Key Largo Wastewater Treatment District
Board of Commissioners Meeting
Agenda Item Summary

Meeting Date:

November 17, 2026

Agenda Item Number: I-2

Action Required:

No

Department:

General Manager

Sponsor:

Peter Rosasco

Subject:

FKWQIP Update

Summary:

Mr. Rosasco will give an update of FKWQIP funding and provide an overview of the recent FKWQIP Steering Committee Meetings.

Reviewed / Approved		Financial Impact	Attachments
Operations:	_____	$	1. FKWQIP's Report to Congress
Administration:	_____		
Finance:	_____	Funding Source:	
District Counsel:	_____	N/A	
District Clerk:	_____	Budgeted:	
Engineering:	_____	N/A	

Approved By: _____ **Date:** 11-12-26
General Manager

FL KEYS WATER QUALITY IMPROVEMENTS (FKWQI) PROGRAM

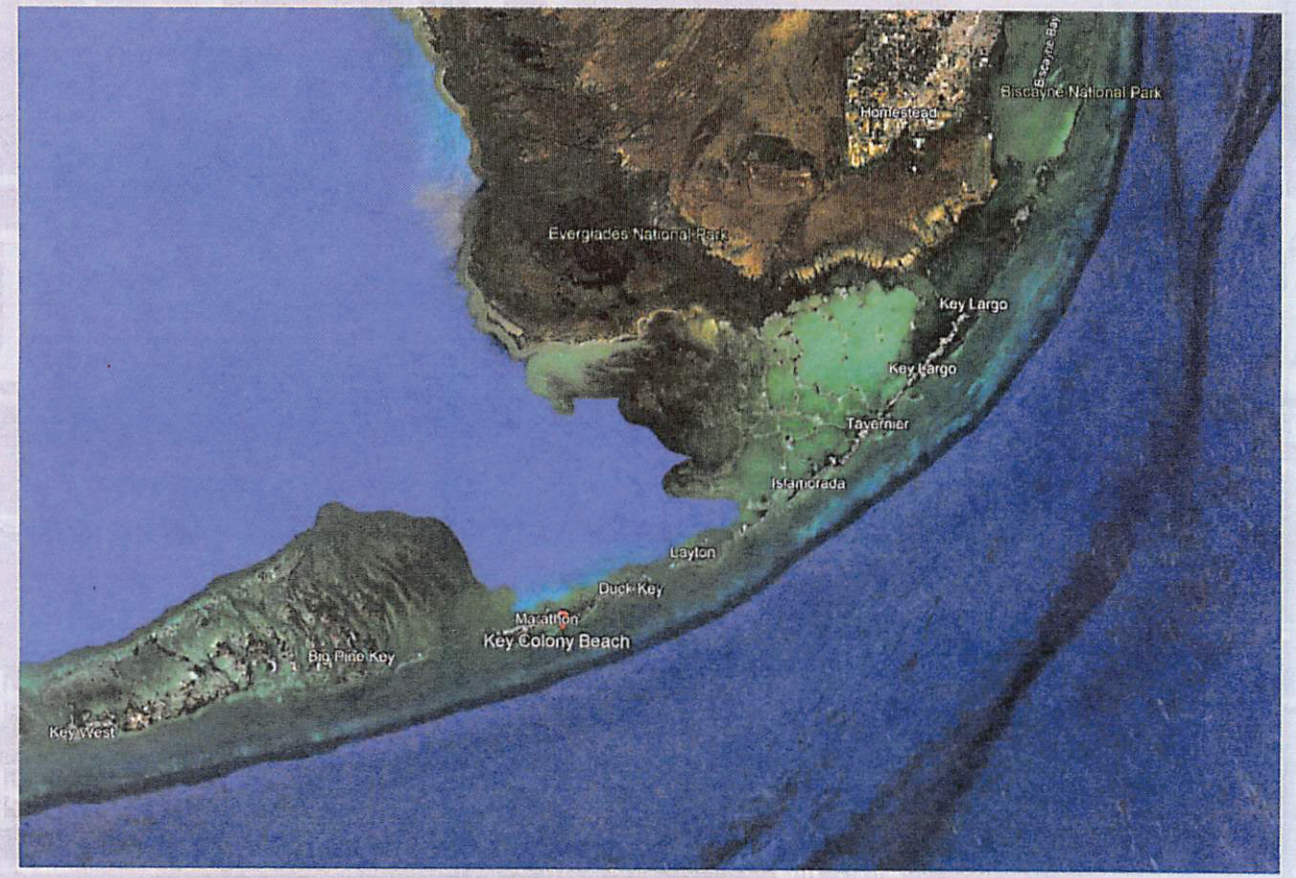
ENVIRONMENTAL INFRASTRUCTURE (EI) SECTION 109 PROGRAM
U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT

FL Keys National Marine Sanctuary Steering Committee Meeting

SAJ FKWQI Program Updates

Marathon City Council Chamber

29 October 2026



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PROGRAM PURPOSE & SANCTUARY PROTECTION OBJECTIVES

- **Mission:** Improve the water quality of nearshore waters within the Florida Keys National Marine Sanctuary, the nation's premier coral reef marine protected area.
- **Interagency Alignment:** Directly supports Sanctuary Water Quality Protection Program (WQPP) priorities by eliminating non-point pollution, cesspits, and outdated wastewater/stormwater practices.
- **Responsive Infrastructure:** Provides cost-effective, long-term technical and financial assistance for:
  - Centralized wastewater collection and advanced wastewater treatment (AWT).
  - Stormwater treatment, retention, and conveyance.
  - Residential canal water quality restoration and circulation remediation.

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LEGISLATIVE FOUNDATION & FUNDING MECHANICS

- **Authorizing Statute:** Section 109, Public Law 106-554, as amended by Section 8376 of WRDA 2022 (Public Law 117-263).
- **Unified Federal Capacity:** Total program authorization cap expanded from $100 million to $200 million.
- **Cost-Sharing Framework:**
  - **65% Federal Share** (USACE reimbursement).
  - **35% Non-Federal Sponsor Share** (Municipalities / County / Utility).
- **Core Statutory Constraints:**
  - Financial assistance operates strictly on a reimbursement basis (not a block grant).
  - Pre-agreement construction work is strictly non-reimbursable.
  - Non-federal sponsors provide all real estate (LERRD) and fund 100% of operations, maintenance, repair, and replacement (OMRR&R).

PROGRAM ACCOMPLISHMENTS: INITIAL $100M STATUS

- **Execution Status:** Over 95% of initial funds ($89.4M+) disbursed to local sponsors to date.
  - **City of Key West** ($10.32M): Fully Reimbursed. AWT upgrades and stormwater drainage systems complete.
  - **City of Key Colony Beach** ($200K) & **City of Layton** ($800K): Fully Reimbursed. Treatment works completed.
  - **City of Marathon** ($29.56M): Package #25 processed ($284.6K net).
  - **Key Largo Wastewater Treatment District** ($29.56M): Package #27 processed ($565.0K net).
  - **Village of Islamorada** ($29.56M): Package #24 processed ($2.71M net).
- Target Milestone: Complete 100% of the initial $100 million authorization in FY27.

ADDITIONAL $100M AUTHORIZATION & FY28 READINESS

- **Expansion to Eight Entities:** Program expands to include Monroe County and the Florida Keys Aqueduct Authority (FKAA) alongside the six municipal sponsors.
- **Negotiated Local Consensus:** NFS agreed to align federal distributions with the State of Florida Stewardship Program Interlocal Agreement (ILA).
- **Shift to Project-Specific Budgeting:**
  - Federal budgeting has shifted from programmatic block allocations to discrete, validated project line items.
  - USACE capabilities database requires verified engineering scopes of work, budgets, and schedules for each Congressional cycle.
- **FY28 Readiness in Motion:**
  - **4 entities have already submitted official FY28 project packages totaling $142.6M:** Monroe County (Canal 278 Injection Wells), Islamorada (Canal 148 Restoration), Marathon (Deep Well & Hardening), and Key Largo (EQ Tanks & Headworks).
- **Anticipated Federal Funding Realities:** Projected appropriations baseline of $5 to $6 million annually based on Congressional capabilities.

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GOVERNANCE & IMPLEMENTATION ROADMAP

- **Streamlined Administrative Process:**
  - Single overarching EI Section 109 Agreement per participating entity.
  - Specific increments of work executed via streamlined Letter Reports (eliminating recurring agreement amendments).
- **Environmental Compliance (NEPA):**
  - Comprehensive NEPA coverage established for historical wastewater projects.
  - Tiered Supplemental Environmental Assessments (EAs) will be conducted for newly added canal restoration and stormwater resilience projects.
- **Near-Term Milestones:**
  - **DEC 2026:** Finalize Interlocal Agreement among all 8 entities; review and validate FY28 submissions from the 4 candidate sponsors. Complete efforts for Marathon and Key Largo.
  - **FY2027:** Complete final $4.33M reimbursement for Islamorada.
  - **FY2028 Cycle**: First full implementation cycle under the new project-specific Section 109 framework.

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SUSTAINING THE FEDERAL PARTNERSHIP

- **Proven Federal-Local Success:** Over $89M disbursed, transforming municipal wastewater treatment and reducing nutrient loads to Sanctuary waters.
- **Clear Path Forward:** Statutory authorization cap in place ($200M); local governance consensus achieved across 8 participating entities.
- **Demonstrated Readiness:** 4 participating sponsors have already submitted candidate project packages for the FY28 funding cycle.
- **Commitment to NOAA Coordination:** Continued coordination with the Water Quality Protection Program to track environmental metrics and leverage infrastructure investments.

QUESTIONS?

