THE STATE OF BISCAYNE BAY MIAMI-DADE COUNTY TROUBLE IN PARADISE

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PRESENTED BY WILBUR MAYORGA, M.S., P.E., CHIEF ENVIRONMENTAL MONITORING AND RESTORATION DIVISION - DERM

FRC CONFERENCE NOVEMBER 8, 2019

OBJECTIVE

TO PRESENT AN OVERVIEW OF THE WATER QUALITY ISSUES FACING BISCAYNE BAY, THE MULTIPLE CONTRIBUTING SOURCES AND THE CHALLENGES TO FINDING RESOLUTION.



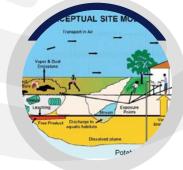
ACKNOWLEDGMENT

INFORMATION AND DATA PROVIDED IN THIS PRESENTATION DRAWS HEAVILY ON AND INCLUDES WORK, PRODUCED BY THE MIAMI-DADE WATER AND SEWER DEPARTMENT AND SEVERAL DIVISIONS AND SECTIONS WITHIN RER-DERM; SPECIFICALLY, SLIDES AND EXCERPTS FROM STAFF PRESENTATIONS TO THE BISCAYNE BAY TASK FORCE.









DERM RESTORATION AND ENHANCEMENT SECTION

Pamela Sweeney

NATURAL RESOURCES DIVISION

Lisa Spadafina

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BISCAYNE BAY

Biscayne Bay

Biscayne Bay Aquatic Preserves (FL Dept of Environmental Protection

Biscayne National Park (Nafl Park Service)

MIAMIDADE

Biscayne Bay is a lagoon that is approximately 35 miles long and up to 8 miles wide located off the mainland of Miami-Dade County on the Atlantic coast of South Florida.

Biscayne Bay is home to two state aquatic preserves, a national park, and borders a national marine sanctuary.

The Biscayne Bay Aquatic Preserves were established in 1974 and 1975, respectively and run the length of Biscayne Bay, from the headwaters of the Oleta River down to Card Sound, with an offshore component adjacent to Key Biscayne. Biscayne National Park lies in the central part of the bay, and its boundaries do not overlap with the Biscayne Bay Aquatic Preserves; however, the boundaries of the Florida Keys National Marine Sanctuary do overlap with the boundaries of the Biscayne Bay Aquatic Preserves in the Card Sound Region

Biscayne Bay Aquatic Preserves is designated by the state of Florida as Outstanding Florida Waters and Biscayne National Park is designated Outstanding National Resource Waters, per 62-302.700 F.A.C.

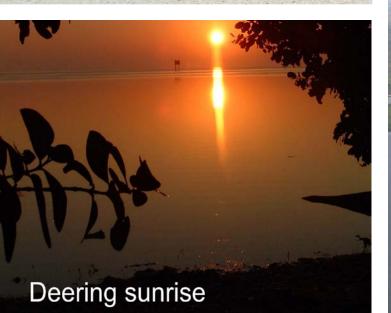
Biscayne Bay is a resource of local, regional and national significance ecologically. It is comprised of mangrove shorelines, developed and undeveloped islands, seagrasses, corals and sponges and hundreds of species that in some way depend on the Bay as a habitat and a food source

Biscayne Bay is a significant economic resource with a thriving tourism industry, recreational and commercial fisheries and countless recreational opportunities along or within the Bay. Fifty three percent of international and 44 percent of domestic visit one of the beaches bordering Biscayne Bay during their visit.

(The Health of Biscayne Bay : Water Flows and Water Woes: Final report of the Miami-Dade County Grand Jury, Fall Term A.D 2018, filed August 8, 2019)







Canal and coastal wetlands in south Biscayne Bay







TROUBLE IN PARADISE

ne > Miami Beach > BISCAYNE BAY MARINE HEALTH SUMMIT ADDRESSES SOLUTIONS FOR POLLUTION

BISCAYNE BAY MARINE HEALTH SUMMIT ADDRESSES SOLUTIONS FOR POLLUTION



Miami Beach Chamber - August 19, 2019

Miami Beach



ENVIRONMENT

Damage to Miami's Biscayne Bay Approaching Point of No Return

● 657

By Ron Brackett · September 24 2019 02:44 PM EDT · weather.com



Miami's skyscrapers overlook Biscayne Bay. (NOAA)



Hiami Herald

ENVIRONMENT

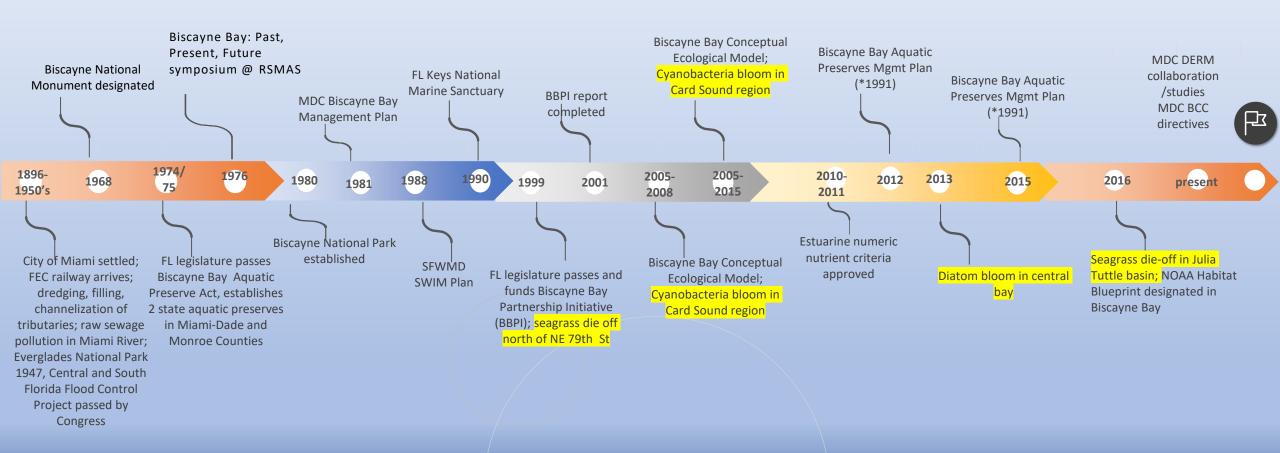
It's time to declare a state of emergency for Biscayne Bay, advocates say

BY ADRIANA BRASILEIRO

SEPTEMBER 21, 2019 06:00 AM, UPDATED SEPTEMBER 22, 2019 04:44 AM

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• Management Efforts BISCAYNE BAY



MANAGEMENT EFFORTS

Resolution No. R-911-16

LUTION NO.

