IN THE CIRCUIT COURT OF THE ELEVENTH JUDICIAL CIRCUIT
OF FLORIDA IN AND FOR THE COUNTY OF MIAMI-DADE

FINAL REPORT
OF THE
MIAMI-DADE COUNTY GRAND JURY

FALL TERM A.D. 2018

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THE HEALTH OF BISCAYNE BAY:
WATER FLOWS AND WATER WOES

I. INTRODUCTION

Water is essential for human life. Up to 60 percent of the human body of an adult is comprised of water. The brain and heart are 73 percent water. Lungs are 83 percent water. The skin is 64 percent water. Muscles and kidneys are 79 percent water, while bones are 31 percent.[1] Water also serves a number of essential functions within the human organism. It is a vital building material in every cell in our bodies. Through the processes of respiration and sweating, water regulates our internal body temperature. Water forms saliva, which assists in the digestive process. The carbohydrates and proteins that our bodies use as food are metabolized and transported by water in the bloodstream. Water assists in flushing waste from our bodies through urination. Water acts as a shock absorber for our brain and our spinal cord, and it also lubricates our joints.[2]

To survive, humans must consume a certain amount of water each day, depending upon age, gender, and where one lives. Generally, an adult male needs about 3.2 quarts of water a day, while an adult female needs about 2.3 quarts of water a day. Some of this water comes from food, but much of it is taken in through drinking fluids, including water.[3] While humans may go up to three weeks without food, they can only survive for three or four days without water.

Not only is water essential for individuals to survive, but in South Florida, water is just as essential for our way of life. The main economic engine which drives the economy in South Florida is tourism. In 2018, Greater Miami had a record number of 16.5 million overnight visitors.[4] These visitors spent almost $18 billion dollars in Greater Miami.[5] Eighty-four percent of the international tourists and seventy-two percent of the domestic tourists came for vacation or pleasure.[6] The importance of the quality of our water to our economy is reflected in the fact that

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[1] The Chemical Composition of The Adult Human Body And Its Bearing On The Biochemistry Of Growth, by H. H. Mitchell, T. S. Hamilton, F. R. Steggerda, and H. W. Bean, Journal of Biological Chemistry, 1945, 158:625-637.
[2] United States Geological Survey (U.S.G.S.), Water Science School, The Water in You: Water and the Human Body; available at https://www.usgs.gov/special-topic/water-science-school/science/water-you-water-and-human-body?qt-science_center_objects=0#qt-science_center_objects
[3] *Ibid.*
[4] Greater Miami and the Beaches, 2018 Visitor Industry Overview, presented by the Greater Miami Convention & Visitors Bureau, at page 7.
[5] *Ibid*, at page 39.
[6] *Ibid*, at page 14.

our beaches were the most popular destinations for tourists to visit. In fact, fifty-three percent of our international tourists and forty-four percent of our domestic tourists visited a beach during their stay in Greater Miami.[7] Both the international visitors and the domestic visitors reported that our beaches were the "most liked" feature of their visit.[8]

Florida is the southeasternmost state in our nation, and South Florida is located at the southeasternmost corner of our peninsula. We are located in a subtropical climate, between the Atlantic Ocean and the Florida Everglades. Our community sprang forth from a settlement along the Miami River, and expanded west toward the Everglades, and east, across Biscayne Bay, to the barrier islands. Biscayne Bay sits as the crown jewel of our environment. Biscayne Bay is an estuary where freshwater from the mainland mixes with saltwater from the Atlantic Ocean. It is a source of numerous recreational and commercial activities, including boating, fishing, cruising, diving, and sightseeing. Clearly, the health and cleanliness of Biscayne Bay is vital to our community and to our economy.

However, Biscayne Bay is now in a precarious balance. The State of Florida has designated some portions of Biscayne Bay's waterways as "impaired". There are three (3) major problems that are contributing to the State's "impaired" designation and negatively impacting the water quality of Biscayne Bay:

1. Sewage contamination, which results in excessive amounts of harmful bacteria;
2. The presence of excess nutrients, which results in destructive algal blooms; and
3. Pollution and littering, which result in massive amounts of trash being discharged into the bay via our storm drainage system.

As a result of these three factors Biscayne Bay is at a tipping point. Without corrective action, the declining quality of this body of water may become irreversible.

II. SEWAGE CONTAMINATION

The Miami-Dade Water and Sewer Department (hereinafter MDWSD) has two main responsibilities. First, the Department is responsible for supplying freshwater to its customers, the residents and businesses in Miami-Dade County. To accomplish this goal MDWSD operates and

[7] *Ibid*, at page 23.
[8] *Ibid*, at page 31.

maintains 3 large regional water treatment plants, 5 small water treatment plants, and the Hialeah Reverse Osmosis Water Treatment Plant (hereinafter WTP). Using 8,500 miles of pipe MDWSD supplies an average of 320 million gallons of water a day to its 450,000 retail and 15 wholesale customers.

MDWSD's second responsibility is to treat and dispose of all wastewater in Miami-Dade County. Wastewater is generated by both residential (single-family residences and apartment buildings) and commercial (office buildings, businesses, shopping centers, and restaurants) sources. Wastewater from these settings primarily originates from water use associated with bathrooms (toilets, sinks, and showers), laundries (washing machines and sinks), kitchens (sinks and garbage disposals), and general cleaning (utility sinks). Industrial, manufacturing, and institutional facilities also generate wastewater that has to be disposed of.

To treat and dispose of all of the wastewater in Miami-Dade County, MDWSD operates three (3) wastewater treatment plants, which collect, treat, and dispose of 300 million gallons of wastewater a day. This equates to approximately 120 gallons per day for every resident of Miami-Dade County. The wastewater system is comprised of a labyrinth of 6,500 miles of main pipes and laterals, as well as over a thousand sewer pump stations which keep the flow of wastewater moving. The three large wastewater treatment facilities are: 1) the North District WTP, located at Florida International University North; 2) the Central District WTP, located at Key Biscayne/Virginia Key; and 3) the South District WTP, located at Black Point Marina. The Central District WTP processes the highest volume of wastewater.

There are three main steps to treating wastewater. The primary process consists of removing grit such as sticks, rocks, toilet wipes, paper towels, feces, and other hard debris. In the secondary process, microbes are utilized. These microbes, when exposed to oxygen, serve to kill organic material. The final process involves the addition of chlorine.

Once treated, wastewater from the three treatment plants – which is referred to as effluent – is disposed of in one of two different ways; deep injection wells or ocean outfall. The deep injection well process involves injecting the effluent deep underground. *All* of the effluent from the South District WTP and *some* of the effluent from the North District WTP is disposed of via deep injection.

A. Direct Discharge of Sewage (Wastewater) Into the Ocean

The second way for the disposing of wastewater is ocean outfall. Ocean outfall involves the discharge of effluent three (3) miles offshore into the Gulfstream Current in the Atlantic Ocean in 100 foot deep water through 96-inch pipes which lie on the bottom of Biscayne Bay. *All* of the effluent from the Central District WTP – which has the highest volume – and *some* of the effluent from the North District WTP is disposed of in this manner. The average **daily** amount of effluent disposed of via the ocean outfall pipe from the Central District WTP on Key Biscayne/Virginia Key is 143 million gallons of sewage a day.[9]

While we were told that ninety-six (96) percent of this effluent goes into the ocean and is swept away from our coast, we were also told that there is a four (4) percent chance that some of it will return to our coast. The idea that our wastewater, whether treated or not, is being pumped into our most valuable resource, our ocean and Bay, is extremely troubling. We were happy to hear that legislation enacted in 2008 mandates that by the year 2025 the Miami-Dade Water and Sewer Department will no longer be able to dispose of wastewater via the ocean outfall process. In 2025 there will be a permanent ban on dumping treated sewage directly into our waterways. We implore all parties to make sure that other disposal processes will be created and will be in place to ensure strict compliance with the impending timeline.

