EPA Work Plan
Indian River Lagoon National Estuary Program
FY 2019-2020

1235 Main Street
Sebastian, FL 32958
www.onelagoon.org
The Indian River Lagoon National Estuary Program is a partnership whose members work to improve the water quality and ecological integrity of the 156-mile long estuary on Florida's east coast. The U.S. Environmental Protection Agency (EPA) designated the lagoon as an "Estuary of National Significance" in April 1990 and included the lagoon in the National Estuary Program in 1991. The IRLNEP is sponsored by the IRL Council, which was established in February 2015 as an independent special district of Florida.
FY 2019-2020 Work Plan

Table of Contents

Section A........................................................................................................................................................................ 1
   A1. General Reporting Requirements......................................................................................................................... 1
   A2. IRLNEP EPA Work Plan Programs FY 2019-2020........................................................................................... 5
   A3. Program Staff and Their Respective Position Responsibilities........................................................................ 10
   A4. Work Plan Program Specific Sub Award Information FY 2019-2020......................................................... 12

Section B...................................................................................................................................................................... 19
   B1. Indian River Lagoon National Estuary Program 2019-2020................................................................. 19
   B2. Proposed New and On-Going Project Reporting Requirements.......................................................... 21

Section C.................................................................................................................................................................... 36
   C1. Completed Major Projects/Activities Previous Year Reporting............................................................... 36
   C3. IRLNEP Clean Water Act Implementation.................................................................................................. 70

Section D................................................................................................................................................................. 71
   D. Clean Water Act Travel Funds FY 2018-2019............................................................................................... 71
Section A.1 General Information Reporting Requirements

A.1. IRL Comprehensive Conservation and Management Plan Goals for Fiscal Year 2019-2020 are based on 32 Vital Signs identified in the One Lagoon CCMP - “Looking Ahead to 2030”. See Figure 1 below. The CCMP is in final review for certification and adoption in 2019. This FY 2019-2020 work plan has been developed in full alignment with the new CCMP.

Figure 1. IRL Vital Signs aligning with the “One Lagoon – One Community – One Voice” Mission.
IRL Health Concern Levels
Each IRL Vital Sign was ranked by the IRLNEP Management Conference members and members of the public based on one of four levels of ecosystem health concern. Levels are shown below:

LEVEL 1: CRITICAL – Condition threatens immediate and long-term prognosis for lagoon health. Indicators are unfavorable. Trend is negative. Immediate and aggressive intervention is urgently needed to stop and reverse trend.

LEVEL 2: SERIOUS – Condition threatens long-term prognosis for lagoon health. Trend is unfavorable or uncertain. Favorable outcome is not expected without strategic intervention and long-term stewardship.

LEVEL 3: UNDETERMINED – Insufficient knowledge is available to inform decision-making and resource management for the Vital Sign. Research needs to be identified, funded, and applied to resource management.

LEVEL 4: STABLE OR IMPROVING TREND – Vital Sign is stable or trending towards improvement. Continued intervention is needed. Long-term stewardship efforts are expected to deliver favorable outcomes.


ONE LAGOON
Water Quality, Habitats, Living Resources

Harmful Algal Blooms – HABs (Level 1 - Critical)
HAB-1: Support continuation of the IRL 2011 Consortium, which would function as a formal task force supported by the IRLNEP and which would develop a HAB RESEARCH and Restoration Response Plan.

HAB-2: Seek partnerships and funding to pursue RESEARCH priorities identified by the IRL 2011 Consortium that align with IRLNEP Management Conference management priorities.

HAB-3: Continue funding and scientific partnerships to understand HABs toxicity and risks to human and wildlife health.

Habitat Restoration Plan (Multiple Vital Signs that Range from Critical - Undetermined)
Seagrass-4: Develop a comprehensive and integrated habitat restoration plan for the IRL. (Level 1-Critical)

Filter Feeders-4: Develop a comprehensive and integrated habitat restoration plan for the IRL. (Level 2 -Serious)

Living Shorelines-6: Develop a comprehensive and integrated habitat restoration plan for the IRL. (Level 2 - Serious)
Wetlands-5: Develop a comprehensive and integrated habitat restoration plan for the IRL.
   (Level 2 – Serious)

Spoil Islands-5: Develop a comprehensive and integrated habitat restoration plan for the IRL.
   (Level 3 - Undetermined)

**Biodiversity (Level 2 - Serious)**
Biodiversity-2: Work to continue, expand and update and improve the IRL species inventory.

**Atmospheric Deposition (Level 3 - Undetermined)**
Atmospheric Deposition-1: Determine the impacts of atmospheric deposition of nutrients and other pollutants on the nutrient budget, water quality, and resources of the IRL.

**ONE COMMUNITY**

**Healthy 21st Century Coastal Communities**

**Trash Free Waters (Level 2 - Serious)**
Trash-Free Waters-1: Identify and map IRL hotspots for trash, develop education projects that REDUCE and/or REMOVE trash, and seek funding for projects from the USEPA Trash-Free Waters Program.

**Marinas and Boating (Level 2 - Serious)**
Marinas and Boating-3: Update and distribute the Boaters Guide to the Indian River Lagoon.

**ONE VOICE**

**Communicate, Collaborate, Coordinate, Innovate**

**Monitoring and Sharing Data (Level 2 - Serious)**
Monitoring-1: Develop a comprehensive IRL monitoring plan.

**State of the Lagoon (Level 2 - Serious)**
State of the IRL-1: Provide support for a “State of the Lagoon Technical Report” to be released every ten years.

**Science, Technology, and Innovation (Level 3 - Undetermined)**
Innovation-1: Work with IRLNEP IRLI², industry leaders, economic development organizations, and startup incubators/accelerators to help drive IRL regional economic, technology, and talent development. (NEW)

Innovation-2: Continue to support and develop a water technology directory for the www.onelagoon.org website. (NEW)

Innovation-3: Evaluate Options for a regular, sustainable, and cost-effective water quality monitoring network using autonomous sampling. (NEW)

Innovation-4: Advance the 10 scientific RESEARCH priorities identified by the STEMAC in the 2019 Looking Ahead – Science 2030 Report. Work with IRL partners to seek funding to implement priority RESEARCH projects within the 10 priorities. (NEW)
**CCMP Implementation and Financing (Level 1 - Critical)**

Implementation-1: Develop a finance plan for CCMP development and implementation, project and program funding, and program delivery with a focus on restoration, scientific **RESEARCH**, monitoring, and citizen engagement. (NEW)

Implementation-2: Provide support, technical assistance and adequate funding for CCMP implementation and oversight. (NEW)

Implementation-3: Provide CCMP technical support and assistance to IRLNEP stakeholders and partners, including development and maintenance of a lagoon-wide proposed project plan inventory, GIS maps of assets and updates/revisions of CCMP as authorized by CWA Section 320.

**Citizen Engagement and Education (Level 2 - Serious)**

Communicate-1: Facilitate implementation of the IRL CCMP consistent with "One Lagoon – One Community – One Voice" mission. (NEW)

Communicate-2: Develop and implement an IRLNEP multi-year Communication Plan.

Communicate-3: Implement public education programs including the “One Community – One Voice” initiative and student Envirothon event to promote education, awareness, community place-based identities and Lagoon-Friendly behaviors. (NEW)

*NOTE Additional IRLNEP funding in FY 2019-2020 from direct IRL Council contributions and Florida specialty license plate revenues (projected at $1,625,000) will fund CCMP restoration projects and program administration. The IRLNEP FY 2019-2020 Business Plan is provided as a support document to this EPA Work Plan Proposal.*
<table>
<thead>
<tr>
<th>Activity</th>
<th>CCMP Vital Sign and Priority</th>
<th>IRLNEP CCMP Core Elements/Sub-Element</th>
<th>Program Title and Abstract</th>
<th>CWA 320 Funding</th>
<th>IRLNEP Partner Match (Minimum)</th>
<th>Total Program Cost</th>
</tr>
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</table>
| 1        | Harmful Algal Blooms: Critical | Ecosystem Status and Trends (Assessment & Monitoring) | **Harmful Algal Bloom Monitoring:** Funding supports continued IRL algae and cyanobacteria monitoring.  
**Output:** Lagoon-wide algae and cyanobacterial monitoring to include species identification, distribution, and abundance data.  
**Outcome:** Enhanced knowledge of algae and cyanobacteria composition, distribution and abundance; enhanced understanding of HABs. | $ 80,000.00 | $ - | $ 80,000.00 |
| 2        | Harmful Algal Blooms: Critical; Monitoring/Data Sharing - Serious | Ecosystem Status and Trends (Assessment & Monitoring; Reporting) | **Harmful Algal Bloom Science - Enhanced Coordination, Collaboration and Communication:** This activity is funded by a FY 2019-2020 supplemental EPA grant of $25,000.  
**Output:** Establish a IRLNEP HAB task force to provide strategic guidance for enhanced HAB science, coordination, response, and water quality restoration activities.  
**Outcome:** Enhanced communication, coordination and cooperation among HAB scientists throughout the IRL watershed and the State of Florida. | $ 25,000.00 | $ - | $ 25,000.00 |
| 3        | Habitat Restoration: Seagrasses (Critical) Other IRL Habitats (Serious-Undetermined) | Ecosystem Status and Trends (Research; Assessment & Monitoring; Reporting) | **One Lagoon Habitat Restoration Plan:** This activity will develop a comprehensive and integrated habitat restoration plan to address multiple IRL natural habitat Vital Signs (i.e. seagrasses, wetlands, filter feeders, living shorelines and spoil islands).  
**Output:** A detailed IRL habitat restoration plan that provides specific guidance and support to the IRLNEP Management Conference and our partners to identify and prioritize habitat restoration project implementation.  
**Outcome:** Enhanced IRL ecosystem restoration decision-making to include consideration for restoring and maintaining biological diversity and coastal resilience. | $ 50,000.00 | $ - | $ 50,000.00 |
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<tr>
<td>4</td>
<td>Seagrasses; Filter Feeders; Living Shorelines; Land Conservation;</td>
<td>Ecosystem Status and Trends (Research; Assessment &amp; Monitoring; Reporting)</td>
<td><strong>IRL Asset GIS Mapping</strong>: This project will provide targeted GIS mapping support to the IRLNEP. <strong>Output</strong>: Develop and deliver lagoon-wide GIS maps and identify data gaps. <strong>Outcome</strong>: Position the IRLNEP as the primary source for updated and accurate lagoon-wide GIS data and map information.</td>
<td>$25,000.00</td>
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<td>$25,000.00</td>
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<td>5</td>
<td>Biodiversity</td>
<td>Ecosystem Status and Trends (Research; Assessment &amp; Monitoring; Reporting)</td>
<td><strong>IRL Biodiversity and the &quot;IRL Species Inventory&quot;</strong>: This project supports delivery and maintenance of the IRL species inventory and biodiversity initiative. <strong>Output</strong>: A complete reorganization and expansion of the species inventory website and website communications. <strong>Outcome</strong>: The refocus of public knowledge and understanding about the importance of IRL biodiversity and the need to fund and conduct an updated assessment of IRL biodiversity to evaluate status and trends since the 2011 superbloom.</td>
<td>$25,000.00</td>
<td>-</td>
<td>$25,000.00</td>
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<td>6</td>
<td>Atmospheric Deposition</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring; reporting)</td>
<td><strong>Atmospheric Deposition Monitoring Plan</strong>: Data collected from this station is essential to developing a nutrient budget for the IRL, providing data for BMAP and RAP updates, and evaluating nutrient deposition trends. <strong>Output</strong>: Continued data collection and monitoring station maintenance. <strong>Outcome</strong>: Evaluation of the need to expand the scope and scale of atmospheric deposition data collection.</td>
<td>$25,000.00</td>
<td>-</td>
<td>$25,000.00</td>
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<td>7</td>
<td>Citizen Engagement &amp; Education (Serious); Trash Free waters (Serious); Science, Technology &amp; Innovation (Undetermined)</td>
<td>Program Implementation &amp; Reporting (Outreach &amp; Public Involvement); Ecosystem Status &amp; Trends (Research)</td>
<td><strong>Special Projects Coordinator</strong>: Funding will support the salary for a Special Projects Coordinator for the IRLNEP. <strong>Output</strong>: The Special Projects Coordinator will focus on a number of administrative and CCMP program priorities in FY 2019-2020. <strong>Outcome</strong>: This new position is viewed as an essential and long-term commitment to successful IRLNEP program and CCMP implementation.</td>
<td>$60,000.00</td>
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<td>$60,000.00</td>
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<td>8</td>
<td>Marinas and Boating</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring: Reporting)</td>
<td><strong>One Lagoon Boater’s Guide:</strong> This project will update and develop a new IRL Boaters Guide with a focus on Lagoon Friendly™ boating practices, safety and enhanced information sharing with the IRL boating community. <strong>Output:</strong> Development of a new IRL Boaters Guide with updated maps. <strong>Outcome:</strong> Enhanced Lagoon-Friendly boating practices, safety and awareness.</td>
<td>$75,000.00</td>
<td>-</td>
<td>$75,000.00</td>
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<td>9</td>
<td>Monitoring &amp; Data Sharing</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring: Reporting)</td>
<td><strong>One Lagoon Monitoring Plan:</strong> The IRL Monitoring Plan will focus on identification of current assets, identifying gaps and looking ahead to develop a more strategic approach to deliver a comprehensive and fully integrated coastal monitoring system for the IRL. <strong>Output:</strong> A lagoon-wide monitoring plan that identifies current assets, network gaps, funding needs and new opportunities. <strong>Outcome:</strong> Enhanced coordination, cooperation, communication and funding to align IRL monitoring network activities to CCMP vital signs and appropriate indicators of ecosystem health.</td>
<td>$50,000.00</td>
<td>-</td>
<td>$50,000.00</td>
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<td>10</td>
<td>State of the Lagoon</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring: Reporting)</td>
<td><strong>State of the Lagoon Technical Report:</strong> Funding for this important multi-year initiative will generate a comprehensive state of the IRL technical document (patterned after the Narragansett Bay - State of the Bay report). <strong>Output FY 2019-2020:</strong> Development of a strategic process to implement the initiative with full and comprehensive participation of the IRLNEP Management Conference, identification of available data and gaps, and preliminary synthesis of available data. <strong>Outcome:</strong> Development and distribution of the State of the Lagoon technical document before FY 2024-2025 to advise any CCMP updates and provide guidance to address issues that need to be considered for the 2030 IRLNEP CCMP revision.</td>
<td>$50,000.00</td>
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<td>11</td>
<td>Citizen Engagement &amp; Education</td>
<td>Program Implementation and Reporting (Outreach and Public Involvement)</td>
<td>One Lagoon Comprehensive Communication Initiative: As the IRLNEP begins to implement the newly adopted CCMP - Looking Ahead to 2030, a more strategic and comprehensive communications campaign is needed. <strong>Output:</strong> Completion and roll-out of new website, delivery of the &quot;One Community-One Voice&quot; initiative, development of infographics, development of the IRLNEP calendar, annual report, one-page fact sheets and an expanded social media outreach effort. <strong>Outcome:</strong> Enhanced brand recognition and delivery of a 10-year strategic communications campaign in alignment with the mission of IRLNEP and the revised CCMP - “Looking Ahead to 2030”.</td>
<td>$ 75,000.00</td>
<td>$ -</td>
<td>$ 75,000.00</td>
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<td>12</td>
<td>CCMP Implementation and Financing</td>
<td>Program Implementation and Reporting (Financial Management)</td>
<td>Grant Writing Support: Funding will support the renewable contracts of three grant writer support contracts with Natua Strategies, T. Pinney and Associates, and Angie Brewer Inc. to provide grant writing technical support to IRLNEP Management Conference stakeholders and partners. <strong>Output:</strong> Identify new grant opportunities and provide technical grant writing support to local governments and community partners at no cost to them. <strong>Outcome:</strong> Build grant writing technical skills and capacity among IRLNEP partners. Increased revenues for IRL restoration, stewardship and community outreach.</td>
<td>$ 50,000.00</td>
<td>$ -</td>
<td>$ 50,000.00</td>
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<td>13</td>
<td>CCMP Implementation and Financing</td>
<td>Program Implementation and Reporting (Technical Assistance &amp; Capacity Building)</td>
<td>IRLNEP Technical Support of Conferences and Workshops: Funding assists IRLNEP science and community partners to develop and deliver high quality conferences, workshops and symposia that are aligned with CCMP priorities. <strong>Output:</strong> Expand community outreach and education; provide technical support to build capacity for high quality IRL events that align with CCMP priorities. <strong>Outcome:</strong> Build community outreach capacity within the IRL CCMP that integrates the sharing of knowledge across the 32 IRL Vital Signs.</td>
<td>$ 25,000.00</td>
<td>$ -</td>
<td>$ 25,000.00</td>
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<td>Activity</td>
<td>CCMP Vital Priority</td>
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<td>14</td>
<td>CCMP Implementation and Financing</td>
<td>Program Implementation and Reporting (Technical Assistance &amp; Capacity Building)</td>
<td>EPA Travel (EPA Work Plan Requirement): Funding supports IRL Council/IRLNEP staff travel to Washington DC for week-long EPA-National Estuary Program National Workshop (Spring) and National Estuary Program Tech Transfer Meetings (Fall).&lt;br&gt;<strong>Output:</strong> Share best practices, new policies and success stories and lessons learned among the 28 NEPs.&lt;br&gt;<strong>Outcome:</strong> Build a nationwide base of knowledge and experience through shared knowledge and best practices to guide restoration and stewardship of all of the estuaries through the United States and its territories.</td>
<td>$10,000.00</td>
<td>- $</td>
<td>$10,000.00</td>
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<tr>
<td>15</td>
<td>CCMP Implementation &amp; Financing</td>
<td>IRL CCMP Implementation: Water Quality and Habitat Restoration Projects</td>
<td>Nutrient Reduction, Habitat Restoration, Community-Based Restoration Projects and Small Grants: Priority areas for FY 2019-2020 are projects that enhance water quality through nutrient reduction projects or habitat restoration projects that focus on seagrasses, filter feeders and living shorelines, community-based restoration projects that use students and/or citizens to enhance citizen engagement through &quot;hands-on&quot; restoration projects, and a small grants program for grant awards between $500-$5,000. A total of $1,035,000 of local funds are budgeted for these CCMP projects. <strong>$625,000 of these local funds are identified as the minimum 1 to 1 match to EPA Section 320 federal funds.</strong>&lt;br&gt;<strong>Outcome:</strong> Restore IRL clean water and natural habitats through nutrient reduction and pollutant reduction to achieve the goals of the CWA.</td>
<td>$ -</td>
<td>$625,000.00</td>
<td>$625,000.00</td>
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**SUBTOTAL $625,000.00**  
**TOTAL $1,250,000.00**
A.3 Program Staff and Their Respective Position Responsibilities

Executive Director, Duane E. De Freese, Ph.D.

