

Water Quality Monitoring Near Key West

The following list is a rough summary of the long- and short-term water quality monitoring projects happening around the greater Key West area. The table includes who is responsible for the monitoring (Agency), what water quality data are being collected (Data Collected), frequency and, if short-term, duration of study (Frequency) as well as Purpose, which gives basic details on the study. Following the table is a map that includes data points for all currently known long-term and short-term data collection sites. At the end of the document is a glossary of terms.

Long Term Water Quality Research near Key West

Agency	Data Collected	Frequency	Purpose
Florida International University	Alkaline Phosphates Ammonium Carbon, Total Organic Chlorophyll-a Dissolved Oxygen Nitrate Nitrite Nitrogen, Total Organic Phosphorus, Total Phosphate, Soluble Reactive Salinity Silicate Temperature Turbidity Vertical Attenuation	Quarterly, since 1995	Ongoing, long-term trends. “Halo Zone” (500-meter boundary) 1 North (1N – purple): Man of War Harbor, Garrison Bight, Channel Key, Calda Channel, East Harbor Key Channel, Lower Harbor Keys. 1 South (1S - red): Key West Cut A, Boca Chica Channel, Boca Chica Mid, Boca Chica Offshore, Western Head, Eastern Dry Rocks, Main Ship Channel, Western Sambo. - Marquesas (orange): KY Northwest Channel, Middle Ground Data through 2003 is available on the Southeast Environmental Research Center website: http://serc.fiu.edu/wqmnetwork/FKNMS-CD/index.htm
FL Dept of Health	Enterococcus, General	Bi-Monthly, since 2000	Time specific swimming advisories. Ongoing, long-term trends. Sampling began in 2000. Sampling had been weekly from 2002 until state funding was cut in 2011. Also cut was monitoring for fecal coliform (redundant) and # of locations. FDOH samples over 50 beaches in the Florida Keys, 3 of which are in Key West: Fort Zachary Taylor State Park, Higgs Beach and Smathers. Simonton Beach and Rest Beach are not sampled. The City recently installed signage with QR codes at all sampled beaches which take viewers to the most recent results: https://www.floridahealth.gov/environmental-health/beach-water-quality/county-detail.html?County=Monroe&Zip=33040

	Copper Lead Zinc		
City of Key West	Hydrogen Sulfide Nitrogen, Total Nitrogen, Total Kjeldahl Nitrate-Nitrite Phosphorus, Total	Bi-Annually 30+ years	Mt Trashmore: Long-term. Groundwater Wells in and around the landfill. FDEP used to require monitoring for compliance, but over time reduced the number of parameters sampled and in 2016 released the City from mandatory sampling. The monitoring has continued on a voluntary basis since then.

Short Term Water Quality Research near Key West

College of the Florida Keys	Dissolved Inorganic Nutrients Total Phosphorus Total Nitrogen Total Organic Carbon Dissolved Organic Carbon Chlorophyll a	2024-2025, frequencies vary: Continuous	Short Term: EPA Grant Partnership #1: Key West Harbor To create a measurement field that captures any disturbances to the baseline water quality conditions between the Key West Harbor and ship channel and Eastern Dry Rocks to determine connectivity of the waters between them. 10 existing FIU data collection sites, from Key West Harbor to Eastern Dry Rocks.
	DO Turbidity Temperature Salinity Phytoplankton	Continuous	“Yellow Man” in water ship cleat, off of Key West Aquarium
	Algae, Total Conductivity Depth Dissolved Oxygen Temperature Turbidity	Pre and Post Cruise Ship	Autonomous Vessel: Follows a set course just off Mole Pier