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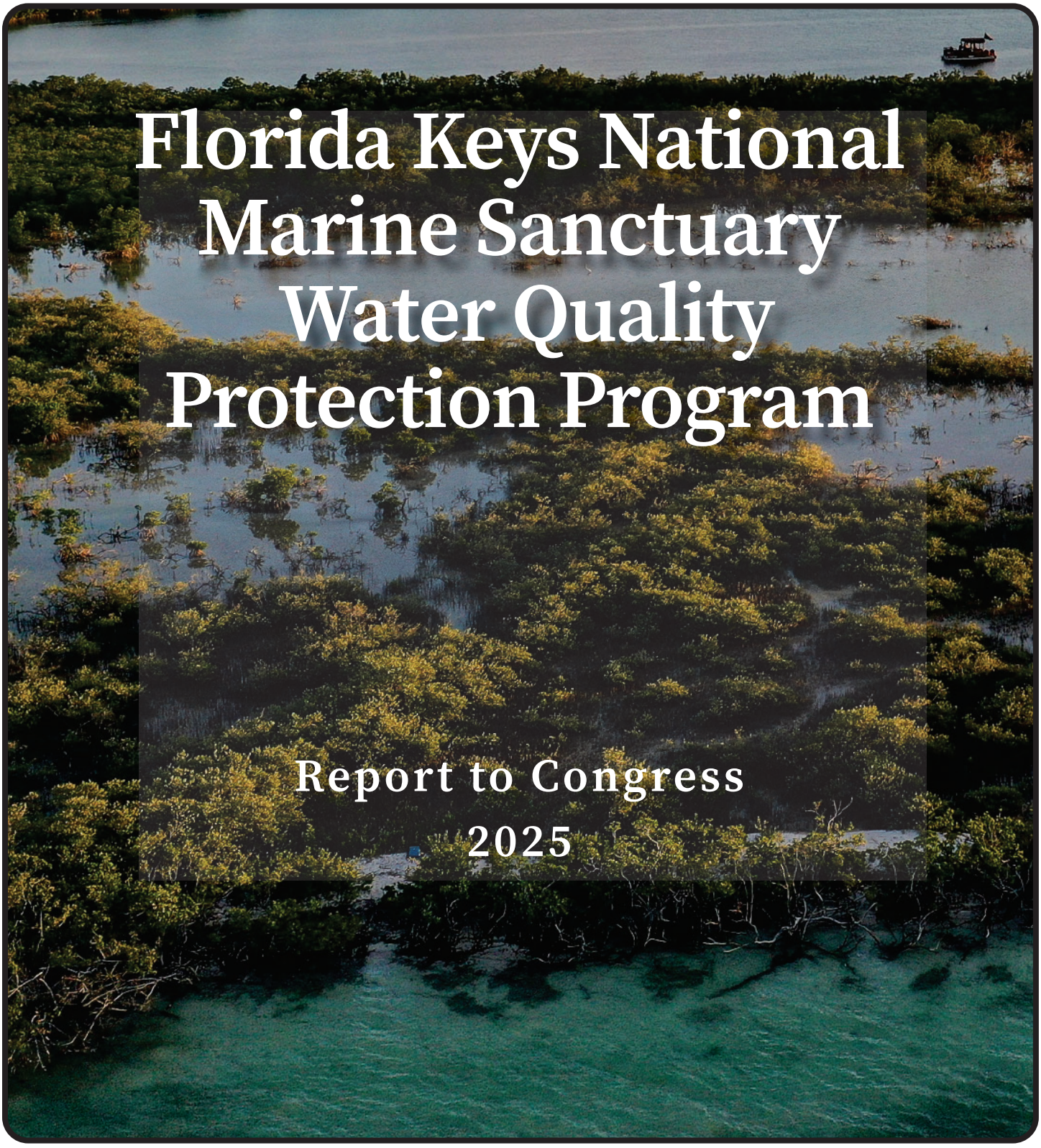
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Florida Keys National Marine Sanctuary Water Quality Protection Program

Report to Congress

2025

This report was created by the Water Quality Protection Program Co-Chairs, the Environmental Protection Agency and Florida Department of Environmental Protection, in cooperation with the Florida Keys National Marine Sanctuary Water Quality Protection Program Partners.

September 2026

Water Quality Protection Program Steering Committee

Committee Chairs

U.S. Environmental Protection Agency, Region 4 (co-chair)
Florida Department of Environmental Protection (co-chair)

Federal Partners

National Oceanic and Atmospheric Administration
National Park Service
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service

State and Local Partners

City of Layton
City of Key Colony Beach
City of Key West
City of Marathon
Florida Department of Commerce
Florida Department of Health
Florida Fish and Wildlife Conservation Commission
Florida Keys Aqueduct Authority
Florida Keys Environmental Fund
Florida Keys Mosquito Control District
Islamorada, Village of Islands
Key Largo Wastewater Treatment District
Monroe County Board of County Commissioners
South Florida Water Management District

Citizen Representatives

Eco Legacy Solutions LLC
Florida Keys National Marine Sanctuary Advisory Council representative
Florida Sea Grant
Marine Industries Association of South Florida
The Nature Conservancy

Message from the Steering Committee

On behalf of the Water Quality Protection Program Steering Committee, the U.S. Environmental Protection Agency and the Florida Department of Environmental Protection are pleased to present this Florida Keys National Marine Sanctuary Water Quality Protection Program Report to Congress covering the reporting period from 2014-2024.

The Florida Keys National Marine Sanctuary and Protection Act amendments of 1992 (Public Law 102–587) established a Steering Committee, which meets regularly, providing guidance to the co-chairs of the Water Quality Protection Program, coordinating with sanctuary staff and one another, and engaging the public. Committee members include federal, state, county, and municipal government staff and knowledgeable citizen representatives from across the Florida Keys and beyond. Together, Steering Committee members pursue the goals of identifying and addressing water quality concerns in this highly sensitive and valuable marine ecosystem.

Since the last Report to Congress, the Florida Keys National Marine Sanctuary Water Quality Protection Program (WQPP) has made significant progress on corrective actions. New infrastructure in Key Largo, Islamorada, Village of Islands, City of Layton, and the highly challenging portion of the unincorporated lower Florida Keys served by the Cudjoe Regional Wastewater System has made advanced wastewater treatment available for almost the entirety of the archipelago. Successful canal water quality restoration efforts using a variety of innovative approaches have advanced from one end of the Keys to the other. Wastewater pump-out vessels serve the anchorages and mooring fields that live-aboard boaters call home.

Monitoring programs and studies, funded mostly by the U.S. Environmental Protection Agency's South Florida Program, have documented changing natural resource conditions, helped identify areas for additional action and proposed solutions. For example, water quality data show mixed results, with some of the pollutants declining while others increased. Monitoring of coral populations on America's only mainland barrier reef shows steep declines from hurricanes, heat- and cold-induced coral bleaching and a novel and lethal coral disease. Long-term water quality degradation may be reflected in some areas experiencing seagrass cover changes. Special studies and projects covered everything from sea sponge restoration and fate tracking of wastewater injected into shallow disposal wells to the development of a free boater education program.

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Executive Summary

Florida Keys National Marine Sanctuary (FKNMS) was established in 1990 by the Florida Keys National Marine Sanctuary and Protection Act (Public Law 101-605) to protect the vital marine ecosystems of the Florida Keys, including coral reefs, seagrass meadows, and mangrove islands. Established as part of the Sanctuary Act, the Water Quality Protection Program (WQPP) is co-chaired by the U.S. Environmental Protection Agency (EPA) and the Florida Department of Environmental Protection (FDEP) to study and address water quality issues within the national marine sanctuary. This Report to Congress, which covers the reporting period from 2014-2024, is required by the Act every two years.

Since the previous Report to Congress, the Water Quality Protection Program and its partner agencies and organizations have made significant progress in improving water quality in the Florida Keys. The EPA's South Florida Program funded long-term monitoring programs, scientific studies, and educational outreach projects focused on water quality in the Keys. These grants to academic institutions, non-governmental organizations, state agencies, and other non-federal entities provided actionable knowledge and proofs of concept that enabled local governments and utilities to implement large-scale water quality enhancement projects, like deep wastewater injection wells, that improve the health of the ecosystems and people who depend on these waters. Specific examples of progress include the following:

- Advanced wastewater treatment: Nearly the entire archipelago has transitioned from septic to advanced wastewater treatment systems, improving water quality across the region.
- Canal restoration: Innovative approaches have begun to successfully restore canal water quality, enhancing the health of local waterways, and efforts continue today.
- Wastewater pump-out vessels: These vessels serve anchorages and mooring fields, preventing the direct introduction of untreated sewage and pollution into marine environments.
- Continuation of long-term monitoring programs: Ongoing monitoring tracks changes in natural resources, identifies issues and proposes solutions to maintain the sanctuary's health extending to all of Florida's Coral Reef.
- Wastewater injection: Impacts from wastewater injection into shallow wells have been identified and are being addressed by exploring deep-well injection methods for major treatment facilities.
- Stormwater treatment: The Steering Committee approved a resolution in 2023, urging the federal and state transportation agencies to provide funding for adding stormwater treatment to all roadway projects, not just enlargements of facilities.

Despite these achievements, complex cross-jurisdictional water quality challenges persist in the Florida Keys, and solutions require engagement by many partners. The WQPP convenes these partners to foster a common understanding of water quality issues and develop consensus on the strategies to achieve water quality improvements. A list of ongoing WQPP priorities can be found in Appendix 1.

The WQPP remains dedicated to collaboration and adaptation, fostering the protection of this valuable ecosystem and economy for the benefit of Florida, FKNMS, and future generations.

Florida Keys National Marine Sanctuary

A Nationally Significant Ecosystem

Geographic Scope and Environmental Importance

Florida Keys National Marine Sanctuary (FKNMS) protects 4,539 square miles of water surrounding the Florida Keys. The Keys archipelago extends southwest 220 miles from Miami, Florida to the Dry Tortugas. Within the sanctuary lies unique and nationally significant marine resources, including the majority of North America's only barrier coral reef, one of the world's most extensive seagrass meadows, 1,800 miles of fringe mangrove islands, and more than 6,000 species of marine life.

Florida's Coral Reef is the only shallow water, tropical coral reef ecosystem in the continental United States. Since the 1970s, Florida's Coral Reef has lost an estimated 90 percent of its coral cover due to a combination of impacts including water quality degradation, thermal stress events, severe storms, increased disease presence, and direct human impacts. The coral reefs surrounding the Florida Keys provide habitat that support fisheries (fish, shrimp, mollusks and sponges) and the industries that rely on them. In addition to being critical for the continued existence of Florida's fisheries, the coral reef provides significant protection from storms. Florida's Coral Reef and its associated diversity also drive tourism in the Florida Keys.

The Florida Keys ecosystem includes 1.5 million acres of seagrass meadows, one of the most productive habitats in south Florida. The seagrass meadows provide an important food source and an essential habitat for wildlife. Their root systems stabilize the ocean floor, and the grasses provide water quality benefits by absorbing nutrients and slowing the flow of water, allowing sediments and pollutants from land to fall out of the water column and settle onto the seafloor. Seagrass beds have declined due to water quality degradation and direct loss of habitat related to dredging, coastal development, and boating impacts. Thermal stress events, reduced freshwater inputs, elevated salinity, land use and runoff, and increased nutrients also contribute to die-offs.