Duties and Responsibilities:
- Primary responsibility for successful delivery of all aspects of the IRLNEP hosted by the IRL Council.
- Ensures the efficient and fiscally responsible operation of the IRL Council and the Indian River Lagoon National Estuary Program.
- Supervises and oversees the managers of technical projects, public education and outreach initiatives, and program administration functions.
- Updates the program's finance strategy and for developing sustainable funding sources from governmental and private sources.
- Establishes, maintains and elevates the position of the IRLNEP to increase the commitment to, and investment in, Indian River Lagoon restoration and stewardship.
- Oversees implementation and updating of the CCMP by directing program office activities and management conference engagement.
- Acts as the principal spokesperson for the IRL Council and IRLNEP.

Deputy Director & Chief Communications Officer, Kathleen Hill

Principal Duties and Responsibilities:
- Supports all activities of the Executive Director, including serving as Deputy Director representing the IRL Council, as needed.
- Provides comprehensive administrative and program management support for the IRL Council/IRL NEP office.
- Supervises management, direction and message alignment for all internal and external communications, community engagement activities and brand development activities.
- IRL NEP Management Conference coordination and IRL Council/IRL NEP office liaison to committees, task forces and volunteers
- Supports STEMAC/CAC/Finance/other committees, with coordination of other staff assignments
- Meets with and participates in various advisory boards and committees.

Chief Operating Officer, Daniel Kolodny

Principal Duties and Responsibilities:
- Oversees all aspects of the day-to-day operations of the IRL Council and IRLNEP.
- Supervises IRLNEP project management and program operations.
- Serves as IRL Council HR manager, in coordination with Legal, keeping in compliance with IRL Council policies.
- Serves as Budget director, coordinating support for budget development and compliance, grant administration and liaison with financial service consultants.
- Coordinates Board support on matters outside the ED realm
- Works with Legal in keeping Board and Advisory Boards/Committees in the Sunshine and in compliance with ADA.
Special Projects Coordinator, New Position for FY 2019-2020 pending funding

**Principal Duties and Responsibilities:**

- Reports directly to the Deputy Director and Chief Communications Officer supporting all due diligence activities associated with the IRLNEP Management Conference including meeting coordination, minutes, and communications.
- Serves as the IRL Council and IRLNEP ADA and Florida Sunshine compliance officer.
- Meets with and participates in various advisory boards and committees.
- Oversees IRLNEP special projects as assigned. Key projects for FY 2019-2020 include the CCMP planning documents proposed in this workplan.
- Position includes oversight for science symposia, special events, outreach coordination, and contract management (as assigned).
### SECTION A.4 Work Plan Program Specific Sub Award information FY 2019-2020

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<th>Activity</th>
<th>Project Partners</th>
<th>CCMP Vital Sign and Priority</th>
<th>IRLNEP CCMP Core Elements/Sub-Element</th>
<th>Program Title and Abstract</th>
<th>CWA 320 Funding 2019-2020</th>
<th>Project Deliverables</th>
<th>Project Start Date/Completion Date</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Top-ranked RFQ Respondent for southern IRL. Top-ranked RFQ respondent for northern IRL.</td>
<td>Harmful Algal Blooms: Critical</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring)</td>
<td><strong>Harmful Algal Bloom Monitoring:</strong> Funding supports continued IRL algae and cyanobacteria monitoring. <strong>Output:</strong> Lagoon-wide algae and cyanobacterial monitoring to include species identification, distribution and abundance data. <strong>Outcome:</strong> Enhanced knowledge of algae and cyanobacteria composition, distribution and abundance; enhanced understanding of HABs.</td>
<td>$80,000.00</td>
<td>Conduct monthly monitoring of algae and cyanobacteria species identification, distribution and abundance.</td>
<td>10/01/2019 - 09/30/2020</td>
</tr>
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<td>2</td>
<td>IRLNEP Management Conference</td>
<td>Harmful Algal Blooms: Critical; Monitoring/Data Sharing - Serious</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring)</td>
<td><strong>Harmful Algal Bloom Science - Enhanced Coordination, Collaboration and Communication:</strong> This activity is funded by a FY 2019-2020 supplemental EPA grant of $25,000. <strong>Output:</strong> Establish a IRLNEP HAB task force to provide strategic guidance for enhanced HAB science, coordination, response and water quality restoration activities. <strong>Outcome:</strong> Enhanced communication, coordination and cooperation among HAB scientists throughout the IRL watershed and the State of Florida.</td>
<td>$25,000.00</td>
<td>Convene the IRLNEP HAB task force. Develop 1-page fact sheets. Convene IRLNEP HAB science summit. Consolidate and communicate knowledge.</td>
<td>10/01/2019 - 09/30/2020</td>
</tr>
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<td>Activity</td>
<td>Project Partners</td>
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<td>3</td>
<td>Tetra-Tech, Inc.</td>
<td>Habitat Restoration: Seagrasses (Critical) Other IRL Habitats (Serious-Undetermined)</td>
<td>Ecosystem Status and Trends (Research; Assessment &amp; Monitoring; Reporting)</td>
<td><strong>One Lagoon Habitat Restoration Plan:</strong> This activity will develop a comprehensive and integrated habitat restoration plan to address multiple IRL natural habitat Vital Signs (i.e. seagrasses, wetlands, filter feeders, living shorelines and spoil islands). <strong>Output:</strong> A detailed IRL habitat restoration plan that provides specific guidance and support to the IRLNEP Management Conference and our partners to identify and prioritize habitat restoration project implementation. <strong>Outcome:</strong> Enhanced IRL ecosystem restoration decision-making to include consideration for restoring and maintaining biological diversity and coastal resilience.</td>
<td>$ 50,000.00</td>
<td>Develop comprehensive lagoon-wide habitat restoration plan.</td>
<td>10/01/2019-09/30/2020</td>
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<td>4</td>
<td>Applied Ecology</td>
<td>Seagrasses; Filter Feeders; Living Shorelines; Land Conservation</td>
<td>Ecosystem Status and Trends (Research; Assessment &amp; Monitoring; Reporting)</td>
<td><strong>IRL Asset GIS Mapping:</strong> This project will provide targeted GIS mapping support to the IRLNEP. <strong>Output:</strong> Develop and deliver lagoon-wide GIS maps and identify data gaps. <strong>Outcome:</strong> Position the IRLNEP as the primary source for updated and accurate lagoon-wide GIS data and map information.</td>
<td>$ 25,000.00</td>
<td>Acquire, synthesize and apply data to develop lagoon-wide GIS maps of key assets of interest.</td>
<td>10/01/2019-09/30/2020</td>
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<td>Project Partners</td>
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<td>5</td>
<td>Top ranked RFQ respondent</td>
<td>Biodiversity</td>
<td>Ecosystem Status and Trends (Research; Assessment &amp; Monitoring; Reporting)</td>
<td><strong>IRL Biodiversity and the &quot;IRL Species Inventory&quot;</strong>: This project supports delivery and maintenance of the IRL species inventory and biodiversity initiative. <strong>Output</strong>: A complete reorganization and expansion of the species inventory website and website communications. <strong>Outcome</strong>: The refocus of public knowledge and understanding about the importance of IRL biodiversity and the need to fund and conduct an updated assessment of IRL biodiversity to evaluate status and trends since the 2011 super bloom.</td>
<td>$25,000.00</td>
<td>Update and deliver a new and revised IRLNEP-Smithsonian IRL Species Inventory website.</td>
<td>10/01/2019 - 09/30/2020</td>
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<td>6</td>
<td>IRLNEP (contract with Wood Group PLC and Indian River County DOH) with support from SJRWMD</td>
<td>Atmospheric Deposition</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring; reporting)</td>
<td><strong>Atmospheric Deposition Monitoring Plan</strong>: Data collected from this station are essential to developing a nutrient budget for the IRL, providing data for BMAP and RAP updates and evaluating nutrient deposition trends. <strong>Output</strong>: Continued data collection and monitoring station maintenance. <strong>Outcome</strong>: Evaluation of the need to expand the scope and scale of atmospheric deposition data collection.</td>
<td>$25,000.00</td>
<td>Continue wet and dry atmospheric deposition monitoring at the only monitoring station along the IRL (at Sebastian Inlet)</td>
<td>10/01/2019 - 09/30/2020</td>
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<td>7</td>
<td>IRLNEP</td>
<td>Citizen Engagement &amp; Education (Serious); Trash Free waters (Serious); Science, Technology &amp; Innovation (Undetermined)</td>
<td>Program Implementation &amp; Reporting (Outreach &amp; Public Involvement); Ecosystem Status &amp; Trends (Research)</td>
<td><strong>Special Projects Coordinator</strong>: Funding will support the salary for a Special Projects Coordinator for the IRLNEP. <strong>Output</strong>: The Special Projects Coordinator will focus on a number of administrative and CCMP program priorities in FY 2019-2020. <strong>Outcome</strong>: This new position is viewed as an essential and long-term commitment to successful IRLNEP program and CCMP implementation.</td>
<td>$60,000.00</td>
<td>Expand IRLNEP program productivity and efficiency by hiring a multi-skilled individual to supervise special projects including IRLNEP Management Conference oversight, ADA compliance and oversight on special projects as assigned by Executive Director.</td>
<td>10/01/2019 - 09/30/2020</td>
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<td>Activity</td>
<td>Project Partners</td>
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<td>8</td>
<td>Marine Resources Council</td>
<td>Marinas and Boating</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring; Reporting)</td>
<td><strong>One Lagoon Boater’s Guide:</strong> This project will update and develop a new IRL Boaters Guide with a focus on Lagoon Friendly™ boating practices, safety and enhanced information sharing with the IRL boating community. <strong>Output:</strong> Development of a new IRL Boaters Guide with updated maps. <strong>Outcome:</strong> Enhanced Lagoon-Friendly boating practices, safety and awareness.</td>
<td>$ 75,000.00</td>
<td>Develop a lagoon-wide boaters guide that is camera ready for printing and distribution in both printed and on-line format.</td>
<td>10/01/2019 - 09/30/2020</td>
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<td>9</td>
<td>Florida Atlantic University-Harbor Branch Oceanographic Institute</td>
<td>Monitoring &amp; Data Sharing</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring; Reporting)</td>
<td><strong>One Lagoon Monitoring Plan:</strong> The IRL Monitoring Plan will focus on identification of current assets, identifying gaps and looking ahead to develop a more strategic approach to deliver a comprehensive and fully integrated coastal monitoring system for the IRL. <strong>Output:</strong> A lagoon-wide monitoring plan that identifies current assets, network gaps, funding needs and new opportunities. <strong>Outcome:</strong> Enhanced coordination, cooperation, communication and funding to align IRL monitoring network activities to CCMP vital signs and appropriate indicators of ecosystem health.</td>
<td>$ 50,000.00</td>
<td>Develop a comprehensive, coordinated and fully integrated Lagoon-wide monitoring plan that identifies existing capacity and assets, gaps, and opportunities. Plan will also develop cost projections to assist in funding initiatives.</td>
<td>10/01/2019 - 09/30/2020</td>
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<td>10</td>
<td>Applied Ecology</td>
<td>State of the Lagoon</td>
<td>Ecosystem Status and Trends (Assessment &amp; Monitoring; Reporting)</td>
<td><strong>State of the Lagoon Technical Report:</strong> Funding for this important multi-year initiative will generate a comprehensive state of the IRL technical document (patterned after the Narragansett Bay - State of the Bay report). <strong>Output FY 2019-2020:</strong> Development of a strategic process to implement the initiative with full and comprehensive participation of the IRLNEP Management Conference, identification of available data and gaps, preliminary synthesis of available data. <strong>Outcome:</strong> Development and distribution of the State of the Lagoon technical document before FY 2024-2025 to advise any CCMP updates and provide guidance to address issues that need to be considered for the 2030 IRLNEP CCMP revision.</td>
<td>$50,000.00</td>
<td>Develop a State of the Lagoon Technical Report to identify current status, emerging trends and future opportunities and needs for restoration and stewardship.</td>
<td>10/01/2019 - 09/30/2020</td>
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<td>11</td>
<td>IRLNEP, IDEAS and competitively procured contract support as needed</td>
<td>Citizen Engagement &amp; Education</td>
<td>Program Implementation and Reporting (Outreach and Public Involvement)</td>
<td><strong>One Lagoon Comprehensive Communication Initiative:</strong> As the IRLNEP begins to implement the newly adopted CCMP - Looking Ahead to 2030, a more strategic and comprehensive communications campaign is needed. <strong>Output:</strong> Completion and roll-out of new website, delivery of the &quot;One Community-One Voice&quot; initiative, development of infographics, development of the IRLNEP calendar, annual report, one-page fact sheets and an expanded social media outreach effort. <strong>Outcome:</strong> Enhanced brand recognition and delivery of a 10-year strategic communications campaign in alignment with the mission of IRLNEP and the revised CCMP - &quot;Looking Ahead to 2030&quot;.</td>
<td>$75,000.00</td>
<td>Continue strategic delivery of the One Lagoon - One Community - One Voice Mission and Brand through a comprehensive and coordinated communication strategy.</td>
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<td>12</td>
<td>IRLNEP with Natua Strategies, T. Pinney and Associates and Angie Brewer Inc.</td>
<td>CCMP Implementation and Financing</td>
<td>Program Implementation and Reporting (Financial Management)</td>
<td><strong>Grant Writing Support:</strong> Funding will support the renewable contracts of three grant writer support contracts with Natua Strategies, T. Pinney and Associates, and Angie Brewer Inc. to provide grant writing technical support to IRLNEP Management Conference stakeholders and partners. <strong>Output:</strong> Identify new grant opportunities and provide technical grant writing support to local governments and community partners at no cost to them. <strong>Outcome:</strong> Build grant writing technical skills and capacity among IRLNEP partners. Increased revenues for IRL restoration, stewardship and community outreach.</td>
<td>$ 50,000.00</td>
<td>Continue to provide grant writing technical assistance to our local government and community partners in need through renewable contracts with Natua Strategies, T. Pinney and Associates and Angie Brewer Inc.</td>
<td>10/01/2019 - 09/30/2020</td>
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<td>13</td>
<td>IRLNEP and Management Conference Partners</td>
<td>CCMP Implementation and Financing</td>
<td>Program Implementation and Reporting (Technical Assistance &amp; Capacity Building)</td>
<td><strong>IRLNEP Technical Support of Conferences and Workshops:</strong> Funding assists IRLNEP science and community partners to develop and deliver high quality conferences, workshops and symposia that are aligned with CCMP priorities. <strong>Output:</strong> Expand community outreach and education; provide technical support to build capacity for high quality IRL events that align with CCMP priorities. <strong>Outcome:</strong> Build community outreach capacity within the IRL CCMP that integrates the sharing of knowledge across the 32 IRL Vital Signs.</td>
<td>$ 25,000.00</td>
<td>Deliver support for scientific conferences and workshops that expand knowledge, appreciation and public support for IRL restoration and stewardship.</td>
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<td>14</td>
<td>IRLNEP</td>
<td>CCMP Implementation and Financing</td>
<td>Program Implementation and Reporting (Technical Assistance &amp; Capacity Building)</td>
<td>EPA Travel (EPA Work Plan Requirement): Funding supports IRL Council/IRLNEP staff travel to Washington DC for week-long EPA National Estuary Program National Workshop (Spring) and National Estuary Program Tech Transfer Meetings (Fall). Output: Share best practices, new policies and success stories and lessons learned among the 28 NEPs. Outcome: Build a nationwide base of knowledge and experience through shared knowledge and best practices to guide restoration and stewardship of all of the estuaries throughout the United States and its territories.</td>
<td>$ 10,000.00</td>
<td>Attend Fall and Spring EPA, NEP and ANEP meetings to fulfill CCMP implementation, work plan development, project management, contract management, program administration and federal compliance activities.</td>
<td>10/01/2019 - 09/30/2020</td>
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<td>Top Ranked RFP respondents for Restoration RFP; Citizen Engagement &amp; restoration RFP and Small grants program RFP. Multiple awards for each RFP. See Section B.1 for grant awards and project details</td>
<td>IRL CCMP Implementation: Water Quality and Habitat Restoration Projects</td>
<td>Nutrient Reduction, Habitat Restoration, Community-Based Restoration Projects and Small Grants: Priority areas for FY 2019-2020 are projects that enhance water quality through nutrient reduction projects or habitat restoration projects that focus on seagrasses, filter feeders and living shorelines, community-based restoration projects that use students and/or citizens to enhance citizen engagement through “hands-on” restoration projects, and a small grants program for grant awards between $500-$5,000. A total of $1,035,000 of local funds are budgeted for these CCMP projects. $625,000 of these local funds are identified as the minimum 1 to 1 match to EPA Section 320 federal funds. Outcome: Restore IRL clean water and natural habitats through nutrient reduction and pollutant reduction to achieve goals of the CWA.</td>
<td>$ 625,000.00</td>
<td>Multiple contracts will be issues based on a competitive RFP process. Funded projects will be ranked and a list of recommended projects will be evaluated by the IRLNEP Management Conference (Management Board, STEM AC and CAC). A list of ranked projects will be provided to the IRL Council Board of Directors for final funding decision.</td>
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**TOTAL IRLNEP CCMP Implementation: Water Quality and Habitat Restoration Projects**

- $10,000.00
- $625,000.00

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<td>Multiple contracts will be issues based on a competitive RFP process. Funded projects will be ranked and a list of recommended projects will be evaluated by the IRLNEP Management Conference (Management Board, STEM AC and CAC). A list of ranked projects will be provided to the IRL Council Board of Directors for final funding decision.</td>
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**TOTAL IRL Council Local Match**

- $18,000.00
- $625,000.00
Section B.1 Indian River Lagoon National Estuary Program 2019-2020

Outputs and Outcomes

Outputs:

- Continued Program administration providing support to IRL Council and IRLNEP Management Conference.
- Implement the strategic IRLNEP Outputs (deliverables) identified in the IRL One Lagoon Comprehensive Conservation and Management Plan: “Looking Ahead to 2030” and FY 2019-2020 Work Plan Proposal:
  
  EPA Section 320 Funding
  - One Lagoon Monitoring Plan.
  - One Lagoon Habitat Restoration Plan.
  - IRL Asset Mapping.
  - One Lagoon Boater’s Guide.
  - IRL Species Biodiversity Inventory
  - Expanded focus on Harmful Algal Bloom monitoring, research and adaptive management strategies.

