

MIAMIBEACH

OFFICE OF THE CITY MANAGER

NO. LTC# 250-2022

LETTER TO COMMISSION

TO: Honorable Mayor Dan Gelber and Members of the City Commission

FROM: Alina T. Hudak, City Manager

DATE: June 27, 2022

SUBJECT: Park View Island Canal Water Quality Study – Emergency Purchase

The purpose of the memorandum is to provide an update regarding an emergency purchase to secure additional specialized analysis to address Park View Canal water quality concerns. Park View Canal is experiencing elevated fecal bacteria levels and a "no contact with the water" advisory is in place for this waterway adjacent to the kayak launch at 73 Street. The water sampling results exceed limits for recreational swim standards established by the Florida Department of Health. Extensive and continued investigations by our staff and consultants have not identified a significant point source of contamination from the city's infrastructure, and in-depth sampling has been conducted that has indicated canine and bird fecal coliform.

To date the City has spent over \$70,000 on investigations such as smoke testing, water quality sampling, contracting a third party to perform an unbiased investigation, and in performing additional cleaning and maintenance in the stormwater system. A more in-depth study of non-point source pollution, including an expanded coverage area, more parameters, increased frequency, and recommended solutions is required.

My staff and I remain concerned along with North Beach and Park View residents. The City's professional staff team working together on this item is Amy Knowles, Chief Resilience Officer and Lindsey Precht, Assistant Director of the Environment and Sustainability Department; and Joe Gomez, PE, Director, Cristina Ortega, City Engineer, PE and Mariana Evora, PE of the Public Works Department. The team also met with Miami-Dade County's Division of Environmental Resources Management, who reviewed efforts to date and agreed this additional analysis with recommendations for solutions is an important next step.

City Commission Meeting Agenda Item

The persistent high bacteria levels require expertise in intertidal zone contamination, and a proposal was presented for a specialized study in item R7 M, sponsored by Commissioner Alex Fernandez, on the June 22, 2022 City Commission agenda. The resolution to waive, by 5/7th vote, the formal competitive bidding requirements in accordance with Section 2-367 of the City Code, is included in Attachment 1. The explanatory memorandum and proposal is also included within the attachment. The item was not heard due to the unfortunate adjournment of the meeting.

Since the item was not heard, and in light of the extensive and continued investigations by our staff and consultants that have not identified a significant point source of contamination, I am authorizing an emergency purchase under City Code Sec. 2-396 for to the health, safety, and welfare of the city. A more in-depth study of non-point source pollution, including an expanded coverage area, more parameters, increased frequency, and recommended solutions is required. Dr. Helena Solo-Gabriele, Associate Dean, University of Miami College of Engineering, Office of

Research is recognized nationally and internationally for her work evaluating microbes in water and sediments. Her area of focus is the interface between water and sediments in both rivers and in marine environments.

Dr. Solo-Gabriele was selected due to her extensive background in non-point source pollution and developing recommendations for permanent solutions. The final report deliverable will include the results of the sampling efforts to identify the source of the non-point source pollution. The sampling will be expanded to north and south of the kayak area, include more parameters and will be more frequent. The report will also identify recommended solutions and high-level cost estimates to implement the recommendations. The cost of the study will not exceed amount of \$122,000.00 for these services and is funded through the FY 2022 Sustainability and Resiliency Fund.

Background

The situation began in March of 2020, when Jaffer Wells Drilling, a sub-contractor for Hy-Power, struck a 42-inch sanitary sewer main near the intersection of 17 Street and Lincoln Road. This event caused increased pressure throughout the sanitary system and on March 5, 2020 caused a sewer force main break at the parking lot at 72 Street and Collins Avenue. Following the break, sewage recovery and cleaning efforts began immediately and continued for approximately one week after the spill. Water quality testing began on March 6, 2020 to identify impacts to the surrounding surface waters.

Typically, following a sanitary sewer break, surrounding surface waters will continue to have high bacteria counts for a couple of days following the incident. However, high bacteria counts continued many days following the sewage break repair and has continue since.

"No Contact Advisory" signage was posted at the kayak launch, notices were issued via the City's Neighborhood Affairs Division team, and information was posted on the City's website. The Public Works Operations Division, along with the Environment and Sustainability Department identified possible sources of cross-contamination in the area along with site specific conditions that potentially could negatively impact the area. The following were identified as potential sources of bacteria: siphon (underwater sewer pipe) between Parkview Island and 72 Street, abandoned force main from North Bay Village at 72 street, abandoned overflow from Sewer Pump Station No. 23 located at 72 Street and Abbot Avenue, human waste from homeless community or otherwise, animal waste, slow movement of water along the canal, possibly limiting "flushing" effect.

