.

Problem:
Boating has been a traditional use of the Indian River Lagoon since Native Americans and early settlers used the lagoon as a primary route for travel and commerce. While the lagoon continues to be heavily used by boaters, today's boating is primarily a recreational activity.

The number of boats and boaters using the Indian River Lagoon is growing rapidly. In 2006, more than 115,000 boats were registered in the Indian River Lagoon region. While recreational use of the lagoon is important for the economy of the region as well as for the enjoyment of its residents and visitors, heavy use can strain the sensitive natural resources of the lagoon.

While most boaters use great care in the operation and maintenance of their boats, some uses may affect the health of the lagoon. Approximately 15% of the vessels registered in the Indian River Lagoon region are greater than 26 feet in length and are required to have some form of marine sanitation device (MSD) on board. Discharges from marine sanitation devices, pollutants generated by fueling and operating boat motors, detergents from boat cleaning and metals or other materials leaching from bottom paints can affect water quality. The impacts of these pollutants can range from slight perturbations to acute toxicity in the water column and sediments to threats to the public health.

Boat traffic itself can damage the lagoon. Boat wakes may erode shorelines and oyster reefs, and if care is not taken to avoid shallow areas, boat propellers may dig into the bottom, disturbing seagrass and/or benthic habitat. In addition to possible damage to the boat, this prop-dredging may impact important seagrass beds or oyster reefs, or stir up bottom sediments. Other recreational impacts can include littering or improper disposal of trash. Manatees, sea turtles, dolphins, fish and birds can be injured or killed by ingesting or becoming entangled in discarded fishing line, nets, plastic bags or other debris.

Numerous marinas and similar facilities have been constructed along the Indian River Lagoon to provide services for boaters and access by the public. Because of their close proximity to the lagoon, these facilities have a high potential to impact the resources of the lagoon if they are not operated and managed carefully.

Education and involvement programs such as the Florida "Clean Boater" and "Clean Marina" programs, promote boater awareness and improved operation and maintenance of boats and marina facilities, bring boaters and marina operators the tolls needed to minimize their potential impacts on the resources of the Indian River Lagoon.

Actions:

MB-1 Implement the Clean Marina Program throughout the Indian River Lagoon.

Revised Language:
Original language "Develop and implement an incentive program promoting the implementation of improved marina operating practices. Explore the feasibility of and need for developing a marina operating permit" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions

1996 Priority Ranking: Medium
2008 Recommended Priority: Medium

Measure of progress:
Number of marinas participating in incentive program

Related Actions:
None

Comments/Background:
FDEP and marine industry interests have developed and are implementing a state-wide "Clean Marina" program, which to date has over 140 participating marinas statewide, with approximately 35 within the Indian River Lagoon region. NEP participated in the development of the "Clean Marina" program and provided support for the implementation of this program.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: FDEP
Support: Marine industry, Sea Grant

MB-2 Implement boat facility siting plans and update these plans as new data and information are available.

Revised Language:
Original language "Complete and implement boat facility siting plans" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions; edited for clarity; comments received at TAC/CAC meeting

1996 Priority Ranking: Medium
2008 Recommended Priority: Medium

Measure of progress:
Number of counties with approved boat facility siting plans

Related Actions:
None

Comments/Background:
Brevard County is in the process of developing a comprehensive maritime management master plan for its portion of the Indian River Lagoon. In addition to habitat and water quality issues, this plan will also address public access to the Indian River Lagoon and the protection and preservation of working waterfronts. All counties along the Indian River Lagoon have approved Manatee Protection Plans (MPPs) that include marine facility siting elements.

Marine facilities siting plans or maritime management plans may include the designation of anchorages or mooring fields. Presently there are few designated mooring areas in the Indian River Lagoon. Through the designation of mooring fields, boaters will be provided a safe and secure anchorage. Designating mooring fields will also provide improved management of mooring, reducing or eliminating damage to seagrasses or other natural resources.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: Local governments
Support: FFWCC, USFWS, DCA, Sea Grant, marine industry

MB-3 Prevent pollutant spills and discharges and protect the resources of the Indian River Lagoon from the impacts of any spills or discharges.

Revised Language:
Original language "Increase protection of resources of the Indian River Lagoon from oil spills" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions; edited for clarity; suggested by IRLCCMP Steering Committee and at TAC/CAC meeting

1996 Priority Ranking: Low
2008 Recommended Priority: Low

Measure of progress:
Status of completion of actions to protect the Indian River Lagoon from oil spills; number of reported and cleaned spills.

Related Actions:
MB-1

Comments/Background:
USCG, FDEP continuing spill response, permitting and inspection of fueling and storage facilities. FWC/FWRI developed environmental sensitivity maps identifying key areas for protection in the event of spills.

Implementation:
Substantial; Ongoing action.

Responsible Parties:
Primary: FDEP, FFWCC, USCG
Support: Florida Sea Grant, marine industry

MB-4 Reduce the impact of in-water, hull-cleaning activities by limited cleaning activities to certified cleaners.

Revised Language:
None

Rationale for Revision:
Removed – Addressed through Clean Marina program (See MB-1)

1996 Priority Ranking: Low
2008 Recommended Priority: N/A

Measure of progress:
Status of development and implementation of hull-cleaning education and certification program

Related Actions:
None

Comments/Background:
BMPs addressing hull cleaning included as part of Clean Marina program.

Implementation:
Substantial

Responsible Parties:
Primary: N/A
Support: N/A

MB-5 Provide educational materials and programs, such as the Clean Boater Program and boater's guides, to owners and operators of boats and personal watercraft.

Revised Language:
Original language "Provide education for-owners and operators of boats and personal watercraft" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions; edits suggested at IRLCCMP Steering Committee, TAC/CAC meeting, and IRL Advisory Board; priority change.

1996 Priority Ranking: High
2008 Recommended Priority: Medium

Measure of progress:
Development and implementation of boater education courses and materials that contain environmental awareness elements, updates of existing guides and similar materials.

Related Actions:
PIE-2

Comments/Background:
Several publications and programs have been developed to provide helpful information for boaters about the Indian River Lagoon, access points (boat ramps/marinas), boater safety and how they can reduce their impact on the resources of the Indian River Lagoon while operating or maintaining their boat. These include the FDEP Clean Boater Program (http://www.dep.state.fl.us/cleanmarina/) which offers a variety of helpful information for boaters. Other sources include the Boaters Guide to the Indian River Lagoon published in 1996 and the Boaters Guide to Brevard County developed in 2005. Both these publications were sponsored by the IRL NEP in cooperation with a variety of other interests.

Implementation:
Substantial, ongoing action

Responsible Parties:

Primary: FDEP, FFWCC

Support: USCG, USCG Auxiliary, U.S Power Squadron, marine industry, interest groups

MB-6 Expand and coordinate enforcement of boating safety and resource protection regulations throughout the Indian River Lagoon.

Revised Language:
Original language "Improve enforcement of boating safety and resource protection regulations through an improved Florida Marine Patrol presence" revised as shown above.

Rationale for Revision:
Edits suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of law enforcement staff assigned to patrol the Indian River Lagoon, amount of staff time committed to patrolling the Indian River Lagoon

Related Actions:
None

Comments/Background:
Several agencies ranging from federal (US Coast Guard, USFWS, NMFS and others) and state FFWCC/Division of Law Enforcement, FDEP/Division of Law Enforcement), to many local governments (counties and cities) have marine law enforcement capability. Enhanced coordination and collaboration among these agencies will improve enforcement of boating safety and resource protection regulations, providing improved protection for the resources of the Indian River Lagoon.

Implementation:
Moderate, ongoing action

Responsible Parties:

Primary: Florida Legislature

Support: FFWCC, FDEP, USCG, local governments, interest groups

MB-7 Eliminate the impacts of waste discharges and marine sanitation devices on the public health and Indian River Lagoon resources.

Revised Language:
Original language "Minimize the impacts of waste discharges and marine sanitation devices on the public health and resources of the Indian River Lagoon" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting, IRL Advisory Board

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of MSD pumpout facilities, portable toilet dump stations and rest rooms available to the boating public, the establishment of no-discharge zones for marine sanitation devices throughout or in segments of the Indian River Lagoon.

Related Actions:
MB-1, PIE-1, PIE-2, PIE-3, and PIE-4

Comments/Background:
Funding available for *marine* pumpout facilities through FDEP. Several pumpout facilities ~~and~~ constructed in the Indian River Lagoon region. Provision of pumpout facilities part of the Clean Marina program and Brevard County comprehensive maritime management master plan.

The impacts of discharges from marine sanitation devices may also be addressed by establishing no-discharge zones for these devices. The entire Indian River Lagoon could be designated as a no-discharge zone or certain segments could be designated.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: FDEP, local governments
Support: Florida Sea Grant, marine industry

MB-8 Monitor boating impacts to Indian River Lagoon natural resources. Where appropriate, establish resource protection zones and monitor their effectiveness.

Revised Language:
Original language “Establish resource protection zones in the Indian River Lagoon” revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting, IRL Advisory Board; priority change

1996 Priority Ranking: Low
2008 Recommended Priority: Medium

Measure of progress:
Number of resource evaluations conducted; number of resource protection zones established; reductions in manatee strikes and prop scarring, reductions in impacts to seagrass beds and oyster reefs.

Related Actions:
None

Comments/Background:
"Slow Speed," "No Entry" and other zones implemented as part of Manatee Protection Plans. MINWR implementing "Pole/Troll" zones in Mosquito Lagoon to protect seagrass resources.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: USFWS, FFWCC, local governments
Support: WMDs, academia, interest groups

Atmospheric Deposition Action Plan

Objective:

To determine the impacts of atmospheric deposition of pollutants on the resources of the Indian River Lagoon and to develop and implement strategies to address these impacts.

Problem:
An emerging issue for the Indian River Lagoon and other waters in Florida is the atmospheric deposition of nutrients and other pollutants. Studies by the Tampa Bay National Estuary Program estimated that up to 21 percent of the nitrogen loadings to Tampa Bay result from atmospheric deposition directly to the bay (http://www.tbep.org/baystate/waterquality.html, http://www.tbeptech.org/html/tnload_jun9.html).

Sources of atmospheric pollutants may be local, resulting from emissions from stationary sources such as power plants or mobile sources (automobiles) in the area, or they may be located elsewhere, even outside the United States.

A National Atmospheric Deposition Program (NADP) monitoring site is located at Kennedy Space Center and two additional atmospheric deposition monitoring sites have been established for the Indian River Lagoon basin. Data from these sites has been used in the development of pollutant load reduction goals for the Indian River Lagoon.

Actions:

AD-1 Determine the impacts of atmospheric deposition of pollutants on the water quality and resources of the Indian River Lagoon.

Revised Language:
Original language "Determine the impacts of atmospheric deposition of pollutants on the water quality and resources of the Indian River Lagoon" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions; priority change

1996 Priority Ranking: Low
2008 Recommended Priority: Medium

Measure of progress:
Determining the role of atmospheric deposition in pollutant loadings to the lagoon as an emerging concern requiring additional investigation.

Related Actions:
FSD-3, TMDL-1

Comments/Background:
Atmospheric deposition monitoring stations established in Volusia and Indian River counties. Data used to develop pollutant load reduction goals for Indian River Lagoon.

Implementation:
Moderate, ongoing action.

Responsible Parties:

Primary: EPA, FDEP

Support: WMDs, academia, local governments, interest groups

Total Maximum Daily Loads (TMDLs) Action Plan

Objective:
Full implementation of basin management action plans (BMAPs) to meet total maximum daily loads (TMDLs) developed for the Indian River Lagoon.

Problem:
Many of the waters of the Indian River Lagoon do not consistently meet state and federal water quality standards for one or more parameters. As a result, these waters have been determined to be "impaired". Under the federal Clean Water Act, this determination requires the development of total maximum daily loads (or TMDLs) of pollutants to the water body, specifying reductions in the pollutants causing the impairment in order to meet water quality standards.