RESOLUTION DIRECTING THE COUNTY MAYOR COUNTY MAYOR'S DESIGNEE TO STUDY AND ASSES HOW SEA LEVEL RISE MAY AFFECT SEPTIC SYSTEMS MIAMI-DADE COUNTY, AND TO PROVIDE A REPORT

R-911-16

WHEREAS, Miami-Dade County, like the rest of South Flo
particularly vulnerable to sea level rise due to its low elevation and p
WHEREAS, onsite sewage treatment and disposal syste
septic systems, are a type of onsite sewage facility, a key o
significant treatment of wastewater in an underground drainfield;
WHEREAS, some portions of the County, particularly
public sanitary sewer systems and therefore rely on septic systems
wastewater from toilets, showers, sinks, and dishwashers; and

WHEREAS, sea level rise poses particular concern to sept other problems, when sea levels rise, water tables rise, diminishing the infields and resulting in elevated levels of ground water pollution; and

THEREAS, rising water tables associated with sea level rise may preference. The ecological, aesthetic, social, and commercial value of Biscar

is may lead to flooding and pooling of sewage in

presents serious public health and

presents serious public health and

may lead to flooding and pooling of sewage in

Resolution No. R-463-18

TSOLUTION NO. R-463-18

RESOLUTION DIRECTING THE COUNTY MAYOR OR THE COUNTY MAYOR'S DESIGNEE TO DEVELOP AND IMPLEMENT AN ANNUAL "REPORT CARD" PROGRAM THAT EVALUATES THE HEALTH OF BISCAYNE BAY AND PREPARE A REPORT FOR THIS BOARD

WHEREAS, Biscayne Bay is one of Miami-Dade County's most natural resources, providing habitat for a diverse array of plants and anima WHEREAS, Biscayne Bay is a place of beauty that provides rec
County residents and visitors, such as boating, swimming, and fishing; and WHEREAS, Biscayne Bay plays a fundamental role in the econ
County, supporting tourism, commercial fishing, marine transportation, and it vities; and

ed with the health of Biscayne Bay; and

d with the health of Biscayne Bay; and

WHEREAS, rising water tables associated with sea level rise may prevereas, the ecological, aesthetic, social, and commercial value of Bisca

Resolution No. R-165-19

RESOLUTION NO. R-165-19

RESOLUTION CREATING A BISCAYNE BAY TASK FORCE; SETTING FORTH POWERS AND RESPONSIBILITIES OF SUCH TASK FORCE; PROVIDING FOR A REPORT; AND PROVIDING FOR SUNSET

WHEREAS, Miami-Dade County is home to Biscayne National Park, and this national

park provides recreational opportunities and economic value to our community, in addition to the national park's intrinsic ecological and environmental value; and

WHEREAS, the health of Biscayne National Park and Biscayne Bay as a whole are linked to the economic well-being of Miami-Dade County through industries such as tourism and commercial and recreational fishing; and

WHEREAS, there are millions of overnight visitors to Miami-Dade County, with the

beaches and Biscayne Bay typically being the most heavily visited areas; and

WHEREAS, numerous issues may affect Biscayne Bay, including, but not limite

nanagement of Biscayne Bay, the health of the marine, marine debris,

ity; and education and outreach to residents and

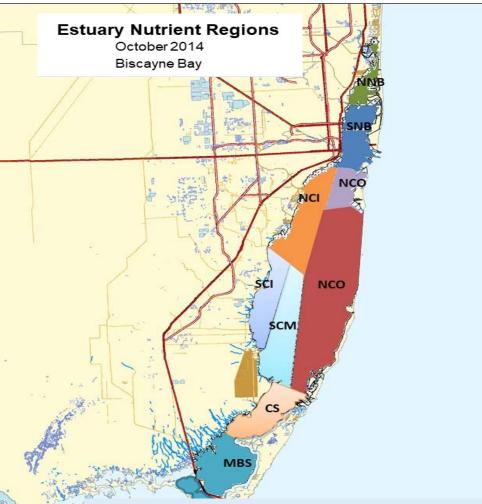
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REGULATORY FRAMEWORK

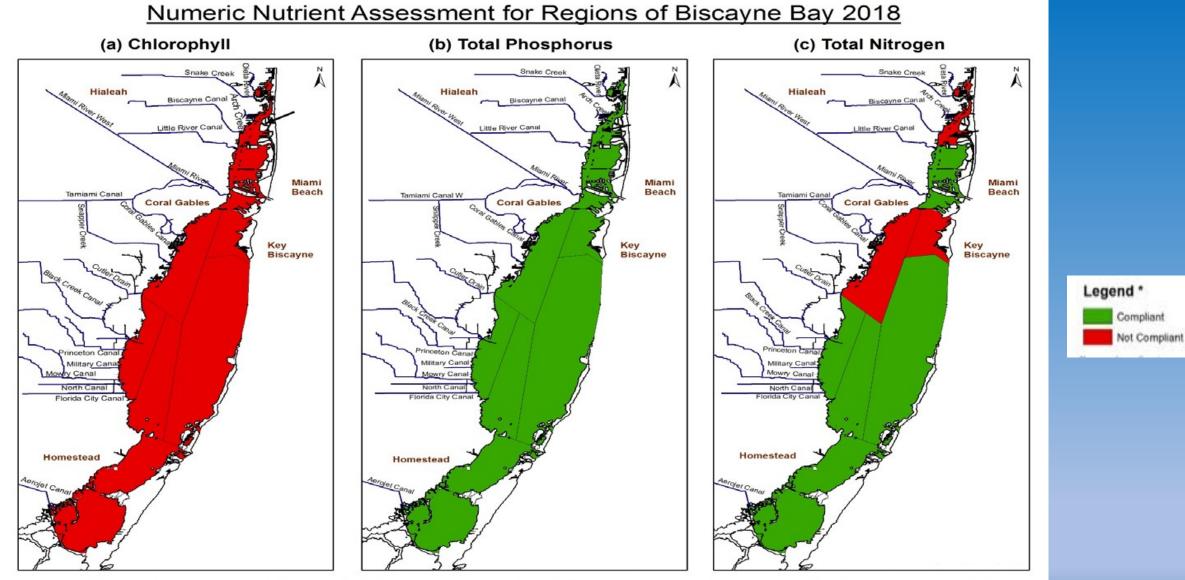
 During the 2009 and in 2011 rule making sessions FDEP, adopted statewide numeric nutrient standards for Florida's waters. Biscayne Bay was delineated into nine (9) Estuarine Regions, each with its own numeric criterion for Total Nitrogen, Total Phosphorus, and Chlorophyll-A

BISCAYNE BAY NUMERIC NUTRIENT CRITERIA										
F.A.C 62-302.532(1)										
		Criterion								
		TP (mg/L)	TN (mg/L)	Chl-a (ug/L)						
NNB	Northern North Bay	0.012	0.30	1.7						
SNM	Southern North Bay	0.010	0.29	1.1						
NCO	North Central Outer	0.007	0.31	0.5						
	Вау									
NCI	North Central Inshore	0.008	0.38	0.7						
SCI	South Central Inshore	0.007	0.48	0.4						
SCM	South Central Mid-Bay	0.007	0.35	0.2						
SCO	South Central Outer	0.006	0.24	0.2						
	Вау									
CS	Card Sound	0.008	0.33	0.5						
MBS	Manatee Bay-Barnes	0.007	0.58	0.4						
	Sound									

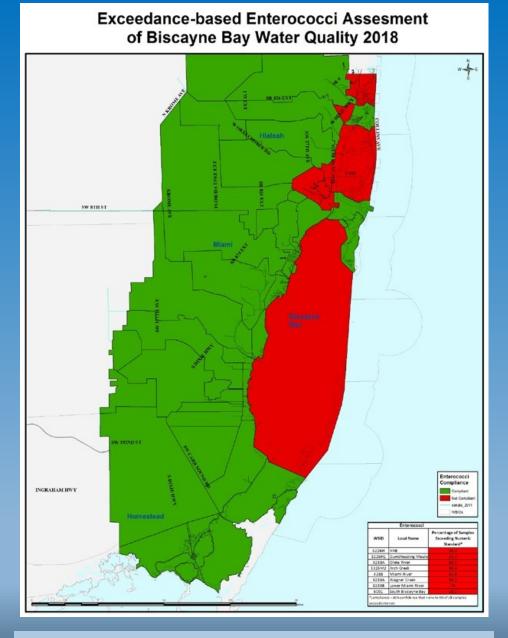


The FINAL List of Assessments in the Group 4 Basins for the Verified List of Impaired Waters and Delist List adopted by the FDEP on July 27, 2017 designated some portions of Biscayne Bay's waterways as "impaired" based on the exceedances of numerical criteria for Clha, Total Nitrogen and specific conductivity.