Mangroves are salt-tolerant trees that line more than 1,800 miles of shoreline within FKNMS. Their thick roots allow them to withstand strong winds and waves, protecting coastlines from storm damage. Mangroves also provide water quality benefits, trapping sediments and contaminants that could bury and suffocate nearby hard-bottom and coral reef habitats. Many commercially and recreationally important reef fish and invertebrates use mangroves as a nursery habitat, finding refuge in their tangled roots. As their roots collect sediments, mangroves create more land and build up islands. Habitat destruction, direct removal, major storms that alter hydrology and poor water quality pose threats to these important shoreline protectors.

The Florida Keys' reefs, seagrasses, and mangroves offer essential habitat for commercially and recreationally important fisheries, enhance shoreline protection and storm mitigation for homes and infrastructure, and provide the foundation of the Florida Keys' thriving multibillion-dollar tourism economy.

Economic Importance

The Florida Keys generate a "blue economy," where employment, businesses, and tourism depend on the sustainability of aquatic environmental resources, including clean water and healthy ecosystems. A 2019 National Marine Sanctuary Foundation report identified FKNMS tourism and recre-

ational value as a major driver of the state's gross domestic product (GDP). Approximately 5 million people visit FKNMS annually for its world-class fishing, scuba diving, beaches, recreational boating, and wildlife interactions. In 2015, FKNMS estimated that the Sanctuary's economic activity supported around 43,000 jobs and contributed $4.4 billion to south Florida's economy.[1] The National Oceanic and Atmospheric Administration (NOAA) estimates that these contributions have grown since that time: in 2020, NOAA estimated Florida's Coral Reef has an asset value of $8.5 billion and contributes 70,400 jobs.

Healthy reefs can absorb up to 97 percent of wave energy from tropical storms, protecting over $560 million in building infrastructure and $320 million GDP in south Florida per year.[2] In Monroe County alone, the commercial fishing industry generates $900 million in annual revenue,[3] while the recreational fishing industry is valued at more than $810 million.[4] Approximately 64 percent of residents in this area (ages of 16 – 65) hold recreational saltwater fishing licenses, the highest percentage among Florida counties.[5]

Factors Affecting Water Quality

Local, regional and global factors, both natural and anthropogenic in origin, influence water quality in the Florida Keys. Natural local processes such as tides, currents, oceanic upwelling and hurricanes, and global trends such as increasing temperatures and ocean acidification impact the sensitive ecosystems in this region. Locally, the low topography and porous limestone geology of the Florida Keys create strong connections between land and water, allowing nutrients and pollutants from stormwater, wastewater, and groundwater to rapidly migrate to nearby coastal waters. Vessel discharges, habitat destruction, and marine debris also affect local water quality. Increasing human activities associated with population growth, development, and tourism further impact the balance of the Florida Keys ecosystems.

Regionally, discharge from highly urbanized areas to the northeast and northwest, as well as the altered and engineered flow of freshwater from the Everglades, influence water quality in the Florida Keys. Ocean currents carry pollutants from the western Gulf of America and Florida across the southwest shelf to the Keys. Pollutants from the southeast Florida coast also migrate south along the Florida Keys through eddies and counter currents, despite the northerly flow of the Florida Current, as evidenced by a recent coral disease outbreak.

Other influences on sanctuary waters include hurricanes, such as Irma in 2017 and Ian in 2022, which transported large amounts of debris and nutrients from impacted urban centers along the west coast of Florida and physically impacted the reef structure. Winds and currents in the North Equatorial and Caribbean current systems[6] also carry large quantities of *Sargassum*, a type of brown algae. While important to the health and biodiversity of open ocean ecosystems, *Sargassum* can negatively affect sanctuary waters when large floating mats reach the shore.[7]

Florida Keys National Marine Sanctuary and Protection Act

Public concern over deteriorating water quality, coral reef health, large vessel groundings, and proposed offshore oil drilling led Congress to establish the FKNMS through the Florida Keys National Marine Sanctuary and Protection Act (Public Law 101-605; Sanctuary Act) in 1990. As a component of that Act, Congress recognized the need for clean water to maintain sanctuary marine resources in support of the local economy and created the Water Quality Protection Program (WQPP).

Water Quality Protection Program

The EPA and the FDEP co-chair the WQPP, in consultation with the NOAA Office of National Marine Sanctuaries (ONMS). The Sanctuary Act tasks the program with adopting or revising water quality standards for the sanctuary, implementing pollution control measures, establishing a comprehensive monitoring program, providing opportunities for public participation, and identifying funding to implement the program. The WQPP carries out its mission through monitoring, corrective actions, research, special studies, education, and outreach.

WQPP Accomplishments

The WQPP brings together government agencies, state and local organizations, academic institutions, and community members in protecting water quality within the FKNMS. The framework of the WQPP allows the group to identify water quality concerns, investigate and research these concerns through monitoring and special studies, and recommend corrective actions to improve water quality. Once the WQPP identifies concerns, the group coordinates and implements long-term monitoring programs, research and special studies, corrective actions and public education and outreach activities to address the issues directly. Accomplishments in these areas are summarized below.

Long-Term Monitoring Programs

The WQPP established and continues to provide input into three comprehensive, long-term monitoring programs designed to track trends in water quality, seagrass, and coral reef communities. The EPA's South Florida Program provides the primary funding for this work. Monitoring data provide critical information about the changing condition of sanctuary resources, informs decision-makers regarding the status and trends of natural resources, and guides corrective actions needed for environmental preservation or restoration. The WQPP website provides access to the data and reports from WQPP monitoring studies.

Additional results are available in Appendix 2.

Research and Special Studies

The EPA South Florida Program provides competitive grants designed to address the immediate and emerging ecological pressures and threats to south Florida waters, particularly threats central to south Florida's economic and ecological well-being. Special studies funded by the EPA South Florida Program are short in duration (1-3 years) and designed to answer targeted questions to further the understanding of issues and factors influencing water quality in south Florida. Between fiscal years 2018-2023, the EPA funded fifty-five special studies, totaling $19.5 million. Each year, the WQPP recommends priority topic areas for funding in alignment with the appropriations language provided by Congress. Awarded projects have focused on water quality monitoring and modeling, aquatic habitat monitoring and restoration, coral health, community-based protection projects, water quality management and nature-based infrastructure. A dashboard of funded projects is available through the EPA South Florida Program website. Additional results are available through Steering Committee meetings, publications and the WQPP website.

Corrective Actions

The WQPP has focused on recommending corrective actions to our partners that are designed to improve nearshore waters within the sanctuary by reducing nutrient inputs from land-based sources. Corrective actions can include implementing pollution control measures, restricting various activities, and modifying regulations such as water quality standards. During this reporting period, corrective actions coordinated through the WQPP have been executed at local, state, and federal levels.

Appendix 3 provides details on implemented corrective actions.

Public Education and Outreach Activities

The success of the WQPP relies on enhancing awareness and providing opportunities for public participation. As such, the WQPP and its partners have supported education, outreach, and communication efforts to disseminate information about threats to water quality and other sanctuary resources, helping individuals and communities identify opportunities to protect water quality and highlight the ongoing work of the WQPP.

The WQPP Steering Committee includes seats for knowledgeable local citizens and all meetings are open to the public with opportunities for public comment. Beginning in 2020, the WQPP has offered Steering Committee meetings virtually or as hybrid meetings with opportunities for virtual and in-person participation. The virtual options increase accessibility and have allowed greater participation in WQPP activities.

In 2023, in response to the recognized need to communicate issues and receive public feedback, the WQPP Steering Committee instituted a sub-group focused on communications.

Appendix 4 provides details on the education projects funded.

WQPP Programmatic Modifications

The WQPP made the following programmatic modifications during the current reporting period from 2014-2024.

- Updated Steering Committee bylaws to clarify processes and improve implementation of the program.
- Expanded membership of the Steering Committee to include representatives from all local governments in the Florida Keys and a new “knowledgeable” citizen seat.
- Increased meeting frequency from 2 to 3 meetings annually to improve Steering Committee engagement in emerging science and opportunities to protect and improve water quality in the Florida Keys.
- Established two new subcommittees to assist in expediting and carrying out the responsibilities of the WQPP: the Ecosystem Connectivity Team investigates and provides guidance on regional activities that may impact water quality in the sanctuary, and the Communications Subcommittee improves external communications about water quality issues, the WQPP, and ongoing efforts to improve water quality in the Florida Keys.

Recommendations and Future Program Implementation

The WQPP is committed to continuing to address sources of pollution that affect FKNMS and identifying new opportunities to achieve meaningful water quality improvements.

In September 2019, recognizing continued water quality challenges and the critical importance of high-quality waters for the human, ecological, and economic well-being of the Florida Keys, the Steering Committee initiated a process to update the program's priorities. The WQPP adopted revised priorities in September 2020 including strategies to address eight water quality issue areas, organized into two broad themes: external water quality influences and local water quality issues. The new priorities also identified core strategies for promoting the long-term functioning and success of the program (Fig. 1). Since their adoption, the WQPP priorities have informed program implementation, including special studies funding under the EPA South Florida Program, and have guided activities carried out by the WQPP partners within their authorities. The complete list of WQPP priorities is available in Appendix 1. For additional information regarding their development, see the 2020 WQPP Priorities Recommendation Document.

Theme	Priority
External Water Quality Influences	South Florida Regional Influences
	Tidal Flooding and Rising Nearshore Waters
Local Water Quality Issues	Stormwater
	Wastewater
	Canal Restoration
	Sargassum and Organic Debris
	Marinas and Liveaboards
	Emerging Pollutants of Concern
WQPP Core Responsibilities	WQPP Administration
	Data Collection, Analysis and Reporting
	Education and Outreach

Figure 1: Updated WQPP priorities adopted in 2020.

Consistent with the WQPP's 2020 priorities and ongoing partner efforts, the WQPP and its partners have identified the following six actions.

1. Support Regional Efforts to Restore Natural Habitats to Protect Water Quality

In addition to locally focused efforts, the WQPP continues to seek opportunities to engage in regional initiatives that aim to restore natural habitats and water quality within FKNMS. These include investigating patterns of connectivity and engaging in South Florida Ecosystem Restoration efforts in the Everglades and Florida's Coral Reef.