Efforts to isolate potential sewer leaks have included multiple dye tests, deep cleaning of the stormwater lines, water quality testing throughout the stormwater system, sediment sampling in the canal, CCTV inspections and smoke testing to determine potential illegal cross connections between private properties sewer lines and the City's stormwater system. The investigations performed to date have not identified any significant deficiencies within the City's public infrastructure that would explain the chronically elevated bacteria concentrations.

In October and November 2020, the City hired Source Molecular to conduct source tracking analysis to identify fecal gene biomarker for humans and/or canines at four locations within the canal. The results indicated that fecal coliform from humans was not detected or detected, but in quantities below the limit of quantification. Fecal coliform for canines had high concentrations in all samples which led the City to launch a multi-tiered outreach campaign to educate the public and encourage people to pick-up after their animals. This campaign includes advertisement on bus shelters, water bills, digital ads, and direct mailing. Educational signs have been installed in the local dog parks, parks, and along the right-of-way and reusable doggie bag dispensers and flyers were distributed to residents walking their dogs in the area as well as to local veterinarians.

and dog groomers.

In November 2020, the City retained ESciences, a third-party consultant specializing in environmental and ecological investigations, to conduct a thorough analysis of the data and investigations to date and provide a road map forward in the illicit discharge detection and elimination. Concurrently, smoke testing and CCTV inspections have also been performed to determine potential illegal cross connections between private property sewer lines and the City's stormwater system. Between June and August 2021, additional DNA source sampling was conducted to identify fecal gene biomarker for humans and/or canines at four locations within the canal and added a new fecal gene biomarker for birds. The results indicated that fecal coliform from humans was not detected or detected, but in quantities below the limit of quantification. Fecal coliform for canines continued to be detected at high concentrations, and the new biomarker for birds was also detected at high concentrations.

Staff has met with the Florida Department of Health (FDOH) and Miami-Dade County Division of Environmental Resources Management (DERM) to review the data. Their recommendation was to increase education and outreach related to residents cleaning-up after their dogs. Code Compliance Department has conducted targeted inspections in this area, focusing specifically on dog issues. In addition, another communication effort was made to inform residents in the area of the importance of picking-up after their pets.

The City also had conversations with municipalities in Monroe and Broward Counties to explore other potential solutions for reducing the high bacteria which may be further replicating in the low flow, high nutrient environment of the canal. Potential options include aeration and bubblers to increase dissolved oxygen and potential help increase water movement. These options will require environmental permits and conversation with the regulatory entities are on-going.

To date the City has spent over \$70,000 on investigations such as smoke testing, water quality sampling, contracting a third party to perform an unbiased investigation, and in performing additional cleaning and maintenance in the stormwater system.

Please contact me or Amy Knowles, Chief Resilience Officer, at amyknowles@miamibeachfl.gov with any questions regarding this study.

ATH/LS/ALK

Resolutions - R7 M

MIAMI BEACH

COMMISSION MEMORANDUM

TO: Honorable Mayor and Members of the City Commission
FROM: Alina T. Hudak, City Manager
DATE: June 22, 2022

SUBJECT: A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, APPROVING, AND WAIVING, BY 5/7TH VOTE, THE FORMAL COMPETITIVE BIDDING REQUIREMENTS, IN ACCORDANCE WITH SECTION 2-367 OF THE CITY CODE, FINDING SUCH WAIVER TO BE IN THE CITY'S BEST INTEREST, AND AUTHORIZING THE UNIVERSITY OF MIAMI TO CONDUCT WATER QUALITY CONTAMINATION RESEARCH AND ANALYSIS FOR PARKVIEW CANAL; AND FURTHER, AUTHORIZING THE CITY MANAGER TO ISSUE A PURCHASE ORDER TO THE UNIVERSITY OF MIAMI FOR THESE SERVICES, IN THE AMOUNT NOT TO EXCEED \$122,000.00, FROM THE SUSTAINABILITY AND RESILIENCY FUND.

RECOMMENDATION

The Administration recommends waiving the formal competitive bidding requirement to be in the best interest of the City of Miami Beach and authorize the University of Miami to conduct water quality contamination research, analysis, and recommend solution options for Park View canal.

The City's professional staff team working together on this item recommends approval of this item, including Amy Knowles, Chief Resilience Officer, Lindsey Precht, Assistant Director of the Environment and Sustainability Department; and Joe Gomez, PE, Director, Cristina Ortega, City Engineer, PE and Mariana Evora, PE of the Public Works Department.

Based on the foregoing, I recommend that the Mayor and City Commission of the City of Miami Beach, Florida, approve the Resolution waiving, by 5/7th vote, the formal competitive bidding requirement, in accordance with section 2-367 of the City Code, finding such waiver to be in the City's best interest, and authorizing the University of Miami to conduct water quality contamination research and analysis for Park View canal, and authorizing the City Manager to issue a purchase order to the University of Miami, in the not to exceed amount of \$122,000.00 for these services through the Sustainability and Resiliency Fund.

