

Improving Florida's Coastal Water Quality with Septic-to-Sewer Programs

Many Florida coastal communities are quickly recognizing the detrimental impacts that septic systems have on water quality and marine life habitat, commercial fisheries, property values, and tourism. As a result, many new septic-to-sewer programs are being implemented throughout Florida coastal communities.



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For more than a century, septic systems have been used in the U.S. as an inexpensive and effective method to collect and treat solid organic waste. However, this method of sewage disposal comes at an environmental price. Septic systems which are installed in the seasonal high groundwater table and/or not maintained on a routine basis can result in the contamination of groundwater, tributaries, and nearby coastal waters and eventually lead to public health issues. Publications by various sources, such as the U.S. Environmental Protection Agency (EPA), have documented how septic systems negatively impact not only our drinking water but the quality of our ecosystem and aquatic life.

Water quality monitoring for fecal indicator bacteria (fecal coliform and enterococci) are typically performed for the purpose of providing an indicator of beach water quality. These bacteria are influenced by specific factors such as beach geomorphology as well as regional factors such as wastewater infrastructure projects, which can have a significant impact in coastal waters. Regional studies using water quality monitoring have demonstrated a significant improvement in coastal water quality following the implementation of large-scale septic-to-sewer programs (Barreras et al, 2019).

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Sarasota County

Sarasota County's septic-to-sewer was initiated in April 1997 when the Board of County Commissioners found that septic systems and package treatment plants were polluting Phillippi Creek, a 7-mile

tidal creek which drains approximately 40 percent of the Sarasota Bay watershed. As a result, a master plan was developed for sewerage of the 57 square mile watershed in the urban, developed area of Sarasota County. Phased construction of the plan, known as the Phillippi Creek Septic System Replacement Program (SSRP), was initiated in 2001 with the purpose of converting more than 14,000 parcels using septic systems and 18 privately-owned package treatment plants over to a centralized wastewater collection system. More than 20 years later, this multi-year program has successfully converted nearly 11,000 parcels over to a centralized collection system using vacuum sewers. Sarasota County’s septic-to-sewer program has been funded largely through the passing of a local sales tax referendum, non-ad valorem assessments, and using state and federal grant monies with the goal to improve the health and aesthetic appeal of Phillippi Creek.

The Phillippi Creek SSRP has been successful as demonstrated by the steady decrease in nitrogen loading as well as the declining chlorophyll a levels in Sarasota Bay and all of the Bay’s segments. The areal extent of seagrass coverage in Sarasota Bay, which provide habitat for juvenile and adult finfish and shellfish, has increased by approximately 40 percent when compared to all coverages since 2004 (see Figure 1). Furthermore, many areas have shown gains in seagrass coverage throughout the Sarasota Estuary Nutrient Region, while no evidence of seagrass decline have occurred in locations with significant areal coverage since 2004 (Janicki, 2019). These gains in seagrass coverage and the evidence of infilling of seagrass beds certainly suggests that water quality has improved in the region. The investment return on this restoration program has demonstrated a positive economic return for the community.

Islamorada, Village of Islands

Since 2000, fecal indicator bacteria have been used as a proxy indicator of beach water quality in the Florida Keys. Sewage sources