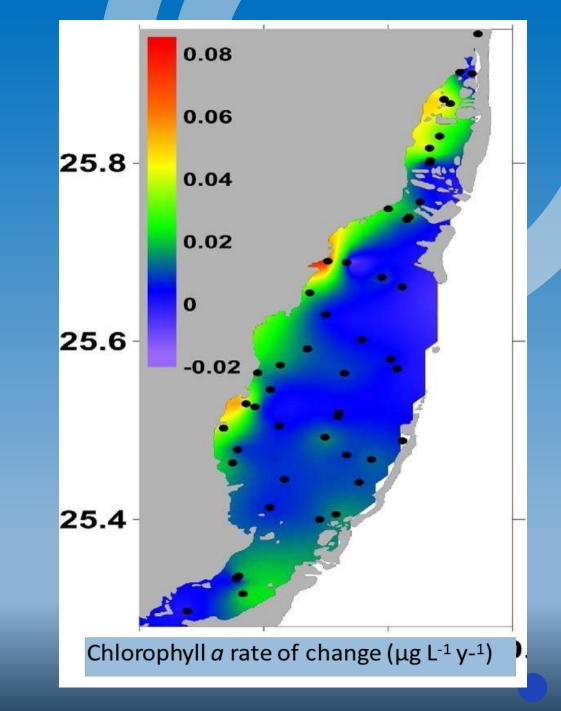
TROUBLE IN PARADISE – THE FALLOUT



Compliance = Annual Geometric Mean (AGM) does not exceeds criteria more than once in a consecutive three (3) year period.



FDEP standards for Enterococcus (marine) and E.coli (freshwater) based on EPA guidance.



Eutrophication

The consequence of increased nutrients and sediments into the coastal ecosystem.

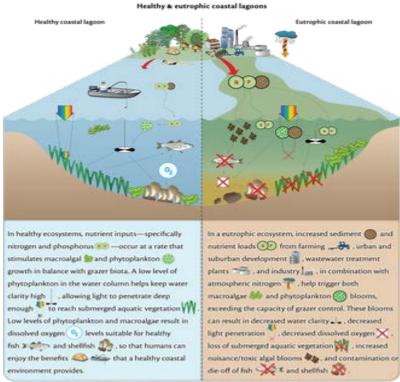
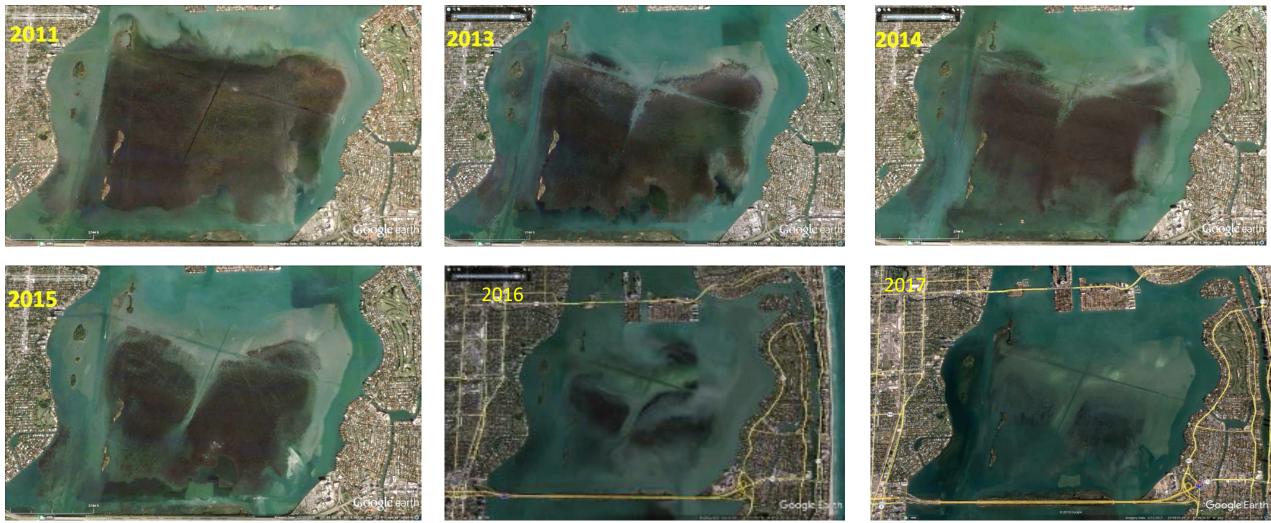


Diagram courtery of the Integration and Application Network (an umces.edu), University of Maryland Center for Environmental Science. Source demons, RC, JL: Elmons, CJ, Can, TJJ, Canuthes, MJR Holl, KJ, Jesian, CJ: Wanish, and DJ. Whon, 2008. Shifting Sands: Environmental and cultural change in Maryland's Countil Bass, With Press, University of Wanish Canada Canada Canada Canada Canada Canada Canada Canada Maryland's Countil Bass, With Press, University of Wanish, and Science.

http://ian.umces.edu/press/publications/93



REDUCTION IN SEAGRASS COVERAGE IN THE JULIA TUTTLE PORTIONS OF BISCAYNE BAY



Recent studies (DERM) indicate an approximate 77% reduction in seagrass habitat in the Julia Tuttle Basin since 2012. Additionally, the Barnes Sound Manatee Bay basin has seen a 93% reduction and the central portion of the Bay near Coral Gables has seen an 85% decrease in seagrass coverage over the past decade.

Report on the Findings of the County's Study on the Decline of Seagrass and Hardbottom Habitat in Biscayne Bay; Memo to the Miami-Dade County Board of County Commissioners January 28, 2019

WHY DOES IT MATTER?

Seagrass serves an important role in the coastal ecosystem:

- Provide habitat and shelter for juvenile species of recreationally- and commercially-important fish. Both recreational and commercial fishers make their living on Biscayne Bay collecting species from baitfish to stone crab, blue crab, shrimp and lobster.
- Seagrasses support the diving industry in South Florida by providing habitat to juvenile fish that colonize reefs later in their development.
- Enhance shoreline protection and prevent erosion by stabilizing sediments with their roots, helping to make shorelines and inland infrastructure that much more resilient to storm surge and other deleterious storm effects.
- Help maintain water quality and clarity.
- Serve as a direct food source for various animals , including the federally protected manatee and sea turtles.
- Seagrasses sequester carbon dioxide in their root systems for decades to hundreds of years, far exceeding the carbonsequestering capacity of terrestrial trees and plants.
- Lastly, seagrasses cycle nutrients out of the water column and they also help stabilize sediments, further aiding in maintaining water quality and clarity.
- Miami-Dade County is unique in being one of a handful of counties that are home to all seven species of seagrasses found in the state of Florida.

