IRL COUNCIL
STEM ADVISORY COMMITTEE

This meeting is open to the public.

Tuesday, February 7, 2023

1:30 PM – 4:30 PM

Up the Creek Farms, 3590 Valkaria Road, Grant-Valkaria, FL 32950

The order of items appearing on the agenda is subject to change during the meeting and is at the discretion of the presiding officer. Anyone wishing to speak on any item is requested to complete a speaker's card.

1. **Call to Order and Pledge of Allegiance** (Dr. Chuck Jacoby, Chair)
2. **Introductions** (Dr. Chuck Jacoby, Chair)
3. **Elections of Officers** (Kathy Hill)
   Requested Action: Elect Chair and Vice Chair for Calendar Year 2023 for the STEM Advisory Committee.
4. **Agenda Revisions** (Chair)
   Note any known changes and inquire if any members have suggested revisions.
5. **Minutes Approval** (Chair)
   Requested Action: Approval of Minutes from the STEM meeting on November 15, 2022.
6. **Public Comment**
7. **Water Quality Reports**
   a. Northern IRL (Dr. Chuck Jacoby, SJRWMD)
   b. Southern IRL (Dr. Melanie Parker, SFWMD)
8. **Presentation**
   Why We Should Focus on the Science of Equity, Diversity and Inclusion (David Jones)
9. **Old Business**
   None
10. **New Business**
    a. Fiscal Year 2024 Water Quality RFP (Daniel Kolodny)
       Requested Action: Motion to recommend that the IRL Council Board of Directors accept the IRLNEP STEM Advisory Committee recommendations and approve the final ranked list of proposals; fund the top proposals contingent and consistent with available funds and budgetary authority; and authorize staff to negotiate and enter into contracts with those applicants.
    b. Fiscal Year 2024 Habitat Restoration RFP (Daniel Kolodny)
       Requested Action: Motion to recommend that the IRL Council Board of Directors accept the IRLNEP STEM Advisory Committee recommendations and approve the final ranked list of proposals; fund the top proposals contingent and consistent with available funds and

budgetary authority; and authorize staff to negotiate and enter into contracts with those applicants.

c. Fiscal Year 2024 Science and Innovation RFP (Daniel Kolodny)
Requested Action: Motion to recommend that the IRL Council Board of Directors accept the IRLNEP STEM Advisory Committee recommendations and approve the final ranked list of proposals; fund the top proposals contingent and consistent with available funds and budgetary authority; and authorize staff to negotiate and enter into contracts with those applicants.

d. Fiscal Year 2024 Tentative Budget (Daniel Kolodny)
Requested Action: Recommend that the IRL Council Board of Directors review and adopt the tentative budget for FY 2024 by Resolution 2023-01, pursuant to Florida Statutes.

11. IRLNEP Staff Reports

a. Communications Report (Kathy Hill)
b. Information Technology and Data Science Update (KJ Ayres)
c. IRL Project Update (Daniel Kolodny)
d. Executive Director Report (Kathy Hill)

Requested Action: No motion is required. Information only.

12. Final Comments (Committee, Staff, Public)

13. Next Meeting

Tuesday, May 9, 2023, at 1:30 p.m.
Up the Creek Farms, 3590 Valkaria Road, Grant-Valkaria, FL 32950

14. Adjourn

NOTE: If a person decides to appeal any decision made by the Board with respect to any matter considered at such meeting or hearing, he or she will need a record of the proceedings, and that, for such purpose, he or she may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based. Section 286.0105, Florida Statutes (2014).

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Erin Bergman at (314) 347-5854. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800) 955-8771 (TDD) or 1(800) 955-8770 (Voice). For more information, you may contact: Erin Bergman, IRL Council, 1235 Main St, Sebastian, FL 32958, (314) 347-5854, or by email at bergman@irlcouncil.org .

IRL COUNCIL
STEM ADVISORY COMMITTEE

Minutes from the meeting of

November 15, 2022

1:30 – 4:30 PM

Up the Creek Farms, 3590 Valkaria Road, Grant-Valkaria, FL 32950

Attendance: Aaron Adams, Marina Barrineau, Kyle Bartow, Bob Day, Kevin Johnson, Dale McGinnis, Melanie Parker, Valerie Paul, Beth Powell, Mitch Roffer, Chad Truxall, Linda Walters, G. S. Jones, Kelly Young, Wendy Noke-Durden, Hyun Jung Cho, Anne Birch.

Guests: Melissa Meisenburg, Paul Sacks, Lauren Hall, Lori Morris,

1. **Call to Order and Pledge of Allegiance** (Dr. Jacoby, Chair)
   The meeting was called to order at 1:30 PM and Dr. Jacoby led the group in the Pledge of Allegiance.
2. **Introductions and New Member Welcome** (Dr. Jacoby, Chair)
   Dr. Jacoby led roundtable introductions including new members and guests.
3. **Agenda Revisions** (Dr. Jacoby, Chair)
   No agenda revisions are needed.
4. **Minutes Approval** (Dr. Jacoby, Chair)
   Requested Action: Approval of Minutes from STEM Advisory Committee meeting on August 2, 2022.

   MOTION WAS MADE BY CHAD TRUXALL TO APPROVE THE MINUTES FROM THE STEM ADVISORY COMMITTEE MEETING ON AUGUST 2, 2022. MOTION WAS SECONDED BY MITCH ROFFER. MOTION PASSED UNANIMOUSLY.
5. **Public Comment**
   No comments made.
6. **Quality Reports**
   a. **Water** Northern and Central Indian River Lagoon (Dr. Jacoby)
      Dr. Jacoby reviewed the status of the northern and central Indian River Lagoon and the effects of Hurricane Ian. Discussion included rainfall, salinity, temperature, turbidity, fluoresent, Chlorophyll-A, and dissolved oxygen.
   b. Southern Indian River Lagoon (Dr. Melanie Parker)
      Dr. Parker reviewed the status of the southern Indian River Lagoon including the short peak of increased flow due to Hurricane Ian. A change in salinity occurred at the A1A site for a brief time. Oyster spat remained consistent and density is stable.

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7. Presentation

Summary of the International Seagrass Biology Workshop
Lori Morris and Lauren Hall, SJRWMD Bureau of Water Resources
Ms. Morris and Ms. Hall gave a presentation summarizing the International Seagrass Biology Workshop. They thanked the IRLNEP for support in attending and discussed seagrass stressors, recovery and restoration efforts as well as diversity issues in conservation sciences.

8. New Business

a. Approve consultant services identified via RGQ to develop an IRLNEP strategy (FY 2023-FY 2026) to address Diversity and Inclusion (D&I) issues in alignment with USEPA guidance and funded through the Infrastructure Investment and Jobs Act (IIJA).

Dr. De Freeze highlighted the aspects of the consulting contract of $49,000 per year for three years with an option of two additional years that will enhance the efforts of IRLNEP to expand community outreach, especially in underrepresented communities. The contractor will work with staff, serve as a community liaison, and work directly with the Executive Director and staff to develop and implement diversity strategies associated with the EPA Long-Term Strategic Plan for use of federal funds from the bipartisan infrastructure act (BIL). Discussion on what *Diversity of Thought* does.

Requested Action: Authorize staff to negotiate and enter into a contract with *Diversity of Though, Inc.* to provide professional services to the IRLNEP staff and program activities. The contract term would be three years with an option of two additional years pursuant to funding availability.

MOTION WAS MADE BY BOB DAY TO RECOMMEND THAT THE COUNCIL BOARD OF DIRECTORS AUTHORIZE STAFF TO NEGOTIATE AND ENTER INTO A CONTRACT WITH DIVERSITY OF THOUGHT, INC. MOTION WAS SECONDED BY ANNE BIRCH. MOTION PASSED UNANIMOUSLY.

b. FY 2023 budget amendment

Mr. Kolodny reviewed and discussed Resolution 2022-06. Changes associated with the Diversity of Thought consulting contract; new staff salary adjustments; Executive Director COLA adjustment; increase in insurance; increase in GIS Support costs.