BACKGROUND/HISTORY

Park View kayak launch and canal water quality concerns and information have been discussed at the Land Use and Sustainability Committee.

On March 4, 2020 Jaffer Wells Drilling, a sub-contractor for Hy-Power, struck a 42-inch sanitary sewer main near the intersection of 17 Street and Lincoln Road. This event caused increased pressure throughout the sanitary system and on March 5, 2020 caused a sewer force main break at the parking lot at 72 Street and Collins Avenue. Following the break, sewage recovery and cleaning efforts began immediately and continued for approximately one week after the spill. Water quality testing began on March 6, 2020 to identify impacts to the surrounding surface waters.

Typically, following a sanitary sewer break, surrounding surface waters will continue to have high bacteria counts for a couple of days following the incident. However, high bacteria counts continued many days following the sewage break repair and further analysis of historical data indicate that this waterway has chronically elevated bacteria levels beyond those caused by the sewer break.

"No Contact Advisory" signage was posted at the kayak launch, notices were issued via the City's Neighborhood Affairs Division team, and information was posted on the City's website. The Public Works Operations Division, along with the Environment and Sustainability Department identified possible sources of cross-contamination in the area along with site specific conditions that potentially could negatively impact the area. The following were identified as potential sources of bacteria: siphon (underwater sewer pipe) between Parkview Island and 72 Street, abandoned force main from North Bay Village at 72 street, abandoned overflow from Sewer Pump Station No. 23 located at 72 Street and Abbot Avenue, human waste from homeless community or otherwise, animal waste, slow movement of water along the canal, possibly limiting "flushing" effect.

Efforts to isolate potential sewer leaks have included multiple dye tests, deep cleaning of the stormwater lines, water quality testing throughout the stormwater system, sediment sampling in the canal, CCTV inspections and smoke testing to determine potential illegal cross connections between private properties sewer lines and the City's stormwater system. The investigations performed to date have not identified any significant deficiencies within the City's public infrastructure that would explain the chronically elevated bacteria concentrations.

In October and November 2020, the City hired Source Molecular to conduct source tracking analysis to identify fecal gene biomarker for humans and/or canines at four locations within the canal. The results indicated that fecal coliform from humans was not detected or detected, but in quantities below the limit of quantification. Fecal coliform for canines had high concentrations in all samples which led the City to launch a multi-tiered outreach campaign to educate the public and encourage people to pick-up after their animals. This campaign includes advertisement on bus shelters, water bills, digital ads, and direct mailing. Educational signs have been installed in the local dog parks, parks, and along the right-of-way and reusable doggie bag dispensers and flyers were distributed to residents walking their dogs in the area as well as to local veterinarians and dog groomers.

In November 2020, the City retained ESciences, a third-party consultant specializing in environmental and ecological investigations, to conduct a thorough analysis of the data and investigations to date and provide a road map forward in the illicit discharge detection and elimination. Concurrently, smoke testing and CCTV inspections have also been performed to determine potential illegal cross connections between private property sewer lines and the City's stormwater system. Between June and August 2021, additional DNA source sampling was conducted to identify fecal gene biomarker for humans and/or canines at four locations within the canal and added a new fecal gene biomarker for birds. The results indicated that fecal coliform from humans was not detected or detected, but in quantities below the limit of quantification. Fecal coliform for canines continued to be detected at high concentrations, and the new biomarker for birds was also detected at high concentrations.

Staff has met with the Florida Department of Health (FDOH) and Miami-Dade County Division of Environmental Resources Management (DERM) to review the data. Their recommendation was to increase education and outreach related to residents cleaning-up after their dogs. To date, the Code Compliance Department has conducted 81 targeted inspections in this area, focusing specifically on dog issues. In addition, another communication effort was made to inform residents in the area of the importance of picking-up after their pets.

The City also had conversations with municipalities in Monroe and Broward Counties to explore other potential solutions for reducing the high bacteria which may be further replicating in the low flow, high nutrient environment of the canal. Potential options include aeration and bubblers to increase dissolved oxygen and potential help increase water movement. These options will require environmental permits and conversation with the regulatory entities are on-going.

To date the City has spent over \$70,000 on investigations such as smoke testing, water quality sampling, contracting a third party to perform an unbiased investigation, and in performing additional cleaning and maintenance in the stormwater system. This long-lasting issue is a concern to public health in this waterway.