TMDLs have been developed for the Indian River Lagoon and basin management action plans (BMAPs) are being developed that will detail how the TMDL for each basin within the lagoon will be implemented. TMDL development is an ongoing process, refining TMDLs as more data and information becomes available and as changes occur within the basin. BMAPs will be detailed strategies to meet TMDLs but they will be adaptive, allowing for flexibility to take advantage of opportunities when they arise.

Actions:

TMDL-1 Develop, implement, and update TMDLs for all areas of the Indian River Lagoon.

Revised Language:
None – New action

Rationale for Revision:
New Action - See Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Number of TMDLs developed, implemented or updated

Related Actions:
FSD-3, FSD-12, FSD-13, SG-1

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: FDEP
Support: EPA, WMDs, FFWCC, academia, local governments, interest groups

TMDL-2 Coordinate development and implementation of BMAPs with Florida Department of Environmental Protection.

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Number of BMAPs established in basins requiring TMDLs

Related Actions:
FSD-3, FSD-12, FSD-13, SG-1

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: FDEP, IRLNEP/WMDs
Support: Local governments, academia, interest groups

TMDL-3 Support implementation of Basin Management Action Plans (BMAPs) for all basins requiring TMDLs.

Revised Language:
None – New Action

Rationale for Revision:
New Action – See Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Number of BMAPs implementing management action plans in basins requiring TMDLs

Related Actions:
FSD-3, FSD-12, FSD-13, SG-1

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: FDEP, IRLNEP/WMDs
Support: Local governments, academia, interest groups

Biodiversity Action Plan

Objective:
Develop and implement a coordinated scientific conservation and management strategy to preserve, protect and restore biodiversity in the Indian River Lagoon.

Problem:
The Indian River Lagoon and its surrounding region is a complex landscape consisting of a broad variety of habitats, which in turn, support a large number of plant and animal species. Much of the biological diversity found in the region results from both physical features of the lagoon, as well as the overlapping of two different climactic zones. These two zones, the temperate Carolinian and the sub-tropical Caribbean, allow species that tolerate different climates to interact within the same region. As a result, a variety of species associated with both of these provinces, as well as species unique to the area, is found within the lagoon region.

Numerous studies and several management activities have attempted to address the maintenance of biological diversity in the Indian River Lagoon region. In the past, many of these efforts frequently lacked coordination such that management and protection activities were often a confusing and occasionally contradictory maze of agencies, policies and regulations. In addition, some species or communities have been the subjects of a number of studies while little information is available on other species or communities.

A comprehensive biodiversity management strategy for the Indian River Lagoon region should consider all aspects of biological productivity, diversity and integrity. Protecting and managing biodiversity will require improved knowledge of the elements of this regional ecosystem and how these elements interact. Acquiring the needed knowledge and developing and implementing a strategy to protect and manage the biodiversity of the Indian River Lagoon region will require the coordination as well as the cooperation and collaboration of a wide variety of entities ranging from academia to the various regulatory and management agencies to local governments to individuals residing in the region.

Actions:

BD-1 Coordinate biodiversity activities within the Indian River Lagoon region.

Revised Language:
None

Rationale for Revision:
Priority change

1996 Priority Ranking: Medium
2008 Recommended Priority: High

Measure of progress:
Through the Technical Advisory Committee, establishment of a multi-organizational Biodiversity Committee that meets regularly and tracks trends in Indian River Lagoon biodiversity.

Related Actions:
ETS-1, MB-8, DIM-2, DIM-3, DIM-4, SR-1, SR-2, SR-3, SR-4

Comments/Background:
Multi-species recovery plan for south Florida developed by USFWS.

Implementation:
Moderate, ongoing action

Responsible Parties:
Primary: USFWS, FFWCC, NMFS, academia
Support: FDEP, WMDs, local governments

BD-2 Acquire and effectively manage environmentally sensitive lands as a tool to preserve, protect and restore the biological diversity, functional integrity and productivity of the Indian River Lagoon region.

Revised Language:
Original language "Continue the acquisition and management of environmentally sensitive lands in order to preserve, protect and restore the biological diversity, integrity and productivity of the Indian River Lagoon region" revised as shown above.

Rationale for Revision:
Suggested by the IRLCCMP Steering Committee and at the TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of acres acquired, managed and/or restored to protect biodiversity in the Indian River Lagoon region; number of land management plans developed and implemented with specific language addressing protection or enhancement of biodiversity.

Related Actions:
LA-1, LA-2, ETS-3, W-4

Comments/Background:
See Action Plans LA-1, LA-2.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: Local governments, WMDs
Support: FDEP, FFWCC, USFWS, interest groups

BD-3 Control or eradicate invasive exotic (non-native) fauna and flora in the Indian River Lagoon region.

Revised Language:
None

Rationale for Revision:
Removed – This action is replaced by new Action Plan (Invasive Flora and Fauna)

1996 Priority Ranking: Low
2008 Recommended Priority: N/A

Measure of progress:
Status of the evaluation of the extent of exotic species invasion; acres of exotic vegetation controlled

Related Actions:
PIE-3, PIE-4

Comments/Background:
Several exotic plant removal projects have been undertaken by agencies, local governments and interest groups. FDEP has mapped exotic plant acreage and established regional exotic plant working groups and provided funding for several exotic plant removal projects.

Implementation:
Moderate, ongoing action

Responsible Parties:
Primary: N/A
Support: N/A

BD-4 Create and maintain a species inventory for the Indian River Lagoon.

Revised Language:
None – New action

Rationale for Revision:
New action suggested by public comment at IRL Advisory Board Meeting

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Status of species inventory updates, number of species accounts developed, availability of the inventory to the general public.

Related Actions:
PIE-1

Comments/Background:
The original Indian River Lagoon species inventory was developed by the Florida Institute of Technology in the mid-1990s. The inventory has been updated, refined, species accounts developed and the inventory made available on the internet by the Smithsonian Marine Station under contract with the Indian River Lagoon Program.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: Academia, USFWS, NMFS, FDEP, FFWCC
Support: Interest groups

Seagrass Protection, Restoration And Management Action Plan

Objective:

To protect and restore seagrass integrity and functionality in the Indian River Lagoon by reducing anthropogenic impacts and attaining and maintaining water quality capable of supporting a healthy, productive and sustainable submerged aquatic vegetation community meeting the seagrass coverage and depth targets developed by the water management districts for the Indian River Lagoon.

Problem:

Submerged aquatic vegetation communities (seagrass and macroalgae) provide critical habitats for numerous invertebrates and fishes, contribute to the food web and help provide shoreline protection.

Seagrass in the lagoon has been adversely affected by man's activities with some areas experiencing declines in seagrass coverage of up to 80 percent. Other areas, more remote from urban centers, have remained relatively healthy. Lagoon-wide, between the 1940s and the 1990s loss in seagrass coverage was nearly 20 percent. In recent years, seagrass coverage has increased in many areas, with Lagoon-wide coverage approaching the acreage of seagrass found in the 1940s. Although improving, most urbanized segments still exhibit significant losses in seagrass coverage when compared with historic acreage.

Declines in seagrass coverage are linked to reduced water quality, particularly those parameters which affect water clarity or transparency. The relationship between water clarity and the extent or abundance of grasses is well documented. This recognition of the relationship between seagrass growth, light availability and water quality has led to the realization that present water quality standards are poorly suited to protect sea grasses.

Actions:

SG-1 Implement a program of protection, restoration and management activities needed to maintain, protect and restore the seagrass/SAV community of the Indian River Lagoon.

Revised Language:

Original language "Implement a program of restoration and management activities needed to maintain, protect and restore the seagrass/SAV community of the Indian River Lagoon" revised as shown above.

Rationale for Revision:

Suggested at TAC/CAC meeting

1996 Priority Ranking: High

2008 Recommended Priority: High

Measure of progress:
Number of acres of healthy seagrass meeting coverage and depth targets relative to historic conditions.

Related Actions:
FSD-3, FSD-6, FSD-10, FSD-12, W-6, TMDL-1, TMDL-2, TMDL-3, (SG-1)

Comments/Background:
Activities include completion of historic (1943) maps of seagrass; ongoing photography and mapping of seagrass throughout the Indian River Lagoon; establishment and regular monitoring of more than 75 seagrass transects throughout Indian River Lagoon; development and/or implementation of hydrodynamic/water quality models based on ecological needs of seagrass; and development of PLRGs/TMDLs based on the outcomes of hydrodynamic/water quality models.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: WMDs
Support: FDEP, FFWCC, USFWS, NPS, academia, interest groups

Smithsonian Marine Station

Wetlands Action Plan

Objective:

Preserve, protect, restore and enhance the wetland resources of the Indian River Lagoon region.

Problem:

Wetlands within the Indian River Lagoon region play a key role in maintaining a healthy ecosystem. These wetlands provide a wide variety of ecological functions including serving as habitat for various species, providing water quality protection and improvement, supporting the food chain, providing flood storage and buffering the lagoon from activities that occur on adjacent uplands.

Many of the wetlands in the Indian River Lagoon have been lost to all types of development, including urban, industrial and agricultural. Brantly (1980) estimated that 8 percent of Florida's estuarine habitat had been lost to development. Within the Indian River Lagoon region, Hoffman and Haddad (1988) estimated that 27 percent of the mangrove acreage in the Fort Pierce area alone was lost between 1940 and 1987. It is likely that similar losses of wetlands occurred in the vicinity of other urban centers in the Indian River Lagoon region.

In addition to direct wetlands loss, more than 40,000 acres of wetlands were impounded for mosquito control purposes and isolated from the Indian River Lagoon (Rey and Kain, 1989). Impounding the wetlands effectively controlled mosquitoes but it also isolated these wetlands from the Indian River Lagoon. As a result, the water quality and habitat benefits of these wetlands to the Indian River Lagoon were largely lost.

Management of wetland impoundments has varied over time. For many years, most management activities in impoundments were limited to water level manipulations using pumps or artesian wells. In recent years, culverts have been installed in the dikes of some impoundments to re-establish the vital connection between the impounded marshes and the Indian River Lagoon. In certain situations, dikes have been entirely removed. Restoration of the connection between formerly impounded wetlands and the open waters of the Lagoon not only benefits water quality, but also improves the habitat quality of the formerly impounded wetlands, providing additional habitat to many Indian River Lagoon species dependent on wetlands for all or a portion of their life cycles.

These revised management practices have not been implemented in all impounded marshes because many of the remaining impounded wetlands in the Indian River Lagoon are privately owned and many of these landowners are reluctant to allow changes in current management practices. However, on publicly owned lands, programs have been enacted at the state and federal levels that regulate development or construction activities within wetlands, thus reducing the rate of wetland loss. Many local governments have also enacted wetland protection policies or ordinances.

Actions:

W-1 Implement programs that protect the ecological services of wetlands.

Revised Language:
Original language "Improve implementation of wetland protection programs" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of agencies implementing wetlands protection plans and policies that assess and evaluate wetland function.

Related Actions:
None

Comments/Background:
Several agencies and local governments have added staff to review projects for compliance with wetland and other resource protection regulations. Suggested changes will provide more focus on wetlands function.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: USACOE, USFWS, NMFS, FDEP, WMDs, local governments
Support: Interest groups, academia

W-2 Regular review and updating of wetlands protection rules and regulations.

Revised Language:
Original language "Undertake a regular review of wetlands protection rules and regulations" revised as shown above.

Rationale for Revision:
Minor clarification

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of agencies implementing regular review of wetland policies and regulations that protect wetlands function.

Related Actions:
None

Comments/Background:
Agencies conducting regular review of programs and regulations; local governments updating growth management plans and land development regulations.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: USACOE, USFWS, NMFS, FDEP, WMDs, local governments
Support: Interest groups, academia

W-3 Establish or enhance wetland or shoreline setback buffers.

Revised Language:
Original language "Establish wetlands or shoreline setback or buffers" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: Medium
2008 Recommended Priority: Medium

Measure of progress:
Development and implementation of resource-based development setback buffers

Related Actions:
None

Comments/Background:
Agencies conducting regular review of programs and regulations; local governments updating growth management plans and land development regulations.