B. Leaking Sewer Pipes

In addition to the sewage and wastewater that is intentionally being discharged into the Atlantic Ocean, this Grand Jury discovered that leaking, broken and busted sewer pipes have contributed to the spilling of millions of gallons of sewage directly into Biscayne Bay. Significant portions of the 6,500 miles of main pipes and laterals in the MDWSD wastewater system are old, and in need of replacement. MDWSD is supposed to assess and make repairs to the entire system of pipes on a ten (10) year cycle. However, we heard testimony that approximately half of the water being treated at the wastewater treatment facilities is mostly groundwater that has seeped into, and actually intruded into the wastewater system through leaks and cracks in the sewer pipes.

A plethora of media accounts over the past several years reveal the poor condition of the pipes and demonstrates how frequently significant breaks in our sewage system cause thousands

[9] https://www.miamiherald.com/news/local/environment/article164655777.html

of gallons of raw sewage to pour into our Bay. On a summer evening in 2010, a break in a 72-inch (6 foot) sewer line at N.W. 18th Avenue and 157th Street caused a spill that lasted for about twelve (12) hours before it was stopped. During those twelve (12) hours, roughly 20 million gallons of sewage spilled into the Biscayne Canal. The Biscayne Canal empties into Biscayne Bay in the Miami Shores area. The day after the break in the 6-foot sewer line, health officials issued an advisory regarding sewage contamination in Biscayne Bay. The advisory affected the area from Oleta River State Park, near the rupture point, south to the Julia Tuttle Causeway, including Bal Harbour Beach and Haulover Park. People were advised to avoid all swimming and recreational activities in the area.[10]

An article in the Palm Beach Post from 2012 started by stating that "Miami-Dade County's antiquated sewer system has ruptured at least 65 times over the past two years, spewing more than 47 million gallons of untreated human waste into waterways and streets from rural South Miami-Dade to the ritzy condos of Brickell Avenue to the Broward County Border."[11] The article stated that many of the leaks were relatively minor, posing minimal public health concerns, but that at least eight (8) leaks topped 100,000 gallons. Six other leaks released more than a million gallons of raw sewage "from rusted valves or cracked concrete-and-steel pipes that county engineers acknowledge had long out-lived their intended life span."[12]

Between October and December of 2011, four (4) separate sewage system failures sent a total of more than 19 million gallons spilling from the Central District Wastewater Treatment Plant.[13] One of those spills, on October 9, 2011, spilled 17 million gallons of raw sewage.[14] Three weeks later, on October 31, 2011, as operators shifted from a generator to the power grid there was a power outage. That power outage caused another million gallons of partially treated sewage to spill out of a relief valve directly into Biscayne Bay. Again, Miami-Dade County was forced to issue a "no-swimming" advisory for the affected areas.

Miami-Dade County has two (2) 96-inch ocean outfall pipes that transport sewage directly out and into the Atlantic Ocean. The two (2) ocean outfall pipes in Miami-Dade County were

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[10] https://www.sun-sentinel.com/news/fl-xpm-2010-06-20-fl-biscayne-bay-sewage-062110-20100620-story.html
[11] https://www.palmbeachpost.com/article/20120515/NEWS/812032210
[12] *Ibid.*
[13] *Ibid.*
[14] *Ibid.*

constructed in 1956 and 1975.[15] One of the 96-inch ocean outfall pipes, the one from the Central District WTP located at Key Biscayne/Virginia Key, was leaking sewage in shallow water within one mile of Fisher Island.[16] Although the pipe was repaired in the summer of 2017, it was reported that the pipe had been leaking for at least a year. A lobster fisherman purportedly reported the broken ocean outfall pipe to MDWSD officials in August of 2016.[17]

We discovered during our investigation that what might start out as a relatively small or insignificant problem in the sewage system could still have a major impact upon Biscayne Bay. For instance, in August of 2018, a faulty grease trap at a local restaurant caused a sewage leak. The restaurant located near the 1800 block of the John F. Kennedy Causeway (N.E. 79th Street) on Treasure Island in North Bay Village, for all intents and purposes, sits on a small island in the middle of Biscayne Bay, between the mainland and Miami Beach. Because of the restaurant's location when the grease trap malfunctioned the resultant sewage spill poured directly into Biscayne Bay. North Bay Village had to call in Miami-Dade County's Department of Environmental Resources Management to help contain the spill.[18]

This past October, during a routine daily inspection of the pump stations on the City of Miami Beach, city inspectors discovered cracks in a wastewater pipe under the bridge to La Gorce Island. Though the leak lasted less than sixteen (16) hours, the inspectors believe that during that time approximately 800 gallons of raw sewage leaked out of the pipe and directly into Biscayne Bay.[19]

On Tuesday, December 4th, 2018, during the week of Art Basel, which brings thousands of visitors and millions of dollars into our community, a construction contractor broke a 16-inch sewage pipe, spilling just over 9,200 gallons of wastewater at the corner of N.E. 2nd Avenue and 30th Street. Much of the wastewater went into storm drains that flush directly into Biscayne Bay. While the spotlight of the annual world renown Art Basel was beginning to shine upon our community once again, officials had to issue warnings against swimming, boating, or fishing in waters between the Venetian Causeway and the Julia Tuttle Causeway. Two days later the

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[15] https://www.miamiherald.com/news/local/environment/article164655777.html
[16] *Ibid.*
[17] *Ibid.*
[18] https://www.local10.com/news/florida/miami-dade/sewage-leaking-into-biscayne-bay-near-north-bay-village
[19] https://www.miaminewtimes.com/news/biscayne-bay-polluted-by-800-gallons-of-poop-from-miami-beach-city-says-10926772

warnings were lifted, after water testing showed no elevated levels of pollution from the sewage spill.[20]

In November of 2018 there was a power outage at the North District Wastewater Treatment Plant. As the pumps were not operating, hundreds of thousands of gallons of treated wastewater was released into the Oleta River, which runs directly into Biscayne Bay.

Finally, on Super Bowl Sunday, February 3, 2019, three (3) pumps in a pump station that serves the North District WTP became clogged. As a result, over about a twelve-hour period approximately 750,000 gallons of untreated wastewater backed up in the facility and spilled into the storm drain system. That untreated wastewater subsequently flowed into the Oleta River, and ultimately into Biscayne Bay.[21] The Miami-Dade Water and Sewer Department once again issued a precautionary advisory against swimming, fishing, or boating in the area bounded by N.E. 163rd Street to the north, Haulover Inlet, including Haulover Beach, to the south; the Intracoastal Waterway to the east, and mainland Miami-Dade County to the west. This also included beaches in Bal Barbour and Oleta River State Park.[22] Fortunately, the Super Bowl was not in Miami-Dade County this year.

Very often, these breaches in the wastewater sewage system result in the issuance of a public health advisory, such that beaches are closed and residents and visitors are told not to swim or engage in other recreational activities in Biscayne Bay or the Atlantic Ocean. Not only are these spills harmful to the physical health of our residents and visitors, but they also have a direct negative impact upon the health of our economy. We believe the negative publicity from these events scares away international and domestic visitors who are so essential to our economy.

We discovered during this investigation that Miami-Dade County is under a 2014 federal court order to repair its aging wastewater sewer system as part of a $1.6 billion-dollar consent decree. While there have been significant advancements in replacement and repairs to the aging sewer pipes, we urge the Miami-Dade Water and Sewer Department to continue to modernize its infrastructure as expeditiously as possible, without sacrificing the quality of work. We urge our

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[20] https://www.miamiherald.com/news/local/environment/article222662665.html
[21] https://www.newsweek.com/florida-officials-dont-swim-fish-after-mechanical-failure-pump-station-1317007
[22] *Ibid.*

elected officials and county staff to be ever vigilant in assessing the system and the employees that maintain it.

III. HARD DEBRIS: TRASH FLOWING INTO OUR WATERWAYS

As the population of South Florida increased and moved west, a series of canals were constructed to drain land for development and to control flooding. After there was catastrophic flooding from Lake Okeechobee caused by severe hurricanes in 1926 and 1928, the Army Corps of Engineers built a dike around Lake Okeechobee. Additional flooding in 1947 led to the construction of an unprecedented number of canals throughout South Florida, regionally and locally. To control flooding, during periods of heavy rainfall, freshwater from the Everglades is moved east, via the canals. The water which courses through these canals also carries many other materials, including a significant amount of debris. Plastics, glass, and other trash are often found floating in the canals. Why is this a problem?