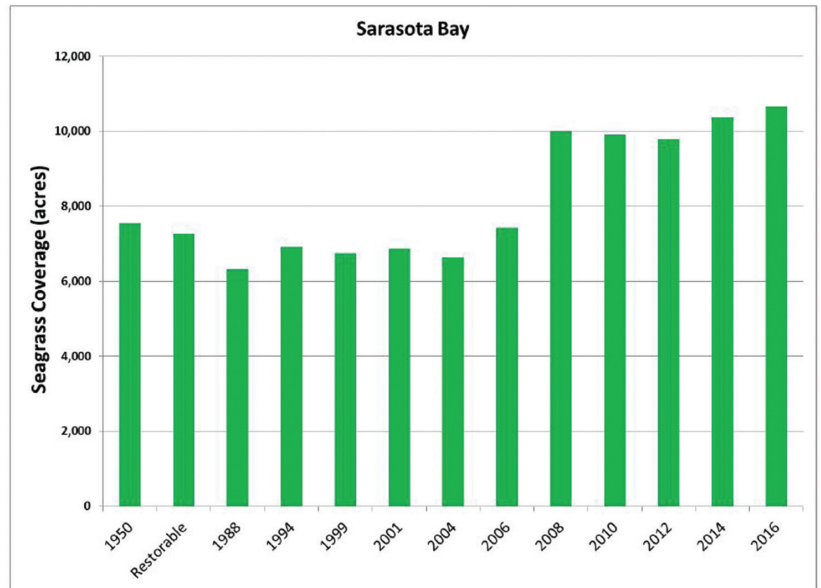


Figure 1. Areal extent of seagrass in the Sarasota Bay Estuarine Nutrient Region (Janicki, 2019)

at beaches and nearshore coastal waters typically include cesspools, outdated package treatment plants, septic tanks and drain fields, and leaking sanitary systems (e.g., collection systems, and leaking lateral connections).

Islamorada is a recent example where a \$130M septic-to-sewer wastewater improvement program under Florida’s legislative mandate for higher wastewater treatment and disposal standards was undertaken in 2010. Islamorada’s program was initiated to serve the residential and commercial community of approximately 9,700 equivalent dwelling units (EDUs). This program included the implementation of a design-build-operate delivery method to construct and implement a regional wastewater collection system (using vacuum and low-pressure sewers) that improved overall water quality in the near shore coastal waters. In 2012, Islamorada also signed an interlocal agreement with the Key Largo Wastewater Treatment District (KLWTD) for a wastewater treatment capacity allocation of 1.1 million gallons per day (mgd) based on average annual daily flow. Sending wastewater flows to the KLWTD for treatment allowed Islamorada to meet the 2015 compliance deadline mandated by the State.

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Salinity Monitoring through May 2021

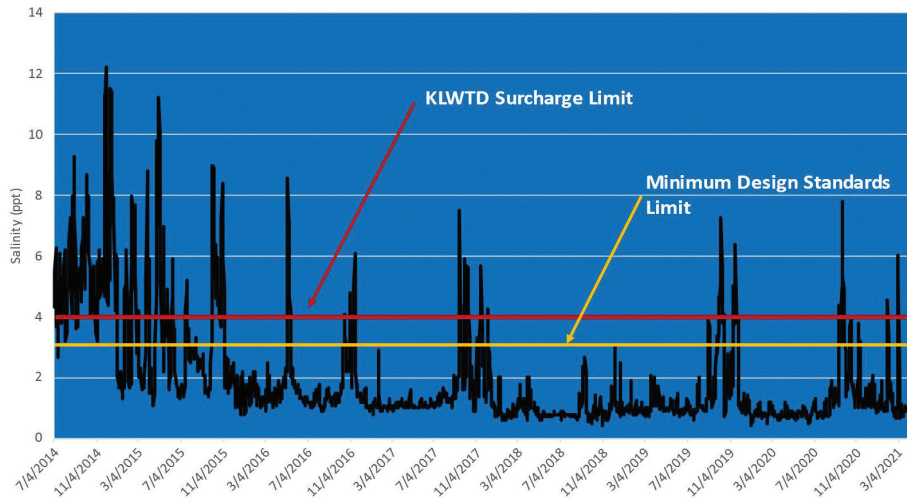


Figure 2. Salinity monitoring through May 2021

The interlocal agreement included penalty surcharges for high strength waste, salinity and excessive inflow and infiltration. From the initial startup of its new collection system, the Village implemented a salinity water quality monitoring program that proved to be critical for compliance with the Key Largo interlocal agreement requirements. As shown in Figure 2, salinity levels in Islamorada’s collection system have periodically exceeded the Village’s salinity design standard limit of 3 parts per thousand (ppt) specified in the Village Utility Policy and the KLWTD’s surcharge limit (4.0 ppt). This monitoring data was instrumental to the rapid identification and location of inflow and infiltration which occurred within private collection systems located throughout the Village.

Another important key to the success of the Islamorada program hinged on the development of an updated Village Utility Policy which included Village-wide Minimum Design and Construction Standards. These new standards specify design requirements for vacuum, low-pressure

and gravity collection systems, including all private onsite collection systems connecting and placed into service with the Village-wide collection systems. Visual and video inspections, as well as hydrostatic and leak testing are routinely used for this purpose.