ANALYSIS

The lasting high bacteria levels in Park View canal are concerning and an expert in the field of contamination in intertidal zones is necessary to develop permanent solutions. Dr. Helena Solo-Gabriele, Associate Dean, University of Miami College of Engineering, Office of Research is recognized nationally and internationally for her work evaluating microbes in water and sediments. Her area of focus is the interface between water and sediments in both rivers and in marine environments. In marine environments, her team has documented new microbial sources and mechanisms of microbe accumulation in the intertidal (or swash) zone. The traditional viewpoint of beach shore microbe contamination has been through the discharge of sewage from urban communities through ocean outfalls. Typically, ocean outfalls are designed to discharge treated sewage offshore and to optimize mixing to minimize impacts to beach waters. The studies by the U.S. Environmental Protection Agency used to develop regulations for beach water quality are conducted in areas impacted by ocean outfall discharges.

However, Dr. Solo-Gabriele's team has documented that there are other significant sources of microbes to beaches known as non-point sources. These sources include humans and animals that frequent the beach shore. Her team has documented the contributions of microbes from human bathing and from animal feces in nearshore environments. These local sources are either directly deposited on the shore or washed onshore (e.g., from human bathers) and accumulate in the intertidal sediments. Her studies have documented elevated concentrations of fecal indicator bacteria (indicate the presence of pathogens) in the nearshore sediments with hot spots in the supratidal zone, the zone at a higher elevation than the intertidal zone. In addition to work focused on fecal indicator bacteria, her team (as part of the Oceans and Human Health Center at the University of Miami) has conducted pioneering work to evaluate pathogens directly, through traditional culture and innovative molecular techniques, in beach water and sand, followed by risk assessments to suggest acceptable levels for microbes in beach sands.

As a result of the environmental studies focused on microbes in the intertidal zone, the paradigm of water quality has changed. It has changed from the traditional viewpoint of offshore sewage discharge sources towards onshore non-point sources. As a result of these studies, the World Health Organization has since added a chapter to their Recreational Beach Water Quality Guidebook which focuses on sand quality. Dr. Solo-Gabriele was a key contributor to that chapter and wrote the section the provides provisional guidelines for acceptable levels of fecal indicator bacteria in beach sands based upon non-point sources. This is the first time that regulations have been proposed globally for beach sands.

Dr. Solo-Gabriele was selected due to her extensive background in non-point source pollution and developing recommendations for permanent solutions. The final report deliverable will include the results of the sampling efforts to identify the source of the non-point source pollution. The sampling will be expanded to north and south of the kayak area, include more parameters and will be more frequent. The report will also identify recommended solutions and high-level cost estimates to implement the recommendations.

SUPPORTING SURVEY DATA

n/a

FINANCIAL INFORMATION

n/a

Amount(s)/Account(s):

\$122,000.00 in funding for this item is available in the Sustainability and Resiliency Fund, authorized by Ordinance 2016-3993 to be used for environmental restoration projects, environmental remediation projects, environmental monitoring, green infrastructure, enhanced storm water quality and quantity improvements, and sustainability planning efforts.

CONCLUSION

In order to identify sources of contamination in the Park View kayak launch and canal, it is crucial that the source(s) and solutions for the pollution be identified. Conducting expanded sampling and analysis is important to identify solutions, as testing to-date has not revealed deficiencies with the City's infrastructure. Dr. Solo-Gabriele, an expert in non-point source pollution, is well qualified to lead this analysis and recommendations.

Applicable Area

North Beach

Is this a "Residents Right to Know" item, pursuant to City Code Section 2-14?

Yes

Does this item utilize G.O. Bond Funds?

No

Strategic Connection

Environment & Infrastructure - Work regionally and nationally to protect Biscayne Bay water quality and to maintain a healthy dune and beach system.

Legislative Tracking

Environment and Sustainability

Sponsor

Sponsored by Commissioner Alex Fernandez

ATTACHMENTS:

Description

- ▣ [Resolution](#)
- ▣ [Attachment 1- UM Proposal](#)

RESOLUTION NO. _____

RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, APPROVING, AND WAIVING, BY 5/7TH VOTE, THE FORMAL COMPETITIVE BIDDING REQUIREMENTS, IN ACCORDANCE WITH SECTION 2-367 OF THE CITY CODE, FINDING SUCH WAIVER TO BE IN THE CITY'S BEST INTEREST, AND AUTHORIZING THE UNIVERSITY OF MIAMI TO CONDUCT WATER QUALITY CONTAMINATION RESEARCH AND ANALYSIS FOR PARK VIEW CANAL; AND FURTHER, AUTHORIZING THE CITY MANAGER TO ISSUE A PURCHASE ORDER TO THE UNIVERSITY OF MIAMI FOR THESE SERVICES, IN THE AMOUNT NOT TO EXCEED \$122,000.00, FROM THE SUSTAINABILITY AND RESILIENCY FUND.