Requested Action: Review and adopt the amended Budget for FY 2023 by Resolution 2022-06. Pursuant to Florida Statutes.

MOTION WAS MADE BY VALERIE PAUL TO RECOMMEND THAT THE IRL COUNCIL BOARD OF DIRECTORS APPROVE THE AMENDED BUDGET FOR FY 2023 BY RESOLUTION 2022-06. MOTION WAS SECONDED BY KEVIN SHROPSHIRE. MOTION PASSED UNANIMOUSLY.

c. Expanding opportunities for federal funding: US Army Corps of Engineers Section 7001 and 729 Letters.

Dr. De Freese reviewed federal funding opportunities possible noting one-time funding not recurring.
Requested Action: Discussion of opportunities and Board Consensus on recommended actions.

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d. 2023 Management Board Meeting Calendar

Ms. Bergman presented the calendar for the 2023 year, noting the November meetings will be the third week due to the Veteran's Day Holiday.

Discussion on the possibility to meet via Zoom for STEM Advisory Committee meetings. It was noted that remote attendees cannot vote thus reaching a quorum is difficult. Dr. De Freese is currently working to bring exception to the Florida Legislature that would exempt regional organizations with long travel distances from an in-person meeting requirement.

Requested Action: Adopt the proposed 2023 IRL Council Board of Directors meeting calendar.

MOTION WAS MADE BY VALERIE PAUL TO RECOMMEND THAT THE IRL COUNCIL BOARD OF DIRECTORS ADOPT THE 2023 IRL COUNCIL BOARD OF DIRECTORS MEETING CALENDAR. MOTION WAS SECONDED BY BOB DAY. MOTION PASSED UNANIMOUSLY.

9. Staff Reports:

a. Communications Report (KJ Ayres)

Ms. Ayres presented the quarter four communications report which included the top social media posts. Ms. Ayres also discussed the four completed Podcasts. Eight podcasts are scheduled for 2023. IDEAS is working with a media partner to optimize and market the podcasts to the widest audience possible.

Discussion on paid advertising on social media accounts; currently paying for 15-second ads on YouTube.

b. Information Tech and Data Science (KJ Ayres)

Ms. Ayres discussed the GeoCollaborate project, Final sessions will be in December, and she invited members to attend the final sessions. The final report is in development and will be submitted in January. The Envirothon Website has been updated. Data Management is underway with the creation of Writing a Best Practices DMP; Organizing and standardizing data on the One Drive; started moving completed project datasets to be publicly available; ArcGIS Hub is purchased. Ms. Ayres is officially employed by the IRL Council and has taken responsibility for Website Management; Project Manager for 6 projects; Presentation at Restore America's Estuaries; Submitted a talk to ESRI User Conference about our Seagrass recovery plan; provided a talk at the Native Plant Society; Updated bios and signatures on the contact page. Ms. Ayes is available to assist project partners is GIS help.

c. IRL Project Updates (Dan Kolodny)

Mr. Kolodny reported 16 CCMP Projects/Activities are still in progress; 27 NEW CCMP Projects/Activities are ready to begin; 15 Projects were Completed during Quarter 4. The following projects were highlighted; Sea and Shoreline LLC's: Restoration, Maintenance, and Conservation of Seagrass in the IRL; City of Port St. Lucie's: Septic to Sewer Conversion along the Elkcam Waterway; Florida Institute of Technology's: Optimization of an Environmentally Friendly Biological Denitrification System for Water Quality Improvements; Wood PLC's: Atmospheric Deposition Monitoring Year.

d. Executive Director (Duane De Freese)

Dr. De Freese reported RFPs for FY 2024 were issued. The deadline is January 6, 2023. He emphasized the IRLNEP's continued focus on projects and delivery of high-value outcomes. Dr. De Freese discussed the role of the three new Community Engagement Coordinators. On a personal note, Dr. De Freese announce he would be working remotely through January due to cancer treatments.

10. Member Reports

Mitch Roffer reported Capt. Frank Catino found juvenile Tarpon with red tumors. Requesting the committee to bring any reports of diseased fish forward. Florida Tech's Tech Surg is seeking abstracts.

Dr. Jacoby is seeking feedback on an FWC-produced HAB video; a link will be sent to the committee.

11. Final Comments (Management Board, Staff, Public)

Inquiry into when the IRL Council calendars would be made available to the public. The copy has been sent to the printer.

12. Next Meeting Announcement

The IRL STEM Advisory Committee meeting will be held on: Tuesday, February 7, 2023, from 1:30 – 4:00 p.m. at Up the Creek Farms, 3590 Valkaria Road, Grant-Valkaria, FL 32950.

13. Adjourn

MOTION WAS MADE TO ADJOURN THE MEETING BY BOB DAY MOTION WAS SECONDED BY CHAD TRUXALL. MOTION PASSED UNANIMOUSLY. MEETING ADJOURNED AT 3:53 PM.

NOTE: If a person decides to appeal any decision made by the Board with respect to any matter considered at such meeting or hearing, he or she will need a record of the proceedings, and that, for such purpose, he or she may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based. Section 286.0105, Florida Statutes (2014).

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CATEGORY 1: WATER QUALITY RESTORATION										Funding Amount	Category Total Remaining
Rank	Applicant	Project	Requested Funding	Cost Share Match	Match %	Total Project Cost	Score	Above 70%?	Eligible?		$450,000.00
1	Martin County	Reduction of TN and TP Using Floating Treatment Wetlands.	$35,360	$40,000	53	$75,360	181	82%	Y	$35,360	$414,640
2	City of Port Saint Lucie	Septic to Sewer Conversion to Reduce Nitrogen Pollution Along the Monterrey Waterway.	$50,000	$50,000	50	$100,000	173	79%	Y	$50,000	$364,640
3	Fort Pierce Utilities Authority	Protecting the Indian River Lagoon and Reducing Nutrient Loads Caused by Septic Systems & Aging Wastewater Infrastructure.	$450,000	$981,415	69	$1,431,415	172	78%	Y	$364,640	$0

Martin County – Reduction of TN and TP Using Floating Treatment Wetlands	
Lead Organization and Partners:	Martin County Board of County Commissioners
Project Locations:	1. Golden Gate STA, Stuart, Fl. Lat: 27.164616°, Long: -80.205309° 2. Old Palm City STA, Old Palm City, FL. Lat: 27.162275°, Long: -80.262927°
Key CCMP Vital Signs:	Impaired Waters, Stormwater
IRLNEP Contribution and Source:	$35,360, IRL Council
Partner Match:	$40,000 [53%]
Total Project Cost:	$75,360

Project Description: The St. Lucie River Estuary Basin includes impaired waters that do not currently meet state water quality standards. This project seeks to reduce nutrient loading into the St. Lucie Estuary and greater IRL by replacing existing dilapidated floating treatment wetlands within two stormwater treatment areas with new floating treatment wetlands of an improved design. A total of 12 floating treatment wetlands will be installed within the Golden Gate and Old Palm City STAs, comprising a total of 6,280 ft^2 of surface area. The improved design will reduce TN and TP discharged into the St. Lucie Estuary and Indian River Lagoon by 412 lbs/year and 140 lbs/year respectively. This improved design will yield a significant cost savings of 52% for annual maintenance and harvesting.

Key Outputs:

1. Remove and replace existing floating treatment wetland foam mats with new mats of improved design.
2. Annual average nutrient reduction of 412 lbs total nitrogen and 140 lbs total phosphorus discharged into the Indian River Lagoon. Expected outputs were quantified by averaging values of nutrients from lab reports from past harvests.

Key Outcomes:

1. Significant reduction in maintenance costs from $\$4.00/ft^2$ to $\$1.40/ft^2$ (52%).
2. Increase in lifespan of floating treatment wetlands from 4-6 years to 8-10 years.
3. In alignment with the St. Lucie River and Estuary TMDL/BMAP program, and the *Impaired Waters* and *Stormwater* Vital Signs within the CCMP, this project will provide water quality benefits by reducing nitrogen and phosphorus loadings discharged into the Indian River Lagoon.
4. The long-term goal is to meet 5-10 year BMAP TMDL targets for total nitrogen and total phosphorus entering the St. Lucie Estuary and greater IRL.