Implementation:
Moderate, ongoing action

Responsible Parties:
Primary: Local governments

Support: WMDs, academia, interest groups

W-4 Implement innovative programs and incentives supporting wetlands protection and management on privately owned lands. When necessary, acquire ownership or control of crucial wetlands.

Revised Language:
Original language "Acquire ownership or control of wetlands" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Acres of privately owned wetlands protected and managed through innovative incentive programs.

Related Actions:
LA-1, LA-2

Comments/Background:
Implementing innovative programs and incentives promoting wetlands protection and management on privately owned lands may be a more effective means of accomplishing improved wetlands protection and management. Should these programs fail to achieve the desired results on wetlands determined to be crucial for protection of public health (mosquito control) or protection or restoration of Indian River Lagoon resources acquisition of ownership or control may be considered.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary:
Support: WMDs, local governments, interest groups

W-5 Continue the restoration and rehabilitation of impacted or impounded coastal wetlands.

Revised Language:
Original language "Reconnect impounded wetlands to the Indian River Lagoon" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Acres of impacted or impounded coastal wetlands restored or rehabilitated.

Related Actions:
IM-1, IM-2

Comments/Background:
More than 40,000 acres of Indian River Lagoon wetlands have been impacted or impounded by mosquito control activities since the 1930s. While these activities provided effective mosquito control, the water quality and habitat benefits of these wetlands to the Indian River Lagoon system were severely impacted.

In recent years, projects have been undertaken in partnership with mosquito control districts to restore or rehabilitate many of these wetlands. Where possible, impounded wetlands are restored by removal of impoundment dikes. Where restoration is not feasible, impounded wetlands are rehabilitated by reconnection to the Indian River Lagoon and implementation of improved management practices such as Rotational Impoundment Management (RIM). Wetlands impacted by dragline ditches created for mosquito control purposes have also been restored by removing the fill generated by the creation of the ditches and placing it in the ditch, restoring both the filled wetland and the ditch area.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: WMDs, mosquito control districts
Support: SOMM, FDEP, FFWCC, USFWS, NMFS

W-6 Continue projects and programs to restore shorelines.

Revised Language:
Original language "restore wetlands and shorelines" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions; priority change

1996 Priority Ranking: Medium
2008 Recommended Priority: High

Measure of progress:
Length of shoreline restored

Related Actions:
BD-1, SG-1, PIE-4

Comments/Background:
Environmental Learning Center hosted shoreline restoration program partially funded by NEP for ten years but recently terminated the program. FDEP-CAMA will be taking over this program in the near future. Marine Resources Council, Volusia Soil and Water Conservation District, and the Marine Discovery Center are also undertaking shoreline restoration projects.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: WMDs, FDEP, MRC
Support: Local governments, interest groups, NOAA

W-7 Promote the removal of trash and litter from wetlands, shorelines and islands.

Revised Language:
Original language "Remove trash and litter from wetlands and shorelines" revised as shown above.

Rationale for Revision:
Suggested by IRL CCMP Steering Committee and at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Acres of wetland or length of shoreline cleaned

Related Actions:
PIE-4

Comments/Background:
Beautification groups have established "Adopt-a-Shoreline," and "Adopt-an-Island" programs throughout the Indian River Lagoon region. Spoil Island Working Group conducts regular island cleanups. NEP participates with community stakeholders in annual coastal clean-up days.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: Interest groups
Support: FDEP, WMDs, local governments

W-8 Undertake research to develop new and improved wetland management best management practices (BMPs).

Revised Language:
None – New action

Rationale for Revision:
New action suggested at TAC/CAC meeting

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Number of wetland best management practices developed and implemented

Related Actions:
W-3, W-5, W-6

Comments/Background:
Development of improved best management practices for wetlands will result in more effective and efficient wetland management. These management practices are anticipated to be adaptive rather than rigid, allowing for response to changing conditions.

Implementation:
New action – to be determined

Responsible Parties:
Primary: NRCS, WMDs, FDEP
Support: Academia, interest groups

Impounded Marsh Restoration And Management Action Plan

Objective:
Restore the function of marshes impounded for mosquito control purposes.

Problem:
Starting with initial projects in the 1930s, more than 40,000 acres of wetlands adjacent to the Indian River Lagoon have been impounded by building dikes around these wetlands for mosquito control purposes. Impounding the marshes effectively controlled mosquitoes but it also isolated wetlands from the open waters of the lagoon. As a result, the water quality and habitat benefits of these wetlands to the Indian River Lagoon were largely lost.

Management of these marshes has varied over time. For many years, most management activities in impounded wetlands were limited to water level manipulations using pumps or artesian wells. In recent years, culverts have been installed in the dikes of some impoundments to re-establish the vital connection between the impounded marshes and the Indian River Lagoon. In certain situations, portions of the dike have been entirely removed. Restoration of the connection between formerly impounded wetlands and the open waters of the lagoon provides benefits water quality, improves the quality of the formerly impounded wetlands and provides additional habitat to many Indian River Lagoon species dependent on wetlands for all or a portion of their life cycles.

These revised management practices have not been implemented in all impounded marshes. Much of the remaining impounded wetlands in the Indian River Lagoon are privately owned and many of these landowners are reluctant to allow changes in current management practices.

Actions:

IM-1 Complete or continue diagnostic, management or feasibility projects related to impounded marshes found in the 1994 SWIM Plan.

Revised Language:
None

Rationale for Revision:
Removed – Actions incorporated into Wetlands Action Plan

1996 Priority Ranking: High
2008 Recommended Priority: N/A

Measure of progress:
Number or percent of projects in the IRL-SWIM Plan completed or continued

Related Actions:
W-5

Comments/Background:
SJRWMD, SFWMD, FMEL, USFWS, FDEP, county mosquito control districts, Subcommittee on Managed Marshes (SOMM), local governments and others implementing SWIM Plan projects and programs.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: N/A
Support: N/A

IM-2 Continue the acquisition of privately owned impounded marshes or obtain conservation easements allowing restoration of their natural functions.

Revised Language:
None

Rationale for Revision:
Removed – Actions incorporated into Wetlands Action Plan

1996 Priority Ranking: High
2008 Recommended Priority: N/A

Measure of progress:
Acreage of privately owned impounded marshes purchased or easements acquired

Related Actions:
LA-1, LA-2, W-4

Comments/Background:
See Action LA-1, LA-2

Implementation:
Ongoing action

Responsible Parties:
Primary: N/A
Support: N/A

Land Acquisition And Protection Action Plan

Objective:
Develop and implement a coordinated strategy to protect environmentally endangered habitats within the Indian River Lagoon basin through acquisition.

Problem:
The water quality of the Indian River Lagoon is directly affected by activities on the lands surrounding the lagoon. Coastal development, stormwater runoff and alteration or destruction of adjacent habitats affect the natural resources of the lagoon. Upland and wetland areas adjacent to the lagoon serve as important travel corridors or habitat for many species. Protection of these upland-wetland-lagoon linkages is important to many of the biological resources of the Indian River Lagoon.

Management of these critical habitats can prove difficult since many of these areas are privately owned. The simplest way to ensure proper management of these areas is through property acquisition or easements. The Indian River Lagoon Blueway Project, a cooperative acquisition plan, was developed through the collaborative efforts of a variety of agencies and identified key properties throughout the Indian River Lagoon region for acquisition. The IRL Blueway Project continues to be a high priority project for the Florida Forever environmental land acquisition program.

While several targeted properties have been acquired, others remain in private hands. For lands with valued habitats that are anticipated to remain in private ownership, provision of incentives encouraging conservation and appropriate management of these lands may be an alternative to acquisition.

In addition to access for wildlife, public access to the Indian River Lagoon is becoming more limited as properties are developed and access points that were once "public" such as marinas, bait shops and restaurants are acquired for private development. Acquisition of property or obtaining easements to provide public access to the Indian River Lagoon is an important aspect of land acquisition.

Actions:

LA-1 Continue coordination of efforts to identify, classify, acquire and manage environmentally sensitive lands throughout the Indian River Lagoon region.

Revised Language:
Original language "Develop a coordinated strategy to identify, classify, acquire and manage environmentally sensitive lands throughout the Indian River Lagoon region" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions; edit for clarity

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Establishment of an Indian River Lagoon-wide land acquisition working group; development and implementation and updating of a strategy to identify and acquire environmentally sensitive lands in the Indian River Lagoon basin.

Related Actions:
BD-2, ETS-3, W-4, IM-2

Comments/Background:
Land acquisition working group (WMDs, FDEP, USFWS, local governments, and private interests) established. A land acquisition package (IRL Blueway Project) involving 600 properties and 8000 acres submitted to Florida Forever, which continues to be highly ranked. Several properties acquired.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: TNC, IRLNEP
Support: WMDs, FDEP, local governments, interest groups

LA-2 Acquire ownership or management of wetlands adjacent to the Indian River Lagoon.

Revised Language:
None

Rationale for Revision:
Removed – Redundant with LA-1 above

1996 Priority Ranking: High
2008 Recommended Priority: N/A

Measure of progress:
Acreage of impounded wetlands purchased or easements acquired

Related Actions:
W-4, IM-2

Comments/Background:
Land and easement acquisition projects by local governments and mosquito control districts planned or initiated and at various stages of completion. Many of the parcels identified for acquisition included in the IRL Blueway Project

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: N/A
Support: N/A

LA-3 Support continuation and expansion of state funding initiatives for long-term acquisition programs for conservation lands.

Revised Language:
None – New Action

Rationale for Revision:
Suggested by IRLCCMP Steering Committee with edits at the TAC/CAC meeting

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Additional state funding provided for long-term acquisition programs

Related Actions:
None

Comments/Background:
The Florida Forever land acquisition program will sunset in the near future. This program should be extended or a new acquisition program with a secure funding source needs to be developed by the Florida Legislature.

Implementation:
New action – to be determined

Responsible Parties:
Primary: Florida Legislature
Support: FDEP, FFWCC, local governments, interest groups

LA-4 Develop and implement incentives to promote conservation of privately owned environmentally sensitive lands.

Revised Language:
None – New action

Rationale for Revision:
Suggested at the TAC/CAC meeting

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Development and implementation of incentives, number of acres of privately owned lands included in incentive program

Related Actions:
W-4, ETS-4

Comments/Background:
Providing incentives to private landowners to maintain or implement conservation-based management practices on environmentally sensitive lands they own may be less costly than attempting to acquire these lands. These incentives may include tax abatement or deferment, temporary or long-term easements or other strategies.

Implementation:
New action – to be determined

Responsible Parties:
Primary: TNC, interest groups
Support: FDEP, FFWCC, WMDs, local governments

LA-5 Promote the acquisition of lands for public access to the Indian River Lagoon.

Revised Language:
None – New action

Rationale for Revision:
Suggested at the TAC/CAC meeting

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Number of public access points to the Indian River Lagoon acquired

Related Actions:
MB-2

Comments/Background:
Public access to the Indian River Lagoon has diminished in recent years as riverfront tracts have been developed and formerly public marinas, fish houses and other businesses have been privatized or converted to residential development. Through this action, parcels would be acquired to provide public access to the Indian River Lagoon.

Implementation:
New action – to be determined

Responsible Parties:

Primary: Local governments
Support: FDEP/Coastal Mgt Program, DCA/Florida Communities Trust/Waterfronts Florida, WMDs, interest groups

Endangered and Threatened Species Action Plan

Objective:
Protect endangered and threatened species found in the Indian River Lagoon region.

Problem:
The Indian River Lagoon region has over 50 species that are listed as endangered, threatened, or species of special concern, and more than 70 others that are considered rare. Included are a variety of plants and animals ranging from small, seldom seen species such as the mangrove rivulus fish *(Rivulus marmoratus)* to large and well publicized ones such as the Florida manatee *(Trichecus manatus latirostris)*.

Several factors are responsible for the endangerment and diminishing numbers of special status species. Habitat loss is a primary cause of declining population size for many species. As the lagoon region developed, much of the habitat important to these species was destroyed or altered. While regulations generally provide protection for specific plants or animals, habitat often receives little protection.