WHEREAS, since 2020, the water quality at the Park View kayak launch and canal has contained chronically elevated bacteria levels for fecal coliform from canines and birds; and

WHEREAS, "No Contact Advisory" signage is posted at the kayak launch and the City has conducted a multi-tiered outreach campaign to educate the public and encourage people to pick-up after their animals; and

WHEREAS, the City's Public Works Department, along with the Environment and Sustainability Department, have conducted multiple dye tests, deep cleaning of the stormwater lines, water quality testing throughout the stormwater system, sediment sampling in the canal, Closed Circuit Television Video (CTTV) inspections and smoke testing to determine potential illegal cross connections between private properties sewer lines and the City's stormwater system; and

WHEREAS, the investigations performed to date have not identified any significant deficiencies within the City's public infrastructure that would explain the chronically elevated bacteria concentrations; and

WHEREAS, the City hired Source Molecular to conduct source tracking analysis to identify fecal gene biomarker for humans and/or canines at four locations within the canal, and the results indicated that fecal coliform from humans was detected but in quantities below the limit of quantification, while fecal coliform for canines had high concentrations in all samples; and

WHEREAS, the City retained ESciences, a third-party consultant specializing in environmental and ecological investigations, to conduct a thorough analysis of the data and investigations; and

WHEREAS, to date, the City has spent over \$70,000 on investigations such as smoke testing, water quality sampling, contracting a third party to perform an unbiased investigation, and in performing additional cleaning and maintenance in the stormwater system, and in addition, the City has procured additional Sanitary Sewer Evaluation Surveys that currently are in process; and

WHEREAS, the lasting high bacteria levels in Park View canal are concerning, and an expert in the field of contamination in intertidal zones is necessary to develop permanent solutions; and

WHEREAS, Dr. Helena Solo-Gabriele, Associate Dean, University of Miami College of Engineering, Office of Research is recognized nationally and internationally for her work evaluating microbes in water and sediments; and

WHEREAS, Dr. Solo-Gabriele is recommended to perform further analysis and develop recommendations for solutions and high-level cost estimates to implement; and

WHEREAS, the Administration recommends waiving the formal competitive bidding requirement to be in the best interest of the City of Miami Beach, and authorize Dr. Solo-Gabriele and the University of Miami to conduct water quality contamination research, analysis, and recommend solution options for Park View canal; and

WHEREAS, approximately \$122,000.00 in funding for this item is available in the Sustainability and Resiliency Fund, authorized by Ordinance No. 2016-3993 to be used for environmental restoration projects, environmental remediation projects, environmental monitoring, green infrastructure, enhanced storm water quality and quantity improvements, and sustainability planning efforts.

NOW, THEREFORE, BE IT DULY RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, that the Mayor and City Commission hereby approve, and waive, by 5/7th vote, the formal competitive bidding requirements, in accordance with Section 2-367 of the City Code, finding such waiver to be in the City's best interest, and authorize the University of Miami to conduct water quality contamination research and analysis for Park View Canal; and further, authorize the City Manager to issue a purchase order to the University of Miami for these services, in the amount not to exceed \$122,000.00, from the Sustainability And Resiliency Fund.

PASSED and ADOPTED this ____ day of _____.

ATTEST:

Dan Gelber, Mayor

Rafael E. Granado, City Clerk

APPROVED AS TO
FORM & LANGUAGE
& FOR EXECUTION

City Attorney

6-6-22

Date

UNIVERSITY OF MIAMI
COLLEGE of ENGINEERING



Helena Solo-Gabriele, Ph.D. P.E.
Professor and Assoc. Dean
Chemical, Environmental, Materials
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RE: Proposal titled, "Sources of Enterococci to an the Kayak Launch Area in Miami Beach"

Date: June 1, 2022

To: Lindsey Precht, c/o City of Miami Beach Team Cristina Ortega, Amy Knowles, Joe Gomez, Mariana Evora, Giancarlo Pena

From: Helena Solo-Gabriele, Professor, University of Miami, College of Engineering

Re: Project titled: Sources of Enterococci to an the Kayak Launch Area in Miami Beach

Thank you for meeting with me on March 17, 2022 and for sharing the data files that document the fecal indicator bacteria (enterococci and fecal coliform) in the waters near the Kayak Launch in Miami Beach. Also thank you for meeting with me again on April 29 to provide feedback on the proposal that was submitted. From the data files, it is apparent that a lot of work has been done which provides considerable insight into the potential sources. Below is an overall assessment and recommendation for further evaluation. I have also included an appendix where I describe my thoughts on the information contained in the various folders that were shared with me. There are additional recommendations listed in the appendix.