Title of Project	Septic to Sewer Conversion to Reduce Nitrogen Pollution Along the Monterrey Waterway
Lead Organization and Partners	City of Port St. Lucie (lead organization), Harbor Branch Oceanographic Institute-Florida Atlantic University (partner)
Project Location	The project location is in central Port St. Lucie along the Monterrey Waterway, which empties into the C-24 Canal that empties into the North Fork of the St. Lucie River. The project area is approximately 2,042 acres. Latitude: 33.7930341, Longitude: 073.8963078.
Key CCMP Vital Sign(s)	Impaired Waters, Wastewater, Monitoring and Data Sharing, Citizen Engagement and Education
IRLNEP Contribution and Source	$50,000, IRL Council
Partner Match	$50,000 cash (from Monterrey Hot Spot property owners)
Total Project Cost	$100,000

Project Description

The North Fork of the St. Lucie Estuary has experienced degraded water quality leading to recurring closures of the water body for recreational use. To determine the sources of this impairment, the City of Port St. Lucie contracted with Harbor Branch Oceanographic Institute-Florida Atlantic University to conduct a microbial source tracking study. That study confirmed elevated fecal coliform levels. The greatest concentrations consistently occurred in five dense urbanized areas of the City, including along the Monterrey Waterway which directly drains into the North Fork of the St. Lucie River. Older septic tanks near the Monterrey Waterway are believed to be contributing to this pollution.

IRLNEP funding will enable the City of Port St. Lucie to expand its septic-to-sewer program. The proposed Monterrey Septic Hot Spot Grant Program will support the conversion of 16 residential septic tanks in the target area to Port St. Lucie's low-pressure, centralized sewer system. Property owners within 50' of the Monterrey Waterway or a ditch that discharges into the Monterey Waterway will be eligible to participate in the septic grant program, which covers 50% of the sewer conversion cost. The City will also offer 10-year interest-free connection fee loans to all participating septic owners. The project is expected to benefit the Indian River Lagoon by removing 6.15 pounds of total nitrogen per septic tank annually. Nutrient pollution is the main cause of toxic algal blooms in the Indian River Lagoon system. Fewer algal blooms will protect marine life and preserve key habitat.

Map and Photos

See attached.

Key Outputs (Deliverables)

16 homes converted from septic tanks to sewer system; elimination of a combined total of 98.4 pounds annually of nitrogen

Key Outcomes (Benefits to the IRL)

Short-term benefits: Enhanced community understanding in Monterrey area; initial nutrient reductions
Mid-term benefits: Incentivizing the conversion of 16 septic tanks in the Monterrey Hot Spot area; significant nutrient reductions; better Indian River Lagoon protection
Long-term benefits: Fewer algal blooms; habitat improvements; restoration of biological diversity

Executive Summary

Title of Project:	Protecting the Indian River Lagoon and Reducing Nutrient Loads Caused by Septic Systems & Aging Wastewater Infrastructure
Lead Organization and Partners:	Fort Pierce Utilities Authority
Project Location:	This project will be carried out throughout FPUA's wastewater territory in Fort Pierce, Florida - 27° 27' 0.9576'' N 80° 20' 23.8236'' W
Key CCMP Vital Sign(s):	Wastewater, Impaired Waters, Stormwater
IRLNEP Contribution and Source:	$450,000, IRL Council
FPUA Match:	$956,415, FPUA (sewer lining grant funds) $25,000, FPUA (septic to sewer conversion grant funds)
Total Project Cost:	$1,431,415

Project Description:

This project aims to improve the overall environmental health of our community by eliminating **850** lbs. of nitrogen/year from reaching the Indian River Lagoon. This particular project consists of eliminating **50** septic systems throughout FPUA's wastewater service territory. Additionally, FPUA will enhance its wastewater infrastructure by lining **4.23 miles** of wastewater pipes with Cured-in-Place PVC lining. This PVC lining will rectify the problems caused by untreated sewage leaking into the soil and groundwater flows to the IRL, caused by cracks in the aging, vitrified clay pipes.

Key Outputs (Deliverables)

1. The removal of **50** aging septic systems.
2. Reduction of **850** lbs. of nitrogen/year[1] and **10** lbs./gallon of phosphorus/year[2] leached into the environment by septic systems.
3. The addition of **4.23** miles of sewer lined by Cured-in-Place-Piping PVC lining.

Key Outcomes (Benefits)

1. The short-term benefit aligns with the IRL CCMP and is to reduce the density of septic systems in the IRL watershed. Reducing the use of septic system infrastructure will also reduce nutrient and other pollutant loads, caused by aging and failing septic systems. In addition, the Cured-in-Place PVC lining will seal and restore the sewer pipes' infrastructure, and eliminate the risk of untreated sewage from entering the IRL.
2. The medium-term benefit is continued reduction of septic system density, and reduction in nutrient and pollutant loads discharges into the IRL caused by aging and failing septic systems and wastewater infrastructure, therefore increasing the water quality in the IRL.
3. The long-term benefit is an improvement to the health of the IRL as pollutant loads, caused in part by failing septic systems, are drastically reduced. Lining the pipes will eliminate sewer seepage to groundwater and the IRL, and improve public and environmental health conditions for residents, tourists, avian and aquatic animals. This project will contribute to the broader collaborative effort to remove the IRL from the Impaired Waters list.

[1] Wakulla County Septic Tank Study, Task 2-Evaluate the Ground Water Flow Pathway from the Woodville Area (floridadep.gov)
[2] The Groundwater Project, 7.3 Phosphorus Fate – Septic System Impacts on Groundwater Quality (gw-project.org)

CATEGORY 2: HABITAT RESTORATION										Funding Amount	Category Total Remaining
Rank	Applicant	Project	Requested Funding	Cost Share Match	Match %	Total Project Cost	Score	Above 70%?	Eligible ?		$100,000.00
1	Florida Oceanographic Society	Optimizing Syringodium filiforme (manatee grass) production factors in a subtropical seagrass nursery for restoration applications	$15,783	$26,896	63	$42,679	190	87%	Y	$15,783	$84,217
2	City of Stuart	SE Illinois Avenue Living Shoreline Project	$90,000	$90,000	50	$180,000	159	72%	Y	$84,217	$0

Title of Project	Optimizing *Syringodium filiforme* (manatee grass) production factors in a subtropical seagrass nursery for restoration applications
Lead Organization and Partners:	Florida Oceanographic Society (lead), University of Florida
Project Location:	Florida Oceanographic Society (FOS), 27°12'56.2"N, 80°10'43.2"W
Key CCMP Vital Sign(s):	Seagrasses, biodiversity, science, technology, and innovation, monitoring and data sharing, wastewater
IRLNEP Contribution and Source:	$15,783
Match:	FOS- $10,649 (25 %), UF- $16,250 (38 %) = 63 % total
Total Project Cost:	$42,681

Project Description

Recent declines of valuable seagrass ecosystems in the Indian River Lagoon (IRL) have necessitated restoration as a component of returning lost acreage. *Syringodium filiforme* (manatee grass) is not commonly used as stock in seagrass restoration, possibly due to a practical preference for *Halodule wrightii* (shoal grass) by restoration practitioners, but it may have important applications in future efforts. To our knowledge, there are limited resources detailing methods to grow *S. filiforme* in a nursery setting and few available sources of the plant outside of harvesting declining natural beds. To increase the availability of *S. filiforme* for use in restoration activities, multiple planting methods will be tested in nursery based mesocosm studies, which aim to tease apart the drivers of successful *S. filiforme* propagation and growth. We will quantify *S. filiforme* growth under various biomass assemblage, nutrient, and sediment treatments, which will increase our knowledge on successful propagation techniques. In general, the first study will compare survival and growth of planting units after plant division in different substrates (coarse vs. fine sand). The second study will test the effects of fertilizers (Osmocote, a common fertilizer, and struvite, a wastewater derived fertilizer) to determine the effect of nutrient addition on *S. filiforme* development. This work will culminate in a planting guide which will form the foundation for nursery propagation of *S. filiforme*. The experiments will not directly increase seagrass acreage in the IRL, but the knowledge gathered from studying nursery grown *S. filiforme* will be valuable to restoration practitioners locally and globally.