IRL Council Local Cost Share Match

  - Water Quality and Habitat Restoration Projects.
    - The Restoration, Maintenance, and Conservation of Seagrasses in the IRL. (IRL Council Contribution $95,872)
    - The Micco Sewer Line Extension. (IRL Council Contribution $246,000)
    - Pelican Island Phase V Restoration. (IRL Council Contribution $35,000)
    - Indian Harbor Estates Sewer Retrofit Design and Engineering. (IRL Council Contribution $100,000)
    - Restoration of Clam Populations in the IRL for Water Quality Improvement. (IRL Council Contribution $103,322)
    - The Efficacy of Adding Highly Concentrated Dissolved Oxygen to Enhance the Performance of Muck Removal Projects. (IRL Council Contribution $82,950)
    - Gabordy Canal 10th Street Stormwater Treatment Facility. (IRL Council Contribution $100,000)
    - Sebastian CRA Septic to Sewer Program. (IRL Council Contribution $46,456)

  - Community-Based Restoration Projects.
    - Living Shoreline Stabilization and Oyster Reef Restoration in Mosquito Lagoon. (IRL Council Contribution $88,585)
    - Water Quality Monitoring Network: Informing Habitat Restoration. (IRL Council Contribution $10,942)
    - Restore Our Shores: Engaging Brevard County Students in Native Plant Provision and Seagrass Restoration. (IRL Council Contribution $61,740)
    - Samsons Island Submerged Lands Restoration. (IRL Council Contribution $38,733)

- Provide CCMP implementation oversight and budgeting/project/contract management activities.
• Deliver facilitated stakeholder meetings throughout the IRL watershed to assist and advise development of planning documents.
• Roll-out new website and associated content development, development of branded print and web documents for public distribution, development of branded meeting and event materials (table covers, pop-up tabletop displays, etc.), updated strategic communications plan, production of an annual report and annual calendar, implementation of new social media strategies, and use of expanded social media platforms.
• Implement IRL small grants program.

Outcomes
• Clean Water Act implementation.
• CCMP: “Looking Ahead to 2030” implementation.
• EPA Strategic Plan implementation.
• Support of EPA Non-Point Source Program.
• Improved water quality, natural habitats, and biological diversity.
• Improved estuary health and resilience.
• Improved integration of IRLNEP activities across the 32 Vital Signs and One lagoon – One Community – One Voice Mission.
• Enhanced public knowledge and awareness that leads to behavior change and better stewardship.
• Continued watershed-wide coordination and networking.
• Expanded funding for IRL restoration and stewardship.
• Project activities that reduce nutrients and restore habitats, including creation of living shorelines provide specific documentation of amount of habitat restored and/or amount of nutrients or other pollutants reduced.
• Provide technical and program support to partners and stakeholders.
Section B.2 Proposed New and On-Going Project Reporting Requirements

Activity 1

CCMP Work Plan Vital Sign and Actions:
One Lagoon - Harmful Algal Blooms (Critical Concern)

HAB-2: Seek partnerships and funding to pursue RESEARCH priorities identified by the IRL 2011 Consortium that align with IRLNEP Management Conference management priorities.

HAB-3: Continue funding and scientific partnerships to understand HABs toxicity and risks to human and wildlife health.

Project/Activity Name:
Harmful Algal Bloom Monitoring

Project Activity Purpose and Description:
Funding supports continued IRL algae and cyanobacteria monitoring currently being delivered by University of Florida (for the northern Lagoon) and Florida Atlantic University - Harbor Branch Oceanographic Institution (for the southern Lagoon). This FY 2019-2020 activity will be contracted through a competitive RFQ process. This activity is considered an urgent, recurring annual monitoring need. Primary output: Lagoon-wide algae and cyanobacterial monitoring to include species identification, distribution and abundance data with specific focus on HABs.

Budget:
$80,000.00

Outcomes:
Short-term Outcome: Enhanced knowledge of algae and cyanobacteria composition, distribution and abundance. Enhanced understanding of HABs and their spatial and temporal variability.

Medium-term Outcome: Enhanced ability to evaluate special and temporal HAB trends.

Long-term Outcome: Application of long-term data to enhance prediction of bloom outbreaks, duration and intensity and adaptation/management responses.

Changes (+/-) in Pressure Targets: The current trend is negative with increased HAB occurrences, intensities and duration, especially in Banana River Lagoon. This project will help to expand scientific knowledge to better understand and reverse current status and trend.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program. The focus is to better understand nutrient and water quality relationships to algal species occurrences and abundance including HABs.
Activity 2

CCMP Work Plan Vital Sign and Actions:
One Lagoon - Harmful Algal Blooms

HAB-1: Support continuation of the IRL 2011 Consortium, which would function as a formal task force supported by the IRLNEP and which would develop a HAB RESEARCH and Restoration Response Plan.

HAB-2: Seek partnerships and funding to pursue RESEARCH priorities identified by the IRL 2011 Consortium that align with IRLNEP Management Conference management priorities.

HAB-3: Continue funding and scientific partnerships to understand HABs toxicity and risks to human and wildlife health.

Project/Activity Name:
Harmful Algal Blooms Science – Enhanced Coordination, Collaboration, and communication (EPA Supplemental Grant)

Project Activity Purpose and Description:
The project builds on harmful algal bloom (HAB) scientific research and monitoring that has been ongoing since the cyanobacterial superbloom of 2011. IRLNEP will take a larger leadership role to address water quality and HABs in the IRL as a result of our 2008 Comprehensive Conservation and Management Plan Revision – “Looking Ahead to 2030”. The proposed project will help “jump-start” the IRLNEP leadership role as the region and State of Florida begin to address the HAB crisis that has impacted our estuary, economy and quality of life.

Budget:
$25,000

Outcomes:
Short-term Outcome: Reconvene the IRL Harmful Algal Bloom (IRL Coalition) to continue and enhance communication and coordination among scientists and the IRLNEP Management Conference.

Medium-term Outcome: Synthesize data and knowledge gained since the 2011 superbloom. Expand scientific knowledge about HABs in the IRL. Seek expanded funding for HAB scientific research, monitoring and response activities.

Long-term Outcome: Application of long-term data to enhance prediction of bloom outbreaks, duration and intensity and adaptation/management responses.

Changes (+/-) in Pressure Targets: The current trend is negative with increased HAB occurrences, intensities and duration, especially in Banana River Lagoon. This project will help to expand scientific knowledge to better understand and revers current status and trend.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program. The focus is to better understand nutrient and water quality relationships to algal species occurrences and abundance including HABs.
Activity 3

CCMP Work Plan Vital Sign and Actions:
One Lagoon – Habitat Restoration

Seagrass-4: Develop a comprehensive and integrated habitat restoration plan for the IRL.
  Health Concern: Level 1 - Critical.
Filter Feeders-4: Develop a comprehensive and integrated habitat restoration plan for the IRL.
  Health Concern: Level 2 - Serious.
Living Shorelines-6: Develop a comprehensive and integrated habitat restoration plan for the IRL.
  Health Concern: Level 2 – Serious.
Wetlands-5: Develop a comprehensive and integrated habitat restoration plan for the IRL.
  Health Concern: Level 2 – Serious.
Spoil Islands-5: Develop a comprehensive and integrated habitat restoration plan for the IRL.
  Health Concern: Level 3 – Undetermined.

Project/Activity Name:
One Lagoon Habitat Restoration Plan

Project Activity Purpose and Description:
The project will develop and deliver a lagoon-wide habitat restoration plan that addresses multiple
habitat types, spatial and temporal consideration and lagoon-wide biological diversity.

Budget:
$50,000

Outcomes:
Short-term Outcome: Develop and deliver a lagoon-wide Habitat Restoration Plan.

Medium-term Outcome: Distribute and update the Plan as needed to provide guidance and best
practices for restoration projects throughout the lagoon (including the need to develop site fidelity
criteria).

Long-term Outcome: Restoration of IRL biological diversity to a stable and resilient state.

Changes (+/-) in Pressure Targets: A positive trend is predicted as restoration projects are funded and
implemented.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters
through the National Estuary Program.
Activity 4

**CCMP Work Plan Vital Sign and Actions:**

*One Lagoon*

- **Seagrass-4:** Develop a comprehensive and integrated habitat restoration plan for the IRL.
  - Health Concern: Level 1 - Critical.
- **Filter Feeders-4:** Develop a comprehensive and integrated habitat restoration plan for the IRL.
  - Health Concern: Level 2 - Serious.
- **Living Shorelines-6:** Develop a comprehensive and integrated habitat restoration plan for the IRL.
  - Health Concern: Level 2 - Serious.
- **Wetlands-5:** Develop a comprehensive and integrated habitat restoration plan for the IRL.
  - Health Concern: Level 2 – Serious.
- **Spoil Islands-5:** Develop a comprehensive and integrated habitat restoration plan for the IRL.

**Project/Activity Name:**

*IRL Asset GIS Mapping*

**Project Activity Purpose and Description:**

This project will provide targeted GIS mapping support to the IRLNEP. Primary outputs for FY 2019-2020 will be to develop and deliver lagoon-wide GIS maps and identify data gaps. The focus for FY 2019-2020 includes, but is not limited to, the following high-priority areas: natural habitats, human-built infrastructure and stakeholder networks (i.e. IRL scientific research organizations, IRL non-profit organizations, IRL restoration projects maps). Short-term outcome: Position the IRLNEP as the primary source for updated and accurate lagoon-wide GIS data and map information.

**Budget:**

$25,000

**Outcomes:**

*Short-term Outcome:* Synthesize available GIS data to develop lagoon-wide map products to help guide restoration and stewardship activities.

*Medium-term Outcome:* Integrate and overlay GIS maps to visually communicate natural and human-built assets throughout the IRL watershed.

*Long-term Outcome:* Application of asset data and GIS map resources to shift thinking about how to deliver natural resource restoration that is aligned with low impact development (LID) policy development and growth management decisions.

*Changes (+/-) in Pressure Targets:* Positive with enhanced knowledge and ability to visually evaluate lagoon-wide status and trends.

**CWA Implementation Information:**

This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program. The project can help to better understand infrastructure improvement needs for both point- and non-point pollution sources.
Activity 5

CCMP Work Plan Vital Sign and Actions:
One Lagoon – Biodiversity
Biodiversity-2: Work to continue, expand, update, and improve the IRL species inventory.

Project/Activity Name:
IRL Biodiversity and the "IRL Species Inventory":

Project Activity Purpose and Description:
This project supports the long-standing investment of the IRLNEP to deliver and maintain the IRL species inventory and biodiversity initiative. In FY 2019-2020, the IRLNEP will celebrate the 25th anniversary of the 1995 IRL Biodiversity Symposium (the first estuarine biodiversity conference in the nation). Primary outputs for this project will be a complete reorganization of the IRL Species Inventory website.

Budget:
$25,000

Outcomes:
Short-term Outcome: Refocus public knowledge and understanding about the importance of IRL biodiversity

Medium-term Outcome: Fund and conduct an updated assessment of IRL biodiversity to evaluate status and trends since the 2011 superbloom. Consider sponsoring another IRL Biodiversity Symposium to build on the scientific knowledge of the 1995 symposium.

Long-term Outcome: Development of quantitative targets to evaluate and track biodiversity.

Changes (+/-) in Pressure Targets: The current trend is unknown but is likely negative with increased HAB occurrences and loss of seagrass habitats. This project will help to expand scientific knowledge to better understand and reverse current status and trend.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program.
Activity 6

CCMP Work Plan Vital Sign and Actions:
One Lagoon – Atmospheric Deposition

Atmospheric Deposition-1: Determine the impacts of atmospheric deposition of nutrients and other pollutants on the nutrient budget, water quality, and resources of the IRL.
Atmospheric Deposition-2: Evaluate need for additional wet and dry atmospheric monitoring stations.

Project/Activity Name:
Atmospheric Deposition Monitoring Plan

Project Activity Purpose and Description:
The IRLNEP maintains the only wet-dry atmospheric deposition monitoring station along the entire IRL. Data collected from this station are essential to developing a nutrient budget for the IRL, providing data for BMAP and RAP updates and evaluating nutrient deposition trends. The primary output from this funding is continued data collection and monitoring station maintenance.

Budget:
$25,000

Outcomes:
Short-term Outcome: Continue long-term data collection of wet- and dry- atmospheric deposition of nutrients.

Medium-term Outcome: Evaluate the need to expand the scope and scale of atmospheric deposition data collection throughout the IRL.

Long-term Outcome: Develop and implement a strategy for an enhanced network to monitor atmospheric deposition and changes.

Changes (+/-) in Pressure Targets: The current trend is positive with decreasing nutrient loads associated with changes in automotive standards. Long-term land-use trends and climate change impacts are unknown.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act and the nexus between water quality and Clean Air Act standards and trends.
Activity 7

**CCMP Work Plan Vital Sign and Actions:**

**Citizen Engagement and Education**
- **Communicate-1:** Facilitate implementation of the IRL CCMP consistent with “One Lagoon – One Community – One Voice” mission.
- **Communicate-2:** Develop and implement an IRLNEP multi-year Communication Plan.
- **Communicate-3:** Implement public education programs including the “One Community – One Voice” initiative to promote community place-based identities and Lagoon-Friendly™ behaviors.

**CCMP Implementation**
- **Implementation-1:** Develop a finance plan for CCMP development and implementation, project and program funding, and program delivery with a focus on restoration, scientific research, monitoring, and citizen engagement.

**Project/Activity Name:**
**Special Projects Coordinator**

**Project Activity Purpose and Description:**
Funding will support the salary for a Special Projects Coordinator for the IRLNEP. This will be the 4th FTE for the program. This staff addition addresses a concern identified by the EPA in the FY 2015-2016 Program Evaluation and a work force analysis. The Special Projects Coordinator will focus on a number of administrative and CCMP program priorities in FY 2019-2020 including: IRLNEP Management Conference meeting management and internal communications; Sunshine and ADA compliance support to the Chief Operating Officer; CCMP implementation and funding (including an update of the 2016 IRL Economic Study); Trash Free Waters Initiative; Technology and Innovation Initiative; Envirothon; social media outreach coordination and delivery; strategic support for science symposia and events; the small grants program; and other special project duties as assigned.

**Budget:**
$60,000

**Outcomes:**
- **Short-term Outcome:** This new position is viewed as an essential and long-term commitment to successful IRLNEP program and CCMP implementation.
- **Medium-term Outcome:** Expand program development and implementation through identification and implementation of special projects that address high priority projects and programs.
- **Long-term Outcome:** Position the new staff member for professional success and high program productivity.

**Changes (+/-) in Pressure Targets:** The addition of IRLNEP staff is essential to delivering a sustained and successful program.

**CWA Implementation Information:**
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program.
Activity 8

CCMP Work Plan Vital Sign and Actions:

Marinas and Boating

Boating-1: Eliminate waste discharges and Marine Sanitary Device impacts on the public health and IRL resources.

Boating-2: Expand and coordinate enforcement of boating safety and resource protection regulations throughout the IRL and develop and distribute targeted public education and outreach products to REDUCE impacts.

Boating-3: Update and distribute the Boaters Guide to the Indian River Lagoon.

Trash Free Waters

Trash-Free Waters 1: Identify and map IRL hotspots for trash, develop education projects that REDUCE and/or REMOVE trash, and seek funding for projects from the USEPA Trash-Free Waters Program.

Trash-Free Waters-2: Identify and REMOVE derelict boats and fishing gear throughout the IRL.

Project/Activity Name:
One Lagoon Boater’s Guide

Project Activity Purpose and Description:
This project will update and develop a new IRL Boaters Guide with a focus on Lagoon Friendly™ boating practices, safety and enhanced information sharing with the IRL boating community. This project will be delivered by a contractor working closely with the IRLNEP Management Conference and staff. The contractor will be chosen by a competitive RFP process (single one-year contract). The guide will be available both in print and on-line. The primary output is development of a new IRL Boaters Guide with updated maps.

Budget:
$75,000 (includes data acquisition, guide development, support maps and graphics, and printing)

Outcomes:

Short-term Outcome: Enhanced Lagoon-Friendly boating practices, safety and awareness.

Medium-term Outcome: Develop a stronger connection to the marine industries and boating community using the lagoon for recreation. Help support the Florida Clean Marina Program.

Long-term Outcome: Change boater awareness and behavior to be Lagoon Friendly and safe. The boating community becomes a model for Lagoon Friendly advocacy.