Our stormwater drainage system in South Florida ultimately discharges into Biscayne Bay. Although most of our stormwater drains flow toward the canal systems, and then into the Bay, some stormwater drains flow directly into the Bay. Accordingly, all of the items we see by the side of the road, including plastic shopping bags, plastic water bottles, paper items, aluminum cans, Styrofoam, plastic straws, food containers, and other organic and inorganic trash and waste products, are often washed into our stormwater drains. From there, eventually those items will find their way into the Bay. Whenever someone decides to throw trash out of a moving car, they need to consider the fact that there is a significant likelihood that the piece of trash that they are throwing out of their window will end up in Biscayne Bay. It is estimated that eighty percent (80%) of the marine debris in Biscayne Bay comes from land-based sources, including litter washed into the Bay through the stormwater system.

A. Clean Up Efforts

As a direct result of the massive littering, various individuals and community groups participate in various cleanup activities to clean Biscayne Bay. *Baynanza* is a celebration of Biscayne Bay and a recognition of its significance as one of our most important ecological systems in South Florida. While *Baynanza* includes numerous events over a period of several weeks, the Biscayne Bay Cleanup Day has become a primary event. Government partners for this event include Miami-Dade County, the City of Miami and the City of Miami Beach. Biscayne National

Park, numerous corporate partners, as well as non-profits, environmental groups, and other community groups also participate in this worthwhile event.

Many of these groups not only participate in Biscayne Bay Cleanup Day in conjunction with *Baynanza*, but also conduct and sponsor regular cleanups of Biscayne Bay and its shoreline. One such group is VolunteerCleanup.org. VolunteerCleanup.org conducts regular cleanups of numerous areas in and around Biscayne Bay.

One such area that VolunteerCleanup.org cleans on a regular basis is Albert Pallot Park. Albert Pallot Park is a three (3) acre park that is located on the western shore of Biscayne Bay, between N.E. 38th and 39th Street, just north of the Julia Tuttle Causeway (State Road 112), in the Buena Vista neighborhood. It is just a couple of blocks to the east of the Miami Design District. Large quantities of marine debris build up along the shoreline of Albert Pallot Park on a regular basis. Cleanups along the shoreline of the park can typically net 300 to 400 pounds of plastic trash. VolunteerCleanup.org typically performs such cleanups monthly. The fact that this park gets so much trash along its shoreline appears to be due to the location of the shoreline of Albert Pallot Park. The park is located on the western edge of Biscayne Bay, and just north of the Julia Tuttle Causeway. Due to the currents and the structure of the land mass at that location, the trash which floats into the area and washes up onto the shore appears to have nowhere else to go.

Margaret Pace Park is an eight (8) acre park that is located at 1745 North Bayshore Drive. It runs along Biscayne Bay from N.E. 17th Terrace to N.E. 20th Street. It is a City of Miami Park. It contains a dog park, basketball court, playground, volleyball courts, tennis courts, and paved walking paths. A lot of marine debris also builds up along the shoreline of Margaret Pace Park. Monthly cleanups of Margaret Pace Park typically also net 300 to 400 pounds of plastic trash.

As one drives along the MacArthur Causeway (State Road A1A) between Miami and Miami Beach, there are beautiful vistas on both sides. To the south, magnificent cruise ships at dock at PortMiami, the largest passenger port in the world. To the north, beautiful multimillion-dollar waterfront homes dot the landscape on Palm Island, Hibiscus Island, and Star Island. Both of these views are framed by the beautiful shimmering waters of Biscayne Bay. This iconic drive has been depicted in many movies and television series. However, if one were to pull over to the side of the road and climb over the protective concrete guardrail, one would see significant

amounts of trash washed up on the shore. A recent cleanup along the shoreline of the MacArthur Causeway (across from Star Island) netted over a thousand (1,000) pounds of trash.

We are making several recommendations to reduce the trash in Biscayne Bay. The first recommendation, which is very basic but still needs to be repeated and emphasized, is that everyone needs to be educated as to what the ultimate impact of littering has upon not only the area where the trash was thrown, but also on Biscayne Bay. It seems that sometimes it takes children to remind adults not to improperly dispose of trash, so apparently the message is getting through to children. A continuous series of public service announcements should be undertaken through radio, television, and social media reminding people of the proper ways to dispose of trash, and – just as importantly – the improper ways not to. We further recommend that signage to this effect also be posted in public places such as in parks and on public transportation.

Many storm drains on the side of the road do not have effective gratings over them. Proper gratings would prevent a significant amount of trash and waste products from entering the stormwater drainage system. However, that would mean that these items would remain on the exteriors of the storm drains. So to be effective, these storm drain gratings would have to be cleaned on a regular schedule. Grates have been installed on all storm drains in the City of Aventura, to block debris from entering into the drainage system. Consequently, the quality of the water emptying into the intra-coastal waterways in that area has improved.[23] We recommend that Miami-Dade County and all of the municipalities in Miami-Dade County do the same.

There are additional devices that can be utilized to capture debris which does make its way into the stormwater drainage system. Items can be trapped by these screening devices to prevent them from getting into the canal system and into Biscayne Bay. Of course, this will also necessitate a regular schedule of frequent cleanings of this filtration system. We recommend the implementation of such a system, as well as more frequent cleaning of the stormwater drainage system.

B. Plastics

"Single use" plastics make up the vast majority of the trash which is contained in the stormwater drainage system, the canals, and Biscayne Bay. The most identifiable and common

[23] https://www.cityofaventura.com/191/Flood-Protection

"single use" plastics are plastic bottles and plastic bags. Plastic is ubiquitous in our daily lives. From the moment that we awake, there is barely a function that we do that does not involve plastic. We brush our teeth with plastic toothbrushes utilizing toothpaste that is squeezed from a plastic tube. We sit on plastic toilet seats and use shampoo that comes from plastic bottles. Our orange juice is packaged in plastic, as is our coffee, our cereal, our bread, our eggs, our bacon, and our cheese. And it is barely 7:00 A.M. The rest of our day is the same, filled with plastic, much of it "single use". But it was not always that way.

World War II necessitated a great expansion of the plastics industry in the United States.[24] The need to preserve scarce natural resources made the production of synthetic alternatives comprised of plastic a priority. Nylon, which was invented in 1935 as a synthetic silk, was used during the war for parachutes, ropes, body armor, and helmet liners.[25] Plexiglas provided an alternative to glass for aircraft windows.[26] During World War II plastic production in the United States increased by 300%.[27]

Disposable plastic utensils became popular with Americans in the 1960s. Plastic water bottles were invented in 1973. In the late 1970s and early 1980s, plastic bags were introduced, to address concerns about the number of trees which were being cut down in order to produce paper bags, which at that time, were in common use. We were informed that it takes between *500 and 1,000* years for a plastic bottle or a plastic bag to fully degrade. That means that essentially every plastic bottle or bag that has ever been produced still exists on this planet in some form. To highlight this problem, the Grand Jury received information that in the middle of the Pacific Ocean is an area that has become known as the Great Pacific Garbage Patch. It is comprised of plastics in various states of degradation, and is said to cover an area twice the size of Texas. It is now believed that there are 5.25 trillion pieces of plastic debris in the ocean. At least two thirds of the world's fish stocks are suffering from plastic ingestion and 100,000 marine creatures a year die from plastic entanglement and these are the ones found.[28]

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[24] Conflicts in Chemistry: The Case of Plastics, The History and Future of Plastics, What Are Plastics, and Where do They Come From?, Science History Institute; available at https://www.sciencehistory.org/the-history-and-future-of-plastics
[25] *Ibid.*
[26] *Ibid.*
[27] *Ibid.*
[28] http://oceancrusaders.org/plastic-crusades/plastic-statistics/

Reducing the use of single use plastics should be a priority for every individual, every company, and every entity of government, from the municipality to the nations of the world. One such way to affect this reduction is through the implementation of a recycling program for single use plastics such as bottles and bags. Numerous states have already seen success with such programs for many years. A recycling program is fairly easy to implement and is quite effective.