Key Outputs and Outcomes

Multiple key outputs and outcomes will be synthesized from the results of this project. Firstly, a nursery planting guide for *S. filiforme* will be published (*short-term outcome*). To our knowledge, this would be the first nursery related planting guide for *S. filiforme,* an important seagrass species in the IRL. Additionally, 1-2 peer reviewed scientific publications will be prepared that will disseminate additional study insights potentially applicable to future efforts (*short-term outcome*). The effects of nutrient addition, particularly struvite, a wastewater derived fertilizer, will be tested for nursery applications, which may increase the growth of *S. filiforme*. If successful, struvite could be applied to nursery environments to improve growth (*medium-term outcome*). If widely adopted, wastewater treatment plants could integrate struvite as a component of advanced wastewater treatment strategies, providing a locally sourced, sustainable fertilizer that could reduce nutrient loads into the IRL (*long-term outcome*). Finally, optimizing and standardizing *S. filiforme* nursery growing techniques will likely increase the stock of the species for restoration applications and increase the biodiversity of seagrass restoration efforts (*medium- to long-term outcome*).

Executive Summary

Title of Project	SE Illinois Avenue Living Shoreline Project
Lead Organization and Partners:	City of Stuart, Marc Rogolino – Utilities & Engineering Project Manager
Project Location:	The project is located at the north end of SE Illinois Avenue in Stuart, Fl Latitude 27°11'57.81"N, Longitude 80°14'42.70"W
Key CCMP Vital Signs(s)	Living Shorelines, Impaired Waters, and Stormwater
IRLNEP Contribution and Source:	$85,000 Previous Award + New request $90,000 = Total $175,000
Partner Match:	$175,000
Total Project Cost:	$350,000

Project Description:

The project is in the City of Stuart, Florida, in the St. Lucie River drainage basin. With this project, a Living Shoreline will be installed to protect against erosion and to provide habitat for marine species and wading birds. The Living Shoreline plantings will also provide nutrient removal from the existing stormwater discharge entering the river at this location. A Buffered Shoreline will be constructed at the north end of SE Illinois Avenue to provide filtration for stormwater runoff from the northern portion of the SE Illinois Avenue right-of-way and adjacent properties. The project is important for the City of Stuart to continue progress towards resiliency and meeting BMAP requirements for the St. Lucie River. The conceptual design of this project is complete, and the project is underway. Indian River Lagoon Council has previously awarded $85,000 for this project. We are seeking an additional $90,000 to address increases in construction costs for equipment, materials, and labor. The City is aware that no funds awarded as a result of this application can be expended prior to October 1, 2023.

Map and Photo(s):

As instructed, a Project Location Map and Photo are attached to this application.

Key Outputs (Deliverables):

Living Shorelines-1: RESEARCH and REPORT science-based siting, planning, design, and construction criteria.
Living Shorelines-3: RESEARCH and REPORT on living shoreline information.
Impaired Waters-2: Work with BMAP Partners and DEP to support implementation of BMAPs and track progress, compliance, and implementation challenges.
Stormwater-5: Upgrade existing urban and agricultural stormwater infrastructure networks to reduce freshwater discharges, nutrient loads, and other pollutants to the IRL.

Key Outputs Benefits:

Short term (1-2 years): This project will also serve as a model project for future Living Shoreline projects within the City of Stuart and is part of the City of Stuart's continuing effort to implement strategies to improve the quality of runoff entering the St. Lucie River and to advance toward BMAP goals.
Medium-term (3-4 years): Continuing to provide erosion protection, and restoring natural shoreline habitat, and to serve as a model project for future City of Stuart Living Shoreline projects.
Long-term (5-10+ years): Continuing to provide erosion control benefits and provide shoreline habitat, in addition to serving as a model project for other City of Stuart Living Shoreline projects.

CATEGORY 4: SCIENCE AND INNOVATION										Funding Amount	Category Total Remaining
Rank	Applicant	Project	Requested Funding	Cost Share Match	Match %	Total Project Cost	Score	Above 70%?	Eligible?		$100,000.00
1	Florida Institute of Technology	Suffocating Sand: Mapping Hypoxia and its Impacts on Benthic Nutrient Fluxes in the IRL, Phase II.	$74,986.00	$71,725.00	49%	$146,711.00	187	85%	Y	$74,986.00	$25,014.00
2	Mote Marine Lab	Using genetic tools to boost seagrass restoration success in the Indian River Lagoon.	$99,847.00	$51,006.00	34%	$150,853.00	185.5	84%	Y		
3	Florida Oceanographic Society	Building ecosystem services: Can stormwater infrastructure be managed to improve water quality for the Indian River Lagoon?	$29,122.00	$92,871.00	76%	$121,993.00	183.8	84%	Y		
4	University of Central Florida	Heavy Metal Uptake by Mangroves and Marsh Grass Used in the Indian River Lagoon for Living Shoreline Stabilization.	$60,312.00	$20,897.00	26%	$81,209.00	177.33	81%	Y		
5	Brevard Zoo	Restore Our Shores: An Evaluation of the Health & Reproductive Status of Oysters in the Indian River Lagoon to Improve Native Oyster Populations.	$25,002.00	$28,687.00	53%	$53,689.00	177.25	81%	Y		
6	University of Auburn	Utilizing Unmanned Aerial Systems to Monitor Water Movement and Harmful Algal Blooms.	$50,992.00	$16,999.00	25%	$67,991.00	175.1	80%	Y		
7	University of Florida	Sediment matters: Linking field-measured living shoreline plantings, sediment type, and wave energy for optimal sediment trapping with Spartina alterniflora (Smooth cordgrass).	$99,912.00	$54,914.00	36%	$154,826.00	168.4	77%	Y		

CATEGORY 4: SCIENCE AND INNOVATION										Funding Amount	Category Total Remaining
Rank	**Applicant**	**Project**	**Requested Funding**	**Cost Share Match**	**Match %**	**Total Project Cost**	**Score**	**Above 70%?**	**Eligible?**		**$100,000.00**
8	City of Satellite Beach	Satellite Beach Manatee Warm Water Management Feasibility Study.	$20,000.00	$115,000.00	85%	$135,000.00	131.5	60%	N		
9	Martin County	Martin County Long-Term Water Quality Monitoring Program.	$100,000.00	$100,000.00	50%	$200,000.00	124.5	57%	N		
10	Florida Institute of Technology	Artificial Intelligence (AI) Based Data Assimilation for Prediction of Algal Bloom in IRL.	$65,452.00	$21,852.00	25%	$87,304.00	113.5	52%	N		

Title of Project	**Suffocating Sand: Mapping Hypoxia and its Impacts on Benthic Nutrient Fluxes in the IRL, Phase II**
Lead Organization and Partners:	**Lead Organization**: Florida Tech (Austin Fox Ph.D). **Partners:** Brevard County Department of Natural Resources (V. Barker), Brevard Zoo (A. Rearden), Cocoa Beach (K. Mack), Satellite Beach (N. Sanzone)
Project Location	This project will be carried out in the IRL/BRL between the Eau Gallie and the Cocoa Beach causeways (Figure ES1, Attachment A). Project centered at 28˚17'50"N, -80˚38'25"W.
Key CCMP Vital Signs:	Legacy Loads and Healthy Sediments, Filter Feeders, Harmful Algal Blooms, 21st Century Communities, Monitoring, Science & Technology Innovation
IRLNEP Contribution and Source:	$ 74,987, IRL Council
Partner Match:	$12,000 (FIT) + $59,725 (Brevard County) = (48% of total)
Total Project Cost:	$ 146,711.16

Project Description:

Hypoxia and hydrogen sulfide impact nutrient cycling, eutrophication, loss of ecosystem services plus virtually all restoration activities, yet, few data are available to quantify the extent of IRL hypoxia or the distribution of sediment sulfide. Year 1 identified widespread hypoxia in bottom water and raised questions about the distribution of sediment sulfide, which in other estuaries has been linked to large-scale losses of seagrasses, mortality of benthic fauna and inhibited nitrogen removal. Using a relatively low-cost network of continuous monitoring stations we will track the extent, duration and movement of bottom water dissolved oxygen (DO) adding measurements of sediment sulfide. Impacts of variable DO and sediment sulfide on nutrient fluxes will be determined using benthic flux chambers located as sites where DO and sulfide monitoring are carried out. This study will focus on degraded areas between the Eau Gallie and Cocoa Beach Causeways, supporting listed water quality monitoring efforts (nutrient and DO) within the Central IRL and Banana River BMAPs (WBID 2963C). This study will leverage and build upon partner and cost-share projects and will use collective datasets to evaluate trends for DO and sulfide against variations in lagoon morphology, muck distribution and circulation patterns. These synergistic efforts plus high-resolution data and interpretations will help project partners and other stakeholders to better select restoration sites with higher probabilities of success towards survival and nutrient removal. Improved outcomes promote greater coastal resilience and improved water quality while addressing the IRLNEP 2024 priorities, action items and the 2030 CCMP priority areas.

Key Outputs (Deliverables):

Publicly available datasets for DO, reports showing the extent and duration of hypoxia plus benthic fluxes of N and P and sediment sulfide in relation to lagoon morphology and bottom composition.

Key Outcomes (Benefits to the IRL):

Short term: Quantifying the extent and duration of hypoxia in IRL sub-basins over a multi-year period. Quantifying impacts of hypoxia and sulfide on nutrient cycling. **Medium term:** Enhanced site selection for restoration (e.g., determination of HSI) by project partners plus other stakeholders and developing mechanisms and metrics to track the success and benefits of restoration projects towards nutrient removal. **Long term:** Improved water, sediment and habitat quality resulting from informed placement and enhanced success of restoration projects. Science-based management tools that will help managers select restoration projects based on potential for success at specific sites in the IRL.

Title of Project	Using genetic tools to boost seagrass restoration success in the Indian River Lagoon
Lead Organization and Partners	Mote Marine Laboratory, University of Florida, Florida Oceanographic Society; FAU Harbor Branch Oceanographic Institute
Project Location	Mosquito Lagoon (28.86851, – 80.83648), Parish Park (28.62508, – 80.79303), Wabasso Causeway (27.75442, – 80.42804), Oslo Road (27.58686, – 80.36506), Harbor Branch (27.53131, – 80.34844), Bear Point (27.42942, – 80.2817), Herman Cove (27.30844, – 80.22234).
CCMP Vital Signs	Seagrasses; Impaired Waters; Harmful Algal Blooms; Climate Ready Estuaries; Monitoring and Data; Science, Technology, and Innovation; Biodiversity.
IRLNEP Contribution	$99,847.27
Partner Match	Mote: $44,810.80 (30%); UF: $6,195 (4%)
Total Project Cost	$150,853.07

Project Description: Seagrasses, which were historically widespread in the Indian River Lagoon (IRL), are currently declining. While seagrass restoration yields improved water quality, habitat, and protection from storms, environmental stress limits seagrass restoration success. With temperate seagrass species, maximizing genetic diversity is an established tool for increasing seagrass restoration success, resilience, and ecosystem functions. Recently, researchers also found that pre-exposing seagrasses to mild stress (i.e., priming) yields epigenetic adaptations that improve seagrass stress tolerance, providing an additional mechanism for potentially increasing restoration success.

Seagrass restoration in the IRL relies on donor material from seagrass nurseries. However, these nurseries lack information on the current genetics of their stock. In 2018, genetic analysis of the Florida Oceanographic Society seagrass nursery revealed unexpectedly low diversity, and we hypothesize that consistently favorable nursery conditions may lead to competitive exclusion, thereby reducing diversity and subsequent resilience. We will further investigate the current genetic diversity of multiple nurseries and test methods for maintaining diversity in nurseries.

This project will analyze the genetic diversity of seagrass donor material, the genetic diversity of natural seagrass meadows in the IRL, and novel tools for improving seagrass restoration success. Specifically, we will test whether applying disturbances in the nursery setting helps maintain genetic diversity and the relative impacts of priming and genetic diversity on seagrass stability. Results will provide practitioners and managers with science-based solutions to common issues with seagrass restoration.

Key Outputs (Deliverables): (1) Genotype *Halodule wrightii* in nurseries, (2) Genotype *H. wrightii* throughout the IRL, (3) Analyze whether disturbances promote maintenance of genetic diversity, (4) Analyze how genetic diversity impacts *H. wrightii* stability, (5) Analyze how low-light priming impacts *H. wrightii* stability, (6) Form new seagrass restoration research partnerships.

Key Outcomes (Benefits to the IRL): Short-term: Provide practitioners and managers with information on seagrass genetic diversity and novel restoration techniques for increasing seagrass stability and genetic diversity, with results informing seagrass nursery practices, restoration methods, and management plans. Mid-term: Incorporation of results into seagrass management and restoration. Long-term: Increased seagrass restoration success and associated ecosystem. These services include enhanced water quality (less *Impaired Waters*, fewer *Harmful Algal Blooms*, increased *Seagrass*), nutrient cycling, erosion control, carbon sequestration, and habitat and resources for endangered species and fishery species (supporting *Biodiversity*).

EXECUTIVE SUMMARY

Title of Project	**Building ecosystem services: Can stormwater infrastructure be managed to improve water quality for the Indian River Lagoon? (Category 4 Science and Innovation Proposal)**
Lead Organization and Partners:	**Lead Organization:** Florida Oceanographic Society, *Loraé T. Simpson, Ph.D.,* **Project Partner:** UF Whitney Lab for Marine Bioscience, *Todd Z. Osborne, Ph.D.*
Project Location:	St. Lucie and Martin Counties, between the Fort Pierce Inlet (27.471107°, -80.292251°) and St. Lucie Inlet (27. 165179°, -80.157845°)
Key CCMP Vital Sign(s):	Impaired waters, stormwater, hydrology and hydrodynamics, connected waters and watersheds, and monitoring and data sharing
IRLNEP Contribution and Source:	$29,122; IRL Council
Partner Match:	$12,860 (FOS, 10 %) + $80,000 (UF, 66 %) = $ 92,871 total (76 %)
Total Project Cost:	$121,993

Project Description: The overarching objective of this proposal is to assess the nutrient removal capacity of roadside ditches in the Indian River Lagoon (IRL) watershed as these human created drainage networks are potential hotspots for nutrient processing that may improve **stormwater** quality. We will measure the nitrogen removal capacity of roadside ditches along a vegetation management gradient (vegetation maintenance from unmanaged to managed) to inform best management practices for nutrient reduction in stormwater. This study will provide a baseline assessment of roadside ditch nutrient removal potential for stormwater quality improvement in the IRL watershed and inform best management practices to enhance nutrient removal in existing stormwater infrastructure, supporting the CCMP priority of **science that supports restoration of water quality**.

Key Outputs: Deliverables will include 1) evaluation of nutrient storage and retention of ditch management scenarios along the IRL and 2) a management guidance document recommending improved mechanisms for nitrogen abatement in stormwater.

Key Outcomes: 1) Baseline quantification of the nitrogen removal capacity of roadside ditches, a widespread but understudied form of stormwater infrastructure (*short-term benefit*), 2) quantification of differences in nutrient retention between wet and dry seasons (*mid- to long-term goal*), and 3) recommendation of management strategies that promote improvement of runoff water quality, specifically by quantifying nitrogen removal rates across a range of vegetation composition and management types (l*ong-term benefit*).