Report on the Findings of the County's Study on the Decline of Seagrass and Hardbottom Habitat in Biscayne Bay; Memo to the Miami-Dade County Board of County Commissioners January 28, 2019

TROUBLE IN PARADISE – POTENTIAL SOURCES

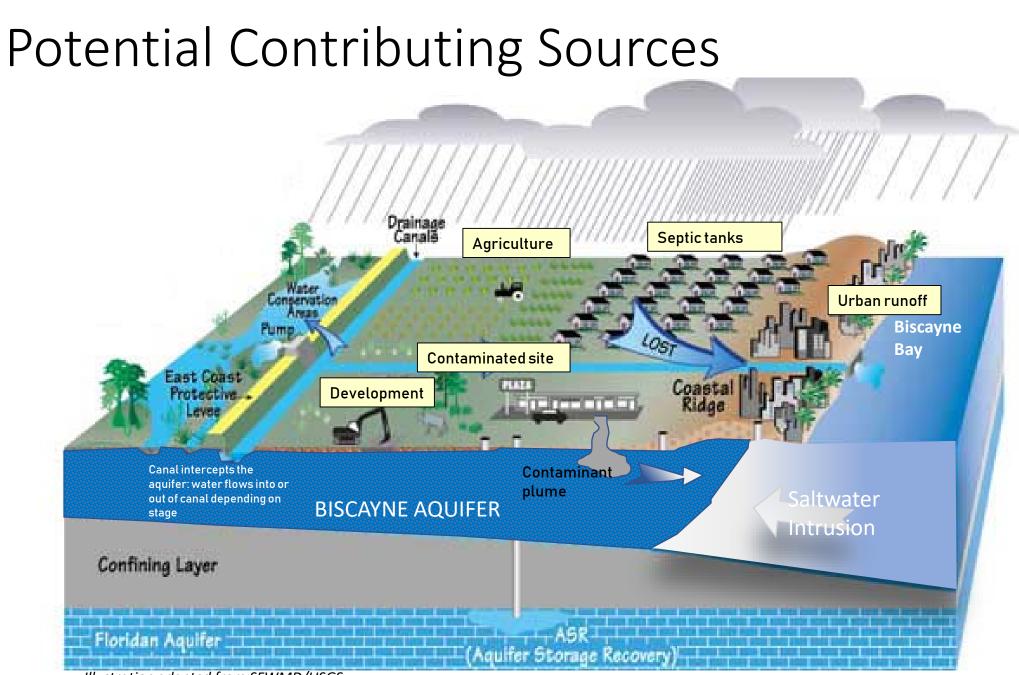


Illustration adapted from SFWMD/USGS

STORMWATER Discharges

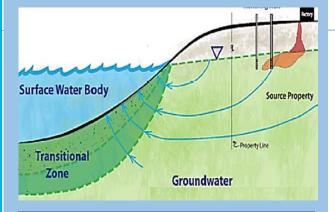
SEWAGE Contamination

Agrichemical Runoff



- Agrichemical Use Residential Landscaping and Agriculture
- Fertilizer
- Clippings and debris

GROUNDWATER



- Landfills
- Contaminated groundwater flux to canals
- Pollutant transport via natural groundwater flow gradient



- Canals
- Storm drain systems
- Sheet flow

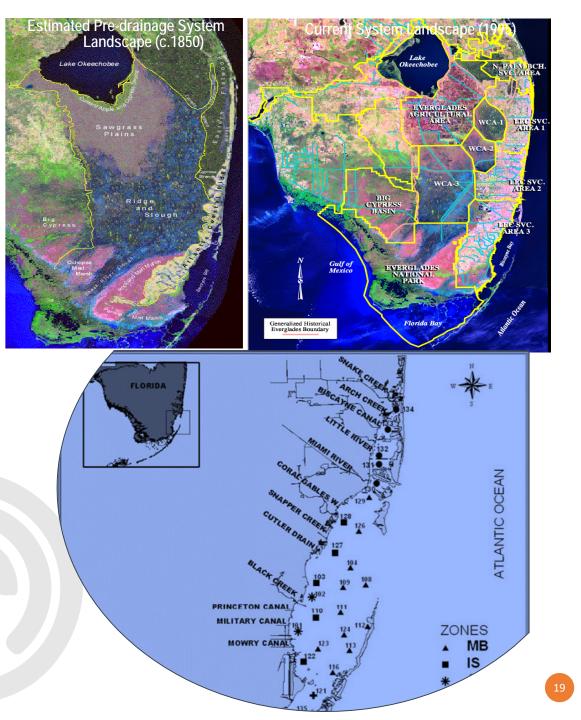


- Leaking sewer pipes
- Sewer main breaks
- Septic Tanks
- Ocean outfall

STORMWATER DISCHARGES

- Extensive local and regional canal system provides flood protection for South Florida and Miami-Dade County.
- Most storm water drainage systems in Miami-Dade County actively or passively discharge into the canal network.
- Canals intercept groundwater and convey it as surface water to Biscayne Bay,
- All canals ultimately discharge into Biscayne Bay.
 - Pollutants carried in stormwater runoff ultimately discharge into Biscayne Bay
- Canal discharge accounts for approximately 40% of freshwater input to Biscayne Bay.
 - Snake Creek, Little River, and Miami River delivered more than 50% of the bay's total freshwater contribution from 1994-2002

Valentina González Caccia, Joseph N. Boyer, 2007. <u>A nutrient loading budget for Biscayne Bay, Florida</u>. Marine Pollution Bulletin downloaded from https://www.semanticscholar.org/paper/A-nutrient-loading-budget-for-Biscayne-Bay%2C-Caccia-Boyer/d8ce25b3cc47b4c3b438f4e9a0f16e7ab9d04531/





Sea level rise resilience planning for coastal cities such as the City of Miami Beach

utilize active storm water discharge pumps to alleviate flooding during rain events. The stormwater is pumped directly into Biscayne Bay

"Every day, we're pressure-washing sidewalks — that's all dirty water. All the alleyways have a lot of grease from washing the containers, kitchen mats from the restaurants. Everything goes into the alleys, and everything goes into the stormwater system,"

Mike Alvarez, former infrastructure director and assistant public works director City of Miami Beach quoted in New Times "Videos Show Dirty Stormwater Pumped Into Biscayne Bay and Swallowed by Manatee" JESSICA LIPSCOMB | FEBRUARY 5, 2019 |



Plume from the City of Miami Beach's stormwater pump outfall discharging into Biscayne Bay.







While not regulated under NPDES permit, trash is a potential contaminant and contaminant source to Biscayne Bay via the stormwater system. Street litter eventually washes towards street drains. Uncovered or ineffective pollution control structures allow discharge of trash into the subsurface drainage structures. Poorly maintained drainage systems accumulate trash. Any contaminants associated with the trash will seep into the stormwater which ultimately discharge to the bay.