A recycling program for plastic bottles (such as water bottles) and plastic bags (such as those utilized by grocery stores) could work as follows. The consumer would be charged a nominal returnable fee for each plastic bottle that he or she purchases. The fee could be approximately five or ten cents per bottle. Accordingly, if the consumer buys a single bottle, such as one might buy at a convenience store or a restaurant, the fee would only be five or ten cents. If the consumer buys a case of water which consists of twenty-four (24) bottles, the fee would be $1.20 or $2.40, depending upon if the fee were five or ten cents. If the case of water consists of forty (40) bottles, the fee would be $2.00 or $4.00, depending upon if the fee were five or ten cents. Upon the consumer returning the empty bottles to any authorized retailer which sells such plastic bottles, the fee for each bottle would immediately be refunded to him or her in cash. If the consumer had bought a bottle of water at a restaurant to drink with their meal, when they were done eating and turned back in their bottle they would immediately be refunded back the fee. Many years ago, such a program was in effect in Florida for certain glass bottles (prior to the implementation of plastic soft drink bottles in the 1990s, soda bottles were all glass).

It has been reported that shoppers worldwide are using approximately 500 **billion** single-use plastic bags per year.[29] Some stores do not provide free bags for their shoppers. Two (2) states (California and Hawaii) have banned plastic bags on a statewide level; 4 U.S. states (Delaware, Maine, Rhode Island and New York) have mandatory recycling or reuse programs in place; and 200 U.S. municipalities have banned or taxed plastic bags. Globally, plastic bags are banned in 32 countries, 18 of which are in Africa[30] Unfortunately for us, Florida was one of 10 U.S. states (AZ, FL, IA, ID, IN, MI, MN, MO, MS, WI) which has placed preemptive bans on banning plastic bags.[31]

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[29] Id.
[30] https://www.reusethisbag.com/articles/where-are-plastic-bags-banned-around-the-world/
[31] Id.

Notwithstanding the statutes, in 2017 the City of Coral Gables passed an Ordinance prohibiting the use or distribution of single use plastic bags at City special events and prohibited vendors within the city from giving out single use plastic bags. Following passage of the ordinance the City of Coral Gables was sued by the Florida Retail Federation Incorporated which claimed the Florida statutes precluded the city from passing such an ordinance. The court found the statutes unconstitutional and entered a final order to that affect. Coral Gables' ordinance is still in effect. We believe the town of Palm Beach, Florida has become the most recent municipality to say goodbye to single-use plastic bags and polystyrene containers. Their ordinance, which takes effect December 12, 2019 applies to restaurants, drug stores, grocery stores, gas stations and vending trucks or carts. It also applies to individuals or groups who hold a special permit for events on town property.[32] We are hopeful that our state will get onboard with this effort and are pleased to report that during this past legislative session a Senate Bill was filed which provided, "A store or a food service business may not provide a carryout bag made of plastic film to a customer". That Bill "died in committee." This Grand Jury recommends that the Florida Legislature make it a major goal to pass such a bill during its next legislative session.

Alternatively, implementing a recycling program for plastic grocery bags would give consumers a choice. Consumers could choose to use their own lightweight but heavy-duty bags. They would bring their empty bags to the grocery store, pack their groceries and take them home full. These bags are typically made from canvas or another fiber or polypropylene (which is ironically a plastic). The Florida Legislature passed, and Governor DeSantis signed into law effective July 1, 2019, Florida Statute §581.217, which creates a state hemp program within the Florida Department of Agriculture and Consumer Services.[33] Hemp is a strong fiber that has traditionally been utilized for the creation of strong ropes for the military. Hemp would be a good source of fiber for making such reusable bags. Consumers who choose not to utilize their own bags for grocery shopping, but who would rather continue to utilize plastic bags, would have the option of doing so, but would be charged a nominal returnable fee for each plastic bag that he or she uses for packing their groceries. Once again, the fee could be five or ten cents a bag. Consumers could actually reuse those plastic bags to save money. Consumers who return the

[32]https://www.palmbeachpost.com/news/20190627/palm-beach-becomes-first-county-municipality-to-ban-plastic-bags-polystyrene-containers

[33] See Florida Senate Bill 1020 (2019).

empty plastic bags to any authorized retailer which utilizes such plastic bags, would receive a cash refund.

Implementing a plastic bottle or plastic bag recycling program turns the bottle or the bag into a commodity, by putting a direct value on it. This directly incentivizes consumers to return the bottles and bags for their refund. Just as the average person would not throw out nickels or dimes into their trash, or onto the side of the road, or into the Bay, if bottles or bags had a cash value to them, the consumer would not discard them either.

The free market would serve to ameliorate the trash created by those few who still might choose to discard their bottles or bags. People who see discarded bottles or bags would pick them up on their own, as a means of earning extra cash. When glass bottles had a return value, various groups, including, Boy Scouts, Girl Scouts, sports teams, and others would regularly collect bottles that they would find as a means to fund certain activities such as trips, or to purchase uniforms.

We urge the Florida Legislature to implement a recycling program such as we detail here.

There is another simple solution to help reduce plastics on our roadways, in our stormwater system, canals, and in our Bay. Putting more trash receptacles in public places can reduce the amount of trash that ends up on the ground, and eventually in the Bay. It is not unusual to see overflowing trash receptacles in some areas of our communities. The overflow ends up on the ground and from there may be blown or washed into the stormwater system. This result can be easily avoided with more frequent emptying of trash receptacles. Finally, we also urge that trash can coverings be utilized that do not allow for wind to blow trash out when the receptacle gets too full.

C. Sediment

In addition to Biscayne Bay suffering damage from plastics and other marine debris, it is also negatively impacted by sediment that flows from the canals into the bay. Devices called baffle boxes can be installed to address this problem. A baffle box is a concrete or fiberglass structure which can be installed inline in a stormwater drainage system. It contains a series of chambers that are separated by baffles. The purpose of a baffle box is to filter out sediment from stormwater. As the water flows through the series of chambers, its flow velocity is reduced as it hits the concrete baffles, allowing solids and pollutants to settle to the bottom of the box.

Baffle boxes have been shown to remove from 500 to 50,000 pounds of sediment per month, depending upon the sediment load which flows into the baffle box.[34] They have been used successfully in other jurisdictions. To be effective, baffle boxes must be regularly cleaned. For this reason manhole covers are placed over each chamber, so that each chamber can be easily accessed for cleaning. While some baffle boxes have been installed in Miami-Dade County, we recommend the installation of additional baffle boxes at appropriate locations to further reduce the amount of harmful sediment flowing into Biscayne Bay.

IV. EXCESSIVE NUTRIENTS

Biscayne Bay is a marine estuary that supports a diverse ecosystem. In its natural state, Biscayne Bay has a living hardbottom habitat with extensive seagrass cover. These seagrass meadows provide nursery space for baby fish, and a habitat for shrimp and other small crustaceans. These in turn lure bigger fish, including snapper, sea trout, snook, bonefish, grunt, and tarpon. Manatees also thrive in these seabeds, where they feed on the seagrass. These seabeds also serve as a filtration system, which helps to keep the waters of the Bay clear.

Unfortunately, over the past several years, Biscayne Bay has suffered a significant loss of much of its seagrass. In 2017, Miami-Dade County biologists discussed a study which indicated that Biscayne Bay has lost more than 21 square miles of seagrass over the pass decade.[35] The shallow basin in the northern portion of Biscayne Bay between the Julia Tuttle Causeway to the south and the 79th Street Causeway to the north is referred to as the Tuttle basin.[36] Nearly half of the seagrass in this basin has died. With this significant reduction in seagrass the fish have fled. The bottom of the Tuttle basin is now being referred to as an underwater dust bowl.[37] In 2017, the Florida Department of Environmental Protection determined that Biscayne Bay is an "impaired waterbody" because of the presence of Chlorophyll-a, Nitrogen.[38]

It is the combination of the nutrients nitrogen and phosphorus that allow algae blooms to thrive. Too much nitrogen and phosphorus in the water causes algae to grow faster than

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[34] Stormwater Technology Fact Sheet Baffle Boxes, United States Environmental Protection Agency, Office of Water, Washington, DC, EPA 832-F-01-004, September 2001.
[35] https://www.miamiherald.com/news/local/environment/article145863444.html
[36] *Ibid.*
[37] *Ibid.*
[38] https://www.miamitodaynews.com/2019/02/05/palm-beach-county-becomes-poster-child-for-biscayne-bays-health/

ecosystems can handle. Significant increases in algae harm water quality, food resources and habitats, and decrease the oxygen that fish and other aquatic life need to survive. Large growths of algae, called algal blooms, can severely reduce or eliminate oxygen in the water, leading to the loss of underwater plants such as seagrasses and the deaths of large numbers of fish.[39]