EXECUTIVE SUMMARY

Title of Project: Category 4 Science and Innovation Proposal: Heavy Metal Uptake by Mangroves and Marsh Grass Used in the Indian River Lagoon for Living Shoreline Stabilization	
Lead Organization & Partners:	University of Central Florida
Project Location:	Mosquito Lagoon (28°54'24"N, 80°49'16"W)
Key CCMP Vital Sign(s):	**ONE LAGOON;** Water Quality: Contaminants of Concern, Wastewater; Habitat Quality: Living Shorelines; **ONE COMMUNITY:** Trash-Free Waters; **ONE VOICE:** Monitoring and Data Sharing
IRLNEP Contribution & Source:	$60,312; IRL Council
Partner Match:	$20,897 from UCF (25.73%)
Total Project Cost:	$81,209

Project Description: Many estuarine restoration projects, including in the Indian River Lagoon (IRL), use mangroves and marsh grass to stabilize sediments, sequester nutrients, enhance fisheries, and provide habitat for threatened/endangered species. For this proposal, we will determine the potential for these shoreline plants to undertake an additional critical ecosystem service (i.e., uptake of heavy metals) and thus become strategic for biomonitoring IRL health. Phytoremediation occurs when plants remove, degrade, or stabilize undesirable substances from the surrounding water or sediment. Some plants (e.g., sunflowers) accumulate extremely high levels of heavy metals, a phenomenon known as hyperaccumulation. To date, metal accumulation (e.g., lead, nickel, zinc) is an unquantified, potential ecosystem service of *Rhizophora mangle* (red mangrove), *Avicennia germinans* (black mangrove), *Laguncularia racemosa* (white mangrove), and *Sporobolus alterniflorus* (smooth cordgrass) in the IRL. This large information gap is primarily due to logistical and financial constraints preventing rapid, accurate heavy metal quantification in the field. X-ray fluorescence (XRF) is a new, exciting, innovative technique championed by co-PI Goolsby that will allow us to collect this urgently needed data for the first time. Our goal is to combine this cutting-edge technology with IRL restoration efforts by co-PIs Walters/Donnelly over the past decade to: 1) understand uptake potential and impact of heavy metals on survival and growth of estuarine plants in controlled, dose-response curve mesocosm studies, 2) examine heavy metal uptake in plants deployed for restoration versus naturally recruited plants, and 3) assess the utility of estuarine plants as biomonitors for detecting metal sequestration in the IRL.

Key Outputs (Deliverables): **1**: Novel chemical analysis methodology to determine heavy metal uptake potential by plants (mangroves, marsh grass) used in IRL estuarine restoration under mesocosm and field conditions. **2**: Dissemination of research findings through 2 peer-reviewed publications. **3**: Quarterly/final reports.

Key Outcomes (Benefits to the IRL): **Deliverable 1: Short,** identification of heavy metal uptake by plants used in shoreline stabilization projects in the IRL through mesocosm and field data collection; **Mid,** data-informed restoration in the IRL; **Long,** large-scale adoption of plants that are best suited for heavy metal uptake in all estuaries. **Deliverable 2: Short,** dissemination of results to scientific community; **Mid,** data-informed restoration projects in the IRL; **Long,** improved quality of water, sediments, and restored habitats. **Deliverable 3: Short,** Communication of results and progress to IRLNEP; **Mid,** New knowledge base for IRLNEP management decisions and prioritization; **Long-term Outcome:** Fuel for additional research by others about heavy metal uptake by plants used for restoration/stabilization efforts around the globe.

Title of Project:	Restore Our Shores: An Evaluation of the Health & Reproductive Status of Oysters in the Indian River Lagoon to Improve Native Oyster Populations
Lead Organization and Partners:	**Lead**: East Coast Zoological Society of Florida d/b/a Brevard Zoo (ECZS) Contact: Luke Dumas, 8225 N Wickham Rd, Melbourne, FL 32940, 321-354-9453 ext. 508, LDumas@brevardzoo.org **Partners**: Dr. Nicole I. Stacy, DVM, Dr.Med.Vet., University of Florida
Project Location:	Monthly spat collections will be taken at 15 sites focusing on the central and northern portions of the Indian River Lagoon from Sebastian River north to the 520 causeway, and the Banana River Lagoon from Dragon Point north to the 528 causeway. In-depth physical and histological monitoring and sampling will be taken at 4 of the 15 sites mentioned above.
Key CCMP Vital Sign(s):	"Impaired Waters" (Level 1: Critical); "Filter Feeders" (Level 2: Serious); "Science & Technology Innovation" (Level 3: Undetermined)
IRLNEP Contribution and Source:	$25,002.05 IRL Council
Partner Match:	ECZS - $10,111.05 (19%) Dr. Nicole Stacy, DVM - $18,576 (35%)
Total Project Cost:	$53,689.10

Project Description:

East Coast Zoological Society of Florida (ECZS) will impact regional efforts to address water quality and filter feeder habitat loss by monitoring 15 sites throughout the Brevard County portion of the Indian River Lagoon (IRL) and determining which are successfully producing oyster larvae, while also studying oyster reproductive health and potential issues through the collection and analysis of samples for histology, condition index, and histology. This survey will improve the efficiency and effectiveness of future oyster restoration projects.

Map and Photo(s):

Please see attached.

Key Outputs (Deliverables):

- Spat monitoring conducted monthly at 15 sites.
- Monthly collection of 20 oysters from 4 sites for histological, hemolymphatic, and condition index analysis.
- Final report of findings/best practices for site selection, submission of project results to 2 peer-reviewed journals for publication to guide future oyster restoration decisions.

Key Outcomes (Benefits to the IRL):

- Short-Term (1-2 years):
  - Increased knowledge on the presence/absence of oyster spat in Brevard County.
  - Increased knowledge of reproductive health of oyster populations in Brevard and improved hatchery relationships related to the production of spat.
  - Increased knowledge on effective site selection for oyster reefs in Brevard.
- Medium-Term (3-4 years):
  - Higher efficiency of oyster restoration work conducted in Brevard.
  - Increased oyster populations.
- Long-Term (5-10+ years):
  - Reestablishment of oyster reefs throughout the Brevard portion of the IRL.
  - Reduction of anthropogenic pollutant and nutrient loading in the IRL within Brevard.
  - Increased long-term success of oyster restoration within Brevard.

Title of Project	Utilizing Unmanned Aerial Systems to Monitor Water Movement and Harmful Algal Blooms
Lead Organization and Partners:	Auburn University, Theiss Research, Florida Atlantic University
Project Location	North Indian River Lagoon: 80°48'29"W, 28°43'56"N; Banana River Lagoon: 80°38'31"W, 28°23'8"N.
Key CCMP Vital Sign(s)	Science and Innovation; Harmful Algal Blooms; Hydrology
IRLNEP Contribution and Source	$50,992.07, IRL Council
Partner Match:	$16,999.00 (25%)
Total Project Cost:	$67,991.07

Project Description:

Recurring Harmful Algal Blooms (HABs) have plagued the Indian River Lagoon (IRL) for decades. Efforts to monitor the IRL for HAB occurrence can be time consuming, costly, and hindered by environmental factors that limit data collection opportunities. Modeling the circulation patterns and transport of HABs using hydrodynamic models of the IRL can significantly improve monitoring efforts, but also depend on accurate observational data for model calibration and validation. This project pairs advanced geospatial technologies with numerical analysis to enhance HAB detection, mapping, and hydrodynamic models by leveraging a suite a sensors and associated data collected by Unmanned Aerial Vehicles (UAVs or drones). The project will provide actionable insights into HAB extent and transport in the IRL using multispectral image analysis and increase the accuracy of circulation models with high resolution measurements of direction and velocity in data sparse IRL locations.

Key Outputs (Deliverables):

The project will result in two peer-reviewed publications documenting the results of the proposed monitoring and modeling approaches. A final report and detailed methodological framework will be provided to the IRL. High resolution observational imagery of HAB extent, shoreline conditions within the study area, and current velocity and direction information for integration into circulation models will also be generated.