While individual species recovery plans continue to be developed as required by federal law, the trend has been to integrate these species recovery plans into ecosystem management plans developed to protect and restore the habitats of threatened and endangered species.

Actions:

ETS-1 Develop, implement, update or refine adaptive management or recovery plans for the endangered, threatened and species of special concern found in the Indian River Lagoon region.

Revised Language:
Original language "Develop, update, or refine management plans for the endangered and threatened species, and species of special concern found in the Indian River Lagoon region" revised as shown above.

Rationale for Revision:
Minor clarification to text; Priority change

1996 Priority Ranking: Medium
2008 Recommended Priority: High

Measure of progress:
Number of species recovery plans reviewed, developed, updated or revised; number of management plans developed

Related Actions:
None

Comments/Background:
Multi-species recovery plan for south Florida has been developed by USFWS. Updates of several recovery plans in progress. While individual species recovery plans are required by federal law, the trend is to integrate these plans into ecosystem management plans developed to protect and restore the habitats of these species.

Implementation:
Moderate, ongoing action

Responsible Parties:
Primary: USFWS, NMFS, FFWCC
Support: FDEP, academia, interest groups

ETS-2 Improve enforcement of regulations protecting endangered, threatened or species of special concern in the Indian River Lagoon region.

Revised Language:
None

Rationale:
N/A

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of personnel trained and participating in the enforcement of regulations designed to protect endangered and threatened species and species of special concern

Related Actions:
MB-7

Comments/Background:
USFWS, FWCC are the primary enforcement agencies. The recent merger of Marine Patrol with FWCC Law Enforcement has provided some additional law enforcement staff and capabilities.

Implementation:
Moderate, ongoing action

Responsible Parties:
Primary: USFWS, NMFS, FFWCC
Support: FDEP, local governments

ETS-3 Protect and manage the critical habitats of endangered, threatened or species of special concern found within the Indian River Lagoon region through land acquisition and other land protection measures.

Revised Language:
Original language "Protect the critical habitats of endangered and threatened species or species of special concern found within the Indian River Lagoon region through land aquisition" revised as shown above.

Rationale for Revision:
Minor clarification to text

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Acres of endangered, threatened and species of special concern habitat protected in the Indian River Lagoon region.

Related Actions:
BD-2, W-4, IM-2, LA-1, LA-2

Comments/Background:
See Action LA-1, LA-2

Implementation:
Substantial, Ongoing action

Responsible Parties:
Primary: TNC
Support: USFWS, NMFS, FFWCC, WMDs, local governments

ETS-4 Undertake studies of wildlife diseases occurring in the Indian River Lagoon region, which may be caused by human activities.

Revised Language:
None

Rationale for Revision:
Removed - Replaced with new Action Plan below

1996 Priority Ranking: High
2008 Recommended Priority: N/A

Measure of progress:
Initiation of studies of Indian River Lagoon wildlife diseases

Related Actions:
BD-2, W-4, IM-2, LA-1, LA-2

Comments/Background:
IRLNEP, FWCC/FWRI established Biotoxin & Aquatic Animal Health Working Group to investigate various diseases and maladies of wildlife in the Indian River Lagoon. Several research and diagnostic projects have been funded.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: N/A
Support: N/A

ETS-5 Encourage private land owners to manage lands for endangered species, threatened species, and species of special concern found within the Indian River Lagoon region.

Revised Language:
None – New action

Rationale for Revision:
New action suggested by IRL CCMP Steering Committee to replace old ETS-4 above

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Acres of endangered, threatened and species of special concern habitat protected by private landowners in the Indian River Lagoon region.

Related Actions:
BD-2, W-4, IM-2, LA-1, LA-2

Comments/Background:
See Action LA-1, LA-2

Implementation:
New action – to be determined

Responsible Parties:

Primary: private land owners
Support: WMDs, local governments, interest groups

ETS-6 Identify endangered, threatened and species of special concern distribution and critical habitats throughout the Indian River Lagoon.

Revised Language:
None

Rationale for Revision:
New action – suggested at the TAC/CAC meeting

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Endangered, threatened and species of special concern crucial distribution and crucial habitats identified and mapped.

Related Actions:
ETS-1, ETS-2, ETS-3, ETS-4

Comments/Background:
Projects to implement this action should build on the Fish and Wildlife Conservation Commission Legacy Program and Florida Natural Area Inventory efforts.

Implementation:
New action – to be determined

Responsible Parties:

Primary: USFWS, FFWCC
Support: FFWCC, FDEP, WMDs, academia, local governments, interest Groups

Fisheries Action Plan

Objective:

Conserve, protect, and restore the fin and shellfish resources of the Indian River Lagoon.

Problem:

Fishing in the Indian River Lagoon has been a recreational pastime and means of subsistence for centuries. Fish populations in the lagoon are some of the richest and most diverse in the United States with more than 700 species identified.

Total fishery landings from the Indian River Lagoon region have increased over the years but these landings combine both lagoon and oceanic landings. Reports from the 1980s show declines in landings of spotted seatrout, a species largely limited to estuaries and strongly associated with grassbeds. Recent fisheries data from the Fisheries Independent Monitoring program conducted by the Florida Fish and Wildlife Research Institute generally show fisheries stocks in the Indian River Lagoon to be stable, although smaller than historic numbers.

The Fisheries Independent Monitoring Program is being undertaken by the Florida Fish and Wildlife Research Institute. This program, which is being conducted in several regions, provides estimates of the relative abundance of many economically and recreationally important species and the data allow the development of annual abundance models of juvenile fishes. These models may be used to predict the availability of a species in the near future and provides the numbers and information needed to determine necessary fisheries management measures and to assess the effectiveness of those measures after they are enacted.

In addition to the Fisheries Independent Monitoring Program, various academic and research institutions active in the Indian River Lagoon region are conducting research projects to inventory and assess the ecological requirements of various species, as well as other fisheries-related studies.

In addition to finfish, several species of shellfish are important components of fishery landings. Blue crabs, stone crabs, hard clams and oysters are harvested from the lagoon by commercial and recreational anglers. Of these species, blue crabs, hard clams and oysters are the primary shellfish species of commercial importance in the Indian River Lagoon.

Actions:

F-1 Conserve, protect, restore and manage the finfish and shellfish resources in the Indian River Lagoon region.

Revised Language:

Original language “Improve management of fisheries in the Indian River Lagoon region” revised as shown above.

Rationale for Revision:
Suggested by IRLCCMP Steering Committee and at the TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
FWRI management actions and monitoring reports show stocks are recovering

Related Actions:
None

Comments/Background:
FWCC/FWRI implemented and expanded studies of Indian River Lagoon fisheries coordinated with other agencies and academia.

Implementation:
Moderate, ongoing action

Responsible Parties:
Primary: FFWCC, MFC
Support: NMFS, USFWS, FDEP, WMDs, Sea Grant, academia, interest groups

F-2 Develop a coordinated fisheries research agenda to improve the present knowledge of the fisheries in the Indian River Lagoon.

Revised Language:
None

Rationale for Revision:
Removed – Incorporated into Action F-3 below

1996 Priority Ranking: High
2008 Recommended Priority: N/A

Measure of progress:
Initiation of efforts to collect fisheries data specific to the Indian River Lagoon

Related Actions:
None

Comments/Background:
FWCC/FWRI implemented and expanded studies of Indian River Lagoon fisheries coordinated with other agencies and academia.

Implementation:
Moderate, ongoing action

Responsible Parties:
Primary: N/A
Support: N/A

F-3 Support and expand research initiatives and coordinated fin fish and shellfish management strategies specific to the Indian River Lagoon.

Revised Language:
Original language "Develop and implement a coordinated fisheries management strategy specific to the Indian River Lagoon" revised as shown above.

Rationale for Revision:
Clarification and consolidation of related actions.

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Implementation of resource-based fin and shellfish management strategies specific to the Indian River Lagoon

Related Actions:
None

Comments/Background:
FWCC/FWRI implemented and expanded studies of Indian River Lagoon fisheries coordinated with other agencies and academia.

Implementation:
Moderate, ongoing action

Responsible Parties:
Primary: FFWCC, MFC
Support: NMFS, USFWS, FDEP, WMDs, Sea Grant, academia, interest groups

F-4 Identify, inventory and assess finfish and shellfish habitats within the Indian River Lagoon and implement appropriate management and restoration strategies.

Revised Language:
None – New action

Rationale for Revision:
New action – suggested at TAC/CAC meeting, IRL Advisory Board comments

1996 Priority Ranking: N/A
2008 Recommended Priority: High

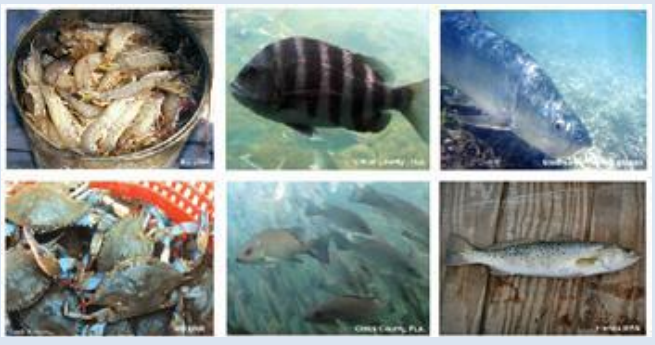
Measure of progress:
Completion of inventory and assessment; implementation of management/restoration strategies; acres of habitat managed or restored.

Related Actions:
SG-1, W-4, W-5,

Comments/Background:
While seagrass and wetlands are key habitats in the Indian River lagoon there are a number of other finfish and shellfish habitats that are important to maintaining a healthy, robust and diverse fish population in the Indian River Lagoon. These habitats are as diverse as oyster reefs and mud bottoms; the water column itself and intertidal areas. Through this action these habitats would be identified, inventoried and assessed and appropriate management or restoration actions determined and implemented to protect, enhance and restore the fisheries of the Indian River Lagoon.

Implementation:
New action – to be determined

Responsible Parties:
Primary: FFWCC, MFC
Support: NMFS, USFWS, FDEP, WMDs, Sea Grant, academia, interest Groups



Biotoxins and Aquatic Animal Health Action Plan

Objective:
Improve knowledge of biotoxin and aquatic animal health issues to protect public health and the resources of the Indian River Lagoon.

Problem:
In 1996, the Indian River Lagoon Comprehensive Conservation and Management Plan (IRL-CCMP) referenced scientific research findings that many green turtles in the Indian River Lagoon were afflicted with fibropapillomatosis (Ehrhart & Redfoot, 1995). Similarly, many dolphins found in the southern portion of the lagoon were afflicted with *Lobo mycosis*. IRL-CCMP Action ETS-4 called for action to undertake studies of wildlife diseases occurring in the Indian River Lagoon region that may be caused by natural processes or human activities.

Since 1996, there have been several additional events and discoveries that raised concerns about aquatic animal health and biotoxins associated with algal blooms in the Indian River Lagoon. As an example, in 2002 nineteen cases of puffer fish poisoning were reported to state and federal health officials following consumption of puffers caught in the Titusville area. Subsequent investigation found that a common algal species in the lagoon was producing a toxin that entered the food chain, ultimately resulting in puffers becoming toxic. This algal species was not previously known to produce toxins. The algae and associated toxin may also be implicated in a 2001 event where several dolphins died in the north-central Indian River and Banana River in what was termed a "unusaul mortality event" as well as several fish kills, horseshoe crab mortalities and similar events. Lesions on fishes in the southern Indian River Lagoon region have also been a cause of public concern. These issues and incidents are reviewed in more detail in the publication *Indian River Lagoon Biotoxin & Aquatic Animal Heath: History and Background Report* (Provancha & Van den Ende, 2006).

To address these and other issues, the Indian River Lagoon Program and Florida Fish & Wildlife Conservation Commission jointly established the Indian River Lagoon Biotoxin and Aquatic Animal Health Working Group. The group developed a *Preliminary Strategic Plan for Algal Toxins and Aquatic Animal Health in the Indian River Lagoon* that identified a series of projects and actions to improve communications and coordination among the various individuals and organizations, to enhance knowledge of these events and to determine the cause or causes of these events and management actions that may be taken to address them.