Trash accumulated behind the barrier Intended to prevent boat traffic just upstream of the water control structure on the canal



SEWAGE

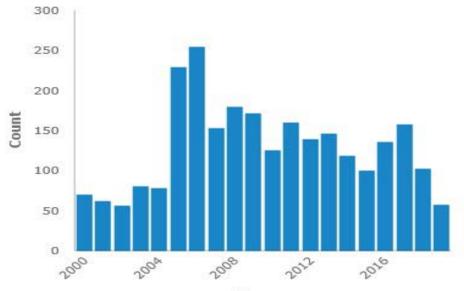
Leaking Sewer Lines

 Over 50% of the MDWASD sanitary sewer force mains and gravity interceptors are over 25 years old with about 10% being over 50 years old.

https://www.epa.gov/sites/production/files/2013-08/documents/miami-dade-cd.pdf

- Potential for leakage into the surrounding environment and ultimately into ground or surface waters.
- Groundwater infiltration into the sewer lines reduces the available transmission capacity.
- Indirect potential impact to Biscayne Bay
- Predisposition to breakage and overflows.

Sanitary Sewer Overflow Incidents by year



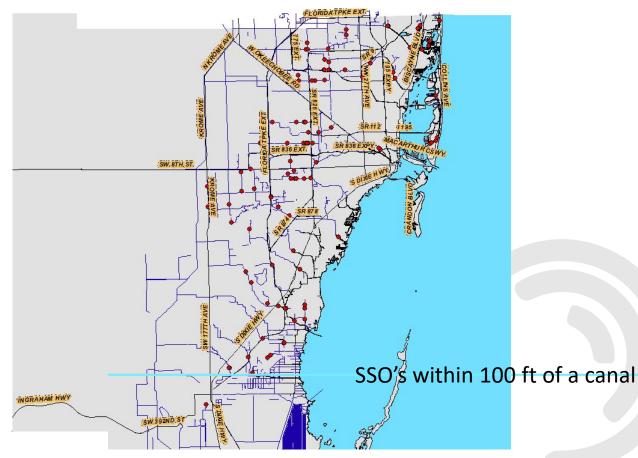
Incident_Date



Sanitary Sewer Overflows (SSOs)

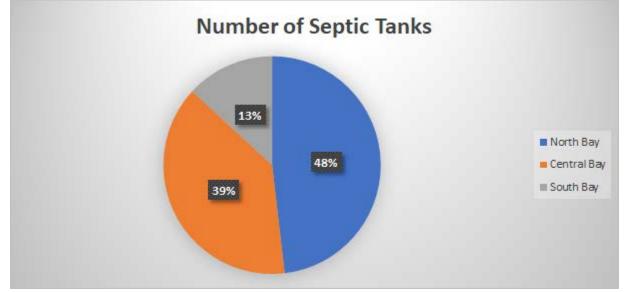
- Approximately 2560 reported SSO since 2000
- 140 (5%) occurred within 100 feet of a canal. 4 SSO occurred within 100 ft of a canal on the barrier islands.
- 31 of SSO within 100 ft of a canal resulted in a discharge of over 10,000 gallons

Data Source: https://gis-mdc.opendata.arcgis.com/datasets/sewer-overflow

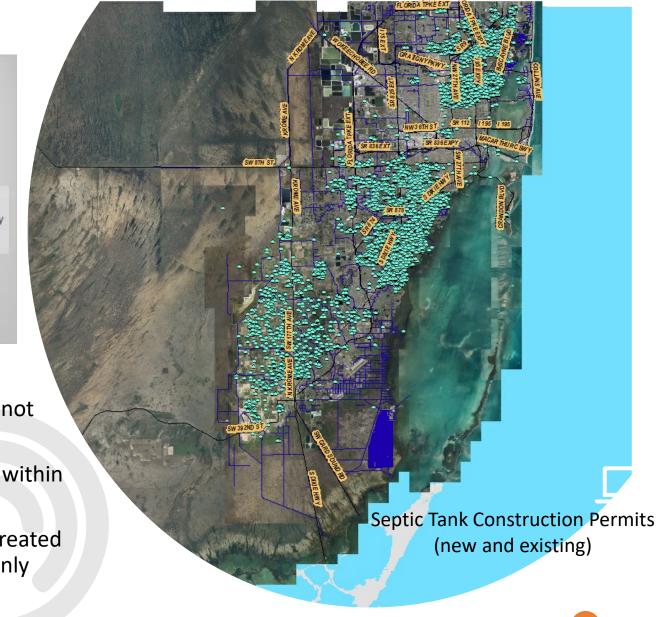




SEPTIC TANKS



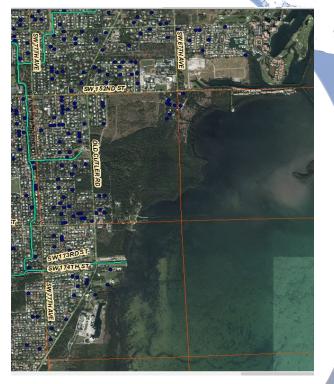
- Approximately 119,298 properties in Miami-Dade County are not served by sanitary sewers (assumed served by septic tanks).
- Approximately 1687 parcel served by septic tanks are located within 500 feet of a canal and 165 are within 100 feet.
- Improperly functioning septic tanks potentially discharge untreated sewage to groundwater and adjacent waterways causing no only bacterial contamination but also nutrient enrichment.

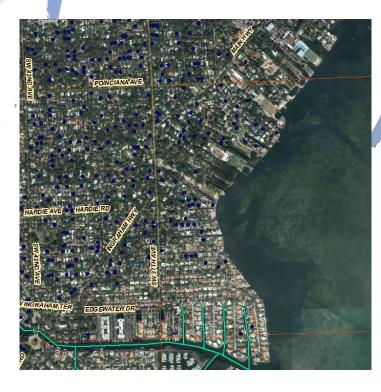


SEPTIC TANKS

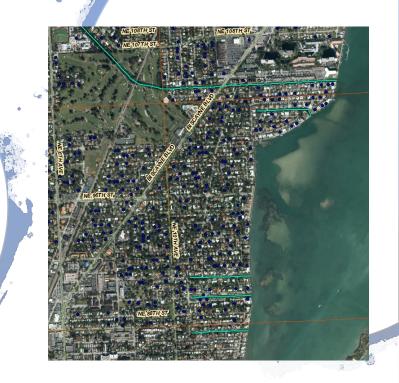
Seepage from septic tanks located adjacent to Biscayne Bay potential increase the nutrient load into Biscayne Bay