Key Outcomes (Benefits):

Short Term: improved data collection and analysis techniques to detect and map HAB occurrence and extent in the IRL; generalizable relationship between HAB multispectral UAV data and in-situ HAB abundance measurements; observational data and measurement techniques to derive velocity and direction of currents in data sparse IRL locations.

Medium Term: Improved understanding of the relationship between water circulation patterns and HAB transport and distribution in the IRL; improvement to IRL circulation models

Long Term: improved data on water circulation and HAB monitoring will allow for improvements in the long-term prediction of HAB movement using hydrodynamic and transport models.

EXECUTIVE SUMMARY: IRLNEP FY 2024 PROPOSAL APPLICATION

Title of Project	Sediment matters: Linking field-measured living shoreline plantings, sediment type, and wave energy for optimal sediment trapping with *Spartina alterniflora* (Smooth cordgrass)
Lead Organization and Partners:	University of Florida, FL SeaGrant, logistic support from FL Fish and Wildlife Commission (FWC) and FL Dept of Environmental Protection (FDEP)
Project Location:	Living Shorelines and natural marshes within the Indian River Lagoon Estuary Program. Potential sites: North Peninsula SPk (29.40959, -81.09899), Marine Discovery Center (29.03639, -80.91800), Edgewater (29.06775, -80.91644), Hog Point Cove (27.99216, -80.52856), Maritime Hammock Sanctuary (27.95652, -80.50287), Driftwood Motel (27.25549, -80.22997), Stuart-Flagler Park (27.20195, -80.25685)).
Key CCMP Vital Sign(s):	Project addresses several priority vital signs, including *Impaired Waters, Seagrass, and Harmful Algal Blooms*), and addresses other vital signs; *Living Shorelines, Climate Ready Estuaries, and Biodiversity*.
IRLNEP Contribution:	$99,912.00
Partner Match:	UF and FL SeaGrant: $54,914.00 (55%)
Total Project Cost:	$154,826.00

Project Description: This project will help identify best management practices for living shoreline (LSL) plantings by identifying planting designs that are appropriate for specific sediment types and wave climates that vary considerably within the IRL. Building on initial work from a 2023 IRLNEP project that revealed the potential influence of sediment type on plant establishment, we will field-measure *Spartina alterniflora* LSLs and observe sediment and wave energy parameters to field test our newly developed model of vegetation trait and planting design impact on LSL goals, particularly sediment trapping. Project locations include LSLs and natural marshes within the boundaries of the Indian River Lagoon National Estuary Program Watershed Boundary and the IRL-Halifax Buffer Planning Boundary (potential sites identified with the FDEP LSL database[1] and the Shoreline Restoration Suitability Model[2], ultimate selection will be guided by FDEP, FWC, and FL SeaGrant partners). Resulting guidance will identify LSL planting designs specific to sediment type and wave energy and will be co-developed and disseminated with practitioners.

Map and Photo(s): Potential LSLs selected for inclusion in this study within the IRL NEP for the field work for this proposal are provided; ultimate selection will be guided by the FDEP LSL database[1], the Shoreline Restoration Suitability Model[2], and with assistance from FDEP, FWC, and FL SeaGrant partners. Photos include field sites and differences in plant traits observed.

Key Outputs (Deliverables): In support of the IRLNEP's CCMP to prioritize LSLs[3], this research will provide best management practices for optimally performing LSLs.

Key Outcomes (Benefits to the IRL): Short term: needed tools to optimally implement LSLs. Medium term: increased sediment trapping, nutrient retention and habitat. Long term: improved water quality (less *Impaired Waters*, fewer *Harmful Algal Blooms*, increased *Seagrass*), improved habitat (for *Biodiversity*), and enhanced function for *Living Shorelines*.

Title of Project	Satellite Beach Manatee Warm Water Management Feasibility Study
Lead Organization and Partners	City of Satellite Beach, US Fish and Wildlife Services, Florida Fish and Wildlife Commission
Project Location	Desoto finger Canal running north and south, Desoto main canal running east and west, coordinates 28.16429 N, 80.60275 W
Key CCMP Vital Signs	Science and Technology, Species of Concern, Hydrology, Impaired Waters
IRLNEP Contribution and Source	$20,000.00, IRL Council
Partner Match	USFWS-$600 in staff time for technical assistance and a request for $70,000 in internal financial assistance is being submitted for 54% of the total project amount; FWC- is seeking $35,000 in internal funding for 23% of the total project amount
Total Project Cost	$130,000.00

Key Outputs (Deliverables): The proposed feasibility study will aid in the way agencies address future permitting on dredging within or adjacent to manatee warm water sites in the Indian River Lagoon. This study may provide better understanding on muck management in congruence with marine mammal conservation. Through science driven and technological approaches such as 2D and 3D modeling this study will look at the hydrology of the canals used by manatees for winter refuge. State and federal agencies will be able to address the importance of localized landscapes as part of the species protection plan and species management plan for the West Indian manatee, *Trichechus manatus*.

Key Outcomes (Benefits to the IRL): Short term benefits: ability to discern if dredging and muck removal will improve navigation and capacity for wintering manatees; Medium term benefits: the level of dredged material that will be of value to muck removal without degrading the thermal dynamics of the canal system; Long term benefits: if dredging is recommended then much removal will have an improvement of water quality. The City of Satellite Beach aims to attain and maintain a functioning, healthy ecosystem which supports endangered and threatened species and to achieve coordinated interagency management of the IRL ecosystem. This aligns with the IRLNEP mission of One Lagoon and One Voice. Additionally, the area to the east of the canal will have native vegetation planted along the entire length of the finger canal to aid in the reduction of stormwater runoff into the canal. This is being funded separately and in partnership with ORCA which is partially funded through previous IRL NEP grant funds. This project will tie into the Satellite Beach Aquatic Habitat Restoration project funded by FWC in which several acres of submerged aquatic vegetation will be planted in the Banana River less than 1 mile from the proposed area if study.

EXECUTIVE SUMMARY: (1-page limit)

Title of Project (Montserrat Font)	
Lead Organization and Partners:	Martin County Board of County Commissioners
Project Location	Throughout Martin County (C-44, St. Lucie River/Estuary)
Key CCMP Vital Sign(s):	Impaired Waters, Stormwater and Wastewater, Harmful Algal Blooms, Monitoring and Data, Policy Considerations, Legacy Loads, Wetlands, Filter Feeders, Biodiversity, Distinctive Lagoon Communities, State of the Lagoon
IRLNEP Contribution and	$100,000, IRL Council
Partner Match:	No Partners, $100,000 (50%) from Martin County
Total Project Cost:	$200,000

Project Description:

The proposed project is designed to establish and maintain a long-term water quality monitoring program for nutrients (TN, TKN, NOx, Ortho, TP), physical parameters (DO, turbidity, temperature, salinity, pH), and environmental and weather conditions, as well as tidal stage and seasonality. This program will provide a baseline understanding of the water quality issues throughout the rivers and in the estuarine and coastal areas. One goal of the project is to monitor a network of sites in the St. Lucie River/Estuary and the Loxahatchee River, from Lake Okeechobee to the coral reef tract. Knowledge of these issues will enable the County to plan for future projects. Predicted and expected quantitative benefits include data on urban contributions, such as septic tanks and stormwater contributions to the Indian River Lagoon; agricultural contributions; and legacy loads, as well as policy and project recommendations on Lake Okeechobee releases, land use, stormwater inputs, and the effect of seasonality, rainfall, tides, and weather conditions on water quality.

Key Outputs (Deliverables):

1. **Long-term monitoring of sites** for nutrients (TN, TKN, NOx, Ortho, TP), physical parameters (DO, turbidity, temperature, salinity, pH), environmental and weather conditions, tidal stage and seasonality.
2. **GIS Maps** of sites and nutrient levels/other parameter values of interest
3. **Database** with 2,070 unique samples (estimated) after first year (Phase 1) of the project.
4. **Statistical analysis and recommendations** for policies and projects in Martin County watersheds that contribute to the IRL.