Beginning in 2005, after Hurricane Katrina and Hurricane Wilma swept through South Florida, significant changes became evident in Biscayne Bay. A persistent algal bloom started to coat the seagrass in the central portion of the Bay. A new microalgae, and a toxic blue-green bloom at the southern end of the Bay was killing off coral and sponges. Fish populations also shrank.[40]

There are many theories as to what caused the increase in nutrients in Biscayne Bay. Annually, 2,173 tons of nitrogen flow into Biscayne Bay from the canal system in Miami-Dade County. Amongst this total is approximately 512 tons of nitrogen a year that is not produced in Miami-Dade County. The source of that nitrogen is the regional canal system which feeds into our local canals. The various contributors of this nutrient loading into the canal system that eventually ends up in Biscayne Bay include stormwater runoff, byproducts from agricultural activities in the western and southern portions of Miami-Dade County, leakage from the wastewater sewer system, and leakage from septic tanks. In addition to the 2,173 tons of nitrogen that are loaded into Biscayne Bay from Miami-Dade canals annually, there is an additional 5,400 tons of nitrogen discharged into the ocean through the ocean outfall pipes on an annual basis.

A. Stormwater Runoff

Nutrients flow into the stormwater system from all sorts of sources, including organic material. Human and pet waste contain nutrients. We were surprised to learn that it is estimated that based upon the population in Miami-Dade County, approximately 100,000 pounds of dog feces a day are deposited in our community. Much of this gets into the stormwater system, and into the Bay. Dog feces contain a lot of nitrogen.

B. Agricultural Activities

Nutrients such as phosphates and nitrogen are utilized in many agricultural activities, and they easily make their way into the canal system and into the Bay. Sources for phosphates and

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[39] United States Environmental Protection Agency (E.P.A.), Environmental Topics, Nutrient Pollution, The Issue; available at https://www.epa.gov/nutrientpollution/issue

[40] https://www.miamiherald.com/news/local/environment/article145863444.html

nitrogen include fertilizer that is used on lawns. The nutrients from fertilizer run into storm drains, the canal system, and eventually the Bay. Runoff from suburban lawns is actually a major source of fertilizer pollution.

C. Wastewater Sewer Systems

As discussed previously, there are many leaks in the wastewater sewer system in Miami-Dade County. Consequently, a significant amount of human waste from the wastewater sewer system makes its way into the canal system and into the Bay.

V. CONTAMINATION OF THE BISCAYNE AQUIFER- THE SOURCE OF OUR DRINKING WATER

The Biscayne Aquifer underlies an area of about 4,000 square miles and is the principal source of water for all of Dade and Broward Counties and the southeastern part of Palm Beach County in southern Florida. The Biscayne Aquifer, which is the primary source of our fresh water for drinking in South Florida, lies a mere four feet below our feet. It goes as deep as eighty (80) to one hundred and forty (140) feet. It is a shallow layer of highly permeable limestone. Because the Biscayne Aquifer is highly permeable and lies at shallow depths everywhere, it is readily susceptible to contamination. The aquifer is the only source of drinking water for about 3 million people.[41] Major population centers that depend on the Biscayne Aquifer for water supply include Boca Raton, Pompano Beach, Fort Lauderdale, Hollywood, Hialeah, Miami, Miami Beach, and Homestead. The Florida Keys also are supplied primarily by water from the Biscayne Aquifer that is transported from the mainland by pipeline.[42] Our natural water supply is being negatively impacted by: 1) run off from septic tanks; and 2) the hypersalinity of water in the cooling canal system used by Florida Power and Light to dissipate the heat created by generators at its nuclear power plant located at Turkey Point.

A. Septic Tanks

Septic tanks not only contribute to the discharge of excessive nutrients into Biscayne Bay, they also are responsible for contaminating our water supply. There are two (2) ways to handle

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[41] Ground Water Atlas Of The United States Alabama, Florida, Georgia, South Carolina HA 730-G, https://pubs.usgs.gov/ha/ha730/ch_g/G-text4.html,
[42] Id.

wastewater from a residence in Miami-Dade County. The vast majority of residences in Miami-Dade County are connected to the Miami-Dade Water and Sewer Department's wastewater sewer system and dispose of their plumbing waste from toilets and sink and shower drains in this manner. This is what is referred to as a "centralized" system. The centralized system in Miami-Dade County consists of the vast network of pipes and pumps operated by MDWSD which collect and move the wastewater from the locations where they are generated to one of the three (3) wastewater treatment plants operated by MDWSD. However, even with the availability of this massive system there are approximately 105,000 parcels of property in Miami-Dade County that are **not** connected to the centralized MDWSD wastewater collection and treatment system.[43] Many of these properties are located in areas of the county where centralized systems are not available, and they treat their wastewater onsite, in what are referred to as "decentralized" systems. These decentralized onsite systems utilize septic tanks.

A septic tank is a large vault, usually constructed of concrete, that is buried under the ground. It typically holds about 1,000 gallons of wastewater. The solid portion of the waste settles to the bottom, and light solids and liquids such as oils and grease float to the top. These solids and liquids remain in the tank. As such, the solid and liquid wastes that remain in the tank must be pumped out and transported from the site by a trained professional. This requirement dictates that septic tanks receive routine maintenance.

As wastewater enters the septic tank it dispels an equal amount of wastewater (effluent) through an outlet valve located on the opposite side of the tank. The outlet valve has a filter in it that prevents solid debris from exiting the tank. As effluent exits the septic tank, it is distributed into a drainfield, which sits on top of soil. Once this effluent gets into the drainfield, it begins to gradually flow down vertically through the soil to the water table. This process is designed to remove a number of pollutants. However, for pathogens such as bacteria and viruses, and other organic and inorganic pollutants to be removed by natural filtration through the soil, the vertical flow must be achieved under *unsaturated* flow conditions. In other words, for this natural filtration process to be effective, the soil that the effluent is flowing down through cannot be saturated. Unsaturated flow conditions allow for aerobic conditions in the soil. The air-filled pockets in the

[43] Septic Systems Vulnerable To Sea Level Rise, November 2018, Final Report in support of Miami-Dade County Resolution No. R-911-16.

soil slow the rate of vertical flow of the wastewater, which increases the time that it takes for the effluent to reach the water table. This allows for proper natural absorption, aeration, filtration, and biochemical reactions to occur.[44]

To achieve *unsaturated* flow conditions, a minimum vertical separation must be maintained between the bottom surface of the drainfield and the wet season high water table. The Environmental Protection Agency recommends a minimum separation between the bottom surface of the drainfield and the wet season high water table of 24 to 48 inches.[45] The minimum separation required by the Florida Department of Health is 24 inches.[46]

If the vertical section of soil below a drainfield of a septic tank is saturated, the effluent that comes out of the drainfield will flow vertically almost unimpeded through the saturated soil, so it will not have necessary time for the proper absorption, aeration, filtration, and chemical reactions to occur. This unimpeded vertical flow significantly increases the risk of contamination of the water table and the risk of impact upon human health. According to Dr. Samir Elmir from the Florida Department of Health:

> "The volume of unsaturated soil underneath the drainfield impacts the [septic system's] ability to efficiently remove pollutants. It has been shown that aeration of effluent in the unsaturated soil is important in achieving decomposition of organic particles and compounds, in effectively removing phosphorus, in facilitating nitrification that serves as the basis for denitrification to remove nitrogen, and in decreasing bacteria and viruses.[47] In addition, effluent moves more slowly in unsaturated soil than in saturated soil, and, therefore, experiences a longer treatment time and a better opportunity for many pollutants to be removed.[48] Studies conducted in Florida show that the concentrations of various contaminants from the septic tank decrease considerably with the increase

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[44] *Ibid.*

[45] United States Environmental Protection Agency (E.P.A.), Design Manual, Onsite Wastewater Treatment and Disposal Systems (EPA 625/1-80-012); available at https://www.epa.gov/sites/production/files/2015-06/documents/septic_1980_osdm_all.pdf

[46] Chapter 64e-6, Florida Administrative Code; available at https://www.flrules.org/gateway/ChapterHome.asp?Chapter=64E-6

[47] Bicki, T. J., R. B. Brown, M. E. Collins, R. S. Mansell, and D. F. Rothwell. 1984. Impact of On-Site Sewage Disposal Systems on Surface and Ground Water Quality. Report to Florida Department of Health and Rehabilitative Services under Contract number LC170.