Actions:

BAH-1 Implement a lagoon-wide, multi-species, multi-disciplinary approach to determine the status of emerging infectious diseases in the Indian River Lagoon, assess trends and identify underlying causes.

Revised Language:
None - New Action

Rationale for Revision:
New action – See Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Status of investigations of status and trends of infectious diseases, identification of causes.

Related Actions:
BAH-2, BAH-3

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: FFWCC, IRLNEP/WMDs, academia
Support: FDEP, FDOH, interest groups, local governments

BAH-2 Continue support of the Biotoxin and Aquatic Animal Health Working Group and the goals of this working group.

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Number of agencies participating in the working group, funding of relevant projects.

Related Actions:
BAH-1, BAH-3

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: FFWCC, IRLNEP/WMDs, academia
Support: FDEP, FDOH, interest groups, local governments

BAH-3 Complete or continue the projects identified in the Preliminary *Strategic Plan for Algal Toxins and Aquatic Animal Health in the Indian River Lagoon.*

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

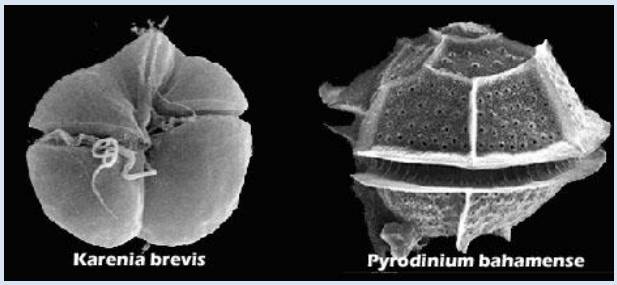
Measure of progress:
Number of projects identified in the Strategic Plan undertaken or completed.

Related Actions:
BAH-1, BAH-2

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: FFWCC, IRLNEP/WMDs, academia
Support: FDEP, FDOH, interest groups, local governments



Climate Change Action Plan

Objective:
Support and implement policies and strategies developed to address impacts resulting from climate change in the Indian River Lagoon.

Problem:
Global climate change will likely affect the resources of the Indian River Lagoon. These impacts may include the following.

Sea level rise will cause wetlands to migrate upland into the present floodplain. In areas where the floodplain has been developed, this migration may not occur or will be limited, resulting in a loss of wetland acreage.

Sea level rise will also result in an increased depth in the Indian River Lagoon. As light penetration is limited even in good quality waters, this may result in a loss of seagrass acreage.

An upward shift in average temperatures and temperature range may result in a loss of temperate species, resulting in decreased biodiversity. This may be offset, however, by an increase in the number of tropical and sub-tropical species.

While many of the actions to address climate change will likely occur at the national or international level, some research that considers and integrates global climate change issues and seeks practical scientific, technological and public policy solutions may be Indian River Lagoon -based. Appropriate information should be provided to local governments and residents of the Indian River Lagoon region about the potential impacts of climate change and actions that can be undertaken to reduce these impacts.

Actions:

CC-1 Track state, national and international actions and research concerning climate change issues that affect the Indian River Lagoon.

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Assignment of responsible entity to track trends and provide regular reports on climate change.

Related Actions:
None

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: EPA, FDEP, IRLNEP/WMDs
Support: USFWS, NOAA, FFWCC, DACS, academia, interest groups

CC-2 Support Indian River Lagoon-based research that considers and integrates global climate change issues and seeks practical scientific, technological and public policy solutions.

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Number of Indian River Lagoon-based research projects addressing climate change, number of strategies developed addressing climate change

Related Actions:
None

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: EPA, FDEP, IRLNEP/WMDs

Support: USFWS, NOAA, FFWCC, DACS, academia, interest groups

CC-3 Provide information to local governments and residents of the Indian River Lagoon region about impacts of climate change and actions they can take to reduce these impacts.

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Provision of regular reports to the IRL stakeholders on impacts of climate change in the IRL region; integrate climate change information into regular State of the Lagoon reports.

Related Actions:
None

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: EPA, FDEP, IRLNEP/WMDs
Support: USFWS, NOAA, FFWCC, DACS, academia, interest groups

Invasive Fauna and Flora Action Plan

Objective:
Identify, control or eradicate invasive, non-native fauna and flora in the Indian River Lagoon.

Problem:
Non-native and non-indigenous are terms that have been used to describe plants and animals that are not native to an area. While many non-native plants are relatively benign due to difficulties in reproduction or propagation, other species are characterized as invasive when they thrive in their new environment, reproducing, growing, and spreading rapidly or uncontrollably. This rapid growth and reproduction can have consequences for the health and biodiversity of the Indian River Lagoon, often resulting in invaders overwhelming native species and resulting in the loss or degradation of valuable habitats or the displacement or loss of animal species.

Actions:

IFF-1 Support the inventory and assessment of non-native invasive fauna and flora within the Indian River Lagoon basin.

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Number of acres assessed or inventoried in the Indian River Lagoon watershed

Related Actions:
EIA-1, EIA-2, EIA-3

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: FDEP, DACS, FFWCC, WMDs
Support: USFWS, NMFS, academia, interest groups, local governments

IFF-2 Support development and implementation of management plans for eradication or control of non-native invasive plants and animals found in the Indian River Lagoon region.

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Number of plans developed and implemented annually to manage invasive species; number to total acres reported annually in Government Performance and Results Act (GPRA) report to EPA.

Related Actions:
EIA-1, EIA-2, EIA-3

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: FDEP, DACS, FFWCC, WMDs
Support: USFWS, NMFS, academia, interest groups, local governments

IFF-3 Coordinate the formation of "Rapid Assessment" teams to assess the extent of recently discovered invasions and provide recommendations for management or eradication.

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Formation of Rapid Assessment Teams.

Related Actions:
EIA-1, EIA-2, EIA-3

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: FDEP, DACS, FFWCC, WMDs
Support: USFWS, NMFS, academia, interest groups, local governments

IFF-4 Engage residents in management and eradication of exotic invasive species by providing standardized information to residents of the Indian River Lagoon region about non-native invasive plants and animals and their management and eradication.

Revised Language:
None – New Action

Rationale for Revision:
New action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Amount of standardized public information made available to the public by partnering organizations and agencies.

Related Actions:
PIE-2, PIE-3, PIE-4

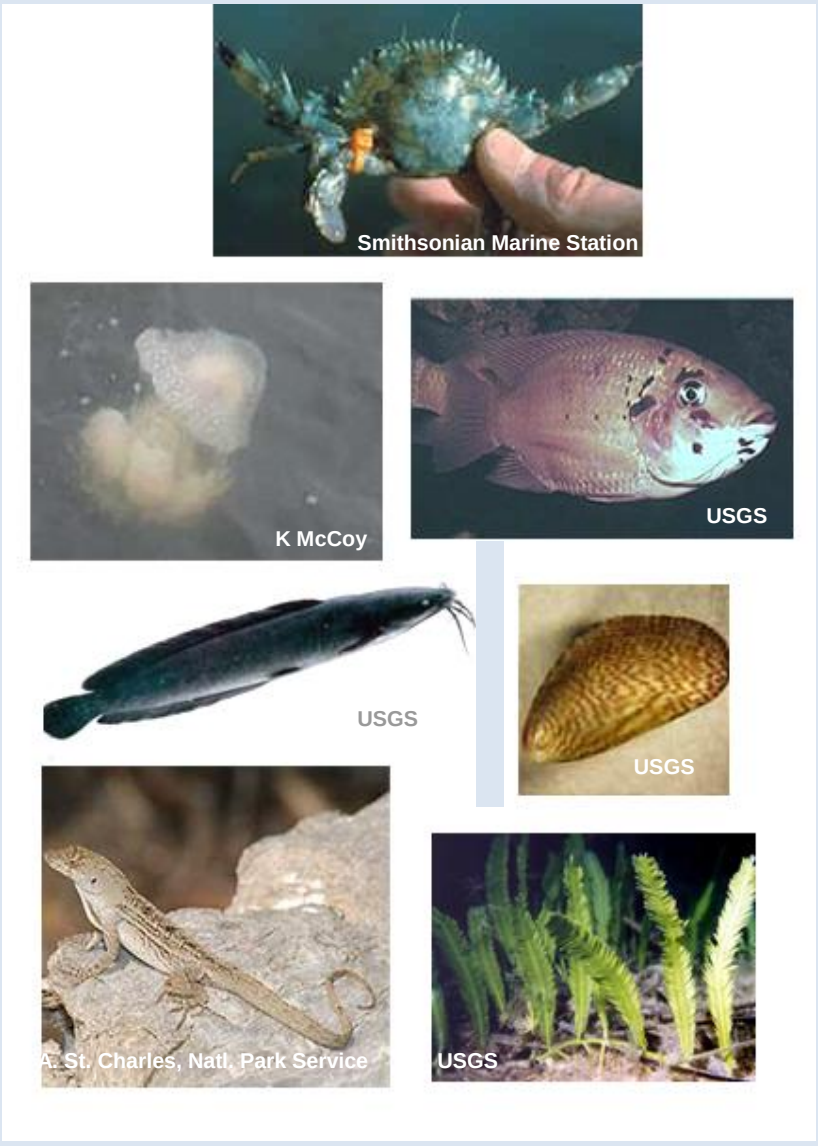
Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:

Primary: FDEP, DACS, FFWCC, WMDs

Support: USFWS, NMFS, academia, interest groups, local governments



Public Involvement and Education Action Plan

Objective:

Facilitate implementation of the Indian River Lagoon (IRL) Comprehensive Conservation and Management Plan (CCMP) through public involvement and education.

Problem:

In the past, protection of the Indian River Lagoon and its resources was, for the most part, not a high priority issue. Few complaints or concerns were expressed unless massive fish kills occurred, noxious odors from decaying seagrass or algae were experienced, shellfish harvesting areas were closed or other problems directly affected the public. At the same time, efforts to increase the public's awareness and understanding of the importance of the resources of the Indian River Lagoon, its value, and its sensitivity to the impacts of man's activities were limited.

In recent years, these attitudes have changed. The general public has expressed an increased interest in the environment in general. This interest has been expressed locally through increased concern over the present and future condition of the lagoon. Federal, state and local agencies charged with management of the lagoon's resources, as well as environmental groups, are building on this interest by actively seeking to educate and involve the general public in the protection and enhancement of the estuary and its resources.

A key event in public involvement and education in the Indian River Lagoon region was the passage of the Surface Water Improvement and Management (SWIM) Act by the Florida Legislature in 1987. This legislation not only included the Indian River Lagoon in the SWIM program as a priority water body of state concern, but also mandated a program to involve and educate the public about efforts to protect and restore SWIM waterbodies. The Indian River Lagoon SWIM public involvement and education efforts have been coordinated by the SJRWMD and the SFWMD for the Indian River Lagoon.

In 1991, the Indian River Lagoon National Estuary Program (IRLNEP) was established. As the National Estuary Program goals of citizen involvement and education are closely related to those of the SWIM program, IRLNEP joined the Indian River Lagoon SWIM (IRL SWIM) program in their public involvement and education. Following the adoption of the IRL CCMP in 1996, the IRLNEP and IRL SWIM programs were merged to create the Indian River Lagoon Program, which continues the implementation of public involvement and education efforts.

Maintaining and nurturing public interest and involvement in the protection and preservation of the Indian River Lagoon and its resources will require a substantial investment of money, time and effort. These efforts must continue beyond the initial CCMP development and adoption phase to continue to promote implementation of CCMP actions.

Actions:

PIE-1 Implement and expand public involvement and education projects or programs.