Changes (+/−) in Pressure Targets: Positive change associated with improved behaviors with a specific target towards best boating practices that protect water quality, seagrasses and fisheries.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program.
Activity 9

**CCMP Work Plan Vital Sign and Actions:**
One Voice: Monitoring and Data Sharing  
  Monitoring 1: Develop a comprehensive IRL monitoring plan.

**Project/Activity Name:**  
One Lagoon Monitoring Plan

**Project Activity Purpose and Description:**  
Funding will build on previous work with the IRL science and monitoring community to enhance communication, cooperation and data sharing among data collectors and users. The IRL Monitoring Plan will focus on identification of current assets, identifying gaps and looking ahead to develop a more strategic approach to deliver a comprehensive and fully integrated coastal monitoring system for the IRL. The plan will be developed by a contractor working closely with the IRL Management Conference. The contractor will be chosen by a competitive RFP. The contract will be a single contract renewable for 2 years.

**Budget:**  
$50,000

**Outcomes:**  
**Short-term Outcome:** Enhanced coordination, cooperation, communication and funding to align IRL monitoring network activities to CCMP vital signs and appropriate indicators of ecosystem health.  

**Medium-term Outcome:** Funding and delivery of a robust, comprehensive, coordinated and integrated coastal monitoring system for the IRL.  

**Long-term Outcome:** Transition monitoring network to take full advantage of technology innovation in smart sensor technology, remote sensing, big-data analytics and crowdsourcing of data acquisition.

**Changes (+/-) in Pressure Targets:** Positive change expected as gaps are identified, and additional funding is secured.

**CWA Implementation Information:**  
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program.
Activity 10

CCMP Work Plan Vital Sign and Actions:
One Voice – State of the Lagoon

State of the IRL-1: Provide support for a “State of the Lagoon Technical Report” to be released every ten years.

Project/Activity Name:
State of the Lagoon technical Report

Project Activity Purpose and Description:
Funding for this important multi-year initiative will generate a comprehensive state of the IRL technical report (patterned after the Narragansett Bay - State of the Bay report). Funding is for FY 2019-2020 (first year) contractor support. The contractor will be chosen through a competitive RFP process. The contractor will work directly with the IRLNEP Management Conference and staff. The contract will be a multiple year contract (renewable up to 5 years contingent on annual progress). This funding is for Year 1 only. The total cost of this initiative is estimated at $350,000-$450,000. Primary output FY 2019-2020 is the Development of a strategic process to implement the initiative with full and comprehensive participation of the IRLNEP Management Conference, identification of available data and gaps, and preliminary synthesis of available data.

Budget:
$50,000

Outcomes:
Short-term Outcome: Development of a strategic process to implement the initiative with full and comprehensive participation of the IRLNEP Management Conference, identification of available data and gaps, preliminary synthesis of available data.

Medium-term Outcome: Development and distribution of the State of the Lagoon technical document before FY 2024-2025 to advise any CCMP updates and provide guidance to address issues that need to be considered for the 2030 IRLNEP CCMP revision.

Long-term Outcome: The State of the lagoon technical report will advise the 2030 CCMP revision.

Changes (+/-) in Pressure Targets: Positive. The State of the Lagoon technical report will provide a science-based foundation for moving forward with restoration and stewardship activities.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program. It addresses Section 320 guidance and authority to track CCMP progress and ecosystem changes and trends.
Activity 11

CCMP Work Plan Vital Sign and Actions:
One Voice – Citizen Engagement and Education

Communicate-1: Facilitate implementation of the IRL CCMP consistent with "One Lagoon – One Community – One Voice" mission.

Communicate-2: Develop and implement an IRLNEP multi-year Communication Plan.

Communicate-3: Implement public education programs including the "One Community – One Voice” initiative to promote community place-based identities and Lagoon-Friendly™ behaviors.

Project/Activity Name:
One Lagoon Comprehensive Communication Initiative

Project Activity Purpose and Description:
As the IRLNEP begins to implement the newly adopted CCMP - Looking Ahead to 2030, a more strategic and comprehensive communications campaign is needed. Funding supports implementation of the IRLNEP communication strategy focused on the "One Lagoon - One Community - One Voice" mission. Funding will be applied to the IRLNEP branding and communication campaign ($50,000); Development of enhanced web/graphics to support the www.onelagoon.org website ($12,500); and expanded communication and outreach activities ($12,500).

Budget:
$75,000

Outcomes:
Short-term Outcome: Completion of new website and roll-out, delivery of the "One Community-One Voice" initiative. Development of infographics. Development of the IRLNEP calendar, annual report, one-page fact sheets and an expanded social media outreach effort based on knowledge learned from Port Canaveral citizen education and behavior change project funded in FY 2016-2017.

Medium-term Outcome: Expanded quality and quantity of IRLNEP communication activity.

Long-term Outcome: Expansion of knowledge changes citizen and community behavior towards a Lagoon Friendly core value.

Changes (+/-) in Pressure Targets: Positive trend associated with delivery of a strategic communications campaign lagoon-wide.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program.
Activity 12

CCMP Work Plan Vital Sign and Actions:
One Voice – CCMP Implementation and Financing
   Implementation-2: Provide support, technical assistance and adequate funding for CCMP implementation and oversight.

Project/Activity Name:
Grant Writing Support – Technical Assistance to Community Partners

Project Activity Purpose and Description:
Funding supports the renewable contracts of three grant writer support companies (i.e. Natua Strategies, T. Pinney and Associates, and Angie Brewer Inc.). These firms provide grant writing technical support to IRLNEP Management Conference stakeholders and partners. Past performance has demonstrated that this IRLNEP service generates a high return on investment value to our partners, especially small NGOs and cities with limited resources to develop and submit competitive proposals.

Budget:
$50,000

Outcomes:
Short-term Outcome: Identification of new grant opportunities. Successful proposal development that increases revenues for CCMP project implementation.

Medium-term Outcome: Enhanced grant writing technical skills and capacity among IRLNEP partners. Increased revenues for IRL restoration, stewardship and community outreach projects.

Long-term Outcome: Enhanced grant writing sophistication among IRLNEP partners results in significant expansion and diversification of revenues generated for CCMP project implementation.

Changes (+/-) in Pressure Targets: Positive. Delivery of this service is already demonstrating a strong return on investment associate with successful proposal development and funding. Continuation will build on that positive trend.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program. This technical support service showcases the value of cooperative federalism.
Activity 13

**CCMP Work Plan Vital Sign and Actions:**
One Voice – CCMP Implementation and Financing
Implementation-2: Provide support, technical assistance and adequate funding for CCMP implementation and oversight.

**Project/Activity Name:**
IRLNEP Technical Support of Conferences and Workshops

**Project Activity Purpose and Description:**
Funding assists IRLNEP science and community partners to develop and deliver high quality conferences, workshops and symposia that are aligned with CCMP priorities. An example of FY 2019-2020 events already in planning stages include four lagoon-wide regional events (Florida Atlantic University-HBOI IRL Science Symposium, Florida Institute of Technology Tech Conference, Daytona State College ShORE Conference (“Sharing Our Research with Everyone”) and the IRL Envirotthon event). Funding will also be used by IRLNEP as a sponsor of the Restore America’s estuaries National Conference scheduled for October 18-22, 2020 in Fort Lauderdale, FL. Small funding support is provided to IRLNEP Management Conference partners ($500-$1,000) for smaller local events pursuant to available funding. Outputs: Expand community outreach and education; provide technical support to build capacity for high quality IRL events that align with CCMP priorities. Outcome: Build a community outreach capacity within the IRL CCMP that integrates the sharing of knowledge across the 32 IRL Vital Signs.

**Budget:**
$25,000

**Outcomes:**
*Short-term Outcome:* Convene the scientific community with IRL stakeholders and citizens to enhance knowledge, awareness and support for CCMP project funding and implementation.

*Medium-term Outcome:* Enhanced ability to evaluate special and temporal HAB trends.

*Long-term Outcome:* Application of long-term data to enhance prediction of bloom outbreaks, duration and intensity and adaptation/management responses.

*Changes (+/-) in Pressure Targets:* The current trend is negative with increased HAB occurrences, intensities and duration, especially in Banana River Lagoon. This project will help to expand scientific knowledge to better understand and reverse current status and trend.

**CWA Implementation Information:**
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program.
Activity 14

CCMP Work Plan Vital Sign and Actions:
EPA Travel (EPA Work Plan Requirement):
   Implementation-2: Provide support, technical assistance and adequate funding for CCMP implementation and oversight.

Project/Activity Name:
EPA Travel (EPA Work Plan Requirement):

Project Activity Purpose and Description:
Funding supports IRL Council/IRLNEP staff travel to Washington DC for week-long EPA-National Estuary Program National Workshop (Spring) and National Estuary Program Tech Transfer Meetings (Fall). Both meetings are scheduled with the Association of National Estuary Program Board of Directors meeting. Outcomes: Share best practices, new policies and success stories and lessons learned among the 28 NEPs.

Budget:
$10,000

Outcomes:
Short-term Outcome: Share best practices, new policies and success stories and lessons learned among the 28 NEPs.

Medium-term Outcome: Transition annual meetings to become more strategic and focused on urgent problems and innovative solutions. Leverage the local, state and EPA partnership for enhanced productivity, efficiency and success.

Long-term Outcome: Build a nationwide base of knowledge and experience to guide restoration and stewardship of all the estuaries throughout the United States and its territories.

Changes (+/-) in Pressure Targets: Positive. Annual discussions among the 28 NEPs and the EPA are generating positive outcomes. Best practices and technology innovations are being shared. Stronger partnerships are being developed. Example: Creation of the Florida estuaries Alliance agreement between Tampa bay, Sarasota Bay, Charlotte harbor and Indian River Lagoon NEPs.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program.
Activity 15

CCMP Work Plan Vital Sign and Actions:
Nutrient Reduction and Habitat Restoration Projects (funded by IRL Council local and state revenues pursuant to the 2015 IRL Council Inter-Local Agreement)

Multiple Vital Signs addressed by projects identified through a competitive RFP process focused on restoration projects that reduce nutrients and pollutants, restore natural habitats or create living shorelines; Community-based restoration projects that engage active participation by citizens and students in water quality and habitat restoration; and small grants program.

<table>
<thead>
<tr>
<th>One Lagoon Vital Signs</th>
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<tbody>
<tr>
<td><strong>Water Quality</strong></td>
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<tr>
<td>• Impaired Waters</td>
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<td>• Wastewater</td>
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<td>• Stormwater</td>
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<td>• Legacy Loads</td>
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Project/Activity Name:
Nutrient Reduction, Habitat Restoration, Community Based Restoration Projects, and Small Grants

Project Activity Purpose and Description:
Funding for design and engineering planning or project construction that enhances water quality through nutrient reduction strategies (wastewater, septic to sewer, stormwater or legacy load removal) or habitat restoration projects that focus on restoration of seagrasses, filter feeders, wetlands and living shorelines. Funding also available for community-based restoration projects that use students and/or citizens to enhance citizen engagement through "hands-on" restoration projects, and a small grants program for grant awards between $500-$5,000.

Budget:
A total of $1,035,000 of local funds are budgeted for these CCMP projects. $625,000 of these local funds are identified as the minimum 1 to 1 match to EPA Section 320 federal funds.

Outcomes:
Short-term Outcome: Implement nutrient reduction and habitat restoration projects that quantify water quality or habitat improvements.

Medium-term Outcome: Continue to implement high-value projects and expand funding and partnerships for project implementation.

Long-term Outcome: Significant expansion of recurring annual funding to accelerate IRL restoration and stewardship.

Changes (+/-) in Pressure Targets: Positive. Every project is progress.

CWA Implementation Information:
This project addresses core objectives of the Clean Water Act to protect wetlands and coastal waters through the National Estuary Program.
Section C. Completed Major Projects/Activities

Previous Year Reporting

C.1 Summary: IRLNEP and Management Conference Accomplishments 2018-2019

Indian River Lagoon National Estuary Program Projects/Activities funded by IRL Council Local Funds and Section 320 Funds.

The IRLNEP has a successful and busy year in FY 2018-2019. Highlights include the following milestone accomplishments as of June 1, 2019:

- Completion of the 2008 CCMP revision – “Looking Ahead to 2030” based on 32 Vital Signs for a healthy Indian River Lagoon. The revised CCMP responds to the dramatic declines in IRL water quality and aligns with the new IRLNEP mission: One Lagoon – One Community-One Voice. The final CCMP edits are being made and will be submitted to EPA for certification and final adoption in August 2019.

- Delivery of the nation’s first hackathon event to explore innovation ideas to help estuary restoration and stewardship (http://hacktheirl.com/). Hack the IRL was a 36-hour hackathon designed to inspire real tech solutions for the Indian River. Hack the IRL brought 52 students, technologists, and entrepreneurs of all ages together to hack through the biggest environmental issues facing the Indian River Lagoon. The “Hack the IRL” event was a partnership between a non-profit technology incubator, Groundswell Startups, IRLNEP, the Space Coast Economic Development Commission and numerous industry partners. Team solutions and winners can be viewed on-line at: (https://hacktheirl.devpost.com/submissions).

- The IRLNEP continued a strong commitment to local community and organization capacity building and technology transfer support. IRLNEP staff participated in the following activities and committees during FY 2018-2019:
  - Mosquito Lagoon Reasonable Assurance Plan (Volusia County).
  - Regional Resilience Action Plan Steering Committee (East Central Florida Regional Planning Council and Space Coast TPO)
  - CareerSource FL Board of Directors (De Freese continued to serve as a former Governor Scott appointee)
  - Florida Ocean Alliance Board of Directors (De Freese serves as Co-Chair)
  - Envirothon
  - Association of National Estuary Programs
  - Martin County Agriculture and Natural Resources Committee
  - Space Coast Office of Tourism Beach Improvement Committee

- IRLNEP staff gave presentations or participated in over 50 public events.

VOLUSIA COUNTY ENVIRONMENTAL MANAGEMENT DIVISION:

- Volusia County Environmental Management Division (EMD) continues to monitor numerous sites in Mosquito Lagoon for water quality (since 1988). Monthly and quarterly collections have been continuous for the northern stretches of the lagoon from Ponce Inlet south to Oak Hill, with sites along the Intracoastal Waterway as well as at points eastward near Bethune Beach and south of George’s Bar. Several points near the Intracoastal Waterway lie near marinas, and some are near shellfish harvesting areas. Sites currently sampled are widely dispersed in the Volusia segment of Mosquito Lagoon to provide a good data set for modeling purposes for water quality requirements.
- On April 3, 2018, County staff and the County’s consultant, Jones Edmunds & Associates, went before County Council to present an update of the Mosquito Lagoon Reasonable Assurance Plan along with the proposed water quality projects that were identified in the report. The Florida Department of Environmental Protection held a public hearing on October 19, 2018 to discuss the final plan for the Lagoon. The plan now needs approval from the EPA before moving forward with final implementation.
- In September 2018, EMD hosted the International Coastal & Halifax/Indian River Cleanup. 1,849 people volunteered to clean up trash along the shores of the beach, Halifax River, and Indian River Lagoon. Volunteers were located at 37 sites and they removed 7,400 pounds of trash. Over 88,000 items of trash were collected.
- EMD continues its commitment to “Project H2O” – a consortium of NGO’s, Universities, Colleges, and other institutions established in 2014. Project H2O helps to coordinate projects and match needs with resources to better address issues of water quality, quantity, and habitat. Partners collaborate on research, education, restoration, and funding to ensure the most effective use of limited resources.
- The Volusia County Council approved the 2019 State and Federal Legislative agenda on November 13, 2018 which supports funding for water quality improvements that provide dedicated funding to improve surface water quality including in the Indian River/Mosquito Lagoon estuary.
- On February 5, 2019, Volusia County Council adopted a resolution of support for the Indian River Lagoon Comprehensive Conservation and Management Plan.
- The Indian River Lagoon Surface Water Improvements and Management Overlay Zone (AKA Class II overlay) is an Environmental Ordinance within the Land Development Code. This regulation was designed to reduce the negative impacts of development adjacent to the Indian River Lagoon and to protect this vital natural resource and the shellfish harvesting industry in that area. Environmental Permitting issued 102 permits within the Class II overlay between April 1, 2018 and March 31, 2019. 139 storm water retention inspections, and 50 native vegetation retention inspections were also completed.
EMD operates the Marine Science Center (MSC) in Ponce Inlet, Florida to educate the public about the marine environments of Volusia County and how to help conserve habitat and reduce human impacts. From April 2018 through March 2019, 106,696 visitors toured the MSC and its exhibits and rehabilitation hospitals. The MSC provided a variety of ways to reach visitors outside the formal museum setting. Live animal presentations are offered 5 times a day that educate the public on birds, turtles, and other marine life that depend on a healthy environment for survival. Over 70 school groups visited the MSC during the school year and participated in a variety of programs, like seine netting, eco-walks, and plankton labs, which focused on the Indian River Lagoon. The MSC also conducted 9 week-long summer camps that concentrated on responsible fishing, observing wildlife, and becoming stewards of the environment. The MSC provided marine science field experiences for Daytona State College and Stetson University students to help gain practical research experience in fisheries biology. During this year, the sea turtle hospital treated over 116 adult and sub-adult sea turtles and over 200 hatchlings and wash-backs. The bird hospital treated over 1070 birds during the same period.

In 2018 through 2019, Be Floridian Now conducted presentations for organizations and groups such as the Ormond Beach Environmental Discovery Center, Downtown Deland Rotary, Daughters of the American Revolution and Environmental Council of Volusia/Flagler, among others.

In 2018-2019, Volusia County EMD funded a Be Floridian Now Coordinator.

In 2018 through 2019, the Be Floridian Now program distributed hundreds of fliers at festivals such as “Lagoonacy” at the Marine Discovery Center, the Water Festival in DeLand, the Volusia County Home and Garden Show at the Ocean Center, the Wildlife Festival at the Lyonia Environmental Center (1,200 reach), and the Florida Wildflower Festival in DeLand (5,000 reach).