2. Align Coastal Resilience and Adaptation Efforts with Water Quality Improvements

Communities are focusing on improving their local adaptive capacity and resiliency to flood and storm events. This focus aligns with the WQPP interest in enhancing the efficacy of coastal adaptation projects by emphasizing nature-based solutions (e.g., mangrove and coral reef barriers) and incorporating water quality treatment technologies. These proactive approaches provide improved protection for surface waters while reducing long-term planning, construction, and operations and maintenance costs.

3. Improve Infrastructure for Stormwater Treatment

Keys communities have not addressed stormwater as comprehensively as wastewater. Stormwater management presents unique challenges in the Florida Keys where limited elevation and land area preclude many conventional treatment methods. The WQPP is committed to pursuing innovative approaches to address this water quality threat. The Florida Keys Reasonable Assurance Document (FKRAD) has identified the following stormwater management practices:

- Retrofit existing drainage systems with stormwater treatment before discharging to near-shore waters.
- Incorporate treatment components into new transportation projects.

4. Continue to Improve Wastewater Infrastructure and Treatment Methodologies

While Florida Keys communities have made wastewater improvements, WQPP data show additional attention is needed to demonstrate the effectiveness of the existing infrastructure and investigate establishing more protective treatment standards. The WQPP continues to support research on shallow injection wells and their functionality in the Florida Keys. The Steering Committee has also begun to explore additional treatment beyond advanced wastewater treatment (AWT), including direct potable wastewater reuse, to enhance protection of marine ecosystems while also providing freshwater for other uses.

5. Apply Research and Monitoring Data to Inform Decision-Making

The WQPP directs science and special studies projects to inform decision-making. This supports robust status and trends monitoring programs and evaluation of them to ensure they are meeting priority needs. Consistent with regional water quality goals, the WQPP supports integration of water quality data into a Unified Monitoring Framework for Florida's Coral Reef to support large-scale restoration and water quality improvement objectives and inform adaptive management.

6. Facilitate Partner Efforts to Advance Water Quality Priorities

Resolving the complex and cross-jurisdictional water quality challenges in the Florida Keys requires leadership and engagement by many partners. A key role of the WQPP is to convene various constituents and organizations, foster a common understanding of water quality issues, and support consensus on the necessary strategies to achieve water quality improvements. Implementation of these strategies relies on the authorities, personnel, and investments of the WQPP partners. The Program and its members seek to support these efforts and highlight opportunities to align them with WQPP priorities. Examples of these partner-led efforts include:

- **Canal Restoration:** canal restoration efforts led by Monroe County, Islamorada, Village of Islands, and the City of Marathon.

- **Florida Keys Water Quality Improvement Program:** In 2022, the Water Resources Development Act (WRDA) authorized an additional $100 million for the Florida Keys Water Quality Improvement Program. The USACE provides technical assistance and reimburses the local government partners for costs associated with the planning, design, and construction of projects to improve water quality in the FKNMS. The WQPP supports these efforts to equitably implement local water quality improvements among the local municipalities.
- **City of Key West Water Quality Improvement Plan:** The City of Key West is developing and implementing a Water Quality Improvement Plan. Initiated in 2022 as part of the city's strategic planning process, this plan is an effort to fill data gaps, implement corrective actions, and improve water quality within the city's jurisdiction utilizing their personnel, funding, and authorities.

Conclusion

In the 35 years since Congress established the Florida Keys National Marine Sanctuary and the Water Quality Protection Program, the investments made have led to progress in preserving and restoring the FKNMS; however, even as the program has made progress, ongoing environmental pressures, including from development and hurricanes, have complicated project implementation and progress. As the FKNMS continues to change, approaches to water quality protection and natural resource management must adapt alongside. The communities of the Florida Keys and Water Quality Protection Program partners are continuing to work toward the protection and restoration of water quality in the sanctuary.

For more information on the Water Quality Protection Program, please visit the WQPP Website or contact the WQPP at WQPP@FloridaDEP.gov.

Appendix 1: WQPP Highest Ranked, Priority 1, Activity Recommendations

To view the full list of WQPP strategy recommendations and information on the development of this table, please refer to the 2020 WQPP Priorities Recommendation Document.

Issue Area	WQPP Strategy	Type of Activity
Emerging Pollutants of Concern	Research emerging pollutants of concern to determine the magnitude of the problem posed by endocrine disruptors and other emerging pollutants.	Research/ Special Studies
WQPP Administration	Ensure adequate staffing and support to effectively manage and advance the Water Quality Protection Program, consistent with the Florida Keys National Marine Sanctuary and Protection Act.	Other - WQPP
Local Stormwater	Design and build more effective stormwater projects, to include stricter stormwater management and project permitting.	Corrective Action
Local Stormwater	Support planning, development and implementation of the Monroe County Stormwater Master Plan. Develop best management practices for stormwater within Monroe County, including a consideration of better solutions to treat stormwater runoff in the Keys' environment. In addition to treatment options, prevention of stormwater via a reduction in impervious surfaces should also be considered.	Corrective Action
Local Wastewater	Research/monitor shallow injection wells to determine their impact on nearshore water quality. Test wastewater or other injectate for pollutants other than nutrients, including endocrine disruptors and other emerging pollutants of concern, salinity, viruses/bacteria, etc. Determine if injected effluent appears in the coastal waters and if so, identify where, what pollutants it still contains, and whether it causes local water quality degradation.	Research/ Special Studies

Issue Area	WQPP Strategy	Type of Activity
Local Wastewater	Pending the results of the shallow injection well studies, consider pursuing additional corrective actions such as (a) the development of water quality standards or aquatic life criteria for endocrine disruptors or other contaminants of emerging concern, (b) investigating and/or implementing new wastewater treatment technologies to remove those contaminants, and (c) reducing the wastewater treatment plant capacity threshold for requiring deep well injection within the Keys and areas with similar porous geology (e.g., require deep injection wells, cased to a minimum depth of 2,100 feet, even if the design capacity of the wastewater treatment plant is less than 1 million gallons per day).	Corrective Action
Monitoring/ Research Activities	Design a monitoring program to detect the effectiveness of corrective actions in improving water quality. While this may need to be project-specific, more general tools such as modeling or remote sensing could be developed to evaluate management actions.	Monitoring
Monitoring/ Research Activities	Set up a Critical Monitoring Workshop to evaluate the existing water quality monitoring program, and recommend changes to answer priority questions or better inform management needs. This will require (a) an articulation of key management questions, (b) an evaluation as to whether those management needs can be fulfilled via mining existing data, a special study or region-wide monitoring, and (c) recommendations from the WQPP Technical Advisory Committee on the design of special studies or changes to the region-wide monitoring program to effectively answer management questions.	Monitoring
Monitoring/ Research Activities	Conduct alternative analyses or “mining” of the existing suite of water quality data to determine if water quality improvements, hotspot areas, or specific sources contributing to water quality degradation can be determined. Consider also incorporating other monitoring tools, such as satellite imagery, to provide additional information about regional trends.	Research/ Special Studies

Issue Area	WQPP Strategy	Type of Activity
Tidal Flooding	Ensure wastewater and stormwater infrastructure is equipped to accommodate changing conditions associated with sea level rise and higher-intensity storms. Assess the ability of existing permitting requirements and facility designs to protect water quality, infrastructure and habitat under various tidal height scenarios, and consider alternative design criteria for different types of facilities, levels of use, and/or areas. Identify and incorporate features to promote resilience, such as stormwater retention basins.	Corrective Action

Appendix 2: Water Quality Project Details

Water Quality Monitoring Program

Data collected by: Florida International University (FIU)
Funding provided by: The EPA South Florida Program

For almost 30 years, over 100 stations throughout FKNMS have monitored water quality on a quarterly schedule, providing resource managers with information on long-term trends on nutrients, dissolved oxygen, chlorophyll-*a* and other parameters used to measure the condition of sanctuary waters. The State of Florida and the federal government have used these data to develop tools and policies in support of numeric nutrient criteria as well as launch protective measures when large impacts are noted. Numeric nutrient criteria identify levels of nitrogen and phosphorus in surface waters that are protective of designated uses, specifying magnitude, duration, and frequency. Establishing numeric values can facilitate additional actions to control nutrients, such as updating assessment lists, calculating maximum pollution loads, and establishing protective concentrations for permits.

Monitoring data show mixed water quality trends over time. Significant trends summarized in Table 1.

Water Quality Monitoring Data Trends Summary (1995 – 2023)

Parameter	Impact	Water Quality Trend
Chlorophyll-*a*	Measure of phytoplankton biomass	Worsening
Total Phosphorus	Limiting nutrient for phytoplankton	Worsening (see Fig. 2)
Dissolved Inorganic and Organic Nitrogen	Fuel phytoplankton growth and eutrophication	Improving
Turbidity and Total Organic Carbon	Affect light availability in the water column and sediment	Improving (see Fig. 3)
Dissolved Oxygen	Indicator of eutrophication	Improving

Table 1: Significant Water Quality trends from data collected by FIU from 1995 - 2023.

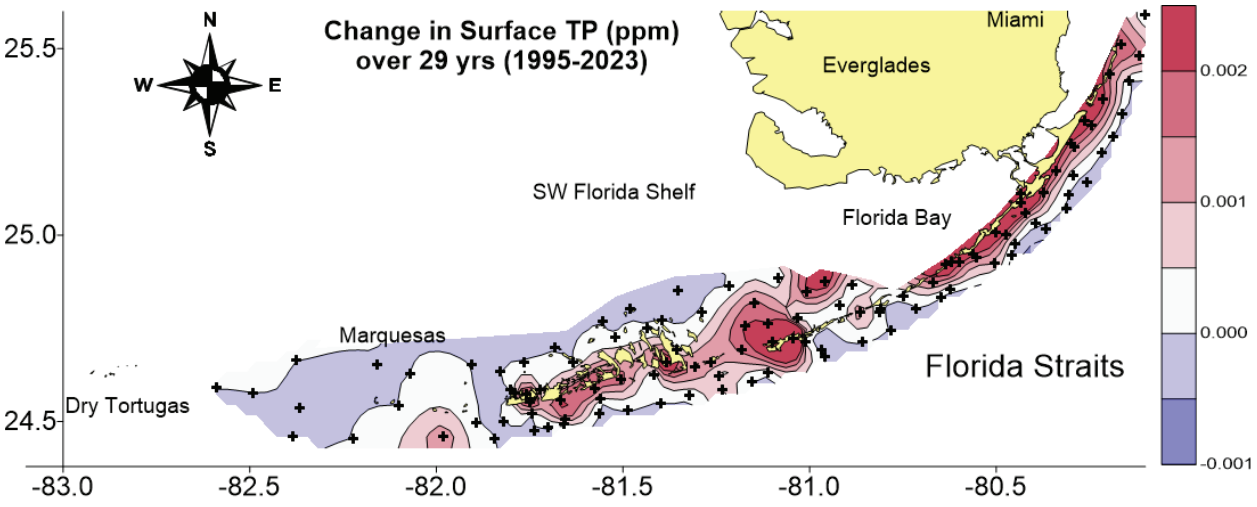


Figure 2. Total change in surface total phosphorus over the 29-year period.