As of 2021, Islamorada’s wastewater improvement program has resulted in connection to the Village-wide wastewater collection and transmission system of more than 99% of the residential and commercial parcels that were previously

using septic systems and package treatment plants, respectively. Water quality data in the nearshore coastal waters and the residential canals have demonstrated significant improvements resulting from the Village completing its septic-to-sewer program.

Brevard County

The Indian River Lagoon system spans 156 miles of Florida’s eastern coastline. Since the 1990s, collective restoration efforts have been made by regional municipal treatment facilities, educational institutions, and federal, state and local governments to improve water quality. The delicate ecosystem of the Indian River Lagoon in Brevard County has been disturbed, as development within the County has led to harmful impacts due to septic systems and harmful levels of nutrients entering the lagoon from stormwater runoffs. With efforts from The Save Our Indian River Lagoon (SOIRL) Initiative, improvements to the water quality have been set into motion to improve the health, productivity, aesthetic appeal, and economic value of the lagoon

in this coastal environment. A principal effort associated with the SOIRL Initiative is the conversion of hundreds of existing residential septic systems to either municipal gravity, low pressure, or vacuum sewer collection systems. Currently, approximately \$120M in prioritized septic-to-sewer projects will provide a significant level of nutrient reduction to the lagoon. Project implementation is funded through a ½-cent sales tax that was approved by Brevard County voters in November 2016.

Septic-to-Sewer Funding

A major obstacle many municipalities face is locating a funding source to pay for desired improvements. Septic-to-sewer projects are typically financed through bonds and loans, user fees and charges, taxes and assessments, developer fees, grants, and/or redirection of existing programs or funding. Potential funding opportunities for septic-to-sewer projects in Florida include the United States (U.S.) Department of Housing and Urban Development (HUD), the USEPA/ Florida Department of Environmental Protection (DEP) grants and loans, United States Department of Agriculture (USDA) loans, Southwest Florida Water Management District (SWFWMD) cooperative funding initiative, capital financing, homeowner special assessments, and/or private bank financing. Municipalities can take advantage of very low interest rate loans through the DEP's State Revolving Fund (SRF) offered by the EPA. In 2020, the national average interest rate for a Clean Water SRF loan in 2020 was 1.2%. While SRF loans are typically earmarked for capital improvements within public rights-of-way, other funding sources, such as HUD grants, can be utilized to assist paying for infrastructure expenses on private property (such as abandoning septic tanks and installing laterals).

Summary

Given the age and lack of proper maintenance for the majority of existing septic systems throughout Florida's coastal communities, the cost of not making improvements is the contamination of our

water bodies and groundwater sources. For that reason, many municipalities throughout the State are taking a proactive step to investigate the various septic-to-sewer options available. Even in low-income areas, municipalities can take advantage of various grant and low interest loan opportunities to improve troubled underground infrastructure and reduce the level of nutrients and septic system contaminants to improve human health and the environment.

References

- Barreras, H., Jr, Kelly, E.A, Kumar, N., Solo-Gabriele, H.M. (2019). Assessment of local and regional strategies to control bacteria at beaches with consideration of impacts from climate change. *Marin Pollution Bulletin* 138: 249-259.
- Janicki Environmental Inc. (2019). Final Report: NNC for Sarasota Bay Estuarine Nutrient Region.

Authors

Daniel G. Burden, PhD, PE has more than 30 years of experience in water resources including numerous septic-to-sewer programs throughout Florida, where he has served clients in a multitude of project roles, including program management, planning, design, permitting, construction, and facility operations. Dr. Burden served as a member of WEF's Alternative Sewer Systems Task Force, was a technical reviewer on WEF's Manual of Practice #FD-12 "Alternative Sewer Systems" and currently serves as a member of WEF's Water Reuse Committee.

Oscar Duarte, PE has over 30 years of water and wastewater experience, covering a full range of wastewater collection, treatment, and effluent disposal planning, design, and construction. His project focus over the last several years has been the rehabilitation of existing wastewater collection systems and the design of new septic-to-sewer systems throughout Florida. He is a member of Water Environment Federation's National Water Reuse Committee and is a Past Chairman of Underground Utility Pipeline Contractors Board of Examiners, Orange County.