Overall Assessment

The canal water at the Kayak Launch (GPS: 25° 51' 31.20" N. 80° 07' 33.00" W) located in Miami Beach near 73 Street and Dickens Avenue (Figure 1) is chronically elevated with fecal indicator bacteria. This is observed for both enterococci and fecal coliform, although enterococci are more elevated. In sanitary sewage, the opposite holds true, where fecal coliform is typically at levels of 10^6 MPN per 100 mL whereas enterococci is typically at levels of 10^5 per 100 mL (Roca et al. 2019). So, the fact that enterococci is higher than fecal coliform leads me to believe that there may be differential die-off or regrowth of enterococci in the environment. Regrowth has been documented to occur in shallow sediment side slopes of water bodies in areas characterized by high organic matter and shade (Solo-Gabriele et al. 2000, Desmarais et al. 2002). On the eastern bank of the Kayak Launch area are mangroves which are known to retain soils with high organic content and which also provide shade. I recommend investigating the sediments that are tidally influenced (in the intertidal zone) for levels of enterococci.

I therefore recommend a phased approach. Below is a breakdown of the first phase.

Phase 1a, Further evaluation of bacteria data already collected against environmental data.

Although a considerable amount of data was collected through the City of Miami Beach, a thorough environmental analysis to evaluate correlations with tidal height and weather events was not found in the

documents provided. This work should be conducted with the bacteria data that has already been collected to determine whether associations exist between environmental factors and enterococci and fecal coliform levels.

Phase 1b, Evaluation of sediments as possible sources.

The data collected through the City of Miami Beach to date are consistent with a potential sediment source of fecal indicator bacteria. The sediments should be evaluated for enterococci levels including sediments along the canal banks (under the mangrove area) and sediments within the storm sewer system. Samples should be collected at low tide from the intertidal zone. Sediments should be analyzed for moisture content and percent volatiles, as these factors may influence the ability of bacteria to persist and possibly regrow in the sediments.

Phase 1c, Intense spatial sampling.

To further isolate the location of the hot spot in the Kayak Launch area, a spatially intense sample collection program is recommended. The program is to include a series of transects that cut across the canal at locations of interest to the north and south of the Kayak Launch area. The spatially intense sampling should be conducted at extreme high tide and at extreme low tide, with all samples collected as quickly as possible to get a snapshot of the enterococci distribution. A possible design of the spatially intense sampling program is illustrated in Figure 2. Samples would be analyzed for basic physical chemical parameters (including dissolved oxygen) plus enterococci by Enterolert.

Phase 1d, Intense temporal sampling.

Some prior efforts have been completed to collect bacteria data on a daily basis and also several times per day. The results show that the enterococci levels are highly variable between days and between fractions of a day. The lack of trends indicates that the temporal time scale of sampling is too coarse. There is a need to collect samples from one location over shorter time scales. I recommend the installation of an autosampler at the Kayak station (in an enclosure to avoid vandalism) which collects samples every hour over the course of several days. Samples should be collected 2 times per day (once every twelve hours) in individual pre-sterilized containers. Depending upon the results from Phase 1c, an additional site may be set up at an identified hotspot location (e.g., OT-1) which showed extremely high levels of enterococci in prior studies.

Future beyond Phase 1

Future potential work beyond Phase 1 can include, for example, evaluating unregulated outfalls for possible sources of fecal indicator bacteria.

Estimated Budget

This work is to be initiated on July 1, 2022 and end on October 31, 2022. In order to fast track this study, Phases 1a, 1b, and 1c will be initiated immediately. We will also initiate the process of coordinating the building of the enclosure and nozzle system for Phase 1d. The results from 1c (Intense spatial sampling) will guide the placement of the autosampler system for 1d (intense temporal sampling). The rough budget for a project is as follows.

Description	Amount
Time for Helena Solo-Gabriele, direct and fringe	\$24,290
PhD Student Time (3 months full-time), salary	\$9,000
Research Associate Time (3 months full-time), salary & fringe	\$19,035
Undergraduate Researchers (2 students)	\$11,440
Supplies (includes 300 samples for enterococci)	\$15,298
Administrative Costs	\$42,937
Total	\$122,000

Assumes that City of Miami Beach will provide boat access and construct enclosure and nozzle system for autosampler. University of Miami team will provide examples and design guidance for the enclosure/nozzle system.

Deliverables

The team will host a kick-off meeting to get input and feedback from the City of Miami Beach concerning the planned approach. This meeting will be via Zoom and/or in person.

Reports will be provided monthly. These reporting schedule is as follows.

- Progress Report 1: Due date, July 31, 2022
- Progress Report 2: Due date, August 31, 2022
- Progress Report 3: Due date, September 310, 2022
- Final Report: Due date, October 31, 2022. The final report will include the results of the sampling efforts and work to identify the source of the non-point source pollution. The report will also identify recommended solutions and high-level cost estimates to implement said recommendations.

The University of Miami team will be prepared to meet with the City of Miami Beach every other week to provide updates on the study, to explain the contents of the reports, and to obtain feedback and recommendations from the City.