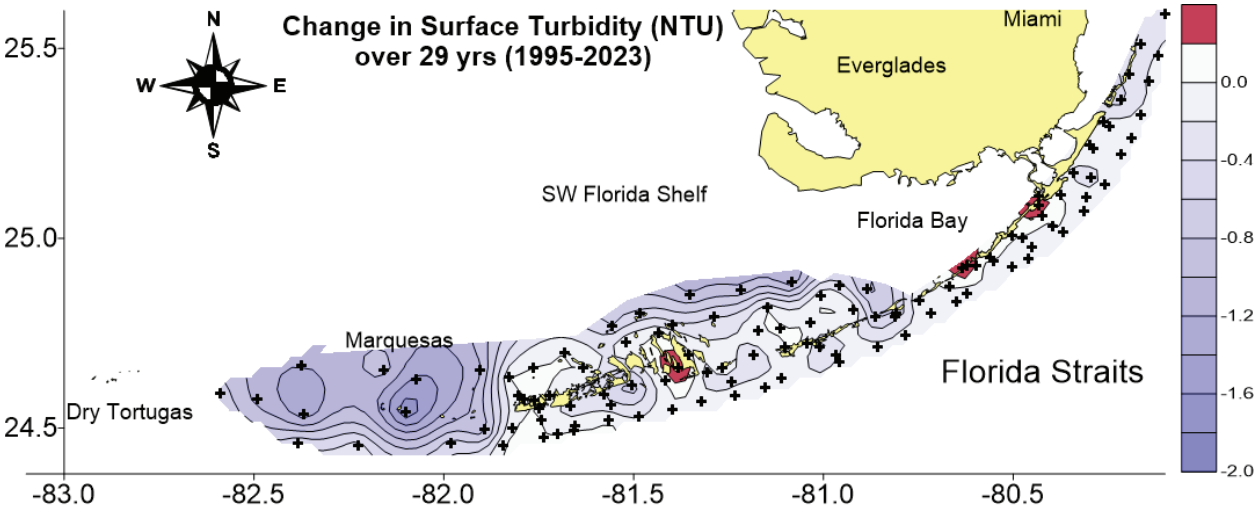


Figure 3. Total change in surface turbidity over the 29-year period.

The time scale of this monitoring program provides a holistic view of the physical, chemical, and biological interactions occurring across south Florida waters. These results reaffirm that ongoing monitoring is a critical tool for addressing management questions and for developing new approaches to restoration and preservation. Data is publicly available through FIU's SERC Water Quality Monitoring Network, the FDEP Watershed Information Network, and the EPA's Water Quality Portal.

Seagrass Monitoring Program

Data collected by: Florida International University
Funding provided by: The EPA South Florida Program

Monitoring data have identified areas of both stability and areas of change. For seagrass monitoring, 40 fixed, permanent sites are monitored twice a year. Florida International University (FIU) coordinates sampling with the FKNMS Water Quality Monitoring Program, allowing for analysis of relationships between water quality and seagrass status data. For example, native turtle grass (*Thalassia testudinum*) represents the desired seagrass community - indicating a healthy ecosystem. The long-term data collected to date has supported development of ecosystem models linking water quality to seagrass growth. Many ecosystem services, such as shoreline protection and habitat provision for commercially valuable fish and shellfish, are greater in turtle grass compared to other seagrasses and algae. Clear water with low nutrient conditions, high-quality waters, are required for the growth of turtle grass.

In contrast, high nutrient, lower-quality conditions result in the loss of turtle grass, favoring algae and more nutrient-adapted seagrasses like shoal grass (*Halodule wrightii*). These lower-quality conditions ultimately lead to microalgae blooms that remove dissolved oxygen, resulting in fish kills and harmful human health effects.

While most sites remained stable over the monitoring period, some were heavily affected by hurricanes (see Fig. 4). None of the permanent monitoring sites impacted by hurricane-induced erosion showed a full recovery of seagrasses over the 30-year period of this study, highlighting that hurricane frequency is an important factor, alongside water quality, in determining seagrass habitat status in the Florida Keys.

Increases in phosphorus can create favorable conditions for algae and shoal grass, which have replaced turtle grass as the dominant seagrass at monitoring sites in the upper, middle, and lower Keys (Fig. 5) and are an indicator of human-derived impacts.

WQPP funded projects show that because phosphorus is efficiently retained and recycled by south Florida's seagrass systems, the impact of high phosphorus can shape habitats long after sources of excess nutrients are remedied. The data and models generated by the seagrass monitoring program strongly influenced the decision to install sewage collection and centralized wastewater treatment and disposal in the Florida Keys to reduce the impact of nutrients on nearshore waters. The presence of old, previously used septic tanks is an example of such a source.

Data is publicly available through the FIU Seagrass Ecosystem Research Lab.

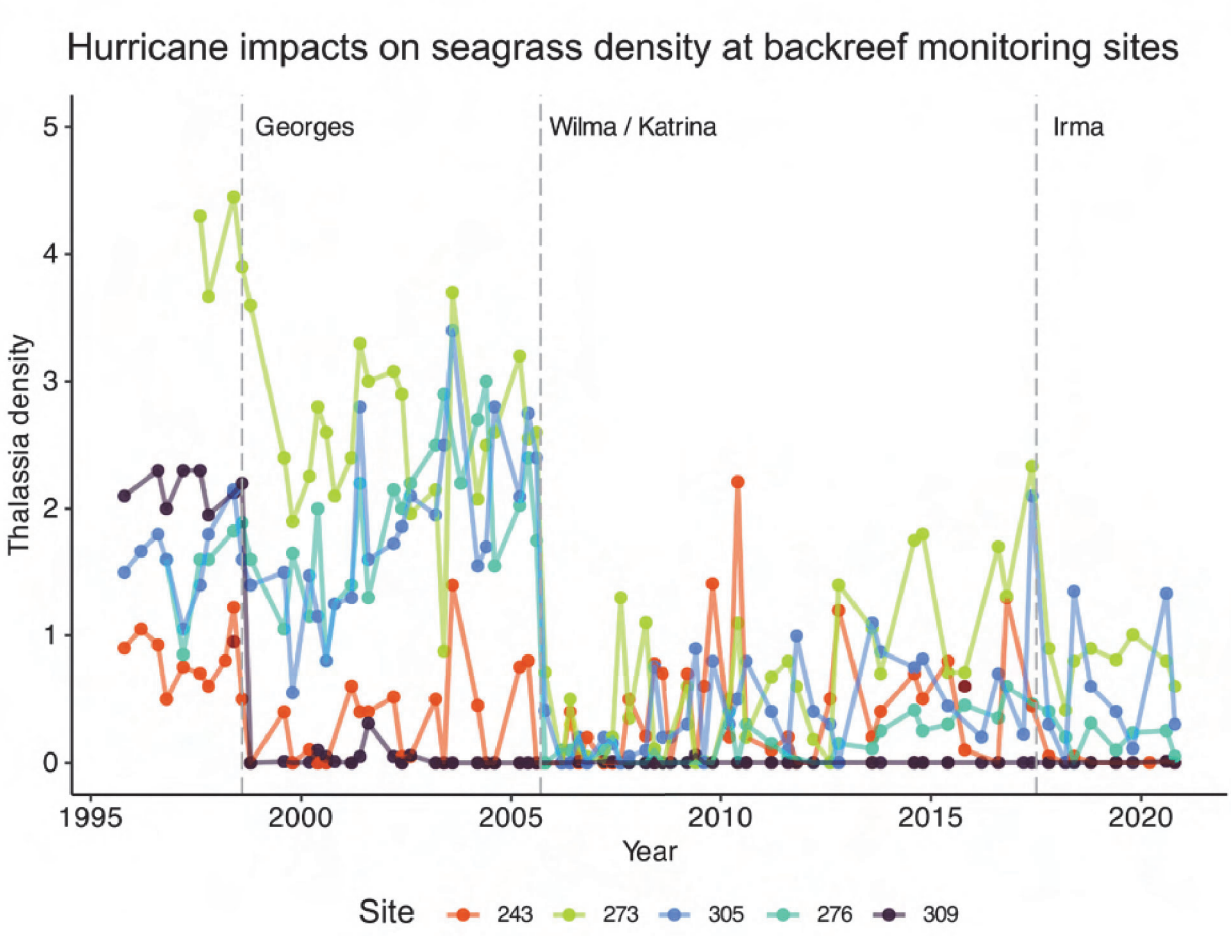


Figure 4. Timeseries of turtle grass (Thalassia) density at seven monitoring sites that lost seagrass over the monitoring period. Vertical dashed lines indicate the occurrence of major hurricanes that impacted the Florida Keys in 1998 (Georges), 2005 (Wilma, Katrina), and 2017 (Irma).

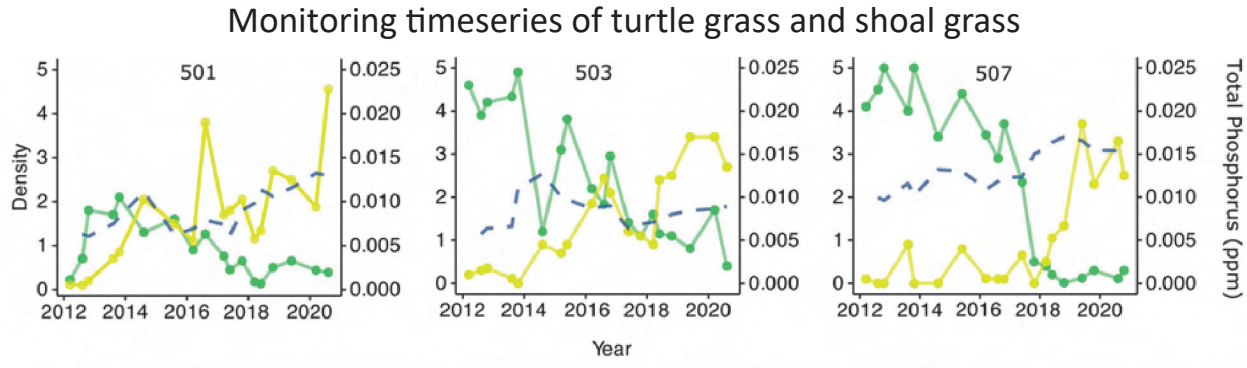


Figure 5. Monitoring timeseries of turtle grass (green) and shoal grass (yellow) densities at nearshore monitoring sites in the upper (501), middle (503), and lower (507) Keys that transitioned to become shoal grass dominated. Blue, dashed lines are total phosphorus concentrations (ppm) in water samples.