Septic tanks located adjacent to Biscayne Bay – South Bay Basin

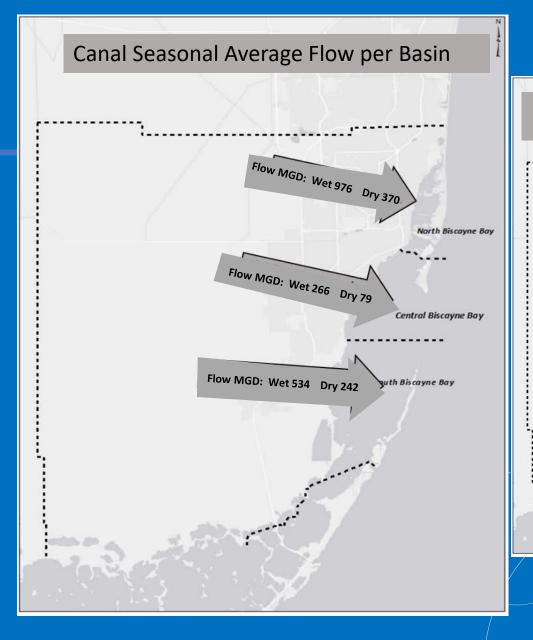


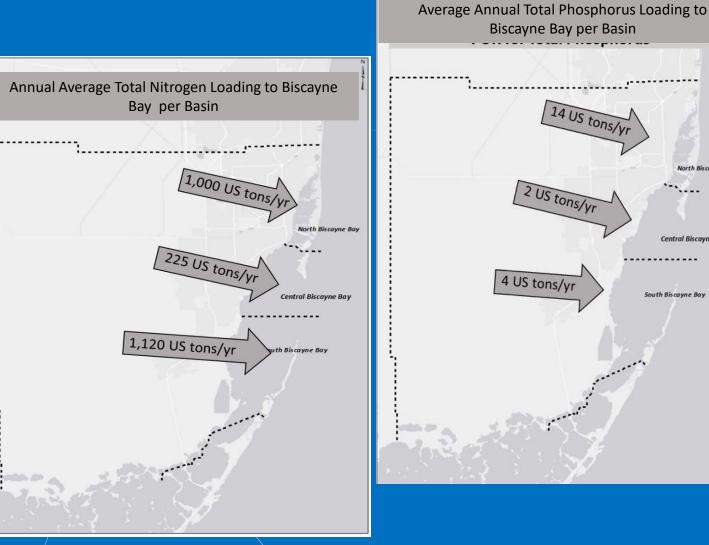


Septic tanks located adjacent to Biscayne Bay – Central Bay Basin



Septic tanks located adjacent to Biscayne Bay – North Bay Basin





North Biscovne

Central Biscayne Ba

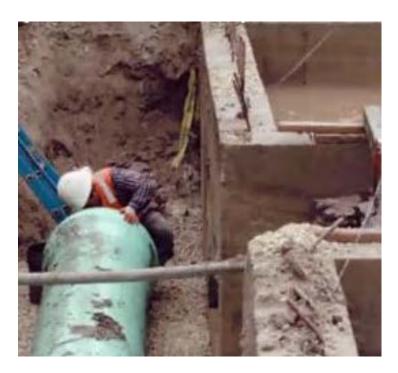
The Timing, Source and Quality of freshwater to the Bay has a profound impact on the health, diversity and distribution of flora and fauna that comprise the ecosystem.

TROUBLE IN PARADISE EVALUATING THE SITUATION

SEWAGE CONTAMINATION – Sanitary Sewers

EPA-FDEP vs MCCONSENT DECREE

- MDC Consent Decree June 2013 –
- Violations of the Clean Water Act and National Pollutant Discharge
 Elimination System ("NPDES") permit and the Florida Air and Water
 Pollution Control Act.
- Although the Consent Decree was not intended to address the health of Biscayne Bay under the Decree Miami-Dade County is required to implement several remedies that will minimize the potential nutrient and bacteriological impacts to Biscayne Bay.

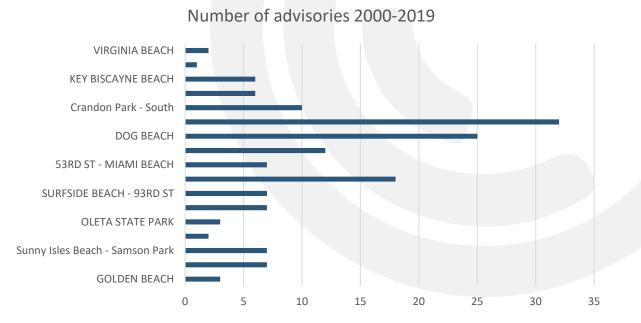


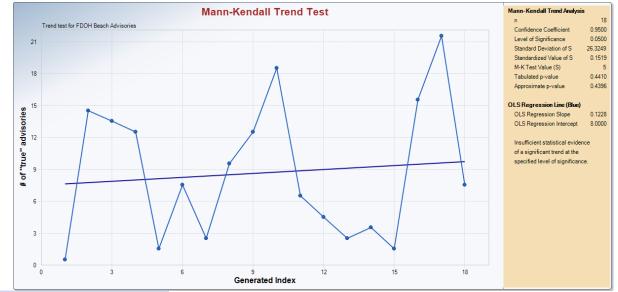
MDC CONSENT DECREE REQUIREMENTS WILL ULTIMATELY HELP TO REDUCE POTENTIAL IMPACTS TO THE BAY

- Sewer Overflow Response Plan (SORP). Pursuant to Paragraph 15 of the First Partial Consent Decree and Paragraph 24 of the Second and Final Consent Decree, Miami-Dade developed and implemented a program for identifying and reporting SSOs.
- Infiltration/Exfiltration/Inflow sewer assessments
- Gravity Sewer System Operations and Maintenance Program and Force Main Operations, Preventative Maintenance and Assessment/Rehabilitation Program
 - Criticality assessment of the structural integrity of force mains and the risk of force main critical failure as well as a Force Main Rehabilitation/Replacement Program

Evaluation of trends in beach closure advisories issued by FDOH







Florida Department of Healthy Beach Program Sampling Locations

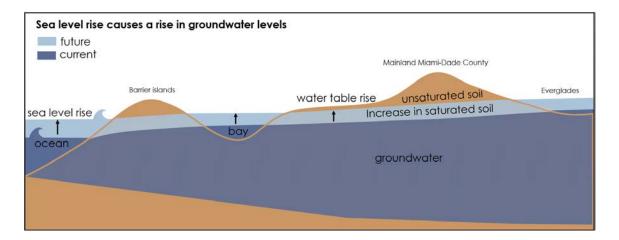
SEWAGE CONTAMINATION Septic Tanks



RESOLUTION NO. R-911-16

REQUIRES THE COUNTY TO STUDY AND ASSESS HOW SEA LEVEL RISE MAY AFFECT SEPTIC SYSTEMS IN MIAMI-DADE COUNTY:

- HOW SEPTIC SYSTEMS MAY BE AFFECTED BY SEA LEVEL RISE
- THE POTENTIAL RISKS INVOLVED
- AREAS OF THE COUNTY THAT COULD BE MOST IMPACTED
- MAKE RECOMMENDATIONS ON HOW BEST TO ELIMINATE THE VULNERABILITY OF SEPTIC SYSTEMS TO SEA LEVEL RISE
- MAKE RECOMMENDATIONS AS TO ANY FURTHER LEGISLATIVE OR ADMINISTRATIVE ACTION



Basic Premise

Sea level rise causes a rise in groundwater levels and a loss of unsaturated soils. This will create a problem for septic systems which rely upon the unsaturated soils underlying the drainfield to store and treat wastewater and reduce nutrients and pathogens emerging from properties

SEPTIC TANK STUDY

METHODOLOGY USED TO IDENTIFY VULNERABLE AREAS

MDWASD used groundwater modeling to evaluate areas where septic tanks are currently at the highest risk due to historic water levels and areas that are expected to be impacted by 2030 and 2040 with higher sea levels and groundwater levels. The data provided by the study will be used to

- 1. assess the potential risk,
- 2. identifying potential solutions, and
- 3. establishing priorities for mitigating impacts

Model Inputs	Data Source/Description
Land Surface Elevation	Digital Elevation Model derived from 2015 LiDAR
Groundwater levels Precipitation Pumpage Canal Flow	USGS Surface Water Groundwater Model - Increased Sea Level Rise Scenario. 30-year simulation period. Groundwater levels were determined for each model cell during the time period simulated (2011-2040). 1996-2010 climate data 2033 projected allocation Canal system operation: Min and Max flows as designated
Sea Level Rise	Unified Sea Level Rise Projection for FL 15.26 inches increase from 2011 average stage at end of 30-year simulation Average daily tide predictions based on 15 years 2011-2016
Locations of septic tanks	Properties without sewer service (vacant land excluded)