Timeline

Task Descriptions	July				August				September				October			
Week number	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Kick off meeting and field visit		X														
Phase 1a, Environmental Data Assess	X	X	X	X	X	X	X									
Phase 1b, Sediments			X	X	X	X	X	X								
Phase 1c, Spatial Sampling			X	X	X	X	X	X	X	X	X	X	X	X		
Phase 1d, Temporal Sampling						X	X	X	X	X	X	X	X	X	X	
Bi-weekly Meetings		X		X		X		X		X		X		X		X
Progress and Final Reports				X				X				X				X

References

- Roca, M. A., Brown, R., Solo-Gabriele, H. M. 2019. Fecal indicator bacteria levels at beaches in the Florida Keys after Hurricane Irma. Marine Pollution Bulletin, 138, 266-273. <http://doi.org/10.1016/j.marpolbul.2018.09.036>
- Desmarais, T.R., Solo-Gabriele, H.M., and Palmer, C.J., 2002. Influence of Soil on Fecal Indicator Organisms in a Tidally Influenced Subtropical Environment. Applied and Environmental Microbiology, 68(3): 1165-1172. <http://dx.doi.org/10.1128/AEM.68.3.1165-1172.2002>
- Solo-Gabriele, H., Wolfert, M, Desmarais, T., and Palmer, C., 2000. Sources of E.coli to a Sub-Tropical Coastal Environment. Applied and Environmental Microbiology, 66(1): 230-237. <http://dx.doi.org/10.1128/AEM.66.1.230-237.2000>