Coral Reef Evaluation and Monitoring Program

Data collected by: Florida Fish and Wildlife Conservation Commission
Funding provided by: The EPA South Florida Program

The Coral Reef Evaluation and Monitoring Program (CREMP) tracks changes in coral reef and hard bottom habitats at 40 reef sites over time. This effort provides information on the status and trends of these habitats, including coral cover, coral abundance, species richness, and bleaching and disease prevalence. Research findings provide essential information for resource managers involved in making management decisions that will guide coral restoration and promote resilience.

Since 2013, four major disturbances have severely impacted Florida's Coral Reef:

- In 2014-2015 mass bleaching and prolonged elevated daily seawater temperatures were recorded. These were the highest seawater temperatures observed in the area since 1997-1998.
- In 2017, Category 4 Hurricane Irma made landfall at Cudjoe Key in the Lower Florida Keys. Hurricane Irma was the most powerful storm to directly strike the Florida Keys since Hurricane Donna in 1960.
- Stony Coral Tissue Loss Disease (SCTLD) is the most catastrophic disease outbreak ever recorded along Florida's Coral Reef causing losses of up to 90 percent in some reef-building coral species. First reported on southeast Florida reefs in 2014, it spread through the Florida Keys and into the Dry Tortugas, where it is now endemic.
- In 2023, mass coral bleaching was reported, occurring for the second time in a decade. Seawater temperatures higher than those reported in 2014-2015 surpassed the threshold for coral survival and many hard and soft corals died directly from heat shock.

Together, these disturbances, in addition to diseases and direct impacts, greatly reduced coral cover between 2013 and 2023. Across all 40 CREMP monitoring sites, coral cover decreased from 8.5 percent in 2013 to 6.0 percent in 2023, representing a 30 percent decline in coral cover in only ten years (Fig. 6 and 7). The full extent of the losses from the 2023 mass bleaching is still being evaluated. Some stony coral species lost nearly 90 percent of their abundance as SCTLD progressed through the Florida Keys from 2016-2021, killing many of the largest and oldest reef-building corals that provided the structure required to mitigate future storm damage.

CREMP monitoring data allow the WQPP to understand and measure coral reef status and evaluate restoration success. CREMP has adapted its sampling design to focus on the causes of coral reef decline and to understand how reef communities are changing. Information provided by CREMP has improved techniques, locations, and timing of coral restoration, and increased the survival of corals planted on the reef after being reared in land-based nurseries.

Data is publicly available through the Coral Reef Evaluation and Monitoring Project site.

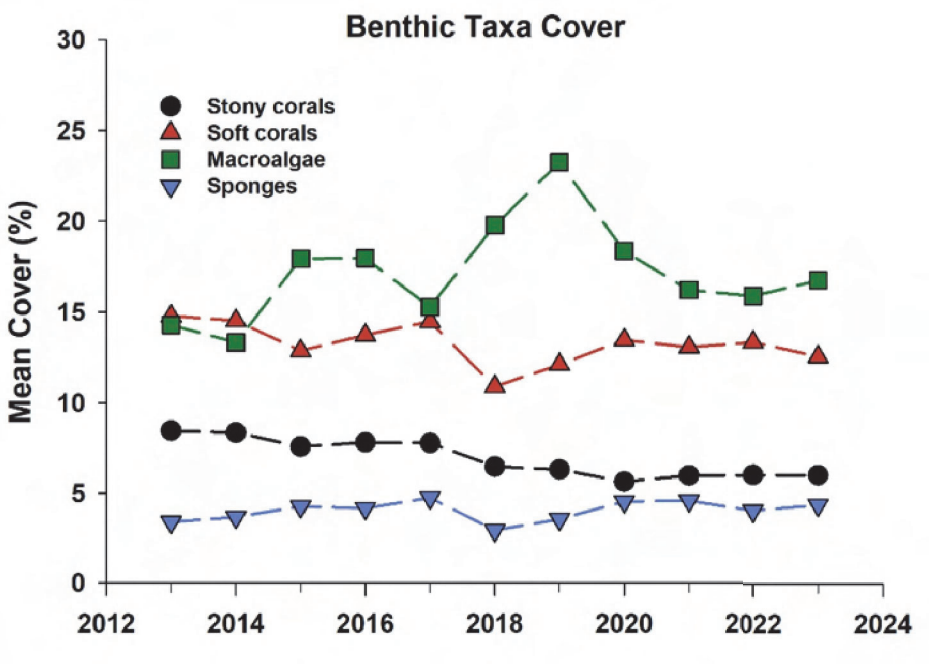


Figure 6. Mean percent cover (percent ± SE) four primary benthic taxa groups (corals, soft corals, macroalgae, sponges) at 40 CREMP sites between 2013 and 2023. All sites have four monitoring stations.

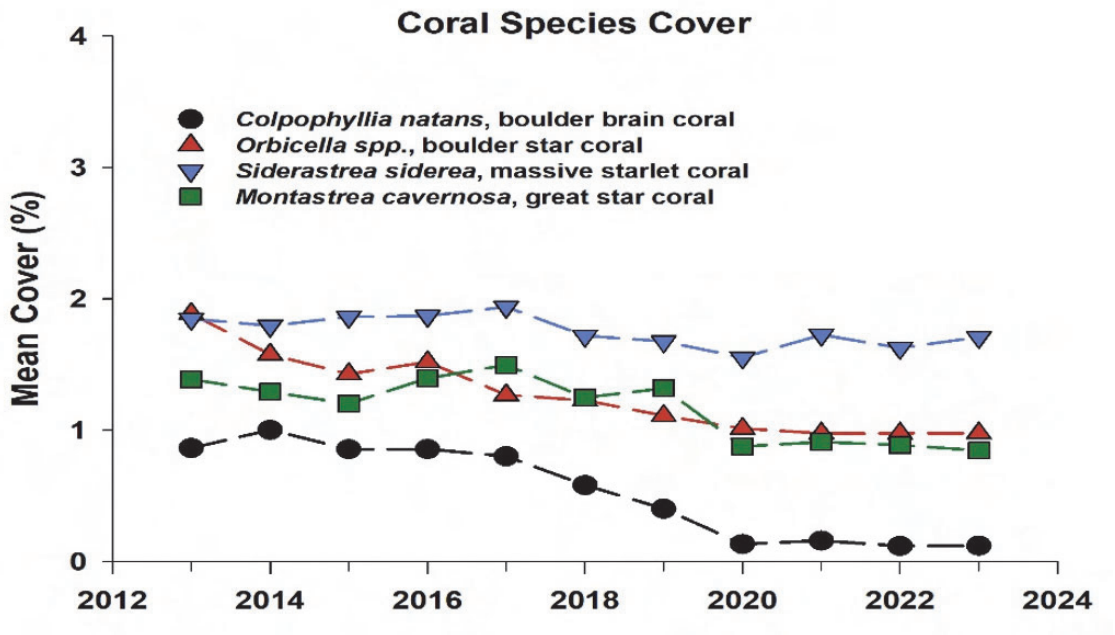


Figure 7. Mean percent cover (percent ± SE) of four major framework building coral species between 2013 and 2023

Appendix 3: Corrective Actions

Canal Water Quality Improvements

Improvements led by: The WQPP Canal Restoration Advisory Subcommittee, Monroe County, and local municipalities
Funding provided by: FDEP State Stewardship, RESTORE, Monroe County, City of Marathon, Islamorada, Village of Islands, and the EPA South Florida Program

In 2013, more than half of the 502 residential canals in the Florida Keys were determined by the WQPP to have poor water quality with levels of dissolved oxygen (DO) in those canals not meeting state water quality standards. Water quality concerns include nutrient and bacterial loading from insufficient stormwater treatment, wastewater inputs, a lack of tidal flushing, and accumulation of organic material. The WQPP has supported efforts to restore water quality in degraded canals, including establishing a Canal Restoration Advisory Subcommittee, supporting development of the Monroe County Canal Management Master Plan, completing a series of canal restoration demonstration projects to test canal remediation techniques, and drafting a canal restoration guidance document to address knowledge gained through these pilot projects.



Figure 8: Example of canal water quality conditions pre-construction.

To determine the effect of restoration technologies on meeting State of Florida water quality standards, Florida International University (FIU) developed a water quality monitoring program that compared water quality data from demonstration canals with similar canals that were not included in the restoration program. FIU's study concluded that canals that received backfilling and culvert treatment technologies showed improved dissolved oxygen saturation after remediation.[8] These canals immediately responded to restoration, not only in oxygen concentration, but also with the arrival of wildlife that was previously absent in the remediated canals.

The FIU study showed that no single restoration technology addresses all water quality issues which may exist in a residential canal. It also noted that poor water quality is most often a function of depth. However, two technologies demonstrated the greatest ability to improve DO: backfilling projects, which reduced the depth of canals and the installation of culverts, which allowed improved flushing of water and accumulated sediment. Both technologies reduced the amount of time water remained in the canal.