Revised Language:
Original language "Continue or complete the public involvement and education projects included in the 1994 SWIM Plan" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions; suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number or percent of projects in the IRL-SWIM Plan completed or continued

Related Actions:
PS-2, FSD-11, MB-7

Comments/Background:
SWIM Plan projects implemented and continuing. NEP has funded, developed, coordinated, reviewed, staffed or participated in some fashion in numerous public involvement and education activities throughout the Indian River Lagoon region

Implementation:
Full, ongoing action

Responsible Parties:
Primary: IRLNEP/WMDs
Support: FDEP, FFWCC, Sea Grant, local governments, interest groups

PIE-2 Develop, implement and refine a communications plan to inform stakeholders and government officials about the resources of the Indian River Lagoon, the economic and ecological value of these resources and threats to the continued viability of these resources.

Revised Language:
Original language "Inform the general public and government officials about the resources of the Indian River Lagoon, the value of these resources and threats to the continued viability of these resources" revised as shown above.

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Development and implementation of a communications plan; number of public information activities and projects to inform stakeholders and government officials about the resources of the Indian River Lagoon.

Related Actions:
PS-2, FSD-11, MB-5, MB-7, BD-3

Comments/Background:
Developed and delivered numerous public education and involvement events, products and programs informing elected officials and the public about the resources of the Indian River Lagoon.

Implementation:
Full, ongoing action

Responsible Parties:
Primary: IRLNEP/WMDs
Support: FDEP, FFWCC, Sea Grant, local governments, interest groups

PIE-3 Increase public and government awareness of programs that protect and restore the Indian River Lagoon.

Revised Language:
None

Rationale for Revision:
Removed and rolled into PIE-2; suggested at TAC/CAC meeting

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of public information projects or activities to inform residents about programs to protect and restore the resources of the Indian River Lagoon

Related Actions:
PS-2, FSD-11, MB-7, BD-3, FI-2, DIM-2, EI-1, EI-2

Comments/Background:
Developed and delivered numerous public education and involvement events, products and programs about programs to protect and restore the Indian River Lagoon.

Implementation:
Full, ongoing action

Responsible Parties:
Primary: N/A
Support: N/A

PIE-4 Increase public and governmental involvement in activities designed to protect and restore the resources of the Indian River Lagoon.

Revised Language:
No change

Rationale for Revision:
N/A

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of public participation or pollution-reduction projects initiated

Related Actions:
PS-2, FSD-10, FSD-11, MB-5, MB-7, W-6, W-7, MON-2, EI-1

Comments/Background:
Developed and delivered numerous public education and involvement events, products and programs designed to increase involvement in activities to protect and restore the Indian River Lagoon.

Implementation:
Full, ongoing action

Responsible Parties:
Primary: IRLNEP/WMDs
Support: FDEP, FFWCC, Sea Grant, local governments, interest groups

PIE-5 Strategically prioritize and implement public education programs based on pollution potential, perceived likelihood for behavior change, resource availability, and opportunities that arise.

Revised Language:
New action

Rationale for Revision:
Suggested at TAC/CAC meeting

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Prioritization of programs completed; number of programs implemented.

Related Actions:
PIE-1, PIE-2, PIE-4

Comments/Background:
A strategic prioritization of programs will be better focus education and involvement programs and increase the effectiveness of these programs.

Implementation:
New action – to be determined

Responsible Parties:

Primary: IRLNEP/WMDs
Support: FDEP, FFWCC, Sea Grant, local governments, interest groups

IRL CCMP Implementation Action Plan

Objective:

Establish a modified management structure that will oversee the implementation of the Indian River Lagoon Comprehensive Conservation and Management Plan (IRL CCMP) and provide for an organization to support its activities

Problem:
Following adoption of the CCMP, the IRLNEP and IRL SWIM programs were merged to create the Indian River Lagoon Program. The SJRWMD is the host agency for the IRL Program. The Indian River Lagoon Advisory Board was established as an advisory board to both SJRWMD and SFWMD. This 19-member board includes many of the members of the former IRLNEP Policy and Management committees and oversees implementation of the IRL CCMP.

The Indian River Lagoon Advisory Board provides oversight for the IRL Program, meeting approximately quarterly to review progress on IRL CCMP implementation, progress on projects and programs funded through the IRL Program, development of the annual work plan and to discuss issues regarding the management and restoration of the Indian River Lagoon.

Actions:

FI-1 Continue the Indian River Lagoon Advisory Board's role of oversight, monitoring, and guidance of implementation of the IRL CCMP.

Revised Language:
Original language "Establish a management structure to oversee, monitor and guide the implementation of the IRL CCMP" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions; the IRL Advisory Board meets a minimum of three times per year to provide oversight, monitoring and guidance of implementation of the IRL CCMP.

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Establishment of an oversight organization

Related Actions:
PIE-2

Comments/Background:
Indian River Lagoon Advisory Committee established.

Implementation:
Full, ongoing.

Responsible Parties:
Primary: IRLNEP
Support: IRL Advisory Board members

FI-2 Continue measurement of progress of CCMP implementation activities.

Revised Language:
Original language "Establish an institutional process to measure the progress of CCMP implementation activities" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Establishment and institution of a means to evaluate IRLCCMP implementation progress

Related Actions:
PIE-2, FI-3

Comments/Background:
Agencies & local governments provide data on CCMP-related activities, regular reports provided to EPA.

Implementation:
Full, ongoing action

Responsible Parties:
Primary: IRLNEP
Support: Advisory Board members

FI-3 Adopt an implementation agreement as an addendum to the IRL CCMP to be signed by all participants of the modified (post IRL CCMP adoption) Management Conference.

Revised Language:
None

Rationale for Revision:
Removed – Determined by IRL Advisory Board to be unnecessary

1996 Priority Ranking: High
2008 Recommended Priority: N/A

Measure of progress:
Development and adoption of IRLCCMP implementation agreements

Related Actions:
FI-2

Comments/Background:
Draft agreement developed.

Implementation:
Minor

Responsible Parties:
Primary: N/A
Support: N/A

Data And Information Management Strategy Action Plan

Objective:
Develop and implement a strategy to coordinate the management and dissemination of data and information concerning the Indian River Lagoon

Problem:
Over the years, the Indian River Lagoon and its resources have been studied and monitored by a number of agencies, institutions and individuals. In the past, much of this information was scattered over several agencies and institutions and often available only in hard copy. Accessing this information was a challenge, particularly for the general public.

To address this issue, the Indian River Lagoon Scientific Information System (IRLSIS) was created. Initially, IRLSIS was a printed bibliography of articles, reports, studies and other information about the Indian River Lagoon. A collection of these reports, studies and other documents was assembled and initially housed at the Florida Institute of Technology library. In recent years, IRLSIS has been entered into an electronic database and is available online (http://www.sjrwmd.com/indianriverlagoon/irlsisbib/irlsispages/search.html). The Indian River Lagoon literature collection is now housed at the Marine Resources Council offices in Palm Bay and is available to the public during normal office hours.

With the advent of the personal computer and the Internet, the availability of data and information about the Indian River Lagoon and virtually any other topic has improved substantially. In addition to IRLSIS, a host of information is available to the public via the Internet from federal, state and local governments, agencies, academia and interest groups. While access to data and information about the Indian River Lagoon is certainly superior to how things used to be, improvements can be made.

Actions:

DIM-1 Continue projects and strategies related to data and information management.

Revised Language:
Original language "Continue or complete current projects related to data and information management found in the 1994 SWIM Plan" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number or percent of related projects in the IRL-SWIM Plan completed or continued

Related Actions:
None

Comments/Background:
SWIM Plan projects completed.

Implementation:
Full, ongoing

Responsible Parties:
Primary: WMDs
Support: EPA, FDEP, local governments, academia

DIM-2 Continue implementation of data and information management strategies.

Revised Language:
None

Rationale for Revision:
Remove – implemented; Redundant with DIM-1

1996 Priority Ranking: High
2008 Recommended Priority: N/A

Measure of progress:
Number or percent of DIMS report recommendations implemented

Related Actions:
BD-1, PIE-2, PIE-3, PIE-4

Comments/Background:
DIMS recommendations adapted to present-day technology.

Implementation:
Full

Responsible Parties:
Primary: N/A
Support: N/A

DIM-3 Improve public access to published research and reports specific to the Indian River Lagoon.

Revised Language:
Original language "Continue to update the Indian River Lagoon Scientific Information System and make IRLSIS available to the public in an accessible electronic format" revised as shown above.

Rationale for Revision:
Update recommended by IRLCCMP Steering Committee, further edited at TAC/CAC meeting.

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of citations available for access

Related Actions:
BD-1

Comments/Background:
IRLSIS updated and available at: sjrwmd.com/indianriverlagoon/irlsisbib/irlsispages/search.html. Many Indian River Lagoon reports, papers and other documents available at the Marine Resources Council library and the SJRWMD library.

Implementation:
Full

Responsible Parties:
Primary: IRLNEP/WMDs
Support: FDEP, FFWCC, academia, interest groups

DIM-4 Ensure appropriate water quality and benthic data and information concerning the Indian River Lagoon is entered into and available through the storage and retrieval (STORET) system or its successor.

Revised Language:
Original language "Ensure that all data and information concerning the Indian River Lagoon is entered into and available through the storage and retrieval (STORET) system" revised as shown above.

Rationale for Revision:
Updated to reflect current conditions; edits suggested by IRL CCMP Steering Committee

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Amount or percent of data specific to the Indian River Lagoon uploaded to STORET

Related Actions:
BD-1, MON-2

Comments/Background:
FDEP, WMDs, citizen monitoring programs, local government uploading data to Florida STORET and ultimately STORET.

Implementation:
Substantial, ongoing action

Responsible Parties:
Primary: Indian River Lagoon monitoring program participants
Support: EPA, FDEP, FFWCC, WMDs, academia

DIM-5 Improve and update the STORET system.

Revised Language:
None

Rationale for Revision:
Remove – Implemented with completion of STORET update by the EPA

1996 Priority Ranking: High
2008 Recommended Priority: N/A

Measure of progress:
Status of STORET upgrade

Related Actions:
None

Comments/Background:
EPA update of STORET complete

Implementation:
Full - by EPA

Responsible Parties:
Primary: N/A
Support: N/A

Environmental Protection Agency

Storage And Retrieval System

Monitoring Action Plan

Objective:

To develop and maintain a monitoring network which will provide adequate and reliable data and information on water quality, sediment quality and the biological resources of the Indian River Lagoon to support mapping, modeling and management decisions.

Problem:

Monitoring the sediment, water quality and biological resources of the Indian River Lagoon is important not only to determining the current condition of the estuary but also to ascertaining the effectiveness of restoration measures. Having adequate and reliable data allows standards to be established and provides a framework for future comparisons. For these reasons, it is important to continue monitoring the resources of the Indian River Lagoon.

Concerned citizens and agencies alike monitor the lagoon's water quality. A long-term comprehensive, coordinated network was established by the Indian River Lagoon Surface Water Improvement and Management program (IRL SWIM) in 1988, including participants from Volusia, Brevard and Indian River Counties; Florida Department of Environmental Protection; NASA; and the South Florida and St. Johns River water management districts.

A Citizens Water Quality Monitoring Network was also established by the Marine Resources Council (MRC) in 1991. The Citizens Water Quality Monitoring Network presently consists of more than 90 stations located throughout the Indian River Lagoon that are monitored on a weekly basis.

Many of the same entities involved in the IRL SWIM monitoring network also monitor or study the biological resources of the lagoon. Fixed seagrass transects located throughout the lagoon are monitored twice each year to assess the health and extent of the seagrass community. Seagrasses in the Indian River Lagoon are mapped every two to three years and aerial photographs of the lagoon are taken each year to document any changes that occur in the period between map developments.

Actions:

MON-1 Continue projects related to monitoring the resources of the Indian River Lagoon and address gaps in data as needed.

Revised Language:

Original language "Complete or continue projects related to monitoring the resources of the Indian River Lagoon found in the 1994 SWIM Plan" revised as shown above.

Rationale for Revision:

Updated to reflect current conditions; edits suggested at TAC/CAC meeting.

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number or percent of monitoring projects completed or continued

Related Actions:
SG-1

Comments/Background:
WMDs funding and implementing monitoring projects, FDEP invertebrate monitoring, etc.