College of the Florida Keys	Oxybenzone Sucralose Ammonia Nitrite-nitrite Phosphorus	2025-2026 Monthly	Short-Term: EPA Grant Partnership #2: Contaminants of Emerging Concern Ft Zach Southernmost Point, Smathers & Higgs Beach
	Sucralose Ammonia	Monthly.	Garrison, Fleming, Wisteria & Stock Island Mooring Fields:
	H2S	Continuous	Stock Island Landfill & CFK Lagoon
Monroe County / UM Coastal Ecology Laboratory	Temperature Depth Salinity Dissolved oxygen pH Nitrogen Phosphorus Chlorophyll-a	Quarterly 2019-2021	Short term. Two-year study to document water quality after recent successes with countywide residential septic to central wastewater conversions and 13 improved canals. Used all 65 FIU water quality stations in the Halo Zone (500 meters) Canal sampling included 16 sites between the mouth of a canal to 500 yards into the open water. One site was just off of Key West had no canal restorations as there were no impaired canals at the initial sampling. Info on canal study is here: https://www.monroecounty-fl.gov/598/Canal-Restoration Key West Ocean Side (2), Key West Bay Side (2), Stock Island Ocean Side, Stock Island Bay Side.
Monroe County / UF Extension Service		FY21	Short Term: EPA Grant: Florida Keys Aquaculture Sponge Restoration Determine seasonality of sponge reproduction for loggerhead & sheepswool; Establish timelines for reproductive function; Create a sponge identification field guide; Develop a community outreach campaign.
Mote	Nitrate Nitrite Ammonia Phosphate Silica Total nitrogen	Monthly, 2025-2026 At least one post storm annually.	Short Term: EPA grant: Florida Keys Water Quality and Climate Monitoring to inform Lower Keys Reef Restoration Assess effectiveness of coral restoration sites. Eleven coral restoration sites in total, two near Key West: Eastern Dry Rocks, Marker 32 Reef

	Dissolved inorganic nitrogen Total organic carbon Dissolved organic carbon Total organic nitrogen Total phosphorus Chlorophyll <i>a</i> Turbidity Dissolved inorganic carbon Total seawater alkalinity with the rest of the carbonate parameters calculated [$p\text{CO}_2$, pH_T , Ω_{arag}]) light current direction speed At surface and bottom		
NOAA	Alkalinity, Total Chlorophyll <i>a</i> Carbon, Dissolved Inorganic Depth Dissolved Oxygen Eukarotics Harmful Algal Blooms Inorganic nutrients Nitrogen Phosphorus Phytoplankton Prokaryotics Salinity Temperature Turbidity Zooplankton, Micro/Meso <u>Microbial Sources:</u> • Bacteroides (human) • Bacteroides (dog)	Every 6 weeks (2025-2027)	South Florida Ecosystem Restoration & Marina Biodiversity Observation Network Short Term: EPA South Florida Grant. • Resolve linkages between water quality and the microbiome, from the open ocean to nearshore areas (within 25 m from the coast). • Characterize spatial and temporal patterns in water quality, microbial assemblages, and lower trophic level biodiversity in the region. • Identify hotspots of poor water quality conditions suitable for exposure to pathogenic bacteria. • Examine relationships between water quality, microbiome, plankton diversity, and benthic habitat health indicators within the study domain. Research is Keyswide, but the Eastern Dry Rocks section is closest to Key West: 7 Sites nearby. Each site may measure different things. EPA Funding: (25m, 50m, 100m, 250m, 500m)

	• Enterococci General • Helicobacter (bird) • Vibrio parahaemolyticus • Vibrio vulnificus <u>Satellites</u> • Chlorophyll-a • Organics, Dissolved • Salinity • Sea Surface Temperature • Topography		
FL Lakewatch	Chlorophyll a Dissolved oxygen Nitrogen, Total Phosphorus, Total Salinity Secchi disk Temperature	Not since 2021	Short Term. Volunteer led. 2 spots canalside to FKAA property, named Monroe, Stock Island 3 & 4, Aug 2019 3 spots in botanical garden, 2 in lake, one behind FKAA cisterns. Monroe Northside 1&2 and Desbiens1
Monroe County	Dissolved Oxygen Sediment thickness Turbidity	2013	Short Term. Canal Management Master Plan 2 canals in Key West (Sigsbee area, Riviera canal through Home Depot) 2 canals in south Stock Island (Sunset Harbor canal off Cow Key Marina and borrow pit south of 12th St). Parameters considered that are not “water quality parameters include nearshore condition, number of parcels, percent developed, Stagnation, Tide range, and Length / area of the canal, # of outlets and 90 degree turns. All canals were ranked “Good” and therefore weren’t ranked in the County’s final canal restoration plan

Map of Known Data Collection Sites

Yellow dots are temporary sites. Orange dots are long term monitoring sites.