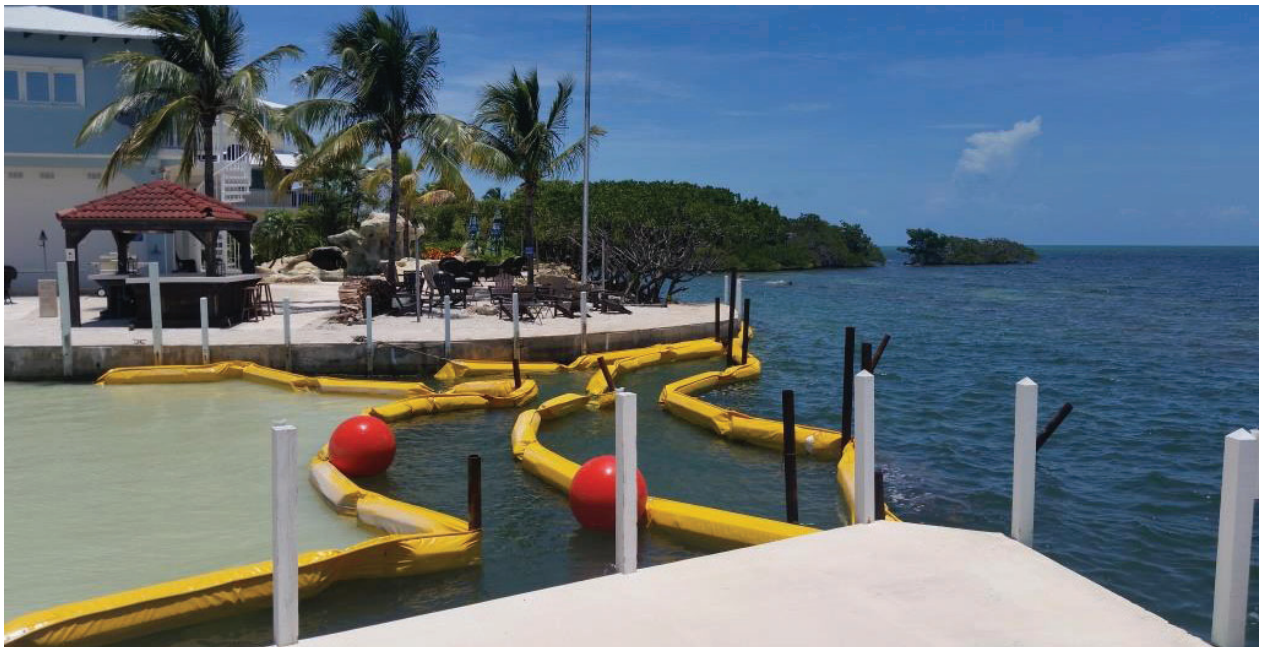


Figure 9: Example of a canal during construction, silt barriers are used to protect waterways while work is taking place.

Following the successful early demonstration phase, the Monroe County Canal Water Quality Restoration Program continues to evaluate, construct, and implement restoration technologies to improve water quality in residential canals. Monroe County tested additional canal remediation techniques such as organic material removal, backfilling, culverts, weed gates, and gravity-fed injection wells. These techniques continue to be tested in the field for their ability to improve overall water quality.

In 2020, Monroe County, Islamorada, Village of Islands, and the City of Marathon incorporated the task of canal restoration and water quality standard compliance into the Area of Critical State Concern 10-year work program. Through 2024, 20 of the 231 canals in this area have been restored. The county, City of Marathon, and Islamorada, Village of Islands ranked the 211 remaining canals with fair or poor water quality to prioritize future restoration.



Figure 10: Example of a canal post construction.

Wastewater Improvements

Improvements led by: local municipalities
Funding provided by: U.S. Army Corps of Engineers, Florida Department of Environmental Protection, and Monroe County residents and businesses.

Florida law prohibits the discharge of domestic wastewater into the surface waters of the Keys. However, wastewater contributes significantly to water quality degradation, primarily through nutrient pollution originating from residual cesspits, ineffective septic systems, and inadequate or outdated wastewater facilities. Monroe County and the Water Quality Steering Committee both identified wastewater management as a critical issue affecting water quality in the Keys. In 1999, Florida required wastewater treatment facilities to meet advanced wastewater treatment (AWT) standards and that communities phase out septic tanks, illegal cesspits, and substandard treatment units. In response, Monroe County developed a comprehensive Wastewater Master Plan, with support from the WQPP, to guide improvement efforts across more than 100 miles and 42 islands within the archipelago.

Monroe County has made substantial progress in wastewater infrastructure development across various municipalities, including:

- **2013:** Key Largo Wastewater Treatment District (KLWTD) expanded the capacity of its AWT plant from 2.3 million gallons per day (MGD) to 3.45 MGD. This expansion enabled KLWTD to accommodate wastewater from neighboring Islamorada, Village of Islands.
- **2013-2018:** The construction of the Cudjoe Regional Wastewater System serves 10 keys across 16 miles, with a capacity of about 0.95 MGD. It includes a deep disposal well and a transmission system to treatment facilities on Cudjoe Key.
- **2014:** Islamorada, Village of Islands completed the construction of a force main, initiating the transfer of wastewater to KLWTD for treatment. Concurrently, KLWTD extended its collection system through the installation of grinder pump systems, achieving connectivity to over 99 percent of properties within its service area.
- **2016-2018:** The City of Layton expanded its wastewater system on Long Key, incorporating 100 additional parcels. Monroe County partnered with the Florida Keys Aqueduct Authority (FKAA) to extend wastewater services to unincorporated areas south of mile marker 87.
- **2020:** The City of Marathon applied to expand its Area 3 wastewater treatment plant to accommodate commercial growth. Additionally, Marathon began exploring beneficial alternatives for effluent disposal including wastewater disposal through deep injection wells, development of reclaimed (non-drinking water) water systems, and indirect and direct potable (drinking water) reuse projects.
- **2021-2024:** The EPA South Florida Program awarded funds to Pennsylvania State University to research the fate of treated wastewater effluent after shallow (<90') injection into limestone bedrock in the Florida Keys. This project monitored concentrations of nutrients, dissolved ions, and man-made compounds in groundwater and nearshore waters over two years. The research found that effluent rises to the shallow subsurface near the injection well and migrates to the coastline, but that subsurface geochemical and microbial processes help to reduce nutrient loadings.[9] [10]

Wastewater improvement efforts continue throughout the island chain, focusing on completing connections, ensuring treatment to AWT standards, and enhancing infrastructure resilience. These efforts underscored a commitment to sustainable wastewater management practices and environmental conservation. As of 2023, most of the Keys are connected to advanced wastewater treatment plants or best available technology systems. Costs for making these connections totaled about $1 billion across 12 major service areas, not including additional costs for individual hookups by businesses and homeowners. Wastewater connections have increased steadily with population growth and new development, but full connection across the Keys remains a moving target as new construction, demolition following hurricanes, and other factors continue to arise.

The KLWTD now provides collection system and advanced wastewater treatment for both the KLWTD and (via interlocal agreement) Islamorada, Village of Islands, treating approximately 20,000 total Equivalent Dwelling Units (EDUs).

Partner investments have also contributed significantly to the reduction in nutrients and pollutants from wastewater and stormwater infrastructure projects. The U.S. Army Corps of Engineers (USACE) has invested approximately $27 million on projects as described below.

Collection System Infrastructure Project – total USACE reimbursement $20,956,803

Beginning in 2005, KLWTD began designing the collection system and its 7 Vacuum (vac) Stations. In 2008, KLWTD began installing pipe in North Key Largo. By 2011, KLWTD had connected the collection system through the end of its service area in Tavernier (Fig. 11 - 14).



Figure 11: KLWTD pipe installation



Figure 12: KLWTD collection system infrastructure



Figure 13: KLWTD collection system infrastructure installation.



Figure 14: KLWTD collection system vac station

Vacuum Collection System Monitoring Project – total USACE reimbursement $4,720,941

Vacuum collection system monitoring reduces the number of backups and overflows that occur when a component of the vacuum collection system malfunctions. It efficiently identifies collection system issues and optimizes performance thereby increasing the collection system's reliability (Fig 15 and 16).



Figure 15: Vacuum collection monitoring system installation.



Figure 16: Vacuum collection monitoring system installation.

Vacuum Pump Stations Upgrade Project – total USACE reimbursement $1,600,389

A mobile emergency vacuum trailer intended to be deployed to a vacuum station in the event of catastrophic failure of the system. The project also includes upgrades to Vacuum Stations to adapt existing pipe/valve manifolds to the new connections (Fig. 17 and 18).



Figure 17: A mobile emergency vacuum trailer



Figure 18: A mobile emergency vacuum trailer

Stormwater Improvements

Improvements led by: Monroe County and local municipalities
Funding provided by: Monroe County and local municipalities

Stormwater runoff washes excess nutrients, sediment and pollutants from roadways, bridges, residential and commercial landscapes and parking lots into near-shore surface waters. The many sources and limited land available in the Florida Keys for traditional treatment methods make it challenging to manage. Municipalities have not managed stormwater as comprehensively as wastewater, but progress continues. The WQPP supported the development of the 2001 Monroe County Stormwater Management Master Plan, which has led to stormwater system upgrades, including retrofitting stormwater drainage systems with treatment technologies, trash grates, roadway drainage improvements and reducing or eliminating direct discharges to nearshore waters.

Monroe County is developing a long-term sustainability and sea-level rise adaptation plan that includes road elevation and stormwater drainage features. The WQPP will support plan development by providing guidance and recommendations on opportunities to include retrofits that improve water quality in accordance with all existing laws in conjunction with local, state, and federal authorities.



Figure 19: Miami curbing installation in Venetian Shores Phase 1 Stormwater Project

Islamorada, Village of Islands completed construction of the Venetian Shores Phase 1 Stormwater Project in 2020 at a cost of $1.7 million. This project was designed to minimize stormwater or tidal water pooling in the streets while simultaneously improving water quality and reducing the amount of discharge to nearshore waters of Florida Bay and the Atlantic Ocean. The system treats stormwater before discharging for reduced nearshore impacts.



Figure 20: Miami curbing installation in Venetian Shores Phase 1

The City of Key West operates and maintains a Municipal Separate Storm Sewer System (MS4) and implements a Stormwater Management Program in compliance with a Phase II MS4 Generic Permit. Since 2013, the City of Key West has installed 160 trash grates on downtown stormwater drains, significantly reducing debris entering the stormwater system, and reducing debris that reaches surface water through the stormwater system.

Florida Keys Reasonable Assurance Document

Improvements led by: Florida Department of Environmental Protection

FDEP adopted the Florida Keys Reasonable Assurance Document (FKRAD) in 2008. This document identifies strategies to restore and protect water quality in the Florida Keys. Recent changes in water quality, identified through monitoring data gathered by FDEP and the WQPP, led FDEP to adopt an update in 2022 to the FKRAD. FDEP developed the update in coordination with stakeholders, including local, regional, and state government, elected officials, citizens, and private interests. The revised document updates the status of management activities including the attainment of total nitrogen and total phosphorus targets, and dissolved oxygen impairments. Since 2011, FDEP and their partners have completed 118 water quality restoration projects. The FDEP adjusted projects and management strategies and its work with stakeholders, including interaction with the WQPP, to reduce nutrient loadings and achieve water quality standards within nearshore waters of the Florida Keys.