Implementation:
Full, ongoing action

Responsible Parties:
Primary: WMDs
Support: USGS, NASA, USFWS, FDEP, academia, local governments

MON-2 Continue the Citizens Water Quality Monitoring Program.

Revised Language:
No change

Rationale for Revision:
N/A

1996 Priority Ranking: High
2008 Recommended Priority: High

Measure of progress:
Number of volunteer sites monitored and data entered in ~~added to~~ STORET

Related Actions:
PIE-4

Comments/Background:
Marine Resources Council volunteers monitoring more than 90 Indian River Lagoon sites on a weekly basis.

Implementation:
Full, ongoing action

Responsible Parties:

Primary: IRLNEP
Support: MRC, FOS, Loxahatchee WCD

MON-3 Provide support for the development of a triennial report on the state of the Indian River Lagoon

Revised Language:
Original language "Provide support for the development of a biennial report on the state of the Indian River Lagoon" revised as shown above.

Rationale for Revision:
Suggested by IRL Advisory Board

1996 Priority Ranking: Medium
2008 Recommended Priority: Medium

Measure of progress:
Production of regular reports on the status of the Indian River Lagoon

Related Actions:
PIE-4, PIE-5, DIM-1

Comments/Background:
Several "State of the Lagoon" meetings have been held every two to three years. In association with these meetings, newspaper inserts have been produced that review the present status and trends of the Indian River Lagoon and its resources.

Implementation:
Full, ongoing action

Responsible Parties:

Primary: IRLNEP/WMDs
Support: Participants in monitoring programs

Indian River Lagoon Scientific Research Action Plan

Objective:
Development of a scientific research vision and implementation strategy for the Indian River Lagoon

Problem:
Developing a comprehensive research strategy in any estuarine ecosystem is challenging. In addition to the challenges of understanding the structure and function of the ecosystem and the processes that govern variability and change, undertaking an effort to assess the current state of knowledge of the system, identify gaps in this knowledge and prioritize research needs to fill these gaps is a daunting task. Within the Indian River Lagoon, these challenges are further exacerbated by the extreme biological diversity and unique natural variability of the lagoon.

An impressive amount of research and monitoring has been done in the Indian River Lagoon basin. One has only to undertake a cursory review of the *Bibliography of the Indian River Lagoon Scientific Information System* or the series of technical reports developed by the Indian River Lagoon National Estuary Program to get an understanding of the wide variety of topics addressed and wealth of information developed by these projects and programs. Yet our knowledge of this ecosystem and the processes that drive it is limited.

While the challenges to developing a research strategy are daunting, opportunities exist to enhance understanding of the Indian River Lagoon. The intellectual capacity and technological infrastructure available in the Indian River Lagoon region offers the opportunity to make a substantial contribution to our knowledge of the lagoon. To take advantage of these resources, a comprehensive scientific research vision and implementation strategy should be developed. Creation of the Indian River Lagoon Science and Management Working Group is proposed to undertake development of this strategy. It is anticipated that this working group would be composed primarily of members of the Technical Advisory Committee and that the body will report to the TAC.

In the development of this strategy, the Working Group shall:

- Identify and prioritize Indian River Lagoon scientific research needs and opportunities with recognition of emerging environmental threats, ongoing areas of research excellence, and identification of critical knowledge gaps.

- Promote regional and super-regional thinking; and promote communication, cooperation and collaboration with other groups and projects that may extend well beyond the boundaries of the Indian River Lagoon in order to address issues that cross local and regional boundaries.

- Identify, evaluate and apply emerging new technologies, methodologies and scientific perspectives.

This strategy shall champion and defend scientific integrity, honesty, objectivity and accountability and integrate science with the social, economic and education needs and values of the community. It should also include the development of a coordinated, integrated and well-managed Indian River Lagoon field research site network with access and facility support.

Actions:

SR-1 Create an Indian River Lagoon Science and Management Working Group charged with the development and implementation of a scientific research vision and implementation strategy for the Indian River Lagoon. This strategy should be consistent with and complimentary to statewide research strategies identified by the Florida Coastal and Ocean Resources Council and national coastal priorities.

Revised Language:
None

Rationale for Revision:
New Action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Creation of a working group to develop and implement a research vision for the Indian River Lagoon region that includes academic, non-governmental organizations, public agencies and private research interests.

Related Actions:
BD-1

Comment/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: IRLNEP
Support: Agencies, academia, interest groups

SR-2 Include the value of scientific research in any studies of the Indian River Lagoon regional economy.

Revised Language:
None

Rationale for Revision:
New Action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Number of current and future economic studies undertaken for the Indian River Lagoon region that include the economic value of research.

Related Actions:
BD-2

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: IRLNEP
Support: Agencies, academia, interest groups

SR-3 Expand and diversify funding for scientific research in the Indian River Lagoon.

Revised Language:
None

Rationale for Revision:
New Action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
The number of grant programs identified and the number of grants received funding identified scientific research needs within the Indian River Lagoon region.

Related Actions:
BD-1

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:

Primary: IRLNEP/Science and Management Working Group
Support: Agencies, academia, interest groups

Environmental Incident Assessment And Response Action Plan

Objective

Rapid assessment of and response to significant environmental incidents that may affect the resources of the Indian River Lagoon.

Problem:

In recent years, there have been several environmental incidents that have had the potential to significantly affect the environmental resources of the Indian River Lagoon. While perhaps the most significant of these events were the hurricanes of 2004, there have been other events such as frosts or freezes, the discovery of aquatic invasive exotic species in various areas of the lagoon (Australian spotted jellyfish, green mussel, *Mytella*), pollutant spills and a variety of other events that could have severe impacts on the Indian River Lagoon, potentially altering the character and biodiversity of the lagoon's ecosystem.

Most pollutant spills (oil, hazardous materials, wastewater, etc.) have established emergency response and assessment protocols in place; other teams are established to respond to marine mammal and sea turtle strandings; and a "hot line" has been implemented for response to fish kills. However, emergency assessment for many other categories of environmental incidents is largely organized on an *ad hoc* basis.

To address the issue, an environmental assessment and response team is proposed to track events; enhance knowledge of these events; determine the cause or causes of these events; determine the severity of these events; and propose management actions that may be taken to address them.

Actions:

EIAR-1: Inventory existing rapid assessment and response programs within the Indian River Lagoon region and identify classes of incidents not addressed by these programs.

Revised Language:
None

Rationale for Revision:
New Action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Status of inventory

Related Actions:
EIAR-1, EIAR-2, EIAR-3

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: IRLNEP/WMDs, FDEP
Support: USFWS, FFWCC, DACS, academia, local governments, interest groups, environmental consultants.

EIAR-2: Create and maintain an inventory of support services and equipment available within the Indian River Lagoon region.

Revised Language:
None

Rationale for Revision:
New Action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Status of inventory of support services and available equipment

Related Actions:
EIAR-1, EIAR-2, EIAR-3, IFF-3

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:
Primary: IRLNEP/WMDs, FDEP
Support: USFWS, FFWCC, DACS, academia, local governments, interest groups, environmental consultants

EIAR-3: Develop assessment and response strategies and protocols for significant environmental incidents not addressed by existing programs.

Revised Language:
None

Rationale for Revision:
New Action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: Medium

Measure of progress:
Strategies and protocols developed to respond to environmental incidents.

Related Actions:
EIAR-1, EIAR-2, EIAR-3, IFF-3

Comments/Background:
See Problem Statement

Implementation:
New action – to be determined

Responsible Parties:

Primary: IRLNEP/WMDs, FDEP

Support: USFWS, FFWCC, DACS, academia, local governments, interest groups, environmental consultants

Economic Analysis Action Plan

Objective:
Provide a current analysis of the economic benefits of the Indian River Lagoon to the economy of the region.

Problem:
An economic analysis of the value of the Indian River Lagoon performed in 1995 placed the value of the Indian River Lagoon to the local economy at more than $730 million per year. This value includes not only recreation and tourism but also commercial fishery landings, the differential in residential land value attributable to fronting on the Indian River Lagoon and values estimated from resident and visitor willingness to pay for environmental programs. This information has been important to inform the public about the contribution made by the Indian River Lagoon to the economy of the region and is helpful in establishing priorities for projects or programs to protect the resources of the Indian River Lagoon.

Economic benefits and values change over time in response to a variety of factors. Without doubt, the 1995 estimated value of $730 million is lower than the current economic value of the lagoon. In order to obtain an accurate understanding of the current economic benefits of a healthy and productive Indian River Lagoon, an analysis should be performed and updated periodically.

Actions:

EA-1 Undertake an analysis of the economic benefits of the Indian River Lagoon to the economy of the region on a recurring basis.

Revised Language:
None

Rationale for Revision:
New Action – see Problem Statement

1996 Priority Ranking: N/A
2008 Recommended Priority: High

Measure of progress:
Updated economic report

Related Actions:
None

Comments/Background:
See Problem Statement

Implementation:

New action – to be determined

Responsible Parties:

Primary: IRLNEP/WMDs

Support: EPA, USFWS, NOAA, FDEP, FFWCC, DACS, academia, local governments, local businesses and industries

Summary of the Draft IRL NEP CCMP 2008 Update

Key to color codes:

Fully implemented – Complete, institutionalized, or combined with similar action	Fully implemented, ongoing	Substantially implemented, ongoing	Moderately implemented, ongoing	New action

Water & Sediment Quality Improvements	Living Resources	Public & Government Support & Involvement	Financing IRL CCMP Implementation
Point Source Discharge Action Plans	***Biodiversity Action Plans***	***Public Involvement & Education Action Plans***	***Economic Analysis Action Plan***
PS-1 (no change) Ensure compliance with the IRL Act **Rank: High**	**BD-1 (edited for clarity)** Coordinate biodiversity activities **Rank change: Medium → High**	**PIE-1 (updated for currency)** Implement & expand PIE projects **Rank: High**	**EA-1 (New)** Undertake an analysis of IRL economic benefits to region on recurring basis **Rank: High**
PS-2 (edited for clarity) Ensure any changes to the IRL Act will not reduce effectiveness of the Act **Rank change: High → Medium**	**BD-2 (edited for clarity)** Acquire and manage sensitive lands to protect biological diversity, functional integrity & productivity **Rank: High**	**PIE-2 (updated for currency)** Develop, implement communications plan to inform stakeholders about IRL resources, economic-ecologic value **Rank: High**	
PS-3 (no change) Reduce or eliminate industrial discharges to the IRL **Rank: Medium**	**BD-3 (replaced with IFF-2)** Control invasive exotic plants & animals in the IRL	**PIE-3 (incorporated into PIE-2)** Increase public & governmental awareness of programs to protect, restore IRL	

Water & Sediment Quality Improvements	Living Resources	Public & Government Support & Involvement	Financing IRL CCMP Implementation
PS-4 (no change) Funding alternatives for upgrading WWTPs **Rank changed: Medium→High**	**BD-4 (New)** Create and maintain a species inventory for the IRL **Rank: Medium**	**PIE-4 (no change)** Increase public and governmental involvement in activities to protect and restore the IRL **Rank: High**	
PS-5 (edited for clarity) Promote alternatives to deep well disposal of effluent **Rank: Medium**	***Seagrass Protection, Restoration & Mgmt Action Plans***	**PIE-5 (New)** Prioritize & implement behavior change oriented education programs to reduce pointless personal pollution **Rank: High**	
On-site Sewage Treatment Action Plans	**SG-1 (edited for clarity)** Implement program of protection, restoration & management to restore SAV **Rank: High**	***IRL CCMP Implementation Action Plans***	
OSDS-1 (Complete) Complete projects in 1994 SWIM Plan	***Wetlands Action Plans***	**FI-1 (updated for currency)** Continue the IRL Advisory Board's oversight and guidance of the IRL CCMP **Rank: High**	
OSDS -2 (no change) Implement OSDS inspection program within the 6 lagoon counties **Rank changed: High→Medium**	**W-1 (edited for clarity)** Implement programs that protect ecological services of wetlands **Rank: High**	**FI-2 (updated for currency)** Continue measurement of progress of CCMP implementation activities **Rank: High**	
OSDS-3 (no change) Quantify impacts of OSDS on IRL & extent of problem areas **Rank changed: Medium→High**	**W-2 (edited for clarity)** Continue regular reviews of wetland protection rules & regulations **Rank: High**	**FI-3 (delete as unnecessary)** Adopt an implementation agreement to IRL CCMP among Management Conference	