Glossary

1. **Algae, Total:** Algae, total refers to the overall amount of algae present in a water sample. It is important because excessive algae growth can lead to eutrophication, depleting oxygen and harming aquatic life.
2. **Alkalinity, Total:** Total alkalinity is a measure of the water's ability to neutralize acids, primarily from substances like carbonates and bicarbonates. Monitoring it is crucial because it helps buffer water against pH changes, which can stress aquatic organisms.
3. **Ammonia:** Ammonia is a nitrogen compound often found in water, usually from wastewater, fertilizers, or organic decay. It is harmful to aquatic life, particularly fish, as high levels can interfere with respiration and reproduction.
4. **Bacteroides (human):** Bacteroides are a group of bacteria commonly found in the human digestive system, and their presence in water indicates possible contamination from human waste. Detecting them helps assess the potential risks of waterborne diseases to human health.
5. **Bacteroides (dog):** Bacteroides from dogs are bacteria present in canine waste, which can contaminate water sources if pet waste is improperly managed. Monitoring these bacteria is important to identify sources of pollution and prevent zoonotic diseases.
6. **BOD5:** Biochemical Oxygen Demand over 5 days, measures the amount of oxygen consumed by microorganisms as they decompose organic matter in water. It is critical for understanding the organic pollution levels and the potential impact on dissolved oxygen and aquatic life.
7. **Depth:** Depth refers to how deep the water is at a specific location. It is essential for determining water volume, habitat availability, and the mixing of water layers, which can affect temperature, oxygen levels, and nutrient distribution.
8. **Dissolved Oxygen:** Dissolved oxygen is the amount of oxygen dissolved in water, essential for the survival of aquatic organisms like fish and invertebrates. It is a key indicator of water quality and the health of the ecosystem, with low levels often indicating pollution or eutrophication.
9. **Carbon, Dissolved Inorganic:** Dissolved inorganic carbon includes compounds like carbon dioxide and bicarbonates found in water. It plays a role in the carbon cycle, influencing the pH of water and the overall health of aquatic ecosystems.
10. **Carbon, Dissolved Organic:** Dissolved organic carbon consists of organic compounds dissolved in water, originating from decaying plants and animals. It is significant because it serves as a food source for microorganisms and can influence oxygen levels in aquatic environments.
11. **Carbon, Total Organic:** Total organic carbon is the sum of all organic carbon present in water, both dissolved and particulate. It is used to assess the level of organic pollution in the water, which can affect oxygen availability and the overall water quality.
12. **Chlorophyll-a:** Chlorophyll a is a pigment found in algae and plants that allows them to perform photosynthesis. Monitoring chlorophyll a levels helps assess the abundance of algae, which can impact nutrient levels and water clarity.
13. **Coliform, Fecal:** Fecal coliforms are a group of bacteria that indicate the presence of fecal contamination from warm-blooded animals. Their presence in water is a key indicator of potential human health risks due to waterborne pathogens.
14. **Coliform, Total:** Total coliforms are a group of bacteria that are commonly found in the environment but also present in human and animal waste. They are used as an indicator of possible contamination in water, as their presence suggests a higher likelihood of harmful pathogens.
15. **Conductivity:** Conductivity measures the ability of water to conduct electricity, which increases with the presence of dissolved ions. It is important for understanding the ion concentration in water, which can influence water quality, aquatic life, and the suitability for various uses.
16. **Enterococci, General:** Enterococci are bacteria found in the intestines of warm-blooded animals and are used to indicate fecal contamination in water. Monitoring their levels helps assess the potential risk for waterborne diseases, particularly gastrointestinal illnesses.
17. **Eukaryotics:** Eukaryotic organisms are those whose cells contain a nucleus, including algae, plants, and animals. Their presence in water is important as they form the basis of aquatic food webs and influence nutrient cycles and ecosystem dynamics.