[48] Bicki, T. J. and R. B. Brown. 1990. On-Site Sewage Disposal – The Importance of the Wet Season Water Table. Journal of Environmental Health 52(5): 277-279

of the depth of unsaturated soil.[49] Bacteria and viruses from wastewater treated by septic systems travel considerable distances in saturated soil and cause groundwater pollution.[50]"

See Septic Systems Vulnerable To Sea Level Rise, November 2018, Final Report in support of Miami-Dade County Resolution No. R-911-16, at pg. 14.

Septic tanks and the effluent that flow from their drainfields not only contain large amounts of ammonia and phosphorus, but also numerous pathogenic human organisms. According to Dr. Elmir, "shigellosis, salmonella, hepatitis A, viral gastroenteritis and other human viral diseases are shed in human waste in extremely high numbers (order of millions) in waste discharged from both ill and healthy people." In addition, Dr. Elmir notes that, "Some of the pathogenic human organisms can survive harsh and various environmental conditions (extreme temperatures, various soil moisture conditions, rainfall, salinity, etc.) for a long time from one day to a couple of years."[51] This reality heightens our concerns over how these septic tanks have the potential to contaminate our drinking water and create health risks for visitors and residents alike.

Saturated soil columns under drainfields do not allow for the filtration and neutralization of these dangerous pathogens and excessive nutrients from effluent that is discharged from the drainfields. This, along with old leaky or cracked septic tanks, allows the effluent from these systems to not only leach into the groundwater, but to also flow into the canal system and then into Biscayne Bay, carrying these pathogens and nutrients with it. Once this contaminated and untreated effluent gets into our ground water and the Biscayne Aquifer, it can easily contaminate our water supply and cause a public health disaster. Studies have demonstrated the migration of viruses from septic tanks to coastal waters in the Florida Keys, Sarasota, and Charlotte Harbor.[52]

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[49] Anderson, D. L., A. L. Lewis, and K. M. Sherman. 1990. Unsaturated Zone Monitoring Below Subsurface Wastewater Systems Serving Individual Homes in Florida. IN: Proceedings of the National Environmental Health Association's Fifth Annual Midyear conference "Drinking Water and Groundwater Protection". Pp. 413- 438; Ayres Associates. 1989 Onsite Sewage Disposal System Research in Florida – Performance Monitoring and Ground Water Quality Impacts of OSDSs in Subdivision Developments. Prepared for Florida Department of Health and Rehabilitative Services, Tallahassee, Florida.; Otis, R. J. 2007. Estimates of Nitrogen Loadings to Groundwater from Onsite Wastewater Treatment Systems in the Wekiva Study Area. Task 2 Report Wekiva Onsite Nitrogen Contribution Study

[50] Hain, K.E., and R.T. Obrien. 1979. The survival of enteric viruses in Septic tanks and septic tank drain fields. Water Resources Res. Inst. Rept. No. 108, New Mexico Water Resources Res. Inst., New Mexico State Univ., las Cruces, New Mexico.; Viraraghavan, T. 1978. Travel of microorganisms from a septic tile. Water, Air, and Soil Poll. 9:355-362

[51] Septic Systems Vulnerable To Sea Level Rise, November 2018, Final Report in support of Miami-Dade County Resolution No. R-911-16.

[52] http://www.floridahealth.gov/environmental-health/onsite-sewage/research/_documents/research-reports/_documents/seasonally-inundated-report.pdf

The impact of rising sea levels upon septic tanks are also a major concern. As sea levels rise, so does the groundwater table. Since 1994, sea levels have risen four (4) inches, and are expected to increase an additional two (2) to six (6) inches by 2030.[53] The increase in sea levels have led to higher groundwater levels in certain areas. With rising sea levels, the soil column below a drainfield remains wet and saturated and does not function effectively or efficiently to filter the effluent coming out of the drainfield of the septic tank. If the water table rises to the level of the drainfield, there is effectively no filtering of the effluent at all once it leaves the septic tank. The unfiltered effluent then seeps into the Biscayne Aquifer, and also runs off as surface water, ultimately getting into Biscayne Bay.

While the current minimum separation between the bottom surface of the drainfield and the wet season high water table is currently 24 inches for new septic tanks, that was not always the standard. The standard, which at one time was only 12 inches, was actually made stronger over time. This means that some septic tanks exist in Miami-Dade County wherein the bottom surface of the drainfield was only 12 inches above the water table when the system was installed. Since sea levels have risen four (4) inches since 1994, these drainfields are only eight (8) inches above the water table now. If the forecasting is correct, and the sea level and the water table rise an expected two (2) to six (6) inches by 2030, then in the next ten years these drainfields may only be two (2) inches above the water table. This is almost as if the property owner just flushed their toilet right into our drinking water.

The Miami-Dade County Board of County Commissioners demonstrated its concern for this issue in 2016 when it voted in favor of a resolution directing the Mayor or Mayor's designee, "to study and assess how sea level rise may affect septic systems in Miami-Dade County".

> On October 5, 2016, the Board of County Commissioners (Board) passed Resolution No. R-911-16, which directs the Mayor or Mayor's designee, "to study and assess how sea level rise may affect septic systems in Miami-Dade County, and to prepare a report. The report shall, at a minimum, identify: (1) how septic systems may be affected by sea level rise; (2) the potential risks involved; (3) areas of the County that could be most impacted; (4) recommendations on how best to eliminate the vulnerability of septic systems to sea level rise; and (5) recommendations as to any further legislative or administrative action that may be necessary to address the vulnerabilities and problems identified, including, but not limited to, seeking funding from the state for purposes of carrying out the objectives of this item."[54]

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[53] Septic Systems Vulnerable To Sea Level Rise, November 2018, Final Report in support of Miami-Dade County Resolution No. R-911-16.

[54] https://www.miamidade.gov/green/library/vulnerability-septic-systems-sea-level-rise.pdf, p.7

In the November 2018 Final Report in support of Miami-Dade County Resolution No. R-911-16, it was determined that as of now, 56% of the septic systems – or 58,349 parcels of property – are already periodically compromised during storms or wet years. To make this calculation, the assumption was that the bottom of the drainfield associated with the septic tank was 18 to 24 inches below the surface of the ground, and that the minimum required separation between the bottom of the drainfield and the water table is 24 inches – the minimum required distance to establish aerobic soil and unsaturated flow and thereby promote proper treatment of the effluent at the wet season high water table. Therefore, an average wet season water table within 42 inches of the surface of the ground will result in approximately 18 to 24 inches between the bottom of the drainfield and the water table and less than 18 to 24 inches for the wettest season water table. At these separations, water quality may already be periodically compromised for 56% of the septic systems – or 58,349 parcels of property which already have an average wet season water table within 42 inches of the surface. By the year 2040, with the increase in sea level rise and the accompanying increase in the water table, it is forecast that water quality will be periodically compromised for 64% of the septic systems – or 67,234 parcels of property.[55]

In this regard, it is our recommendation that from now on, no property owner in Miami-Dade County should be permitted to install a septic tank and MUST connect to the Miami-Dade Water and Sewer Department's wastewater sewer system, if there is a sewer line in the vicinity. In those portions of the county where the water table is already so high that any septic tank system would already be periodically compromised during storms or wet years if such a system were to be installed, then such a system should not be approved for installation.

Additionally, while we know that Miami-Dade County leaders are exploring the possibility of connecting the property owners that are currently utilizing onsite decentralized septic tanks onto the centralized MDWSD wastewater sewer system, we are also aware of the substantial cost that would be involved to accomplish this. A preliminary analysis in 2013 done by MDWSD estimated that the cost to connect all of the residential properties to the MDWSD wastewater sewer system who were on septic tanks would be $2.3 billion. A subsequent report in 2016 indicated that the cost would be approximately $3.3 billion.[56] Assuming the figure of 100,000 properties, the cost,

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[55] Septic Systems Vulnerable To Sea Level Rise, November 2018, Final Report in support of Miami-Dade County Resolution No. R-911-16.
[56] *Ibid.*

when spread amongst each property owner, would be approximately $33,000.00 each. This is a prohibitive cost for property owners to incur.