Water Quality Standards for the Florida Keys

Improvements led by: Florida Department of Environmental Protection

In 2012, FDEP implemented Numeric Nutrient Criteria (NNC) in state waters surrounding the Keys to help maintain water quality. Data collected by the WQPP Water Quality Monitoring Program show conditions differ across the FKNMS, leading to the development of different sets of criteria specific to seven biogeochemically distinct water bodies within the Keys. The NNC includes standards for total nitrogen, total phosphorus and chlorophyll-*a* and provides a regulatory benchmark for maintaining the quality of waters 500 meters or greater from the coastline. The FDEP did not establish specific NNC for the nearshore waters where stormwater runoff is highest; however, the targets are enforceable through the FKRAD. Nearshore waters are currently being evaluated for future adaptation of criteria.

Mobile Vessel Sewage Pump-Out Service

Improvements led by: Florida Department of Environmental Protection, Monroe County and Key Largo Wastewater Treatment District

Monroe County partnered with the FDEP Clean Vessel Act Program from 2013 through 2020 to provide free mobile pump-out service to vessels anchored in waters between Key West and Key Largo. This service facilitated vessel compliance with the federal No Discharge Zone and Monroe County Proof of Pump-Out ordinance. The county and FDEP suspended this Keys-wide program from June 2020 until November 2021, temporarily replacing it with regional services. In December 2021, FDEP assumed management of the service. Between 2013 and 2023, this free pump-out service collected over 2.6 million gallons of sewage that could otherwise have been discharged into nearshore waters. More information is available at Monroe County Vessel Pump-Out Services.

In 2024, the Key Largo Wastewater Treatment District established the Vessel Sanitary Wastewater Program to provide commercial and non-commercial boating facilities with sanitary wastewater pump-out services for vessels in marinas and community docks. Program information is available at KLWTD website.

Appendix 4: Education Project Details

Florida Keys National Marine Sanctuary Boater Education Course

Effort led by: Indiana University Eppley Institute for Parks and Public Lands, the National Oceanic and Atmospheric Administration/FKNMS, and the National Parks Conservation Association.
Funded by: The EPA South Florida Program

The presence of shallow water, coral, and seagrass beds, as well as the frequent movement of sand make boating in the Florida Keys complex. Boater ignorance and negligence can lead to significant environmental impacts. For example, vessels running aground can damage seagrass and coral habitat that can take decades to recover. To help address these challenges, in 2018, the WQPP supported the development of an online Boater Education Course to teach boaters how to reduce vessel impacts to water quality and seagrass and coral communities in FKNMS. Indiana University's Eppley Institute developed and launched the online course in both English and Spanish in spring 2019. Costs for the initial development and hosting of the website totaled $109,394 through 2019. The current cost to maintain the English version of the course is $10,358 annually. Due to funding constraints, the Spanish course was discontinued as of January 2025. By February 2025, over 6,100 individuals had enrolled in or completed the course. Evaluation responses indicate that the FKNMS Boater Education Course had a significant positive impact on participants knowledge of the topic.

Florida Keys Water Watch

Led by: University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) Extension, Monroe County and Florida Sea Grant
Funds provided by: The EPA South Florida Program

The Florida Keys Water Watch citizen science water quality monitoring program has trained more than 415 residents, 11 Extension agents, 158 STEM teachers, and 900 students to collect water quality data for dissolved oxygen, salinity, temperature, and turbidity. More than 3,000 individuals have attended public seminars since the program began in 2015 in partnership with the Monroe County Canal Management Master Plan. What began as a county initiative has expanded coastwide into UF/IFAS Water Watch in more than 8 coastal counties with 28 trainers that collectively reach thousands of Floridians, resulting in an estimated $185,000 of in-kind volunteer sampling work since 2018.

Additional Resources

To find out more about the Florida Keys National Marine Sanctuary and the Water Quality Protection Program, visit us on the web at:

Florida Keys National Marine Sanctuary Water Quality Protection Program

Florida Keys National Marine Sanctuary

Southeast Environmental Research Center

EPA South Florida Program

Florida Keys National Marine Sanctuary Water Quality

Monroe Canal Restoration

Monroe County RESTORE Funding

Florida Keys Basin Water Quality Reports

Florida Keys Reasonable Assurance Plans

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1 TBD Economics, 2019. The Economic Contribution of Spending in the Florida Keys National Marine Sanctuary to the Florida Economy. Accessed November 20, 2023, https://marinesanctuary.org/wp-content/uploads/2019/07/FKNMS-Report-Final-072819.pdf

2 Storlazzi, C.D., Reguero, B.G., Cole, A.D., Lowe, E., Shope, J.B., Gibbs, A.E., Nickel, B.A., McCall, R.T., van Dongeren, A.R., and Beck, M.W. 2019. Rigorously valuing the role of U.S. coral reefs in coastal hazard risk reduction: U.S. Geological Survey Open-File Report 2019–1027, 42pp. Accessed on November 18, 2021, https://pubs.usgs.gov/of/2019/1027/ofr20191027.pdf

3 NOAA Fisheries, 2016

4 Gastesi, Roman. 2019. Florida's Coastal Economy: Opportunities and Challenges in the Florida Keys Testimony for the U.S. Senate Committee on Small Business and Entrepreneurship. https://www.sbc.senate.gov/public/_cache/files/e/2/e2c36195-6f1a-42cb-b665-c4c7a33678eb/CEA98CE79469EB1D6732EADB06291874.gastesi-testimony.pdf

5 Florida Sea Grant, 2017

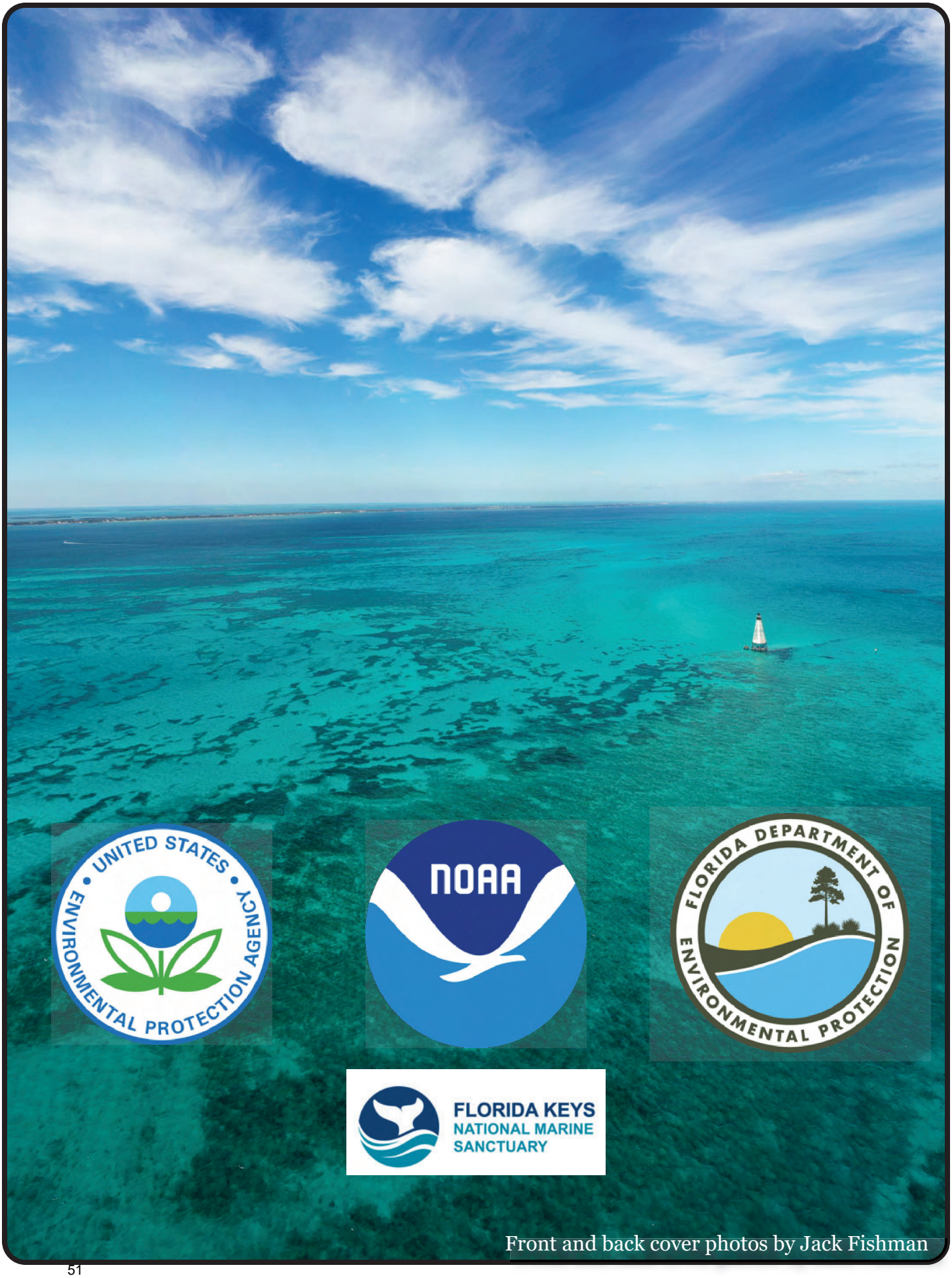
6 Florida Sea Grant, 2017

7 K. Lumpkin, Nathan F. Putman, Ryan H. Smitha, Frank E. Muller-Karger, Digna T. Rueda-Roa, Chuanmin Hu, Mengqiu Wang, Maureen T. Brooks, Lewis J. Gramer, Francisco E. Werner. 2020. The establishment of a pelagic Sargassum population in the tropical Atlantic: Biological consequences of a basin-scale long distance dispersal event. Progress in Oceanography, 182 (2020) 102269.

8 Florida International University. 2018. Water Quality Monitoring Project for Demonstration of Canal Remediation Methods: Florida Keys: Final Report May 2018 Submitted by: Henry O. Briceno Southeast Environmental Research Center Florida International University Miami, Florida.

9 ACS EST Water 2024, 4, 8, 3540–3549 https://doi.org/10.1021/acsestwater.4c00407

10 Depositional Rec 2025, 00:1-20 https://onlinelibrary.wiley.com/doi/pdf/10.1002/dep2.70018



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