Key Outcomes (Benefits to the IRL): Short-term benefits: data from sample analysis

Long-term:

1. Long-term database of water quality in Martin County.
2. Statistical, temporal, and spatial analysis on effects of seasonality, tidal stage, and weather/environmental conditions on water quality parameters.
3. Recommendations for policies and projects that will provide benefits to infrastructure, public and environmental health, and sustainability.

Executive Summary

Title of Project: Artificial Intelligence (AI) Based Data Assimilation for Prediction of Algal Bloom in IRL	
Lead Organization and Partners:	Florida Institute of Technology
Project Location	28.118488, -80.670372
Key CCMP Vital Sign(s):	Harmful Algal Blooms, Emergency Response, State of the Lagoon, Monitoring and Data, Science and Technology Innovation
IRLNEP Contribution and Source:	$65,452, IRL Council
Partner Match:	$21,852 (25%) Florida Institute of Technology
Total Project Cost:	$87,304

Project Description:

Harmful Algal Blooms (HABs) directly impact the water quality and health of IRL ecosystem and responding to HABs incidents and mitigating their impacts are of the priorities of CCMP. Predicting HABs based on climate and environmental factors improves the readiness to take action and allocate resources in timely fashion to control and mitigate the impacts of HABs on humans, animals, and IRL ecosystem. AI can help us building decision-support tools and technologies for predicting extreme weather events to mitigate and adapt to the impacts of climate change. An AI system will be developed by hierarchical data assimilation in conjunction with Artificial Neural Networks (ANNs) to provide a decision-support system for predicting HABs incident based on climate and water quality factors.

Key Outputs (Deliverables):

The deliverable for this effort will be comprised of three distinct sub-deliverables:

1) Code base for AI/ML model: The code will be in a modern and main stream programming language such as Python, R, or MATLAB using readily available packages or internally written methods or functions or open-source options. The model itself will use state of the art machine learning techniques to output likelihood/likelihood classes for algal blooms in the IRL based on climate and water quality indicators.
2) User Guide: The user guide will provide algorithmic and model information with regards to its construction and use, the type of inputs the user need to supply and the outputs to be expected.
3) Case Study/Application of Model to Indian River Lagoon: The case study will demonstrate via a direct application of the model to the specified region of the IRL, the capabilities of the model to predict HABs incident from the climate and water sensor data. The case study will be in the format of an academic paper with the potential for publication in a peer reviewed journal.

Key Outcomes (Benefits to the IRL):

The benefits of the project are multi-fold.

1) An AI/ML model could provide early warning of HABs incident to the community and potentially allow for early responses to mitigate the fall out to the IRL or allow for protective measures to be taken.
2) The unique construction/architecture of the neural network will add to the diversity of approaches and architectures being developed to analyze time series phenomenology like algal blooms using monitoring infrastructure currently in place.
3) It will automate the analysis of the streaming time series data from multiple sensors operated by multiple organizations providing specifically for algal blooms and provide a template/methodology to replicate in other regions with similar infrastructure in place i.e., weather and water quality sensors that stream data.

RESOLUTION NO. 2023-01

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE IRL COUNCIL ADOPTING THE TENTATIVE BUDGET FOR THE 2024 FISCAL YEAR

WHEREAS, the IRL Council was created via Interlocal Agreement to carry out the goals of the Indian River Lagoon National Estuary Program; and

WHEREAS, the IRL Council held a public hearing to consider the tentative Budget;

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE IRL COUNCIL, THAT:

Section 1. The Fiscal Year 2024 Tentative Budget is attached as Exhibit "A".

Section 2. The Fiscal Year 2024 Tentative Budget is hereby adopted.

Section 3. This Resolution shall become effective immediately upon passage.

DONE at_____, Florida, this_____day of_____,2023.

By: _____
IRL Council Chair

ATTEST:

_____
IRL Council Secretary

Approved as to legal form and sufficiency:

_____
Glen J. Torcivia
IRL Council, Legal Counsel

IRL Council
FY 2024 Tentative Budget
Exhibit A

REVENUES	
Federal Section 320	$ 800,000
Federal Infrastructure Investment and Jobs Law	$ 909,800
IRL License Plate	$ 125,000
Member Contributions	$1,500,000
TOTAL REVENUES	$3,334,800
EXPENDITURES	
Other Expenditures	$2,481,009
IRL Council Strategic Program, IRLNEP 2024 EPA 320 Work Plan, IRLNEP 2024 Infrastructure Work Plan, Unplanned Contingency Reserve	
Salaries & Benefits	$ 642,386
Facilities Expenses	$ 29,500
Rent, Utilities, Equipment Maintenance, Communications	
Administrative Costs	$ 66,000
Postage, Office Supplies, Insurance, Printing, Travel, Licenses & Subscriptions, Dues, Professional Development	
Administrative Services	$ 115,905
Legal, Accounting, Auditing, IT Services, Legal Ads	
TOTAL EXPENDITURES	$3,334,800
Agency Balance Beginning of Year	$ 0
Fund Balance - Beginning of Year	$ 0
Fund Balance – End of Year	$ 0

FY 2024 Tentative Budget Expenditure Detail (Narrative)

- OTHER EXPENDITURES ($2,481,009)
    1. IRL Council Strategic Program ($700,000) includes the following:
        a. Water Quality Restoration Project(s) - $450,000
        b. Habitat Restoration Project(s) -$100,000
        c. Science and Innovation Project(s) - $100,000
        d. Small grants program - $25,000
        e. IRLNEP Technical Support of Conferences and Workshops - $25,000
    2. IRLNEP FY2024 EPA Workplan ($800,000) includes the following:
        a. Herbicide Impact Study (TOX 3 with SJRWMD) - $100,000
        b. State of the Lagoon Technical Report Y5 - $76,125
        c. Communication Support: Service contracts for web/graphics/design support, scientific and other publications, other contract support as needed, and expanded social media and support for communication intern. Includes service contracts with IDEAS, Brandt Ronat, Firefly, and O'Hara - $117,000
        d. Biodiversity Inventory Contract Y5 - $25,000
        e. Atmospheric Deposition Monitoring Central Station Y5 - $30,000
        f. North and South Atmospheric Deposition Monitoring Stations Operation and Maintenance - $60,000
        g. 3 Community Engagement coordinators (Salary Only) - $196,875
        h. Harmful Algal Bloom Monitoring Contracts - $150,000
        i. EPA Travel (mandatory) - $10,000
        j. CCMP project inventory and prioritization service contract(s) - $15,000
        k. Grant Writing Support - $20,000
    3. IRLNEP FEDERAL INFRASTRUCTURE INVESTMENT AND JOBS LAW Workplan ($909,800)
        a. Underserved and Underrepresented Community Restoration Project(s) - $111,800
        b. Seagrass Nursery Network - $500,000
        c. JEDI Support: Service Contract with Diversity of Thought - $49,000
        d. Stormwater Design and Build (SJRWMD) - $249,000
    4. Unplanned Contingency Reserve - $71,209

- SALARIES AND BENEFITS ($642,386)
    1. Salaries and 35% fringe rate for the Executive Director, Deputy Director, Chief Operating Officer, Administrative Coordinator, and GIS/IT Coordinator.
    2. 35% fringe rate only for the 3 Community engagement coordinators

- FACILITIES EXPENSES ($29,500)
    1. Utilities - $2,500
    2. Rent and Leases - $9,000
    3. Equipment Maintenance - $3,000
    4. Equipment and Communications - $15,000

- ADMINISTRATIVE COSTS ($66,000)
    1. Travel General - $20,000
    2. Postage and Mailing - $1,000
    3. Office Supplies - $5,000
    4. Dues, Licenses, and Subscriptions - $10,000
    5. Printing - $10,000
    6. Insurance - $12,000
    7. Staff Training and Professional Development - $8,000

- ADMINISTRATIVE SERVICES ($115,905)
    1. Legal - $65,000
    2. Accounting - $28,500
    3. Auditing - $19,405
    4. IT Services and Compliance - $2,500
    5. Legal Ads - $500