As of March 2019, 10 out of the 26 home improvement stores in Volusia County (select Ace Hardware and Home Depot locations) are displaying Be Floridian Now fliers next to their fertilizer sections. The Be Floridian Now Coordinator has continued to reach out to stores within the county with the goal of reaching all 26.

Volusia County staff continue to participate in Lagoon SMART (Social Marketing and Research Team) meetings coordinated by the Marine Resources Council for many different stakeholders.

In 2019, Volusia County partnered with UF/IFAS Extension and the Blue Spring Alliance to hold "Guidelines for Community Associations", a workshop for Community Association Managers and Homeowners’ Association Board Members to explain how to reduce water consumption, fertilizer and pesticide use, while saving significant money on the landscape.

Explore Volusia provided 53 programs within the IRL watershed reaching 1029 people, which includes High School students in the Project IBIS (Investigating Biomes in Science) program. Explore Volusia programs provide outdoor education opportunities teaching residents and visitors about the diverse habitats of Volusia County. Programs range from hiking, biking, kayaking, and EcoBuggy tours. Experienced educators lead all programs with a focus on biodiversity and conservation. These programs are designed to engage participants, teach them about the county’s diverse habitats and how they are interconnected. Topics for discussion during the programs vary depending on the location, but often include water quality, quantity, and conservation.

The Volusia County Marine Mammal Stranding Team assisted with 76 (Jan ’18 – May ’19) marine mammals in distress within the Indian River Lagoon watershed. This
included 22 dolphins, 46 manatees, and 3 whales. This was done in partnership with the Florida Fish and Wildlife Conservation Commission, Hubbs SeaWorld Research Institute, Volusia County Beach Safety and Sheriff’s Marine Unit.

- EMD staff conducted 8 underwater cleanups, retrieving a total of 1377 pounds of monofilament line and marine debris from within the lagoon watershed.
- Working with Volusia County school students and the IBIS program, Manatee Protection Program (MPP) staff initiated a marine debris clean-up and education program by partnering with the NOAA Marine Debris Monitoring and Assessment Project to document marine debris in Rose Bay. Cleanups and data entry continue on a monthly basis. Volusia County’s project site was the first to be established in Florida for this NOAA program. Since then, 4 other Counties (Manatee, Pinellas, Palm Beach, & Hillsborough) have established their own project sites.
- Of the 128 recycling bins in the Monofilament Line Recycling Program 55 are located within the Indian River Lagoon watershed. Citizens volunteer to empty the bins, document and send in the data, and then take the line to a recycling center.
- MPP staff conducted two Manatee Watch program trainings to train volunteers to document manatee sightings and report animals in distress. These sightings serve to indicate manatee usage of our waterways and inform our citizens about manatee habitat, biology, and physiology.
- MPP staff designed a bilingual English/Spanish sign to assist fishers in what to do if they accidentally hook a bird while fishing. The signs were created with specific areas along the IRL in mind. The sign, approved by the Florida Fish and Wildlife Conservation Commission, will be available for use throughout the state in their “Don’t Cut the Line” campaign. Bird monofilament line entanglement presents a great hazard for birds, especially shore and wading birds that feed and nest close to waterways. The signs have been placed at 9 strategic locations (marinas/popular fishing docks) throughout the County; including: New Smyrna Beach (Bethune Park, Smyrna Dunes Park, Buena Vista Park, New Smyrna Marina), Ponce Inlet (Lighthouse Point Park), Oak Hill (River Breeze Park), Port Orange (North Causeway, Dunlawton Fishing Pier, Dunlawton Boat Ramp).
- In 2018 MPP staff created an educational sticker, to be distributed in 2019 to kayak rental companies in popular manatee viewing areas. The sticker displays the manatee harassment law and FWC hotline number. Having the information readily available will give kayakers a chance to report manatee harassment in real-time, and hopefully decrease the amount of harassment happening.
- In order to help decrease the number of manatee injuries and mortalities due to watercrafts, MPP staff and Volusia County GIS specialists developed and application that provides boaters with digital access to Volusia County manatee speed zones. , https://www.volusia.org/services/growth-and-resource-management/environmental-management/natural-resources/florida-manatee/manatee-speed-zones.stml
UNIVERSITY OF CENTRAL FLORIDA:

**Restoration of oyster reefs impacted by recreational boat wakes:**
Between April 2018 and March 2019, 6 additional reefs were restored (0.25 acres), bringing our 12-year total to 89 reefs (3.75 acres). In January 2019, there was an average of 961.2 live oysters on the oldest reefs restored in 2007; this project has provided over 10 million oysters in Mosquito Lagoon. We have documented positive impacts beyond our restoration footprint as well – with additional oysters growing nearby the stabilized area and seagrass recruitment at 25% now adjacent to restored reefs. Unfortunately, boring sponge infection and brown tide have had negative impacts on our restored and natural reefs within Mosquito Lagoon. We are currently examining both of these interactions, as well as invasive species and crown conch. Project lifetime volunteer numbers: 50,754. Between April 2108 and March 2019, we had 1030 volunteers contribute 4426 hours to this project.

**Living Shoreline Stabilization** of culturally important shorelines (historic structures, shell middens). Over the past 8 years we have stabilized over 3700 meters of shoreline, including 10 shell midden sites within CANA and 520 m of shell midden shoreline at Tomoka State Park. Through monitoring we have documented that highly eroded areas are now accreting sediment and that storms as powerful as Hurricane Matthew did not hinder our progress. Lifetime volunteer numbers: 10,403. Between April 2018 and March 2019, we had 733 volunteers who contributed 2821 hours to this project.

**Living shoreline suitability modeling:** We are developing a model to guide shoreline stabilization in Volusia and Brevard Counties, based on wind and wake energy and current shoreline structure.

**Impact vs Success of Mosquito Lagoon living shorelines and oyster reef restoration:** With funding from the National Science Foundation, in addition to standard success metrics of restoration/stabilization (# new oysters, # volunteers, etc.), we are collectively looking at impacts on biodiversity (wading birds, fisheries, crabs, worms, etc.), nutrients, ecohydrology, and volunteer perceptions (social science).

**Microplastics in the IRL:** In collaboration with the Marine Discovery Center, FL DEP, and Florida Oceanographic Society, we are currently undertaking one year survey of the distribution and abundance of microplastics in the IRL that includes: 1) a monthly lagoon-wide sampling of microplastics in water, 2) quarterly sampling of microplastics in the soft tissues of the oyster *Crassostrea virginica* throughout the lagoon, and 3) experimental determinations of retention of microplastics within juvenile and adult oysters.

CANAVERAL NATIONAL SEASHORE-MOSQUITO LAGOON:

**Boating safety and Resource Protection:**
Three Federal Wildlife Officers spent over 300 hours patrolling the Indian River Lagoon (IRL) by boat and enforcing State, Federal and U.S. Coast Guard regulations. The officers also worked with the Florida Fish and Wildlife Conservation Commission (FWC), and local law enforcement for resource checks, navigation/safety checks. Officers assisted State agencies and researchers with rescues of injured and sick manatees and dolphins.
**Wetland Restoration:**
The University of Central Florida continued oyster restoration on reefs eroded by boat wakes, including known archeological sites. Approximately 1 acre of oyster habitat was restored and continues to conduct monitoring and research on the health of the oysters. In addition, 500 meters of living shoreline was installed to prevent erosion and restore wetland habitat. Over 10,000 volunteer hours were documented for these activities. National Park Service staff from the Inventory and Monitoring group continued wetland SET monitoring at fixed locations in the Park. There is also a sonde that collects continuous water quality data and is downloaded monthly. A five-year vegetation mapping of the 58,000 acres was also conducted.

**Endangered and Threatened Species:**
The Park continued monitoring and protection of state and federally listed species, including scrub jays, beach mice, and sea turtles. Over 4,600 sea turtle nests were deposited on the 24 mile stretch of beach. A region-wide environmental assessment is in process to address predator control for better protection of species.

**Public Education:**
Canaveral National Seashore conducts education programs on a regular basis, including guided canoe and boat tours to educate visitors about the lagoon, habitats, and species. Interpretation staff gives programs on seining and fishing in the lagoon. Guided hikes are offered along trails and at Turtle Mound which is a very important archeological site. Brochures and information are provided to hundreds of guests on daily basis. The Park had an annual visitation of 1.7 million visitors. Plans are underway to revamp displays at the Visitor Center to focus on lagoon and mangrove habitat. The National Park System celebrated its Centennial and has been providing additional education at more festivals and events. New signs have been installed at the various boat ramps to notify boaters of an App developed by the University of Central Florida to map areas of oyster reefs and other sensitive areas to avoid. A new kayak trail and tour have been added to the south district.

**Clean Up Projects:**
The Park and partners continue to conduct regular clean ups in the lagoon and along the ocean. Many dumpsters of debris have been removed.

**Research Projects:**
NPS collaborates with many universities and partners for monitoring of habitats and wildlife. Research projects included dolphin health assessments and abundance by Hubbs SeaWorld, horseshoe crab behavior and morphology by the University of Florida and Marine Discovery Center, vegetation mapping by the University of Georgia, vegetation monitoring by NASA biologists, and sea turtles. The Park provides housing and logistical support for University of Central Florida and in return valuable data is conducted. Including research on climate change impact on ecosystems, brown tide effect on oyster populations, impounded restoration monitoring, and sediment elevation monitoring. The Park continues to work with state and other partners for water quality, seagrass, manatee, and invertebrate monitoring.

**Hurricane Funding**
The park incurred significant damage to Apollo boat ramp piers and severe erosion along the lagoon shoreline including many archeological sites. The park has received funding to address these issues.
BREVARD COUNTY NATURAL RESOURCES MANAGEMENT DEPARTMENT (NRMD):

Save Our Indian River Lagoon Plan Completed Projects:

- Merritt Island Septic Removal Phases 1 of 2, Merritt Island/North IRL: Septic phase out in area of South Tropical Trail, sanitary sewer construction along Cone Road; benefit to the lagoon: removal of 1,296 pounds of total nitrogen.

- Breeze Swept Septic to Sewer Connection, Rockledge/North IRL: Removal of 143 septic systems and connection to sanitary sewer; benefit to the lagoon: annual removal of 2,002 pounds of total nitrogen.

- Long Point Park Upgrade, Brevard County/Central IRL: Denitrification barrier to remove nitrogen from the groundwater of package treatment plant at campgrounds; benefit to the lagoon: annual removal of 127 pounds of total nitrogen.

- Central Blvd Baffle Box, Cape Canaveral/Banana River Lagoon: Upgraded first generation baffle box to second generation baffle box for better nutrient removal; benefit to the lagoon: annual removal of 481 pounds of total nitrogen and 14 pounds of total phosphorus.

- Gleason Park Reuse, Indian Harbour Beach/Banana River Lagoon: Expanded the reuse water irrigation from a wet detention pond in Gleason Park to further remove nutrients from the water; benefit to the lagoon: annual removal of 48 pounds of total nitrogen, 9 pounds of total phosphorus.

- Bayfront Stormwater Project, Palm Bay/Central IRL: Constructed wet detention ponds and nutrient filtration system to treat 320 acres of land draining to the IRL; benefit to the lagoon: annual removal of 348 pounds of total nitrogen, 83 pounds of total phosphorus.

- Church Street Baffle Box, Cocoa/North IRL: Installed a second-generation baffle box; benefit to the lagoon: annual removal of 237 pounds of total nitrogen, 29 pounds of total phosphorus.

- Cocoa Beach Country Club Living Shoreline, Banana River Lagoon: Planted 200 mangroves and 1000 spartina grasses along 1,000 feet of shoreline in order to reduce erosion and absorb nutrients; benefit to the lagoon: annual removal of 67 pounds of total nitrogen, 23 pounds of total phosphorus.

- Riverview Senior Resort Oyster Reef, Palm Bay/Central IRL: Built a 320 linear foot oyster reef to help reduce shoreline erosion, filter water, and trap nutrients; benefit
to the lagoon: annual removal of 64 pounds of total nitrogen, 22 pounds of total phosphorus.

- Bomalaski Oyster Reef, Brevard Zoo/North IRL: Built a 320 linear foot oyster reef in Merritt Island to help reduce shoreline erosion, filter water, and trap nutrients; benefit to the lagoon: annual removal of 20 pounds of total nitrogen, 7 pounds of total phosphorus.

- Muck re-dredging in Turkey Creek, Brevard County/Central IRL: Dredge muck deposited by Hurricane Irma in 11 acres of Turkey Creek; benefit to the lagoon: annual removal of 560 pounds of total nitrogen and 84 pounds of total phosphorus.

- Muck Interstitial Water Treatment for Turkey Creek, Brevard County/Central IRL: Scrub excess nutrients from Turkey Creek re-dredging return water; benefit to the lagoon: annual removal of 688 pounds of total phosphorus.

- Mims Muck Interstitial Water Treatment, Mims/North IRL: Scrub excess nutrients from Mims Muck Dredging Project, 30% complete; 250 pounds of total nitrogen, 40 pounds of total phosphorus.
Cocoa Beach Muck Removal, Cocoa Beach/Banana River Lagoon: Dredge 300,000 cubic yards of muck from 36 residential canals, 35% Complete; 852 pounds of total nitrogen, 128 pounds of total phosphorus.

Save Our Indian River Lagoon Plan Projects Under Construction:

- Melbourne Hoag Septic to Sewer
- Melbourne Pennwood Septic to Sewer
- Melbourne Riverside Drive Septic to Sewer
- MIRA Septic to Sewer Phase II
- Titusville South Street Baffle Box
- Titusville St Teresa Baffle Box
- Titusville La Paloma Baffle Box

- Cocoa Beach Phase III Muck Dredging
Save Our Indian River Lagoon Plan Monitoring/Planning Projects in Progress:
- Annual Plan Updates
- Leaky Lateral Monitoring
- Living Shoreline Monitoring
- Muck Finders & Muck Capping
- County Groundwater Monitoring
- Micco Septic to Sewer Monitoring
- Breeze Swept Septic to Sewer Monitoring
- Long Point Park Denitrification Monitoring
- Grass Clippings Outreach
- Fertilizer Management Outreach
- Septic Maintenance Outreach

Save Our Indian River Lagoon Plan Projects Under Contract and in Design:
- Johns Rd Pond Retrofit
- Kingsmill-Aurora Stormwater Project
- Huntington Pond Retrofit
- Flounder Creek Pond
- Basin 1349 Stormwater Project
- Basin 1409 Stormwater Project
- Basin 989 Stormwater Project
- Basin 1298 Bioreactor
- Cliff Creek Baffle Box
- Thrush Drive Baffle Box
- Titusville High Baffle Box
- Coleman Pond MAPS
- Crane Creek/M1 Flow Restoration
- Sykes Creek Zone N Septic to Sewer
- Grand Canal Muck Dredging
- Eau Gallie Area Muck Dredging
- Merritt Island Muck Removal
- Rockledge Area Muck Dredging
- Basin 1304 Bioreactor
- Basin 832 Broadway Pond BAM
- Basin 100 Burkholm Road BAM
- Basin 115 Carter Road BAM
- Basin 2134 Fleming Grant BAM
- Basin 51 Johns Road Pond BAM
- Basin 193 Wiley Road BAM
- Sykes Creek Zone M Septic to Sewer
- Sykes Creek Zone T Septic to Sewer
- South Central Zone C Septic to Sewer
- Sylvan Estates Septic to Sewer
- Micco Sewer Line Extension
- Palm Bay North Area WTF Upgrade
- Osprey WTF Upgrade
- Sykes Creek Muck Dredging
- Titusville Area Muck Dredging
- Central IRL Oyster Restoration

MELBOURNE-TILLMAN WATER CONTROL DISTRICT (MTWCD):

From September 2018 to the end of March 2019, MTWCD harvested 63,294 cubic yards of vegetation which equates to filling 0.71 of an Olympic pool or the depth of 1.1 feet of a football field.

MTWCD conducted successful restoration and hardening of canal slopes after damage from Hurricane Irma in which slope erosion occurred to Canals C-77 and C-82 adjacent to and east of Babcock Street, in a watershed that free flows into Turkey Creek.
WOOD ENVIRONMENTAL:

The Clean Air Status and Trends Network (CASTNET) is a long-term environmental monitoring network with 96 sites located throughout the United States and Canada. CASTNET is managed and operated by the U.S. Environmental Protection Agency (EPA) in cooperation with the National Park Service (NPS); Bureau of Land Management, Wyoming State Office (BLM); and other federal, state, and local partners including six Native American tribes that operate CASTNET sites on tribal lands. The network was established under the 1990 Clean Air Act Amendments to provide accountability for emission reduction programs by reporting trends in pollutant concentrations and acidic deposition. Data from CASTNET also support the assessment of the primary and secondary National Ambient Air Quality Standards (NAAQS) for ozone (O3), nitrogen dioxide (NO2), and sulfur dioxide (SO2). The NPS and BLM utilize CASTNET data for assessing critical loads exceedances in sensitive ecosystems (i.e., high elevation and coastal sites) and applications related to permitting.

CASTNET (www.epa.gov/castnet) measures ambient concentrations of sulfur and nitrogen species as well as rural O3 concentrations. Ambient concentrations of gases, SO2 and nitric acid (HNO3), and particles (sulfate (SO4), nitrate (NO3), ammonium (NH4), chloride (Cl), and base cations) are used to calculate dry deposition fluxes. CASTNET is the only network in the United States that provides a consistent, long-term data record of acidic dry deposition fluxes. The CASTNET site at Sebastian Inlet (IRL141) has been in continuous operation since 2001. IRL141 is a highly valued site within the network because it provides unique information about coastal environments along the Atlantic Ocean.