18. **Harmful Algal Blooms (HAB):** Harmful algal blooms occur when certain algae species rapidly multiply and release toxins. These blooms can harm aquatic life, pose health risks to humans, and disrupt local economies reliant on water resources.
19. **Helicobacter (bird):** Helicobacter is a genus of bacteria found in the digestive tract of birds and can be present in their waste. Monitoring their presence in water helps assess contamination from bird feces and potential public health risks.
20. **Hydrogen Sulfide:** Hydrogen sulfide is a gas produced by the breakdown of organic matter under low oxygen conditions, often associated with sewage or decaying organic material. It is important because it can be toxic to aquatic life and contributes to foul odors in water.
21. **Inorganic Nutrients:** Inorganic nutrients include substances like nitrates, phosphates, and silicates, which are essential for plant growth in aquatic systems. Monitoring these nutrients is crucial as excess amounts can lead to eutrophication, harming water quality and aquatic ecosystems.
22. **Nitrate – Nitrite:** Nitrates and nitrites are forms of nitrogen commonly found in fertilizers and sewage. High concentrations can cause oxygen depletion in water and harm aquatic life, particularly by causing "dead zones" where few organisms can survive.
23. **Nitrogen:** Nitrogen is a key nutrient in the environment, often present in the forms of ammonia, nitrates, and nitrites in water. Its monitoring is vital to assess nutrient pollution, which can lead to harmful algal blooms and oxygen depletion in aquatic ecosystems.
24. **Nitrogen, Total Kjeldahl:** Total Kjeldahl Nitrogen (TKN) represents the sum of organic nitrogen and ammonia in water. It helps evaluate the total nitrogen load in water, which can affect water quality and contribute to eutrophication if elevated.
25. **Nitrogen, Total Dissolved Inorganic:** Total dissolved inorganic nitrogen includes ammonia, nitrite, and nitrate found in water in dissolved form. It is critical to measure as it contributes to nutrient pollution and can lead to water quality issues such as eutrophication.
26. **Nitrogen, Total Organic**
Total organic nitrogen refers to nitrogen compounds found in water that are part of organic matter, such as proteins and amino acids. It is important for assessing the contribution of organic materials to the nitrogen cycle and potential water quality concerns.
27. **Oil & Grease:** Oil and grease refer to oily substances in water, typically from industrial discharges, runoff, or sewage. These substances can harm aquatic life, reduce oxygen levels, and affect water clarity, making monitoring essential for water quality.
28. **Organics, Dissolved:** Dissolved organic substances in water include organic compounds from plant and animal material, typically measured as dissolved organic carbon (DOC). They are important for understanding nutrient cycling and can influence the oxygen demand and health of aquatic ecosystems.
29. **Oxybenzone:** Oxybenzone is a chemical commonly found in sunscreens that can enter water systems through runoff. Its presence in water is concerning due to its potential toxicity to aquatic organisms, particularly coral reefs.
30. **pH:** pH measures the acidity or alkalinity of water, ranging from 0 (acidic) to 14 (alkaline). It is a crucial indicator of water quality, as extreme pH values can harm aquatic life and disrupt the chemical balance of water.
31. **Phosphorus:** Phosphorus is an essential nutrient for plants and animals, often found in water as phosphates. It is important to monitor because excess phosphorus from runoff or wastewater can lead to eutrophication and harmful algal blooms.
32. **Phosphorus, Total:** Total phosphorus includes all forms of phosphorus found in water, both organic and inorganic. It is important for identifying nutrient pollution, as high phosphorus levels can cause water quality issues like algal blooms and oxygen depletion.
33. **Phosphate, Soluble Reactive:** Soluble reactive phosphate is a form of phosphorus that is readily available for uptake by plants and algae. Monitoring it is important to assess nutrient loading in water, which can contribute to eutrophication and degrade water quality.
34. **Phosphates, Alkaline:** Alkaline phosphates are forms of phosphorus that are associated with alkaline conditions in water. They are important to track because they can influence the growth of aquatic plants and algae, potentially leading to water quality degradation.
35. **Phytoplankton:** Phytoplankton are microscopic plants that form the base of aquatic food webs, using sunlight to produce energy through photosynthesis. Their abundance is important for assessing the overall health of aquatic ecosystems and potential risks of algal blooms.