We know that Miami-Dade County leaders are exploring funding sources for this important and necessary project, including but not limited to general obligation bonds, revenue bonds, rate surcharges, the creation of a special taxing district, connection charges, and connection surcharges. Because this is such a critical issue for our communities, we urge Miami-Dade County leaders to explore these funding sources, as well as other sources of funding that have been suggested, including funding from the U.S. Environmental Protection Agency Clean Water State Revolving Fund, U.S. Environmental Protection Agency Nonpoint Source Section 319 Grants, Community Development Block Grants from the U.S. Department of Housing and Urban Development, funding programs within the U.S. Economic Development Administration, financial assistance sources from within the Catalog of Federal Funding Sources for Watershed Protection, and grant funding from the U.S. Environmental Protection Agency Environmental Center Network.

Biscayne Bay and the waterways in Miami-Dade County are not the only ones having problems in the State of Florida. On July 6, 2016, (then) Governor (now Senator) Rick Scott announced that he would propose additional funding in his State Fiscal Year 2017-2018 recommended budget to help clean up the Indian River Lagoon and Caloosahatchee River into which the polluted waters of Lake Okeechobee are discharged. This budget was to include new funding for a voluntary 50/50 matching grant program with local communities surrounding the water bodies affected by algae blooms resulting from the frequent discharges of water from Lake Okeechobee. Governor Scott stated in a press release that septic tank runoff is a major contributor to the pollution in those waters, and that he looked forward to working with the Legislature to fund efforts to curb it. As the successor to Rick Scott, we encourage Governor DeSantis, working with the Florida Legislature, to fund efforts to assist Miami-Dade County in saving the health of Biscayne Bay and the health of the residents of South Florida by eliminating septic tanks and converting to the centralized MDWSD wastewater sewer system.

A person may not construct, repair, modify, abandon or operate an onsite sewage treatment and disposal system (OSTDS) without first obtaining a permit approved by the Miami-Dade County Health Department. The OSTDS program is responsible for performing application reviews, conducting site evaluations, issuing permits, and conducting inspections and complaint

investigations associated with the construction, installation, repairs, and abandonment of an onsite sewage treatment and disposal system. We recommend that the OSTDS program implement a mandatory biannual inspection of every septic tank in Miami-Dade County, to insure that they are all maintained properly. Such an effort would preserve the public health by preventing groundwater and surface water contamination.

B. Hypersalinity Of Water In Cooling Canals at Florida Power and Light's Turkey Point Power Plant

Florida Power and Light is the largest of Florida's fifty-five (55) electric utilities. It powers about half of the state and serves over 10 million people over about 5 million customer accounts. Florida Power and Light's Turkey Point Power Plant is located at 9700 S.W. 344th Street, on a 3,300-acre site two (2) miles east of Homestead and twenty-five (25) miles south of Miami. It was built in the late 1960s and initially had two (2) fuel powered electrical generation units. In 1972 the first nuclear plant – Unit 3 – came on line, followed by the second nuclear plant – Unit 4 – which came on line the following year. Combined, these units generate 1,632 megawatts of electricity. Unit 5, a natural gas electrical generation unit capable of generating 1,187 megawatts of electricity, was commissioned in 2007. Units 1 and 2 are decommissioned. Half of the electricity used in Miami-Dade County comes from Florida Power and Light's Turkey Point Power Plant.

Nuclear power generators create a significant amount of heat, which must somehow be dissipated. The system that dissipates the heat utilizes water, which does not come into contact with the actual nuclear equipment, to remove the heat. It is analogous to the radiator of a car, which dissipates the heat built up in an engine, yet the radiator fluid does not come into contact with the gasoline or the interior of the cylinders in the internal combustion engine of the car. Most nuclear power plants dissipate this heat by the use of cooling towers; large towers which transfer the heat from the water into the air.

Turkey Point is unique, in that rather than using cooling towers to dissipate the heat, it utilizes a series of cooling canals. This cooling canal system is comprised of a series of thirty-nine (39) adjacent canals. Each canal is about thirty (30) yards wide and only three (3) feet deep. The cooling canal system is two (2) miles wide, and five (5) miles long. It is referred to as a giant radiator, and in fact, from above, looks like a radiator turned on its side. The water flows in a

counterclockwise direction. Hot water from the electrical generating process is discharged from the electrical power generating units in the plant into a feeder canal which flows into the thirty-two (32) canals on the western side of the cooling canal system. These canals flow in a southerly direction toward a collector canal, which then brings the water in an easterly direction to seven (7) north-flowing canals. The "cooled" water is then returned to the intake location at the electrical power generating unit, where it begins another cycle.

The heat from the water in the cooling canal system is dissipated as the water flows through its cycle. It is dissipated through the natural processes of evaporation and solar radiation. When the water enters the electrical power generating unit, its temperature is approximately eighty-eight degrees (88°). When the water is discharged from the electrical power generating unit, its temperature is about six (6) or seven (7) degrees hotter.

Like all other canals in South Florida, the cooling canals are connected to our groundwater. The water in the cooling canal system is saltwater. As the water evaporates from the cooling canals, the salinity concentration in the water that remains in the canals increases significantly. Additionally, drought conditions can cause an increase in the salinity of water in the cooling canals. Because saltwater is denser and heavier than freshwater, the saltwater tends to sink. Because the cooling canals are connected to the groundwater, the hypersaline water flows down into the groundwater. In fact, in our ecosystem, there is a constant struggle between the saltwater in the ocean and the freshwater inland. As sea levels rise, saltwater intrudes further inland, threatening our underground freshwater supply.

C. The Saltwater Plume

The hypersaline water from Turkey Point has formed an underground saltwater plume that currently exists under Turkey Point, and extends several miles beyond the western boundary of Florida Power and Light's Turkey Point property footprint. In fact, scanning technology employed by Florida Power and Light has revealed that the location of the plume is depth dependent, in that the deeper the depth of the scan, the higher the concentration of saline contained in the groundwater. This saltwater plume constitutes a serious threat to the source of our freshwater.

Florida Power and Light has acknowledged the existence of this saltwater plume and has undertaken strategies to mitigate it. They are taking a two-pronged approach. The first prong is directed at taking steps to decrease the salinity in the cooling canals. The second prong is focused

on retracting the area of the hypersaline plume by pumping the hypersaline groundwater out of the Biscayne Aquifer.

To reduce the salinity in the cooling canals, Florida Power and Light has installed wells that are approximately one thousand (1,000) feet deep, and extend into the Floridan Aquifer, which is way below the level of the Biscayne Aquifer. These wells are pumping 14 million gallons of water a day from the Floridan Aquifer into the cooling canals, in an effort to reduce the salinity in the cooling canal system to the average salinity of Biscayne Bay, which is 34 psu (practical salinity units).

To retract the underground hypersaline plume, Florida Power and Light has implemented a recovery well system that extracts the hypersaline groundwater out of the Biscayne Aquifer. The recovery well system consists of ten (10) wells that extract 15 million gallons of hypersaline groundwater per day. This hypersaline groundwater is then injected approximately three thousand (3,000) feet underground into the boulder zone, which is a confined zone safely below the Biscayne Aquifer. It is the same zone where the Miami-Dade Water and Sewer Department injects all of the wastewater from the South District Wastewater Treatment Plant and some of the wastewater from the North District Wastewater Treatment Plant. Florida Power and Light's first goal is to halt the westward migration of the hypersaline plume within five (5) years. Its second goal is to retract the plume to an area within the boundaries of the Florida Power and Light Turkey Point property lines within ten (10) years.

Florida Power and Light's plans to accomplish these goals are set forth in two separate agreements. One is a 2015 Consent Agreement with Miami-Dade County. The other is a 2016 Consent Order with the Florida Department of Environmental Protection. In accordance with these agreements, by 2021, Florida Power and Light must reduce the salinity in the cooling canals to 34 practical salinity units. Florida Power and Light has stated that to meet with this deadline, it will employ additional measures if needed.