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT (SJRWMD):

SJRWMD continues to coordinate work on algal blooms in the northern and central Indian River Lagoon. A supplemental grant to the Indian River Lagoon National Estuary Program from the U.S. Environmental Protection Agency will provide valuable support for these efforts. Efforts focus on drawing together information on the physiology of the key phytoplankters responsible for recent blooms; evaluating the physiological tolerances of drift algae; documenting the storage and cycling of nutrients by seagrasses, epiphytes, and dust algae; and reviewing grazing rates for zooplankton, infauna, and epifauna. The results of these efforts will be incorporated into a mathematical model.

In addition, SJRWMD has five beneficial projects for the Indian River Lagoon that were in progress or completed during Fiscal Year 2018:

- **C-10 Water Management Area (WMA):** This project includes a 1,300-acre reservoir, pump station, and outlet structure. Design of the pump station was initiated in 2018. Upon project completion, C-10 WMA will increase the redistraction volume to the St. Johns River reducing nutrient loads and fresh water discharges to the Indian River Lagoon.

- **Crane Creek M-1 Canal Flow Restoration:** This project includes a water control structure, pump station, force main, and stormwater treatment area. The project is in the design phase. The project will reduce pollutant loads to the Indian River by treating and returning baseflows to the St. Johns River.
• **Eau Gallie River Dredge:** The Eau Gallie River dredging project commenced in January 2017, and muck dredging was underway in 2018. An estimated 630,000 cubic yards of muck will be removed from the Eau Gallie River upon completion. The Eau Gallie River is a tributary to the Indian River Lagoon.

• **Fellsmere Water Management Area:** This project includes a 10,000-acre reservoir, pump stations, culverts, and other water control structures. The reservoir is in place, and the project is almost complete. Improvements to Pump Station 4 was initiated in 2018. The Fellsmere WMA project decreases the frequency of freshwater discharges to the Indian River Lagoon.

• **Micco Stormwater Park:** This project includes two wet-detention ponds and wetland restoration areas, which improve the water quality of stormwater and surface water discharges to the Sebastian River and Indian River Lagoon. The stormwater system infrastructure was complete in 2016. The park was opened to the public in 2018 after installation of educational signs and other site amenities.

SJRWMD also awarded nearly $3.5M of cost share funds during Fiscal Year 2018 to five projects that benefit the Indian River Lagoon.

• **Cocoa Beach Muck Removal Phase 3:** The project consists of the removal of 44,000 cubic yards of muck from 13 residential canals, which are connected to the Banana River Lagoon.

• **Daytona Beach Bennett Swamp Rehydration and Conservation Project:** The project includes new infrastructure for the City’s Westside Regional Wastewater Treatment Plant that will disperse treated reclaimed water from the plant to a forested wetland known as Bennett Swamp. The project will reduce effluent discharges to the Halifax River at the northern end of the Indian River Lagoon.

• **Fellsmere South Regional Lake:** The project involves construction of the first phase of a two-phased stormwater project. This project will treat a significant portion of the water passing through the Fellsmere Water Control District. This treatment will reduce nutrient loads to the Sebastian River, a tributary to the Indian River Lagoon.

• **Titusville South Street Basin Baffle Boxes:** The project includes the installation of three second generation baffle boxes with upflow filters and nutrient reducing media. The project will reduce pollutant loads to the Indian River Lagoon.

• **Volusia County Rio Way Drainage Improvements:** This project involves expansion of the existing Riveria Oaks stormwater pond and reconstruction of the control structure. The project will provide additional treatment of water and reduce pollutant loads to the Halifax River.
Indian River Lagoon Research and Education

FAU HBOI, with its scientific and technology expertise, ideal geographical location, and over 45 years of history of research on the Indian River Lagoon (IRL), continues to be a strong contributor to finding answers to research questions regarding the many facets of the Lagoon. HBOI researchers collaborate with other research institutions, federal and state agencies, not-for-profits, governmental bodies, and other interested parties to advance this research and education.

Projects and other activities related to the IRL in the past year include:

Research:

**Water Quality, Harmful Algal Blooms, and Restoration**

The Indian River Lagoon Observatory (IRLO): Biodiversity and Ecosystem Function of an Estuary in Transition (PI: D. Hanisak) – IRLO is a long-term, multi-disciplinary, ecosystem-based program, that addresses emerging issues of environmental health in the IRL ecosystem (http://www.fau.edu/hboi/irlo/index.php). Key components are: (1) long-term ecosystem-based research, including high-frequency water quality and seagrass/macroalgal monitoring along a water quality gradient in the south central IRL that demonstrates both human impacts and climate-related interannual variability in IRL water quality; (2) collaboration among various organizations working in the IRL, best exemplified by the Indian River Lagoon Symposium (see below); and (3) use of advance technology for observing long-term changes in the IRL, including IRLO’s Network of Environmental Sensors (IRLON), a network of Land/Ocean Biogeochemical Observatories (LOBOs) and weather stations that provides continuous real-time, high-accuracy, high-resolution water-quality and weather data through a dedicated interactive website (http://fau.loboviz.com/).

(Save Our Seas Florida specialty license plate sales granted by the HBOI Foundation: $1,294,456, July 1, 2016 – June 30, 2019)

**Land/Ocean Biogeochemical Observatories (LOBOs) for Water Quality Sampling in the St. Lucie Estuary and Indian River Lagoon** (PI: D. Hanisak) – This project supports five IRLON real-time water quality and weather stations in the St. Lucie Estuary (SLE) and nearby IRL. These data provide scientists of various disciplines from many organizations reliable, continuous observatory data to better quantify and model relationships between environmental factors and biological processes in the SLE and IRL. The data can also be used to follow the outcome of changes related to recovery measures and assist resource and policy managers with decision making. (Florida Department of Environmental Protection, two awards: total funding $700,000 – $350,000 July 1, 2017 to June 30, 2018; $350,000 – July 1, 2018 to June 30, 2019)

**Land/Ocean Biogeochemical Observatories (LOBOs) for Intensive, Real-time Water Quality Sampling in the St. Lucie Estuary** (PI: D. Hanisak) – This project provided support for one IRLON site, strategically located in the South Fork of the SLE (South Florida Water Management District: $138,007 and $138,007 match from HBOI, June 11, 2015 to June 10, 2018)

**Developing Next Generation Ocean Color Remote Sensing Algorithms for Indian River Lagoon (IRL) HABs** (Pls: M. Twardowski, M. McFarland, A. Nayak, J. Sullivan) – This pilot project tested a new approach for linking phytoplankton and particle fields with optical properties
using in-water holographic microscopy to measure optically important particle characteristics including size, shape, and density. Key issues addressed in this project included the relative contributions of large and small particles to IOPs and sources of uncertainty in data derived from in situ holographic imaging. (Save Our Seas Florida specialty license plate sales granted by the HBOI Foundation: $31,000, July 1, 2017 to June 30, 2018)

**Development of the Florida Center for Coastal and Human Health** (PIs: A. Wright, M. Twardowski, N. Dickens, M. Ajemian, E. Guzmán) – The Center will define connections between ecosystem changes from the macro to micro scale using direct sampling, remote sensing, novel genomics, metabolomics and informatics analyses coupled to toxicity testing and assessment of trophic and human impacts. The long-term goal of the Center is to develop predictive models for coastal ecosystem dynamics related to ecosystem and human health. The focus of the current project is on defining the drivers of HAB initiation, toxicity, and collapse with a goal of reducing HAB events having adverse health and economic impacts. (HBOI Foundation: $650,000, July 1, 2018 to June 30, 2019, $850,000, July 1, 2019 to June 30, 2020)

**Improving Monitoring and Understanding of Phytoplankton and Harmful Algal Blooms in the Southern Indian River** (PIs: J. Sullivan, D. Hanisak, M. McFarland) – This project seeks to add phytoplankton and Harmful Algal Bloom (HAB) monitoring to the IRLON time series to enhance its scientific value and leverage its utility. Samples collected from ten sites at monthly intervals will be returned to HBOI for comprehensive analysis of phytoplankton composition, HAB species identification, and toxin analysis, if a HAB is detected. These types of combined environmental and phytoplankton species data are routinely collected in the Northern IRL by the St. Johns River Water Management District, but a similar program for the Southern IRL is lacking. (Save Our Seas Florida specialty license plate sales granted by the HBOI Foundation: $34,903, July 1, 2018 – June 30, 2019)

**Characterizing Polyaromatic Hydrocarbons in the Indian River Lagoon** (PIs: A. Wright, E. Guzmán) – Polyaromatic hydrocarbons (PAHs) can enter the environment naturally through bacterial degradation of plant material, but they can also be introduced anthropogenically. The Wright lab previously identified high levels of a PAH in sediments in the IRL. The amounts observed were approximately 4000 ng/g of sediment and are substantially higher than values reported from many other marine habitats including the Gulf of Mexico (10-950 ng/g sediment). It has been reported that PAHs may have negative impacts on seagrasses and could contribute to seagrass loss. PAHs have also been reported to be carcinogenic/toxic but no cytotoxicity data is available for the observed PAH. This project will purify major PAHs in IRL sediments; use NMR to identify the structures; and define their cytotoxicity against a mammalian cell line. Mass spectrometry will be used to define distribution. Defining the structures, concentrations, and cytotoxicity of the PAHs could lead to a healthier IRL through better management. (Save Our Seas Florida specialty license plate sales granted by the HBOI Foundation: $35,000, July 1, 2018 to June 30, 2019)

**Determining New Sediment Metrics for Seagrass Restoration Monitoring** (PIs: D. Hanisak, J. Beckler) – This project hypothesizes that the relative deposition rates of organic carbon and reactive iron may be important predictors of sediment sulfidization and seagrass survivability. In turn, these parameters will be measured along transects in an ongoing seagrass monitoring program. Nursery experiments will also be conducted with organic carbon and iron amended sediments. The goal is to develop a new sediment geochemical
metric that can be routinely measured in IRL seagrass health assessments and become a tool in seagrass restoration efforts. (Save Our Seas Florida specialty license plate sales granted by the HBOI Foundation: $35,000, July 1, 2018 – September 30, 2019)

Pilot-Scale Demonstration of Seagrass Restoration in the Indian River Lagoon Using Nursery-Grown Halodule (PIs: P. Hanisak, P. Wills.) – To supply sustainable donor material for a pilot-scale seagrass restoration project in the Indian River Lagoon, this project is developing infrastructure and technical capabilities to successfully cultivate Halodule wrightii in a closed, land-based tank system. This project will further advance that technology and produce enough cultured Halodule to transplant it to three sites in the lagoon suffering limited recovery from heavy losses in recent years. This effort will be facilitated by partnering with agencies deeply invested in IRL management and with citizen scientists in the planting and monitoring of the transplanted seagrass. (Indian River Lagoon National Estuarine Program: $80,283, October 1, 2018 – September 30, 2019)

Harmful Algal Blooms in the Indian River Lagoon (PI: J. Sullivan) – In this study, a network of ten strategically placed sites that span the IRL from the Mosquito Lagoon to the St. Lucie Estuary will be sampled twice per month and analyzed for phytoplankton composition, abundance, biovolume and biomass, including the identification of HAB species. The project study sampling is a collaborative effort between the University of Florida (UF) and FAU, where five northern sites will be examined by UF and five southern sites will be examined by FAU to cover the bulk of the IRL. In the short-term, observations of major phytoplankton blooms and the dominant taxa in the blooms, will be reported to IRLNEP and other key agencies. The data produced will be used in quantitative modeling applications to define environmental drivers for blooms, and how they vary by region of the IRL and HAB species. Additional medium/long term goals are to generate model outputs that can forecast HAB development and identify optimal targets for management efforts to control blooms. (Indian River Lagoon National Estuarine Program: $40,480, October 1, 2018 – September 30, 2019)

Synoptic Assessment of the Indian River Lagoon Light Field for Seagrass Restoration Using Satellite Remote (PI: M. Twardowski) – Multi-spectral passive remote sensing imagery from new high-resolution Sentinel and Landsat imagers will be used to map vertical light attenuation (K) throughout the Lagoon (from Ponce to Jupiter Inlet) at a resolution of 10 m spatially and ~5 days temporally. Existing algorithms for K will be refined with extensive in situ optical measurements using state-of-the-art optical instrumentation during three seasonal surveys. Resulting maps of K will be combined with bathymetry maps to provide IRL-wide contour maps showing percent surface irradiance at the bottom (%Es), which will be synthesized with seagrass light requirements to assess suitable seagrass habitat. Map deliverables will fill a gap in knowledge for high spatial resolution data on light availability for seagrasses throughout the lagoon, providing needed input to assess optimal IRL locations for ongoing and future seagrass restoration and related management efforts, such as assessing impacts of water quality improvements. The algorithm deliverable will also be ready to implement for ongoing assessment after project completion. (HBOI & River Branch Foundations: $109,442, October 1, 2018 to September 30, 2019)

Marine Mammals

Epidemiology, Pathology & Population Health Science Health of Indian River Lagoon Bottlenose Dolphins (PIs: A. Schaefer, A. Page-Karjian) – HBOI epidemiology research focuses on the health of IRL bottlenose dolphins as an indicator of the health of the
ecosystem and potential implications for human health. Studies include a new approach to identification and characterization of a fungal infection that occurs in dolphins and humans, the use of MRI to investigate the effects of environmental chemicals on dolphin central nervous systems, molecular identification of dolphin viruses, and the study and archiving of tissues from stranded dolphins. (Protect Wild Dolphins Florida specialty license plate sales granted by the HBOI Foundation: $160,000, January 1, 2017 to December 31, 2018)

Wild Dolphin Stranding Response, Care & Research (PI: S. Burton) – As a member of the NOAA National Marine Fisheries Service Marine Mammal Health and Stranding Response Network, HBOI is responsible for responding to marine mammal stranding incidents in the IRL and near-shore ocean waters between the Sebastian and St. Lucie Inlets. The team also serves as a resource to assist with strandings, transport, disentanglements, and rehabilitation of dolphins throughout the IRL and state. (Protect Wild Dolphins Florida specialty license plate sales granted by the HBOI Foundation: $667,000, January 1, 2017 to December 31, 2019)

Dolphins as Sentinels for Harmful Algal Bloom Toxins in the Indian River Lagoon: An Interdisciplinary Study (PI: J. Sullivan) – This project is assessing the distribution and concentration of Harmful Algal Bloom toxins (microcystin, nodularin, BMAA, saxitoxin) in IRL waters, the food chain (prey fish) and ultimately in resident dolphin populations. Assessing the concentration of these toxins within an IRL food chain potentially shared by both dolphins and humans (i.e., fish) could have significant public health impacts, where dolphins serve as the sentinel species for understanding future health threats to humans. (Protect Wild Dolphins Florida specialty license plate sales granted by the HBOI Foundation: $285,709, January 1, 2017 to December 31, 2019)

Photo-identification - Dolphin Census and Spatiotemporal Trends (PI: M. Mazzoil) – HBOI has been conducting photo identification studies of IRL bottlenose dolphins since 1996 and has identified more than 1,700 individual dolphins. Among the findings enabled by this data is identification of a distinct IRL stock now breeding its third generation since the study began, and insights into breeding and social behavior. The program is expanding to include remote biopsy sampling to support ongoing research collaborations in the study of contaminant burdens and develop innovative projects to assess health, stress and brevotoxin effects. (Protect Wild Dolphins Florida specialty license plate sales granted by the HBOI Foundation: $405,000, January 1, 2019 to December 31, 2019)

Photo-identification – Update and Expansion of Publications and Scientific Data Dissemination (PIs: M. Mazzoil, E. Titcomb, B. Nelson, A. Schaefer) – This one-year project builds on a longitudinal study designed to collect requisite data on individual dolphins and their environment. The program has identified >3,000 dolphins along 70% of the east coast of Florida and provides crucial population census data, including abundance, distribution and movement patterns. Four concurrent generations of resident dolphins are monitored in the IRL, with many of known age, sex, lineage, reproductive status and health. The 20-year dataset, derived from photo-identification, health assessments and remote biopsy sampling techniques, can provide invaluable data for research which will be disseminated on dolphin biology, ecology and behavior; stock and social structure, health, human threats, and wildlife sentinel responses to coastal ecosystem changes that include shifts in climate, water quality, trophic structure disturbance, harmful algal blooms, and environmental contaminants. (Protect Wild Dolphins Florida specialty license plate sales granted by the HBOI Foundation: $321,111, January 1, 2019 to December 31, 2019)
**Real-time Assessment and Management of the Risk of Infectious Disease in Wild Florida Dolphins** (PIs: G. O’Corry-Crowe, S. Burton, A. Page-Karjian) – The project team recently spearheaded genomic and proteomic research that revealed individual animals and distinct populations of dolphins have different inherent abilities to mount an immune response to pathogens. Research is now focused on what those pathogen threats are and what risks they pose to wild dolphins. Furthermore, molecular tools are required to rapidly respond to emerging disease threats from habitat deterioration. This project will use genomic screening of tissue and blow samples along with OMIC, clinical and histopathological assessments of dolphin health, and eDNA OMIC analysis of water and habitat samples to assess immune competence, infectious disease, and pathogen exposure in dolphins. These parameters will then be used to model spatial and temporal variation in disease risk in wild Florida dolphins. Our findings will be applied to broader ongoing investigations of ecosystem health and decision analyses that facilitate more effective policy. (Protect Wild Dolphins Florida specialty license plate sales granted by the HBOI Foundation: $151,000, January 1, 2019 to December 31, 2019)

**Graduate Research Fellowships**

**IRL Graduate Research Fellowships** (Pl: P. McCarthy) – Proceeds from the Harbor Branch Oceanographic Institute Foundation’s 2017 and 2018 Love Your Lagoon fundraising galas are supporting competitively awarded graduate student fellowships for IRL research projects being conducted by graduate students at FAU. The fellowships are being used for research assistantships, tuition, travel related to experimental work and presentation of research at scientific conferences, and purchase of necessary equipment and supplies related to these student research projects. (HBOI Foundation: $89,826 – May 15, 2017 to May 4, 2018; $102,700 – May 14, 2018 to June 30, 2019)

**Outreach and Education**

HBOI works to foster IRL research via the annual Indian River Lagoon Symposium (IRLS), which it hosts and organizes as part of a multi-institution steering committee. The IRLS attracts over 300 scientists, resource managers, and students, and provides a forum for all researchers and agencies working in the IRL to share research findings and discuss challenges and opportunities. The program and abstracts for all the symposia (2012-2019) are available at: [http://indianriverlagoon.org/symposium.html](http://indianriverlagoon.org/symposium.html).