Water & Sediment Quality Improvements	Living Resources	Public & Government Support & Involvement	Financing IRL CCMP Implementation
OSDS-4 (New) Promote connections to central sewer or advanced OSTDS in problem areas & id and publicize funding sources **Rank: High**	**W-3 (edited for clarity)** Establish or enhance wetland or shoreline setback buffers **Rank: Medium**	***Data Information and Management Strategy Action Plans***	
Fresh & Stormwater Discharges Action Plans	**W-4 (updated for currency)** Implement innovative programs & incentives supporting wetlands protection & management on private lands. When necessary acquire crucial wetlands **Rank: High**	**DIM-1 (updated for currency)** Continue projects & strategies related to DIM **Rank: High**	
FSD-1 (updated for currency) Complete/continue stormwater and freshwater projects **Rank: High**	**W-5 (updated for currency)** Continue restoration & rehabilitation of impacted coastal wetlands **Rank: High**	**DIM-2 (Complete, delete)** Continue implementation of DIM strategies	
FSD-2 (updated for currency) Implement NPDES program **Rank changed: Medium→High**	**W-6 (edited for clarity)** Continue projects to restore shorelines **Rank changed: Medium→High**	**DIM-3 (updated for currency)** Improve public access to published research & reports specific to IRL **Rank: High**	
FSD-3 (updated for currency) Implement PLRGs for IRL ***Rank: High***	**W-7 (updated for currency)** Promote the removal of trash from wetlands, shorelines & islands **Rank: High**	**DIM-4 (edited for clarity)** Ensure water quality & benthic data is entered and retrievable through STORET **Rank: High**	

Water & Sediment Quality Improvements	Living Resources	Public & Government Support & Involvement	Financing IRL CCMP Implementation
FSD-4 (edited for clarity) Implement BMPs for management of stormwater, agricultural and freshwater discharges **Rank: High**	**W-8 (New)** Undertake research to develop new/ improved wetland management BMPs **Rank: Medium**	**DIM-5 (Complete)** Improve and update the STORET system	
FSD-5 (edited for clarity) Update comprehensive drainage maps **Rank: Medium**	***Impounded Marsh Restoration & Management Action Plans***	***Monitoring Action Plans***	
FSD-6 (edited for clarity) Reduce impacts of muck on IRL **Rank: Medium**	**IM-1 (incorporated into W-5)** Complete projects for impounded marshes found in 1994 SWIM Plan	**MON-1 (updated for currency)** Continue monitoring of IRL resources and address data gaps as needed **Rank: High**	
FSD-7 (updated for currency) Amend local comprehensive plans and land develop regulations to incorporate CCMP **Rank changed: Medium→High**	**IM-2 (incorporated into W-4)** Continue acquisition of privately owned impounded marshes	**MON-2 (no change)** Continue Citizen Water Quality Monitoring Program **Rank: High**	
FSD-8 (Complete) State Revolving Trust Fund legislation for NPS Projects	***Land Acquisition and Protection Action Plans***	**MON-3 (updated for currency)** Provide support for a regular state of the lagoon report **Rank: Medium**	
FSD-9 (edited for clarity) Strengthen stormwater & freshwater discharge management programs **Rank: Medium**	**LA-1 (updated for currency)** Continue coordination to identify, classify, acquire & manage sensitive lands **Rank: High**	***IRL Scientific Research Action Plans***	

Water & Sediment Quality Improvements	Living Resources	Public & Government Support & Involvement	Financing IRL CCMP Implementation
FSD-10 (updated for currency) Encourage proper use of fertilizers, herbicides, pesticides & reuse water **Rank: High**	**LA-2 (incorporated into LA-1)** Acquire ownership or management of wetlands adjacent to IRL	**SR-1 (New)** Create IRL Science & Management Work Group to develop & implement a scientific research vision for IRL consistent with FL Coastal & Ocean Resources Council and national coastal priorities **Rank: High**	
FSD-11 (no change) Educate residents about impacts of stormwater and freshwater discharges on IRL **Rank: High**	**LA-3 (New)** Support continued, expanded state funding for land acquisition programs **Rank: High**	**SR-2 (New)** Include the value of scientific research in IRL economic studies **Rank: High**	
FSD-12 (updated for currency) Plans of reclamation for WCDs and SOP for large drainage districts to reduce discharges & pollutants **Rank: Medium**	**LA-4 (New)** Develop incentives for conservation of privately owned sensitive lands **Rank: High**	**SR-3 (New)** Expand & diversify funding for research **Rank: High**	
FSD-13 (updated for currency) Upgrade stormwater systems to reduce pollutant loadings to IRL **Rank: High**	**LA-5 (New)** Promote acquisition of lands for public access to the IRL **Rank: Medium**	***Environmental Incident Assessment & Response Action Plans***	
FSD-14 (updated for currency) Funding for operation & improvement of stormwater systems **Rank: High**	***Endangered and Threatened Species Action Plans***	**EIAR-1 (New)** Inventory existing rapid assessment & response programs within IRL & identify data gaps **Rank: Medium**	

Water & Sediment Quality Improvements	Living Resources	Public & Government Support & Involvement	Financing IRL CCMP Implementation
Marina & Boat Impacts Action Plans	**ETS-1 (updated for currency)** Develop, implement adaptive management or recovery plans for endangered/threatened species **Rank changed: Medium→High**	**EIAR-2 (New)** Create & maintain inventory of support services & resources in IRL region **Rank: Medium**	
MB-1 (updated for currency) Implement clean marina program **Rank: Medium**	**ETS-2 (no change)** Improve enforcement of regulations to protect endangered/threatened species **Rank: High**	**EIAR-3 (New)** Develop response strategies for various environmental incidents **Rank: Medium**	
MB-2 (edited for clarity) Implement boat facility siting plans **Rank: Medium**	**ETS-3 (edited for clarity)** Protect & manage crucial habitats of endangered/threatened species of IRL through land acquisition **Rank: High**	**EIAR-4 (New)** Develop assessment & response strategies for environmental incidents not already addressed **Rank: Medium**	
MB-3 (updated for currency) Prevent spills & discharge impacts **Rank: Low**	**ETS-4 (replaced by new ETS-4)** Undertake studies of wildlife diseases caused by humans		
MB-4 (institutionalized MB-1) Reduce impacts from in-water hull cleaning activities	**ETS-5 (New)** Encourage private land owners to manage lands for ETS within IRL **Rank: Medium**		
MB-5 (updated for currency) Provide educational materials and programs to boaters **Rank changed: High→Medium**	**ETS-6 (New)** Identify distribution and crucial habitats for endangered/threatened species of the IRL **Rank: High**		

Water & Sediment Quality Improvements	Living Resources	Public & Government Support & Involvement	Financing IRL CCMP Implementation
MB-6 (updated for currency) Expand &coordinate enforcement of boating safety & resource protection regulations in IRL **Rank: High**	***Fisheries Action Plans***		
MB-7 (updated for clarity) Eliminate impacts from boating waste discharges & marine sanitation devices **Rank: High**	**F-1 (updated for currency)** Conserve, protect, restore & manage finfish & shellfish resources in IRL **Rank: High**		
MB-8 (updated for clarity) Monitor boating impacts on IRL natural resources & effectiveness of resource protection zones **Rank changed: Low→Medium**	**F-2 (Incorporated into F-3)** Develop coordinated fisheries research agenda for the IRL		
Atmospheric Deposition Action Plan	**F-3 (updated for currency)** Support & expand research initiatives & coordinated finfish & shellfish management strategies **Rank: High**		
AD-1 (updated for currency) Continue to determine the impacts of Atmospheric Deposition of pollutants on water quality & resources **Rank changed: Low→Medium**	**F-4 (New)** Identify, inventory & assess fisheries habitats within IRL & implement management & restoration strategies **Rank: High**		
Total Maximum Daily Loads Action Plan	***Biotoxins and Aquatic Animal Health Action Plans***		

Water & Sediment Quality Improvements	Living Resources	Public & Government Support & Involvement	Financing IRL CCMP Implementation
TMDL-1 (New) Continue efforts to refine TMDLs **Rank: High**	**BAH-1 (New)** Implement multi-species-disciplinary strategy to address emerging infectious diseases in IRL; assess trends & identify causes **Rank: High**		
TMDL-2 (New) Coordinate BMAPs with FDEP **Rank: High**	**BAH-2 (New)** Continue support of Biotoxin & Aquatic Animal Health Work Group **Rank: High**		
TMDL-3 (New) Support implementation of BMAPs for all basins requiring TMDLs **Rank: High**	**BAH-3 (New)** Complete projects in Plan for Algal Toxins & Aquatic Animal Health **Rank: High**		
	Climate Change Action Plans		
	CC-1 (New) Track state, national & international actions & research on climate change issues that impact the IRL **Rank: Medium**		
	CC-2 (New) Support IRL research that integrates global climate change issues & seeks practical technological & public policy solutions **Rank: Medium**		

Water & Sediment Quality Improvements	Living Resources	Public & Government Support & Involvement	Financing IRL CCMP Implementation
	CC-3 (New) Provide information to local governments & residents of IRL about impacts of climate change & actions to reduce impacts **Rank: Medium**		
	Invasive Fauna & Flora Action Plans		
	IFF-1 (New) Support inventory & assessment of non-native species within IRL **Rank: High**		
	IFF-2 (New) Develop & implement management plans to control non-native species found in IRL **Rank: High**		
	IFF-3 (New) Formation of Rapid Assessment teams for newly identified invasive species **Rank: High**		
	IFF-4 (New) Engage residents in management & control of invasive species through education **Rank: High**		

IMPLEMENTATION STATUS RUBRIC:

Full:
All actions have been completed and are being implemented

Substantial:
Most actions have been completed and/or most partners are fully implementing actions

Moderate:
Some actions have been completed or are partially completed; and/or some partners are fully or partially implementing actions

Minor:
Implementation has been initiated with minor progress on actions; and/or some partners are initiating implementation

ACRONYMS:

BMAP	Basin management action plan
CAC	Citizens advisory committee
CAMA	Coastal and Aquatic Managed Areas
CCMP	Comprehensive conservation and management plan
CERP	Comprehensive Everglades Restoration Plan
COE	Corps of Engineers
CPHU	County public health unit
DACS	Department of Agriculture and Consumer Services
DCA	Department of Community Affairs
FDEP	Florida Department of Environmental Protection
FDOH	Florida Department of Health
FDOT	Florida Department of Transportation
FFWCC	Florida Fish and Wildlife Conservation Commission
FIND	Florida Inland Navigation District
FOS	Florida Oceanographic Society
IFAS	Institute for Food and Agricultural Science
IRL	Indian River Lagoon
IRL CCMP	Indian River Lagoon Comprehensive Conservation and Management Plan
IRL NEP	Indian River Lagoon National Estuary Program
IRL SIS	Indian River Lagoon Scientific Information System
IRL SWIM	Indian River Lagoon Surface Water Improvement and Management
MFC	Marine Fisheries Commission
MRC	Marine Resources Council
NADP	National Atmospheric Deposition Program
NEP	National Estuary Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	National Parks Service
NRCS	Natural Resources Conservation Service

OSTDS	On-site sewage treatment and disposal system
PLRG	Pollutant load reduction goal
RIM	Rotational impoundment management
SOMM	Subcommittee on Managed Marshes
SRF	State Revolving Fund
STORET	Storage and Retrieval system
SWIM	Surface Water Improvement and Management
TAC	Technical advisory committee
TMDL	Total maximum daily load
TNC	The Nature Conservancy
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WCD	Water control district
WMD	Water management district
WWTP	Wastewater treatment plant