36. **Polycyclic Aromatic Hydrocarbons:** Polycyclic aromatic hydrocarbons (PAHs) are toxic chemicals found in petroleum products and produced by combustion. Monitoring PAHs is crucial because they can be harmful to aquatic life and pose long-term environmental health risks.
37. **Prokaryotics:** Prokaryotic organisms are simple cells that lack a nucleus, including bacteria and archaea. Their presence in water is important for understanding microbial communities, nutrient cycling, and potential contamination sources.
38. **Salinity/Conductivity:** Salinity is the concentration of dissolved salts in water, and conductivity measures its ability to conduct electricity, influenced by ion concentration. Both are important for assessing water chemistry, particularly in coastal and estuarine environments, and understanding the suitability of water for different species.
39. **Sediments:** Sediment testing includes analyzing various contaminants in water sediment, such as heavy metals and toxic substances like arsenic, cadmium, and lead. It is vital for assessing long-term pollution in aquatic ecosystems, as sediments can act as reservoirs for harmful substances.
40. **Sea Surface Temperature:** Sea surface temperature refers to the temperature of the top layer of ocean water. Monitoring it is critical for understanding climate change impacts, marine ecosystem health, and fish migration patterns.
41. **Silicate:** Silicate is a compound containing silicon and oxygen, commonly found in water, and is an essential nutrient for certain aquatic organisms, like diatoms. It is important to monitor because changes in silicate levels can affect aquatic food webs and ecosystem health.
42. **Salinity:** Salinity refers to the concentration of dissolved salts in water, typically expressed in parts per thousand. It is an essential parameter for assessing the water's suitability for marine and freshwater species and its role in regulating ecosystem processes.
43. **Sucralose:** Sucralose is a synthetic sweetener commonly found in water due to industrial runoff or wastewater discharge. Monitoring its presence helps detect contaminants that are not typically removed by wastewater treatment and assess water quality.
44. **Temperature:** Water temperature is a measure of the heat energy in water, influencing the rate of biological processes and the solubility of oxygen. It is crucial for assessing the suitability of water for aquatic life and understanding environmental changes.
45. **Topography:** Topography refers to the physical features of the land and sea floor, including slopes, depths, and contours. It affects water movement, sediment transport, and nutrient distribution, making it important for understanding water flow and habitat formation.
46. **Turbidity:** Turbidity measures the cloudiness or haziness of water caused by suspended particles like dirt, algae, or pollutants. It is important because high turbidity can block sunlight, harm aquatic plants, and indicate the presence of contaminants.
47. **Vibrio parahaemolyticus:** *Vibrio parahaemolyticus* is a bacterium found in coastal waters that can cause foodborne illness, particularly from consuming contaminated seafood. Monitoring its presence helps prevent public health risks associated with seafood consumption.
48. **Vibrio vulnificus:** *Vibrio vulnificus* is a pathogenic bacterium commonly found in marine environments and can cause serious infections in humans, particularly through wound exposure or consumption of raw seafood. Its monitoring is essential to protect human health, especially in coastal areas.
49. **Vertical Attenuation:** Vertical attenuation refers to the decrease in light intensity as it passes through water, often due to particles or dissolved substances. It is important for understanding photosynthetic processes in aquatic ecosystems and the overall health of marine environments.
50. **Zooplankton, Micro/Meso:** Micro and meso zooplankton are small aquatic organisms that form an essential part of the food chain in water bodies. Monitoring their populations is crucial for assessing the health of aquatic ecosystems, as they are a food source for many larger aquatic species.