The breadth of HBOI IRL research is reflected in its *Mission: Ocean Discovery* public outreach program, which includes the Ocean Science Lecture Series, a forum for HBOI researchers and guest speakers to inform the public about their work; the Ocean Discovery Visitor’s Center, a museum-style visitor center that features interpretations of HBOI research and nearby marine environments including the IRL via a continually evolving array of interactive exhibits, small live animal tanks, video, and other displays; the Immersion Tour program, which offers visitors an up-close look at the HBOI site and its laboratories; the Indian River Lagoon Research Boat Tour, an opportunity for the public to learn about the IRL, relevant research, and wildlife encountered; the Ocean Discovery Experience, an off-site after-school program that introduces children (ages 9-12) in underserved communities to marine science; and DNAngler, a citizen science project designed to engage the community in cutting edge molecular techniques used to detect different fish species in the water. Another outreach tool is the HBOI IRL video ([www.youtube.com/watch?v=1v6KiaUA18Q&list=UU6YvxeMtnn-a5NbhMKvk-Jg](https://www.youtube.com/watch?v=1v6KiaUA18Q&list=UU6YvxeMtnn-a5NbhMKvk-Jg)), which is an overview of the estuary and some of the ways HBOI is investigating its challenges.
The IRL also is an integral part of the curricula for HBOI educational programming, which includes FAU College of Science and HBOI Semester By The Sea, a semester-long undergraduate immersion in marine science located at HBOI; graduate student training for FAU students pursuing advanced degrees in biological and environmental sciences, including a new Marine Science & Oceanography M.S degree that was launched in August 2017, with initial graduates in May 2019; the Harbor Branch Summer Intern Program, a competitive program that attracts top undergraduate and graduate students worldwide for a 10-week immersion in marine science and engineering projects; the Marine and Oceanographic Academy, a magnet high school program located at HBOI and created in partnership with the St. Lucie County School District; FAU Pine Jog’s and HBOI’s H2O to Go Summer Research Institute, a week-long, residential research institute for high school students focused on the interconnectedness and complexity of South Florida water systems and the environmental issues facing them; the Indian River County Junior Scientists Fellows Program, a HBOI partnership with the Indian River Land Trust to engage high school students in the research and care of an environmentally sensitive, 185-acre preserve located along the IRL; and newly launched in January, in collaboration with Indian River State College, a partnership with Upward Bound Program - St. Lucie County, which brought minority high school students to HBOI for a weekly after-school program, heavily focused on the IRL.

ST. LUCIE COUNTY ENVIRONMENTAL RESOURCES DEPARTMENT (SLCERD):

Teague Hammock Preserve Hydrologic Restoration Project:
Western St. Lucie County, St. Lucie County Environmental Resources Department (SLC ERD) has partnered with the Florida Fish and Wildlife Conservation Commission Aquatic Habitat Enhancement Section (FWC AHRES) to design, engineer, and permit a 300-acre wetland restoration project at Teague Hammock Preserve. Benefits include reducing nutrient concentrations, providing groundwater recharge, restoring hydroperiods, and improving habitat function for fish and wildlife. The project provides direct benefits to the C-24 basin and the St. Lucie Estuary. The project is in the permitting phase with construction expected to begin next year. FWC provided $100,000 towards design/permitting and St. Lucie County has $400,000 committed from the Florida Legislature for construction. Recent efforts including invasive species and prescribed fire management has recruited an abundance of bird life, including several listed species.

Richard E. Becker Preserve River Restoration Project:
Ten Mile Creek - upper North Fork St. Lucie River, St. Lucie County Environmental Resources Department (SLC ERD) has partnered with the Florida Fish and Wildlife Conservation Commission Aquatic Habitat Enhancement Section (FWC AHRES) to design, engineer, and permit a priority restoration project that will reconnect a former oxbow along Ten Mile Creek within the Becker Preserve. Ten Mile Creek and the North Fork was heavily altered in the early 1900s by dredging and channel construction, which isolated floodplain and blocked several oxbows. The project directly benefits the St. Lucie Estuary by improving habitat function, water quality, and floodplain storage in the upper North Fork. The project is in the permitting phase with construction expected to begin next year. The project is a 50/50 cost-share project between FWC and St. Lucie County totaling $400,000.
**Wesley’s Island (SL17) Tree Canopy Restoration:**
Indian River Lagoon – Port of Port Pierce, together with several partners, including the IRLNEP, St. Lucie County Environmental Resources Department completed the initial restoration phases of Wesley’s Island in 2017. This involved removing invasive exotic vegetation from the island and replanting native understory plants and grasses. With funding assistance from the Indian River Lagoon License Plate Grant, St. Lucie County expects to begin native tree canopy restoration in the coming year. This will consist of barging equipment and materials to the island, establishing native trees, and installing nesting platforms. St. Lucie County is matching the funding with volunteer hours, project coordination, and a future outdoor classroom on the island. This is a 50/50 cost-share project and is estimated at $70,000.

**DJ Wilcox Preserve – Indian River Lagoon Filter Pond:**
Northeast St. Lucie County, St. Lucie County Environmental Resources Department is combining funding resources with the St. Lucie River Issues Team to construct enhancements to a man-made pond at DJ Wilcox Preserve. The project will create a treatment wetland, filtering run-off to the Lagoon, but also improve habitat function for wildlife. Work will involve minor site excavation to enlarge the pond footprint, creation of littorals and living shoreline enhancements, and installing a control structure at the outfall of the pond. Goals are to reduce total nitrogen and phosphorus inputs to the Lagoon. An adjacent 800 LF boardwalk overlooks the project, providing educational opportunities for Lagoon restoration. This is a 50/50 cost-share project and is estimated at $76,000.

**FLORIDA OCEANOGRAPHIC SOCIETY (FOS):**

**General Activities**

**Florida Oceanographic Oyster Restoration (FLOOR):** Between April 2018 and March 2019, 12 additional reefs were created in the St. Lucie Estuary and the Indian River Lagoon. Volunteers created 3,450 bags of restaurant recycled shell during this timeframe for use in oyster reef creation. To date, FLOOR has created over 126 oyster reefs (~1.5 acres). Continuing work has expanded sites further into the Indian River Lagoon proper from the St. Lucie Estuary to improve resiliency of reefs to impacts from freshwater discharges and incorporating salt marsh and mangroves into living shorelines with these oyster reefs to increase stability. Mangroves and/or salt marsh were planted into oyster reefs at 5 sites as pilot project to improve success of plantings from April 2018 to March 2019. FOS is also currently examining the role of these oyster reefs on shoreline stabilization, including through the use of sediment elevation tables, the interactions of reefs with shoreline vegetation in living shorelines and microplastics.

**Florida Oceanographic Seagrass Training Education Restoration (FOSTER):** Between April 2018 and March 2019, an equivalent of 213 mats was deployed across 55m² of seagrass into the Indian River Lagoon. To date, FOSTER has planted over 589 sq. ft.; however, field success has been variable due to storm events and discharges. Since 2015, Florida Oceanographic Society has been successfully cultivating seagrass in a land-based nursery tank from washed ashore fragments. This method provides a non-destructive source of seagrass for restoration, avoiding the need for transplanting seagrass from
established beds and creates a standing stock of nursery-grown seagrass in face of ongoing losses in natural populations. Beginning in April 2018, Florida Oceanographic is expanding the pilot seagrass nursery from six 110-gallon tanks to fifty 110-gallon tanks to support seagrass research and restoration in the Indian River Lagoon. We are also currently examining methods for improving transplant success of seagrass and the role of genetic diversity in nursery-grown seagrass for restoration.

**Florida Oceanographic Society Water Quality Program:** Florida Oceanographic Society added 1297 new data sets to its 20-year-old database of water quality measurements. Data was collected weekly at up to 34 fixed sites. Sites were located in the IRL watershed between Hobe Sound and Jensen Beach and included sites in the IRL proper, St. Lucie River and two Martin County mosquito impoundments. Weekly reports were made available to the public through the Stuart News, the FOS website, Facebook & on request by email.

**Grants:**

**New planting methods to enhance the resiliency of Living Shorelines:** This project augments existing permitted living shorelines with new mangrove and/or salt marsh plantings by using the oyster reef structures to protect and stabilize new plantings. The modified reef structure is expected to protect the newly planted vegetation during early establishment, thereby increasing the resiliency of these plantings to high tides and storm events. This is a novel approach to living shorelines to enhance shoreline stability and resiliency. This project supported living shoreline restoration (oyster reefs and shoreline vegetation) at four sites within the St. Lucie Estuary and the southern Indian River Lagoon (Martin County) and supported the propagation of shoreline vegetation within Florida Oceanographic Society’s mangrove and marsh nursery. (SFWMD Indian River Lagoon License Plate: $16,707 – October 1, 2018 to September 30, 2019)

**Enhancing seagrass restoration success in the Indian River Lagoon by incorporating genetic diversity from an established nursery source:** Seagrass declines in the Indian River Lagoon are ongoing due to a myriad of impacts to water quality that have led to increased algal blooms and turbidity reducing light availability. However, restoration of these ecologically and economically important seagrass habitats has also been met with variable success, making the need for improved restoration techniques critical to seagrass persistence. This project (1) established a genetically diverse nursery by isolating and cultivating unique genotypes, (2) piloted test planting of genetically diverse plantings for their role in restoration, and (3) determined the current genetic diversity of natural, surviving seagrass (*Halodule wrightii*) populations in a lagoon-wide study. (Indian River Lagoon National Estuary Program: $43,048 – October 1, 2017 to September 30, 2018)

**Grants as Sub-contracts:**

**Microplastics, Oysters, and the IRL:** Florida Oceanographic Society is a partner on a microplastics study lead by Dr. Linda Walters of University of Central Florida. This project encompasses 30 sites across the Indian River Lagoon and includes water and oyster sampling for microplastics. FOS oversees the water sample collection and processing for 10 sites in the southern IRL. (Indian River Lagoon Natural Estuary Program to UCF: $99,797 – FOS sub-award: $14,998 – October 1, 2018 to September 30, 2019)
SOUTH FLORIDA WATER MANAGEMENT DISTRICT (SFWMD):

(SFWMD) continues to lead localized IRL restoration efforts and CCMP implementation throughout the southern IRL watershed.

- SFWMD continues implementation of the Northern Everglades and Estuaries Protection Program (NEEPP) and associated watershed protection plans for the three northern watersheds (Lake Okeechobee, St. Lucie, and Caloosahatchee).

- As part of the ongoing effort to maximize water storage in the greater Everglades system, the SFWMD continues to partner with agencies and private landowners to bolster the Dispersed Water Management (DWM) Program. Storing or treating water on public and private lands is one tool to help reduce the amount of water flowing into Lake Okeechobee and/or discharged to the St. Lucie and Caloosahatchee estuaries during times of high-water conditions throughout south Florida. In 2018, the SFWMD has led effort to plan, implement, and/or operate one Florida Ranchlands Environmental Services Project (FRESP), 14 Northern Everglades Payment for Environmental Services (NE PES) Projects, two water farming projects, six large Northern Everglades Public Private Partnership (NE PPP) projects, and two projects on District lands. Since its inception in 2005, the DWM Program’s estimated average annual storage/treatment volume has grown to more than 123,000 acre-feet per year in Operation and Maintenance with an additional estimated average annual storage/treatment volume of over 224,000 acre-feet per year in the planning, design/permitting, or construction phase.

- SFWMD through the CERP RECOVER program is monitoring IRL and St. Lucie River benthos, submerged aquatic vegetation, oyster reefs and water quality parameters in partnership with the U.S. Army Corps of Engineers. Data is reported in the 2019 Everglades Report Card and System Status Report on evergladescohealth.org.

- The SFWMD Coastal Ecosystems Section (CES) is currently doing research on the effects of low level dry season freshwater releases into the estuary on the productivity in the oligohaline zone of the estuary.

- Waters of the St. Lucie estuary sometimes exhibit low concentrations of dissolved oxygen and some WBIDs are impaired for this water quality parameter. To better understand the causes and extent of this impairment, the CES is conducting a study of dissolved oxygen in the North Fork of the St. Lucie.

- The Coastal Ecosystems Science Section is developing and calibrating a water quality model and a nutrient budget for the St. Lucie Estuary.

- A phytoplankton study began this year to get a better understanding of the abundance, distribution and species composition of phytoplankton in the St. Lucie River and Estuary under different seasonal, flow and salinity regimes.

The St. Lucie River Issues Team was formed by the South Florida Ecosystem Restoration Working Group in May 1998 and is managed by SFWMD. The Issues Team mission is to develop federal, state and stakeholder consensus on an action plan that would accelerate progress toward improving water and habitat quality in the St. Lucie River Estuary and IRL.
This action plan assessed current problems in the estuary and lagoon and set direction for achieving improvements in both water quality and estuarine ecosystem functions (e.g., fish and wildlife habitat).

The Issues Team has continued to solicit, rank and submit projects to the Florida Legislature. And to date, has received $65.7 million from the Florida Legislature, and an additional $2 million in federal funding for over 131 individual projects in Martin and St. Lucie counties.

Current Issues Team projects administered by the District are as follows:

- **DJ Wilcox Preserve – Indian River Lagoon Filter Pond:** The primary focus of this project is to redirect runoff and surface water that collects in the western perimeter ditch into an existing manmade pond near the trailhead boardwalk. This will repurpose the pond to provide attenuation and filtering of non-point source nutrients prior to flowing into the impoundment and Indian River Lagoon.

Issues Team projects completed in FY2018 include:

- **Land/Ocean Biogeochemical Observatories (LOBOs) for Intensive, Real-time Water Quality Sampling in the St. Lucie Estuary:** Harbor Branch Oceanographic Institute proposes to install a LOBO that will provide real-time comprehensive suite of critical environmental data that are directly relevant to understanding ecosystem change which is necessary for management of the St. Lucie Estuary and Indian River Lagoon.

The **Indian River Lagoon License Plate Program** was established to support habitat restoration, water quality improvement, and associated education projects. The South Florida Water Management District is responsible for administering Indian River Lagoon License Plate funds for projects in St. Lucie, Martin and Palm Beach counties.

Indian River Lagoon License Plate projects currently under contract are as follows:

- **Wesley’s Island – Phase 2 in St. Lucie County:** The first phase of this project involved removing exotic vegetation and replanting groundcover. Phase 2 will involve transporting and establishing larger native canopy trees on the island in strategic locations. Canopy establishment in strategic locations on the island will improve habitat for wildlife including resident and migratory birds and will ease recreational pressures in sensitive locations.

- **Resiliency of Living Shorelines in Martin County:** The project will utilize new planting methods to augment existing, permitted Living Shorelines increasing the resiliency of the plantings. It also plans on increasing the propagation of shoreline vegetation within the existing mangrove and marsh nursery.

- **Septic to Sewer Conversion of Harbor Road South in Martin County:** This project will result in six properties on the banks of the Indian River Lagoon being converted from individual septic systems to the regional sanitary sewer system.

- **Septic to Sewer Conversion of Island Country Estates in Palm Beach County:** This project will result in 38 properties very near the Loxahatchee River being converted from individual septic systems to the regional sanitary sewer system.
- **Riverbend Park Culver/Water Control Structure Replacement Project in Palm Beach County**: This project will replace a 30-year-old damaged culvert/water control structure used to manage the flow of water out of the park allowing the Park’s wetlands to naturally cleanse the water prior to discharge into the Loxahatchee River.

Indian River Lagoon License Plate projects that were completed in FY2018 include:

- **Phillips C. Gates Structure in St Lucie County**: This project will retrofit a Fort Pierce Farms Water Control Structure to prevent sediment from entering the Indian River Lagoon.

- **Indian River Drive Stormwater Quality Retrofit in Martin County**: The project includes stormwater improvements including the installation of approximately 230 linear feet of exfiltration trench, baffle boxes and bio-swale treatment for an existing development adjacent to the Indian River Lagoon in Jensen Beach.

- **Indian River Lagoon Science Enrichment Program in Martin County**: This project will develop education programs focused on the Indian River Lagoon, for Martin County’s underserved students and future leaders.

- **Dubois Park Shoreline Stabilization and Environmental Enhancement Project**: The project includes construction of a maintenance ramp that will allow frequent removal of sand from the snorkeling lagoon, thereby reducing sediment flow into the Indian River Lagoon. Installation of native landscaping and stabilization of the eastern shoreline of the tidal creek will provide habitat and prevent further erosion and sediment flow into the tidal creek and Indian River Lagoon.

- **Loxahatchee River District Sewering of 171st Street**: This project will result in the acquisition of right-of-way and conversion of seven homes from septic to sewer on 171st Street, a private road, adjacent to the southern Indian River Lagoon.

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**Ten Mile Creek Water Preserve Area**
The South Florida Water Management District (SFWMD) completed the long-stalled federal project and began filling the repaired Ten Mile Creek Water Preserve Area in June of 2017. The project was designed and built by the U.S. Army Corps of Engineers in 2006 to store and treat water from the Ten Mile Creek Basin that flows into the North Fork of the St. Lucie River. The project did not operate as intended, was subject to litigation and placed into SFWMD control by the U.S. Congress in 2015. The SFWMD Governing Board formally took full control of the project in May 2016 and quickly began work to repair it. The $5.8 million repairs reduce seepage and improve the security of the 526-acre reservoir’s embankments. The repairs also improve the reservoir’s capacity to store water from one to four feet deep and be able to hold 2,500 acre-feet of local stormwater. An additional $500,000 was added to improve the 132-acre stormwater treatment area (STA). The STA was regraded to improve uniform sheet flow conditions and assist in achieving treatment performance objectives.