Septic Tank Vulnerability Matrix

Vulnerable to Failure

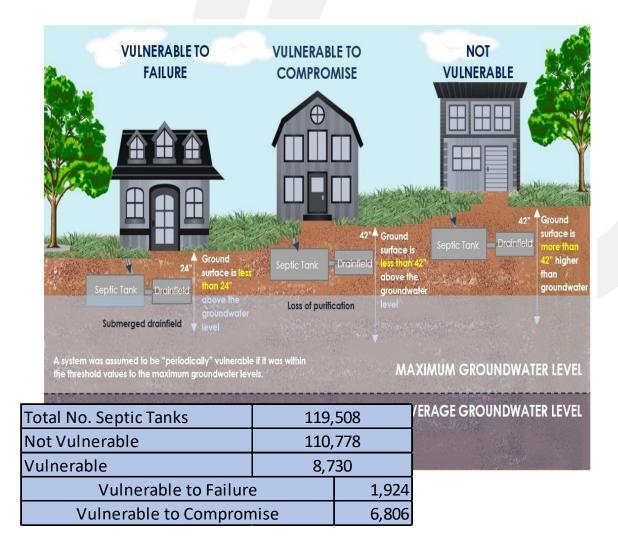
- Average wet season groundwater elevations were within 24 inches of the ground surface elevation (Figure 9) assuming that the average bottom of the drainfield is at 18 to 24 inches below grade.
- 2. Parcel is affected by high groundwater levels

Vulnerable to Compromise

Average wet season groundwater elevations were within 42 inches of the ground surface elevation (Figure 9). This assumes that the average bottom of drainfield is 18 to 24 inches below ground surface and the required minimum distance between the bottom of the drainfield and the water table elevation is 24 inches.

Not Vulnerable

Average wet season elevation greater than 42 inches of ground surface elevation



As sea level rises many areas will experience groundwater levels within half a foot of the surface more than 25% of the year by 2040. For other areas, groundwater levels are expected to be within half a foot of the surface more than 75% of the year. In these places, it will be very difficult for septic systems to function properly unless they are elevated.

Based on the Miami-Dade County Septic Tank Study more than 92% of vulnerable properties are within the Urban Development Boundary. While most properties are in the unincorporated areas of the County for coastal municipalities all septic tank systems are projected to be subject to periodic compromise by 2030 under the sea level rise scenario.

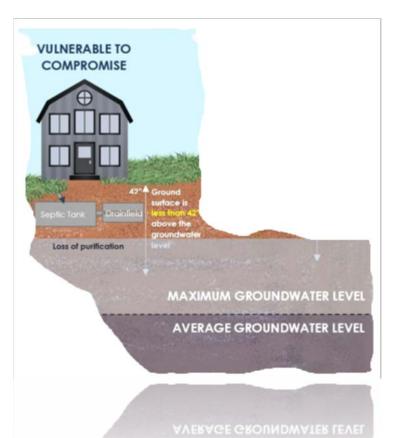


Table 7. Rumber of rest		Base-Case Scenario					Sea-Level Scenario	
	Parcels	Vulnerable	Vulnerable	Vulnerable	Vulnerable to	Vulnerable to	Vulnerable to	
MUNICIPALITY	with	to persistent	to persistent	to periodic	periodic	periodic	periodic	
	septic	failure2	compromise	failure₄	compromise	compromise	compromise	
	systems ¹		з		5	by 2030¢	by 20407	
AVENTURA	54	1	5	54	54	54	54	
BISCAYNE PARK	854	0	21	357	607	672	708	
CORAL GABLES	2930	4	22	75	195	256	260	
CUTLER BAY	228	1	1	1	18	31	31	
DORAL	329	9	93	166	303	321	321	
EL PORTAL	754	9	94	164	365	462	462	
FLORIDA CITY	0	0	0	0	0	0	0	
GOLDEN BEACH	65	3	9	65	65	65	65	
HIALEAH	689	18	71	287	611	649	649	
HIALEAH GARDENS	124	5	22	53	119	121	121	
HOMESTEAD	2305	4	163	1528	2275	2301	2302	
INDIAN CREEK	30	0	1	22	26	30	30	
VILLAGE								
KEY BISCAYNE	14	0	4	13	14	14	14	
MIAMI	1603	5	23	75	156	177	177	
MIAMI GARDENS	6708	0	125	1328	3761	4515	4515	
MIAMI LAKES	10	0	1	5	7	8	8	
MIAMI SHORES	3123	10	64	211	578	864	888	
NORTH MIAMI	199	5	78	146	176	184	188	
NORTH MIAMI BEACH	5265	0	4	665	2780	3751	3751	
OPA-LOCKA	0	0	0	0	0	0	0	
PALMETTO BAY	5757	2	18	52	893	1753	1753	
PINECREST	5088	5	23	175	926	1797	1808	
SOUTH MIAMI	2101	0	27	694	1203	1324	1324	
SWEETWATER	672	0	244	669	672	672	672	
VIRGINIA GARDENS	477	0	62	370	475	477	477	
MIAMI SPRINGS	1	0	0	1	1	1	1	
SUNNY ISLES BEACH	5	2	3	5	5	5	5	
UNINCORPORATED	65386	748	4687	23575	42064	46573	46650	
TOTAL	104771	831	5865	30756	58349	67077	67234	

260 Municipalities with eastern boundary abutting Biscayne Bay

65 Barrier Island Municipalities – Biscayne Bay Coastal Communities





Sampling Program

STORMWATER DISCHARGES

Targeted Miami Beach Pump Station Sampling Program

Goal:

MB Pump Stations DW MBPS Outfalls

- Assess how Miami Beach stormwater pumps perform
 - During rain events
 - During non-rain events (i.e., king tides)
- Identify issues with the stormwater system and potential causes of exceedances of bacteriological and nutrient standards
 - Sampling all 48 existing and operating stormwater pumps on Miami Beach
 - 10th Street Basin Study

Revaluation of Monitoring Program

DERM's Biscayne Bay monitoring program implemented pursuant to the county's NPDES permit consist of over 100 surface water monitoring stations (canals and Biscayne Bay) The data has been instrumental in providing information on the overall health of the Bay; however, the program was not designed to evaluate point sources and cannot fingerprint the specific point source(s) contributions.

Additionally, DERM maintains a network of approximately 185 groundwater monitoring wells to evaluate ambient water quality and water quality within wellfield protection areas.

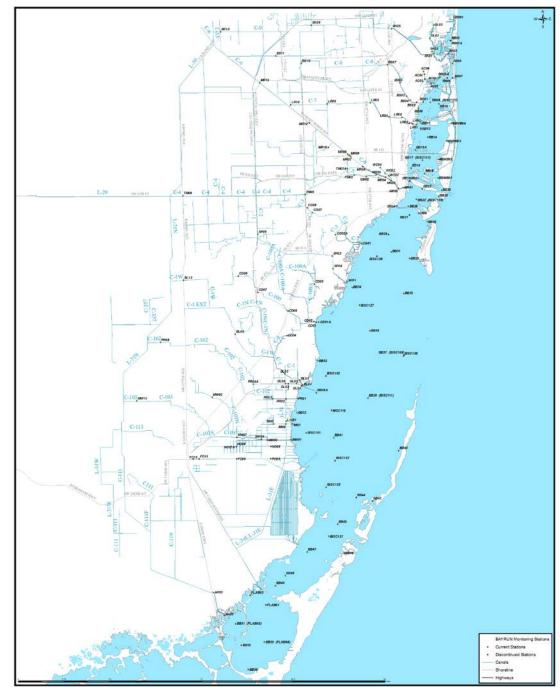
Other agencies e.g. the USGS and SFWMD also conduct sampling.