We implore the executives at Florida Power and Light to do whatever they can to ensure that the salinity levels in the cooling canal system are brought down as much as possible, as soon as possible, and that the saltwater plume is reduced as much as possible and as soon as possible. We also urge all of the agencies with regulatory authority over the Turkey Point facility, including the United States Nuclear Regulatory Commission, the United States Environmental Protection

Agency, the Florida Department of Environmental Protection, the Miami-Dade County Department of Environmental Resource Management, the South Florida Water Management District, and Miami-Dade County, amongst others, to rigorously evaluate and monitor Florida Power and Light's efforts to both bring the salinity levels in the cooling canal system down to 34 psu, and to diminish the saltwater plume.

As stated earlier in this report, ocean outfall legislation requires that by the year 2025, there is to be no more wastewater discharged into the ocean. We urge Florida Power and Light and Miami-Dade County to continue their efforts as stated in a Joint Participation Agreement to explore opportunities to reuse treated wastewater at Florida Power and Light's Turkey Point facility.

We also recommend that should Florida Power and Light move forward with plans to build additional nuclear power generating units at Turkey Point, such units must be cooled utilizing cooling towers, rather than a cooling canal system.

VI. CONCLUSION

It is obvious that the health of our precious Biscayne Bay and our underground drinking water is at a state of precarious balance, brought forth by the many forces which have been discussed herein, most of which are manmade. The entire balance is further threatened by rising sea levels. Whether these rising sea levels are caused by manmade forces and are a consequence of global warming, or whether the rise in sea levels are part of long-term natural ebbs and flows of the environment over the passage of great periods of time is a debate for another day, but we know for a fact that sea levels have risen.

Accordingly, we encourage everyone, from the individual to every unit of government, to act responsibly in making decisions that will affect the future health of Biscayne Bay and our water supply. We are heartened to see that the Miami-Dade County Board of County Commissioners has created the Biscayne Bay Task Force, whose purpose is to advise the Miami-Dade County Board of County Commissioners and the County Mayor "on issues related to Biscayne Bay. That includes but is not limited: to the long-term management of Biscayne Bay; the health of the marine community; run-off and other impacts to water quality; marine debris; education and outreach; economic development and vitality related to Biscayne Bay; and how conditions in Biscayne Bay

may affect residents and property owners. As part of its duties, the Task Force shall also review the relevant data and prior studies, assessments, reports, and evaluations related to Biscayne Bay, and receive advice and recommendations from County staff including the County's Division of Environmental Resources Management (DERM), Office of Resiliency, and Water and Sewer Department. The Task Force may hear additional presentations and comments from other experts and members of the public, including but not limited to entities such as the South Florida Water Management District, the Florida Inland Navigation District, the Florida Department of Environmental Protection, and the National Parks Service. The Task Force shall prepare a written report with recommendations to the Board of County Commissioners. That report should include recommendations and an action plan identifying problem areas and prioritizing projects for Biscayne Bay, and recommendations to this Board regarding proposed State and Federal legislation, activities, and appropriations."[57]

We urge all levels of government to participate in earnest efforts to implement whatever recommendations they can to ensure a healthy future for our Bay and our groundwater. The broad and beautiful lagoon that we know today as Biscayne Bay has always had a special magnetism, from its 1513 European discovery by Juan Ponce De Leon to its contemporary daily discovery by residents, tourists and visitors alike. Yet, as we express our love for Biscayne Bay's beauty, marine life and its ecology, we too often shy away from our daily actions that may be slowly strangling this thing we say we cherish. This Grand Jury hopes that their report, intended to focus our attention on those daily actions and activities which are damaging Biscayne Bay, will be a loud call to action so that we may save this valuable resource.

[57] Miami-Dade County Board of County Commissioners Resolution Number R-165-19.

NAME OF DEFENDANT	CHARGE	INDICTMENT RETURNED
THALES FERREIRA	First Degree Murder First Degree Murder	True Bill
WALTER SAUL PEREZ	First Degree Murder Attempted Felony Murder with a Firearm/Deadly Weapon or Aggravated Battery	True Bill
JOHN STANTON (A) and JERMAINE SHELDON KING (B)	First Degree Murder (A & B) Robbery Using Deadly Weapon Or Firearm (A & B) Firearm Weapon Ammunition Possession by Convicted Felon Or Delinquent (A)	True Bill
DAVID THOMAS CASH (A) and KARL PHILIP SCHMIDT (B)	First Degree Murder (A&B) Controlled Substance Sell /Manufactue/ Deliver/ or Possess W/ Intent (A) Controlled Substance Sell /Manufactue/ Deliver/ or Possess W/ Intent (B) Controlled Substance Sell / Manufacture/ Deliver/ or Possess W/ Intent (A)	True Bill
JULIO MONTEZ MORRIS, Also known as "BOO", also known as "BOO BA" (B), JAMES WILLIAM KELLY, III, Also known as "SKATEBOARD" (C), and HOWARD TRANARD WATERS (D)	First Degree Murder (B) First Degree Murder (B,C,D) First Degree Murder (B,C,D) Conspiracy to Commit First Degree Murder (B,C,D) Attempted/Premeditated Murder (B) Retaliating Against a Witness, Victim or Informant / Bodily Injury / Firearm (B) Retaliating Against a Witness, Victim or Informant/ Bodily Injury /Firearm (B,C,D)	

NAME OF DEFENDANT	CHARGE	INDICTMENT RETURNED
(continued from previous page)		
	Tamper/Wit/Vic/Life/Capital Felony (B) Tamper/Wit/Vic/Life/Capital Felony (B,C,D) Burglary With Assault or Battery Therein While Armed (B) Attempted Premeditated Murder With a Deadly Weapon or Aggravated Battery (B)	True Bill
NOEL A. CHAMBERS	First Degree Murder First Degree Murder Murder 1st Degree /With a Deadly Weapon / Attempt	True Bill
ANTHONY RODRIGUEZ (A) and JAMES ANTHOWN LEMONS (B)	First Degree Murder (A&B) Murder Premeditated Attempt Deadly Weapon or Aggravated Battery (A&B) Murder Premeditated Attempt Deadly Weapon or Aggravated Battery (A&B) Murder 1st Degree/With a Weapon/ Conspiracy (A&B) Shooting or Throwing Deadly Missile (A&B) Firearm/Weapon/Ammunition Possession by Convicted Felon or Delinquent (A) Grand Theft 3rd Degree/Vehicle (A) Robbery Using Deadly Weapon or Firearm (B) Murder 1st Degree With a Deadly Weapon Attempt (B)	True Bill
PAOLA DENISE VARGAS ORTIZ	First Degree Murder	True Bill

ACKNOWLEDGMENTS

We have had the privilege and opportunity of serving as Grand Jurors on the Fall Term 2018 Miami-Dade County Grand Jury over the past nine (9) months, including an extension. We come from many different backgrounds, from many different parts of the County, but we all have a common appreciation of how important our work here has been. The homicide cases which were presented to us were sobering. We leave both informed and enriched. We would like to express a debt of gratitude to the following individuals:

- Thank you to Katherine Fernandez Rundle for allowing us to be a voice for this community and for the leadership that you show on this important topic.
- Thank you to Don Horn for getting us started with the rules of law and for your guidance in giving us examples based upon interesting stories from other matters that you used as references.
- Thank you to Howard Rosen for the guidance through this long Grand Jury process and your invaluable assistance to us in preparing this report.
- Thank you to Neil Gil for the great entertainment and mushroom pizza. We are still waiting on that lobster.
- Thank you to Rose Anne Dare for your important work in keeping things running smoothly.
- Thank you Judge Lopez, Judge Rodriguez, and Judge Hogan Scola for your important role in this awesome extended journey.
- Thank you to John Perikles and David Maer for your help and insight.
- Thank you to all our fellow Grand Jurors for your dedication and commitment to serving this Country. God Bless America.

It has been an honor and a pleasure to serve our community.

Respectfully submitted,

Robert Behar, Vice Foreperson
Miami-Dade County Grand Jury
Fall Term 2018

ATTEST:

Erik Kessler
Acting Clerk

Date: August 8, 2019