C-44 Reservoir and Stormwater Treatment Area

Now under construction by the South Florida Water Management District and the U.S. Army Corps of Engineers, the St. Lucie River (C-44) Reservoir and Stormwater Treatment Area (STA) project in Martin County will improve the timing and water quality of flows to the St. Lucie Estuary. The SFWMD is building the 6,300-acre STA, its associated features and the reservoir pump station. State-funded construction of these major components will be complete in 2019. The Corps completed some critical project works in 2014 and started construction on the 3,400-acre, deep-storage reservoir in November 2015. Completion of the reservoir is expected in 2021.
The project will capture 65 percent of the average annual stormwater runoff in the C-44 basin. The reservoir will hold up to 50,600 acre-feet, or 16 billion gallons, of water at an average depth of 15 feet. Pumping capacity for the reservoir pump station will be 1,100 cubic feet per second, or about 717 million gallons per day. The STA will include 32 miles of berms, 30 miles of canals and 63 structures.

Northern Everglades Public Private Partnership – Caulkins Water Farm

The Florida Legislature directed the Florida Department of Environmental Protection (FDEP) and the South Florida Water Management District (District) to implement projects on private agricultural lands to store and treat water in the northern everglades consistent with the legislative objectives in Sections 373.4595 and 373.4591, Florida Statutes (F.S.) FDEP identified six water quality improvement projects to implement these legislative objectives through the Northern Everglades Public Private Partnership (NE PPP) program. These projects will retain rainfall, store or treat excess surface water from the regional canal system to help address nutrient loads in Lake Okeechobee and the Caloosahatchee and St. Lucie rivers and estuaries.

One of the six NE PPP projects, Caulkins Water Farm Expansion (CWFE) became operational in December 2017. CWFE was one of the original three pilot projects to test the theory of using fallow citrus for water farms as an interim measure to reduce excessive discharges to coastal waters. CWFE has been expanded from 400 acres to 3000 acres.

The annual average storage volume for CWFE is estimated at 60,000 acre feet/year withdrawn from the C-44 canal, located in Martin County, when excess water is being discharged to tide.

Northern Everglades Public Private Partnership – Bluefield Water Farm

The Project was approved by the governing board in December 2018 and is currently completing its Federal permits. It is a 6,100 acre fallow citrus grove located off of the C-23 and is expected to store approximately 28,000 acre-feet of excess water annually.
Northern Everglades Public Private Partnership – Scott Water Farm
The Project was approved by the governing board in December 2018 and is currently completing its Federal permits. It is a 7,000 acre fallow citrus grove located off of the C-25 and is expected to store approximately 29,00 acre-feet of excess water annually.

C-23 Section C Dispersed Water Management Project
Located off of the C-24 this project uses District lands originally purchased for C-23/24 reservoir and provides interim storage on 300 acres. The project was completed in 2017 and stores approximately 2900 acre-feet of excess water annually.

Northern Everglades Water Farm – Spur Land and Cattle
Located off of the C-23 this 210 acre fallow grove in Martin County stores approximately 1500 acre-feet annually of excess water. The project began operations in 2014.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Project Partners</th>
<th>CCMP Action Plan &amp; Priority</th>
<th>Project Title and Abstract</th>
<th>CWA320 Funding FY 2018-2019</th>
<th>Project Deliverables</th>
<th>Project Start Date / Completion Date</th>
<th>Project Status</th>
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<tbody>
<tr>
<td>1</td>
<td>FAU-Harbor Branch Oceanographic Institution and University of Florida</td>
<td>BAH-2 (High) MON-1 (High) TMDL-1 (High)</td>
<td>(Harmful Algal Blooms in the Indian River Lagoon) Project is a joint effort among two universities that will deliver lagoonwide monitoring for the presence of harmful algal blooms (HABs). Ten strategically located sites will be sampled two times per month for phytoplankton composition, abundance, biovolume and biomass, and identification of HAB species.</td>
<td>$ 80,893.00</td>
<td>Submit Quarterly Progress Reports and a Final report. Each report will include HAB species composition, abundance, biovolume, and biomass from sampled sites. Additionally, other water quality parameters will be collected concurrently with the HAB data that include water temperature, salinity, oxygen concentration, Secchi depth, and chlorophyll a.</td>
<td>11/2018-9/30/2019</td>
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<td>2</td>
<td>Florida Institute of Technology</td>
<td>FSD-6 (Medium) MON-1 (High) PIE-5 (High)</td>
<td>(Efficacy of Sediment Aeration as a Complement to Muck Dredging in the Indian River Lagoon) Project represents Phase 2 of an IRLNEP-funded study of the efficacy of muck aeration in the IRL. In this phase, the project will utilize a variety of nanobubble techniques (aeration using air, aeration using oxygen, aeration mats) to more efficiently decompose the 10% - 30% fraction of organic materials in muck. A direct comparison between the efficacy of aeration vs. muck dredging will be made in the same canal system over the same time frame.</td>
<td>$ 110,000.00</td>
<td>Complete installation of the aeration system. Conduct Monthly pre and post dredging surveys. During dredging and aeration operation conduct monthly sampling and analysis. Submit quarterly reports with project status updates. A final report will be submitted that includes reporting and interpretation of the results.</td>
<td>4/1/2019-9/30/2019</td>
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<td>University of Central Florida</td>
<td>F-1 (High) PIE-1 (High) MON-1 (High)</td>
<td><strong>(Microplastics, Oysters and the IRL)</strong> Recent scientific evidence shows that IRL oysters in Mosquito Lagoon have high levels of microplastics in their tissues. This project initiates a coordinated effort to sample water, juvenile oysters, and adult oysters in order to quantify the distribution and abundance of microplastics throughout the IRL watershed and within established oyster reefs.</td>
<td>$ 99,797.00</td>
<td>Task 1: Run a minimum of 4 workshops and social media blitz (Project update, digital photographs of workshops, copy of media campaign); Task 2: Run coordinated monthly water sampling and processing from 30 sites in the IRL (Digital Photos of volunteers in action, spreadsheet summary and raw data collected, analyzed data synthesis in GIS); Task 3: Run quarterly monitoring and processing of oysters (Digital Photos of volunteers in action, spreadsheet summary and raw data collected, analyzed data synthesis in GIS); Task 4: Complete all feces/pseudofeces data collection with adult oysters and spat (Digital Photos of volunteers in action, spreadsheet summary and raw data collected, analyzed data synthesis in GIS); Task 5: Submit quarterly and final reports</td>
<td>11/2018-9/30/2019</td>
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<td>St. Lucie County</td>
<td>FSD-10 (High) PIE-1 (High) PIE-5 (High)</td>
<td>(Oxbow Eco-Center St. Lucie Water Champions Initiative) This project will coordinate efforts among partnering agencies and organizations to better inform, educate and engage the public about ongoing lagoon health issues. It will deliver clean-up and/or restoration demonstration projects, conduct focus groups, and recruit citizens to participate in a citizen's training course focused on the IRL, and reducing personal impacts on it.</td>
<td>$28,026.00</td>
<td>Q1: Execute funding contracts; Government Coordination Committee meeting; develop and hold focus group; develop marketing materials; develop SL Water Champions Course; develop lecture series; secure speakers and hold 1st lecture; promote SL Water Champions at community events. Q2: Government Coordination Committee meeting; hold focus group sessions; launch social media and marketing campaign; hold water champions training course, lectures in various locations promote SL water champions at events. Q3: Government Coordination Committee meeting; evaluate/analyze focus group results; flood market with marketing; hold water champions training course #2; hold lectures/discussions, perform restoration project; promote SL Water Champions at events. Q4: Focus group messaging; flood market with marketing; hold water champions training course; lectures/discussions; Restoration project; Final report</td>
<td>1/22/2019-9/30/2019</td>
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<td>Florida Oceanographic Society</td>
<td>PIE-1 (High) F-1 (High) BD-2 (High)</td>
<td>(Florida Oceanographic Oyster Restoration and Discovery- FLOORED) Project provides classroom and field experiences for students and adults in St. Lucie and Martin counties to educate them about oyster reefs, the ecosystem services they provide, their importance as habitat and to IRL restoration.</td>
<td>$ 19,751.00</td>
<td>Task 1: Provide 6 middle school and/or high school classes with a hands-on educational experience focused on the health of the IRL and the role of oyster reef restoration over 3 field trips. Task 2: Provide one group of adults from the community with a hands-on educational experience focused on the health of the IRL and the role of oyster reef restoration. Task 3: Create 7 new oyster reefs. Task 4: Submit quarterly reports. Task 5: Submit a final report.</td>
<td>1/22/2019-9/30/2019</td>
<td>On Schedule</td>
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<td>6</td>
<td>Pelican Island Audubon Society</td>
<td>PIE-1 (High) FSD-11 (High) IFF-4 (High)</td>
<td>(Audubon Advocates: Changing Behavior to Improve Lagoon Habitat) This project will continue Audubon’s successful after-school program for youth and their families and will provide classroom and field experiences that engage audiences about the IRL, its health, stewardship activities and sustainable behaviors that can protect and restore the IRL.</td>
<td>$ 25,000.00</td>
<td>Task 1: Provide a copy of contract to program for education program coordinator; enroll and run 1st semester programs for students in after school. Task 2: Run second semester of after school program; run spring break camp for disadvantaged children. Task 3: Recruit older students for the summer vacation camps and complete summer vacation camps. Task 4: Submit project final report; provide complete enrollments lists for all the education programs.</td>
<td>10/15/2018-9/30/2019</td>
<td>On Schedule</td>
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<td>7</td>
<td>Brevard Zoo</td>
<td>W-6 (High) F-1 (High) PIE-4 (High)</td>
<td><strong>(Restore Our Shores: Living Shoreline Restoration on Environmentally Endangered Lands)</strong> This community-based restoration project will remove invasive species and trash from the restoration site at Maritime Hammock Preserve in Melbourne Beach, Florida, a property of Brevard County Environmentally Endangered Lands Program. Following site preparation, restoration will be conducted on a minimum of 800 linear feet of shoreline using both oyster reefs and native shoreline vegetation. The program will engage community volunteers to harvest and grow native shoreline plants that will be used in restoration of the site. Volunteers will also conduct site clearing and preparation, as well as installation of oyster reefs and shoreline plants.</td>
<td>$ 51,533.00</td>
<td>Task 1: Hire and supervise Restore Our Shores Staff. (notification of employment) Task 2: Obtain all necessary permits. (copies of permits) Task 3-5: Organize and conduct at least 20 community-based events to engage community volunteers in at least 1500 hours of conservation actions benefitting the IRL, mainly to collect and foster/harvest a minimum of 1800 native shoreline vegetation individuals to restore 800 linear feet of shoreline. Task 6: Submit the final report. (summary total of all the shoreline vegetation fostered and the final number of native shoreline plants planted, a summary total of all volunteers who collected and/or planted native shoreline plants, and the total number of reef modules restored during the deployments, including an estimation of the number of acres restored or enhanced as a result of the deployments).</td>
<td>12/18/18-9/30/2019</td>
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<td>8</td>
<td>Tetra Tech, Inc.</td>
<td>FI-2 (High)</td>
<td>(Comprehensive Conservation and Management Plan—Technical Support and Data Management) Tetra Tech, Inc. will continue to assist the IRLNEP with revision of the Comprehensive Conservation and Management Plan (CCMP). They will solicit and compile project information, prepare databases, research and write action plans, produce maps and other graphical elements, and coordinate with IRLNEP staff to solicit Management Conference and public input and comment to inform the final version of the CCMP.</td>
<td>$ 50,000.00</td>
<td>Provide technical assistance to the IRLNEP Management Conference in development of the draft CCMP, pursuant to EPA guidance.</td>
<td>3/27/2019-9/30/2019</td>
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<td>Activity</td>
<td>Project Partners</td>
<td>CCMP Action Plan &amp; Priority</td>
<td>Project Title and Abstract</td>
<td>CWA320 Funding FY 2018-2019</td>
<td>Project Deliverables</td>
<td>Project Start Date / Completion Date</td>
<td>Project Status</td>
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<td>9</td>
<td>Integrity Arts &amp; Technology, Inc. d/b/a IDEAS</td>
<td>PIE-2 (High) PIE-4 (High)</td>
<td>(IRLNEP &quot;One Community – One Voice Initiative&quot;) The project will develop and communicate strategic messaging to expand local community engagement with the IRLNEP, build upon the One Lagoon concept, and succinctly articulate the activities and value proposition of the IRLNEP. The brand activation strategy will include development of tactics to expand revenues for restoration projects through cause-marketing activities.</td>
<td>$ 50,000.00</td>
<td>a. Strategic messaging to develop and implement CCMP priorities, expand local community engagement and investment in the IRLNEP. b. Succinctly articulate the activities and value proposition of the IRLNEP.</td>
<td>12/11/2017-12/11/2018</td>
<td>Extended</td>
</tr>
<tr>
<td>10</td>
<td>Natua Strategies; T. Pinney &amp; Associates; Angie Brewer, Inc.</td>
<td>FSD-13 (High) FSD-14 (High)</td>
<td>(Grant Writing Support and Capacity Building for IRLNEP Local Stakeholders) Three consulting companies, each with expertise and experience in particular focus areas, will assist the IRLNEP with building capacity among the Program's local government and community partners through new revenue source identification, research and grant writing assistance.</td>
<td>$ 50,000.00</td>
<td>a. Provide project discovery and/or grant writing in support. b. Provide copies of all completed grant applications/proposals prepared in cooperation with local governments.</td>
<td>2/15/2018- as needed</td>
<td>On Schedule</td>
</tr>
<tr>
<td>Activity</td>
<td>Project Partners</td>
<td>CCMP Action Plan &amp; Priority</td>
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<tr>
<td>11</td>
<td>IRLNEP</td>
<td>FSD-11 (High) PIE-2 (High)</td>
<td>(Part Time Program Support) Intern(s) will assist development of the Water Technology Directory for the IRLNEP website. Included in that activity will be research on emerging water technologies and companies, outreach to potential industry leaders interested in participating in the IRLNEP directory, and building a data base of water technology companies and contacts. Intern(s) will also be required to support IRLNEP communications, IRLNEP social media, IRLNEP events and IRL CCMP development as needed.</td>
<td>$ 25,000.00</td>
<td>Build and publish a Water Technologies directory for the IRLNEP website</td>
<td>10/1/2018-9/30/2019</td>
<td>On Going</td>
</tr>
<tr>
<td>12</td>
<td>IRLNEP</td>
<td>FI-2 (High)</td>
<td>EPA Grant Funded Travel: (Required Grant Condition) Funds support EPA travel for CCMP support.</td>
<td>$ 10,000.00</td>
<td>Support of CCMP Actions.</td>
<td>10/1/2018-9/30/2019</td>
<td>On Schedule</td>
</tr>
</tbody>
</table>

Total $ 600,000.00
C.3 IRLNEP Clean Water Act Implementation

The IRLNEP CCMP, authorized by Section 320 of the Clean Water Act (CWA) and in compliance with the CWA, has developed extensive partnerships with federal, state and local governments both within the IRLNEP Management Conference and outside of the Management Conference. The IRLNEP has developed a unique partnership with private-sector industry called the Indian River lagoon Innovator and Investor Network (IRLI2). This network represents an opportunity for industry to partner with the IRLNEP in technology development and innovation as well as special projects. These extensive and diverse partnerships form the framework for consensus building and delivery of science-based ecosystem management strategies designed to restore and maintain the water quality, wetlands and other natural habitats of the IRL.

The FY 2019-2020 IRLNEP Work Plan directly or indirectly supports all the CWA core programs. Highlighted in this section are two related examples of IRLNEP Work Plan activities that directly support CWA Implementation.

Harmful Algal Blooms
Work Plan Activities #1 & 2

These two related projects respond to the chronic and acute water quality declines that the Indian River Lagoon has experienced since the 2011 “super bloom”. Recurring blooms of picocyanobacteria and the Texas brown tide organism (*Aureounbra lagunensis*) have caused a 50% reduction in seagrass coverage, threatening both estuary health, human health and the $7.6 billion annual economy that the IRL supports. These projects directly support expanded scientific communication, collaboration and innovation to address the causes and management interventions necessary to lower nutrient pollution and decrease the intensity and persistence of HABs impacting the IRL.

Clean Water Act Implementation Information

The IRLNEP has a primary role in these projects. These activities directly support the objectives of the CWA to “restore and maintain the chemical, physical, and biological integrity of the estuary, including restoration and maintenance of water quality, a balanced indigenous population of shellfish, fish and wildlife, and recreational activities in the estuary, and assure that the designated uses of the estuary are protected...”
# Section D. Clean Water Act Travel Funds

## Indian River Lagoon National Estuary Program FY 2018-2019 Travel Cost

<table>
<thead>
<tr>
<th>Personnel</th>
<th>Travel Dates</th>
<th>Purpose</th>
<th>Location</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frank Sakuma</td>
<td>10/3/2018-10/6/2018</td>
<td>San Francisco NEP Meeting</td>
<td>San Francisco, CA</td>
<td>$2,126.19</td>
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<tr>
<td>Kathleen Hill</td>
<td>10/1/2018-10/6/2018</td>
<td>San Francisco NEP Meeting</td>
<td>San Francisco, CA</td>
<td>$1,286.89</td>
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<tr>
<td>Kathleen Hill</td>
<td>12/9/2018-12/12/2018</td>
<td>RAE Conference Long Beach, CA</td>
<td>Long Beach, CA</td>
<td>$1,932.96</td>
</tr>
</tbody>
</table>

| Total             |                    |                             |                  | $10,000.00 |

## Section D. Clean Water Act Travel Funds

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
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</tbody>
</table>

| Total             |                    |                             |                  | $10,000.00 |