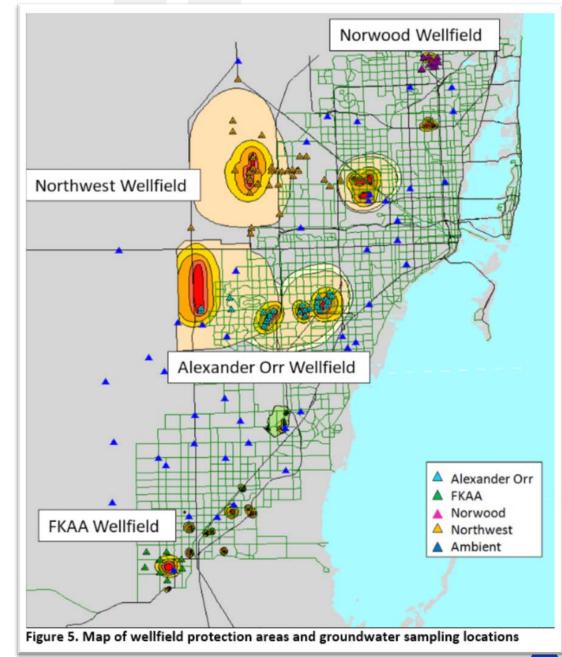
Sampling efforts are fragmented and not coordinated between programs and agencies and there is not centralized data repository.

Revised and revamped monitoring program(s) needed

- 1. More targeted monitoring to:
 - plug data gaps
 - evaluate for source specific pollutants (e.g. Sucralose, Acetaminophen, Ibuprofen, caffeine as indicator of domestic wastewater inputs), microbial source tracking –
 - human vs. dog markers
- 2. Evaluate groundwater/surface water interactions
- 3. Countywide sampling of stormwater outfalls during peak and non-peak flows
- 4. Integrated groundwater/surface water GIS data interface

Biscayne Bay Water Quality Monitoring Stations





AGRICHEMICAL

Excessive nutrient loading to Florida's surface and ground waters is one of the biggest water quality issues facing our state. A major source of nutrient loading is from fertilizers applied to urban landscaping. To minimize the impacts of such fertilizers, the State of Florida has undertaken several initiatives to promote Florida-Friendly Landscaping and fertilizers.

Florida-Friendly Landscape Guidance Models for Ordinances, Covenants, and Restrictions. Florida Department of Environmental Protection and the University of Florida. January, 2009

FL STAT § 373.185 (2016) :LOCAL FLORIDA-FRIENDLY LANDSCAPING ORDINANCES.

Requires water management districts to:

- 1. Design and implement an incentive program to encourage all local governments within its district to adopt new ordinances or amend existing ordinances to require Florida-friendly landscaping for development permitted after the effective date of the new ordinance or amendment.
- 2. Work with the regulatory, industry groups and other interested stakeholders to promote, through educational programs, publications, and other district activities authorized under this chapter, the use of Florida-friendly landscaping practices,

In addition to statutory requirements of § 373.185 and as a proactive measure to minimize the impacts from fertilizers 85 municipalities and 32 counties have enacted ordinances specific to fertilizer use. Most fertilizer ordinances include a ban on the use of fertilizers during the rainy season and a "summer blackout".

Example:

City of North Bay Village Chapter 102 - FLORIDA-FRIENDLY USE OF FERTILIZER ON URBAN LANDSCAPES

No applicator shall apply fertilizers containing nitrogen and/or phosphorous ... to turf or landscape plants during the Restricted Application Period, which is defined as June 1 to September 30.

Fertilizer shall not be applied within 15 feet of any pond, stream, watercourse, lake, canal, or wetland or from the top of a seawall.

Limitation on annual application of Nitrogen, with no more than one-pound total nitrogen per 1,000 square feet applied at any one time, and not to exceed 0.50 pounds phosphorous per 1,000 square feet per year.

Requirement that the nitrogen content of fertilizer applied to turf or landscape plans contain at least 50 percent slow release, controlled release, timed release, slowly available, or water insoluble nitrogen per guaranteed analysis label.

THE WAY FORWARD

RESTORING BISCAYNE BAY WILL REQUIRE A COLLABORATIVE EFFORT BETWEEN ALL STAKEHOLDERS: GOVERNMENT AGENCIES, ACADEMIA, BUSINESSES, ENVIRONMENTAL GROUPS AND AVERAGE CITIZENS. THERE ARE NO MAGIC BULLETS, NO QUICK FIXES, NO SINGLE SOLUTION. EFFORTS WILL NEED TO INCLUDE:

- LEVERAGING TECHNOLOGY
- IDENTIFYING AND EXPEDITIOUSLY IMPLEMENTING "LOW HANGING FRUIT' WITH RESPECT TO EASY TO IMPLEMENT AND OBVIOUS SOLUTIONS
- PUBLIC EDUCATION; EVERY CITIZEN OF MIAMI-DADE COUNTY HAS A STAKE AND EVERY CITIZEN IS A PART OF THE SOLUTION

RECOMMENDATIONS

- 1. Additional efforts and resources are required to bolster existing monitoring programs to further identify, quantify, and locate the sources and transmission pathways of pollutants into the Biscayne Aquifer, Biscayne Bay, and other coastal and surface waters.
 - i. Synoptic countywide groundwater sampling utilizing existing monitoring wells at permitted facilities to evaluate groundwater as a potential contributor to nutrient loading to the canals and Biscayne Bay. Correlations: distance to septic tanks-vulnerability index, surface water quality in canals immediately adjacent to septic tanks vs surface water quality in the canals upstream and downstream from the septic tanks.
 - ii. Surface water transects with distance from areas with high density of septic tanks
 - ii. Surface water sampling associated with storm water outfalls, pretreatment structures and drainage collectors.

RECOMMENDATIONS

2. Enhanced coordination between governing and regulatory entities with roles in water management and services to achieve the greatest environmental, social, and economic outcomes in addressing water quality issues with the public resources available.

Prioritize sewer extensions to address areas vulnerable to sea level and groundwater rise especially those areas adjacent to the coast and canals. In areas where providing sanitary sewer extension is not feasible, utilize other technical interventions such as replacing existing systems with mounded systems, etc.

Additional analysis of regional water management practices and local drainage practices to determine how these practices could be modified to reduce the impact of rising groundwater on vulnerable septic tank infrastructure, to inform decisions on improvements for the secondary and tertiary systems especially those under County ownership/maintenance/operations

3. Amendments to county and municipal ordinances to address new challenges and the new realities.

e.g. countywide fertilizer ordinance.

- 4. Practical modifications to current stormwater infrastructure e.g., baffle boxes, redesigned storm water pollution prevention grates.
- 5. Storm system maintenance



QUESTIONS?



THANKYOU!



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