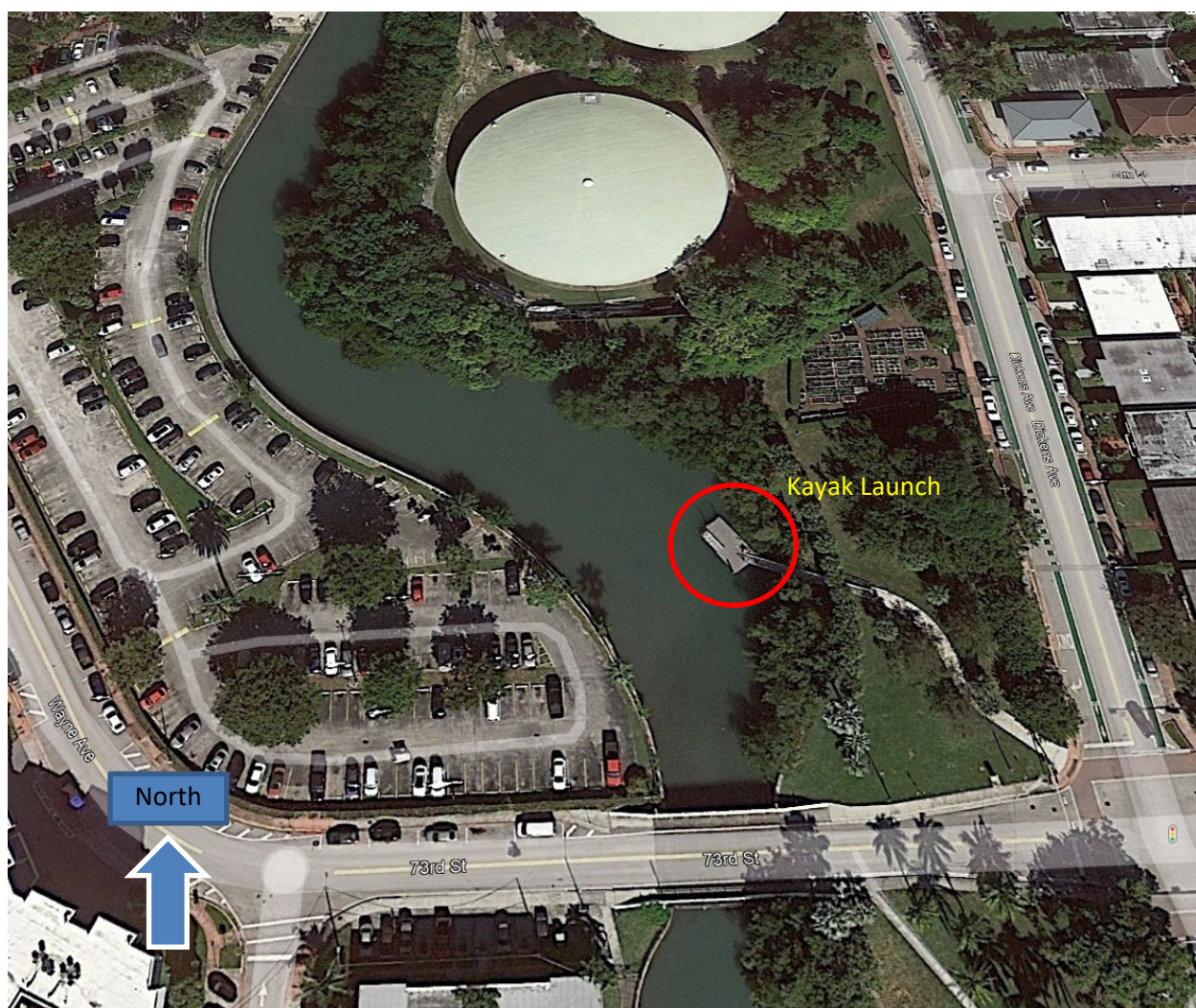


Figure 1: Location of Kayak Launch (25° 51' 31.20" N. 80° 07' 33.00" W), near 73 Street and Dickens Avenue Miami Beach, FL. Basemap from Google Earth.

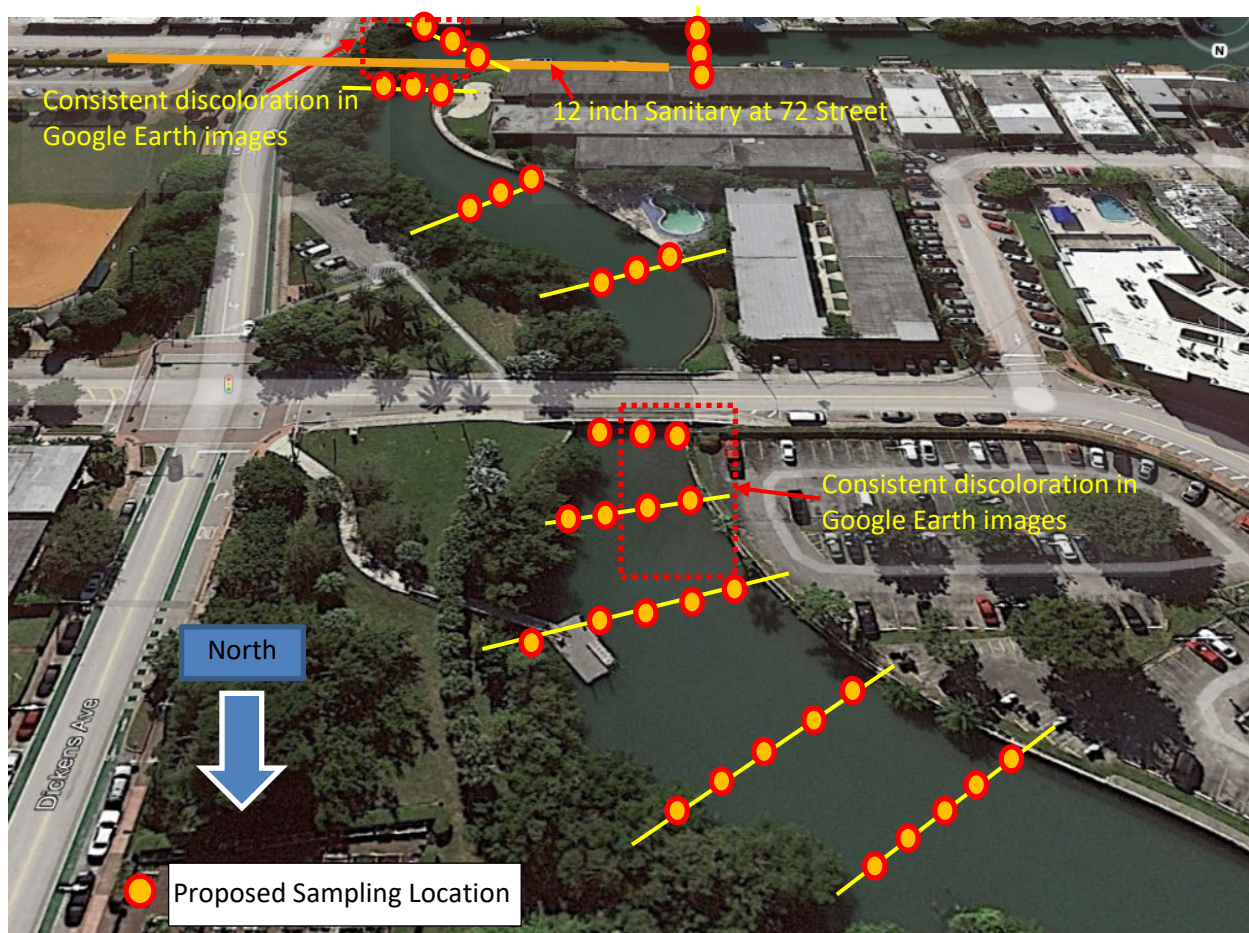


Figure 2: Potential Sample Collection Program for Phase 1c, to evaluate the spatial distribution of enterococci. Conduct sampling at low tide and high tide. Run either 1:10 to 1:100 dilutions using Enterolert.